

14011

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

1980 TOYOTA CELICA TO 1980 FORD MUSTANG
FRONTAL IMPACT, 70 MPH CLOSING SPEED
NHTSA 308-38-498

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FINAL REPORT

Prepared For

U. S. DEPARTMENT OF TRANSPORTATION
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Enforcement

Office of Vehicle Safety Compliance
Nassif Building - 400 Seventh Street, S. W.
Washington, D. C. 20590

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Contract Technical Manager

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16. Abstract A symmetric frontal-to-frontal crash test of a 1980 Toyota Celica, two-door sedan into a 1980 Ford Mustang, two-door sedan was performed at the Calspan Corporation, Advanced Technology Center, Transportation Research Department in Buffalo, New York. The velocity at impact for both vehicles was 34.75 mph. The test date was August 12, 1980. The driver side occupant in the Toyota Celica exceeded the FMVSS 208 Injury Criteria for chest and right femur. The passenger side occupant in the Toyota Celica complied with the FMVSS 208 Injury Criteria. Both occupants in the Ford Mustang complied with the FMVSS 208 Injury Criteria.			
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SECTION 1

TEST PURPOSE AND PROCEDURE

This car-to-car crash test of a 1980 Toyota Celica and a 1980 Ford Mustang is part of the New Car Assessment Program B.O.A., Task 3, sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract DOT-HS-8-01938. The purpose of this test was to investigate mass effects of vehicles in a car-to-car crash test.

The Calspan Corporation, Advanced Technology Center, Transportation Research Department Test Plan (Calspan Report No. 6525-V-101) for New Car Assessment Car-to-Car Crash Tests which was submitted to, and approved by, the Contract Technical Manager (CTM), contains the specific procedures used to perform this test.

SECTION 2

SUMMARY OF TEST NUMBER 38

A symmetric frontal car-to-car impact test of a 1980 Toyota Celica into a 1980 Ford Mustang with each vehicle traveling 35 mph was performed at the Calspan Corporation, Advanced Technology Center on 12 August 1980. A summary of the test conditions can be found in Table 1 and pre- and post-test photographs can be found in Appendix A.

Each vehicle contained two 50th percentile male Part 572 test dummies, one in the driver position and one in the right front passenger position. Both vehicles were equipped with bucket seats. The occupants were restrained with the production three-point belt system that came installed in the vehicles. The belt systems for each occupant were instrumented to measure lap and torso belt loads.

The occupant dummies were instrumented for head and chest triaxial accelerometers and femur load cells. Each of the dummies used in this test had been used once subsequent to their certification. The certification data sheets along with instrumentation calibration data, can be found in Appendix C.

Injury criteria values are presented in Table 9 and Appendix B contains the vehicle and dummy response data traces.

Post-test observations are contained in the Occupant and Vehicle Information Section on page 4-1.

Table 1

CRASH TEST SUMMARY

TEST NO. 38 PROJECT New Car Assessment
Car-to-Car Test
 DATE 8-12-80 TIME 2:20pm TEMP. 78^o
 TEST CONDITION Car-to-Car Frontal Impact
 VEHICLE NO. 1 1980 Toyota Celica
 VEHICLE NO. 2 1980 Ford Mustang

	VEH. NO. 1	VEH. NO. 2
TEST WEIGHT (lbs)	<u>3020</u>	<u>3040</u>
IMPACT ANGLE (deg)*	<u>0</u>	<u>0</u>
IMPACT VELOCITY (mph)**	<u>34.75</u>	<u>34.75</u>
MAX. CRUSH (in)	<u>27.6</u>	<u>27.8</u>
MAX. INTRUSION (in)	<u>-5.0</u>	<u>4.6</u>

DUMMIES	VEH. NO. 1	VEH. NO. 2
TYPE	<u>Part 572, 50th Percentile Male</u>	<u>Part 572, 50th Percentile Male</u>
LOCATION	<u>(1) Driver (2) RFP</u>	<u>(1) Driver (2) RFP</u>
RESTRAINT	<u>3-Point Production Belts</u>	<u>3-Point Production Belts</u>
S/N	<u>153, 320</u>	<u>109, 111</u>

NUMBER OF DATA CHANNELS 58
 NUMBER OF HIGH SPEED CAMERAS 11 + 2 Real Time

* WITH RESPECT TO TOW TRACK CENTERLINE
 ** SPEED TRAP MEASUREMENT (±0.5% ACCURACY)

Table 2

VEHICLE TEST WEIGHTS AS TESTED

VEHICLE NO. 1 - TOYOTA CELICA

Left Front	770 lbs	Left Rear	730 lbs
Right Front	<u>850</u> lbs	Right Front	<u>670</u> lbs
TOTAL FRONT	<u>1620</u> lbs	TOTAL REAR	<u>1400</u> lbs

Total Weight = 3020 lbs

Wheel Base = 98 inches

$C_{gF.W.} = \frac{1400 \text{ lbs} \times 98 \text{ inches}}{3020 \text{ lbs}} = \underline{45.4}$ inches

CALCULATION FOR TEST WEIGHT

- RCLW = Rated Cargo and Luggage Weight
- UDW = Unloaded Delivered Weight (2570 lbs)
- VCW = Vehicle Capacity Weight (725 lbs)
- DSC = Designated Seating Capacity (4)

RCLW = VCW - 150 (DSC)

RCLW = 725 - 150 (4) = 125 lbs

TEST WEIGHT = UDW + RCLW + (No. Dummies x 164 lbs)

TEST WEIGHT = 2570 lbs + 125 lbs + 2 (164 lbs)

TEST WEIGHT = 3023 lbs

Table 3

VEHICLE TEST WEIGHTS AS TESTED

VEHICLE NO. 2 - FORD MUSTANG

Left Front	800	lbs	Left Rear	690	lbs
Right Front	830	lbs	Right Front	730	lbs
TOTAL FRONT	1630	lbs	TOTAL REAR	1420	lbs

Total Weight = 3050 lbs

Wheel Base = 101 inches

$Cg_{F.W.} = \frac{1420 \text{ lbs} \times 101 \text{ inches}}{3050 \text{ lbs}} = \underline{47} inches$

CALCULATION FOR TEST WEIGHT

RCLW = Rated Cargo and Luggage Weight
UDW = Unloaded Delivered Weight (2600 lbs)
VCW = Vehicle Capacity Weight (700 lbs)
DSC = Designated Seating Capacity (4)

RCLW = VCW - 150 (DSC)

RCLW = 700 - 150 (4) = 100 lbs

TEST WEIGHT = UDW + RCLW + (No. Dummies x 164 lbs)

TEST WEIGHT = 2600 lbs + 100 lbs + 2 (164 lbs)

TEST WEIGHT = 3028 lbs

SUMMARY OF TEST CONDITIONS

VEHICLE NO. 1 - TOYOTA CELICA

TEST VEHICLE INFORMATION

Vehicle Manufacturer Toyota Motor Company, Ltd.
Make/Model Celica
Body Style 2-Door Sedan Model Year 1980
VIN RA42 387434 Build Date 5-80
NHTSA No. 308-31-498 Color Silver
Engine Data: 4 cylinders 134 in³~~cc~~ displacement
Transmission Data: 5 speed () Manual () Automatic
Date Vehicle Received by Laboratory 7-30-80
Dealer's Name & Address Northtown Toyota, Buffalo, N. Y.

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

Vehicle Manufactured by Toyota Motor Company, Ltd.
Date of Manufacture 5-80 VIN RA42 387434
GVRW 3415 lbs GAWR: Front 1920 lbs Rear 1920 lbs

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

Vehicle Load (up to capacity) - Front 24 psi
Rear 24 psi
Recommended Tire Size 175SR-14 Load Range: B C D
Vehicle Capacity: Types of Seats Bench Bucket Split Bench
Number of Occupants (Designated Seating Capacity): 2 Front
2 Rear
4 TOTAL
Cargo Load = 125 lbs
TOTAL = 725 lbs

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

Right Front = 720 lbs Right Rear = 550 lbs
Left Front = 710 lbs Left Rear = 590 lbs
TOTAL FRONT WEIGHT = 1430 lbs (56 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1140 lbs (44 % of Total Vehicle Weight)
TOTAL DELV. WEIGHT = 2570 lbs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 122 lbs CARGO

Right Front = 850 lbs Right Rear = 670 lbs
Left Front = 770 lbs Left Rear = 730 lbs
TOTAL FRONT WEIGHT = 1620 lbs (54 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1400 lbs (46 % of Total Vehicle Weight)
TOTAL TEST WEIGHT = 3020 lbs
Weight of ballast secured in vehicle trunk area = 0 lbs

SUMMARY OF TEST CONDITIONS

TEST VEHICLE INFORMATION

Vehicle Manufacturer Ford Motor Company
Make/Model Mustang
Body Style 2-Door Sedan Model Year 1980
VIN 0F02A273690 Build Date 5-80
NHTSA No. 308-38-498 Color Bright Blue
Engine Data: 4 cylinders 2.3L ~~XXXXXX~~ displacement
Transmission Data: 4 speed () Manual () Automatic
Date Vehicle Received by Laboratory 7-29-80
Dealer's Name & Address Midway Ford, Buffalo, N. Y.

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

Vehicle Manufactured by Ford Motor Company
Date of Manufacture 5-80 VIN 0F02A273690
GVRW 3570 lbs GAWR: Front 1785 lbs Rear 1805 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 P185R/80R-13 Load Range: B C D
Vehicle Capacity: Types of Seats Bench Bucket Split Bench
Number of Occupants (Designated Seating Capacity):
2 Front
2 Rear
4 TOTAL
Cargo Load = 100 lbs
TOTAL = 700 lbs

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

Right Front = 750 lbs Right Rear = 550 lbs
Left Front = 740 lbs Left Rear = 560 lbs
TOTAL FRONT WEIGHT = 1490 lbs (57 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1110 lbs (43 % of Total Vehicle Weight)
TOTAL DELV. WEIGHT = 2600 lbs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 122 lbs CARGO

Right Front = 830 lbs Right Rear = 730 lbs
Left Front = 800 lbs Left Rear = 690 lbs
TOTAL FRONT WEIGHT = 1630 lbs (53 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1420 lbs (47 % of Total Vehicle Weight)
TOTAL TEST WEIGHT = 3050 lbs
Weight of ballast secured in vehicle trunk area = 0 lbs

Table 5
SUMMARY OF TEST CONDITIONS (Cont'd)

TEST CONDITIONS

Date of Test 8-12-80 Time of Test 2:12 ~~3:00~~ pm
Ambient Temperature 78 °F at impact area
Temperature in Occupant Compartment 77 °F

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude: RF 28" LF 27-7/8" RR 27-3/8" LR 27-5/8"
Test Attitude: RF 26.5 LF 26.4 RR 25.7 LR 26.3

VEHICLE TIRE DATA

Recommended Cold Tire Pressure: Front = 35 psi Rear = 35 psi
Recommended Tire Size P185/80R-13 Load Range B
Tires on Vehicle P185R
Is Spare Tire a "Space Saver" yes X no
Is Spare Tire Standard Equipment yes X no

TEST FLUID DATA

Test Fluid Type: Red Stoddard Solvent #2 Spec. Grav.: 0.764
Kinematic Viscosity 0.96 Centistokes
Spill Point Volume* gal (SPV)
Test Volume 10.69 gal (90 to 91% of SPV)
Fuel System Capacity (data from Owner's Manual) 11.5 gal
Details of fuel system Engine Operated Fuel Pump

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 172.8 /L 151.6 inches
Post-Test = R 172.9 /L 146.3 inches
Crush = R 21.2 /L 26.6

SECTION 3

COMPLIANCE RELATED INFORMATION

Although testing for compliance to FMVSS 212- Windshield Mounting, 219 - Windshield Intrusion, and 301-75 - Fuel Systems Integrity - is not required for this series of tests, observations regarding these federal regulations will be reported.

Vehicle No. 1 - the Toyota Celica - experienced no fuel leakage and no loss of windshield retention in this car-to-car crash test. It is likely that in a barrier test of the same impact velocity this vehicle would comply with the requirements of FMVSS 301-75 and 212. A protected zone styrofoam template was not installed on the windshield; however, a review of the high speed motion pictures indicated that nothing penetrated this area and it is likely that this vehicle would comply with the requirements of FMVSS 219.

Vehicle No. 2 - the Ford Mustang - experienced no loss of windshield retention. A protected zone styrofoam template was not installed on the windshield; however, a review of the high speed motion pictures indicated that nothing penetrated this area. It is likely that this vehicle would comply with the requirements of FMVSS 212 and 219 in a barrier crash test of the same impact velocity. The fuel tank was punctured by the edge of a sheared metal abort bar attached to the underside of the vehicle causing all the fuel to leak out (see Appendix A - Figure A-1). Since no other damage to the fuel tank was observed, it is likely that this vehicle would comply with requirements of FMVSS 301-75 in a barrier test of the same impact velocity.

SECTION 4

OCCUPANT AND VEHICLE INFORMATION

VEHICLE NO 1 - TOYOTA CELICA

Occupants - The driver of the Toyota Celica did not comply with the injury criteria requirements of FMVSS 208 for chest acceleration and right femur load. The right front passenger did comply with the FMVSS 208 requirements. The occupant results are summarized in Table 10 and the data traces are given in Appendix B.

The driver's knees struck the dash panel very close to the steering column support brackets. These brackets cause the dash panel to be stiff in that area which, undoubtedly, caused the high right femur load. The driver's abdomen struck the lower steering wheel rim and the head struck the upper rim. The steering wheel collapsed under this load and the chest struck the hub resulting in a high chest deceleration.

There was a large amount of slack, stretch, or spool-off in the belt restraint system permitting the occupant to move forward quite far and strike the vehicle interior. The knees were forced upward as they struck the dash which, in turn, forced the hips down allowing the lap belt to ride up into the occupant's abdomen.

The right front passenger exhibited similar kinematics although the dash panel was softer and there was no steering wheel or column to be struck. As a result, the occupant injury criteria levels were much lower. As before, the knees forced the hips downward and under the lap belt and there was a great deal of slack, stretch, or spool-off in the belt restraint system.

The belt restraint system appears to be well designed for maximum occupant displacement and, thus, minimum acceleration levels, for a 30 mph crash. This crash of 35 mph exceeded the limits of the system for the driver.

Vehicle - The instrument panel was badly broken up. The vehicle body buckled behind the B-pillar on both sides. The steering column collapsed the shear capsule. The driver side door was inoperable, while the passenger side door could be opened. The driver seat tracks failed and the seat moved forward 2.5". The passenger seat tracks failed and the seat moved forward 3.0".

VEHICLE NO. 2 - FORD MUSTANG

Occupants - Both driver and right front passenger complied with the injury criteria requirements of FMVSS 208. The occupant results are summarized in Table 11 and the data traces are given in Appendix B.

The driver's lap belt restrained the hips very well resulting in very little knee-to-dash contact. The torso belt slipped off of the occupant's shoulder and into the dummy arm/shoulder cavity causing the occupant to roll outboard and permitting forward motion. The occupant's abdomen struck the lower wheel rim and the right side of the head struck the upper rim. The head also struck the upper dash panel slightly. On rebound the belt slipped off the occupant completely.

The passenger exhibited similar kinematics. The belt slipped into the arm/shoulder cavity and the upper torso rolled outboard. The head struck the upper dash panel slightly and then struck the right knee more firmly. On rebound the belt slipped off the occupant entirely.

The fact that the torso belt slips into the arm/shoulder opening creates an artificial situation that is difficult to relate to human occupants.

Vehicle - The windshield sustained stress cracks. Neither door was operable; the steering column bent downward due to driver abdominal loads.

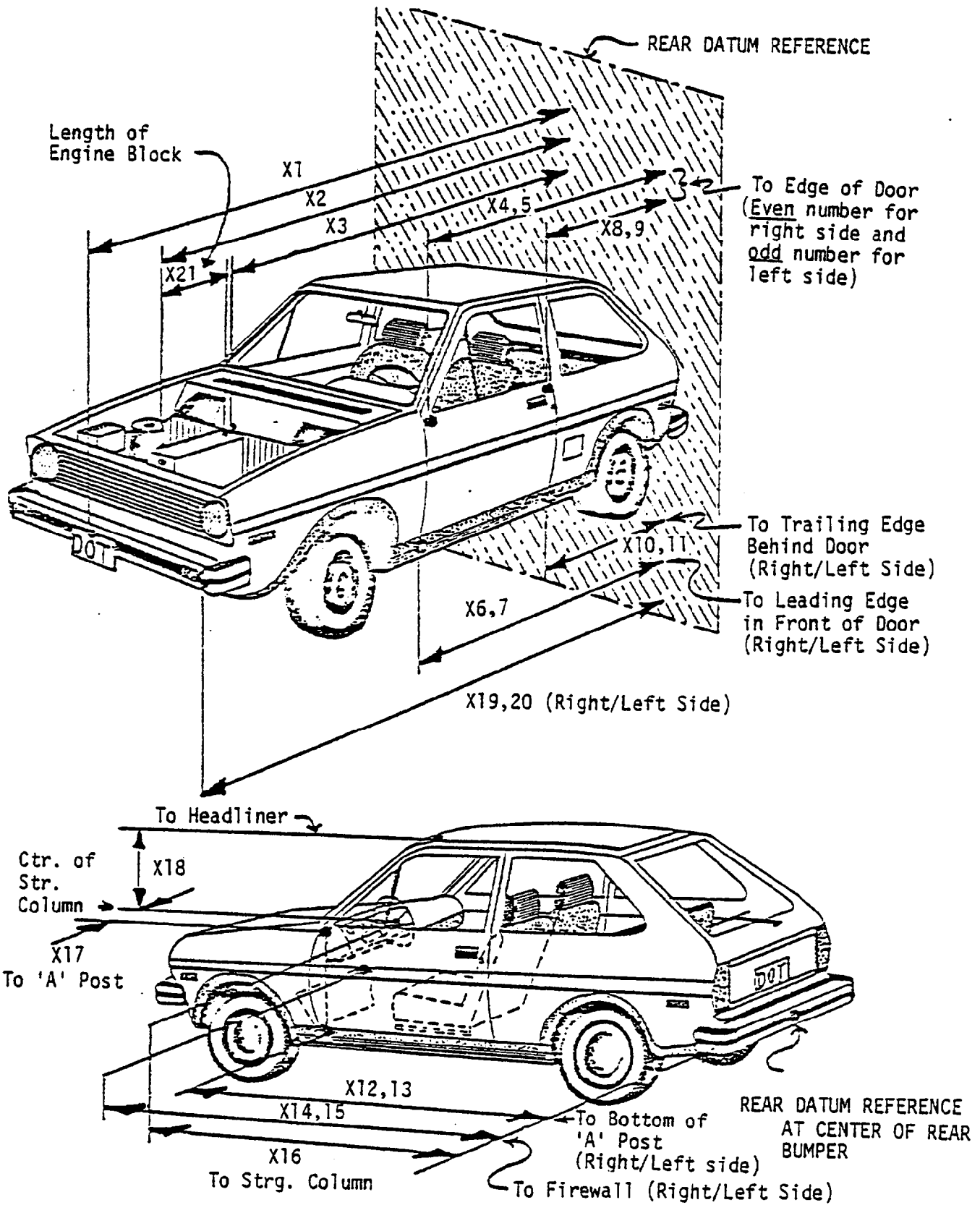


Figure 1 PRE-TEST AND POST-TEST MEASUREMENT POINTS

Table 6

VEHICLE MEASUREMENTS

All Dimensions in Inches

NO.	VEHICLE NO. 1 - TOYOTA CELICA	Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	175.4	148.2	27.2
X2	Rear Surface of Vehicle to Front of Engine	150.7	139.8	10.9
X3	Rear Surface of Vehicle to Firewall	126.8	122.3	4.5
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	114.4	114.3	0.1
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	114.6	114.6	0.0
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	114.5	114.1	0.4
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	114.3	113.9	0.4
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	66.2	66.1	0.1
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	66.1	65.8	0.3
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	66.4	65.9	0.5
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	66.2	65.6	0.6
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	113.0	112.6	0.4
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	113.0	112.5	0.5
X14	Rear Surface of Vehicle to Firewall - Right Side	126.3	121.5	4.8
X15	Rear Surface of Vehicle to Firewall - Left Side	124.8	119.8	5.0
X16	Rear Surface of Vehicle to Steering Column	99.6	99.2	0.4
X17	Center of Steering Column to "A" Post	13.4	11.8	1.6
X18	Center of Steering Column to Headliner	16.1	21.5	-5.4
X19	Rear Surface of Vehicle to Right Side of Front Bumper	171.7	147.1	24.6
X20	Rear Surface of Vehicle to Left Side of Front Bumper	171.6	144.0	27.6
X21	Length of Engine Block	22.2	22.2	0.0
X22	Dash to Rear Deck	80.2	78.6	1.6

NOTE: * X1, X19, X20 measured to soft bumper backing plate. X1', X19', X20' measured to front of soft bumper. Post-test measurement taken to backing plate.

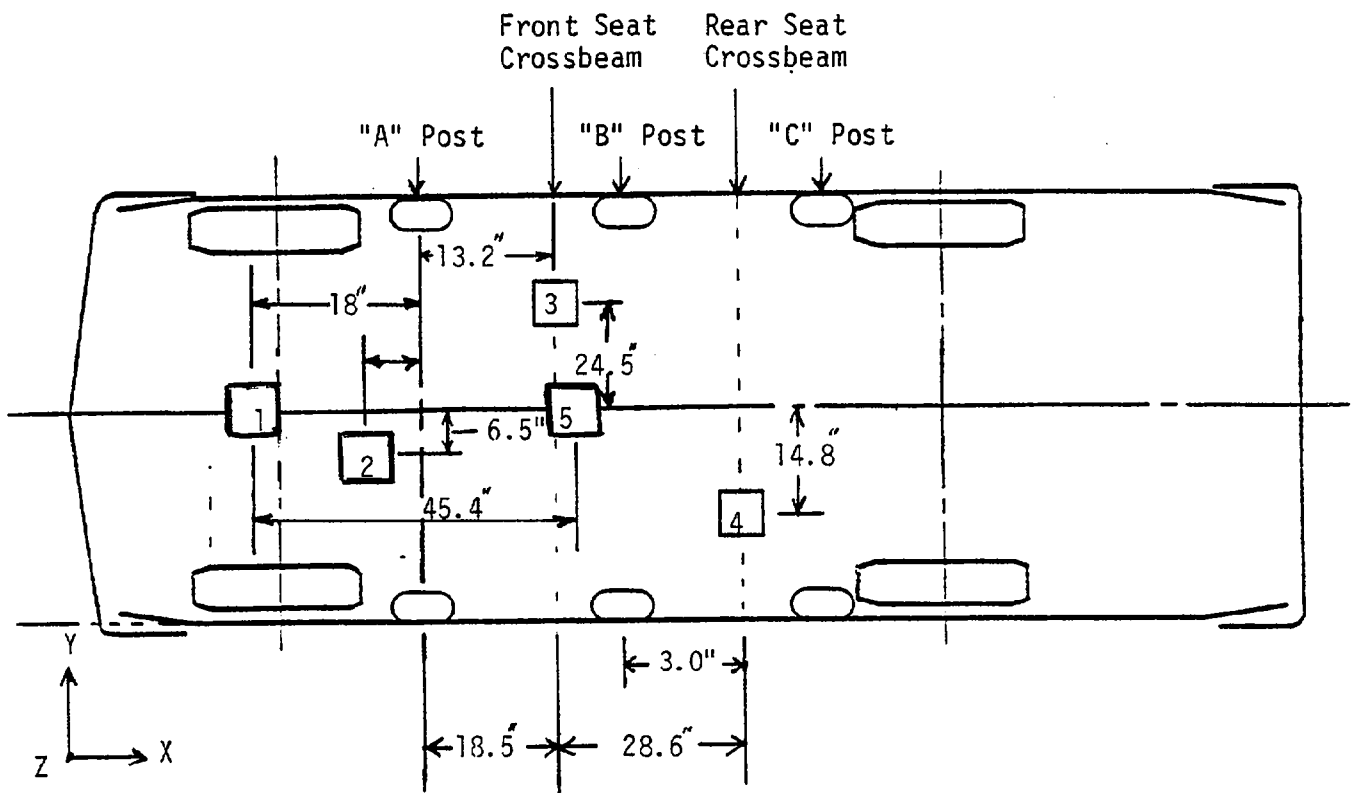
Table 7

VEHICLE MEASUREMENTS

All Dimensions in inches

NO.	VEHICLE NO. 2 - FORD MUSTANG	Pre-Test	Post-Test	Difference
* X1, X1'	Total Length of Vehicle at Centerline	177.5/178.7	149.7/153.2	27.8/25.5
X2	Rear Surface of Vehicle to Front of Engine	147.9	141.8	6.1
X3	Rear Surface of Vehicle to Firewall	127.0	123.1	3.9
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	111.9	111.3	0.6
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	111.9	111.2	0.7
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	115.1	114.6	0.5
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	115.3	115.1	0.2
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	64.8	64.3	0.5
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	64.8	64.4	0.4
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	64.5	64.0	0.5
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	64.5	64.0	0.5
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	113.8	113.1	0.7
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	113.8	113.2	0.6
X14	Rear Surface of Vehicle to Firewall - Right Side	126.9	123.3	3.6
X15	Rear Surface of Vehicle to Firewall - Left Side	127.6	123.0	4.6
X16	Rear Surface of Vehicle to Steering Column	100.4	97.7	2.7
X17	Center of Steering Column to "A" Post	16.8	15.3	1.5
X18	Center of Steering Column to Headliner	15.4	22.5	-7.1
* X19, X19'	Rear Surface of Vehicle to Right Side of Front Bumper	172.8/174.3	151.6/162.8	21.2/11.5
* X20, X20'	Rear Surface of Vehicle to Left Side of Front Bumper	172.9/174.4	146.3/155.6	26.6/18.8
X21	Length of Engine Block	19.7	19.7	0.0
X22	Dash to Rear Deck	79.8	77.2	2.6

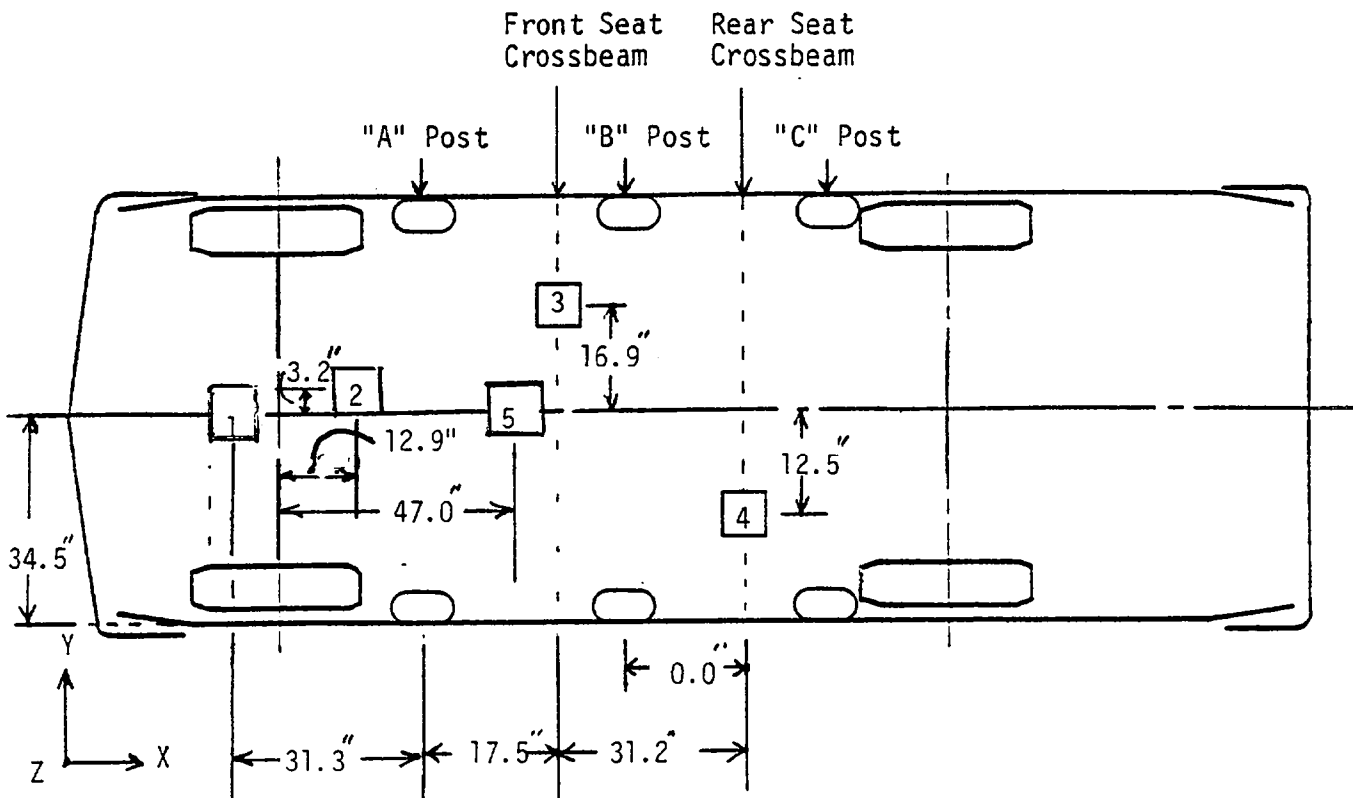
NOTE: * X1, X19, X20 measured to soft bumper backing plate. X1', X19', X20' measured to front of soft bumper. Post-test measurement taken to backing plate.



ACCELEROMETER NUMBER *	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Engine	X		X
2	Firewall	X		X
3	Front Seat Crossbeam	X		
4	Rear Seat Crossbeam	X		
5	C.G.	X	X	X

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

FIGURE 2 VEHICLE ACCELEROMETER LOCATIONS
VEHICLE NO. 1 - TOYOTA CELICA



ACCELEROMETER NUMBER *	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Engine	X		X
2	Firewall	X		X
3	Front Seat Crossbeam	X		
4	Rear Seat Crossbeam	X		
5	C.G.	X	X	X

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

FIGURE 3 VEHICLE ACCELEROMETER LOCATIONS
VEHICLE NO. 2 - FORD MUSTANG

NOTE: Camera Information Shown on Tables 8 and 9.

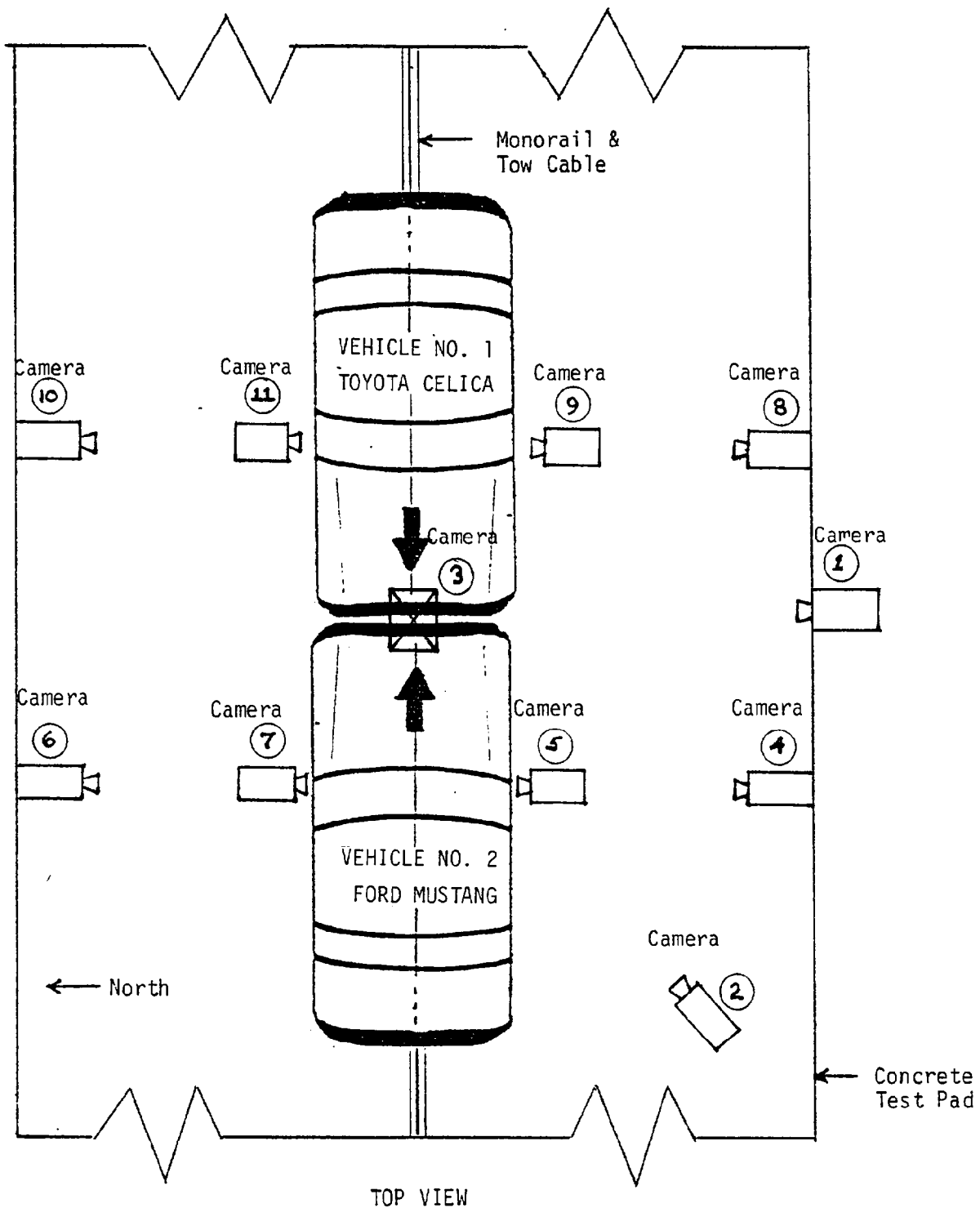


FIGURE 4 CAMERA POSITION FOR FRONTAL IMPACTS

Table 8

HIGH SPEED CAMERA LOCATIONSTest No.: 308-38-498Vehicle No. 1 TOYOTA CELICAVehicle No. 2 FORD MUSTANG

CAMERA NUMBER	VIEW	CAMERA POSITIONS (IN)*			CAMERA ANGLE (DEG)**	FILM PLANE TO HEAD TARGET (IN) X
		X	Y	Z		
1	Impact Event	0.0	-512.5	42.5	+1.0	---
2	Impact Event, 45° angle	-225.0	-221.0	127.0	≈45.0	---
3	Overhead Tower	0.0	0.0	388.0	≈90.0	---
4	Vehicle No. 2 Passenger	-65.5	-298.5	44.5	-3.0	283.1
5	Onboard - Vehicle No. 2 Pass.	--	--	--	--	---
6	Vehicle No. 2 Driver	-71.0	239.5	47.5	-5.0	226.2
7	Onboard-Vehicle No. 2 Driver	--	--	--	--	---
8	Vehicle No. 1 Driver	58.5	-309.5	45.5	-3.5	295.5
9	Onboard-Vehicle No. 1 Driver	--	--	--	--	---
10	Vehicle No. 1 RF Passenger	39.0	253.5	47.5	-4.0	239.3
11	Onboard-Vehicle No. 1 Pass.	--	--	--	--	---

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

** Referenced to Horizontal Plane

Table 9
HIGH SPEED CAMERA INFORMATION
 (Test 38)

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)
1	IMPACT	PHOTOSONIC	13	880
2	TOWER 45 ⁰	PHOTOSONIC	13	900
3	OVERHEAD	PHOTOSONIC	13	730
4	MUSTANG PASSENGER	PHOTOSONIC	25	890
5	MUSTANG PASSENGER ONBOARD	STALEX	8	1100
6	MUSTANG DRIVER	PHOTOSONIC	25	880
7	MUSTANG DRIVER ONBOARD	STALEX	8	780
8	TOYOTA DRIVER	PHOTOSONIC	25	970
9	TOYOTA DRIVER ONBOARD	STALEX	8	910
10	TOYOTA PASSENGER	PHOTOSONIC	25	890
11	TOYOTA PASSENGER ONBOARD	STALEX	8	875

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

FIGURE 5
PART 572 DUMMY IN-VEHICLE POSITION

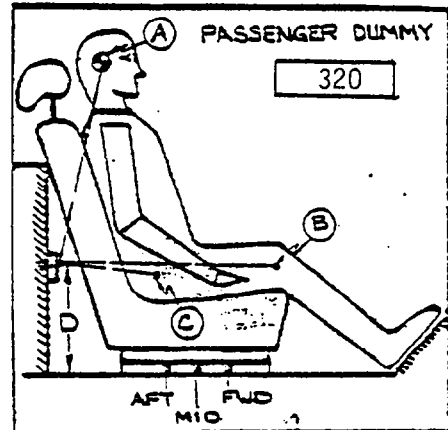
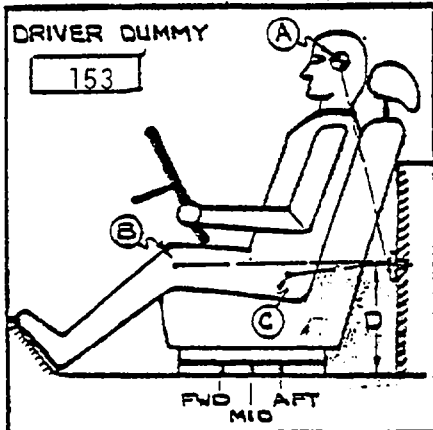
Test No. 38

Vehicle No. 1 Toyota Celica

SEAT TYPE:
 Bench
 Bucket
 Split Bench

ADJUSTER TYPE:
 Manual
 Power

BUCKET SEAT BACK TYPE:
 Fixed
 Adjustable Reclining

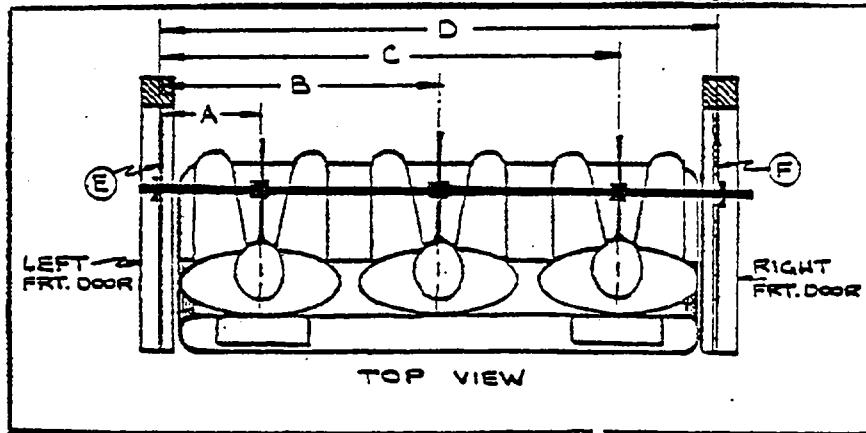


MEASUREMENT LOCATION

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

A = 24.7 in. 30 Degrees
 B = 35.5 in. 92 Degrees
 C = 20 in. 107 Degrees
 D = 13.7 in.

A = 25 in. 30 Degrees
 B = 34.6 in. 93 Degrees
 C = 20.25 in. 108 Degrees
 D = 13.7 in.



DUMMY ID

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A	=	Left Door to Driver Centerline	<u>11.7</u> in.
B	=	Left Door to Center Passenger Centerline	<u>--</u> in.
C	=	Left Door to Right Passenger Centerline	<u>39.2</u> in.
D	=	Left Door to Right Door	<u>51.5</u> in.
E, F	=	Window Glass Height (Right and Left Must be Equal)	<u>9</u> in.

FIGURE 6
PART 572 DUMMY IN-VEHICLE POSITION

Test No. 38

Vehicle No. 2 Ford Mustang

SEAT TYPE:

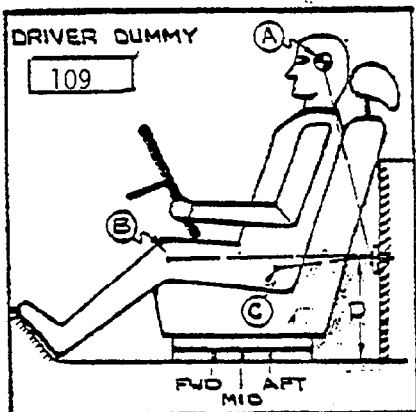
- Bench
 Bucket
 Split Bench

ADJUSTER TYPE:

- Manual
 Power

BUCKET SEAT BACK TYPE:

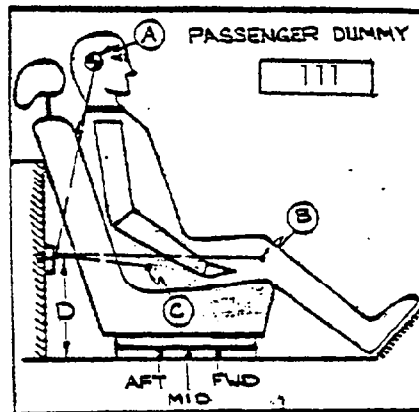
- Fixed
 Adjustable Reclining



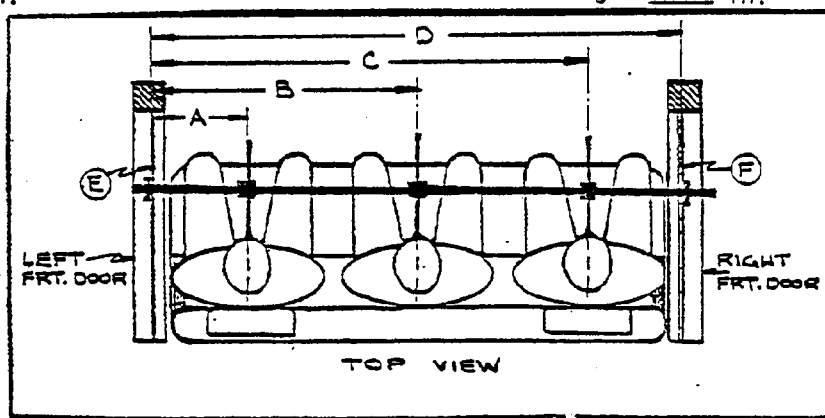
- A = 27 in. 30 Degrees
B = 38 in. 90 Degrees
C = 27 in. 30 Degrees
D = 11.5 in.

MEASUREMENT LOCATION

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



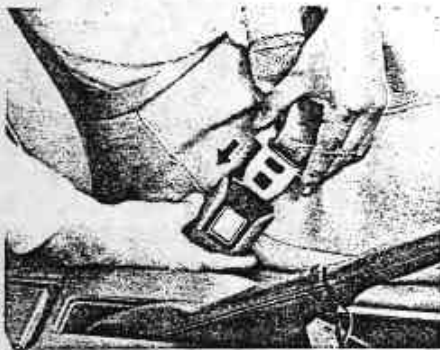
- A = 26.5 in. 30 Degrees
B = 36.7 in. 90 Degrees
C = 22-1/4 in. 99 Degrees
D = in.



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- A = Left Door to Driver Centerline 12.7 in.
B = Left Door to Center Passenger Centerline -- in.
C = Left Door to Right Passenger Centerline 41.4 in.
D = Left Door to Right Door 52 in.
E, F = Window Glass Height (Right and Left Must be Equal) 10.5 in.

Front seat belts

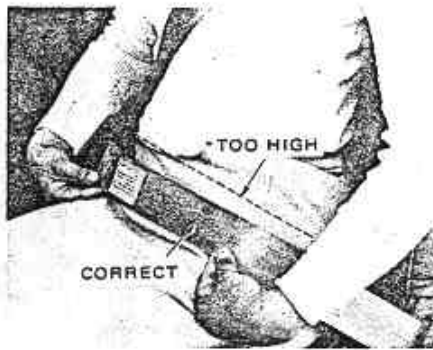


To put on a belt, pull it out of the retractor and insert the tab into the buckle.

You'll hear a "click" when the tab locks into the buckle. Make sure the connection is secure and the belt is not twisted.

The front seat belt length automatically adjusts to your size and the seat position.

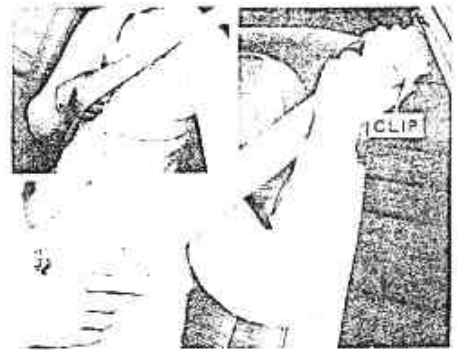
The retractors will lock the belt only during a fast stop or on impact. At other times you can move around freely.



Adjust the position of the lap and shoulder belts.

To reduce the risk of sliding under the belt during an accident, *the lap belt should be as low as possible on your hips* — not on your waist.

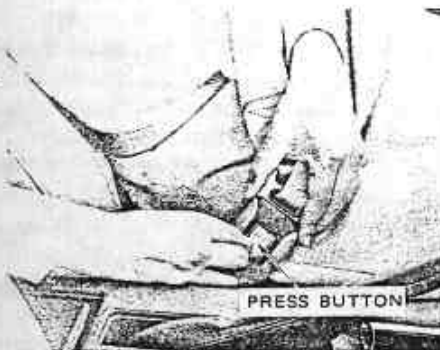
For your safety *do not place the shoulder belt under your arm.*



Adjust the comfort clip to provide a little slack in the shoulder belt.

This prevents any possible discomfort from the tension of the belt-return spring. To adjust the clip, pull the belt down a little and then push the clip up against the seat belt guide to hold the slack. *Do not put more than 2 inches (50 mm) of slack between the belt and your chest (the width of a fist).* Too much slack will keep the belt from protecting you in an accident.

Front seat belt (cont.)



To release a belt, press the buckle-release button and allow the belt to retract.

If the belt doesn't fully retract, pull it out and check for kinks or twisting. Then make sure that it remains untwisted as it retracts.

Rear seat belts

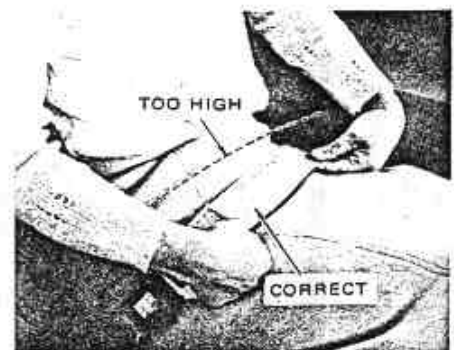


Pull the belt out of the retractor and fasten the buckle just like the front.

The belt may be locked if you pull it out too quickly.

You'll hear a "click" when the tab locks into the buckle. Make sure that the connection is secure and the belt is not twisted.

The rear seat belt length also automatically adjusts to your size. The retractors will lock the belt only during a fast stop or impact.



Adjust the position of the belt.

The belt should be *as low as possible on your hips*—not on your waist.

To release the belt, press the buckle-release button.

FIGURE 7 OWNERS MANUAL RESTRAINT SYSTEM OPERATING INSTRUCTIONS - VEHICLE NO.1
TOYOTA CELICA

SEE OTHER SIDE FOR STARTING INSTRUCTIONS

SEAT BELT INSTRUCTIONS



WARNING SYSTEM

1. All passengers should buckle up seat belts.
2. Warning light will come on for 4 to 8 seconds after ignition is turned on regardless of seat belt usage.
3. Warning buzzer will sound for 4 to 8 seconds after ignition is turned on if driver's seat belt is not buckled up.

SHOULDER BELT RETRACTOR

The shoulder belt retractor adjusts the belt automatically. The belt should unreeel freely as the wearer moves around. However, it is designed to "lock up" under sudden stop conditions.

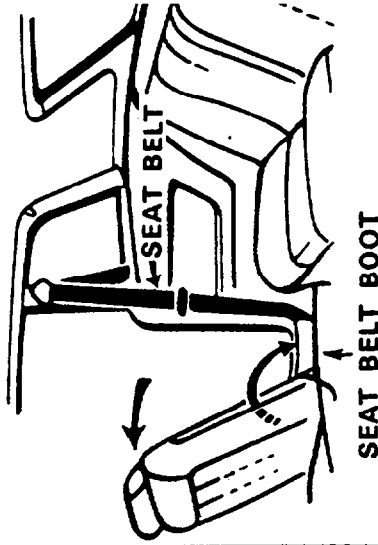
OPTIONAL BELT TENSION RELIEVER

If your car is equipped with optional Deluxe Seat Belts, after buckling up, the shoulder belt tension can be relieved as follows:

1. Door must be closed.
2. Pull shoulder belt away from body approximately 6" or 150mm and release.
3. Pull shoulder belt down a small amount, approximately 3" or 75mm and release.
IMPORTANT: Set the least amount of slack to relieve tension.
4. If, for any reason, excessive slack is incurred, then reset by repeating Steps 2 and 3.

TO GET INTO REAR SEAT 2-DOOR MODELS

1. Push seat belt "boot" to the rear.
2. Enter in front of seat belts.
3. After getting in, push the "boot" forward so it will be easy for front seat passenger to reach the belt.



AIR CONDITIONED VEHICLES

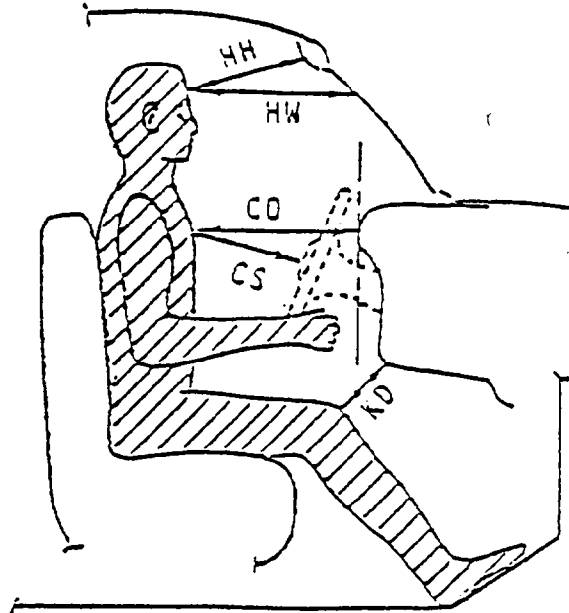
The vent position is recommended for use in moderate weather when refrigeration is not required. In this position, the compressor does not operate and outside rather than cooled air is discharged from the instrument panel registers. Operating your air conditioning unit in this mode and utilizing other sensible driving habits can assist in achieving good fuel economy. To help prevent fog from forming on the windshield in cool, humid weather, place the A/C system in DEFROST or V (DEFOG) prior to starting the car. After a few minutes of operation move the function control lever to the desired position.

MAINTENANCE

Your vehicle has been designed to operate with a minimum amount of regularly scheduled maintenance. However, it is important to the long life of your vehicle and to help maintain the desired level of fuel efficiency that maintenance be performed at the time and/or mileage intervals specific in the owner's guide. It is recommended that maintenance work be performed using Ford Motorcraft or the equivalent replacement parts. Know your vehicle's capabilities and limitations. Read the owner's guide. Keep it handy in your car for ready reference.

