

DOT 593

REPORT NO. 208-CAL-83-010

NHTSA NEW VEHICLE ASSESSMENT AND
STANDARDS ENFORCEMENT INDICANT TESTING

CHRYSLER CORPORATION
1983 Plymouth Reliant
4-Door Wagon

NHTSA NO. MD0301

CALSPAN TEST NO. 7103-V-11

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FINAL REPORT

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U.S. DEPARTMENT OF TRANSPORTATION
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16. Abstract A frontal barrier test of a 1983 Plymouth Reliant, 4-door wagon was performed at Calspan Corporation, Advanced Technology Center, Transportation Research/Physical Sciences Department facility as part of the New Car Assessment and Standards Enforcement Testing Program for the Office of Vehicle Safety Compliance, the Office of Market Incentives (OMI) and for Research and Development Impact speed was 35.12 mph. Ambient temperature on the test date was 78°F. The post-test vehicle crush was 26.3 inches and intrusion of the firewall into compartment was 12.4 inches. In regard to occupant restraint performance (FMVSS 208 - Injury Criteria), the driver met all the criteria. The right front passenger did not meet the head criteria: HIC No. 1221.1.		
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SECTION 1

PURPOSE AND TEST PROCEDURE

This frontal barrier test is part of the Composite FY-83 Vehicle Barrier Impact Testing program, sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract DTNH22-82-C-01140. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint performance data for impact speeds in excess of the current FMVSS requirements.

The test was performed in accordance with the Office of Market Incentives (OMI) Laboratory Procedure No. IP-212-02 dated April 4, 1980. Occupant performance data for a nominal 35 mph impact is provided herein.

SECTION 2

SUMMARY OF TEST NO. MD0301

A frontal barrier crash test was performed on a 1983 Plymouth Reliant 4-door wagon at an impact velocity of 35.12 mph. The test was performed at the Calspan Corporation Advanced Technology Center on August 23, 1983. Pre and post-test photographs of the vehicle and occupants can be found in Appendix A. Table 1 presents pertinent crash test information.

Two Part 572, 50 percentile male anthropomorphic test devices (ATD's) were placed in the driver and right-front passenger positions, according to dummy placement procedures specified in Laboratory Procedure for Vehicle Assessment IP-212-02.

The test dummies were instrumented with head and chest triaxial accelerometers and femur load cells. Load cells were also placed on the lap and shoulder belts to measure dummy torso and lap loading. The right front passenger ATD (Serial No. 1020) had been used in a previous test (CD0208) and the FMVSS Injury Criteria Values were not exceeded in that test. The driver ATD (Serial No. 1021) had been certified prior to this test; verification details along with instrumentation calibration data are found in Appendix C.

The crash event was recorded by 15 high-speed cameras. Camera locations and other pertinent camera information are found in Section 3 of this report.

The 35 channels of data were recorded on three-14 channel FM tape recorders. There were no data losses experienced during the test. Appendix B contains the vehicle and dummy response data traces. The Injury Criteria Values are presented in summary form in Table 6.

Table 1

CRASH TEST SUMMARY

TEST NO. MD0301 PROJECT: FY-83 New Car Assessment Program

DATE: 8/23/83 TIME: 1430 TEMP: 78°F

VEHICLE 1983 Plymouth Reliant 4-door Wagon

TEST WEIGHT (lbs) 2910

IMPACT ANGLE (deg)* 0

IMPACT VELOCITY (mph)** 35.12

MAX. CRUSH (in) 26.3

MAX. INTRUSION (in) 12.4

DUMMIES

TYPE	<u>Hybrid II Part 572</u>	<u>Hybrid II Part 572</u>
------	---------------------------	---------------------------

LOCATION	<u>LF (1) Ser. #1021</u>	<u>RF (2) Ser. #1020</u>
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RESTRAINT	<u>Production 3-point Belt System</u>	<u>Production 3-point Belt System</u>
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NUMBER OF DATA CHANNELS 35

NUMBER OF HIGH SPEED CAMERAS 15 plus 1 real time

*With respect to tow track Centerline

**Speed trap measurement ($\pm$.05% accuracy)

GENERAL COMMENTS

The 1983 Plymouth Reliant 4-door station wagon was equipped with a 135 cubic inch, 4 cylinder engine, 4 speed manual transmission, and power brakes.

The vehicle was involved in a frontal barrier impact at a velocity of 35.12 mph and sustained approximately 26.3 inches of static and 34.5 inches of dynamic crush. Maximum static firewall intrusion into the occupant compartment was 12.4 inches.

The driver's head struck the upper steering wheel rim and the femurs contacted the dash panel. The driver appeared to comply with all FMVSS 208 Injury Criteria with a HIC of 655.5, maximum chest deceleration over 3 milliseconds of 51.5 g's and femur loads of 1100 and 1300 pounds.

The right front passenger head struck the dash panel and thus did not appear to meet the FMVSS 208 - Head Injury Criteria (HIC of 1221.1). The remaining criteria were satisfactory as indicated by a maximum chest deceleration over 3 milliseconds of 51.9 g's, and femur loads of 820 and 1560 pounds.

The belt related data for each occupant are presented in Table 7 of this report.

TABLE 2

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION

Make/Model Plymouth Reliant Body Style 4-door wagon
Model Year 1983 NHTSA No. MD0301 Color Blue
Engine Data: 4 cylinders, 135 cubic inches
Transmission Data: 4 speed, (X) manual () automatic
Date Rec'd 7-21 Air Cond. Pw. Str. Pw. Brks. X
Dealer's Name & Address Sheridan Chrysler Buffalo, N.Y.
Odometer Reading 017

DATA FROM CERTIFICATION LABEL ON LEFT DOOR REAR FACE OR "B" POST

Vehicle Manufactured by: Chrysler Corporation
Date of Manufacture 3-83 VIN 1P3BP4905DF14784
GVRW 3715 lbs., GAWR: front 1900 lbs., rear 1865 lbs.

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL ON DOOR, POST, GLOVE BOX, ETC.

Vehicle Load (up to capacity): front 35 psi
rear 35 psi
Recommended Tire Size P175-75R13 Load Range X B C D
Recommended Cold Tire Pressure: front 35 psi, rear 35 psi
Tires on Vehicle P175-75R13
Is Spare Tire a "Space Saver?" X yes no
Is Spare Tire Standard Equipment? X yes no
Vehicle Capacity: Types of Seats: bench, bucket, X split bench
Number of Occupants (Designated Seating Capacity): 3 front
3 rear
6 TOTAL
Cargo Load: 150 lbs.
TOTAL = 1050 lbs.

TABLE 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (WITH MAXIMUM FLUIDS) = UDW

Right Front = 710 lbs. Right Rear = 490 lbs.
 Left Front = 770 lbs. Left Rear = 470 lbs.
 TOTAL FRONT WEIGHT = 1480 lbs. (60.7 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 960 lbs. (39.3 % of Total Vehicle Weight)
 TOTAL DELIVERY WEIGHT = 2440 lbs.

CALCULATION FOR TARGET TEST WEIGHT

RCLW = Rated Cargo and Luggage Weight
 UDW = Unloaded Delivered Weight (2440 lbs.)
 VCW = Vehicle Capacity Weight (1050 lbs.)
 DSC = Designated Seating Capacity (6)
 RCLW = VCW - 150 (DSC) = 150 lbs.
 Target Test Weight = UDW + RCLW + (2 dummies X 164 lbs./dummy)
 Target Test Weight = 2918 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 140 POUNDS CARGO

Right Front = 810 lbs. Right Rear = 630 lbs.
 Left Front = 830 lbs. Left Rear = 640 lbs.
 TOTAL FRONT WEIGHT = 1640 lbs. (56.4 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1270 lbs. (43.6 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 2910 lbs.
 Weight of ballast secured in vehicle trunk area = 0 lbs.

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude:	RF	<u>25.9</u>	LF	<u>25.8</u>	RR	<u>25.4</u>	LR	<u>25.3</u>
Test Attitude:	RF	<u>25.2</u>	LF	<u>25.5</u>	RR	<u>23.7</u>	LR	<u>23.8</u>

Remarks: Wheel Base = 100.5 inches

Vehicle C/G as tested was 43.9 inches rearward of front wheel C/L

TABLE 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)POST-IMPACT DATA

Type of Test Barrier Impact Angle 0 °
 Date of Test 8/23/83 Time of Test 1430
 Ambient Temperature 78 °F at impact area
 Temperature in Occupant Compartment 78 °F
 Windshield Molding Temperature -- °F
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: primary = 35.12 mph, secondary - mph

VEHICLE REBOUND AND CRUSH (inches)

Vehicle Length: Pre-test = R 173.9 C 175.4 L 173.9
 Post-test = R 150.8 C 149.1 L 151.0
 Crush = R 23.1 C 26.3 L 22.9
 Distance from front of test vehicle to point of impact:
 R 19.2 C/L 19.0 L 19.0

VISIBLE DUMMY CONTACT POINTS

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Upper Steering Wheel Rim</u>	<u>Dash Panel</u>
Chest	<u>-</u>	<u>-</u>
Abdomen	<u>-</u>	<u>-</u>
Left Knee	<u>Underside of Dash Panel</u>	<u>Door of Glove Compartment</u>
Right Knee	<u>-</u>	<u>-</u>

	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
	<u>No</u>	<u>No</u>	<u>Yes</u>	<u>Yes</u>
Door Opening	<u></u>	<u></u>	<u></u>	<u></u>
	<u></u>	<u></u>	<u></u>	<u></u>
	<u></u>	<u></u>	<u></u>	<u></u>

TABLE 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

<u>Seat Movement</u>	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Seat Back Failure	<u>No</u>	<u>No</u>	<u>-</u>	<u>-</u>
Seat Shift (in.)	<u></u>	<u></u>	<u>-</u>	<u>-</u>
	<u></u>	<u></u>	<u></u>	<u></u>

Glazing Damage

Backlight/Windshield	Windshield cracked
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Other notable impact effects: --

SECTION 3

OCCUPANT AND VEHICLE INFORMATION (OMI AND AID DATA)

- ° Vehicle Measurements
- ° Vehicle Accelerometer Locations
- ° AID Data Summary
- ° Camera Positions and Locations
- ° Owner's Manual Seat Belt Instructions
- ° Dummy In-Vehicle Positioning
- ° Dummy Injury Criteria Values
- ° Belt Related Data

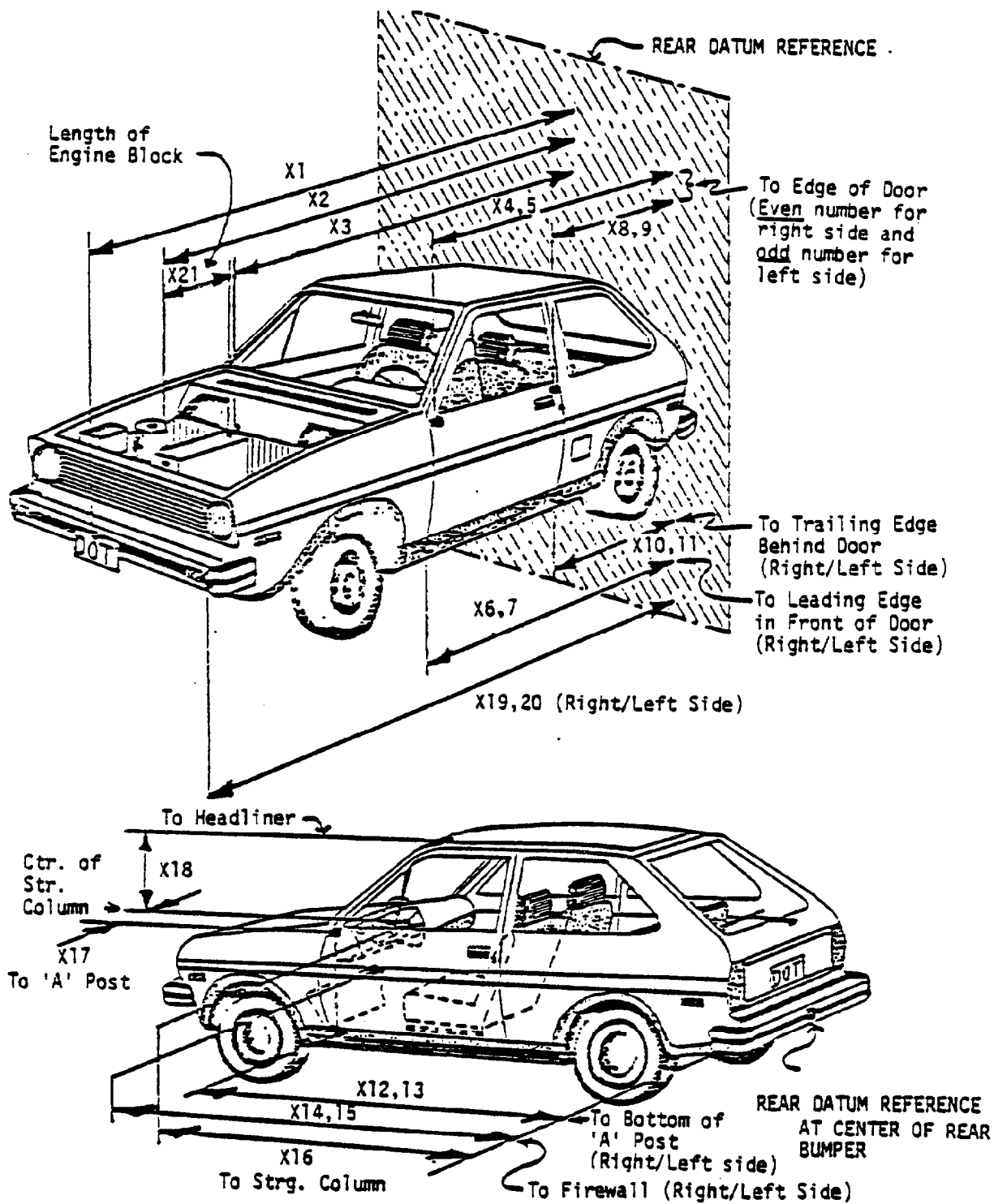


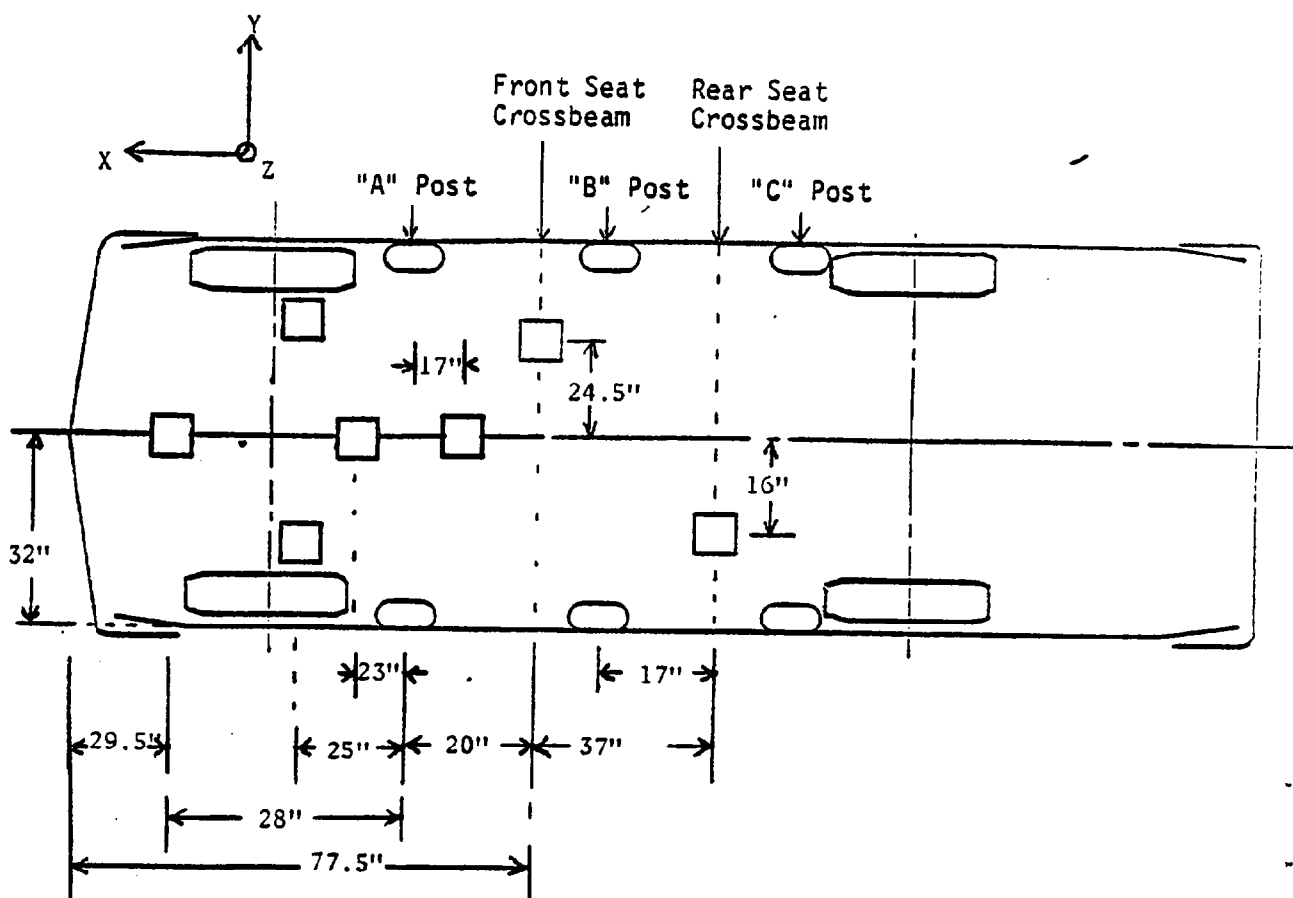
Figure 1 PRE- AND POST-TEST MEASUREMENT POINTS

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Table 3

VEHICLE MEASUREMENTS

1983 Plymouth Reliant		All Dimensions in Inches			
No.		Pre-Test	Post-Test	Difference	
X1	Total Length of Vehicle at Centerline	175.4	149.1	26.3	
X2	Rear Surface of Vehicle to Front of Engine -25.1 -9.7	150.3	139.4	10.9	
X3	Rear Surface of Vehicle to Firewall -41.1 -27.2	134.3	1219	12.4	
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	114.4	113.8	.6	
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	114.4	114.5	-.1	
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	117.7	117.1	.6	
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	117.4	116.7	.7	
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	78.3	78.0	.3	
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	78.3	78.4	-.1	
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	78.8	77.3	1.5	
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	78.5	77.8	.7	
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	117.3	117.3	0	
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	117.0	117.0	0	
X14	Rear Surface of Vehicle to Firewall, Right Side	129.5	121.7	7.8	
X15	Rear Surface of Vehicle to Firewall, Left Side	129.2	122.0	7.2	
X16	Rear Surface of Vehicle to Steering Column	104.0	99.3	4.7	
X17	Center of Steering Column to "A" Post	13.0	17.7	-4.7	
X18	Center of Steering Column to Headliner	17.8	19.4	-1.6	
X19	Rear Surface of Vehicle to Right Side of Front Bumper	173.9	150.8	23.1	
X20	Rear Surface of Vehicle to Left Side of Front Bumper	173.9	151.0	22.9	
X21	Length of Engine Block	15.0	15.0	-	



ACCELEROMETER NUMBER *	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Front Seat Crossmember	X		
2	Vehicle C.G.	X		
3	Rear Seat Crossmember	X		
4	Top of Engine	X		
5	Bottom of Engine	X		
6	Right Front Brake Caliper	X		
7	Left Front Brake Caliper	X		

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

FIGURE 2 VEHICLE ACCELEROMETER LOCATIONS

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Table 4
ACCIDENT INVESTIGATION DIVISION
Data Summary

Test No. MD0301
Date 8-23-83

Vehicle No. 1

Impact Description	Frontal Barrier
Make	1983 Plymouth Reliant
Model	Station Wagon
Year	1983
Size Category	Mid-Size
Test Weight	2910
Wheelbase	100.5
Front Overhang	36.5
Overall Width	68.6
Accelerometer Location	43.9 inches rearward of front wheel C/L
Calibration Procedure	Shaker Table/least squares
Accelerometer Linearity	±.075%
Integration Algorithm	Hybrid Simpson - Newton 3/8
Impact Speed	35.12
Time of Separation	300 milliseconds
Velocity Change	37.1
CDC	12 FDEW3
Damage Length	L: 62.5
Crush Dimensions	C1: 23.35
	C2: 26.6
	C3: 26.0
	C4: 26.4
	C5: 26.5
	C6: 24.05
Midpoint of Damage	D: 0

TABLE 4 (continued)

National Accident Sampling System — Continuous Sampling Subsystem: Vehicle Data

FIELD MEASUREMENTS

1983 'K' Wagon Reliant

Complete When Applicable	
End Damage	Side Damage
Undeformed end width <u>62.5"</u>	Bowing: B1 <u>N/A</u> X1 <u>N/A</u>
Corner shift: A1 <u>N/A</u>	B2 <u>N/A</u> X2 <u>N/A</u>
A2 <u>N/A</u>	Bowing constant
End shift at frame (CDC) (check one)	$\frac{X1 + X2}{2} = \underline{N/A}$
< 4 inches <u>N/A</u>	
≥ 4 inches <u>N/A</u>	

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

CDC = 12 FDEW3

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	62.5	26.75	62.5	24.1	25.15	26.75	26.5	26.25	25.1	0
	Free/Space		-2.25		-2.25	-1.0	-2.25	-2.5	-1.0	-2.25	
1	ACTUAL CRUSH	62.5	26.5"	62.5	21.85	24.15	26.5	26.25	25.35	22.85	0

*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).

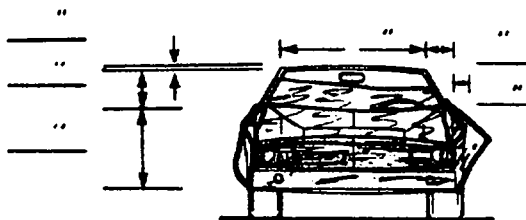
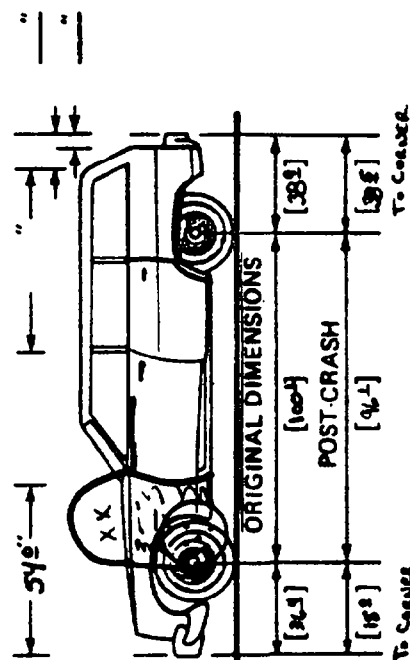
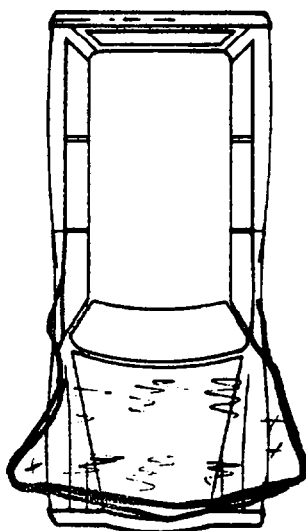
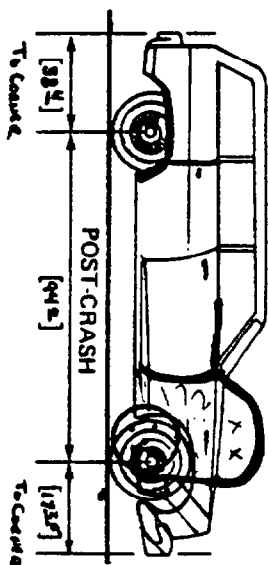
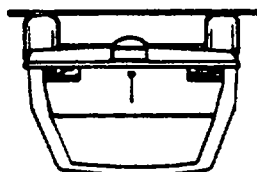
Free space value is defined as the distance between the baseline and the original body contour taken at the individual C locations. This may include the following: bumper lead, bumper taper, side protrusion, side taper, etc. Record the value for each C-measurement and maximum crush.

**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 e— Wheel Damage a. Rotation physically restricted RF <u>2</u> LF <u>2</u> RR <u>2</u> LR <u>2</u> b. Tire deflated RF <u>2</u> LF <u>2</u> RR <u>2</u> LR <u>2</u> (1) Yes, (2) No, (8) NA, (9) Unk.	TYPE OF TRANSMISSION ___ Manual ___ Automatic Average Track: <u>57.3</u> Maximum Width: <u>68.6</u> Test Curb Weight: <u>2910</u> Overall Length: <u>176.4</u>	WHEEL STEER ANGLES (For locked front wheels or displaced rear axles only) RF $\pm$ <u>N/A</u> ° LF $\pm$ <u>N/A</u> ° RR $\pm$ <u>N/A</u> ° LR $\pm$ <u>N/A</u> ° Within $\pm$ 5 degrees
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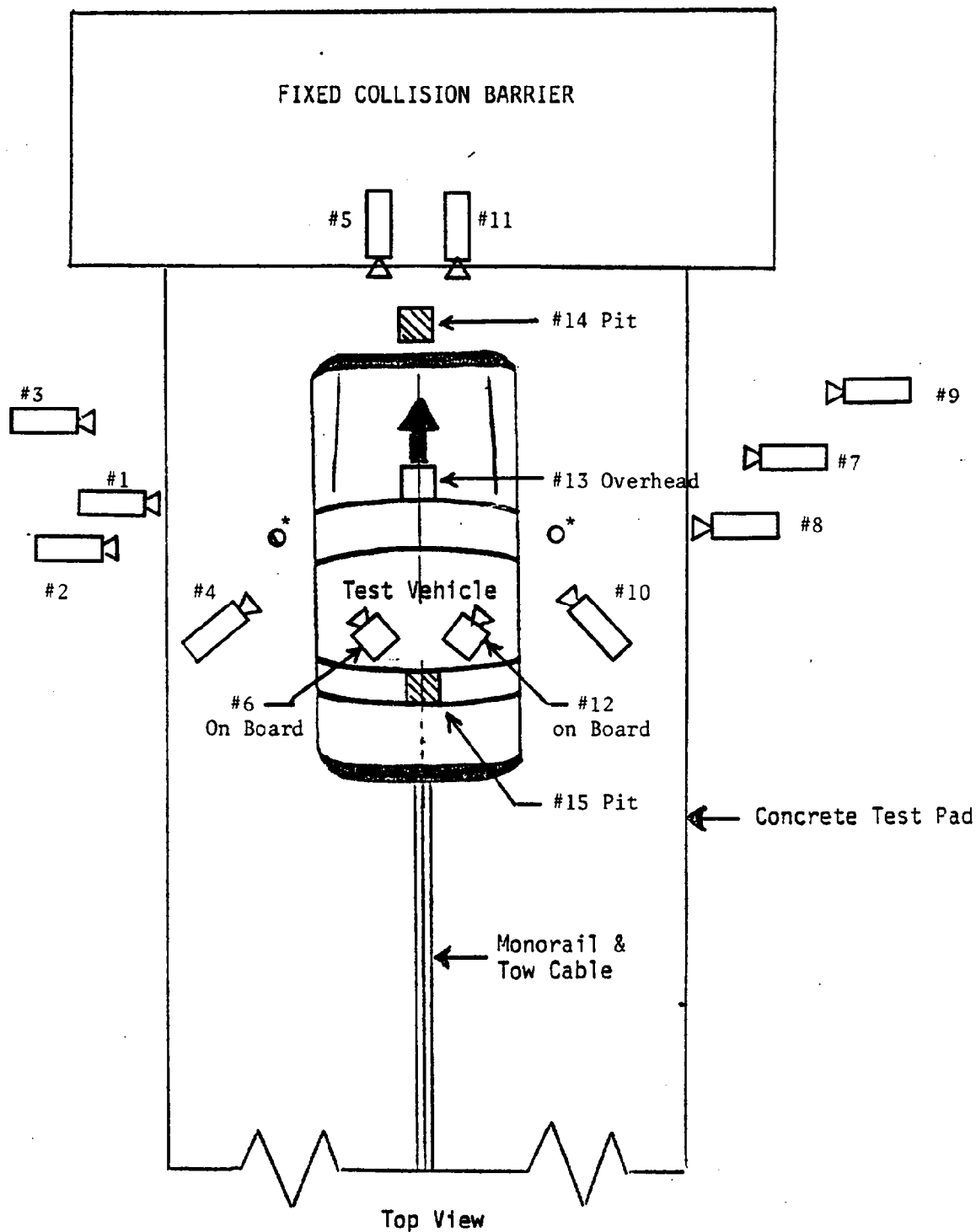


Note: Sketch new perimeter and cross hatch direct damage and single hatch induced damage on all views. Annotate observations which might be useful in reconstructing the accident (e.g., grass in tire bead, direction of striations, scuff on sidewall, etc.)

If pulling trailer sketch type of trailer and damage received on reverse side.

Annotate any damage caused by extrication such as component removal by torching, prying or hydraulic shears.

NOTE: Camera Information Shown on Table 5.



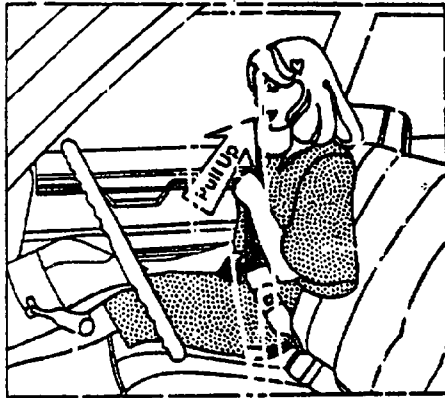
* Stadia Poles 72 inches from Barrier Face

Figure 4 CAMERA POSITION FOR FRONTAL IMPACTS

Table 5
HIGH-SPEED CAMERA LOCATIONS

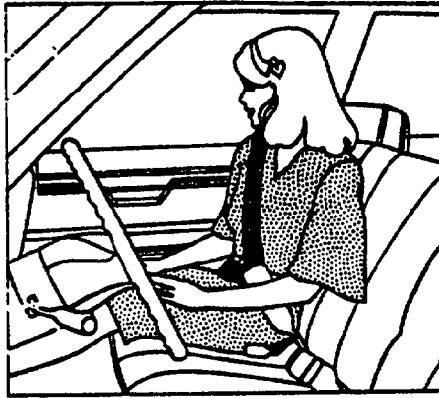
Test No.	MD0301	Vehicle	1983 Plymouth Reliant					
CAMERA NO.	VIEW	CAMERA POSITIONS (in)*			ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Vehicle Left Side	230	54	44	- 7	-	13	870
2	Driver	246	72	44	- 2	222	35	880
3	Driver	315	26	52	- 4	291	50	880
4	Driver	90	108	75	-25	-	13	-
5	Driver (Barrier)	20	0	70	-28	97	25	880
6	Left Belt Retractor	-	-	-	-	-	8	-
7	Vehicle Right Side	281	41	45	- 9	-	13	880
8	Passenger	268	66	44	- 2	244	35	1020
9	Passenger	312	14	45	- 2	288	50	1030
10	Passenger	90	104	69	-23	-	13	880
11	Passenger (Barrier)	20	0	70	-28	97	25	980
12	Right Belt Retactor	-	-	-	-	-	8	-
13	Overhead	0	40	216	-90	-	13	880
14	Engine (P.T)	0	36	-120	90	-	25	950
15	Fuel Tank (P.T)	0	136	-120	90	-	25	900

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



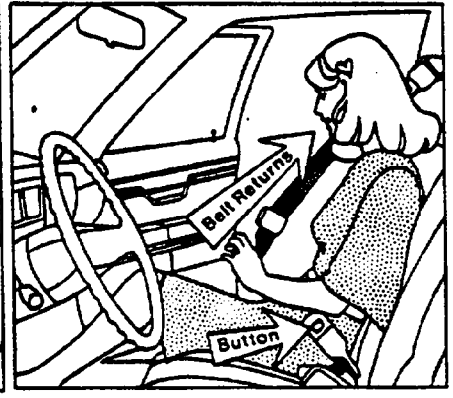
4. Slack will automatically be removed due to tension created by the retractor. If a snug fit in the lap belt portion is desired, pull up on the shoulder belt as shown.

5. If the shoulder belt feels snug, move your shoulder forward slightly, or give a slight tug on the belt, such that you withdraw an inch or so of webbing.



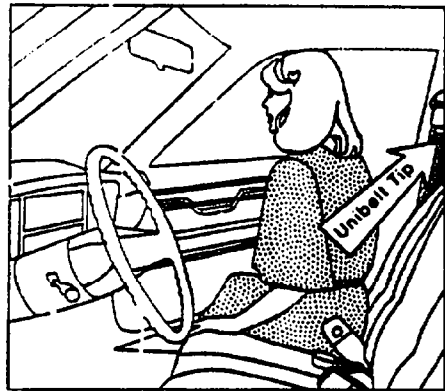
The belt will retain the small amount of slack necessary for comfort when you return to your normal seating position. If the belt is still too tight, pull out 6 to 8 inches of webbing, let it return to your chest and repeat the above motion.

Note: The door must be closed to achieve belt tension relief.



The shoulder belt will allow unrestricted movement of the upper body under normal conditions. Extreme movements will probably require resetting the slack in the shoulder belt. The belt will lock in the event of an accident.

6. To release the belt, push the button on the buckle. The belt will automatically retract to its stowed position when the door is opened.



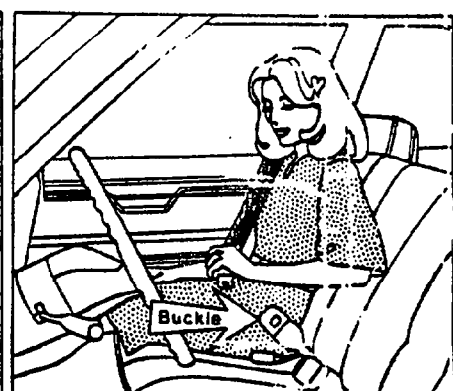
UNIBELT OPERATING INSTRUCTIONS

1. Enter the vehicle and adjust the seat. Note the metal tip of the unibelt in its stowed position.



CLOSE DOOR

2. Grasp the metal tip and slide it up the webbing as far as necessary to go around your lap as you pull out the webbing. A couple of tries and this will become an automatic one handed operation.



3. As you pull the webbing, move the metal tip toward the buckle. This system will not lock up if you stop or hesitate, so relax and continue to "buckle up".

Insert the tip into the buckle until a "click" is heard.

Figure 5 OWNER'S MANUAL SEAT BELT INSTRUCTIONS

Figure 6
PART 572 DUMMY IN-VEHICLE POSITION

Test No. MD0301

Vehicle Plymouth Reliant Station Wagon

SEAT TYPE:

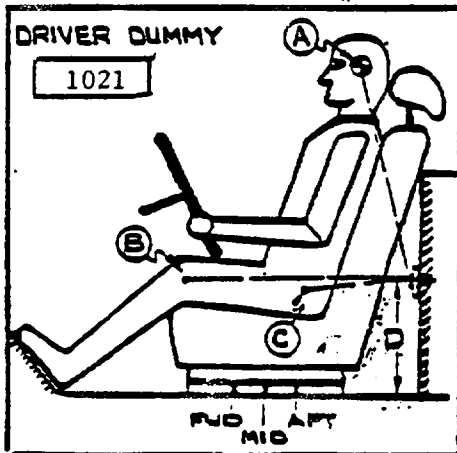
☒ Bench
☐ Bucket
☐ Split Bench

ADJUSTER TYPE:

☒ Manual
☐ Power

BUCKET SEAT BACK TYPE:

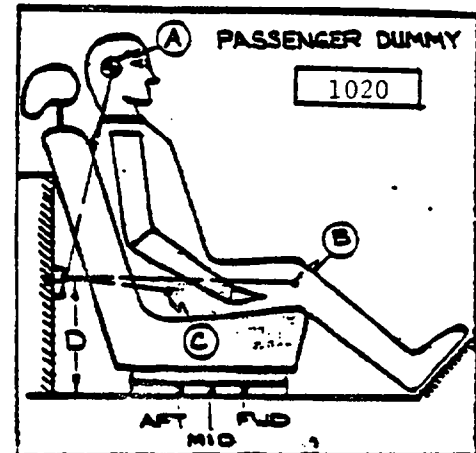
☒ Fixed
☐ Adjustable Reclining



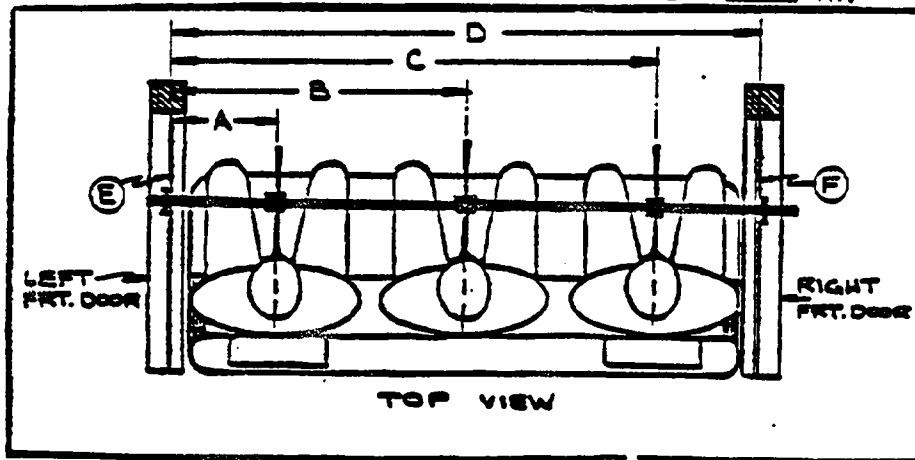
A = 21.5 in. 1° Degrees
B = 23.5 in. 92 Degrees
C = 9.2 in. 134 Degrees
D = 13 in.

