

~~DOT 372~~
DOT 372

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

FORD MUSTANG TO PLYMOUTH HORIZON
Frontal Impact, 70 mph Closing Speed
NHTSA 308-34-492

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



June 18, 1980

FINAL REPORT

Prepared For
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
Enforcement
Office of Vehicle Safety Compliance
Nassif Building - 400 Seventh Street, S. W.
Washington, D. C. 20590

This Final Test Report was prepared for the U. S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DOT-HS-8-01938. This document is disseminated under the sponsorship of the U. S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

FINAL REPORT ACCEPTED BY:

Contract Technical Manager

Date of Report Acceptance

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.		2. Government Accession No.		3. Recipient's Catalog No.			
4. Title and Subtitle NEW CAR ASSESSMENT AND STANDARDS ENFORCEMENT INDICANT TESTING - FORD MUSTANG TO PLYMOUTH HORIZON FRONTAL IMPACT, 70 MPH CLOSING SPEED				5. Report Date June 18, 1980			
				6. Performing Organization Code 92325			
7. Author(s) Walter E. Levan, Test Engineer Barbara J. Kelleher, Staff Associate				8. Performing Organization Report No. 6525-V-34			
9. Performing Organization Name and Address Calspan Advanced Technology Center P.O. Box 400 Buffalo, New York 14225				10. Work Unit No. 308 Series			
				11. Contract or Grant No. DOT-HS-8-01938			
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance 400 Seventh Street, S.W. Washington, D.C. 20590				13. Type of Report and Period Covered Final Report May-June 1980			
				14. Sponsoring Agency Code NAD-30			
15. Supplementary Notes Reviewed: <u>W. Levan for D.A. Alionello</u> Project Engineer Approved: <u>K. Hendershott</u> Head, Transportation Research Dept. Calspan Advanced Technology Center							
16. Abstract A symmetric frontal car-to-car crash test of a 1980 Ford Mustang, two-door sedan and a 1980 Chrysler-Plymouth Horizon, two door sedan was performed at Calspan Corporation, Advanced Technology Center, Transportation Research Facility, Buffalo, New York on May 15, 1980. Ambient temperature on the test date was 59°F. At impact each vehicle was travelling at 35.08 mph. The FMVSS 208 Injury Criteria sustained by the occupants in both vehicles is listed below: <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>Vehicle No. 1 - Ford Mustang</u> <u>Driver</u> Head - Pass Chest - Pass Femurs - Pass <u>Right Front Passenger</u> Head - Fail (HIC = 1967) Chest - Pass Femurs - Pass </td> <td style="width: 50%; vertical-align: top;"> <u>Vehicle No. 2 Plymouth Horizon</u> <u>Driver</u> Head - Fail (HIC = 1817) Chest - Fail (C_R = 60.7) Femurs - Pass <u>Right Front Passenger</u> Head - Fail (HIC = 2096) Chest - Pass Femurs - Pass </td> </tr> </table>						<u>Vehicle No. 1 - Ford Mustang</u> <u>Driver</u> Head - Pass Chest - Pass Femurs - Pass <u>Right Front Passenger</u> Head - Fail (HIC = 1967) Chest - Pass Femurs - Pass	<u>Vehicle No. 2 Plymouth Horizon</u> <u>Driver</u> Head - Fail (HIC = 1817) Chest - Fail (C _R = 60.7) Femurs - Pass <u>Right Front Passenger</u> Head - Fail (HIC = 2096) Chest - Pass Femurs - Pass
<u>Vehicle No. 1 - Ford Mustang</u> <u>Driver</u> Head - Pass Chest - Pass Femurs - Pass <u>Right Front Passenger</u> Head - Fail (HIC = 1967) Chest - Pass Femurs - Pass	<u>Vehicle No. 2 Plymouth Horizon</u> <u>Driver</u> Head - Fail (HIC = 1817) Chest - Fail (C _R = 60.7) Femurs - Pass <u>Right Front Passenger</u> Head - Fail (HIC = 2096) Chest - Pass Femurs - Pass						
17. Key Words Crash Test Frontal Impact Car-to-Car Tests			18. Distribution Statement <u>Copies of this report are available from:</u> Technical Reference Division National Highway Traffic Safety Admin. Room 5108, NASSIF Building 400 7th St., S.W., Washington, D.C. 20590				
19. Security Classif. (of this report) UNCLASSIFIED		20. Security Classif. (of this page) UNCLASSIFIED		21. No. of Pages	22. Price		

TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1.0	TEST PURPOSE AND PROCEDURE	1-1
2.0	GENERAL TEST AND VEHICLE INFORMATION	2-1
2.1	Narrative Summary of Test	2-1
3.0	COMPLIANCE RELATED INFORMATION	3-1
4.0	OCCUPANT AND VEHICLE INFORMATION	4-1
4.1	Narrative Summary of Occupant Responses	4-1
APPENDIX A -	PRE- AND POST-TEST PHOTOGRAPHS	A-1
	VEHICLE NO. 1 - 1980 FORD MUSTANG	A-2
	VEHICLE NO. 2 - 1980 PLYMOUTH HORIZON	A-13
APPENDIX B -	VEHICLE AND DUMMY RESPONSE DATA	B-1
	VEHICLE NO. 1 - 1980 FORD MUSTANG	B-2
	VEHICLE NO. 2 - 1980 PLYMOUTH HORIZON	B-49
APPENDIX C -	DUMMY CERTIFICATION TESTS	C-1

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1	PRE-TEST AND POST-TEST MEASUREMENT POINTS	4-3
2	VEHICLE ACCELEROMETER LOCATIONS - VEHICLE NO. 1 MUSTANG	4-6
3	VEHICLE ACCELEROMETER LOCATIONS - VEHICLE NO. 2 HORIZON	4-8
4	CAMERA POSITIONS FOR FRONTAL CAR-TO-CAR IMPACT	4-10
5	PART 572 DUMMY IN-VEHICLE POSITION - VEHICLE NO. 1 MUSTANG	4-13
6	PART 572 DUMMY IN-VEHICLE POSITION - VEHICLE NO. 2 HORIZON	4-14
7	OWNER'S MANUAL RESTRAINT SYSTEM OPERATION INSTRUCTIONS VEHICLE NO. 1 - MUSTANG	4-15
8	OWNER'S MANUAL RESTRAINT SYSTEM OPERATION INSTRUCTIONS VEHICLE NO. 2 - HORIZON	4-16
9	OCCUPANT CLEARANCE DIMENSIONS - VEHICLE NO. 1 - MUSTANG	4-17
10	OCCUPANT CLEARANCE DIMENSIONS - VEHICLE NO. 2 - HORIZON	4-18
A-1	VEHICLES NOS. 1 AND 2 - PRE- AND POST-TEST IMPACT CONFIGURATION	A-2
A-2	VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF FRONT AND REAR	A-3
A-3	VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT SIDES	A-4
A-4	VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF FRONT AND REAR THREE-QUARTER	A-5
A-5	VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT FRONT QUARTER	A-6
A-6	VEHICLE NO. 1 - PRE-TEST VIEWS OF UNDERBODY	A-7
A-7	VEHICLE NO. 1 - POST-TEST VIEWS OF UNDERBODY	A-8
A-8	VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF DRIVER POSITION	A-9
A-9	VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF RIGHT FRONT PASSENGER	A-10
A-10	VEHICLE NO. 1 - POST-TEST VIEWS OF DRIVER AND RIGHT FRONT PASSENGER	A-11
A-11	VEHICLE NO. 1 - FUEL TUBE AND CAP	A-11
A-12	VEHICLE NO. 1 - PRE-TEST ENGINE COMPARTMENT VIEW	A-11

LIST OF FIGURES (Cont.)

<u>Figure No.</u>		<u>Page No.</u>
A-13	VEHICLE NO. 1 - POST-TEST INTERIOR VIEWS	A-12
A-14	VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF FRONT AND REAR	A-14
A-15	VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT SIDE	A-15
A-16	VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF FRONT AND REAR THREE-QUARTER	A-16
A-17	VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT FRONT QUARTER	A-17
A-18	VEHICLE NO. 2 - POST-TEST VIEWS OF WINDSHIELD	A-18
A-19	VEHICLE NO. 2 - FUEL TUBE AND CAP	A-19
A-20	VEHICLE NO. 2 - PRE-TEST VIEW OF ENGINE	A-19
A-21	VELOCITY TRAP COUNTER DISPLAY	A-19
A-22	VEHICLE NO. 2 - PRE-TEST VIEWS OF UNDERBODY	A-20
A-23	VEHICLE NO. 2 - POST-TEST VIEWS OF UNDERBODY	A-21
A-24	VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF DRIVER	A-22
A-25	VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF RIGHT FRONT PASSENGER	A-23
A-26	VEHICLE NO. 2 - POST-TEST INTERIOR VIEWS	A-24

LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
1	CRASH TEST SUMMARY	2-4
2	VEHICLE TEST WEIGHT AS TESTED VEHICLE NO. 1 - 1980 FORD MUSTANG	2-6
3	VEHICLE TEST WEIGHT AS TESTED VEHICLE NO. 2 - 1980 PLYMOUTH HORIZON	2-7
4	SUMMARY OF TEST CONDITIONS VEHICLE NO. 1 - 1980 FORD MUSTANG	2-8
5	SUMMARY OF TEST CONDITIONS VEHICLE NO. 2 - 1980 PLYMOUTH HORIZON	2-10
6	VEHICLE MEASUREMENTS VEHICLE NO. 1 - 1980 FORD MUSTANG	4-4
7	VEHICLE MEASUREMENTS VEHICLE NO. 2 - 1980 PLYMOUTH HORIZON	4-5
8	ELECTRONIC INSTRUMENTATION VEHICLE NO. 1 - 1980 FORD MUSTANG	4-7
9	ELECTRONIC INSTRUMENTATION VEHICLE NO. 2 - 1980 PLYMOUTH HORIZON	4-9
10	HIGH SPEED CAMERA LOCATIONS	4-11
11	CAMERA INFORMATION	4-12
12	DUMMY INJURY CRITERIA VALUES VEHICLE NO. 1 - 1980 FORD MUSTANG	4-19
13	DUMMY INJURY CRITERIA VALUES VEHICLE NO. 2 - PLYMOUTH HORIZON	4-20

SECTION 1

TEST PURPOSE AND PROCEDURE

This car-to-car crash test of a 1980 Ford Mustang and a 1980 Chrysler Horizon 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

GENERAL TEST AND VEHICLE INFORMATION

2.1 Narrative Summary of Test No. 34

A 1980 Ford Mustang and a 1980 Plymouth Horizon were crash tested at Calspan Corporation, Advanced Technology Center on May 15, 1980, in a symmetric frontal car-to-car impact mode with a nominal closing speed of 70 mph. Ambient temperature on the day of impact was 59⁰F.

Both vehicles were supplied with Part 572, 50th percentile male Anthropometric Test Devices (ATD) in the driver and right front passenger positions. Section 4 contains a discussion of ATD placement, kinematics and performance evaluation criteria.

Vehicle Number 1, the Ford Mustang, was a two-door vehicle with a designated seating capacity for four occupants. This vehicle was equipped with a 140 cubic inch four-cylinder engine and four-speed manual transmission. The 11.5 gallon fuel tank on this vehicle is located aft of the rear axle and was filled to 93 percent capacity with red Stoddard fluid.

Vehicle Number 2, the Plymouth Horizon, was also a two door vehicle with four designated seating positions. The Horizon had a smaller four cylinder engine (105 cubic inch) and was also supplied with a four-speed manual transmission. The 13 gallon fuel tank is located forward of the rear axle and was filled to 93 percent capacity with red Stoddard fluid.

Test weights of the two vehicles differed by 390 pounds, with the Mustang (3150 lbs) being heavier than the Horizon (2760 lbs). Neither vehicle was equipped with an air conditioning unit. Impact velocity for each vehicle was recorded at 35.08 mph. Vehicle impact occurred approximately 3 inches east of the anticipated impact area. After impact, the crushed front end of the Mustang came to rest approximately 16 inches west of the impact point. The Horizon rebounded and its crushed front end came to rest approximately

56 inches west of the impact point.

The crash event was recorded by two real-time and eleven high-speed cameras. All cameras functioned satisfactorily and pertinent camera information can be found in Section 4 of this report. All film has been delivered under separate cover to the NHTSA.

Pre- and post-test vehicle configuration photographs are provided in Appendix A and vehicle and dummy data traces are furnished in Appendix B. A brief summary of impact observations is provided herein.

Vehicle Number 1 - Mustang

There was no significant forward pitch of the vehicle observed at impact. The right and left front fenders separated and buckled outward as can be seen in Figures A-1, A-2 and A-4. Cracks were noticed in both lower corners of the windshield and the right lower corner was exposed where the hood and fender separated (Figure A-10). The roof buckled slightly at the B-pillars on both sides and the upper steering column was bent. Both doors could be opened after impact. Maximum crush (24.7 inches) of this vehicle was measured along the left side of the car from the bumper backing plate (Table 4, X20') to the rear surface. The bumper backing plate was located .9 inches behind the soft front bumper. Maximum firewall intrusion was 3.2 inches measured on the right side.

Vehicle Number 2 - Horizon

The Horizon pitched forward on impact with the rear wheels becoming airborne. The frontal deformation was somewhat skewed as can be seen in Figures A-14 and A-16. The windshield was severely cracked and dented into the occupant compartment where it had been penetrated by the hood. Views of this windshield deformation are available in Figure A-18. The left door could be opened after impact but the right door was jammed shut. The maximum crush on this vehicle was 21.2 inches measured along the vehicle centerline. This

car also was equipped with a soft front bumper and, therefore, this measurement was made from the bumper backing plate located 2 inches behind the bumper (Table 7, X1). Firewall intrusion into the front occupant compartment was 8.3 inches at vehicle centerline.

Table 1
CRASH TEST SUMMARY

TEST NO. 34 PROJECT New Car Assessment Program
 DATE 5/15/80 TIME 1340 TEMP. 59°F
 TEST CONDITION Symmetric Frontal - 70 mph Closing Speed
 VEHICLE NO. 1 1980 Ford Mustang 2-Door
 VEHICLE NO. 2 1980 Plymouth Horizon 2-Door

	VEH. NO. 1	VEH. NO. 2
TEST WEIGHT (lbs)	<u>3150</u>	<u>2760</u>
IMPACT ANGLE (deg)*	<u>0</u>	<u>0</u>
IMPACT VELOCITY (mph)**	<u>35.08</u>	<u>35.08</u>
MAX. CRUSH (in)	<u>24.7</u>	<u>21.2</u>
MAX. INTRUSION (in)	<u>3.2</u>	<u>8.3</u>
	VEH. NO. 1	VEH. NO. 2
DUMMIES		
TYPE	<u>PART 572, 50th PERCENTILE MALE</u>	<u>PART 572, 50TH PERCENTILE MALE</u>
LOCATION	<u>LF(1) RF(2)</u>	<u>LF(1) RF(2)</u>
RESTRAINT	<u>Production 3-Point Belt System</u>	<u>Production 3-Point Belt System</u>
I.D. NUMBER	<u>320 163</u>	<u>111 110</u>
NUMBER OF DATA CHANNELS	<u>58</u>	
NUMBER OF HIGH SPEED CAMERAS	<u>11 + 2 Real Time</u>	

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

Table 1 (Cont'd)

OBSERVATIONS (VEHICLE NO. 1) - MUSTANG

GLAZING Cracked.

DOORS Both doors opened after impact.

SEAT ANCHORAGES No Failure.

RESTRAINTS No Failure.

OBSERVATIONS (VEHICLE NO. 2) - HORIZON

GLAZING Windshield cracked and was penetrated by hood.

DOORS Left door could be opened; right door could not be opened.

SEAT ANCHORAGES Both seats moved forward on seat tracks approximately 1/2 inch.

RESTRAINTS No Failure.

GENERAL COMMENTS _____

Table 2

VEHICLE TEST WEIGHTS AS TESTED

Vehicle No. 1 - 1980 FORD MUSTANG 2-DOOR

Left Front	830 lbs	Left Rear	720 lbs
Right Front	<u>830</u> lbs	Right Rear	<u>770</u> lbs
TOTAL FRONT	1660 lbs	TOTAL REAR	1490 lbs

Total Weight = 1660 + 1490 = 3150 lbs

Wheel Base = 101.0 inches

Cg_{F.W.} = $\frac{1490 \text{ lbs} \times 101 \text{ inches}}{3150 \text{ lbs}}$ = 47.77 inches

CALCULATION FOR TEST WEIGHT

- RCLW = Rated Cargo and Luggage Weight
- UDW = Unloaded Delivered Weight (2720 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 = 2720 lbs + 100 lbs + 2 (164 lbs)

TEST WEIGHT = 3148 lbs (CALCULATED)

Table 3

VEHICLE TEST WEIGHTS AS TESTED

Vehicle No. 2 - 1980 PLYMOUTH HORIZON 2-DOOR HATCHBACK

Left Front	810	lbs	Left Rear	570	lbs
Right Front	<u>780</u>	lbs	Right Rear	<u>600</u>	lbs
TOTAL FRONT	1590	lbs	TOTAL REAR	1170	lbs

Total Weight = 1590 + 1170 = 2760 lbs

Wheel Base = 96 inches

$Cg_{F.W.} = \frac{1170 \text{ lbs} \times 96 \text{ inches}}{2760 \text{ lbs}} = \underline{40.7}$ inches

CALCULATION FOR TEST WEIGHT

- RCLW = Rated Cargo and Luggage Weight
- UDW = Unloaded Delivered Weight (2300 lbs)
- VCW = Vehicle Capacity Weight (715 lbs)
- DSC = Designated Seating Capacity (4)

RCLW = VCW - 150 (DSC)

RCLW = 715 - 150 (4) = 115 lbs

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

TEST WEIGHT = 2300 lbs + 115 lbs + 2 (164 lbs)

TEST WEIGHT = 2743 lbs (CALCULATED)

Table 4

SUMMARY OF TEST CONDITIONSVehicle No. 1 MustangTEST VEHICLE INFORMATION

Vehicle Manufacturer Ford Motor Company
 Make/Model 1980 Ford Mustang
 Body Style Tudor Model Year 1980
 VIN 0F02A242616 Build Date March 1980
 NHTSA No. 308-34-492 Color Orange
 Engine Data: 4 cylinders 140 in³ displacement
 Transmission Data: 4 speed (X) Manual () Automatic
 Date Vehicle Received by Laboratory 4/29/80
 Dealer's Name & Address Delivered by NHTSA

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

Vehicle Manufactured by Ford Motor Company
 Date of Manufacture March 1980 VIN 0F02A242616
 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 P175/75R14
 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 = 800 lbs Right Rear = 580 lbs
 Left Front = 770 lbs Left Rear = 570 lbs
 TOTAL FRONT WEIGHT = 1570 lbs (57.7 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1150 lbs (42.3 % of Total Vehicle Weight)
 TOTAL DELV. WEIGHT = 2720 lbs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 102 lbs CARGO

Right Front = 830 lbs Right Rear = 770 lbs
 Left Front = 830 lbs Left Rear = 720 lbs
 TOTAL FRONT WEIGHT = 1660 lbs (52.7 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1490 lbs (47.3 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 3150 lbs
 Weight of ballast secured in vehicle trunk area = 0 lbs

SUMMARY OF TEST CONDITIONS (Cont'd)Vehicle No. 1 MustangTEST CONDITIONS

Date of Test 5/15/80 Time of Test 1340 am/pm
 Ambient Temperature 59 °F at impact area
 Temperature in Occupant Compartment 74 °F
 Impact Velocity 35.08 mph

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude:	RF <u>27.9</u>	LF <u>28.25</u>	RR <u>27</u>	LR <u>27.25</u>
Test Attitude:	RF <u>27.0</u>	LF <u>27.0</u>	RR <u>25.6</u>	LR <u>25.7</u>

VEHICLE TIRE DATA

Recommended Cold Tire Pressure: Front = 35 psi Rear = 35 psi
 Recommended Tire Size ^{P175/75R14} P185/75R13 P185/75R14
 Tires on Vehicle P175/75R14
 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
 EPA Capacity 11.5 gal
 Test Volume 10.7 gal (93% of EPA Capacity)
 Fuel System Capacity (data from Owner's Manual) 11.5 gal
 Details of fuel system Engine operated fuel pump. Fuel tank is located aft of rear axle and held in place by two tank straps. The fill tube is on right side of vehicle sealed by a twist-type cap and is concealed by a hinged access door.
 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 N/A Yes N/A No

VEHICLE CRUSH

Overall Length of Test Vehicle: Pre-Test = R 173.6 /L 173.5 inches
 Post-Test = R 152.6 /L 148.8 inches
 Crush = R 21.0 /L 24.7

Table 5

SUMMARY OF TEST CONDITIONSVehicle No. 2 HorizonTEST VEHICLE INFORMATION

Vehicle Manufacturer Chrysler Corporation
 Make/Model 1980 Plymouth Horizon
 Body Style 2-Door Model Year 1980
 VIN ML24AAD254331 Build Date 2/80
 NHTSA No. 308-34-492 Color Blue
 Engine Data: 4 cylinders 105 in³ displacement
 Transmission Data: 4 speed (x) Manual () Automatic
 Date Vehicle Received by Laboratory May 8, 1980
 Dealer's Name & Address Delivered by NHTSA

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

Vehicle Manufactured by Chrysler Corporation
 Date of Manufacture 2/80 VIN ML 24AAD254331
 GVRW 3195 lbs GAWR: Front 1765 lbs Rear 1480 lbs

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

Vehicle Load (up to capacity) - Front 35 psi
 Rear 35 psi
 Recommended Tire Size P175/75R13
 Vehicle Capacity: Types of Seats Bench X Bucket Split Bench
 Number of Occupants (Designated Seating Capacity): 2 Front
 2 Rear
 4 TOTAL
 Cargo Load = 115 lbs
 TOTAL = 715 lbs

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

Right Front = 720 lbs Right Rear = 450 lbs
 Left Front = 700 lbs Left Rear = 430 lbs
 TOTAL FRONT WEIGHT = 1420 lbs (61.7 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 880 lbs (38.3 % of Total Vehicle Weight)
 TOTAL DELV. WEIGHT = 2300 lbs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 132 lbs CARGO

Right Front = 780 lbs Right Rear = 600 lbs
 Left Front = 810 lbs Left Rear = 570 lbs
 TOTAL FRONT WEIGHT = 1590 lbs (57.6 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1170 lbs (42.4 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 2760 lbs
 Weight of ballast secured in vehicle trunk area = 0 lbs

Table 5
SUMMARY OF TEST CONDITIONS (Cont'd)

Vehicle No. 2 Horizon

TEST CONDITIONS

Date of Test 5/15/80 Time of Test 1340 am/pm
Ambient Temperature 59 °F at impact area
Temperature in Occupant Compartment 71 °F
Impact Velocity 35.08 mph

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude:	RF <u>26</u>	LF <u>26.5</u>	RR <u>25.8</u>	LR <u>25.8</u>
Test Attitude:	RF <u>25</u>	LF <u>25.4</u>	RR <u>24.0</u>	LR <u>24.1</u>

VEHICLE TIRE DATA

Recommended Cold Tire Pressure: Front = 35 psi Rear = 35 psi
Recommended Tire Size P175/75R13
Tires on Vehicle P175/75R13 Firestone
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
EPA Capacity 13 gal
Test Volume 12.1 gal (93% of EPA Capacity)
Fuel System Capacity (data from Owner's Manual) 13 gal
Details of fuel system Fuel tank is located forward of rear axle and held in place with two tank straps. Filler tube is on right side of vehicle and sealed with a twist-type cap.

