

REPORT NO. CAL-86-N18

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

VOLKSWAGEN OF AMERICA

1986 Volkswagen Golf

4-Door Sedan

NHTSA NO. MG5801

CALSPAN TEST NO. 7457-18

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FINAL REPORT

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16. Abstract A frontal load cell barrier test of a 1986 Volkswagen Golf 4-Door Sedan was performed at the Calspan Corporation, Advanced Technology Center crash test facility in Buffalo, New York, on May 8, 1986. Impact speed was 34.9 mph, and the ambient temperature at the barrier face at the time of impact was 55°F. The maximum post-test vehicle crush was 21.9 inches. The test vehicle appeared to comply with the indicant requirements of the following Federal Motor Vehicle Safety Standard. 1. FMVSS No. 212, "Windshield Mounting" 2. FMVSS No. 219 (Partial), "Windshield Zone Intrusion" 3. FMVSS No. 301-75, "Fuel System Integrity" <u>Type of Restraint System</u> 2-point continuous webbing passive restraint system at each front outboard seating position.					
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Section 1
PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY 86 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-84-D-01149. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 30 mph FMVSS 212/219/301-75 requirements.

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

Section 2
SUMMARY OF TEST NUMBER MG5801

A load cell barrier consisting of 36 load cells was impacted by a 1986 Volkswagen Golf 4-Door Sedan at a velocity of 34.9 mph. The test was performed at the Calspan Corporation Advanced Technology Center on May 8, 1986. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 16 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

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

Both ATDs were fully instrumented with head and chest triaxial accelerometers and right/left femur load cells. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver ATD (Serial No. 1022) had been used in two previous tests (CG0201, MG0100) and the Injury Criteria Values were not exceeded in both tests. The right-front passenger ATD (Serial 1019) was certified prior to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

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

The driver's head struck the steering wheel rim and hub; the HIC was 895.7. The maximum chest deceleration over 3 milliseconds was 48 g's and femur loads were 1482 and 1695 pounds.

The right-front passenger HIC was 644.3 and maximum chest deceleration over 3 milliseconds was 46 g's. Femur loads were 1660 and 1511 pounds.

Table 1

GENERAL TEST AND VEHICLE DATA

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1986 Volkswagen Golf 4-Door Sedan
 NHTSA NO.: MG5801 VIN.: 1VWFA9174GV047789
 BODY COLOR: White DATE OF MANUFACTURE: March 1986
 Engine: 4 cylinders; - C.I.D.; 1.8 Liters; - CC
x Gas; - Diesel; - Turbocharged
- Longitudinal; x Transverse
 Transmission: 5 Speed x Manual; - Automatic; - Overdrive
 Final Drive: x Front Wheel; - Rear Wheel; - Four Wheel
 Date Received: 3-10-86 Odometer Reading: 15
- A/C; x P/S; x P/B; - P/wdo.; - Tilt Wheel
- P/seats; - Cruise Control
 Type of Occupant Restraint: 2-point passive restraint system
 DATA RECORDED FROM VEHICLE'S TIRE PLACARD:
 Tire Pressure (at capacity): Front 29 psi, Rear 35 psi
 Recommended Tire Size: 175/70R13-82S
 Recommended Cold Tire Pressure: Front 29 psi, Rear 35 psi
 Tires on Vehicle: 175/70R13-82S; Manufacturer: Continental
 Number of Occupants: 2 Front; 3 Rear; - 3rd Seat; 5 TOTAL
 Type of Front Seats: x Bucket; - Bench; - Split Bench
 Type of Front Seat Back: - Fixed; x Adj. With - Lever x Rot. Knot
 Vehicle Capacity Weight (VCW) = 900 lbs. (A)
 No. of Occupants x 150 lbs. = 750 lbs. (B)
 Rated Cargo and Luggage Weight (RCLW) A-B = 150 lbs.
 GVWR 3175 lbs. GAWR: Front 1800 lbs. Rear 1540 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 = <u>690</u> lbs.	Right Rear = <u>410</u> lbs.
Left Front = <u>650</u> lbs.	Left Rear = <u>380</u> lbs.
TOTAL FRONT WEIGHT = <u>1340</u> lbs. (<u>63</u> % of Total Vehicle Weight)	
TOTAL REAR WEIGHT = <u>790</u> lbs. (<u>37</u> % of Total Vehicle Weight)	
TOTAL DELIVERY WEIGHT = <u>2130</u> lbs.	

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (2130 lbs.)
 VCW = Vehicle Capacity Weight (900 lbs.)
 DSC = Designated Seating Capacity (5)
 RCLW = VCW - 150 (DSC) = 150 lbs.
 Target Test Weight = UDW + RCLW + (2 dummies x 164 lbs./dummy)
 Target Test Weight = 2608 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 0 POUNDS CARGO:

Right Front = <u>720</u> lbs.	Right Rear = <u>590</u> lbs.
Left Front = <u>760</u> lbs.	Left Rear = <u>550</u> lbs.
TOTAL FRONT WEIGHT = <u>1480</u> lbs. (<u>56</u> % of Total Vehicle Weight)	
TOTAL REAR WEIGHT = <u>1140</u> lbs. (<u>44</u> % of Total Vehicle Weight)	
TOTAL TEST WEIGHT = <u>2620</u> lbs.	

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

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude:	RF	<u>25.2</u>	LF	<u>25.1</u>	RR	<u>25.6</u>	LR	<u>25.5</u>
Test Attitude:	RF	<u>24.8</u>	LF	<u>24.8</u>	RR	<u>24.2</u>	LR	<u>24.0</u>

Wheel Base: 97.3 in.; C.G. = 42.3 in. rearward of front wheel C/L

Remarks: _____

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

POST-IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0 °
 Date of Test: 5-8-86 Time of Test: 11:55
 Ambient Temperature: 55 °F at impact area
 Temperature in Occupant Compartment: 72 °F.
 Windshield Molding Temperature: 72 °F.
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: primary = 34.9 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>156.6</u>	C _L	<u>158.3</u>	L	<u>156.5</u>
	Post-test	= R	<u>134.8</u>	C _L	<u>136.4</u>	L	<u>136.3</u>
	Crush	= R	<u>21.8</u>	C _L	<u>21.9</u>	L	<u>20.2</u>

Distance from front of test vehicle to point of impact:

R 8.5 C/L 8.0 L 8.7

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Rim</u>	<u>No contact</u>
Chest	<u>No contact</u>	<u>No contact</u>
Abdomen	<u>No contact</u>	<u>No contact</u>
Left Knee	<u>Dash</u>	<u>Dash</u>
Right Knee	<u>Dash</u>	<u>Dash</u>

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

	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Door Opening	<u>operable</u>	<u>not operable</u>	<u>operable</u>	<u>not 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>0.5" forward</u>	<u>0.5" forward</u>

Section 3

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

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

Figure 1

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

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

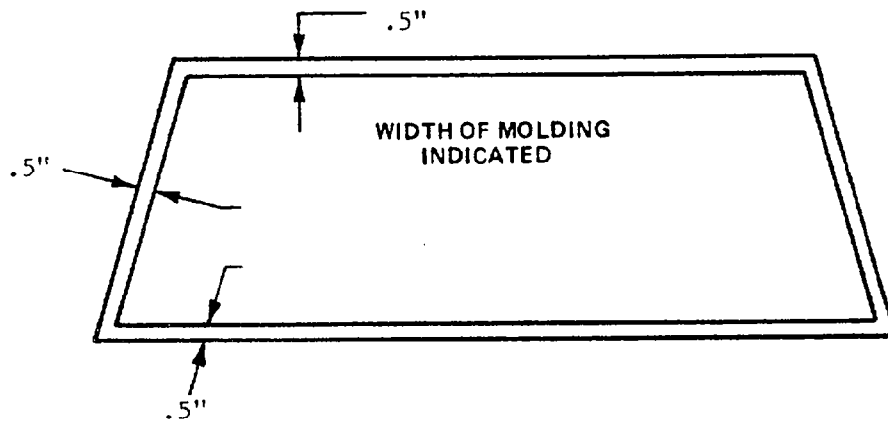
Windshield is bonded in place and covered with 0.5 inch molding.

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

FMVSS 212 TEST DATA:

	WINDSHIELD PREIPHERY		PERCENT RETENTION
	PRE-TEST (in.)	POST-TEST (in.)	
RIGHT SIDE	75.0	75.0	100%
LEFT SIDE	75.0	75.0	100%
TOTAL	150.0	150.0	100%

AREA OF RETENTION FAILURE:



FRONT VIEW

FAILURE DETAILS:

None

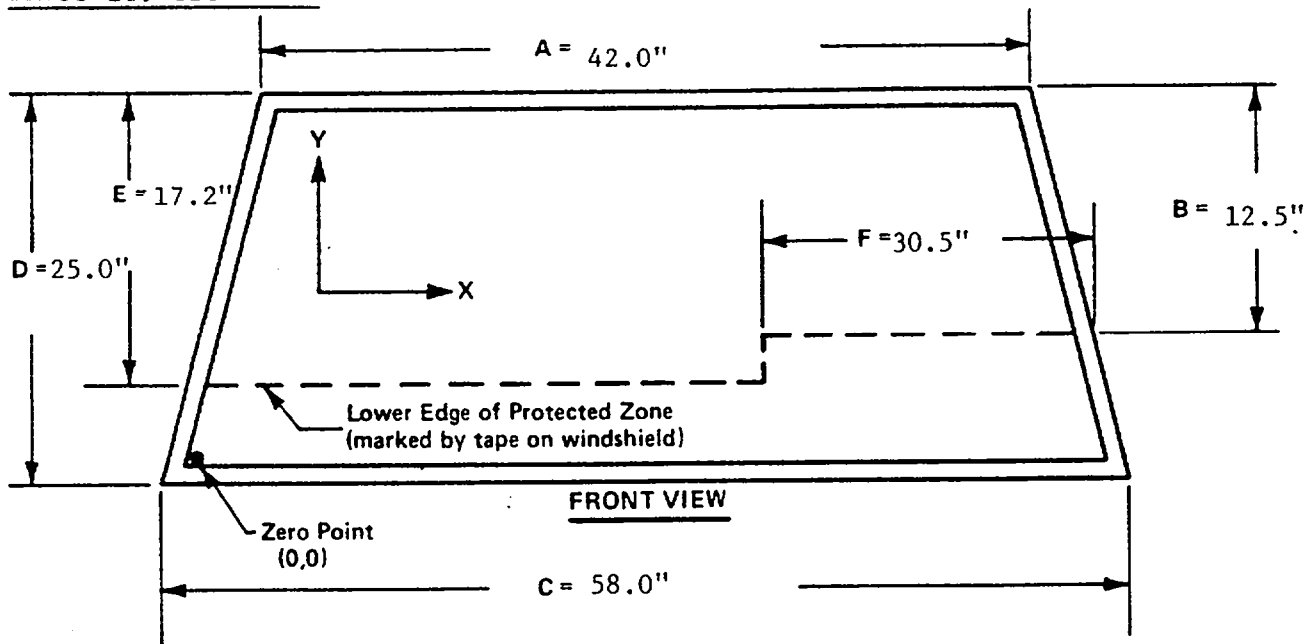
Figure 2

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

PROTECTED ZONE LOWER EDGE REQUIREMENT:

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

FMVSS 219 TEST DATA:



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

None

COORDINATES		
	X	Y
1.		
2.		
3.		
4.		

Figure 3

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

TEST VEHICLE NHTSA NO.: MG5801; TEST DATE: May 8, 1986

VEHICLE MAKE/MODEL/BODY STYLE: 1986 Volkswagen Golf 4-Door Sedan

USABLE CAPACITY OF VEHICLE'S FUEL TANK: 14.5 Gallons (figure furnished by vehicle manufacturer)

TEST REQUIREMENTS:

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

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

13.48 Gallons which is 93 % of the Stated USABLE CAPACITY.

SOLVENT SPILLAGE MEASUREMENT AFTER 35 MPH FRONTAL BARRIER IMPACT TEST:

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

SOLVENT SPILLAGE DETAILS:

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

Time reqd. for machine to rotate 90° = 2 minutes, 58 seconds
 FMVSS 301-75 Position Hold Time = 5 minutes, 0 seconds
 TOTAL = 7 minutes, 58 seconds
 Next Whole Minute Interval.... = 8 minutes

Figure 3

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

VEHICLE STATIC ROLLOVER DATA:

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

SOLVENT SPILLAGE LOCATION(S):

None

Section 4
OMI FINAL DATA

Occupant and Vehicle Information

I. OMI DATA

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

II. OVR DATA

1. Load Cell Barrier Data
2. Vehicle Accelerometer Data

III. AID DATA

1. Test Vehicle Measurements
2. Accident Investigation Damage Data Summary

Table 2
DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DUMMY (1)	-57	11	52	66	-49	-19	-14	48
DUMMY (2)	-22	22	71	71	-48	38	-17	46
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE - FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	1482	1695
DUMMY (2)	1660	1511
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)	2061	--	--
DUMMY (2)	2443	--	--
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**			
	HIC	t ₁ (SEC)	t ₂ (SEC)	AVE. ACC. (g) t ₁ TO t ₂
DUMMY (1)	895.7	.05970	.11362	48.8
DUMMY (2)	644.3	.06217	.11160	44.3
DUMMY (3)				
DUMMY (4)				

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

Figure 4

PART 572 DUMMY IN-VEHICLE POSITION

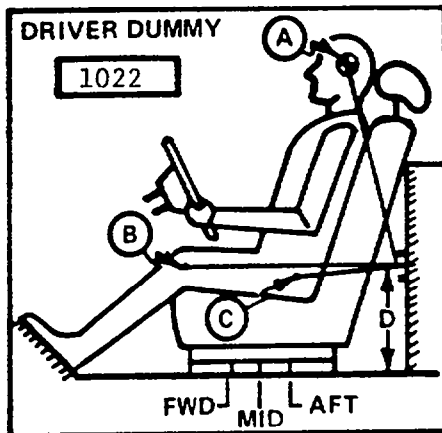
TEST NO.: 716-180-730

VEHICLE: 1986 Volkswagen Golf 4-Dr Sedan

SEAT TYPE:
☐ Bench
☒ Bucket
☐ Split Bench

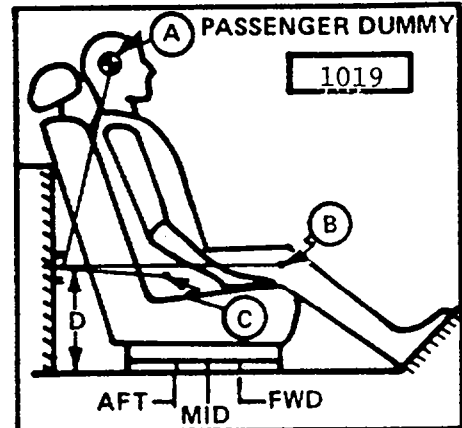
ADJUSTER TYPE:
☒ Manual
☐ Power

BUCKET SEAT BACK TYPE:
☐ Fixed
☒ Adjustable Reclining



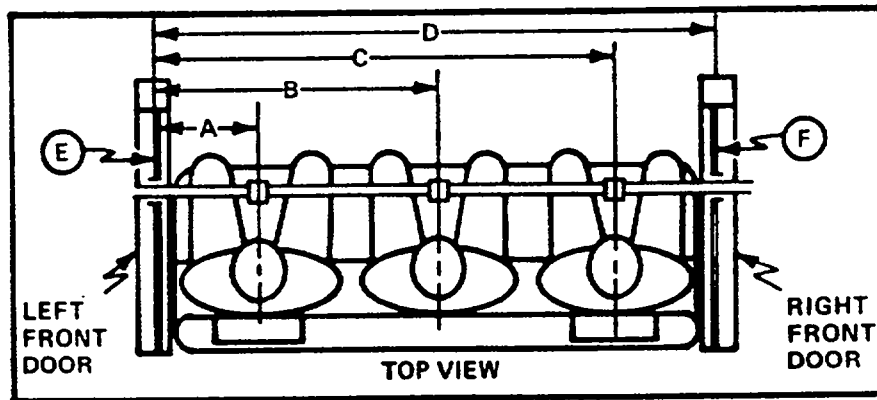
MEASUREMENT
LOCATION

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



A =	17.0	in.	10	Degrees
B =	24.0	in.	114	Degrees
C =	12.5	in.	140	Degrees
D =	18.3	in.		

A =	18.5	in.	5	Degrees
B =	25.3	in.	105	Degrees
C =	11.8	in.	140	Degrees
D =	18.25	in.		



DUMMY ID

1022

1019

A	=	Left Door to Driver Centerline	11.5 in.
B	=	Left Door to Center Passenger Centerline	in.
C	=	Left Door to Right Passenger Centerline	36.6 in.
D	=	Left Door to Right Door	47.5 in.
E, F	=	Window Glass Height (Right and Left Must Be Equal)	13.0 in.

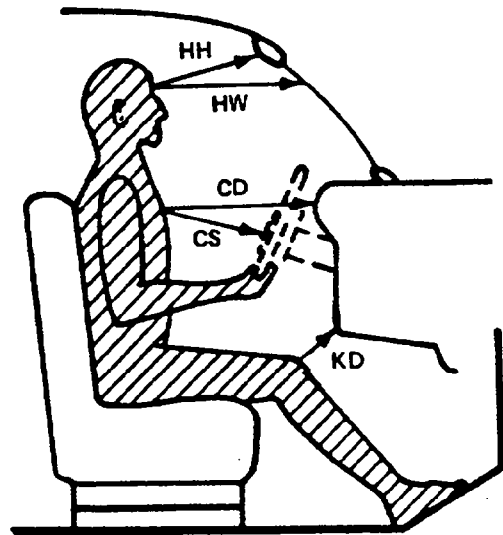
Figure 5

OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	16.0	16.0
HW	19.1	19.2
CD	22.1	21.9
CS	13.6	--
KDL	3.6	3.1
KDR	4.0	3.0
SA	15°	15°
TA	24°	24°

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

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	7.7	7.5
AD	4.5	4.5
HD	6.7	5.7
KK	10.7	8.7

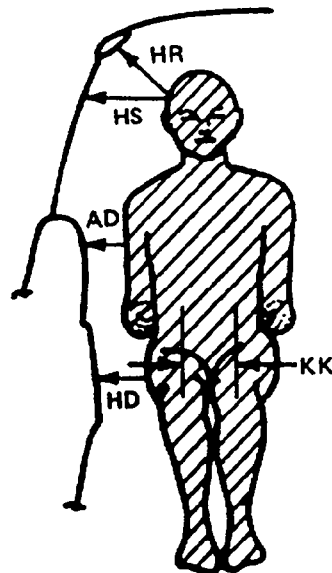
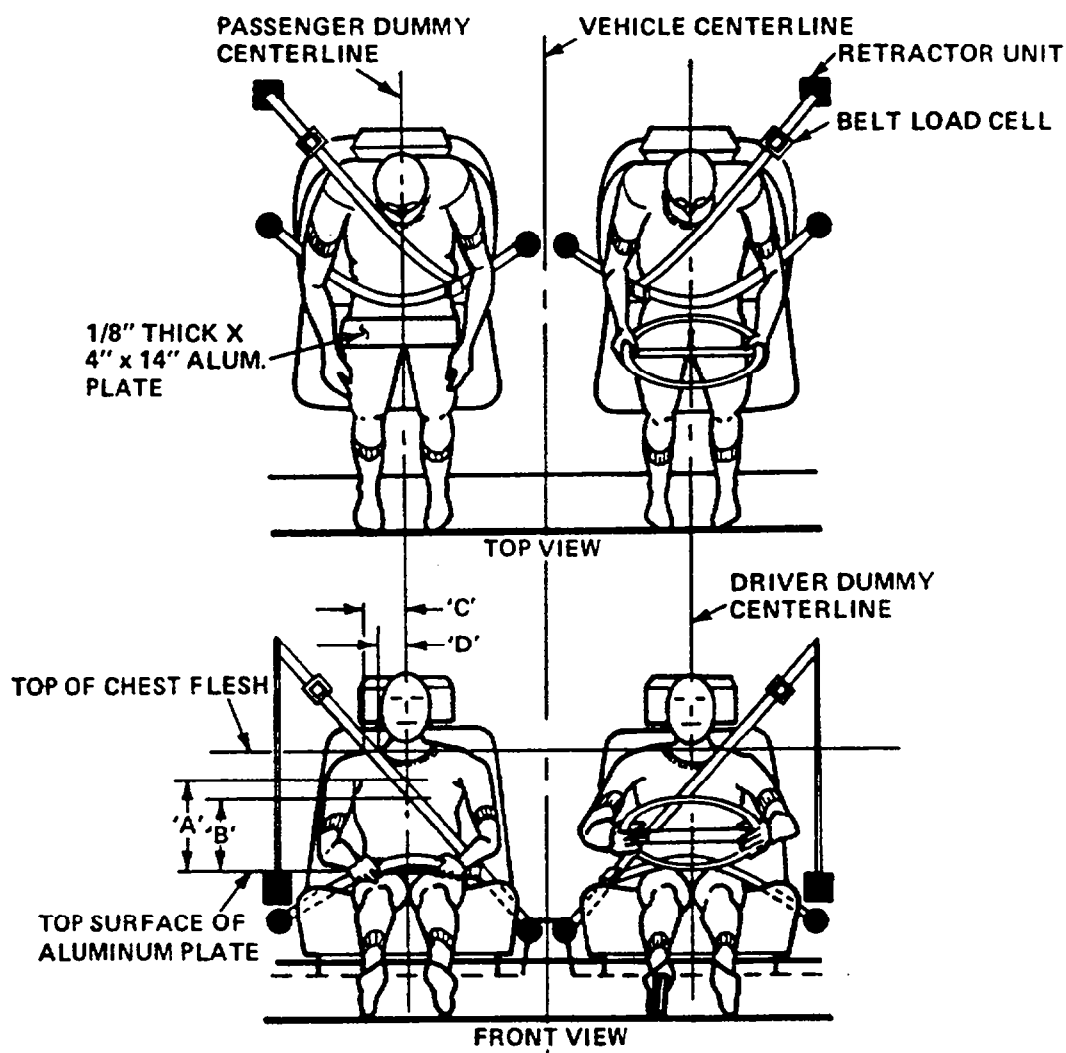


Figure 6

SEAT BELT POSITIONING DATA



	DRIVER DUMMY (in.)	PASS. DUMMY (in.)
1. Dimension 'A'--alum. plate to belt upper edge on dummy centerline.	13.7	14.0
2. Dimension 'B'--alum. plate to belt lower edge on dummy centerline.	11.0	11.5
3. Dimension 'C'--dummy centerline to outer edge at chest flesh top	7.2	7.2
4. Dimension 'D'--dummy centerline to inner edge at chest flesh top	5.0	5.0
5. Lap belt tension (lbs.)	--	--
6. Shoulder belt tension (lbs.)	2 lbs	2 lbs

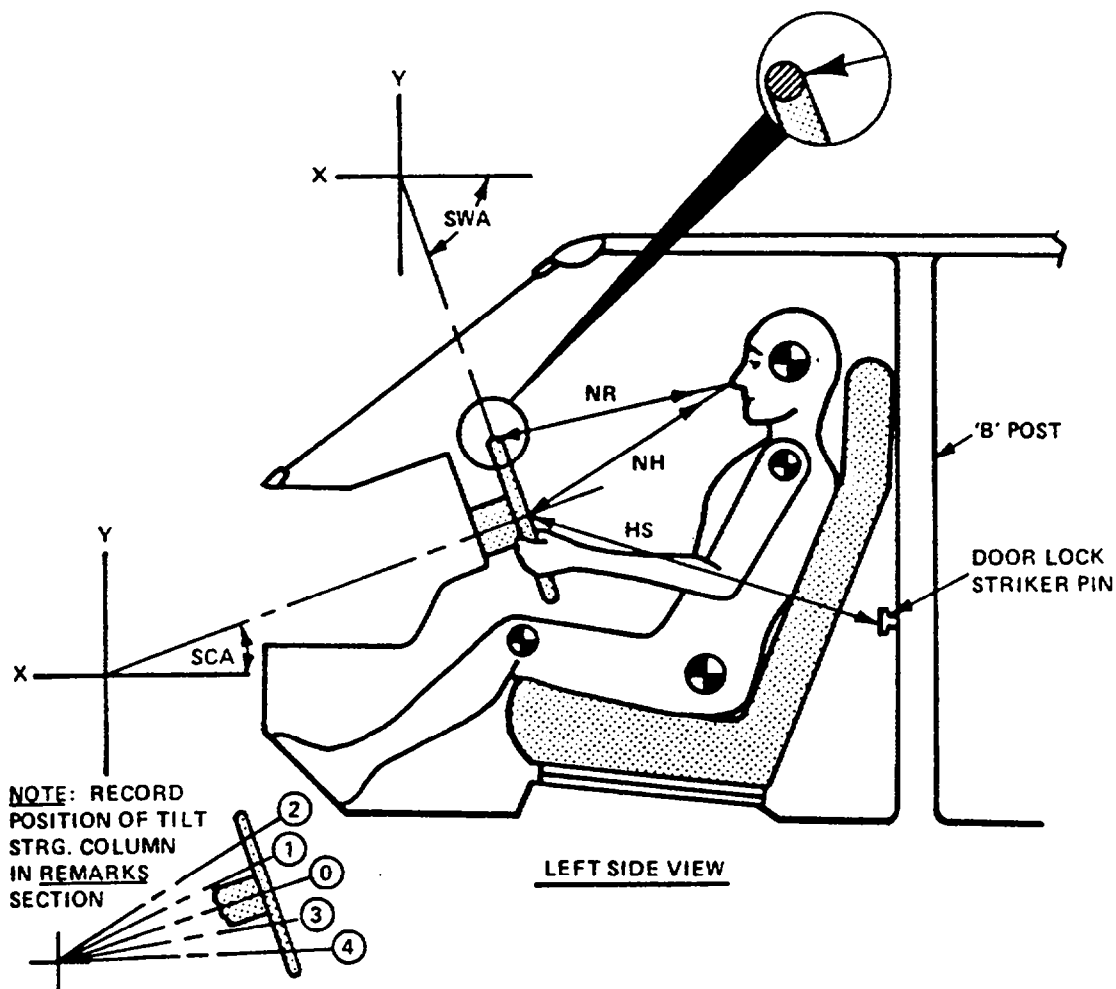
Table 3

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

<u>BELT LENGTH DATA:</u>	PASSIVE BELT	<u>Driver</u>	<u>Passenger</u>
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.		<u>See Note</u>	<u>See Note</u>
Should belt length as measured on Part 572 Dummy.		<u>38.0"</u>	<u>38.0"</u>
Lap belt length as measured on Part 572 Dummy.		<u>See Note</u>	<u>See Note</u>
<u>BELT SPOOL-OFF DATA:</u>			
As determined by film analysis.		<u>>5.0"</u>	<u>>6.0"</u>
As determined mechanically.		<u>9.3"</u>	<u>9.5"</u>
As determined electronically.		Not <u>measured</u>	Not <u>Measured</u>
<u>BELT STRETCH DATA:</u>			
Measured electronically between shoulder belt load cell and the "D" ring.	1.6"/foot	<u>1.6"/foot</u>	<u>1.7"/foot</u>
Measured Mechanically		<u>0.0"</u>	<u>0.0"</u>

Note: Belt System is a 2-point passive belt restraint. There is no lap belt.

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



MEASUREMENTS	
NR--Distance from tip of dummy's nose to top rear surface to steering wheel rim	17.7 Inches
NH--Distance from tip of dummy's nose to center of steering column hub	18.4 Inches
HS--Distance from center of steering column hub to the forward surface of the door lock striker pin	Y = 16 X = 22.5 Inches
SCA--Angle of steering column relative to the horizontal X axis	30 Degrees
SWA--Angle of steering wheel relative to the horizontal X axis	-60 Degrees

REMARKS CONCERNING ADJUSTABLE OR TILT STEERING COLUMN IF VEHICLE IS SO EQUIPPED:

Figure 8

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4

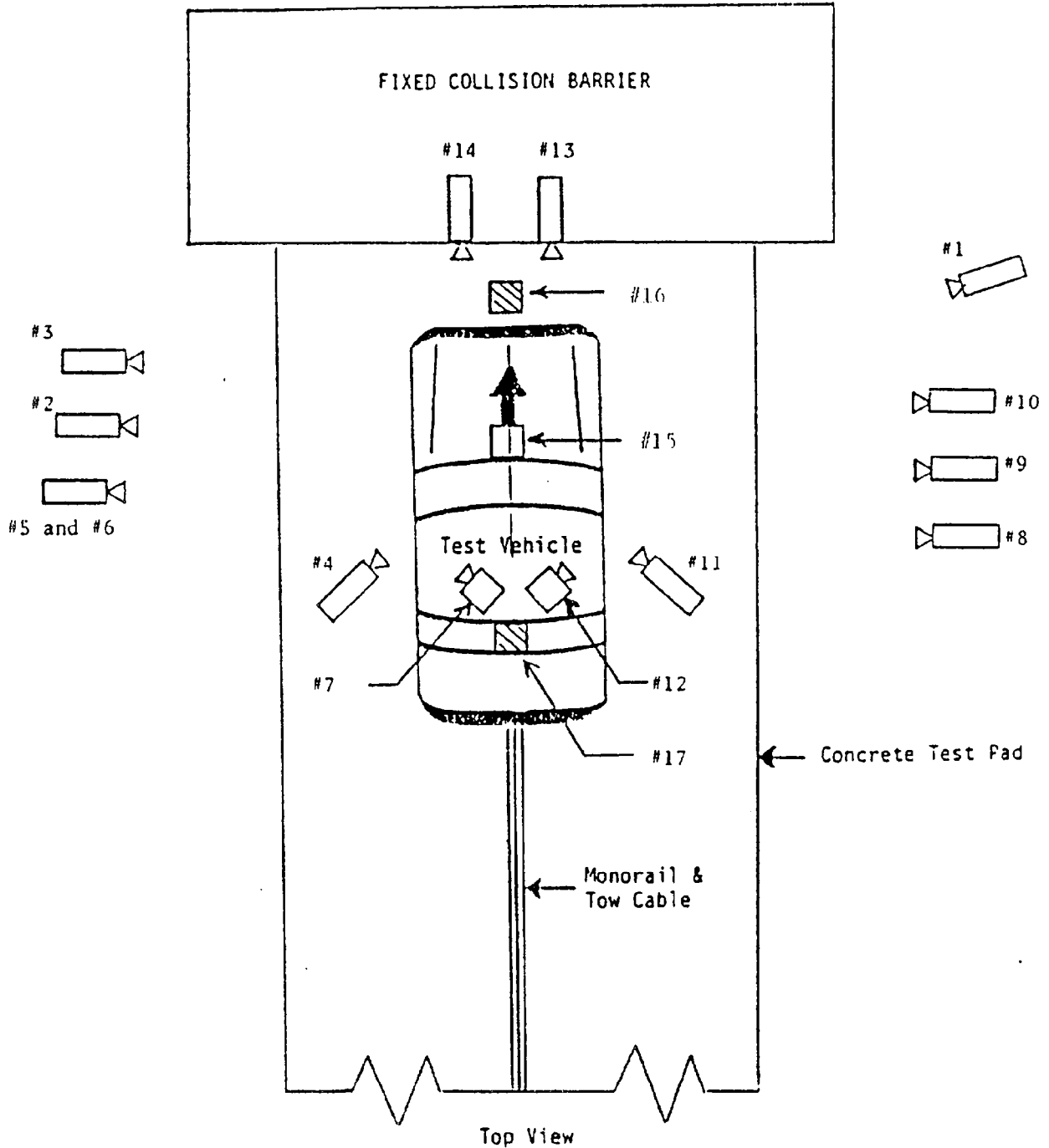


Table
HIGH-SPEED CAMERA LOCATIONS

MG5801

Vehicle 1986 Volkswagen Golf 4-Door

Test No.

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	215	57	41	-5	--	13	530
3	Left Side View	205	37	50	-6	--	25	530
4	Driver and Interior View	101	124	70	-15	--	13	670
5	Steering Column (Bottom)	230	80	46	-5	213	25	550
6	Steering Column (Top)	230	80	70	-10	213	25	550
7	Left Belt	--	--	--	--	--	8	670
8	Overall Right Side	280	91	48	-6	--	13	800
9	Right Side View	270	79	47	-5	--	25	830
10	Right Passenger View	282	67	51	-4	265	35	780
11	Passenger and Interior View	101	124	72	-15	--	25	600
12	Right Belt	--	--	--	--	--	8	870
13	Passenger Front View	21	0	72	-38	103	13	540
14	Driver Front View	21	0	72	-38	103	13	590
15	Windshield View	0	0	126	-53	--	13	540
16	Pit View of Engine	0	36	-120	90	--	13	740
17	Pit View of Fuel Tank	0	130	-120	90	--	13	750

(1) Camera speed is not recorded on film. Value is a nominal

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

VEHICLE TARGET LOCATIONS



Figure 10

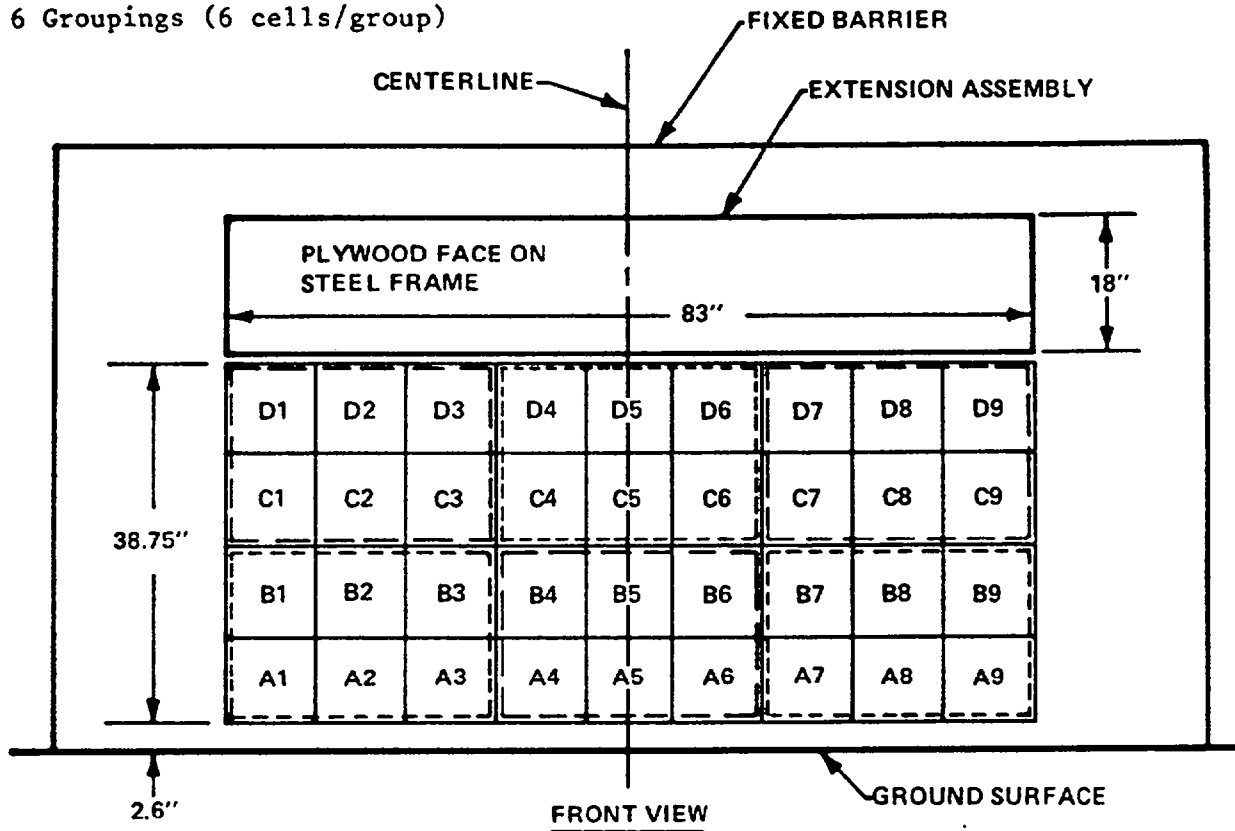
LOAD CELL LOCATIONS ON FIXED BARRIER

36 Load Cells

4 Rows

9 Columns

6 Groupings (6 cells/group)



6 GROUPS OF 6 LOAD CELLS EACH

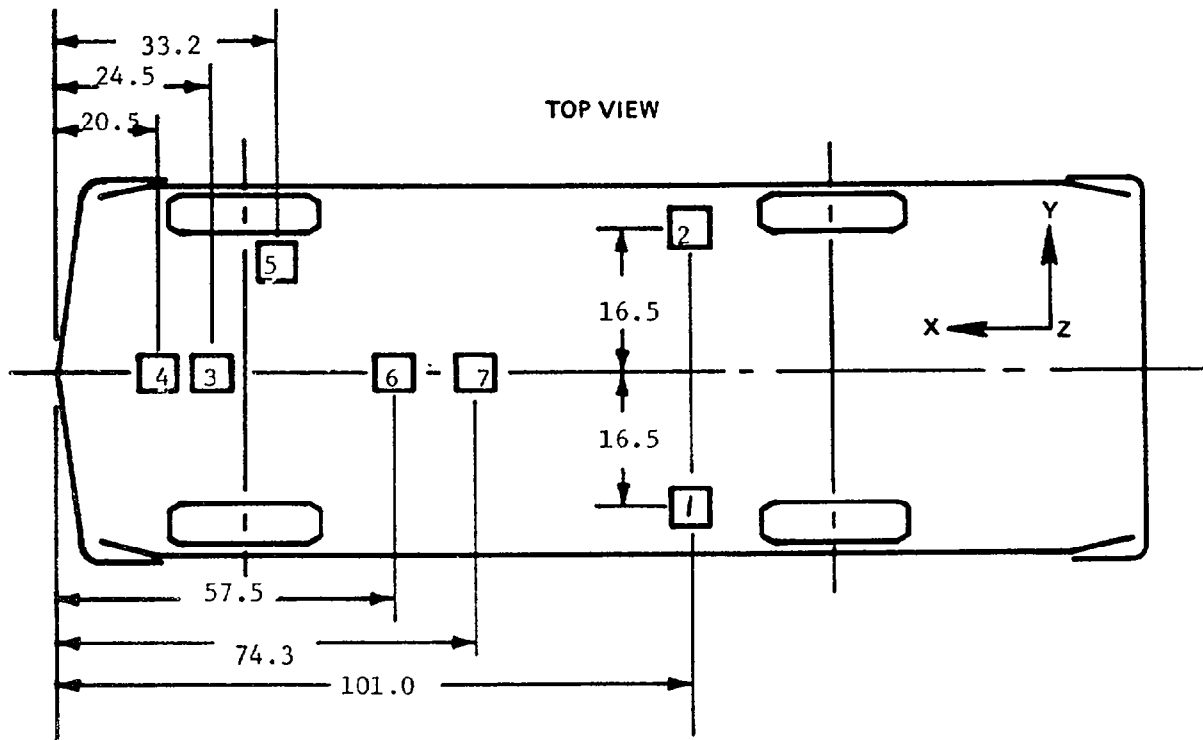
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

The following data is presented in Appendix B:

- (1) Data from 36 individual load cells
- (2) Total or Sum of 36 individual load cells
- (3) Data from 6 Groupings shown above (6 cells/group)

Figure 11

VEHICLE ACCELEROMETER LOCATIONS

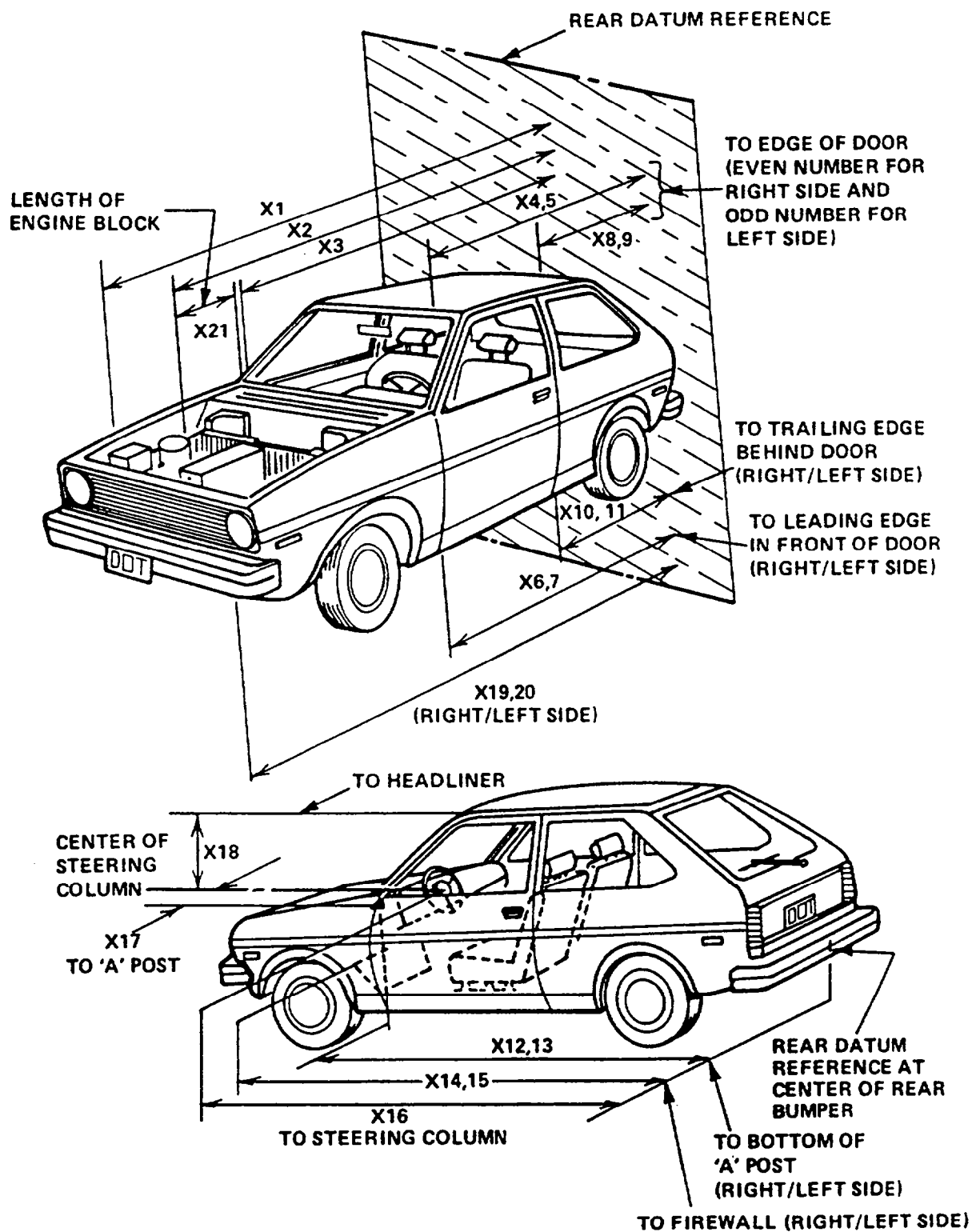


ACCELEROMETER NUMBER*	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Left Rear Seat Crossmember	X		
2	Right Rear Seat Crossmember	X		
3	Top of Engine	X		
4	Bottom of Engine	X		
5	Right Disc Brake Caliper	X		
6	Instrument Panel	X		
7	Center of Gravity (C/G)	X		

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

Figure 12

TEST VEHICLE MEASUREMENTS



Table

VEHICLE MEASUREMENTS

All Dimensions in Inches				
No.		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	158.3	136.4	21.9
X2	Rear Surface of Vehicle to Front of Engine	133.1	127.6	5.5
X3	Rear Surface of Vehicle to Firewall	119.2	116.3	2.9
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	107.5	106.2	1.3
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	107.0	107.5	- 0.5
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	108.1	106.0	2.1
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	107.5	107.2	0.3
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	69.1	69.0	0.1
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	68.6	69.5	- 0.9
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	70.0	67.8	2.2
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	69.2	69.1	0.1
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	107.5	104.4	3.1
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	106.5	106.5	0.0
X14	Rear Surface of Vehicle to Firewall, Right Side	117.7	110.0	7.7
X15	Rear Surface of Vehicle to Firewall, Left Side	118.5	113.1	5.4
X16	Rear Surface of Vehicle to Steering Column	91.7	91.5	0.2
X17	Center of Steering Column to "A" Post	14.8	15.0	- 0.2
X18	Center of Steering Column to Headliner	16.5	19.0	- 2.5
X19	Rear Surface of Vehicle to Right Side of Front Bumper	156.6	134.8	21.8
X20	Rear Surface of Vehicle to Left Side of Front Bumper	156.5	136.3	20.2
X21	Length of Engine Block	14.8	14.8	0.0

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

Table 6

**ACCIDENT INVESTIGATION DIVISION DATA
FOR 35 MPH FRONTAL BARRIER IMPACT**

VEHICLE MAKE/MODEL/BODY STYLE: 1986 Volkswagen Golf 4-Door Sedan

VEH. NHTSA NO.: MG5801 ; VIN: 1VWFA9174GV047789

MODEL YEAR: 1986 ; BUILD DATE: March 1986 ; TEST DATE: May 8, 1986

VEH. SIZE CATEGORY: Sub-Compact ; TEST WEIGHT: 2620

VEH. WHEELBASE: 97.3 ; FRONT OVERHANG: 31.9 ; OVERALL WIDTH: 65.5

ACCELEROMETER DATA:

LOCATION: 42.3 inches rearward of the front wheel C/L

CALIBRATION PROCEDURE: Shaker Table/Least Squares

LINEARITY: ±0.75% ; INTEGRATION ALGORITHM: Hybrid Simpson Newton 3/8

VEH. IMPACT SPEED: 34.9 ; TIME OF SEPARATION: 203.9

VELOCITY CHANGE: 38.94

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE:

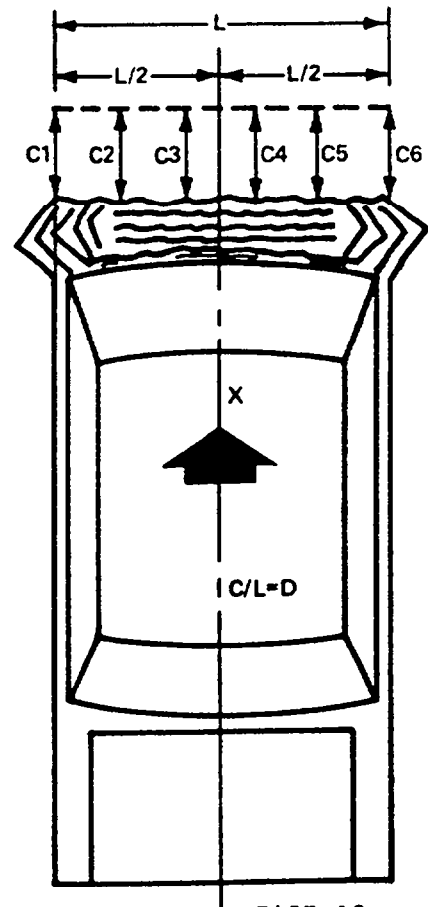
F (Frontal) 12FDEW3

CRUSH DEPTH DIMENSIONS:

C1 =	<u>19.8</u>	inches
C2 =	<u>20.7</u>	inches
C3 =	<u>21.4</u>	inches
C4 =	<u>21.6</u>	inches
C5 =	<u>21.5</u>	inches
C6 =	<u>20.8</u>	inches

MIDPOINT OF DAMAGE: D = Vehicle Centerline (Longitud.)

LENGTH OF DAMAGED REGION: L = 55.5 inches



National Accident Sampling System — Continuous Sampling Subsystem: Vehicle Data

FIELD MEASUREMENTS

NCI
1986 VOLKSWAGON GOLF 4 DOOR HATCHBACK

Complete When Applicable

End Damage	Side Damage
Undeformed end width <u>SS.S</u>	Bowing: B1 _____ X1 _____
Corner shift: A1 _____	B2 _____ X2 _____
A2 _____	Bowing constant
End shift at frame (CDC) (check one)	$\frac{X1 + X2}{2} = \underline{\hspace{2cm}}$
<4 inches _____	
≥4 inches _____	

Note: Measure C1 to C6 from Driver to Passenger side in Front or Rear impacts—
Rear to Front in Side impacts.

12FDEW3

Specific Impact Number	Plane* of C-Measurements	Direct Damage		Field L**	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	±D
		Width** (CDC)	Max*** Crush								
1	Bumper	SS.S	21.9	SS.S	22.0	21.4	21.6	21.8	22.2	23.0	Ø
	Free/Space		Ø		2.2	.7	.2	.2	.7	2.2	
1	ACTUAL CRUSH	SS.S	21.9	SS.S	19.8	20.7	21.4	21.6	21.5	20.8	Ø

*Identify the plane at which the C-measurements are taken (e.g., at bumper, above bumper, at sill, above sill, at beltline, etc.) or label adjustments (e.g., free space).

Free space value is defined as the distance between the baseline and the original body contour taken at the individual C locations. This may include the following: bumper lead, bumper taper, side protrusion, side taper, etc. Record the value for each C-measurement and maximum crush.

**Measure and document on the vehicle diagram the beginning or end of the direct damage width and field L (e.g., side damage with respect to undamaged axle.)

***Measure and document on the vehicle diagram the location of the maximum crush.

Note: Use as many lines/columns as necessary to describe each damage profile.

NCI

DAMAGE DESCRIPTION

Tire—Wheel Damage

a. Rotation physically restricted b. Tire deflated

RF 1

LF 1

RR 2

LR 2

RF 2

LF 2

RR 2

LR 2

(1) Yes, (2) No, (8) NA, (9) Unk.

TYPE OF TRANSMISSION

1 Manual Automatic

Average Track:

Maximum Width:

Curb Weight:

Overall Length: 158.3

Wheel Base: 97.3

Engine Size: cyl. 4

displ. 1.8L

WHEEL STEER ANGLES

(For locked front wheels or displaced rear axles only)

RF 0 1 °

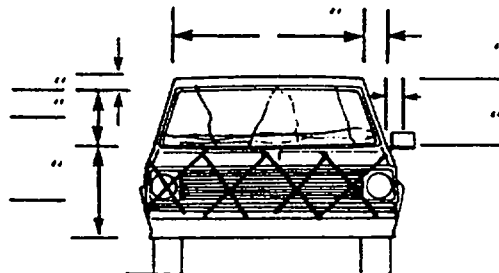
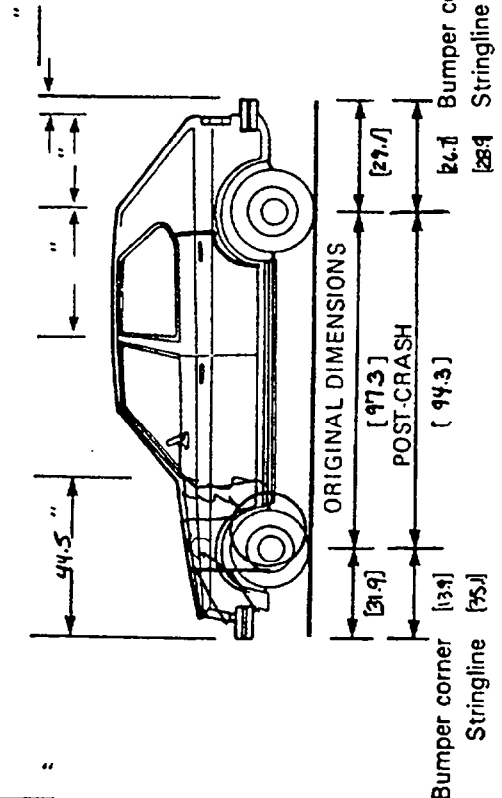
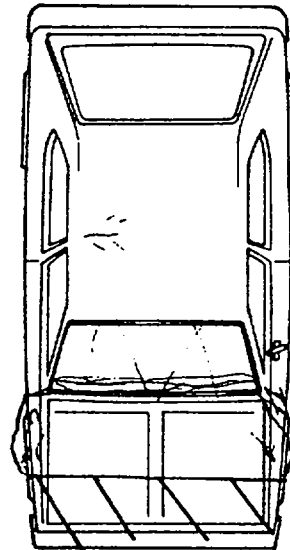
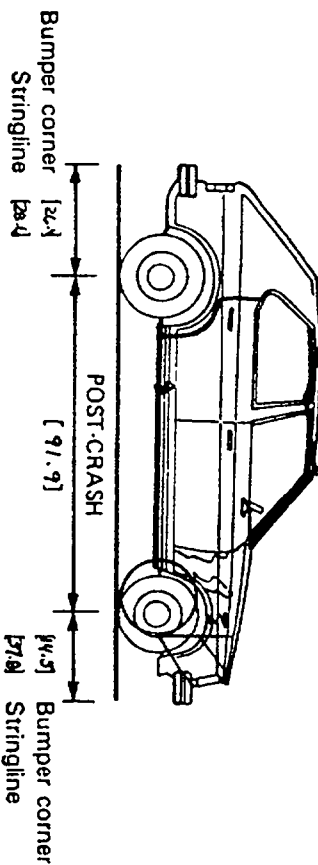
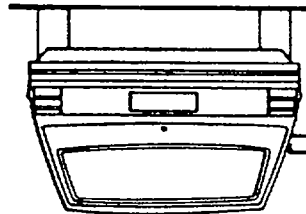
LF 0 3 °

RR N/A °

LR 1 1 °

Within ± 5 degrees

1986 Volkswagen Golf



Note: Sketch new perimeter and cross hatch direct damage and single hatch induced damage on all views. Annotate observations which might be useful in reconstructing the accident (e.g., grass in tire bead, direction of striations, scuff on sidewall, etc.) If pulling trailer sketch type of trailer and damage received on the back of this page. Annotate any damage caused by extrication such as component removal by torching, prying or hydraulic shears. If the vehicle contacted a pedestrian, complete page 6R.

