

REPORT NO. 6525-V-17

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DOT 376

NEW CAR ASSESSMENT AND STANDARDS
ENFORCEMENT INDICANT TESTING
FMVSS NOS. 212, 219 AND 301-75

Chrysler Corporation
1979 Chrysler LeBaron
NHTSA 308-17-458

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August 28, 1979

FINAL REPORT

Prepared For

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Enforcement

Office of Vehicle Safety Compliance
2100 Second Street, S. W., Transpoint Building
Washington, D. C. 20590

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16. Abstract A frontal barrier test of a 1979 Chrysler LeBaron was performed at Calspan Corporation, Advanced Technology Center, Transportation Research Department facility for the New Car Assessment and Standards Enforcement Inducant Testing of FMVSS 212 - Windshield Mounting; FMVSS 219 - Windshield Zone Intrusion; FMVSS No. 301 - Fuel System Integrity for the Office of Vehicle Safety Compliance, the Office of Automotive Ratings and for Research and Development. The impact speed was 35.04 mph. The post-test vehicle crush was 24.6 inches. Intrusion of firewall into compartment was 9.0 inches. Test vehicle complied in all respects with following: 1. FMVSS 212 - Windshield Retention. 2. FMVSS 219 - Windshield Intrusion. 3. FMVSS 301-75 - Fuel System Integrity, FMVSS 208 head injury criteria were exceeded by all of the dummy occupants.			
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SECTION 1

PURPOSE AND TEST PROCEDURE

PURPOSE: The purpose of this test was to determine whether the subject vehicle (a 1979 Chrysler LeBaron) meets the requirements of FMVSS Nos. 212, 219 and 301-75 at a higher test speed and also to obtain structural information and dummy injury criteria values for Research and Development and the Office of Automotive Ratings of the NHTSA. This test is part of the New Car Assessment Program B.O.A., Task 2, sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract DOT-HS-8-01938.

TEST PROCEDURE: The Calspan Corporation, Advanced Technology Center, Transportation Research Department Test Procedure for the New Car Assessment Crash Tests submitted to, and approved by, the Contract Technical Manager (CTM) contains the specific procedures used to perform this test.

With the exception of a higher test speed, this procedure is not in conflict with any portion of FMVSS Procedures issued by the Office of Standard Enforcement and the amendments in effect as noted by the applicable contract.

SUMMARY OF TEST NUMBER 17

A frontal barrier crash test was conducted on a 1979 Chrysler LeBaron 2-door sedan at an impact velocity of 35.04 mph. Photographs of the vehicle and occupants can be viewed in Appendix A and Table 1 presents pertinent crash test information.

The vehicle occupants included a 50th percentile Part 572 driver wearing a production 3-point belt, a 50th percentile Part 572 right front passenger also restrained with a 3-point belt and a lap belted Alderson VIP-6C 6-year old size ATD center rear seat passenger. The 50th percentile ATD certification information is found in Appendix C. Table 3 presents the FMVSS-208 injury criteria generated by these occupants and the associated data traces, along with vehicle data traces, are provided in Appendix B.

The maximum vehicle crush of 24.6 inches was measured along the vehicle centerline. The maximum intrusion into the occupant compartment was 9 inches.

Post-test observations are summarized in General Comments, page 2-3.

Table 1

CRASH TEST SUMMARYTEST NO. 308-17-458PROJECT: NEW CAR ASSESSMENT PROGRAMDATE: 8/28/79TIME: 1530TEMP: 80°F

VEHICLE	<u>1979 Chrysler LeBaron 2-Door</u>
TEST WEIGHT (lbs)	<u>4160</u>
IMPACT ANGLE (deg)*	<u>0°</u>
IMPACT VELOCITY (mph)**	<u>35.04</u>
MAX. CRUSH (in)	<u>24.6 inches</u>
MAX. INTRUSION (in)	<u>9.0 inches</u>

DUMMIES

TYPE	<u>HYBRID II, PART 572</u>	<u>HYBRID II, PART 572</u>	<u>ALDERSON VIP-6C (6 YEAR OLD SIZE)</u>
LOCATION	<u>LF(1)</u>	<u>RF(2)</u>	<u>CENTER REAR(6)</u>
RESTRAINT	<u>Production 3-Point System</u>	<u>Production 3-Point System</u>	<u>Lap Belt</u>
NUMBER OF DATA CHANNELS	<u>42</u>		
NUMBER OF HIGH SPEED CAMERAS	<u>9 + 1 Real Time</u>		

*With respect to tow track Centerline

**Speed trap measurement (± .05% accuracy)

GENERAL COMMENTS

The 1979 Chrysler LeBaron involved in a frontal barrier crash at a nominal velocity of 35 mph complied with FMVSS Nos. 212, Windshield Mounting, 219, Windshield Zone Intrusion and 301-75, Fuel System Integrity. There was 100% retention of the windshield, no intrusion into the protected zone and no fuel leakage. No cracks were observed in the windshield after impact (Figure A-8).

All of the ATD occupants failed to comply with the FMVSS-208 Head Injury Criteria (HIC) limit of 1000. Both the driver and right front passenger occupants submarined, their lap belts roped and overrode the pelvic regions becoming imbedded in the abdominal regions. The knees of both ATDs contacted and slightly deformed the lower instrument panel. The driver contacted the top rim and the hub of the steering wheel with his head, deforming the hub of the steering wheel and forcing the steering column downward. There was no apparent head contact between the right front passenger and the interior of the vehicle. The head of the 6-year old size ATD in the center rear position hit the arm rest between the front bucket seats. The lap belt showed no indication of roping.

Underbody damage can be viewed in Figures A-5 and A-6. The drive shaft broke off the differential. A small dent in the fuel tank was caused by the end of the rail at the edge of the camera pit and is incidental to the vehicle performance.

Other post-test observations include:

- Neither door could be opened.
- Both front tires were pinched but remained inflated.
- The second velocity trap counter failed to trigger (Figure A-10).

Table 2

VEHICLE TEST WEIGHTS AS TESTED

Left Front 1100 lbs
Right Front 1100 lbs
TOTAL FRONT 2200 lbs

Left Rear 990 lbs
Right Front 970 lbs
TOTAL REAR 1960 lbs

Total Weight = $\frac{2200 + 1960}{1}$ = 4160 lbs

Wheel Base = 113 inches

$C_{g_{F.W.}} = \frac{1960 \text{ lbs} \times 113 \text{ inches}}{4160 \text{ lbs}} = 53.24 \text{ inches}$

CALCULATION FOR TEST WEIGHT

RCLW = Rated Cargo and Luggage Weight
UDW = Unloaded Delivered Weight (3600 lbs)
VCW = Vehicle Capacity Weight (1100 lbs)
DSC = Designated Seating Capacity (6)

RCLW = VCW - 150 (DSC)

RCLW = 1100 - 150 (6) = 200 lbs

TEST WEIGHT = UDW + RCLW + (No. Dummies x 164 lbs) + (Wt. of 6-Yr-Old Size Dummy)

TEST WEIGHT = 3600 lbs + 200 lbs + 2 (164 lbs) + 48 lbs.

TEST WEIGHT = 4176 lbs

DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G") *											
	HEAD				CHEST				PELVIS			
	X	Y	Z	R	X	Y	Z	R	X	Y	Z	R
DUMMY (1)	-220	-60	95	235	-44	14	-21	45				
DUMMY (2)	85	9	69	102	-38	8	10	39				
DUMMY (3)	-79	-30	120	129	-36	-11	51	59				
DUMMY (4)												

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	300	740
DUMMY (2)	440	420
DUMMY (3)		
DUMMY (4)		

	MAXIMUM FORCE-SEAT BELTS LOADS (LBS)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP BELT LOAD	
DUMMY (1)	1470	1270	
DUMMY (2)	1900	1490	
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	CHEST
DUMMY (1)	2402.4	.0801	.0888	150.1	3395.7	
DUMMY (2)	1070.8	.0567	.1866	36.8	1506.5	
DUMMY (3)	2810.1	.0858	.1236	88.8	3347.4	
DUMMY (4)						

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

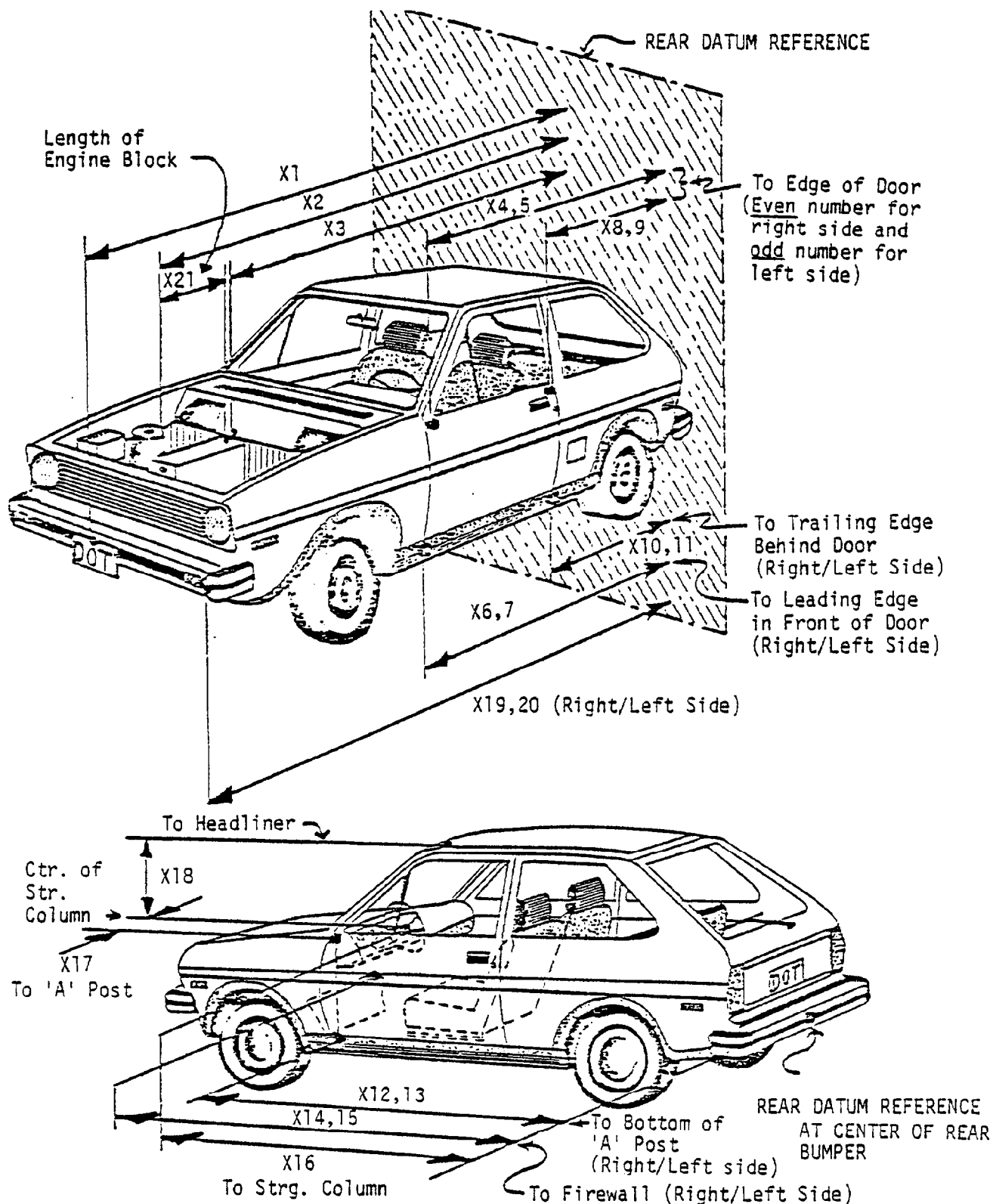


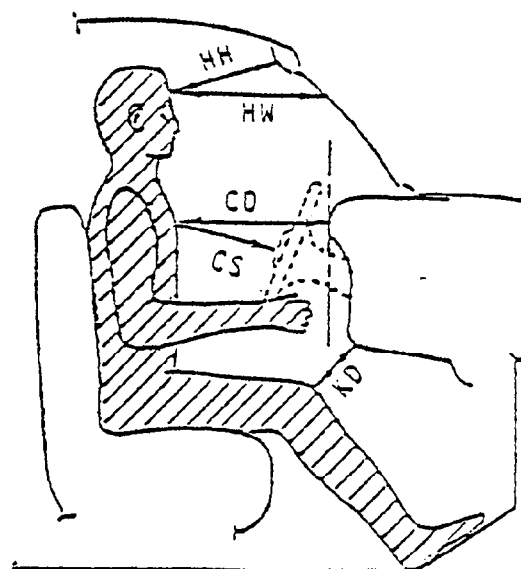
Figure 1 PRE-TEST AND POST-TEST MEASUREMENT POINTS

VEHICLE MEASUREMENTS

All Dimensions in inches

NO.		Pre-Test	Post-Test
X1	Total Length of Vehicle at Centerline	203.5	178.9
X2	Rear Surface of Vehicle to Front of Engine	176.2	163.4
X3	Rear Surface of Vehicle to Firewall	149.5	145.7
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	139.2	138.5
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	139.5	138.5
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	137.2	136.5
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	137.5	136.6
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	83.9	82.8
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	84.1	83.0
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	85.3	84.5
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	85.5	84.6
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	134.2	133.5
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	134.3	133.2
X14	Rear Surface of Vehicle to Firewall - Right Side	149.3	142.4
X15	Rear Surface of Vehicle to Firewall - Left Side	149.8	140.8
X16	Rear Surface of Vehicle to Steering Column	119.9	117.1
X17	Center of Steering Column to "A" Post	15.2	14.4
X18	Center of Steering Column to Headliner	16.5	16.0
X19	Rear Surface of Vehicle to Right Side of Front Bumper	199.5	176.8
X20	Rear Surface of Vehicle to Left Side of Front Bumper	199.7	177.4
X21	Length of Engine Block	24.5	22.5

	<u>DRIVER</u>	<u>PASS</u>
HH	14.0	14.0
HW	18.2	18.0
CD	20.2	20.0
CS	14.0	N/A
KDL	6.8	6.8
KDR	6.2	6.8



HR	4.5	4.4
HS	7.2	7.2
AD	3.5	3.5
HD	7.0	6.5

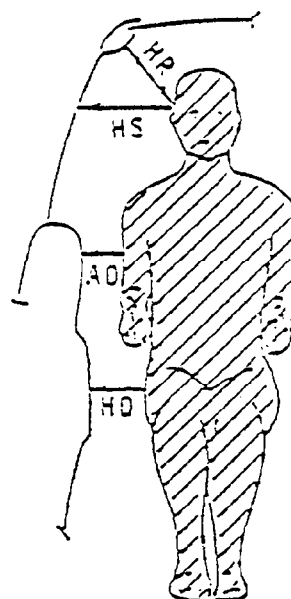


Figure 2 OCCUPANT CLEARANCE DIMENSIONS

Note: Camera information shown in Table 5.

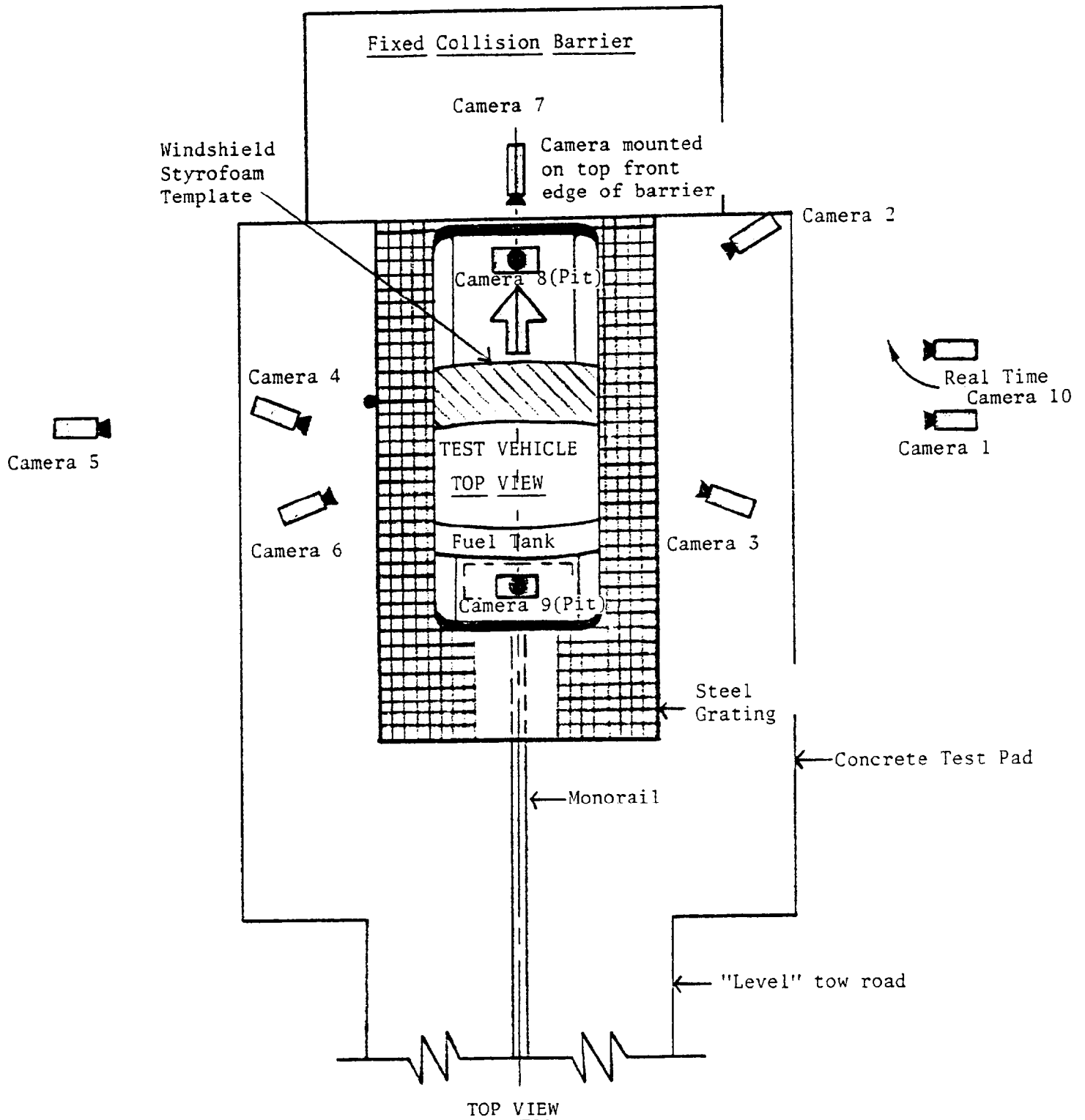
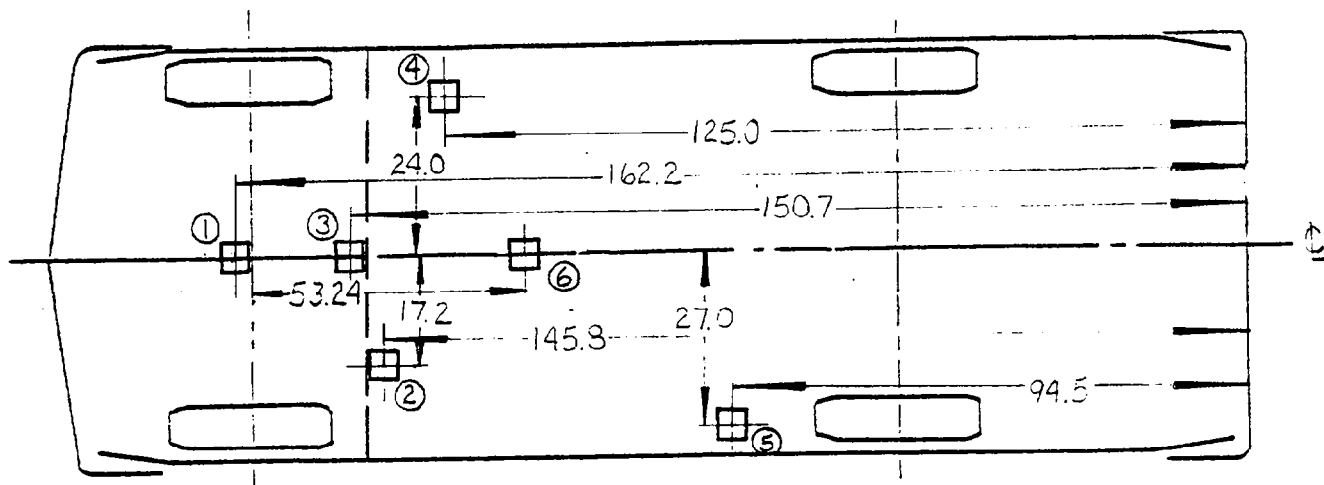


Figure 3 CAMERA POSITIONS FOR FRONTAL IMPACTS

Table 5
HIGH SPEED CAMERA INFORMATION
 (Test 308-17-458)
 Chrysler LeBaron Frontal

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)
1	SOUTH WIDE	HYCAM	25 mm	1500
2	SOUTH WINDSHIELD	FASTEX	50 mm	No Pulse
3	SOUTH DUMMY	FASTEX	50 mm	1000
4	NORTH DUMMY	FASTEX	50 mm	1300
5	NORTH WIDE	FASTEX	35 mm	1400
6	REAR DUMMY	FASTEX	50 mm	1350
7	BARRIER FACE	PHOTOSONICS	8 mm	1000
8	PIT FRONT	PHOTOSONICS	13 mm	600
9	PIT REAR	PHOTOSONICS	13 mm	300
10	SOUTH WIDE	REAL TIME	--	24

NOTE: (24 fps) real time movie film coverage of pre-crash, post-crash and crash event spliced at start and end of film.



ACCELEROMETER NUMBER *	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Engine	X		X
2	Firewall above Steering Column	X		X
3	Firewall at Vehicle Centerline	X		X
4	Front Seat "Crossbeam"	X		
5	Rear Seat "Crossbeam"	X		X
6	CG	X	X	X

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

Figure 4. VEHICLE ACCELEROMETER LOCATIONS

SECTION 3

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

- Summary of Test Conditions
- Post-Impact Data
- Windshield Zone Intrusion, FMVSS 219
- Protected Zone
- Summary of FMVSS Data
- Fuel System Integrity Post-Impact

Table 6
SUMMARY OF TEST CONDITIONS (Cont'd)

TEST CONDITIONS

Date of Test 8/28/79 Time of Test 1530 HRS
Ambient Temperature 80 °F at impact area
Temperature in Occupant Compartment 80 °F
Windshield Molding Temperature 84 °F

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude: RF 29" LF 28-1/2" RR 28-3/4" LR 28-1/2"
Test Attitude: RF 28-3/4" LF 28-1/2" RR 26-3/4" LR 26-1/2"

VEHICLE TIRE DATA

Recommended Cold Tire Pressure: Front = 28 psi Rear = 28 psi
Recommended Tire Size FR78-15 Load Range B
Tires on Vehicle FR78-15 General
Is Spare Tire a "Space Saver" yes x no
Is Spare Tire Standard Equipment x yes no

TEST FLUID DATA

Test Fluid Type: Red Stoddard Solvent #2 Spec. Grav.: 0.764
Kinematic Viscosity 0.96 Centistokes
Spill Point Volume* 20.5 gal (SPV)
Test Volume 18.6 gal (90 to 91% of SPV)
Fuel System Capacity (data from Owner's Manual) 19-1/2 gal
Details of fuel system Engine operated fuel pump. Fuel tank is located
under trunk area with fill tube on left side behind rear wheel.

Electric Fuel Pump Yes x No Fuel Injection Yes x No
Does electric fuel pump operate with ignition switch "on" and the engine
not operating Yes x No

VEHICLE REBOUND AND CRUSH

Overall Length of Test Vehicle: Pre-Test = R 199.5 / L 199.7 inches
Post-Test = R 176.8 / L 177.4 inches
Crush = R 22.7 / L 22.3
FOR FRONTAL IMPACTS, distance from front of test vehicle to the barrier
after impact = 6.6 inches

*With entire fuel system filled from fuel tank through carburetor bowl.

Table 7
POST-IMPACT DATA - STANDARDS 219 AND 301

DATA SHEET

TYPE OF TEST X Frontal (90°) Impact
 Oblique (°) Impact on Left (Driver's) Side
 Right Side
 Lateral or Side Impact on Left (Driver's) Side
 Right Side
 Rear Impact

DATE OF TEST 8/28/79 TIME 1530 TEMP 78 °F

VEHICLE NHTSA NO. 308-17-458 VIN FH22G9G217130

REQUIRED VEHICLE VELOCITY RANGE 34.5 to 35.5 mph

IMPACT VELOCITY (traps within 5 feet of impact event) 35.04

Trap No. 1 = 35.04 mph Trap No. 2 = Failed mph

Distance from the vehicle's front bumper to the barrier face entering
the vehicle velocity measurement device = 58

exiting the vehicle velocity measurement device = 18

VEHICLE STATIC CRUSH (for frontal and rear impacts only)

Driver's Side = 22.3 in Passenger's Side = 22.7 in

Average = 22.5 in

Crush Details:

Compartment intrusion 9.0"

VEHICLE STATIC CRUSH (for side impacts only)

Amount of Crush = - inches on side

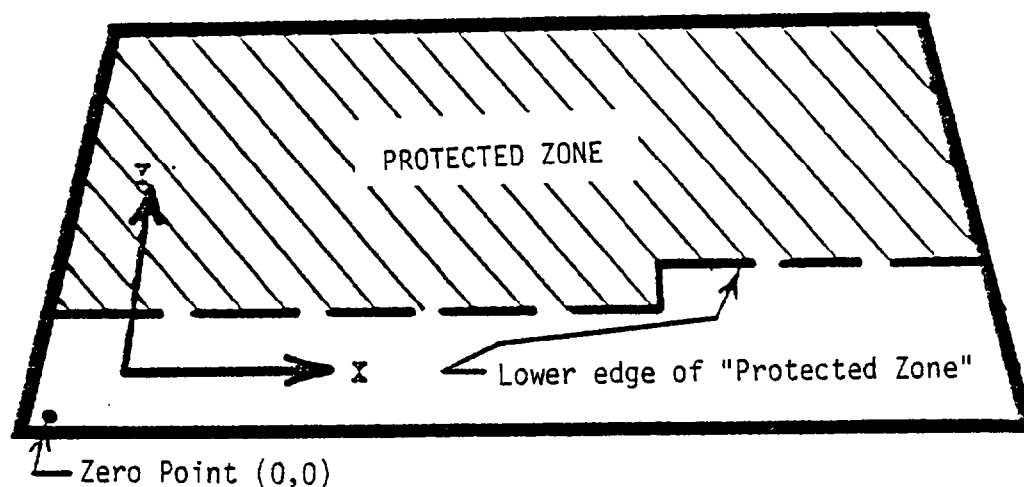
Crush Details:

VEHICLE REBOUND (from rigid barrier only)

Driver's Side = - in Passenger's Side = - in

Average = 6.6 in

REMARKS



FRONT VIEW

With the zero coordinate for the X-Y grid located at the lower right corner (passenger side) of the windshield, record the following positions:

- (1) The area that the "Protected Zone" template was penetrated more than .25 inches by a vehicle component other than one which is normally in contact with the windshield.

NONE

Coordinates	
X	Y

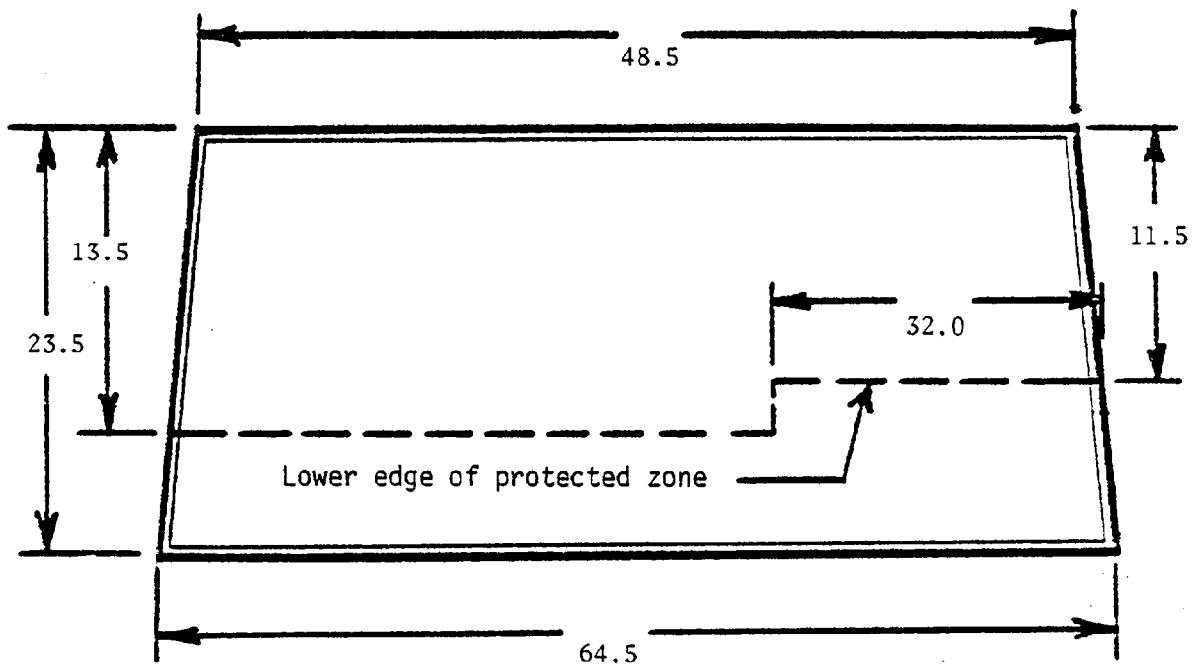
- (2) The area beneath the "Protected Zone" that the inner surface of the windshield was penetrated by a vehicle component.

NONE

Coordinates	
X	Y

- (3) Record any windshield retention clips or brackets used to insure that the windshield would not disengage from the body.

Figure 5 WINDSHIELD ZONE INTRUSION, FMVSS 219 - DATA SHEET



FRONT VIEW OF WINDSHIELD

Provide all dimensions necessary to reproduce the protected zone.

Method of adhering styrofoam to the windshield:

Construction adhesive applied to windshield surface and to brake
side of styrofoam, then clamped in place until dry.

Figure 6 PROTECTED ZONE

Details of windshield mounting (method of retention, type of trim, etc.):

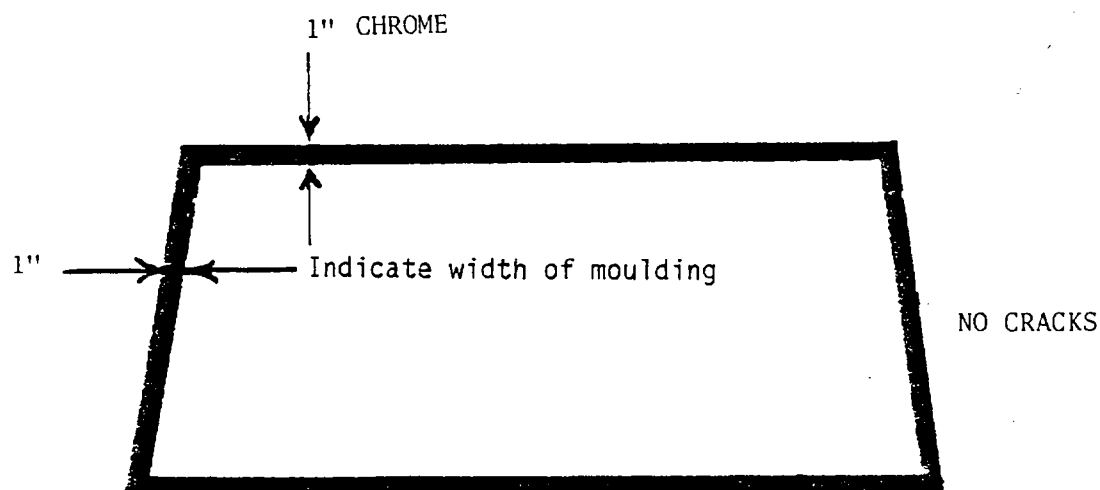
Windshield is bonded in place and has a chrome trim piece around the

perimeter of the window.

	Windshield Periphery		
	Pre-Test	Post-Test	Retention %
Right Side	80	80	100%
Left Side	80	80	100%
TOTAL	160	160	100%

The standard requires that Post-Test be a minimum of 75 percent of the Pre-Test total periphery measurement for vehicle not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles which are equipped with occupant passive restraints.

AREA OF RETENTION FAILURE



FRONT VIEW

Figure 7 SUMMARY OF FMVSS 212 DATA

Table 8

TEST VEHICLE NHTSA NO. 308-17-458

Test Date 8/28/79

Vehicle Manufacture/Make/Model 1979 Chrysler LeBaron

Test vehicle fuel tank filled to 90-91% of capacity with Stoddard Solvent and with electric fuel pump operating (if it will operate without engine operation). Part 572 test dummies located at each front designated seating position.

TEST VEHICLE IMPACT TYPE

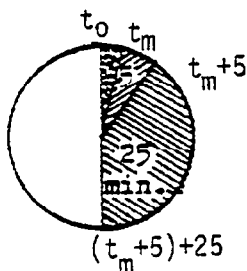
X Frontal (35 mph)

Oblique (30 mph) with _____° barrier face first contacting
driver _____ passenger side

Rear Moving Barrier (35 mph)

Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT



	Actual	Max. Allow.
From impact until vehicle motion ceases	0	1 oz
For 5 min. period after vehicle motion ceases	0	5 oz
For next 25 min.	0	1 oz/1 min

TEST VEHICLE STATIC ROLLOVER

Test information will be added to the following static rollover data sheets

- (1) Figure 8A - Rollover data for 0° to 90° test phase

(2) Figure 8B - Rollover data for 90° to 180° test phase

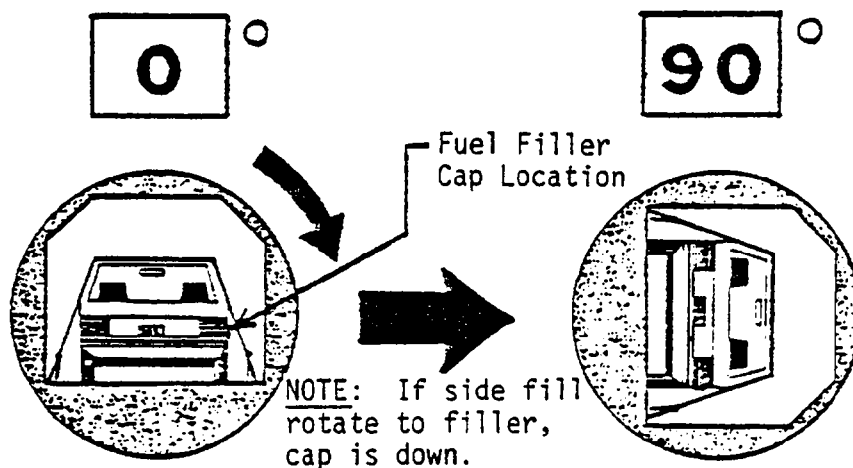
(3) Figure 8C - Rollover data for 180° to 270° test phase

(4) Figure 8D - Rollover data for 270° to 360° test phase

SOLVENT SPILLAGE DETAILS

NONE.

Table 8A
FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASEDETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Rollover Fixture 90° Rotation Time = 2 minutes 58 seconds
 (Spec. Range = 1 to 3 min.)

FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds

TOTAL = 7 minutes 58 seconds

Next Whole Minute Interval = 8 minutes

FMVSS 301-75 REQUIREMENTS

Time Period

First 5 min. <u>from</u> onset of rotation	6th min.	7th min.	8th min. if reqd.
--	----------	----------	-------------------

Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
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ACTUAL TEST VEHICLE SOLVENT SPILLAGE

0	0	0	0
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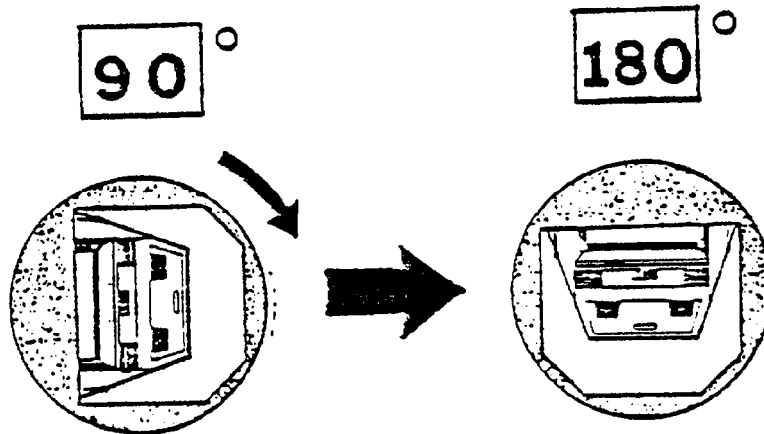
NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATION(S)

NONE.

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Rollover Fixture 90° Rotation Time = 2 minutes 57 seconds
(Spec. Range = 1 to 3 min.)

FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds

TOTAL = 7 minutes 57 seconds

Next Whole Minute Interval = 8 minutes

FMVSS 301-75 REQUIREMENTS

Time Period

First 5 min. <u>from</u> onset of rotation	6th min.	7th min.	8th min. if reqd.
--	----------	----------	-------------------

Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

ACTUAL TEST VEHICLE SOLVENT SPILLAGE

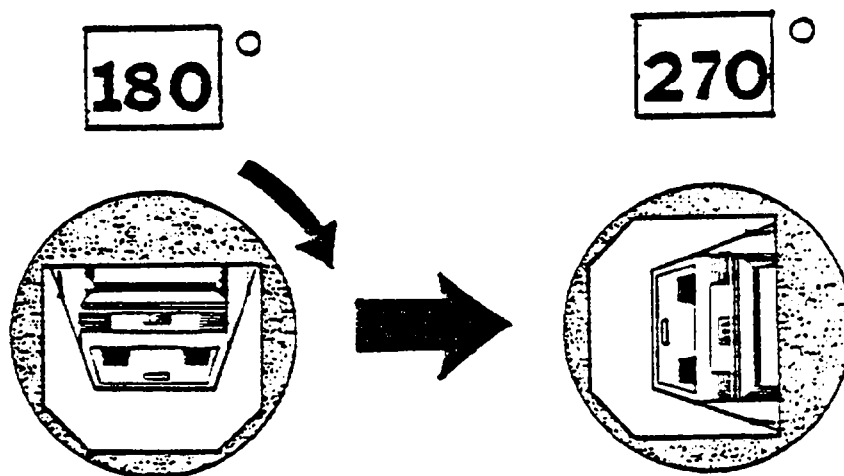
0	0	0	0
---	---	---	---

NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATION(S)

NONE.