MEASUREMENT LOCATION

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



A = 22.0 in. 0 Degrees
B = 24.7 in. 94 Degrees
C = 9.7 in. 130 Degrees
D = 13 in.



DUMMY ID

1021

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1020

A	=	Left Door to Driver Centerline	<u>13.2</u> in.
B	=	Left Door to Center Passenger Centerline	<u>--</u> in.
C	=	Left Door to Right Passenger Centerline	<u>39.0</u> in.
D	=	Left Door to Right Door	<u>51.7</u> in.
E, F	=	Window Glass Height (Right and Left Must be Equal)	<u>11.0</u> in.

Table 6
DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R *
DUMMY (1)	-181	-235	51.8	182	-49	-31	-14	51.5
DUMMY (2)	- 78	26	102	130	-48	31	-19	51.9
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	1100	1300
DUMMY (2)	820	1560
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)	1162	-	950
DUMMY (2)	2025	1125	-
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA**				SEVERITY INDEX
	HIC	t ₁ (SEC)	t ₂ (SEC)	AVE. ACC. (g) t ₁ TO t ₂	HEAD
DUMMY (1)	655.5	.07252	.11392	47.8	1001.4
DUMMY (2)	1221.1	.09195	.11272	80.9	1647.1
DUMMY (3)					
DUMMY (4)					

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

Table 7
BELT RELATED DATA

	<u>Driver</u>	<u>Passenger</u>
Belt Spool-off		
film	3.9	4.4
electronic	3.9	4.3
Belt Strain ⁽¹⁾	.32" per foot	.4" per foot
Belt Length Data	121.5	122.5
total length ⁽²⁾		
retractor to "D" ring ⁽³⁾	26.5	26.5
torso belt ⁽³⁾	32.0	32.5
lap belt ⁽³⁾	30.5	31.5
remainder on spool	32.5	32.0

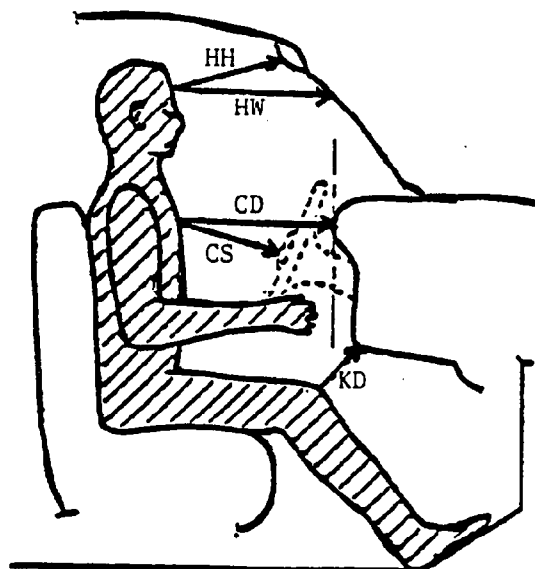
(1) as measured between retractor and "D" ring

(2) retractor spool to bolt hole anchor point for unibelts

(3) as measured on Part 572 dummy

	DRIVER	PASSENGER
HH	14.5	14.7
HW	20.4	20.5
CD	21.9	22.0
CS	15.5	--
KDL	6.6	6.5
KDR	6.8	6.5
SA	25	26
TA	25	24

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

	DRIVER	PASSENGER
HR	6.3	6.5
HS	9.4	9.5
AD	5.3	6.2
HD	8.0	8.0

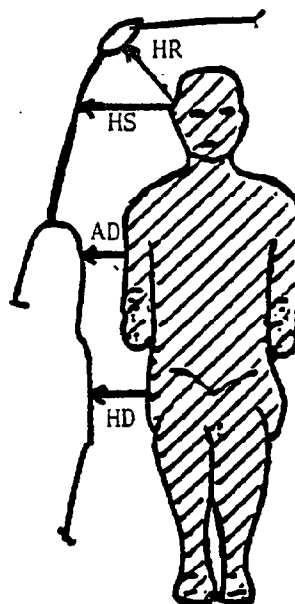


Figure 7 OCCUPANT CLEARANCE DIMENSIONS

APPENDIX A
PHOTOGRAPHS

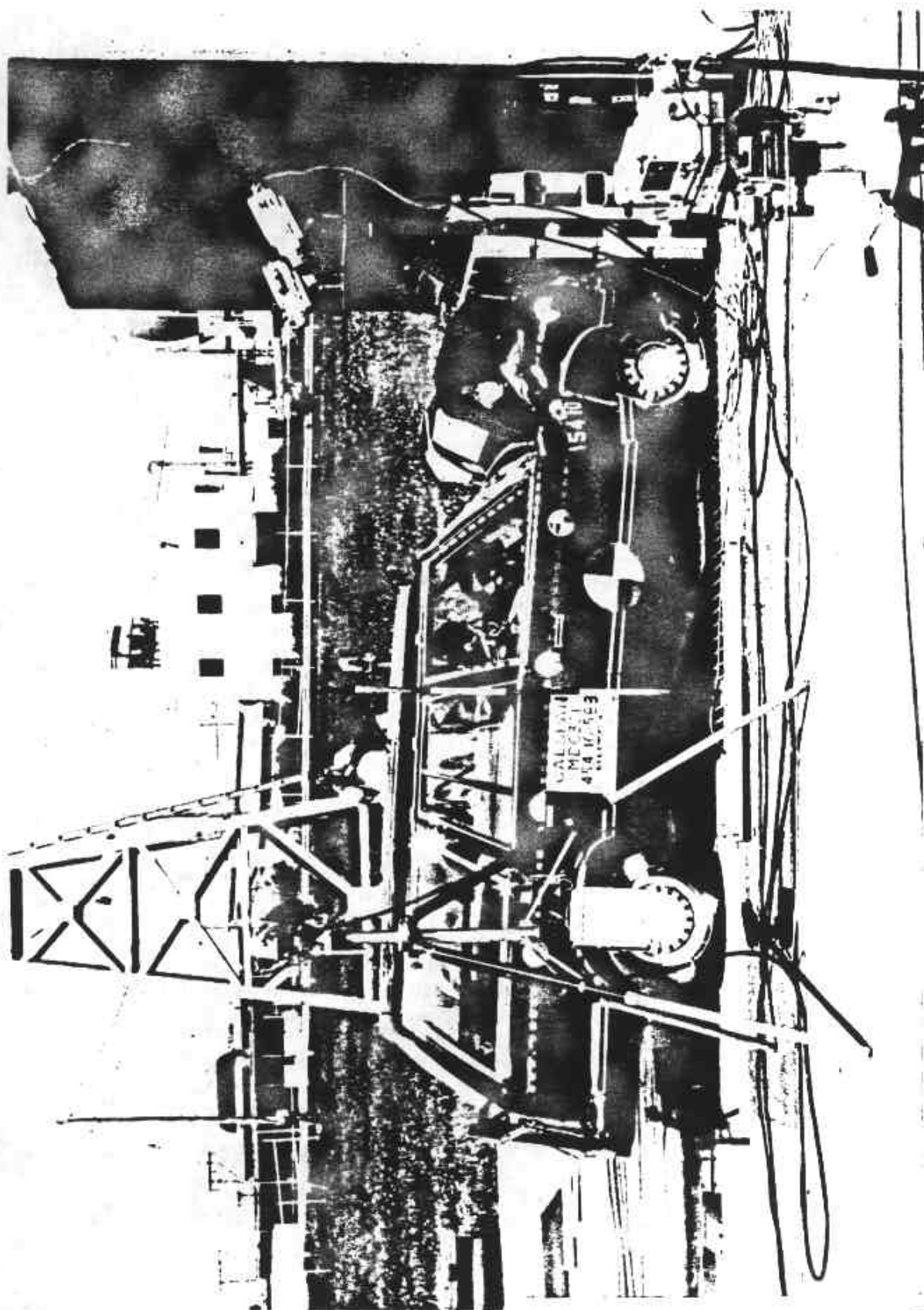


Figure A-1 IMPACT VIEW

A-2

7103-V-11

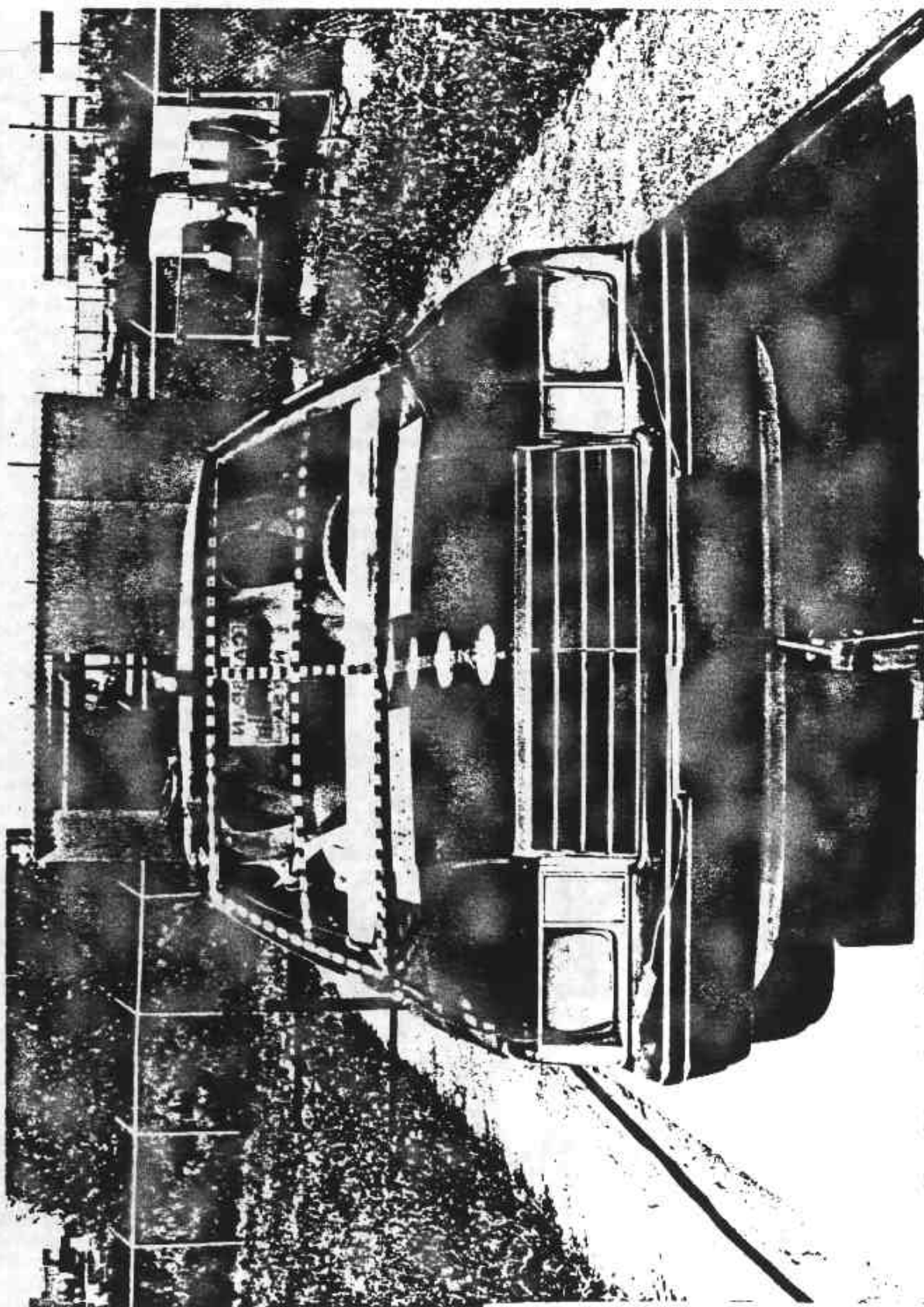


Figure A-2 PRE-TEST FRONT VIEW

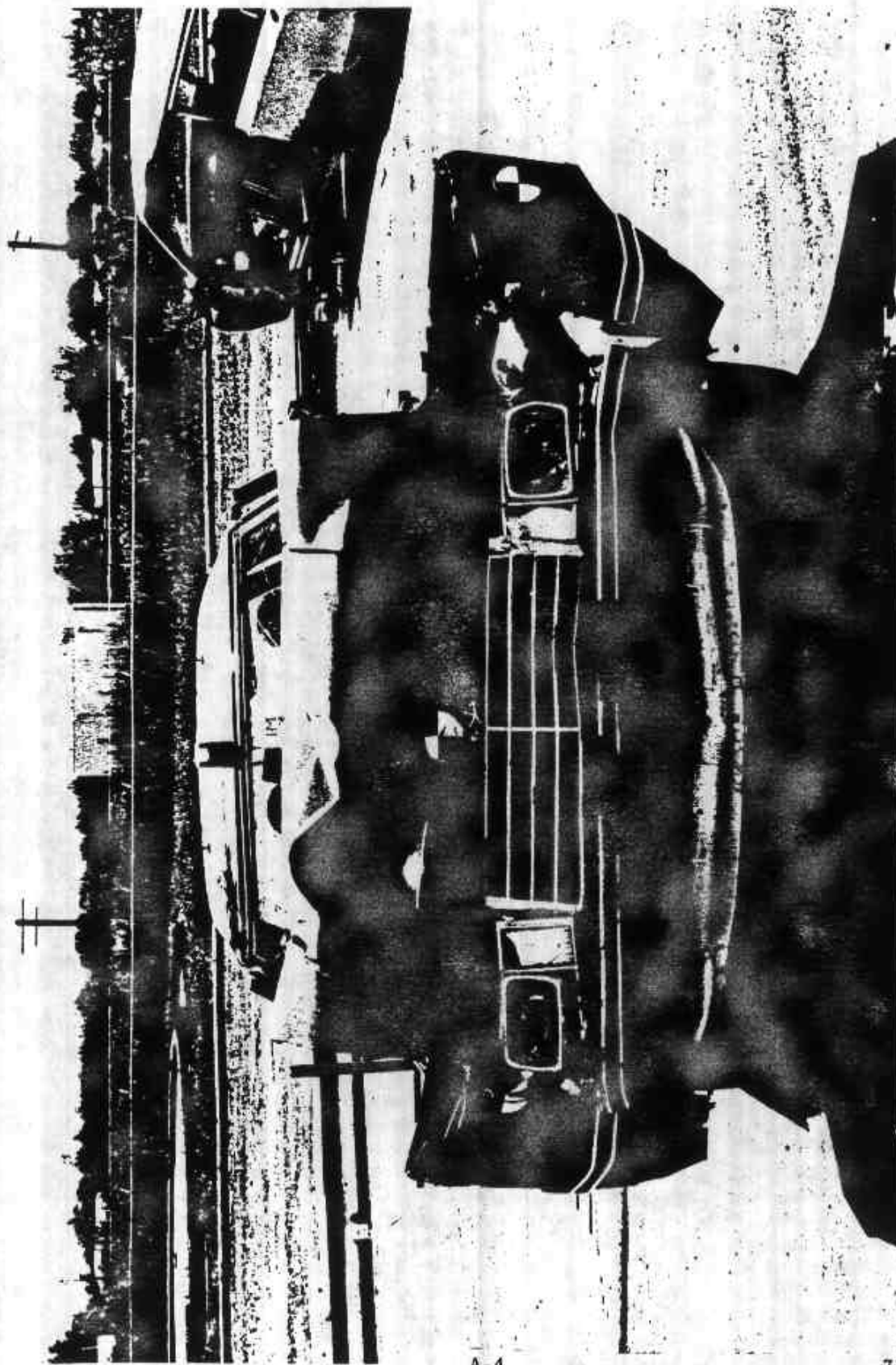


Figure A-3 POST-TEST FRONT VIEW

A-4

7103-V-11

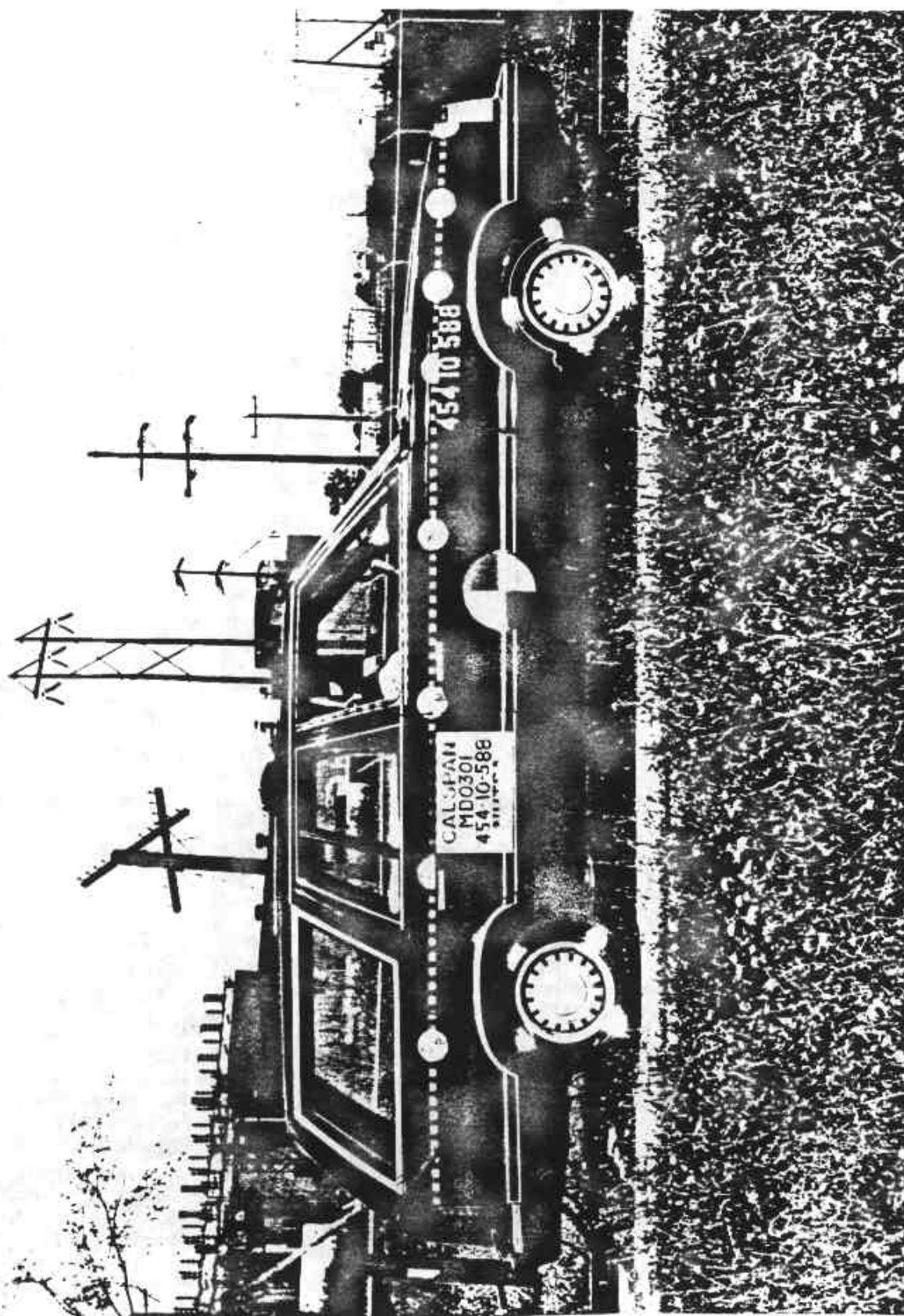
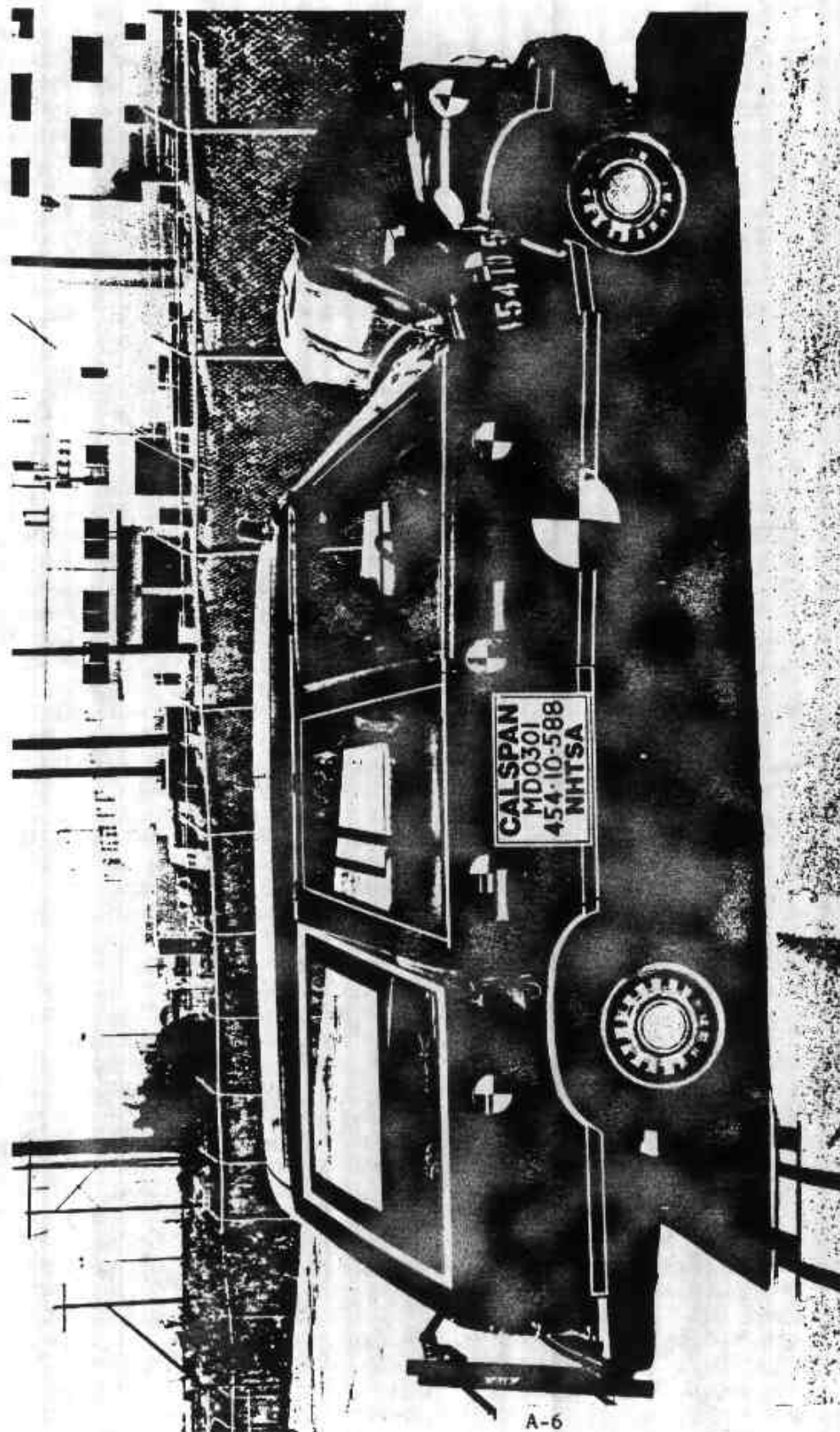