APPENDIX A

PHOTOGRAPHS

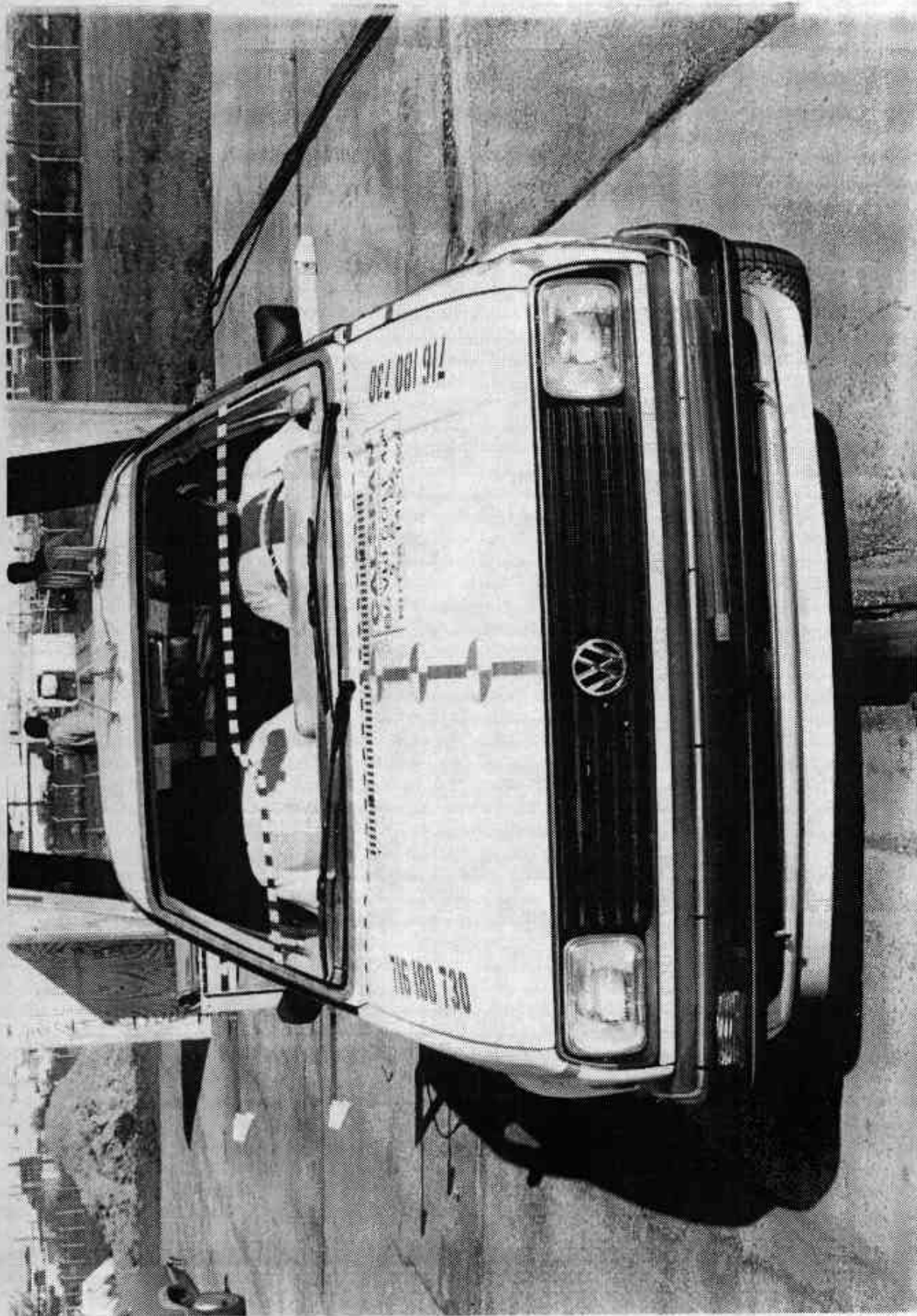


Figure A-1 PRE-TEST FRONT VIEW

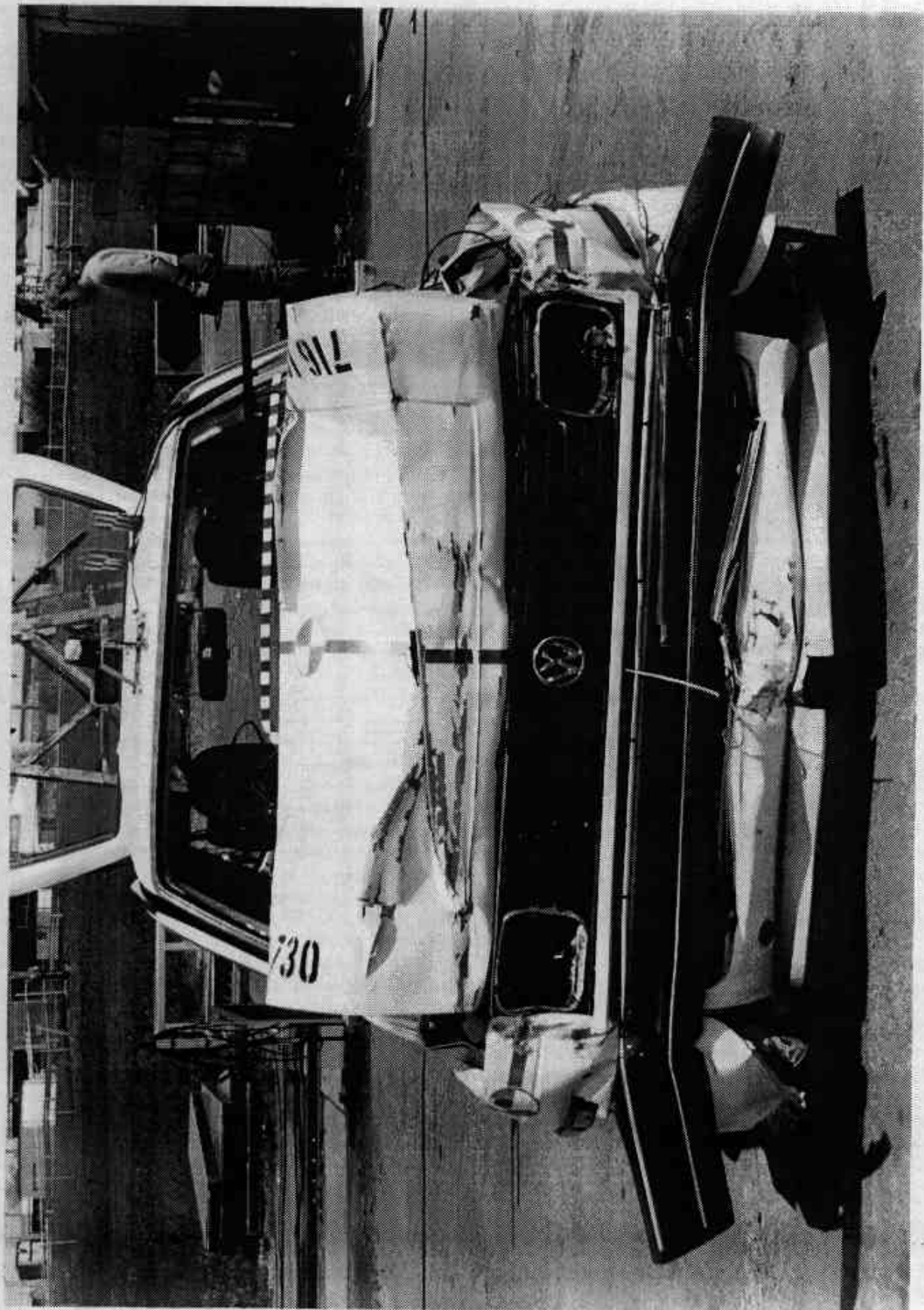


Figure A-2 POST-TEST FRONT VIEW

A-3

7457-18

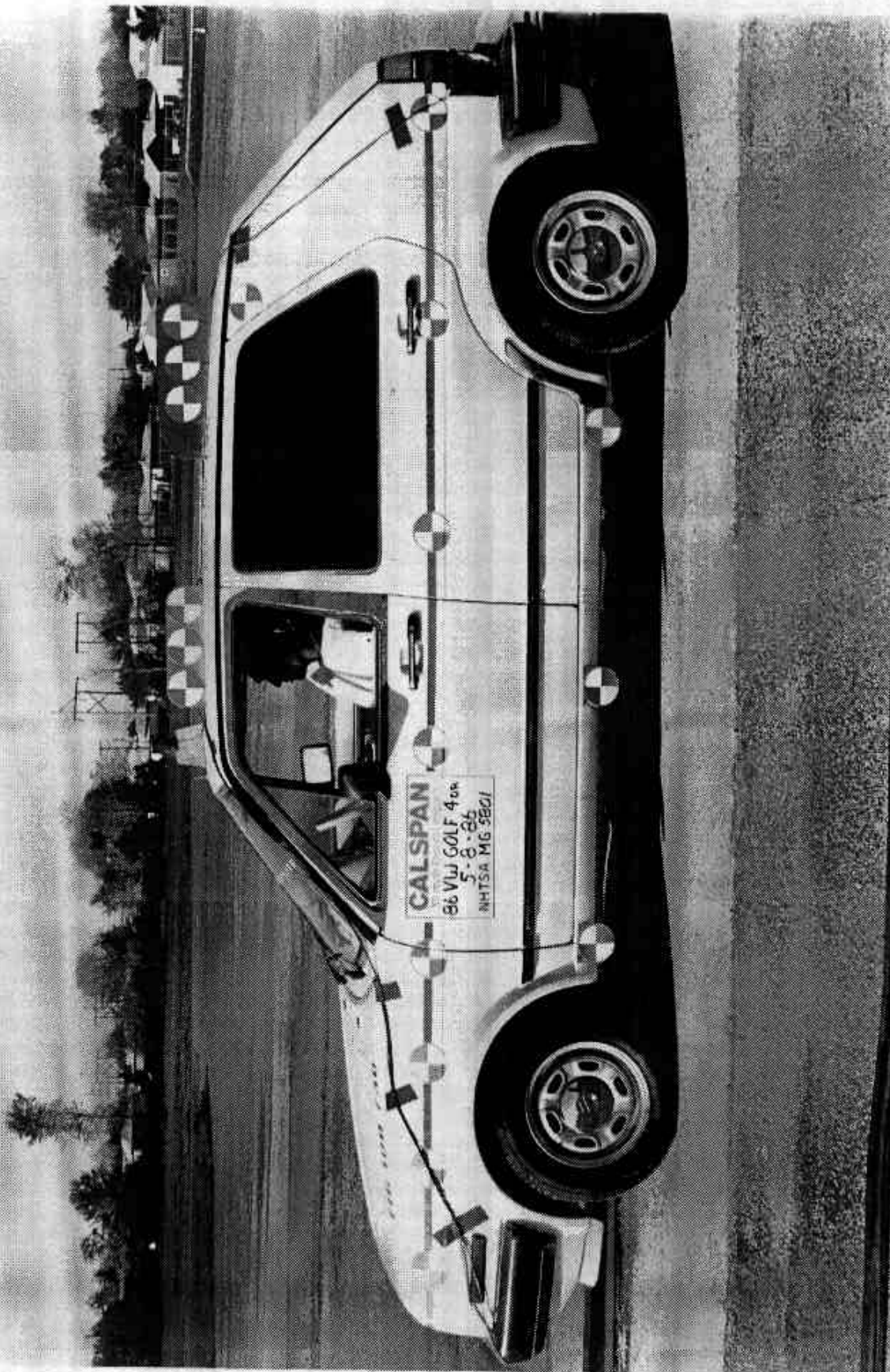


Figure A-3 PRE-TEST LEFT SIDE VIEW

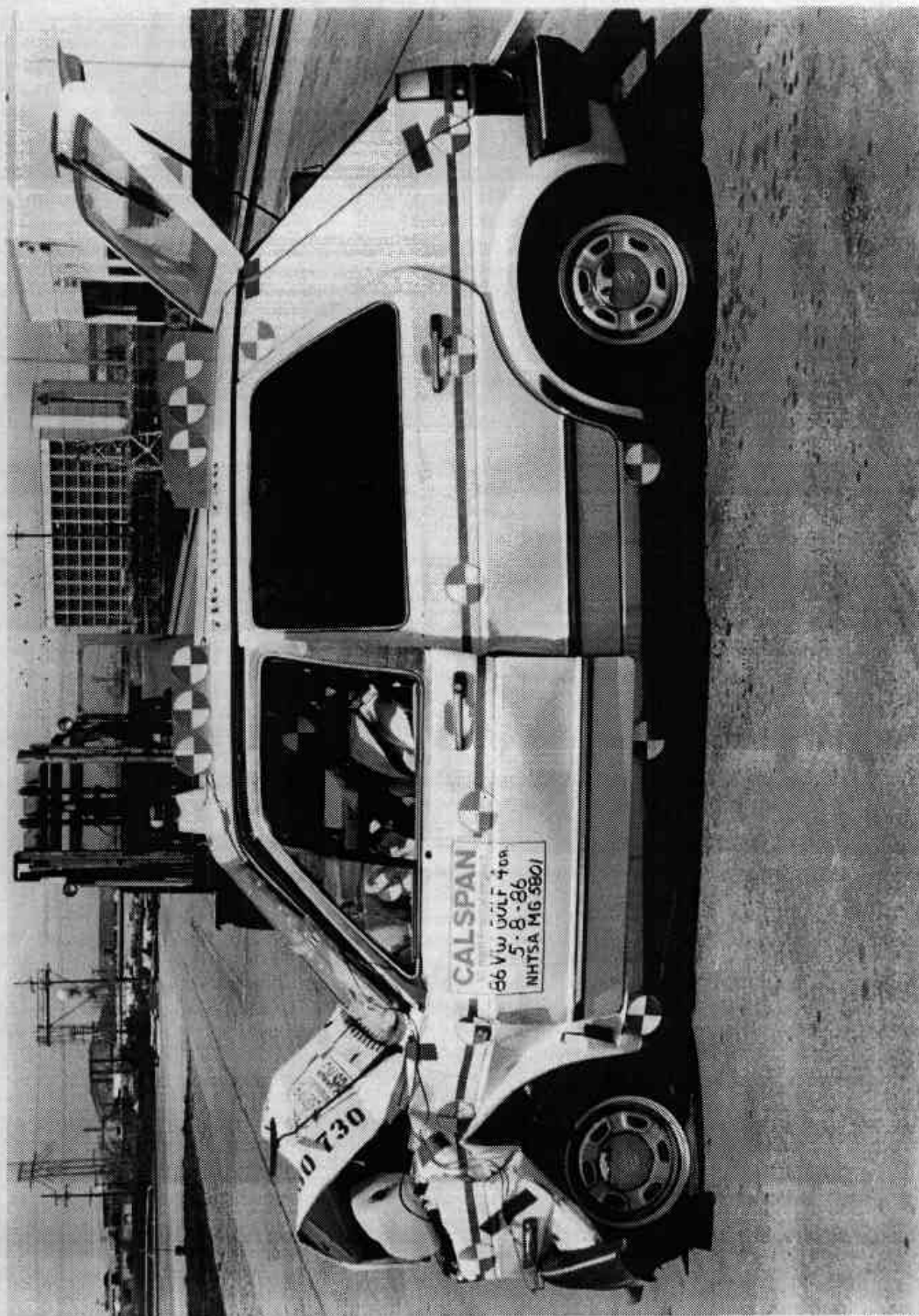


Figure A-4 POST-TEST LEFT SIDE VIEW

A-5

7457-18

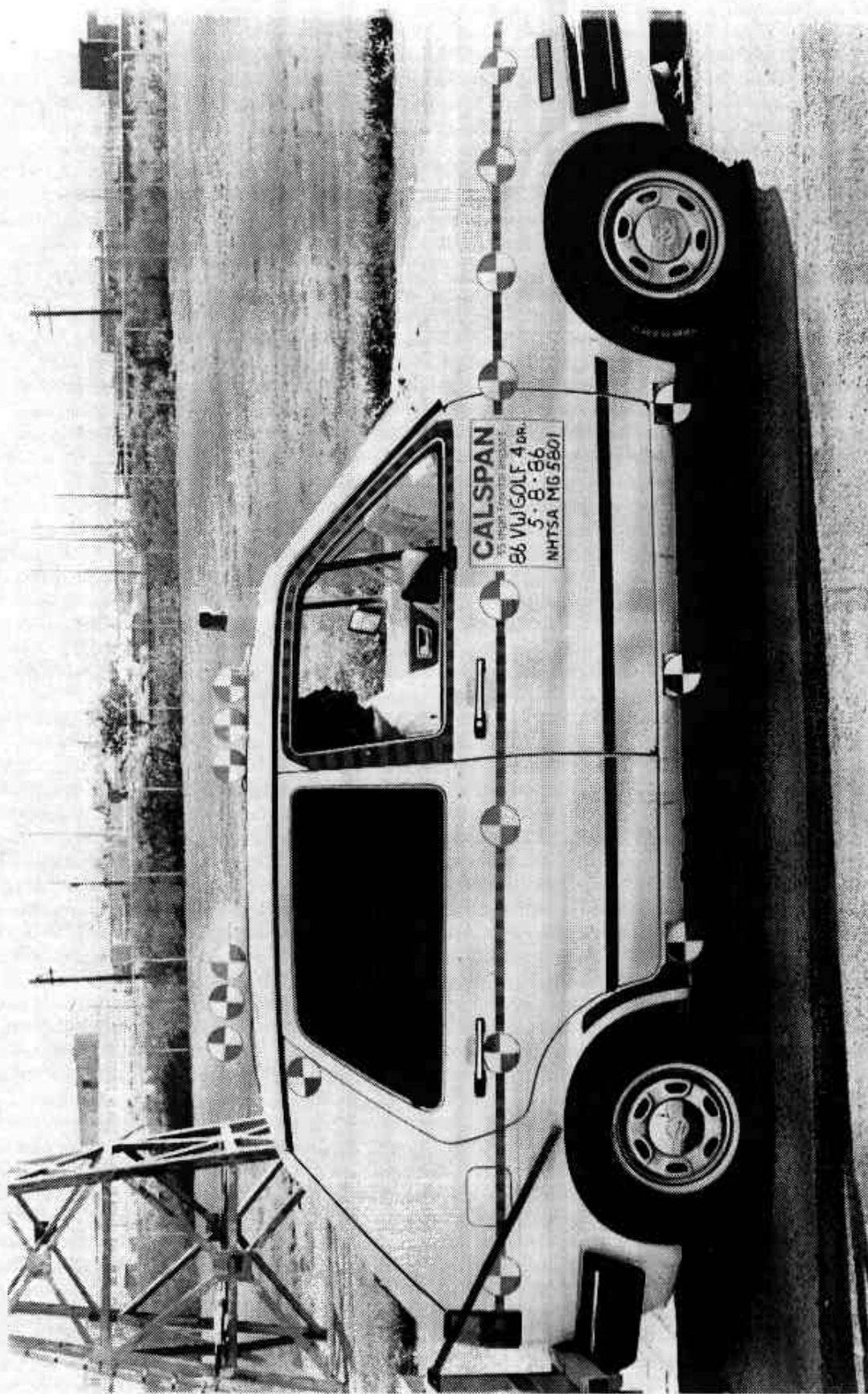
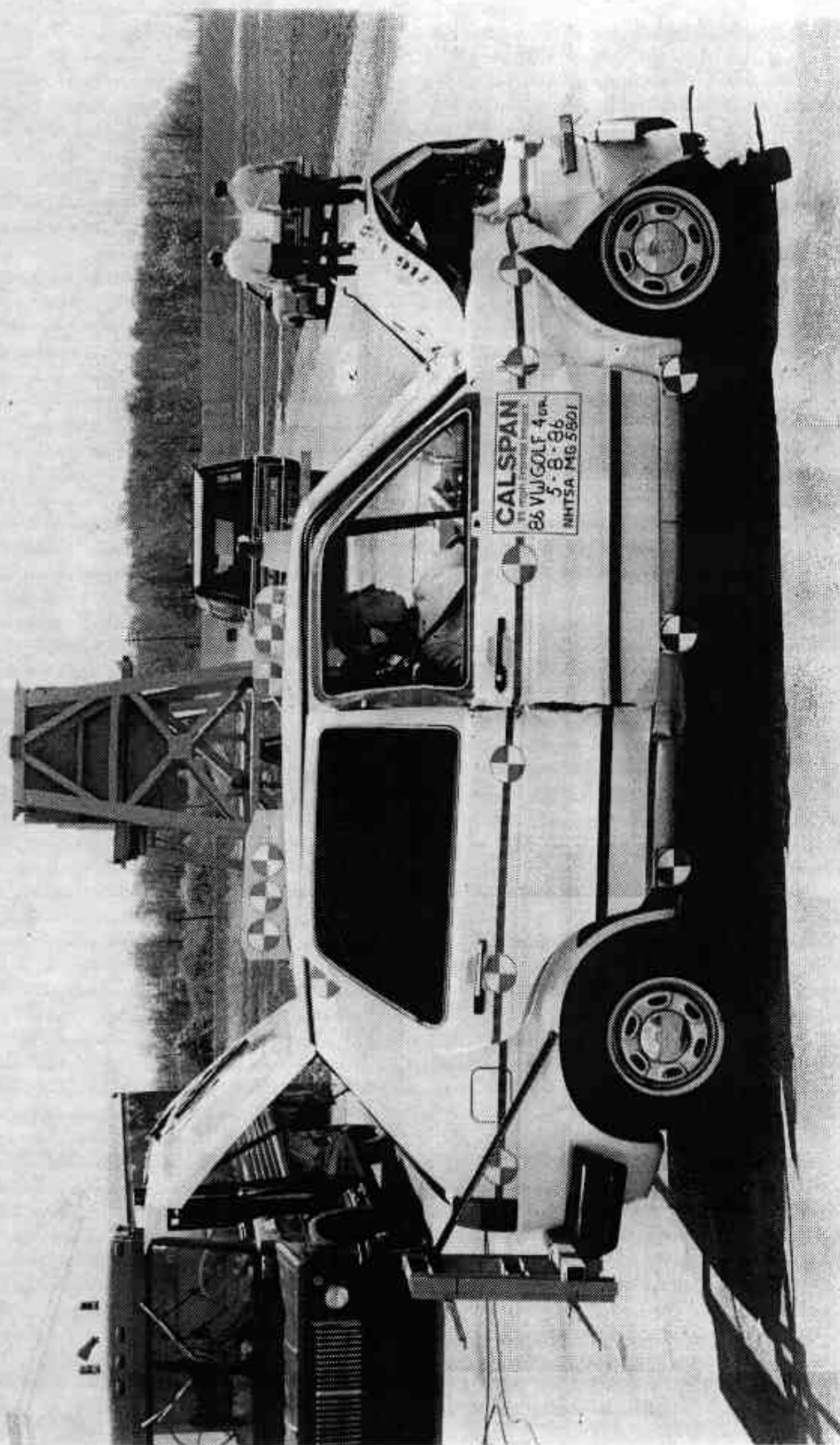


Figure A-5 PRE-TEST RIGHT SIDE VIEW

A-6

7457-18



A-7

7457-18

Figure A-6 POST-TEST RIGHT SIDE VIEW



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

A-8

7457-18

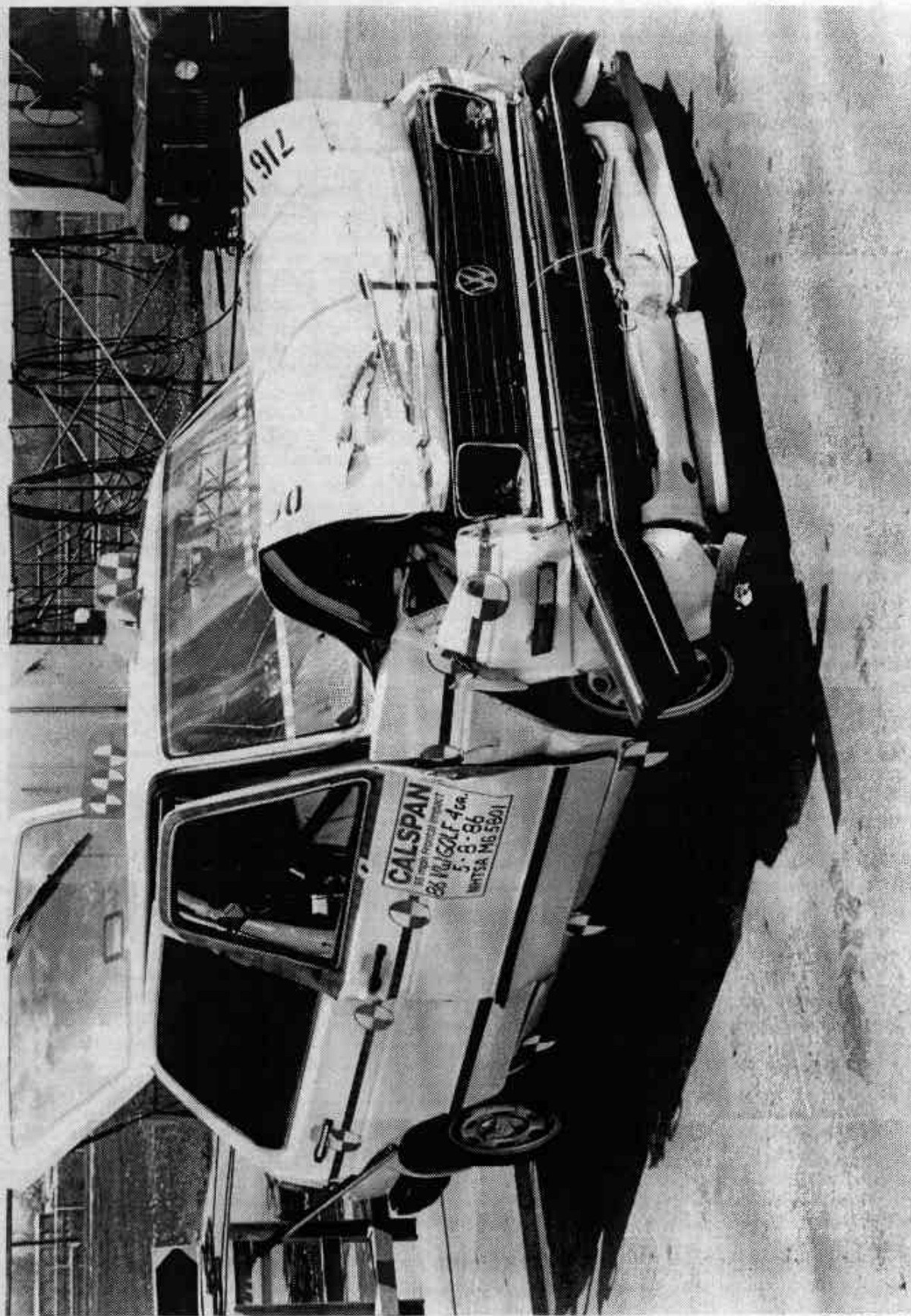


Figure A-8 POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-9

7457-18

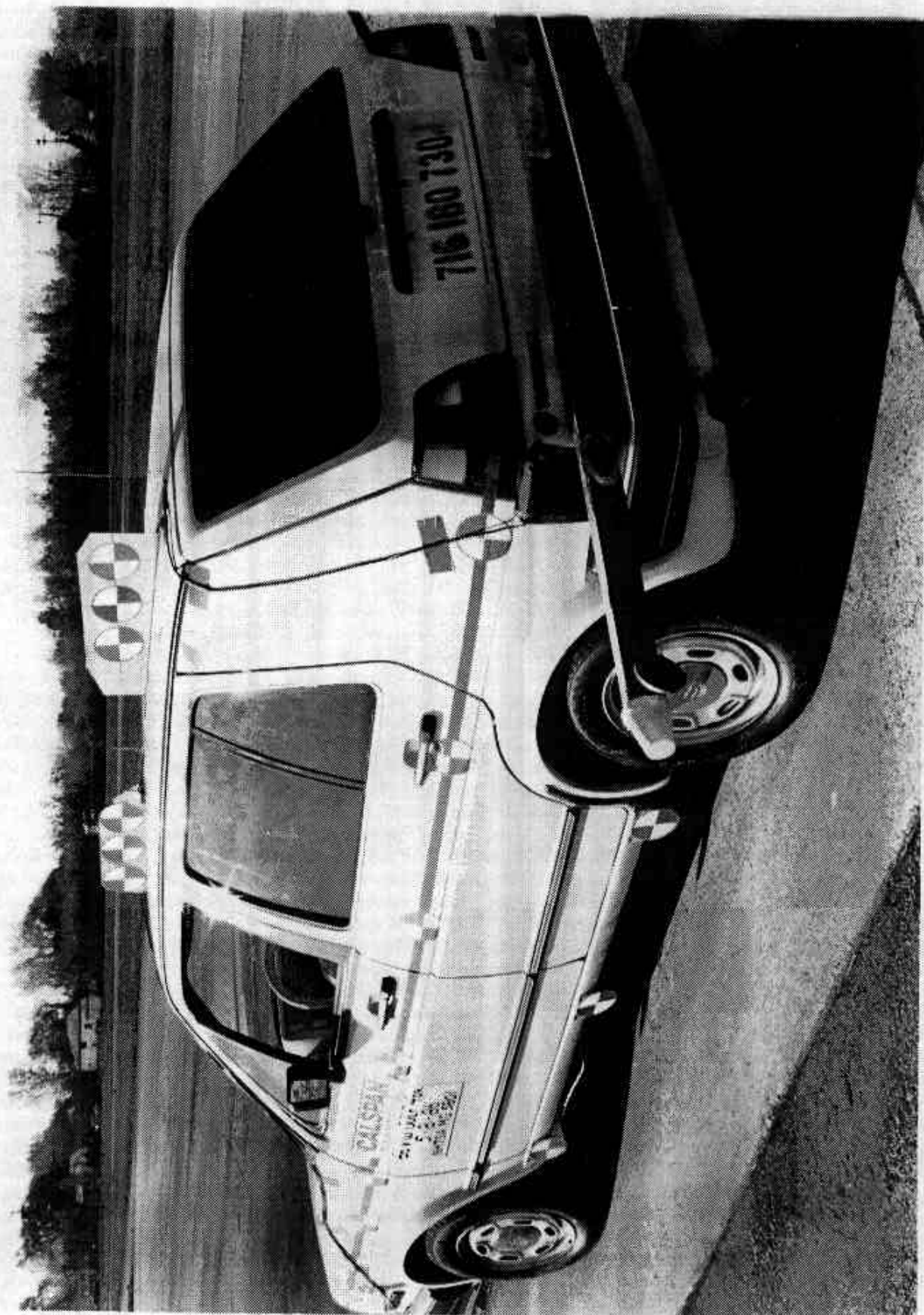


Figure A-9 PRE-TEST LEFT REAR THREE-QUARTER VIEW

A-10

7457-18



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

A-11

7457-18

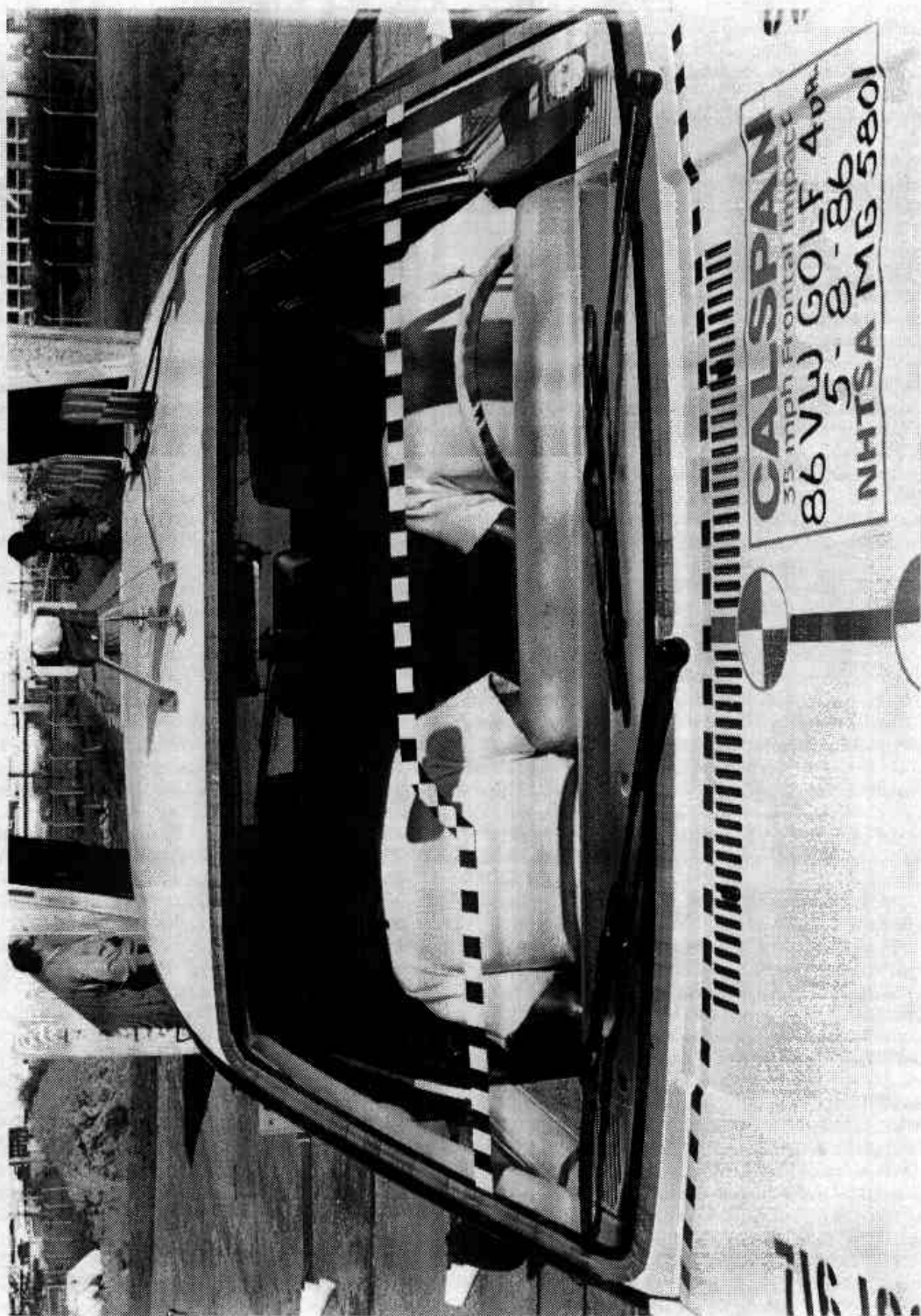


Figure A-11 PRE-TEST WINDSHIELD VIEW

A-12

7457-18

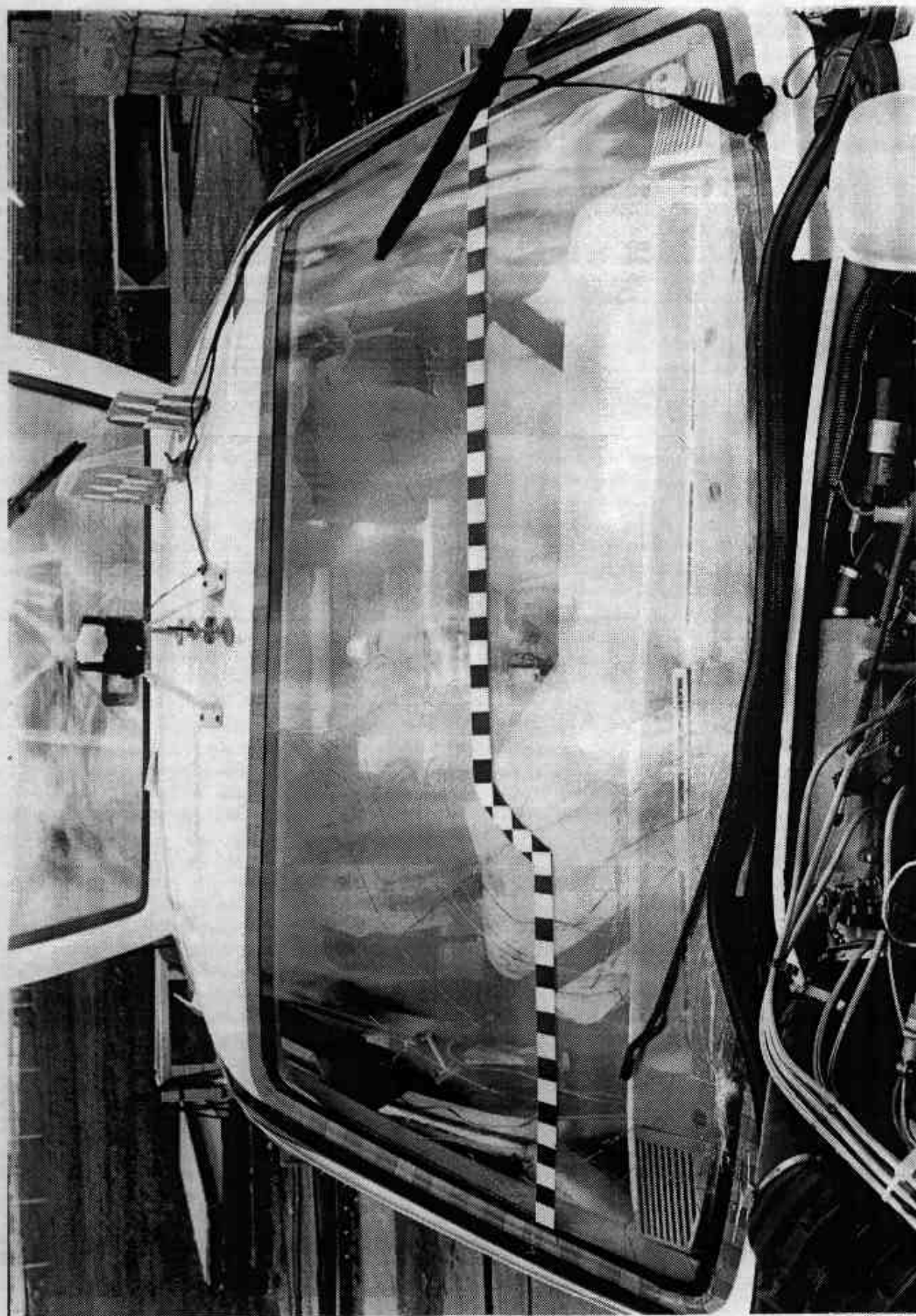


Figure A-12 POST-TEST WINDSHIELD VIEW

A-13

7457-18

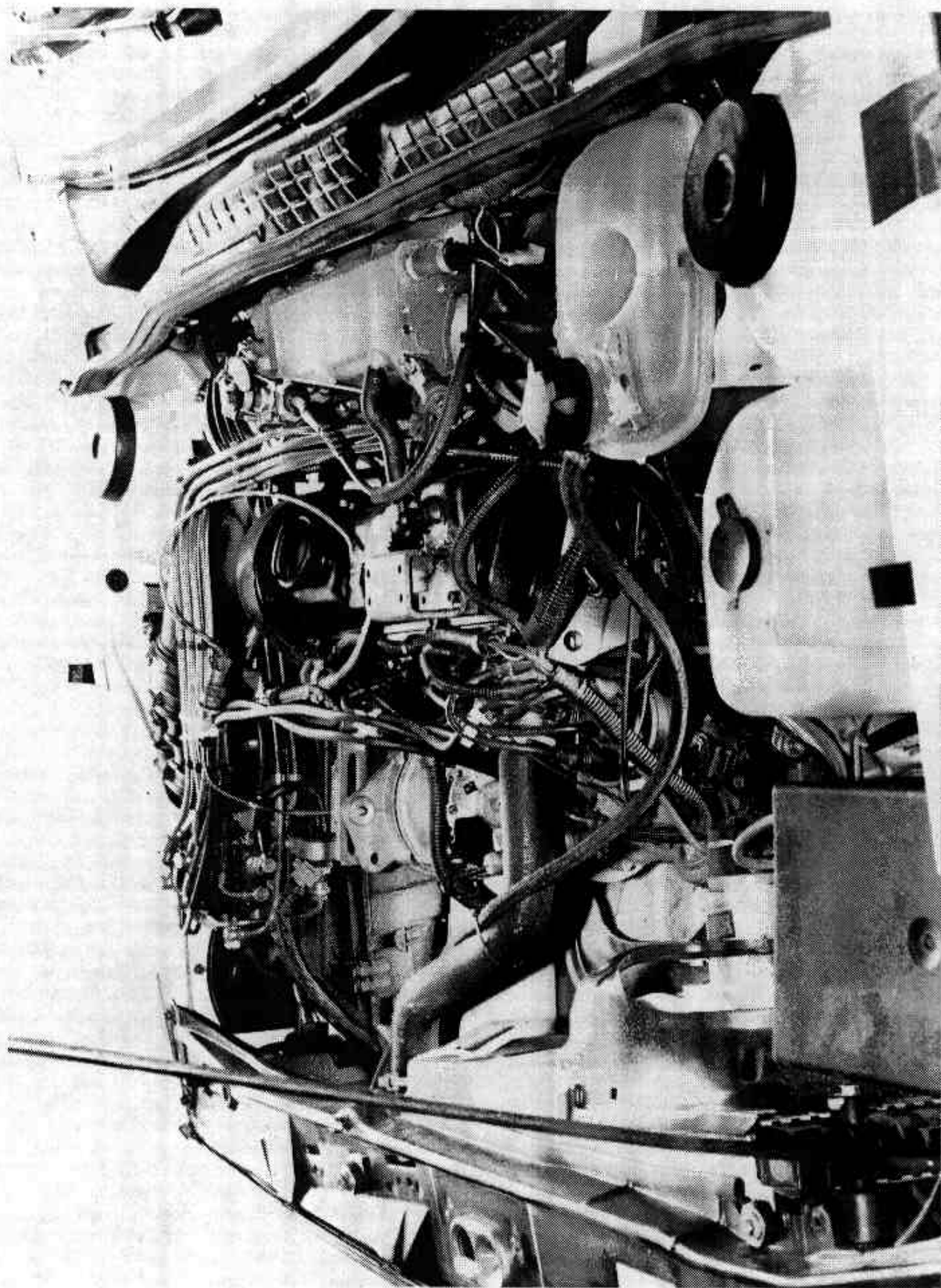


Figure A-13 PRE-TEST ENGINE COMPARTMENT VIEW

A-14

7457-18

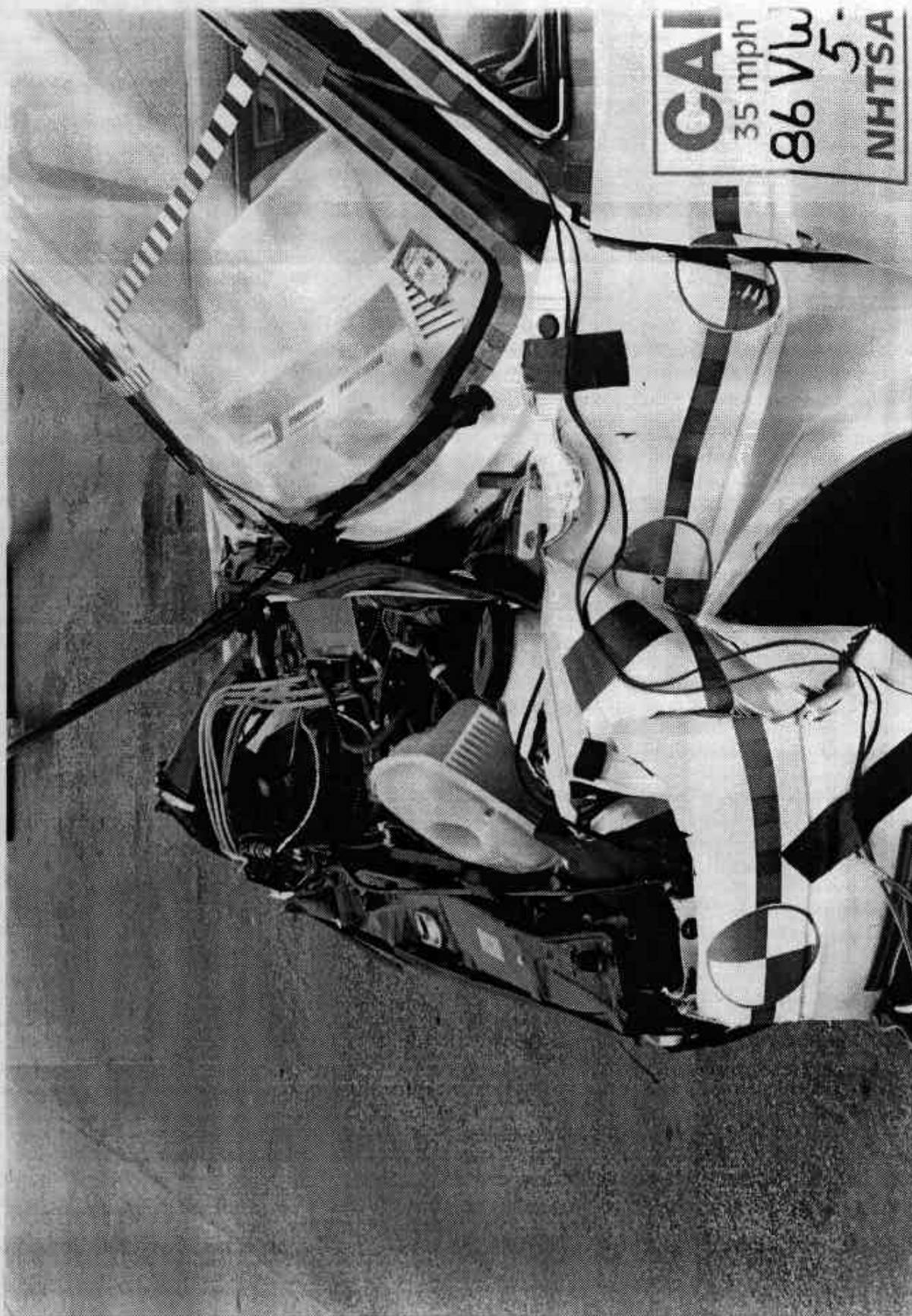


Figure A-14 POST-TEST ENGINE COMPARTMENT VIEW

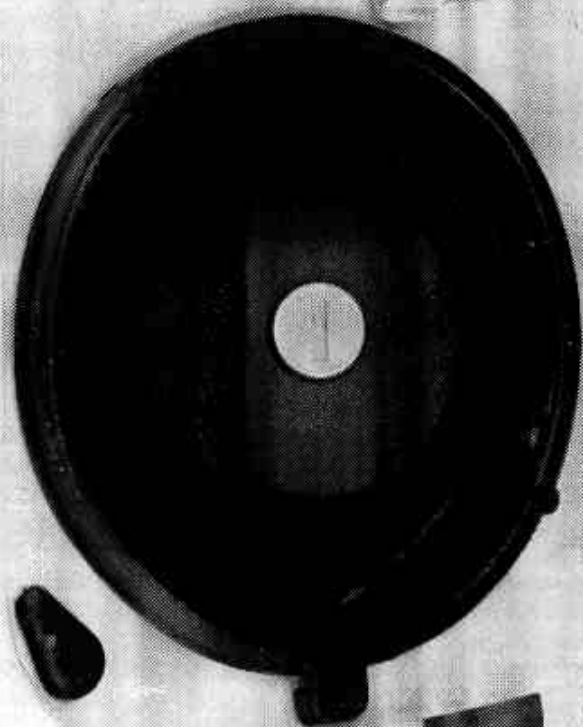


FIGURE A-15 PRE-TEST FUEL FILTER CAP VIEW

A-16

7457-18

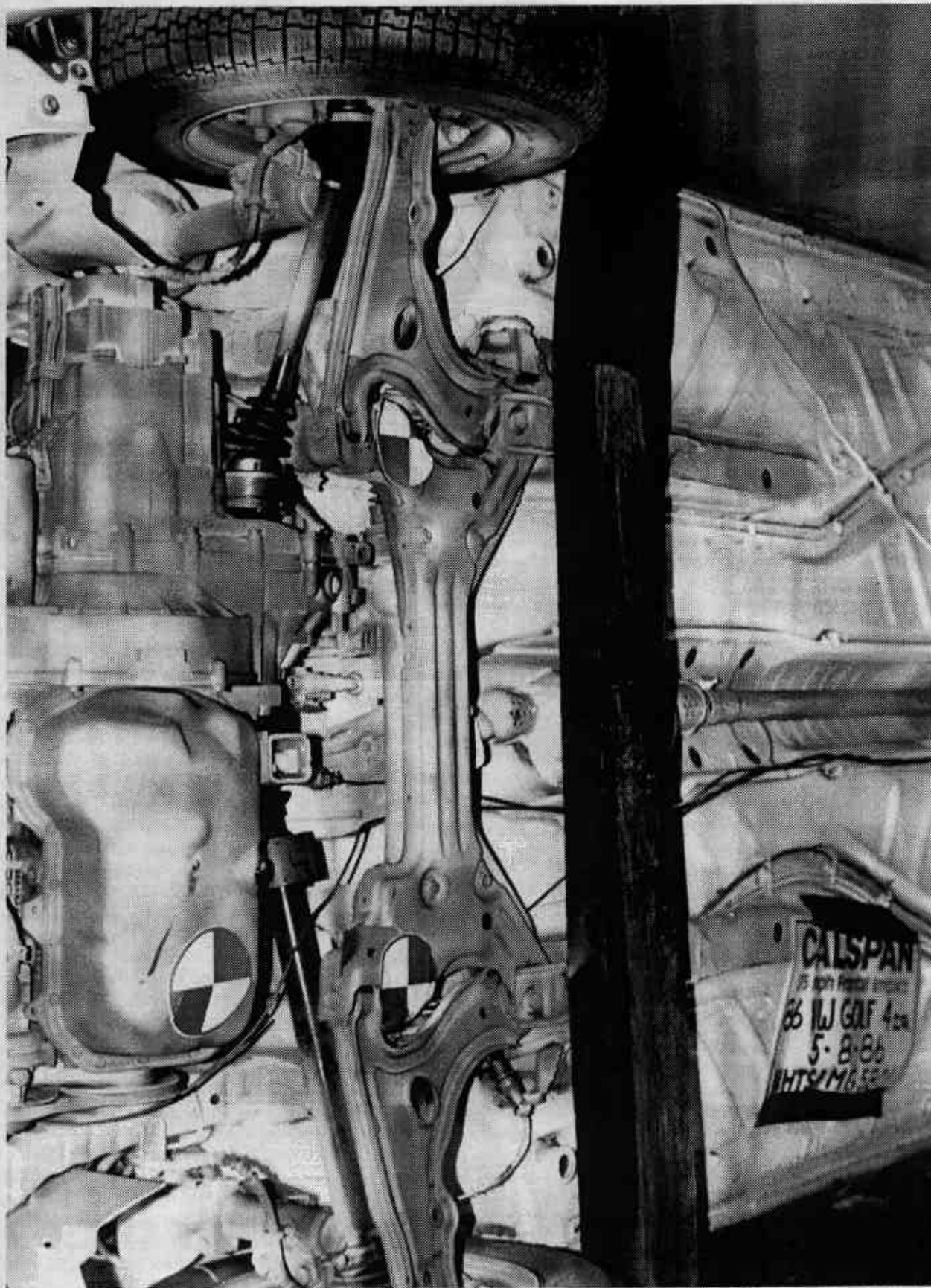


Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

A-17

7457-18

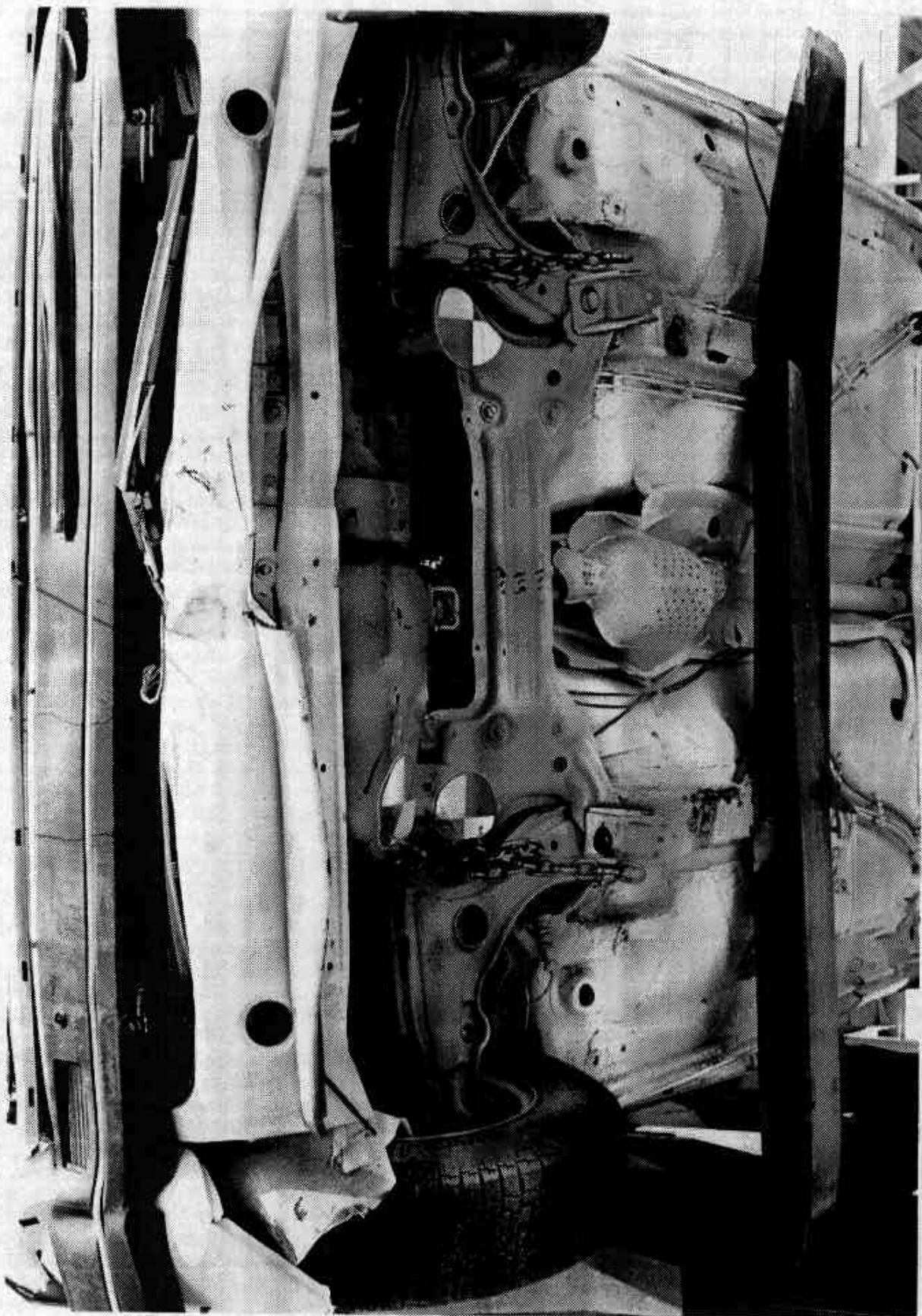


Figure A-17 POST-TEST FRONT UNDERBODY VIEW

A-18

7457-18

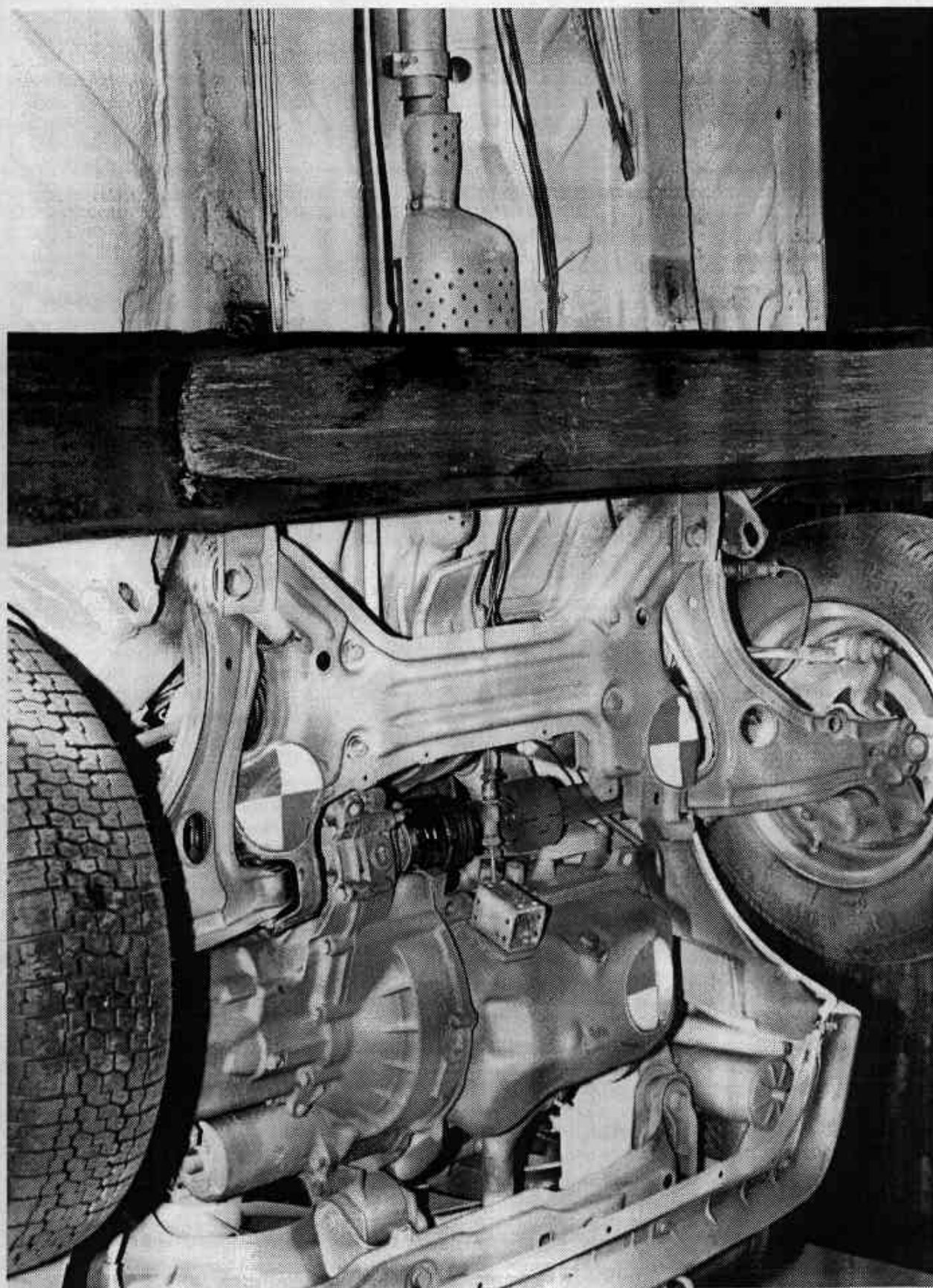


Figure A-18 PRE-TEST FRONT-SIDE UNDERBODY VIEW

A-19

7457-18

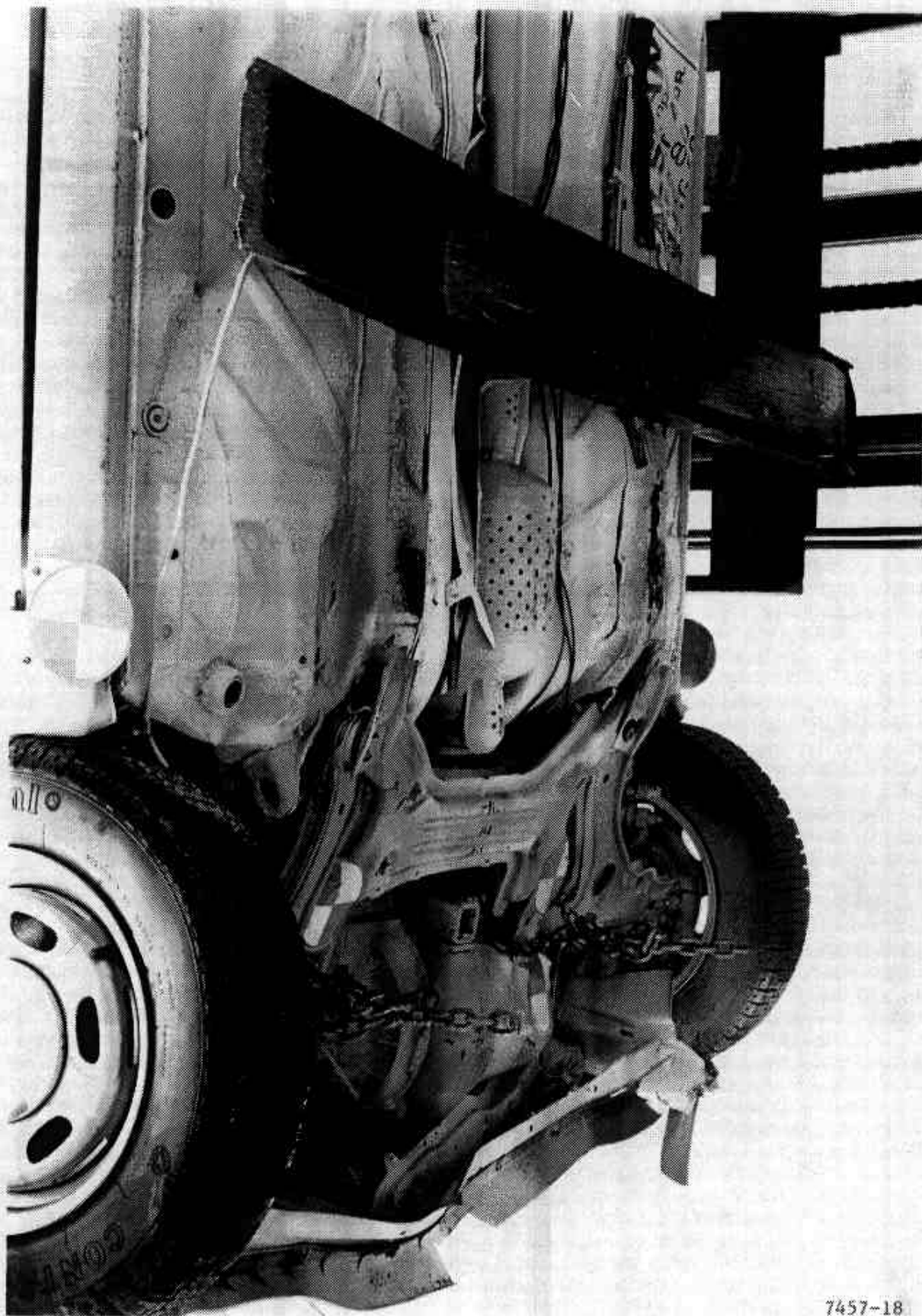


FIGURE A-19 POST-TEST FRONT-SIDE UNDERBODY VIEW

A-20

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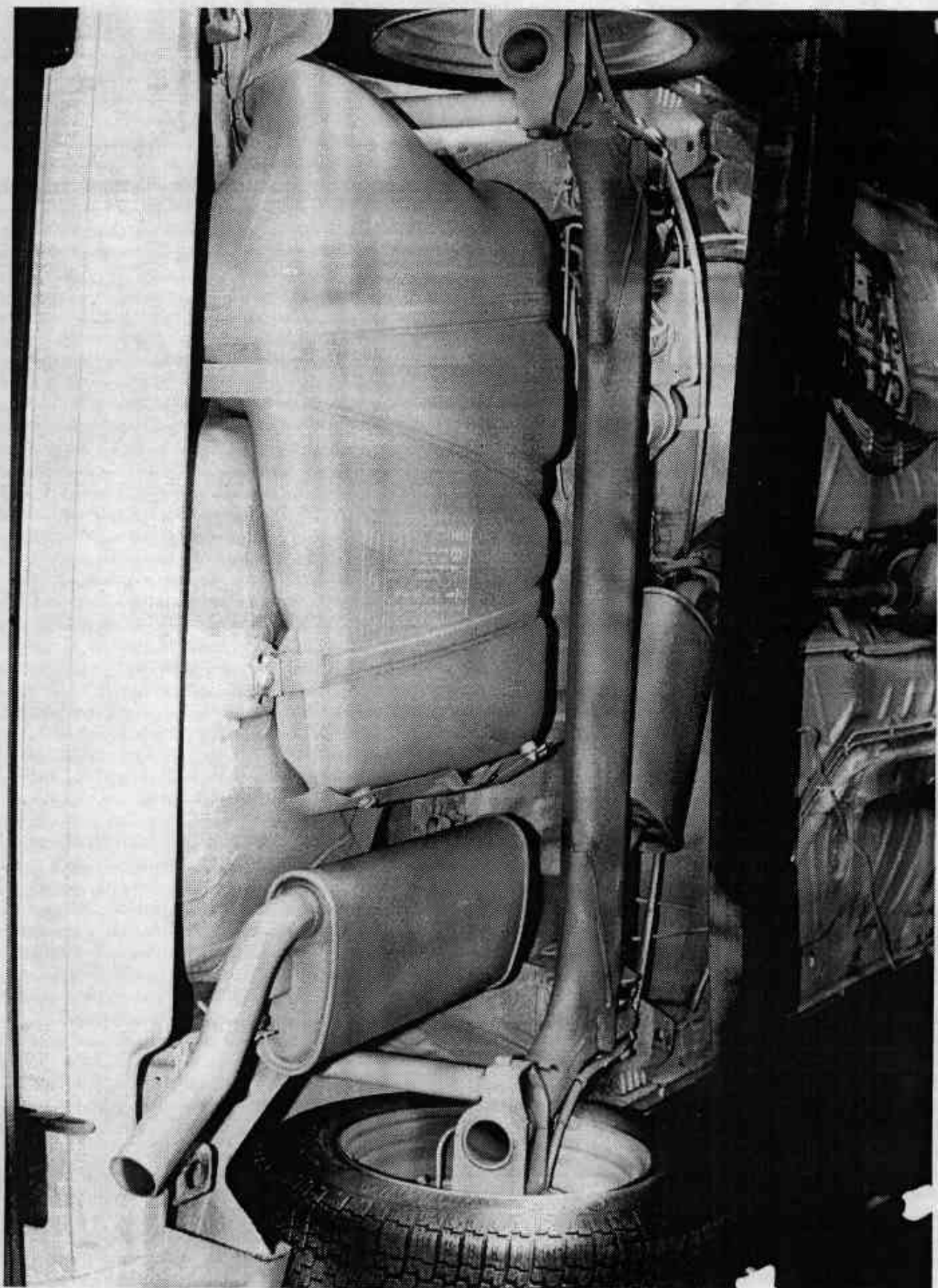