Table 8C
FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASEDETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Rollover Fixture 90° Rotation Time = 2 minutes 59 seconds
 (Spec. Range = 1 to 3 min.)
 FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds
 TOTAL = 7 minutes 59 seconds
 Next Whole Minute Interval = 8 minutes

FMVSS 301-75 REQUIREMENTS

Time Period

First 5 min. <u>from</u> onset of rotation	6th min.	7th min.	8th min. if reqd.
--	----------	----------	-------------------

Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

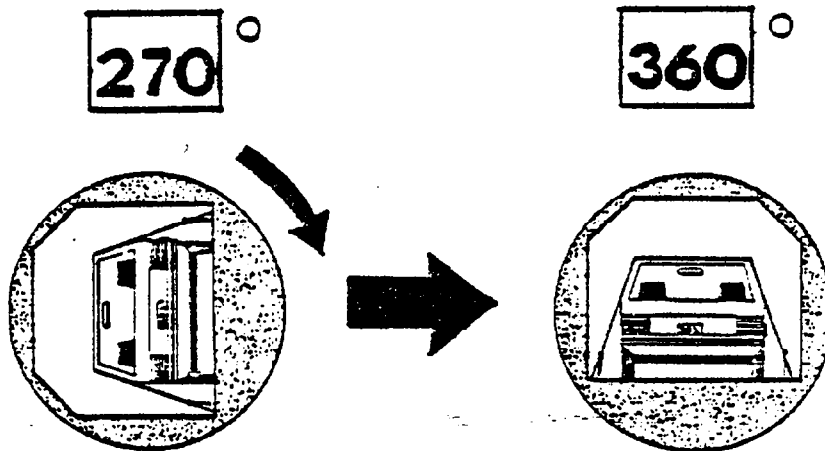
ACTUAL TEST VEHICLE SOLVENT SPILLAGE

0	0	0	0
---	---	---	---

NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATION(S)

NONE.

FMVSS NO. 301-75 STATIC ROLLOVER DATA SHEETTEST PHASEDETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Rollover Fixture 90° Rotation Time = 2 minutes 59 seconds
 (Spec. Range = 1 to 3 min.)
 FMVSS 301-75 Position Hold Time = 5 minutes 00 seconds
 TOTAL = 7 minutes 59 seconds
 Next Whole Minute Interval = 8 minutes

FMVSS 301-75 REQUIREMENTS

Time Period

First 5 min. <u>from</u> onset of rotation	6th min.	7th min.	8th min. if reqd.
--	----------	----------	-------------------

Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

ACTUAL TEST VEHICLE SOLVENT SPILLAGE

0	0	0	0
---	---	---	---

NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATION(S)

NONE.

APPENDIX A
STILL PHOTOGRAPHS

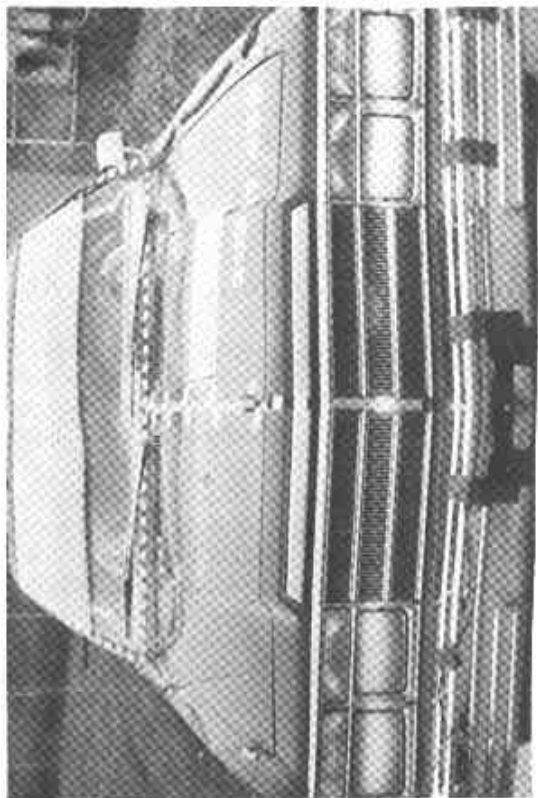


Figure A-1 PRE- AND POST-TEST FRONT VIEWS

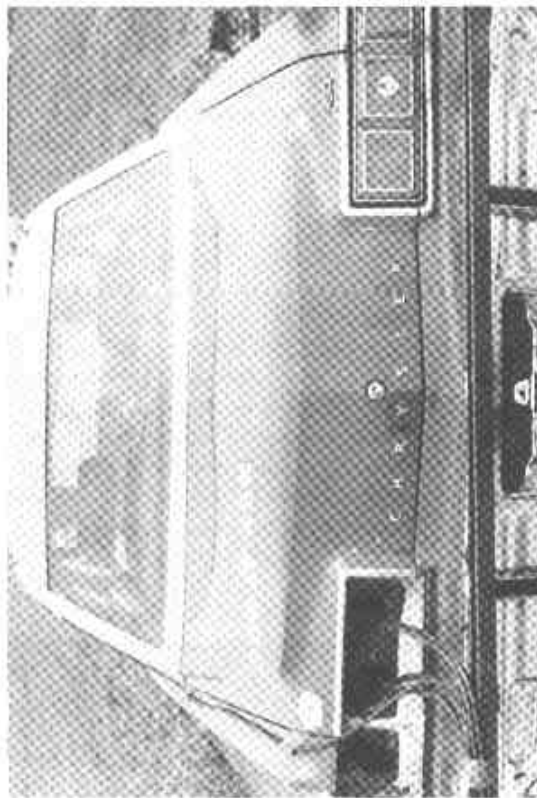
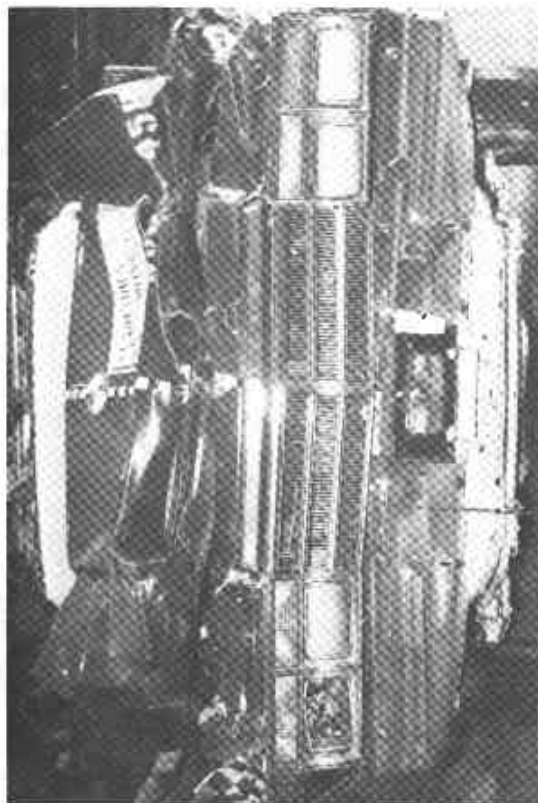


Figure A-2 PRE- AND POST-TEST REAR VIEWS



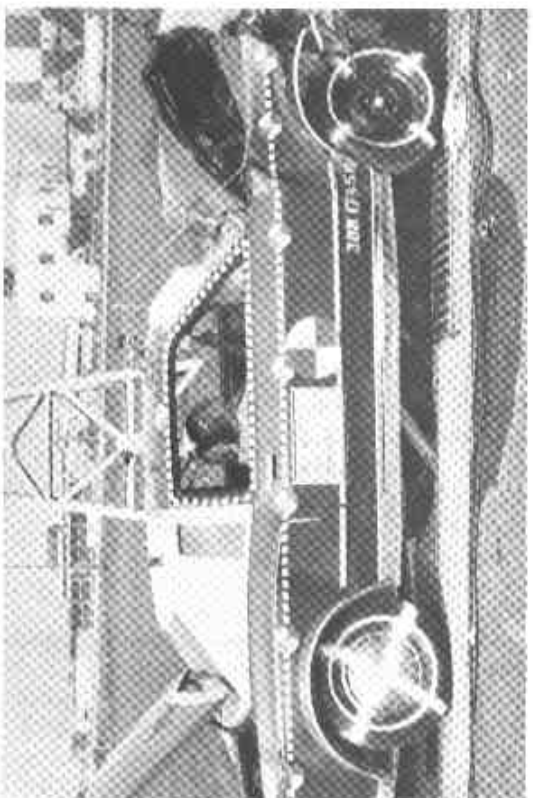
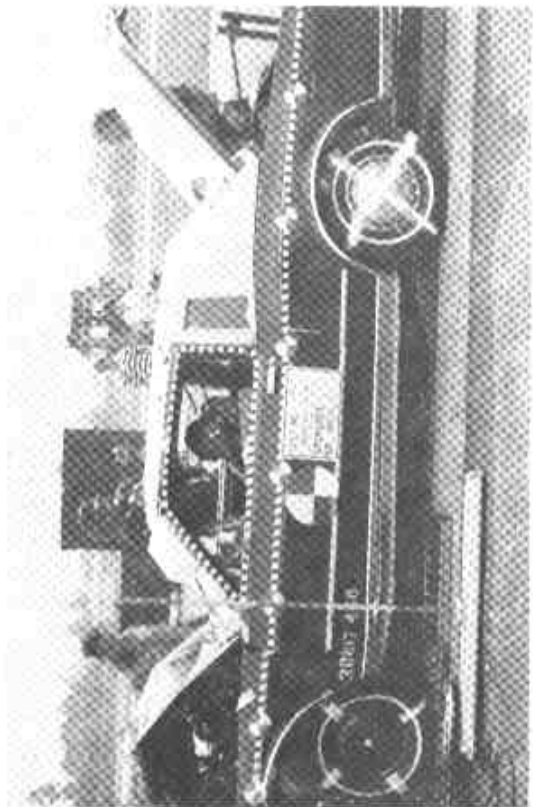
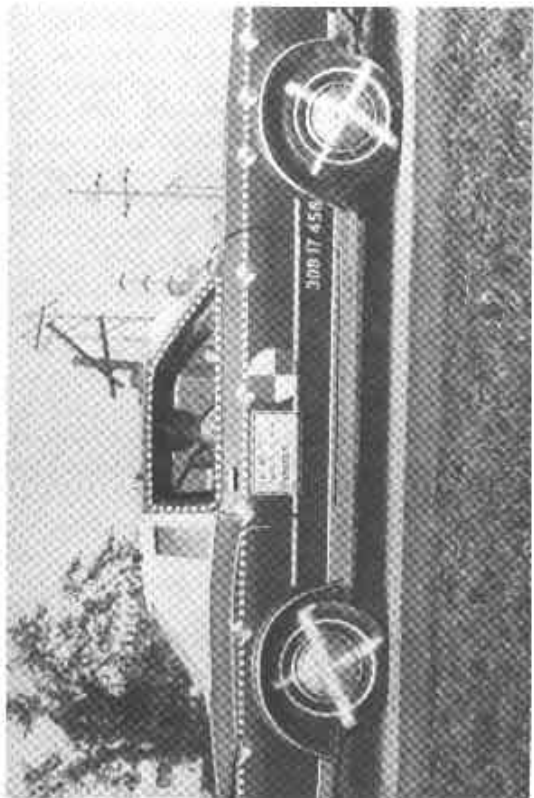
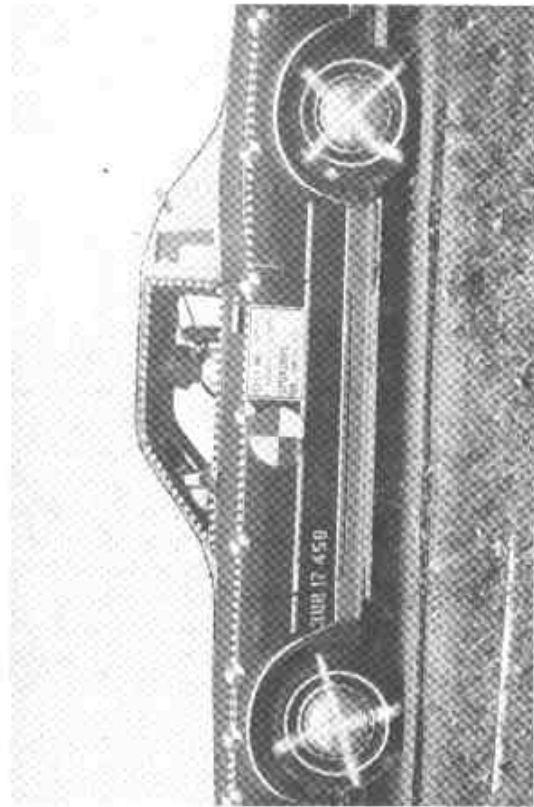


Figure A-3 PRE- AND POST-TEST SIDE VIEWS

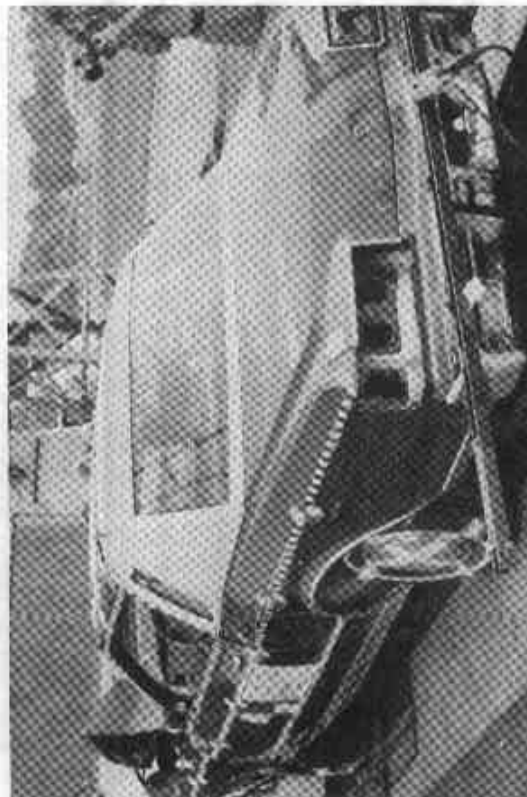
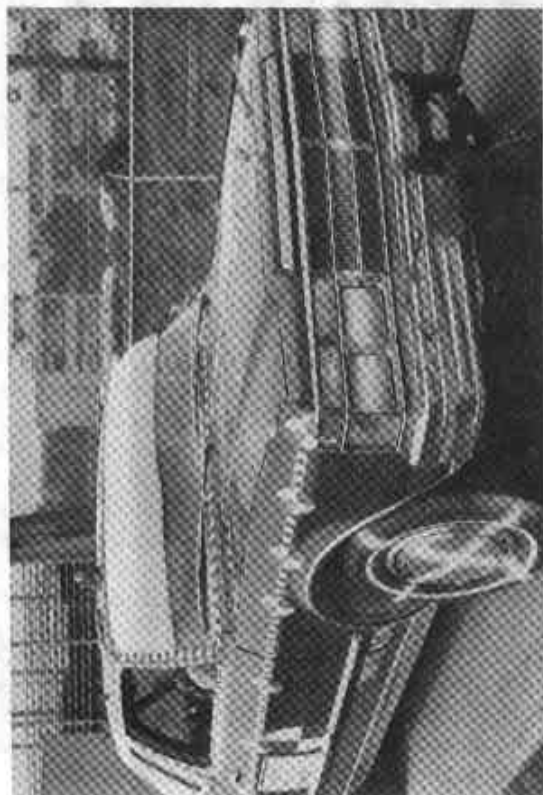
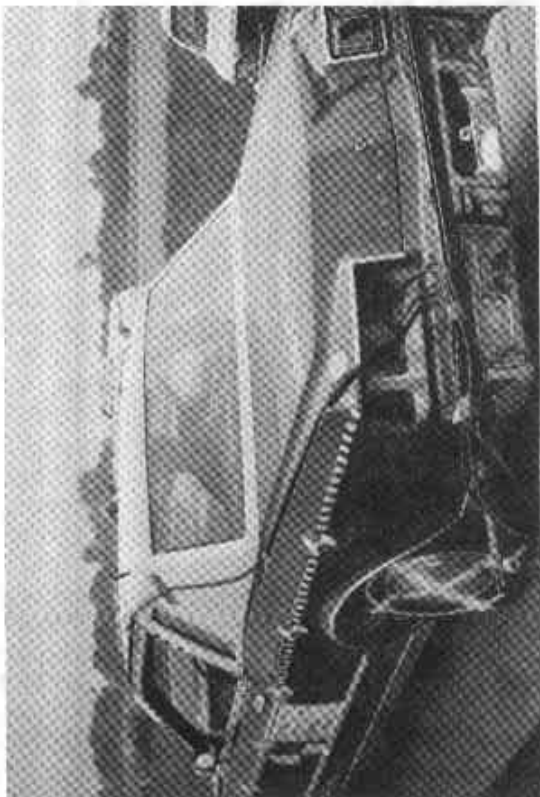


Figure A-4 PRE- AND POST-TEST THREE-QUARTER VIEWS

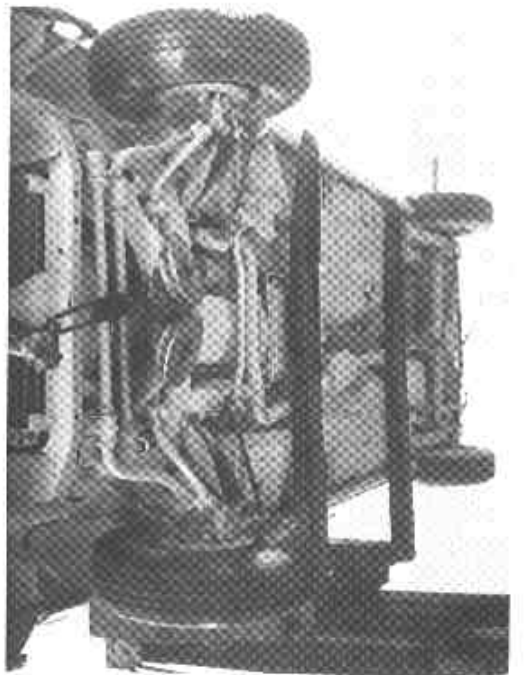
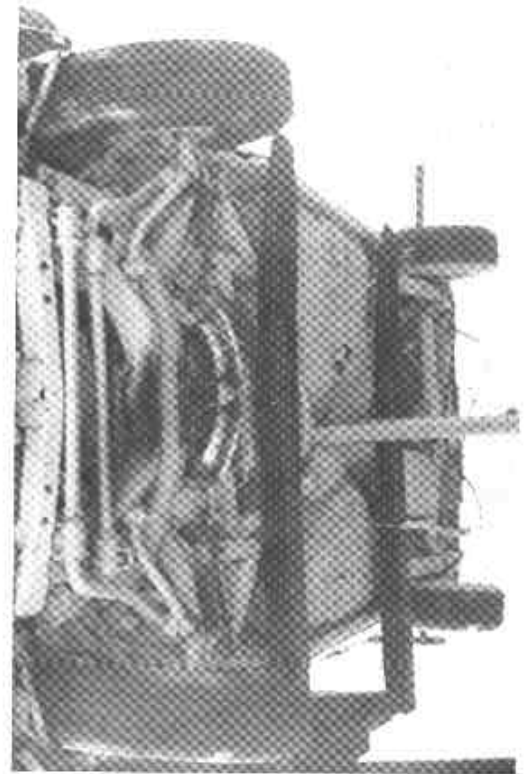
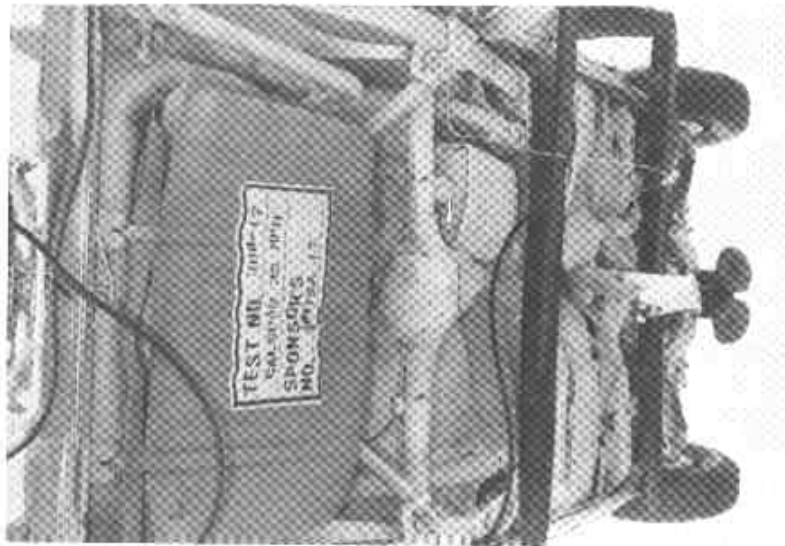


Figure A-5 PRE- AND POST-TEST UNDERBODY VIEWS

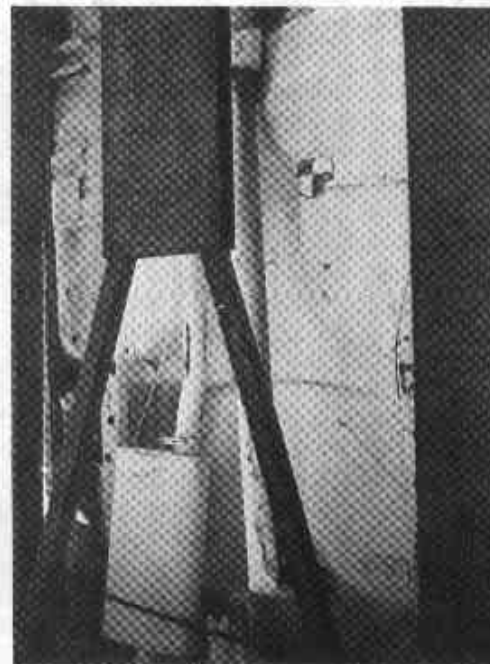
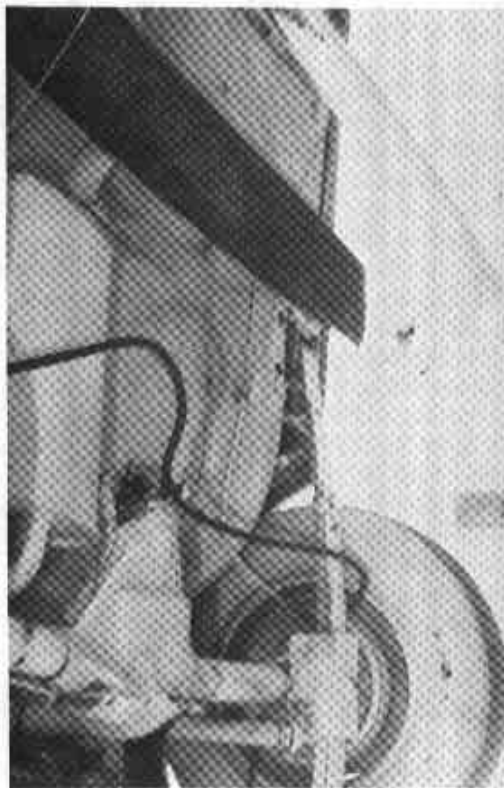
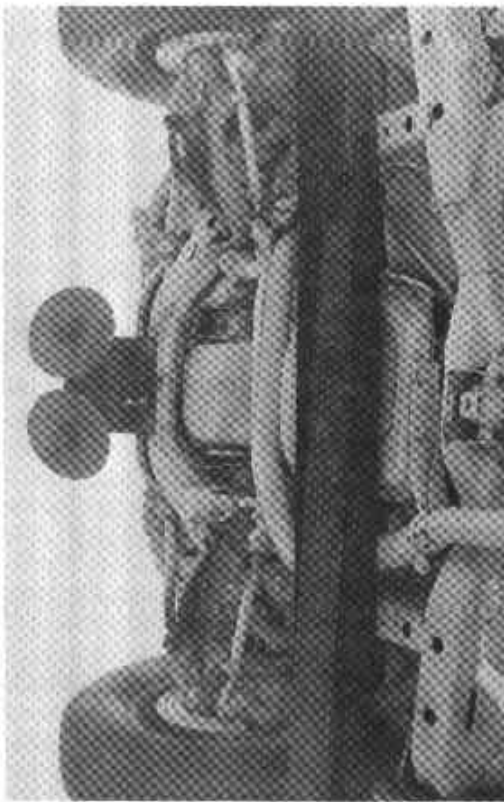


Figure A-6 POST-TEST UNDERBODY DEFORMATION

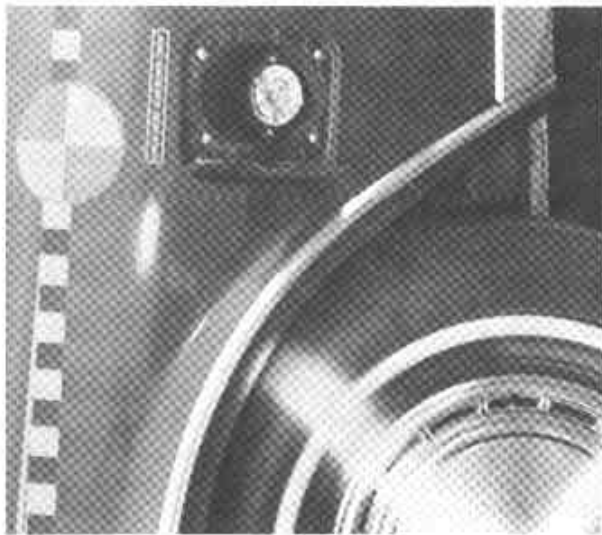


Figure A-7 FUEL CAP

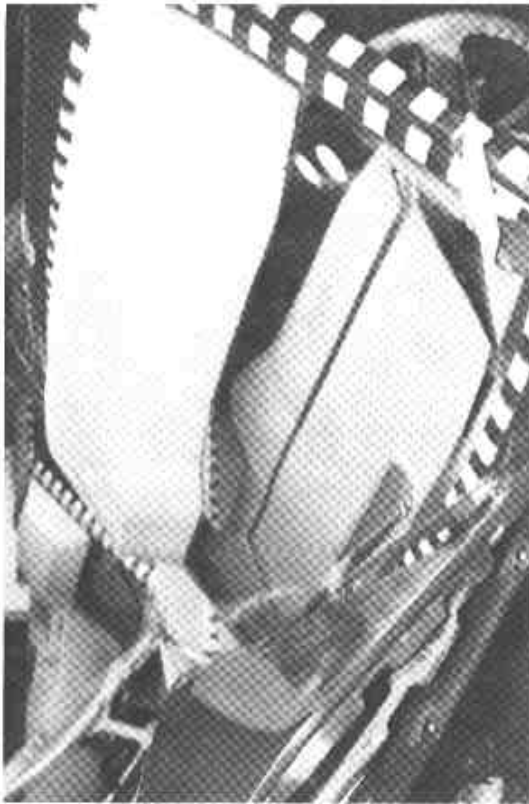


Figure A-8 POST-IMPACT WINDSHIELD

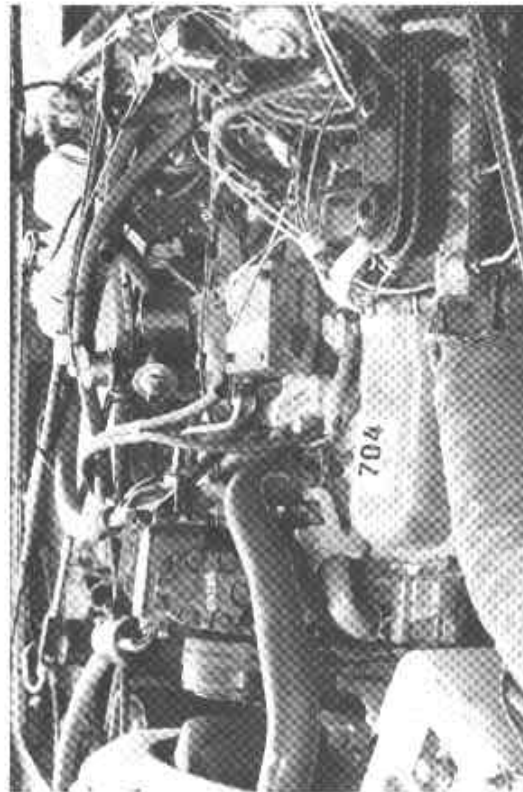


Figure A-9 ENGINE COMPARTMENT
ACCELEROMETER

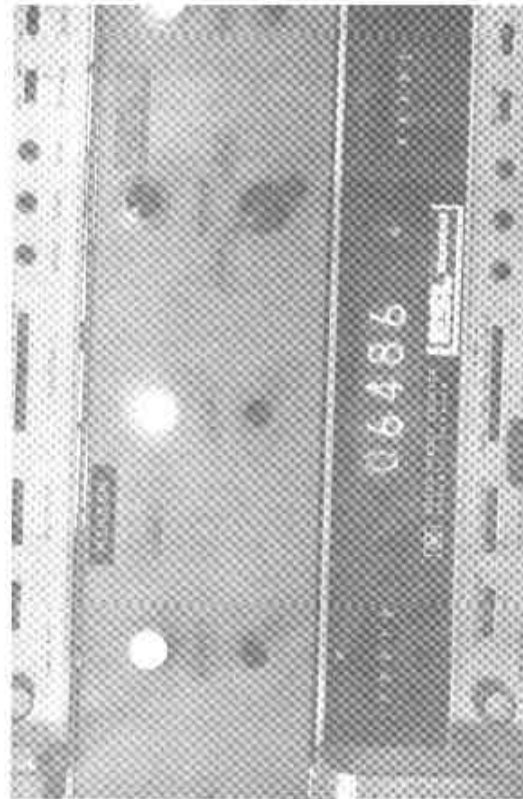
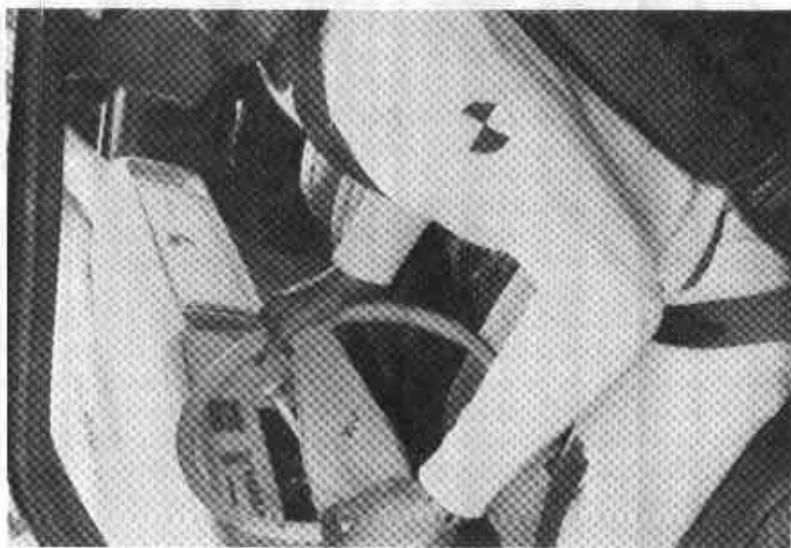


Figure A-10 VELOCITY TRAP
COUNTER DISPLAY



A-8

Figure A-11 PRE-TEST OCCUPANT POSITIONS

6525-V-17



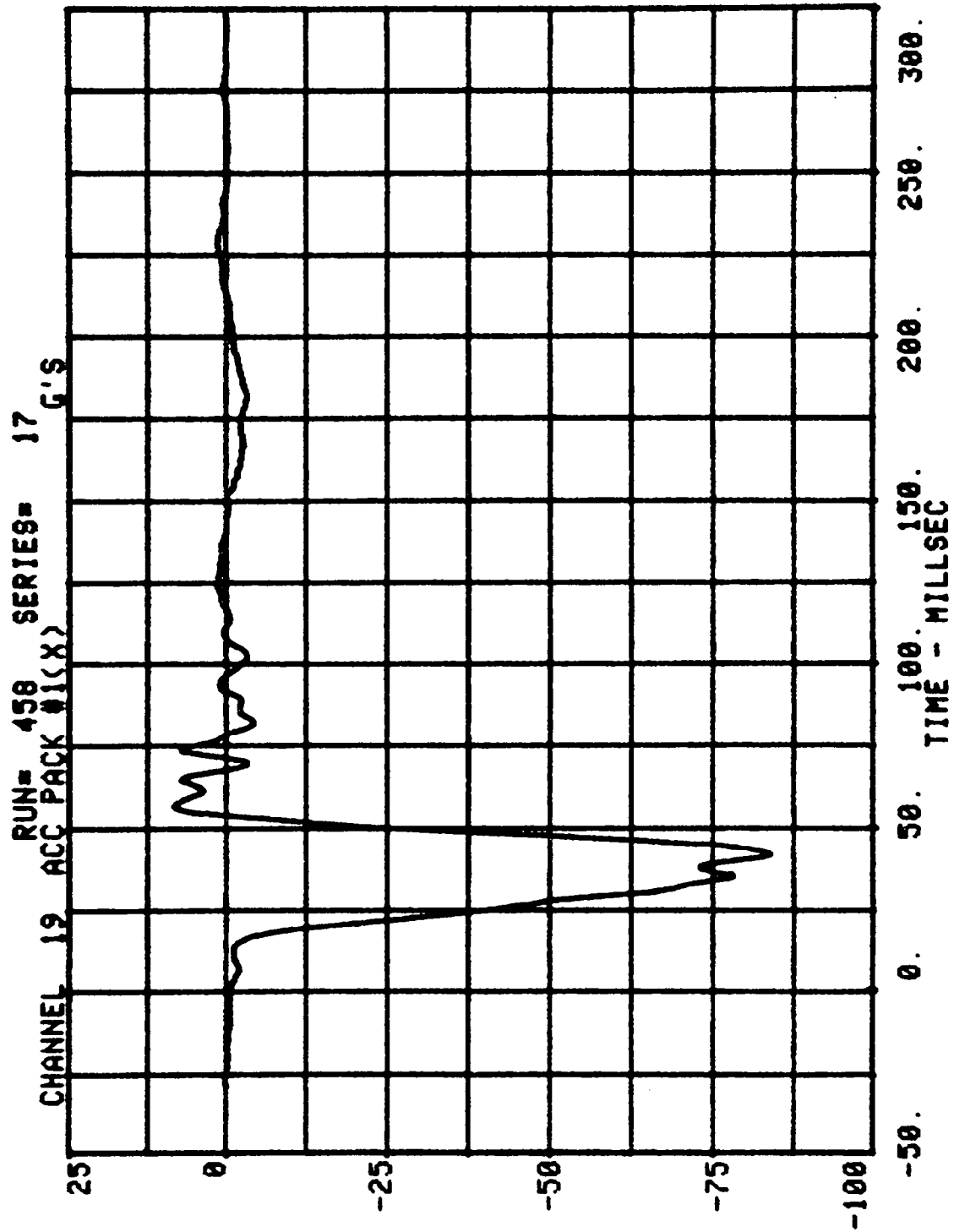
Figure A-12 POST-TEST OCCUPANT POSITIONS

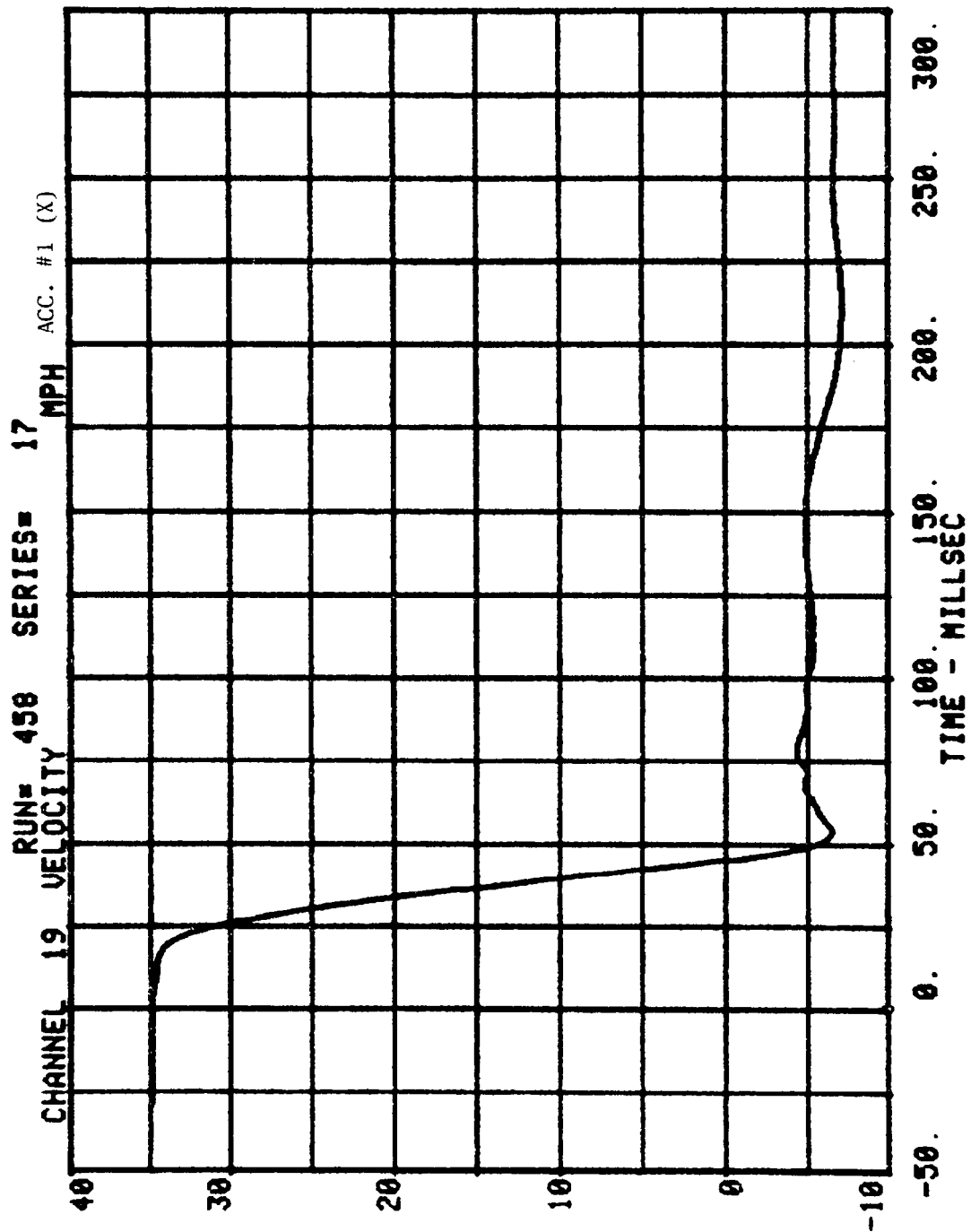
APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA

