

DOT 997

REPORT NO. CAL-87-N01

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

FORD MOTOR COMPANY
1987 FORD ESCORT
2-DOOR HATCHBACK

NHTSA NO. MH0200
CALSPAN TEST NO. 7556-1

CALSPAN CORPORATION
ADVANCED TECHNOLOGY CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225
MARCH 4, 1987



FINAL REPORT

Prepared for:

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

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

Prepared: Walter E. Levan
Walter E. Levan, Project Engineer

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

FINAL REPORT ACCEPTED BY:

C. R. Juarles

Manager, New Car Assessment Program (NCAP)

JUL 17 1987

Date of Report Acceptance

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. CAL-87-N01		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle NHTSA New Car Assessment Program (NCAP) Frontal Barrier Impact on 1987 Ford Escort 2-Door Hatchback				5. Report Date March 4, 1987	
				6. Performing Organization Code CAL	
7. Author(s) Walter E. Levan, Project Engineer Donald A. Alianello, Program Manager				8. Performing Organization Report No. 7556-1	
9. Performing Organization Name and Address Calspan Advanced Technology Center P.O. Box 400 Buffalo, NY 14225				10. Work Unit No. 229-01-763	
				11. Contract or Grant No. DTNH22-87-D-02012	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Market Incentives (NRM-20) 400 Seventh Street, S.W., Washington, DC 20590				13. Type of Report and Period Covered Final Report March - April	
				14. Sponsoring Agency Code DOT/NHTSA/RM/OMI	
15. Supplementary Notes					
16. Abstract <p>A frontal load cell barrier test of a 1987 Ford Escort 2-Door Hatchback was performed at the Calspan Corporation, Advanced Technology Center crash test facility in Buffalo, New York on March 4, 1987</p> <p>Impact speed was 34.7 mph, and the ambient temperature at the barrier face at the time of impact was 35°F. The maximum post-test vehicle crush was 21.8 inches.</p> <p>The 1987 Ford Escort 2-door hatchback was equipped with a passive shoulder belt and manual lap belt. The shoulder belt and lap belt were both used on each occupant in the test.</p> <p>With regard to FMVSS No. 208 "Occupant Crash Protection," injury criteria, the driver and passenger dummies appeared to satisfy the head, chest and femur requirements.</p>					
17. Key Words 35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP)				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

TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	PURPOSE AND TEST PROCEDURE	1-1
2	SUMMARY OF FRONTAL BARRIER IMPACT TEST	2-1
3	OCCUPANT AND VEHICLE INFORMATION	3-1
APPENDIX A	PHOTOGRAPHS	A-1
APPENDIX B	VEHICLE, LOAD CELL BARRIER DATA AND DUMMY RESPONSE DATA	B-1
APPENDIX C	DUMMY CONFIGURATION TESTS	C-1
APPENDIX D	VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS	D-1

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1	Part 572 Dummy In-Vehicle Position	3-3
2	Occupant Clearance Dimensions	3-4
3	Seat Belt Positioning Data	3-5
4	Driver Dummy to Steering Column/Wheel Dimensions	3-7
5	Camera Positions for Frontal Impacts	3-8
6	Vehicle Target Locations	3-10
7	Load Cell Locations on Fixed Barrier	3-11
8	Vehicle Accelerometer Locations	3-12
9	Test Vehicle Measurements	3-13

Section 1
PURPOSE AND TEST PROCEDURE

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

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

Section 2
SUMMARY OF TEST NUMBER MH0200

A load cell barrier consisting of 36 load cells was impacted by a 1987 Ford Escort 2-Door Hatchback at a velocity of 34.7 mph. The test was performed at the Calspan Corporation Advanced Technology Center on March 4, 1987. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 15 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

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

Both ATDs were fully instrumented with head and chest triaxial accelerometers and right/left femur load cells. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. These ATDs had been certified prior to the test, and certification details along with instrumentation calibration data, are found in Appendix C.

The 67 channels of data were recorded on six 14-channel FM tape recorders. Appendix B contains the vehicle, load cell barrier and dummy response data traces.

The driver's head struck the steering wheel hub and his HIC was 551. The maximum chest deceleration over 3 milliseconds was 42g's and femur loads were 1053 and 1146 pounds.

The right front passengers HIC was 418. The maximum chest deceleration over 3 milliseconds was 40g's and femur loads were 619 and 465 pounds.

Table 1

GENERAL TEST AND VEHICLE DATA

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1987 Ford Escort 2 Dr. Hatchback

NHTSA NO.: MH0200 VIN.: IFAPP2095HT140209

BODY COLOR: Beige DATE OF MANUFACTURE: 2/87

Engine: 4 cylinders; - C.I.D.; 1.9 Liters; - CC
X Gas; - Diesel; - Turbocharged
- Longitudinal; X Transverse

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

Date Received: 2/18/87 Odometer Reading: 43.7
- A/C; - P/S; X P/B; - P/wdo.; - Tilt Wheel
- P/seats; - Cruise Control

Type of Occupant Restraint: Passive Restraint

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

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

Recommended Tire Size: P175/80R13-P165/80R13

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

Tires on Vehicle: P175/80R13; Manufacturer: Firestone

Number of Occupants: 2 Front; 2 Rear; - 3rd Seat; 4 TOTAL

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

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

Vehicle Capacity Weight (VCW) = 650 lbs. (A)

No. of Occupants x 150 lbs. = 600 lbs. (B)

Rated Cargo and Luggage Weight (RCLW) A-B = 50 lbs.

GVWR 3165 lbs. GAWR: Front 1774 lbs. Rear 1459 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 = 720 lbs. Right Rear = 420 lbs.
 Left Front = 700 lbs. Left Rear = 440 lbs.
 TOTAL FRONT WEIGHT = 1420 lbs. (62.3 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 860 lbs. (37.7 % of Total Vehicle Weight)
 TOTAL DELIVERY WEIGHT = 2280 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (2280 lbs.)
 VCW = Vehicle Capacity Weight (650 lbs.)
 DSC = Designated Seating Capacity (4)
 RCLW = VCW - 150 (DSC) = 50 lbs.
 Target Test Weight = UDW + RCLW + (2 dummies x 164 lbs./dummy)
 Target Test Weight = 2658 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND POUNDS CARGO:

Right Front = 830 lbs. Right Rear = 560 lbs.
 Left Front = 760 lbs. Left Rear = 590 lbs.
 TOTAL FRONT WEIGHT = 1590 lbs. (58.0 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1150 lbs. (42.0 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 2740 lbs.
 Weight of ballast secured in vehicle trunk area = 0 lbs.

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 27.3 LF 27.2 RR 26.6 LR 26.2
 Test Attitude: RF 25.8 LF 25.5 RR 24.5 LR 24.0
 Wheel Base: 94.0 in.; C.G. = 39.4 in. rearward of front wheel C/L
 Remarks: 12.0 gallons of solvent was added to fuel tank. Removed rear bumper to achieve test weight

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

POST-IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0 °
 Date of Test: 3/4/87 Time of Test: 1245
 Ambient Temperature: 35 °F at impact area
 Temperature in Occupant Compartment: 72 °F.
 Windshield Molding Temperature: 70 °F.
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: primary = 34.7 mph, secondary = 34.9 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	<u>165.2</u>		<u>167.2</u>		<u>165.0</u>
	Post-test	= R	<u>144.4</u>		<u>145.4</u>		<u>144.4</u>
	Crush	= R	<u>20.8</u>		<u>21.8</u>		<u>20.6</u>

Distance from front of test vehicle to point of impact:

R 15.2 C/L 15 L 14.5

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	Steering Wheel Hub	None
Chest	None	None
Abdomen	None	None
Left Knee	Dash Panel	Glove Box
Right Knee	Dash Panel	Glove Box

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

	<u>Front</u>	
	<u>Left</u>	<u>Right</u>
Door Opening	<u>Operable</u>	<u>Operable</u>

	<u>Front</u>	
<u>Seat Movement</u>	<u>Left</u>	<u>Right</u>
Seat Back Failure	<u>None</u>	<u>None</u>
Seat Shift (in.)	<u>None</u>	<u>None</u>

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**

Table 2
DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DUMMY (1)	-69	-12	95	109	-45	12	-19	42
DUMMY (2)	58	10	41	59	27	19	-45	40
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE - FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	1053	1146
DUMMY (2)	619	465
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)	-	-	610
DUMMY (2)	1960	700	-
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**			
	HIC	36 millisecond max.		AVE. ACC. (g) t ₁ TO t ₂
		t ₁ (SEC)	t ₂ (SEC)	
DUMMY (1)	551	.05730	.09330	47.2
DUMMY (2)	418	.06247	.09847	42.3
DUMMY (3)				
DUMMY (4)				

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION

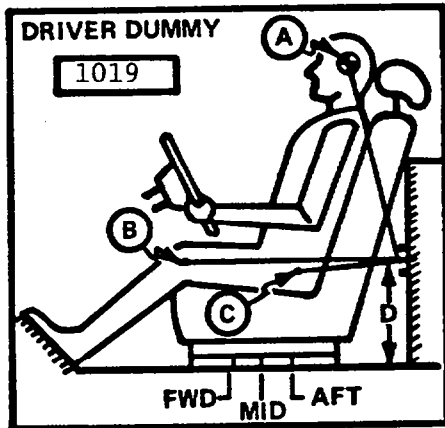
TEST NO.: MH0200

VEHICLE: 1987 Ford Escort 2 Dr. Hatchback

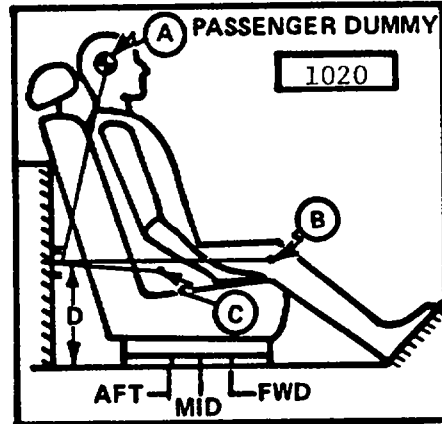
SEAT TYPE:
 _____ Bench
 X Bucket
 _____ Split Bench

ADJUSTER TYPE:
 _____ X Manual
 _____ Power

BUCKET SEAT BACK TYPE:
 _____ Fixed
 X Adjustable Reclining Lever

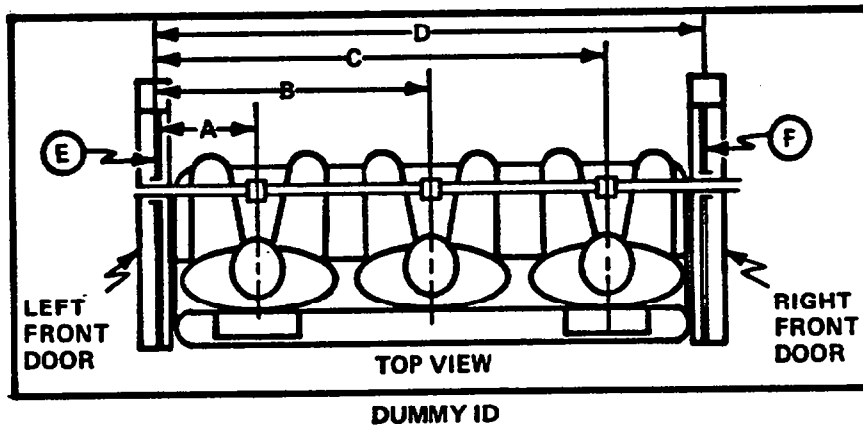


MEASUREMENT LOCATION
 A - Head Target
 B - Knee Joint
 C - Approximate 'H' Point
 D - Sill to Reference Point



A = 24.7 in. 23 Degrees
 B = 31.9 in. 96 Degrees
 C = 17.0 in. 113 Degrees
 D = 14.0 in.

A = 24.6 in. 30.0 Degrees
 B = 31.9 in. 96 Degrees
 C = 16.5 in. 112 Degrees
 D = 14.0 in.



1019

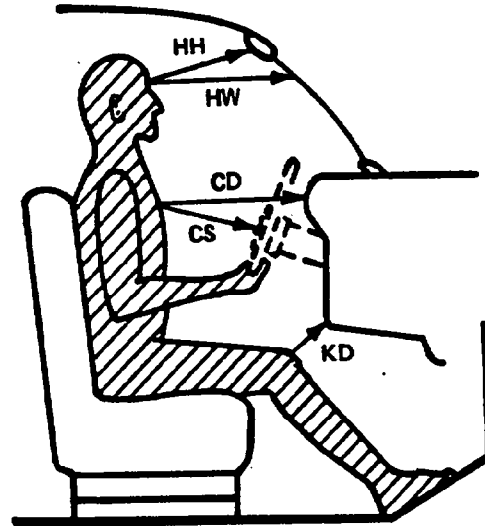
1020

A = Left Door to Driver Centerline 10.1 in.
 B = Left Door to Center Passenger Centerline - in.
 C = Left Door to Right Passenger Centerline 36.0 in.
 D = Left Door to Right Door 45.7 in.
 E, F = Window Glass Height (Right and Left Must Be Equal) 13.5 in.

Figure 2

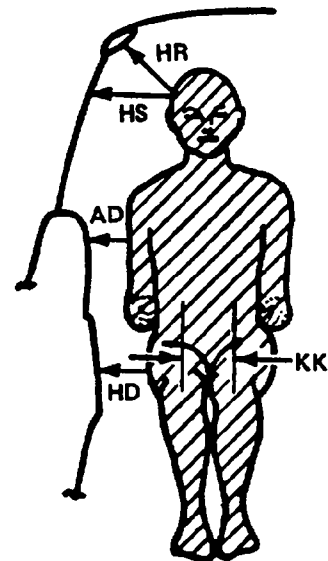
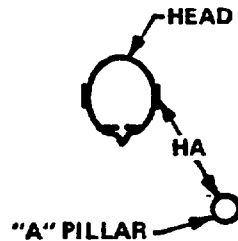
OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	10.0	10.7
HW	16.0	16.4
CD	18.7	20.3
CS	11.9	-
KDL	3.5	4.5
KDR	3.5	4.4
SA	20.0	20.0
TA	18.0	21.0



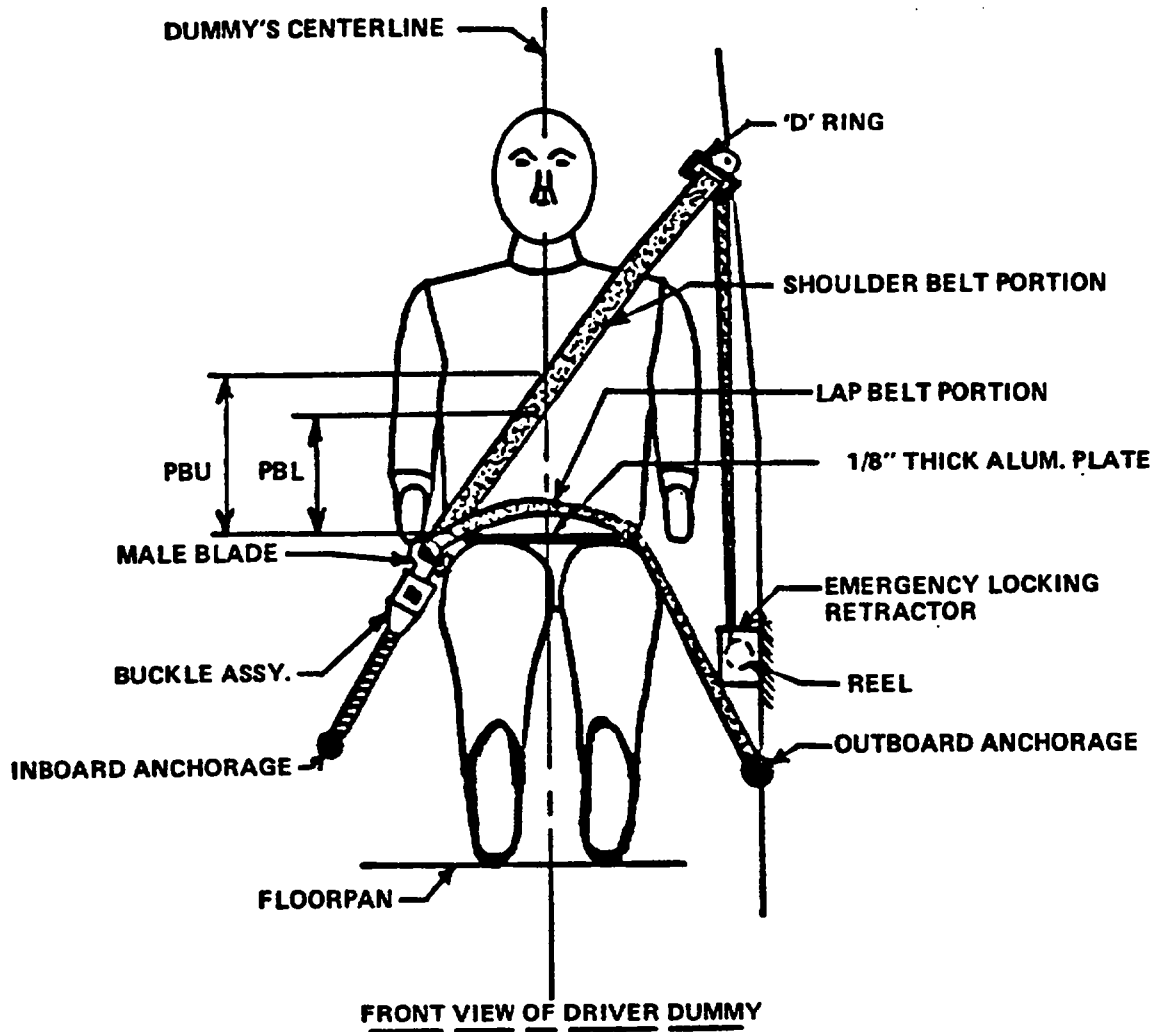
- HH = Head to Windshield Header
- HW = Head to Windshield
- CD = Chest to Dash
- CS = Chest to Steering Wheel
- KD(L/R) = Knee to Dash (Left/Right)
- SA = Seat Back Angle
- TA = Torso Angle

- HA = Head Target to "A" Pillar
- HR = Head to Side Roof
- HS = Head to Side Window
- AD = Arm to Door
- HD = Hip to Door
- KK = Knee to Knee



	DRIVER	PASSENGER
HR	5.2	5.0
HS	6.8	6.8
AD	3.5	3.2
HD	6.5	5.9
KK	9.7	7.8
HA	15.4	17.8

Figure 3
SEAT BELT POSITIONING DATA



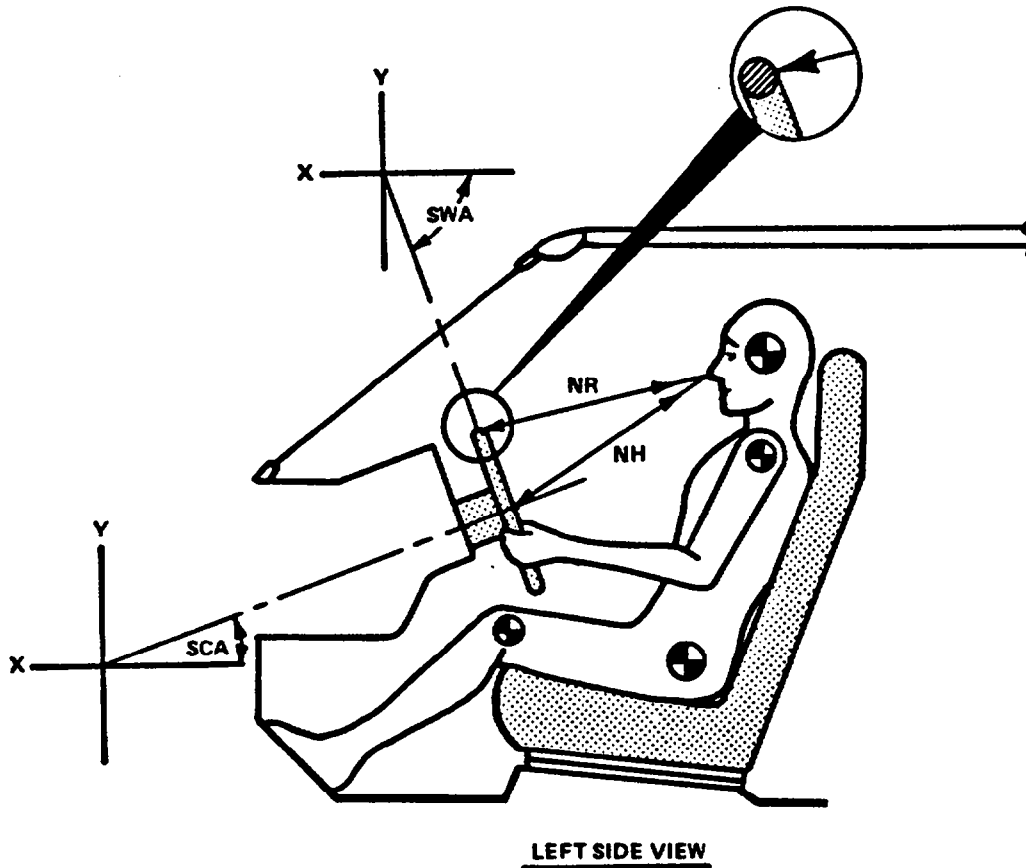
	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
<u>PBU</u> -- Top surface of alum. plate to upper edge	17.2	17.2
<u>PBL</u> -- Top surface of alum. plate to belt lower edge	14.0	14.2
<u>LAP BELT TENSION</u>	-	-
<u>SHOULDER BELT TENSION</u>	Passive Rest.	Passive Rest.

Table 3

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

<u>BELT LENGTH DATA:</u>	<u>Driver</u>	<u>Passenger</u>
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	<u>-</u>	<u>-</u>
Should belt length as measured on Part 572 Dummy.	Passive <u>Restraint</u>	Passive <u>Restraint</u>
Lap belt length as measured on Part 572 Dummy.	<u>33"</u>	<u>33"</u>
<u>BELT SPOOL-OFF DATA:</u>		
As determined by film analysis.	<u>Unable to Read Film</u>	<u>Unable to Read Film</u>
As determined mechanically.	<u>1.7</u>	<u>2.3</u>
<u>BELT STRETCH DATA:</u>		
Measured electronically between shoulder belt load cell and the "D" ring.	<u>No Data</u>	<u>1.6 in. per ft.</u>
Measured Mechanically	<u>0</u>	<u>.5</u>

Figure 4
DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



	MEASUREMENTS	
<u>NR</u> -- Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	15.5	Inches
<u>NH</u> -- Distance from tip of dummy's nose to center of steering column hub	16.5	Inches
<u>SCA</u> -- Angle of steering column relative to the horizontal X axis	25	Degrees
<u>SWA</u> -- Angle of steering wheel relative to the horizontal X axis	-65	Degrees

NOTE: Camera Information Shown on Table

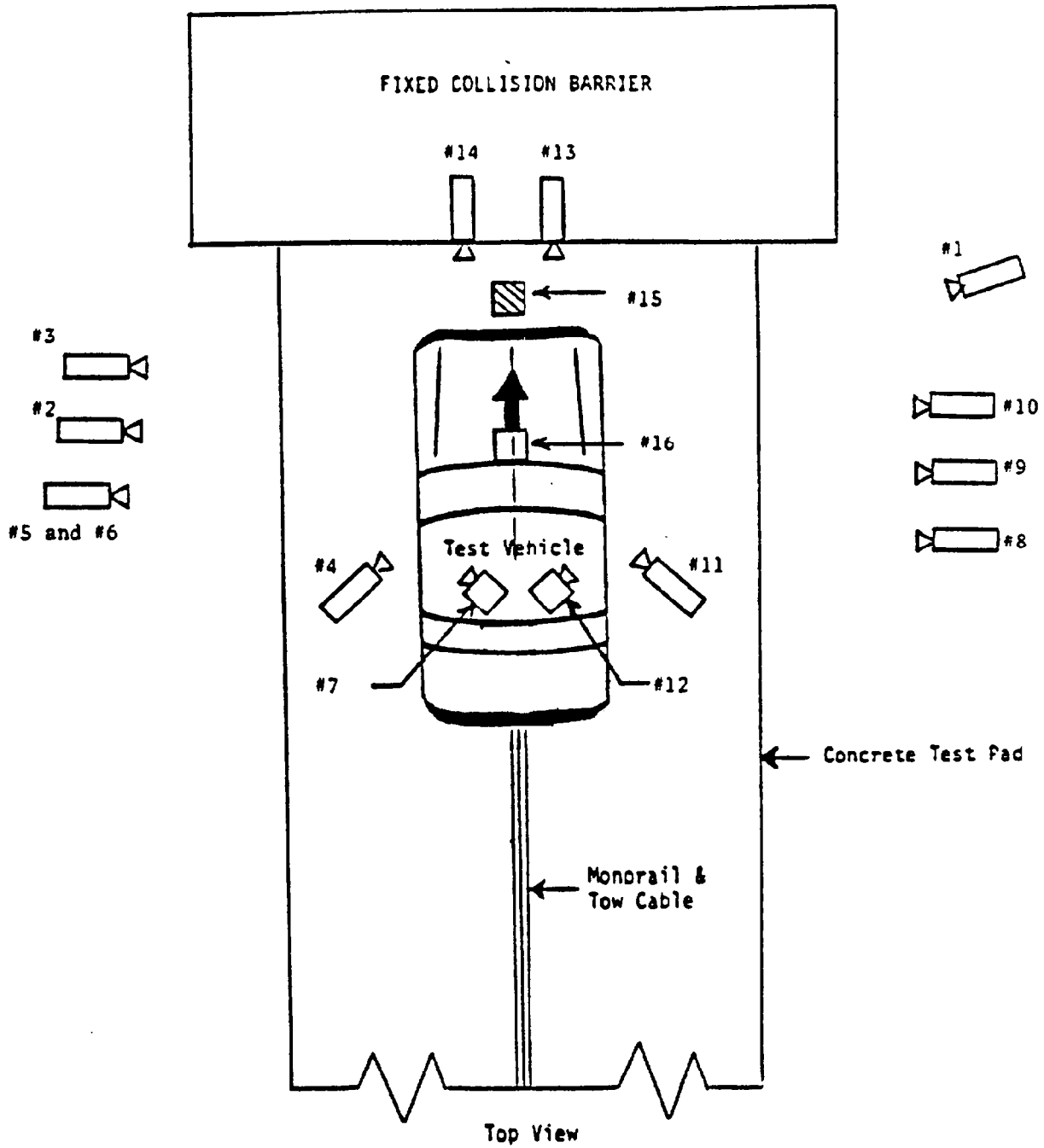


Figure 5 CAMERA POSITION FOR FRONTAL IMPACTS

Table 4
HIGH-SPEED CAMERA LOCATIONS

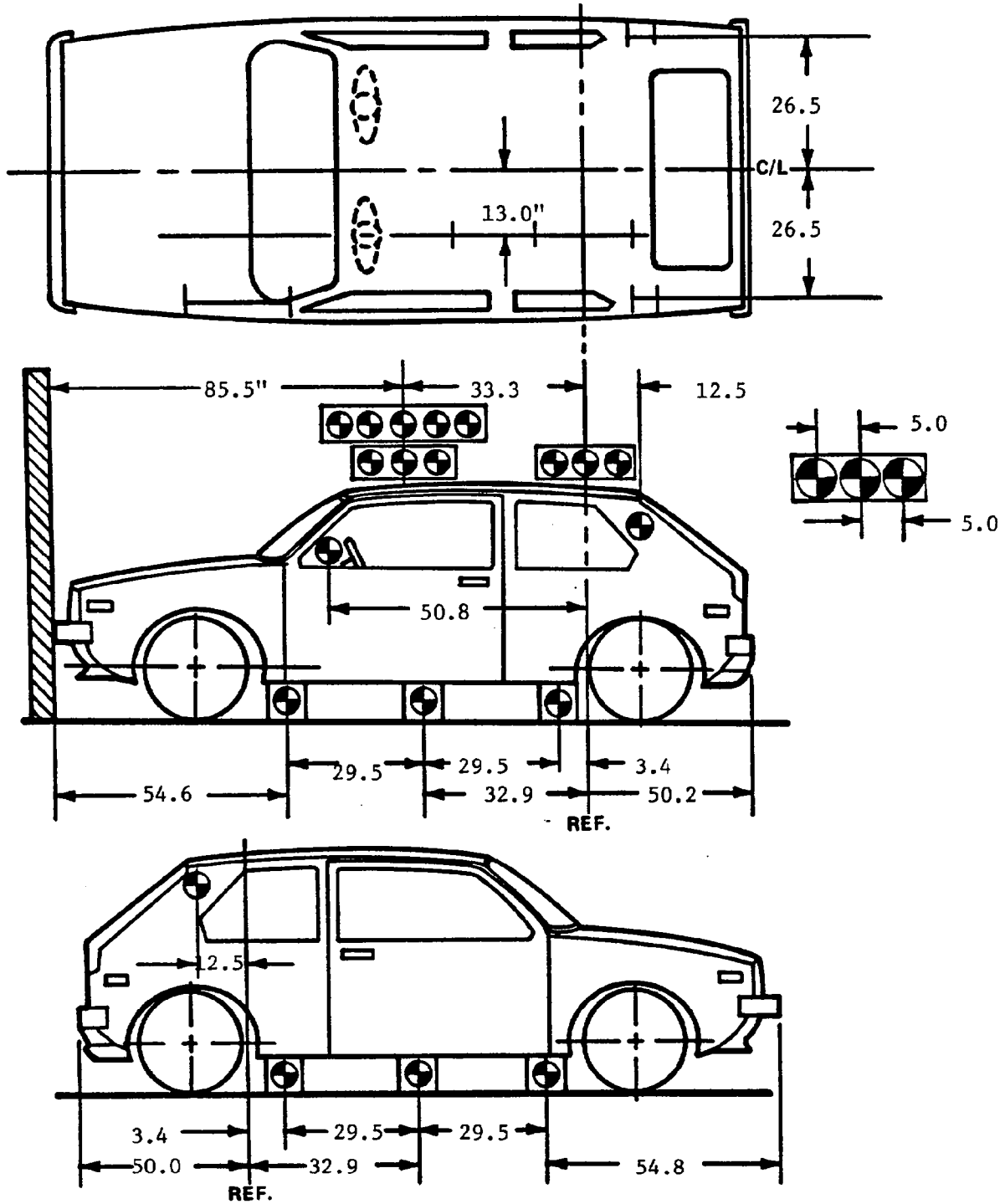
Test No. MH0200 Vehicle 1987 Ford Escort 2-Door Hatchback

CAMERA NO.	VIEW	CAMERA POSITIONS (in)*			ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Camera	-	-	-	-	-	24	
2	Overall Left Side	262	45	42	-2	-	525	
3	Left Side View	251	40	43	-3	-	525	
4	Driver and Interior View	105	114	70	-16	-	700	
5	Steering Column (Bottom)	240	78	52	-6	224	550	
6	Steering Column (Top)	240	78	77	-13	224	570	
7	Left Belt	-	-	-	-	-	860	
8	Overall Right Side	246	47	43	-1	-	800	
9	Right Side View	260	70	44	-4	-	900	
10	Right Passenger View	276	86	42	-3	260	760	
11	Passenger & Interior View	87	101	66	-20	-	600	
12	Right Belt	-	-	-	-	Not Used	-	
13	Passenger Front View	24	0	72	-37	-	540	
14	Driver Front View	24	0	72	-37	-	560	
15	Windshield View	0	0	126	-55	-	525	
16	Pit View of Engine	0	32	-120	90	-	860	
17								

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

Figure 6

VEHICLE TARGET LOCATIONS

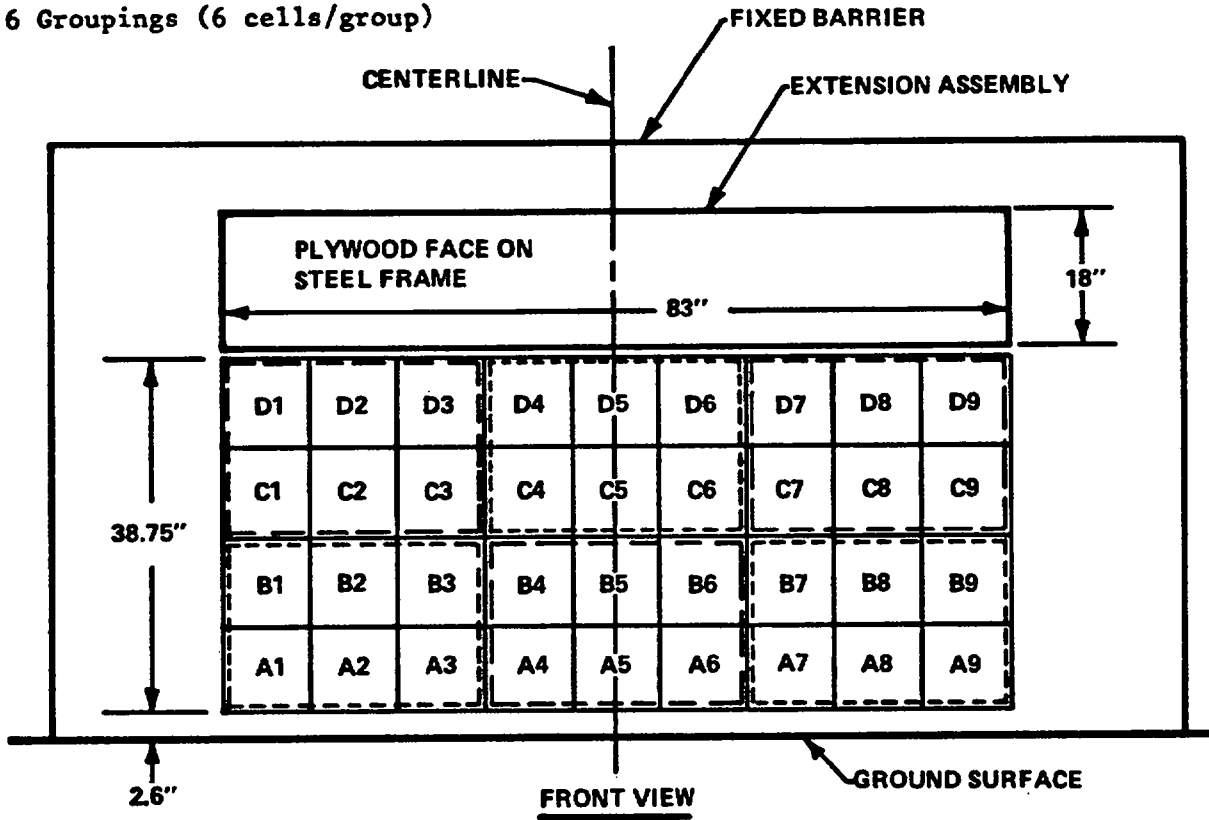


(DIMENSIONS IN INCHES)

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

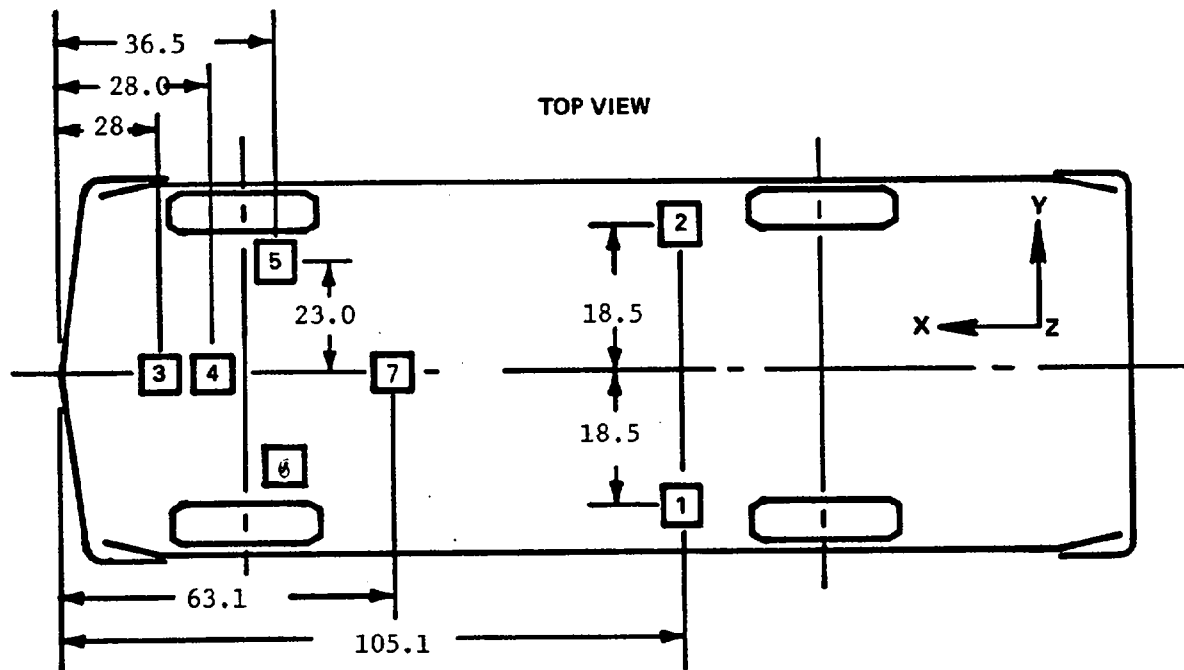
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

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	Left Disc Brak Caliper	X		
7	Instrument Panel	X		

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

Figure 9

TEST VEHICLE MEASUREMENTS

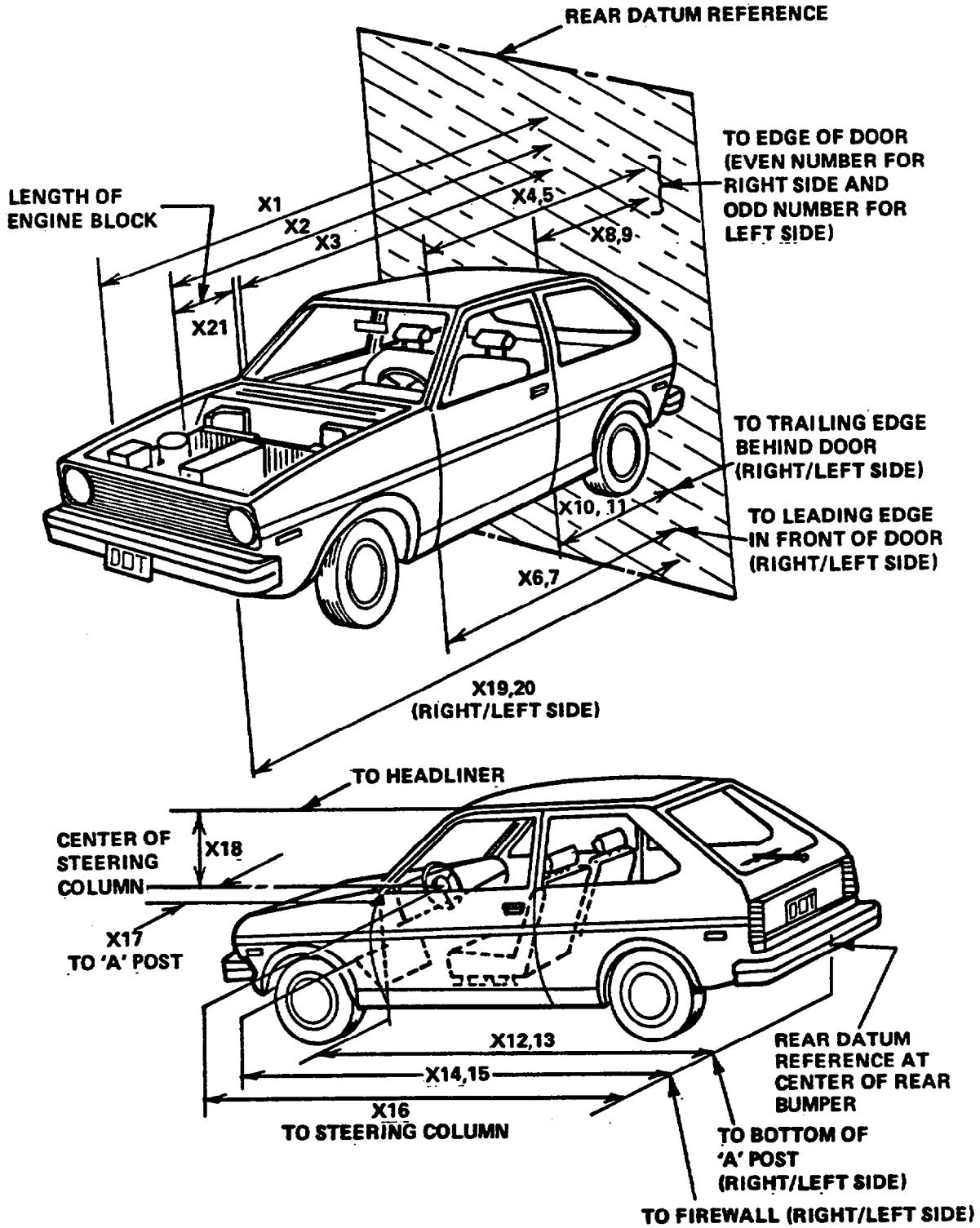


Table 5
VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	167.2	145.4	21.8
X2	Rear Surface of Vehicle to Front of Engine	143.3	137.5	5.8
X3	Rear Surface of Vehicle to Firewall	124.4	120.2	4.2
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	109.5	108.9	.6
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	109.4	108.1	1.3
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	109.5	109.2	.3
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	109.0	109.0	0
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	65.2	64.0	1.2
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	65.0	64.4	.6
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	63.1	63.0	.1
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	63.1	63.0	.1
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	109.5	109.0	.5
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	109.2	109.0	.2
X14	Rear Surface of Vehicle to Firewall, Right Side	119.7	113.8	5.9
X15	Rear Surface of Vehicle to Firewall, Left Side	120.3	114.1	6.2
X16	Rear Surface of Vehicle to Steering Column	93.4	93.1	.3
X17	Center of Steering Column to "A" Post	15.8	15.9	-.1
X18	Center of Steering Column to Headliner	16.5	17.2	-.7
X19	Rear Surface of Vehicle to Right Side of Front Bumper	165.2	144.4	20.8
X20	Rear Surface of Vehicle to Left Side of Front Bumper	165.0	144.4	20.6
X21	Length of Engine Block	17.5	17.5	0

Appendix A
PHOTOGRAPHS

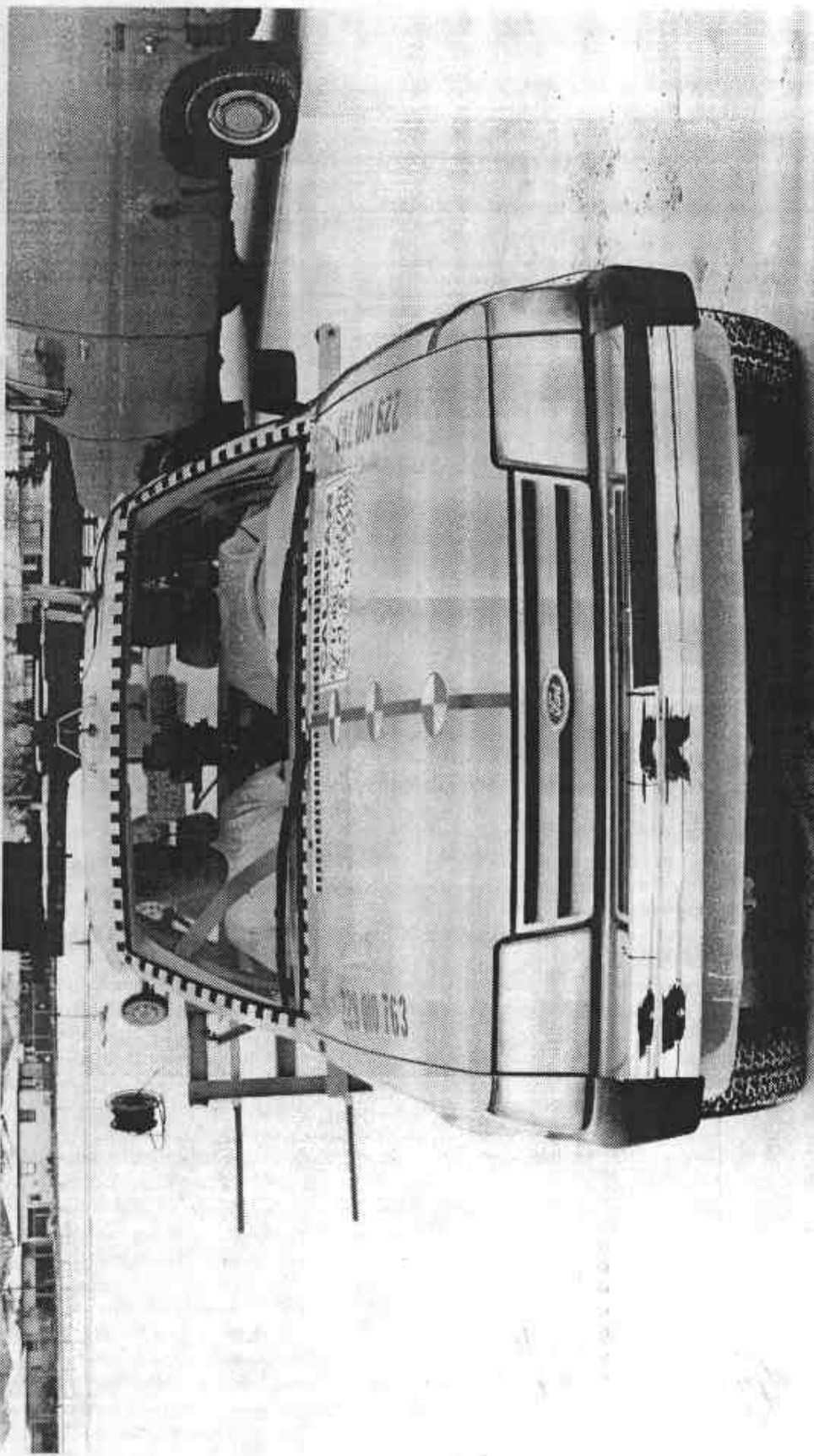


Figure A-1 PRE-TEST FRONT VIEW

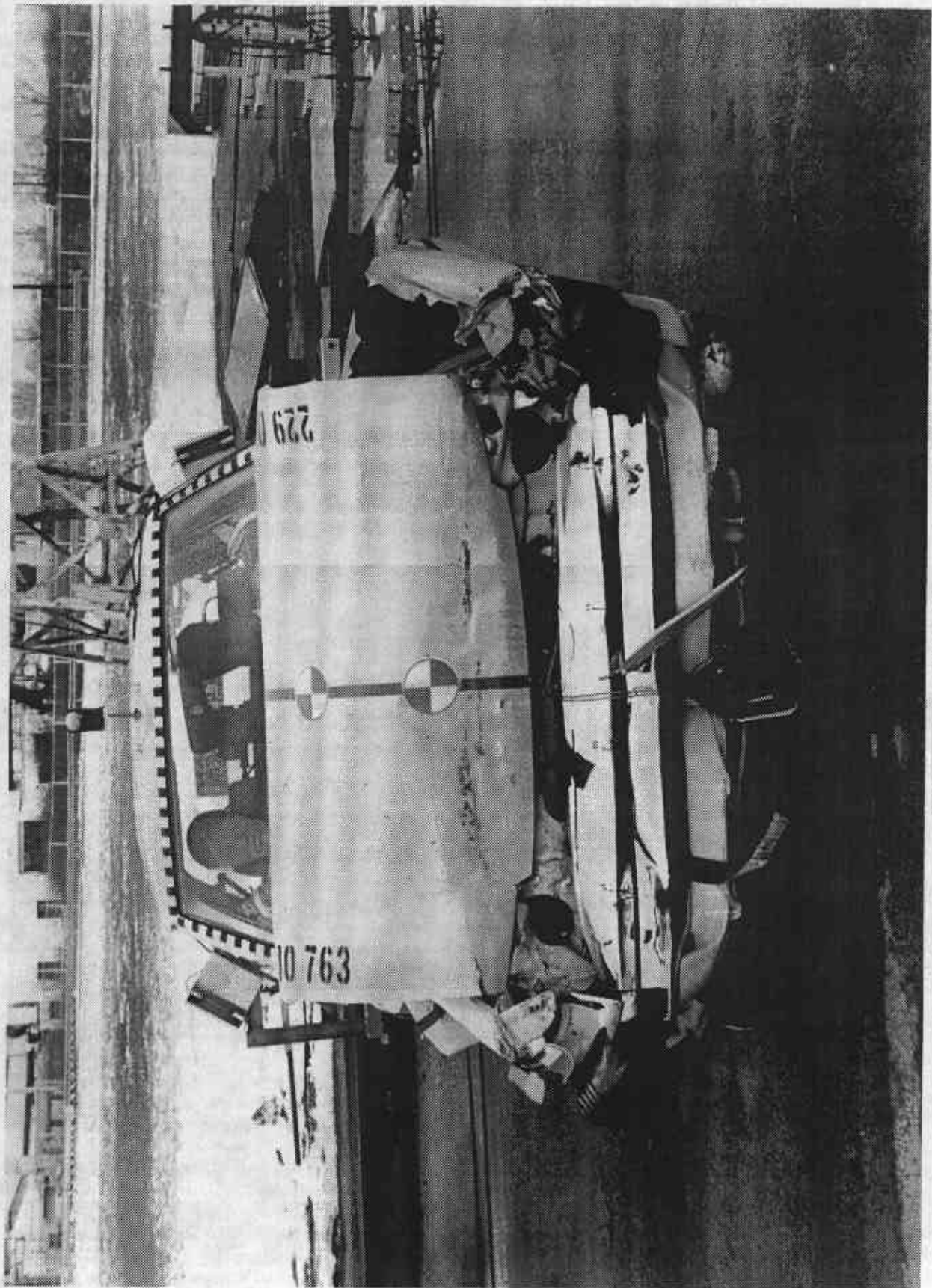
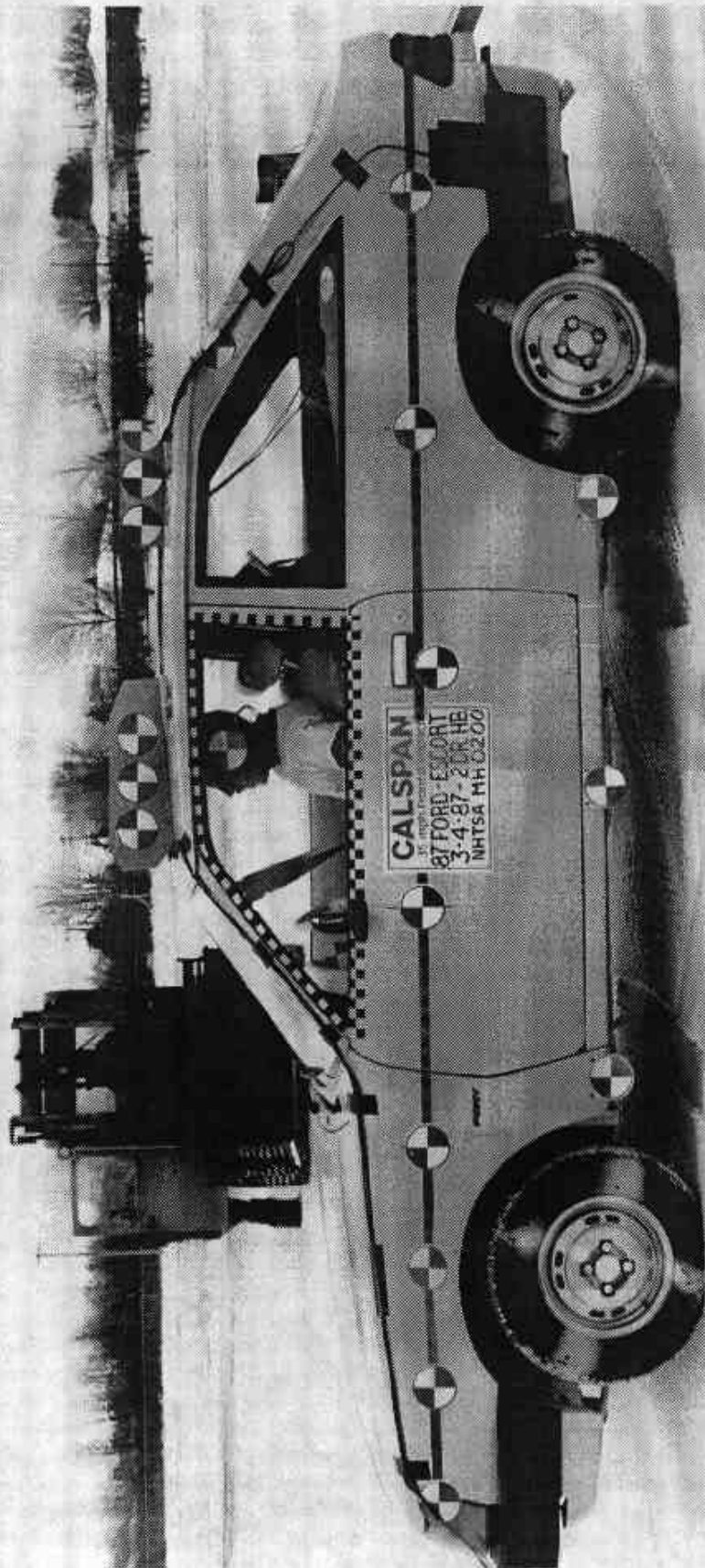


Figure A-2 POST-TEST FRONT VIEW

A-3

7556-1



A-4

7556-1

Figure A-3 PRE-TEST LEFT SIDE VIEW

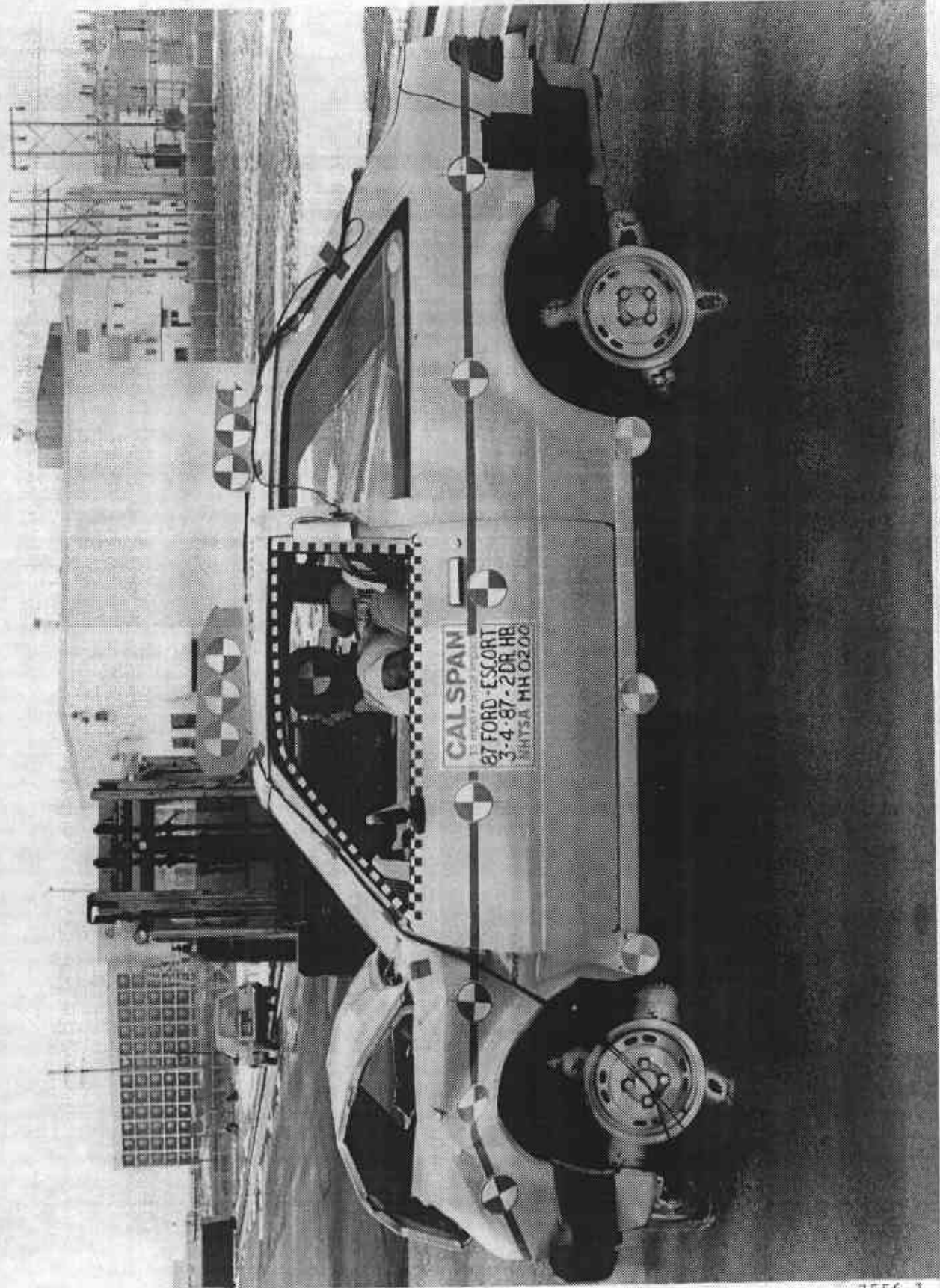
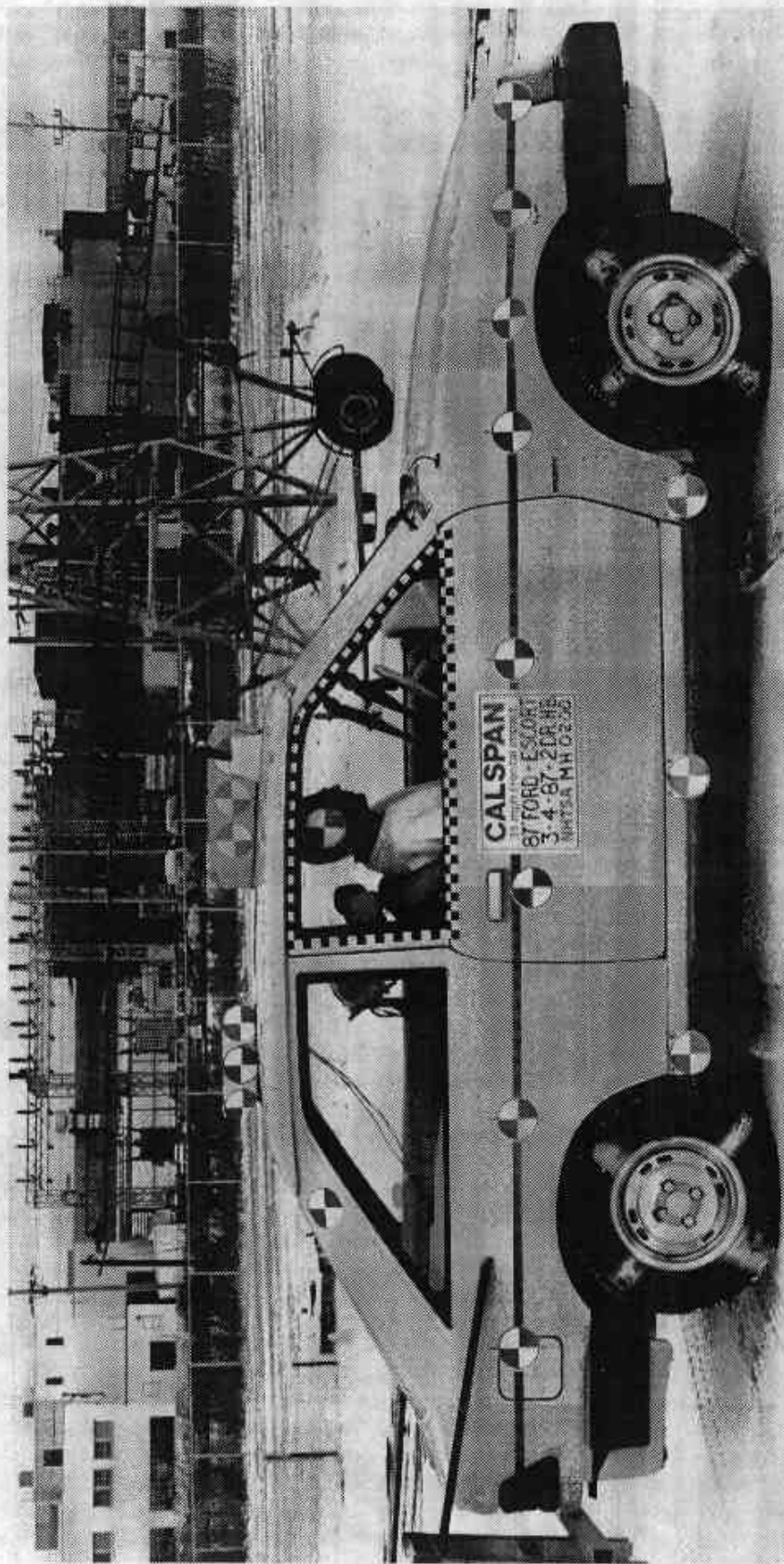