Figure A-20 PRE-TEST REAR UNDERBODY VIEW

A-21

7457-18

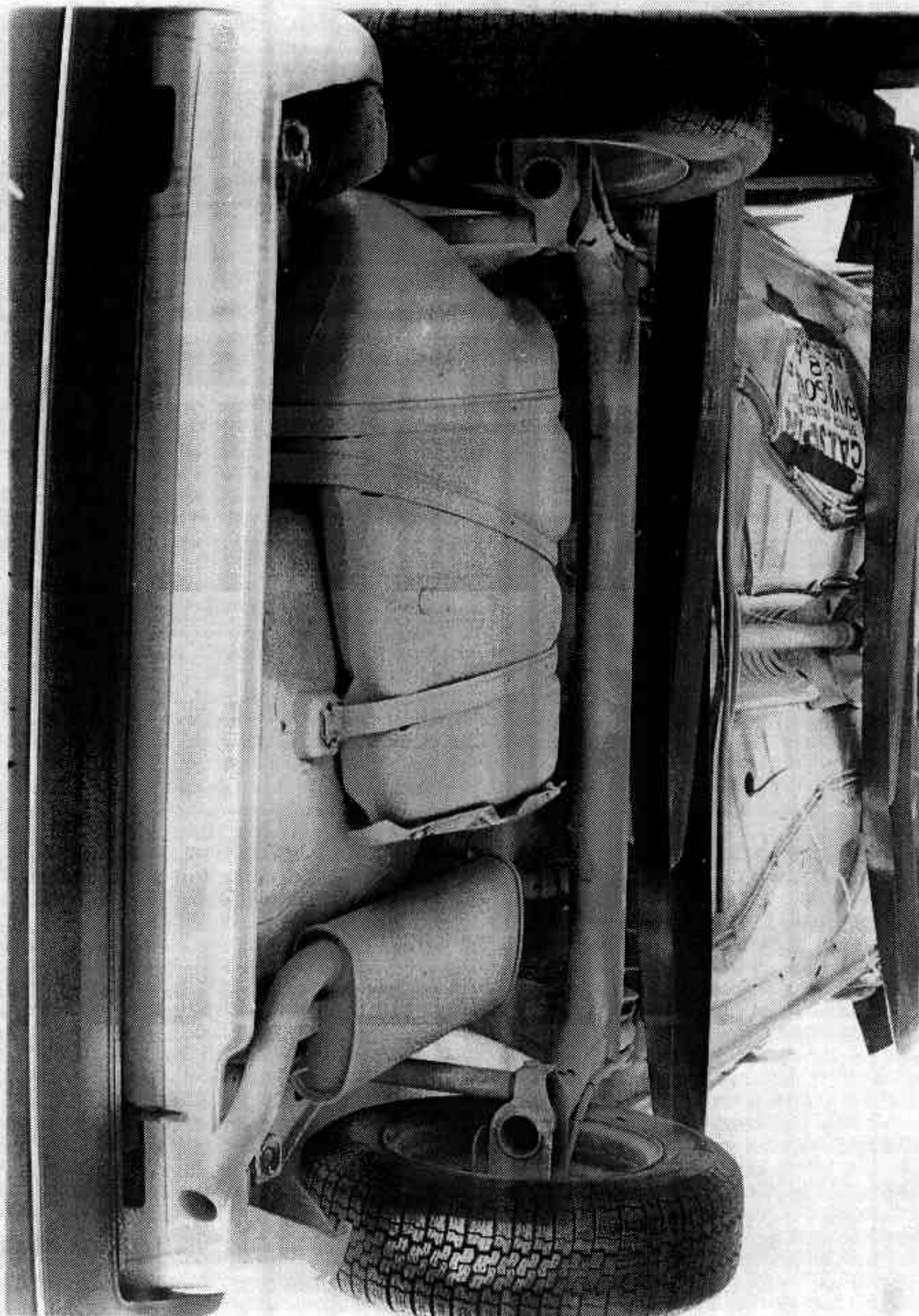


Figure A-21 POST-TEST REAR UNDERBODY VIEW

A-22

7457-18



Figure A-22 PRE-TEST DRIVER POSITION VIEW

A-23

7457-18



Figure A-23 POST-TEST DRIVER POSITION VIEW

A-24

7457-18



Figure A-24 PRE-TEST PASSENGER POSITION VIEW

A-25

7457-18



Figure A-25 POST-TEST PASSENGER POSITION VIEW

A-26

7457-18



Figure A-26 PRE-TEST DRIVER AND INTERIOR VIEW

A-27

SPAN
Ontario International
7457-18

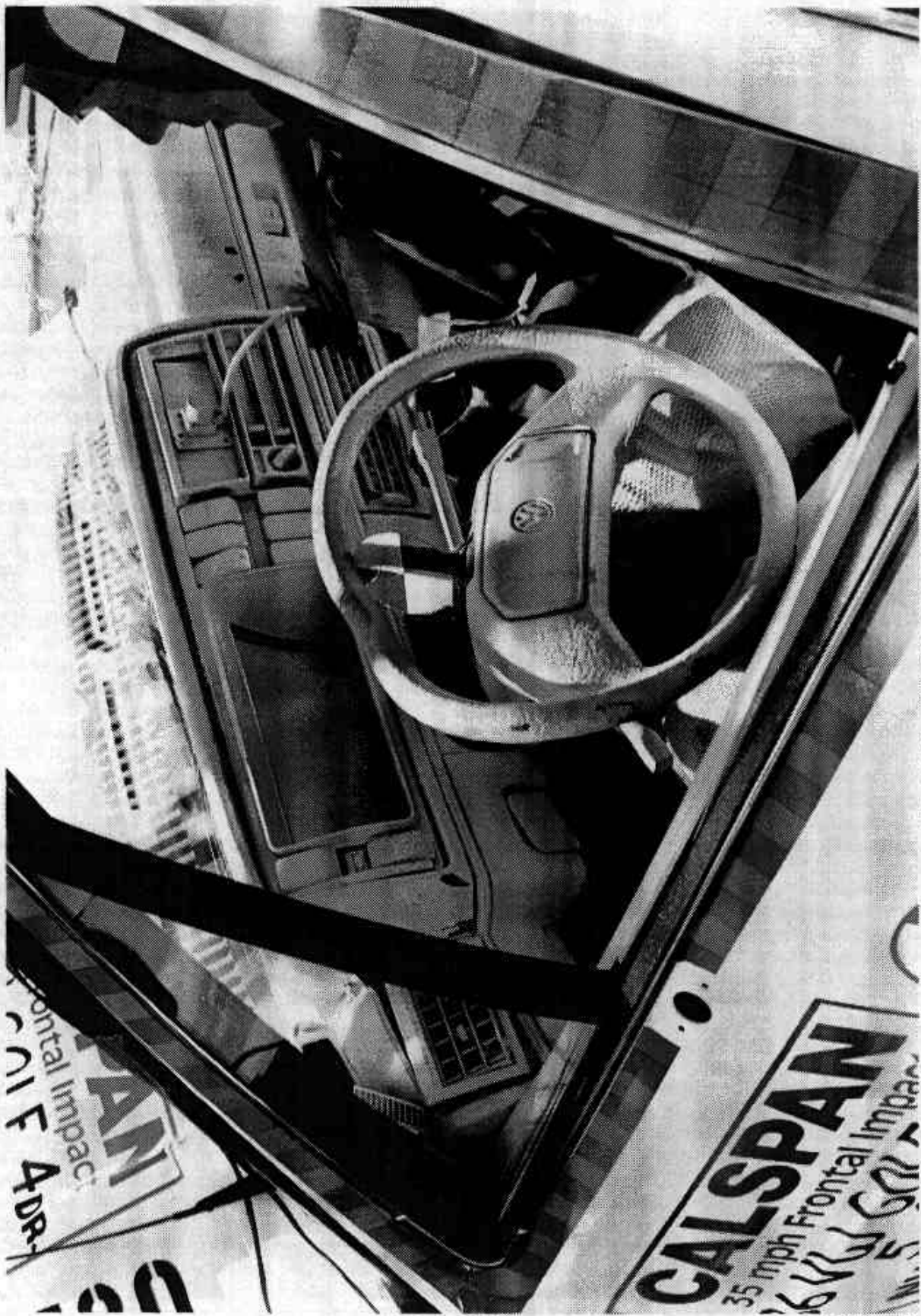


Figure A-27 POST-TEST DRIVER AND INTERIOR VIEW



Figure A-28 POST-TEST CLOSE UP DRIVER AND INTERIOR VIEW



Figure A-29 PRE-TEST PASSENGER AND INTERIOR VIEW



Figure A-30 POST-TEST PASSENGER AND INTERIOR VIEW

APPENDIX B

VEHICLE, DUMMY RESPONSE DATA AND LOAD CELL BARRIER DATA

TEST NO. MG5801

VEHICLE DATA

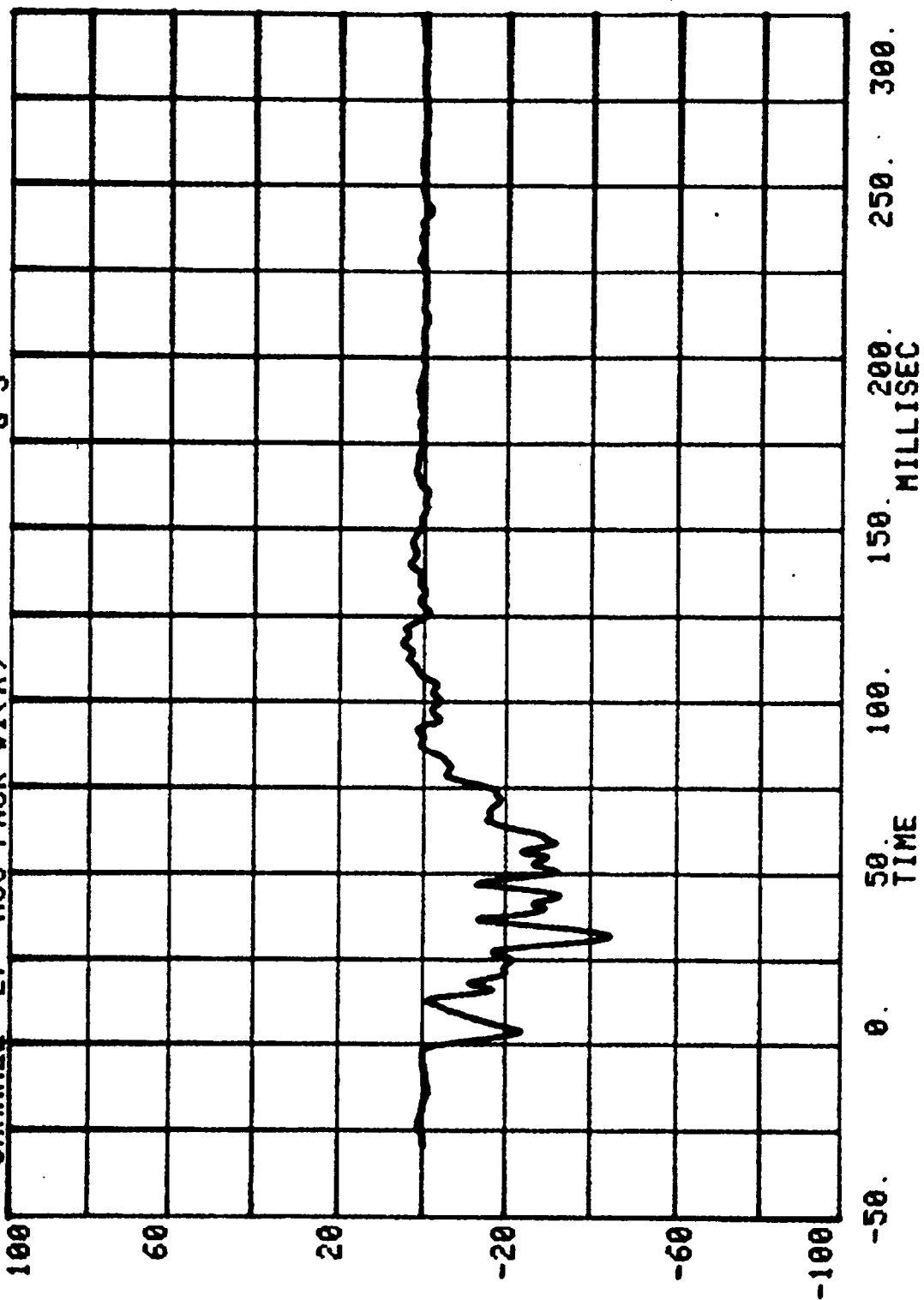
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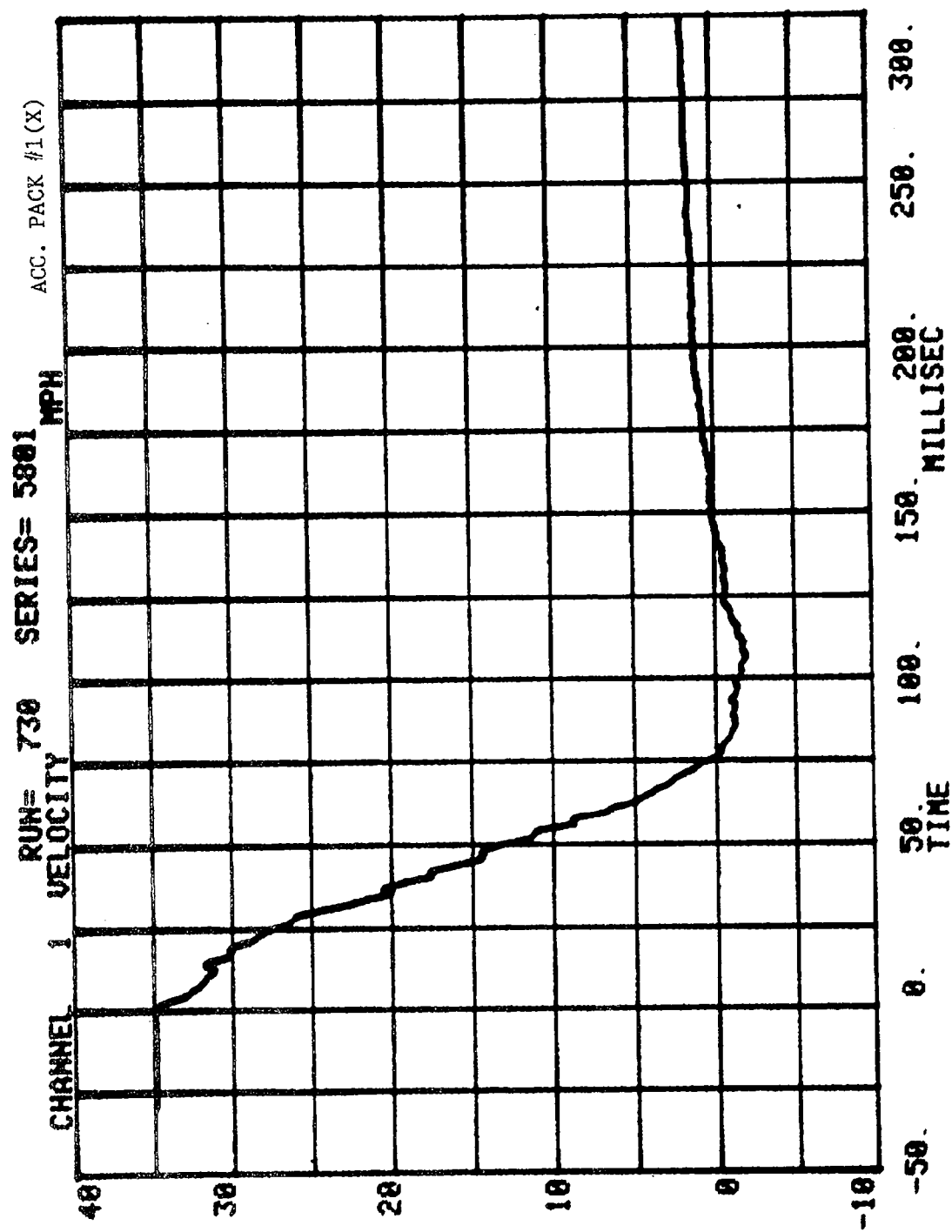
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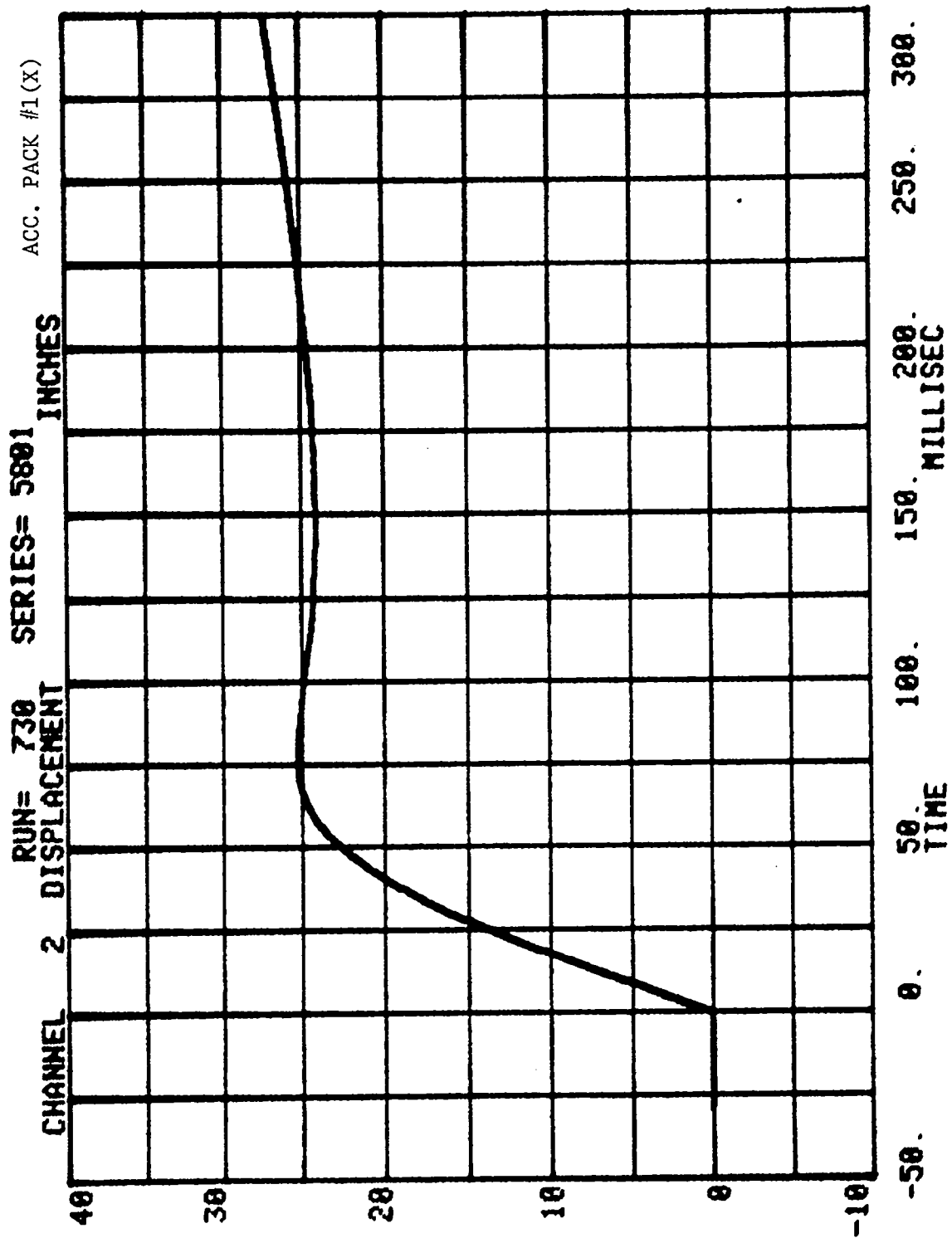
B-2

7457-18

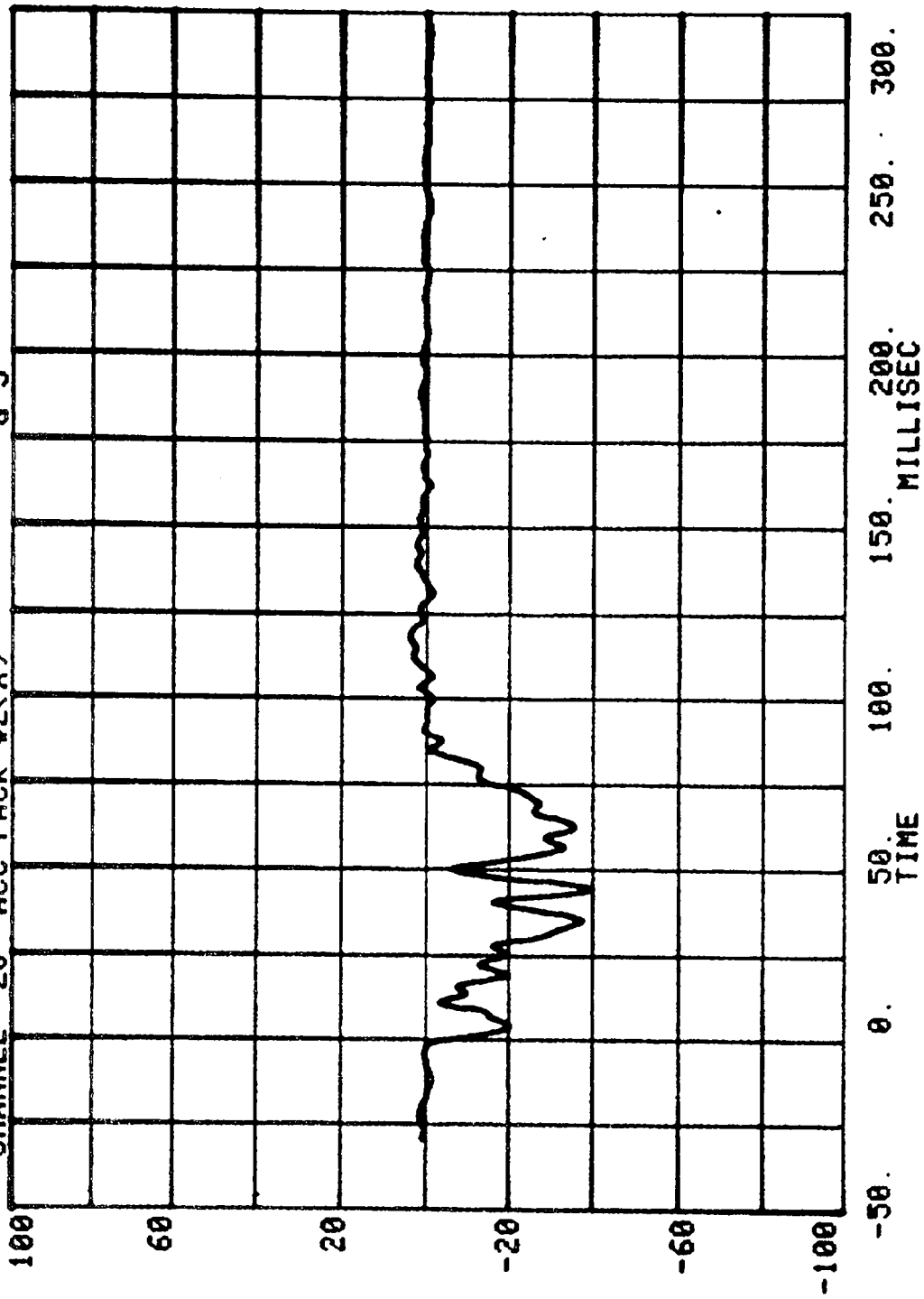
CHANNEL 27 ACC PACK #1(X) RUN= 730 SERIES= 5801 G'S

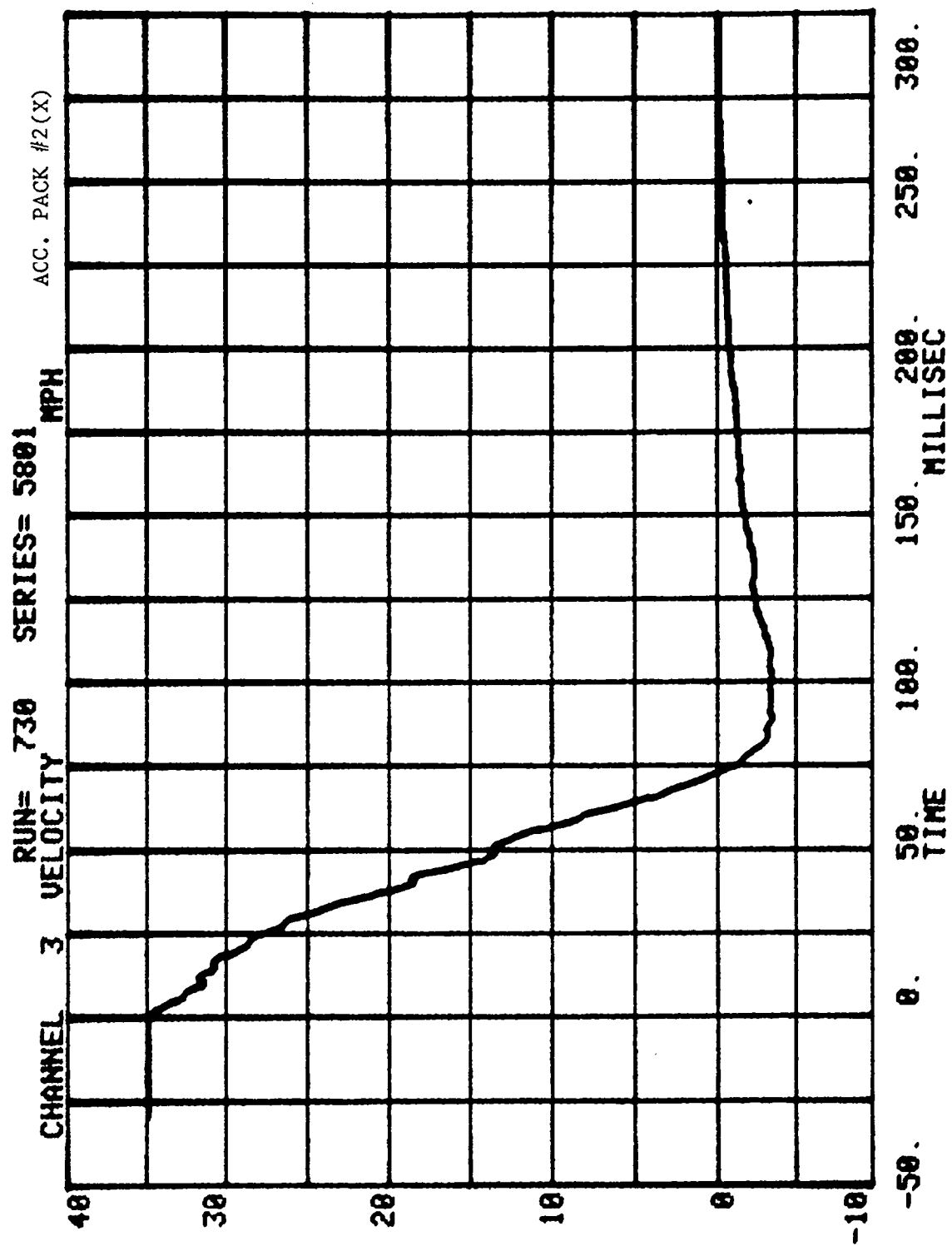


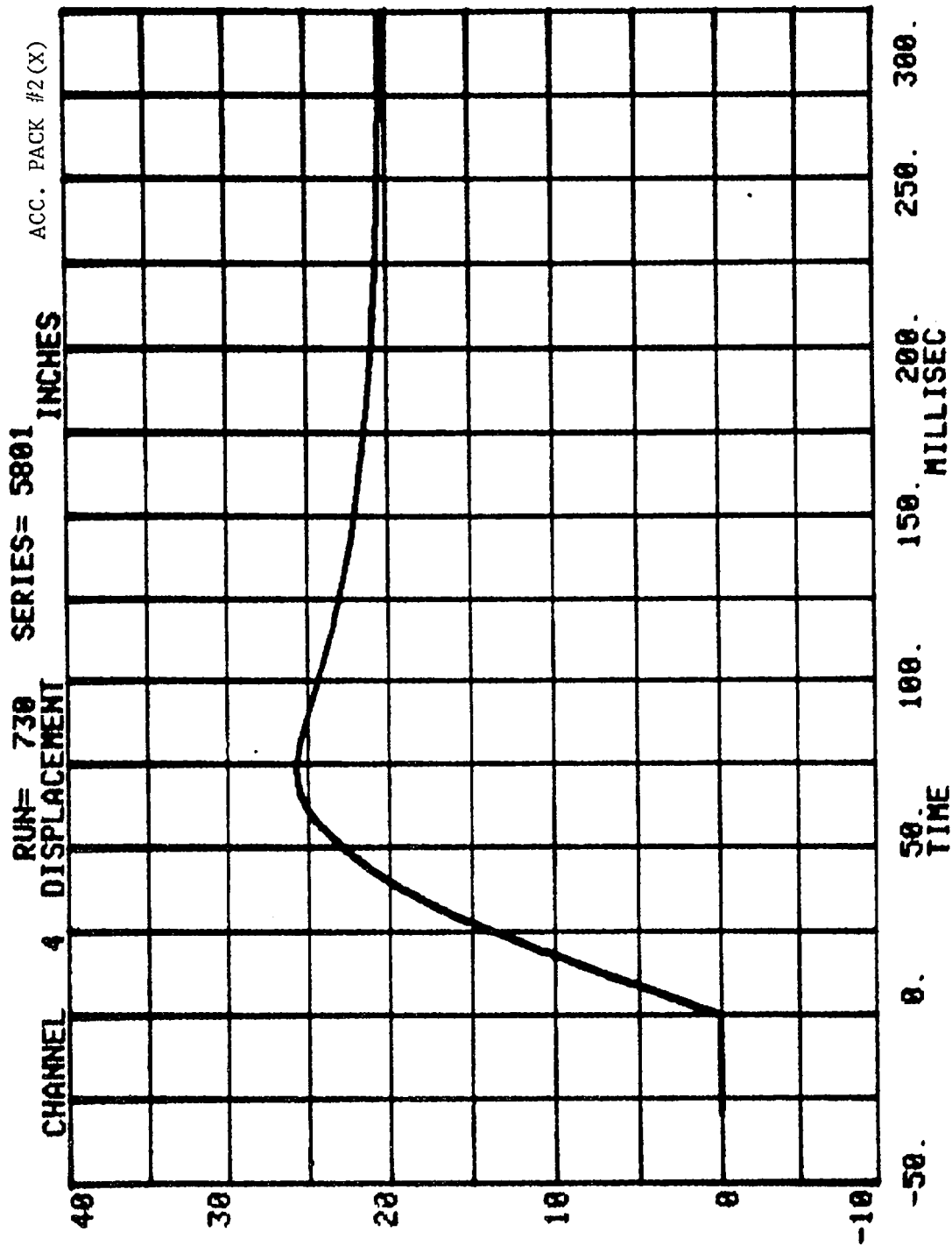




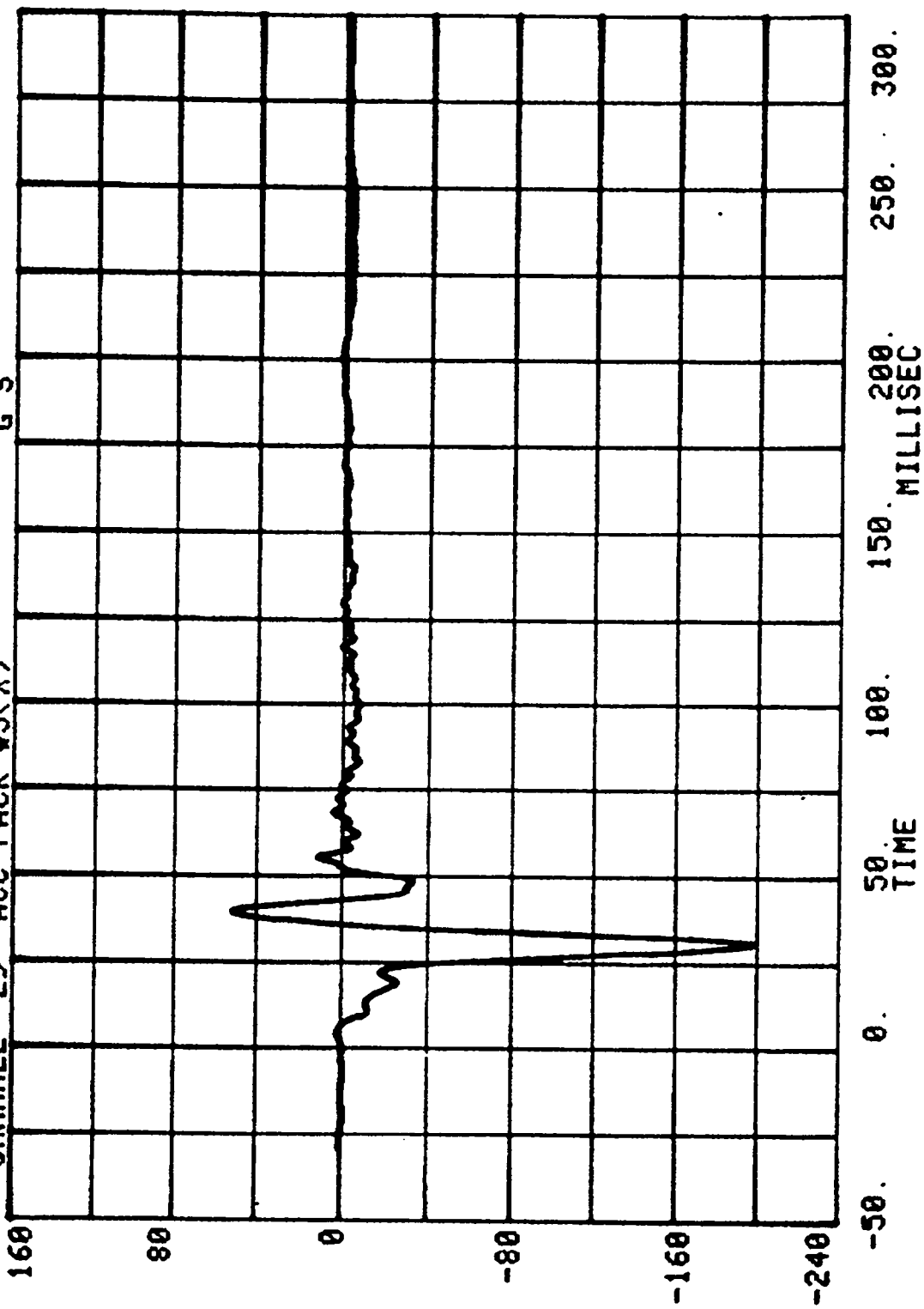
CHANNEL 28 ACC PACK #2(X) RUN= 730 SERIES= 5801 G'S

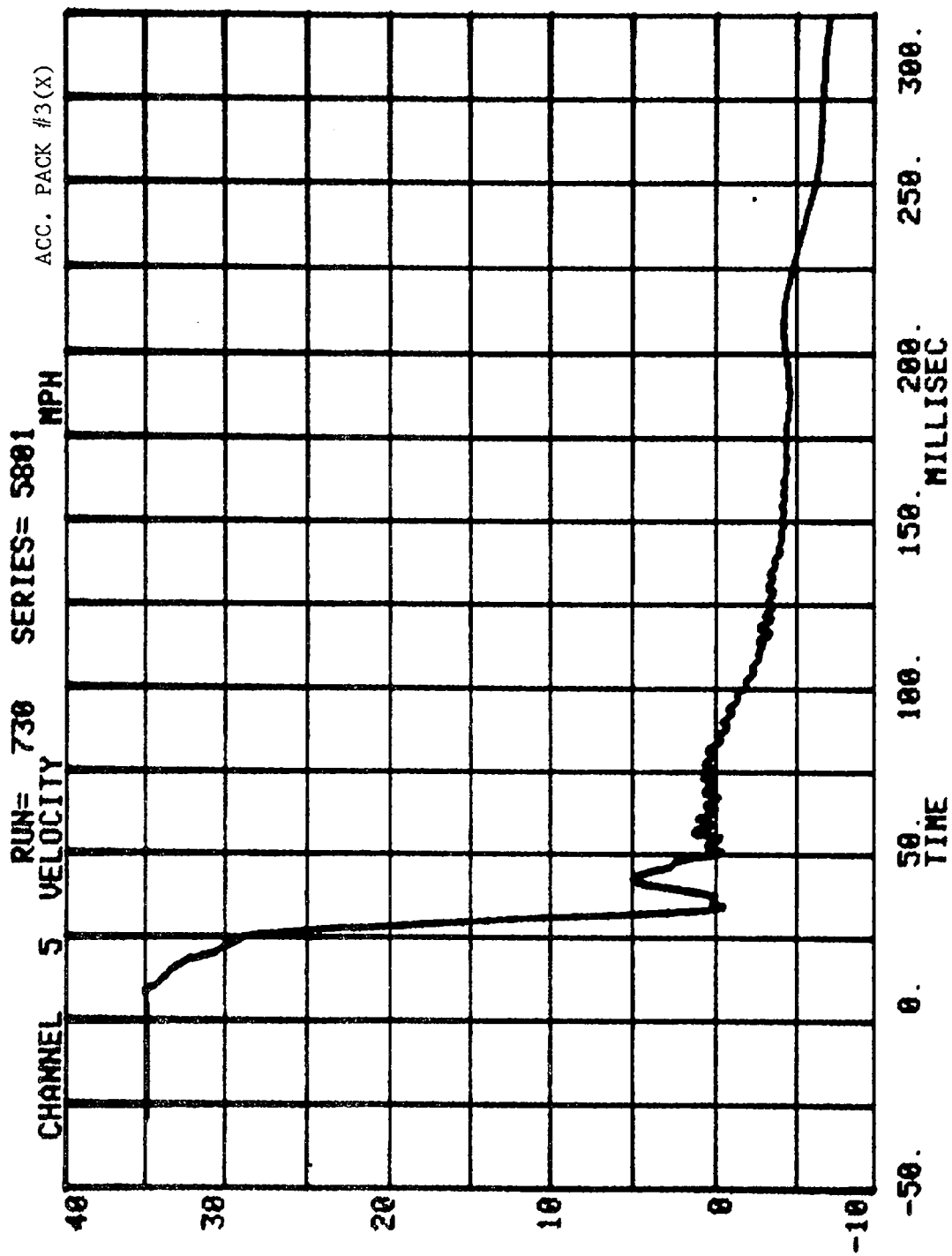


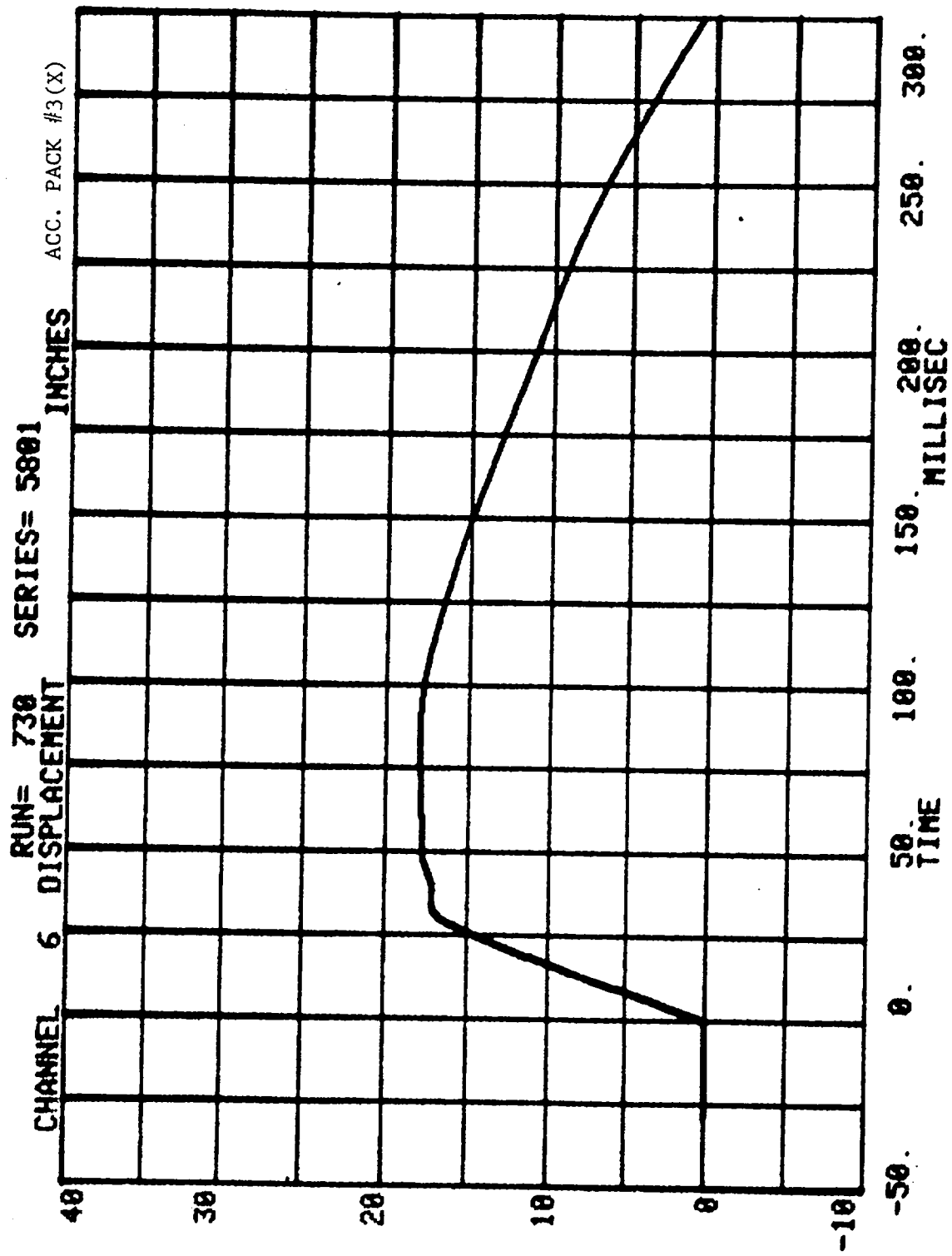


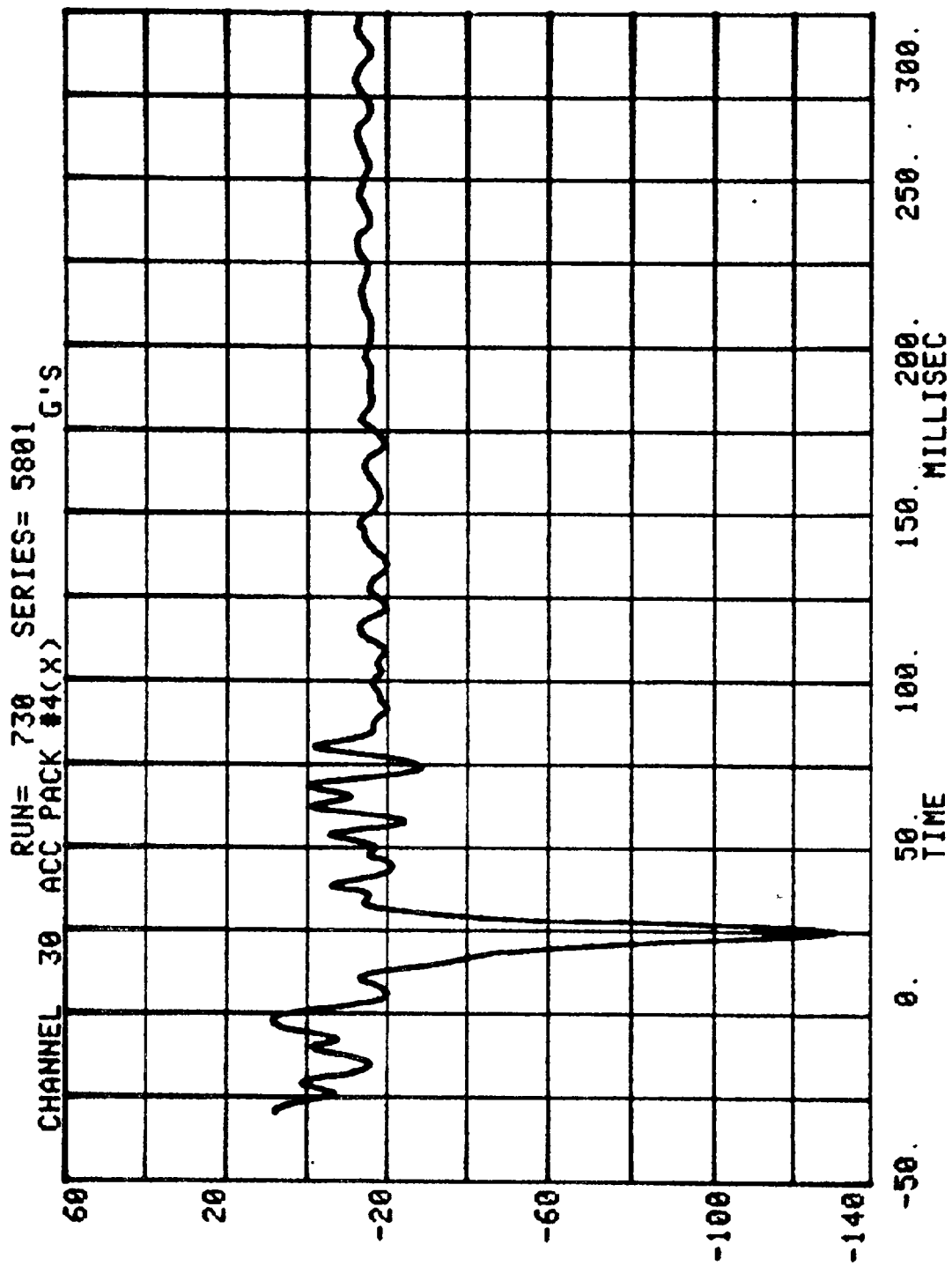


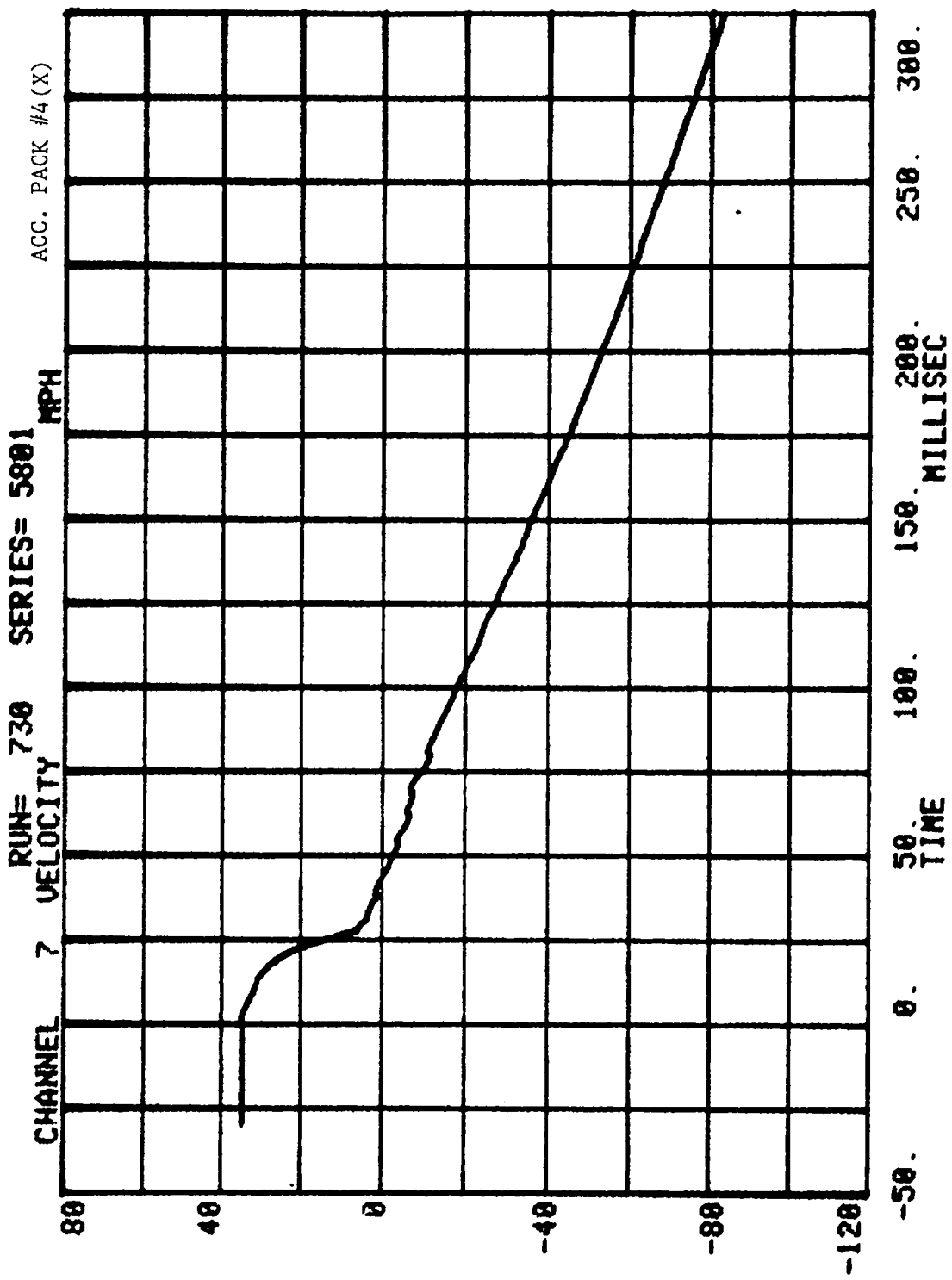
RUN= 730 SERIES= 5801
CHANNEL 29 ACC PACK #3(X) G'S