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 No

VEHICLE CRUSH

Overall Length of Test Vehicle: Pre-Test = R 170.1 /L 170.1 inches
Post-Test = R 150.8 /L 151.1 inches
Crush = R 19.3 /L 19.0

SECTION 3

COMPLIANCE-RELATED INFORMATION

Although testing for compliance to FMVSS Numbers 212, Windshield Mounting, 219, Windshield Intrusion and 301-75, Fuel System Integrity, are not required for car-to-car impacts, observations regarding these federal regulations will be reported.

These observations are based on incomplete data, due to the fact that specific testing procedures for determining compliance to these regulations were not required (i.e., no roll-over testing for 301-75, no windshield template placement for 219) and, as such, are not to be considered absolute. Nevertheless, the following compliance-related observations are:

Vehicle Number 1 - Ford Mustang

FMVSS - 212 (Pass) - There was no contact of any vehicle component outside of the occupant compartment (except windshield molding and other components designed to be normally in contact with the windshield) in the area designated for placement of the styrofoam template or in that portion of the windshield within the daylight opening which would be under the template.

FMVSS - 219 (Pass) - There was greater than 75 percent retention of the windshield periphery.

FMVSS - 301-75 (Pass) - No fuel leakage was evident after impact for a period of at least 30 minutes.

Vehicle Number 2 - Plymouth Horizon

FMVSS - 212 (Fail) - The hood penetrated the inner surface of the windshield in the area of the daylight opening beneath the area designated for styrofoam template placement and would most likely have penetrated the styrofoam template also.

FMVSS - 219 (Pass) - Windshield retention was greater than 75 percent.

FMVSS - 301-75 (Pass) - No fuel leakage was observed for at least 30 minutes after impact.

SECTION 4

OCCUPANT AND VEHICLE INFORMATION

4.1 Narrative Summary of Occupant Responses

Vehicle Number 1, the Ford Mustang and Vehicle Number 2, the Chrysler-Plymouth Horizon were both occupied by Part 572 50th percentile male Anthropometric Test Devices (ATDs) in the driver and right front passenger seating locations. These ATDs had been positioned in the respective vehicles according to the dummy placement procedures specified in Laboratory Procedure TP-212-02 and documented in "Test Plan for New Car Assessment, Car-to-Car Crash Tests," Calspan Report No. 6525-V-101. All dummies were secured in the vehicles by means of the production three-point belt systems. Owner's Manual Restraint System operating Instructions for Vehicles 1 and 2 are found in Figures 7 and 8, respectively.

The ATDs were instrumented with triaxial accelerometer packages in the head and chest regions and load cells in each femur. Belt loads were measured on the lap and shoulder belts. All ATDs had been certified immediately preceding the crash test and certification data are available in Appendix C.

Vehicle Number 1 - Mustang

The Mustang driver complied with all FMVSS 208 injury criteria values. His head brushed the roof and struck the top of the steering wheel deforming the steering wheel top and forcing the steering column downward. The wheel was turned 30 degrees to the left, post-impact. Both driver knees contacted the instrument panel. After impact the driver was in a normal upright position. The torso belt, although twisted at the D-ring, was in the typical usage position. The lap belt had twisted but did not rope or penetrate the abdominal area. Three and one-half inches of spool-off were measured and the belt webbing was jammed in the retractor.

The Mustang's right front passenger failed to comply with FMVSS 208 HIC number criterion (HIC = 1967). This high HIC number was calculated over a short period (less than 2 msec) when the passenger's head contacted his right knee. (See Appendix B, pages B-37 through B-40). Both knees of the passenger ATD struck the instrument panel and his head struck the roof on rebound. Post-impact examination indicated no roping or penetration of the three-point belt. The belt had jammed in the retractor, was twisted at the D-ring and three and one-half inches of spool-off were measured.

Vehicle Number 2 - Plymouth Horizon

Both the driver and the right front passenger in the Horizon failed the FMVSS 208 HIC number criterion and the driver also failed the chest resultant criterion of 60 g (60.7 g).

The driver's head struck the top of the steering wheel causing significant steering wheel deformation (Figure A-26) and his chest struck the lower rim. The steering wheel hub cover was knocked off by face contact. Both knees contacted the instrument panel with the left knee also contacting the steering column probably causing some upward force. There was no noticeable roping or penetration of the three-point belt system.

The right front passenger's head contacted the upper instrument panel generating a HIC number of 2096. The torso belt scraped along the passenger's face leaving red chalk on the belt. The shirt material near the ATD's neck was found melted into the torso belt. Both of the ATD's knees contacted the dash panel, his left knee contacted his head and his right knee contacted the right side of his chest. No roping or penetration of the three-point belt system was evident.

Post-impact spool-off was measured at one and three-quarter inches for the driver and three inches for the passenger. Because neither retractor was jammed, some of the spooled-off webbing may have retracted before these measurements were taken.

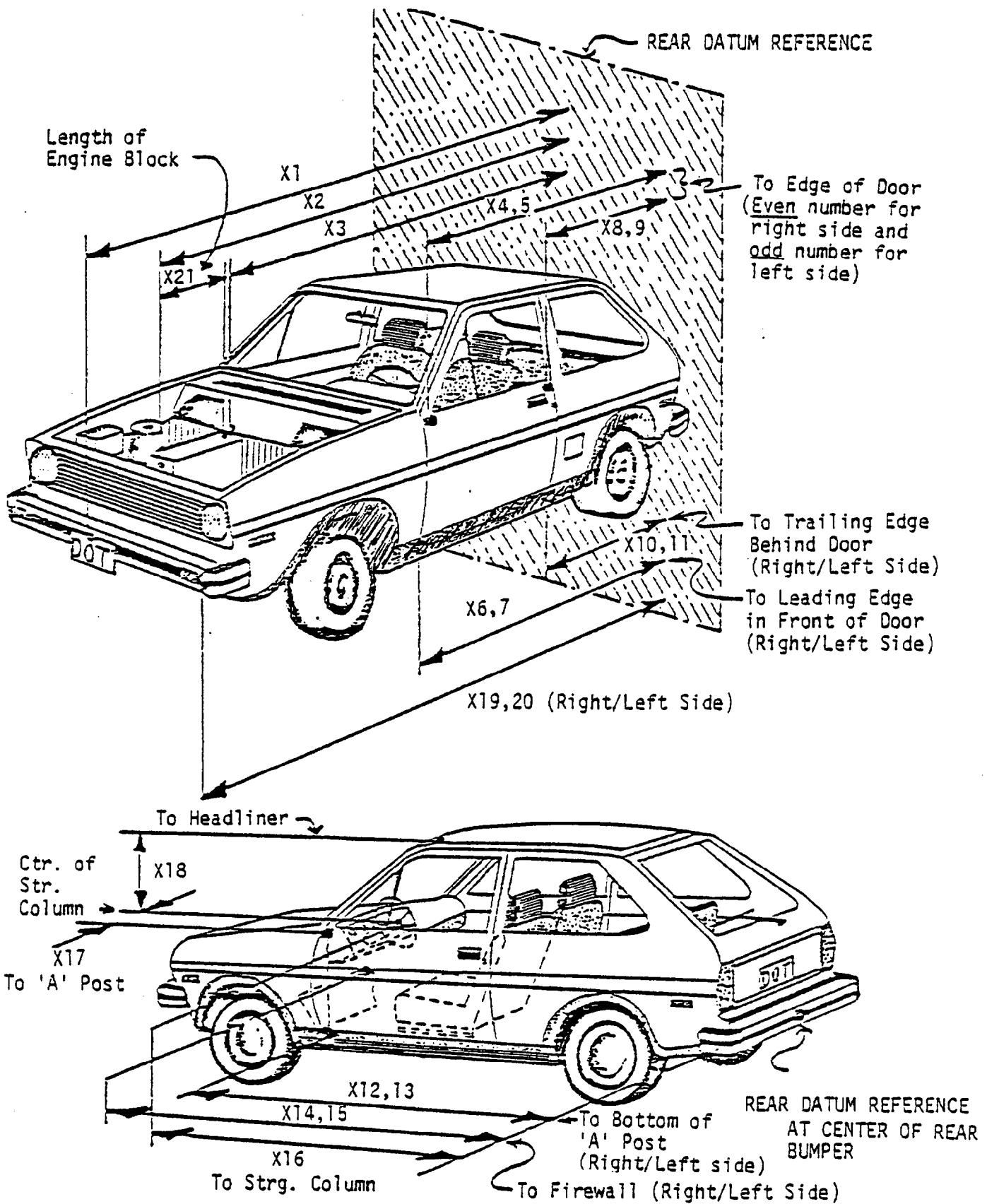


FIGURE 1 PRE-TEST AND POST-TEST MEASUREMENT POINTS

Table 6

VEHICLE MEASUREMENTS

All Dimensions in Inches

NO.	Vehicle No. 1	1980 FORD MUSTANG	Pre-Test	Post-Test	Difference
X1, X1'	Total Length of Vehicle at Centerline*		178.0/178.8	155.2	22.8
X2	Rear Surface of Vehicle to Front of Engine		150.0	146.0	4
X3	Rear Surface of Vehicle to Firewall		127.2	124.4	2.8
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door		112.0	111.1	.9
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door		112.0	111.7	.3
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door		115.2	114.9	.3
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door		115.2	115.1	.1
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door		64.8	64.1	.7
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door		64.8	64.8	0.
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door		64.6	64.2	.4
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door		64.5	64.5	0
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side		114.3	113.7	.6
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side		114.3	114.0	.3
X14	Rear Surface of Vehicle to Firewall - Right Side		127.6	124.4	3.2
X15	Rear Surface of Vehicle to Firewall - Left Side		128.6	125.8	2.8
X16	Rear Surface of Vehicle to Steering Column		100.8	98.4	2.4
X17	Center of Steering Column to "A" Post		16.9	15.3	1.6
X18	Center of Steering Column to Headliner		17.6	20.0	-2.4
X19, X19	Rear Surface of Vehicle to Right Side of Front Bumper		173.6/174.5	152.6	21.0
X20, X20	Rear Surface of Vehicle to Left Side of Front Bumper		173.5/174.4	148.8	24.7
X21	Length of Engine Block		21.5	21.5	0
X22	Dash to Base of Rear Window		79.9	77.6	2.3

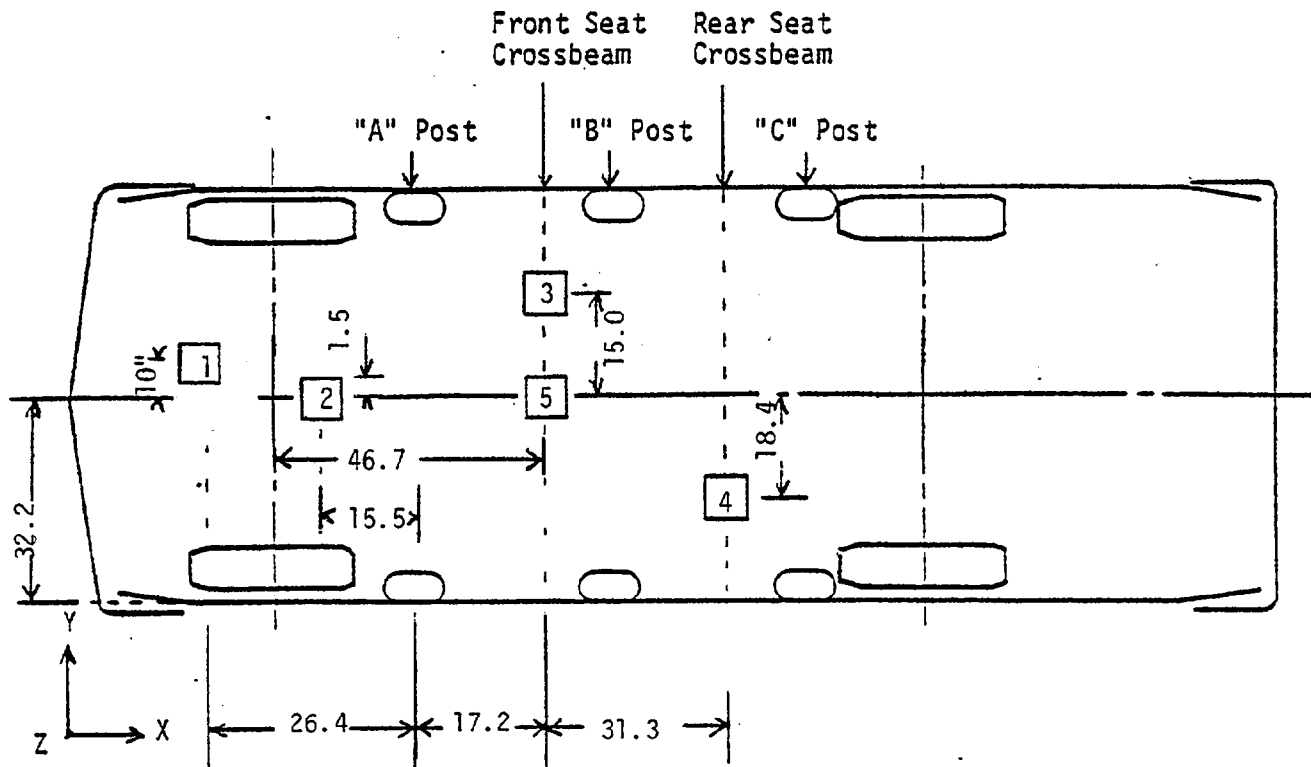
* X1, X19, X20 measured to soft bumper backing plate. X1', X19', X20' measured to front of soft bumper. Post-measurements taken to backing plate.

VEHICLE MEASUREMENTS

All Dimensions in Inches

NO.	Vehicle No. 1980 PLYMOUTH HORIZON	Pre-Test	Post-Test	DIFF.
X1, X1'	Total Length of Vehicle at Centerline*	170.1/173.1	148.9	21.2
X2	Rear Surface of Vehicle to Front of Engine	145.9	133.1	12.8
X3	Rear Surface of Vehicle to Firewall	129.7	121.4	8.3
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	112.0	110.8	1.2
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	112.0	111.5	.5
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	114.3	112.8	1.5
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	114.3	113.2	1.1
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	67.4	67.1	.3
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	67.2	67.1	.1
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	66.4	65.0	1.4
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	66.4	65.3	1.1
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	114.5	114.1	.4
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	114.4	113.8	.6
X14	Rear Surface of Vehicle to Firewall - Right Side	128.4	120.8	7.6
X15	Rear Surface of Vehicle to Firewall - Left Side	126.9	120.0	6.9
X16	Rear Surface of Vehicle to Steering Column	102.9	97.9	5.0
X17	Center of Steering Column to "A" Post	14.4	13.3	1.1
X18	Center of Steering Column to Headliner	18.5	13.6	4.9
X19, X19'	Rear Surface of Vehicle to Right Side of Front Bumper*	170.1/171.4	150.8	19.3
X20, X20'	Rear Surface of Vehicle to Left Side of Front Bumper*	170.1/171.4	151.1	19.0
X21	Length of Engine Block	18.5	18.5	0
X22	Dash to Trunk Lock	102.5	100.3	2.2

* X1, X19, X20 measured to soft bumper backing plate. X1', X19', X20' measured to front of soft bumper. Post-measurements taken to backing plate.



ACCELEROMETER NUMBER *	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	ENGINE	X		X
2	FIREWALL AT VEHICLE CENTERLINE	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 - MUSTANG

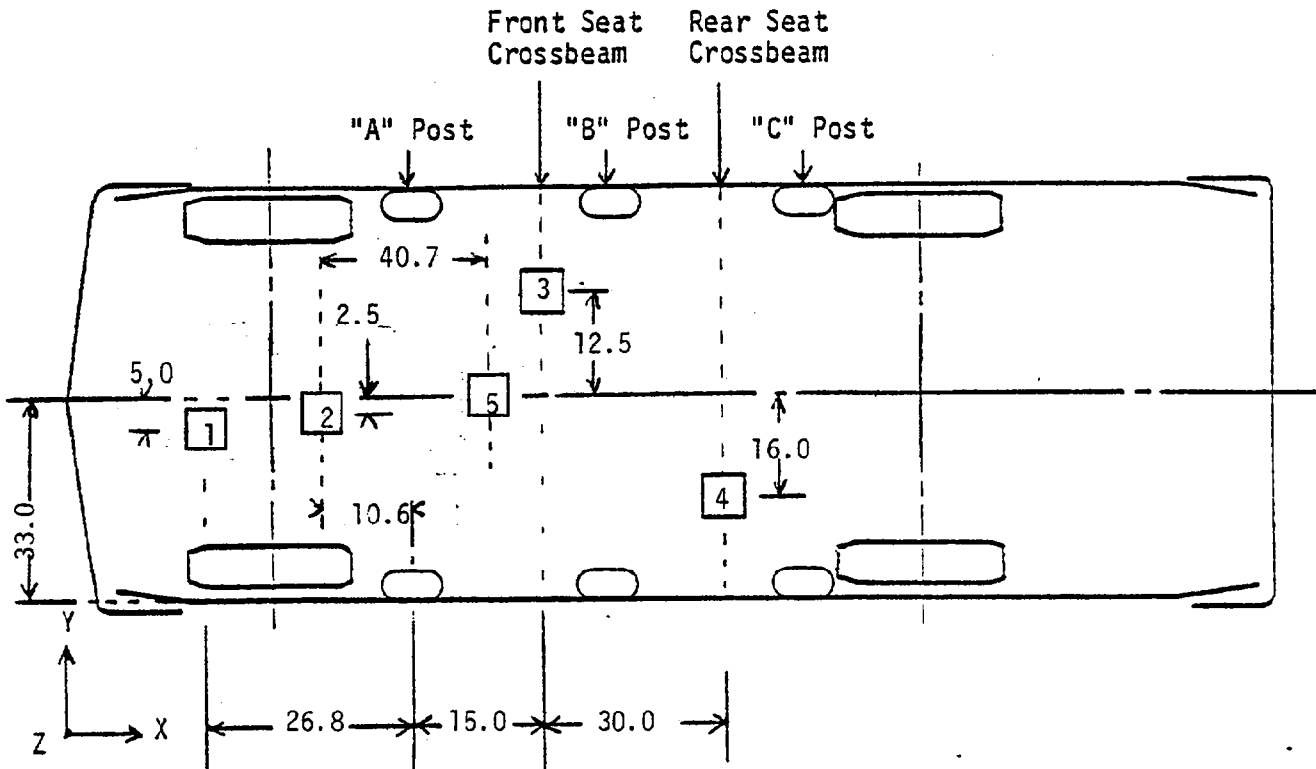
Vehicle No. 1 - MUSTANG

TRANSDUCER DESCRIPTION OR ACCELEROMETER LOCATION *	DIRECTION OF PARAMETER BEING MEASURED	LOCATION ON VEHICLE	DESCRIPTION LISTED ON DATA PLOTS
<u>VEHICLE ACCELEROMETERS</u>			
1	X, Z	Engine	Veh. #1 Acc. Pack #1
2	X, Z	Firewall at Centerline	Veh. #1 Acc. Pack #2
3	X	Front Seat Crossmember	Veh. #1 Acc. Pack #3
4	X	Rear Seat Crossmember	Veh. #1 Acc. Pack #4
5	X, Y, Z	C/G of Vehicle	Veh. #1 Acc. Pack #5
<u>DUMMY</u>			
<u>DRIVER POSITION 1</u>			
Head	X, Y, Z	Left Front Seat	Veh. #1 Pos. #1 Head
Chest	X, Y, Z	Left Front Seat	Veh. #1 Pos. #1 Chest
Femur	R, L**	Left Front Seat	Veh. #1 Pos. #1 Femur
Belts	U, L***	Left Front Seat	Veh. #1 Pos. #1 Belts
<u>RF PASSENGER POSITION 2</u>			
Head	X, Y, Z	Right Front Seat	Veh. #1 Pos. #2 Head
Chest	X, Y, Z	Right Front Seat	Veh. #1 Pos. #2 Chest
Femur	R, L**	Right Front Seat	Veh. #1 Pos. #2 Femur
Belts	U, L***	Right Front Seat	Veh. #1 Pos. #2 Belts

*See Accelerometer Layout Diagram Figure 2.