Figure A-4. POST-TEST LEFT SIDE VIEW

A-5

7556-1



A-6

7556-1

Figure A-5 PRE-TEST RIGHT SIDE VIEW

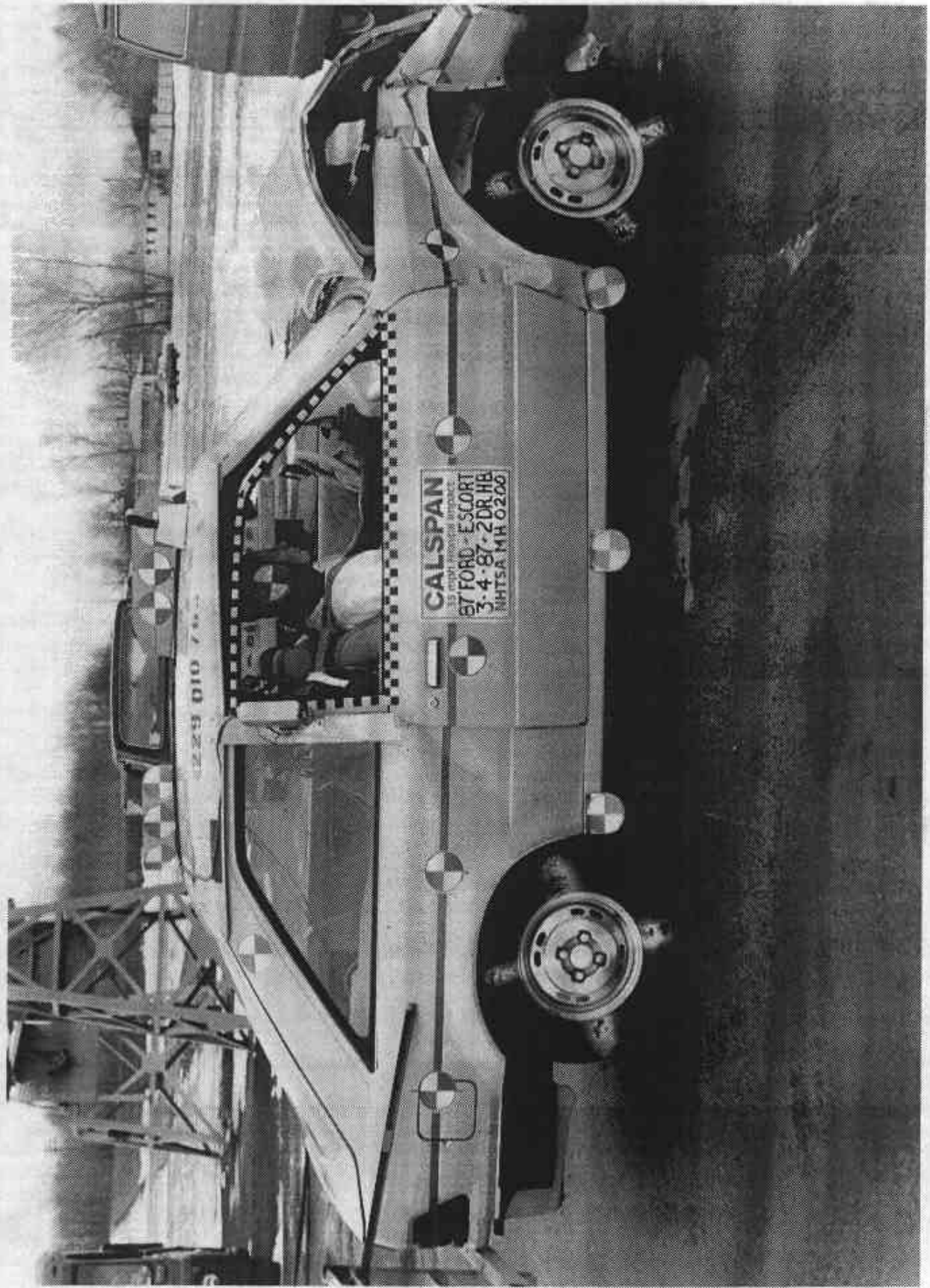


Figure A-6 POST-TEST RIGHT SIDE VIEW

A-7

7556-1

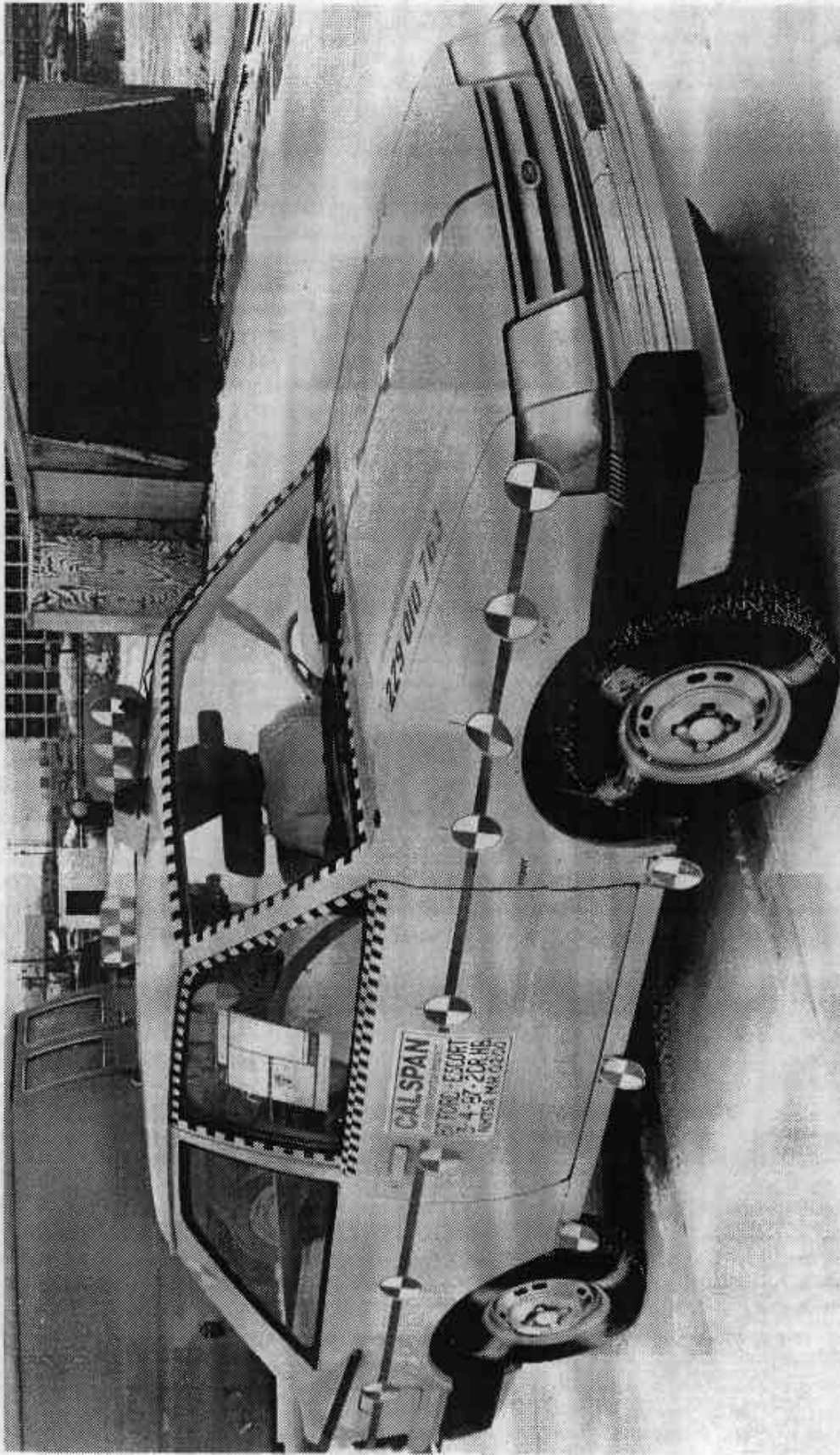


Figure A-7 PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

A-8

7556-1

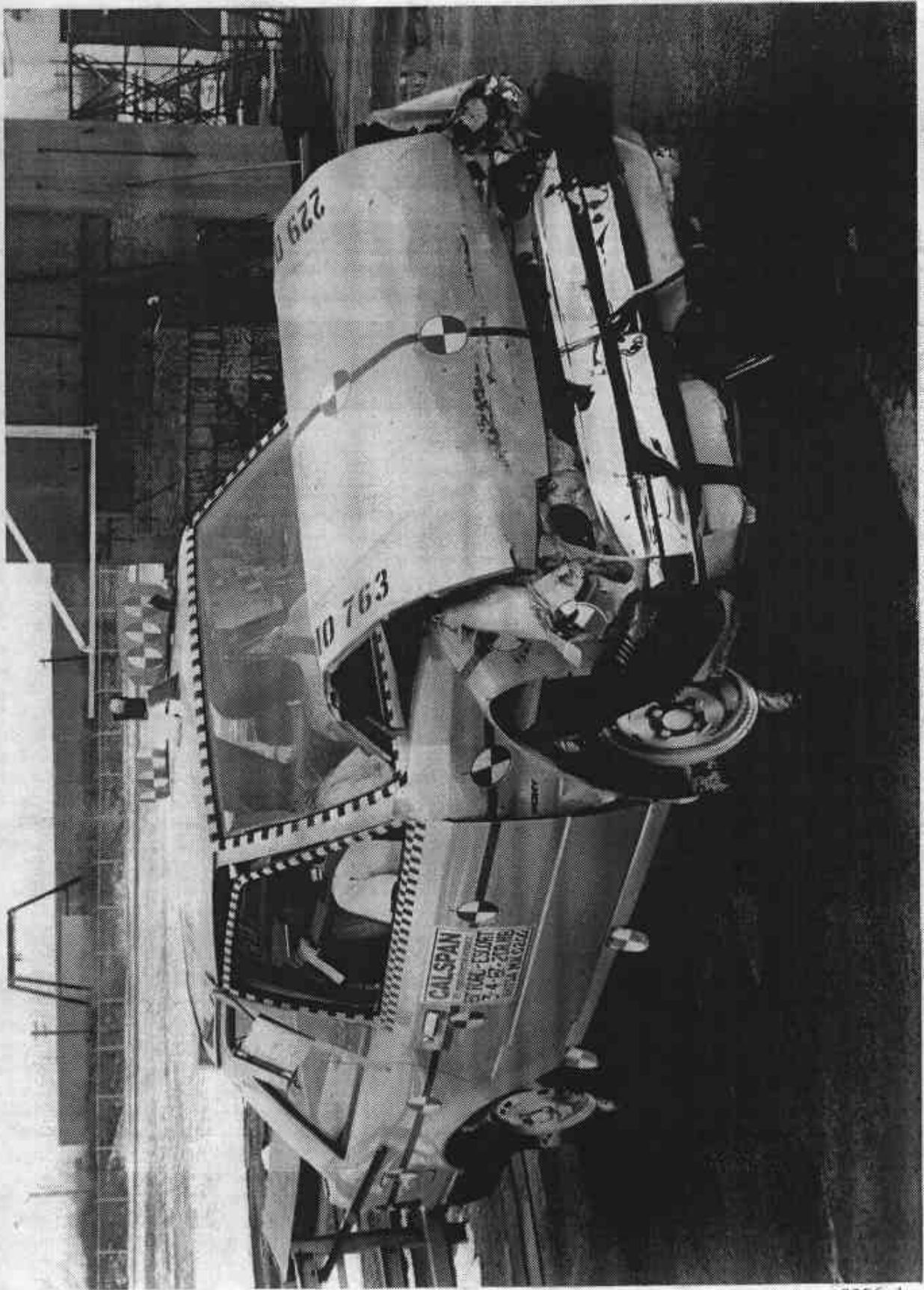


Figure A-8 POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-9

7556-1



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

A-10

7556-1

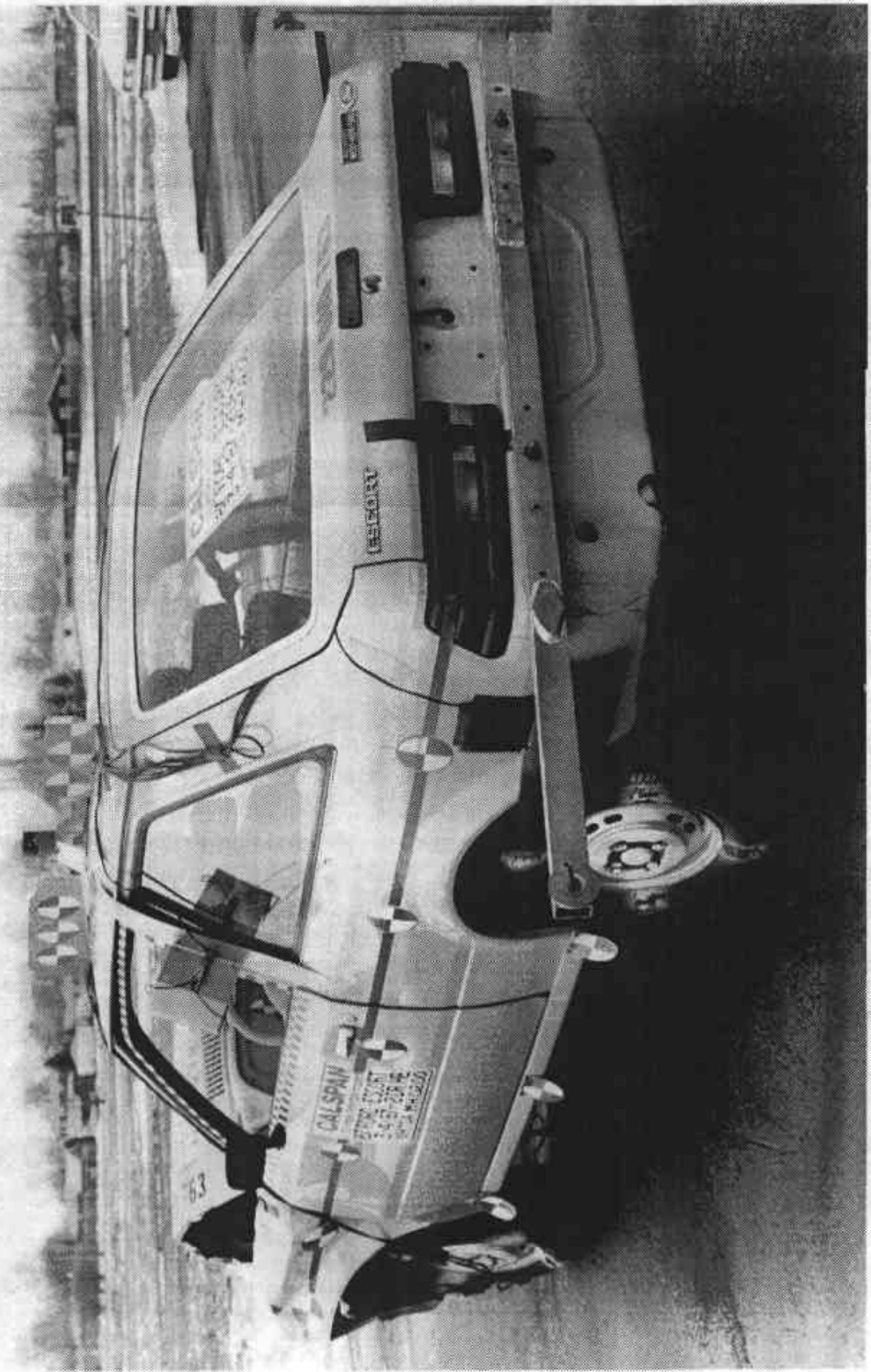


Figure A-10 POST-TEST LEFT REAR THREE-QUARTER VIEW

A-11

7556-1

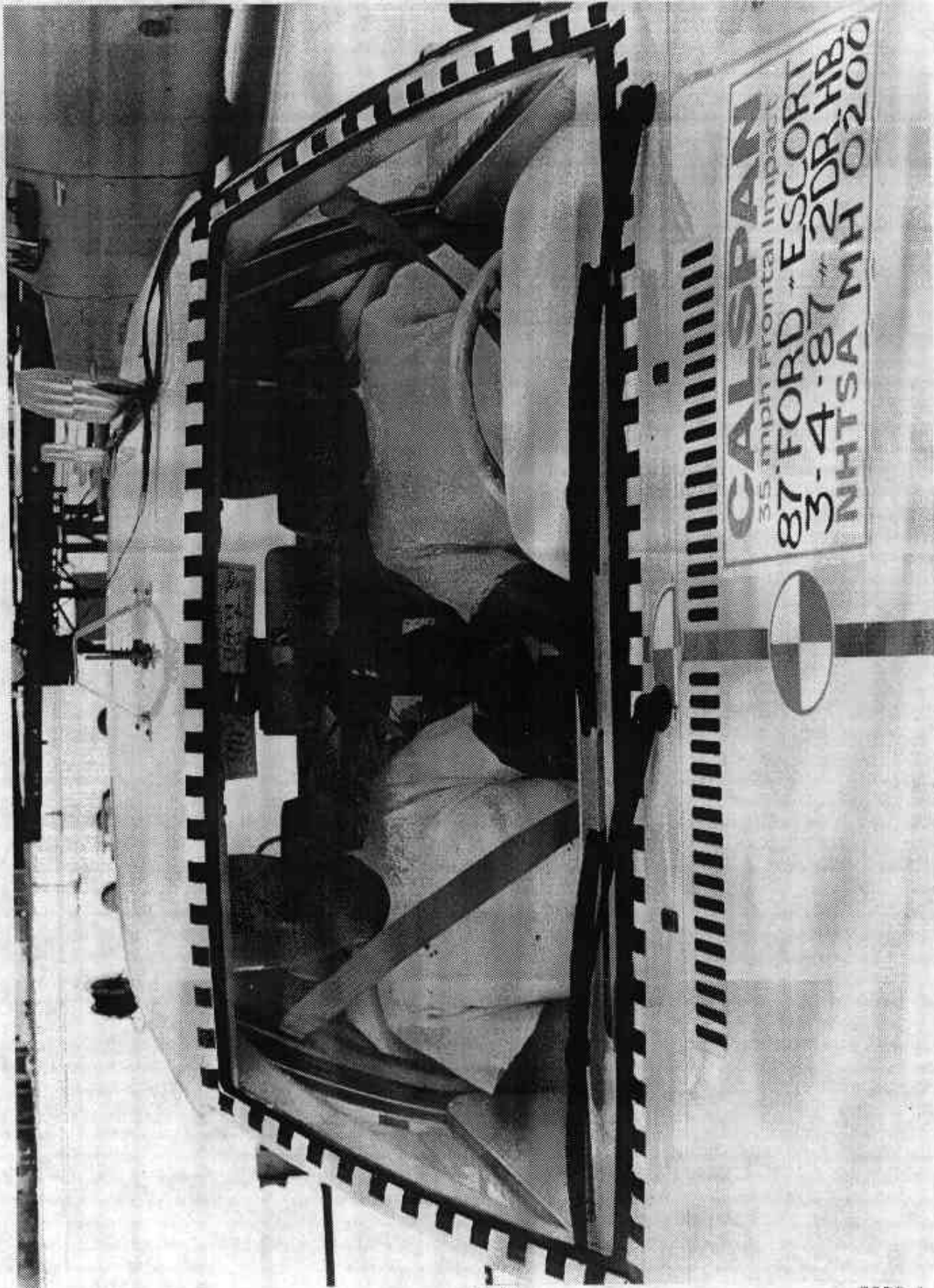


Figure A-11 PRE-TEST WINDSHIELD VIEW

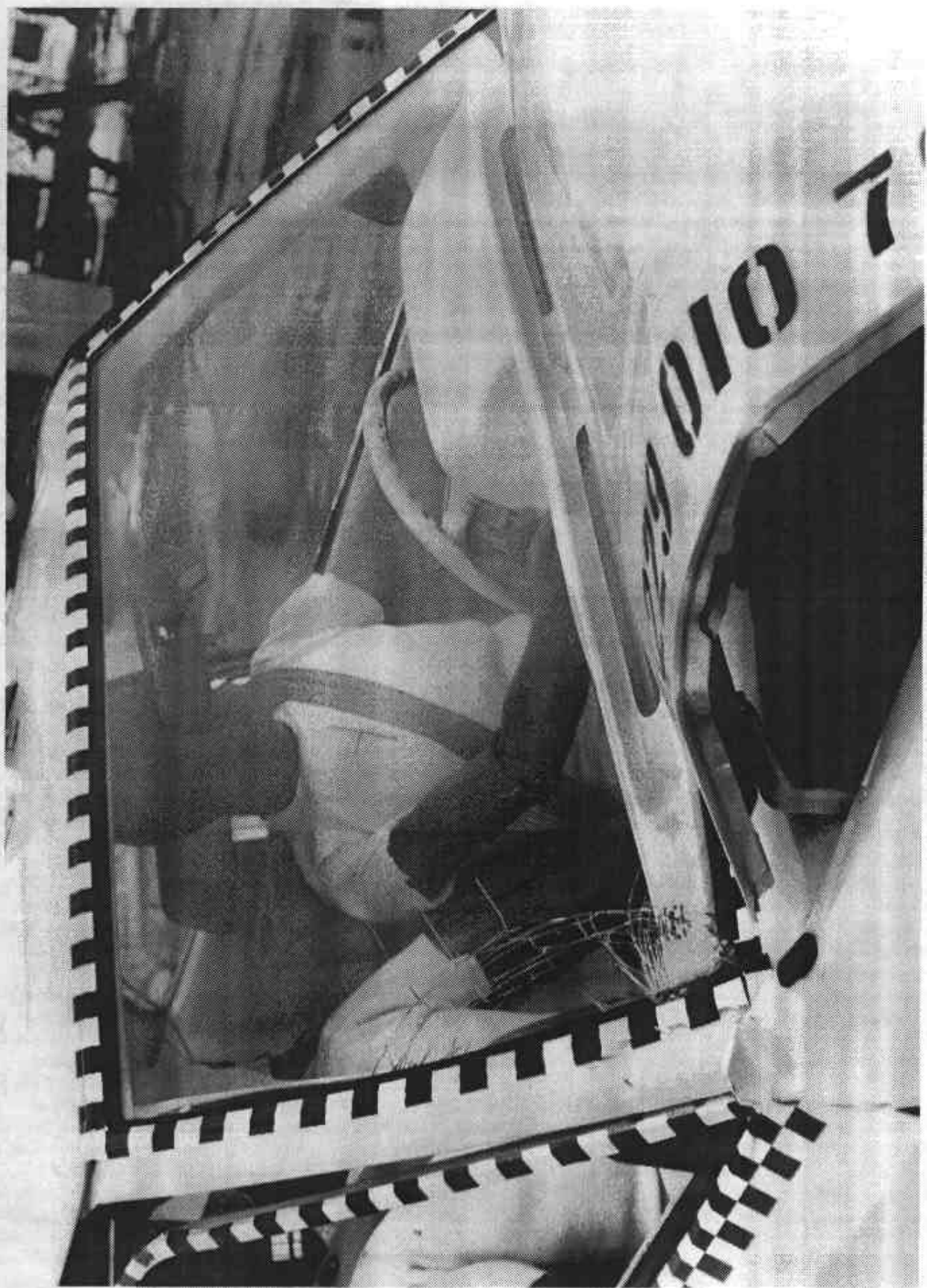


Figure A-12 POST-TEST WINDSHIELD VIEW

A-13

7556-1

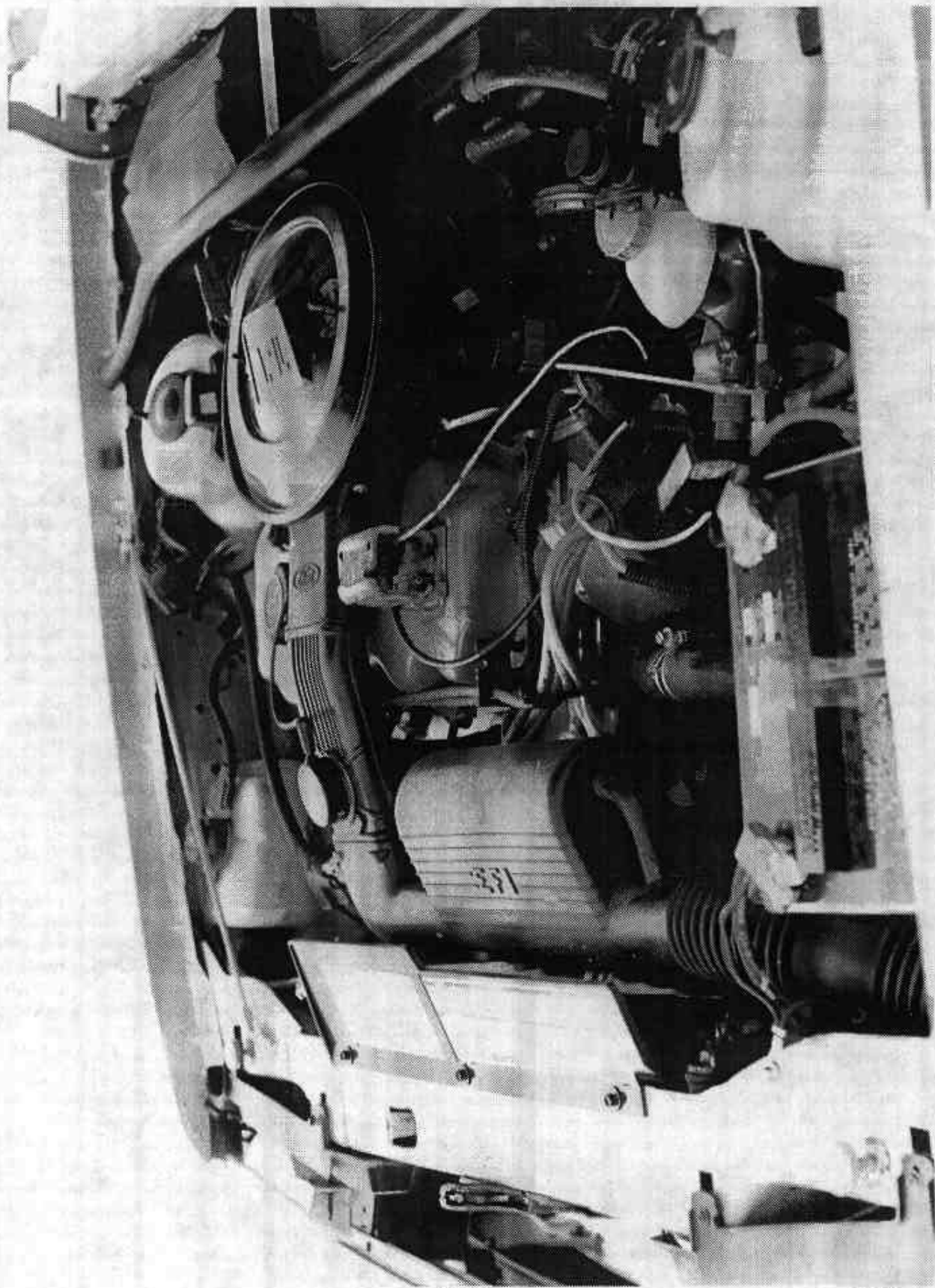


Figure A-13 PRE-TEST ENGINE COMPARTMENT VIEW

A-14

7556-1

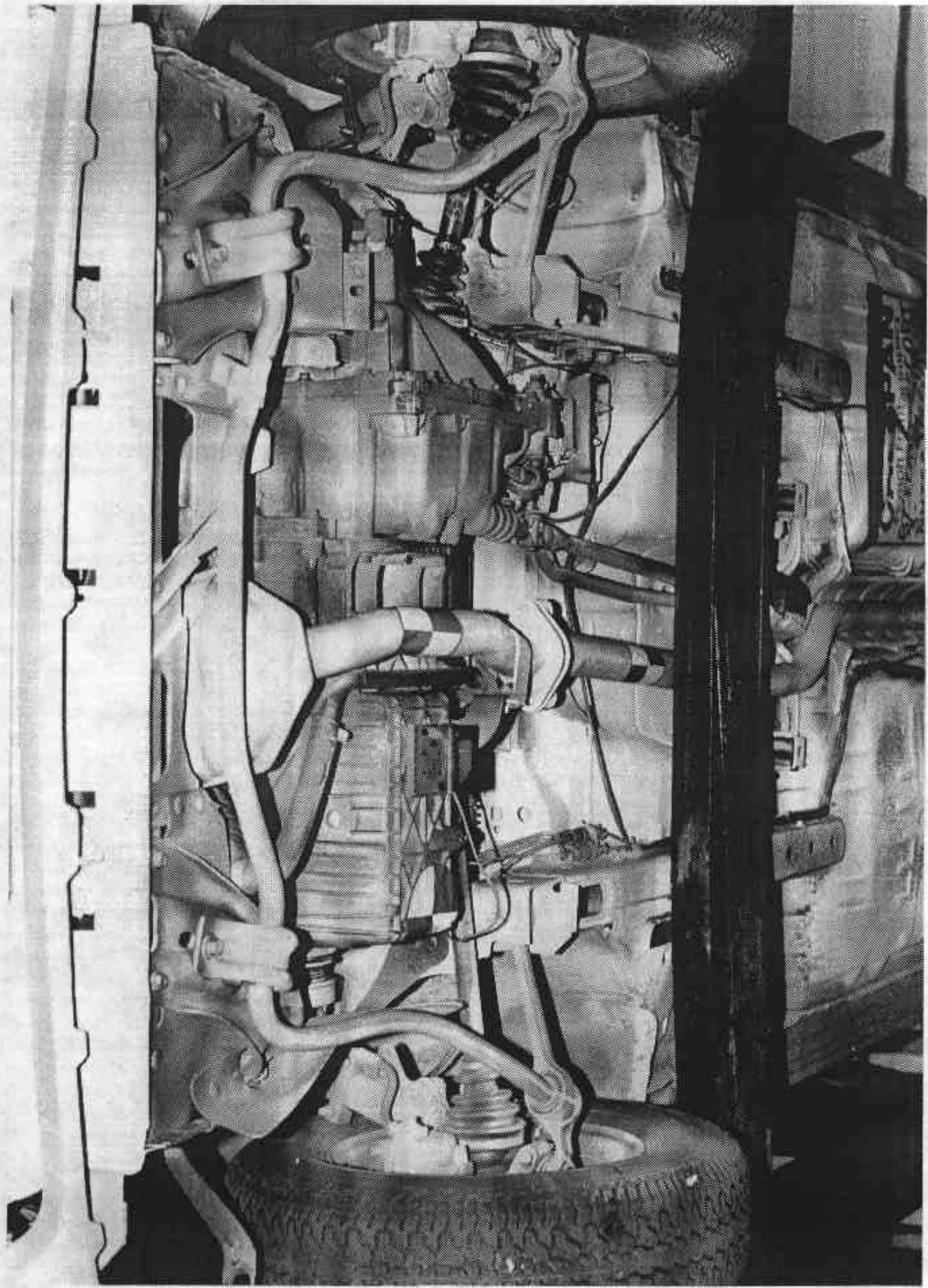


Figure A-14 PRE-TEST FRONT UNDERBODY VIEW

A-15

7556-1

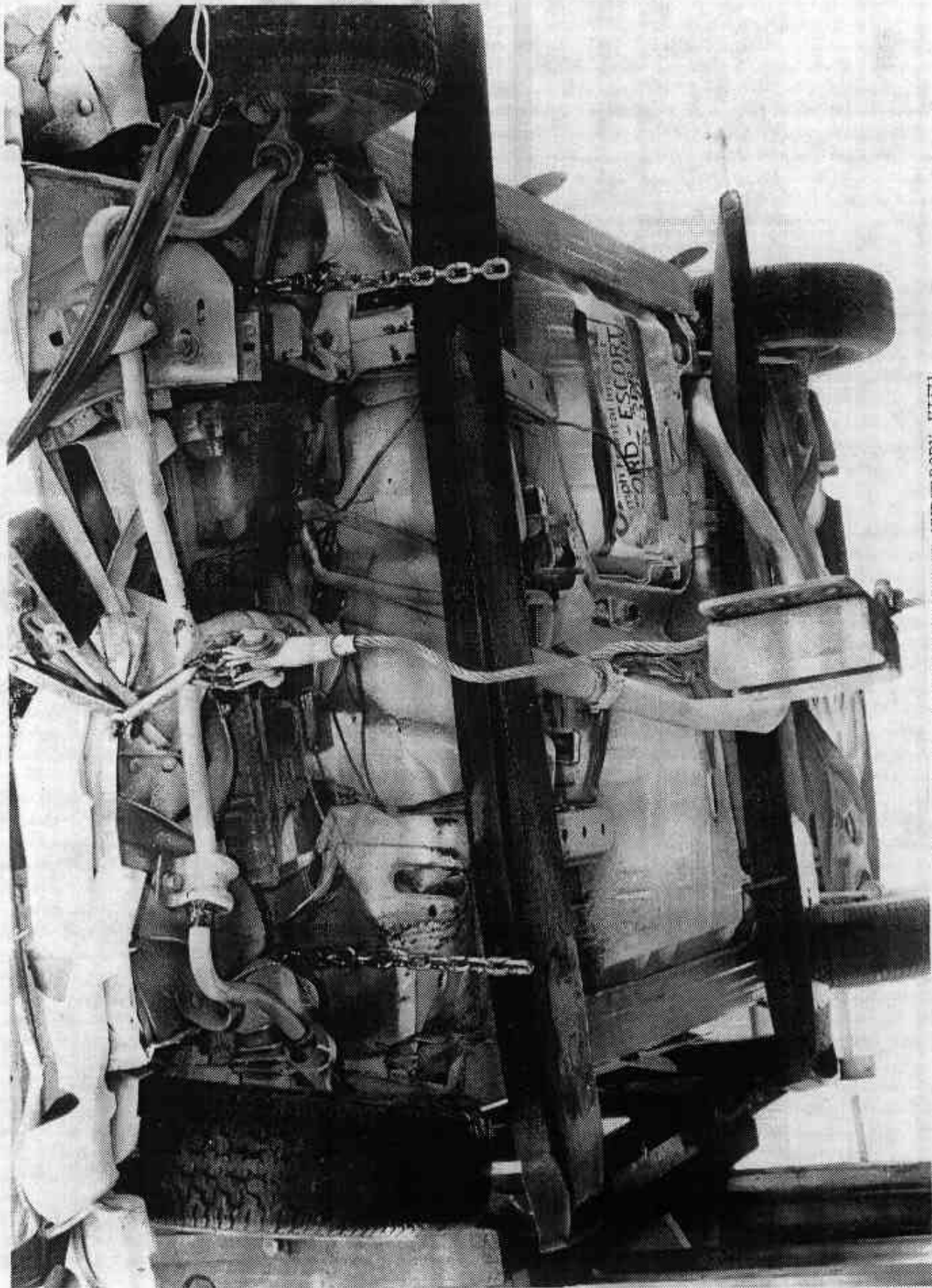


Figure A-15 POST-TEST FRONT UNDERBODY VIEW

A-16

7556-1

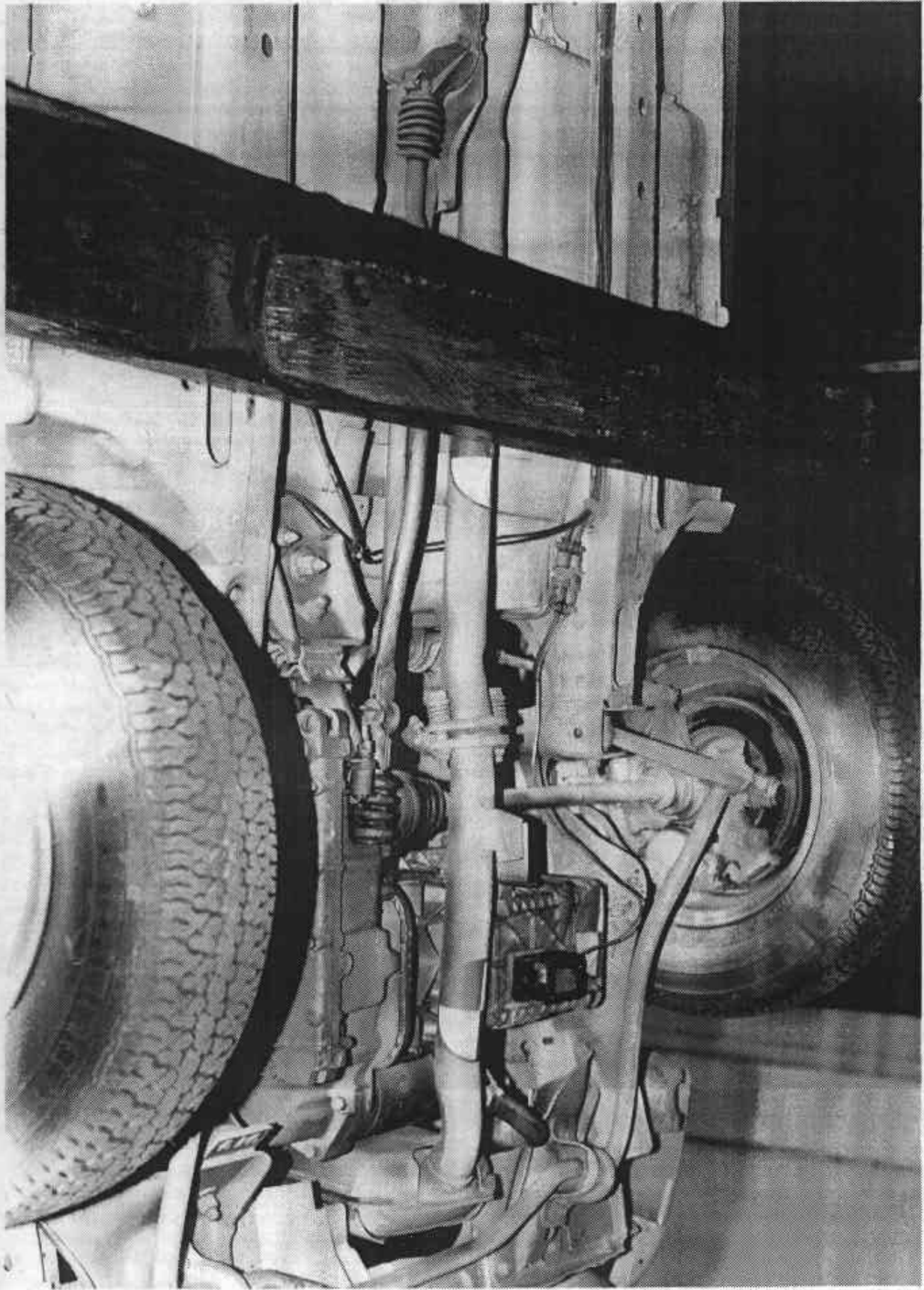


Figure A-16 PRE-TEST FRONT-SIDE UNDERBODY VIEW

A-17

7556-1

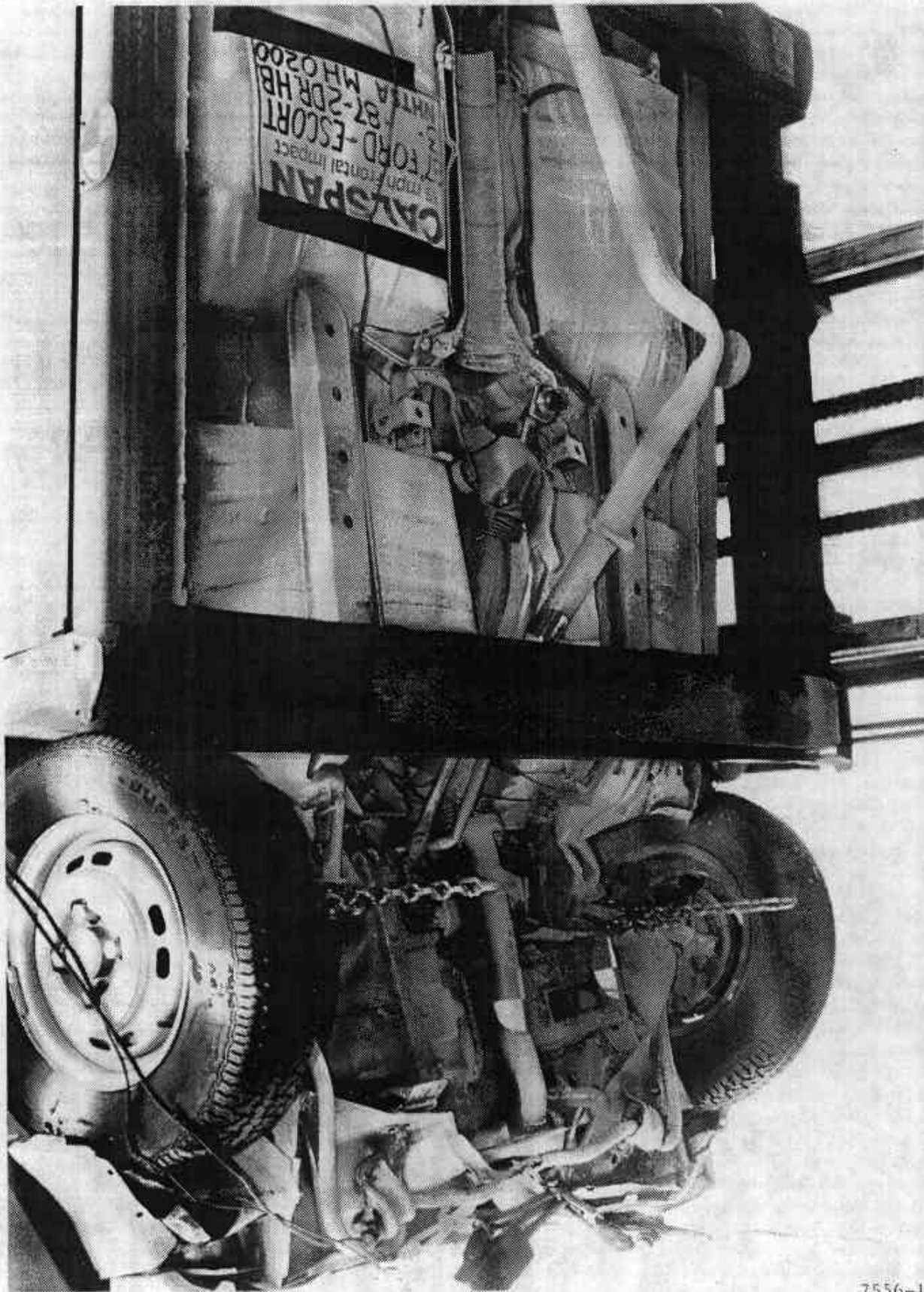


Figure A-17 POST-TEST FRONT-SIDE UNDERBODY VIEW

A-18

7556-1

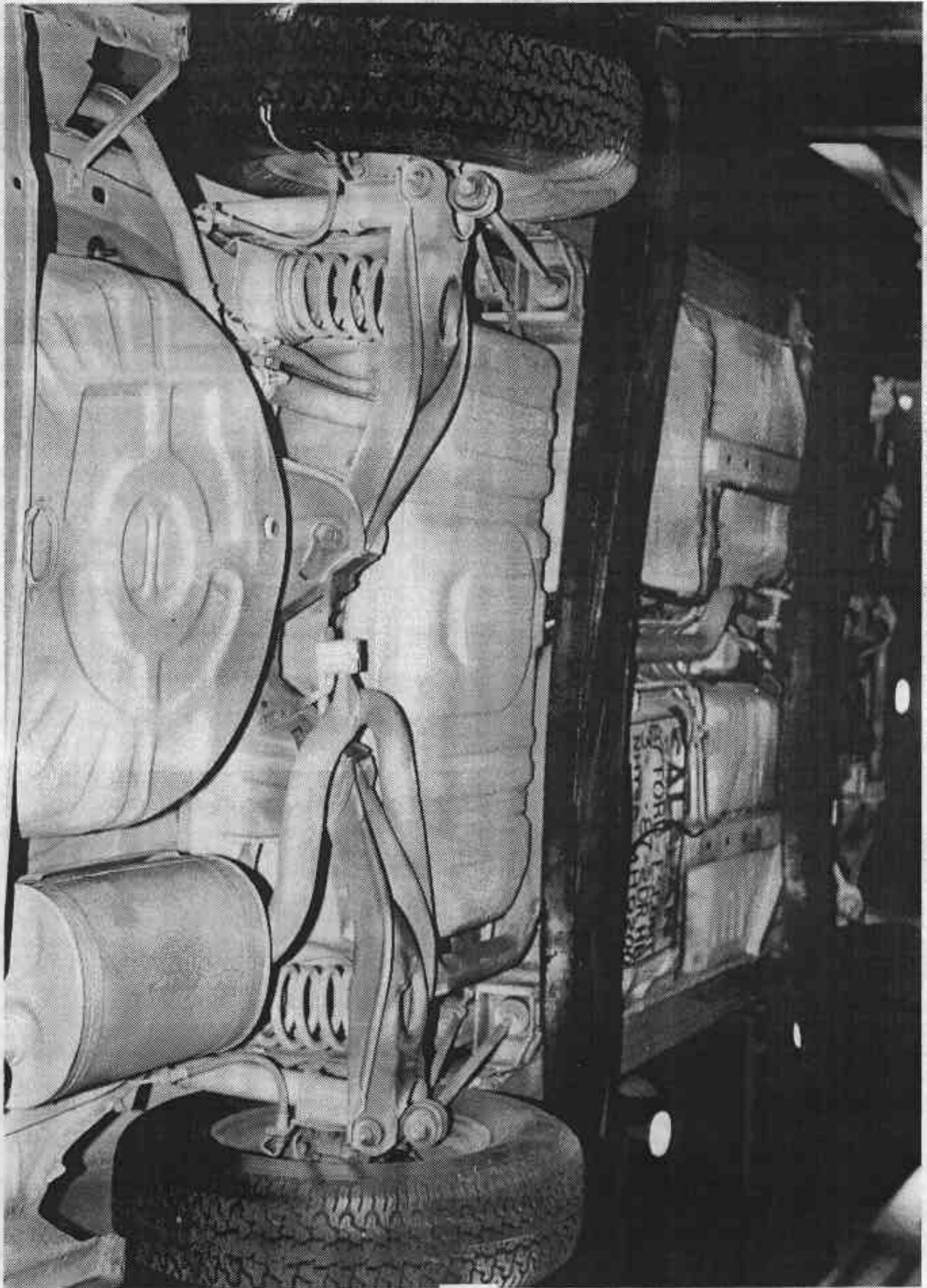


Figure A-18 PRE-TEST REAR UNDERBODY VIEW

A-19

7556-1

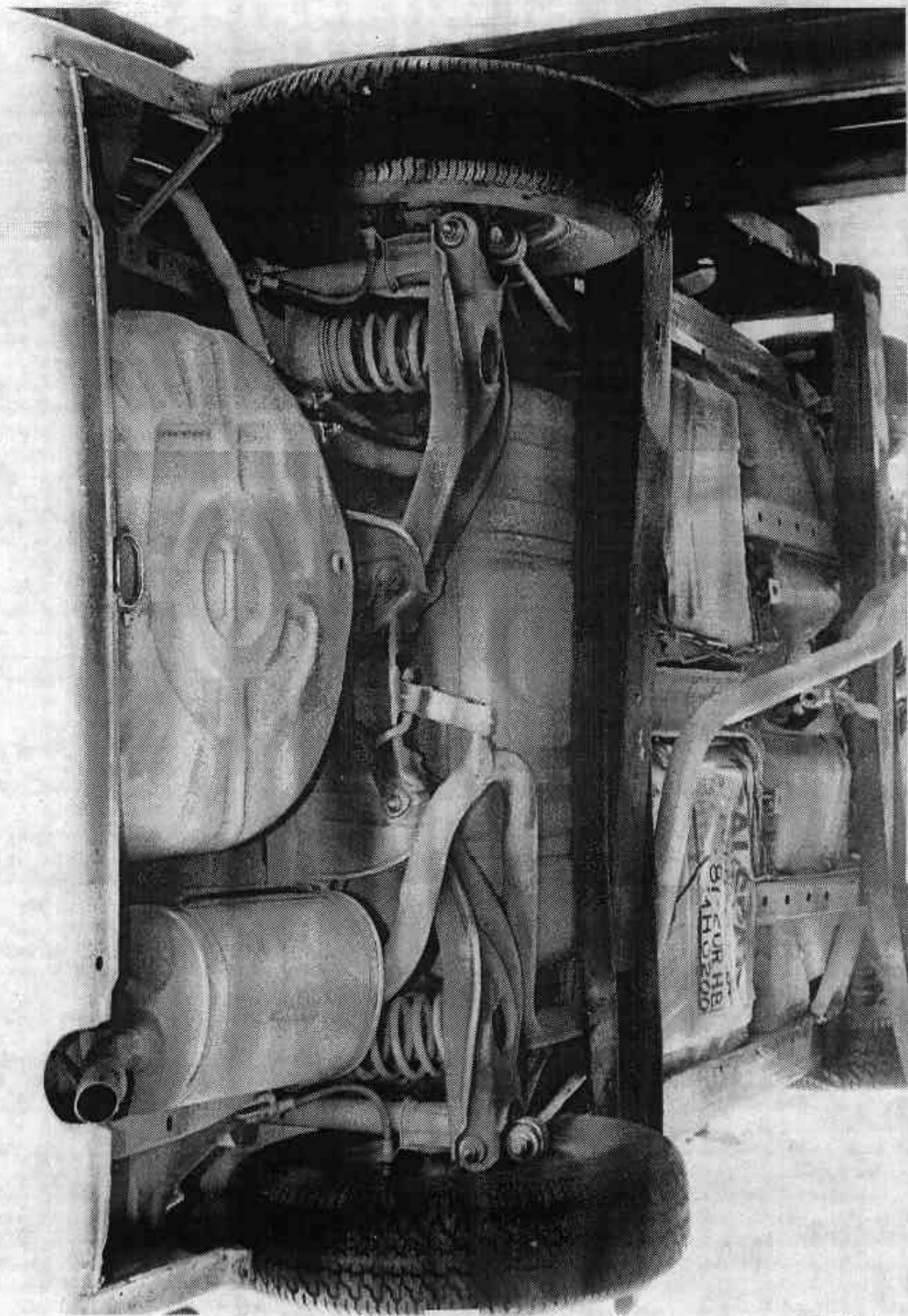


Figure A-19 POST-TEST REAR UNDERBODY VIEW

A-20

7556-1

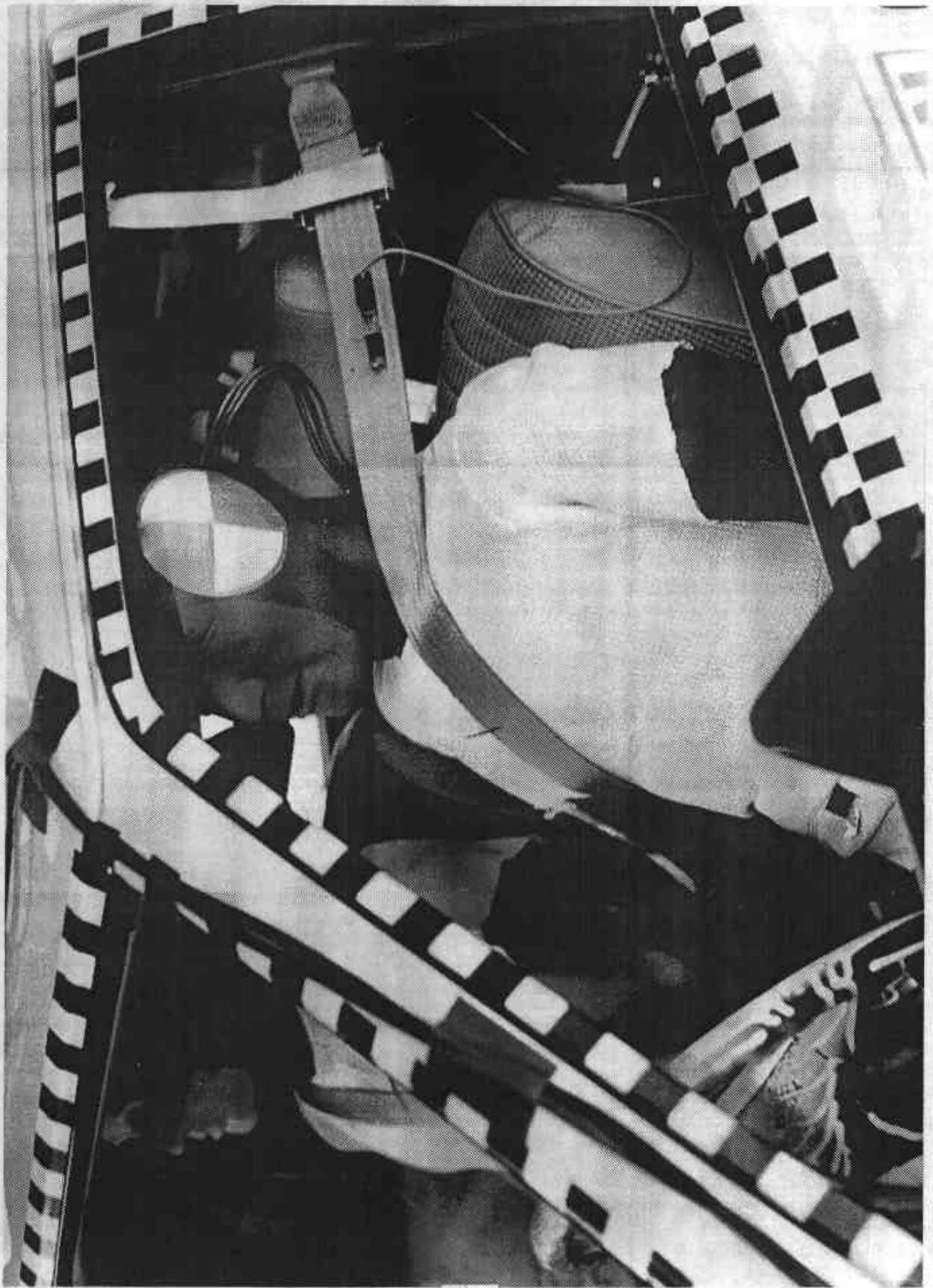


Figure A-20 PRE-TEST DRIVER POSITION VIEW

A-21

7556-1

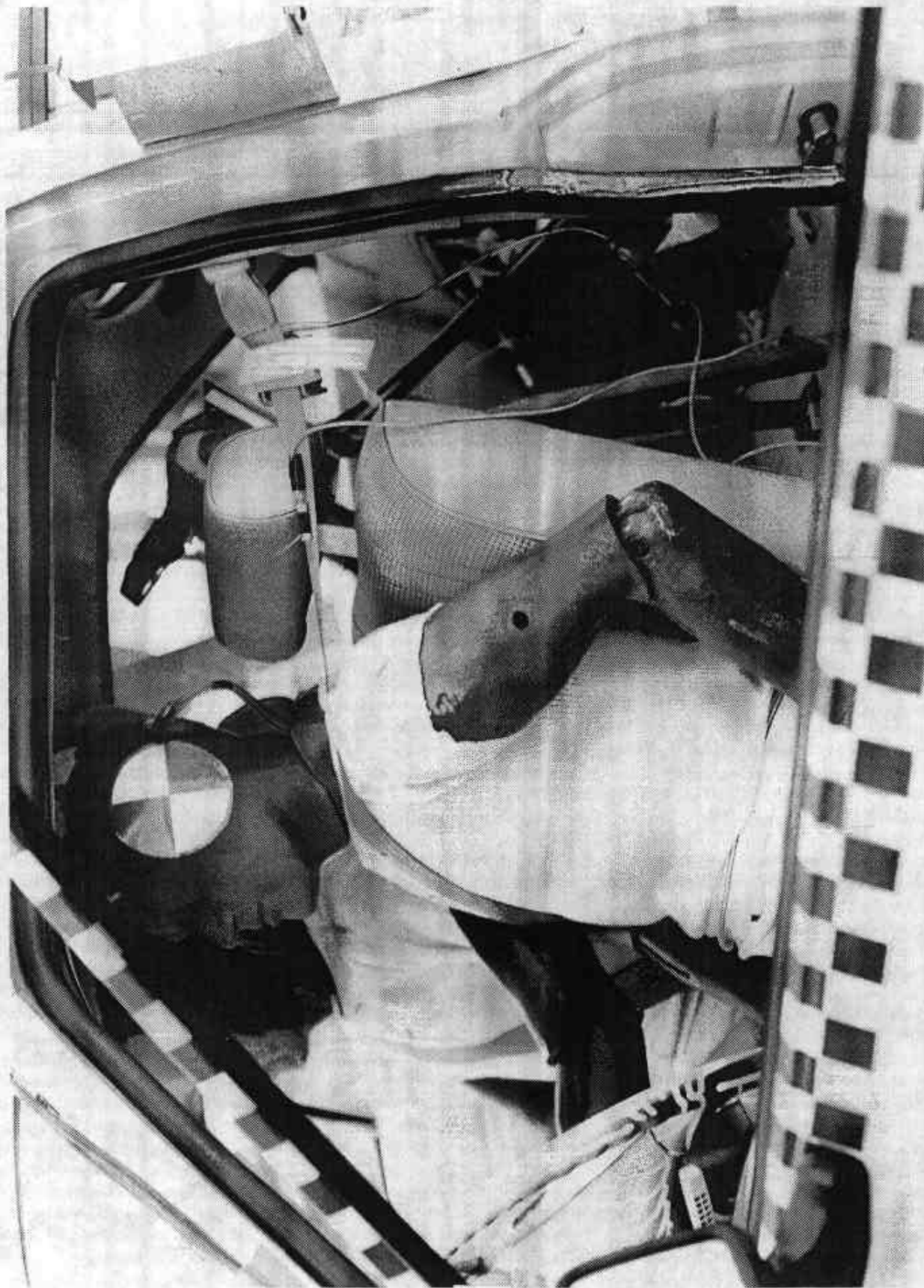


Figure A-21 POST-TEST DRIVER POSITION VIEW

A-22

7556-1

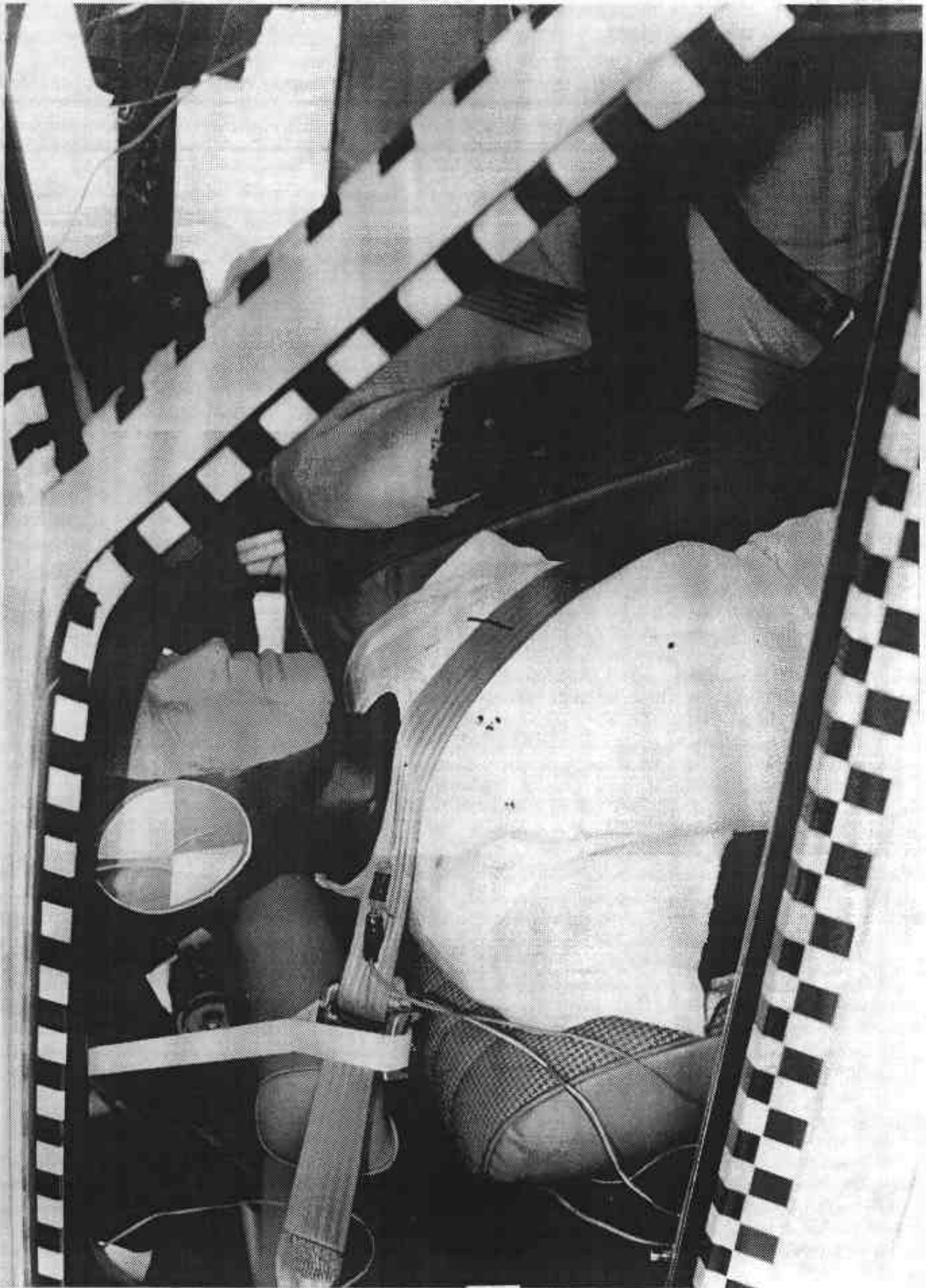


Figure A-22 PRE-TEST PASSENGER POSITION VIEW



Figure A-23 POST-TEST PASSENGER POSITION VIEW

