DOT 0943

REPORT NO. CAL-86-N14

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

GENERAL MOTORS CORPORATION

1986 OLDSMOBILE TORONADO

BROUGHAM COUPE

NHTSA NO. CG0102

CALSPAN TEST NO.7457-14

CALSPAN CORPORATION

ADVANCED TECHNOLOGY CENTER

P.O. BOX 400

BUFFALO, NEW YORK 14225

April 18, 1986

FINAL REPORT

Prepared for:

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

OFFICE OF MARKET INCENTIVES

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NHTSA New Car Assessment Program (NCAP) Frontal Barrier Impact Test on 1986 Oldsmobile Toronado Brougham Coupe to Indicant Requirements of FMVSS 212, 219 (Partial), and 301-75	April 18, 1986
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15. Supplementary Notes

16. Abstract

A frontal load cell barrier test of a 1986 Oldsmobile Toronado Brougham Coupe was performed at the Calspan Corporation, Advanced Technology Center crash test facility in Buffalo, New York, on April 18, 1986.

Impact speed was 35.3 mph, and the ambient temperature at the barrier face at the time of impact was 62°F. The maximum post-test vehicle crush was 31.0 inches.

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

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

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

17. Key Words	18. Distribution Statement
35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP) FMVSS 212 Indicant Testing FMVSS 219 (Partial) Indicant Testing FMVSS 301-75 Indicant Testing	Copies of this report are available from: Technical Reference Division National Highway Traffic Safety Admin. Nassif Building, Room 5108 400 Seventh St., S.W., Washington, DC 20590

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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 CG0102

A load cell barrier consisting of 36 load cells was impacted by a 1986 Oldsmobile Toronado Brougham Coupe at a velocity of 35.3 mph. The test was performed at the Calspan Corporation Advanced Technology Center on April 18, 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. 749) and the passenger ATD (Serial No. 1019) had been used in two previous tests (CG5101, CG0101) the Injury Criteria Values were not exceeded in both tests. 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. Data was lost regarding the driver's belt elongation, the driver's belt spool out and the passenger's belt spool out.

The driver's head struck the steering wheel rim and the HIC was 826.1. The maximum chest deceleration over 3 milliseconds was 45 g's and femur loads were 570 and 944 pounds.

Table 1

GENERAL TEST AND VEHICLE DATA

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1986 Oldsmobile Toronado (Brougham Coupe)

NHTSA NO.: CG0102 VIN.: 1G3EZ57B4GU303169

BODY COLOR: Lt. Blue DATE OF MANUFACTURE: 2-86

Engine: 6 cylinders; - C.I.D.; 3.8 Liters; - CC
x Gas; - Diesel; - Turbocharged
- Longitudinal; x Transverse

Transmission: 3 Speed - Manual; x Automatic; x Overdrive
Final Drive: x Front Wheel; - Rear Wheel; - Four Wheel

Date Received: 4-9-86 Odometer Reading: 69.9
X A/C; X P/S; X P/B; X P/wdo.; X Tilt Wheel
X P/seats; X Cruise Control

Type of Occupant Restraint: 3-point continous belt system

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

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

Recommended Tire Size: P205-70R-14

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

Tires on Vehicle: P205-70R-14MS ; Manufacturer: UNIROYAL

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

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

Type of Front Seat Back: - Fixed; x Adj. With x Lever - Rot. 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 4395 lbs. GAWR: Front 2448 lbs. Rear 1947 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 = 1080 lbs. Right Rear = 550 lbs.

Left Front = 1070 lbs. Left Rear = 550 lbs.

TOTAL FRONT WEIGHT = 2150 lbs. (66 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1100 lbs. (34 % of Total Vehicle Weight)

TOTAL DELIVERY WEIGHT = 3250 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (3250 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 = 3728 lbs.

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

Right Front = 1140 lbs. Right Rear = 750 lbs.

Left Front = 1110 lbs. Left Rear = 690 lbs.

TOTAL FRONT WEIGHT = 2250 lbs. (61 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1440 lbs. (39 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 3690 lbs.

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

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 27.4 LF 27.2 RR 28.7 LR 28.4

Test Attitude: RF 27.1 LF 26.9 RR 27.6 LR 27.3

Wheel Base: 108 in.; C.G. = 42.1 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: 4/18/86 Time of Test: 11:50

Ambient Temperature: 62 °F at impact area

Temperature in Occupant Compartment: 71 °F.

Windshield Molding Temperature: 68 °F.

Required Impact Velocity Range: 34.5 to 35.5 mph

Impact Velocity: primary = 35.3 mph, secondary = 35.3 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	184.6	C_L	189.4	L	184.4
Post-test	= R	156.6	C_L	158.4	L	158.8
Crush	= R	28.0	C_L	31.0	L	25.6

Distance from front of test vehicle to point of impact:

R 15.5 C/L 15.7 L 16.5

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	Rim	No contact
Chest	No contact	No contact
Abdomen	No contact	No contact
Left Knee	Dash	Glove box
Right Knee	Dash	Glove box

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

	Front	
	Left	Right
Door Opening	operable	operable

	Front	
Seat Movement	Left	Right
Seat Back Failure	None	None
Seat Shift (in.)	None	1 notch forward

Other notable impact effects: Steering column did not change position.

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.:

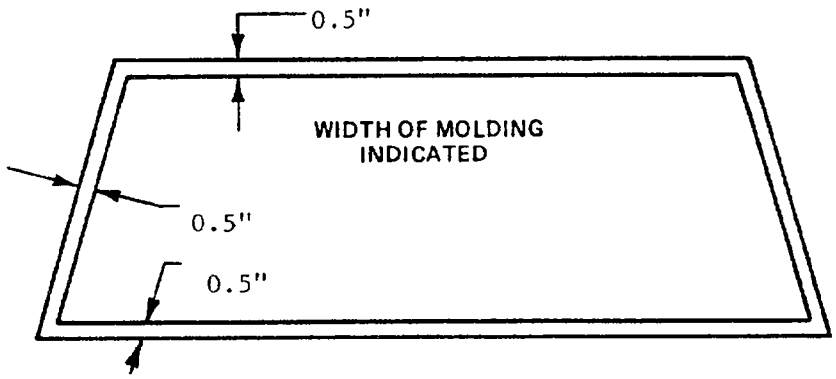
Windshield is bonded in place and covered with 1/2" molding.

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

FMVSS 212 TEST DATA:

	WINDSHIELD PREIPHERY		
	PRE-TEST (in.)	POST-TEST (in.)	PERCENT RETENTION
RIGHT SIDE	88.3	88.3	100%
LEFT SIDE	88.3	88.3	100%
TOTAL	176.6	176.6	100%

AREA OF RETENTION FAILURE:



FRONT VIEW

FAILURE DETAILS:

None

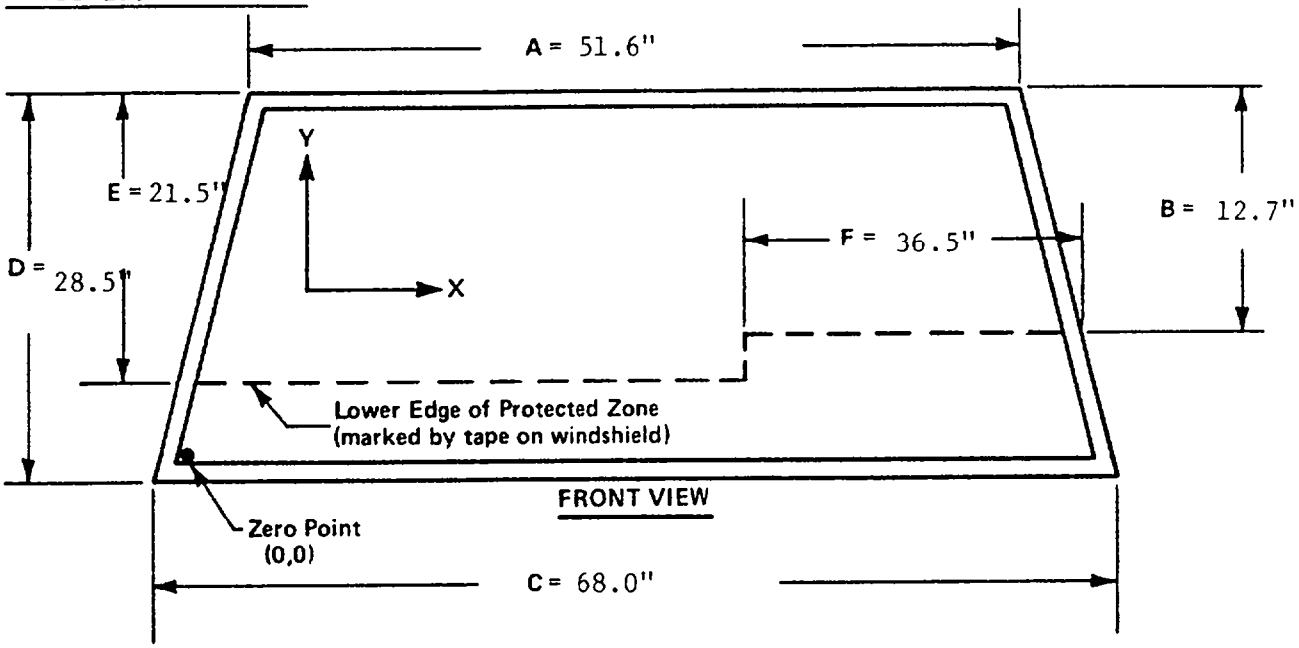
Figure 2

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.: CG0102 ; TEST DATE: 4/18/86

VEHICLE MAKE/MODEL/BODY STYLE: Oldsmobile Toronado Brougham Coupe

USABLE CAPACITY OF VEHICLE'S FUEL TANK: 18.0 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:

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

SOLVENT SPILLAGE MEASUREMENT AFTER 35 MPH FRONTAL BARRIER IMPACT TEST:

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

SOLVENT SPILLAGE DETAILS:

None

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

Time reqd. for machine to rotate 90°	=	2 minutes,	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)	-126	-23	144	192	-44	15	-12	45
DUMMY (2)	64	41	63	83	-39	-11	-30	45
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE - FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	570	944
DUMMY (2)	498	1419
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)	2633	--	1161
DUMMY (2)	3503	2292	--
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**			
	HIC	t_1 (SEC)	t_2 (SEC)	AVE. ACC. (g) t_1 TO t_2
DUMMY (1)	826.1	.06960	.11565	50.3
DUMMY (2)	650.3	.06225	.18915	30.5
DUMMY (3)				
DUMMY (4)				

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

Figure 4

PART 572 DUMMY IN-VEHICLE POSITION

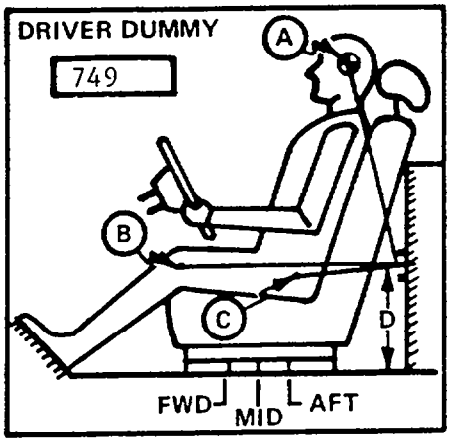
TEST NO.: CG0102

VEHICLE: 1986 Olds Toronado Brougham Coupe

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

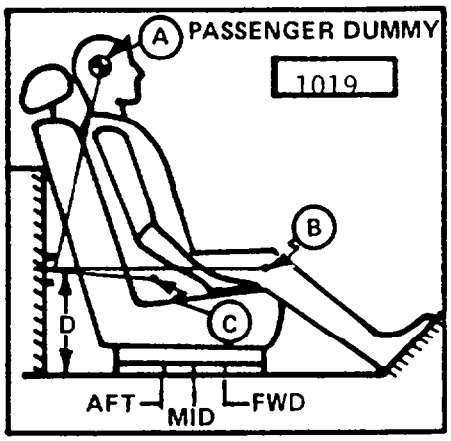
ADJUSTER TYPE:
- see note Manual
- see note Power

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

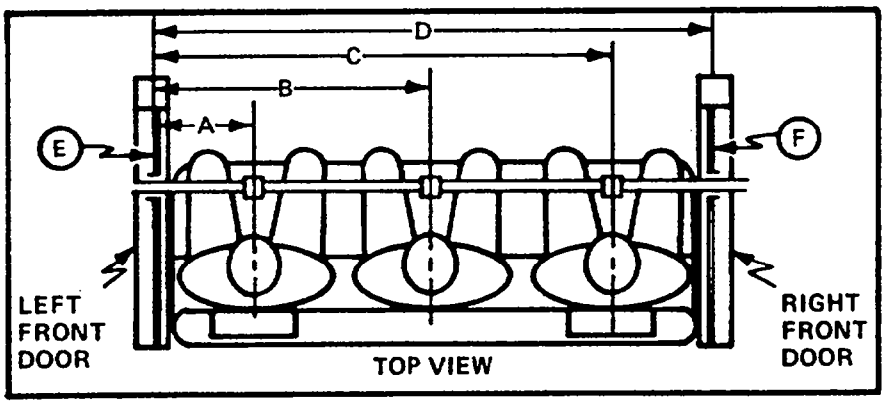


MEASUREMENT LOCATION

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



A =	26.0	in.	32	Degrees	A =	24.8	in.	27	Degrees
B =	35.5	in.	90	Degrees	B =	34.7	in.	93	Degrees
C =	20.5	in.	103	Degrees	C =	18.8	in.	105	Degrees
D =	12.1	in.			D =	12.1	in.		



DUMMY ID

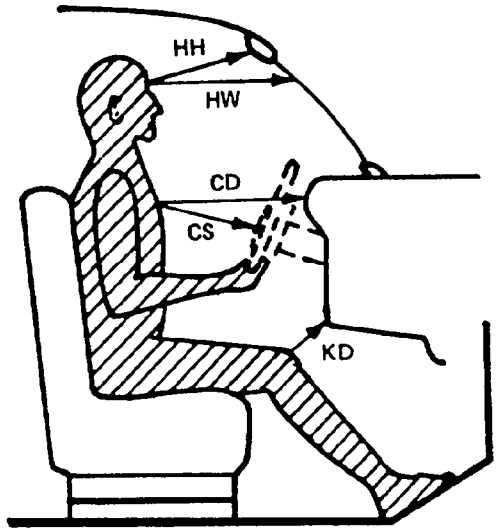
		749	1019
A	=	Left Door to Driver Centerline	12.5 in.
B	=	Left Door to Center Passenger Centerline	-- in.
C	=	Left Door to Right Passenger Centerline	42.4 in.
D	=	Left Door to Right Door	53.0 in.
E, F	=	Window Glass Height (Right and Left Must Be Equal)	11.0 in.

Note: Passenger's seat has a manual position adjuster; driver's seat has a power position adjuster.

Figure 5

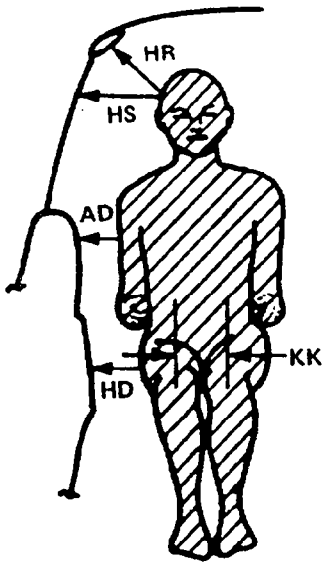
OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	15.0	16.0
HW	20.8	20.3
CD	20.0	26.0
CS	14.0	--
KDL	5.7	8.8
KDR	6.8	9.5
SA	23.5	23.5
TA	23.0	23.0



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

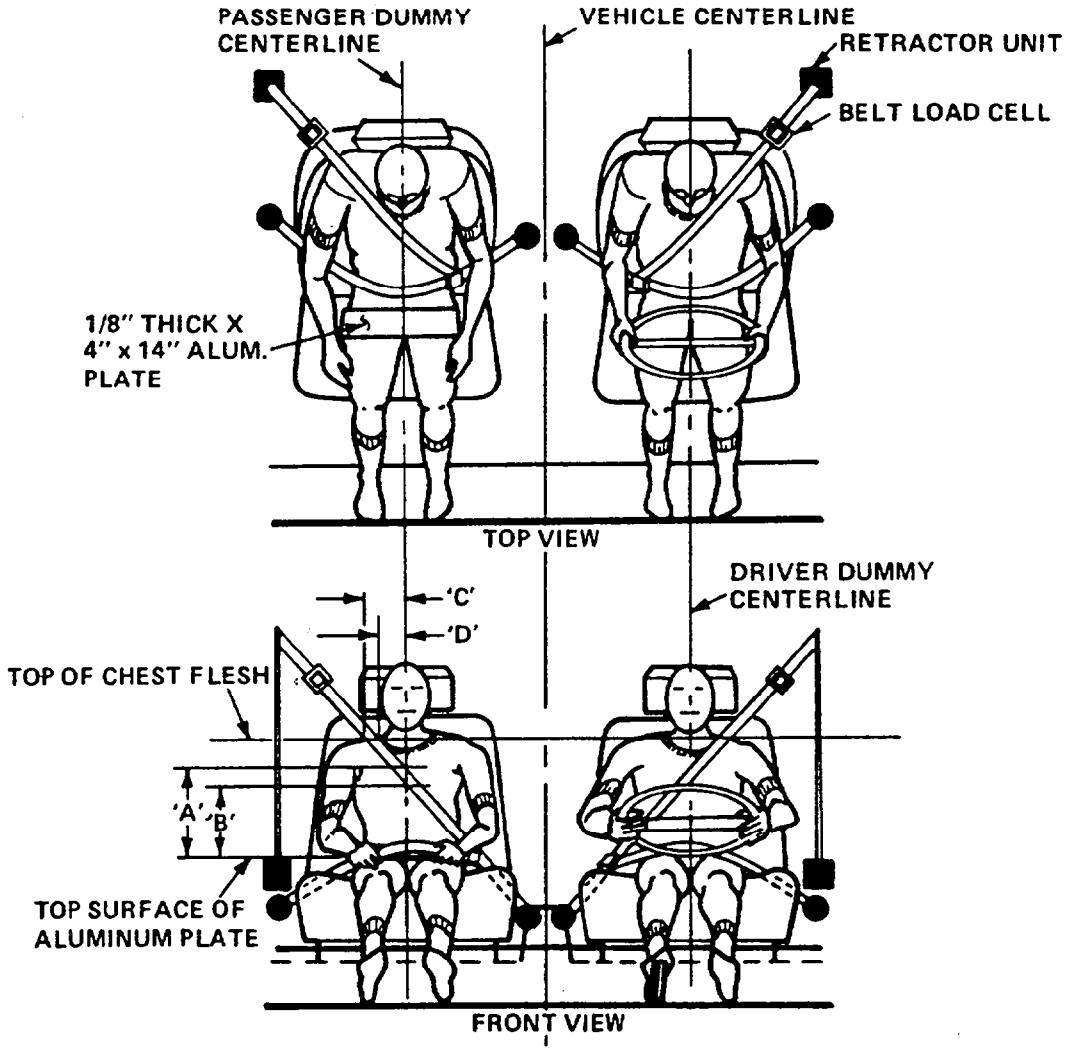
HR = Head to Side Roof
HS = Head to Side Window
AD = Arm to Door
HD = Hip to Door
KK = Knee to Knee



	DRIVER	PASSENGER
HR	5.3	5.3
HS	8.0	8.0
AD	4.2	5.0
HD	4.5	4.8
KK	8.5	7.5

Figure 6

SEAT BELT POSITIONING DATA



		DRIVER DUMMY (in.)	PASS. DUMMY (in.)
1.	Dimension 'A'--alum. plate to belt upper edge on dummy centerline.	16.0	15.0
2.	Dimension 'B'--alum. plate to belt lower edge on dummy centerline.	12.5	11.0
3.	Dimension 'C'--dummy centerline to outer edge at chest flesh top	3.3	3.7
4.	Dimension 'D'--dummy centerline to inner edge at chest flesh top	1.2	1.3
5.	Lap belt tension (lbs.)	1.0	1.0
6.	Shoulder belt tension (lbs.)	1.5	2.0

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Table 3

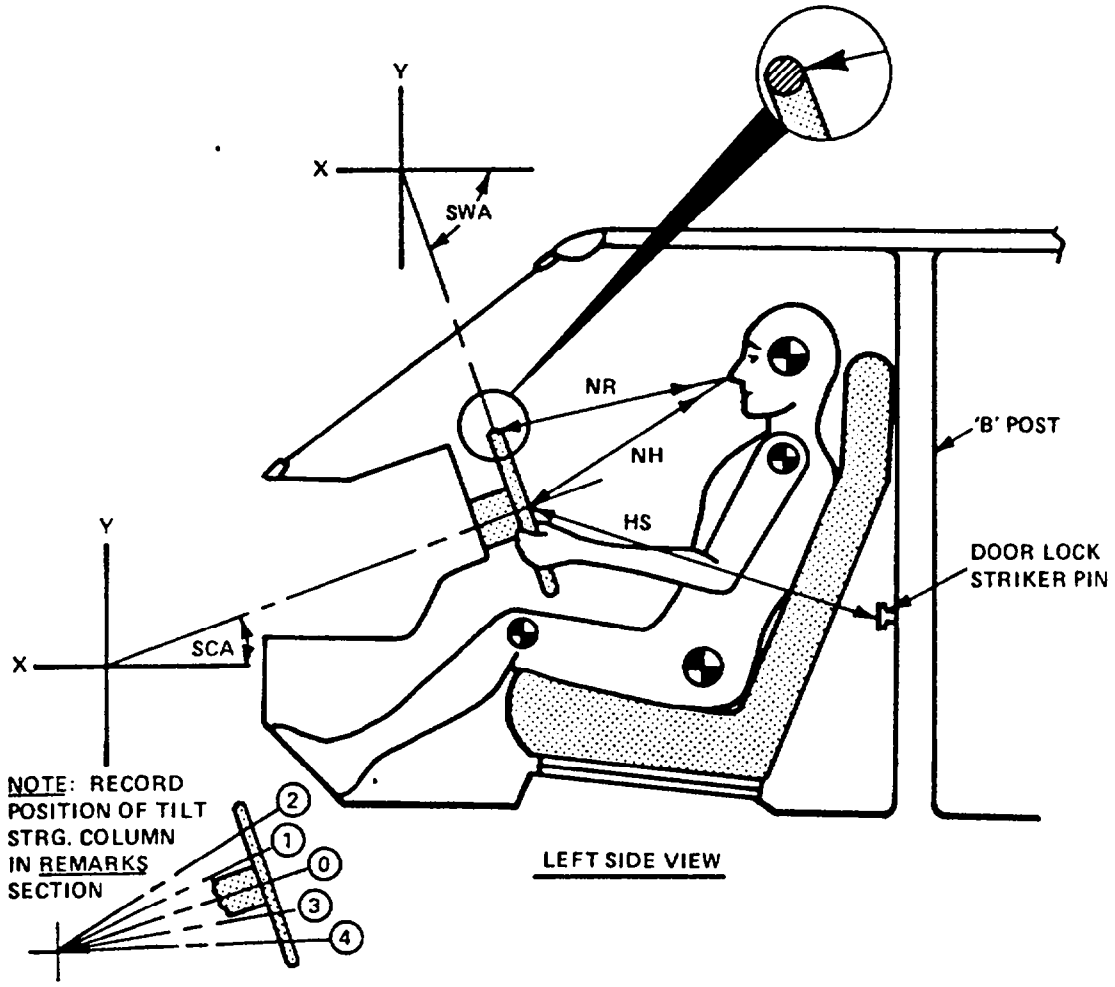
SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

BELT LENGTH DATA:	Driver	Passenger
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	74.0"	73.0"
Should belt length as measured on Part 572 Dummy.	46.5"	46.0"
Lap belt length as measured on Part 572 Dummy.	27.5"	27.0"
BELT SPOOL-OFF DATA:		
As determined by film analysis.	4.0"	3.0"
As determined mechanically.	3.9"	1.75"
As determined electronically.	see note	see note
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	see note	.94"/foot
Measured Mechanically	0.0"/foot	1.6"/foot

Note: Data was lost regarding driver's belt elongation, driver's belt spool out and passenger's belt spool out.

Figure 7

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	17.9	Inches
NH--Distance from tip of dummy's nose to center of steering column hub	20.3	Inches
HS--Distance from center of steering column hub to the forward surface of the door lock striker pin	Y = 16 X = 35	Inches
SCA--Angle of steering column relative to the horizontal X axis	23	Degrees
SWA--Angle of steering wheel relative to the horizontal X axis	-67	Degrees

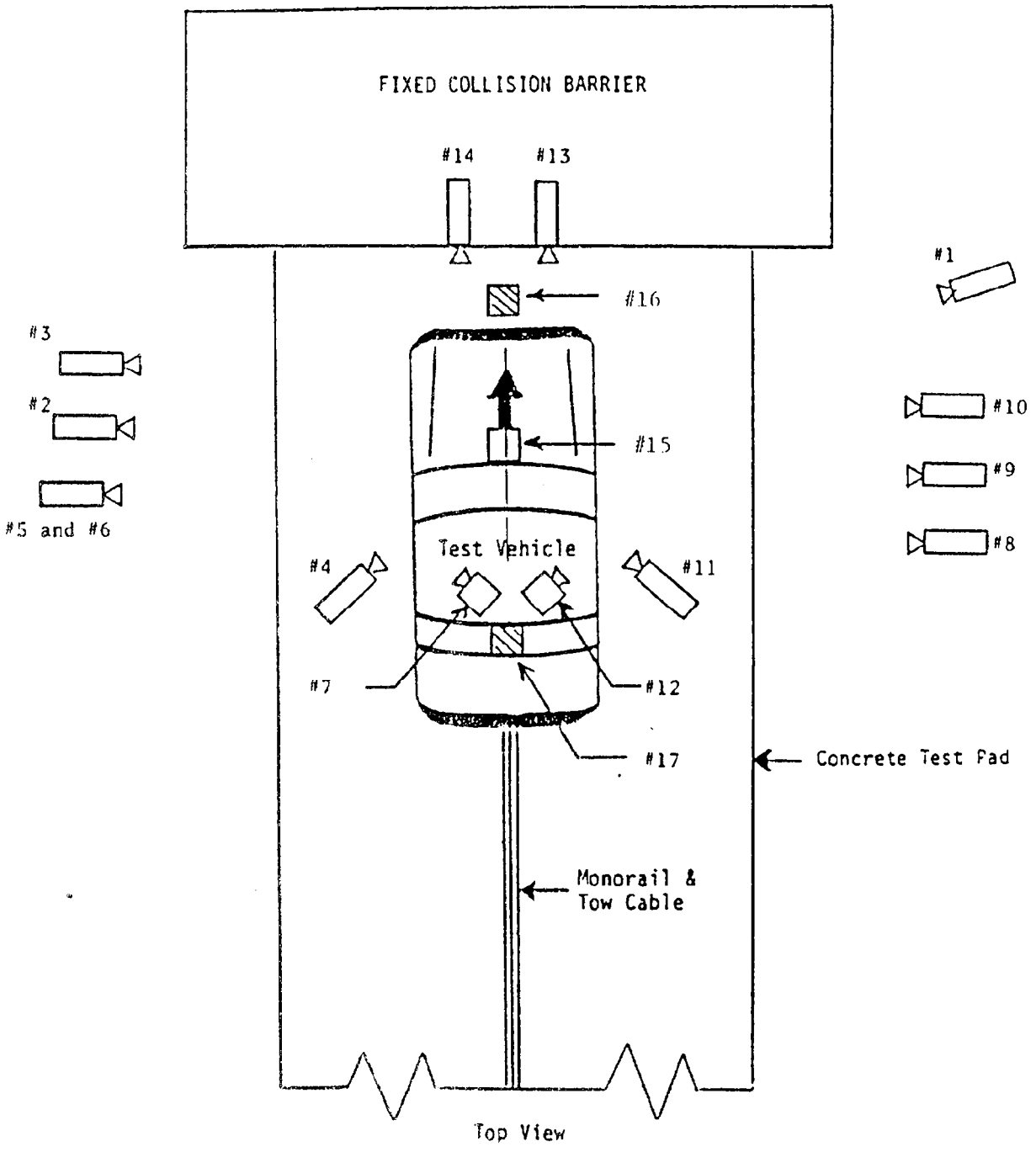
REMARKS CONCERNING ADJUSTABLE OR TILT STEERING COLUMN IF VEHICLE IS SO EQUIPPED:

3 positions below midpoint, and 3 positions above.

Figure 8

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4



HIGH-SPEED CAMERA LOCATIONS

Test No. CG0102 Vehicle 1986 Oldsmobile Toronado Brougham Coupe

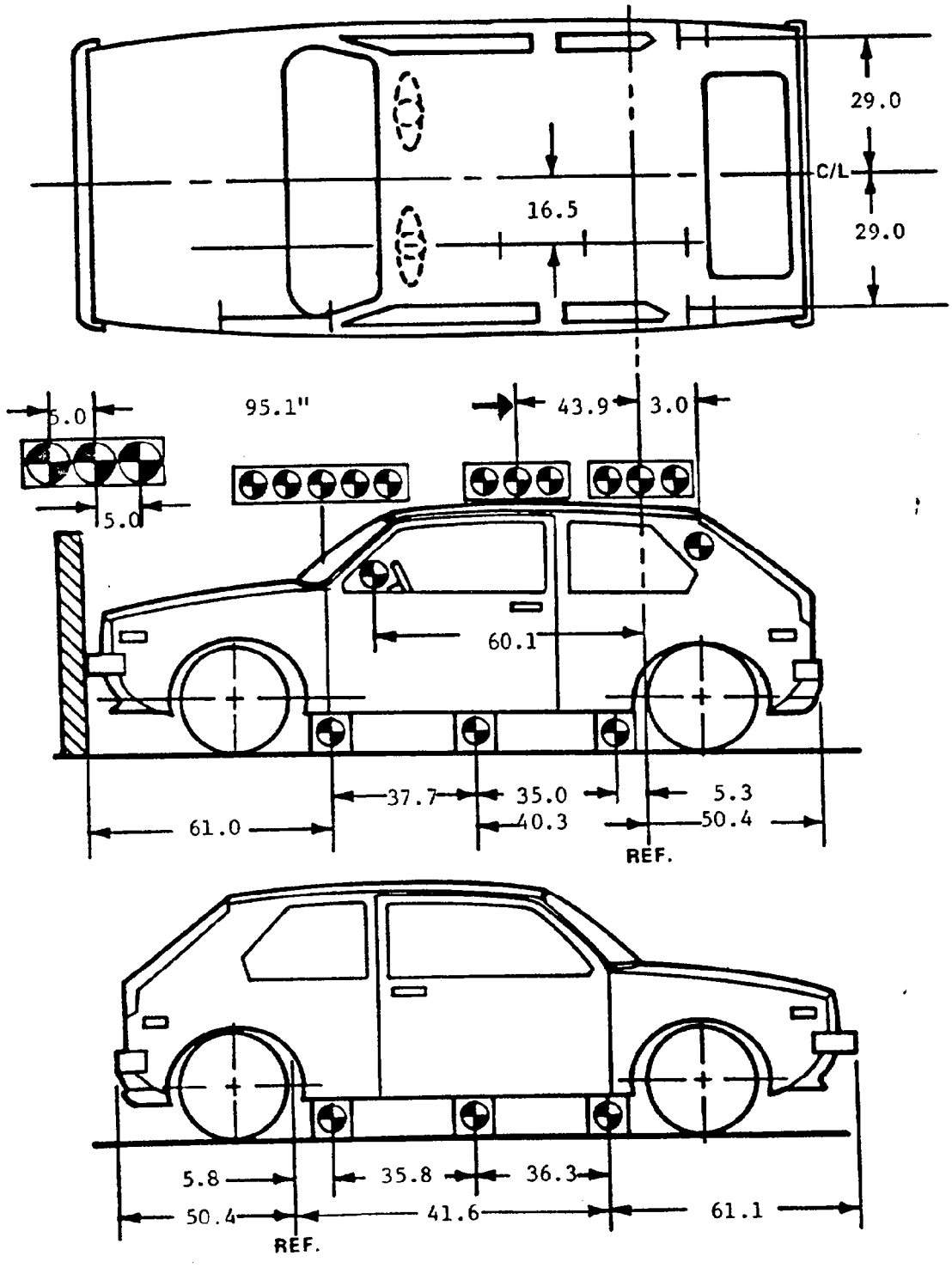
CAMERA NO.	VIEW	CAMERA POSITIONS (in)* X	Y	Z	ANGLE ** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
1	Real-Time Camera	--	--	--	--	--	--	24
2	Overall Left Side	215	57	41	-5	--	13	530
3	Left Side View	205	37	50	-6	--	25	530
4	Driver and Interior View	101	124	70	-15	--	13	700
5	Steering Column (Bottom)	230	80	46	-5	213	25	550
6	Steering Column (Top)	230	80	70	-10	213	25	550(1)
7	Left Belt	--	--	--	--	--	8	820
8	Overall Right Side	280	91	48	-6	--	13	780
9	Right Side View	270	79	47	-5	--	25	990
10	Right Passenger View	282	67	51	-4	265	35	810
11	Passenger and Interior View	101	124	72	-15	--	25	460
12	Right Belt	--	--	--	--	--	8	740(1)
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	510
16	Pit View of Engine	0	36	-120	90	--	13	780
17	Pit View of Fuel Tank	0	130	-120	90	--	13	750

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

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

Figure 9

VEHICLE TARGET LOCATIONS

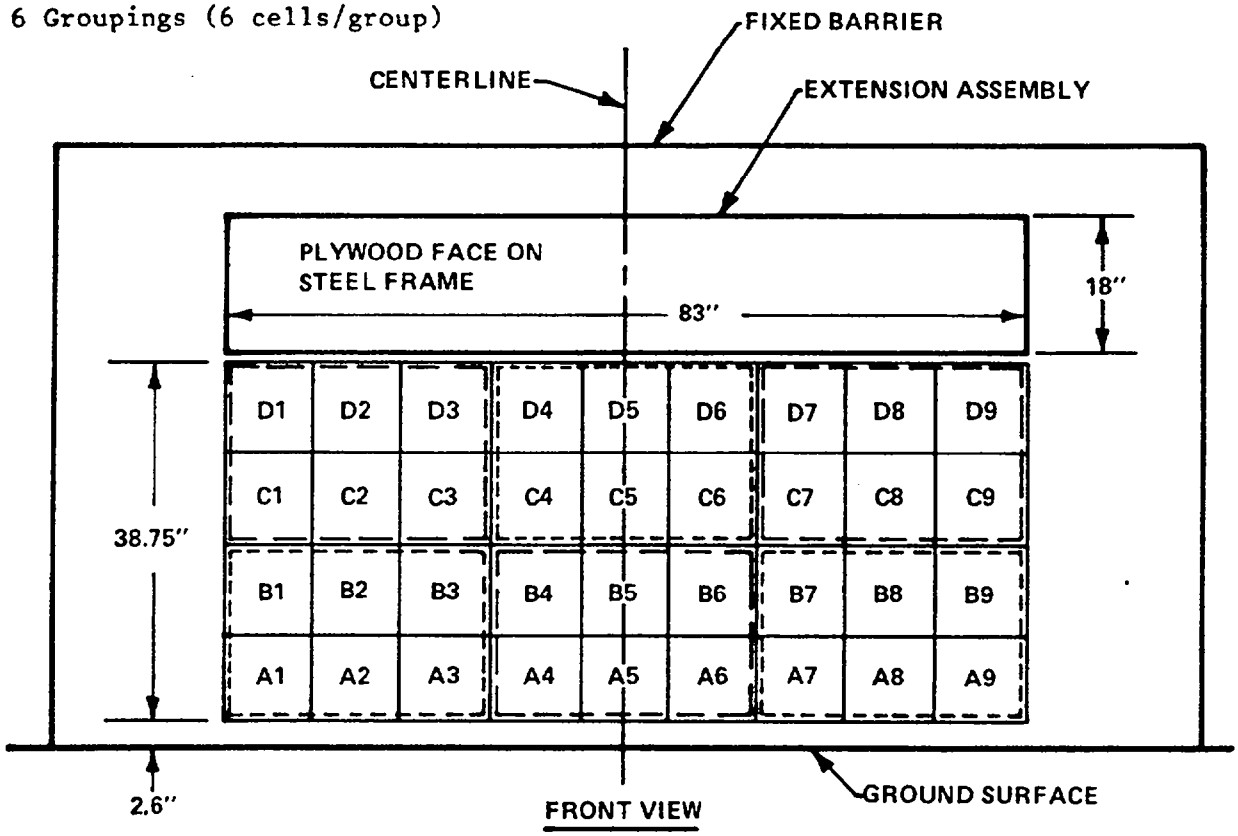


(DIMENSIONS IN INCHES)

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

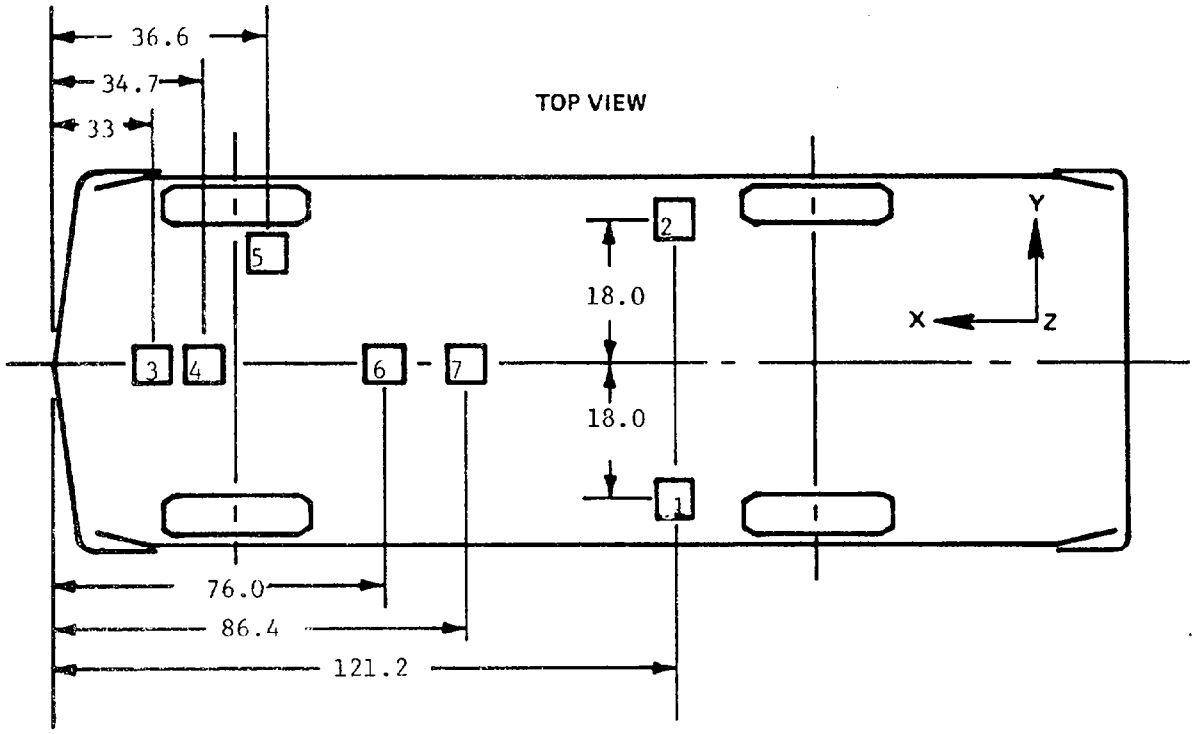
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

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

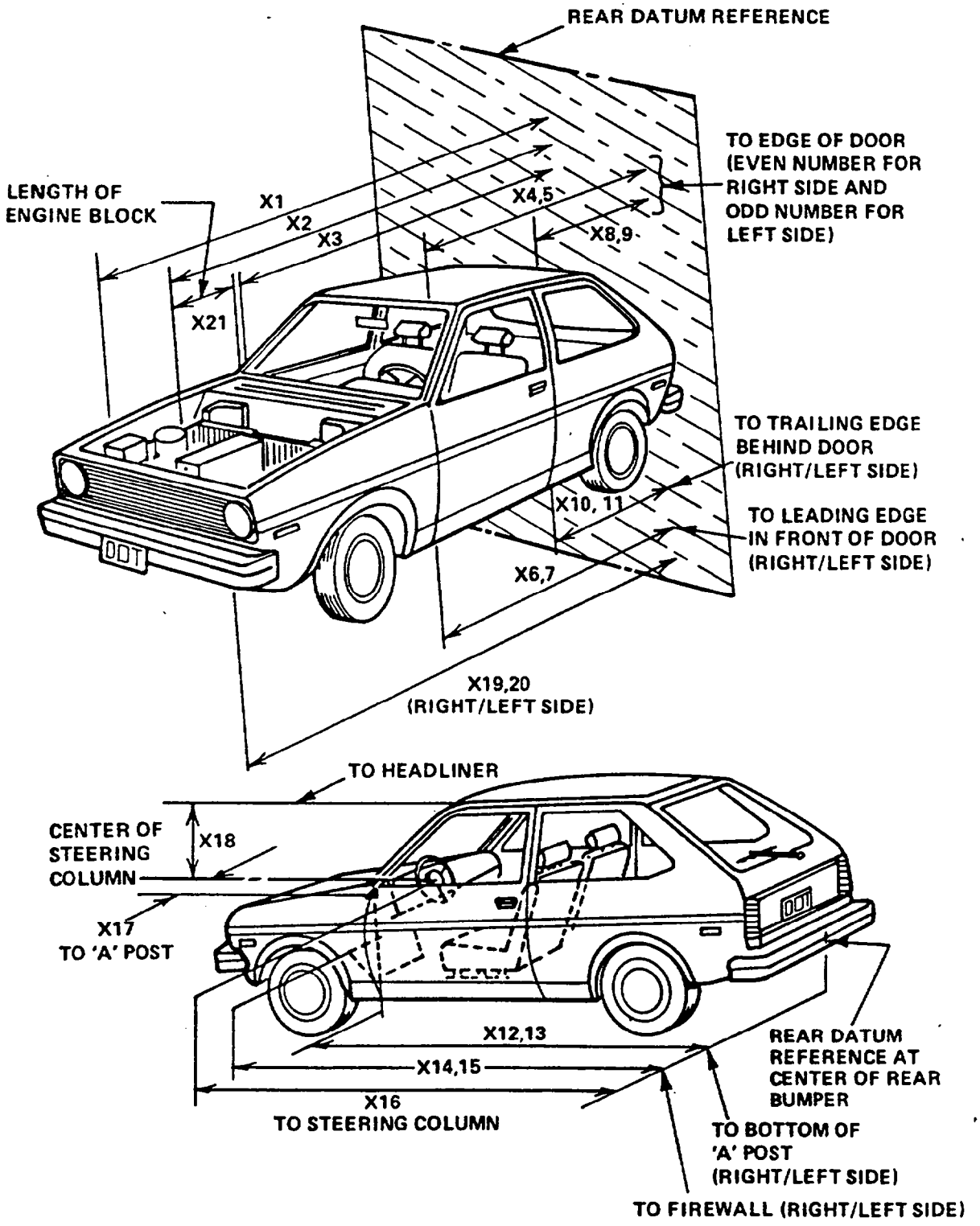


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Table

VEHICLE MEASUREMENTS

All Dimensions in Inches

No.		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	189.4	158.4	31.0
X2	Rear Surface of Vehicle to Front of Engine	165.5	152.7	12.8
X3	Rear Surface of Vehicle to Firewall	141.2	135.7	5.5
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	122.8	122.2	.6
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	122.9	122.5	.4
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	123.5	122.8	.7
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	123.5	122.9	.6
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	72.4	71.6	.8
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	72.4	72.0	.4
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	72.0	71.0	1.0
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	72.0	71.2	.8
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	123.0	122.5	.5
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	123.2	122.1	1.1
X14	Rear Surface of Vehicle to Firewall, Right Side	133.9	130.0	3.9
X15	Rear Surface of Vehicle to Firewall, Left Side	133.7	126.5	7.2
X16	Rear Surface of Vehicle to Steering Column	106.8	103.6	3.2
X17	Center of Steering Column to "A" Post	16.2	18.5	-2.3
X18	Center of Steering Column to Headliner	15.2	16.0	-.8
X19	Rear Surface of Vehicle to Right Side of Front Bumper	184.6	156.6	28.0
X20	Rear Surface of Vehicle to Left Side of Front Bumper	184.4	158.8	25.6
X21	Length of Engine Block	15.0	15.0	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 Oldsmobile Toronado Brougham Coupe

VEH. NHTSA NO.: CG0102 ; VIN: 1G3EZ57B4GU303169

MODEL YEAR: 1986 ; BUILD DATE: 2/86 ; TEST DATE: 4/18/86

VEH. SIZE CATEGORY: Full Size ; TEST WEIGHT: 3690 pounds

VEH. WHEELBASE: 108.0" ; FRONT OVERHANG: 44.3" ; OVERALL WIDTH: N/A

ACCELEROMETER DATA:

LOCATION: 42.1 inches rearward of front wheel C/L

CALIBRATION PROCEDURE: Shaker Table/Least Squares

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

VEH. IMPACT SPEED: 35.3 mph ; TIME OF SEPARATION: 143.5 msec

VELOCITY CHANGE: 41.1 mph

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE:

F (Frontal) 12 FDEW 3

CRUSH DEPTH DIMENSIONS:

C1 = 25.2 inches

C2 = 28.0 inches

C3 = 29.5 inches

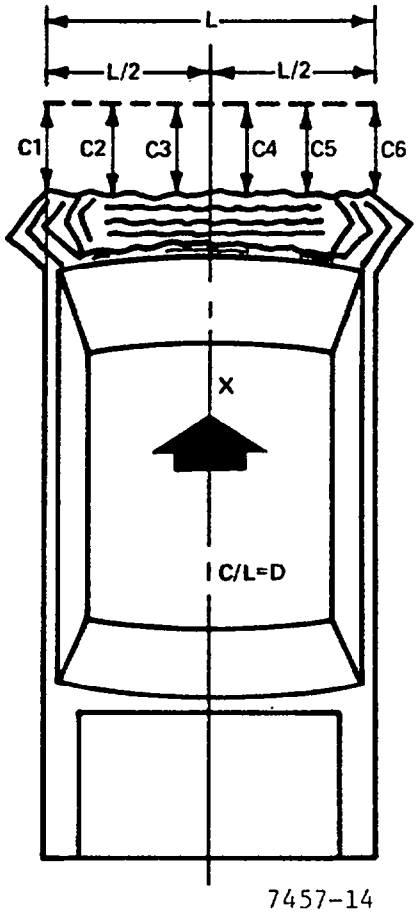
C4 = 30.1 inches

C5 = 29.0 inches

C6 = 27.7 inches

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

LENGTH OF DAMAGED REGION: L = 58.5 inches



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National Accident Sampling System — Continuous Sampling Subsystem: Vehicle Data

FIELD MEASUREMENTS

NCI 1986 OLDSMOBILE TORONADO 1G3E25?B4GU303169

Complete When Applicable	
End Damage	**Side Damage**
Undeformed end width 58.5	Bowing: B1 _____ X1 _____
Corner shift: A1 _____	B2 _____ X2 _____
A2 _____	Bowing constant
End shift at frame (CDC) (check one)	$\frac{X1 + X2}{2}$ = _____
<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.

1ZFDEW3

Specific Impact Number	Plane* of C-Measurements	Direct Damage Width** (CDC)	Direct Damage Max*** Crush	Field L**	C_1	C_2	C_3	C_4	C_5	C_6	±D
1	Bumper	58.5	31.1	58.5	31.5	30.5	30.5	31.1	31.5	34.0	Ø
	Free/space		1.0		6.3	2.5	1.Ø	1.Ø	2.5	6.3	
	ACTUAL CRUSH	58.5	30.1	58.5	25.2	28.Ø	29.5	30.1	29.Ø	27.7	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

DAMAGE DESCRIPTION

Tire—Wheel Damage

a. Rotation physically restricted

RF 2
LF 2
RR 2
LR 2

b. Tire deflated

RF 2
LF 2
RR 2
LR 2

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

TYPE OF TRANSMISSION

___Manual x Automatic

Average Track: _____
Maximum Width: _____
Test Curb Weight: _____
Overall Length: 189.4
Wheel Base: 108.0
Engine Size: cyl. V-6
displ. 3.8L

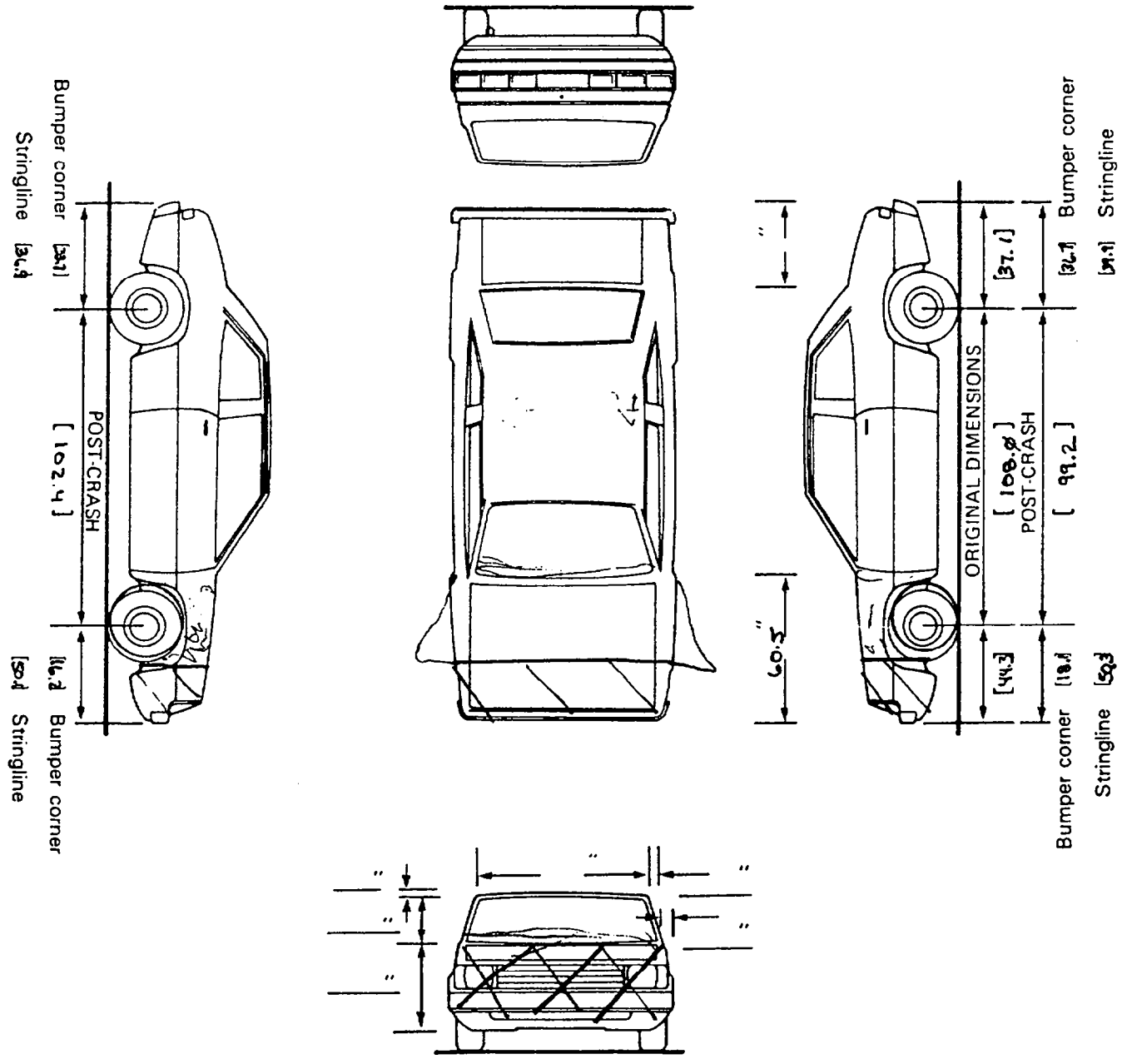
WHEEL STEER ANGLES

(For locked front wheels or displaced rear axles only)

RF ± N/A °
LF ± ___ °
RR ± ___ °
LR ± ___ °

Within ± 5 degrees

1986 OLDSMOBILE TORONADO



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

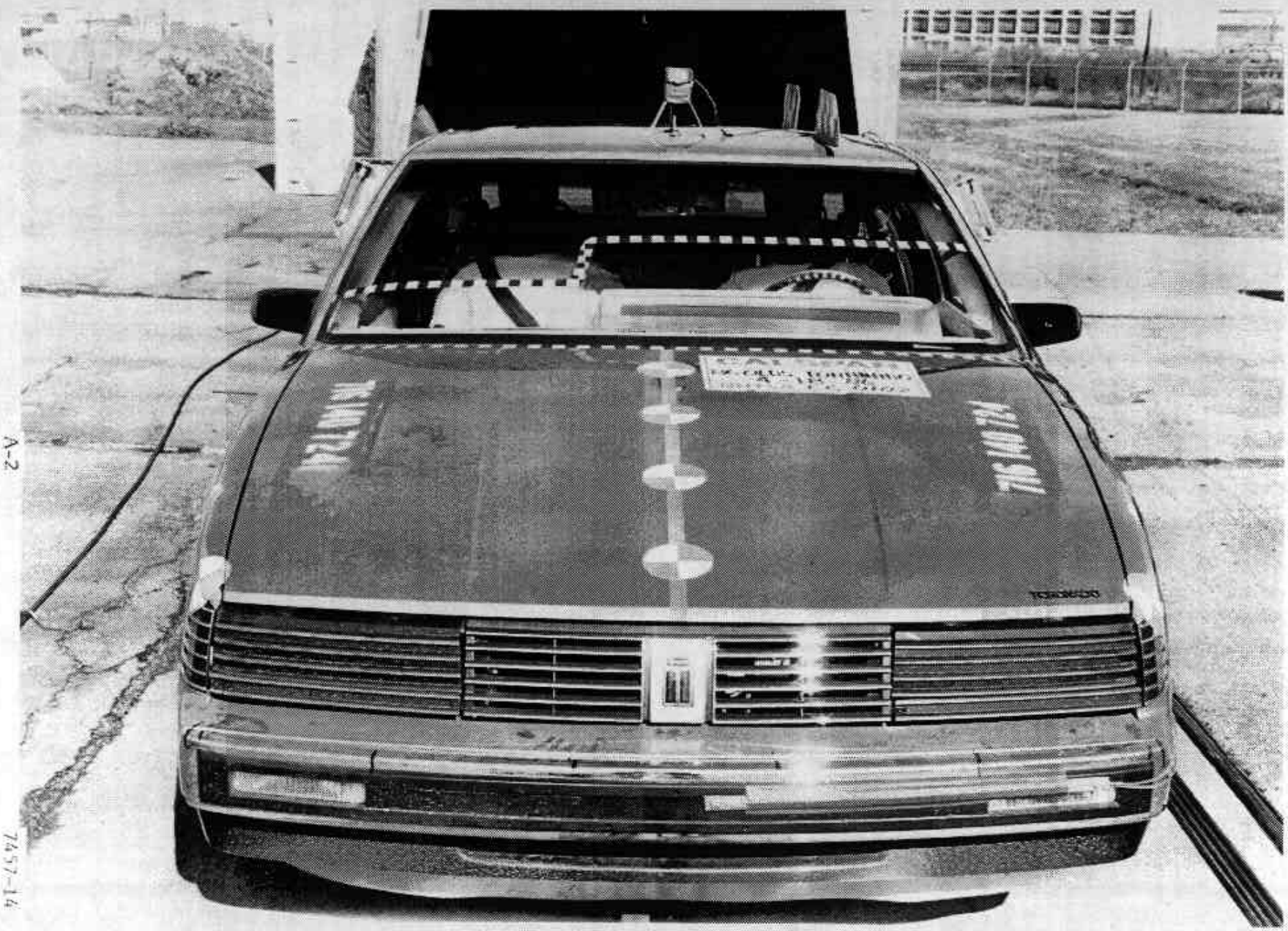


Figure A-1 PRE-TEST FRONT VIEW

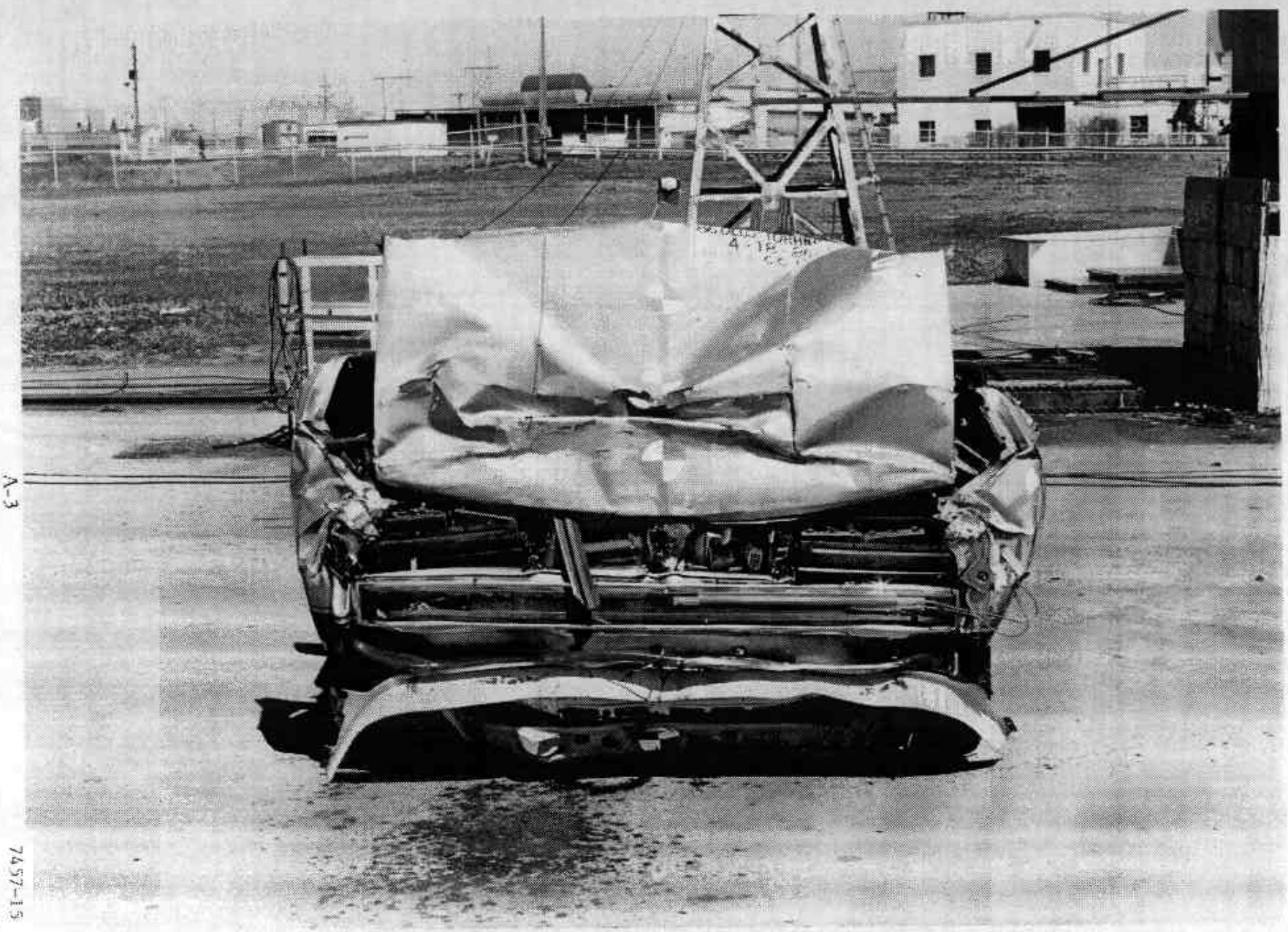


Figure A-2 POST-TEST FRONT VIEW

A-4

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Figure A-3 PRE-TEST LEFT SIDE VIEW