FIGURE 8 OWNERS MANUAL RESTRAINT SYSTEM OPERATING INSTRUCTIONS - VEHICLE NO. 2 FORD MUSTANG

	<u>DRIVER</u>	<u>PASS</u>
HH	10.5	10.5
HW	13.5	13.7
CD	20.0	18.7
CS	13.3	---
KDL	6.0	6.25
KDR	5.5	6.25



HR	4.2	4.7
HS	7.2	8
AD	3.7	4.7
HD	4.7	6.5

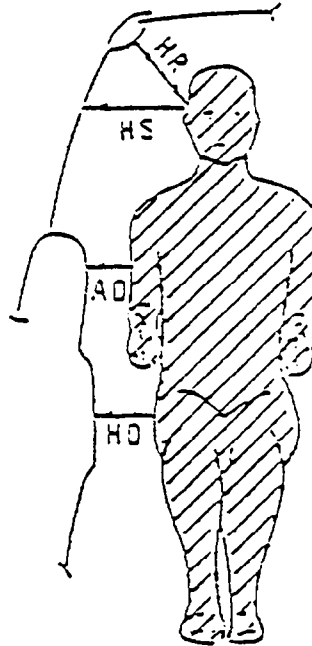
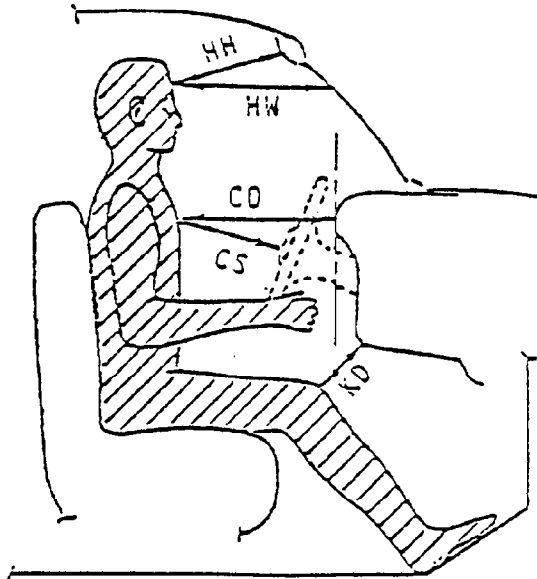


FIGURE 9 OCCUPANT CLEARANCE DIMENSIONS
VEHICLE NO. 1 - TOYOTA CELICA

	<u>DRIVER</u>	<u>PASS</u>
HH	11.0	11.0
HW	17.0	17.0
CD	20.0	21.2
CS	13.0	---
KDL	5.5	5.5
KDR	5.4	5.5



HR	5.5	5.0
HS	7.2	7.0
AD	4.3	4.0
HD	6.2	6.2

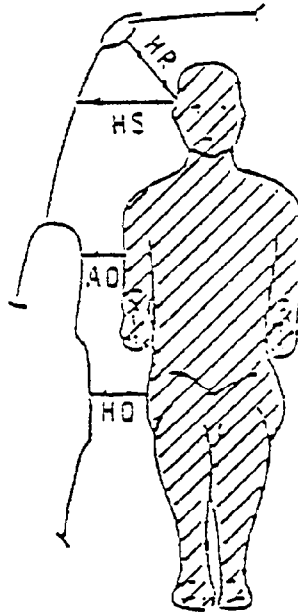


FIGURE 10 OCCUPANT CLEARANCE DIMENSIONS
VEHICLE NO. 2 - FORD MUSTANG

Table 10

DUMMY INJURY CRITERIA VALUES

Vehicle No. 1 - Toyota Celica

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R*	X	Y	Z	R*
DUMMY (1)	-76	18	57	68.7	-72	15	-22	64.8
DUMMY (2)	-102	-49	76	105.6	-54	20	-15	53.0
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	3700	840
DUMMY (2)	480	560
DUMMY (3)		
DUMMY (4)		

	MAXIMUM FORCE-SEAT BELTS LOADS (LBS)	
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD
DUMMY (1)	1300	600
DUMMY (2)	1850	700
DUMMY (3)		
DUMMY (4)		

	HEAD INJURY CRITERIA**				SEVERITY INDEX
	HIC	t ₁ (SEC)	t ₂ (SEC)	AVE. ACC. (g) t ₁ TO t ₂	(300 Msec) HEAD
DUMMY (1)	881.0	.0651	.1149	50.0	1134.7
DUMMY (2)	921.2	.0927	.1062	85.8	1572.6
DUMMY (3)					
DUMMY (4)					

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

Table 11

DUMMY INJURY CRITERIA VALUES

Vehicle No. 2 - Ford Mustang

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R*	X	Y	Z	R*
DUMMY (1)	-77	-175	40	83.1	-47	-28	20	41.8
DUMMY (2)	126	44	120	77.4	-40	30	-14	40.5
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	280	450
DUMMY (2)	100	670
DUMMY (3)		
DUMMY (4)		

	MAXIMUM FORCE-SEAT BELTS LOADS (LBS)	
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD
DUMMY (1)	1250	1300
DUMMY (2)	1100	2600
DUMMY (3)		
DUMMY (4)		

	HEAD INJURY CRITERIA**				SEVERITY INDEX
	HIC	t ₁ (SEC)	t ₂ (SEC)	AVE. ACC. (g) t ₁ TO t ₂	(300 Msec) HEAD
DUMMY (1)	872.3	.0750	.1101	57.3	1504.1
DUMMY (2)	690.9	.0969	.1155	67.3	1279.9
DUMMY (3)					
DUMMY (4)					

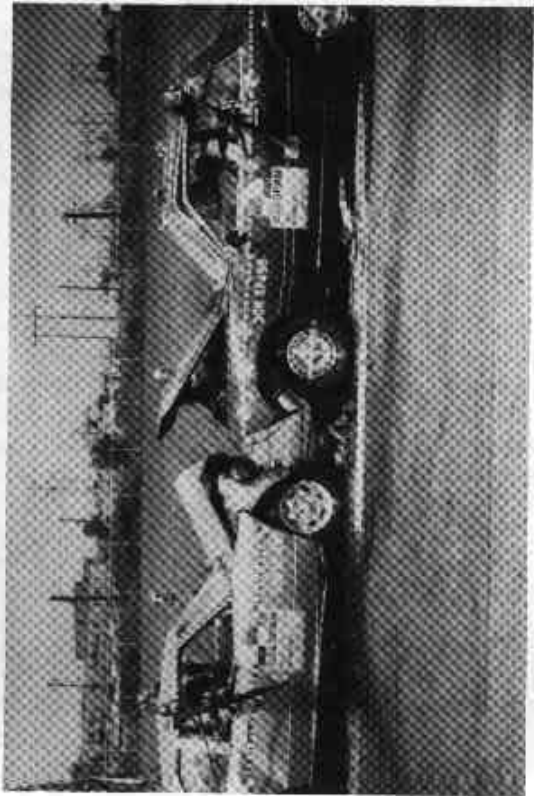
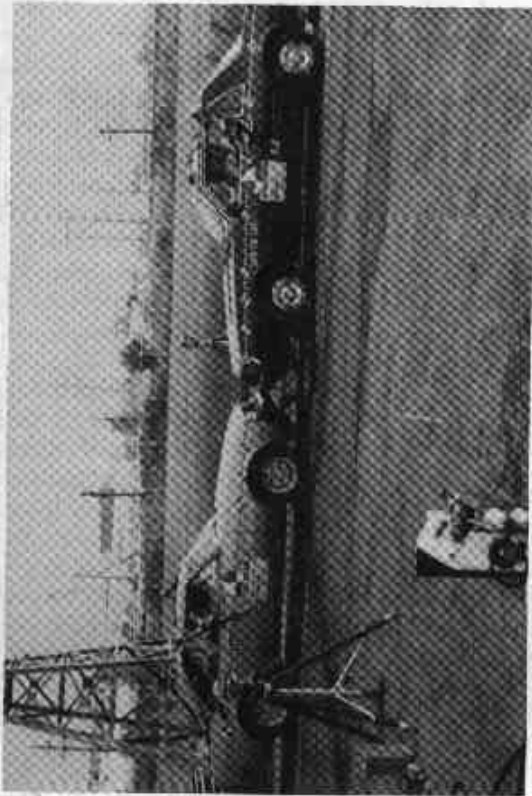
*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

APPENDIX A

STILL PHOTOGRAPHS

VEHICLE NO. 1 - TOYOTA CELICA



A-2

6525-V-38

FIGURE A-1 PRE- AND POST-TEST IMPACT CONFIGURATION

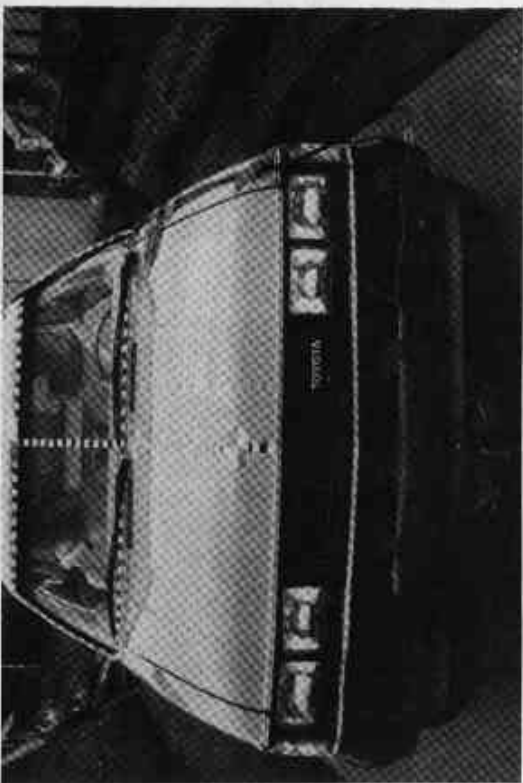


FIGURE A-2 VEHICLE NO. 1 - TOYOTA CELICA - PRE- AND POST-TEST FRONT AND REAR VIEWS

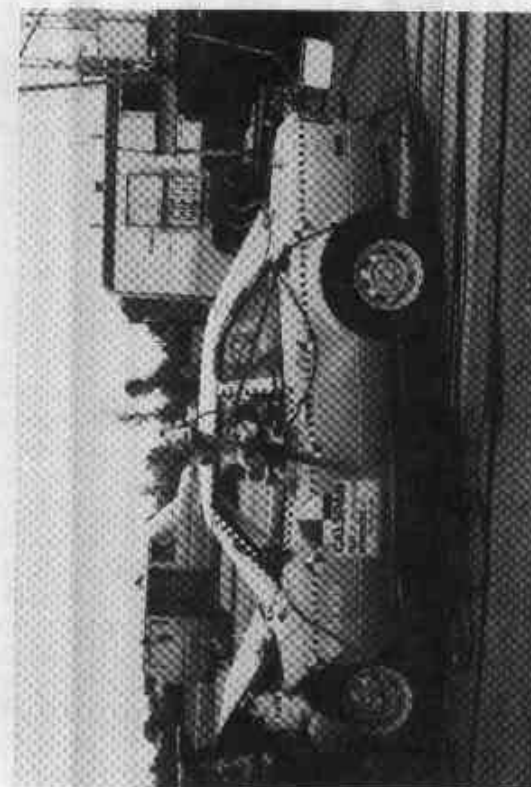
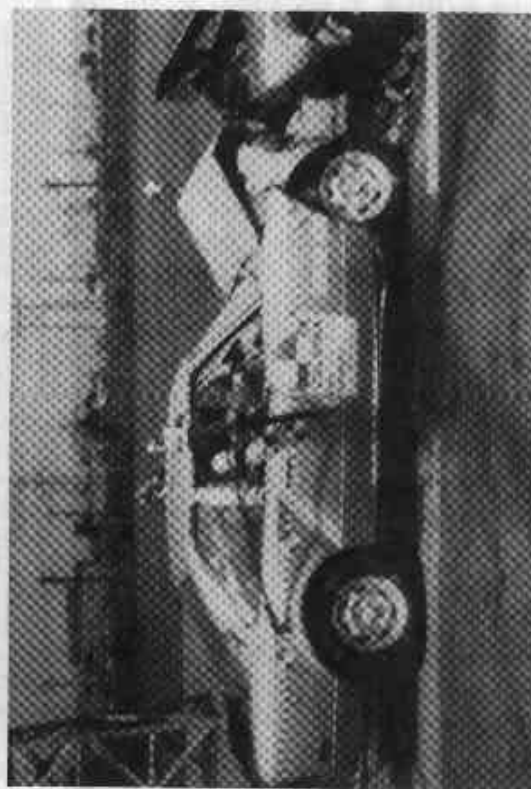
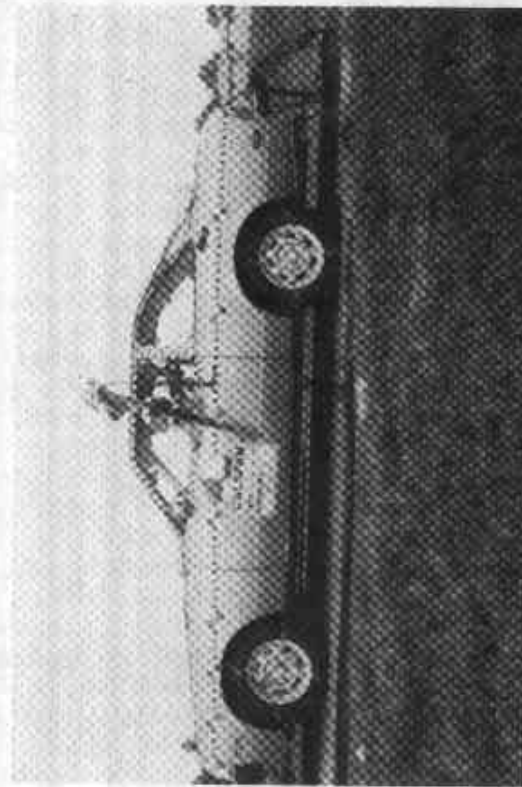
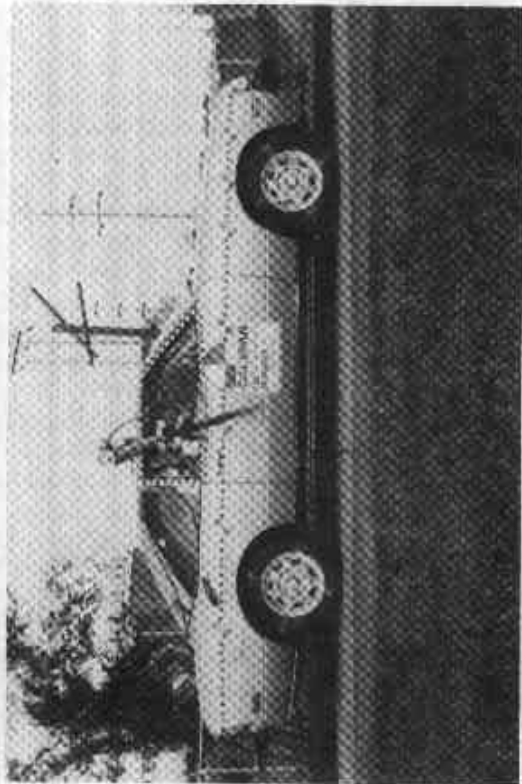


FIGURE A-3 VEHICLE NO. 1 - TOYOTA CELICA - PRE- AND POST-TEST RIGHT AND LEFT SIDE VIEWS

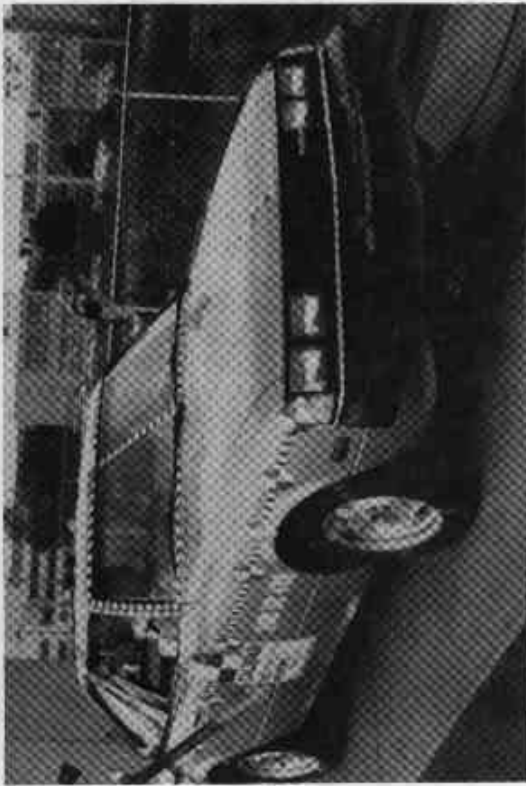
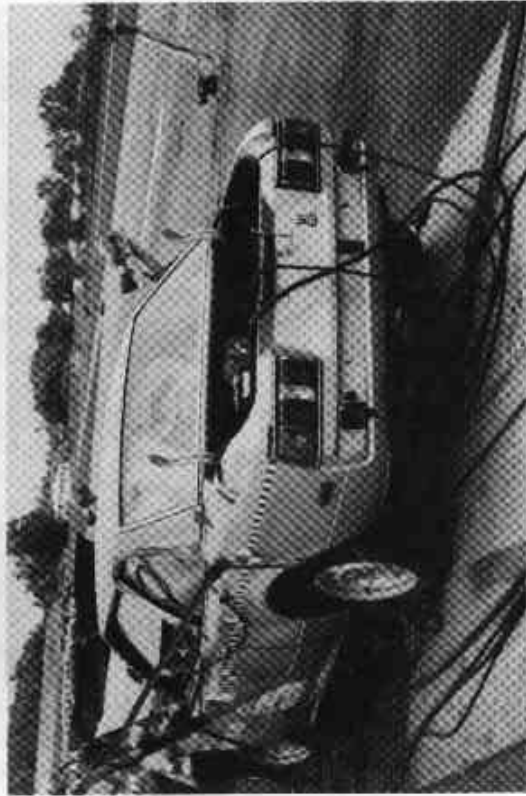


FIGURE A-4 VEHICLE NO. 1 - TOYOTA CELICA - PRE- AND POST-TEST FRONT AND REAR THREE-QUARTER VIEWS

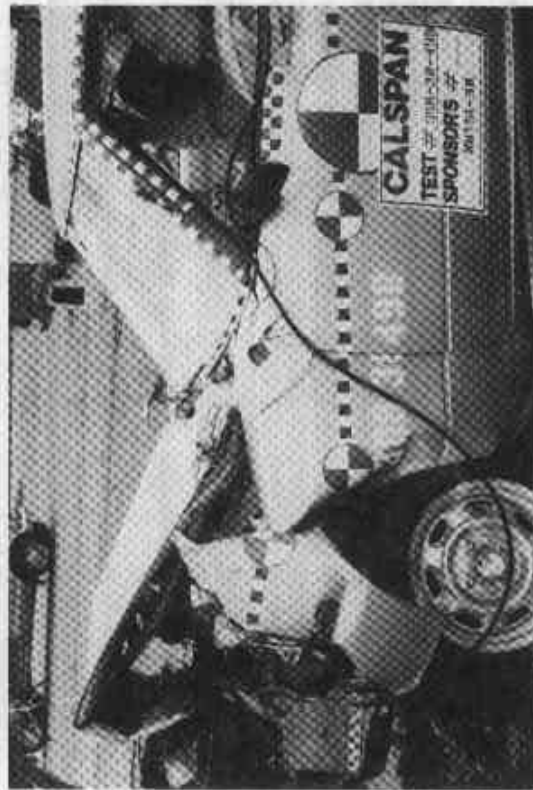
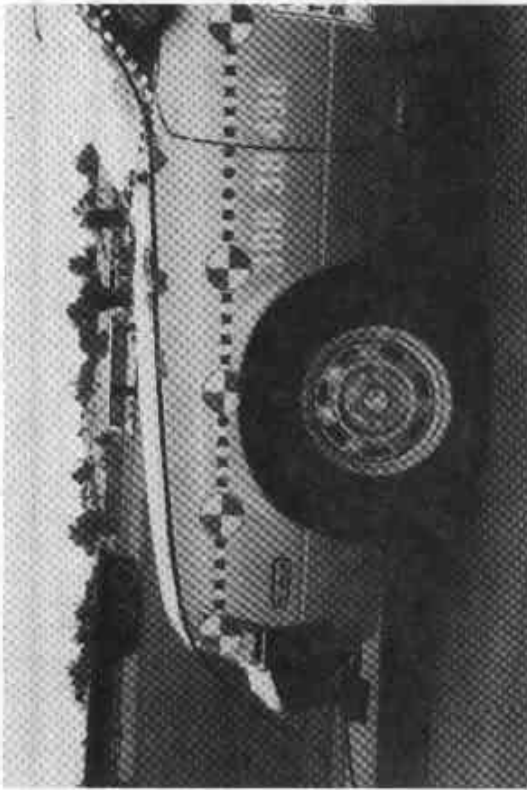
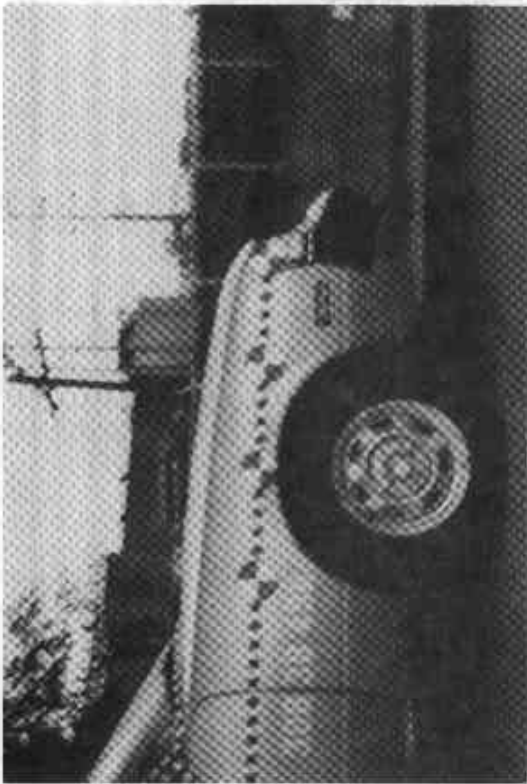


FIGURE A-5 VEHICLE NO. 1 - TOYOTA CELICA - PRE- AND POST-TEST RIGHT AND LEFT FRONT QUARTER VIEWS

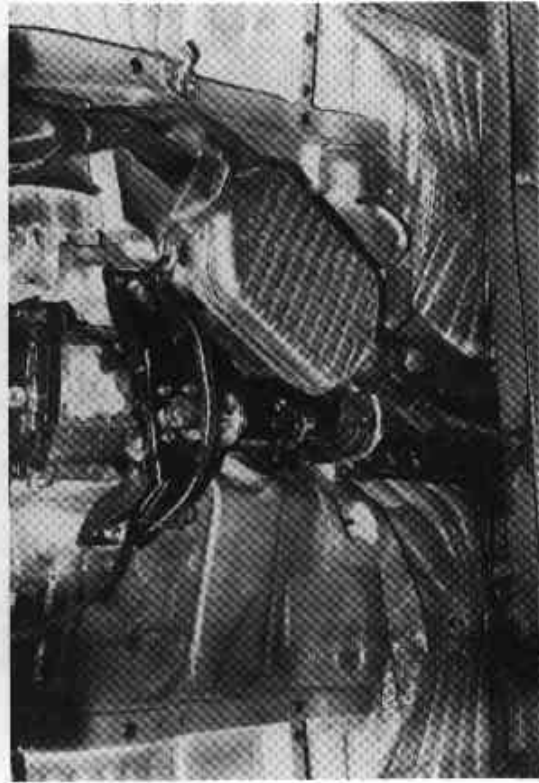
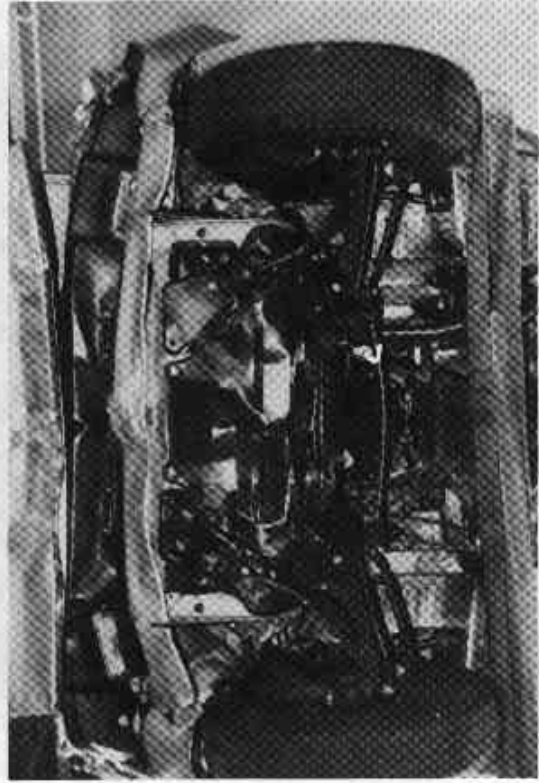
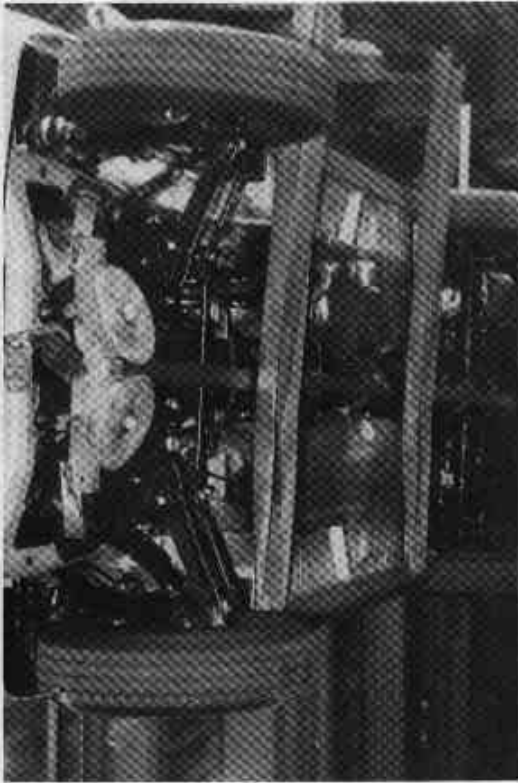


FIGURE A-6 VEHICLE NO. 1 - TOYOTA CELICA - PRE- AND POST-TEST UNDERBODY VIEWS

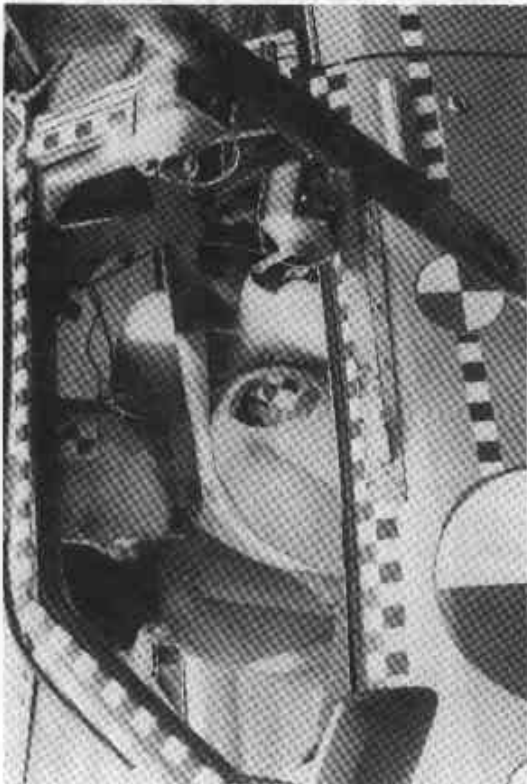


FIGURE A-7 VEHICLE NO. 1 - TOYOTA CELICA - PRE- AND POST-TEST DRIVER VIEWS



FIGURE A-8 VEHICLE NO. 1 - TOYOTA CELICA - PRE- AND POST-TEST PASSENGER VIEWS



FIGURE A-9 VEHICLE NO. 1 - TOYOTA CELICA - PRE-TEST ENGINE COMPARTMENT VIEWS

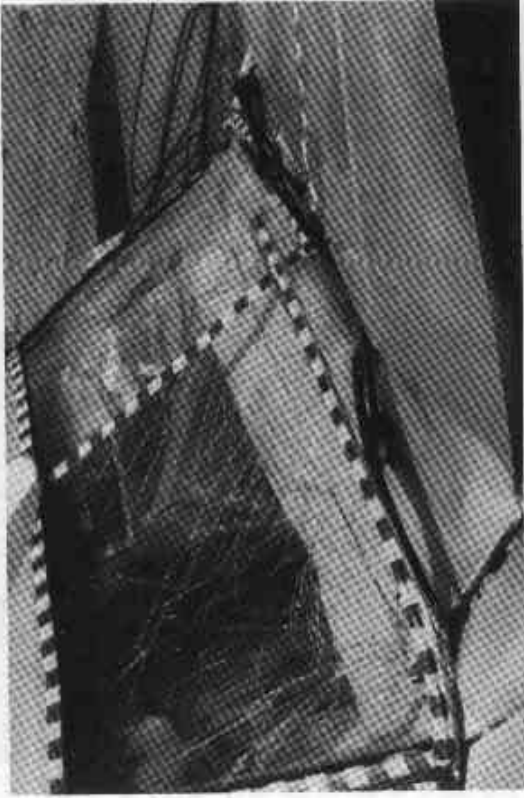


FIGURE A-10 VEHICLE NO. 1 - TOYOTA CELICA - POST-TEST WINDSHIELD



FIGURE A-11 VEHICLE NO. 1 - TOYOTA CELICA - POST-TEST OCCUPANT COMPARTMENT

STILL PHOTOGRAPHS

VEHICLE NO. 2 - FORD MUSTANG

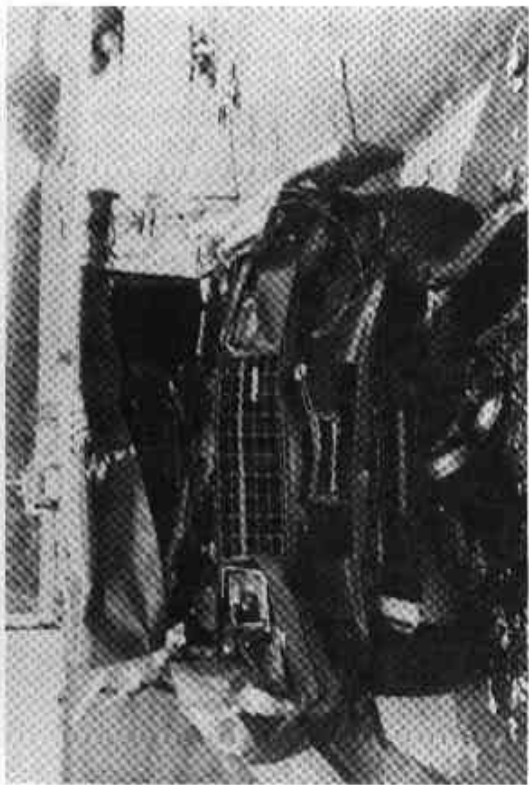
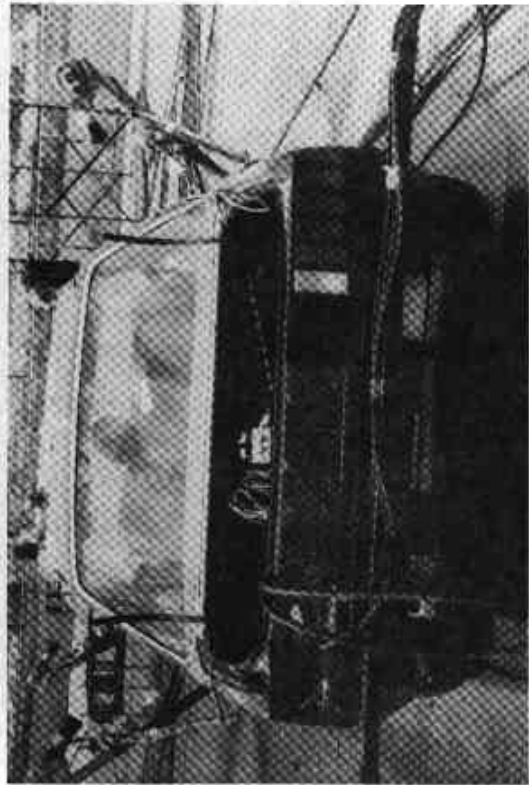
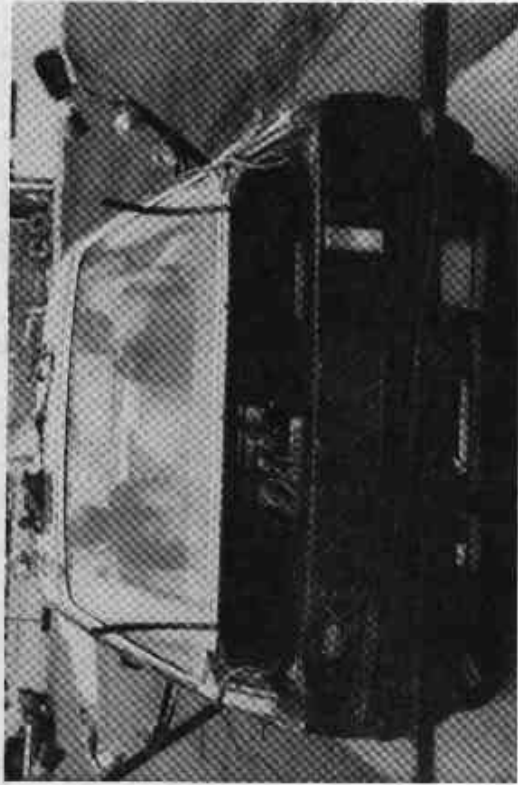


FIGURE A-12 VEHICLE NO. 2 - FORD MUSTANG - PRE- AND POST-TEST FRONT AND REAR VIEWS

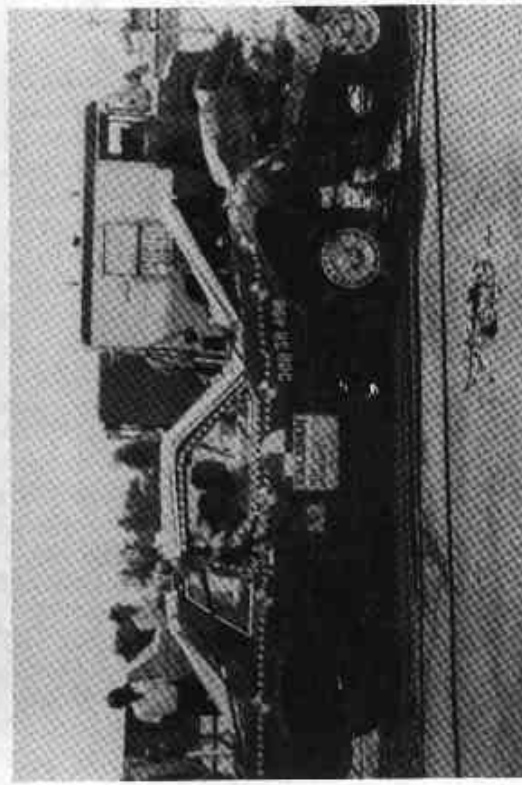
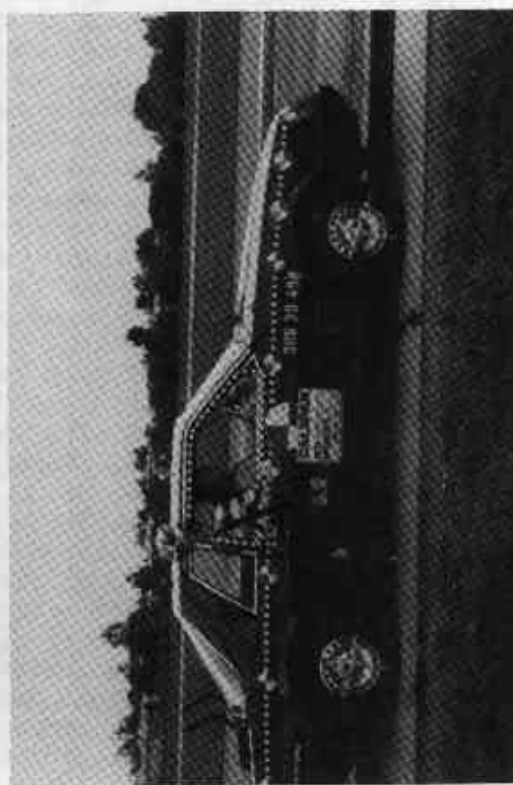
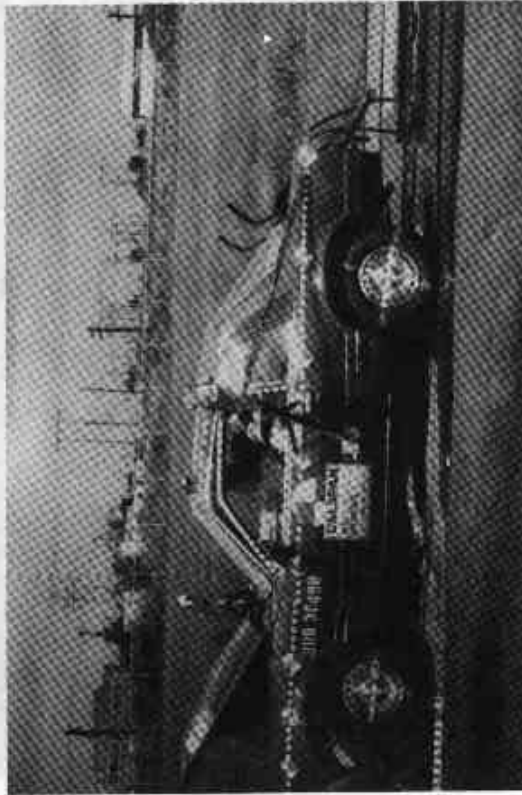
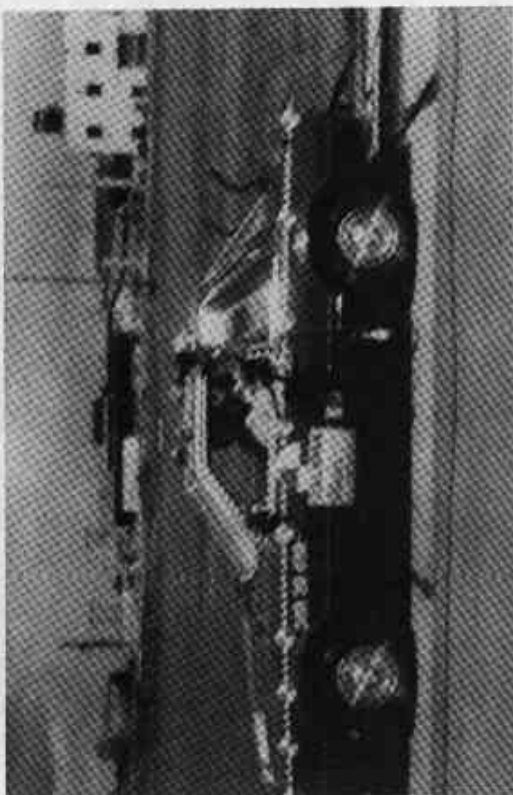
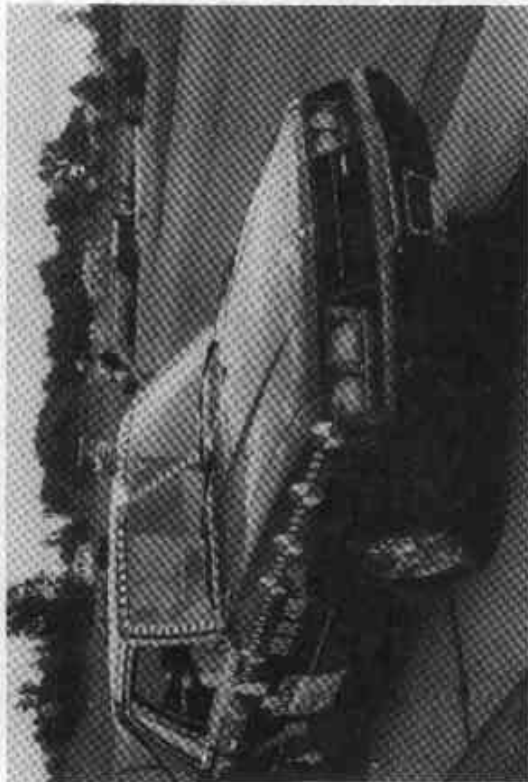


FIGURE A-13 VEHICLE NO. 2 - FORD MUSTANG - PRE- AND POST-TEST RIGHT AND LEFT SIDE VIEWS



A-14

6525-V-38

FIGURE A-14 VEHICLE NO. 2 - FORD MUSTANG - PRE- AND POST-TEST FRONT AND REAR THREE QUARTER VIEWS

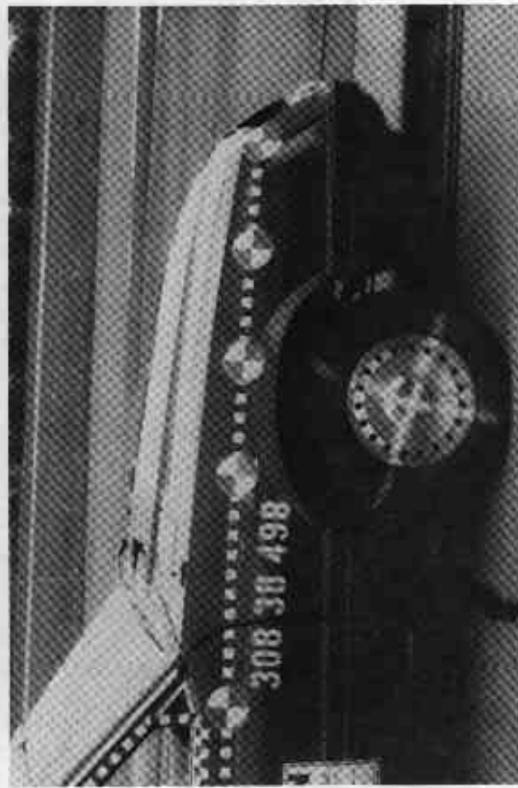
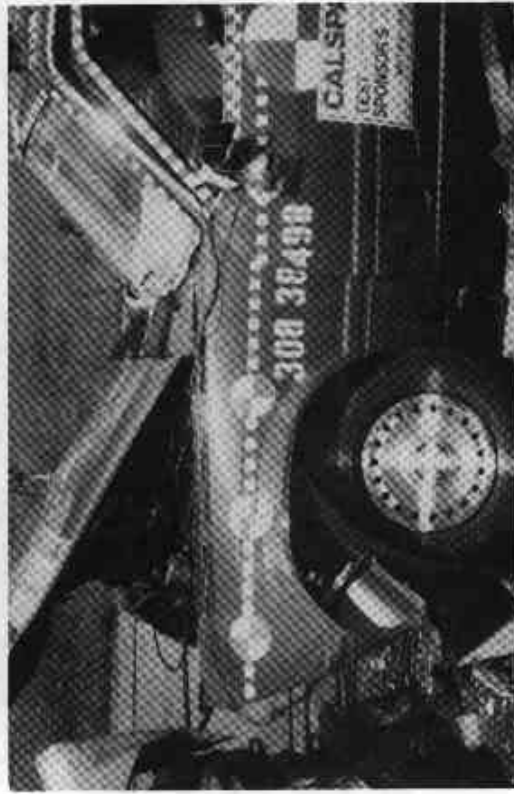
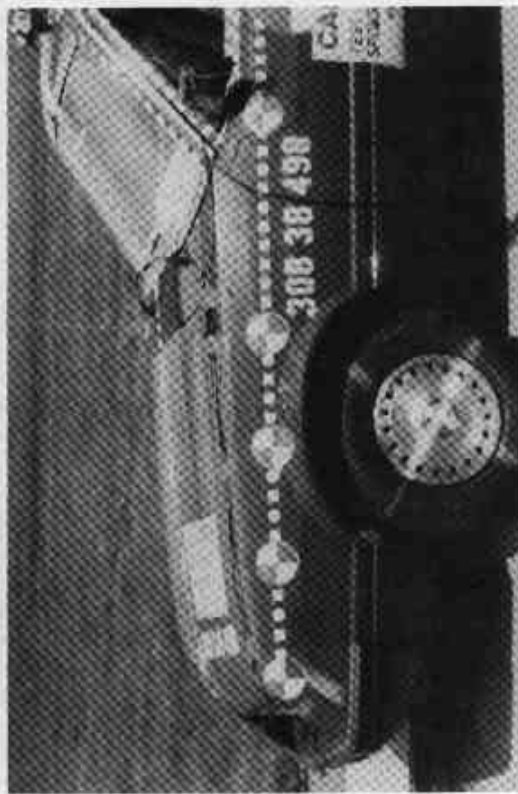


FIGURE A-15 VEHICLE NO. 2 - FORD MUSTANG - PRE- AND POST-TEST FRONT QUARTER VIEWS

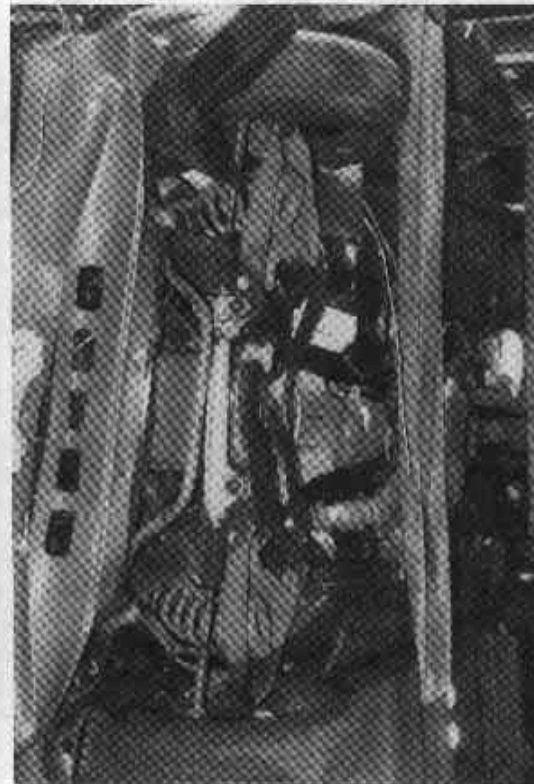
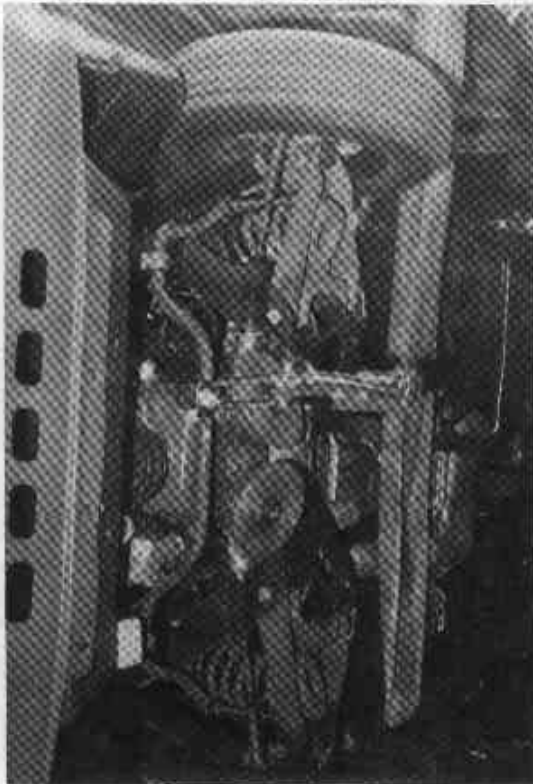
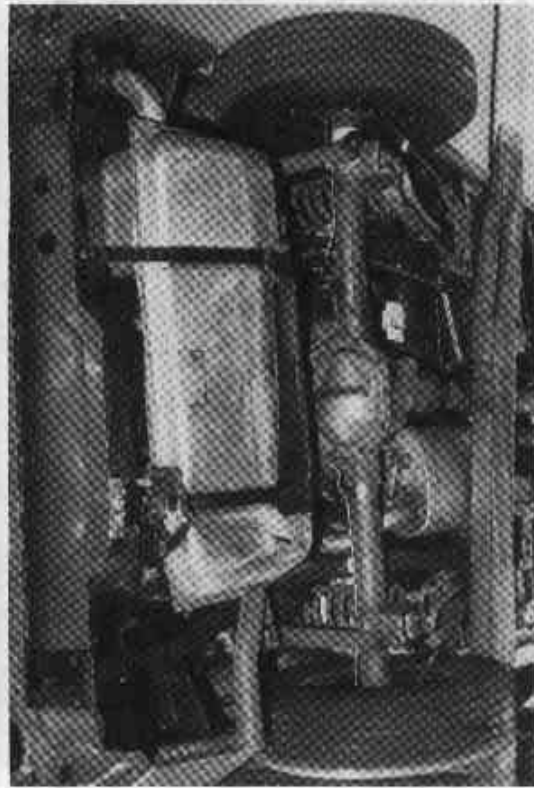
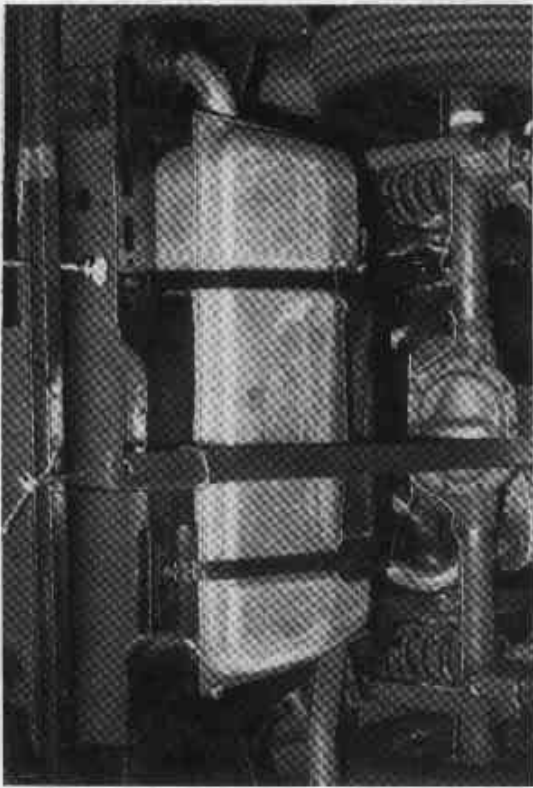


FIGURE A-16 VEHICLE NO. 2 - FORD MUSTANG - PRE- AND POST-TEST UNDERBODY VIEWS

A-16

6525-V-38



FIGURE A-17 VEHICLE NO. 2 - FORD MUSTANG - PRE- AND POST-TEST DRIVER VIEWS

A-17



FIGURE A-18 VEHICLE NO. 2 - FORD MUSTANG - PRE- AND POST-TEST PASSENGER VIEWS

6525-V-38

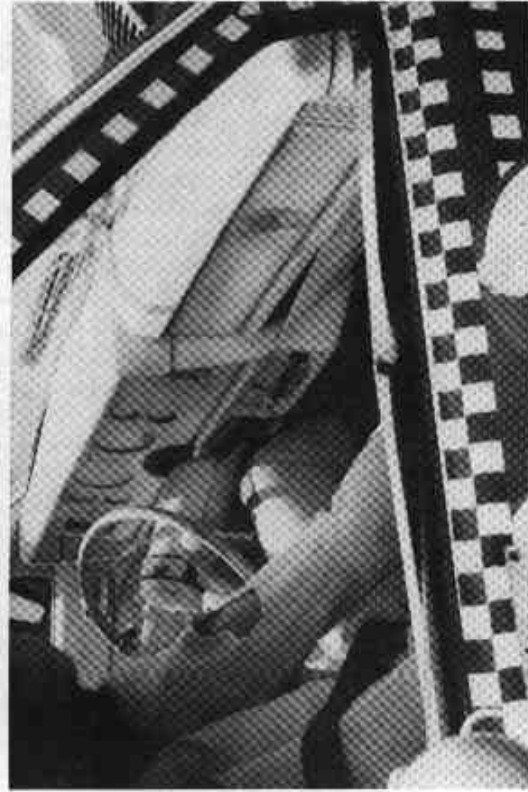




FIGURE A-19 VEHICLE NO. 2 - FORD MUSTANG
POST-TEST OCCUPANT COMPARTMENT

A-18

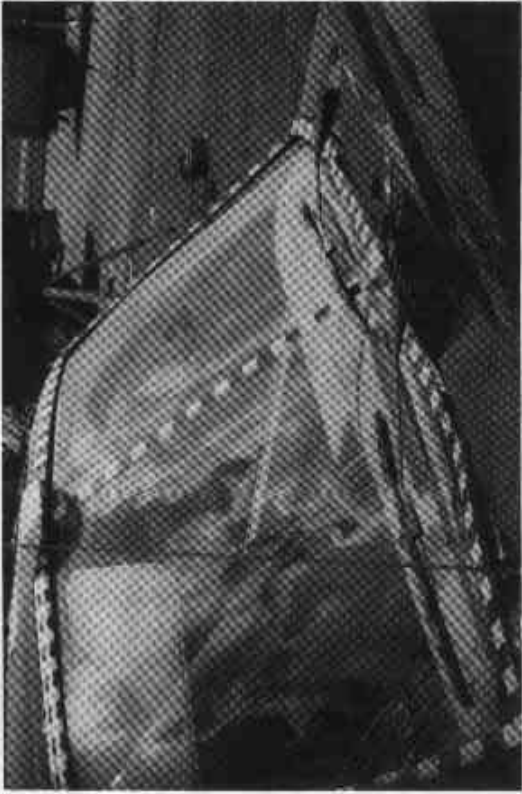


FIGURE A-20 VEHICLE NO. 2 - FORD MUSTANG - POST-TEST
WINDSHIELD

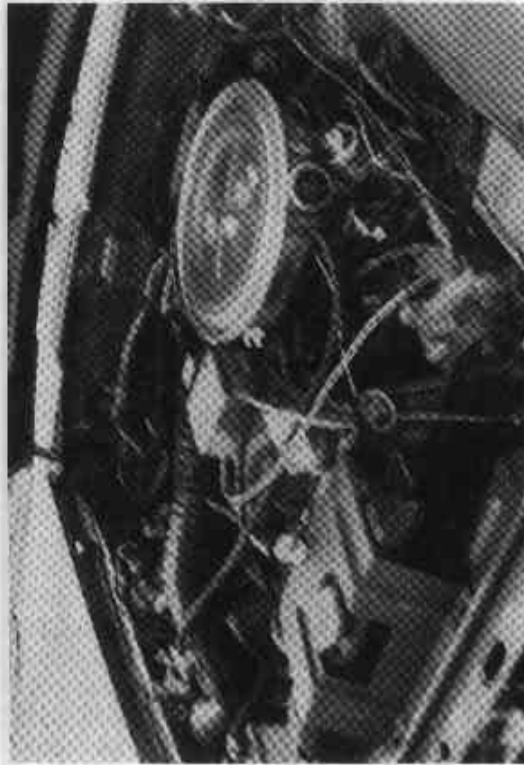


FIGURE A-21 VEHICLE NO. 2 - FORD MUSTANG -
PRE-TEST ENGINE COMPARTMENT

6525-V-38

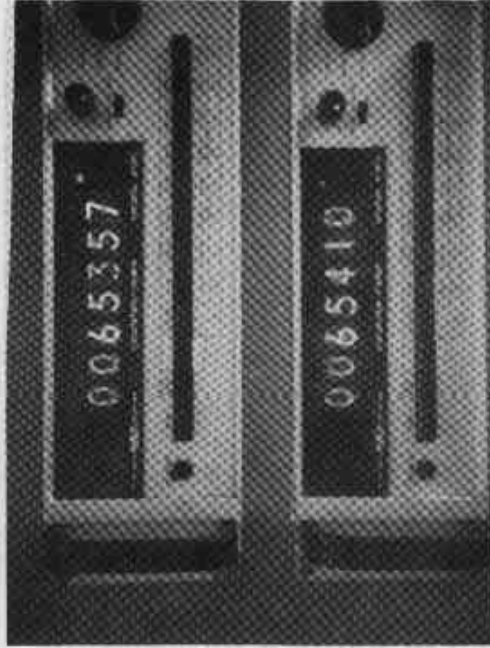


FIGURE A-22 VELOCITY TRAP COUNTER DISPLAY

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA

TEST NO. 308-38-498

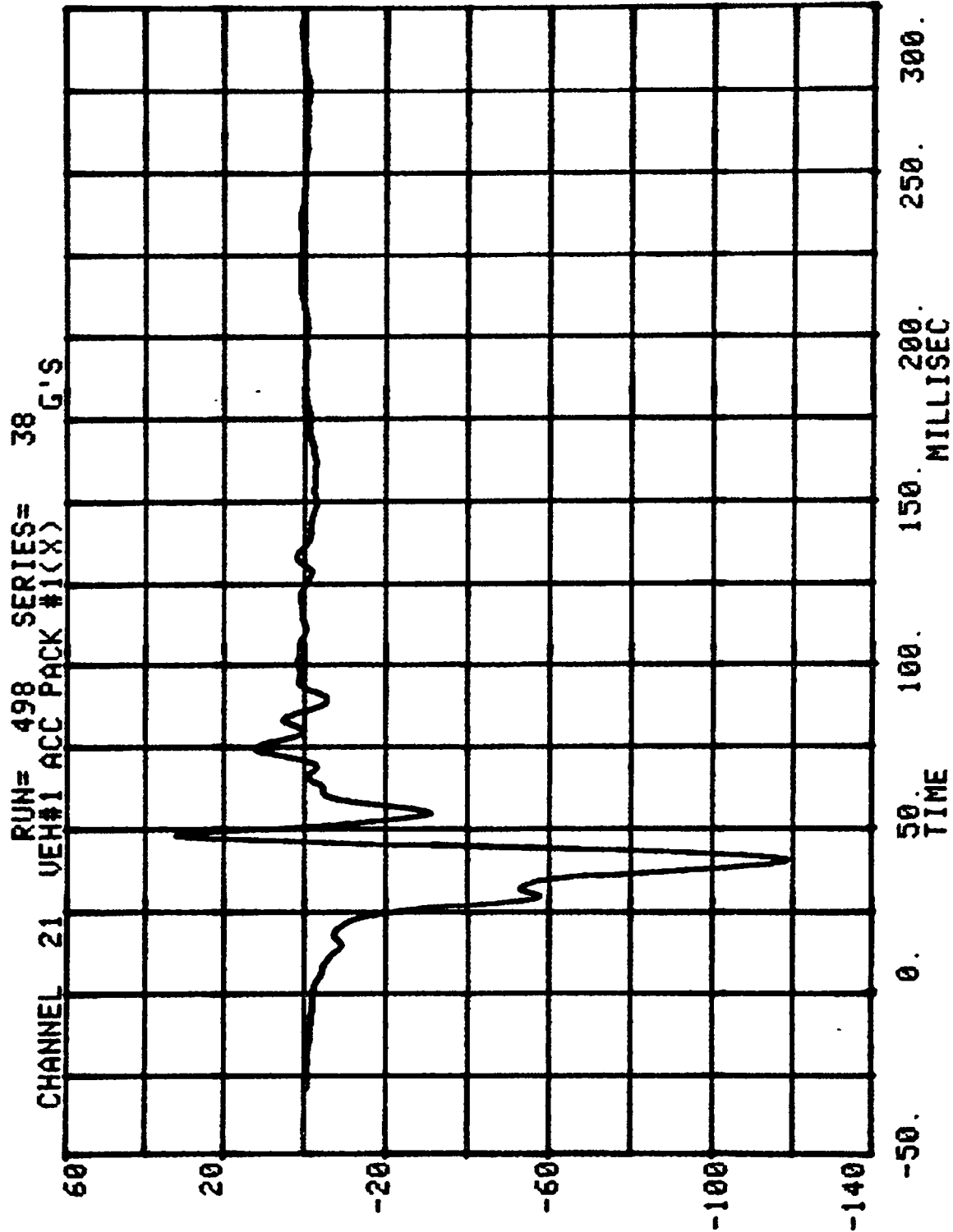
1980 TOYOTA CELICA

FILTER CHANNEL CLASS

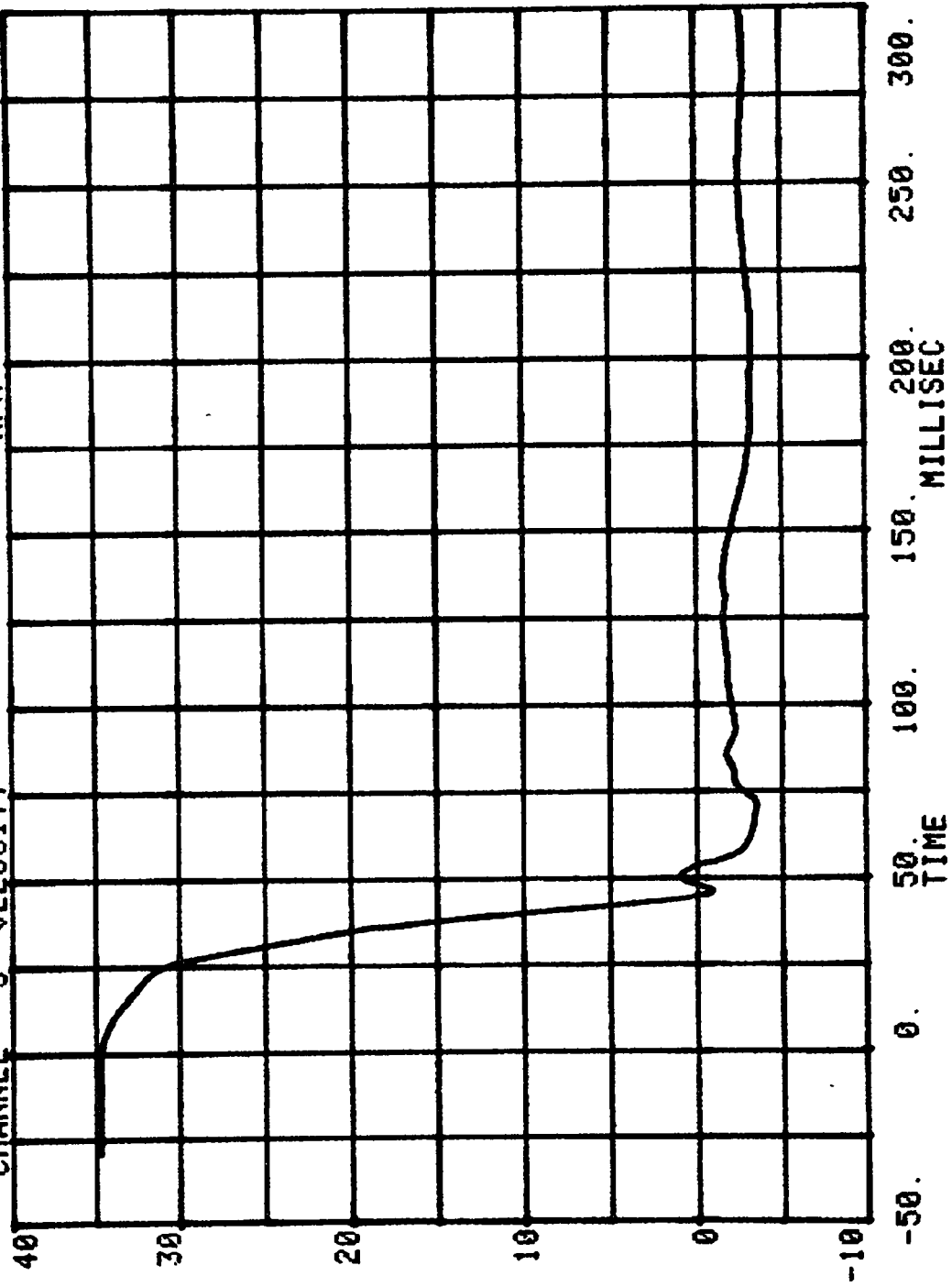
VEHICLE DATA

60

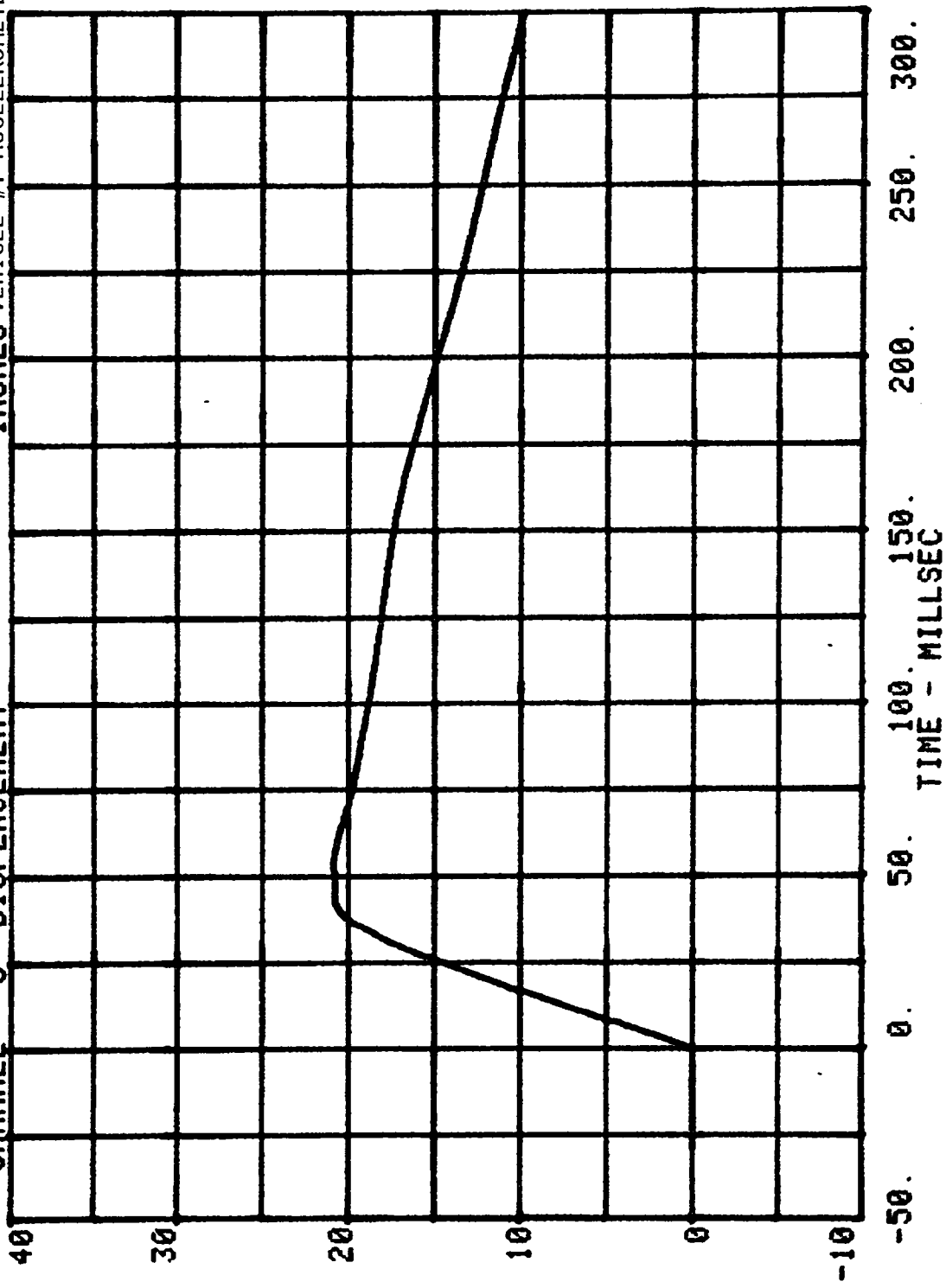
See Figure 2 for accelerometer layout.



