N07942

REPORT NO. CAL-86-N05

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

1986 ISUZU I MARK
4-DOOR SEDAN

NHTSA NO. MG5701
CALSPAN TEST NO. 7457-5

CALSPAN CORPORATION
ADVANCED TECHNOLOGY CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225
FEBRUARY 18, 1986

FINAL REPORT

Prepared for:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF MARKET INCENTIVES
400 SEVENTH STREET, S.W.
ROOM NO. 5313 (NEF-30)
WASHINGTON D.C. 20590

This Final Test Report was prepared for the U. S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-84-D-01149. This document is disseminated under the sponsorship of the U. S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

Prepared: Michael J. Kilgallon
Michael J. Kilgallon, Test Engineer

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

FINAL REPORT ACCEPTED BY:

C. R. Juarles
Manager, New Car Assessment Program (NCAP)

APR 14 1986
Date of Report Acceptance

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
CAL-85-N05		

4. Title and Subtitle	5. Report Date
NHTSA New Car Assessment Program (NCAP) Frontal Barrier Impact Test on 1986 Isuzu I Mark 4-door Sedan to Indicant Requirements of FMVSS 212, 219 (Partial), and 301-75	February 18, 1986
	6. Performing Organization Code: CAL
7. Author(s): Michael J. Kilgallon, Test Engineer; Donald A. Alianello, Program Manager	8. Performing Organization Report No.: 7457-5
9. Performing Organization Name and Address: Calspan Advanced Technology Center, P.O. Box 400, Buffalo, NY 14225	10. Work Unit No.: 716-060-713
	11. Contract or Grant No.: DTNH22-84-D-01149
	13. Type of Report and Period Covered: Final Report, February-March 1986
12. Sponsoring Agency Name and Address: U. S. Department of Transportation, National Highway Traffic Safety Administration, Office of Vehicle Safety Compliance (NEF-30), 400 Seventh Street, S.W., Washington, DC 20590	14. Sponsoring Agency Code: DOT/NHTSA/RM/OMI

15. Supplementary Notes

16. Abstract

A frontal load cell barrier test of a 1986 Isuzu I Mark 4-door Sedan was performed at the Calspan Corporation, Advanced Technology Center crash test facility in Buffalo, New York, on Feburary 18, 1986.

Impact speed was 34.9 mph, and the ambient temperature at the barrier face at the time of impact was 53°F. The maximum post-test vehicle crush was 23.4 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"

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

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified		

Form DOT F 1700.7 (8-69)

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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 MG5701

A load cell barrier consisting of 36 load cells was impacted by a 1986 Isuzu IMARK 4-Door Sedan at a velocity of 34.9 mph. The test was performed at the Calspan Corporation Advanced Technology Center on February 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. 1021) had been used in one previous test (MG5401) and the Injury Criteria Values were not exceeded in this test. The right-front passenger ATD (Serial 1022) was certified prior to the 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 hub; the HIC was 2172. The maximum chest decleration over 3 milliseconds was 43 g's and femur loads were 176 and 486 pounds.

The right-front passenger's head struck the front edge of the dash; the HIC was 1146 and maximum chest deceleration over 3 milliseconds was 43 g's. Both the passengers' knees contacted the glove box door and femur loads were 260 and 275 pounds.

Some of the load cell barrier data was not recorded due to equipment failure. Data for load cells A1-A9, B1, B2 and B3 was lost. Therefore, we are unable to provide this data as well as load cell group 1, load cell group 2, load cell group 3 and total load cell.

Table 1

GENERAL TEST AND VEHICLE DATA

Vehicle Year/Make/Model/Body Style 1986 Isuzu IMARK - 4 door sedan

NHTSA No. MG5071 **VIN.** JABRT6973G4113383

Body Color Silver **Date of Manufacture** 9/85

Engine: 4 cylinders; -- C.I.D.; 1.5 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 1/16/86 **Odometer Reading;** 13
_____ A/C; _____ P/S; X P/B; _____ P/wdo.; X Tilt Wheel
_____ P/seats; _____ Cruise Control

Type of Occupant Restraint 3-point continuous belt

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

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

Recommended Tire Size: P175/70R13

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

Tires on Vehicle: P175/70R13 ; **Manufacture:** General

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

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

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

Vehicle Capacity Weight (VCW) = 725 lbs. (A)

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

Rated Cargo and Luggage Weight (RCLW) A-B = 125 lbs.

GVWR 2785 lbs. **GAWR: Front** 1520 lbs. **Rear** 1300 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 = 620 lbs. Right Rear = 360 lbs.

Left Front = 620 lbs. Left Rear = 360 lbs.

TOTAL FRONT WEIGHT = 1240 lbs. (63.3 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 720 lbs. (36.7 % of Total Vehicle Weight)

TOTAL DELIVERY WEIGHT = 1960 lbs.

CALCULATION FOR TARGET TEST WEIGHT

UDW = Unloaded Delivered Weight (1960 lbs.)

VCW = Vehicle Capacity Weight (725 lbs.)

DSC = Designated Seating Capacity (4)

RCLW = VCW - 150 (DSC) = 125 lbs.

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

Target Test Weight = 2413 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 92 POUNDS CARGO

Right Front = 650 lbs. Right Rear = 550 lbs.

Left Front = 640 lbs. Left Rear = 540 lbs.

TOTAL FRONT WEIGHT = 1290 lbs. (54.2 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1090 lbs. (45.8 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 2380 lbs.

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

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude: RF 28.2" LF 26.5" RR 25.7" LR 26.4"

Test Attitude: RF 25.5 LF 25.5 RR 24.7 LR 24.4

Wheel Base: 94.2 in.; C.G. = 43.1 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 2/18/86 Time of Test 14:00

Ambient Temperature 53 °F. at impact area

Temperature in Occupant Compartment 72 °F.

Windshield Molding Temperature 68 °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	156.3	℄	158.2	L 156.9
	Post-test =	R	132.9	℄	136.6	L 136.6
	Crush =	R	23.4	℄	21.6	L 20.3

Distance from front of test vehicle to point of impact:

R 20.0 C/L 19.5 L 21.3

VISIBLE DUMMY CONTACT POINTS

	Driver	Passenger
Head	Steering wheel hub	Front edge of dash
Chest	None	None
Abdomen	None	None
Left Knee	Lower dash panel	Glove Compartment door
Right Knee	Lower dash panel	Glove Compartment door

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

	Front		Rear	
	Left	Right	Left	Right
Door Opening	Not Operable	Not Operable	Operable	Operable

Seat Movement	Front Left	Front Right
Seat Back Failure	None	None
Seat Shift (in.)	.5" forward	None

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.:

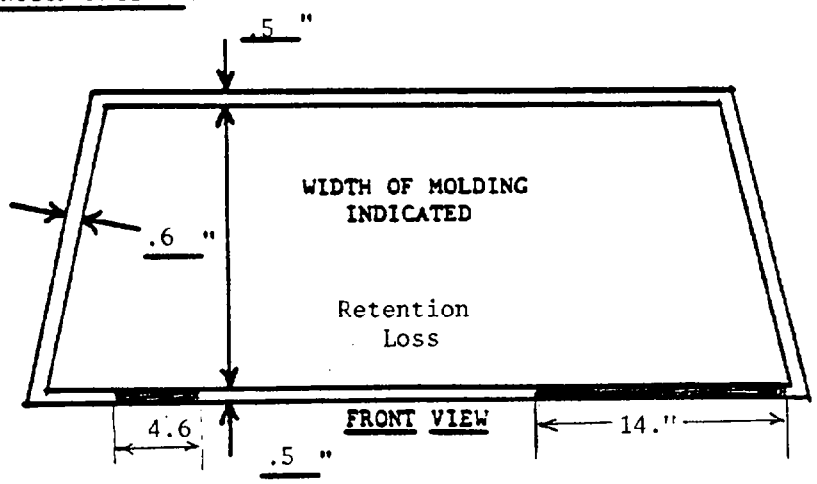
Bonded in place, rubber gasket around perimeter.

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 PERIPHERY		
	PRE-TEST (in.)	POST-TEST (in.)	PERCENT RETENTION
RIGHT SIDE	75.3	70.7	94%
LEFT SIDE	75.3	61.3	81%
TOTAL	150.6	132.0	88%

AREA OF RETENTION FAILURE:



FAILURE DETAILS:

See darkened areas along windshield bottoms (Figure A-13).

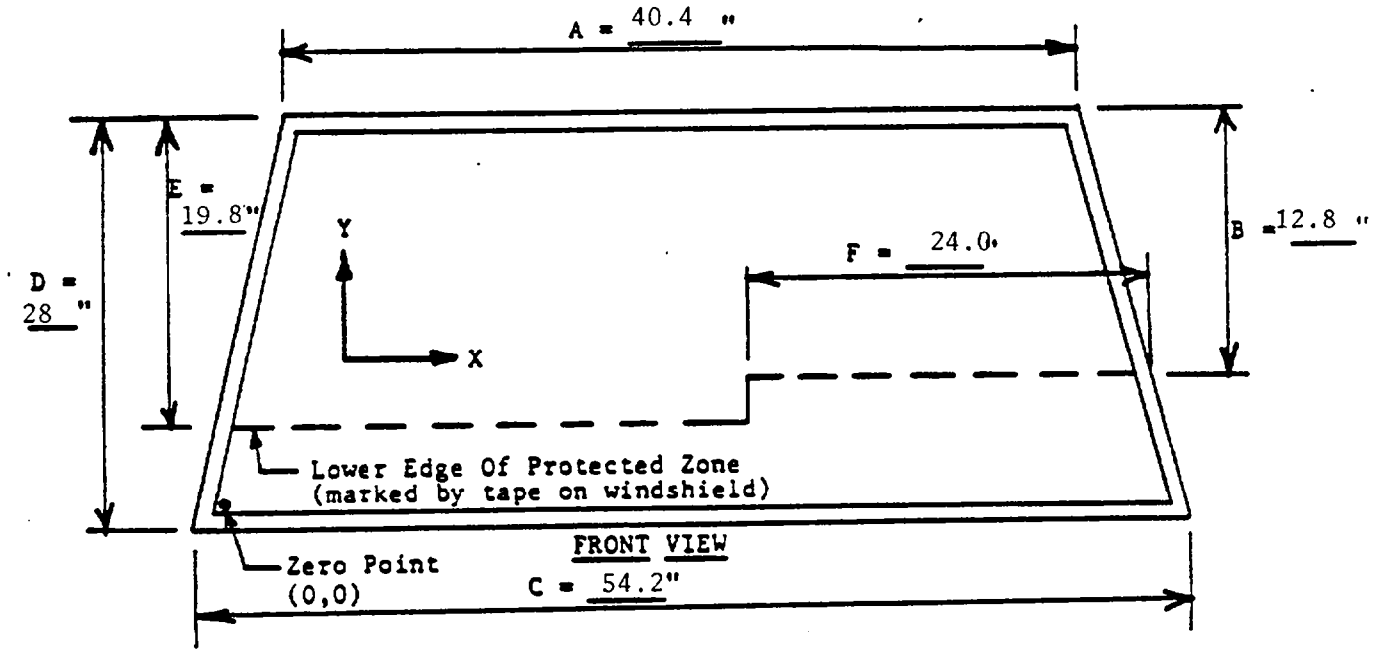
Figure 2

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. Draw the locus of points on the inner surface of the windshield contactable 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 onto the outer surface of the windshield of this line.

FMVSS 219 TEST DATA:



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

	COORDINATES	
	X	Y
1.		
2.		
3.		
4.		

Figure 3

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

TEST VEHICLE NHTSA NO.: MG 5701 ; TEST DATE: 2/18/86

VEHICLE MAKE/MODEL/BODY STYLE: Isuzu I MARK 4-Door Sedan

USABLE CAPACITY OF VEHICLE'S FUEL TANK: 10.9 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 RED 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:

10.1 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:

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

Time reqd. for machine to rotate 90° = 2 minutes, 56 seconds

FMVSS 301-75 Position Hold Time = 5 minutes, 0 seconds

TOTAL- - - - - - - - = 7 minutes, 56 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

OMI FINAL DATA

SECTION 4

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)	-260	-35	102	266	-44	12	-21	43
DUMMY (2)	74	10	144	160	-69	16	-22	43
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	176	486
DUMMY (2)	260	275
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)	2076	--	1359
DUMMY (2)	2027	***	
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**			
	HIC	t_1 (SEC)	t_2 (SEC)	AVE. ACC. (g) t_1 TO t_2
DUMMY (1)	2172	.07530	.08137	166
DUMMY (2)	1146	.06277	.12150	52
DUMMY (3)				
DUMMY (4)				

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

***Right Belt load is not available due to equipment failure

Figure 4

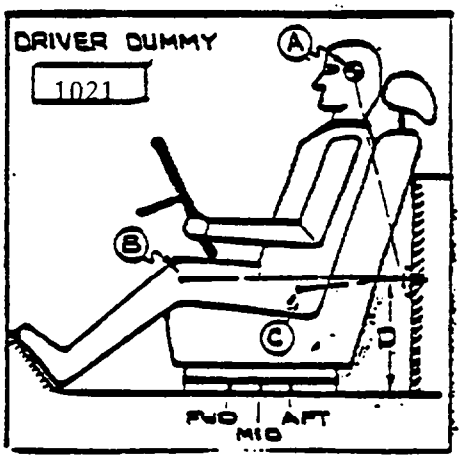
PART 572 DUMMY IN-VEHICLE POSITION

Test No. MG5701 Vehicle 1986 Isuzu I Mark

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

ADJUSTER TYPE:
- _X_ Manual
- ____ Power

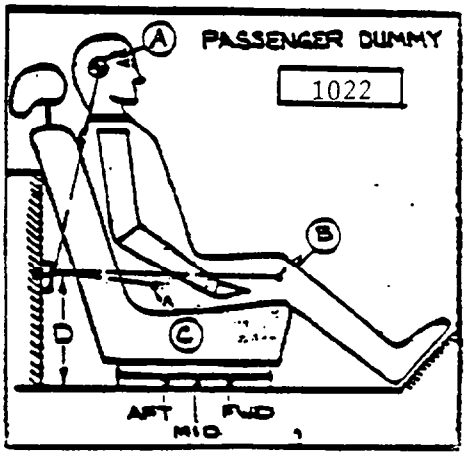
BUCKET SEAT BACK TYPE:
- ____ Fixed
- _X_ Adjustable Reclining



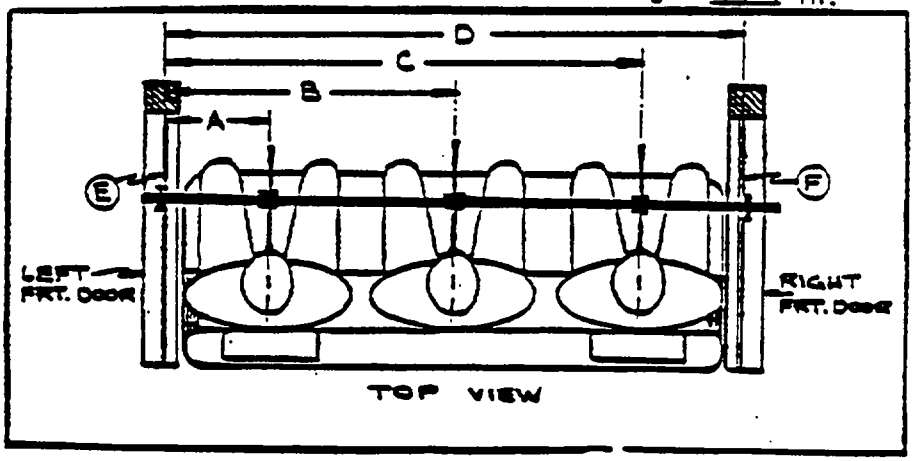
A = 21.8 in. -2 Degrees
B = 25 in. 90 Degrees
C = 10.2 in. 122 Degrees
D = 13.5 in.

MEASUREMENT LOCATION

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

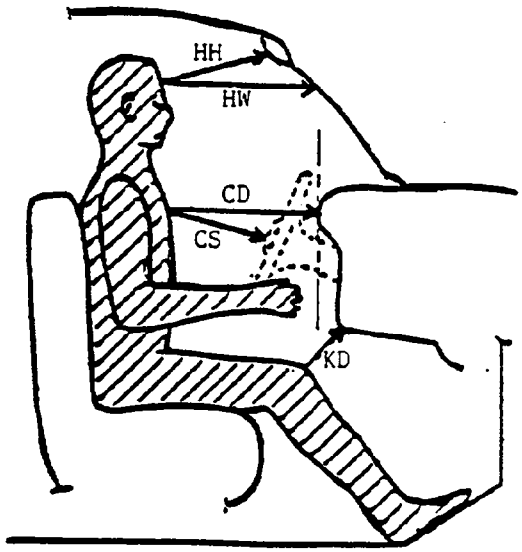


A = 22.1 in. 0 Degrees
B = 25 in. 92 Degrees
C = 10 in. 120 Degrees
D = 13.5 in.



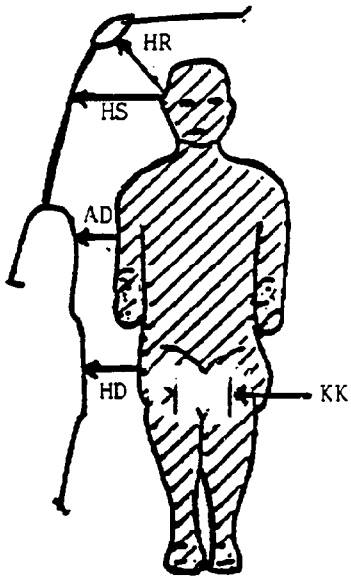
	DUMMY ID 1021	1022
A = Left Door to Driver Centerline		11 in.
B = Left Door to Center Passenger Centerline		-- in.
C = Left Door to Right Passenger Centerline		37.5 in.
D = Left Door to Right Door		48.5 in.
E, F = Window Glass Height (Right and Left Must be Equal)		12 in.

	DRIVER	PASSENGER
HH	15.8	15.6
HW	22.2	21.0
CD	22.5	22.2
CS	17.0	---
KDL	3.6	4.3
KDR	5.1	4.3
SA	8th notch	8th notch
TA	25 ^{o}	25^{o}



HH = Head to Windshield Header
HW = Head to Windshield
CD = Chest to Dash
CS = Chest to Steering Wheel
KD = Knee to Dash
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

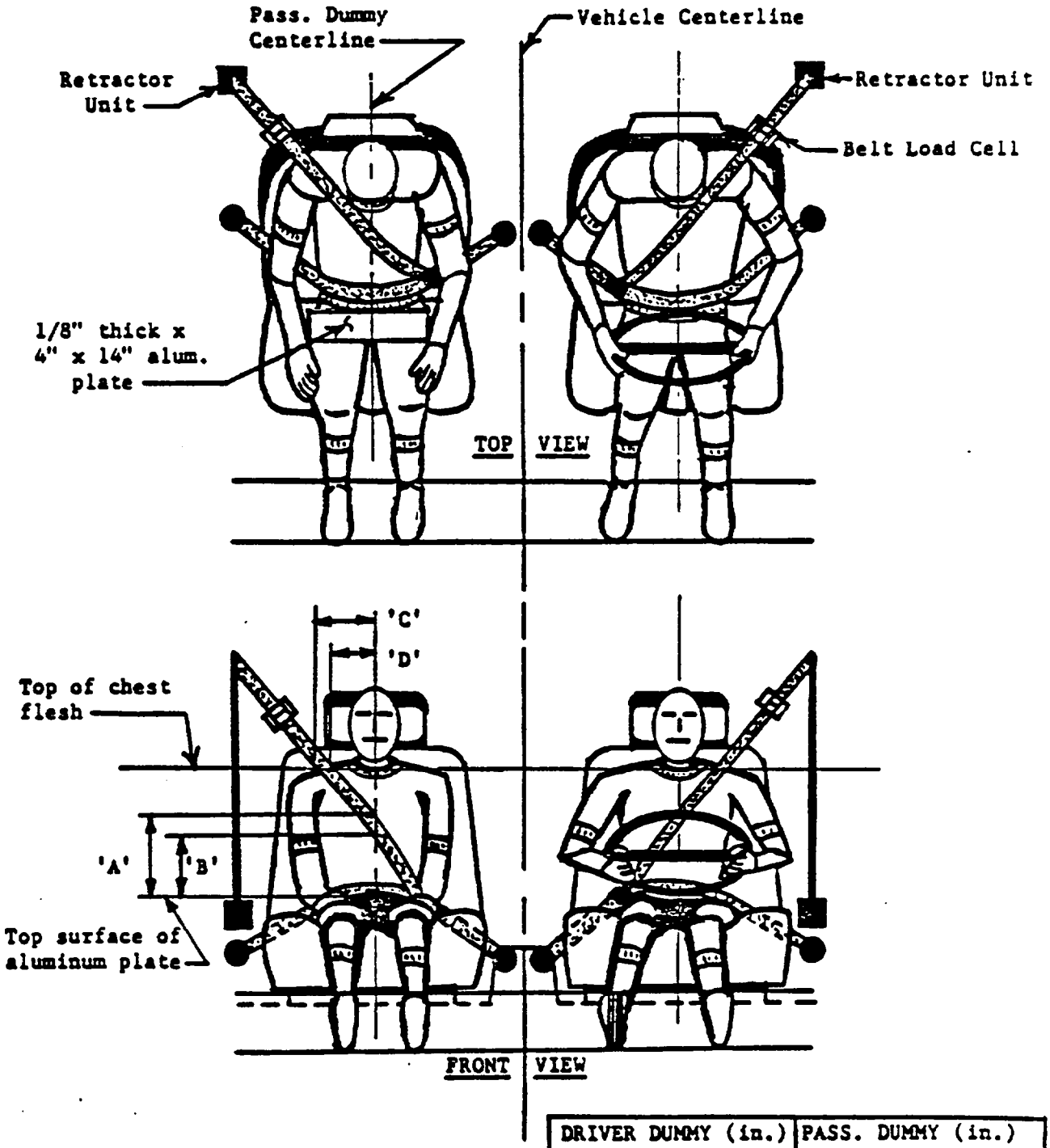


	DRIVER	PASSENGER
HR	5.6	5.6
HS	7.5	7.6
AD	3.2	4.2
HD	5.2	4.7
KK	11.7	7.4

Figure 5 OCCUPANT CLEARANCE DIMENSIONS

Figure 6

SEAT BELT POSITIONING DATA



	DRIVER DUMMY (in.)	PASS. DUMMY (in.)
1. Dimension 'A'--alum. plate to belt upper edge on dummy centerline	14.3	14.2
2. Dimension 'B'--alum. plate to belt lower edge on dummy centerline	11.0	11.0
3. Dimension 'C'--dummy centerline to outer edge at chest flesh top	5.2	5.0
4. Dimension 'D'--dummy centerline to inner edge at chest flesh top	3.0	2.5
5. Lap belt tension (lbs.)	-	-
6. Shoulder belt tension (lbs.)	-	-

Table 3

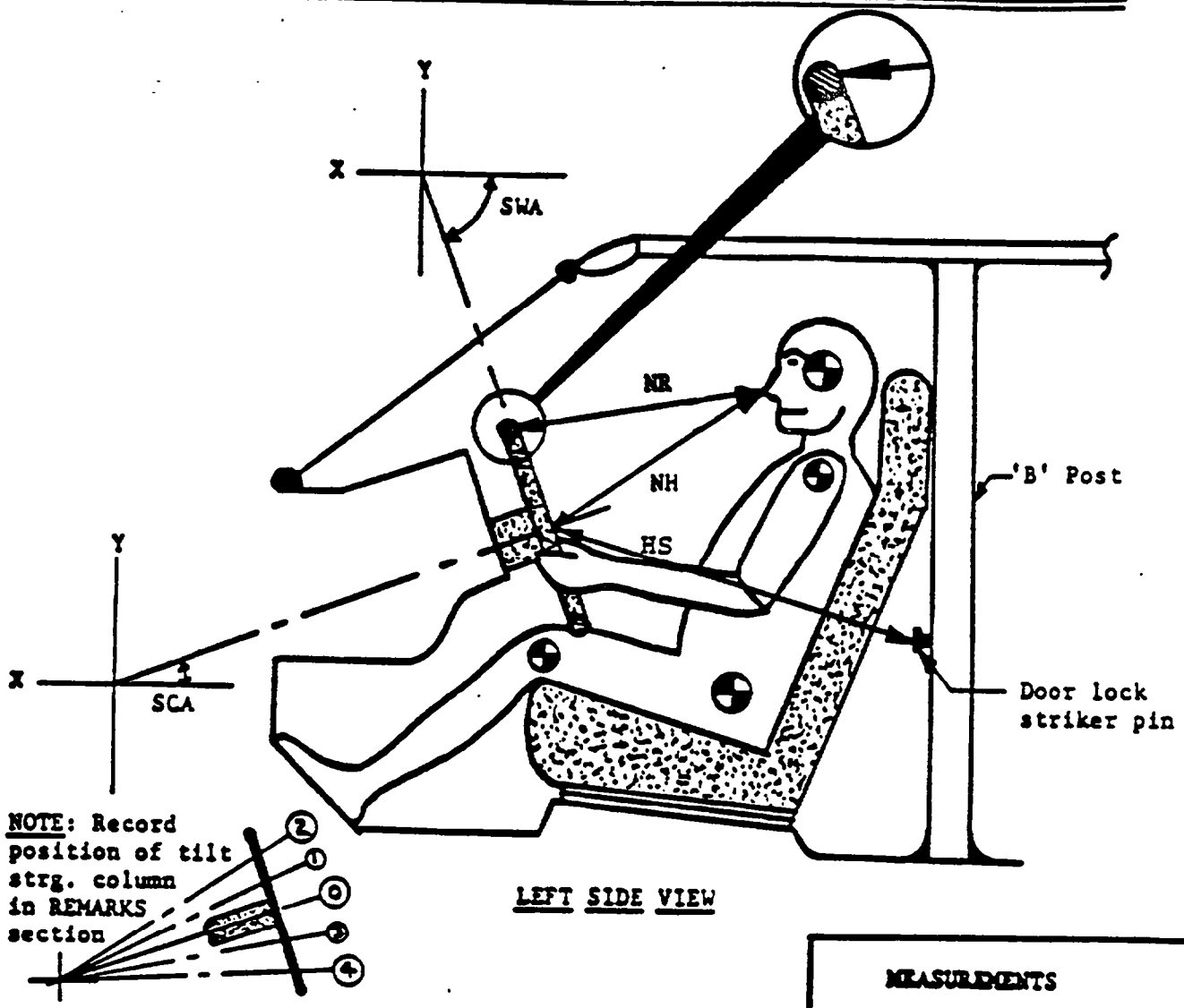
SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

Belt Length Data:	Driver	Passenger
Belt length from trim panel exit to bolt hole anchor point for exit to "D" continuous webbing systems.	10.5	10.5
Shoulder belt length as measured on Part 572 Dummy.	34.5	35.5
Lap belt length as measured on Part 572 Dummy.	34.2	34.5
Belt Spool-Off Data:		
As determined by film analysis.	3.6	3.2
As determined mechanically.	3.2"	3.0"
As determined electronically.	3.0	3.0
Belt Stretch Data:		
Measured electronically between shoulder belt load cell and the "D" ring.	*	.24"
Measured between two inch reference marks on belt.	0"	0"

*Driver's belt stretch data is not available due to equipment failure.

Figure 7

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



LEFT SIDE VIEW

	MEASUREMENTS	
NR--Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	19.9	Inches
NH--Distance from tip of dummy's nose to center of steering column hub	21.5	Inches
HS--Distance from center of steering column hub to the forward surface of the door lock striker pin.	X = 25 Y = 16	Inches
SCA--Angle of steering column relative to the horizontal X axis	-23^{o}	Degrees
SWA--Angle of steering wheel relative to the horizontal X axis.	67^{o}	Degrees

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

Steering column adjusted to mid-position.

NOTE: Camera Information Shown on Table 4

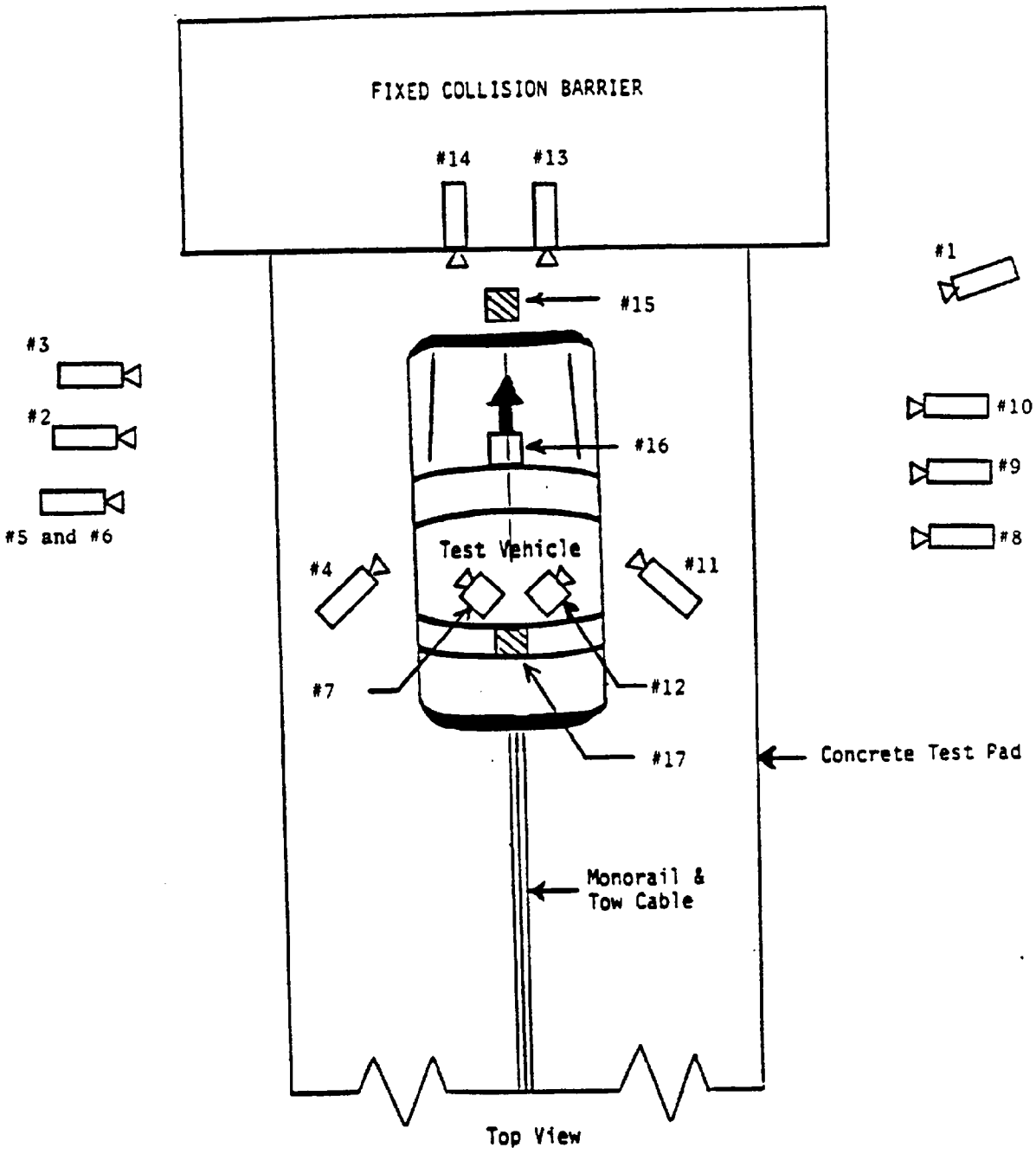


Figure 8 CAMERA POSITIONS FOR FRONTAL IMPACTS

Table 4

HIGH-SPEED CAMERA LOCATIONS

Test No. MG5701 Vehicle 1986 Isuzu IMark 4-Door Sedan

CAMERA NO.	VIEW	CAMERA POSITIONS (in)* X	Y	Z	ANGLE ** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
1	Real Time Camera	--	--	--	--	--	--	24
2	Overall Left Side	205	63	50	-5	--	13	1000
3	Left Side View	211	40	51	-6	--	25	530
4	Driver and Interior View	96	156	67	-18	--	25	530
5	Steering Column (Bottom)	222	81	46	-6	206	25	540
6	Steering Column (Top)	222	81	60	-12	206	25	540(1)
7	Left Belt	--	--	--	--	--	8	610
8	Overall Right Side	282	106	46	-4	--	13	980
9	Right Side View	280	82	48	-5	--	25	790
10	Right Passenger View	282	70	52	-3	266	35	810
11	Passenger and Interior View	96	156	63	-16	--	25	590
12	Right Belt	--	--	--	--	--	8	740
13	Passenger Front View	21	0	72	-28	98	13	540
14	Driver Front View	21	0	72	-27	98	13	620(1)
15	Windshield View	0	0	126	-47	--	13	530
16	Pit View of Engine	0	38	-120	90	--	13	850
17	Pit View of Fuel Tank	0	132	-120	90	--	13	810

* 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.

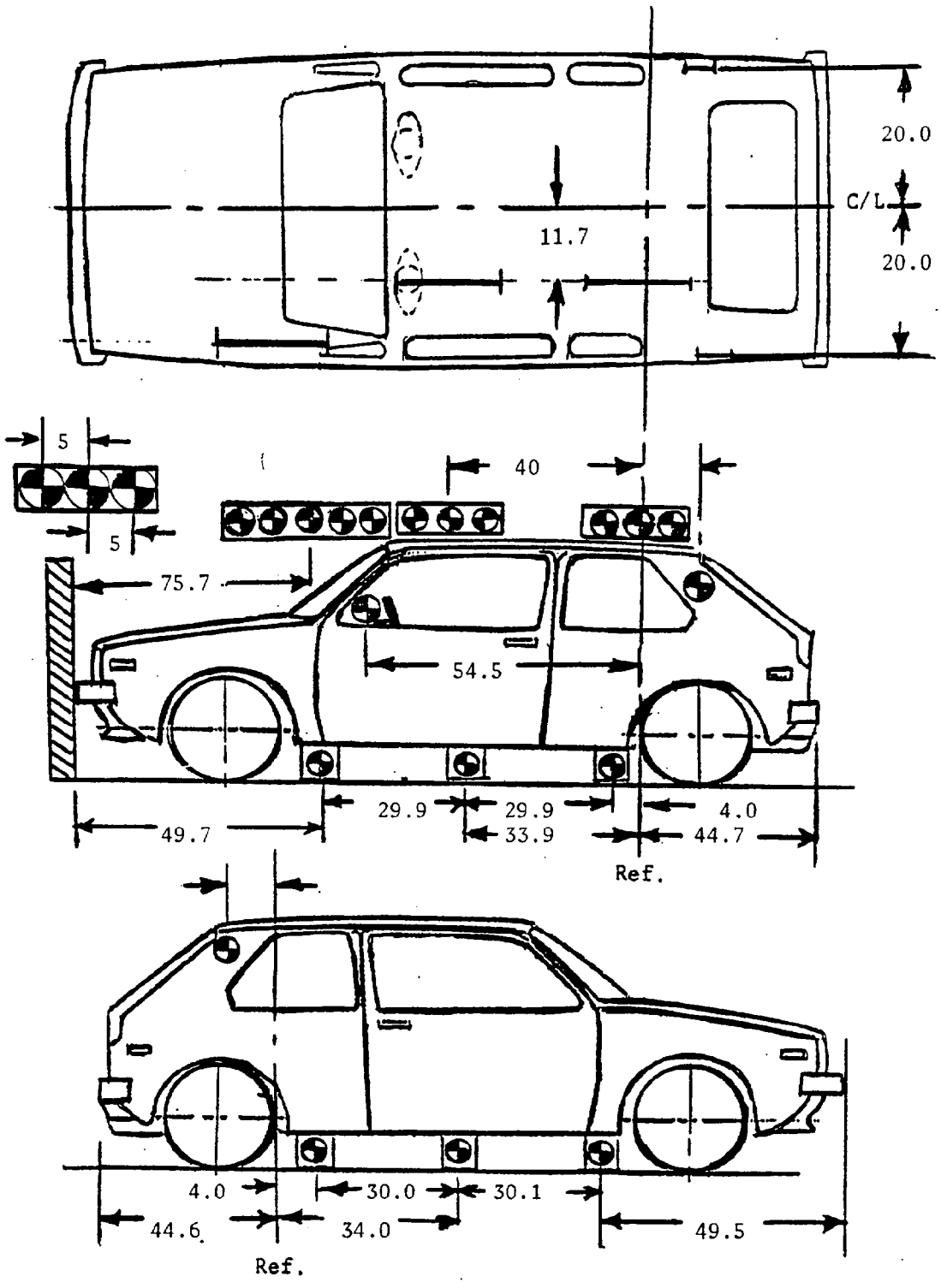
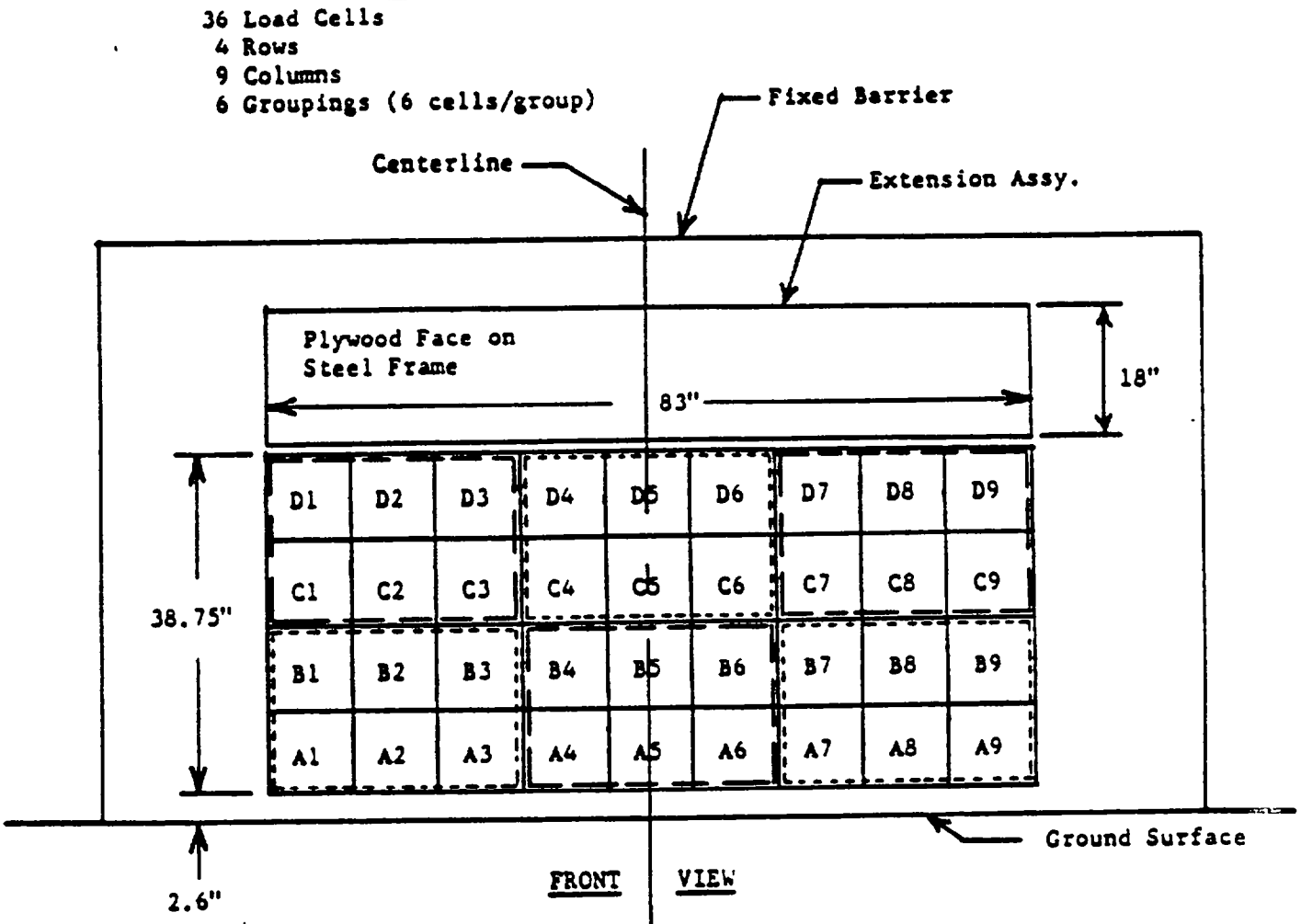


Figure 9 VEHICLE TARGET LOCATIONS

Figure 10

LOAD CELL LOCATIONS ON FIXED BARRIER



6 GROUPINGS OF 6 LOAD CELLS EACH

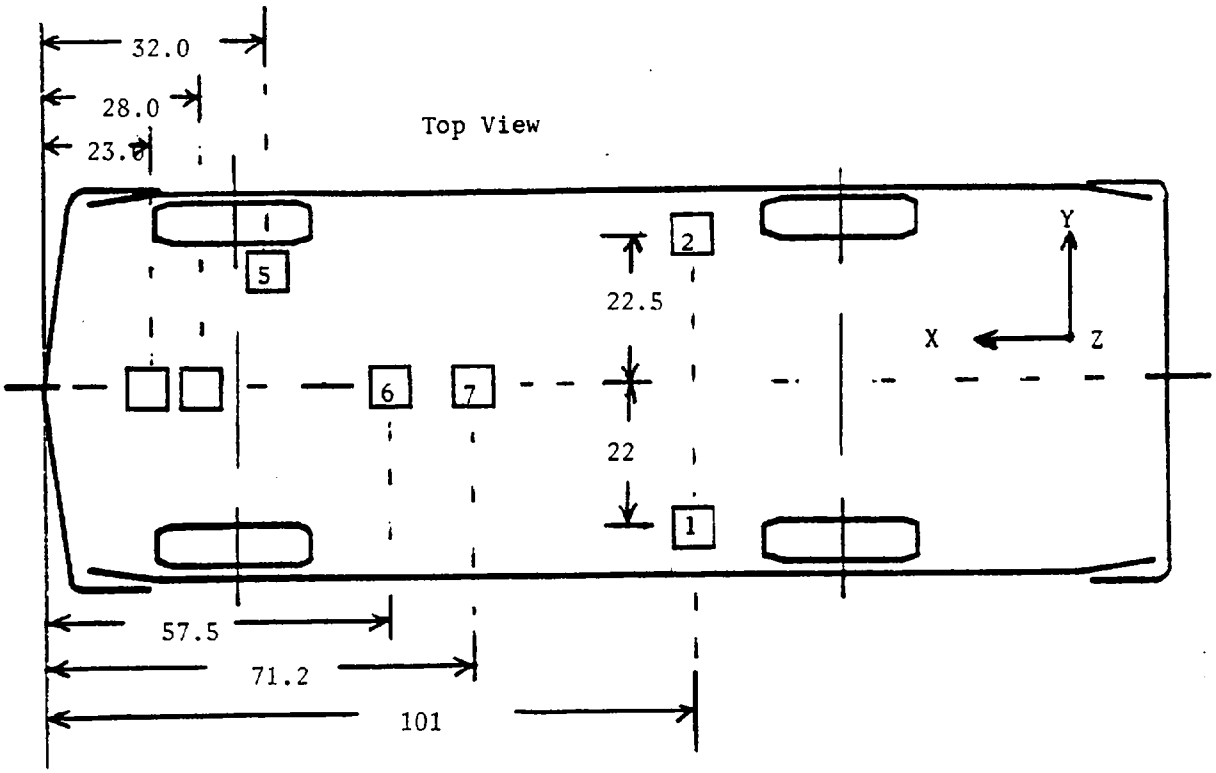
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

The following data is presented in Appendix B:

(1) Data from 36 individual load cells

(2) Total or Sum of 36 individual load cells

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



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 11 VEHICLE ACCELEROMETER LOCATIONS

Figure 12

TEST VEHICLE MEASUREMENTS

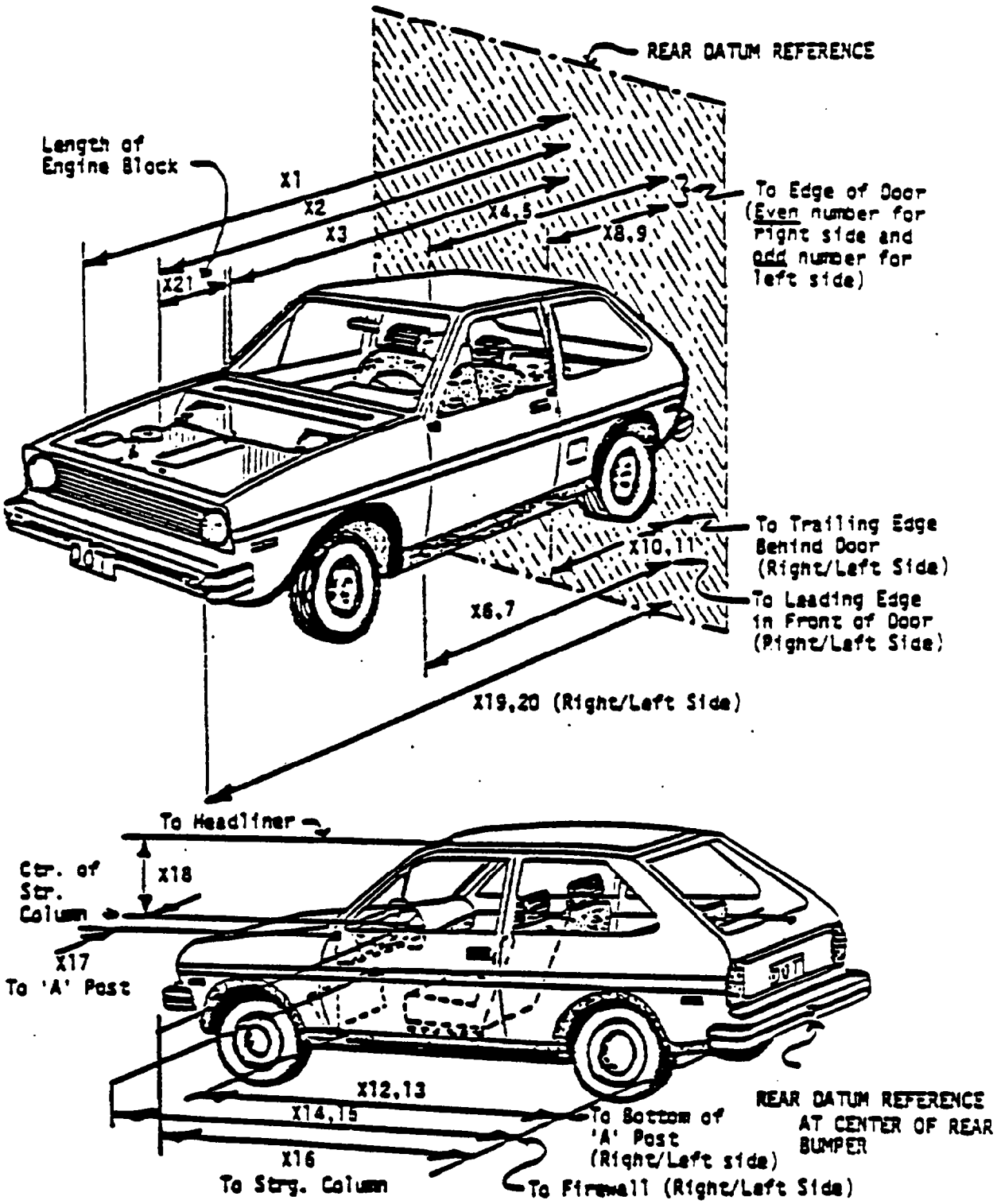


Table 5

VEHICLE MEASUREMENTS

All Dimensions in Inches

No.		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	158.2	136.6	21.6
X2	Rear Surface of Vehicle to Front of Engine	138.6	130.4	8.2
X3	Rear Surface of Vehicle to Firewall	119.7	117.0	2.7
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	109.0	108.9	.1
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	108.9	109.5	-.6
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	109.1	108.5	.6
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	109.5	108.7	.8
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	69.0	69.0	0
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	69.0	69.5	-.5
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	69.5	69.1	.4
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	69.9	69.5	.4
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	108.9	108.5	.4
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	108.8	108.1	.7
X14	Rear Surface of Vehicle to Firewall, Right Side	118.0	110.5	7.5
X15	Rear Surface of Vehicle to Firewall, Left Side	118.5	111.7	6.8
X16	Rear Surface of Vehicle to Steering Column	95.1	93.3	1.8
X17	Center of Steering Column to "A" Post	13.1	14.8	-1.7
X18	Center of Steering Column to Headliner	16.7	16.5	.2
X19	Rear Surface of Vehicle to Right Side of Front Bumper	156.3	132.9	23.4
X20	Rear Surface of Vehicle to Left Side of Front Bumper	156.9	136.6	20.3
X21	Length of Engine Block	17.5	17.5	0

Table 6

ACCIDENT INVESTIGATION DIVISION DATA
FOR 35 MPH FRONTAL BARRIER IMPACT

VEHICLE MAKE/MODEL/BODY STYLE: 1986 Isuzu I Mark 4 - door Sedan

VEH. NHTSA NO.: MG5701 ; VIN: JABRT 6973G4113383

MODEL YEAR: 1986 ; BUILD DATE: 9/85 ; TEST DATE: 2/18/86

VEH. SIZE CATEGORY: Compact ; TEST WEIGHT: 2380

VEH. WHEELBASE: 94.2 ; FRONT OVERHANG: 30.9 ; OVERALL WIDTH: 63.5

ACCELEROMETER DATA:

LOCATION: 40.3 inches rearward of front wheel C/L

CALIBRATION PROCEDURE: Shaker Table/Least Squares

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

VEH. IMPACT SPEED: 34.9 ; TIME OF SEPARATION: 143.9

VELOCITY CHANGE: 39.3

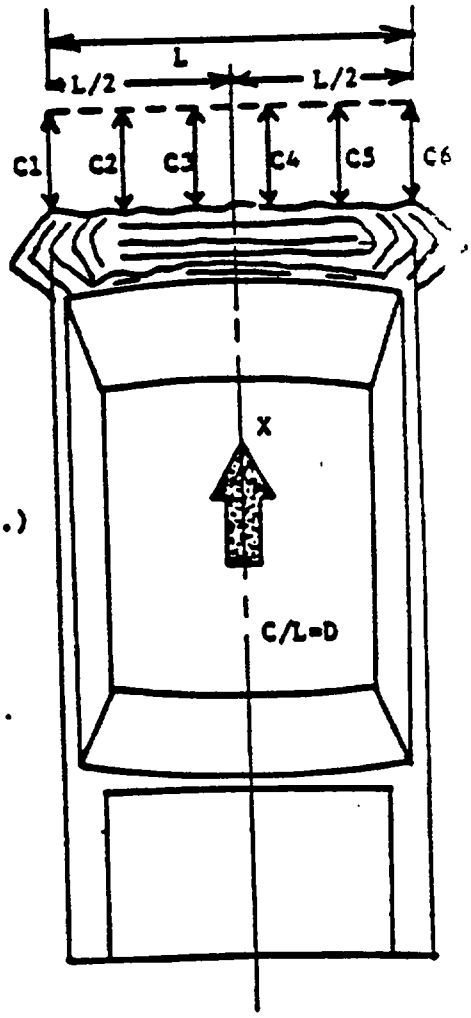
COLLISION DEFORMATION CLASSIFICATION (CDC) CODE:
F (Frontal) 12 FDEW 3

CRUSH DEPTH DIMENSIONS:

C1= 18.0 inches
C2= 20.9 inches
C3= 21.3 inches
C4= 21.6 inches
* C5= 21.9 inches
* C6= 21.7 inches

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

LENGTH OF DAMAGED REGION: L = 56.5 inches



* Measurements are not taken in the same location as measurements for the Accident Investigation report. Therefore, measurements may not be equal.

National Accident Sampling System — Continuous Sampling Subsystem: Vehicle Data

FIELD MEASUREMENTS

1986 ISUZU I-MARK 4DR JAABT69736K413383

NC1

Complete When Applicable	
End Damage	**Side Damage**
Undeformed end width: 56.5	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.