**Right and Left Femur Forces

***Upper and Lower Belt Forces



ACCELEROMETER NUMBER *	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	ENGINE	X		X
2	FIREWALL AT VEHICLE CENTERLINE	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 - HORIZON

ELECTRONIC INSTRUMENTATION TEST

Vehicle No. 2 - HORIZON

TRANSDUCER DESCRIPTION OR ACCELEROMETER LOCATION*	DIRECTION OF PARAMETER BEING MEASURED	LOCATION ON VEHICLE	DESCRIPTION LISTED ON DATA PLOTS
<u>VEHICLE ACCELEROMETER</u> 1 2 3 4 5	X, Z X, Z X X X, Y, Z	Engine Firewall at Centerline Front Seat Crossmember Rear Seat Crossmember C/G of Vehicle	Veh. #2 Acc. Pack #1 Veh. #2 Acc. Pack #2 Veh. #2 Acc. Pack #3 Veh. #2 Acc. Pack #4 Veh. #2 Acc. Pack #5
<u>DUMMY</u> <u>DRIVER POSITION 1</u> Head Chest Femur Belts	X, Y, Z X, Y, Z R, L** U, L***	Left Front Seat Left Front Seat Left Front Seat Left Front Seat	Veh. #2 Pos. #1 Head Veh. #2 Pos. #1 Chest Veh. #2 Pos. #1 Femur Veh. #2 Pos. #1 Belts
<u>RF PASSENGER POSITION 2</u> Head Chest Femur Belts	X, Y, Z X, Y, Z R, L** U, L***	Right Front Seat Right Front Seat Right Front Seat Right Front Seat	Veh. #2 Pos. #2 Head Veh. #2 Pos. #2 Chest Veh. #2 Pos. #2 Femur Veh. #2 Pos. #2 Belts

* See Accelerometer Layout Diagram Figure 3.

*** Upper and Lower Belt Forces

** Right and Left Femur Forces

NOTE: Camera Information Shown on Tables 10 and 11

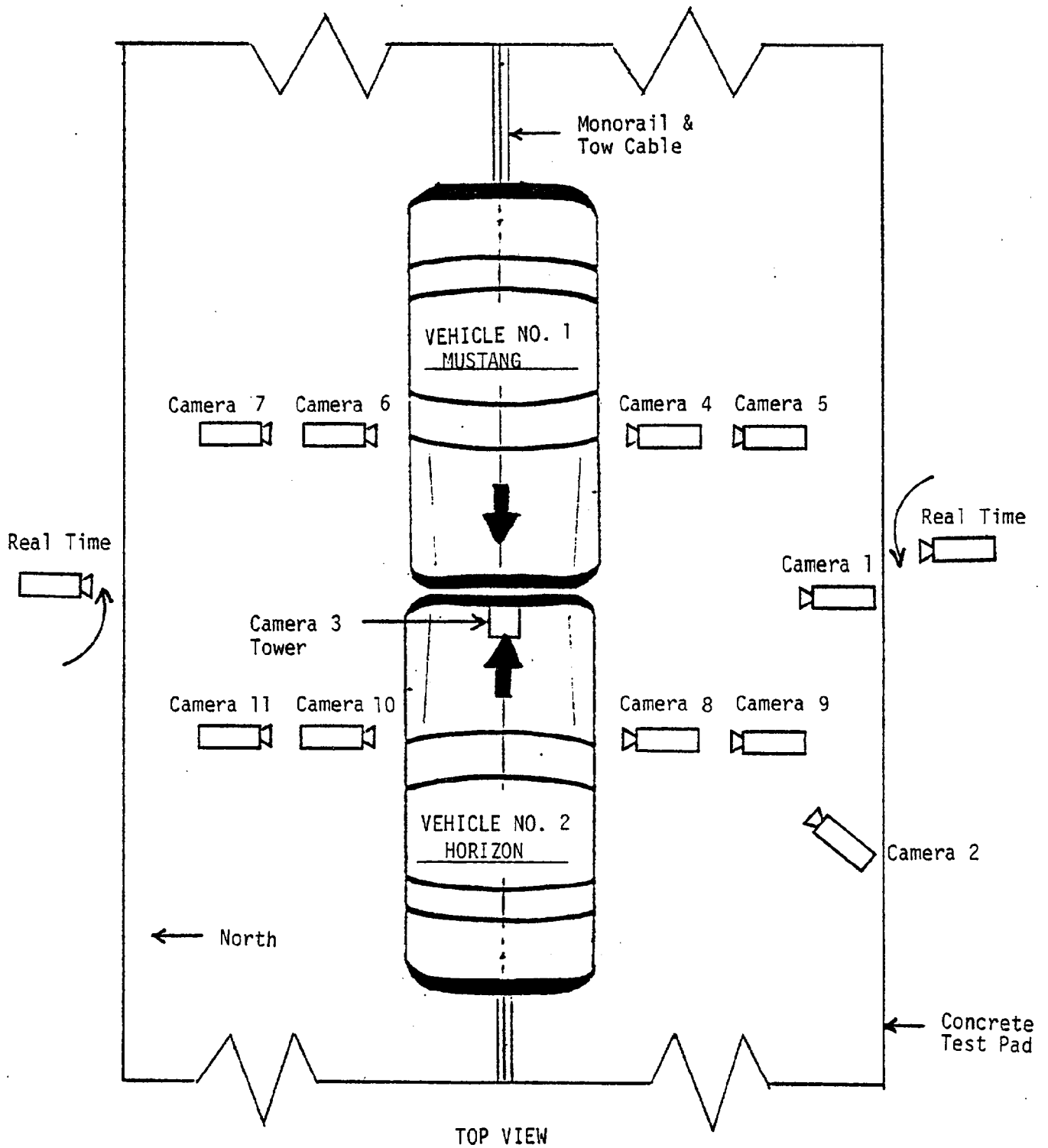


FIGURE 4 CAMERA POSITION FOR FRONTAL IMPACTS

Table 10

HIGH SPEED CAMERA LOCATIONS

Test No. 308-34-492 Vehicle 1 MUSTANG
 Vehicle 2 HORIZON

CAMERA NUMBER	VIEW	CAMERA POSITIONS (IN)*			CAMERA ANGLE (DEG)**	FILM PLANE TO HEAD TARGET (IN) X
		X	Y	Z		
1	Impact Event	517	32	42	- 3	
2	Impact Event, 45° angle	210	225	125	-17	
3	Overhead Tower	0	75	388	-79	
4	Vehicle 1 - driver	162	58	41	- 4.5	141.5
5	Redundant for Camera 4	289	59	65.5	- 7.5	268.5
6	Vehicle 1 - right front passenger	160	48	41	- 2	139.5
7	Redundant for Camera 6	242	43	71.5	-11	221.5
8	Vehicle 2 - right front passenger	167	73	40.5	- 5	147.25
9	Redundant for Camera 8	249	91	65	- 7.5	229.2
10	Vehicle 2 - driver	160	69	41	- 1.5	140.2
11	Redundant for Camera 10	246	78	68	-11.5	226.2

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

** Referenced to horizontal plane

Table 11
CAMERA INFORMATION
 (Test 34)

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)
1	IMPACT	PHOTOSONIC	13	900
2	TOWER, 45°	PHOTOSONIC	13	900
3	TOWER	PHOTOSONIC	13	1000
4	MUSTANG - DRIVER	PHOTOSONIC	13	900
5	MUSTANG - DRIVER (redundant)	PHOTOSONIC	25	900
6	MUSTANG - RF PASS.	PHOTOSONIC	13	900
7	MUSTANG - RF PASS. (redundant)	PHOTOSONIC	25	900
8	HORIZON - RF PASS.	PHOTOSONIC	13	900
9	HORIZON - RF PASS. (redundant)	PHOTOSONIC	25	1000
10	HORIZON - DRIVER	PHOTOSONIC	13	900
11	HORIZON - DRIVER (redundant)	PHOTOSONIC	25	900

NOTE: Cameras are numbered according to splicing sequence of film.

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

FIGURE 5
PART 572 DUMMY IN-VEHICLE POSITION

Test No. 2-Door

Vehicle No. 1 - MUSTANG

SEAT TYPE:

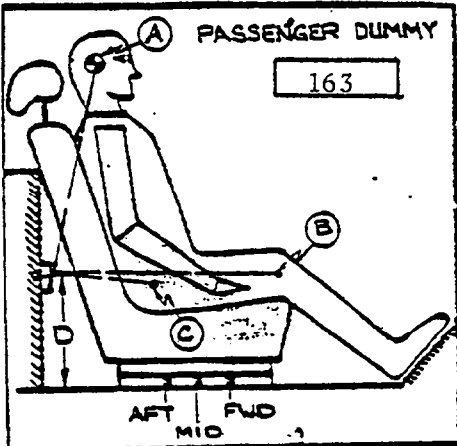
- Bench
 Bucket
 Split Bench

ADJUSTER TYPE:

- Manual
 Power

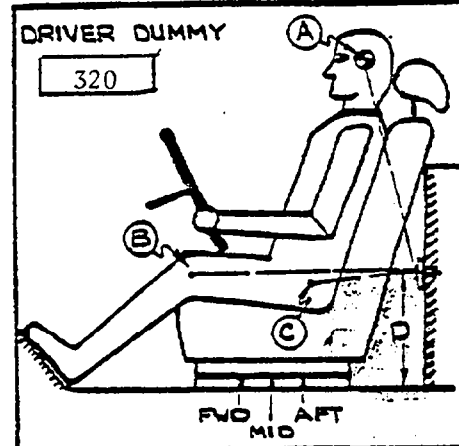
BUCKET SEAT BACK TYPE:

- Fixed
 Adjustable Reclining



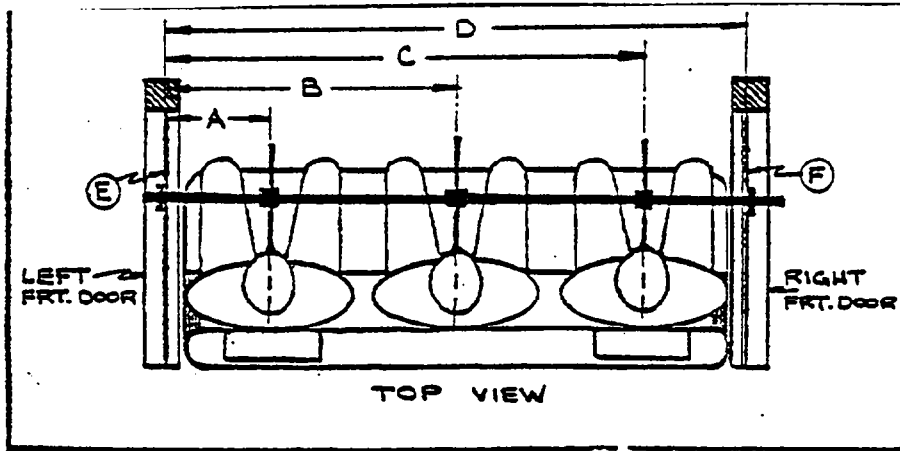
MEASUREMENT LOCATION

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



A =	26-1/4	in.	35	deg.
B =	36-1/4	in.	115	deg.
C =	21-1/4	in.	108	deg.
D =	12	in.		

A =	26-1/2	in.	35	deg.
B =	36-1/4	in.	91	deg.
C =	21-1/4	in.	112	deg.
D =	12	in.		



DUMMY ID

320 -- 163

A =	Left Door to Driver Centerline	13 in.
B =	Left Door to Center Passenger Centerline	-- in.
C =	Left Door to Right Passenger Centerline	41-1/4 in.
D =	Left Door to Right Door	54 in.
E, F =	Window Glass Height (Right and Left Must be Equal)	8-3/4 in.

FIGURE 6
PART 572 DUMMY IN-VEHICLE POSITION

Test No. 34

Vehicle No. 2 HORIZON

SEAT TYPE:

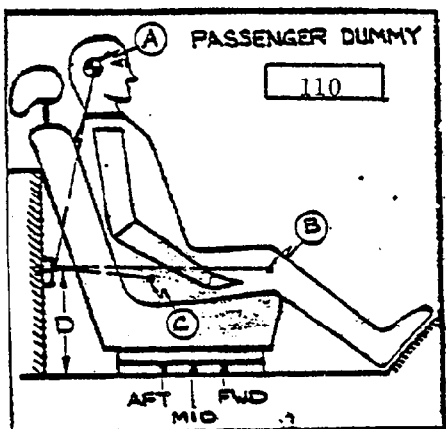
- Bench
 Bucket
 Split Bench

ADJUSTER TYPE:

- Manual
 Power

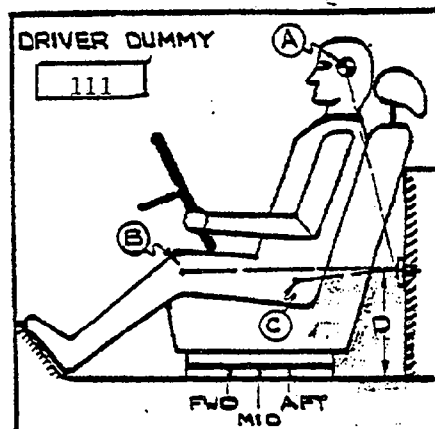
BUCKET SEAT BACK TYPE:

- Fixed
 Adjustable Reclining



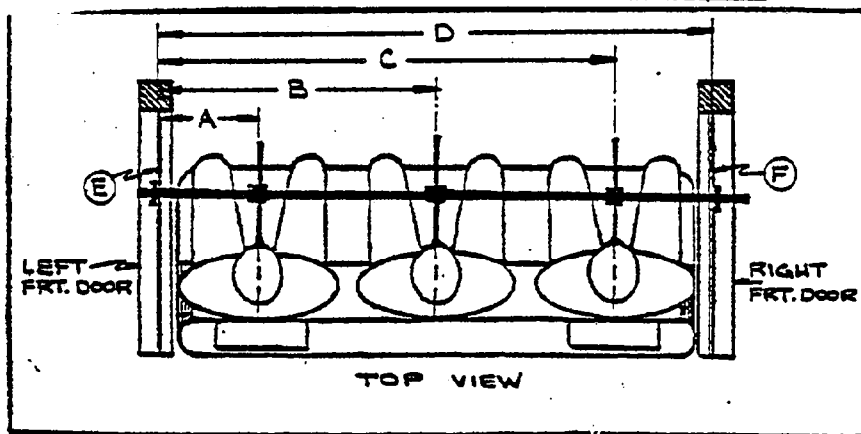
MEASUREMENT LOCATION

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



- A = $23\frac{1}{2}$ in. 35 deg.
 B = $35\frac{1}{2}$ in. 92 deg.
 C = 18 in. 102 deg.
 D = $13\frac{1}{4}$ in.

- A = $22\frac{1}{2}$ in. 34 deg.
 B = $35\frac{1}{4}$ in. 90 deg.
 C = $18\frac{1}{2}$ in. 110 deg.
 D = $13\frac{1}{4}$ in.



DUMMY ID

111

--

110

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

- $13\frac{1}{4}$ in.
 -- in.
 $39\frac{1}{4}$ in.
 52 in.
 $7\frac{1}{2}$ in.

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.

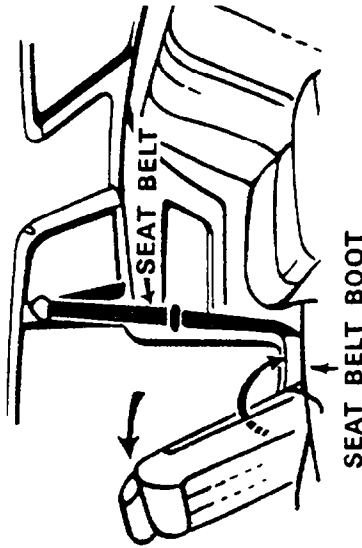
OPTIONAL BELT TENSION RELIEVER

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 ∇ (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 specified 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 7 OWNERS MANUAL RESTRAINT SYSTEM OPERATING INSTRUCTIONS
VEHICLE NO. 1 - MUSTANG

Seats, Seat Belts, Mirrors

Seat Belts

Always use the seat belts. The chance of a serious injury is greatly reduced when the seat belts are properly used.

Seat belts provide protection against being thrown from the vehicle as well as reducing the risk of an injury caused by striking the interior of the vehicle.

The following pages contain the recommended procedures for fastening, adjusting and wearing the belts for maximum comfort and safety.

Front Seats

The "UNIBELT" or single belt restraint system, is installed for the driver and front seat passenger. This system incorporates a vehicle sensitive shoulder belt retractor, designed to lock (i.e. restrict belt travel) only during very sudden stops or impacts. This feature allows the shoulder belt to move freely with the wearer. It will not lock by jerking or pulling the webbing.



UNIBELT OPERATING INSTRUCTIONS

1. Enter the car and adjust the seat.
2. Grasp the metal tip located beside the seat and pull the belt forward across the body so that the shoulder portion of the belt crosses the shoulder and chest.
3. As you pull the metal tip toward the buckle, allow the webbing to slide through the tip. This system will not lock up if you stop or hesitate, so relax and continue to "buckle-up".
4. Slack will automatically be removed due to tension created by the retractor.
5. To release the belt, push the button on the buckle. The belt will automatically return to its stowed position.



DELUXE UNIBELT SYSTEM WITH TENSION RELIEVER AND AUTOMATIC RELEASE (optional)

1. Enter the car and adjust the seat. Note the metal tip of the Unibelt in stowed position high on the vertical pillar - 4-door; or at the guide loop on the headrest - 2-door.

CLOSE DOOR

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

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

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



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

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

The belt will retain the small amount of slack necessary for comfort when you return to your normal seating position. If the belt is still too tight, pull out 6" to 8" of webbing, let it return to your chest and repeat the above motion. **NOTE: The door must be closed to achieve belt tension relief.**

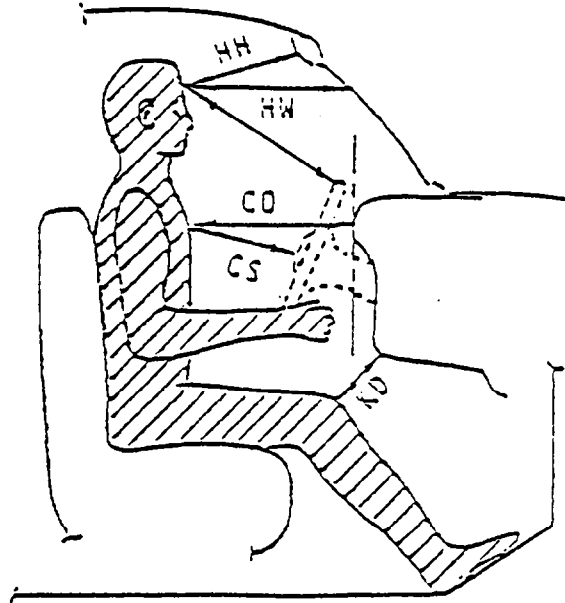
The shoulder belt will allow unrestricted movement under normal conditions. Extreme movements will probably require resetting the slack in the shoulder belt. The belt will lock tightly in the event of an accident.