Figure A-4 PRE-TEST RIGHT SIDE VIEW



A-6

7103-V-11

Figure A-5 POST-TEST RIGHT SIDE VIEW



Figure A-6 POST-TEST LEFT SIDE VIEW

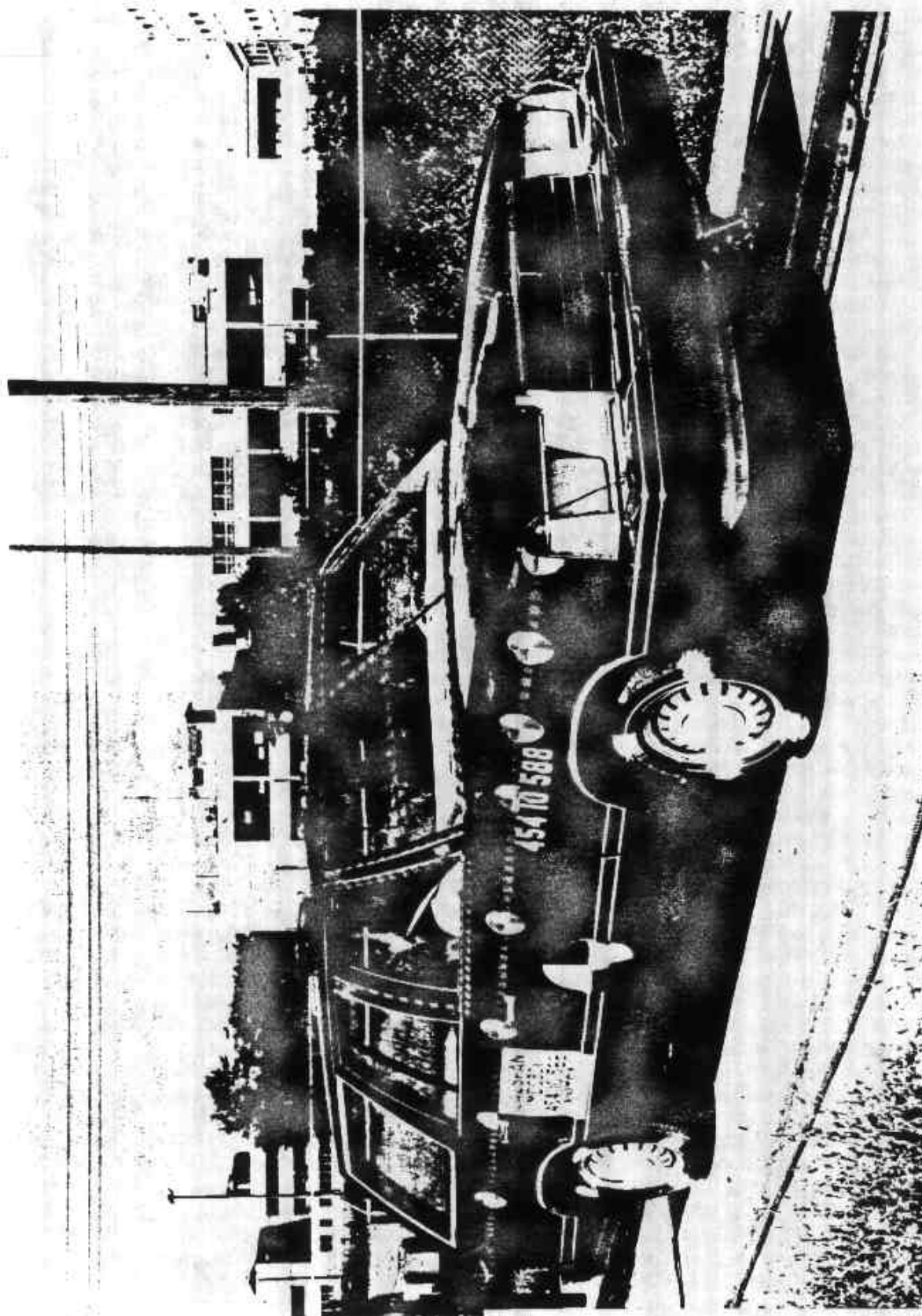


Figure A-7 PRE-TEST RIGHT FRONT THREE QUARTER VIEW

A-8

7103-V-11

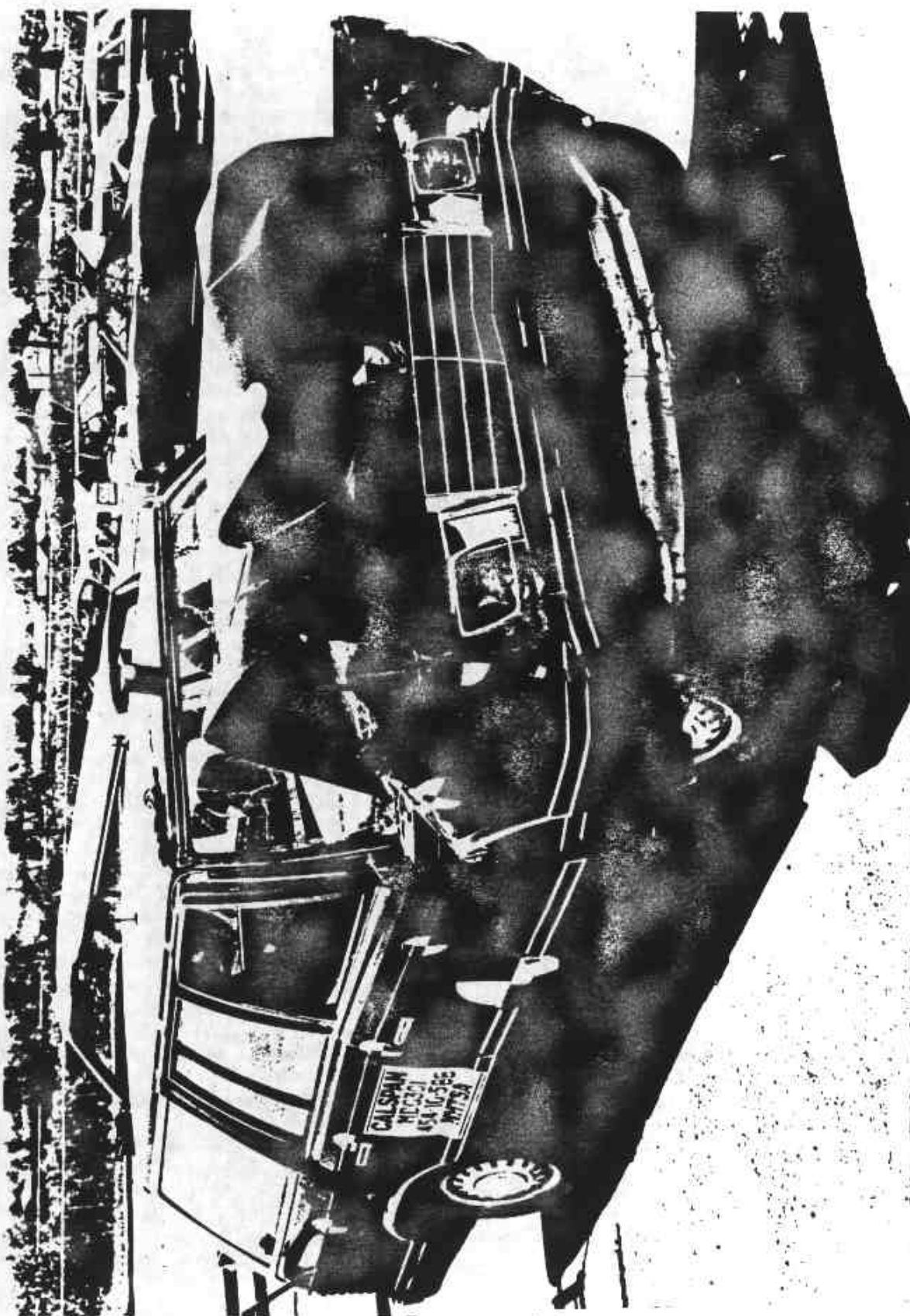


Figure A-8 POST-TEST RIGHT FRONT THREE QUARTER VIEW

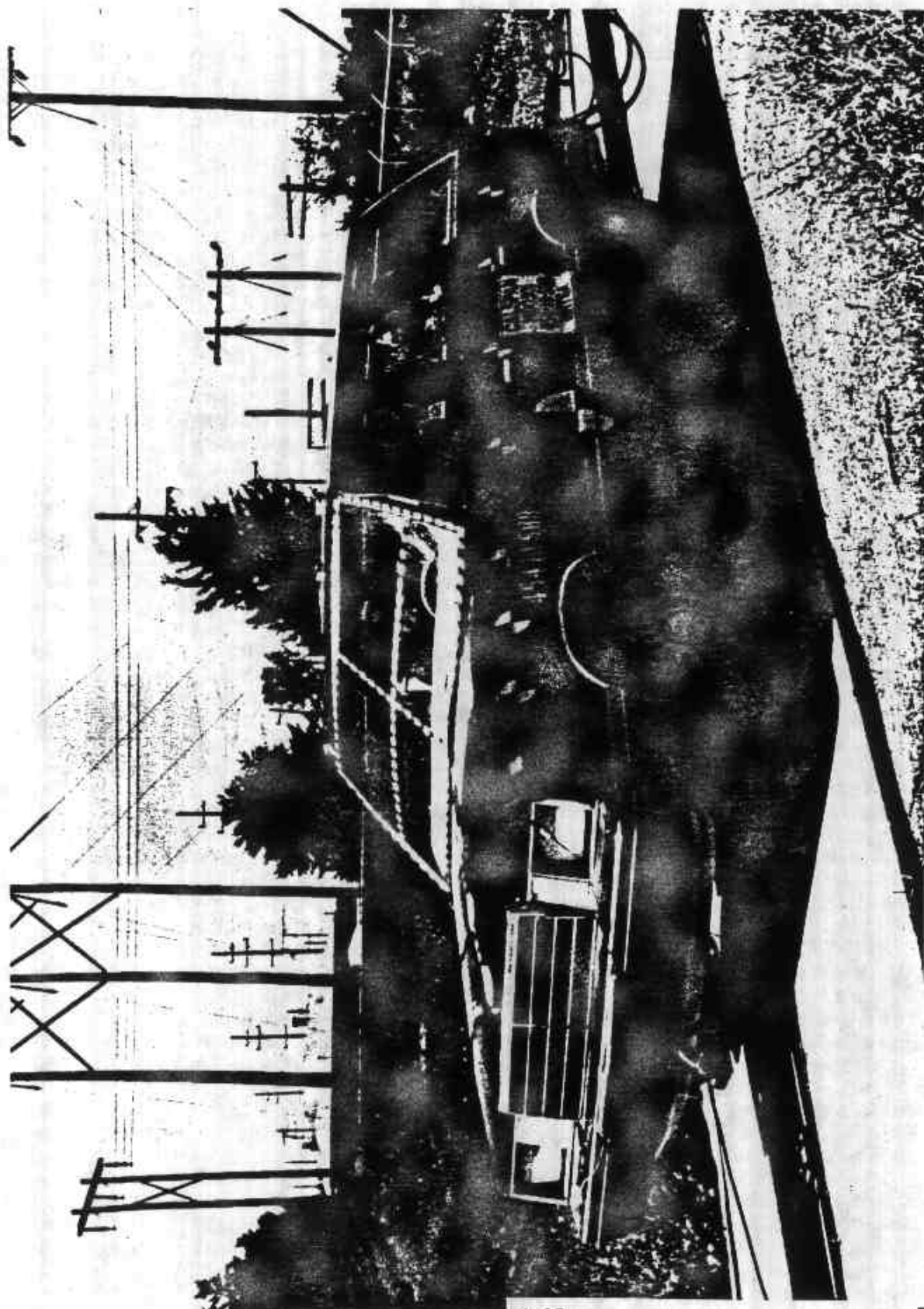


Figure A-9 PRE-TEST LEFT FRONT THREE QUARTER VIEW

A-10

7103-V-11

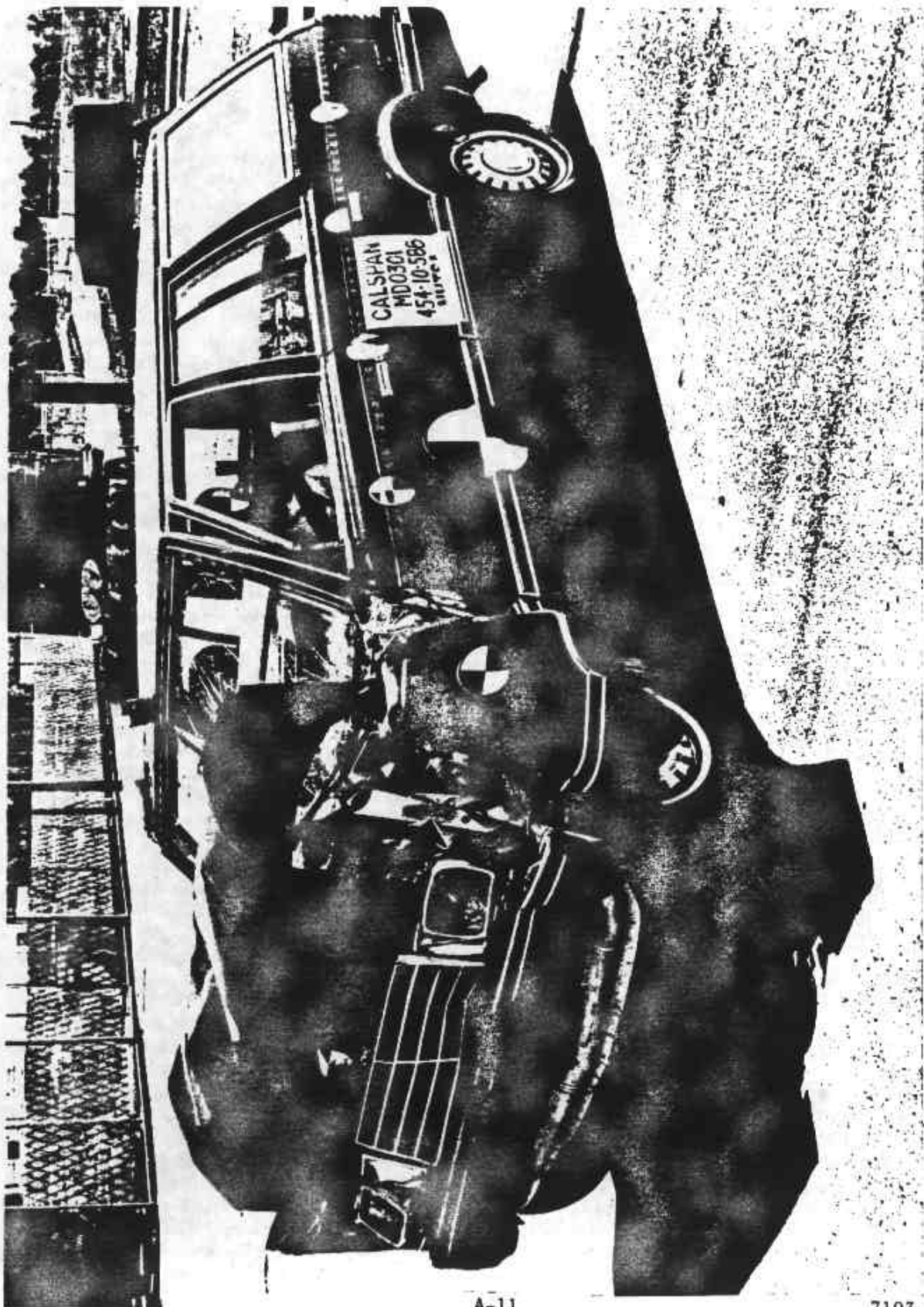


Figure A-10 POST-TEST LEFT FRONT THREE QUARTER VIEW

A-11

7103-V-11

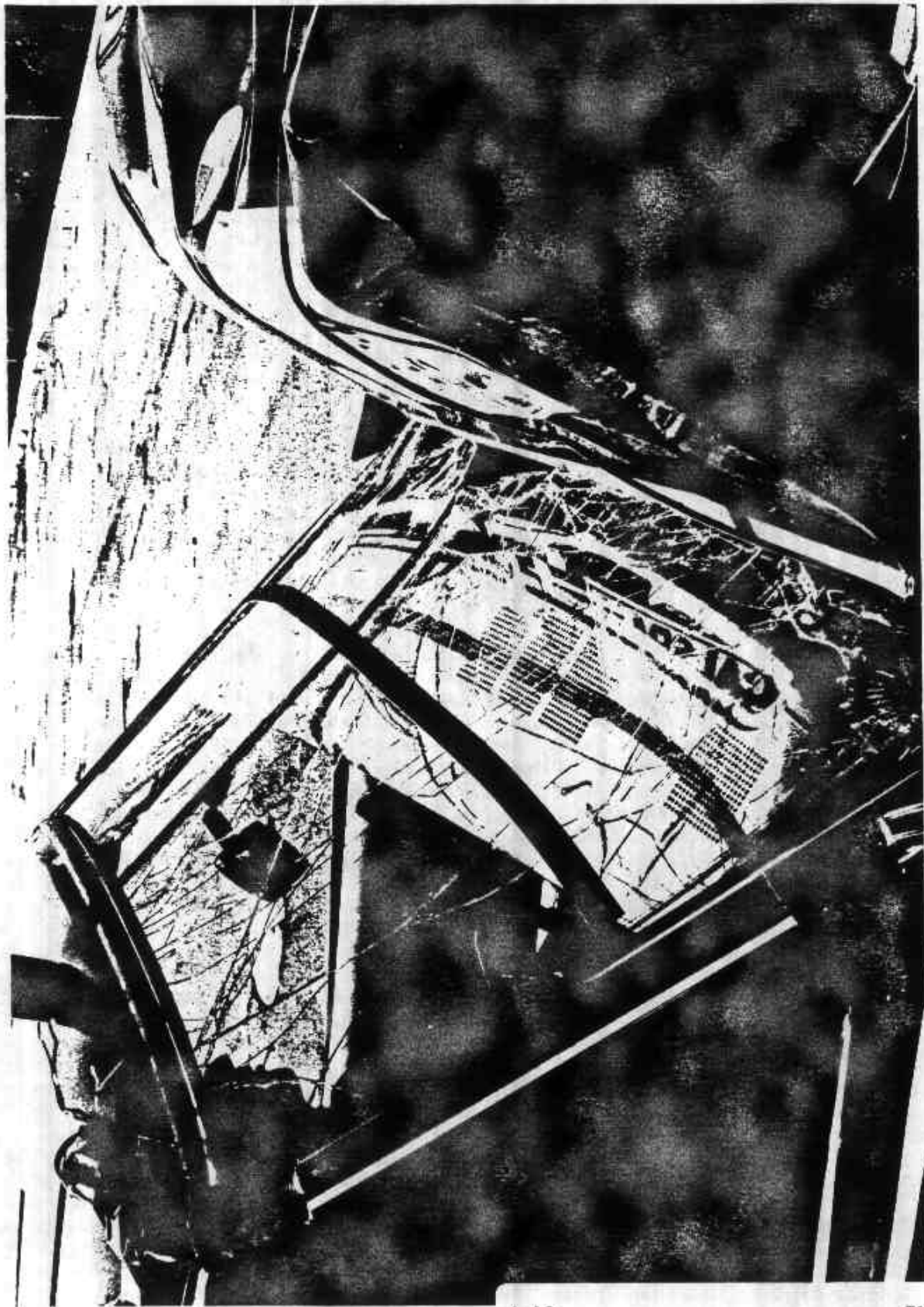


Figure A-11 POST-TEST WINDSHIELD VIEW

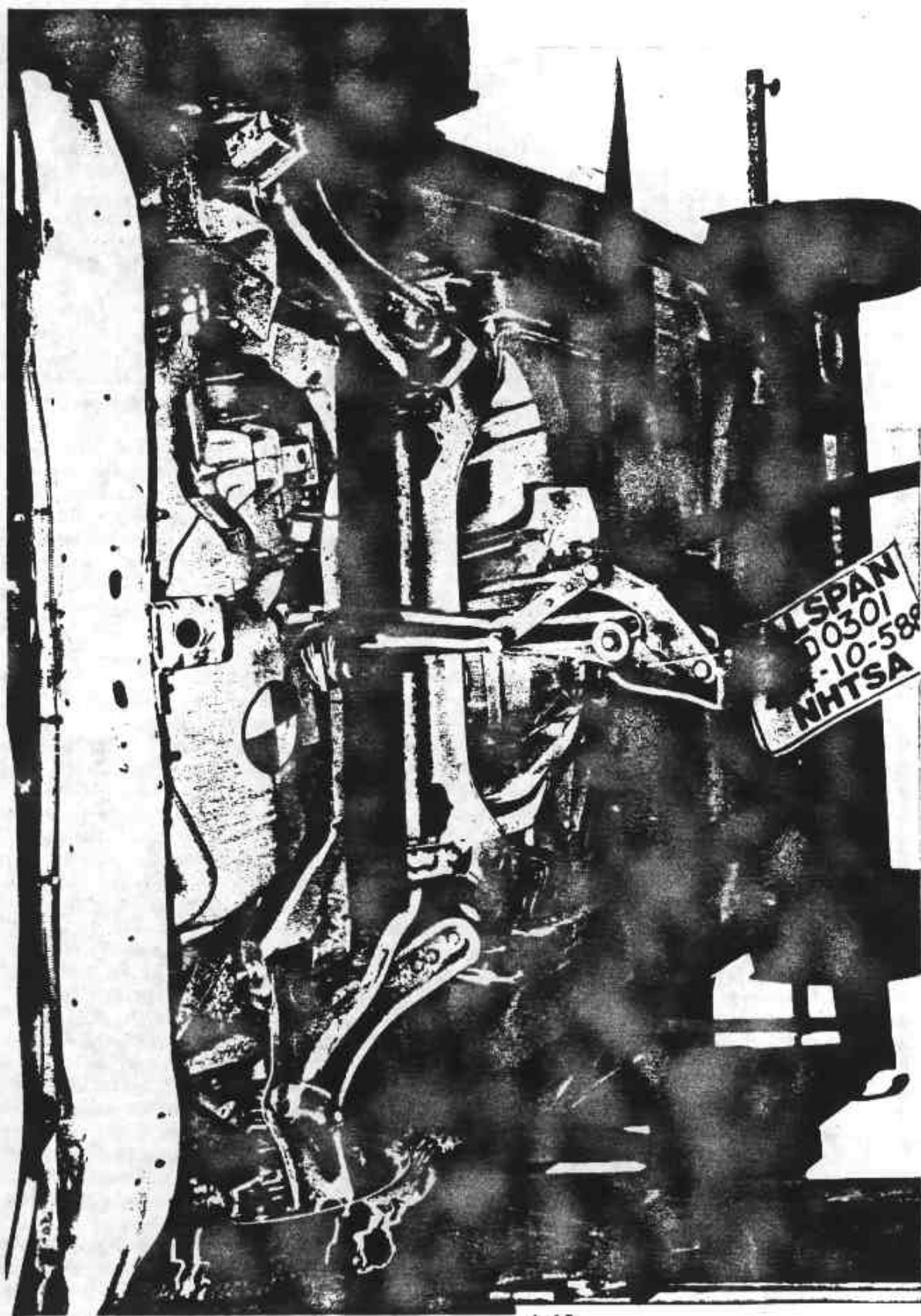


Figure A-12 POST-TEST FRONT UNDERBODY VIEW



Figure A-13 PRE-TEST DRIVER POSITION VIEW

A-14

7103-V-11

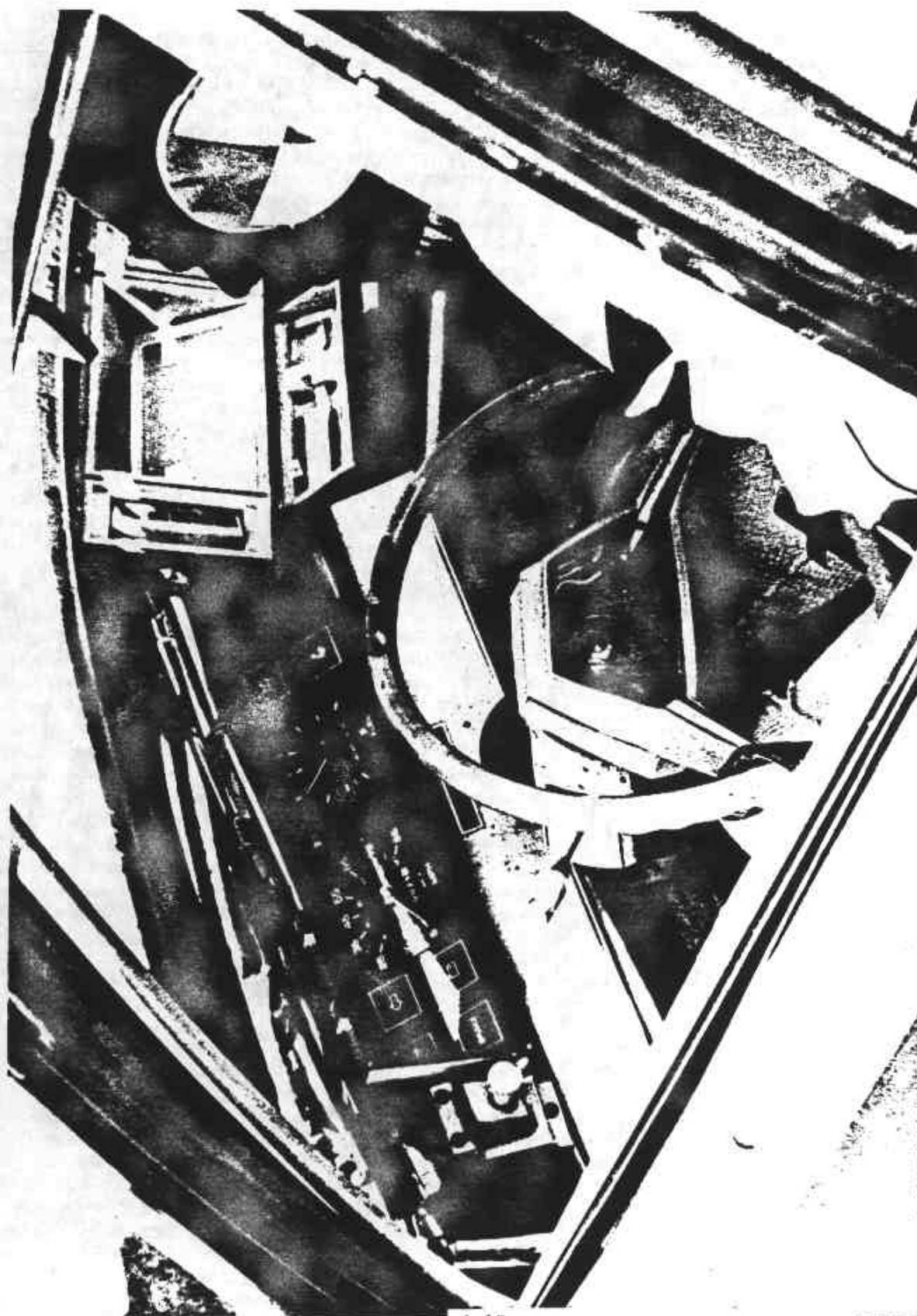


Figure A-14 POST-TEST DRIVER AND INTERIOR VIEW