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	56.5	C5 22.5	56.5	20.5	21.5	21.4	21.7	22.5	24.2	Ø
	Face/space		.6		2.5	.6	.1	.1	.6	2.5	
1	Actual Crush	56.5	21.9	56.5	18.0	20.9	21.3	21.6	21.9	21.7	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		b. Tire deflated	
RF	1	RF	1
LF	1	LF	2
RR	2	RR	2
LR	2	LR	2

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

TYPE OF TRANSMISSION

___Manual ___Automatic

Average Track: _____
Maximum Width: _____
Test Weight: 2380
Overall Length: 158.2
Wheel Base: 94.5
Engine Size: cyl. _____
displ. _____

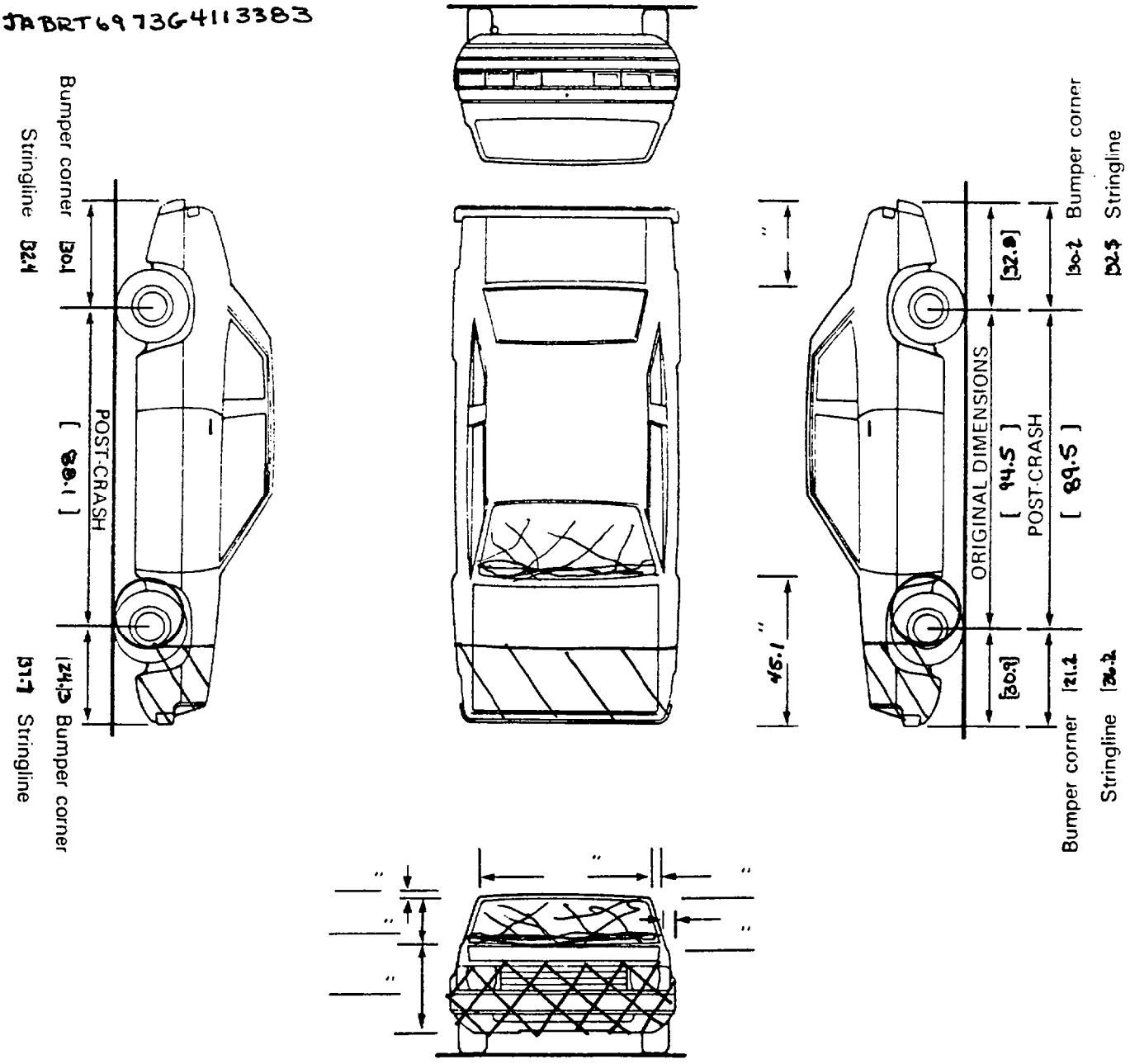
WHEEL STEER ANGLES

(For locked front wheels or displaced rear axles only)

RF ± 0 0 °
LF 0 0 1 °
RR ± N/A °
LR ± N/A °

Within ± 5 degrees

1986 ISUZU MARKI
JABRT69736411338 3



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.