A-24

7556-1

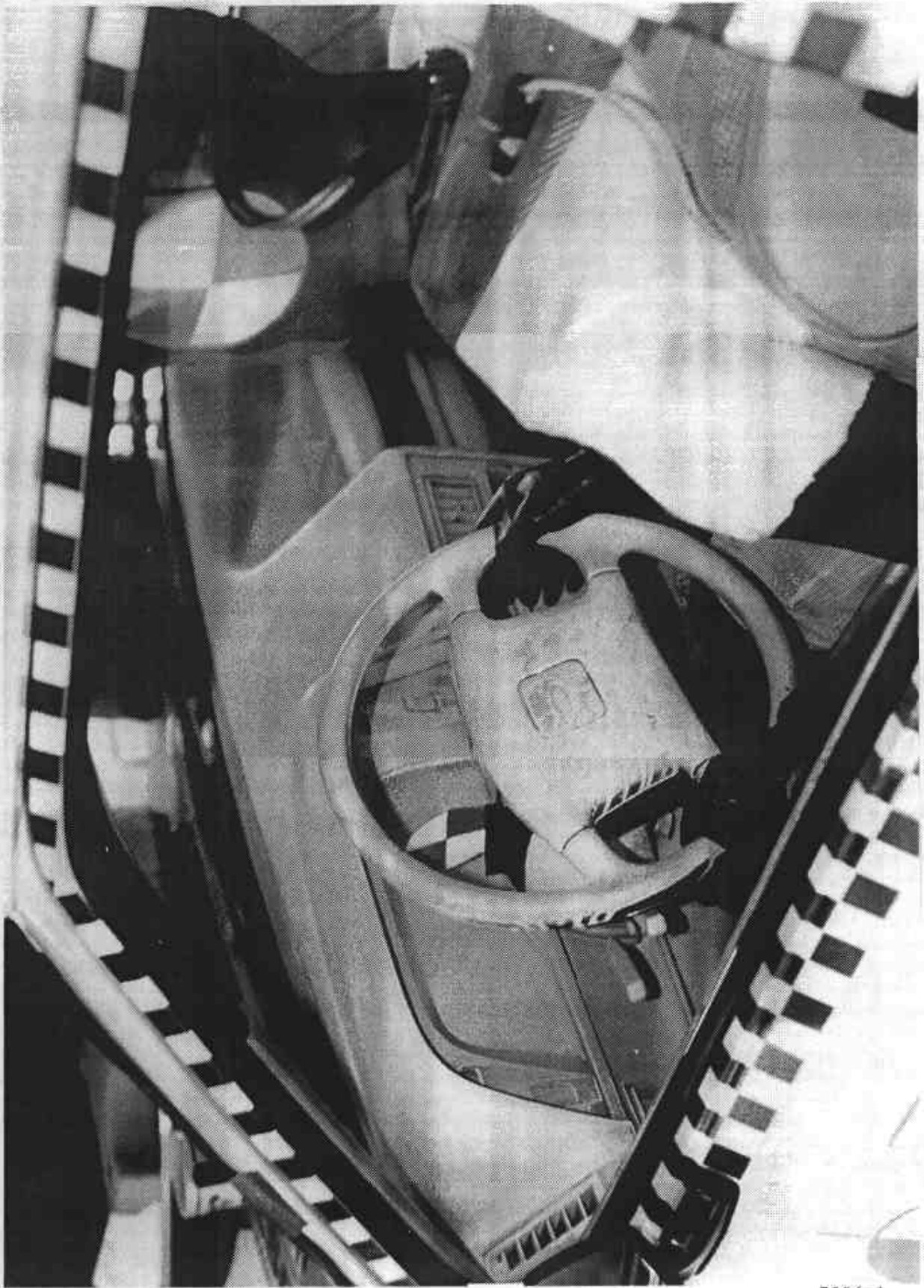


Figure A-24 PRE-TEST DRIVER AND INTERIOR VIEW

A-25

7556-1



Figure A-25 POST-TEST DRIVER AND INTERIOR VIEW

A-26

7556-1



Figure A-26 PRE-TEST PASSENGER AND INTERIOR VIEW

A-27

7556-1

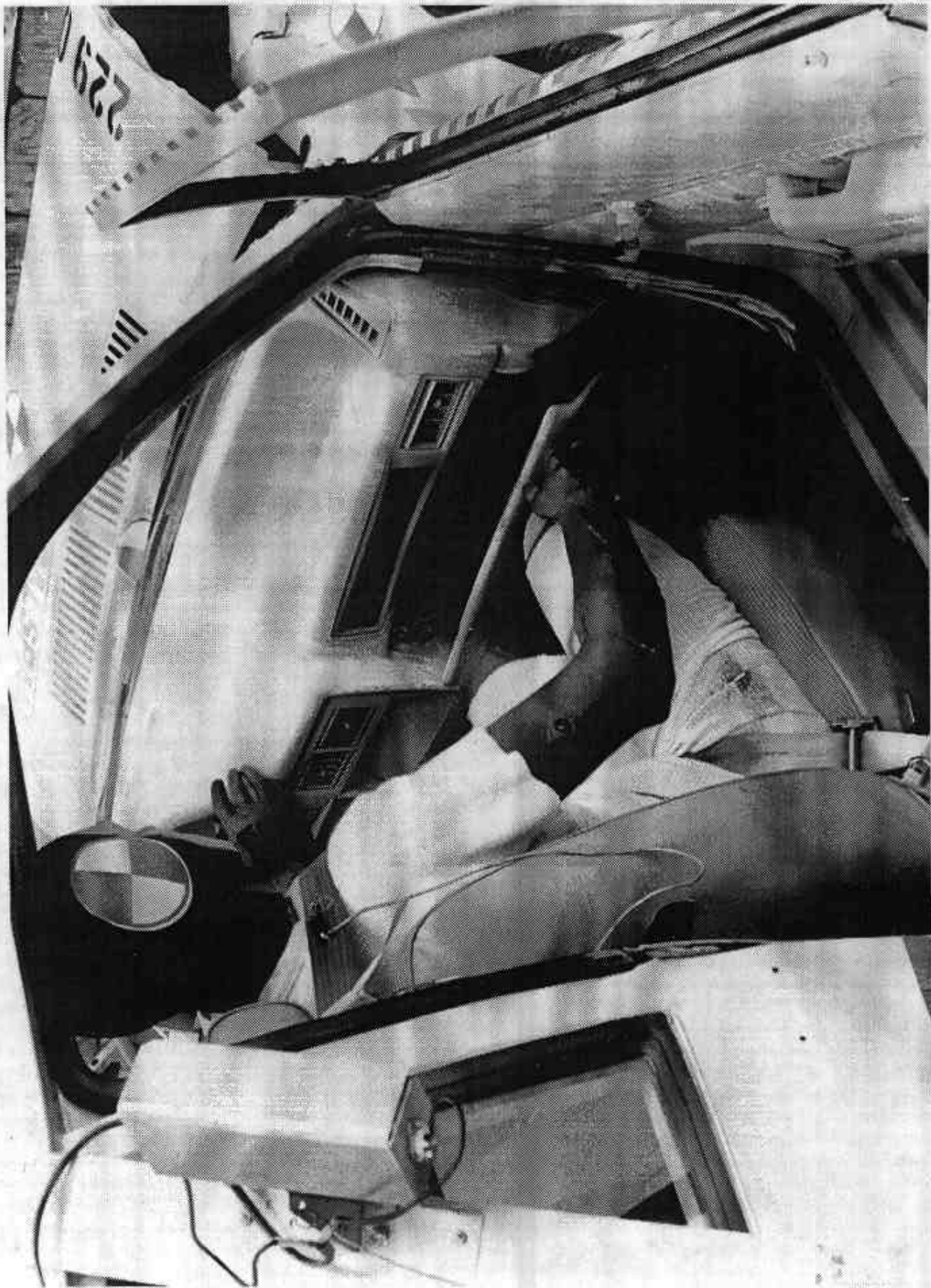


Figure A-27 POST-TEST PASSENGER AND INTERIOR VIEW

A-28

7556-1

Appendix B
VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

TEST NO. MH0200

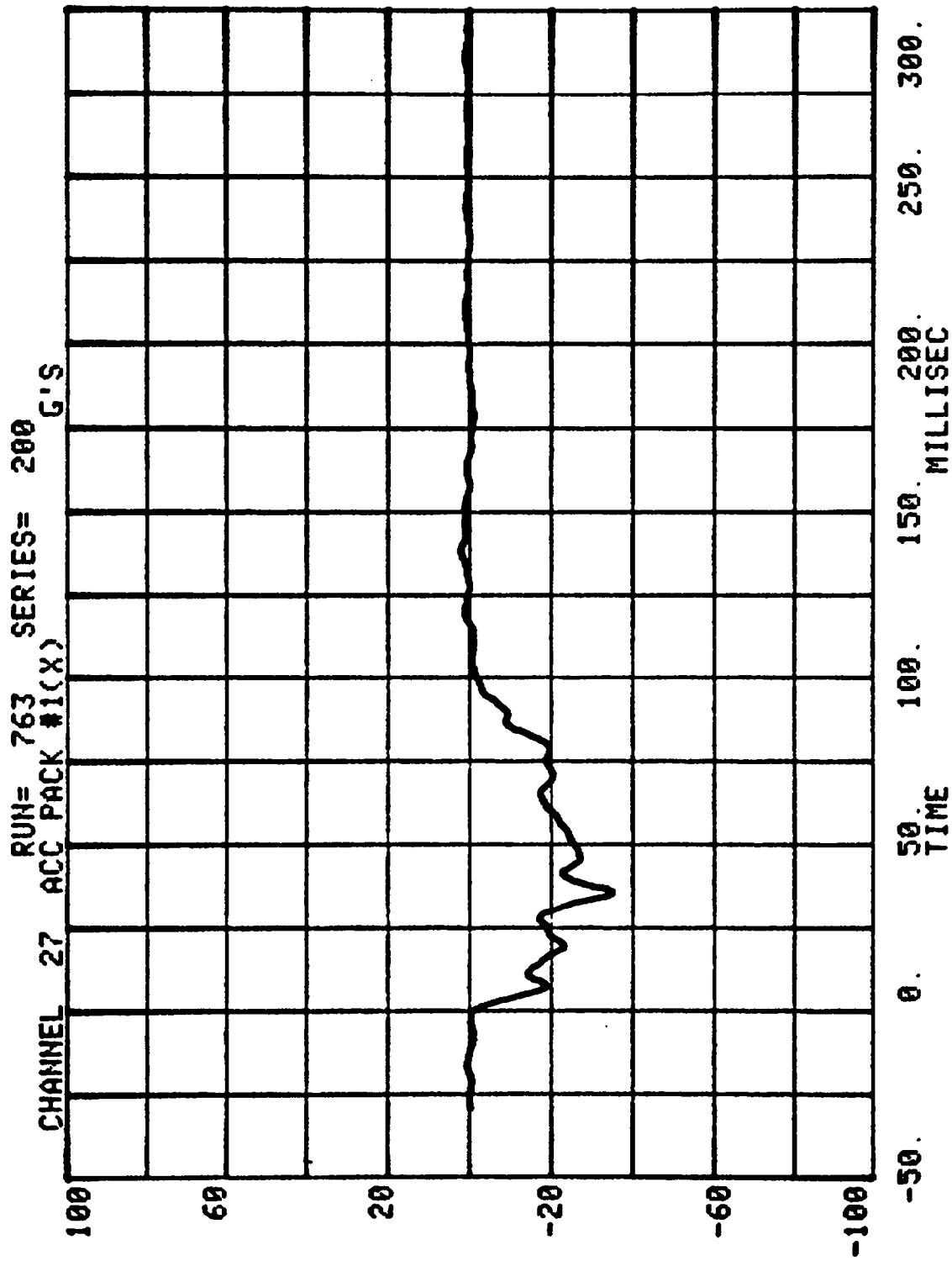
VEHICLE DATA

FILTER CHANNEL CLASS

60

B-2

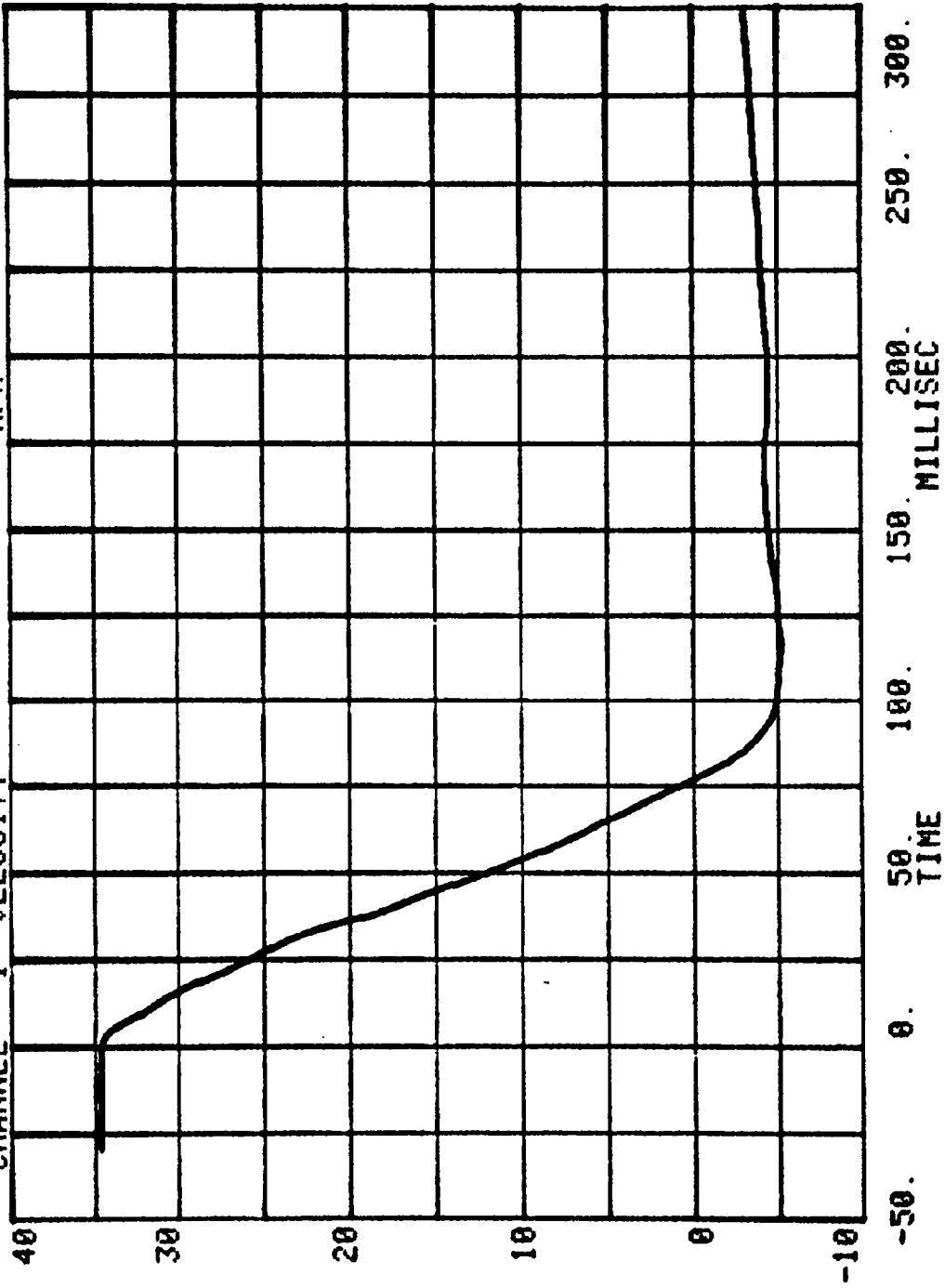
7556-1



ACC #1(X)

CHANNEL 1 VELOCITY SERIES= 200 MPH

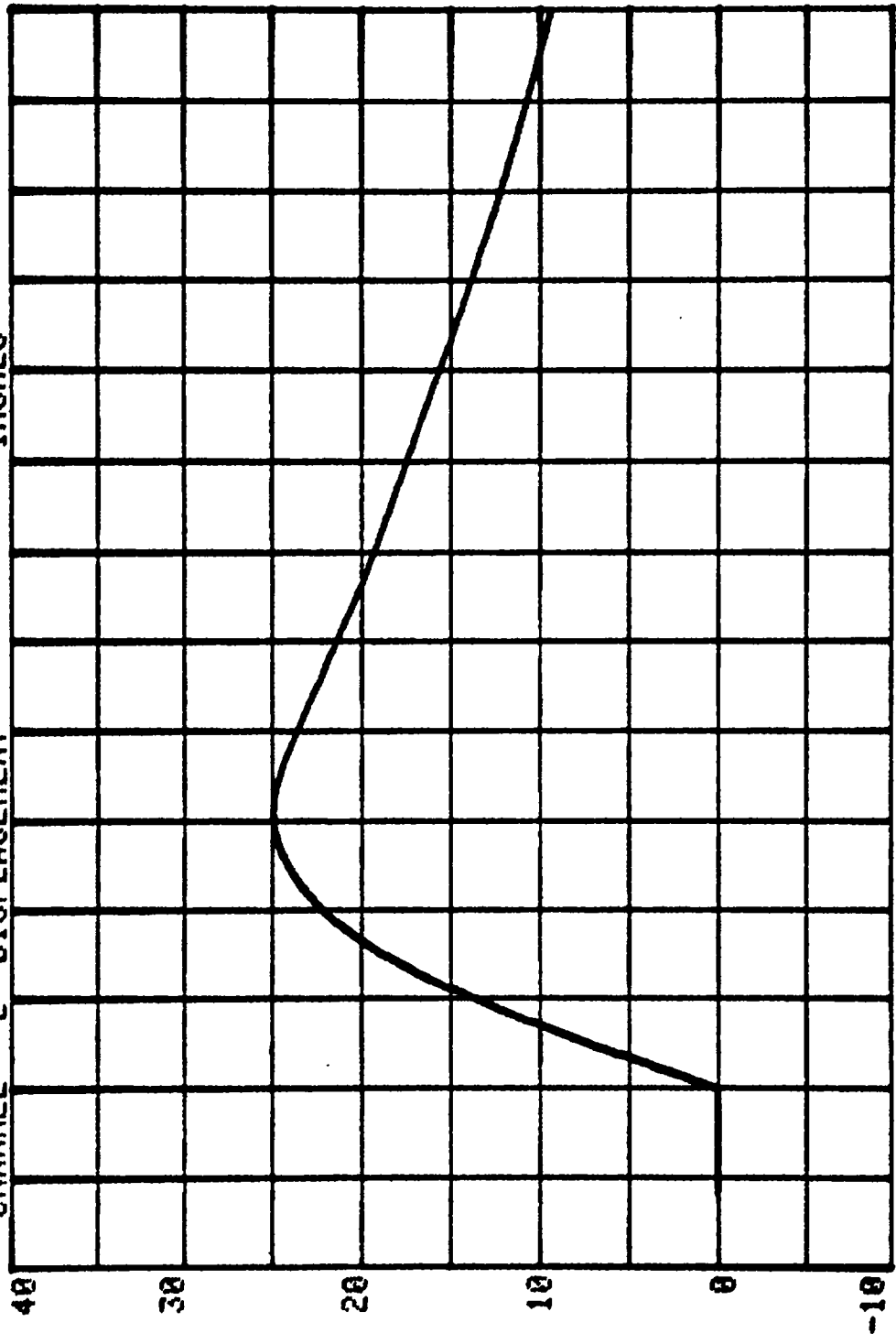
RUN= 763



ACC #1(X)

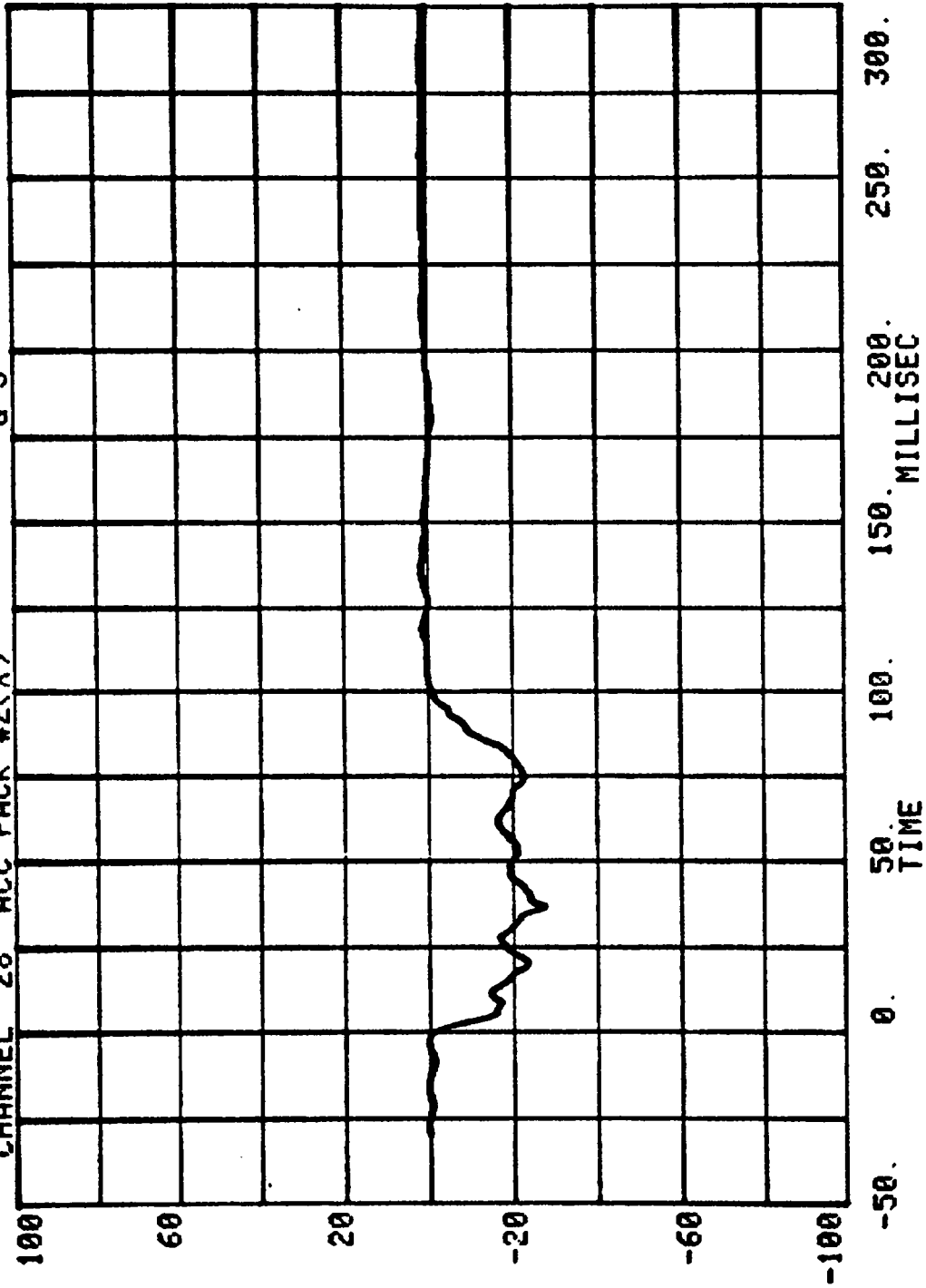
CHANNEL 2 DISPLACEMENT SERIES= 200 INCHES

RUN= 763



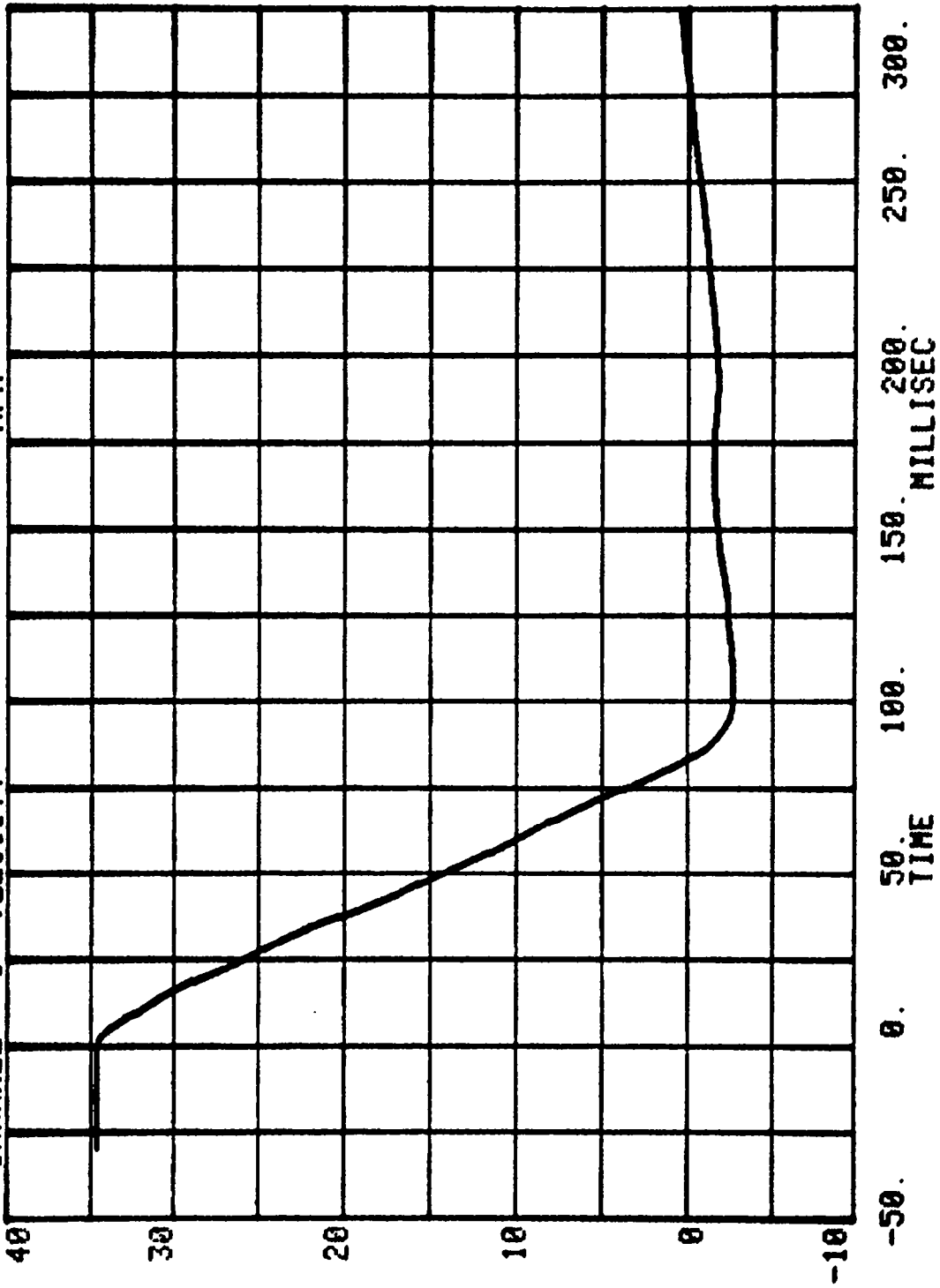
-50. 0. 50. 100. 150. 200. 250. 300.

CHANNEL 28 ACC PACK #2(X) RUN= 763 SERIES= 200 G'S



ACC #2(X)

CHANNEL 3 VELOCITY
RUN= 763 SERIES= 200 MPH

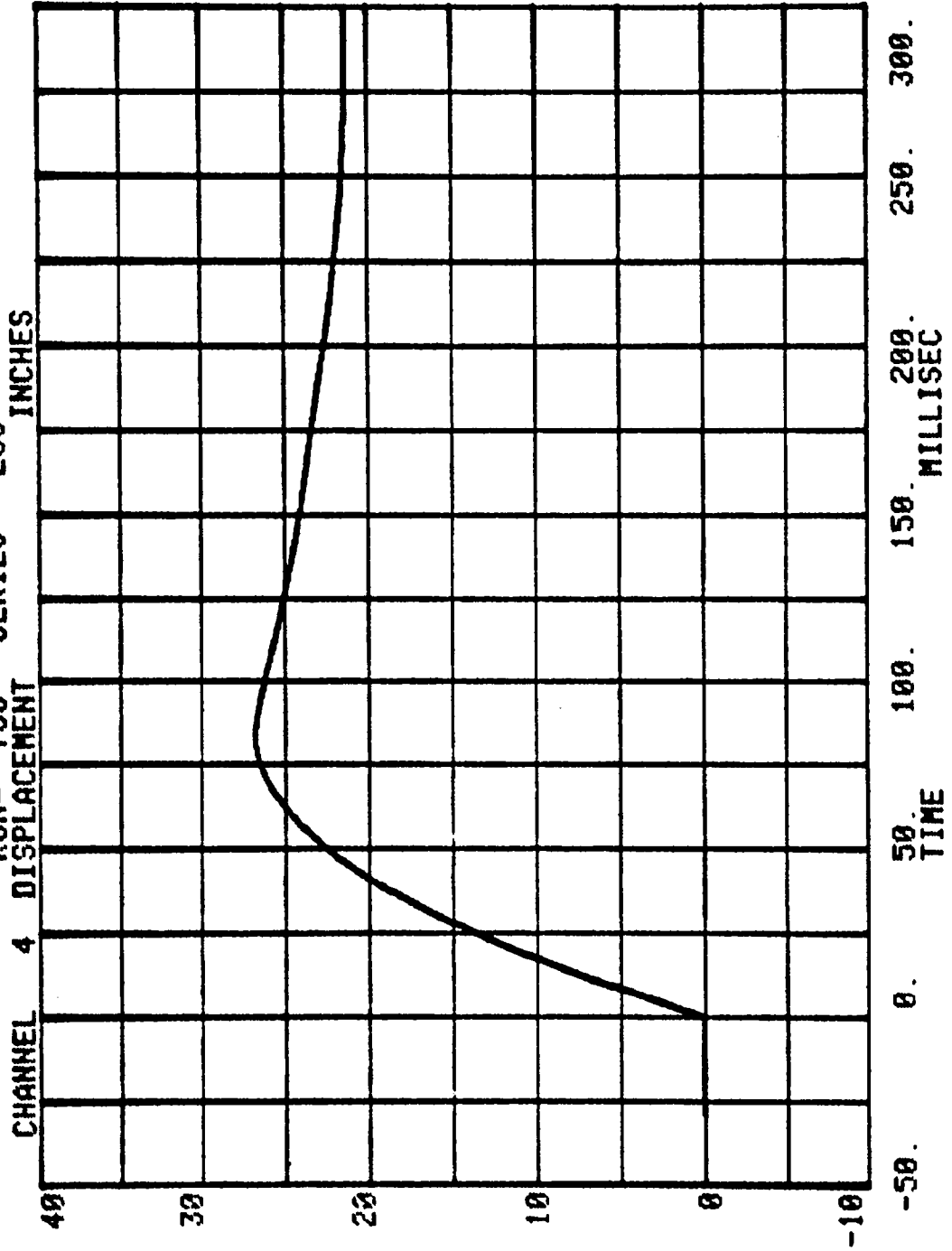


ACC #2(X)

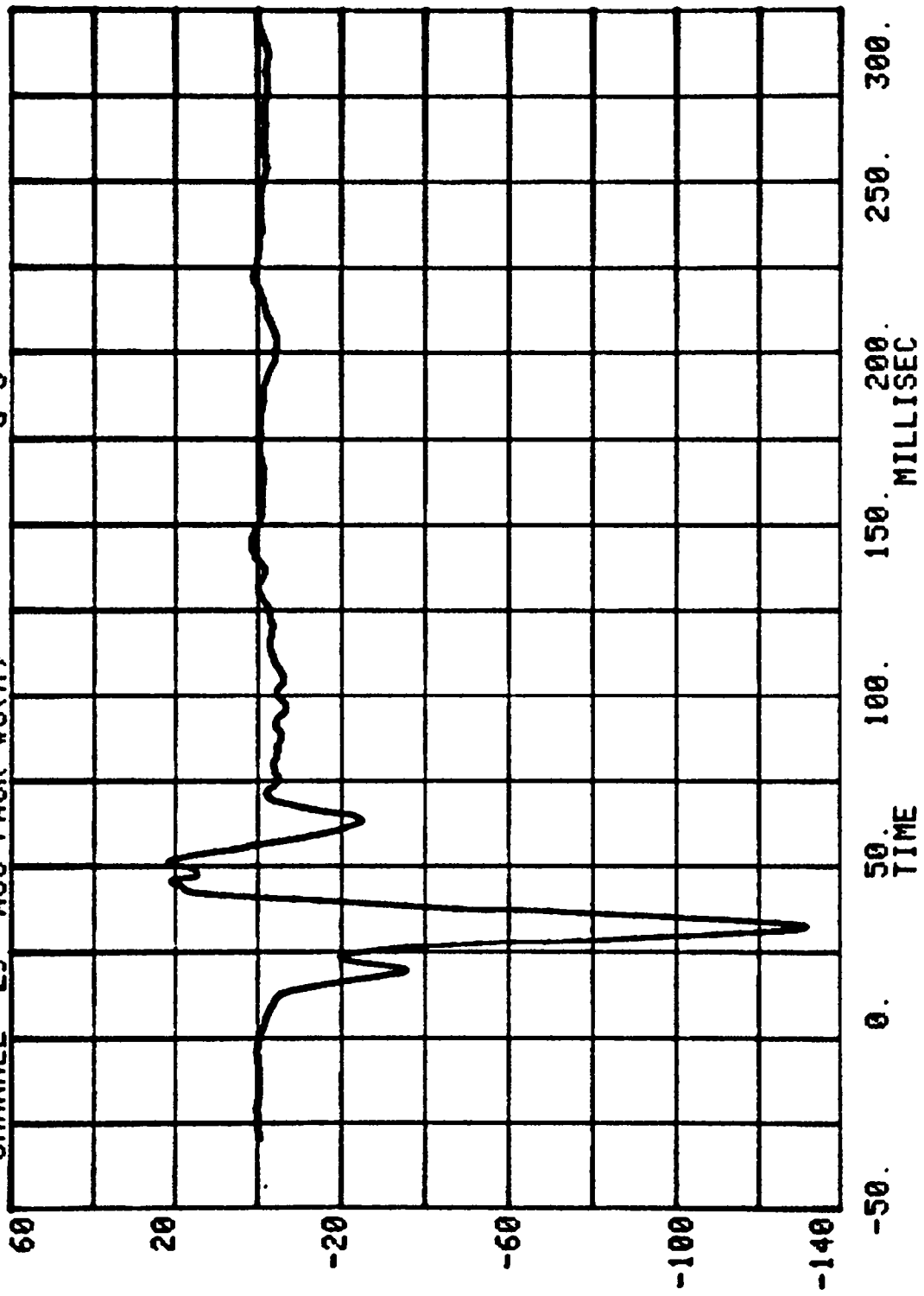
CHANNEL 4 DISPLACEMENT SERIES= 200 INCHES

RUN= 763

SERIES= 200

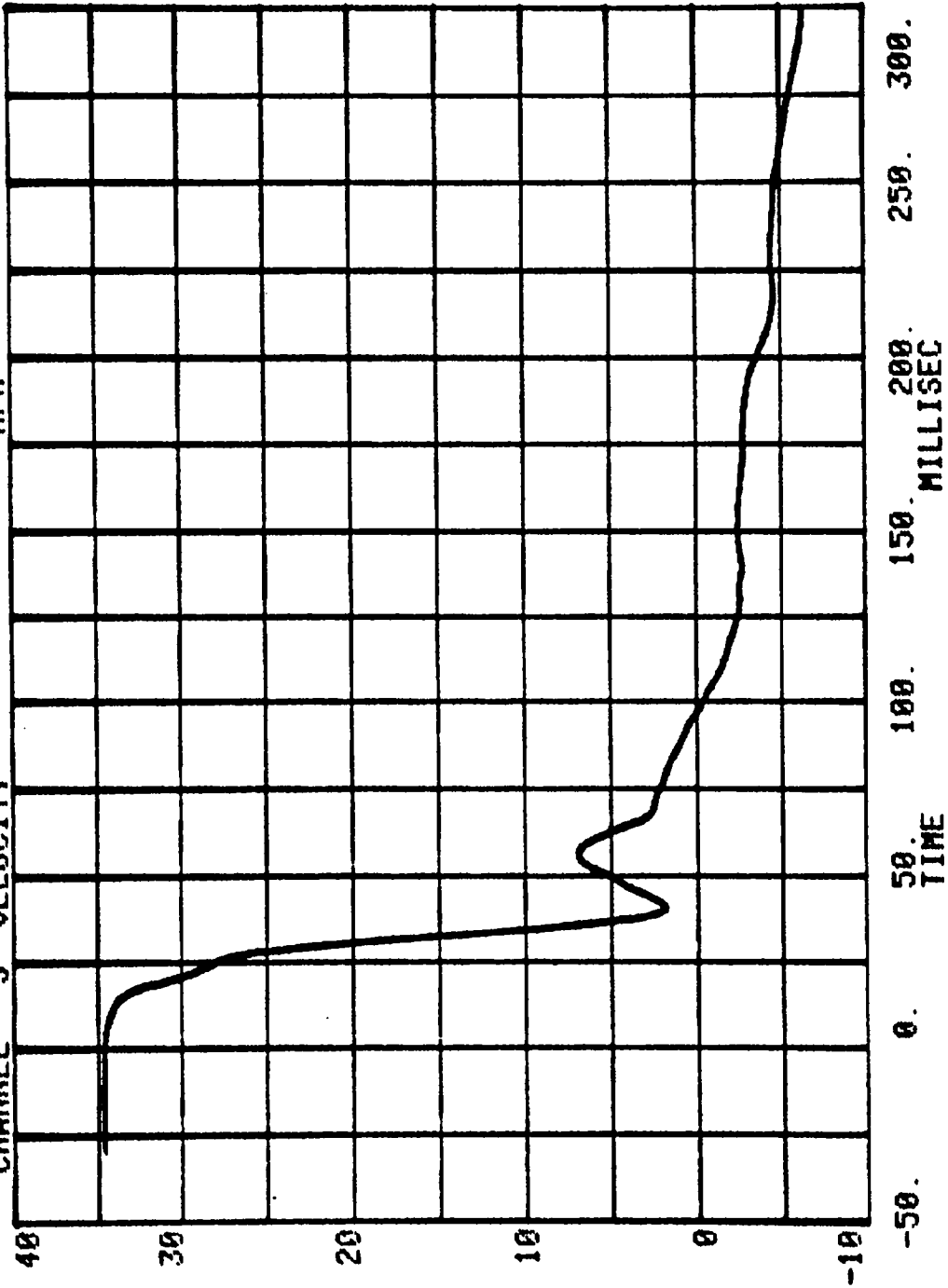


CHANNEL 29 ACC PACK #3(X) RUN= 763 SERIES= 200 G'S



ACC #3(X)

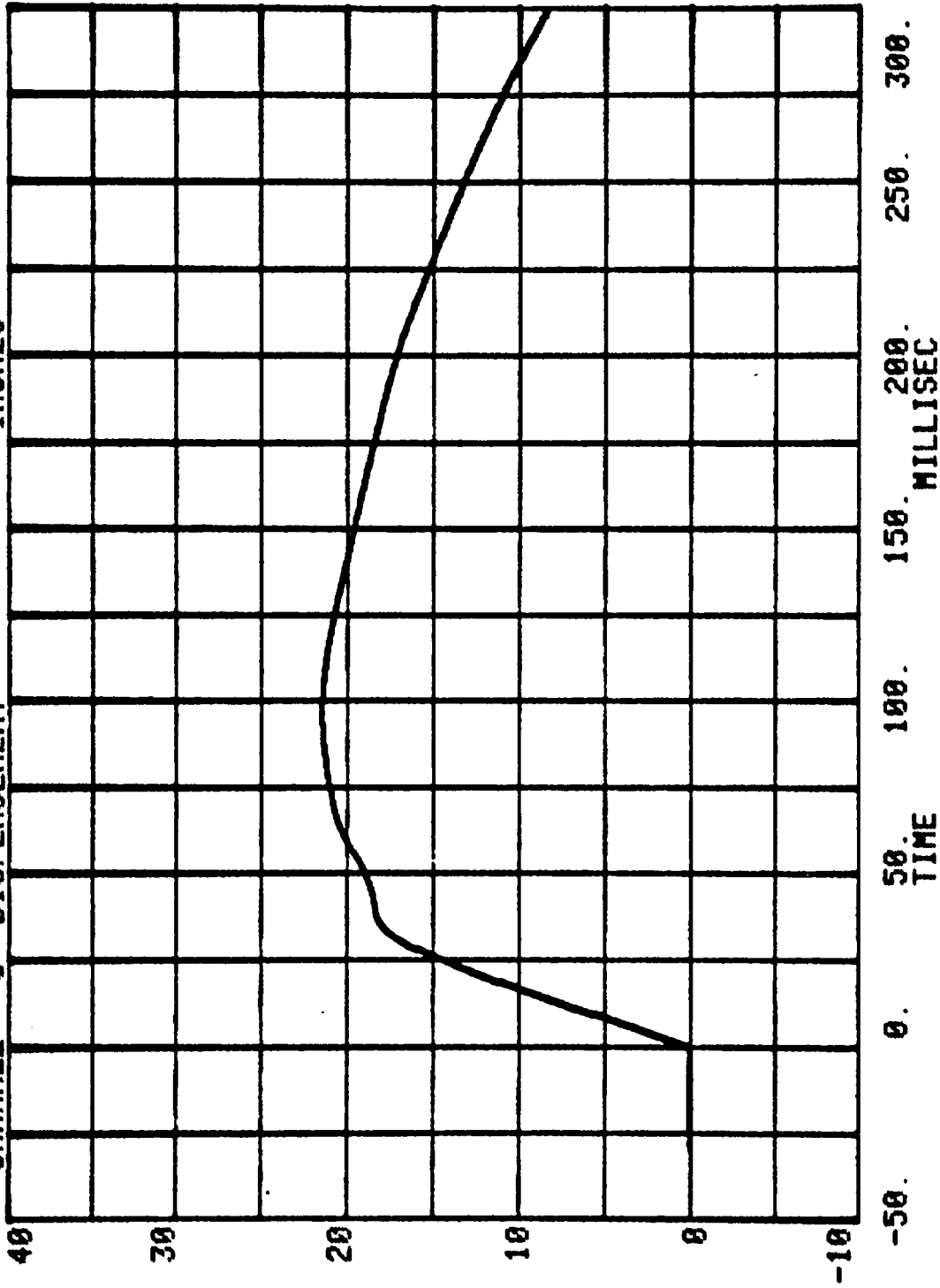
CHANNEL 5 VELOCITY
RUN= 763 SERIES= 200 MPH

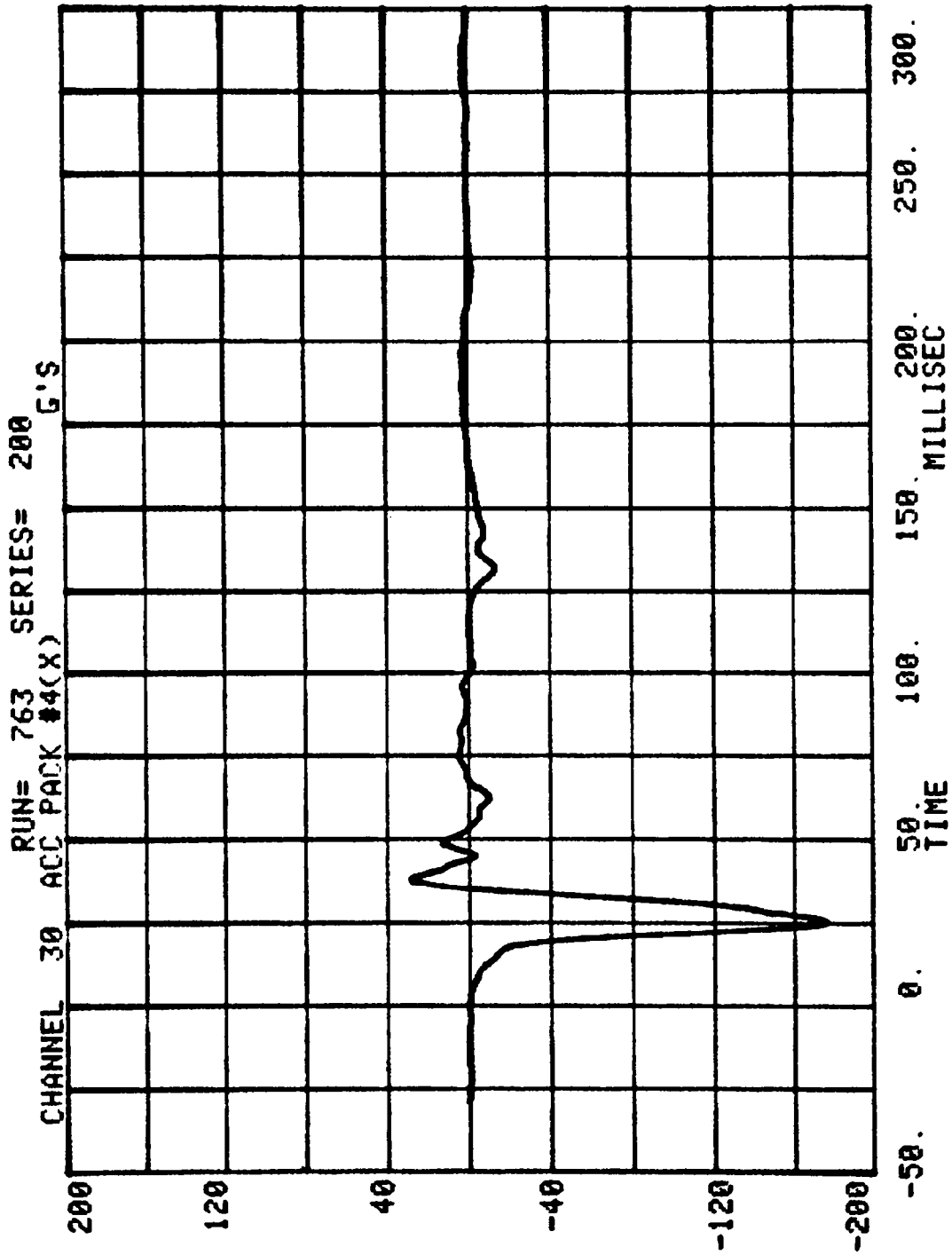


ACC #3(X)

CHANNEL 6 DISPLACEMENT SERIES= 200 INCHES

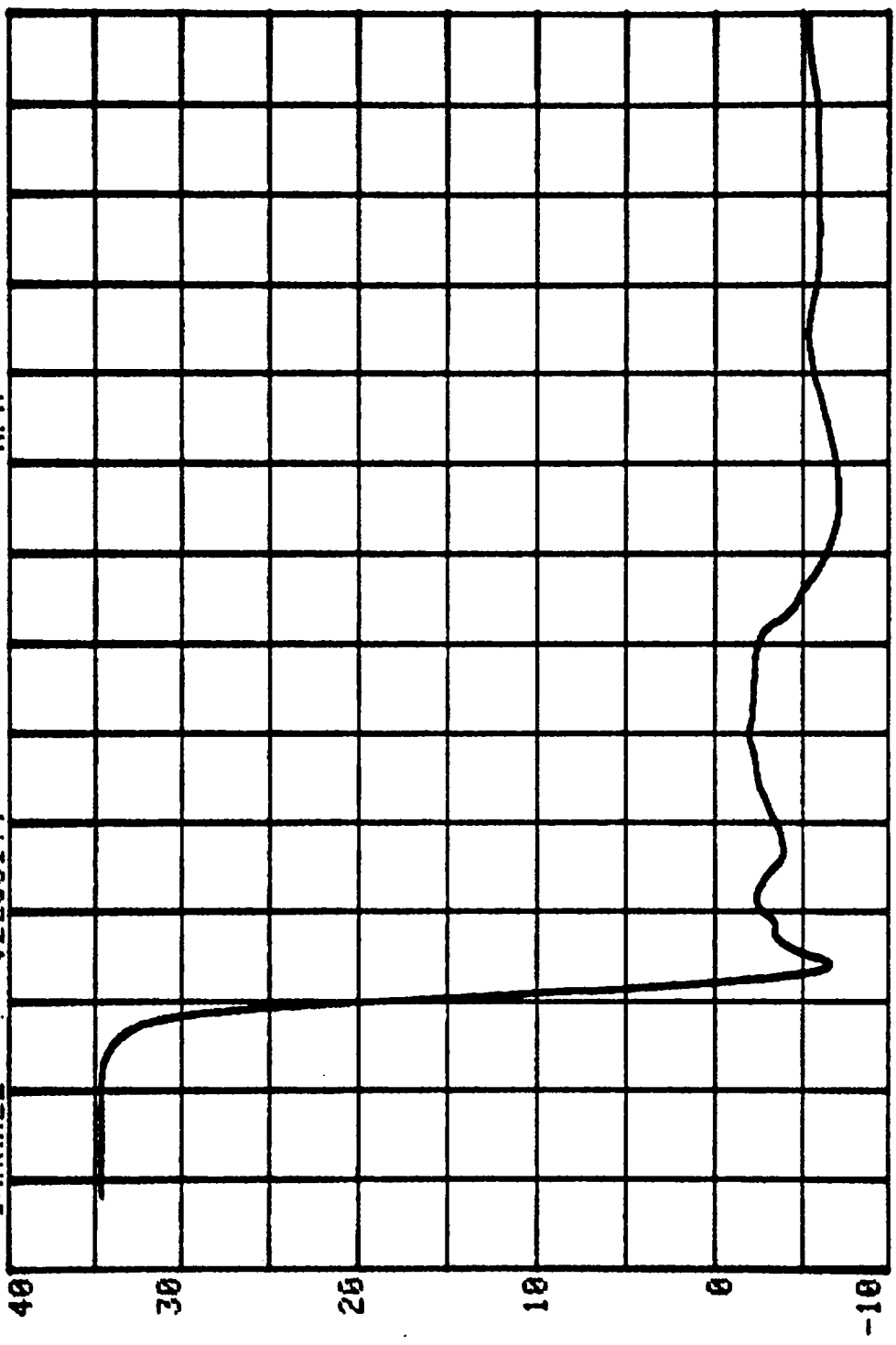
RUN= 763





ACC #4 (X)

CHANNEL 7 VELOCITY
RUN= 763 SERIES= 200 MPH

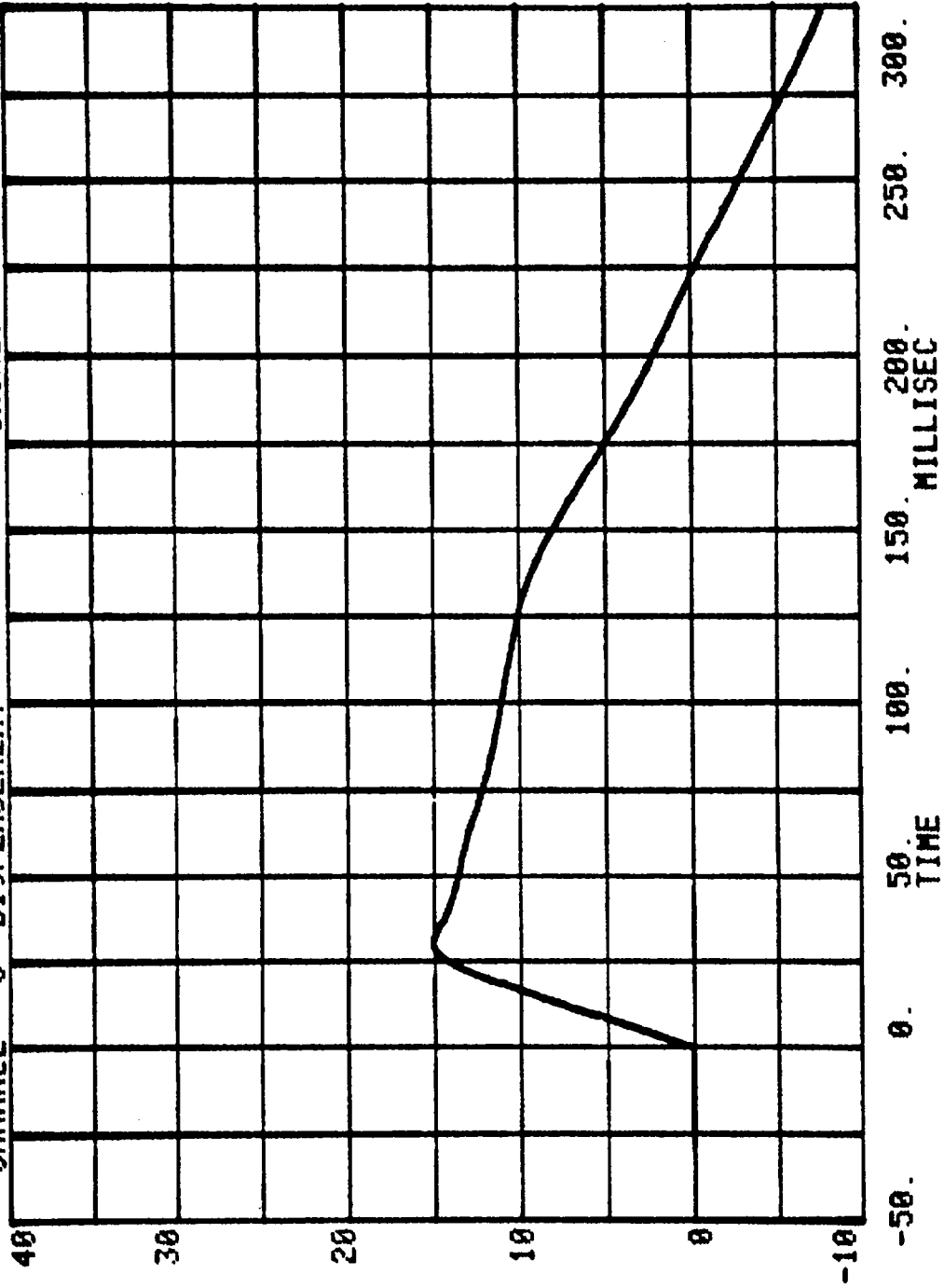


-50. 0. 50. 100. 150. 200. 250. 300.
TIME

ACC #4 (X)

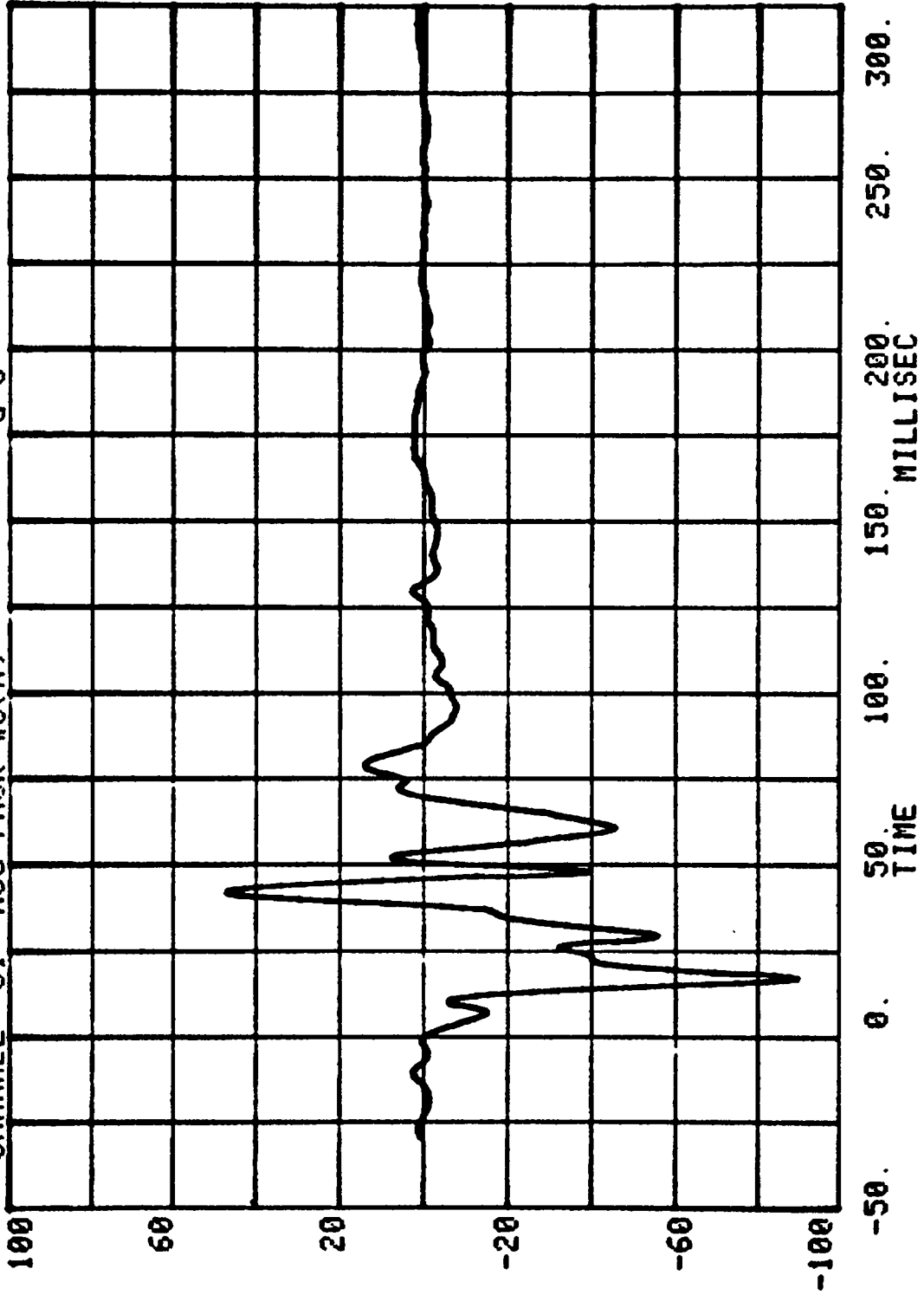
CHANNEL 8 DISPLACEMENT SERIES= 200 INCHES

RUN= 763



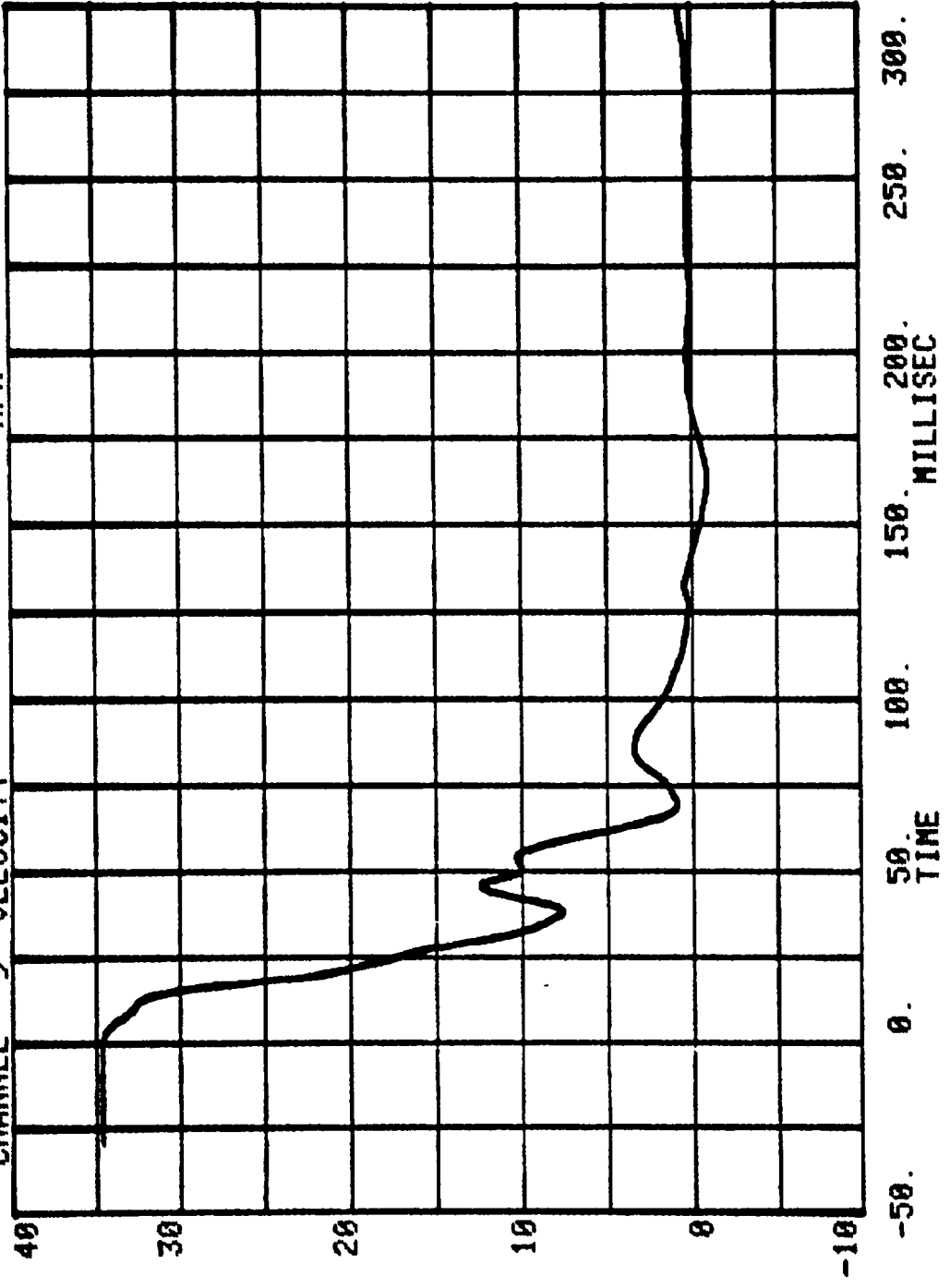
CHANNEL 31 ACC PACK #5(X) G'S

RUN= 763 SERIES= 200



ACC #5(X)