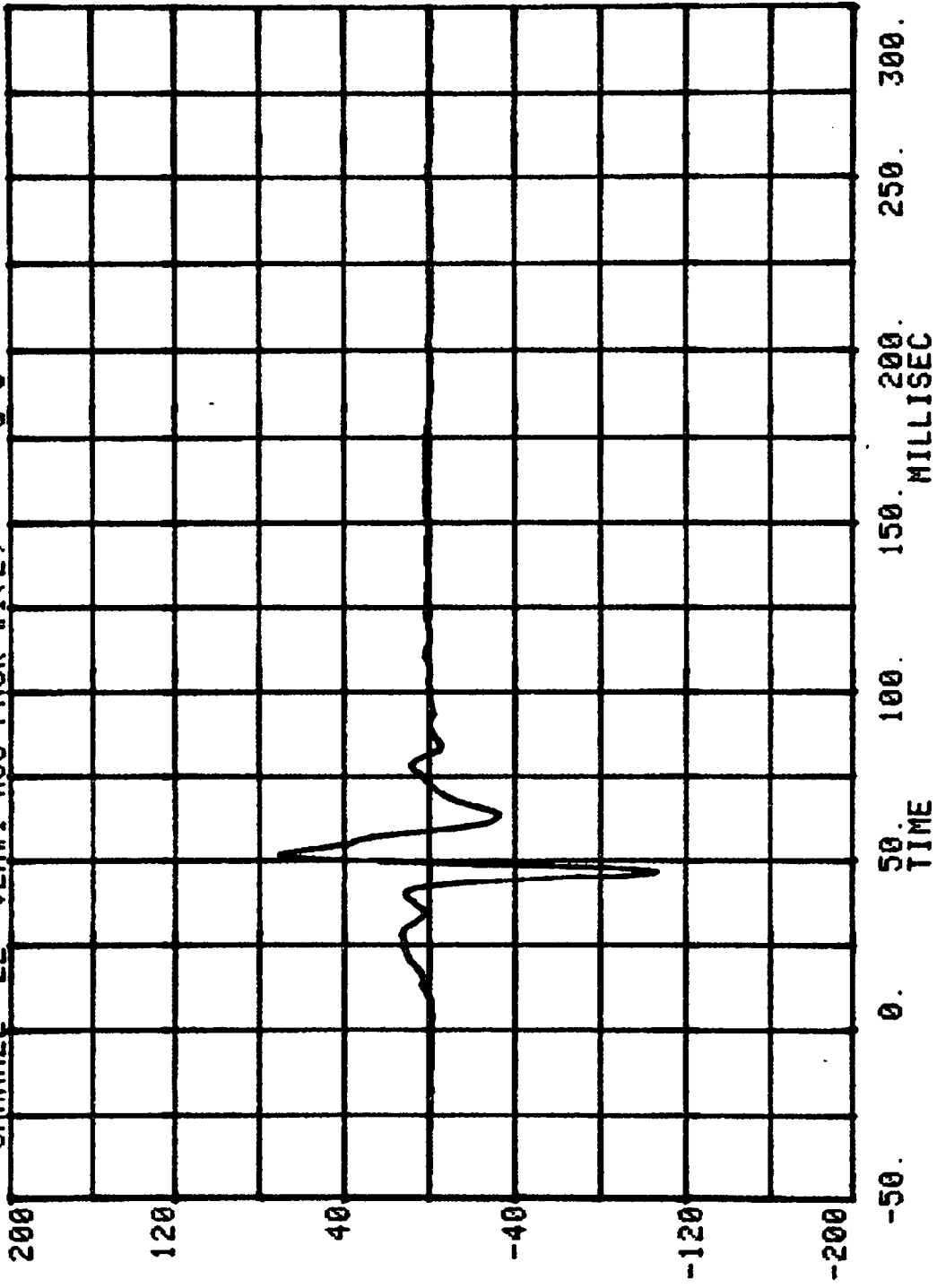
CHANNEL 5 VELOCITY
RUN= 498 SERIES= 38 MPH VEHICLE #1 ACCELEROMETER PACK #1 (X)



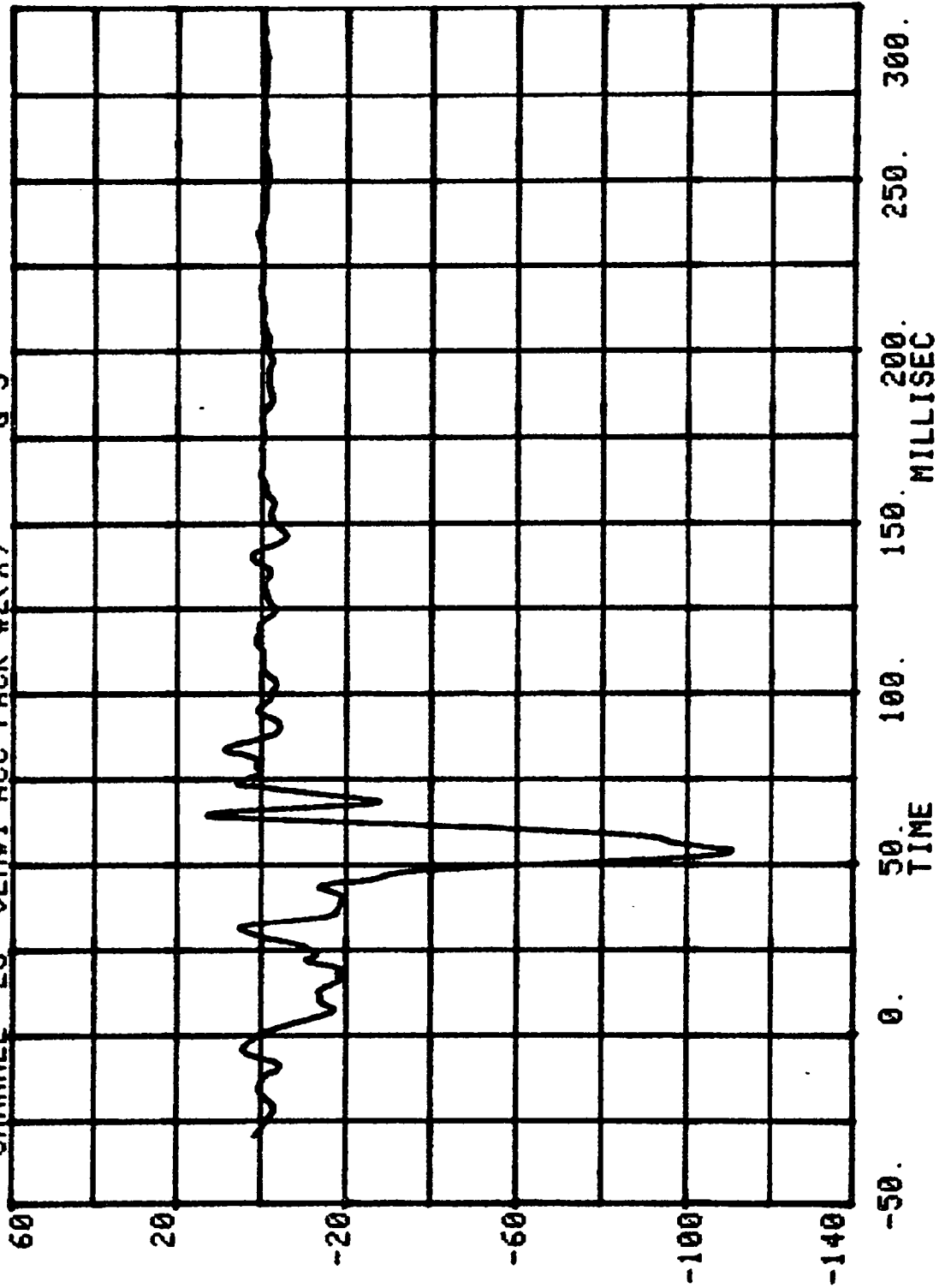
CHANNEL 6 DISPLACEMENT RUN= 498 SERIES= 38 INCHES VEHICLE #1 ACCELEROMETER PACK #1



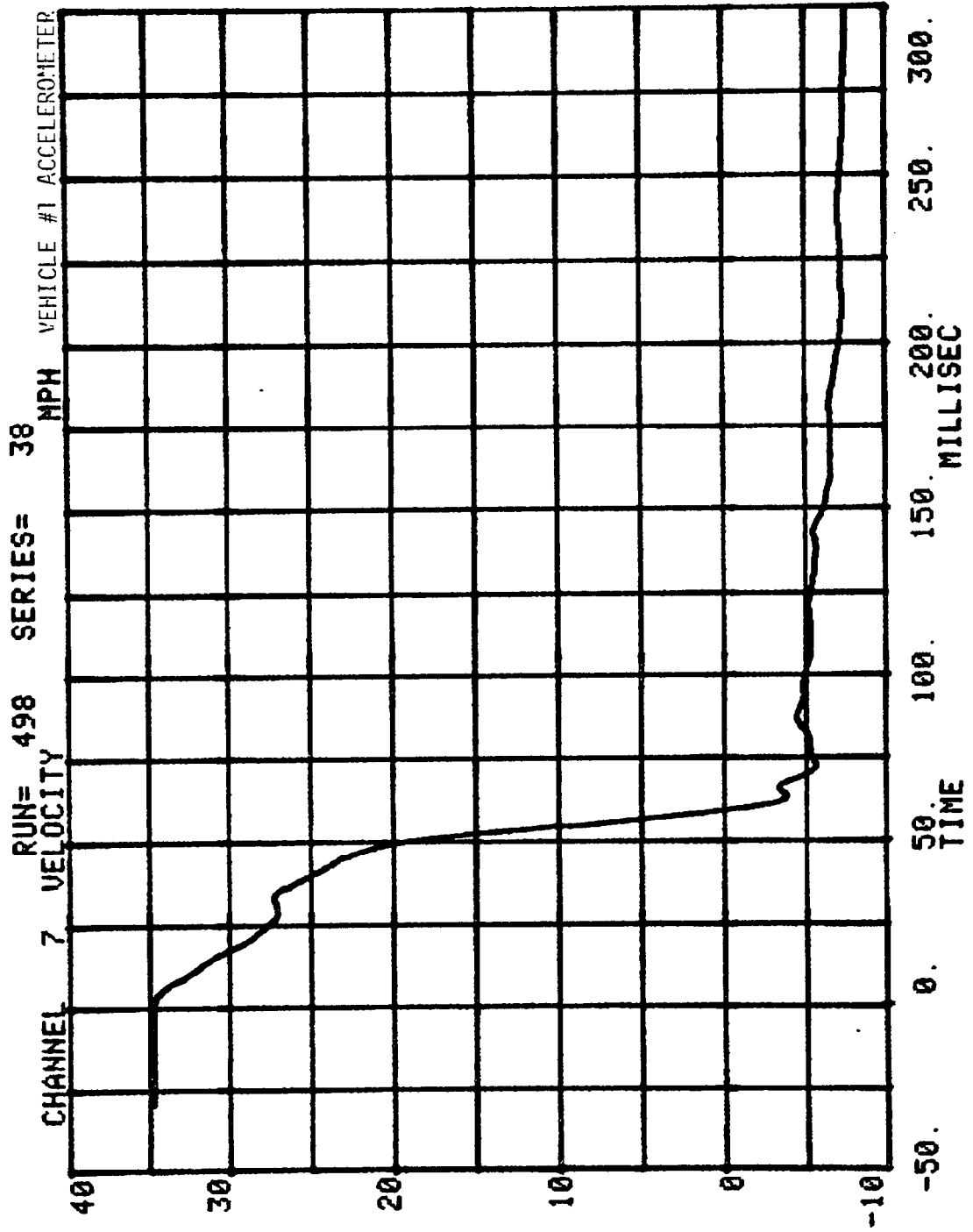
CHANNEL 22 RUN= 498 SERIES= 38 G'S
VEH#1 ACC PACK #1(Z)



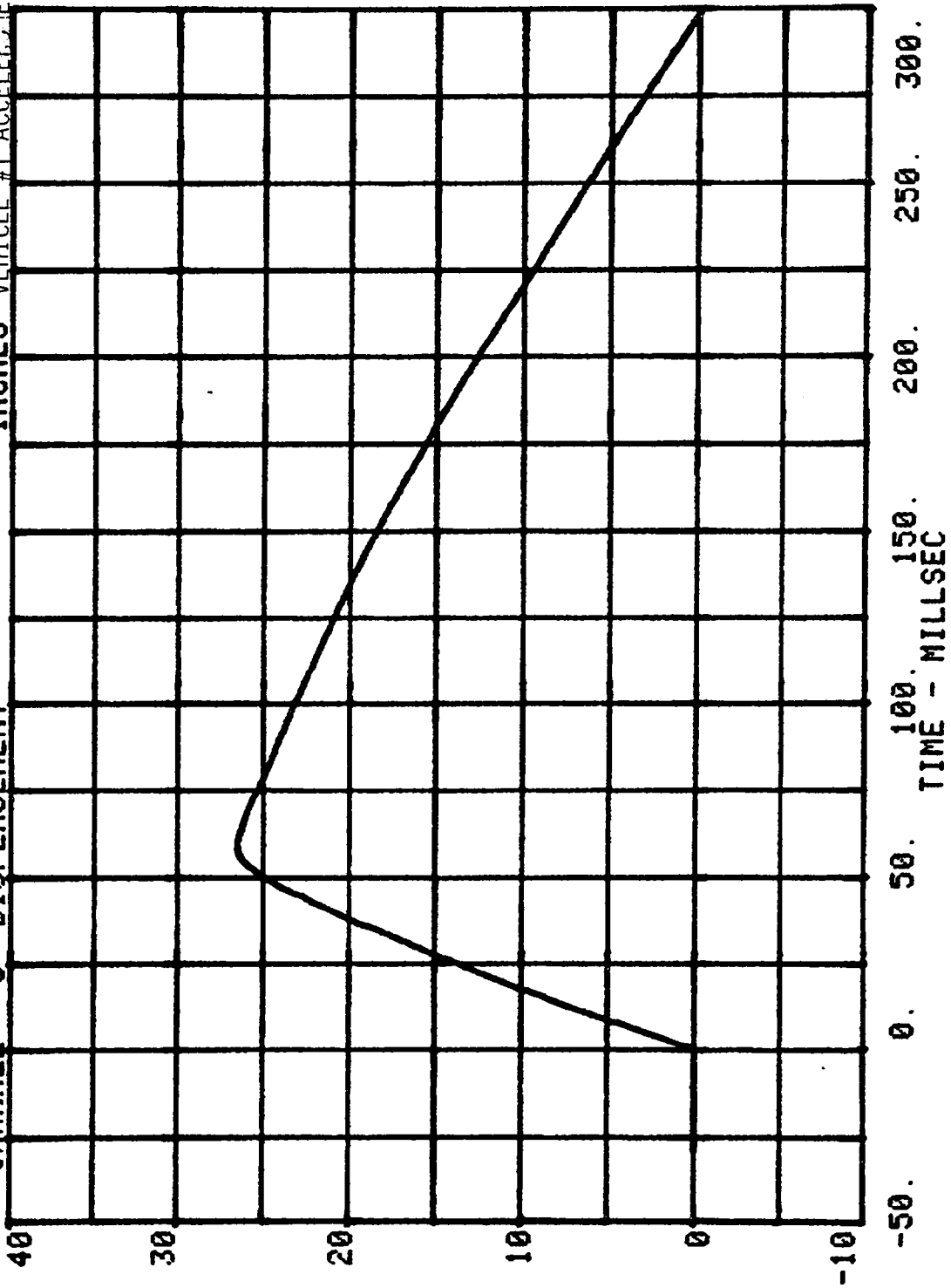
CHANNEL 23 RUN= 498 SERIES= 38 G'S
VEH#1 ACC PACK #2(X)



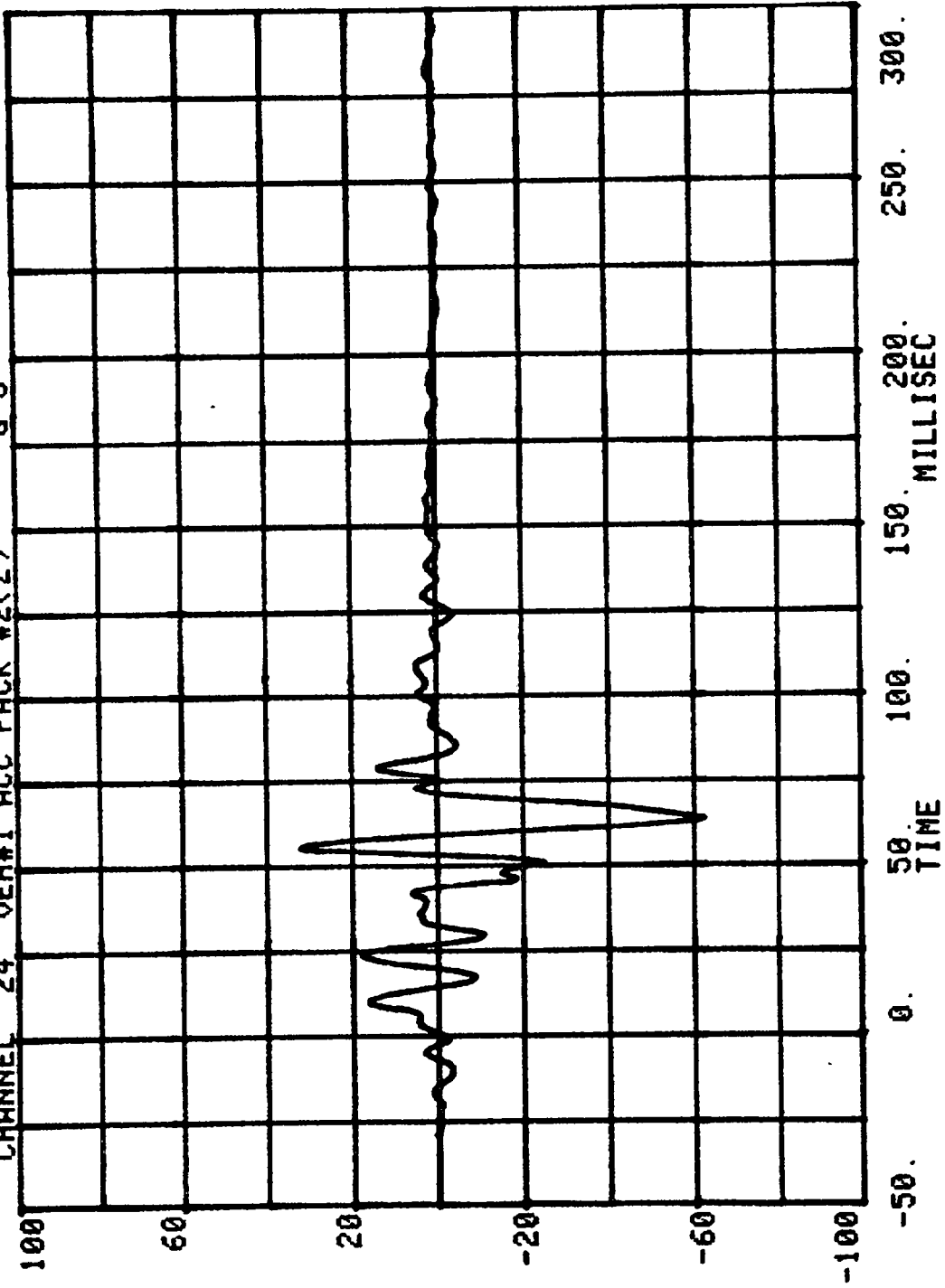
CHANNEL 7 VELOCITY 38 MPH VEHICLE #1 ACCELEROMETER PACK #2 (X)



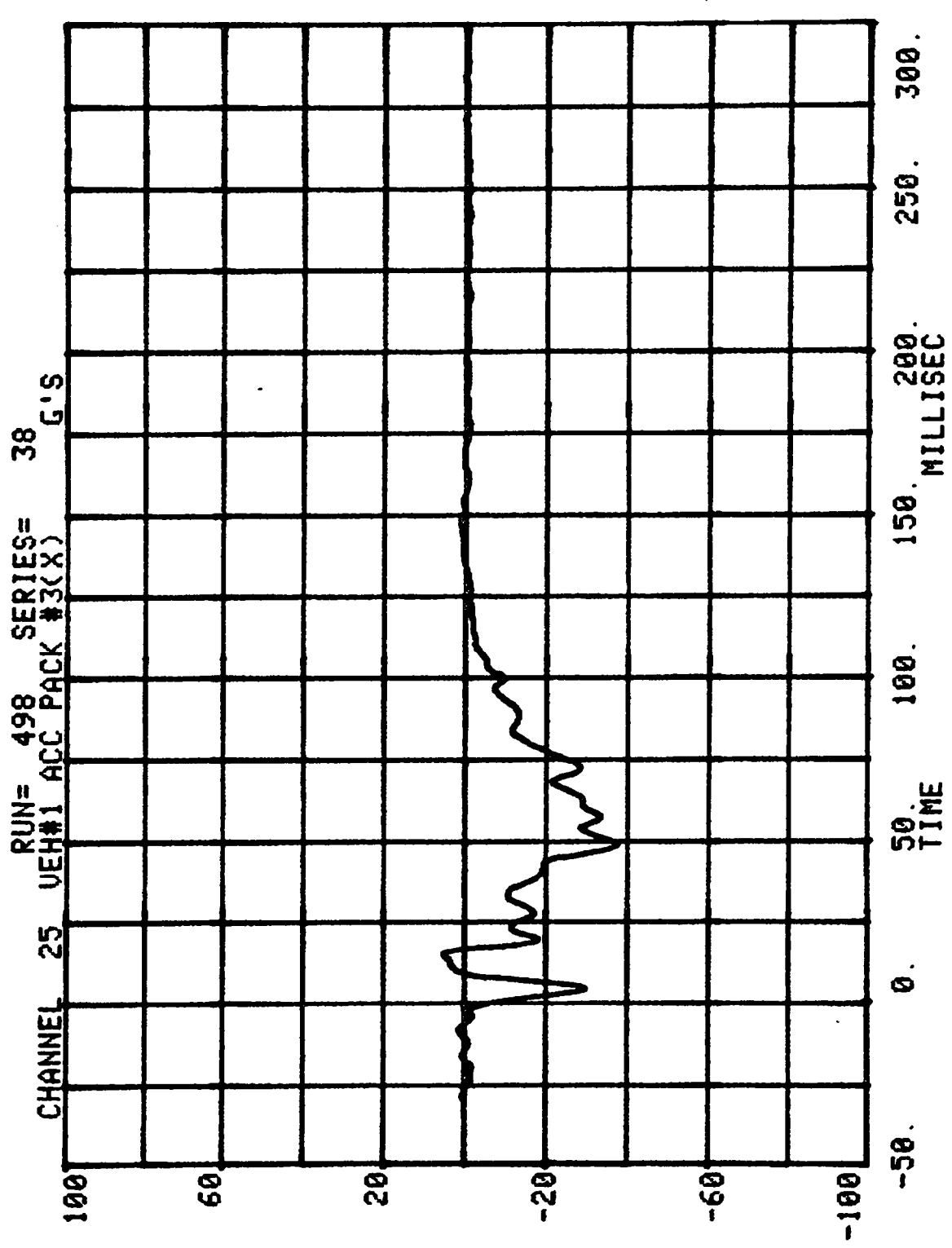
CHANNEL 8 DISPLACEMENT SERIES= 38 INCHES VEHICLE #1 ACCELEROMETER PACK #2(



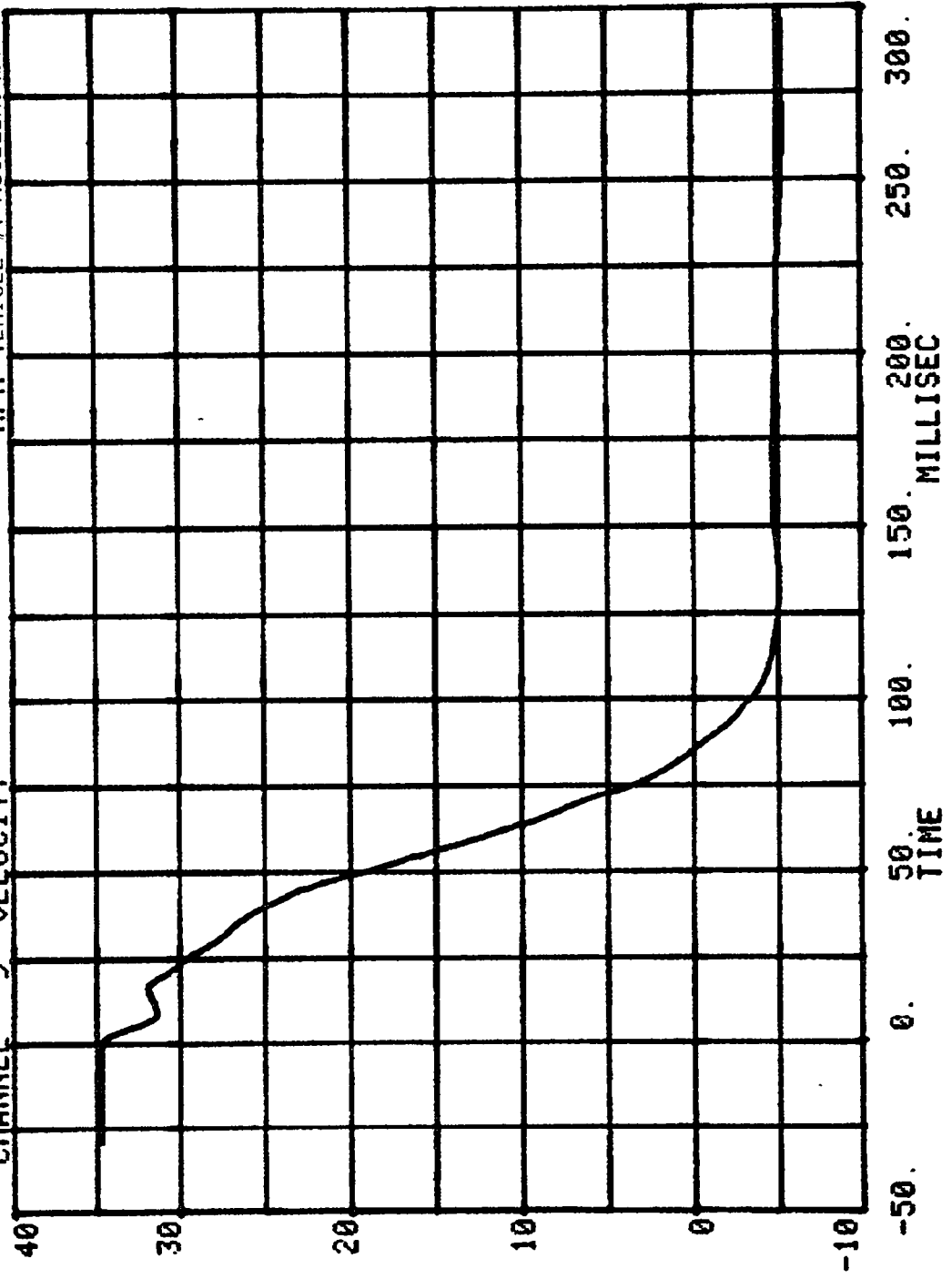
CHANNEL 24 VEH#1 ACC PACK #2(Z) G'S
RUN= 498 SERIES= 38



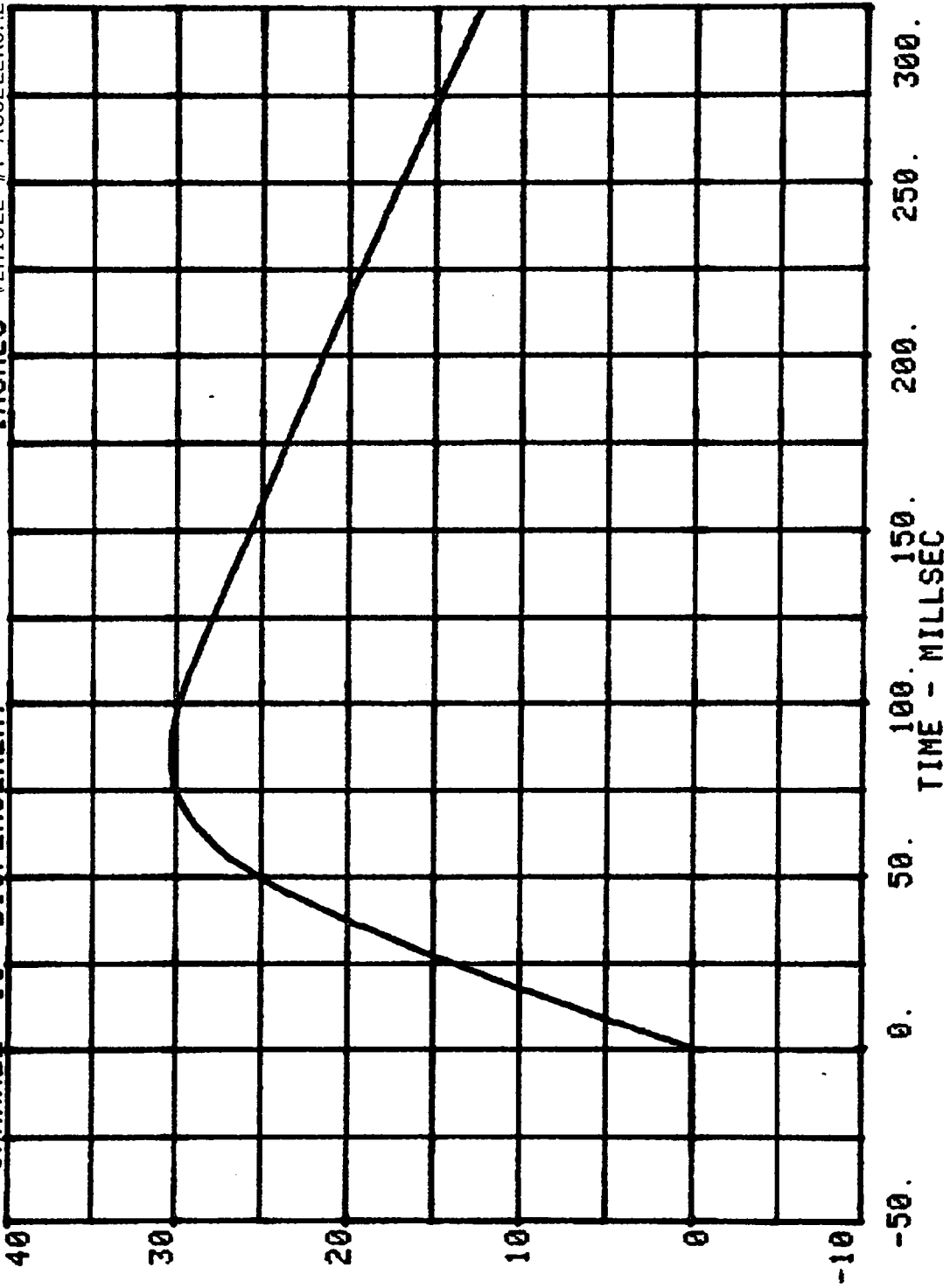
CHANNEL 25 VEH#1 ACC PACK #3(X) 38 G'S

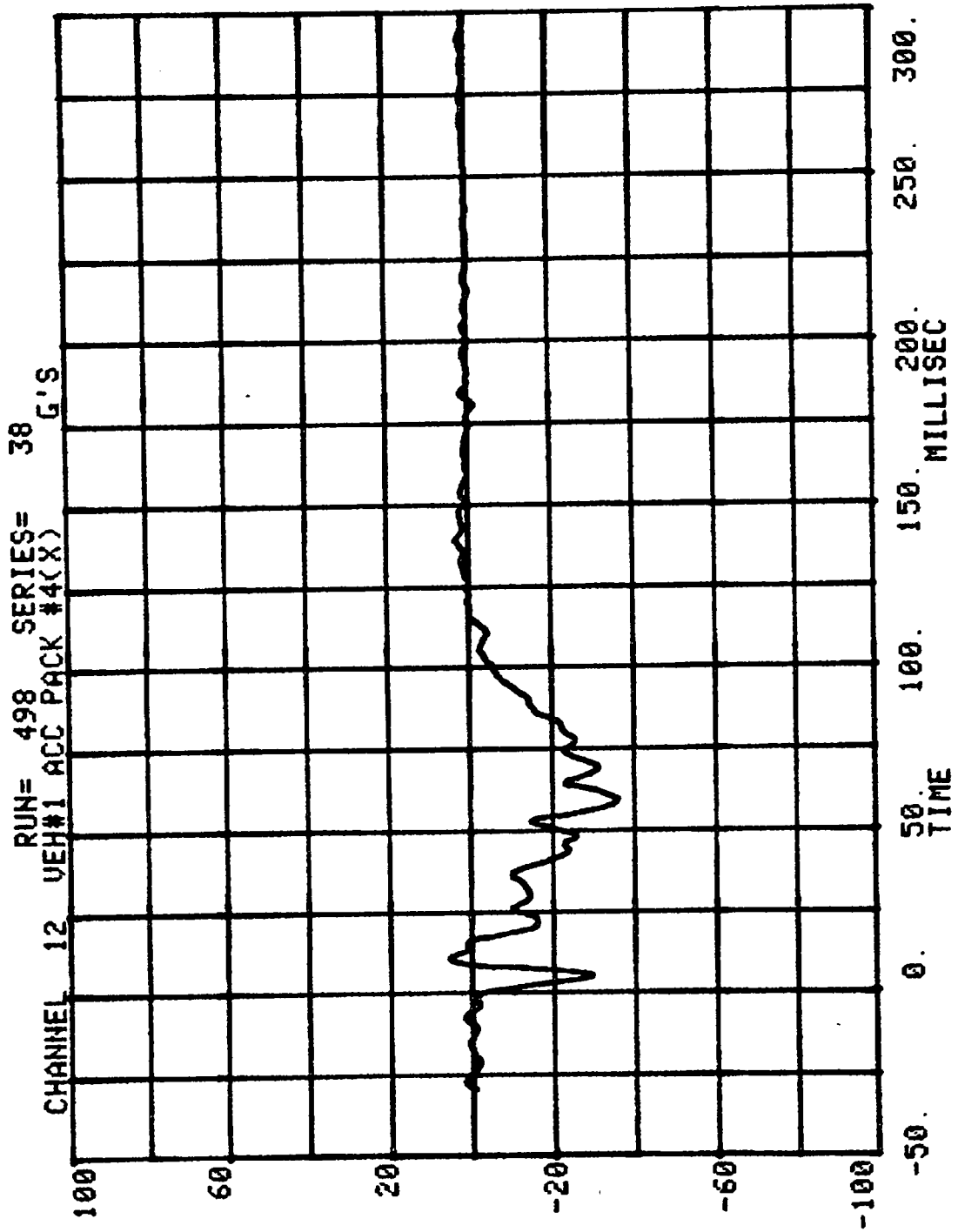


CHANNEL 9 VELOCITY RUN= 498 SERIES= 38 MPH VEHICLE #1 ACCELEROMETER PACK #3 (X)



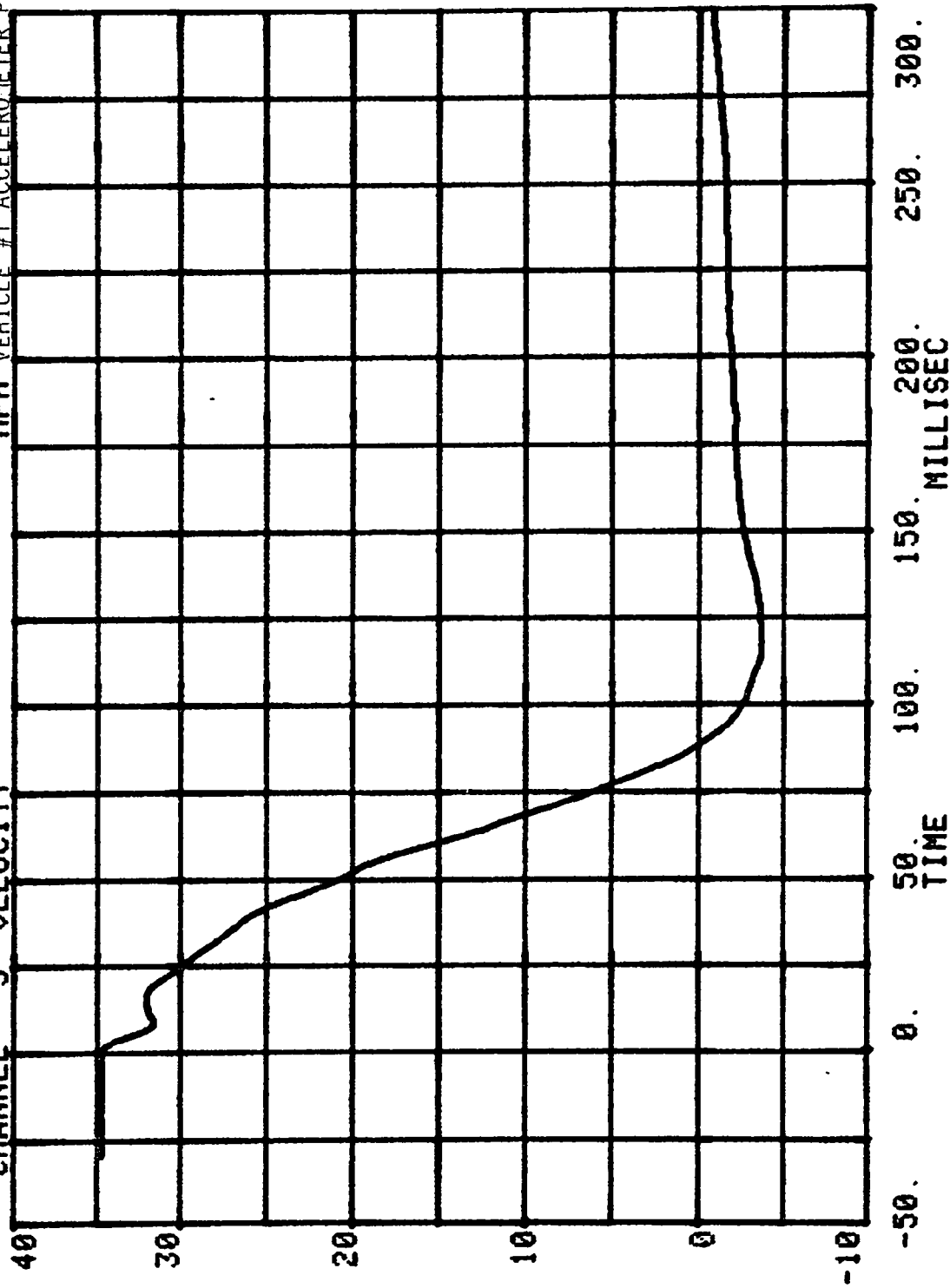
RUN= 498 SERIES= 38 INCHES VEHICLE #1 ACCELEROMETER PACK #31
CHANNEL 10 DISPLACEMENT



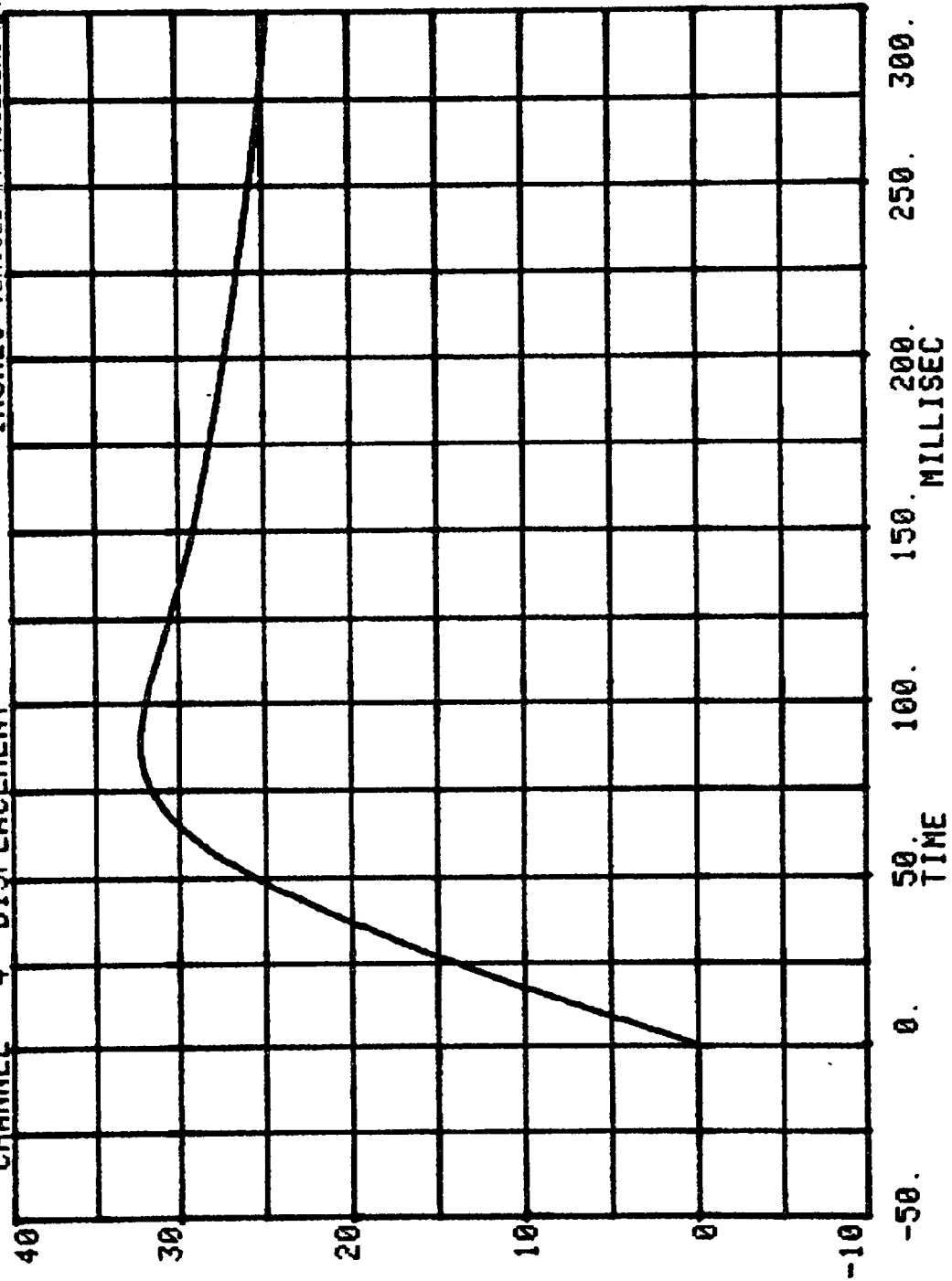


CHANNEL 3 VELOCITY MPH VEHICLE #1 ACCELEROMETER PACK #4 (X)

RUN= 498 SERIES= 38

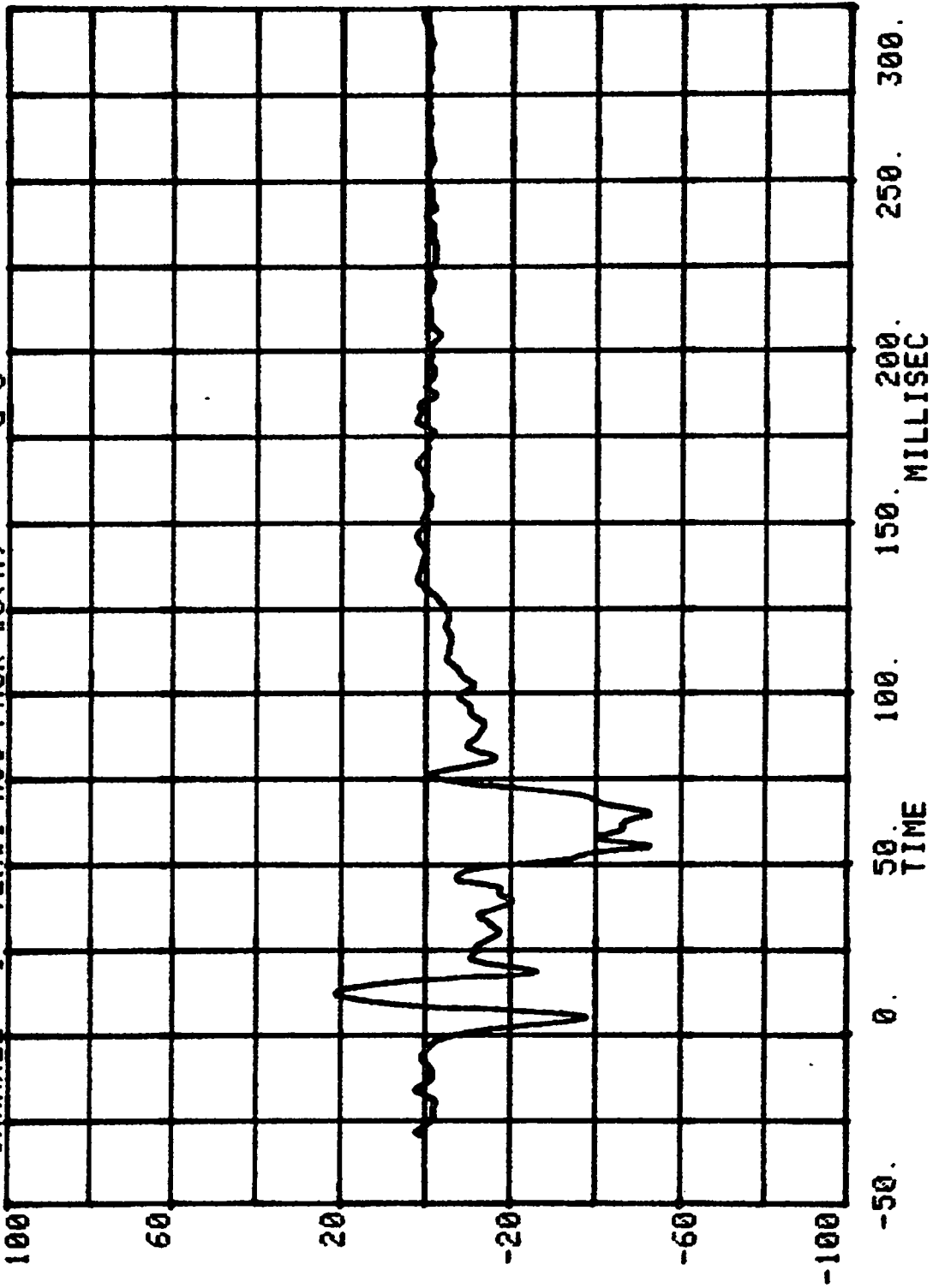


CHANNEL 4 DISPLACEMENT RUN= 498 SERIES= 38 INCHES VEHICLE #1 ACCELEROMETER PACK #4 (X)