Figure 13 TEST VEHICLE DAMAGE DETAILS

APPENDIX A

PHOTOGRAPHS

Figure A-1 PRE-TEST FRONT VIEW

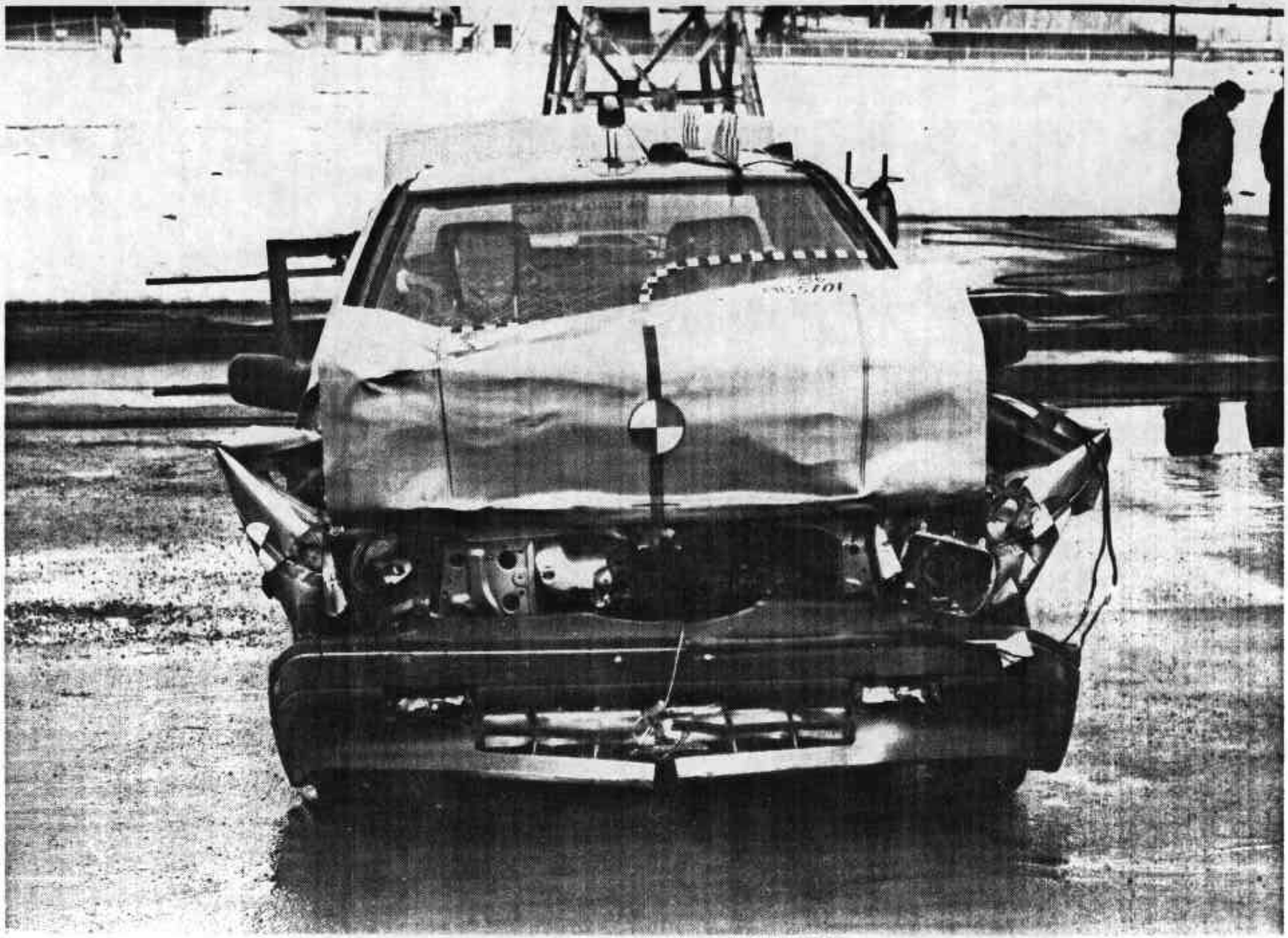


Figure A-2 POST-TEST FRONT VIEW

Figure A-3 PRE-TEST LEFT SIDE VIEW

Figure A-4 POST-TEST LEFT SIDE VIEW

Figure A-5 PRE-TEST RIGHT SIDE VIEW

Figure A-6 POST-TEST RIGHT SIDE VIEW

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

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

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

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

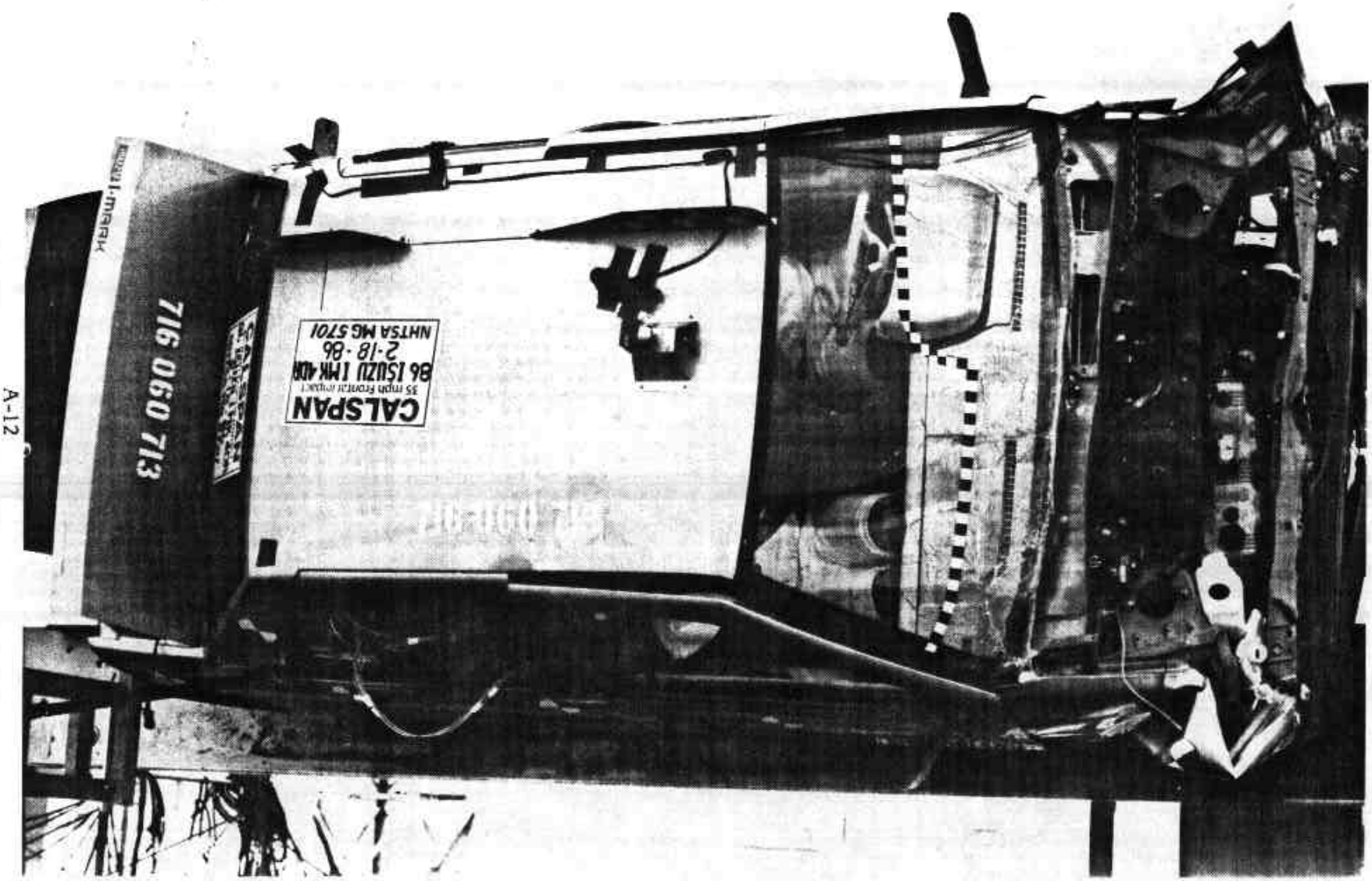


Figure A-11 POST-TEST TOP VIEW

Figure A-12 PRE-TEST WINDSHIELD VIEW

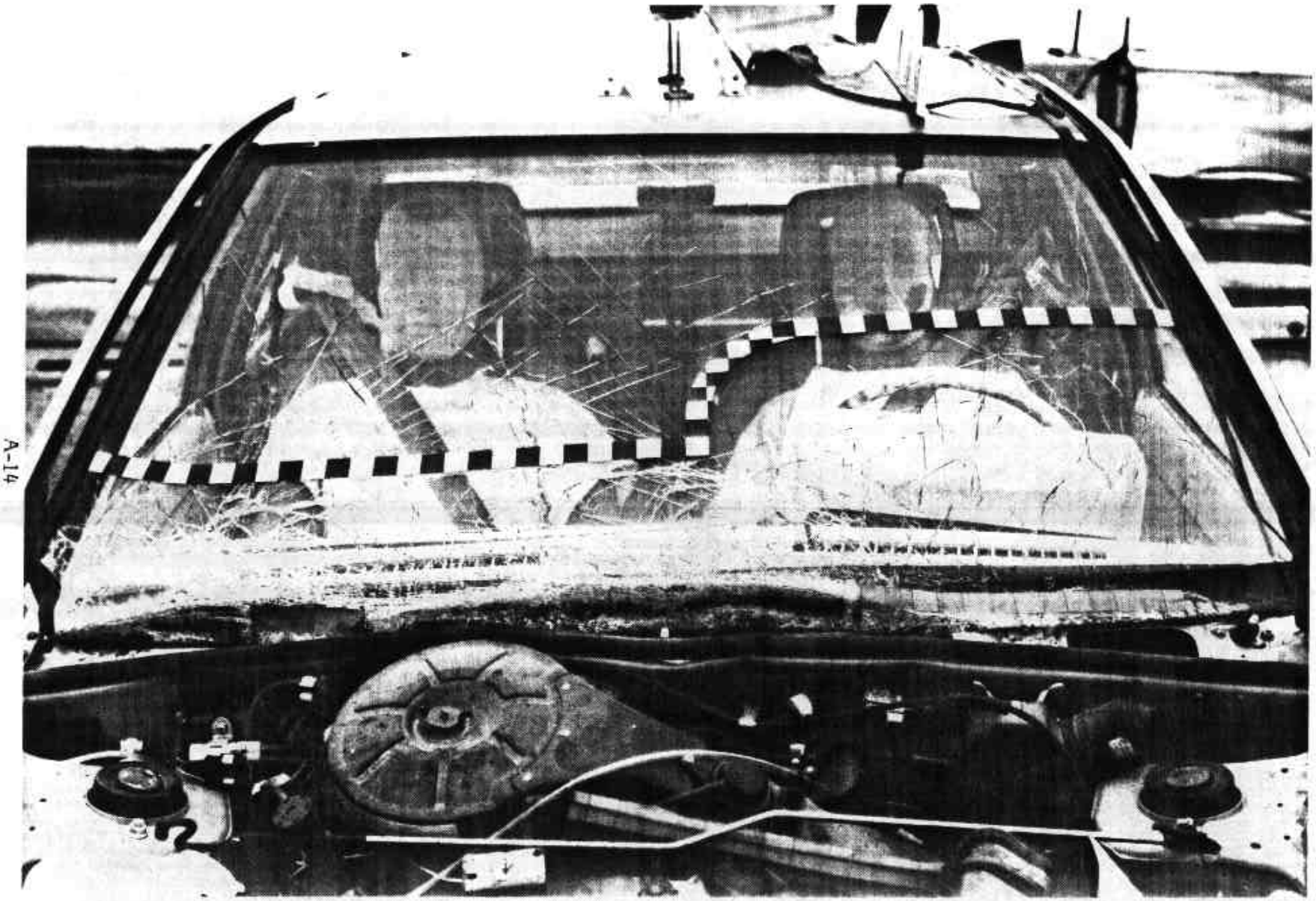


Figure A-13 POST-TEST WINDSHIELD VIEW

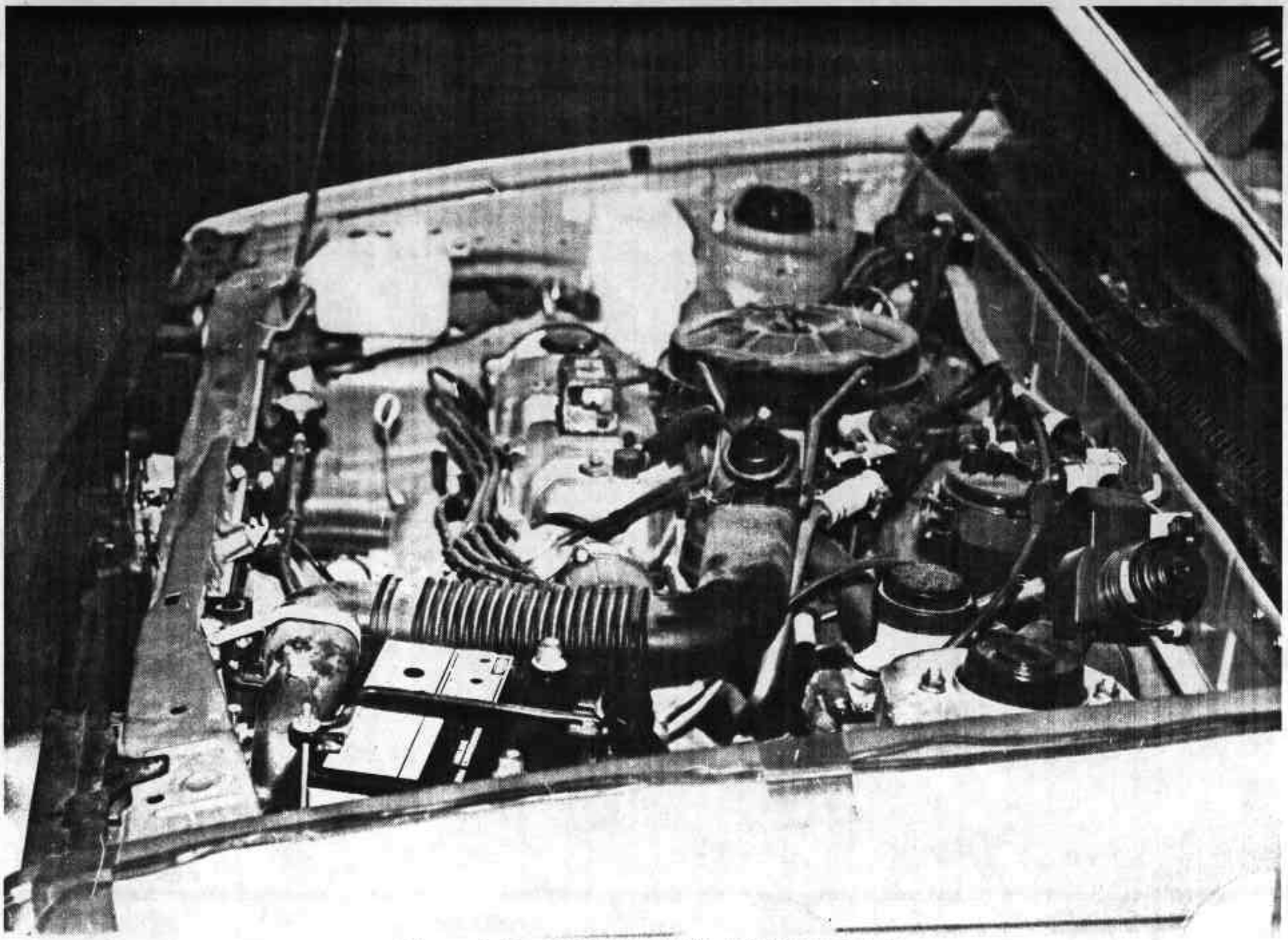


Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

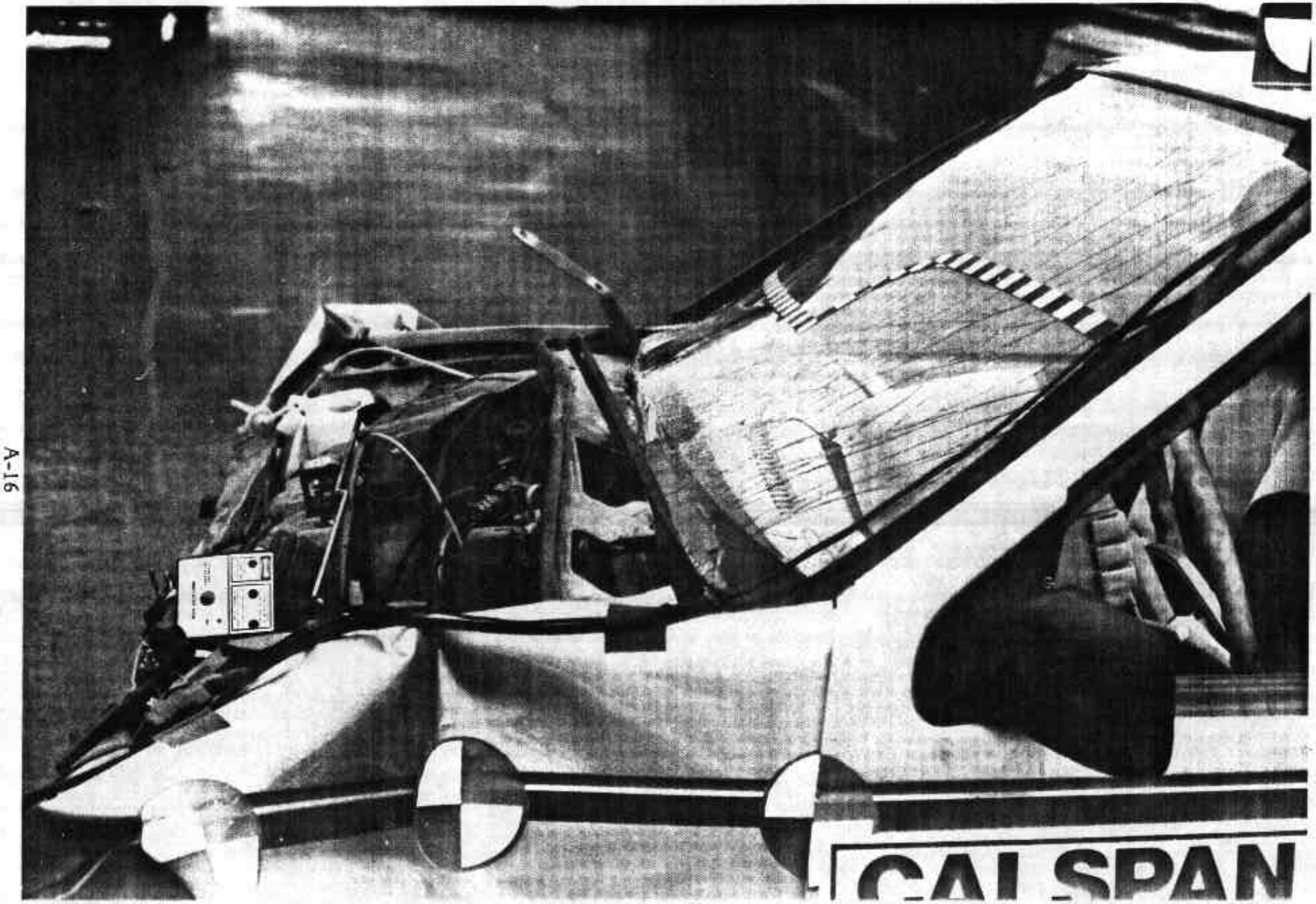


Figure A-15 POST-TEST ENGINE COMPARTMENT VIEW

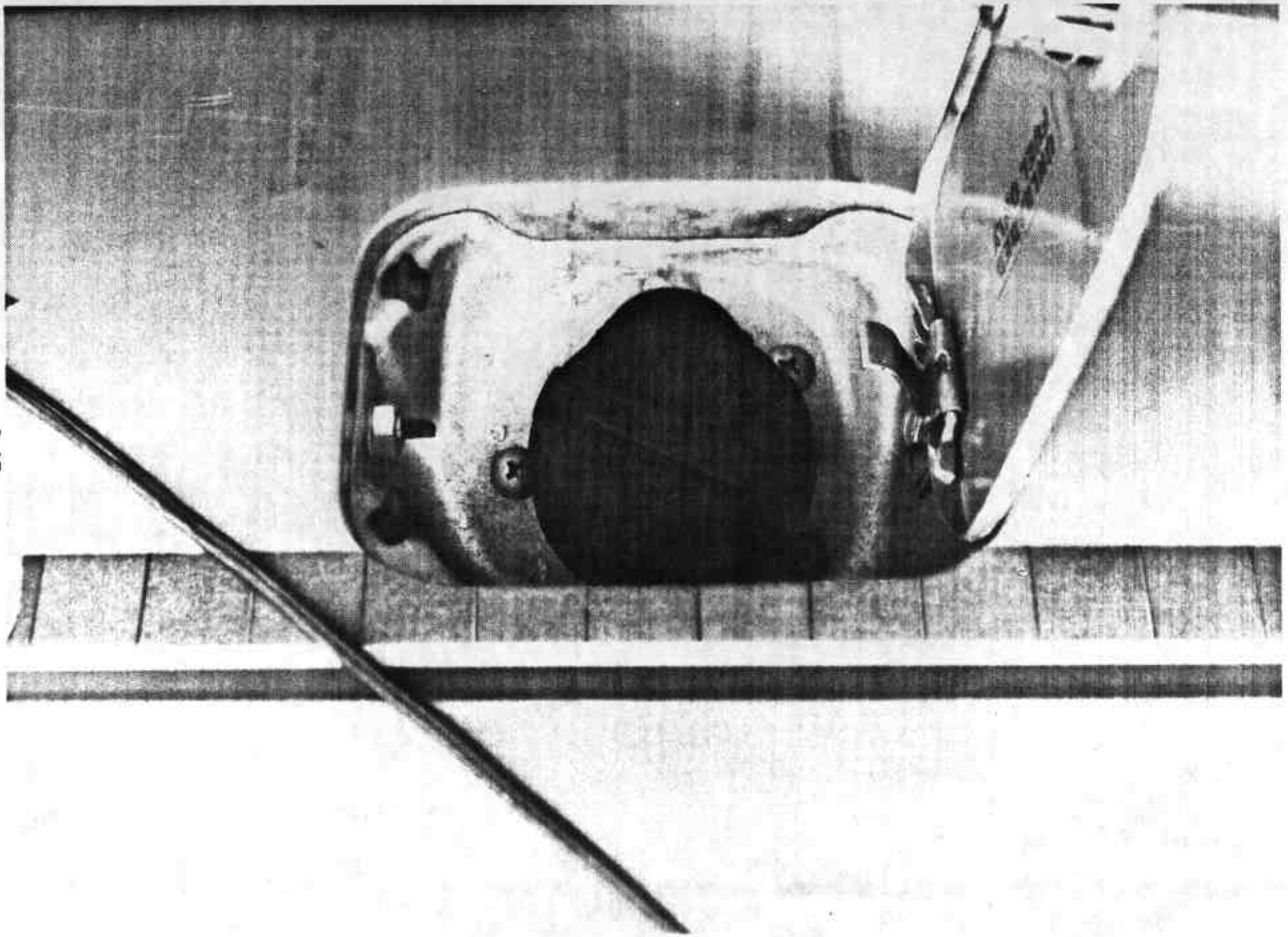


Figure A-16 PRE-TEST FUEL FILTER CAP VIEW

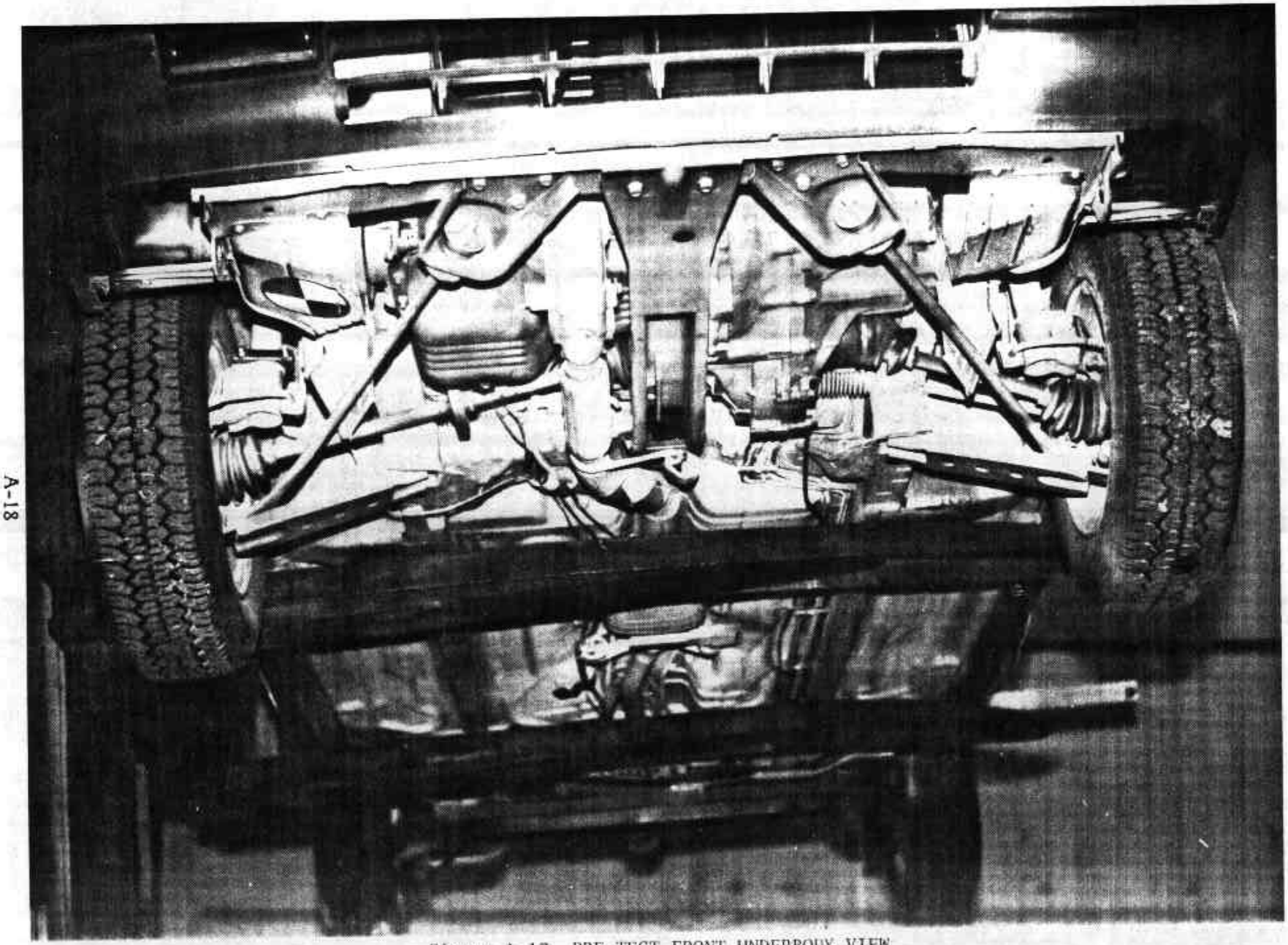


Figure A-17 PRE-TEST FRONT UNDERBODY VIEW

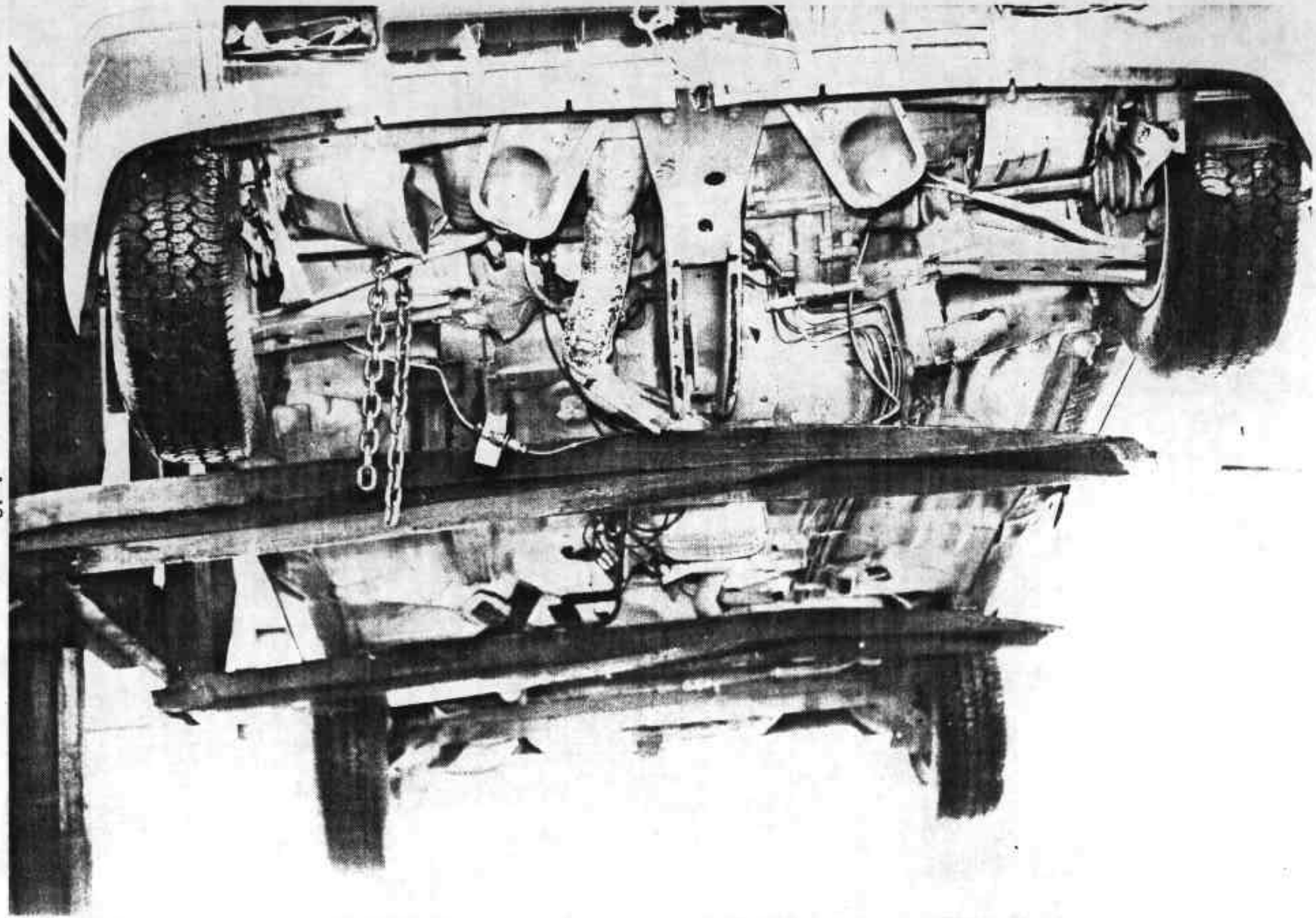


Figure A-18 POST-TEST FRONT UNDERBODY VIEW

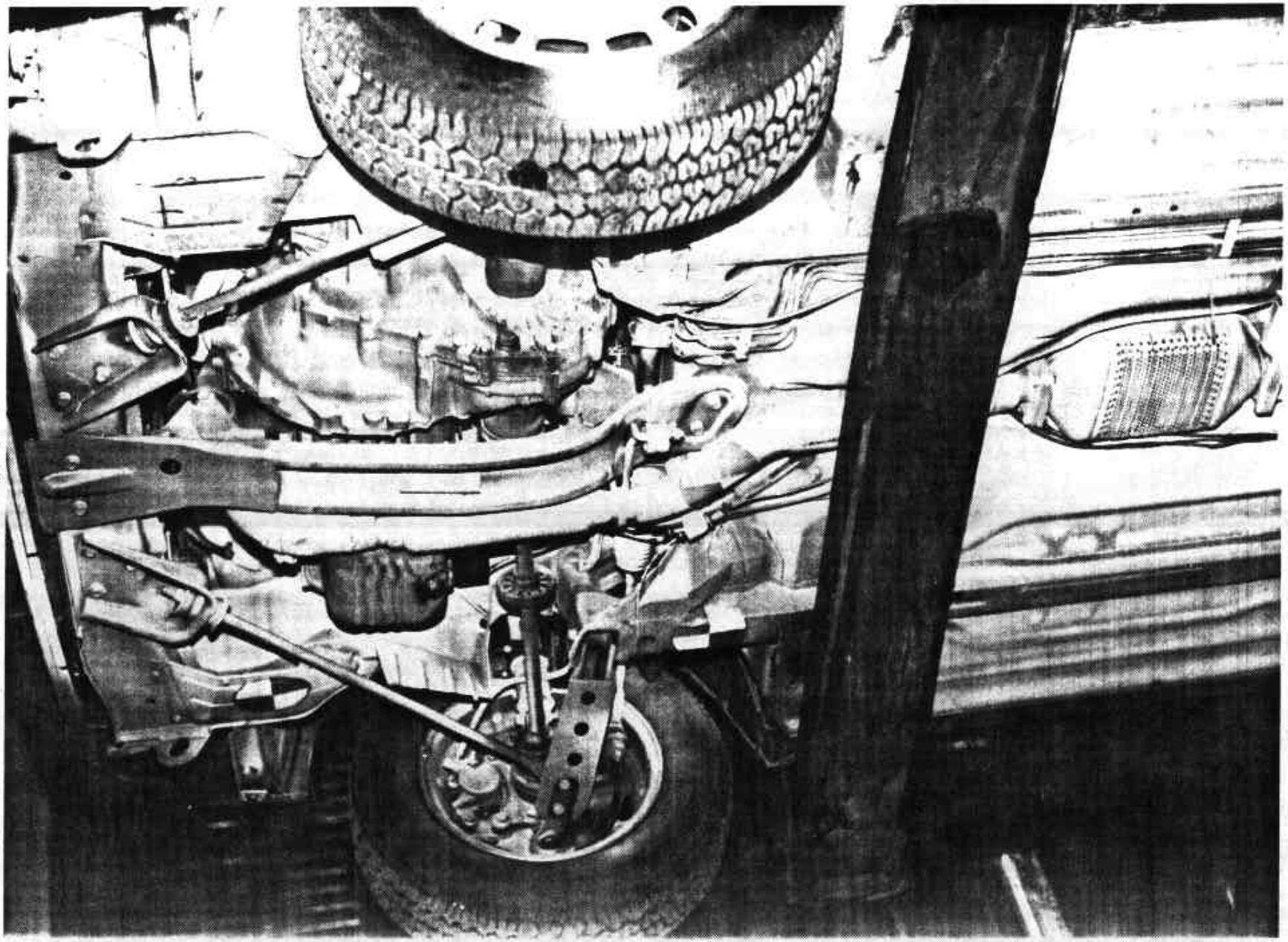


Figure A-19 PRE-TEST FRONT-SIDE UNDERBODY VIEW

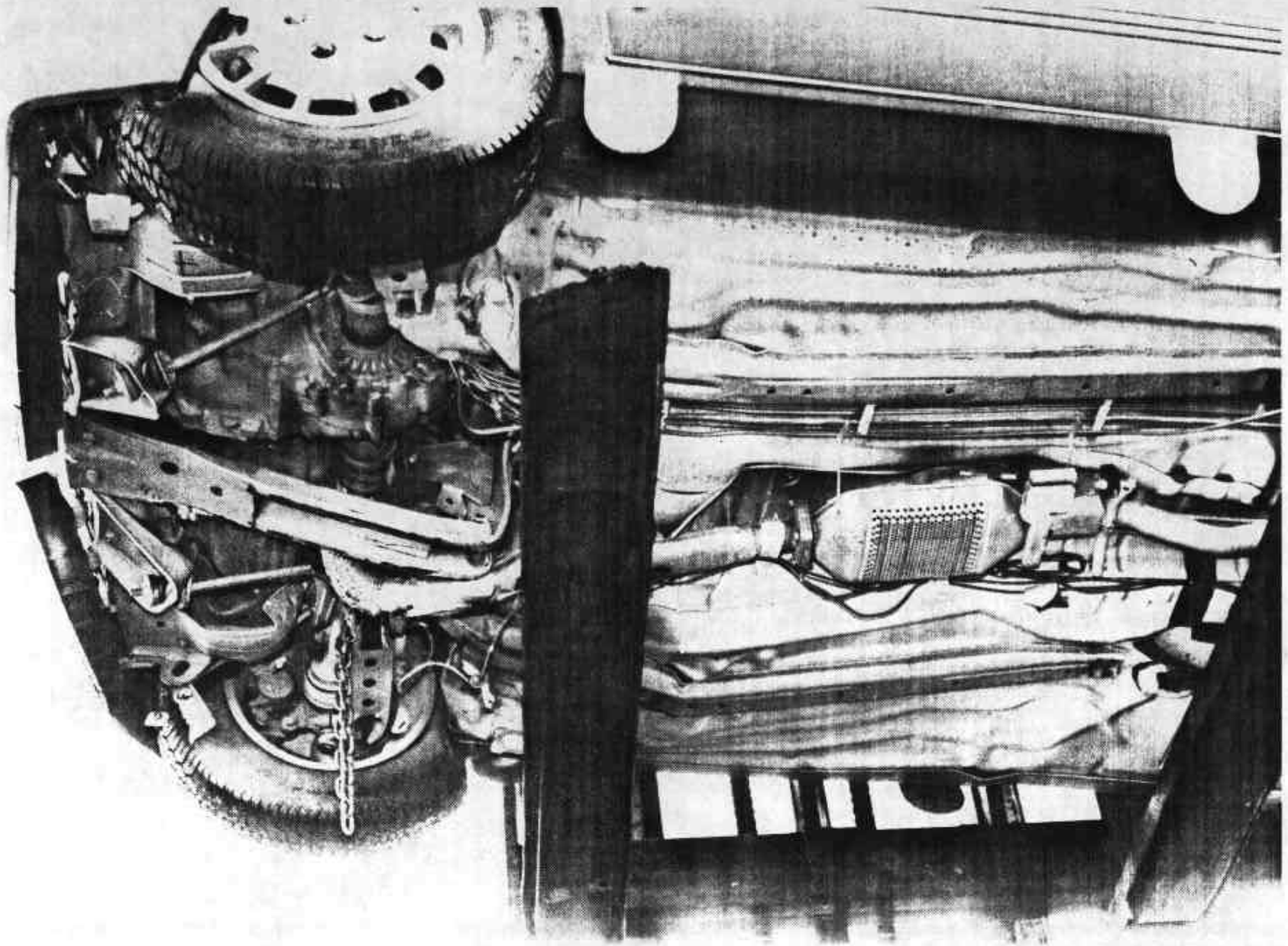


Figure A-20 POST-TEST FRONT-SIDE UNDERBODY VIEW

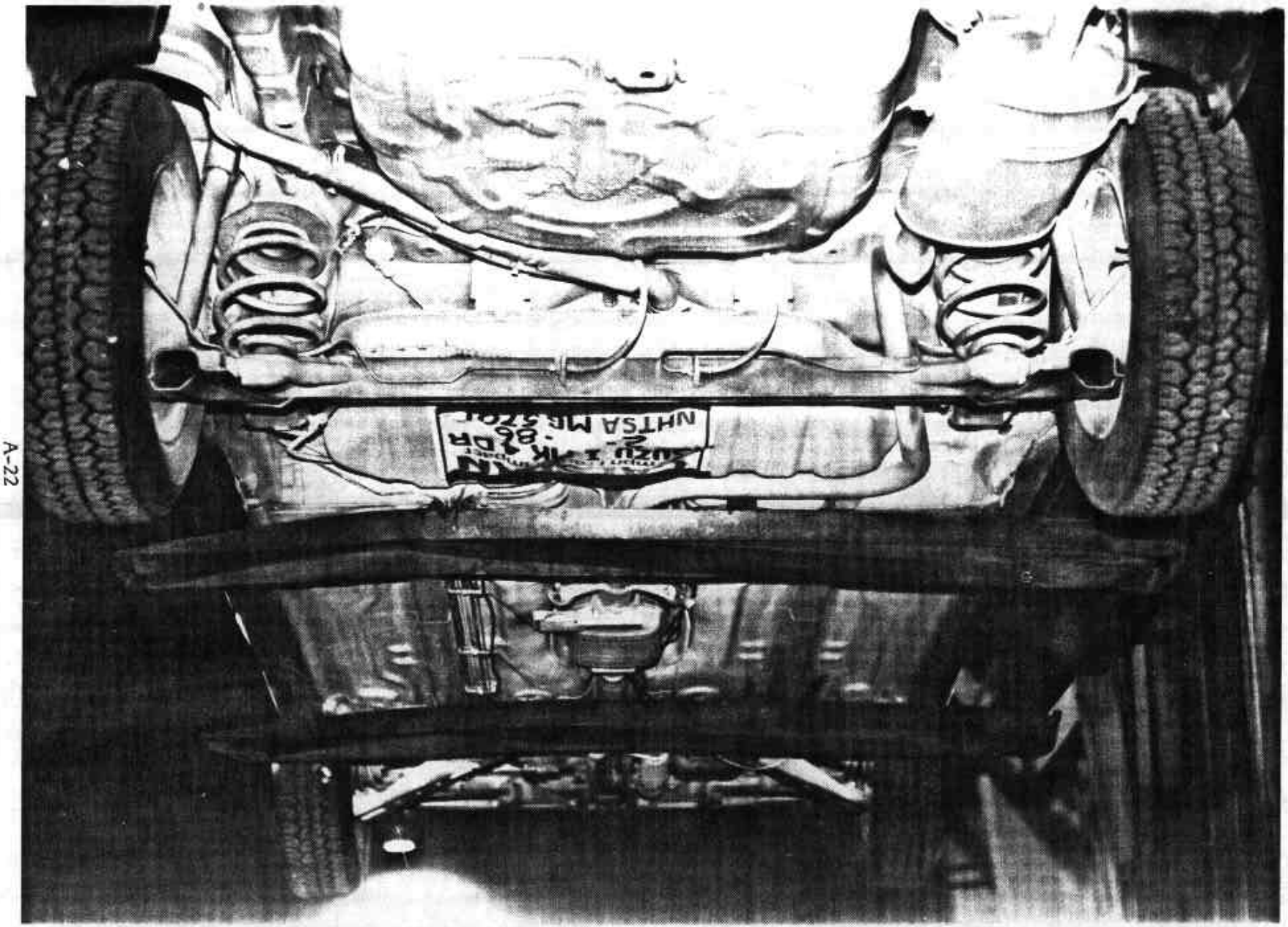


Figure A-21 PRE-TEST REAR UNDERBODY VIEW

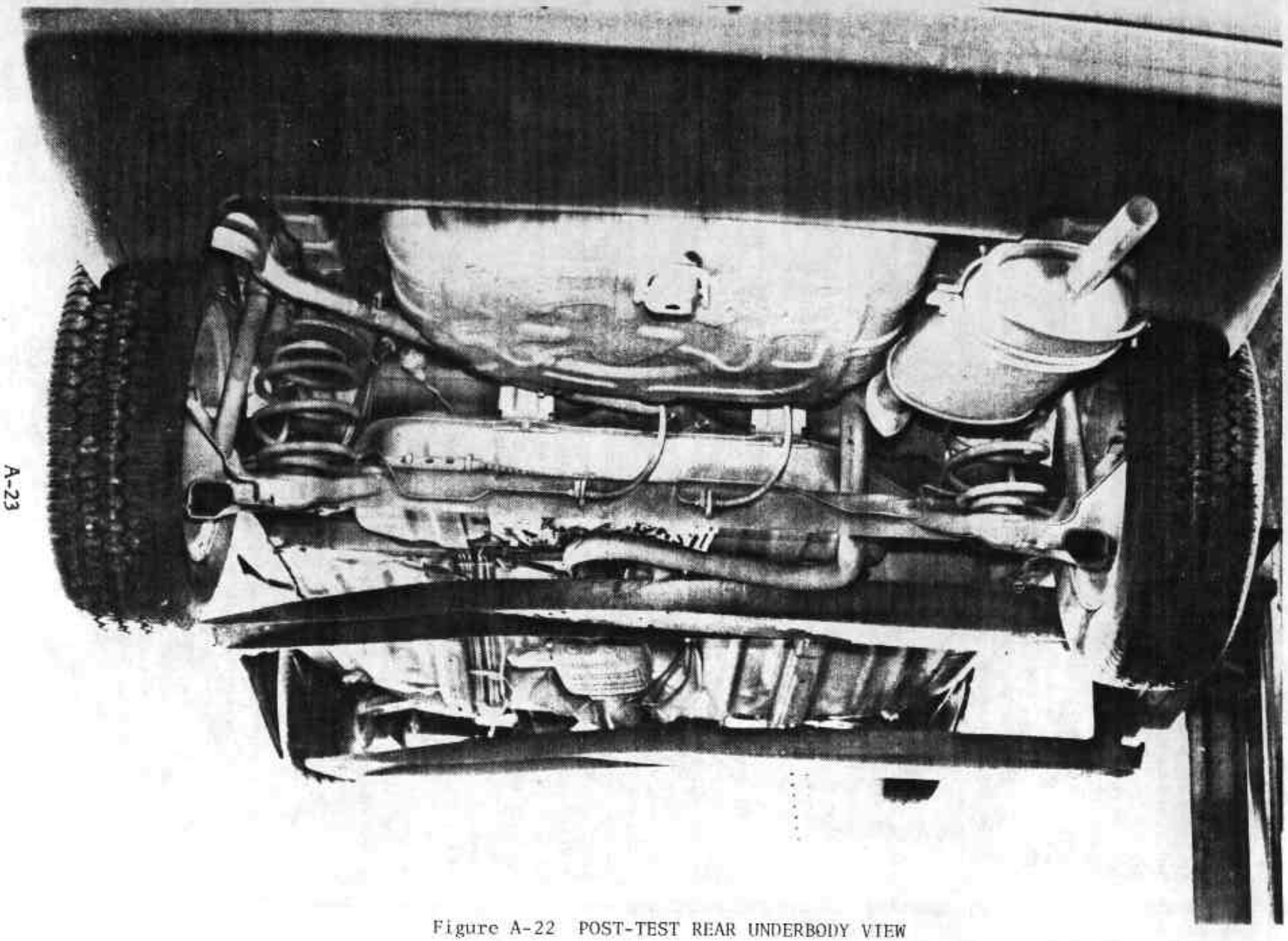


Figure A-22 POST-TEST REAR UNDERBODY VIEW

Figure A-23 PRE-TEST DRIVER POSITION VIEW

Figure A-24 POST-TEST DRIVER POSITION VIEW

Figure A-25 PRE-TEST PASSENGER POSITION VIEW

Figure A-26 POST-TEST PASSENGER POSITION VIEW

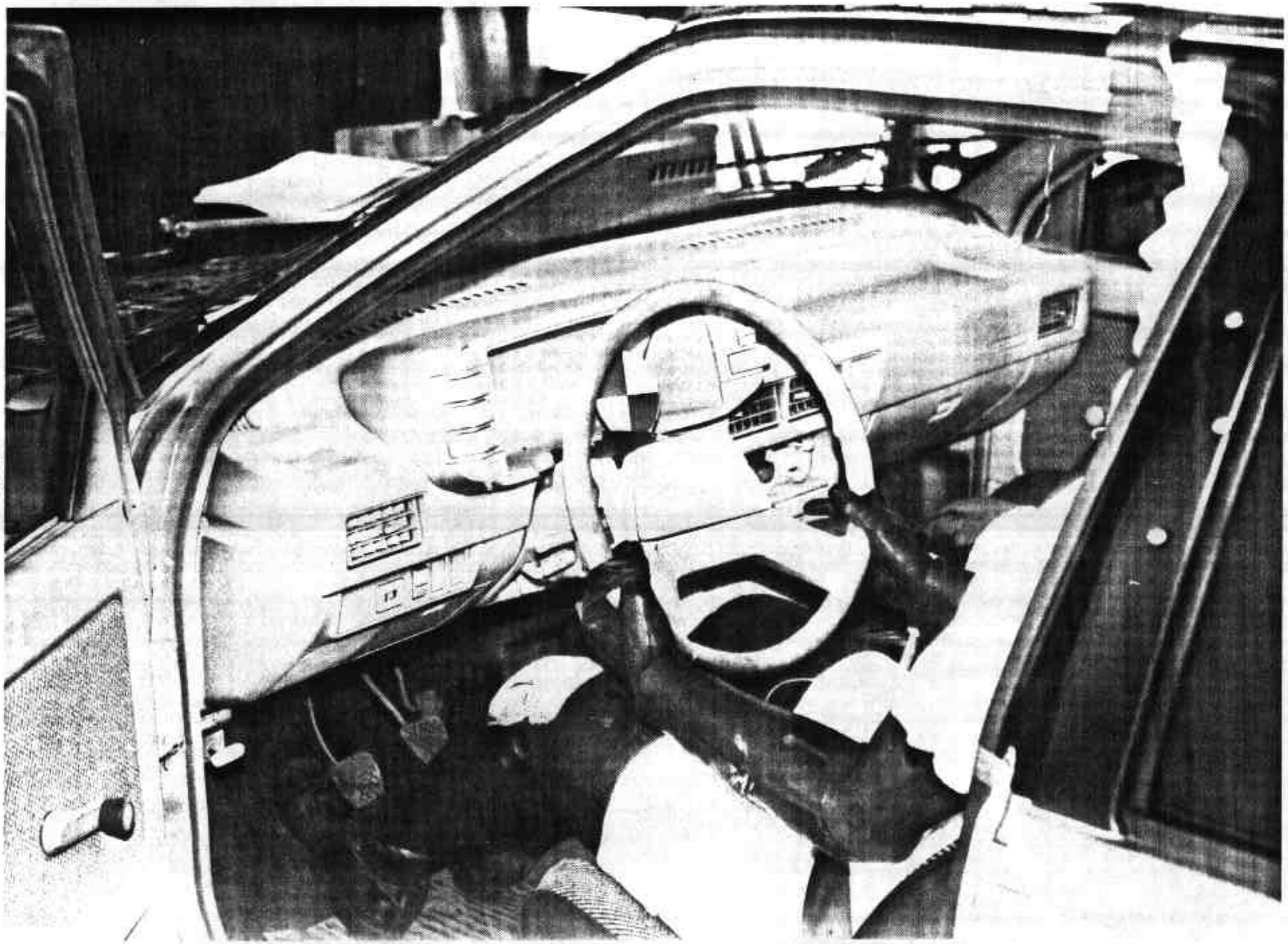


Figure A-27 PRE-TEST DRIVER AND INTERIOR VIEW

Figure A-28 POST-TEST DRIVER AND INTERIOR VIEW

Figure A-29 PRE-TEST PASSENGER AND INTERIOR VIEW

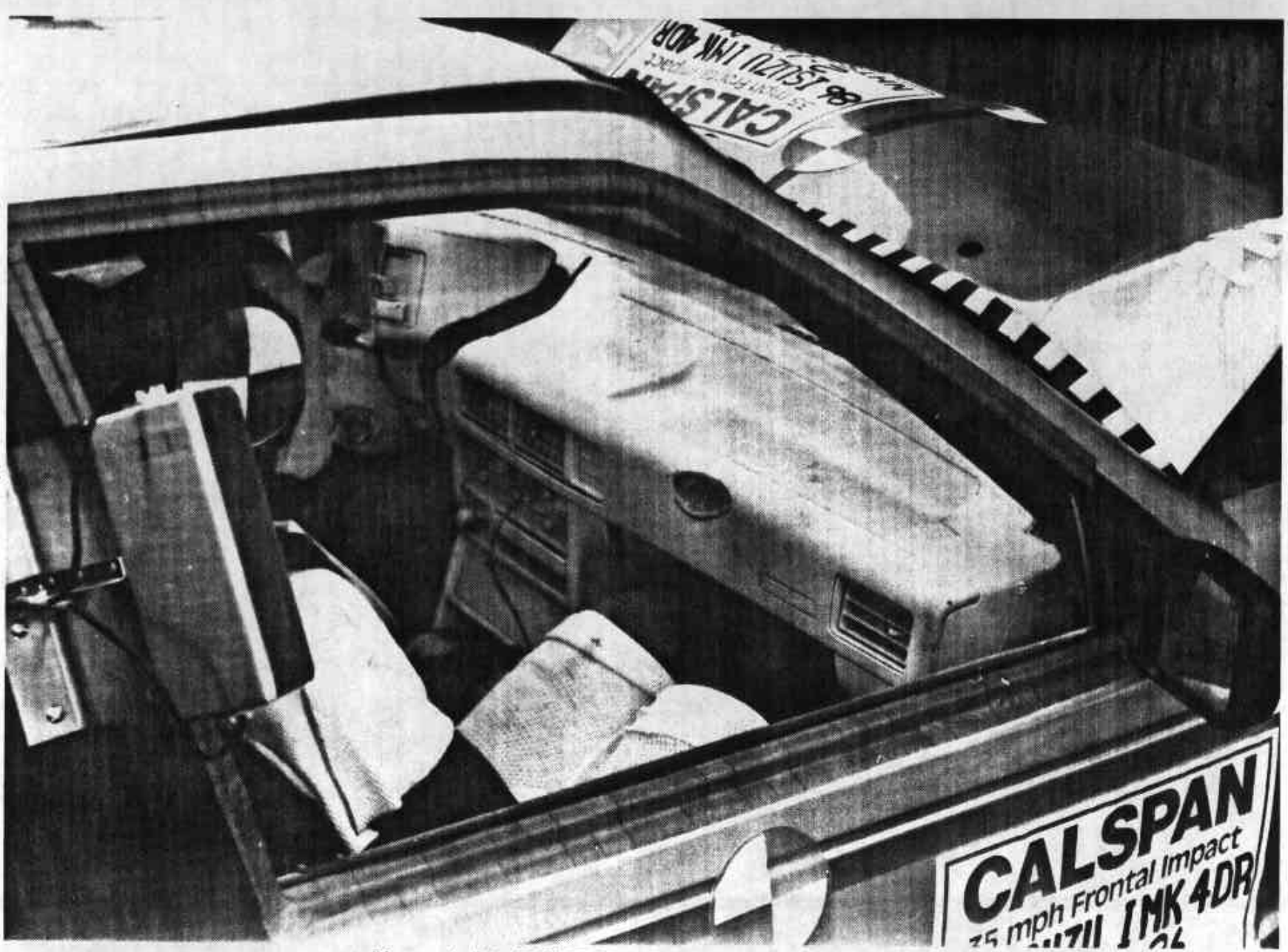


Figure A-30 POST-TEST PASSENGER AND INTERIOR VIEW

APPENDIX B

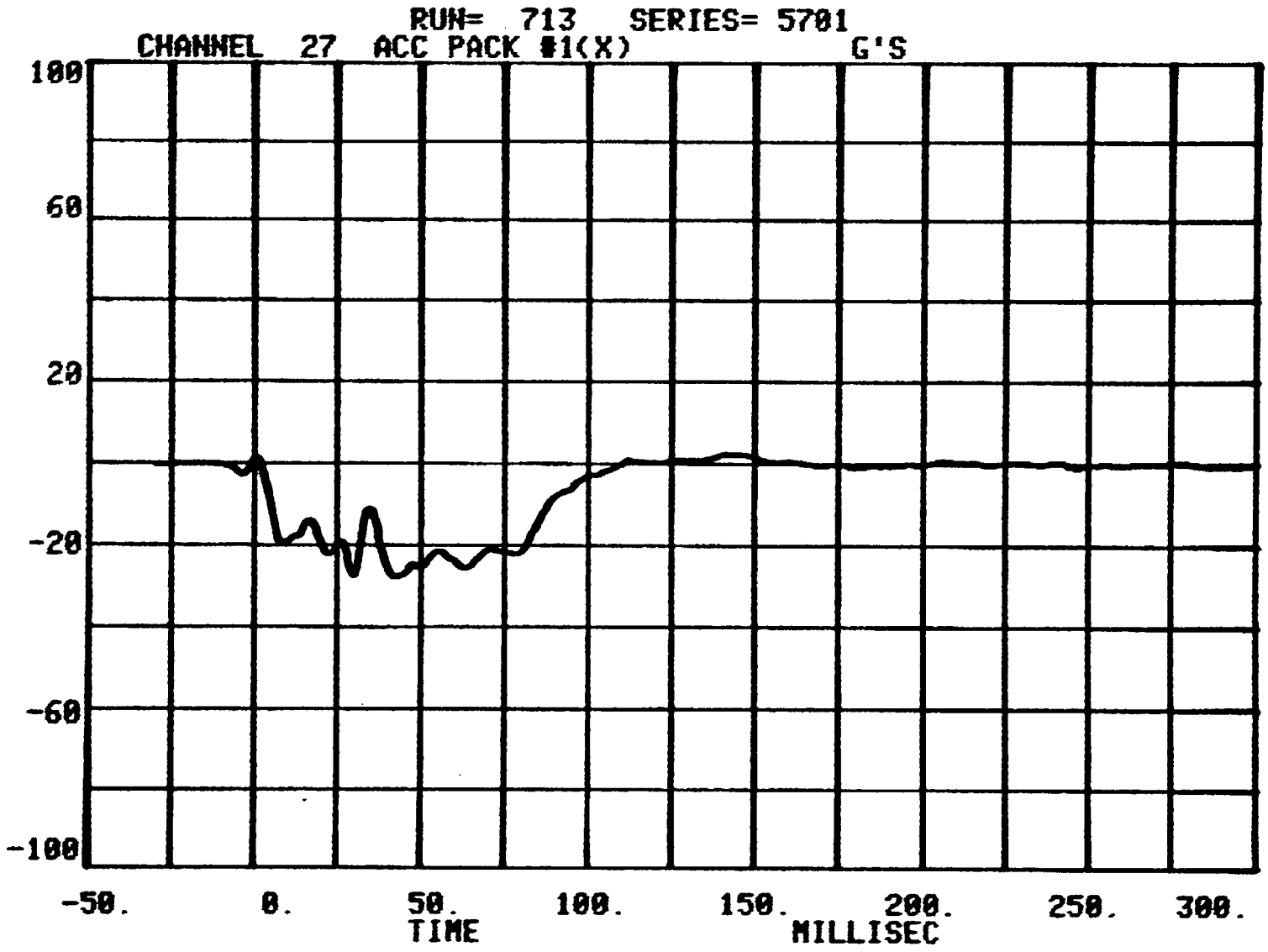
VEHICLE, DUMMY RESPONSE DATA AND LOAD CELL BARRIER DATA

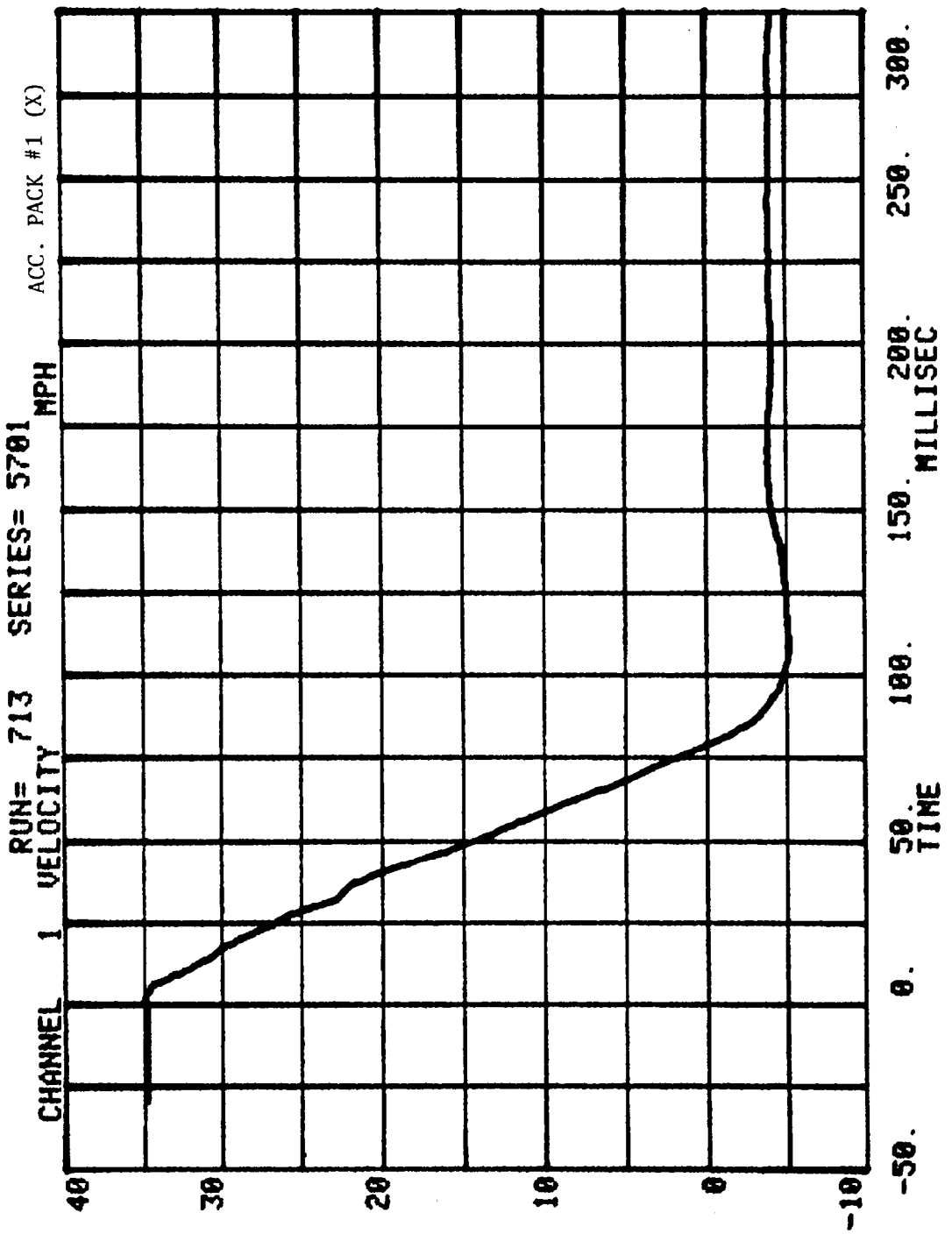
TEST NO. MG5701

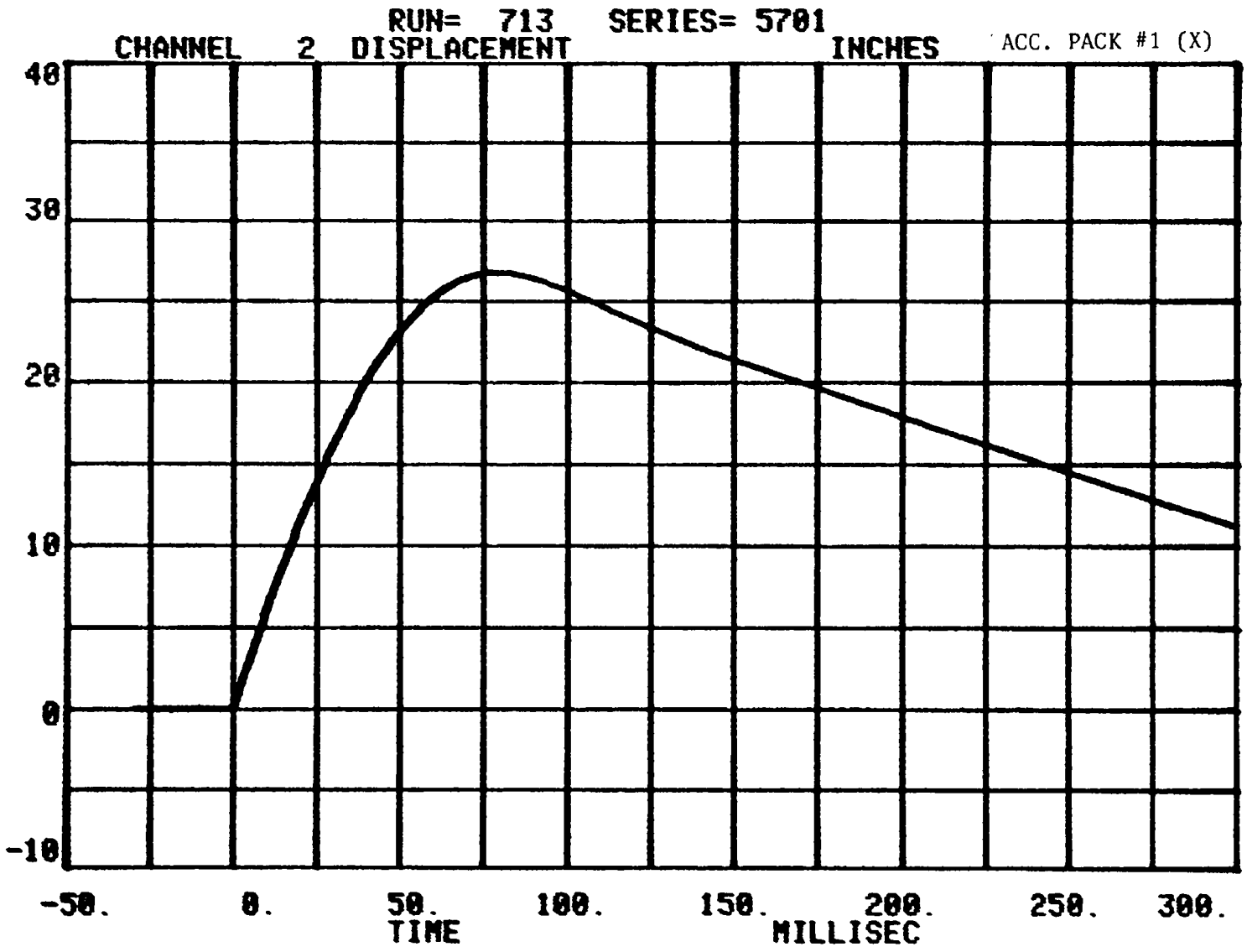
VEHICLE DATA

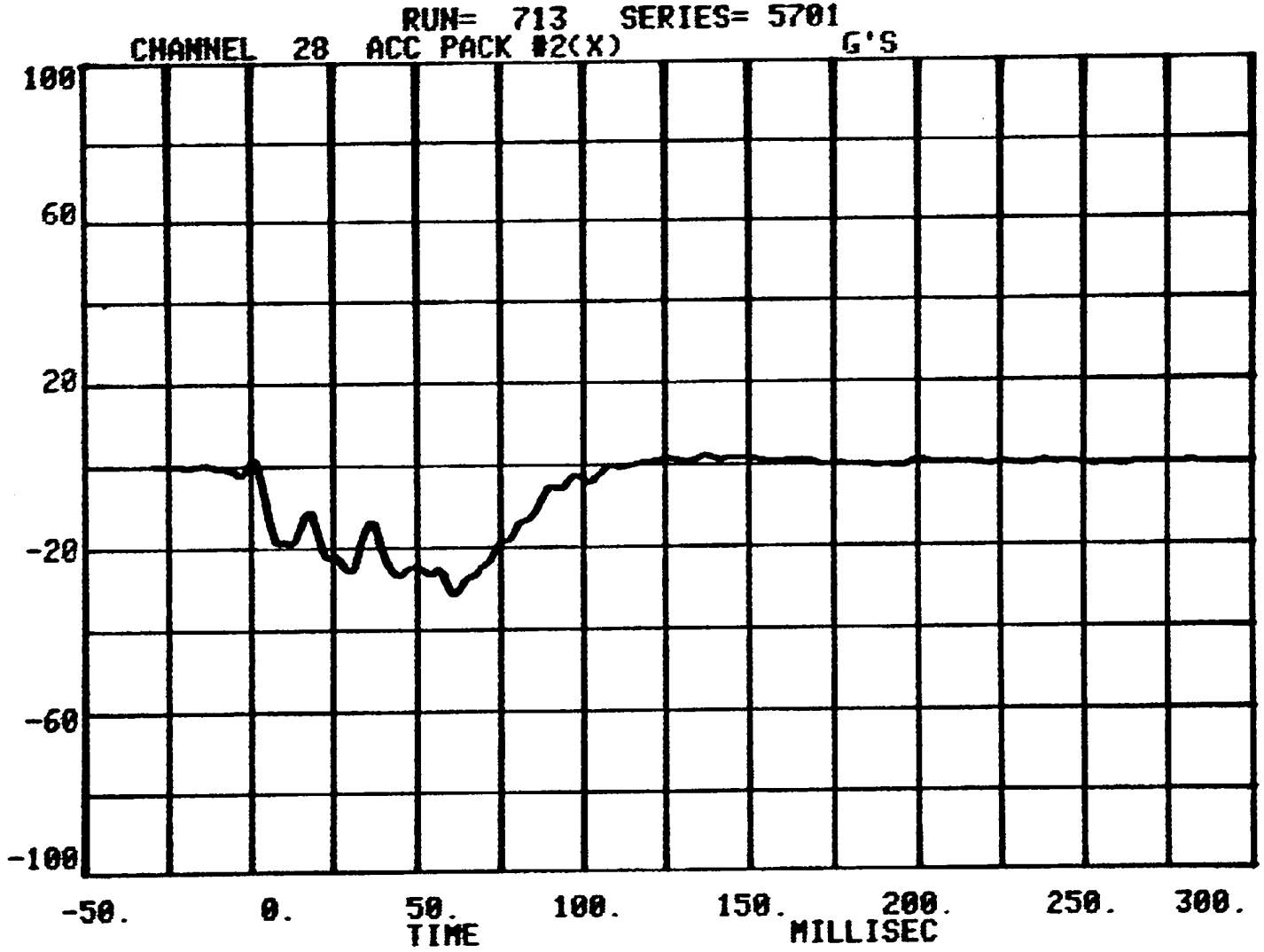
FILTER CHANNEL CLASS

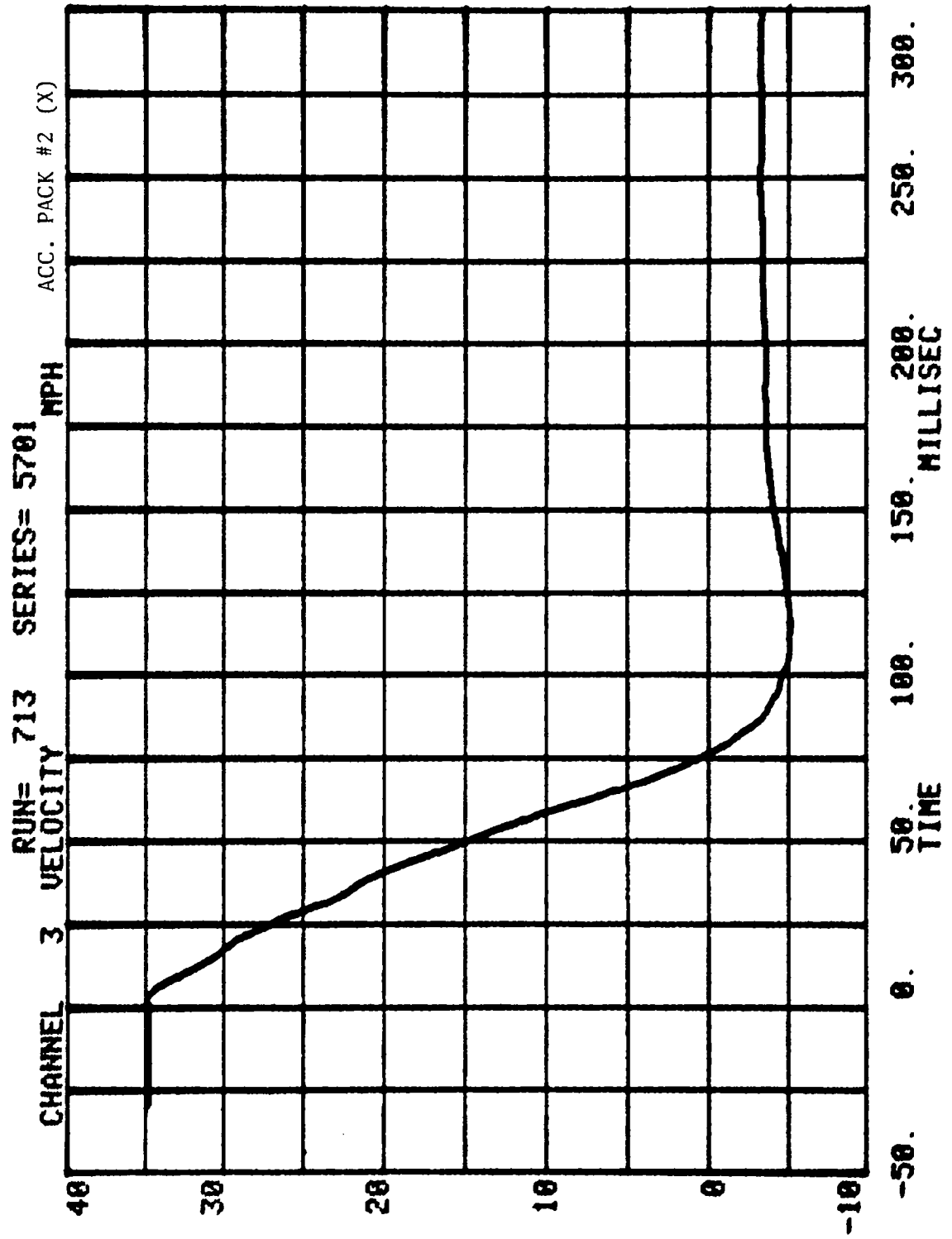
60

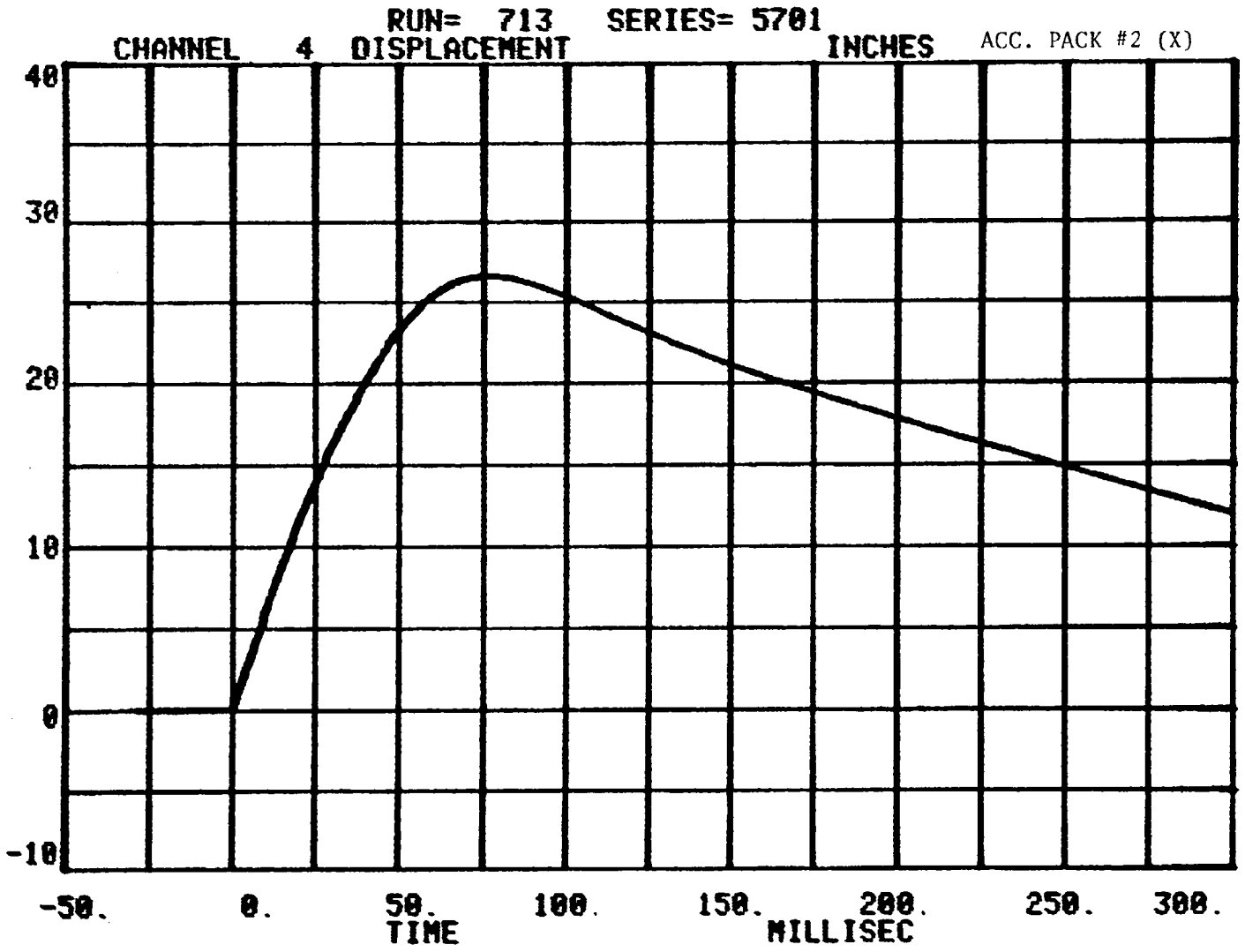

RUN= 713 SERIES= 5701
CHANNEL 27 ACC PACK #1(X) G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

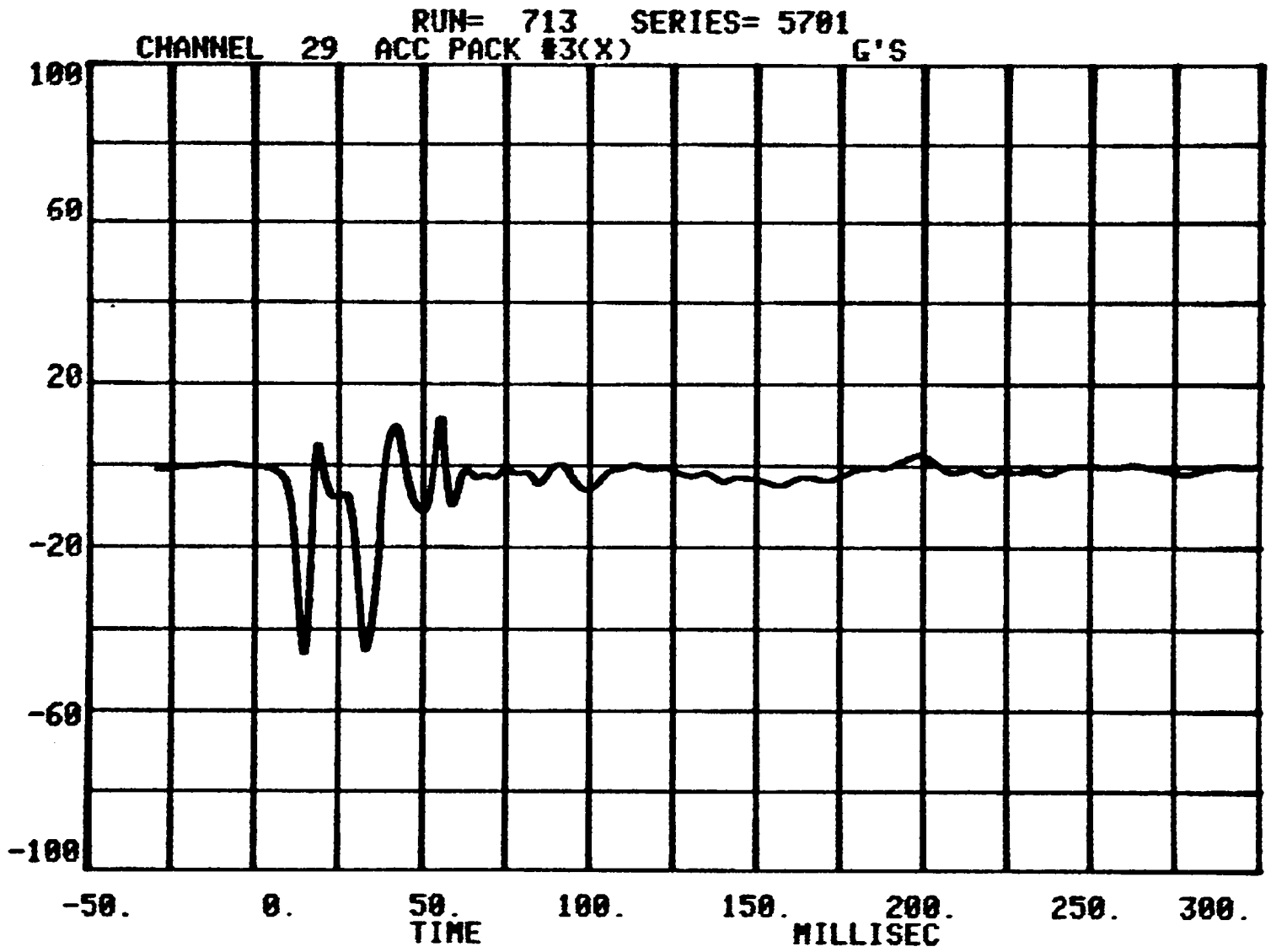

CHANNEL 1 VELOCITY
RUN= 713 SERIES= 5701
MPH
ACC. PACK #1 (X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

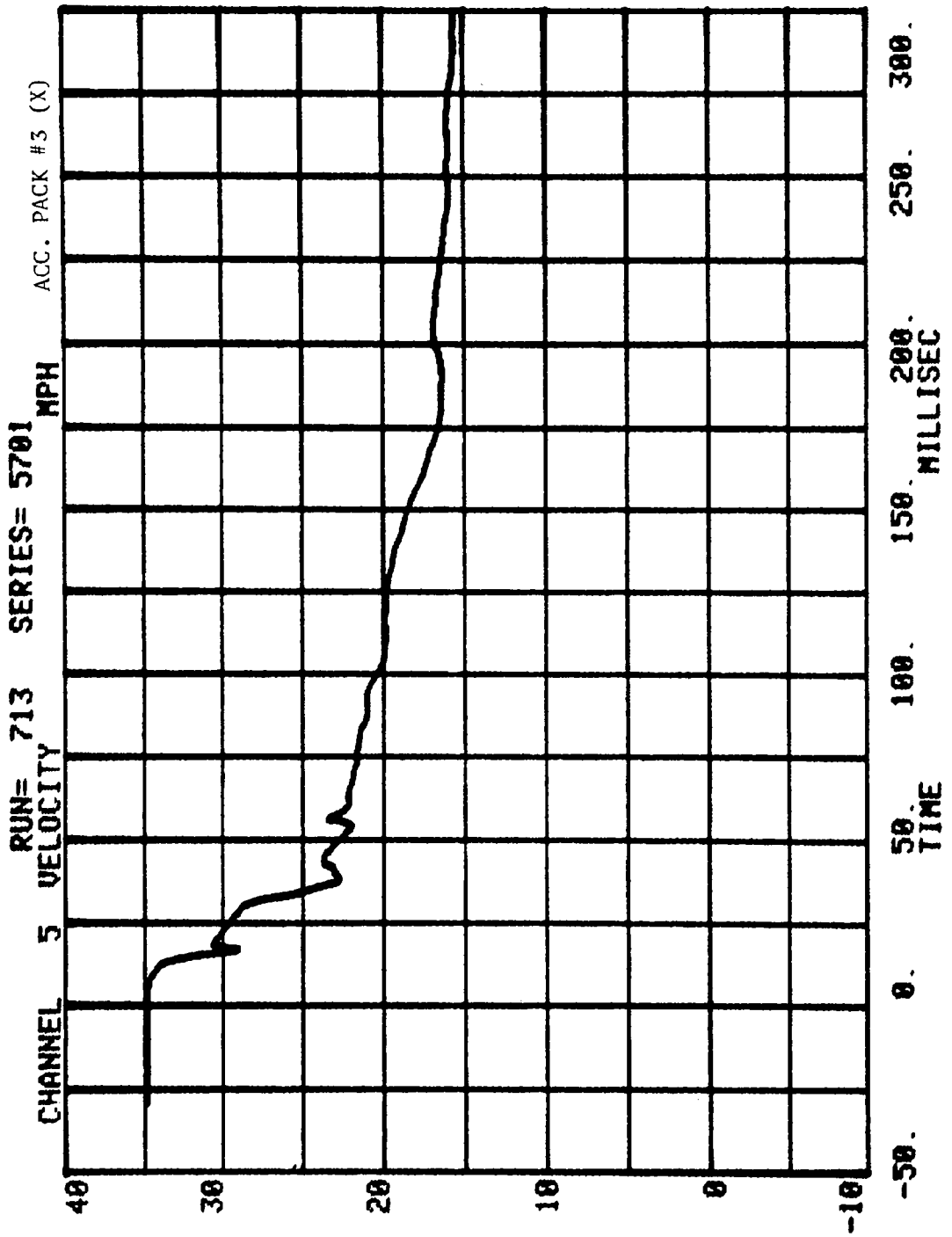

RUN= 713 SERIES= 5701
CHANNEL 2 DISPLACEMENT INCHES
ACC. PACK #1 (X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

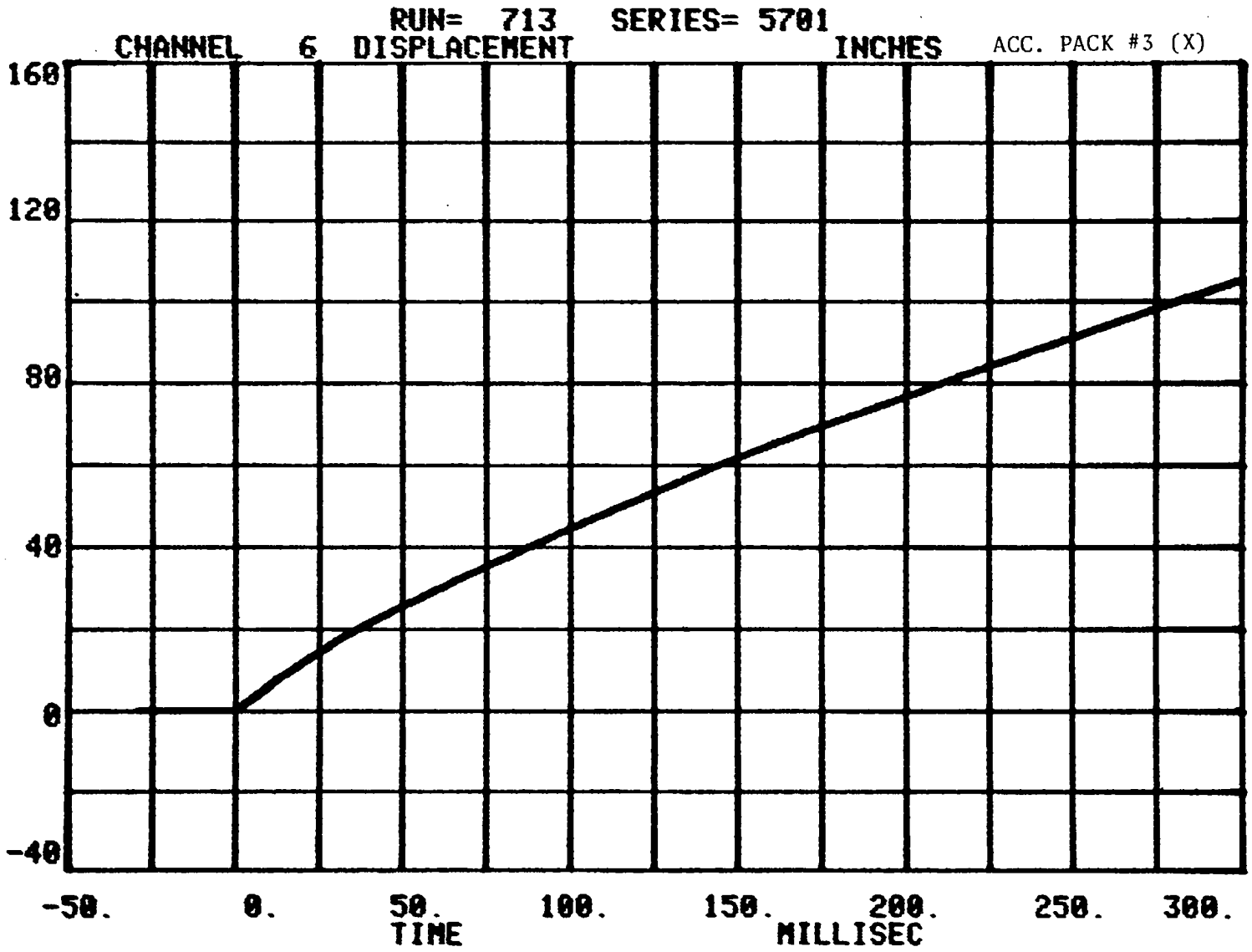

RUN= 713 SERIES= 5701
CHANNEL 28 ACC PACK #2(X)
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

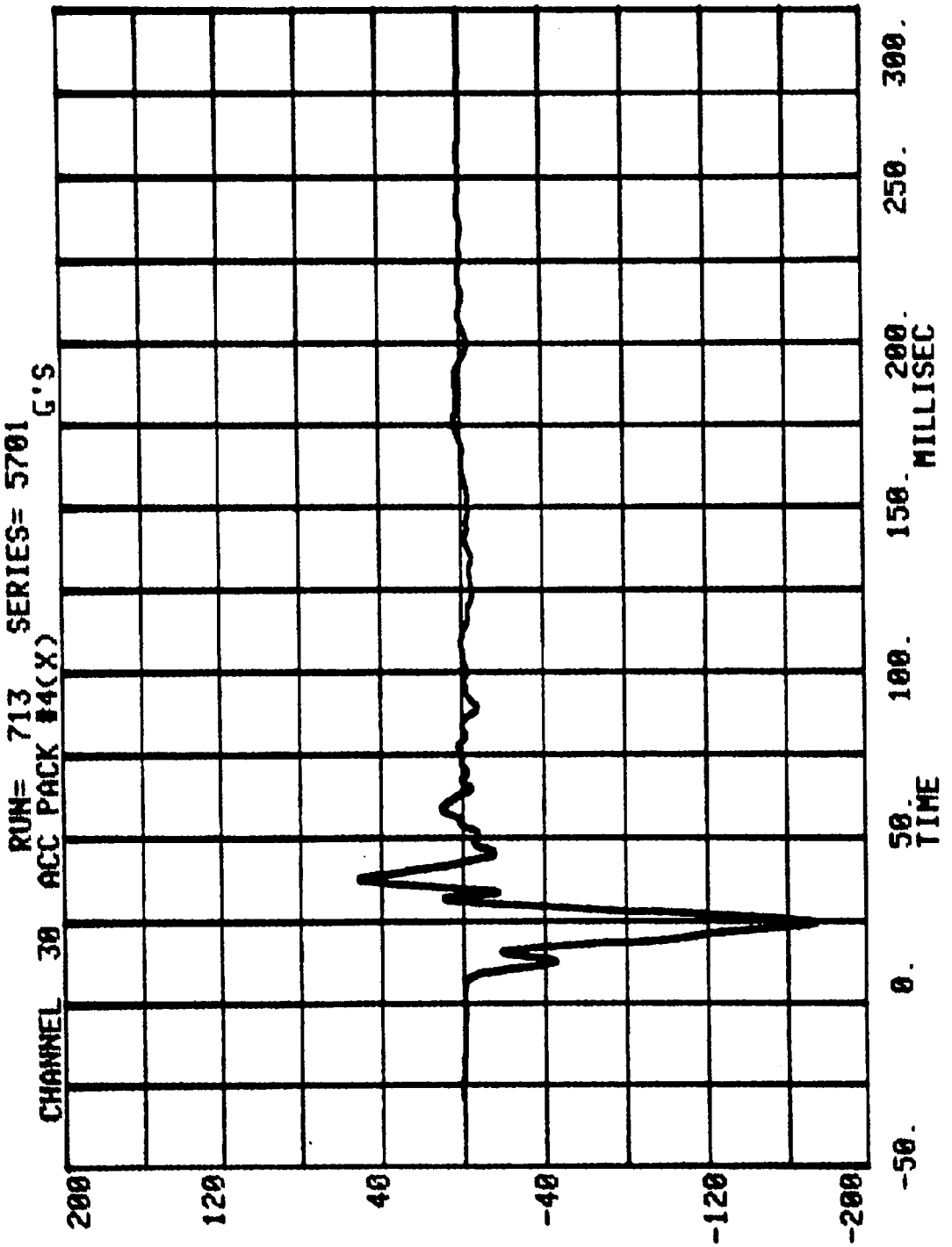

CHANNEL 3 VELOCITY
RUN= 713 SERIES= 5701
MPH
ACC. PACK #2 (X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

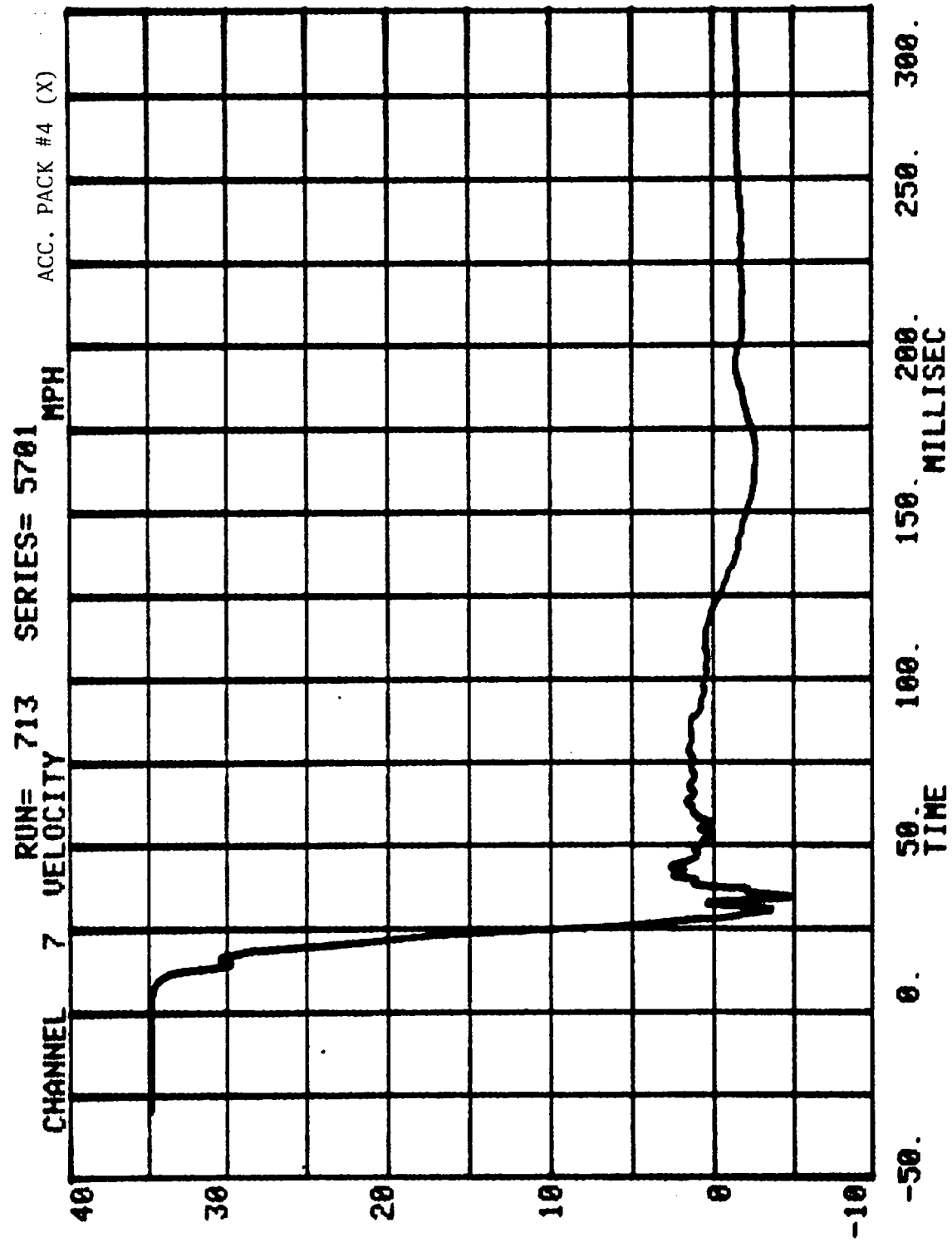

RUN= 713 SERIES= 5701
CHANNEL 4 DISPLACEMENT INCHES
ACC. PACK #2 (X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

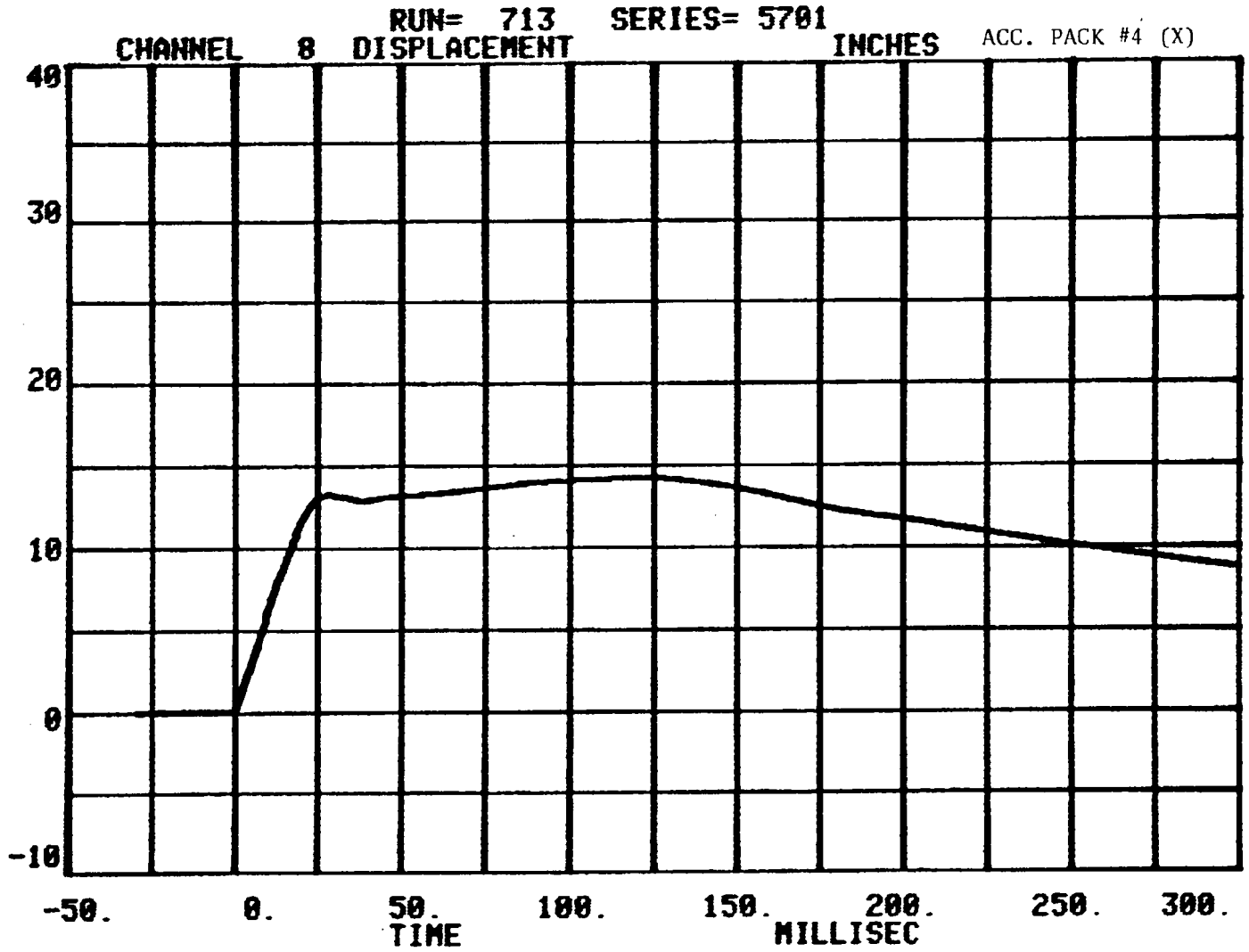

RUN= 713 SERIES= 5701
CHANNEL 29 ACC PACK #3(X)
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