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

FIGURE 8 OWNER'S MANUAL RESTRAINT SYSTEM OPERATING INSTRUCTIONS

Vehicle #2 Horizon

	<u>DRIVER</u>	<u>PASS</u>
HH	11-1/2	11
HW	17	16-1/2
CD	21-1/2	22-1/4
CS	16	N/A
KDL	6-5/8	7-1/2
KDR	5-7/8	7-1/2
HST	19	



HR	5-1/2	5
HS	6-1/2	6-1/2
AD	4-1/8	5
HD	6	6

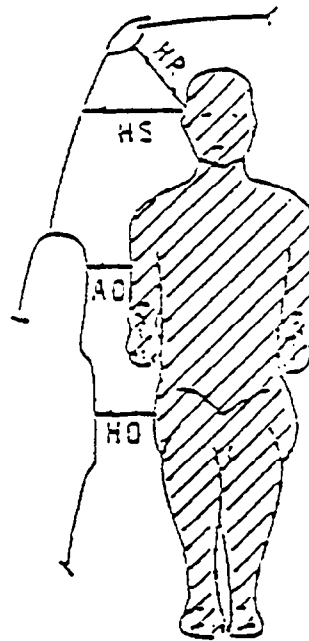
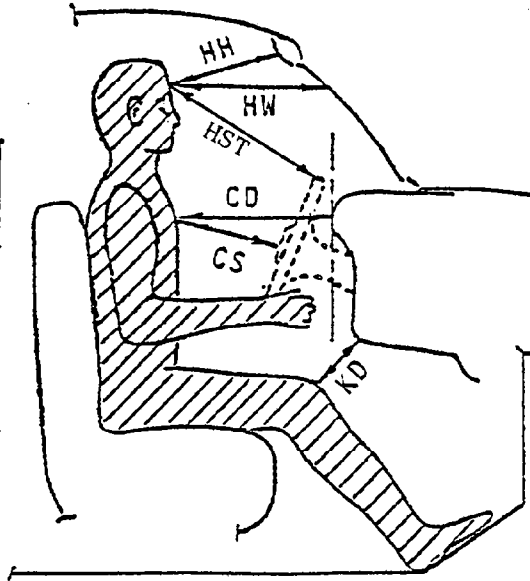


FIGURE 9 OCCUPANT CLEARANCE DIMENSIONS
VEHICLE NO. 1 - MUSTANG

HW	11-1/4	11-1/4
HW	15	15-1/2
CD	20-1/2	24-1/4
CS	18	N/A
KDL	8-1/2	8-3/4
KDR	9-1/4	8-3/4
HST	20-1/2	



HR	5-1/4	5
HS	6-1/4	6-1/4
AD	3-3/4	4-1/4
HD	6-7/8	6-1/2

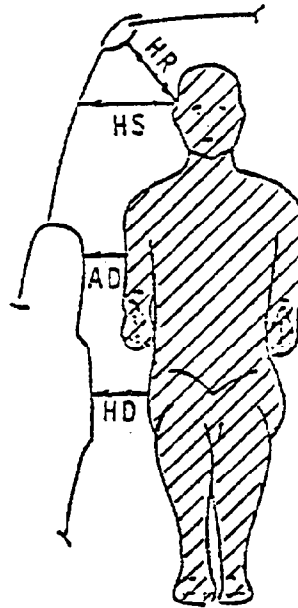


FIGURE 10 OCCUPANT CLEARANCE DIMENSIONS
VEHICLE NO. 2 - HORIZON

Table 12

DUMMY INJURY CRITERIA VALUES
VEHICLE #1 - 1980 FORD MUSTANG

	MAXIMUM ACCELERATION ("G") *							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R
DUMMY (1)	-66	-21	30.1	72.6	-43.4	8.2	-12	44.3
DUMMY (2)	-31.2	42.1	54.4	61.3	-31.1	32.2	17.4	43.6
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	475	525
DUMMY (2)	600	350
DUMMY (3)		
DUMMY (4)		

	MAXIMUM FORCE-SEAT BELTS LOADS (LBS)	
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP BELT LOAD
DUMMY (1)	1340	1280
DUMMY (2)	1360	1480
DUMMY (3)		
DUMMY (4)		

	HEAD INJURY CRITERIA**				SEVERITY INDEX
	HIC	t ₁ (SEC)	t ₂ (SEC)	AVE. ACC. (g) t ₁ TO t ₂	HEAD
DUMMY (1)	704.2	.0789	.1044	59.8	897.7
DUMMY (2)	1967.0	.1053	.1068	280.0	2760.8
DUMMY (3)					
DUMMY (4)					

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

Table 13

DUMMY INJURY CRITERIA VALUES

VEHICLE #2 - 1980 PLYMOUTH HORIZON

	MAXIMUM ACCELERATION ("G") *							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R
DUMMY (1)	-121	15.8	30.2	121	-60.2	9.8	16.7	60.7
DUMMY (2)	-74.4	21.5	109	128	-48.7	14.6	15	52.2
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	1375	1700
DUMMY (2)	675	1300
DUMMY (3)		
DUMMY (4)		

	MAXIMUM FORCE-SEAT BELTS LOADS (LBS)	
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP BELT LOAD
DUMMY (1)	1400	1460
DUMMY (2)	1460	2160
DUMMY (3)		
DUMMY (4)		

	HEAD INJURY CRITERIA**				SEVERITY INDEX
	HIC	t ₁ (SEC)	t ₂ (SEC)	AVE. ACC. (g) t ₁ TO t ₂	HEAD
DUMMY (1)	1816.9	.0693	.0849	106.3	2224.3
DUMMY (2)	2095.7	.0921	.1011	140.2	3649.1
DUMMY (3)					
DUMMY (4)					

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

APPENDIX A

STILL PHOTOGRAPHS

VEHICLE 1 - MUSTANG

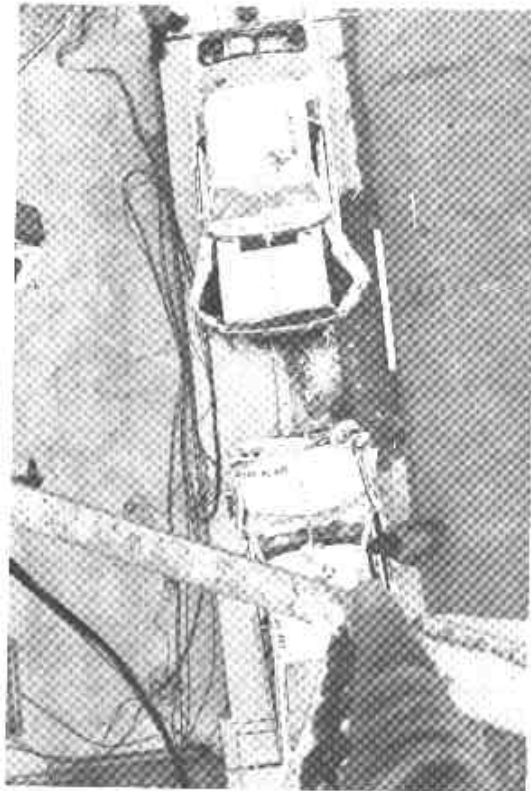
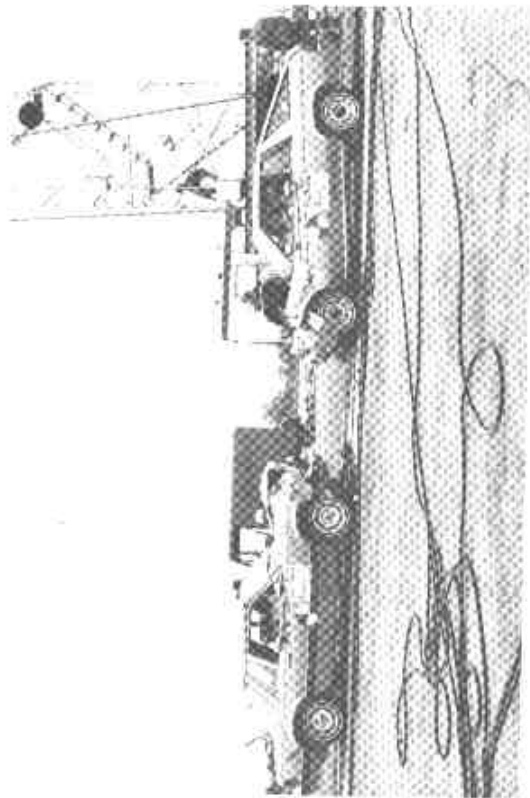
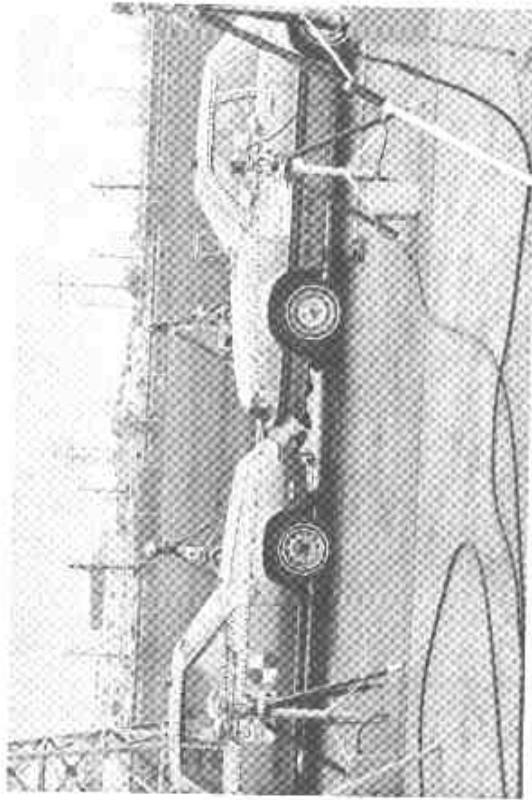


FIGURE A-1 VEHICLES NOS. 1 AND 2 - PRE- AND POST-TEST IMPACT CONFIGURATION

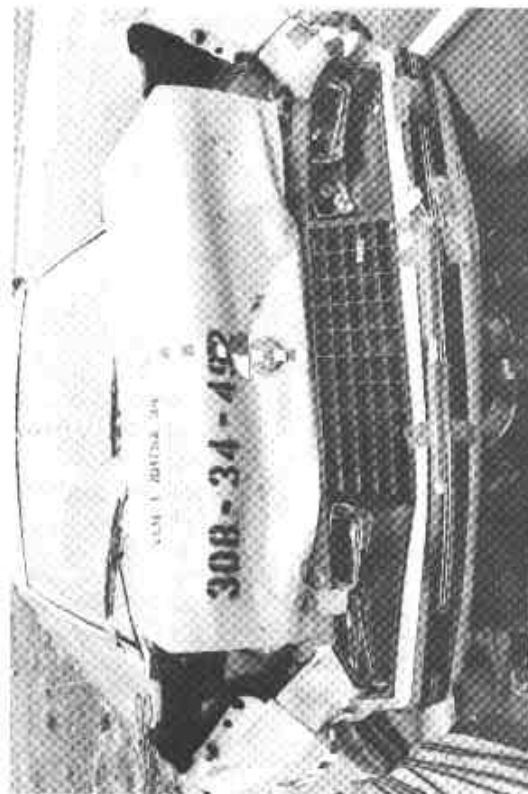
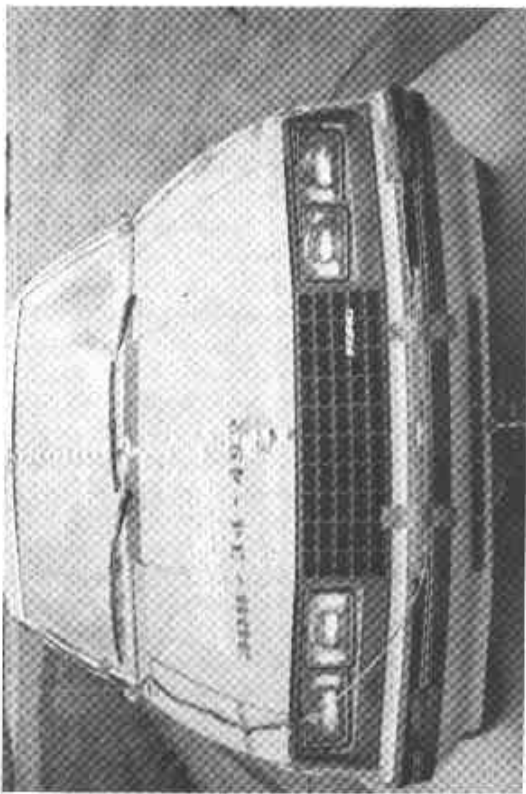
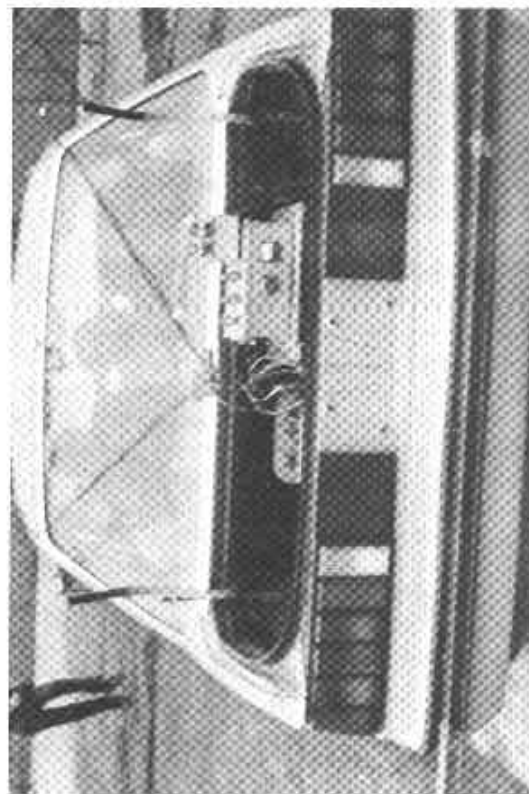
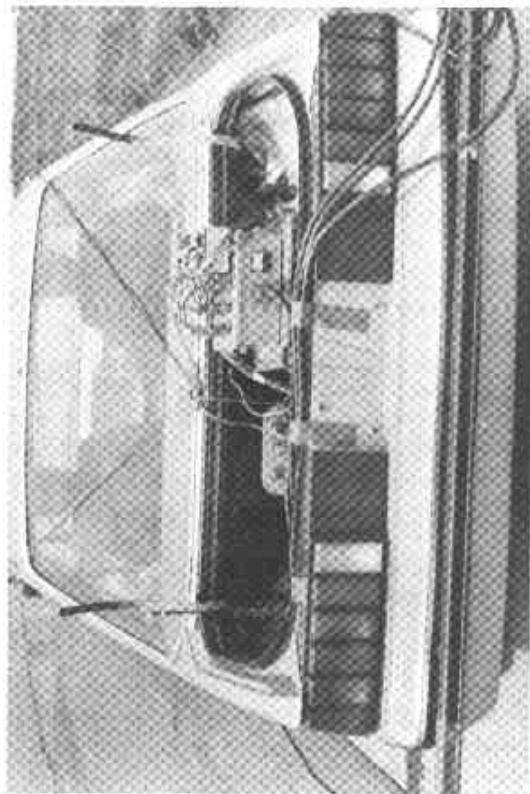


FIGURE A-2 VEHICLE NO. 7 - PRE- AND POST-TEST VIEWS OF FRONT AND REAR

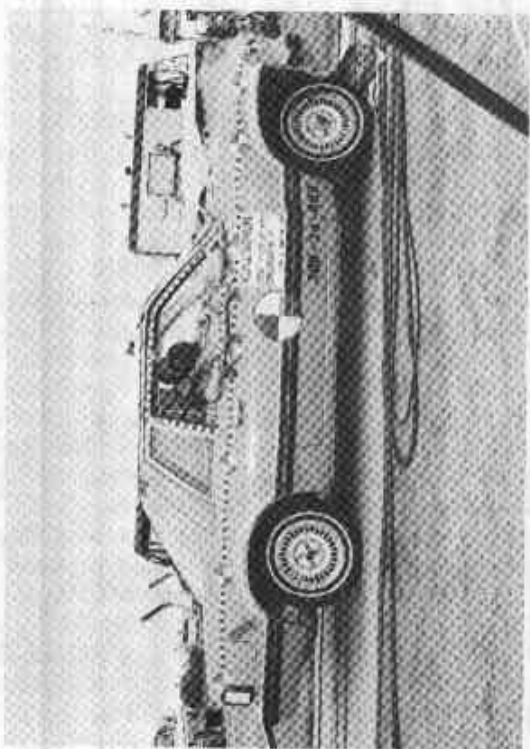
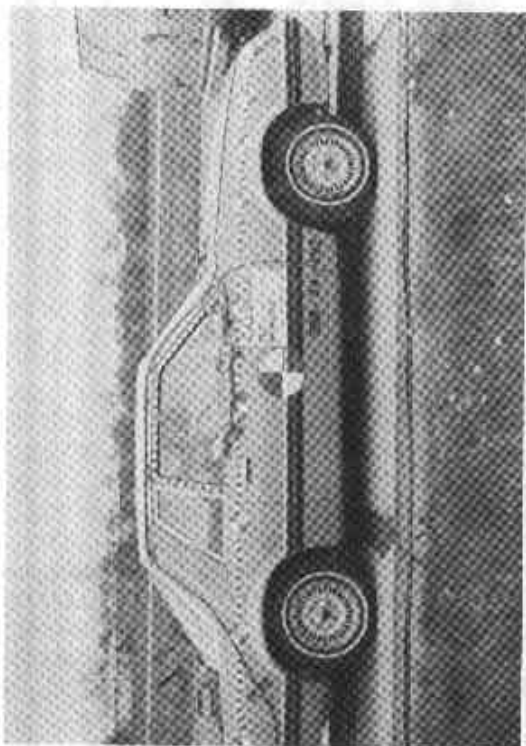
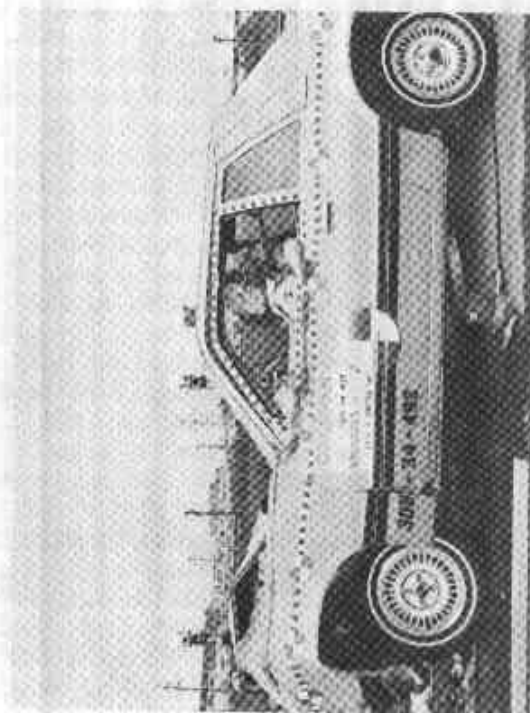


FIGURE A-3 VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT SIDES

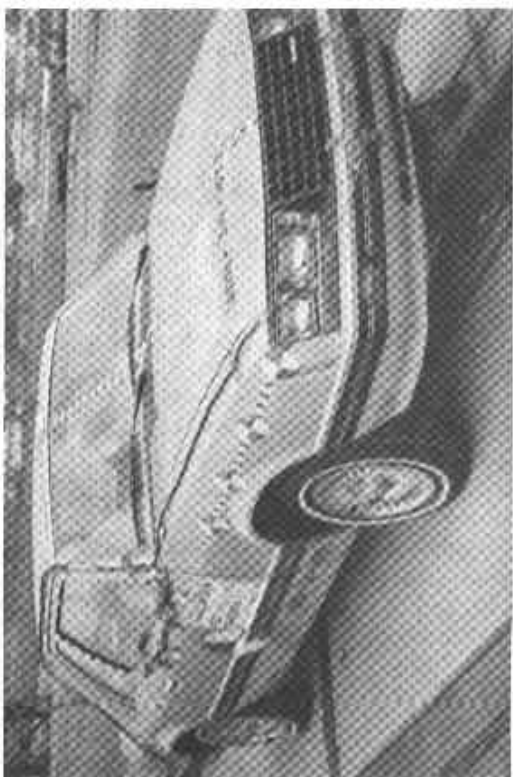


FIGURE A-4 VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF FRONT AND REAR THREE-QUARTER

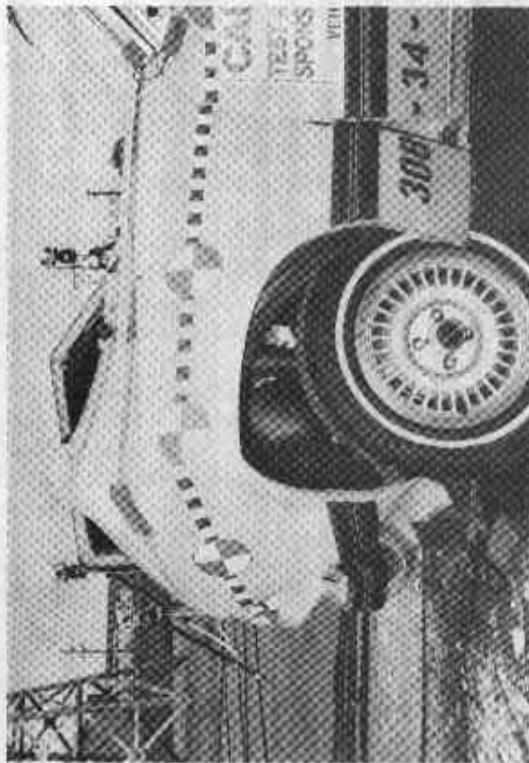
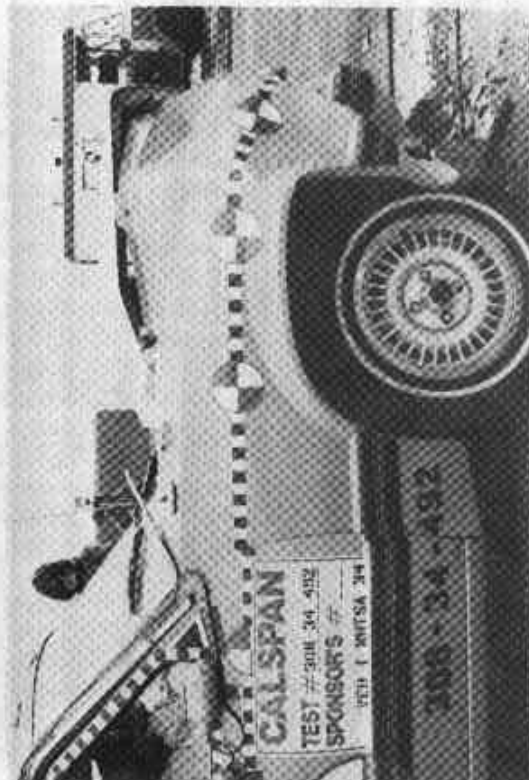
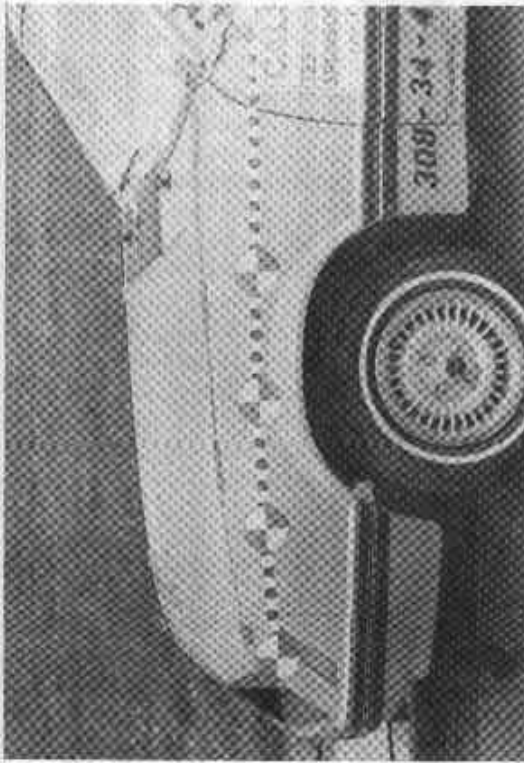
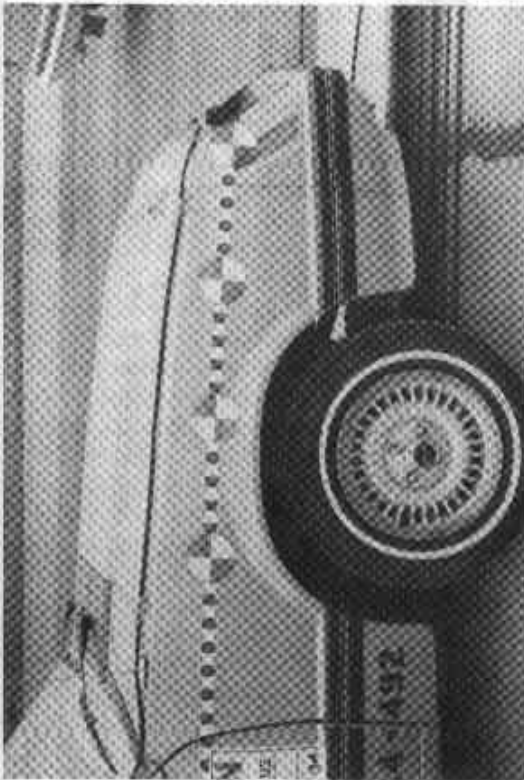