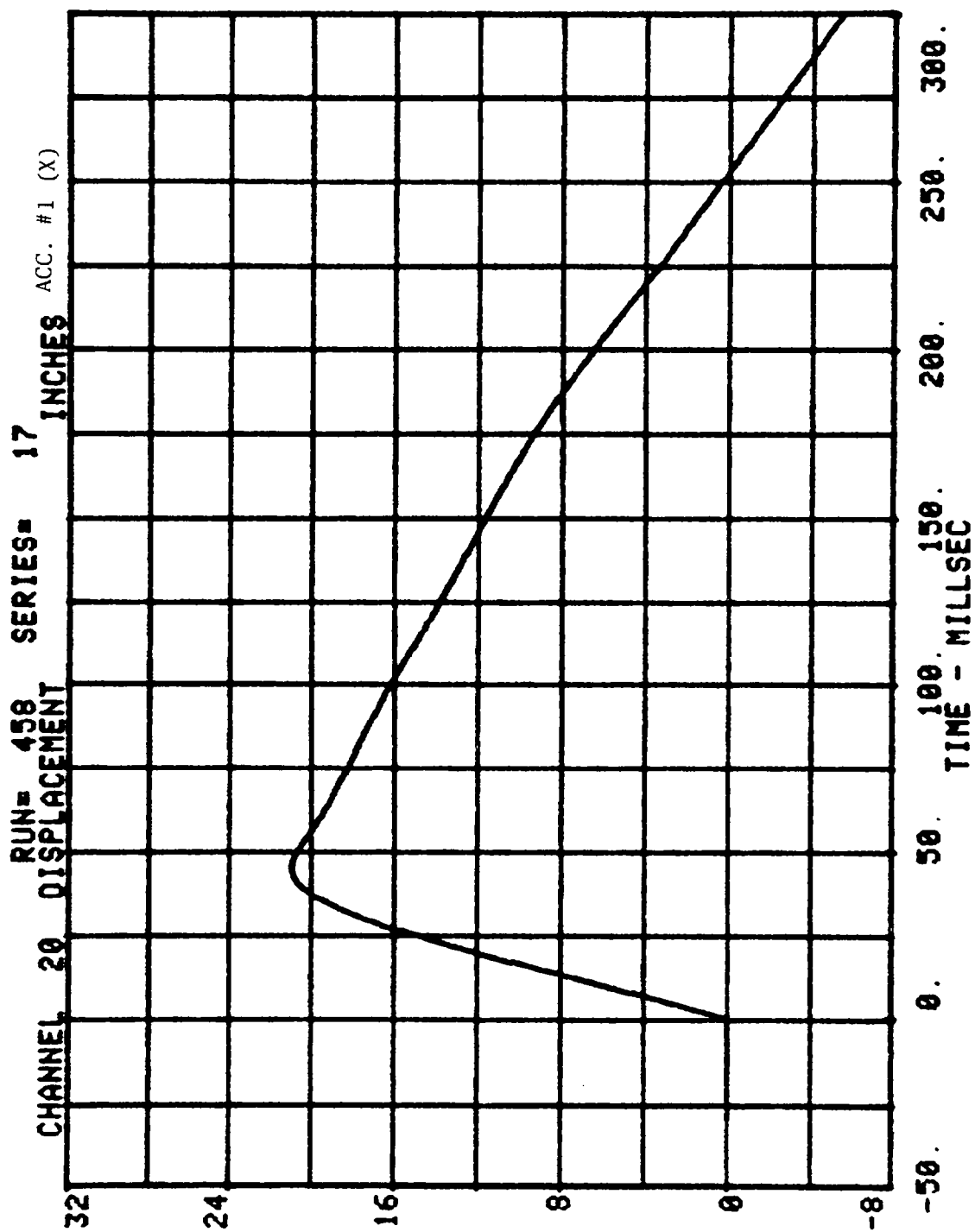
TEST NO. 308-17-458
1979 CHRYSLER LeBARON
VEHICLE DATA

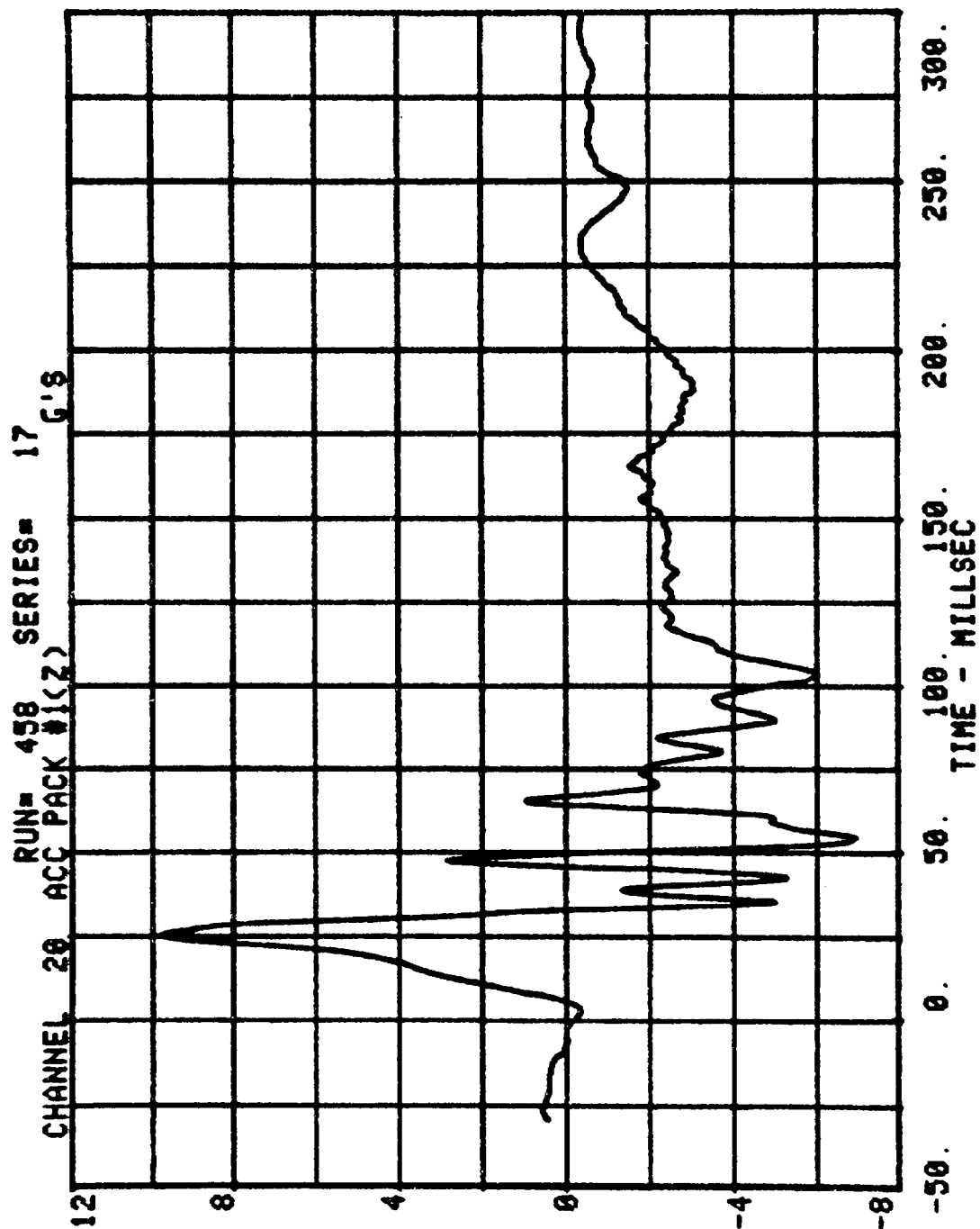
VEHICLE DATA

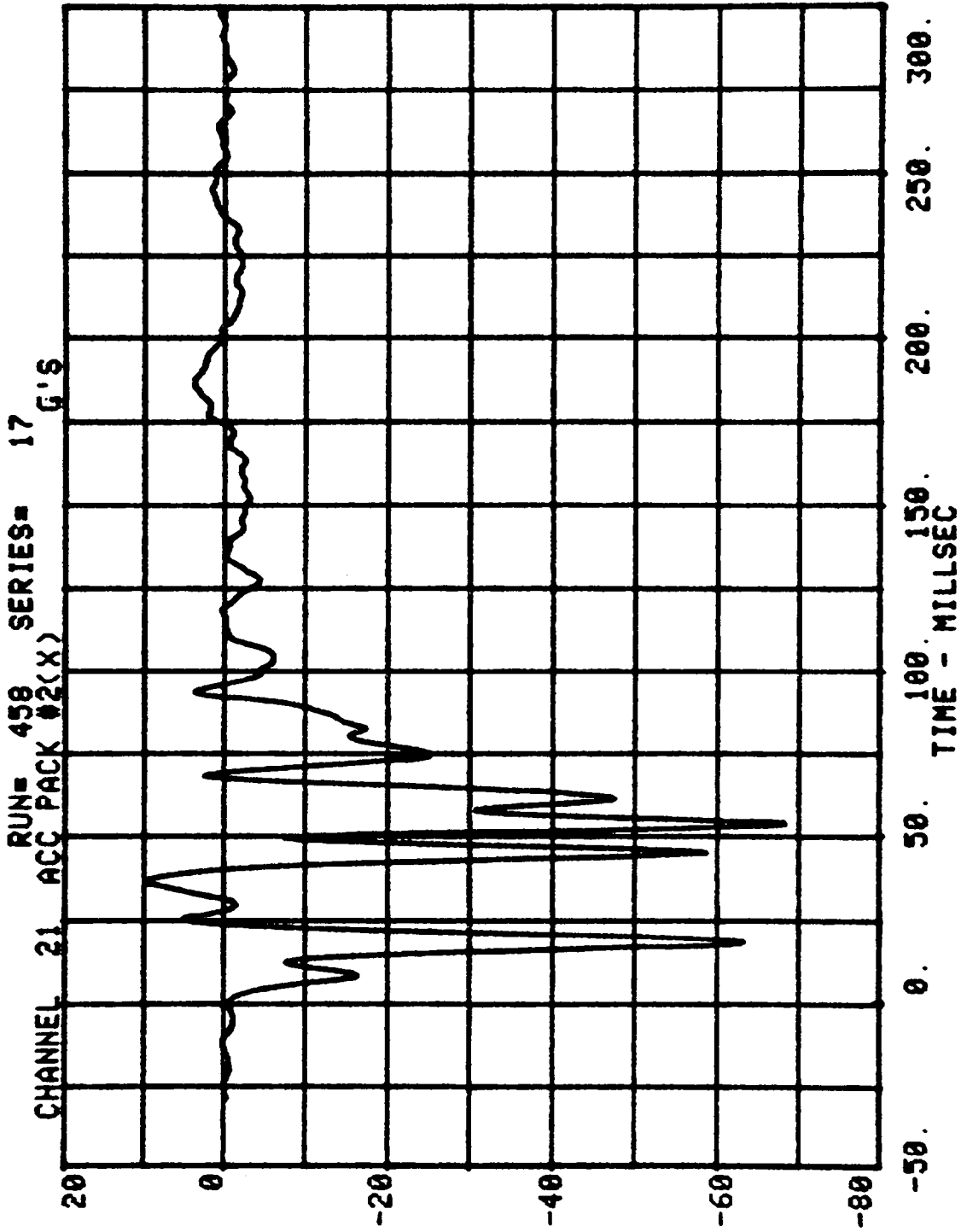
FILTER CHANNEL CLASS
60

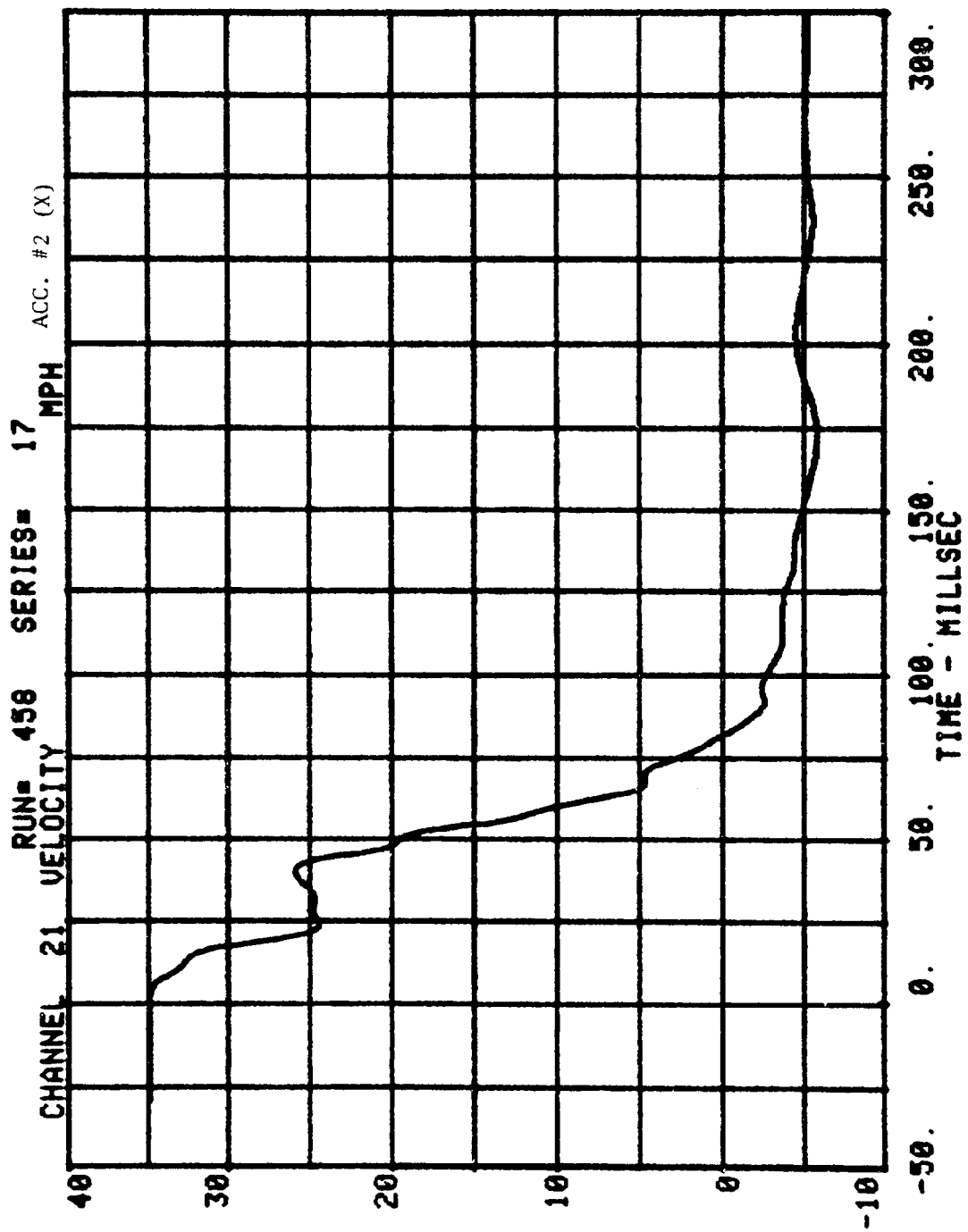


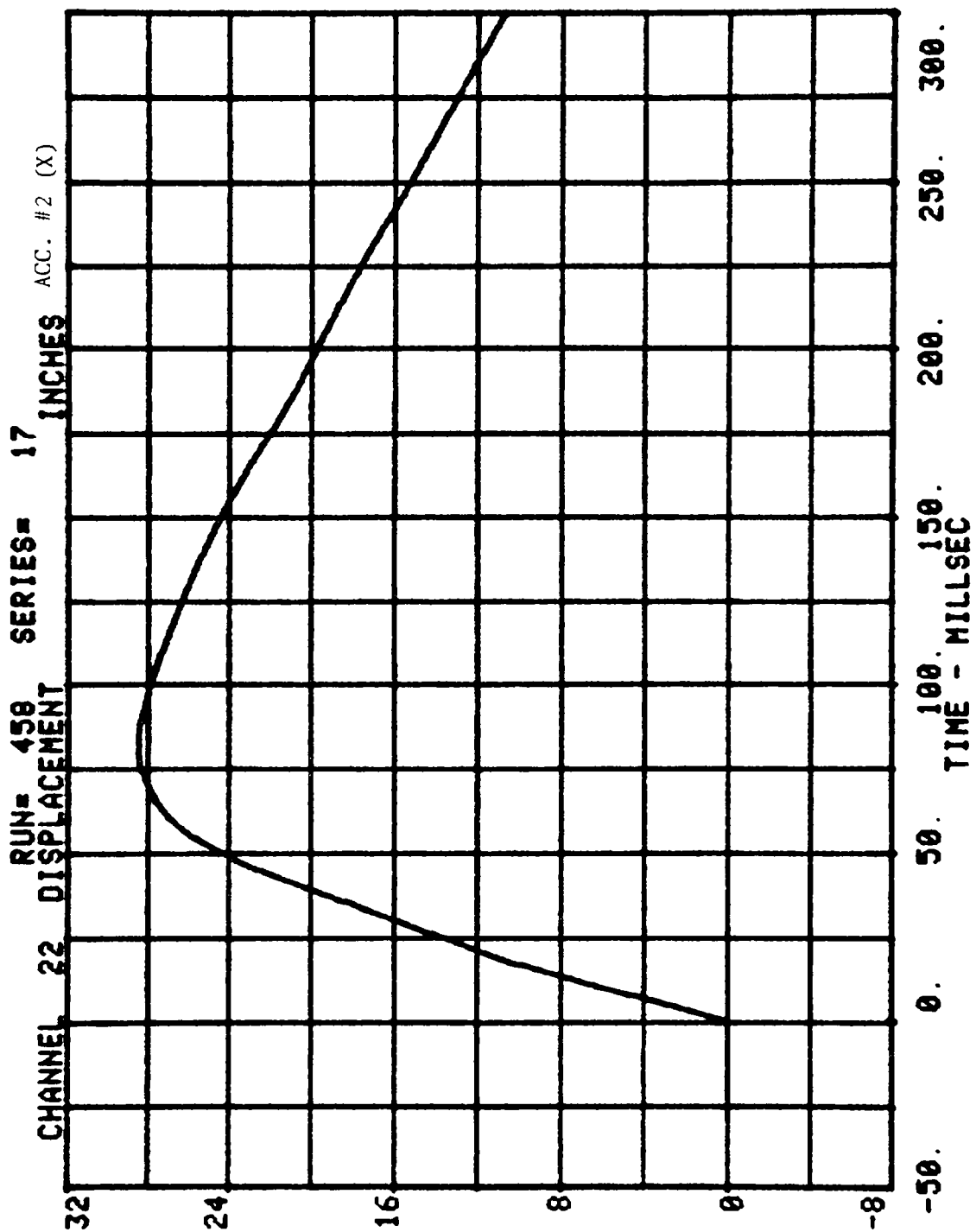




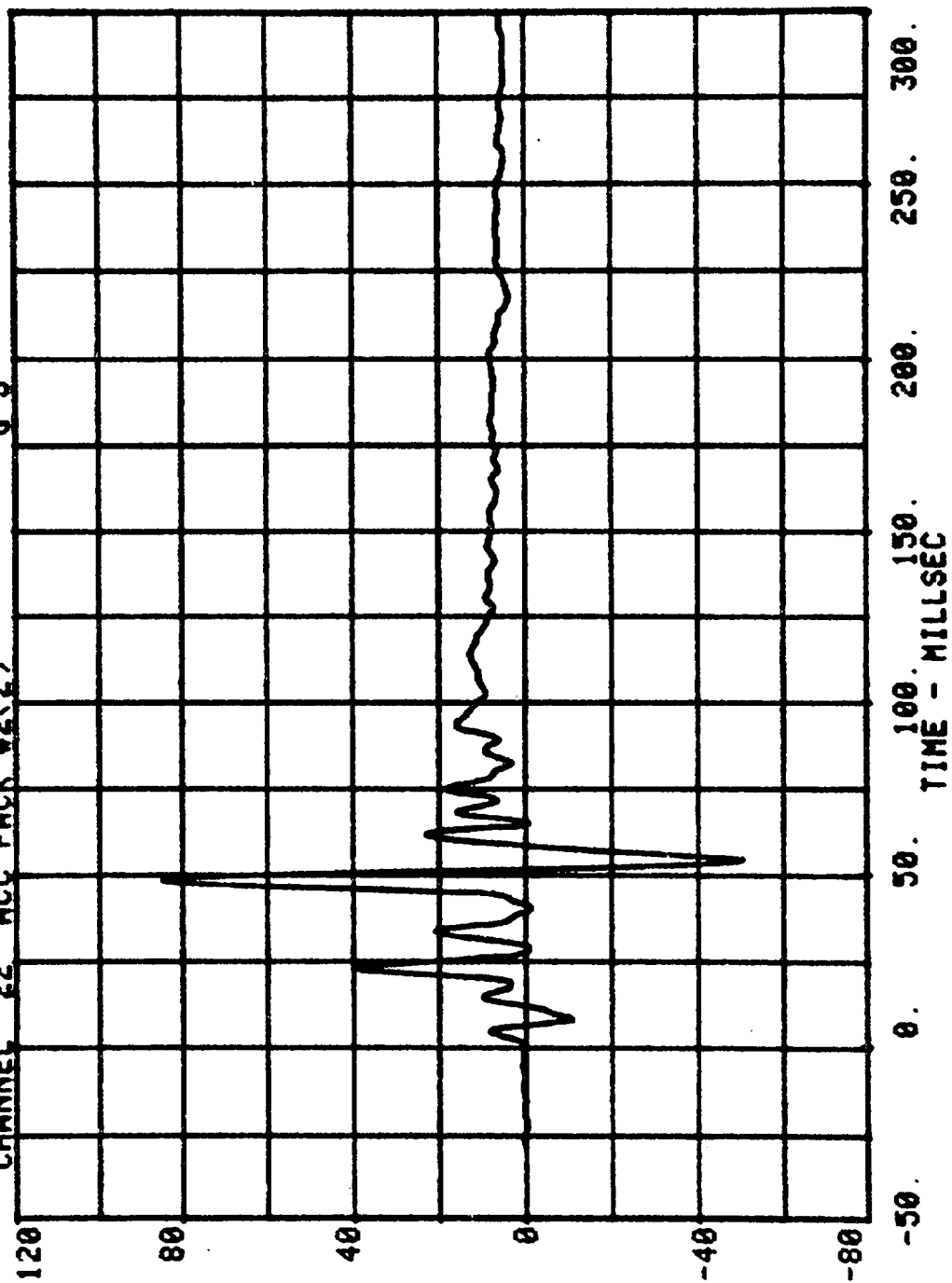


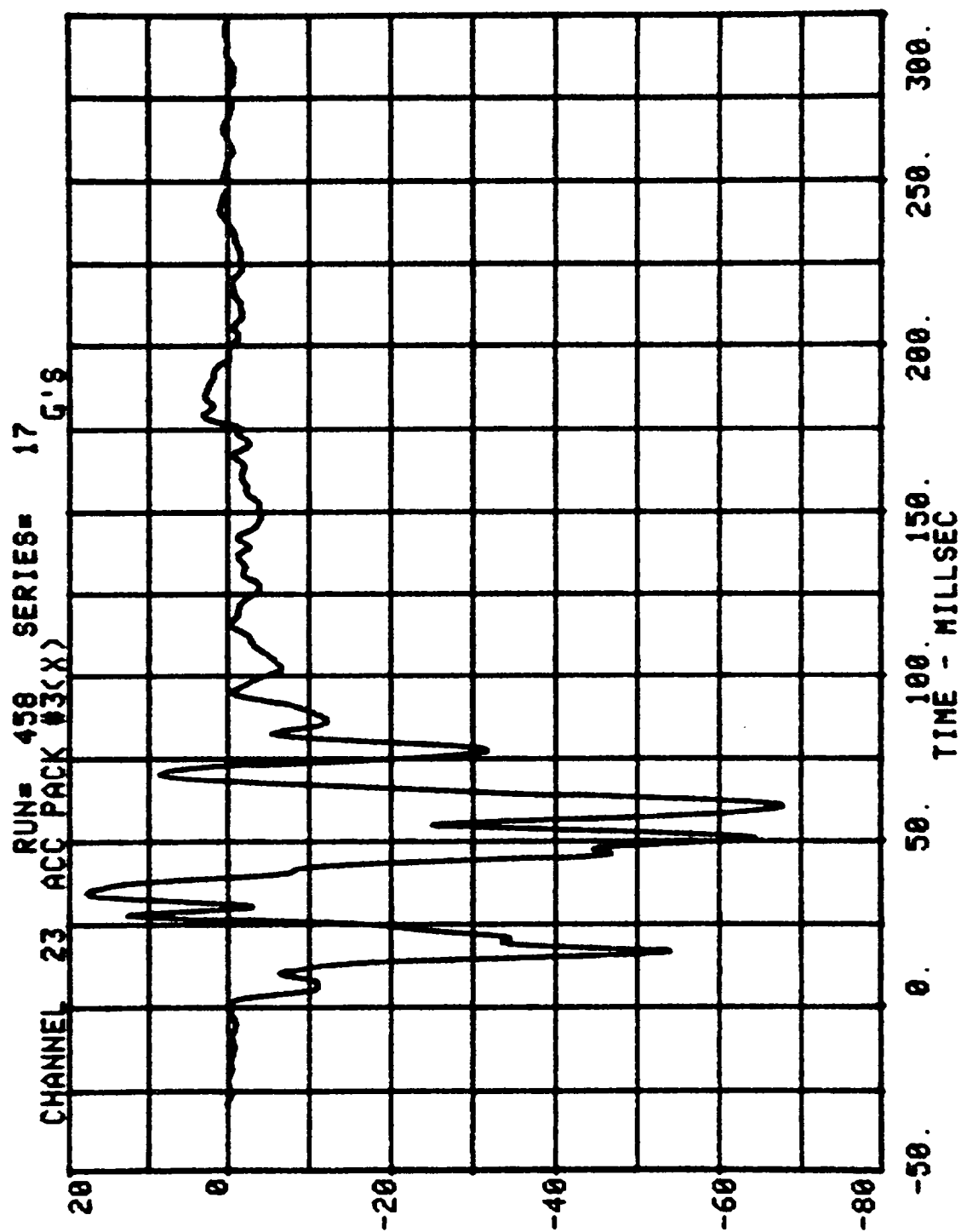


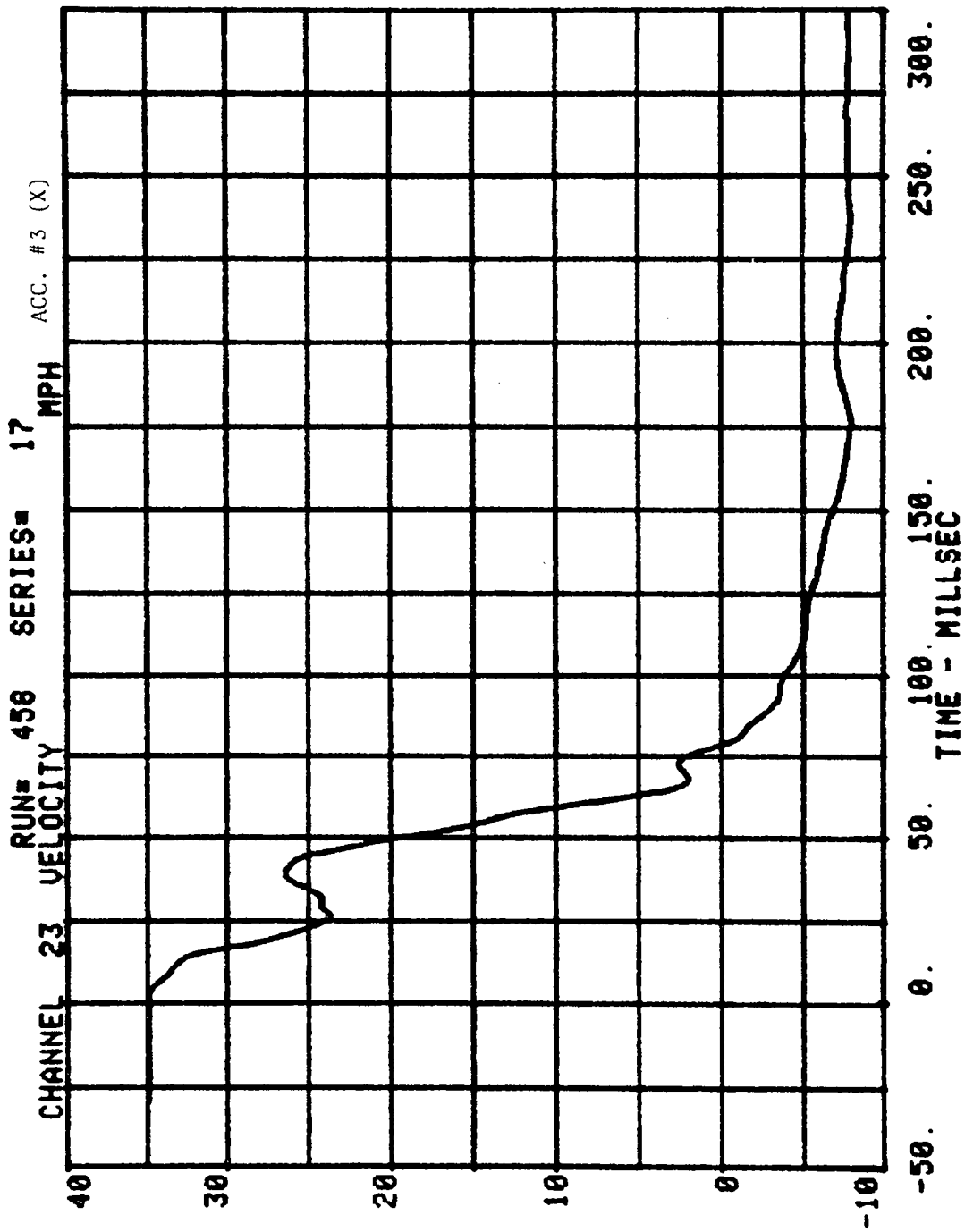


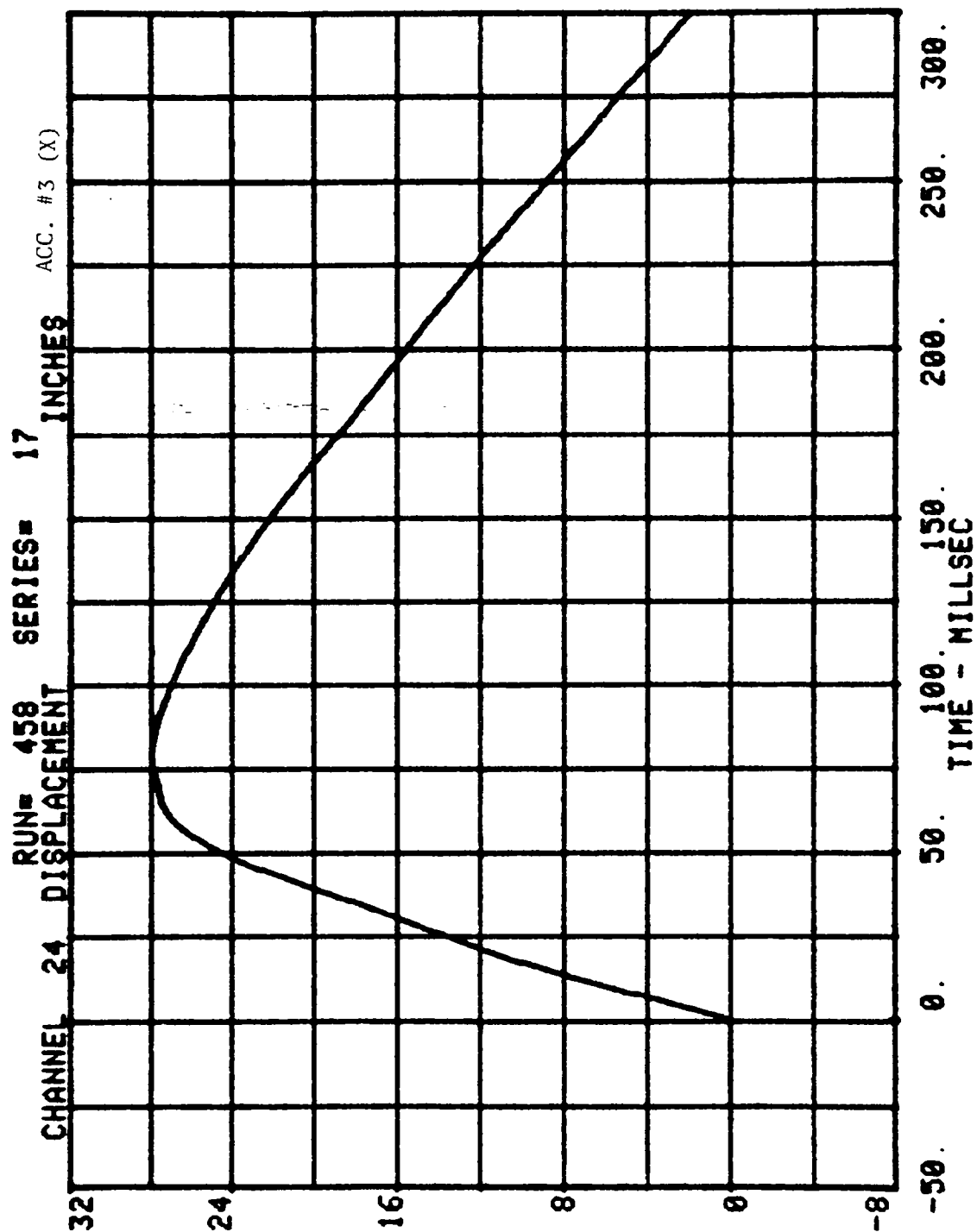


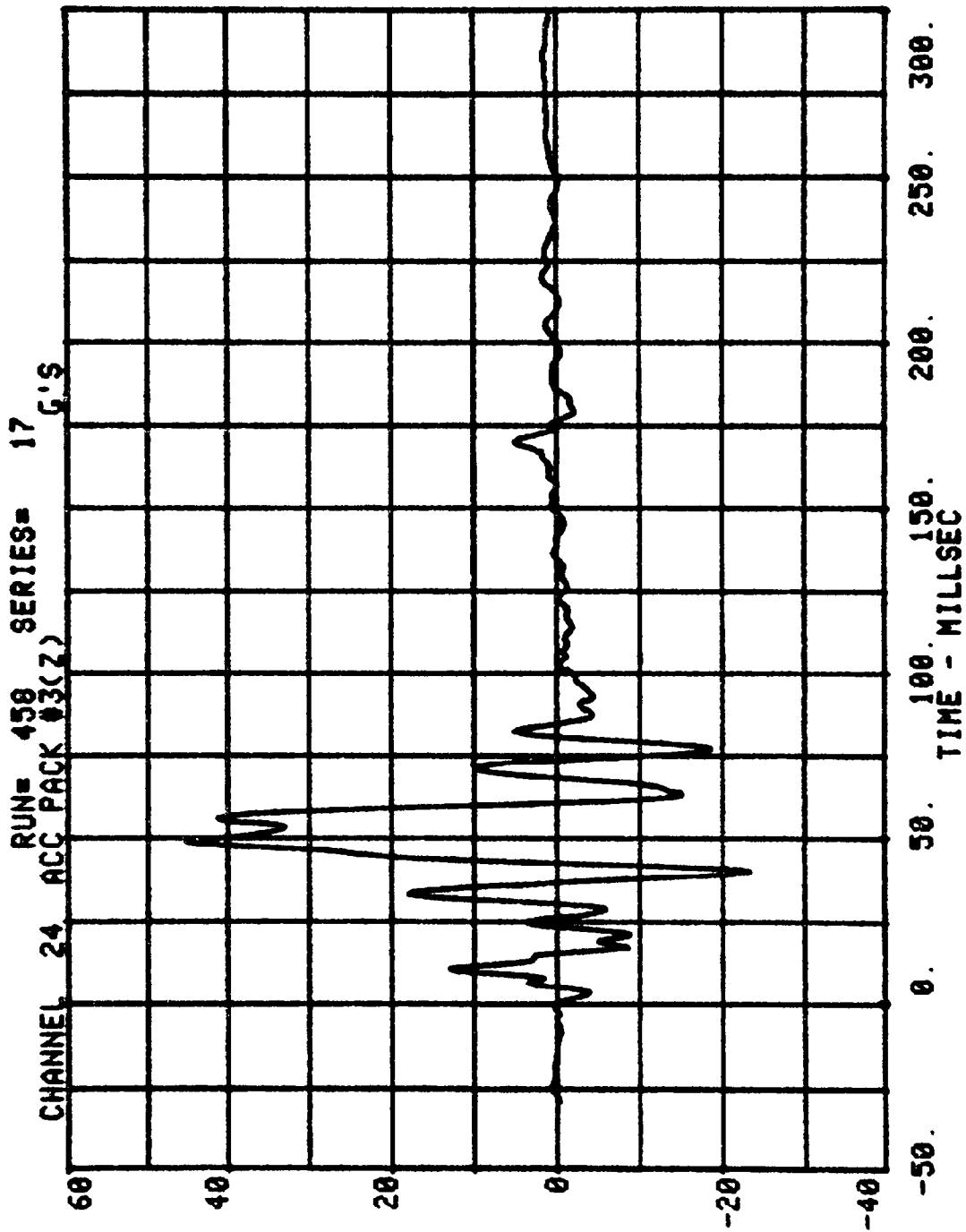
CHANNEL 22 ACC PACK #2(Z) RUN= 458 SERIES= 17 G'S