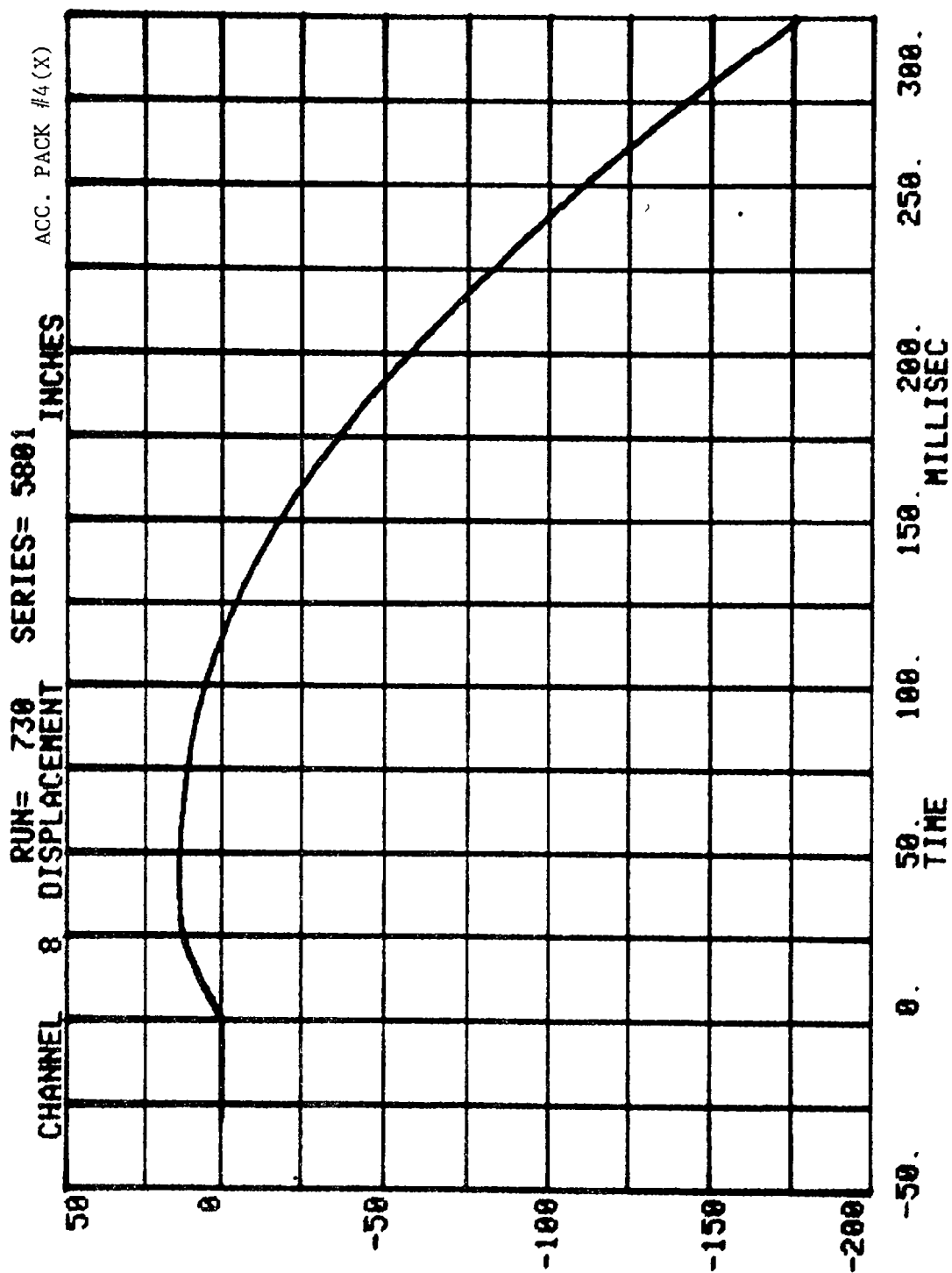


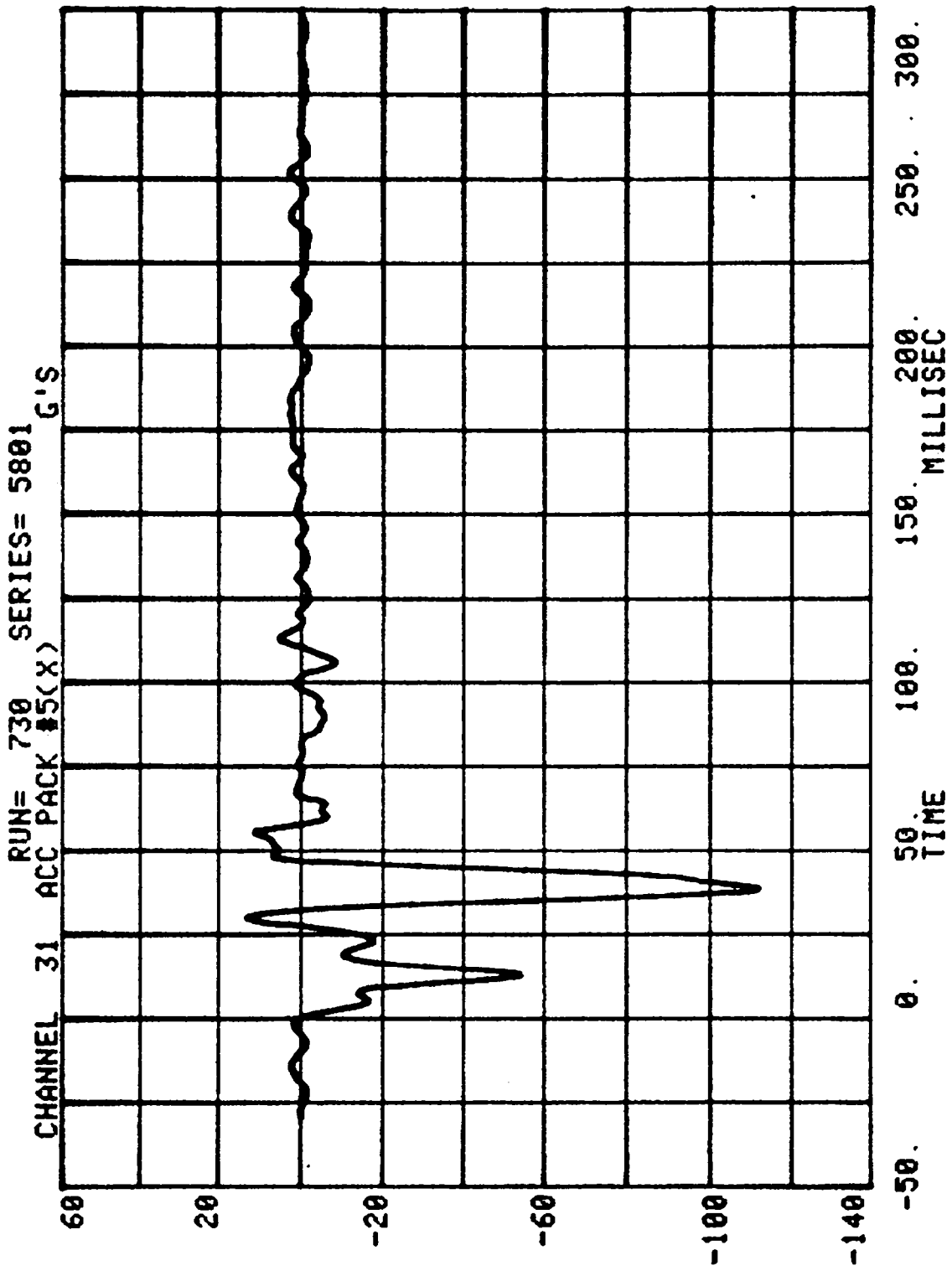


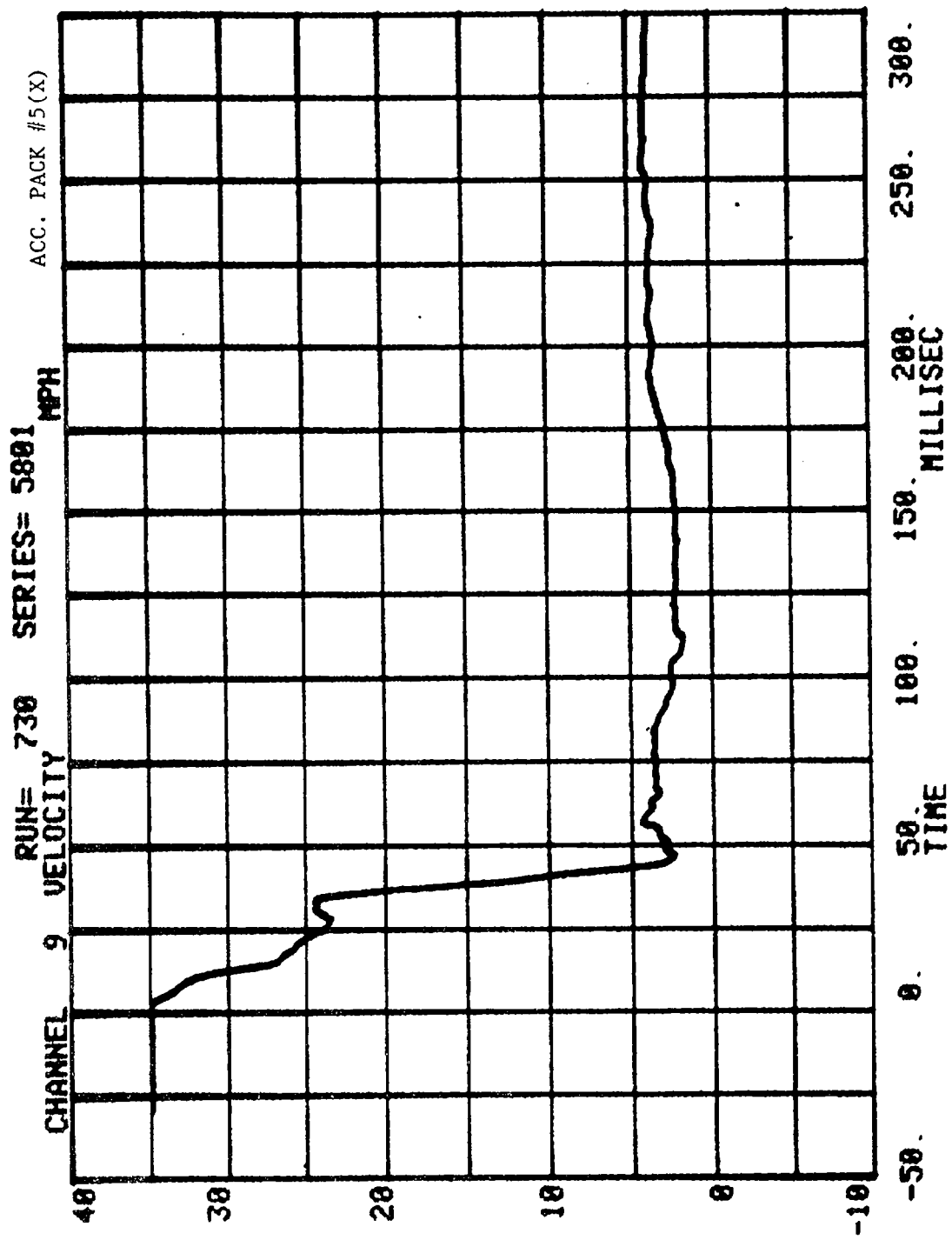


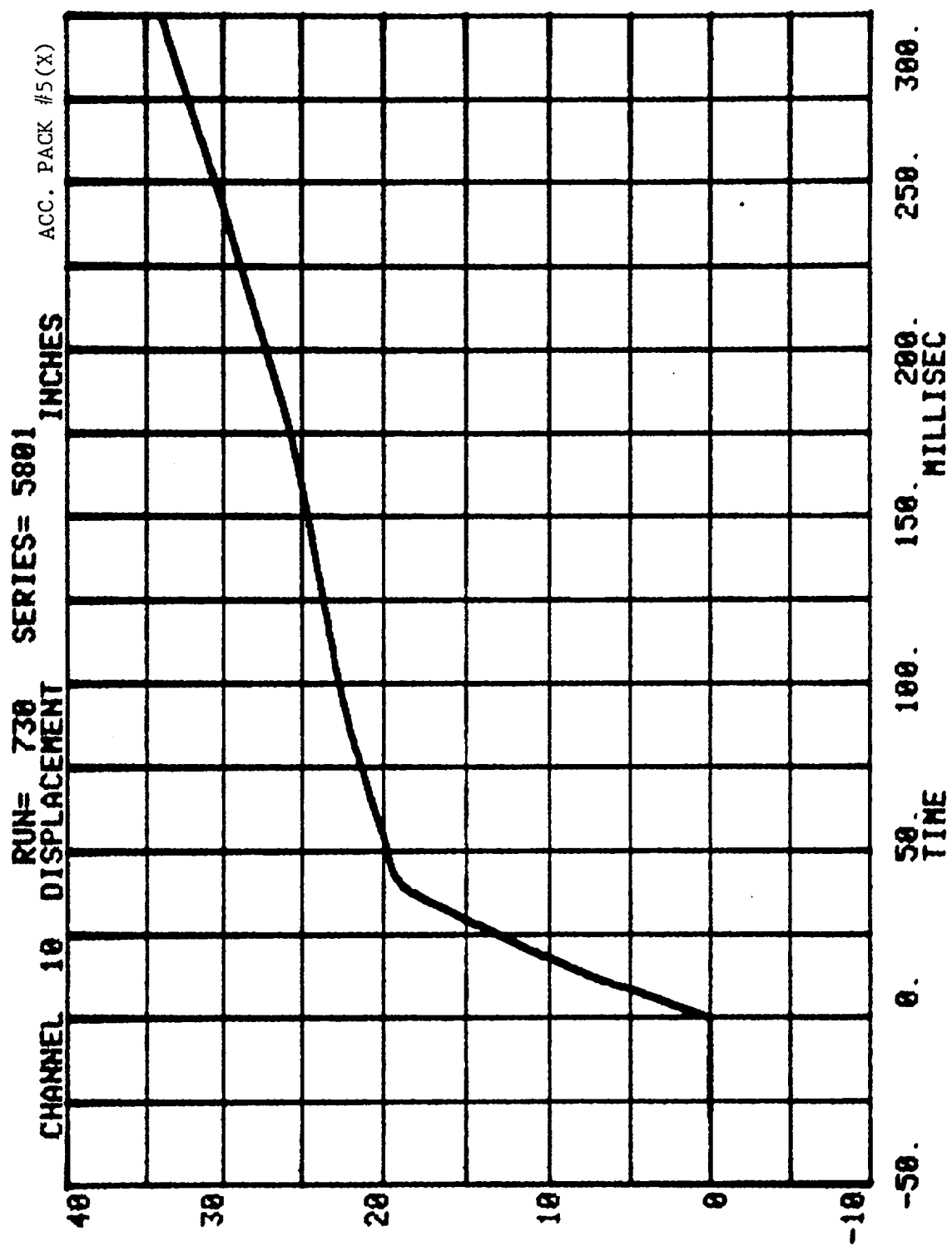


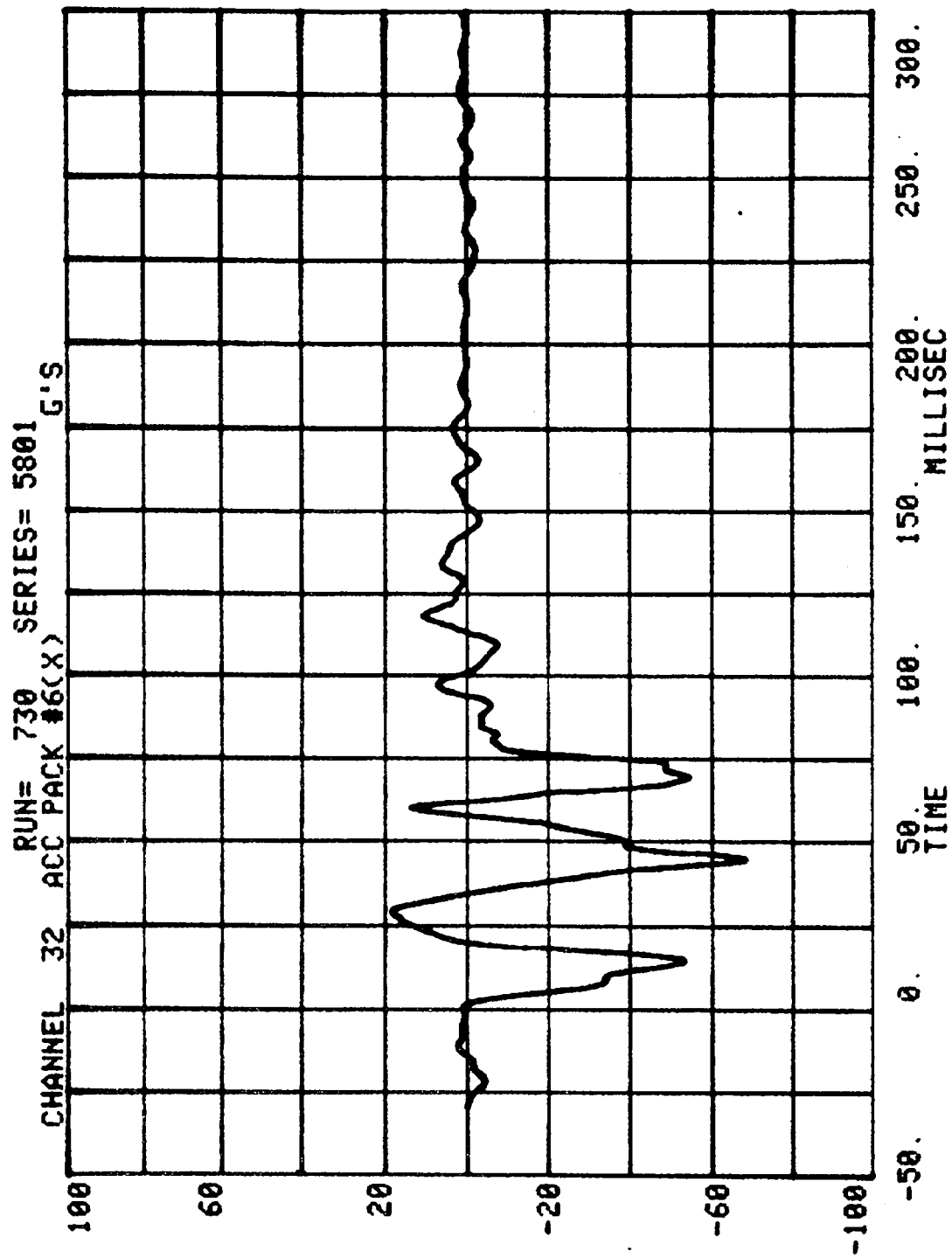


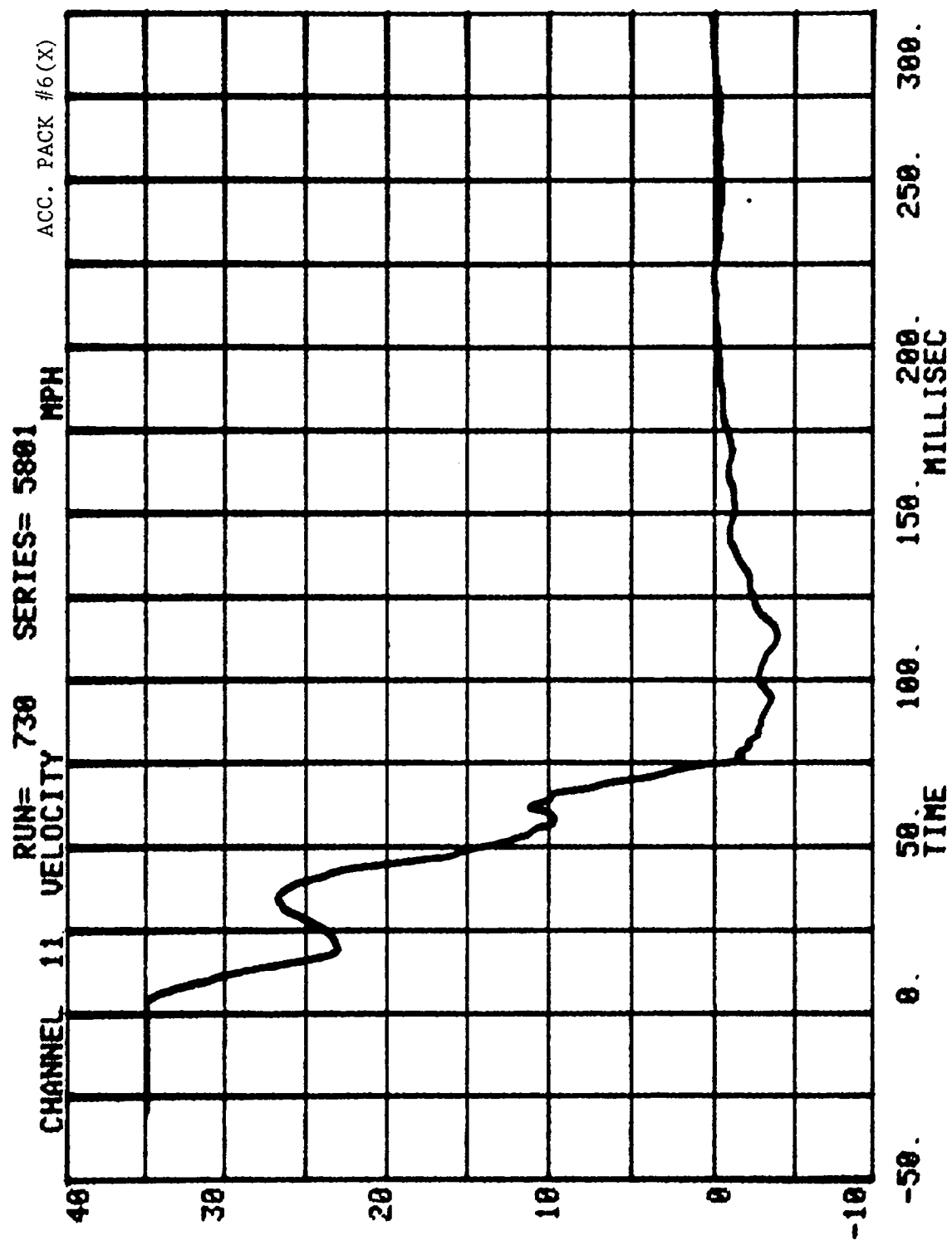


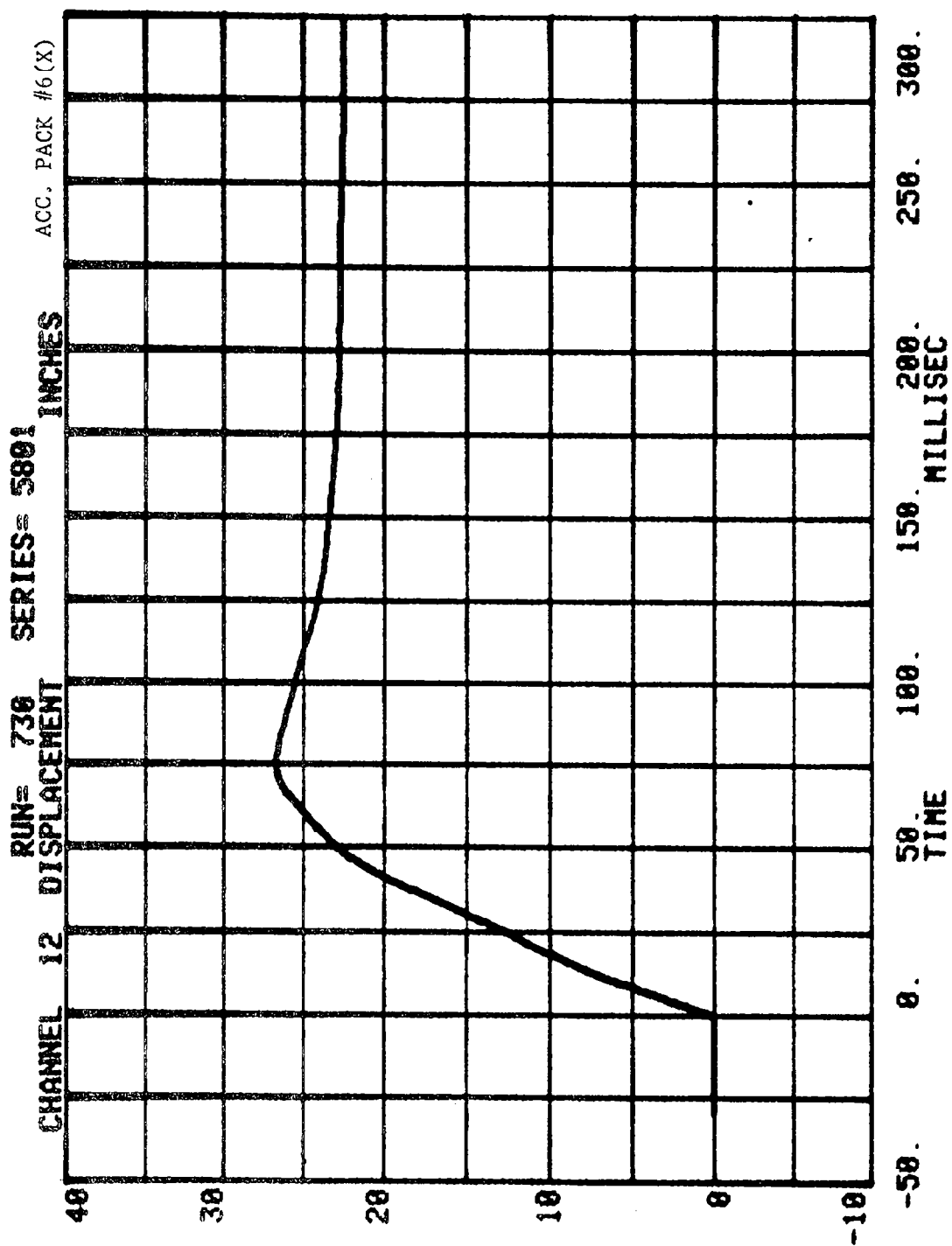




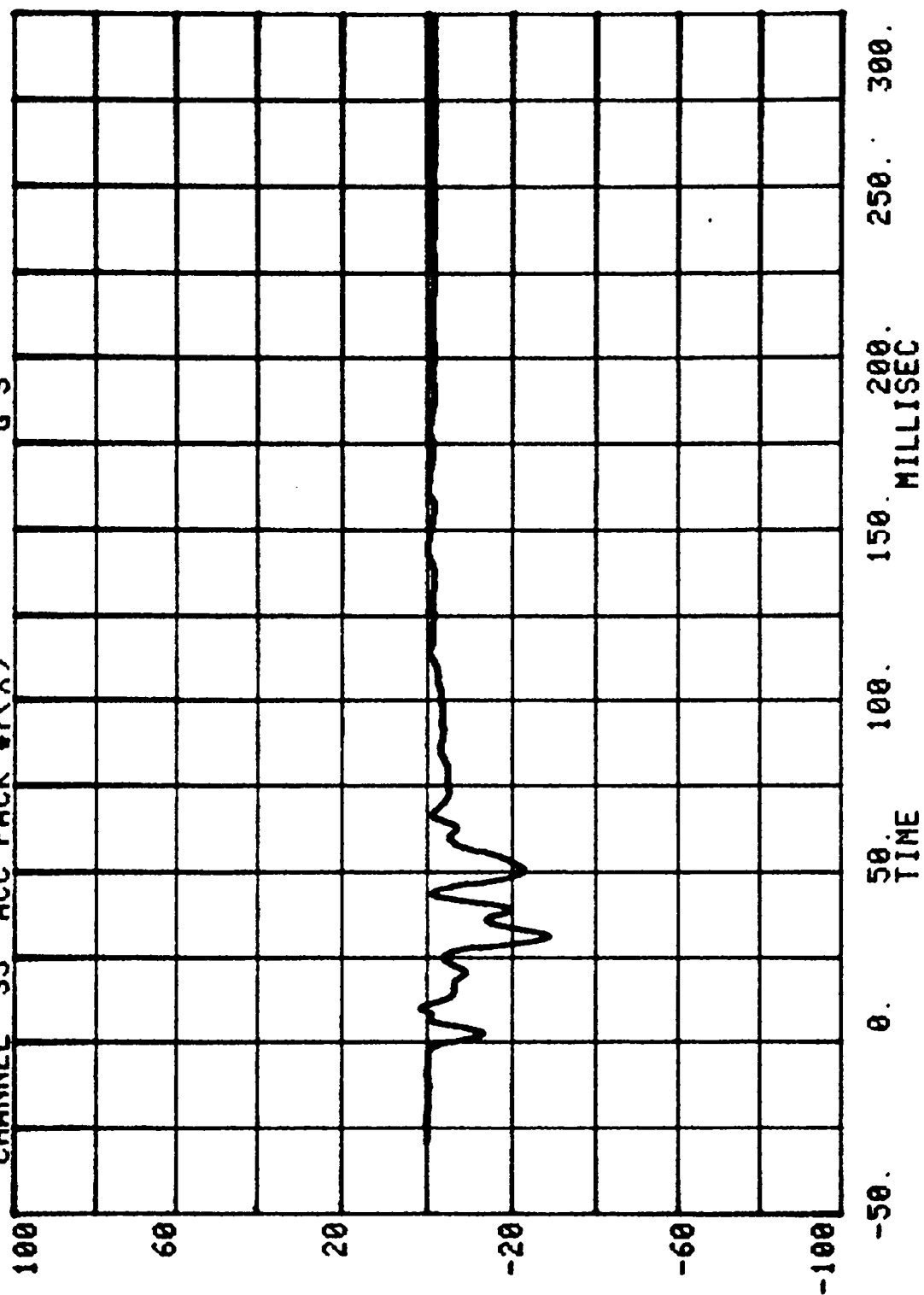


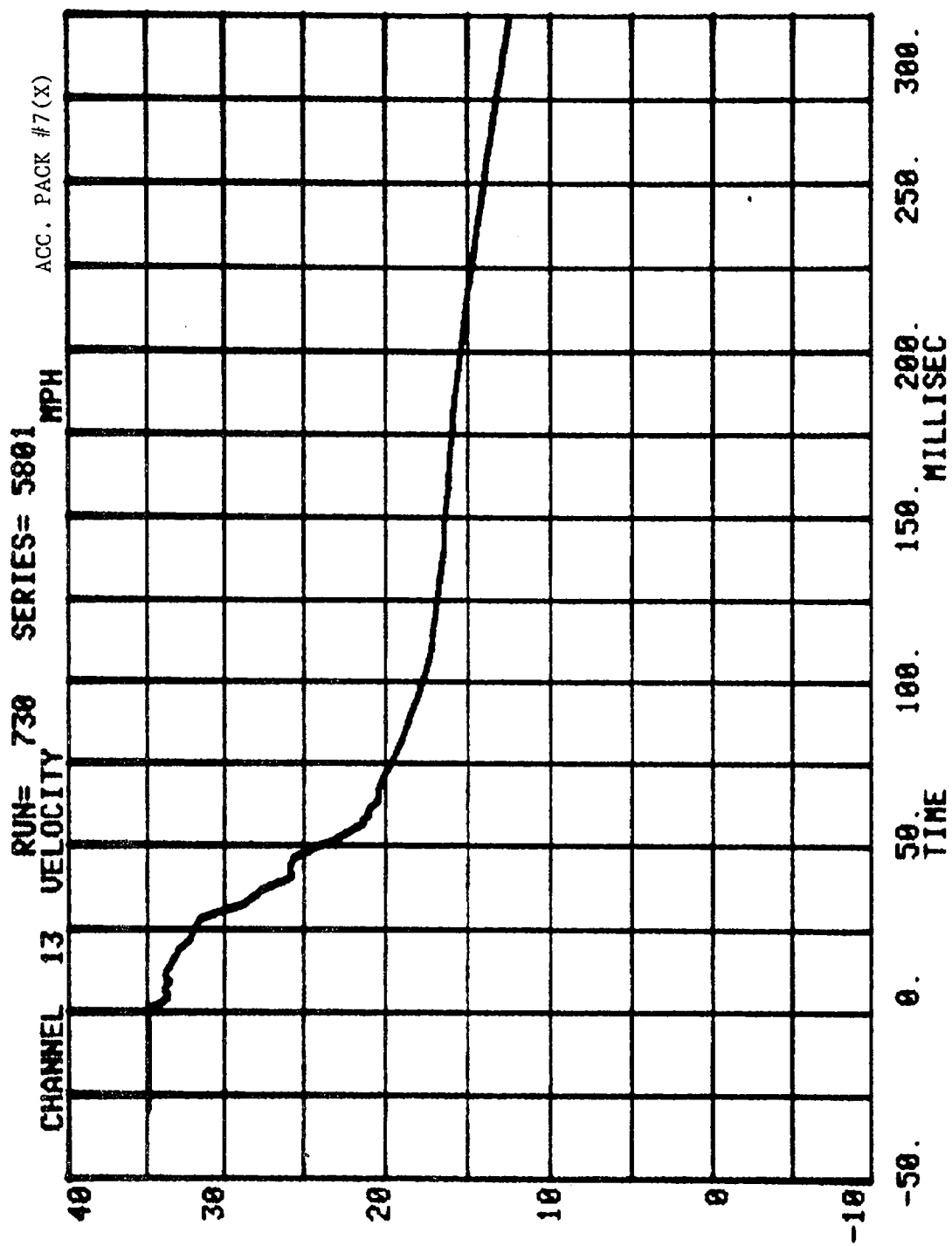


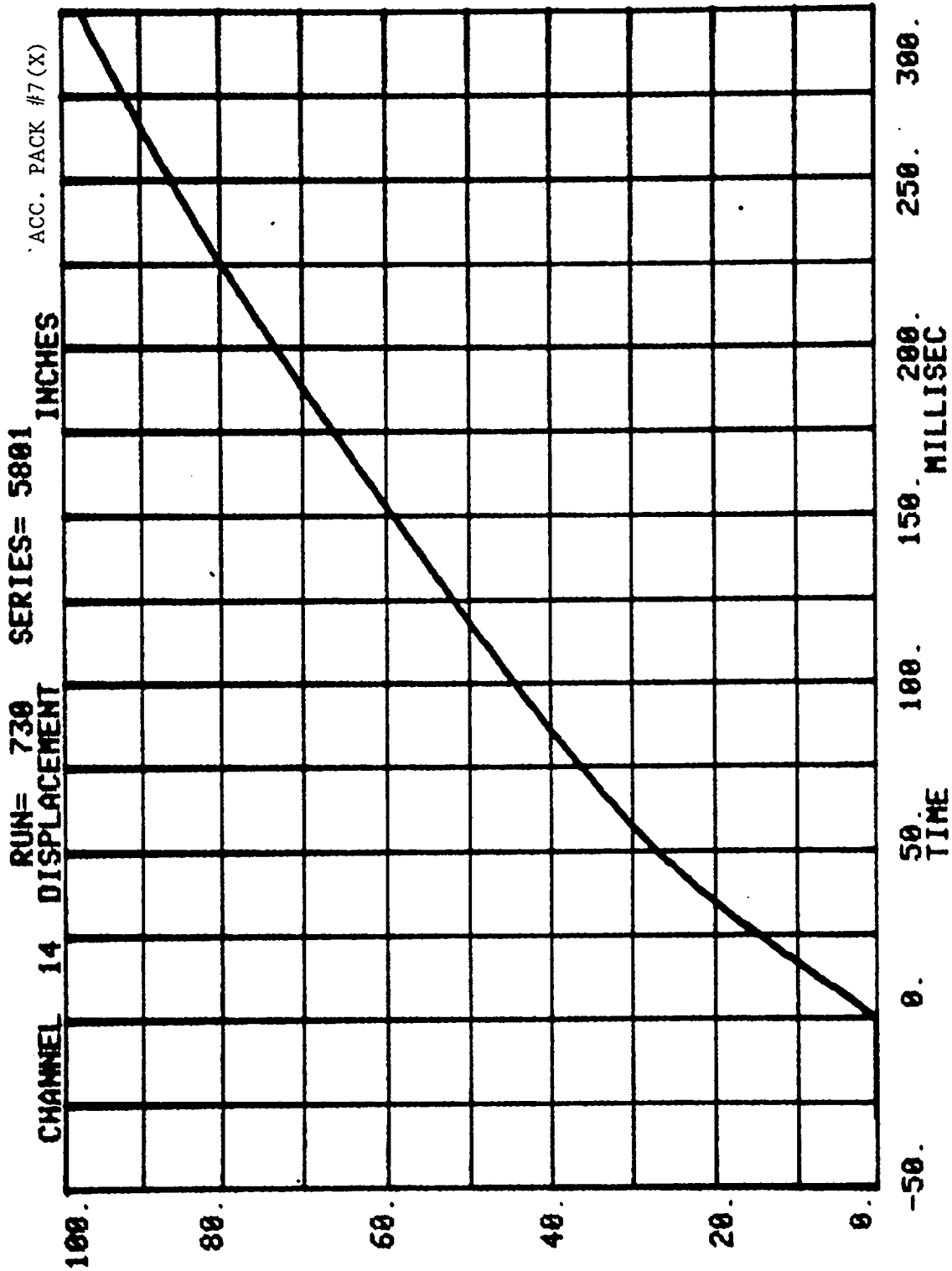




CHANNEL 33 ACC PACK #7(X) RUN= 730 SERIES= 5801 G'S







TEST NO. MG5801

LOAD CELL BARRIER DATA

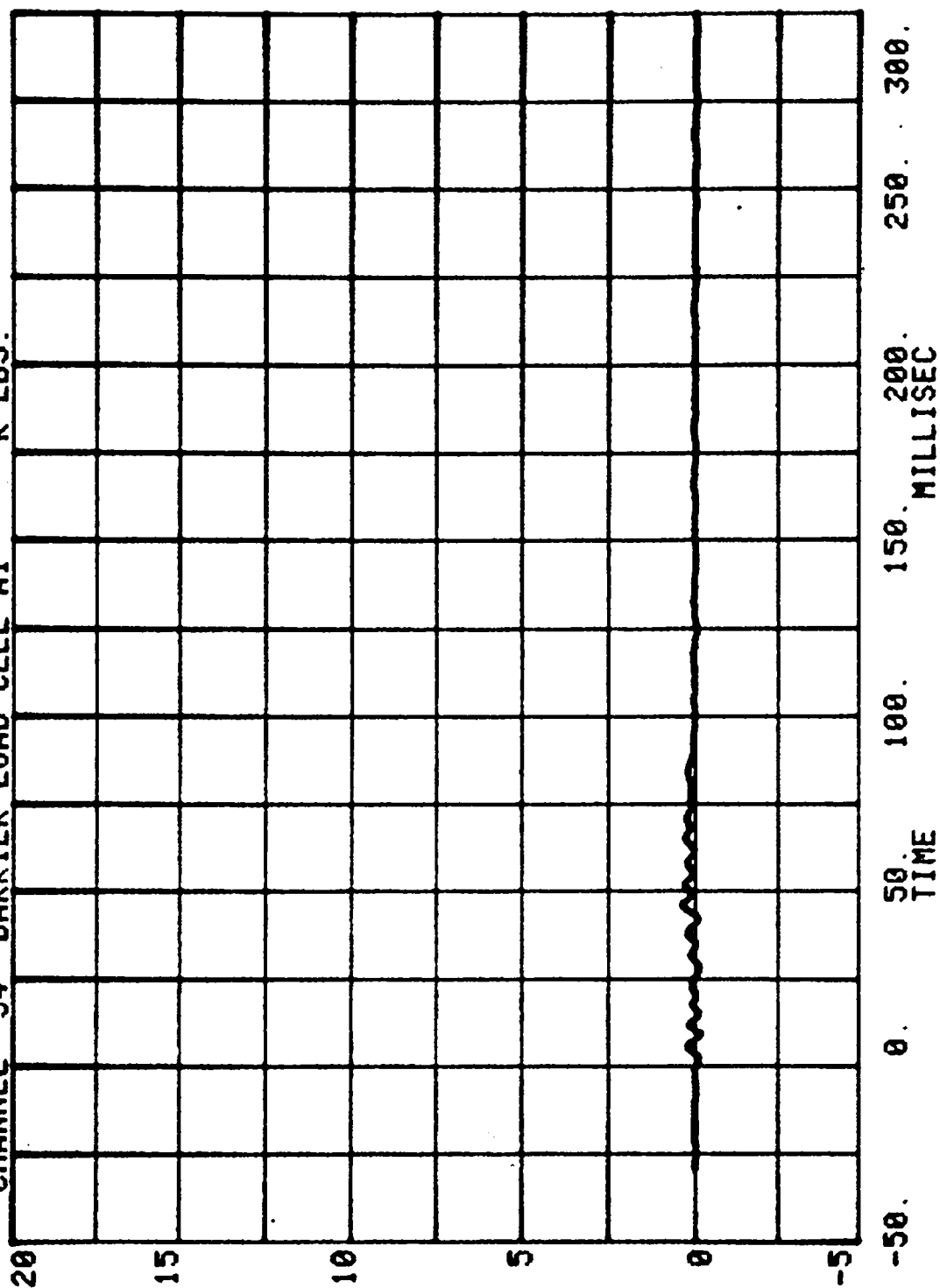
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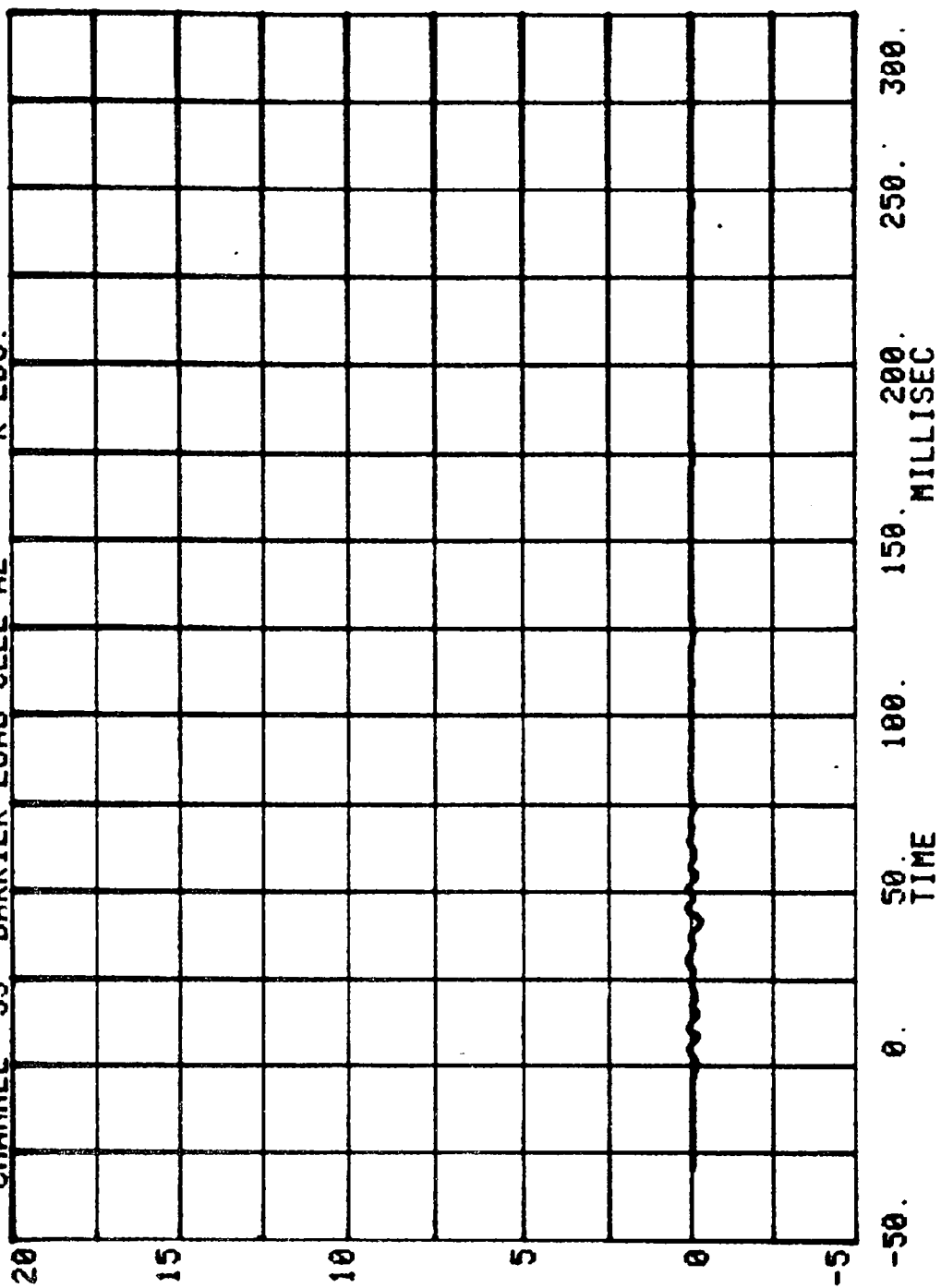
B-24

7457-18

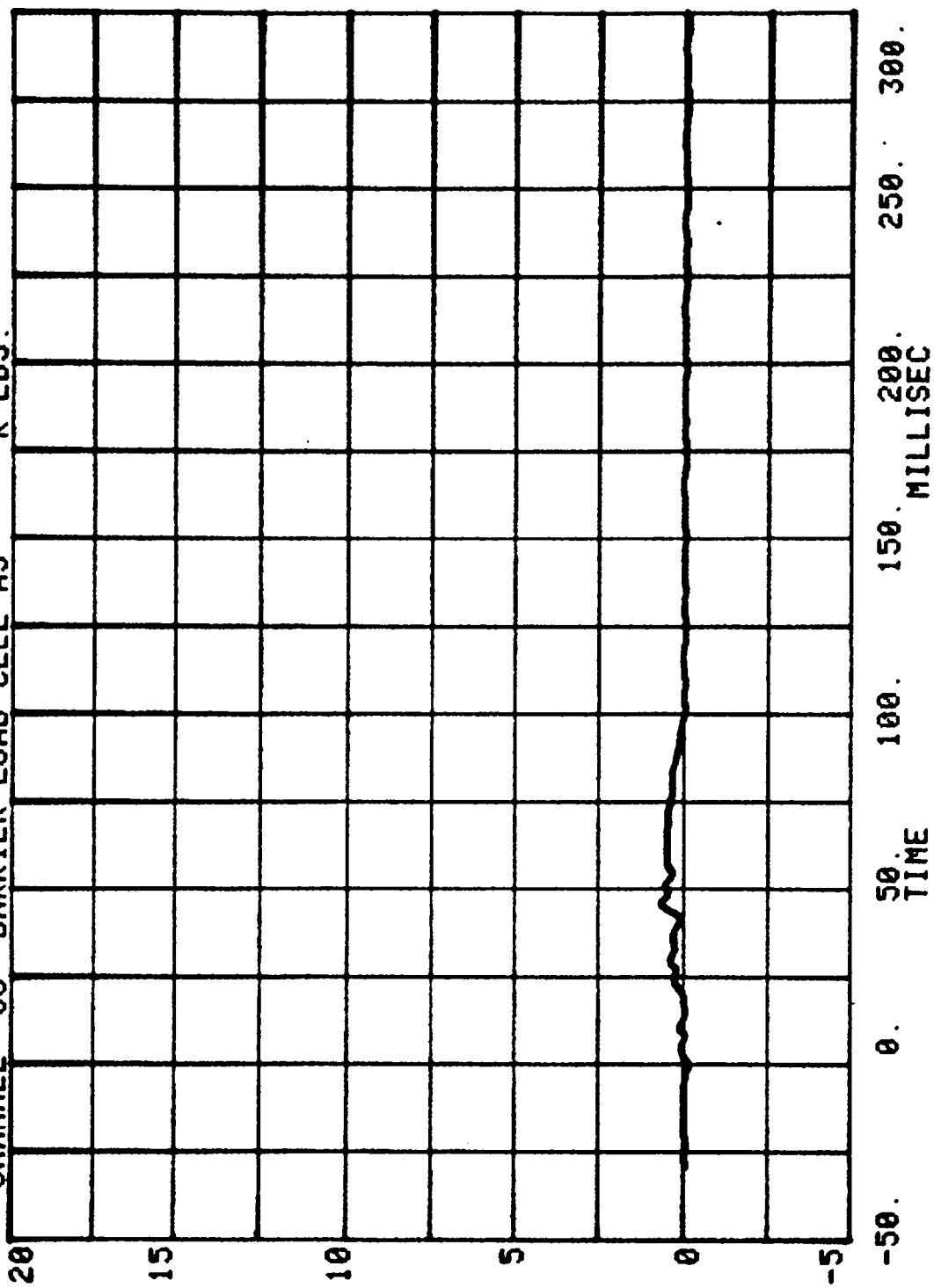
CHANNEL 34 BARRIER LOAD CELL A1 RUN= 730 SERIES= 5801 K LBS.



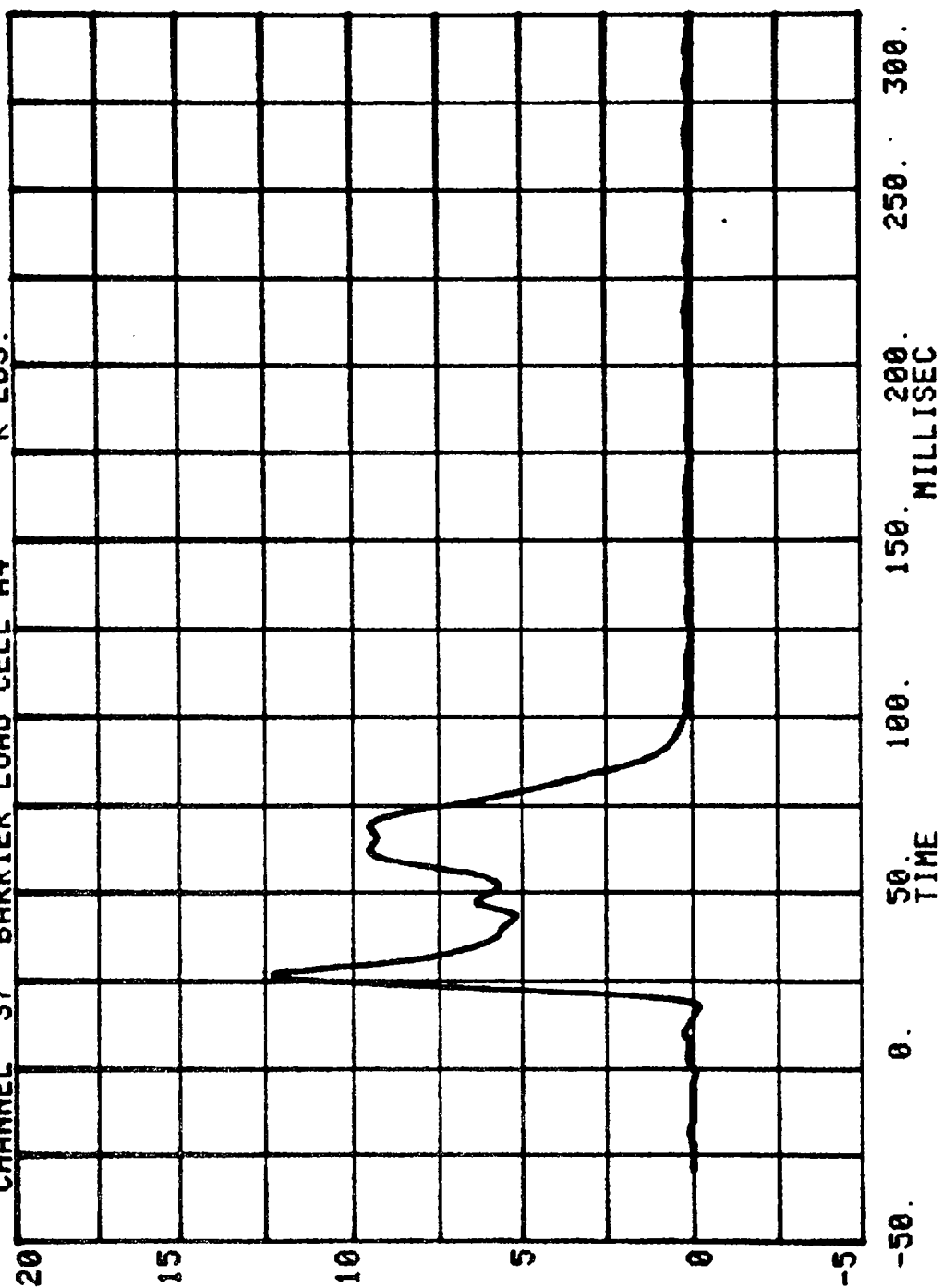
CHANNEL 35 BARRIER LOAD CELL A2 RUN= 730 SERIES= 5801 K LBS.



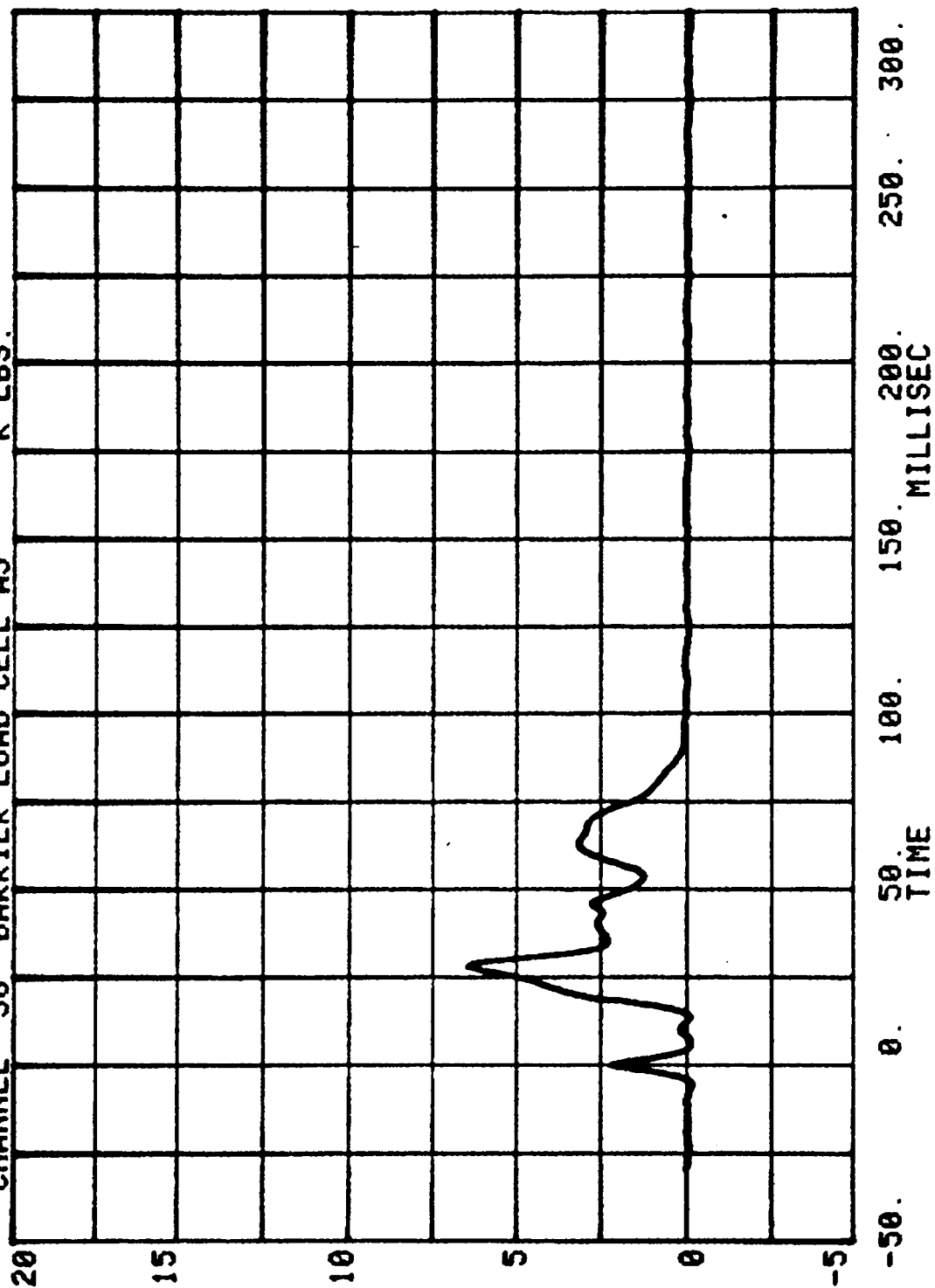
CHANNEL 36 BARRIER LOAD CELL A3 RUN= 730 SERIES= 5801 K LBS.



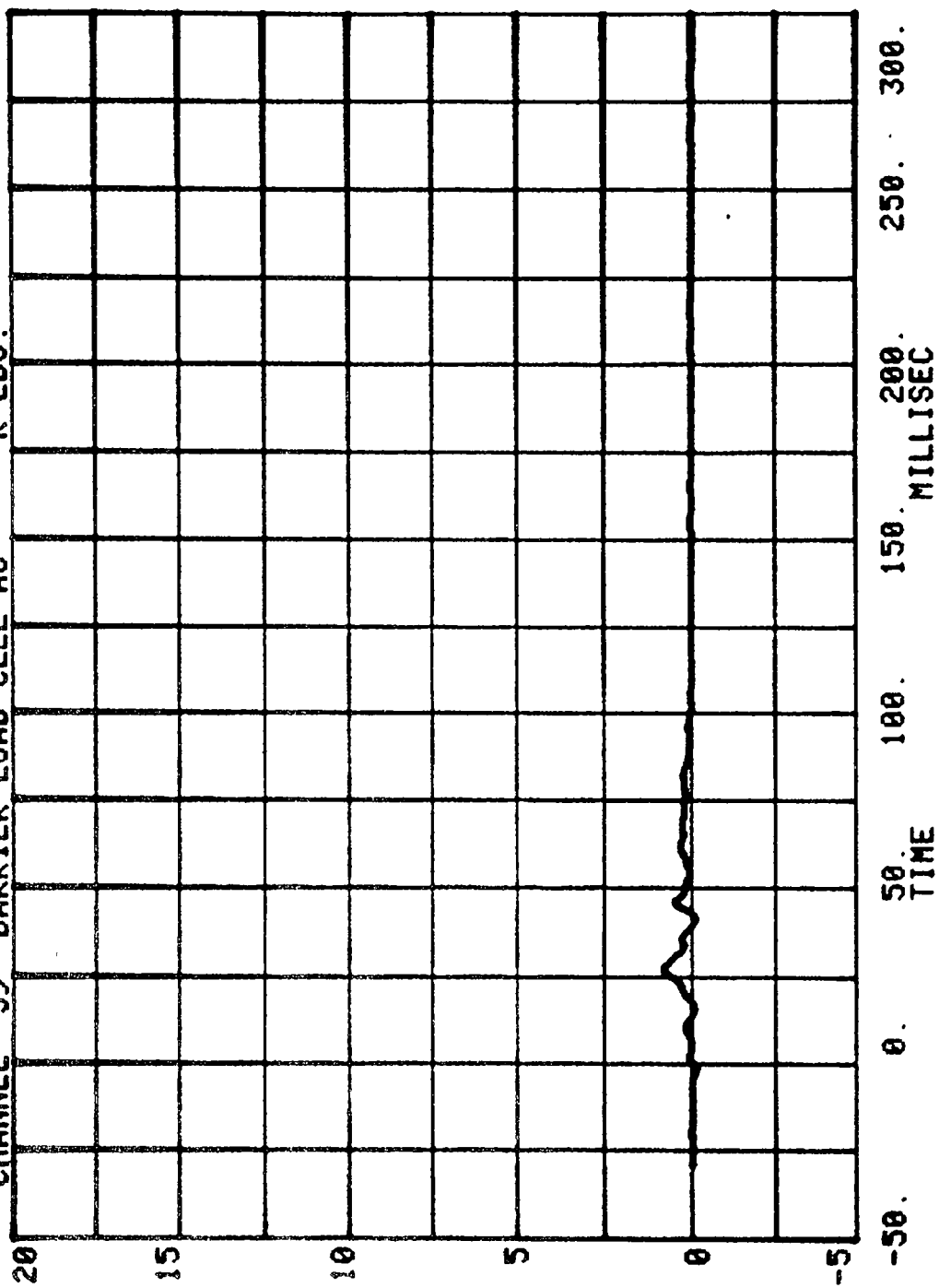
CHANNEL 37 BARRIER LOAD CELL A4 RUN= 730 SERIES= 5801 K LBS.



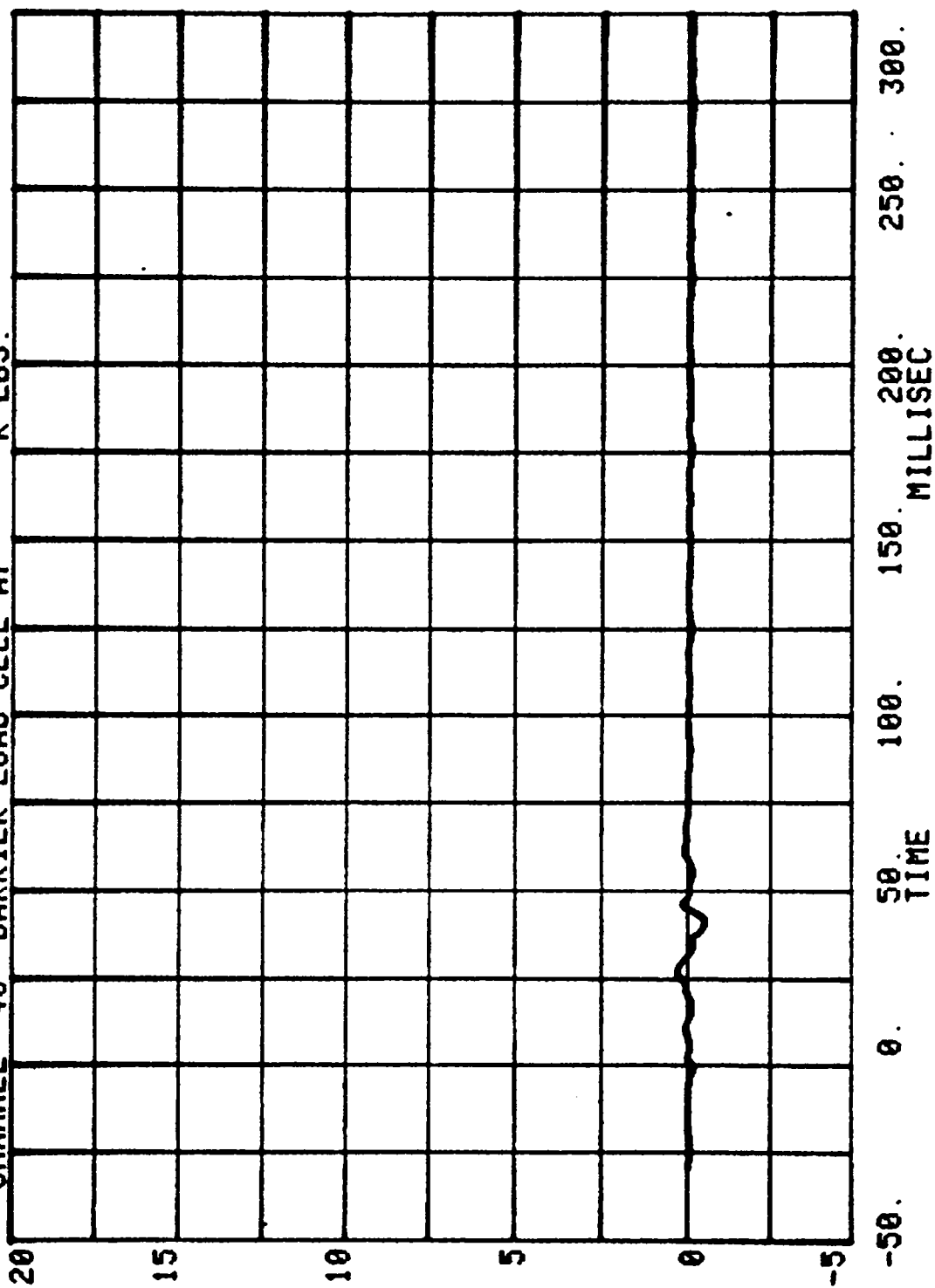
CHANNEL 38 BARRIER LOAD CELL A5
RUN= 730 SERIES= 5801 K LBS.

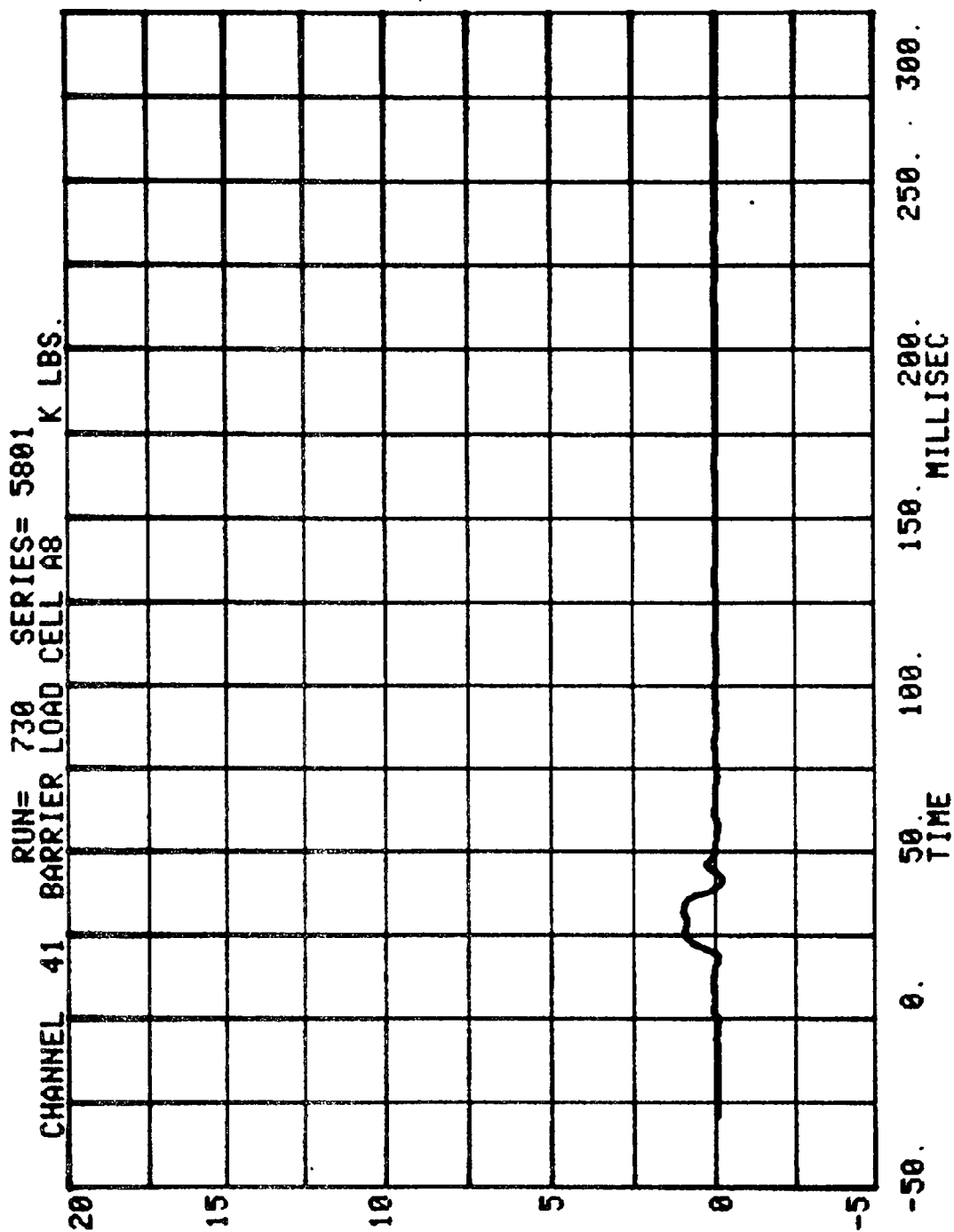


CHANNEL 39 BARRIER LOAD CELL A6 RUN= 730 SERIES= 5801 K LBS.



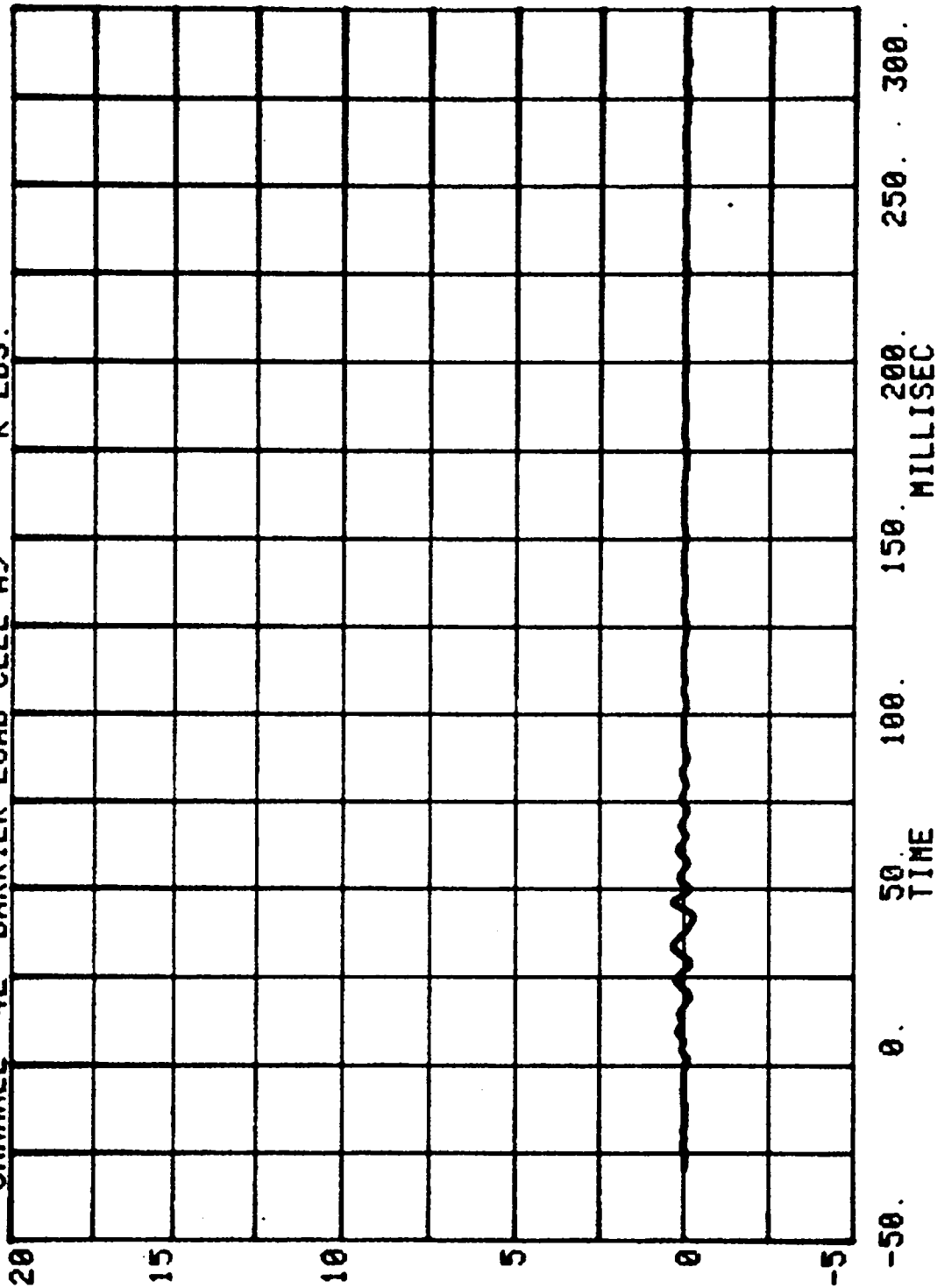
CHANNEL 40 BARRIER LOAD CELL A7 RUN= 730 SERIES= 5801 K LBS.