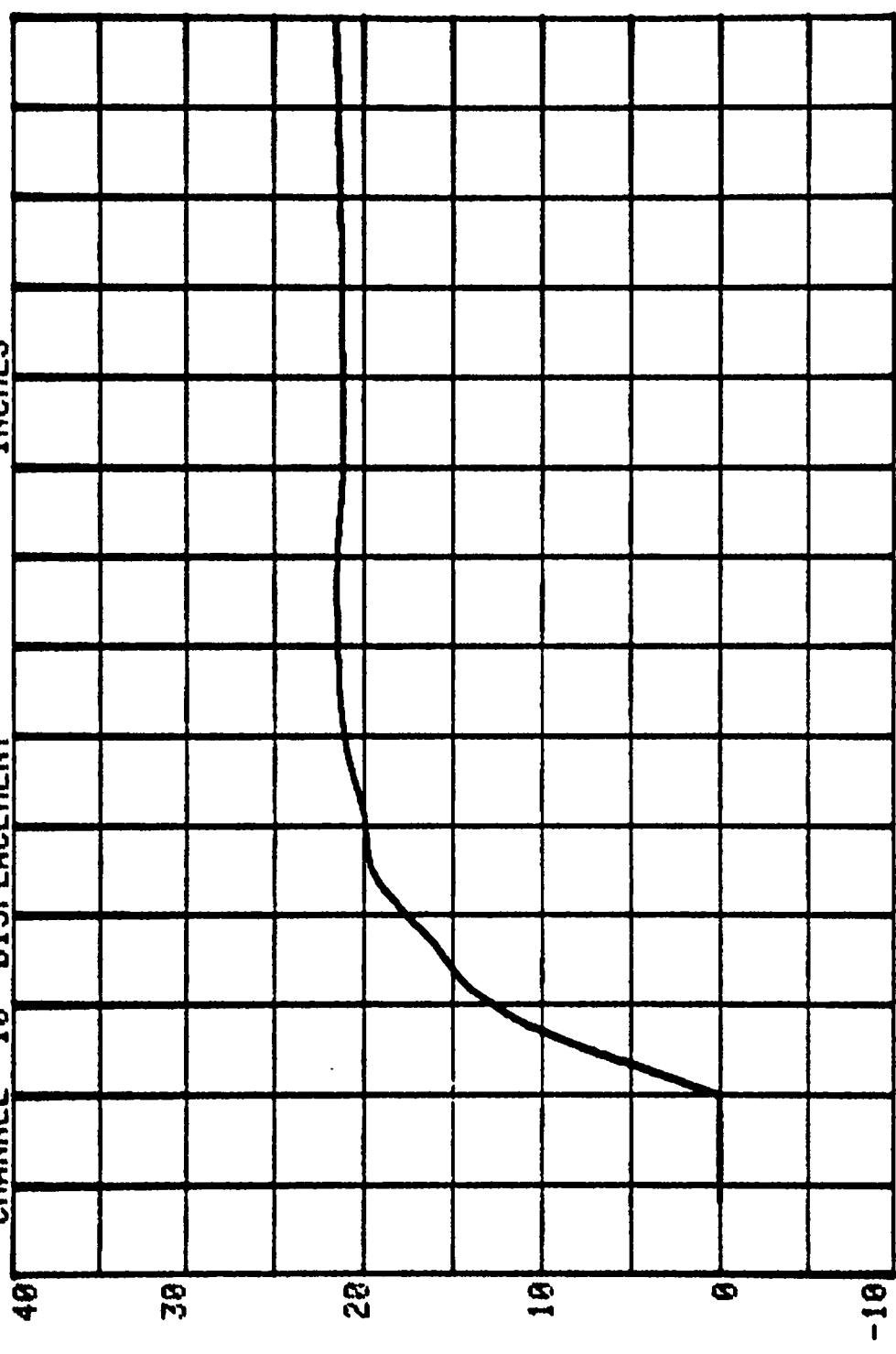
CHANNEL 9 VELOCITY
RUN= 763 SERIES= 200 MPH



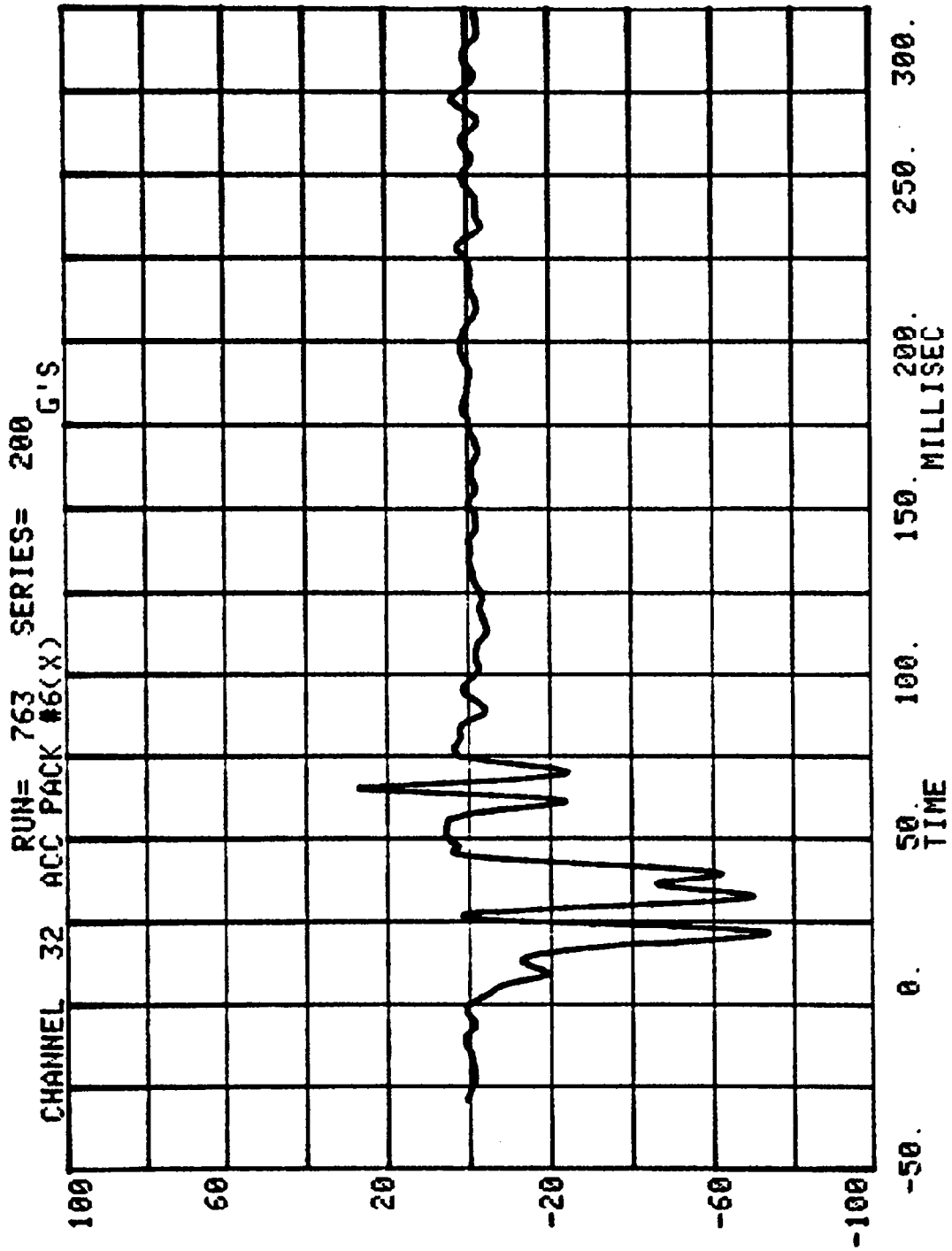
ACC #5 (X)

CHANNEL 10 DISPLACEMENT SERIES= 200 INCHES

RUN= 763

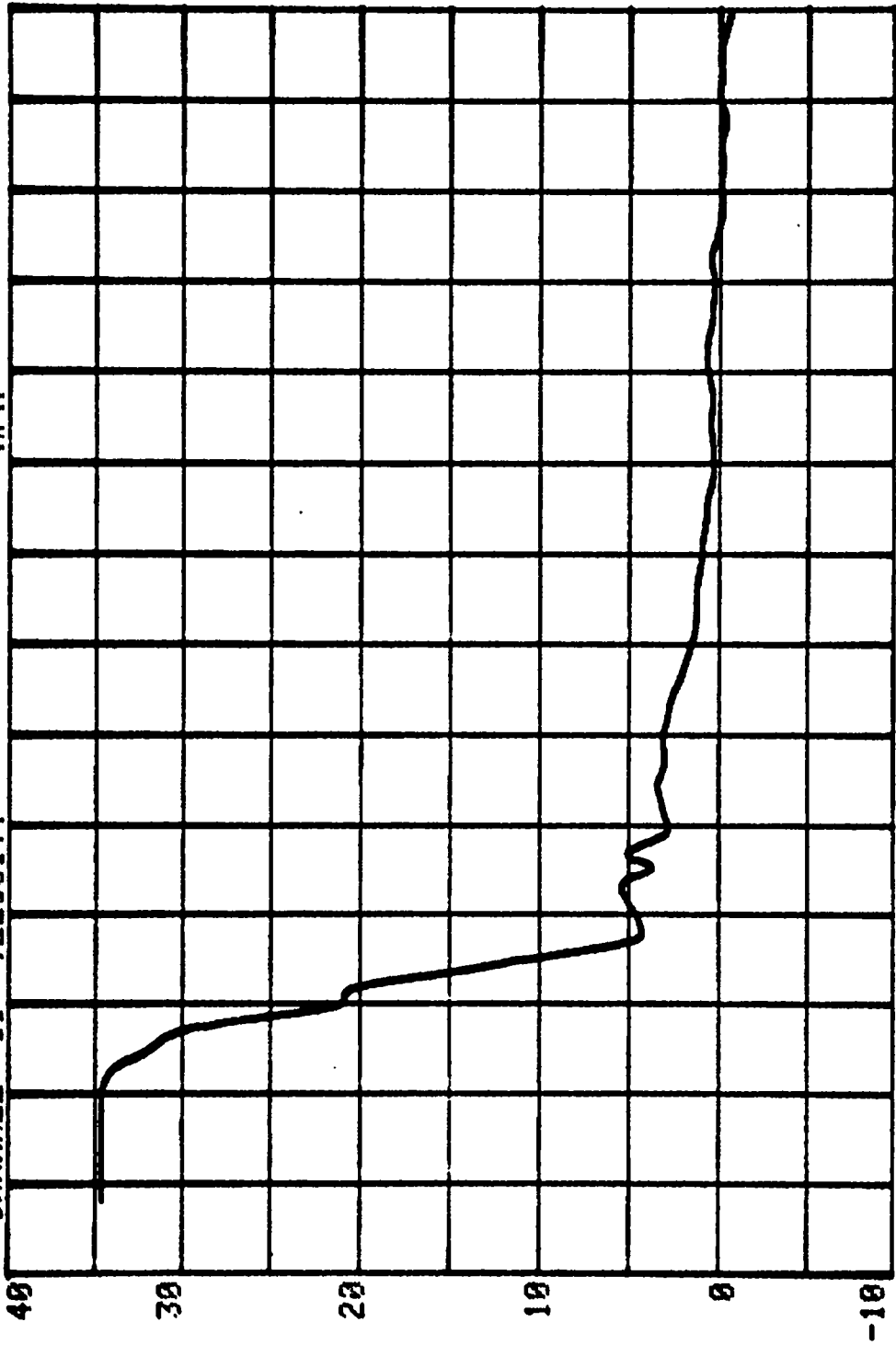


-50. 0. 50. 100. 150. 200. 250. 300.



ACC #6 (X)

CHANNEL 11 VELOCITY
RUN= 763 SERIES= 200 MPH

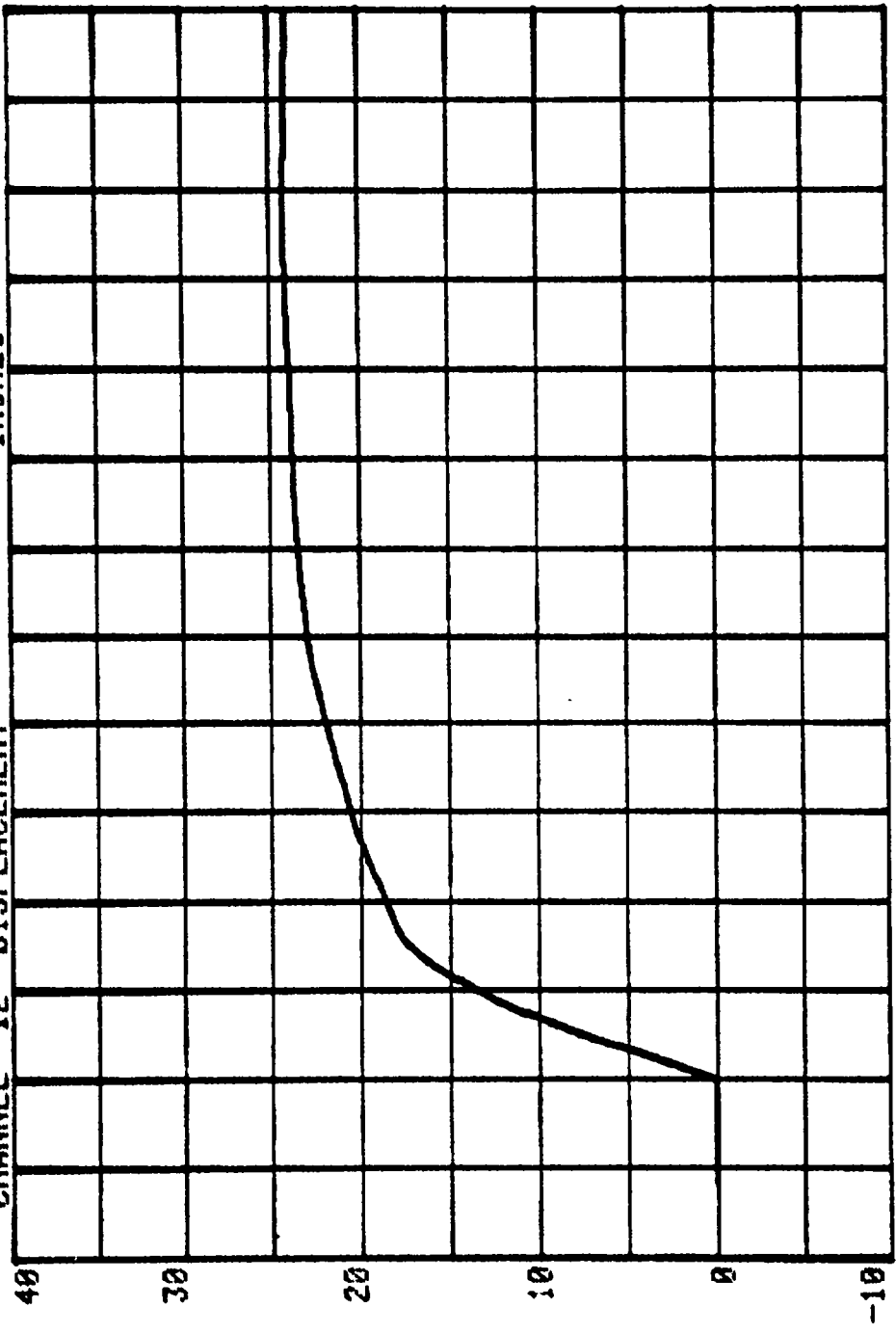


TIME
-50. 0. 50. 100. 150. 200. 250. 300.

ACC #16(X)

CHANNEL 12 DISPLACEMENT SERIES= 200 INCHES

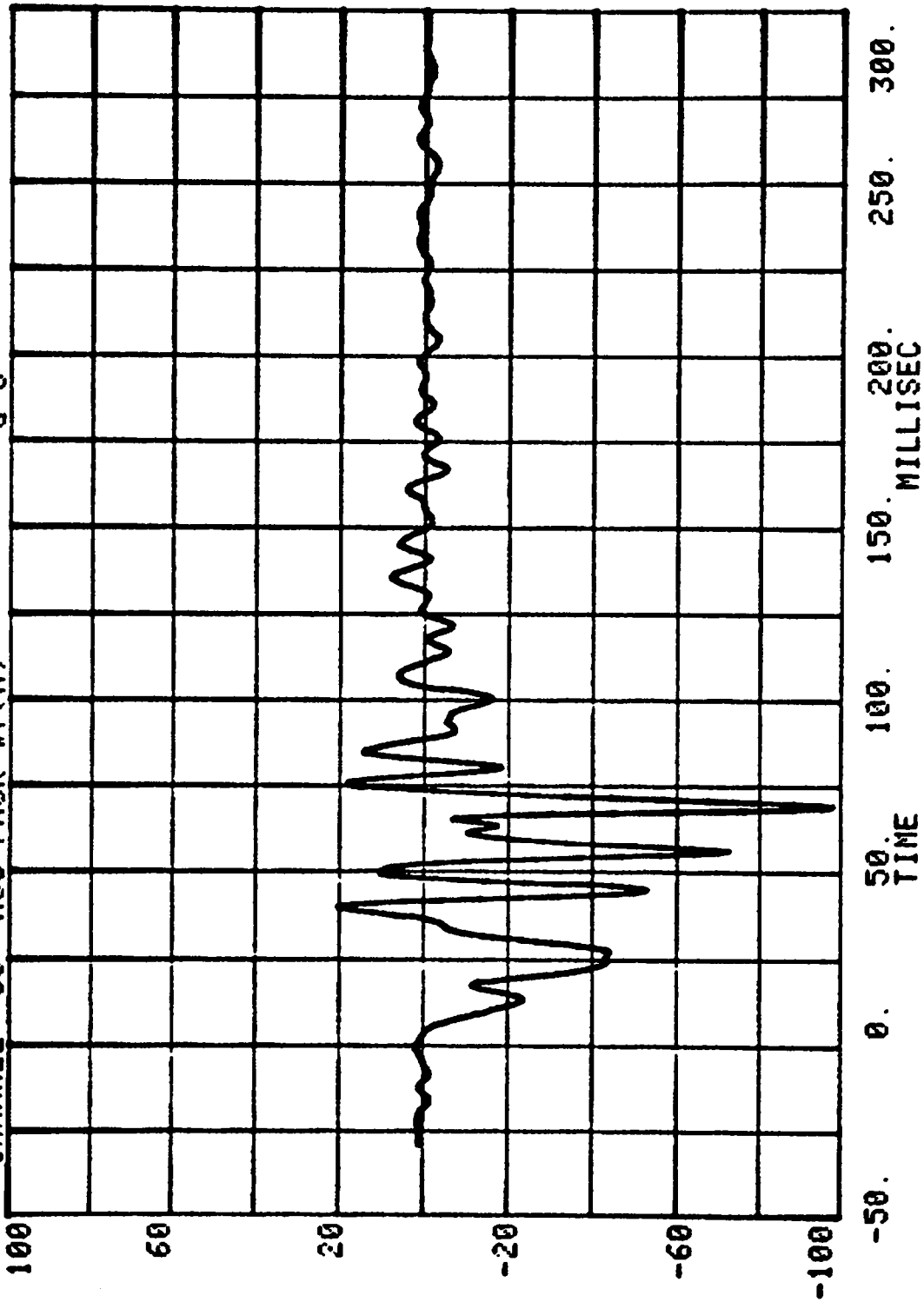
RUN= 763



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

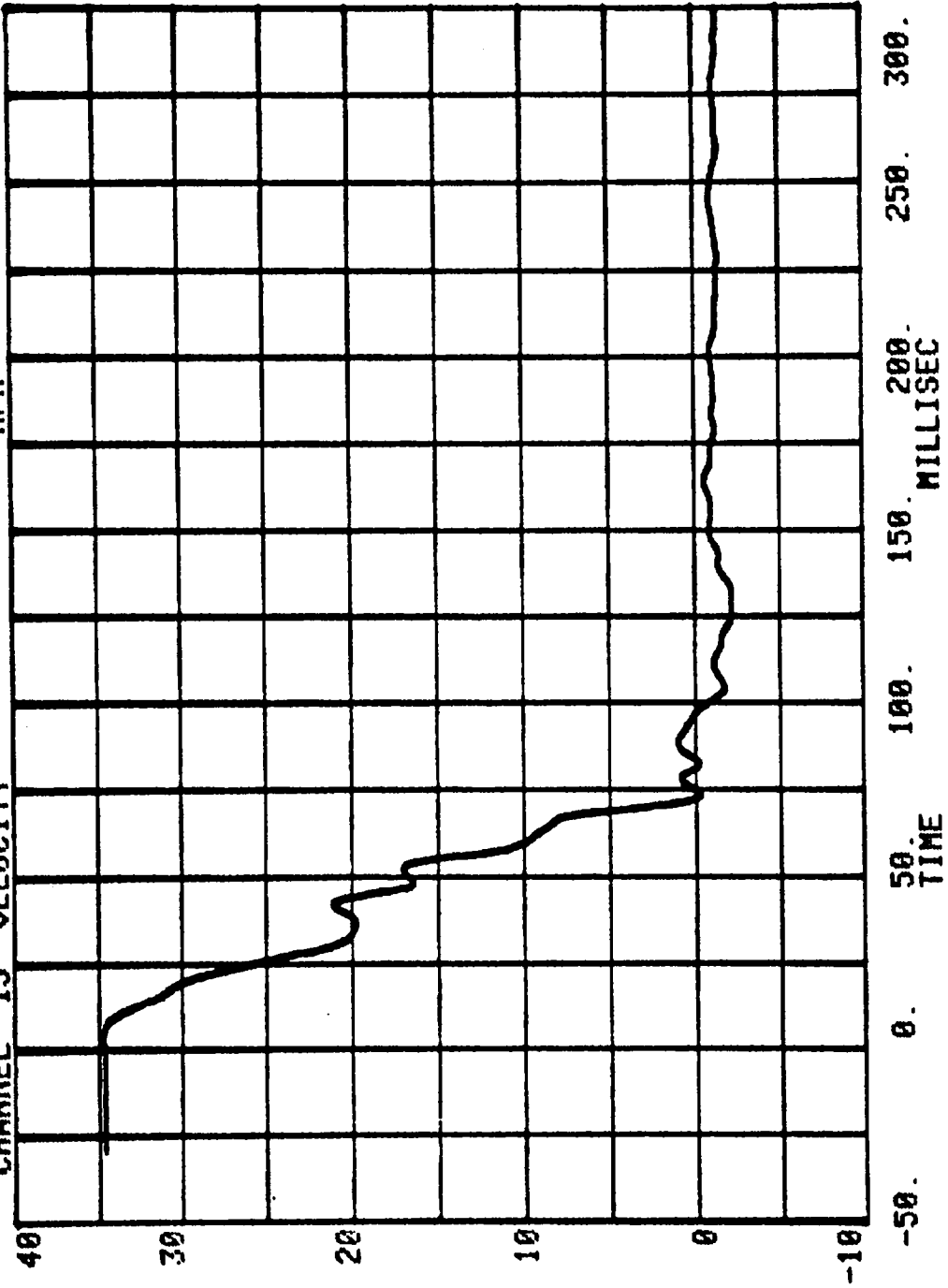
CHANNEL 33 ACC PACK #7(X) G'S

RUN= 763 SERIES= 200



ACC #7(X)

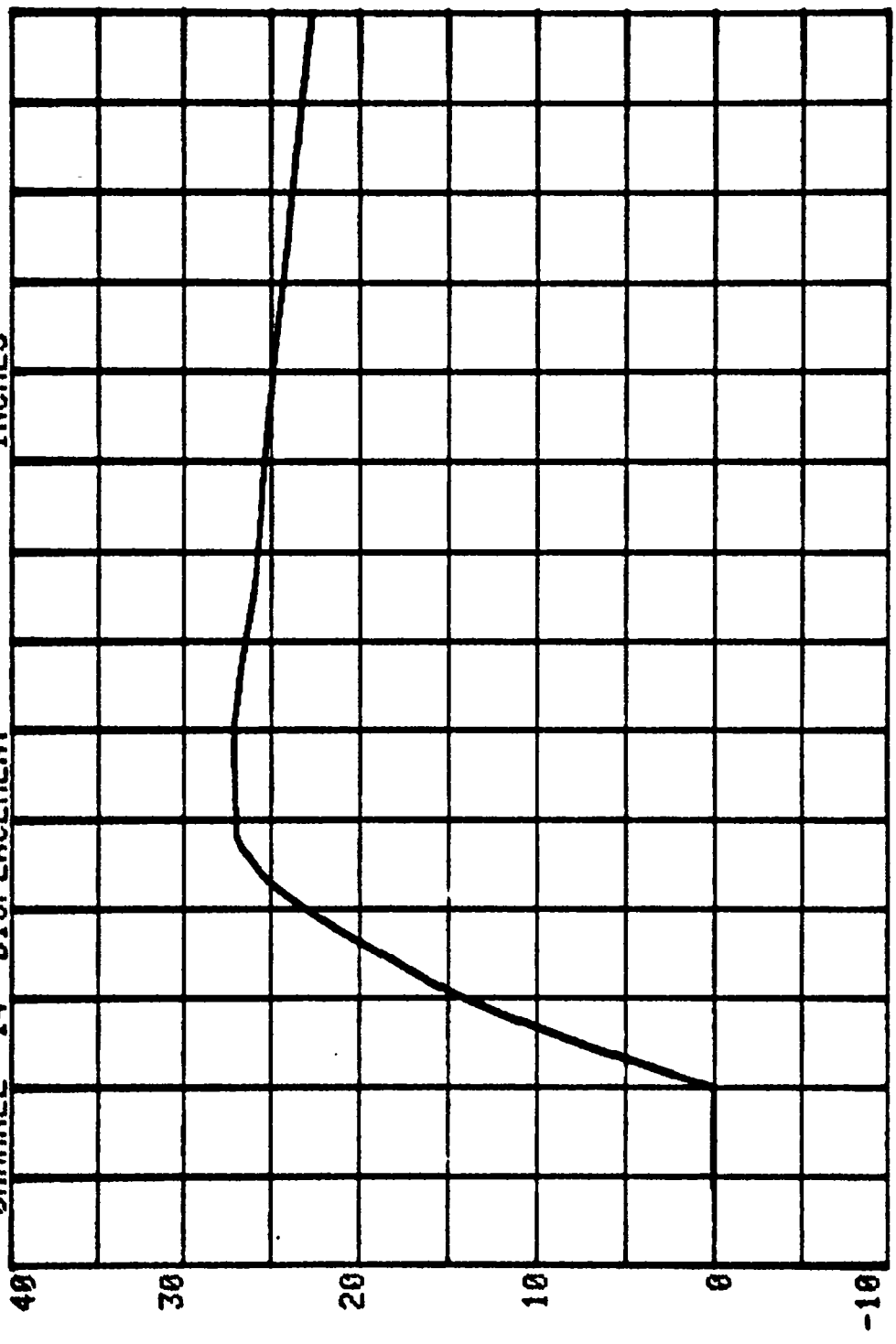
CHANNEL 13 VELOCITY
RUN= 763 SERIES= 200 MPH



ACC #7(X)

CHANNEL 14 DISPLACEMENT SERIES= 200 INCHES

RUN= 763



40
30
20
10
0
-10
-50. 0. 50. 100. 150. 200. 250. 300.
TIME

TEST NO. MH0200

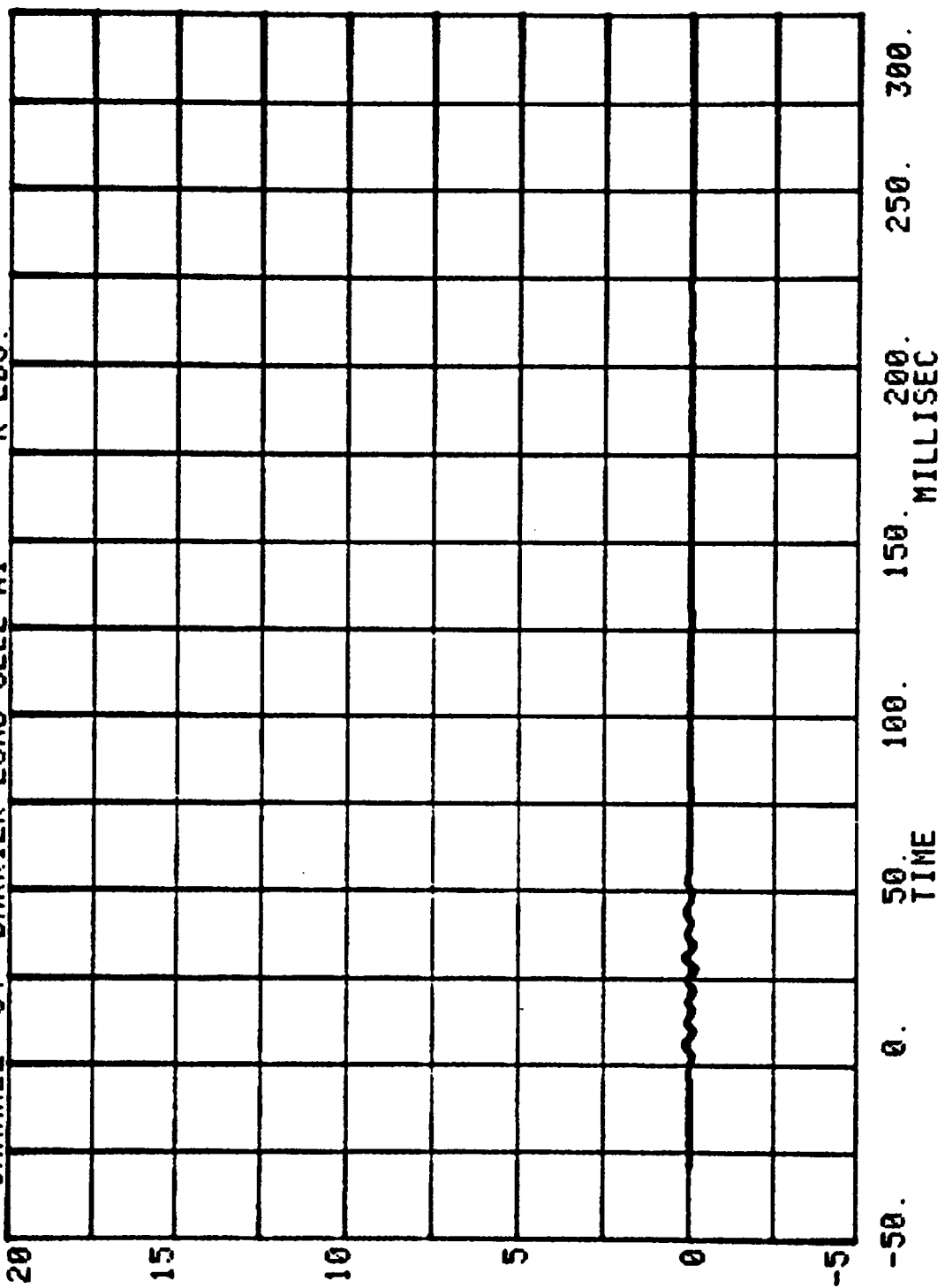
LOAD CELL BARRIER DATA
FILTER CHANNEL CLASS

60

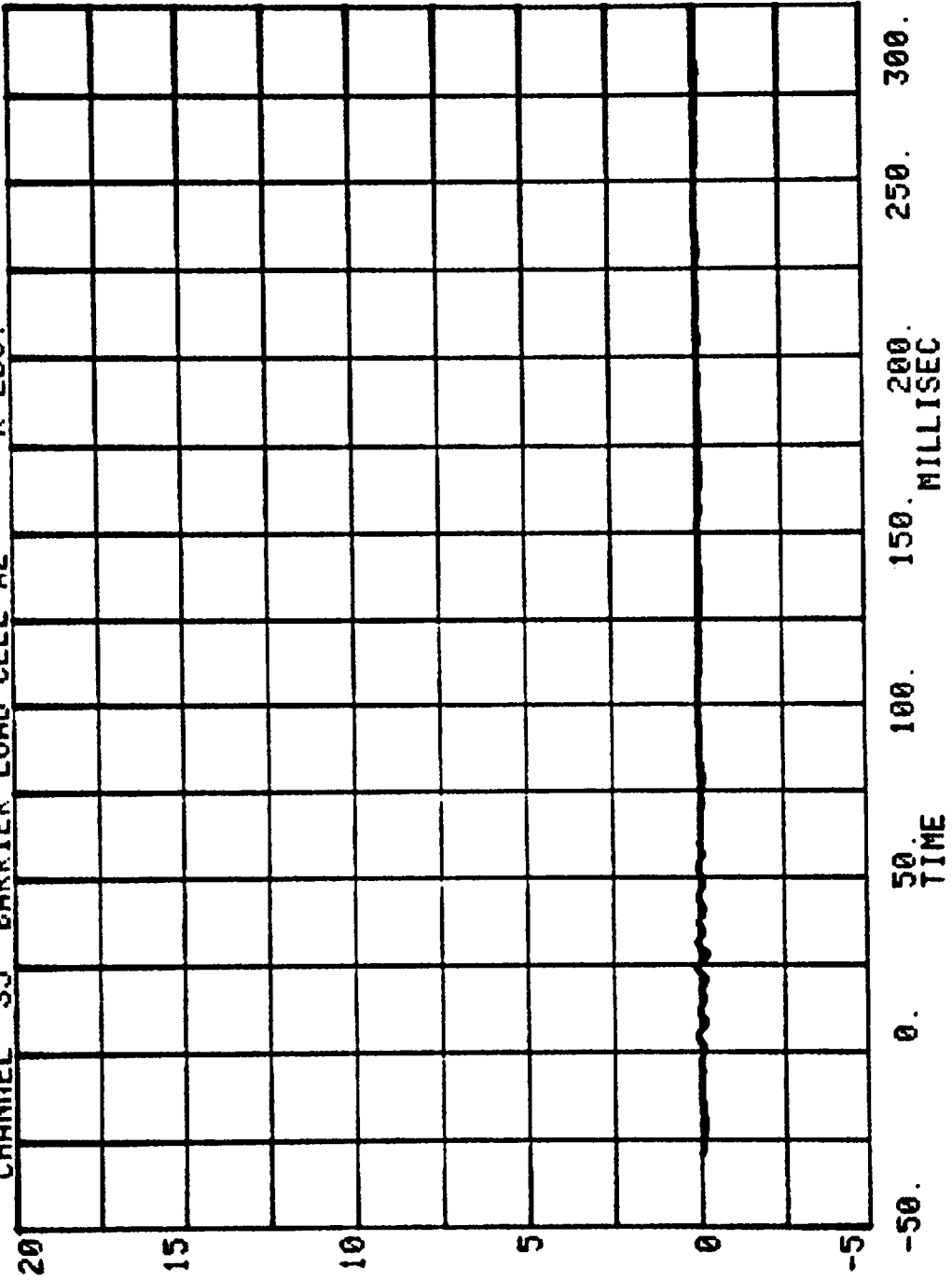
B-24

7556-1

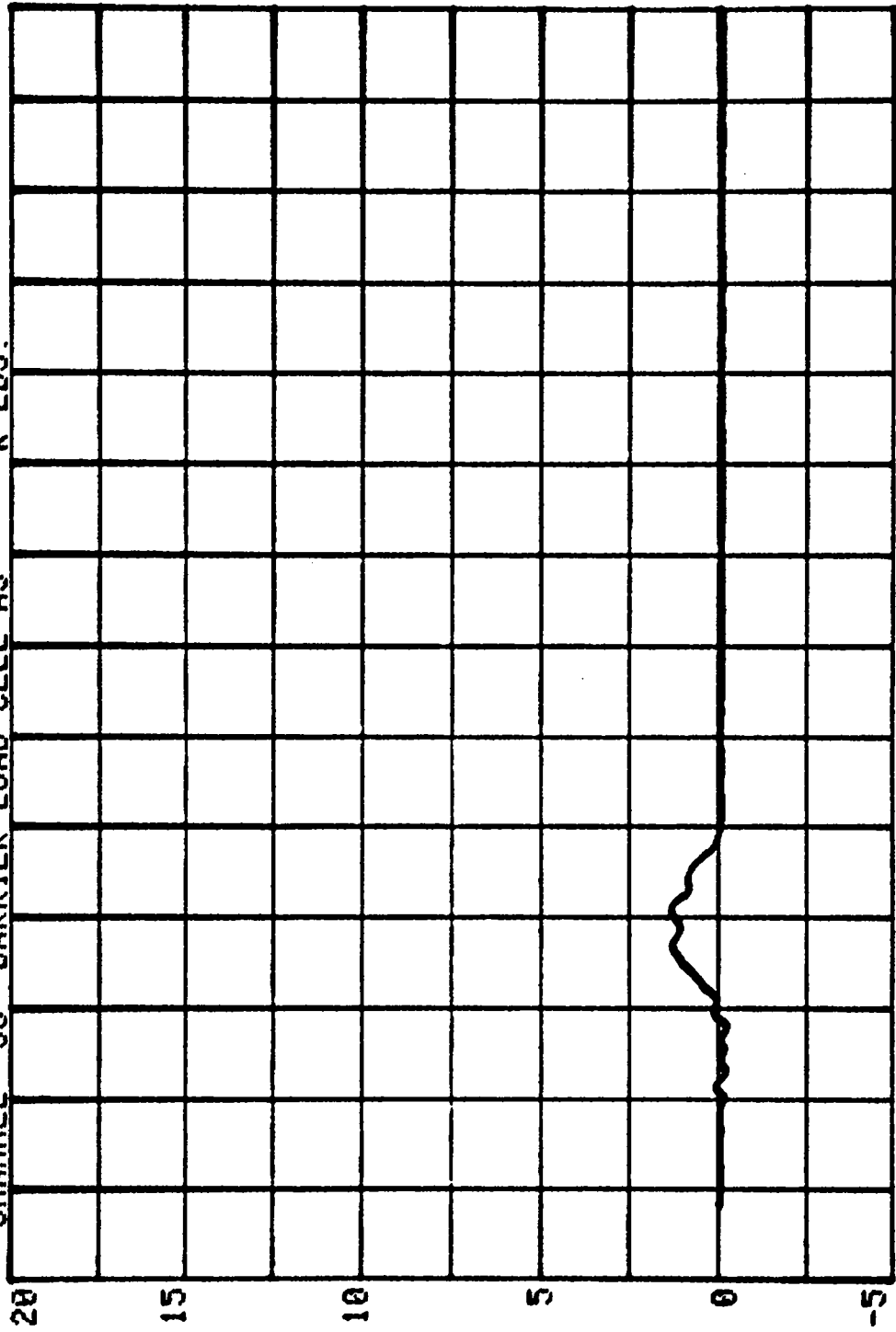
CHANNEL 34 BARRIER LOAD CELL A1 SERIES= 200 K LBS.



CHANNEL 35 BARRIER LOAD CELL A2 RUN= 763 SERIES= 200 K LBS.

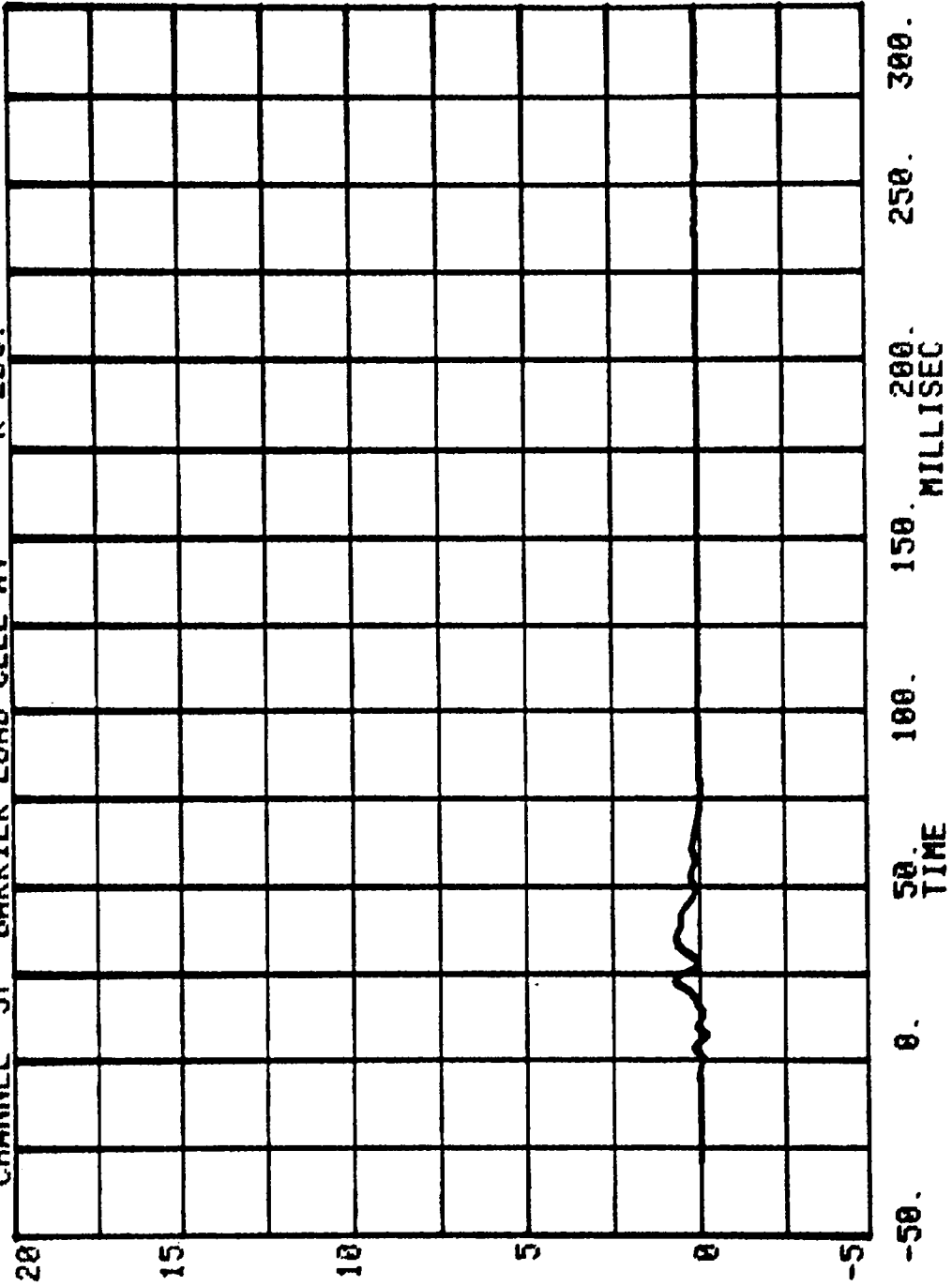


CHANNEL 36 BARRIER LOAD CELL A3 RUN= 763 SERIES= 200 K LBS.

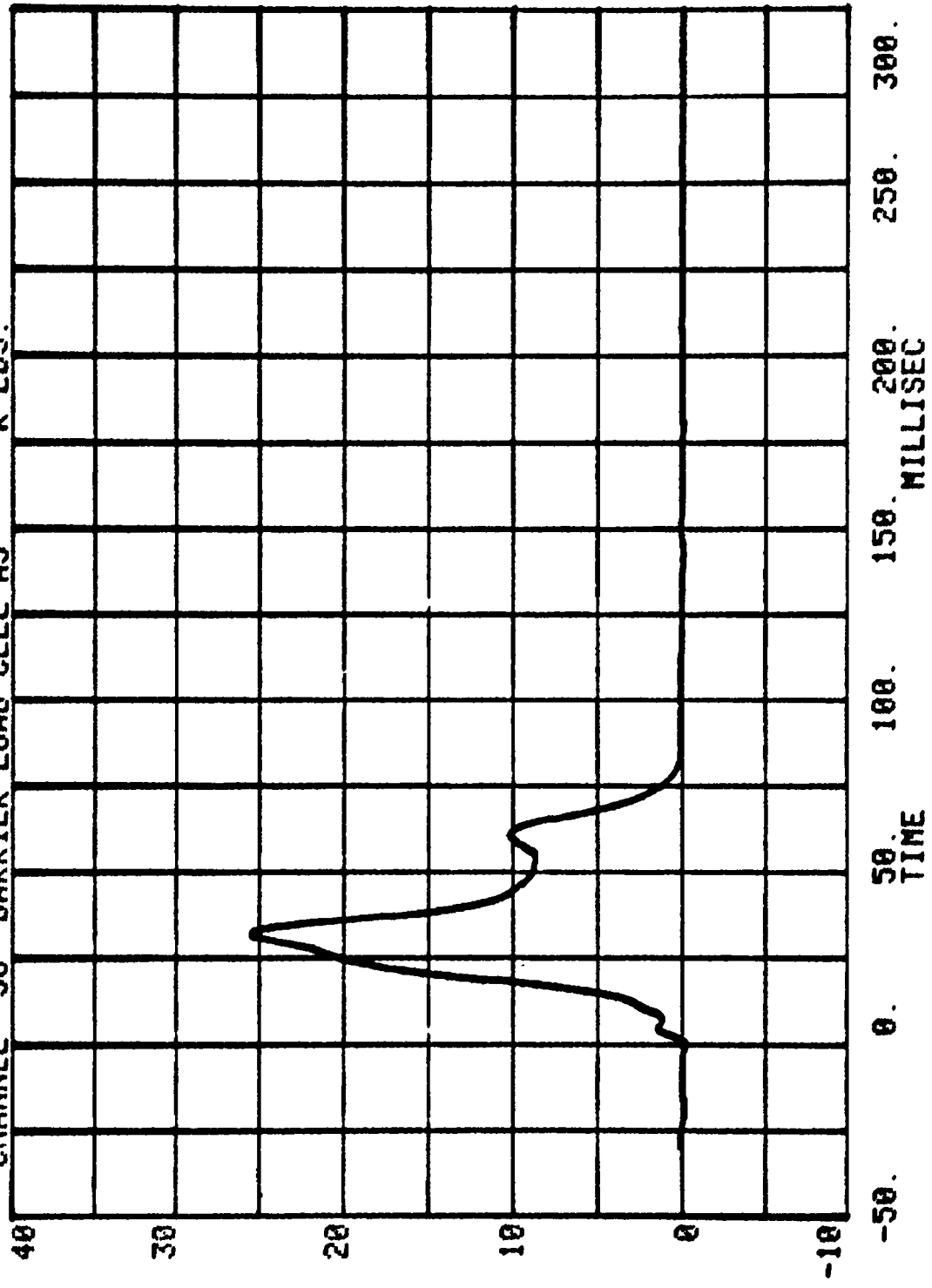


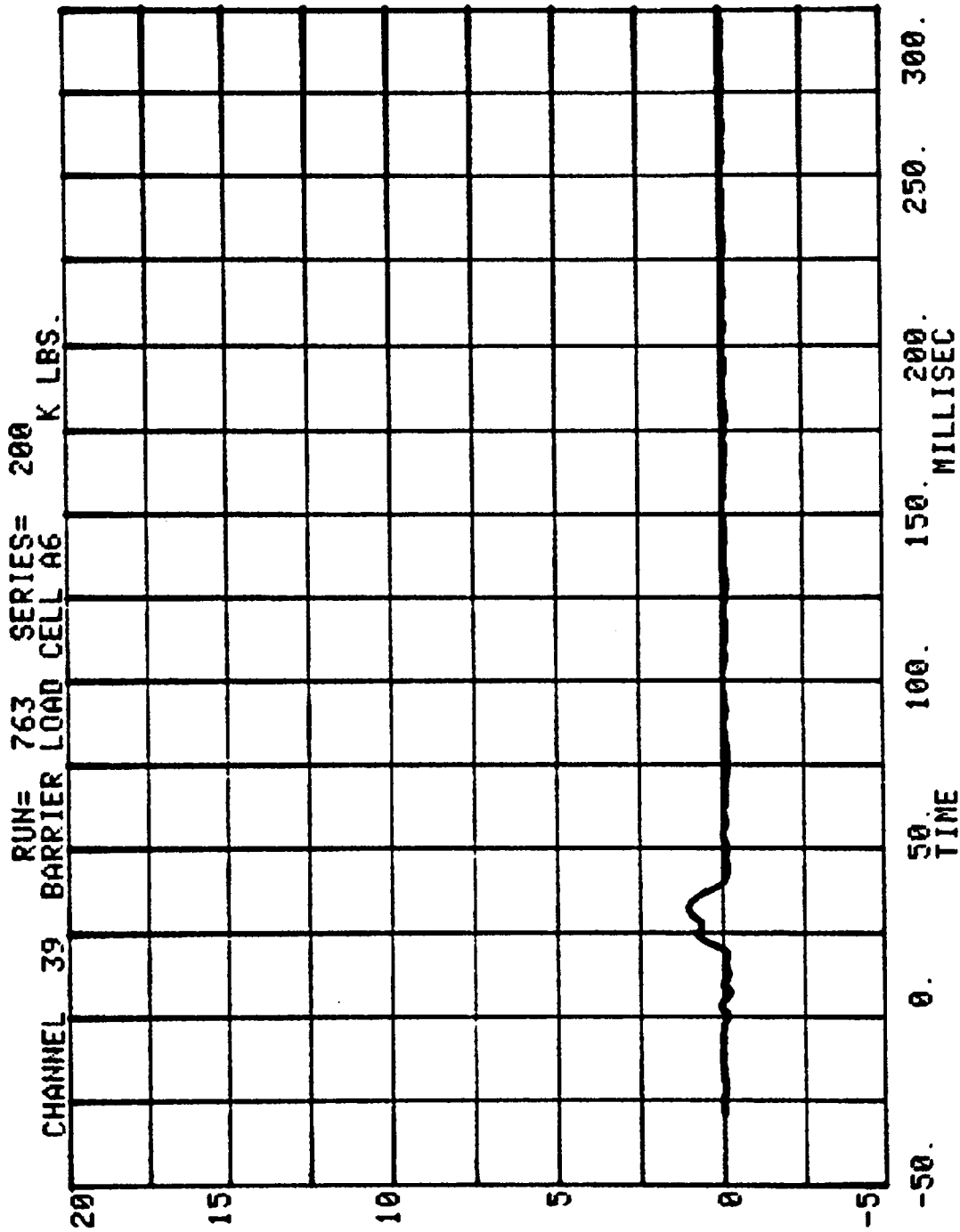
-50. 0. 50. 100. 150. 200. 250. 300.
TIME
MILLISEC

CHANNEL 37 BARRIER LOAD CELL A4
RUN= 763 SERIES= 200 K LBS.

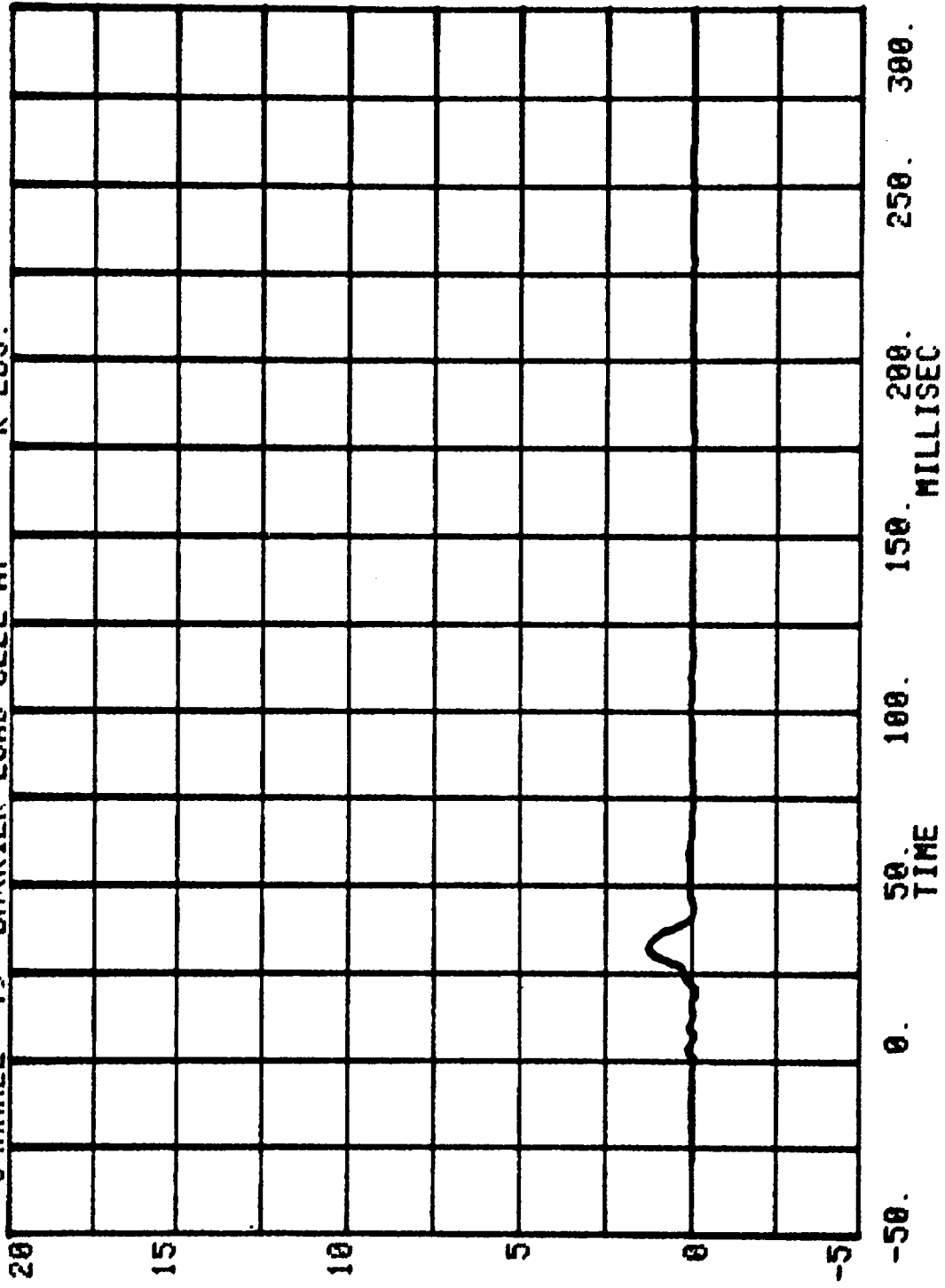


CHANNEL 38 BARRIER LOAD CELL A5
RUN= 763 SERIES= 200 K LBS.

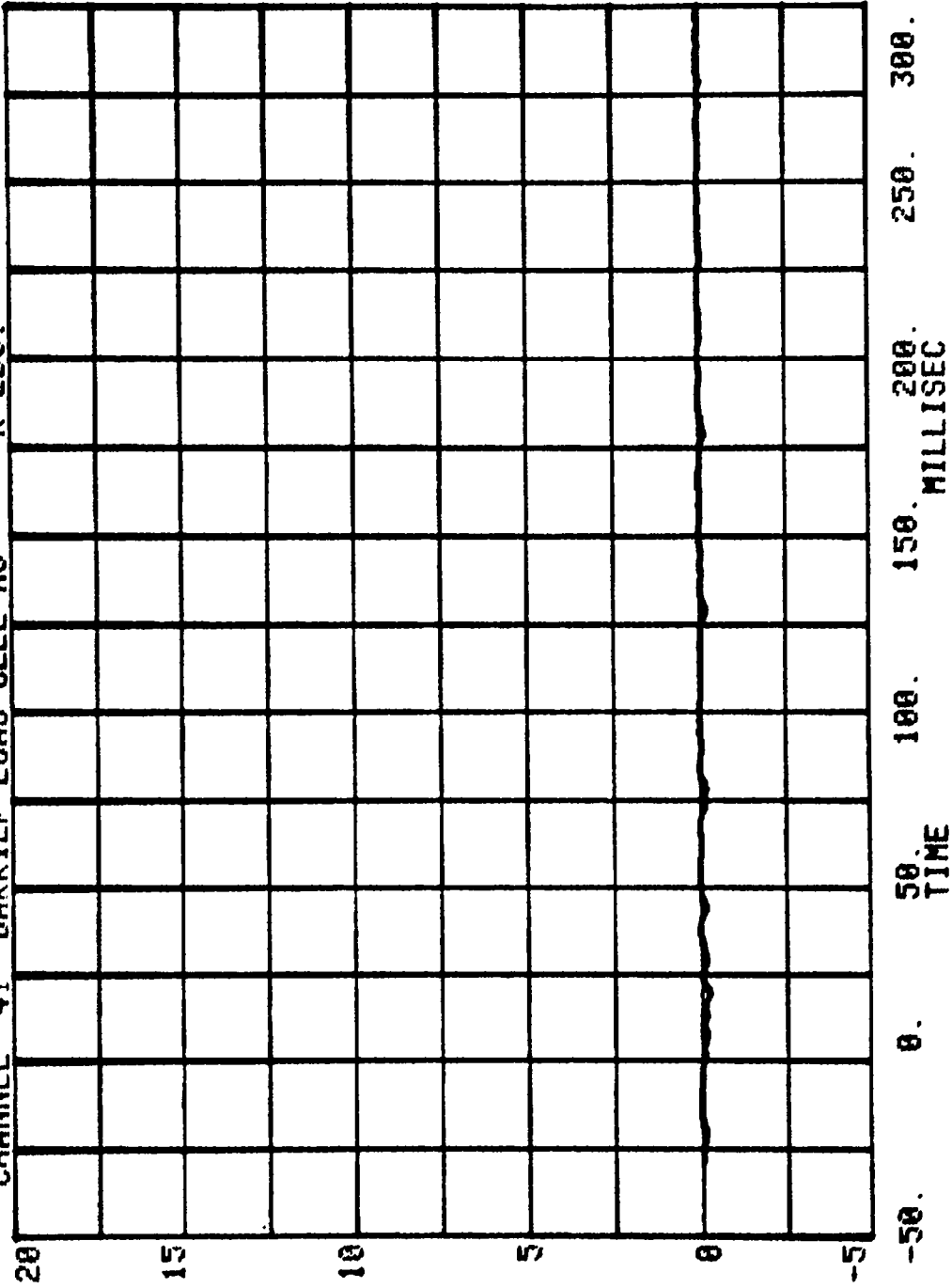




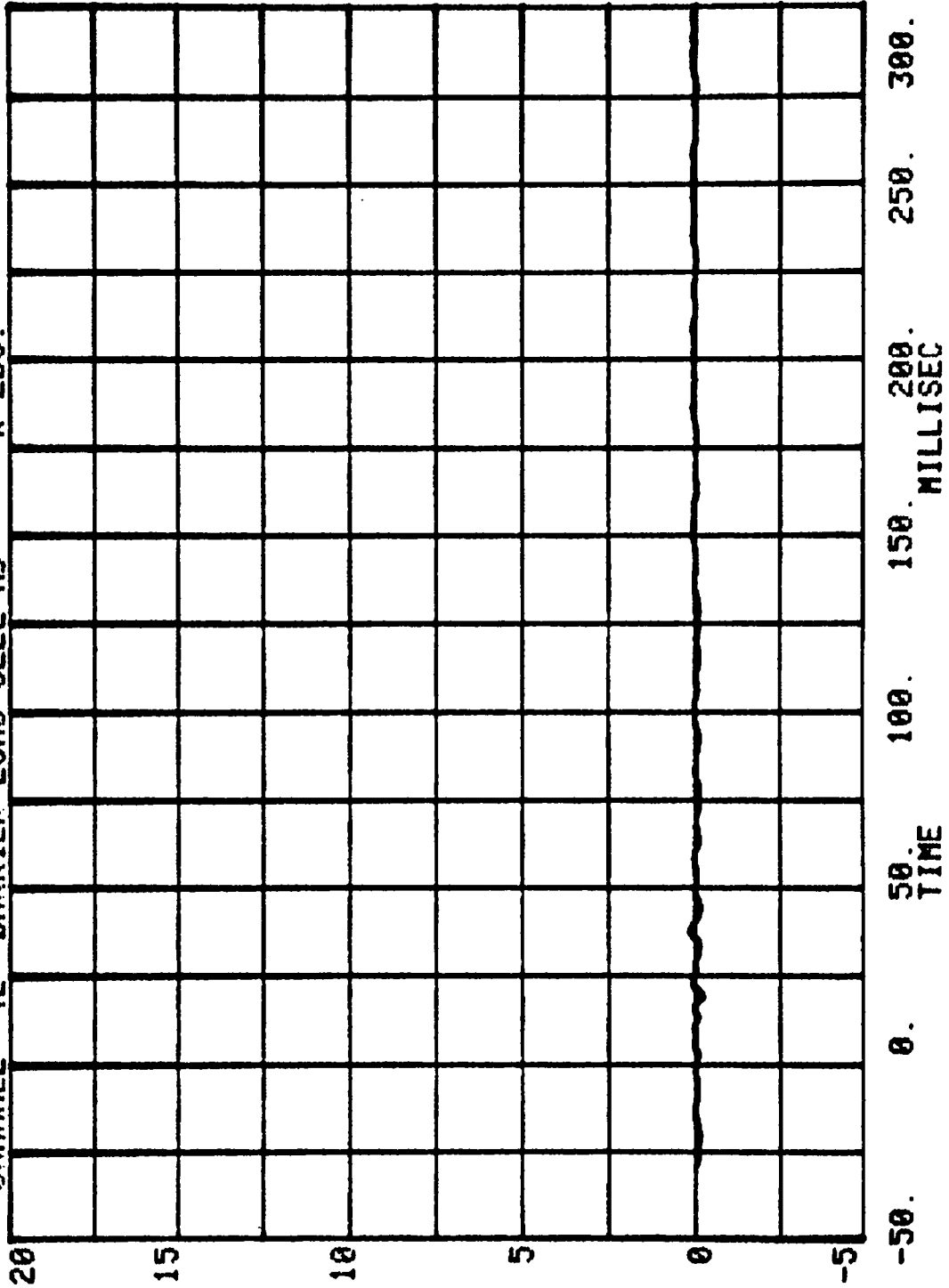
CHANNEL 49 BARRIER LOAD CELL A7
RUN= 763 SERIES= 200 K LBS.