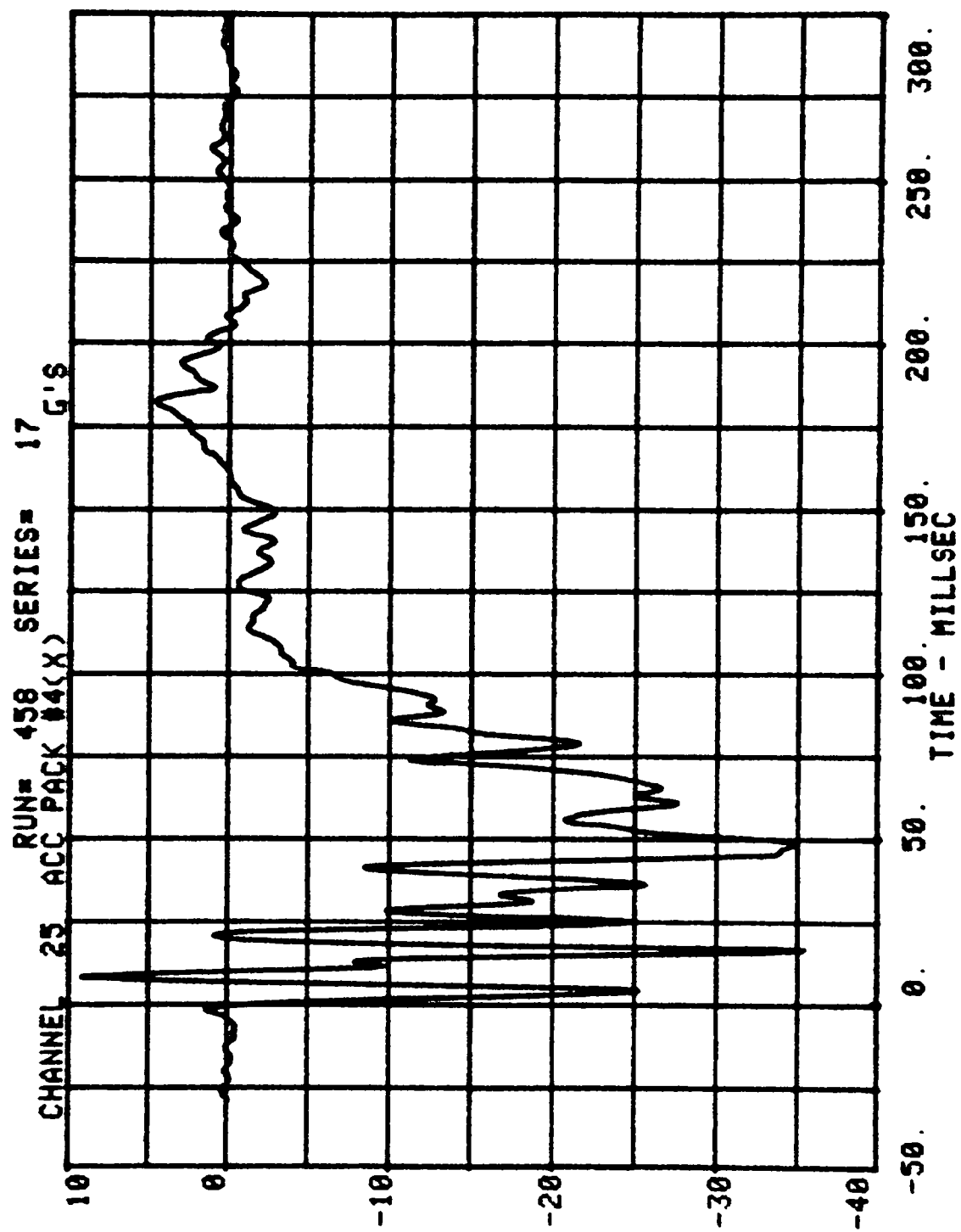


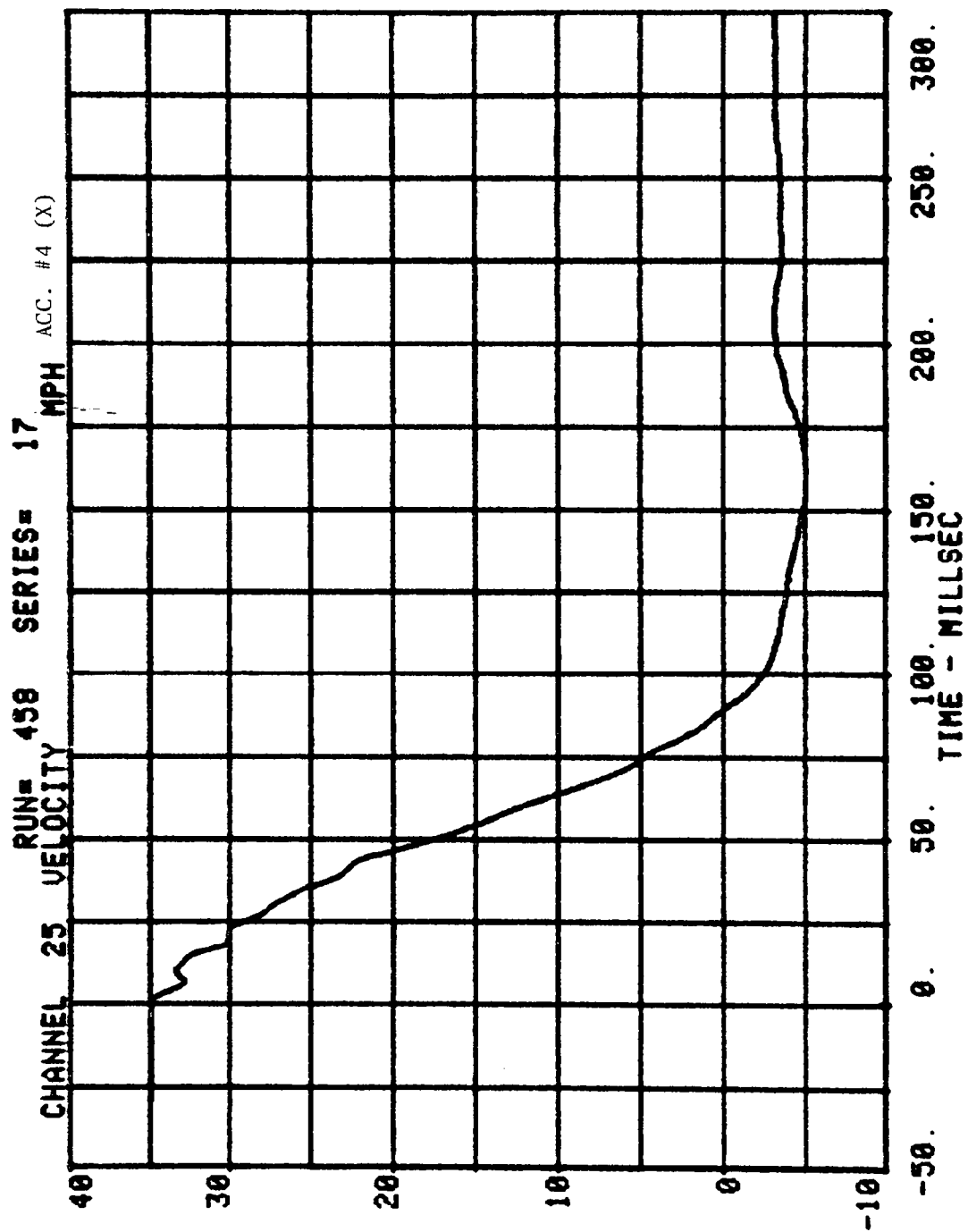


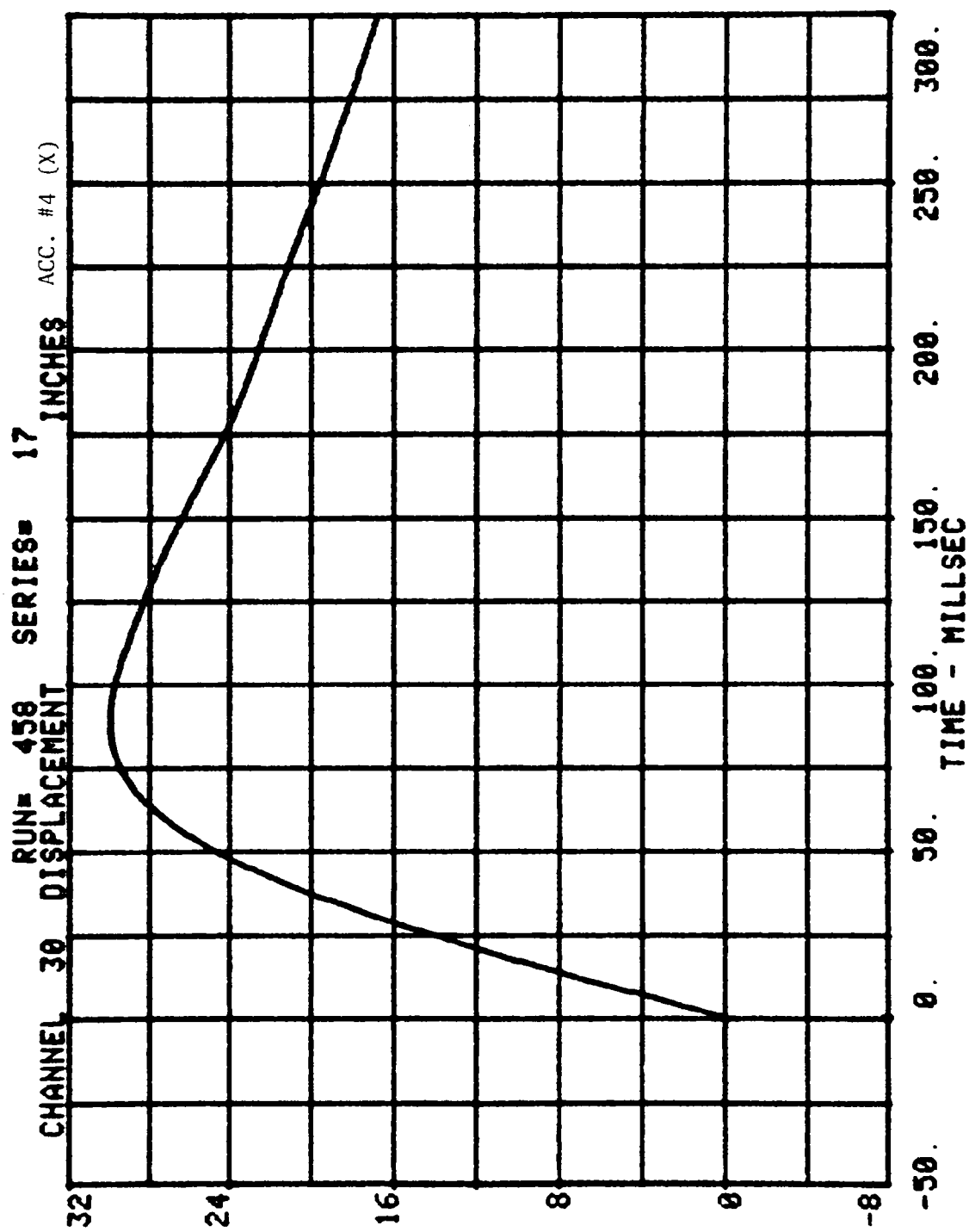


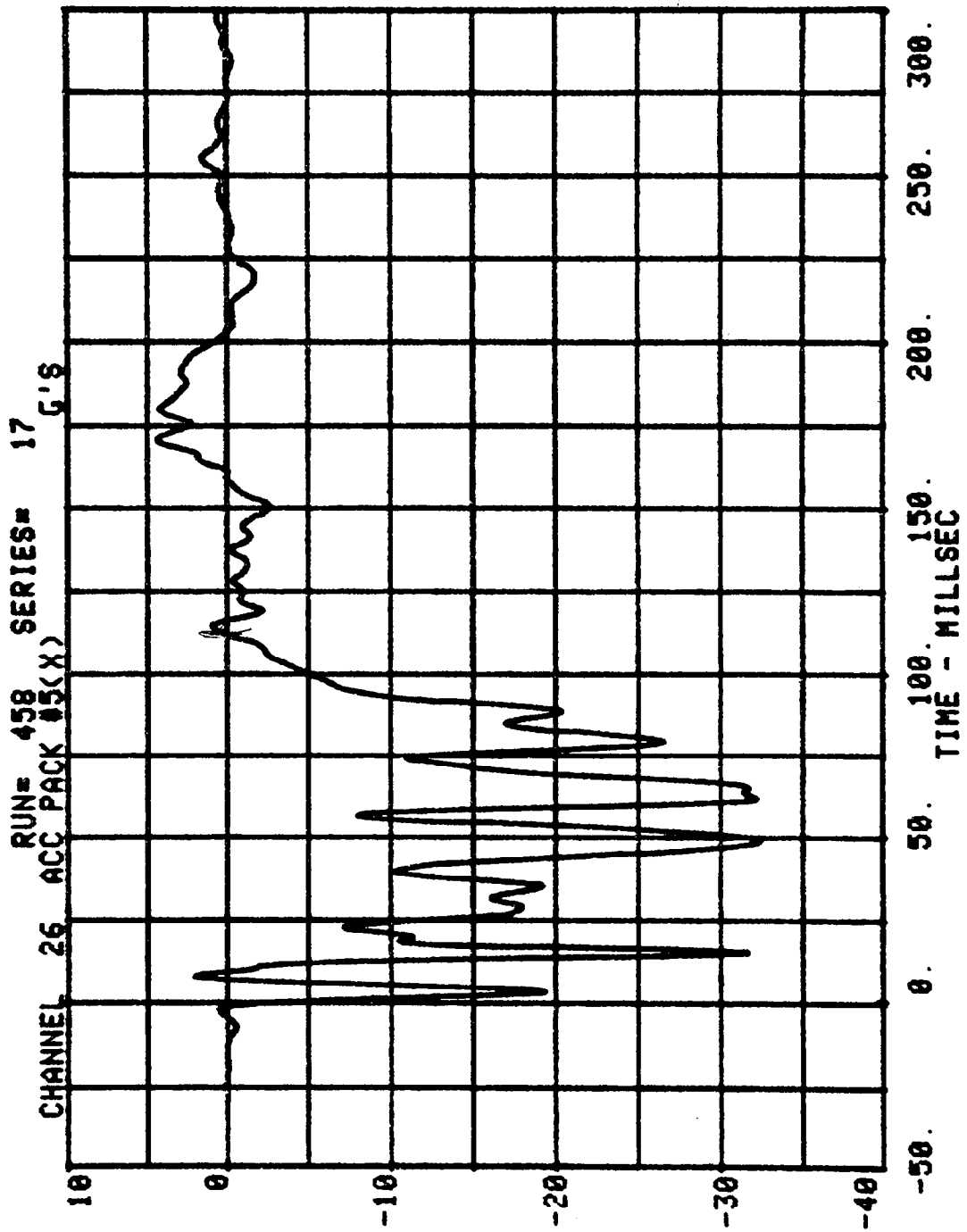


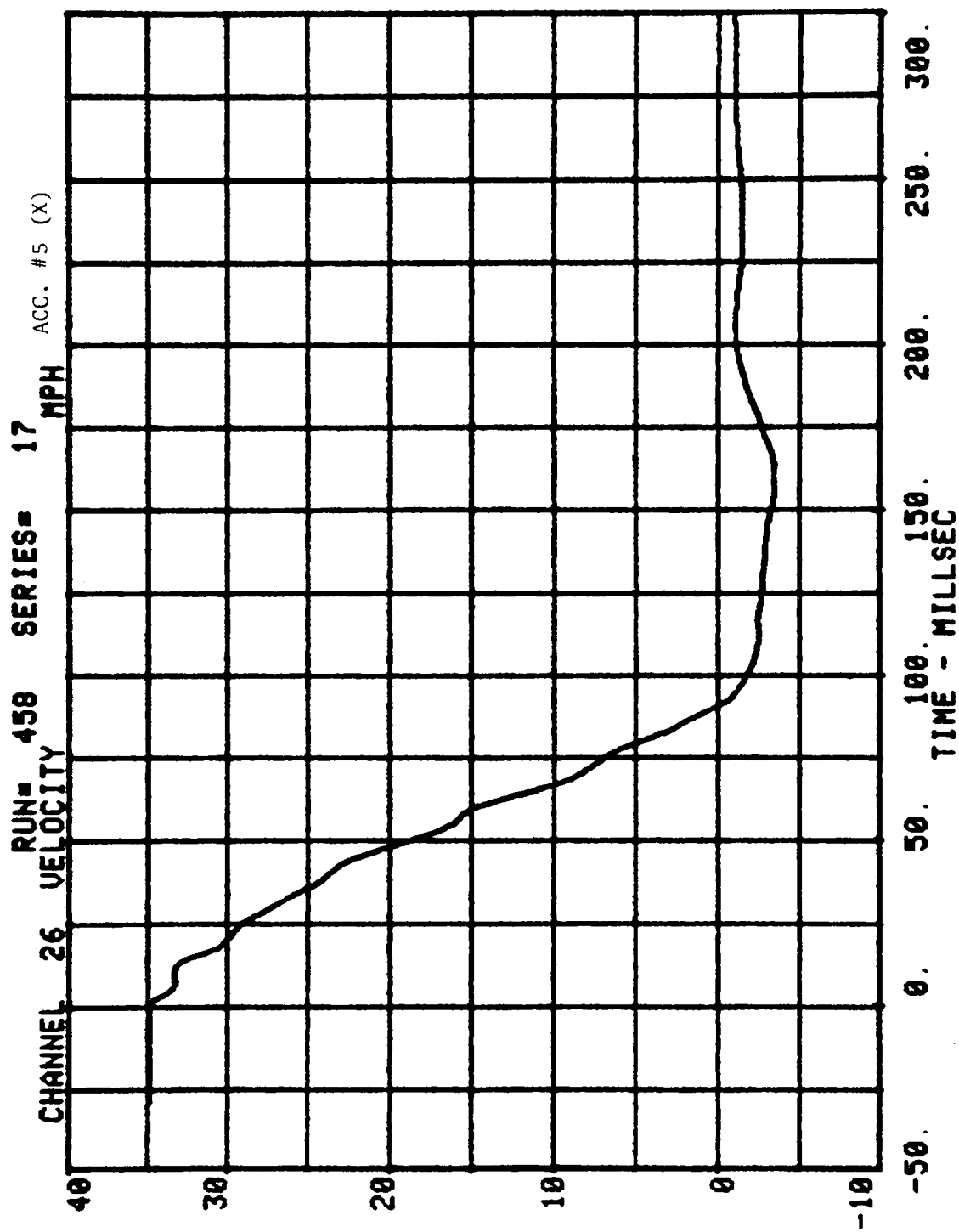


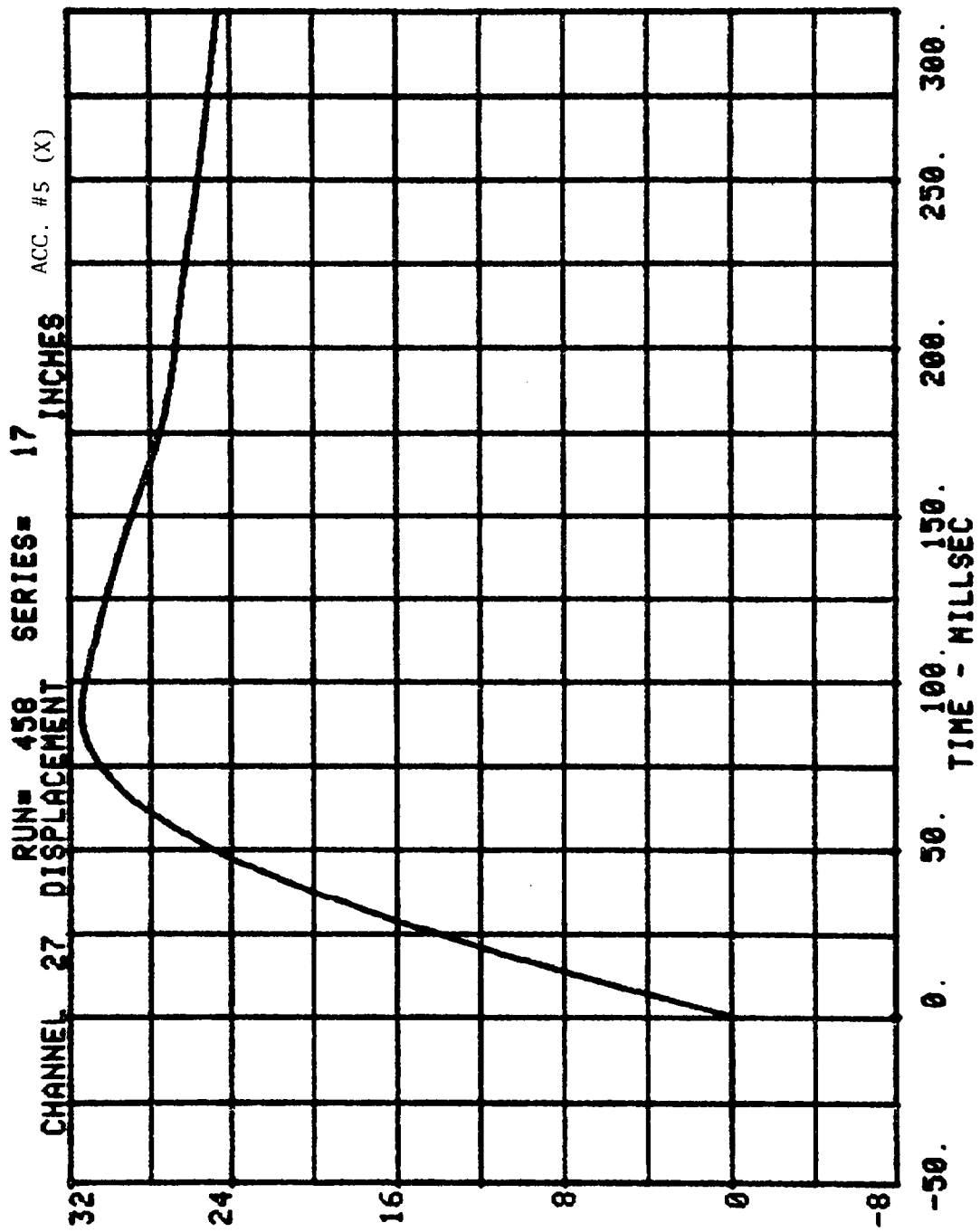


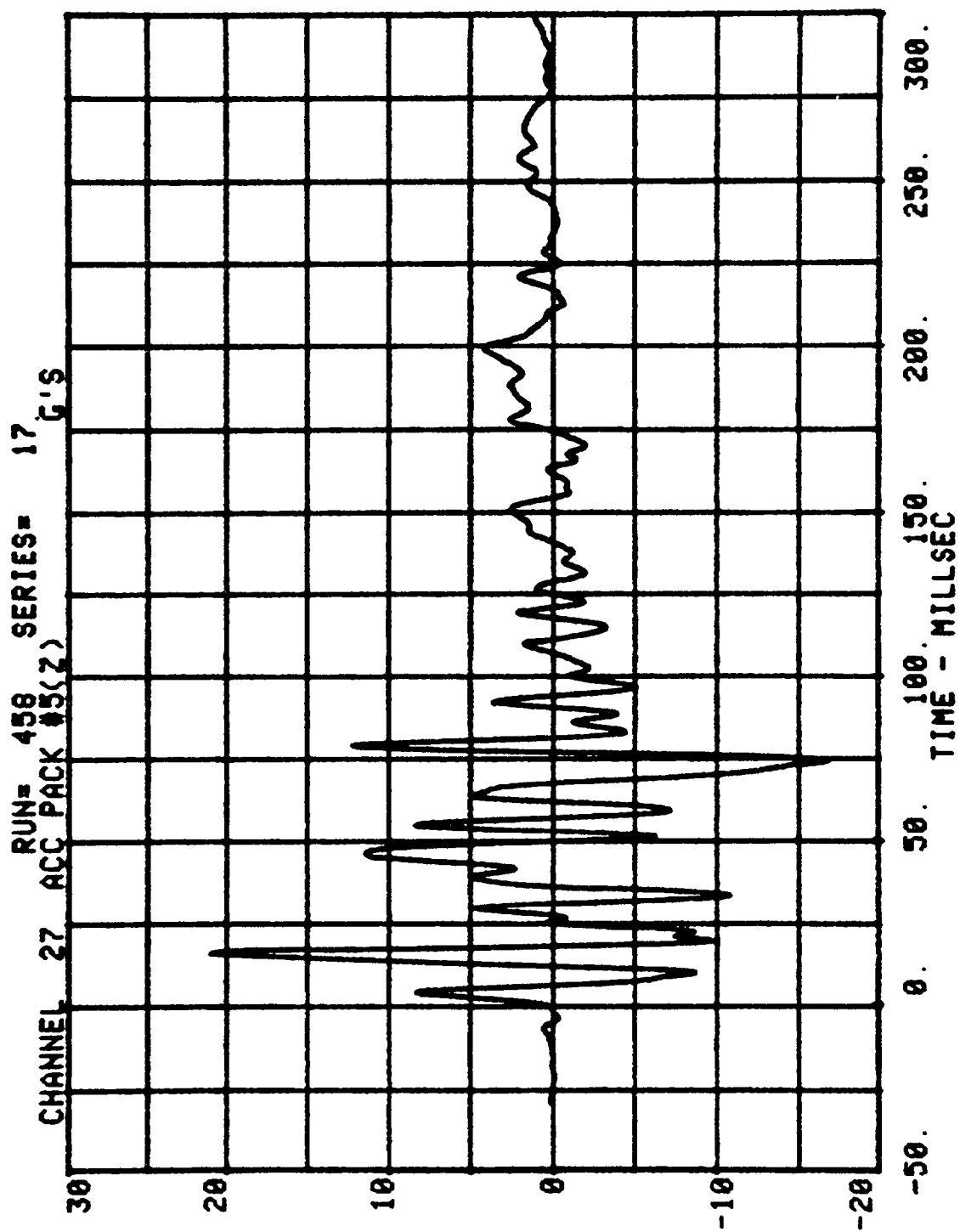




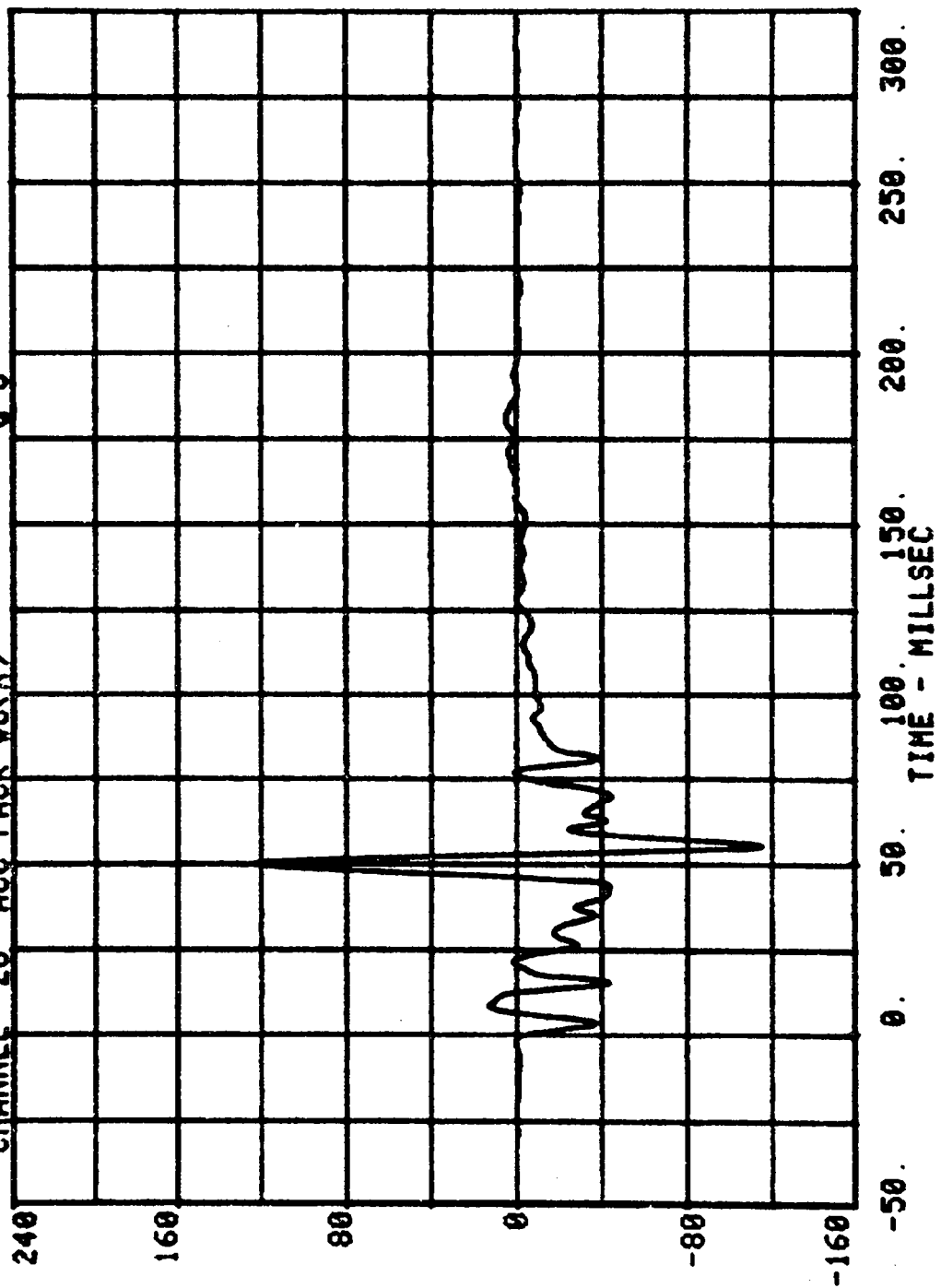


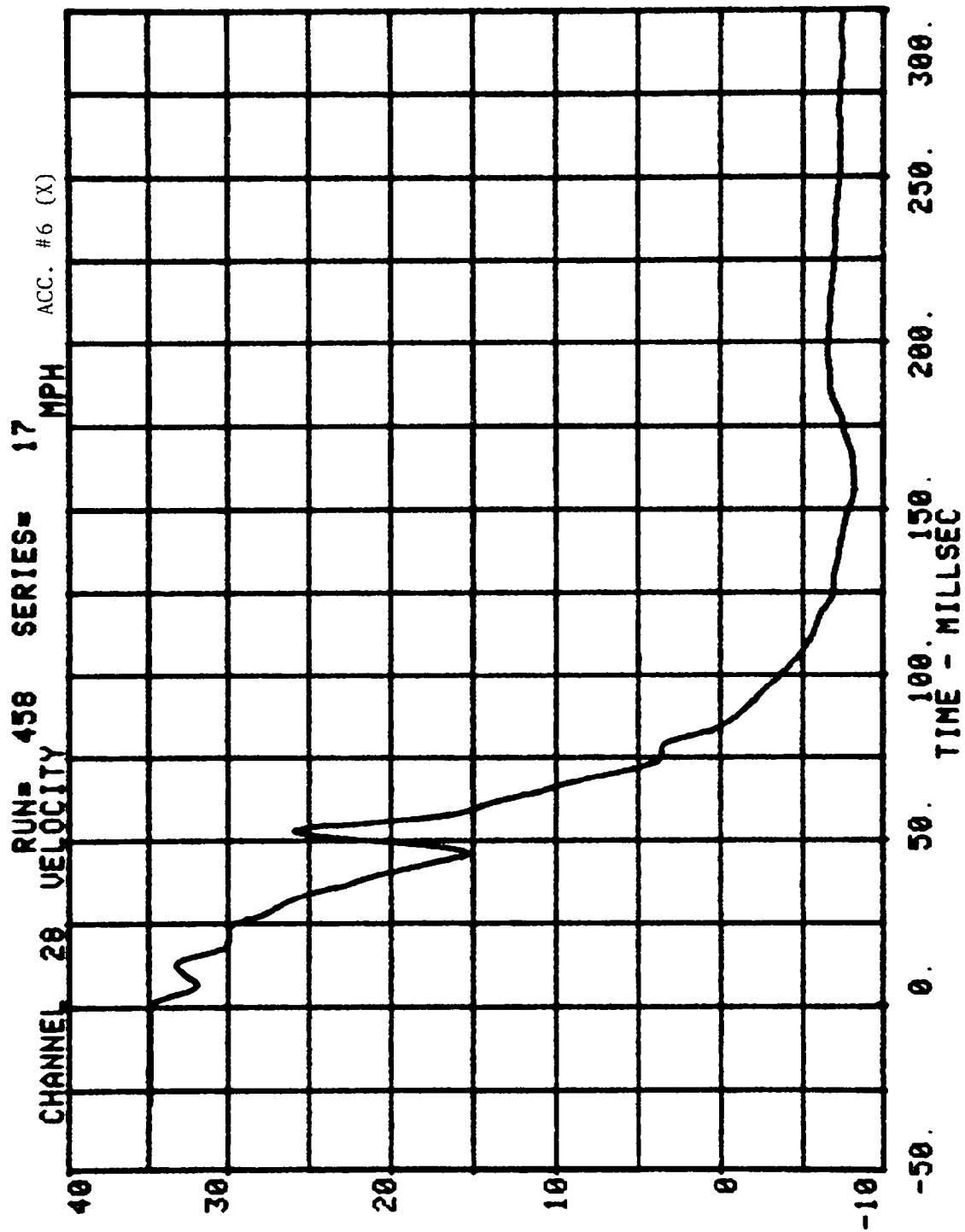


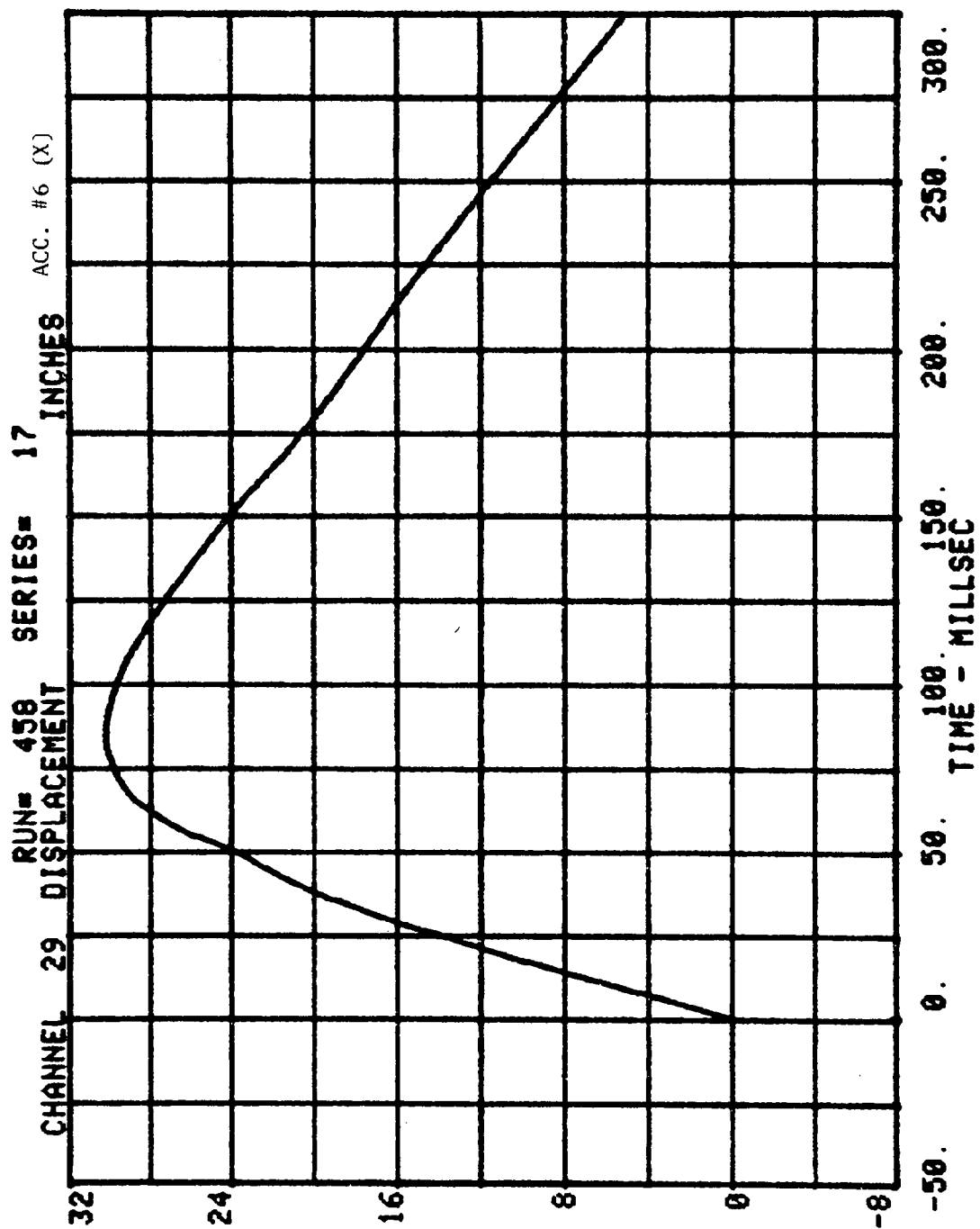


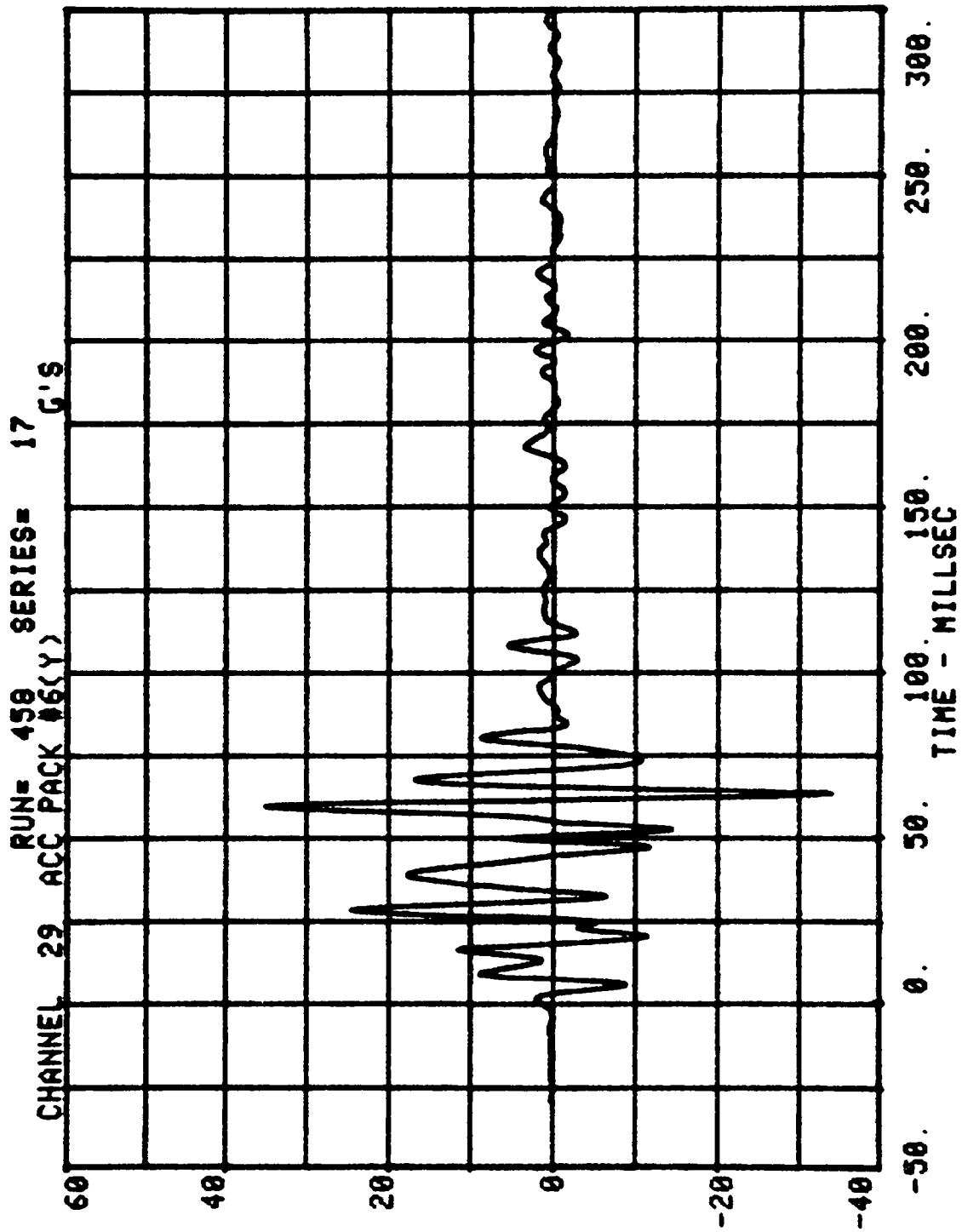


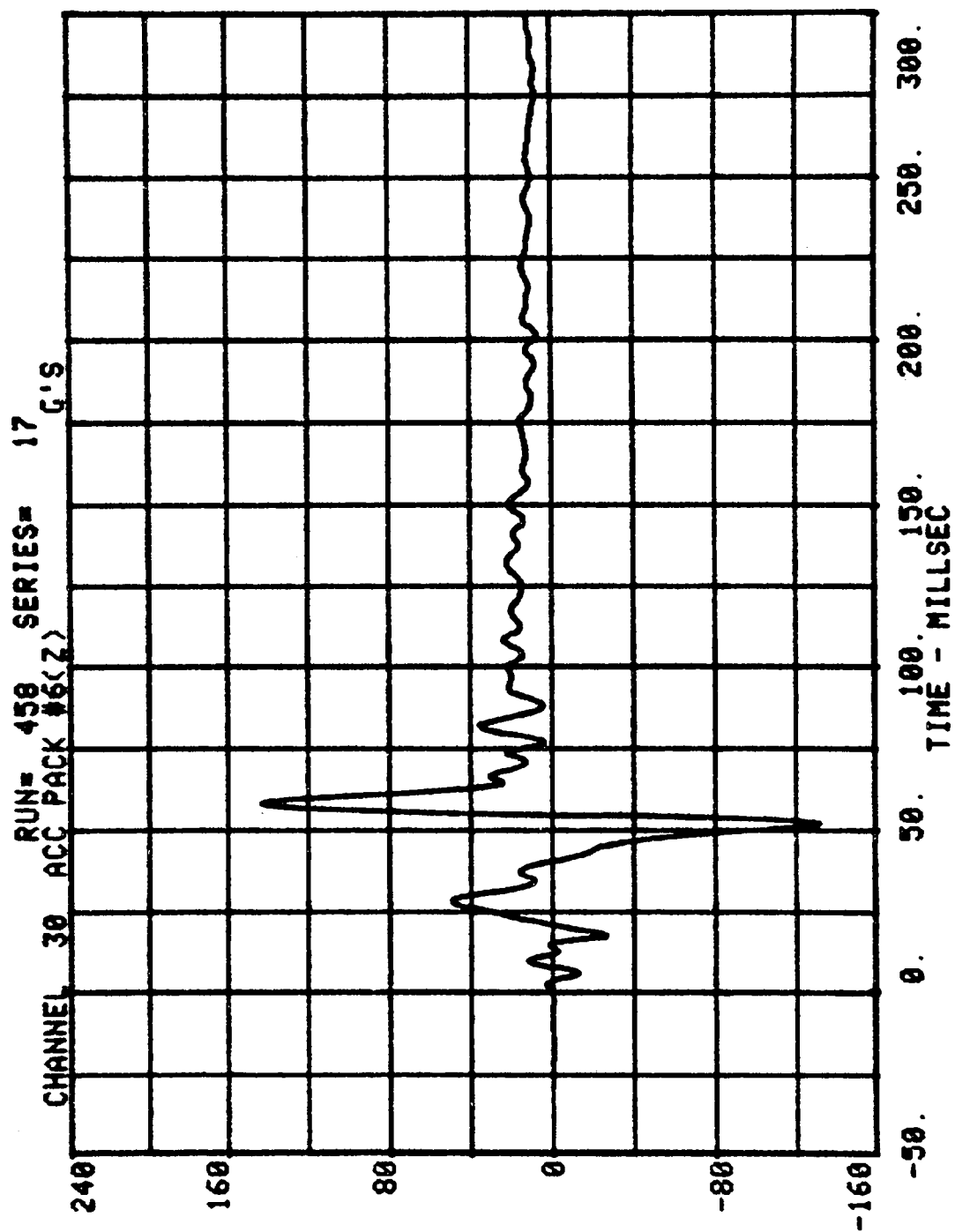
CHANNEL 28 ACC PACK #6(X) RUN= 458 SERIES= 17 G'S