FIGURE A-5 VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT FRONT QUARTER

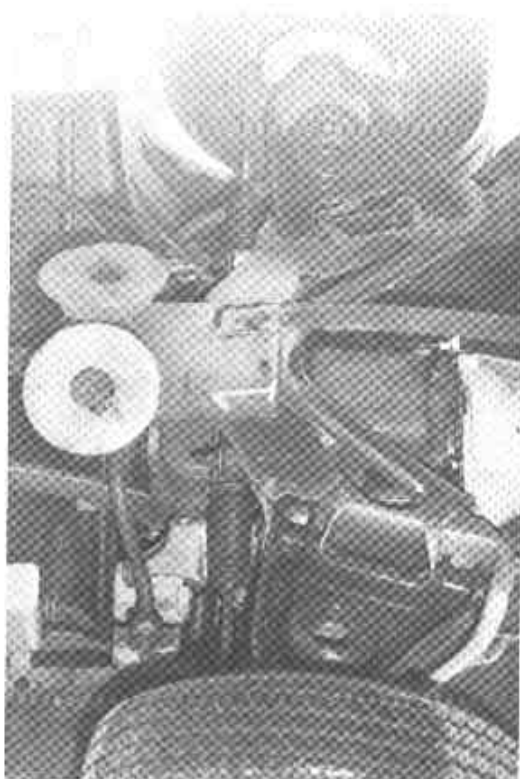
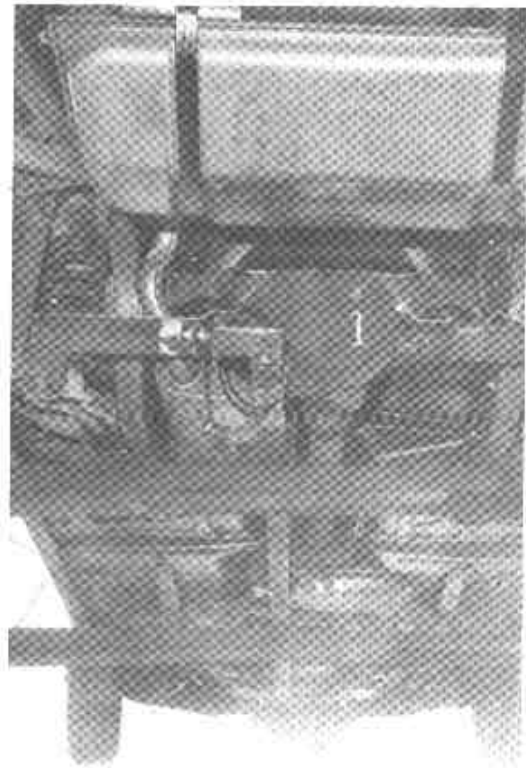
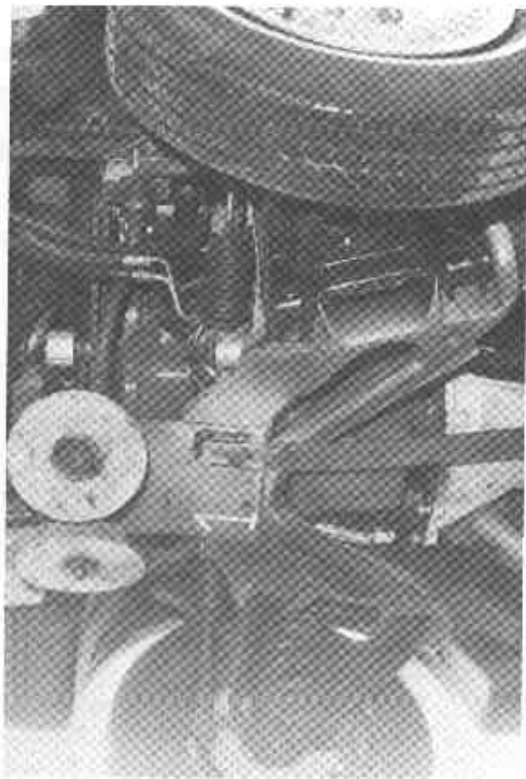


FIGURE A-6 VEHICLE NO. 1 - PRE-TEST VIEWS OF UNDERBODY

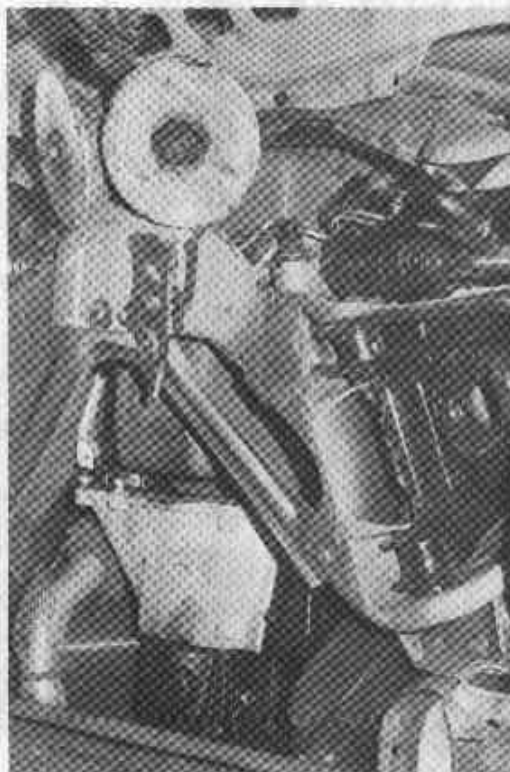
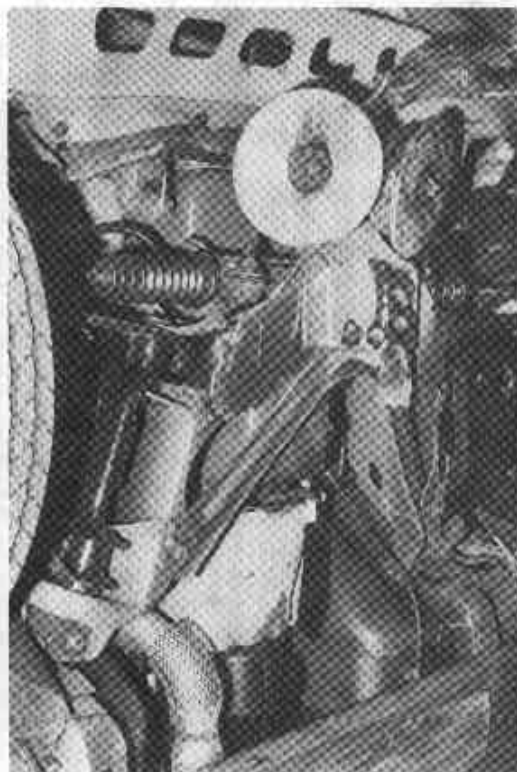
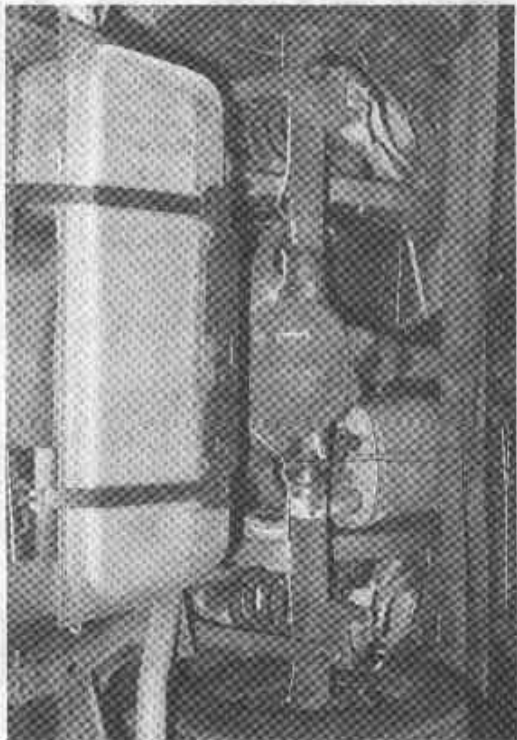


FIGURE A-7 VEHICLE NO. 1 - POST-TEST VIEWS OF UNDERBODY

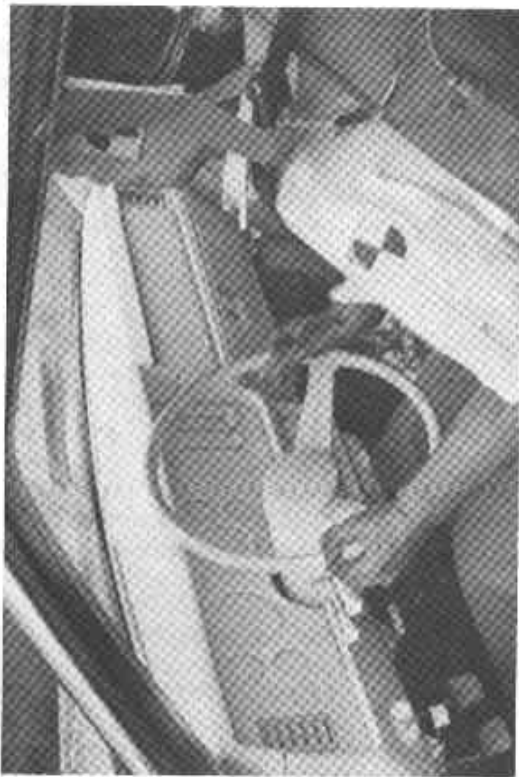
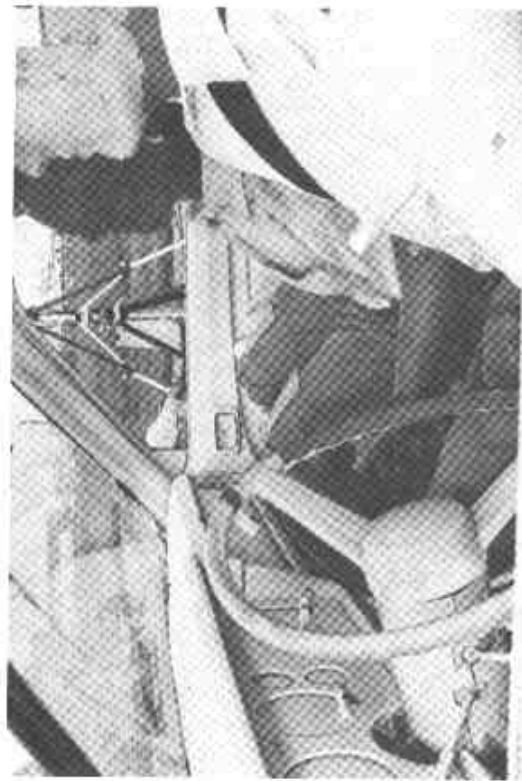


FIGURE A-8 VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF DRIVER POSITION

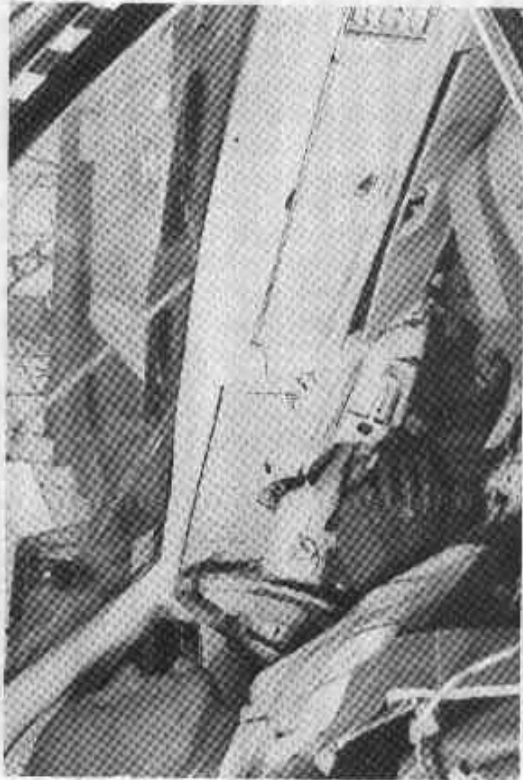
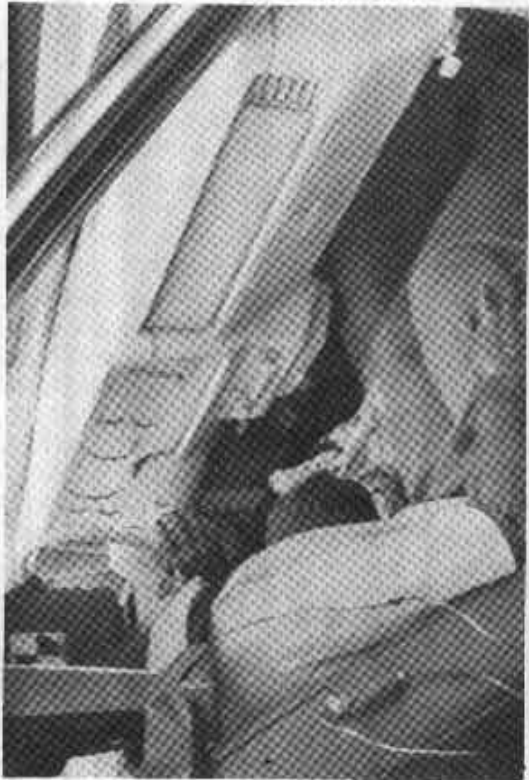


FIGURE A-9 VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF RIGHT FRONT PASSENGER



FIGURE A-10 VEHICLE NO. 1 - POST-TEST VIEWS OF DRIVER AND RIGHT FRONT PASSENGER

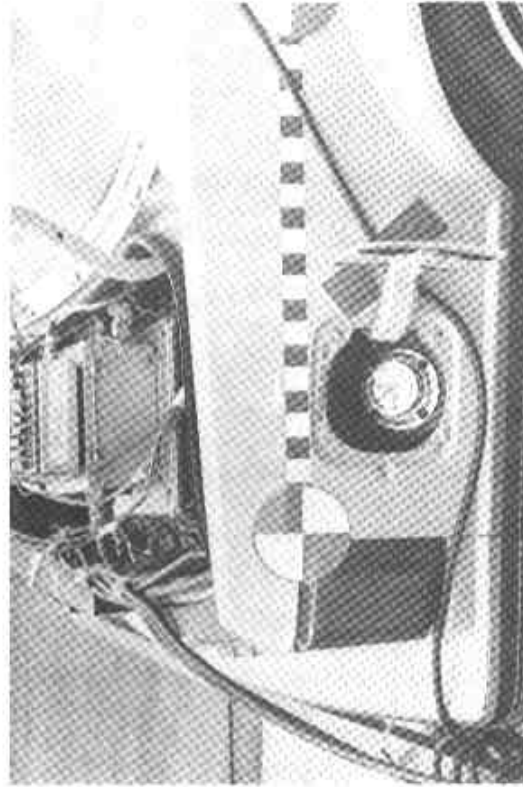


FIGURE A-11 VEHICLE NO. 1 - FUEL TUBE AND CAP

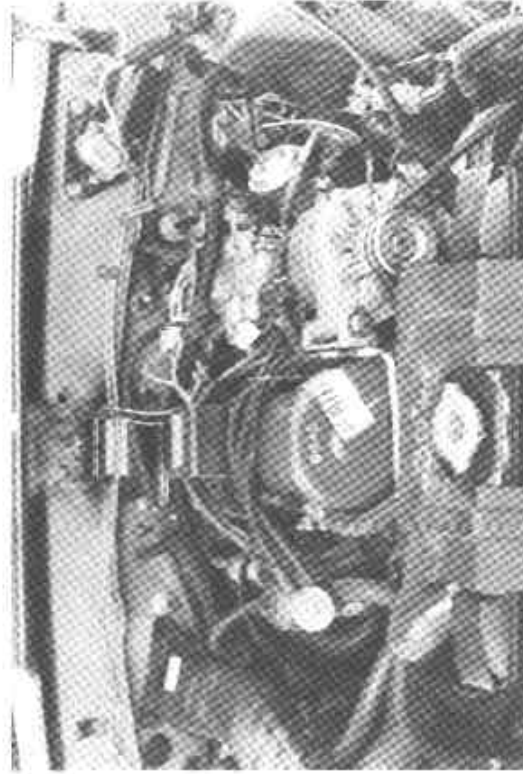


FIGURE A-12 VEHICLE NO. 1 - PRE-TEST ENGINE COMPARTMENT VIEW

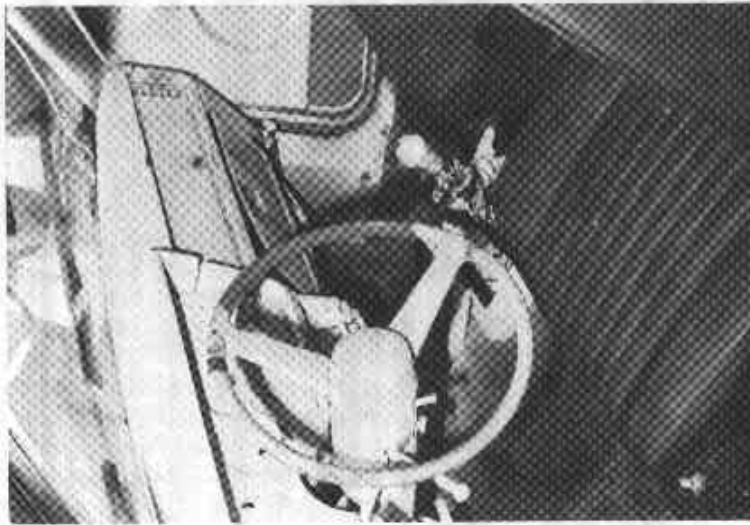
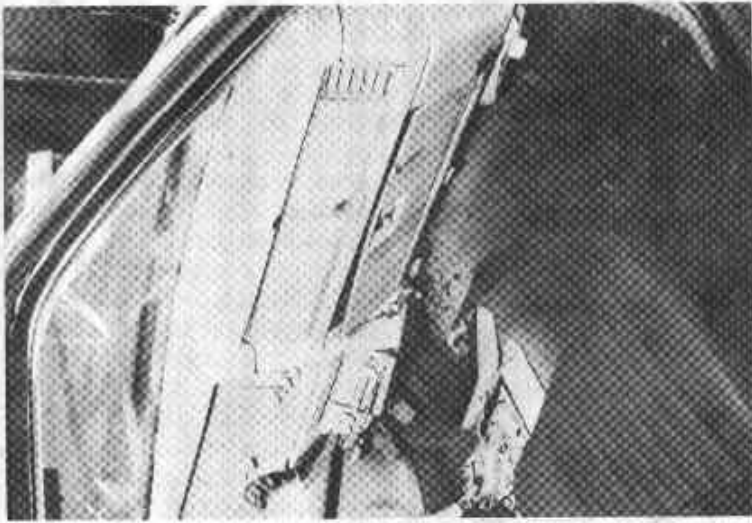