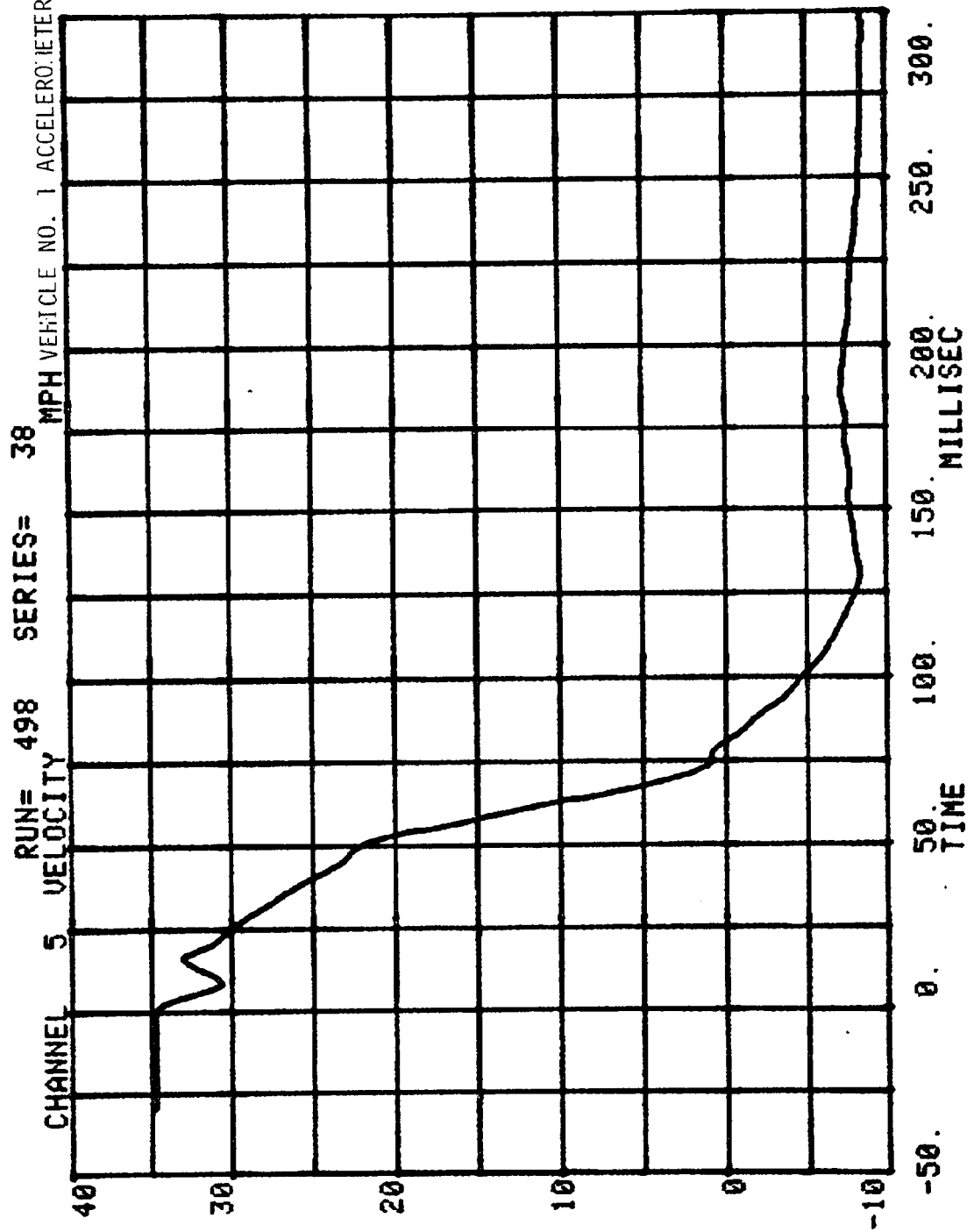


CHANNEL 9 VEH#1 ACC PACK #5(X) 38 G'S

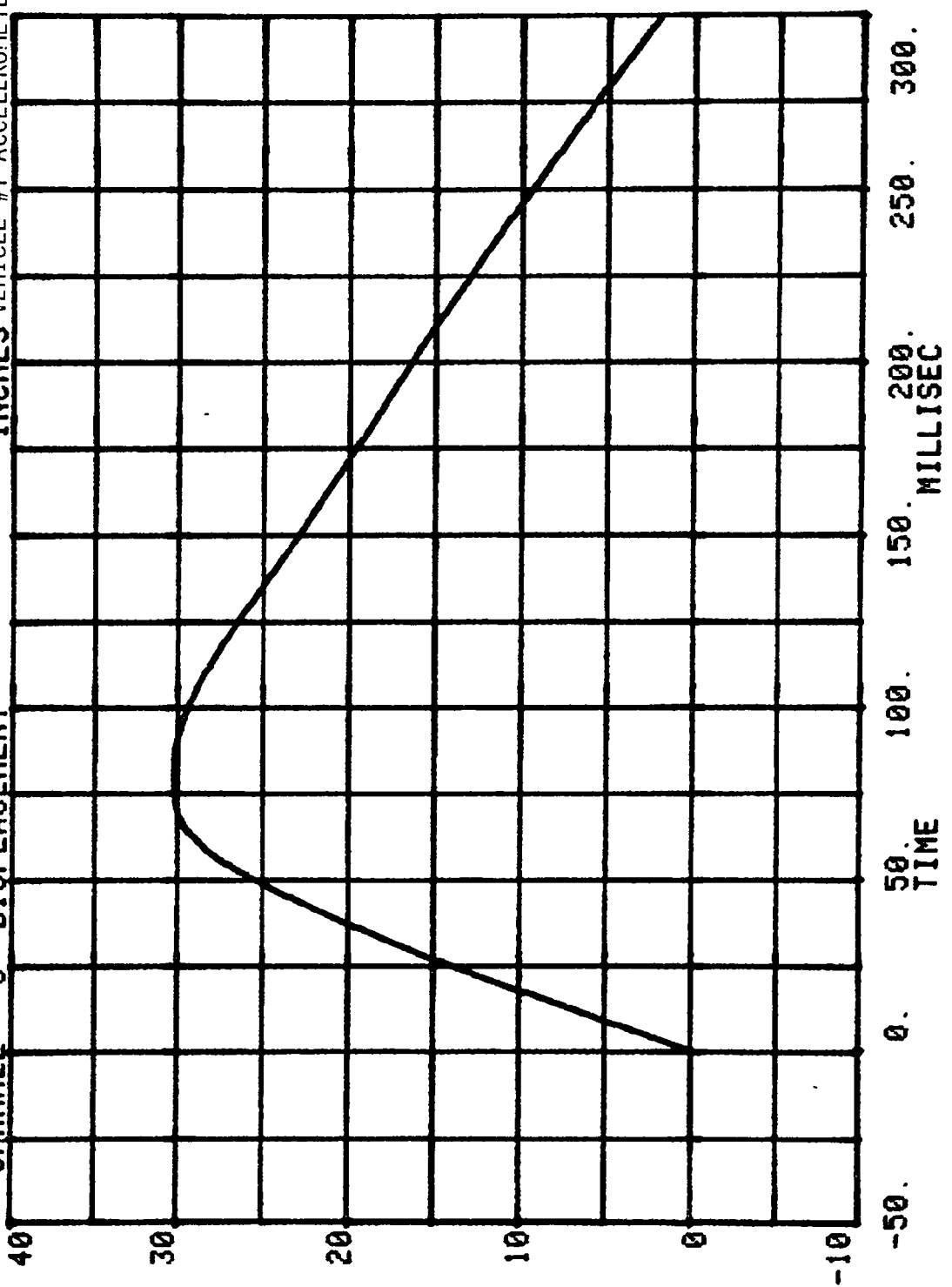
RUN= 498 SERIES=



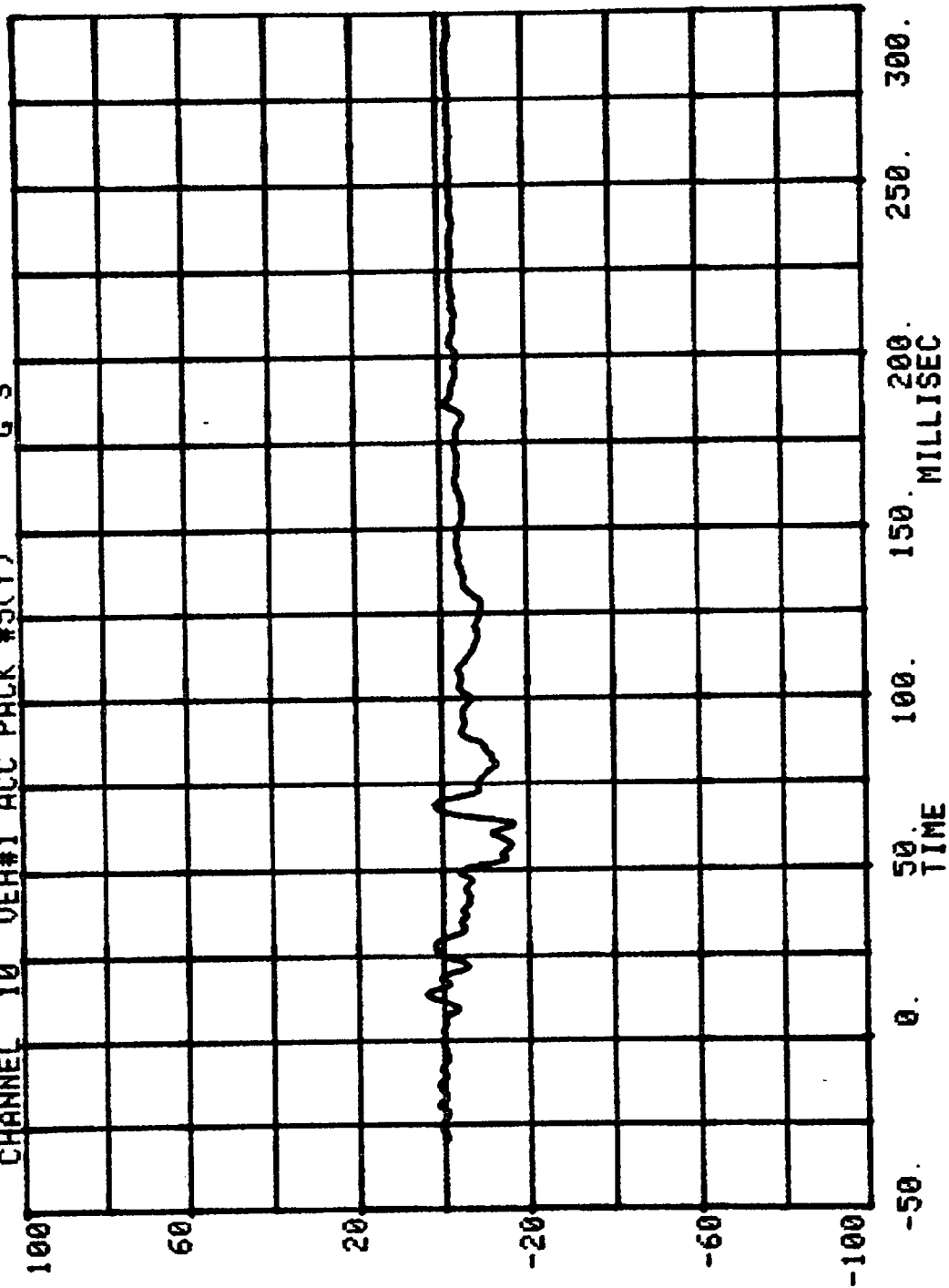
CHANNEL 5 VELOCITY 38 MPH VEHICLE NO. 1 ACCELEROMETER PACK #5 (X)



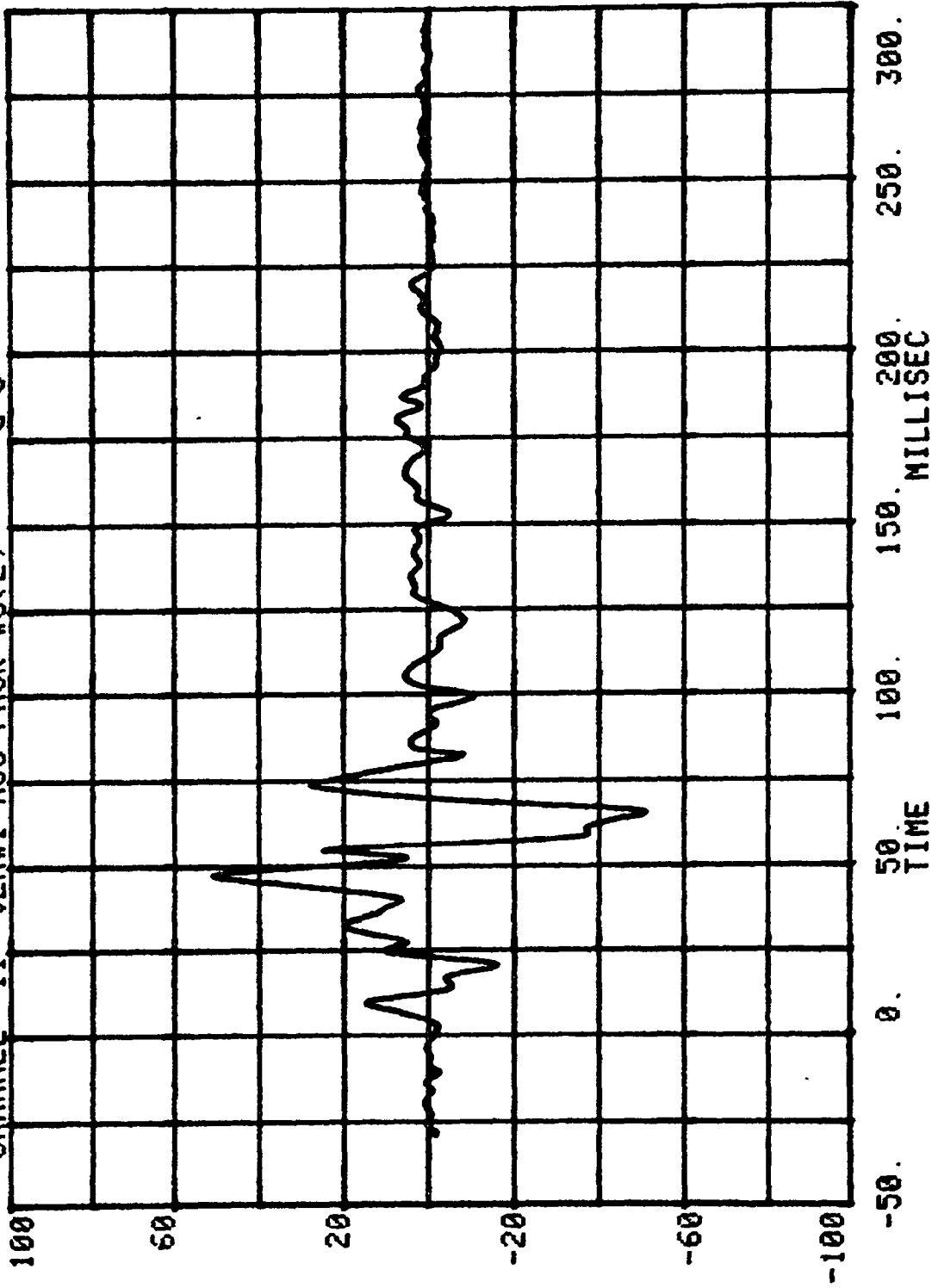
CHANNEL 6 DISPLACEMENT RUN= 498 SERIES= 38 INCHES VEHICLE #1 ACCELEROMETER PACK #51



CHANNEL 10 VEH#1 ACC PACK #5(Y) SERIES= 38 G'S



CHANNEL 11 RUN= 498 SERIES= 38 G'S
VEH#1 ACC PACK #5(Z)



TEST NO. 308-38-498

1980 TOYOTA CELICA

DUMMY DATA

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

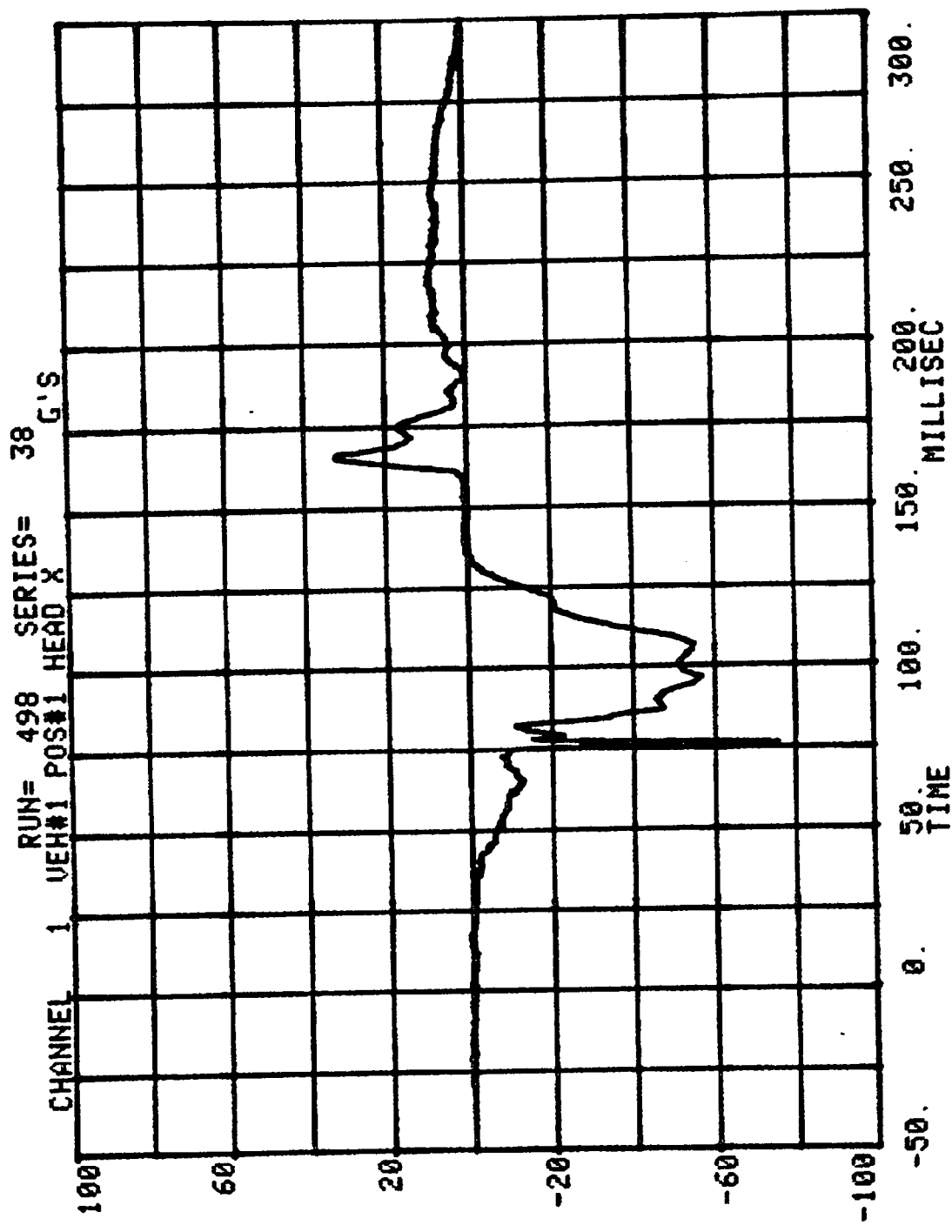
HEAD INJURY CRITERION
HEAD SEVERITY INDEX

NCA CAR-TO-CAR TEST #38

RUN= 498

VEH#1 POS#1 HEAD R

HIC= 881.0 FROM T1= .06510 TO T2= .11490
AVERAGE ACCELERATION BETWEEN T1 AND T2= 50.0G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=1134.7