A-15

7103-V-11

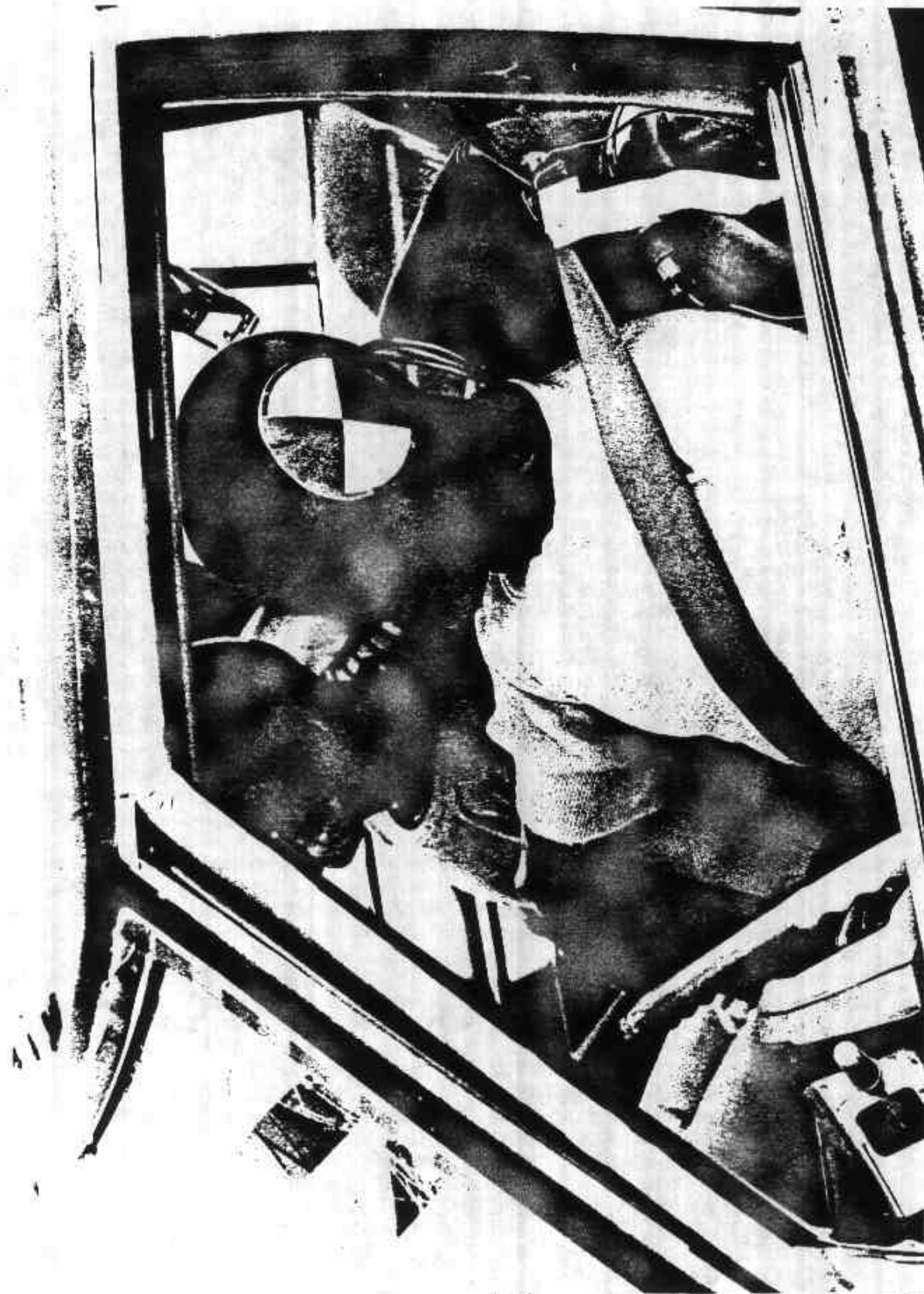


Figure A-15 POST-TEST DRIVER VIEW

A-16

7103-V-11



Figure A-16 PRE-TEST RIGHT FRONT PASSENGER VIEW

10301
10-588

A-17

7103-V-11



Figure A-17 POST-TEST RIGHT FRONT PASSENGER AND INTERIOR VIEW

A-18

7103-V-11



Figure A-18. RIGHT FRONT PASSENGER VIEW

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA

TEST NO. MD 0301

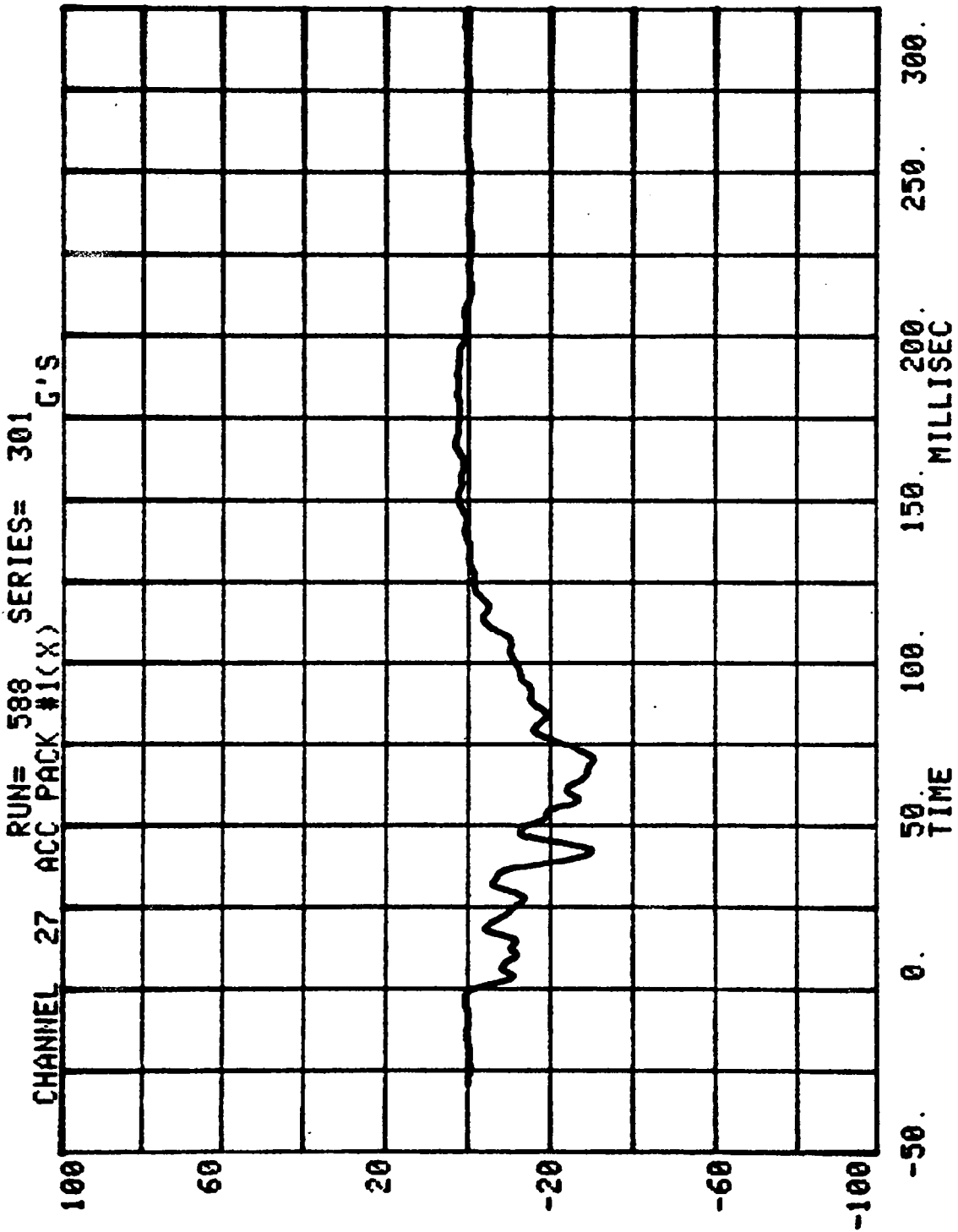
1983 Plymouth Reliant

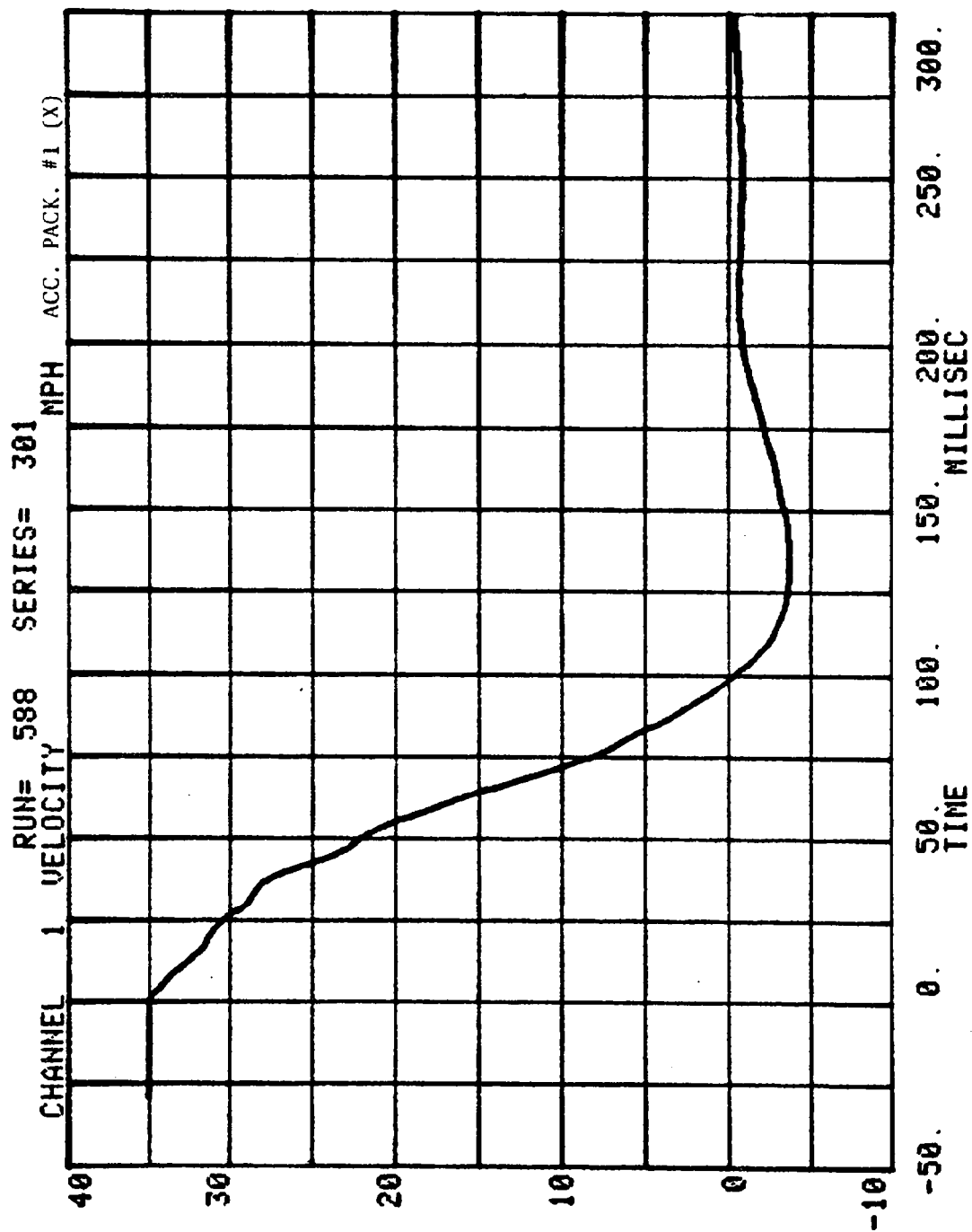
4-Door Wagon

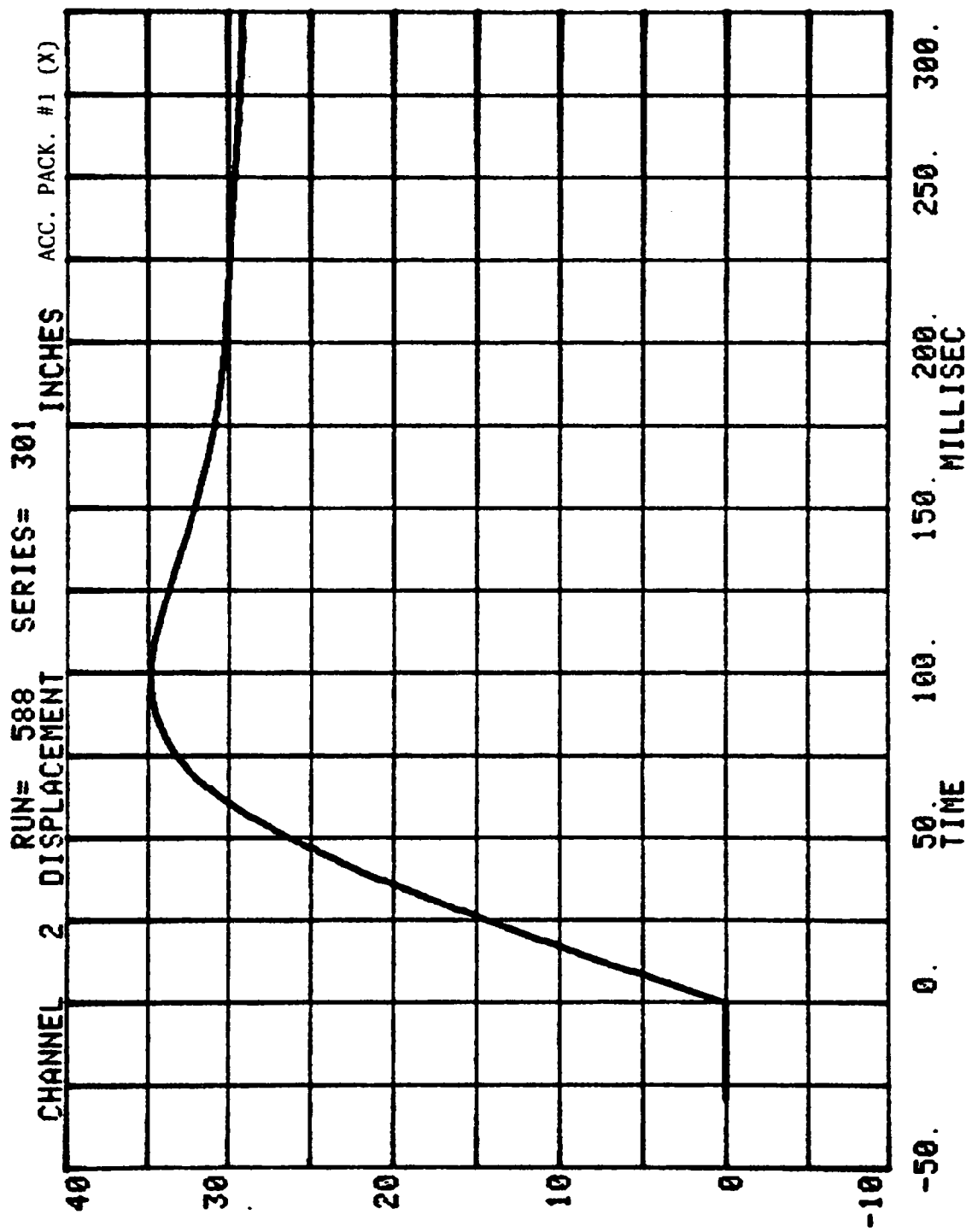
VEHICLE DATA

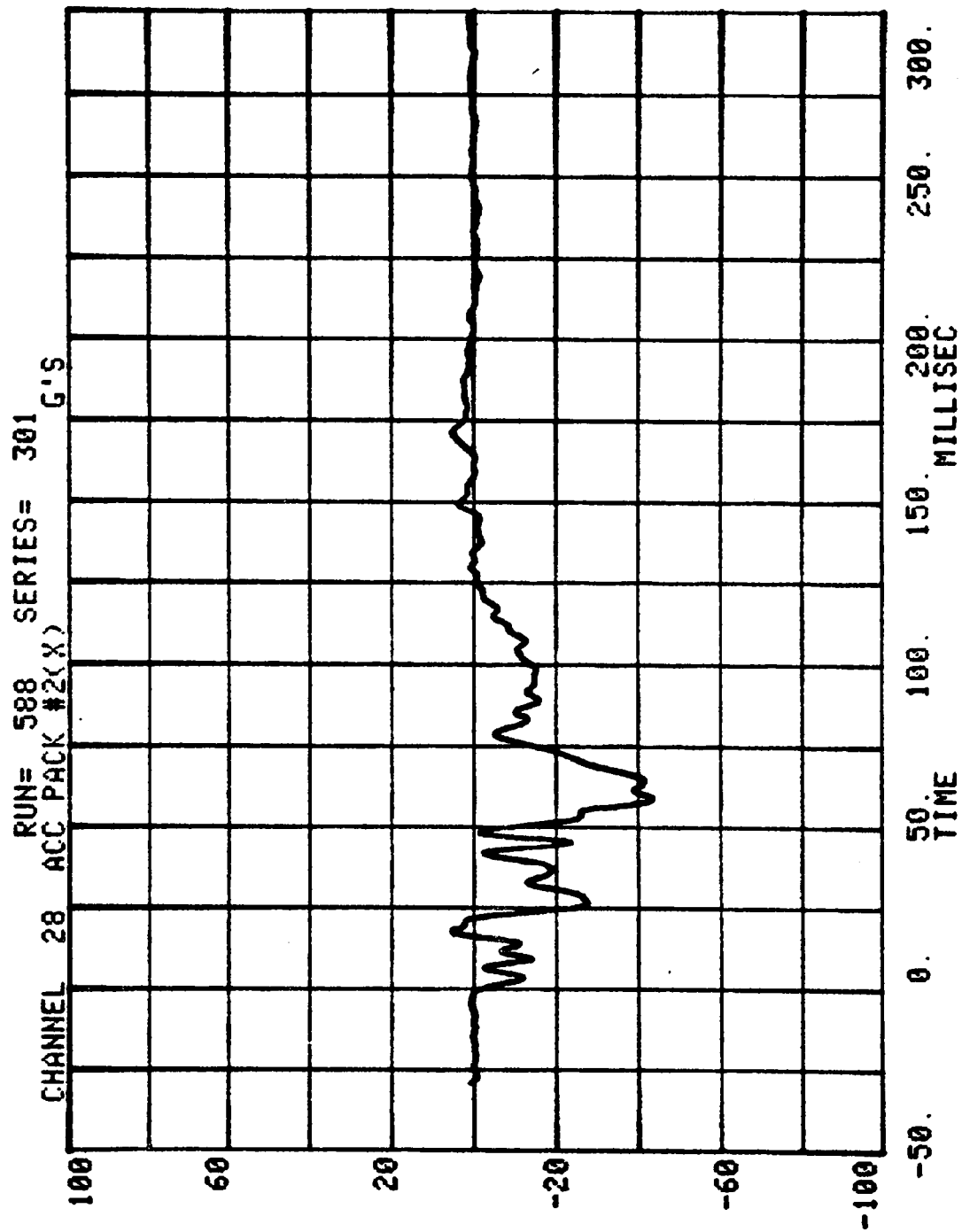
FILTER CHANNEL CLASS

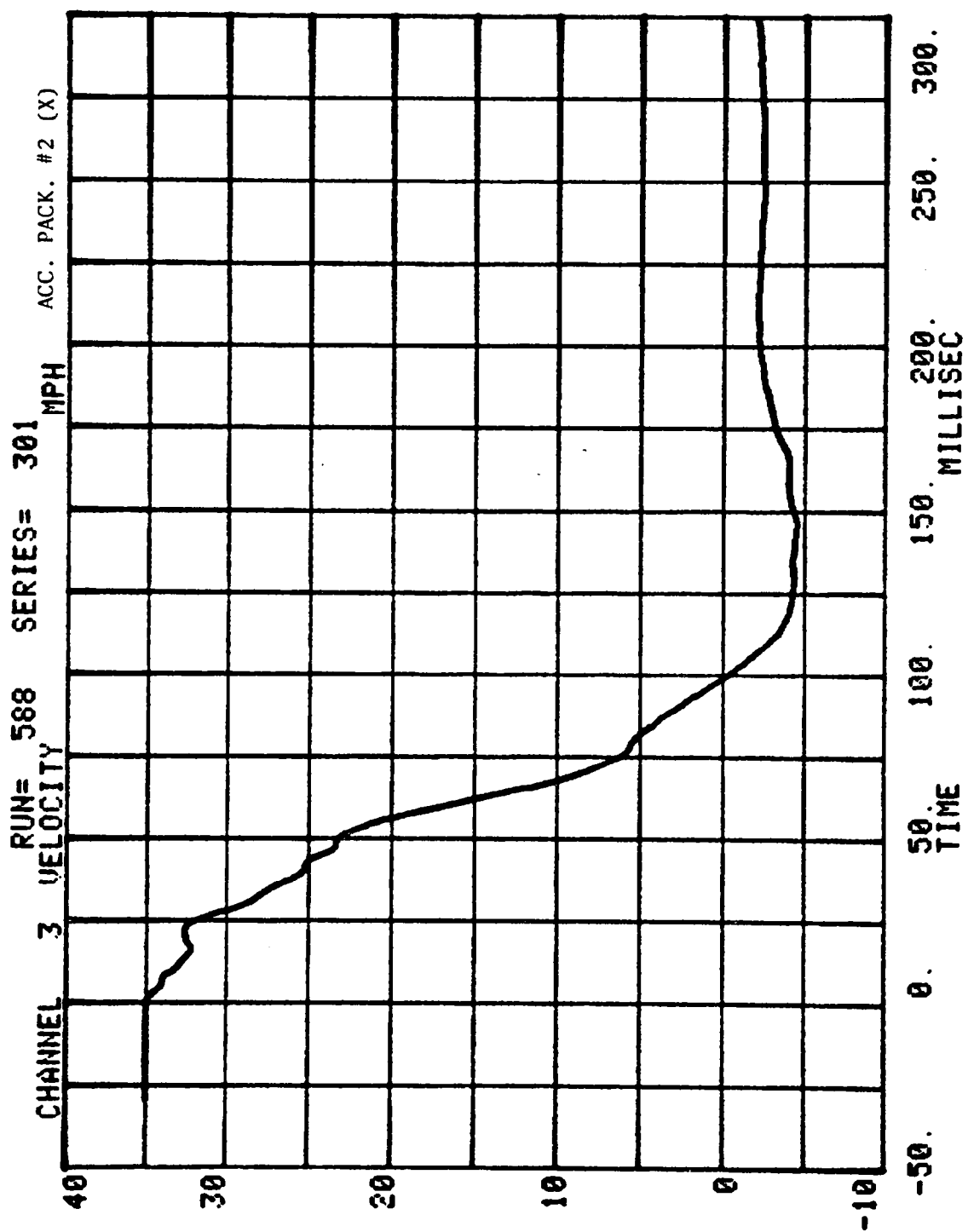
60

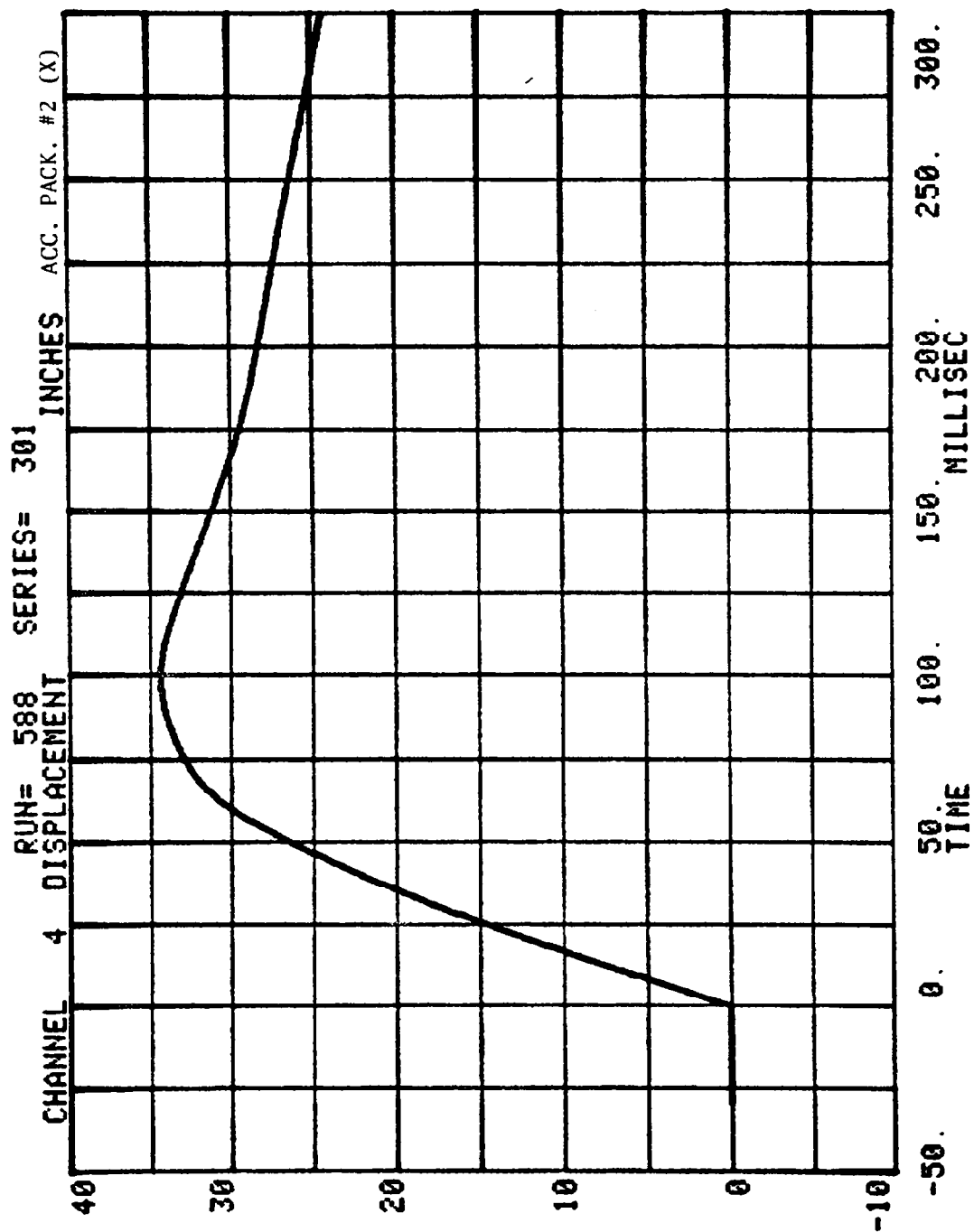


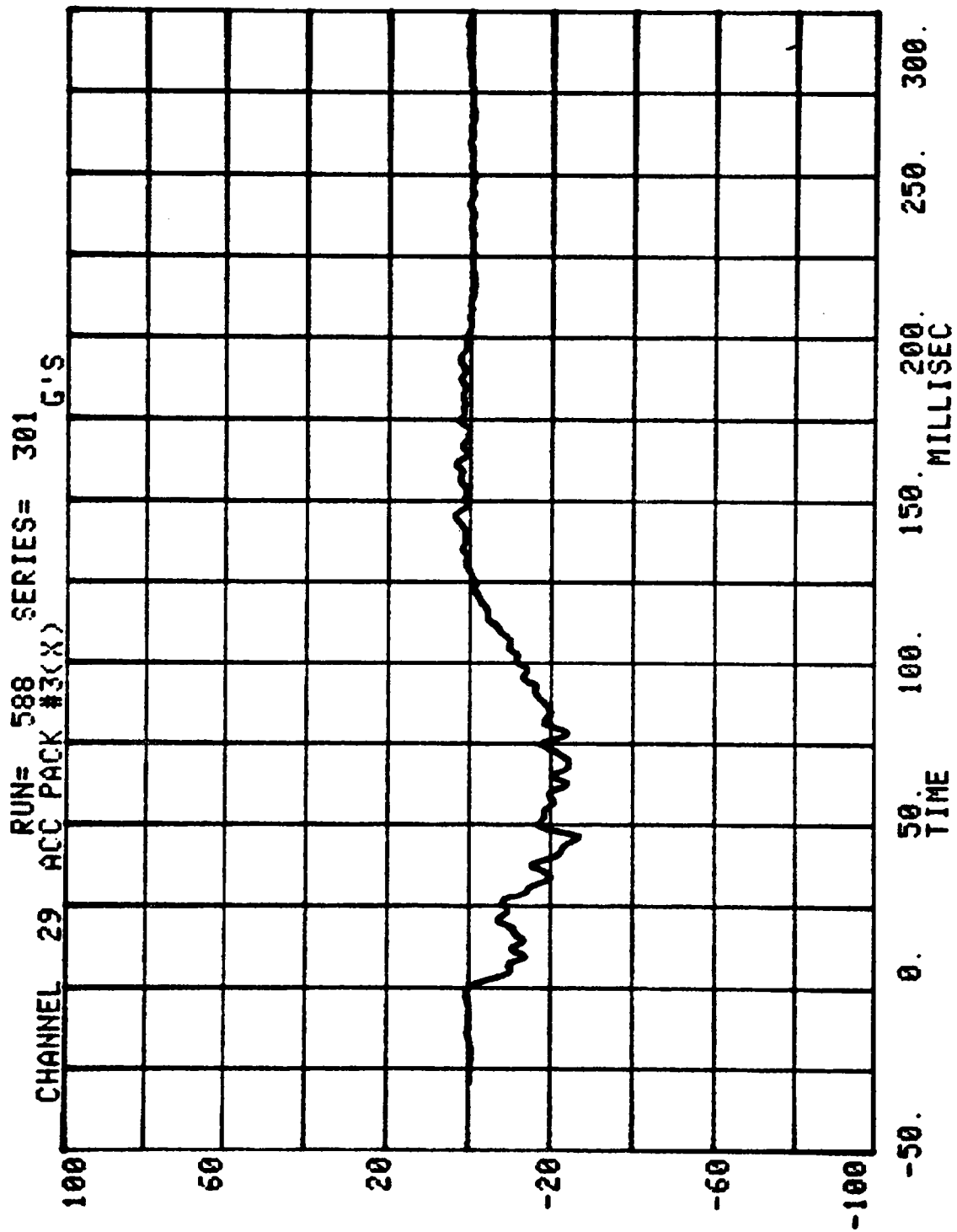


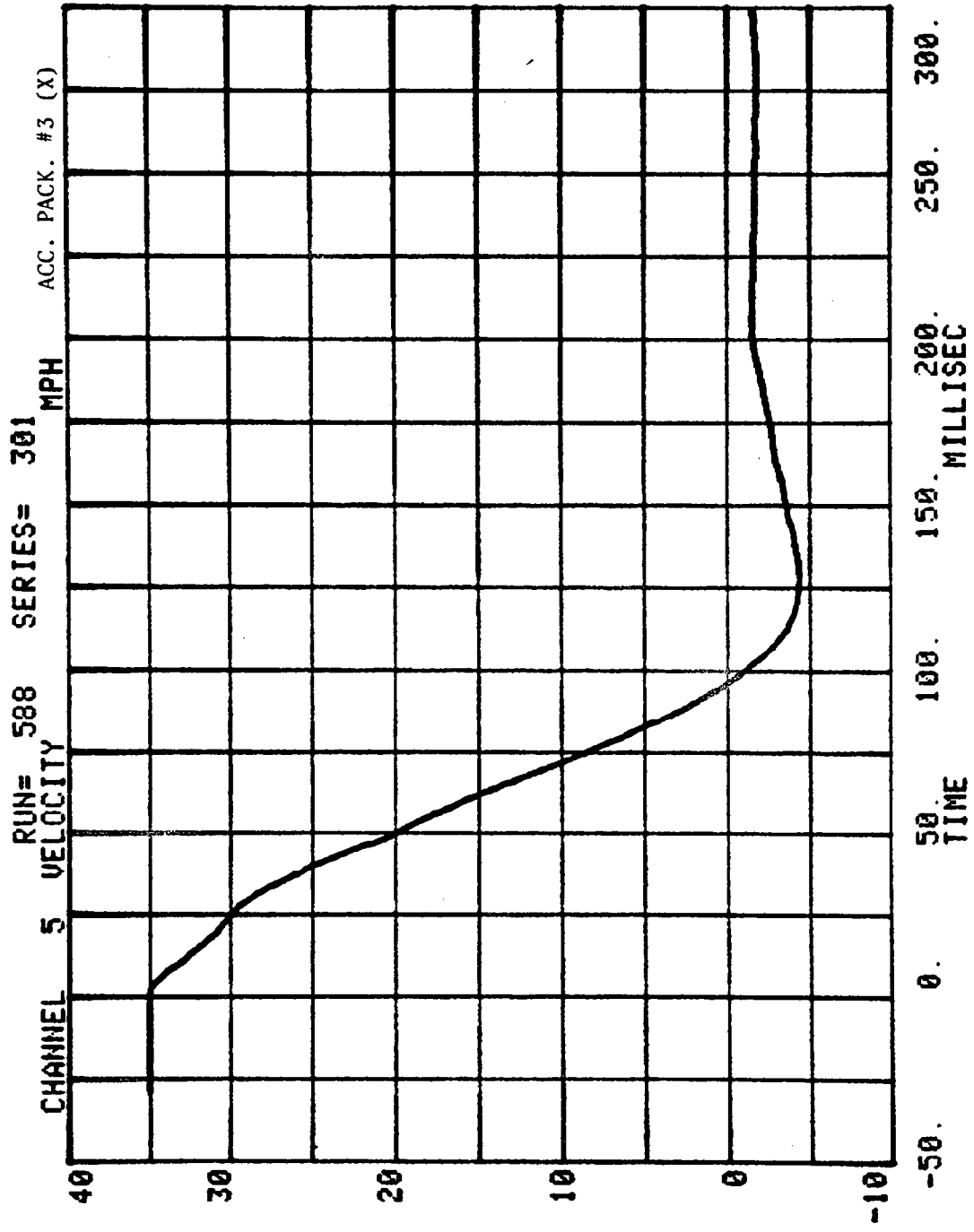


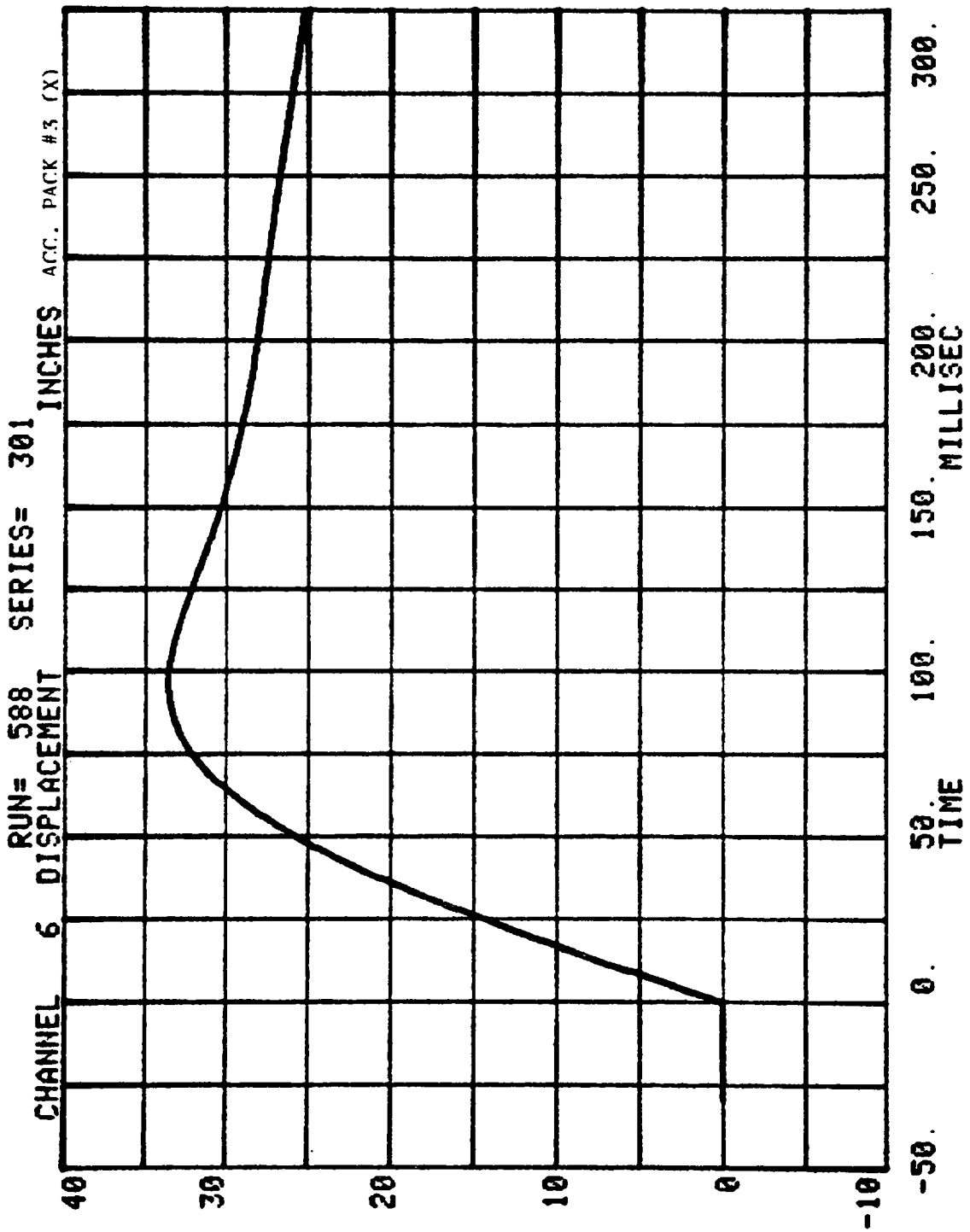


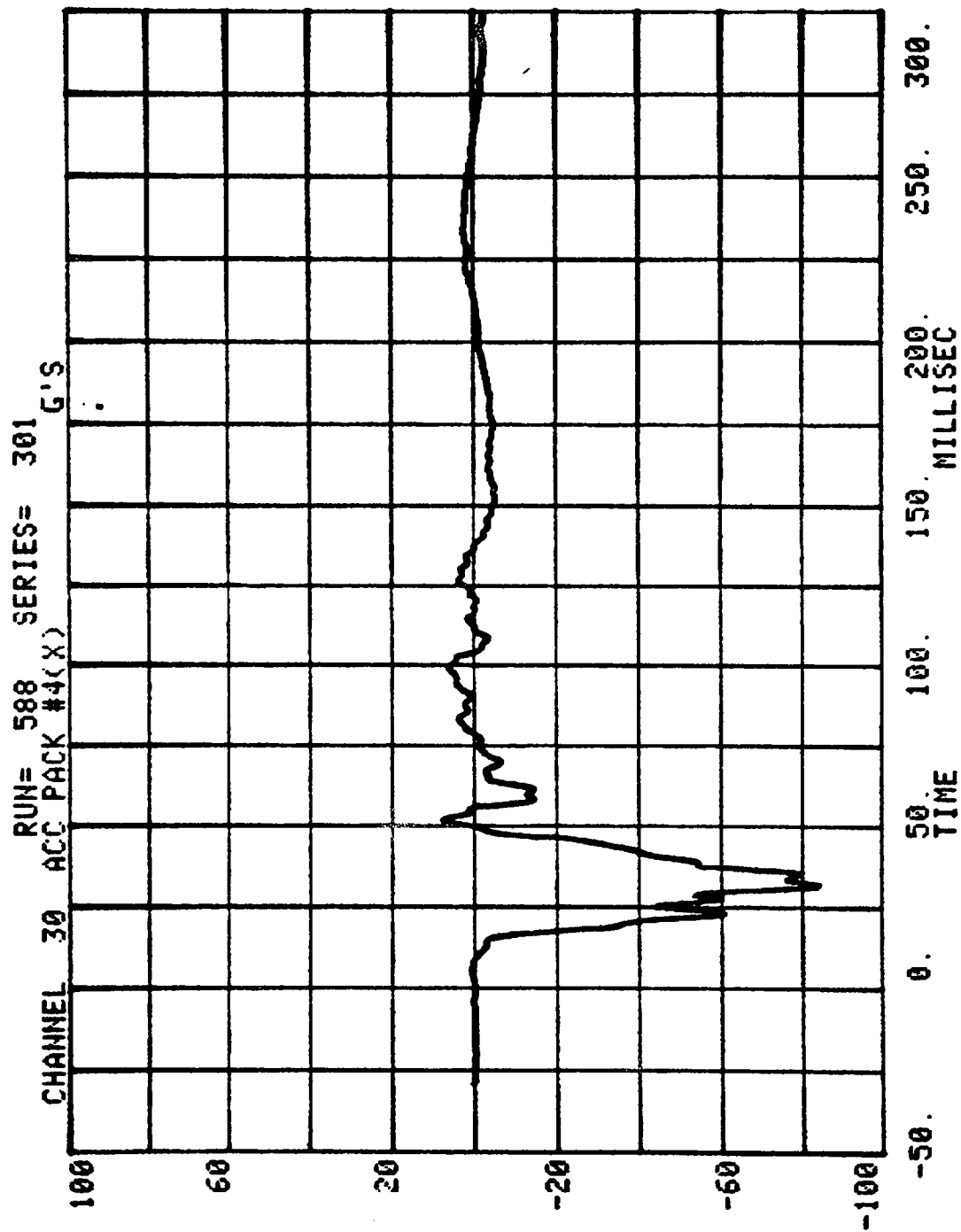