FIGURE A-13 VEHICLE NO. 1 - POST-TEST INTERIOR VIEWS

A-12

6525-V-34

STILL PHOTOGRAPHS

VEHICLE NO. 2 - HORIZON

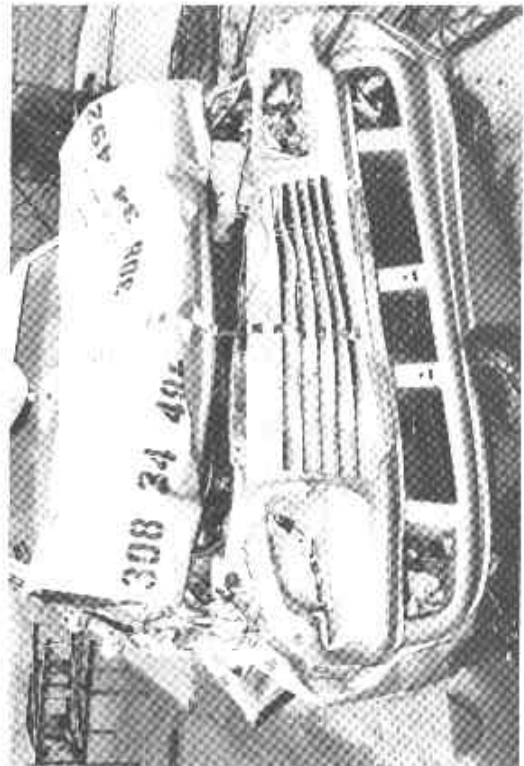
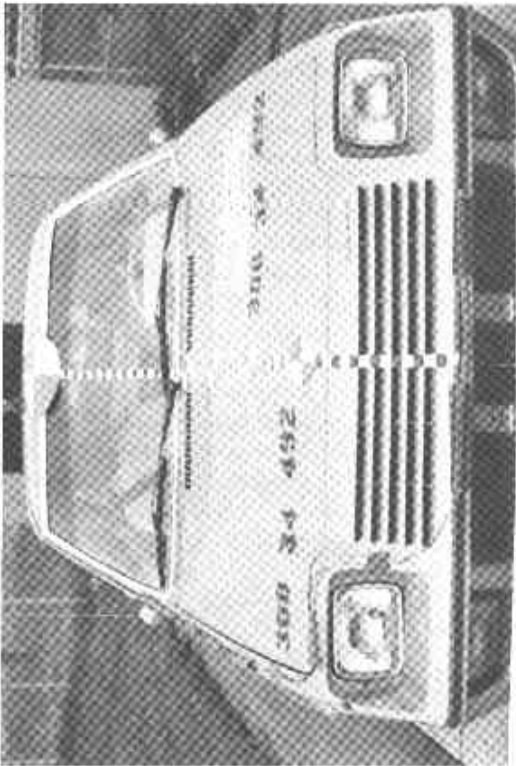
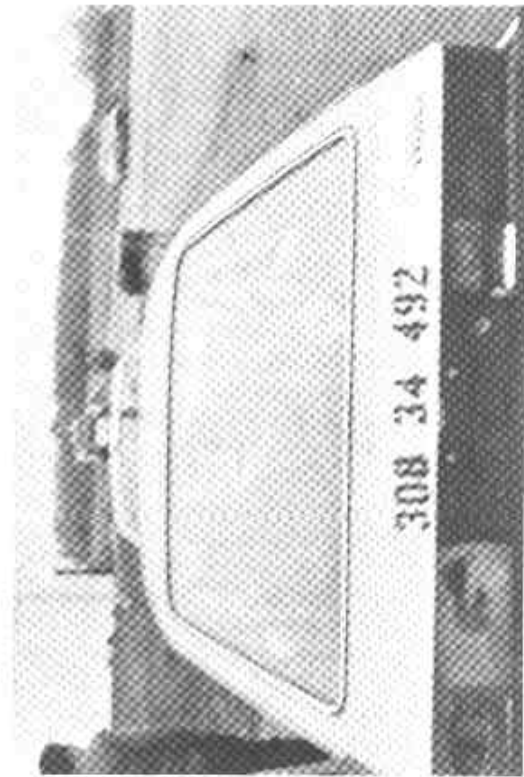


FIGURE A-14 VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF FRONT AND REAR

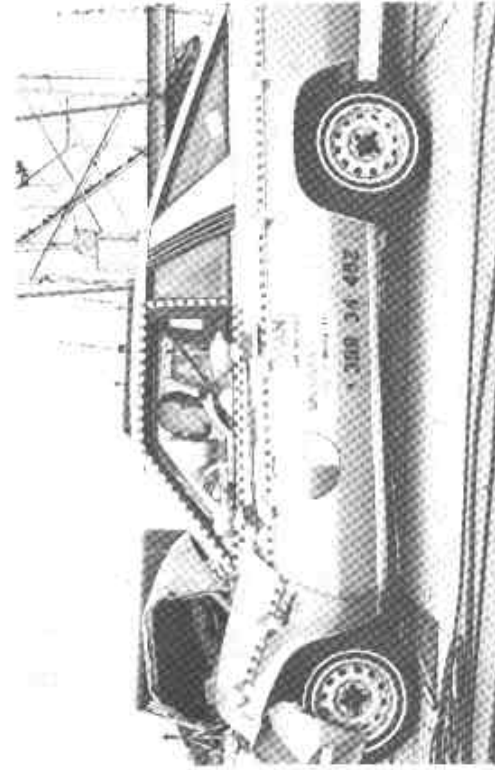
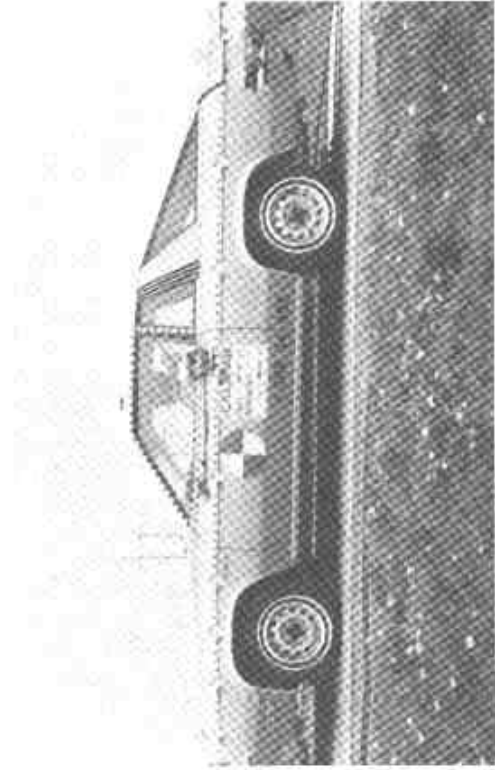
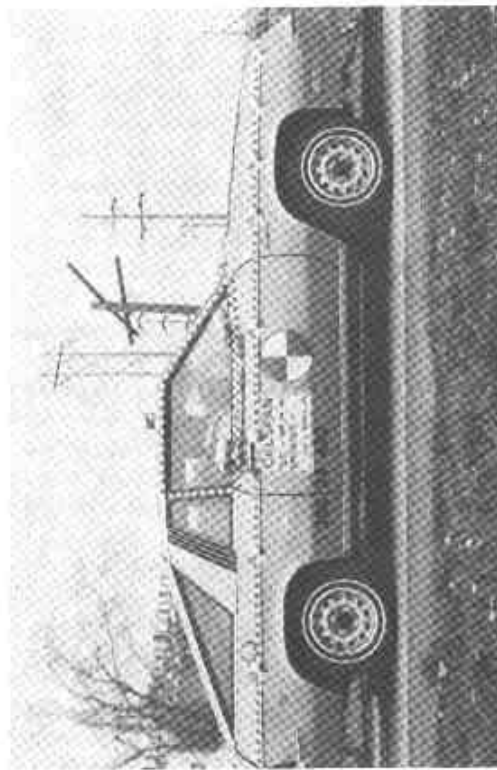
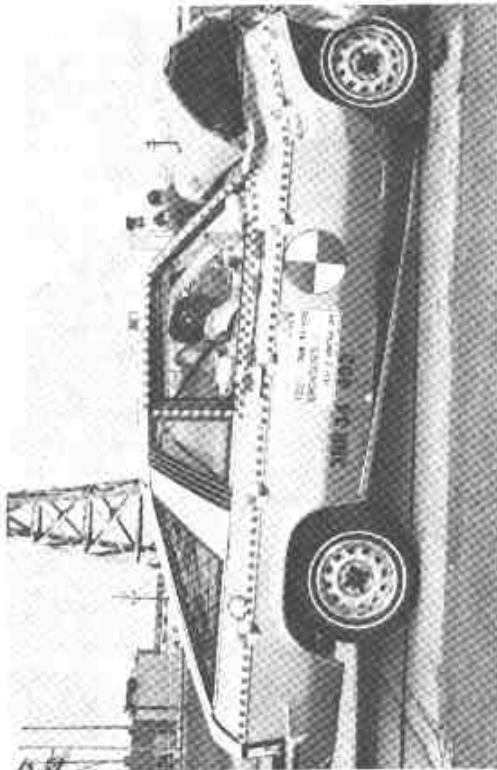


FIGURE A-15 VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT SIDE

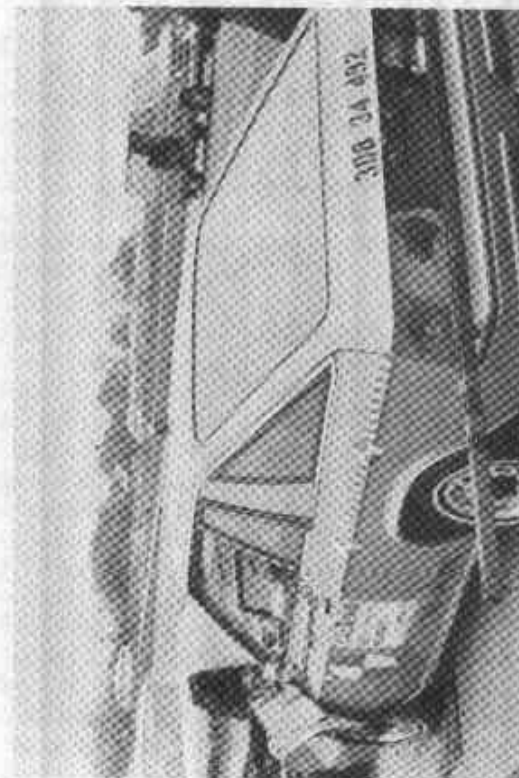
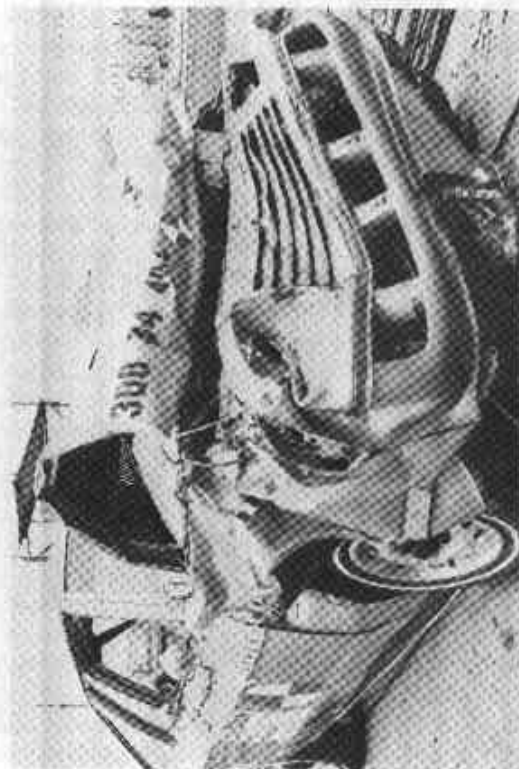
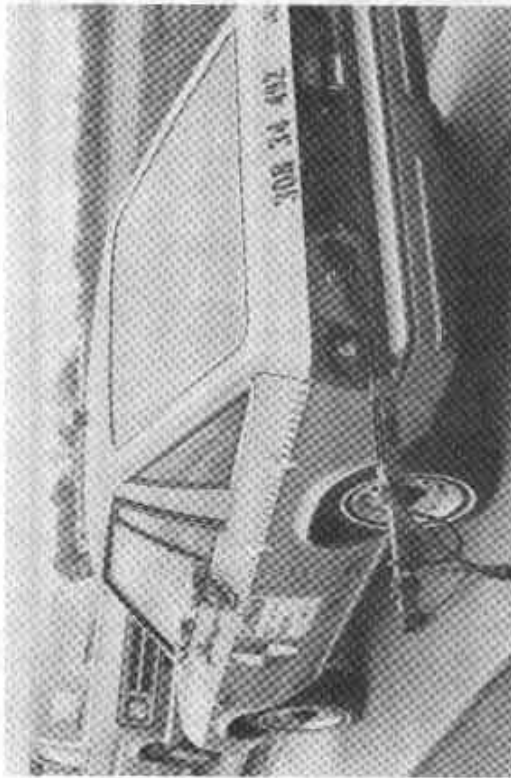
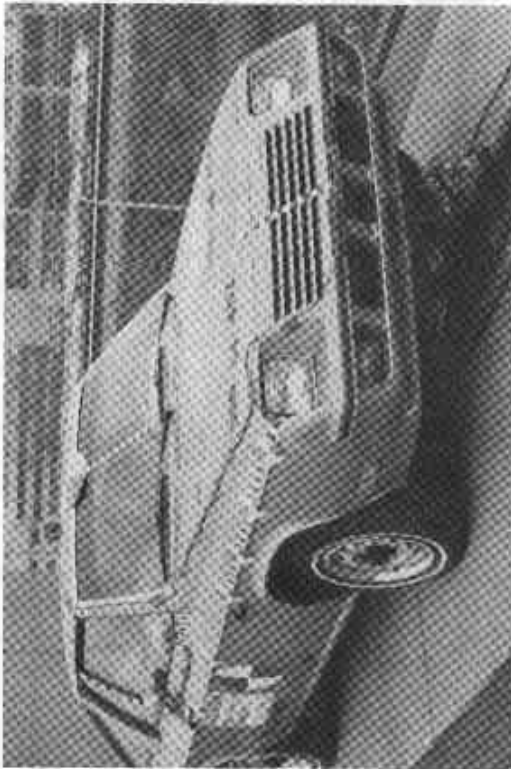


FIGURE A-16 VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF FRONT AND REAR THREE-QUARTER

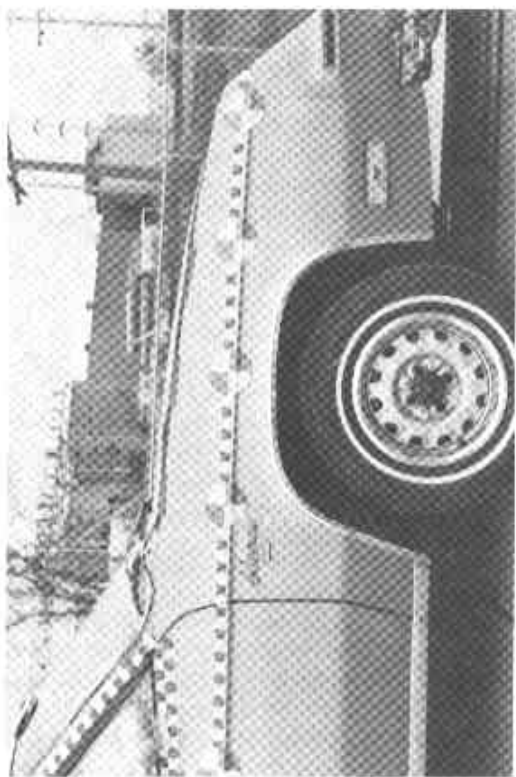
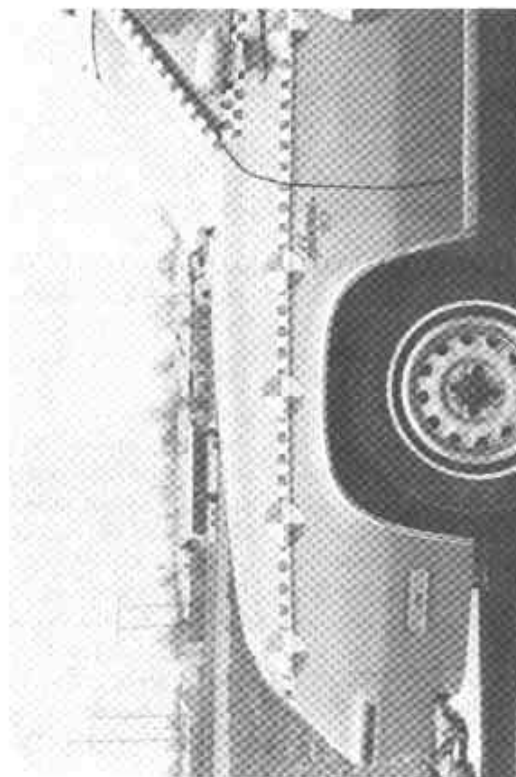


FIGURE A-17 VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT FRONT QUARTER

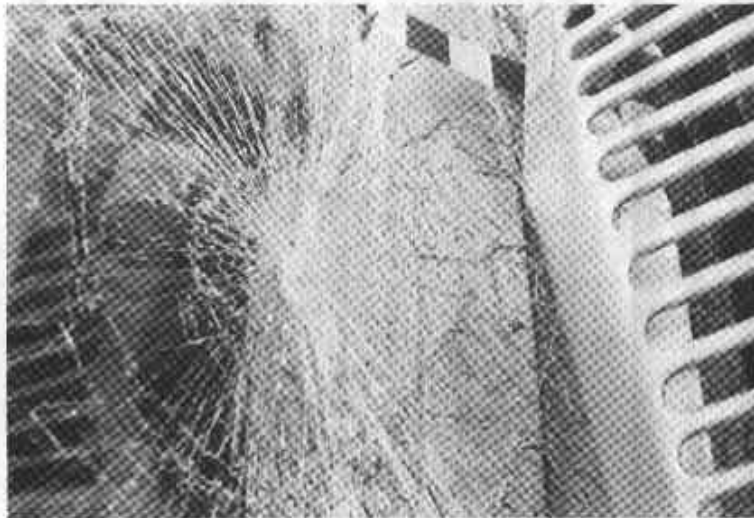
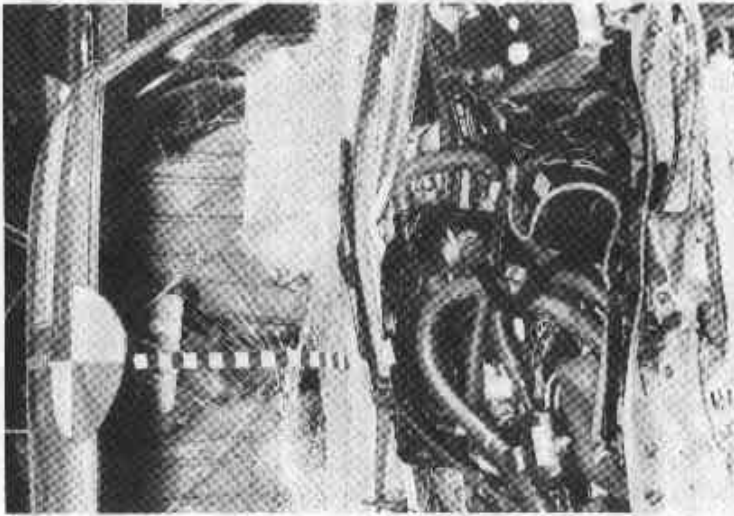
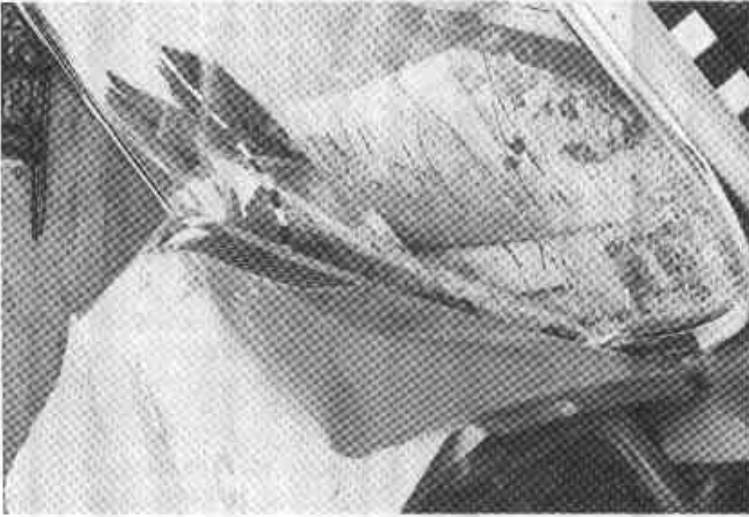