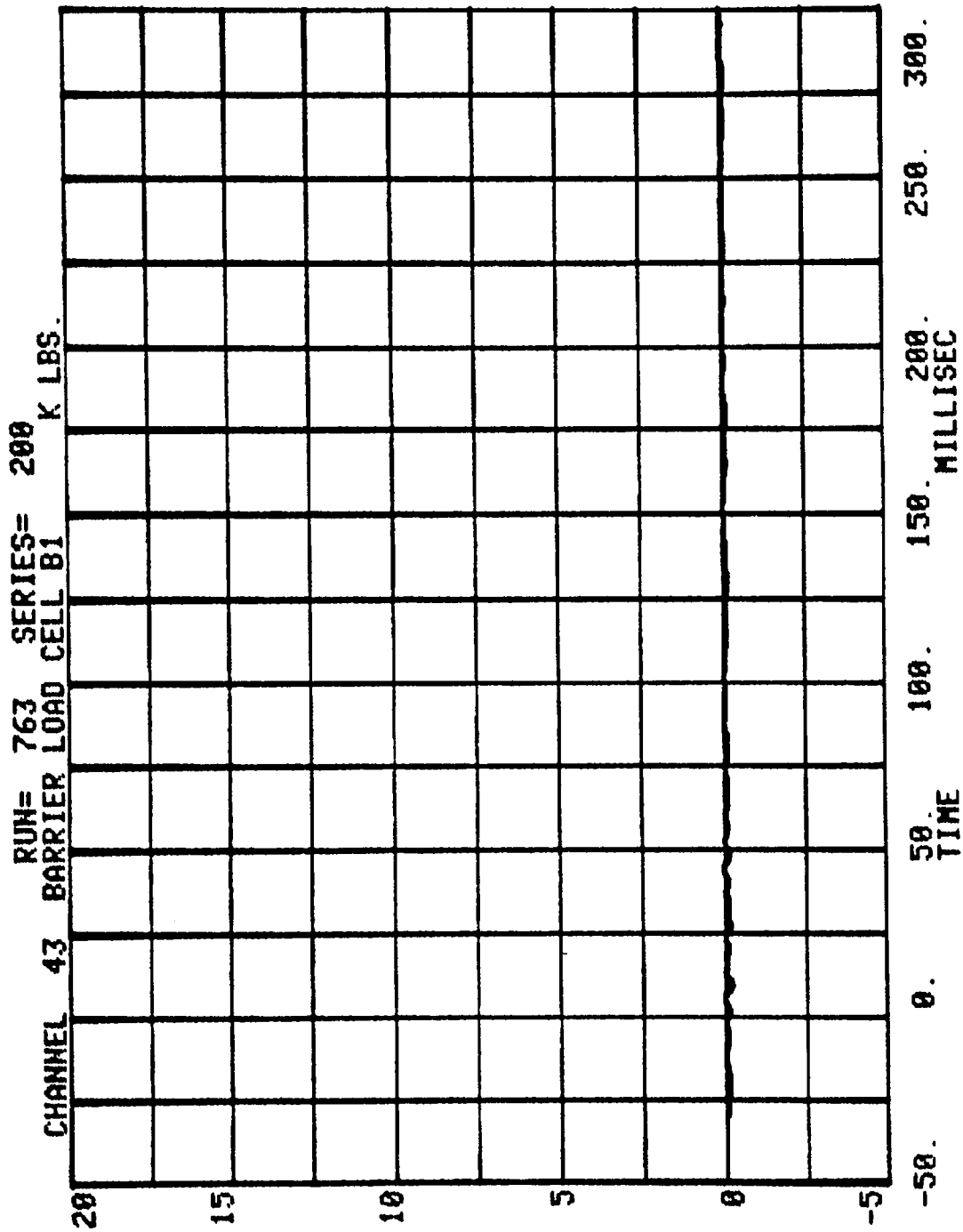


CHANNEL 41 BARRI EP LOAD CELL A8 RUN= 763 SERIES= 200 K LBS.



CHANNEL 42 BARRIER LOAD CELL A9 RUN= 763 SERIES= 200 K LBS.

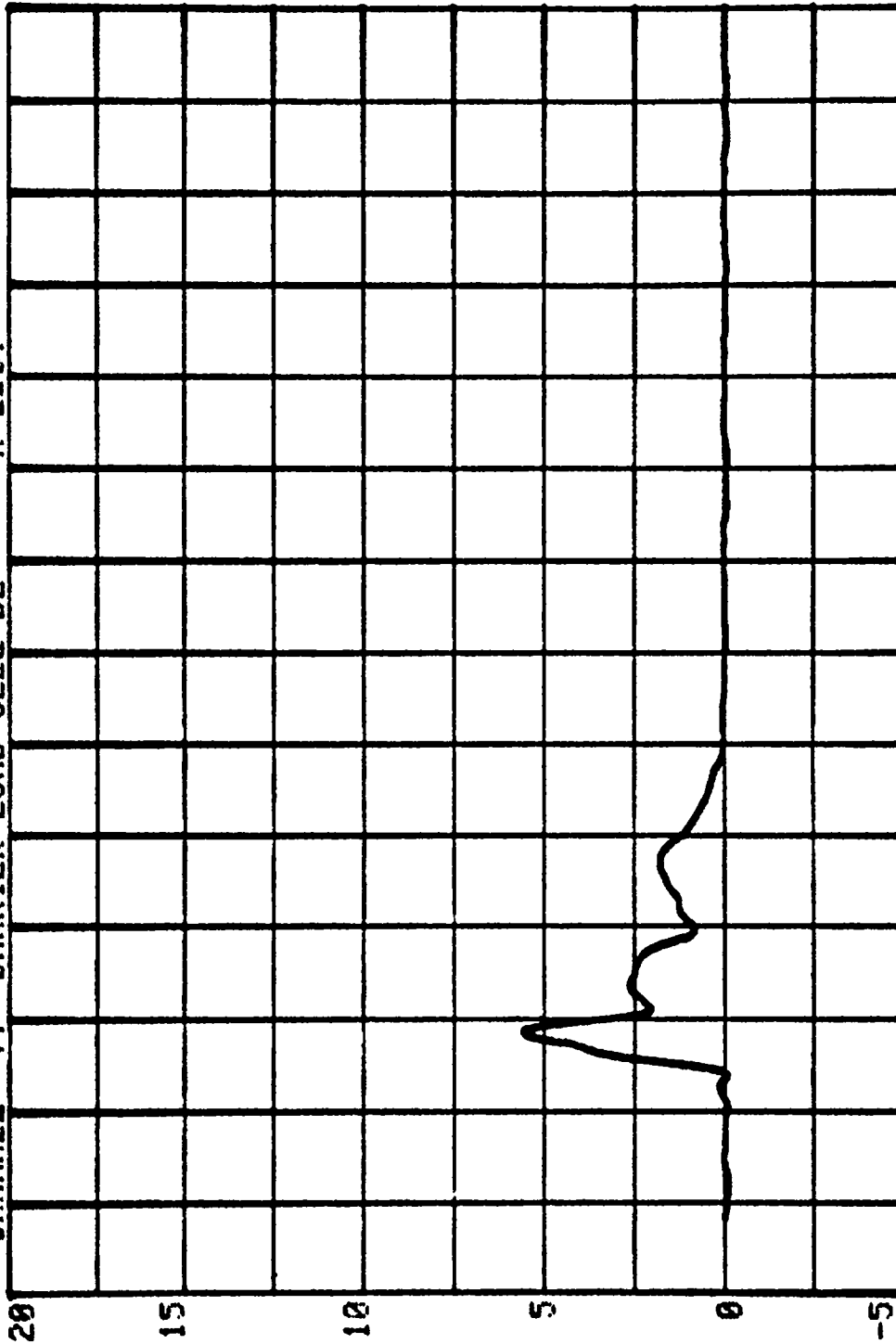




CHANNEL 44 BARRIER LOAD CELL B2

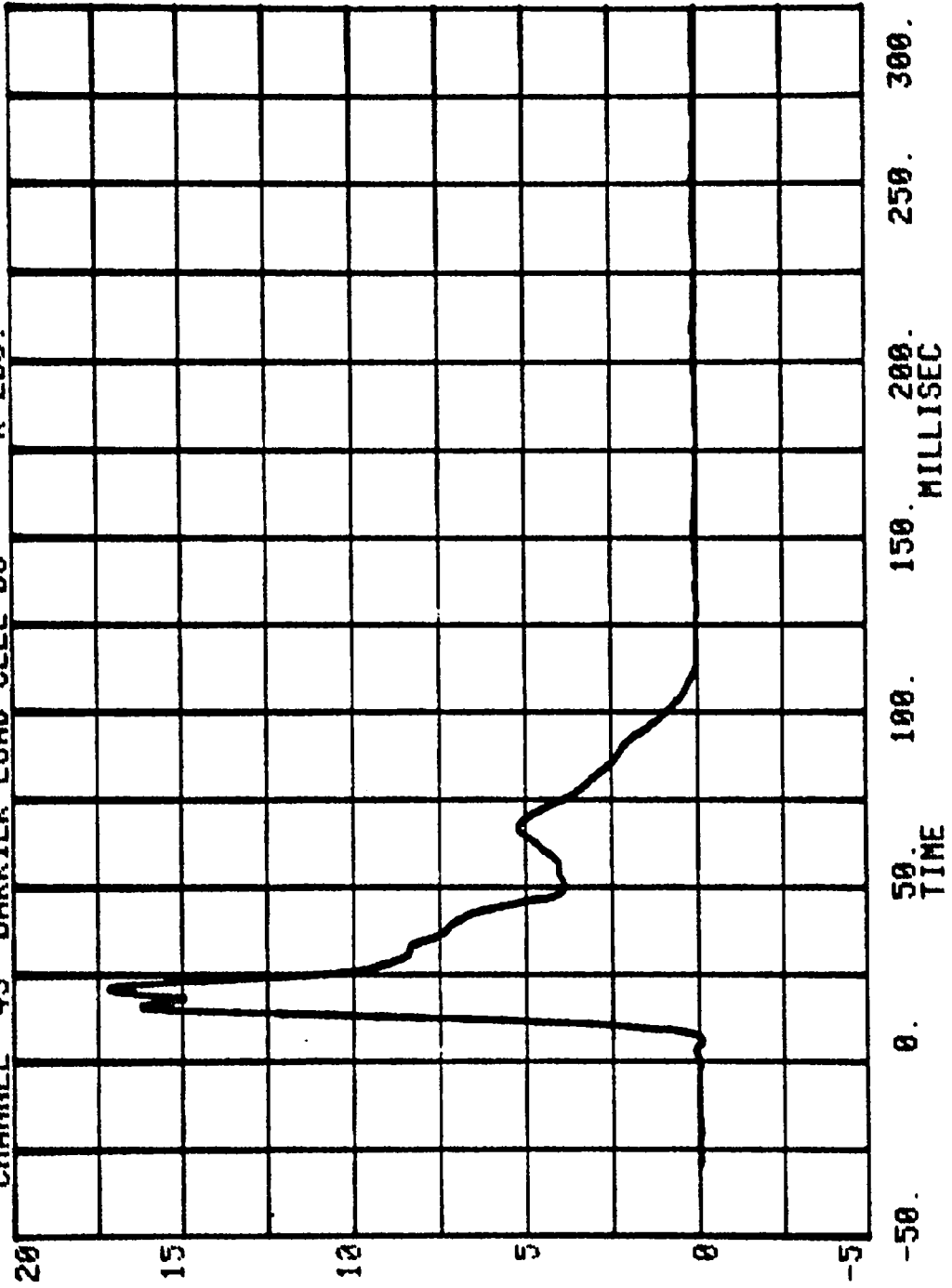
RUN= 763 SERIES= 200

K LBS.

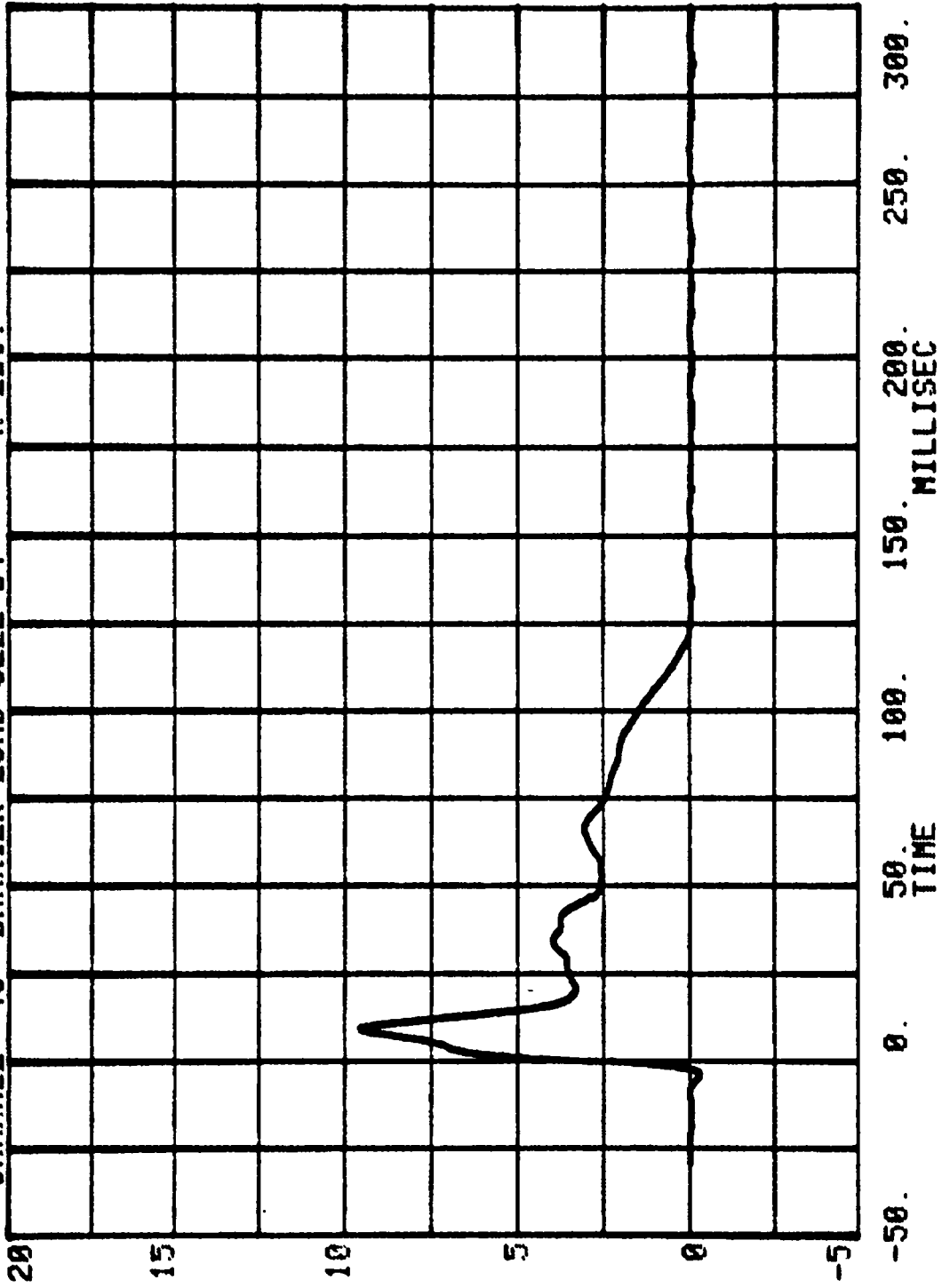


-50. 0. 50. 100. 150. 200. 250. 300.
MILLISEC
TIME

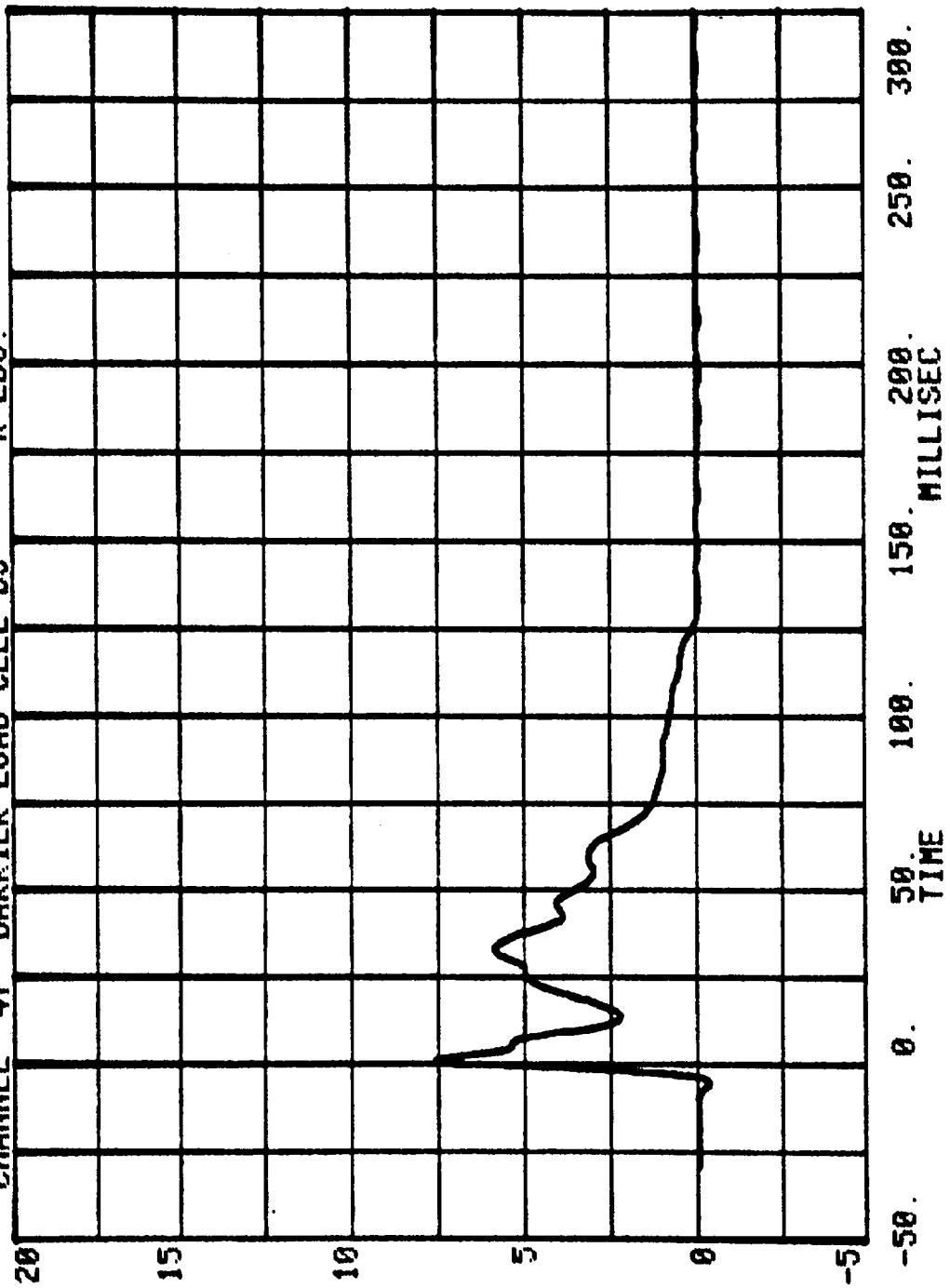
CHANNEL 45 BARRIER LOAD CELL B3
RUN= 763 SERIES= 200 K LBS.



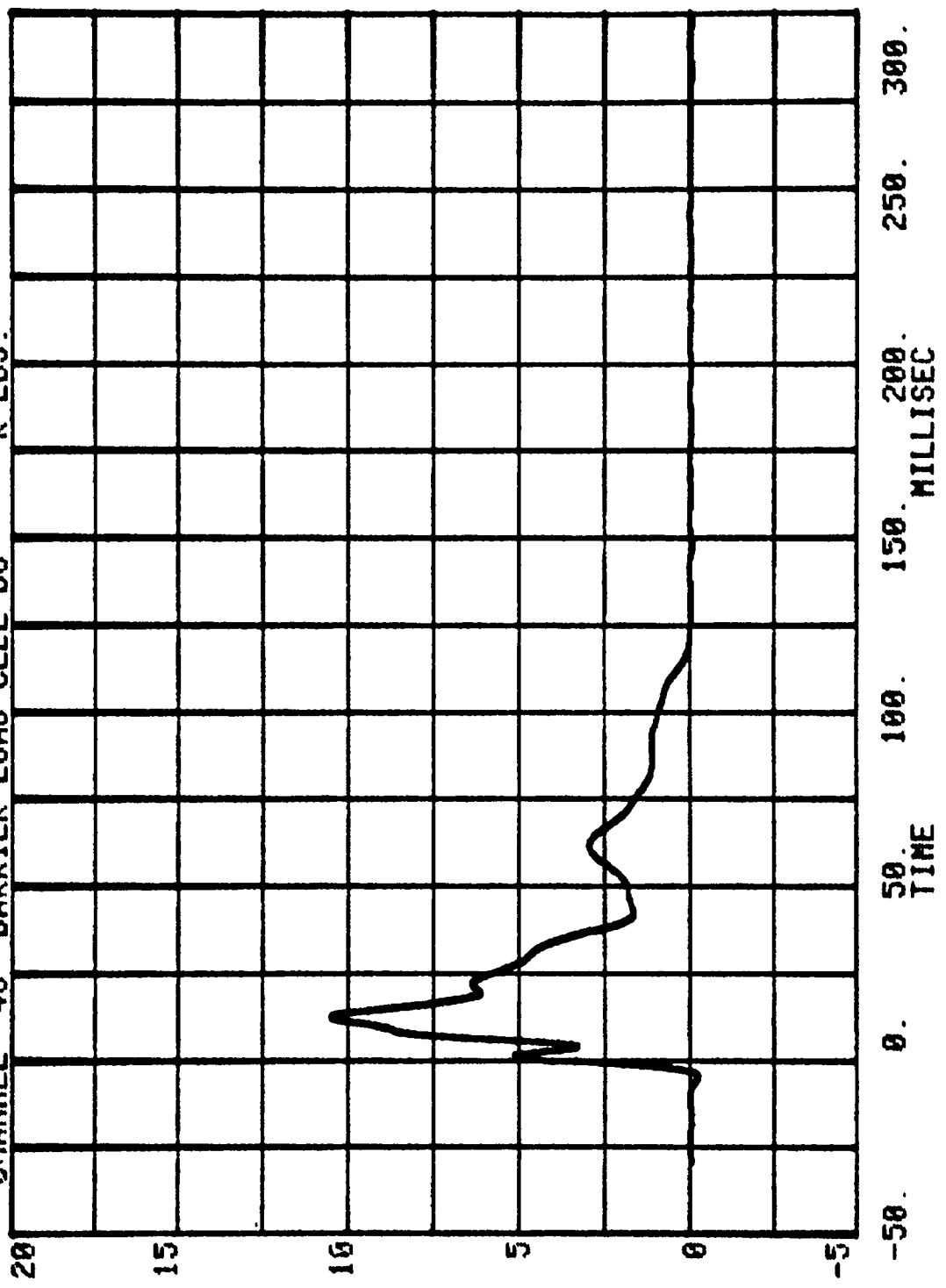
CHANNEL 46 BARRIER LOAD CELL B4 RUN= 763 SERIES= 200 K LBS.

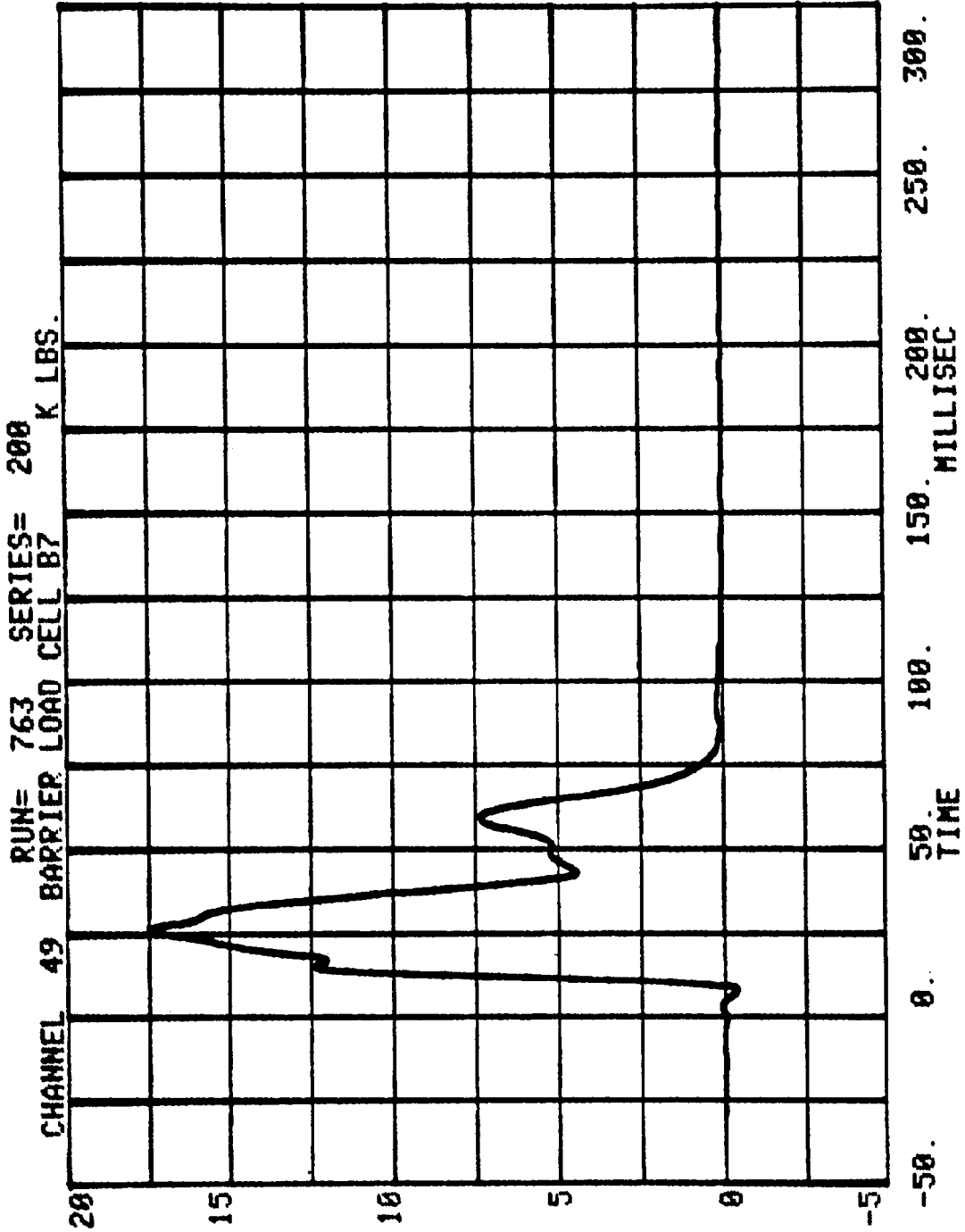


CHANNEL 47 BARRIER LOAD CELL B5
RUN= 763 SERIES= 200 K LBS.

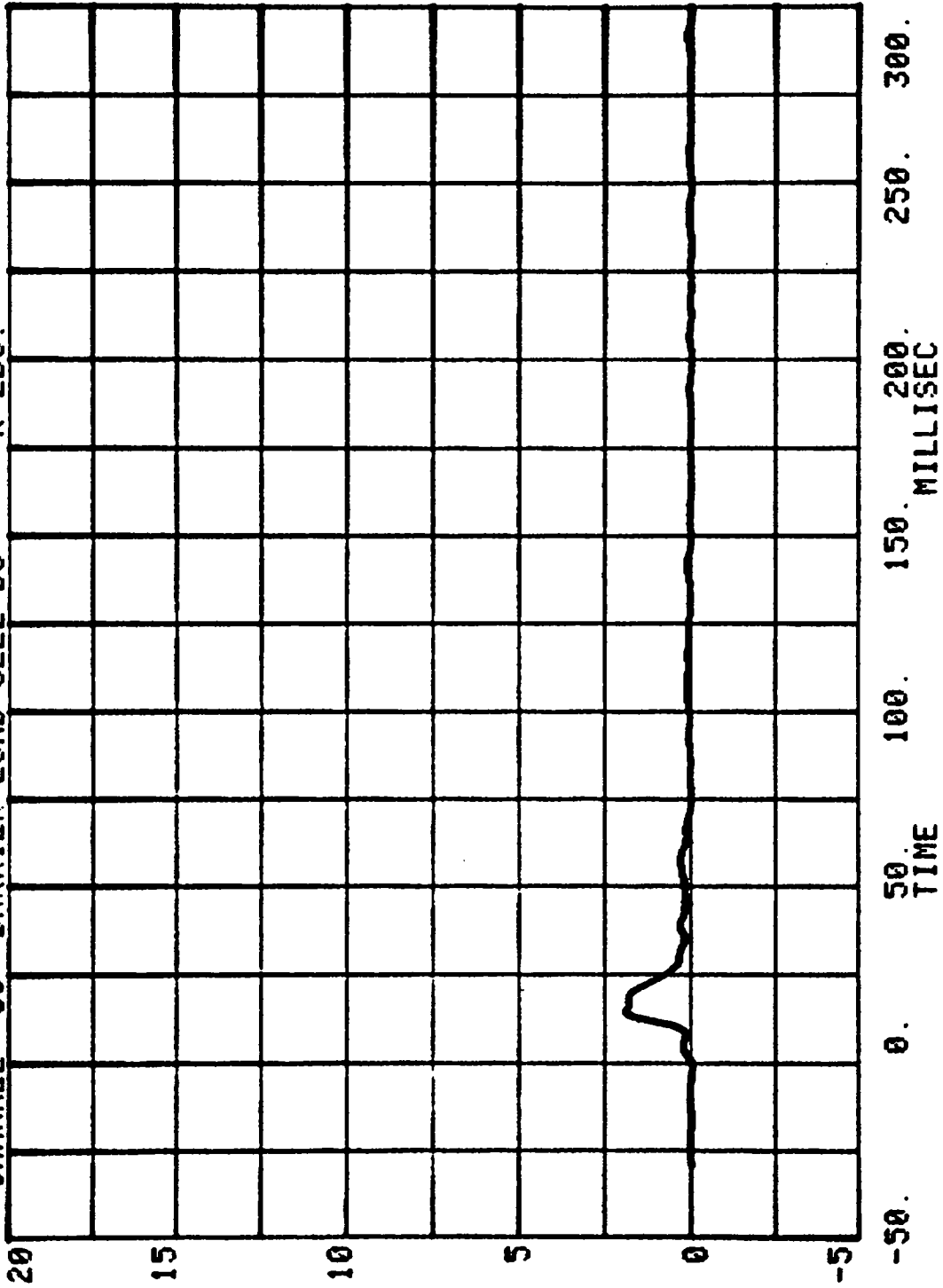


CHANNEL 48 BARRIER LOAD CELL B6
RUN= 763 SERIES= 200 K LBS.

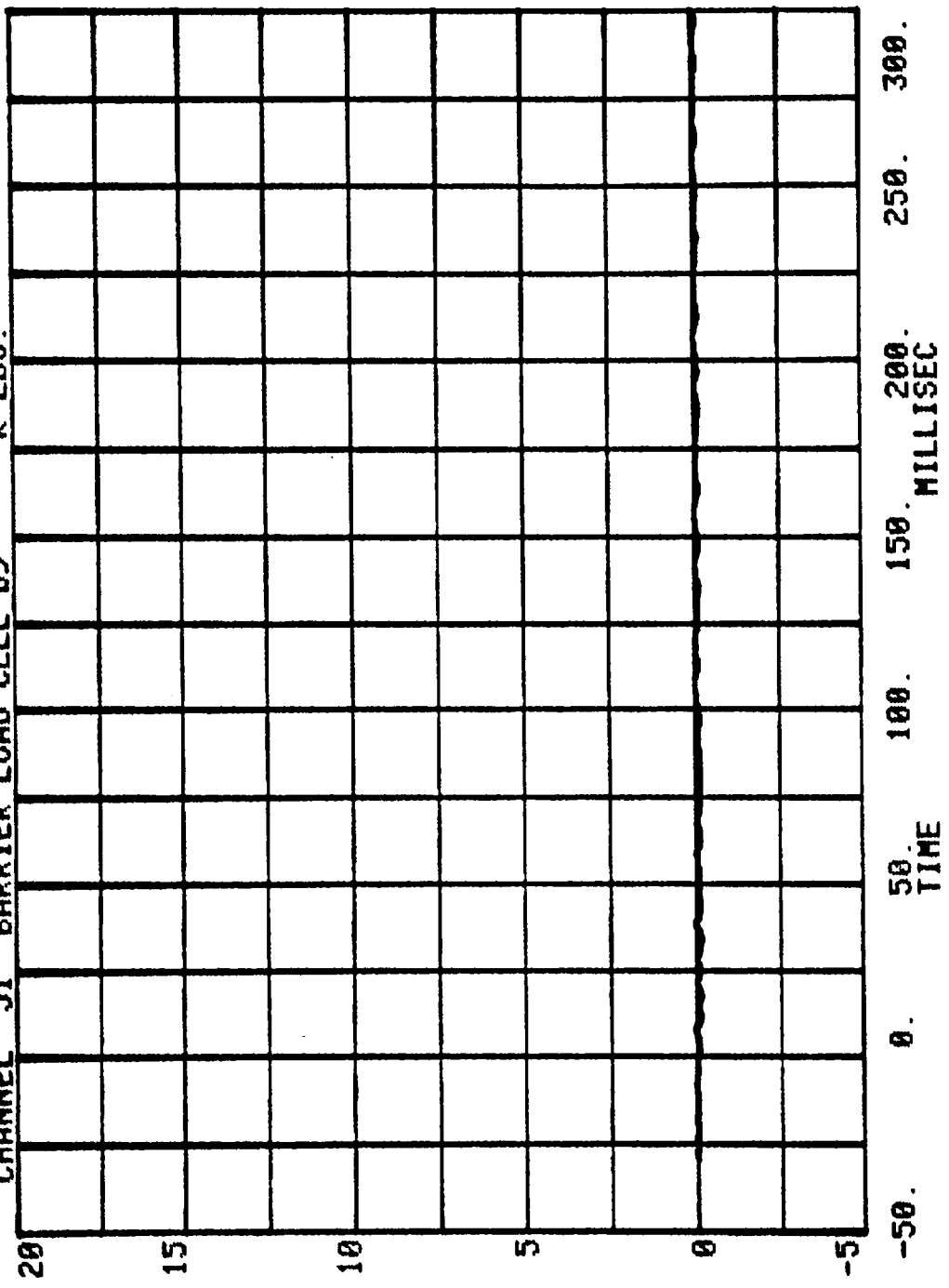




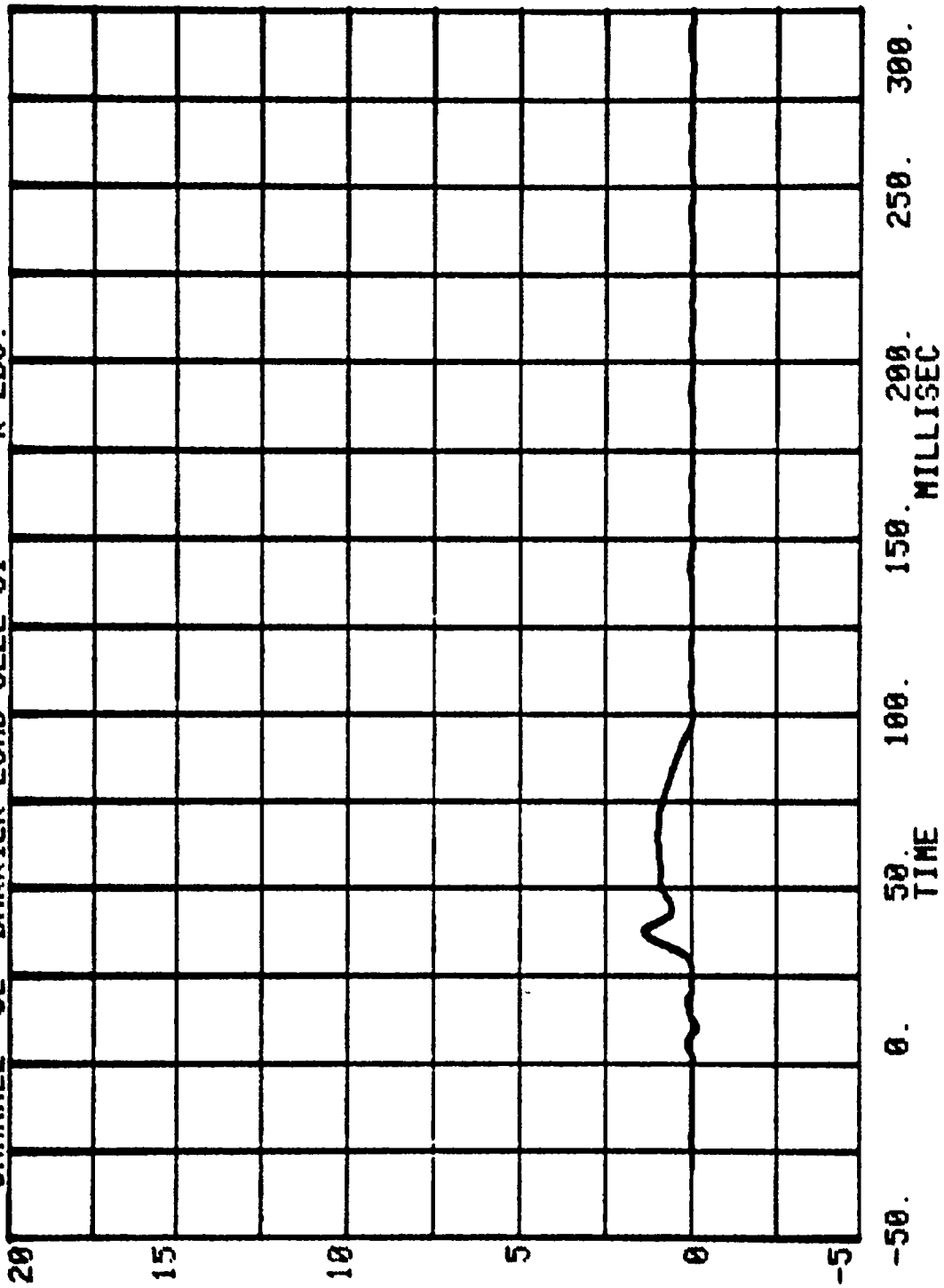
CHANNEL 50 BARRIER LOAD CELL 88
RUN= 763 SERIES= 200 K LBS.

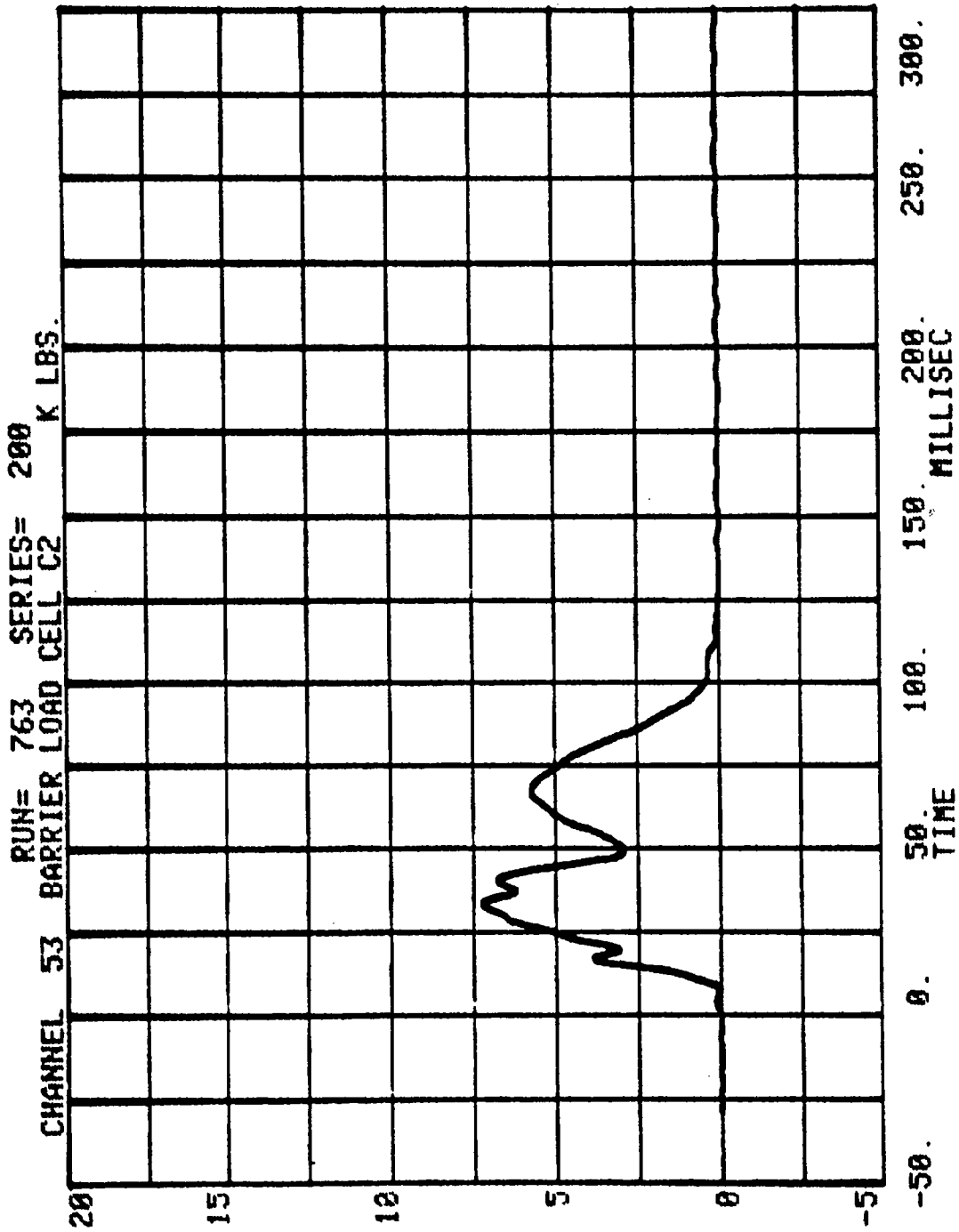


CHANNEL 51 BARRIER LOAD CELL B9 RUN= 763 SERIES= 200 K LBS.

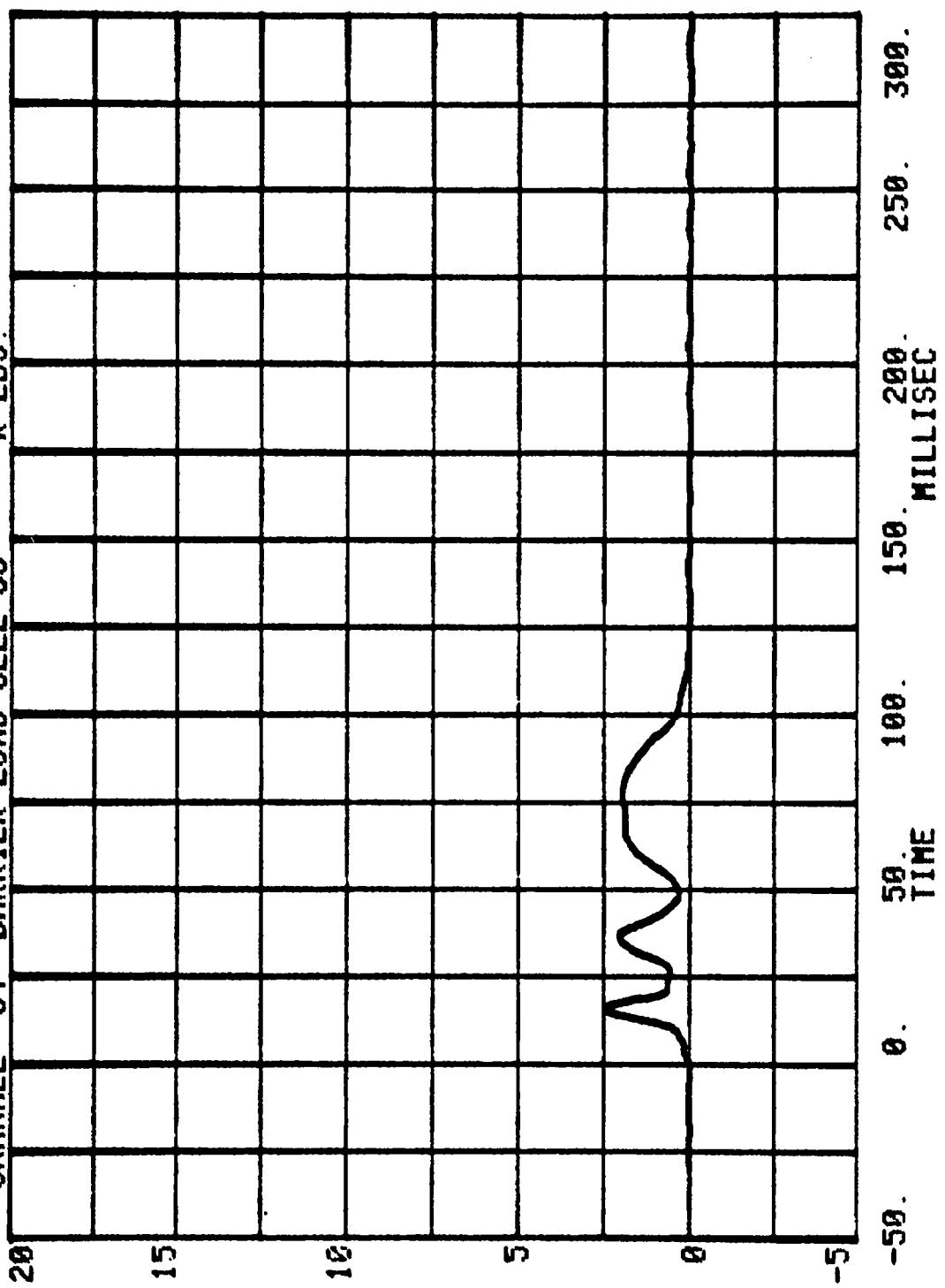


CHANNEL 52 BARRIER LOAD CELL C1
RUN= 763 SERIES= 200 K LBS.

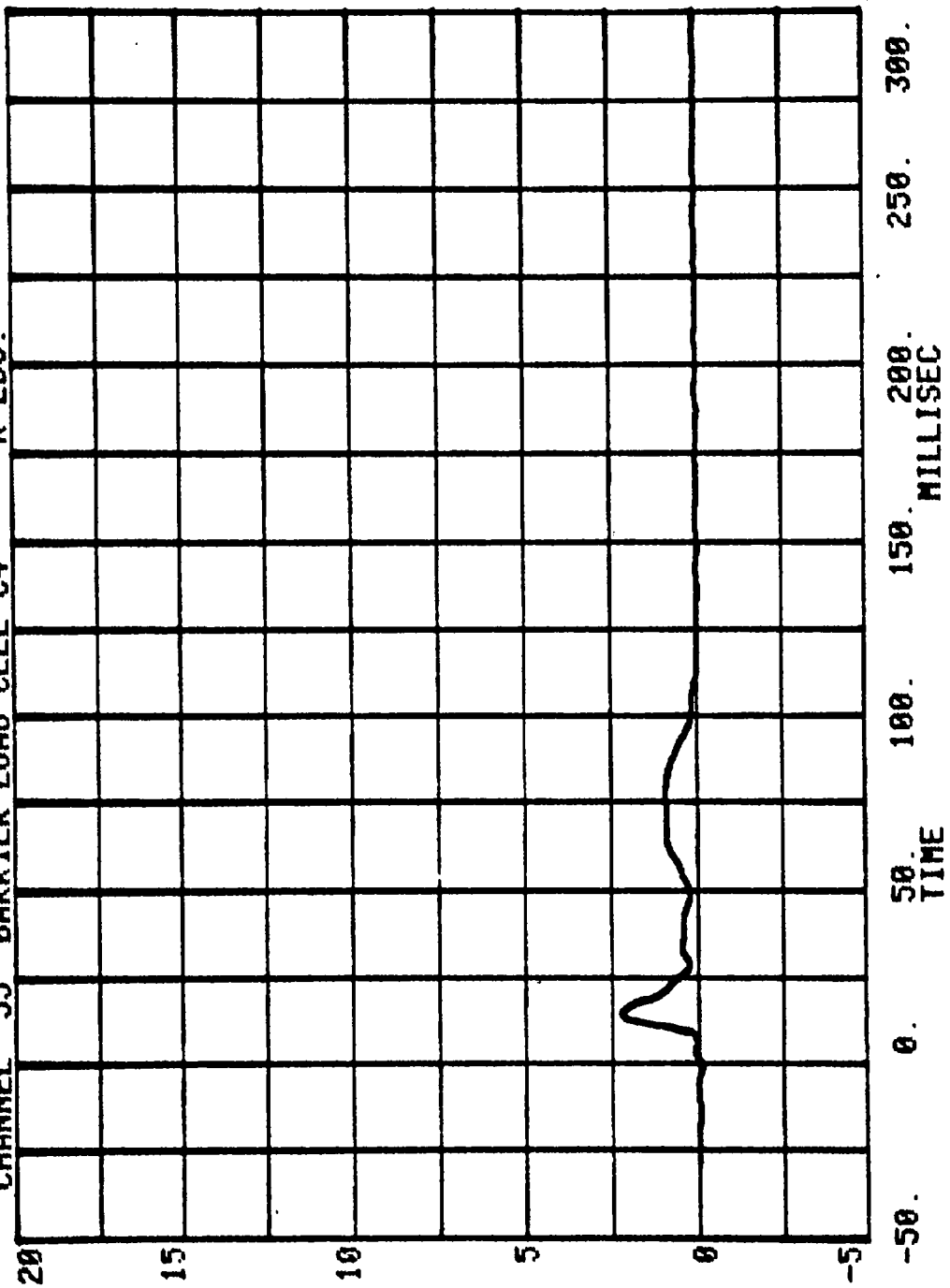




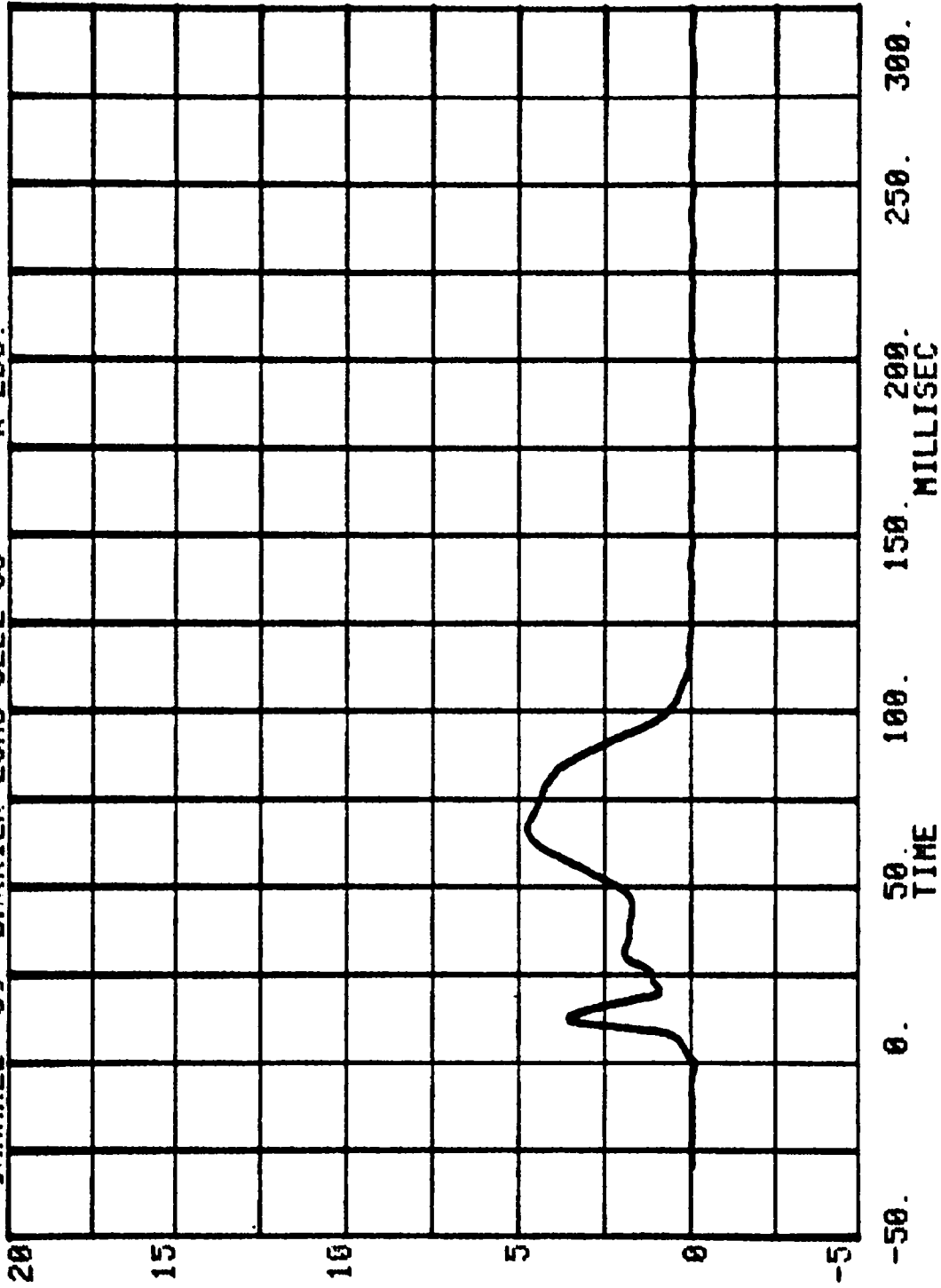
CHANNEL 54 BARRIER LOAD CELL C3 RUN= 763 SERIES= 200 K LBS.

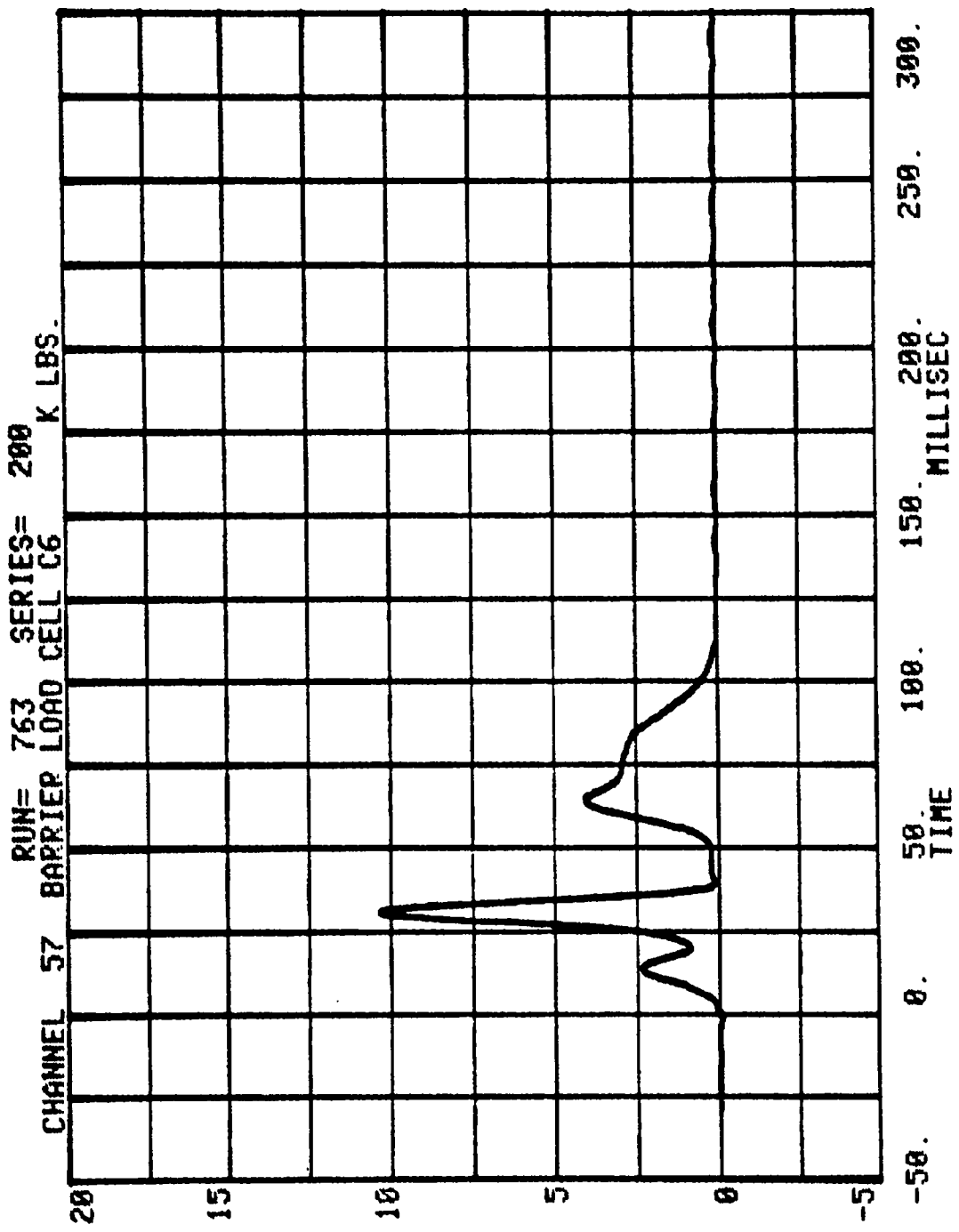


CHANNEL 55 BARRIER LOAD CELL C4
RUN= 763 SERIES= 200 K LBS.

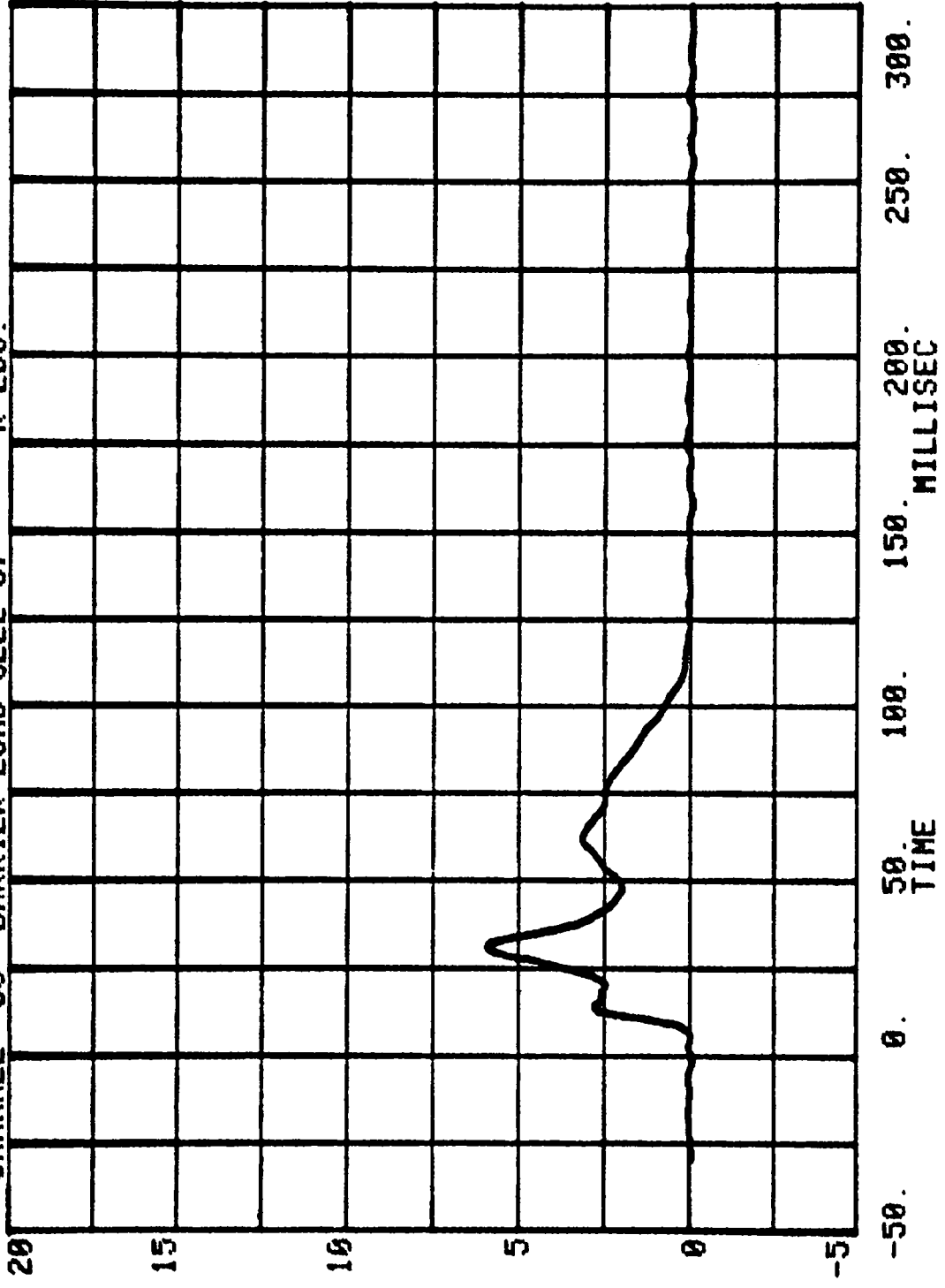


CHANNEL 56 BARRIER LOAD CELL C5
RUN= 763 SERIES= 200 K LBS.