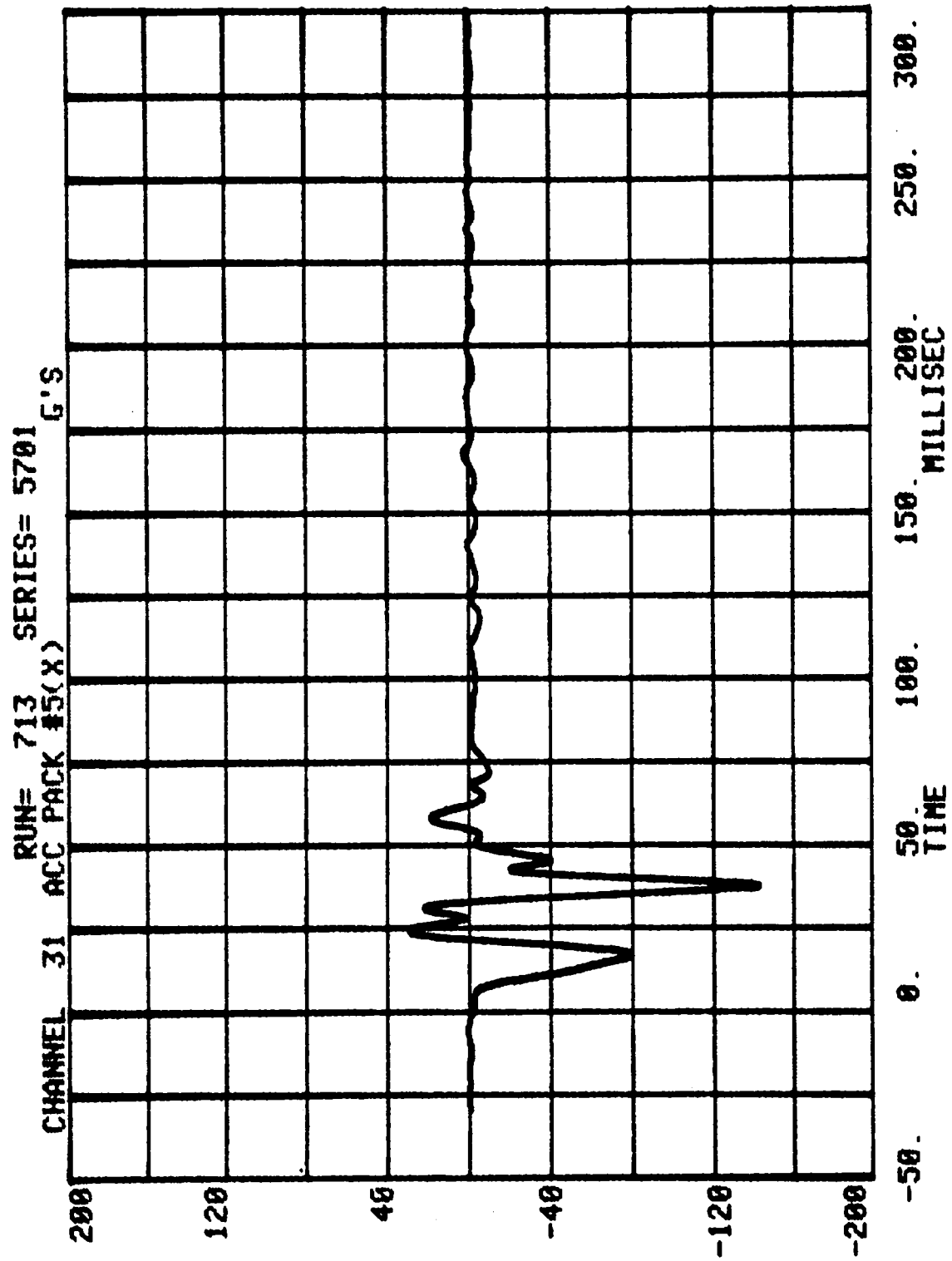

CHANNEL 5 VELOCITY
RUN= 713 SERIES= 5701
MPH
ACC. PACK #3 (X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

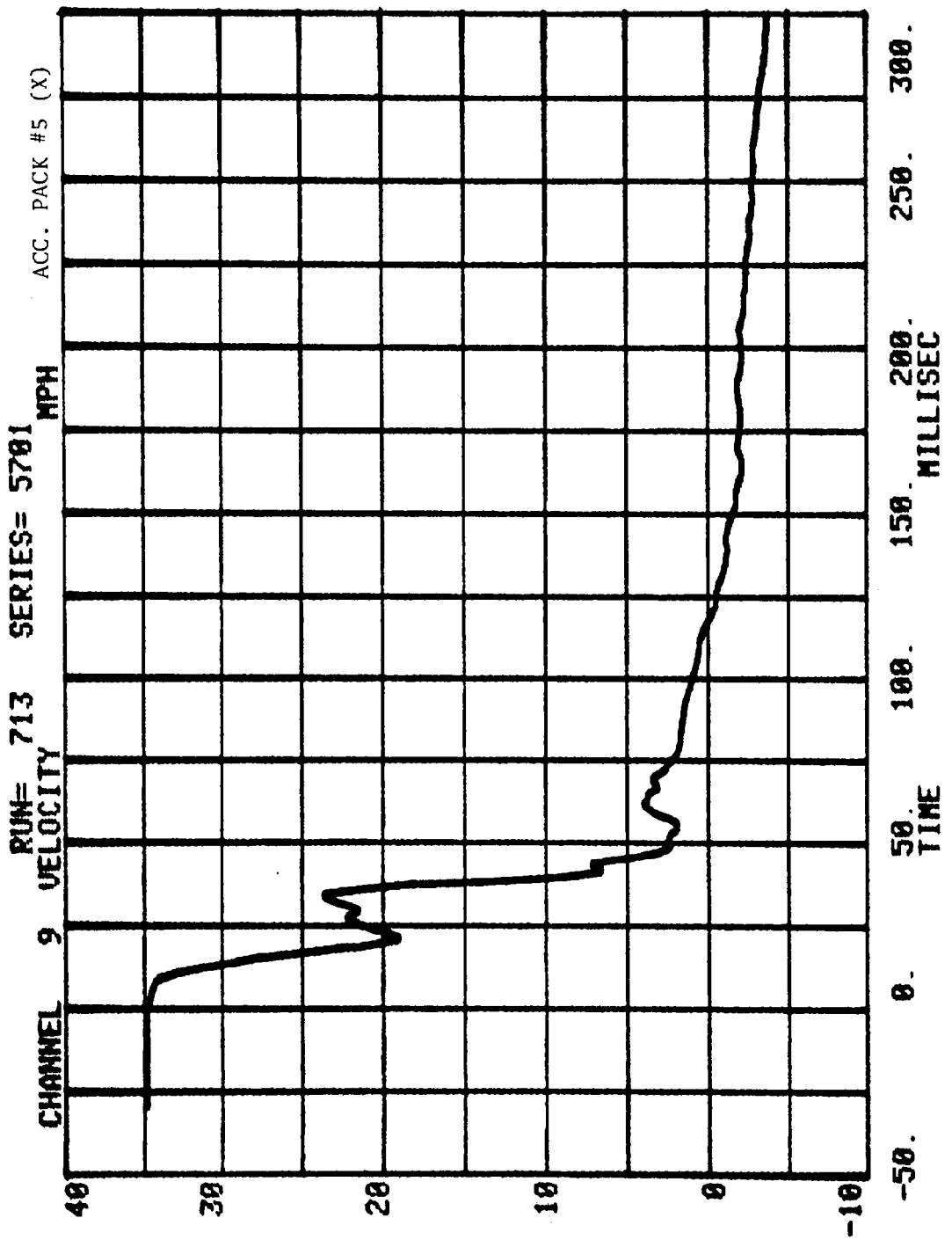

RUN= 713 SERIES= 5701
CHANNEL 6 DISPLACEMENT INCHES
ACC. PACK #3 (X)
160
120
80
40
0
-40
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

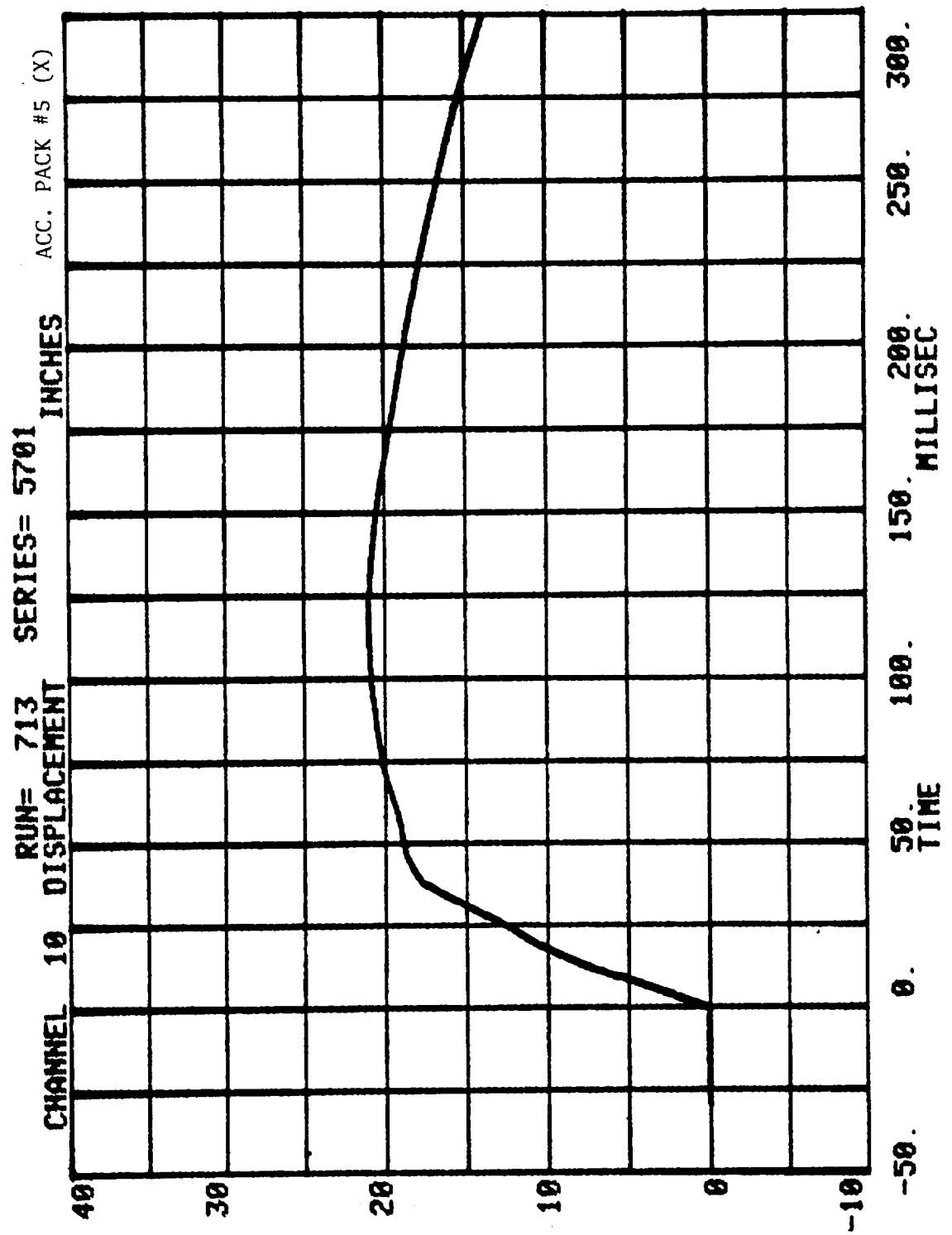

CHANNEL 30 ACC PACK #4(X)
RUN= 713 SERIES= 5701
G'S
200
120
40
-40
-120
-200
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

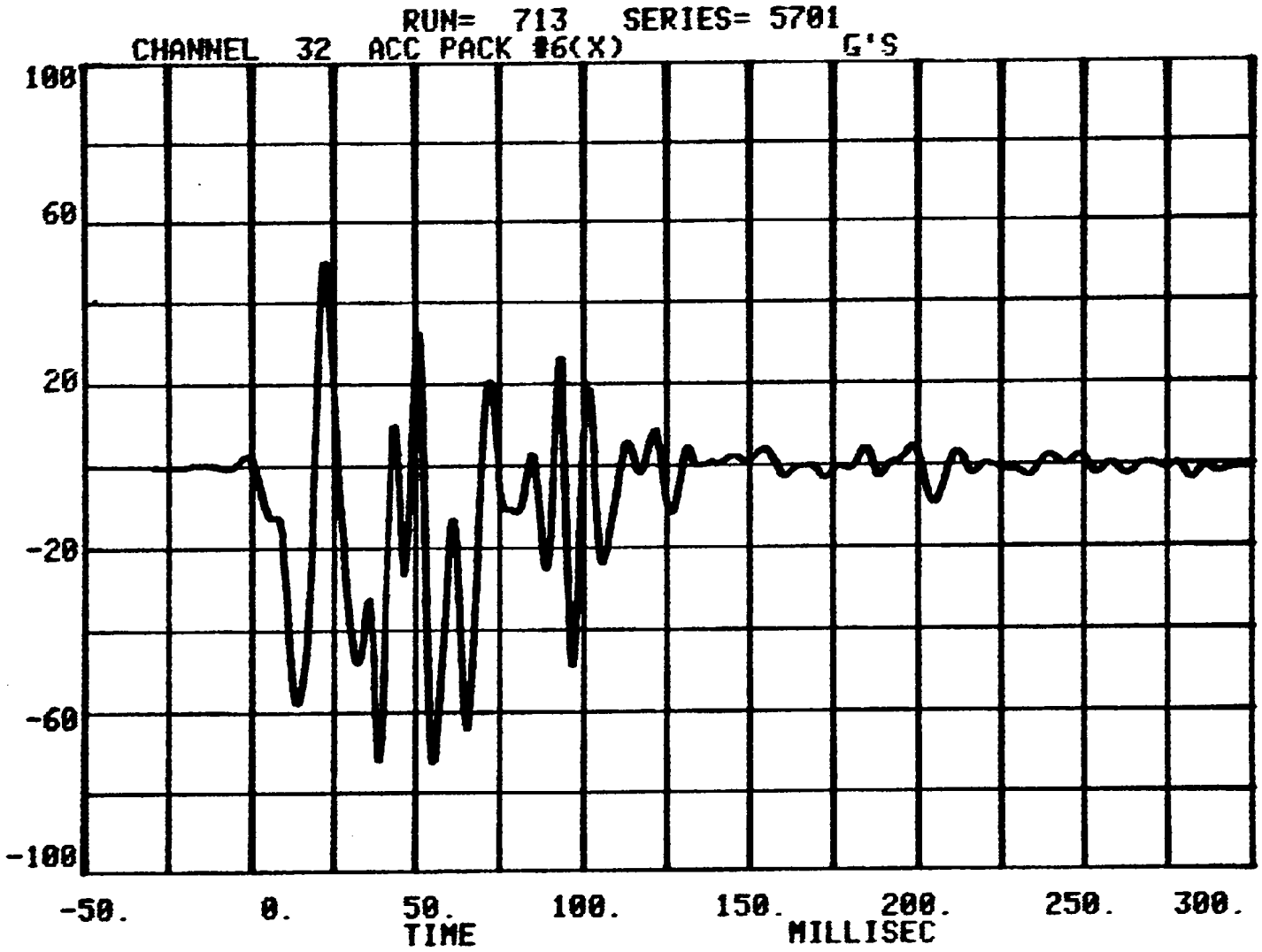

CHANNEL 7 VELOCITY
RUN= 713 SERIES= 5701
ACC. PACK #4 (X)
MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

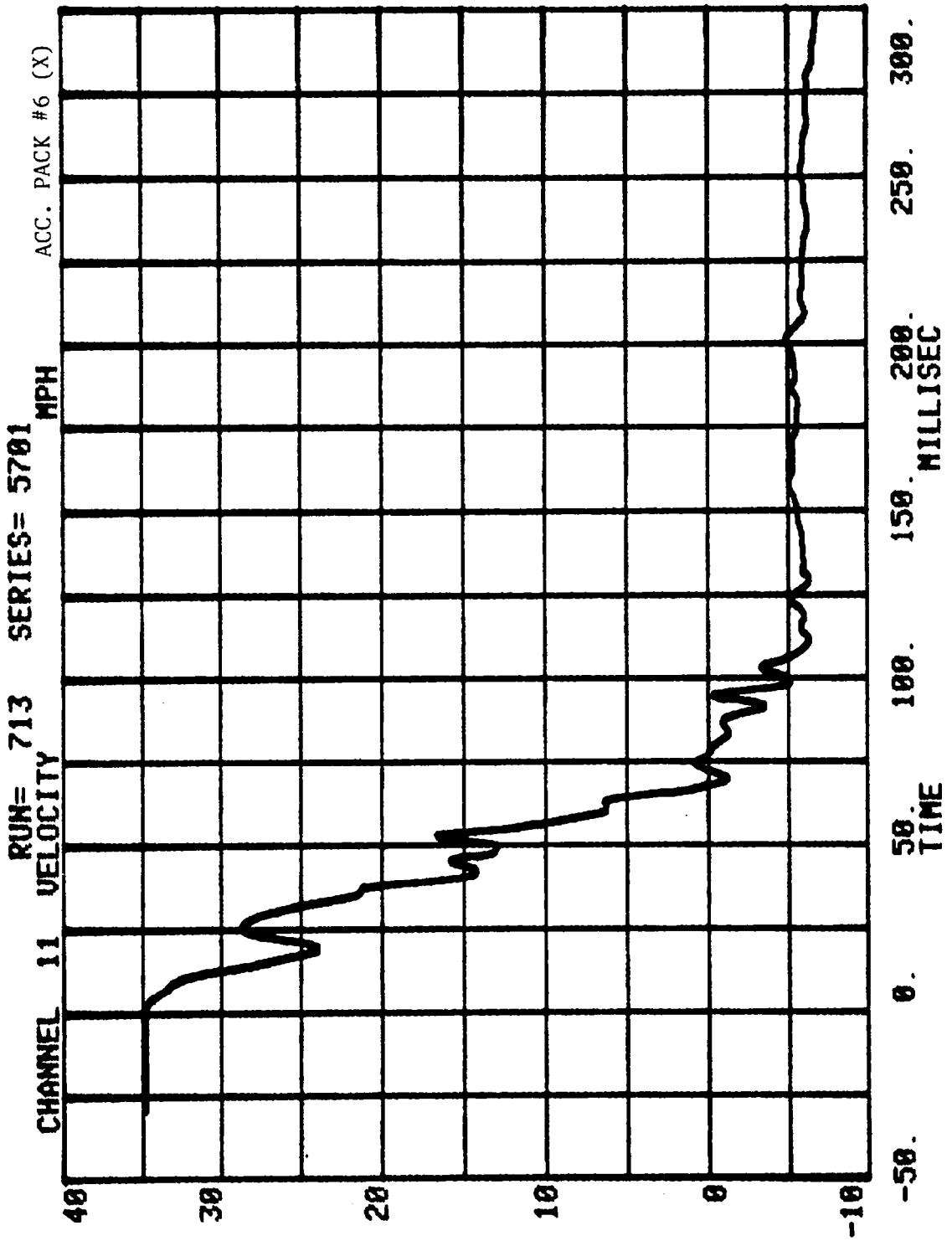

RUN= 713 SERIES= 5701
CHANNEL 8 DISPLACEMENT INCHES
ACC. PACK #4 (X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

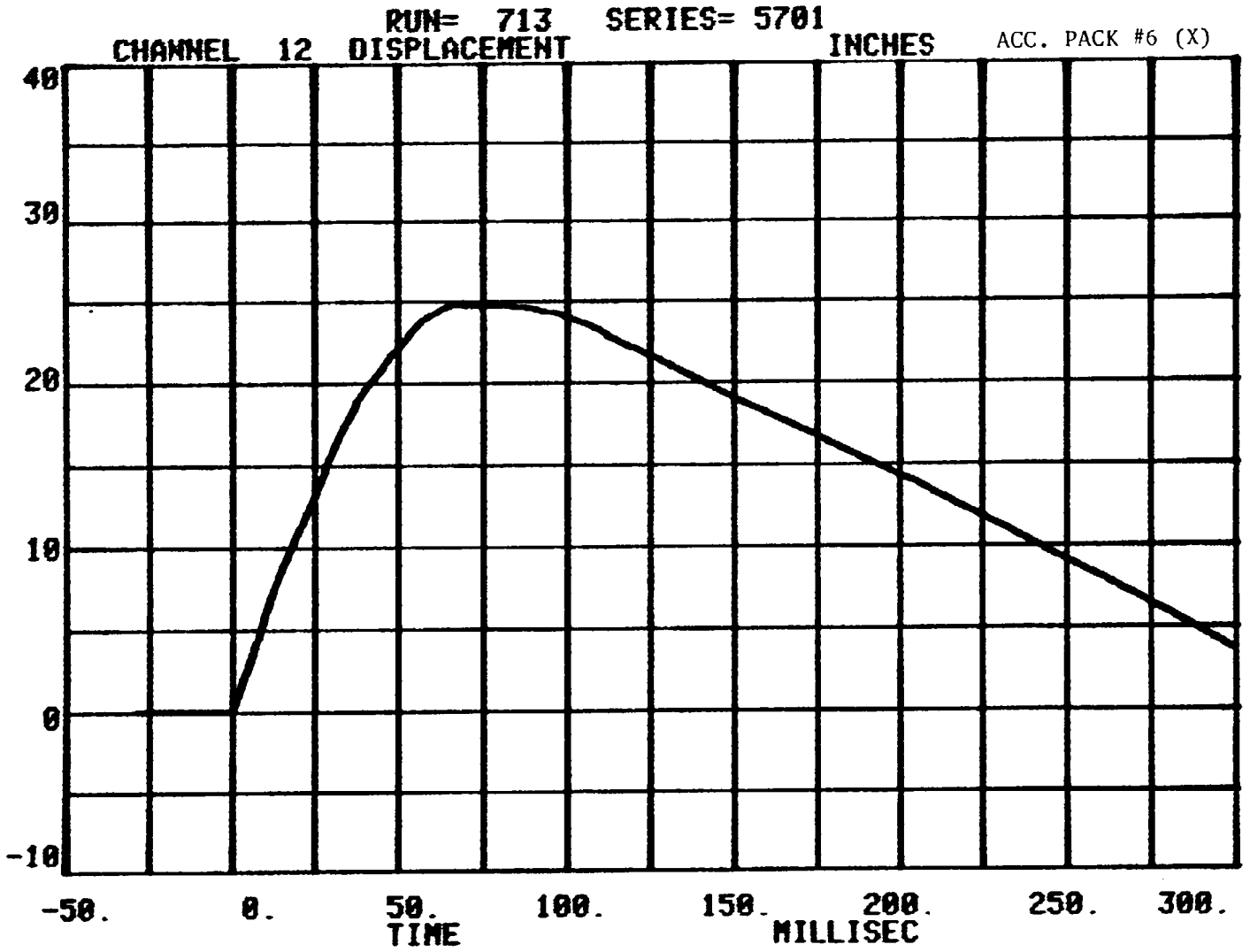

CHANNEL 31 ACC PACK #5(X)
RUN= 713 SERIES= 5701
G'S
200
120
40
-40
-120
-200
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

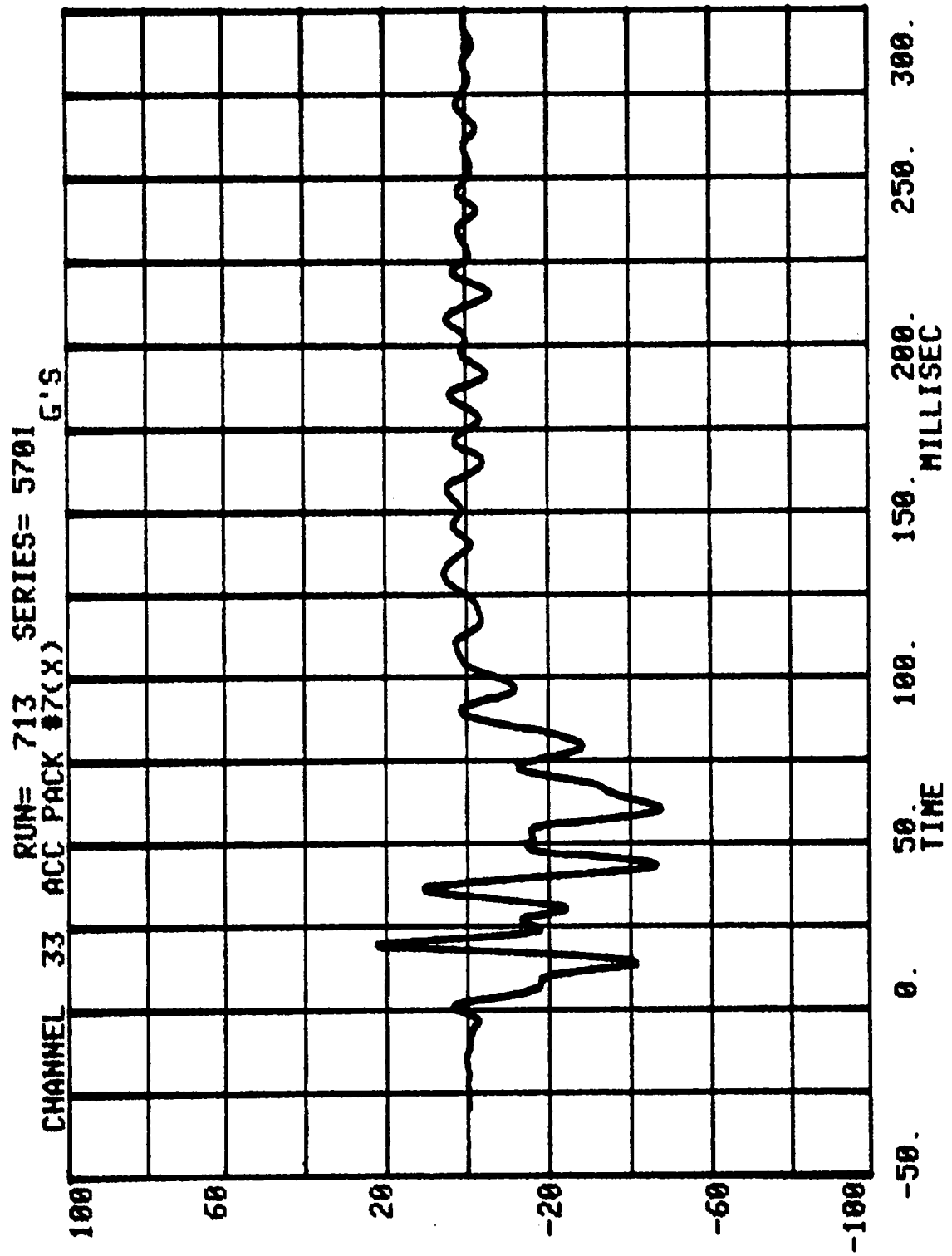

CHANNEL 9 VELOCITY
RUN= 713 SERIES= 5701
ACC. PACK #5 (X)
MPH
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

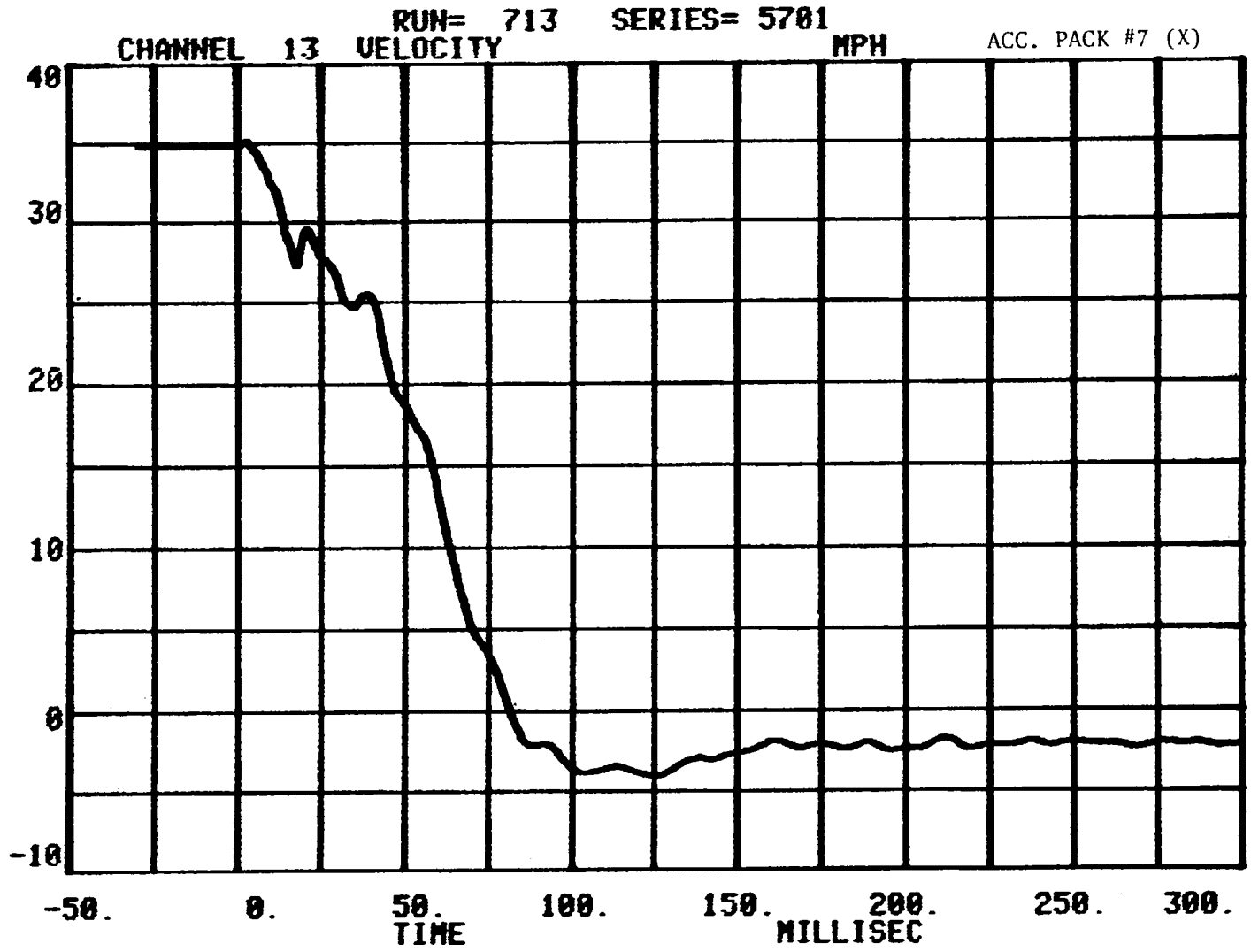

CHANNEL 10 DISPLACEMENT
RUN= 713 SERIES= 5701
INCHES
ACC. PACK #5 (X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

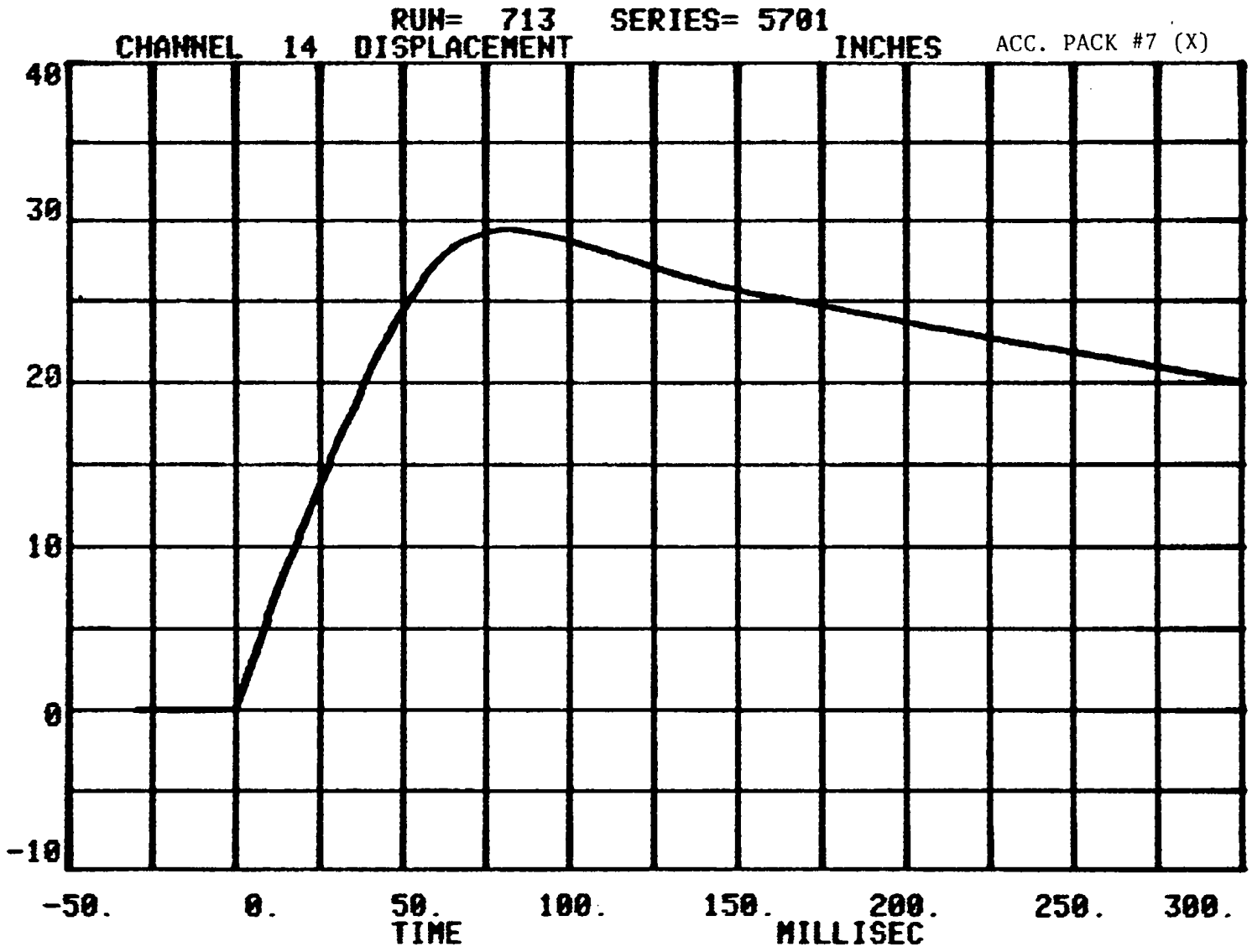

RUN= 713 SERIES= 5701
CHANNEL 32 ACC PACK #6(X)
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 11 VELOCITY
RUN= 713 SERIES= 5701
MPH
ACC. PACK #6 (X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 713 SERIES= 5701
CHANNEL 12 DISPLACEMENT INCHES
ACC. PACK #6 (X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC


RUN= 713 SERIES= 5701
CHANNEL 33 ACC PACK #7(X)
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

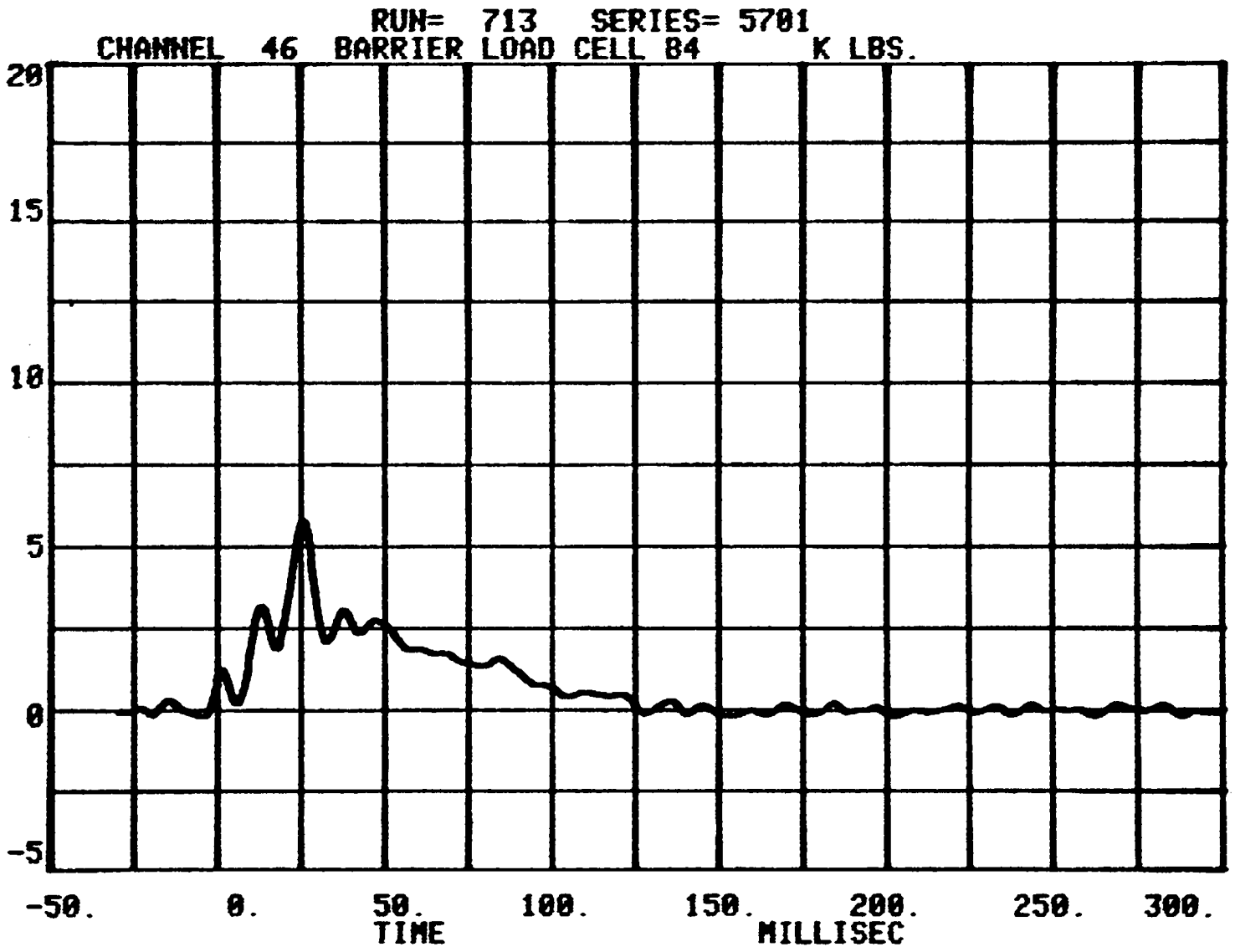

RUN= 713 SERIES= 5701
CHANNEL 13 VELOCITY
MPH
ACC. PACK #7 (X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

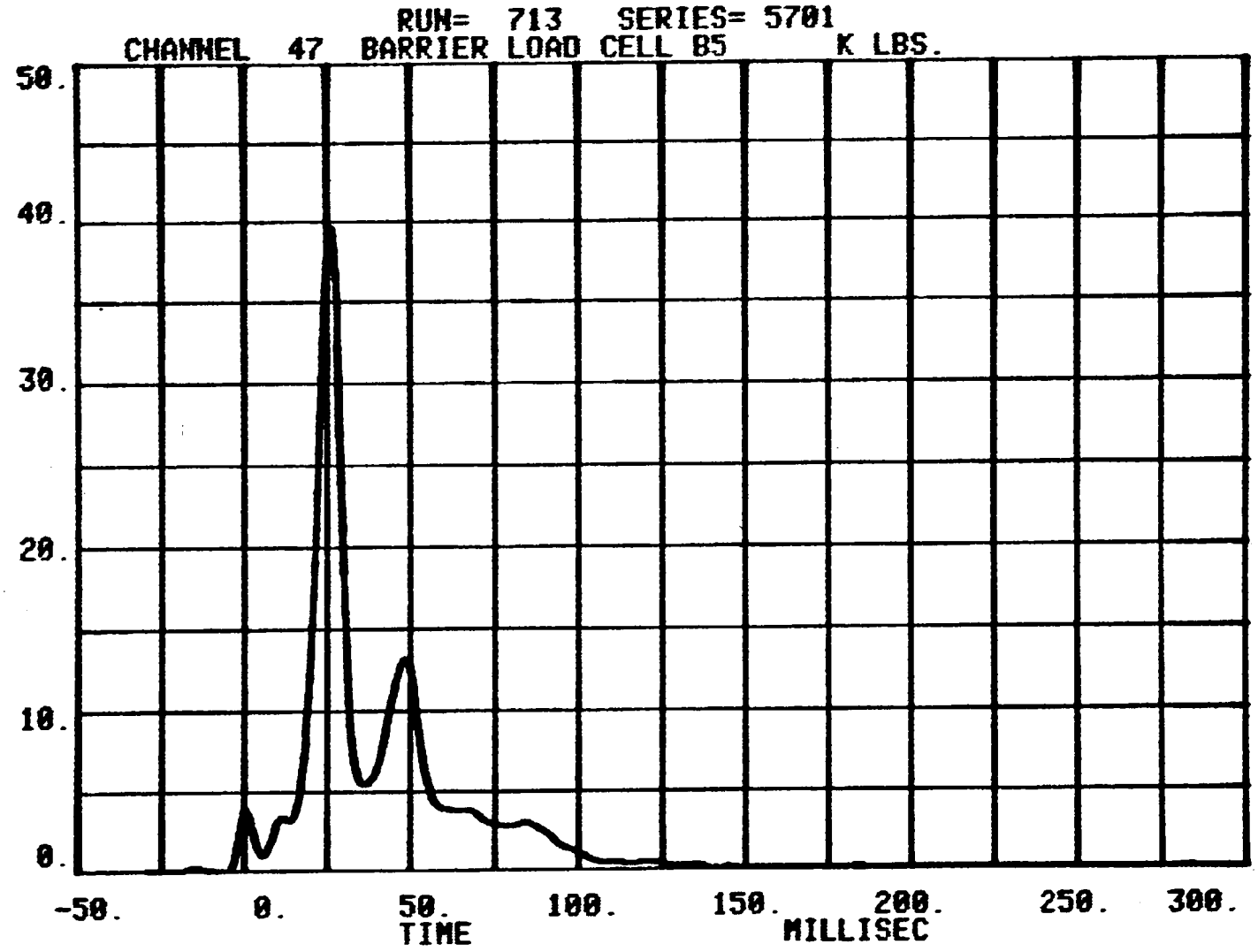

RUN= 713 SERIES= 5701
CHANNEL 14 DISPLACEMENT INCHES
ACC. PACK #7 (X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

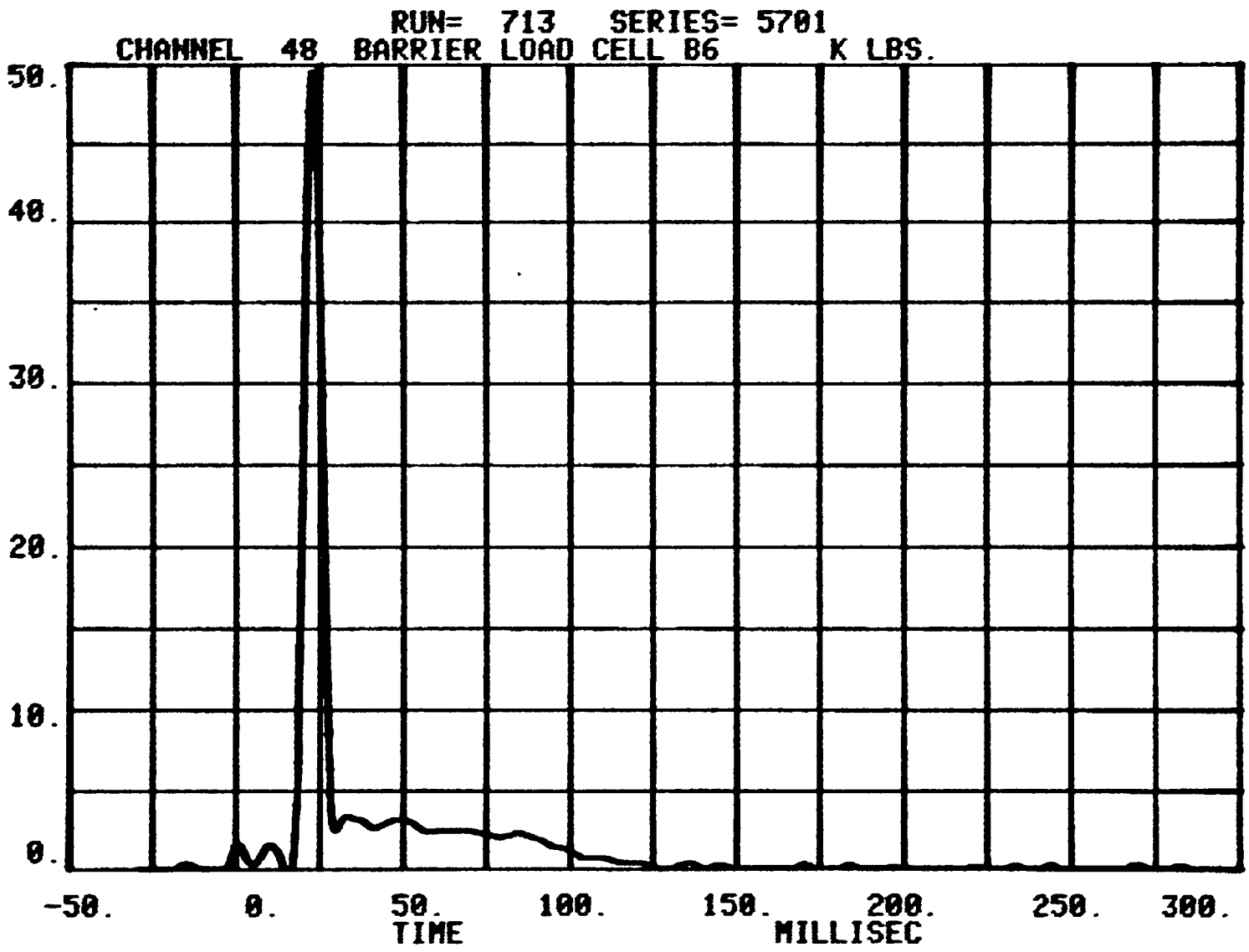
TEST NO. MG5701

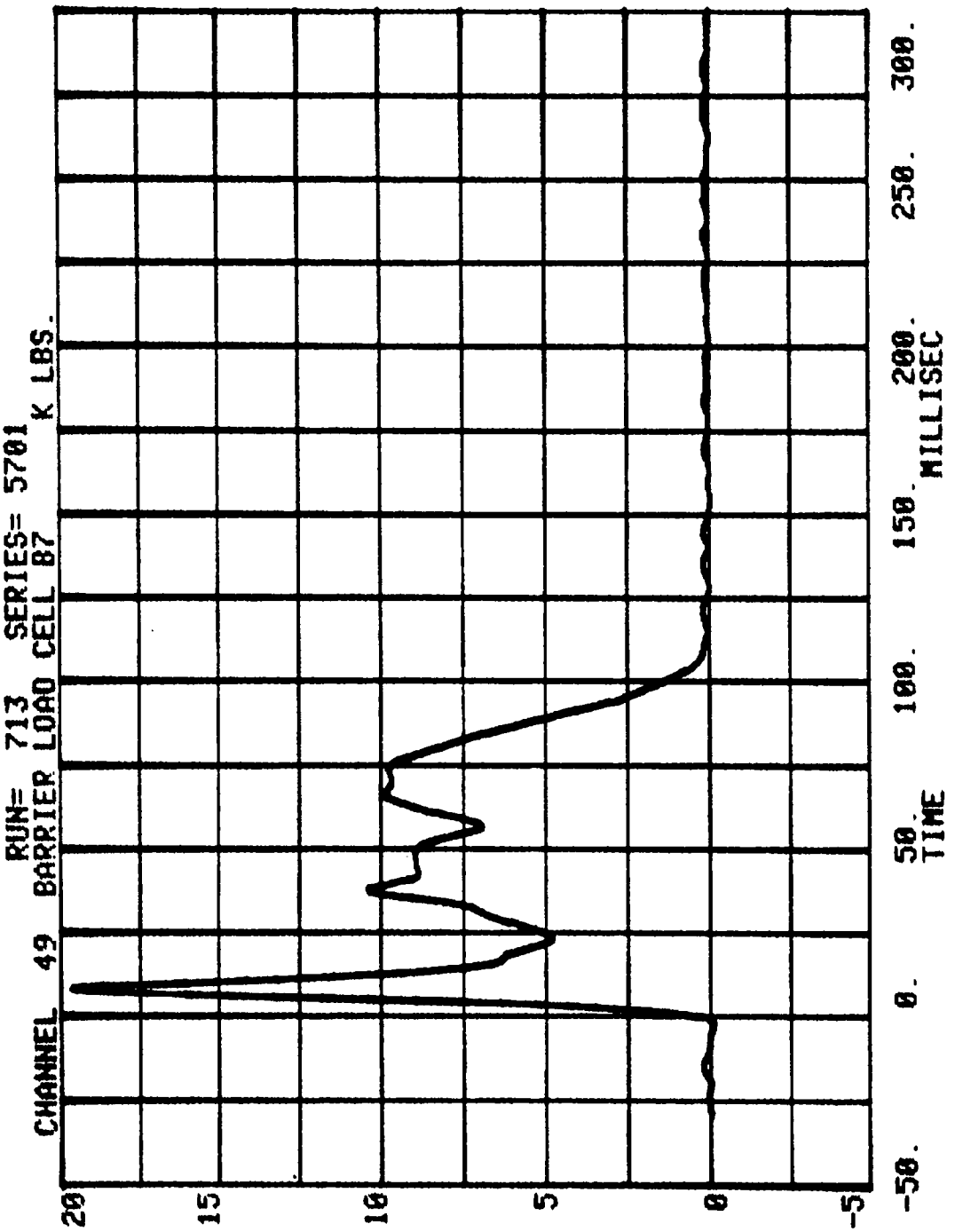
LOAD CELL BARRIER DATA
FILTER CHANNEL CLASS