FIGURE A-18 VEHICLE NO. 2 - POST-TEST VIEWS OF WINDSHIELD

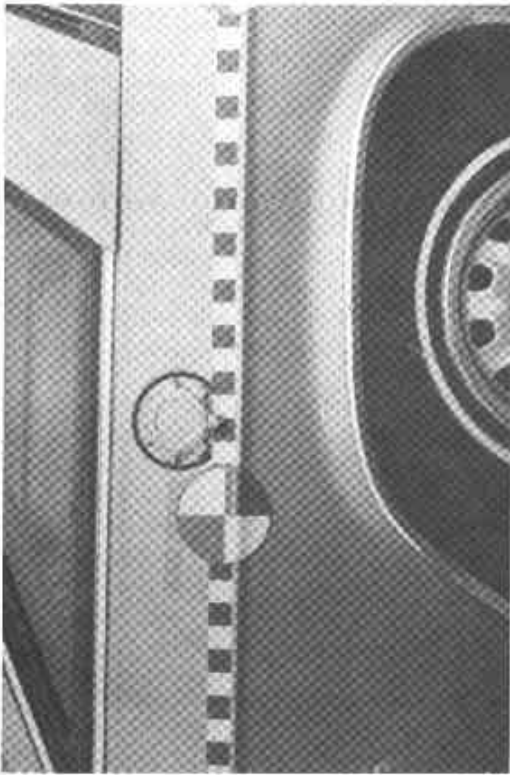


FIGURE A-19 VEHICLE NO. 2 - FUEL TUBE AND CAP

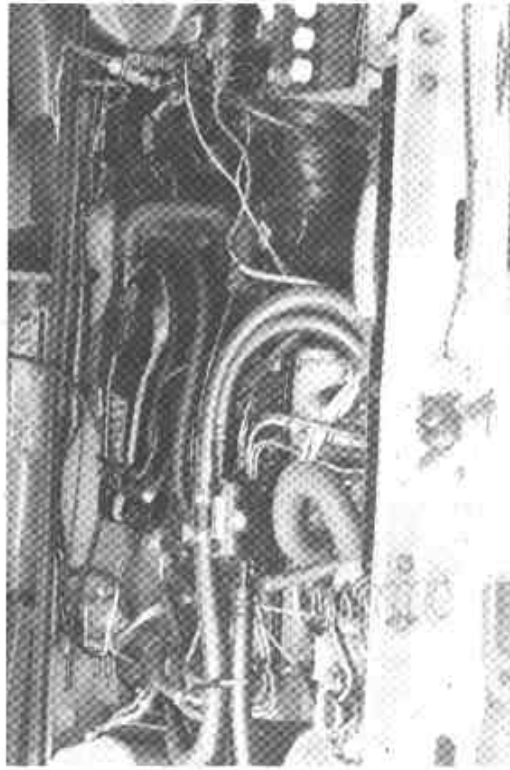


FIGURE A-20 VEHICLE NO. 2 - PRE-TEST VIEW OF ENGINE

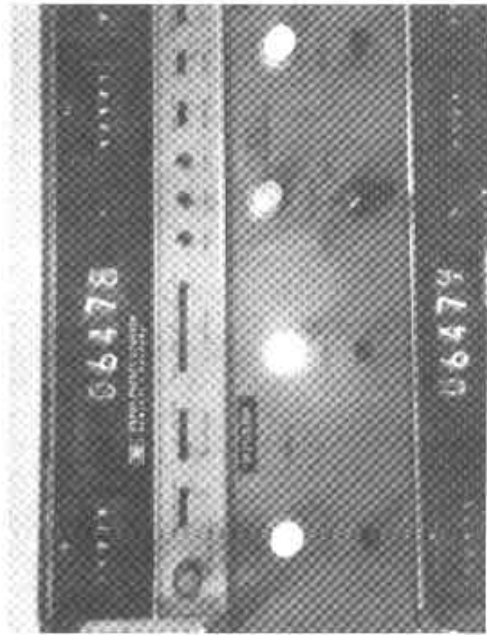


FIGURE A-21 VELOCITY TRAP COUNTER DISPLAY

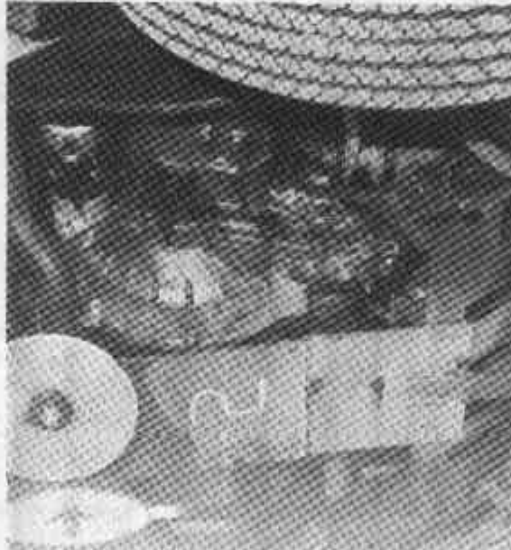
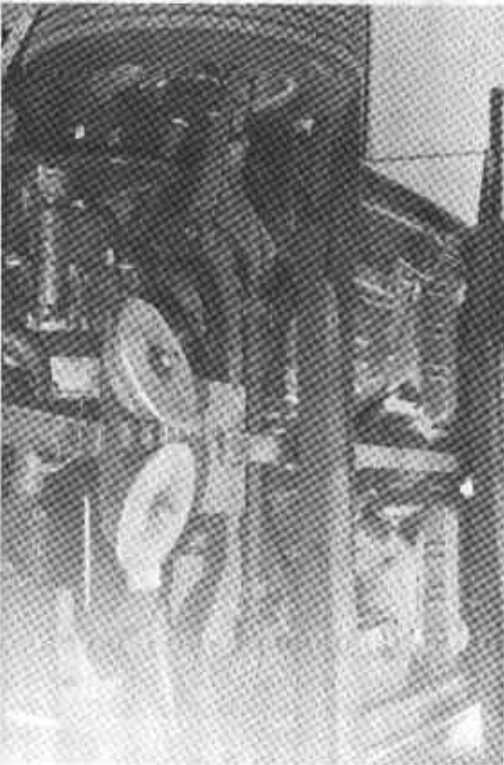
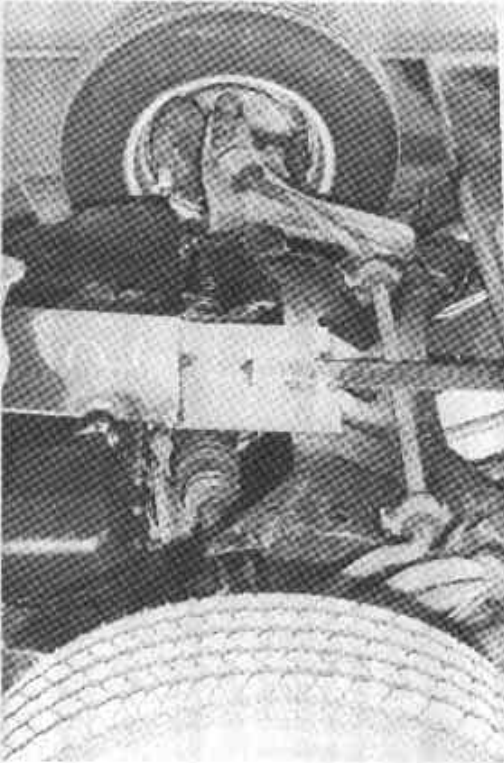


FIGURE A-22 VEHICLE NO. 2 - PRE-TEST VIEWS OF UNDERBODY

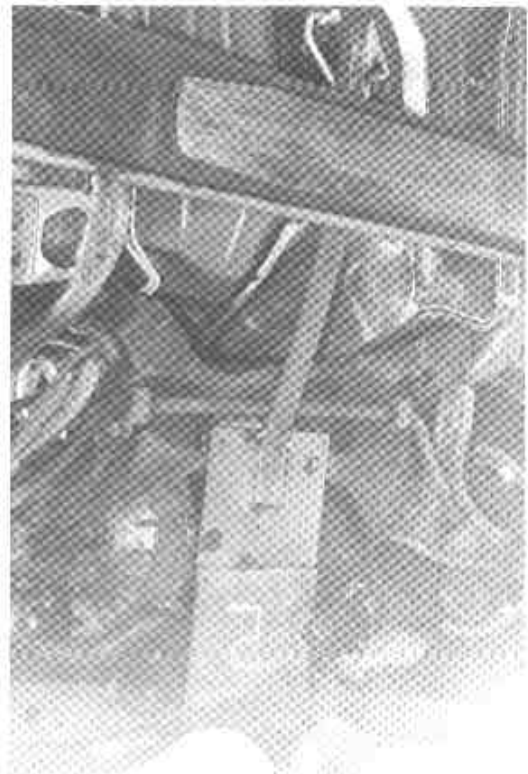
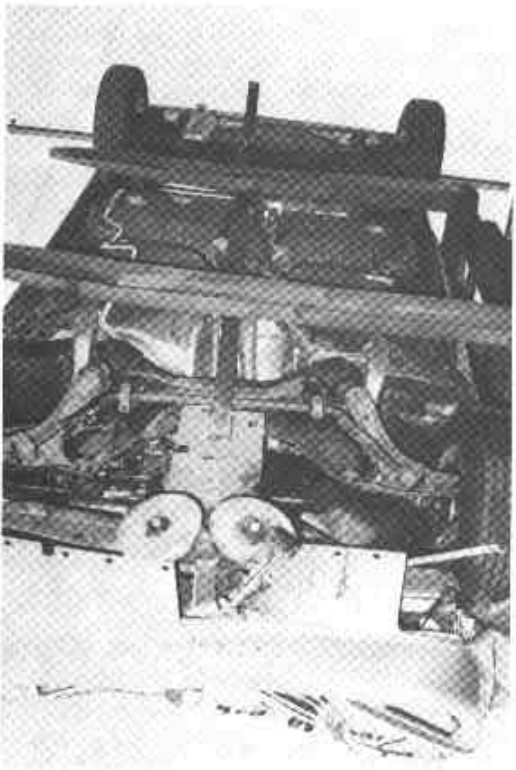


FIGURE A-23 VEHICLE NO. 2 - POST-TEST VIEWS OF UNDERBODY

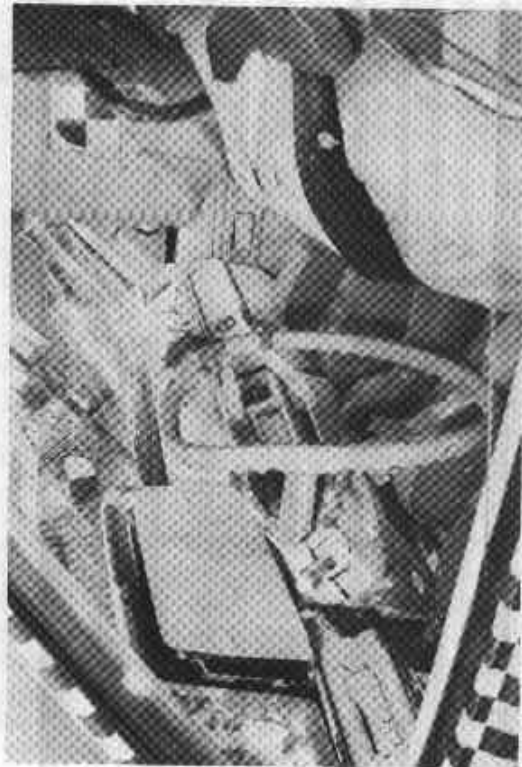
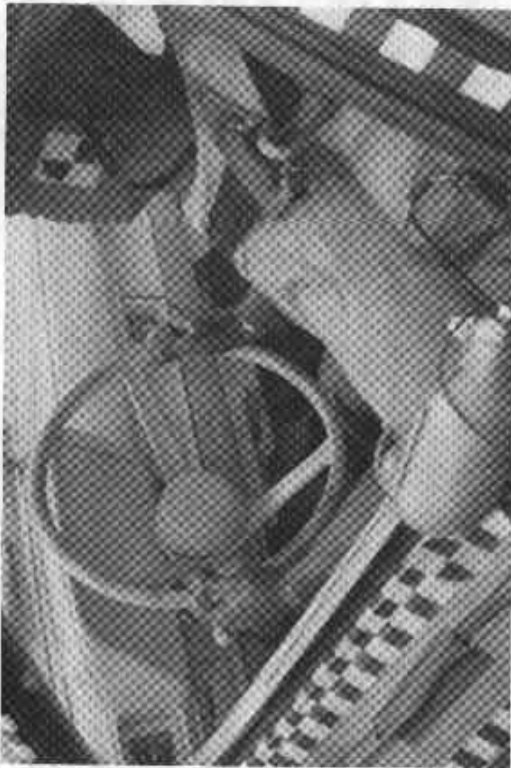
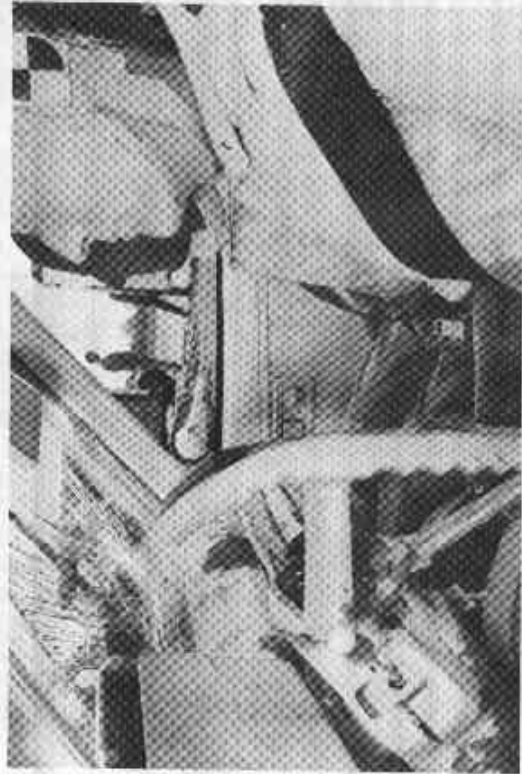


FIGURE A-24 VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF DRIVER



FIGURE A-25 VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF RIGHT FRONT PASSENGER

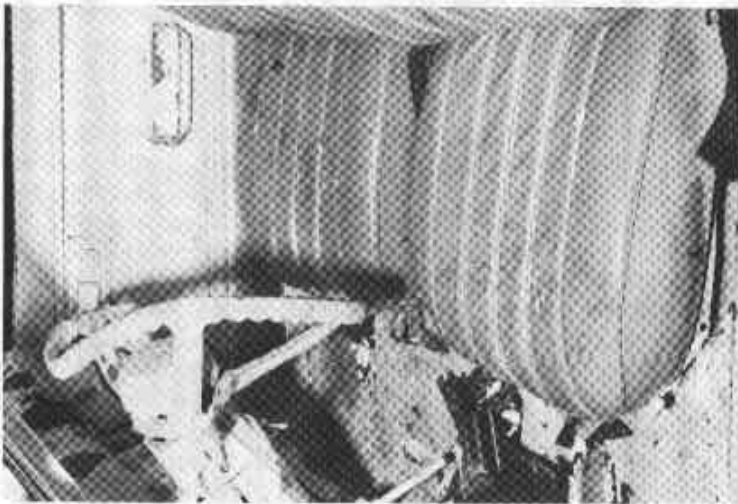
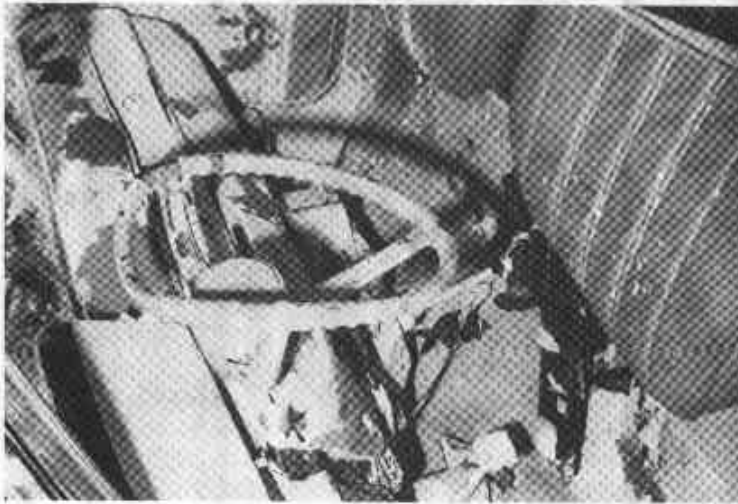
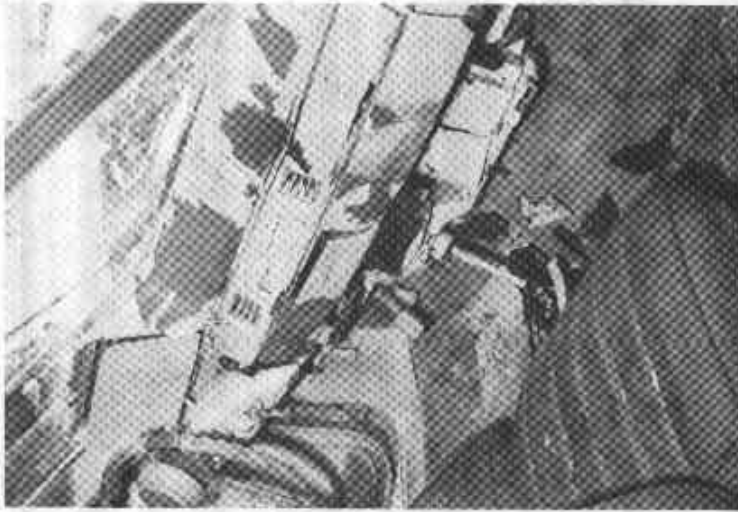