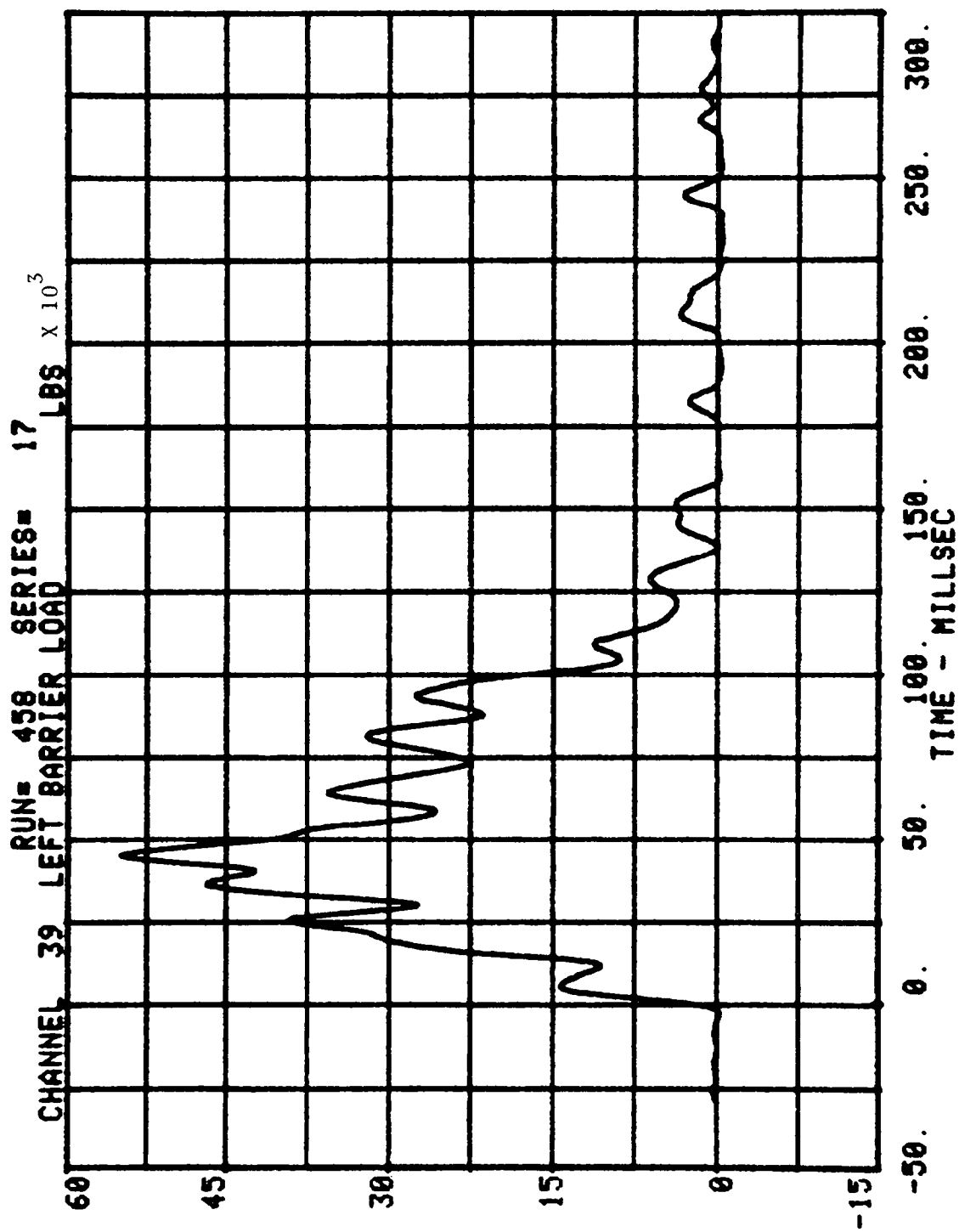


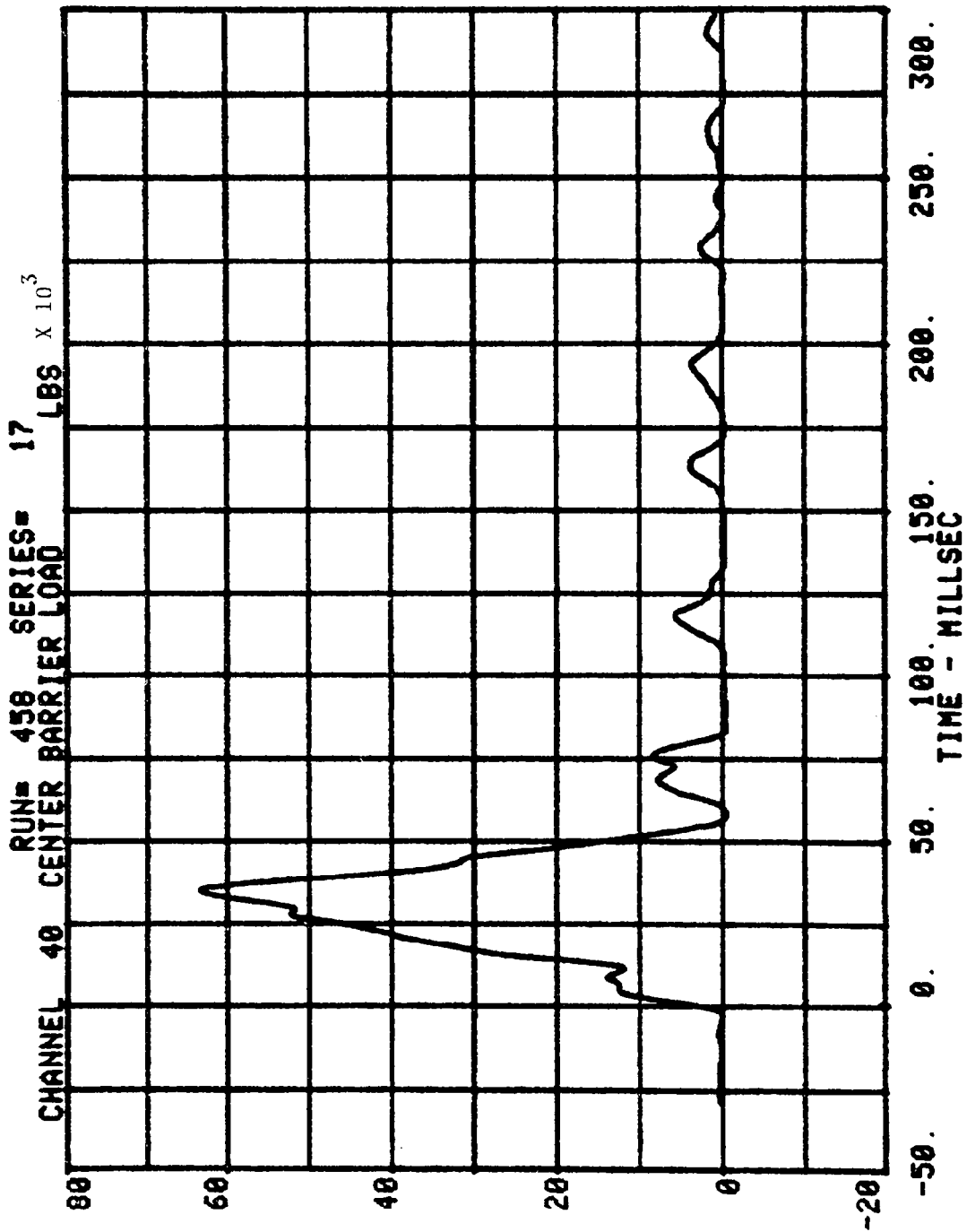


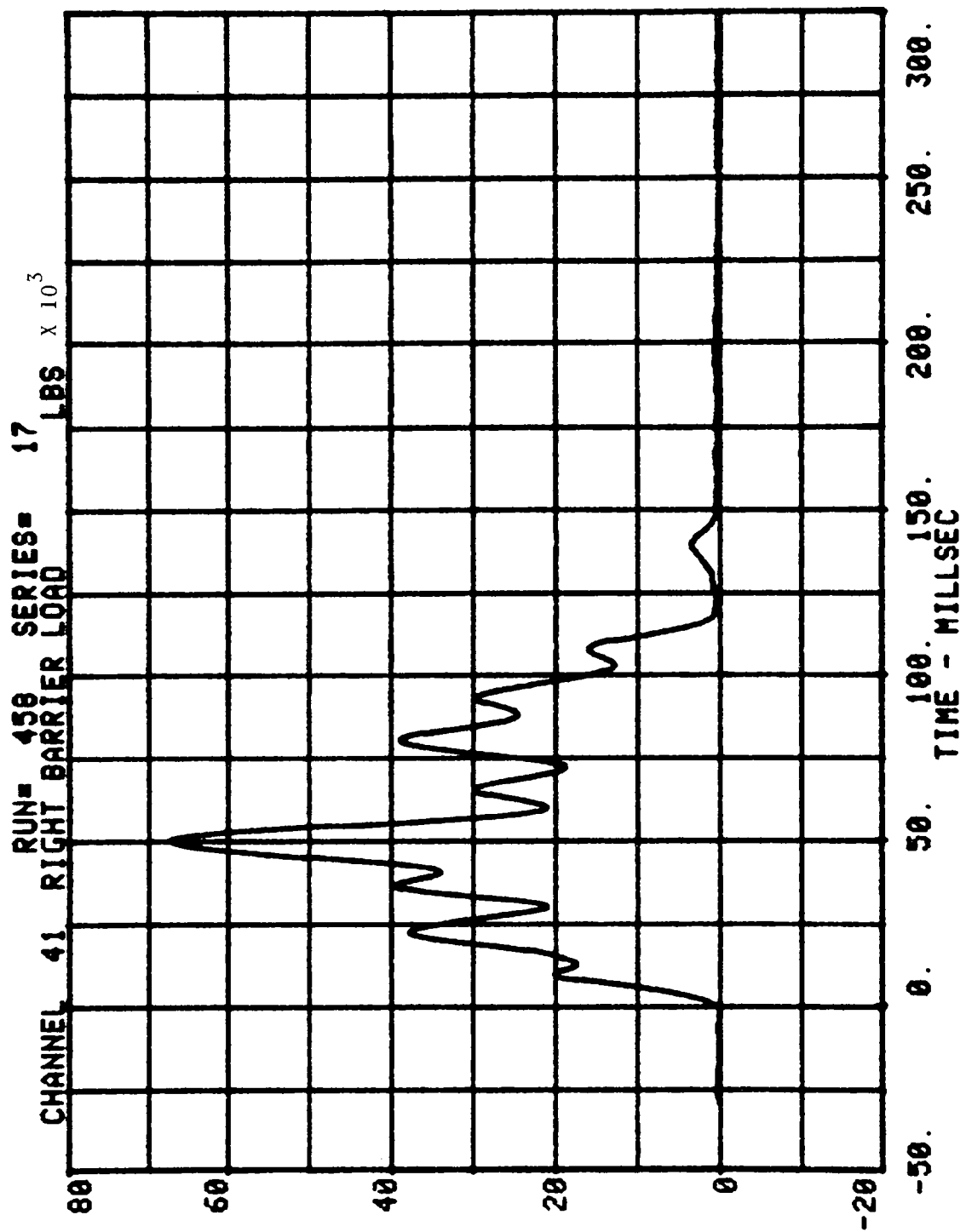


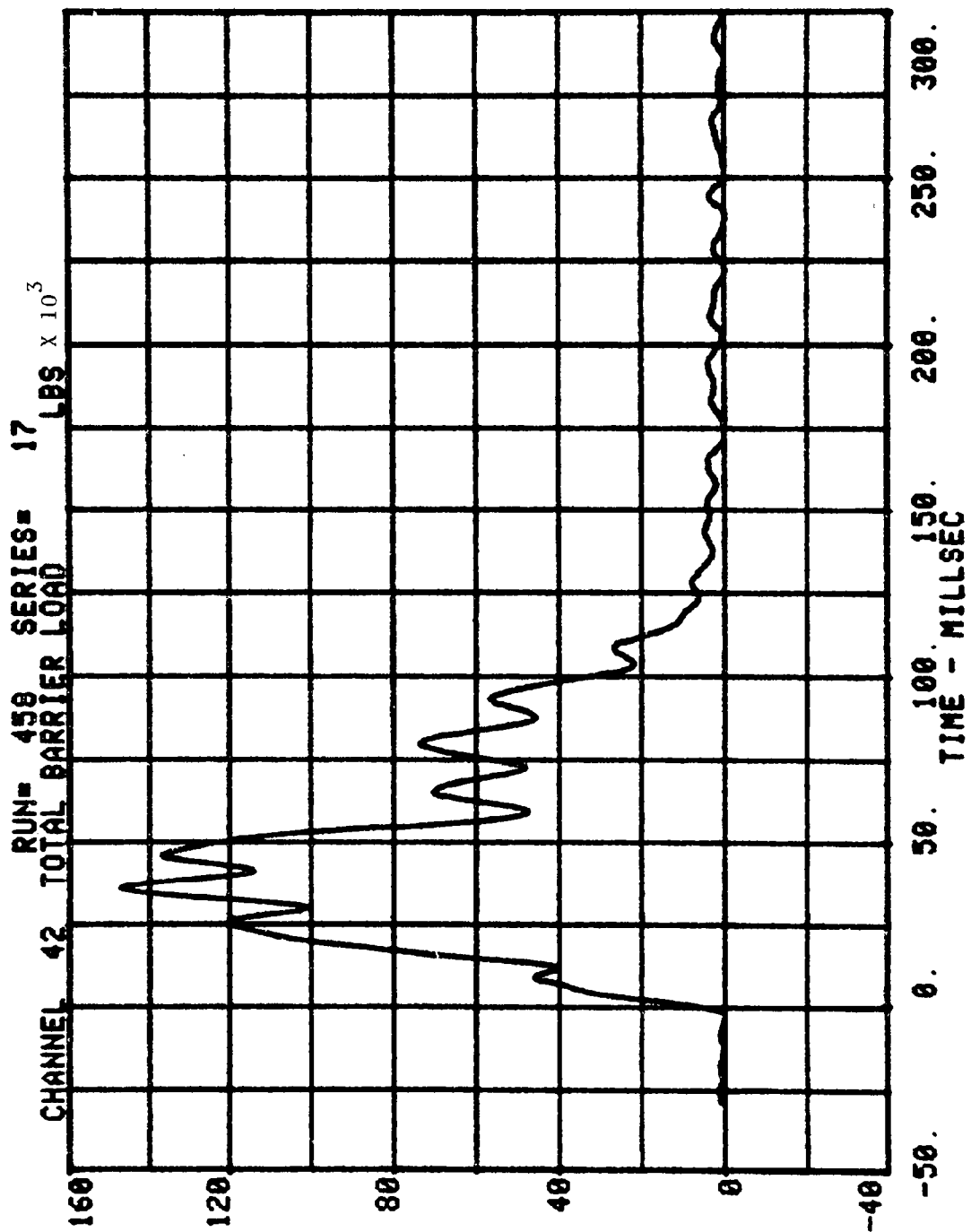












TEST NO. 308-17-458
1979 CHRYSLER LeBARON
DUMMY DATA

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

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

BOA #17 LA BARON BARRIER TEST

RUN= 458

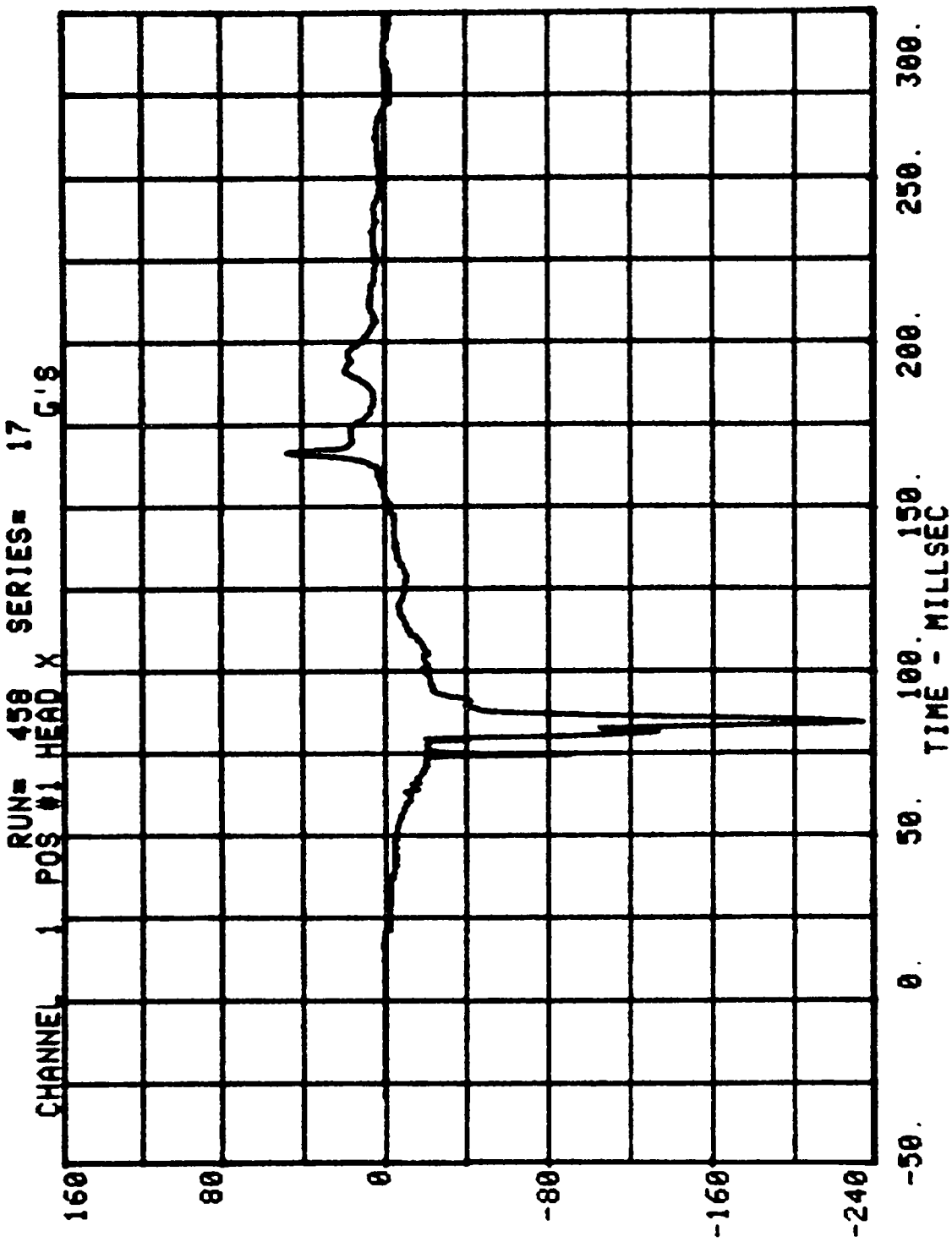
POS #1 HEAD RESULTANT

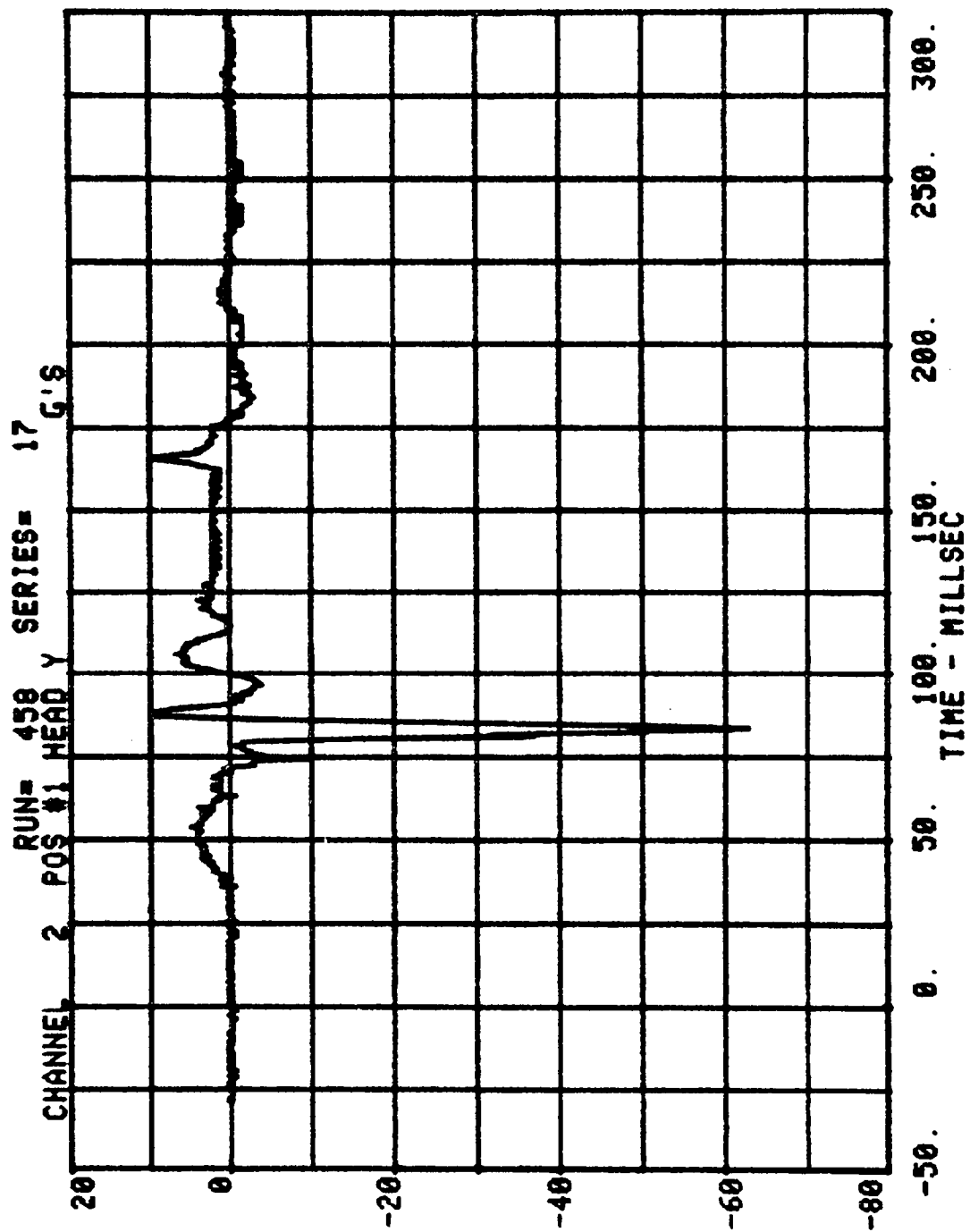
HIC=2402.4 FROM T1= .08010 TO T2= .08880

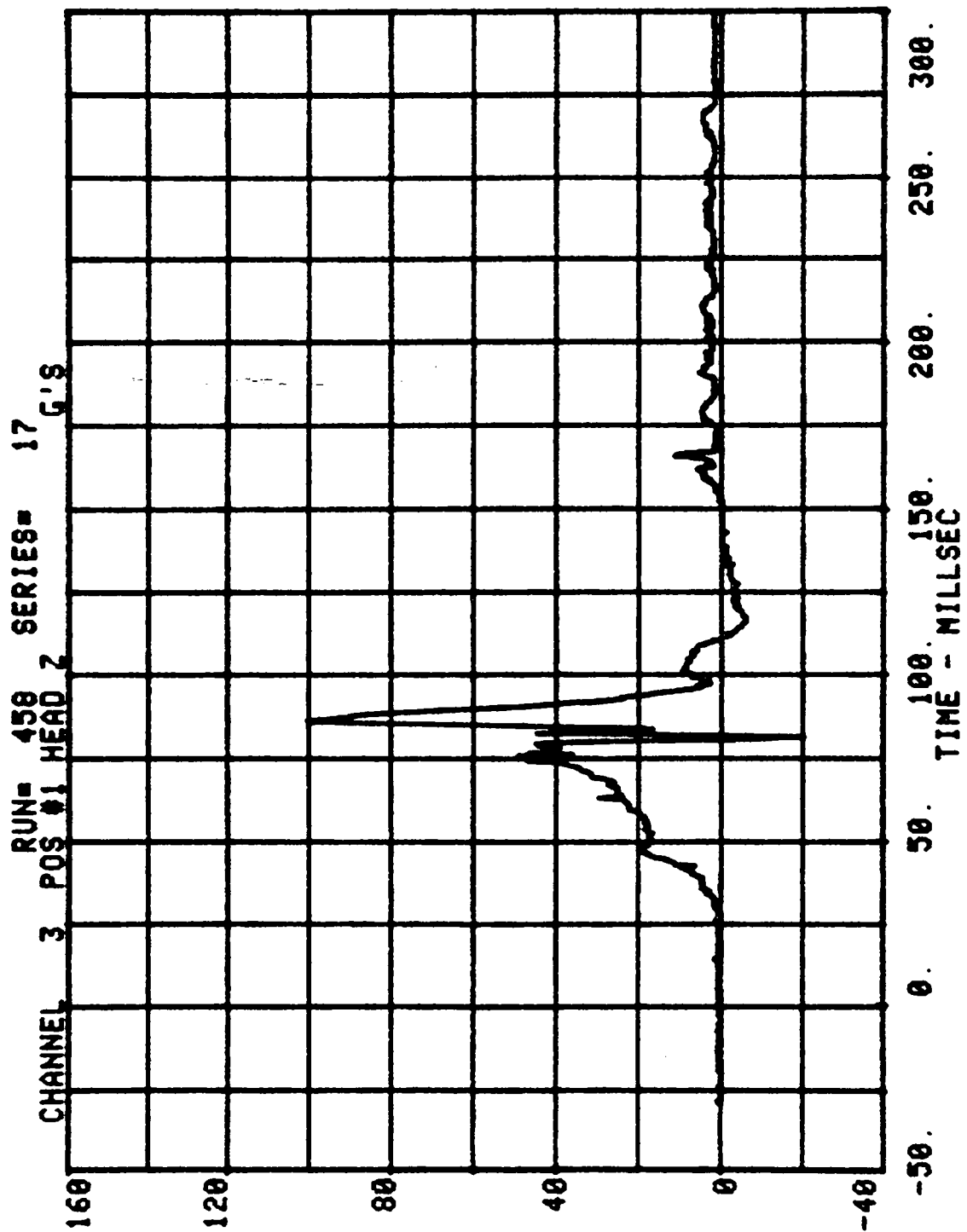
AVERAGE ACCELERATION BETWEEN T1 AND T2= 150.1G'S