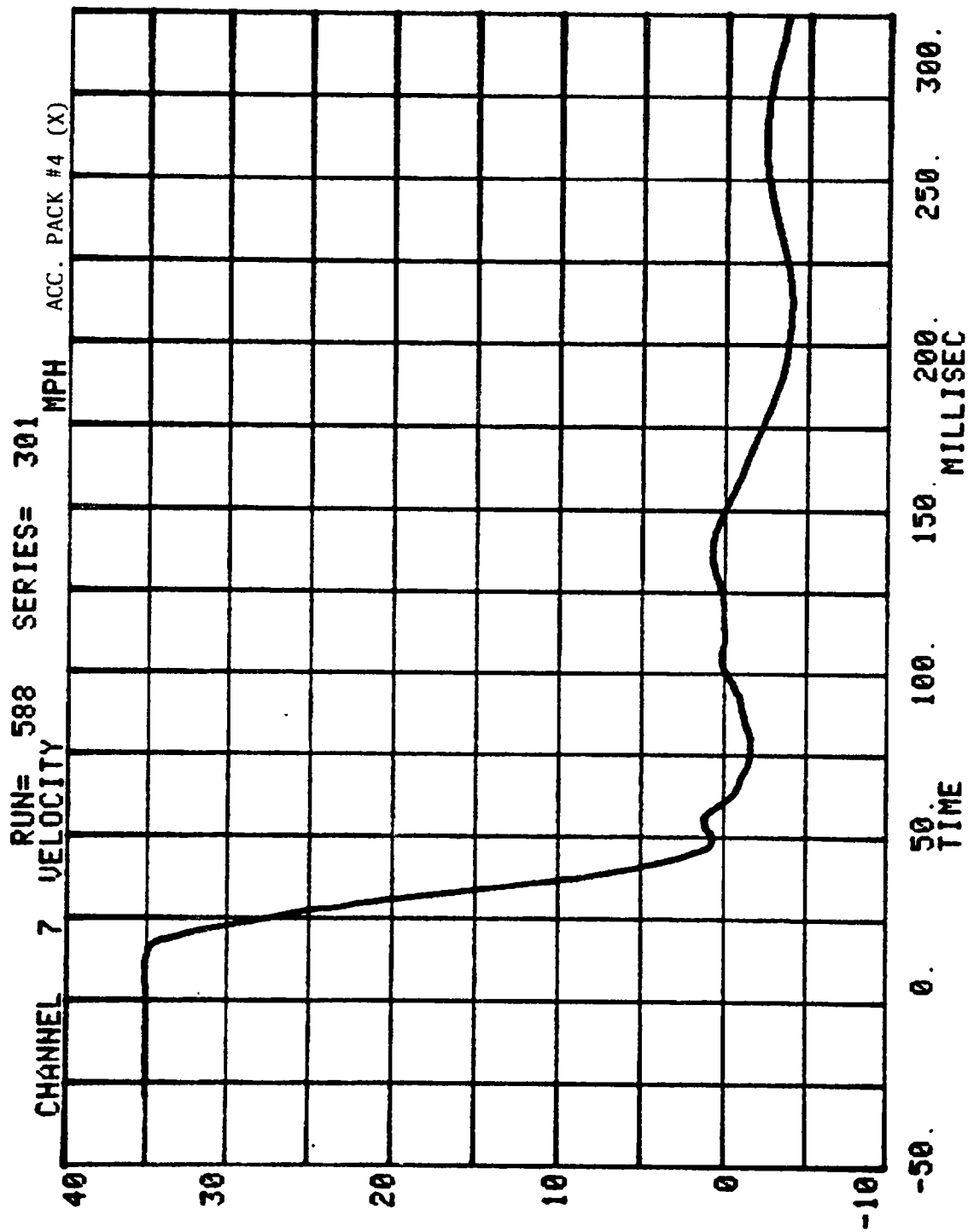


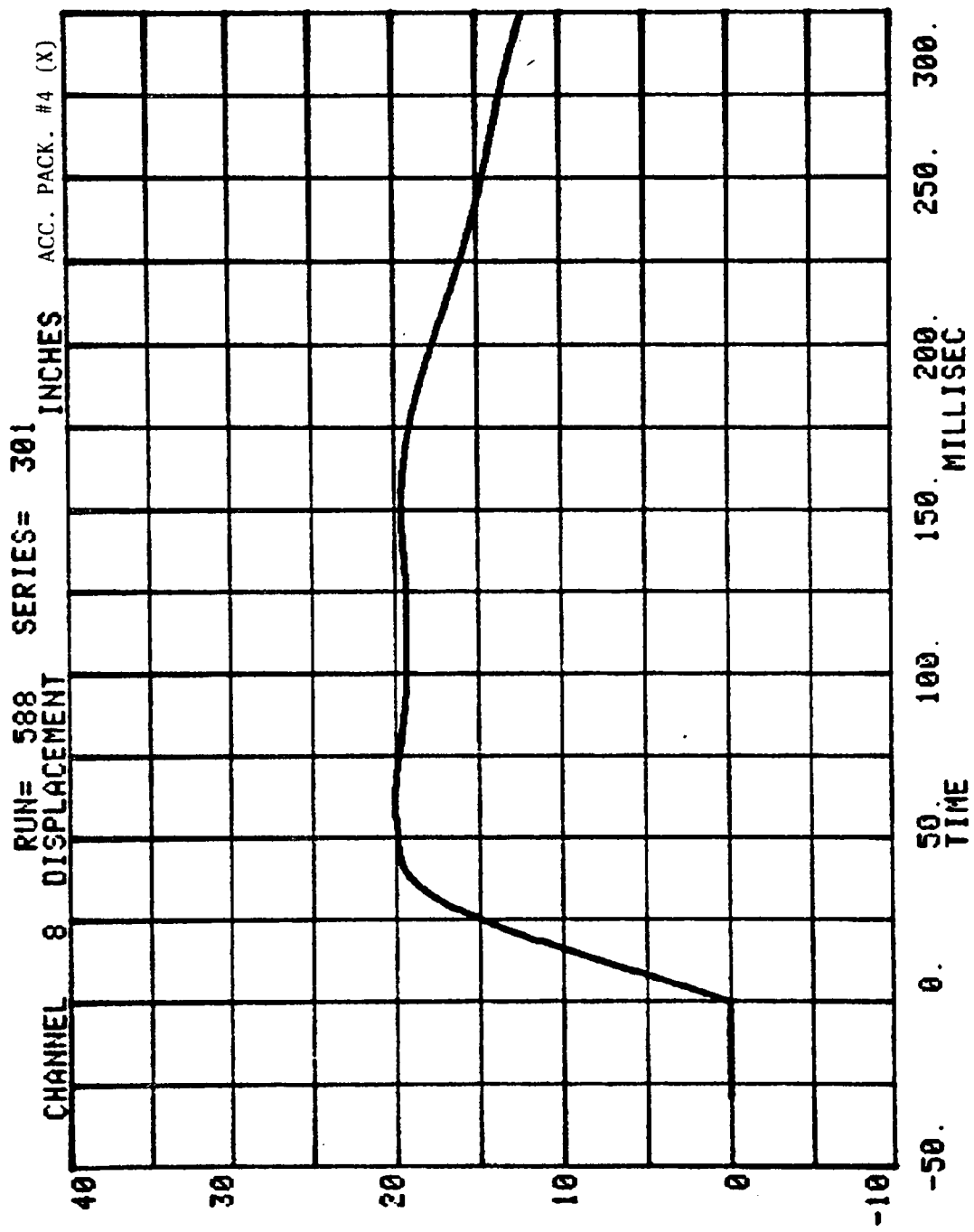


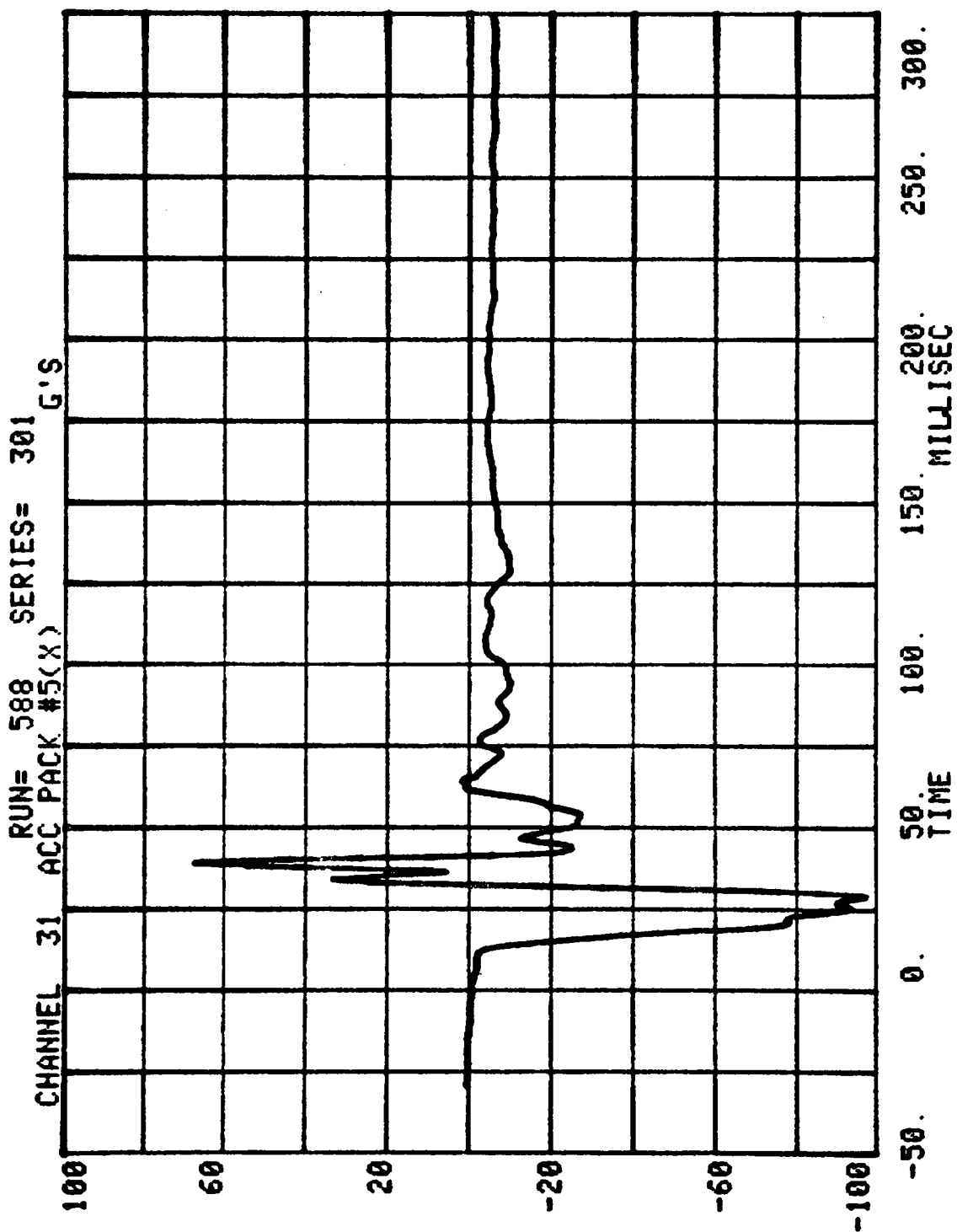


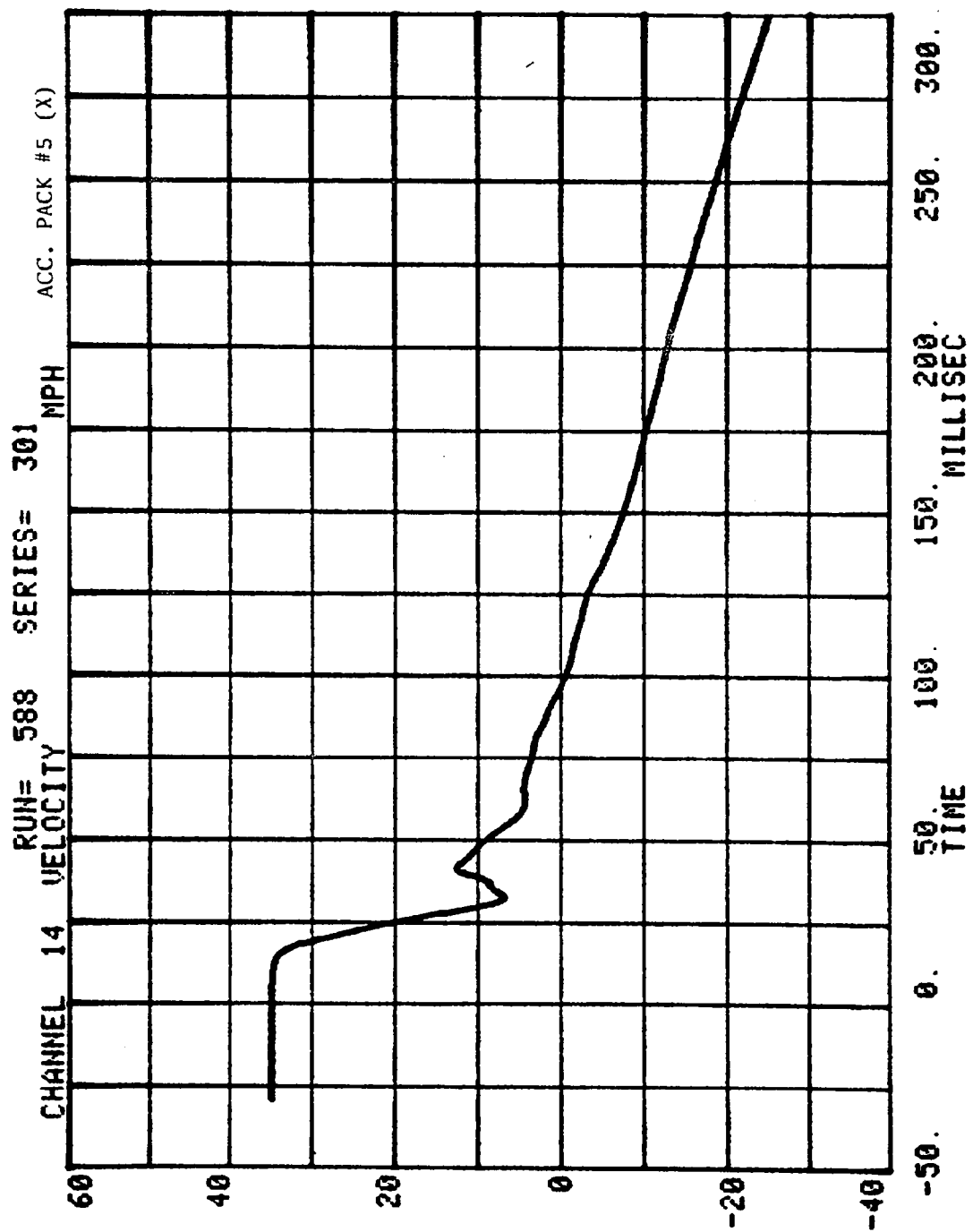


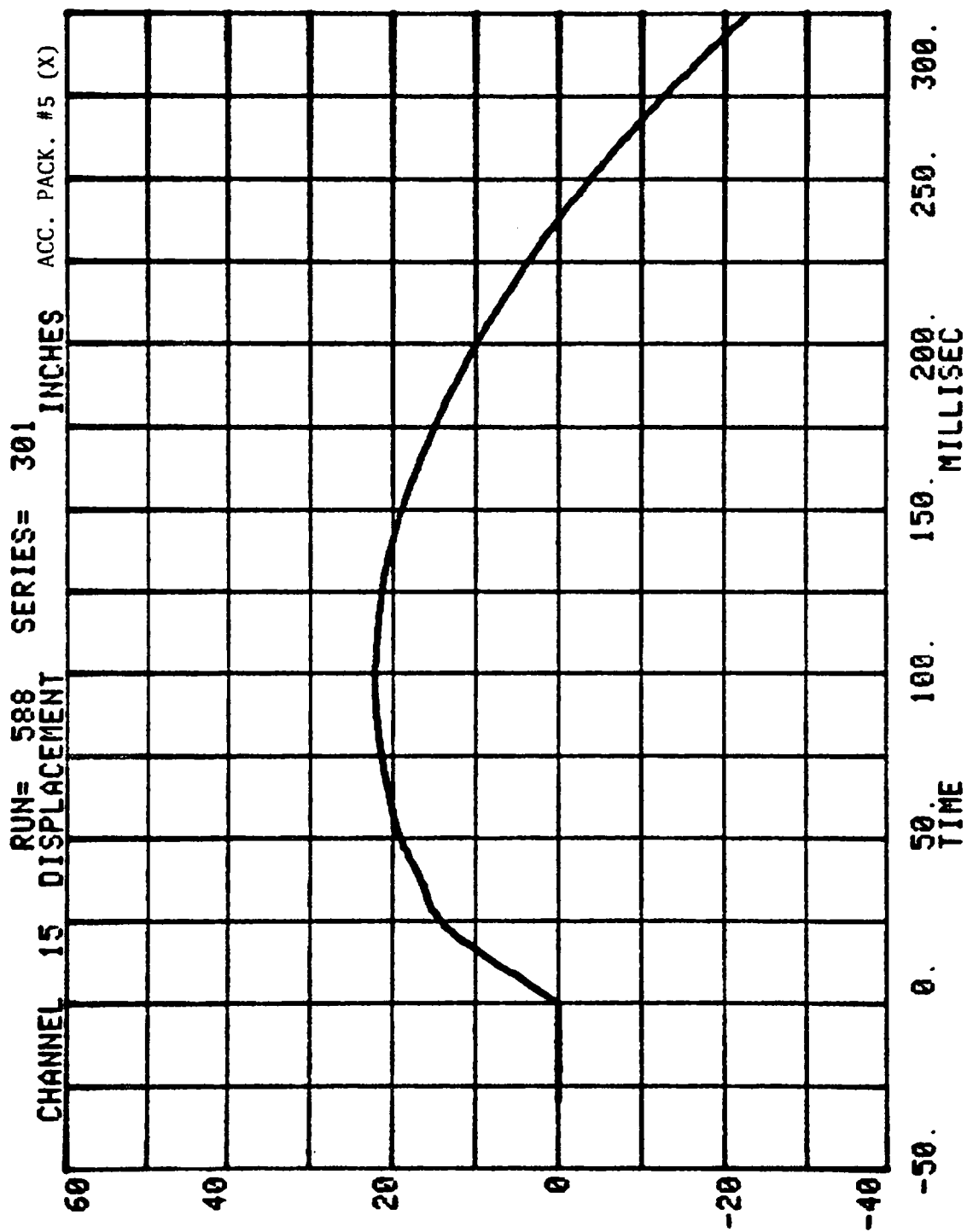


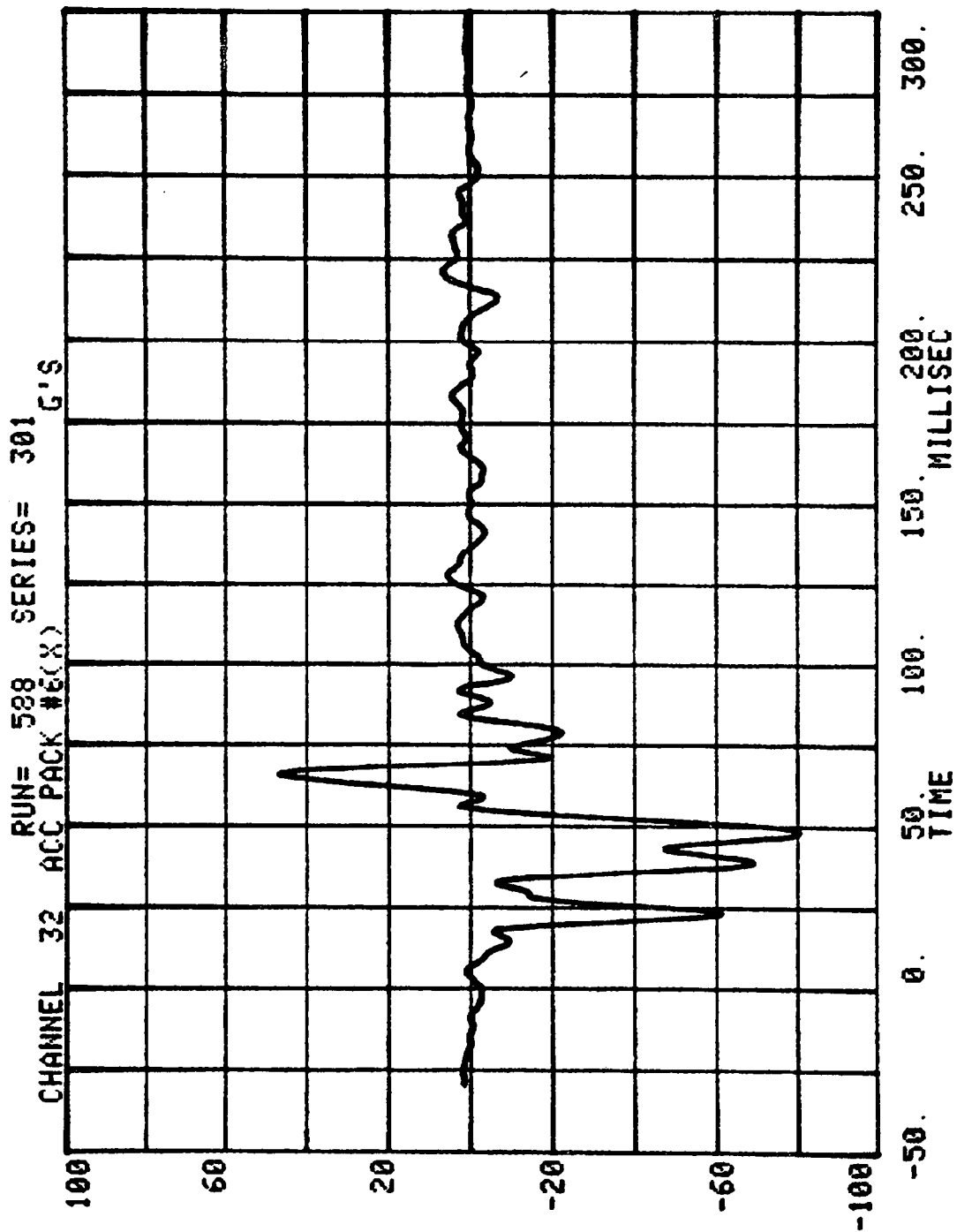


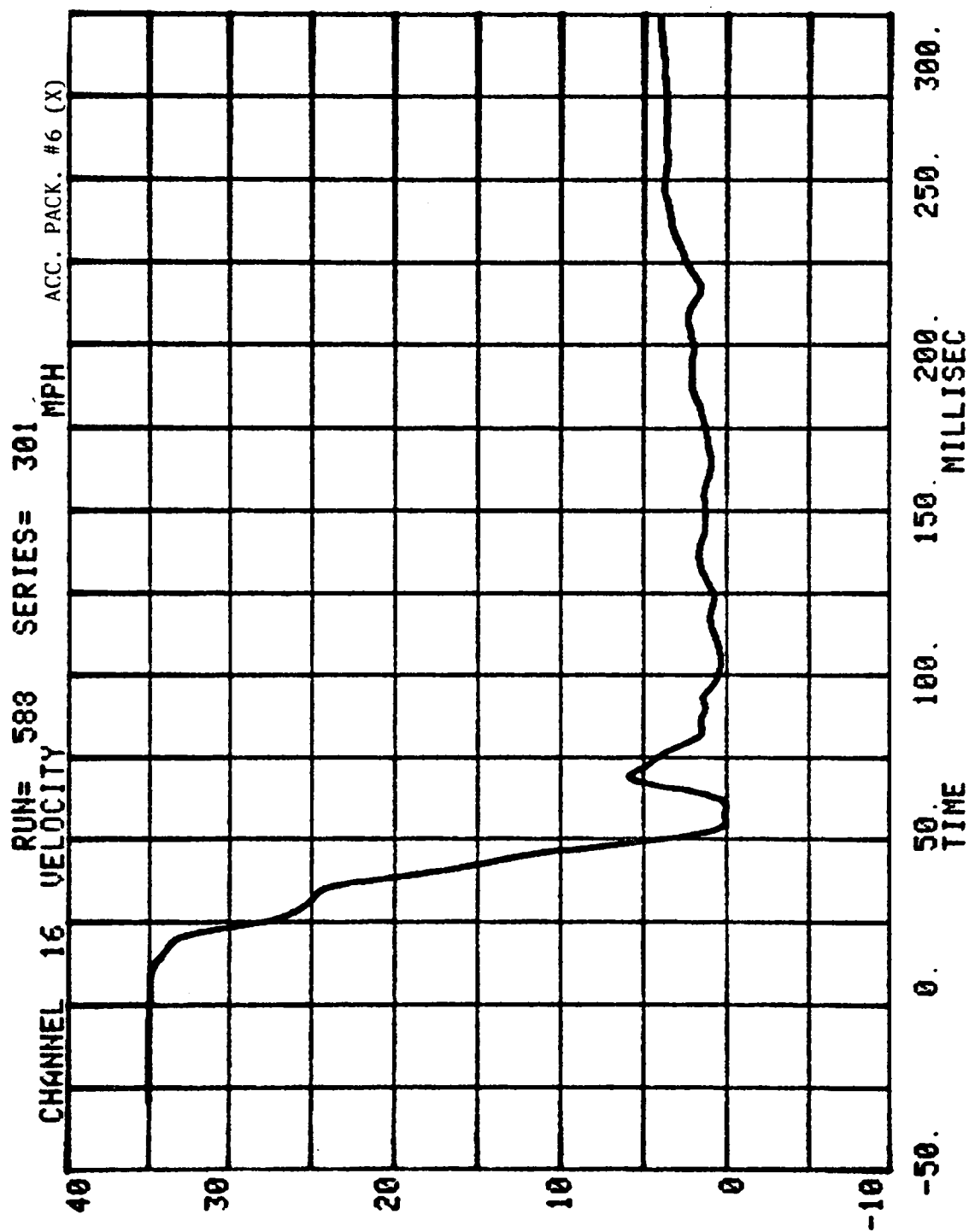


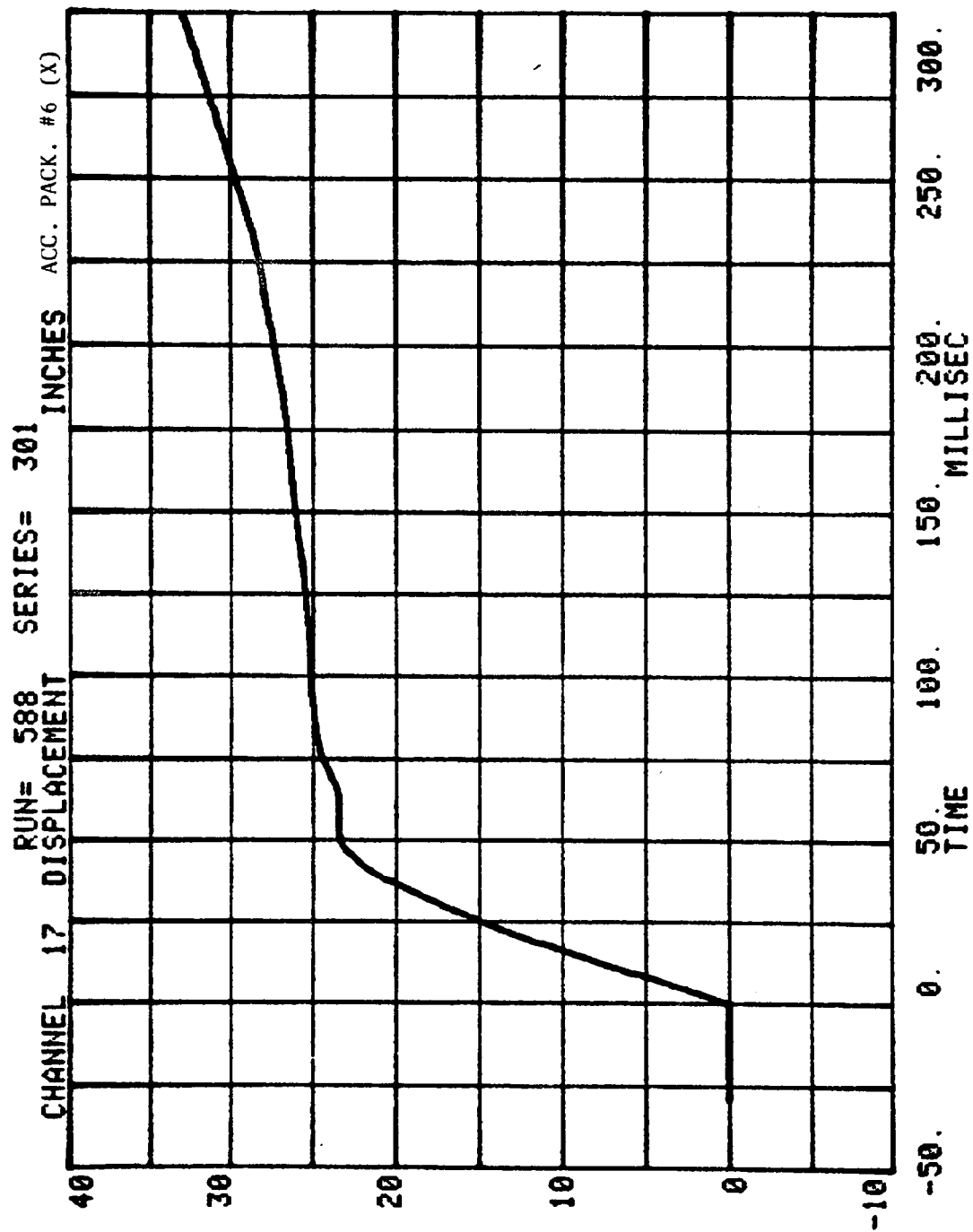




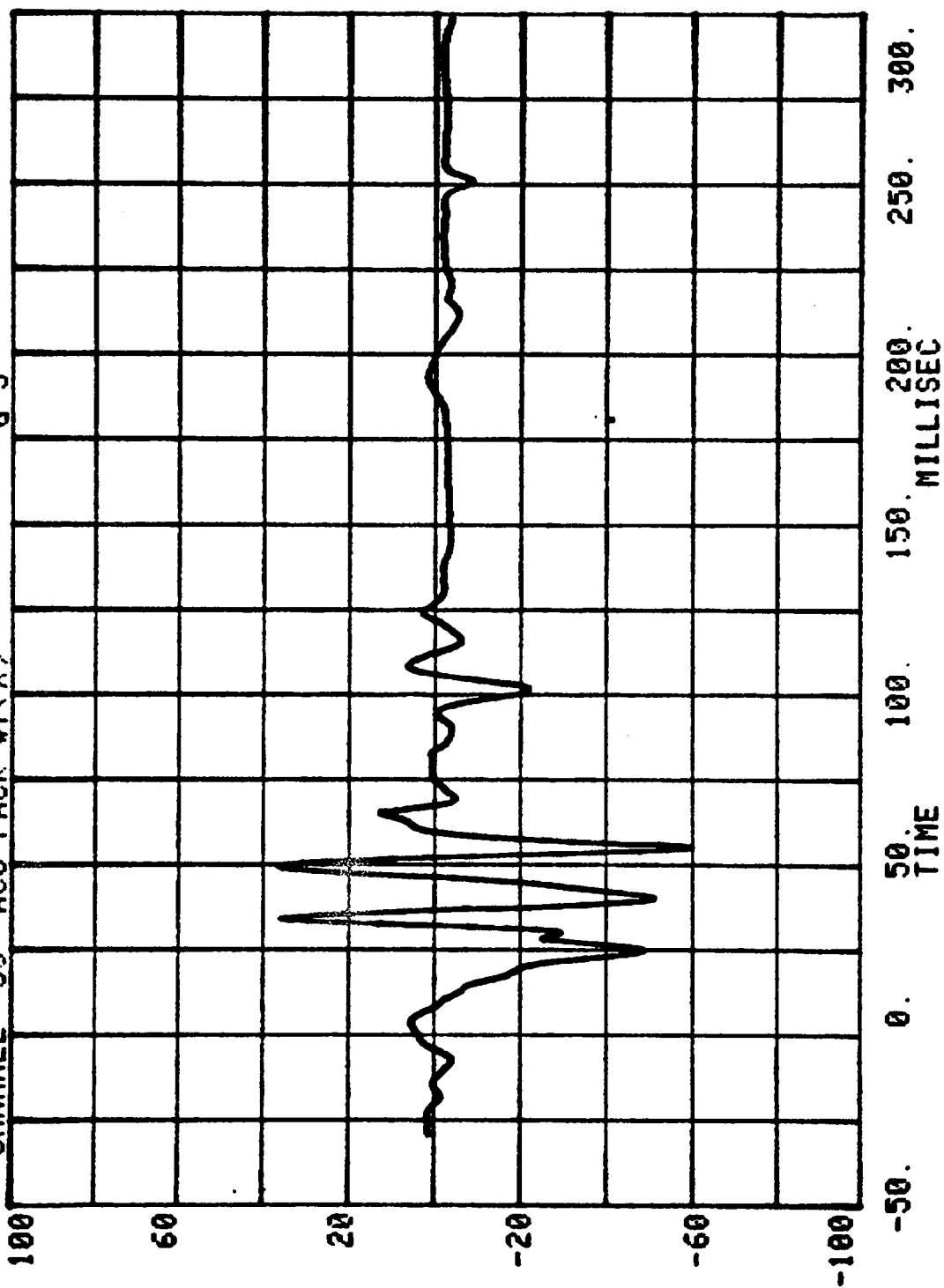


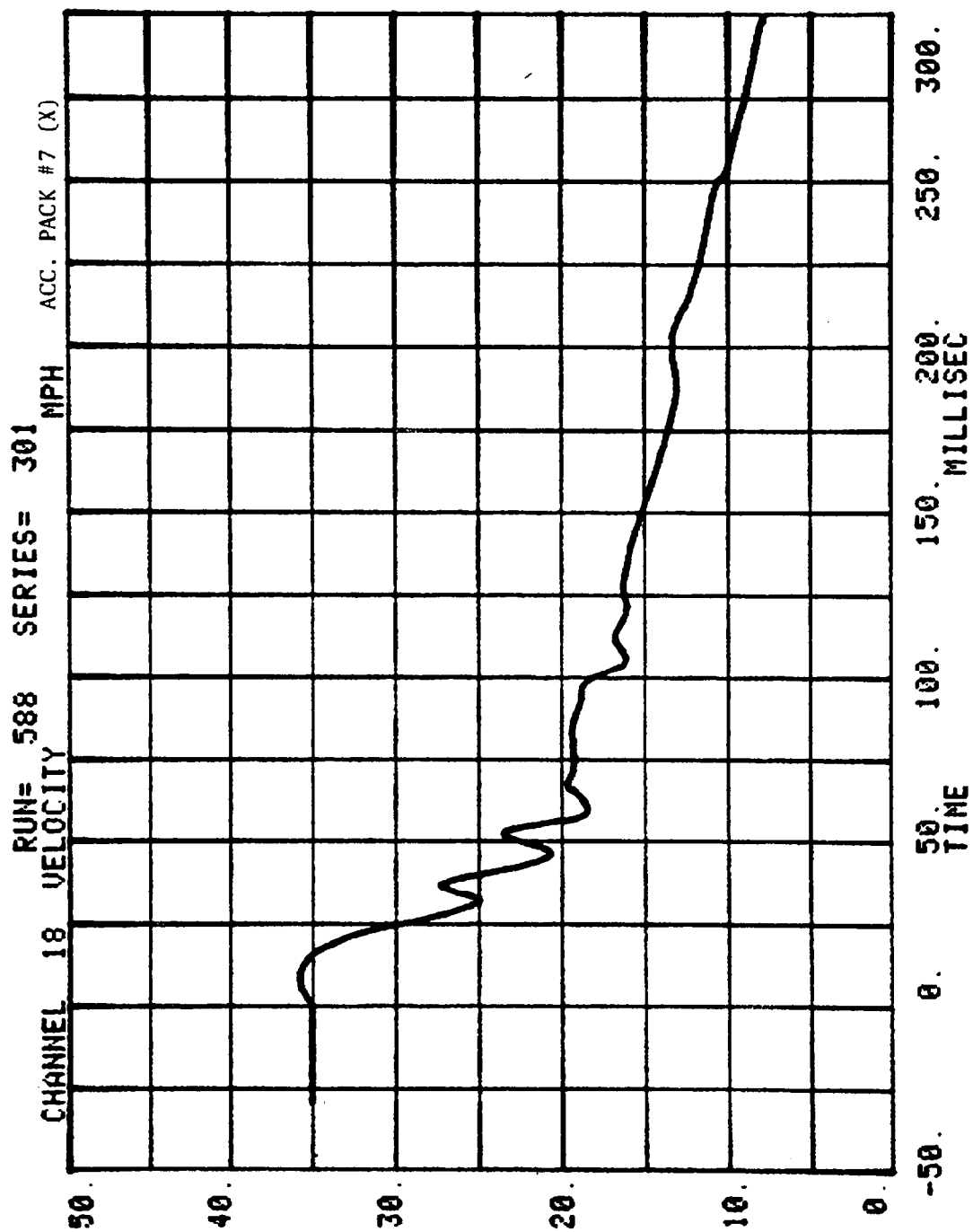


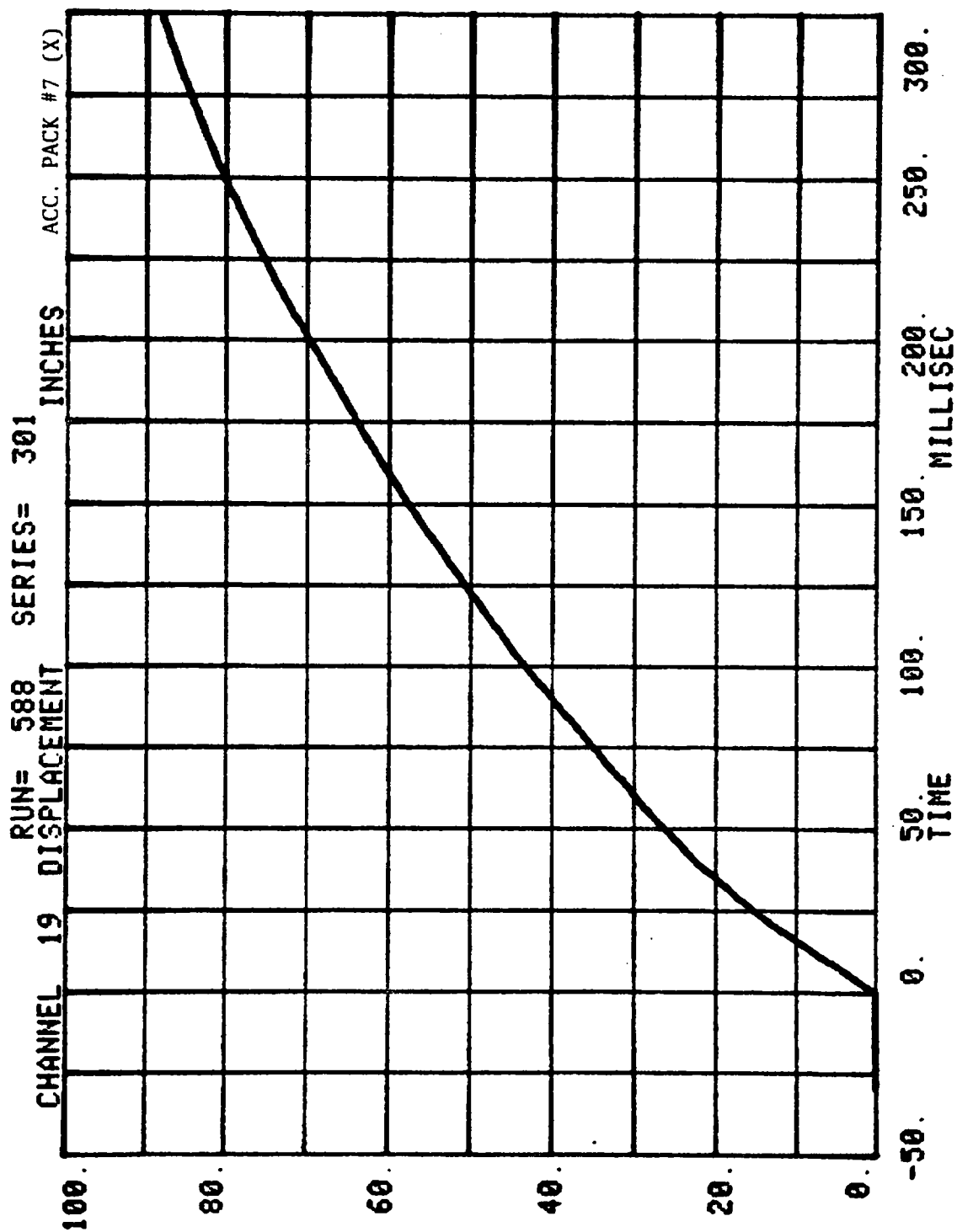




CHANNEL 33 ACC PACK #7(X) RUN= 588 SERIES= 301 G'S

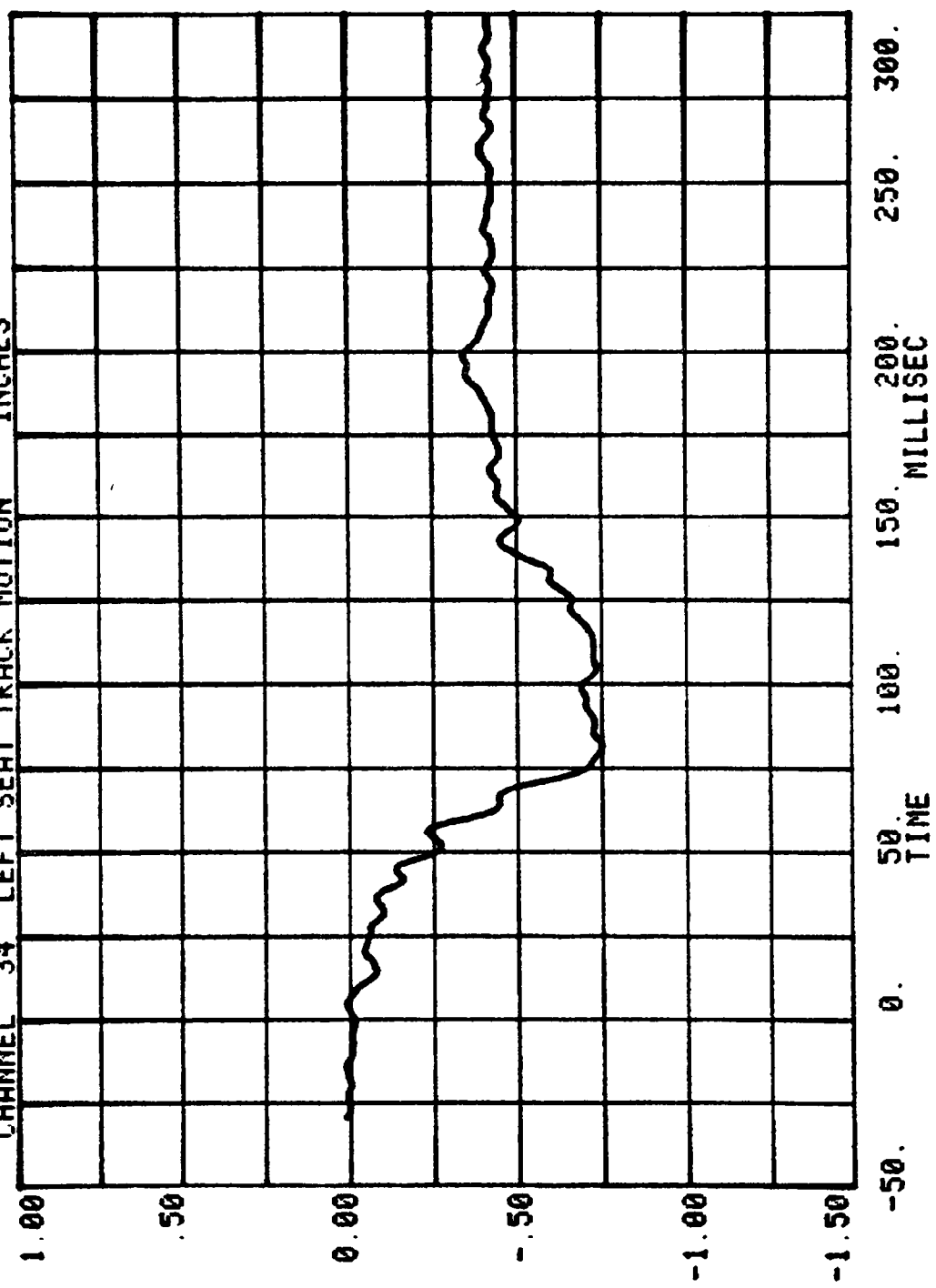


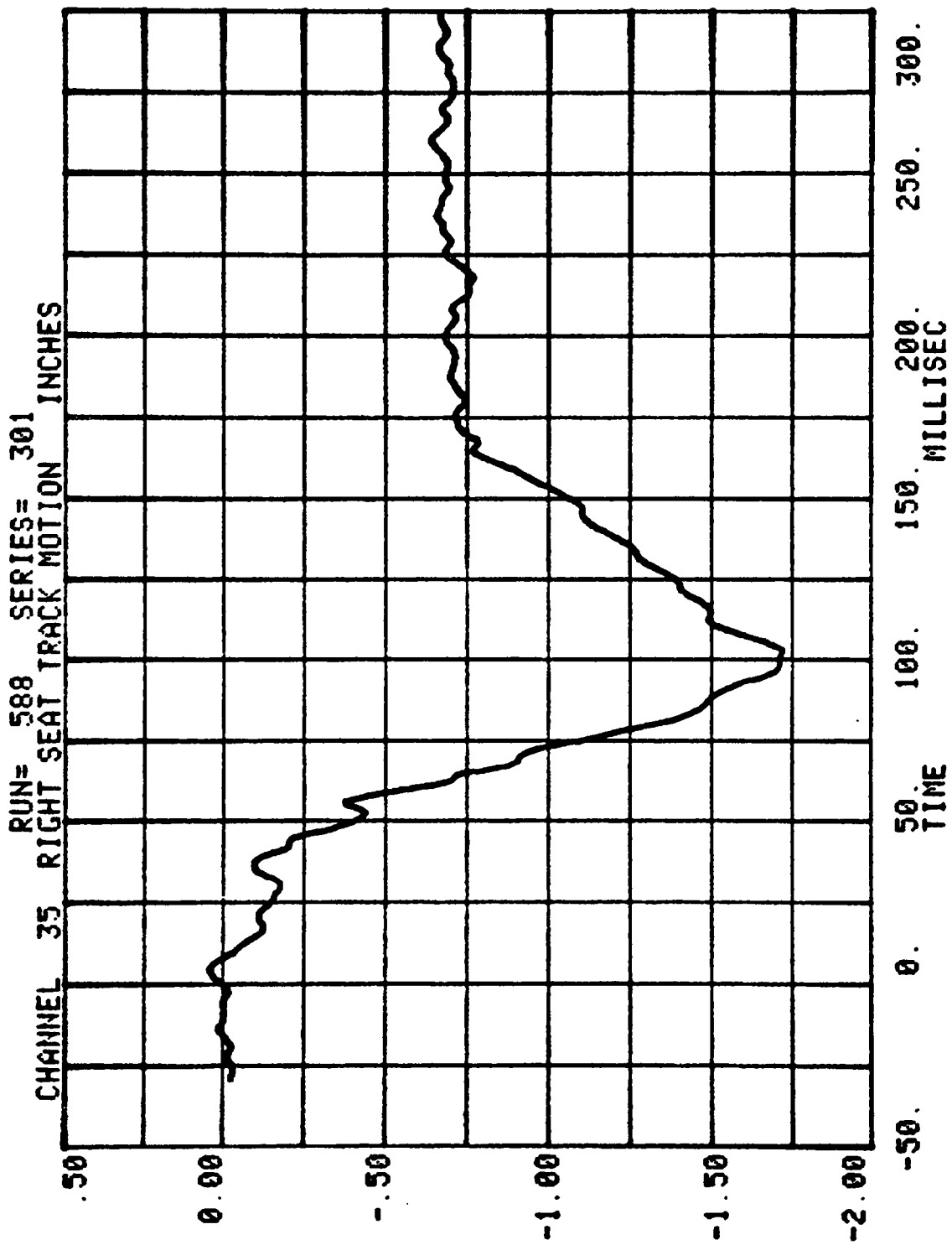




CHANNEL 34 LEFT SEAT TRACK MOTION INCHES

RUN= 588 SERIES= 301





TEST NO. MD0301
1983 Plymouth Reliant
4-Door Wagon

DUMMY DATA

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

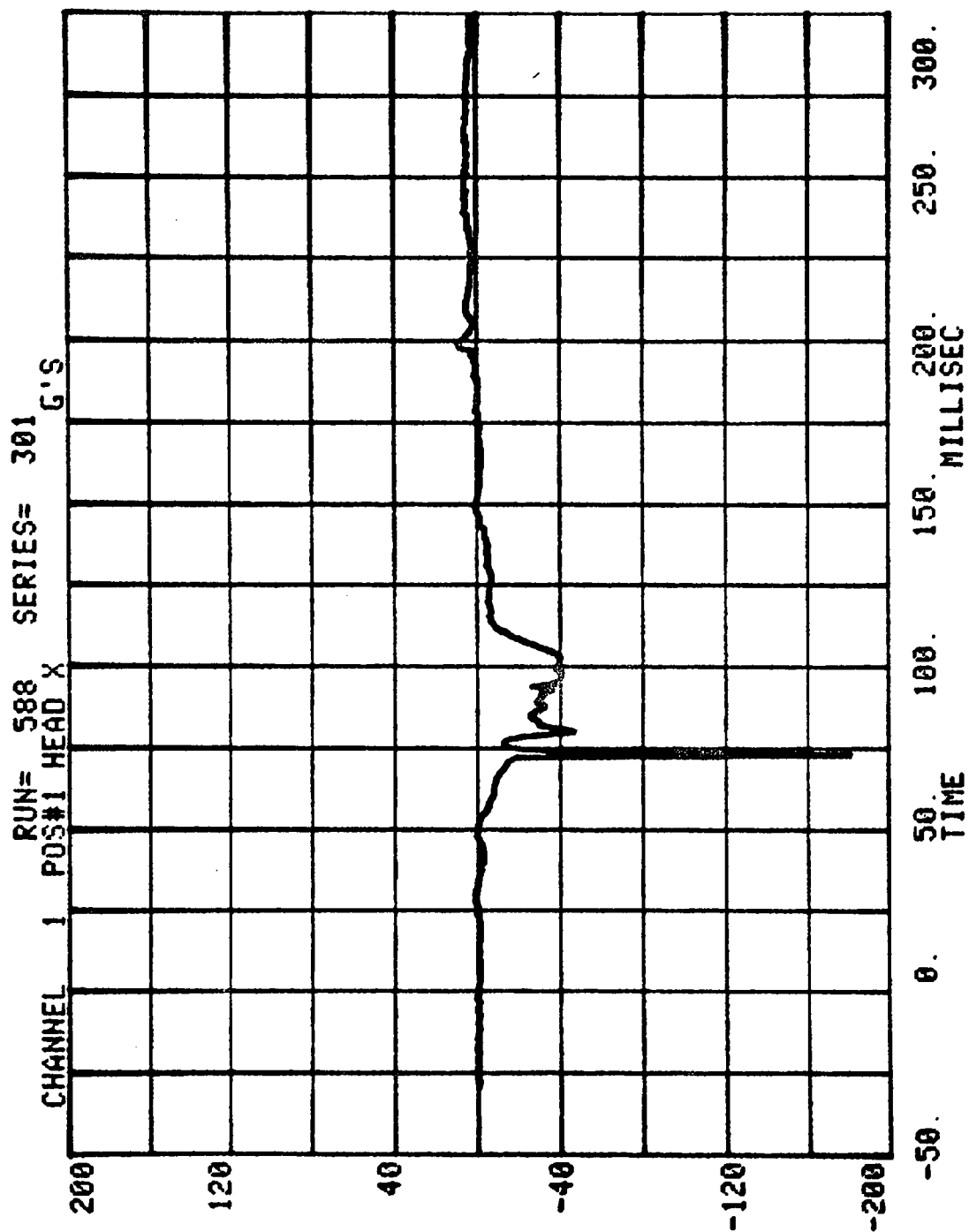
HEAD INJURY CRITERION
HEAD SEVERITY INDEX