Figure A-4 POST-TEST LEFT SIDE VIEW

A-6

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Figure A-5 PRE-TEST RIGHT SIDE VIEW

Figure A-6 POST-TEST RIGHT SIDE VIEW

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

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

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

74574-1A

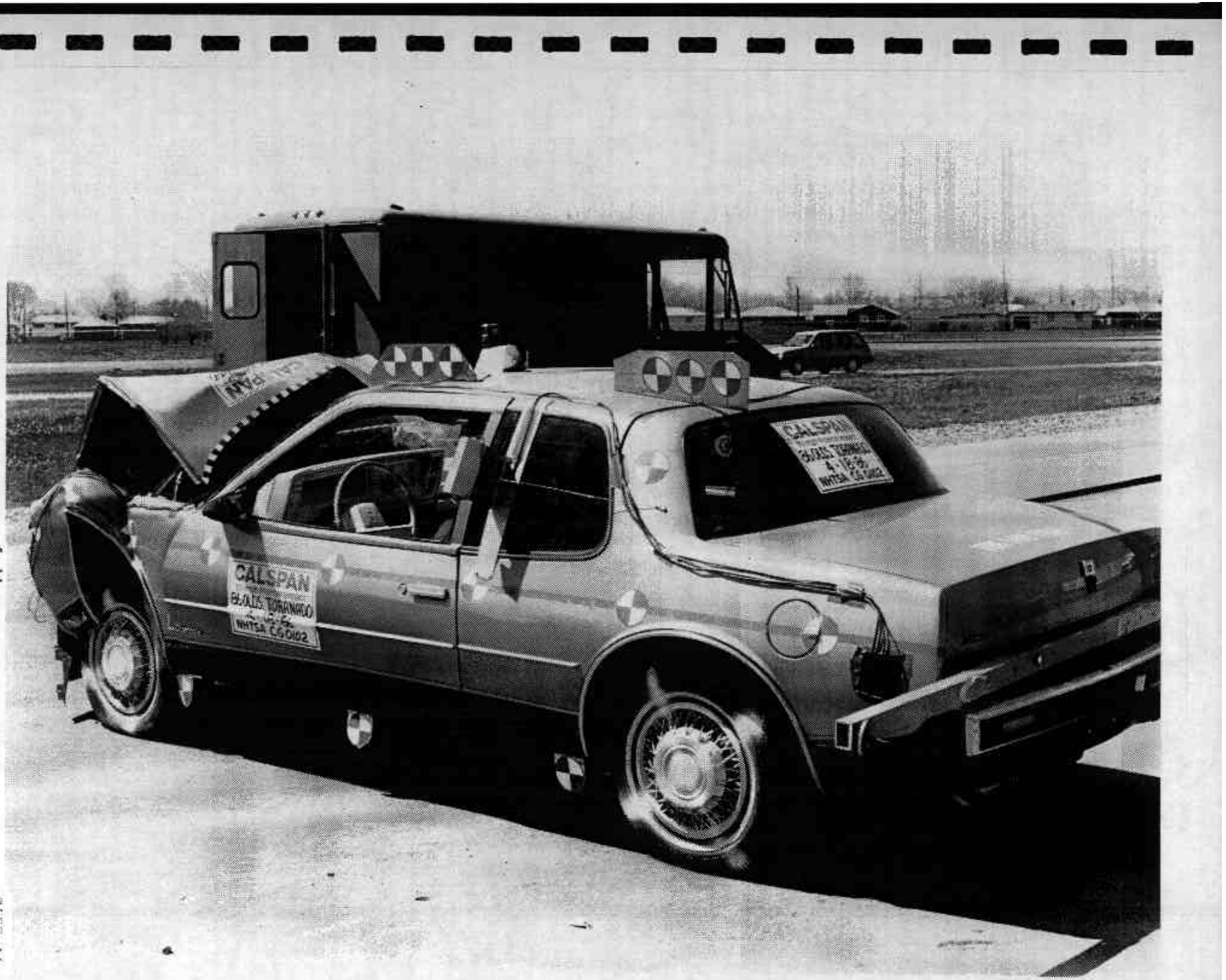

Figure A-10 POST-TEST LEFT REAR THREE-QUARTER VIEW

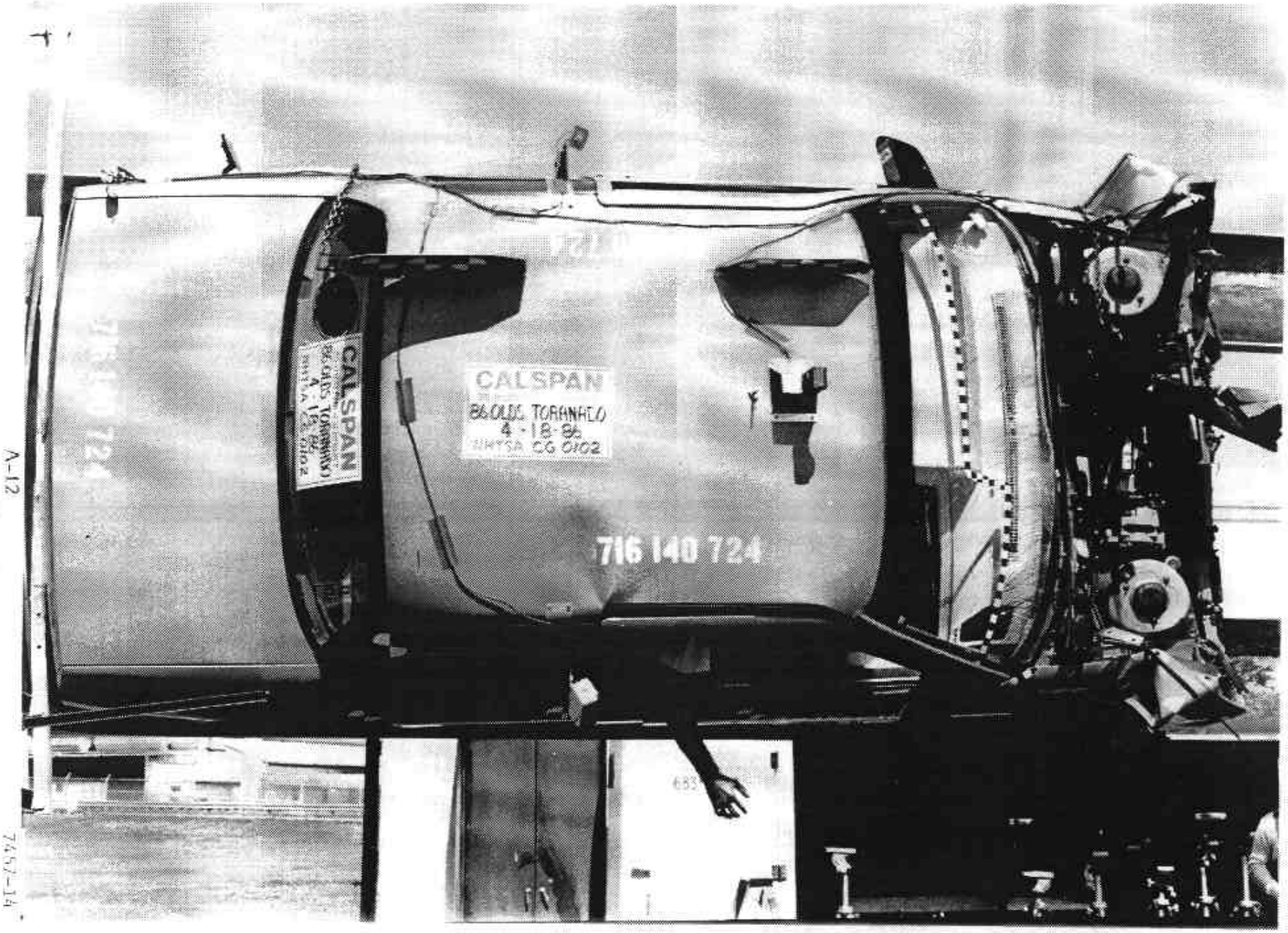

Figure A-11 POST-TEST TOP VIEW

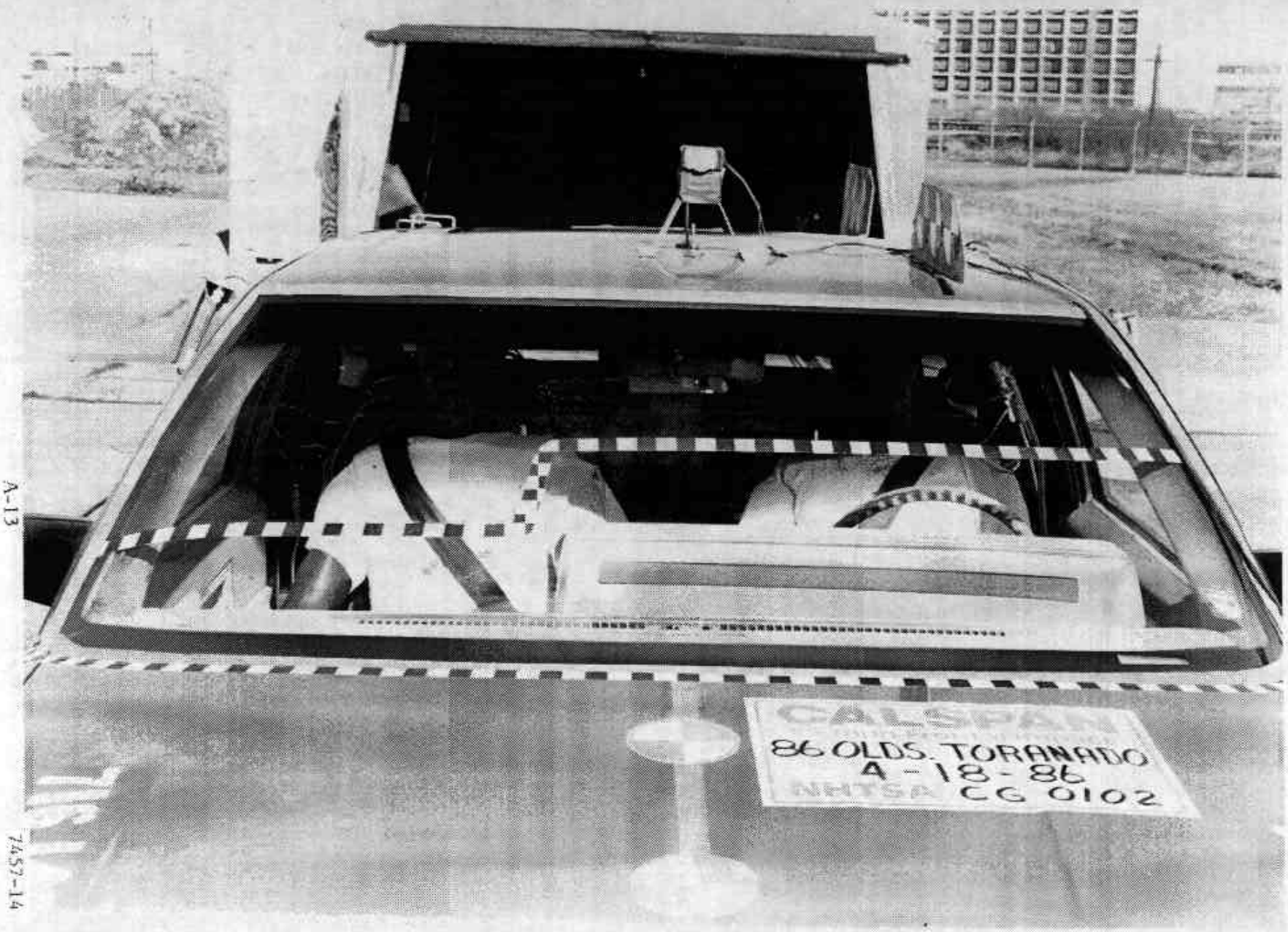

Figure A-12 PRE-TEST WINDSHIELD VIEW

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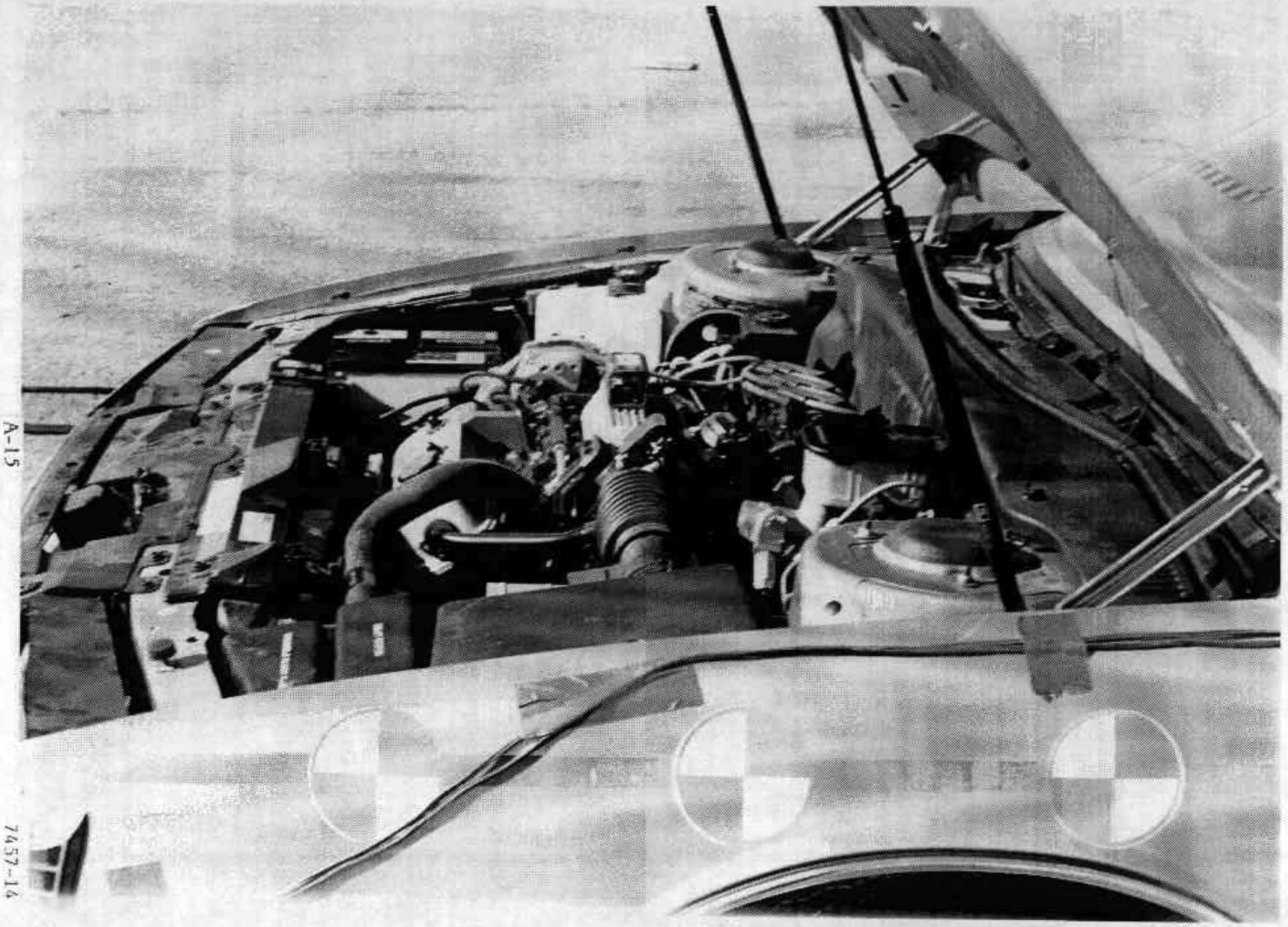
Figure A-13 POST-TEST WINDSHIELD VIEW



A-15

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Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

A-16

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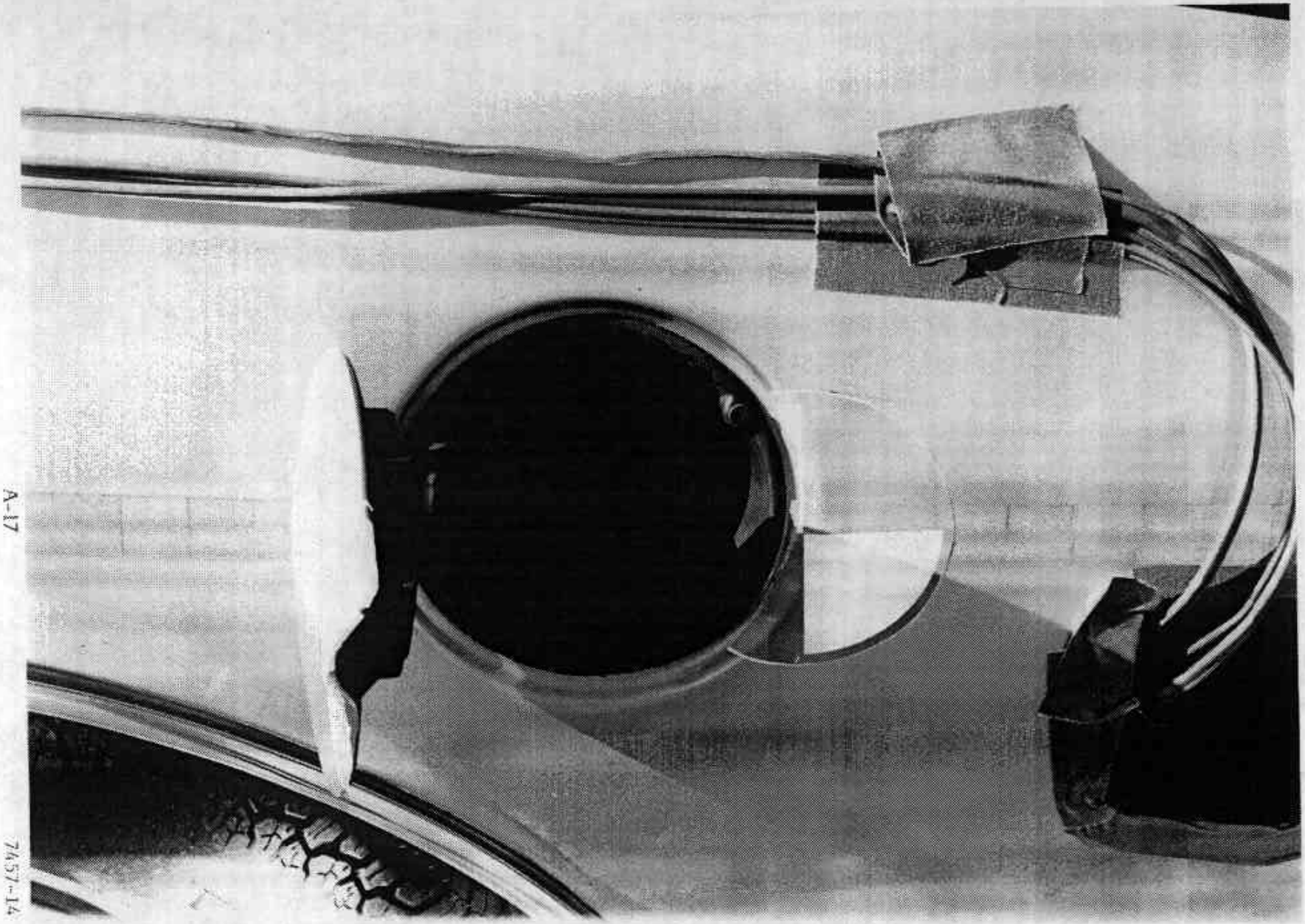
Figure A-15 POST-TEST ENGINE COMPARTMENT VIEW



A-17

7457-14

Figure A-16 PRE-TEST FUEL FILTER CAP VIEW

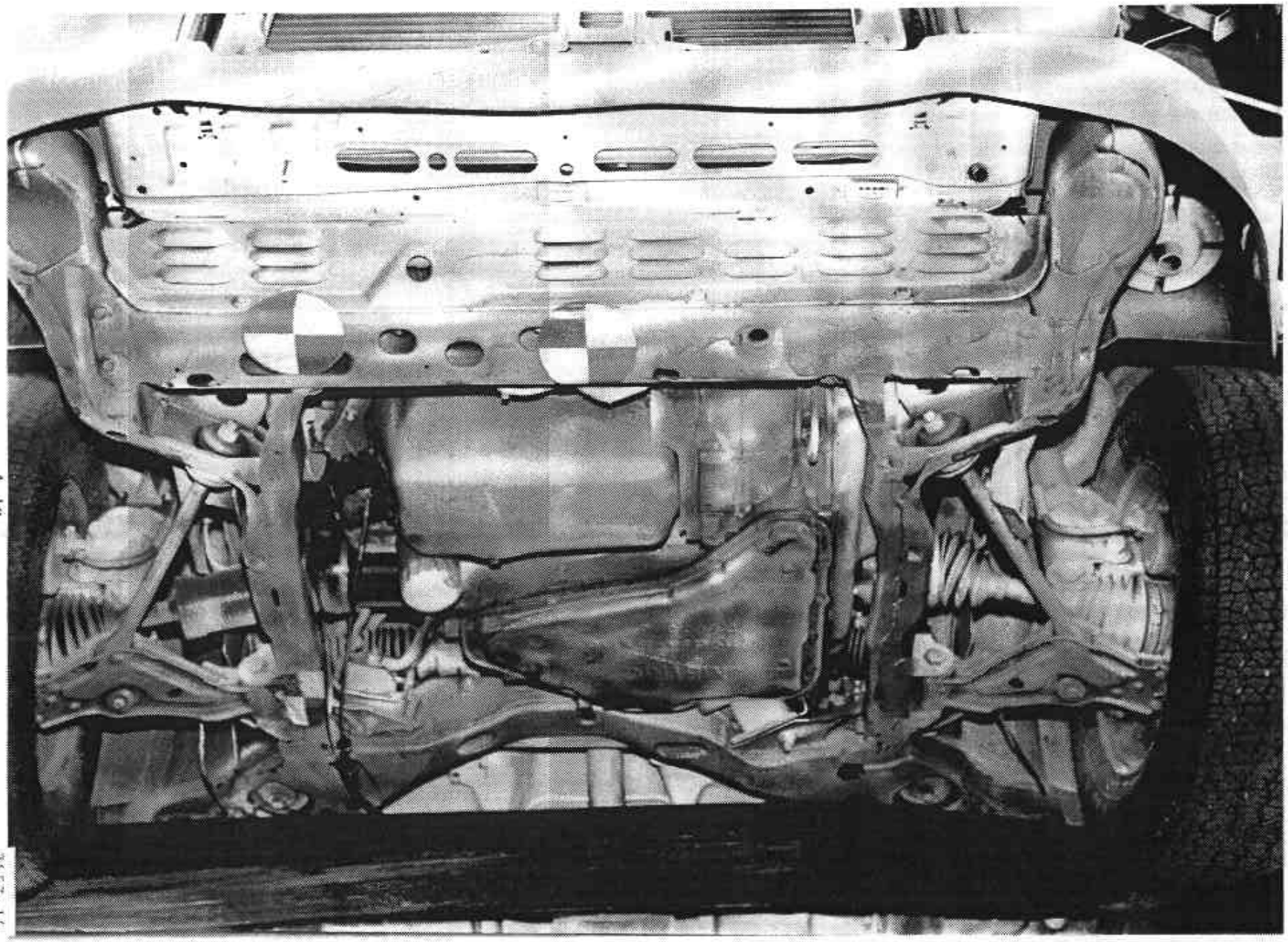
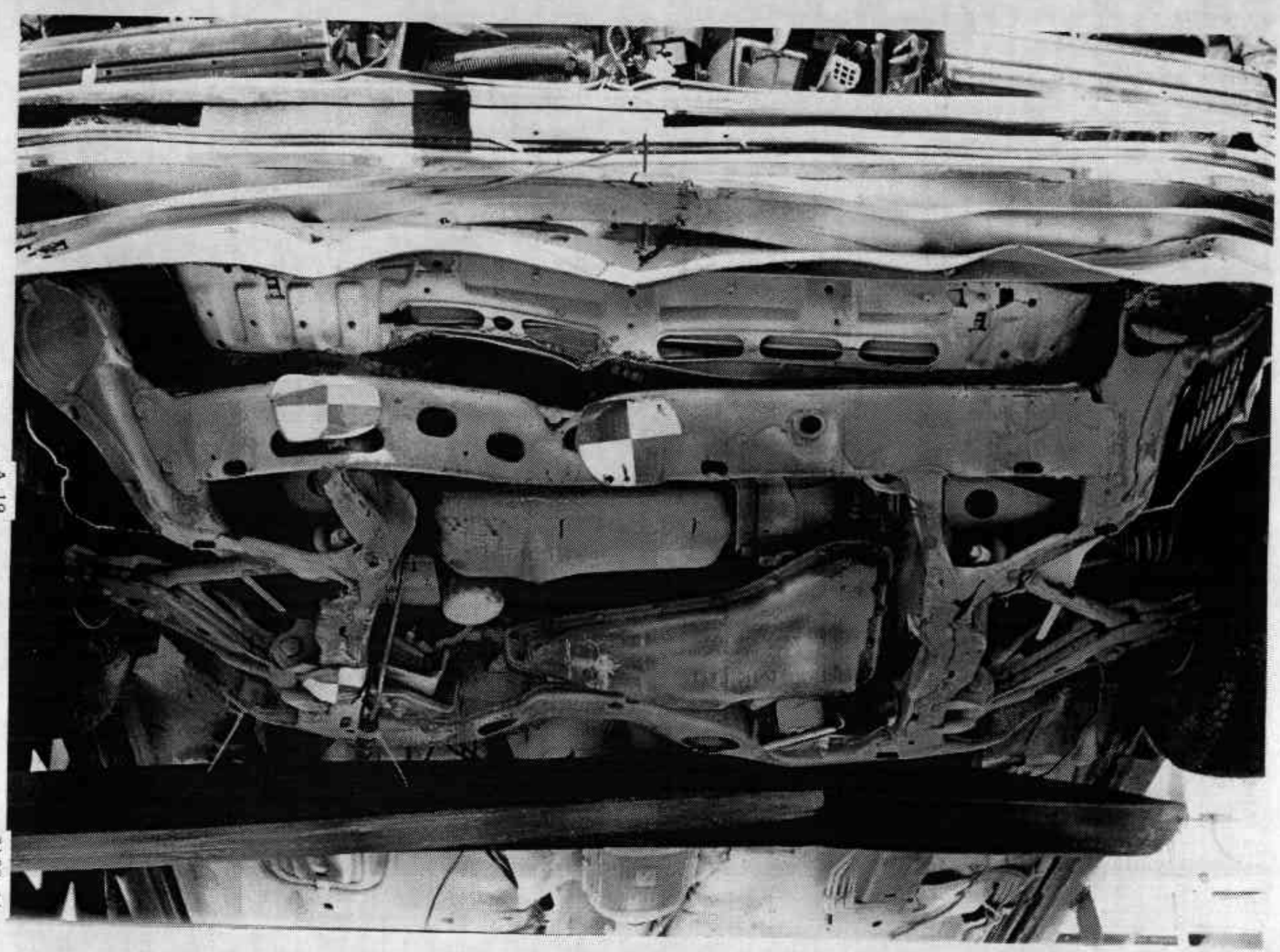


Figure A-17 PRE-TEST FRONT UNDERBODY VIEW



A-19

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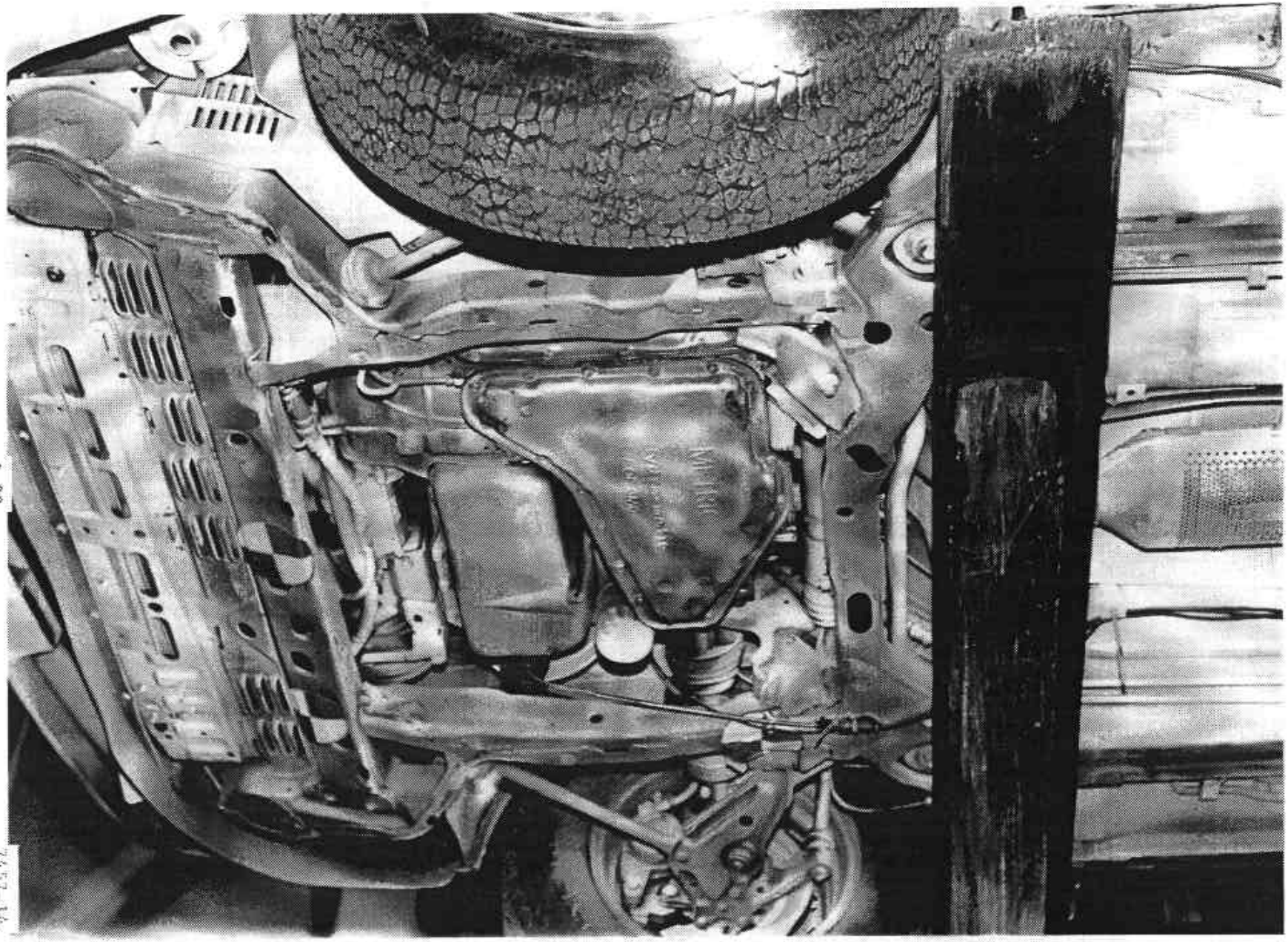
Figure A-18 POST-TEST FRONT UNDERBODY VIEW



7457-14

Figure A-19 PRE-TEST FRONT-SIDE UNDERBODY VIEW

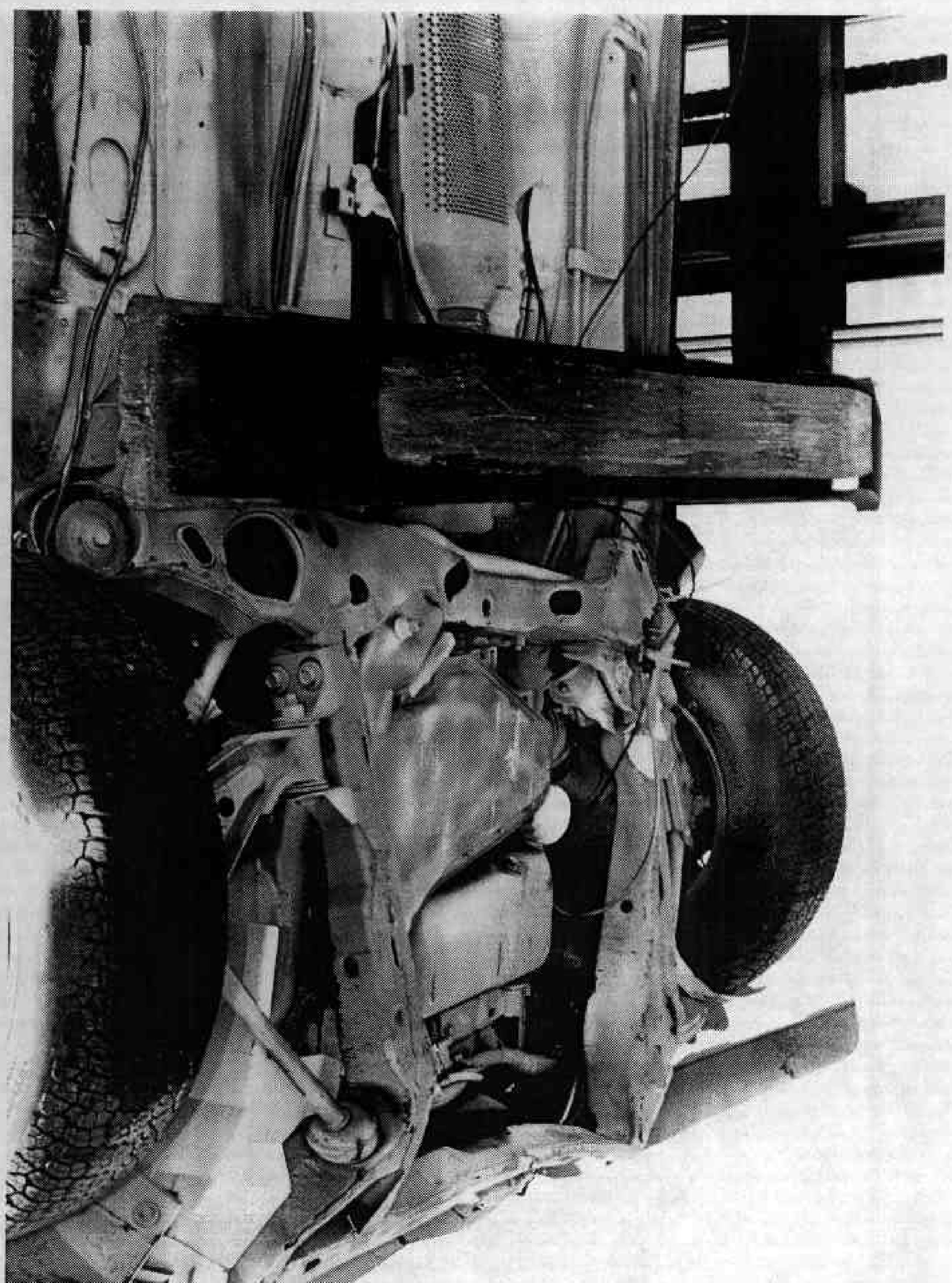


Figure A-20 POST-TEST FRONT-SIDE UNDERBODY VIEW

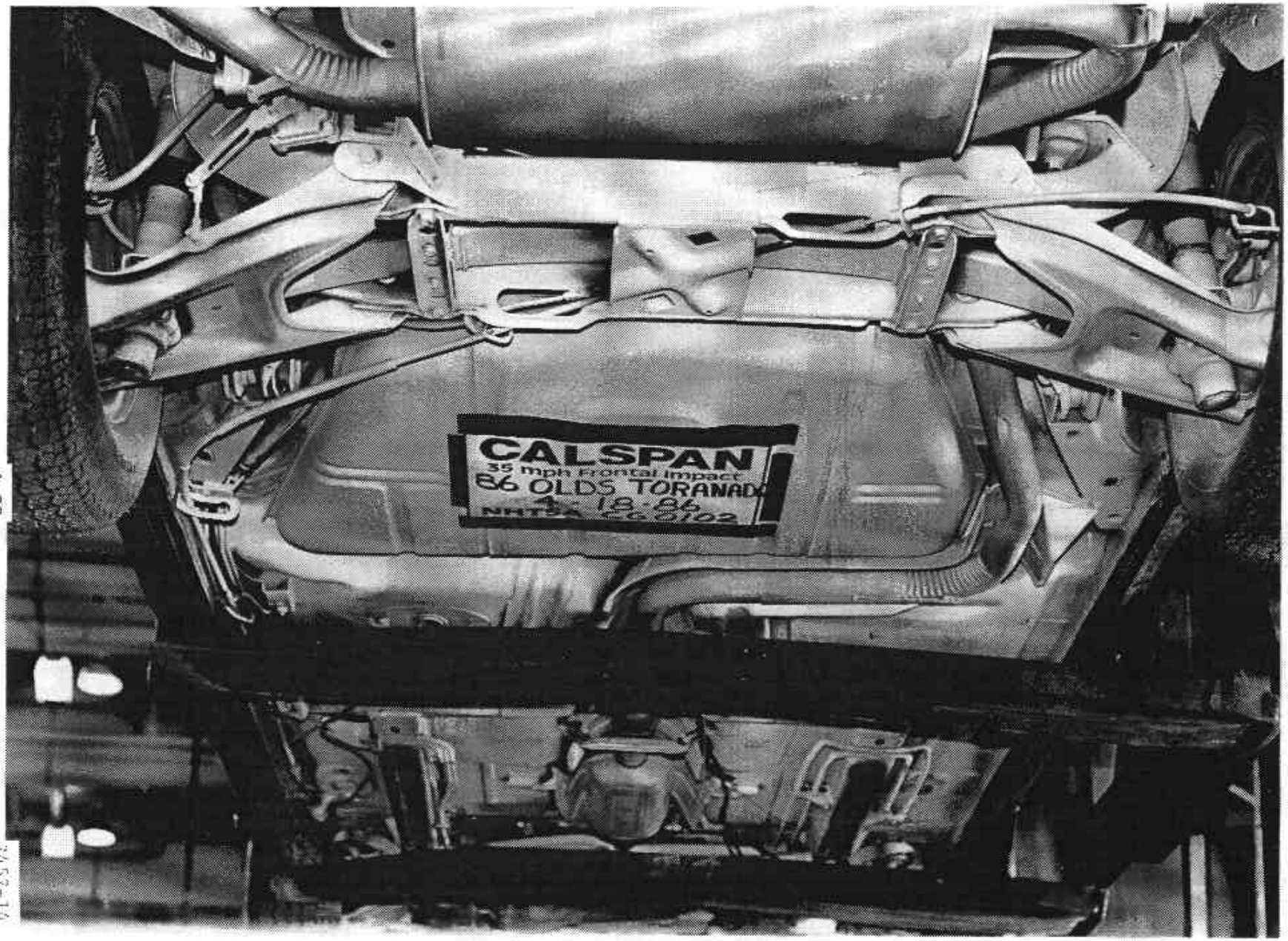


Figure A-21 PRE-TEST REAR UNDERBODY VIEW

Figure A-22 POST-TEST REAR UNDERBODY VIEW

Figure A-13 PRE-TEST DRIVER POSITION VIEW

Figure A-24 POST-TEST DRIVER POSITION VIEW

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Figure A-25 PRE-TEST PASSENGER POSITION VIEW

Figure A-26 POST-TEST PASSENGER POSITION VIEW

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Figure A-27 PRE-TEST DRIVER AND INTERIOR VIEW

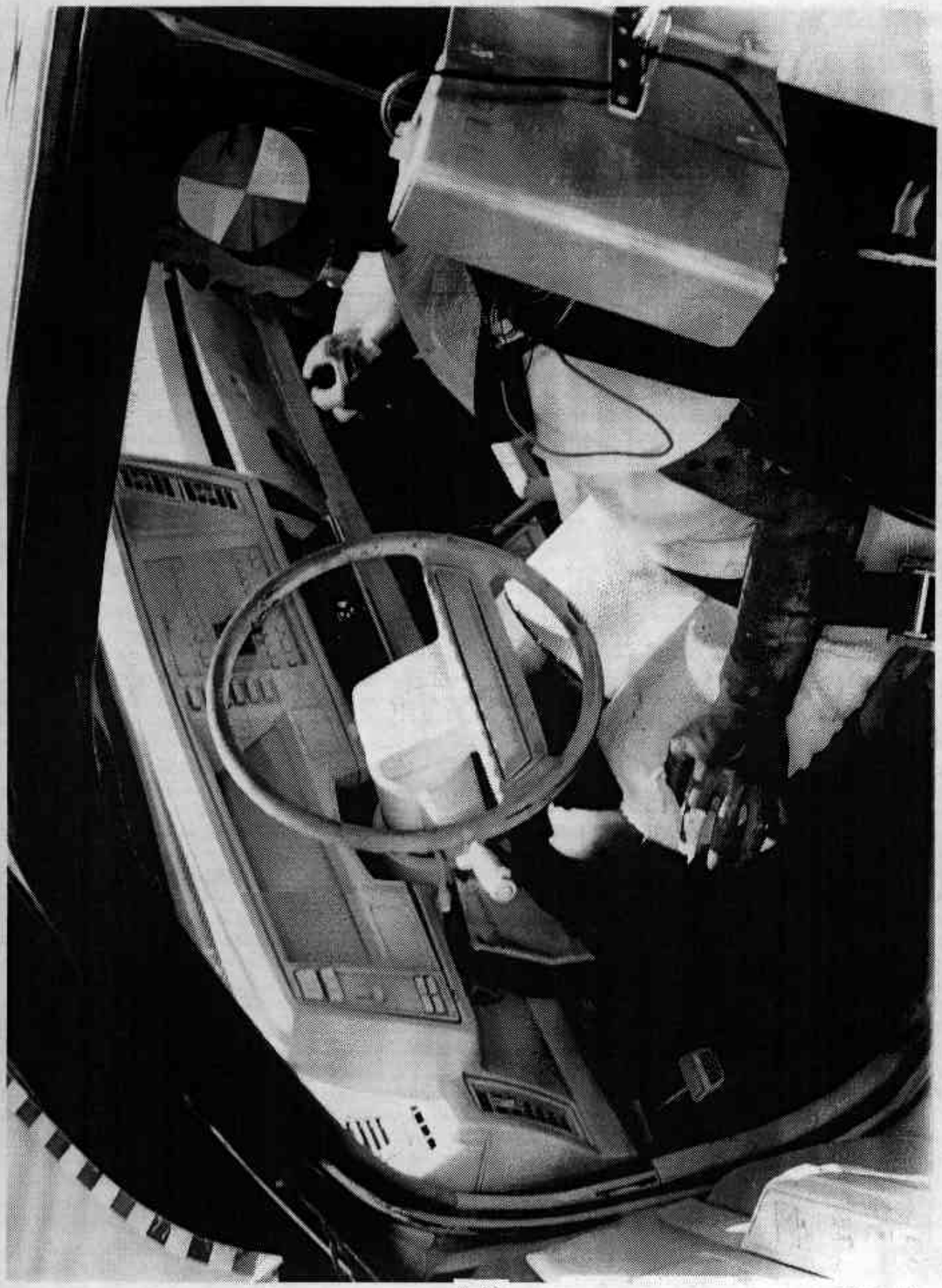


Figure A-28 POST-TEST DRIVER AND INTERIOR VIEW

7457-14

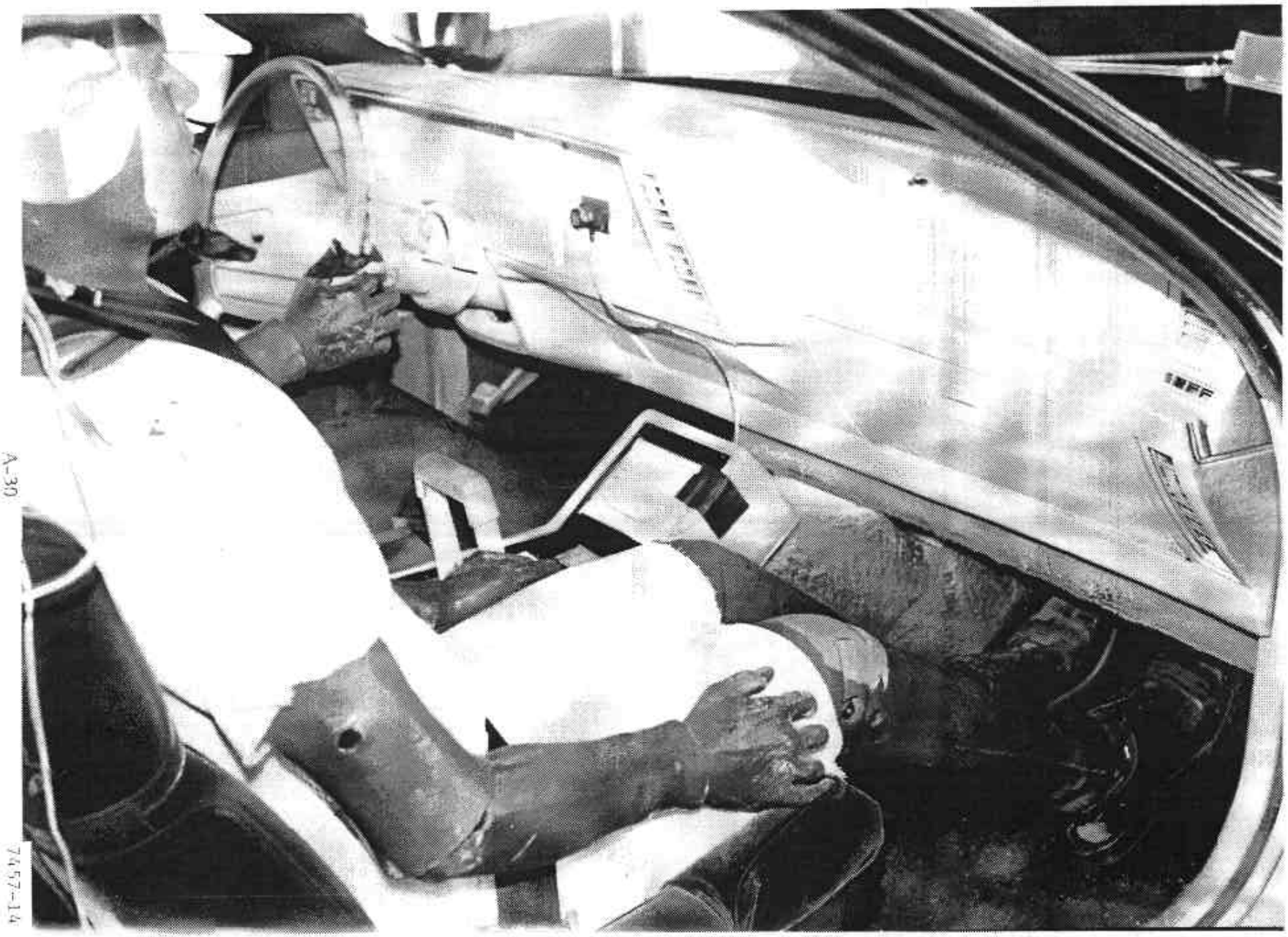


Figure A-29 PRE-TEST PASSENGER AND INTERIOR VIEW

Figure A-30 POST-TEST PASSENGER AND INTERIOR VIEW

7457-14

APPENDIX B

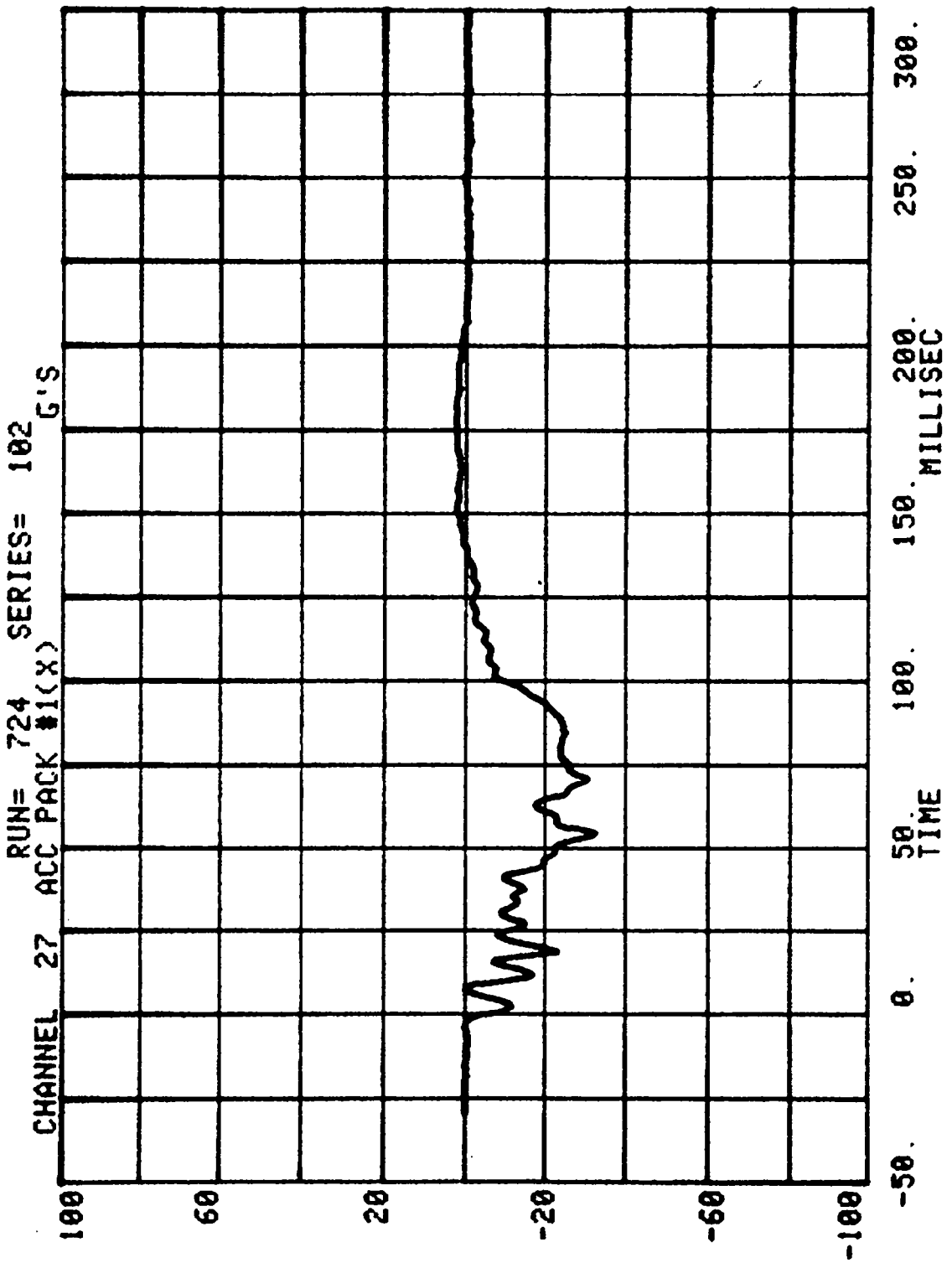
VEHICLE, DUMMY RESPONSE DATA AND LOAD CELL BARRIER DATA

TEST NO. CG0102

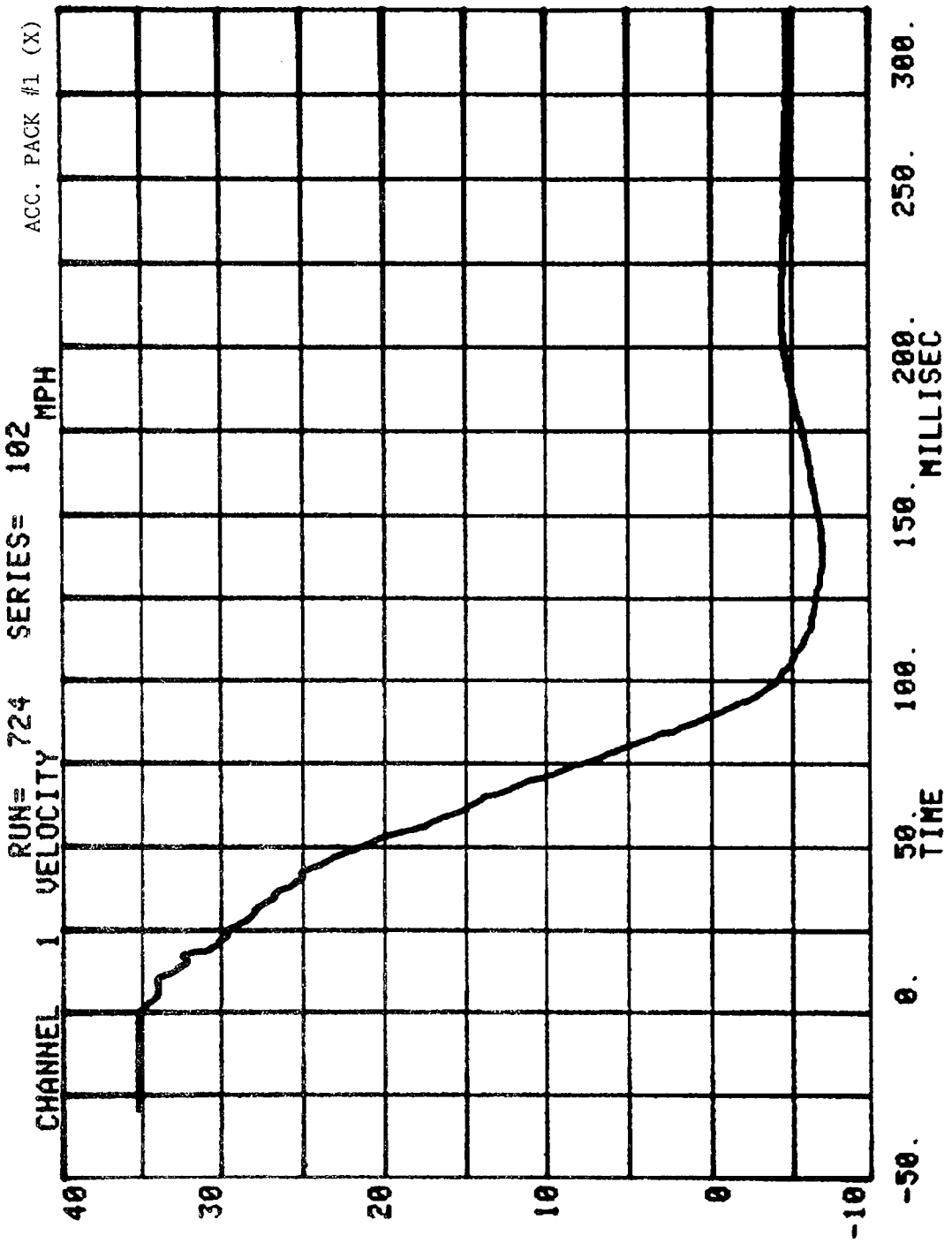
VEHICLE DATA

FILTER CHANNEL CLASS

60


CHANNEL 27 ACC PACK #1(X)
RUN= 724 SERIES= 102
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7457-14