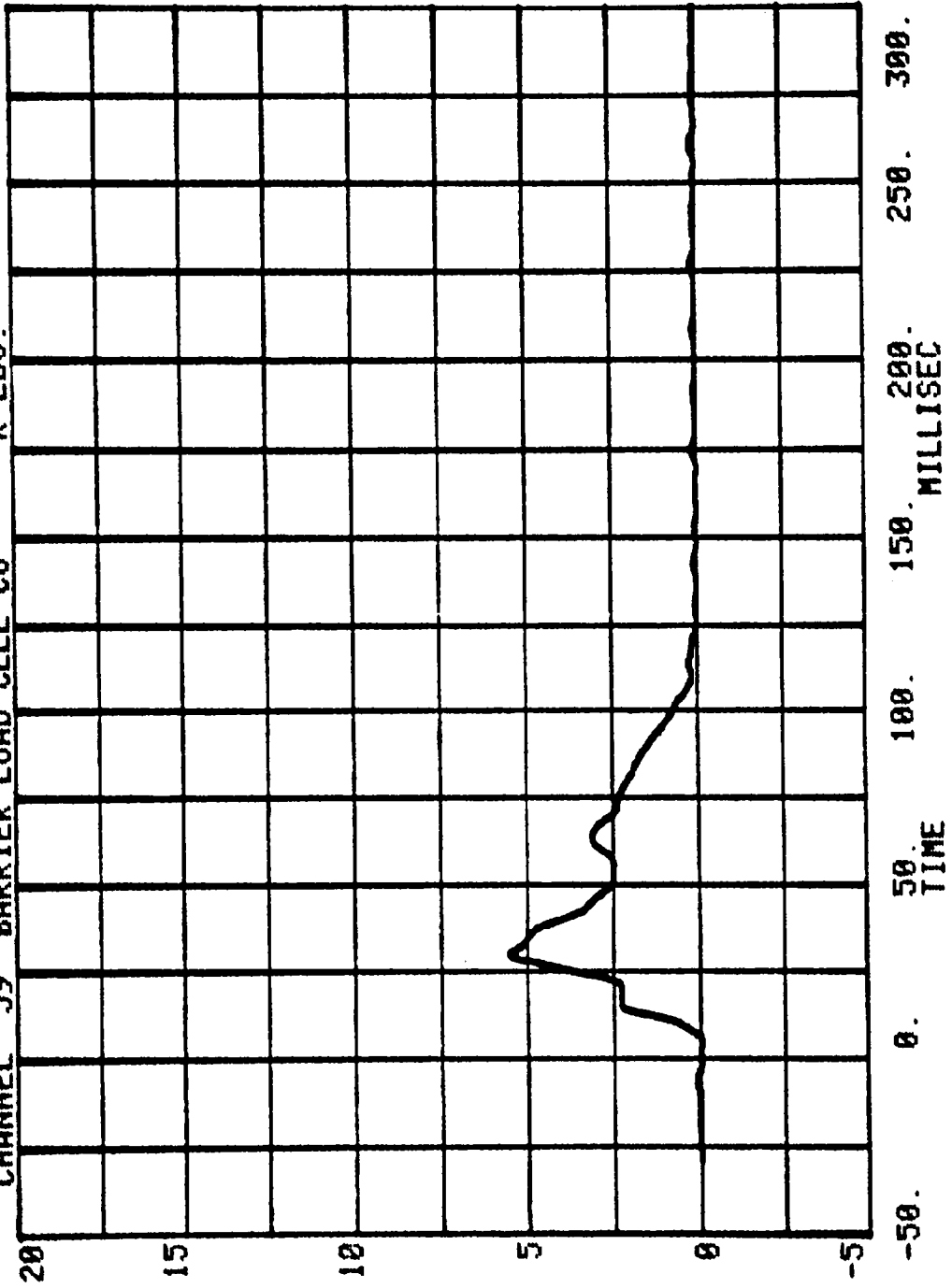




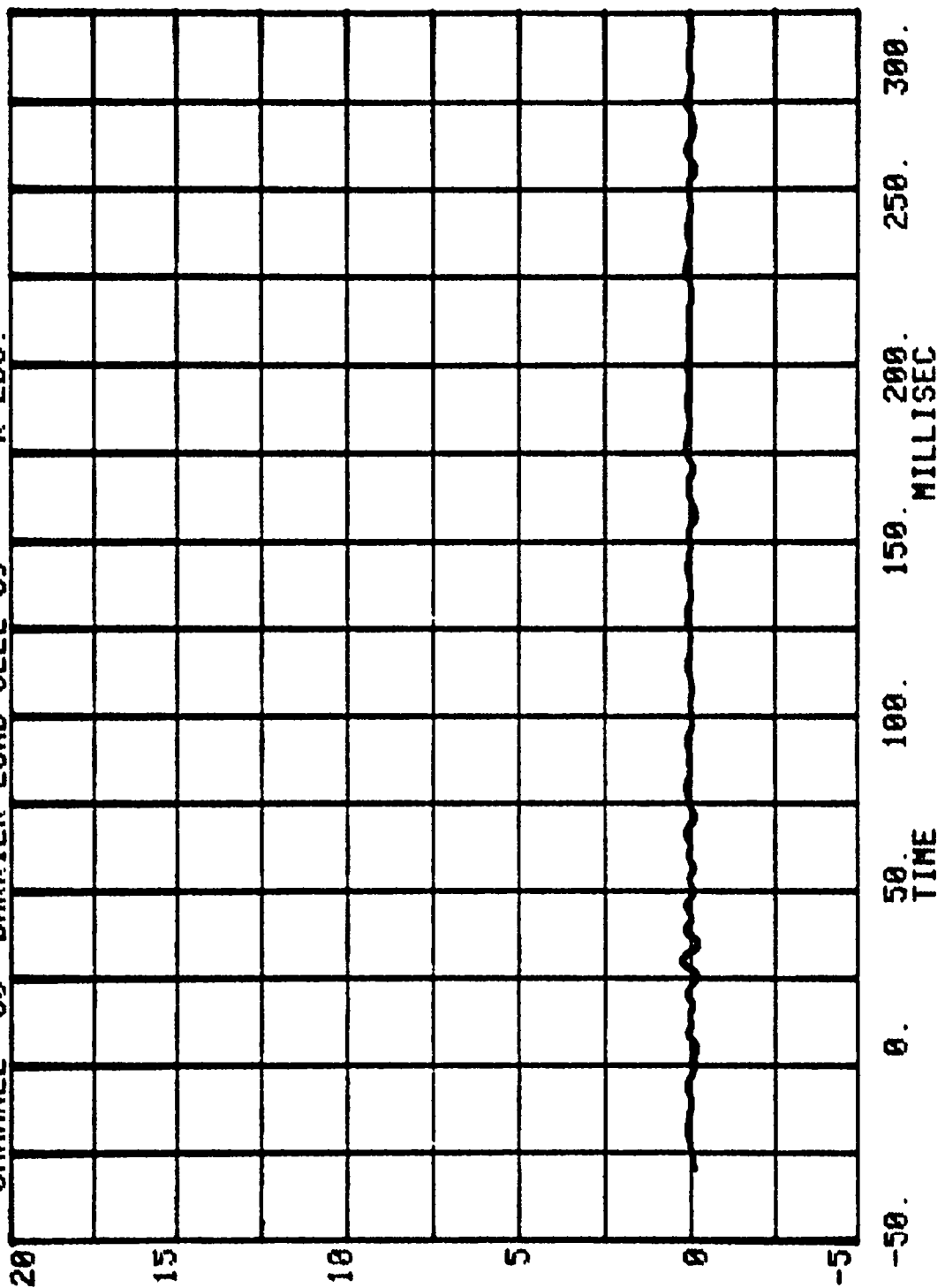
CHANNEL 58 BARRIER LOAD CELL C7 RUN= 763 SERIES= 200 K LBS.



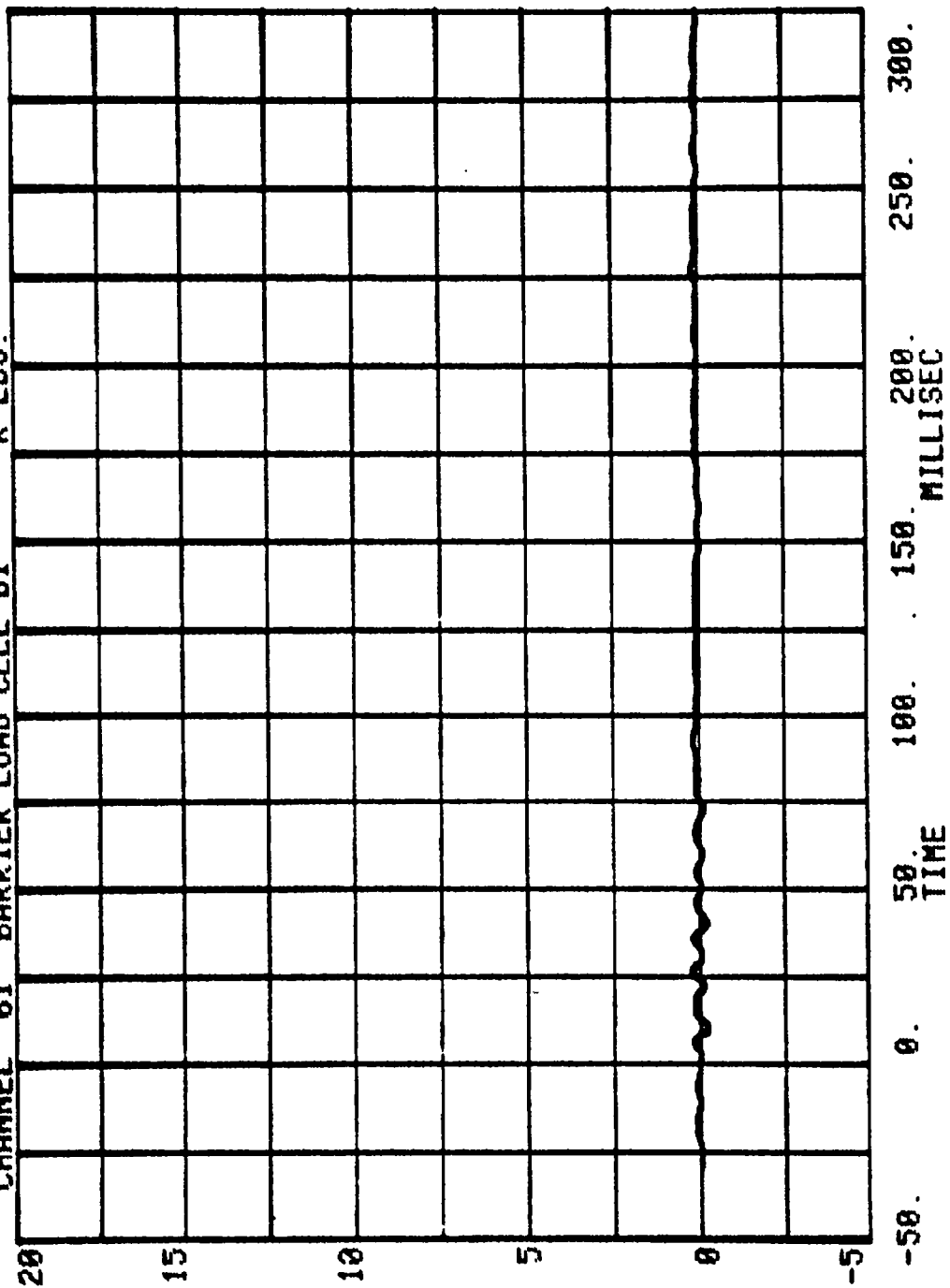
CHANNEL 59 BARRIER LOAD CELL C8 RUN= 763 SERIES= 200 K LBS.



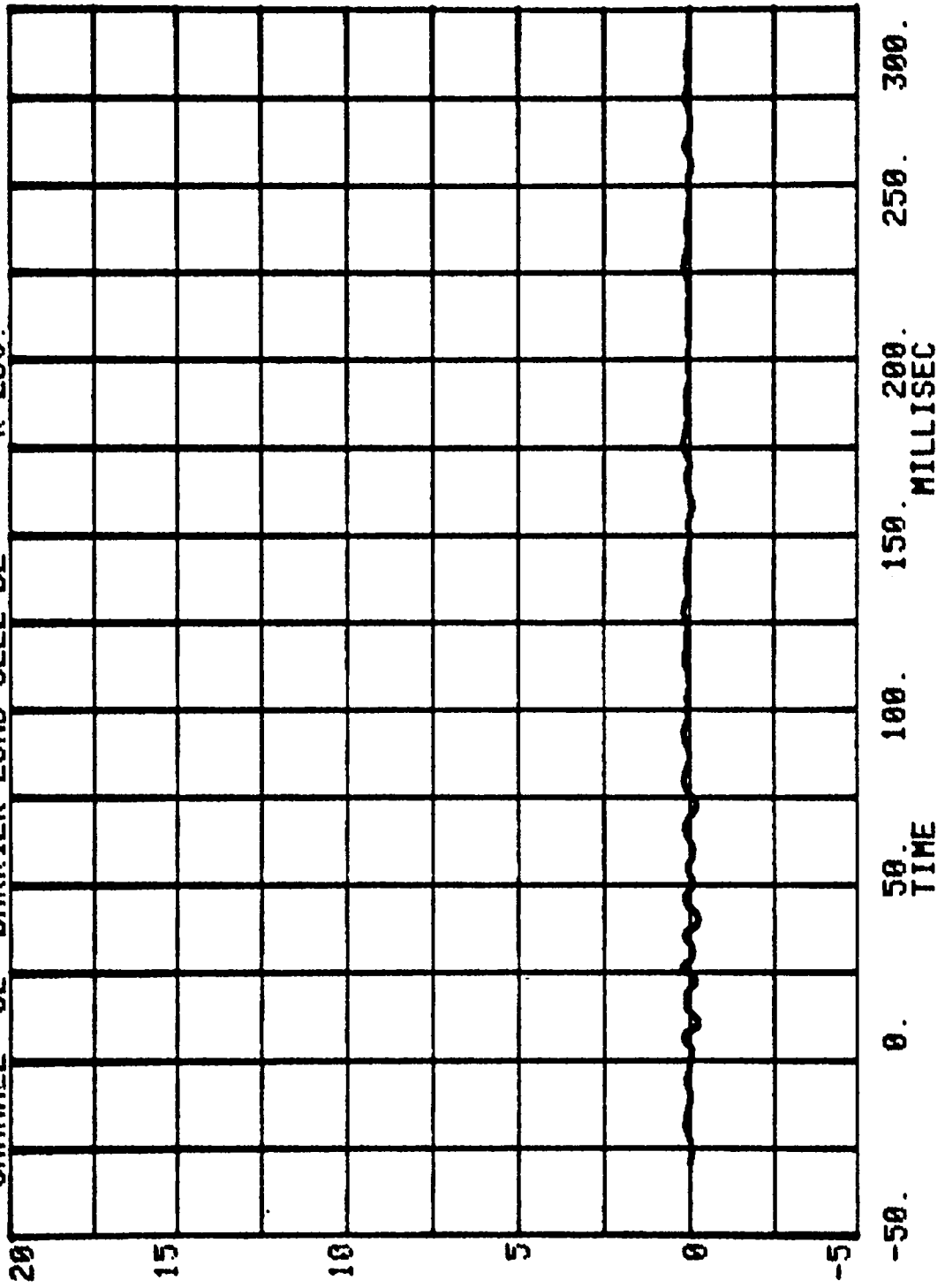
CHANNEL 60 BARRIER LOAD CELL C9 SERIES= 200 K LBS.



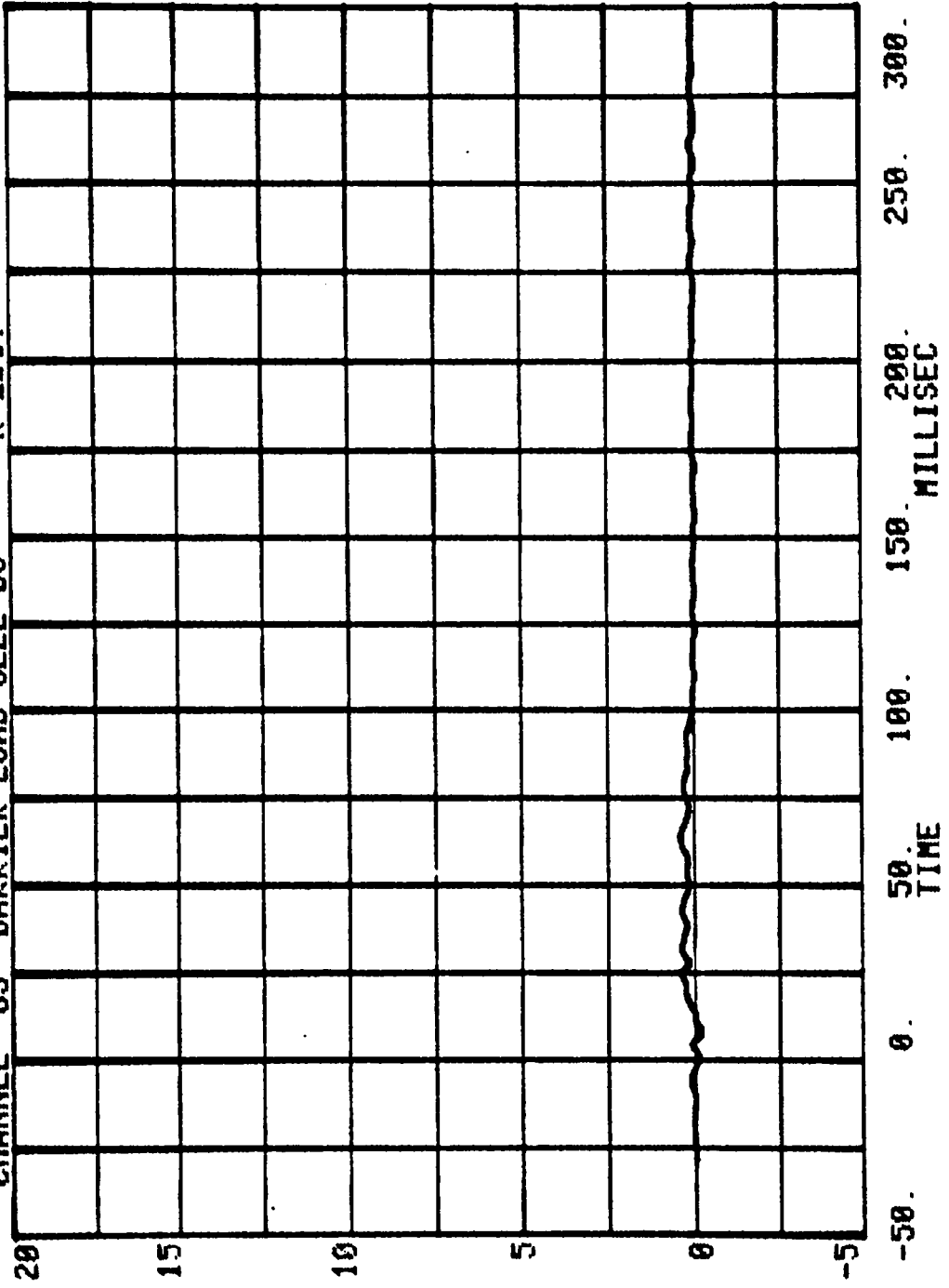
CHANNEL 61 BARRIER LOAD CELL D1
RUN= 763 SERIES= 200 K LBS.



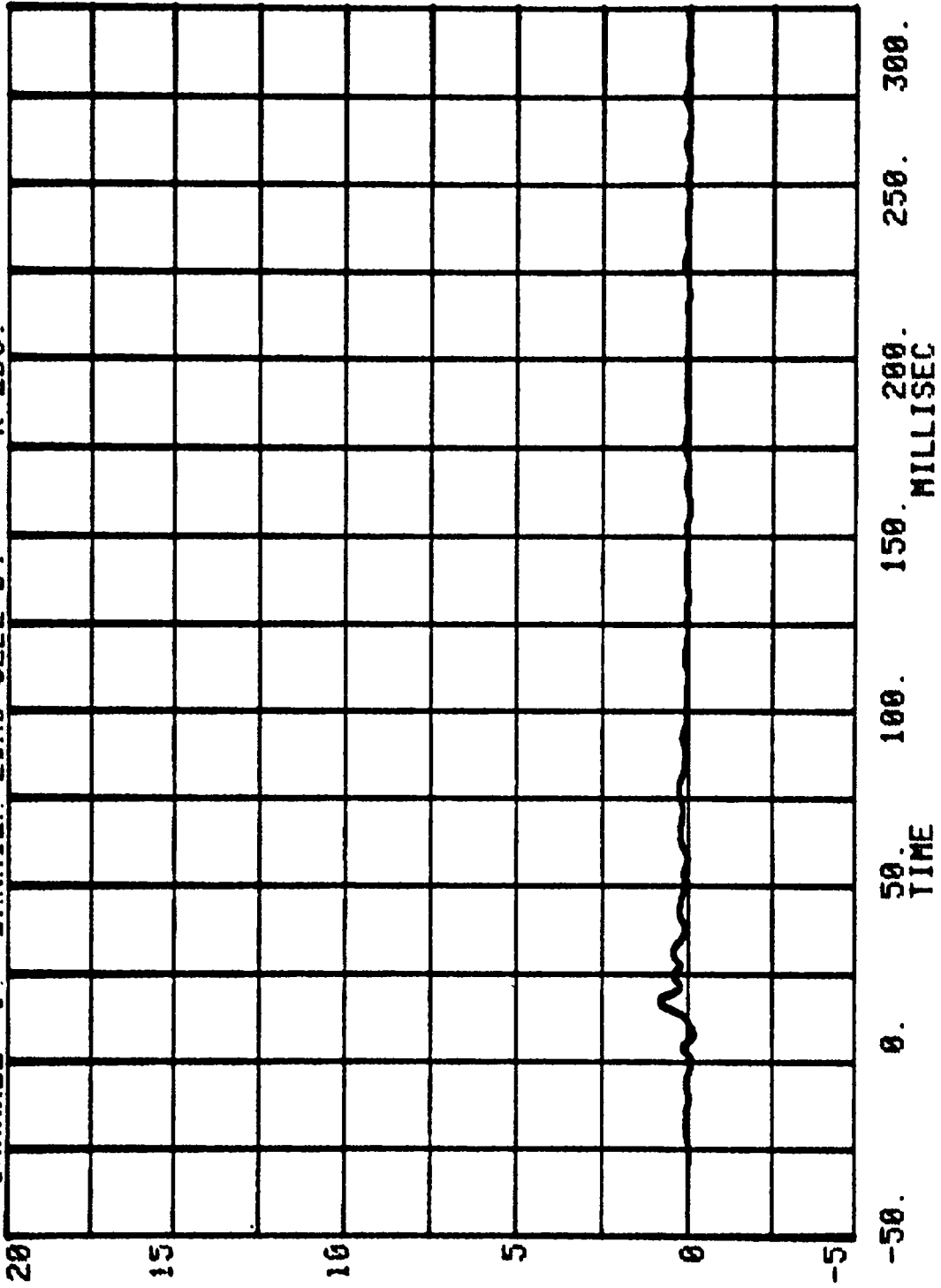
CHANNEL 62 BARRIER LOAD CELL D2 RUN= 763 SERIES= 200 K LBS.



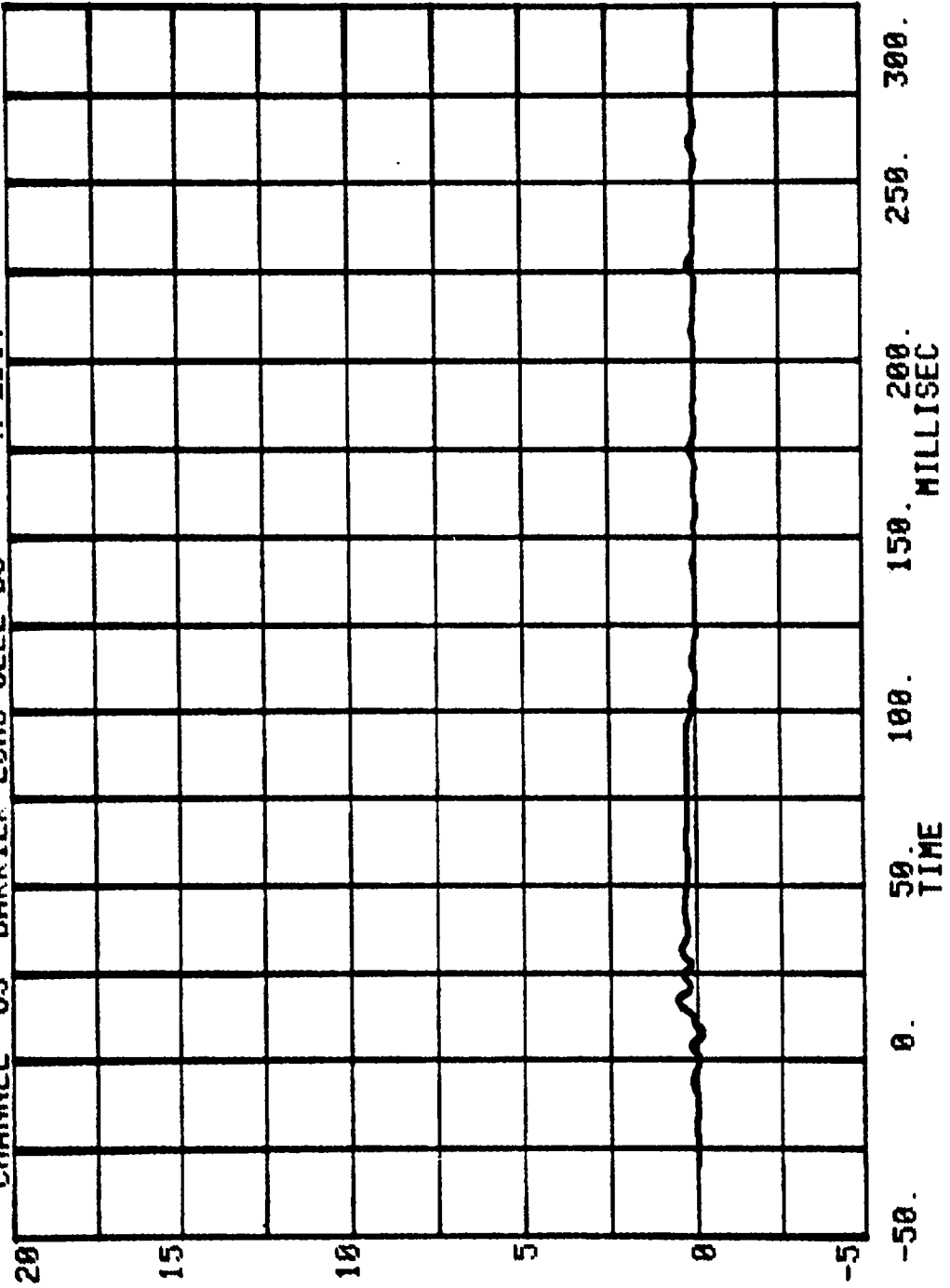
CHANNEL 63 BARRIER LOAD CELL 03
RUN= 763 SERIES= 200 K LBS.



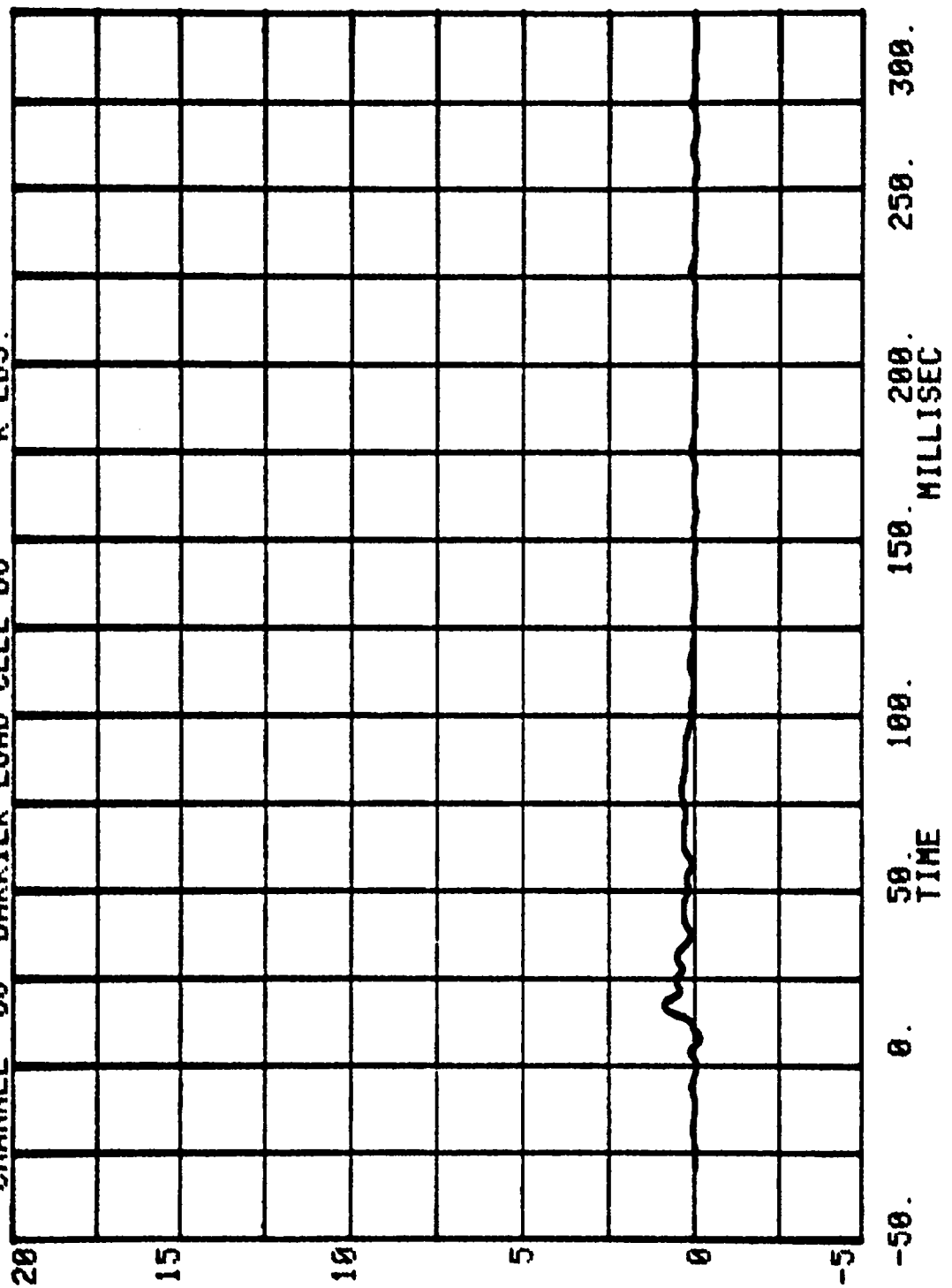
CHANNEL 64 BARRIER LOAD CELL D4
RUN= 763 SERIES= 200 K LBS.

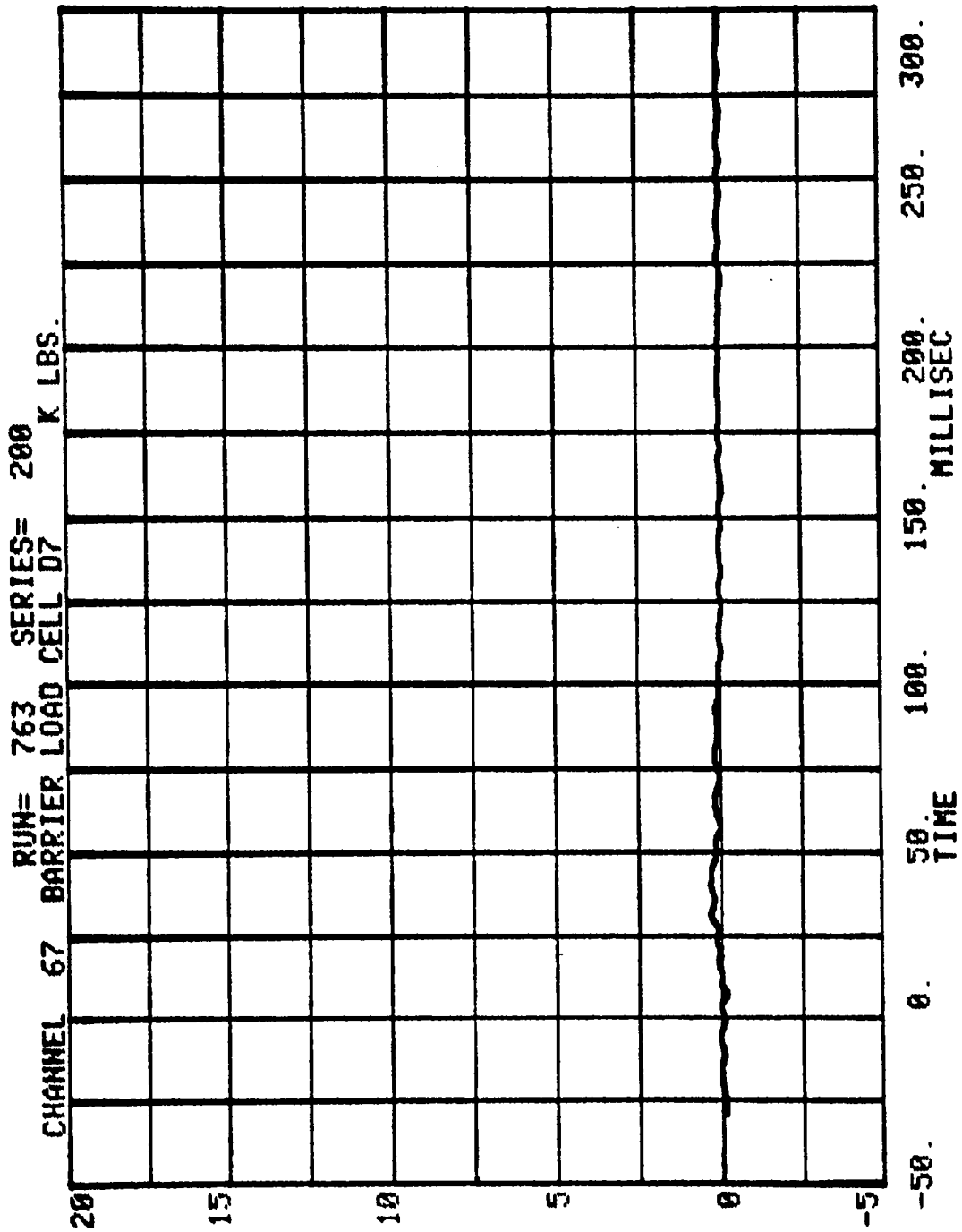


CHANNEL 65 BARRIER LOAD CELL 05 SERIES= 200 K LBS.

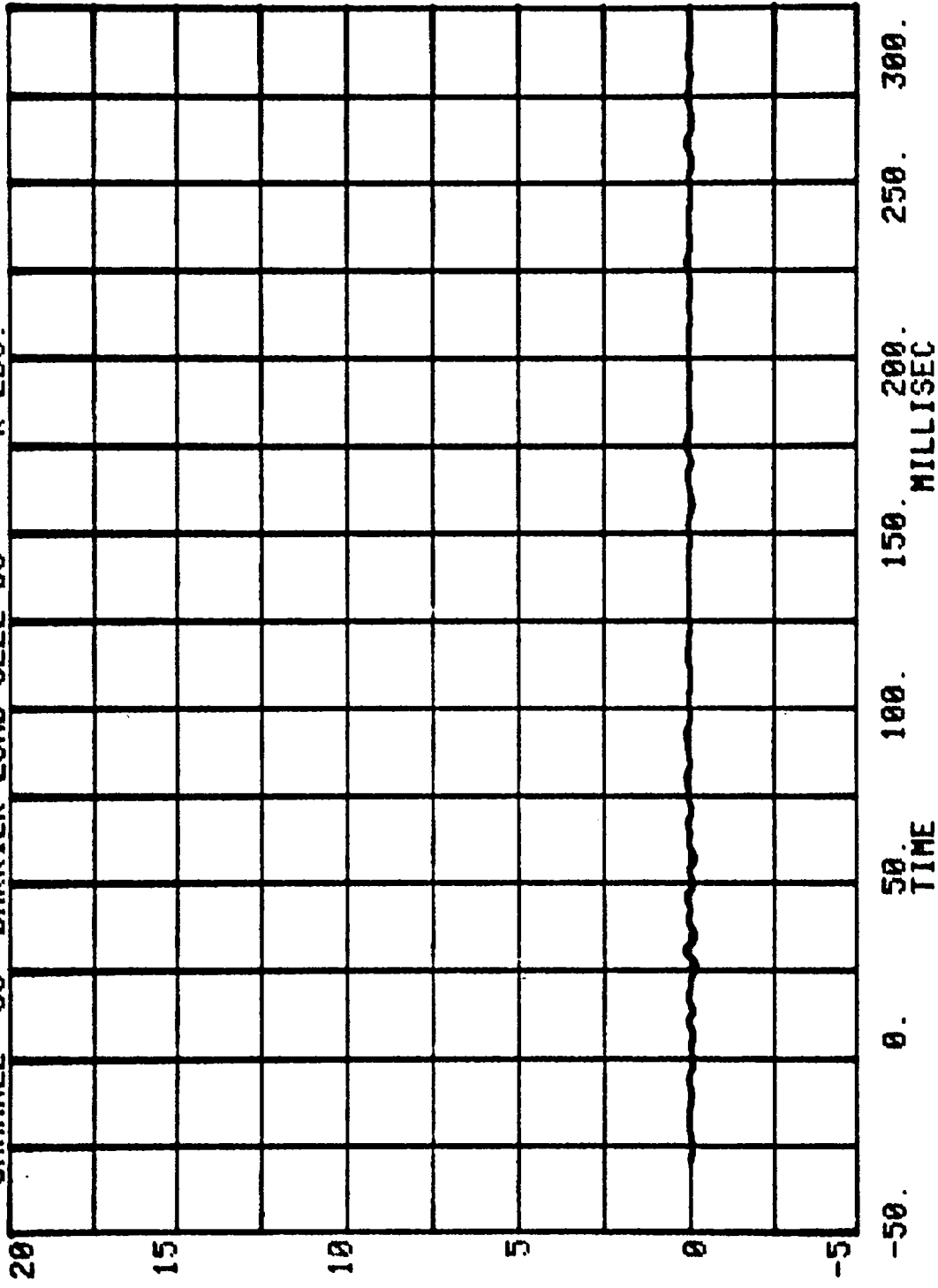


CHANNEL 66 BARRIER LOAD CELL D6
RUN= 763 SERIES= 200 K LBS.

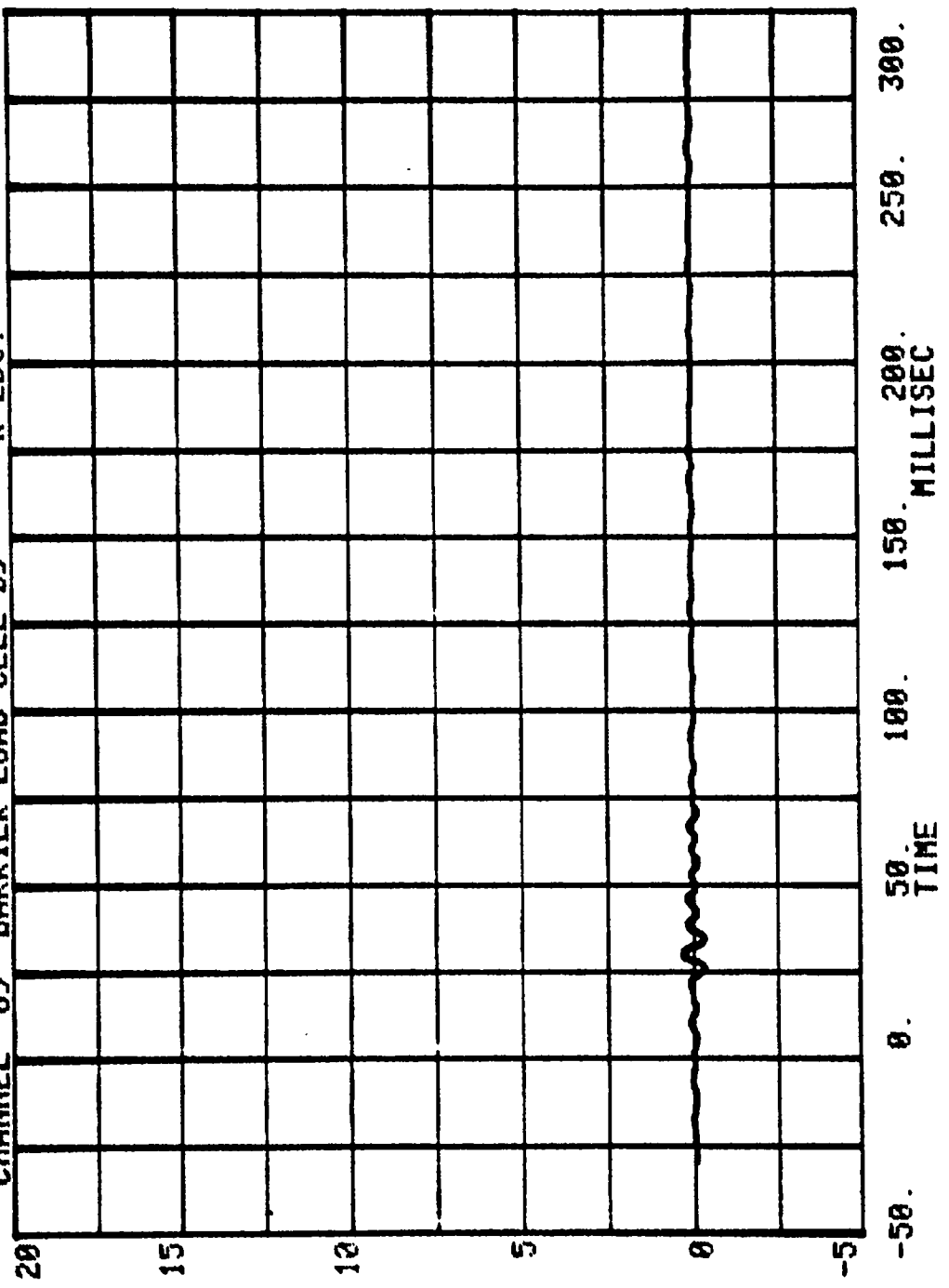




CHANNEL 68 BARRIER LOAD CELL D8 RUN= 763 SERIES= 200 K LBS.



CHANNEL 69 BARRIER LOAD CELL 09 K LBS.
RUN= 763 SERIES= 200

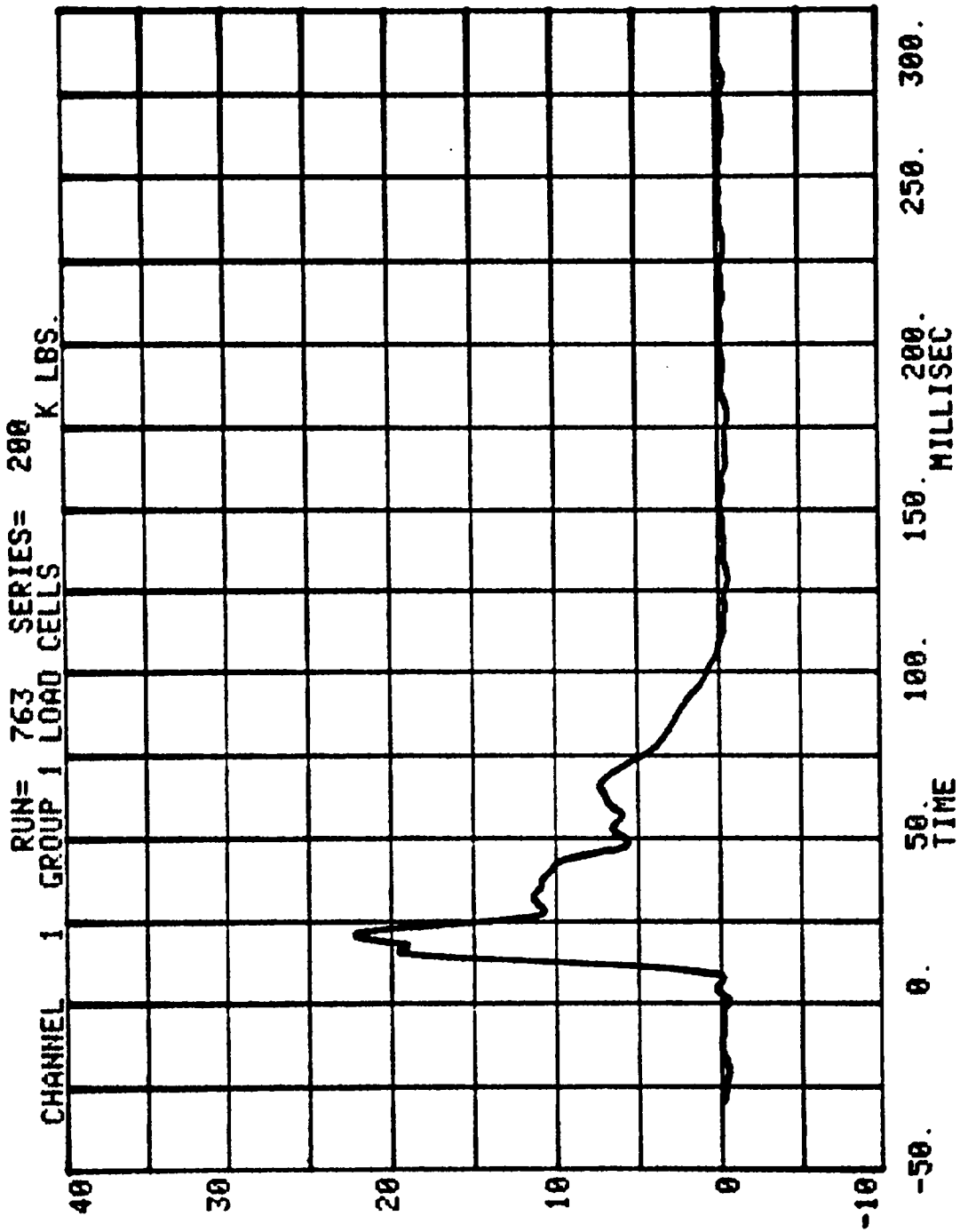


NEW CAR ASSESSMENT BARRIER TESTS - 1987

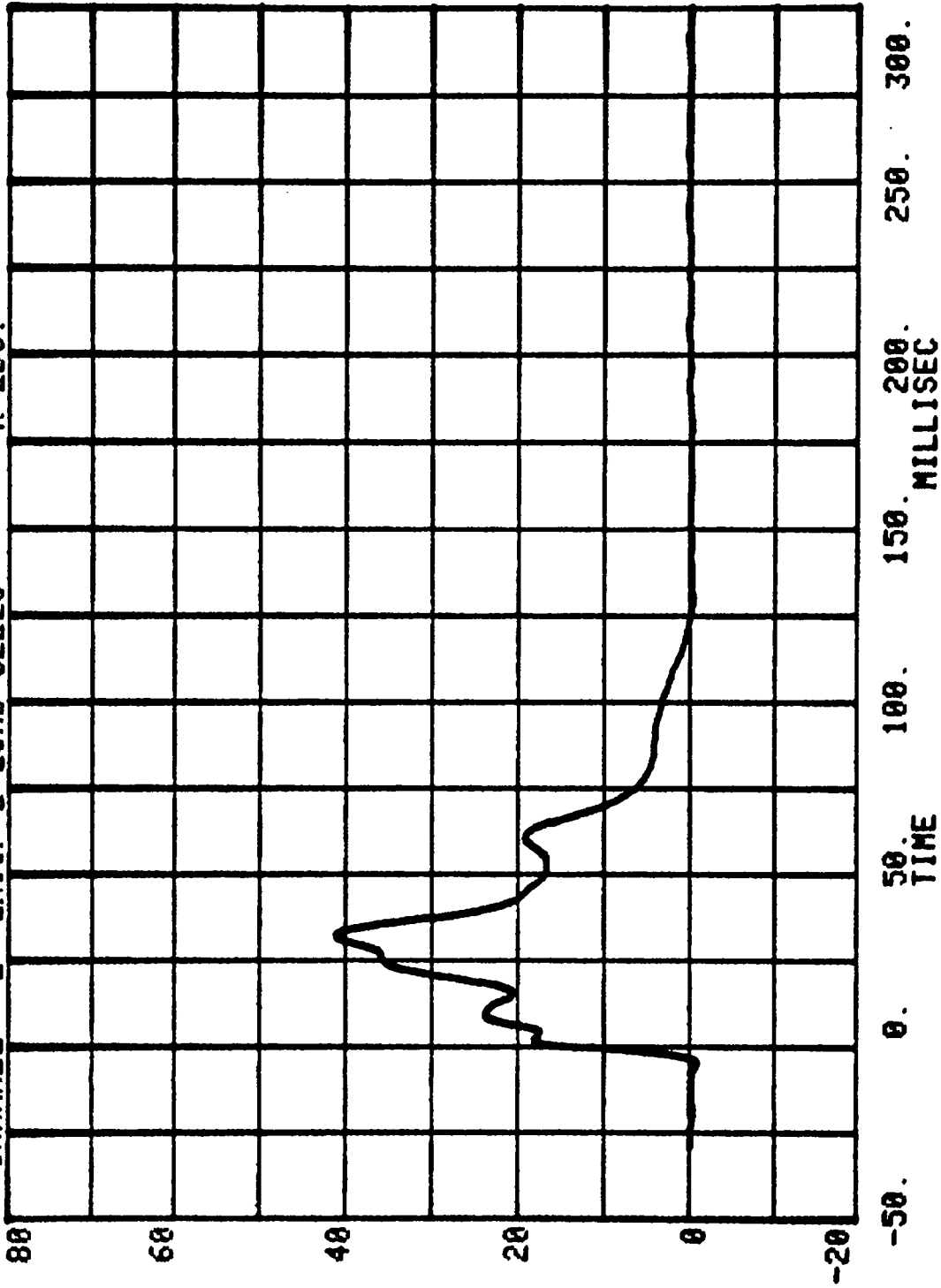
RUN # 763

SERIES # 200

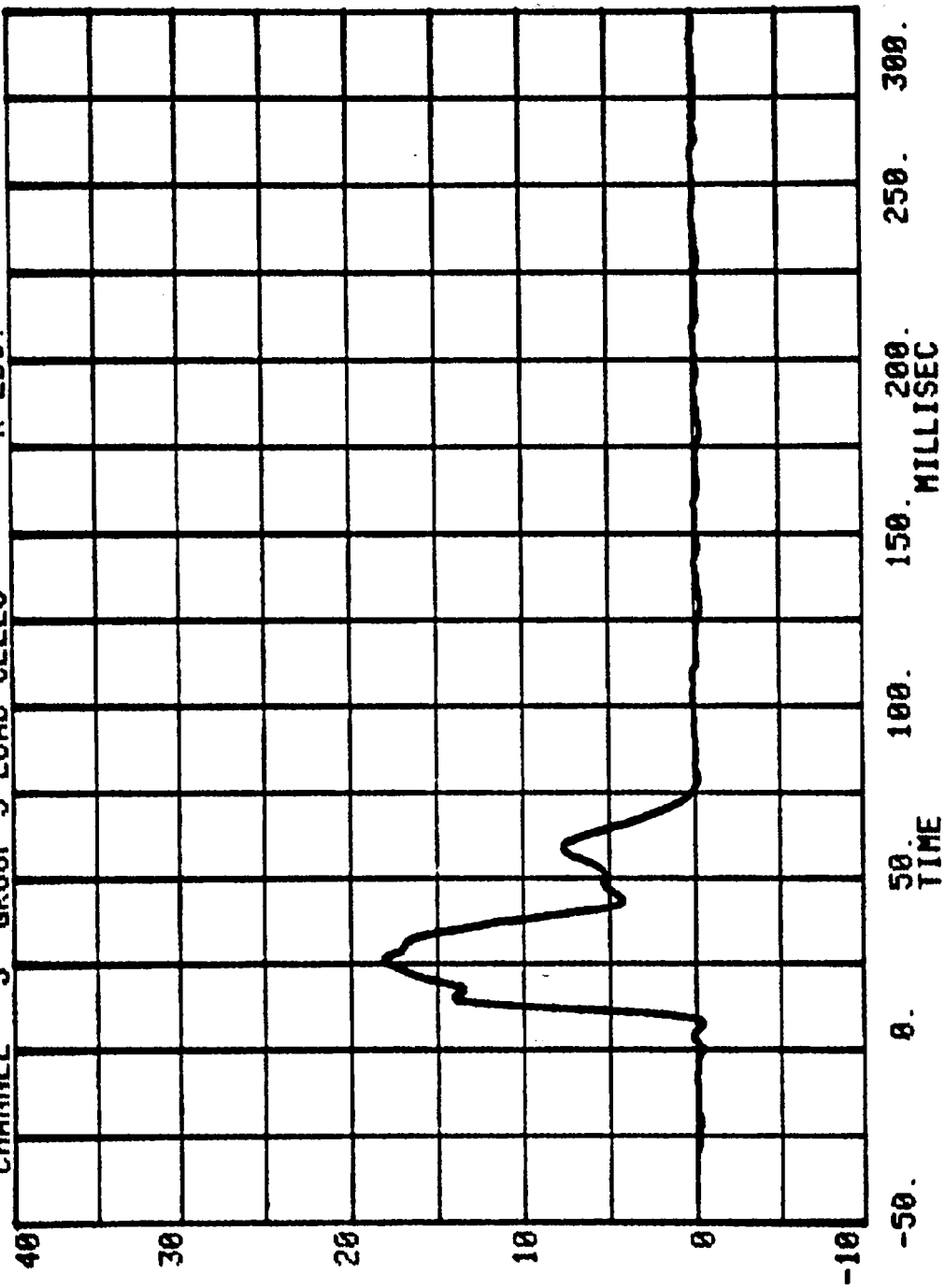
CHAN	TITLE	MINIMUM	MAXIMUM
1	GROUP 1 LOAD CELLS	- .466	22.321 K LBS.
2	GROUP 2 LOAD CELLS	- .880	41.218 K LBS.
3	GROUP 3 LOAD CELLS	- .456	18.172 K LBS.
4	GROUP 4 LOAD CELLS	- .241	10.464 K LBS.
5	GROUP 5 LOAD CELLS	- .623	13.995 K LBS.
6	GROUP 6 LOAD CELLS	- .491	12.293 K LBS.
7	TOTAL LOAD CELL SUM	-1.382	103.512 K LBS.



CHANNEL 2 GROUP 2 LOAD CELLS
RUN= 763 SERIES= 200 K LBS.



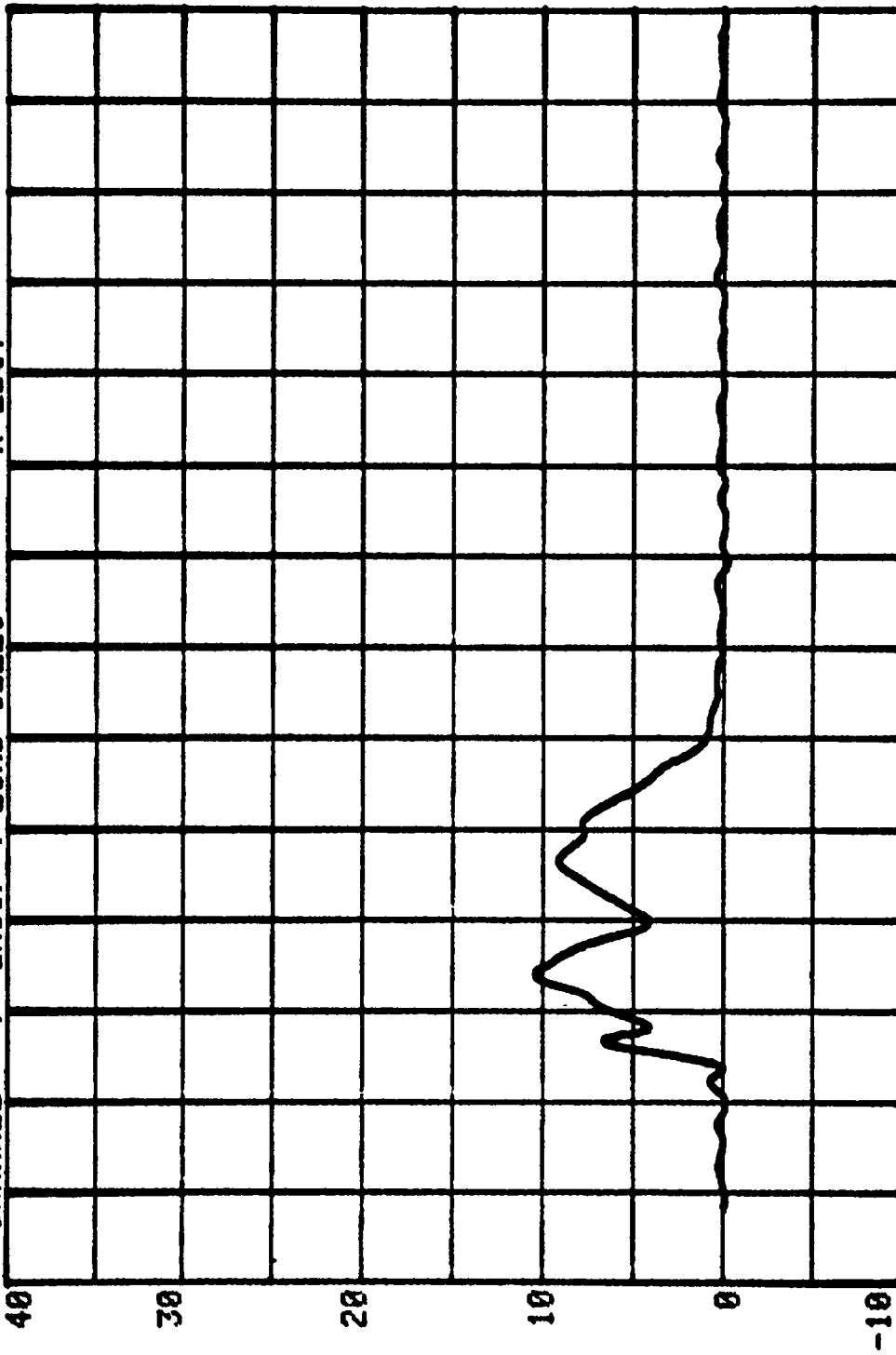
CHANNEL 3 GROUP 3 LOAD CELLS
RUN= 763 SERIES= 200 K LBS.



CHANNEL 4 GROUP 4 LOAD CELLS

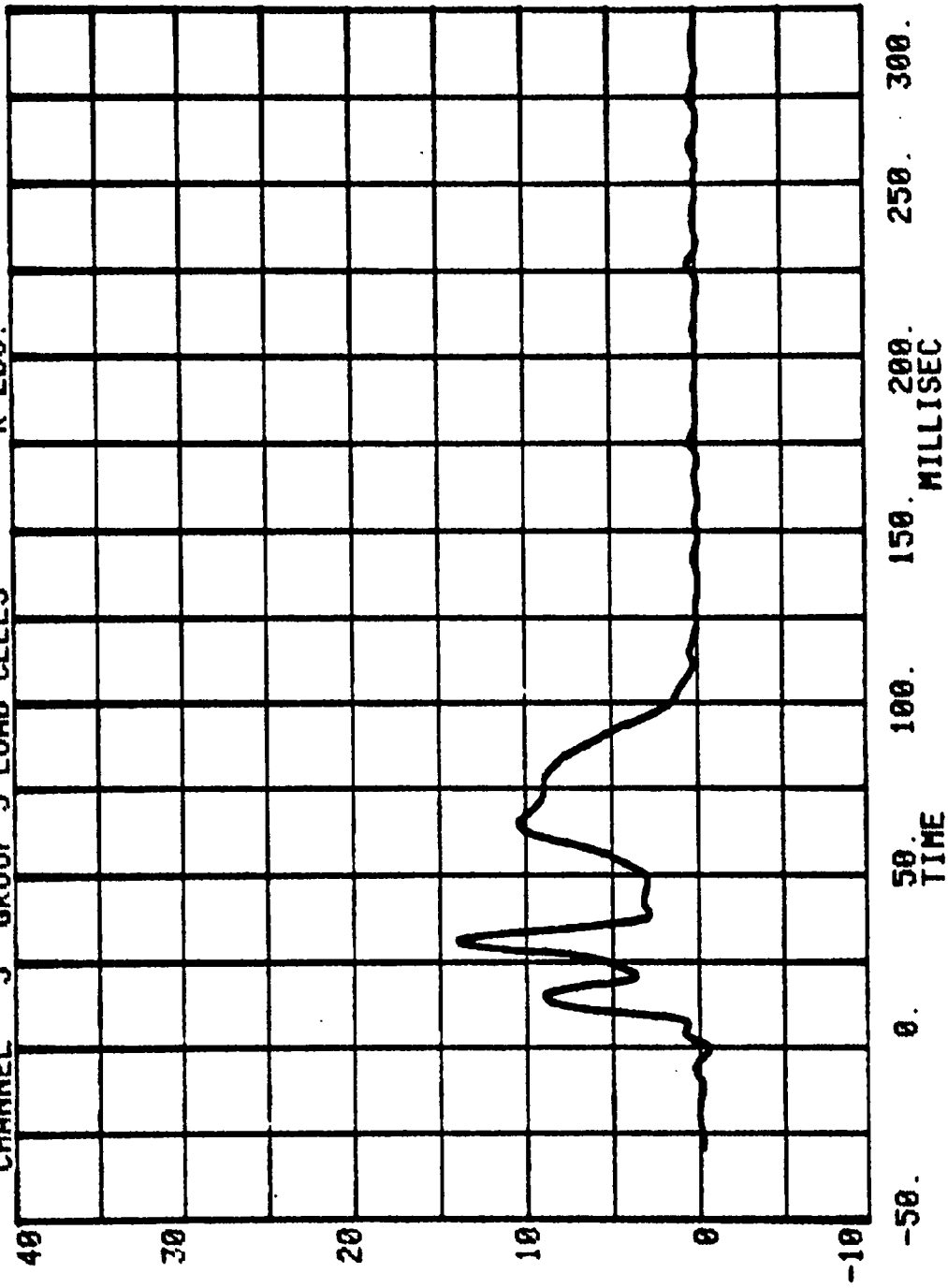
RUN= 763 SERIES= 200

K LBS.