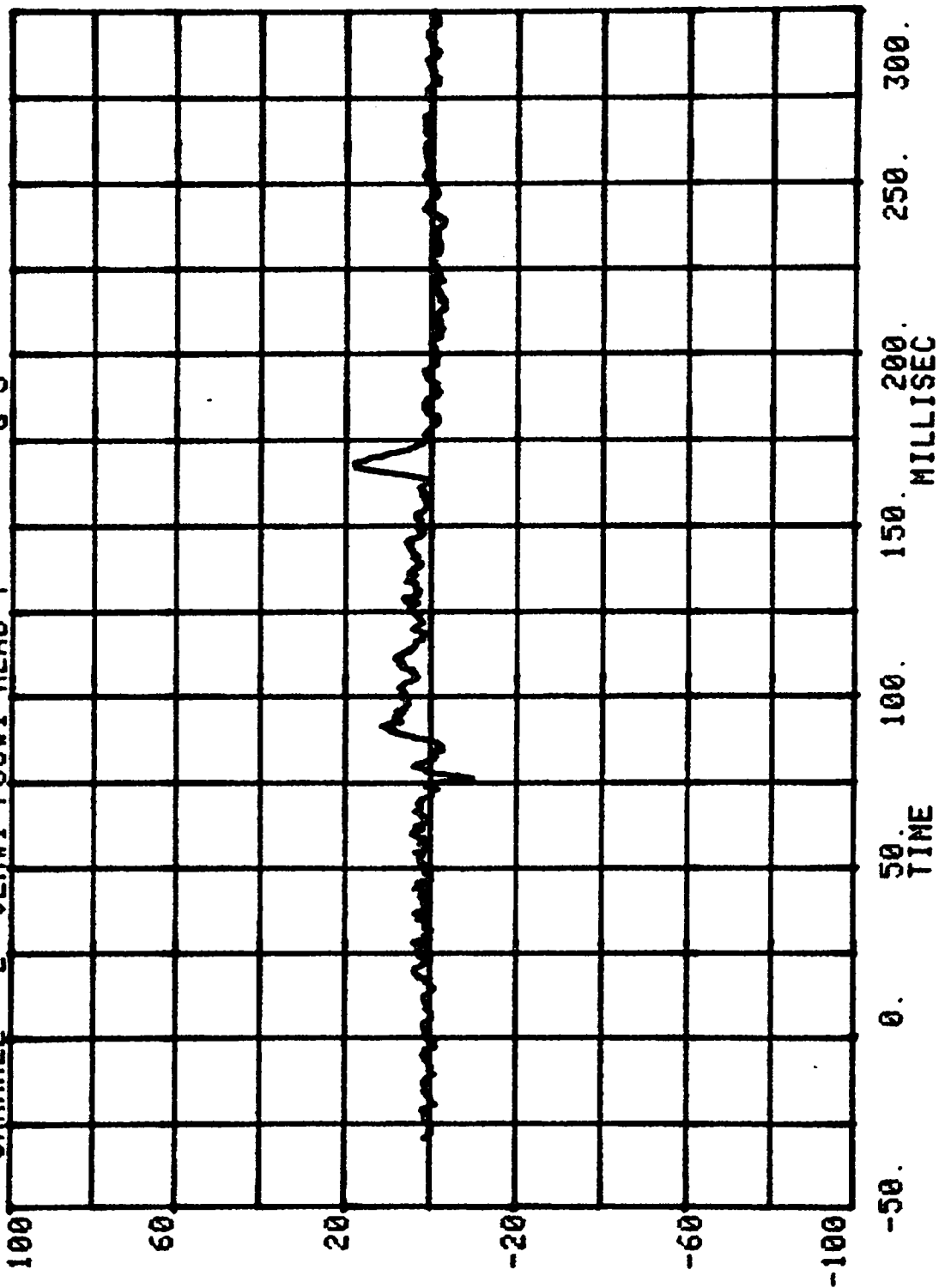


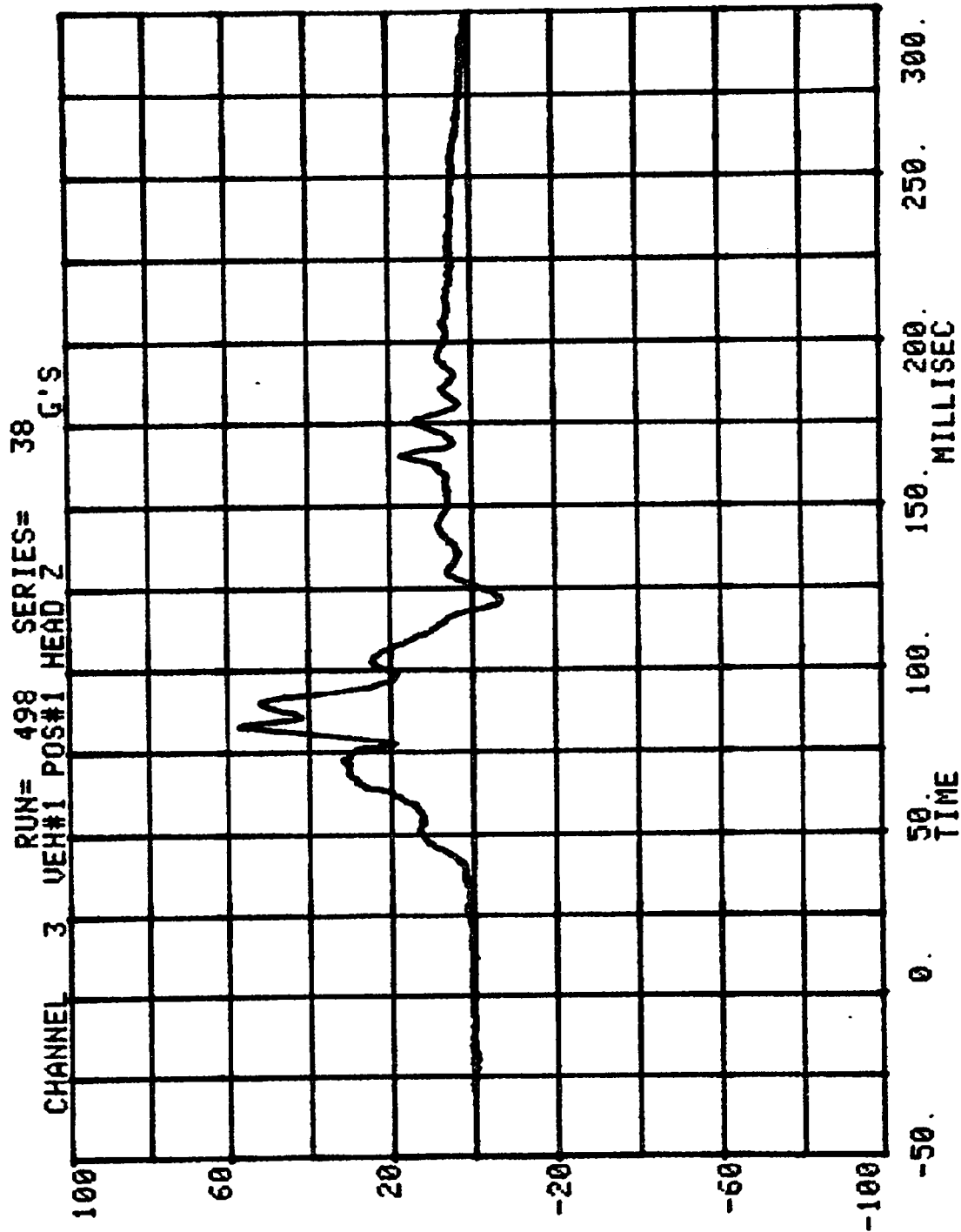
CHANNEL 2 VEH#1 POS#1 HEAD Y

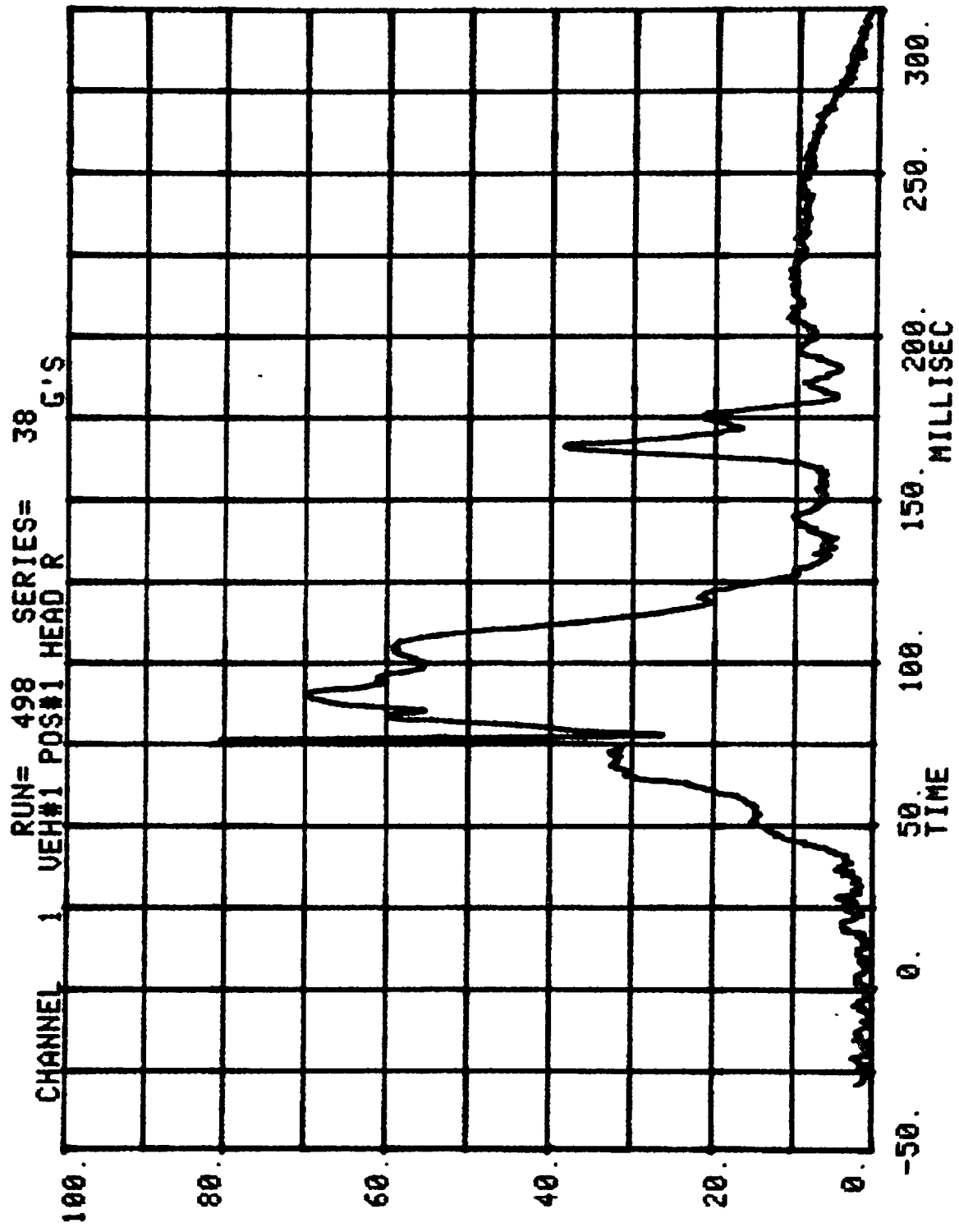
RUN= 498

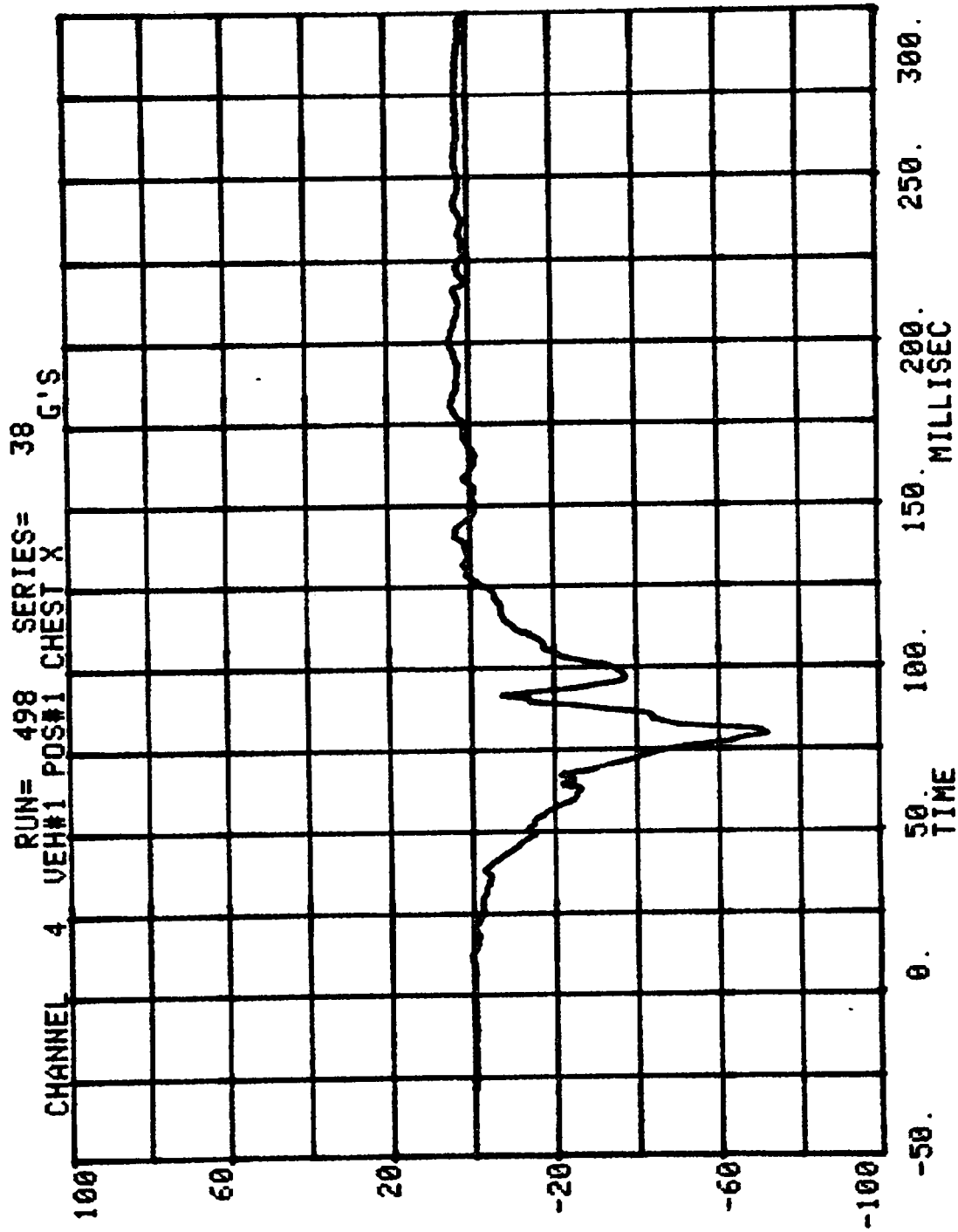
SERIES=

38 G'S

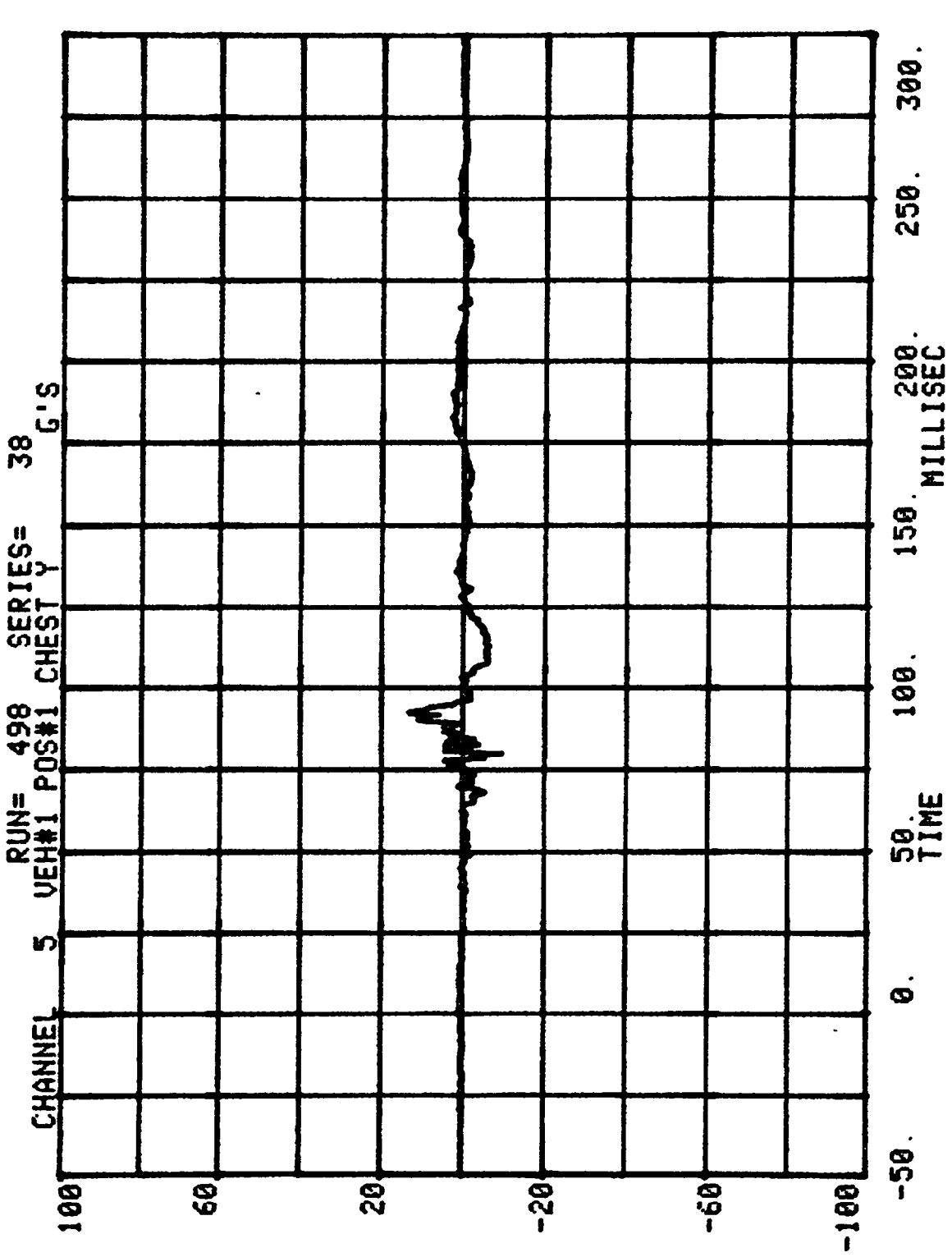




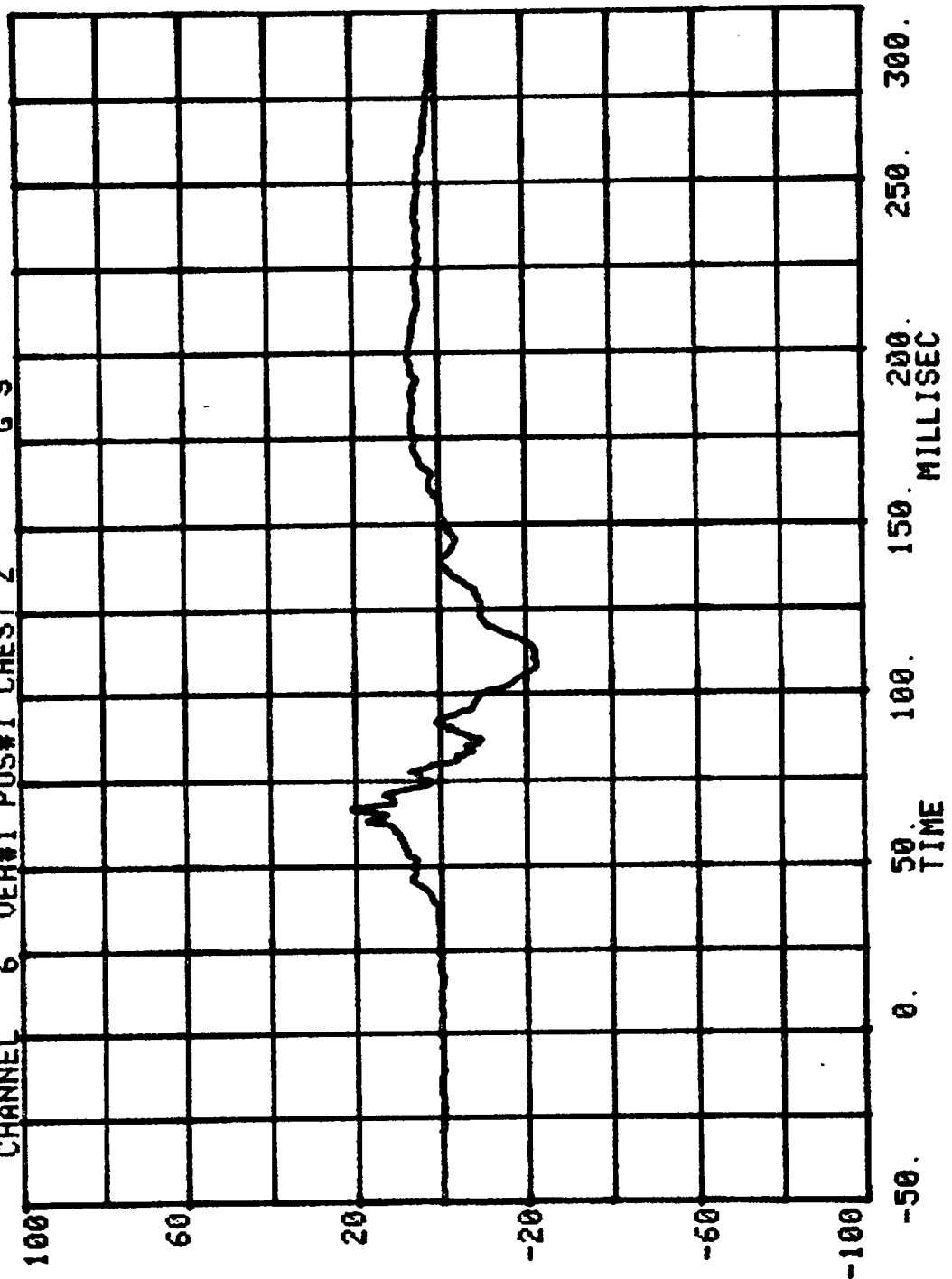


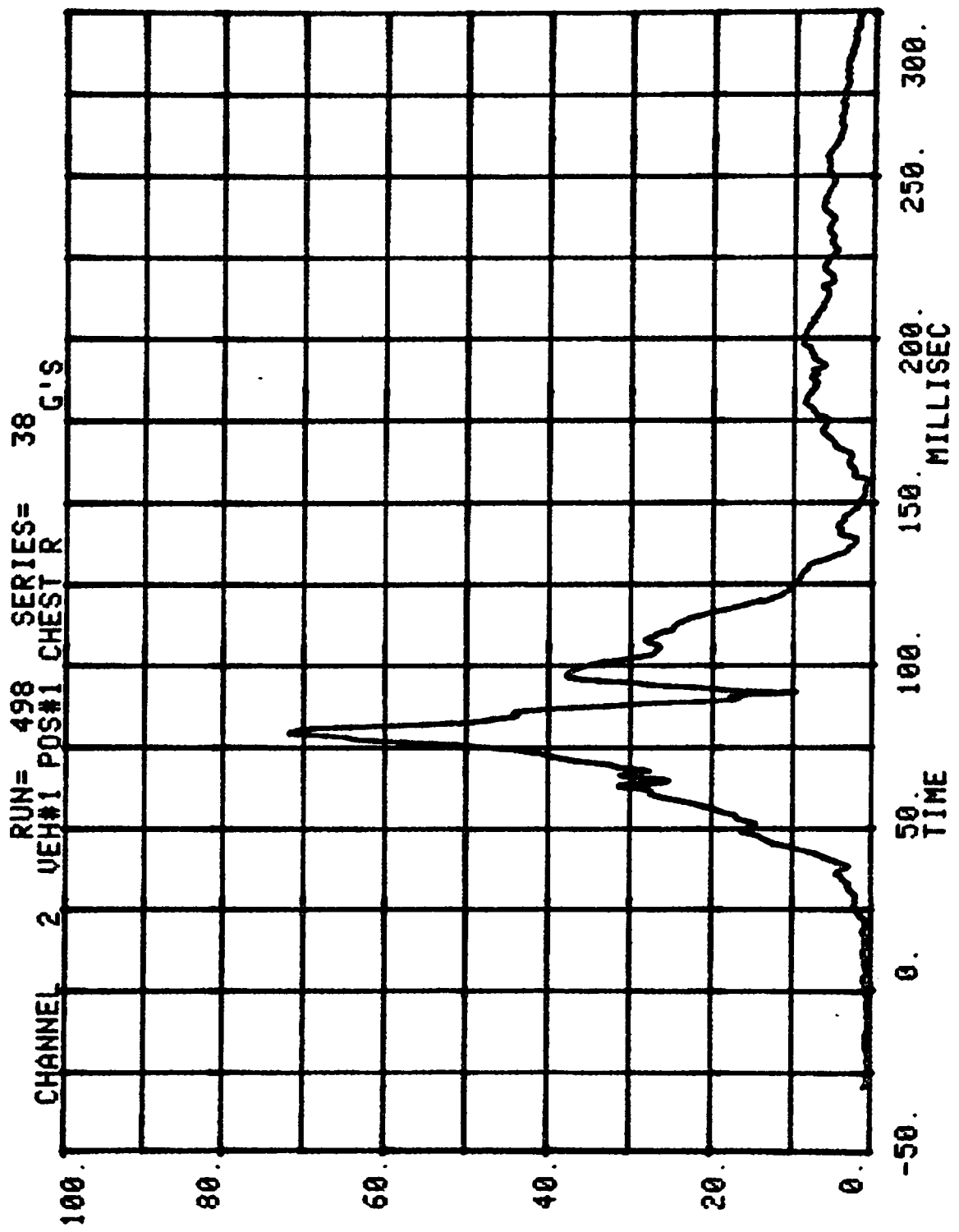


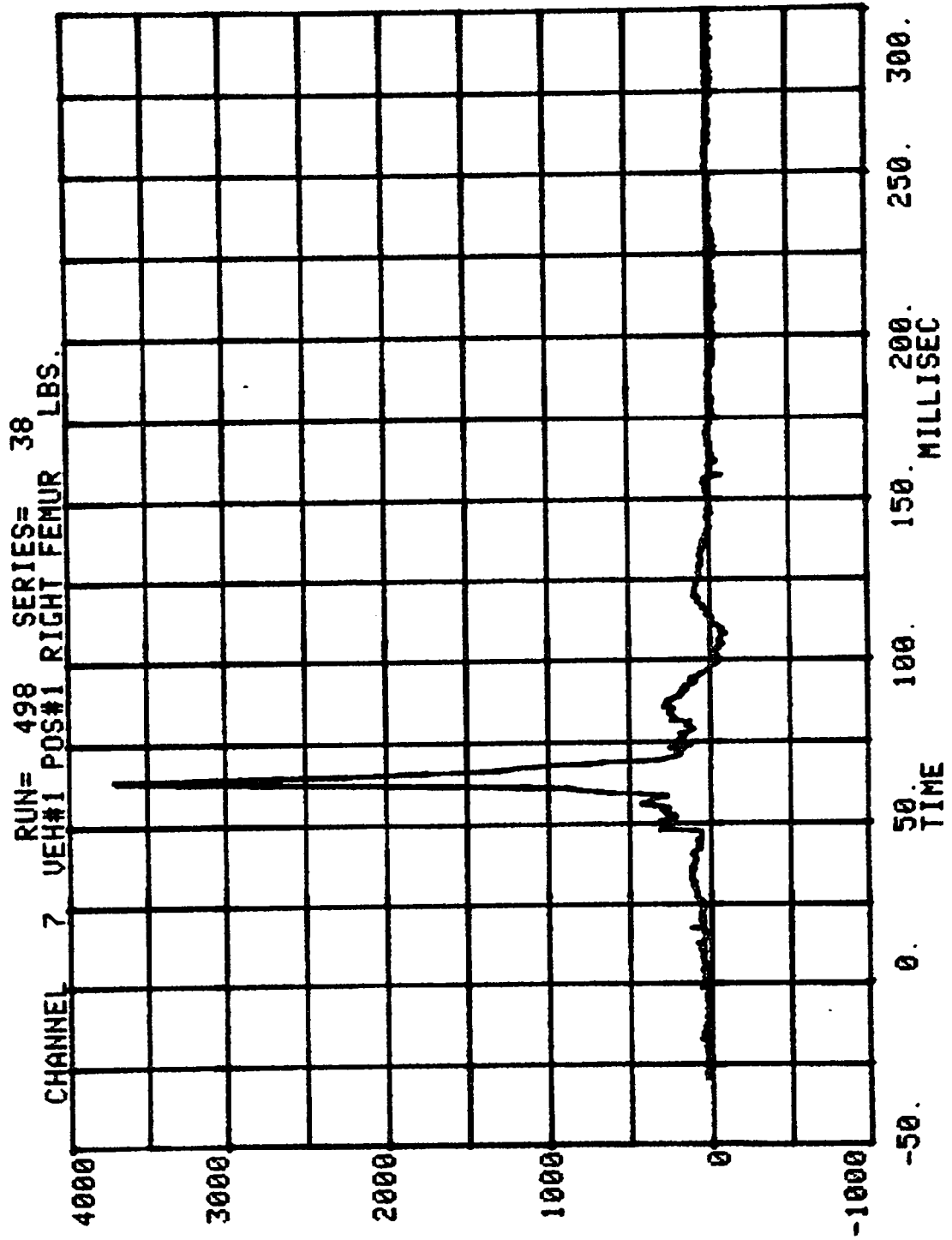
CHANNEL 5 VEH#1 POS#1 CHEST Y 38 C'S

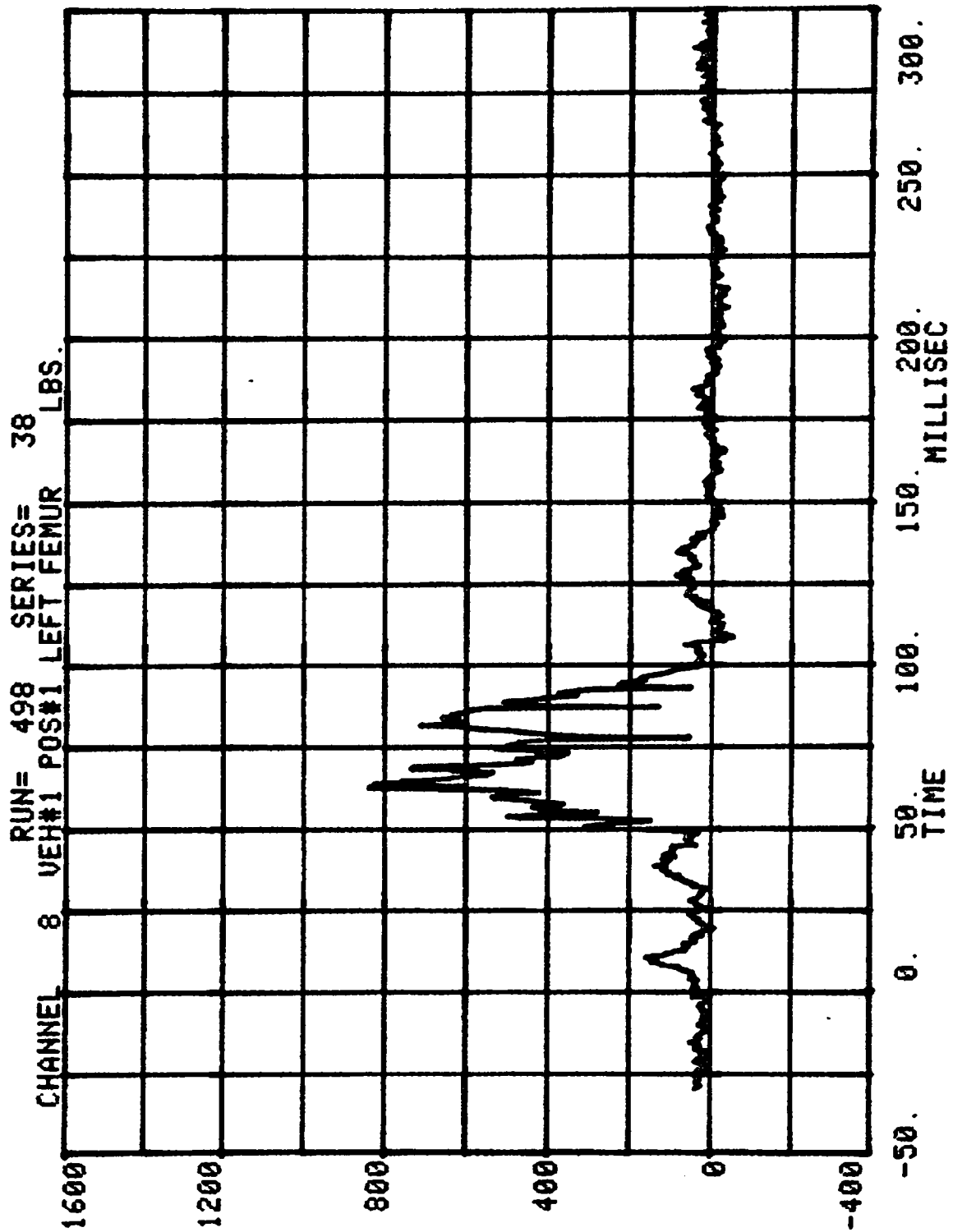


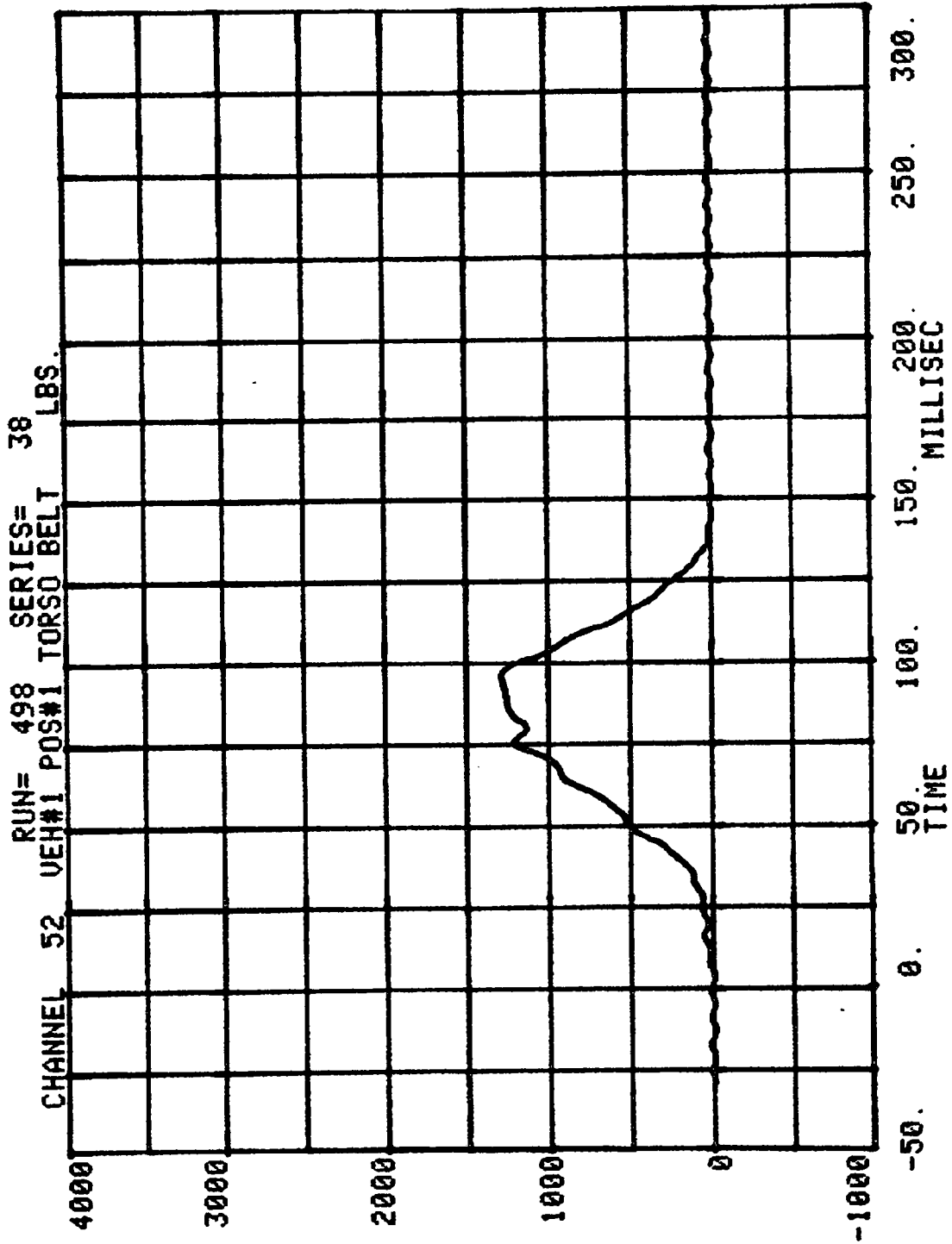
CHANNEL 6 VEH#1 POS#1 CHEST Z 38 G'S



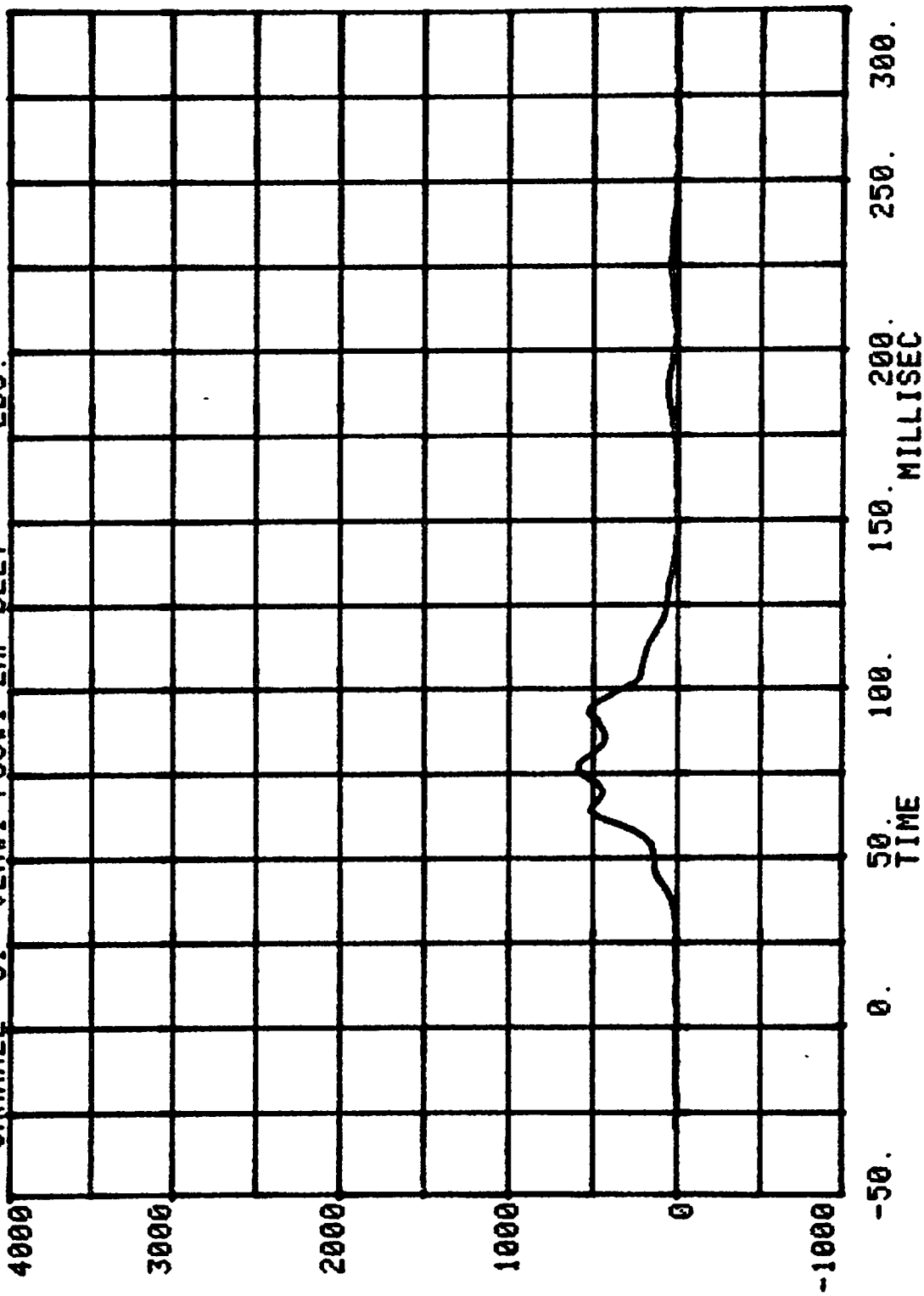








CHANNEL 51 VE#1 POS#1 LAP BELT 38 LBS. SERIES= 498 RUN=



HEAD INJURY CRITERION
HEAD SEVERITY INDEX

NCA CAR-TO-CAR TEST #38

RUN= 498

VEH#1 POS#2 HEAD R

HIC= 921.2 FROM T1= .09270 TO T2= .10620

AVERAGE ACCELERATION BETWEEN T1 AND T2= 85.8G'S

EVENT TIME= 300.0 MSEC

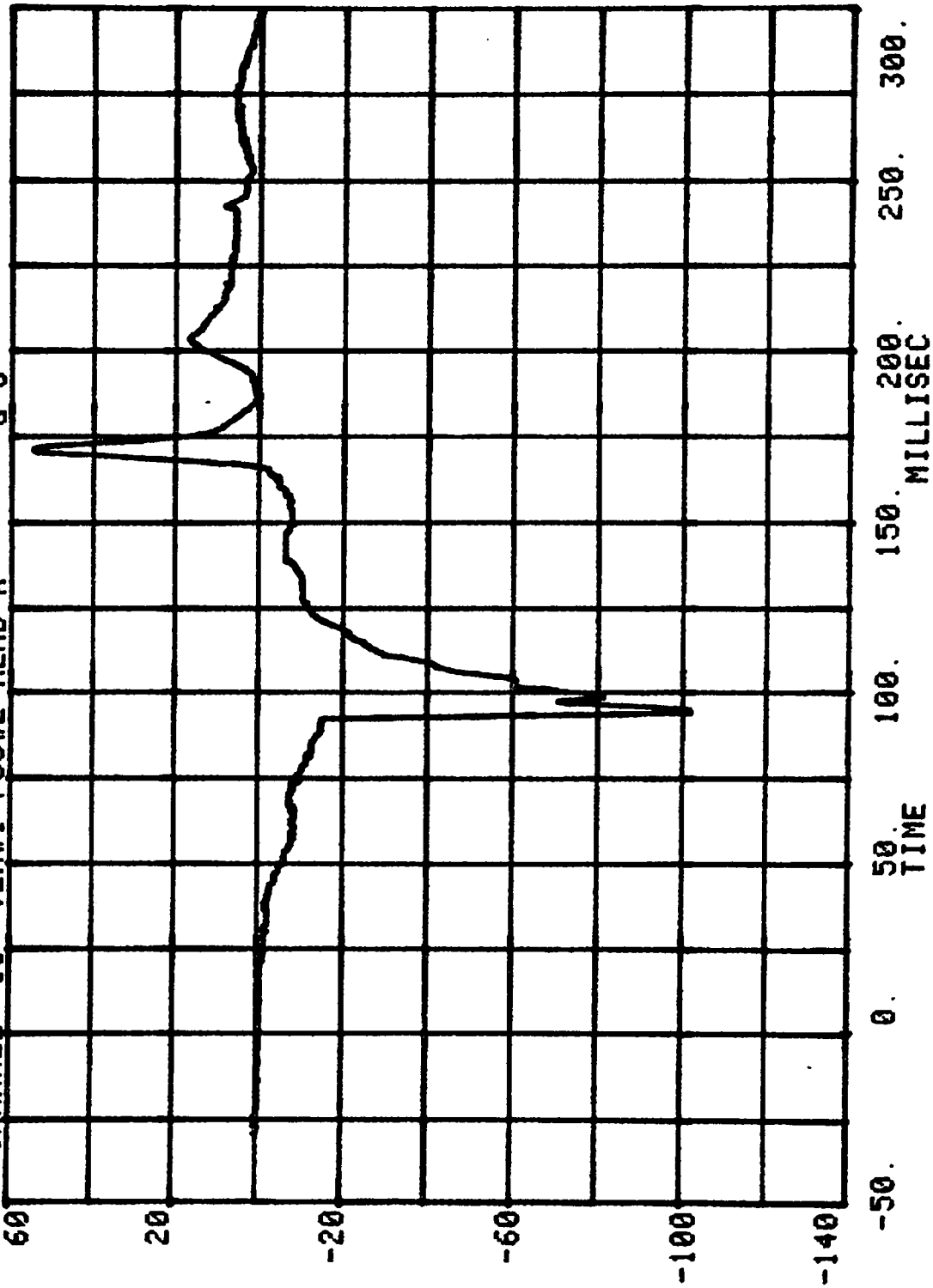
SEVERITY INDEX=1572.6

CHANNEL 13 VEH#1 POS#2 HEAD X

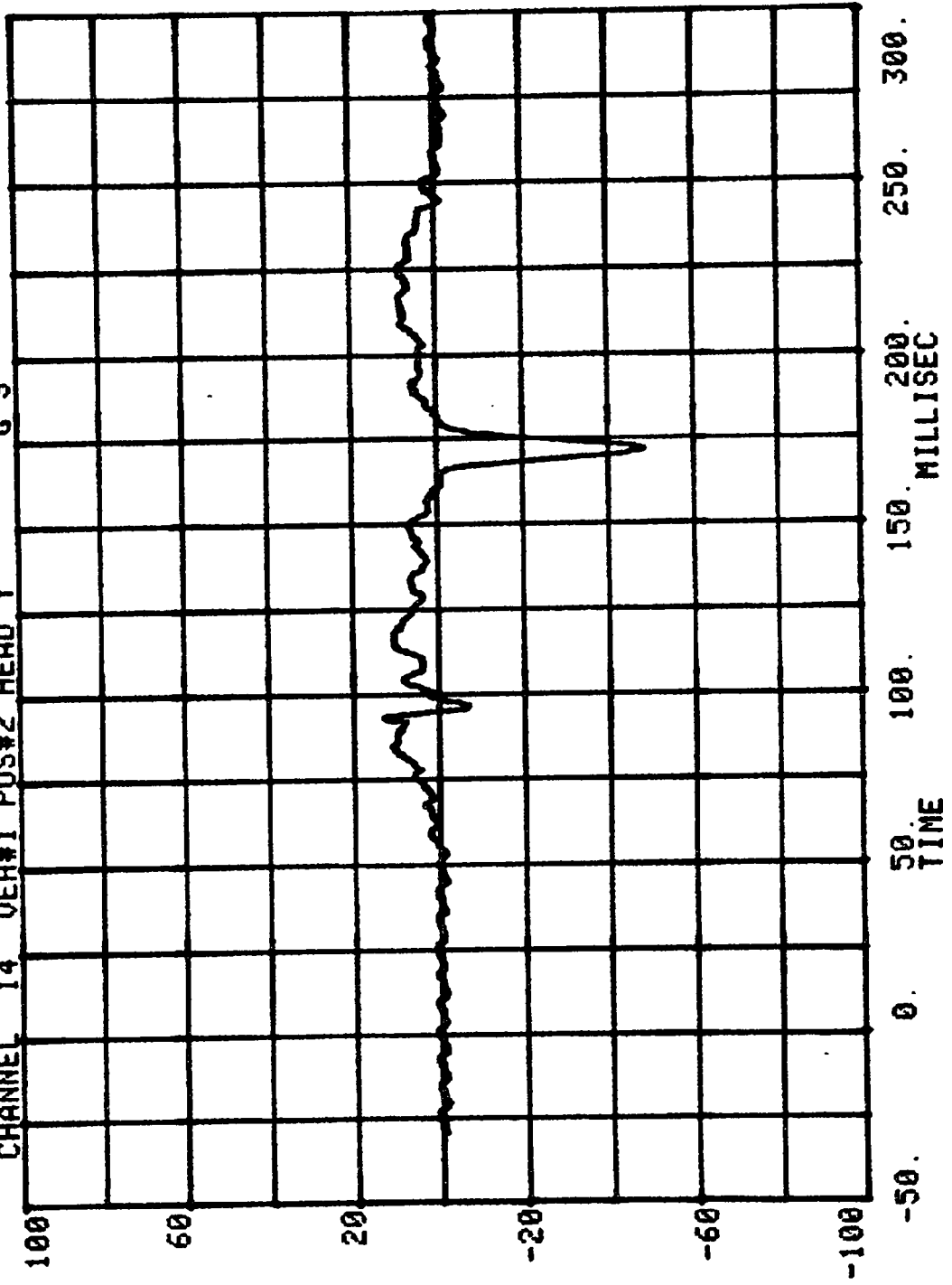
RUN= 498

SERIES=

38 G'S

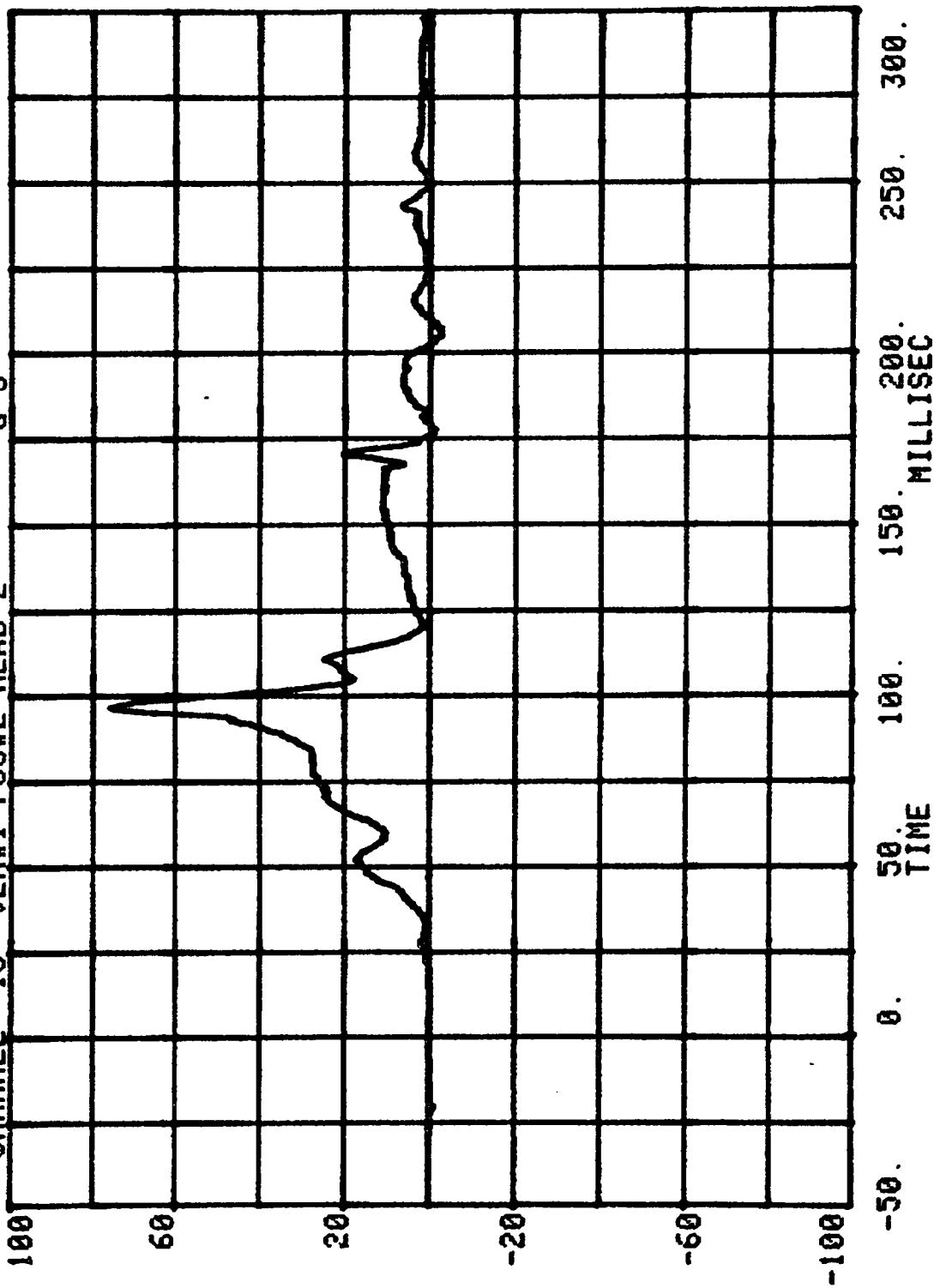


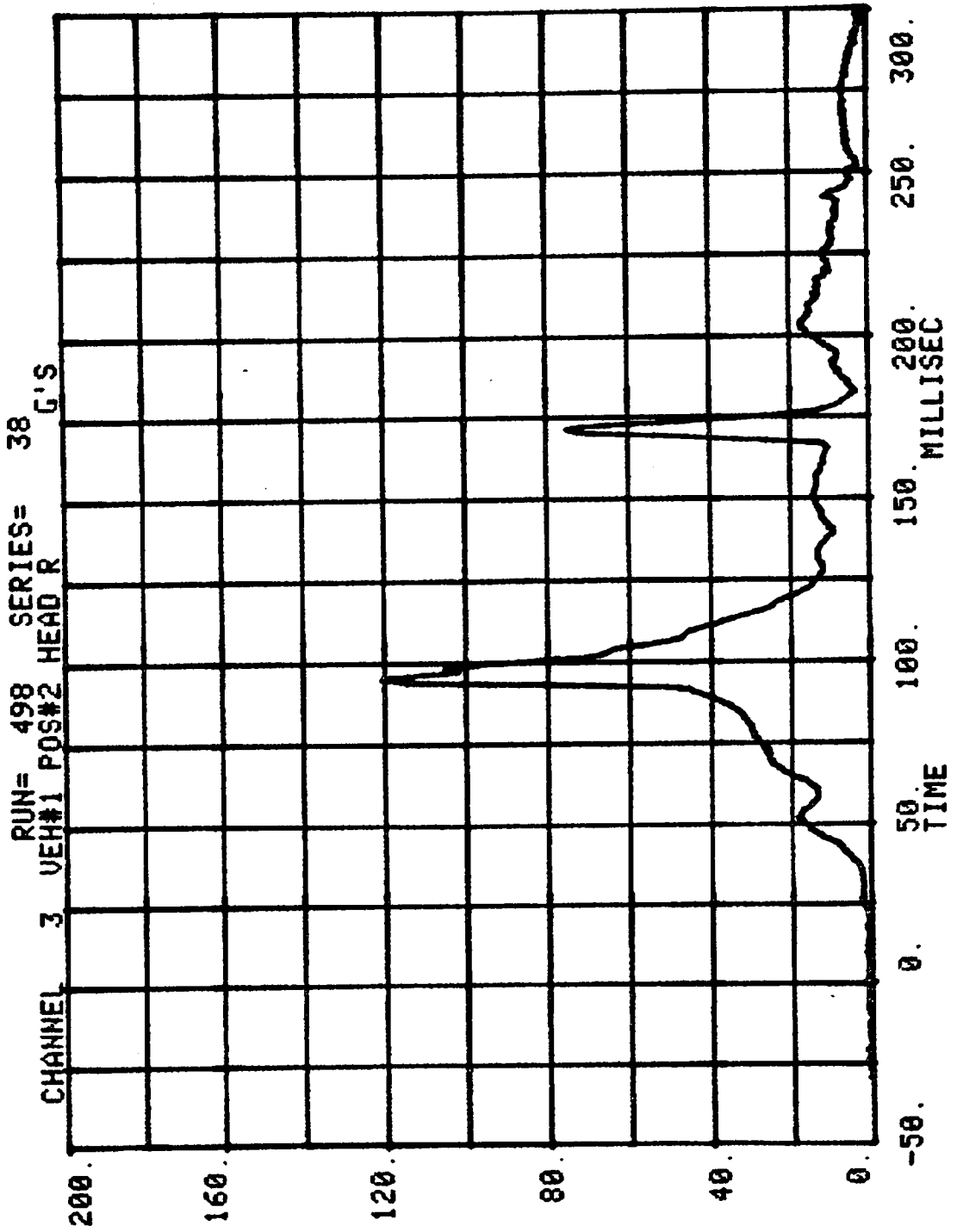
CHANNEL 14 VEH#1 POS#2 HEAD Y
RUN= 498 SERIES= 38 G'S

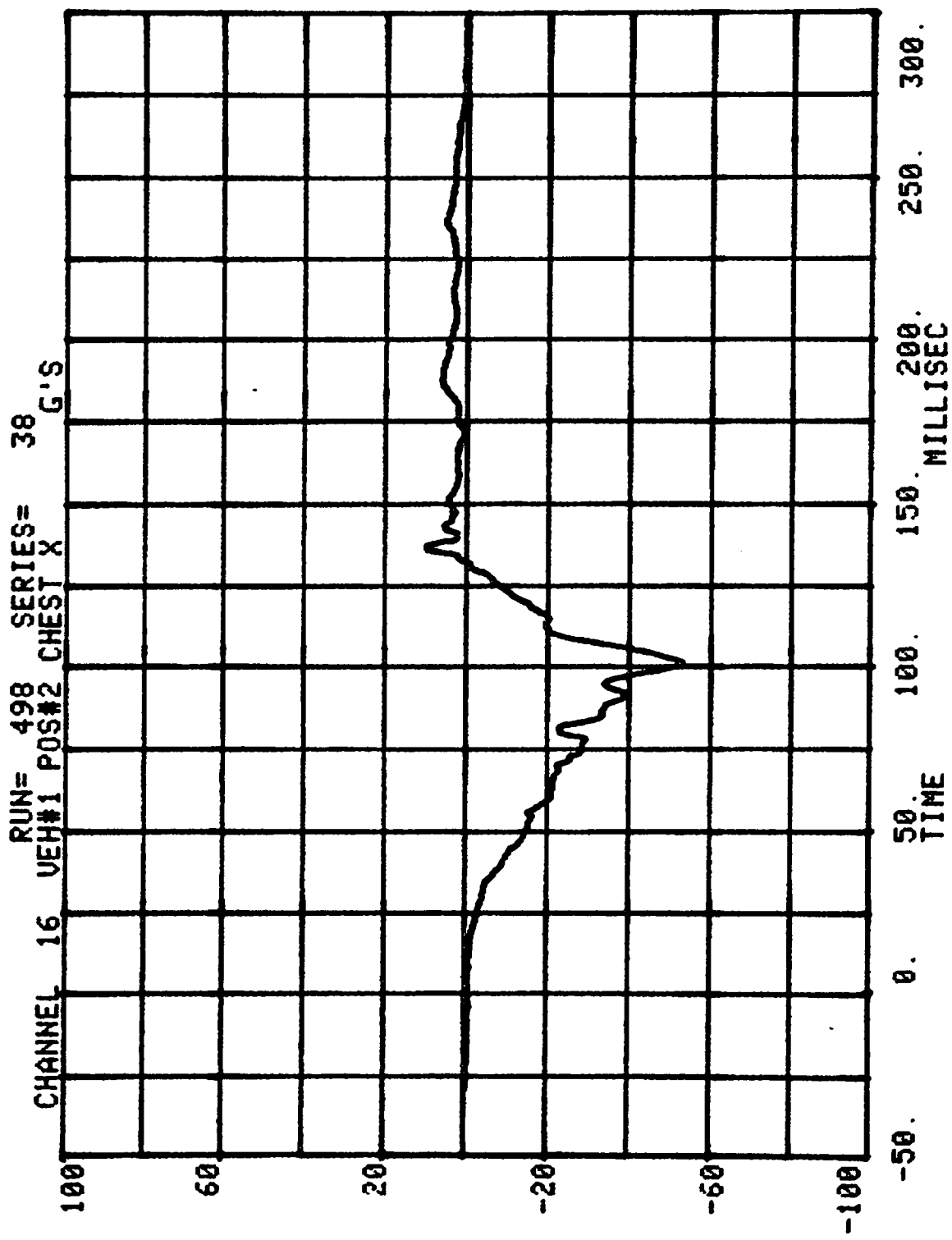


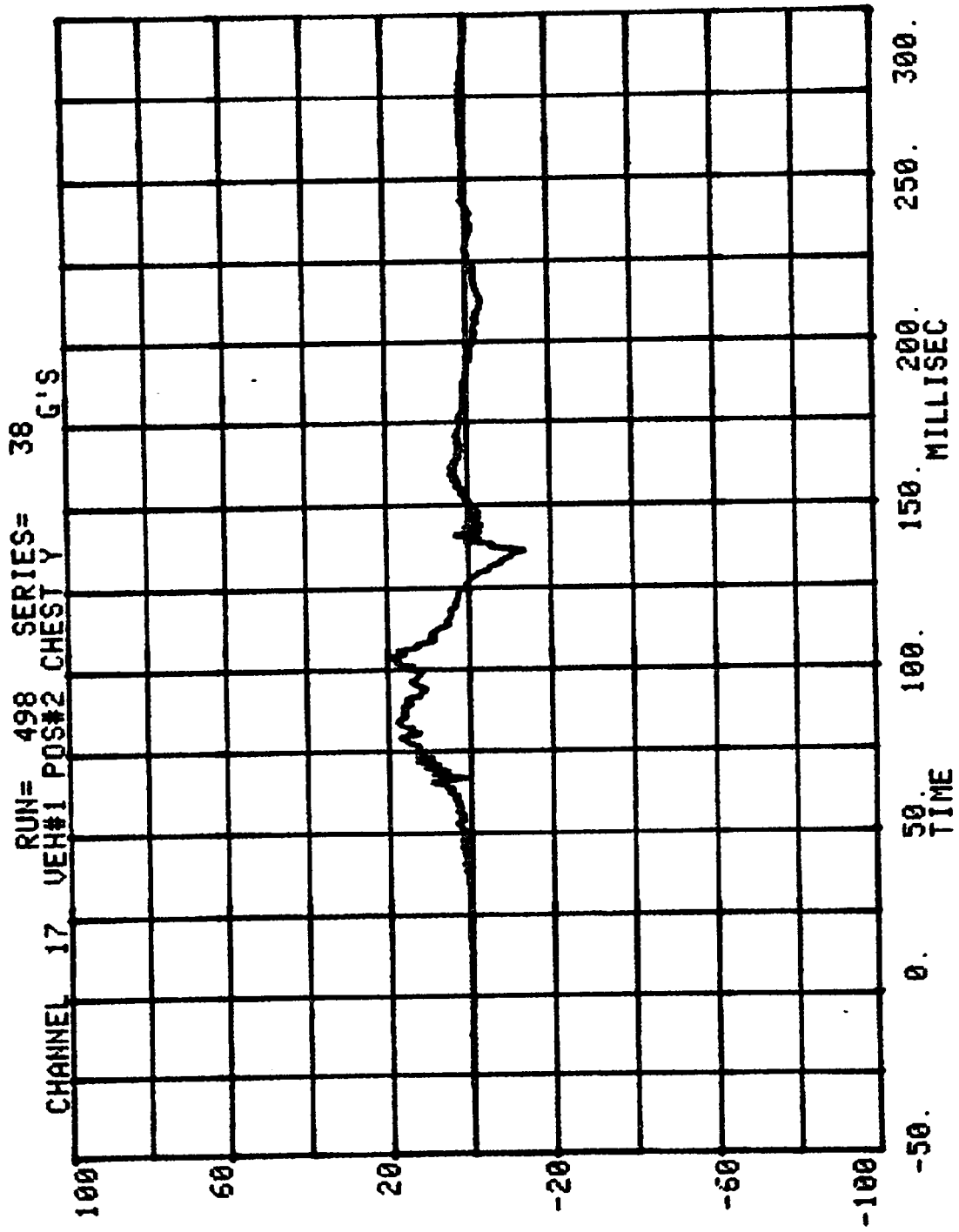
CHANNEL 15 VEH#1 POS#2 HEAD Z 38 G'S

RUN= 498 SERIES=

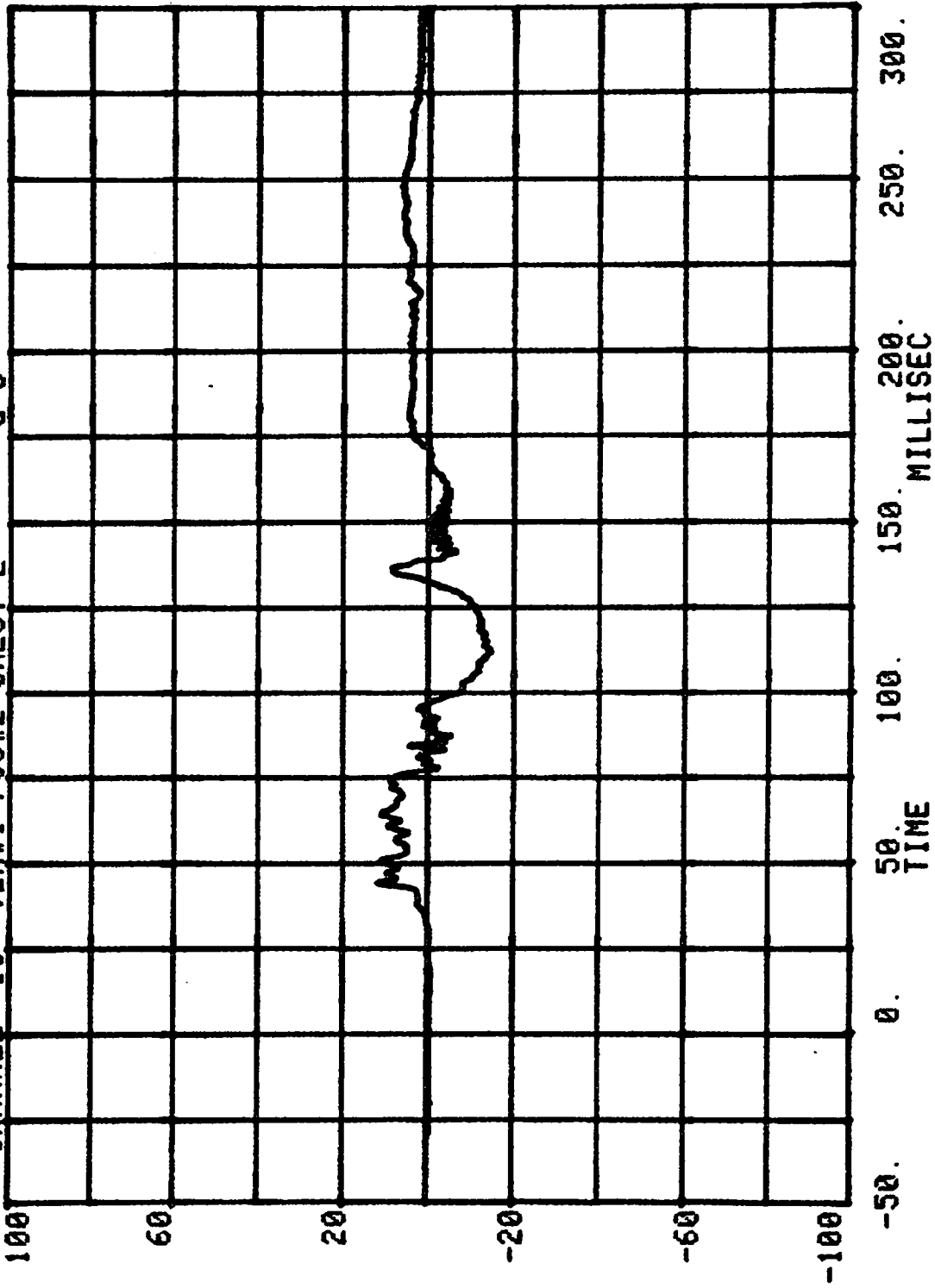


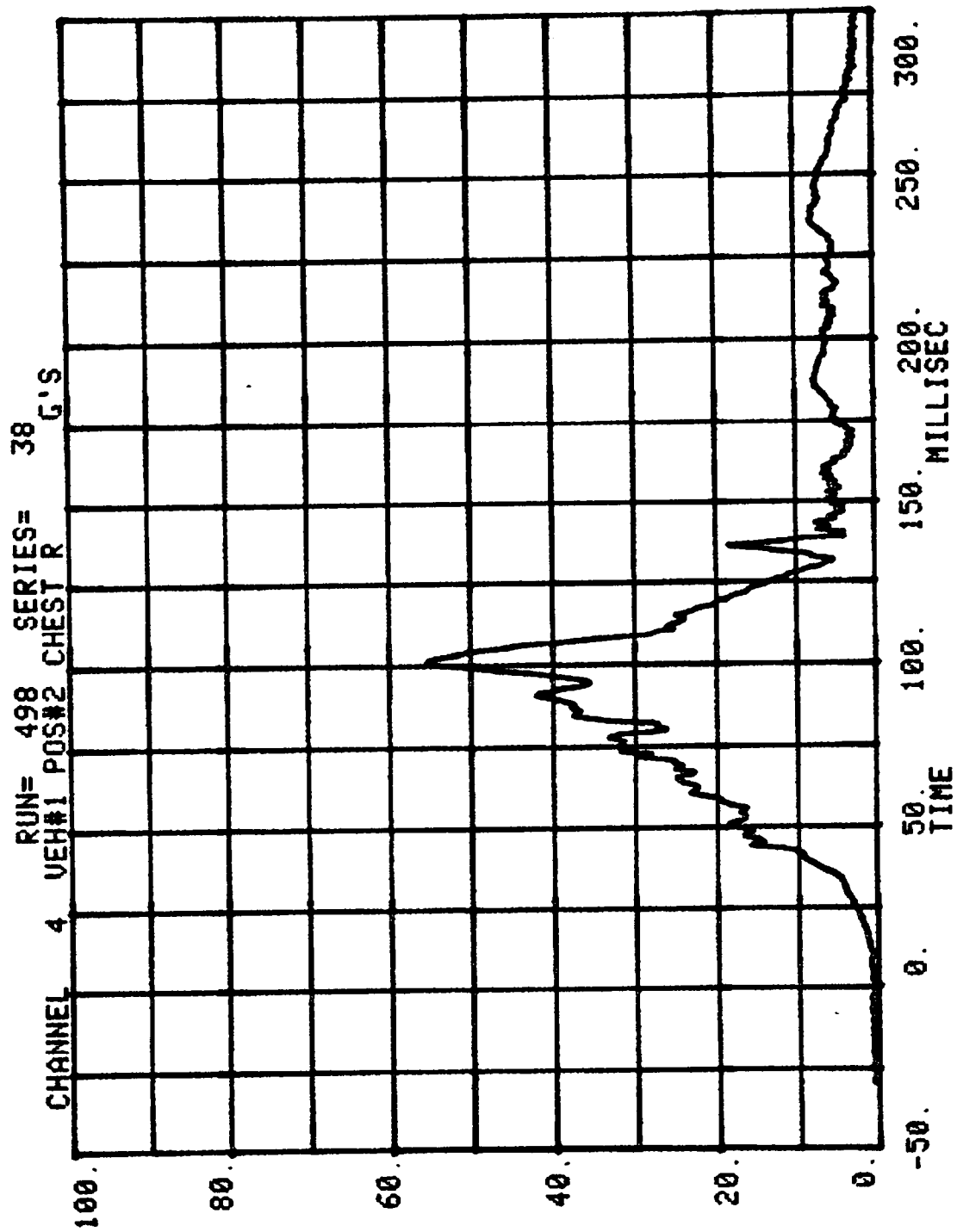


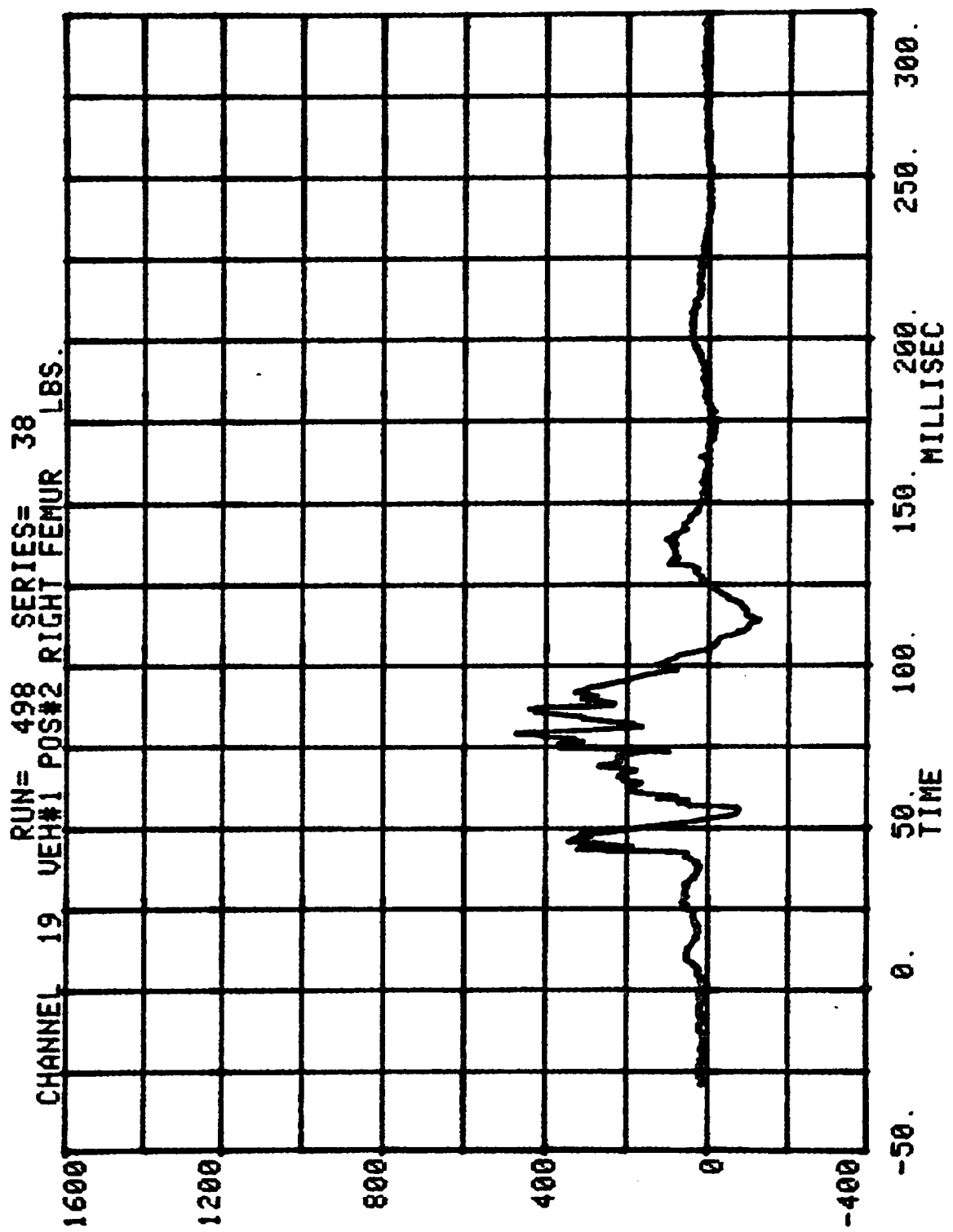




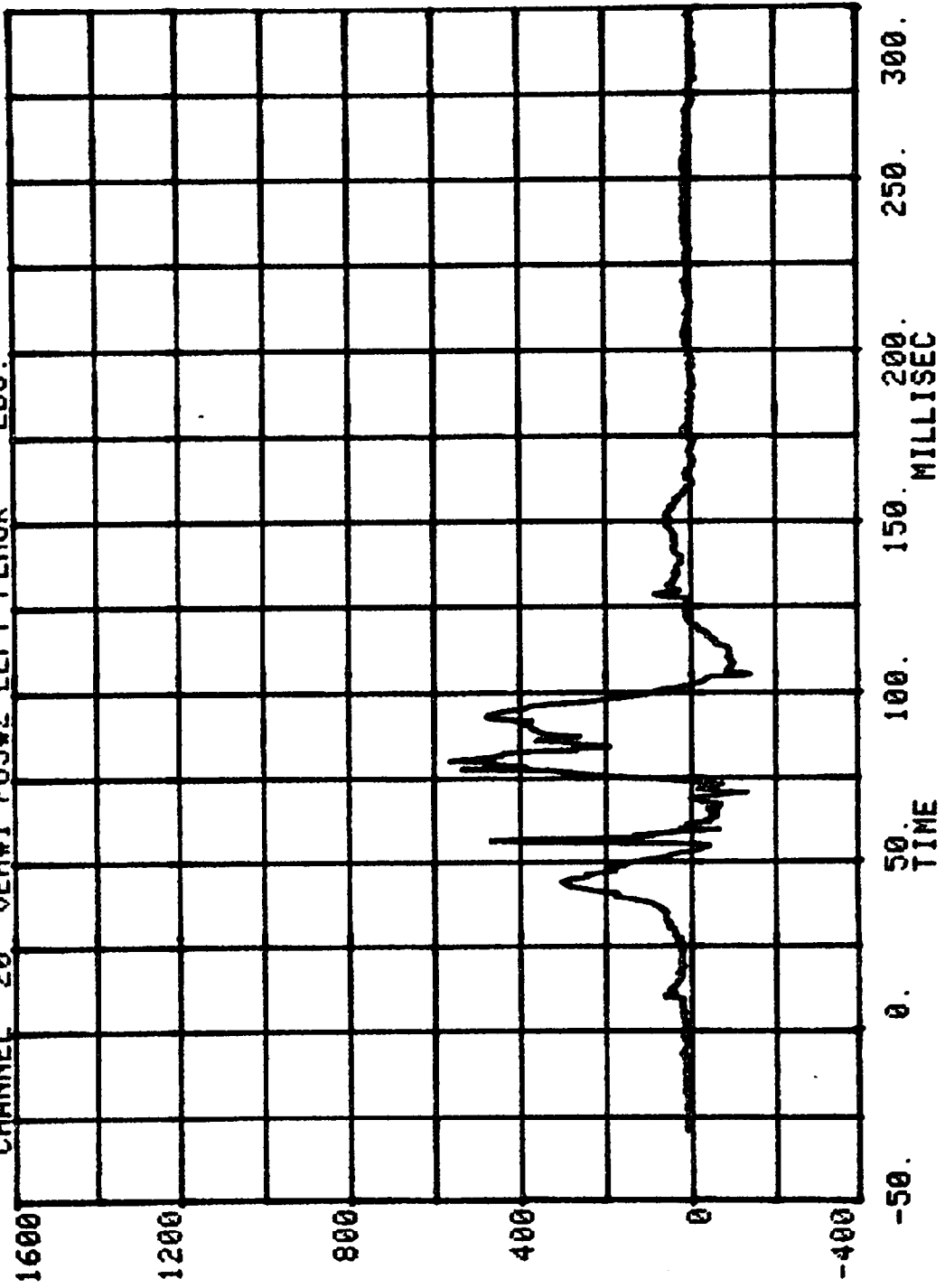
CHANNEL 18 VEH#1 POS#2 CHEST 2 SERIES= 38 G'S

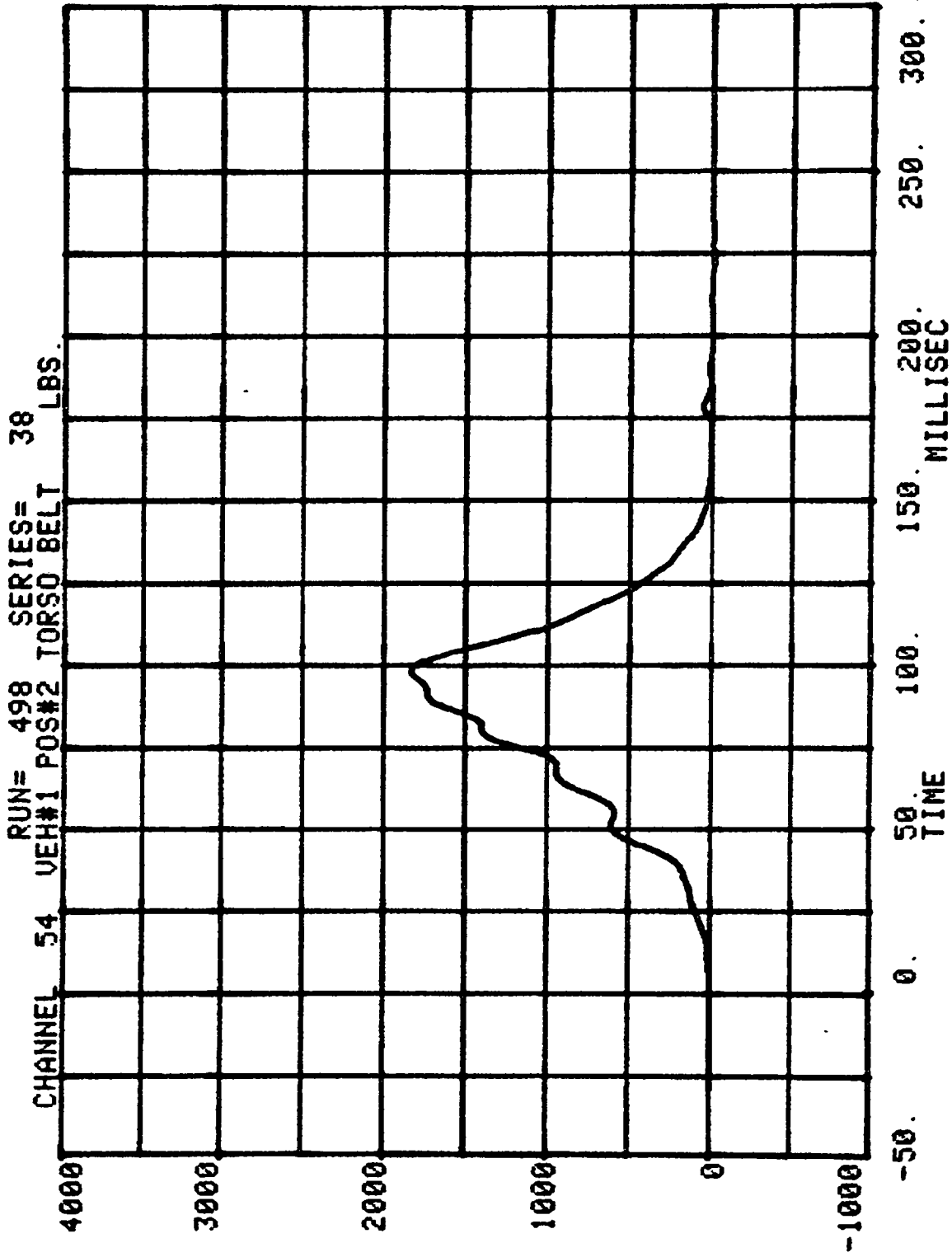




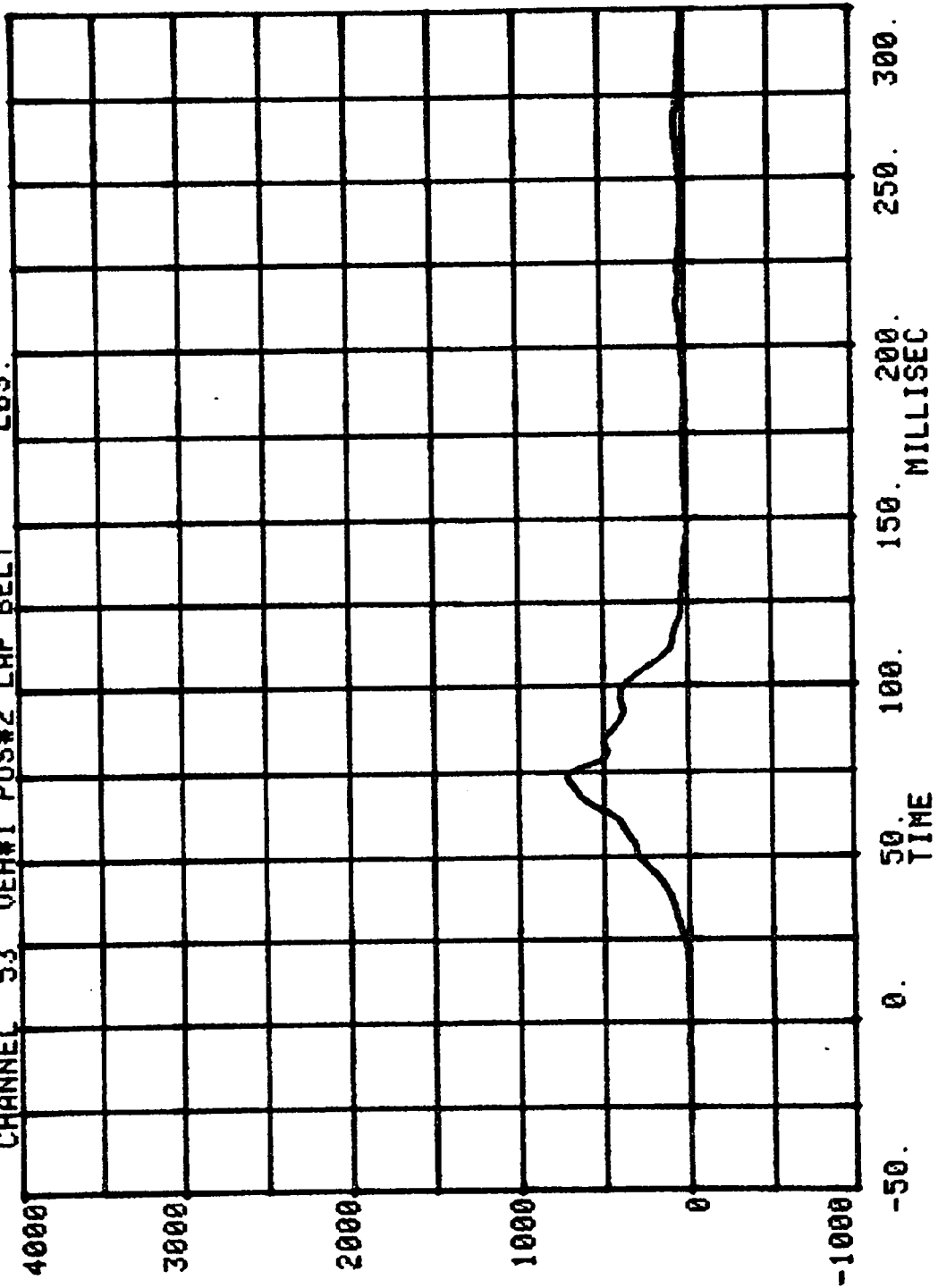


CHANNEL 20 VEH#1 POS#2 LEFT FEMUR 38 LBS.





CHANNEL 53 RUN= 498 SERIES= 38 LBS.
VEH#1 POS#2 LAP BELT



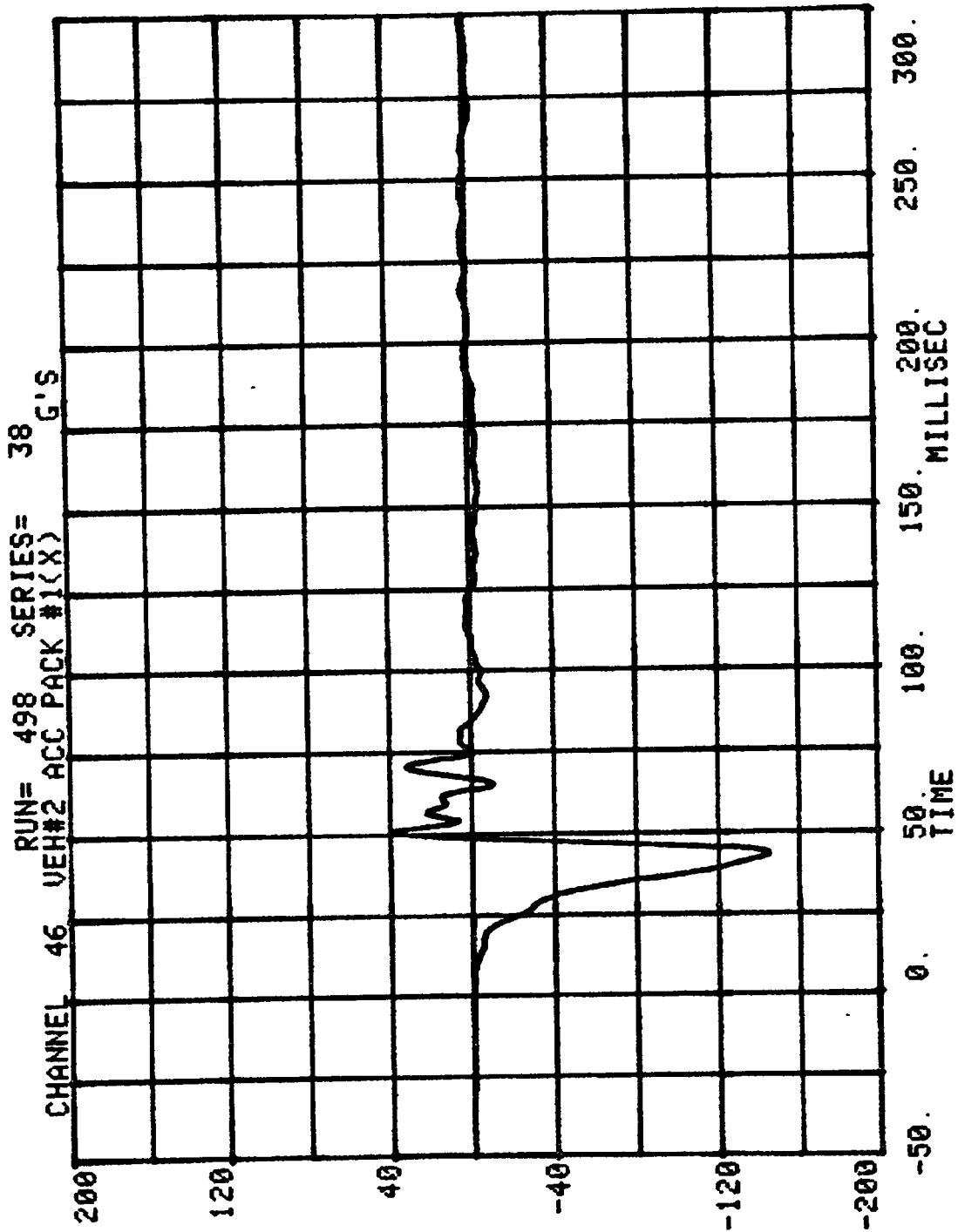
TEST NO. 308-38-498

1980 FORD MUSTANG

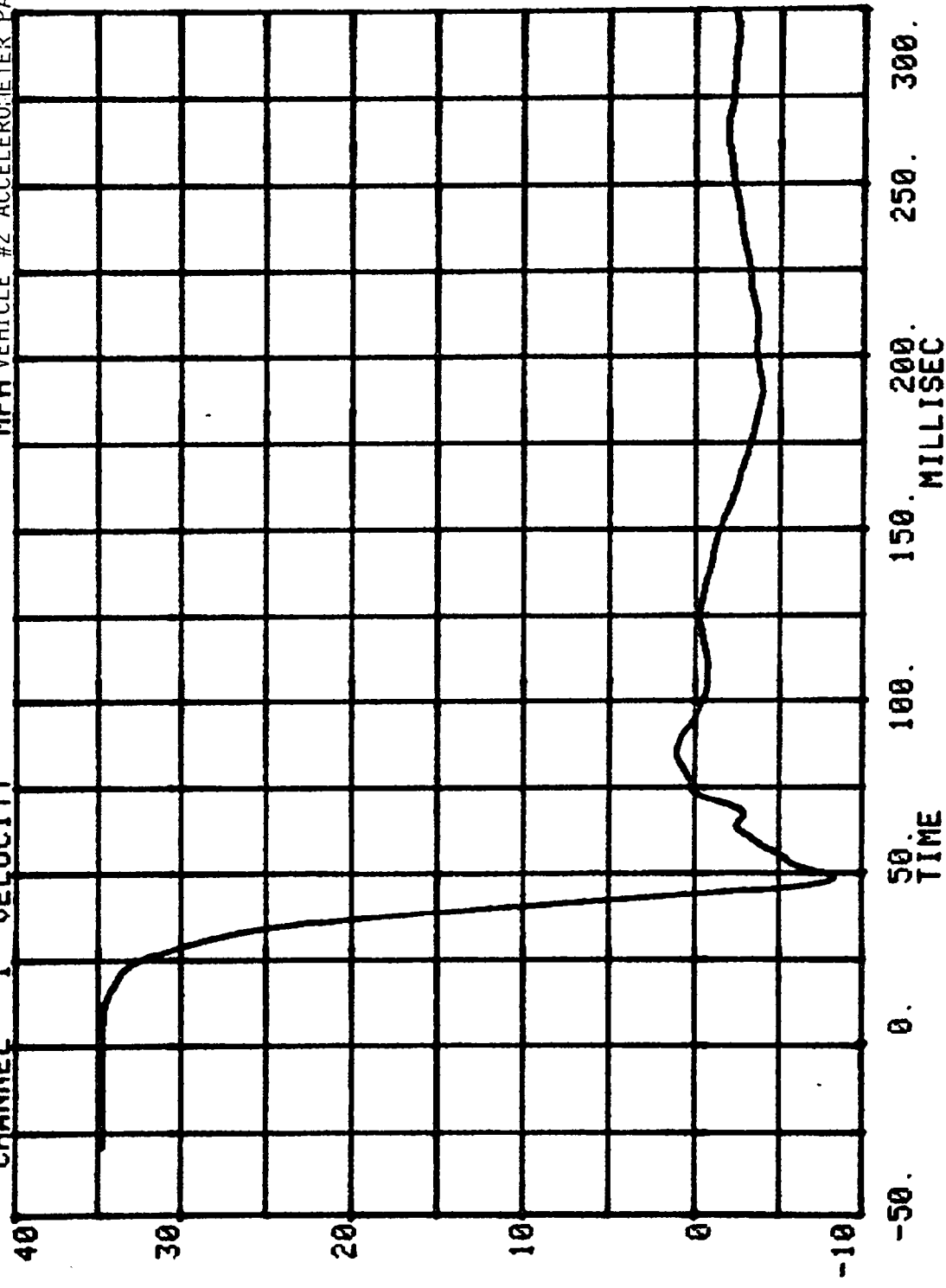
FILTER CHANNEL CLASS

VEHICLE DATA

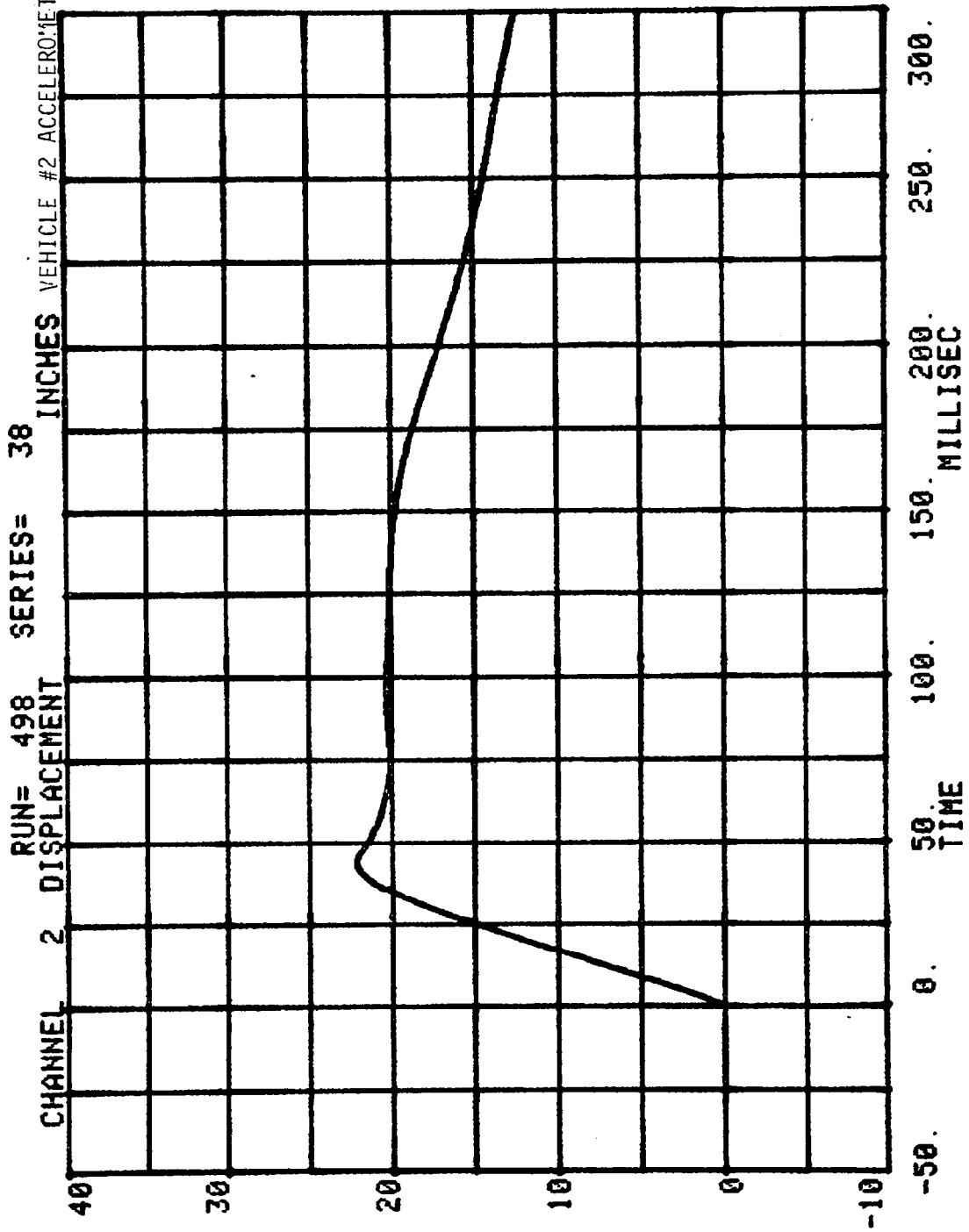
60

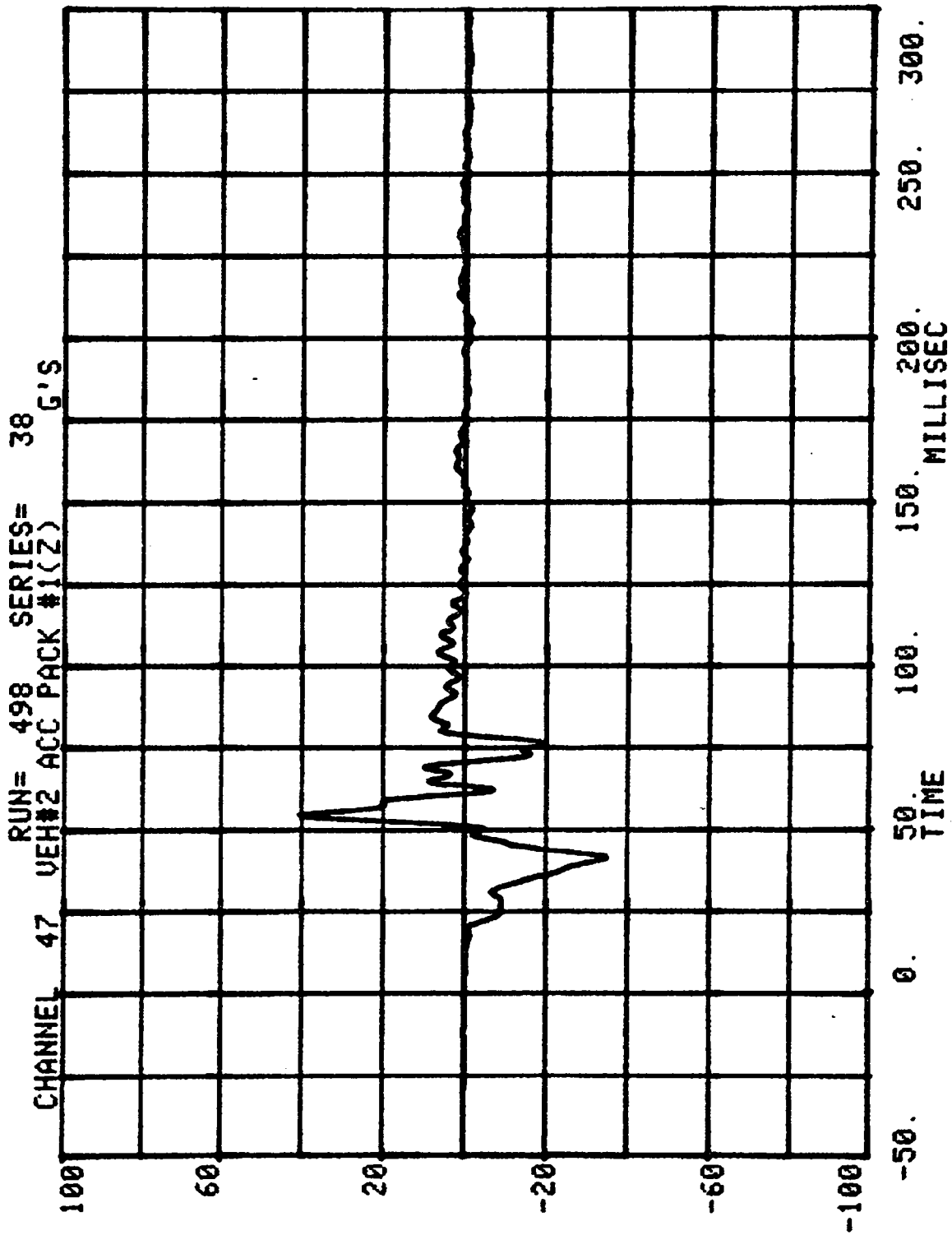


CHANNEL 1 VELOCITY
RUN= 498 SERIES= 38 MPH VEHICLE #2 ACCELEROMETER PACK #1 (X)