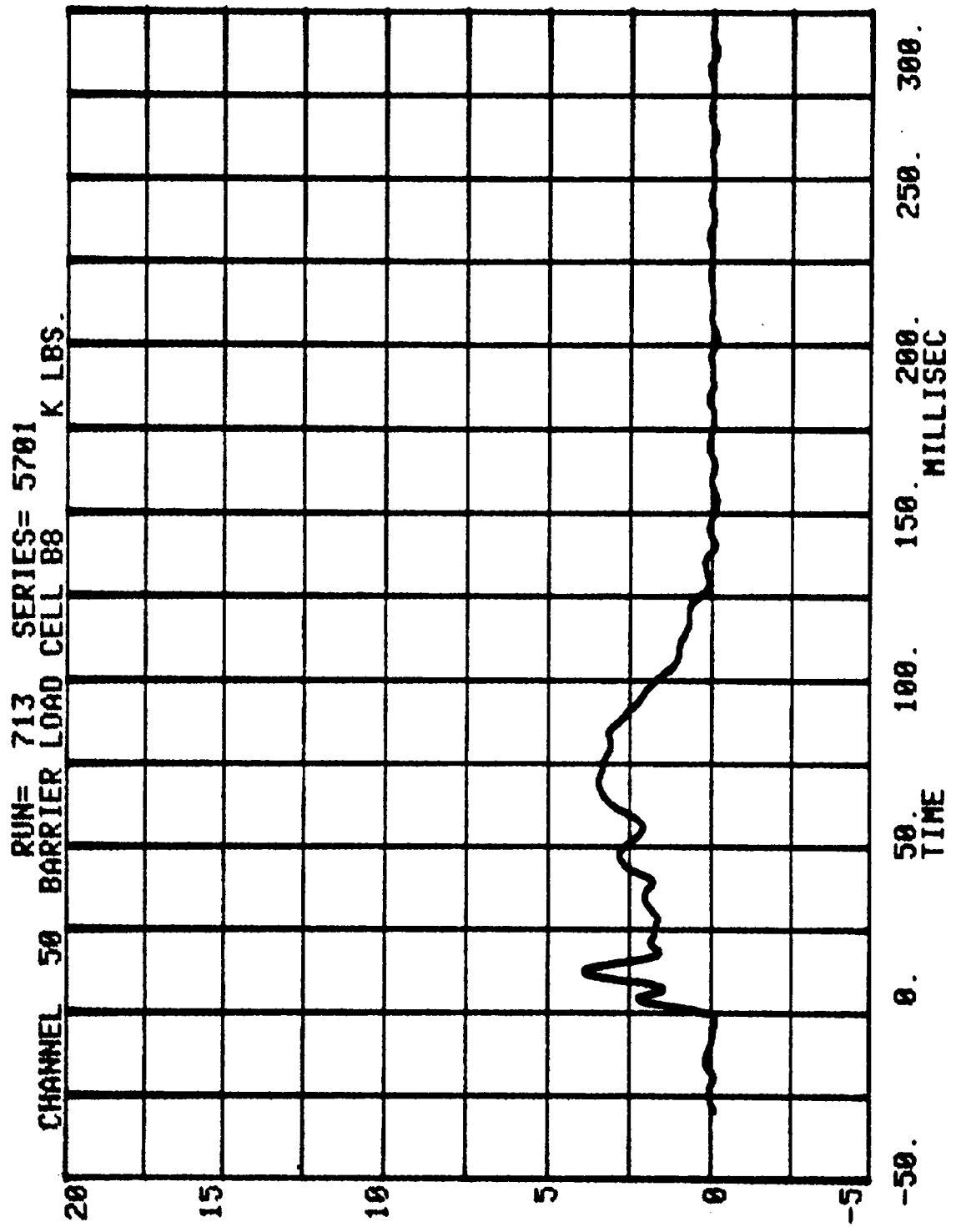
60

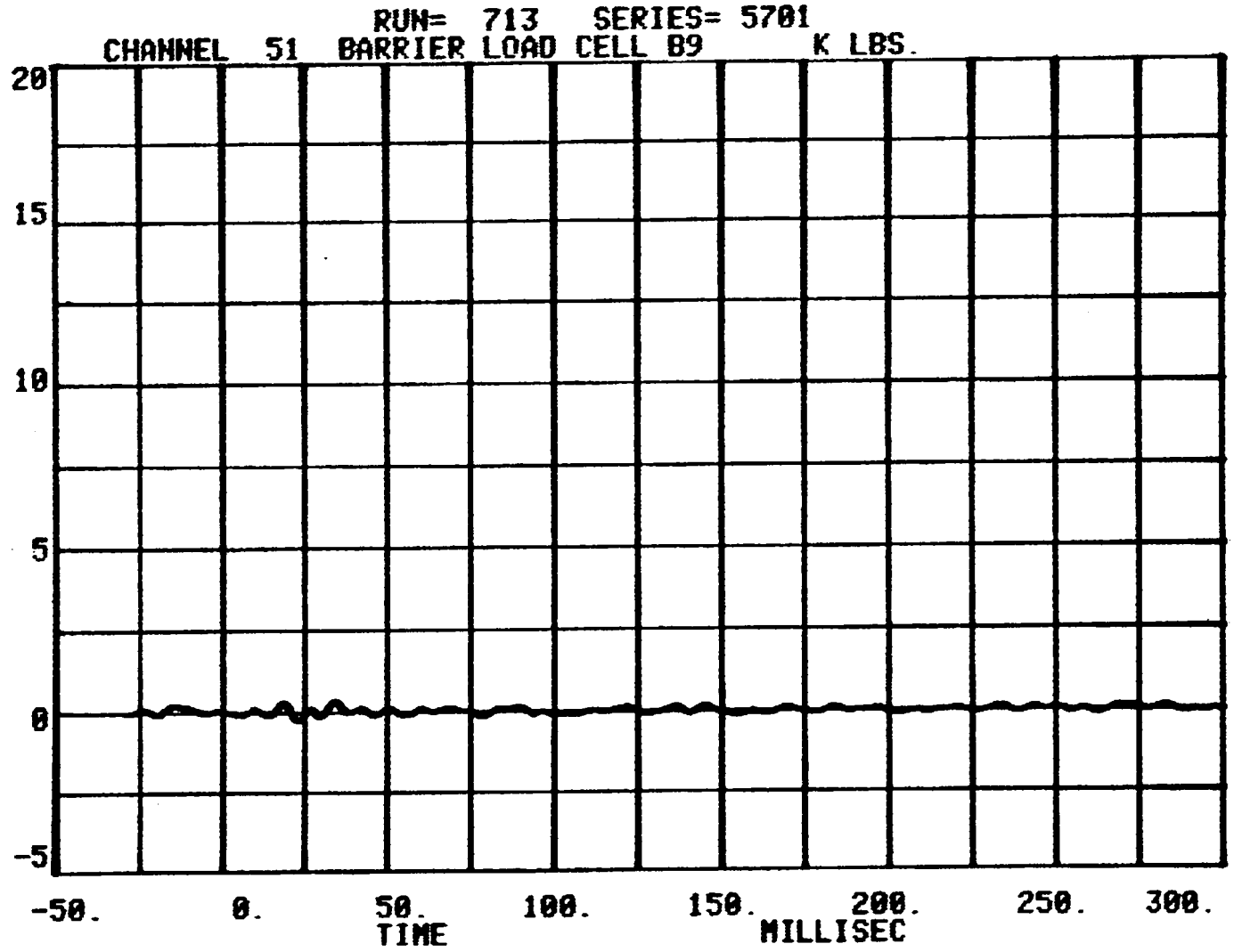

RUN= 713 SERIES= 5701
CHANNEL 46 BARRIER LOAD CELL B4 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

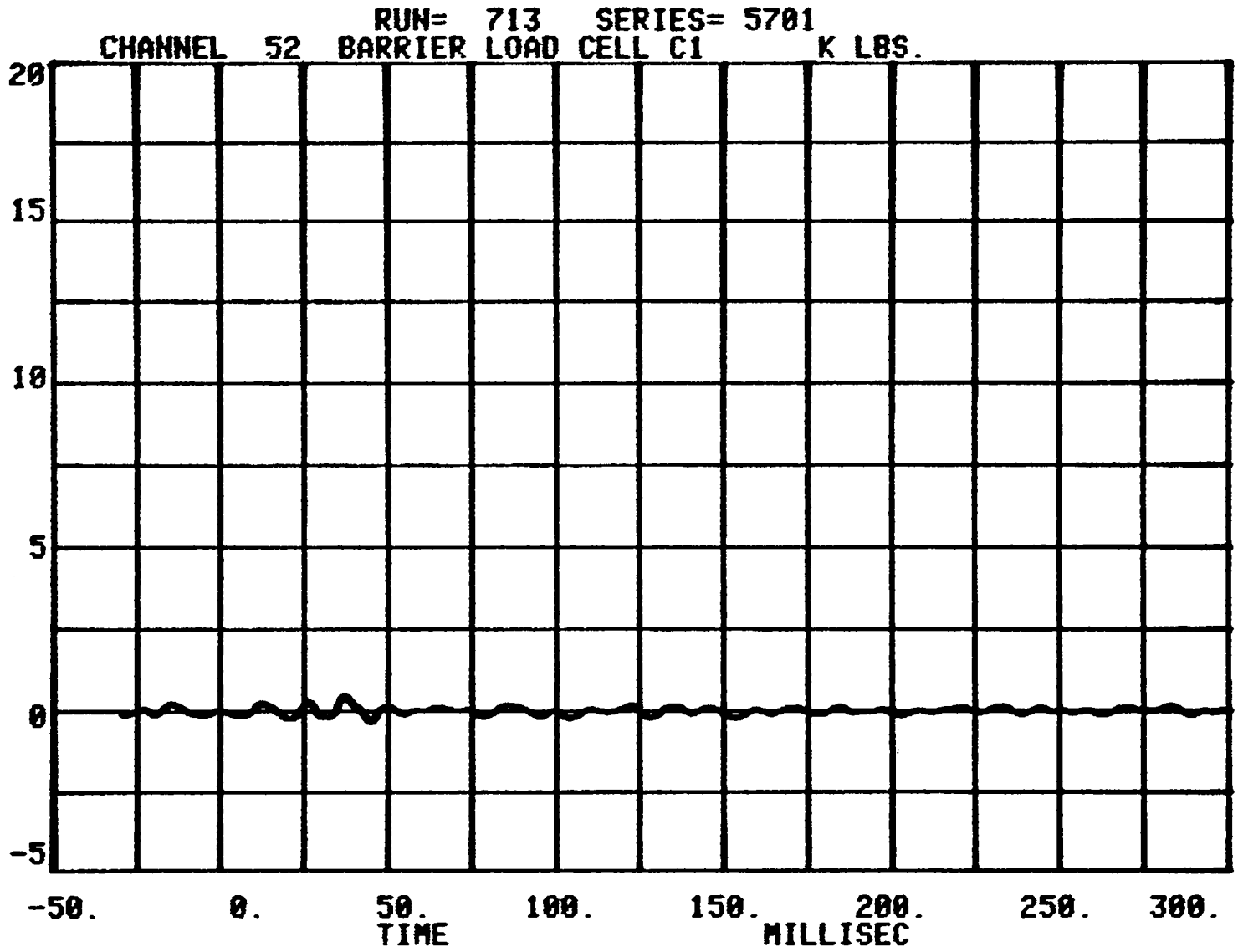

RUN= 713 SERIES= 5701
CHANNEL 47 BARRIER LOAD CELL B5 K LBS.
50.
40.
30.
20.
10.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

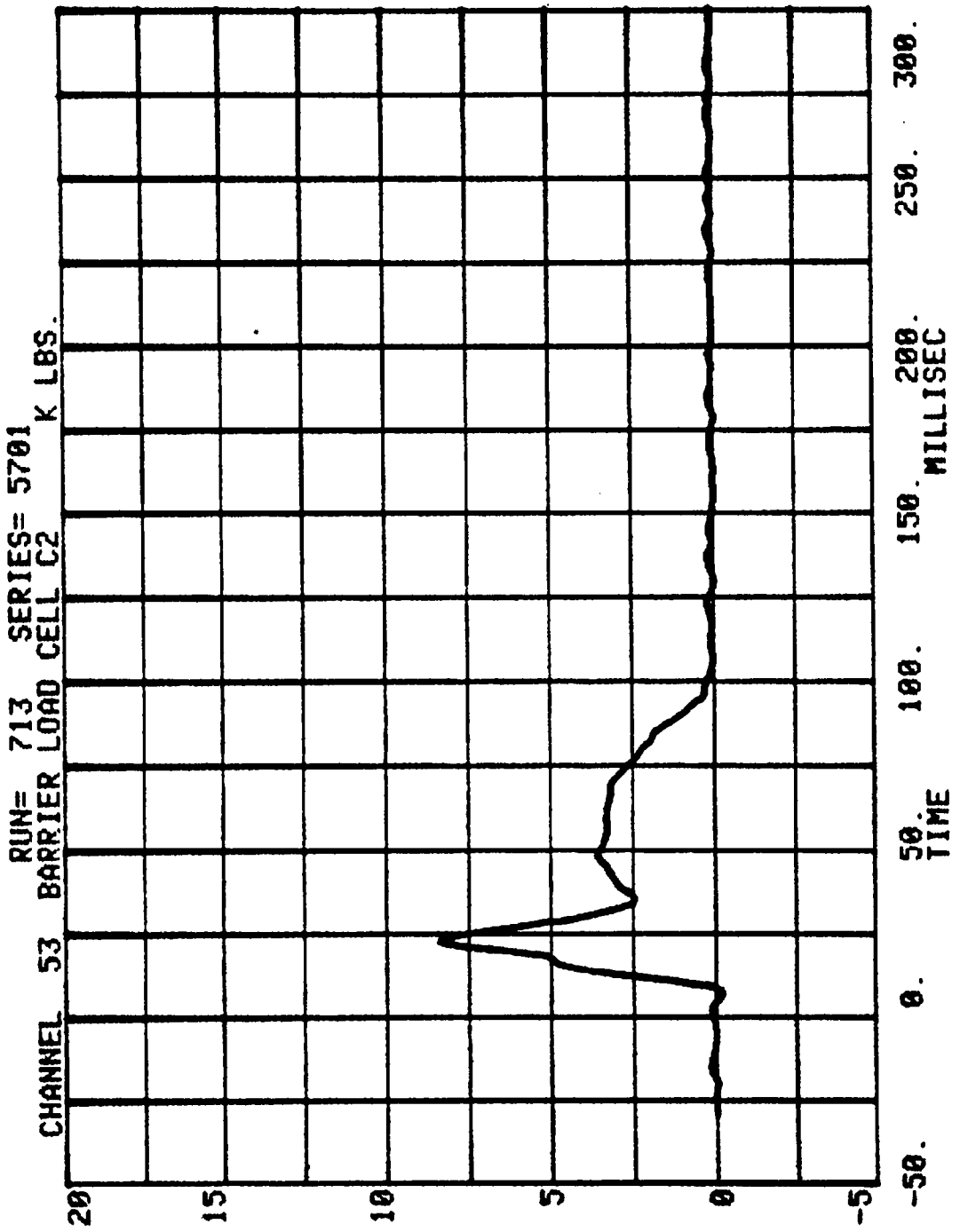

RUN= 713 SERIES= 5701
CHANNEL 48 BARRIER LOAD CELL B6 K LBS.
50.
40.
30.
20.
10.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

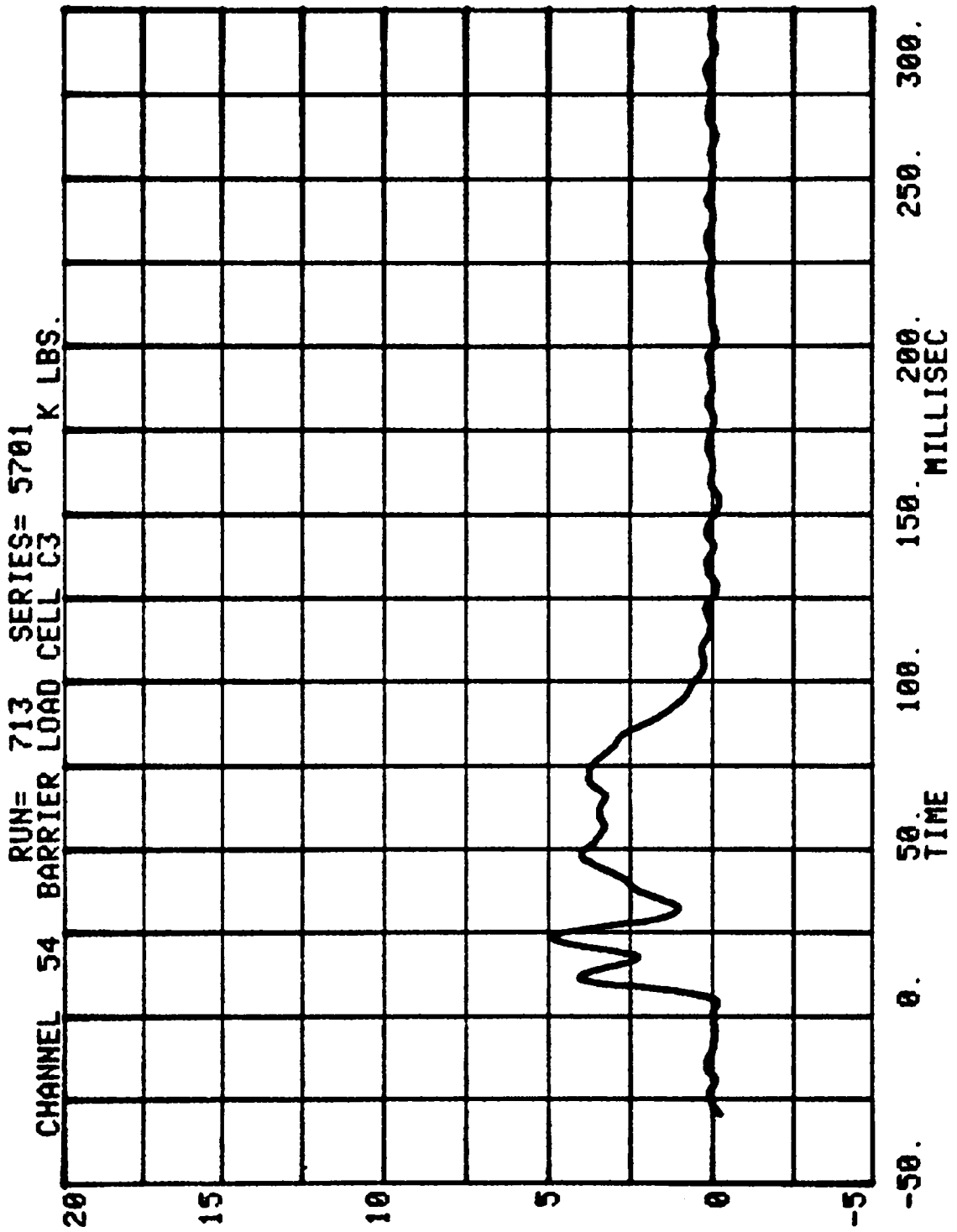

CHANNEL 49 RUN= 713 SERIES= 5701
BARRIER LOAD CELL 87 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

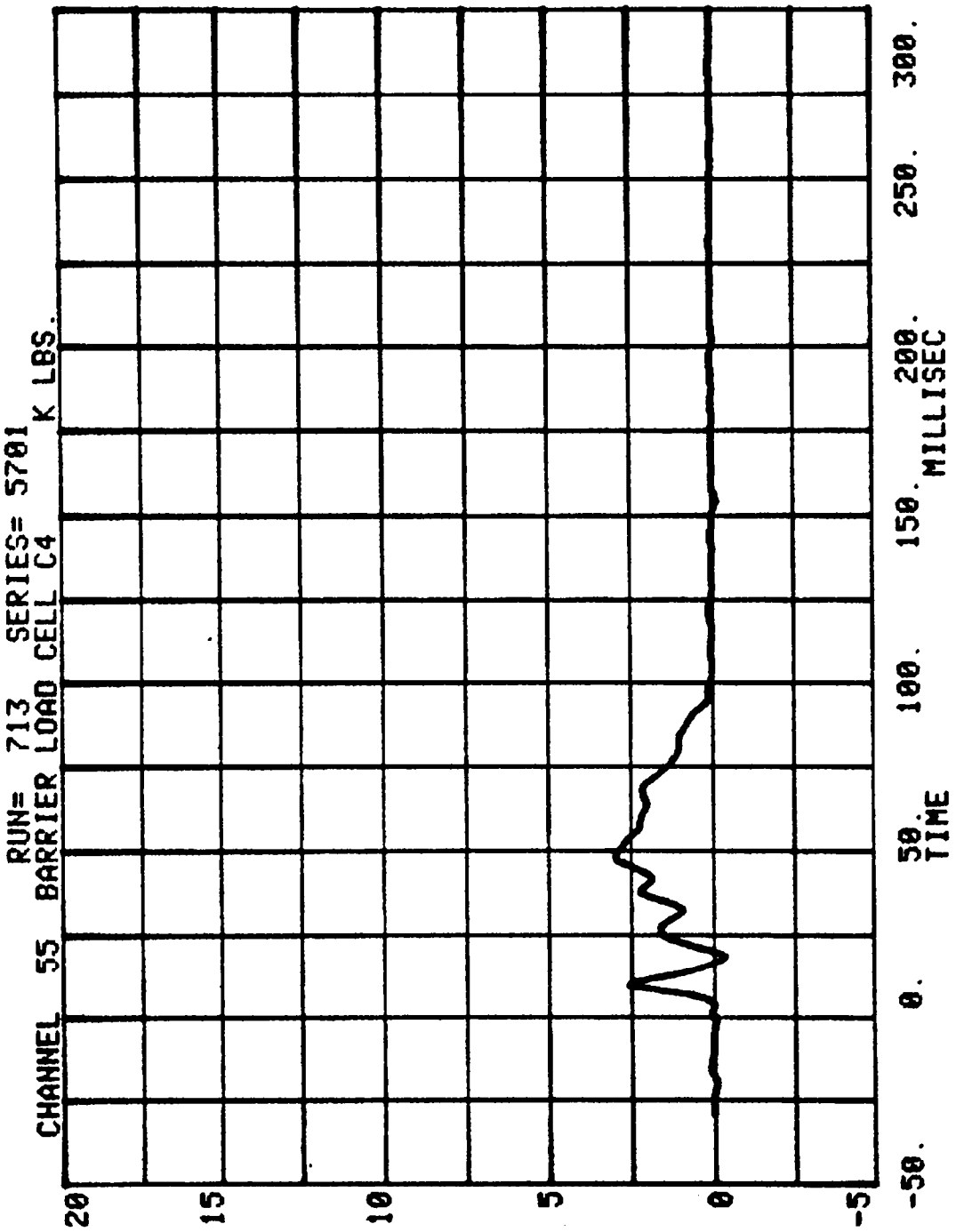

CHANNEL 50 BARRIER LOAD CELL B8
RUN= 713 SERIES= 5701
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

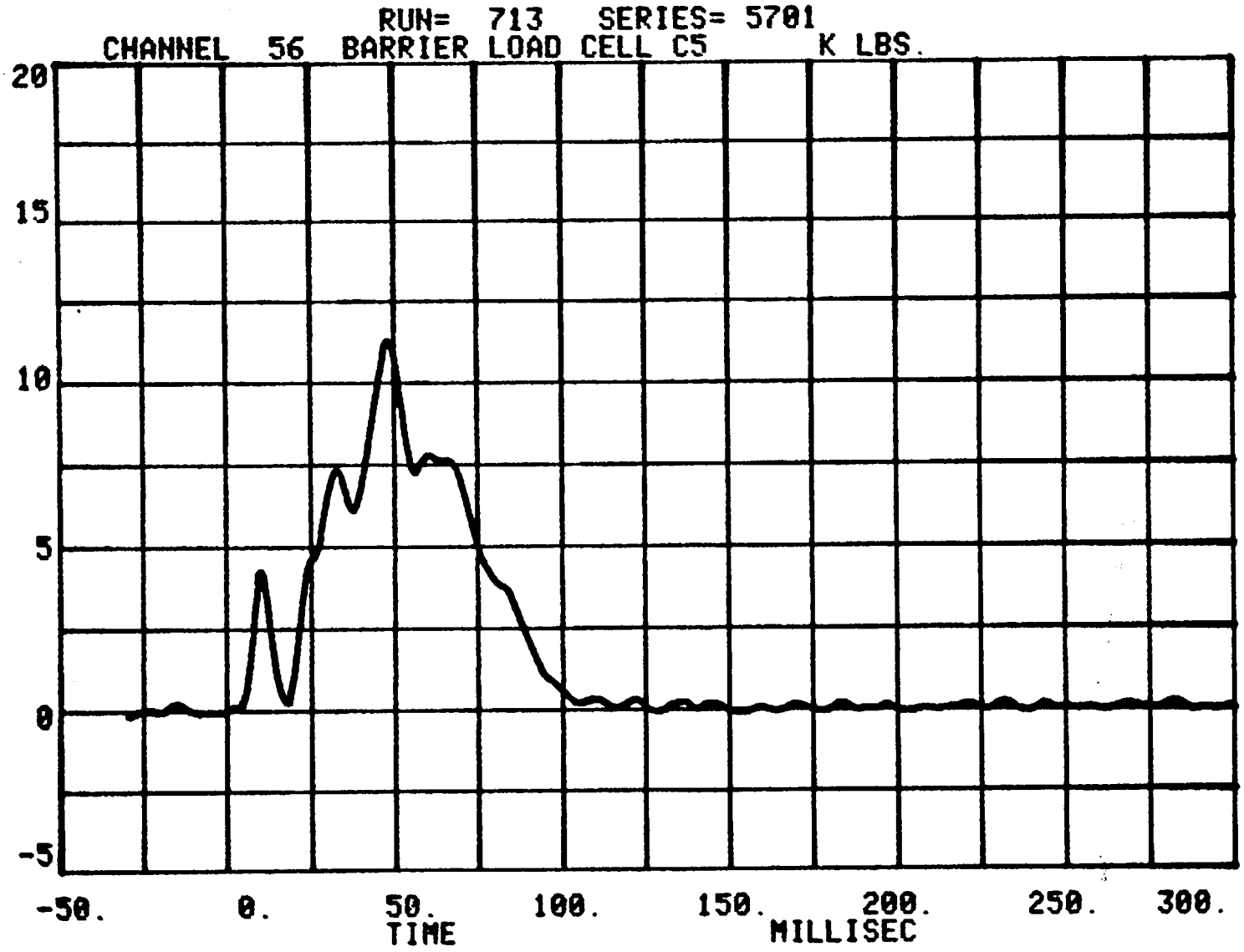

RUN= 713 SERIES= 5701
CHANNEL 51 BARRIER LOAD CELL B9 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

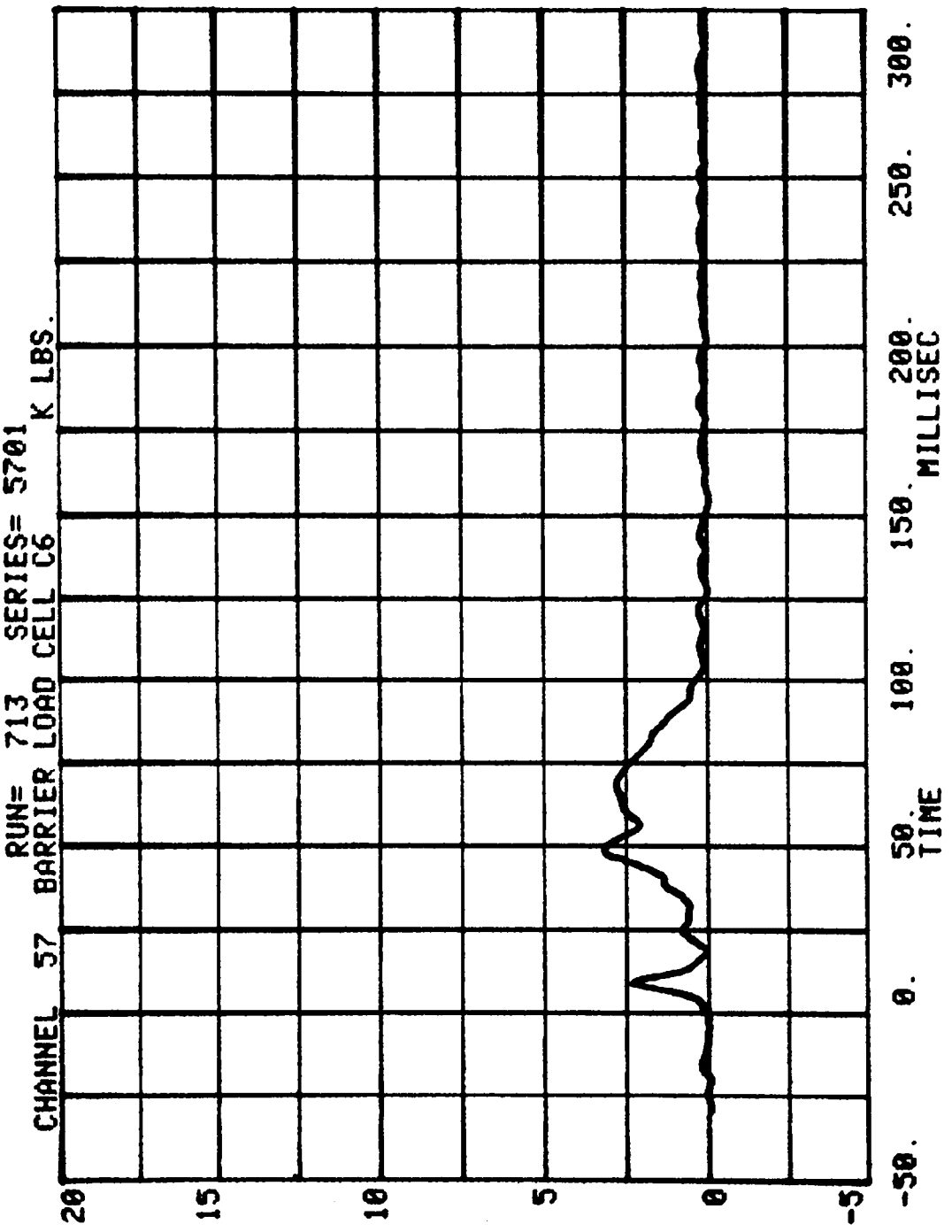

RUN= 713 SERIES= 5701
CHANNEL 52 BARRIER LOAD CELL C1 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

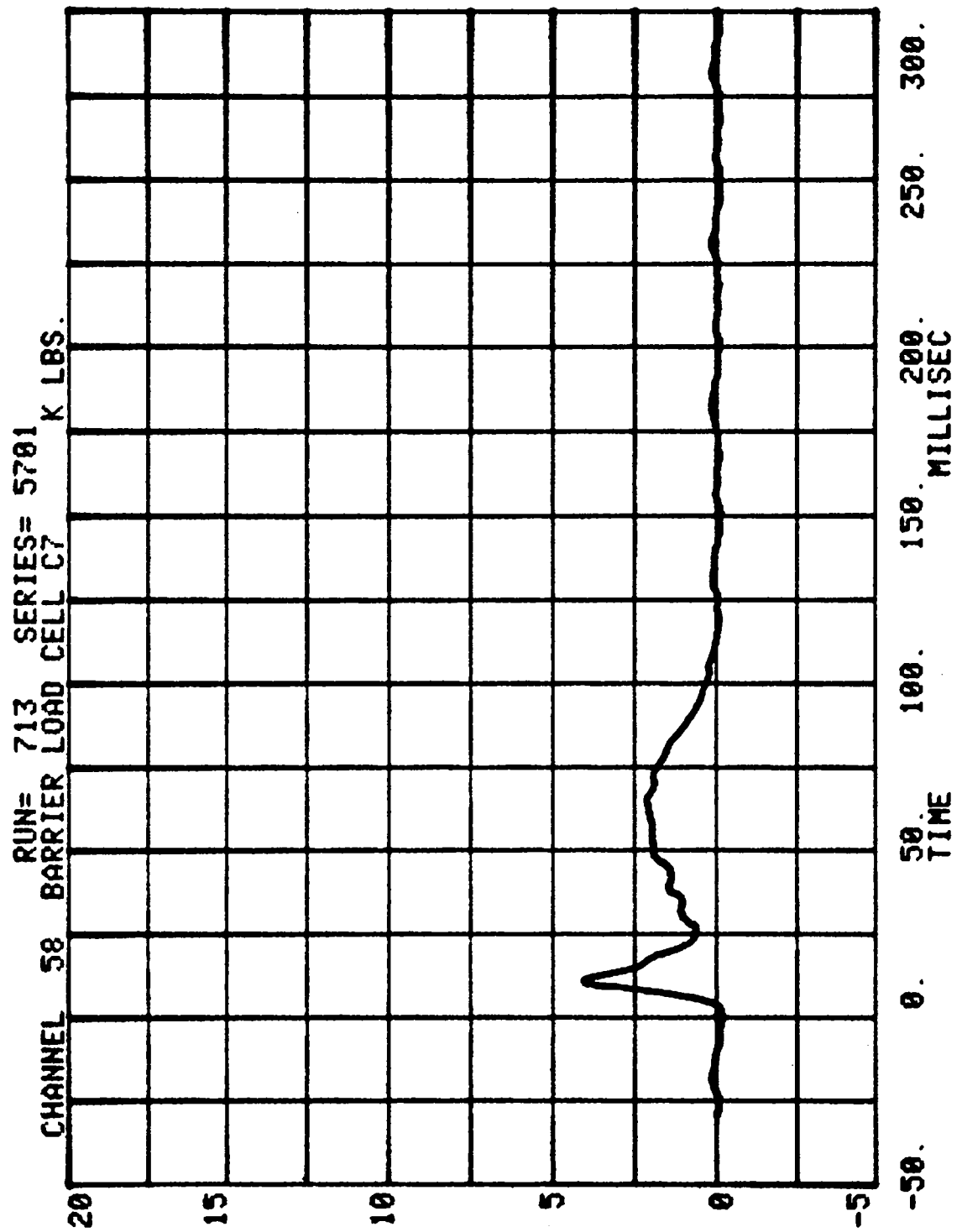

CHANNEL 53 BARRIER LOAD CELL C2
RUN= 713 SERIES= 5701
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

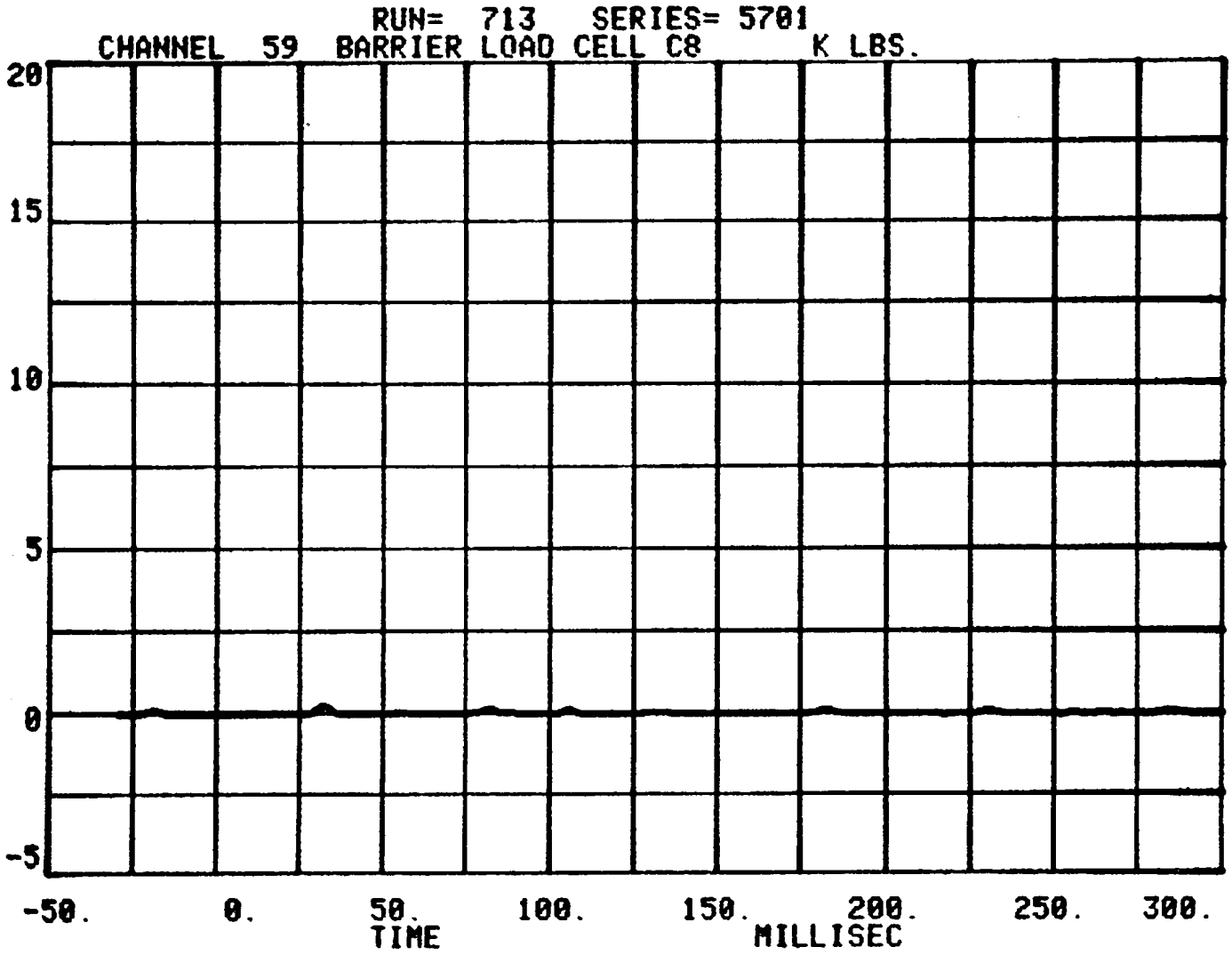

CHANNEL 54 BARRIER LOAD CELL C3
RUN= 713 SERIES= 5701
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

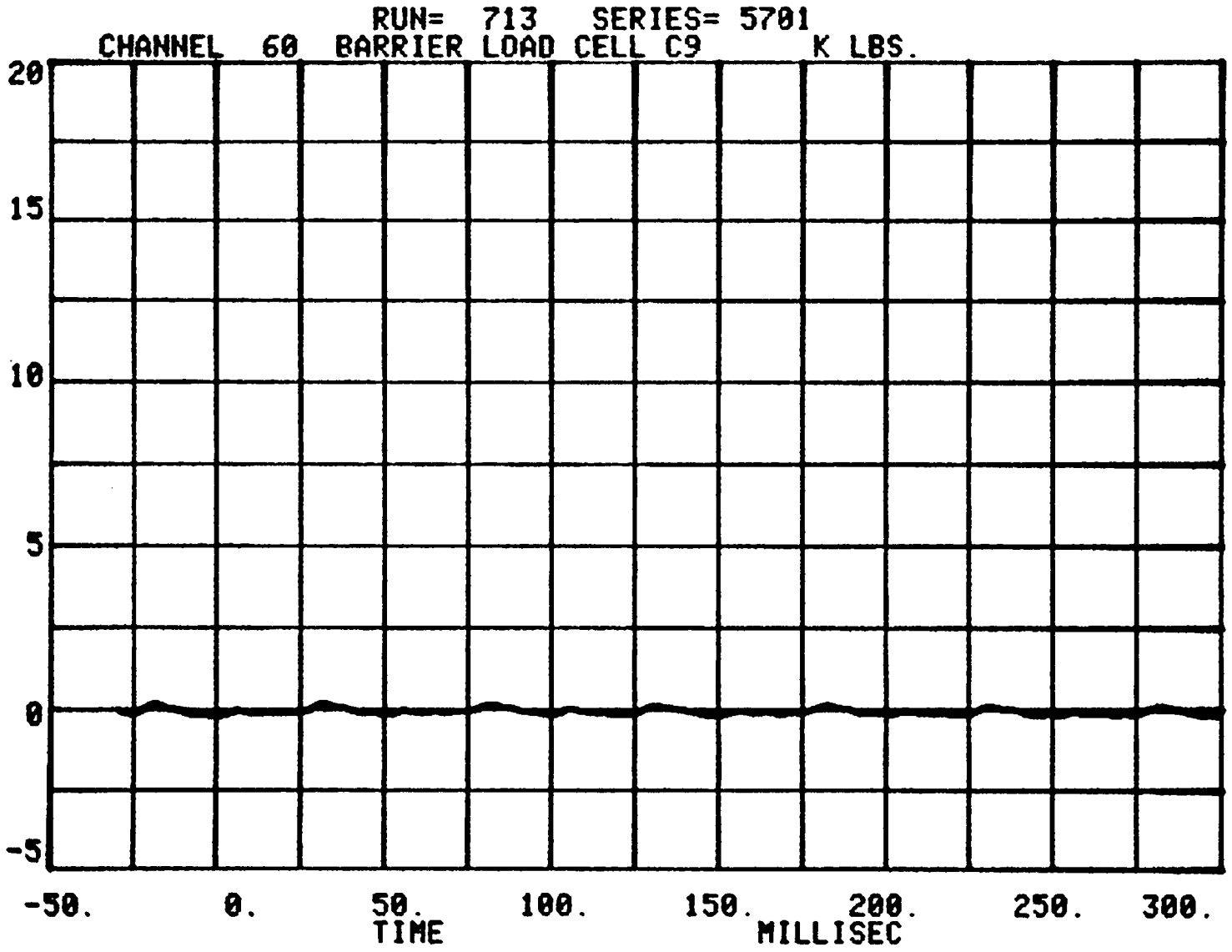

CHANNEL 55 BARRIER LOAD CELL C4
RUN= 713 SERIES= 5701
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

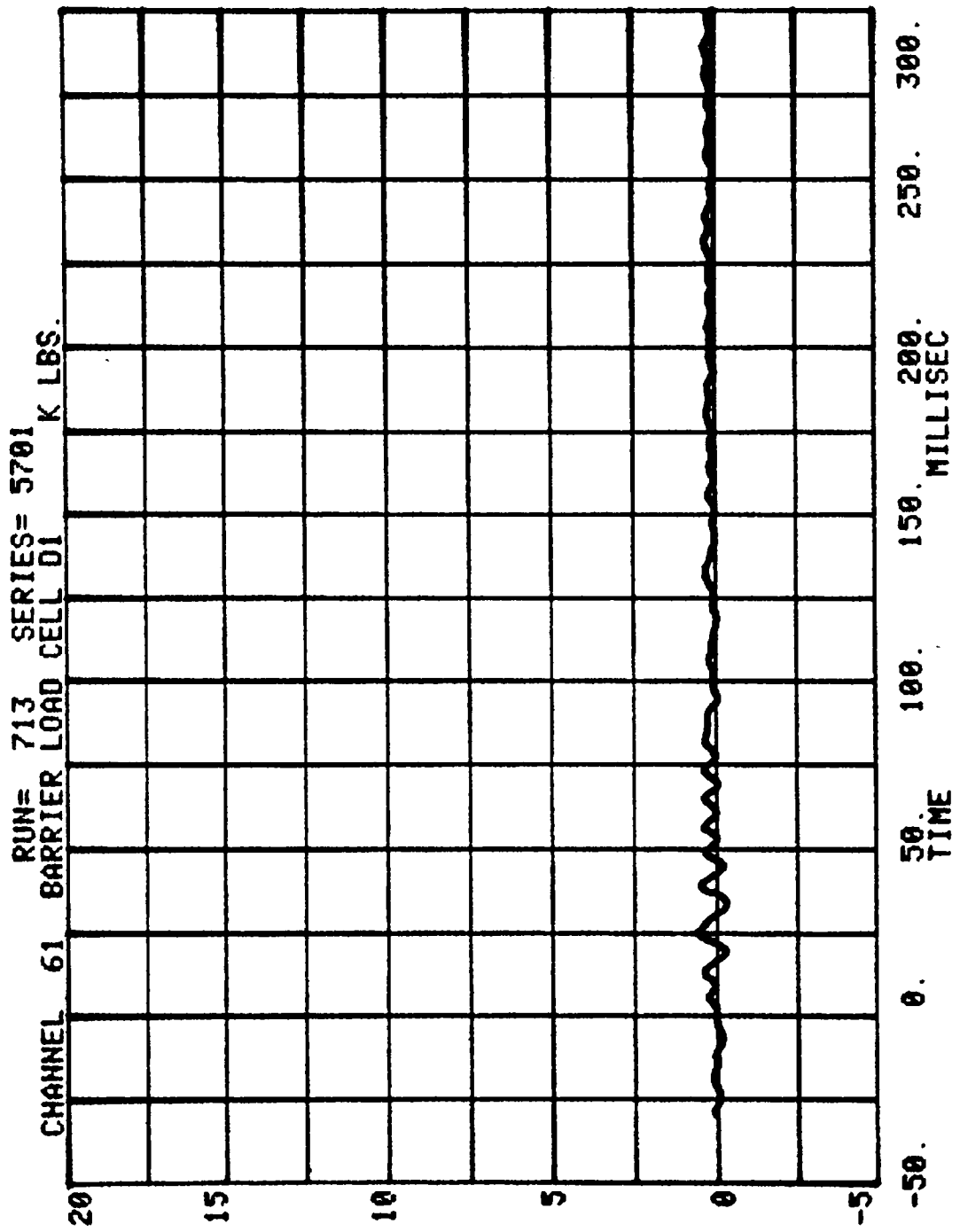

RUN= 713 SERIES= 5701
CHANNEL 56 BARRIER LOAD CELL C5 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

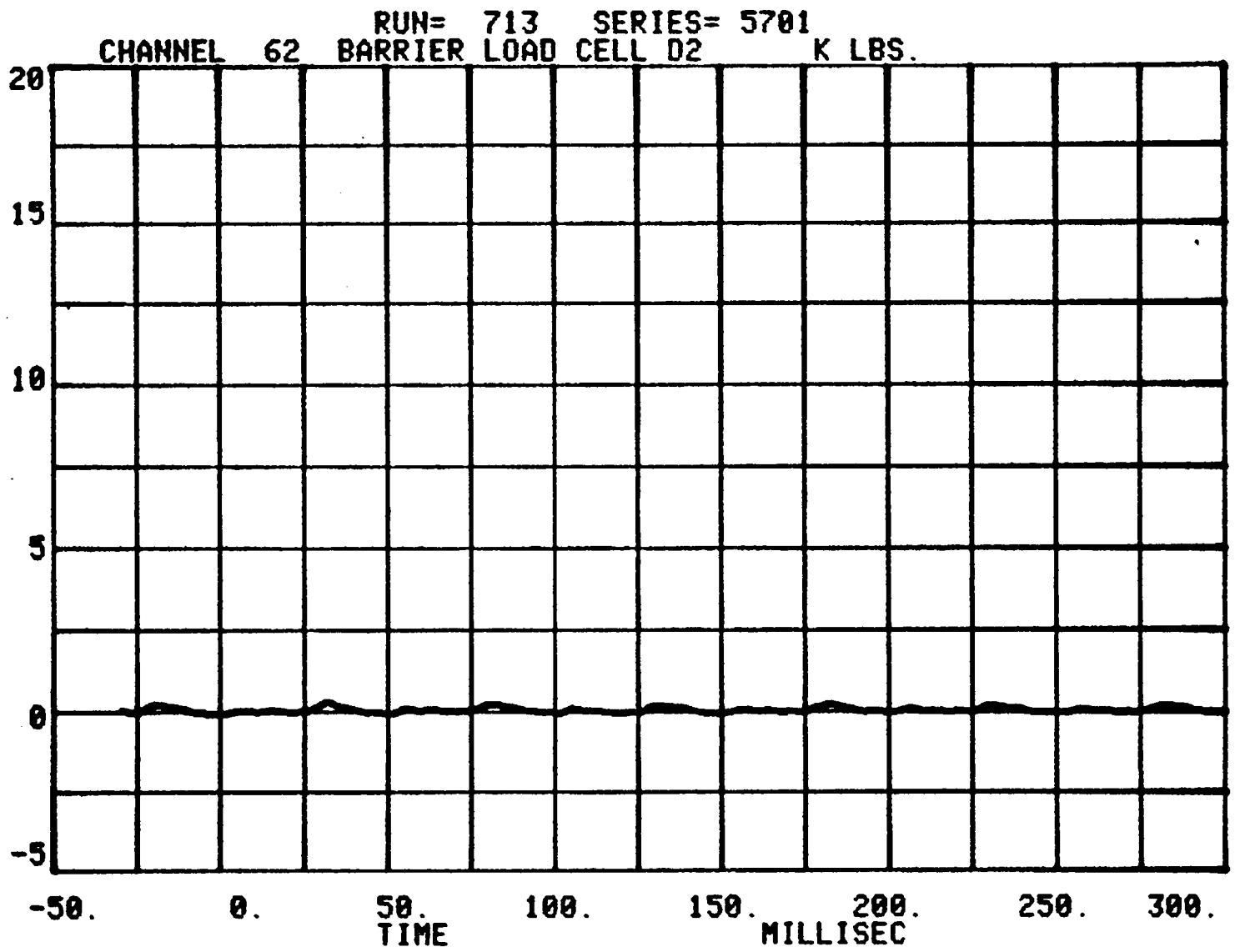

CHANNEL 57
RUN= 713 SERIES= 5701
BARRIER LOAD CELL C6
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

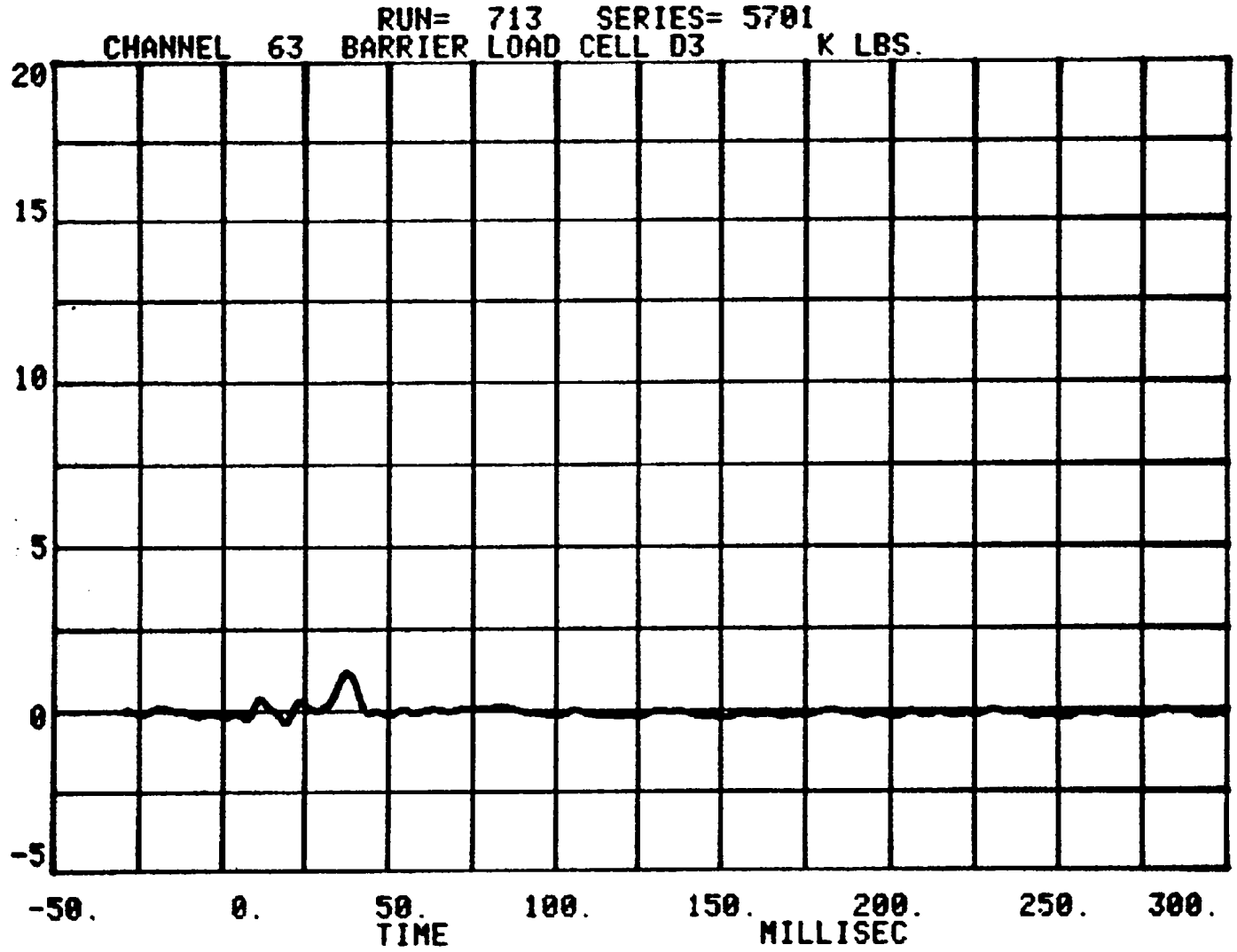

CHANNEL 58 BARRIER LOAD CELL C7
RUN= 713 SERIES= 5701
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

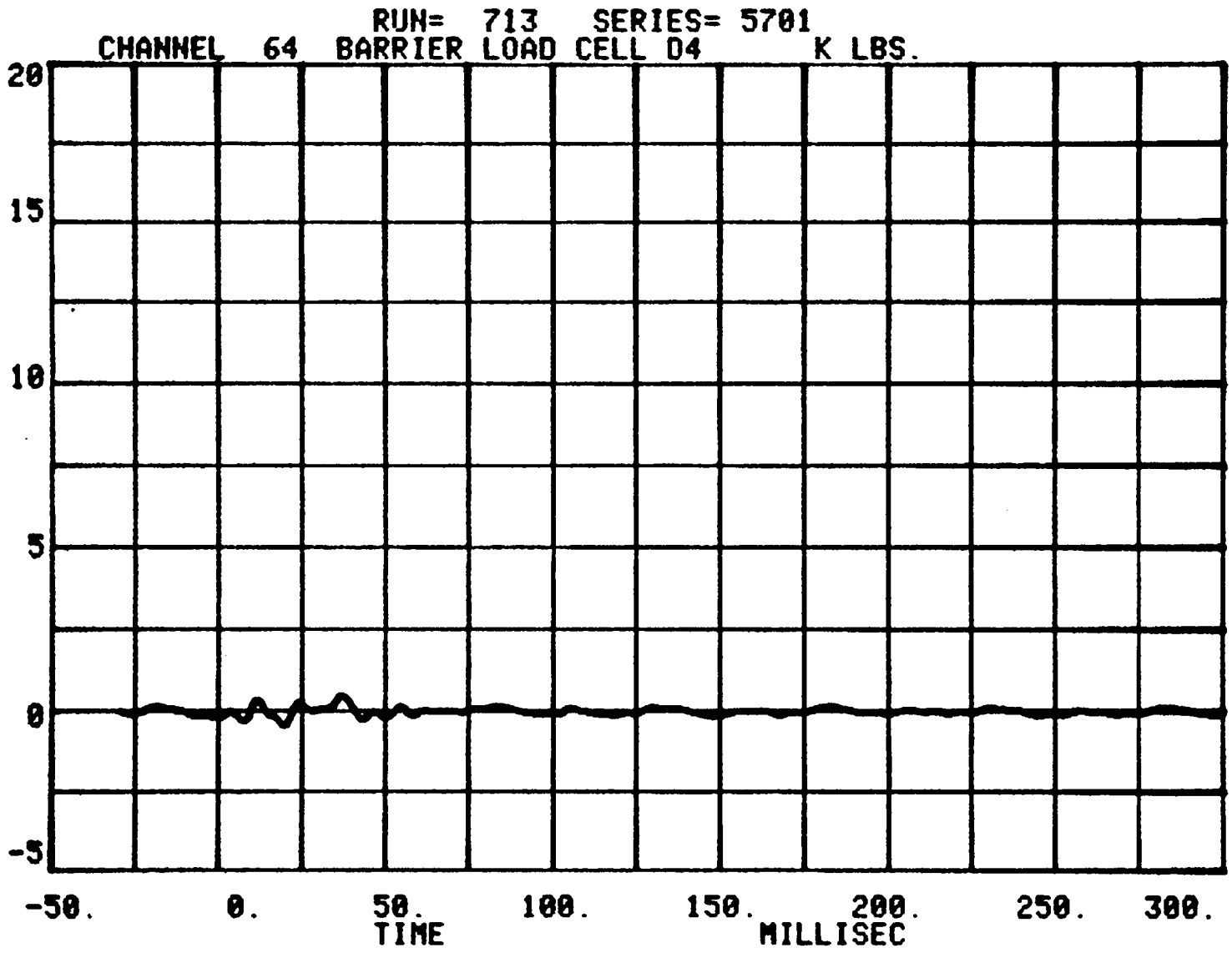

RUN= 713 SERIES= 5701
CHANNEL 59 BARRIER LOAD CELL C8 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