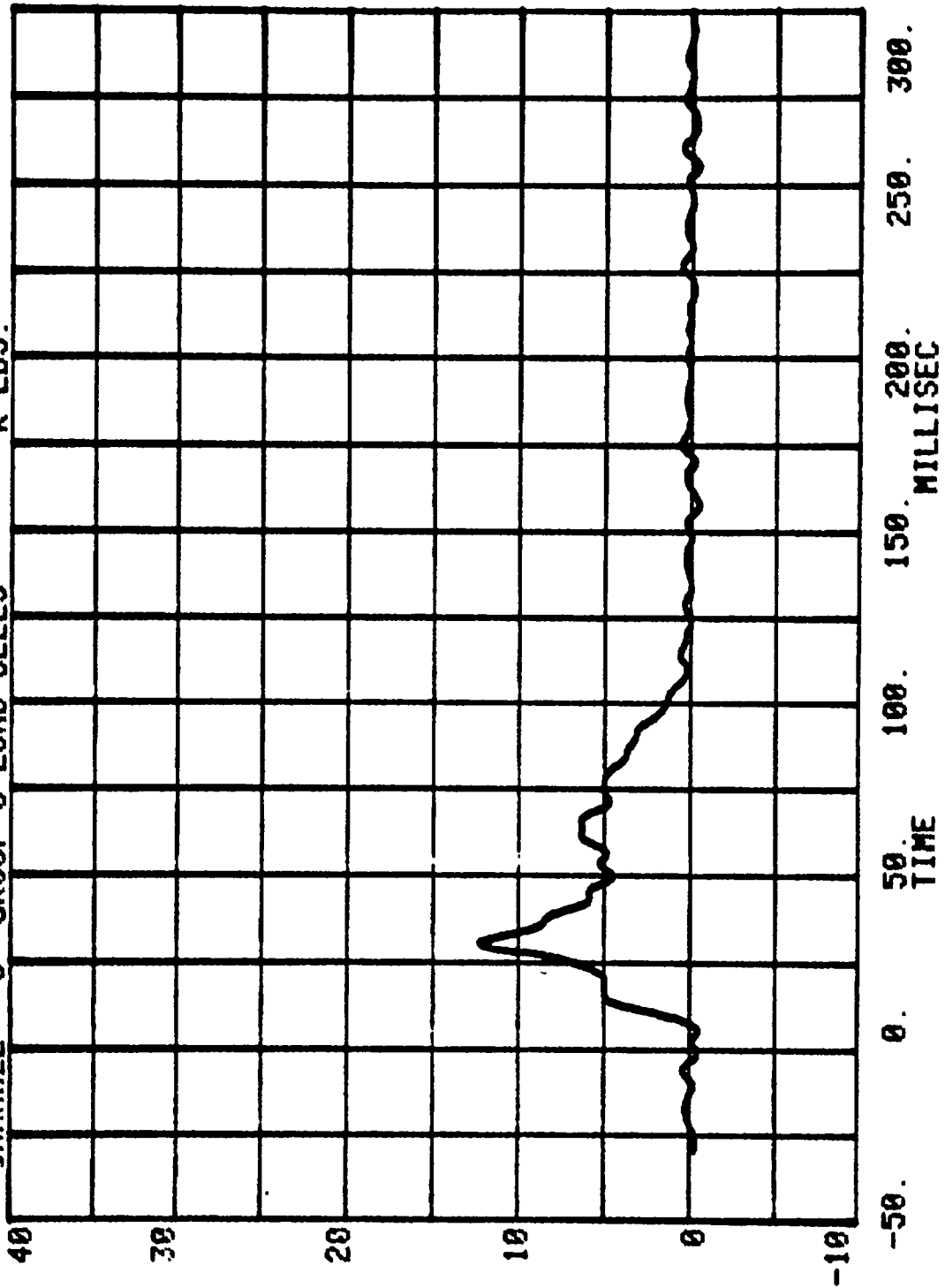


-50. 0. 50. 100. 150. 200. 250. 300.
TIME

CHANNEL 5 GROUP 5 LOAD CELLS
RUN= 763 SERIES= 200 K LBS.

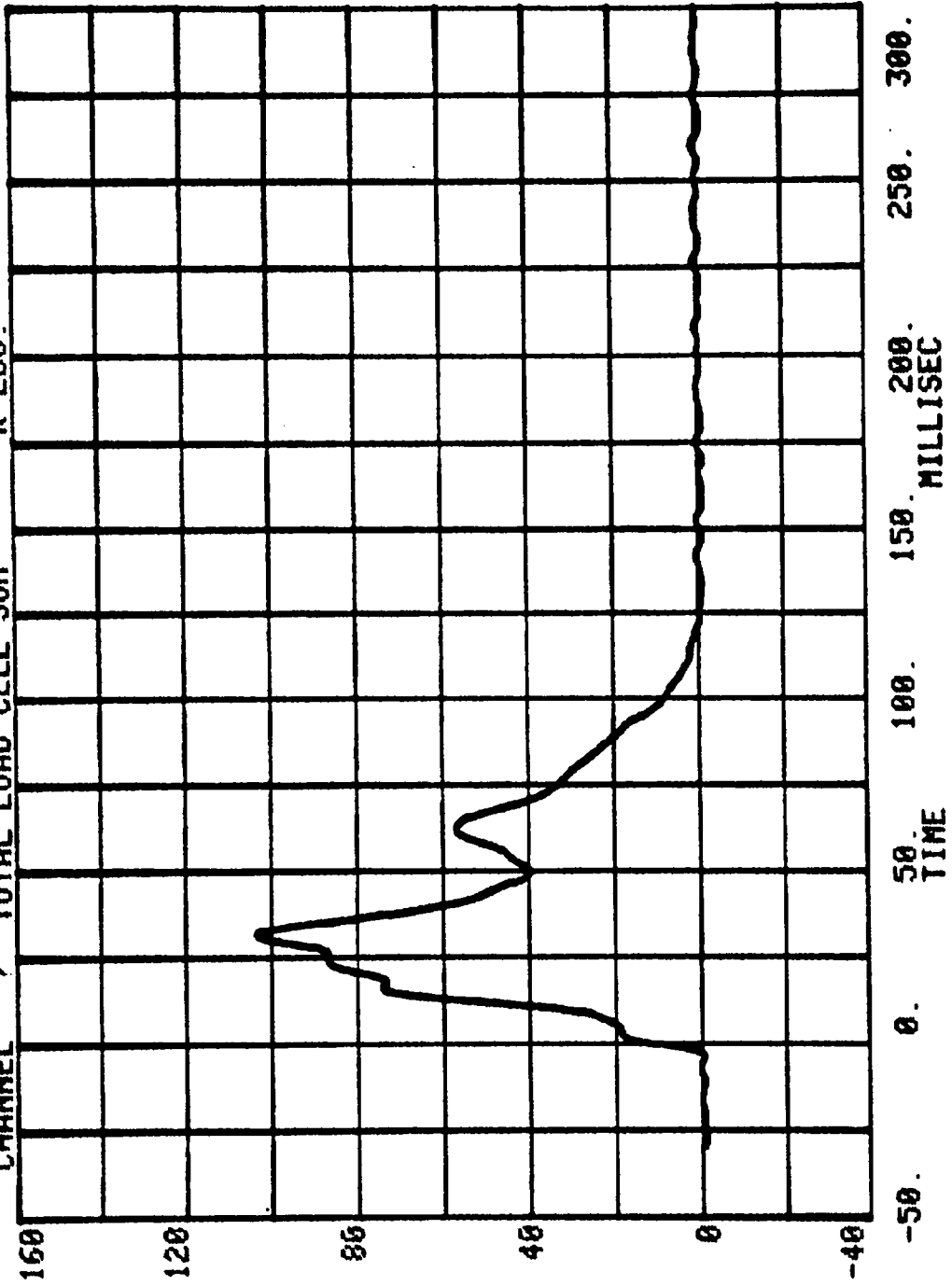


CHANNEL 6 GROUP 6 LOAD CELLS
RUN= 763 SERIES= 200 K LBS.



CHANNEL 7 TOTAL LOAD CELL SUM K LBS.

RUN= 763 SERIES= 200



TEST NO. MH0200

DUMMY DATA

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

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

NEW CAR ASSESSMENT BARRIER TESTS - 1997

RUN= 763

POS#1 HEAD R

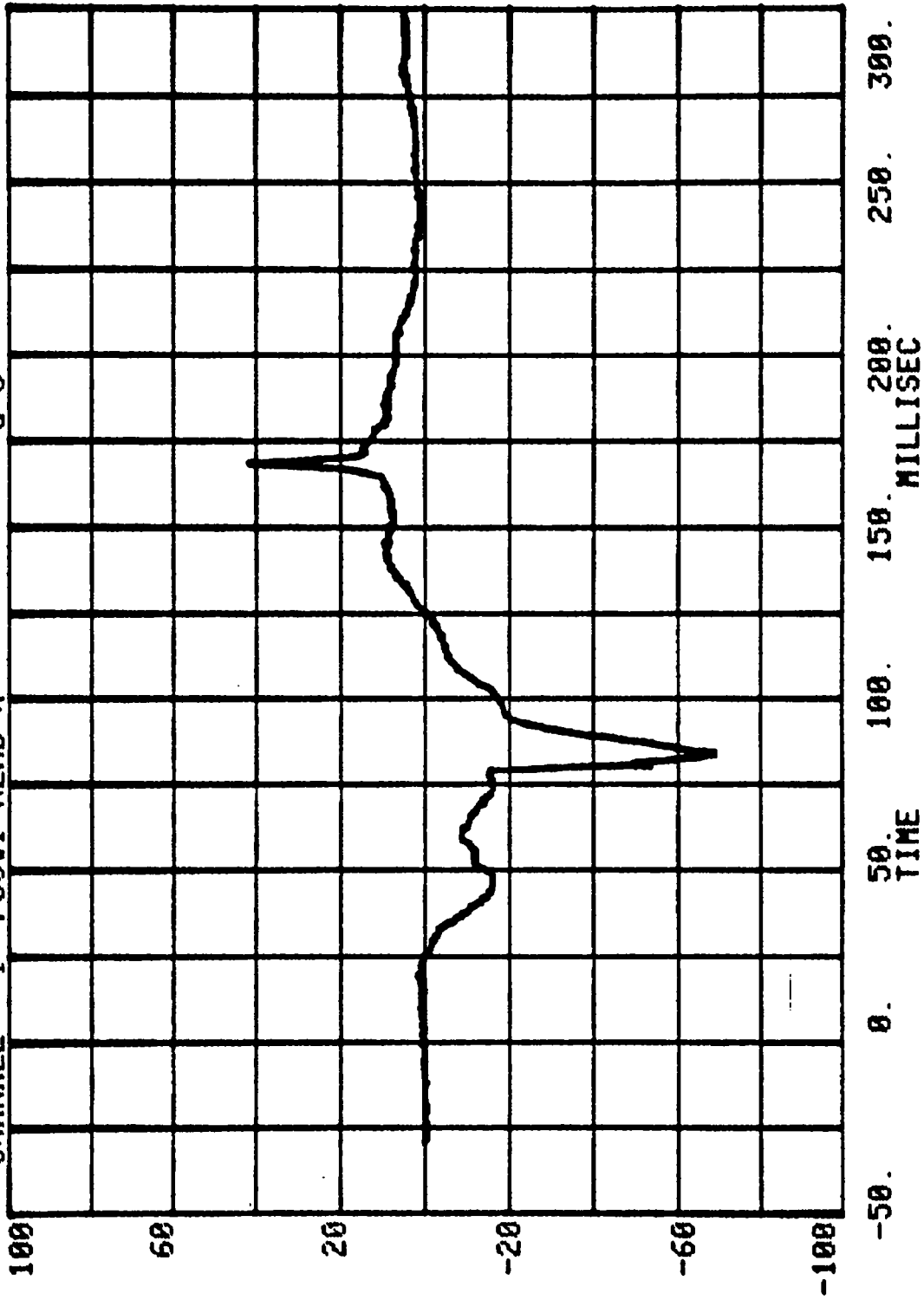
HIC= 551.5 FROM T1= .05730 TO T2= .09330

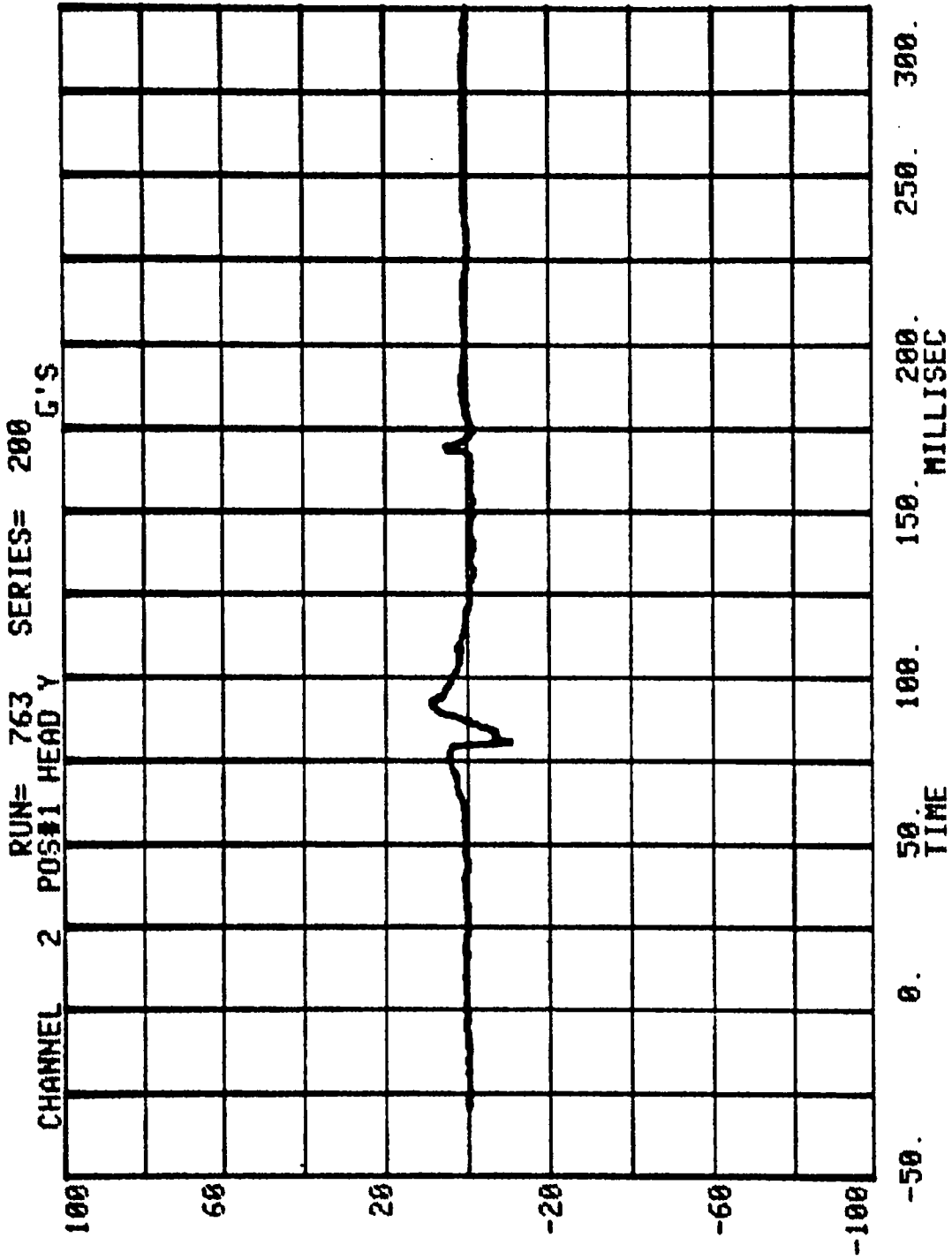
AVERAGE ACCELERATION BETWEEN T1 AND T2= 47.2G'S

EVENT TIME= 300.0 MSEC

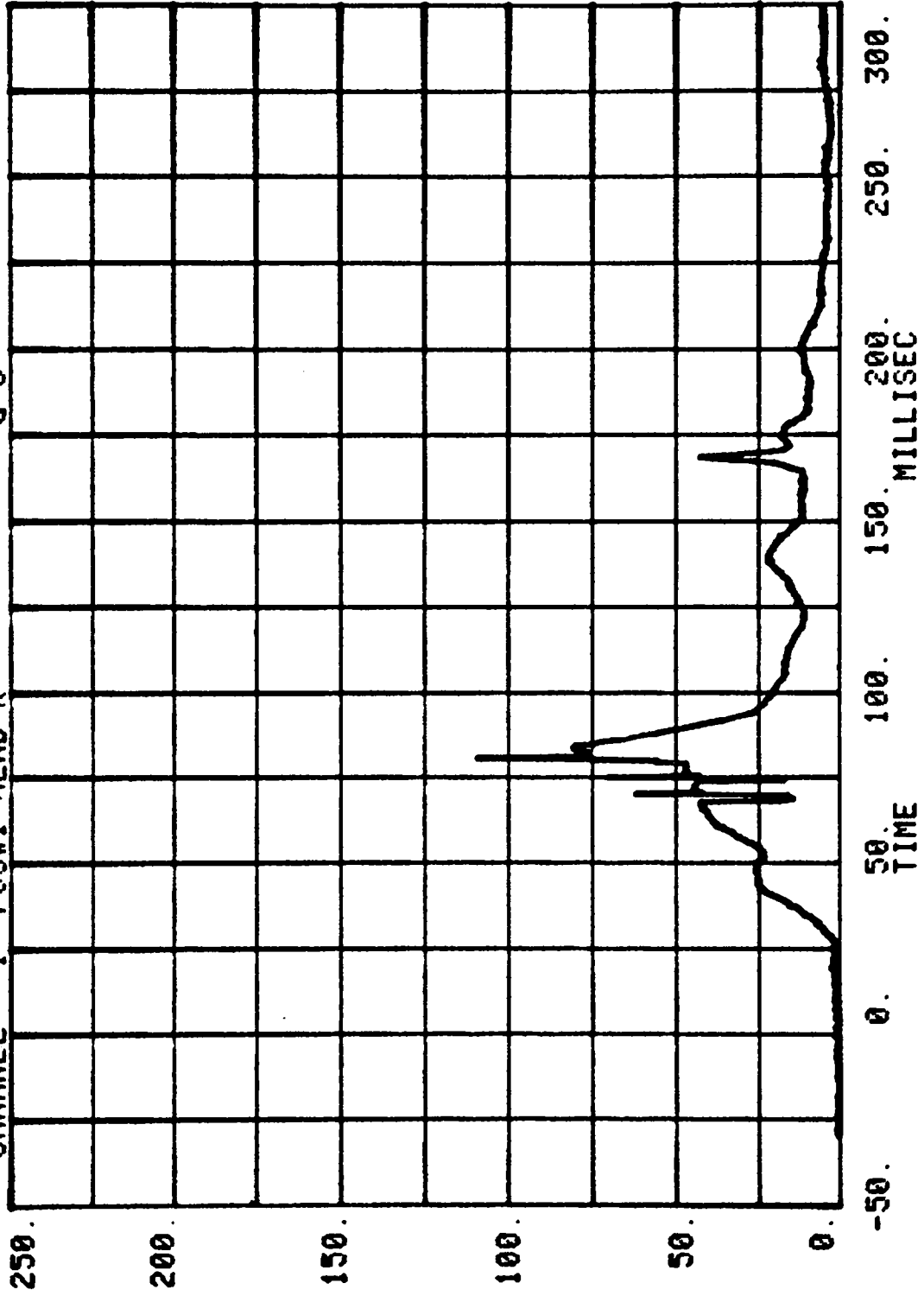
SEVERITY INDEX= 889.8

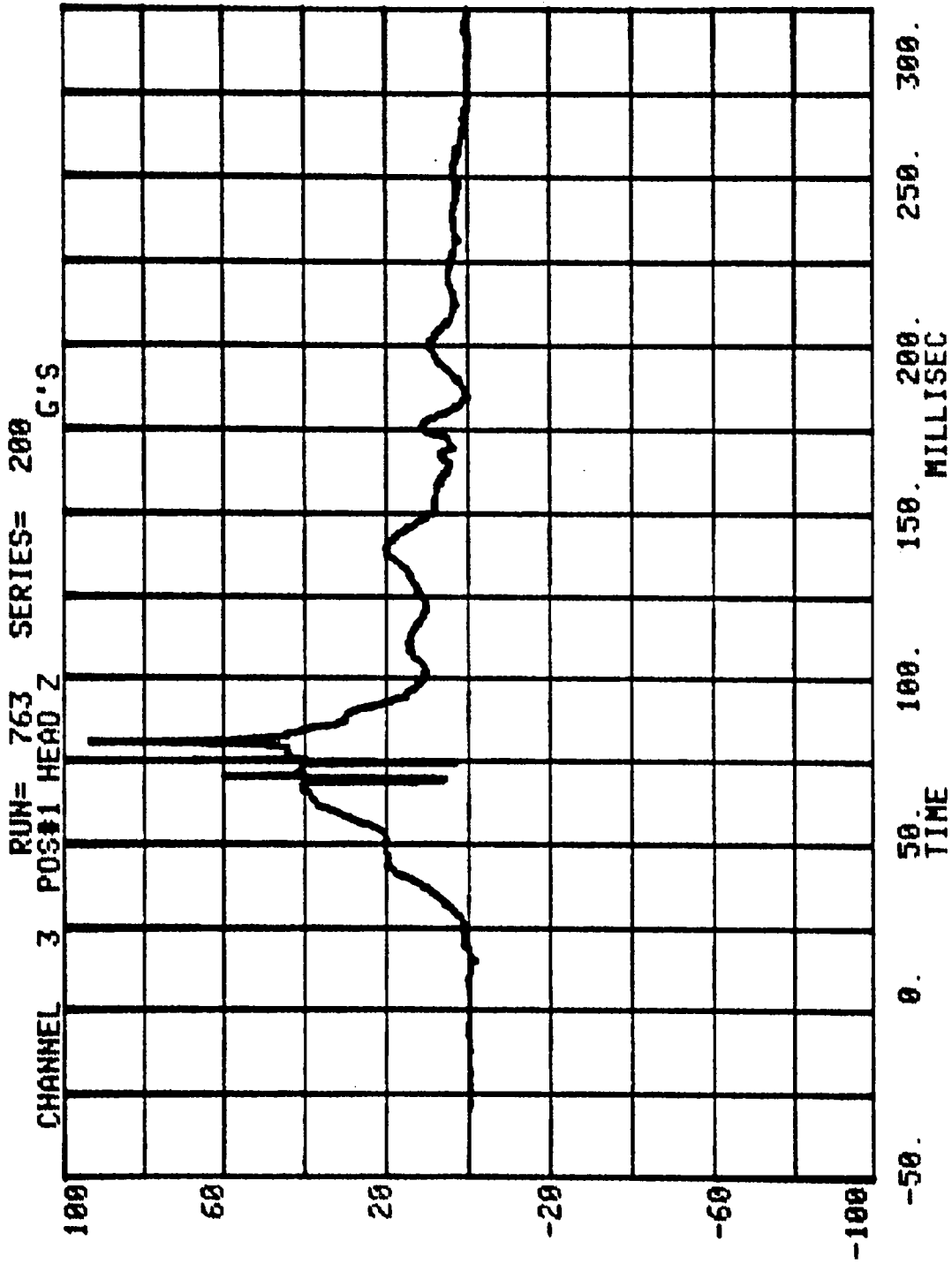
CHANNEL 1 POS#1 HEAD X RUN= 763 SERIES= 200 G'S



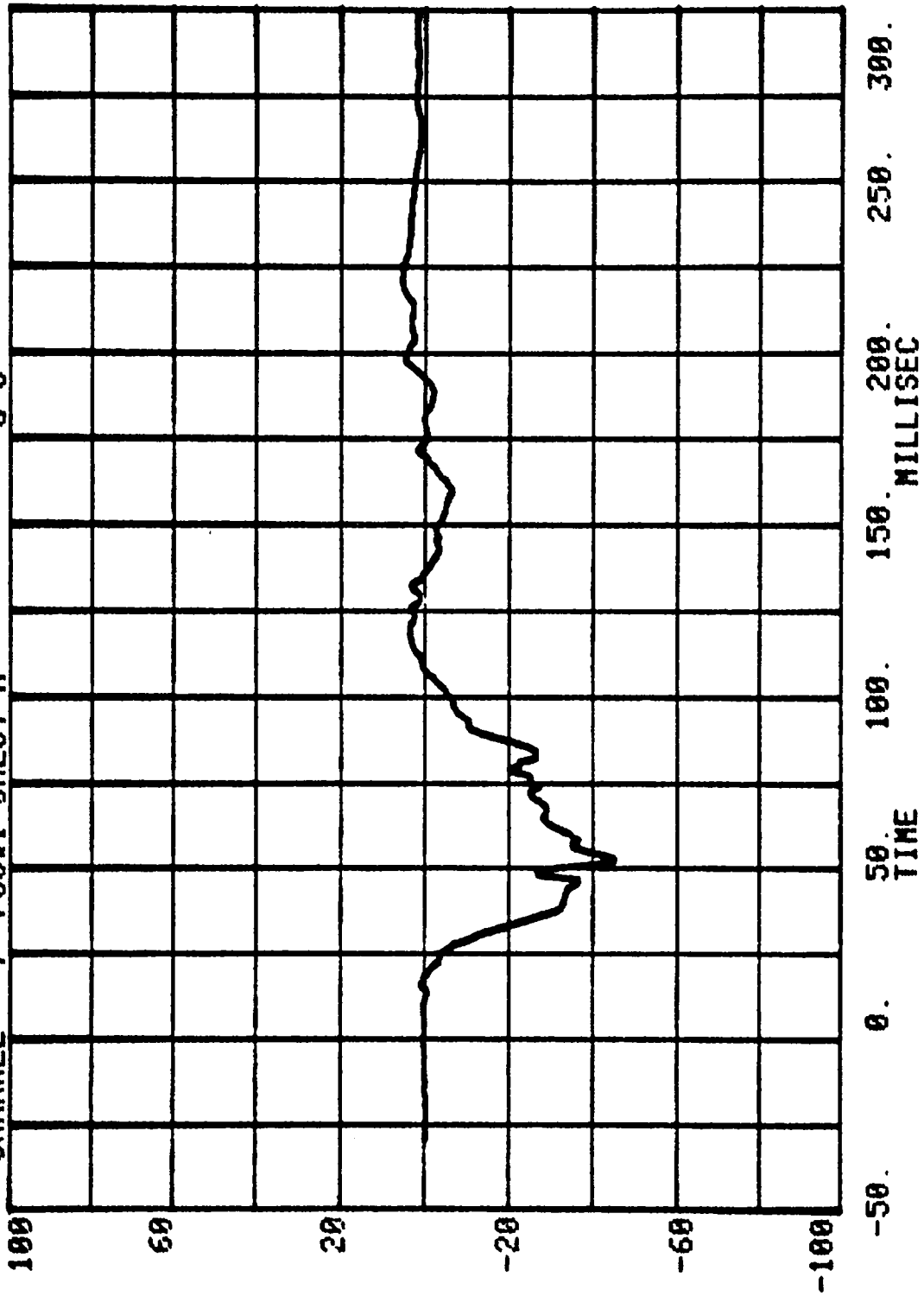


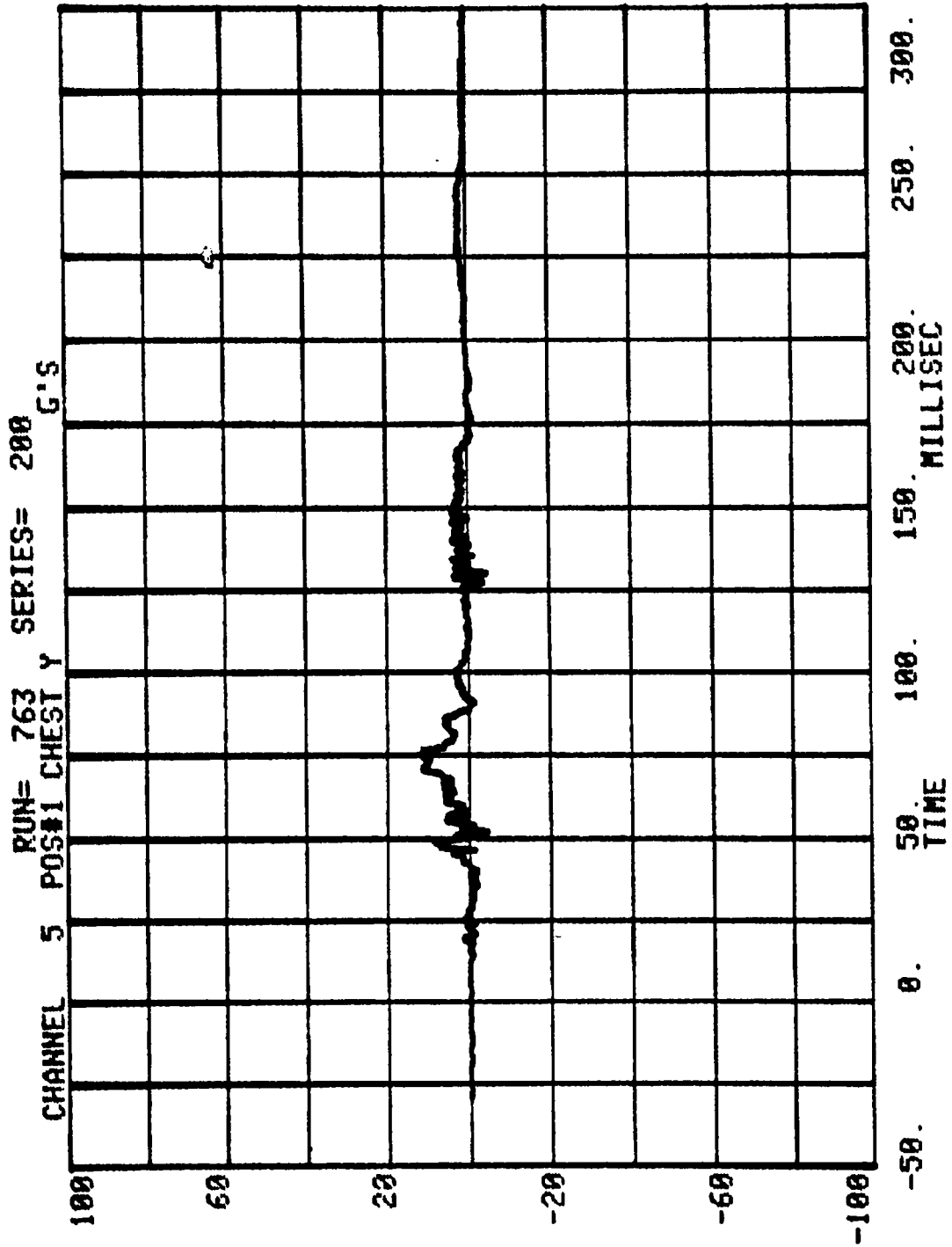
CHANNEL 1 POS#1 HEAD R RUN= 763 SERIES= 200 G'S





CHANNEL 4 POS#1 CHEST X
RUN= 763 SERIES= 200 G'S





B-76

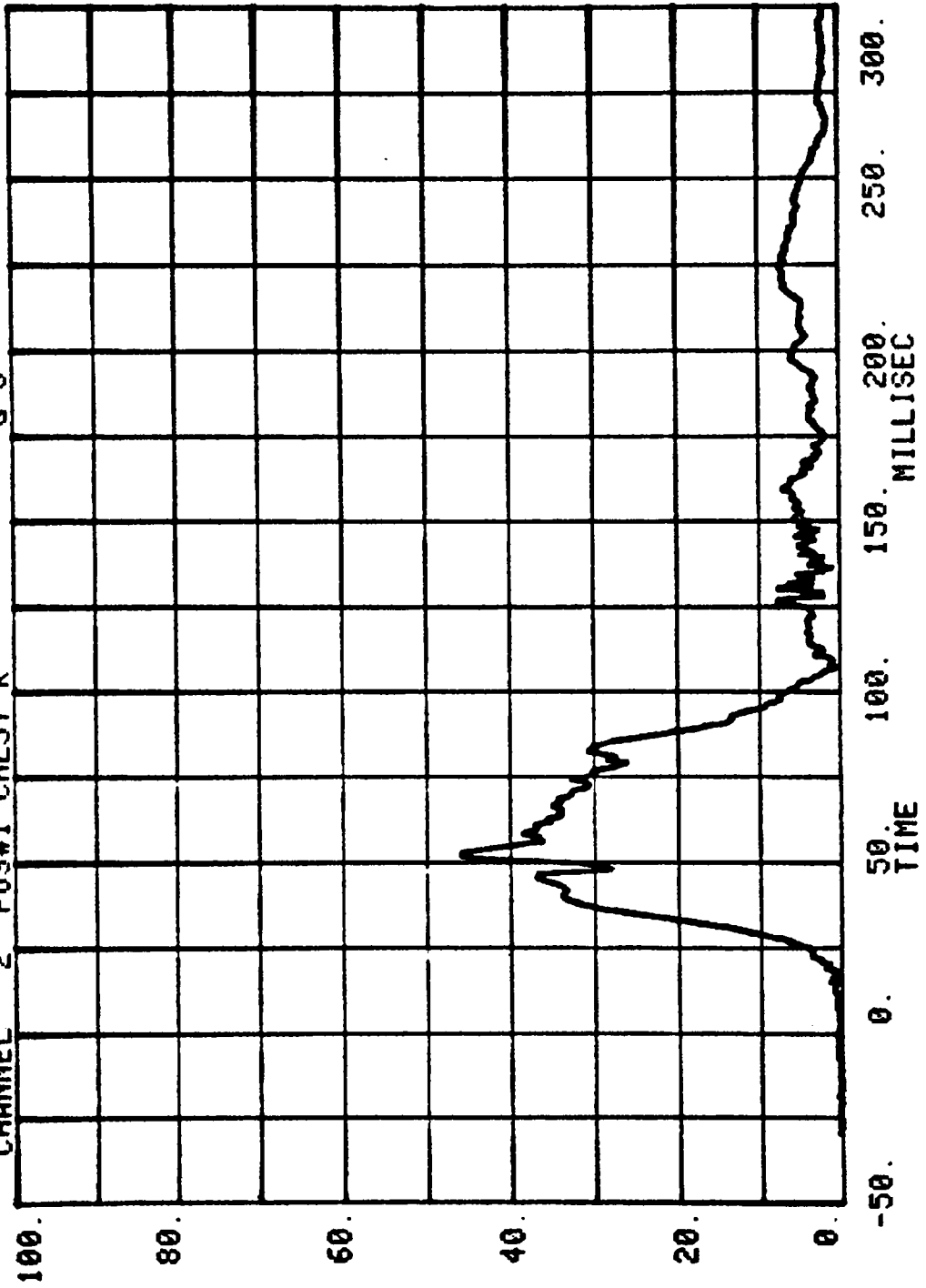
7556-1

CHANNEL 6 POS#1 CHEST Z G'S

RUN= 763 SERIES= 200



CHANNEL 2 POS#1 CHEST R SERIES= 200 G'S

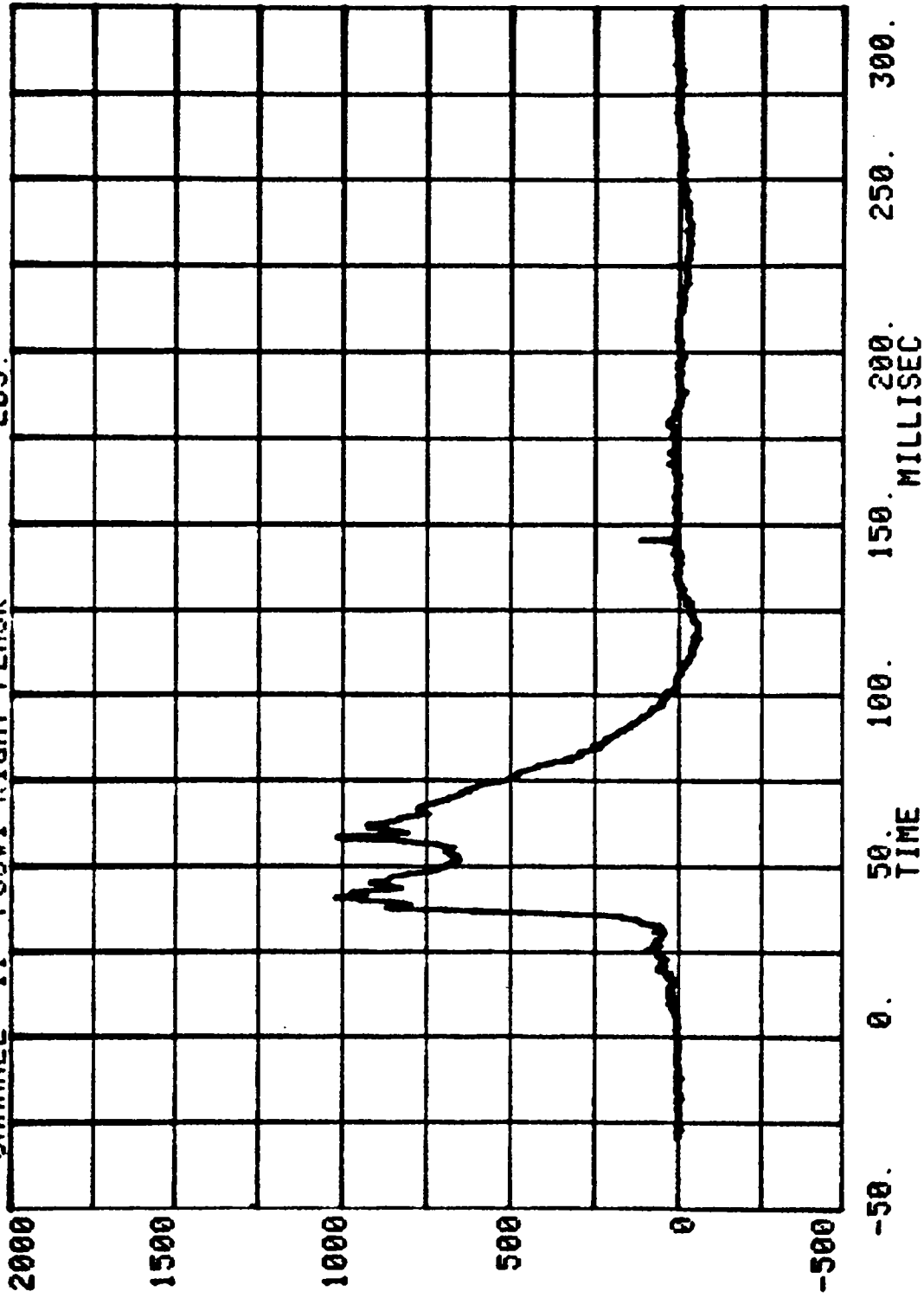


CHANNEL 11 POS#1 RIGHT FEMUR

RUN= 763

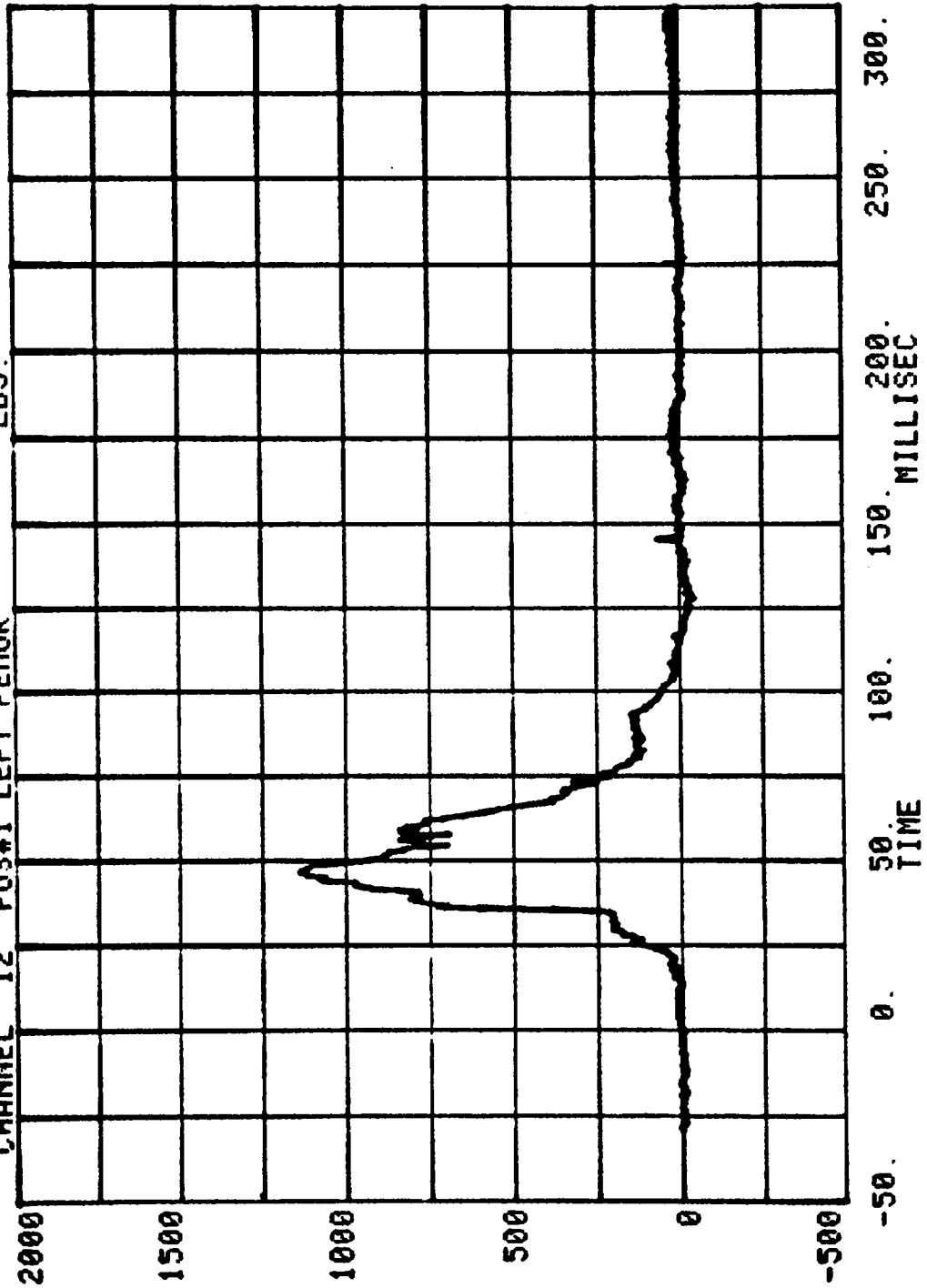
SERIES= 200

LBS.



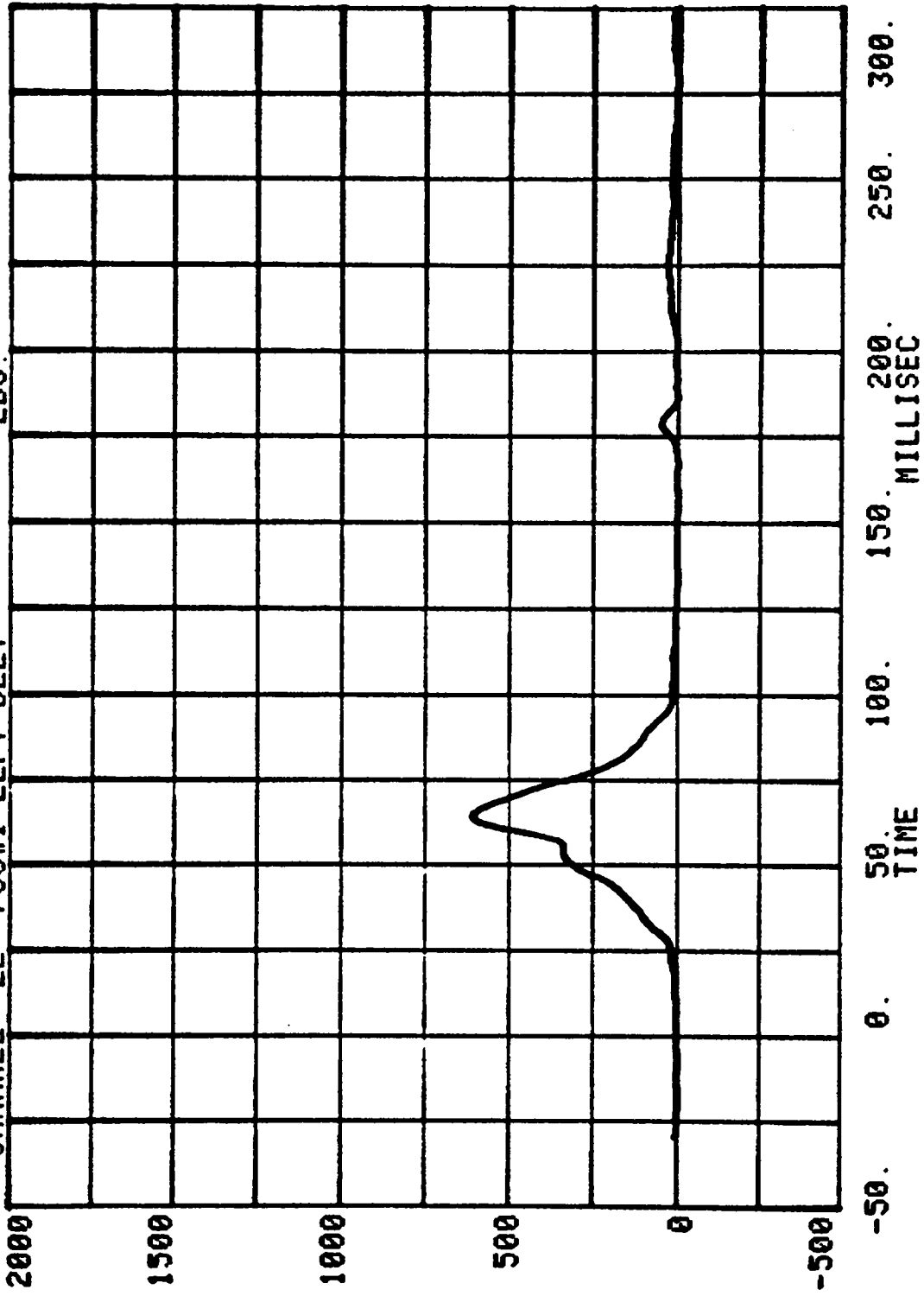
CHANNEL 12 POS#1 LEFT FEMUR LBS.

RUN= 763 SERIES= 200



CHANNEL 22 POS#1 LEFT BELT

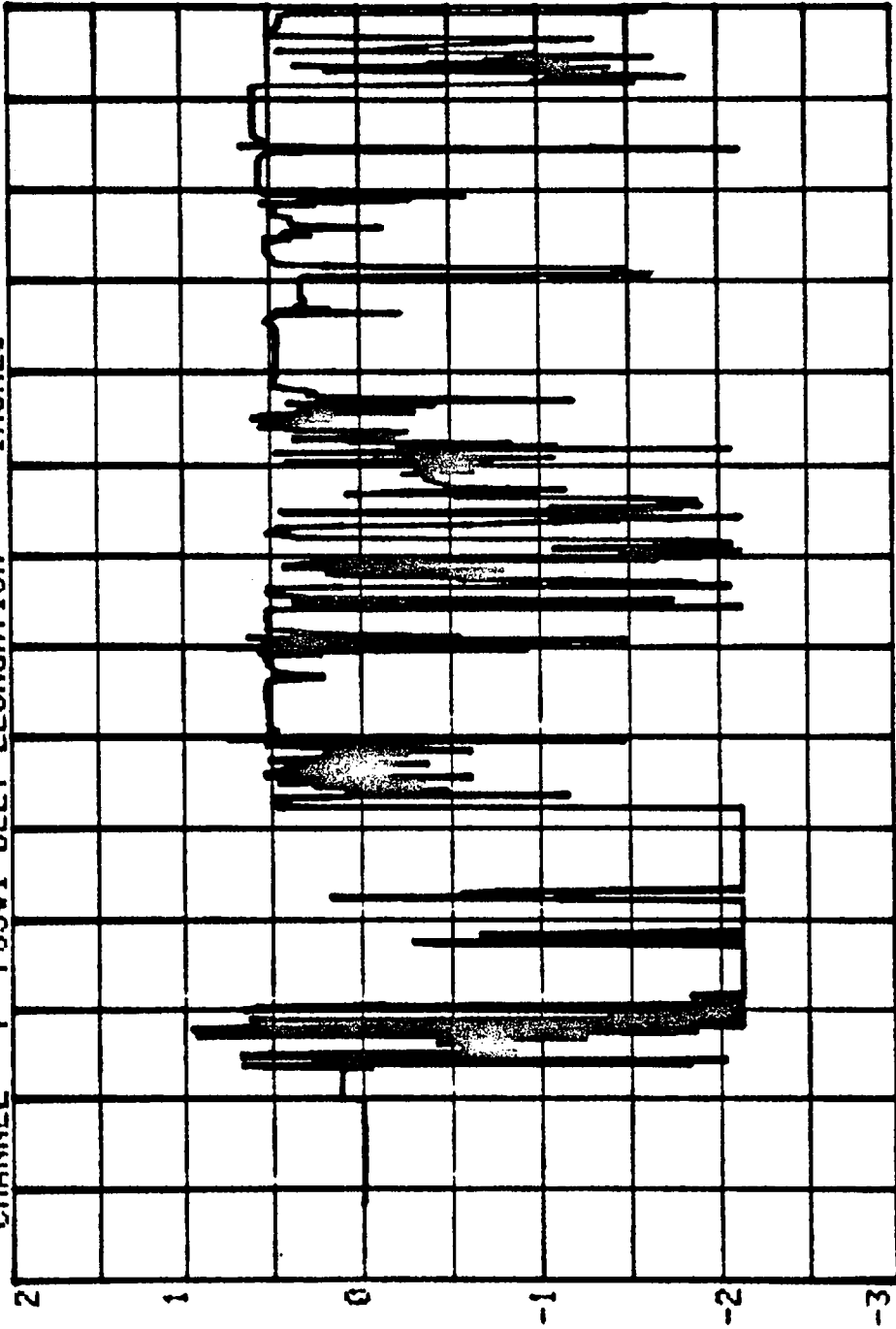
RUN= 763 SERIES= 200 LBS.



CHANNEL 7 POS#1 BELT ELONGATION

RUN= 763 SERIES= 200

INCHES



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

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

NEW CAR ASSESSMENT BARRIER TESTS - 1987

RUN= 763

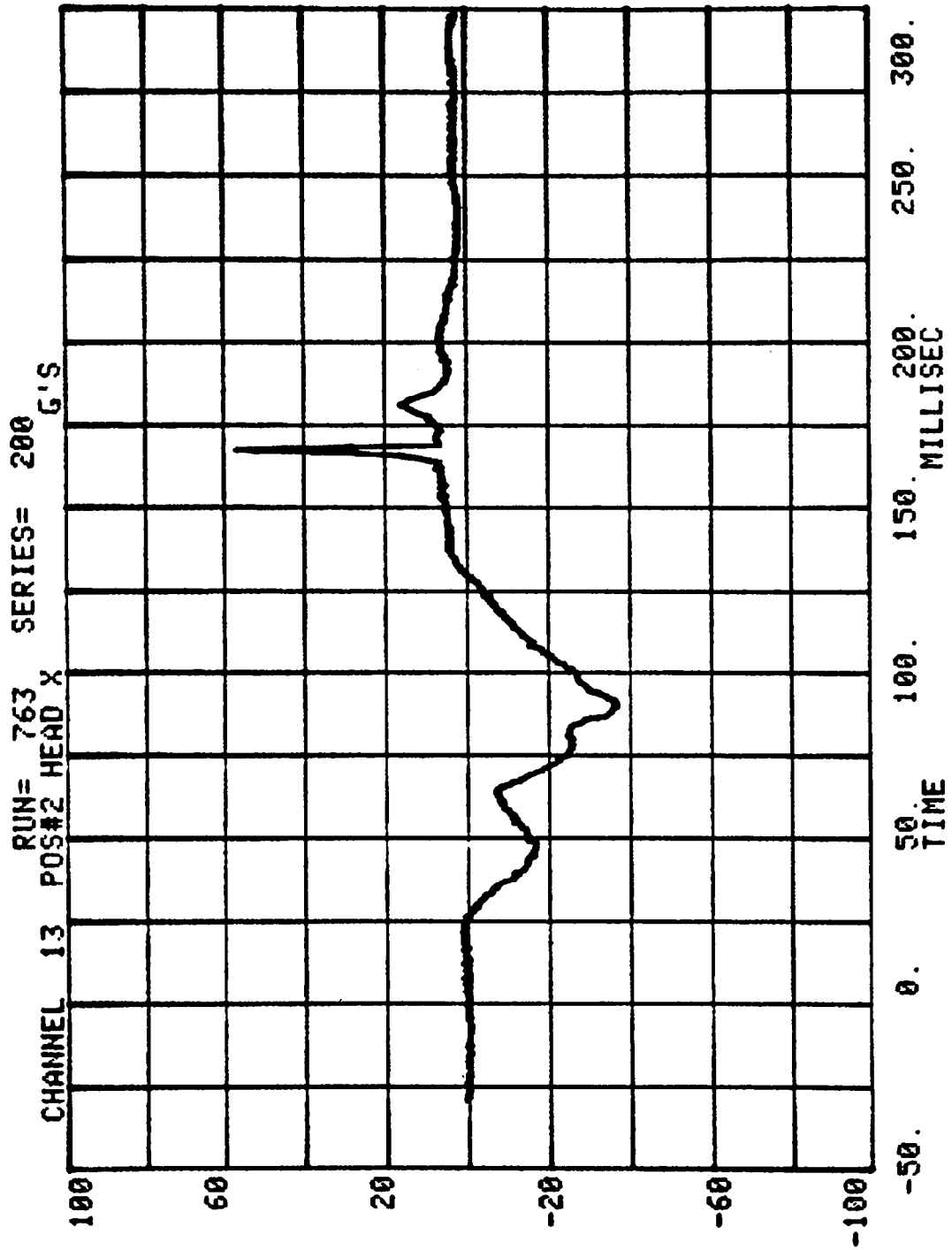
POS#2 HEAD R

HIC= 417.8 FROM T1= .06247 TO T2= .09847

AVERAGE ACCELERATION BETWEEN T1 AND T2= 42.3G'S

EVENT TIME= 300.0 MSEC

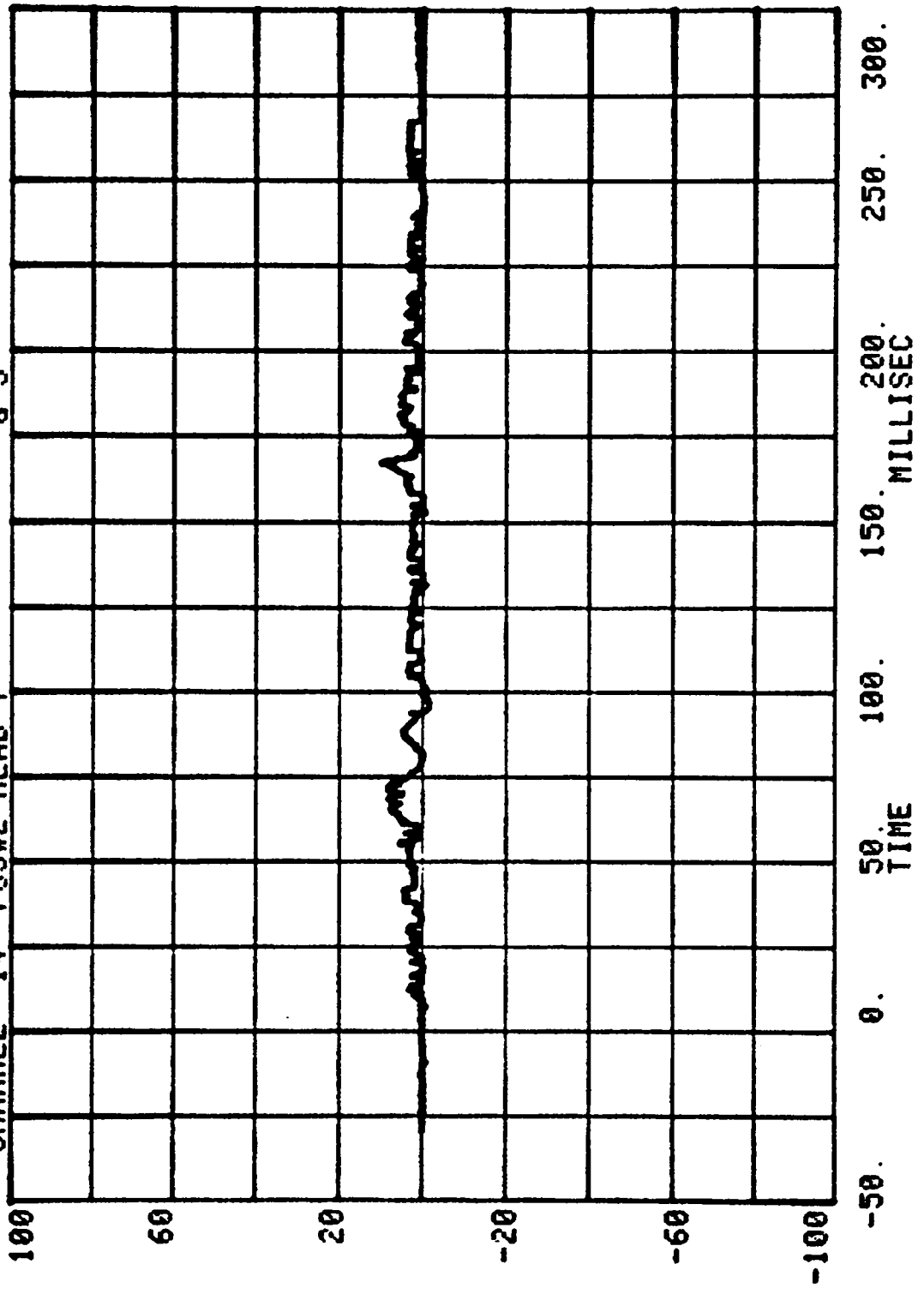
SEVERITY INDEX= 694.7

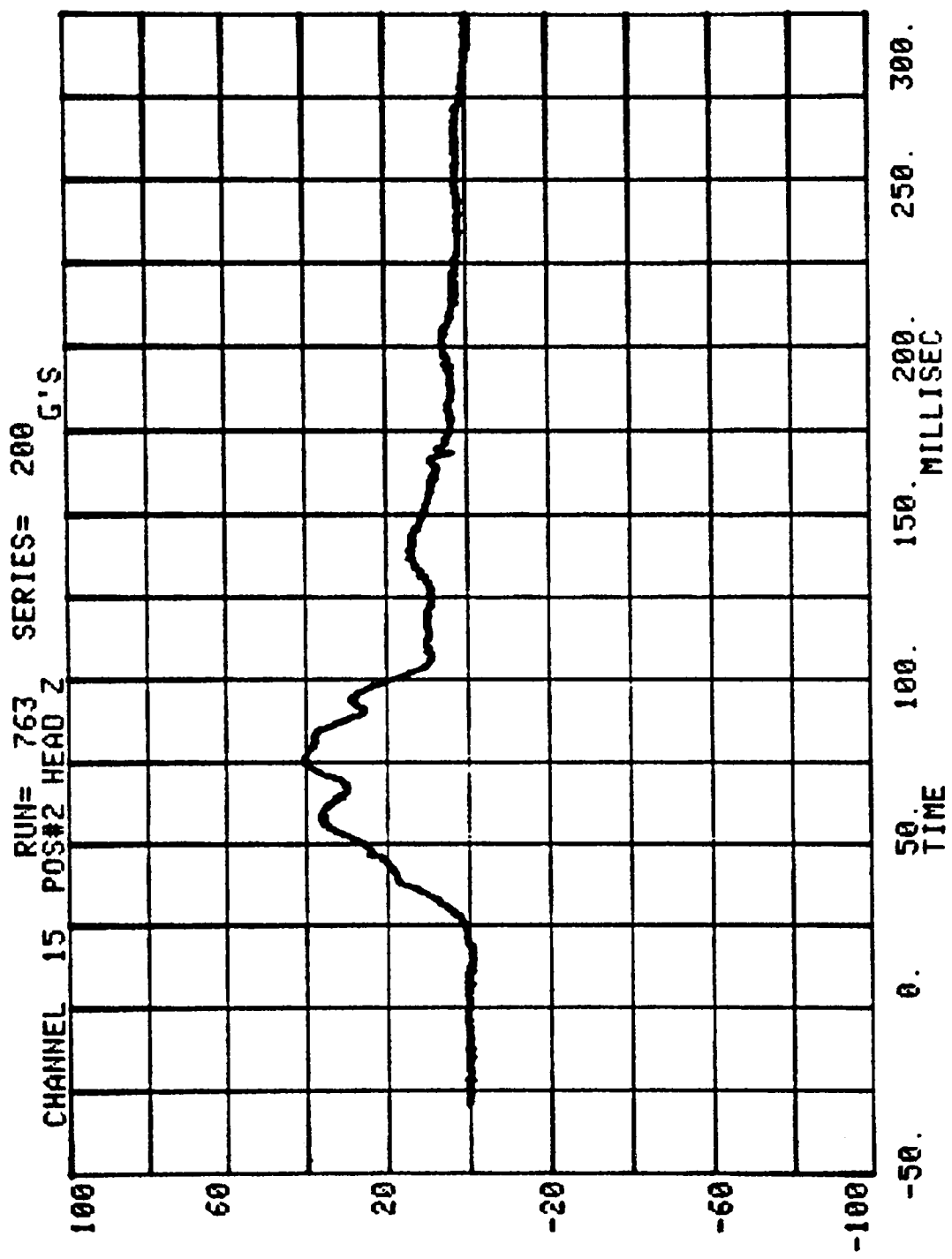


B-84

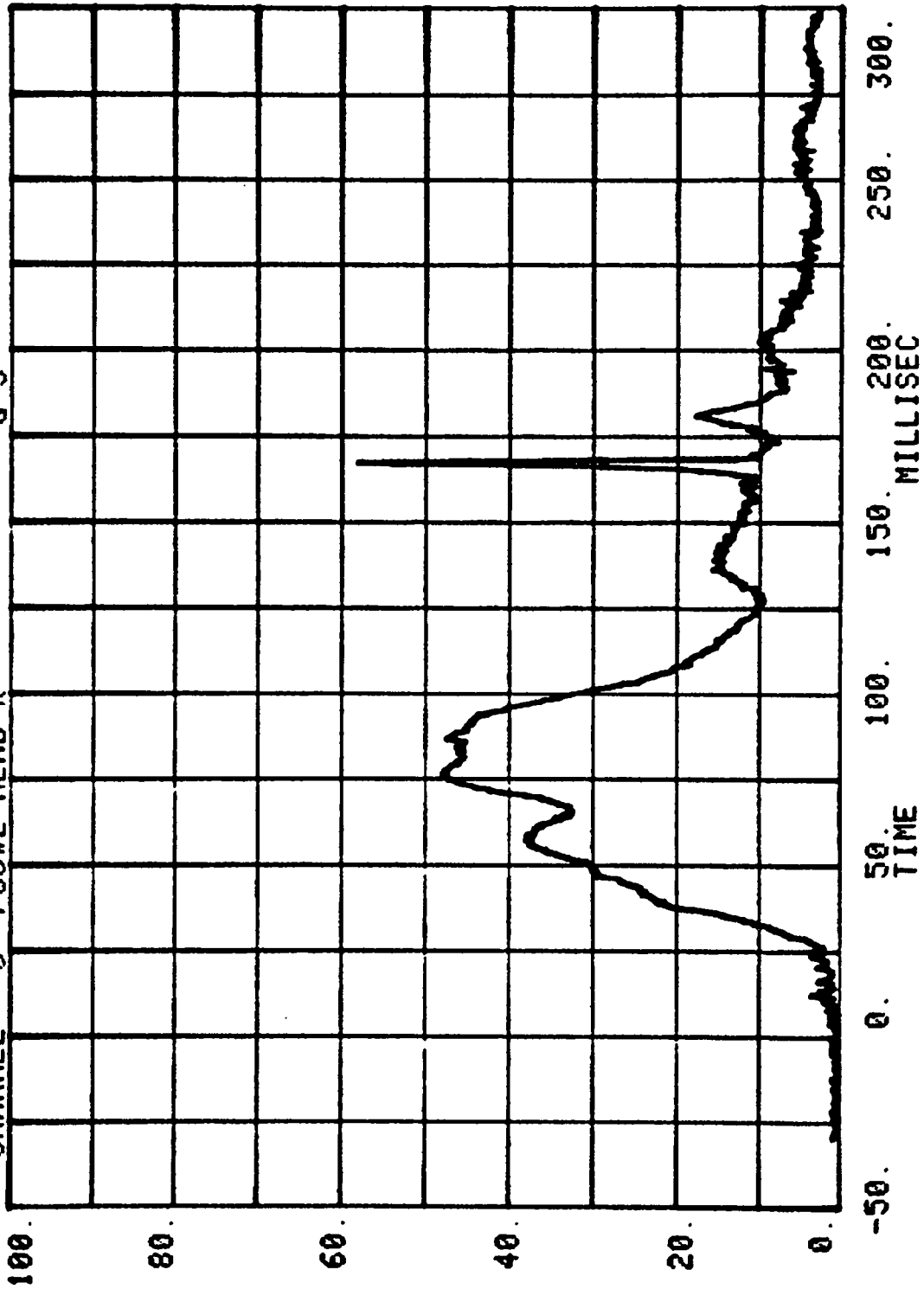
7556-1

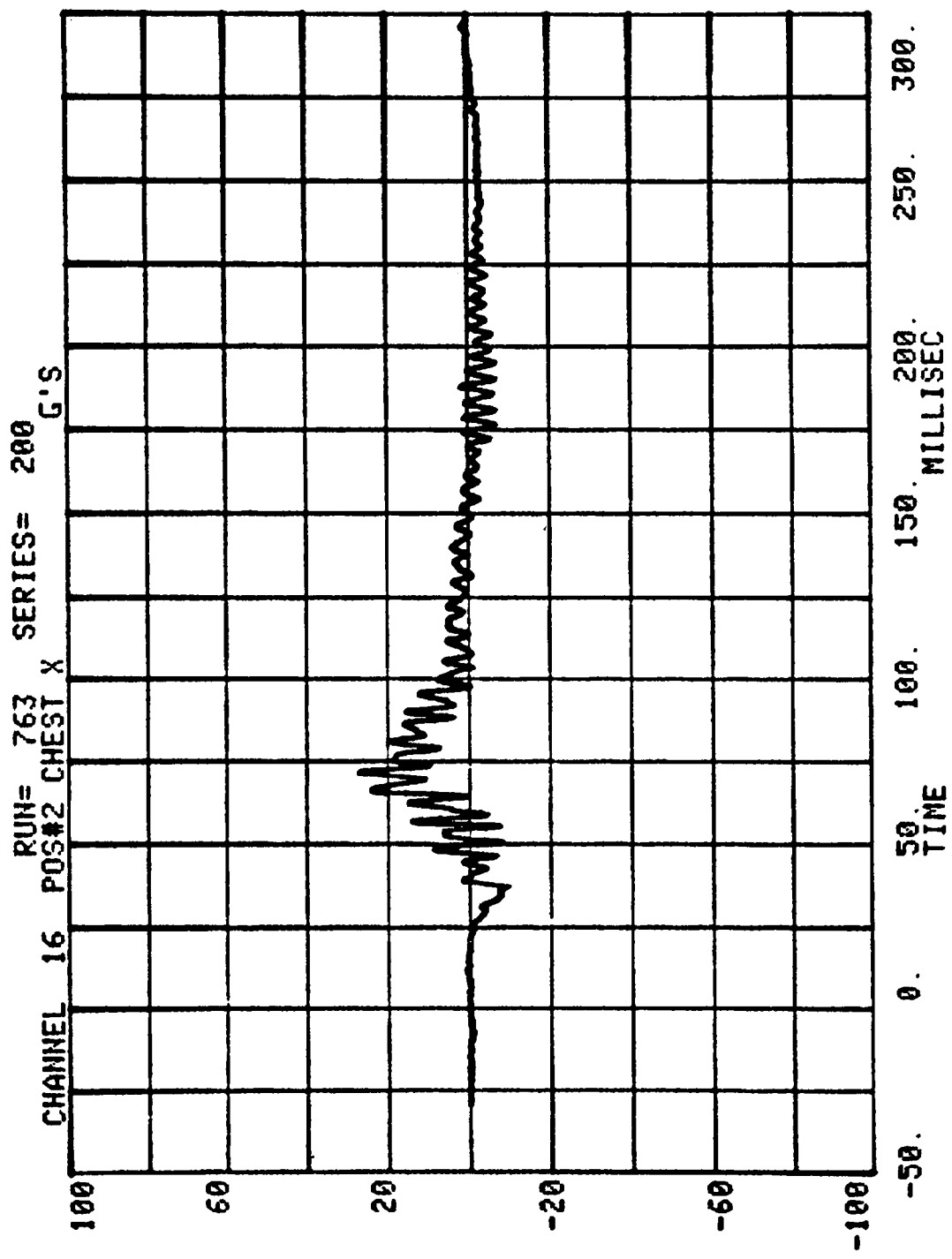
CHANNEL 14 POS#2 HEAD Y RUN= 763 SERIES= 200 G'S