ACC. PACK #1 (X)
CHANNEL 1 VELOCITY
RUN= 724 SERIES= 102 MPH
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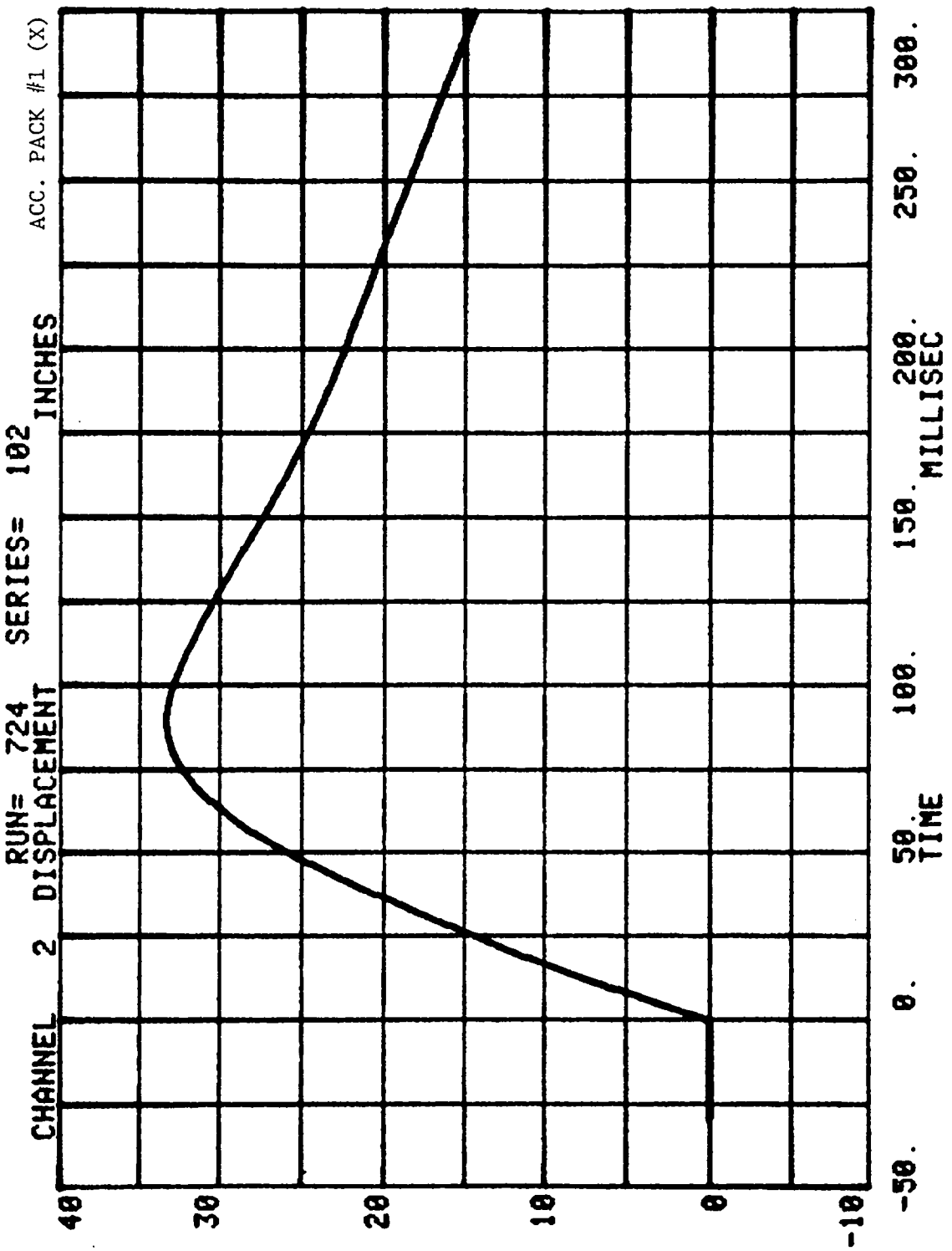
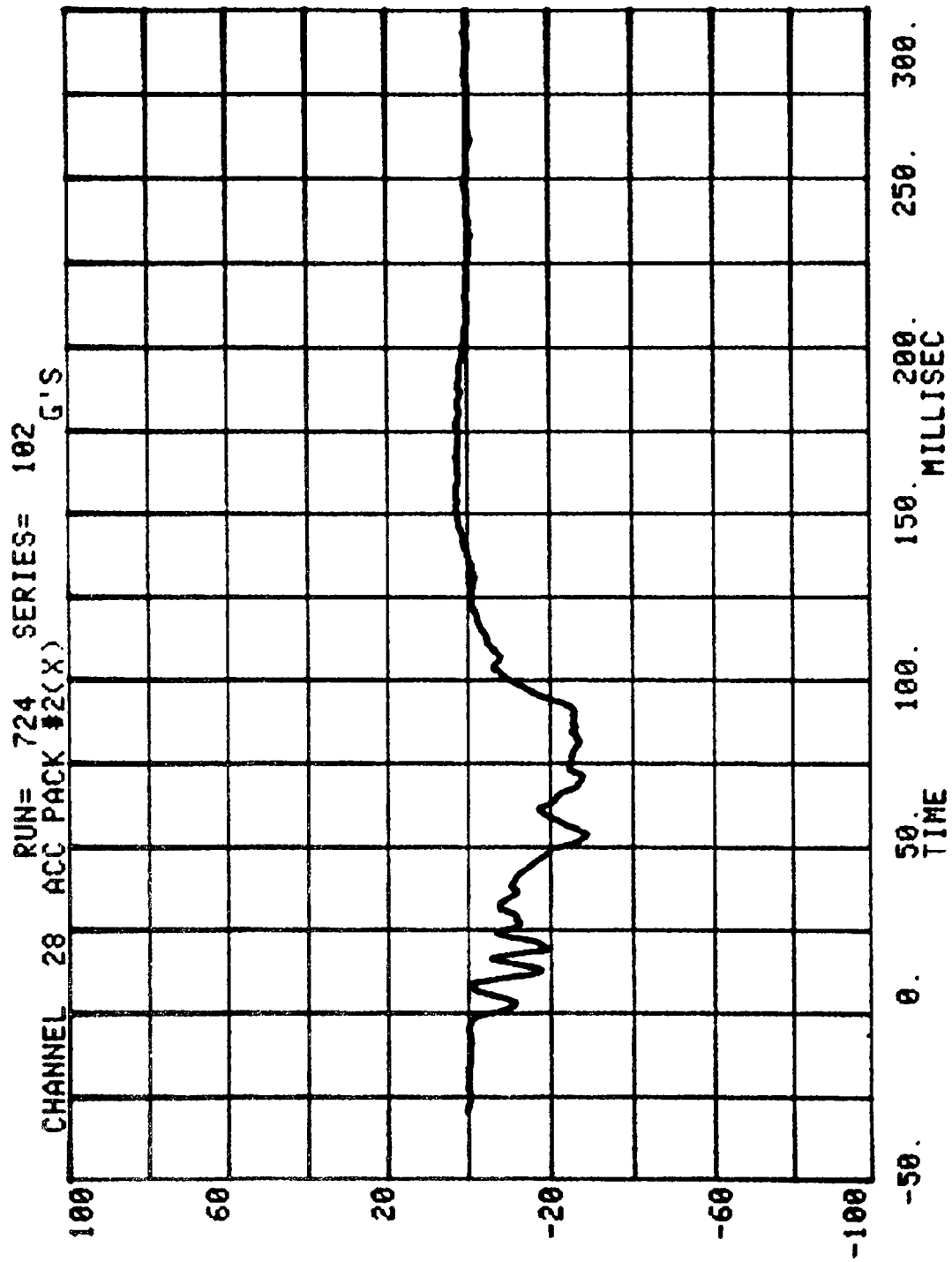
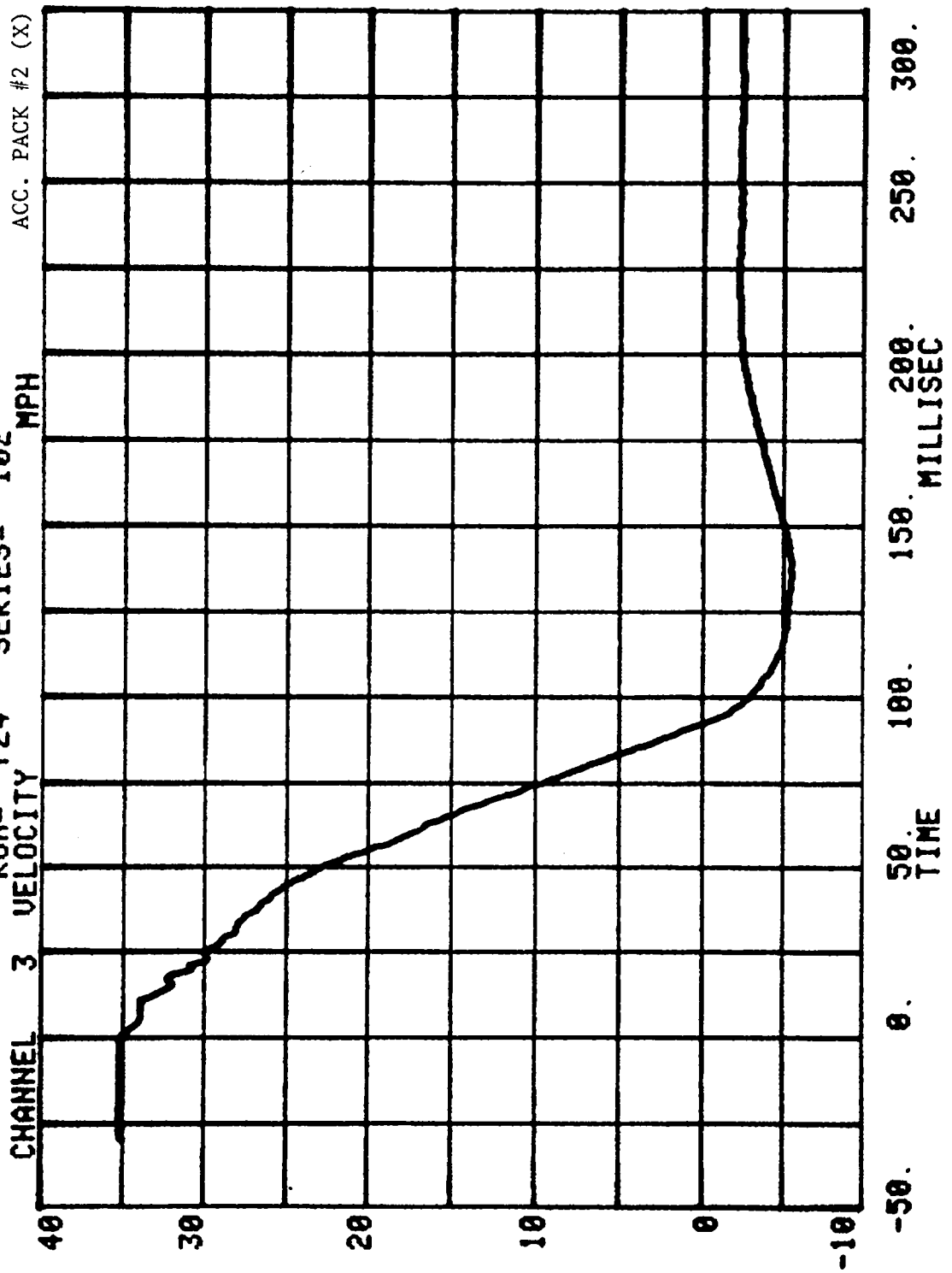
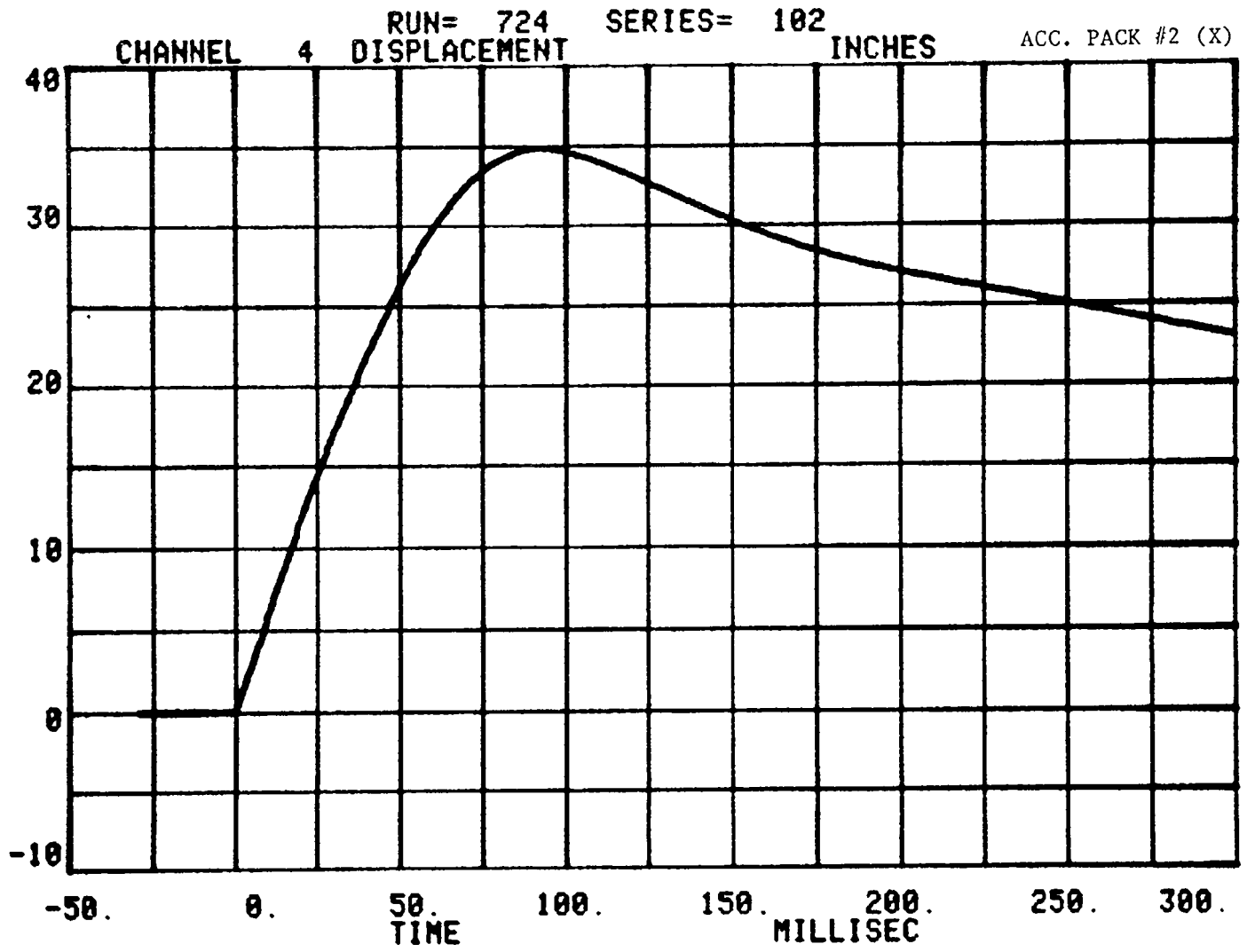
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


ACC. PACK #1 (X)
CHANNEL 2 DISPLACEMENT
RUN= 724 SERIES= 102
INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 28 ACC PACK #2(X)
RUN= 724 SERIES= 102
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7457-14


ACC. PACK #2 (X)
CHANNEL 3 VELOCITY
RUN= 724 SERIES= 102 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 724 SERIES= 102
CHANNEL 4 DISPLACEMENT INCHES
ACC. PACK #2 (X)
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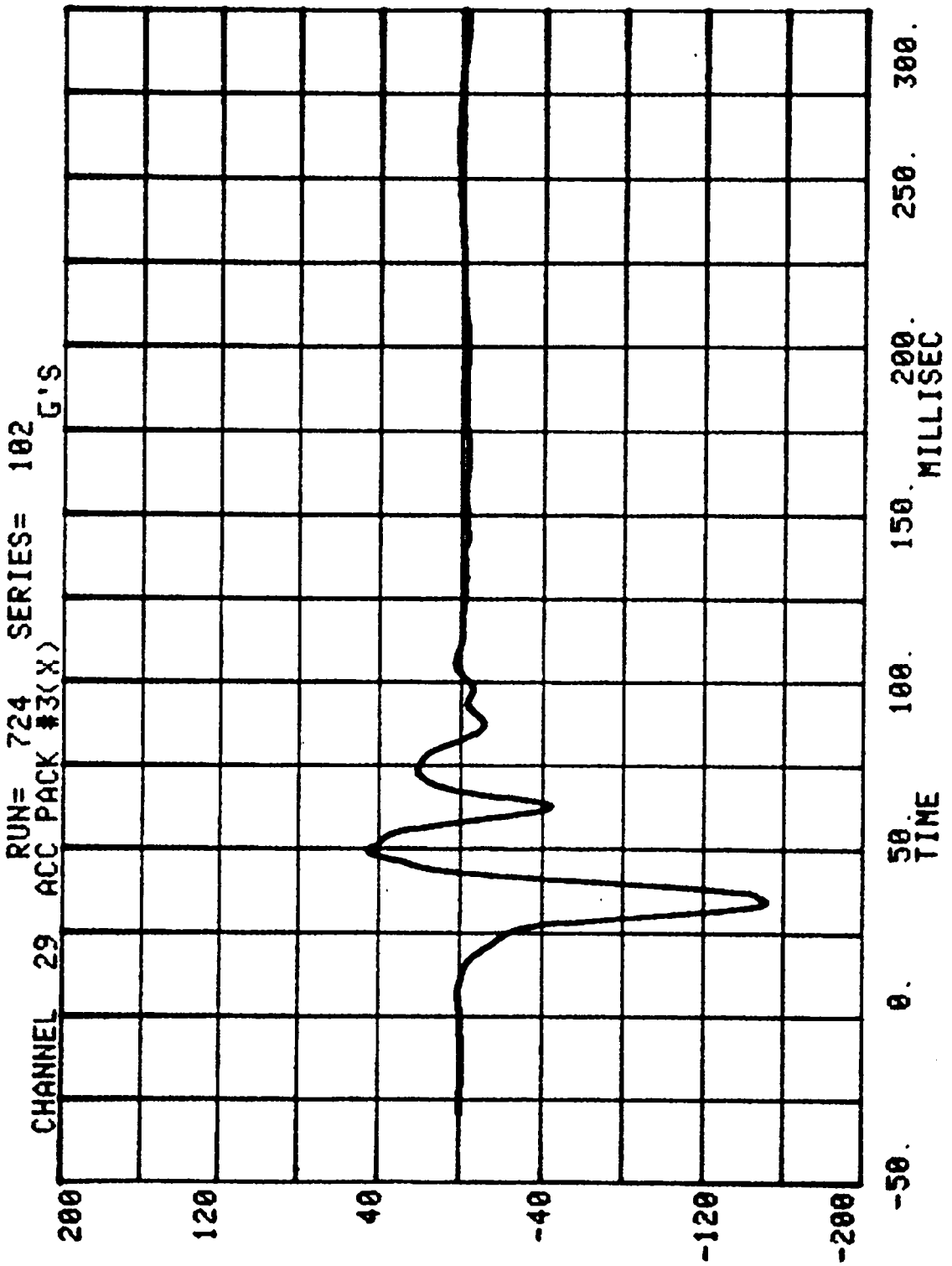
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC


CHANNEL 29 ACC PACK #3(X)
RUN= 724 SERIES= 102
G'S
200
120
40
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-120
-200
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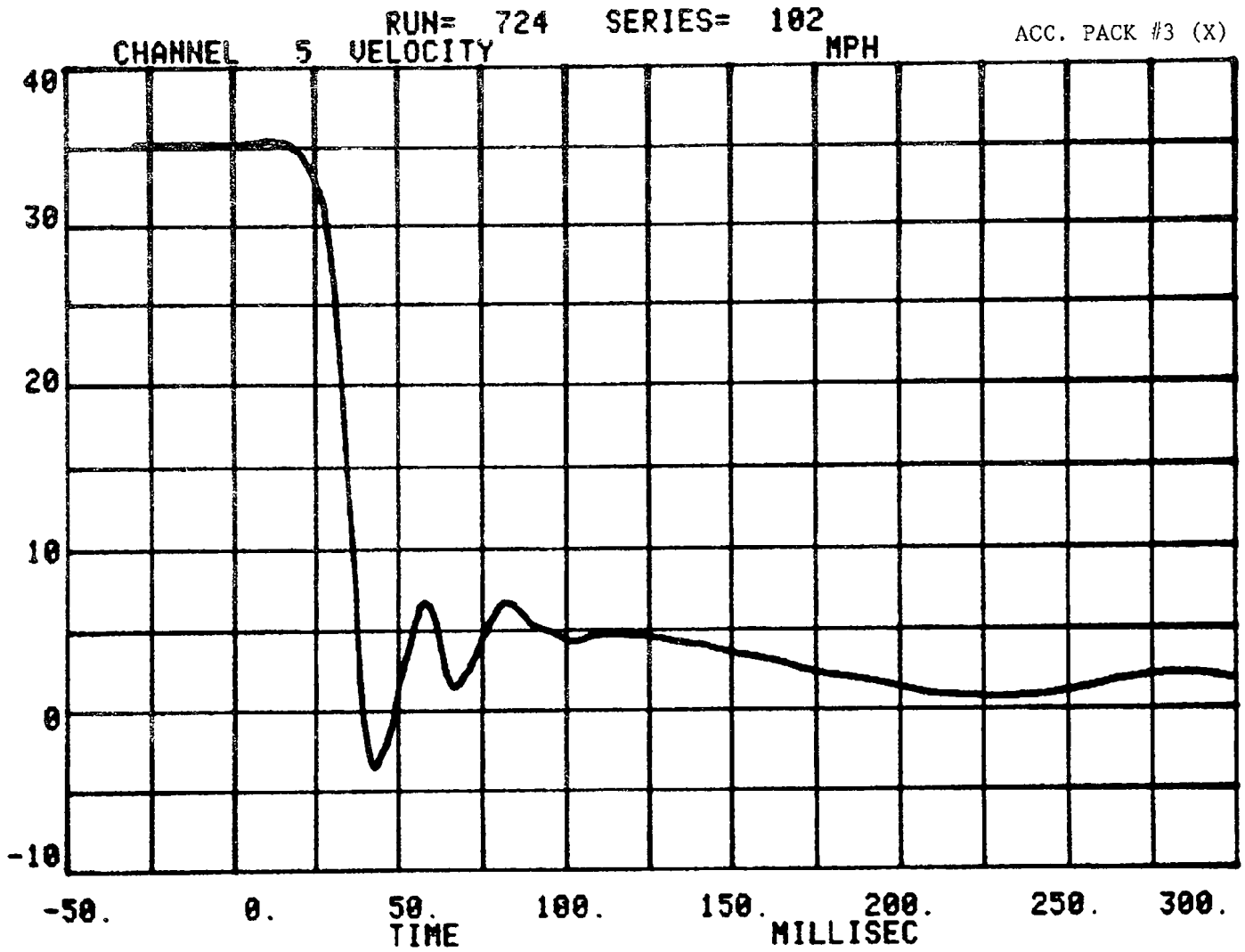
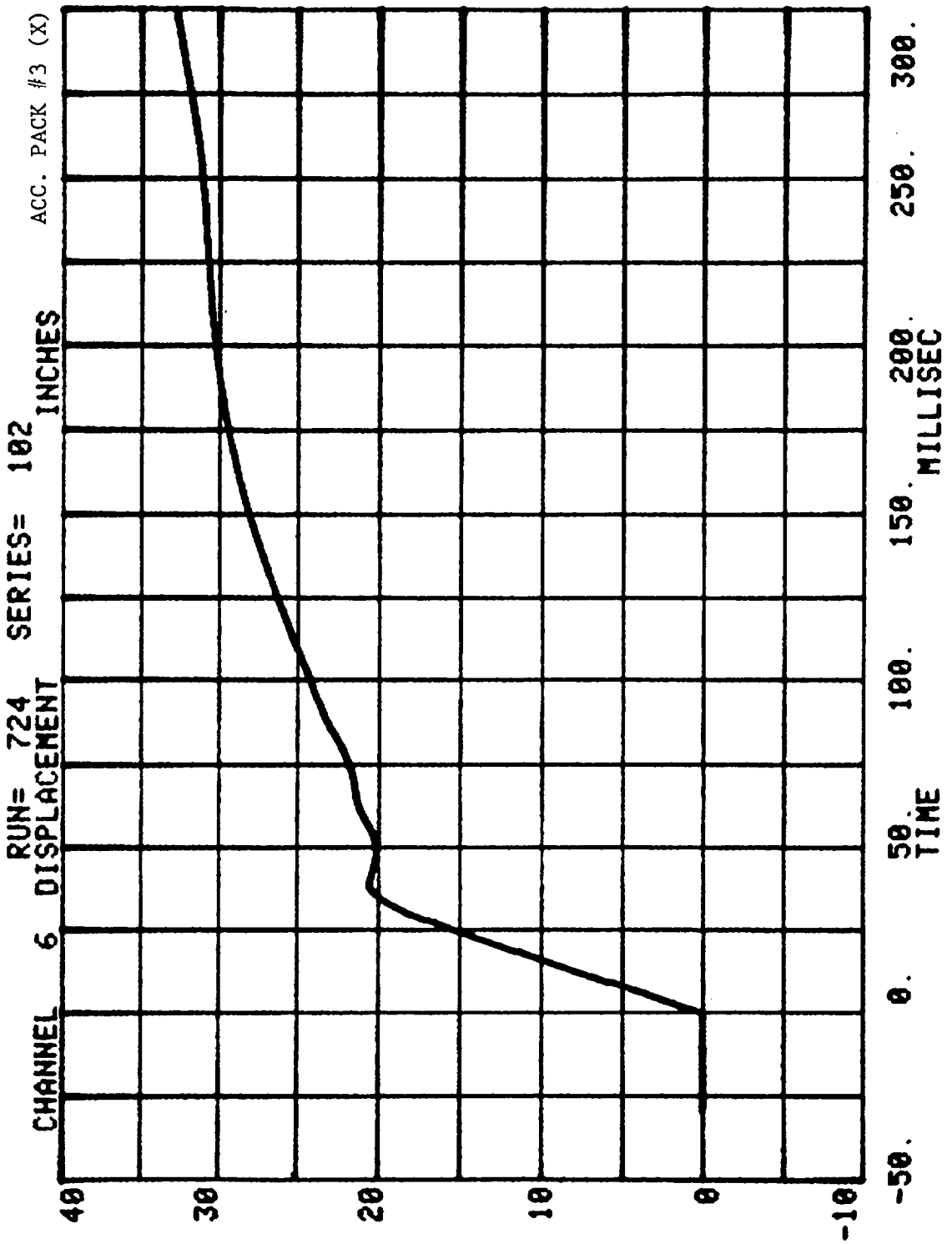
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 724 SERIES= 102
ACC. PACK #3 (X)
CHANNEL 5 VELOCITY
MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 6 DISPLACEMENT
RUN= 724 SERIES= 102
INCHES
ACC. PACK #3 (X)
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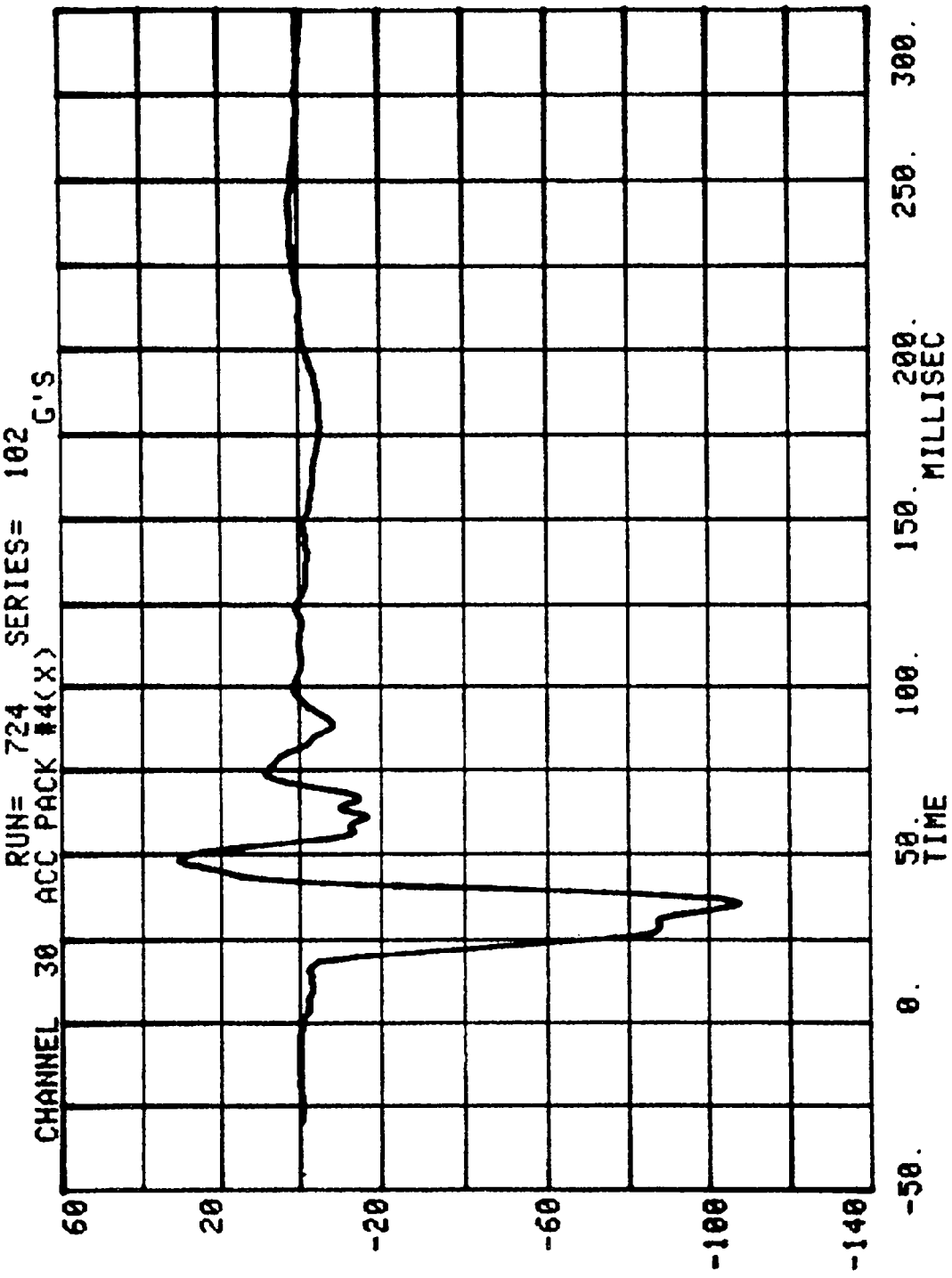
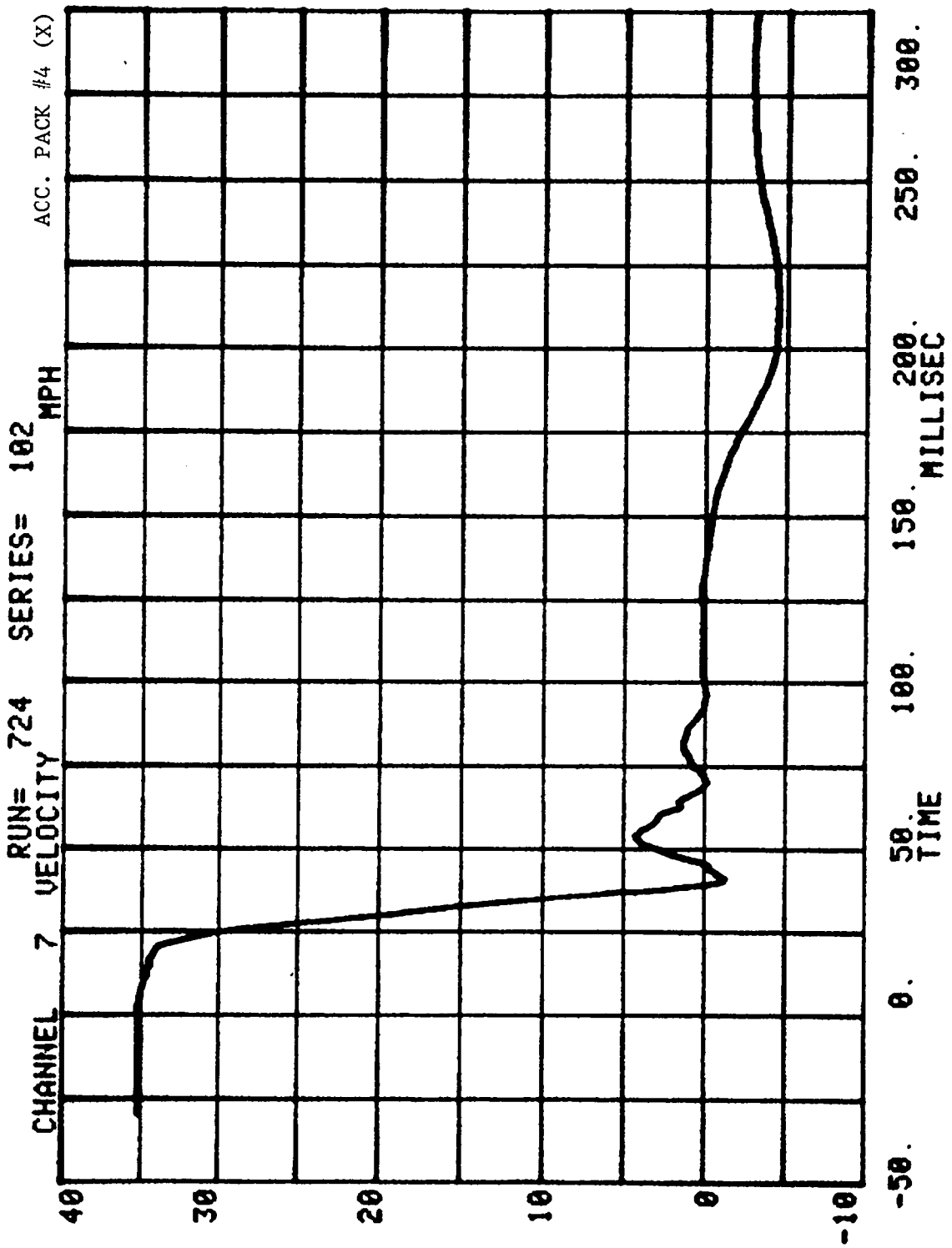
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 30 ACC PACK #4(X)
RUN= 724 SERIES= 102
G'S
60
20
-20
-60
-100
-140
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


ACC. PACK #4 (X)
CHANNEL 7 VELOCITY
RUN= 724 SERIES= 102 MPH
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30
20
10
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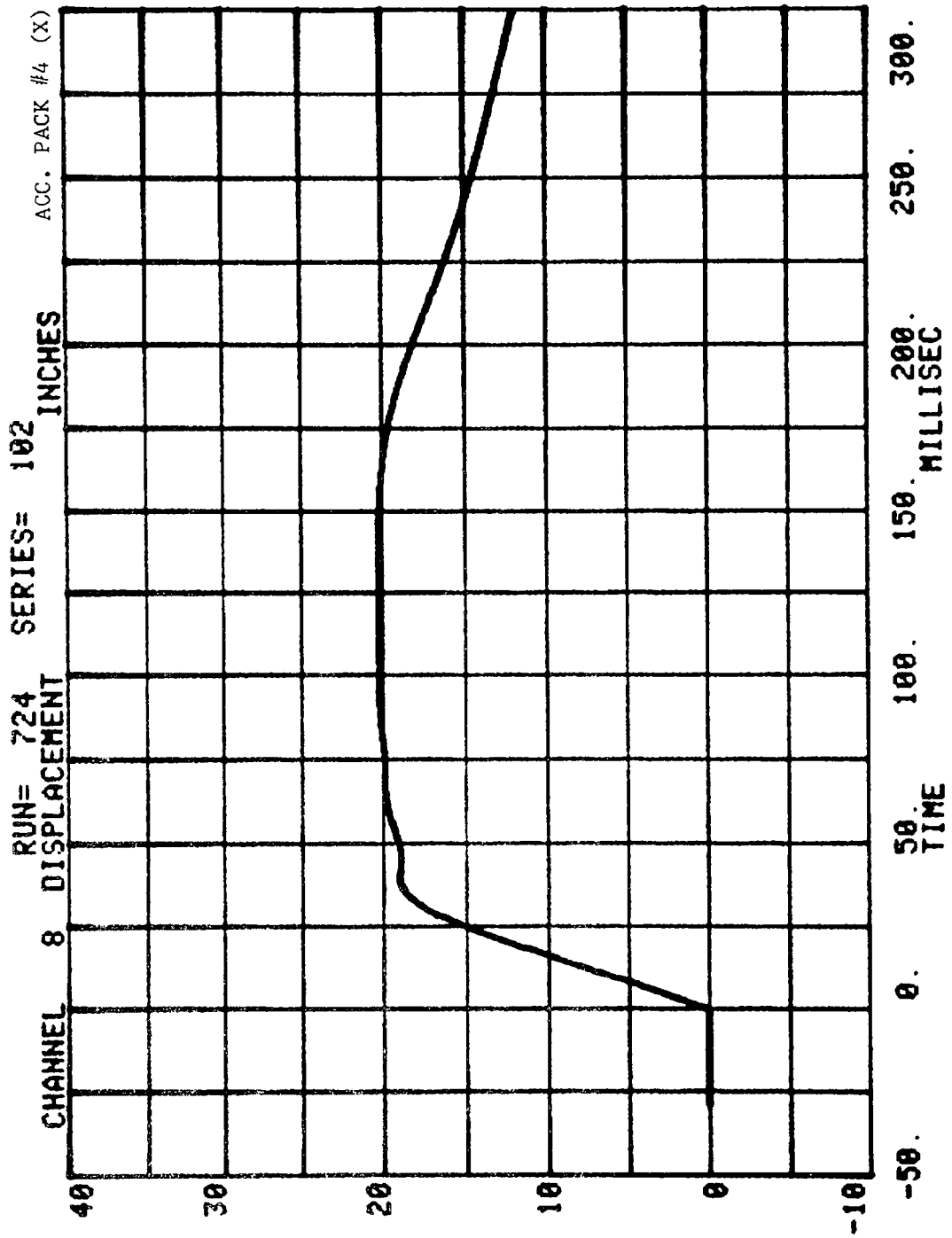
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


ACC. PACK #4 (X)
CHANNEL 8 DISPLACEMENT
RUN= 724 SERIES= 102
INCHES
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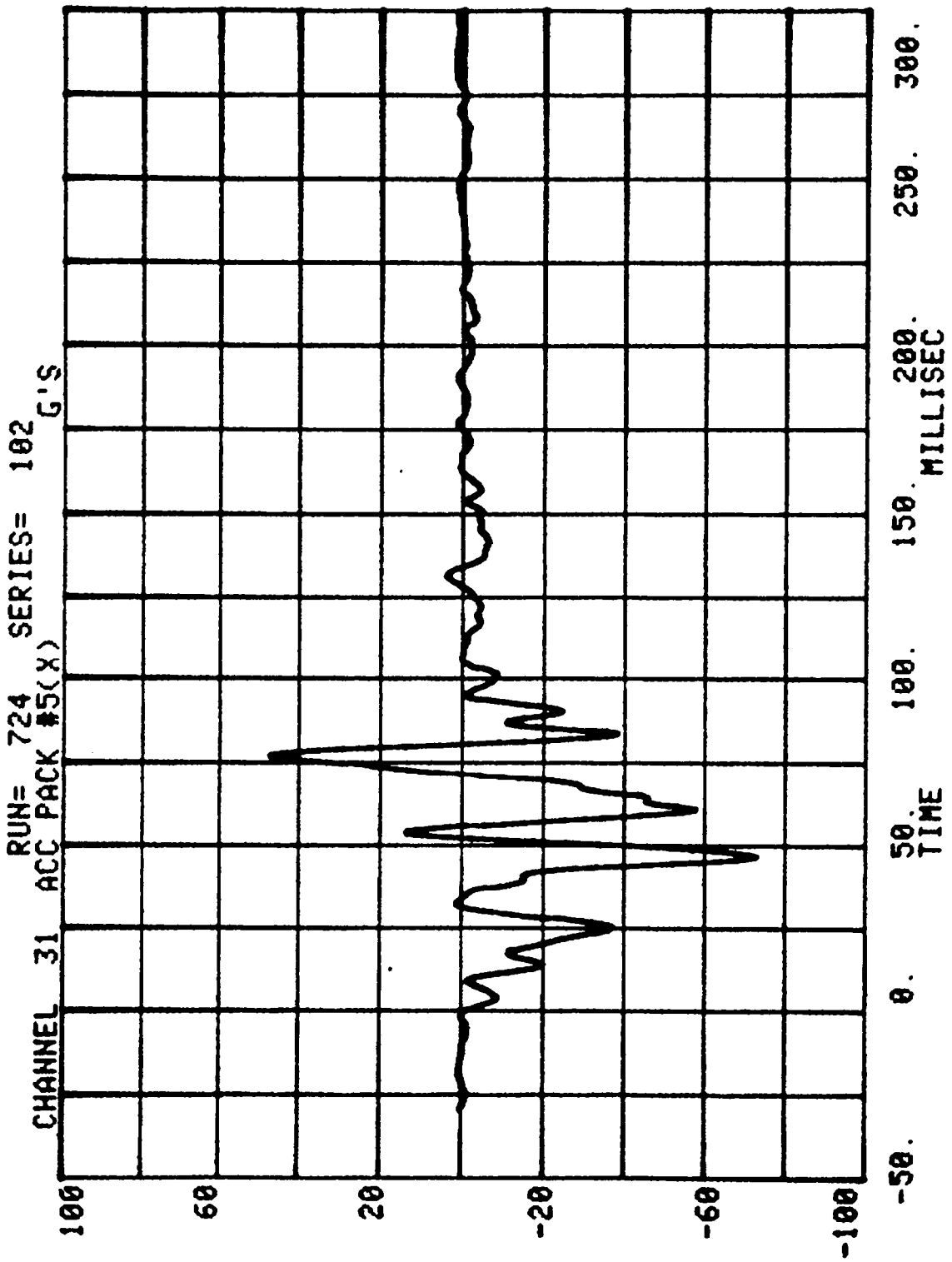
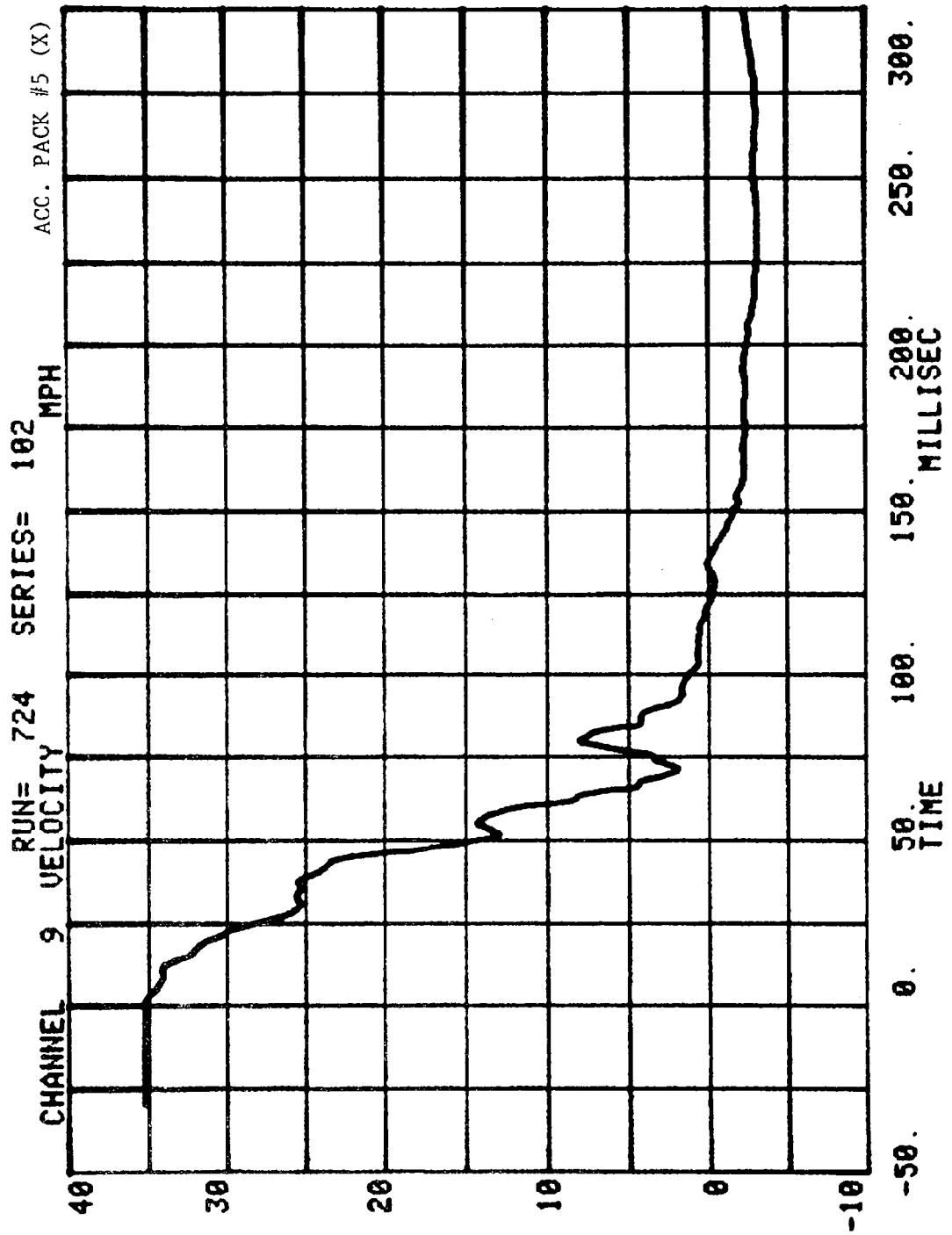
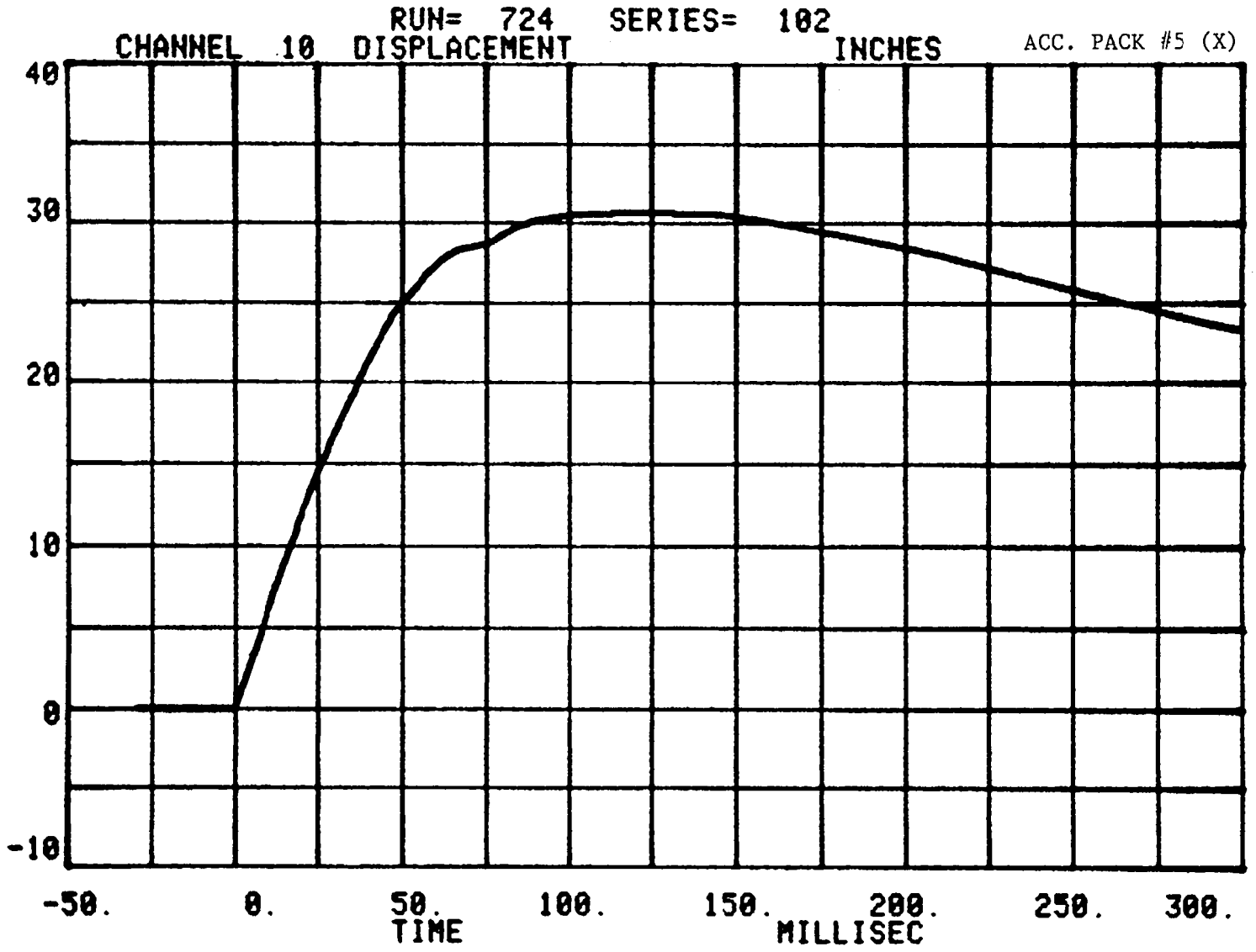
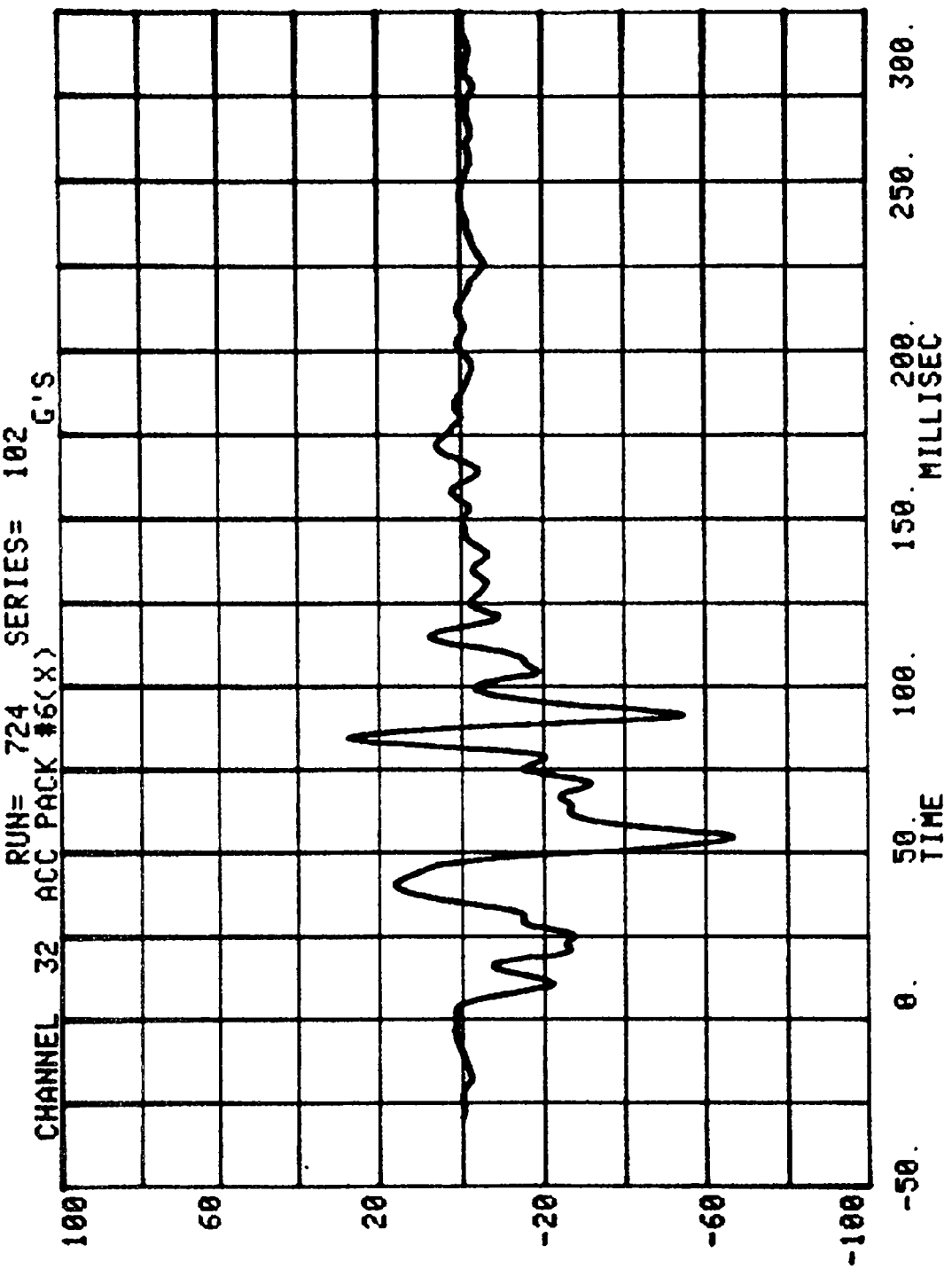
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 31 ACC PACK #5(X)
RUN= 724 SERIES= 102
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


ACC. PACK #5 (X)
CHANNEL 9 VELOCITY
RUN= 724 SERIES= 102 MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 724 SERIES= 102
CHANNEL 10 DISPLACEMENT INCHES
ACC. PACK #5 (X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 32 ACC PACK #6(X)
RUN= 724 SERIES= 102
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