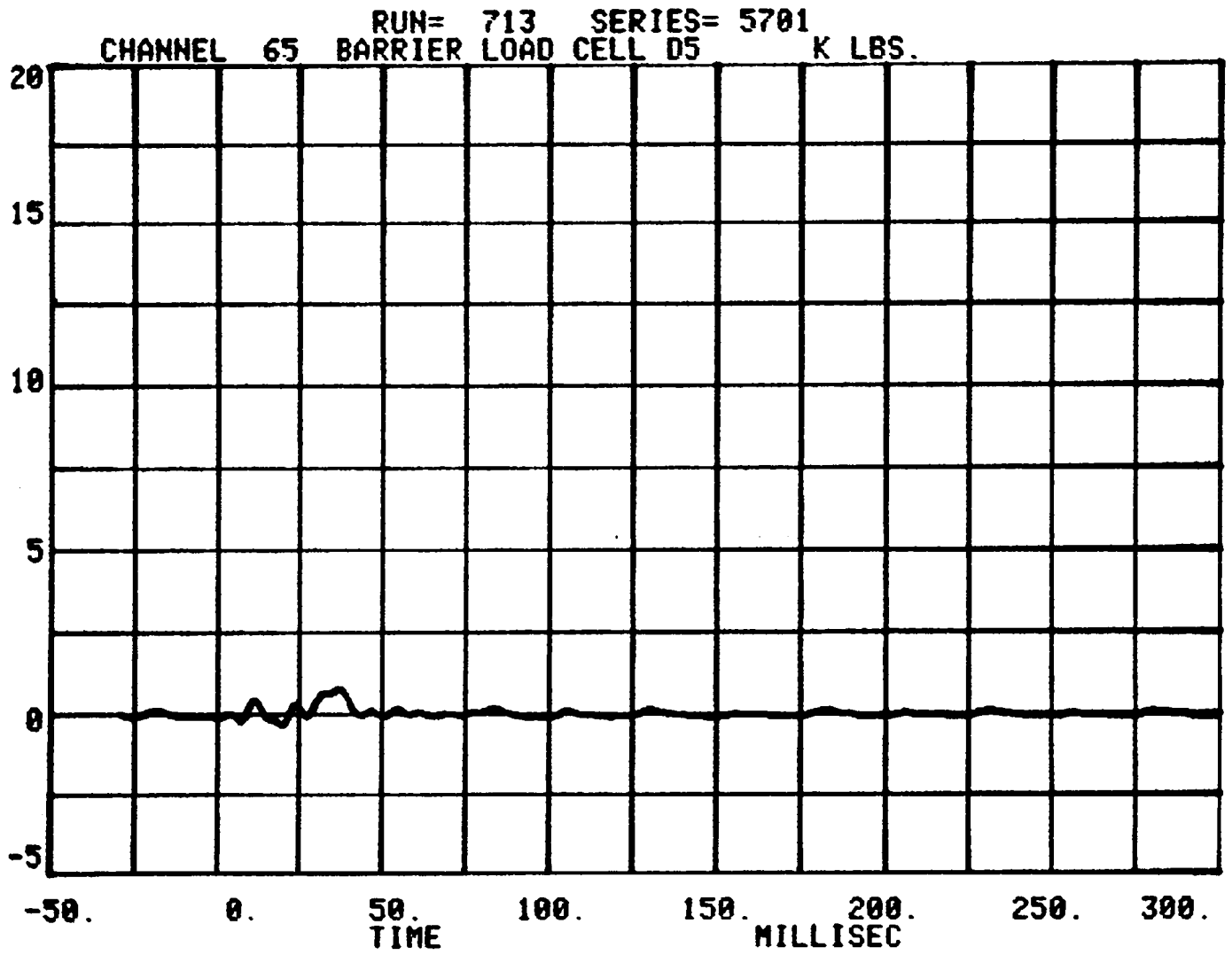

RUN= 713 SERIES= 5701
CHANNEL 60 BARRIER LOAD CELL C9 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

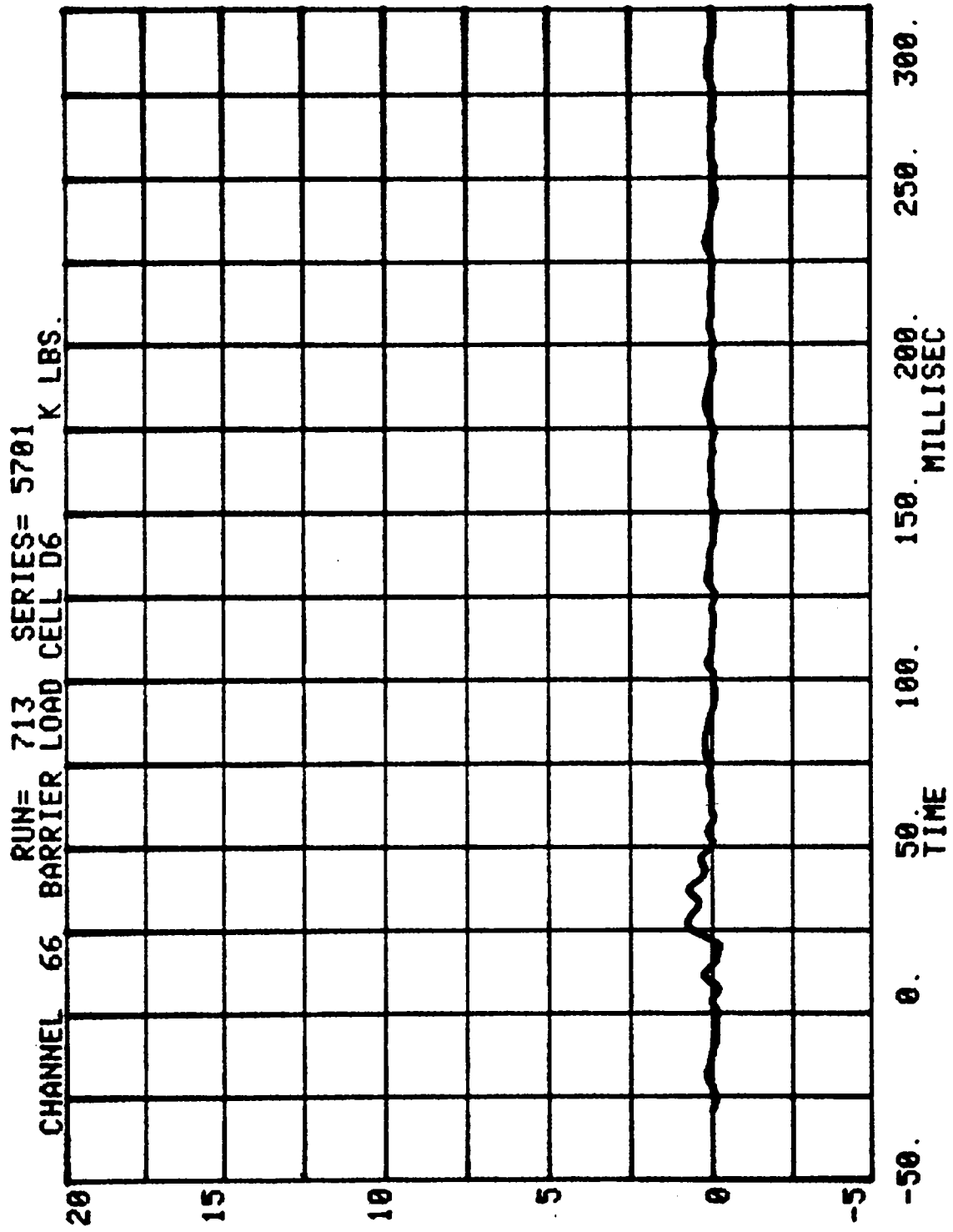

CHANNEL 61 BARRIER LOAD CELL D1
RUN= 713 SERIES= 5701
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

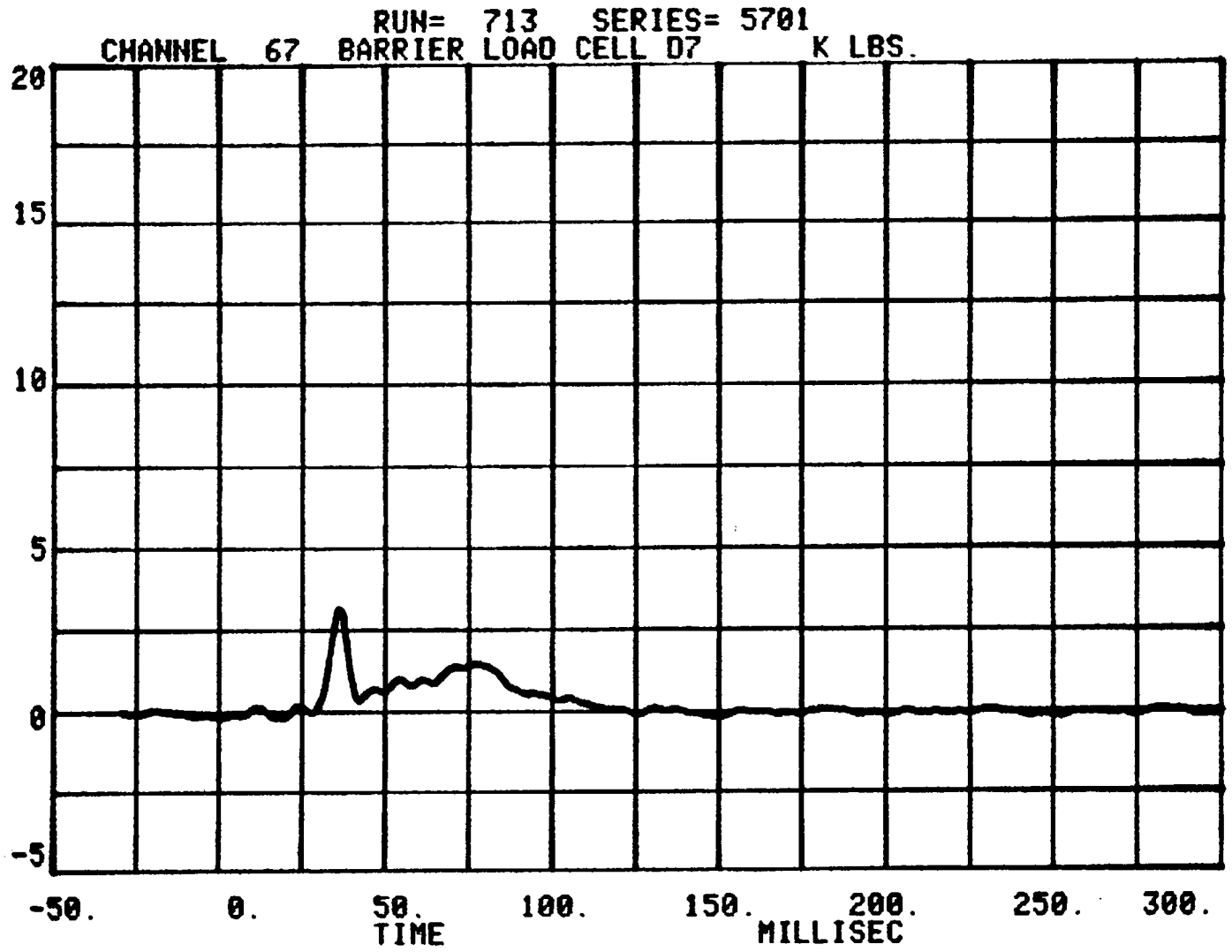

RUN= 713 SERIES= 5701
CHANNEL 62 BARRIER LOAD CELL D2 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

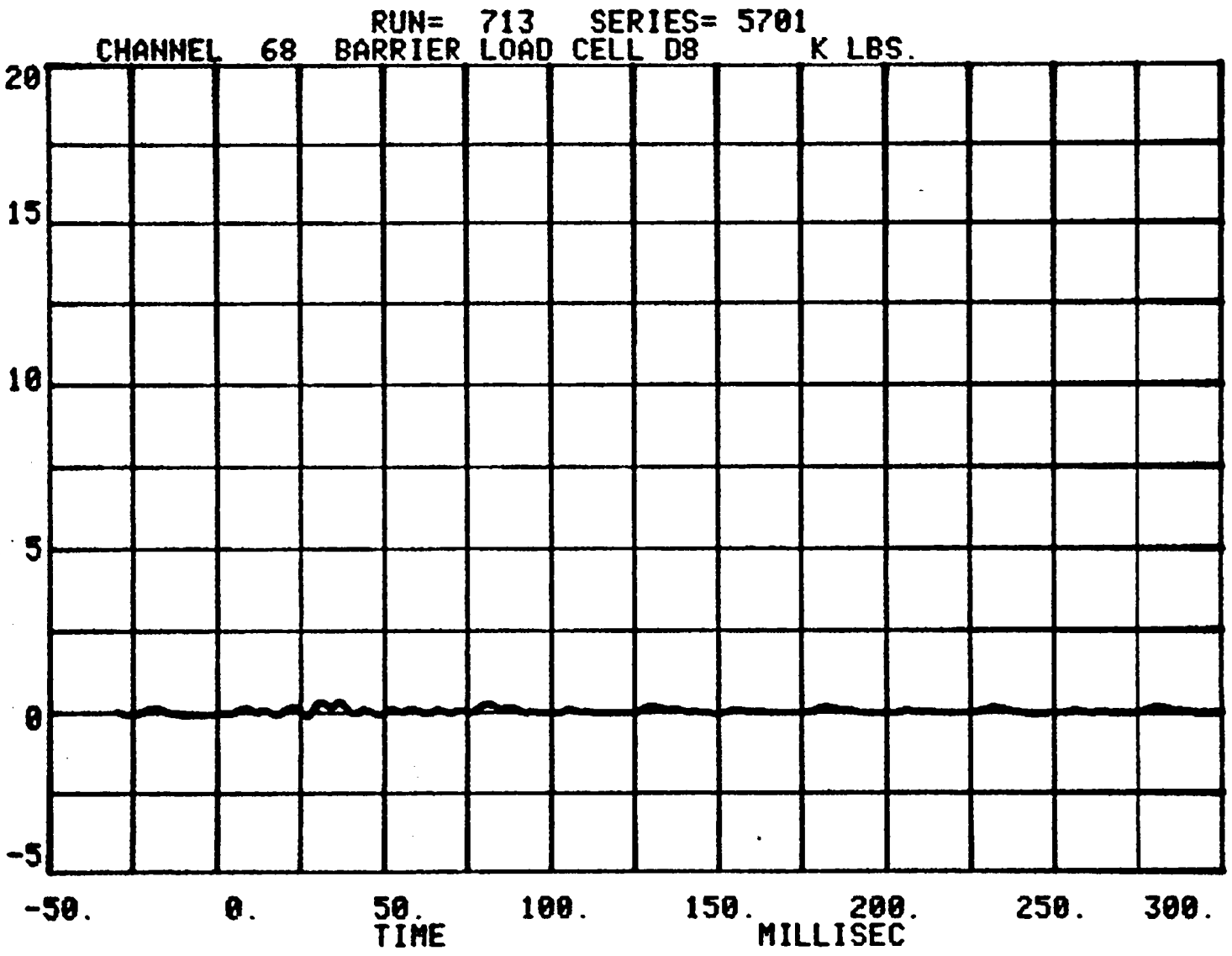

RUN= 713 SERIES= 5701
CHANNEL 63 BARRIER LOAD CELL D3 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

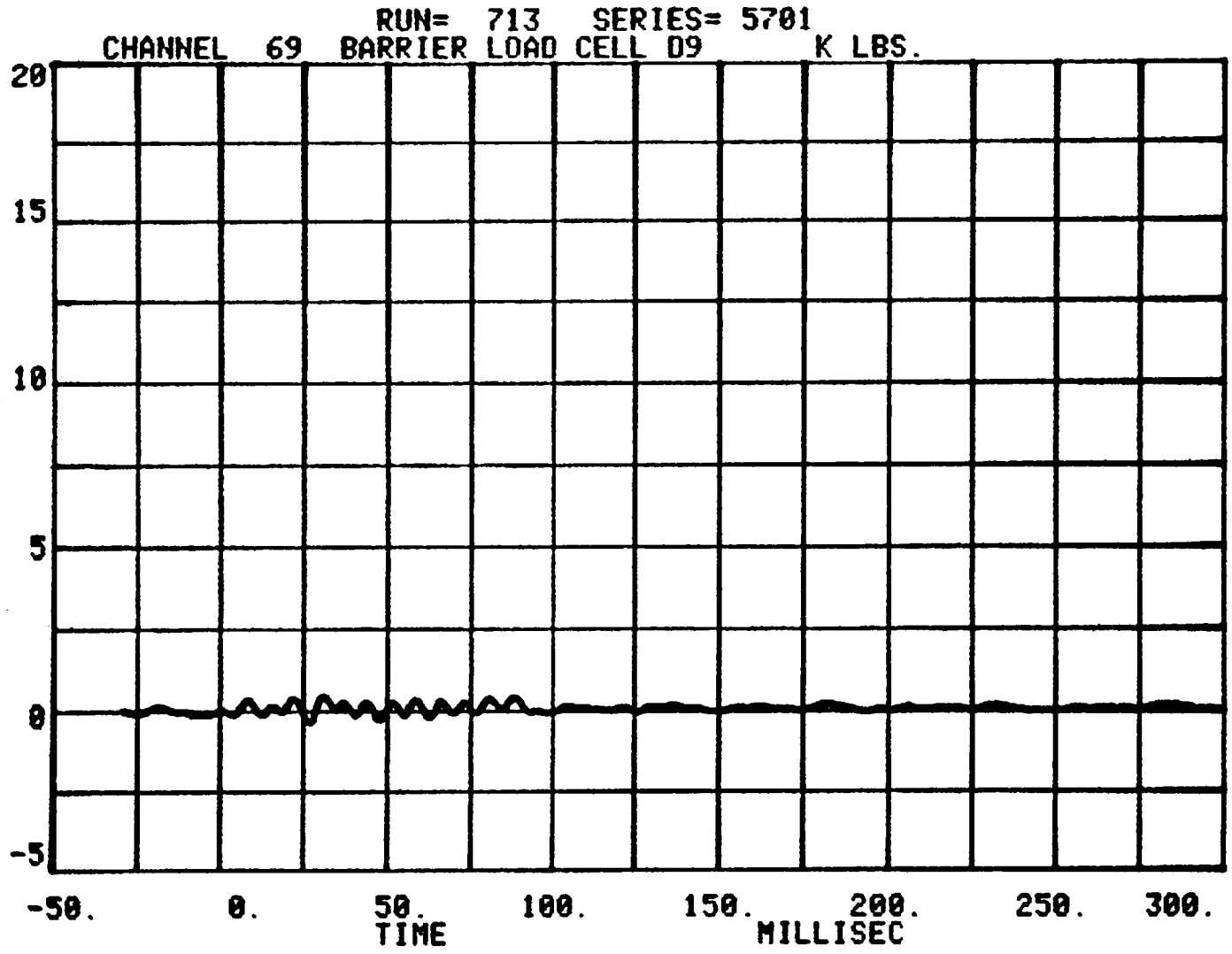

RUN= 713 SERIES= 5701
CHANNEL 64 BARRIER LOAD CELL D4 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 713 SERIES= 5701
CHANNEL 65 BARRIER LOAD CELL D5 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 66 BARRIER LOAD CELL D6
RUN= 713 SERIES= 5701
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 713 SERIES= 5701
CHANNEL 67 BARRIER LOAD CELL 07 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

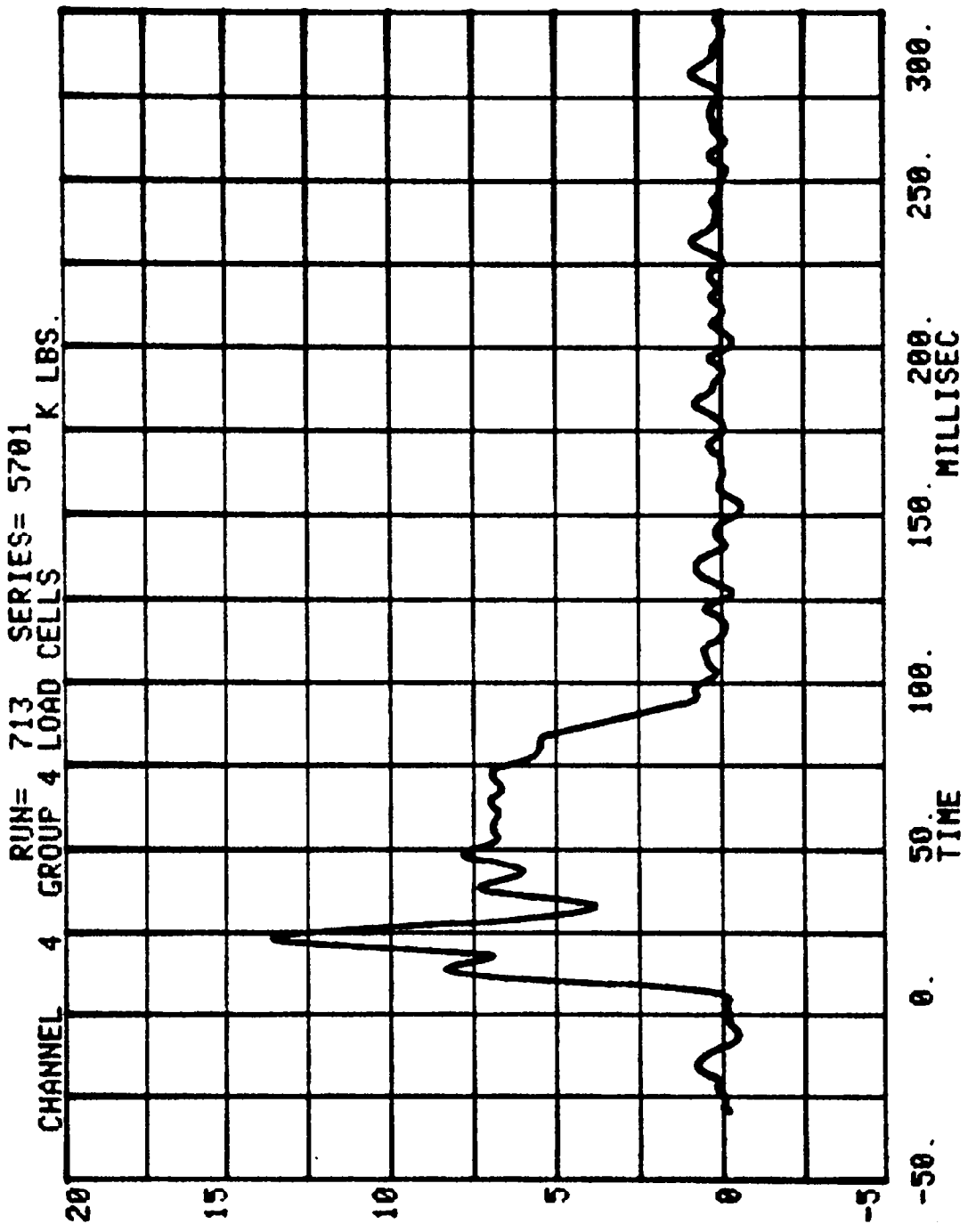

RUN= 713 SERIES= 5701
CHANNEL 68 BARRIER LOAD CELL D8 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

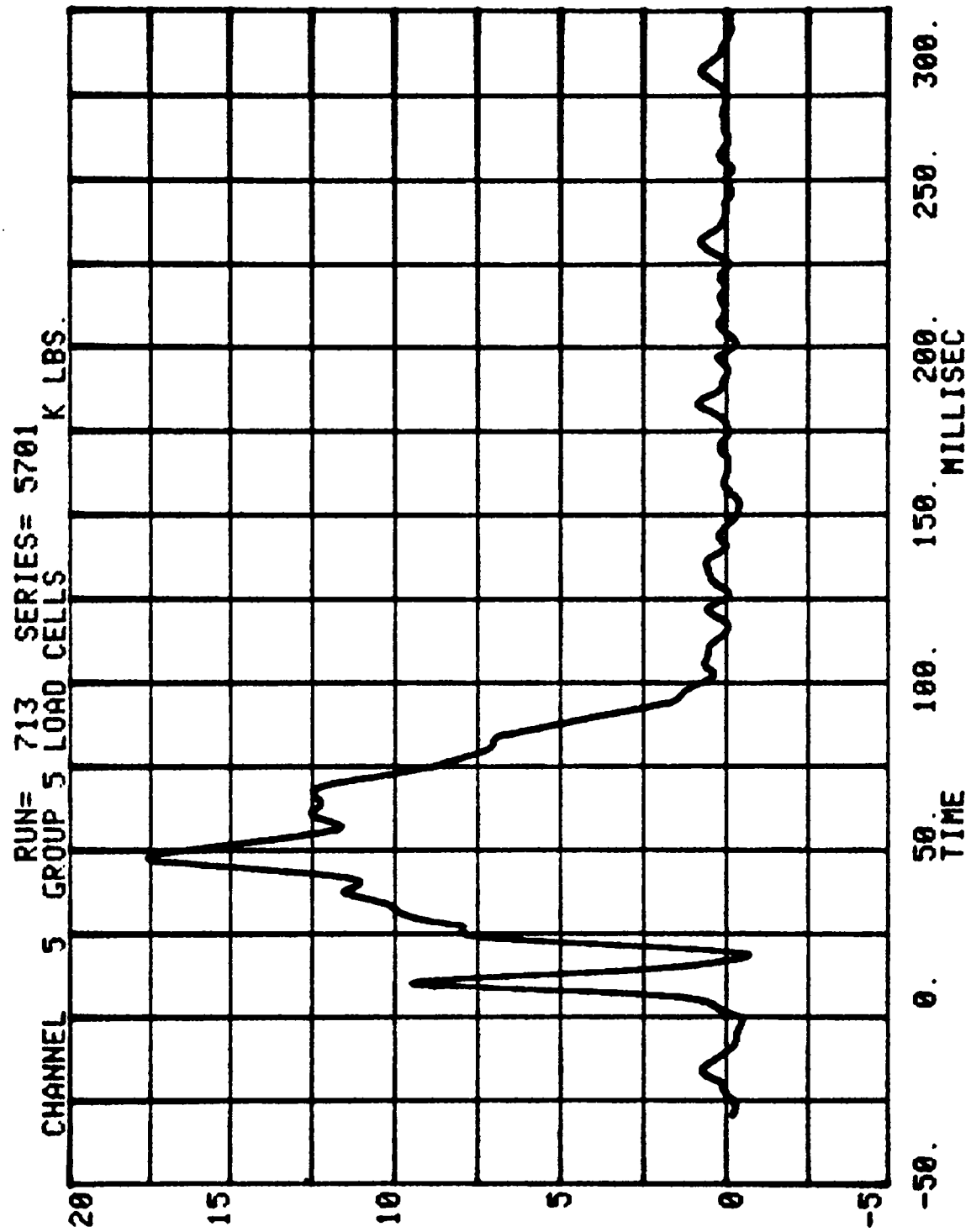

RUN= 713 SERIES= 5701
CHANNEL 69 BARRIER LOAD CELL D9 K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

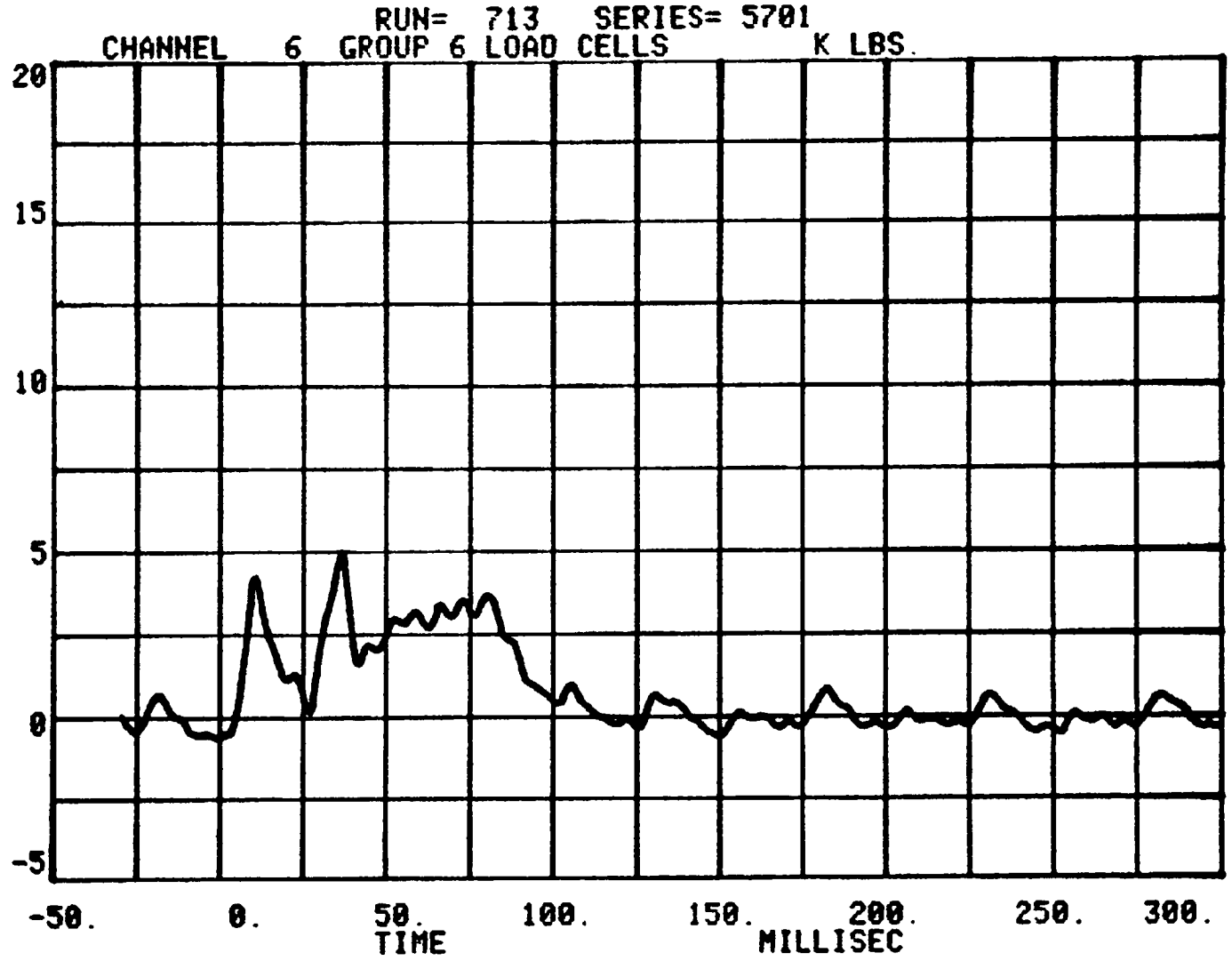
NEW CAR ASSESSMENT BARRIER TESTS - 1986

RUN # 713 SERIES # 5701

CHAN	TITLE	MINIMUM	MAXIMUM
4	GROUP 4 LOAD CELLS	-.600	13.625 K LBS.
5	GROUP 5 LOAD CELLS	-.695	17.635 K LBS.
6	GROUP 6 LOAD CELLS	-.602	4.923 K LBS.


CHANNEL 4 RUN= 713 SERIES= 5701
GROUP 4 LOAD CELLS
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 5 GROUP 5 LOAD CELLS
RUN= 713 SERIES= 5701
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 713 SERIES= 5701
CHANNEL 6 GROUP 6 LOAD CELLS
K LBS.
20
15
10
5
0
-5
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

TEST NO. MG5701

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= 713

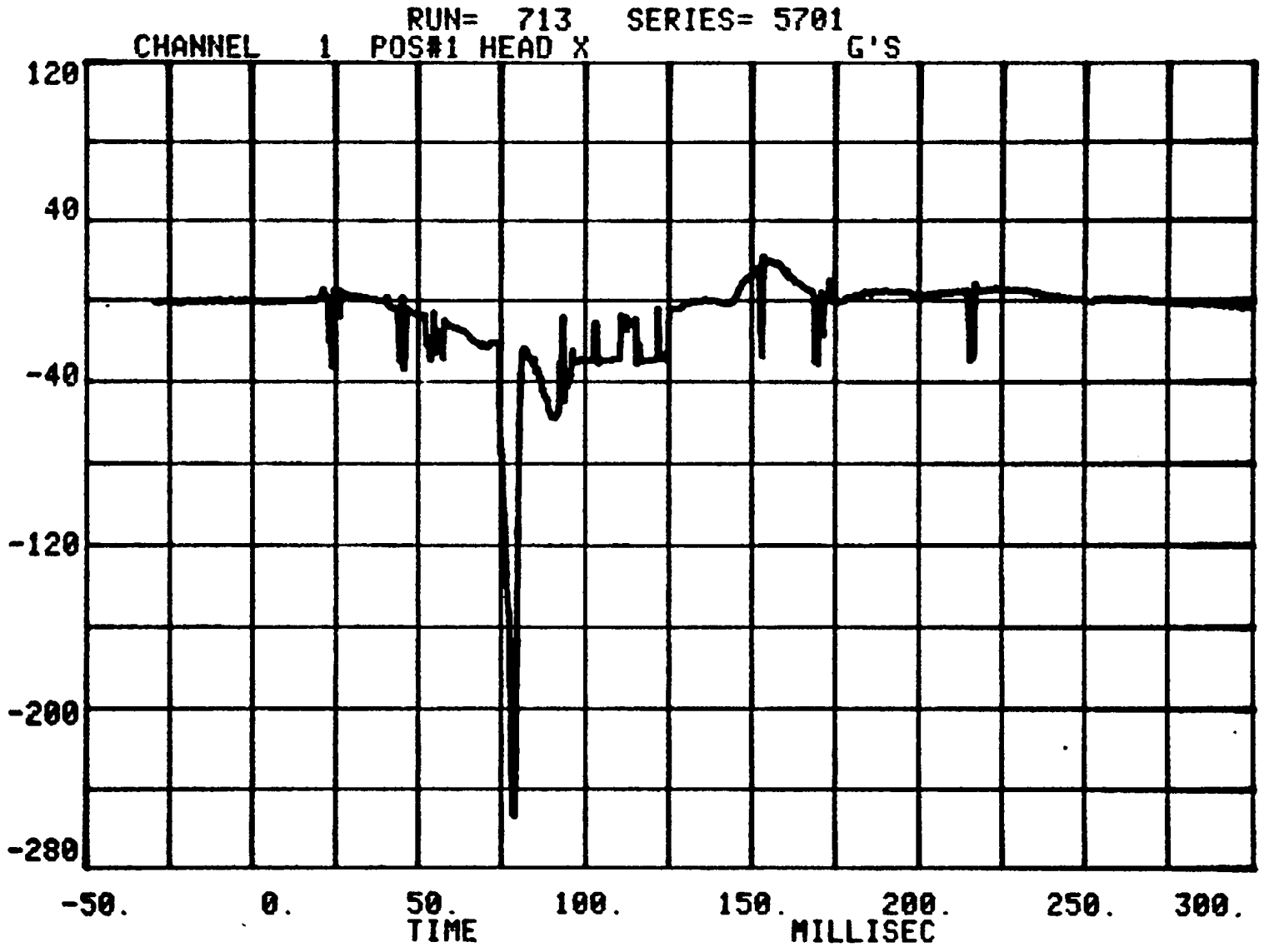
POS#1 HEAD R

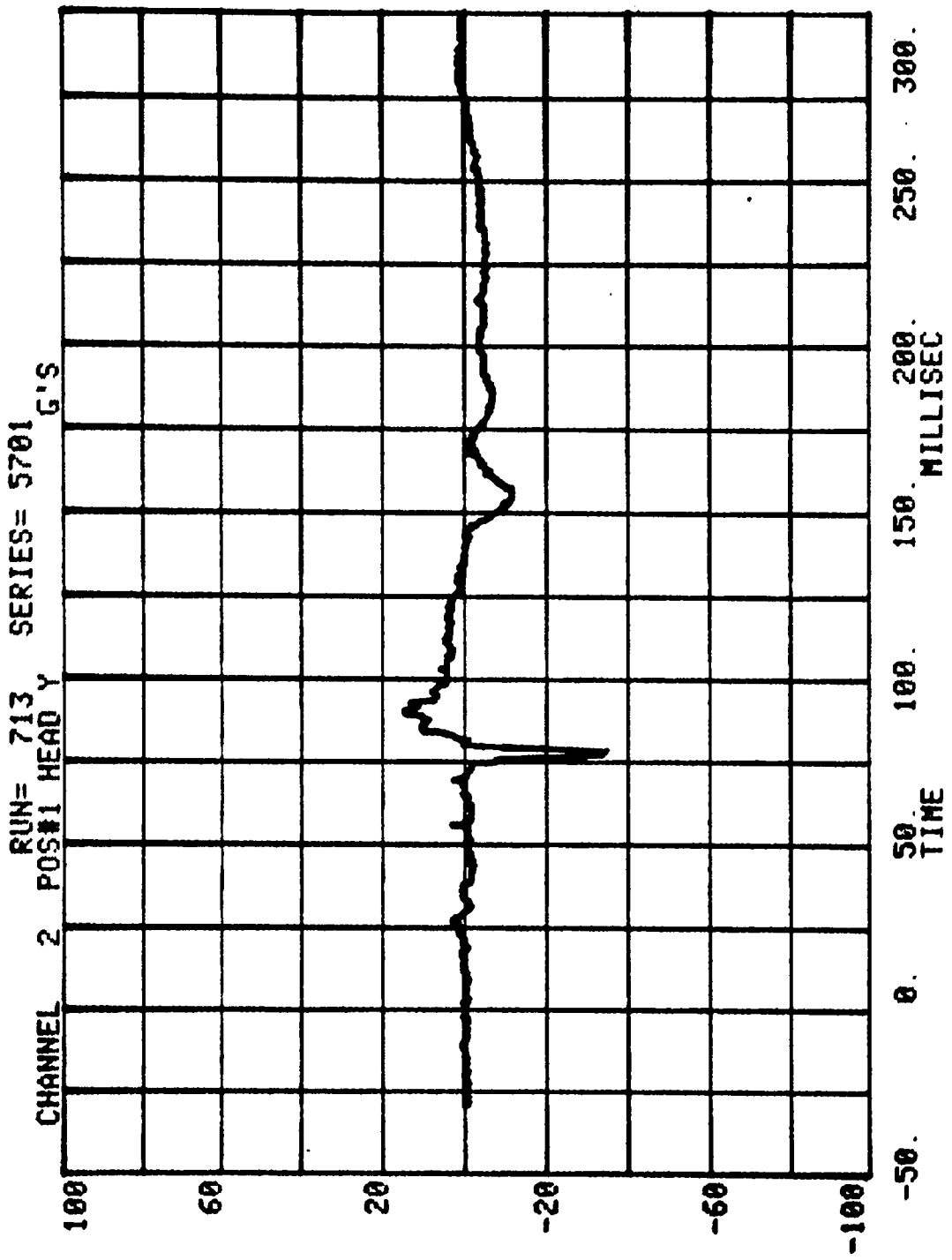
HIC=2172.0 FROM T1= .07530 TO T2= .08137

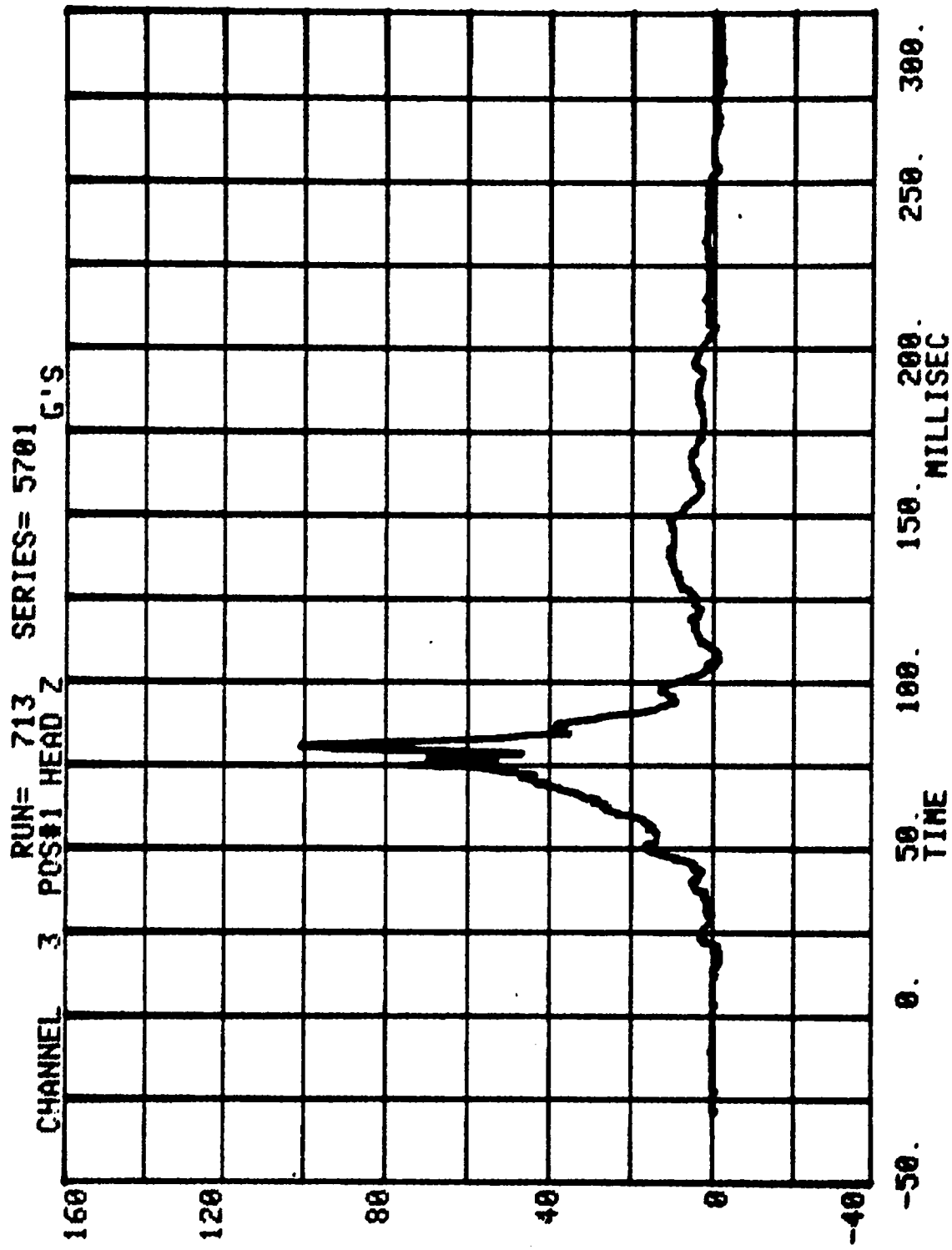
AVERAGE ACCELERATION BETWEEN T1 AND T2= 166.5G'S

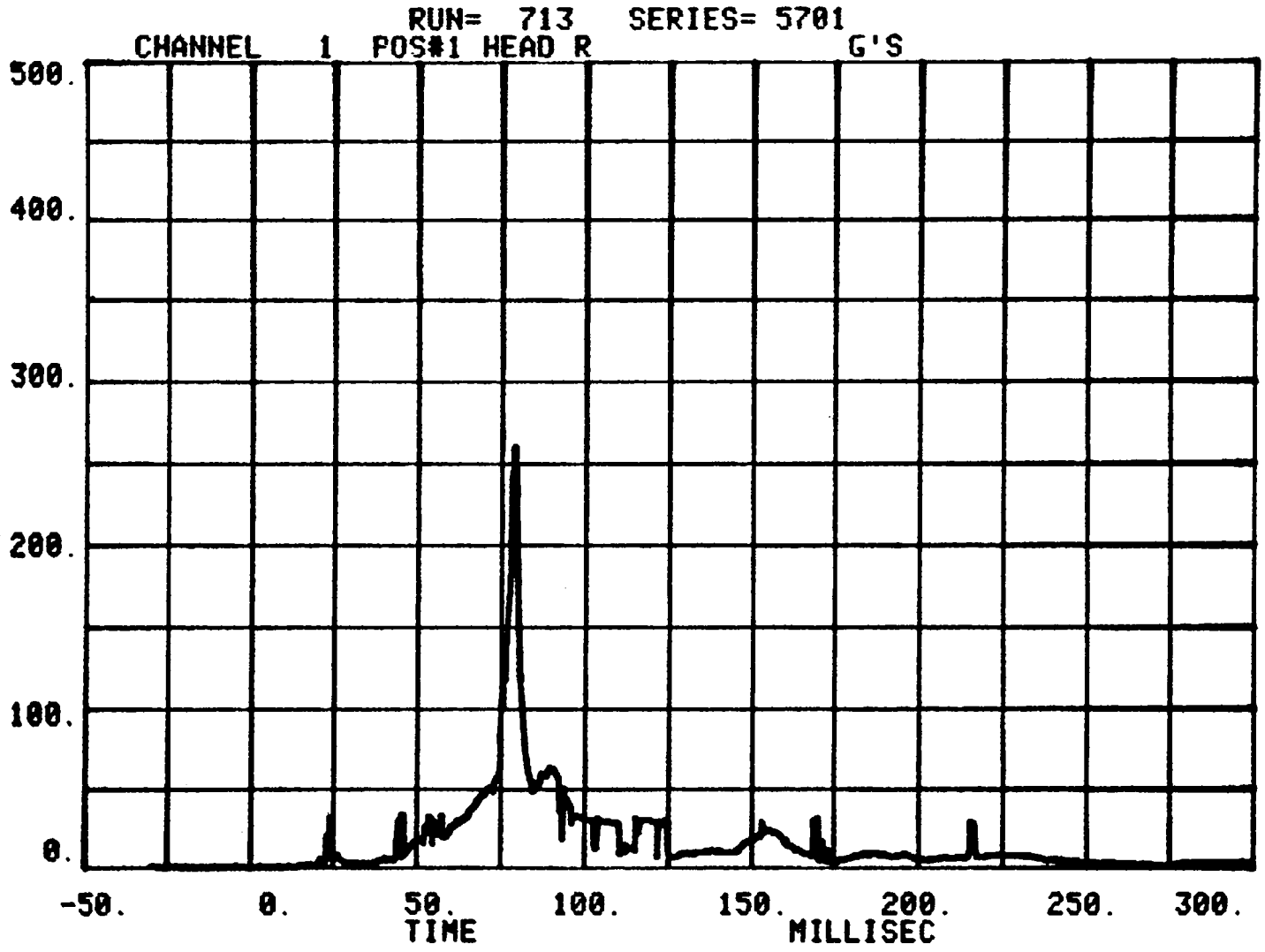
EVENT TIME= 300.0 MSEC

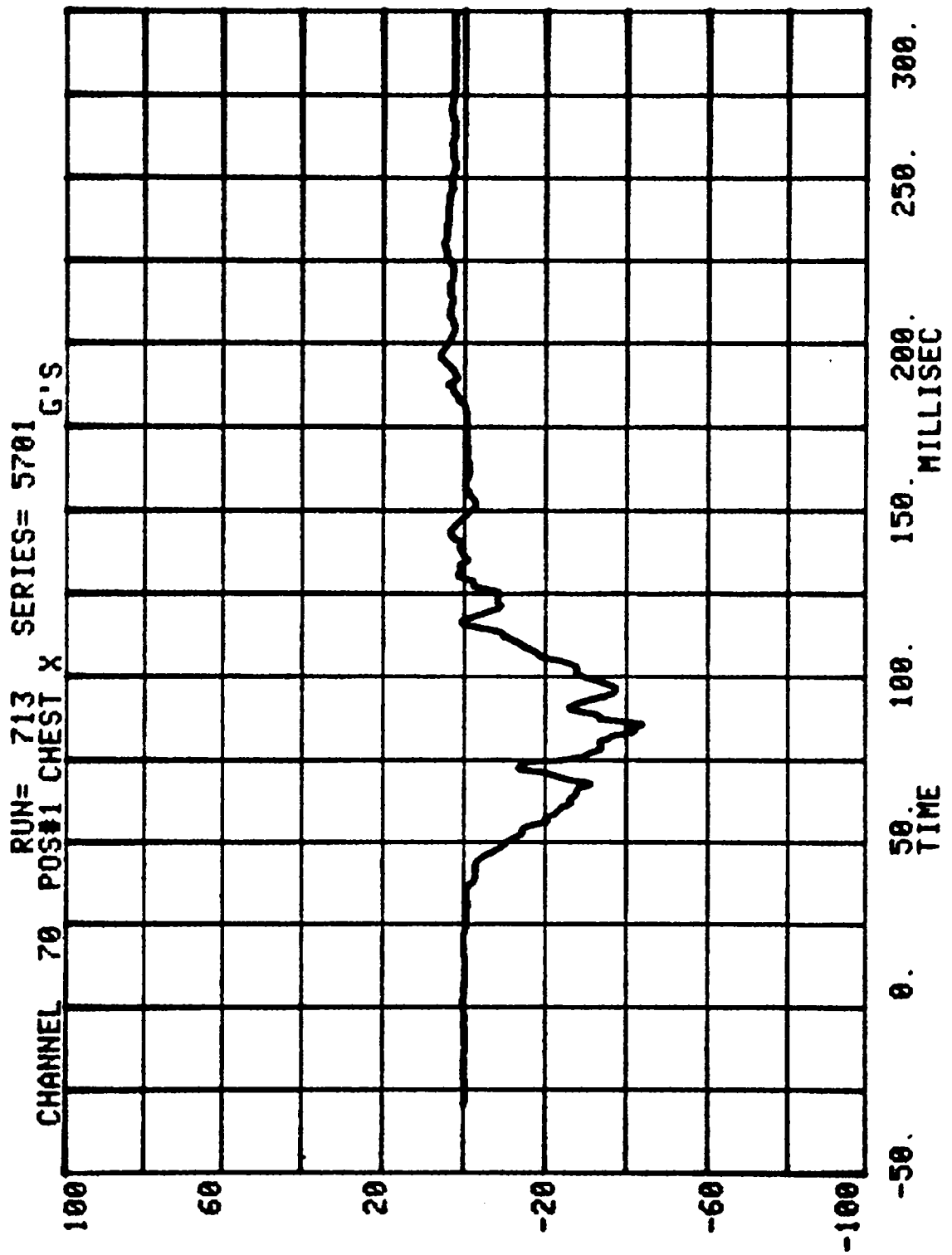
SEVERITY INDEX=3467.8

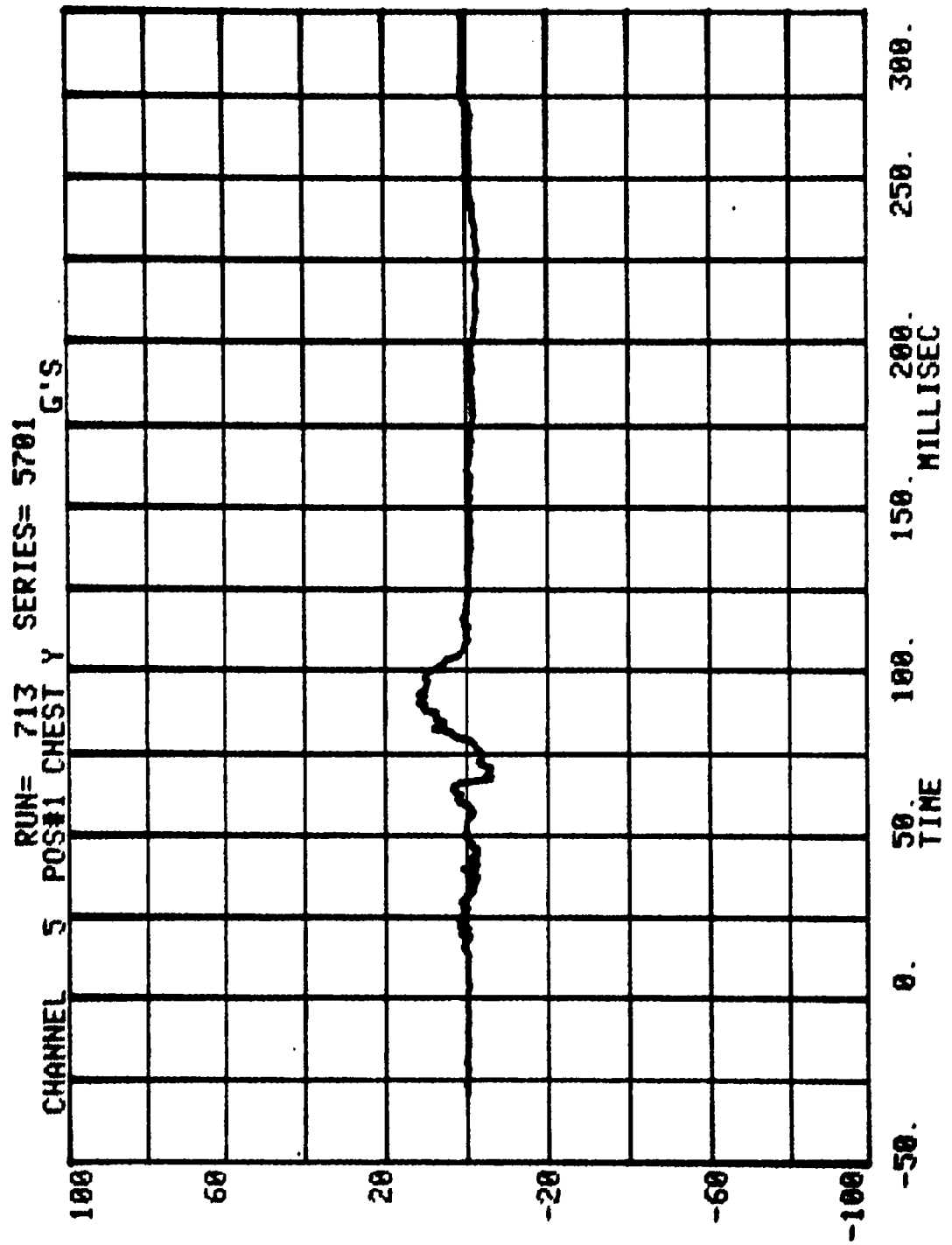

RUN= 713 SERIES= 5701
CHANNEL 1 POS#1 HEAD X G'S
120
40
-40
-120
-200
-280
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