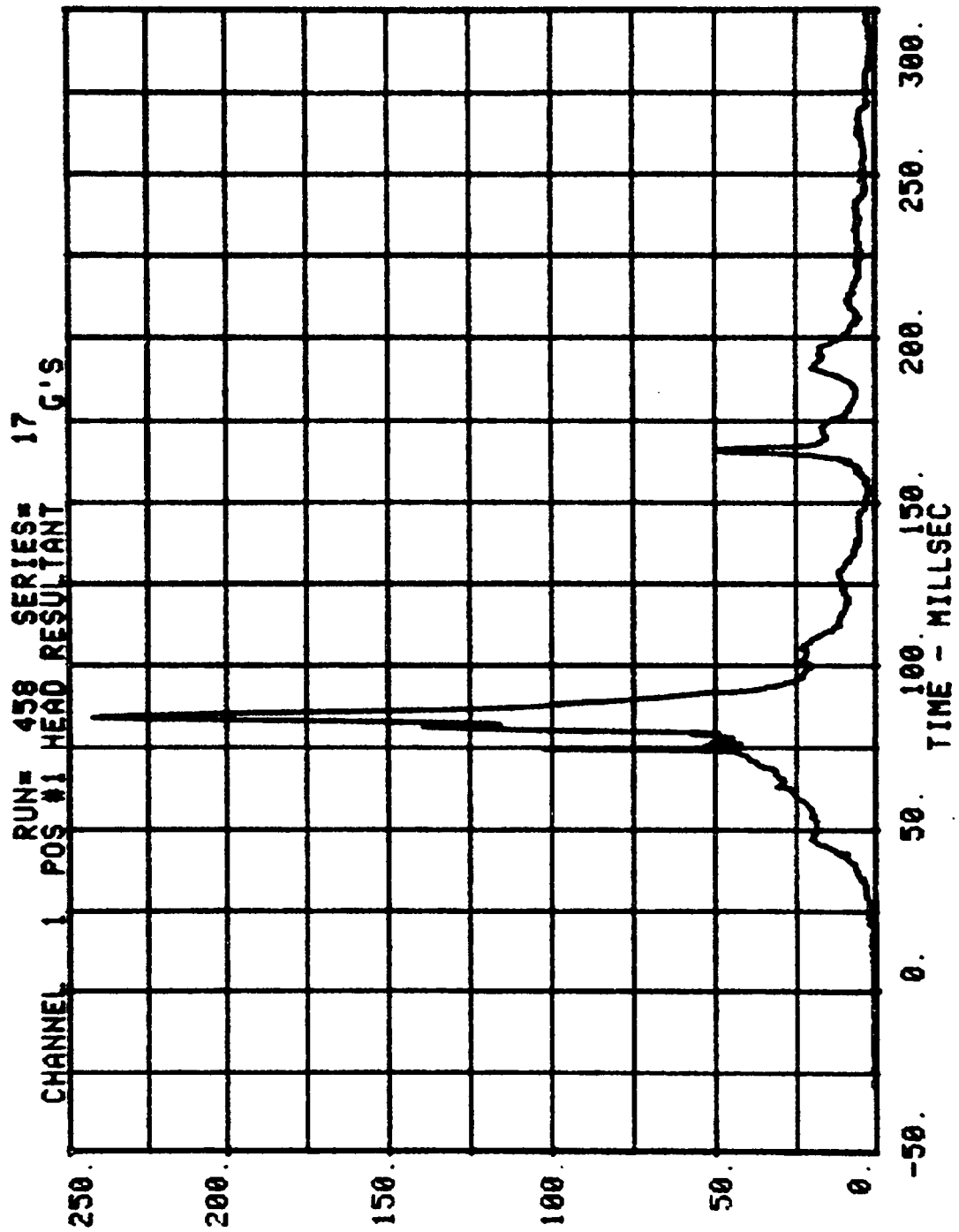
EVENT TIME= 300.0 MSEC

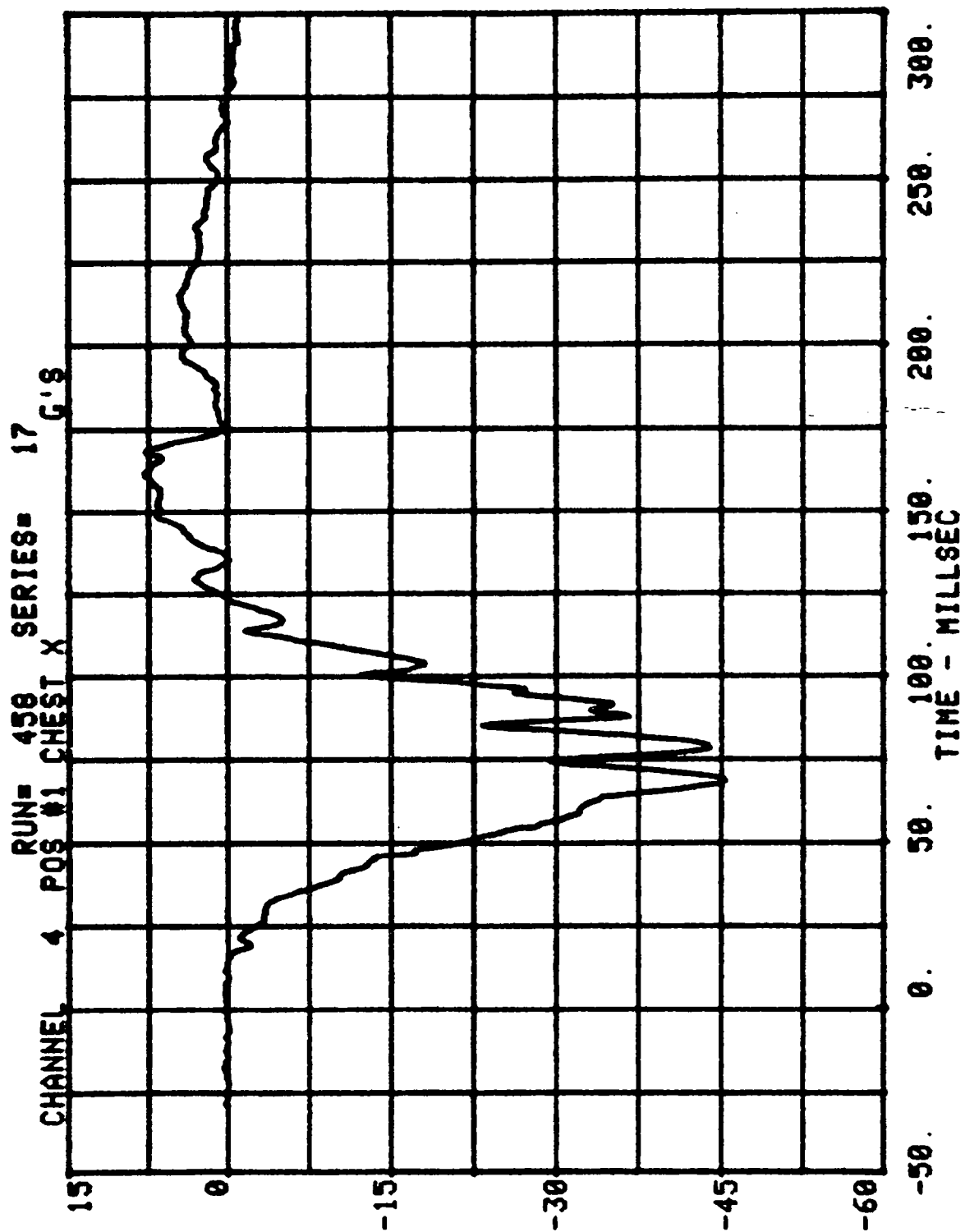
SEVERITY INDEX=3395.7

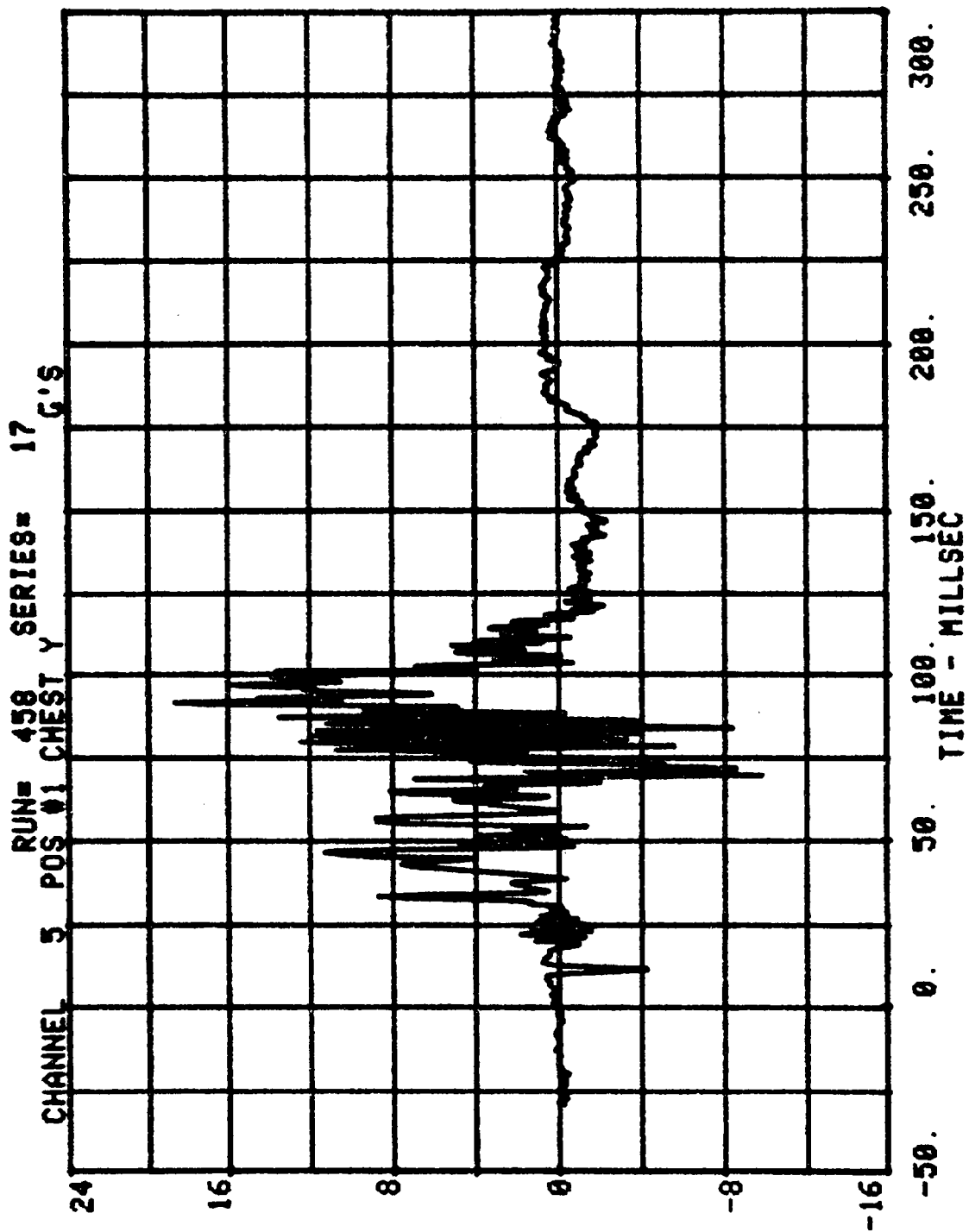


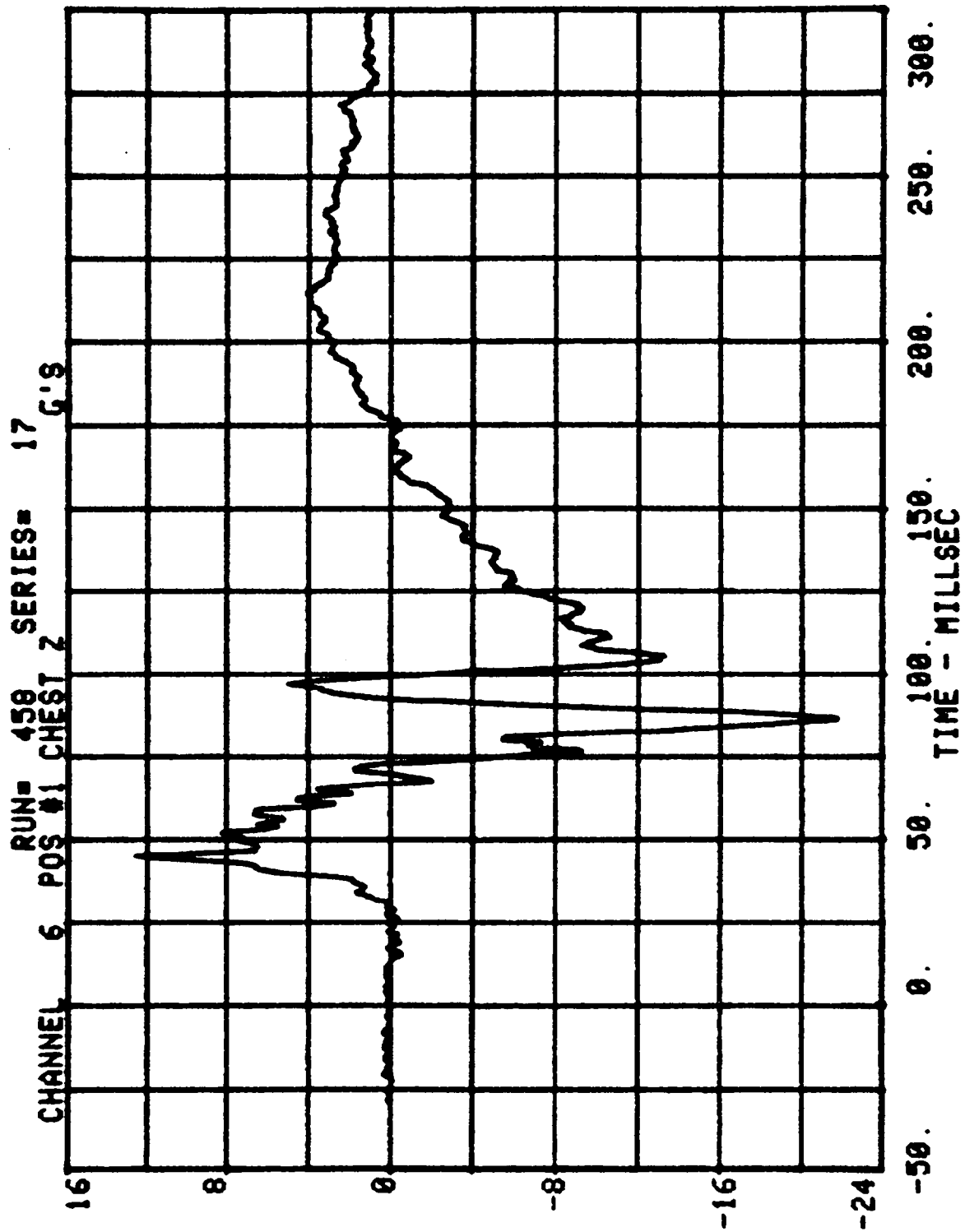




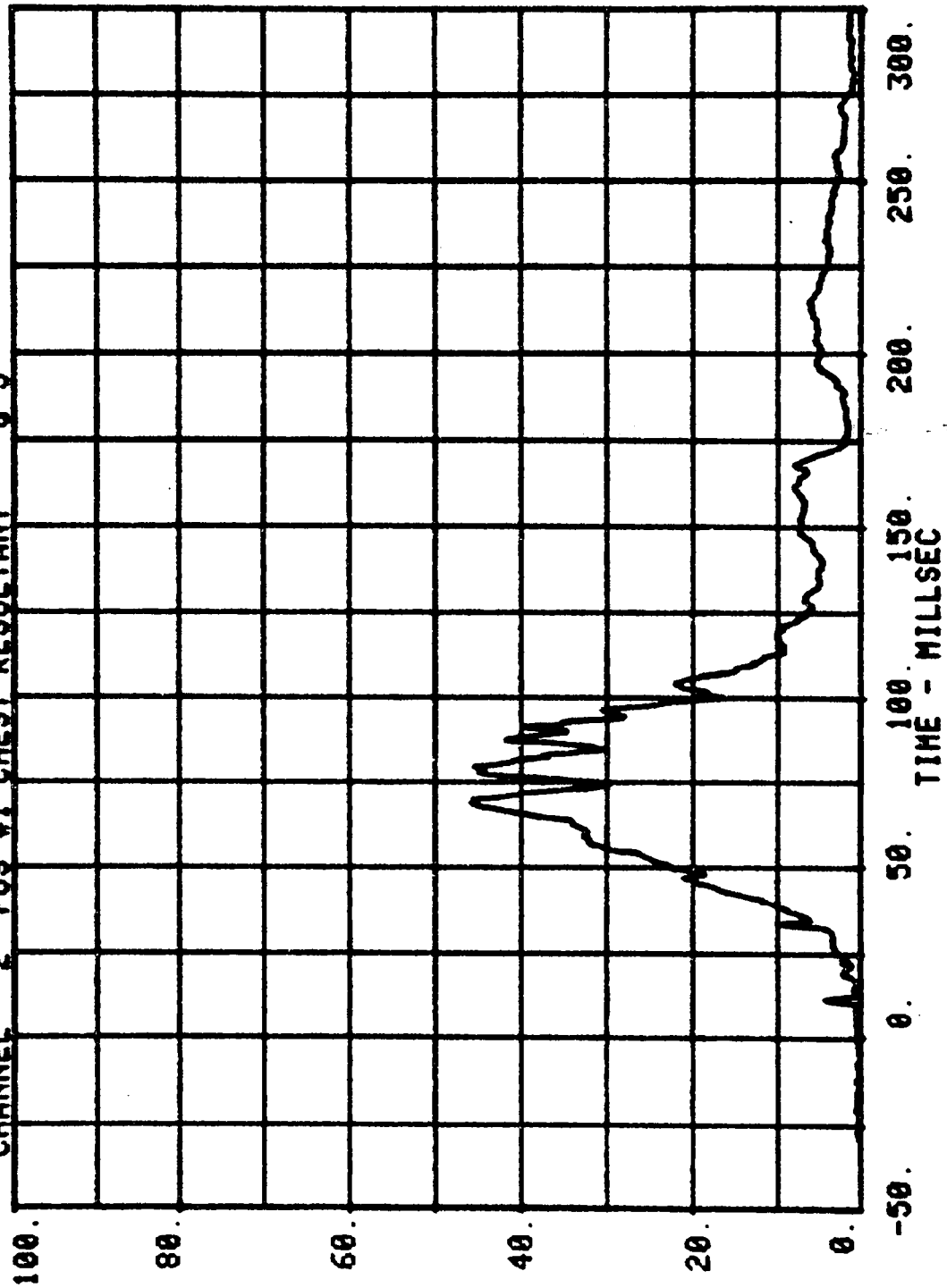








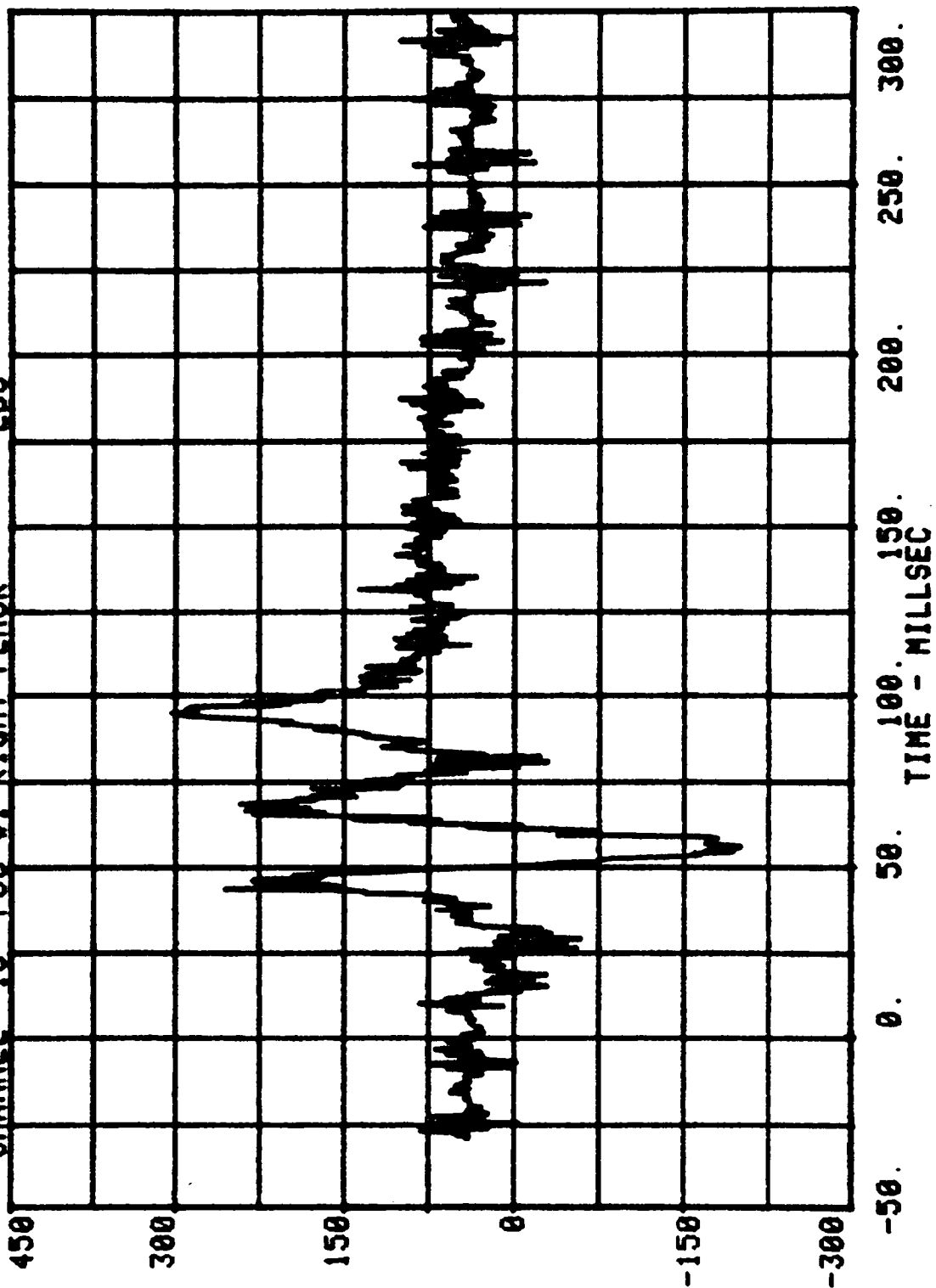
CHANNEL 2 POS #1 CHEST RESULTANT 17 G'S

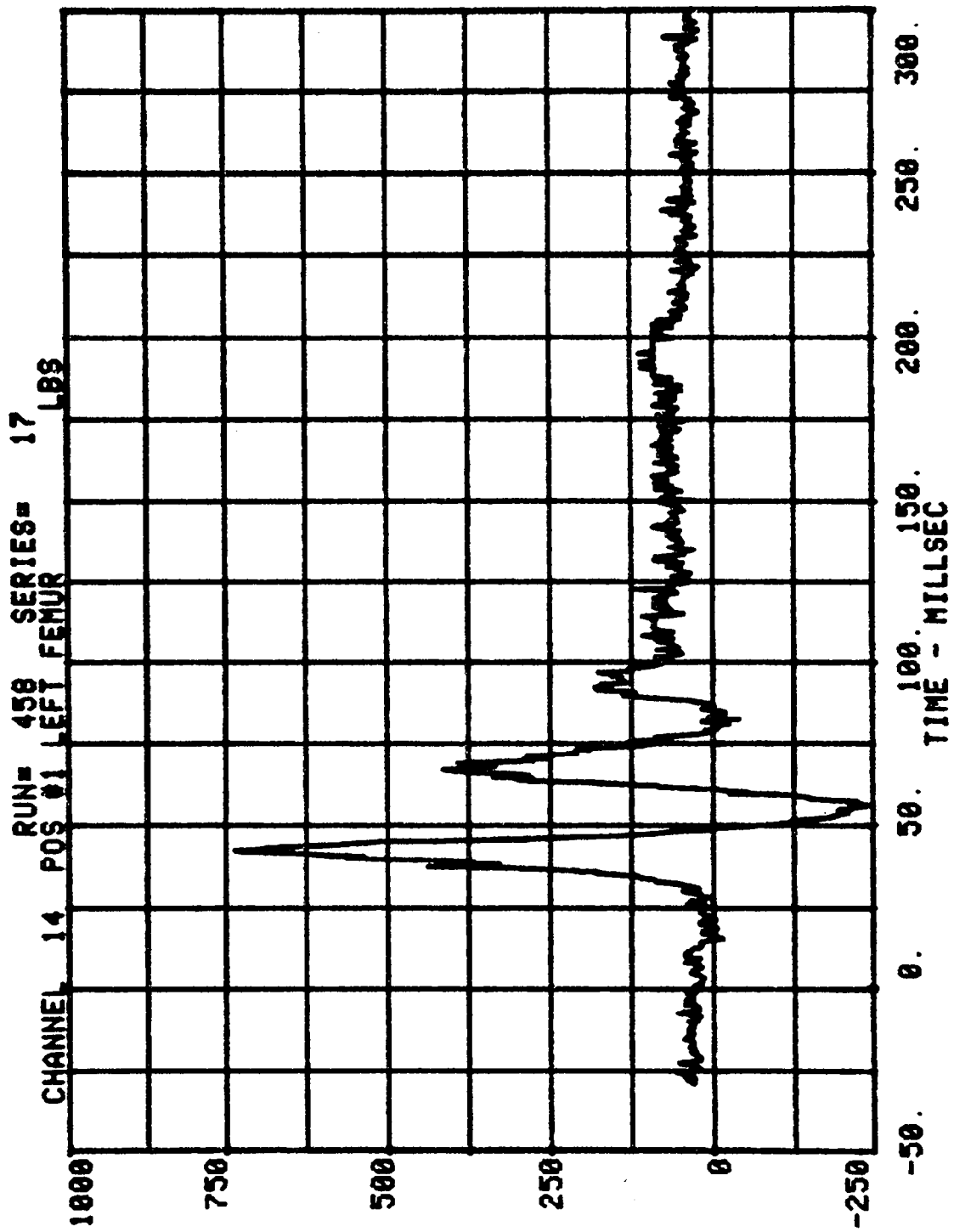


CHANNEL 13 POS #1 RIGHT FEMUR

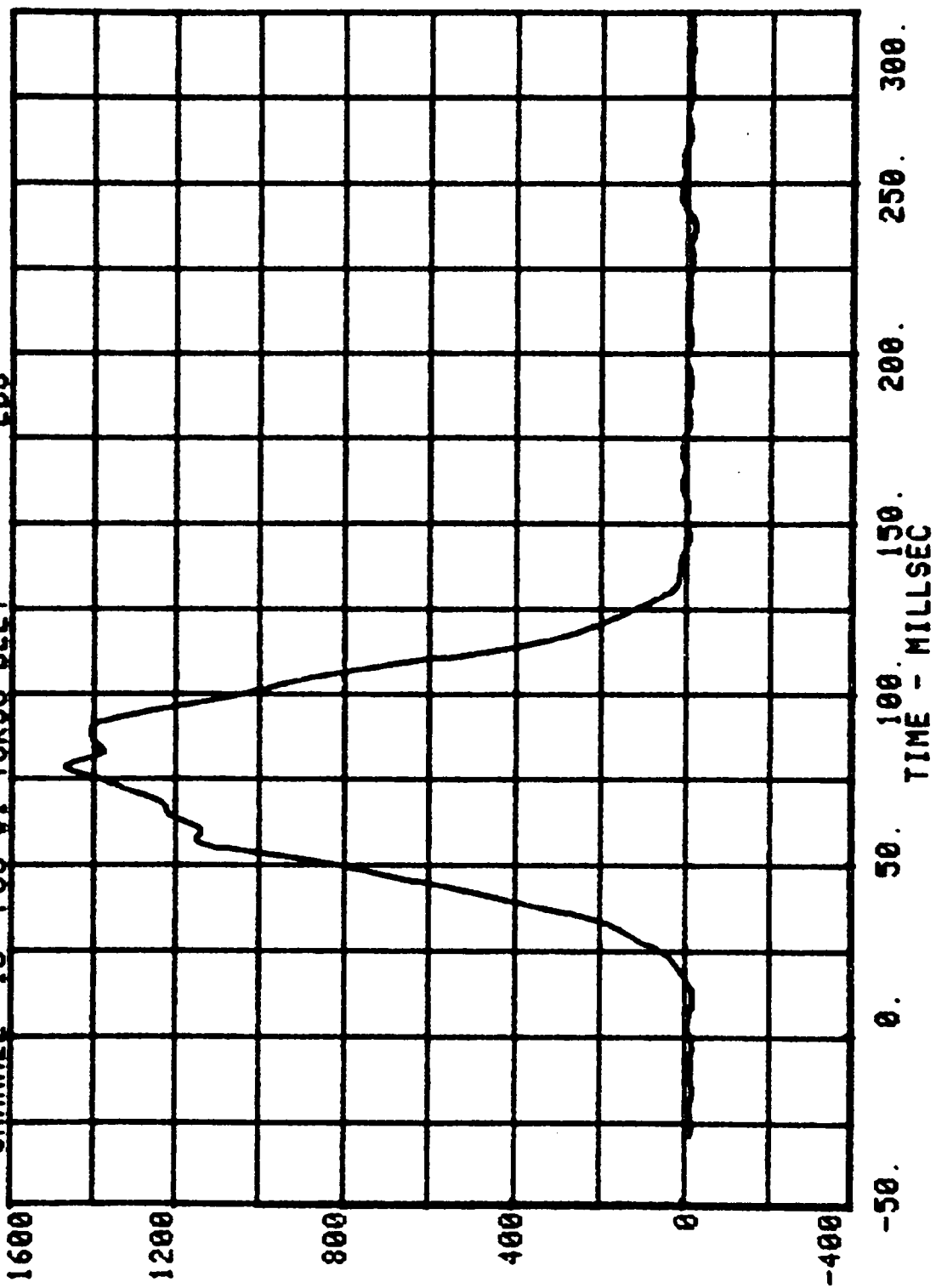
RUN= 450 SERIES= 17

LBS





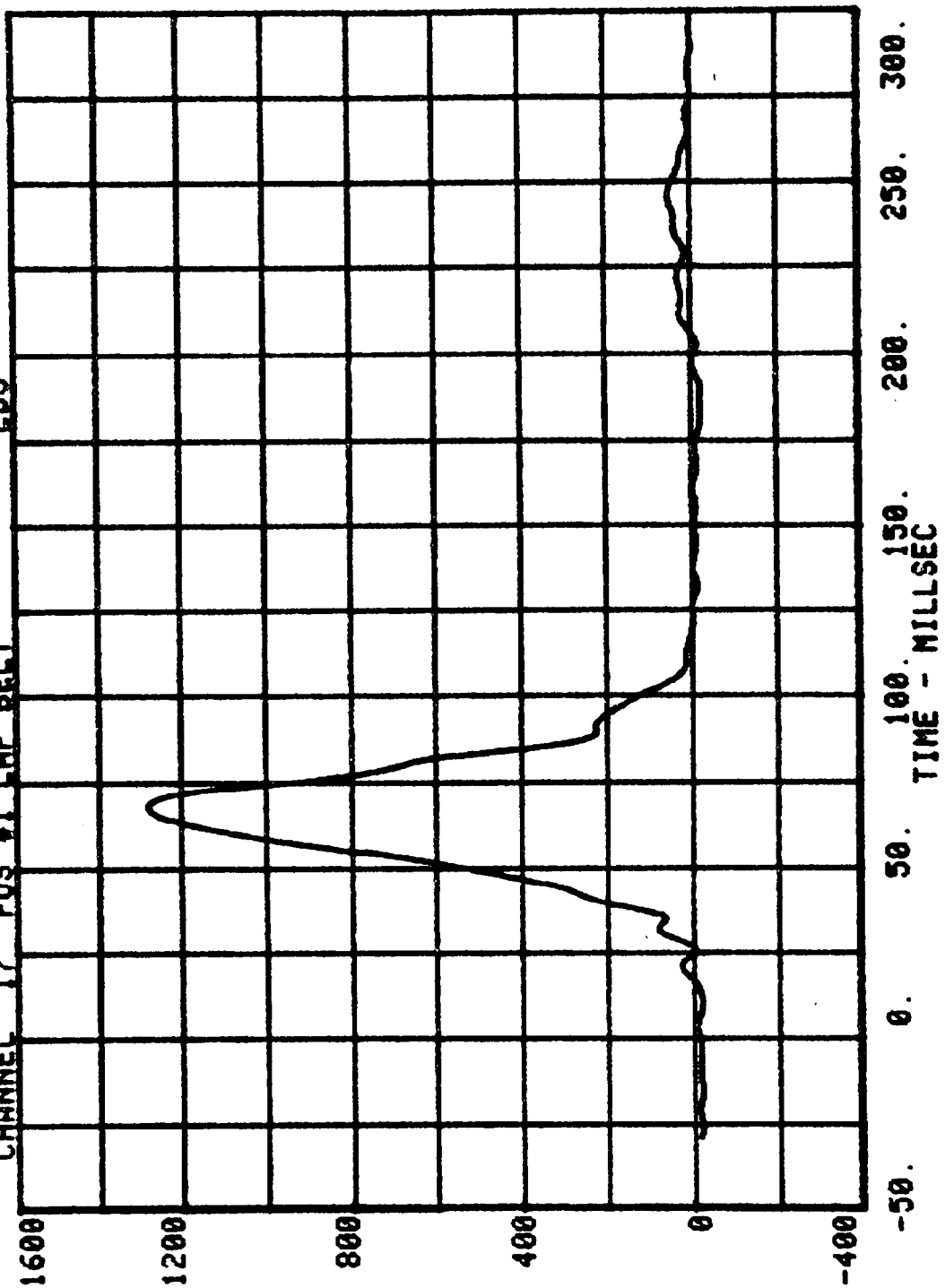
CHANNEL 18 POS #1 TORSO BELT
RUN= 438 SERIES= 17 LBS



CHANNEL 17 POS #1 LAP BELT

RUN= 458 SERIES= 17

LBS



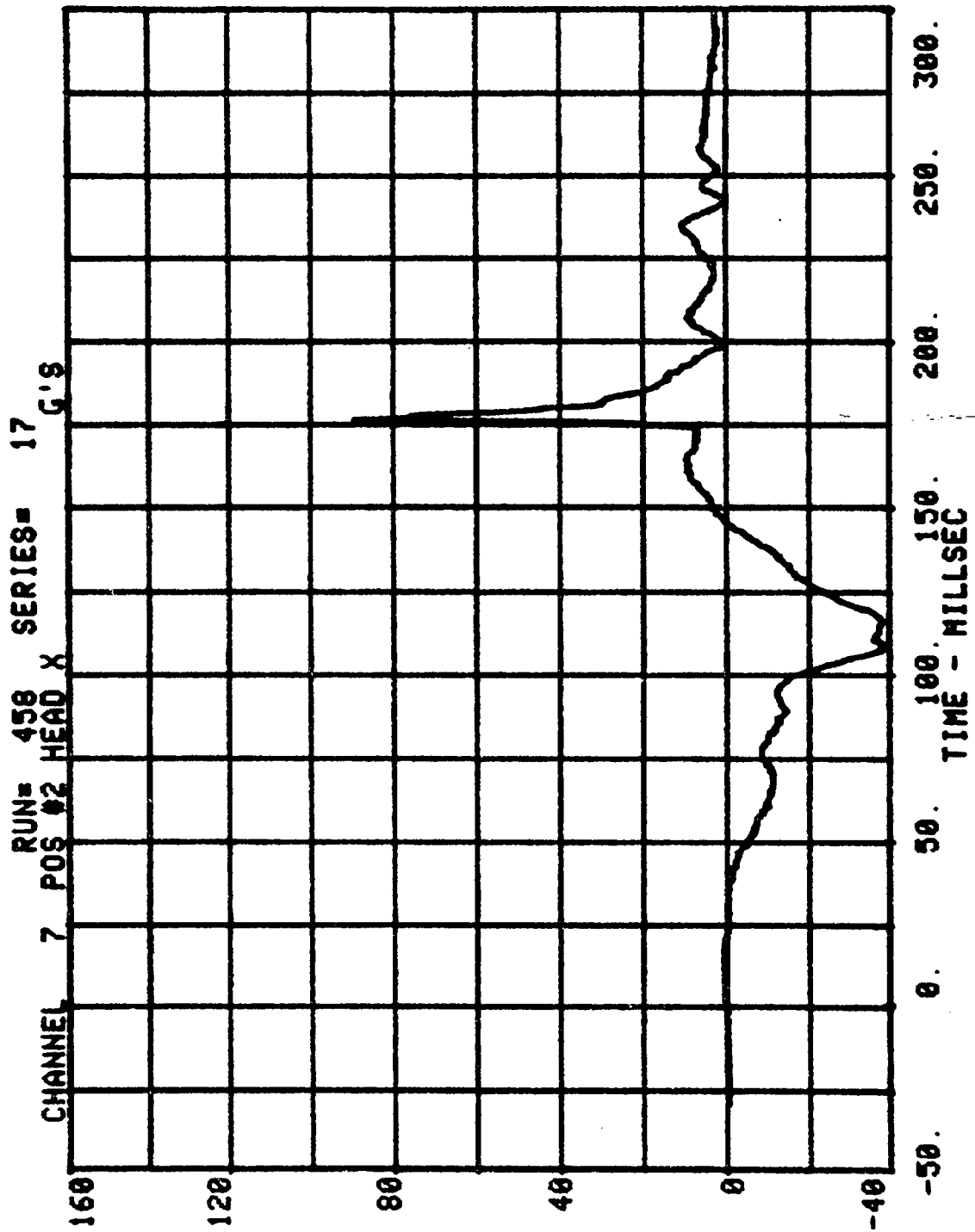
HEAD INJURY CRITERION
HEAD SEVERITY INDEX

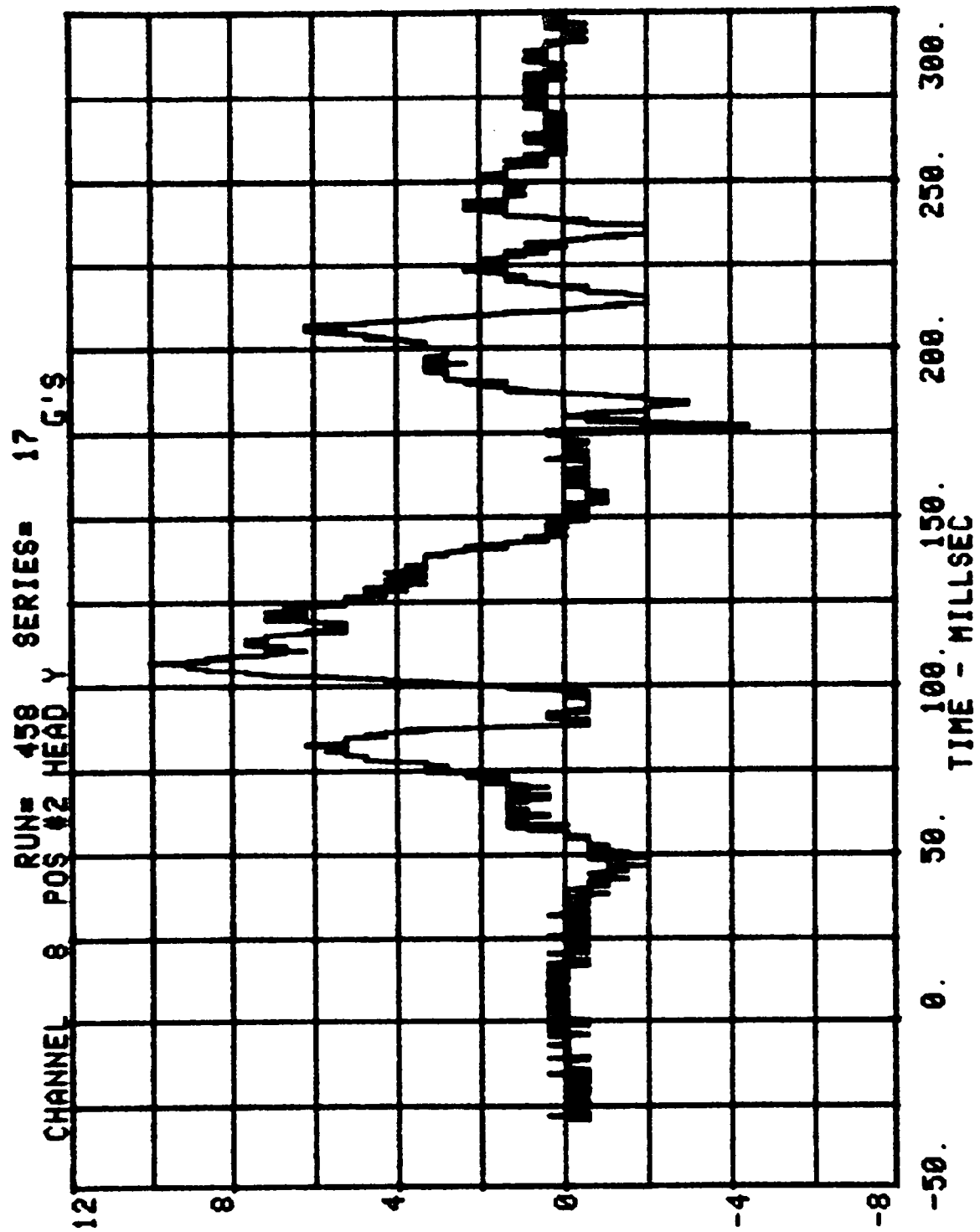
BOA #17 LA BARON BARRIER TEST

RUN= 458

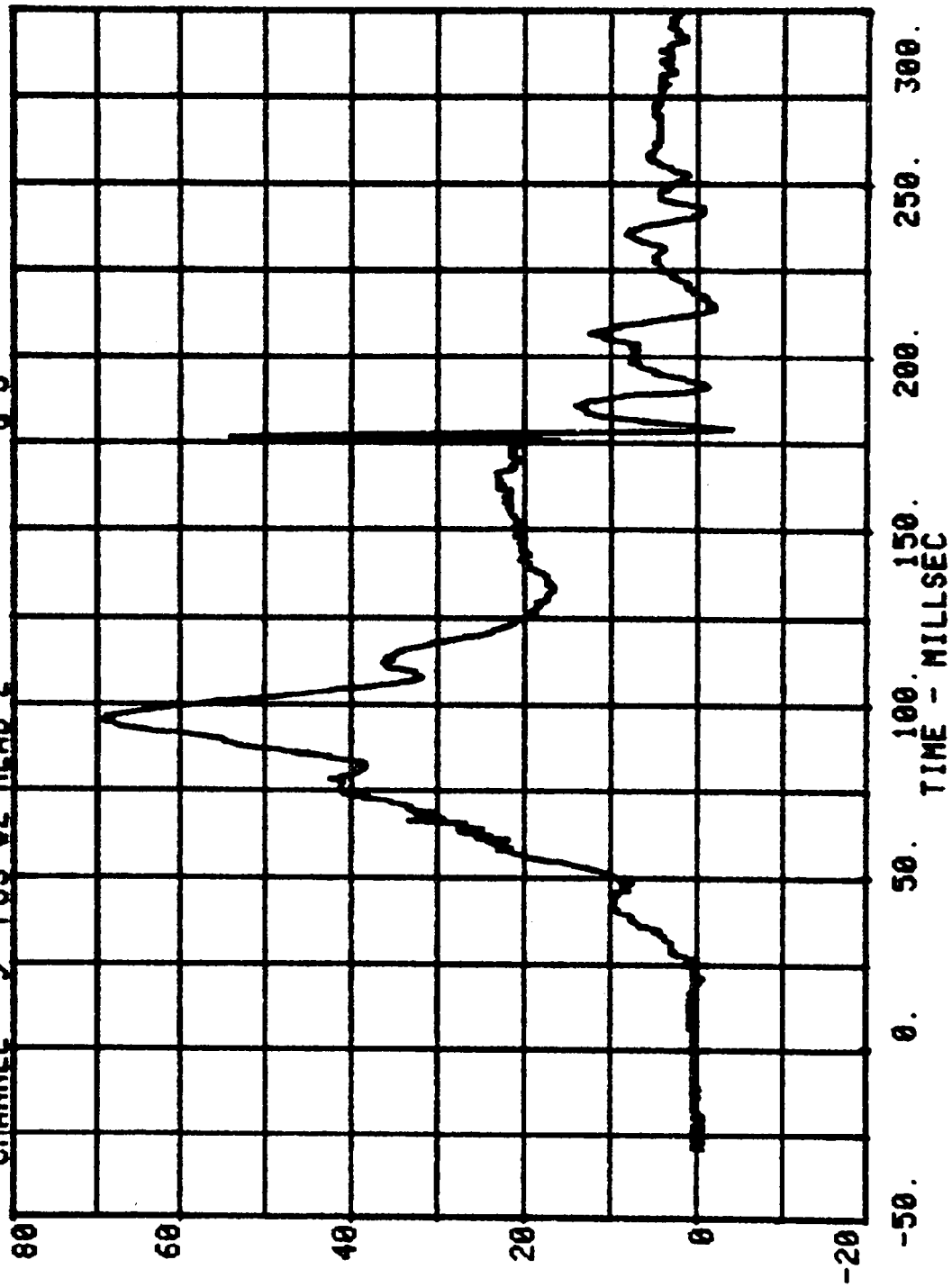
POS #2 HEAD RESULTANT

HIC=1070.8 FROM T1= .05670 TO T2= .18660
AVERAGE ACCELERATION BETWEEN T1 AND T2= 36.8G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=1506.5