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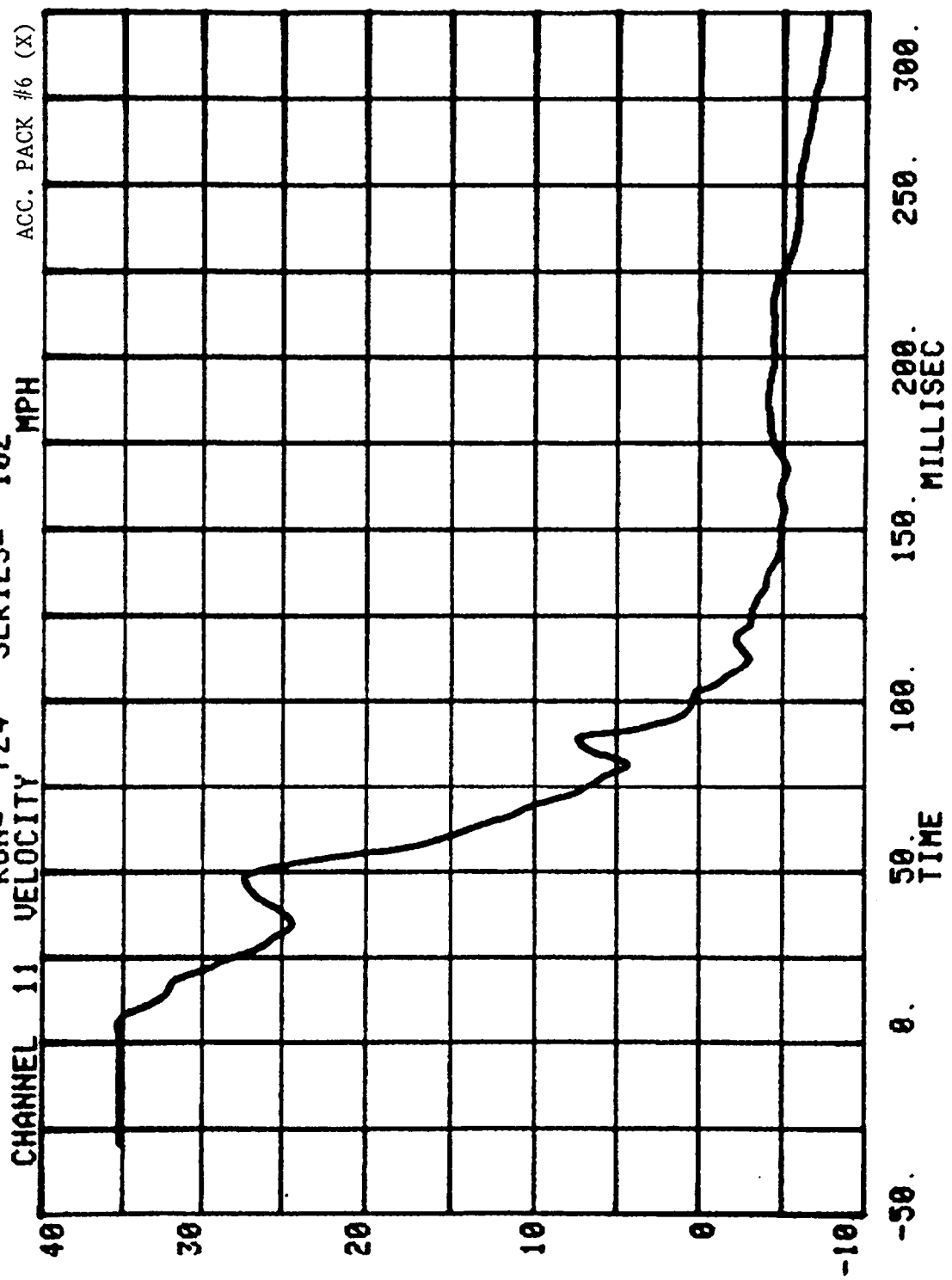
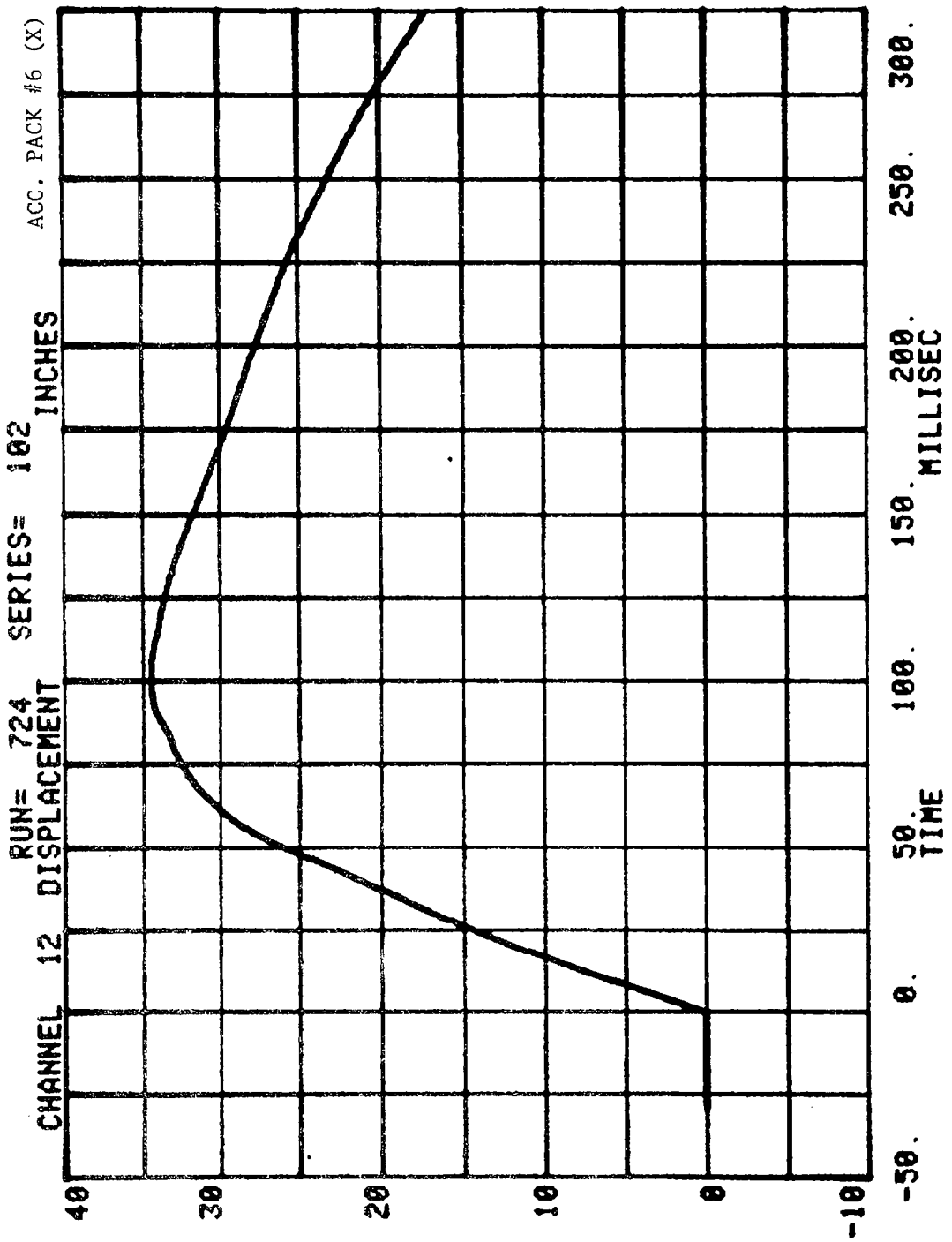
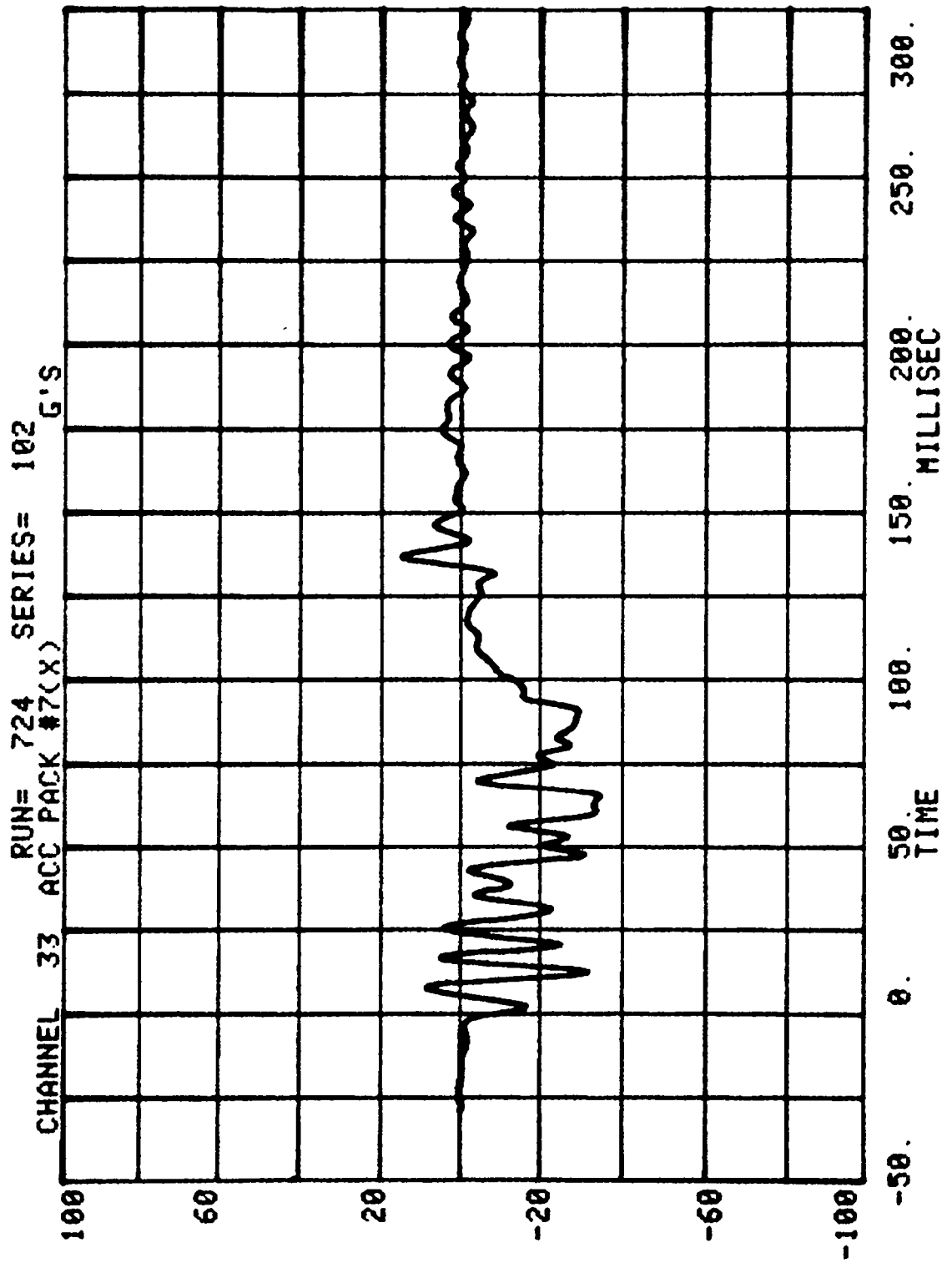
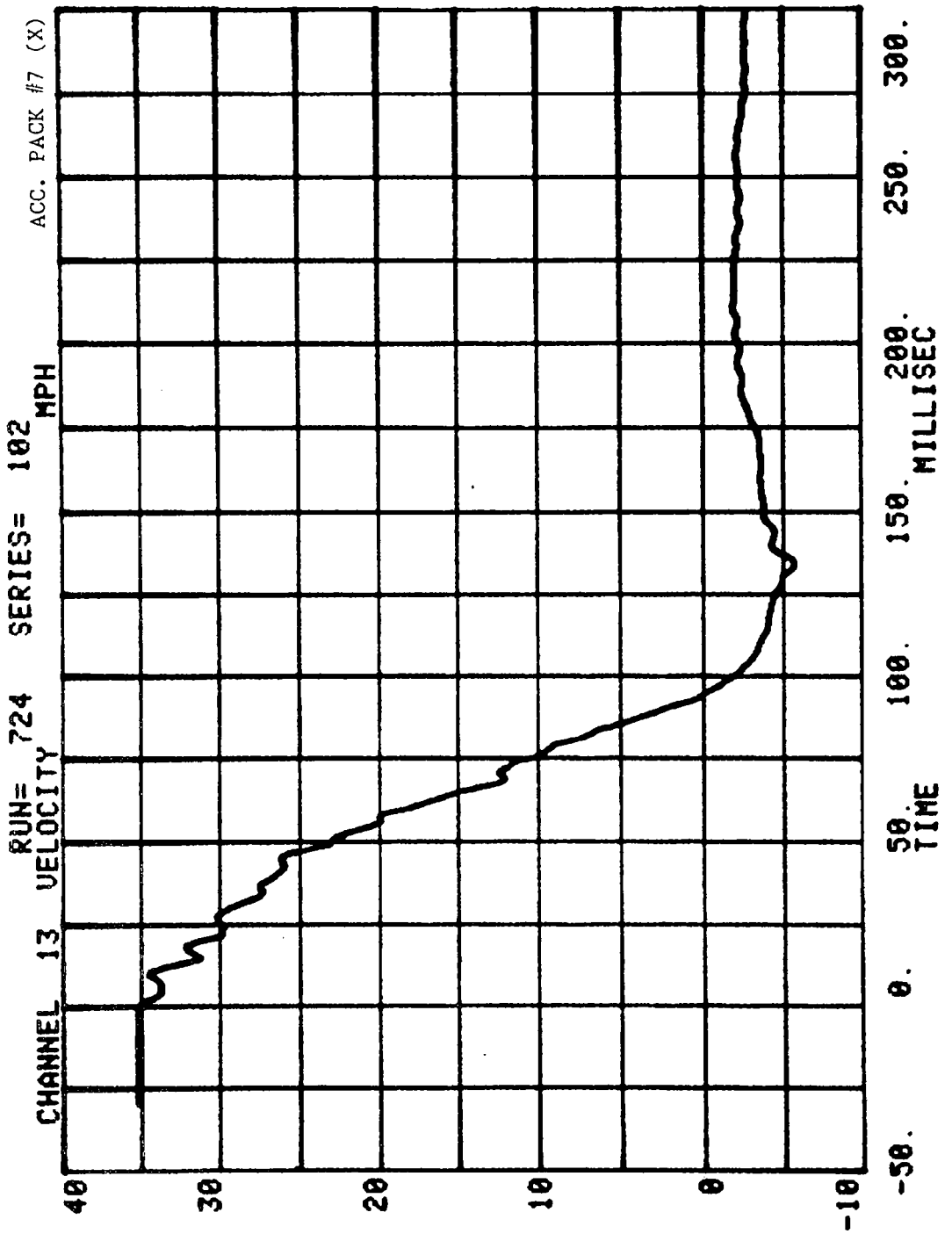
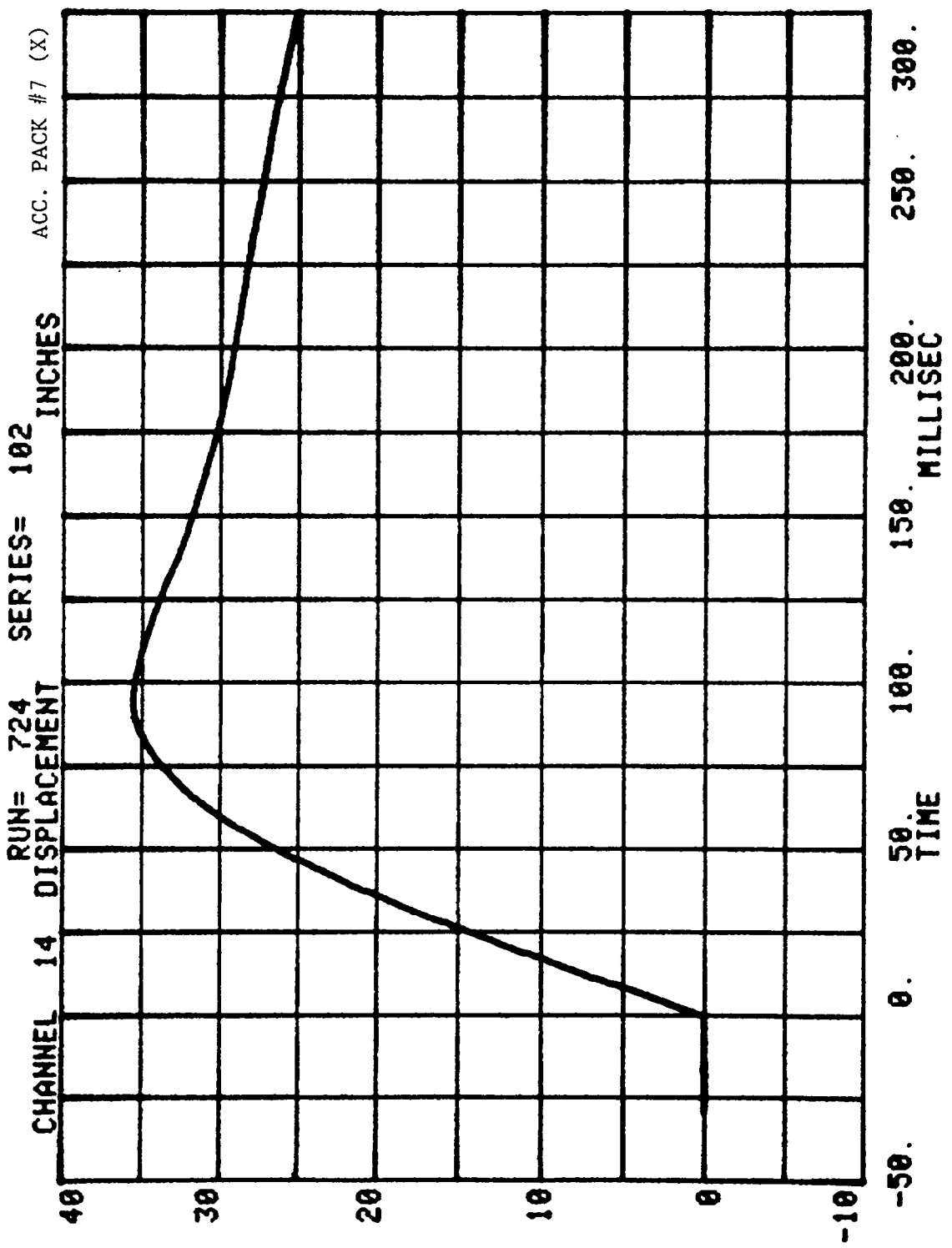

CHANNEL 11 VELOCITY
RUN= 724 SERIES= 102 MPH
ACC. PACK #6 (X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


ACC. PACK #6 (X)
CHANNEL 12 DISPLACEMENT
RUN= 724 SERIES= 102
INCHES
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 33 ACC PACK #7(X)
RUN= 724 SERIES= 102
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 13 VELOCITY
RUN= 724 SERIES= 102 MPH
ACC. PACK #7 (X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

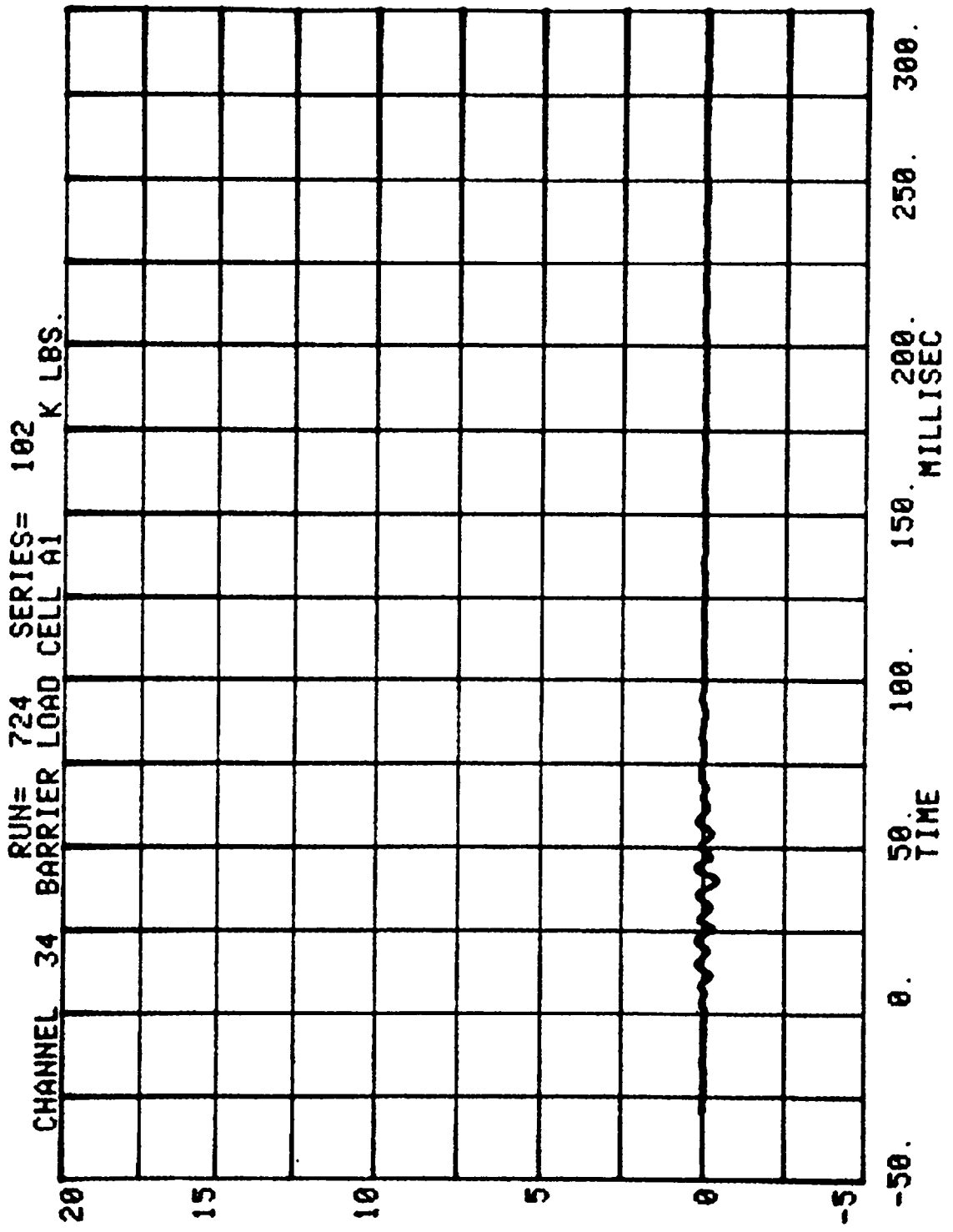

CHANNEL 14 DISPLACEMENT
RUN= 724 SERIES= 102
INCHES
ACC. PACK #7 (X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

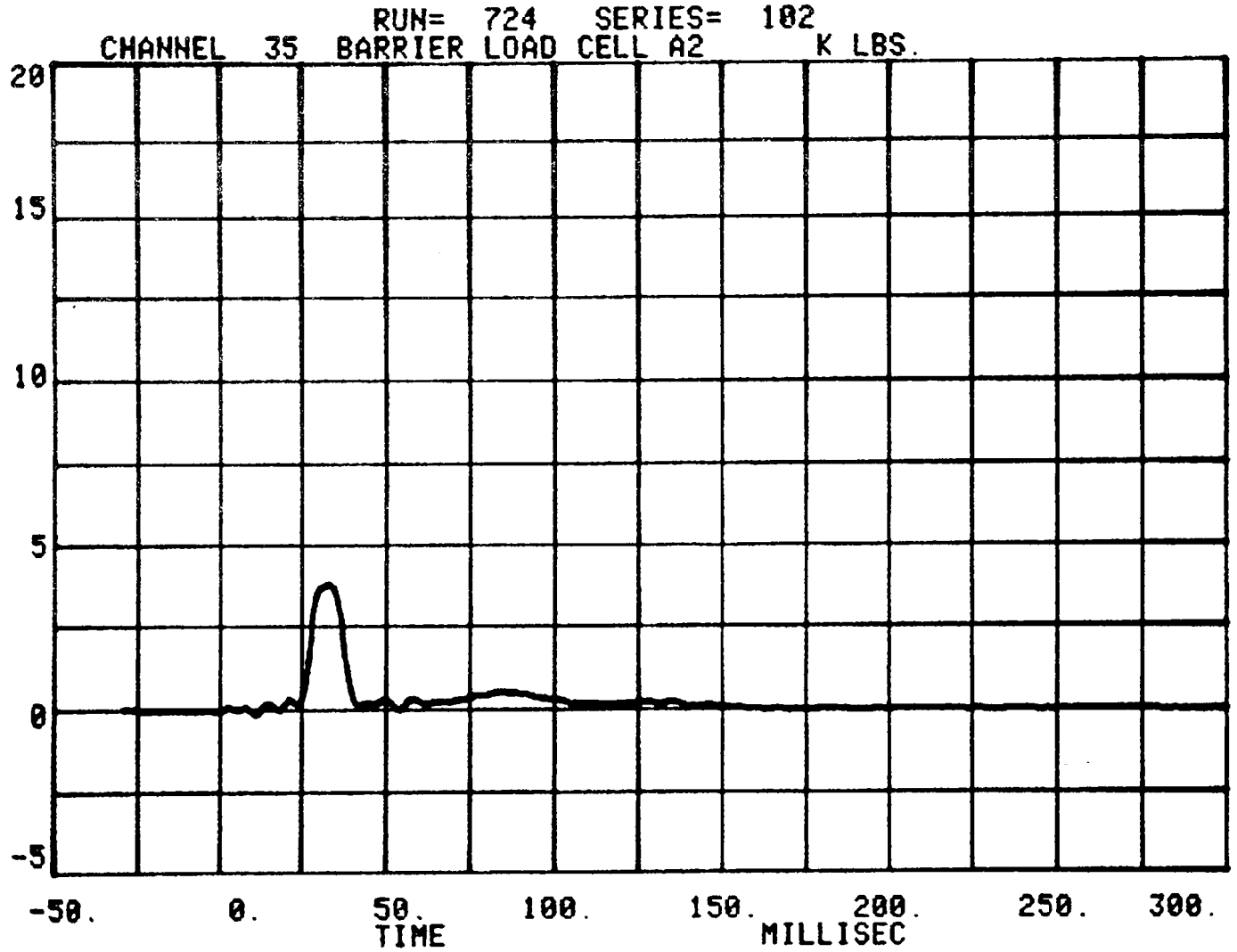
TEST NO. CG0102

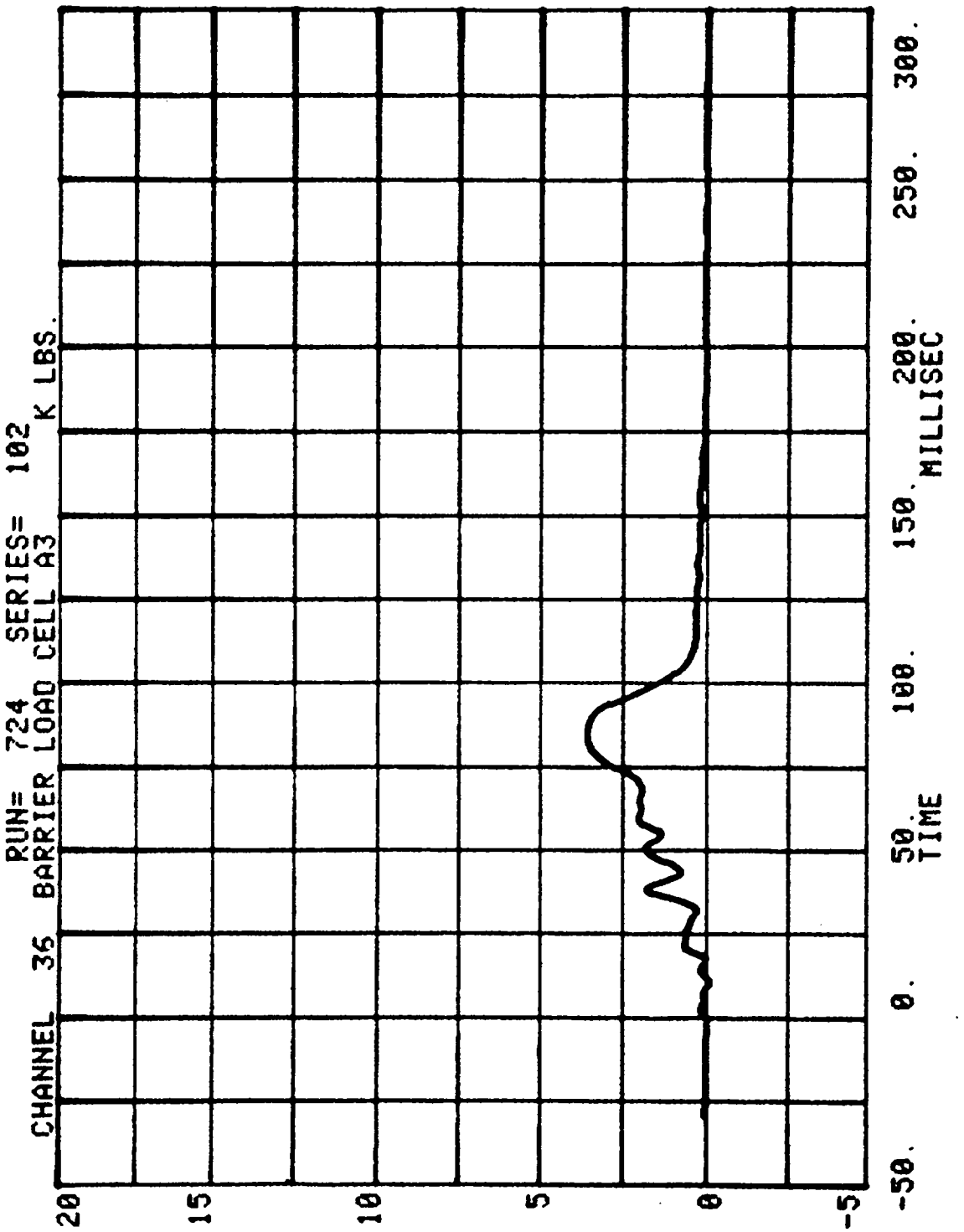
LOAD CELL BARRIER DATA

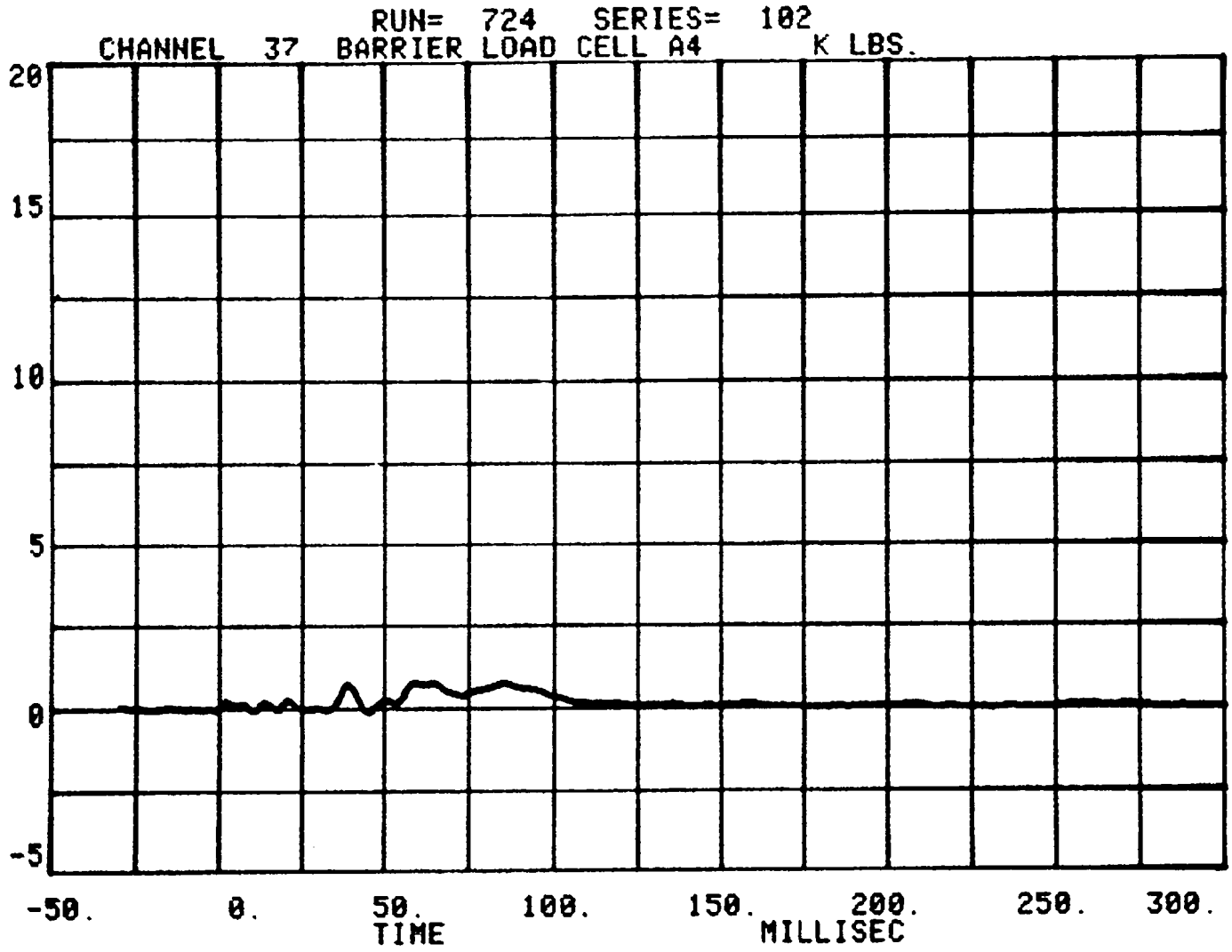
FILTER CHANNEL CLASS

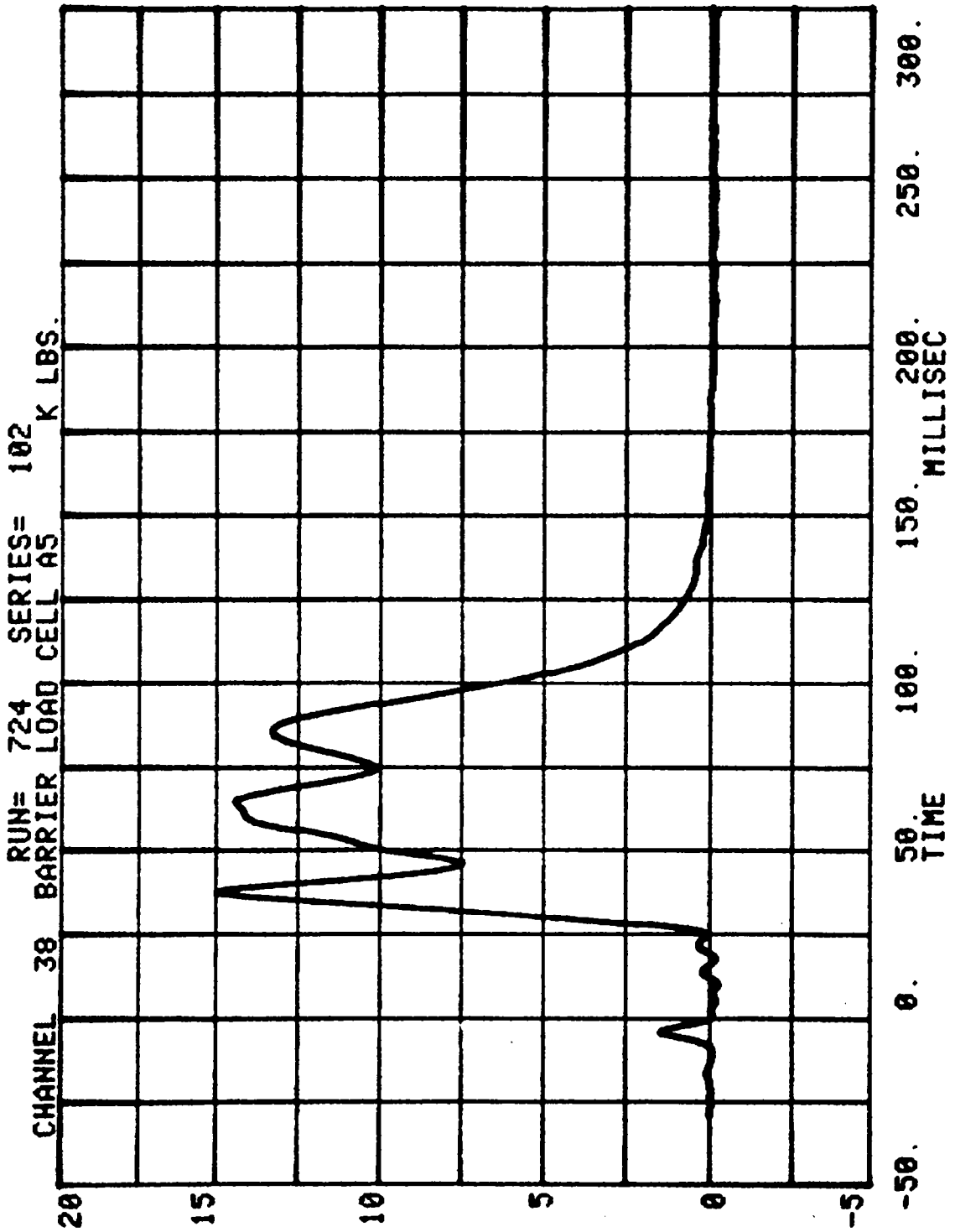
60


CHANNEL 34 BARRIER LOAD CELL A1
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 724 SERIES= 102
CHANNEL 35 BARRIER LOAD CELL A2
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 36 BARRIER LOAD CELL A3
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 724 SERIES= 102
CHANNEL 37 BARRIER LOAD CELL A4 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 38 BARRIER LOAD CELL AS
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

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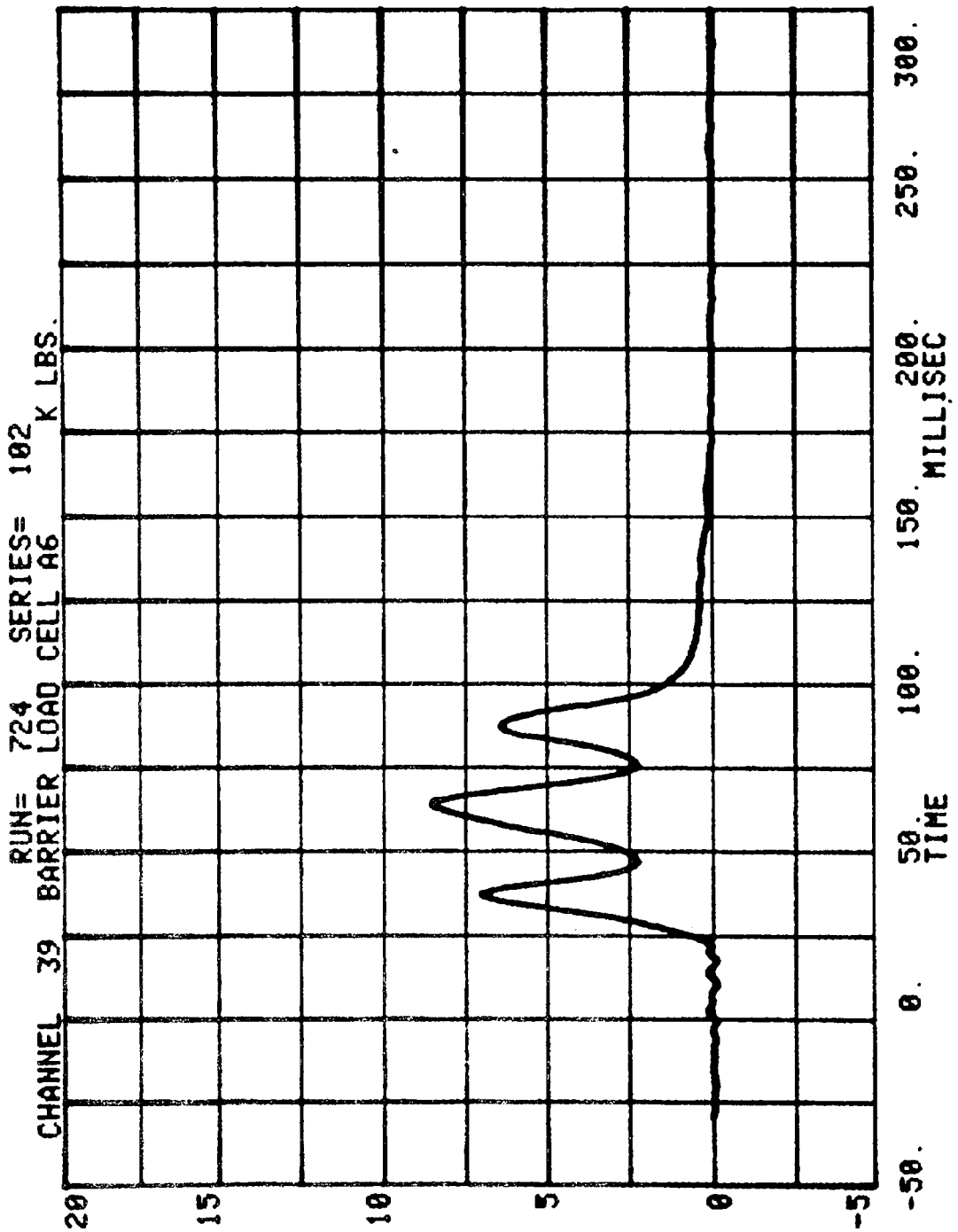
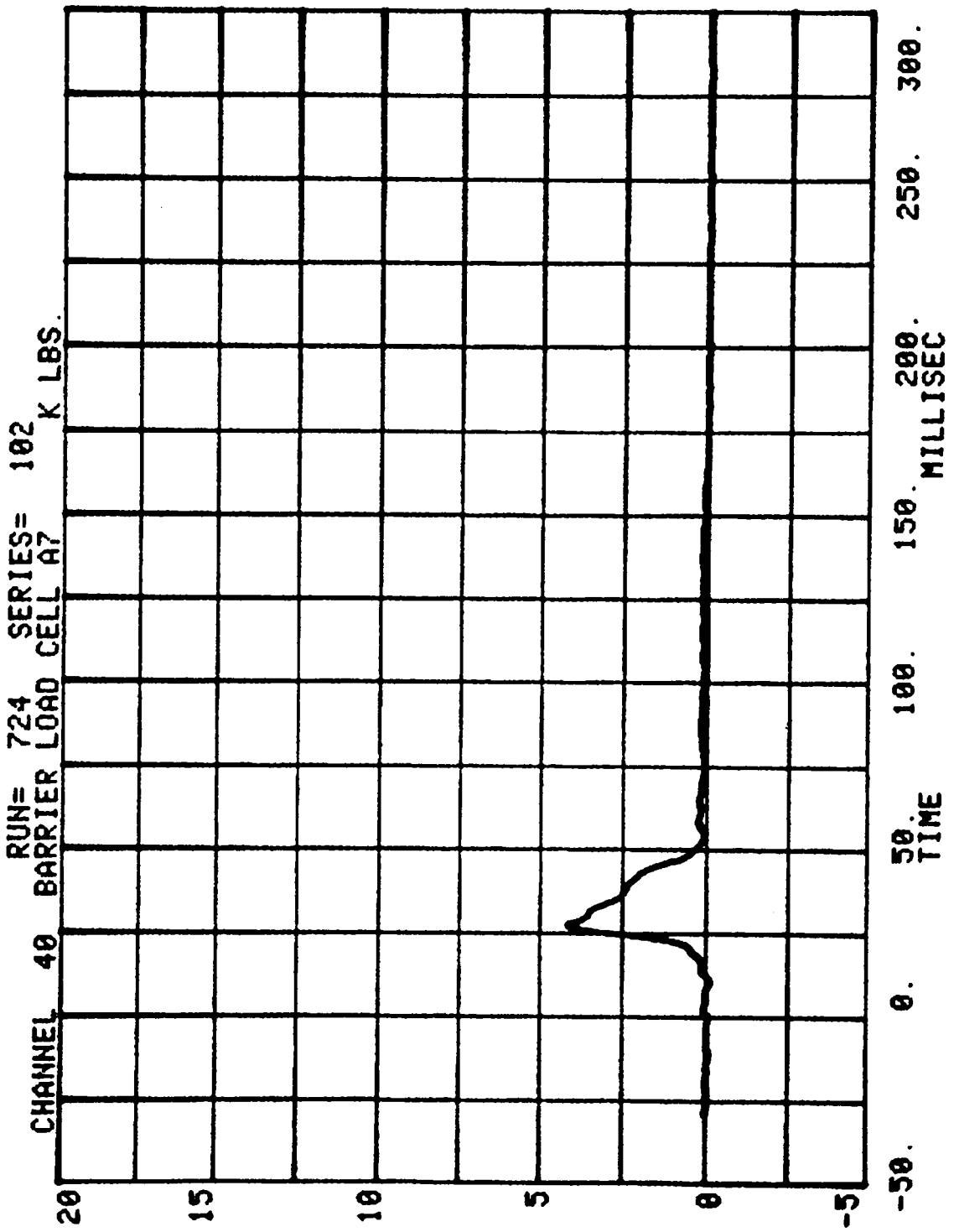
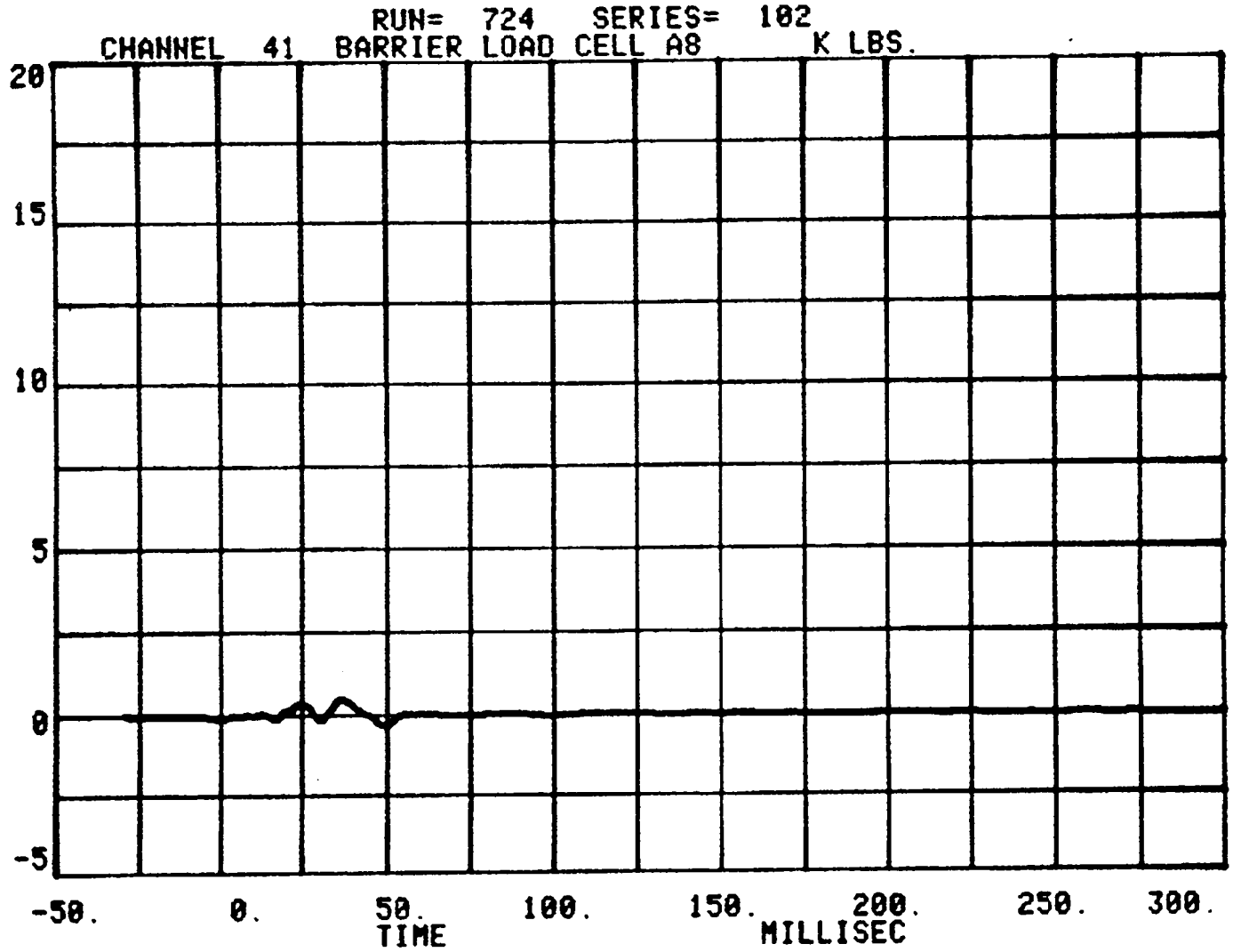
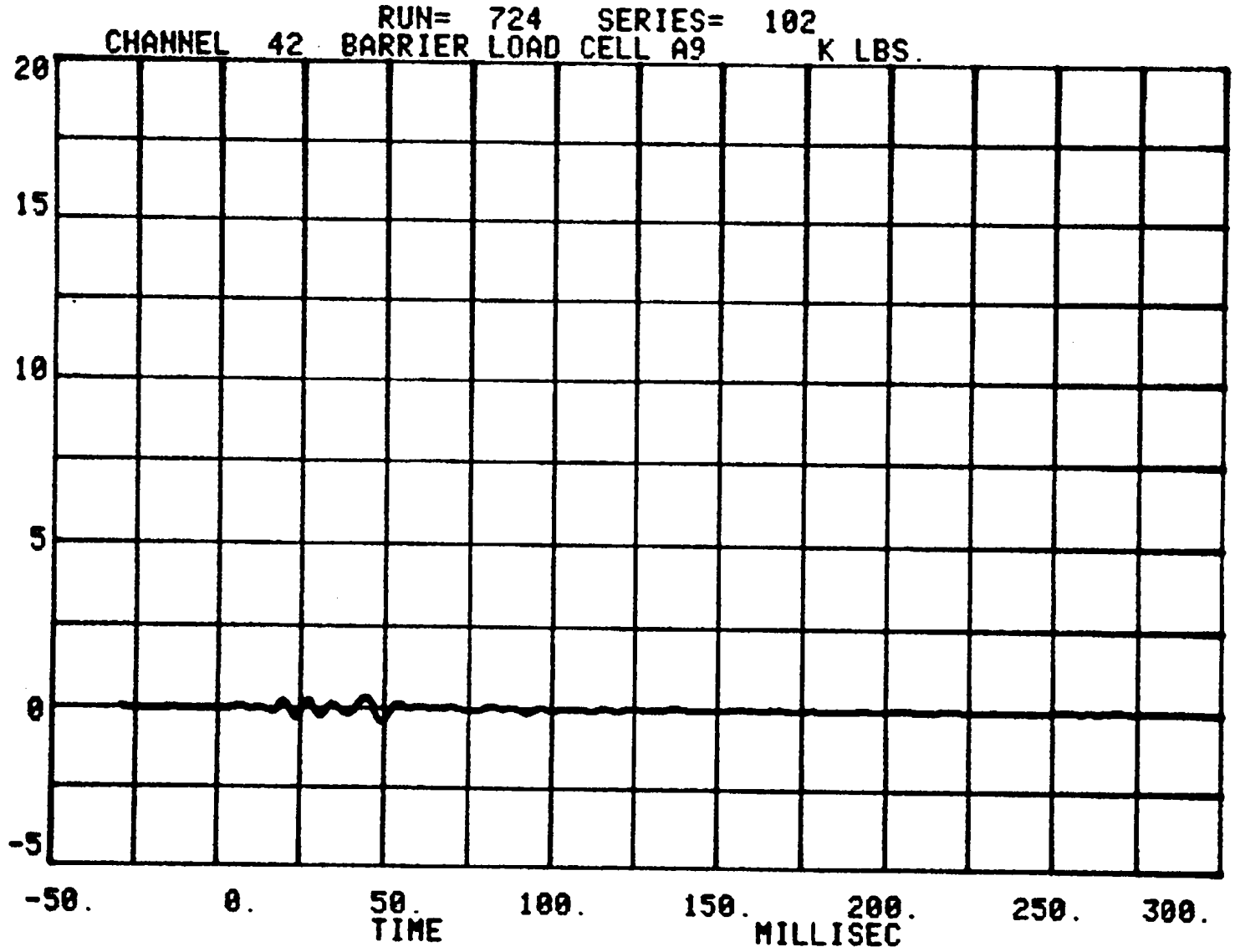
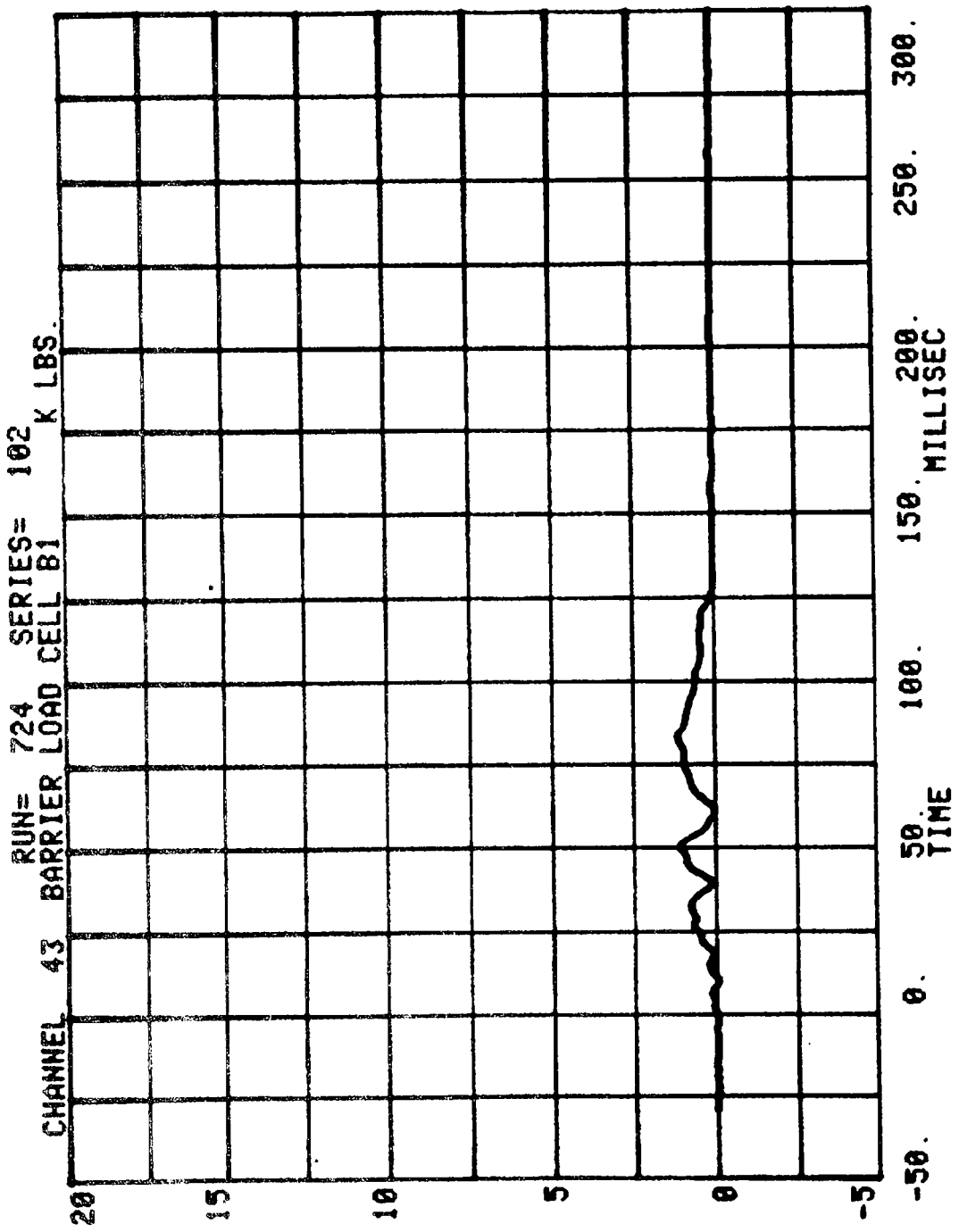
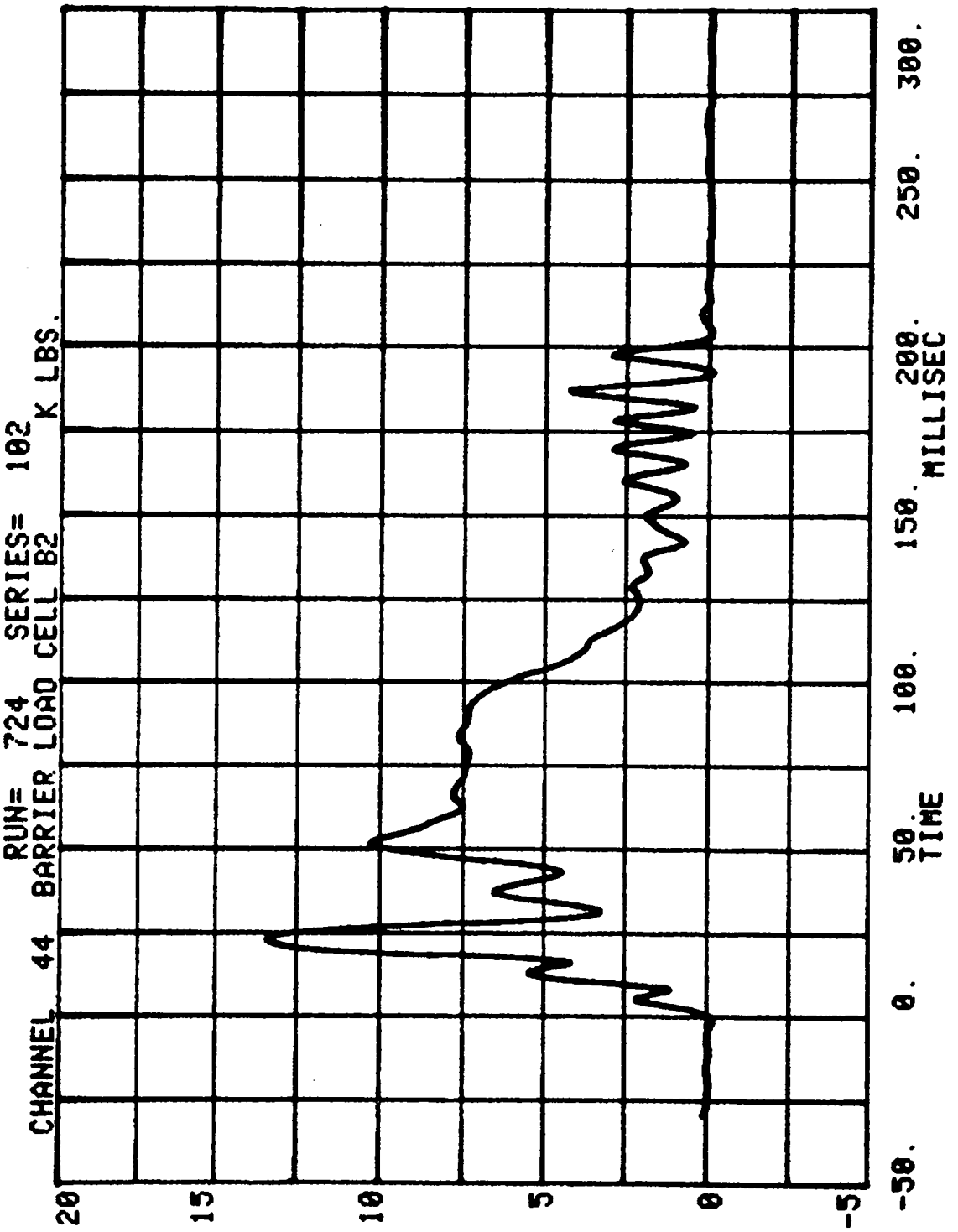

CHANNEL 39 BARRIER LOAD CELL A6
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

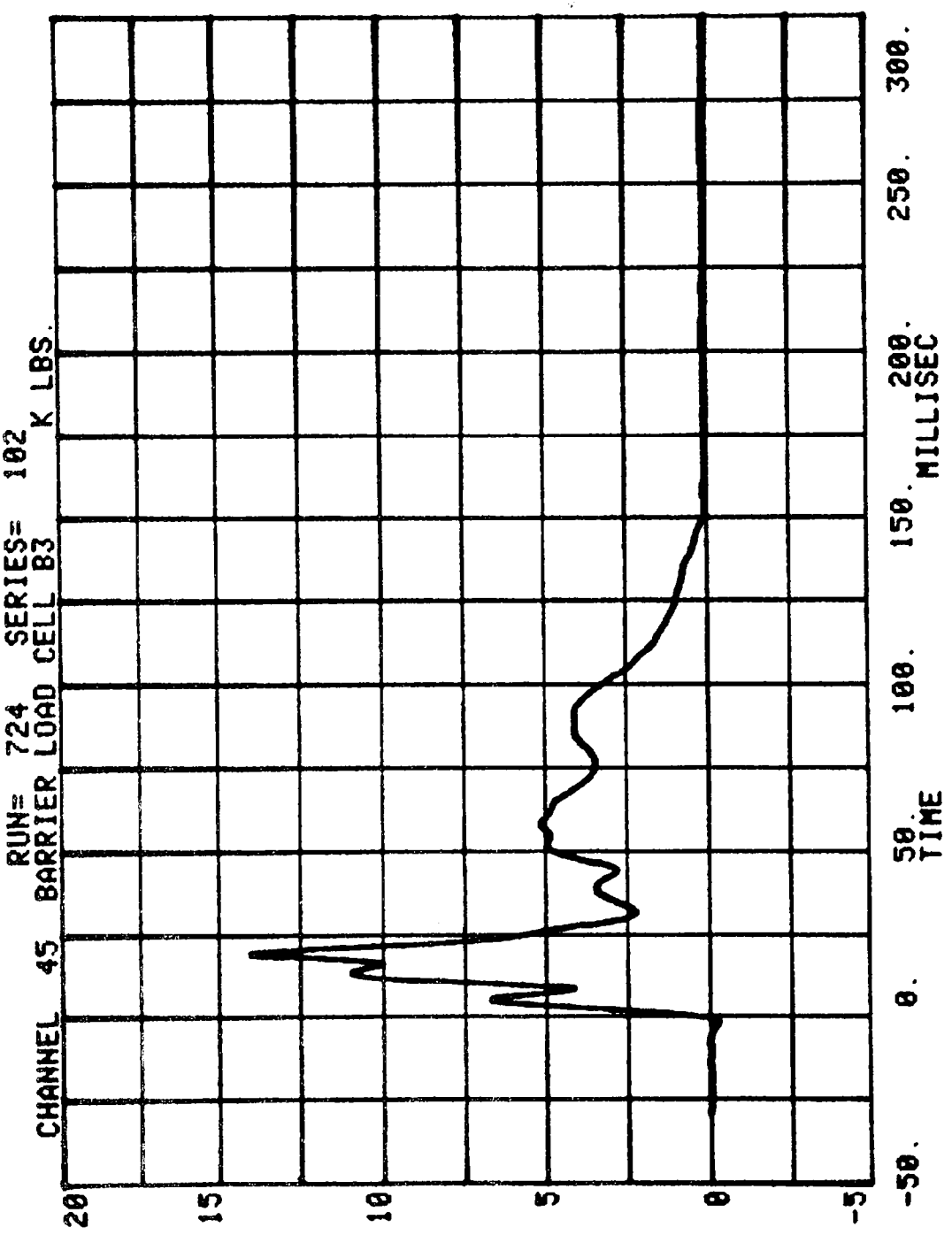

CHANNEL 40 BARRIER LOAD CELL A7
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