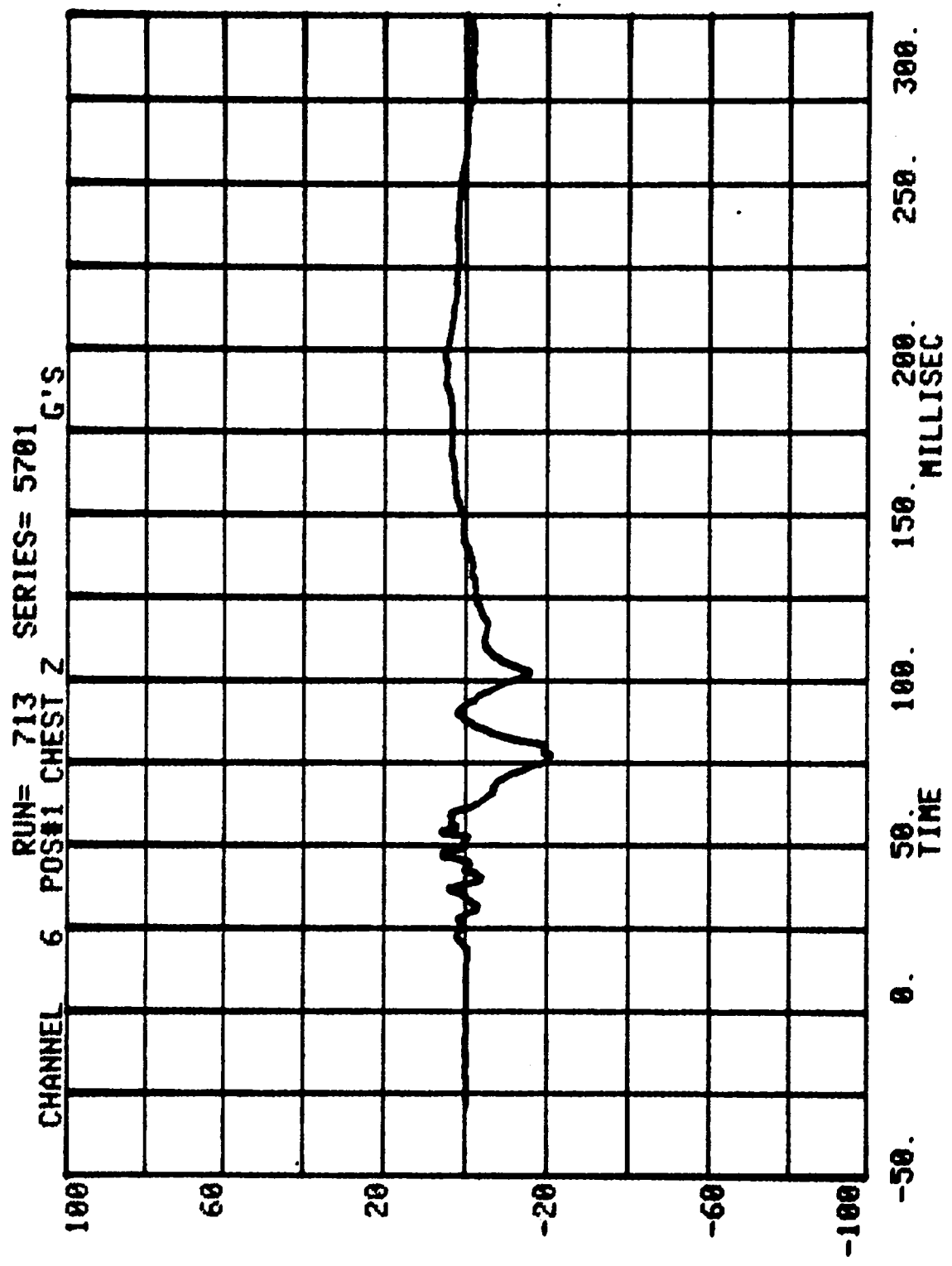

CHANNEL 2 RUN= 713 SERIES= 5701
POS#1 HEAD Y
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

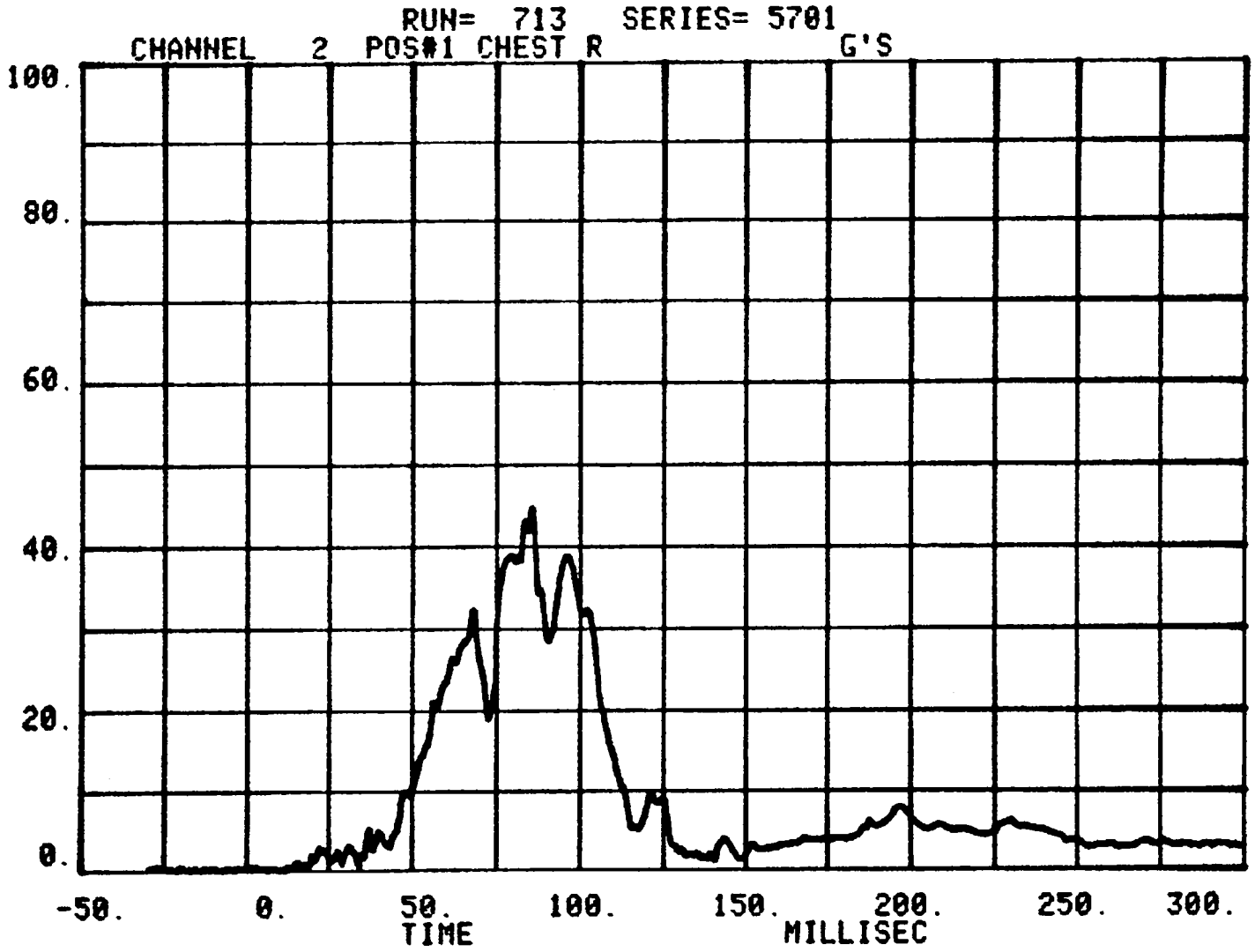

CHANNEL 3 POS#1 HEAD Z
RUN= 713 SERIES= 5701
G'S
160
120
80
40
0
-40
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

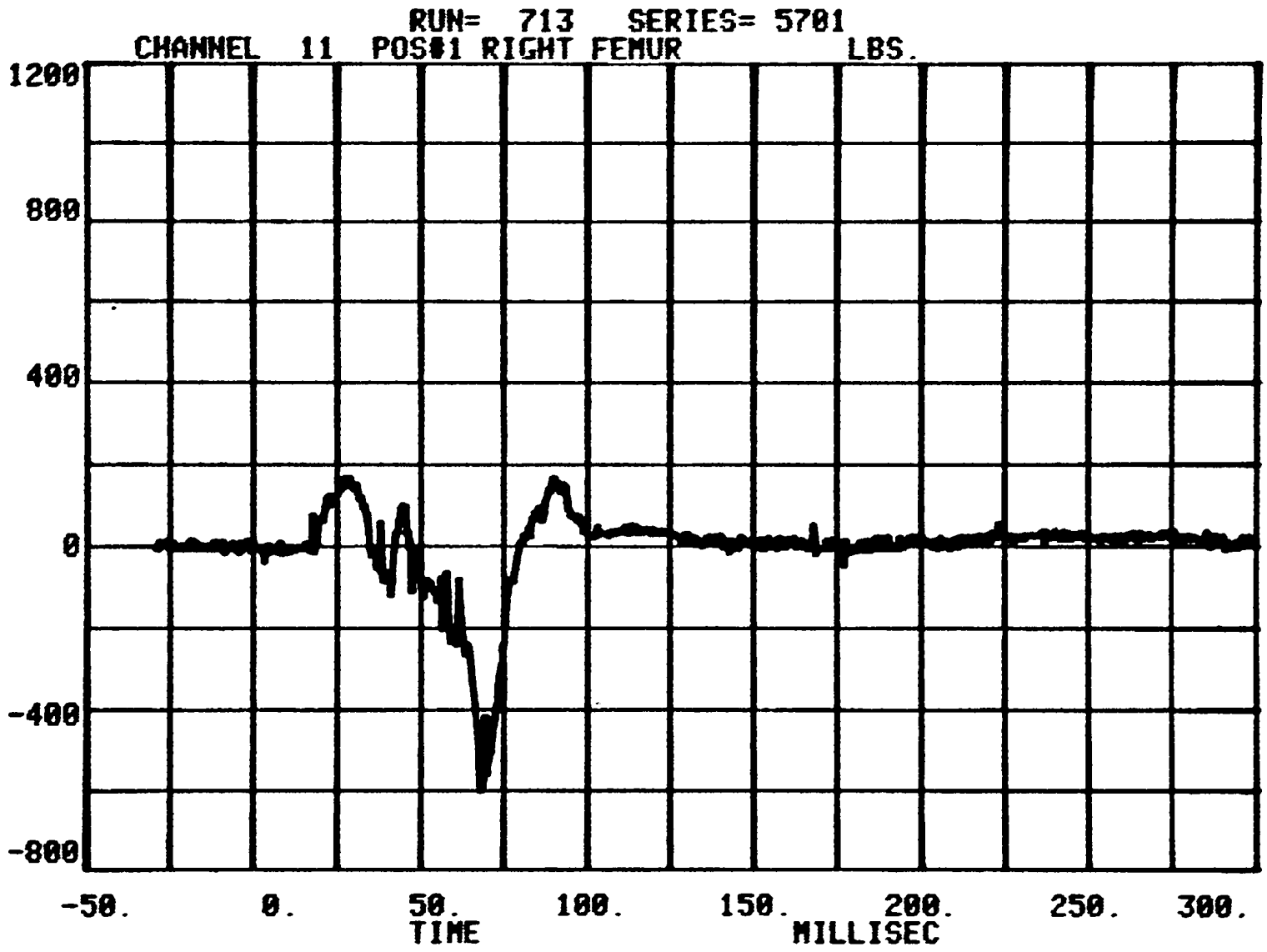

RUN= 713 SERIES= 5701
CHANNEL 1 POS#1 HEAD R
G'S
500.
400.
300.
200.
100.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

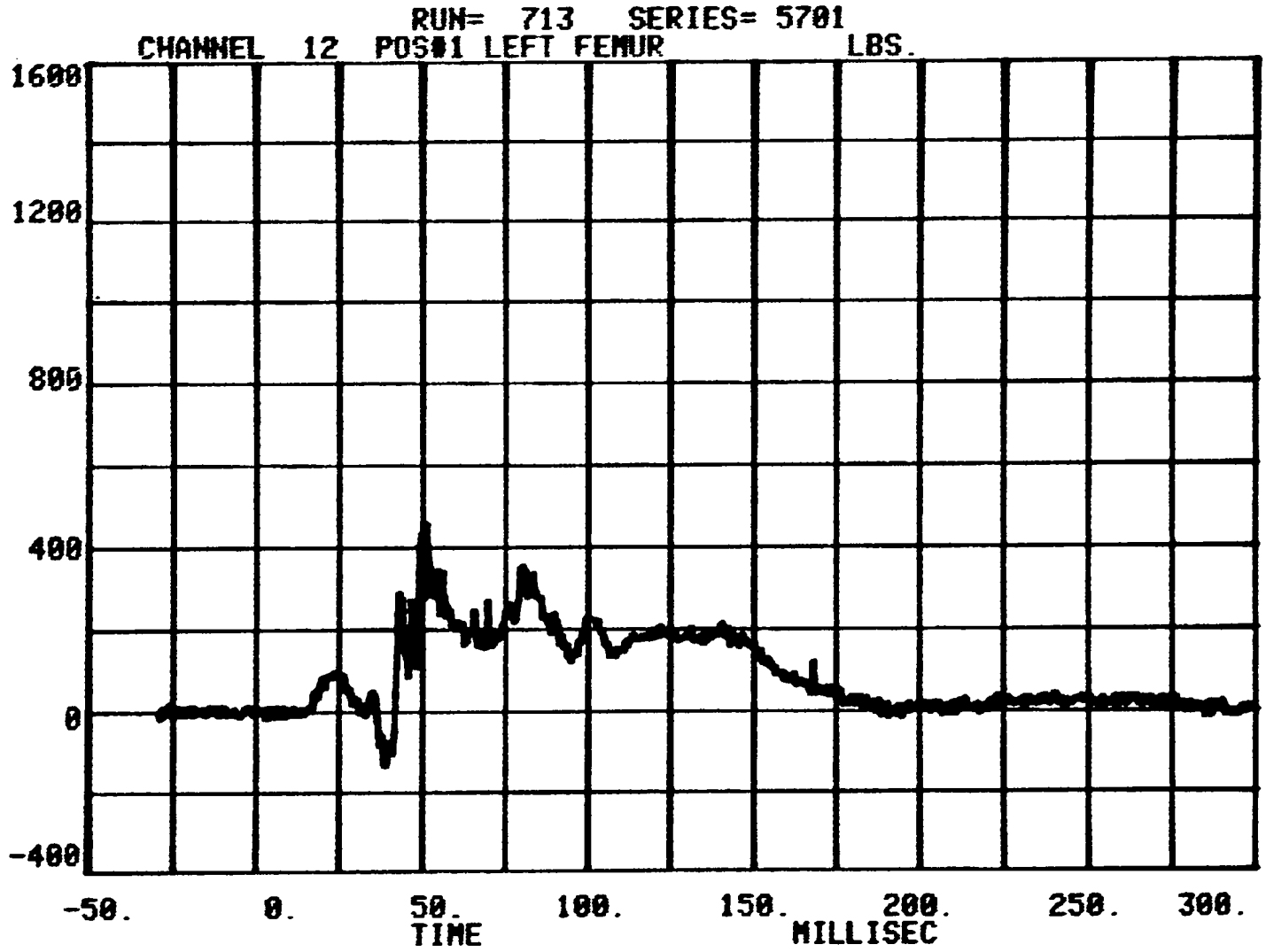

CHANNEL 70 POS#1 CHEST X
RUN= 713 SERIES= 5701
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

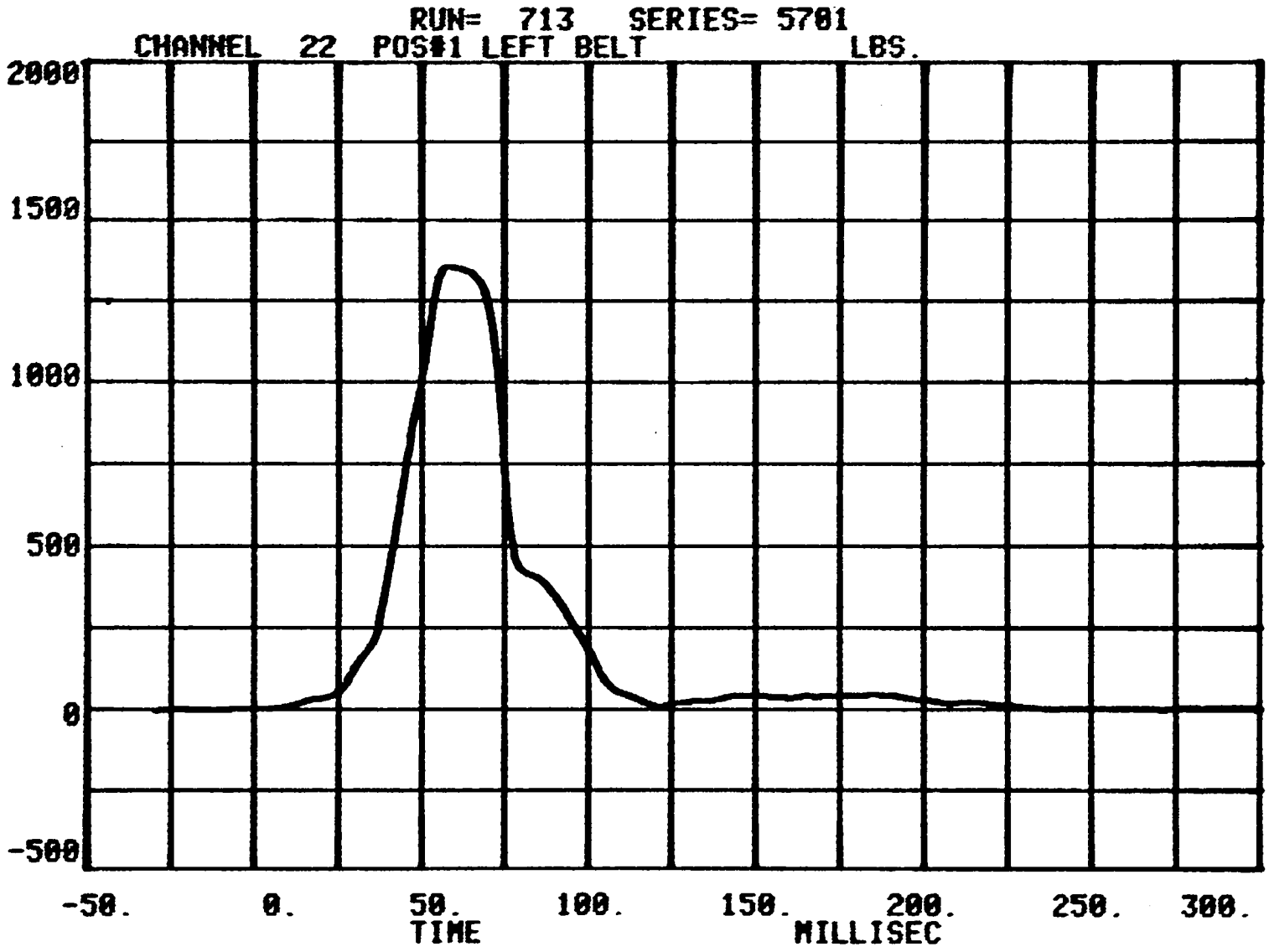

CHANNEL 5 POS#1 CHEST Y
RUN= 713 SERIES= 5701
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

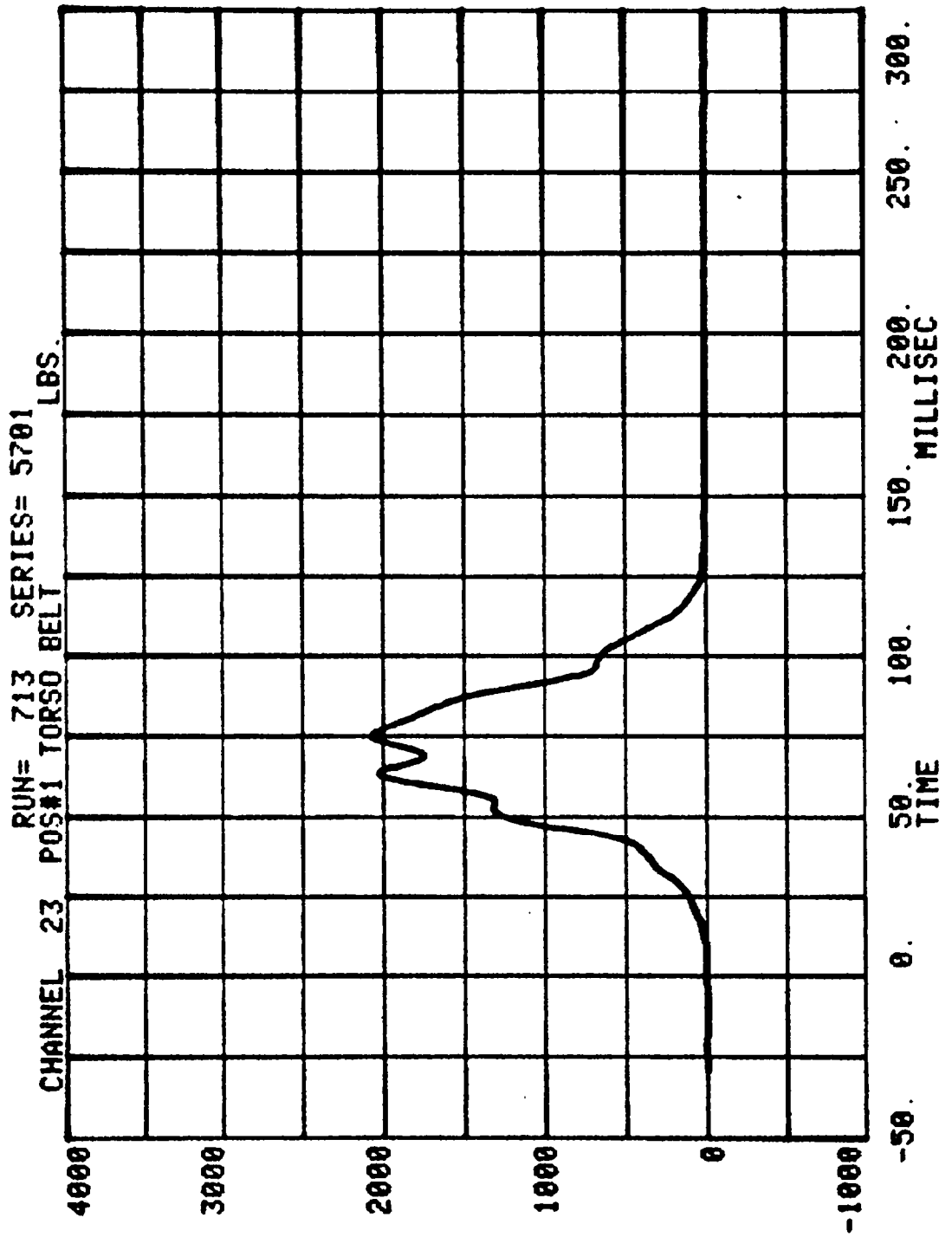

CHANNEL 6 POS#1 CHEST Z
RUN= 713 SERIES= 5701
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

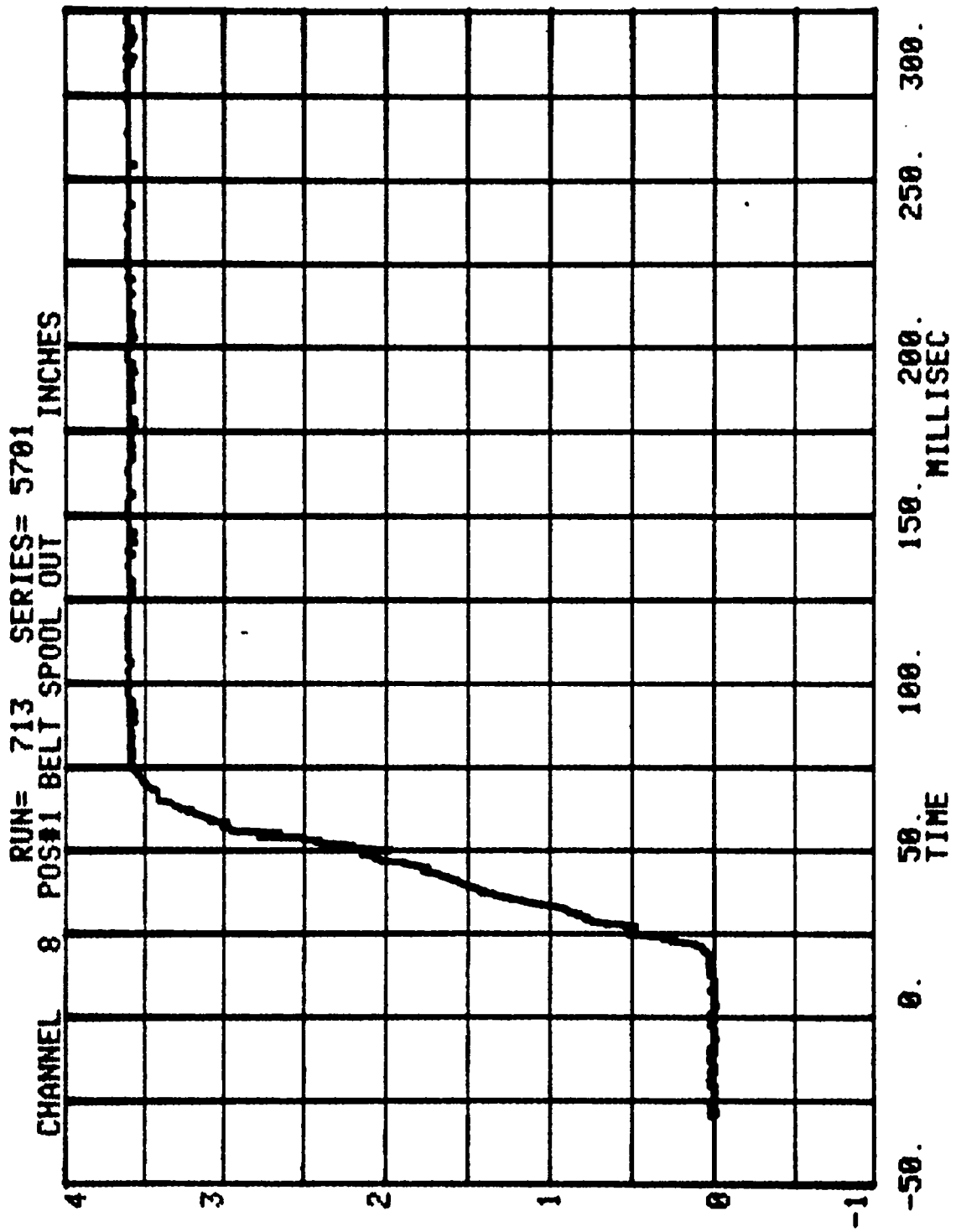

RUN= 713 SERIES= 5701
CHANNEL 2 POS#1 CHEST R G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 713 SERIES= 5701
CHANNEL 11 POS#1 RIGHT FEMUR LBS.
1200
800
400
0
-400
-800
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 713 SERIES= 5701
CHANNEL 12 POS#1 LEFT FEMUR LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 713 SERIES= 5701
CHANNEL 22 POS#1 LEFT BELT LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 23 POS#1 TORSO BELT
RUN= 713 SERIES= 5701
LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 8 POS#1 BELT SPOOL OUT
RUN= 713 SERIES= 5701
INCHES
4
3
2
1
0
-1
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

NEW CAR ASSESSMENT BARRIER TESTS - 1986

RUN= 713

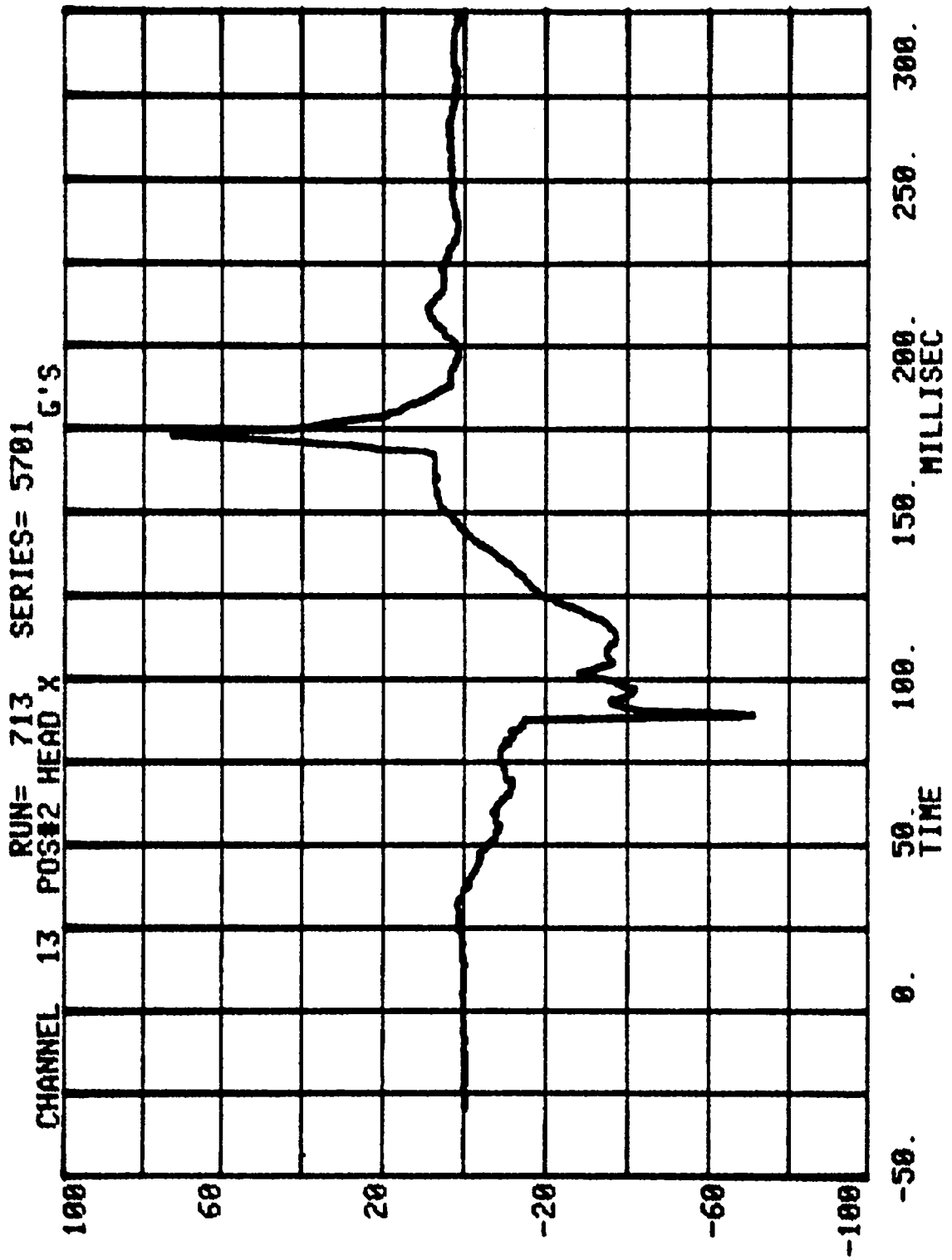
POS#2 HEAD R

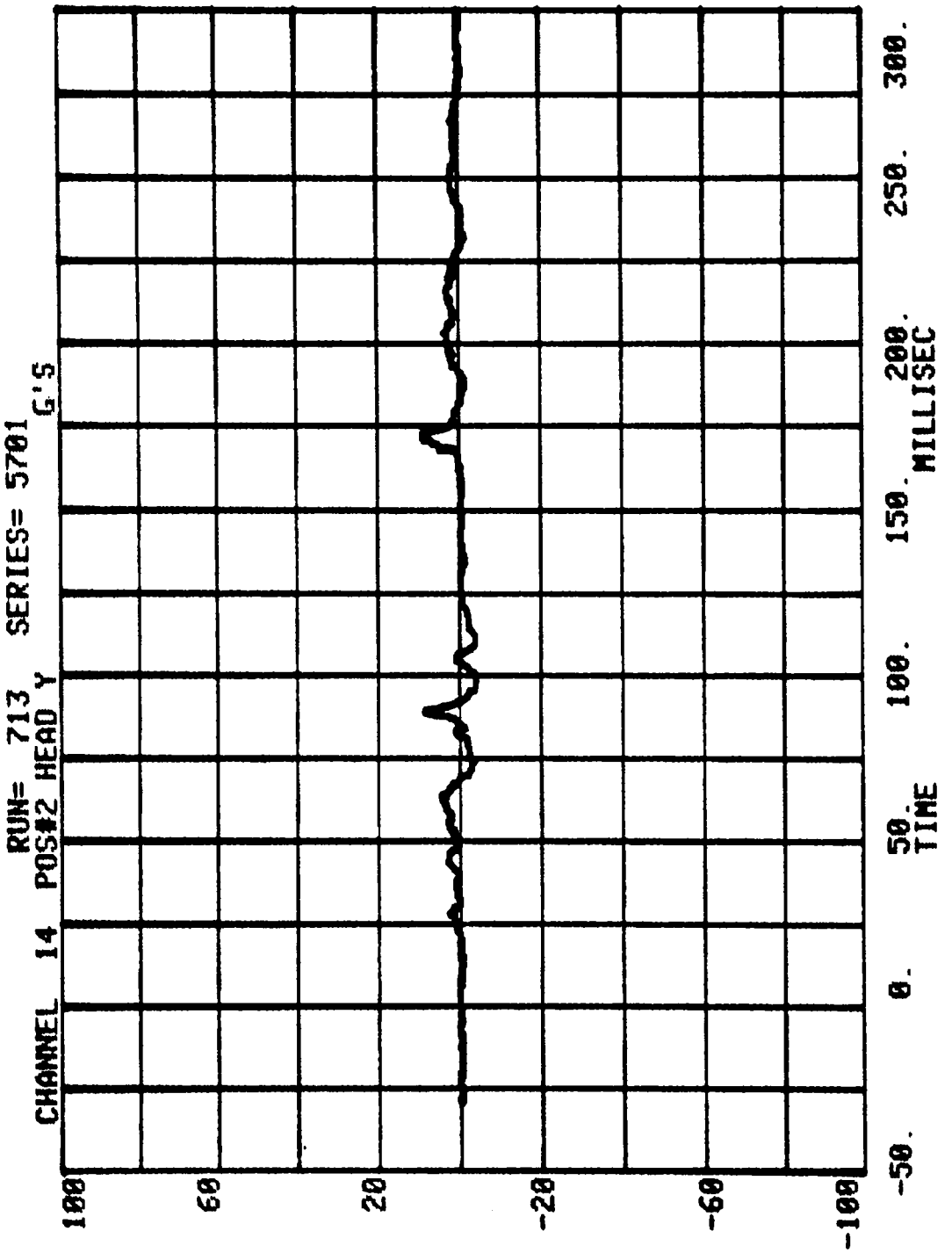
HIC=1146.4 FROM T1= .06277 TO T2= .12150

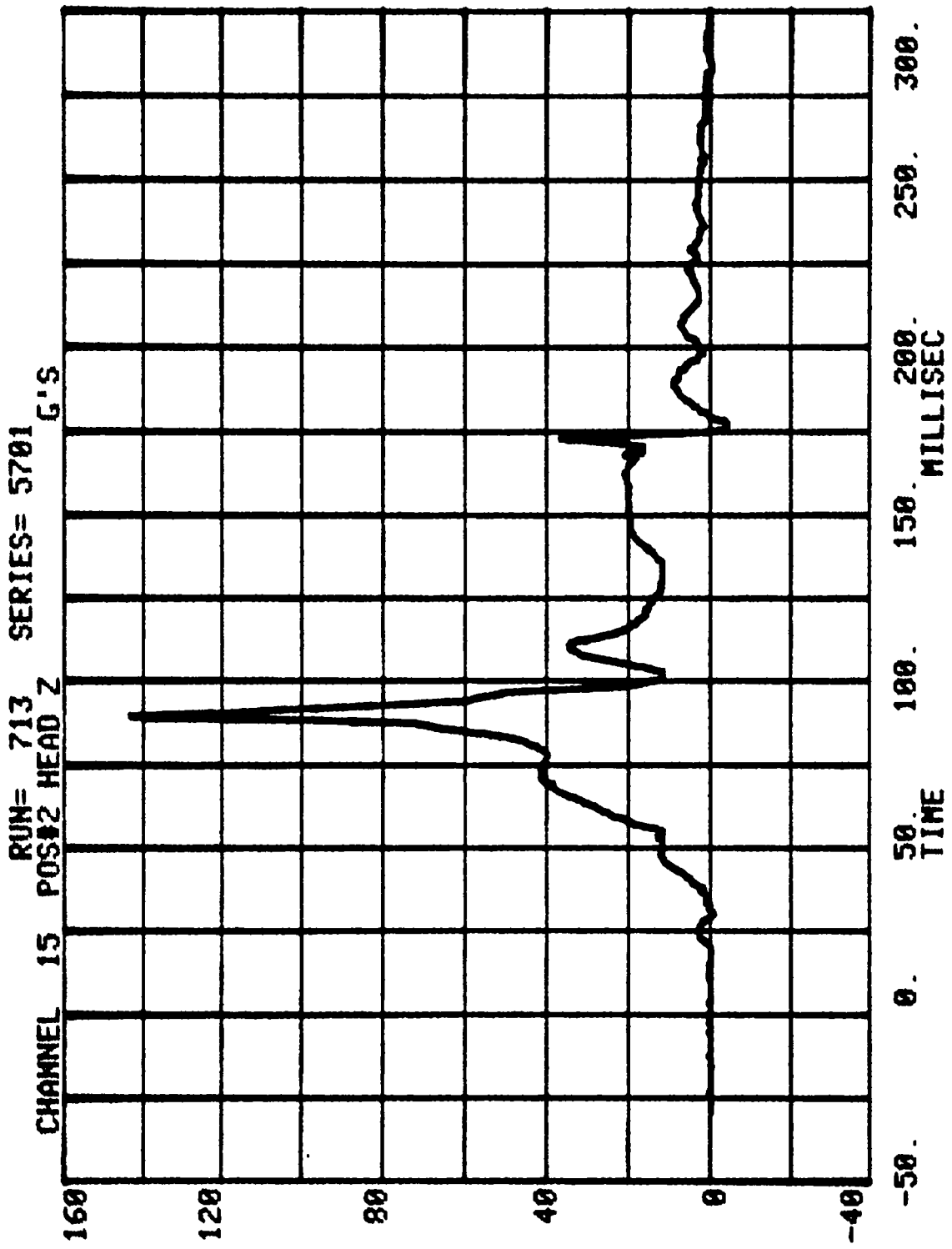
AVERAGE ACCELERATION BETWEEN T1 AND T2= 52.0G'S

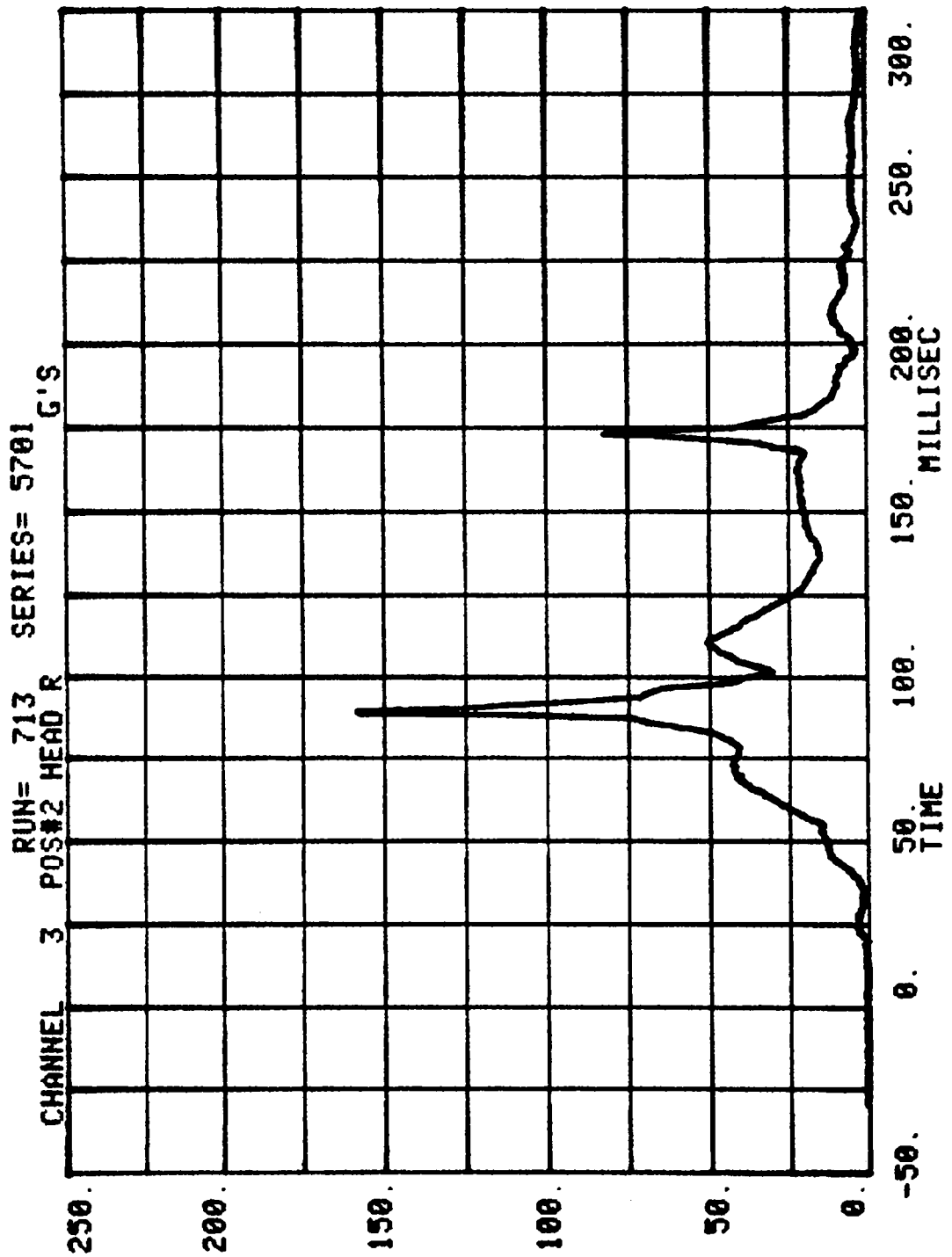
EVENT TIME= 300.0 MSEC

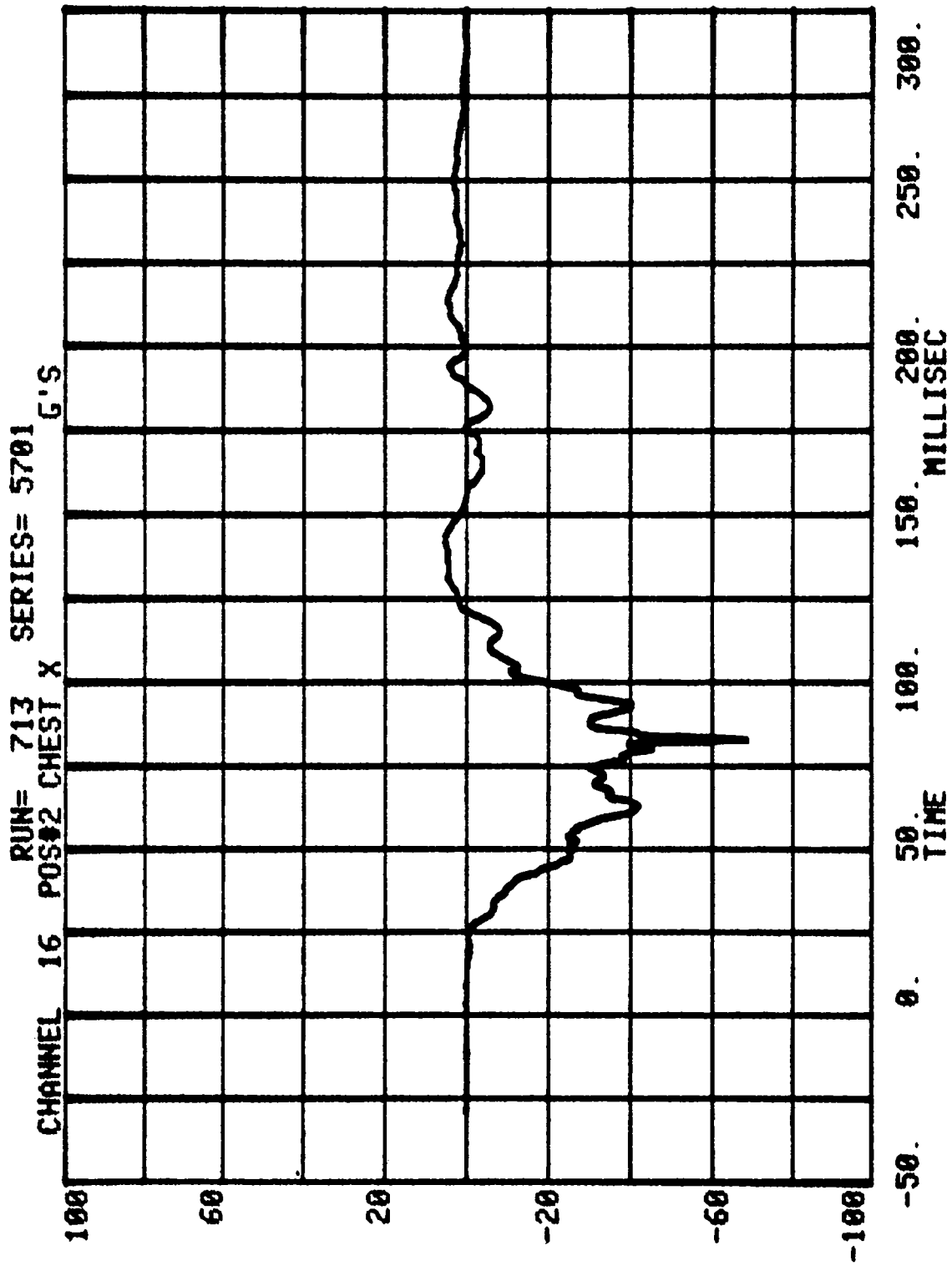
SEVERITY INDEX=2011.7

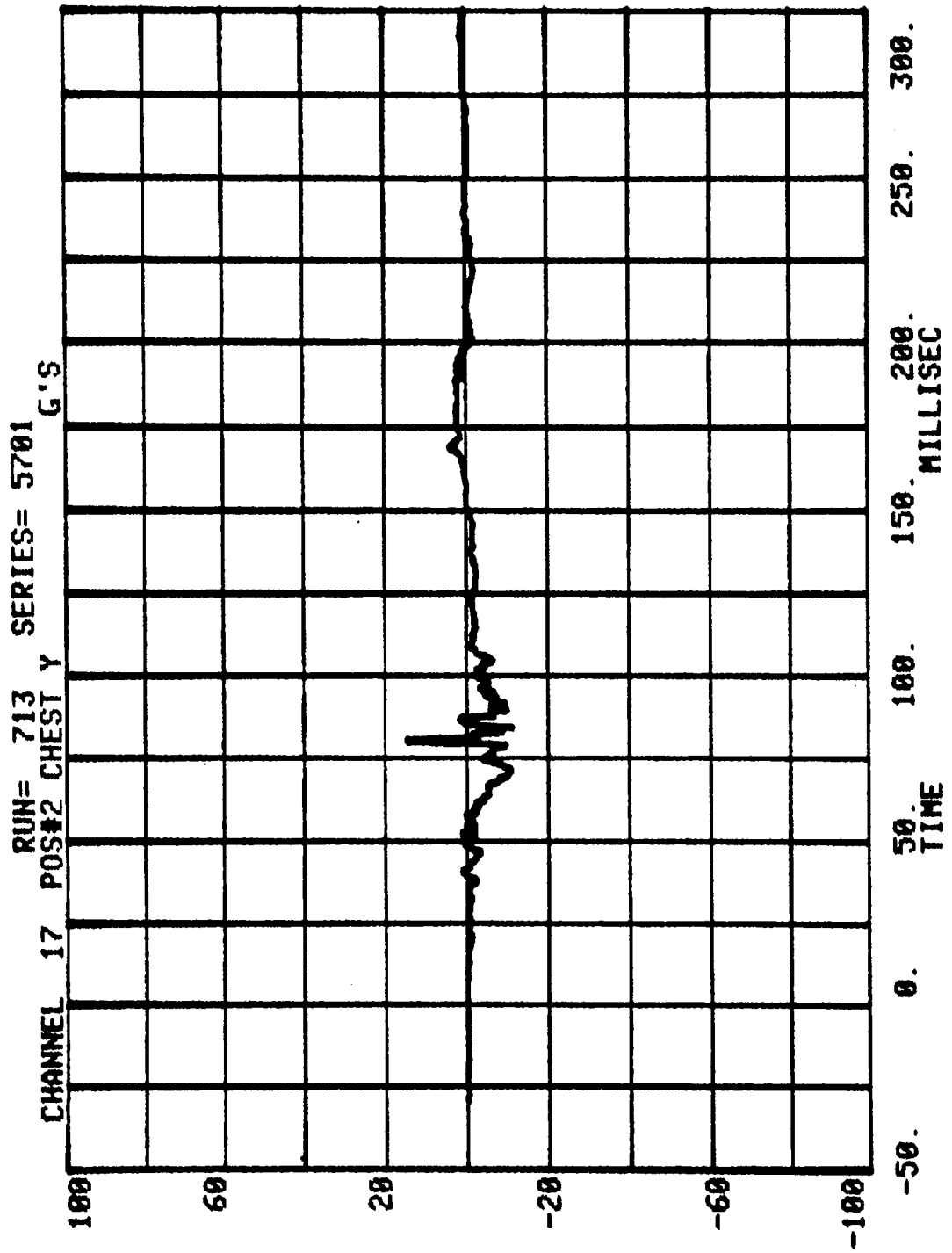

CHANNEL 13 RUN= 713 SERIES= 5701
POS#2 HEAD X G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