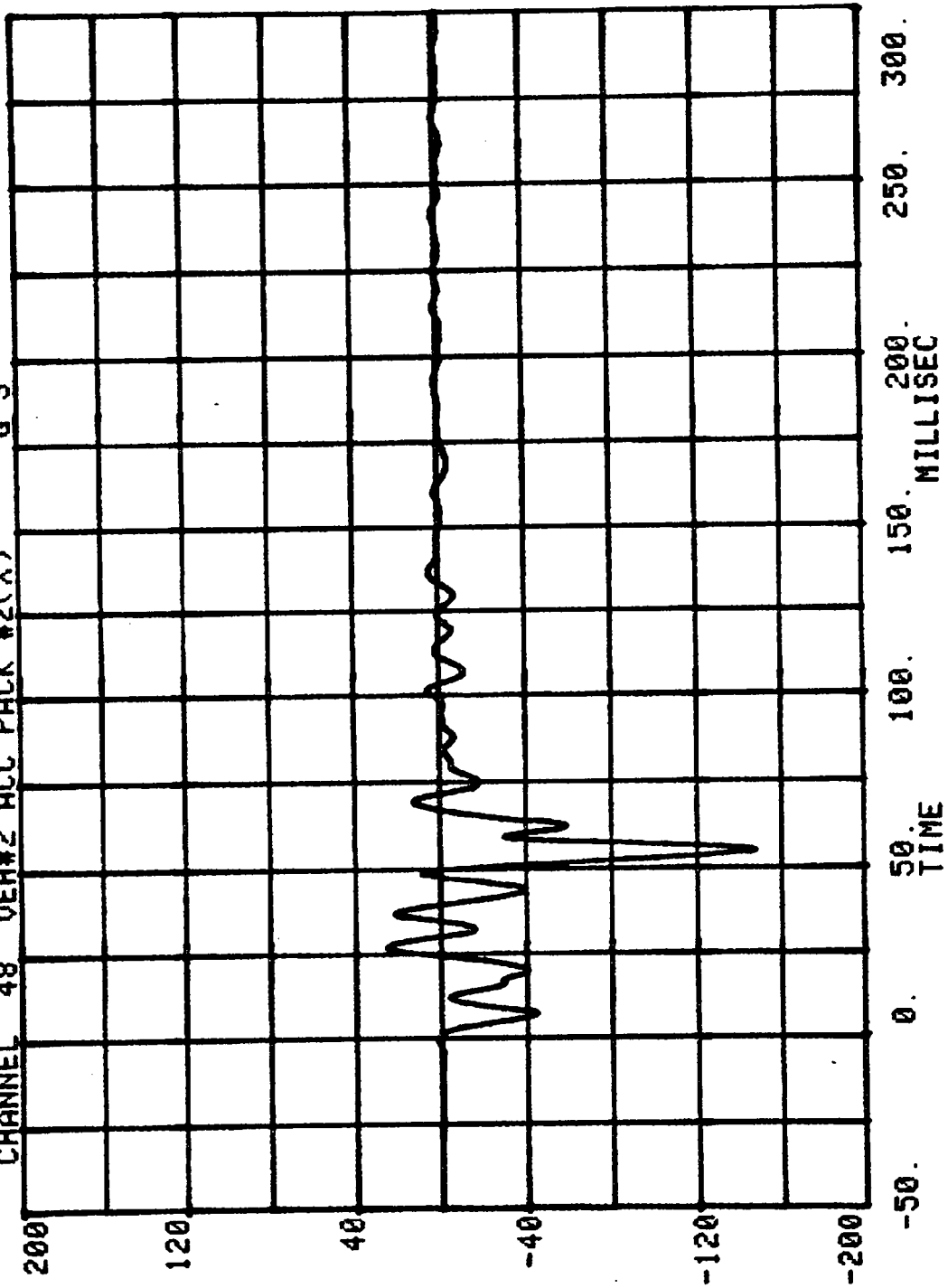


CHANNEL 2 DISPLACEMENT SERIES= 38 INCHES VEHICLE #2 ACCELEROMETER PACK #1(X)

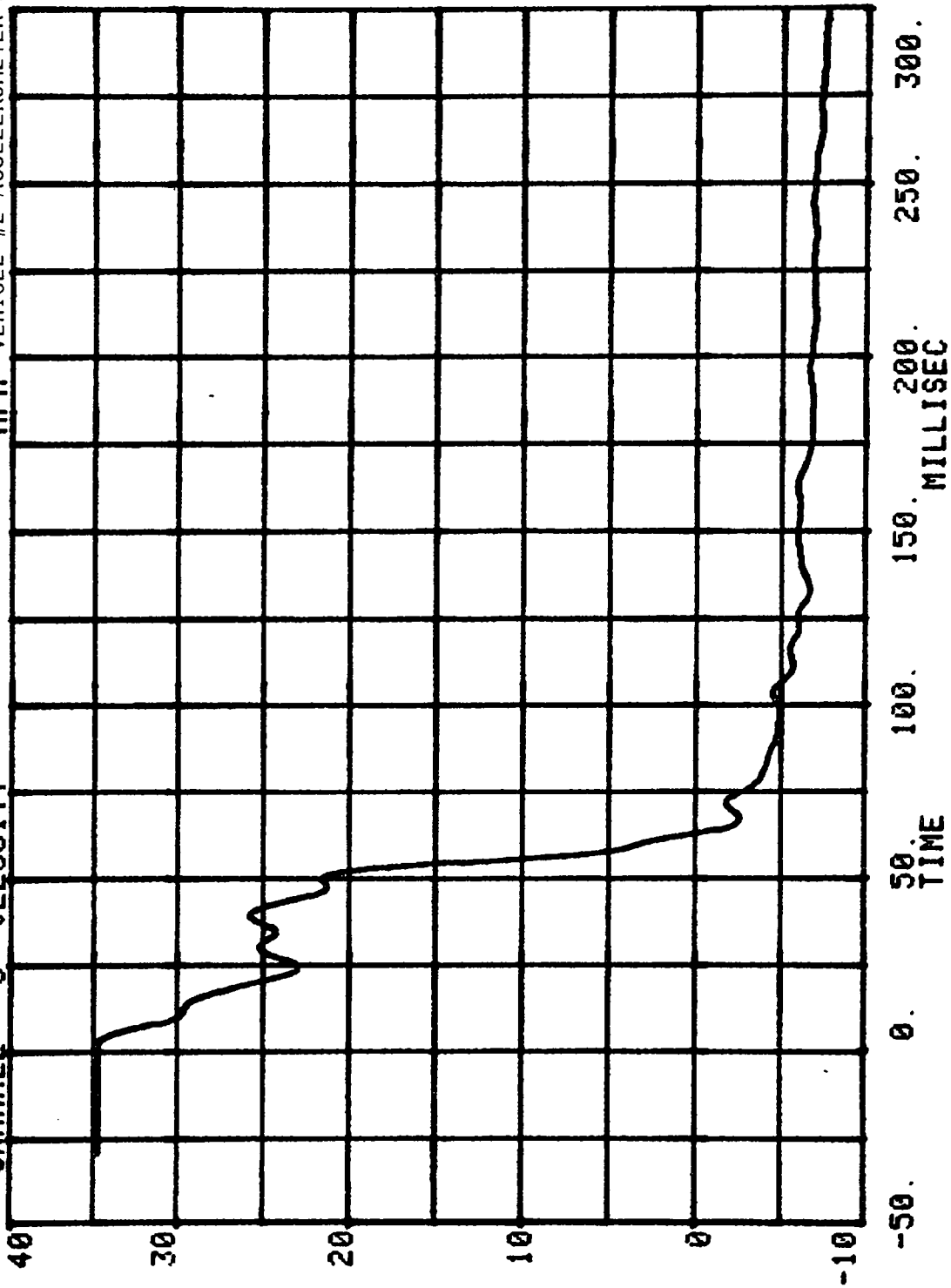




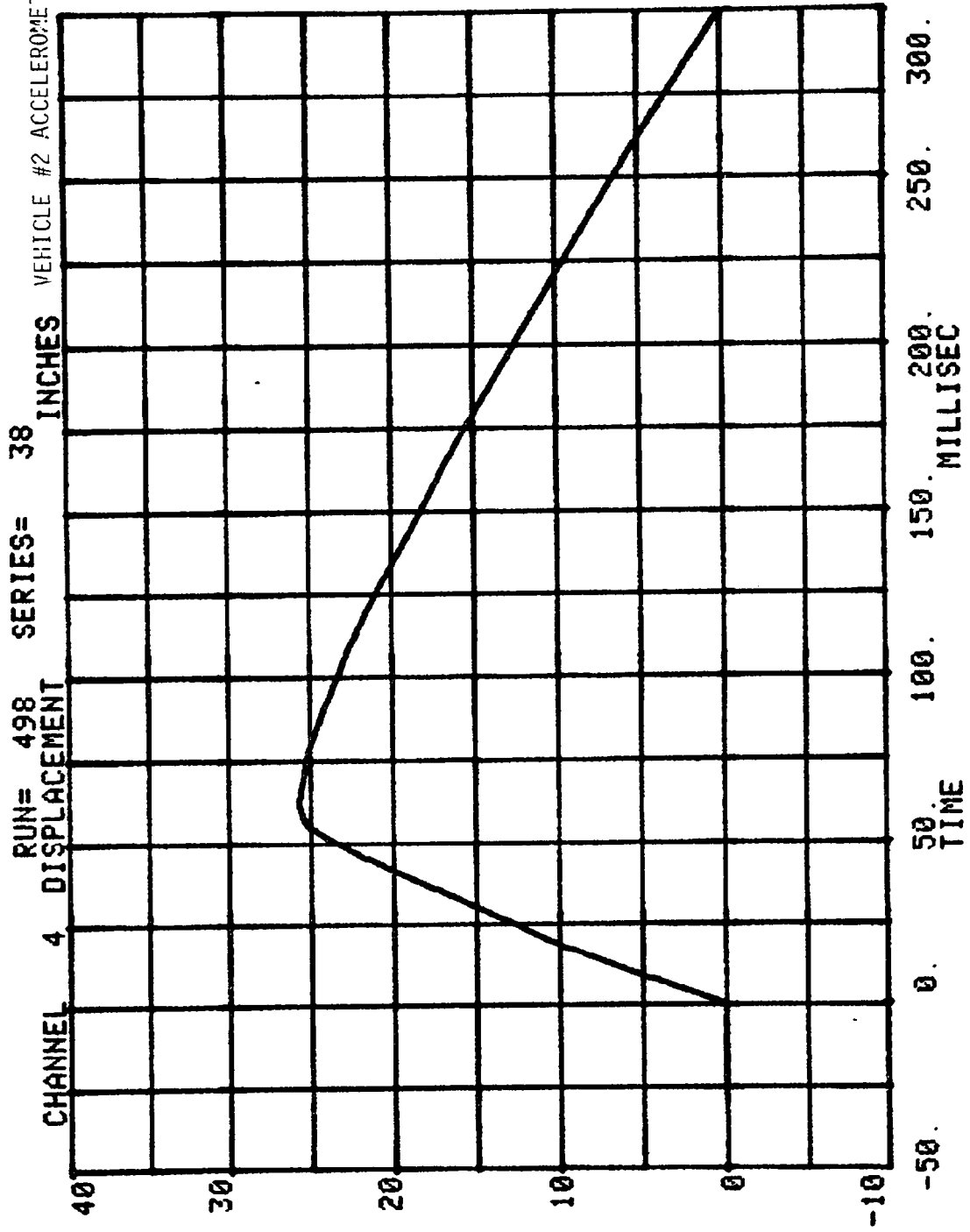
CHANNEL 48 VEH#2 ACC PACK #2(X) 38 G'S



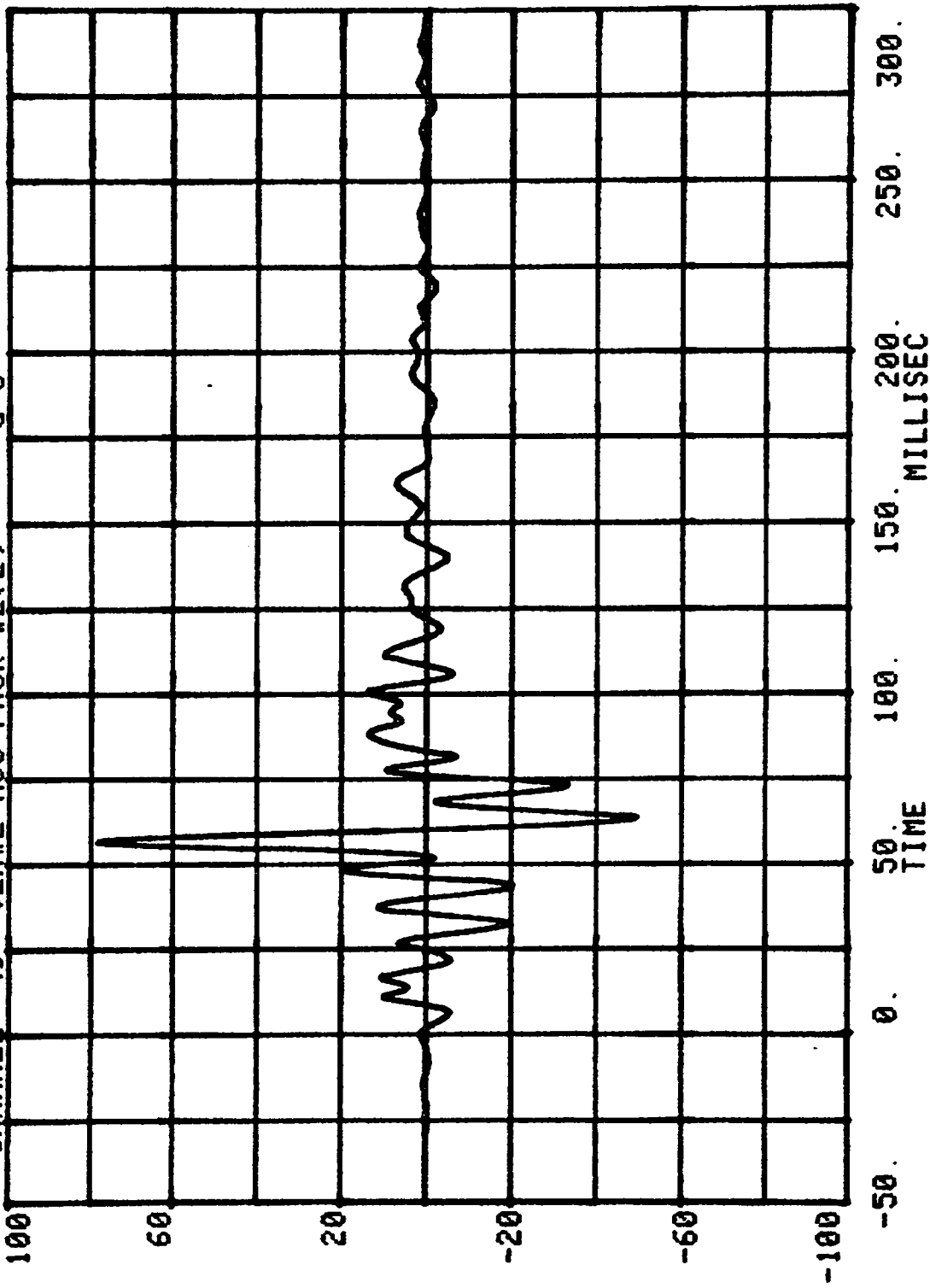
CHANNEL 3 VELOCITY
RUN= 498 SERIES= 38 MPH VEHICLE #2 ACCELEROMETER PACK #2 (X)



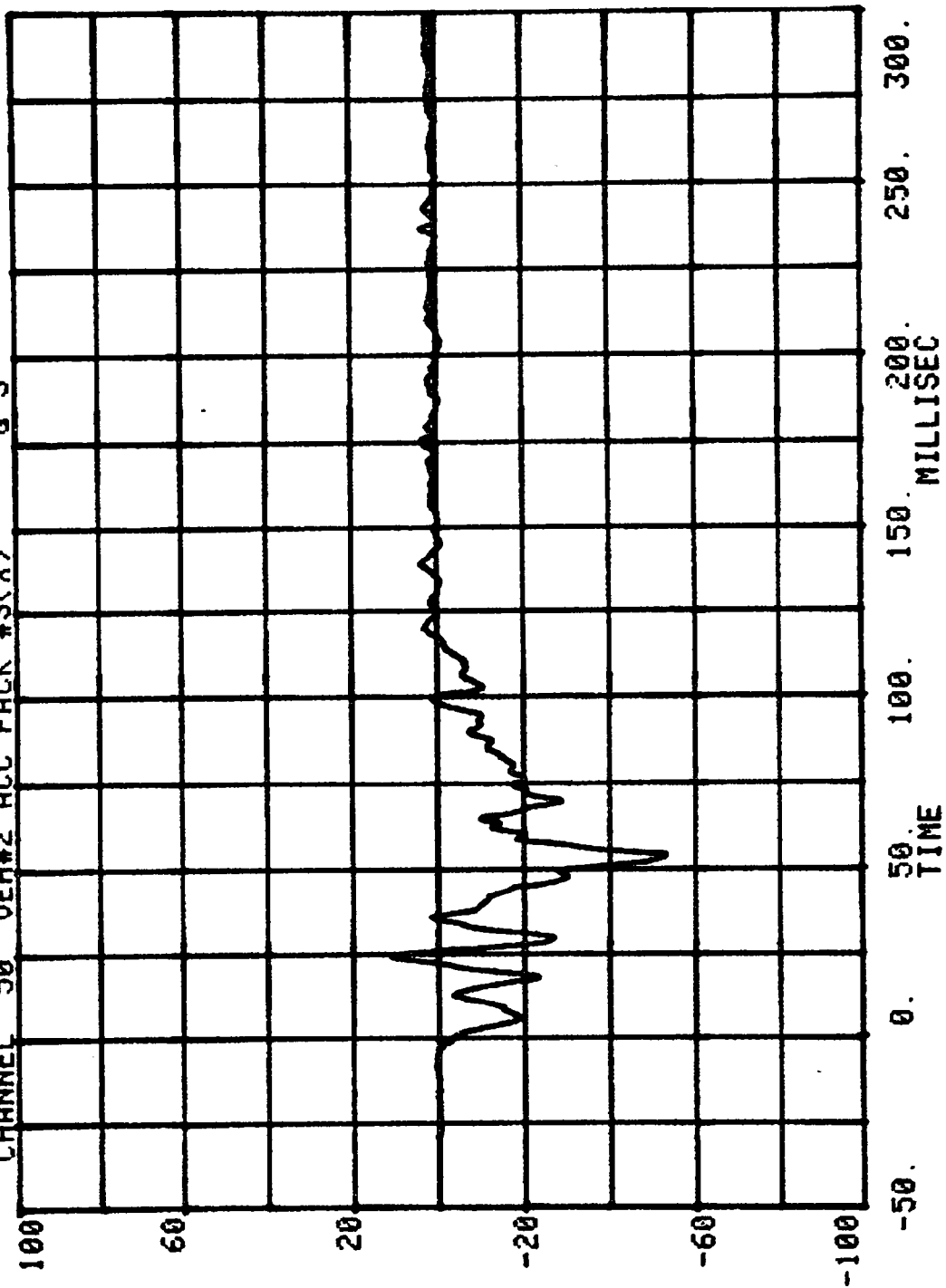
CHANNEL 4 DISPLACEMENT SERIES= 38 INCHES VEHICLE #2 ACCELEROMETER PACK #2(X)



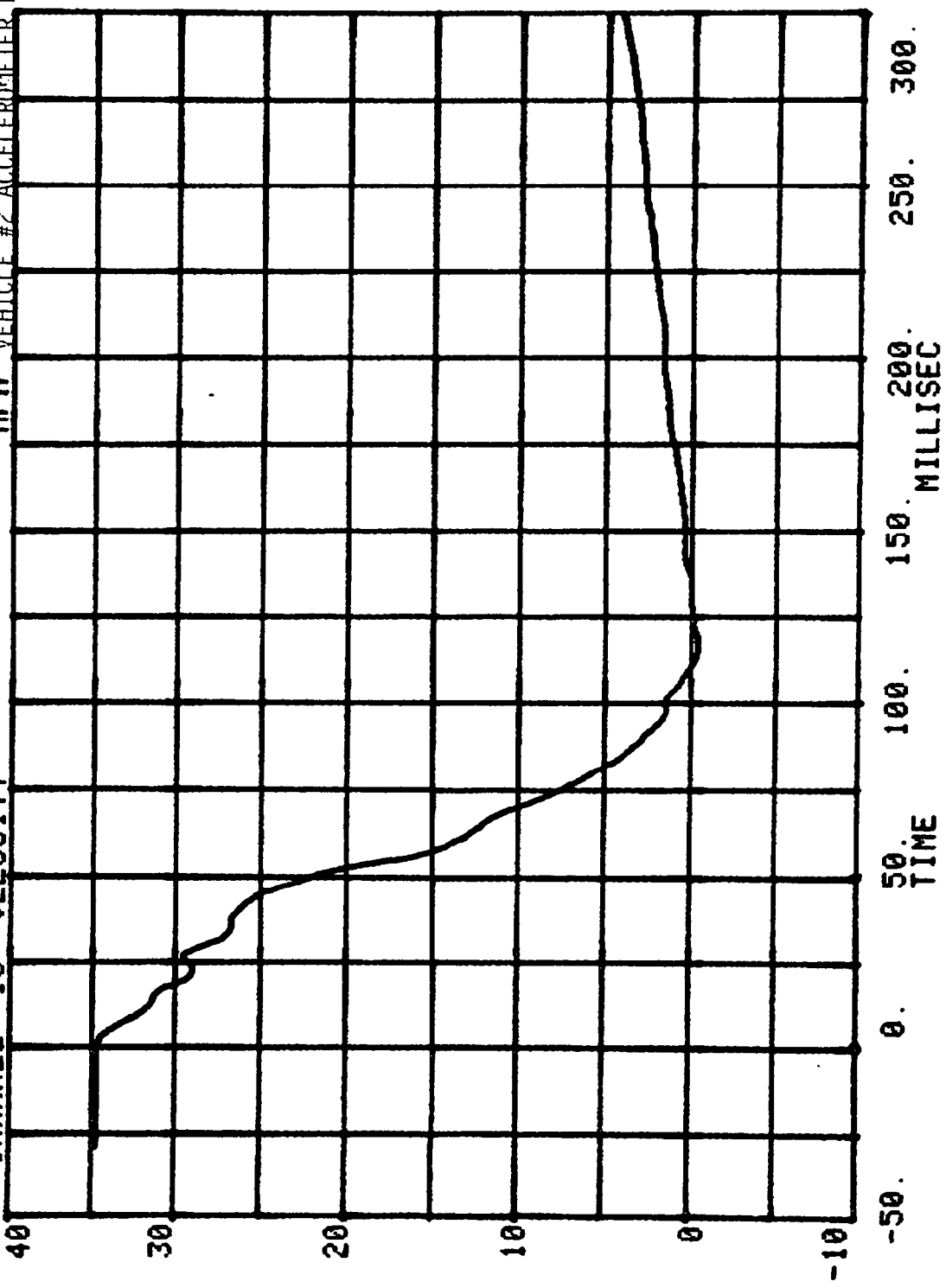
CHANNEL 49 RUN= 498 SERIES= 38 G'S
VEH#2 ACC PACK #2(Z)



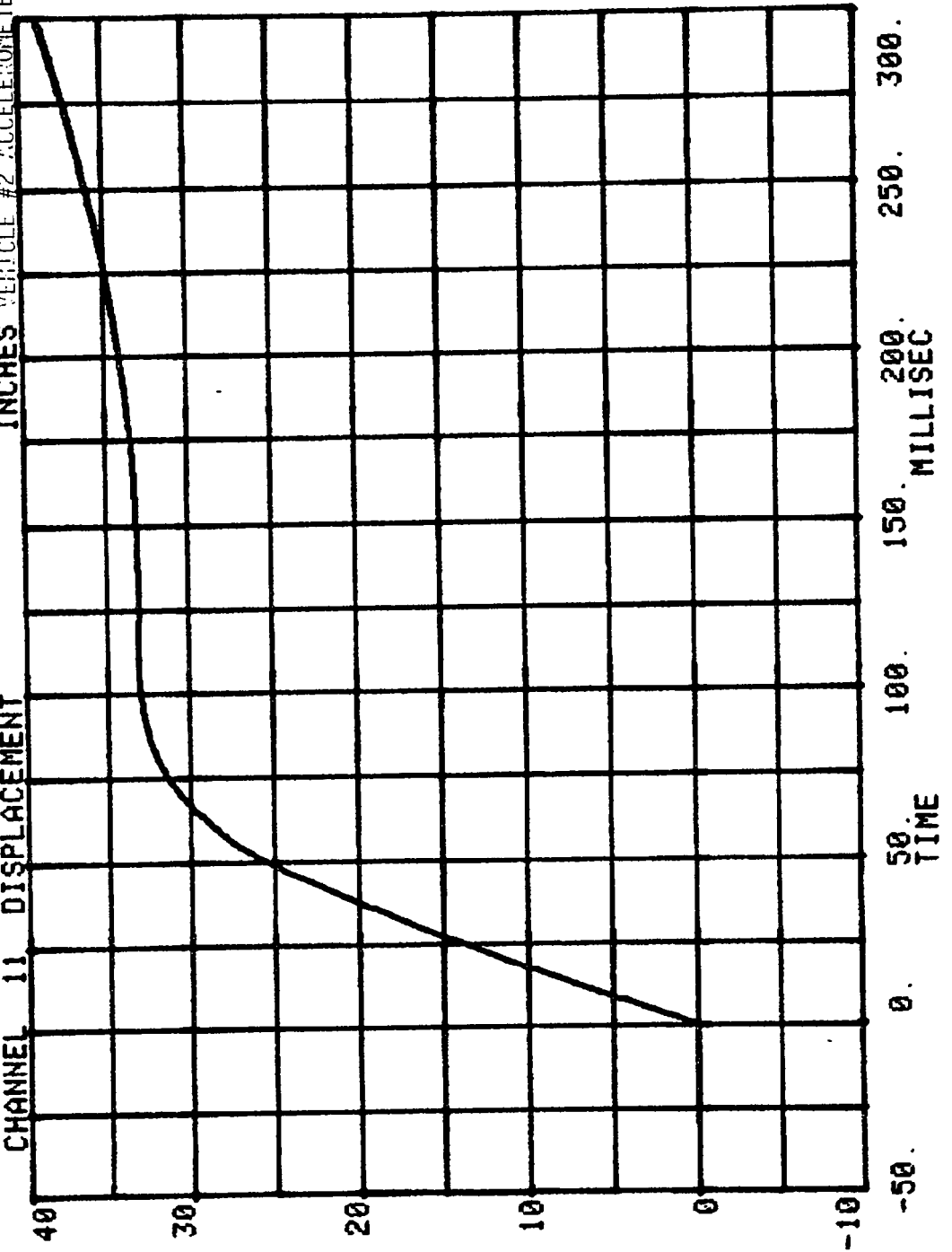
CHANNEL 50 VEH#2 ACC PACK #3(X) 38 G'S



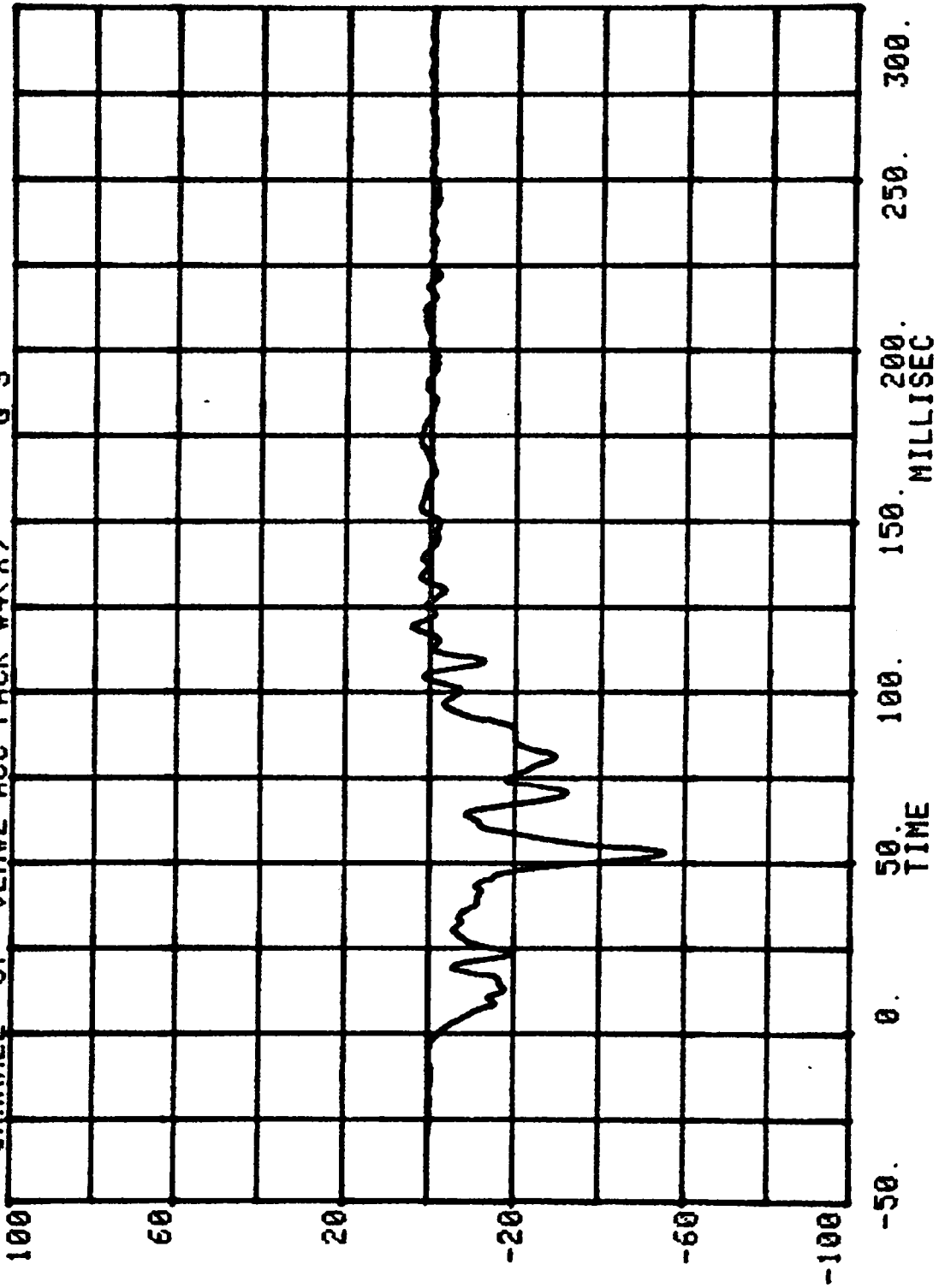
CHANNEL 10 VELOCITY RUN= 498 SERIES= 38 MPH VEHICLE #2 ACCELEROMETER PACK #3 (X)



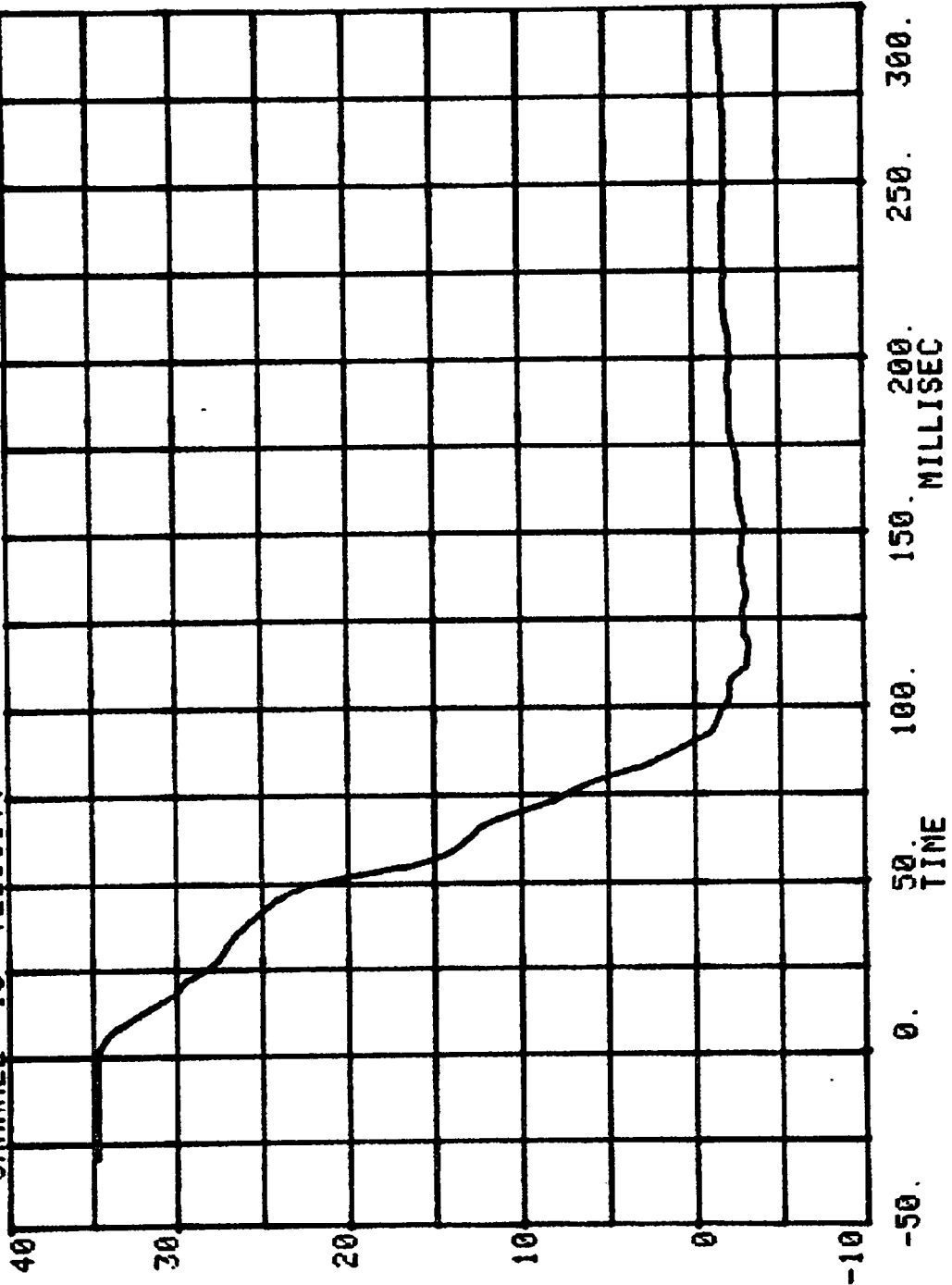
CHANNEL 11 DISPLACEMENT RUN= 498 SERIES= 38 INCHES VEHICLE #2 ACCELEROMETER PACK #3 (X)



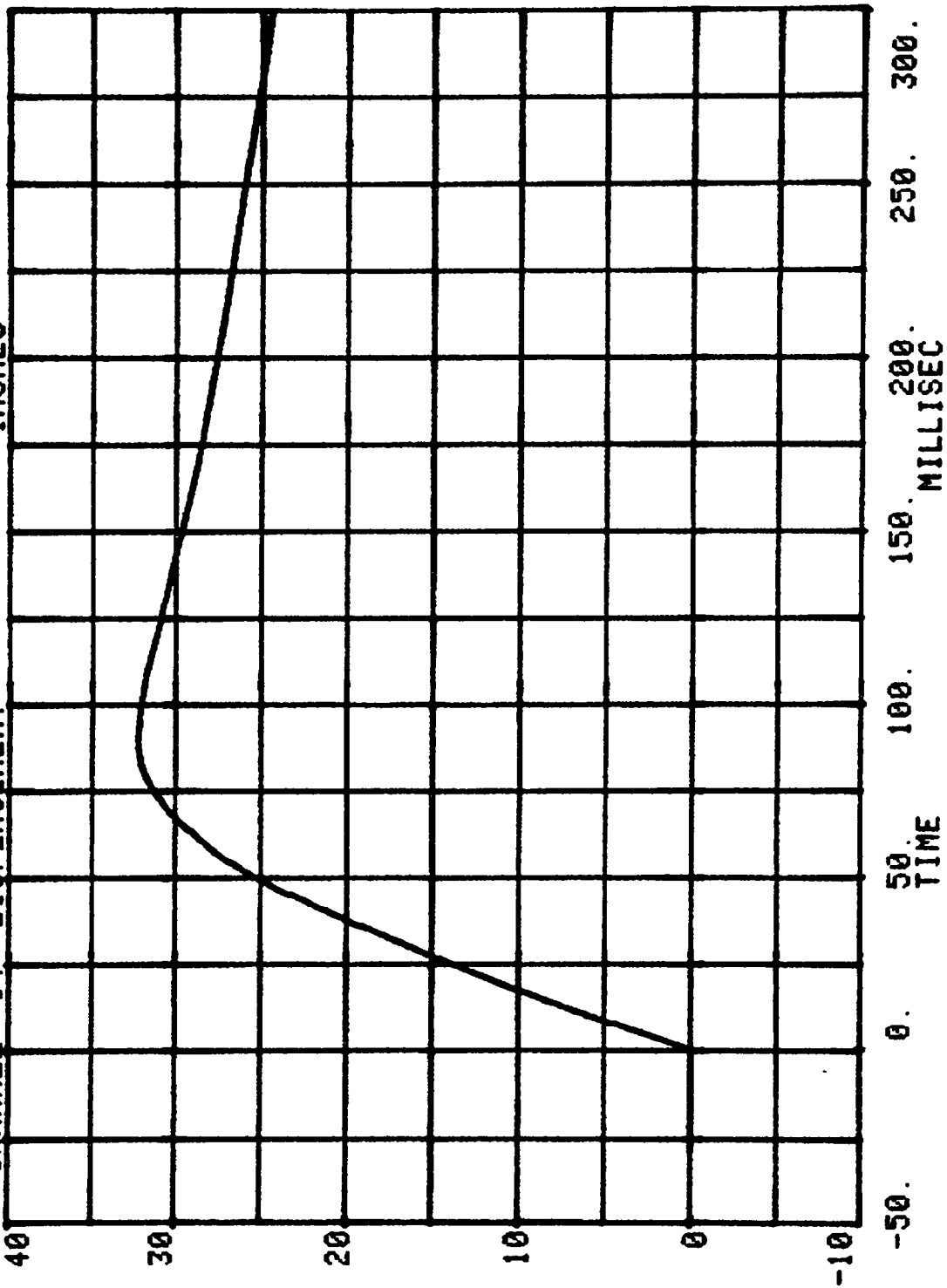
CHANNEL 37 VEH#2 ACC PACK #4(X) SERIES= 38 G'S



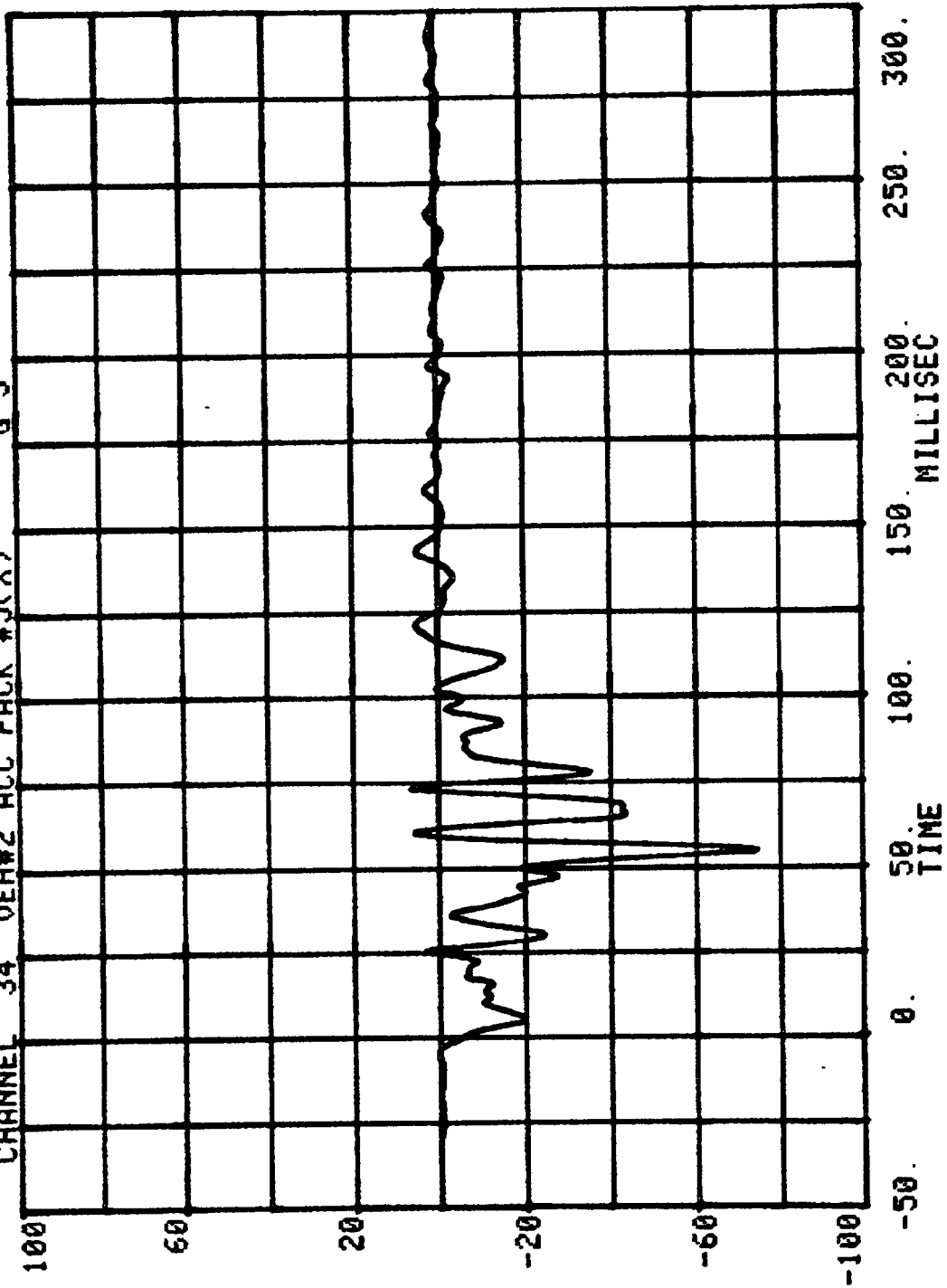
CHANNEL 13 VELOCITY
RUN= 498 SERIES= 38 MPH VEHICLE #2 ACCELEROMETER PACK #4 (X)



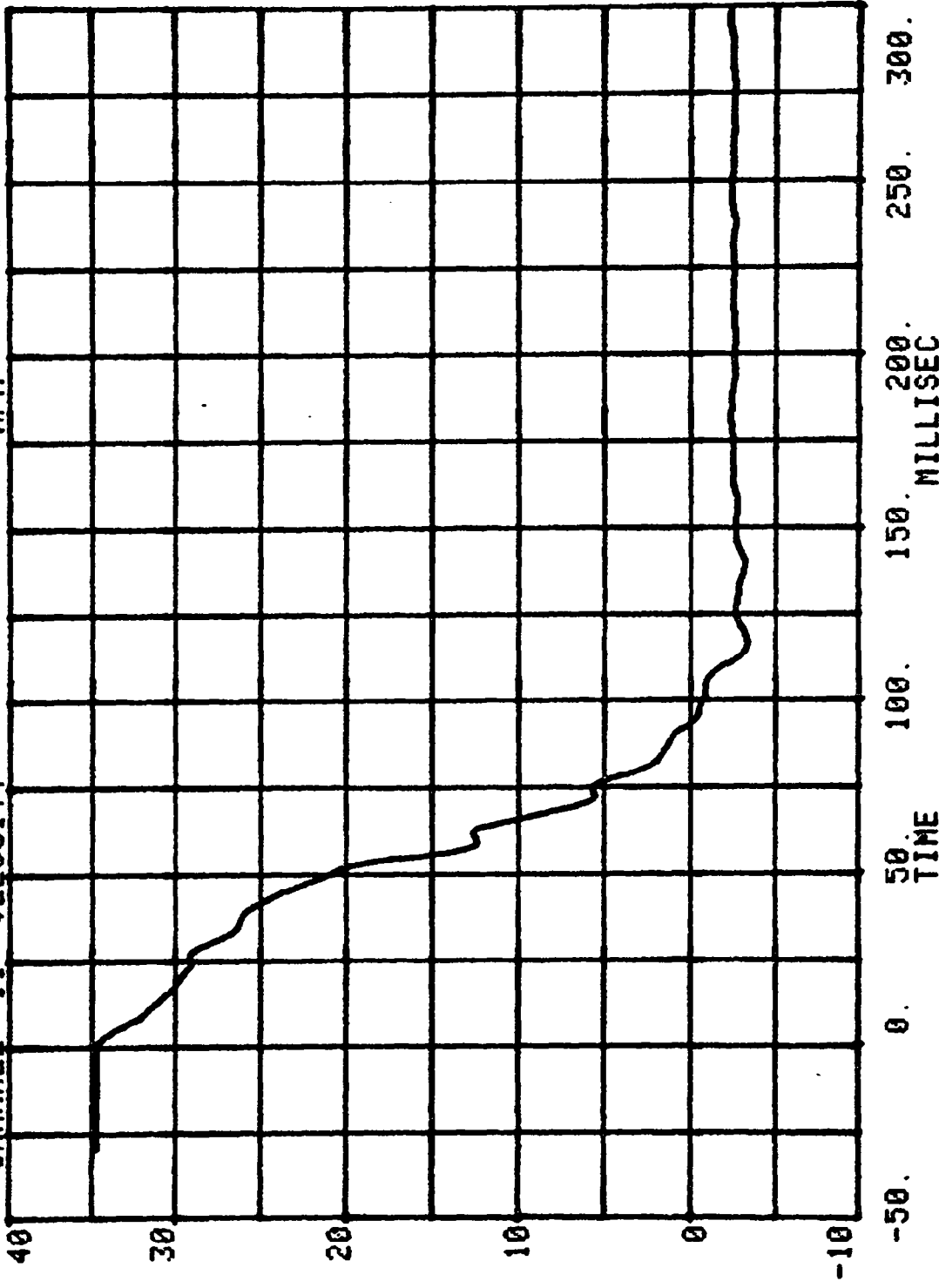
CHANNEL 14 DISPLACEMENT RUN= 498 SERIES= 38 INCHES VEHICLE #2 ACCELEROMETER PACK #4()