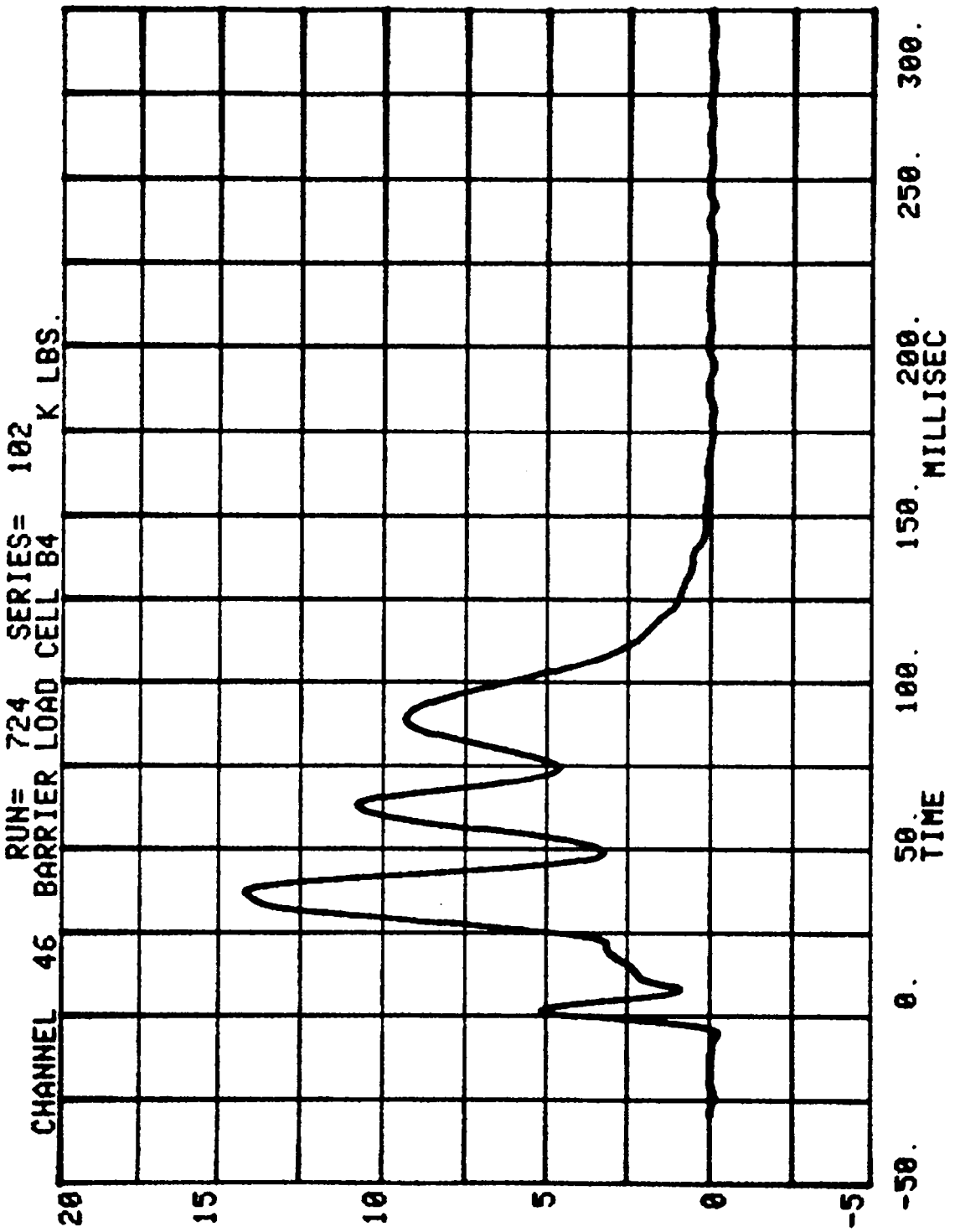

RUN= 724 SERIES= 102
CHANNEL 41 BARRIER LOAD CELL A8
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

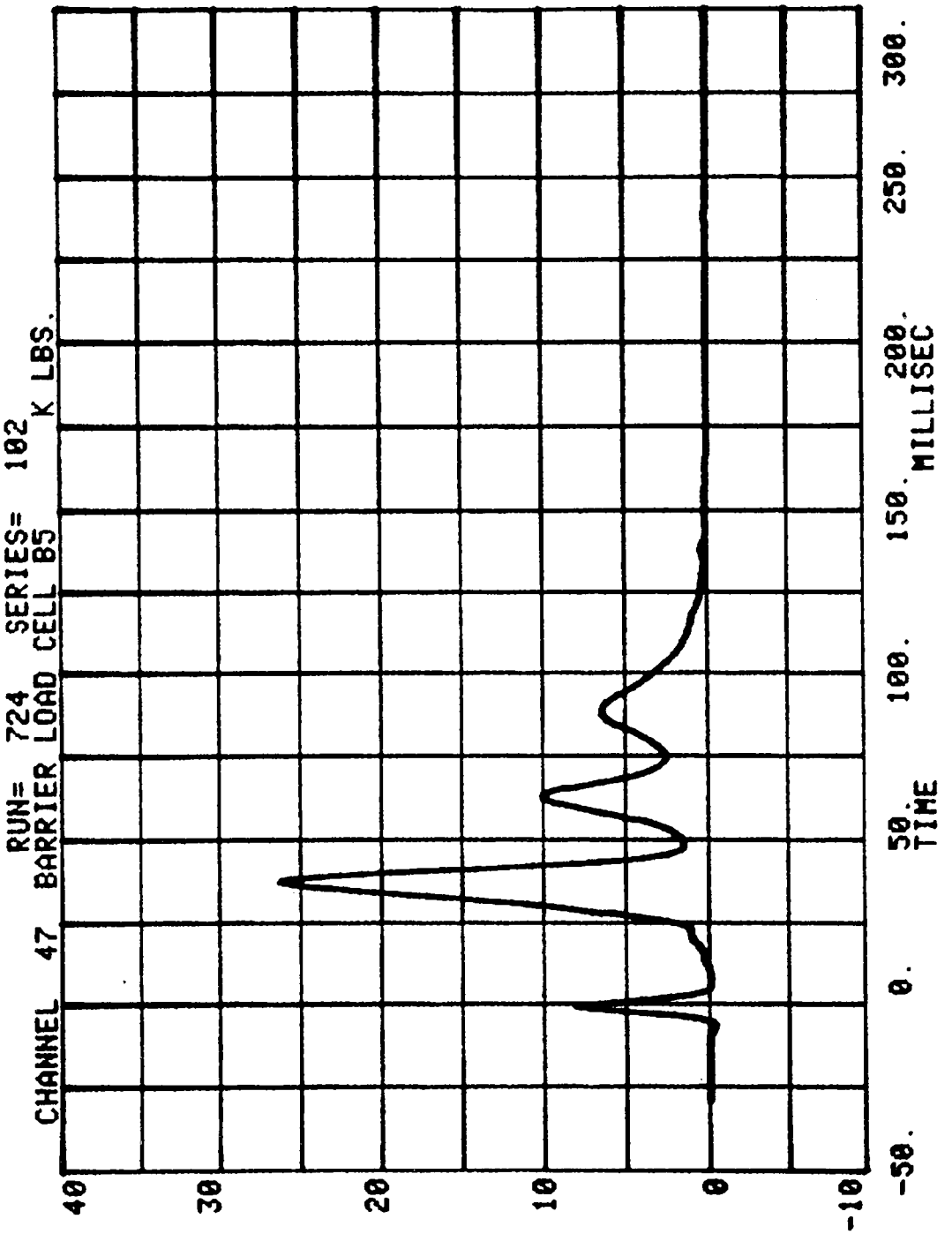

RUN= 724 SERIES= 102
CHANNEL 42 BARRIER LOAD CELL A9 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 43 BARRIER LOAD CELL B1
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 44 BARRIER LOAD CELL B2
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 45 BARRIER LOAD CELL B3
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 46 BARRIER LOAD CELL B4
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 47 BARRIER LOAD CELL B5
RUN= 724 SERIES= 102 K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

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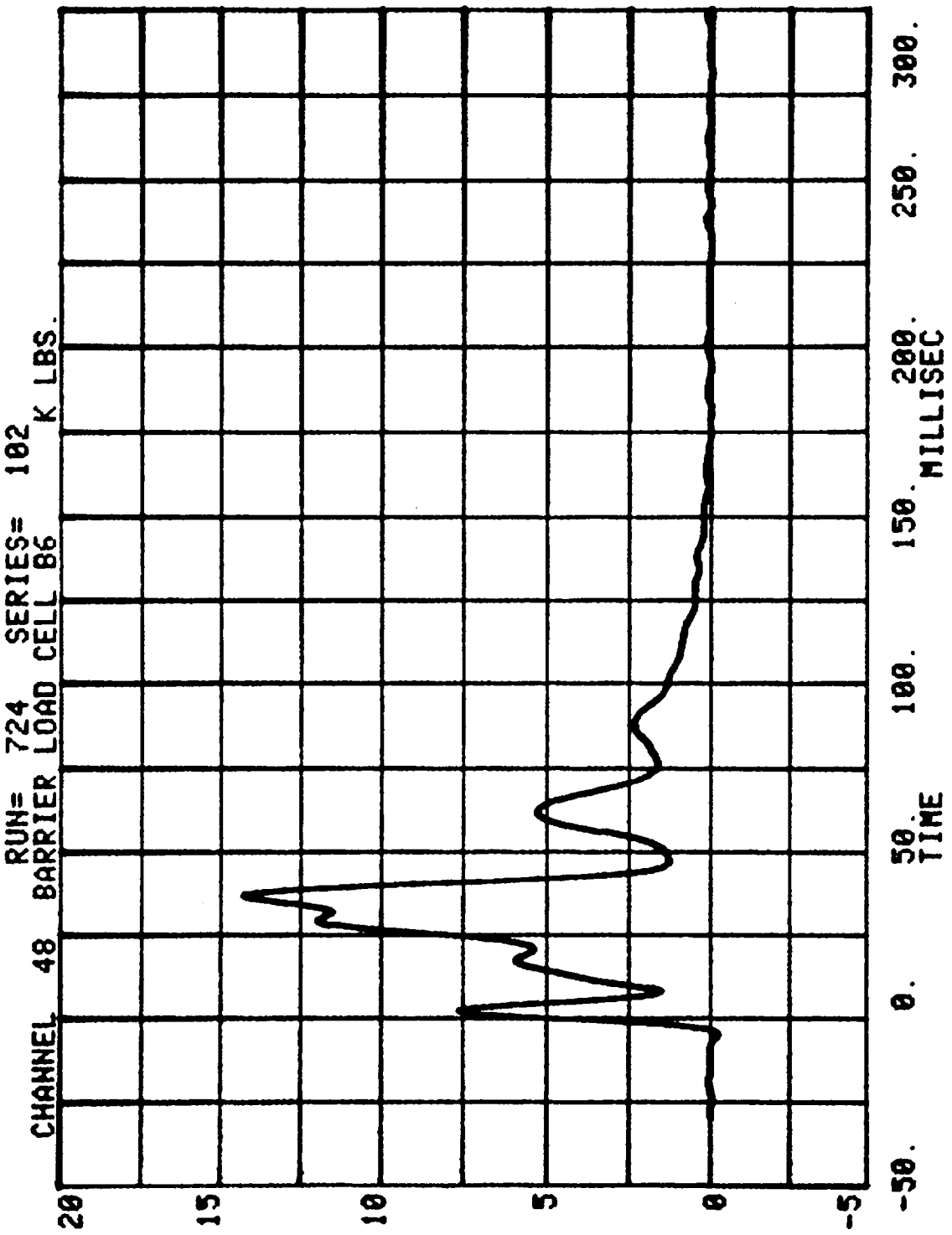
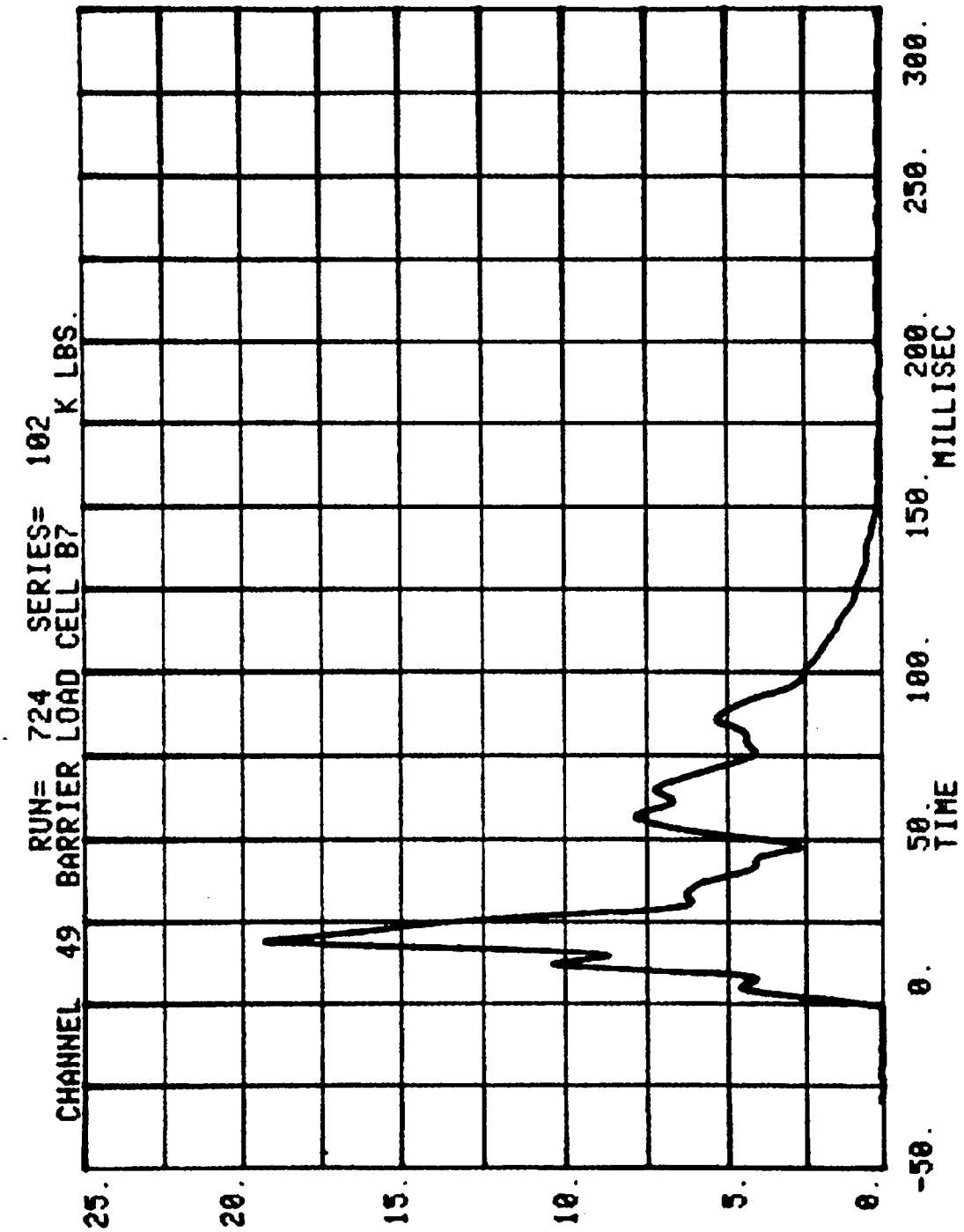
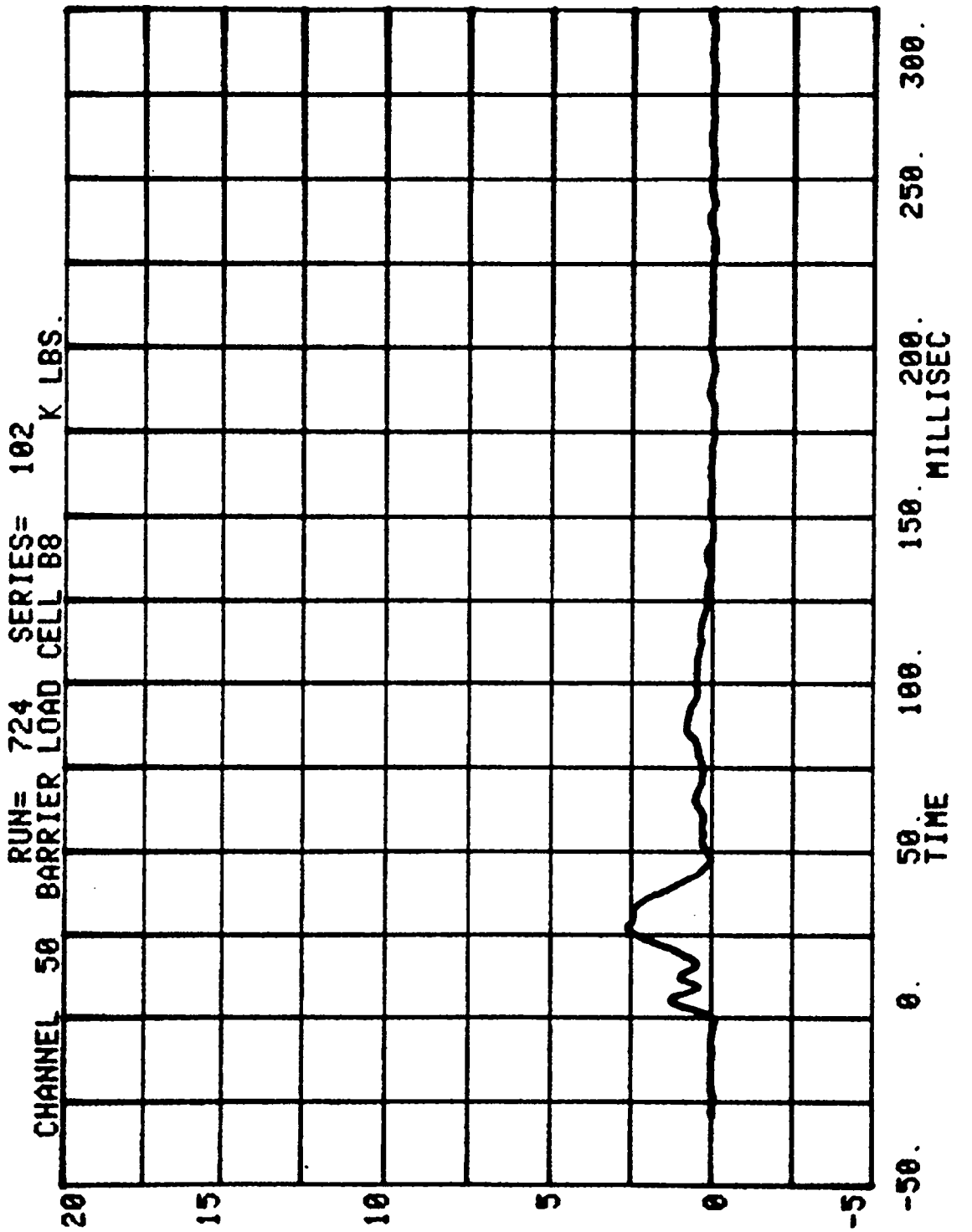
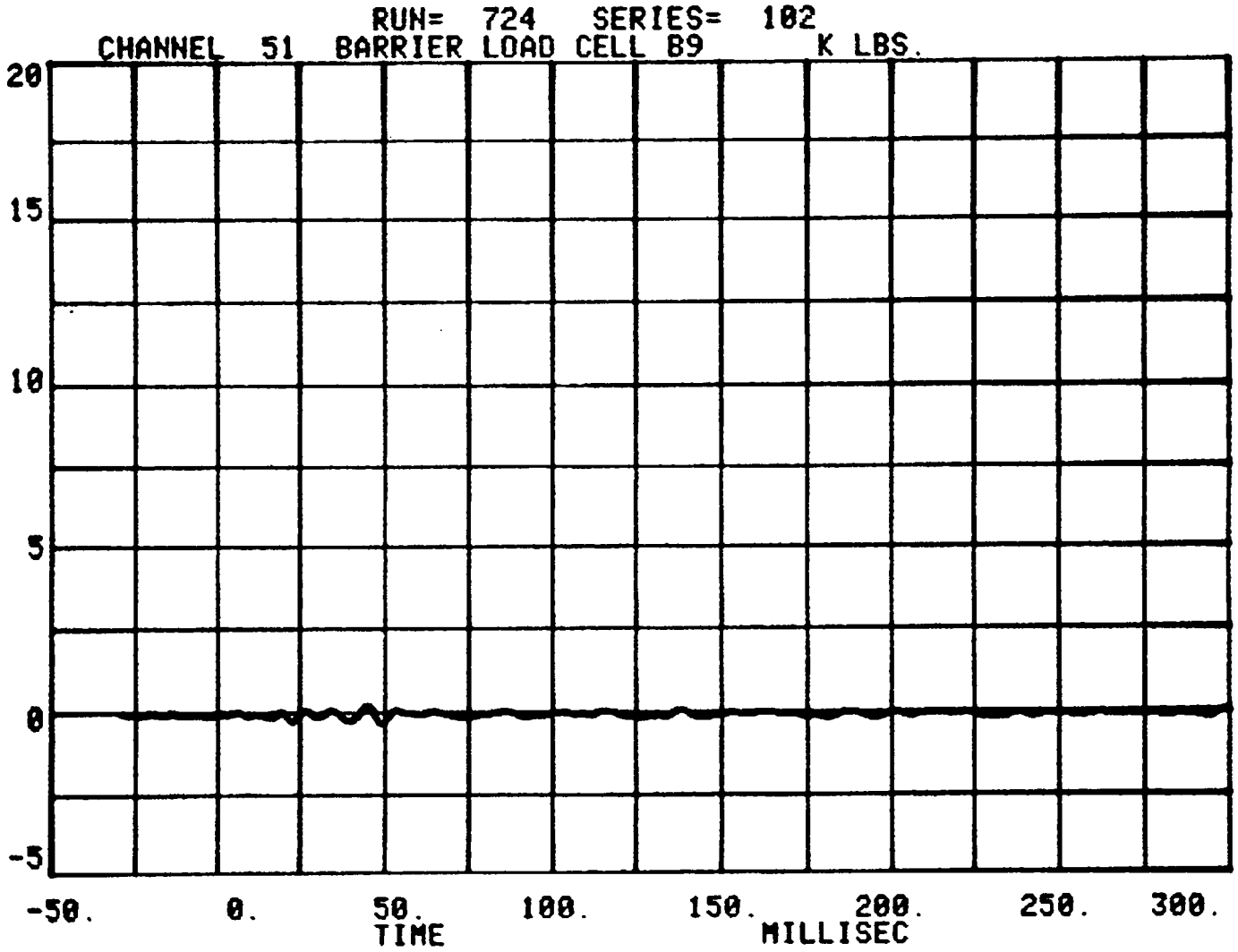
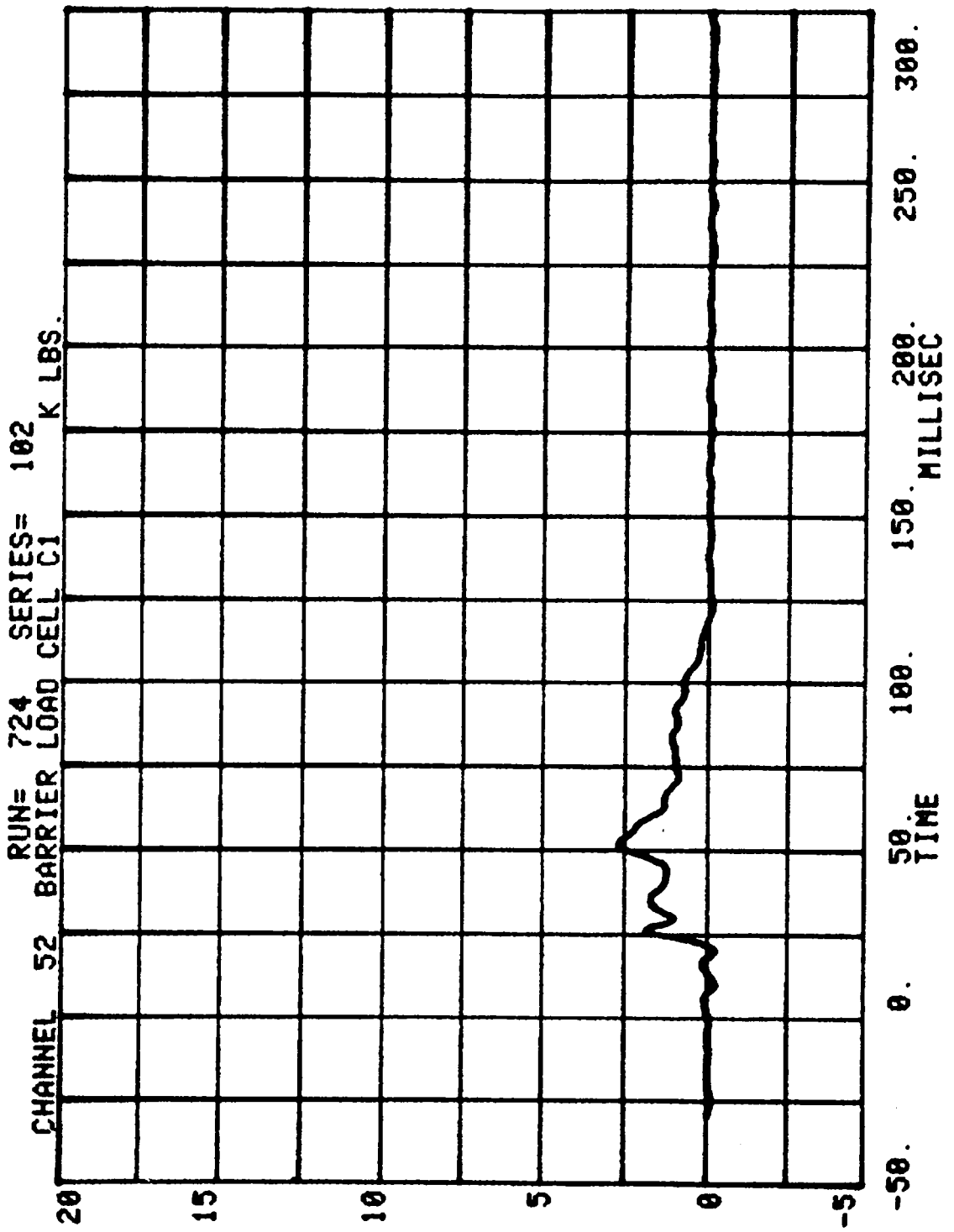
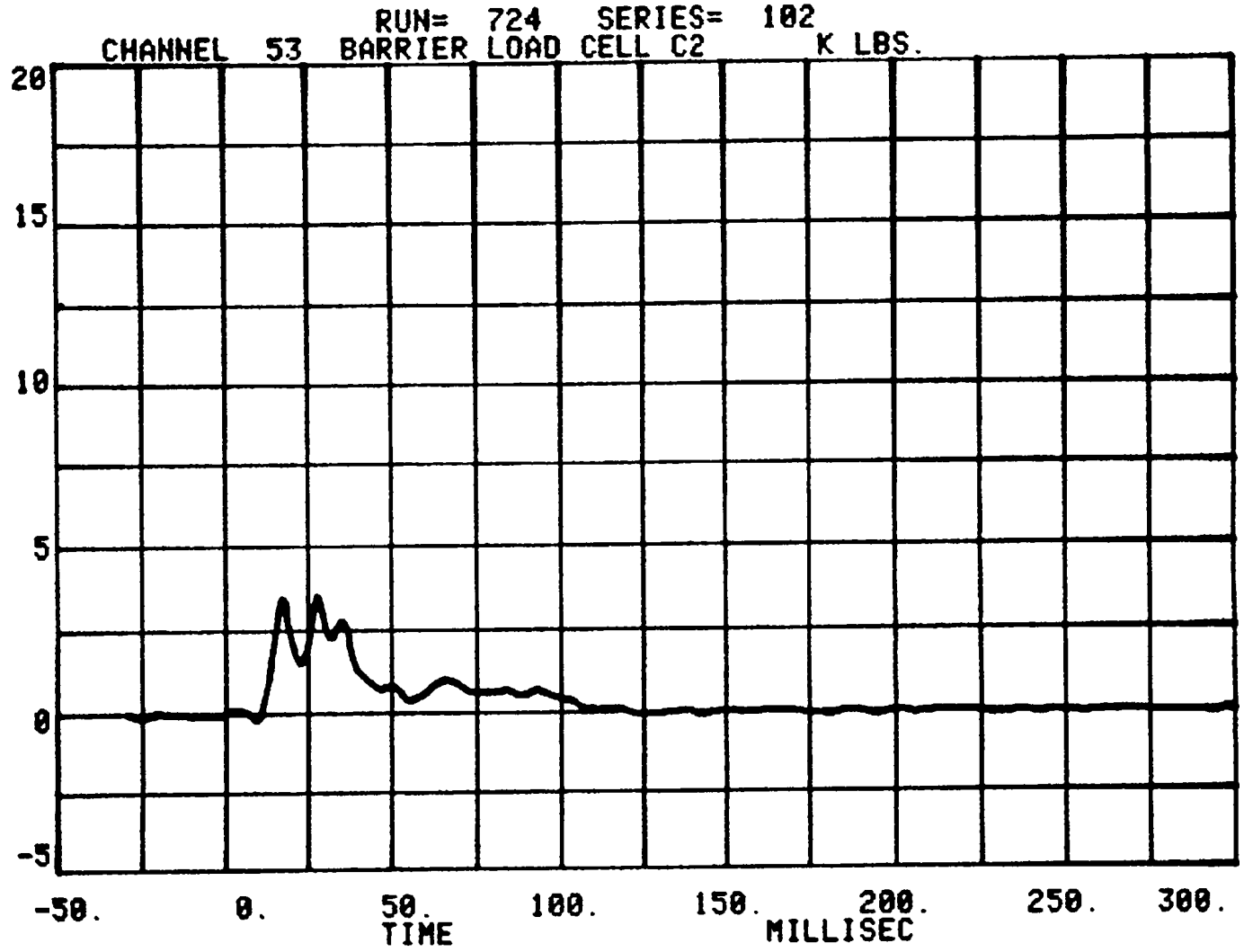

CHANNEL 48
RUN= 724 SERIES= 102
BARRIER LOAD CELL 86
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

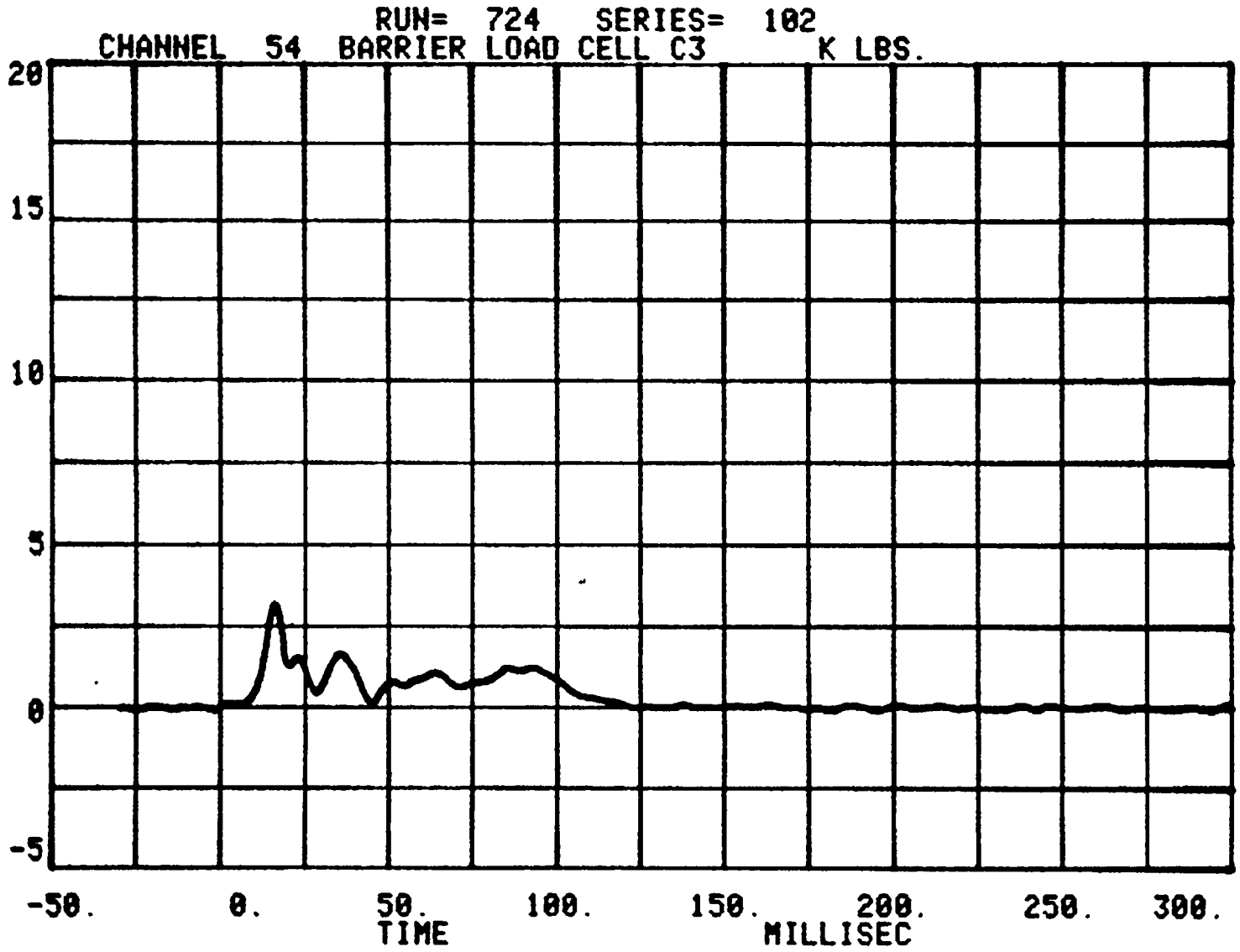

CHANNEL 49 BARRIER LOAD CELL B7
RUN= 724 SERIES= 102
K LBS.
25.
20.
15.
10.
5.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

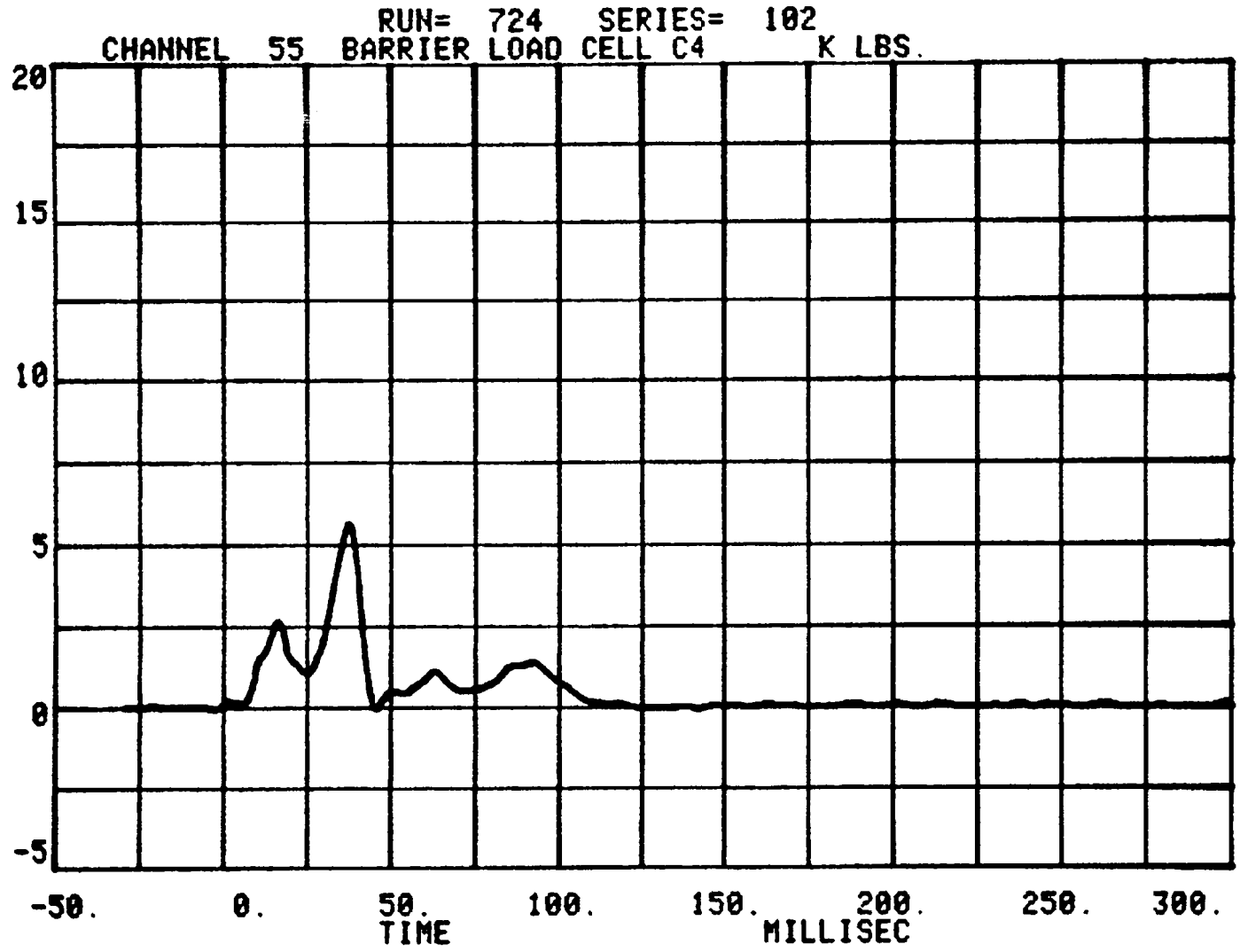

CHANNEL 50 BARRIER LOAD CELL B8
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

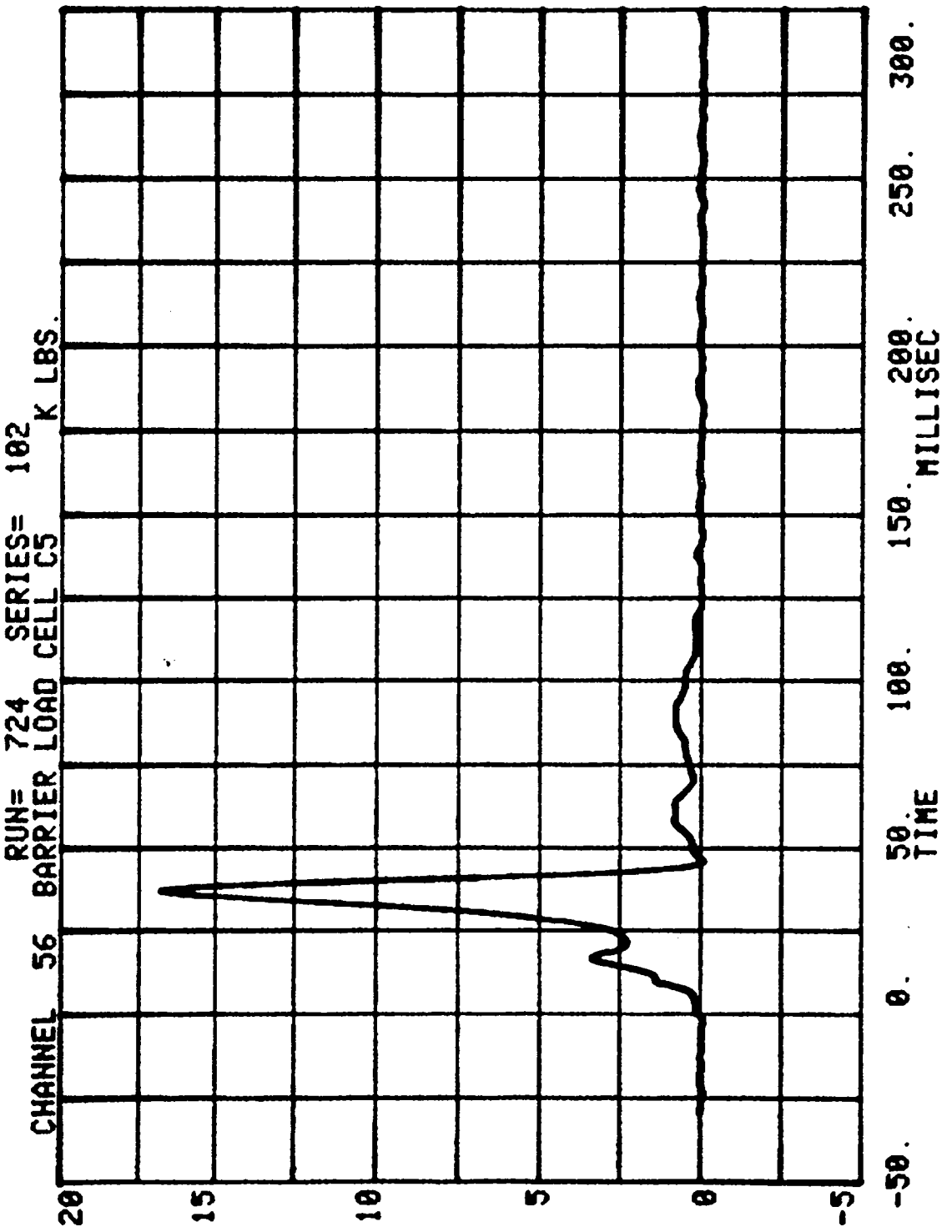

RUN= 724 SERIES= 102
CHANNEL 51 BARRIER LOAD CELL B9 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 52 BARRIER LOAD CELL C1
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

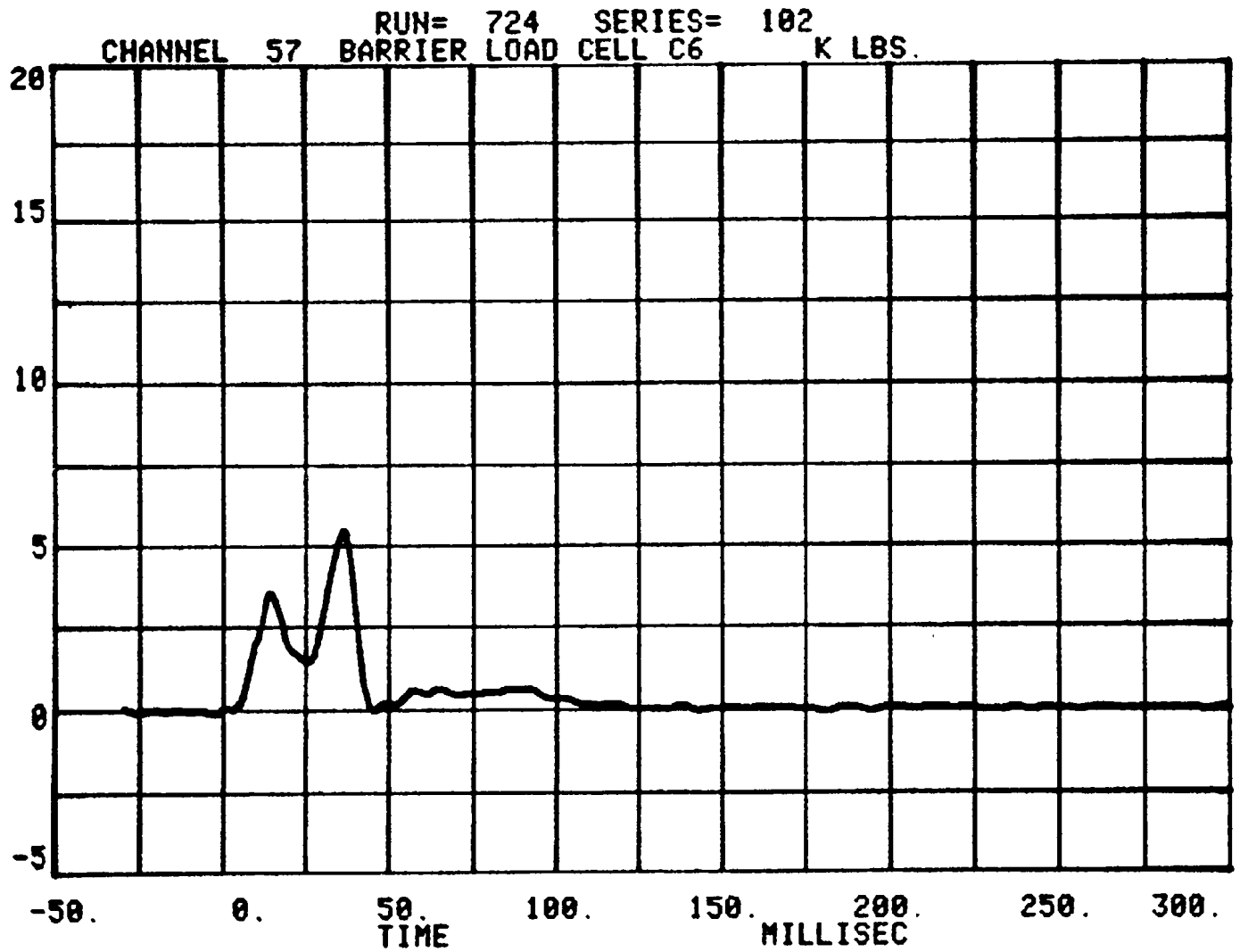

RUN= 724 SERIES= 102
CHANNEL 53 BARRIER LOAD CELL C2 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 724 SERIES= 102
CHANNEL 54 BARRIER LOAD CELL C3 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

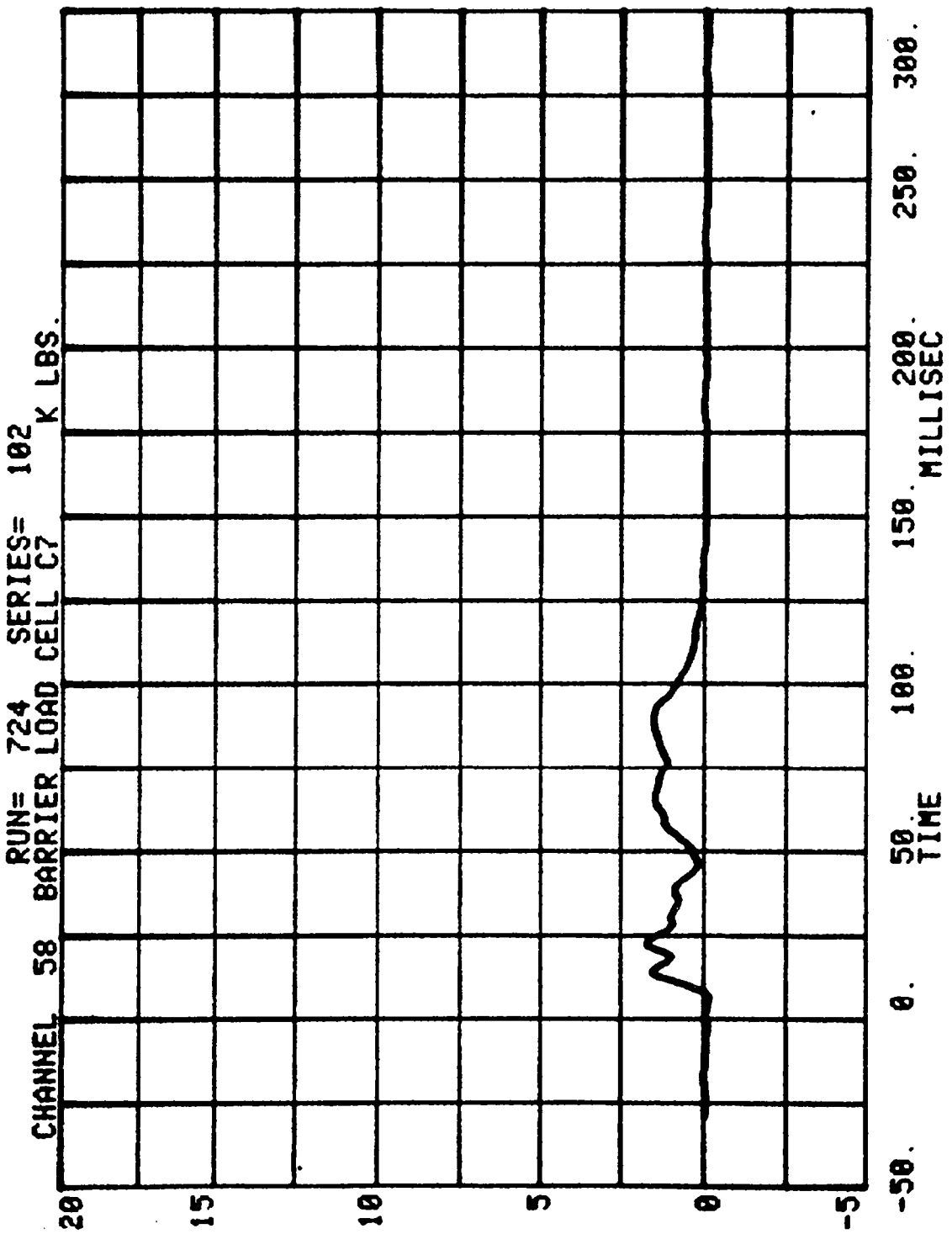

RUN= 724 SERIES= 102
CHANNEL 55 BARRIER LOAD CELL C4 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

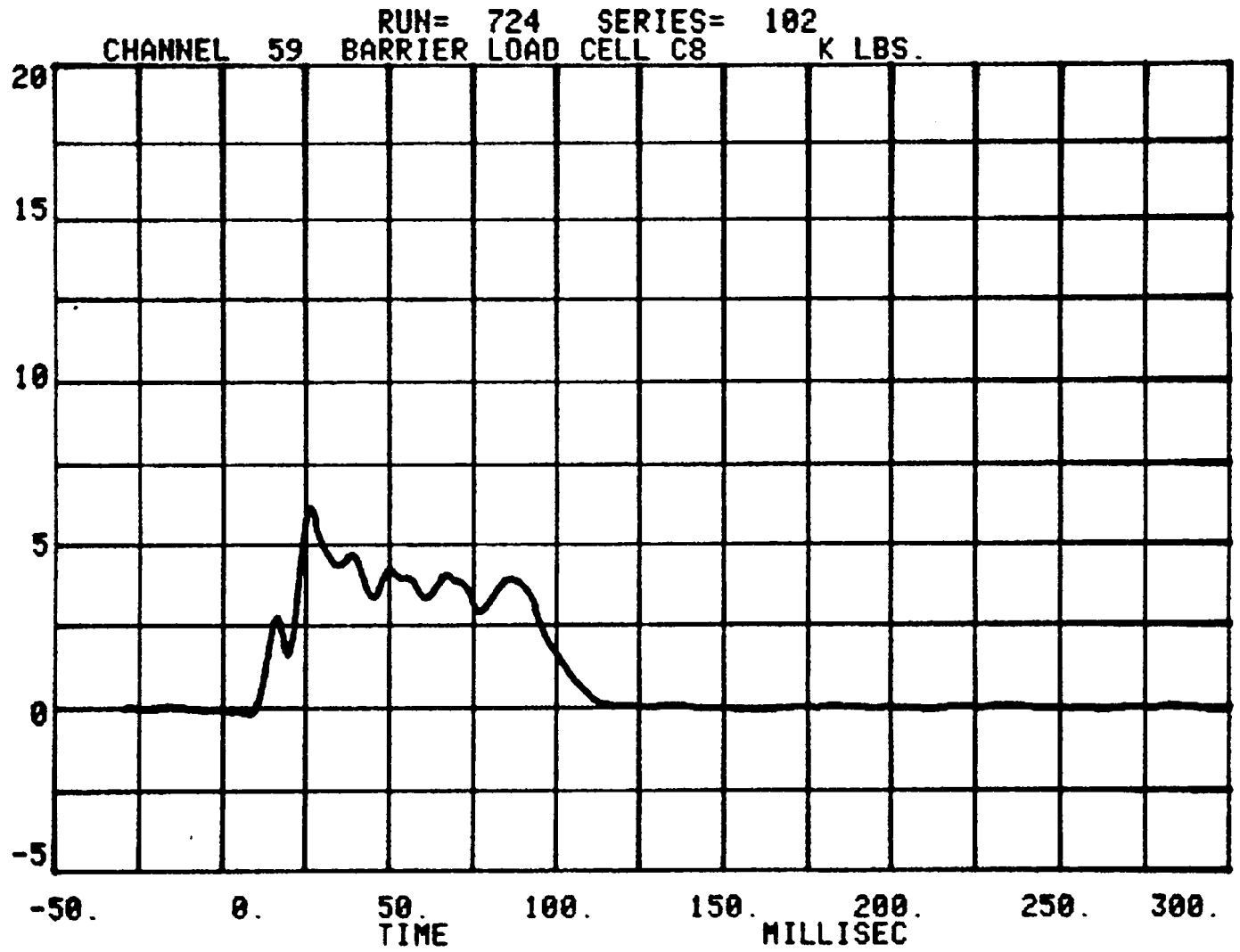

CHANNEL 56 BARRIER LOAD CELL C5
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

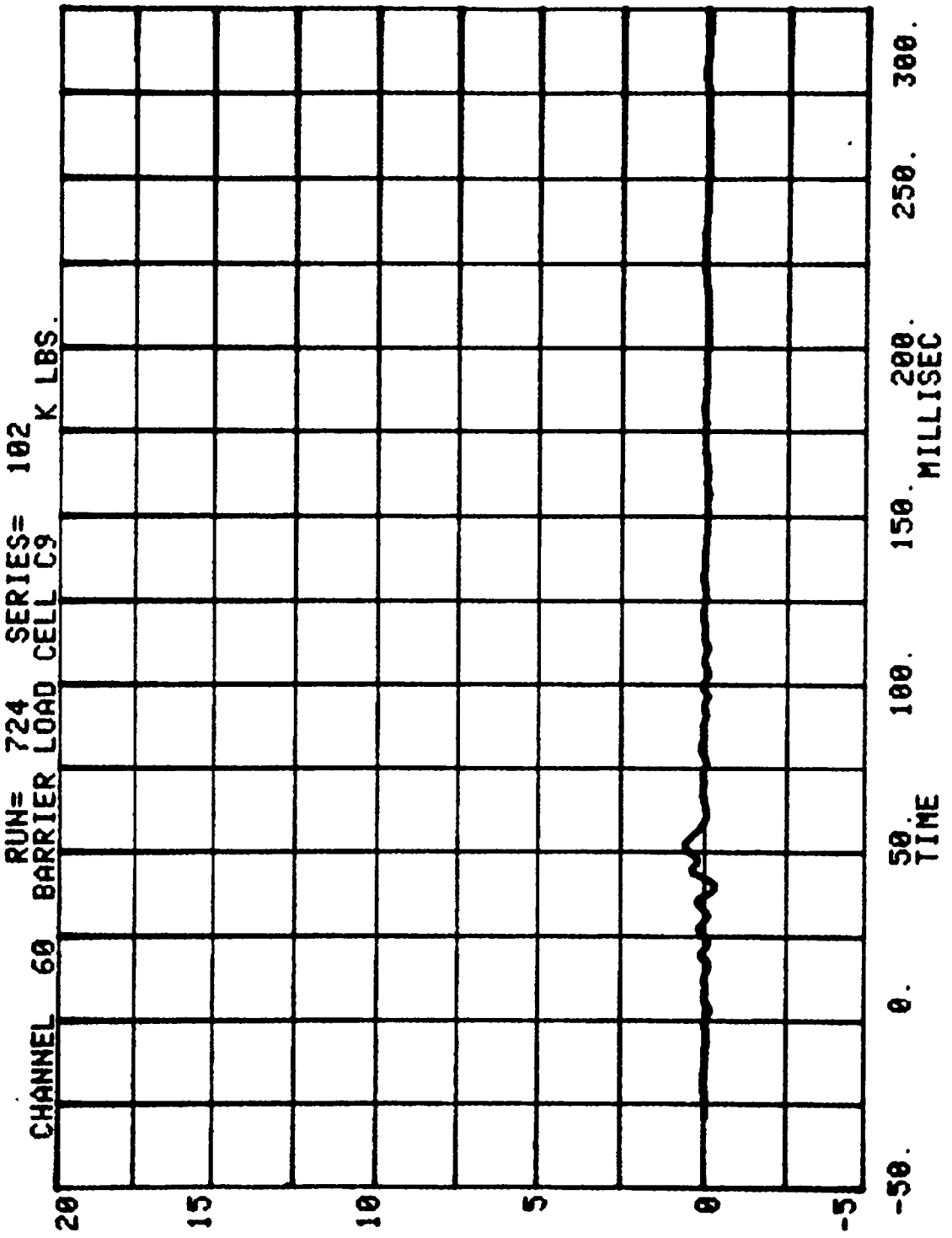
7457-14

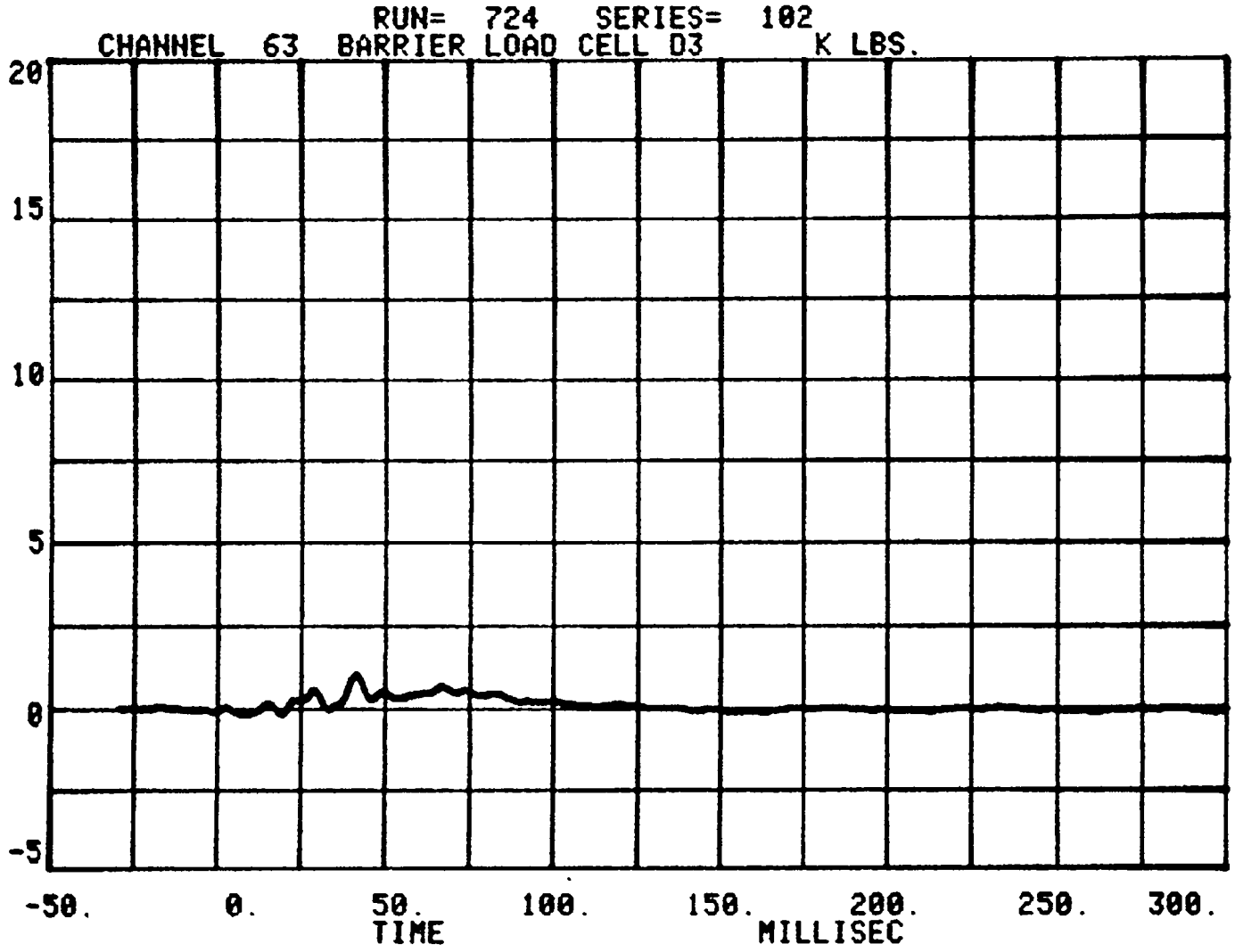

RUN= 724 SERIES= 102
CHANNEL 57 BARRIER LOAD CELL C6
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