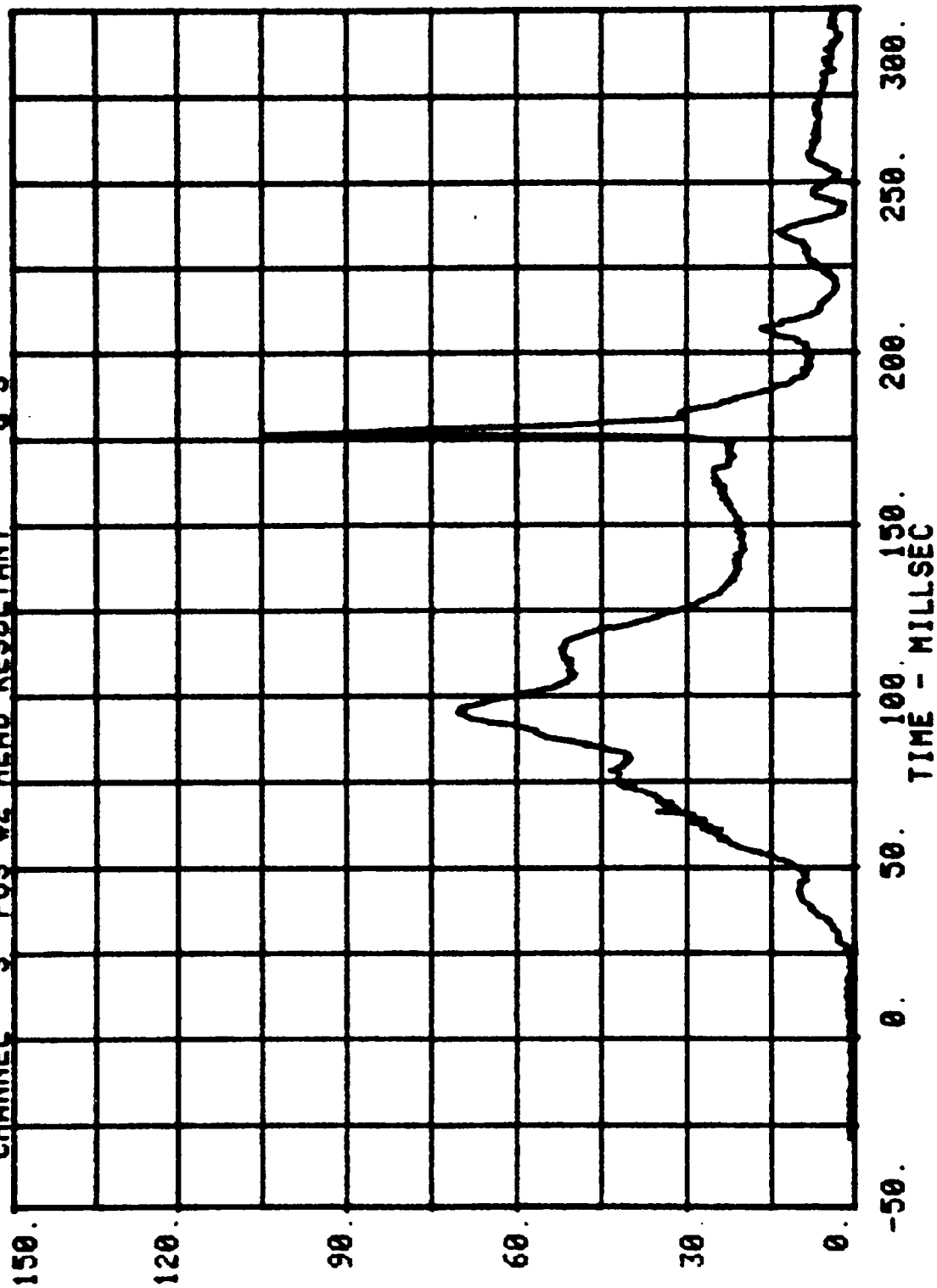


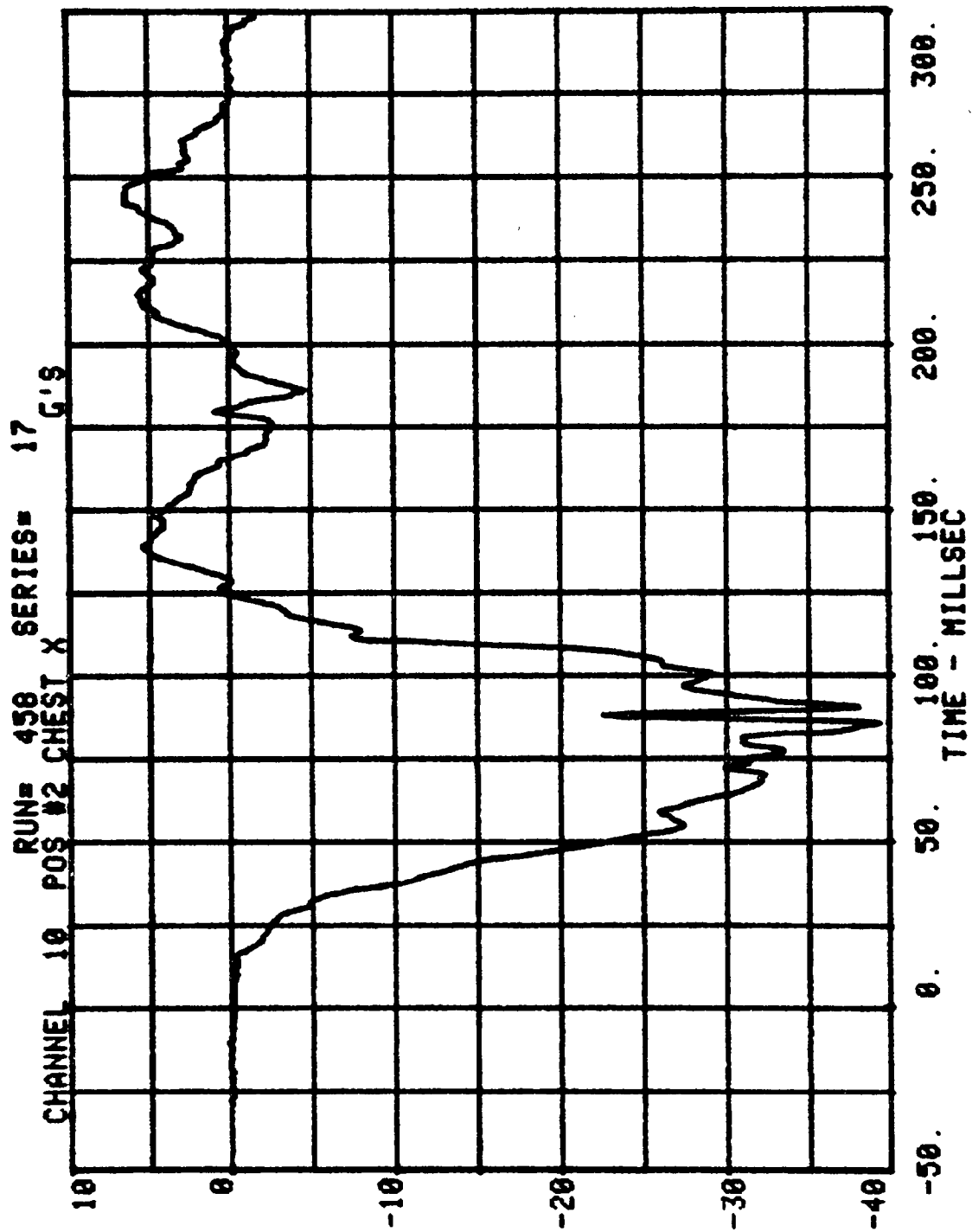


CHANNEL 9 POS #2 HEAD 2 RUN= 458 SERIES= 17 G'S

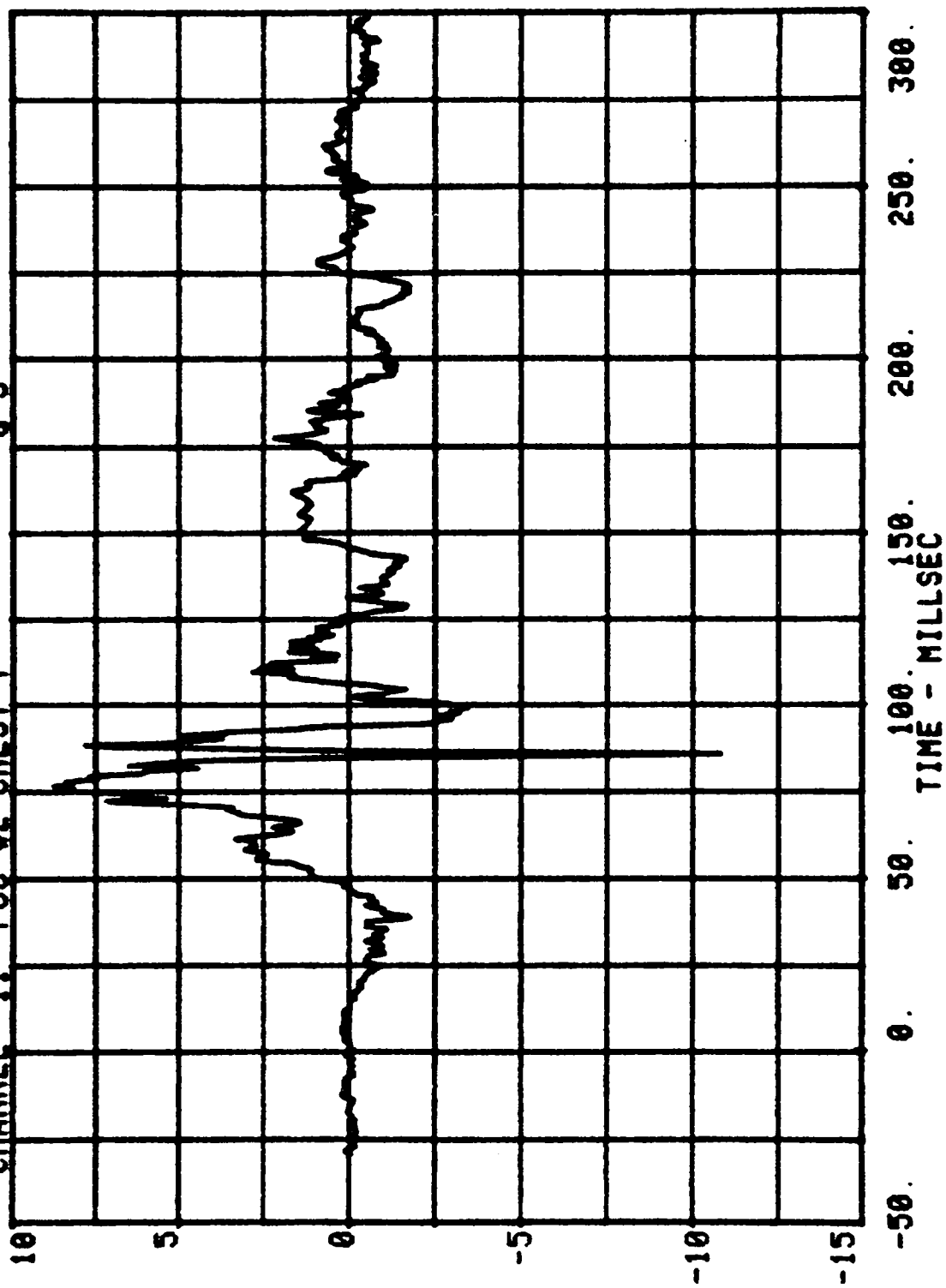


CHANNEL 3 POS #2 HEAD RESULTANT 17 G'S

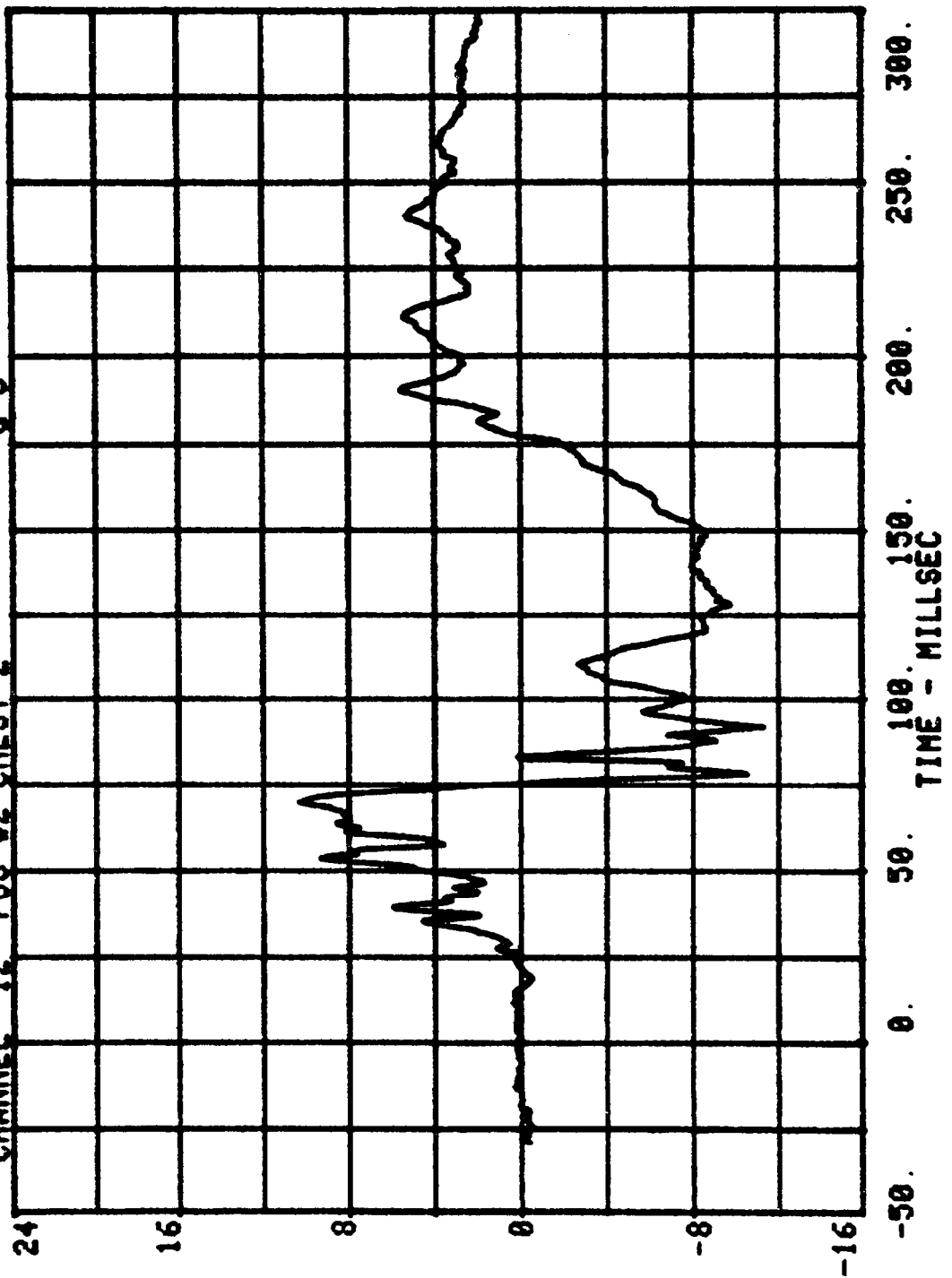




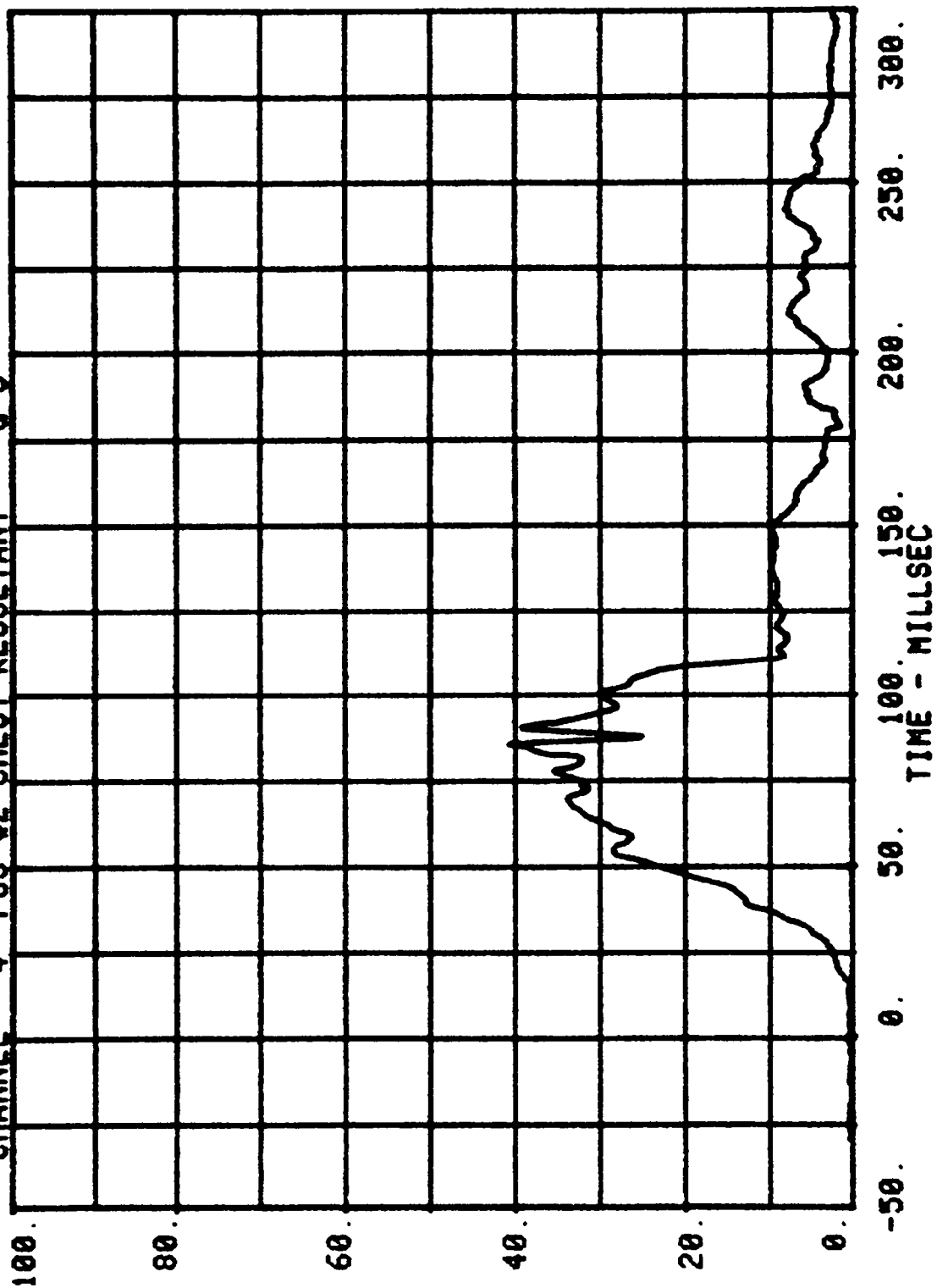
CHANNEL 11 POS #2 CHEST Y
RUN= 458 SERIES= 17 G'S



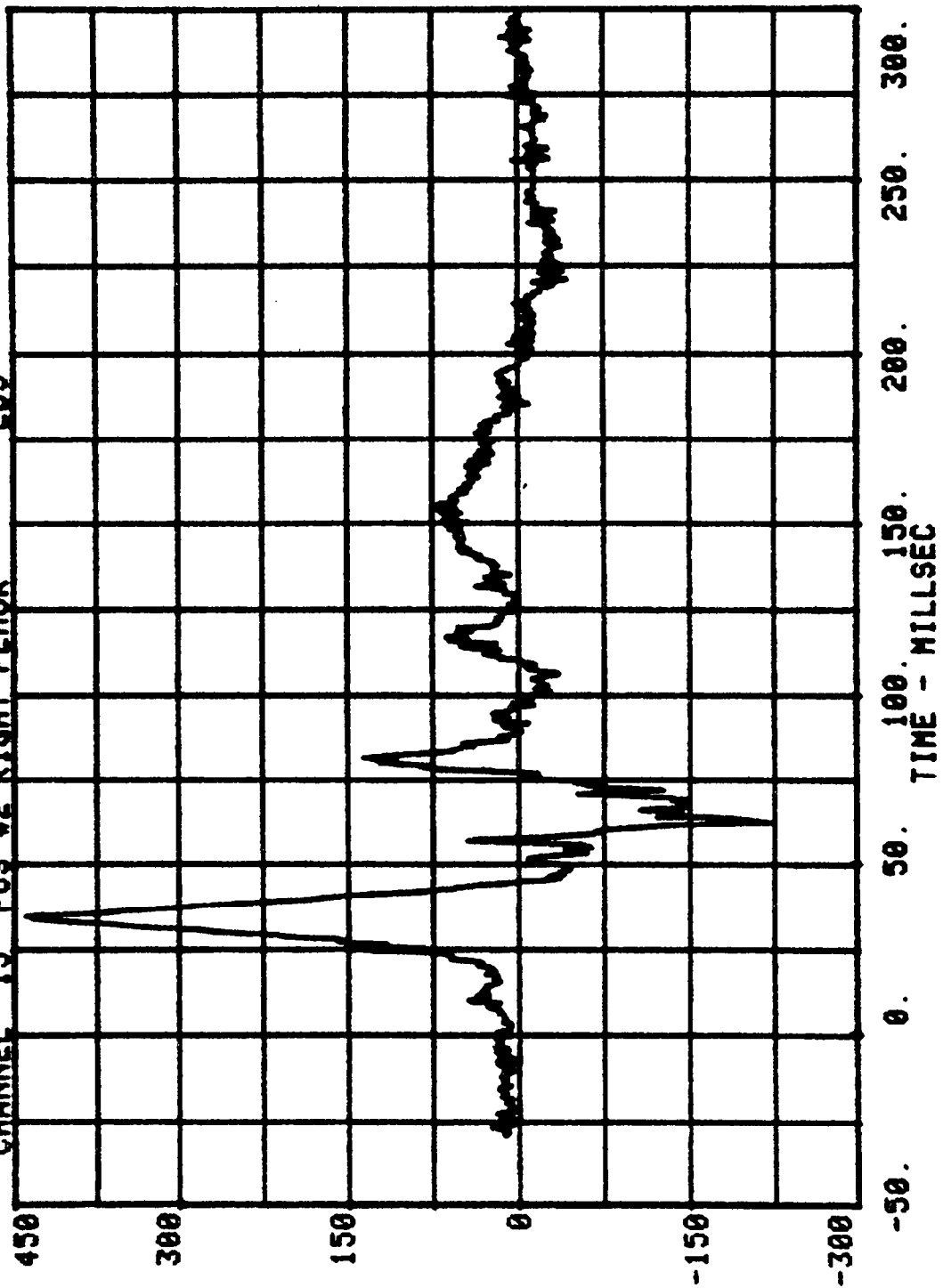
CHANNEL 12 POS #2 CHEST Z RUN= 458 SERIES= 17 G'8

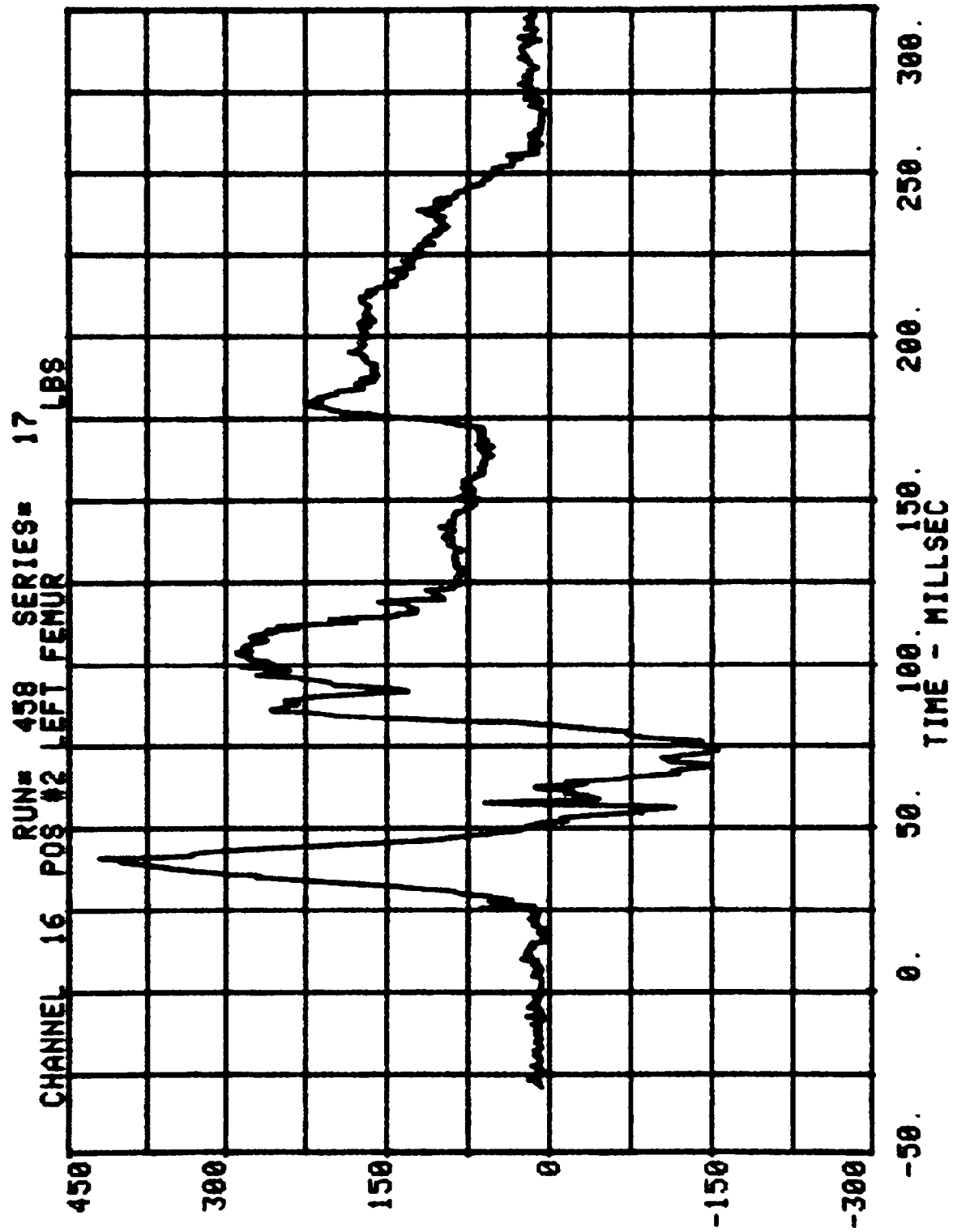


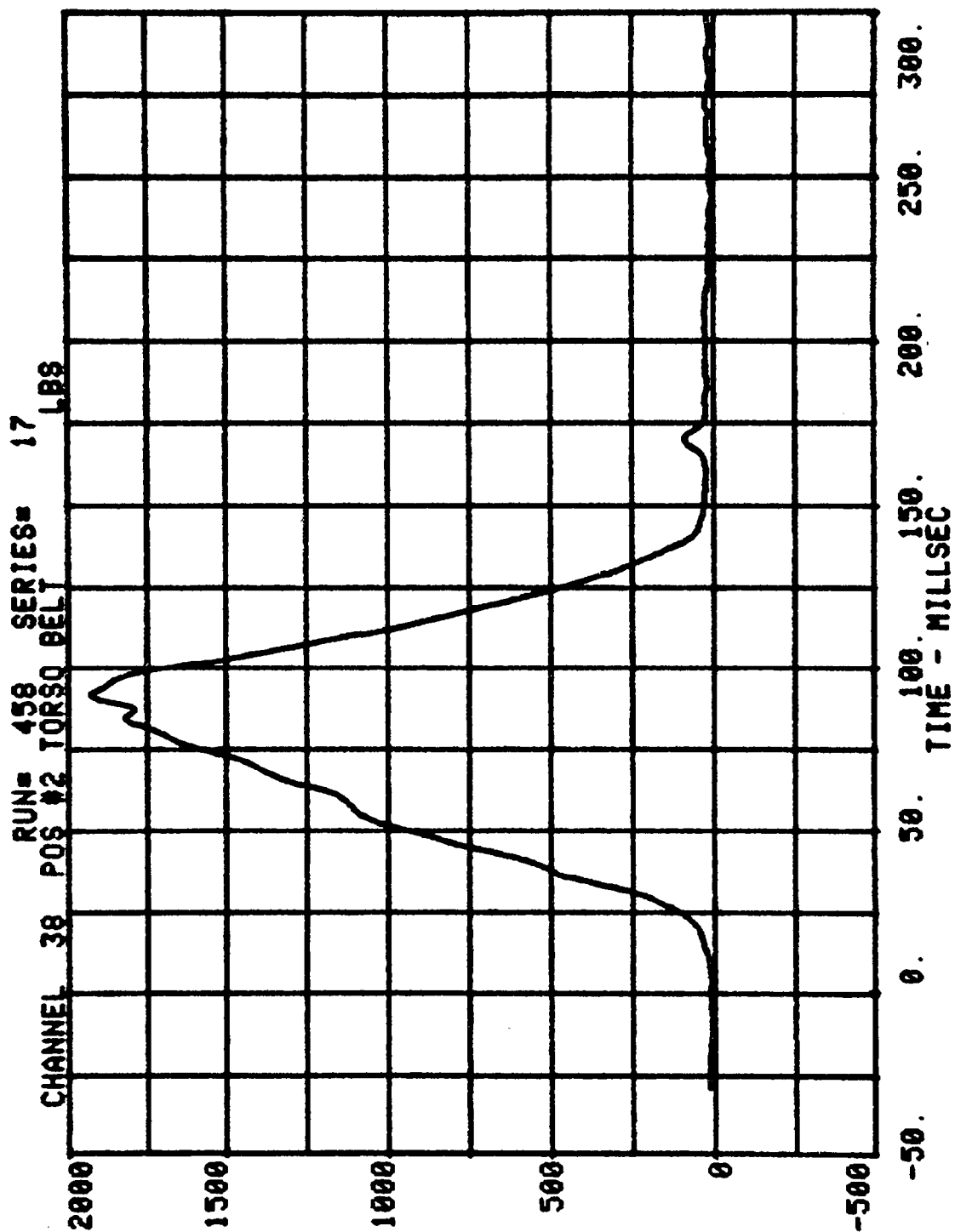
CHANNEL 4 POS #2 CHEST RESULTANT 17 G'S



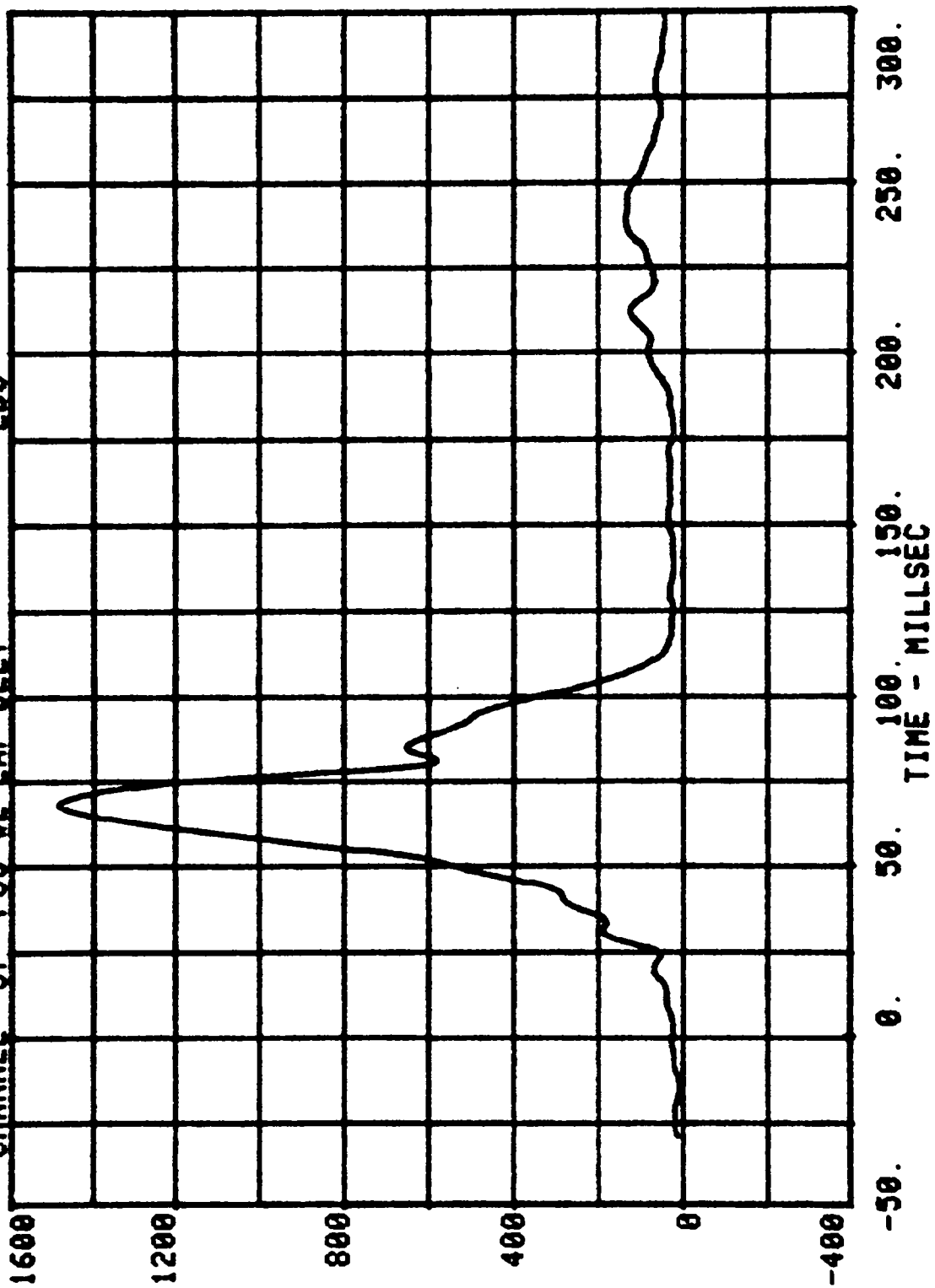
CHANNEL 13 POS #2 RIGHT FEMUR RUN= 458 SERIES= 17 LBS







CHANNEL 37 POS #2 LAP BELT RUN= 458 SERIES= 17 LBS



HEAD INJURY CRITERION
HEAD SEVERITY INDEX

BOA #17 LA BARON BARRIER TEST

RUN= 458

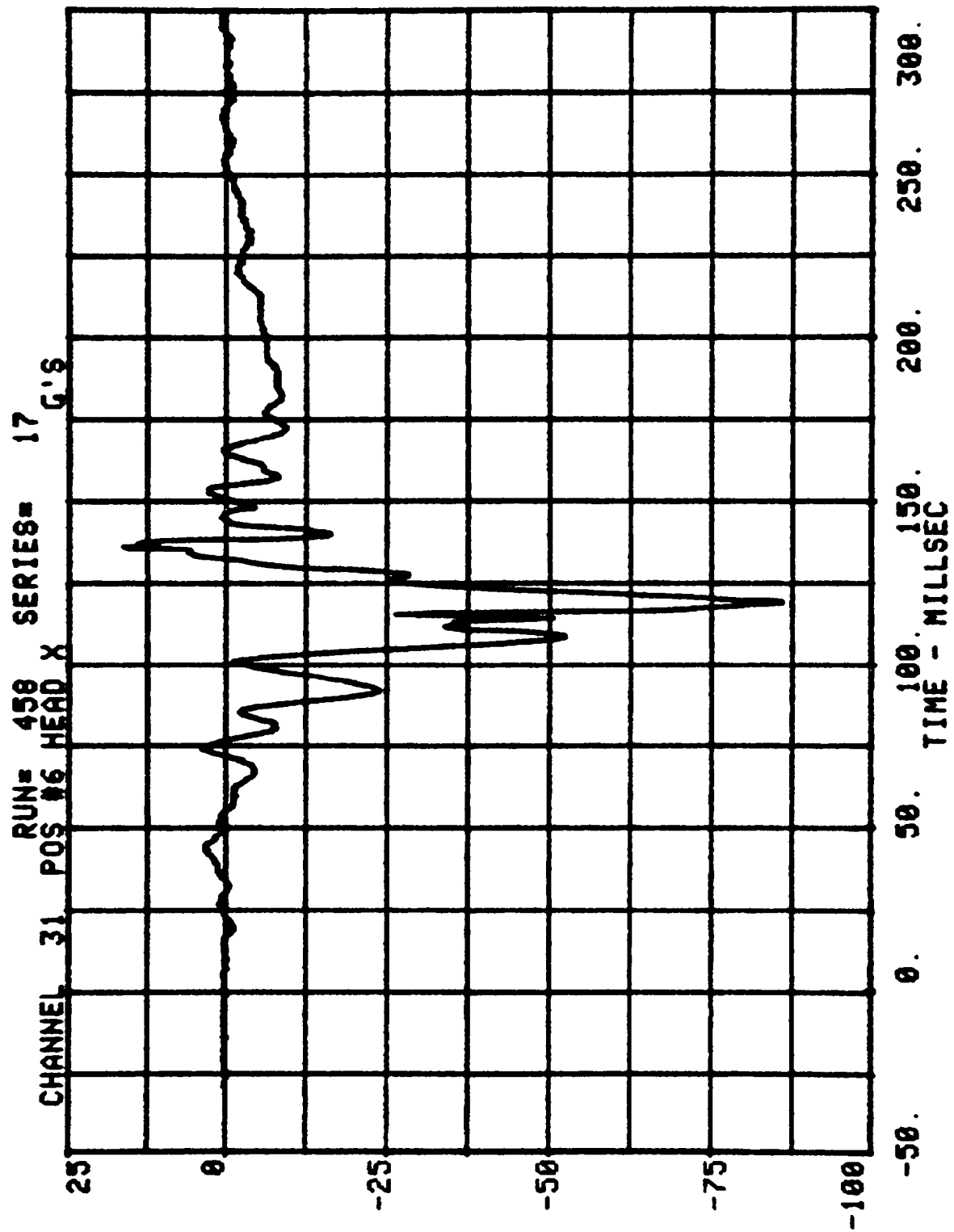
POS #6 HEAD RESULTANT

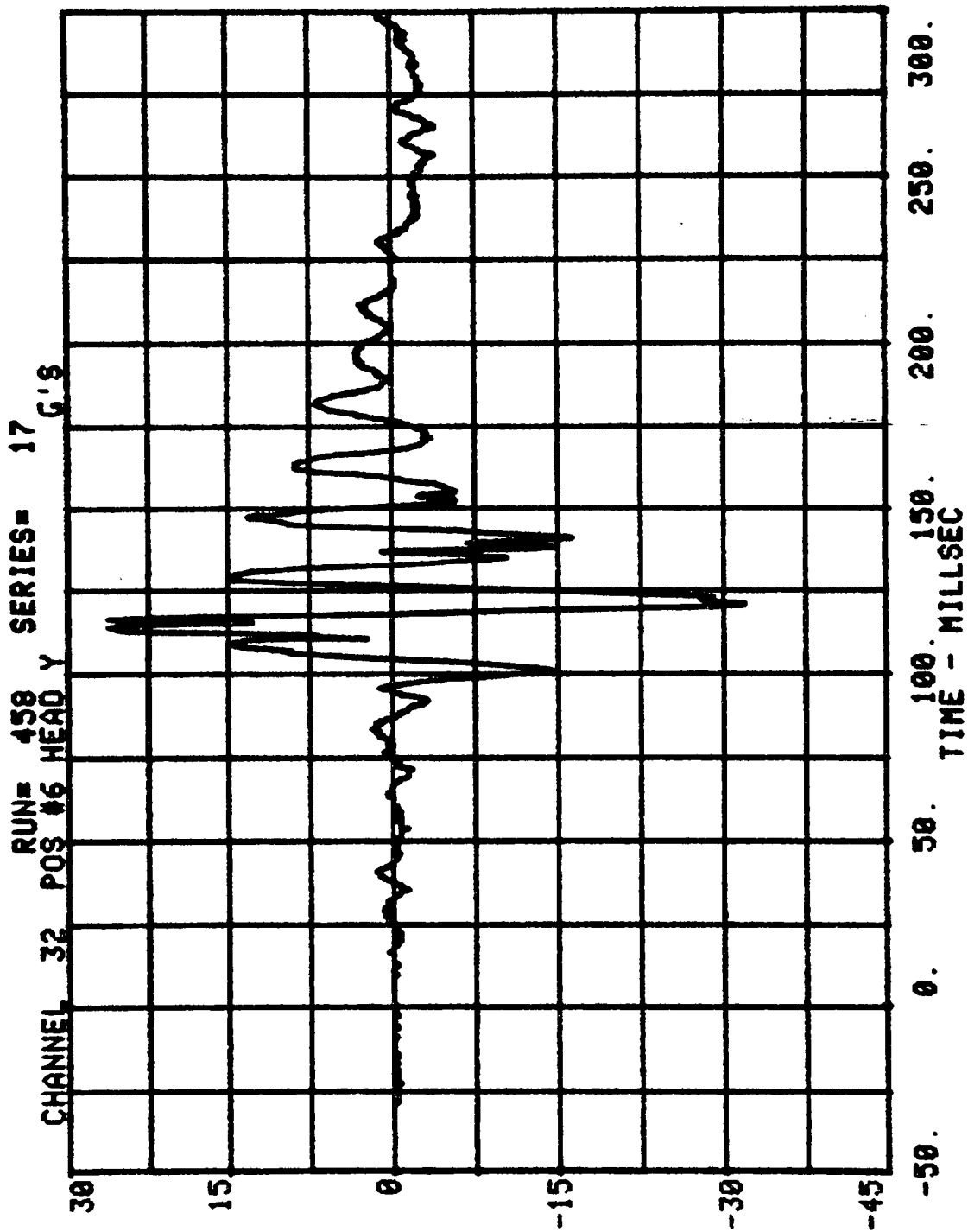
HIC=2810.1 FROM T1= .08580 TO T2= .12360