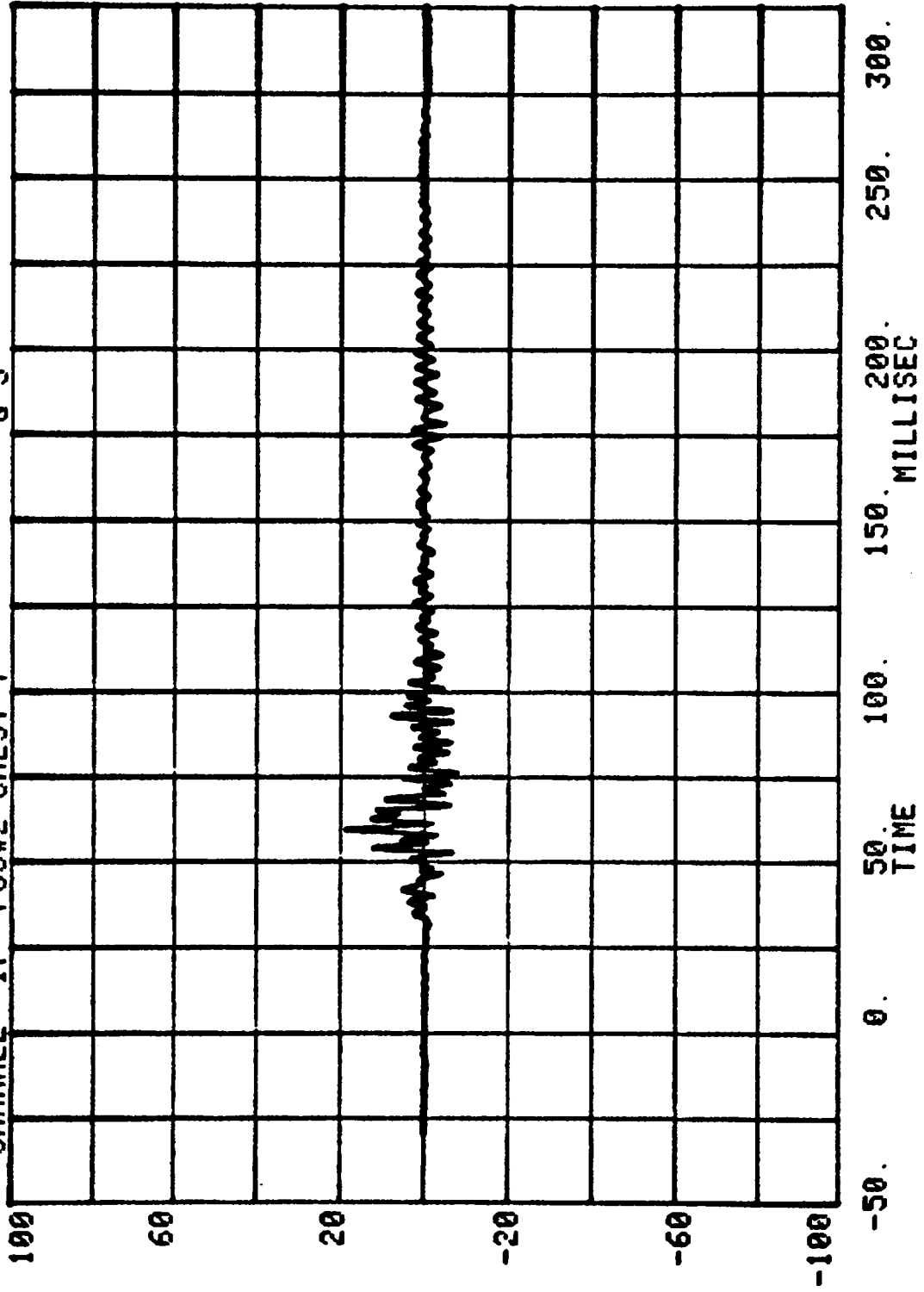


CHANNEL 3 POS#2 HEAD R RUN= 763 SERIES= 200 G'S

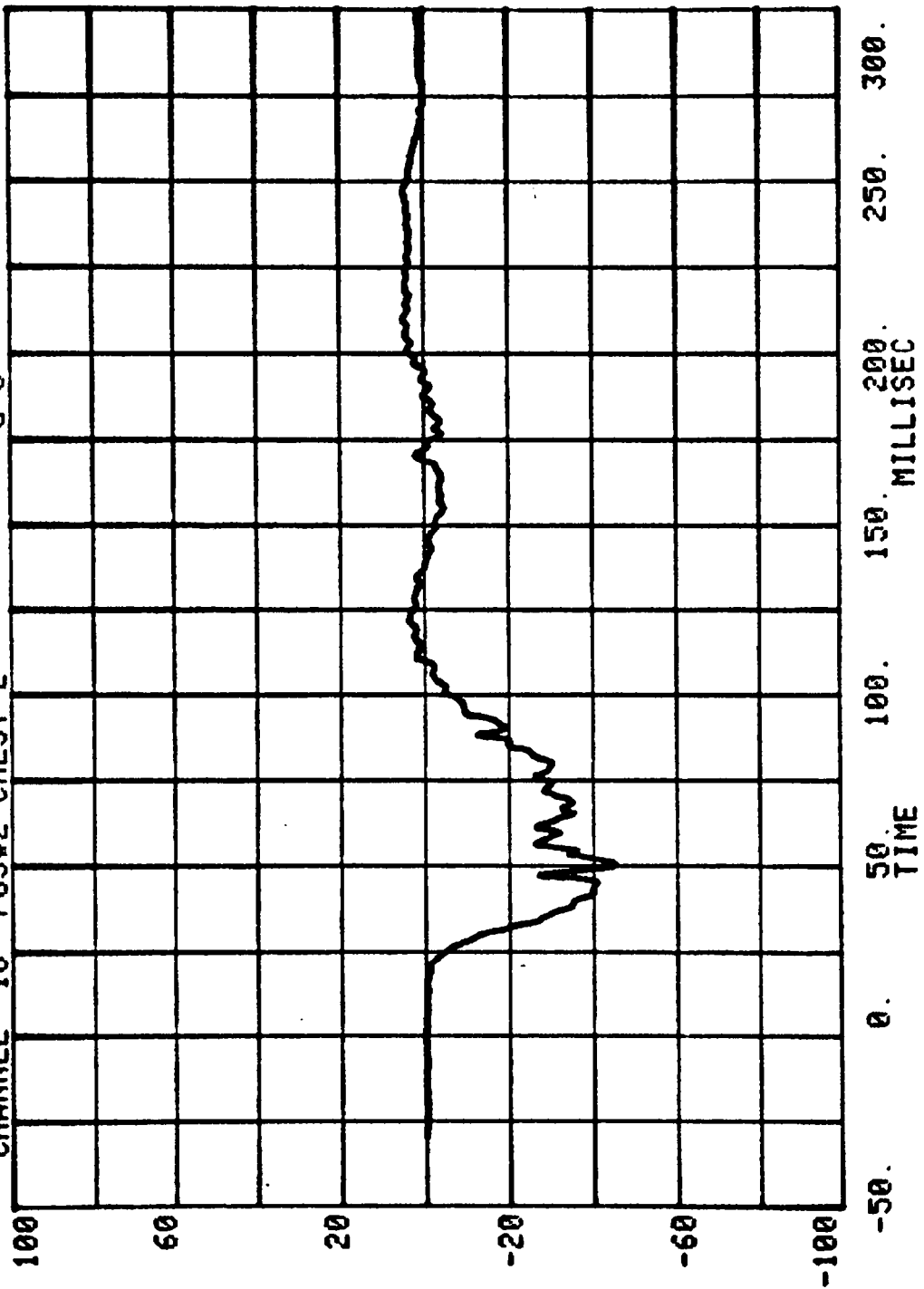




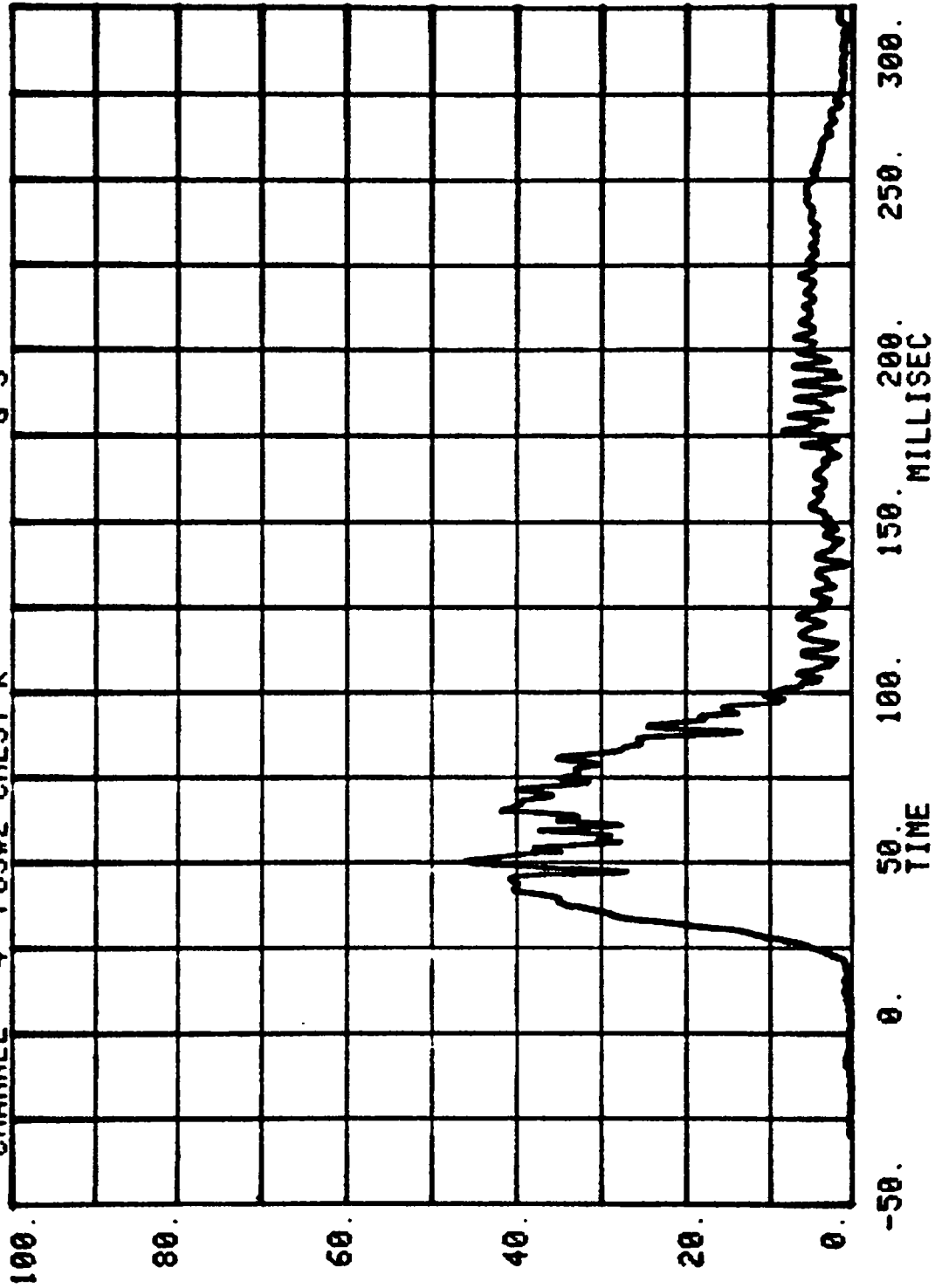
CHANNEL 17 POS#2 CHEST Y
RUN= 763 SERIES= 200 G'S

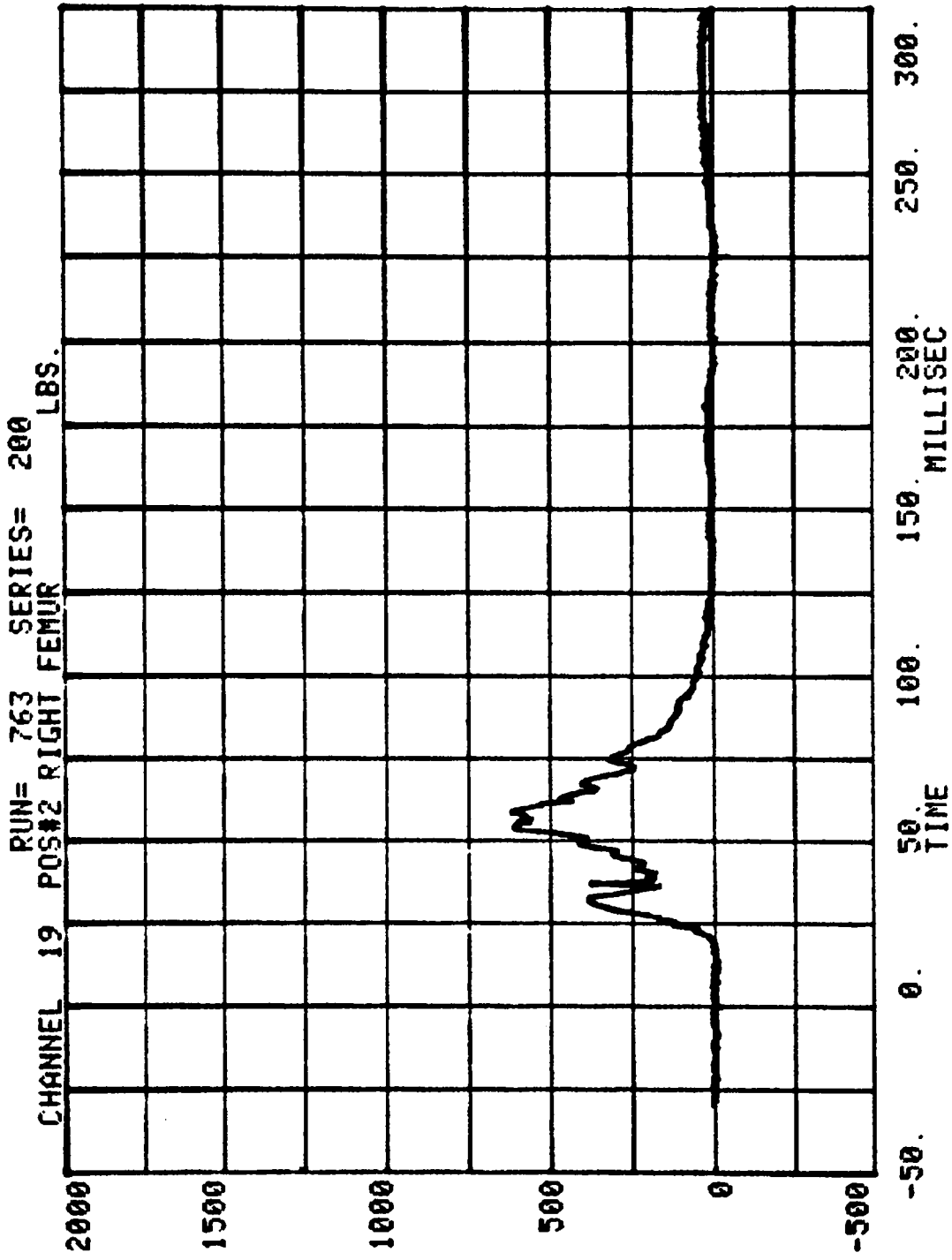


CHANNEL 18 POS#2 CHEST Z
RUN= 763 SERIES= 200 G'S



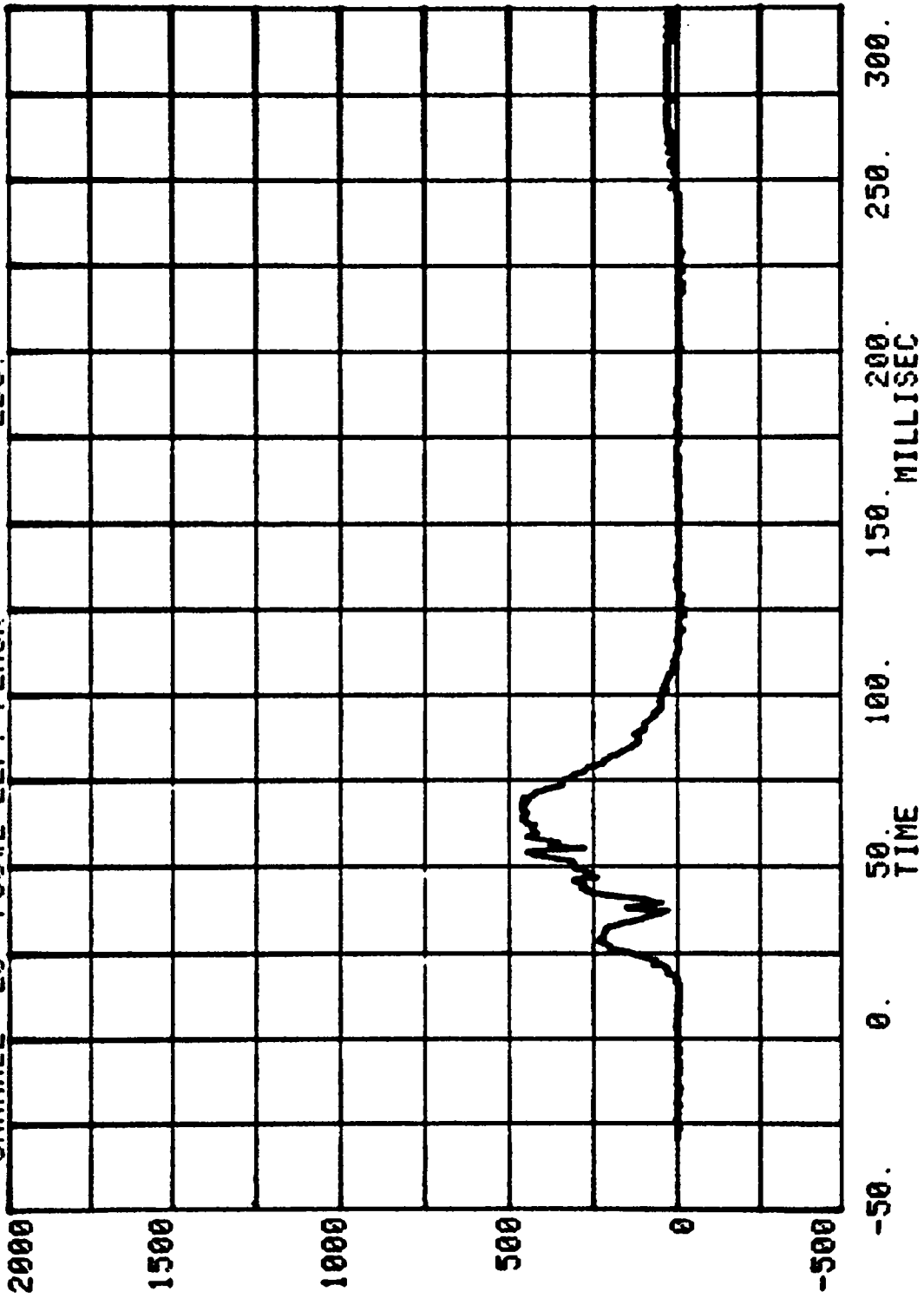
CHANNEL 4 POS#2 CHEST R
RUN= 763 SERIES= 200 G'S



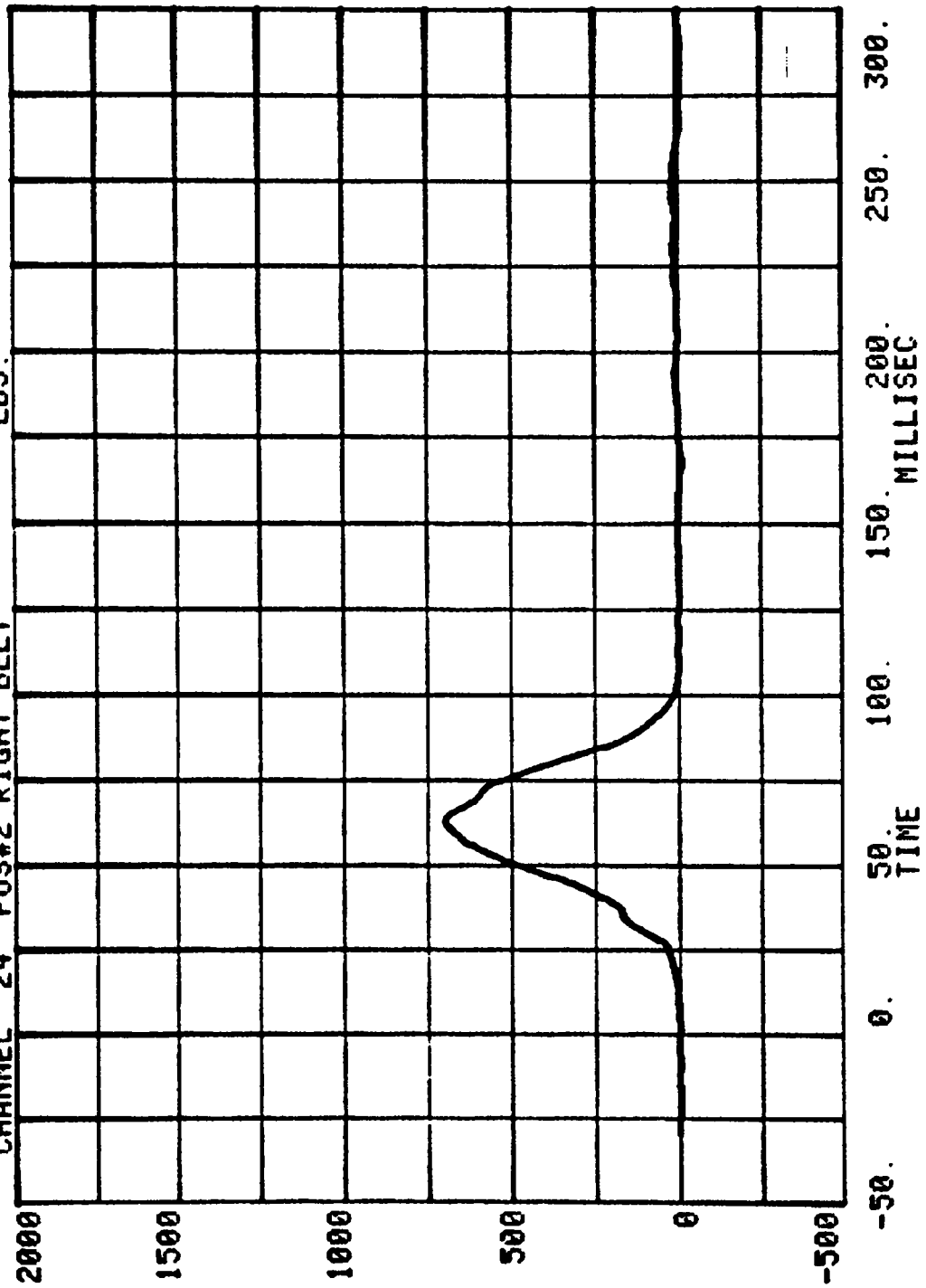


CHANNEL 20 POS#2 LEFT FEMUR

RUN= 763 SERIES= 200 LBS.



CHANNEL 24 POS#2 RIGHT BELT
RUN= 763 SERIES= 200 LBS.

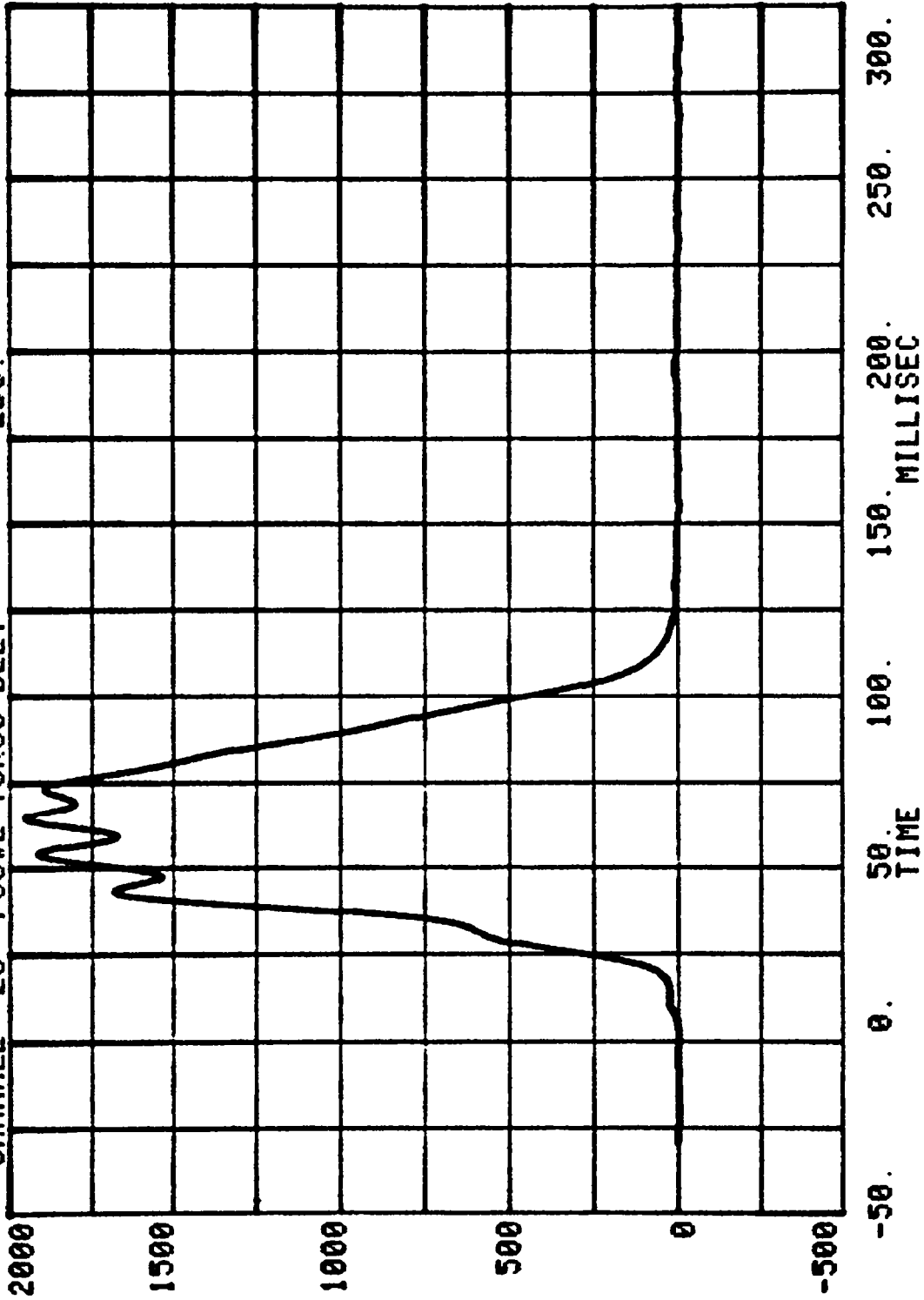


CHANNEL 26 POS#2 TORSO BELT

RUN= 763

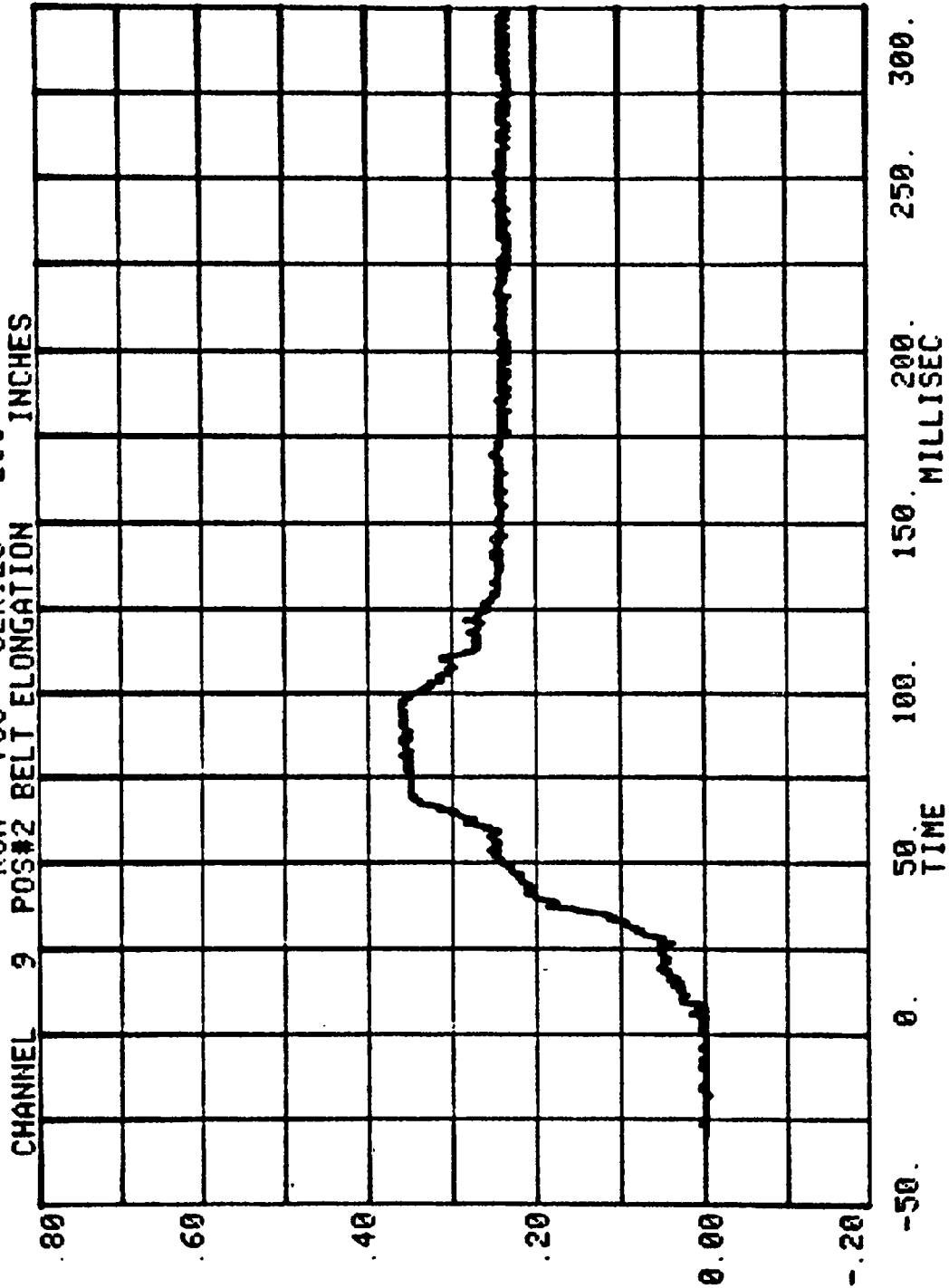
SERIES= 200

LBS.



CHANNEL 9 POS#2 BELT ELONGATION

RUN= 763 SERIES= 200



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:

<u>Serial No.</u>	<u>Completion Date</u>
1019	2/24/87
1020	2/24/87

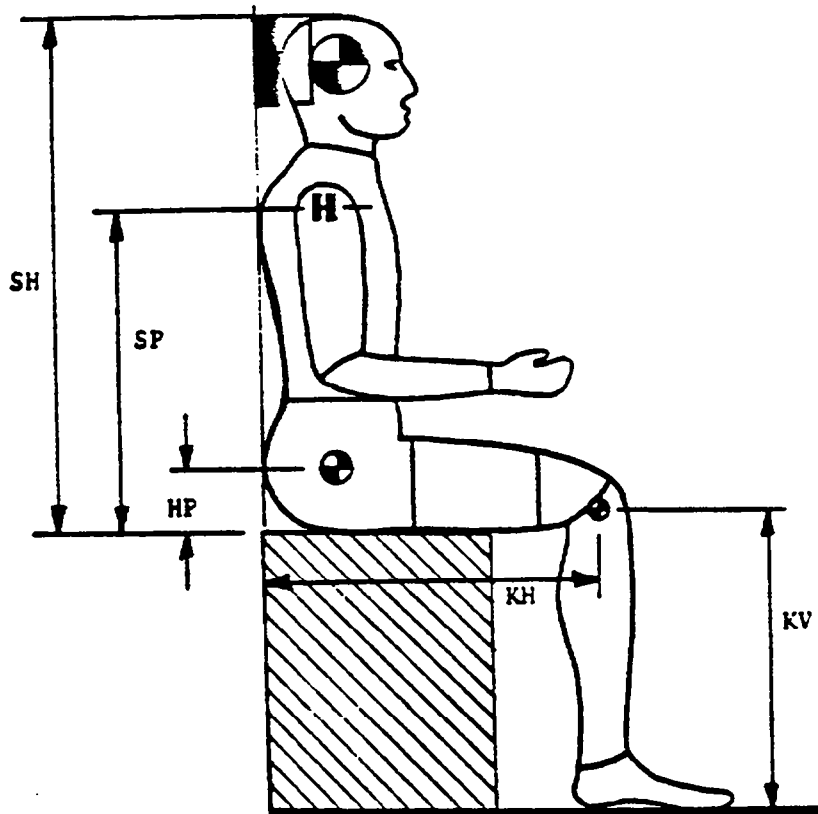
Electronic Test Equipment

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

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NO.: 1019

I. CONFIGURATION VERIFICATION DATA:



	P.572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION		2-24-87	
VERIFICATION NUMBER FOR DUMMY*		1	
SH - Seated Height - - - - -	35.6 to 35.8"	35.6"	
SP - Shoulder Pivot Height - - - -	21.8 to 22.4"	21.9"	
HP - Hip Pivot Height - - - - -	3.9" ref.	3.9"	
KH - Knee Pivot from back line - -	20.1 to 20.7"	20.4"	
KV - Knee Pivot from floor - - -	19.3 to 19.9"	19.6"	
SW - Shoulder Width - - - - -	17.8 to 18.4"	18.2"	
HW - Hip Width - - - - -	14.0 to 15.4"	15.0"	

TECHNICIAN'S NAME: D. W. Hess

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

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

II. PERFORMANCE VERIFICATION DATA:

NHTSA DUMMY I.D. NO.: 1019

TECHNICIAN'S NAME: D. W. Hess

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION-----		2-24-87	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*-----		1	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----		66-72 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)		22-28 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST--			
a. Peak Resultant Accel.-	210 to 260G	250 g	
b. Peak Lateral Accel.- -	≤ - 10G	4 g	
c. Time above 100G- - - -	0.9 to 1.5ms	1 ms	
2. NECK BENDING TEST--			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	23.0 fps	
b. Pend. Avg. Decel. over t ₃ - t ₂	20 to 24G	24 g	
c. Peak Resultant Head Acceleration - - - -	26G max.	26 g	
d. Pendulum Decel.(t ₂ -t ₁)	≤ - 3ms	2.5 ms	
e. Pendulum Decel.(t ₃ -t ₂)	25 to 30 ms	29 ms	
f. Pendulum Decel.(t ₄ -t ₃)	≤ - 10ms	7 ms	
g. Max. Head Rotation - -	63 to 73°	71°	
h. Chordal Displacement--			
Head Rotation Angle-			
0°	Time- -	-2 to 2 ms	0.0 ms
	Displ.-	-.5 to .5"	0.0"
30°	Time- -	25.6 to 34.4ms	30 ms
	Displ.-	2.1 to 3.1"	2.5"
60°	Time- -	40.3 to 51.7ms	45 ms
	Displ.-	4.3 to 5.3"	4.8"
Maximum (71 °)	Time- -	53.2 to 66.8ms	63 ms
	Displ.-	5.0 to 6.0"	5.4"

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

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

II. PERFORMANCE VERIFICATION DATA (Continued)

NHTSA DUMMY I.D. NO.: 1019

TECHNICIAN'S NAME: D. W. Hess

TEST PARAMETER	SPECIFICATION	Pre-Test (if required)	Post-Test (if required)
2. NECK BENDING TEST....			
<u>Continued:</u>			
h. Chordal Displacement:			
Head Rotation Angle--			
60°	Time	67.0 to 83.0 ms	76 ms
	Displ.	4.3 to 5.3 in.	4.7"
30°	Time	85.4 to 104.6 ms	94 ms
	Displ.	2.1 to 3.1 in.	2.3"
0°	Time	101.0 to 123.0 ms	108 ms
	Displ.	-.5 to 0.5 in.	0.0"
3. ABDOMINAL COMPRESSION TEST:			
(Preload = 10 pounds)			
a. Force @ .5" - - - -	23 to 36 lbs.	28 lbs.	
b. Force @ .75" - - - -	36 to 50 lbs.	41 lbs.	
c. Force @ 1.0" - - - -	50 to 63 lbs.	57.5 lbs.	
d. Force @ 1.3" - - - -	73 to 88 lbs.	80 lbs.	
4. LUMBAR FLEXION TEST:			
a. Force @ 20° - - - -	22 to 34 lbs.	31 lbs.	
b. Force @ 30° - - - -	34 to 46 lbs.	43.5 lbs.	
c. Force @ 40° - - - -	46 to 58 lbs.	51.5 lbs.	
d. Return Angle - - - -	12° maximum	9°	
5. CHEST IMPACT TESTS:			
a. High Speed			
(1) Probe Speed- - - -	21.78-22.22 fps	21.82 fps	
(2) Peak Deflection- - -	1.7" maximum	1.39"	
(3) Peak Resistive Force- - - - -	2250 lbs. maximum	2054 lbs.	
(4) Internal Hysteresis - - -	50 to 70%	52.2%	
b. Low Speed			
(1) Probe Speed- - - -	13.86-14.14 fps	13.88 fps	
(2) Peak Deflection- - -	1.1" maximum	.96"	
(3) Peak Resistive Force- - - - -	1450 lbs. maximum	1248 lbs.	
(4) Internal Hyster. - - -	50 to 70%	66.4%	

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

II. PERFORMANCE VERIFICATION DATA (Continued)

NHTSA DUMMY I.D. NO.: 1019

TECHNICIAN'S NAME: D. W. Hess

TEST PARAMETER	SPECIFICATION	Pre-Test (if required)	Post-Test (if required)
6. KNEE IMPACT TESTS:			
a. Right Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.03 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2260 lbs.	
(3) Time Above 1000g-	1.7 ms minimum	1.84 ms	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.00 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1990 lbs	
(3) Time Above 1000g-	1.7 ms minimum	2.16 ms	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1019

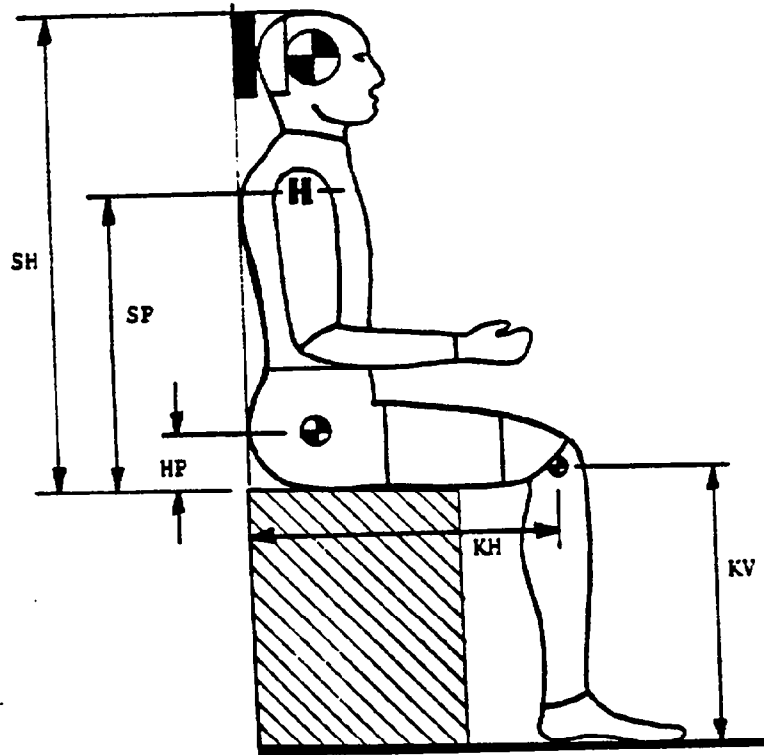
CALIB. SEQ. NOS. FOR DUMMY: 1 &

A. <u>DUMMY INSTRUMENTS:</u>	<u>MANUFACTURER</u>	<u>SERIAL NUMBER</u>	<u>DATE LAST CALIBRATED</u>	<u>DATE OF NEXT CALIBRATION</u>
1. Head Accelerometers --				
a. Triaxial unit - - - - -	NA	-----	-----	-----
b. Uniaxial units				
(1) Longitudinal (A_x) -	Endevco	CL60	2-87	8-87
(2) Lateral (A_y) - - -	"	CG34	2-87	8-87
(3) Vertical (A_z) - - -	"	CN24	2-87	8-87
2. Chest Accelerometers -- (Vehicle Crash Test Usage)				
a. Triaxial unit - - - - -	NA	-----	-----	-----
b. Uniaxial units				
(1) Longitudinal (A_x) -	CEC	A129	2-87	8-87
(2) Lateral (A_y) - - -	Endevco	CN64	2-87	8-87
(3) Vertical (A_z) - - -	CEC	A56	2-87	8-87
3. Chest Potentiometer - - -	NA	-----	-----	-----
4. Femur Load Cells --				
a. Right Side - - - - -	GSE	311	2-87	8-87
b. Left Side - - - - -	GSE	312	2-87	8-87
B. <u>CALIB. LAB. INSTRUMENTS:</u>				
1. Pendulum Accelerometer - - -	CED	18259	2-87	8-87
2. Test Probe Accelerometer - - -	CED	17815	2-87	8-87
3. Lumbar Flexion Test Push Force Gauge - - - - -	Transducer Inc.	20051	2-87	8-87
4. Abdominal Compression Test Force Gauge - - - - -	BLH	72952	2-87	8-87
5. Abdominal Compression Test Displacement Gauge - - - - -	CIC	567-11	2-87	8-87

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NO.: 1020

I. CONFIGURATION VERIFICATION DATA:



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

TECHNICIAN'S NAME: D. W. Hess

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

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

II. PERFORMANCE VERIFICATION DATA:

NHTSA DUMMY I.D. NO.: 1020

TECHNICIAN'S NAME: D. W. Hess

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION-----		2-24-87	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*-----		1	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----		66-72 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)		22-28 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST--			
a. Peak Resultant Accel.-	210 to 260G	258 g	
b. Peak Lateral Accel.- -	≤ - 10G	6 g	
c. Time above 100G- - - -	0.9 to 1.5ms	1.04 ms	
2. NECK BENDING TEST--			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	23.0 fps	
b. Pend. Avg. Decel. over t ₃ - t ₂	20 to 24G	24 g	
c. Peak Resultant Head Acceleration - - - - -	26G max.	25.5 g	
d. Pendulum Decel.(t ₂ -t ₁)	≤ - 3ms	2 ms	
e. Pendulum Decel.(t ₃ -t ₂)	25 to 30 ms	28 ms	
f. Pendulum Decel.(t ₄ -t ₃)	≤ - 10ms	9 ms	
g. Max. Head Rotation - -	63 to 73°	71°	
h. Chordal Displacement-- Head Rotation Angle-			
0°	Time- - -2 to 2 ms	0.0 ms	
	Displ.- -.5 to .5"	0.0"	
30°	Time- - 25.6 to 34.4ms	29 ms	
	Displ.- 2.1 to 3.1"	2.5"	
60°	Time- - 40.3 to 51.7ms	44.5 ms	
	Displ.- 4.3 to 5.3"	5.3"	
Maximum (71 °)	Time- - 53.2 to 66.8ms	60 ms	
	Displ.- 5.0 to 6.0"	5.9"	

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

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

II. PERFORMANCE VERIFICATION DATA (Continued)

NHTSA DUMMY I.D. NO.: 1020

TECHNICIAN'S NAME: D. W. Hess

TEST PARAMETER	SPECIFICATION	Pre-Test (if required)	Post-Test (if required)
2. NECK BENDING TEST....			
Continued:			
h. Chordal Displacement:			
Head Rotation Angle--			
60°	Time	67.0 to 83.0 ms	75 ms
	Displ.	4.3 to 5.3 in.	4.9"
30°	Time	85.4 to 104.6 ms	91.5 ms
	Displ.	2.1 to 3.1 in.	2.1"
0°	Time	101.0 to 123.0 ms	106 ms
	Displ.	-.5 to 0.5 in.	0.0"
3. ABDOMINAL COMPRESSION TEST:			
(Preload = 10 pounds)			
a. Force @ .5" - - - -	23 to 36 lbs.	24.5 lbs.	
b. Force @ .75" - - - -	36 to 50 lbs.	38 lbs.	
c. Force @ 1.0" - - - -	50 to 63 lbs.	52.5 lbs.	
d. Force @ 1.3" - - - -	73 to 88 lbs.	77.5 lbs.	
4. LUMBAR FLEXION TEST:			
a. Force @ 20° - - - -	22 to 34 lbs.	28.5 lbs.	
b. Force @ 30° - - - -	34 to 46 lbs.	40.5 lbs.	
c. Force @ 40° - - - -	46 to 58 lbs.	53.5 lbs.	
d. Return Angle - - - -	12° maximum	7°	
5. CHEST IMPACT TESTS:			
a. High Speed			
(1) Probe Speed- - -	21.78-22.22 fps	21.85 fps	
(2) Peak Deflection- -	1.7" maximum	1.58"	
(3) Peak Resistive Force- - - - -	2250 lbs. maximum	2080 lbs.	
(4) Internal Hysteresis - - -	50 to 70%	52.4%	
b. Low Speed			
(1) Probe Speed- - -	13.86-14.14 fps	14.10 fps	
(2) Peak Deflection- -	1.1" maximum	.96"	
(3) Peak Resistive Force- - - - -	1450 lbs. maximum	1274 lbs.	
(4) Internal Hyster. - - -	50 to 70%	60.9%	

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

II. PERFORMANCE VERIFICATION DATA (Continued)

NHTSA DUMMY I.D. NO.: 1020

TECHNICIAN'S NAME: D. W. Hess

TEST PARAMETER	SPECIFICATION	Pre-Test (if required)	Post-Test (if required)
6. KNEE IMPACT TESTS:			
a. Right Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.97 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1900 lbs.	
(3) Time Above 1000g-	1.7 ms minimum	2.08 ms	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.01 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2400 lbs.	
(3) Time Above 1000g-	1.7 ms minimum	1.76 ms	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

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

A. DUMMY INSTRUMENTS:

1. Head Accelerometers --

- a. Triaxial unit - - - - -
- b. Uniaxial units
 - (1) Longitudinal (A_x) -
 - (2) Lateral (A_y) - - -
 - (3) Vertical (A_z) - - -

2. Chest Accelerometers --
(Vehicle Crash Test Usage)

- a. Triaxial unit - - - - -
- b. Uniaxial units
 - (1) Longitudinal (A_x) -
 - (2) Lateral (A_y) - - -
 - (3) Vertical (A_z) - - -

3. Chest Potentiometer - - -

4. Femur Load Cells --

- a. Right Side - - - - -
- b. Left Side - - - - -

B. CALIB. LAB. INSTRUMENTS:

- 1. Pendulum Accelerometer - - -
- 2. Test Probe Accelerometer - - -
- 3. Lumbar Flexion Test Push Force Gauge - - - - -
- 4. Abdominal Compression Test Force Gauge - - - - -
- 5. Abdominal Compression Test Displacement Gauge - - - - -

<u>MANUFACTURER</u>	<u>SERIAL NUMBER</u>	<u>DATE LAST CALIBRATED</u>	<u>DATE OF NEXT CALIBRATION</u>
NA	-----	-----	-----
Endevco	CS70	2-87	8-87
"	CH35	2-87	8-87
"	CU88	2-87	8-87
NA	-----	-----	-----
CEC	A84	2-87	8-87
Endevco	CY71	2-87	8-87
CEC	A86	2-87	8-87
NA	-----	-----	-----
GSE	551	2-87	8-87
GSE	552	2-87	8-87
CED	18259	2-87	8-87
CED	17815	2-87	8-87
Transducer Inc.	20051	2-87	8-87
BLH	72952	2-87	8-87
CIC	567-11	2-87	8-87

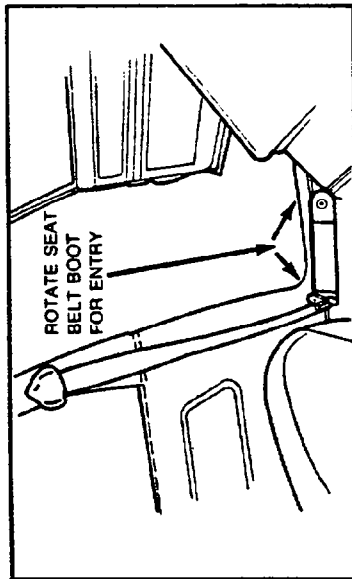
APPENDIX D

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

BEFORE DRIVING YOUR VEHICLE

WARNING — Never allow more than 1 1/2 inches (3.8 cm) of slack to be introduced into your seat belt system. Use the shoulder belt on the outside shoulder only. Never wear the shoulder belt under the arm. Never swing it around your neck over the inside shoulder. Never use a single belt for more than one person. Be sure the lap portion of the belt is fitted snugly and as low as possible around the hips, not on the waist. Failure to follow these precautions could increase the chance and/or severity of injury in an accident.

Rear Seat Entry (2-Door Models Excluding EXP)



MOTORIZED PASSIVE RESTRAINT SYSTEM (Not Available in Canada)

The Passive Restraint System operates electrically. The system restrains the driver and front seat passenger in the vehicle through the use of the shoulder belt, the lap belt, and knee bolsters. **THE SEAT LAP BELT IS TO BE MANUALLY CONNECTED BY THE DRIVER/PASSENGER AND SHOULD ALWAYS BE WORN WITH THE SHOULDER BELT. BE SURE THE LAP BELT IS ON YOUR HIPS AS LOW AS POSSIBLE.**

BEFORE DRIVING YOUR VEHICLE

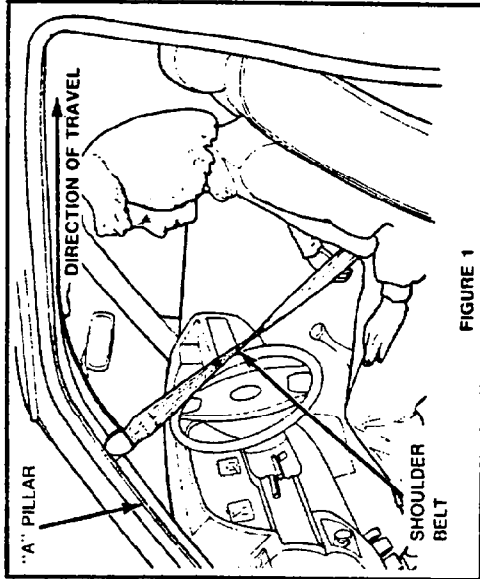


FIGURE 1

After entering the vehicle and closing the door, insert the key into the ignition and turn to the ON position. A motor will cause the shoulder belt to slide along its track (Figure 1) starting at the Front Body "A" Pillar and moving rearward to its locked position in the center body "B" Pillar (Figures 2 and 3). The shoulder belt warning indicator lamp in the instrument cluster will illuminate four to eight seconds. In the unlikely event the shoulder belt should stall before it reaches the "B" Pillar, the indicator lamp will begin to flash after nine (9) seconds and will continue flashing until the shoulder belt is in its locked position in the "B" Pillar. If the indicator belt continues flashing refer to the Manual Override System in this section before driving the vehicle. The shoulder belt will automatically adjust itself to allow for comfortable wear and freedom of movement by the occupant. It will lock tight only on extremely hard braking, or impacts of approximately 3 mph (5 km/h) or more.

When the vehicle ignition is turned to the OFF position and the door is opened, the shoulder belt will move forward to the "A" Pillar. This will allow ample room for exit from the vehicle by the driver or passenger.

BEFORE DRIVING YOUR VEHICLE

IMPORTANT FOR YOUR SAFETY

Before driving the vehicle, read the label on the back of the sun visor (Figures 4 and 5).

DRIVER SIDE

IMPORTANT

Before driving, read the label on the other side of the visor.

IMPORTANT FOR YOUR SAFETY

Following these instructions will greatly improve your chances of avoiding severe injury in case of an accident:

- Always wear your lap belt when the car is moving.
- Be sure the shoulder belt release lever is down.
- If the symbol () stays lit for more than 8 seconds, consult your Owner's Guide before driving this vehicle.

See section entitled "Occupant Restraints" in your Owner's Guide for more information.

FIGURE 4

BEFORE DRIVING YOUR VEHICLE