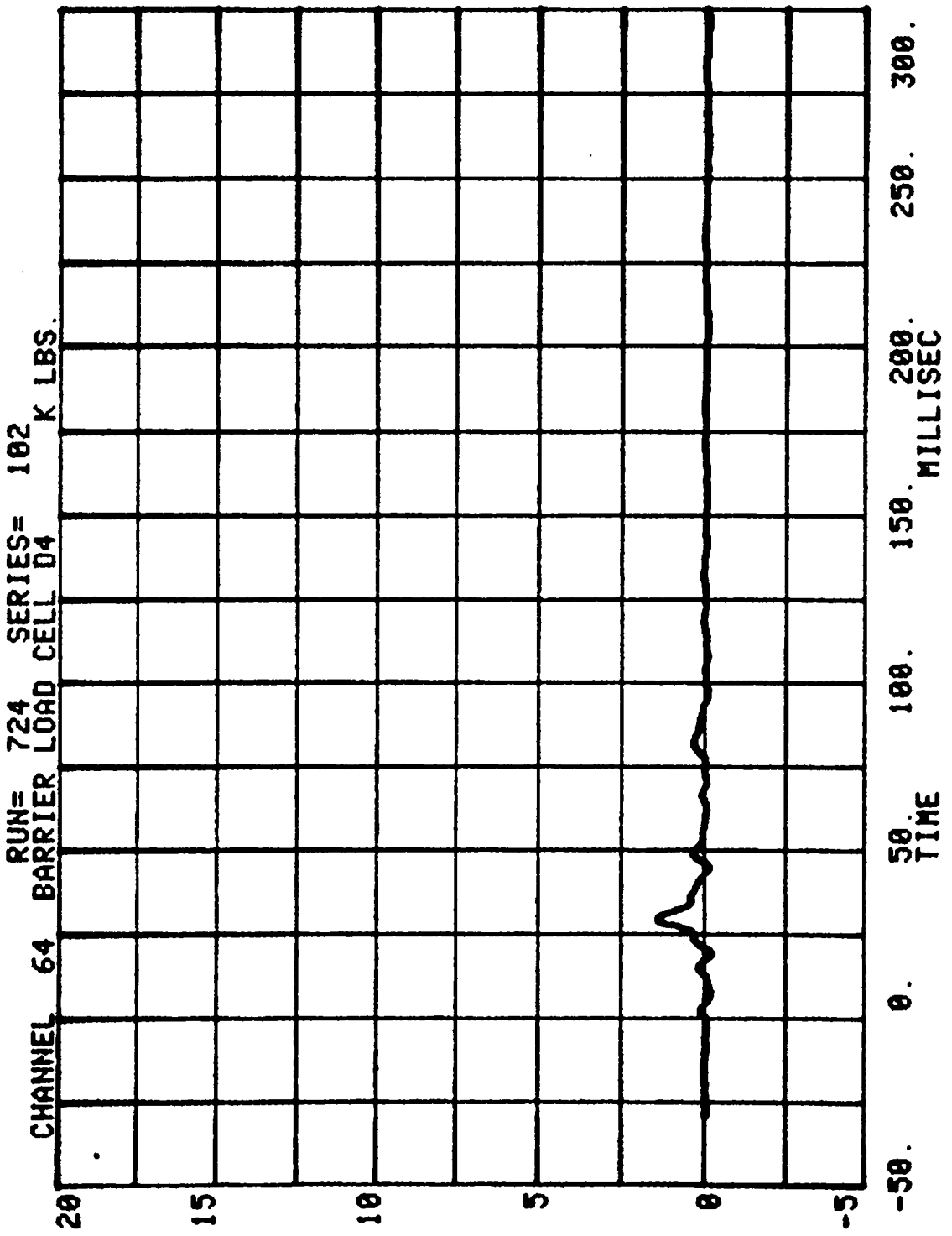
7457-14

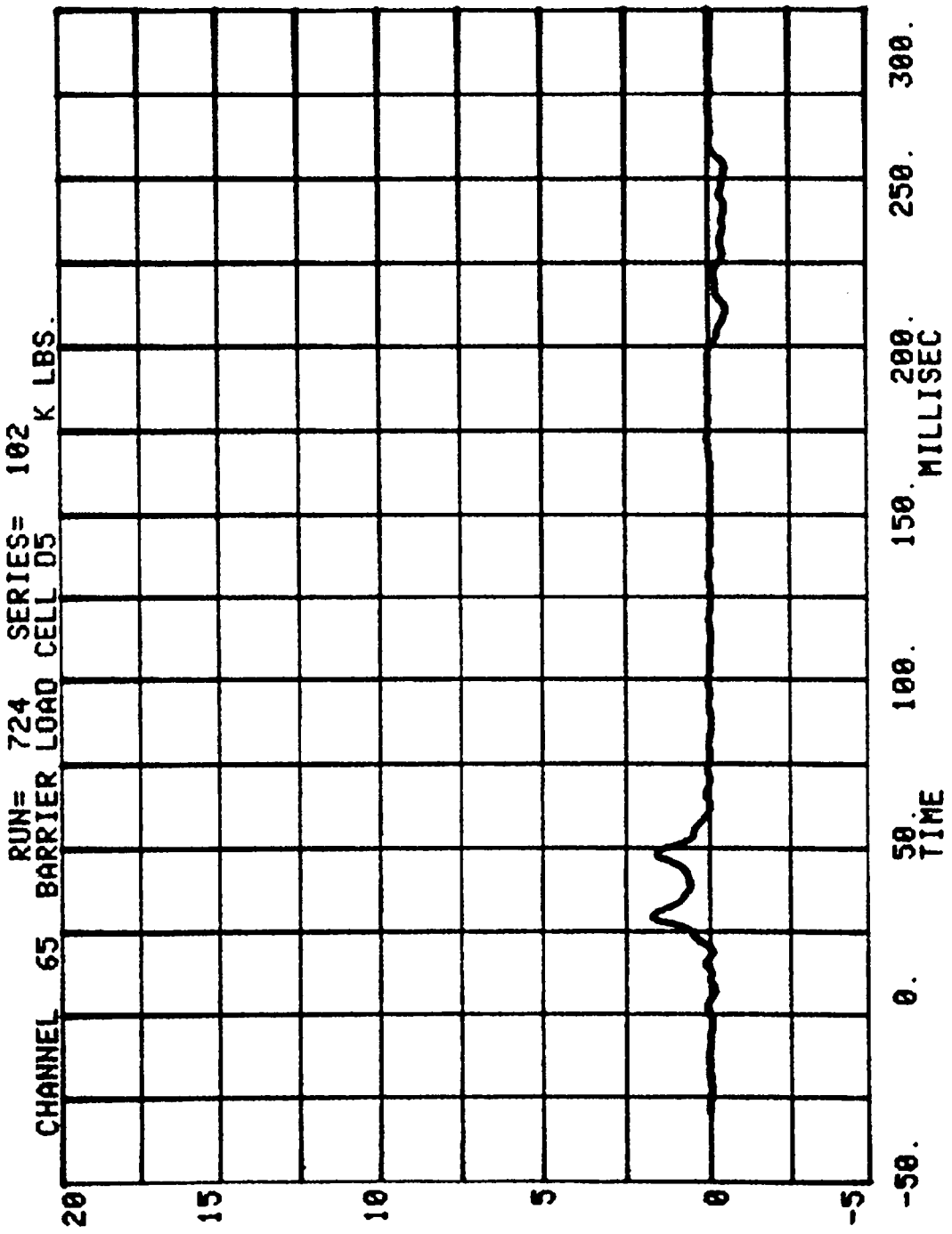

CHANNEL 58 BARRIER LOAD CELL C7
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

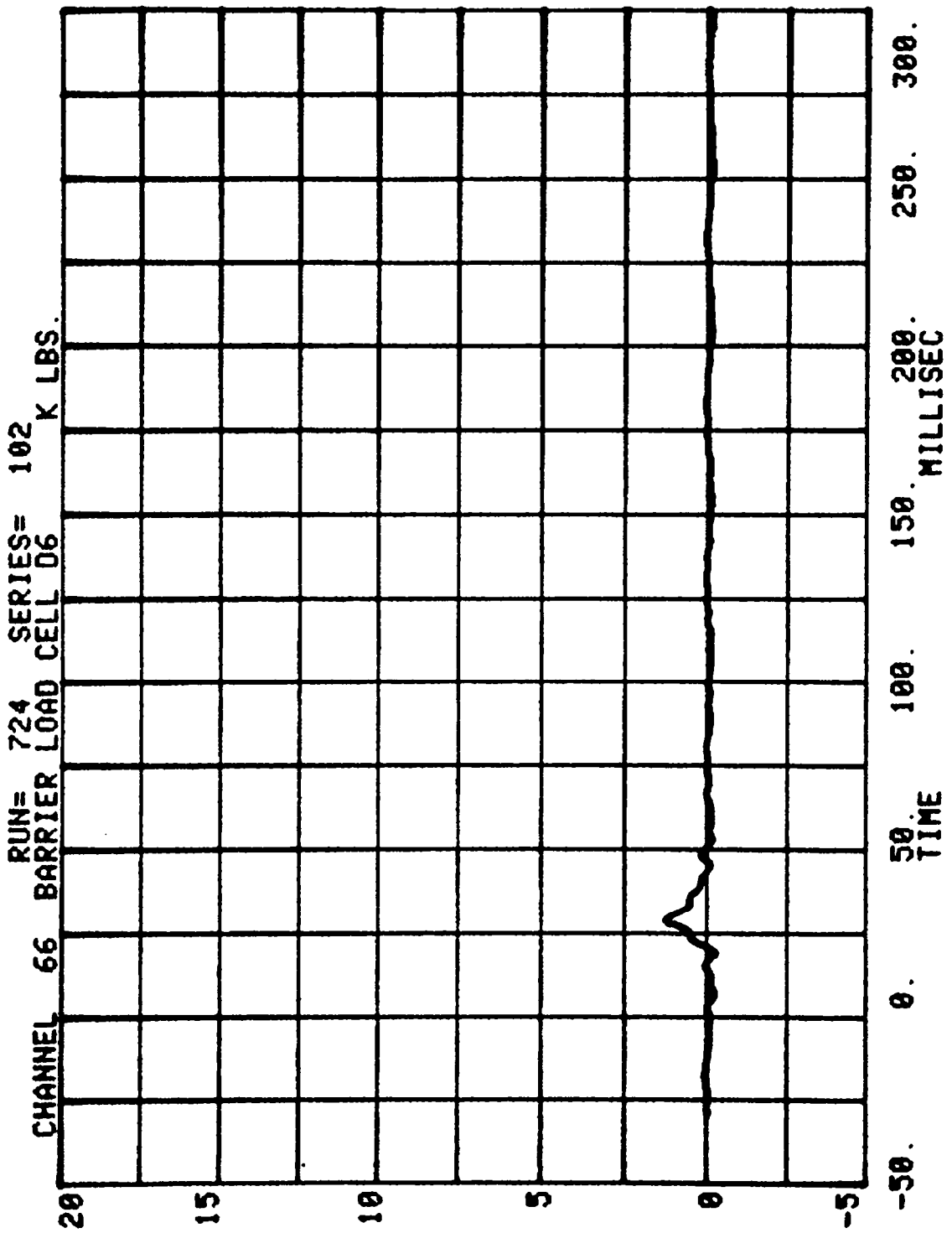

RUN= 724 SERIES= 102
CHANNEL 59 BARRIER LOAD CELL C8 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

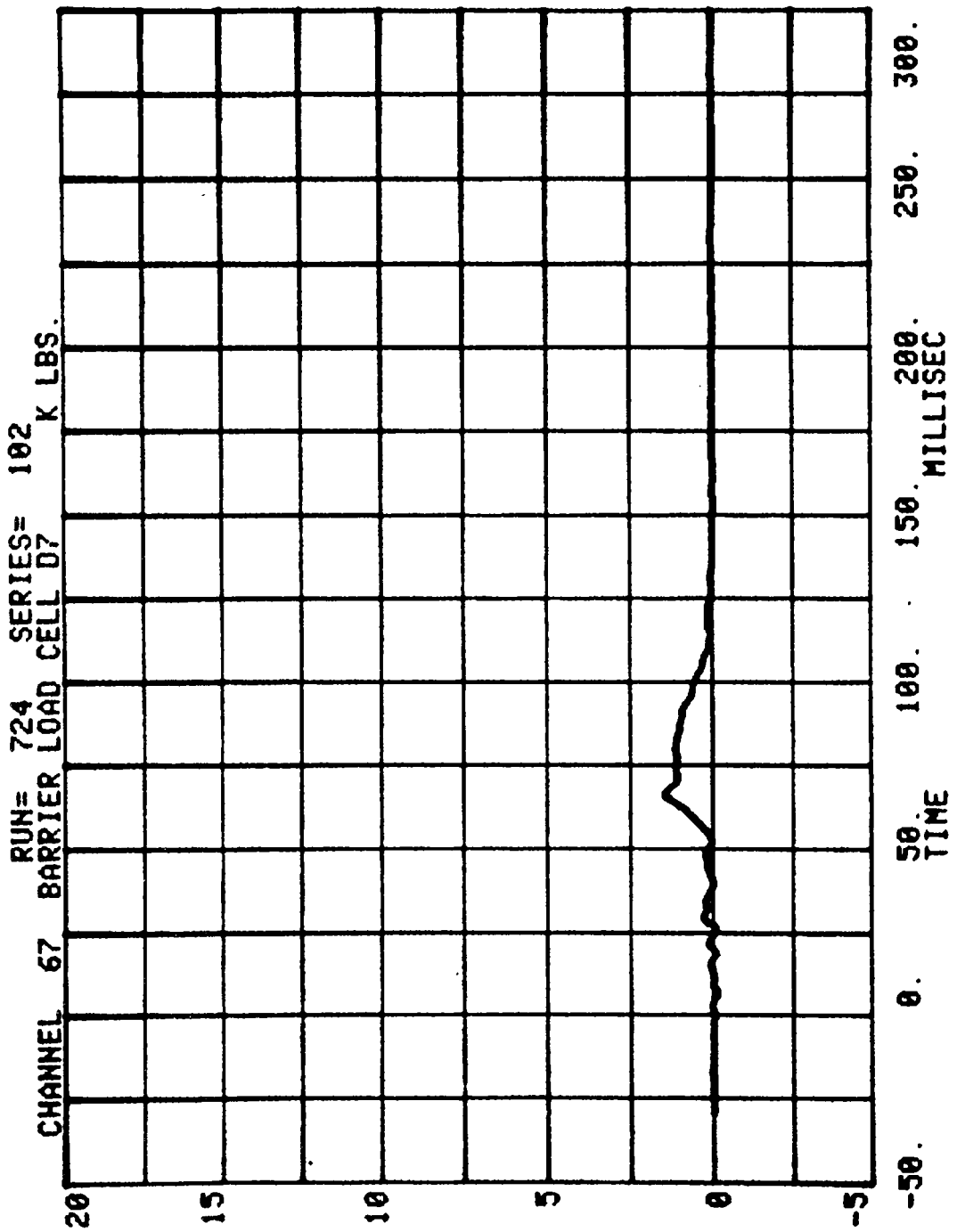

CHANNEL 60
RUN= 724
BARRIER LOAD CELL C9
SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

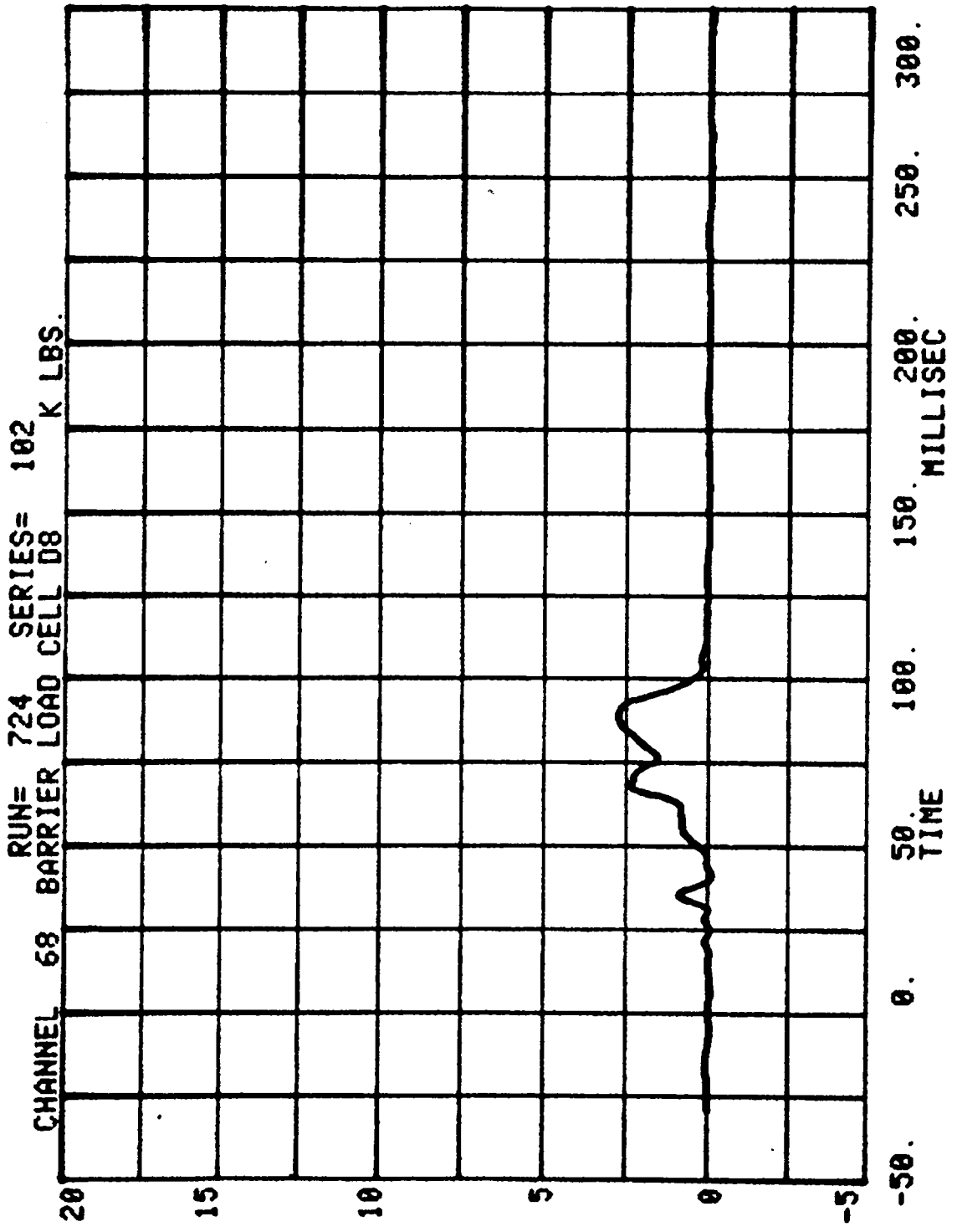

RUN= 724 SERIES= 102
CHANNEL 63 BARRIER LOAD CELL D3 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

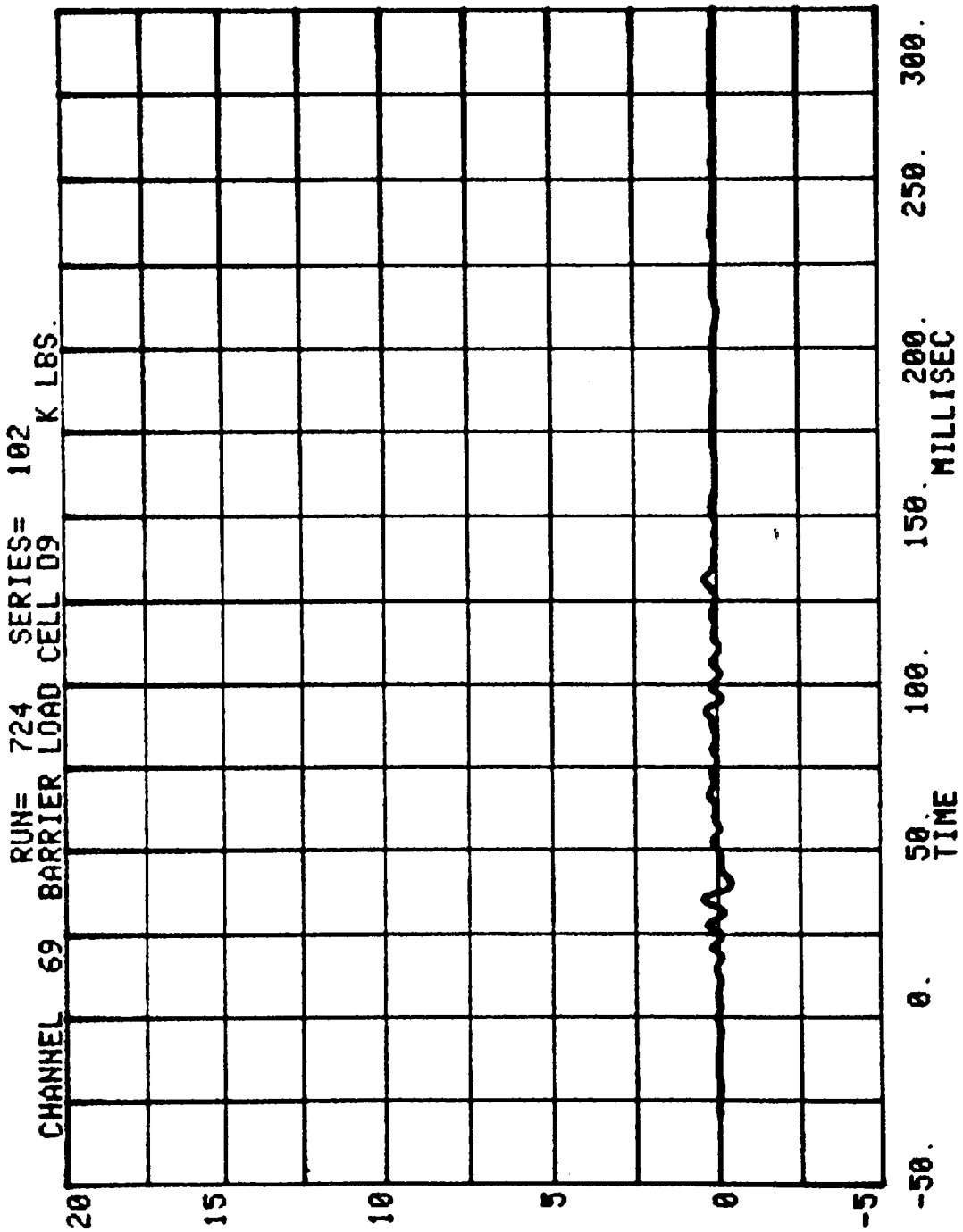

CHANNEL 64 BARRIER LOAD CELL D4
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 65 BARRIER LOAD CELL D5
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 66 BARRIER LOAD CELL 06
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 67 BARRIER LOAD CELL D7
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 68 BARRIER
RUN= 724 LOAD CELL D8
SERIES= 102 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

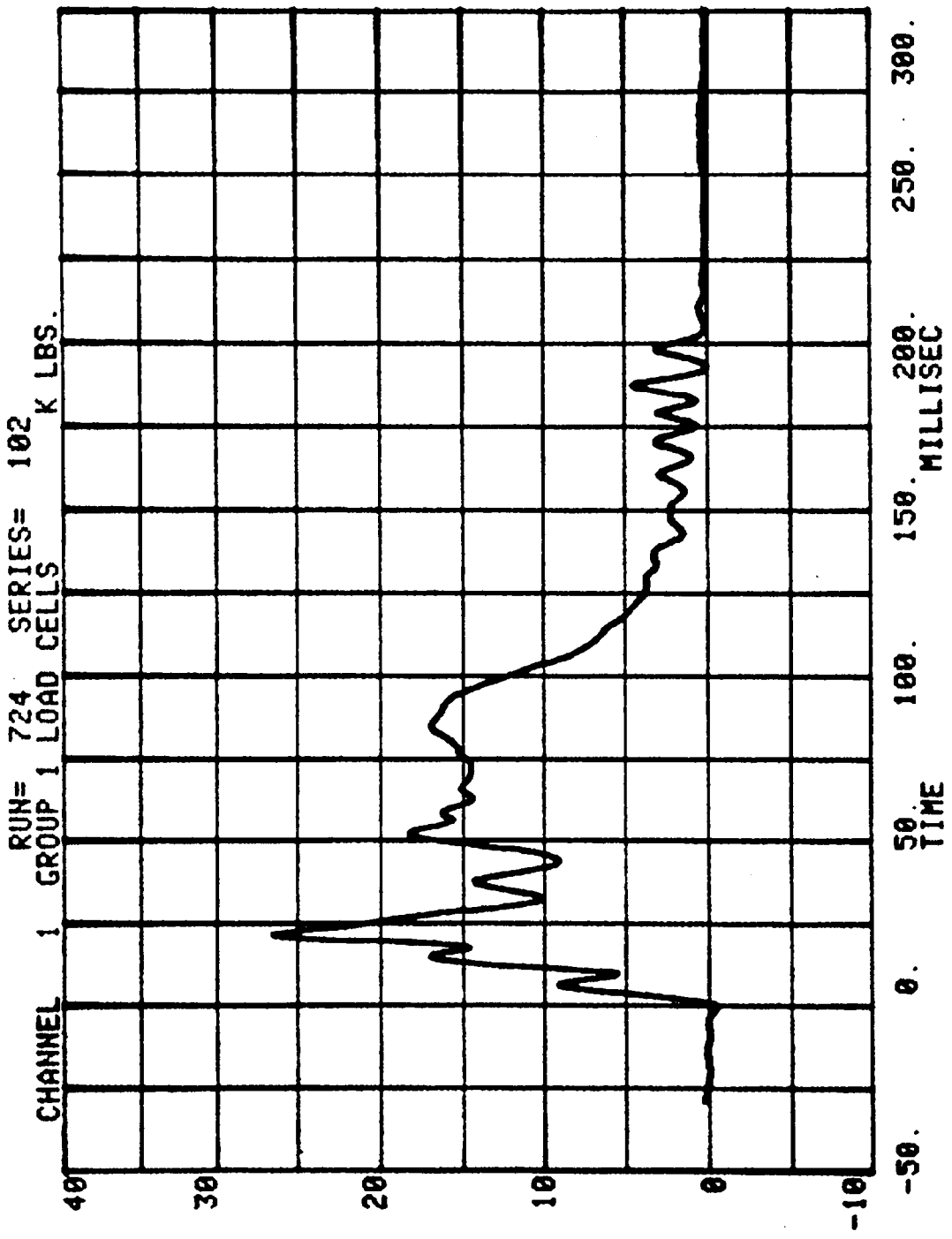

CHANNEL 69 BARRIER LOAD CELL D9
RUN= 724 SERIES= 102
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

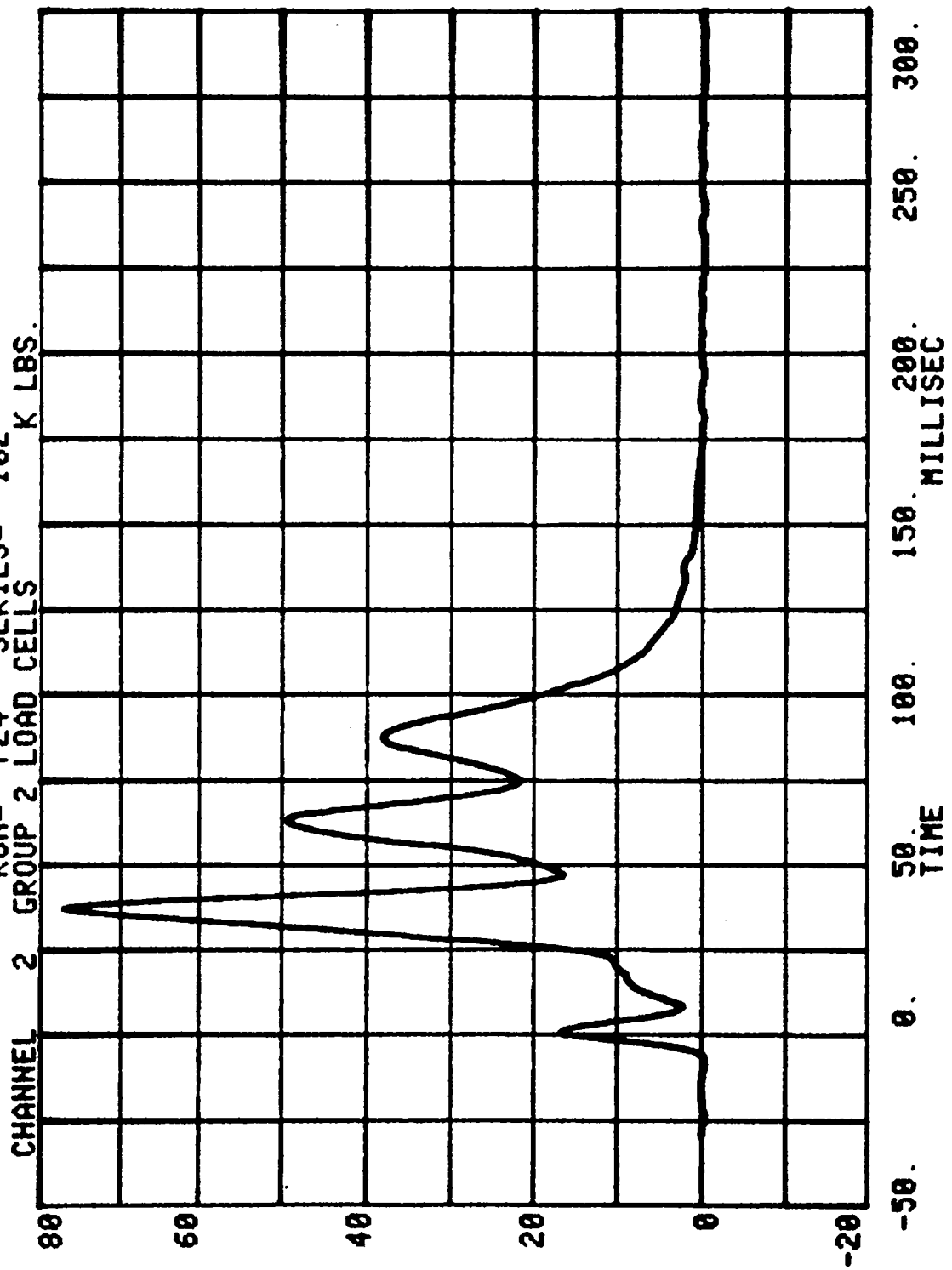
7457-14

NEW CAR ASSESSMENT BARRIER TESTS - 1986

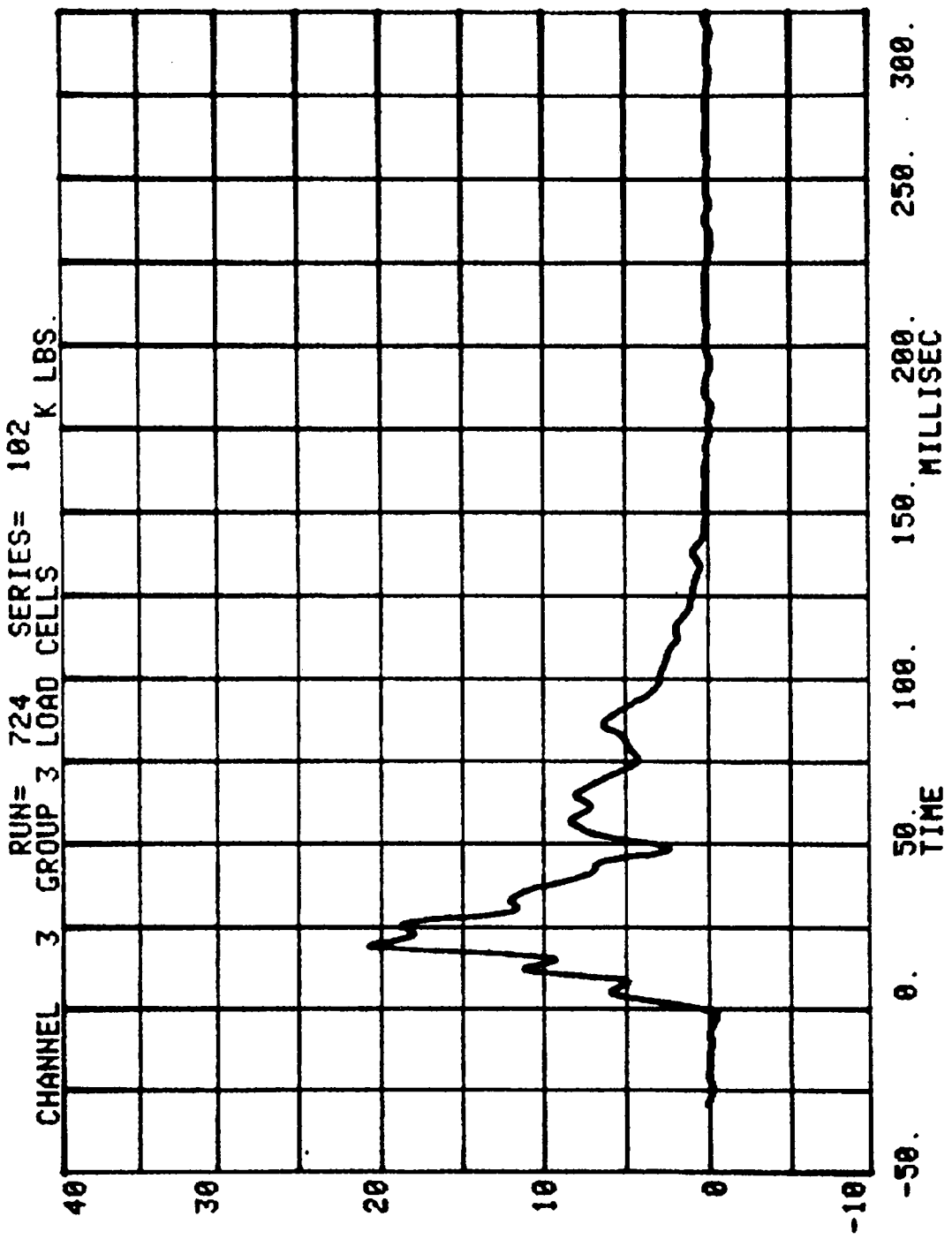
RUN # 724 SERIES # 102

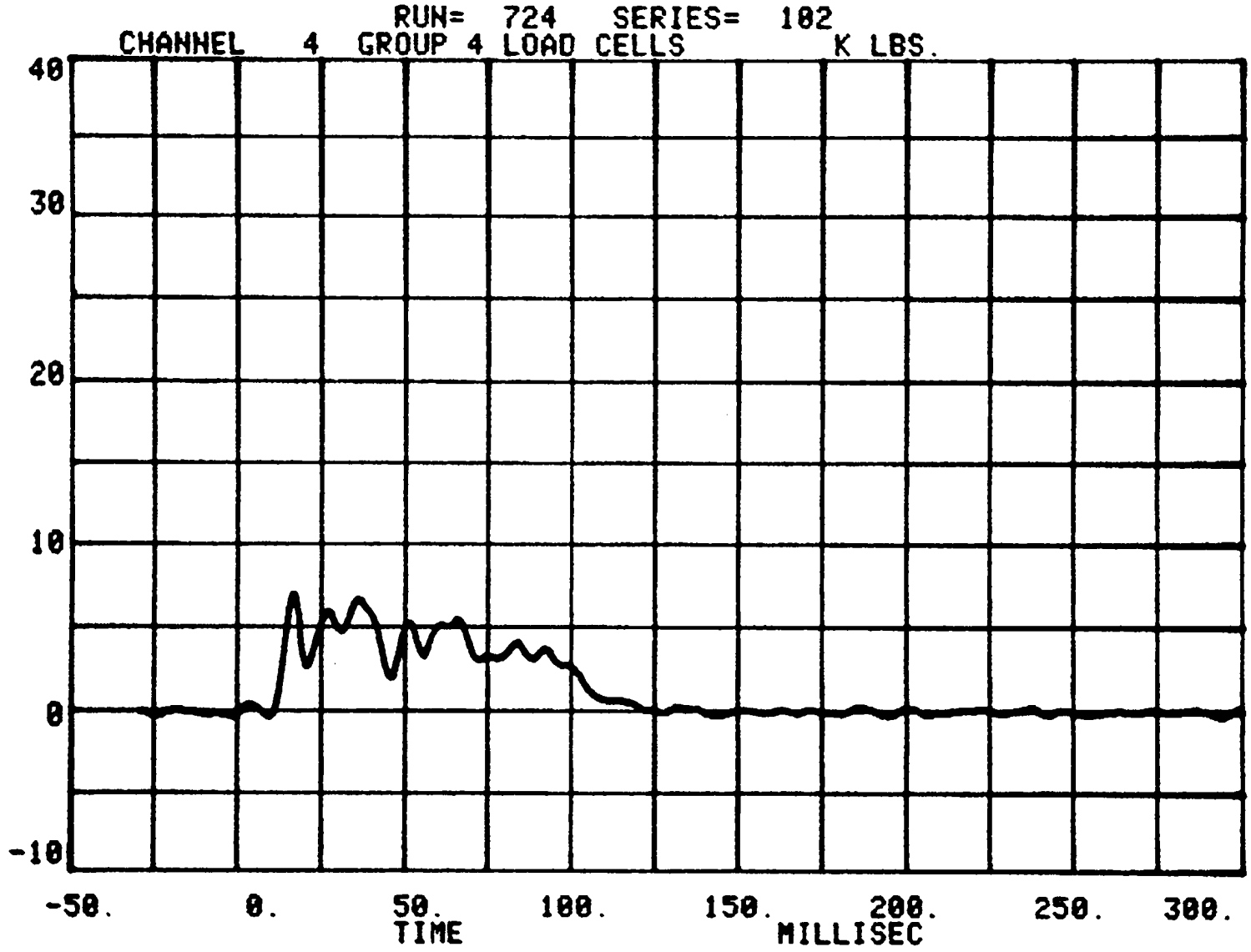
CHAN	TITLE	MINIMUM	MAXIMUM
1	GROUP 1 LOAD CELLS	-.521	26.560 K LBS.
2	GROUP 2 LOAD CELLS	-.291	77.228 K LBS.
3	GROUP 3 LOAD CELLS	-.454	20.781 K LBS.
4	GROUP 4 LOAD CELLS	-.360	6.930 K LBS.
5	GROUP 5 LOAD CELLS	-.644	29.230 K LBS.
6	GROUP 6 LOAD CELLS	-.497	9.446 K LBS.
7	TOTAL LOAD CELL SUM	-1.265	143.548 K LBS.

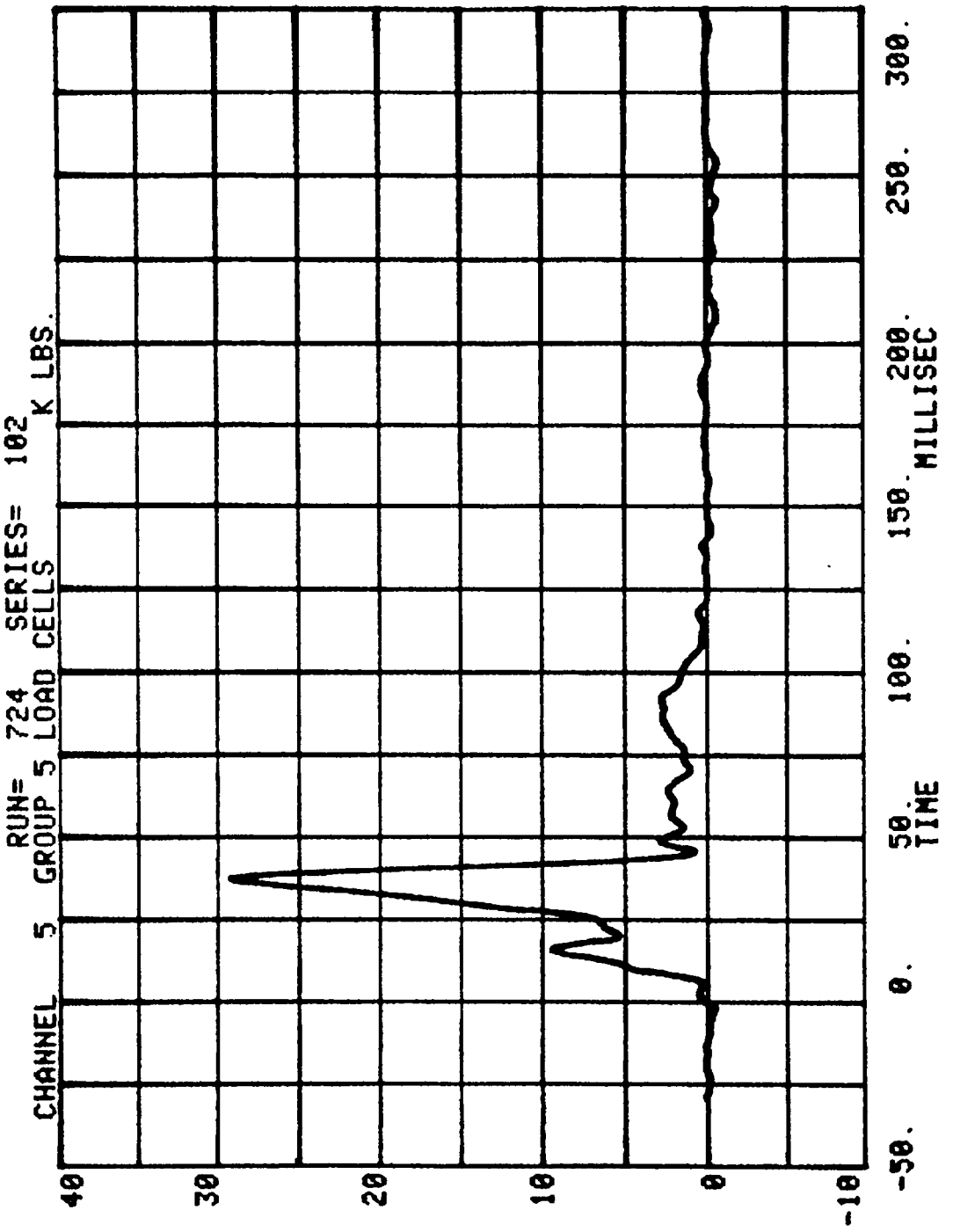

CHANNEL 1 GROUP 1 LOAD CELLS
RUN= 724 SERIES= 102
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

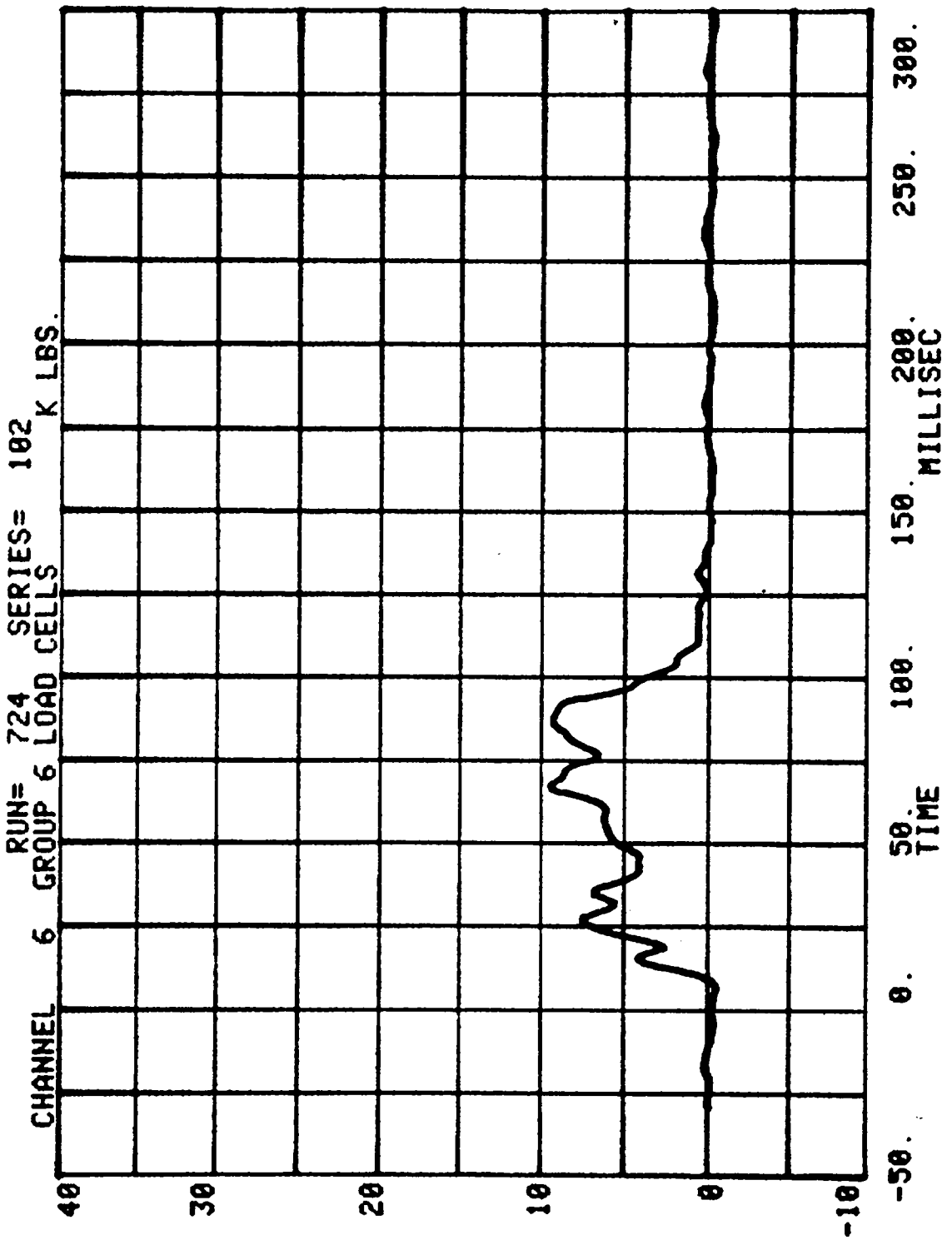

CHANNEL 2 GROUP 2 LOAD CELLS
RUN= 724 SERIES= 102
K LBS.
80
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

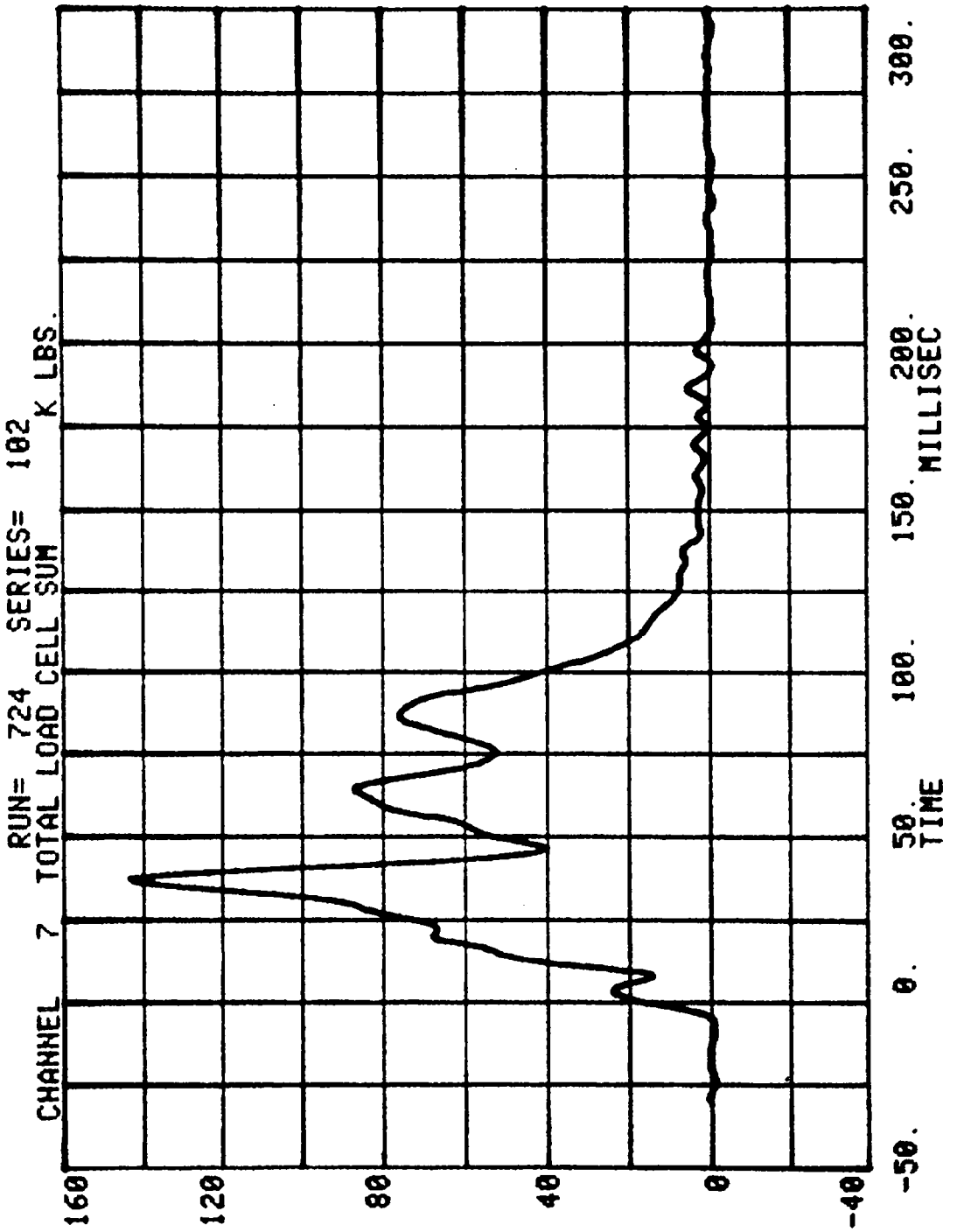
7457-14


CHANNEL 3 GROUP 3 LOAD CELLS
RUN= 724 SERIES= 102
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 724 SERIES= 102
CHANNEL 4 GROUP 4 LOAD CELLS K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 5 GROUP 5 LOAD CELLS
RUN= 724 SERIES= 102
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 6 GROUP 6 LOAD CELLS
RUN= 724 SERIES= 102
K LBS.
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 7 TOTAL LOAD CELL SUM
RUN= 724 SERIES= 102
K LBS.
160
120
80
40
0
-40
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

TEST NO. CG0102

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= 724

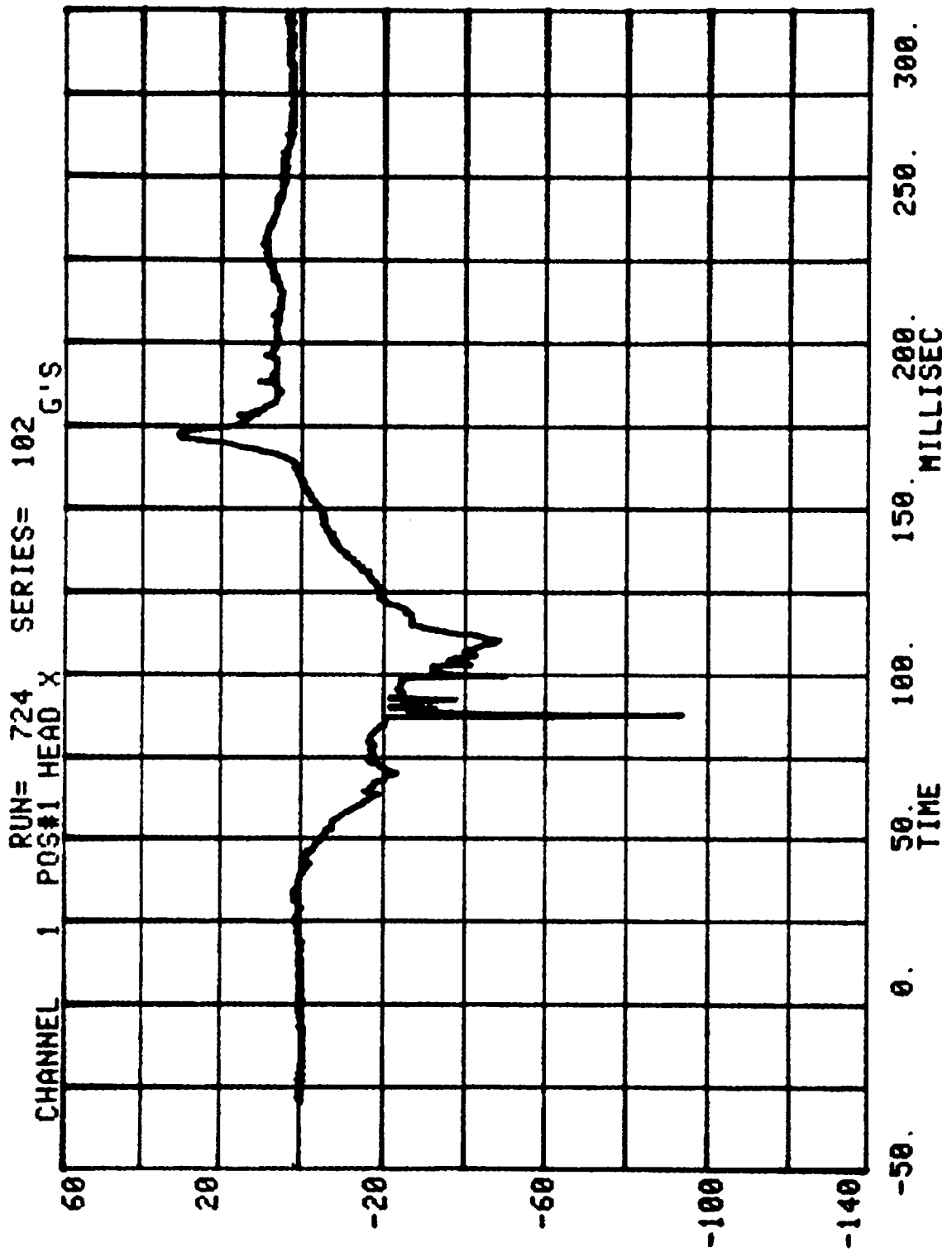
POS#1 HEAD R

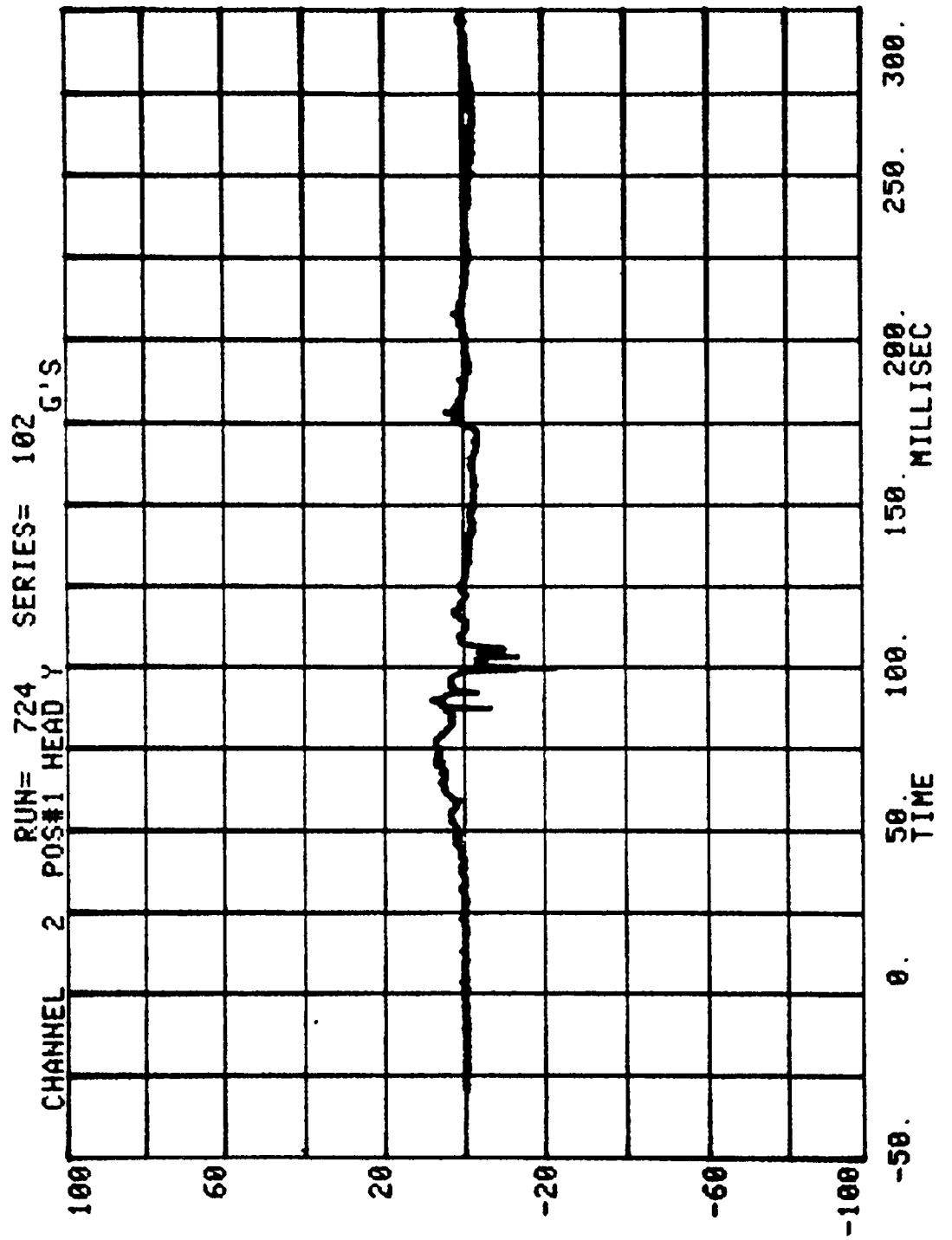
HIC= 826.1 FROM T1= .06960 TO T2= .11565