AVERAGE ACCELERATION BETWEEN T1 AND T2= 88.8G'S

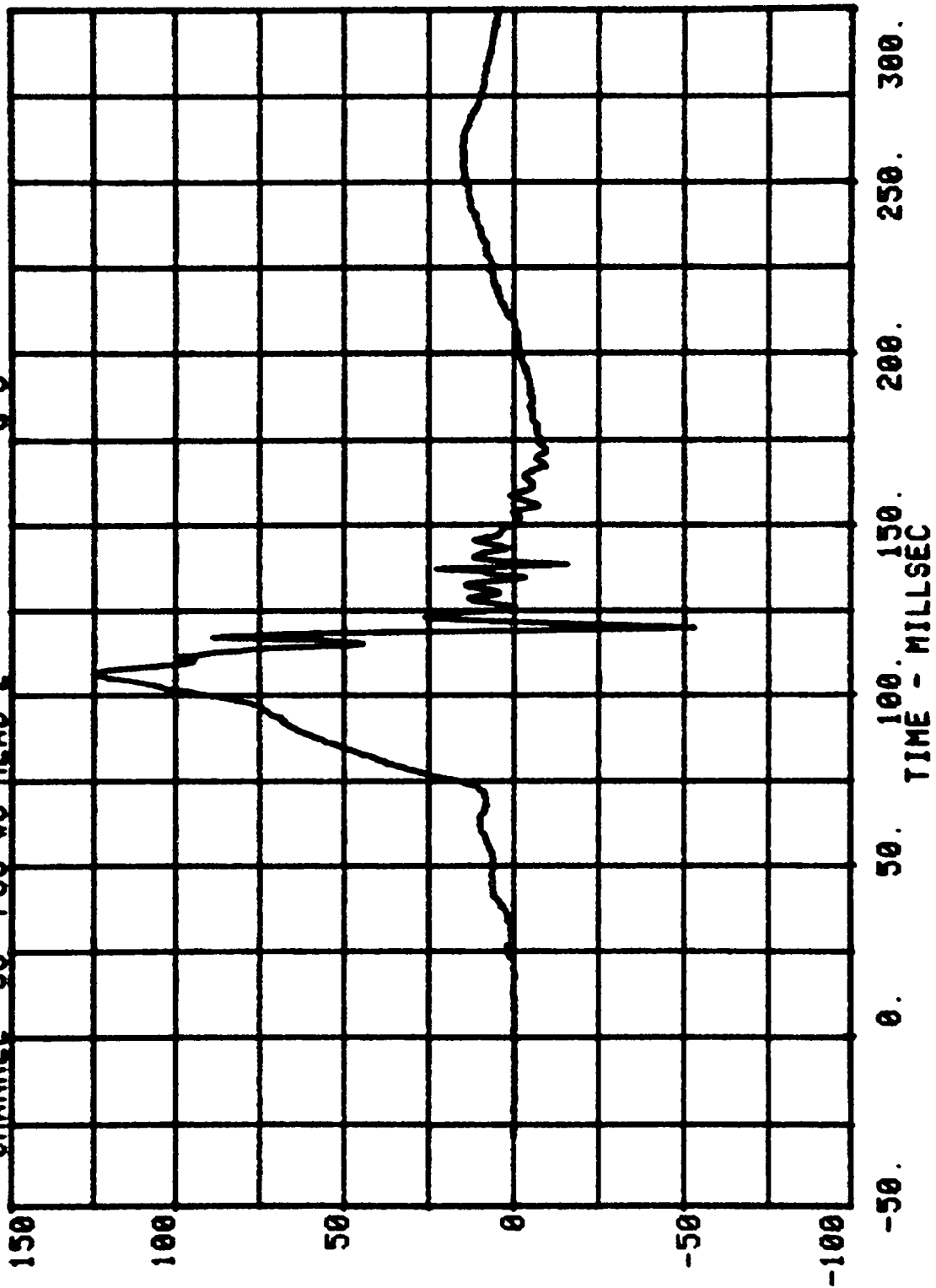
EVENT TIME= 300.0 MSEC

SEVERITY INDEX=3347.4



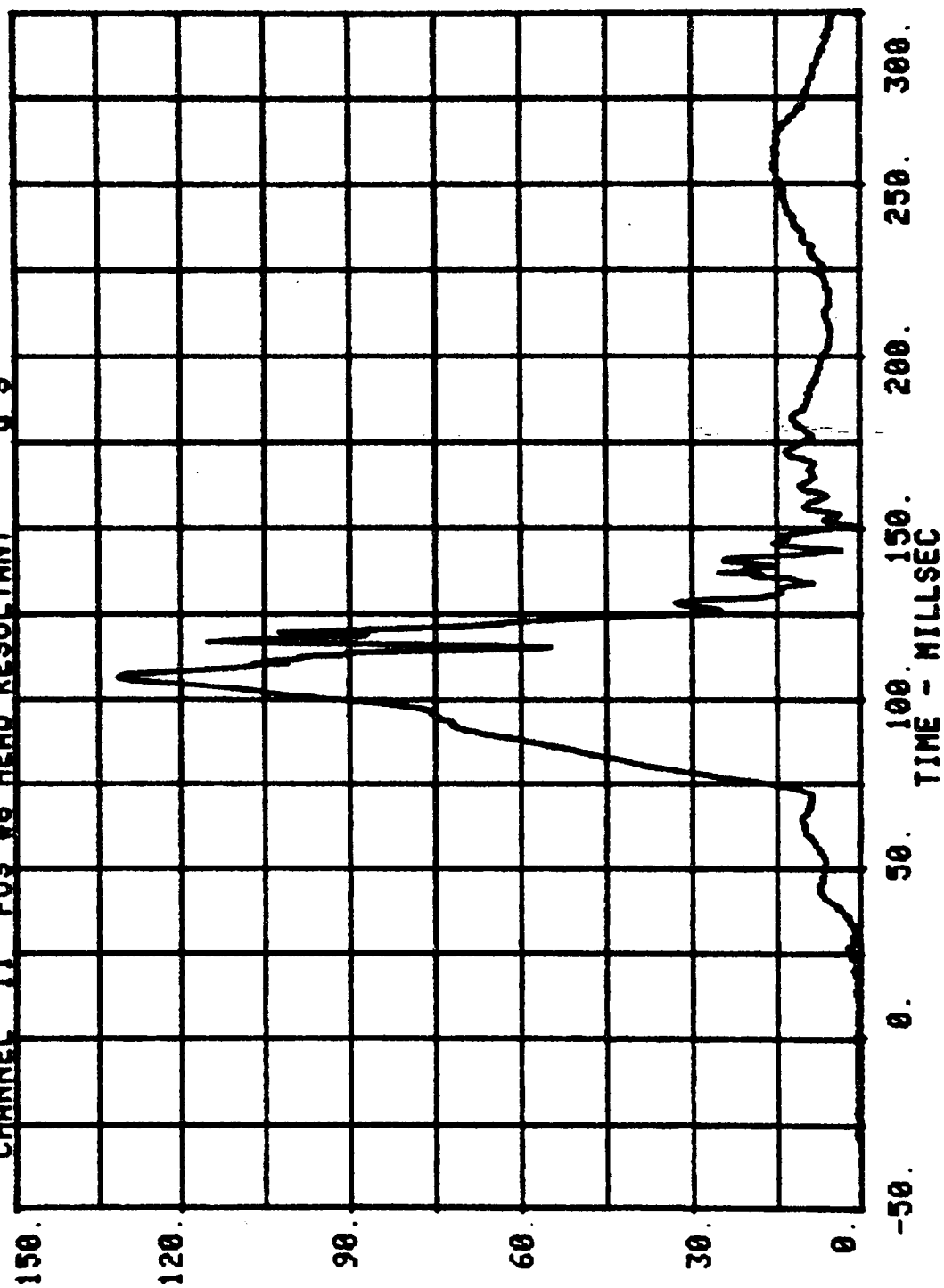


CHANNEL 33 RUN= 438 SERIES= 17 G'S
POS #6 HEAD 2

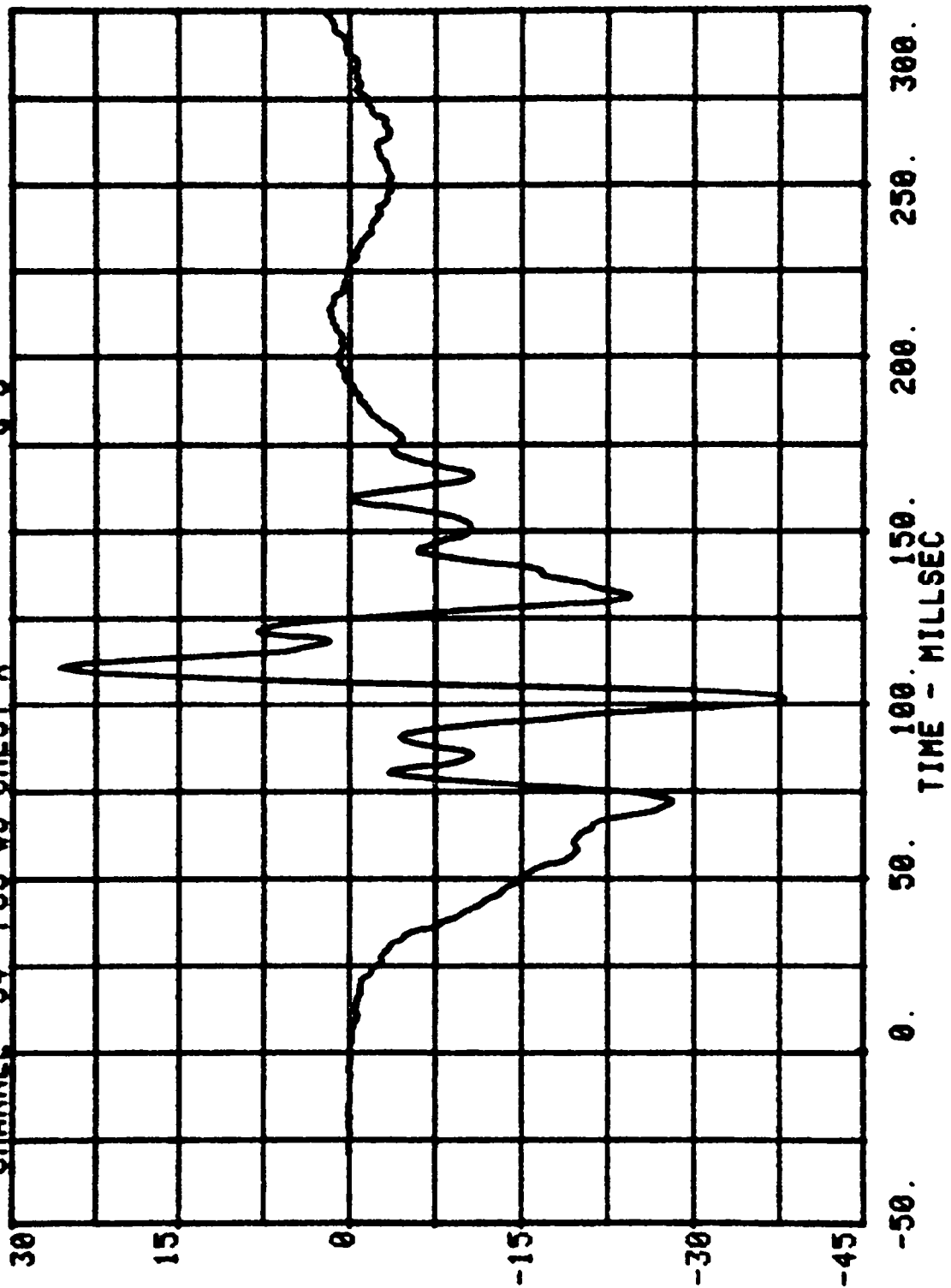


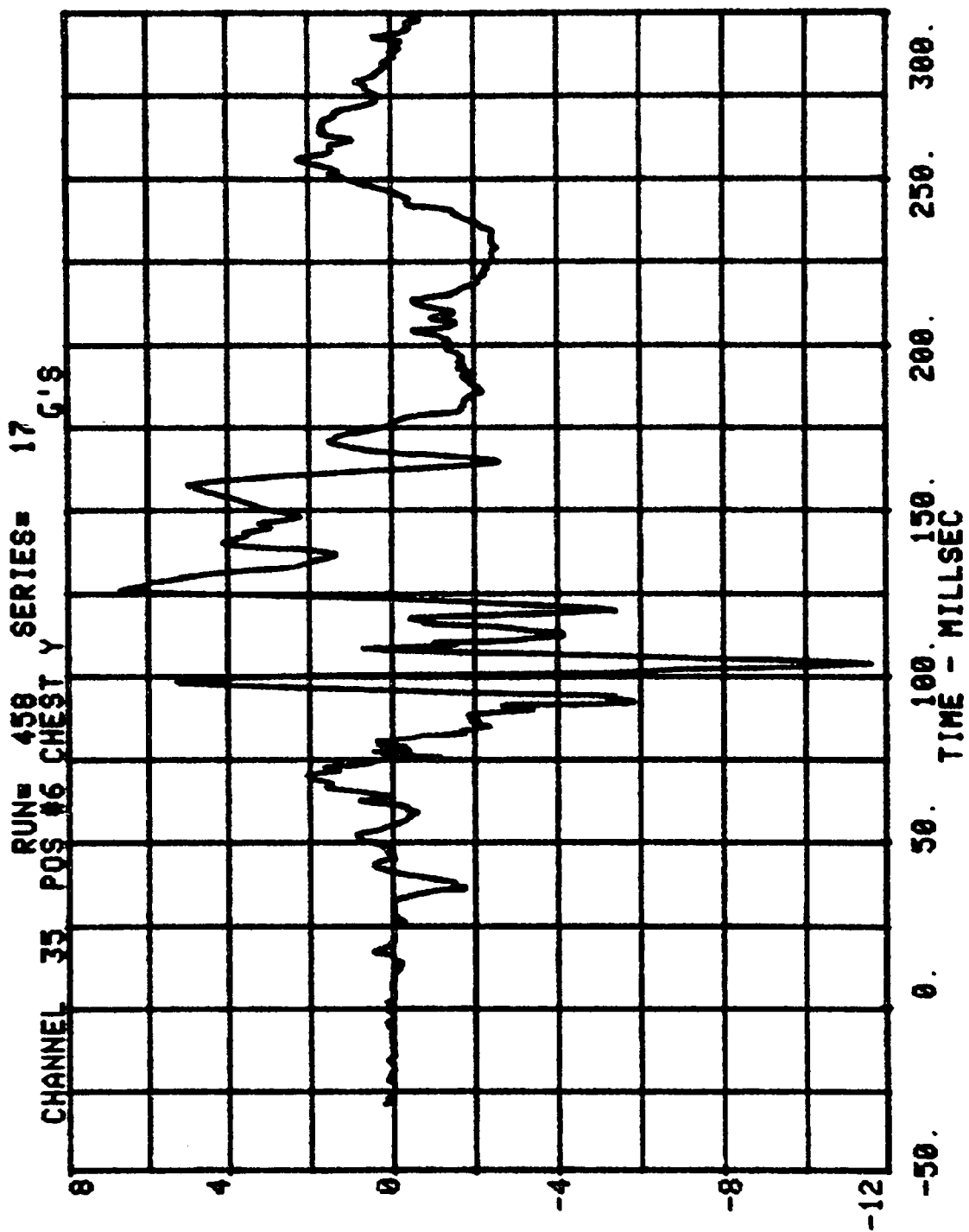
CHANNEL 11 POS #6 HEAD RESULTANT G'S

RUN= 458 SERIES= 17

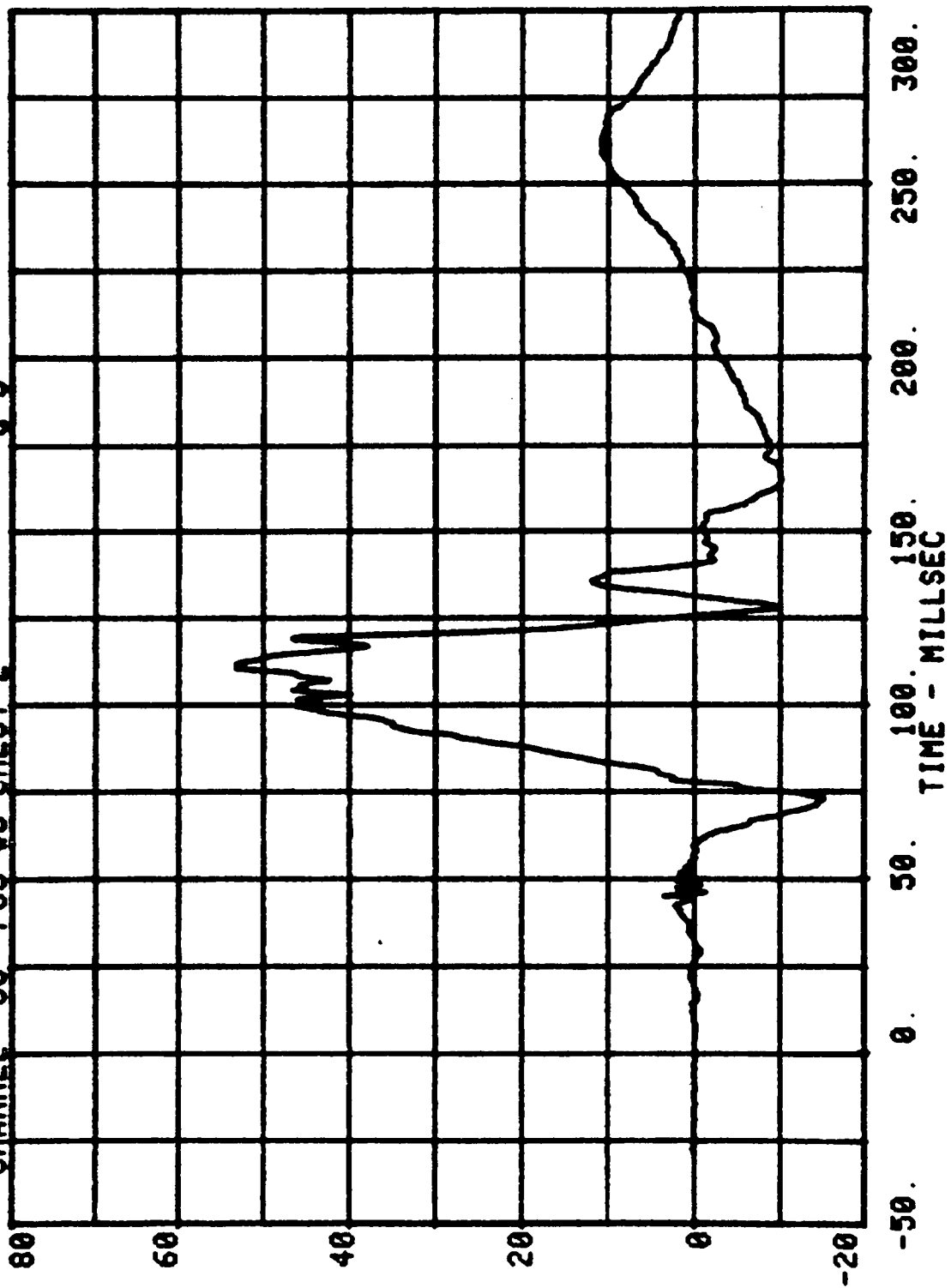


CHANNEL 34 RUN# 458 POS #6 CHEST X
SERIES# 17 G'S





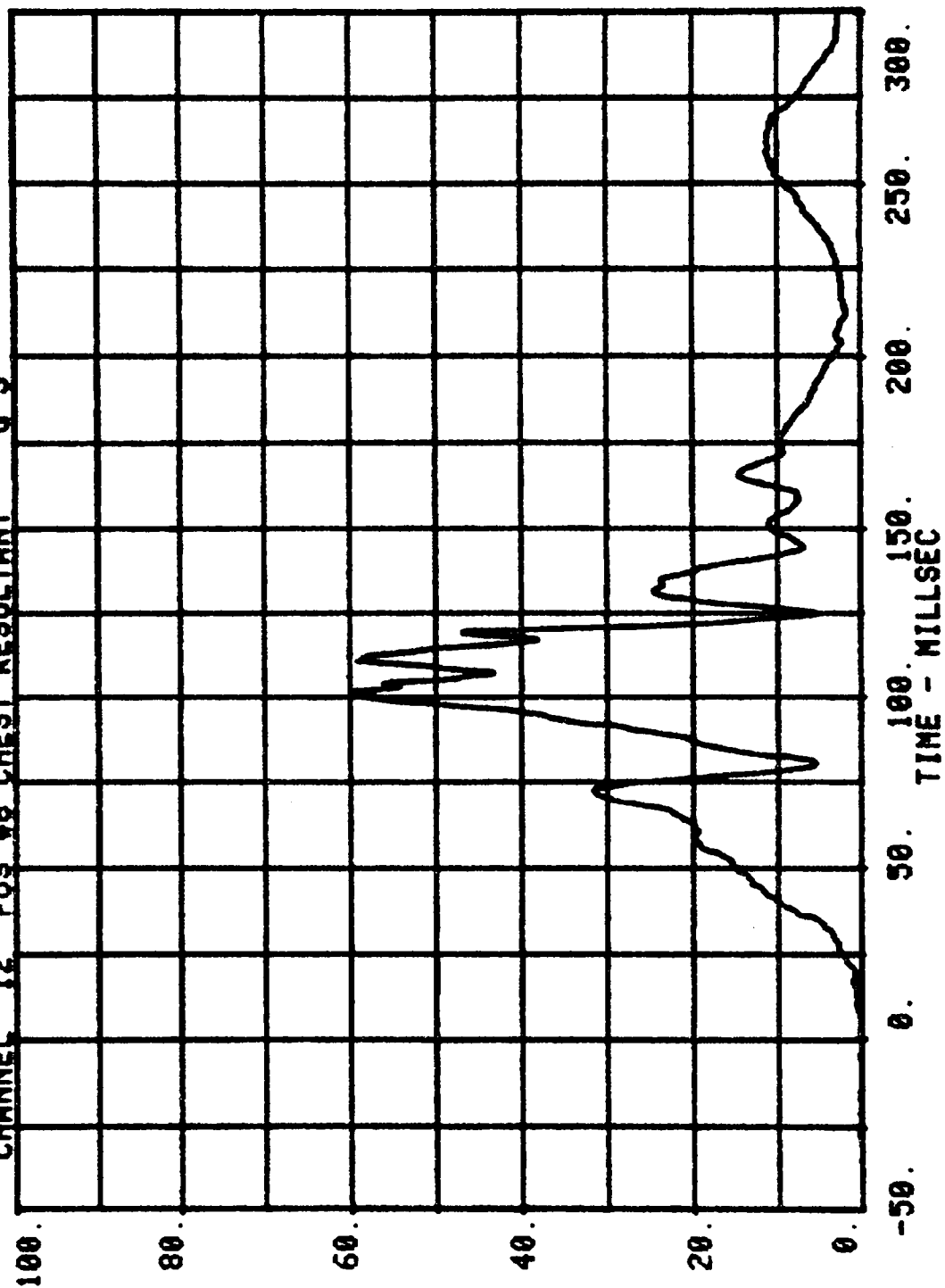
CHANNEL 36 POS #6 CHEST Z RUN= 458 SERIES= 17 G'S



CHANNEL 12 POS #6 CHEST RESULTANT G'S

RUN# 458

SERIES# 17



APPENDIX C
DUMMY CERTIFICATION TESTS

This test report contains results from certification tests performed on Alderson Research Laboratories Model ATD 30034, 50th percentile anthropomorphic test dummies, Serial Nos. 109, 814, which were completed on August 25, 1979. 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, Vol. 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 is presented in the following tables, Table 1C through 8C along with the Part 572 requirements.

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 109

LABORATORY TECHNICIAN: Fred Juliano

APPROVED BY: _____

		Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -		8/14/79-8/25/79	
Calibration Sequential Number for Dummy - - -			
Temperature in Lab. (Spec. = 66 to 78°F)- - -		67-74	
Relative Humidity in Lab. (Spec. = 10 to 70%) -		62-68	
TEST PARAMETER	SPECIFICATION		
1. <u>HEAD DROP TEST:</u>			
a. Peak Resultant Accel. -	210 to 260G	250	
b. Peak Lateral Accel. - -	≤10G	7	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.0	
2. <u>NECK BENDING TEST:</u>			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	22.12	
b. Pendulum Avg. Decel. (over $t_3 - t_2$) - - - -	20 to 24G	23	
c. Peak Resultant Head Acceleration - - - -	26G maximum	24	
d. Pendulum Decel. ($t_2 - t_1$)	≤ 3 ms	.75	
e. Pendulum Decel. ($t_3 - t_2$)	25 to 30 ms	26	
f. Pendulum Decel. ($t_4 - t_3$)	≤10 ms	5	
g. Pendulum Direction Reversal Time - - - -	≥123 ms	117	
h. Max. Head Rotation - -	63 to 73°	63	
i. Chordal Displacement:			
Head Rotation Angle - -			
0°	Time	-2 to 2 ms	0
	Displ.	-.5 to .5 in	0
30°	Time	25.6 to 34.4 ms	29
	Displ.	2.1 to 3.1 in.	2.95
60°	Time	40.3 to 51.7 ms	50
	Displ.	4.3 to 5.3 in.	5.25
Maximum	Time	53.2 to 66.8 ms	58.8
(°)	Displ.	5.0 to 6.0 in.	5.6

Continued

TEST PARAMETER		SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
2. <u>NECK BENDING TEST</u> <u>Continued</u>				
i. Chordal Displacement:				
Head Rotation Angle --				
60°	Time	67.0 to 83.0 ms	67	
	Displ.	4.3 to 5.3 in.	5.3	
30°	Time	85.4 to 104.6 ms	95	
	Displ.	2.1 to 3.1 in.	2.2	
0°	Time	101.0 to 123.0 ms	116	
	Displ.	-.5 to 0.5 in.	.15	
3. <u>ABDOMINAL COMPRESSION TEST:</u>				
(Preload = 10 pounds)				
a. Force @ 1" - - - - -		50 to 63 lbs.	56	
b. Force @ 1.3" - - - - -		73 to 88 lbs.	84	
4. <u>LUMBAR FLEXION TEST:</u>				
a. Force @ 20° - - - - -		22 to 34 lbs.	26	
b. Force @ 30° - - - - -		34 to 46 lbs.	37.5	
c. Force @ 40° - - - - -		46 to 58 lbs.	53	
d. Return Angle - - -		12° maximum	5	
5. <u>CHEST IMPACT TESTS:</u>				
a. High Speed				
(1) Probe Speed - -		21.78-22.22 fps	21.85	
(2) Peak Deflection -		1.7" maximum	.8	
(3) Peak Resistive Force - - - - -		2250 lbs. maximum	1813	
(4) Internal Hysteresis - - - -		50 to 70%	60%	
b. Low Speed				
(1) Probe Speed - - -		13.86-14.14 fps	14.03	
(2) Peak Deflection -		1.1" maximum	.6	
(3) Peak Resistive Force - - - - -		1450 lbs. maximum	1243	
(4) Internal Hysteresis- - - -		50 to 70%	57%	

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	6.95	
(2) Maximum Force - -	1850 to 2500 lbs	2450	
(3) Time Above 1000#	1.7 ms minimum	2.2	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.95	
(2) Maximum Force - -	1850 to 2500 lbs.	1850	
(3) Time Above 1000#	1.7 ms minimum	2.1	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 109

CALIB. SEQ. NOS. FOR DUMMY: _____ & _____

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	CF82/CS09	1/79	1/80
ENDEVCO	CK54/CS41	1/79	1/80
ENDEVCO	CE76/CY62	1/79	1/80
CEC	22958	2/79	1/80
ENDEVCO	CS75	1/79	1/80
CEC	22705	2/79	1/80
HUMANOID SPECIAL			1/80
GSE	549	1/79	1/80
GSE	548	1/79	1/80
CEC	17547	2/79	1/80
CEC	16928	1/79	1/80
BLH	73141		
BLH	72952		
CIC	567-11		

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 814

LABORATORY TECHNICIAN: Fred Juliano

APPROVED BY: B. Kelleher

		Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -		8/14/79-8/25/79	
Calibration Sequential Number for Dummy - - - -		74	
Temperature in Lab. (Spec. = 66 to 78°F) - - - -			
Relative Humidity in Lab. (Spec. = 10 to 70%) -		60	
TEST PARAMETER	SPECIFICATION		
1. <u>HEAD DROP TEST:</u>			
a. Peak Resultant Accel. -	210 to 260G	230	
b. Peak Lateral Accel. - -	≤10G	10	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.0	
2. <u>NECK BENDING TEST:</u>			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	21.64	
b. Pendulum Avg. Decel. (over $t_3 - t_2$) - - - -	20 to 24G	20	
c. Peak Resultant Head Acceleration - - - -	26G maximum	22	
d. Pendulum Decel. ($t_2 - t_1$)	≤ 3 ms	1.5	
e. Pendulum Decel. ($t_3 - t_2$)	25 to 30 ms	25	
f. Pendulum Decel. ($t_4 - t_3$)	≤10 ms	8	
g. Pendulum Direction Reversal Time - - - -	≥123 ms	120	
h. Max. Head Rotation - -	63 to 73°	68°	
i. Chordal Displacement:			
Head Rotation Angle - -			
0°	Time	-2 to 2 ms	0
	Displ.	-.5 to .5 in	0
30°	Time	25.6 to 34.4 ms	29
	Displ.	2.1 to 3.1 in.	2.65
60°	Time	40.3 to 51.7 ms	47
	Displ.	4.3 to 5.3 in.	4.80
Maximum (°)	Time	53.2 to 66.8 ms	65
	Displ.	5.0 to 6.0 in.	5.40

Continued

TEST PARAMETER		SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
2. <u>NECK BENDING TEST</u> <u>Continued</u>				
i. Chordal Displacement:				
Head Rotation Angle --				
60°	Time	67.0 to 83.0 ms	80	
	Displ.	4.3 to 5.3 in.	4.75	
30°	Time	85.4 to 104.6 ms	100	
	Displ.	2.1 to 3.1 in.	2.3	
0°	Time	101.0 to 123.0 ms	119	
	Displ.	-.5 to 0.5 in.	1	
3. <u>ABDOMINAL COMPRESSION TEST:</u>				
(Preload = 10 pounds)				
a. Force @ 1" - - - - -		50 to 63 lbs.	58	
b. Force @ 1.3" - - - - -		73 to 88 lbs.	86	
4. <u>LUMBAR FLEXION TEST:</u>				
a. Force @ 20° - - - - -		22 to 34 lbs.	28	
b. Force @ 30° - - - - -		34 to 46 lbs.	34.5	
c. Force @ 40° - - - - -		46 to 58 lbs.	47	
d. Return Angle - - - - -		12° maximum	6°	
5. <u>CHEST IMPACT TESTS:</u>				
a. High Speed				
(1) Probe Speed - - -		21.78-22.22 fps	21.82	
(2) Peak Deflection -		1.7" maximum	1.1	
(3) Peak Resistive Force - - - - -		2250 lbs. maximum	1916.6	
(4) Internal Hysteresis - - - - -		50 to 70%	70	
b. Low Speed				
(1) Probe Speed - - -		13.86-14.14 fps	13.88	
(2) Peak Deflection -		1.1" maximum	.95	
(3) Peak Resistive Force - - - - -		1450 lbs. maximum	1243.2	
(4) Internal Hysteresis - - - - -		50 to 70%	68	

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	6.96	
(2) Maximum Force - -	1850 to 2500 lbs	2075	
(3) Time Above 1000#	1.7 ms minimum	2.2	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.01	
(2) Maximum Force - -	1850 to 2500 lbs.	2200	
(3) Time Above 1000#	1.7 ms minimum	2.1	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 814

CALIB. SEQ. NOS. FOR DUMMY: _____ & _____

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	CF82/CP30	1/79	1/80
ENDEVCO	CK54/CE18	1/79	1/80
ENDEVCO	CF76/CL79	1/70	1/80
CEC	22595	1/79	1/80
ENDEVCO	CT01	1/79	1/80
CEC	22703		1/80
HUMANOID SPECIAL			1/80
D.V.	1927	1/79	1/80
D.V.	1928	1/79	1/80
CEC	17547	2/79	1/80
CEC	16928	1/79	1/80
BLH	73141		
BLH	72952		
CIC	567-11		
C-10		6525-V-17	

Electronic Test Equipment

The complement of signal conditioning recording and display equipment used in conjunction with dummy certification testing is shown in Figure 8.

- Data Acquisition - Sangamo Mod. 3500 14 channel FM Tape Transport (recording speed: 60 in/sec).
- Data Reduction - Brush Mark 260 six channel recorder or Pace X-Y plotter.
- Signal Conditioning - Calspan designed and fabricated bridge amplifiers providing gain, balance, and shunt calibration of all sensor inputs.
- Computational Equipment - Calspan designed and fabricated analog computer consisting of operational amplifiers in circuit configurations providing continuous computation of acceleration vector magnitude and Severity Index relationships.
- Signal Filtering - Calspan designed and fabricated second order active filters (six channels) with selectable frequency responses consistent with SAE J211b Class 60, 180, 600 and 1000 requirements. Filters are compensated for 32:1 real time expansion resulting from data recording at 60 in/sec and playback at 1-7/8 in/sec.
- Real Time Reference - Tektronix Time Mark Generator; 1 and 10 millisecond is synchronously recorded with all certification data and reproduced at playback on all strip chart records.
- The data acquisition, reproduction, and time reference equipment is maintained by Calspan's Equipment and Standards Laboratory (ESL), which is an NBS traceable calibration facility. Other special purpose equipment is maintained by qualified test facility personnel using support equipment maintained and standardized by all ESL.

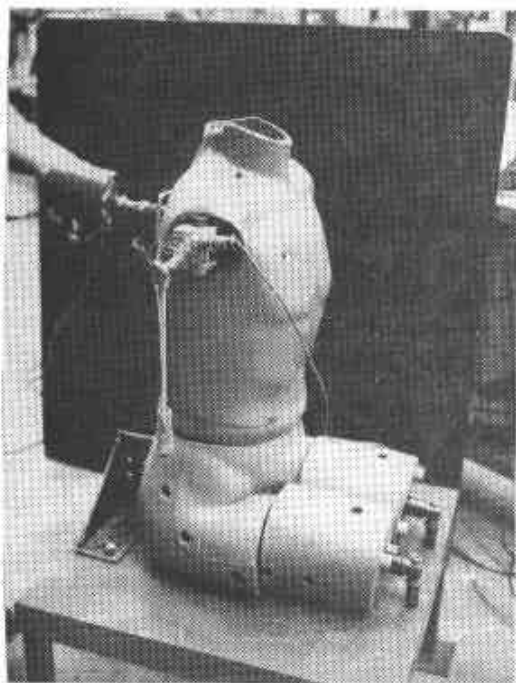


FIGURE C-1

LUMBAR SPINE FLEXION TEST APPARATUS

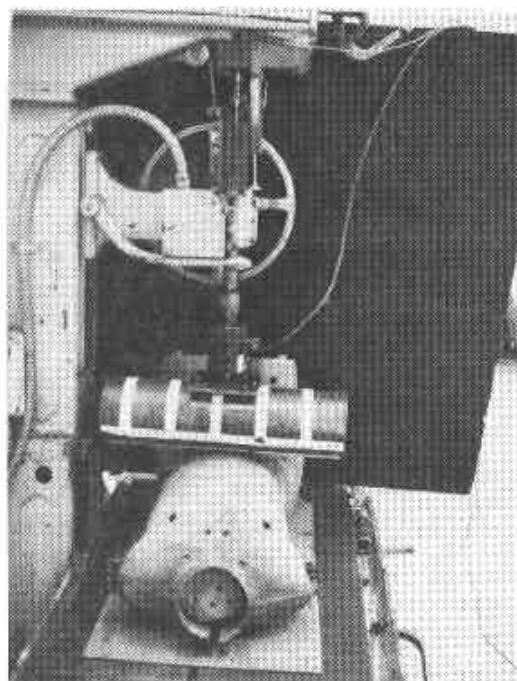


FIGURE C-2

ABDOMEN PRESS TEST APPARATUS

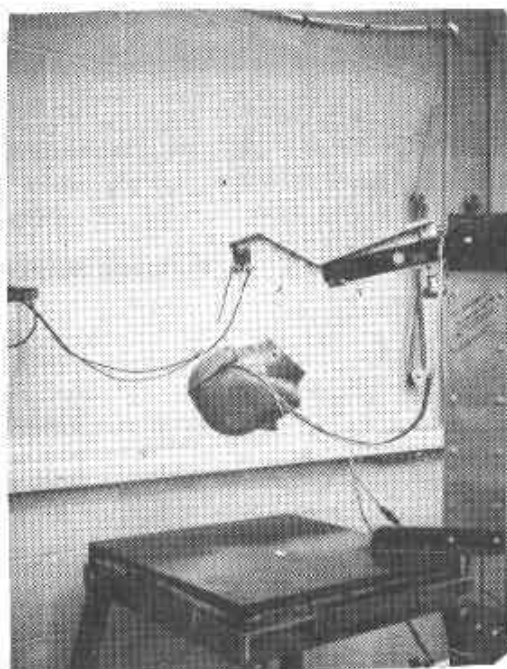


FIGURE C-3

HEAD DROP TEST APPARATUS

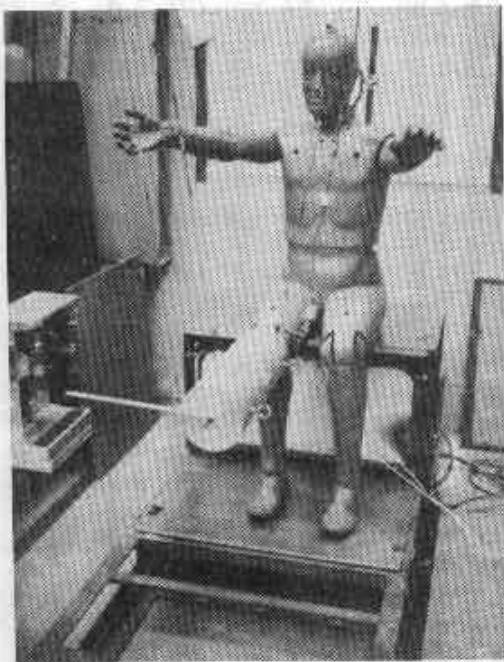


FIGURE C-4
KNEE IMPACT TEST APPARATUS

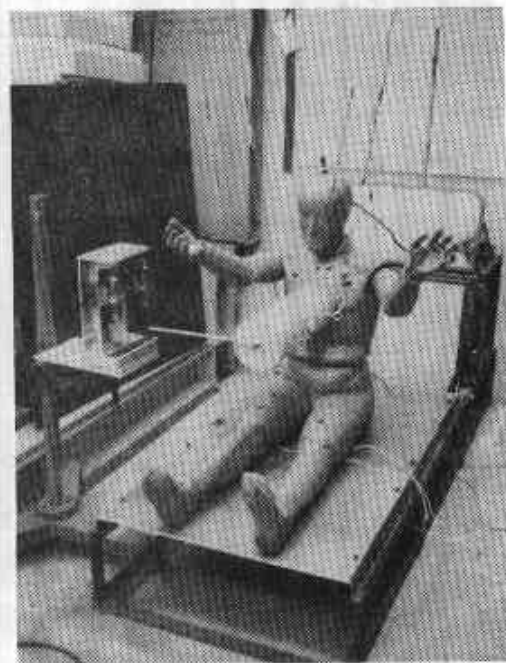


FIGURE C-5
THORAX IMPACT TEST APPARATUS

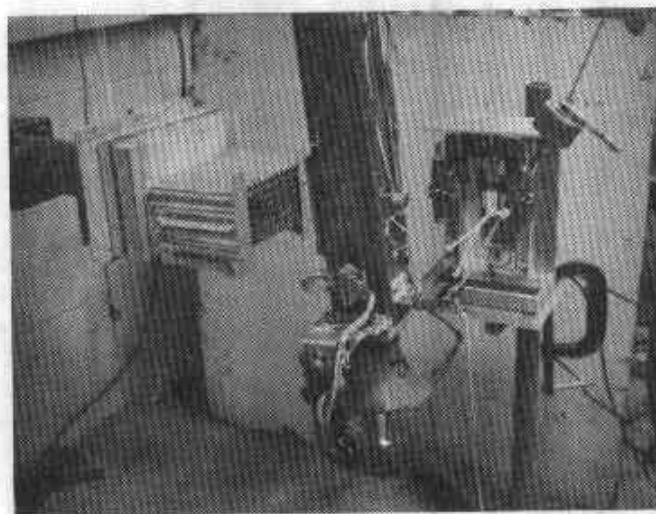


Figure C-6
NECK IMPACT TEST APPARATUS



FIGURE C-7



FIGURE C-7
PART 572 TEST DUMMY
FRONT & SIDE VIEW

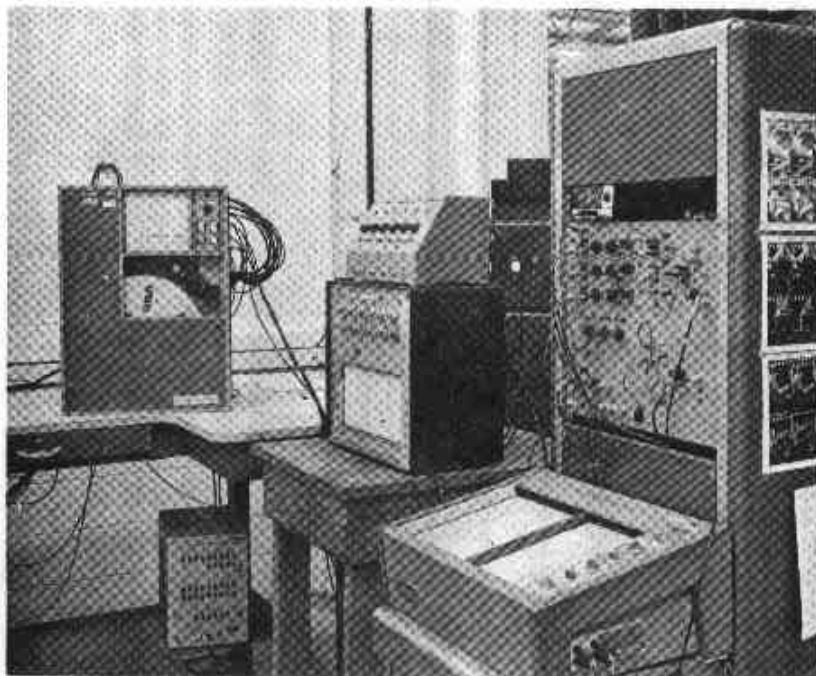


Figure C-8 ELECTRONIC TEST EQUIPMENT