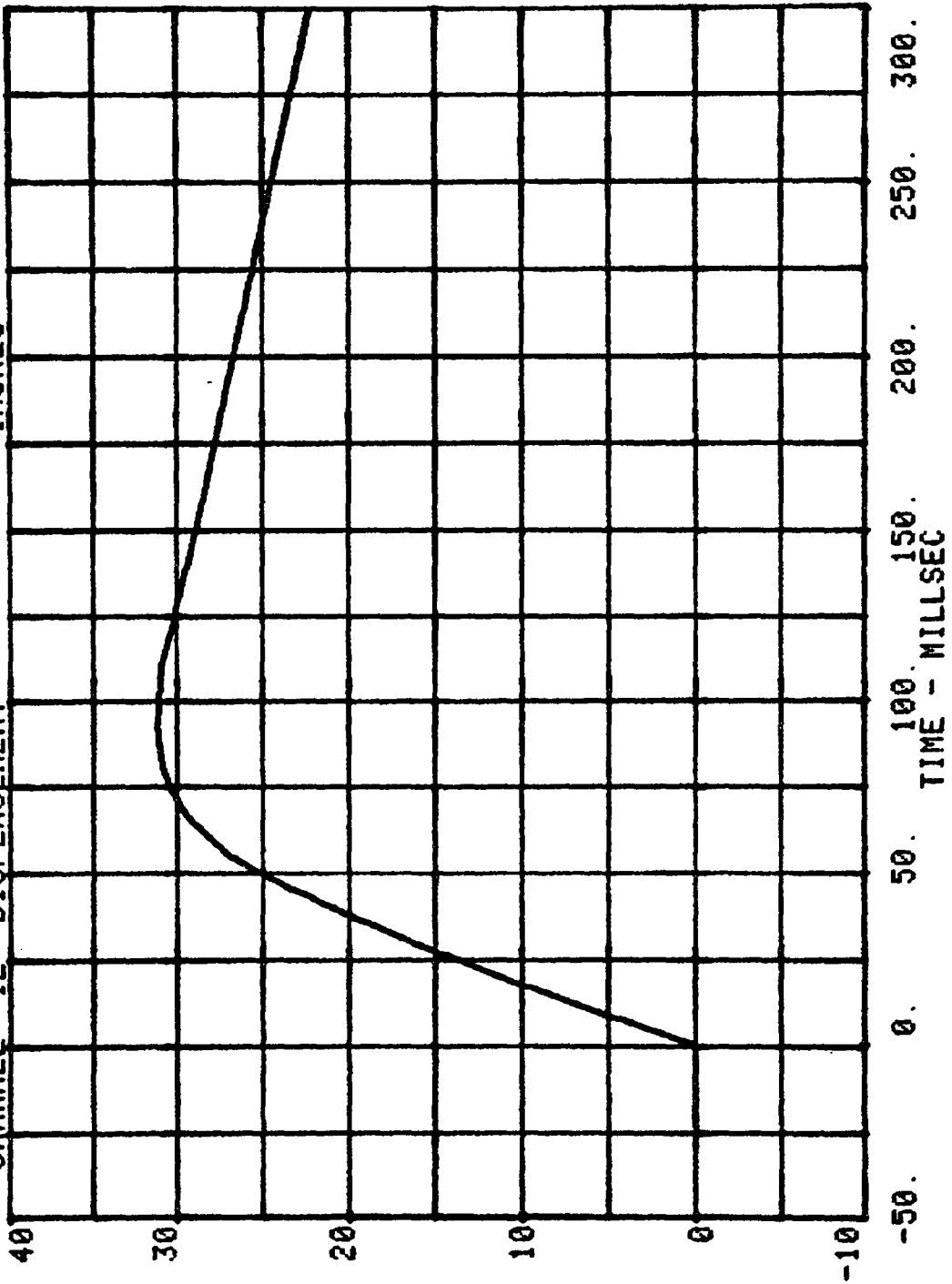
CHANNEL 34 VEH#2 ACC PACK #5(X) 38 G'S



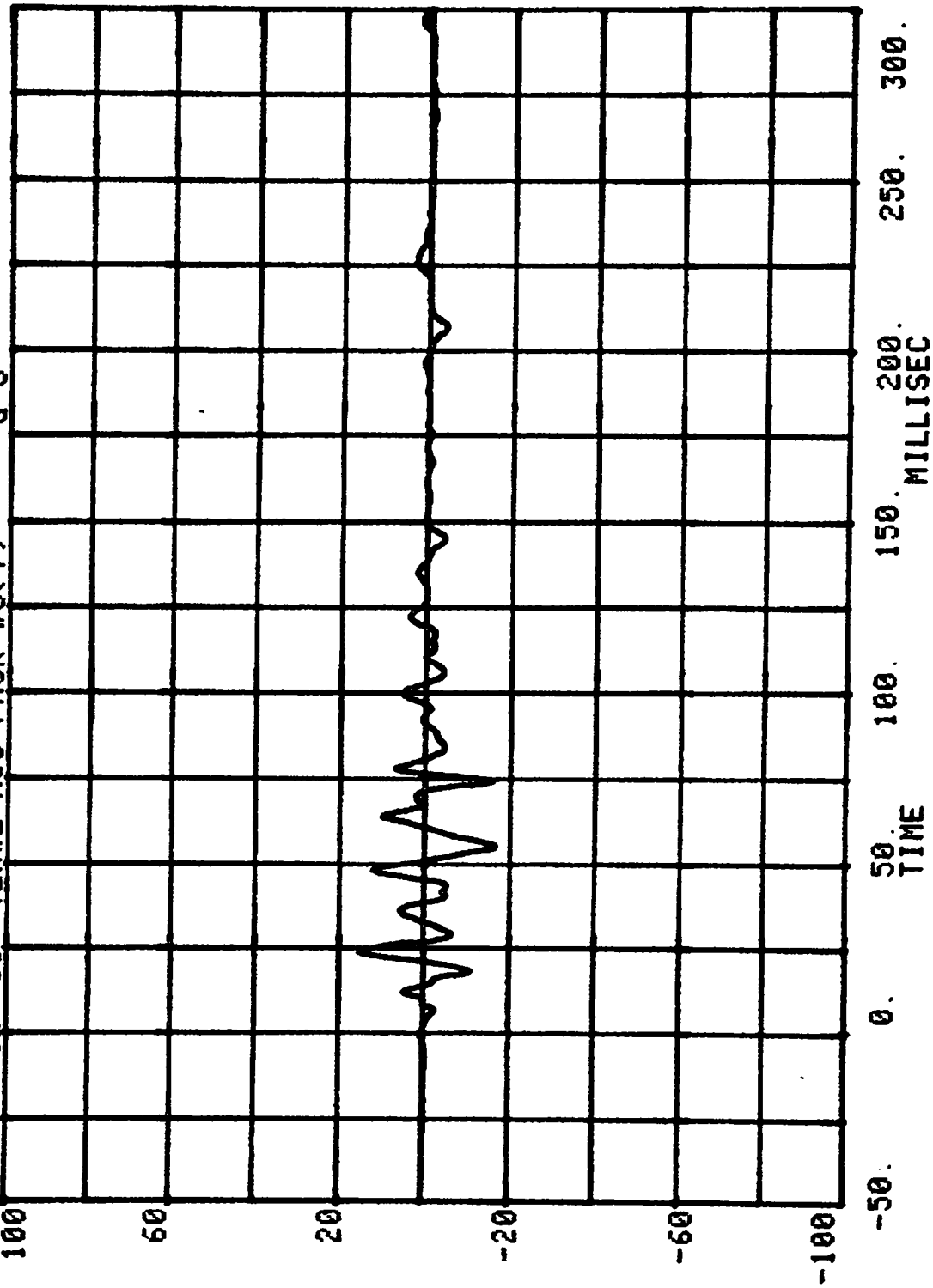
CHANNEL 11 VELOCITY RUN= 498 SERIES= 38 MPH VEHICLE #2 ACCELEROMETER PACK #5 (X)

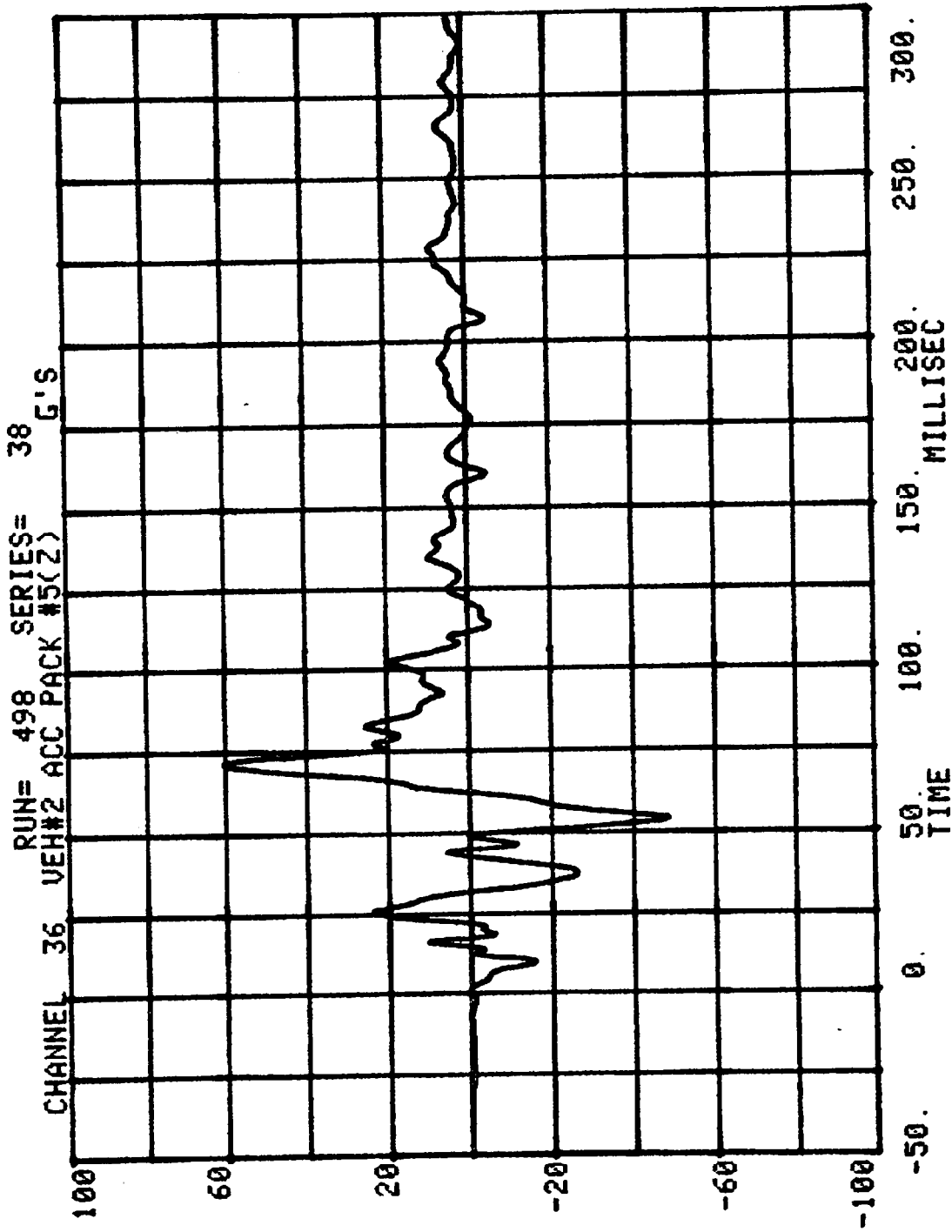


CHANNEL 12 DISPLACEMENT RUN= 498 SERIES= 38 INCHES VEHICLE #2 ACCELEROMETER PACK #5 (X)



CHANNEL 35 RUN= 498 SERIES= 38 G'S
VEH#2 ACC PACK #5(Y)





TEST NO. 308-38-498

1980 FORD MUSTANG

DUMMY DATA

FILTER CHANNEL CLASS

HEAD ACCELERATIONS	1000
CHEST ACCELERATIONS	180
FEMUR FORCES	600
LOAD FORCES	60

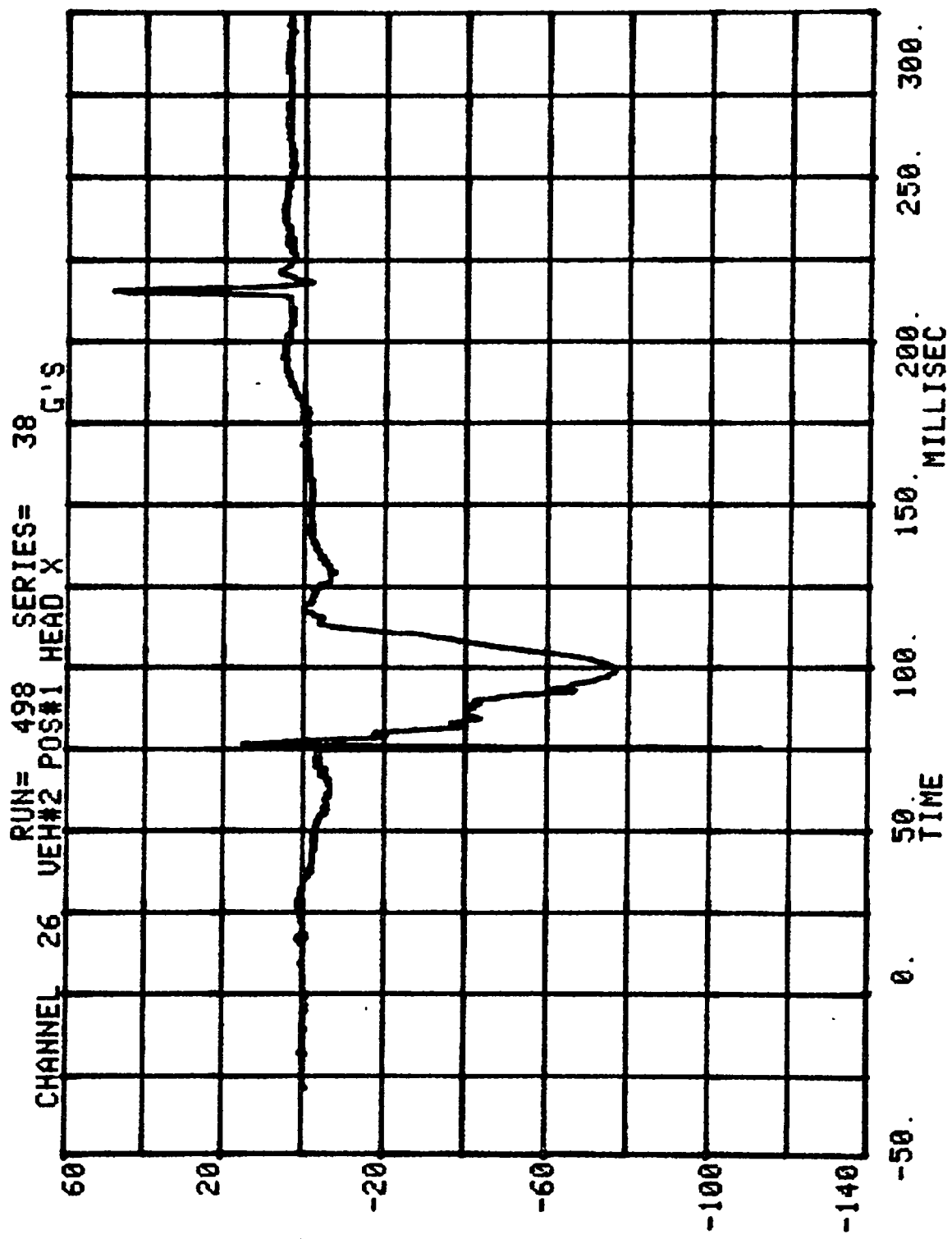
HEAD INJURY CRITERION
HEAD SEVERITY INDEX

NCA CAR-TO-CAR TEST #38

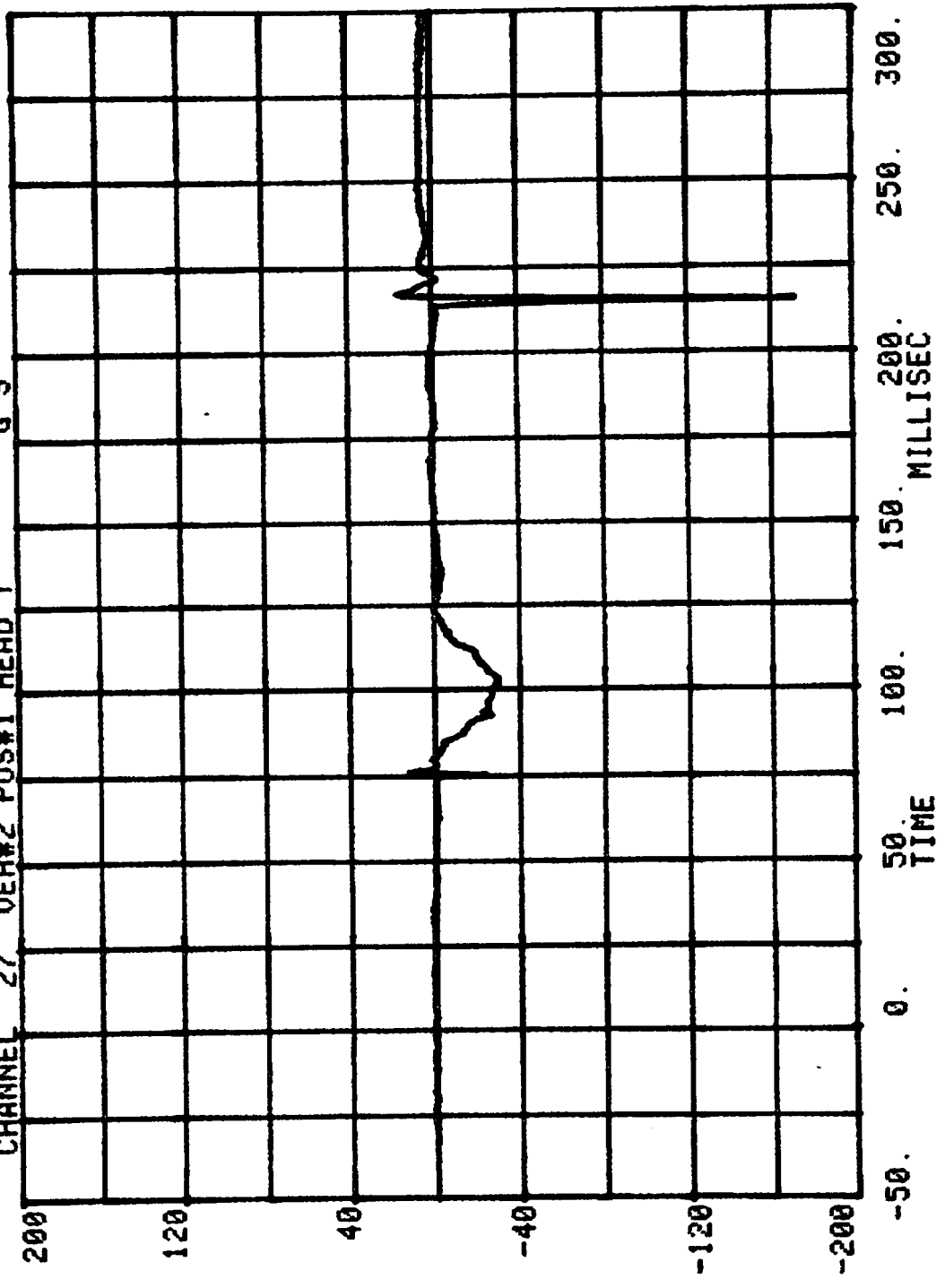
RUN= 498

VEH#2 POS#1 HEAD R

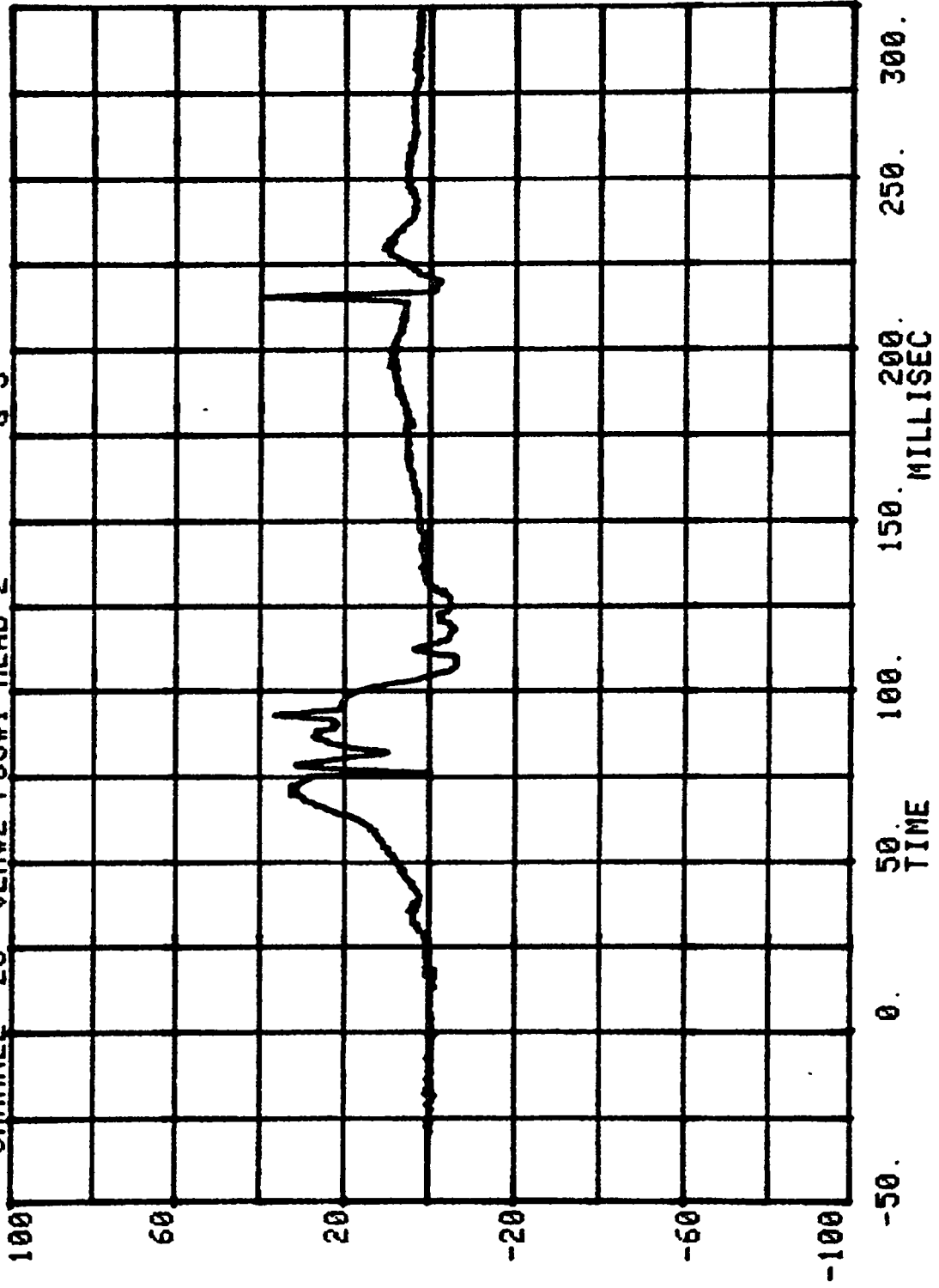
HIC= 872.3 FROM T1= .07500 TO T2= .11010
AVERAGE ACCELERATION BETWEEN T1 AND T2= 57.3G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=1504.1

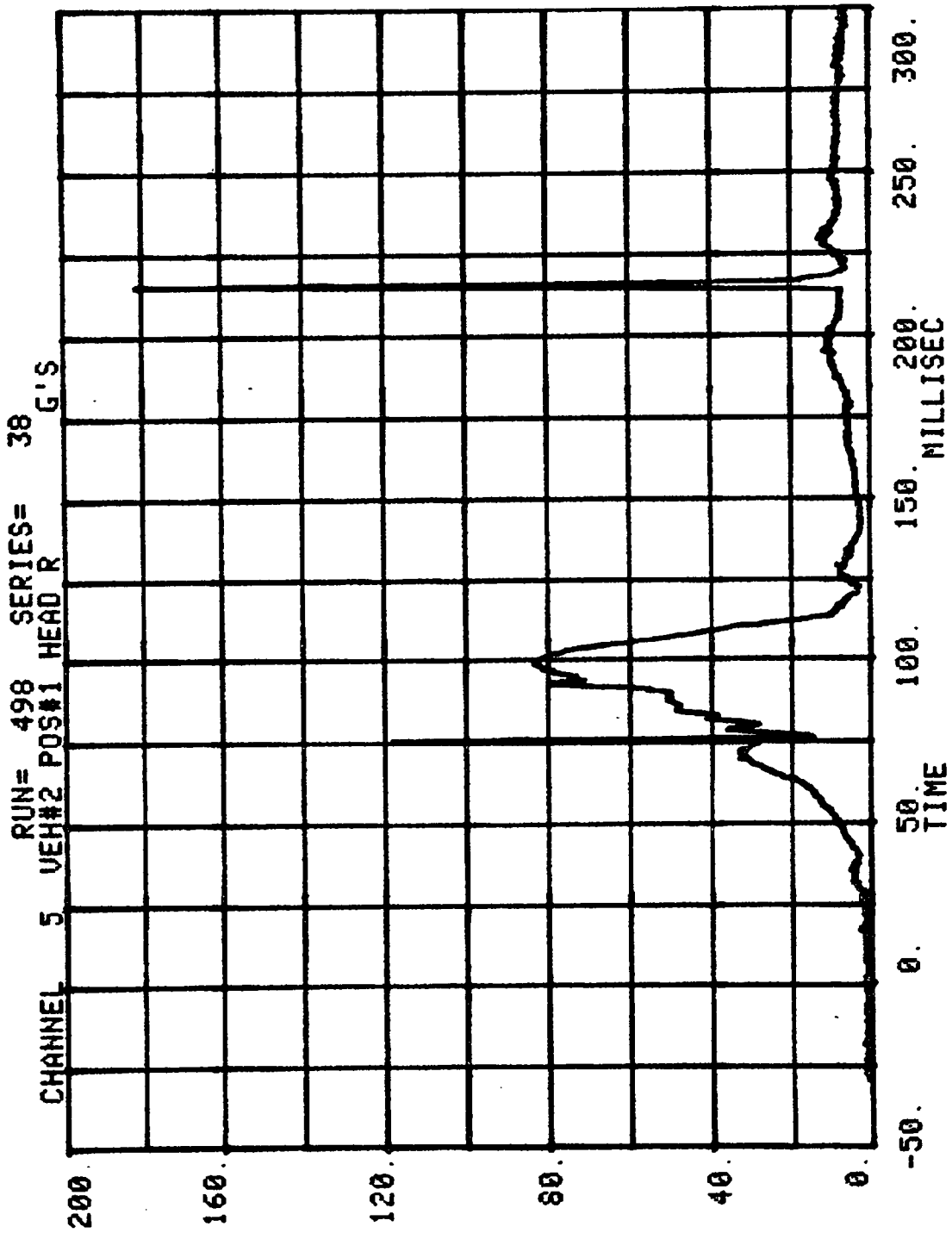


CHANNEL 27 VEH#2 POS#1 HEAD Y 38 G'S

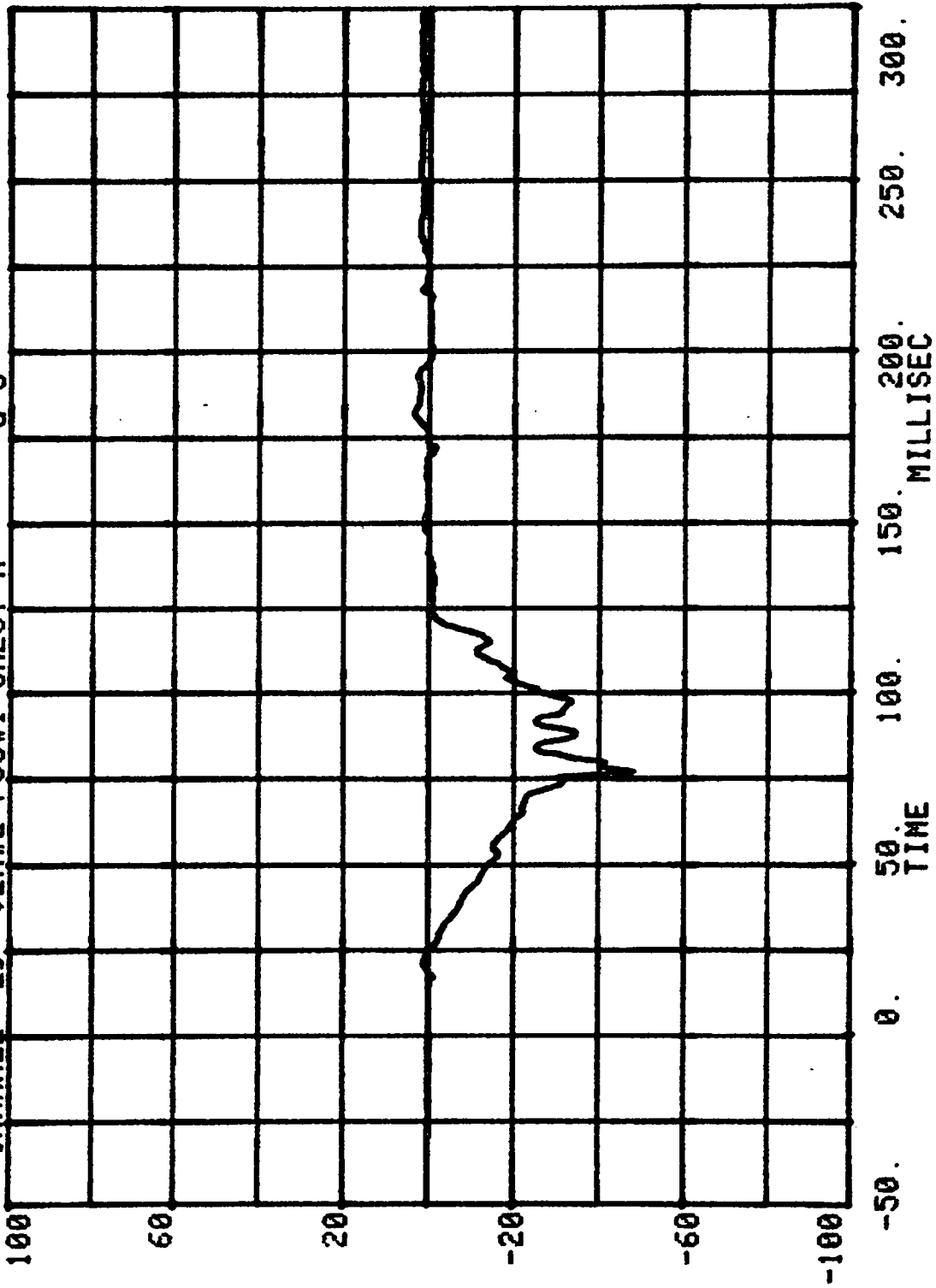


CHANNEL 28 VEH#2 POS#1 HEAD Z
RUN= 498 SERIES= 38 G'S





CHANNEL 29 VEH#2 POS#1 CHEST X
RUN= 498 SERIES= 38 G'S

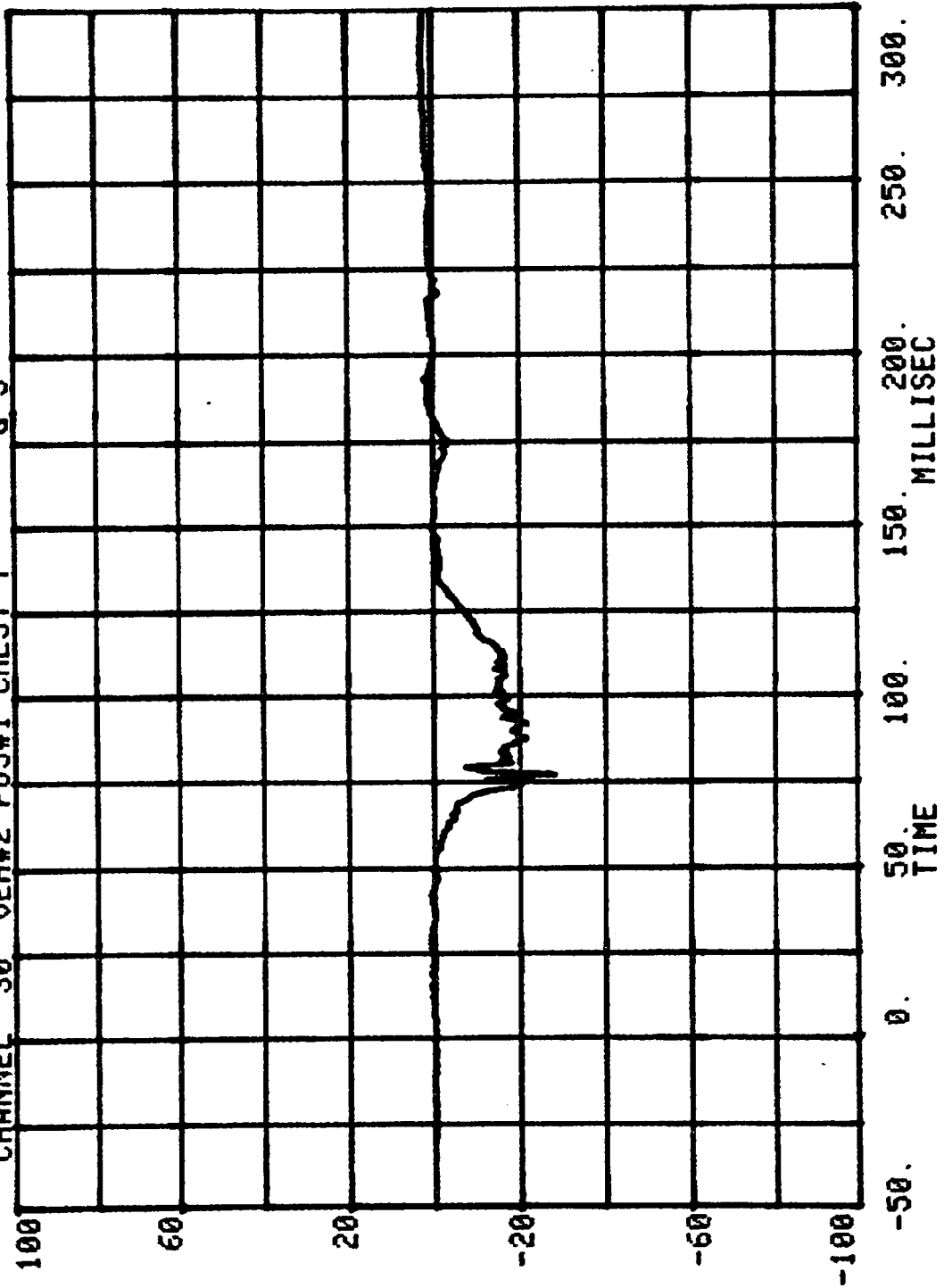


CHANNEL 30 VEH#2 POS#1 CHEST Y

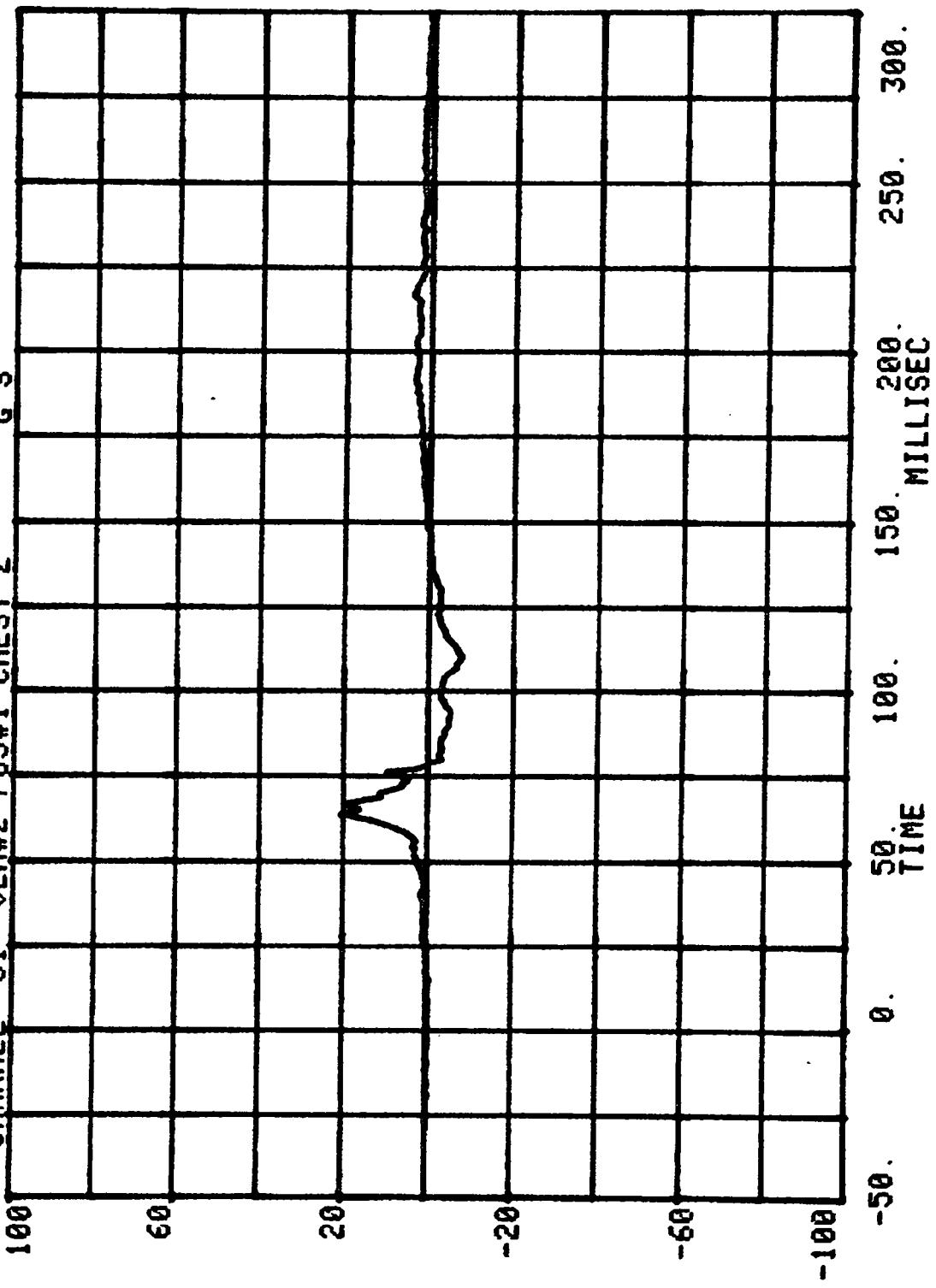
RUN= 498

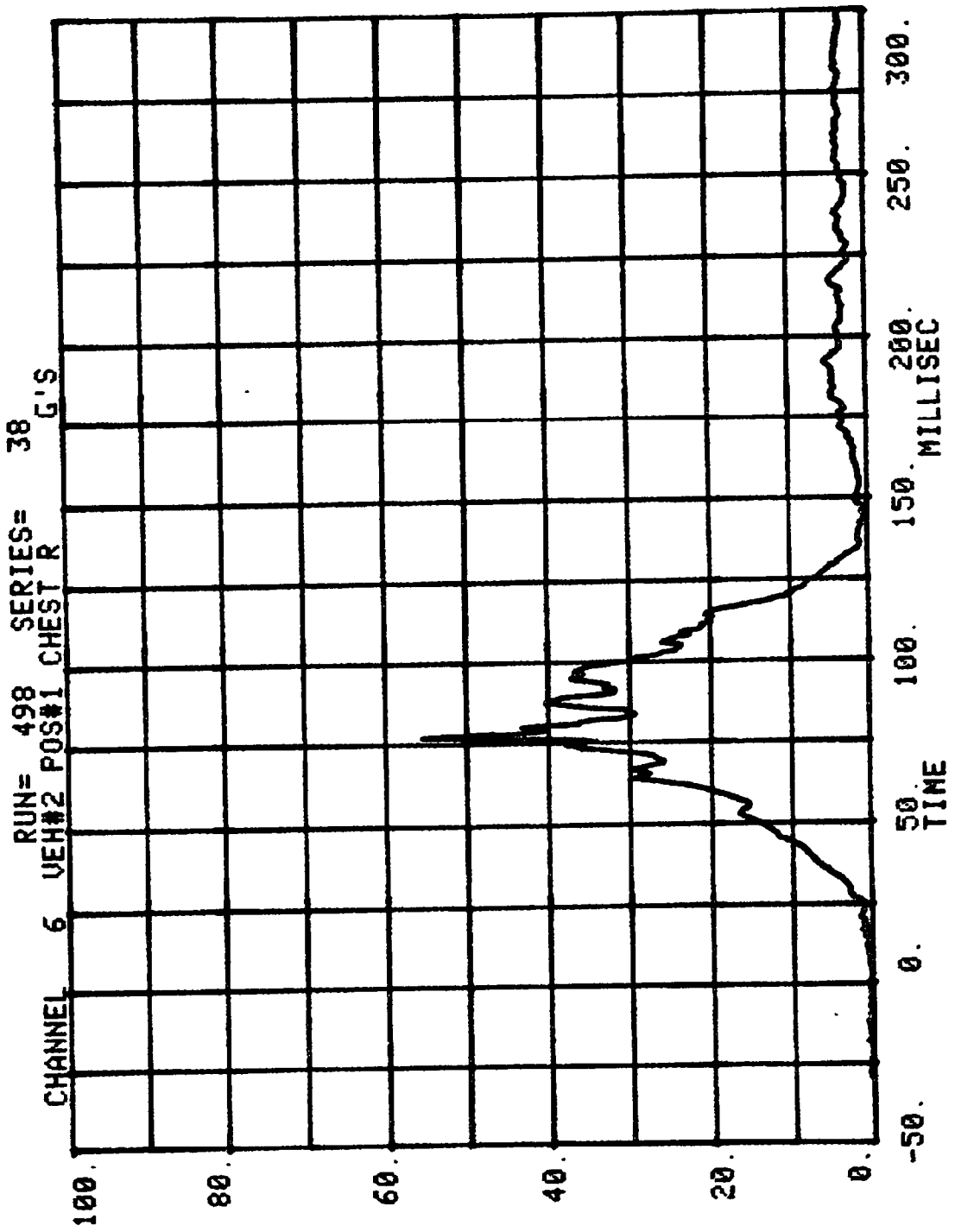
SERIES=

38 G'S

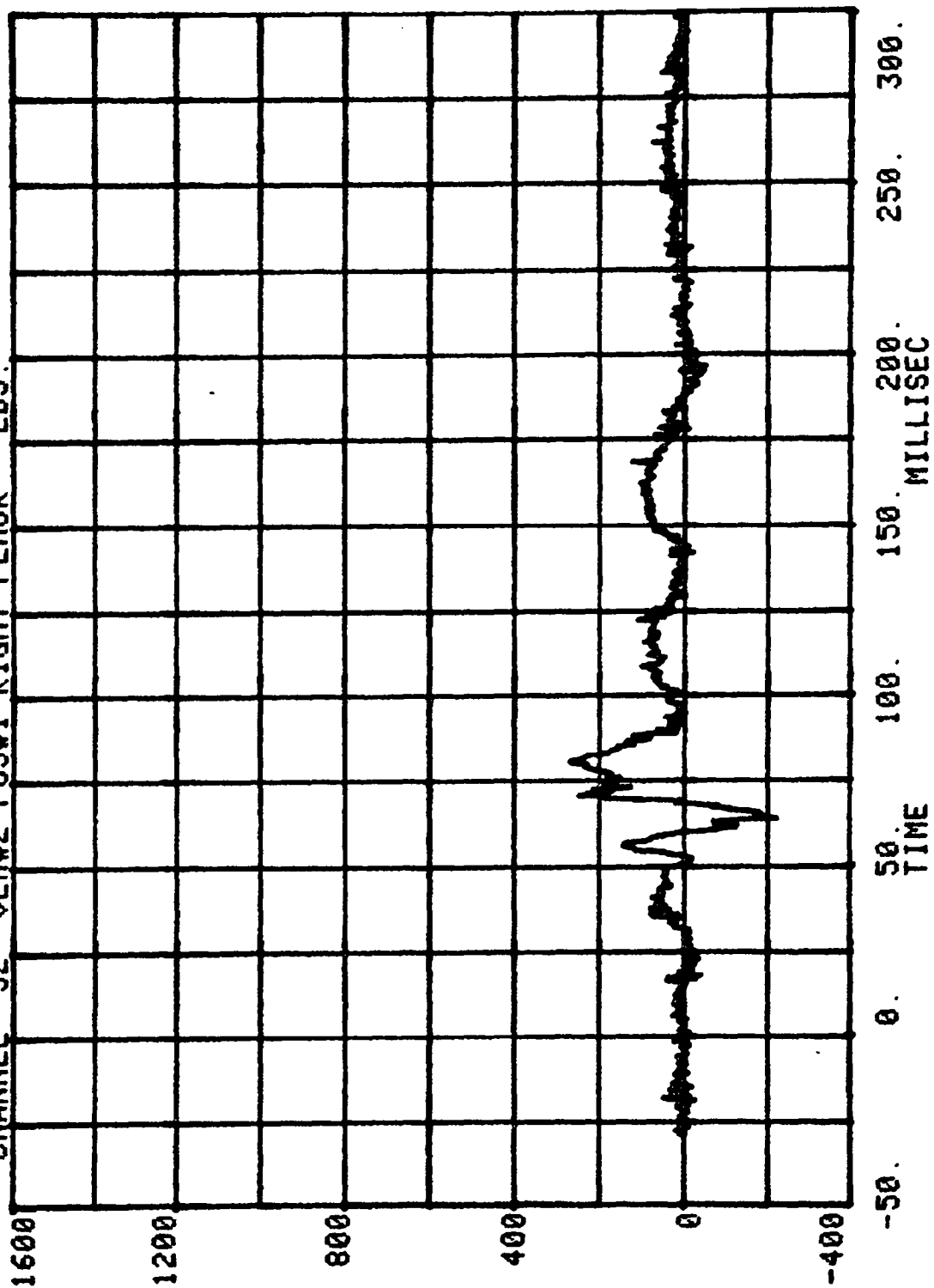


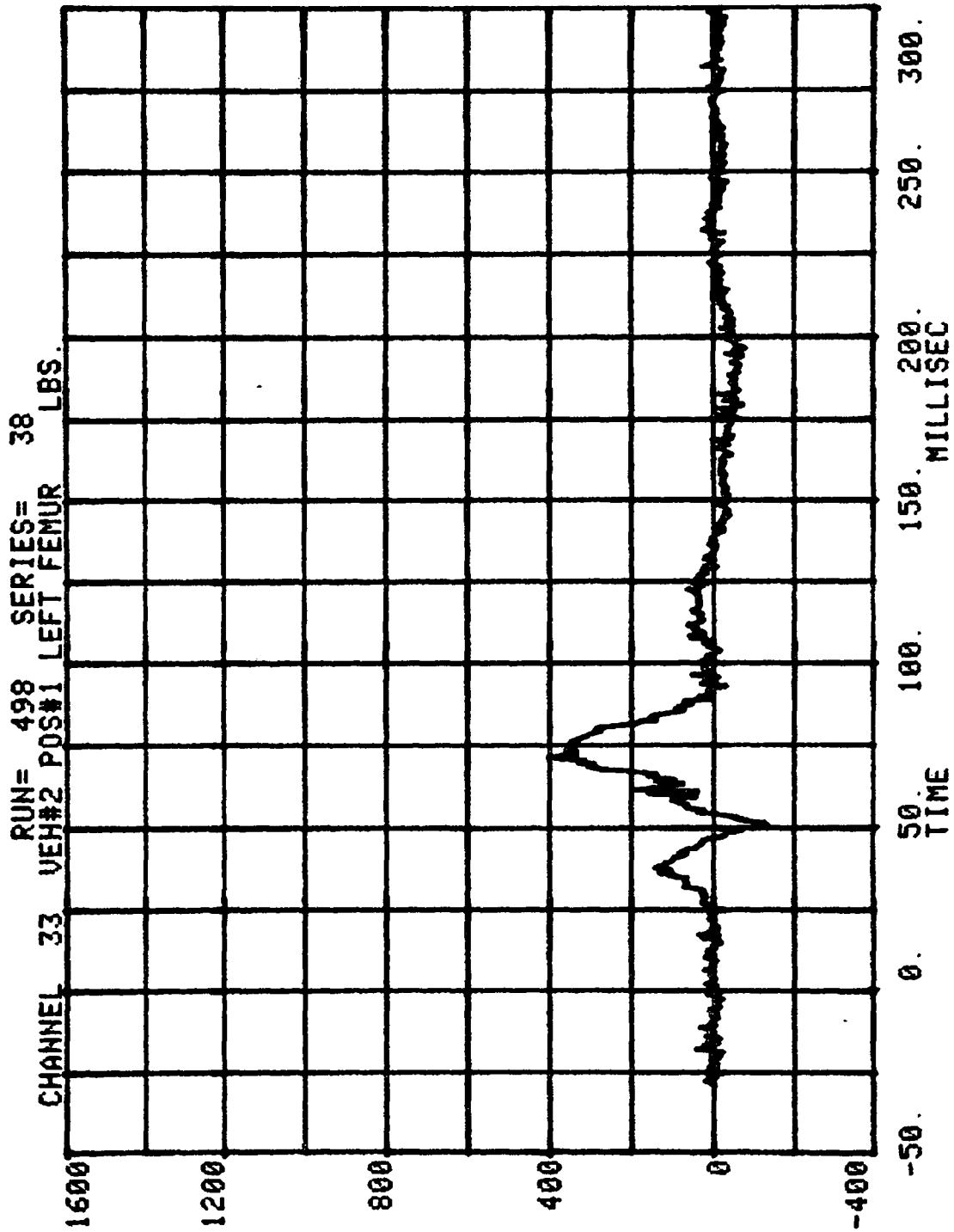
CHANNEL 31 VEH#2 POS#1 CHEST 2 38 G'S

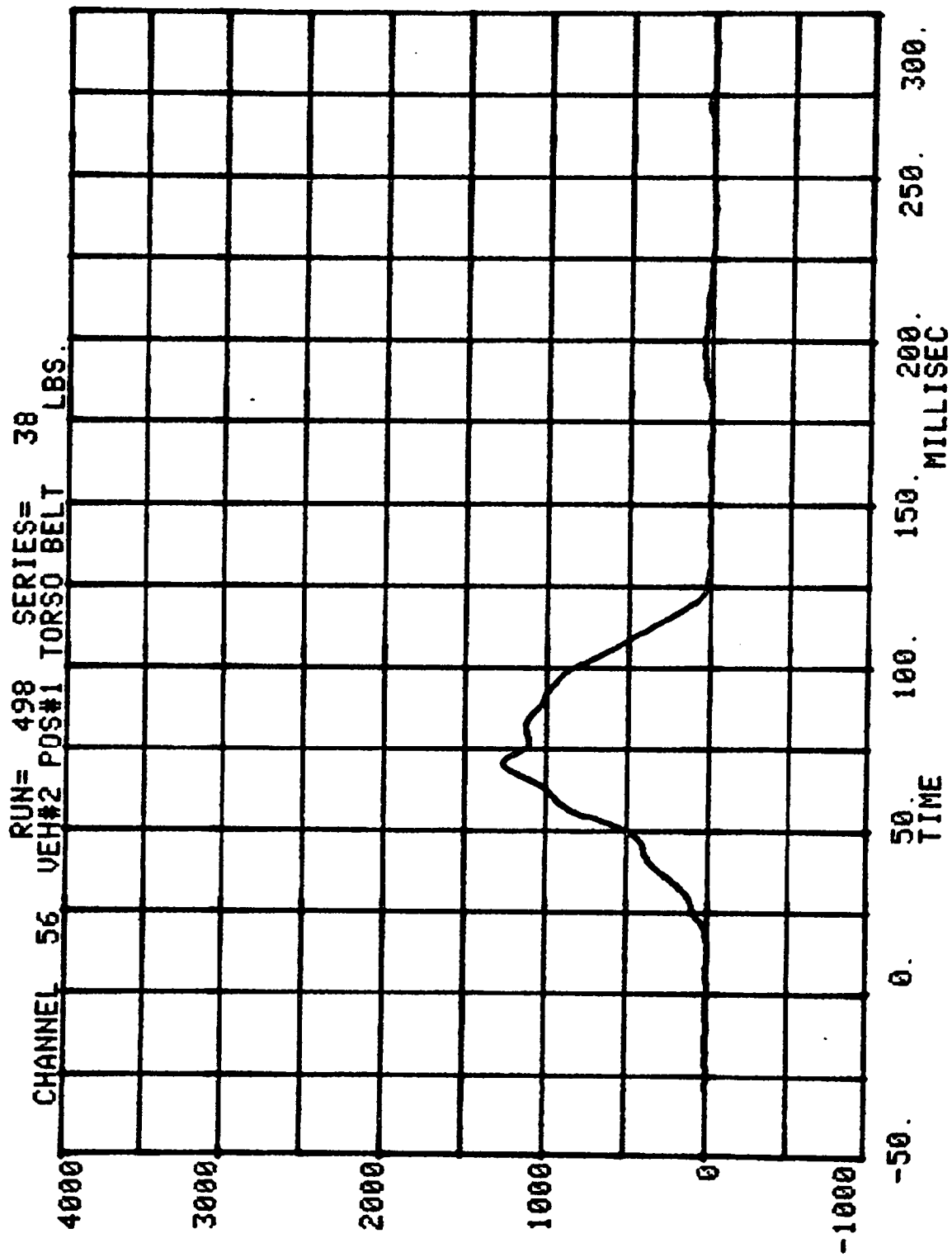




RUN= 498 SERIES= 38
CHANNEL 32 VEH#2 POS#1 RIGHT FEMUR LBS.