AVERAGE ACCELERATION BETWEEN T1 AND T2= 50.3G'S

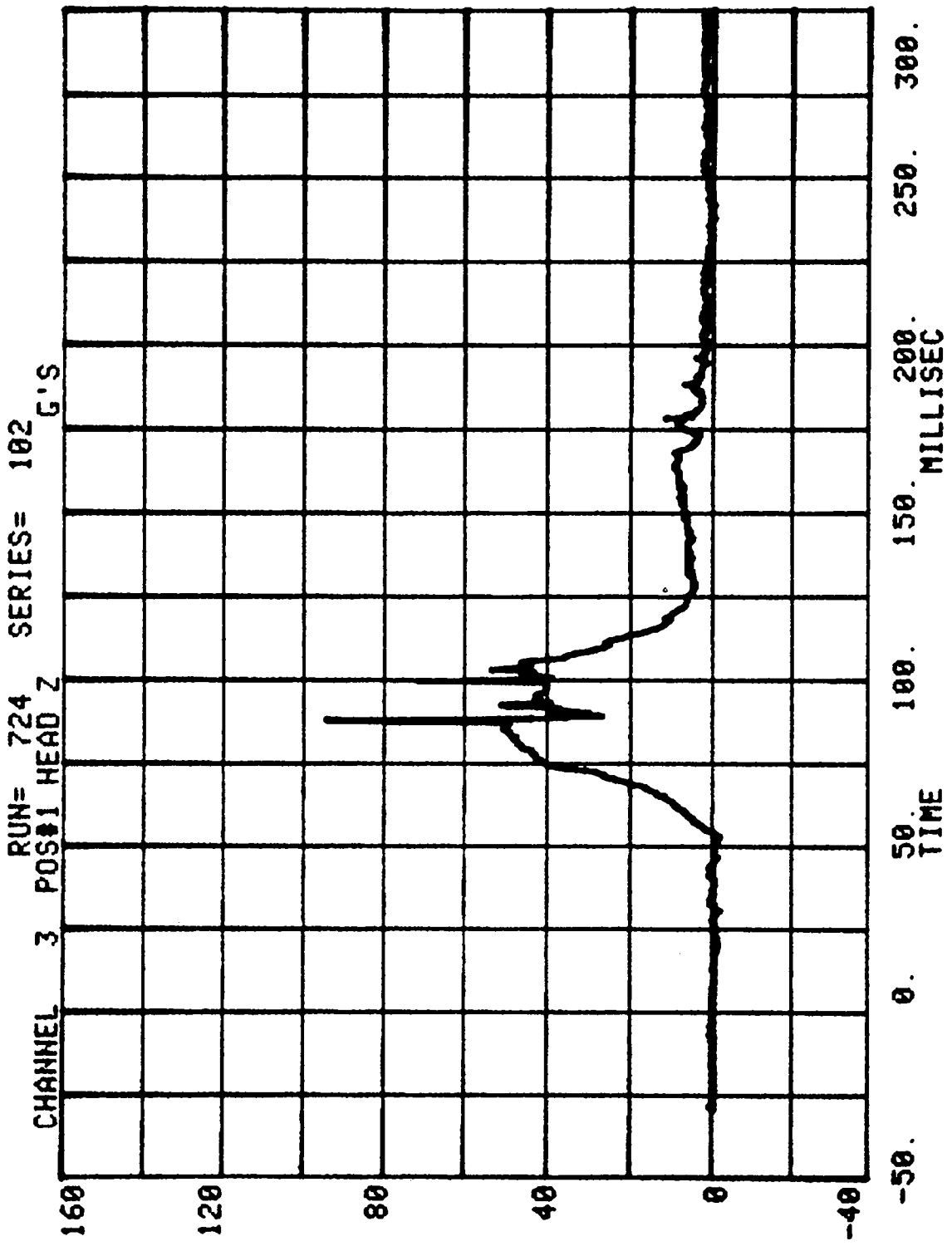
EVENT TIME= 300.0 MSEC

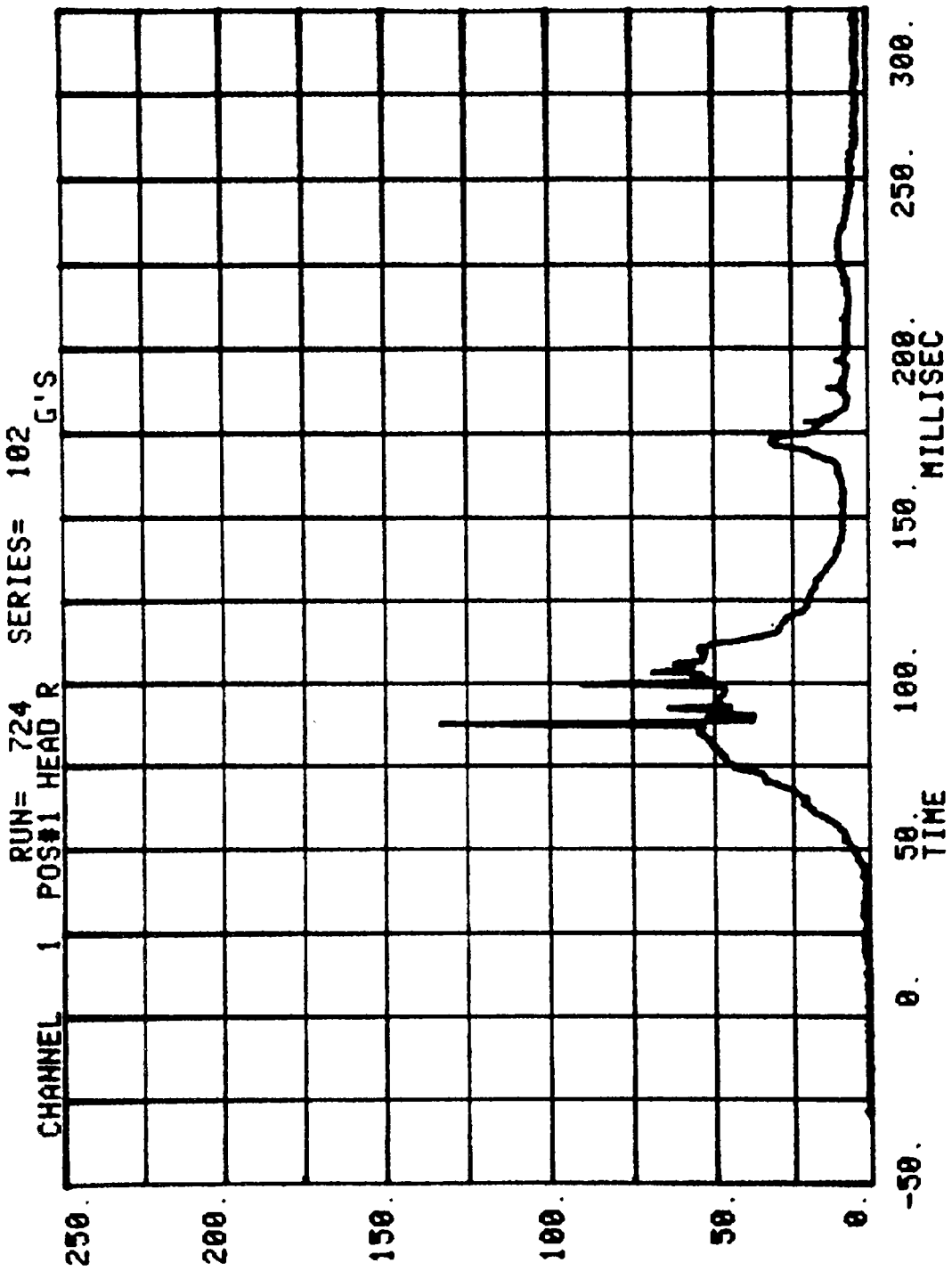
SEVERITY INDEX=1083.1


CHANNEL 1 POS#1 HEAD X
RUN= 724 SERIES= 102
G'S
60
20
-20
-60
-100
-140
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

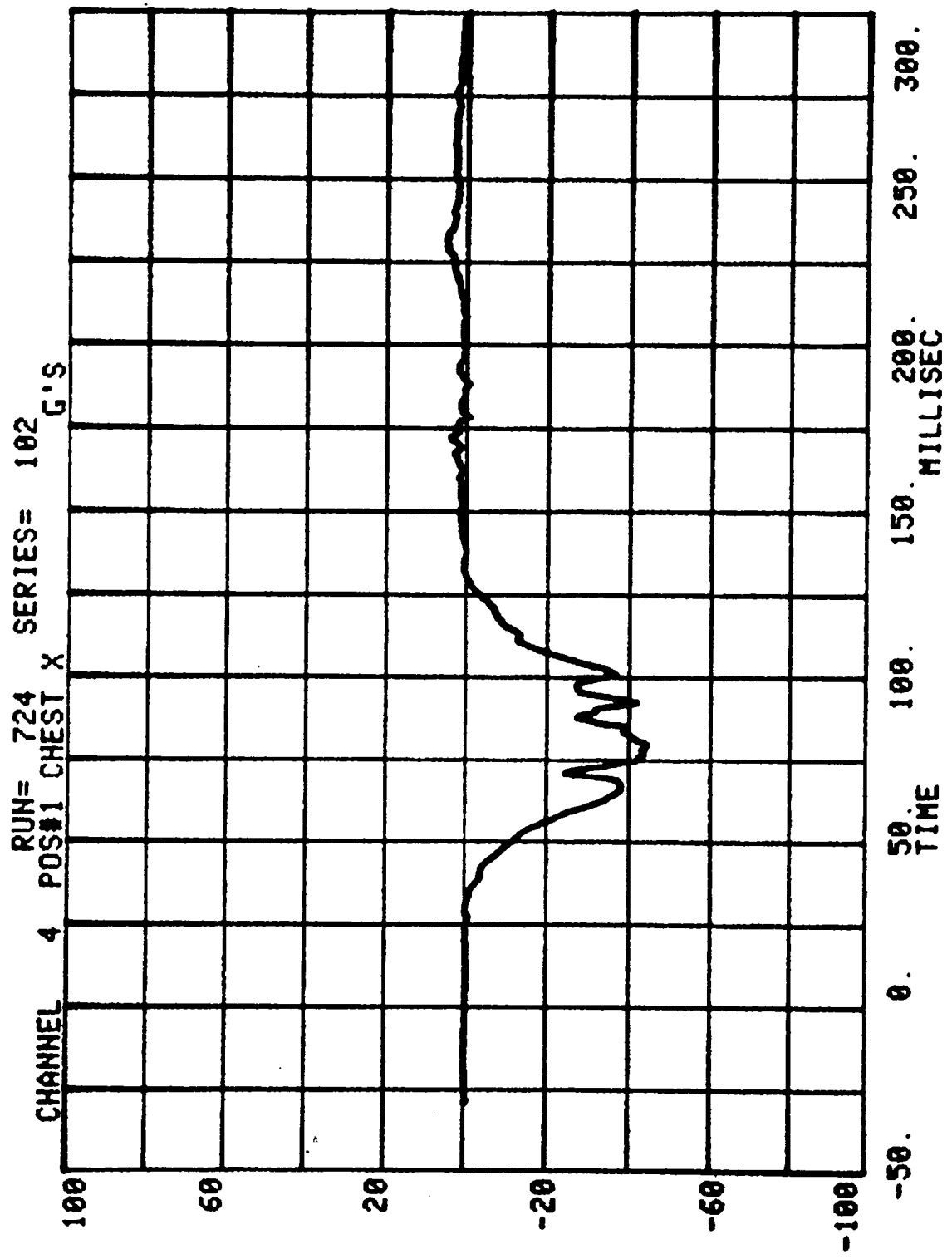

CHANNEL 2 POS#1 HEAD Y
RUN= 724 SERIES= 102
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

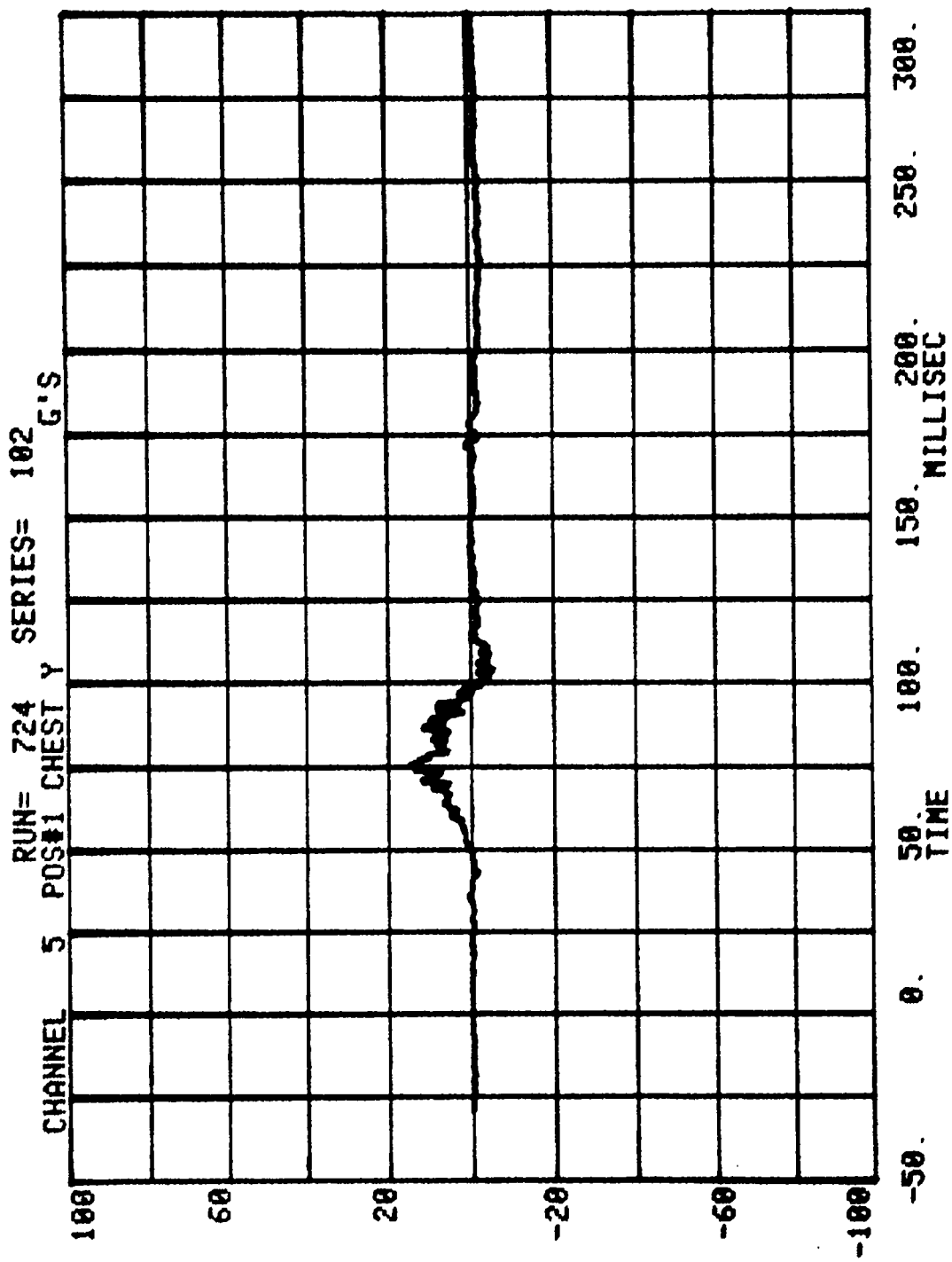
7457-14

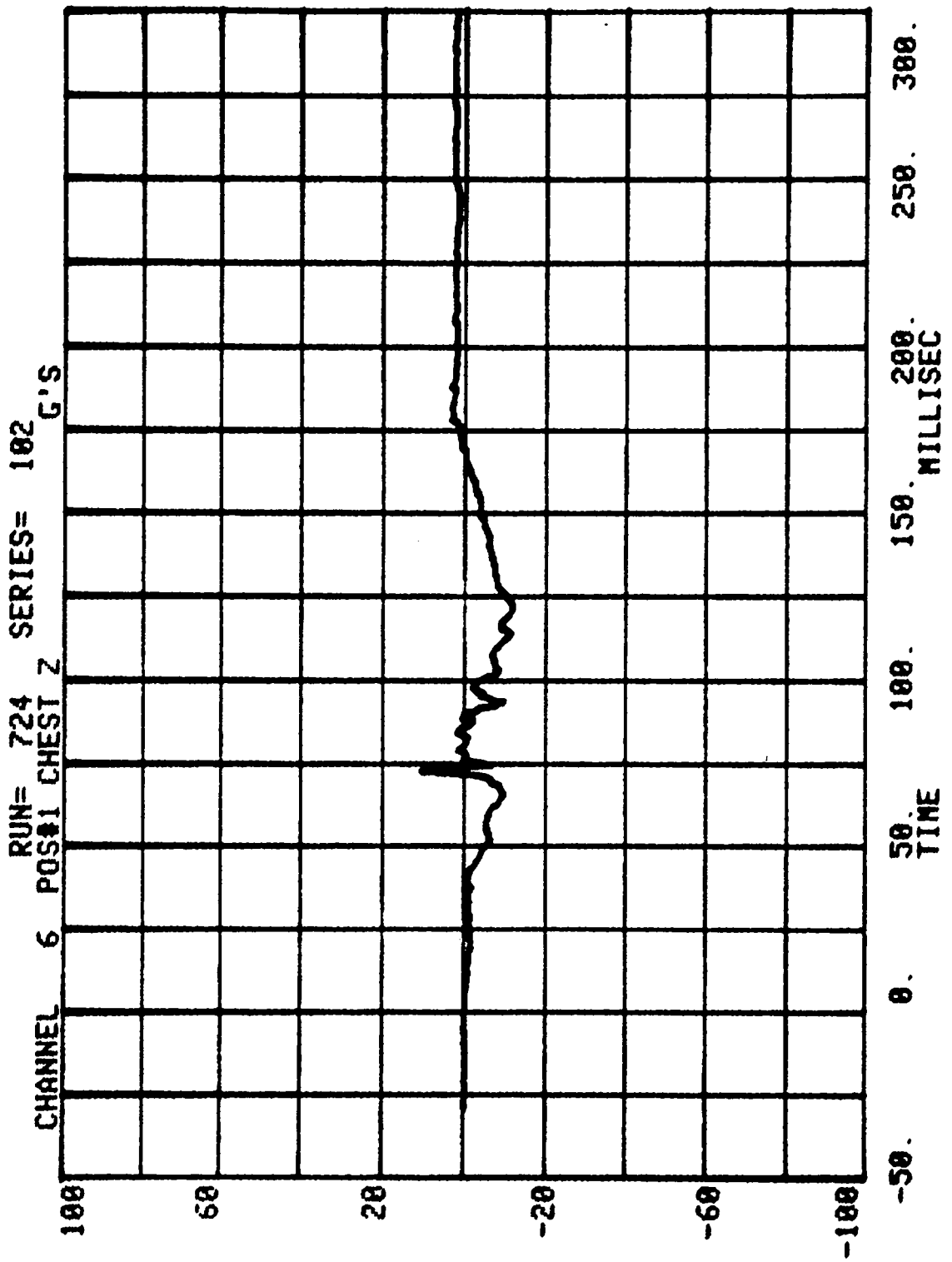

CHANNEL 3 POS#1 HEAD Z
RUN= 724 SERIES= 102
G'S
160
120
80
40
0
-40
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 1 POS#1 HEAD R
RUN= 724 SERIES= 102
G'S
250.
200.
150.
100.
50.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

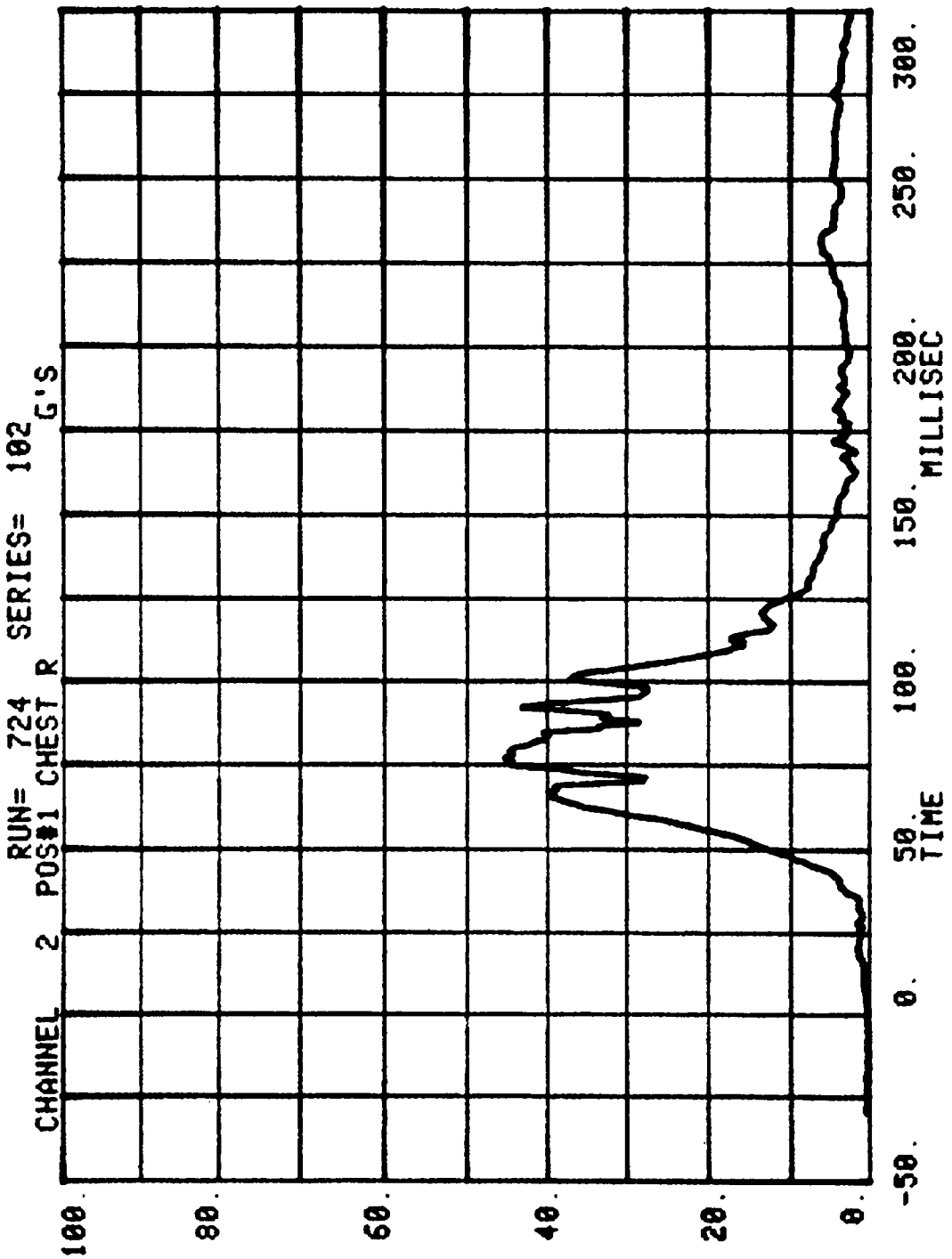
7457-14

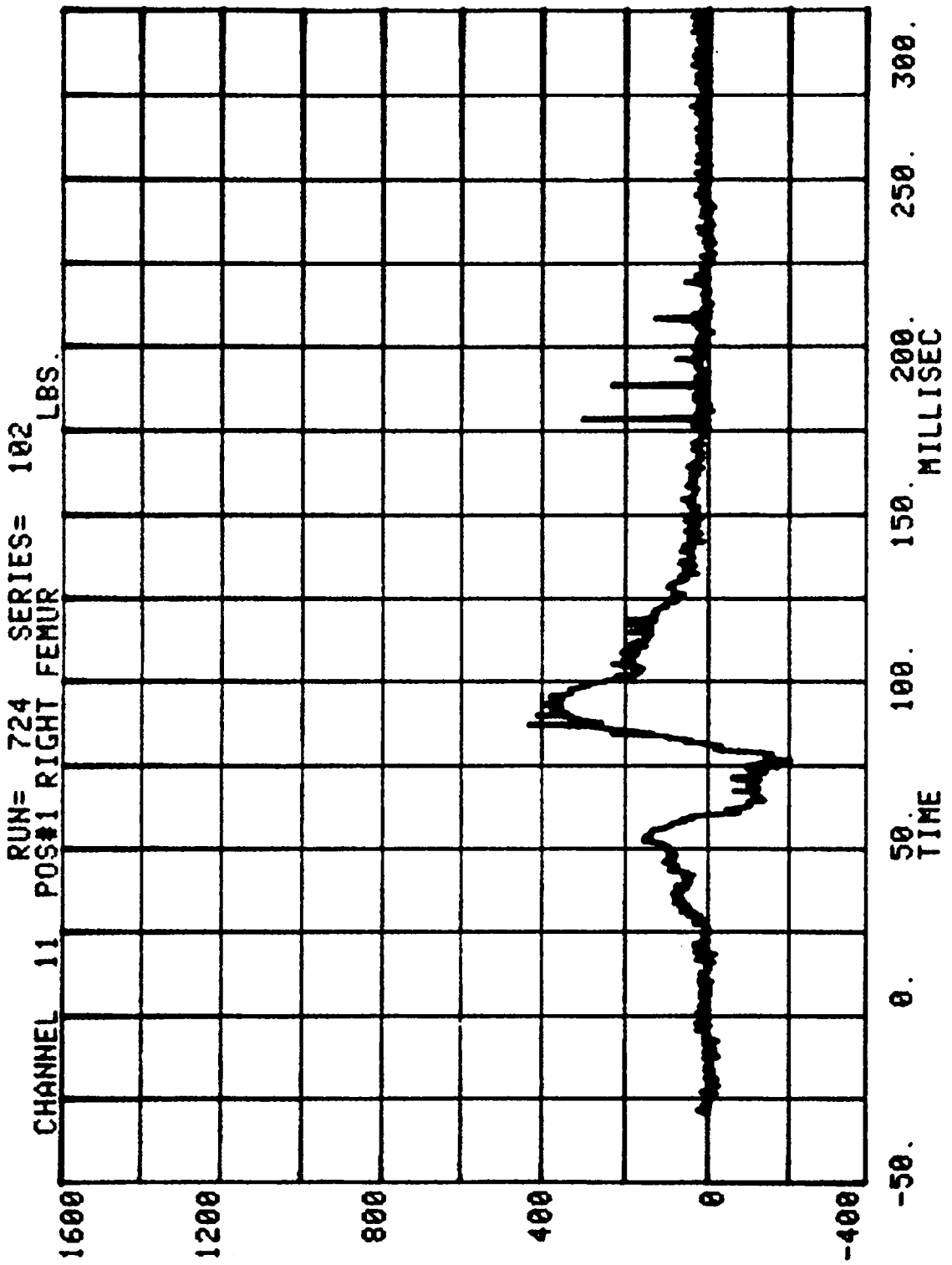

CHANNEL 4 POS#1 CHEST X
RUN= 724 SERIES= 102
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

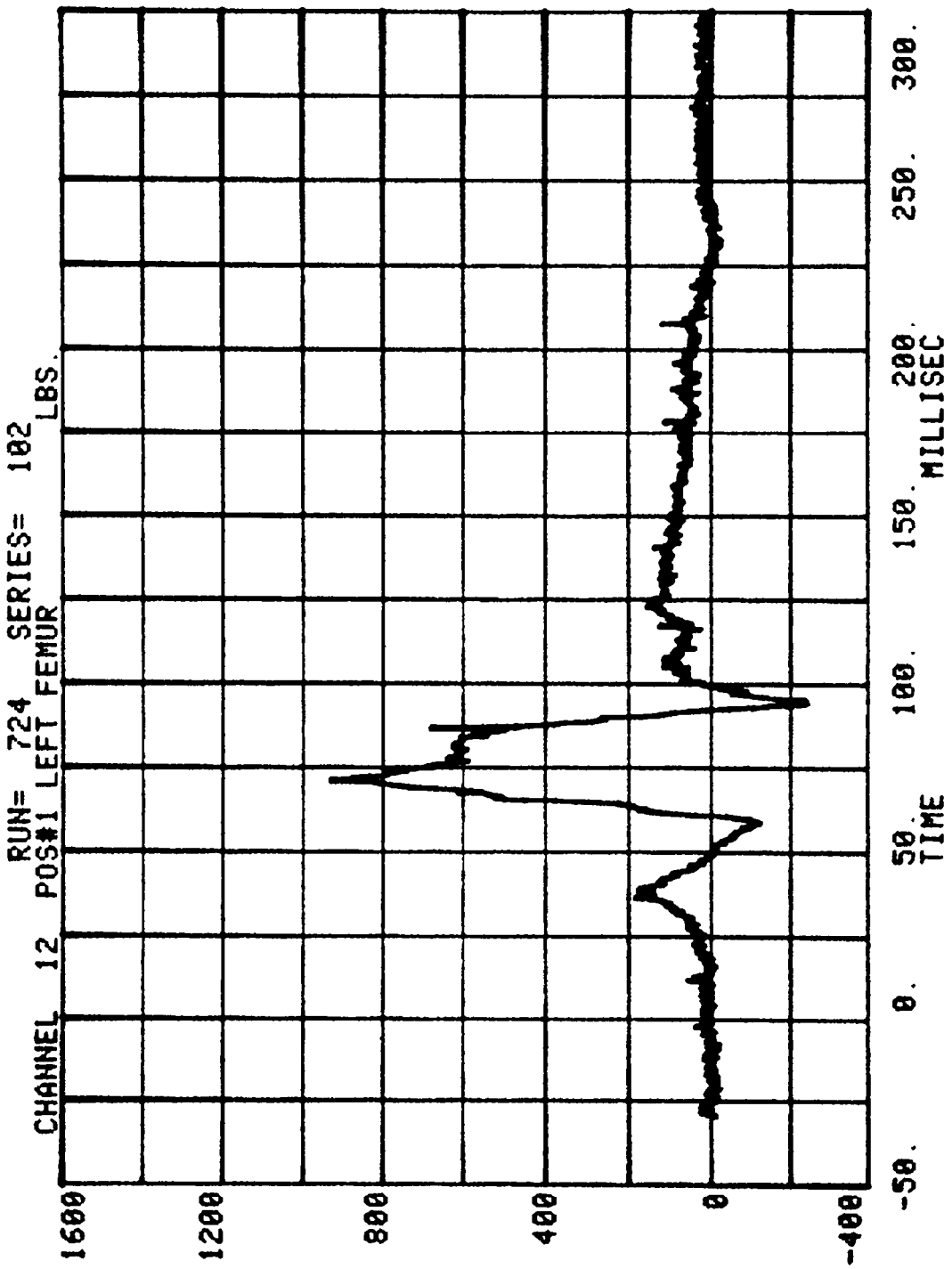

CHANNEL 5 POS#1 CHEST Y
RUN= 724 SERIES= 102 G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 6 POS#1 CHEST Z
RUN= 724 SERIES= 102
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

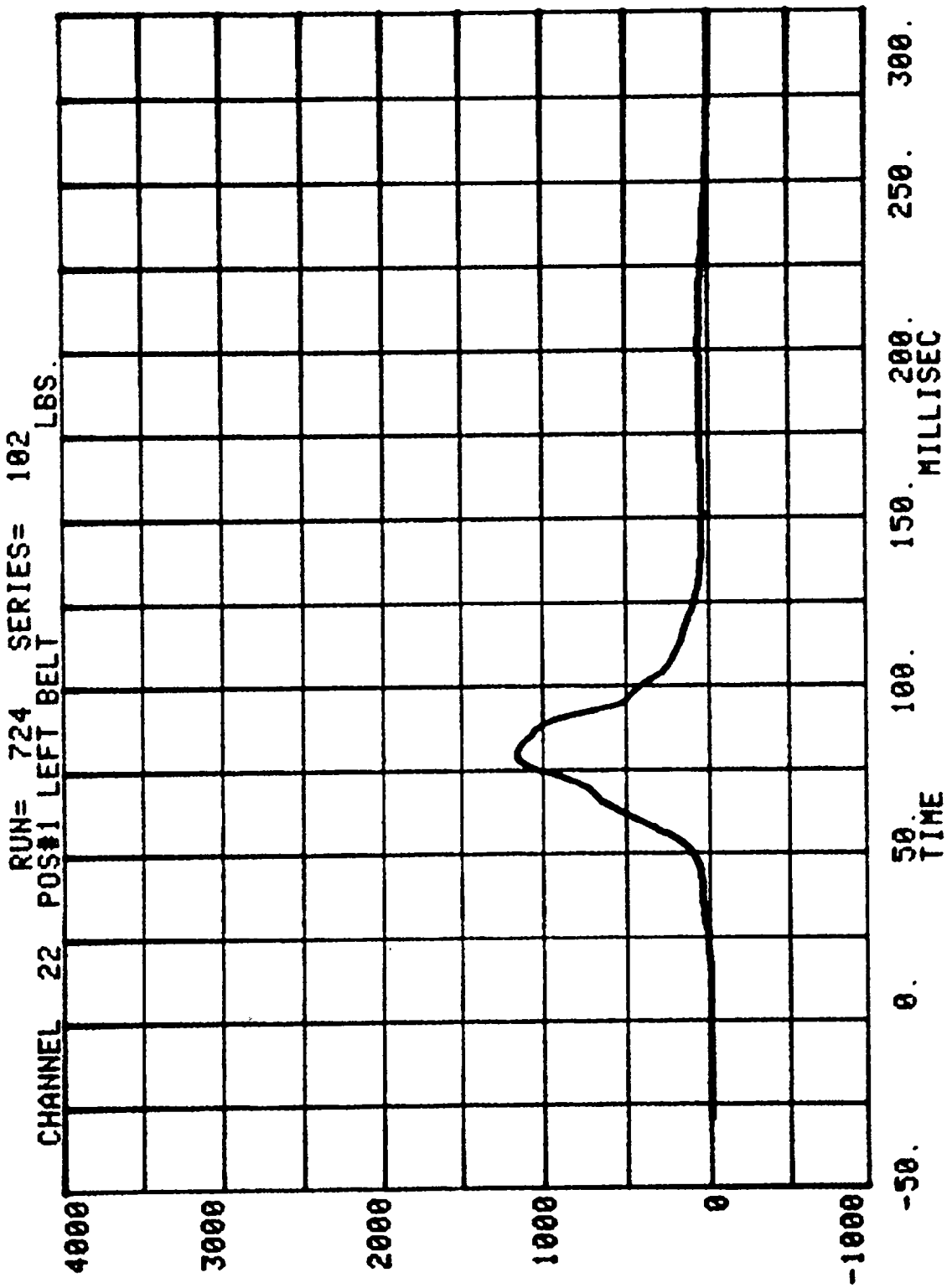
7457-14


CHANNEL 2 POS#1 CHEST R
RUN= 724 SERIES= 102
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

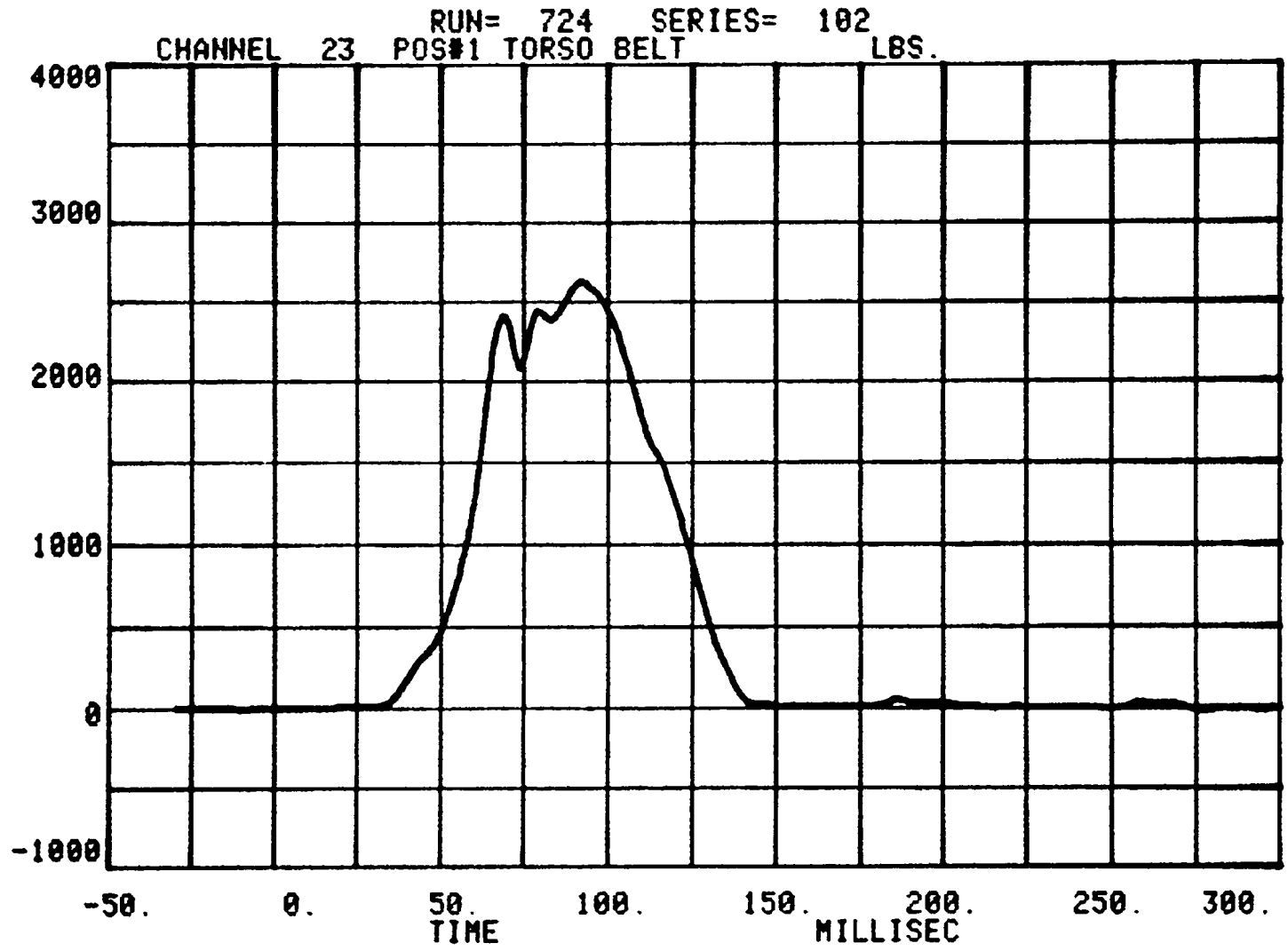

CHANNEL 11 POS#1 RIGHT FEMUR
RUN= 724 SERIES= 102
LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 12 POS#1 LEFT FEMUR
RUN= 724 SERIES= 102
LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7457-14


CHANNEL 22 POS#1 LEFT BELT
RUN= 724 SERIES= 102
LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7457-14


RUN= 724 SERIES= 102
CHANNEL 23 POS#1 TORSO BELT LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

NEW CAR ASSESSMENT BARRIER TESTS - 1986

RUN= 724

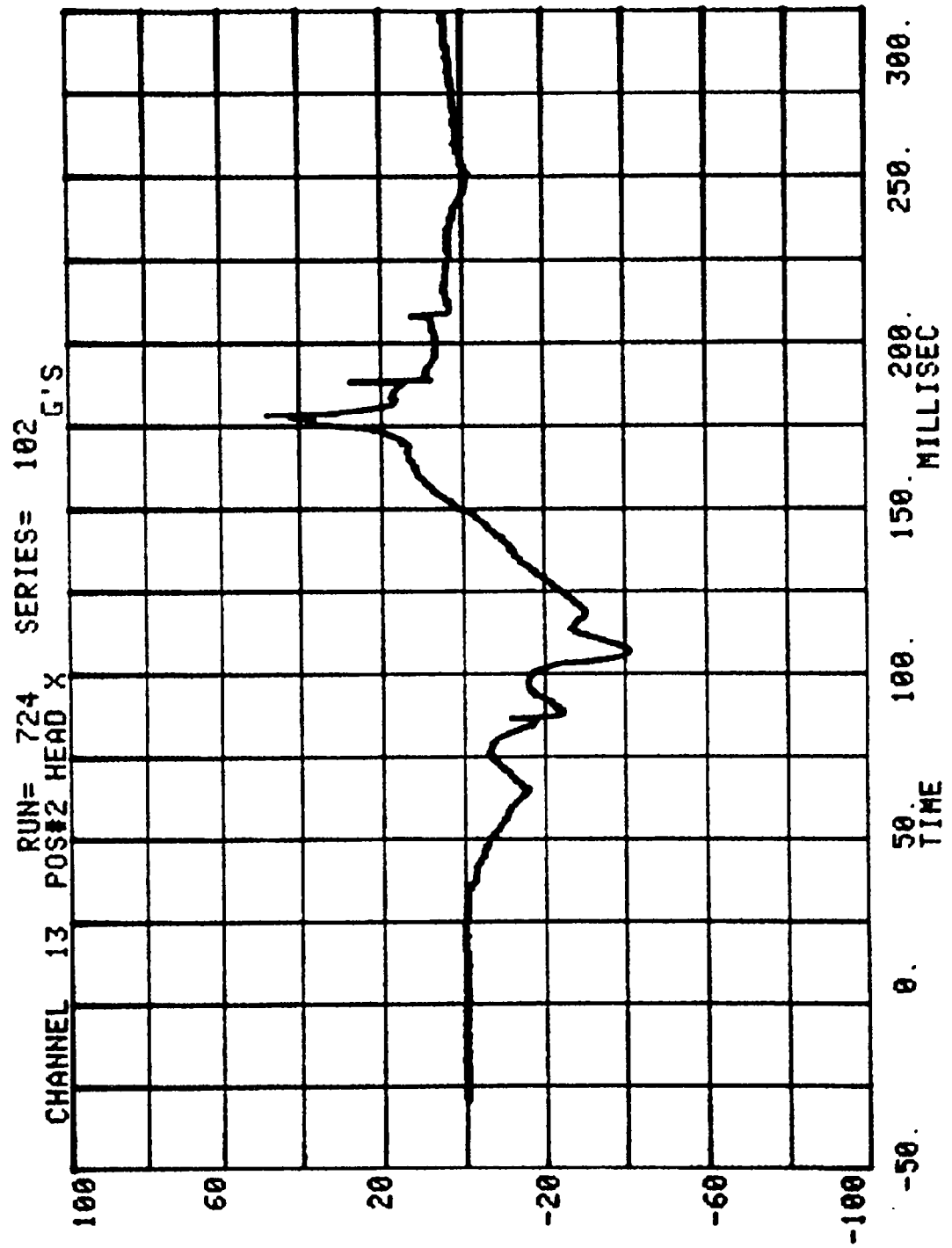
POS#2 HEAD R

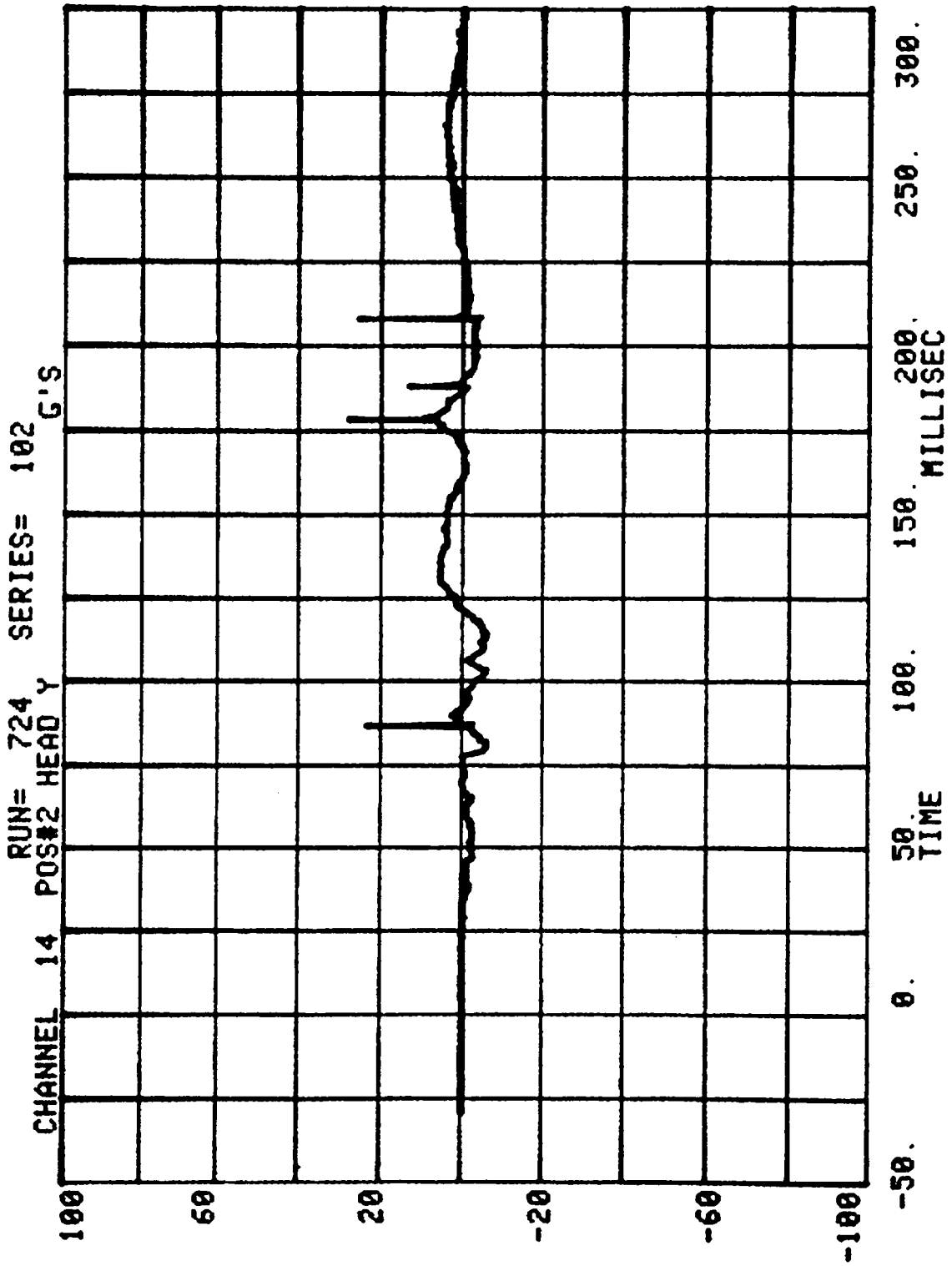
HIC= 650.3 FROM T1= .06225 TO T2= .18915

AVERAGE ACCELERATION BETWEEN T1 AND T2= 30.5G'S

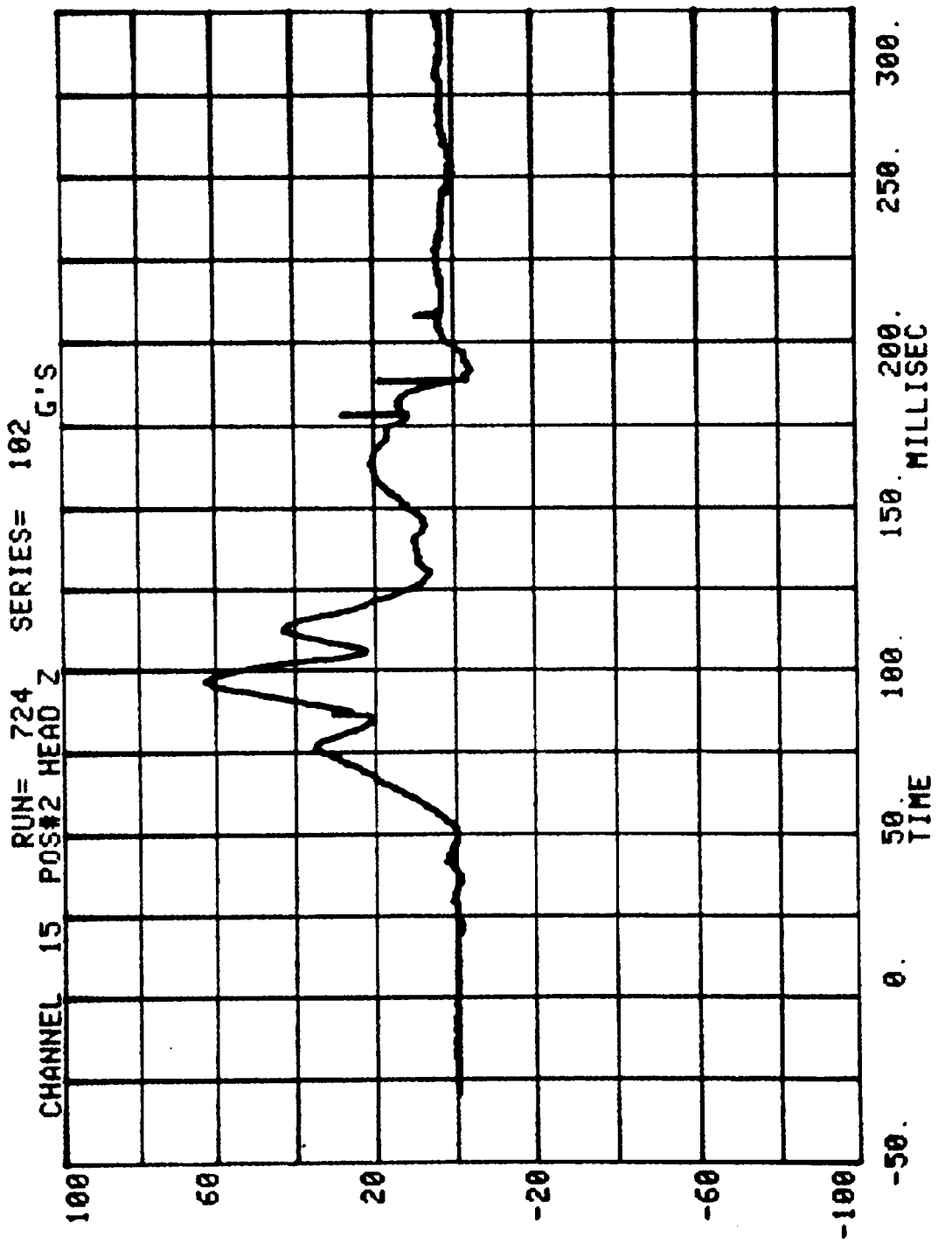
EVENT TIME= 300.0 MSEC

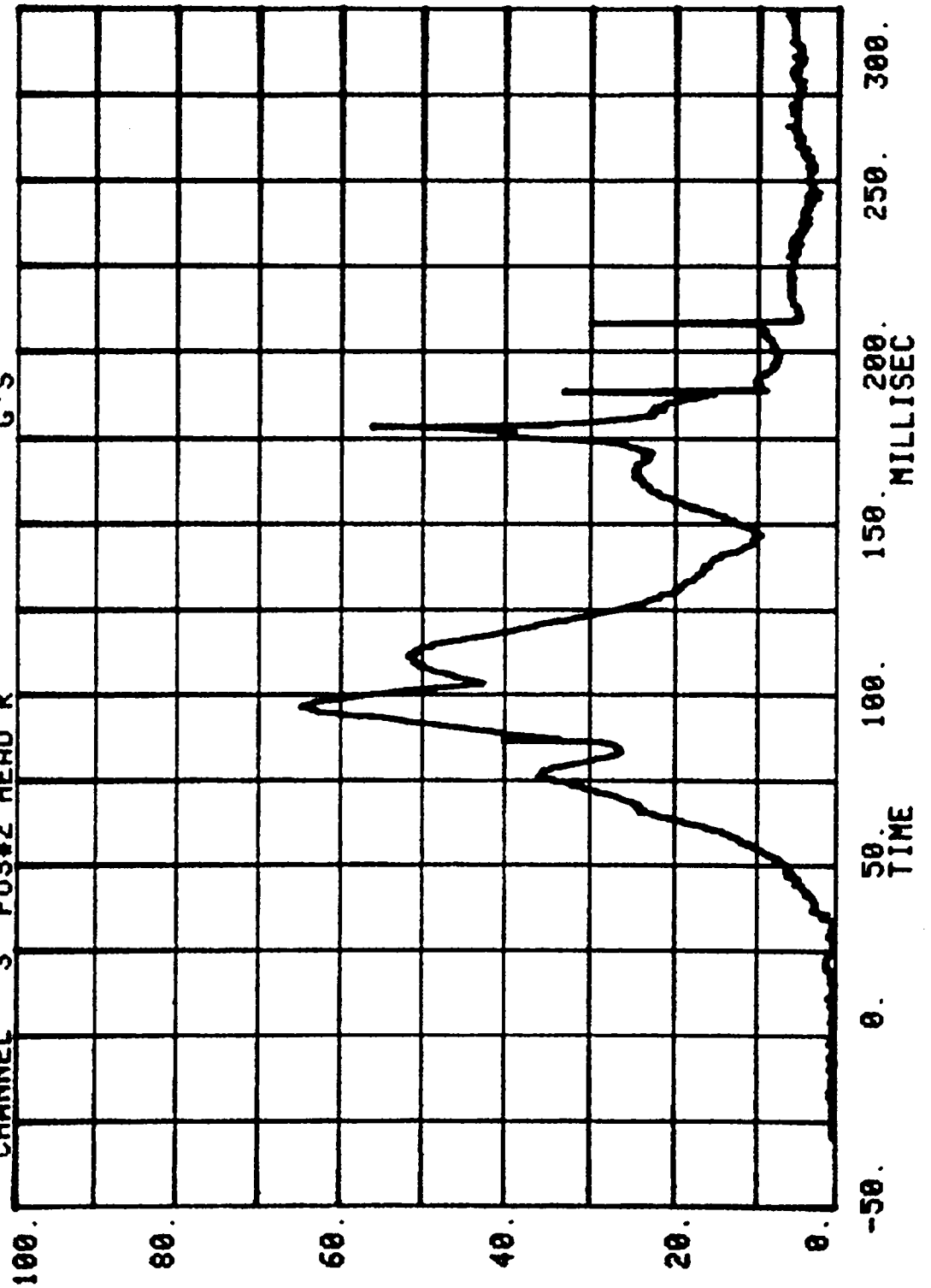
SEVERITY INDEX= 936.6


CHANNEL 13 POS#2 HEAD X
RUN= 724 SERIES= 102
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