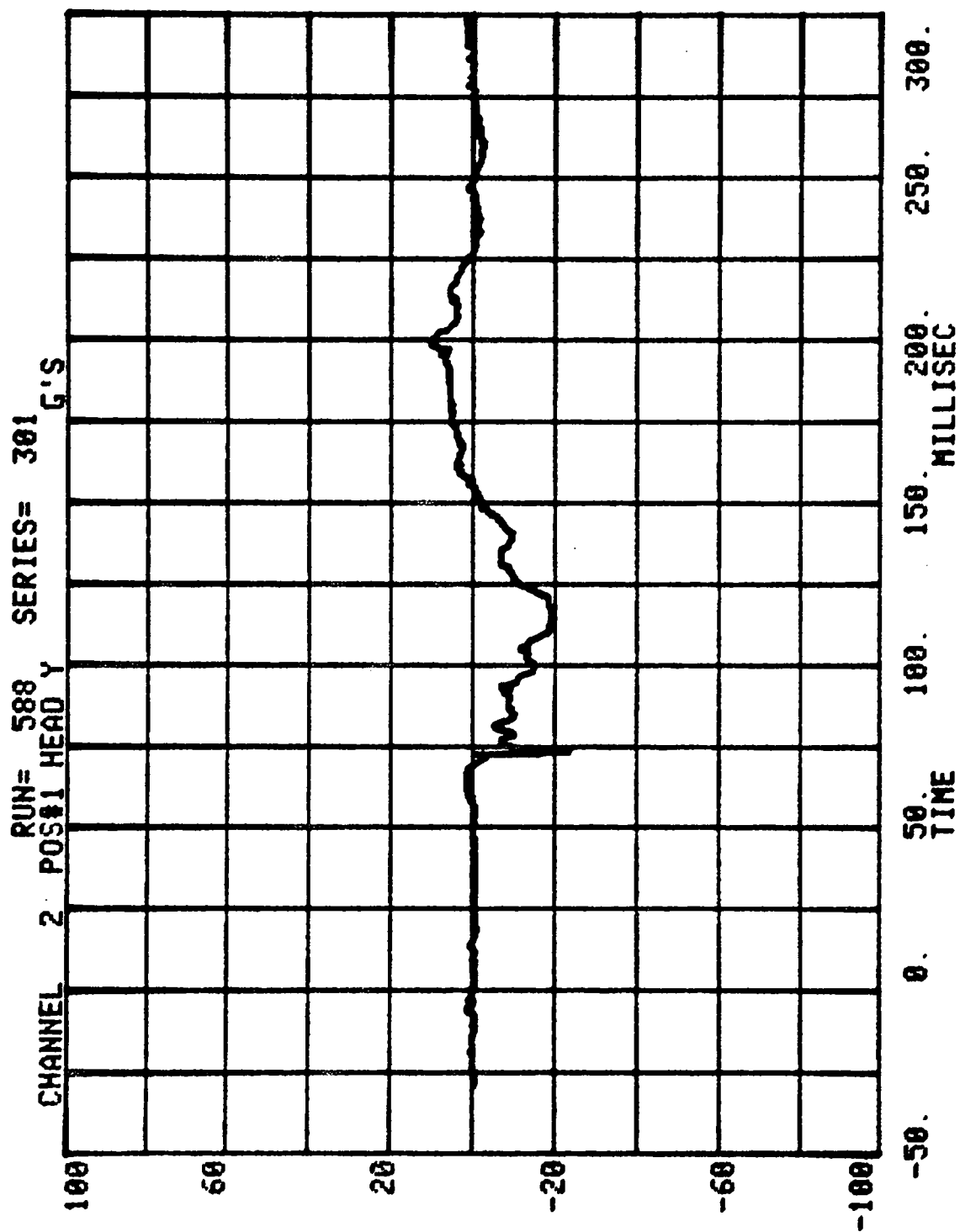
CAR TO LOAD CELL BARRIER

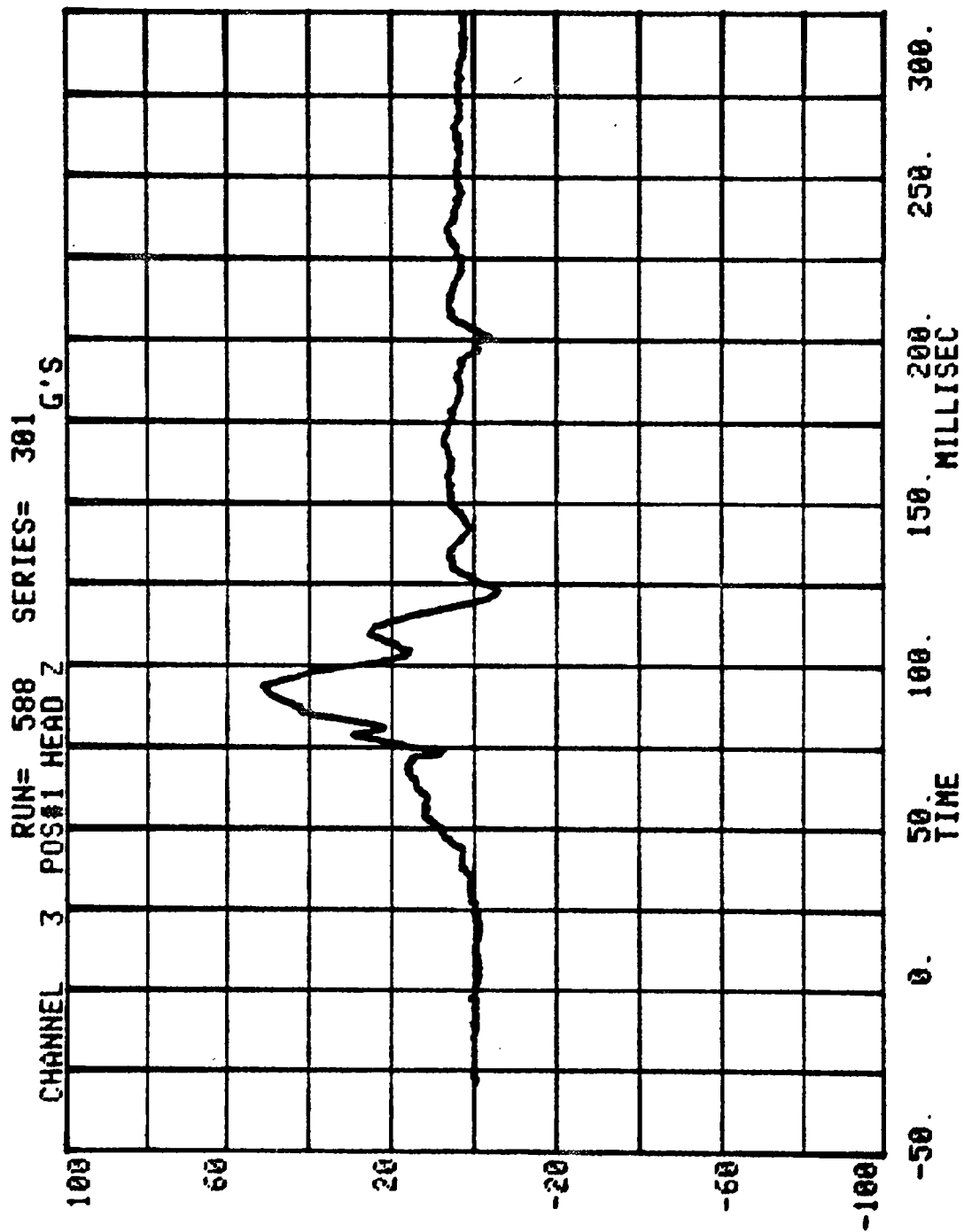
RUN= 588

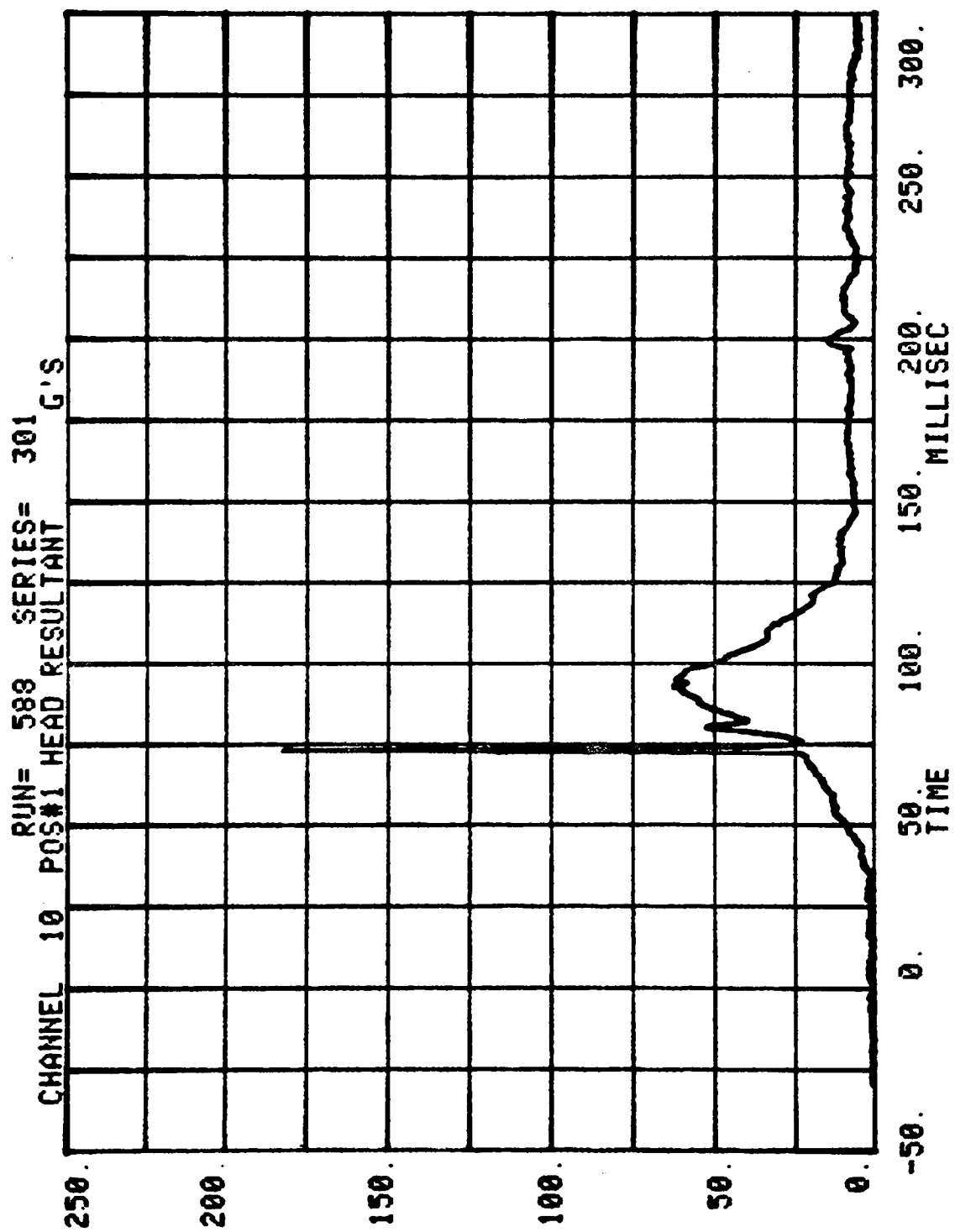
POS#1 HEAD RESULTANT

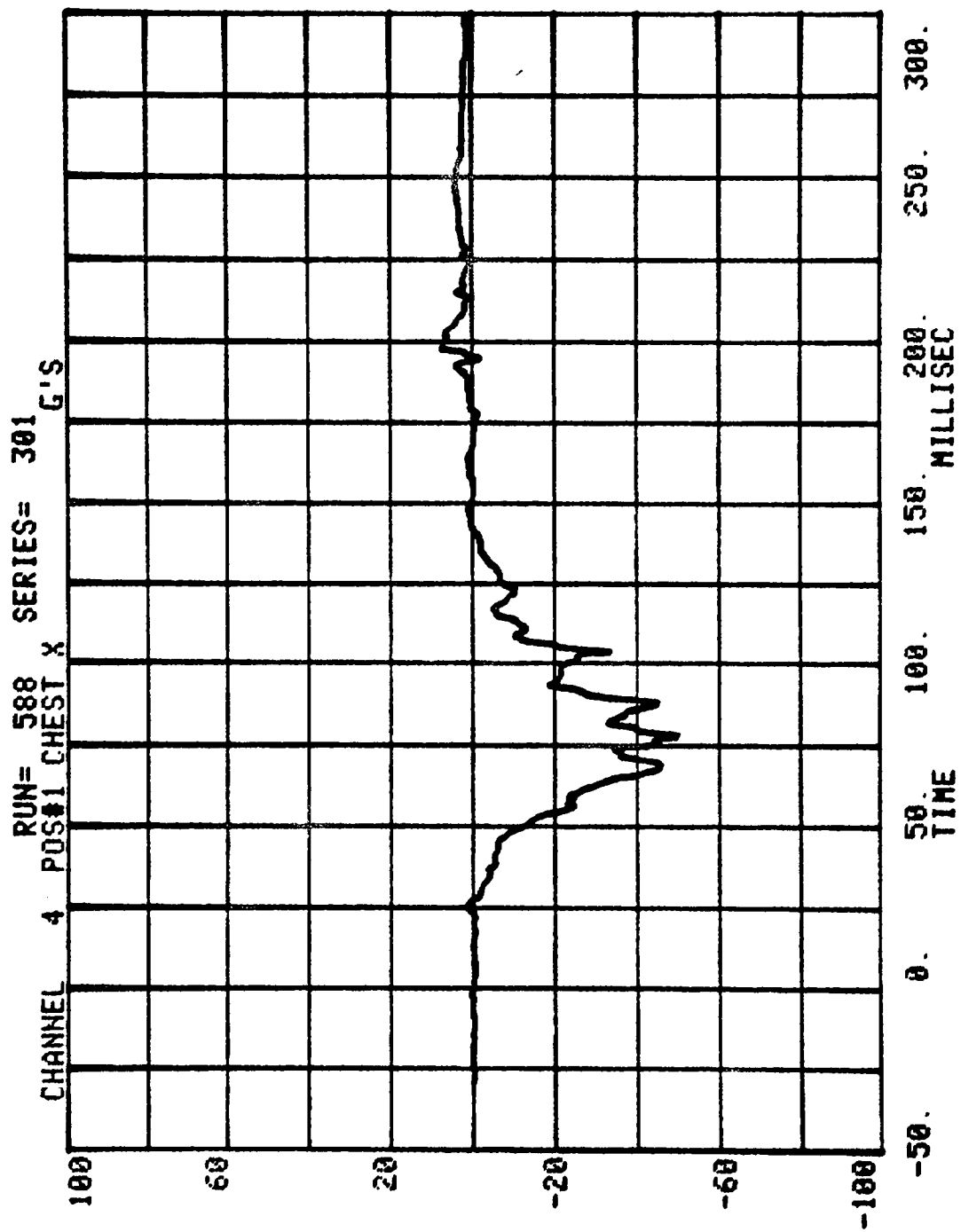
HIC= 655.5 FROM T1= .07252 TO T2= .11392
AVERAGE ACCELERATION BETWEEN T1 AND T2= 47.8G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=1001.4