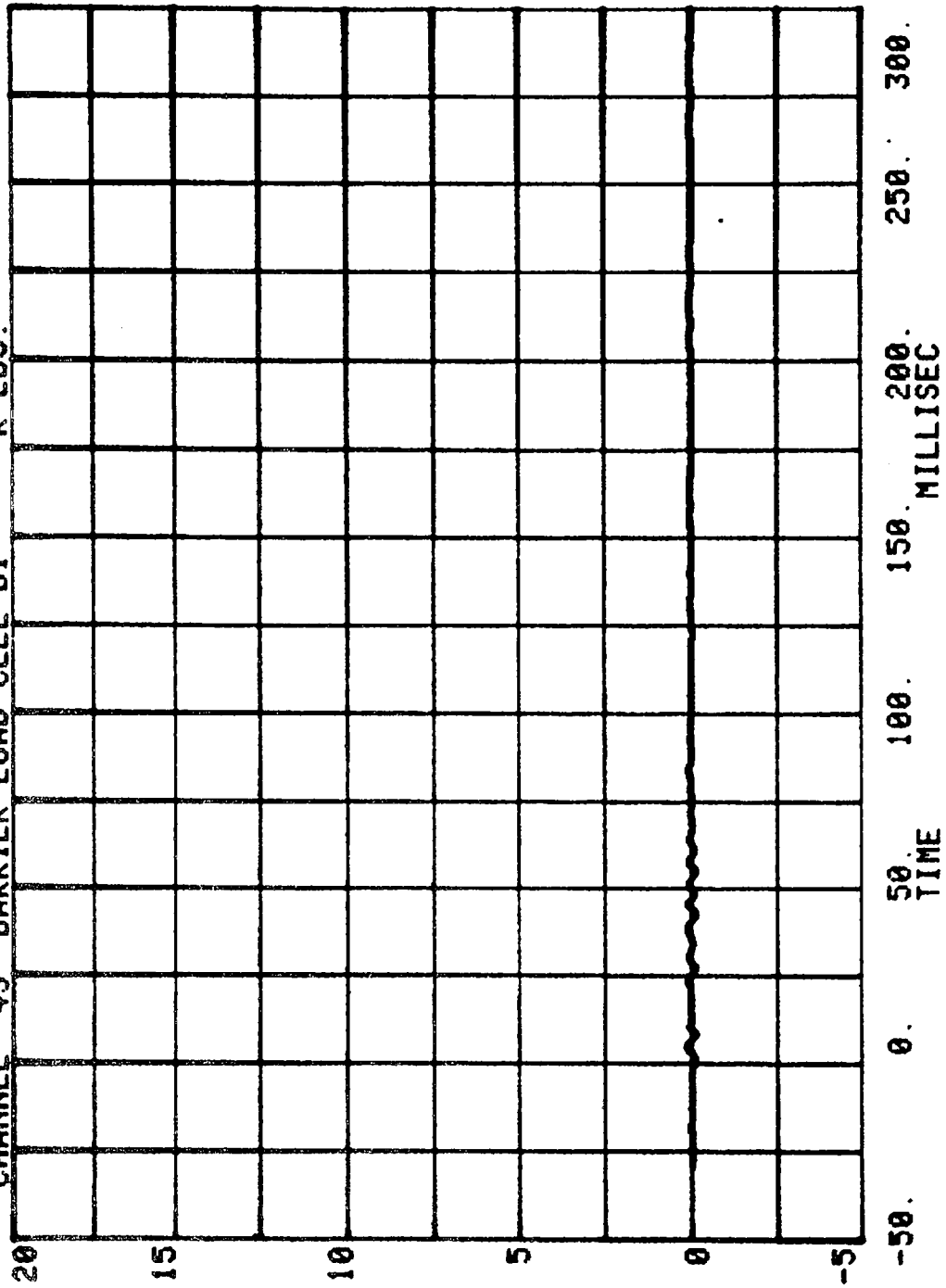


CHANNEL 42 BARRIER LOAD CELL A9 K LBS.

RUN= 730 SERIES= 5801

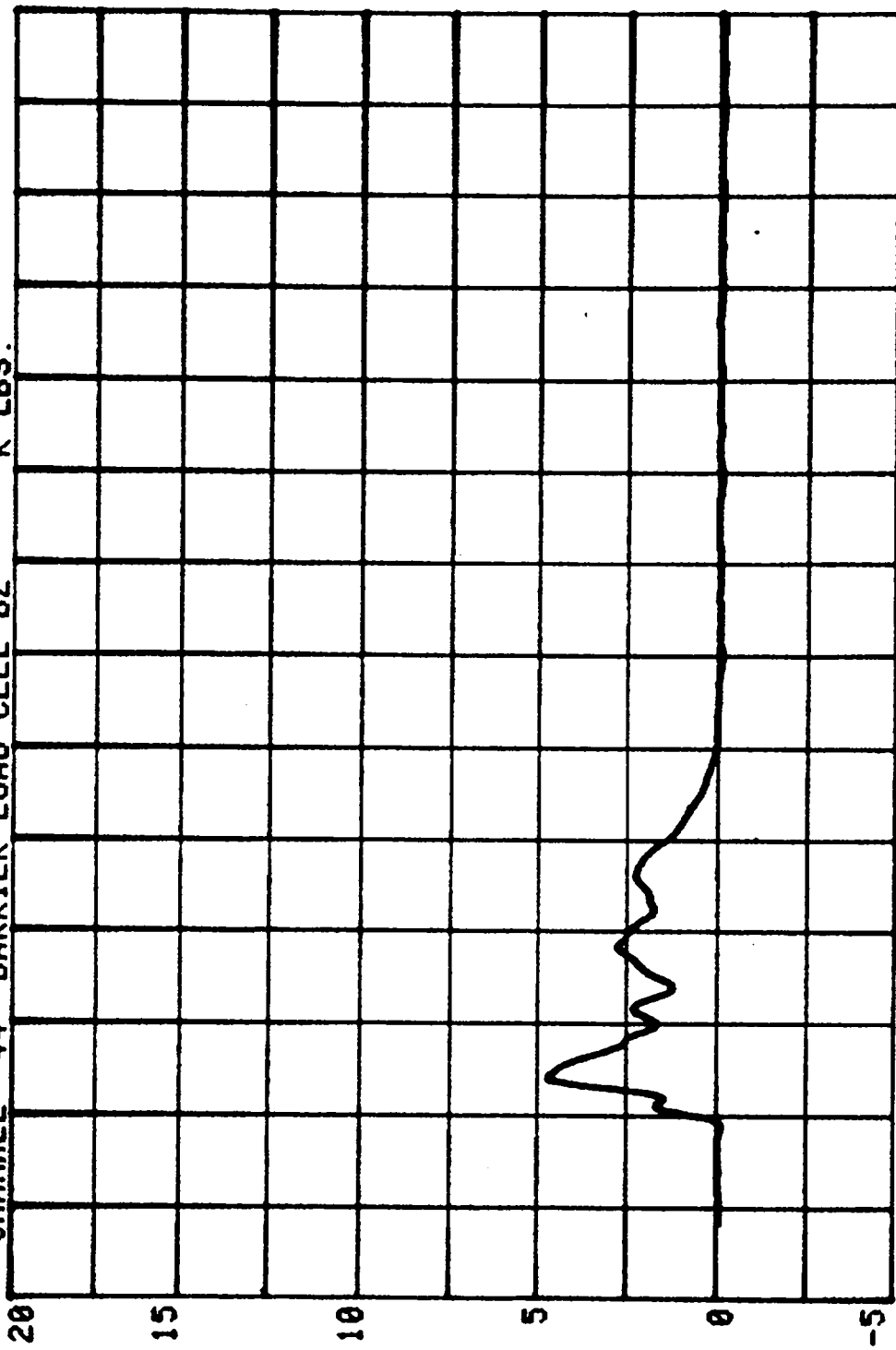


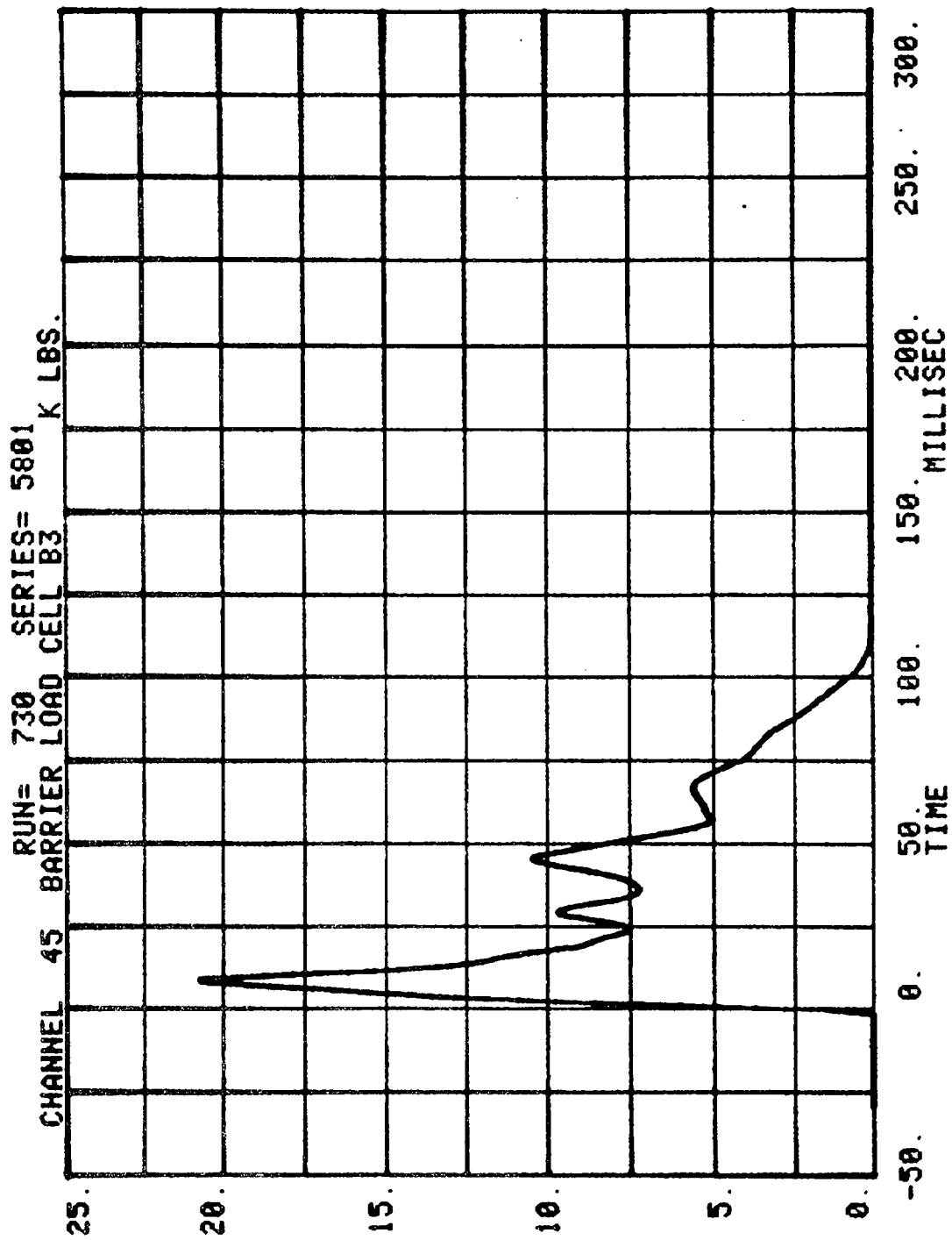
RUN= 730 SERIES= 5801
CHANNEL 43 BARRIER LOAD CELL B1 K LBS.



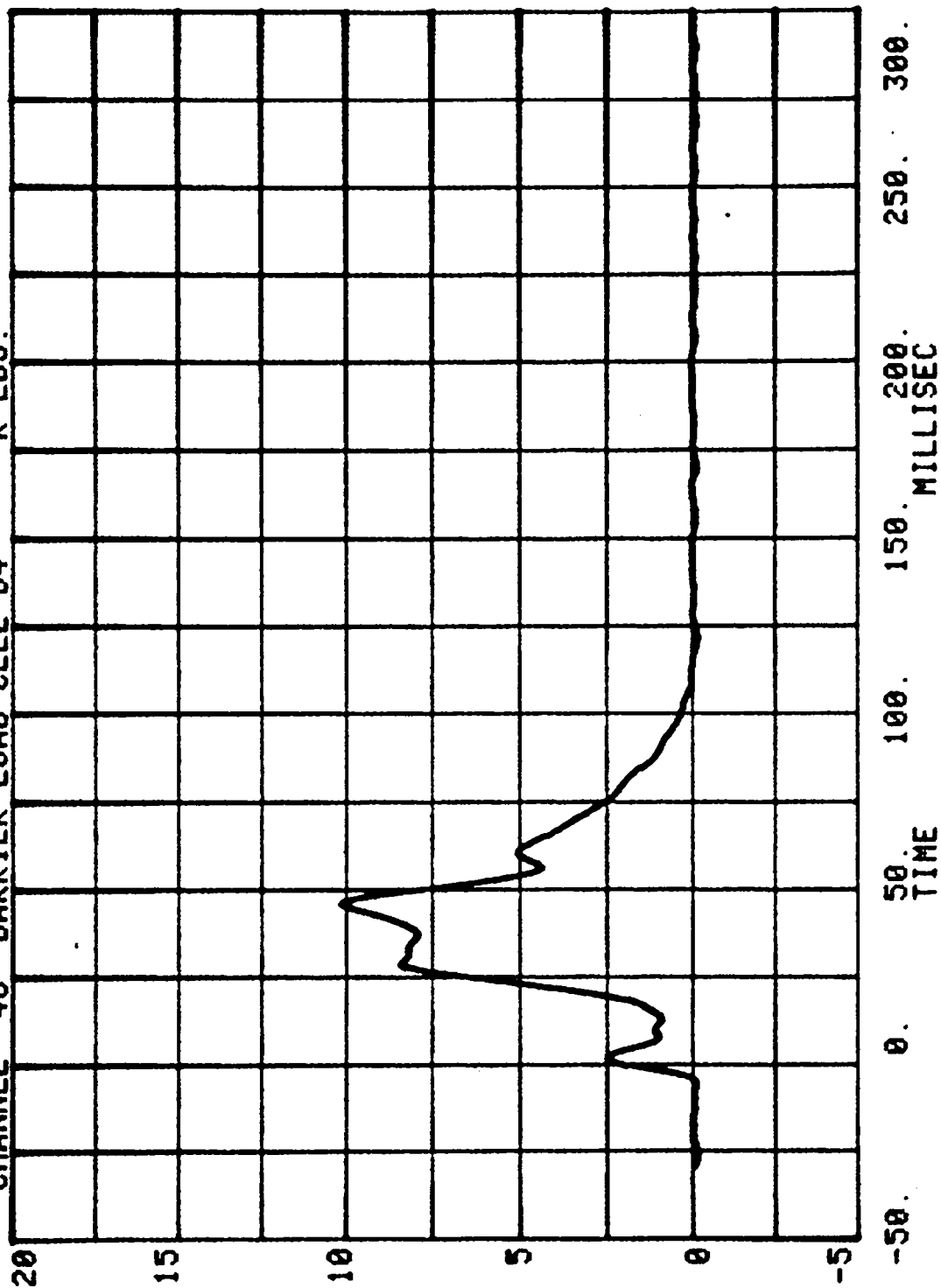
CHANNEL 44 BARRIER LOAD CELL B2 K LBS.

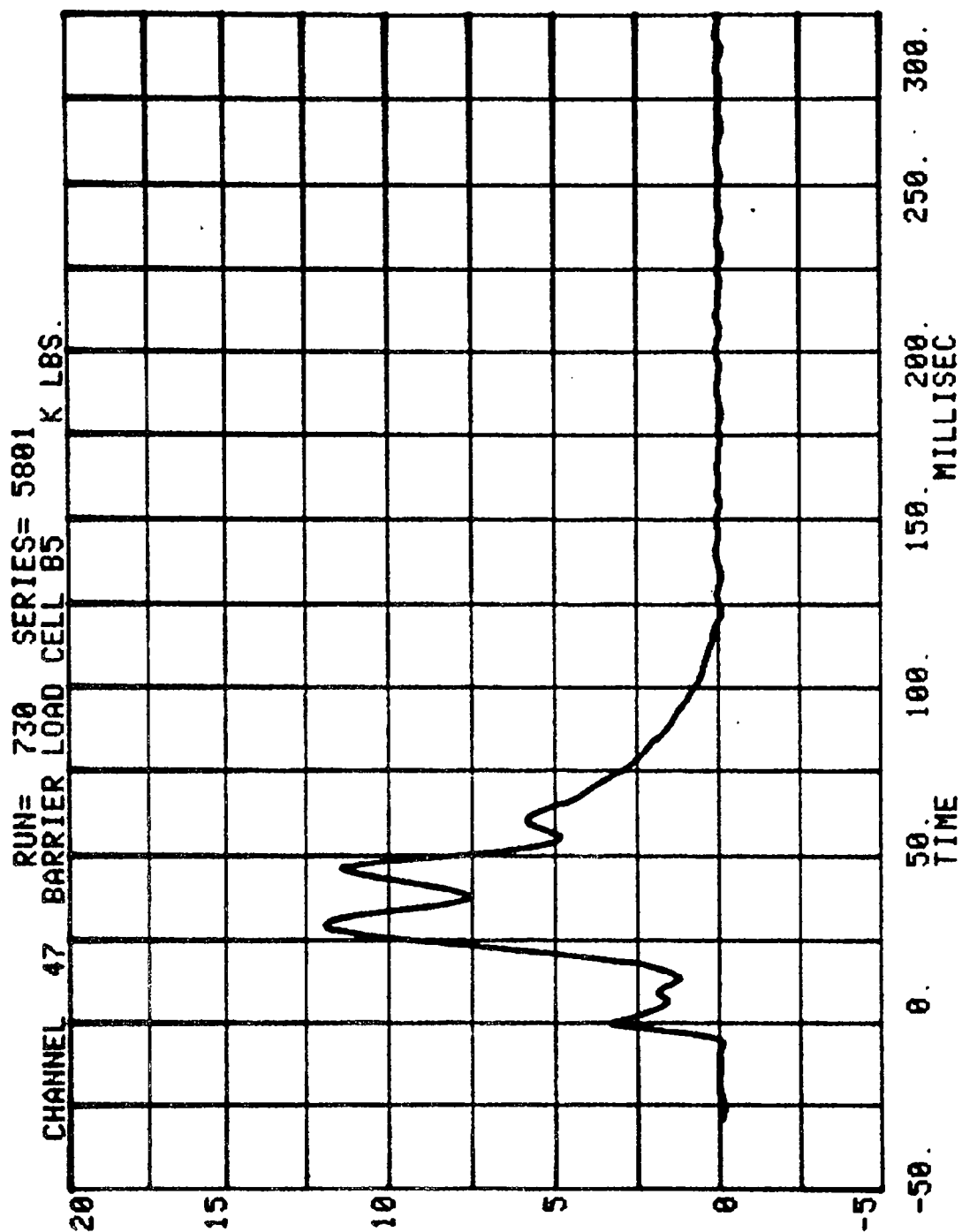
RUN= 730 SERIES= 5801



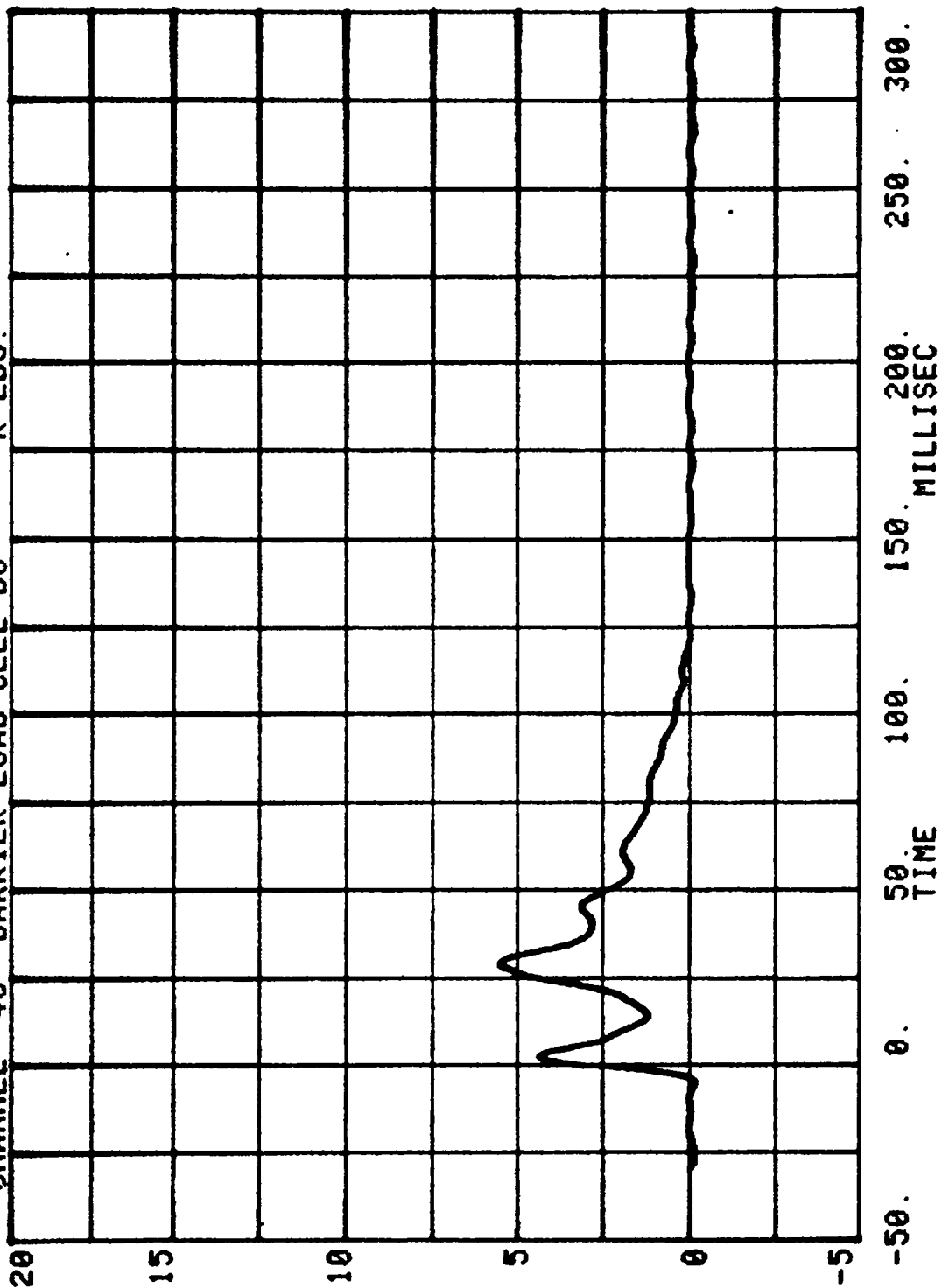


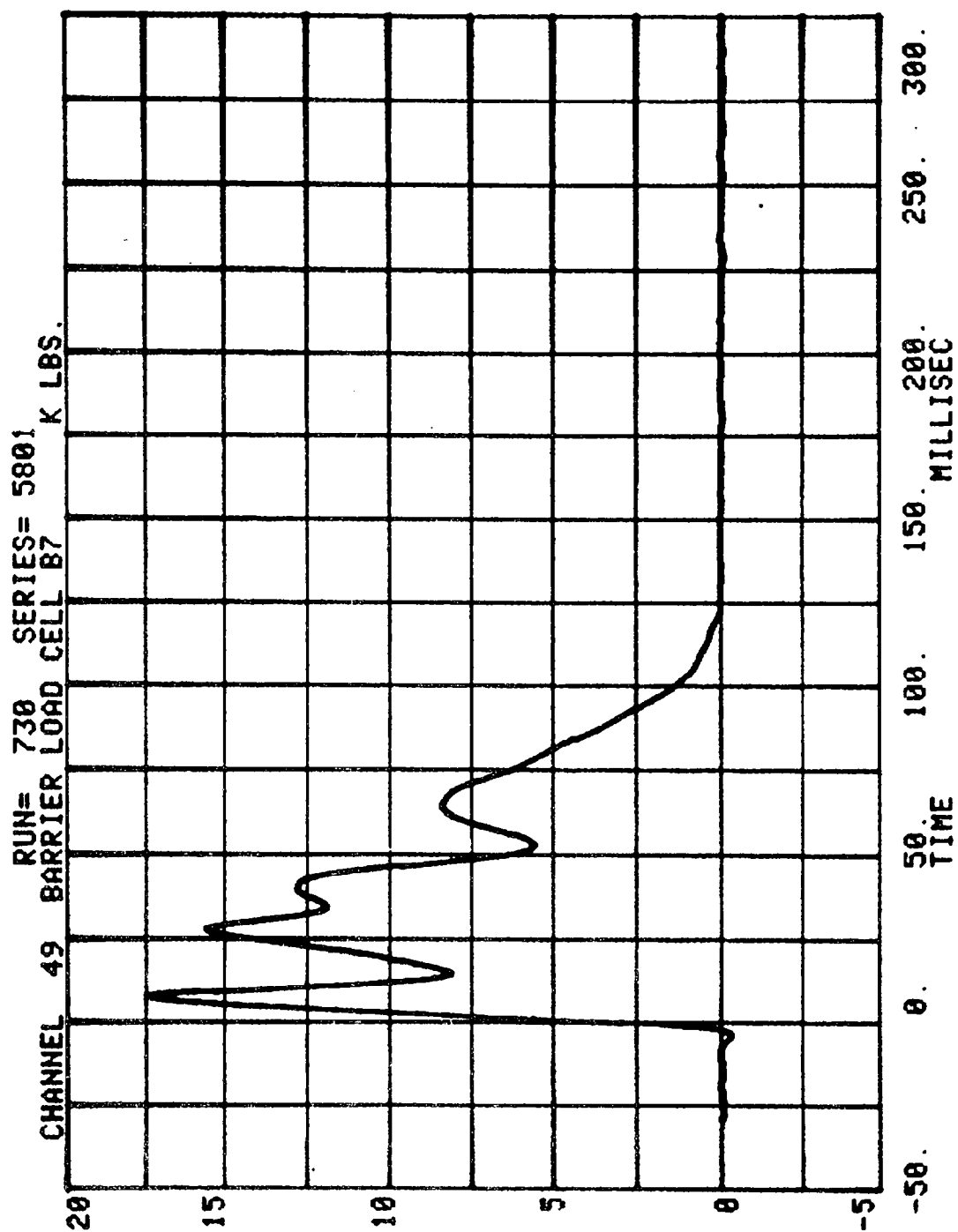
CHANNEL 46 BARRIER LOAD CELL B4
RUN= 730 SERIES= 5801 K LBS.



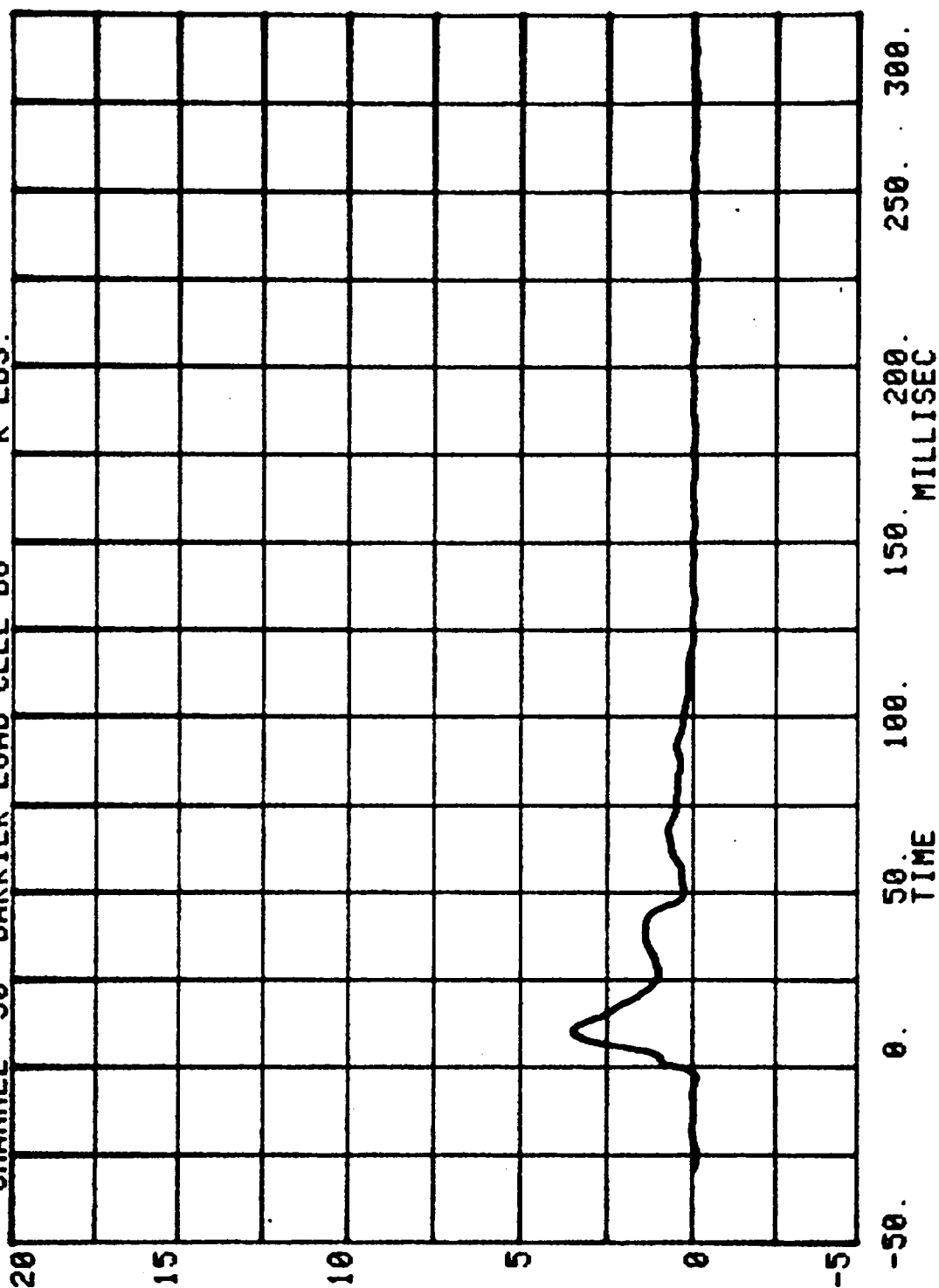


CHANNEL 48 BARRIER LOAD CELL B6
RUH= 730 SERIES= 5801 K LBS.

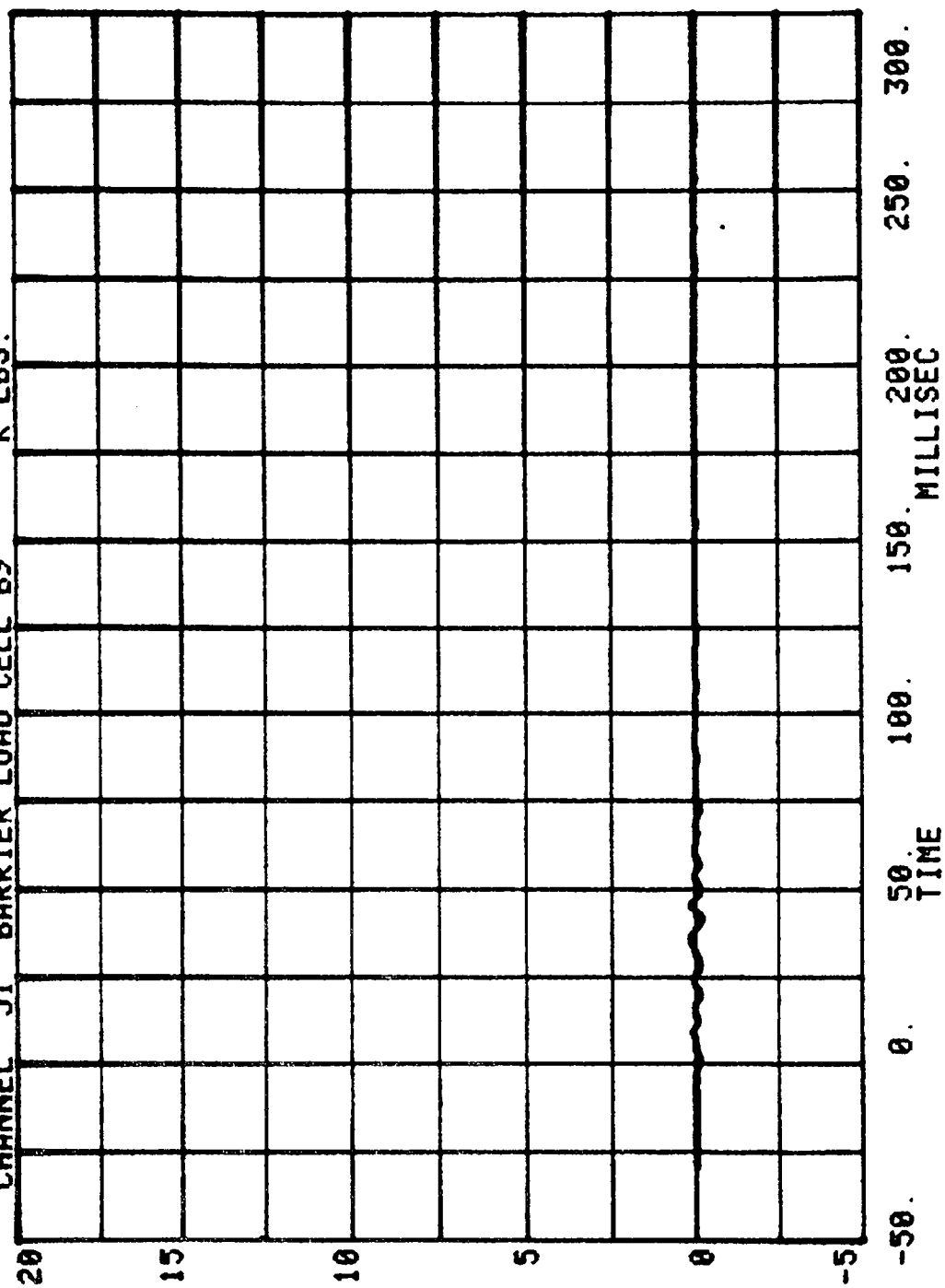




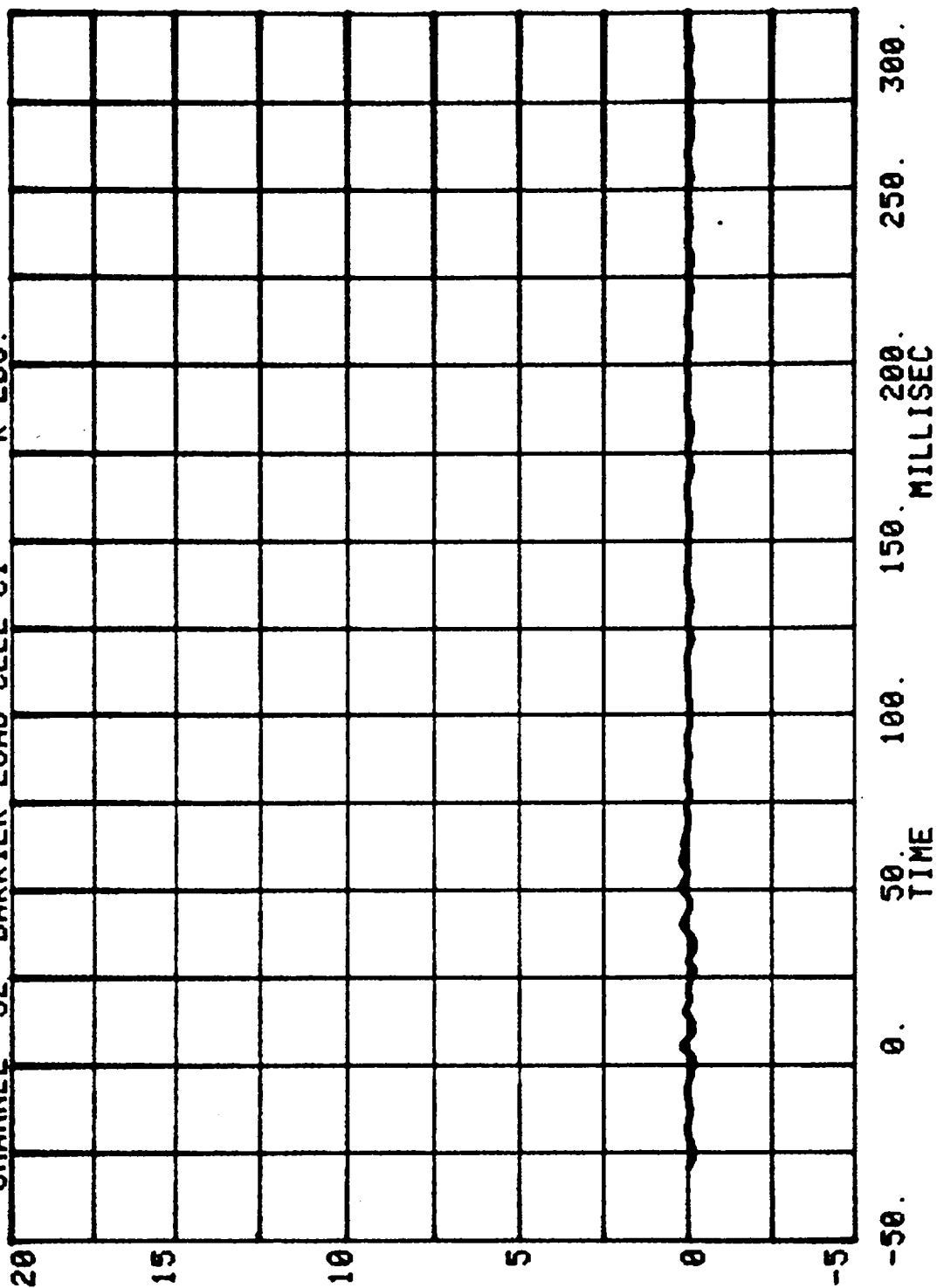
CHANNEL 50 BARRIER LOAD CELL B8 RUN= 730 SERIES= 5801 K LBS.

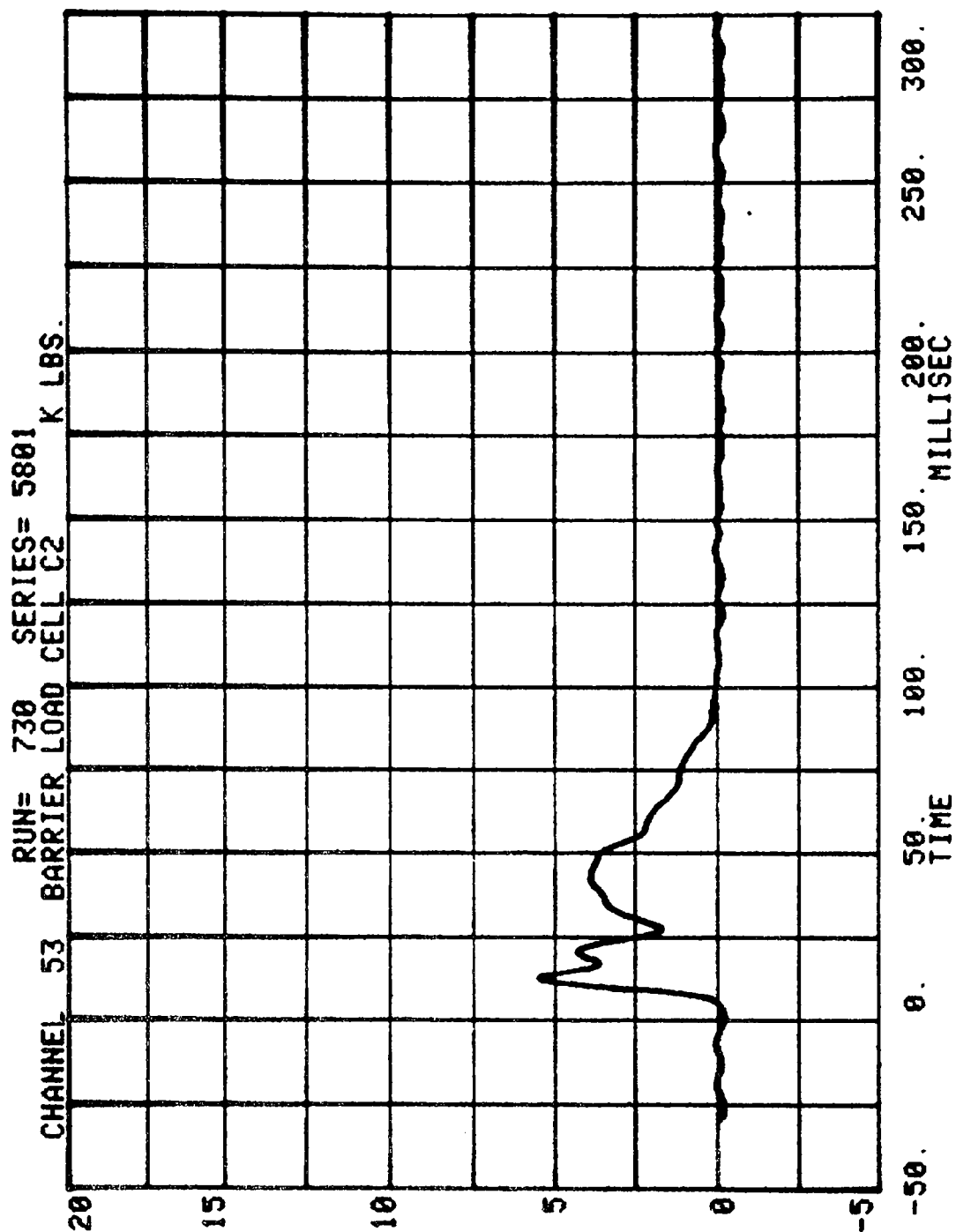


RUN= 730 SERIES= 5801
CHANNEL 51 BARRIER LOAD CELL B9 K LBS.

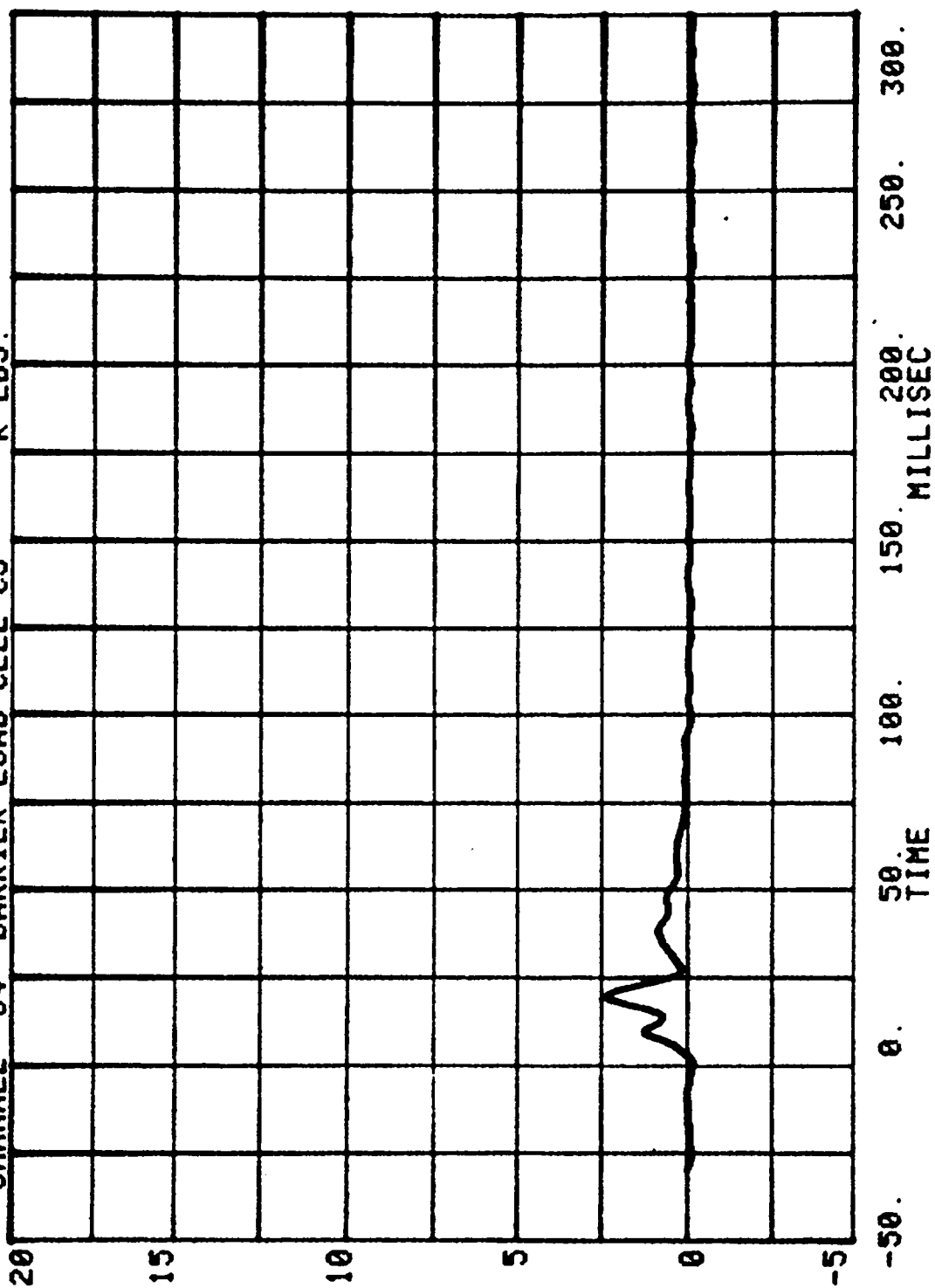


CHANNEL 52 BARRIER LOAD CELL C1 RUN= 730 SERIES= 5801 K LBS.

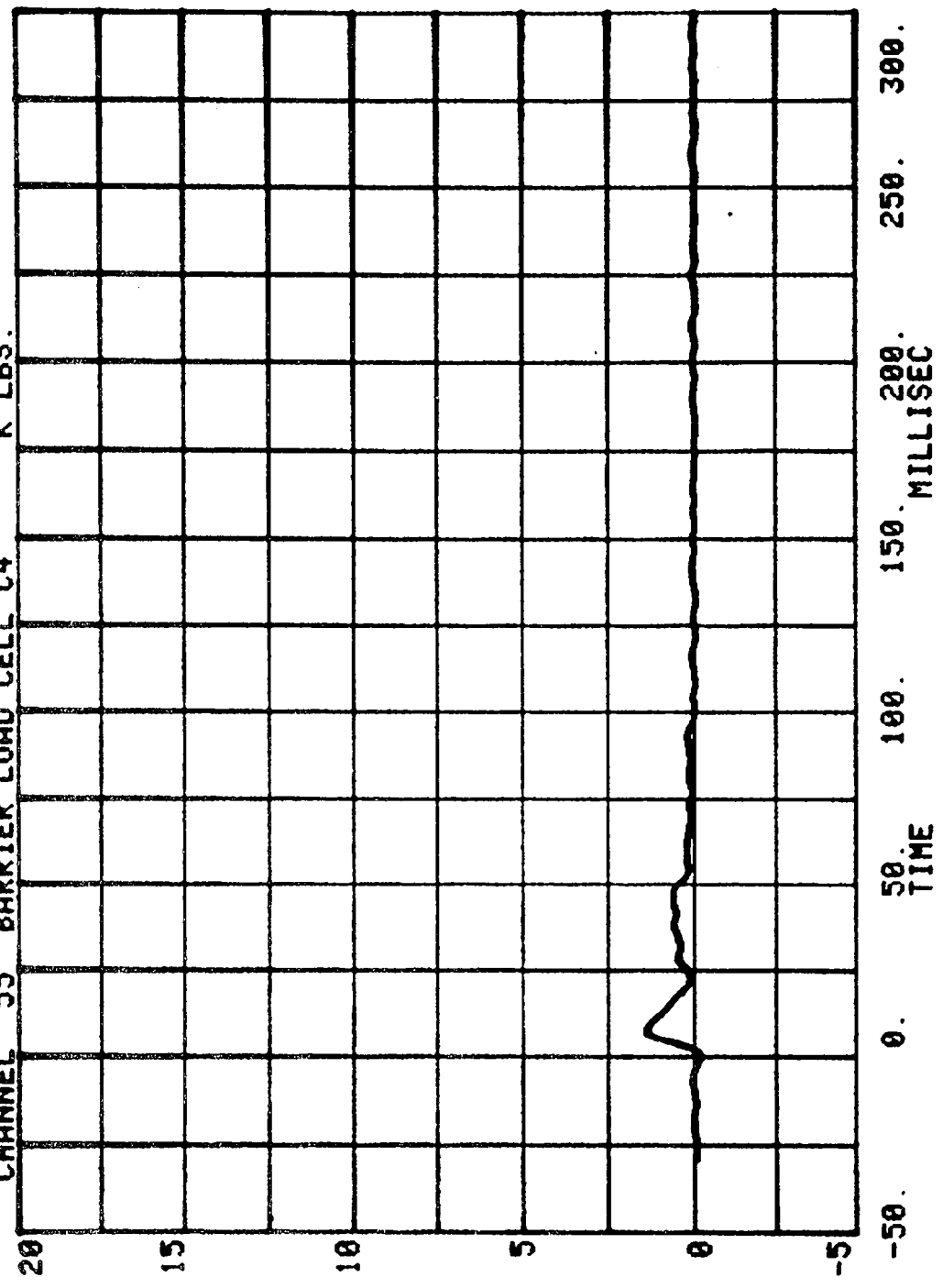




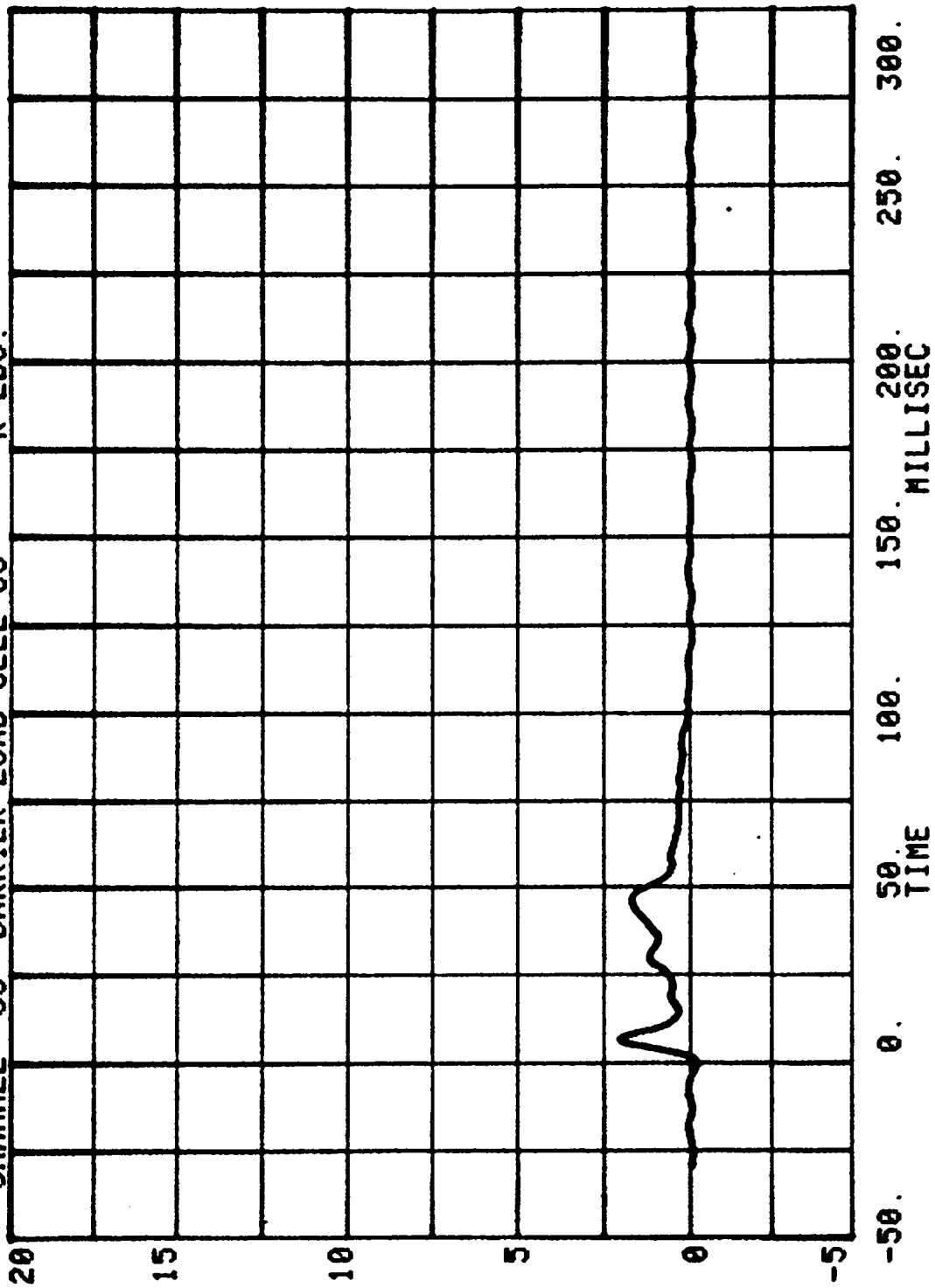
CHANNEL 54 RUN= 730 SERIES= 5801
BARRIER LOAD CELL C3 K LBS.



CHANNEL 55 BARRIER LOAD CELL C4 RUN= 730 SERIES= 5801 K LBS.

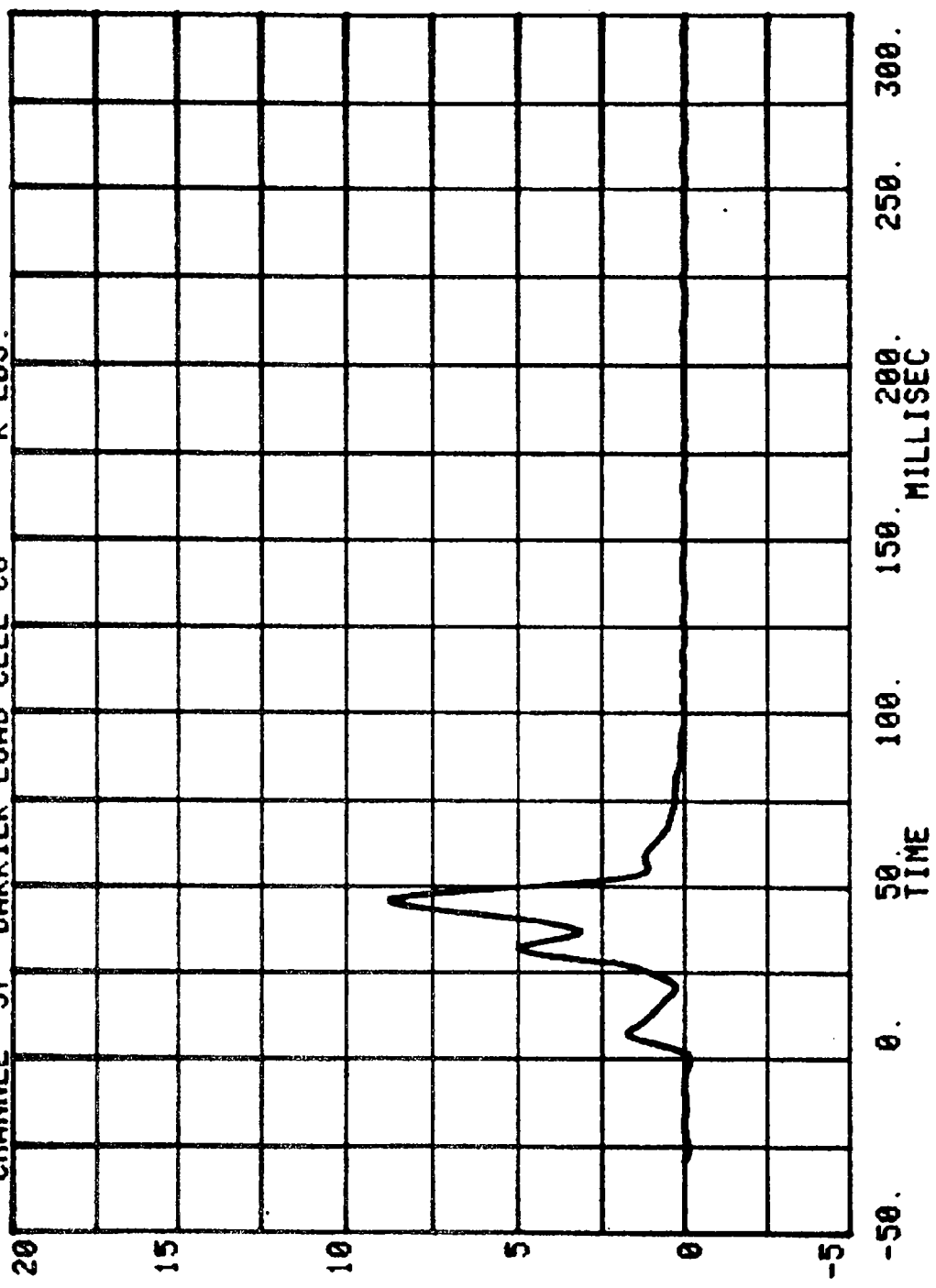


CHANNEL 56 BARRIER LOAD CELL C5 RUN= 730 SERIES= 5801 K LBS.

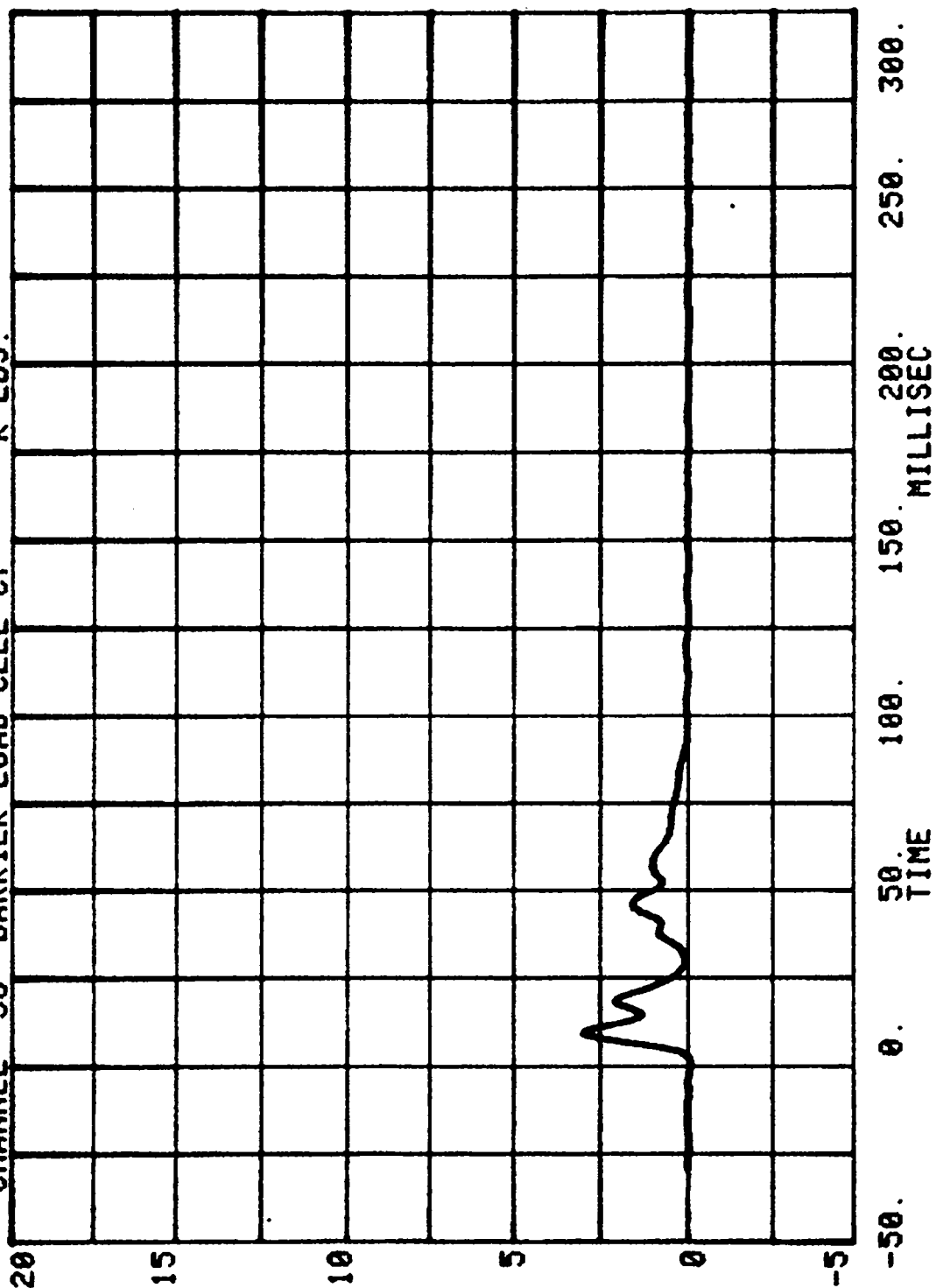


CHANNEL 57 BARRIER LOAD CELL C6 K LBS.