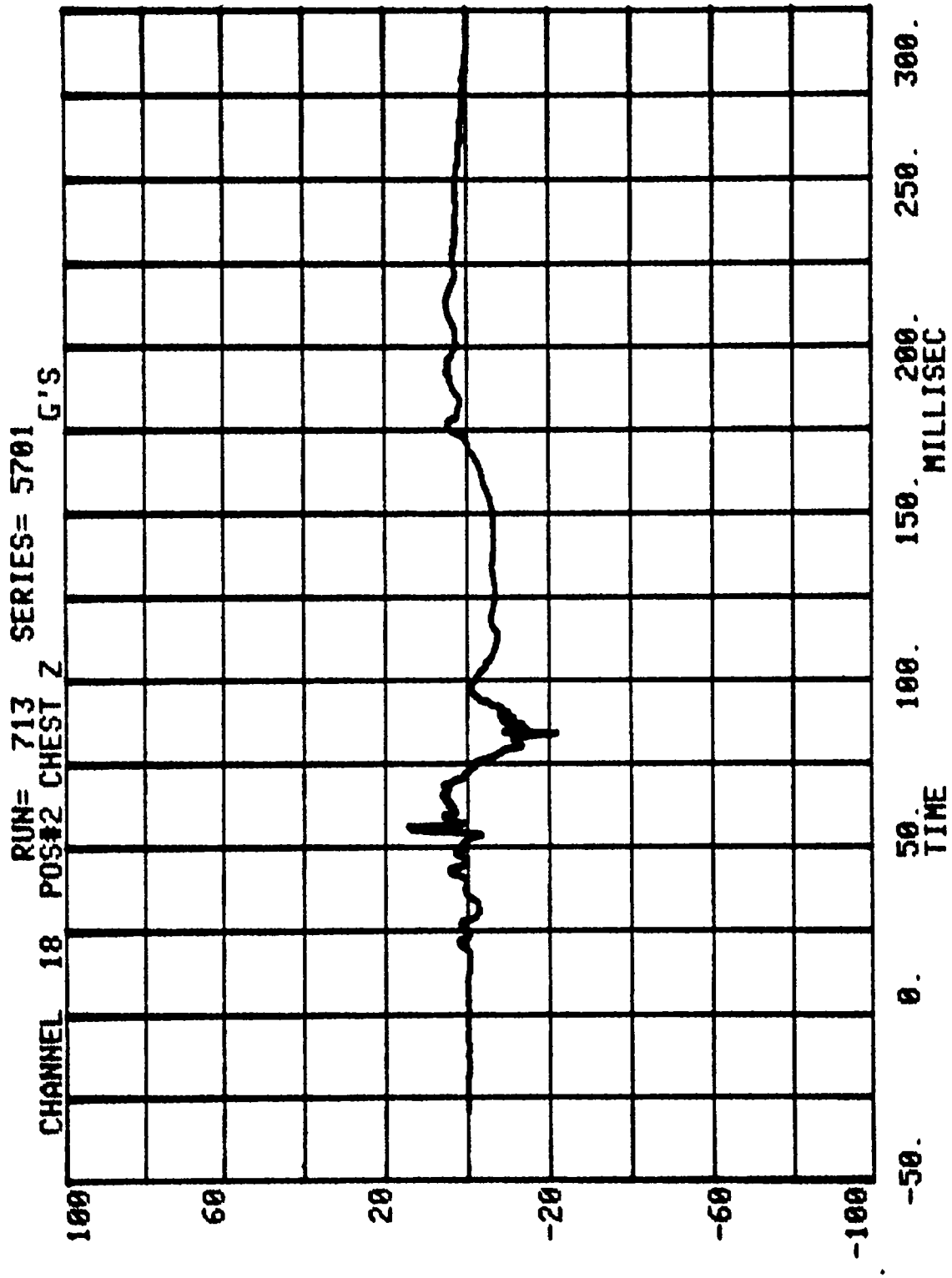

CHANNEL 14 POS#2 HEAD Y
RUN= 713 SERIES= 5701
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

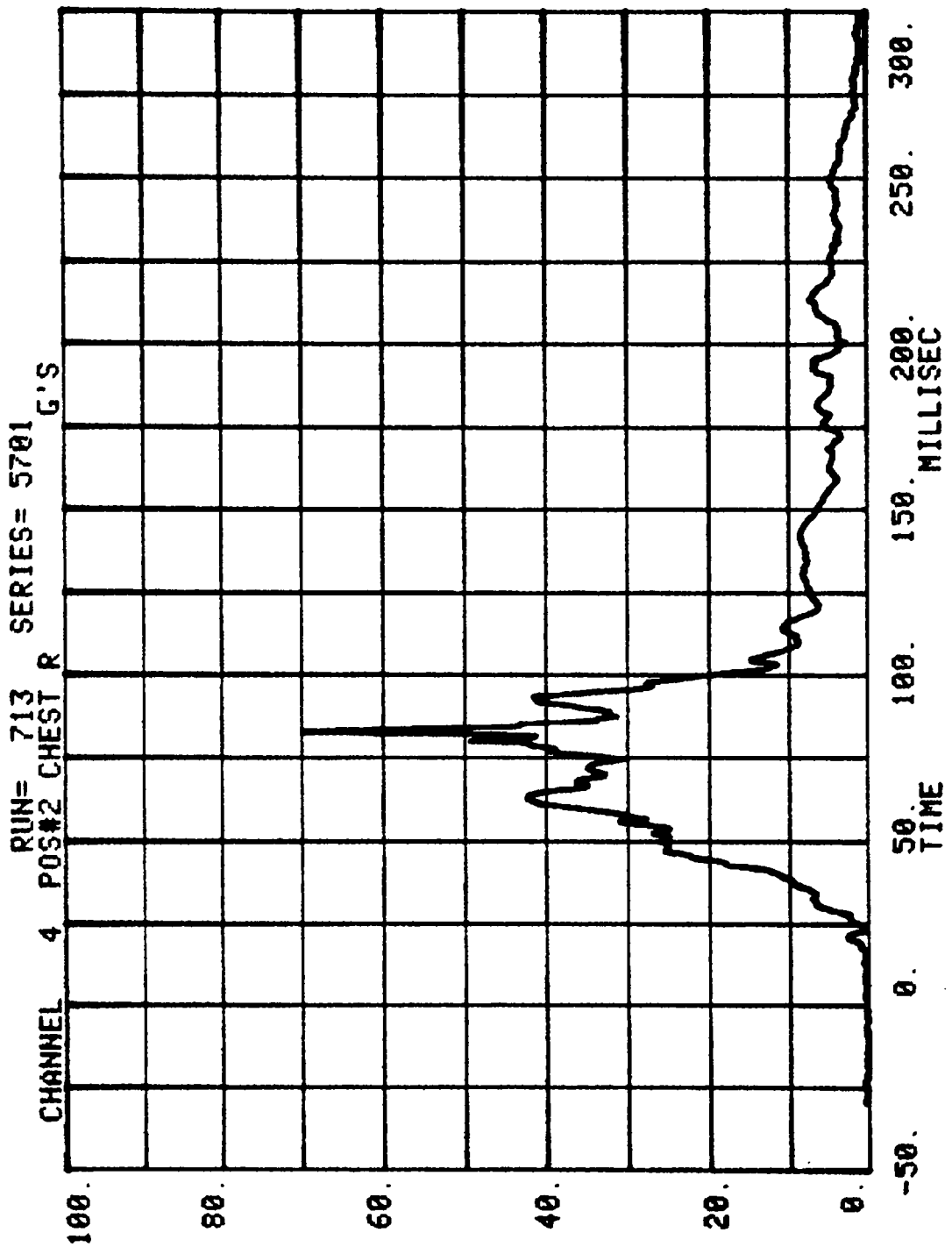

CHANNEL 15 POS#2 HEAD Z
RUN= 713 SERIES= 5701
G'S
160
120
80
40
0
-40
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

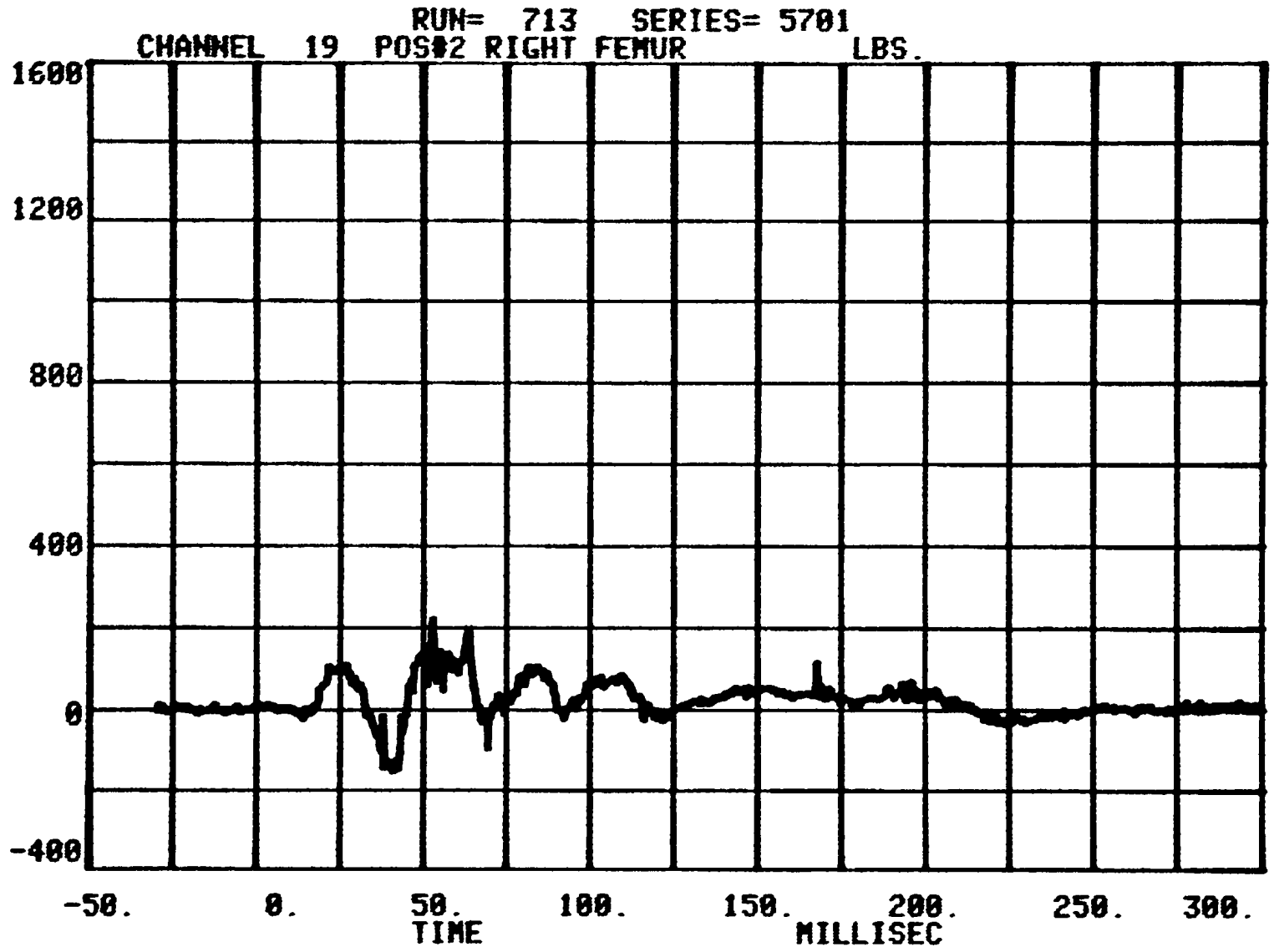

CHANNEL 3 RUN= 713 SERIES= 5701
POS#2 HEAD R G'S
250.
200.
150.
100.
50.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

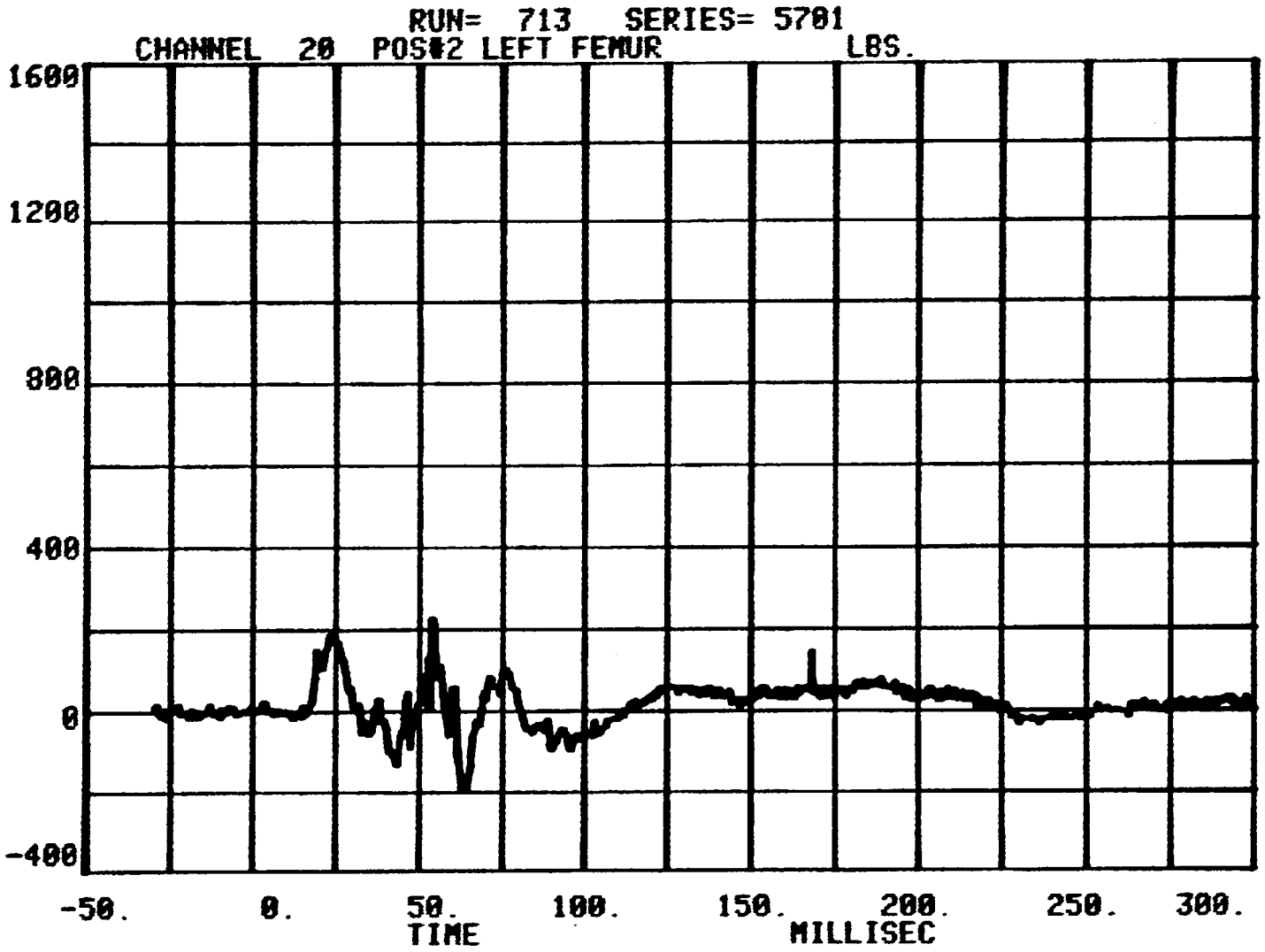

CHANNEL 16 POS#2 CHEST X
RUN= 713 SERIES= 5701
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

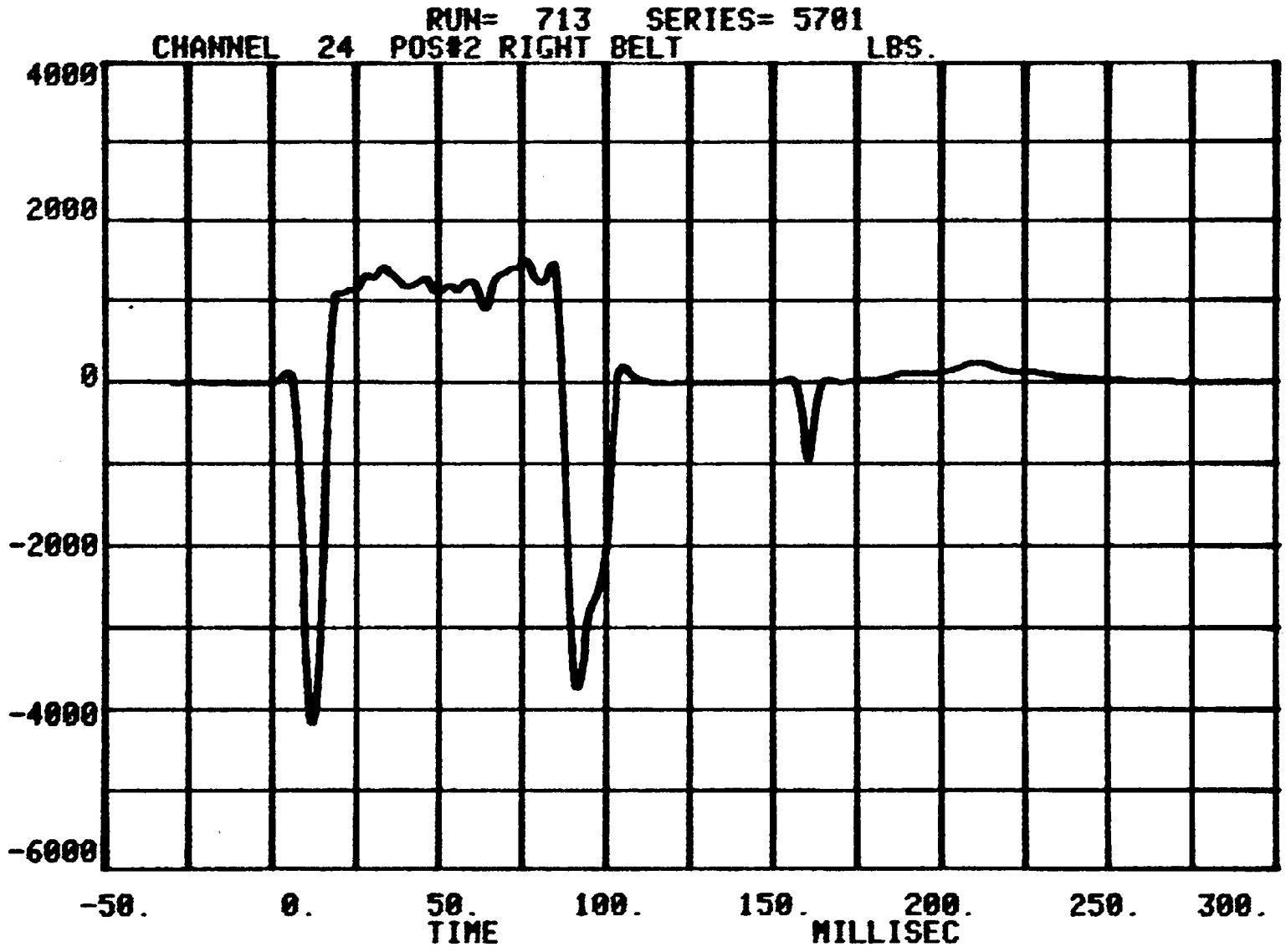

CHANNEL 17 POS#2 CHEST Y
RUN= 713 SERIES= 5701
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

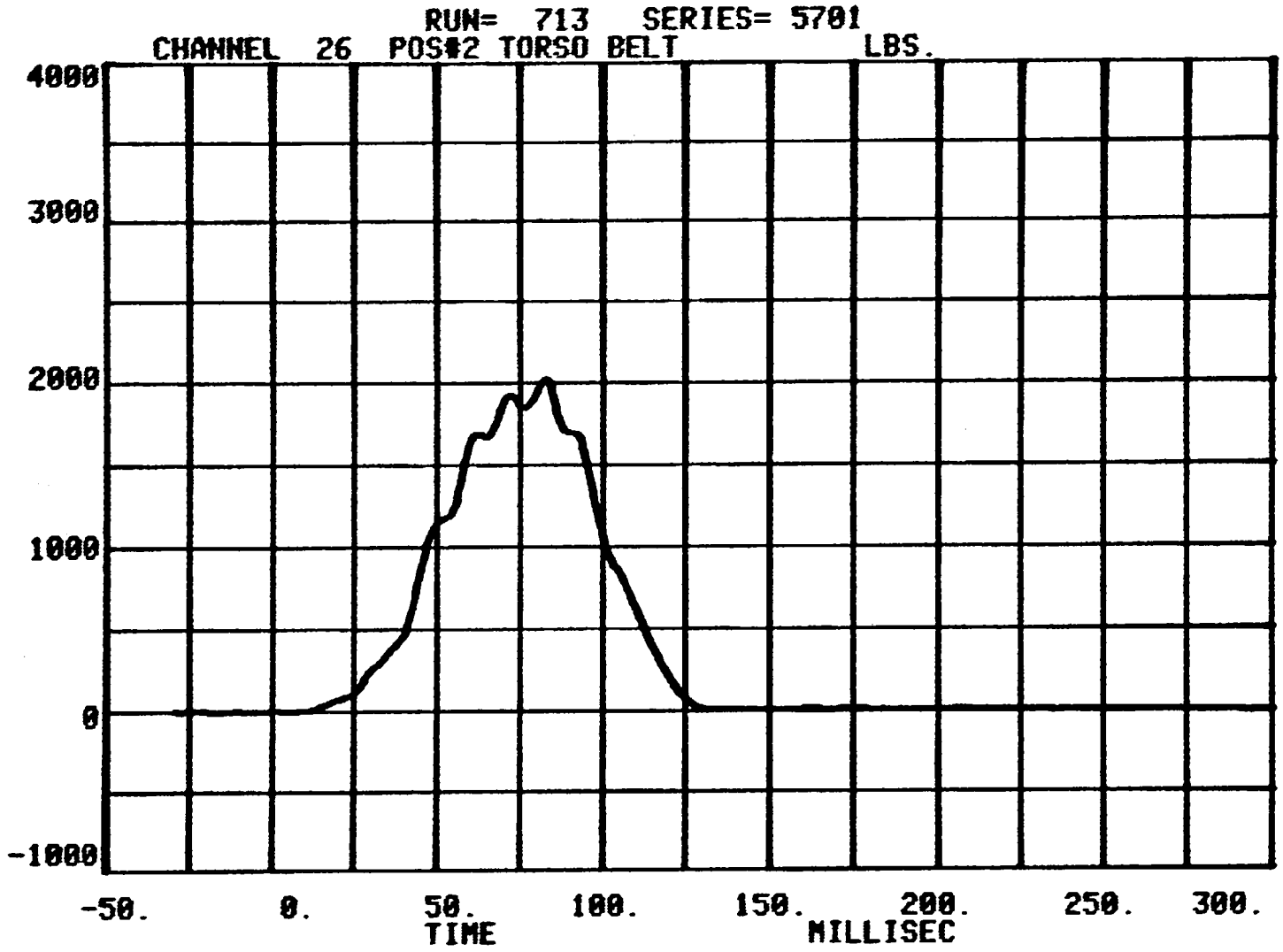

CHANNEL 18 POS#2 CHEST Z
RUN= 713 SERIES= 5701
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

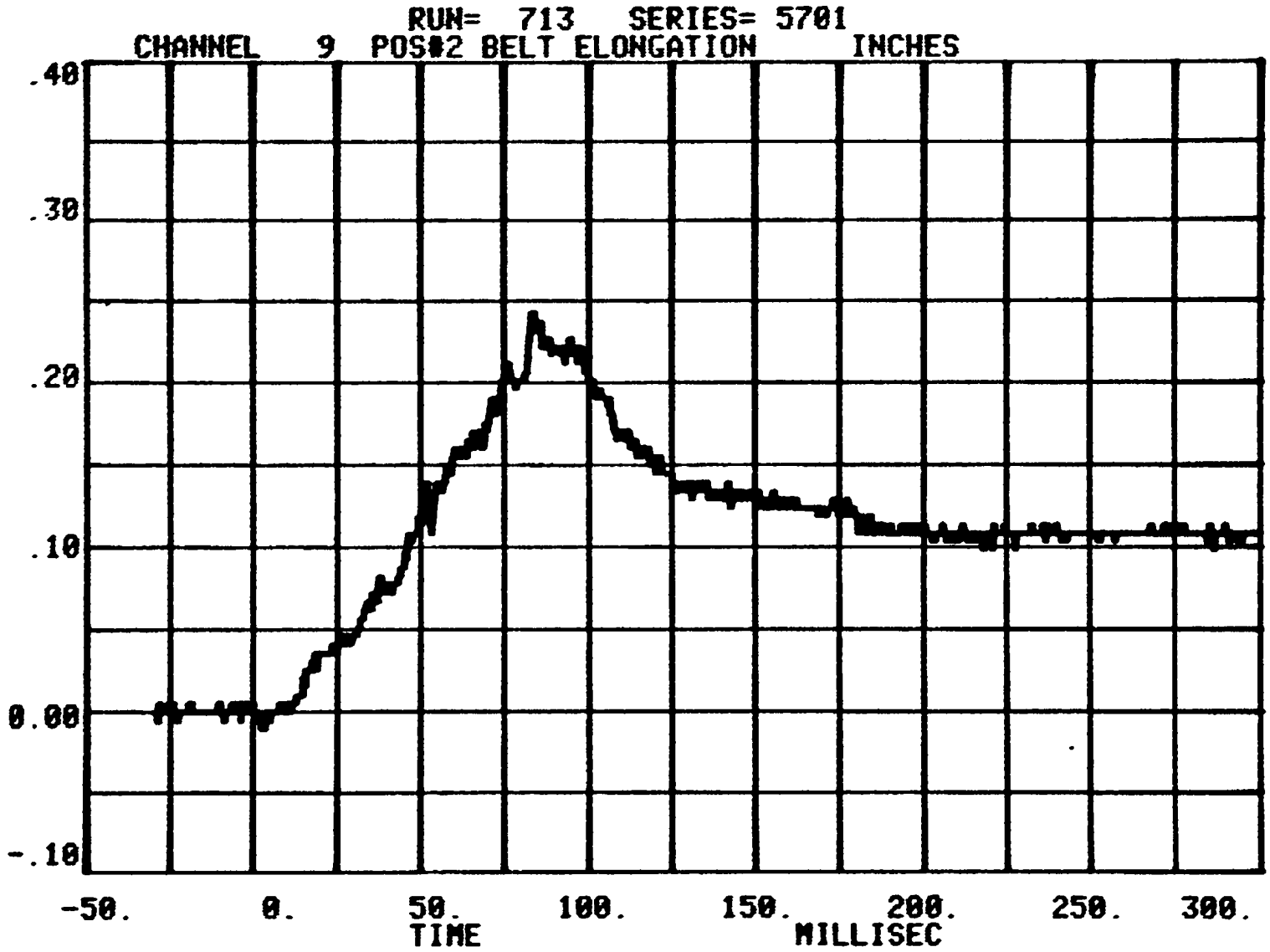

CHANNEL 4 POS#2 CHEST R
RUN= 713 SERIES= 5701
G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

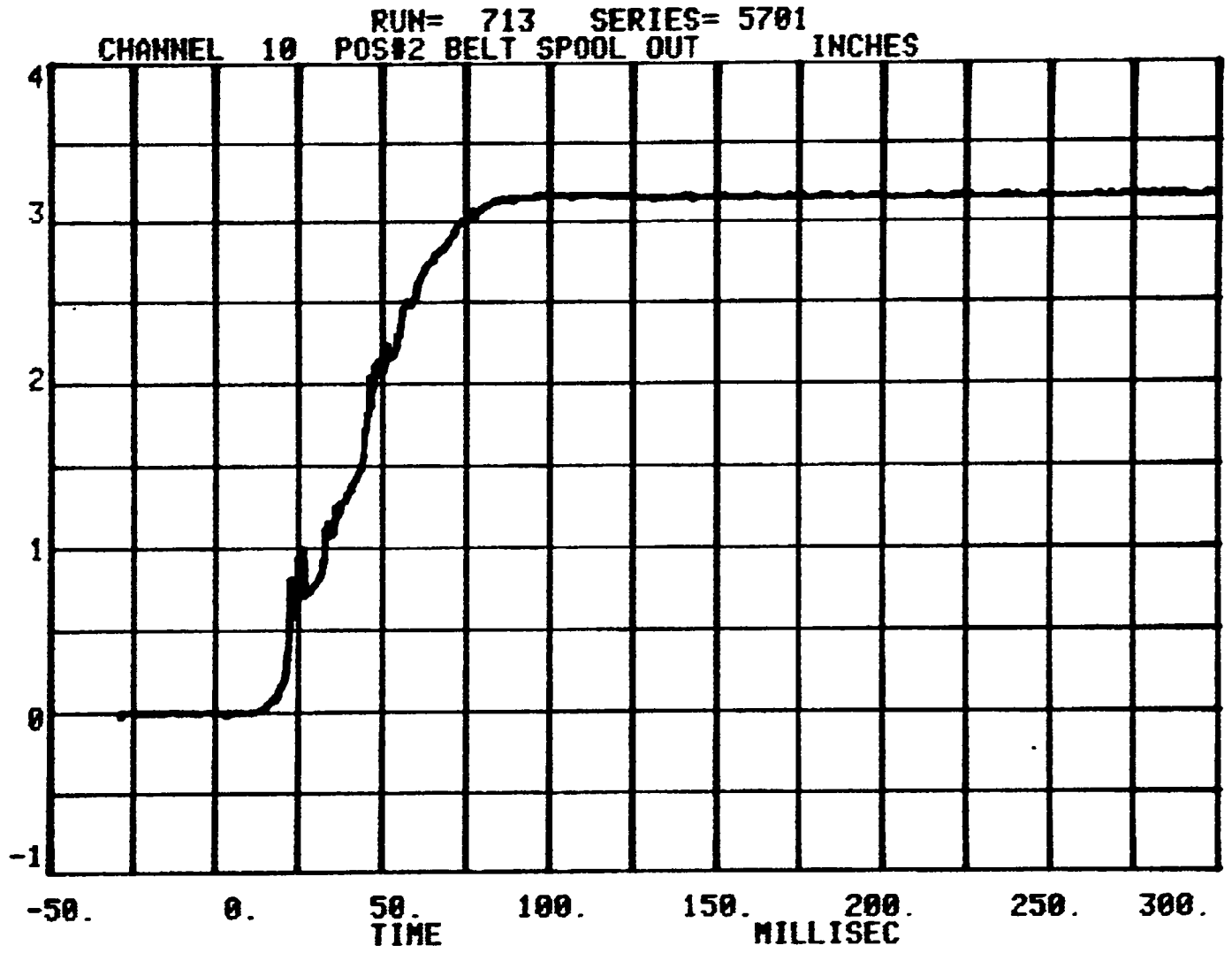

RUN= 713 SERIES= 5701
CHANNEL 19 POS#2 RIGHT FEMUR LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC


RUN= 713 SERIES= 5701
CHANNEL 20 POS#2 LEFT FEMUR LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 713 SERIES= 5701
CHANNEL 24 POS#2 RIGHT BELT LBS.
4000
2000
0
-2000
-4000
-6000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 713 SERIES= 5701
CHANNEL 26 POS#2 TORSO BELT LBS.
4000
3000
2000
1000
0
-1000
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 713 SERIES= 5701
CHANNEL 9 POS#2 BELT ELONGATION INCHES
.40
.30
.20
.10
0.00
-.10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 713 SERIES= 5701
CHANNEL 10 POS#2 BELT SPOOL OUT INCHES
4
3
2
1
0
-1
-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
1022	1/3/86
1021	1/3/86

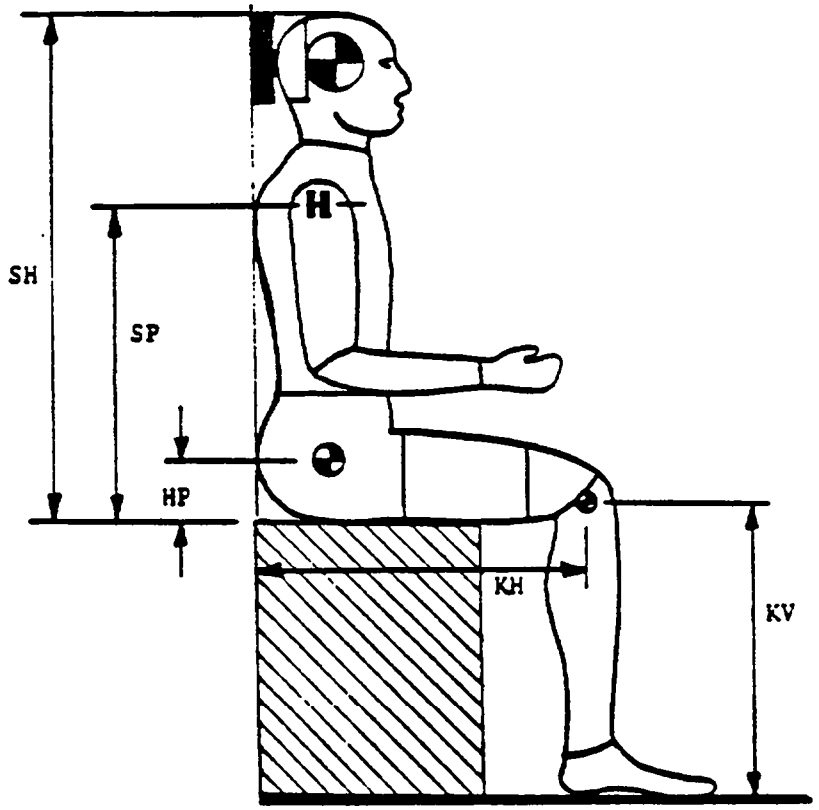
Electronic Test Equipment

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.: 1022

I. CONFIGURATION VERIFICATION DATA:



	P.572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION		1/3/86	
VERIFICATION NUMBER FOR DUMMY*		1	
SH - Seated Height- - - - - - - -	35.6 to 35.8"	35.8"	
SP - Shoulder Pivot Height- - - -	21.8 to 22.4"	22.2"	
HP - Hip Pivot Height - - - - - -	3.9" ref.	3.9"	
KH - Knee Pivot from back line- -	20.1 to 20.7"	20.6"	
KV - Knee Pivot from floor- - - -	19.3 to 19.9"	19.4"	
SW - Shoulder Width - - - - - - -	17.8 to 18.4"	18.0"	
HW - Hip Width- - - - - - - - - -	14.0 to 15.4"	14.5"	

TECHNICIAN'S NAME: G. Gestwick

* 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.: 1022

TECHNICIAN'S NAME: G. Gestwick

			PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION----------			1/3/86	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*------			1	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----			68° - 70° °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)			25% - 36% %	%
TEST PARAMETER		SPECIFICATION		
1. HEAD DROP TEST--				
a. Peak Resultant Accel.-		210 to 260G	220 g.	
b. Peak Lateral Accel.- -		≤ - 10G	8 g.	
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	23.3 fps	
b. Pend. Avg. Decel. over $t_3 - t_2$		20 to 24G	23.5 g.	
c. Peak Resultant Head Acceleration - - - - -		26G max.	24.5 g.	
d. Pendulum Decel.(t_2-t_1)		≤ - 3ms	2.0 ms.	
e. Pendulum Decel.(t_3-t_2)		25 to 30 ms	26.3 ms.	
f. Pendulum Decel.(t_4-t_3)		≤ - 10ms	2.5 ms.	
g. Max. Head Rotation - -		63 to 73°	68°	
h. Chordal Displacement-- Head Rotation Angle-				
0°	Time- -	-2 to 2 ms	0 ms.	
	Displ.-	-.5 to .5"	0.0"	
30°	Time- -	25.6 to 34.4ms	28 ms.	
	Displ.-	2.1 to 3.1"	3.0"	
60°	Time- -	40.3 to 51.7ms	43.5 ms.	
	Displ.-	4.3 to 5.3"	5.1"	
Maximum (68°)	Time- -	53.2 to 66.8ms	59 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.: 1022

TECHNICIAN'S NAME: G. Gestwick

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	70.5 ms.	
		Displ.	4.3 to 5.3 in.	5.0"	
	30°	Time	85.4 to 104.6 ms	89 ms.	
		Displ.	2.1 to 3.1 in.	2.5"	
	0°	Time	101.0 to 123.0 ms	105 ms.	
		Displ.	-.5 to 0.5 in.	0.0"	
3. ABDOMINAL COMPRESSION TEST:					
(Preload = 10 pounds)					
a. Force @ .5" - - - - -			23 to 36 lbs.	25.5 lbs.	
b. Force @ .75" - - - - -			36 to 50 lbs.	39.0 lbs.	
c. Force @ 1.0" - - - - -			50 to 63 lbs.	54.0 lbs.	
d. Force @ 1.3" - - - - -			73 to 88 lbs.	77.5 lbs.	
4. LUMBAR FLEXION TEST:					
a. Force @ 20° - - - - -			22 to 34 lbs.	26.0 lbs.	
b. Force @ 30° - - - - -			34 to 46 lbs.	36.0 lbs.	
c. Force @ 40° - - - - -			46 to 58 lbs.	46.5 lbs.	
d. Return Angle - - - - -			12° maximum	10°	
5. CHEST IMPACT TESTS:					
a. High Speed					
(1) Probe Speed- - -			21.78-22.22 fps	21.95fps	
(2) Peak Deflection-			1.7" maximum	1.64"	
(3) Peak Resistive Force- - - - - -			2250 lbs. maximum	2080 lbs.	
(4) Internal Hysteresis - - -			50 to 70%	58.9%	
b. Low Speed					
(1) Probe Speed- - -			13.86-14.14 fps	13.92 fps	
(2) Peak Deflection-			1.1" maximum	.94"	
(3) Peak Resistive Force- - - - - -			1450 lbs. maximum	1180 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.: 1022

TECHNICIAN'S NAME: G. Gestwick

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	6.95 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2375 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.75 ms.	
b. Left Side—			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.83 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1950 lbs.	
(3) Time Above 1000#	1.7 ms minimum	2.0 ms.	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

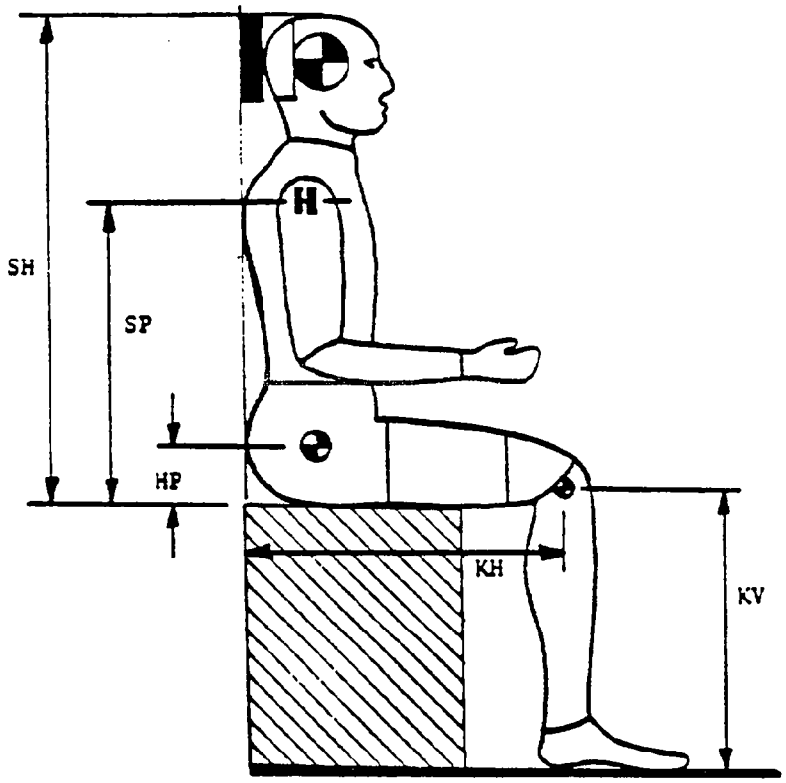
NHTSA DUMMY ID NO. 1022 CALIB. SEQ. NOS. FOR DUMMY: 1

	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	DB47	10-85	4-86
(2) Lateral (A_y) - - -	Endevco	CX05	10-85	4-86
(3) Vertical (A_z) - - -	Endevco	CJ54	10-85	4-86
2. Chest Accelerometers -- (Vehicle Crash Test Usage)				
a. Triaxial unit - - - - -	NA	--	--	--
b. Uniaxial units				
(1) Longitudinal (A_x) -	CEC	A115	9-85	3-86
(2) Lateral (A_y) - - -	Endevco	CS09	10-85	4-86
(3) Vertical (A_z) - - -	CEC	A29	9-85	3-86
3. Chest Potentiometer - - -	NA	--	--	--
4. Femur Load Cells --				
a. Right Side - - - - - -	GSE	75	11-85	5-86
b. Left Side - - - - - -	GSE	74	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

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NO.: 1021

I. CONFIGURATION VERIFICATION DATA:



	P.572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION		1/3/86	
VERIFICATION NUMBER FOR DUMMY*		1	
SH - Seated Height- - - - - - - -	35.6 to 35.8"	35.7"	
SP - Shoulder Pivot Height- - - -	21.8 to 22.4"	22.2"	
HP - Hip Pivot Height - - - - - -	3.9" ref.	3.9"	
KH - Knee Pivot from back line- -	20.1 to 20.7"	20.5"	
KV - Knee Pivot from floor- - - -	19.3 to 19.9"	19.8"	
SW - Shoulder Width - - - - - - -	17.8 to 18.4"	18.0"	
HW - Hip Width- - - - - - - - - -	14.0 to 15.4"	15.0"	

TECHNICIAN'S NAME: Gary Gestwick

* 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 (Continued) NHTSA DUMMY I.D. NO.: 1021

TECHNICIAN'S NAME: G. Gestwick

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	71 ms.	
	Displ.	4.3 to 5.3 in.	5.0"	
30°	Time	85.4 to 104.6 ms	88 ms.	
	Displ.	2.1 to 3.1 in.	2.8"	
0°	Time	101.0 to 123.0 ms	103 ms.	
	Displ.	-.5 to 0.5 in.	0.0"	
3. ABDOMINAL COMPRESSION TEST:				
(Preload = 10 pounds)				
a. Force @ .5" - - - - -		23 to 36 lbs.	24.5 lbs.	
b. Force @ .75" - - - - -		36 to 50 lbs.	38.0 lbs.	
c. Force @ 1.0" - - - - -		50 to 63 lbs.	54.0 lbs.	
d. Force @ 1.3" - - - - -		73 to 88 lbs.	78.0 lbs.	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - - -		22 to 34 lbs.	32.0 lbs.	
b. Force @ 30° - - - - -		34 to 46 lbs.	43.5 lbs.	
c. Force @ 40° - - - - -		46 to 58 lbs.	54.5 lbs.	
d. Return Angle - - - - -		12° maximum	8°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed- - -		21.78-22.22 fps	21.88 fps	
(2) Peak Deflection-		1.7" maximum	1.46"	
(3) Peak Resistive Force- - - - - -		2250 lbs. maximum	2020 lbs.	
(4) Internal Hysteresis - - -		50 to 70%	57.0%	
b. Low Speed				
(1) Probe Speed- - -		13.86-14.14 fps	13.90 fps	
(2) Peak Deflection-		1.1" maximum	.95"	
(3) Peak Resistive Force- - - - - -		1450 lbs. maximum	1170 lbs.	
(4) Internal Hyster.		50 to 70%	53.0%	

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

II. PERFORMANCE VERIFICATION DATA:

NHTSA DUMMY I.D. NO.: 1021

TECHNICIAN'S NAME: G. Gestwick

			PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION----------			1/3/86	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*------			1	
VERIF. LAB. TEMPERATURE (66 to 78°F Range)-----			68° - 70° °F.	°F.
VERIF. LAB. HUMIDITY (10 to 70% Range)			25% - 36% %	%
TEST PARAMETER		SPECIFICATION		
1. HEAD DROP TEST--				
a. Peak Resultant Accel.-		210 to 260G	220 g.	
b. Peak Lateral Accel.- -		≤ - 10G	3 g.	
c. Time above 100G- - - -		0.9 to 1.5ms	1.2 ms.	
2. NECK BENDING TEST--				
a. Pendulum Speed - - - -		21.5 to 25.5 fps	23.7 fps	
b. Pend. Avg. Decel. over $t_3 - t_2$		20 to 24G	24 g.	
c. Peak Resultant Head Acceleration - - - - -		26G max.	26 g.	
d. Pendulum Decel.(t_2-t_1)		≤ - 3ms	1.9 ms.	
e. Pendulum Decel.(t_3-t_2)		25 to 30 ms	25.6 ms.	
f. Pendulum Decel.(t_4-t_3)		≤ - 10ms	2.5 ms.	
g. Max. Head Rotation - -		63 to 73°	68°	
h. Chordal Displacement-- Head Rotation Angle-				
0°	Time- -	-2 to 2 ms	0 ms.	
	Displ.-	-.5 to .5"	0.0"	
30°	Time- -	25.6 to 34.4ms	27 ms.	
	Displ.-	2.1 to 3.1"	3.1"	
60°	Time- -	40.3 to 51.7ms	42 ms.	
	Displ.-	4.3 to 5.3"	5.2"	
Maximum (68 °)	Time- -	53.2 to 66.8ms	57.5 ms.	
	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.: 1021

TECHNICIAN'S NAME: G. Gestwick

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	7.00 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2200 lbs.	
(3) Time Above 1000#-	1.7 ms minimum	2.1 ms.	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.93 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2175 lbs.	
(3) Time Above 1000#-	1.7 ms minimum	2.1 ms.	

REMARKS:

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1021 CALIB. SEQ. NOS. FOR DUMMY: _____

	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	CH83	10-85	4-86
(2) Lateral (A_y) - - -	Endevco	CU62	10-85	4-86
(3) Vertical (A_z) - - -	Endevco	CM86	10-85	4-86
2. Chest Accelerometers -- (Vehicle Crash Test Usage)				
a. Triaxial unit - - - - -	NA	--	--	--
b. Uniaxial units				
(1) Longitudinal (A_x) -	CEC	A91	10-85	4-86
(2) Lateral (A_y) - - -	Endevco	CE76	10-85	4-86
(3) Vertical (A_z) - - -	CEC	A72	10-85	4-86
3. Chest Potentiometer - - -				
4. Femur Load Cells --				
a. Right Side - - - - - -	GSE	306	11-85	5-86
b. Left Side - - - - - -	GSE	310	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 - - - - - - - - -	CLH	72952	11-85	5-86
5. Abdominal Compression Test Displacement Gauge - - - - -	CIC	567-11	11-85	5-86

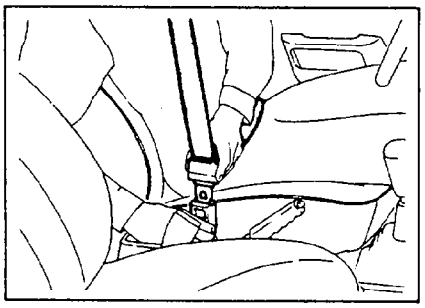
APPENDIX D

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

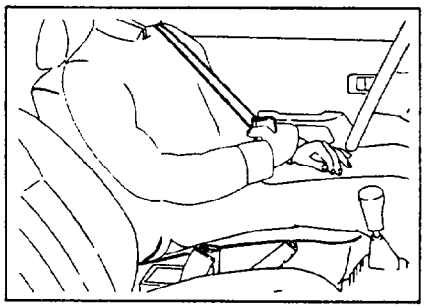
SEAT BELTS

To help lessen the chance of injury and/or the severity of injury in accidents or sudden stops, we urge that people riding in the vehicle be properly restrained at all times, using the seat belts provided. This includes women who are pregnant and children of all ages. (See the following pages for use of restraints by children and pregnant women.) A seat belt is provided at each position designed for occupant seating.

Front Seat Lap/Shoulder Belt

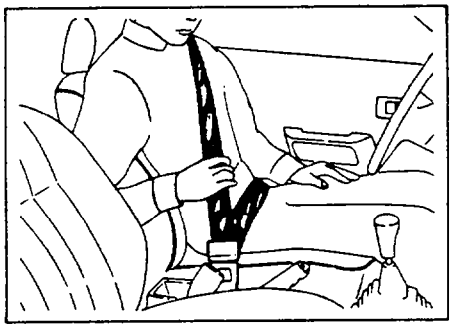


- Adjust the front seat as needed. Sit up straight and well back in the seat.
- Take hold of the seat belt latch plate and pull the lap/shoulder belt webbing across the body. Push the latch plate into the buckle until it clicks. If the retractor locks before the belt reaches the buckle, let the belt retract a little, then withdraw it again, slowly.



- Position the "lap" portion of the belt across the lap as LOW ON THE HIPS as possible. Then, adjust to a SNUG FIT by pulling the "shoulder" portion of the front seat belt UPWARD. This reduces the risk of sliding under the belt during an accident. Adjust the rear seat lap belt to a SNUG FIT by letting the retractor fully take up the slack.

- A snug fit with the lap belt positioned low on the hips is necessary to lessen the chance of injury and/or the degree of injury in an accident. This spreads the force of the lap belt over the strong hip bone instead of across the soft abdomen.
- The shoulder portion of the front seat belt restraint has a "vehicle and webbing sensitive retractor" which is designed to lock ONLY during a sudden stop or impact. At other times, it is designed to move freely with the person.



- To unfasten the belts, push in the button in the top of the buckle.
- When no longer in use, seat belts should be stowed by letting them rewind into their retractors. If necessary, move the keeper along the front seat belt webbing to let the belt retract fully. This will also put the latch plate within easy reach on the door pillar.

CAUTION:

- *Too much slack increases the probability of injury because the belt would not be able to properly restrain you in an accident. DO NOT wear the shoulder belt under the arm or out of position. Such use could increase the chance of injury and/or the degree of injury in an accident.*
- *Never use the same belt for more than one person at a time, do not wear twisted belts, and do not damage belts or belt buckles by pinching them in the seat or door.*

Restraint of Pregnant Women

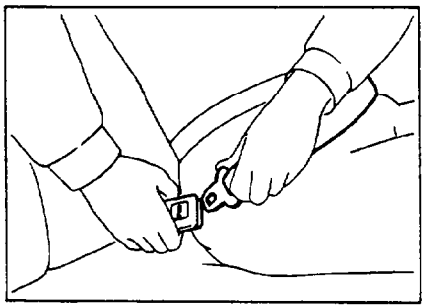
It is recommended that pregnant women use seat belts. Check with your doctor for specific recommendations. The lap belt should be worn snug and positioned as low as possible around the hips, not the waist.

Seat Belt Light/Buzzer Reminder

When the key is turned to "ON", a 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 buzzer will sound at the same time.

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

Lap Belt for Rear Seat



To enter the rear seat in two-door cars:

- Push the front seat belt "sleeve" rearward out of the door opening and enter the car.
- After entering, push the sleeve forward so it will be easy for the person in the front seat to reach the belt.
- Rear seat lap belts have retractors which are designed to take up extra webbing automatically.
- Pull the lap belt slowly across your lap and push the latch plate into the buckle until it clicks. If the retractor locks before the belt reaches the buckle, let the belt fully retract, then withdraw it again slowly.
- These belts should be located, fastened, and released as described above under "Front Seat Lap/Shoulder Belt." After fastening, check that the belt is SNUG by pulling the belt firmly across the lap toward the lap belt retractor. This will allow the retractor to take up slack.