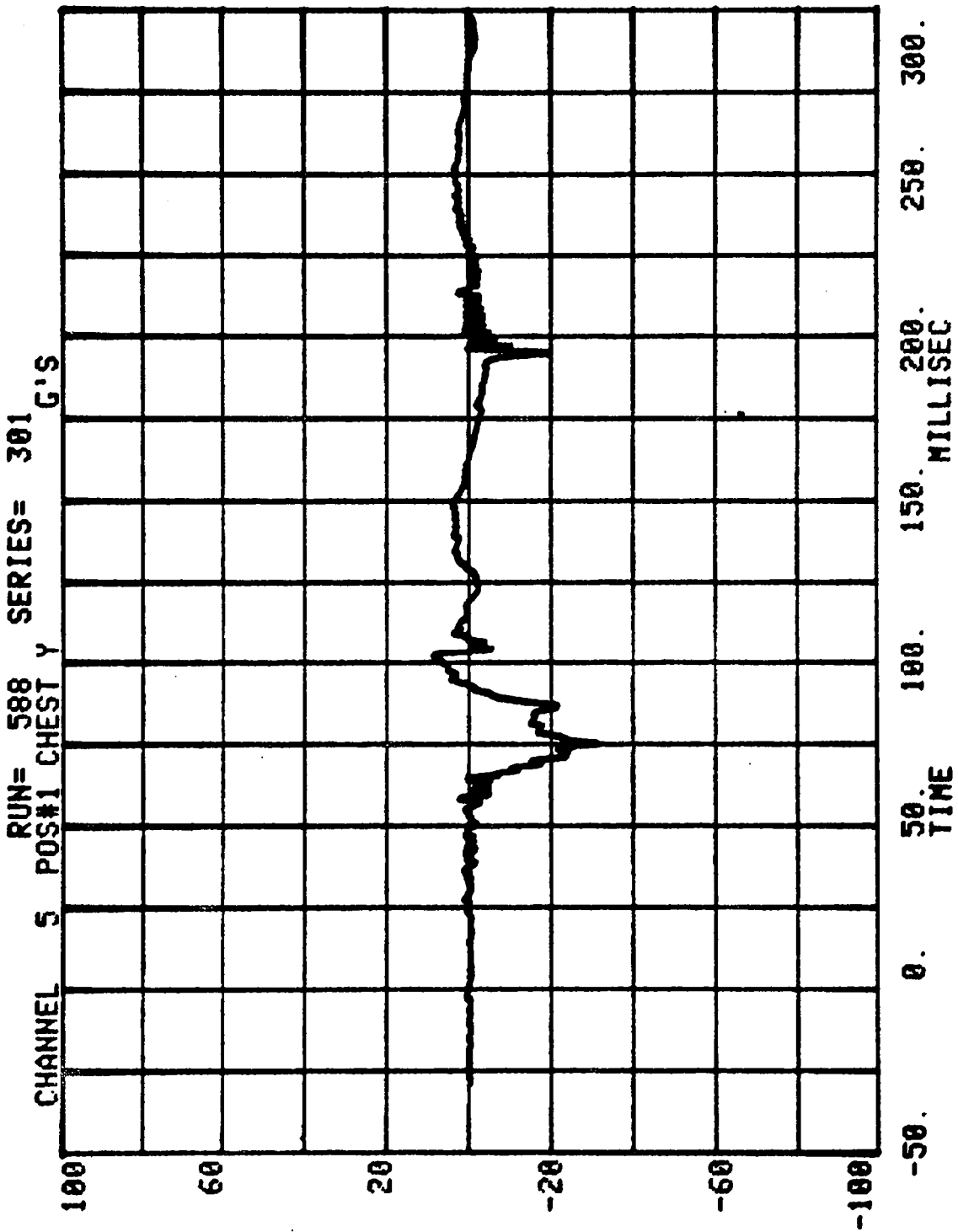


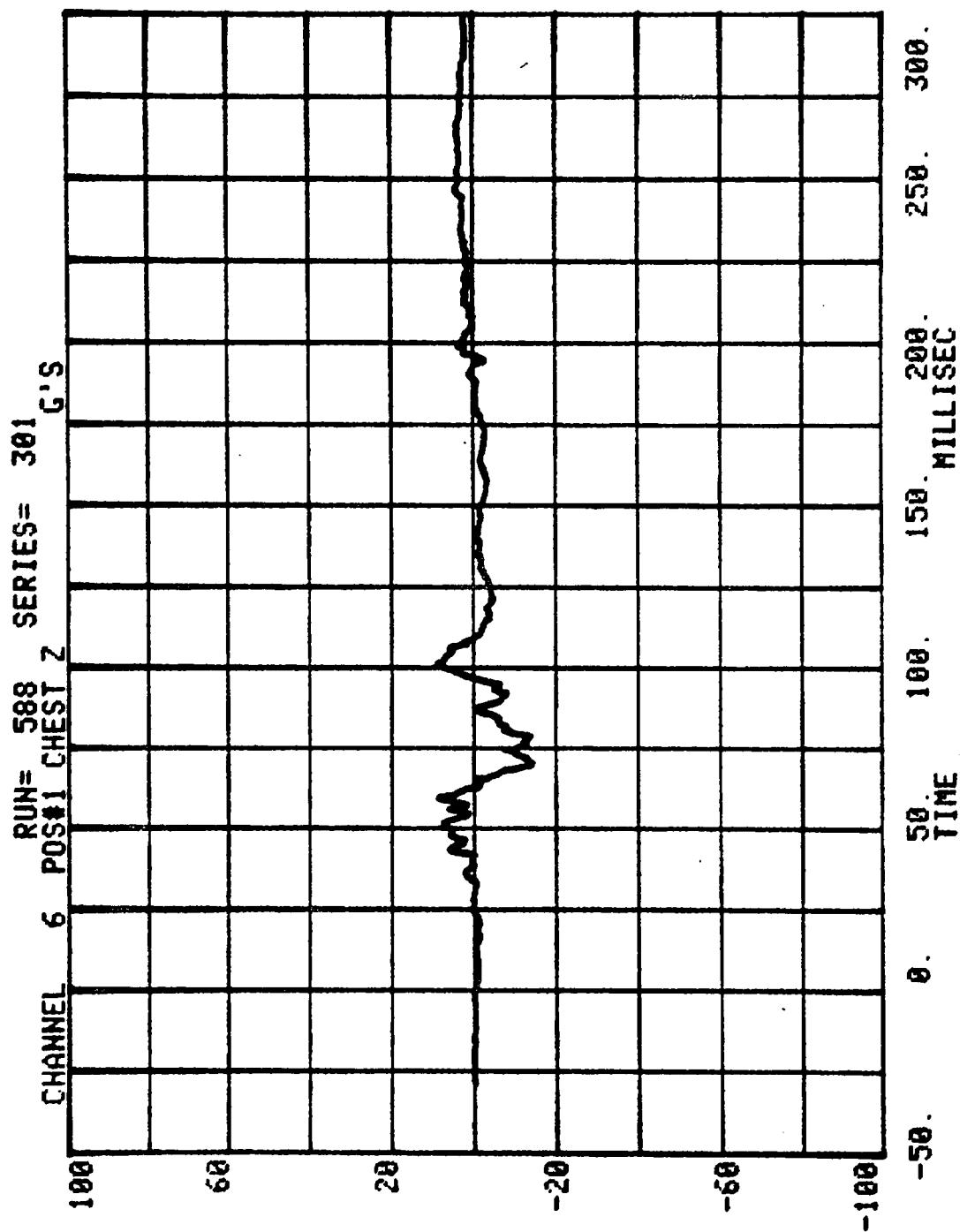


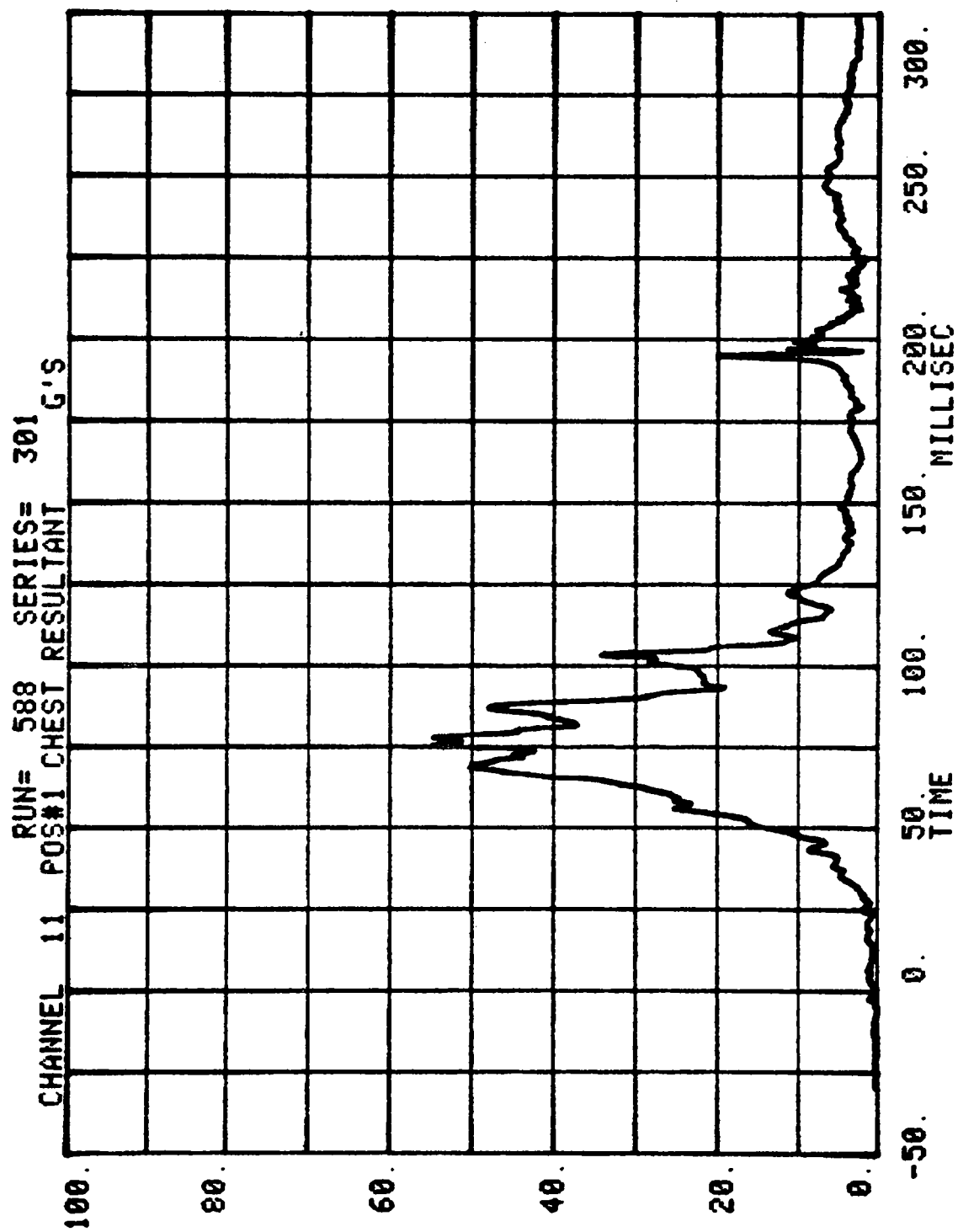


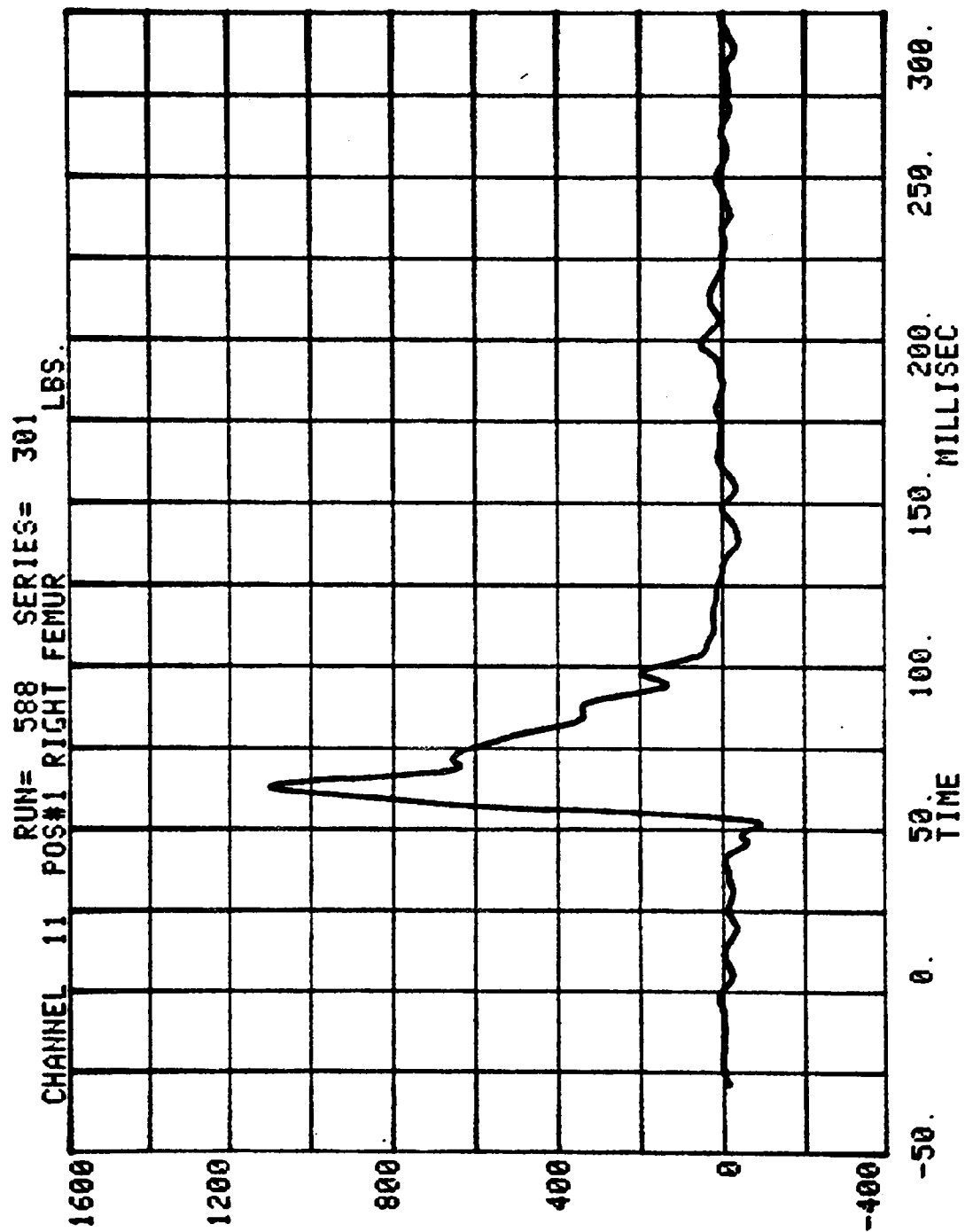


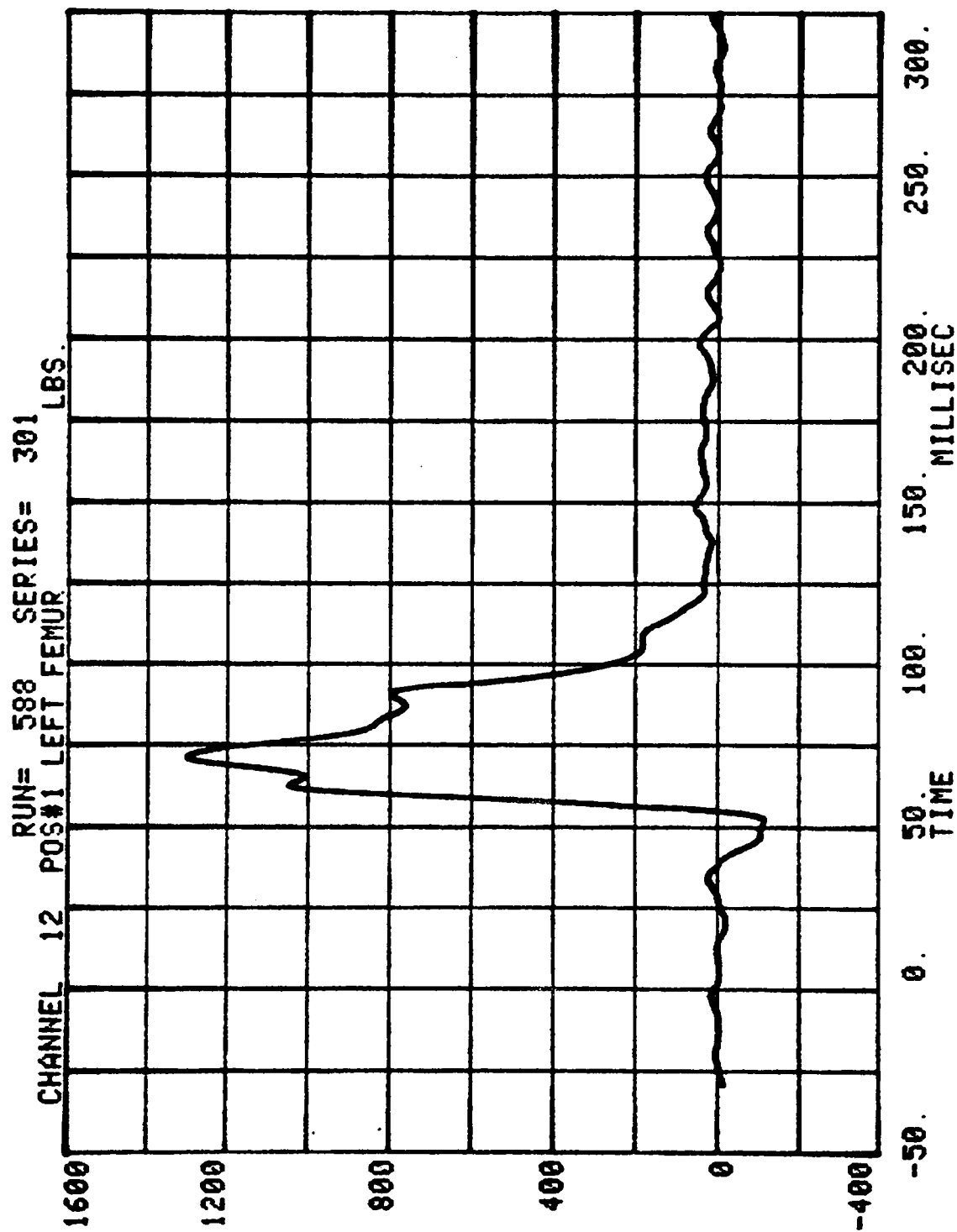


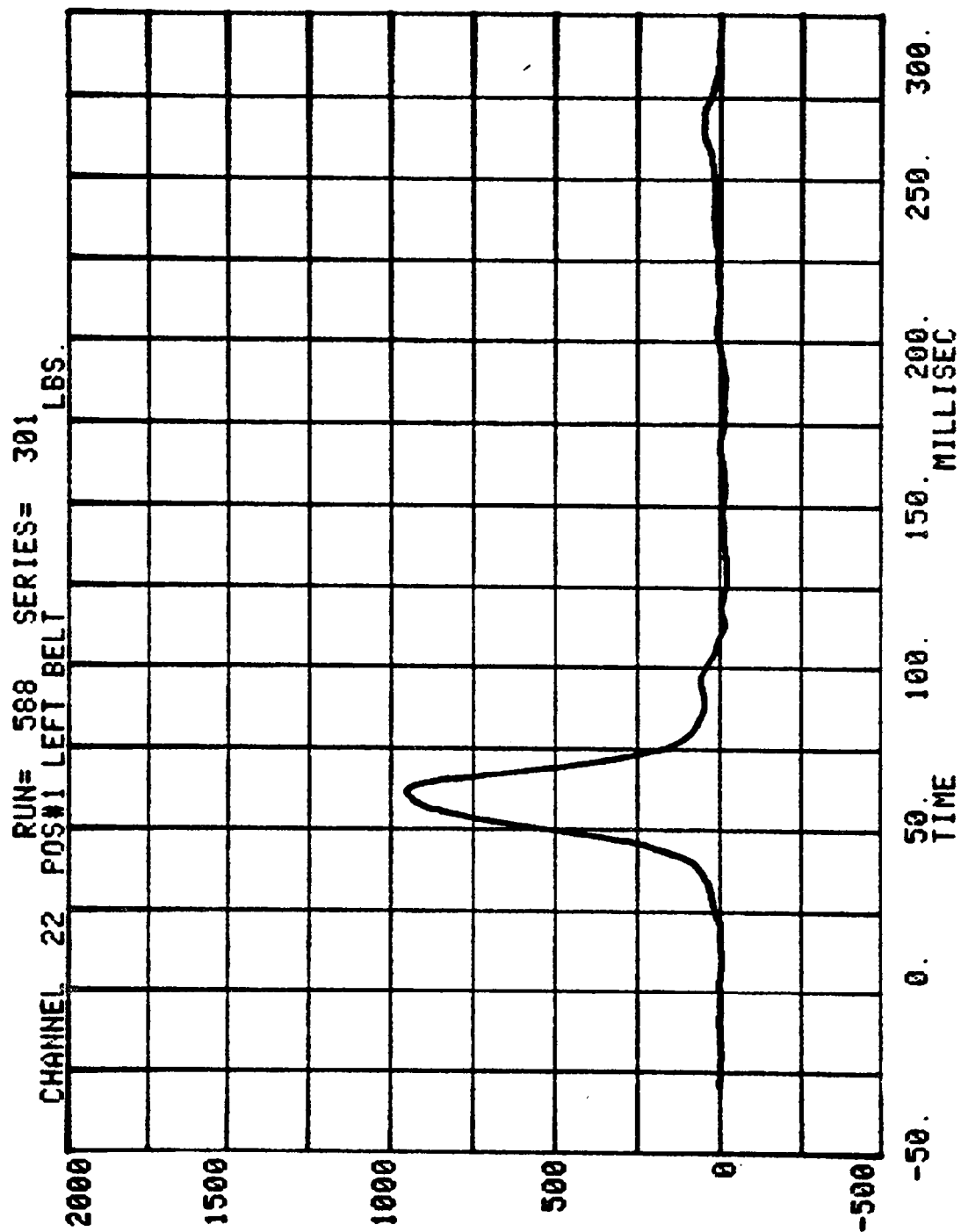


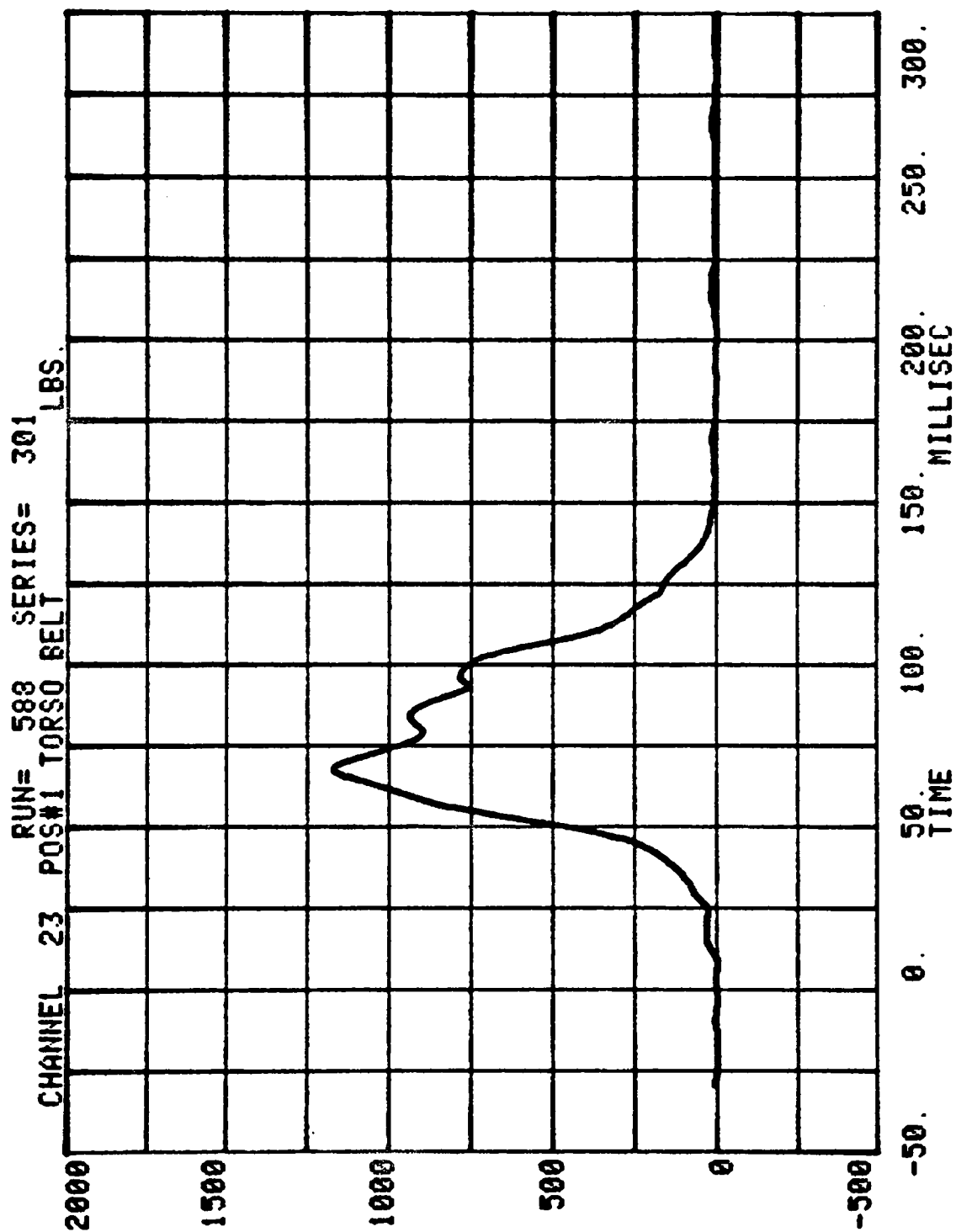


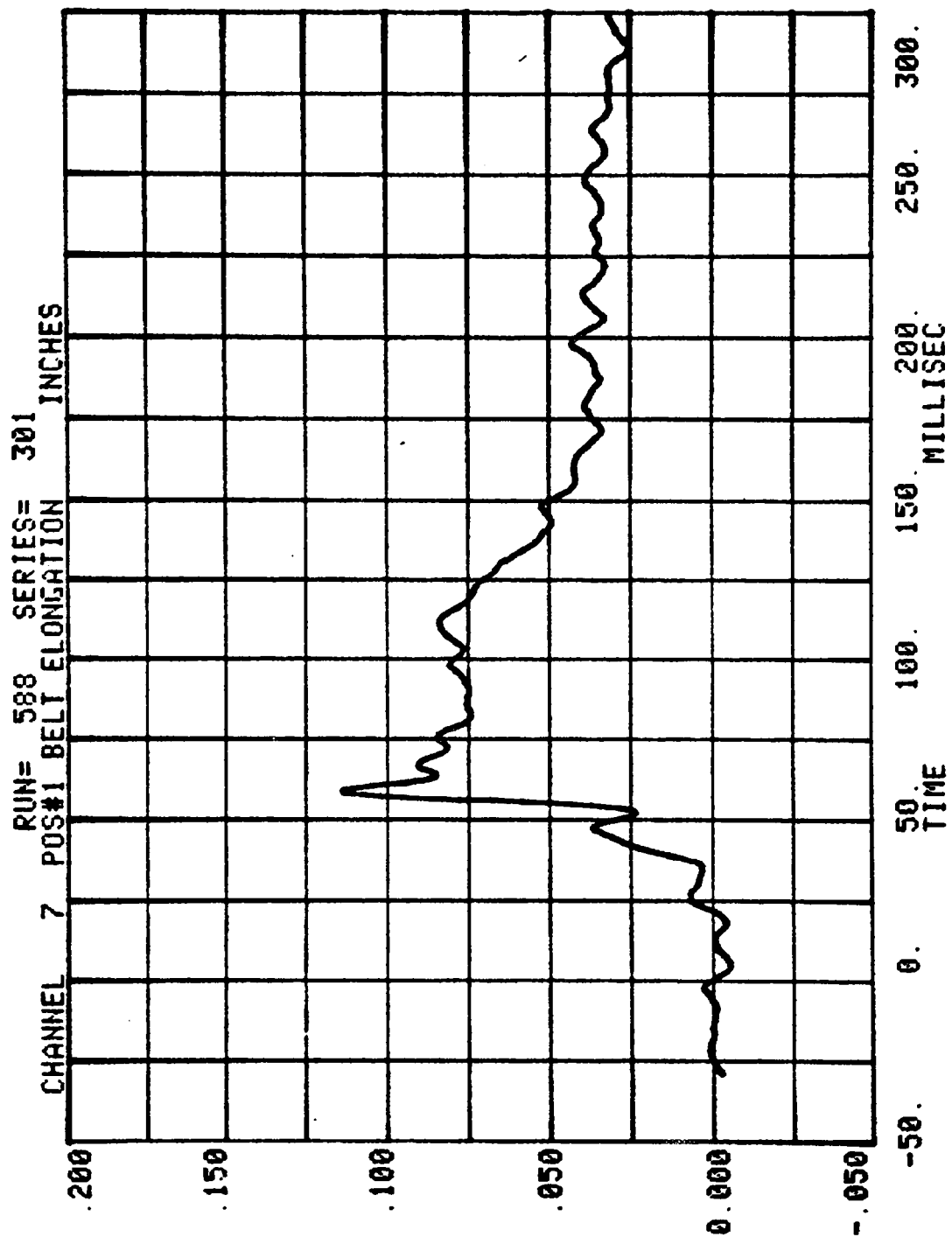


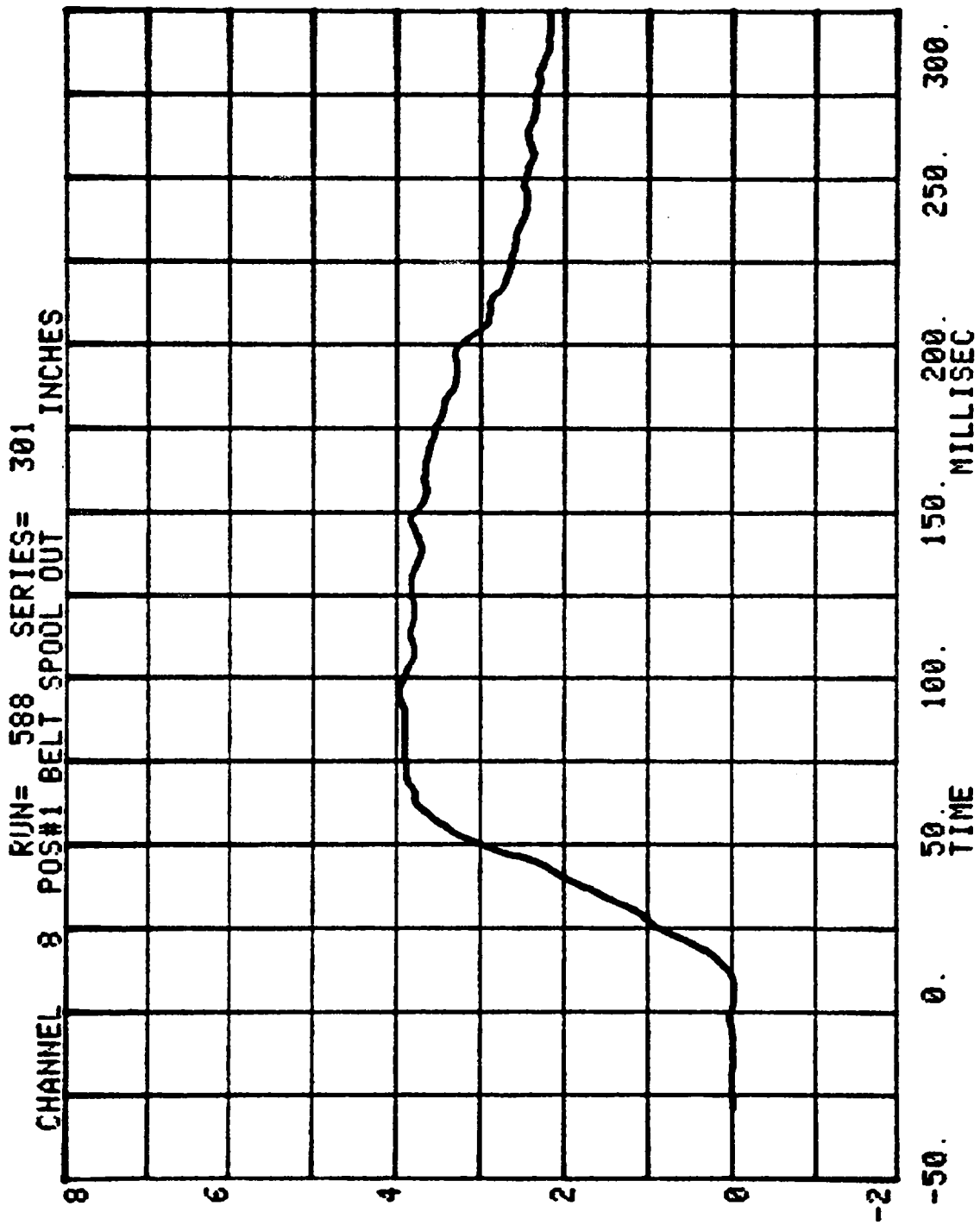












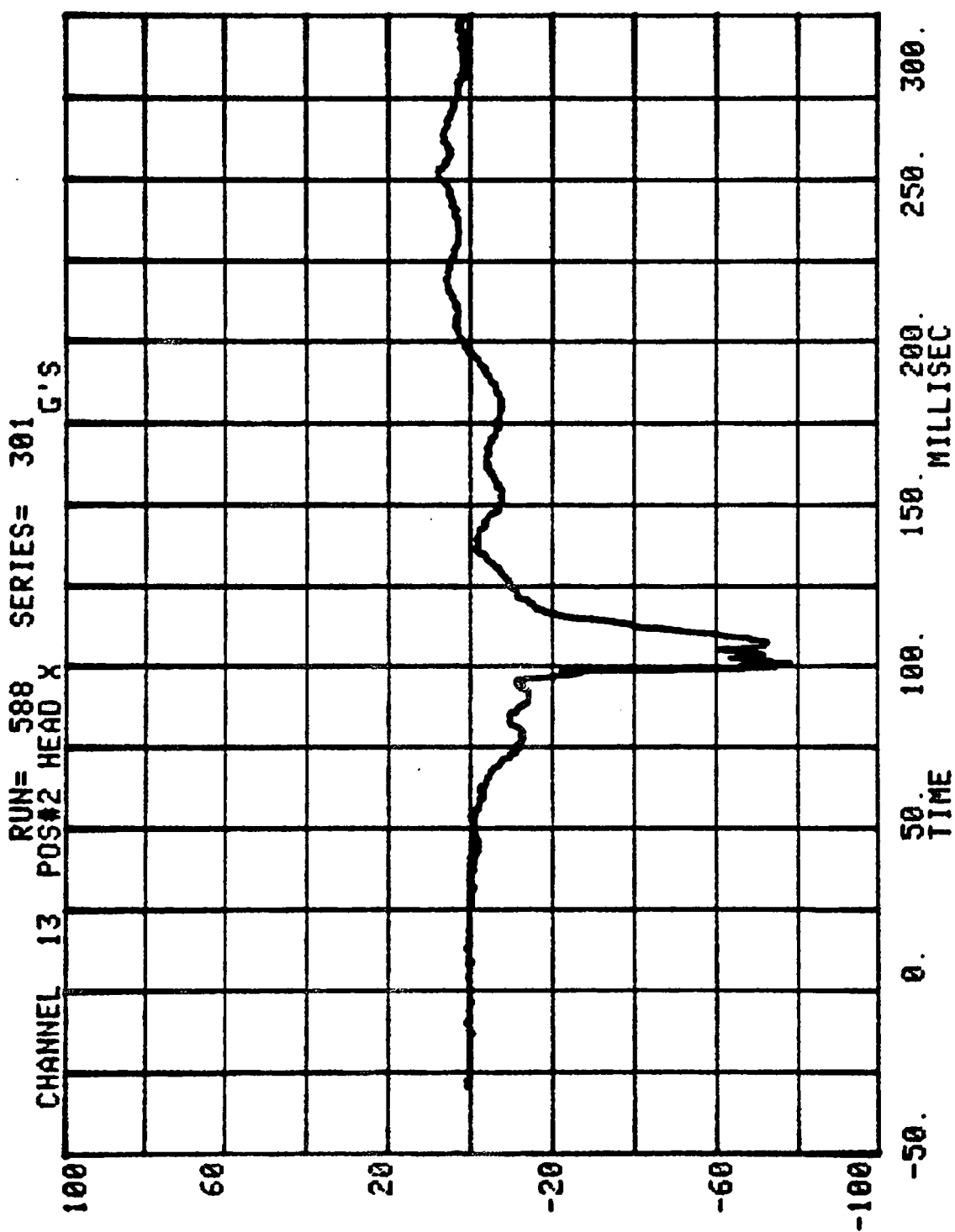
HEAD INJURY CRITERION
HEAD SEVERITY INDEX

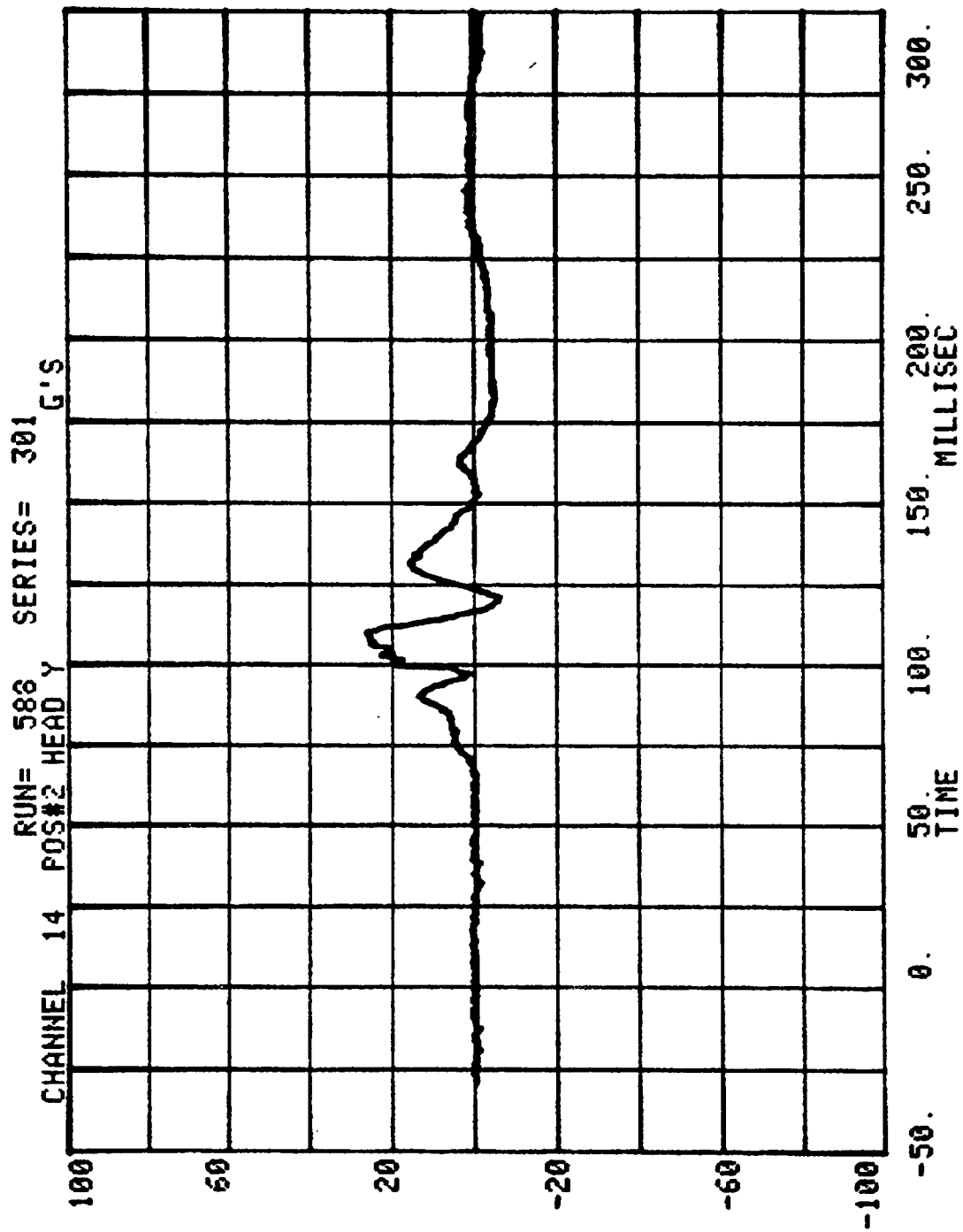
CAR TO LOAD CELL BARRIER

RUN= 588

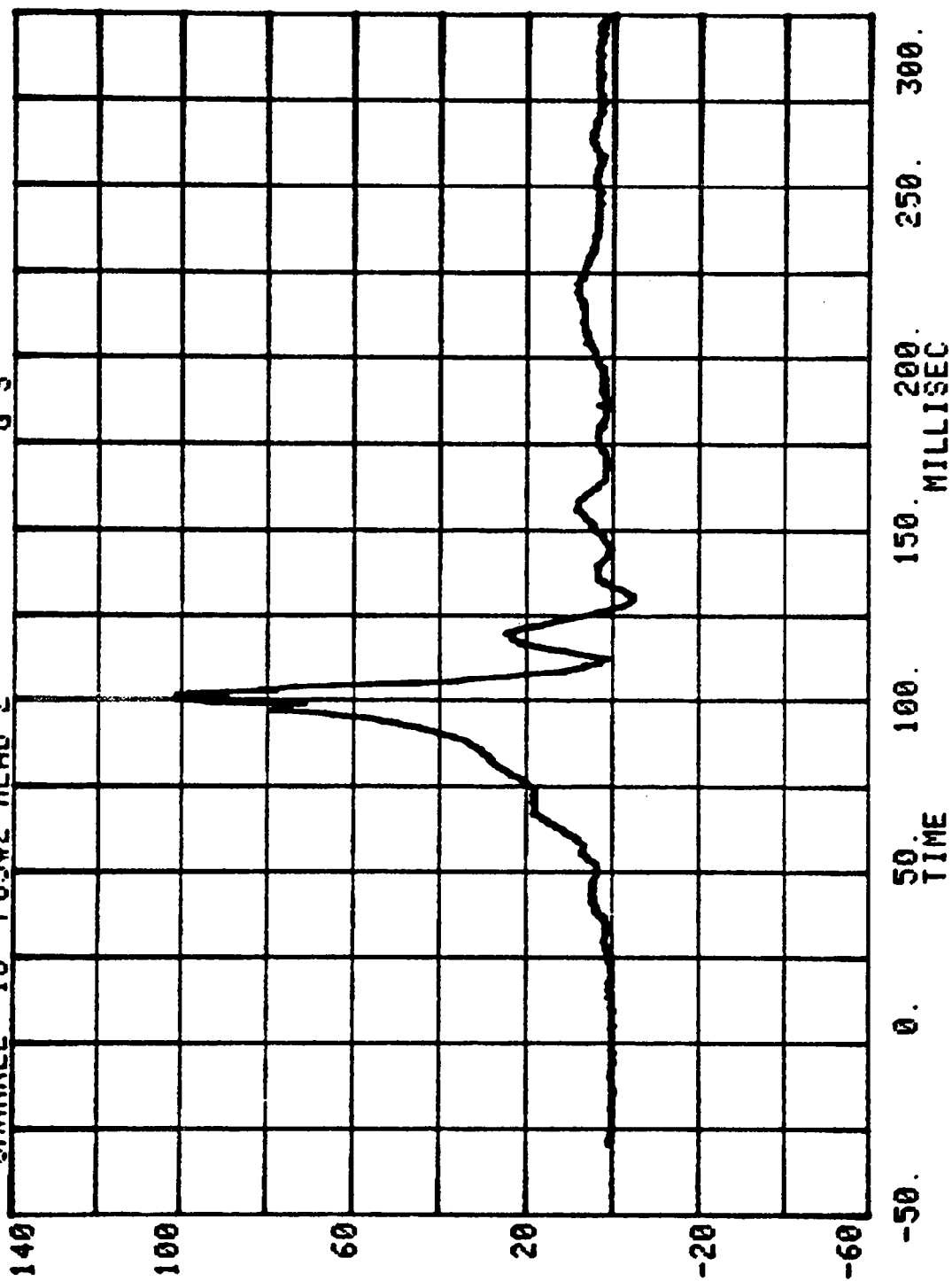
POS#2 HEAD RESULTANT

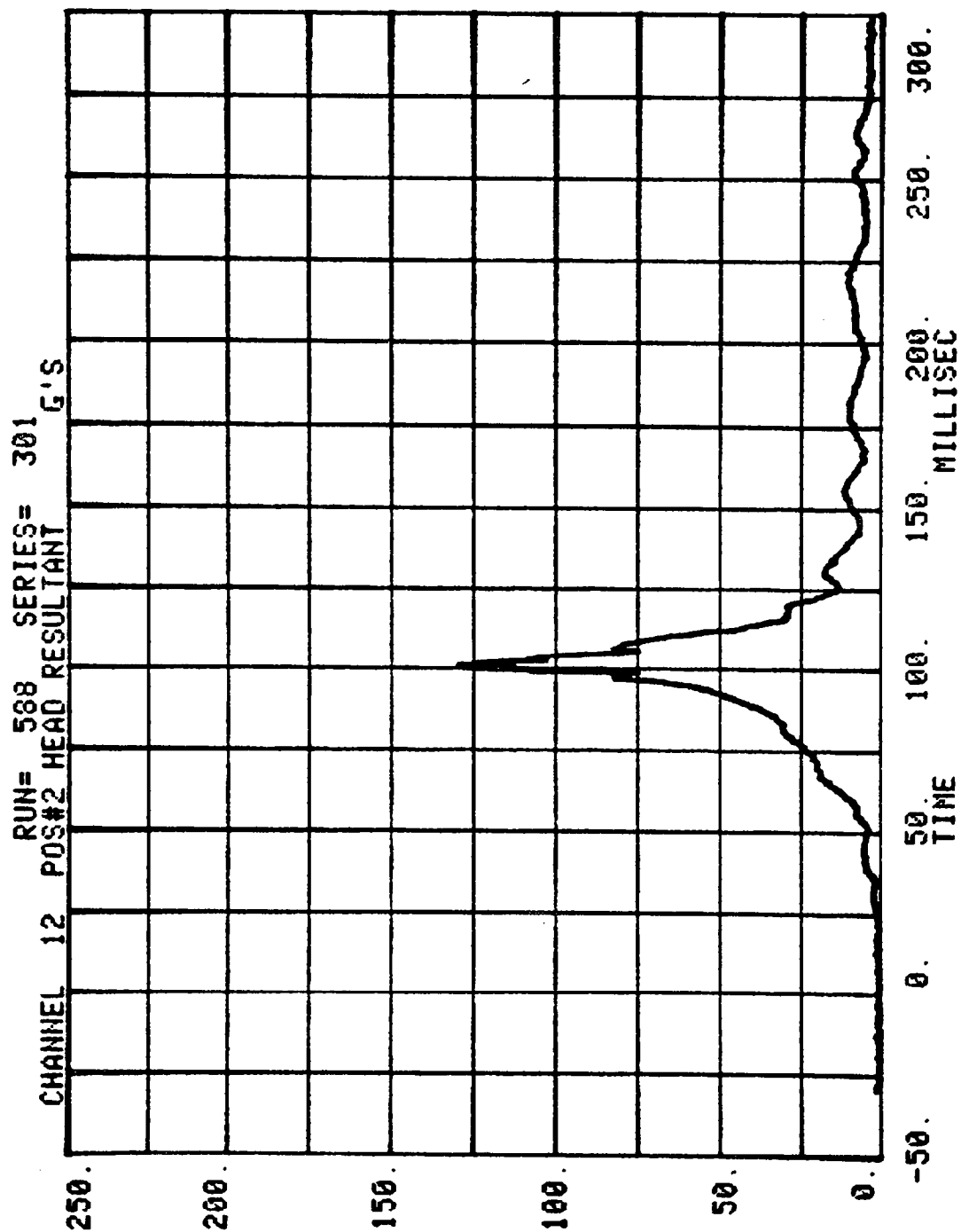
HIC=1221.1 FROM T1= .09195 TO T2= .11272
AVERAGE ACCELERATION BETWEEN T1 AND T2= 80.9G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=1647.1



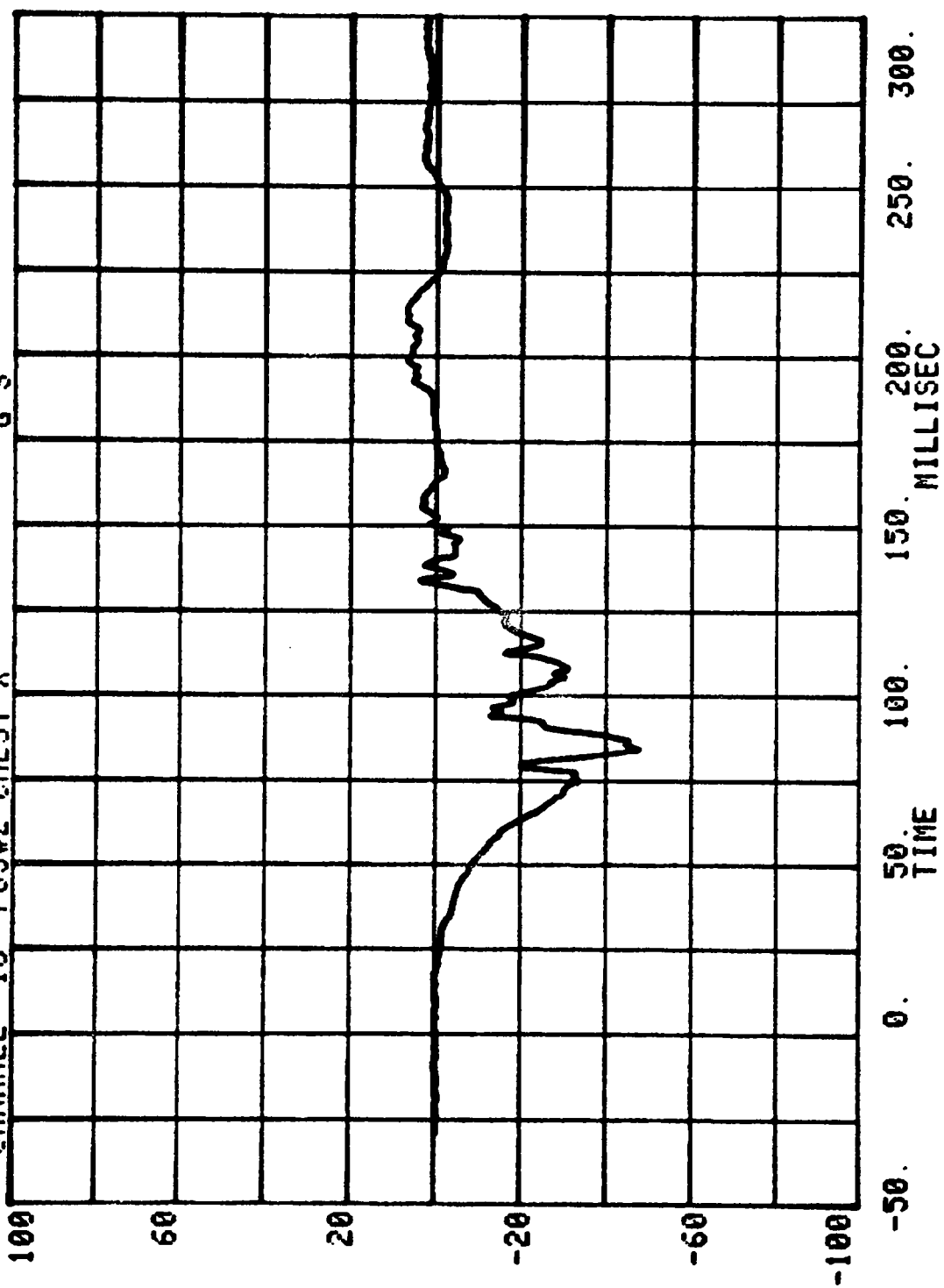


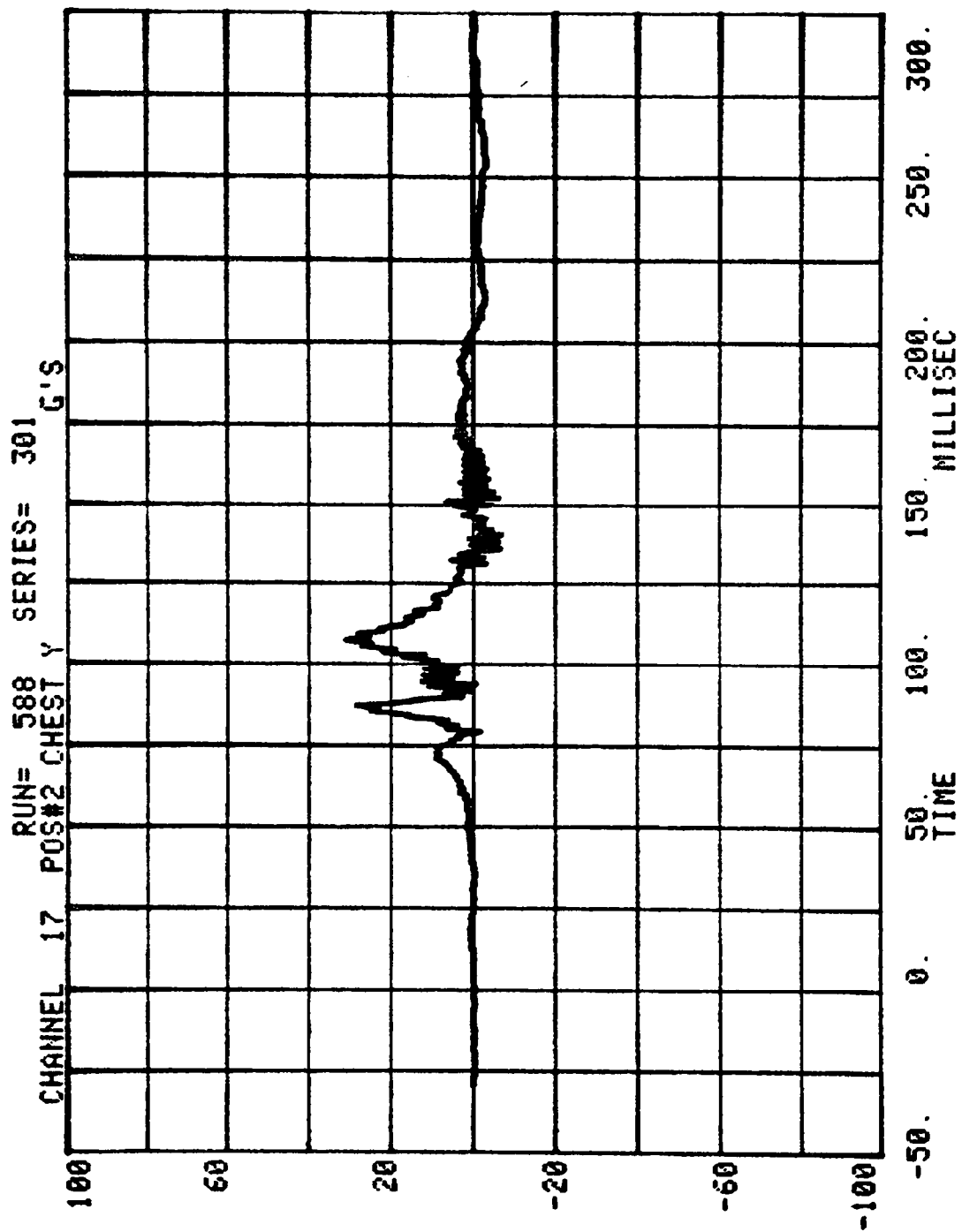
CHANNEL 15 POS#2 HEAD Z RUN= 588 SERIES= 301 G'S



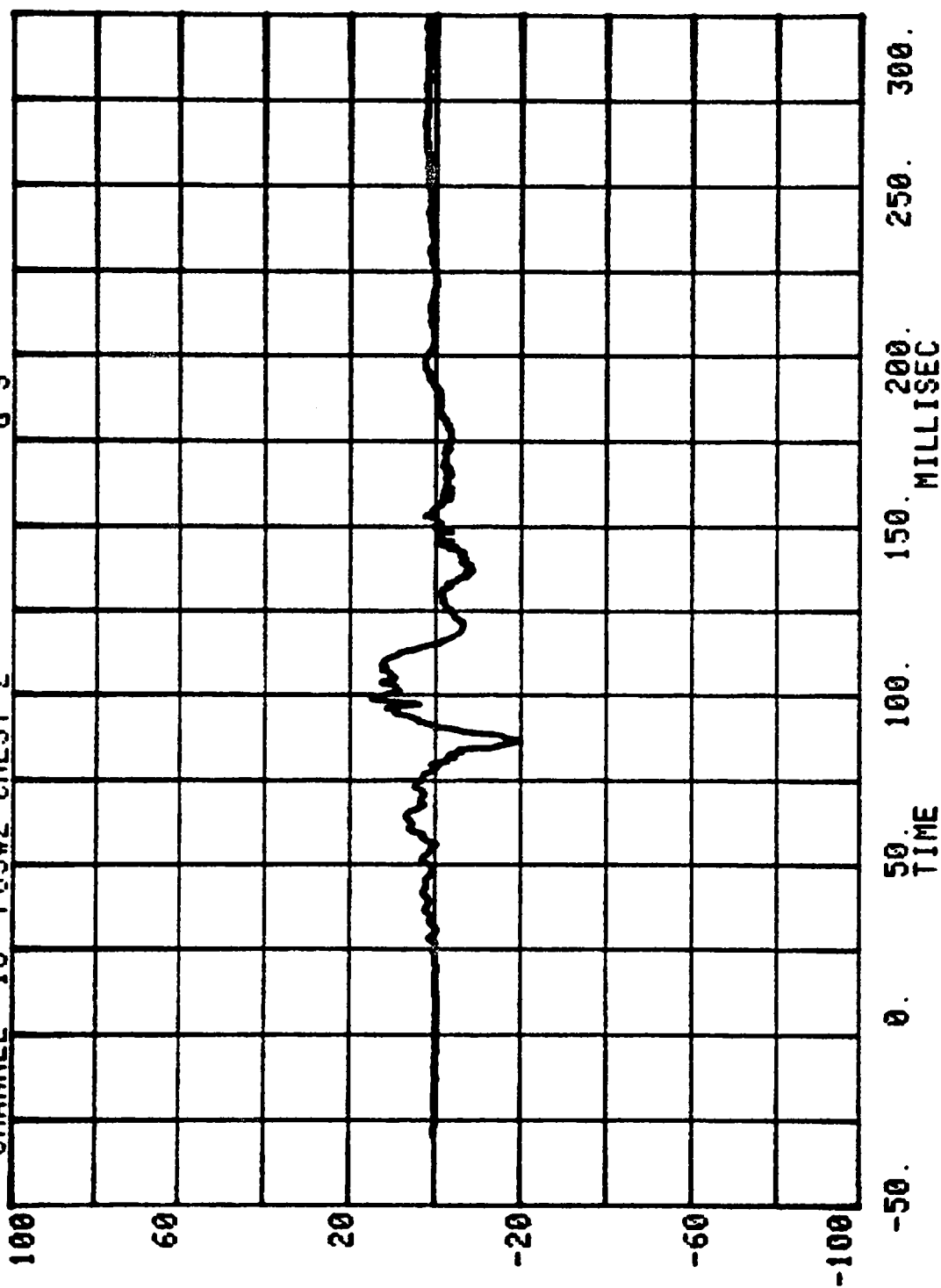


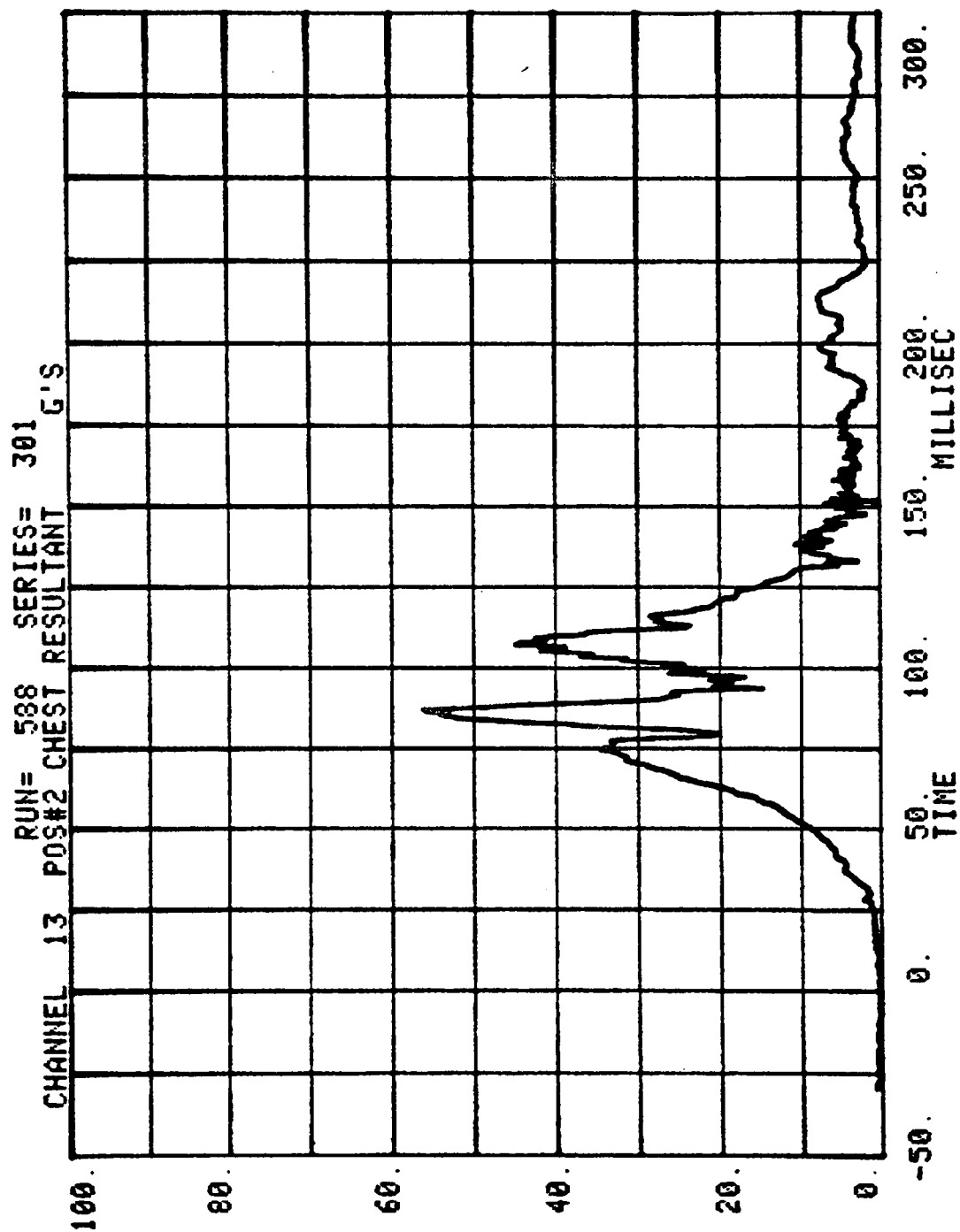
CHANNEL 16 POS#2 CHEST X
RUN= 588 SERIES= 301 G'S