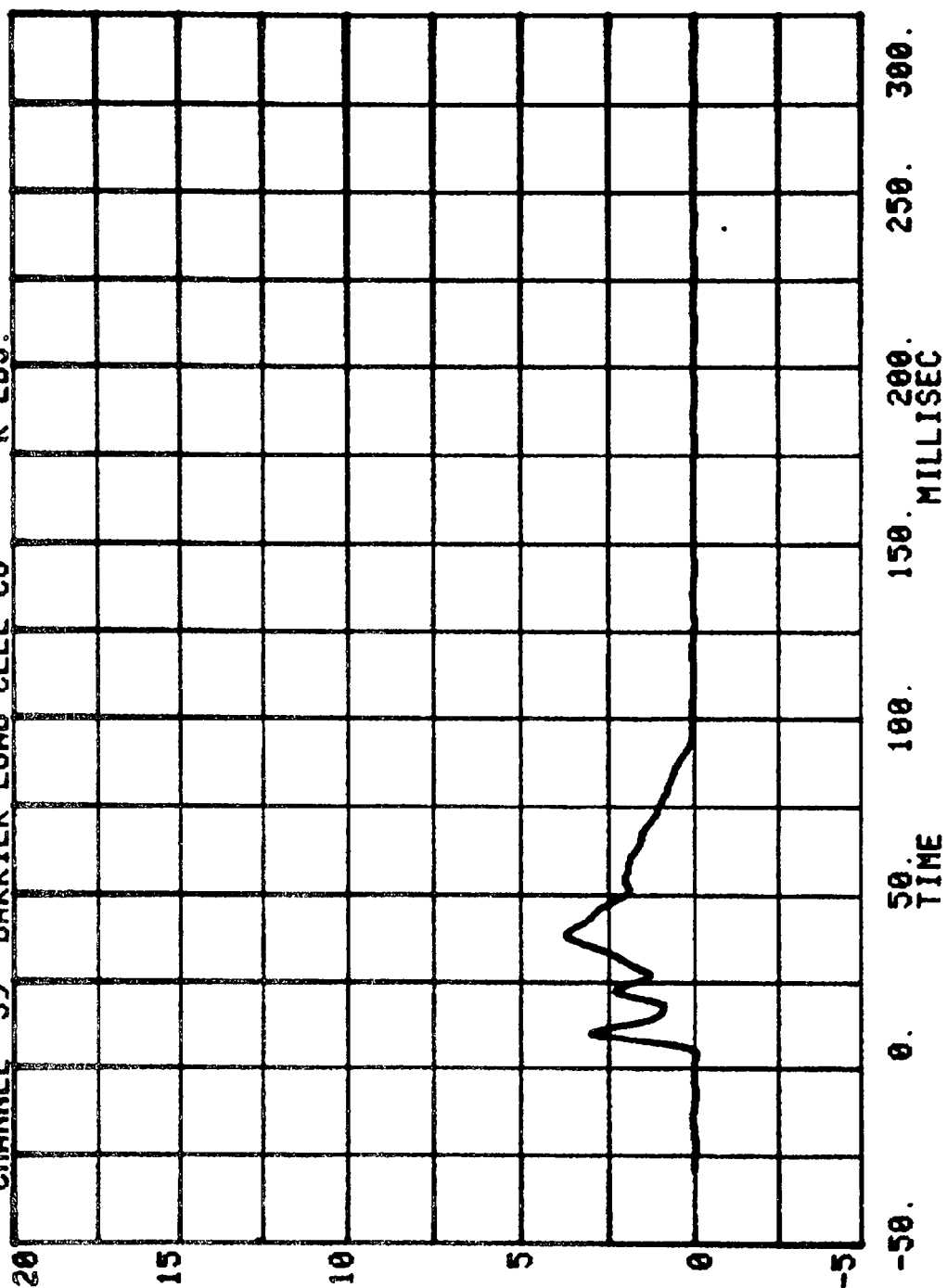
RUN= 730 SERIES= 5801



CHANNEL 58 BARRIER LOAD CELL C7 RUN= 730 SERIES= 5801 K LBS.

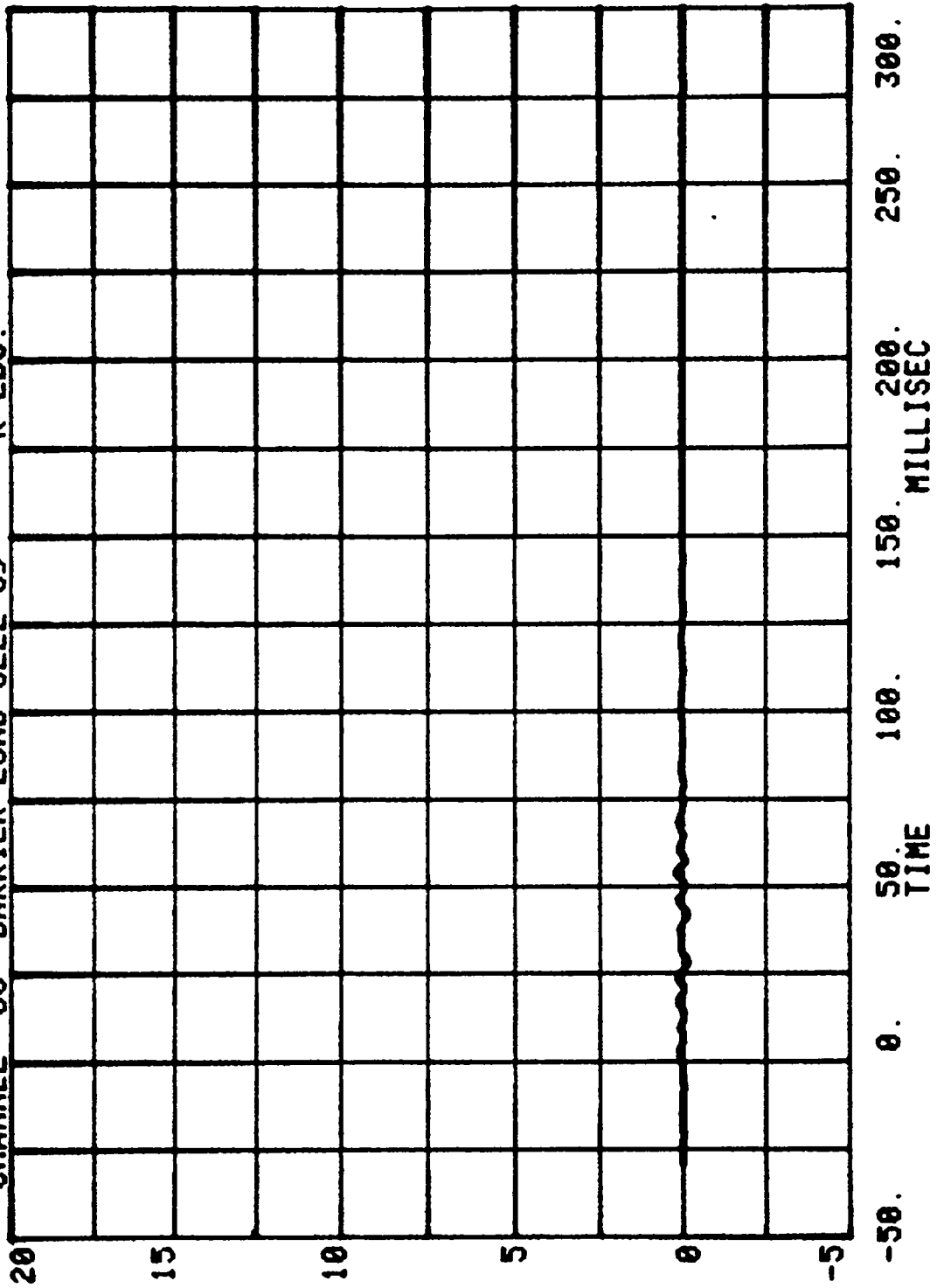


CHANNEL 59 RUN= 730 SERIES= 5801
BARRIER LOAD CELL C8 K LBS.



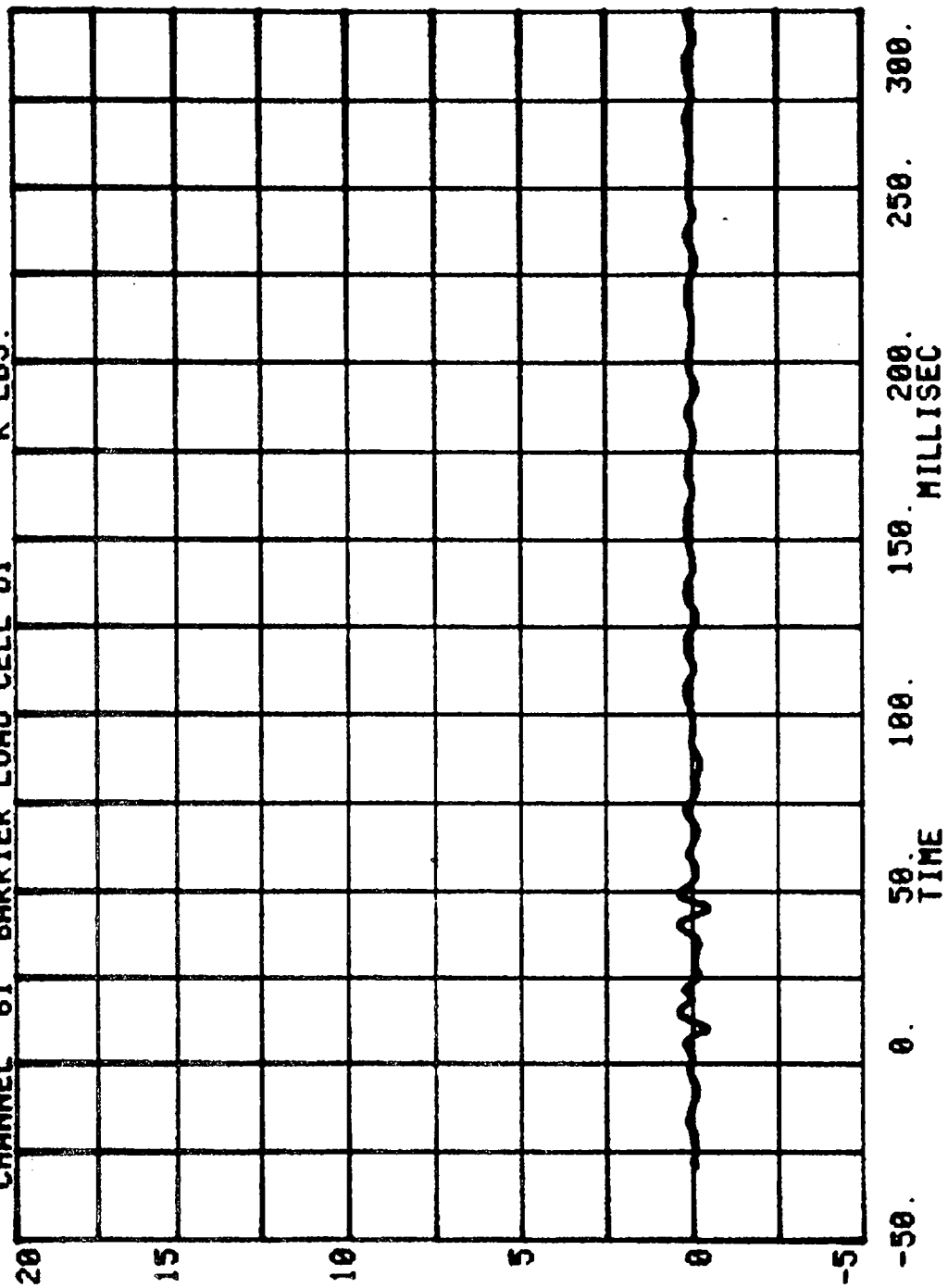
CHANNEL 60 BARRIER LOAD CELL C9 K LBS.

RUN= 730 SERIES= 5801

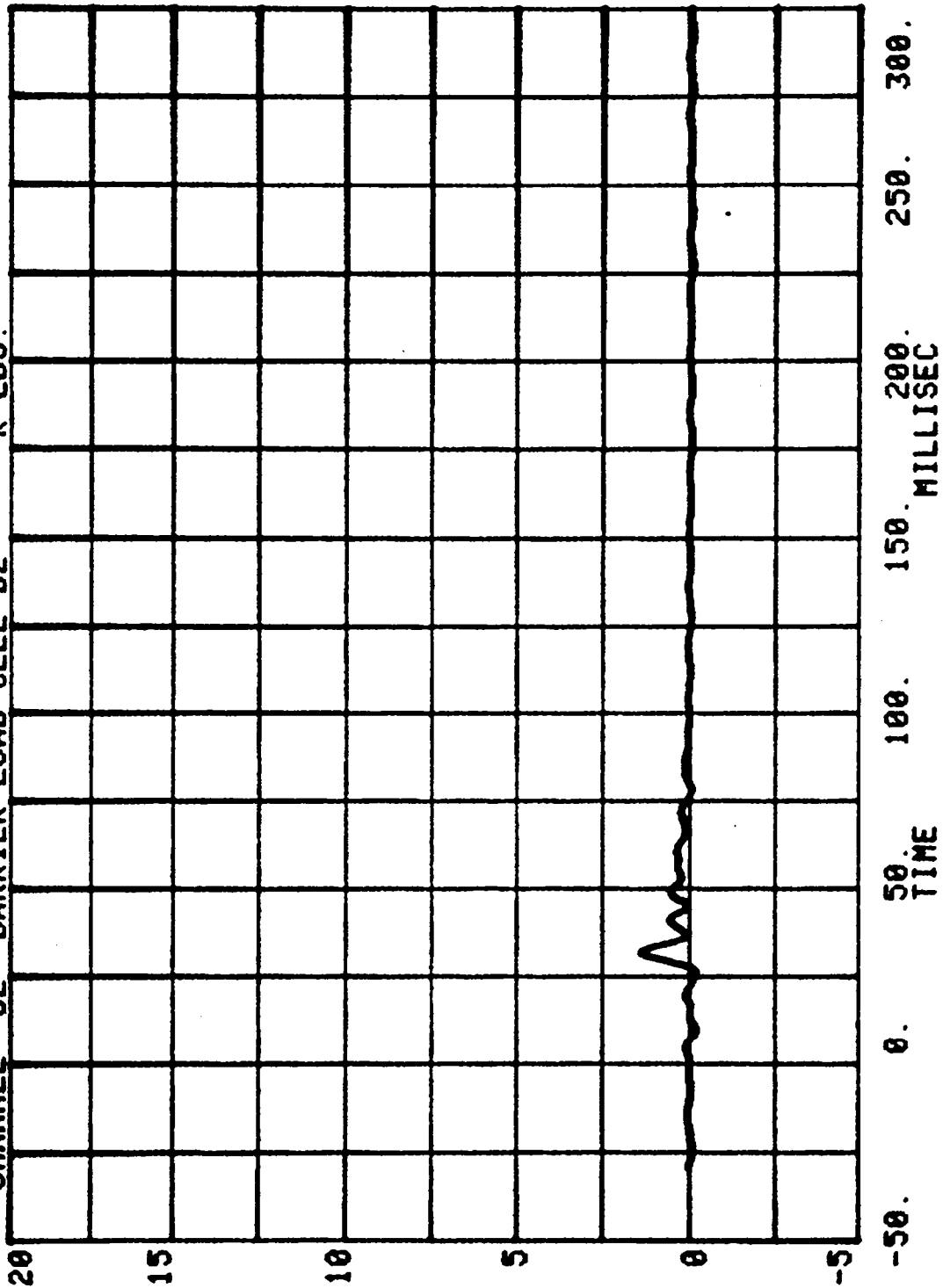


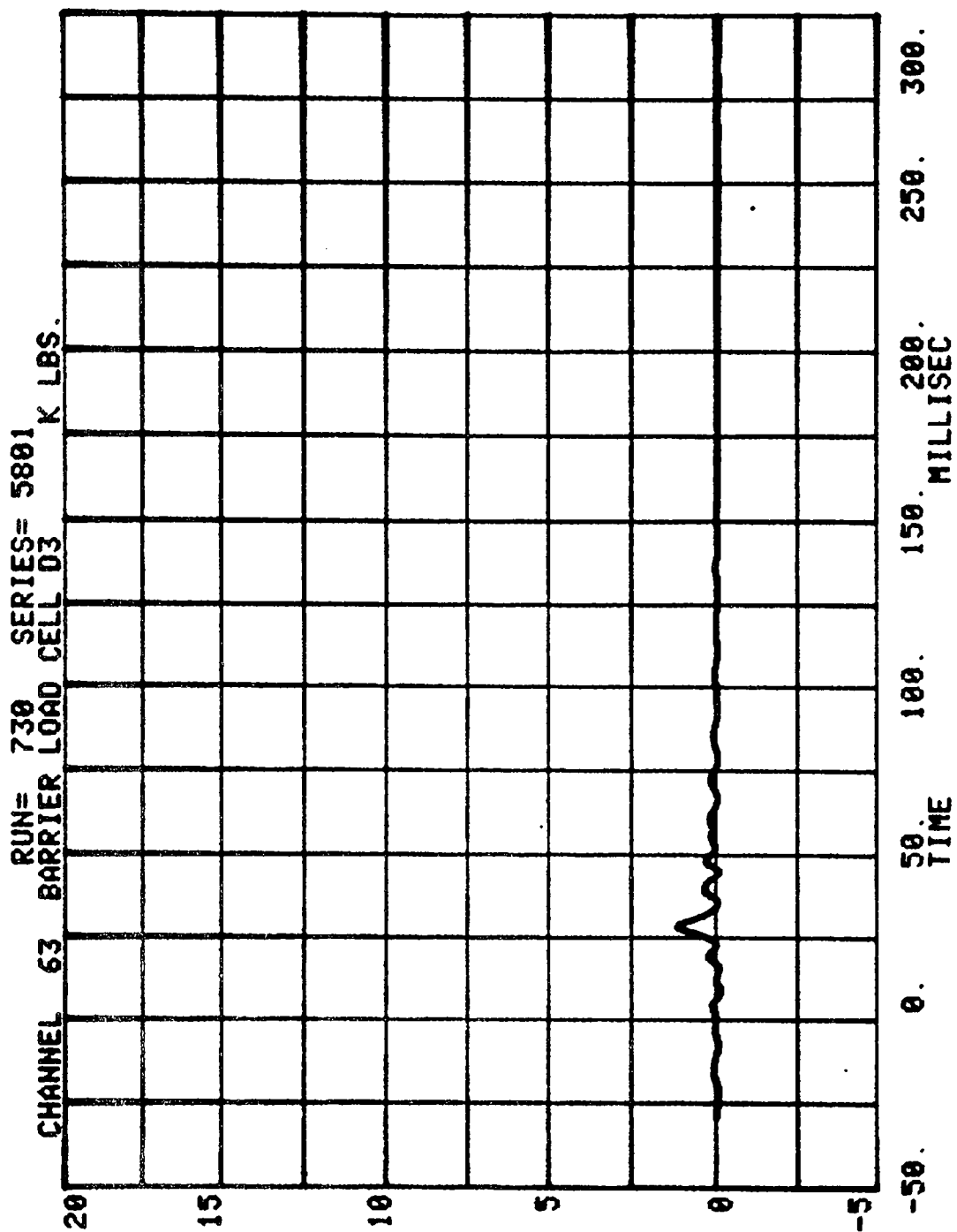
CHANNEL 61 BARRIER LOAD CELL 01 K LBS.

RUN= 730 SERIES= 5801

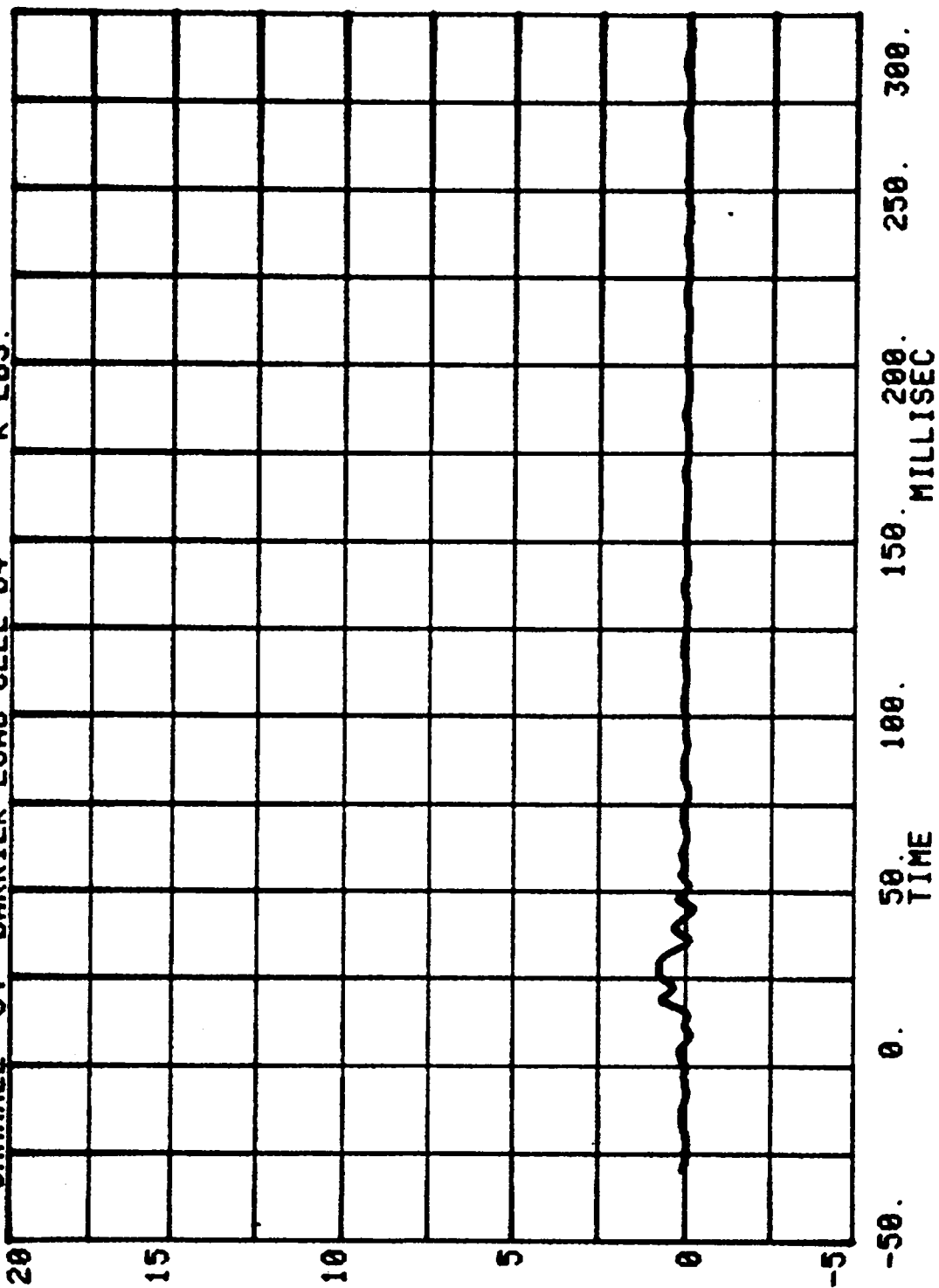


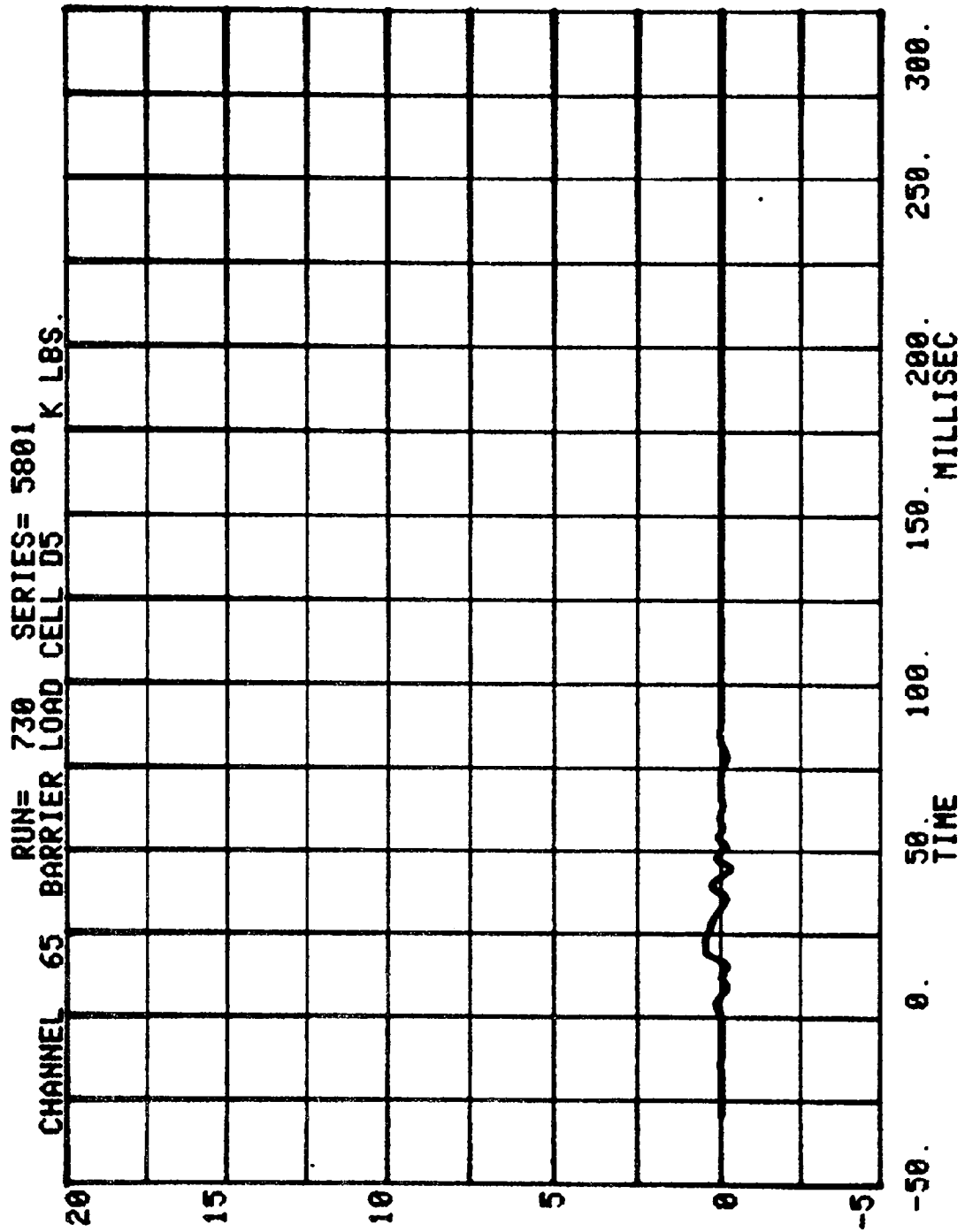
CHANNEL 62 BARRIER LOAD CELL D2 RUN= 730 SERIES= 5801 K LBS.



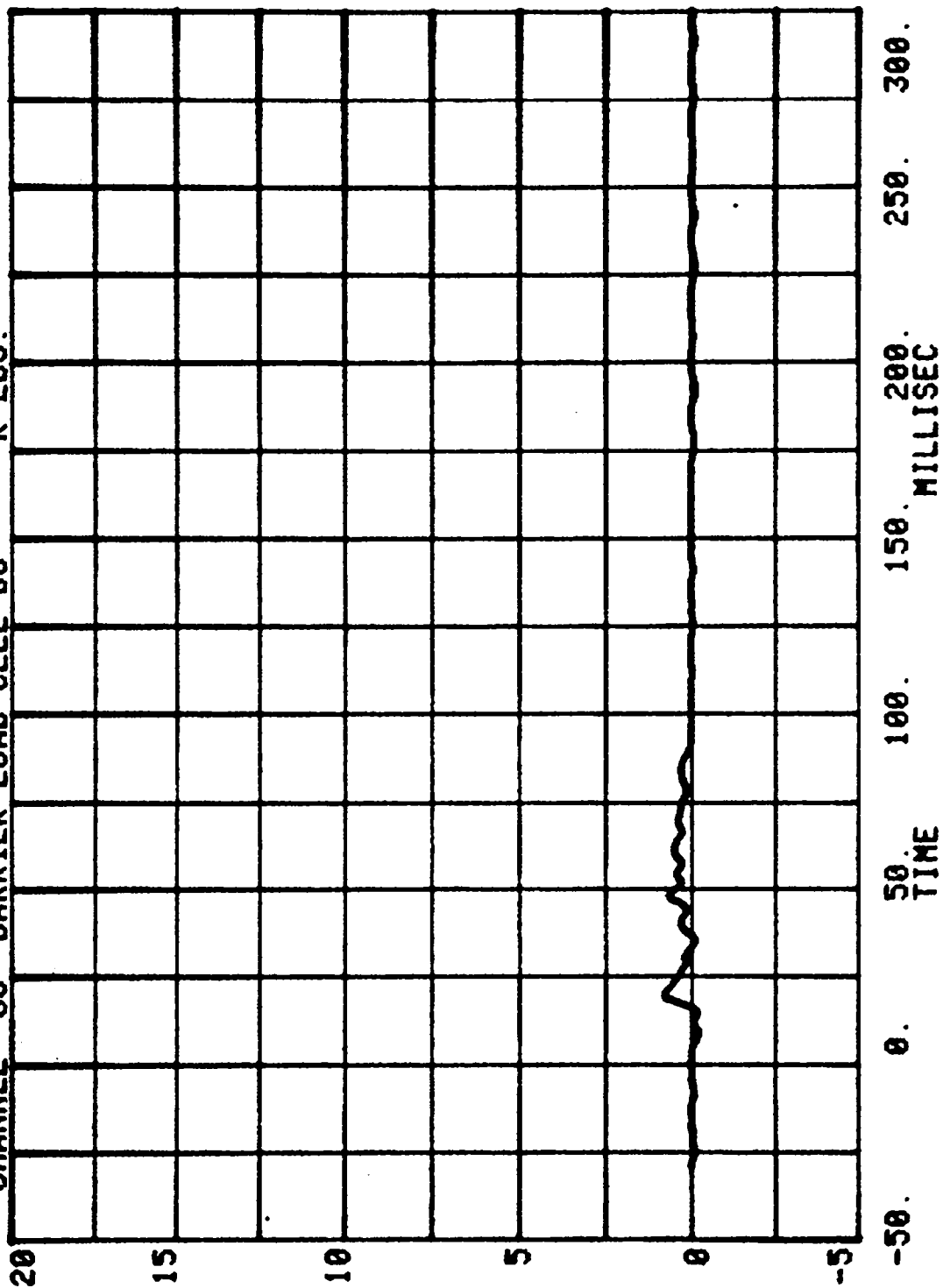


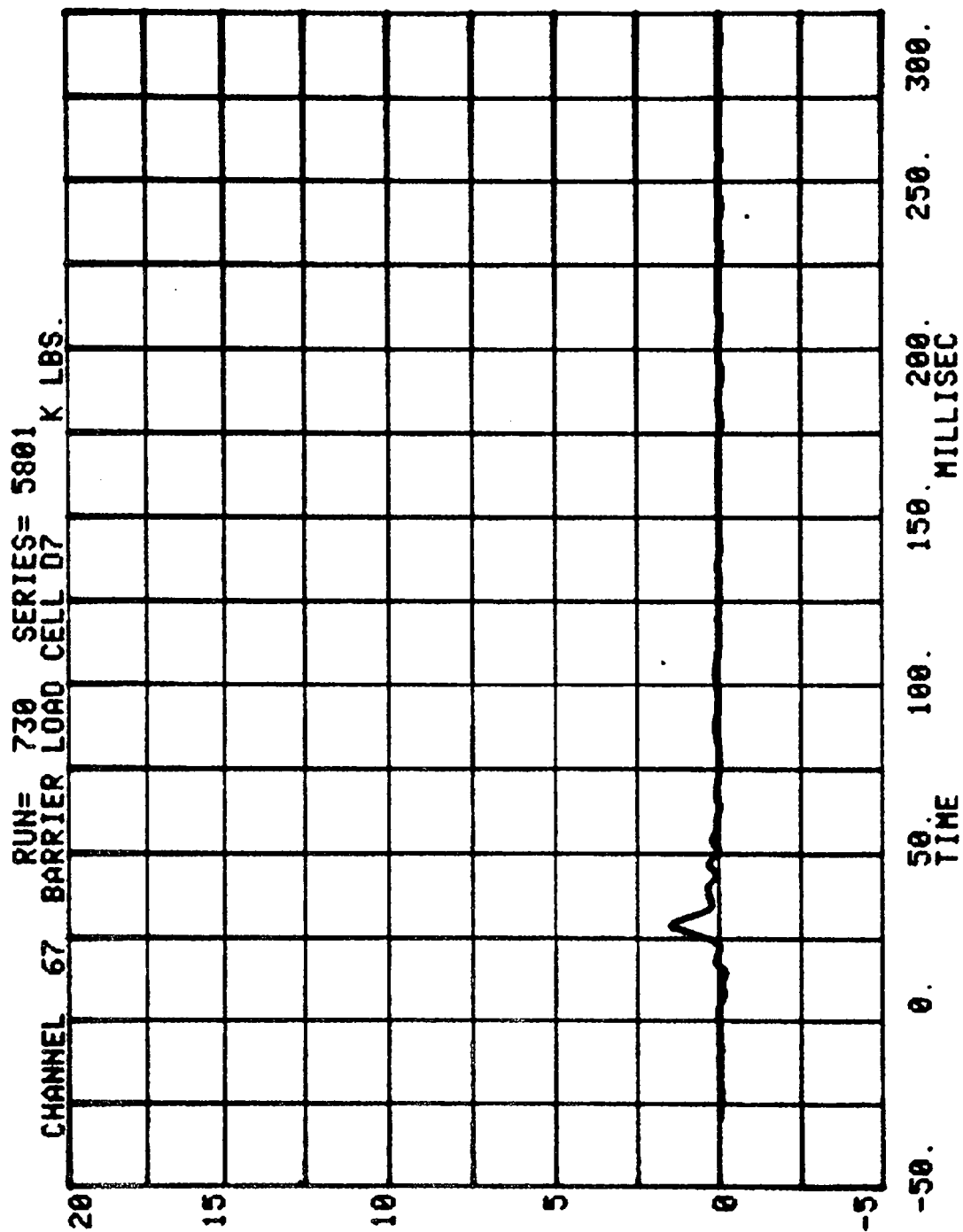
CHANNEL 64 RUN= 730 SERIES= 5801
BARRIER LOAD CELL 04 K LBS.



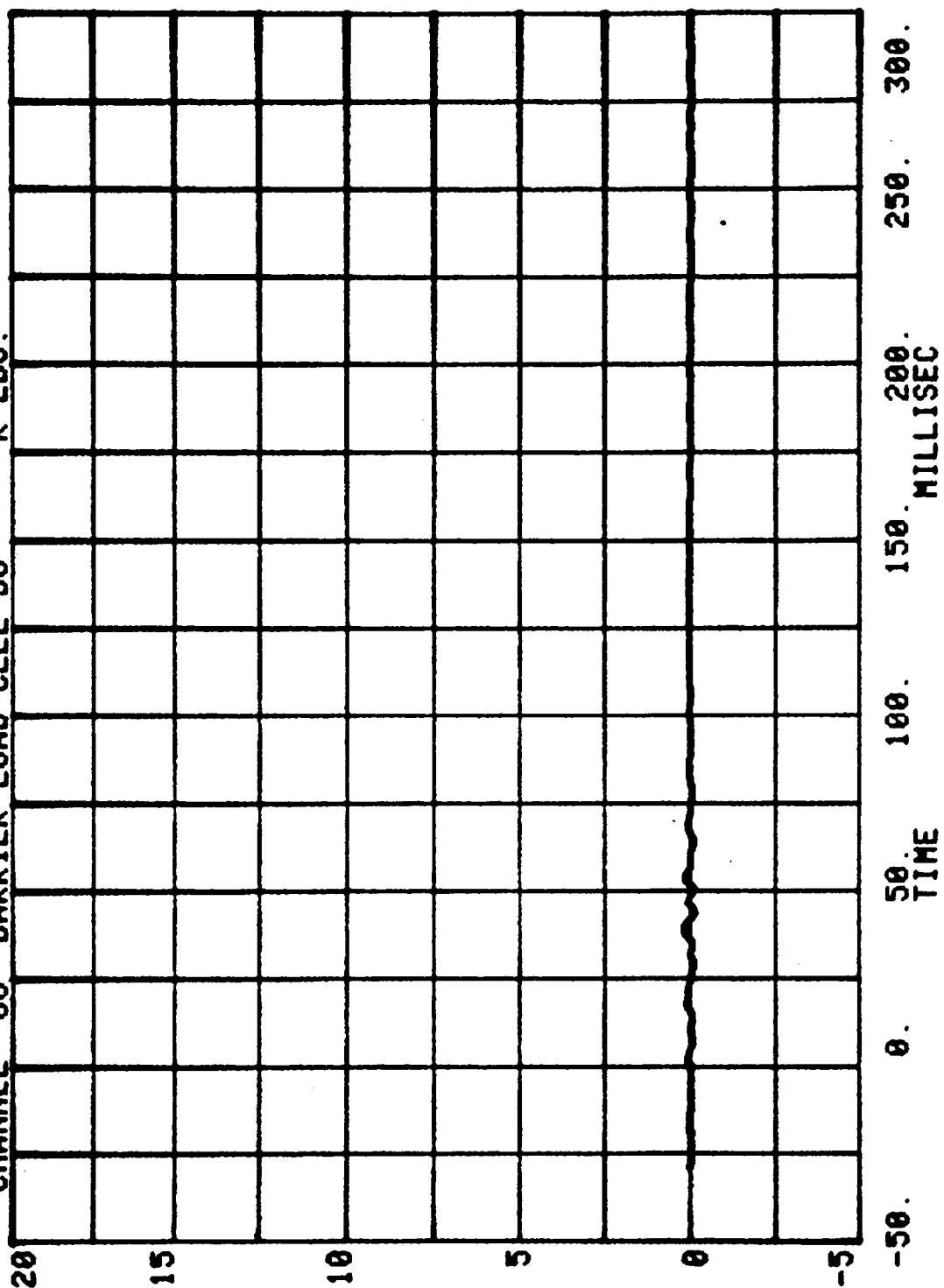


CHANNEL 66 RUN= 730 SERIES= 5801 K LBS.
BARRIER LOAD CELL D6

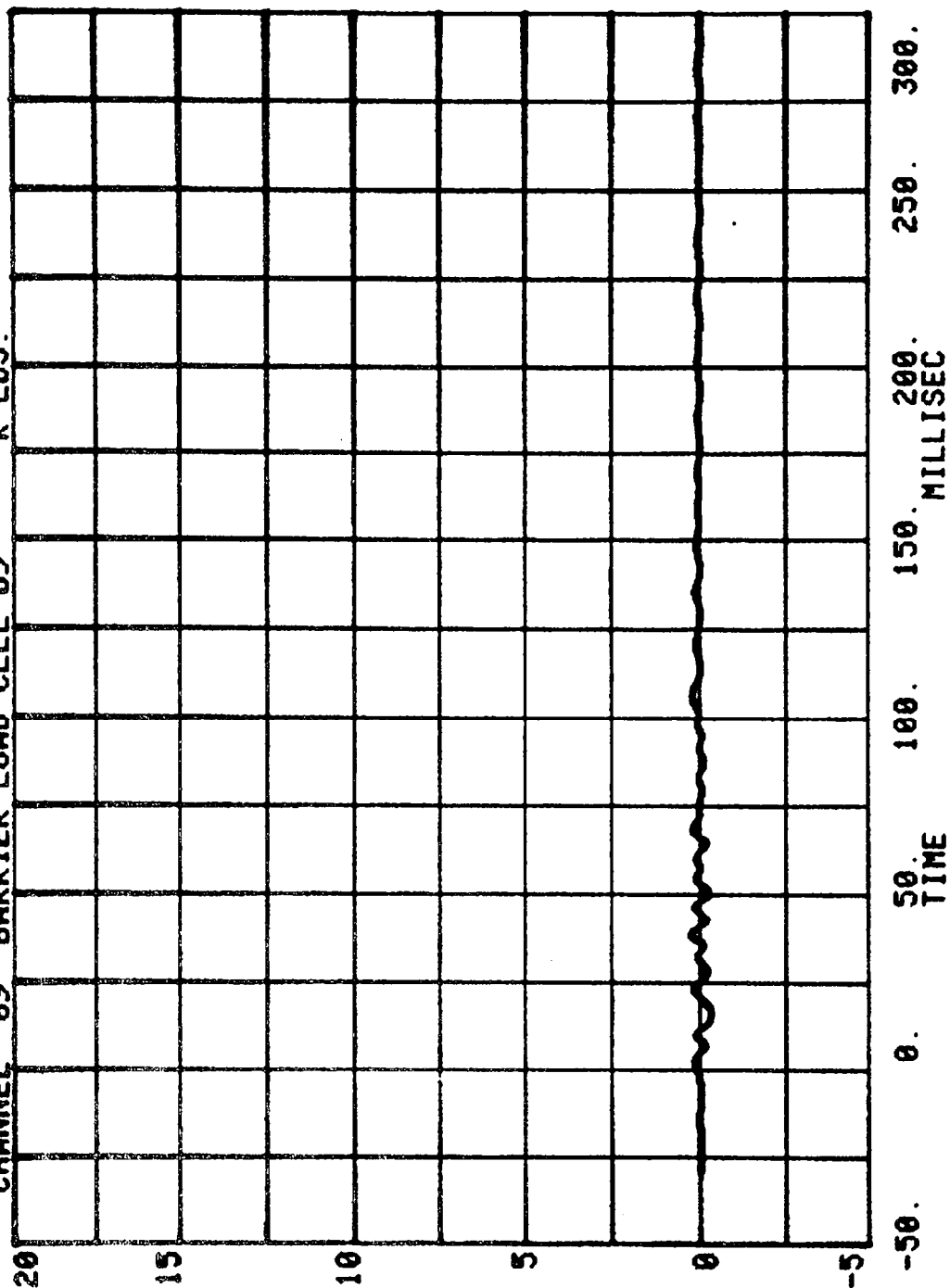




CHANNEL 68 BARRIER LOAD CELL D8 RUN= 730 SERIES= 5801 K LBS.

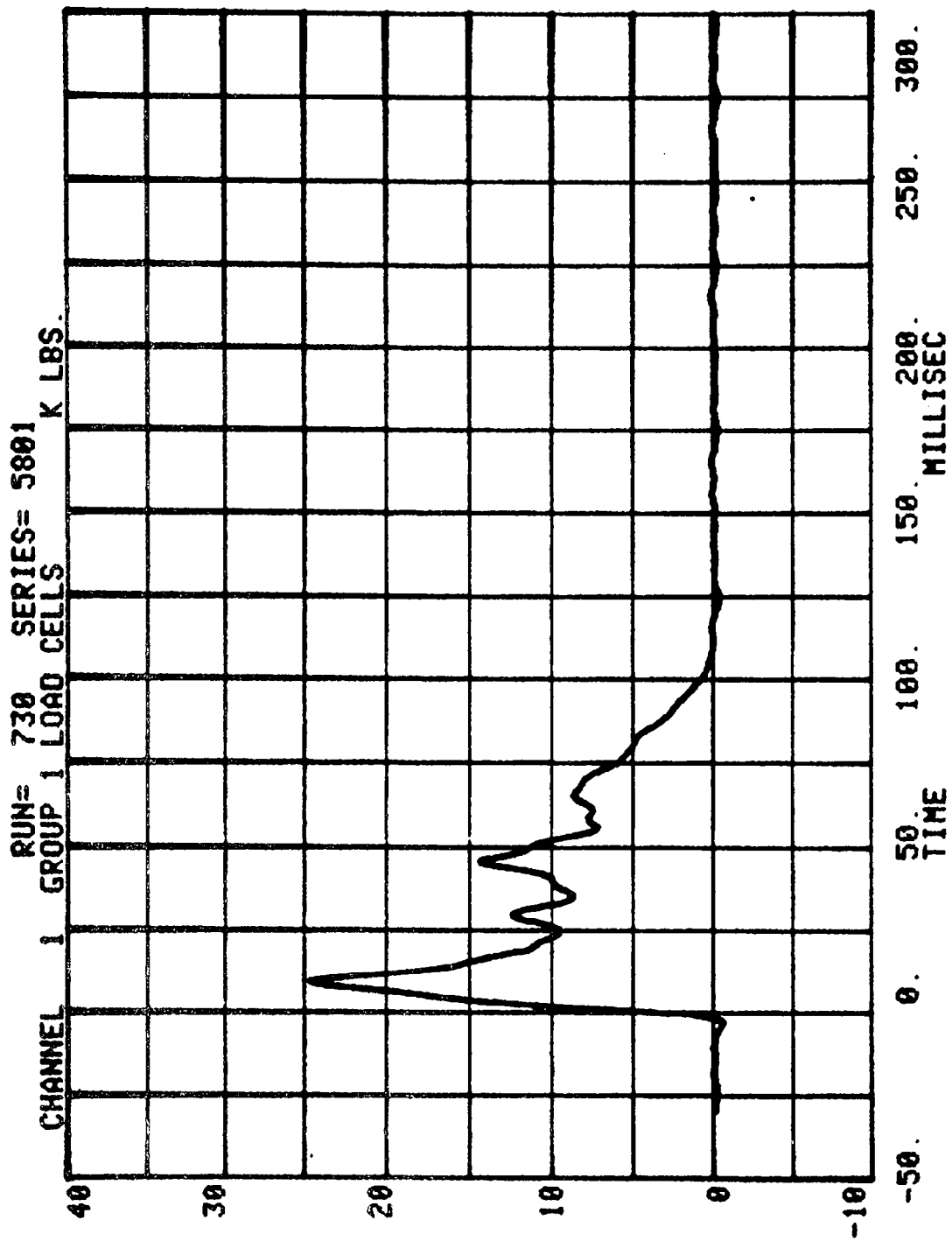


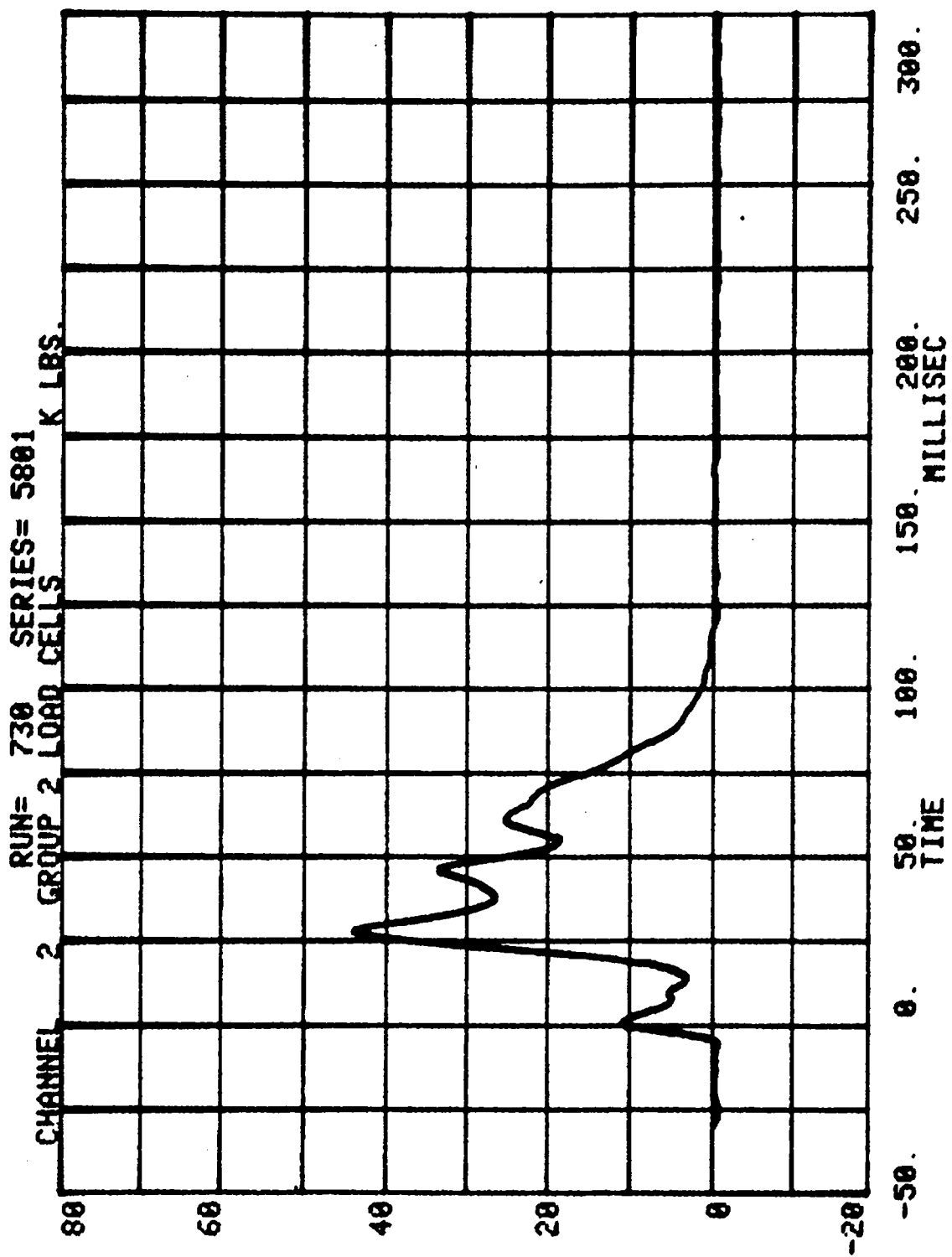
CHANNEL 69 BARRIER LOAD CELL D9 RUN= 730 SERIES= 5801 K LBS.

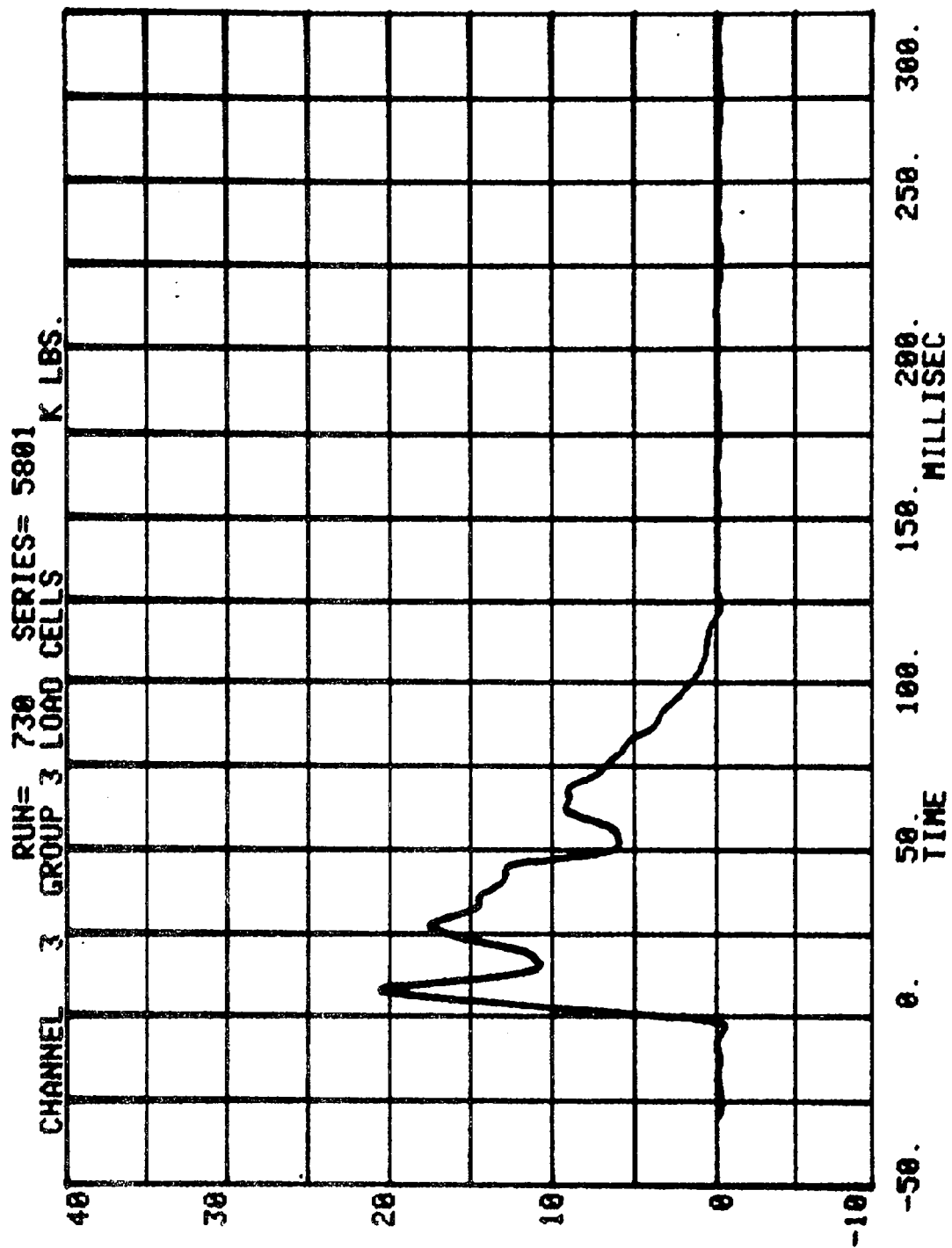


NEW CAR ASSESSMENT BARRIER TESTS - 1986

RUN # 730		SERIES # 5801	
CHAN	TITLE	MINIMUM	MAXIMUM
1	GROUP 1 LOAD CELLS	-.563	24.732 K LBS.
2	GROUP 2 LOAD CELLS	-.407	44.312 K LBS.
3	GROUP 3 LOAD CELLS	-.493	20.648 K LBS.
4	GROUP 4 LOAD CELLS	-.576	7.010 K LBS.
5	GROUP 5 LOAD CELLS	-.505	11.467 K LBS.
6	GROUP 6 LOAD CELLS	-.146	5.885 K LBS.
7	TOTAL LOAD CELL SUM	-1.854	85.234 K LBS.

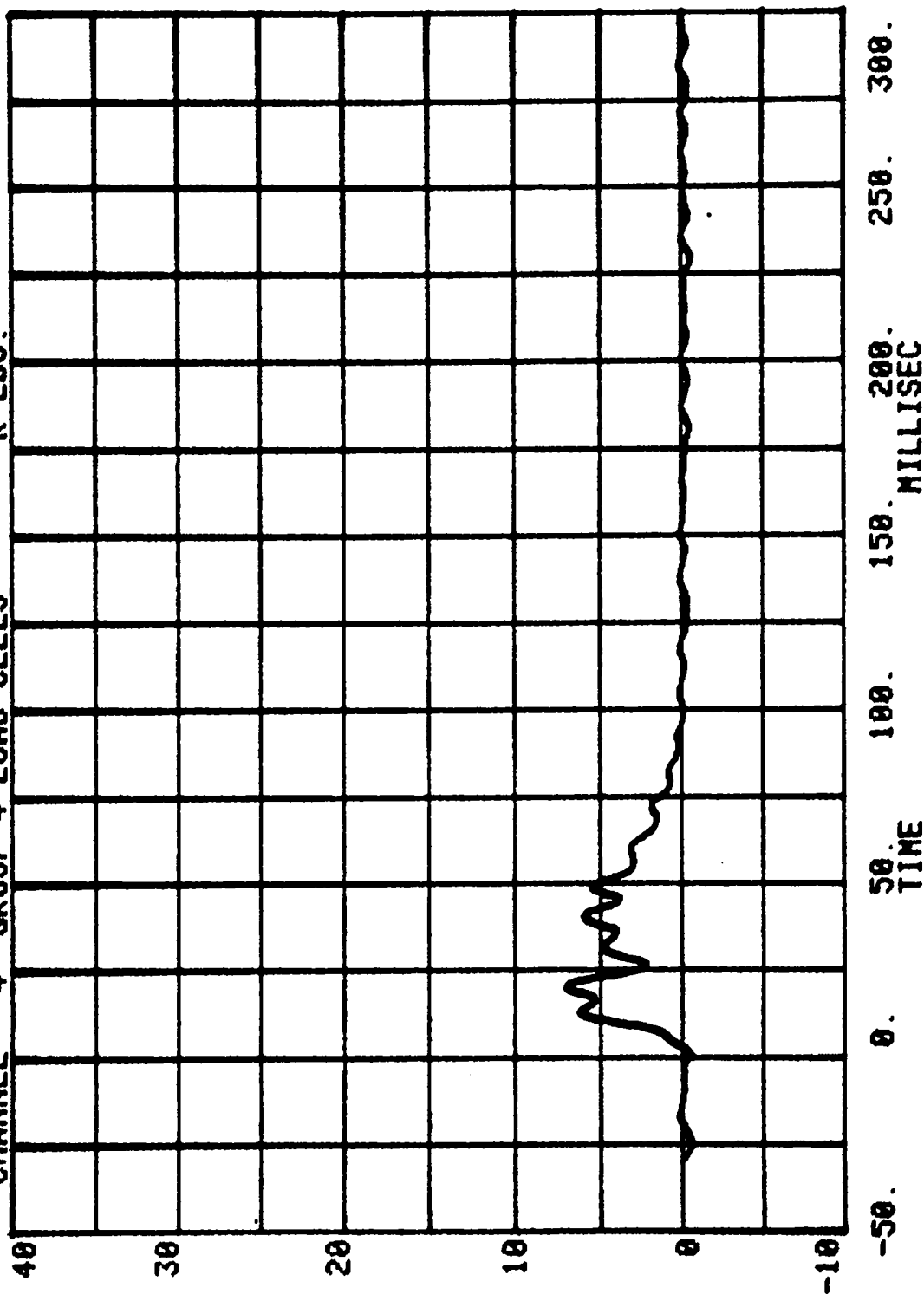




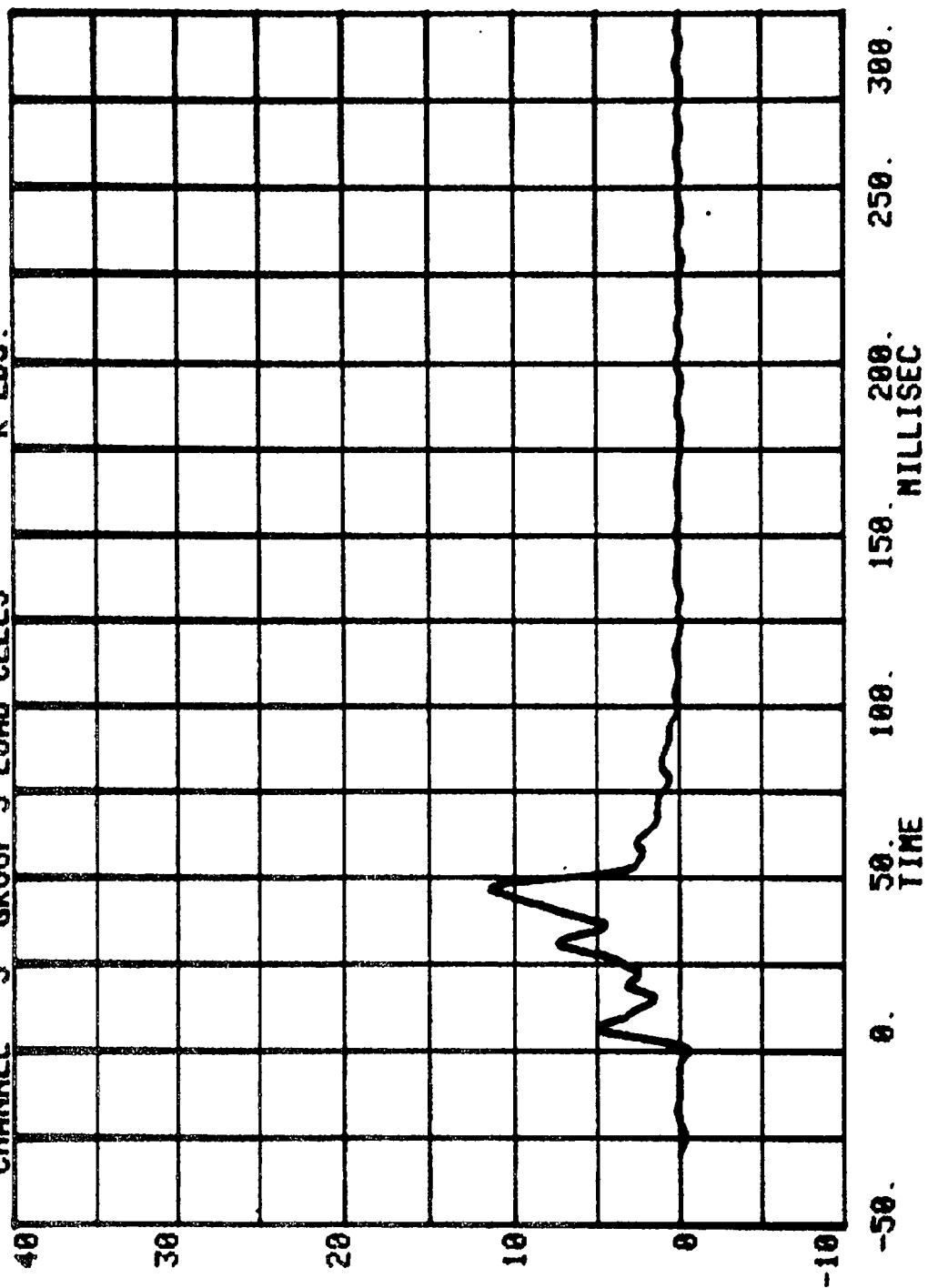


CHANNEL 4 GROUP 4 LOAD CELLS K LBS.