HEAD INJURY CRITERION
HEAD SEVERITY INDEX

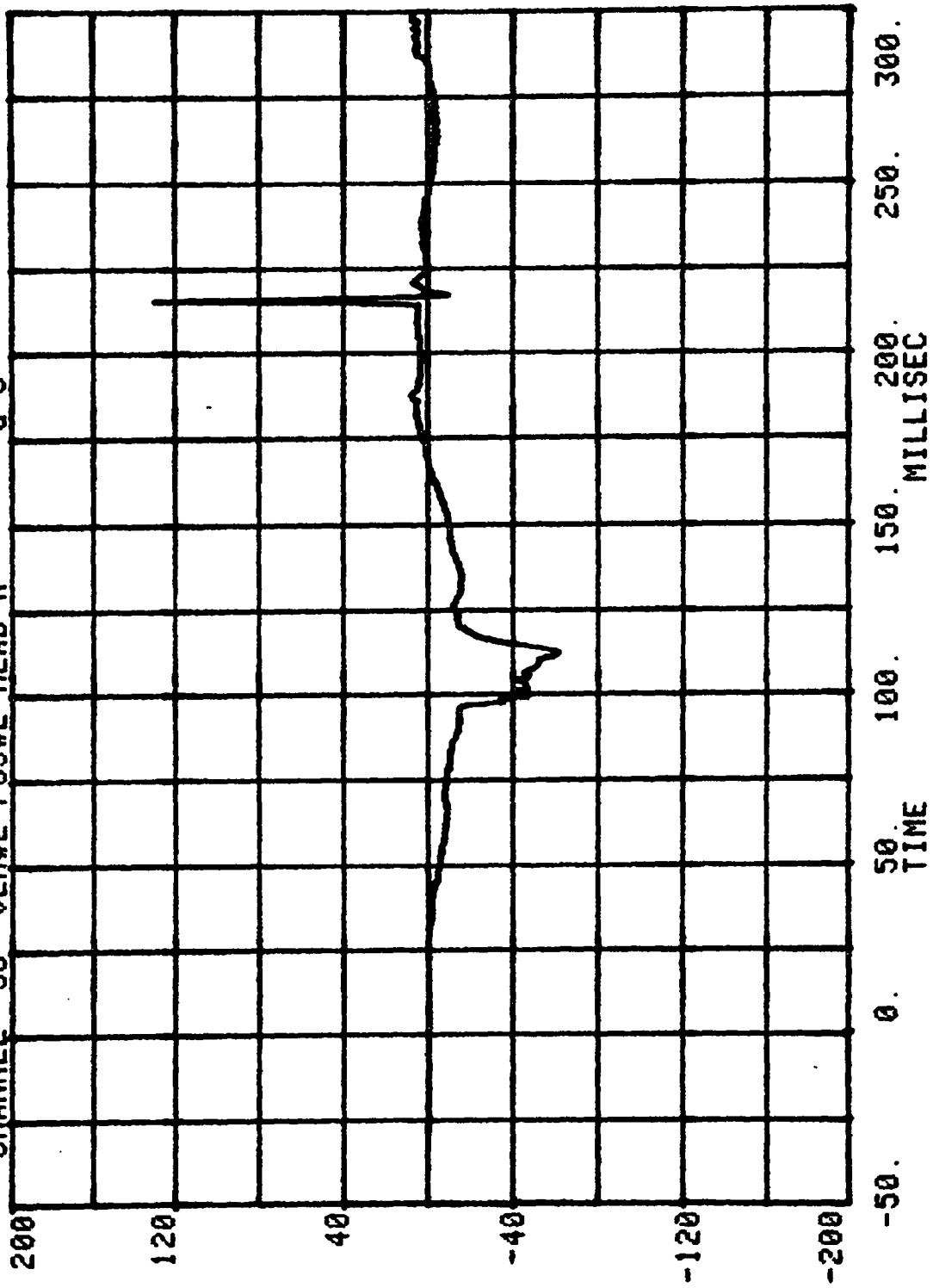
NCA CAR-TO-CAR TEST #38

RUN= 498

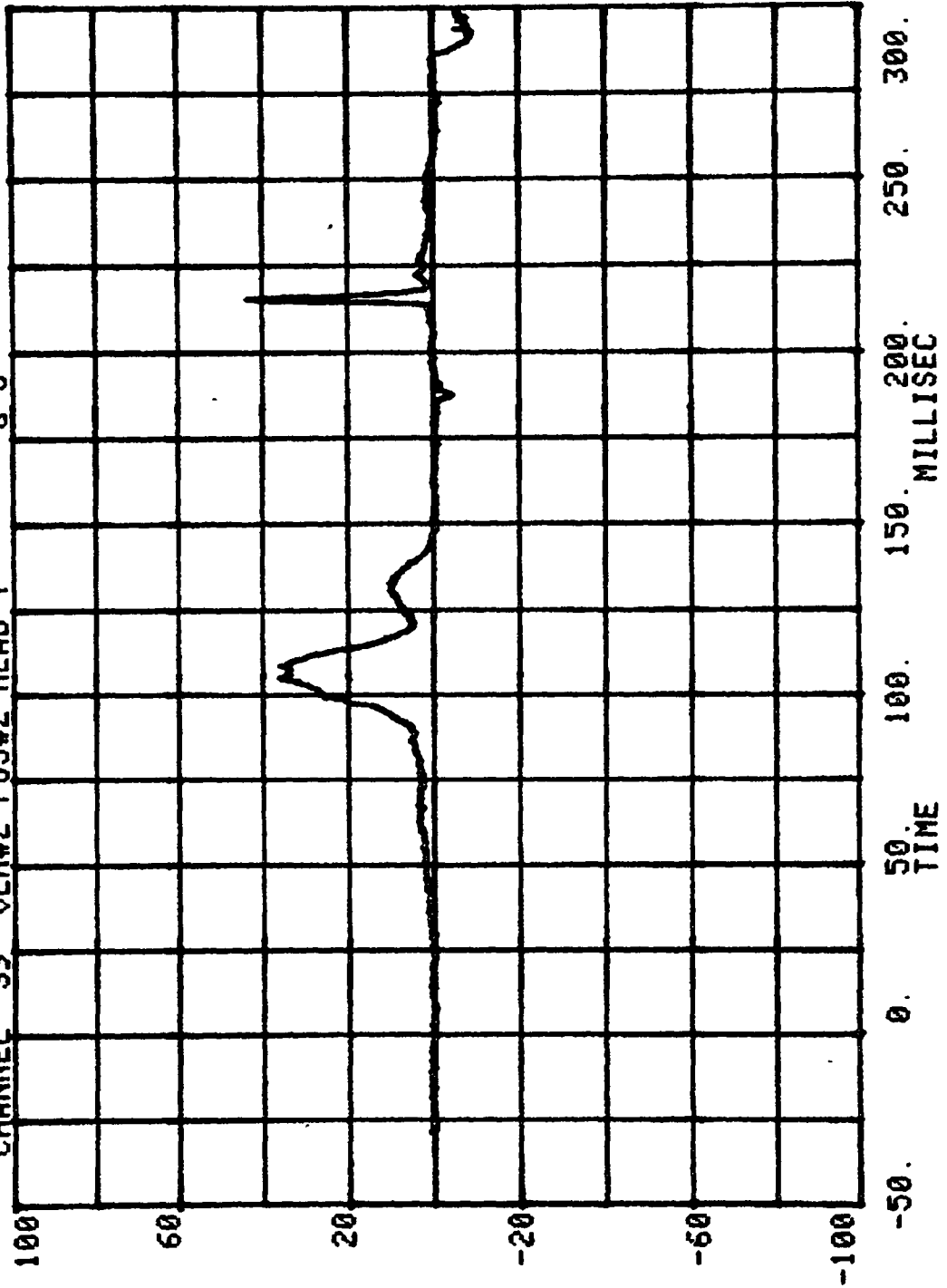
VEH#2 POS#2 HEAD R

HIC= 690.9 FROM T1= .09690 TO T2= .11550
AVERAGE ACCELERATION BETWEEN T1 AND T2= 67.3G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=1297.9

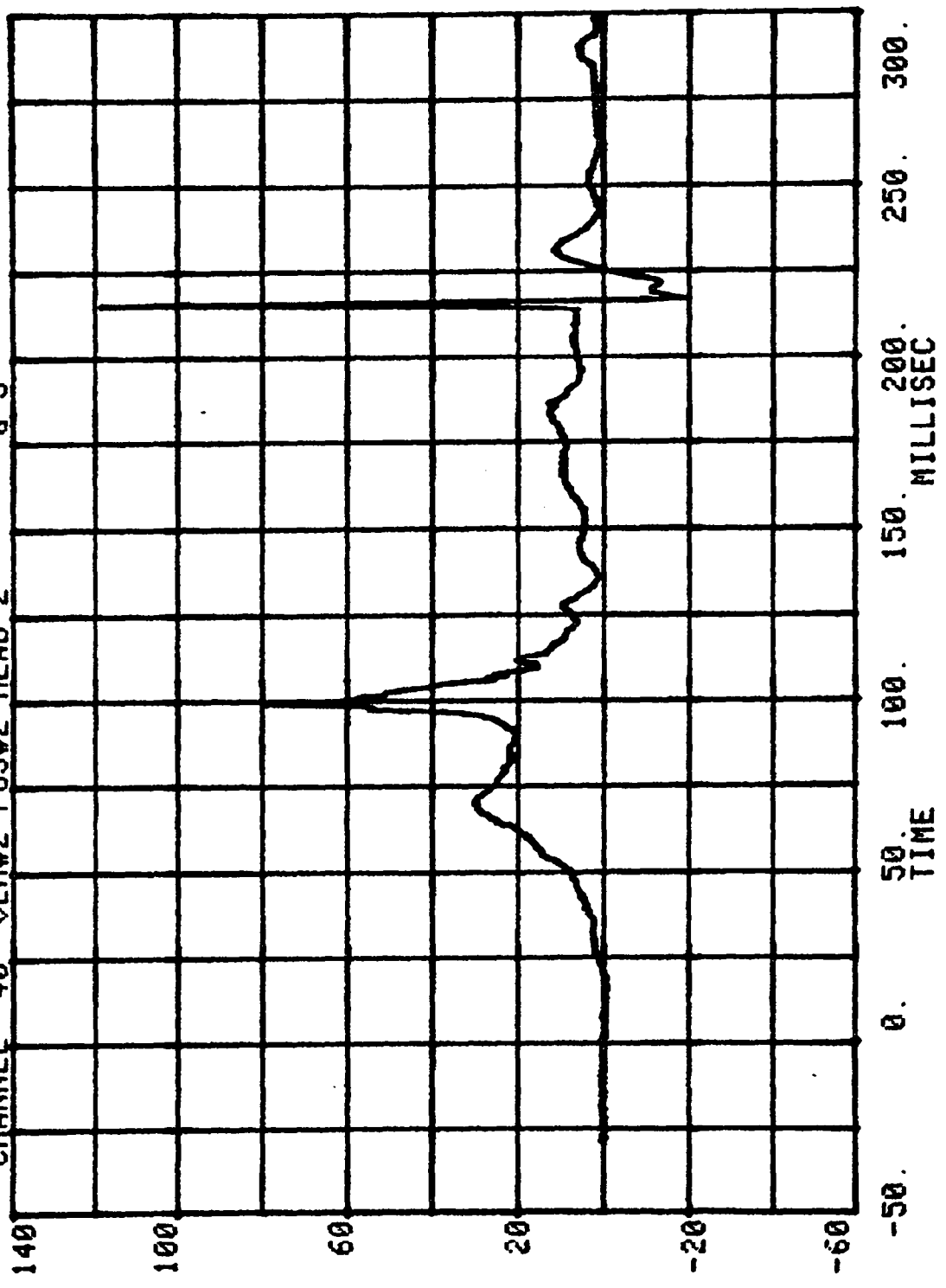
CHANNEL 38 VEH#2 POS#2 HEAD X SERIES= 38 G'S

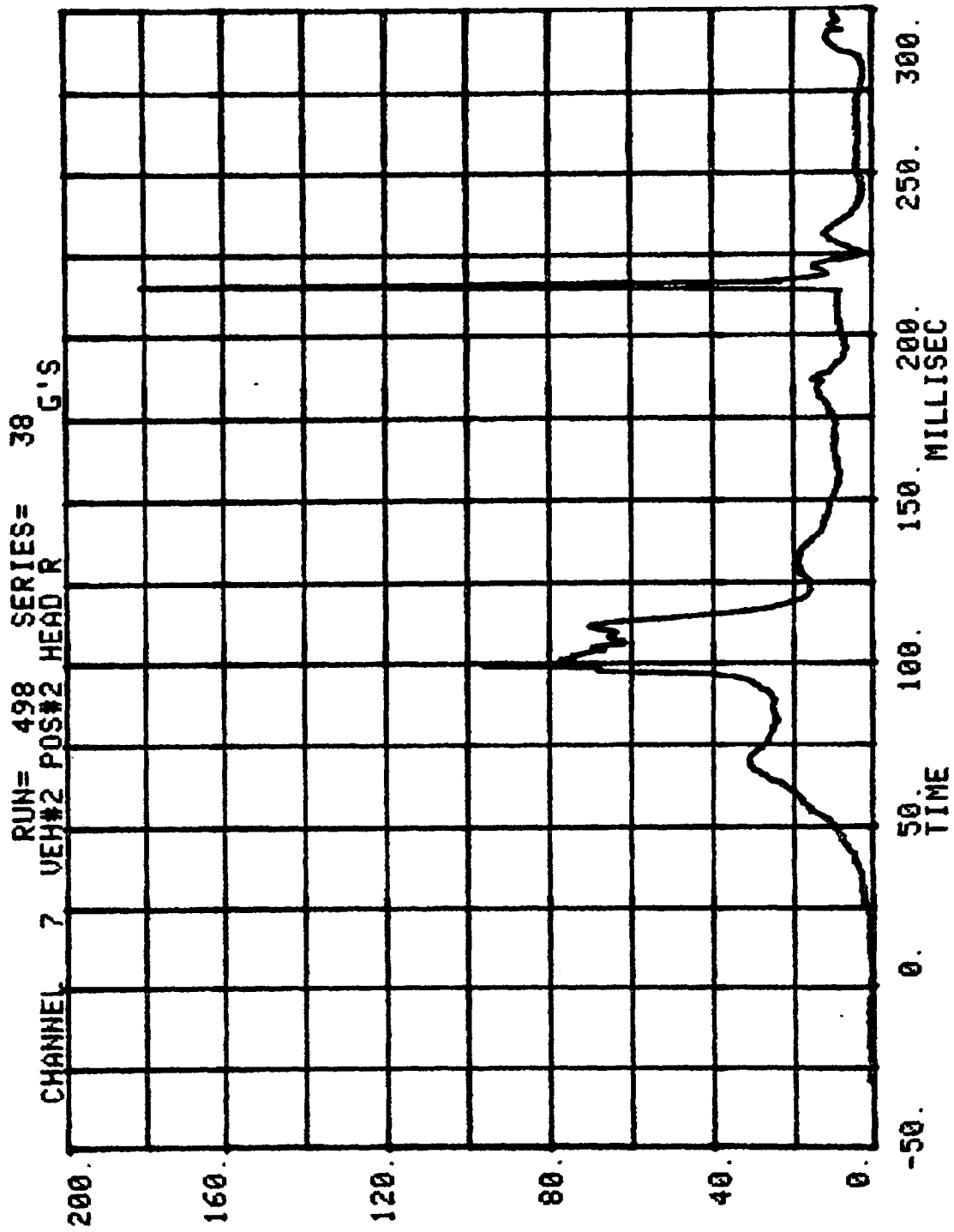


CHANNEL 39 VEH#2 POS#2 HEAD Y
RUN= 498 SERIES= 38 G'S

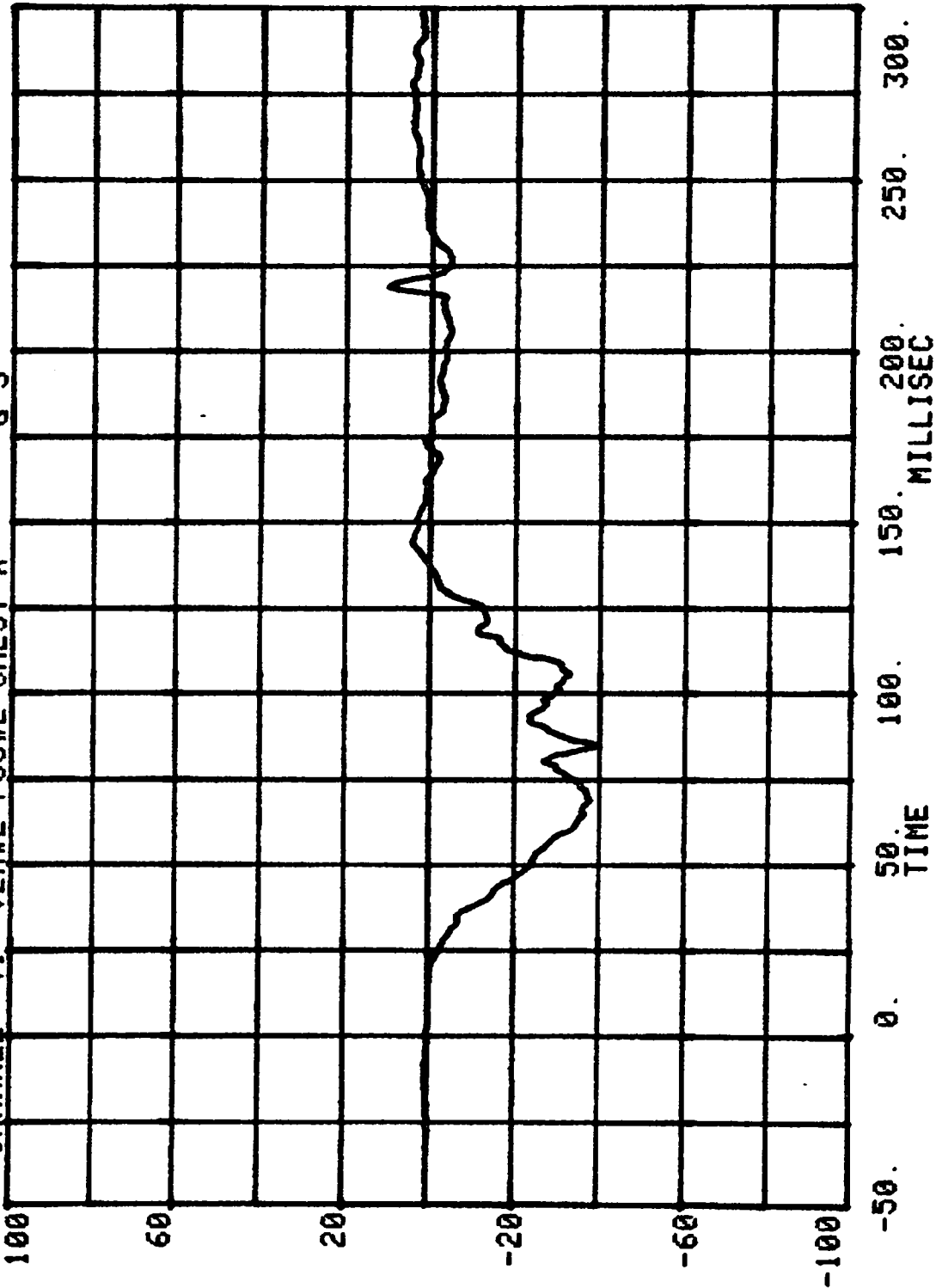


CHANNEL 40 VEH#2 POS#2 HEAD Z 38 G'S

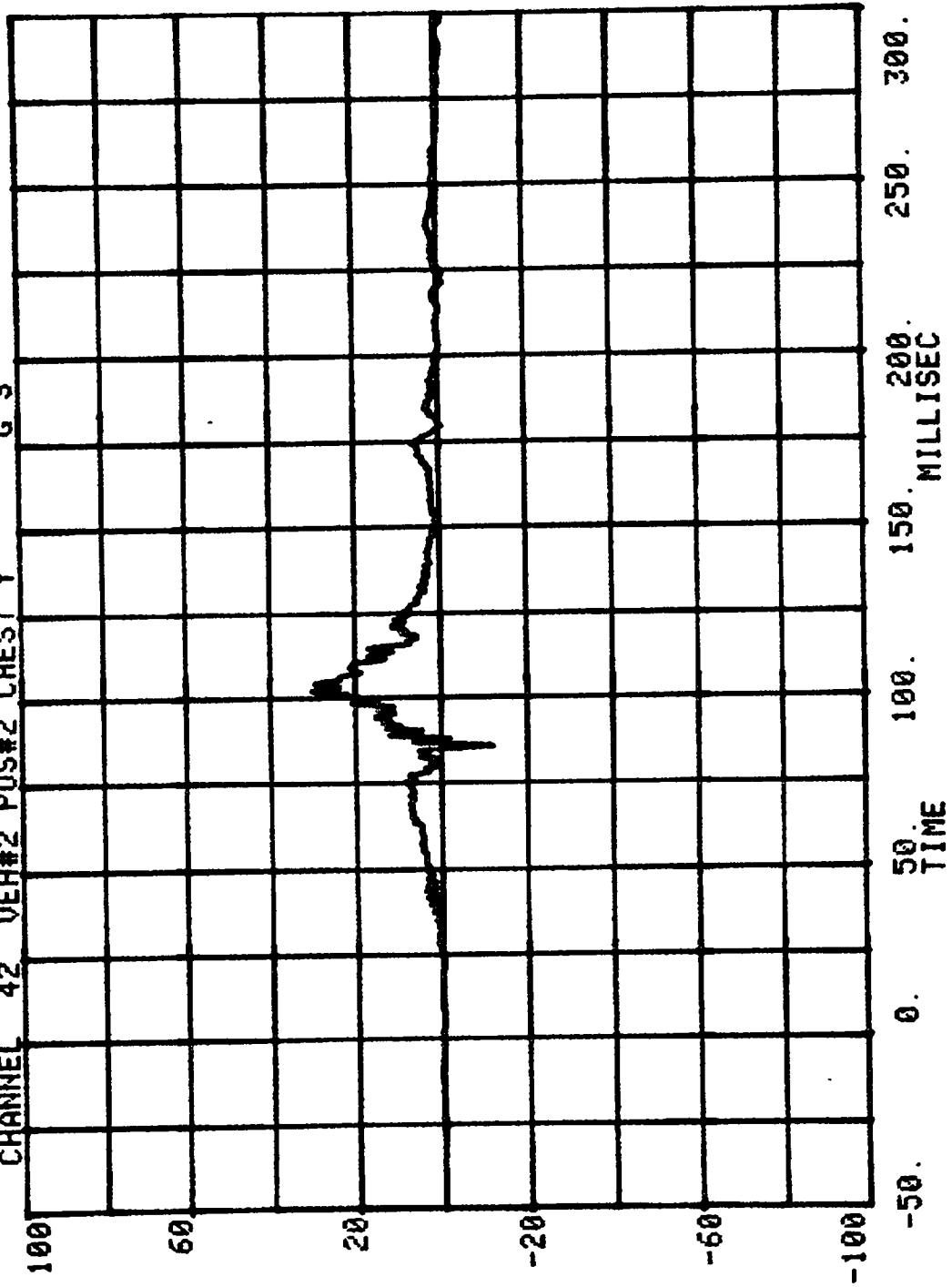


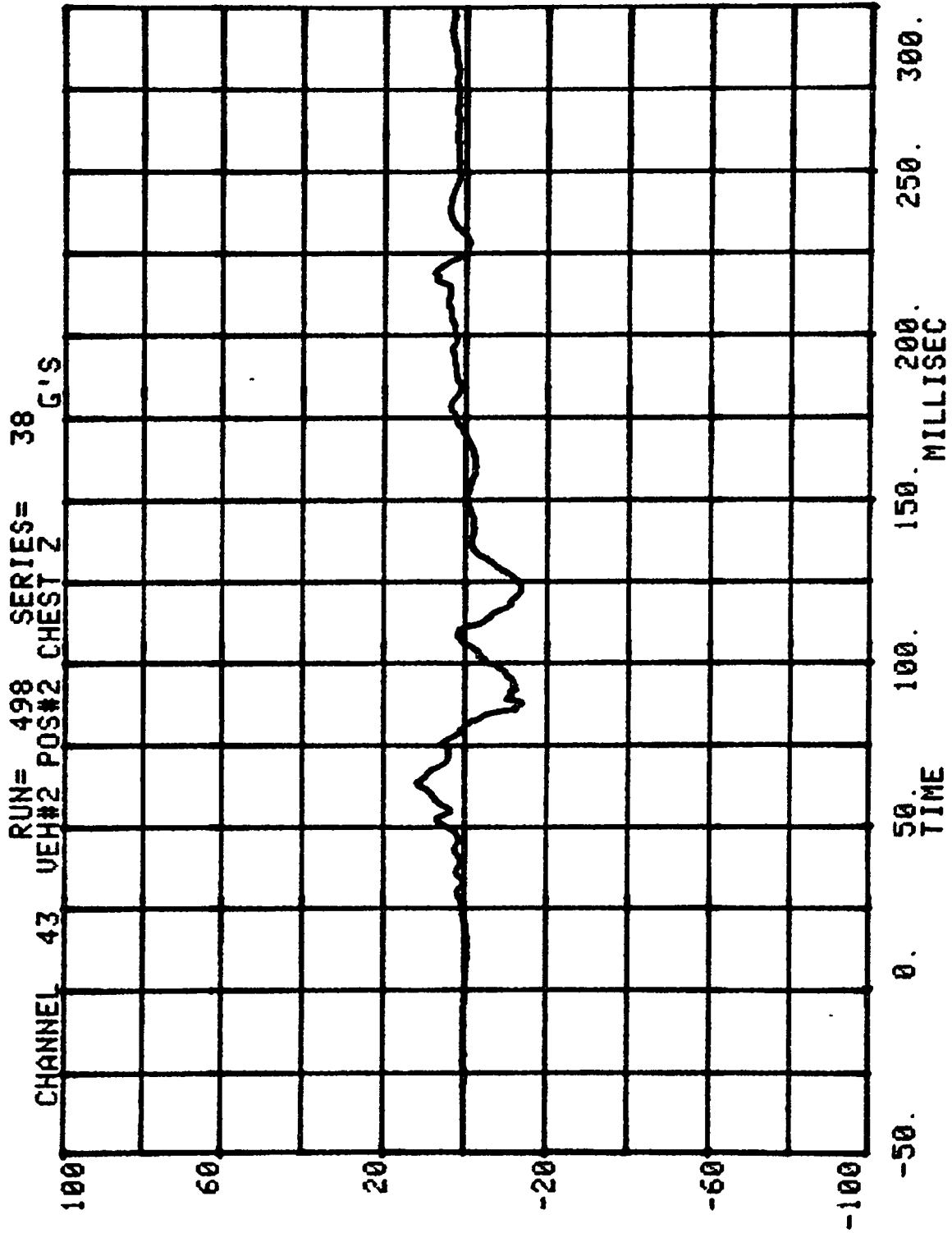


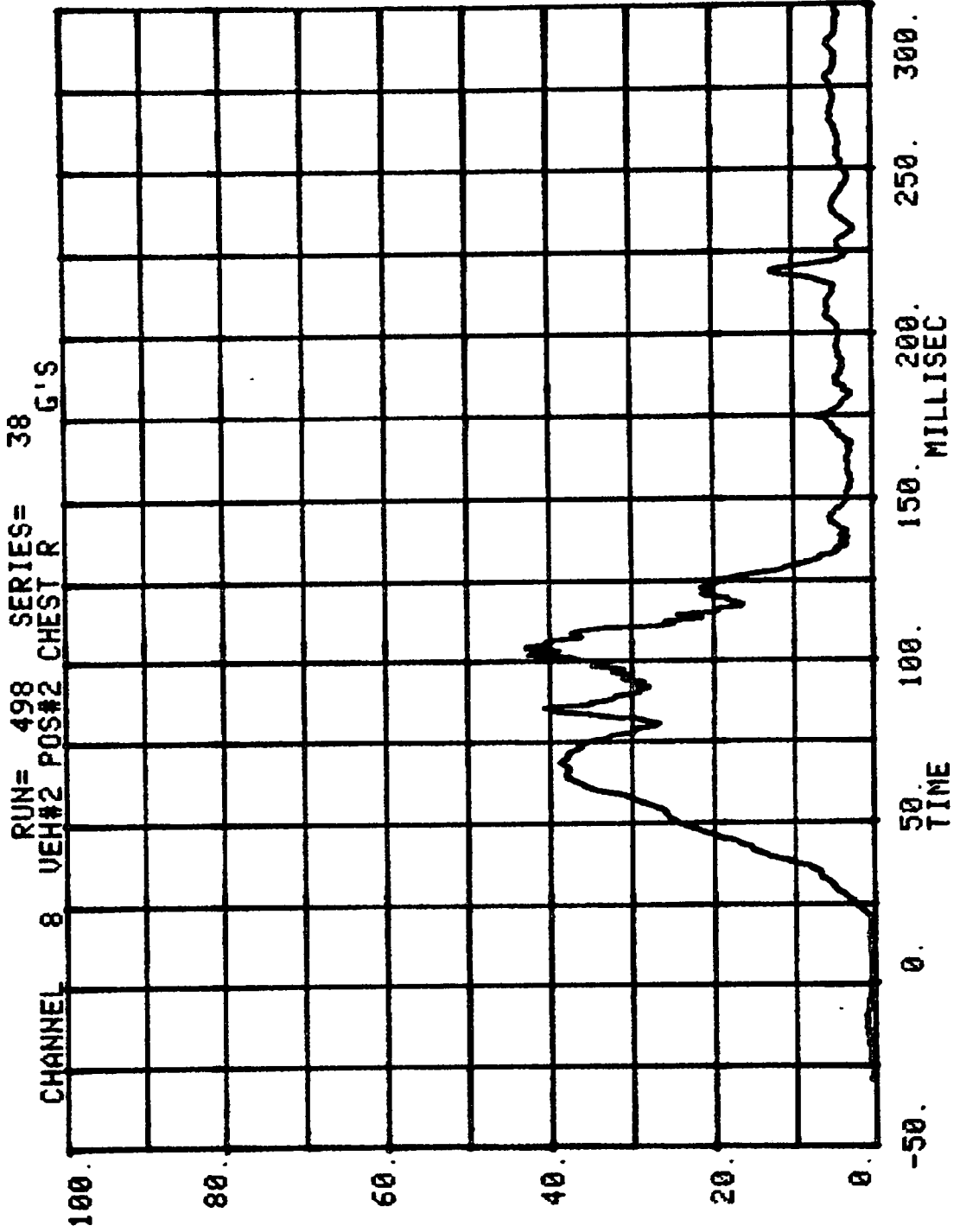
CHANNEL 41 VEH#2 POS#2 CHEST X 38 G'S



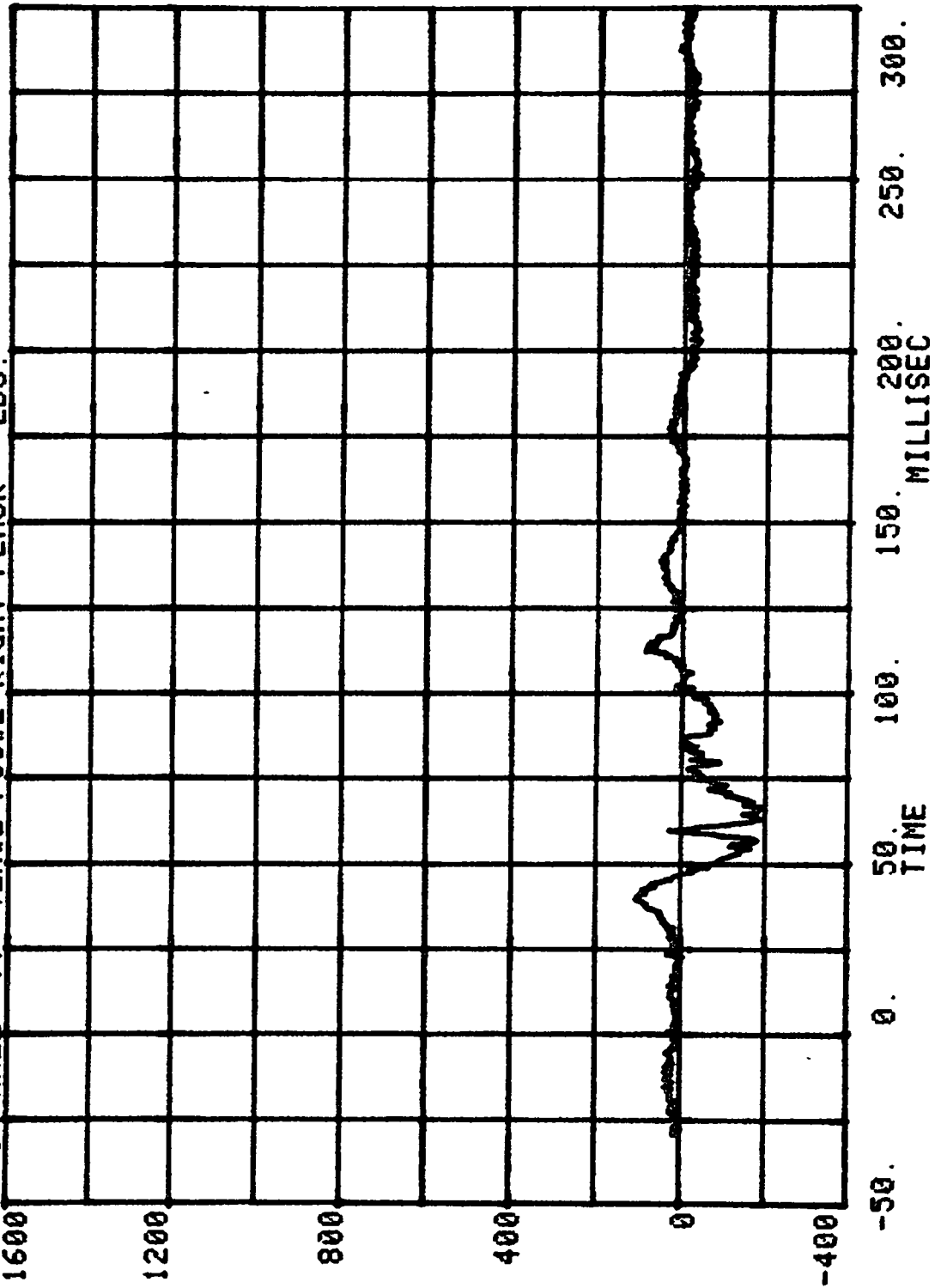
CHANNEL 42 RUN= 498 SERIES= 38 G'S
VEH#2 POS#2 CHEST Y

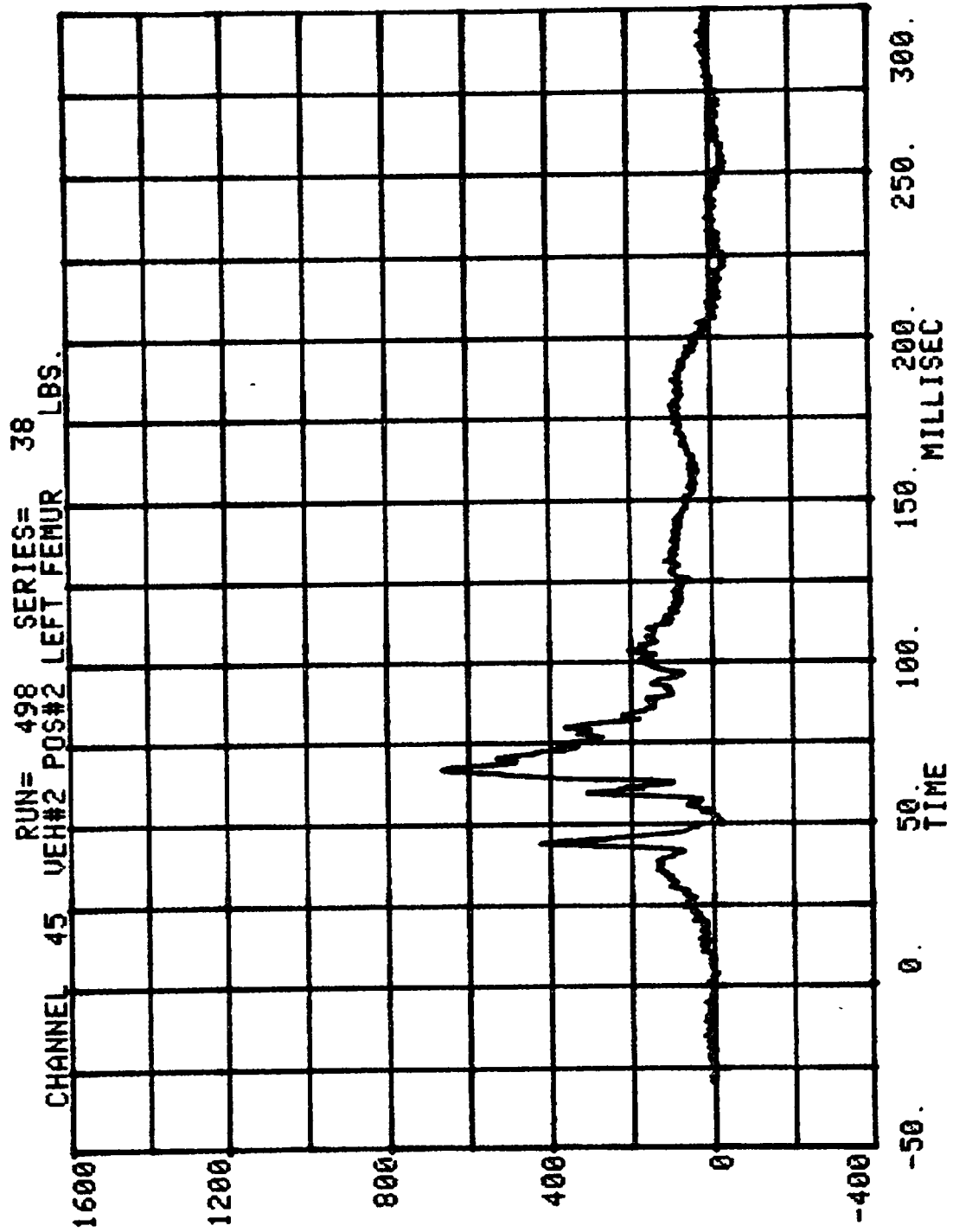


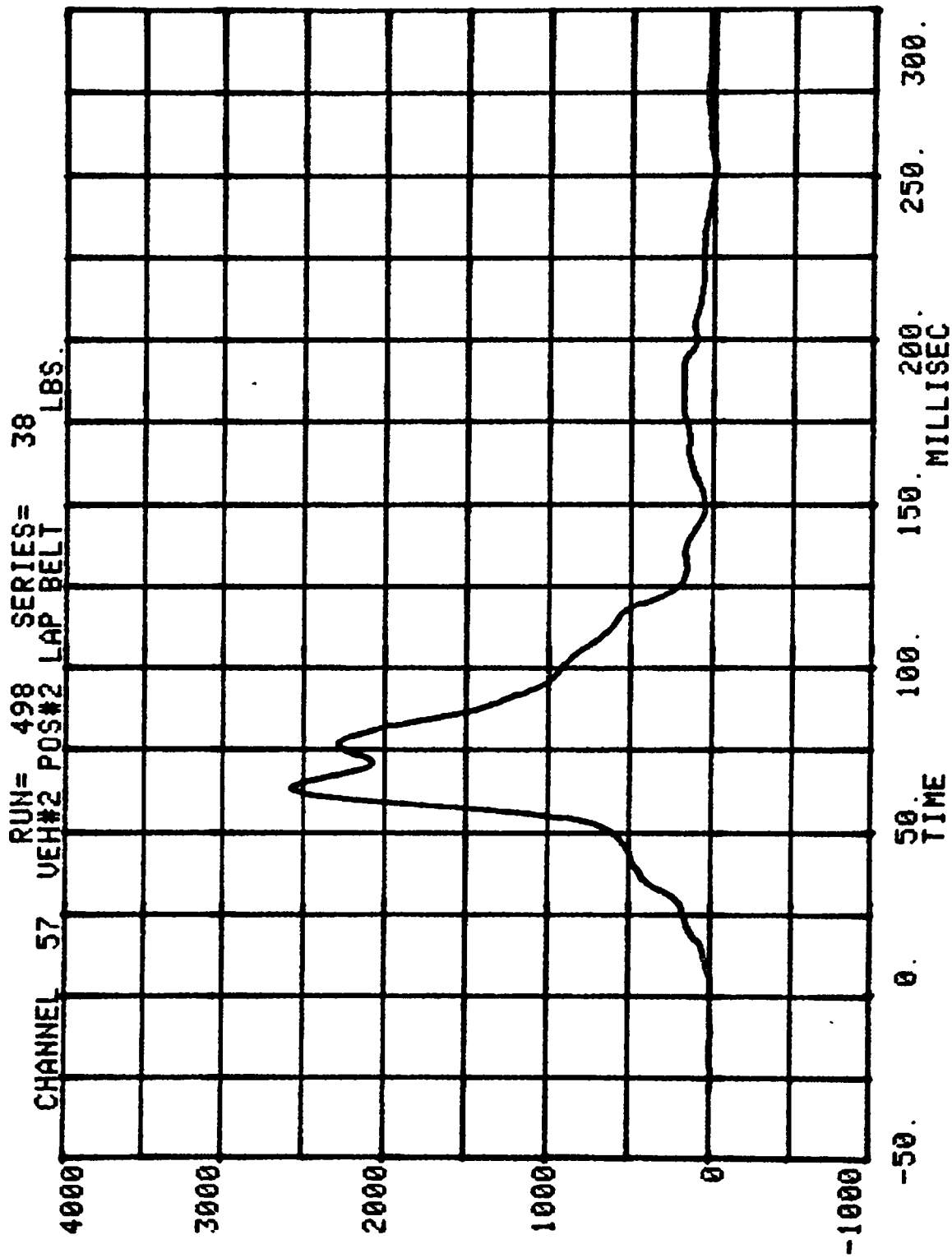


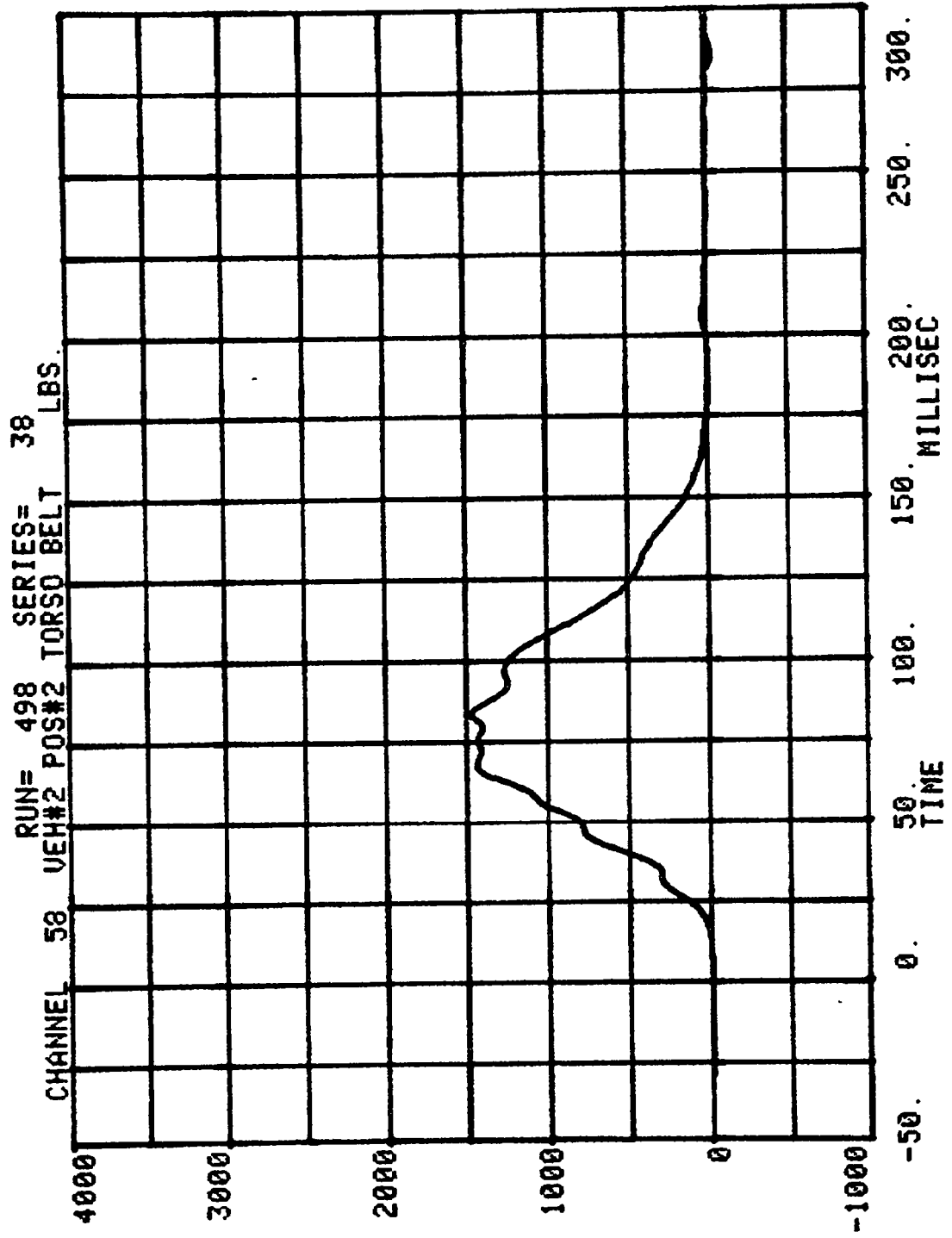


CHANNEL 44 VEH#2 POS#2 RIGHT FEMUR 38 LBS.
RUN= 498 SERIES=









APPENDIX C

DUMMY CERTIFICATION TESTS

Appendix C contains the results from certification tests performed on the Alderson Research Laboratories Model ATD 30034, 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, Vol. 42, No. 25, dated February 7, 1977.

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

Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Date</u>
109	8/1/80
111	8/4/80
153	8/4/80
320	8/4/80

Electronic Test Equipment

The complement of signal conditioning recording and display equipment used in conjunction with dummy certification testing can be found in New Car Assessment and Standards Indicant Testing Final Report, Report Number 6525-V-1.

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 109

LABORATORY TECHNICIAN: Gary Gestwick

APPROVED BY: _____	Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -	7/30/80-8/1/80	
Calibration Sequential Number for Dummy - - - -	10	
Temperature in Lab. (Spec. = 66 to 78°F)- - - -	68° - 76°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -	60% - 65%	

TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST:			
a. Peak Resultant Accel. -	210 to 260G	257 g	
b. Peak Lateral Accel. - -	≤10G	4 g	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.0 ms	
2. NECK BENDING TEST:			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	23.00 fps	
b. Pendulum Avg. Decel. (over t ₃ - t ₂) - - - -	20 to 24G	24 g	
c. Peak Resultant Head Acceleration - - - -	26G maximum	24 g	
d. Pendulum Decel. (t ₂ -t ₁)	≤3 ms	1 ms	
e. Pendulum Decel. (t ₃ -t ₂)	25 to 30 ms	27 ms	
f. Pendulum Decel. (t ₄ -t ₃)	≤10 ms	5 ms	
g. Pendulum Direction Reversal Time - - - -		107 ms	
h. Max. Head Rotation - -	63 to 73°	69°	
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.	2.8 in.
60°	Time	40.3 to 51.7 ms	42 ms
	Displ.	4.3 to 5.3 in.	4.8 in.
Maximum	Time	53.2 to 66.8 ms	57.5 ms
(°)	Displ.	5.0 to 6.0 in.	5.6 in.

Continued

P, 572 DUMMY CALIBRATION TEST DATA Continued:

Dummy I.D. No.:

1	0	9
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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	72 ms
	Displ.	4.3 to 5.3 in.	4.9 in
30°	Time	85.4 to 104.6 ms	90 ms
	Displ.	2.1 to 3.1 in.	2.4 in.
0°	Time	101.0 to 123.0 ms	104 ms
	Displ.	-.5 to 0.5 in.	0.1 in
3. ABDOMINAL COMPRESSION TEST:			
(Preload = 10 pounds)			
a. Force @ 1" - - - - -	50 to 63 lbs.	56 lbs	
b. Force @ 1.3" - - - - -	73 to 88 lbs.	79 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20° - - - - -	22 to 34 lbs.	28.5 lbs	
b. Force @ 30° - - - - -	34 to 46 lbs.	39.0 lbs	
c. Force @ 40° - - - - -	46 to 58 lbs.	50.0 lbs	
d. Return Angle - - -	12° maximum	3°	
5. CHEST IMPACT TESTS:			
a. High Speed			
(1) Probe Speed - -	21.78-22.22 fps	31.82 fps	
(2) Peak Deflection -	1.7" maximum	1.7 in.	
(3) Peak Resistive Force - - - - -	2250 lbs. maximum	1865 lbs	
(4) Internal Hysteresis - - - - -	50 to 70%	50.78%	
b. Low Speed			
(1) Probe Speed - - -	13.86-14.14 fps	13.87 fps	
(2) Peak Deflection -	1.1" maximum	1.08 in.	
(3) Peak Resistive Force - - - - -	1450 lbs. maximum	1173 lbs	
(4) Internal Hysteresis- - - -	50 to 70%	51.11%	

P.572 DUMMY CALIBRATION TEST DATAContinued:

Dummy I.D. No.:

1	0	9
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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	6.95 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2150 lbs	
(3) Time Above 1000#	1.7 ms minimum	2.0 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.96 fps	
(2) Maximum Force ---	1850 to 2500 lbs.	2050 lbs	
(3) Time Above 1000#	1.7 ms minimum	2.2 ms	

INSTRUMENT CALIBRATION INFORMATION

DUMMY I.D. NO.:

1	0	9
---	---	---

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	CS75	1/80	1/81
ENDEVCO	CU62	1/80	1/81
ENDEVCO	CU88	1/80	1/81
GSE	312	1/80	1/81
GSE	306	1/30	1/31
CEC	A49 22704	7/80	7/31
CEC	A73 22960	1/80	1/81
TRANSDUCER, INC.	20051	4/80	4/81
BLH	72952	8/79	8/80
CIC	567-11	8/79	8/80
C-6			6525-V-38

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 111

LABORATORY TECHNICIAN: Gary Gestwick

APPROVED BY: _____

	Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -	7/30/80-8/4/80	
Calibration Sequential Number for Dummy - - -	7	
Temperature in Lab. (Spec. = 66 to 78°F)- - -	68° - 77°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -	52% - 64%	

TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST:			
a. Peak Resultant Accel. -	210 to 260G	247 g	
b. Peak Lateral Accel. - -	≤10G	8 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	23.2 fps	
b. Pendulum Avg. Decel. (over t ₃ - t ₂) - - - -	20 to 24G	23 g	
c. Peak Resultant Head Acceleration - - - -	26G maximum	26 g	
d. Pendulum Decel. (t ₂ -t ₁)	≤3 ms	1 ms	
e. Pendulum Decel. (t ₃ -t ₂)	25 to 30 ms	27 ms	
f. Pendulum Decel. (t ₄ -t ₃)	≤10 ms	6 ms	
g. Pendulum Direction Reversal Time - - - -		103 ms	
h. Max. Head Rotation - -	63 to 73°	69°	
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.	2.8 in.
60°	Time	40.3 to 51.7 ms	42.5 ms
	Displ.	4.3 to 5.3 in.	4.9 in.
Maximum (°)	Time	53.2 to 66.8 ms	59 ms
	Displ.	5.0 to 6.0 in.	5.6 in.

Continued

P. 572 DUMMY CALIBRATION TEST DATA Continued:

Dummy I.D. No.:

1	1	1
---	---	---

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	71 ms
	Displ.	4.3 to 5.3 in.	5.0 in.
30°	Time	85.4 to 104.6 ms	89.5 ms
	Displ.	2.1 to 3.1 in.	2.5 in.
0°	Time	101.0 to 123.0 ms	103 ms
	Displ.	-.5 to 0.5 in.	0.2 in.
3. ABDOMINAL COMPRESSION TEST:			
(Preload = 10 pounds)			
a. Force @ 1" - - - - -	50 to 63 lbs.	53 lbs	
b. Force @ 1.3" - - - - -	73 to 88 lbs.	86 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20° - - - - -	22 to 34 lbs.	31 lbs	
b. Force @ 30° - - - - -	34 to 46 lbs.	42 lbs	
c. Force @ 40° - - - - -	46 to 58 lbs.	52 lbs	
d. Return Angle - - - - -	12° maximum	3.5°	
5. CHEST IMPACT TESTS:			
a. High Speed			
(1) Probe Speed - - -	21.78-22.22 fps	21.98 fps	
(2) Peak Deflection -	1.7" maximum	1.61 in.	
(3) Peak Resistive Force - - - - -	2250 lbs. maximum	1864 lbs	
(4) Internal Hysteresis - - - - -	50 to 70%	61.18%	
b. Low Speed			
(1) Probe Speed - - -	13.86-14.14 fps	13.89 fps	
(2) Peak Deflection -	1.1" maximum	1.0 in.	
(3) Peak Resistive Force - - - - -	1450 lbs. maximum	1165 lbs	
(4) Internal Hysteresis - - - - -	50 to 70%	57.67%	

P.572 DUMMY CALIBRATION TEST DATAContinued:

Dummy I.D. No.:

1	1	1
---	---	---

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	6.77 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2050 lbs	
(3) Time Above 1000#	1.7 ms minimum	2.0 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.00 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2450 lbs	
(3) Time Above 1000#	1.7 ms minimum	1.8 ms	

INSTRUMENT CALIBRATION INFORMATION

DUMMY I.D. NO.:

1	1	1
---	---	---

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	CS75	1/80	1/81
ENDEVCO	CU62	1/80	1/81
ENDEVCO	CU88	1/80	1/81
GSE	312	1/80	1/81
GSE	306	1/80	1/81
CEC	A49 22704	7/80	7/81
CEC	A73 22960	1/80	1/81
TRANSDUCER, INC.	20051	4/80	4/81
BLH	72952	8/79	8/80
CIC	567-11	8/79	8/80
C-10		6525-V-38	

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 153

LABORATORY TECHNICIAN: Gary Gestwick

APPROVED BY: _____

	Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -	7/30/80-8/4/80	
Calibration Sequential Number for Dummy - - - -	1	
Temperature in Lab. (Spec. = 66 to 78°F)- - - -	68° - 77°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -	52% - 64%	

TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST:			
a. Peak Resultant Accel. -	210 to 260G	218 g	
b. Peak Lateral Accel. - -	≤10G	7 g	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.25 ms	
2. NECK BENDING TEST:			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	22.99 fps	
b. Pendulum Avg. Decel. (over t ₃ - t ₂) - - - -	20 to 24G	23 g	
c. Peak Resultant Head Acceleration - - - -	26G maximum	24 g	
d. Pendulum Decel. (t ₂ -t ₁)	≤3 ms	1 ms	
e. Pendulum Decel. (t ₃ -t ₂)	25 to 30 ms	28 ms	
f. Pendulum Decel. (t ₄ -t ₃)	≤10 ms	5 ms	
g. Pendulum Direction Reversal Time - - - -		107 ms	
h. Max. Head Rotation - -	63 to 73°	64°	
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	29.5 ms
	Displ.	2.1 to 3.1 in.	2.6 in.
60°	Time	40.3 to 51.7 ms	46.5 ms
	Displ.	4.3 to 5.3 in.	4.6 in.
Maximum (°)	Time	53.2 to 66.8 ms	56 ms
	Displ.	5.0 to 6.0 in.	5.0 in.

Continued

P, 572 DUMMY CALIBRATION TEST DATA Continued:

Dummy I.D. No.:

1	5	3
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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	64 ms
	Displ.	4.3 to 5.3 in.	4.7 in.
30°	Time	85.4 to 104.6 ms	89 ms
	Displ.	2.1 to 3.1 in.	2.4 in.
0°	Time	101.0 to 123.0 ms	104 ms
	Displ.	-.5 to 0.5 in.	0.1 in.
3. ABDOMINAL COMPRESSION TEST:			
(Preload = 10 pounds)			
a. Force @ 1" - - - - -	50 to 63 lbs.	57 lbs	
b. Force @ 1.3" - - - - -	73 to 88 lbs.	86 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20° - - - - -	22 to 34 lbs.	33.5 lbs	
b. Force @ 30° - - - - -	34 to 46 lbs.	41.0 lbs	
c. Force @ 40° - - - - -	46 to 58 lbs.	52 lbs	
d. Return Angle - - -	12° maximum	3°	
5. CHEST IMPACT TESTS:			
a. High Speed			
(1) Probe Speed - -	21.78-22.22 fps	21.9 fps	
(2) Peak Deflection -	1.7" maximum	1.52 in.	
(3) Peak Resistive Force - - - - -	2250 lbs. maximum	1916 lbs	
(4) Internal Hysteresis - - - - -	50 to 70%	60.13%	
b. Low Speed			
(1) Probe Speed - - -	13.86-14.14 fps	13.89 fps	
(2) Peak Deflection -	1.1" maximum	.94 in.	
(3) Peak Resistive Force - - - - -	1450 lbs. maximum	1243 lbs	
(4) Internal Hysteresis - - - - -	50 to 70%	51.37%	

P.572 DUMMY CALIBRATION TEST DATAContinued:

Dummy I.D. No.:

1	5	3
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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	7.03 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2500 lbs	
(3) Time Above 1000#	1.7 ms minimum	1.75 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.88 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2250 lbs	
(3) Time Above 1000#	1.7 ms minimum	2.0 ms	

INSTRUMENT CALIBRATION INFORMATION

DUMMY I.D. NO.:

1	5	3
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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	CS75	1/80	1/81
ENDEVCO	CU62	1/80	1/81
ENDEVCO	CU88	1/80	1/81
GSE	312	1/80	1/81
GSE	306	1/80	1/81
CEC	A49 22704	7/80	7/81
CEC	A73 22960	1/80	1/81
TRANSDUCER, INC.	22051	4/80	4/81
BLH	72952	8/79	8/80
CIC	567-11	8/79	8/80
C-14		6525-V-38	

P. 572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 320

LABORATORY TECHNICIAN: Gary Gestwick

APPROVED BY: _____

	Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -	7/30/80-8/4/80	
Calibration Sequential Number for Dummy - - -	11	
Temperature in Lab. (Spec. = 66 to 78°F)- - -	68° - 77°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -	52% - 64%	

TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST:			
a. Peak Resultant Accel. -	210 to 260G	212 g	
b. Peak Lateral Accel. - -	≤10G	5 g	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.3 ms	
2. NECK BENDING TEST:			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	22.41 fps	
b. Pendulum Avg. Decel. (over t ₃ - t ₂) - - - -	20 to 24G	22.5 g	
c. Peak Resultant Head Acceleration - - - -	26G maximum	24 g	
d. Pendulum Decel. (t ₂ -t ₁)	≤3 ms	1 ms	
e. Pendulum Decel. (t ₃ -t ₂)	25 to 30 ms	27 ms	
f. Pendulum Decel. (t ₄ -t ₃)	≤10 ms	4 ms	
g. Pendulum Direction Reversal Time - - - -		111 ms	
h. Max. Head Rotation - -	63 to 73°	70°	
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	29.5 ms
	Displ.	2.1 to 3.1 in.	2.8 in.
60°	Time	40.3 to 51.7 ms	42.5 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.	5.6 in.

Continued

P, 572 DUMMY CALIBRATION TEST DATA Continued:

Dummy I.D. No.:

3	2	0
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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	75 ms
	Displ.	4.3 to 5.3 in.	5.0 in.
30°	Time	85.4 to 104.6 ms	94.5 ms
	Displ.	2.1 to 3.1 in.	2.4 in.
0°	Time	101.0 to 123.0 ms	109 ms
	Displ.	-.5 to 0.5 in.	0.0 in.
3. ABDOMINAL COMPRESSION TEST:			
(Preload = 10 pounds)			
a. Force @ 1" - - - - -	50 to 63 lbs.	61 lbs	
b. Force @ 1.3" - - - - -	73 to 88 lbs.	87 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20° - - - - -	22 to 34 lbs.	33.5 lbs	
b. Force @ 30° - - - - -	34 to 46 lbs.	37.0 lbs	
c. Force @ 40° - - - - -	46 to 58 lbs.	46.0 lbs	
d. Return Angle - - - - -	12° maximum	6°	
5. CHEST IMPACT TESTS:			
a. High Speed			
(1) Probe Speed - - - - -	21.78-22.22 fps	21.94 fps	
(2) Peak Deflection - - - - -	1.7" maximum	1.67 in.	
(3) Peak Resistive Force - - - - -	2250 lbs. maximum	1864 lbs	
(4) Internal Hysteresis - - - - -	50 to 70%	51.61%	
b. Low Speed			
(1) Probe Speed - - - - -	13.86-14.14 fps	13.88 fps	
(2) Peak Deflection - - - - -	1.1" maximum	1.1 in.	
(3) Peak Resistive Force - - - - -	1450 lbs. maximum	1191 lbs	
(4) Internal Hysteresis - - - - -	50 to 70%	50.72%	

P.572 DUMMY CALIBRATION TEST DATAContinued:

Dummy I.D. No.:

3	2	0
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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	7.04 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2350 lbs	
(3) Time Above 1000#	1.7 ms minimum	1.9 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.96 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2050 lbs	
(3) Time Above 1000#	1.7 ms minimum	2.1 ms	

INSTRUMENT CALIBRATION INFORMATION

DUMMY I.D. NO.:

3	2	0
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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
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ENDEVCO	CU62	1/80	1/81
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GSE	306	1/80	1/81
CEC	A49 22704	7/80	7/81
CEC	A73 22960	1/80	1/81
TRANSDUCER, INC.	20051	4/80	4/81
BLH	72952	8/79	8/80
CIC	567-11	8/79	8/80
C-18		6525-V-38	