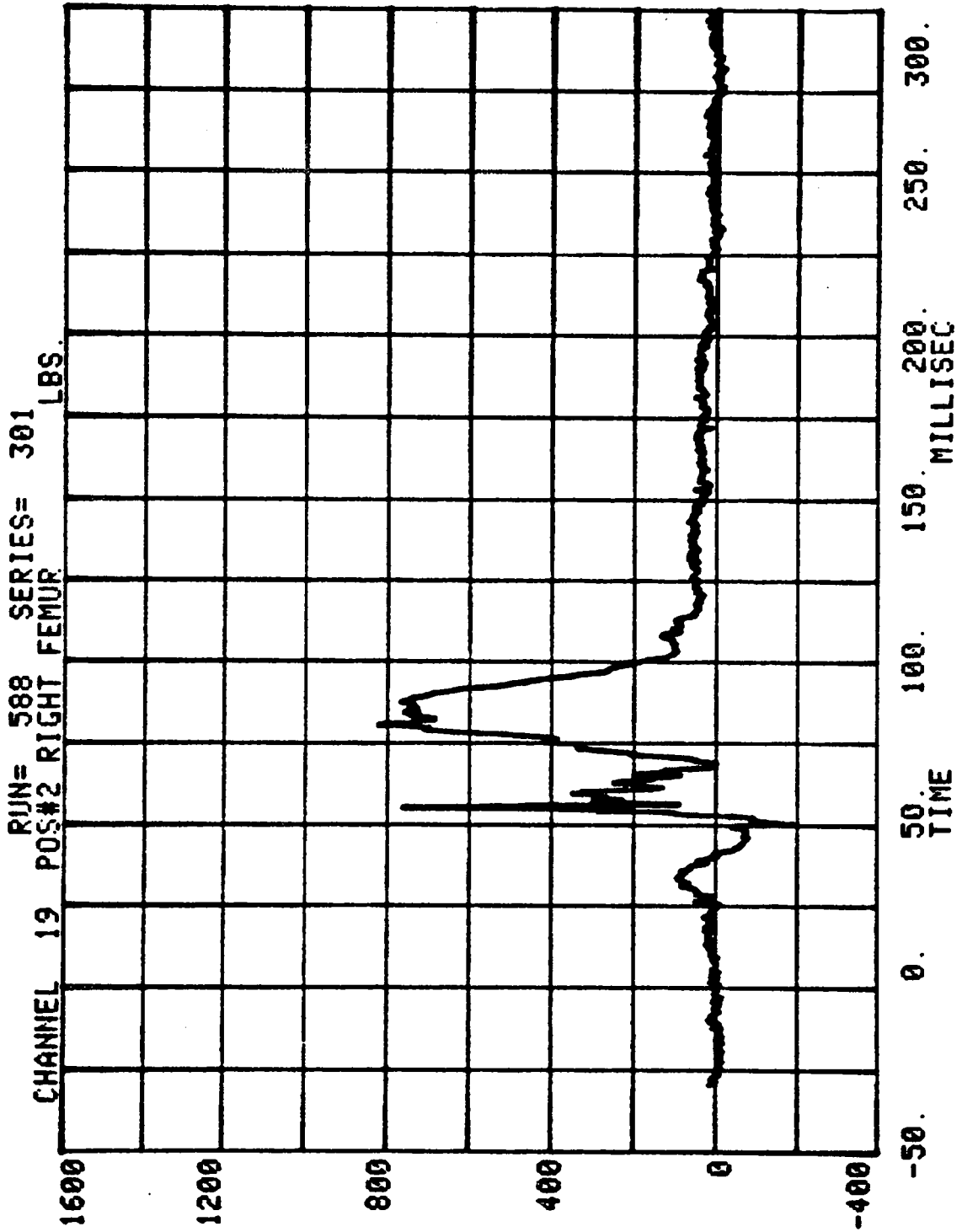


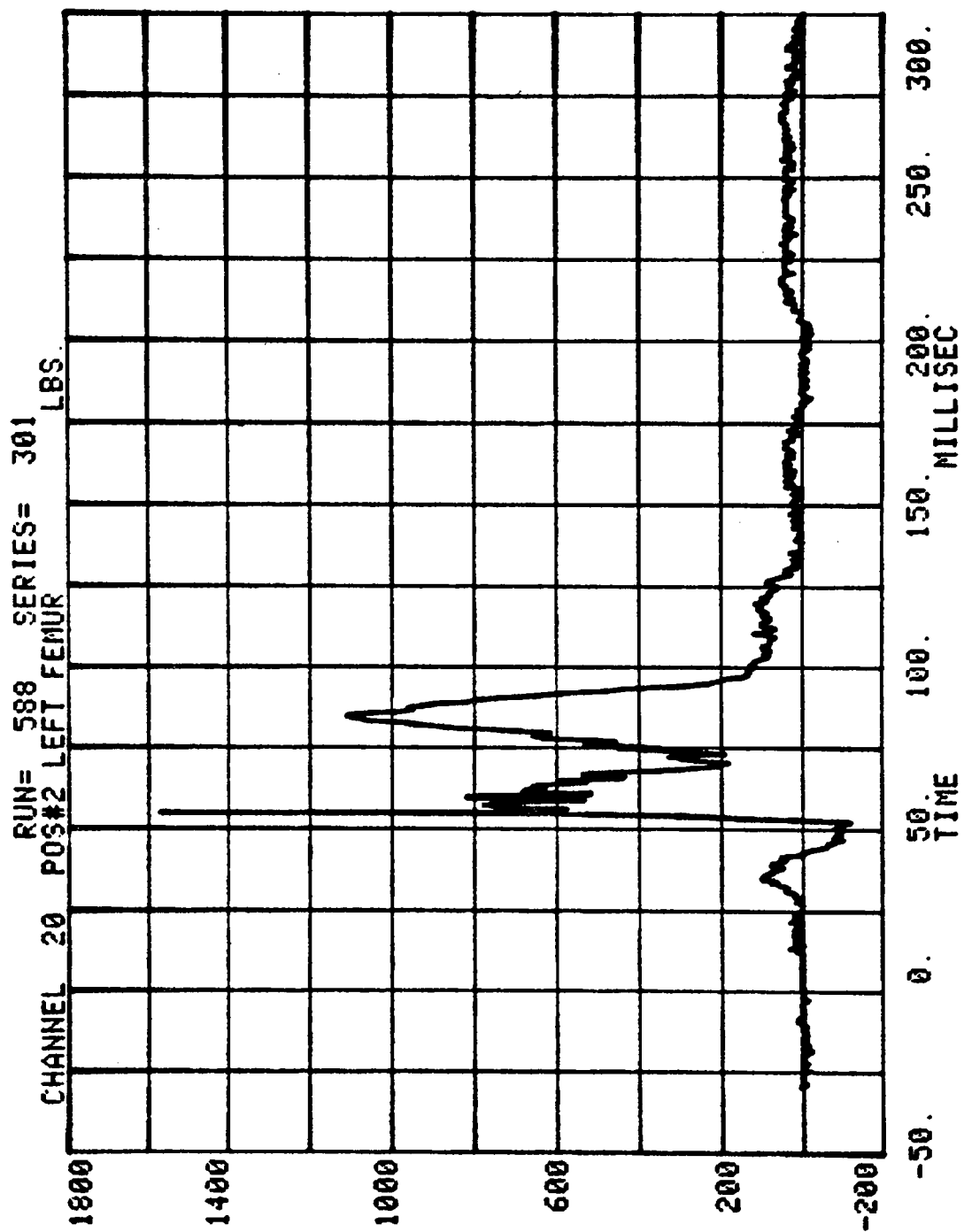


CHANNEL 18 POS#2 CHEST Z RUN= 588 SERIES= 301 G'S







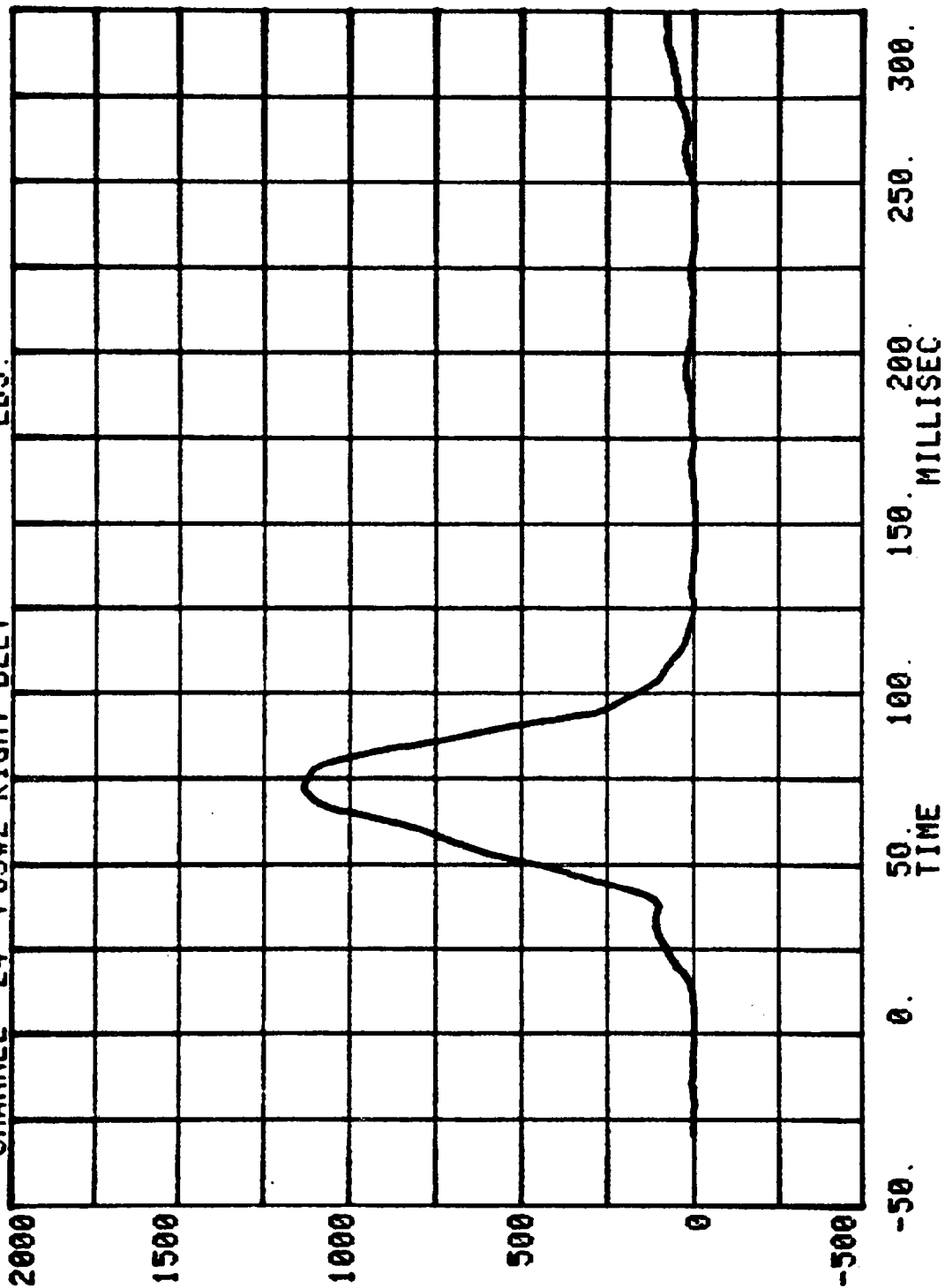


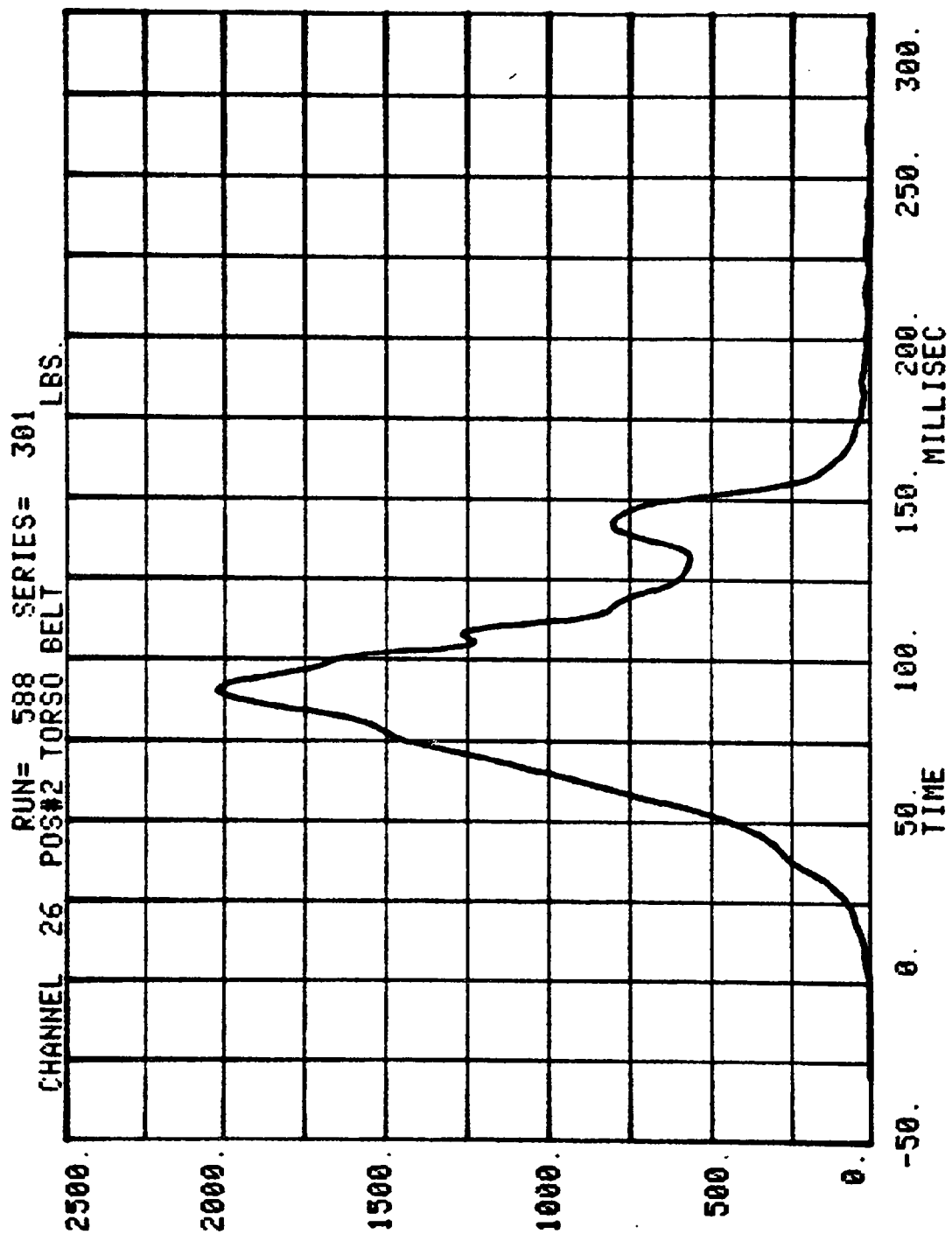
CHANNEL 24 POS#2 RIGHT BELT

RUN= 588

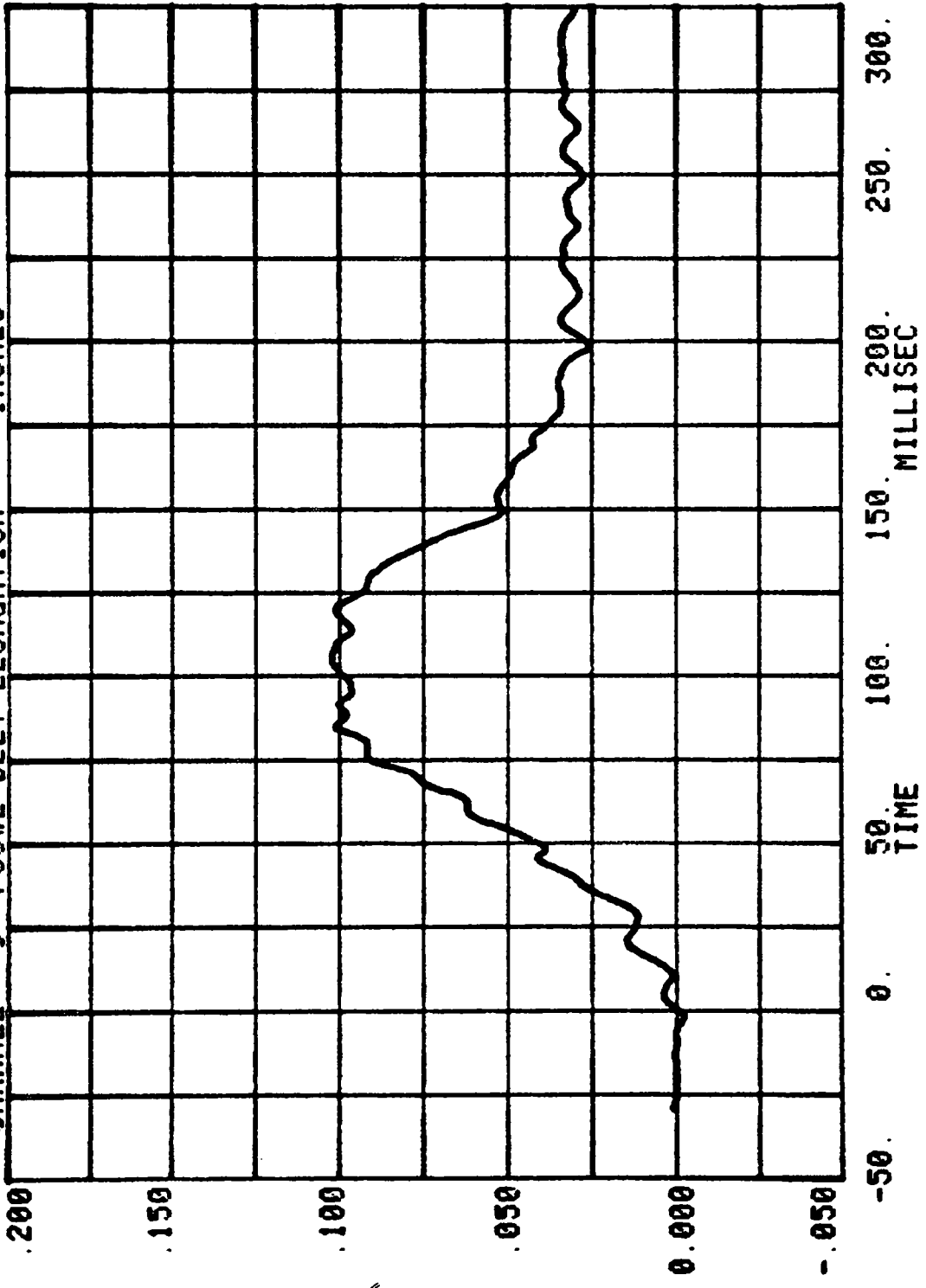
SERIES= 301

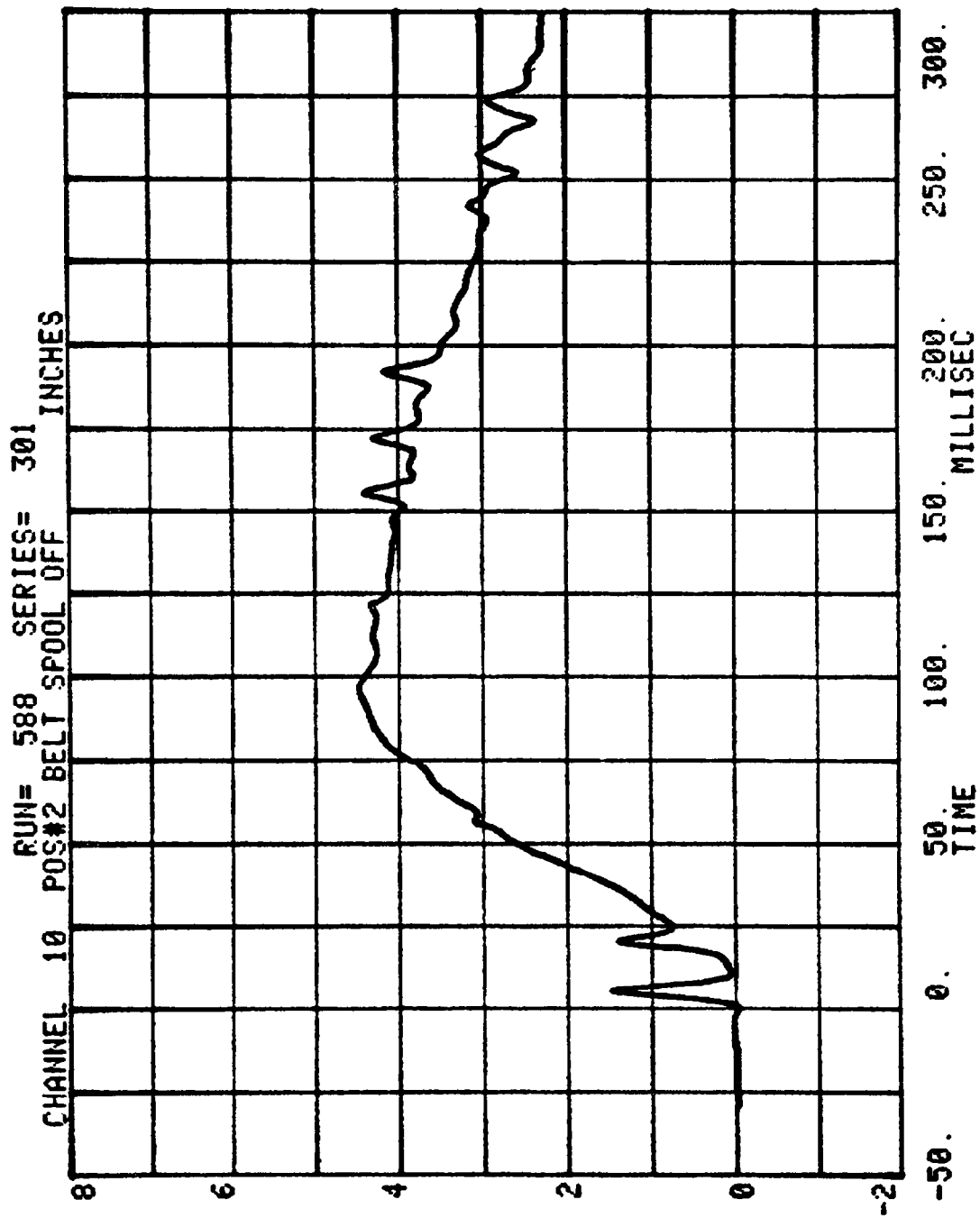
LBS.





CHANNEL 9 POS#2 BELT ELONGATION RUN= 588 SERIES= 301 INCHES





APPENDIX C
DUMMY CERTIFICATION TESTS

Appendix C contains the results from certification tests performed on the 50th percentile male anthropometric test devices utilized for this crash test. The results indicate that the dummies meet all of the performance requirements of the six standard tests as specified in 49 CFR Part 572, Federal Register, Volume 42, No. 25, dated February 7, 1977.

The tests were conducted at the Dummy Certification Test Facility of Calspan Corporation, Advanced Technology Center. A summary of the test results, Part 572 specifications and instrument calibration information is included in this Appendix.

Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Date</u>
1020	4/13/83
1021	4/13/83

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 Inducant Testing Final Report, Report No. 6525-V-1.

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 1020

LABORATORY TECHNICIAN: Gary R. Gestwick

APPROVED BY: D. Albanella

		Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -		4/6/83-4/13/83	
Calibration Sequential Number for Dummy - - - -		2	
Temperature in Lab. (Spec. = 66 to 78°F)- - - -		68°-72°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -		28%-32%	
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST:			
a. Peak Resultant Accel. -	210 to 260G	220 g	
b. Peak Lateral Accel. - -	≤10G	4 g	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.1 ms	
2. NECK BENDING TEST:			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	23.7 fps	
b. Pendulum Avg. Decel. (over t ₃ - t ₂) - - - -	20 to 24G	23.5 g	
c. Peak Resultant Head Acceleration - - - -	26G maximum	24 g	
d. Pendulum Decel. (t ₂ -t ₁)	≤3 ms	2.5 ms	
e. Pendulum Decel. (t ₃ -t ₂)	25 to 30 ms	27.5 ms	
f. Pendulum Decel. (t ₄ -t ₃)	≤10 ms	5.0 ms	
g. Pendulum Direction Reversal Time - - - -		114 ms	
h. Max. Head Rotation - -	63 to 73°	73°	
i. Chordal Displacement:			
Head Rotation Angle - -			
0°	Time	-2 to 2 ms	0 ms
	Displ.	-.5 to .5 in	0.0 in
30°	Time	25.6 to 34.4 ms	28 ms
	Displ.	2.1 to 3.1 in.	2.6 in
60°	Time	40.3 to 51.7 ms	42 ms
	Displ.	4.3 to 5.3 in.	4.7 in
Maximum	Time	53.2 to 66.8 ms	62 ms
(°)	Displ.	5.0 to 6.0 in.	5.7 in

Continued

P, 572 DUMMY CALIBRATION TEST DATA Continued:

NHTSA DUMMY ID NO. 1020

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
2. NECK BENDING TEST			
<u>Continued</u>			
i. Chordal Displacement:			
Head Rotation Angle --			
60°	Time	67.0 to 83.0 ms	79 ms
	Displ.	4.3 to 5.3 in.	4.7 in
30°	Time	85.4 to 104.6 ms	95.5 ms
	Displ.	2.1 to 3.1 in.	2.5 in
0°	Time	101.0 to 123.0 ms	110 ms
	Displ.	-.5 to 0.5 in.	0.0 in
3. ABDOMINAL COMPRESSION TEST:			
(Preload = 10 pounds)			
a. Force @ 1" - - - -	50 to 63 lbs.	60 lbs	
b. Force @ 1.3" - - - -	73 to 88 lbs.	85 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20° - - - -	22 to 34 lbs.	31 lbs	
b. Force @ 30° - - - -	34 to 46 lbs.	42.5 lbs	
c. Force @ 40° - - - -	46 to 58 lbs.	56 lbs	
d. Return Angle - - - -	12° maximum	4°	
5. CHEST IMPACT TESTS:			
a. High Speed			
(1) Probe Speed - -	21.78-22.22 fps	21.82 fps	
(2) Peak Deflection -	1.7" maximum	1.55 in	
(3) Peak Resistive Force - - - - -	2250 lbs. maximum	1930 lbs	
(4) Internal Hysteresis - - - -	50 to 70%	50.6%	
b. Low Speed			
(1) Probe Speed - -	13.86-14.14 fps	14.10 fps	
(2) Peak Deflection -	1.1" maximum	1.02 in	
(3) Peak Resistive Force - - - - -	1450 lbs. maximum	1285 lbs	
(4) Internal Hysteresis- - - -	50 to 70%	50.6%	

P.572 DUMMY CALIBRATION TEST DATAContinued:

NHTSA DUMMY ID NO. 1020

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
6. <u>KNEE IMPACT TESTS:</u>			
a. Right Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.00 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2300 lbs	
(3) Time Above 1000#	1.7 ms minimum	1.76 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.94 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1950 lbs	
(3) Time Above 1000#	1.7 ms minimum	2.4 ms	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1020

CALIB. SEQ. NOS. FOR DUMMY: 2 &

A. DUMMY INSTRUMENTS:

1. Head Accelerometers--

a. Triaxial unit - - - -

b. Uniaxial units

(1) Longitudinal (A_x) -

(2) Lateral (A_y) - - -

(3) Vertical (A_z) - - -

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

a. Triaxial unit - - - -

b. Uniaxial units

(1) Longitudinal (A_x) -

(2) Lateral (A_y) - - -

(3) Vertical (A_z) - - -

3. Chest Potentiometer - - -

4. Femur Load Cells--

a. Right Side - - - - -

b. Left Side

B. CALIB. LAB. INSTRUMENTS:

1. Pendulum Accelerometer - -

2. Test Probe Accelerometer -

3. Lumbar Flexion Test Push
Force Gauge - - - - -

4. Abdominal Compression Test
Force Gauge - - - - -

5. Abdominal Compression Test
Displacement Gauge - - - -

MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
ENDEVCO	DB47	1/83	7/83
ENDEVCO	CX05	1/83	7/83
ENDEVCO	CJ54	1/83	7/83
GSE	312	1/83	7/83
GSE	311	1/83	7/83
CEC	22707	1/83	7/83
CEC	22958	1/83	7/83
TRANSDUCER INC	20051	3/83	10/83
BLH	72952	3/83	10/83
CIC	567-11	3/83	10/83

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 1021

LABORATORY TECHNICIAN: Gary Gestwick

APPROVED BY: D. Alianello

		Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -		4/6/83-4/13/83	
Calibration Sequential Number for Dummy - - - -		Z	
Temperature in Lab. (Spec. = 66 to 78°F) - - - -		68° - 72°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -		28% - 32%	
TEST PARAMETER	SPECIFICATION		
1. <u>HEAD DROP TEST:</u>			
a. Peak Resultant Accel. -	210 to 260G	235G	
b. Peak Lateral Accel. - -	≤10G	5G	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.2 ms	
2. <u>NECK BENDING TEST:</u>			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	23.9 fps	
b. Pendulum Avg. Decel. (over t ₃ - t ₂) - - - -	20 to 24G	23.5G	
c. Peak Resultant Head Acceleration - - - -	26G maximum	23G	
d. Pendulum Decel. (t ₂ -t ₁)	≤3 ms	2.8 ms	
e. Pendulum Decel. (t ₃ -t ₂)	25 to 30 ms	26.6 ms	
f. Pendulum Decel. (t ₄ -t ₃)	≤10 ms	6.9 ms	
g. Pendulum Direction Reversal Time - - - -		117 ms	
h. Max. Head Rotation - -	63 to 73°	72°	
i. Chordal Displacement:			
Head Rotation Angle - -			
0°	Time	-2 to 2 ms	0 ms
	Displ.	-.5 to .5 in	0.0 in.
30°	Time	25.6 to 34.4 ms	29 ms
	Displ.	2.1 to 3.1 in.	2.6 in.
60°	Time	40.3 to 51.7 ms	44.5 ms
	Displ.	4.3 to 5.3 in.	4.7 in.
Maximum	Time	53.2 to 66.8 ms	61.5 ms
(°)	Displ.	5.0 to 6.0 in.	5.7 in.

Continued

P. 572 DUMMY CALIBRATION TEST DATA Continued:

NHTSA DUMMY ID NO. 1021

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
2. NECK BENDING TEST <u>Continued</u>			
i. Chordal Displacement:			
Head Rotation Angle --			
60°	Time	67.0 to 83.0 ms	81 ms
	Displ.	4.3 to 5.3 in.	4.7 in.
30°	Time	85.4 to 104.6 ms	98 ms
	Displ.	2.1 to 3.1 in.	2.4 in.
0°	Time	101.0 to 123.0 ms	113 ms
	Displ.	-.5 to 0.5 in.	0.0 in.
3. ABDOMINAL COMPRESSION TEST: (Preload = 10 pounds)			
a. Force @ 1" - - - -	50 to 63 lbs.	57.0 lbs.	
b. Force @ 1.3" - - - -	73 to 88 lbs.	88.0 lbs.	
4. LUMBAR FLEXION TEST:			
a. Force @ 20° - - - -	22 to 34 lbs.	33.5 lbs.	
b. Force @ 30° - - - -	34 to 46 lbs.	45.0 lbs.	
c. Force @ 40° - - - -	46 to 58 lbs.	54.5 lbs.	
d. Return Angle - - -	12° maximum	7°	
5. CHEST IMPACT TESTS:			
a. High Speed			
(1) Probe Speed - -	21.78-22.22 fps	21.93 fps	
(2) Peak Deflection -	1.7" maximum	1.58"	
(3) Peak Resistive Force - - - - -	2250 lbs. maximum	1955 lbs.	
(4) Internal Hysteresis - - - -	50 to 70%	60.3%	
b. Low Speed			
(1) Probe Speed - - -	13.86-14.14 fps	14.01 fps	
(2) Peak Deflection -	1.1" maximum	.96"	
(3) Peak Resistive Force - - - - -	1450 lbs. maximum	1290 lbs.	
(4) Internal Hysteresis - - - -	50 to 70%	53.0 %	

P. 572 DUMMY CALIBRATION TEST DATAContinued:

NHTSA DUMMY ID NO. 1021

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
6. KNEE IMPACT TESTS:			
a. Right Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.90 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2050 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.85 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.78 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1900 lbs.	
(3) Time Above 1000#	1.7 ms minimum	1.92 ms	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 1021 CALIB. SEQ. NOS. FOR DUMMY: 2 &

A. DUMMY INSTRUMENTS:

1. Head Accelerometers--

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

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

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

3. Chest Potentiometer - - -

4. Femur Load Cells--

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

B. CALIB. LAB. INSTRUMENTS:

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

MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
ENDEVCO	DB47	1/83	7/83
ENDEVCO	CX05	1/83	7/83
ENDEVCO	CJ54	1/83	7/83
GSE	312	1/83	7/83
GSE	311	1/83	7/83
CEC	22707	1/83	7/83
CEC	22958	1/83	7/83
TRANSDUCER INC	20051	3/83	10/83
BLH	72952	3/83	10/83
CIC	567-11	3/83	10/83