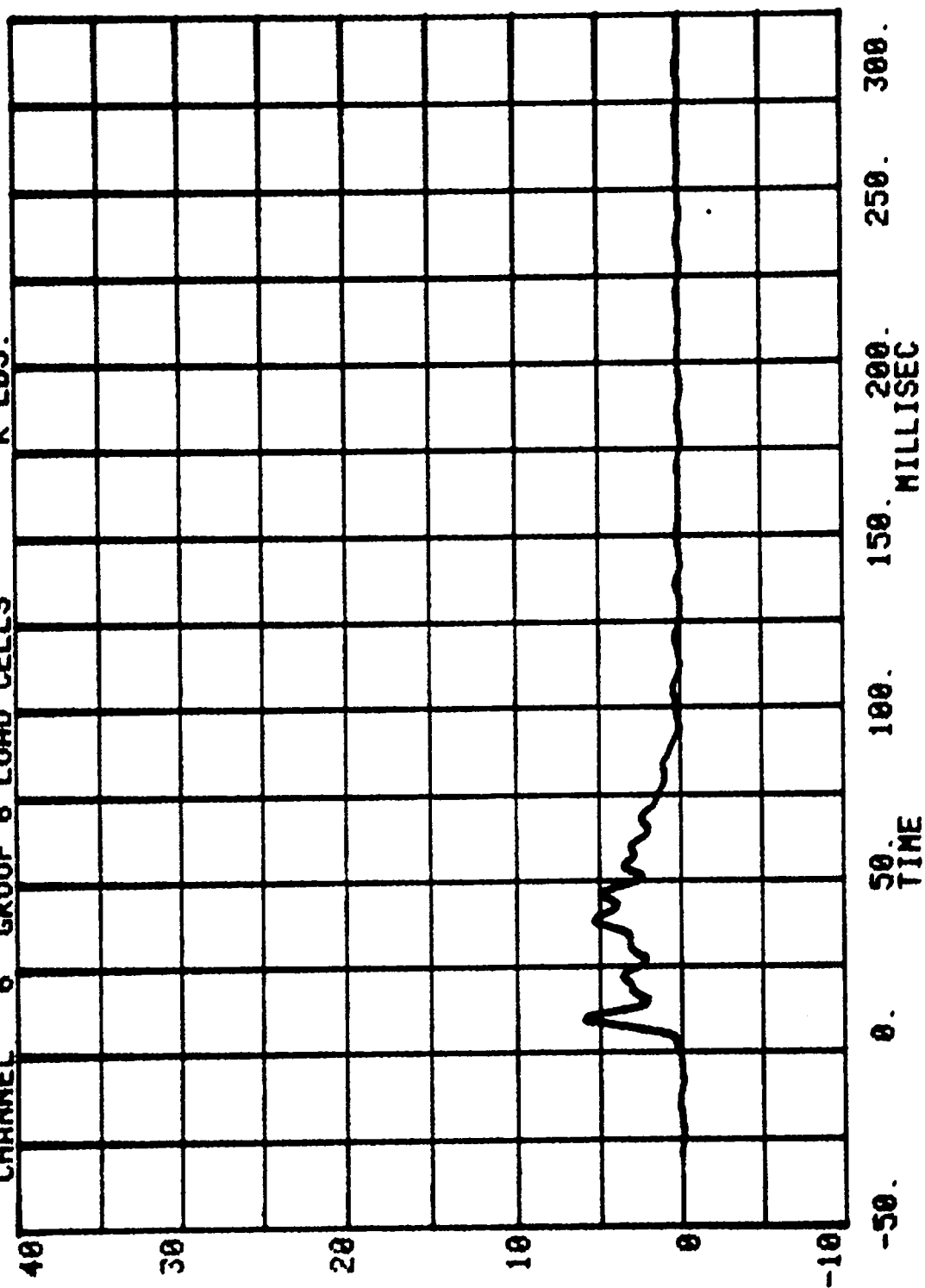
RUN= 730 SERIES= 5801

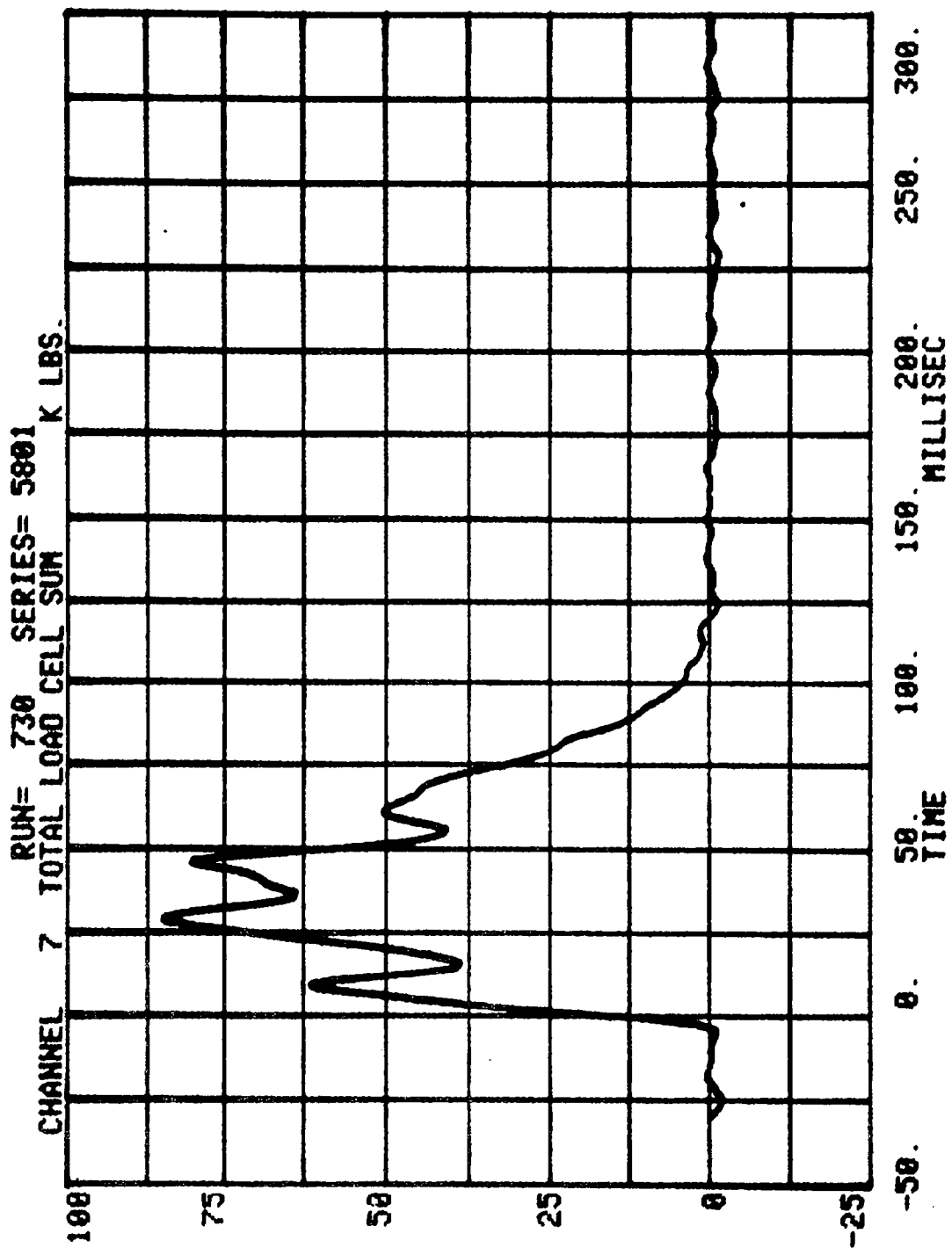


CHANNEL 5 GROUP 5 LOAD CELLS RUN= 730 SERIES= 5801 K LBS.



CHANNEL 6 GROUP 6 LOAD CELLS RUN= 730 SERIES= 5801 K LBS.





TEST NO. MG5801

DUMMY DATA

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

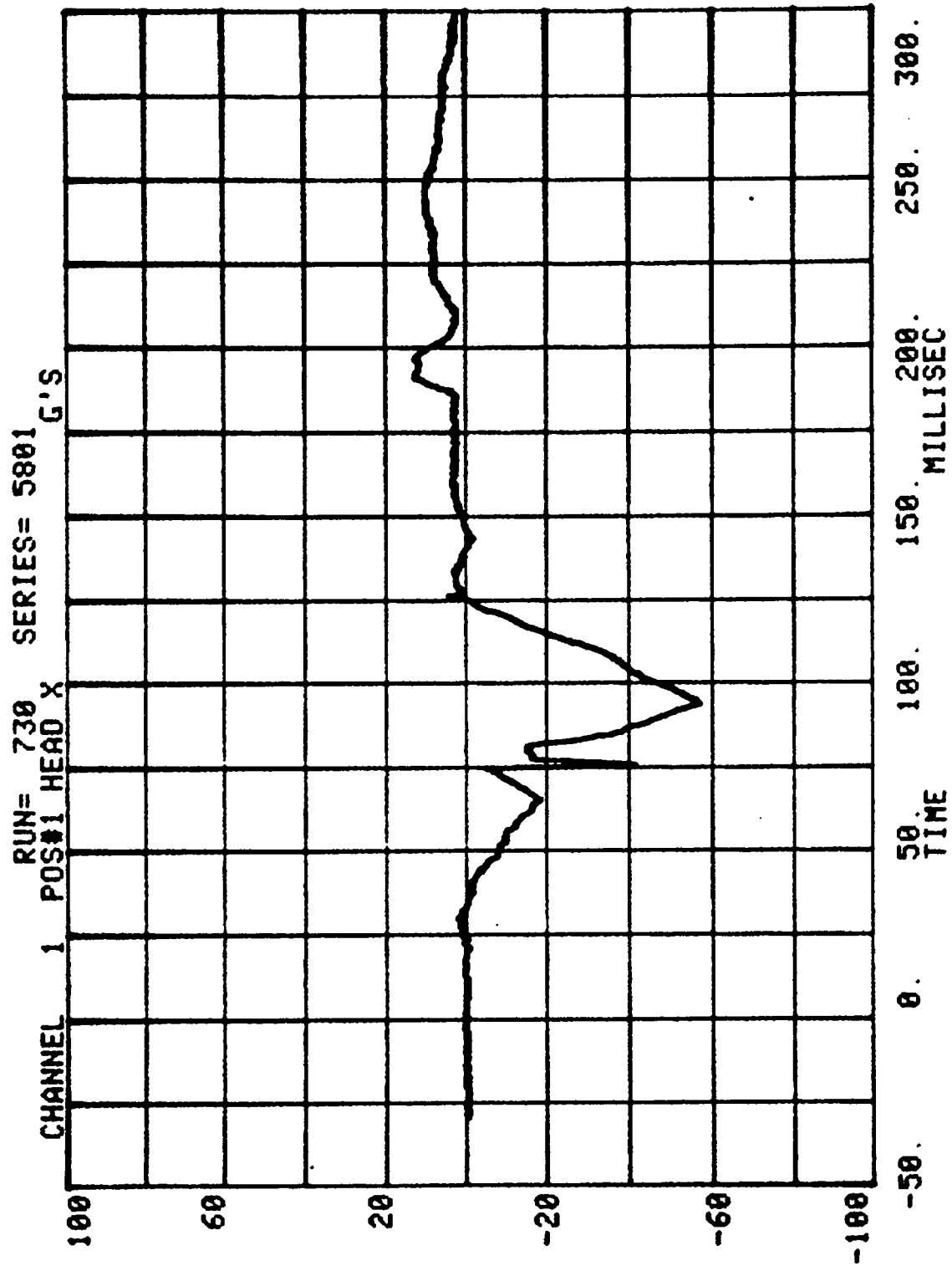
HEAD INJURY CRITERION
HEAD SEVERITY INDEX

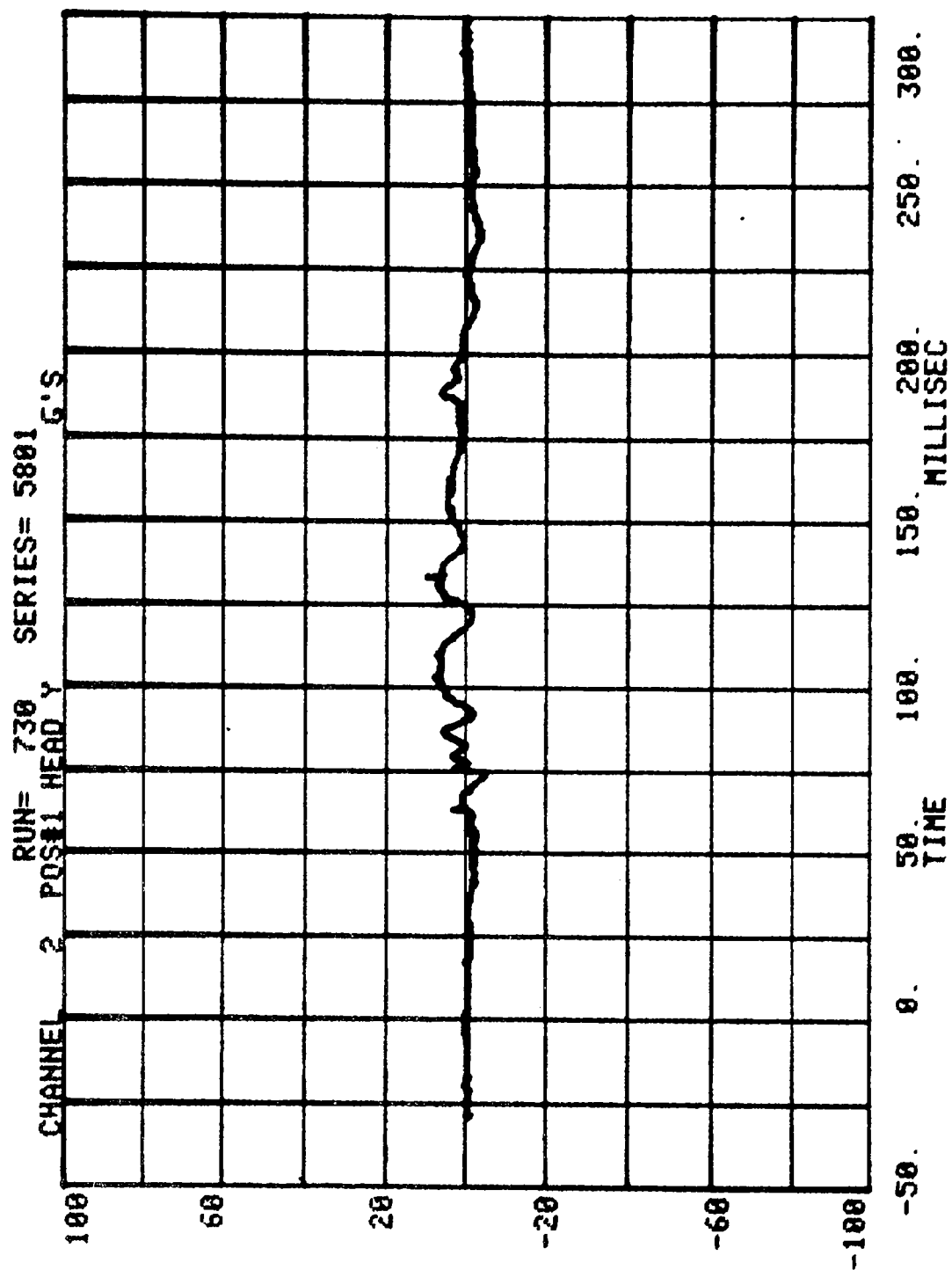
NEW CAR ASSESSMENT BARRIER TESTS - 1986

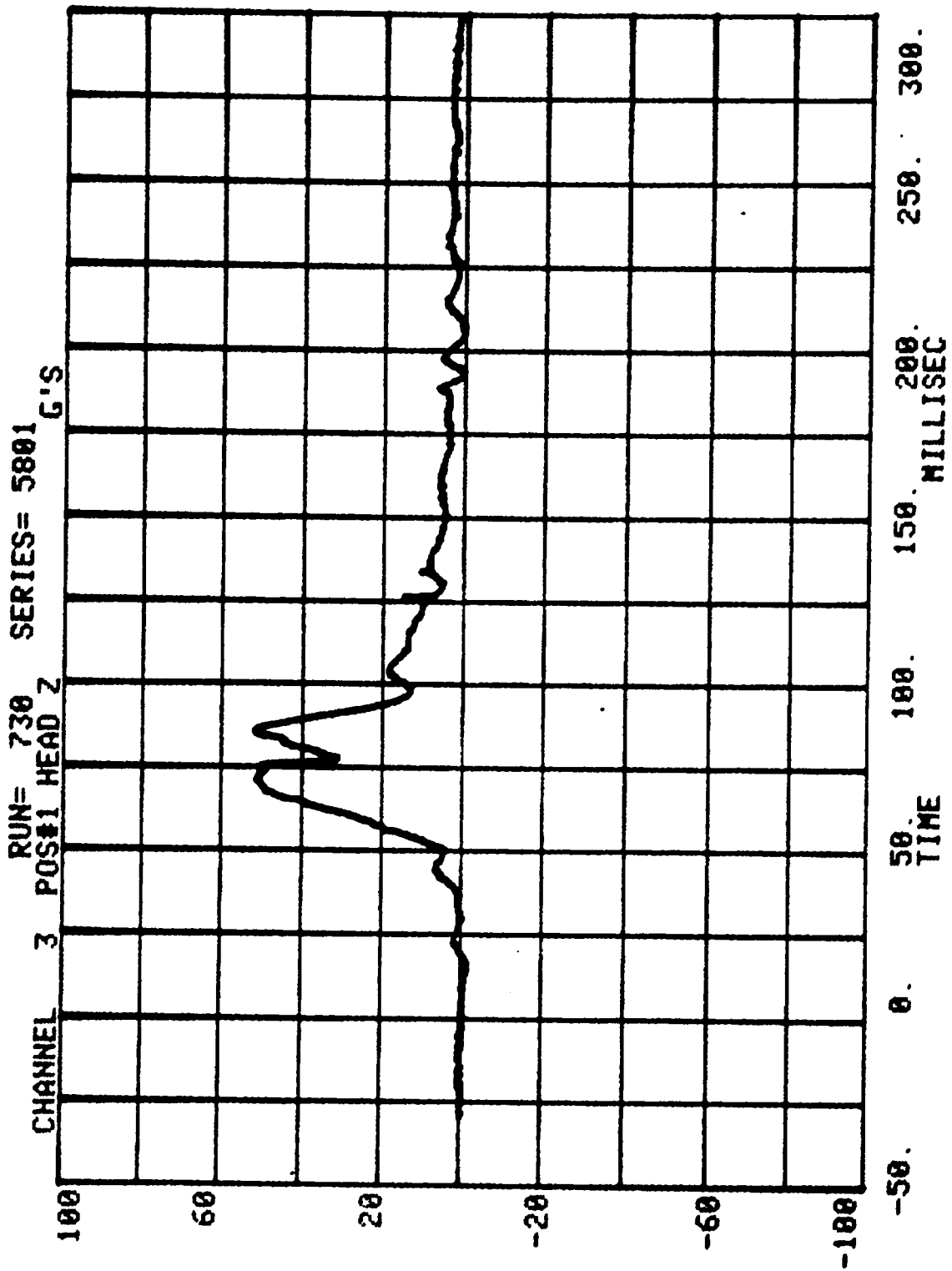
RUN= 730

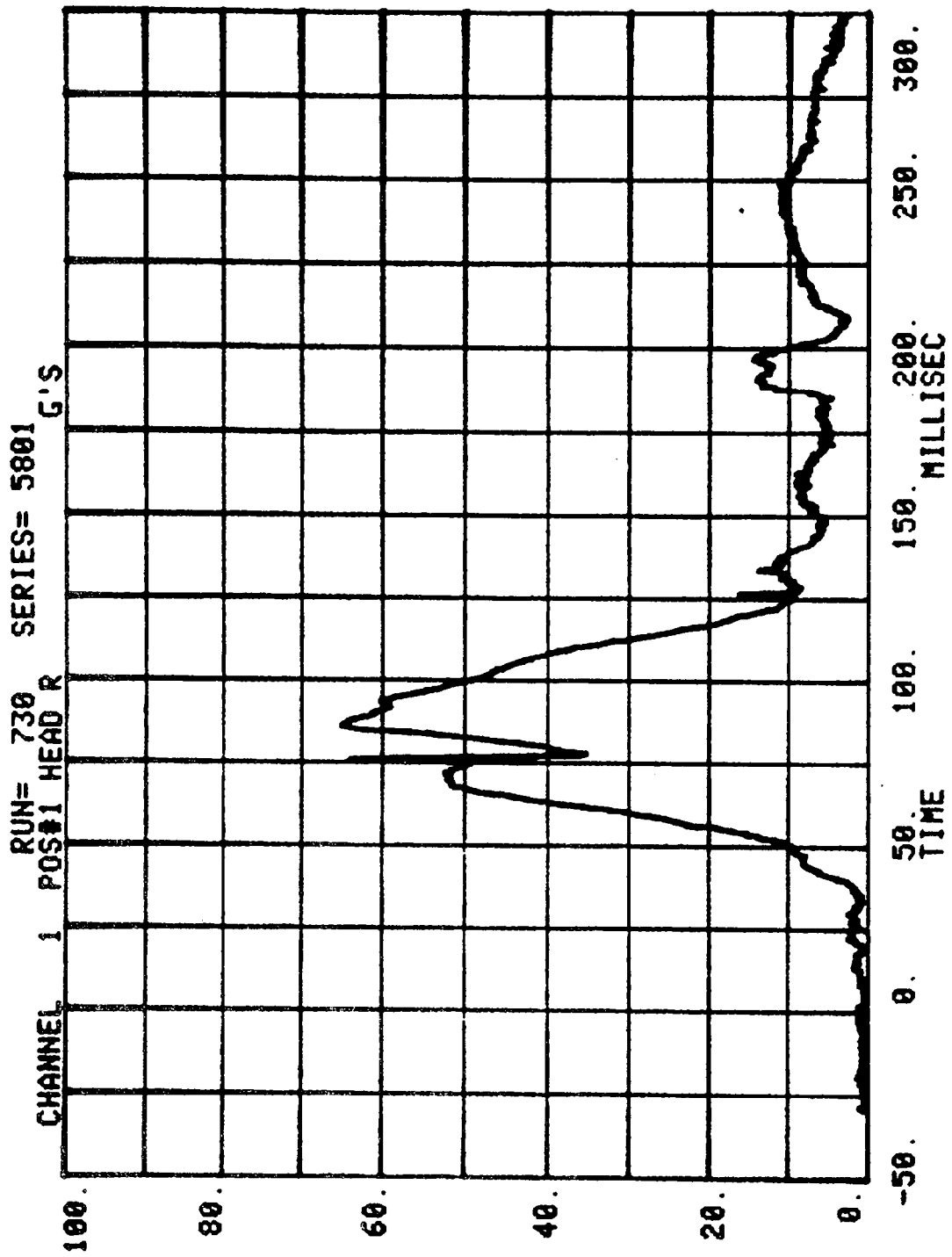
POS#1 HEAD R

HIC= 895.7 FROM T1= .05970 TO T2= .11362
AVERAGE ACCELERATION BETWEEN T1 AND T2= 48.8G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=1028.4

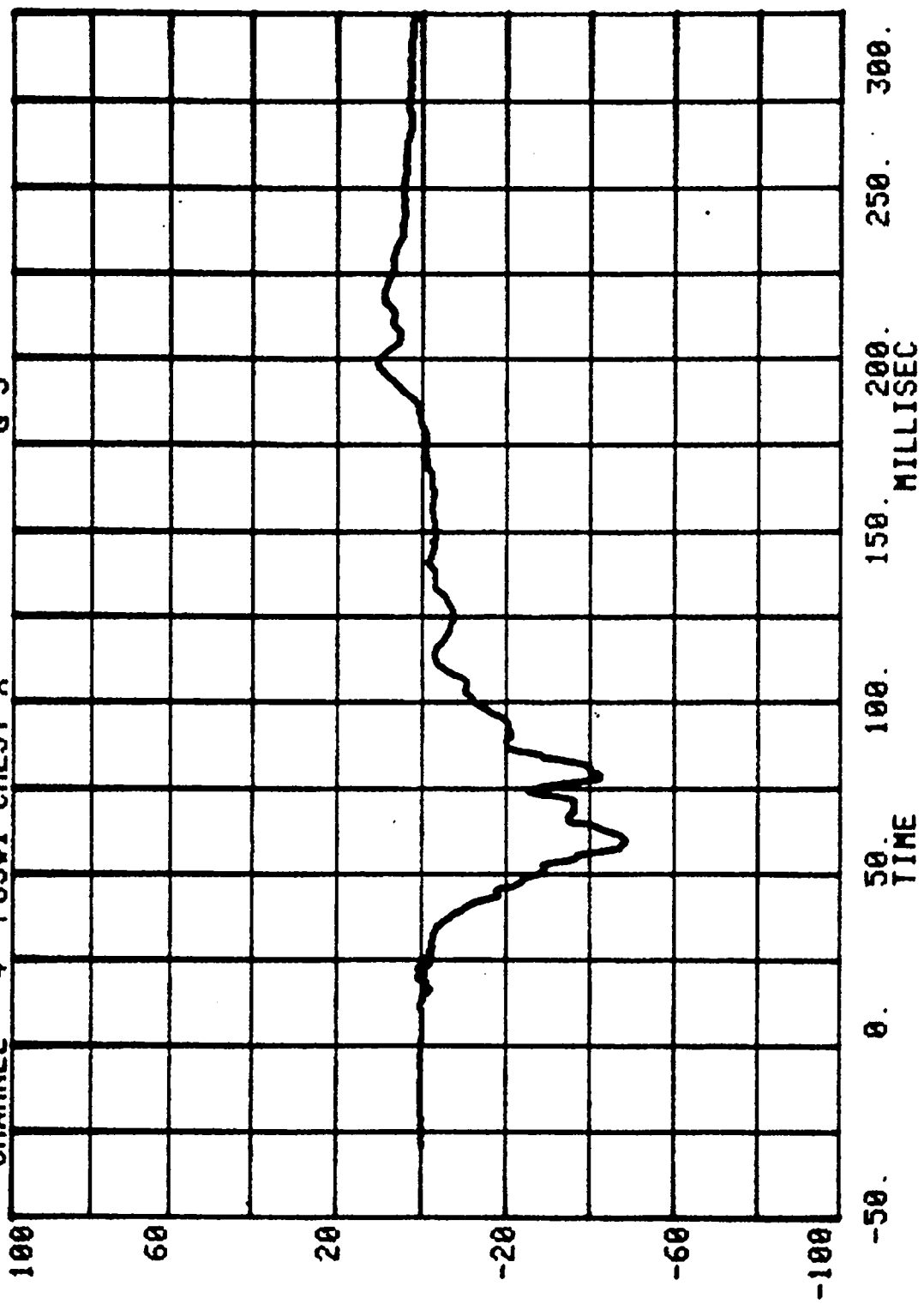


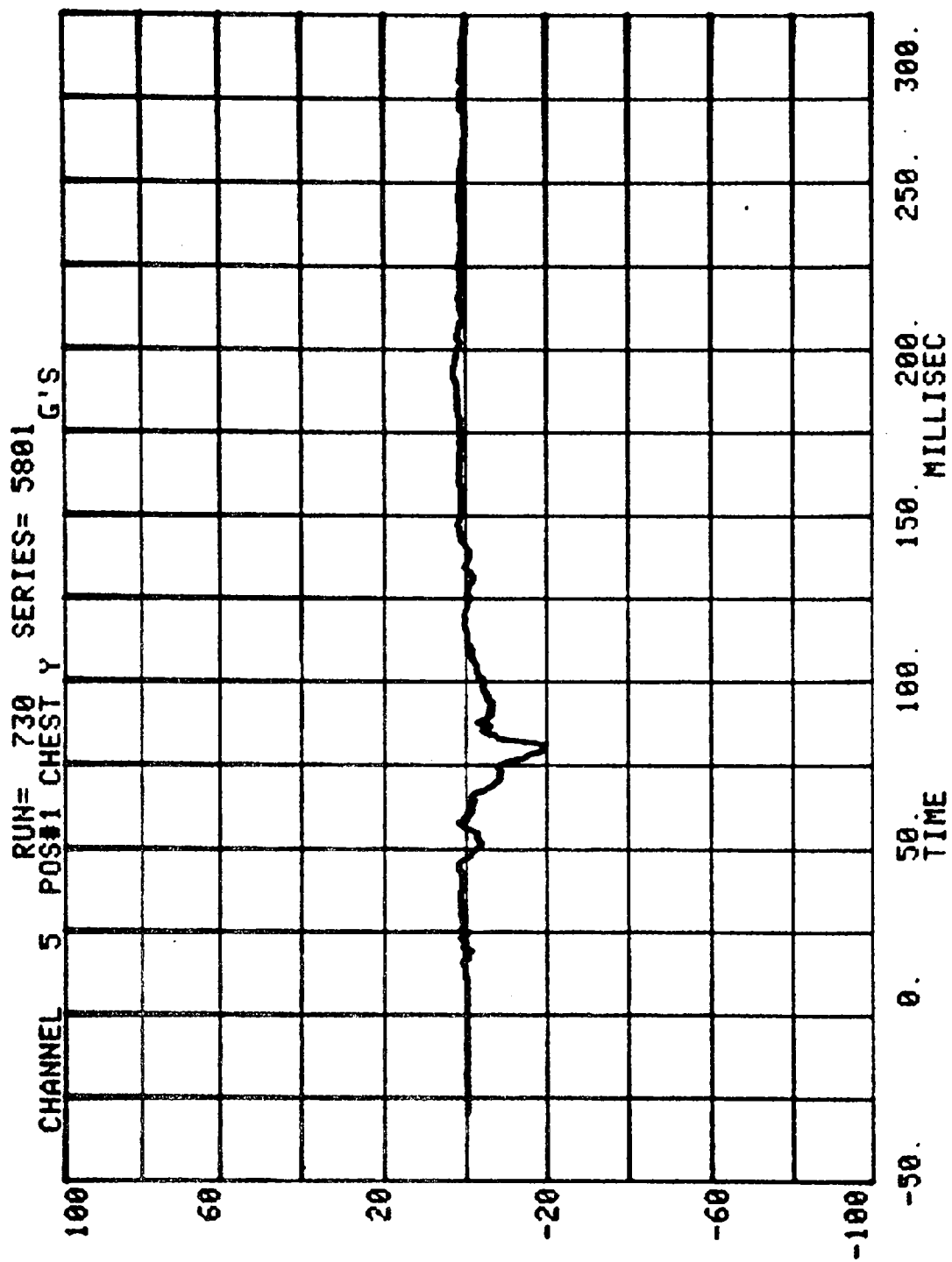


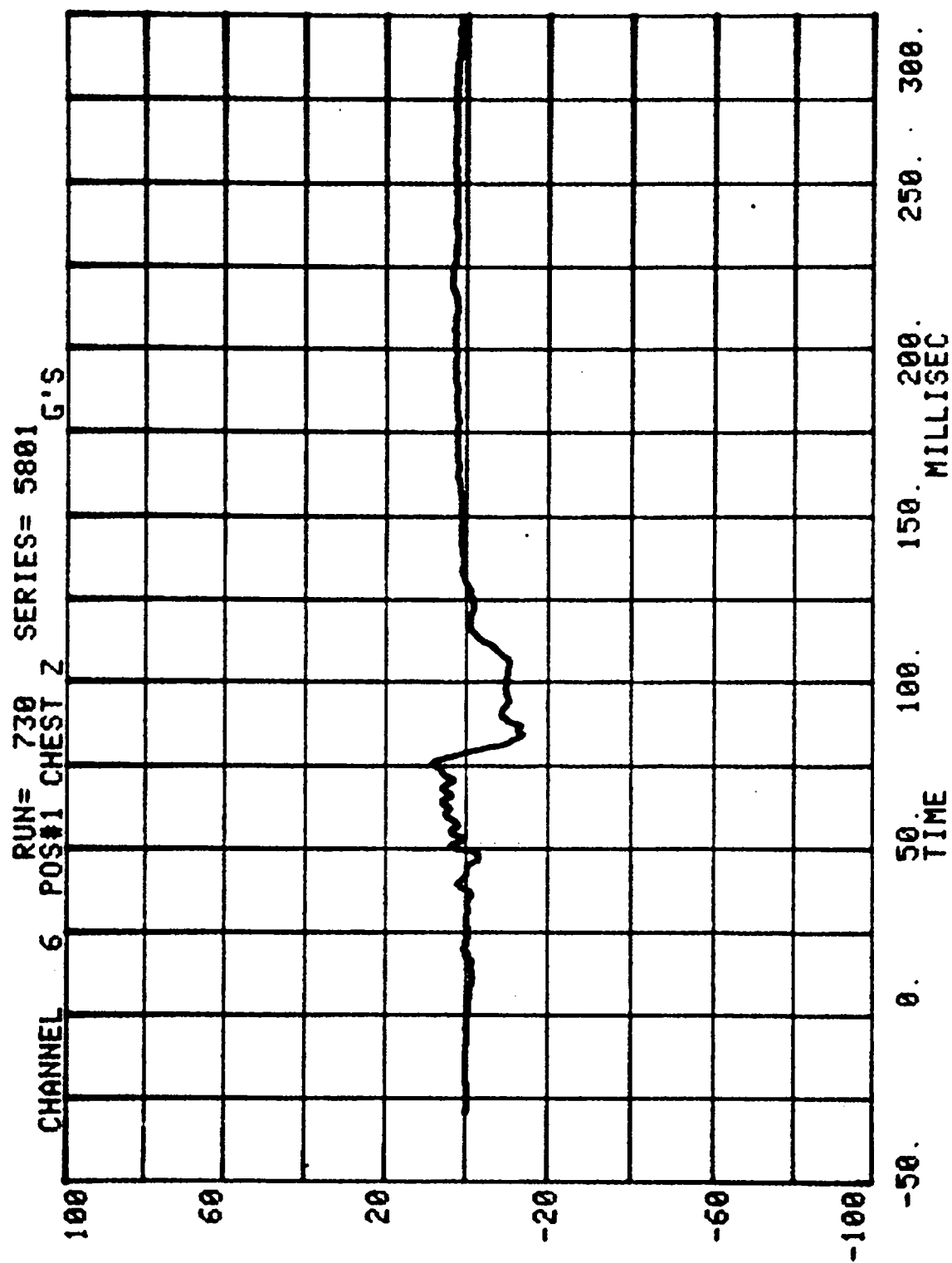


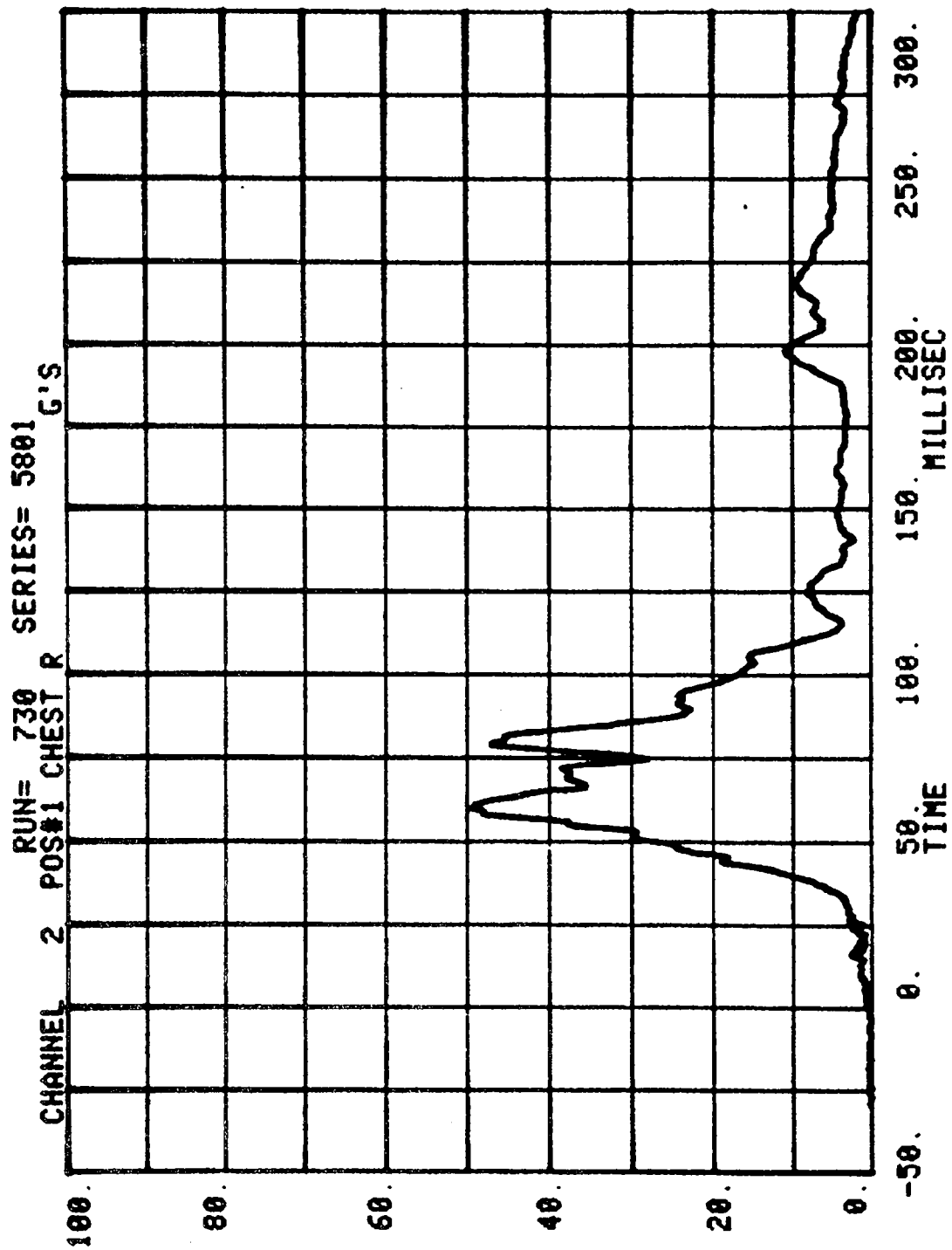


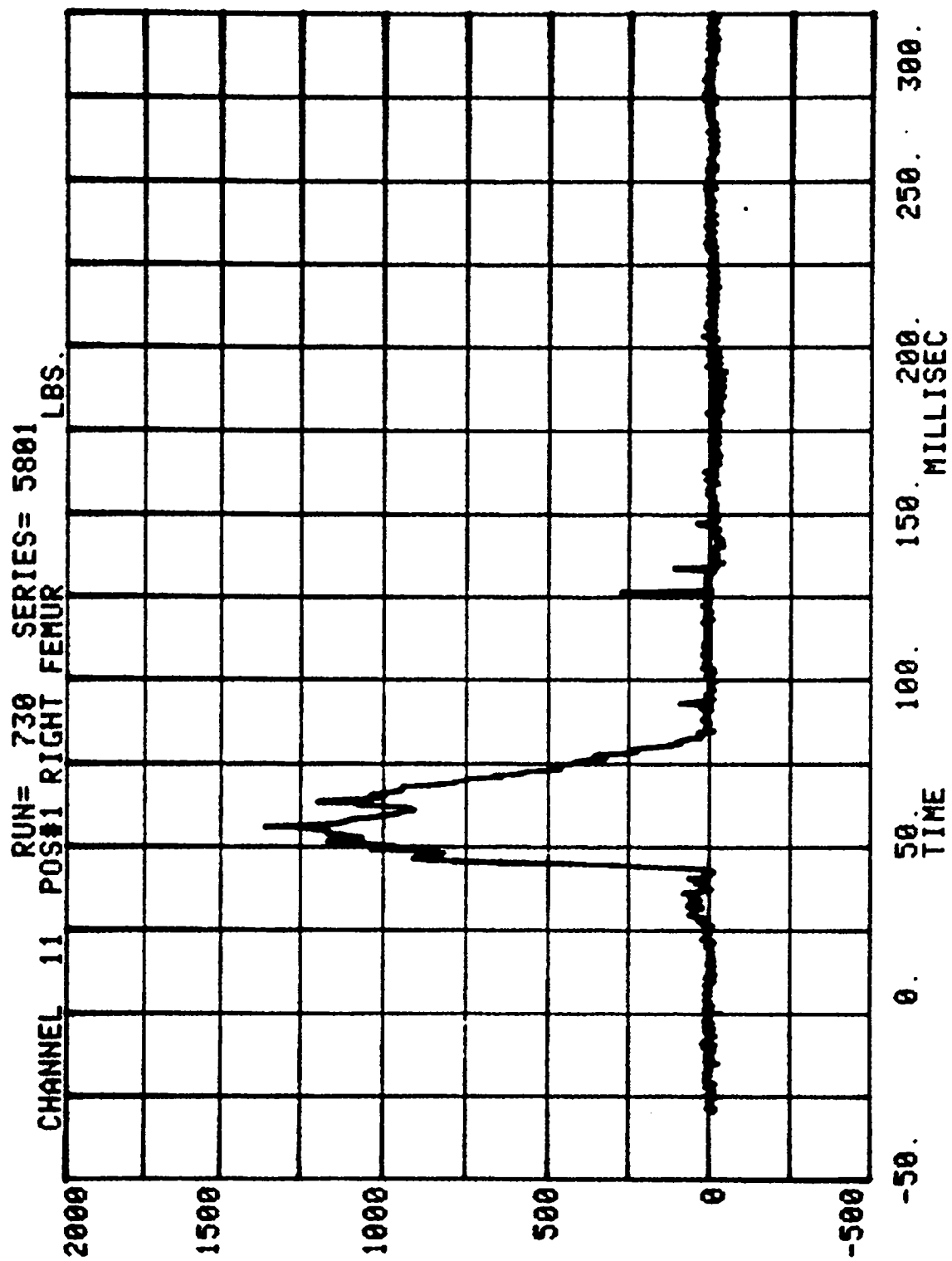
CHANNEL 4 POS#1 CHEST X RUN= 730 SERIES= 5801 G'S

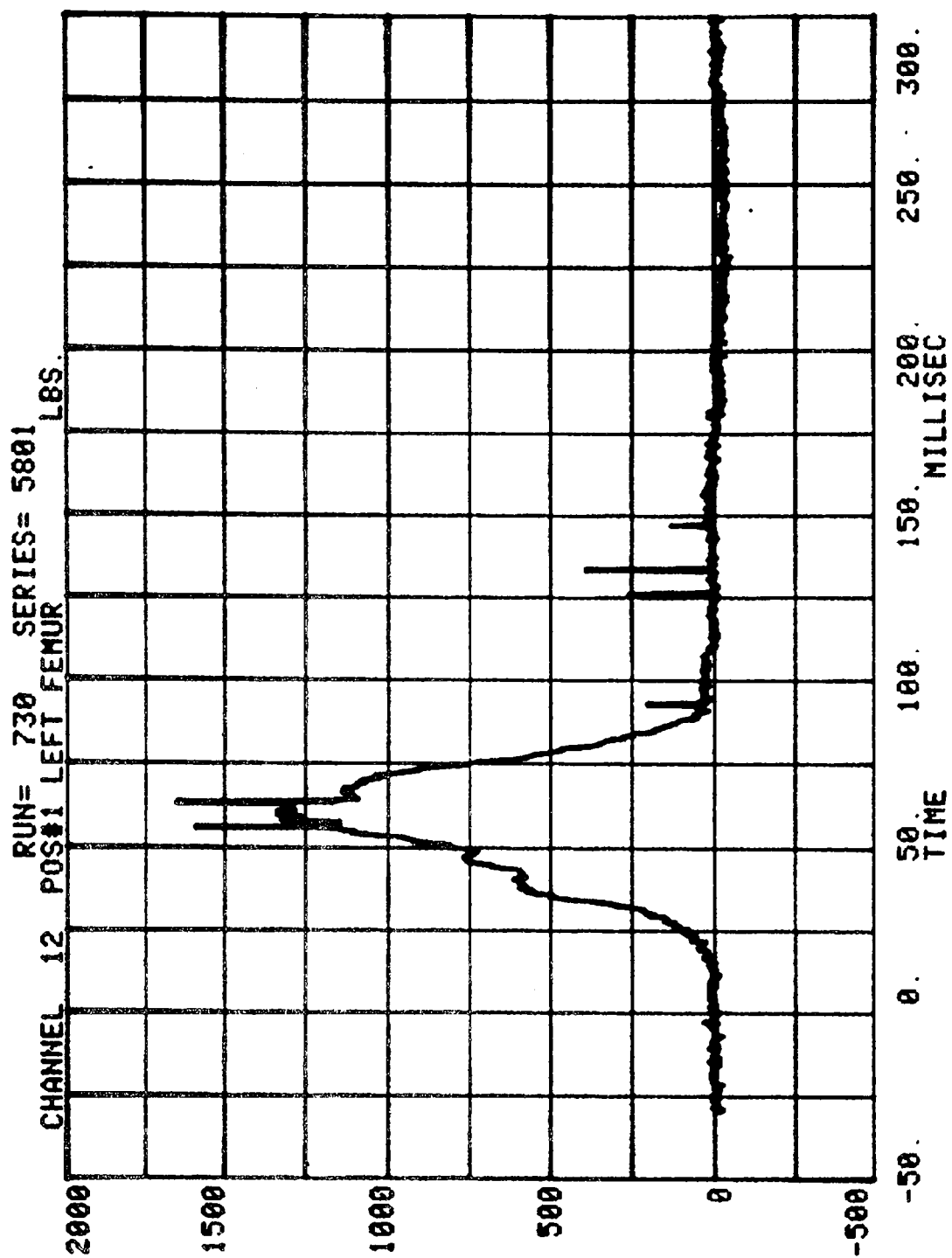


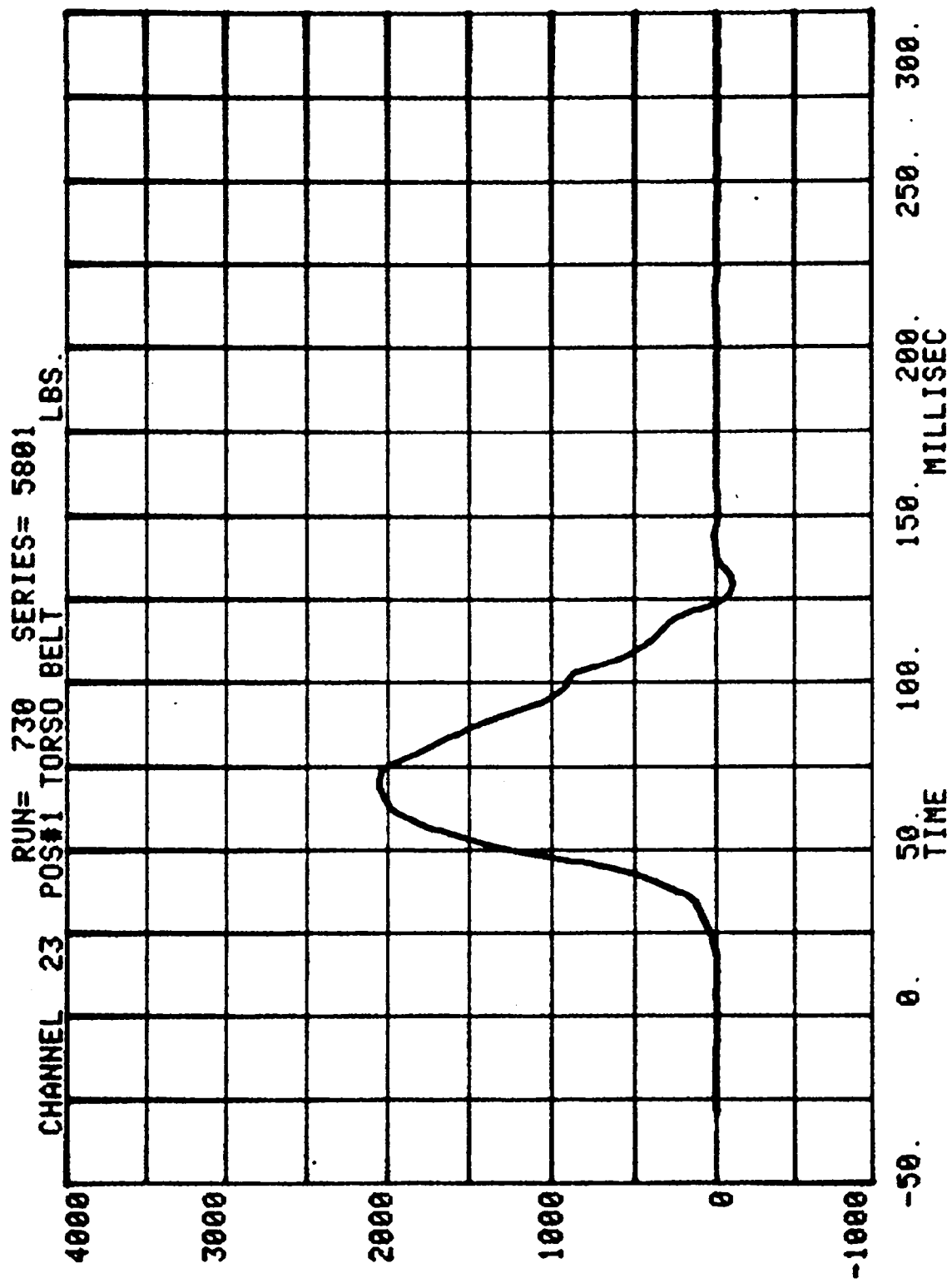








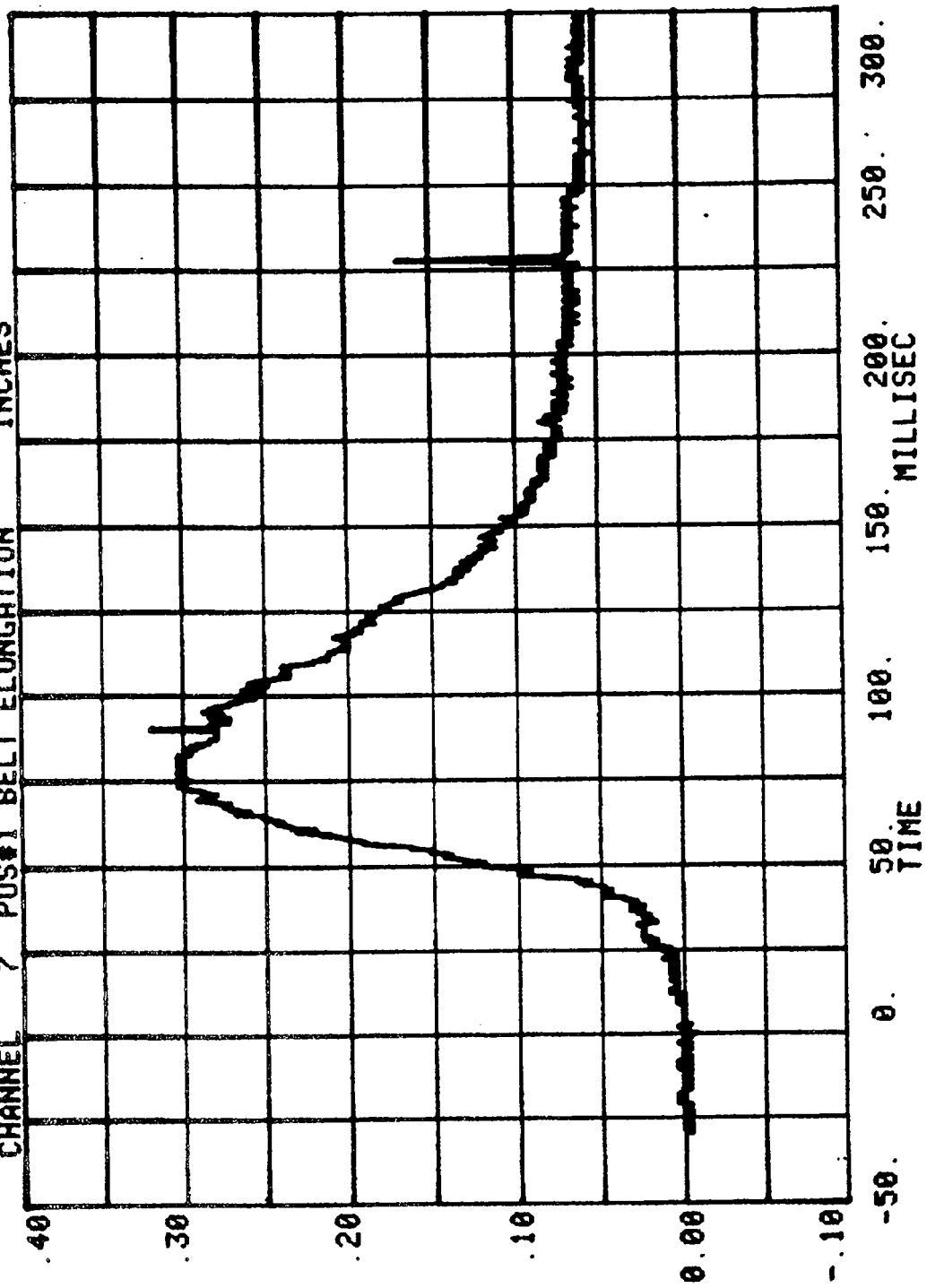




MEASURED OVER 2.5 INCHES

CHANNEL 7 POS#1 BELT ELONGATION

RUN= 730 SERIES= 5801



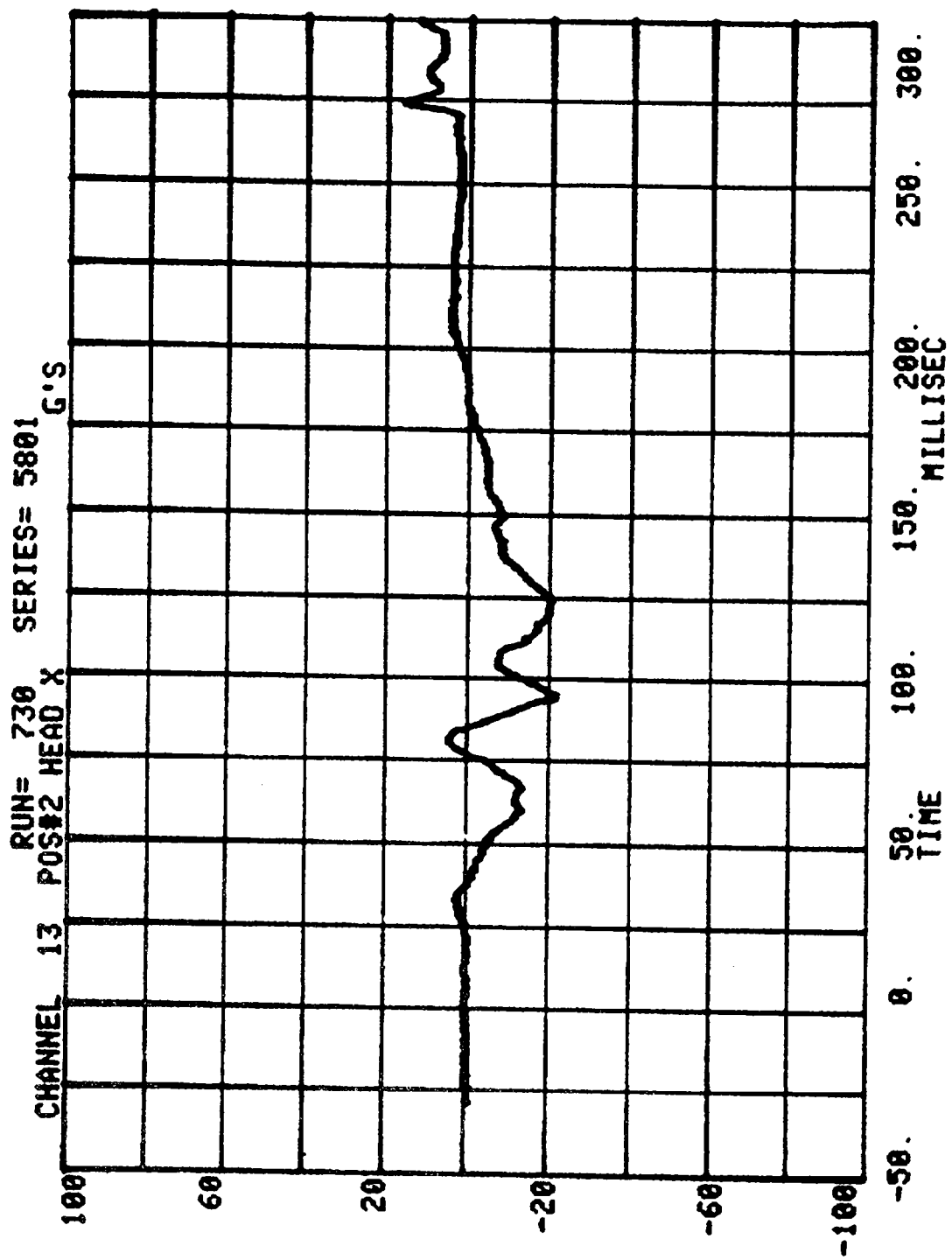
HEAD INJURY CRITERION
HEAD SEVERITY INDEX