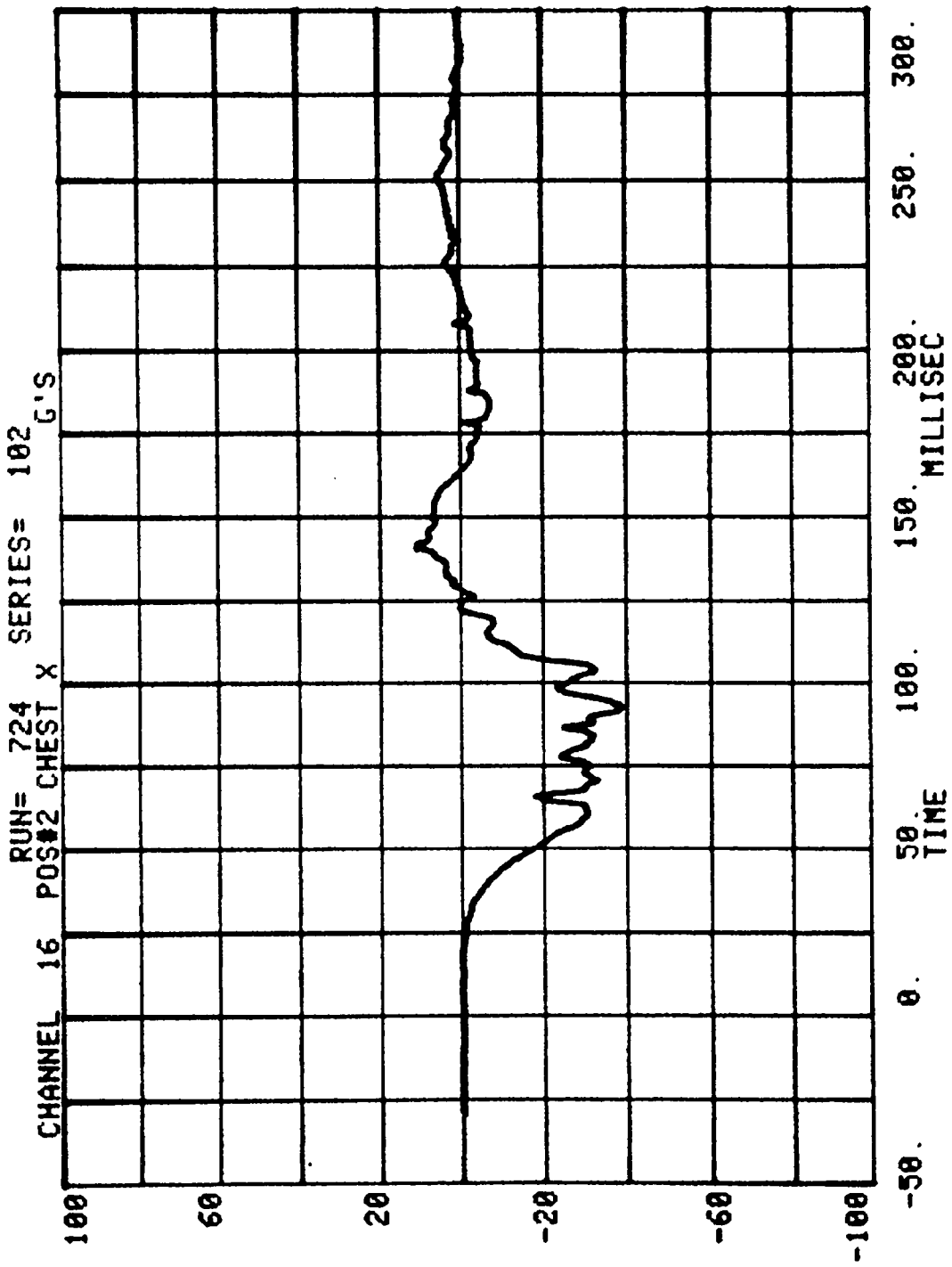

CHANNEL 14 POS#2 HEAD Y
RUN= 724 SERIES= 102
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

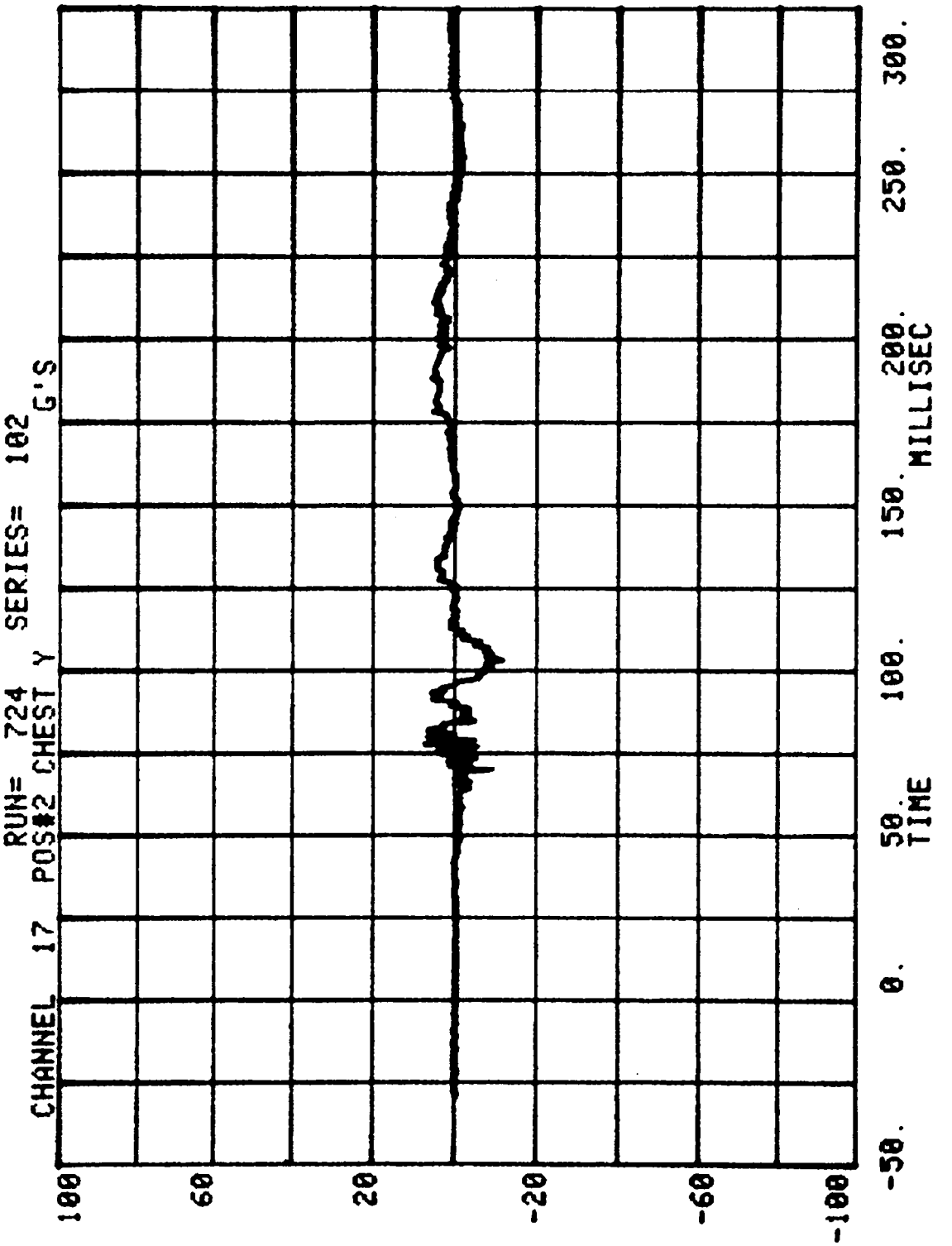
7457-14

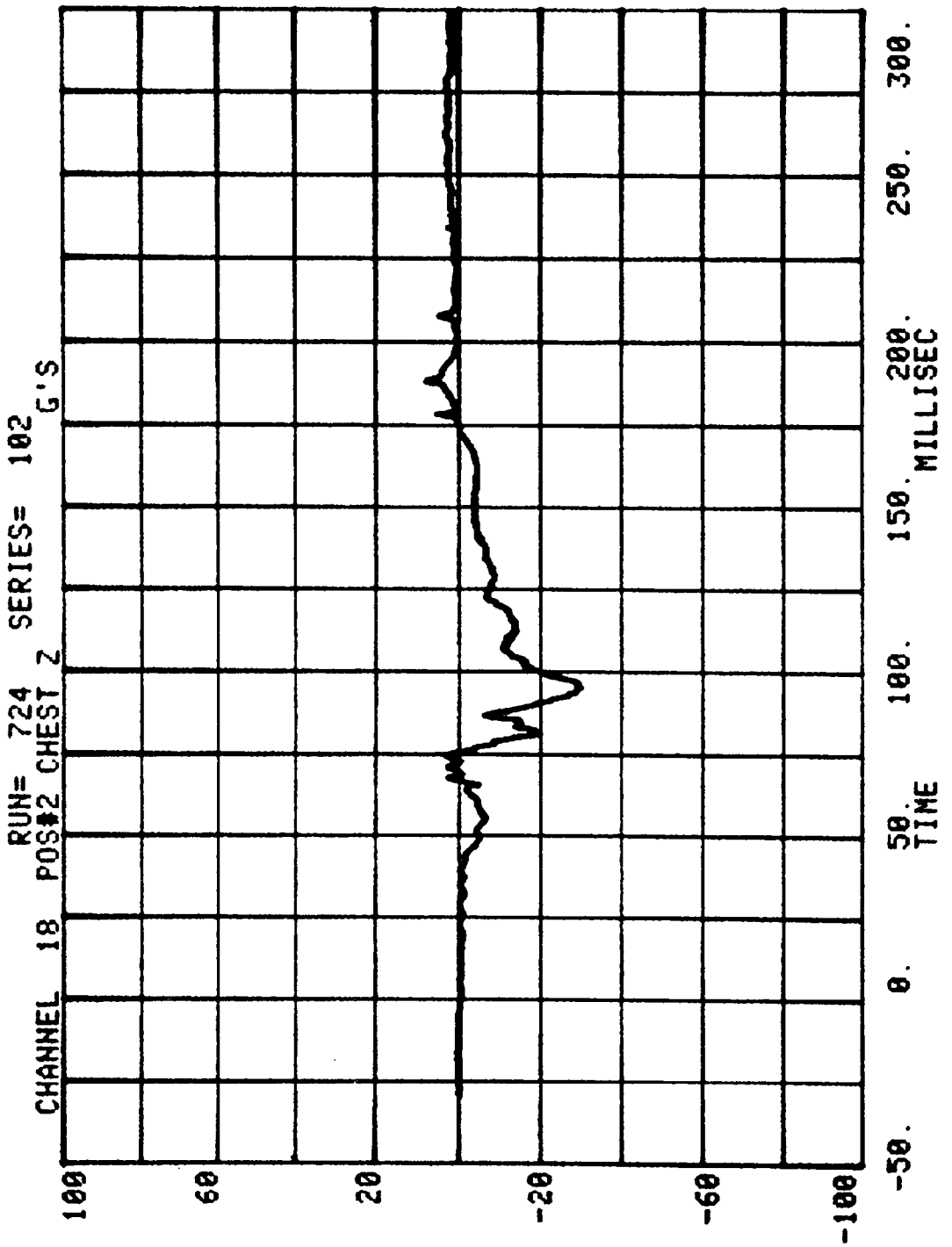

CHANNEL 15 POS#2 HEAD Z
RUN= 724 SERIES= 102 G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

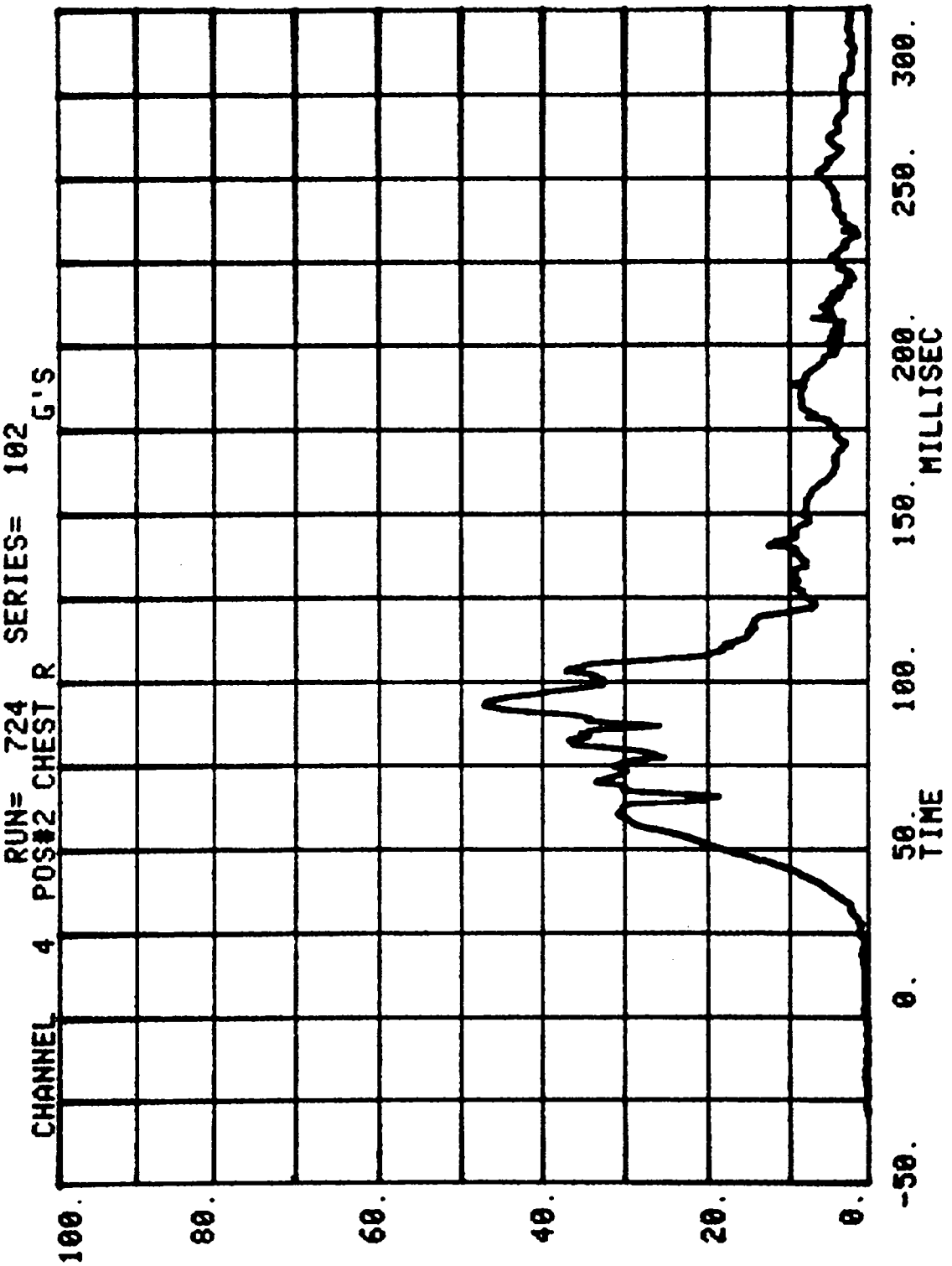

CHANNEL 3 POS#2 HEAD R
RUN= 724 SERIES= 102
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

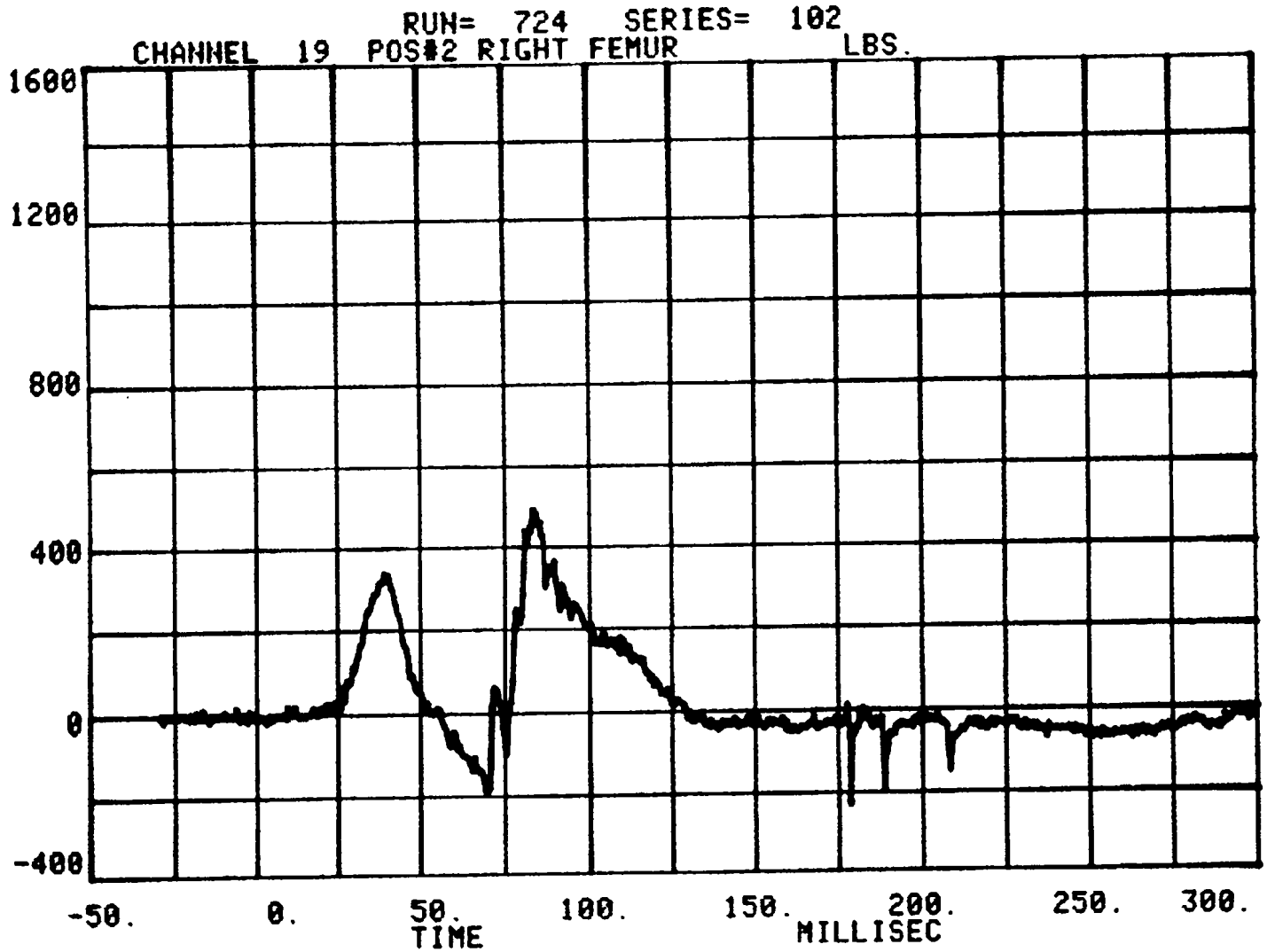
7457-14


CHANNEL 16 POS#2 CHEST X
RUN= 724 SERIES= 102
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

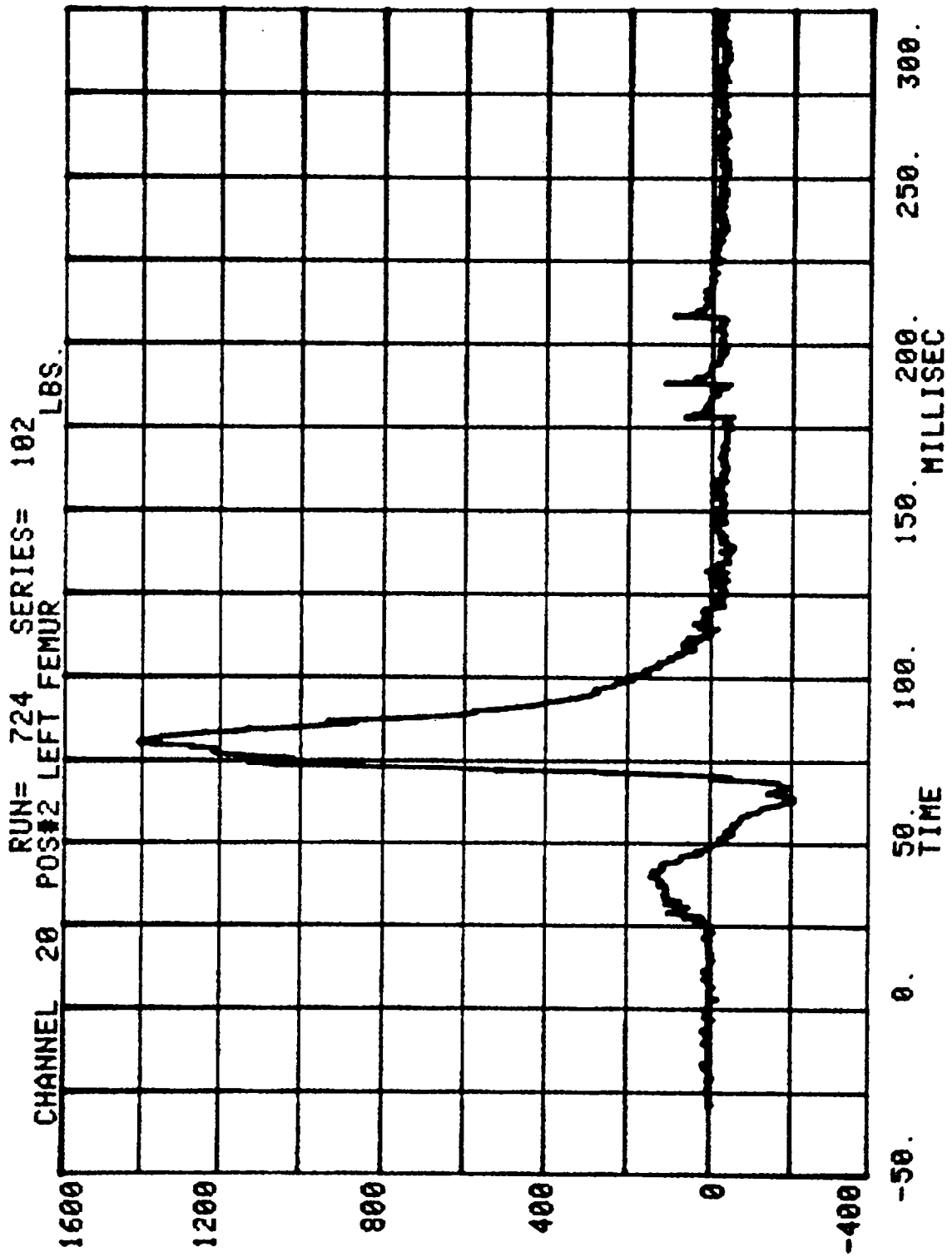

CHANNEL 17 POS#2 CHEST Y
RUN= 724 SERIES= 102
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

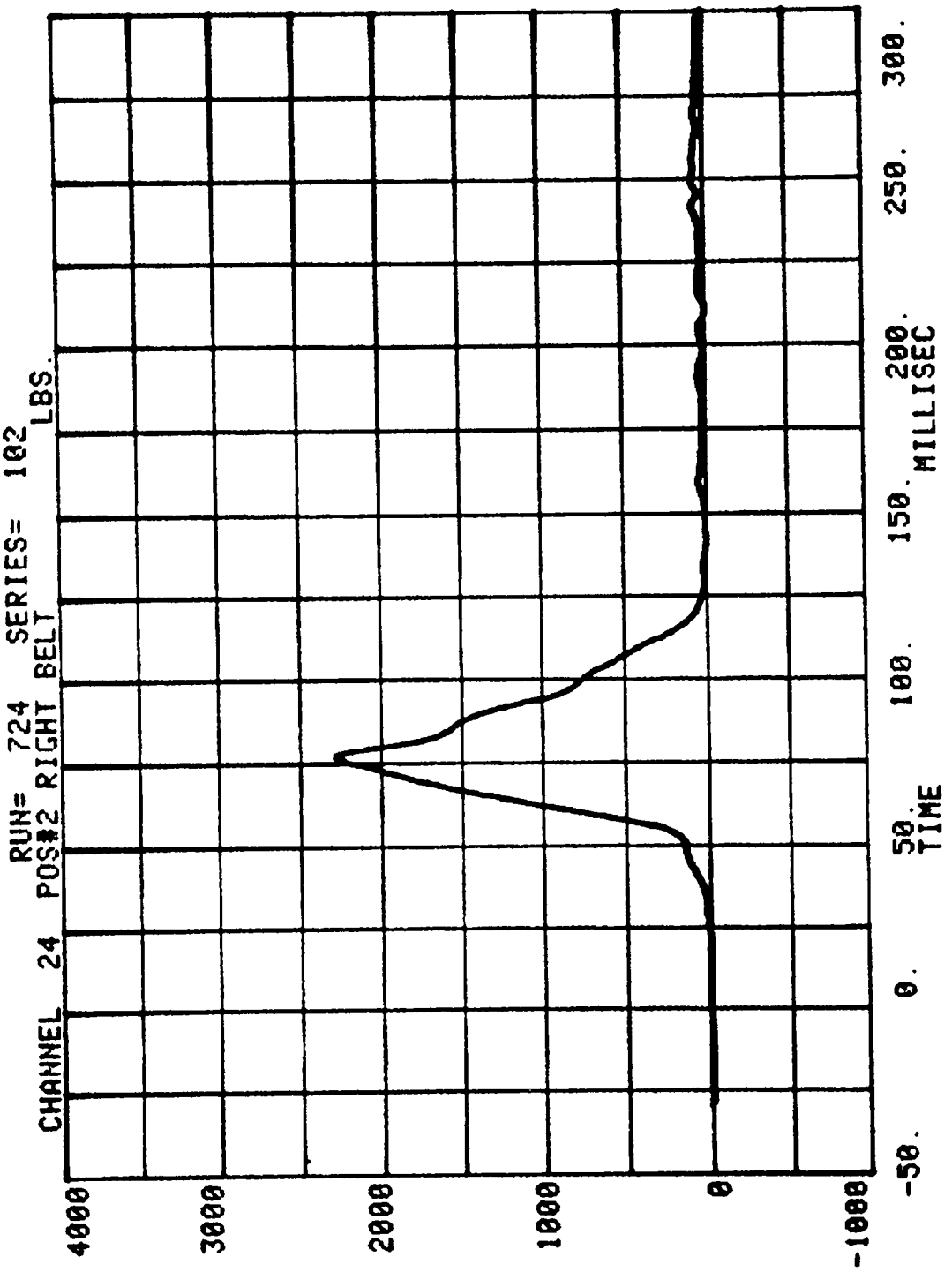

CHANNEL 18 RUN= 724 SERIES= 102
POS#2 CHEST Z G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

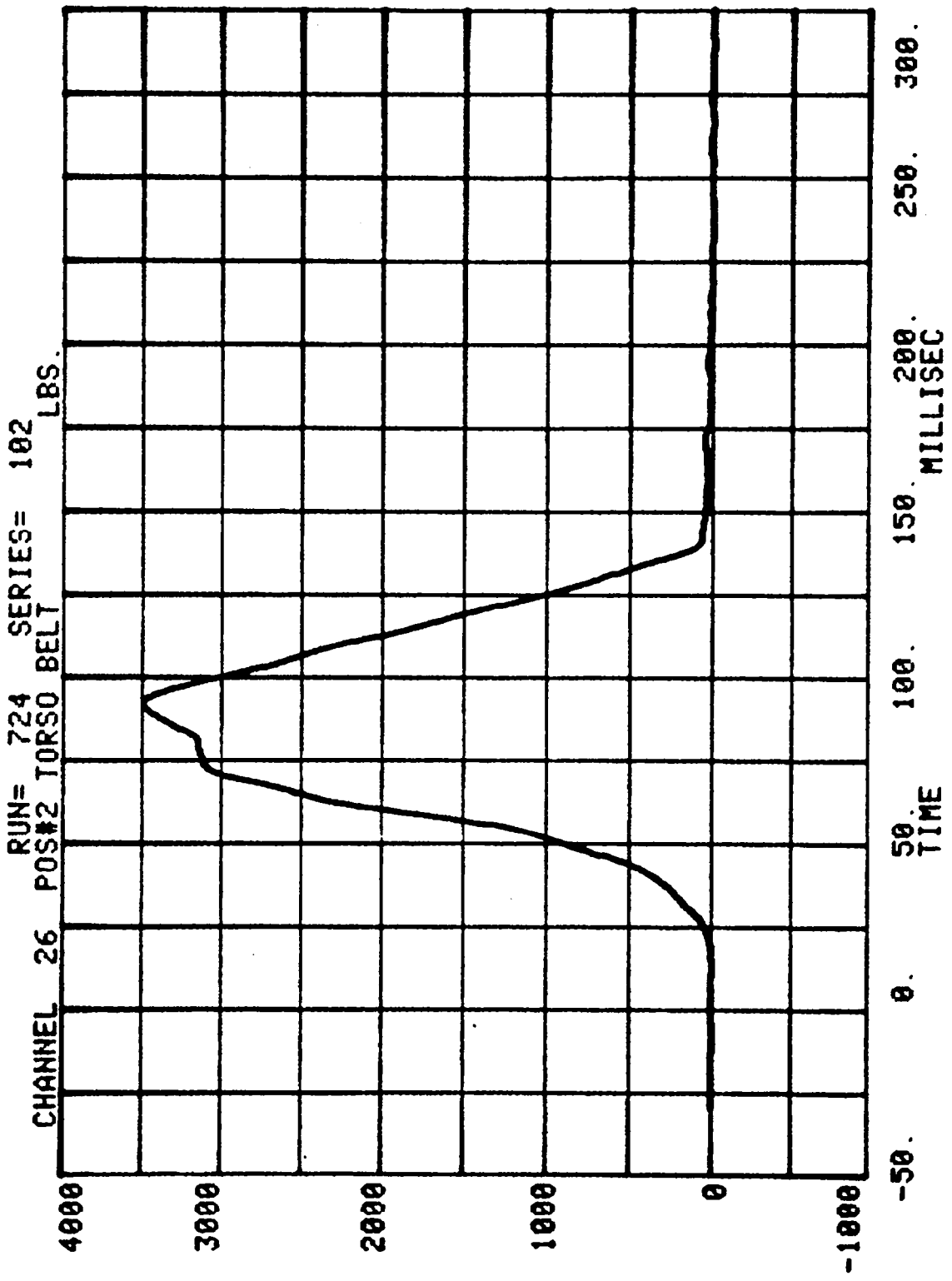

CHANNEL 4 POS#2 CHEST R
RUN= 724 SERIES= 102
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

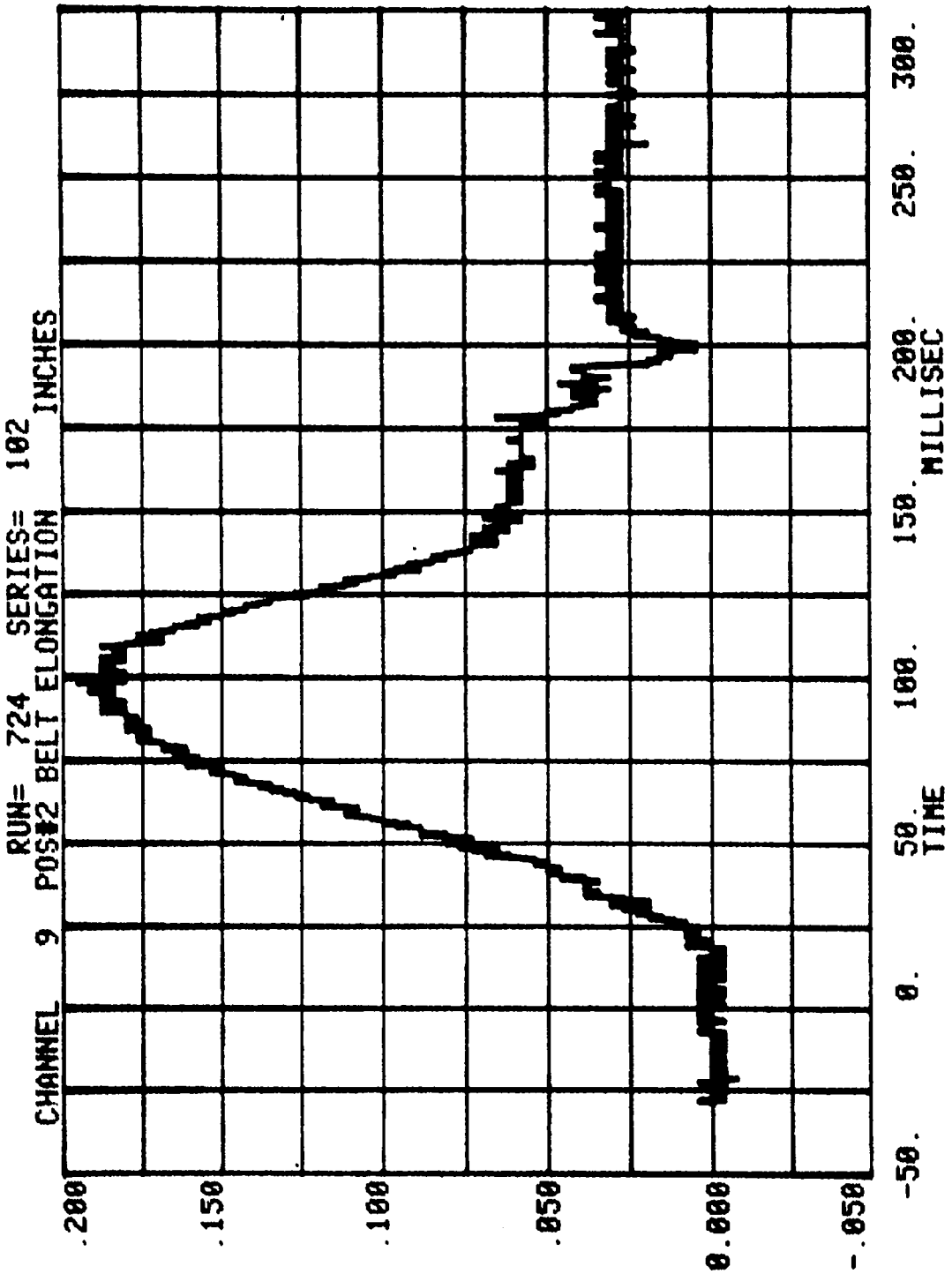

RUN= 724 SERIES= 102
CHANNEL 19 POS#2 RIGHT FEMUR LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

7457-14


CHANNEL 20 RUN= 724 SERIES= 102
POS#2 LEFT FEMUR
LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 24 POS#2 RIGHT BELT
RUN= 724 SERIES= 102
LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 26 POS#2 TORSO BELT
RUN= 724 SERIES= 102
LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 9 RUN= 724 SERIES= 102
POS#2 BELT ELONGATION INCHES
.200
.150
.100
.050
0.000
-.050
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

APPENDIX C

DUMMY CERTIFICATION TESTS

Appendix C contains the results from certification tests performed on the 50th percentile male 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:

Serial No.	Completion Date
749	2-27-86
1019	2-26-86

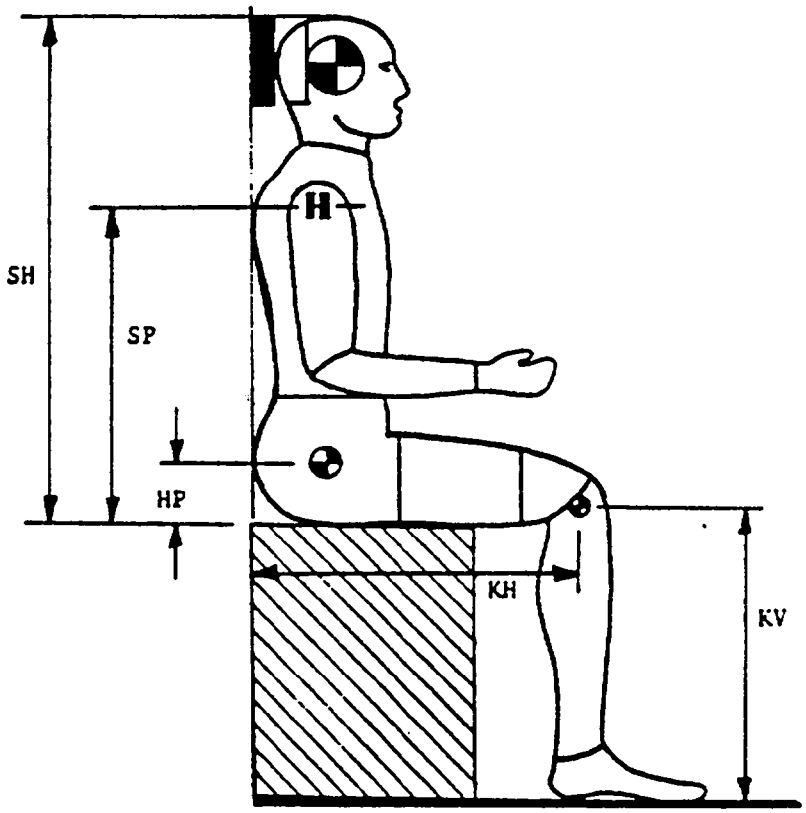
Electronic Test Equipment

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.: 749

I. CONFIGURATION VERIFICATION DATA:



	P.572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION		2-27-86	
VERIFICATION NUMBER FOR DUMMY*		2	
SH - Seated Height- - - - - - - -	35.6 to 35.8"	35.7"	
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"	20.3"	
KV - Knee Pivot from floor- - - -	19.3 to 19.9"	19.4"	
SW - Shoulder Width - - - - - - -	17.8 to 18.4"	17.9"	
HW - Hip Width- - - - - - - - - -	14.0 to 15.4"	14.4"	

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.: 749

TECHNICIAN'S NAME: DWH

			PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION----------			2-26-86	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*------			2	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----			68-70 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)			18-26 %	%
TEST PARAMETER		SPECIFICATION		
1. HEAD DROP TEST--				
a. Peak Resultant Accel.-		210 to 260G	210g	
b. Peak Lateral Accel.- -		≤ - 10G	9g	
c. Time above 100G- - - -		0.9 to 1.5ms	1.15 ms	
2. NECK BENDING TEST--				
a. Pendulum Speed - - - -		21.5 to 25.5 fps	22.6 fps	
b. Pend. Avg. Decel. over $t_3 - t_2$		20 to 24G	23g	
c. Peak Resultant Head Acceleration - - - - -		26G max.	23.5g	
d. Pendulum Decel.(t_2-t_1)		≤ - 3ms	2.9ms	
e. Pendulum Decel.(t_3-t_2)		25 to 30 ms	25.7ms	
f. Pendulum Decel.(t_4-t_3)		≤ - 10ms	3.7 ms	
g. Max. Head Rotation - -		63 to 73°	67°	
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	28 ms	
	Displ.-	2.1 to 3.1"	3.1"	
60°	Time- -	40.3 to 51.7ms	43 ms	
	Displ.-	4.3 to 5.3"	5.3"	
Maximum (67°)	Time- -	53.2 to 66.8ms	57 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.: 749

TECHNICIAN'S NAME: DWH

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	69.2 ms	
		Displ.	4.3 to 5.3 in.	5.2"	
	30°	Time	85.4 to 104.6 ms	89 ms	
		Displ.	2.1 to 3.1 in.	2.7"	
	0°	Time	101.0 to 123.0 ms	104 ms	
		Displ.	-.5 to 0.5 in.	0.0"	
3. ABDOMINAL COMPRESSION TEST:					
(Preload = 10 pounds)					
a. Force @ .5" - - - - -			23 to 36 lbs.	26#	
b. Force @ .75" - - - - -			36 to 50 lbs.	40.5#	
c. Force @ 1.0" - - - - -			50 to 63 lbs.	59#	
d. Force @ 1.3" - - - - -			73 to 88 lbs.	87#	
4. LUMBAR FLEXION TEST:					
a. Force @ 20° - - - - -			22 to 34 lbs.	33.5#	
b. Force @ 30° - - - - -			34 to 46 lbs.	45.5#	
c. Force @ 40° - - - - -			46 to 58 lbs.	57.5#	
d. Return Angle - - - - -			12° maximum	5.5°	
5. CHEST IMPACT TESTS:					
a. High Speed					
(1) Probe Speed- - -			21.78-22.22 fps	21.9 fps	
(2) Peak Deflection-			1.7" maximum	1.28"	
(3) Peak Resistive Force- - - - - -			2250 lbs. maximum	2080#	
(4) Internal Hysteresis - - -			50 to 70%	60.6%	
b. Low Speed					
(1) Probe Speed- - -			13.86-14.14 fps	13.88 fps	
(2) Peak Deflection-			1.1" maximum	.6"	
(3) Peak Resistive Force- - - - - -			1450 lbs. maximum	1341#	
(4) Internal Hyster.			50 to 70%	54%	

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

II. PERFORMANCE VERIFICATION DATA (Continued) NHTSA DUMMY I.D. NO.: 749

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.	1875#	
(3) Time Above 1000#-	1.7 ms minimum	1.8 ms	
b. Left Side--		7.01 fps	
(1) Probe Speed - - -	6.76 to 7.04 fps		
(2) Maximum Force - -	1850 to 2500 lbs.	1880#	
(3) Time Above 1000#-	1.7 ms minimum	1.96 ms	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

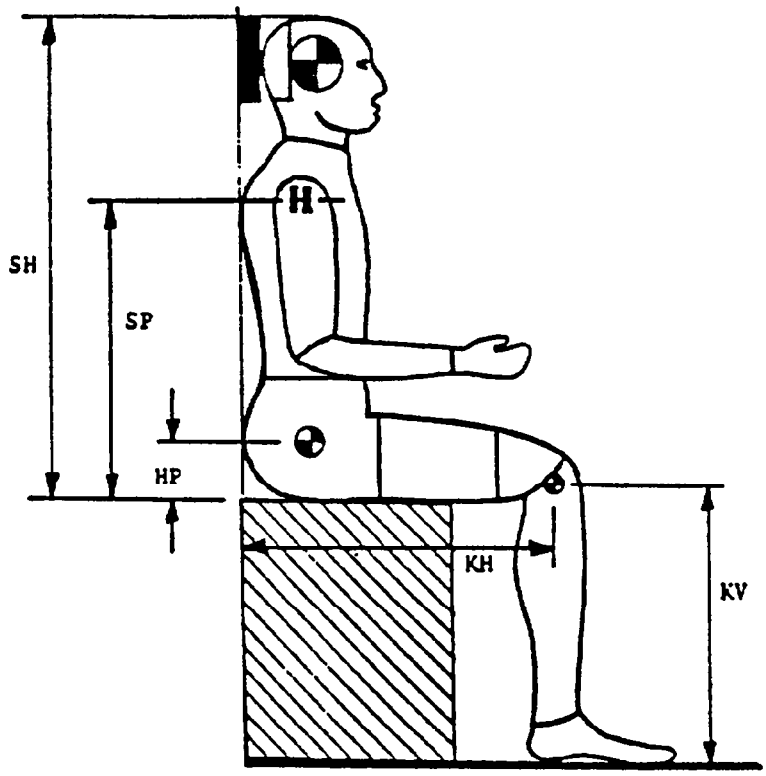
NHTSA DUMMY ID NO. 749 CALIB. SEQ. NOS. FOR DUMMY: 2

	MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
A. DUMMY INSTRUMENTS:				
1. Head Accelerometers --				
a. Triaxial unit - - - - -	NA	--	--	--
b. Uniaxial units				
(1) Longitudinal (A_x) -	Endevco	CK54	10-85	4-86
(2) Lateral (A_y) - - -	Endevco	CK78	10-85	4-86
(3) Vertical (A_z) - - -	Endevco	CD75	10-85	4-86
2. Chest Accelerometers -- (Vehicle Crash Test Usage)				
a. Triaxial unit - - - - -	NA	--	--	--
b. Uniaxial units				
(1) Longitudinal (A_x) -	CEC	A52	10-85	4-86
(2) Lateral (A_y) - - -	Endevco	CL65	10-85	4-86
(3) Vertical (A_z) - - -	CEC	A90	10-85	4-86
3. Chest Potentiometer - - -	NA	--	--	--
4. Femur Load Cells --				
a. Right Side - - - - - -	GSE	77	11-85	5-86
b. Left Side - - - - - -	GSE	76	12-85	6-86
B. CALIB. LAB. INSTRUMENTS:				
1. Pendulum Accelerometer - - -	CEC	18259	9-85	3-86
2. Test Probe Accelerometer - - -	CEC	17815	9-85	3-86
3. Lumbar Flexion Test Push Force Gauge - - - - - - - - -	Transducer Inc.	20051	11-85	5-86
4. Abdominal Compression Test Force Gauge - - - - - - - - -	BLH	72952	11-85	5-86
5. Abdominal Compression Test Displacement Gauge - - - - -	CIC	567-11	11-85	5-86

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NO.: 1019

1. CONFIGURATION VERIFICATION DATA:



	P.572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION		2-26-86	
VERIFICATION NUMBER FOR DUMMY*		3	
SH - Seated Height- - - - - - - -	35.6 to 35.8"	35.6"	
SP - Shoulder Pivot Height- - - -	21.8 to 22.4"	21.9"	
HP - Hip Pivot Height - - - - - -	3.9" ref.	3.9"	
KH - Knee Pivot from back line- -	20.1 to 20.7"	20.2"	
KV - Knee Pivot from floor- - - -	19.3 to 19.9"	19.5"	
SW - Shoulder Width - - - - - - -	17.8 to 18.4"	17.9"	
HW - Hip Width- - - - - - - - - -	14.0 to 15.4"	14.3"	

TECHNICIAN'S NAME: DNH

* 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----------			2-26-86	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*------			3	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----			68-70 °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)			18-30 %	%
TEST PARAMETER		SPECIFICATION		
1. HEAD DROP TEST--				
a. Peak Resultant Accel.-		210 to 260G	245g	
b. Peak Lateral Accel.- -		≤ - 10G	2 g	
c. Time above 100G- - - -		0.9 to 1.5ms	1.0 ms	
2. NECK BENDING TEST--				
a. Pendulum Speed - - - -		21.5 to 25.5 fps	23.1 fps	
b. Pend. Avg. Decel. over $t_3 - t_2$		20 to 24G	24.0 g	
c. Peak Resultant Head Acceleration - - - - -		26G max.	25.5 g	
d. Pendulum Decel.(t_2-t_1)		≤ - 3ms	2.5 ms	
e. Pendulum Decel.(t_3-t_2)		25 to 30 ms	25.7 ms	
f. Pendulum Decel.(t_4-t_3)		≤ - 10ms	3.0 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	28.0 ms	
	Displ.-	2.1 to 3.1"	3.1"	
60°	Time- -	40.3 to 51.7ms	43.0 ms	
	Displ.-	4.3 to 5.3"	5.1"	
Maximum (69 °)	Time- -	53.2 to 66.8ms	59 ms	
	Displ.-	5.0 to 6.0"	6.0"	

*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. NECK BENDING TEST.... Continued:				
h. Chordal Displacement:				
Head Rotation Angle--				
60°	Time	67.0 to 83.0 ms	73.2 ms	
	Displ.	4.3 to 5.3 in.	5.0"	
30°	Time	85.4 to 104.6 ms	91 ms	
	Displ.	2.1 to 3.1 in.	2.6"	
0°	Time	101.0 to 123.0 ms	105.7 ms	
	Displ.	-.5 to 0.5 in.	0.0"	
3. ABDOMINAL COMPRESSION TEST: (Preload = 10 pounds)				
a. Force @ .5" - - - - -		23 to 36 lbs.	27#	
b. Force @ .75" - - - - -		36 to 50 lbs.	41#	
c. Force @ 1.0" - - - - -		50 to 63 lbs.	56#	
d. Force @ 1.3" - - - - -		73 to 88 lbs.	80#	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - - -		22 to 34 lbs.	29#	
b. Force @ 30° - - - - -		34 to 46 lbs.	39#	
c. Force @ 40° - - - - -		46 to 58 lbs.	48#	
d. Return Angle - - - - -		12° maximum	9°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed- - -		21.78-22.22 fps	22.15 fps	
(2) Peak Deflection-		1.7" maximum	1.66"	
(3) Peak Resistive Force- - - - - -		2250 lbs. maximum	2210#	
(4) Internal Hysteresis - - -		50 to 70%	53.8%	
b. Low Speed				
(1) Probe Speed- - -		13.86-14.14 fps	13.92 fps	
(2) Peak Deflection-		1.1" maximum	.82"	
(3) Peak Resistive Force- - - - - -		1450 lbs. maximum	1196#	
(4) Internal Hyster. -		50 to 70%	60.7%	

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	7.01 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2340#	
(3) Time Above 1000#-	1.7 ms minimum	1.9 ms	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.81 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2175#	
(3) Time Above 1000#-	1.7 ms minimum	1.76 ms	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1019 CALIB. SEQ. NOS. FOR DUMMY: 3

	MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
A. DUMMY INSTRUMENTS:				
1. Head Accelerometers --				
a. Triaxial unit - - - - -	NA	--	--	--
b. Uniaxial units				
(1) Longitudinal (A_x) -	Endevco	CL60	10-85	4-86
(2) Lateral (A_y) - - -	Endevco	CG34	10-85	4-86
(3) Vertical (A_z) - - -	Endevco	CN24	10-85	4-86
2. Chest Accelerometers -- (Vehicle Crash Test Usage)				
a. Triaxial unit - - - - -	NA	--	--	--
b. Uniaxial units				
(1) Longitudinal (A_x) -	CEC	A129	10-85	4-86
(2) Lateral (A_y) - - -	Endevco	CN64	10-85	4-86
(3) Vertical (A_z) - - -	CEC	A56	10-85	4-86
3. Chest Potentiometer - - -	NA	--	--	--
4. Femur Load Cells --				
a. Right Side - - - - - -	GSE	311	11-85	5-86
b. Left Side - - - - - -	GSE	312	11-85	5-86
B. CALIB. LAB. INSTRUMENTS:				
1. Pendulum Accelerometer - - -	CEC	18259	9-85	3-86
2. Test Probe Accelerometer - - -	CEC	17815	9-85	3-86
3. Lumbar Flexion Test Push Force Gauge - - - - - - - - -	Transducer Inc.	20051	11-85	5-86
4. Abdominal Compression Test Force Gauge - - - - - - - - -	BLH	72952	11-85	5-86
5. Abdominal Compression Test Displacement Gauge - - - - -	CIC	567-11	11-85	5-86

APPENDIX D

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

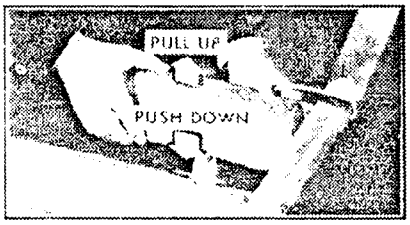
SUN VISORS

The sun visors may be swung down to prevent glare from the front. You can also remove them from the mounting and swing them toward the door windows to prevent glare from the sides. The screws on the rear of the visors may be used to adjust the force needed to move them.

A tinted shield is built into the end of the sun visor. Slide the shield out for more protection from glare.

Visor Vanity Mirrors

The visor vanity mirror(s) are on the rear of the sun visor. If your car has an optional lighted visor vanity mirror or mirrors, the lights are designed to come on when you lift the mirror cover. If desired, you can tilt the sun visor forward to use the lights for reading. A bright/dim switch at the lower right corner of the mirror controls the brightness. Close the cover to turn off the lights.



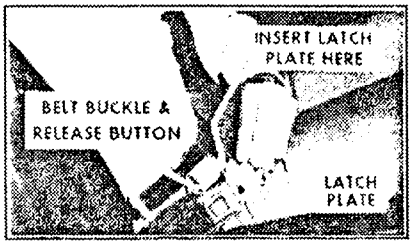
Head Restraint

HEAD RESTRAINTS

Head restraints are designed to help reduce the risk of neck injuries. Choose the position which places the top of the head restraint closest to the top of your ears. To raise or lower, just slide the head restraint up or down.

SEAT BELT SYSTEMS

CAUTION: Use the seat belts to help reduce the risk of personal injury in collisions or sudden
(Continued)



Front Seat Lap-Shoulder Belts

(CAUTION Continued)
maneuvers. (Follow the instructions in this section on their proper use, maintenance and application with child restraint systems.) This includes pregnant women; pregnant women should select a seat with a lap-shoulder belt whenever possible.

NEVER:

- Put the lap portion of a seat belt over any armrest.
- Wear a shoulder belt under your arm nearest the door.
- Use a belt for more than one person at a time.
- Wear the belts twisted.
- Let the belt system become damaged by a door or seat.

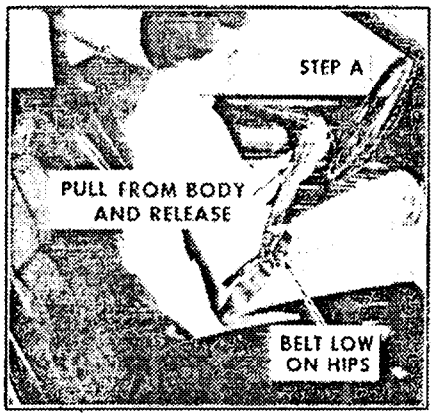
Front Seat Lap-Shoulder Belt

Adjust the seat as needed and sit well back and straight up. Then, pull the belt across your lap and push the latch plate into the buckle until it clicks. (If the belt is not long enough, an extension is available from your dealer. See **"Seat Belt Extender"** which follows.)

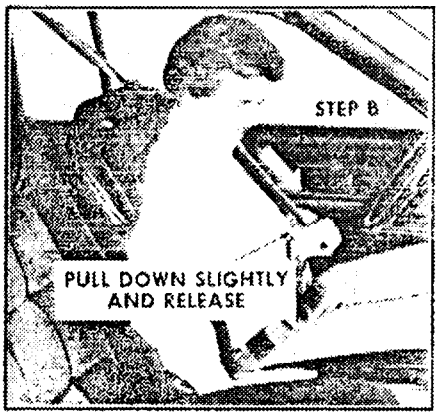
To reduce the risk of sliding under the belt during a collision, position the belt across your lap as low on your hips as possible. Then, pull it toward the door to a snug fit, so the retractor can take up slack.

The lap-shoulder belt is designed to lock only during a sudden stop or impact. At other times it should move freely.

If the shoulder belt is too snug:



Fastening Seat Belts – Step A



Fastening Seat Belts – Step B

- Pull the shoulder belt out at least 130 millimeters (five inches), so it returns to your chest when you let go.
- Then, pull down on the shoulder belt the least amount needed to ease pressure (but no more than 25 millimeters or one inch) and let go.
- To get rid of belt slack, pull the belt out at least 130 millimeters (five inches) and let go.

Keep any shoulder belt slack to a minimum. Too much belt slack could reduce the amount of protection in an accident because the belt is too loose to restrain you properly.

To unfasten the belt, push in the button in the center of the buckle. To stow the belt, pull it out about 180 millimeters (seven inches) and let go. To help prevent damage to the seat belt and interior trim, be sure the belt is fully retracted and the latch plate is out of the way before you close the door.

Seat Belt Extender

If the seat belt cannot be fastened because it is not long enough, General Motors will be pleased to furnish a seat belt extender without charge. Contact your dealer; remember to bring the heaviest coat you expect to wear, to obtain the proper length extender.

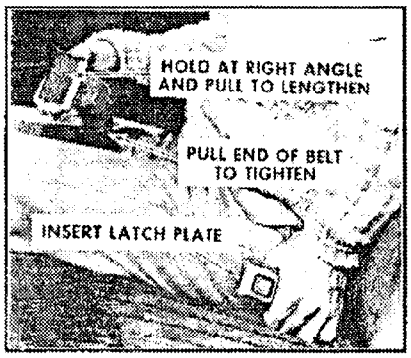
Remember that the extender intended for this car may not be safe for use in another vehicle, and that the extender from another vehicle may not be safe for use in this car. For example, an improper extender might come apart during an accident, causing the user to be injured. Do not use the extender if the seat belt can be fastened without it.

To use the extender, push the car's seat belt latch plate into the extender's buckle, and the extender's latch plate into the seat belt buckle. To unfasten the belt, push in the button in the center of the extender buckle so that it remains attached on the inboard side. This helps avoid damaging the extender or interior trim. Keep the extender in the vehicle for which it was intended.

Seat Belt Reminder

When you turn the ignition key to "Run" or "Start," a red **"FASTEN BELTS"** reminder light will come on for four to eight seconds to remind people to fasten their seat belts. Unless the driver's seat belt is buckled, a chime will sound at the same time.

If the seat belt or reminder system does not work as described, see your dealer for service.



Rear (and Center Front) Lap Belts

Rear Seat and Center Front Seat Lap Belts

Rear seat lap belts next to side windows have retractors which are designed to take up extra webbing.

In a single motion, pull the rear seat outboard lap belt across your lap far enough to push the latch plate into the buckle, until it clicks. (If the belt is not long enough, an extender is available from your dealer. See **"Seat Belt Extender"** in this section.)

The lap belt will lock automatically during a sudden stop or impact; or can be made to lock after adjusting. At other times, it should move freely. For some cars, however, if the belt is pulled all the way out, the retractor switches to a "ratcheting" mode. In this mode, the belt cannot be pulled out as it retracts until it is fully retracted. See **"Child Restraint"** in this section for details.

These belts should be positioned, worn and released as described under **"Front Seat Lap-Shoulder Belt."** Adjust the belt to a snug fit by pulling it firmly across your lap toward the retractor, so the retractor can take up slack.

The lap belts at center seats also should be positioned, worn and released as described above; however, they do not have retractors. Adjust them to a snug fit by pulling on the end of the belt coming from the latch plate.

To lengthen a center seat lap belt, place the latch plate at an angle to the belt webbing and pull on the latch plate; the belt should then slide easily. (If the belt does not fit, an extension is available from your dealer. See **"Seat Belt Extender"** in this section.)

Rear Seat Shoulder Belts

(Dealer-Installed Accessory)

When properly worn with a lap belt, a shoulder belt (available for rear outboard seats) can give riders added protection. It can prevent or reduce impact with the inside of the car by restraining the upper body in a collision, especially in a frontal impact. (If you have your dealer install this accessory, you may wish to ask that the originally installed lap belts– without the "keyhole" slot for the shoulder belt– be returned to you.)

To use the detachable shoulder belt:

- Before fastening the lap belt, place the knob on the shoulder belt end in the "keyhole" on the lap belt latch plate. Tilt the knob as needed to pass it through the slot. Pull the knob firmly upward to seat it at the narrow end of the keyhole, then fasten the lap belt. (Do this in reverse when taking off the shoulder belt and putting it away.)
- A detachable shoulder belt can be made shorter and longer in the same way as center seat lap belts.

Rear Seat Shoulder Belt