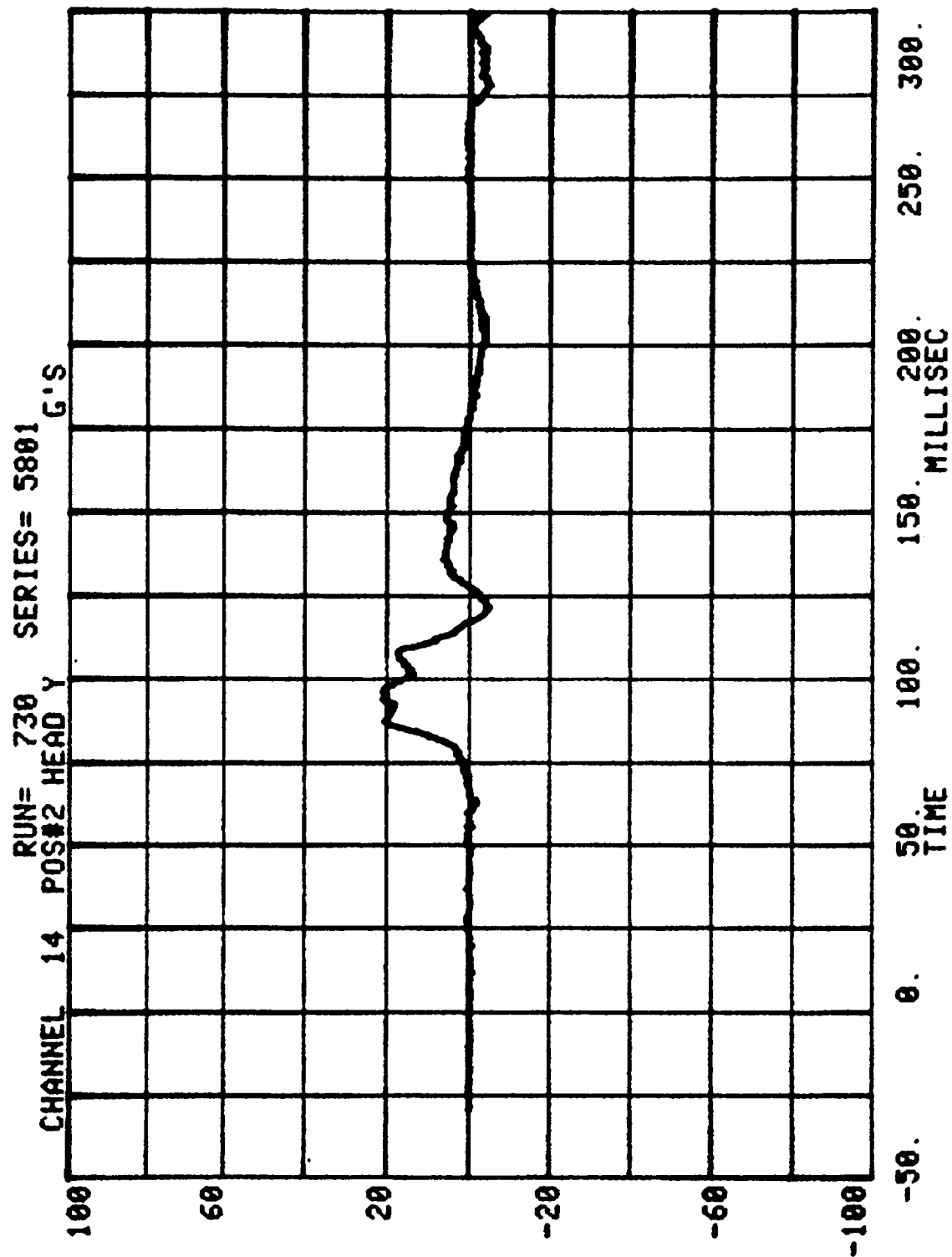
NEW CAR ASSESSMENT BARRIER TESTS - 1986

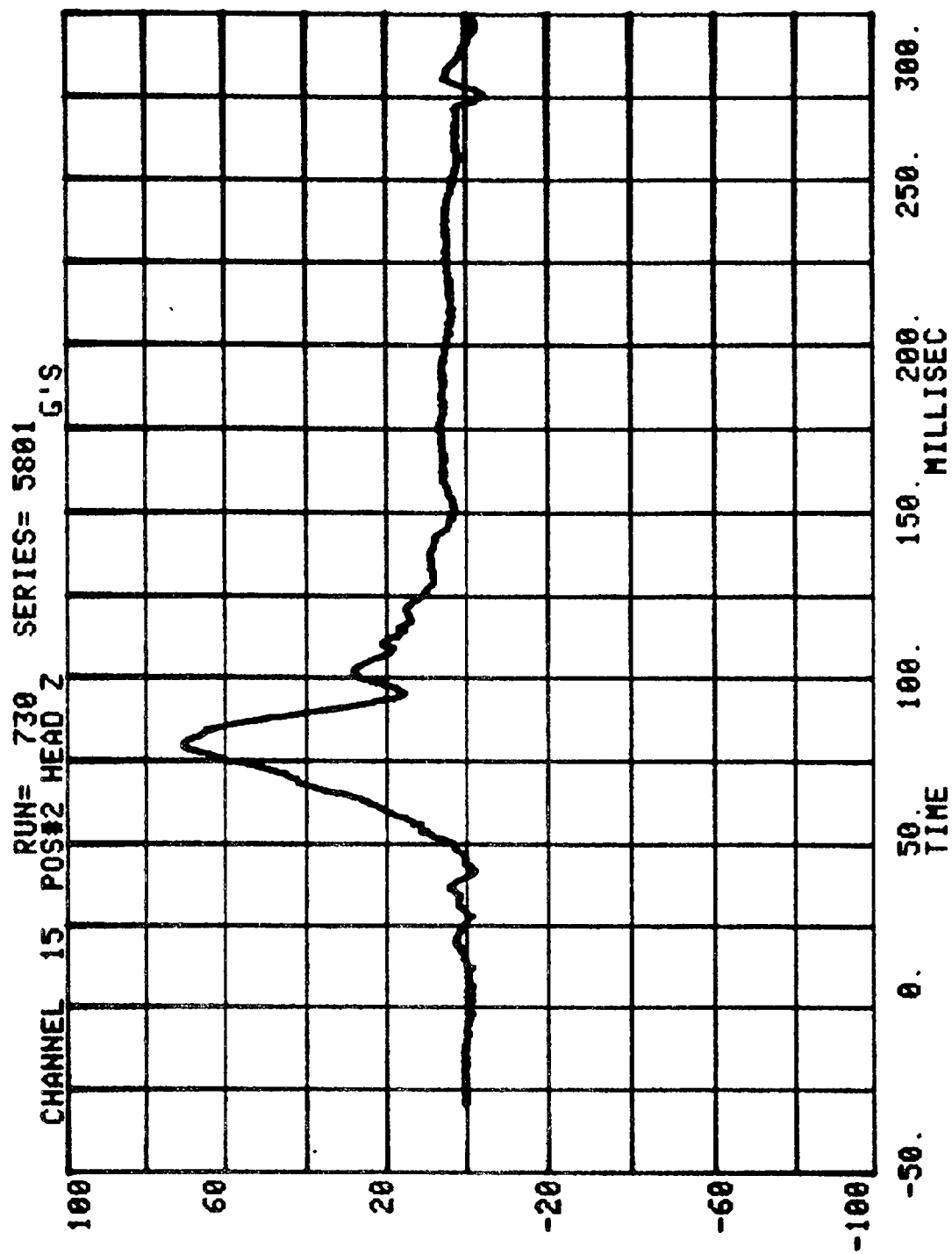
RUN= 730

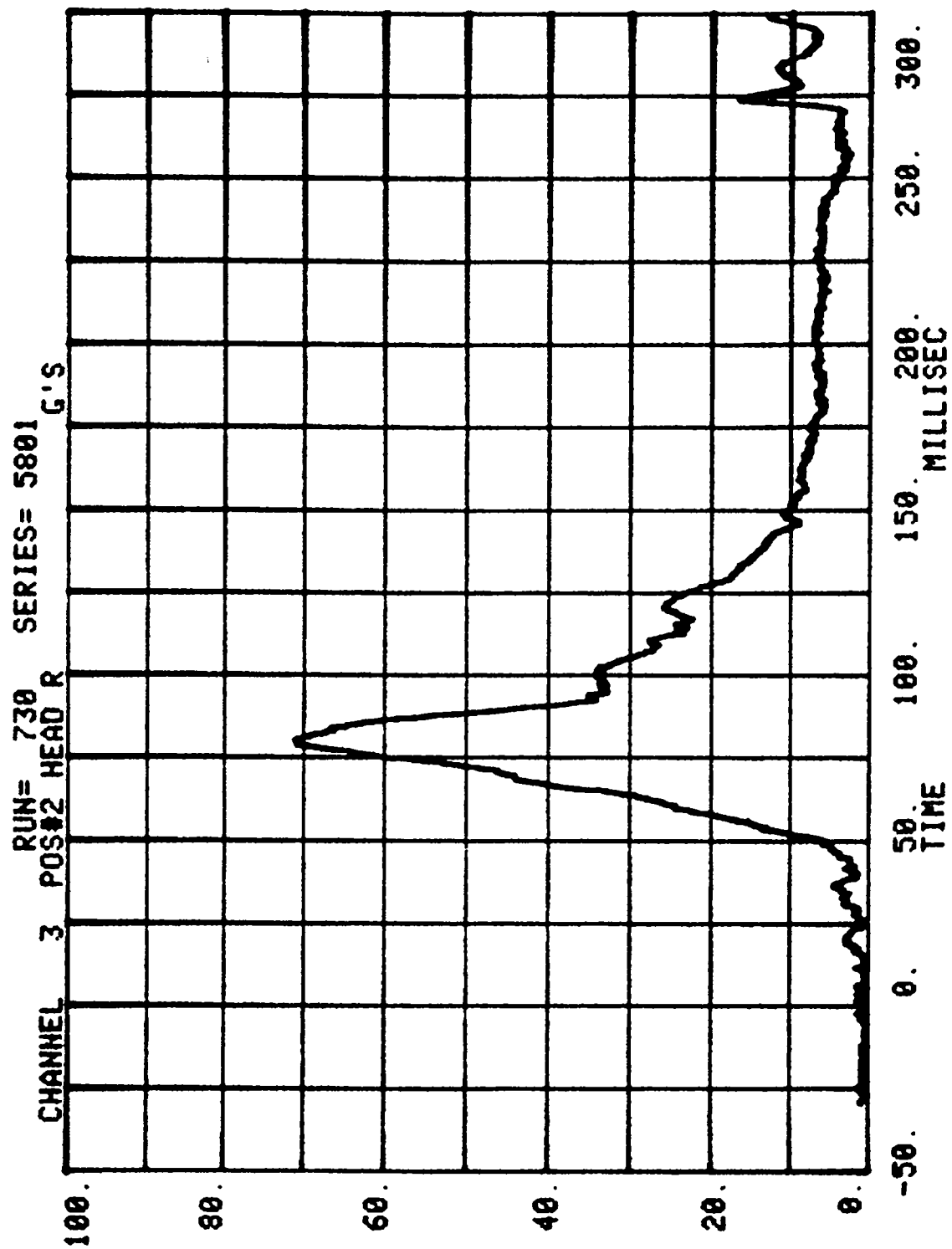
POS#2 HEAD R

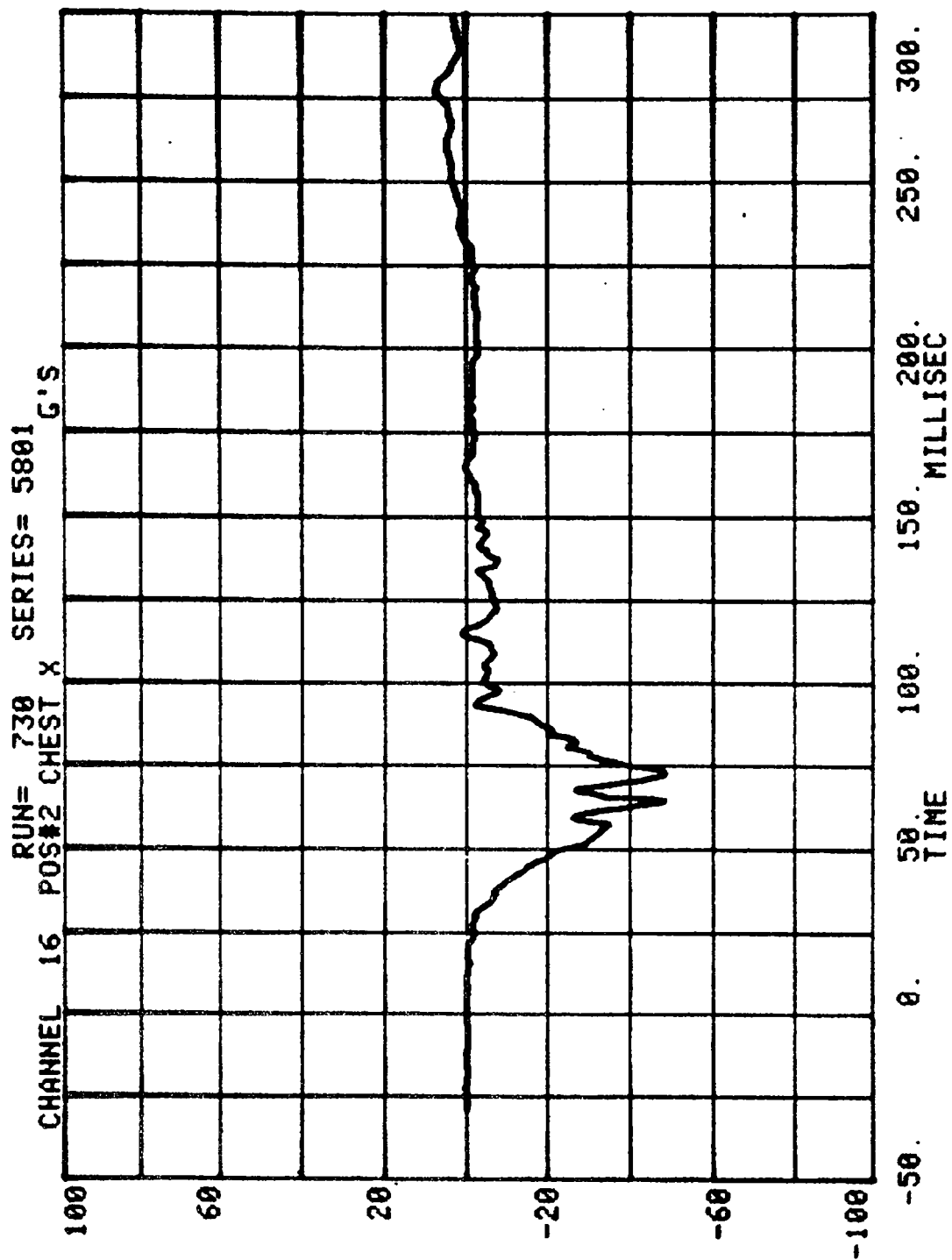
HIC= 644.3 FROM T1= .06217 TO T2= .11160
AVERAGE ACCELERATION BETWEEN T1 AND T2= 44.3G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX= 881.3

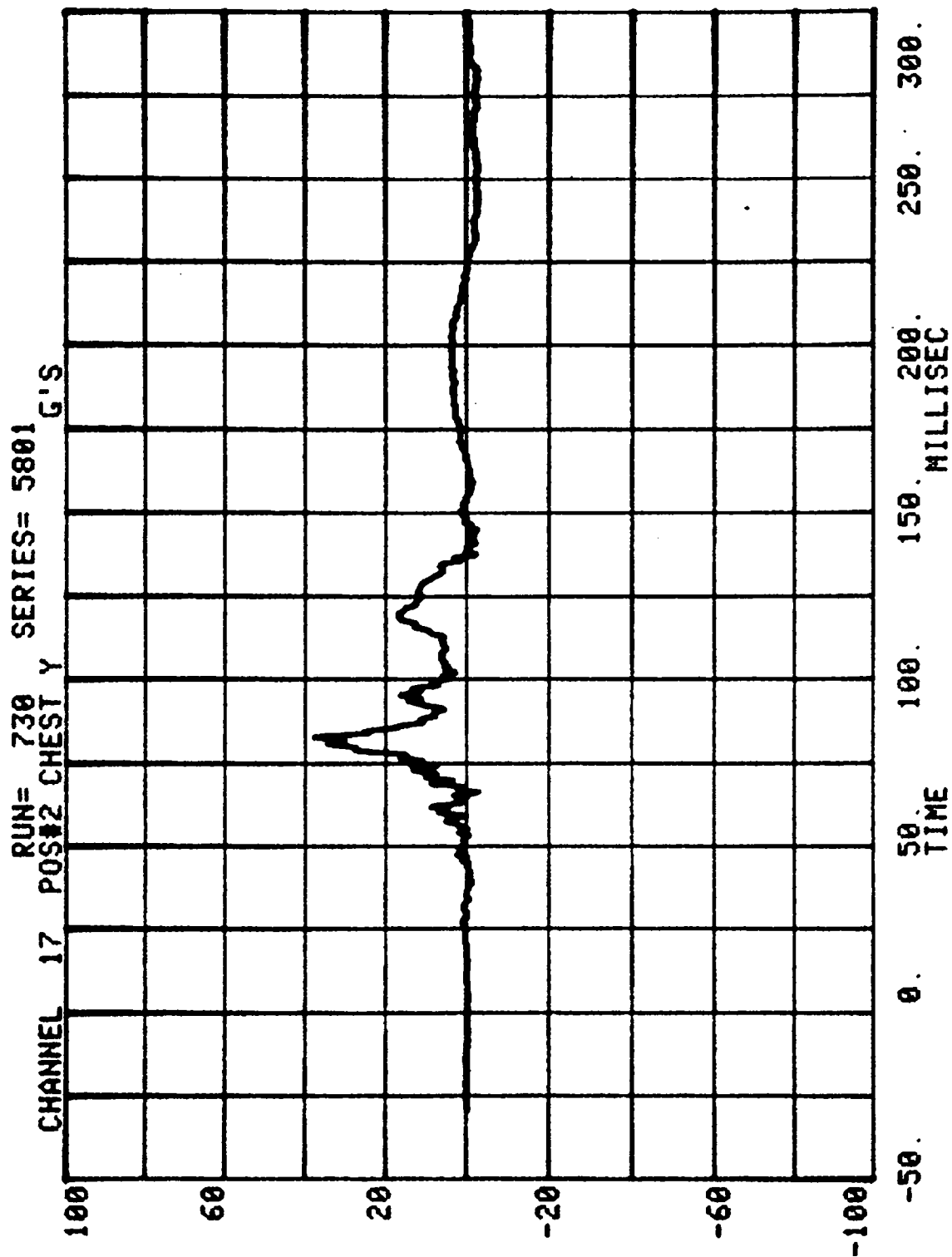


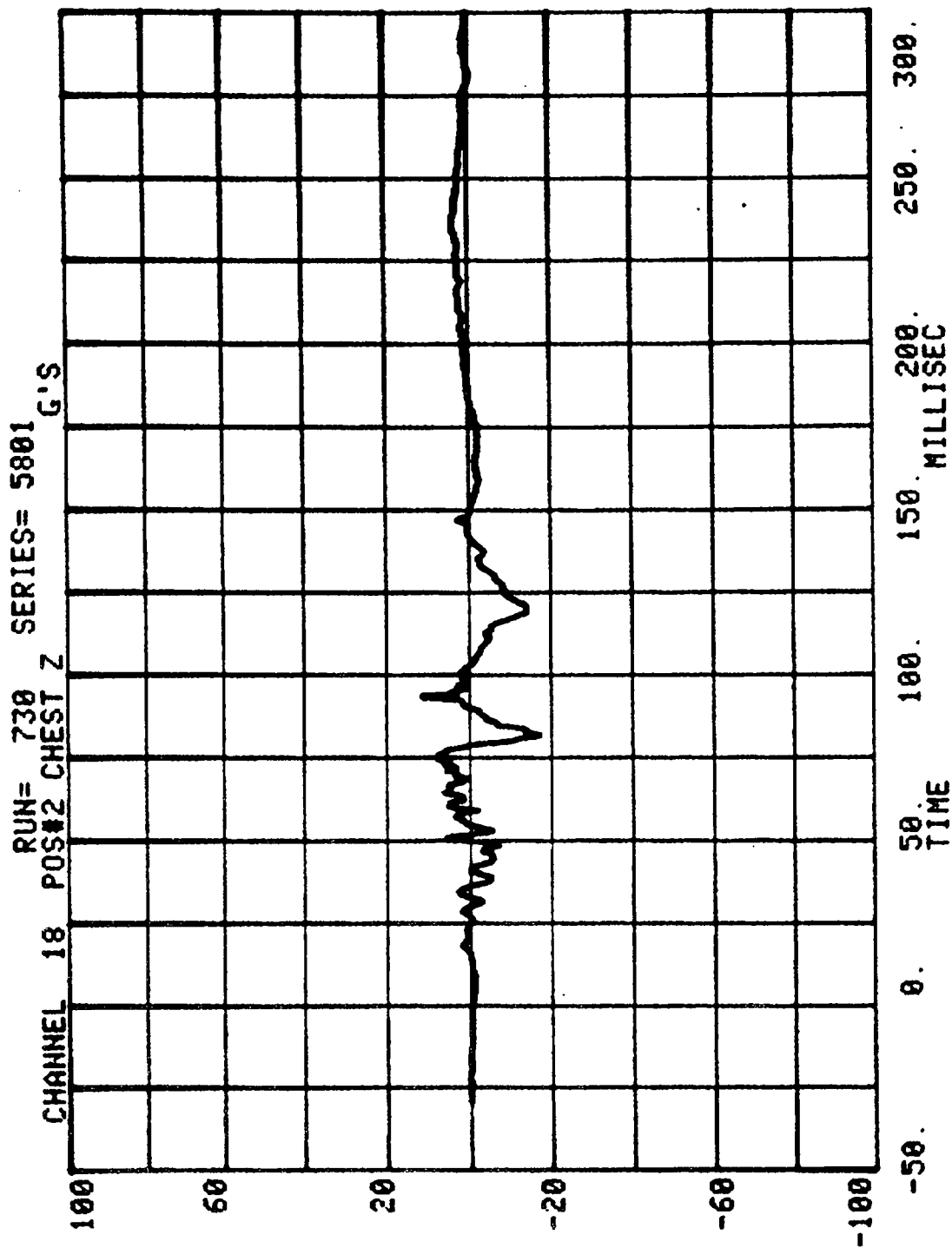


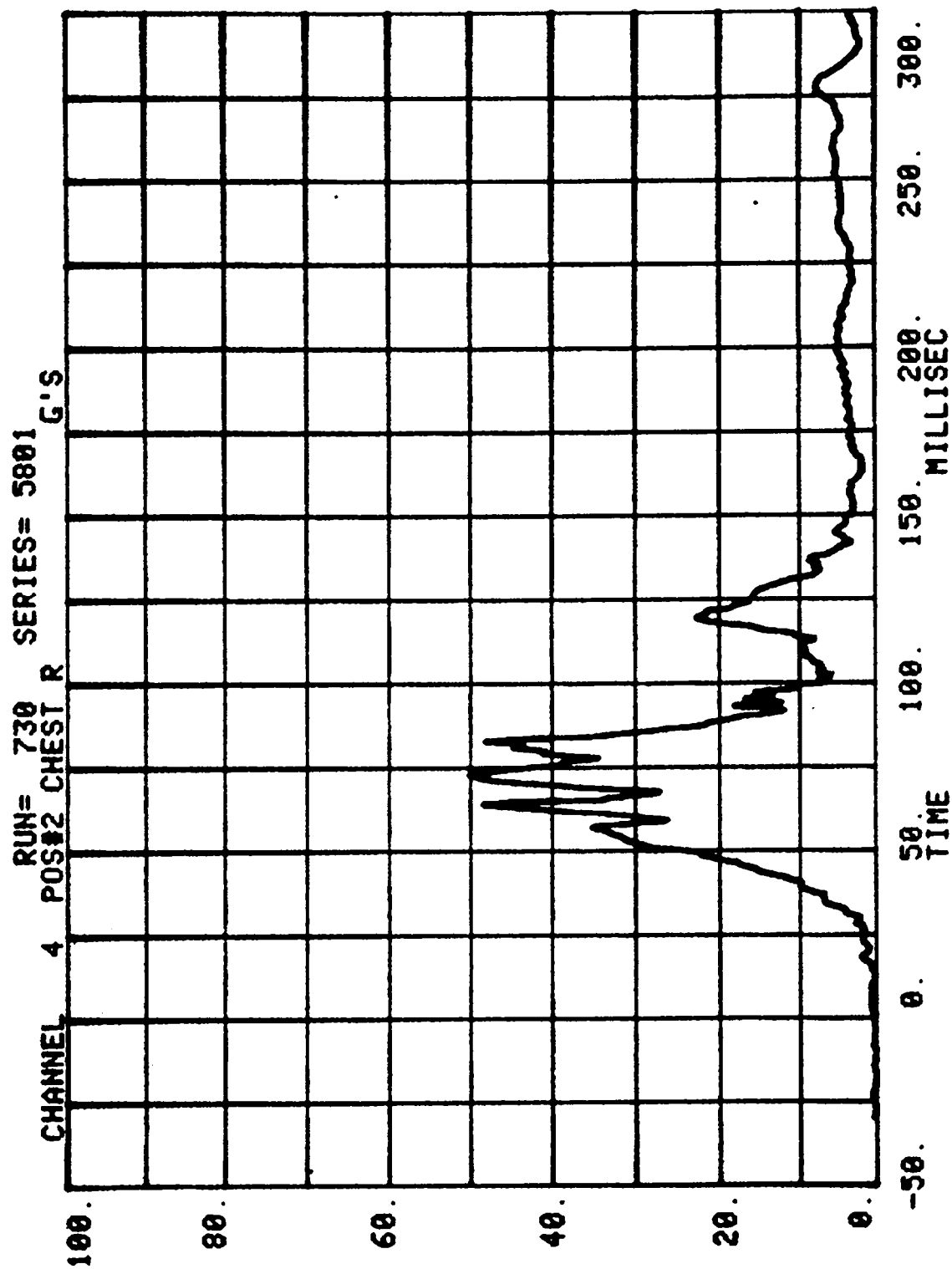


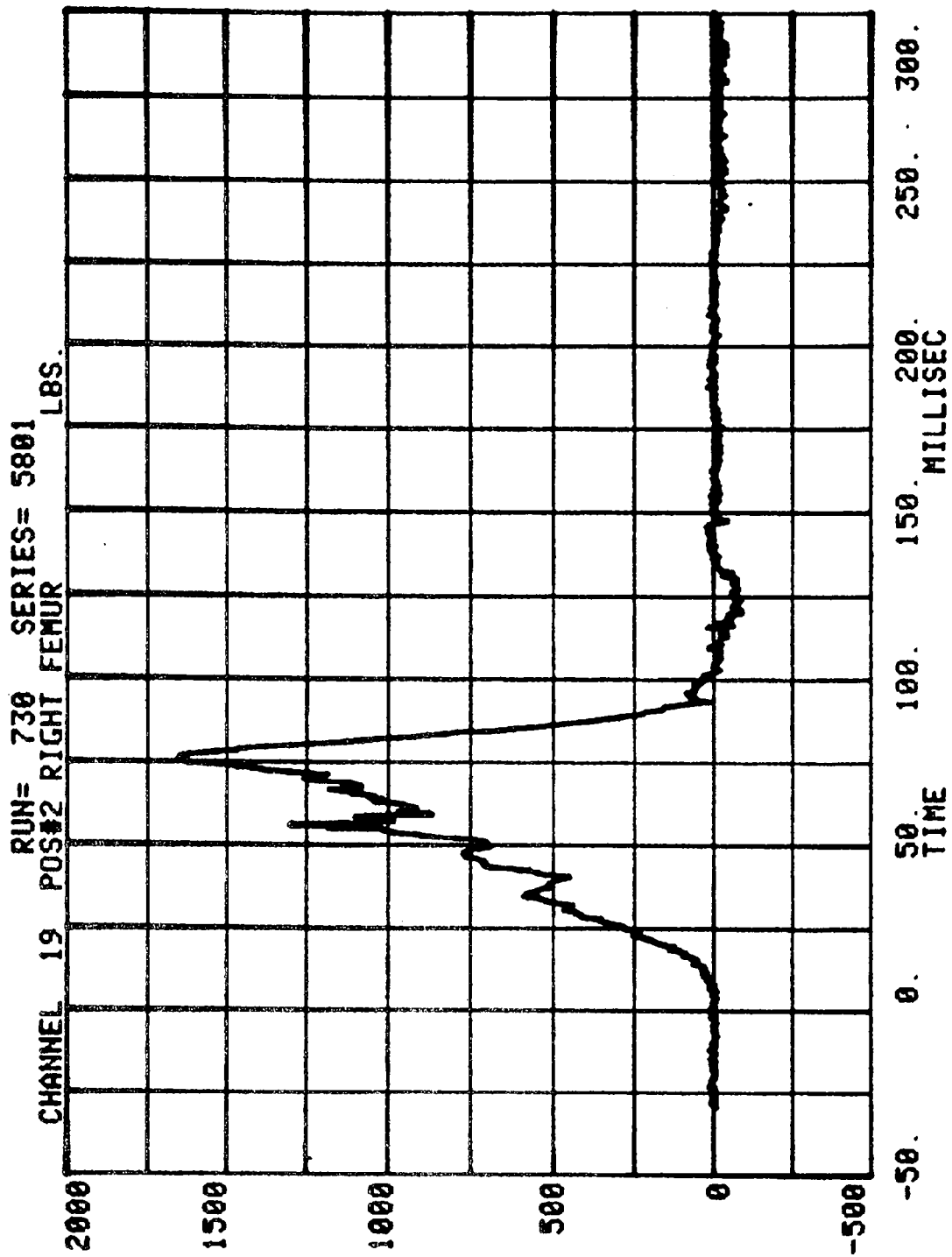




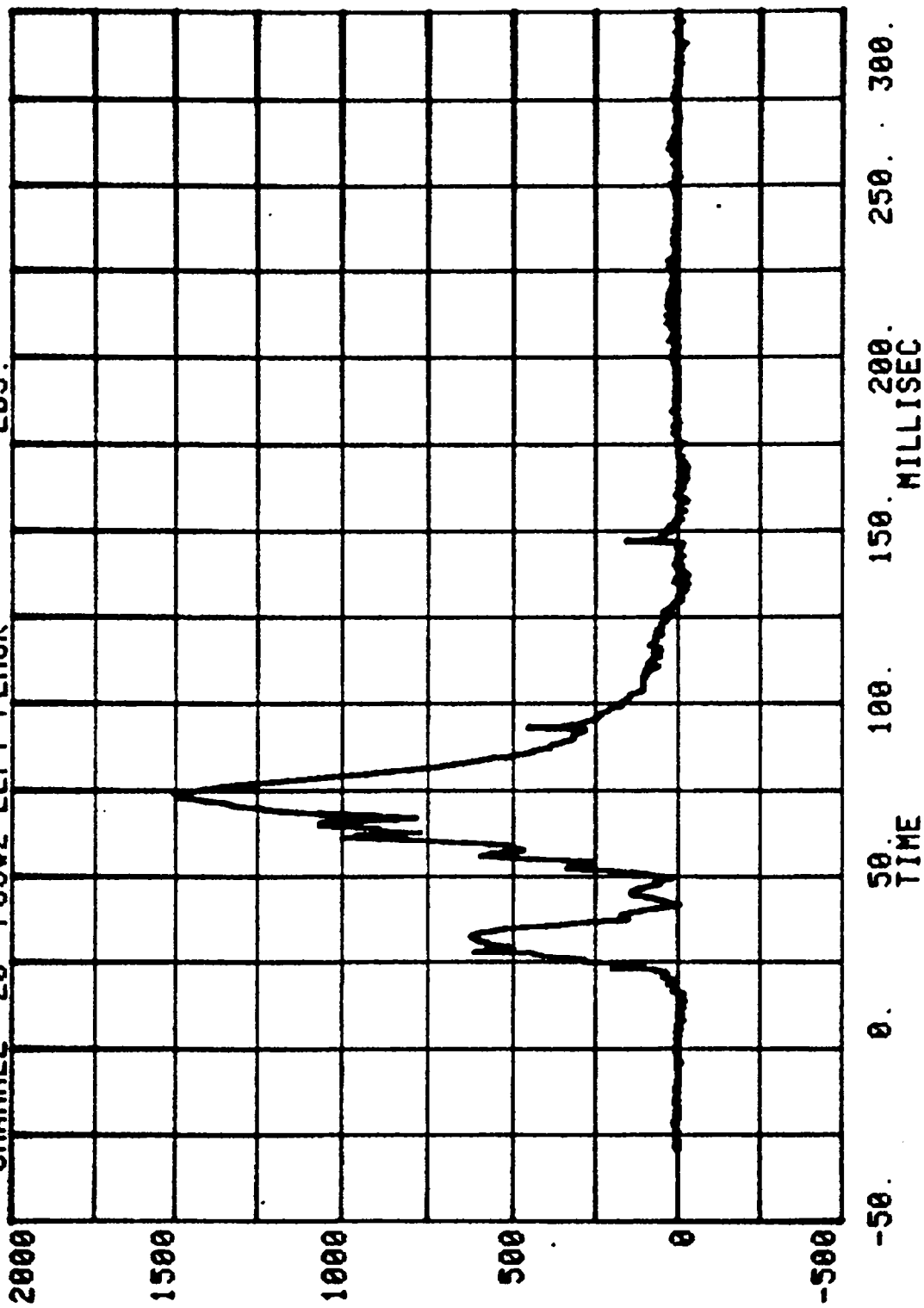


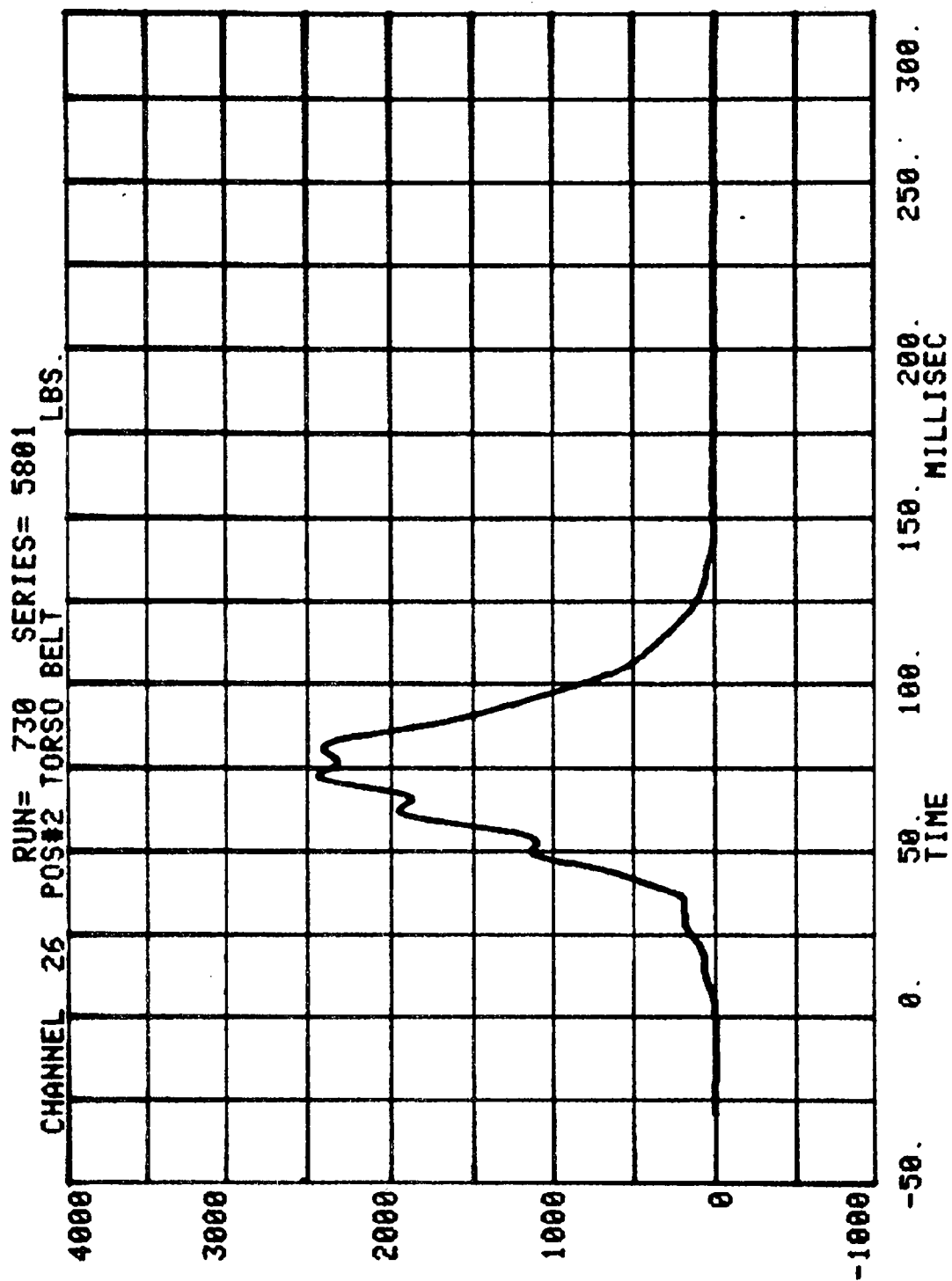




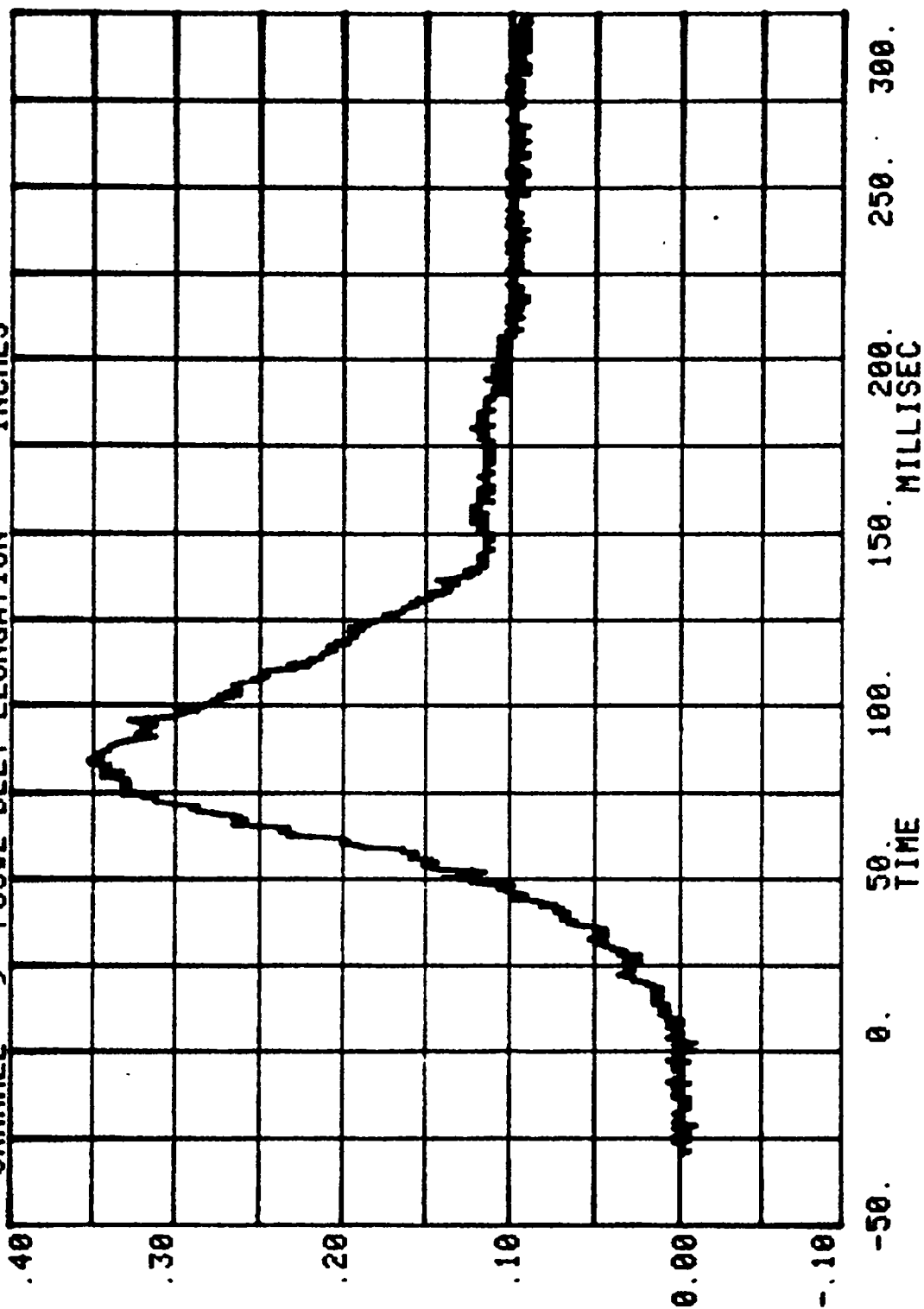


RUN= 730 SERIES= 5801 LBS.
CHANNEL 20 POS#2 LEFT FEMUR





CHANNEL 9 POS#2 BELT ELONGATION SERIES= 5801 MEASURED OVER 2.5 INCHES



APPENDIX C
DUMMY CERTIFICATION TESTS

Appendix C contains the results from certification tests performed on the 50th percentile male anthropometric 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	5-6-86
1022	4-4-86

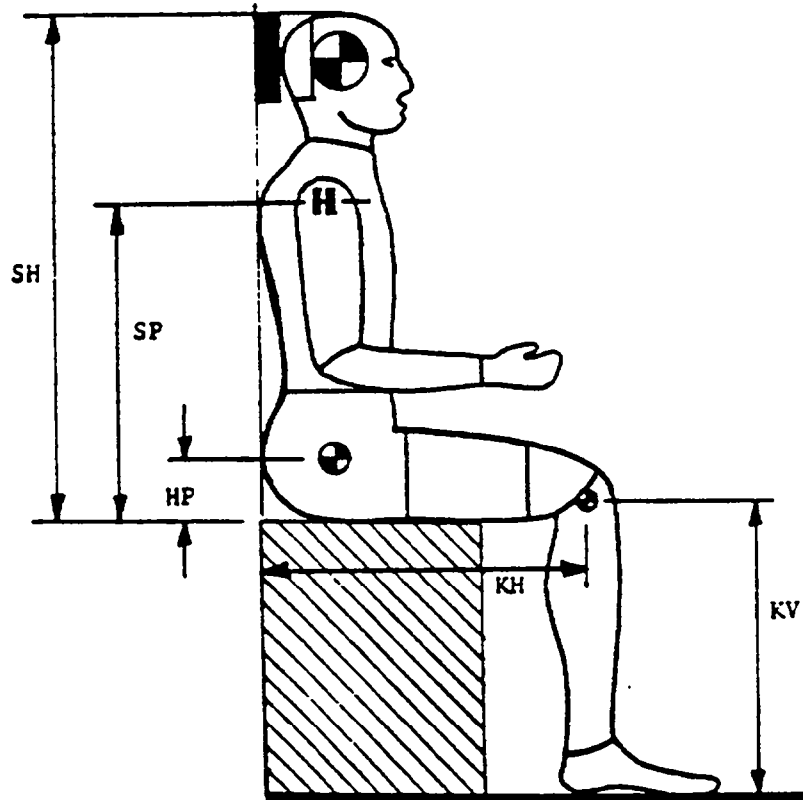
Electronic Test Equipment

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		5-6-86	
VERIFICATION NUMBER FOR DUMMY*		4	
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"	14.8"	

TECHNICIAN'S NAME: DWH

* 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: DWH

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION-----		5-6-86	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*-----		4	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----		70-72 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)		22-35 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST--			
a. Peak Resultant Accel.-	210 to 260G	247g	
b. Peak Lateral Accel.-	≤ - 10G	6g	
c. Time above 100G- - -	0.9 to 1.5ms	1.38 ms	
2. NECK BENDING TEST--			
a. Pendulum Speed - - -	21.5 to 25.5 fps	23.4 fps	
b. Pend. Avg. Decel. over t ₃ - t ₂	20 to 24G	23.5g	
c. Peak Resultant Head Acceleration - - - -	26G max.	23.5g	
d. Pendulum Decel.(t ₂ -t ₁)	≤ - 3ms	2.5 ms	
e. Pendulum Decel.(t ₃ -t ₂)	25 to 30 ms	27 ms	
f. Pendulum Decel.(t ₄ -t ₃)	≤ - 10ms	6 ms	
g. Max. Head Rotation -	63 to 73°	68°	
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	30.2 ms	
	Displ.- 2.1 to 3.1"	3.0"	
60°	Time- - 40.3 to 51.7ms	46.5 ms	
	Displ.- 4.3 to 5.3"	5.2"	
Maximum (68 °)	Time- - 53.2 to 66.8ms	61.5 ms	
	Displ.- 5.0 to 6.0"	5.7"	

*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: DWH

TEST PARAMETER		SPECIFICATION	Pre-Test (if required)	Post-Test (if required)
2. <u>NECK BENDING TEST</u>....				
Continued:				
h. Chordal Displacement:				
Head Rotation Angle--				
60°	Time	67.0 to 83.0 ms	74 ms	
	Displ.	4.3 to 5.3 in.	5.0"	
30°	Time	85.4 to 104.6 ms	98 ms	
	Displ.	2.1 to 3.1 in.	2.7"	
0°	Time	101.0 to 123.0 ms	107.7 ms	
	Displ.	-.5 to 0.5 in.	0.0"	
3. <u>ABDOMINAL COMPRESSION TEST:</u>				
(Preload = 10 pounds)				
a. Force @ .5"- - - - -		23 to 36 lbs.	28 lbs	
b. Force @ .75"- - - - -		36 to 50 lbs.	44 lbs	
c. Force @ 1.0"- - - - -		50 to 63 lbs.	60.5 lbs	
d. Force @ 1.3"- - - - -		73 to 88 lbs.	83 lbs	
4. <u>LUMBAR FLEXION TEST:</u>				
a. Force @ 20°- - - - -		22 to 34 lbs.	29.5 lbs	
b. Force @ 30°- - - - -		34 to 46 lbs.	36.5 lbs	
c. Force @ 40°- - - - -		46 to 58 lbs.	47.5 lbs	
d. Return Angle - - - - -		12° maximum	8.5°	
5. <u>CHEST IMPACT TESTS:</u>				
a. High Speed				
(1) Probe Speed- - - - -		21.78-22.22 fps	21.85 fps	
(2) Peak Deflection- - - - -		1.7" maximum	1.48"	
(3) Peak Resistive Force- - - - -		2250 lbs. maximum	2111.5	
(4) Internal Hysteresis - - - - -		50 to 70%	59.3%	
b. Low Speed				
(1) Probe Speed- - - - -		13.86-14.14 fps	13.89 fps	
(2) Peak Deflection- - - - -		1.1" maximum	.96"	
(3) Peak Resistive Force- - - - -		1450 lbs. maximum	1261 lbs	
(4) Internal Hyster. - - - - -		50 to 70%	54.5%	

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

II. PERFORMANCE VERIFICATION DATA (Continued)

NHTSA DUMMY I.D. NO.: 1019

TECHNICIAN'S NAME: DWH

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.	1910 lbs	
(3) Time Above 1000g-	1.7 ms minimum	1.96 ms	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.97 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1870 lbs	
(3) Time Above 1000g-	1.7 ms minimum	2.0 ms	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1019

CALIB. SEQ. NOS. FOR DUMMY: 4

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

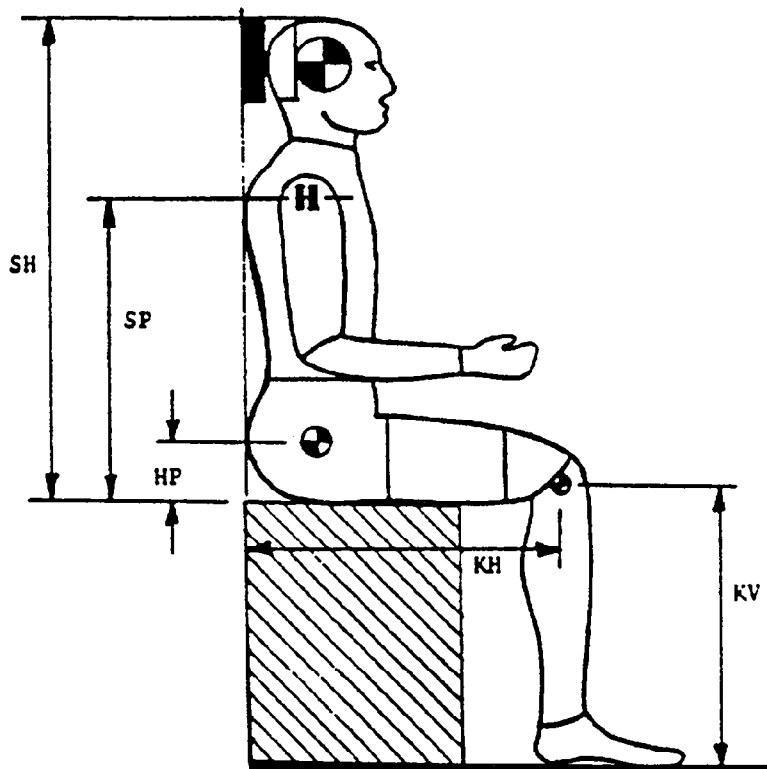
5. Abdominal Compression Test Displacement Gauge

MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
--	--	--	--
Endevco	CL60	4/86	10/86
Endevco	CG34	4/86	10/86
Endevco	CN24	4/86	10/86
--	--	--	--
CEC	A129 18341	4/86	10/86
Endevco	CN64	4/86	10/86
CEC	A56 22705	4/86	10/86
GSE	311	4/86	10/86
GSE	312	4/86	10/86
CEC	18259 A128	4/86	10/86
CEC	17815	4/86	10/86
Transducer Inc.	20051	4/86	10/86
BLH	72952	4/86	10/86
CIC	567-11	4/86	10/86

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NO.: 1022

I. CONFIGURATION VERIFICATION DATA:



	P. 572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION		4-4-86	
VERIFICATION NUMBER FOR DUMMY*		3	
SH - Seated Height- - - - -	35.6 to 35.8"	35.6"	
SP - Shoulder Pivot Height- - -	21.8 to 22.4"	22.0"	
HP - Hip Pivot Height - - - - -	3.9" ref.	3.9"	
KH - Knee Pivot from back line- -	20.1 to 20.7"	20.4"	
KV - Knee Pivot from floor- - -	19.3 to 19.9"	19.6"	
SW - Shoulder Width - - - - -	17.8 to 18.4"	18.1"	
HW - Hip Width- - - - -	14.0 to 15.4"	14.3"	

TECHNICIAN'S NAME: DWH

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

II. PERFORMANCE VERIFICATION DATA:

NHTSA DUMMY I.D. NO.: 1022

TECHNICIAN'S NAME: DWH

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION-----			4-4-86	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*-----			3	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----			70-72 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)			22-35 %	%
TEST PARAMETER		SPECIFICATION		
1. HEAD DROP TEST--				
a. Peak Resultant Accel.-	210 to 260G	230 g		
b. Peak Lateral Accel.-	≤ - 10G	6 g		
c. Time above 100G- - -	0.9 to 1.5ms	1.16 ms		
2. NECK BENDING TEST--				
a. Pendulum Speed - - -	21.5 to 25.5 fps	21.9 fps		
b. Pend. Avg. Decel. over t ₃ - t ₂	20 to 24G	23 g		
c. Peak Resultant Head Acceleration - - - -	26G max.	20 g		
d. Pendulum Decel.(t ₂ -t ₁)	≤ - 3ms	3 ms		
e. Pendulum Decel.(t ₃ -t ₂)	25 to 30 ms	26.2 ms		
f. Pendulum Decel.(t ₄ -t ₃)	≤ - 10ms	7.8 ms		
g. Max. Head Rotation - -	63 to 73°	69°		
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	30.7 ms	
	Displ.-	2.1 to 3.1"	3.0"	
60°	Time- -	40.3 to 51.7ms	46.4 ms	
	Displ.-	4.3 to 5.3"	5.3"	
Maximum	Time- -	53.2 to 66.8ms	58.7 ms	
(69 °)	Displ.-	5.0 to 6.0"	5.8"	

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

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

II. PERFORMANCE VERIFICATION DATA (Continued)

NHTSA DUMMY I.D. NO.: 1022

TECHNICIAN'S NAME: DWH

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	74 ms	
	Displ.	4.3 to 5.3 in.	5.1"	
30°	Time	85.4 to 104.6 ms	87.5 ms	
	Displ.	2.1 to 3.1 in.	2.6"	
0°	Time	101.0 to 123.0 ms	107 ms	
	Displ.	-.5 to 0.5 in.	0	
3. ABDOMINAL COMPRESSION TEST:				
(Preload = 10 pounds)				
a. Force @ .5" - - - -		23 to 36 lbs.	26 lbs	
b. Force @ .75" - - - -		36 to 50 lbs.	42 lbs	
c. Force @ 1.0" - - - -		50 to 63 lbs.	58 lbs	
d. Force @ 1.5" - - - -		73 to 88 lbs.	85 lbs	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - -		22 to 34 lbs.	27 lbs	
b. Force @ 30° - - - -		34 to 46 lbs.	38.5 lbs	
c. Force @ 40° - - - -		46 to 58 lbs.	47.5 lbs	
d. Return Angle - - - -		12° maximum	7°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed- - -	21.78-22.22 fps	22.1 fps		
(2) Peak Deflection- -	1.7" maximum	1.38"		
(3) Peak Resistive Force- - - - -	2250 lbs. maximum	2236 lbs		
(4) Internal Hysteresis - - -	50 to 70%	63.8%		
b. Low Speed				
(1) Probe Speed- - -	13.86-14.14 fps	13.91 fps		
(2) Peak Deflection- -	1.1" maximum	.92"		
(3) Peak Resistive Force- - - - -	1450 lbs. maximum	1378 lbs		
(4) Internal Hyster. - - -	50 to 70%	60.8%		

DUMMY CONFIG. & PERF. VERIF. DATA....Continued:II. PERFORMANCE VERIFICATION DATA (Continued)

NHTSA DUMMY I.D. NO.: 1022

TECHNICIAN'S NAME: DWH

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.	2300 lbs	
(3) Time Above 1000g/-	1.7 ms minimum	1.84 ms	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.02 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1960 lbs	
(3) Time Above 1000g/-	1.7 ms minimum	1.96 ms	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1022

CALIB. SEQ. NOS. FOR DUMMY: 3

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

MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
--	--	--	--
Endevco	DB47	4/86	10/86
Endevco	CX05	4/86	10/86
Endevco	CJ54	4/86	10/86
--	--	--	--
CEC	A115 17839	4/86	10/86
Endevco	CS09	4/86	10/86
CEC	A29 16492	4/86	10/86
GSE	75	4/86	10/86
GSE	74	4/86	10/86
CEC	18259 A128	4/86	10/86
CEC	17815	4/86	10/86
Transducer Inc.	20051	4/86	10/86
BLH	72952	4/86	10/86
CIC	567-11	4/86	10/86

APPENDIX D

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

SAFETY BELTS

WARNING

■ For your and your passenger's protection, use safety belts at all times while the vehicle is in motion.

■ Safety belts must be properly positioned on the body. Improperly positioned safety belts can cause serious personal injury in case of an accident. Therefore heed all of the following warnings and instructions.

■ When fastening the lap/shoulder belt, the shoulder belt should be positioned midway over the shoulder — never across the neck. See illustration on next page.

■ The combination lap/shoulder belt on the front seats can be adjusted to fit over the body by using the seat height adjuster* or by having a shoulder height adjuster installed in your vehicle. Contact your VW dealer.

■ Children who are less than 12 years old should sit in the rear and should wear, depending on age, either a child restraint system or the existing safety belts:

— Infants or toddlers should be secured with a child restraint system designed for their size which conforms to Federal Regulation FMVSS 213.

*where applicable

When installing and using a child restraint system, always follow the instructions of the manufacturer.

— Children at about six years old and older may wear lap belts.

— If the child is big enough to wear a combination lap/shoulder belt, make sure that the shoulder belt is positioned midway over the shoulder — never across the neck of the child. See illustration on next page.

■ Do not strap in more than one person with each belt.

■ For maximum effectiveness, the lap belt must be worn low and tight across the pelvic crest.

■ Do not wear shoulder part of belt under your arm or otherwise out of position. This would increase the possibility of serious injury in case of an accident.

■ Belts should not be worn twisted.

■ Do not wear belts over rigid or breakable objects in or on your clothing, such as eye glasses, pens, keys, etc. as these may cause injury.

■ Several layers of heavy clothing may interfere with proper positioning of belts.

■ Belts must not rub against sharp objects.

■ Keep belt buckles free of any obstruction that may prevent secure locking.

■ Make sure that belt of the unoccupied passenger seat is fully wound up on its retractor, so that the belt tongue is in its stowed position. This reduces the possibility of the tongue becoming a striking object in case of a sudden stop.

■ Belts that have been subjected to excessive stretch forces in an accident must be replaced.

■ If belts show damage to webbing, bindings, buckles or retractors, they should be replaced.

■ If belts do not work properly, see your VW dealer.

■ Do not modify or disassemble the safety belts in your vehicle.

■ The belts must be kept clean as otherwise the retractors may not work properly (see also "Vehicle care — interior").

■ Never bleach or dye safety belts.

■ Do not allow safety belts to retract until they are completely dry.

17

Combination lap/shoulder belts

Belt warning system

An audio-visual warning system is interconnected with the driver's safety belt.

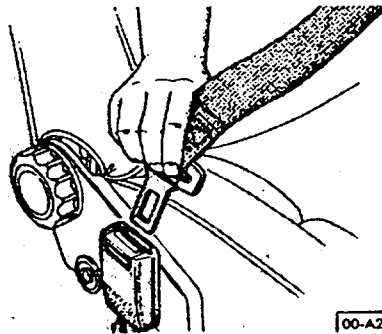
Every time the ignition is turned on, the safety belt warning light will come on for about six seconds as a reminder to buckle up. If the driver does not fasten the safety belt, the chime will also come on for six seconds. The chime goes off as soon as the driver buckles up.

Inertia reel retractor

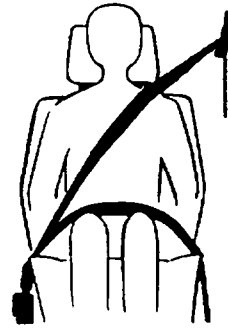
The combination lap/shoulder belt with inertia reel locking mechanism adjusts automatically to your size and movements as long as the pull on the belt is slow.

Rapid deceleration during hard braking or a collision locks the belt. The belt will also lock when you drive up or down a steep hill or in a sharp curve.

■ To fasten, grasp belt tongue and pull belt in continuous slow motion across your chest and lap.



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■ Insert belt tongue into buckle on inboard side of seat. Push down until it is securely locked with an audible click. Pull belt to check.

■ Pull shoulder section to make sure belt fits snugly across the hips.

■ Belts should fit snugly across the pelvis and chest. Make sure any slack is wound on the retractor.

■ The shoulder belt must be positioned midway over the shoulder — **never across the neck**. See illustration.

■ Do not wear shoulder part of belt under your arm or otherwise out of position. This would increase the possibility of serious injury in case of an accident.

■ To unfasten belt, push down the orange colored release on the buckle. Belt will spring out of buckle.

■ To release a locked belt, lean back to take the body pressure off the belt.

■ To store lap/shoulder belt, allow belt to wind up on retractor as you guide belt tongue to its stowed position.

Always heed WARNINGS on page 17

Lap belts for rear seats

Outer seating positions

The automatic retractor will lock the rear seat lap belt when your passenger has buckled up, and the remaining slack has retracted.

Before pulling belt out, let it first retract fully.

■ To fasten lap belt, grasp belt tongue on outboard side of seat and slowly pull across the pelvis. Insert belt tongue into buckle on inboard side of seat and push down until it is securely locked with an audible click. Pull belt to check.

■ To unfasten belt, push down the orange release on the buckle.

■ To store belt, allow belt to wind up as you guide belt tongue into retractor.

Always heed WARNINGS on page 17

Center seating position

The safety belt for the center seating position is not equipped with a retractor, and has to be adjusted manually.

■ To lengthen belt, hold the belt at a right angle to the belt and loop out the required portion. For ease of operation, press cap and tongue of buckle together. Take up any slack by moving the slide on the belt.

■ To tighten belt, buckle up and pull at loose end of the belt.

■ To fasten lap belt, grasp belt tongue on outboard side of seat, pull across pelvis and insert in inboard buckle.

■ To unfasten belt, push release button on buckle.

Belt tongues and buckles should always be kept on top of seat for ready use.

OPERATING CONTROLS

VW AUTOMATIC SEATBELT SYSTEM FOR FRONT SEATS*

The VW Automatic Seatbelt System is a passive restraint system. Driver and front seat passenger are buckled up automatically as they sit down and close the door.

The automatic seatbelts are interconnected with the ignition.

To be able to start the engine, belts should be properly connected to the buckle at upper rear edge of door.

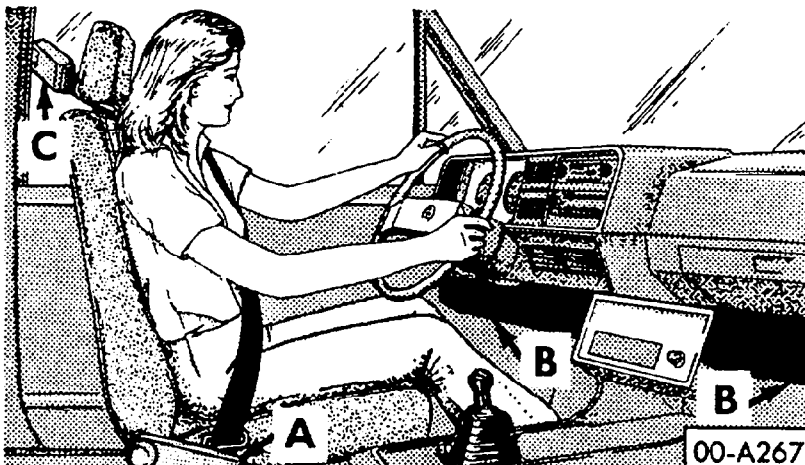
- Open door (do not disconnect belt at top where marked **PRESS EMERGENCY**)
- Sit on seat
- Belt places itself across chest as you close the door (make sure belt is fully retracted)
- Start the engine

For best protection, belt should fit snugly across chest. If belt has too much slack, pull in direction of retractor on inboard side of seat to permit belt to wind up on retractor.

Front seat passengers should not ride in a moving vehicle with the seatback reclined. Safety belts only offer optimum protection when the seatback is in an upright position, as illustrated.

Always heed WARNINGS on page 17

*where applicable



WARNING

- When wearing the automatic seat belt, make sure that the belt is positioned midway over the shoulder — never across the neck.
- The automatic seatbelt should not be used to hold a child's seat as the diagonal belt will not provide the needed protection.

- Children who are less than 12 years old should sit in the rear and should wear, depending on age, either a child restraint system or the existing safety belts.

- Always heed WARNINGS on page 17.

How the automatic seatbelt system works

The belt tongue is locked in the belt buckle which is fastened firmly to the upper rear edge of the door (C) which mates with the load bearing structure of the vehicle body. The other end of the belt is wound automatically on the automatic retractor under the seat (A).

As the door opens, it pulls the belt from the retractor and provides access to the interior of the vehicle. When the door is closed, the belt automatically places itself diagonally across the chest.

WARNING

Do not wear shoulder part of belt under your outboard arm or otherwise out of position. This would increase the possibility of serious injury in case of an accident.

The belt automatically takes up any belt slack and adjusts to your normal wearing position and movements so that you can conveniently reach all operating controls.

Safety belt warning light and chime

If belts are not connected . . .
the engine cannot be started. The chime

will sound for about six seconds, and the warning light will glow until the belts are reconnected. Only after the belts are reconnected, can the engine be started.

If belts are disconnected while you are driving . . .

the engine will not stop but the warning light will glow until the belts are reconnected.

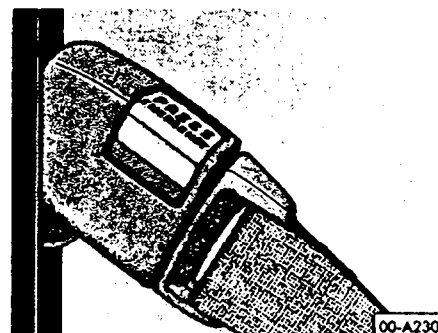
A stalled engine cannot be restarted if the belts are disconnected.

Inertia reel retractor (A)

In a sudden stop or impact, the belt's inertia reel retractor automatically locks the belt. Sudden acceleration or hard braking, fast cornering or driving up or down steep hills will also cause the belt to lock. To release a locked belt, lean back to take the body pressure off the belt.

Knee bar (B)

The knee bar, which is located under the dashboard, prevents the driver and passenger from sliding toward the dashboard during a sudden stop. **The knee bar must not be removed.**



Emergency release (C)

If required, press the emergency release on the belt buckle marked PRESS EMERGENCY, and pull out the belt tongue. Always reconnect the belt to the buckle.

Since the automatic restraint system is interconnected with the ignition, **the engine can only be started if the belts are properly connected.**

* Always heed WARNINGS on page 17