FIGURE A-26 VEHICLE NO. 2 - POST-TEST INTERIOR VIEWS

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA

Test No. 308-34-492

1980 FORD MUSTANG

VEHICLE NO. 1 DATA

VEHICLE DATA

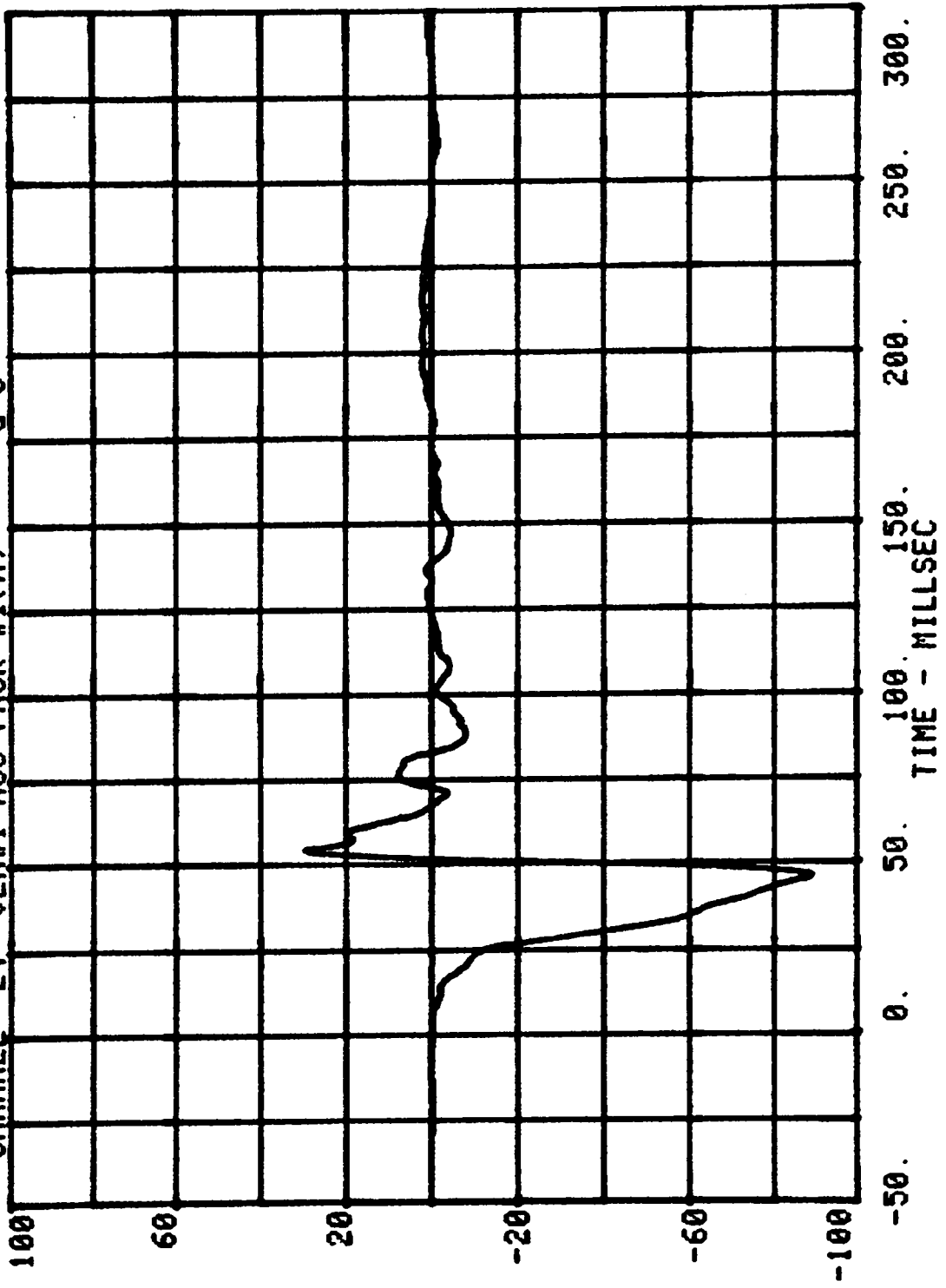
FILTER CHANNEL CLASS

60

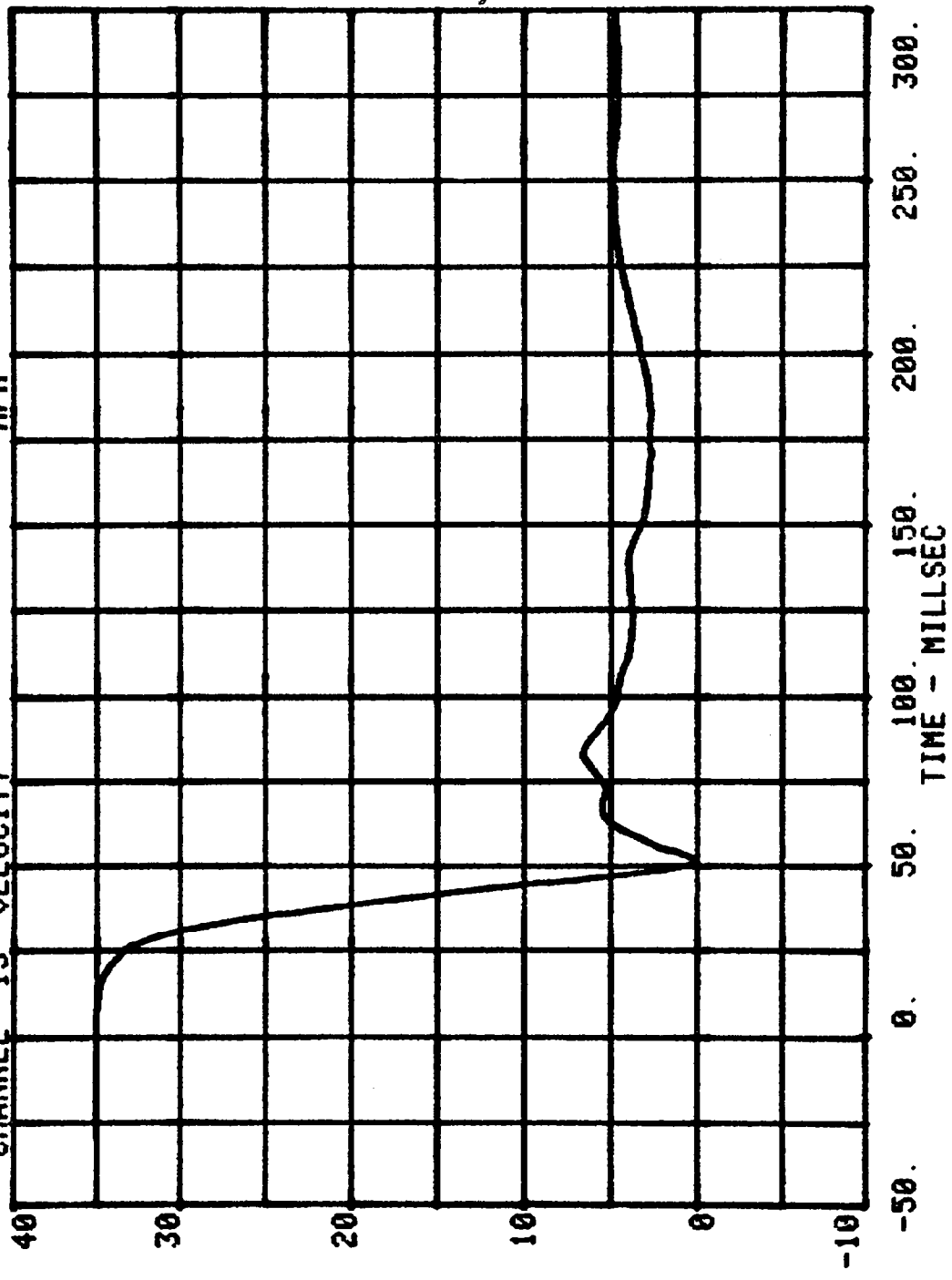
See Figure 2 for Accelerometer Layout

See Table 8 for Electronic Instrumentation Descriptors

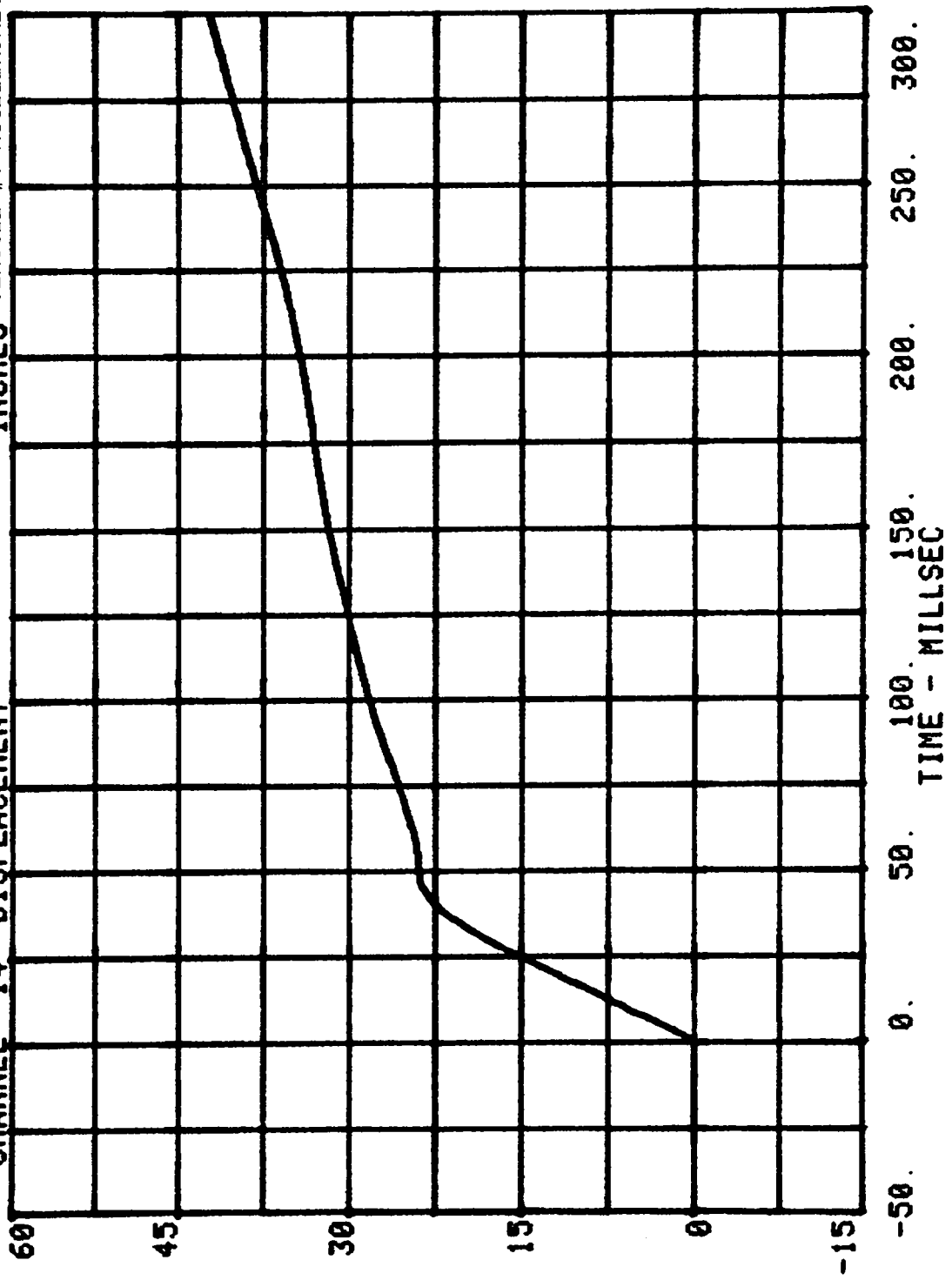
CHANNEL 24 VEH#1 ACC PACK #1(X) RUN= 492 SERIES= 34 G'S

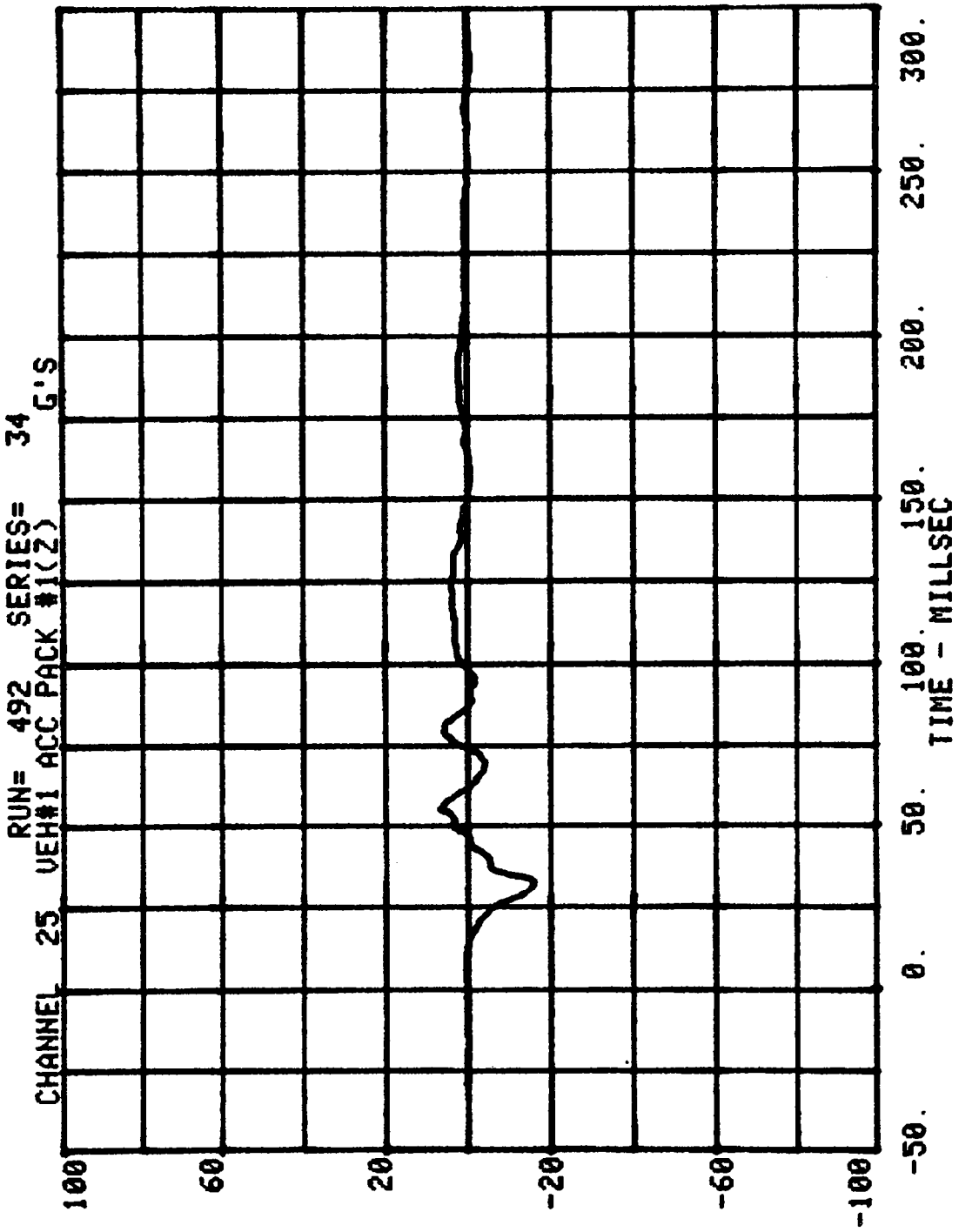


CHANNEL 13 VELOCITY RUN= 492 SERIES= 34 MPH VEHICLE #1 ACCELEROMETER PACK #1 X

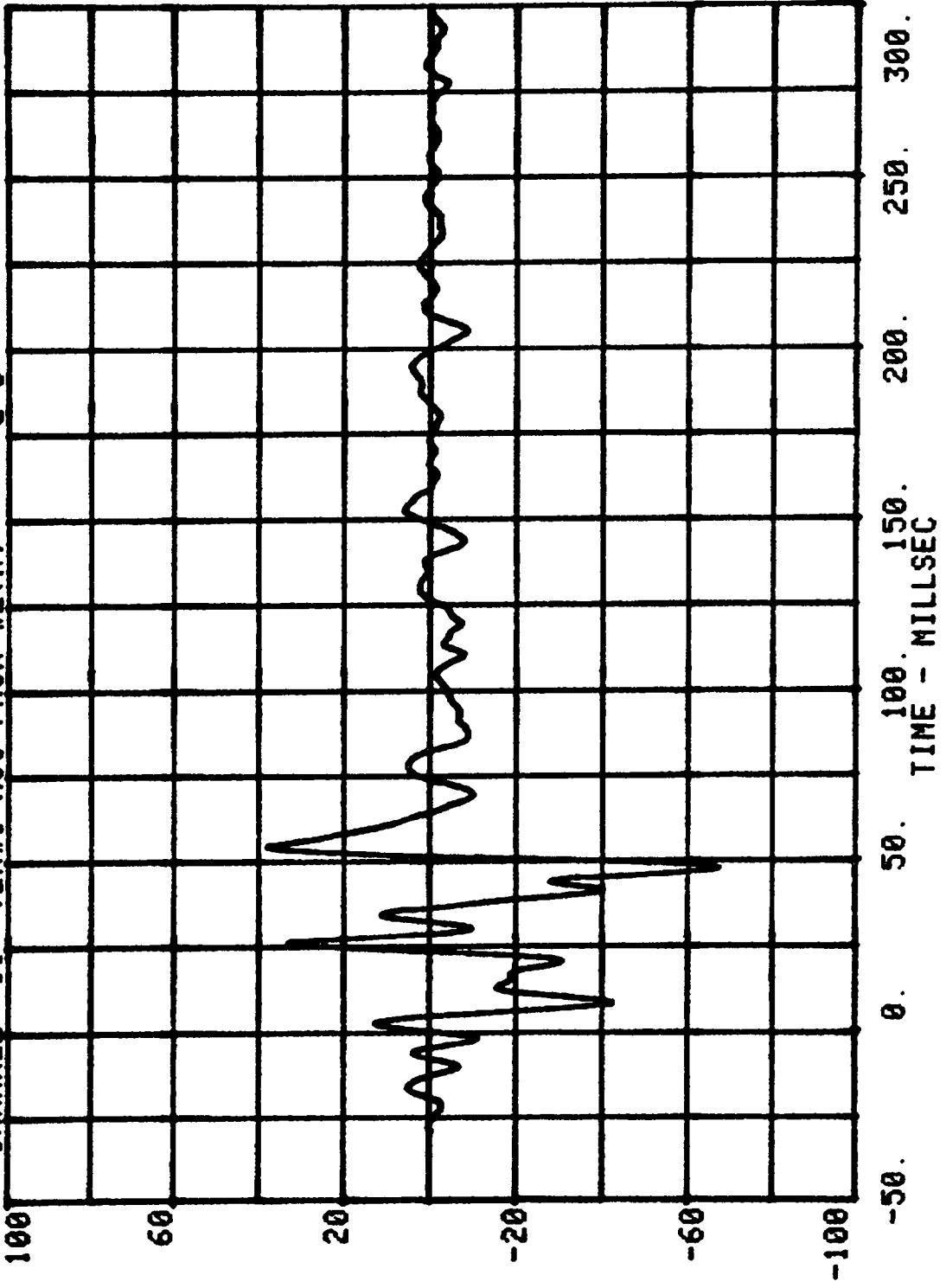


CHANNEL 14 DISPLACEMENT RUN= 492 SERIES= 34 INCHES VEHICLE #1 ACCELEROMETER PACK #

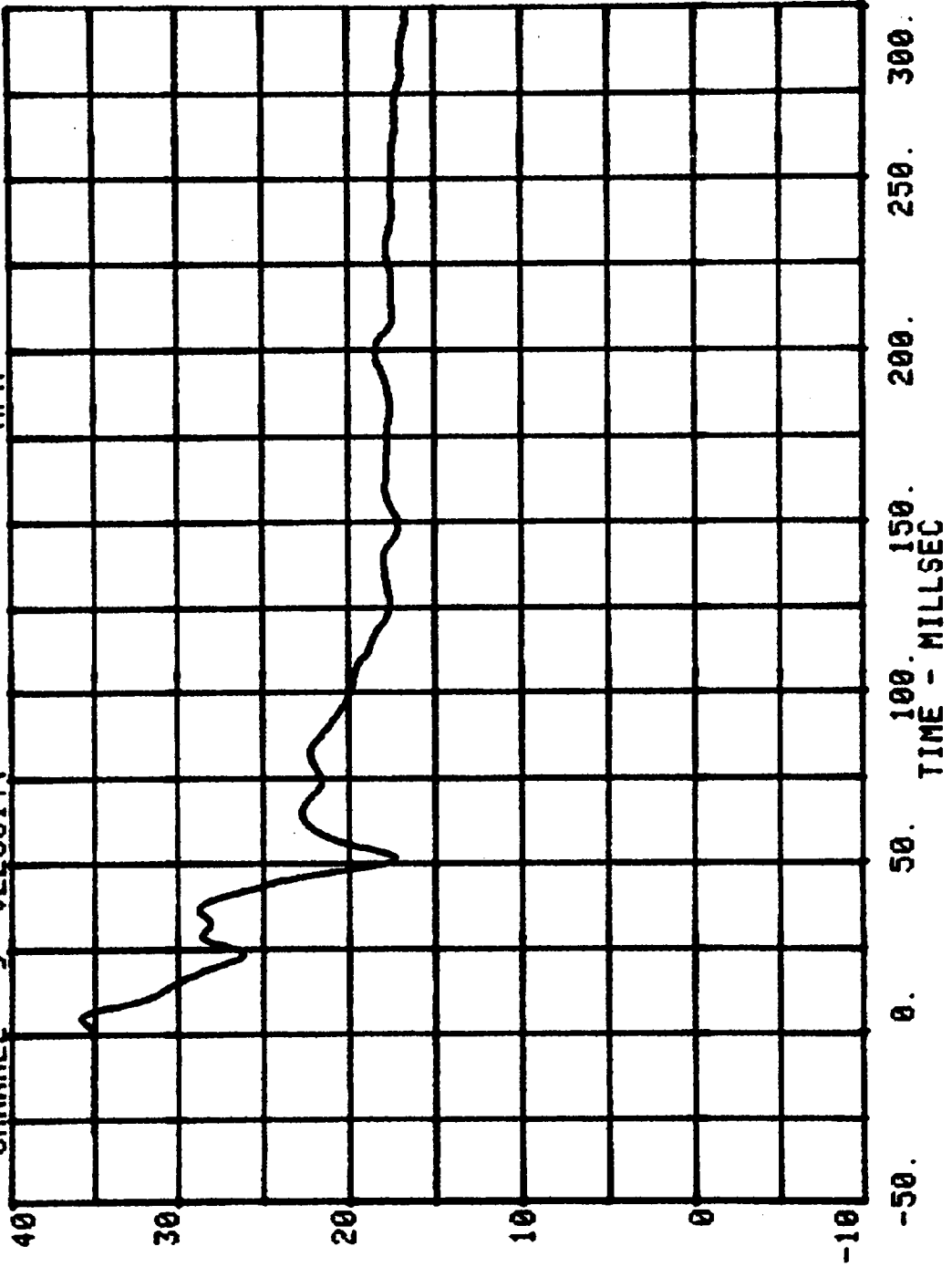




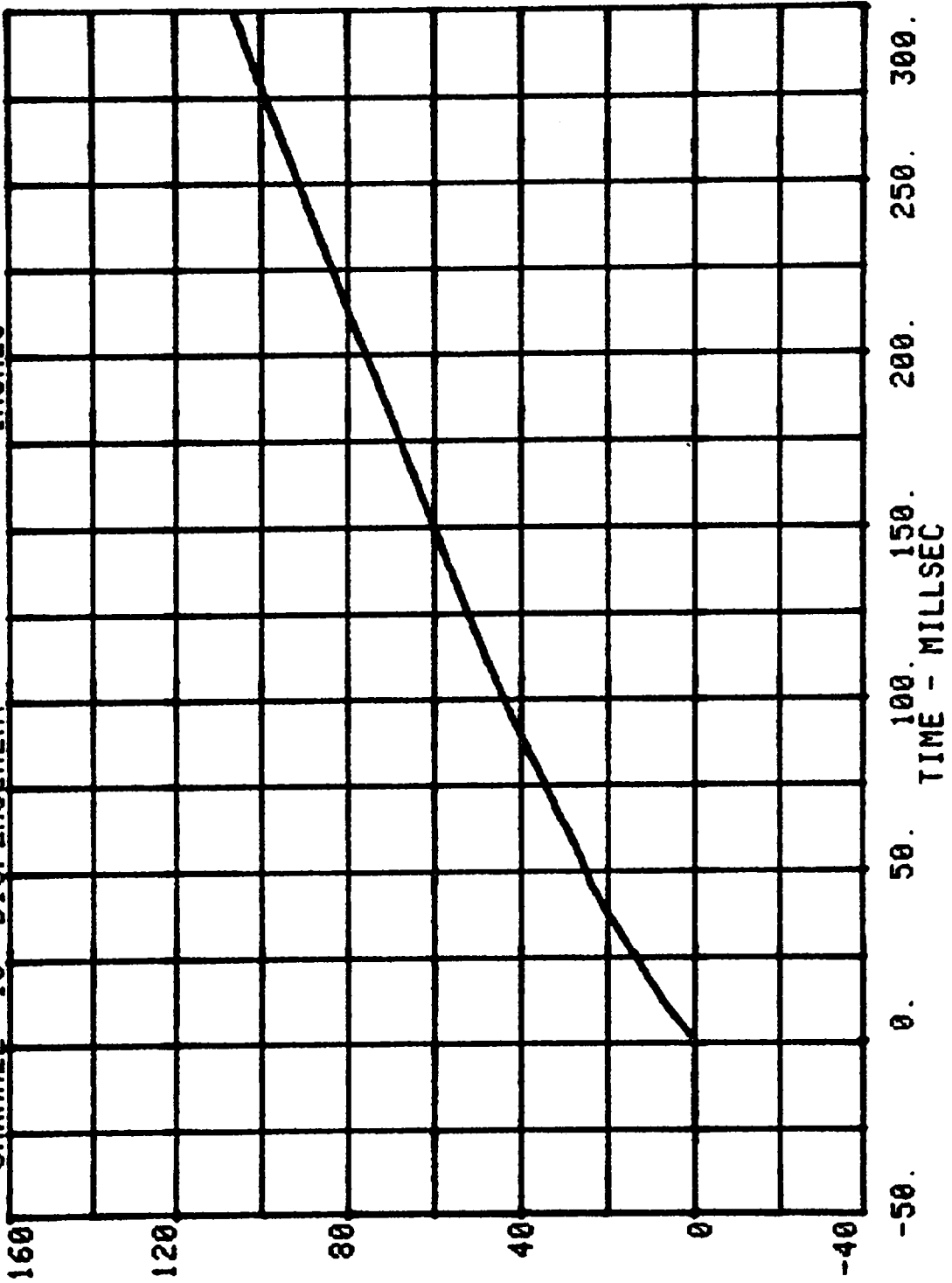
CHANNEL 11 VEH#1 ACC PACK #2(X) RUN= 492 SERIES= 34 G'S



CHANNEL 9 VELOCITY RUN= 492 SERIES= 34 MPH VEHICLE #1 ACCELEROMETER PACK #2 X

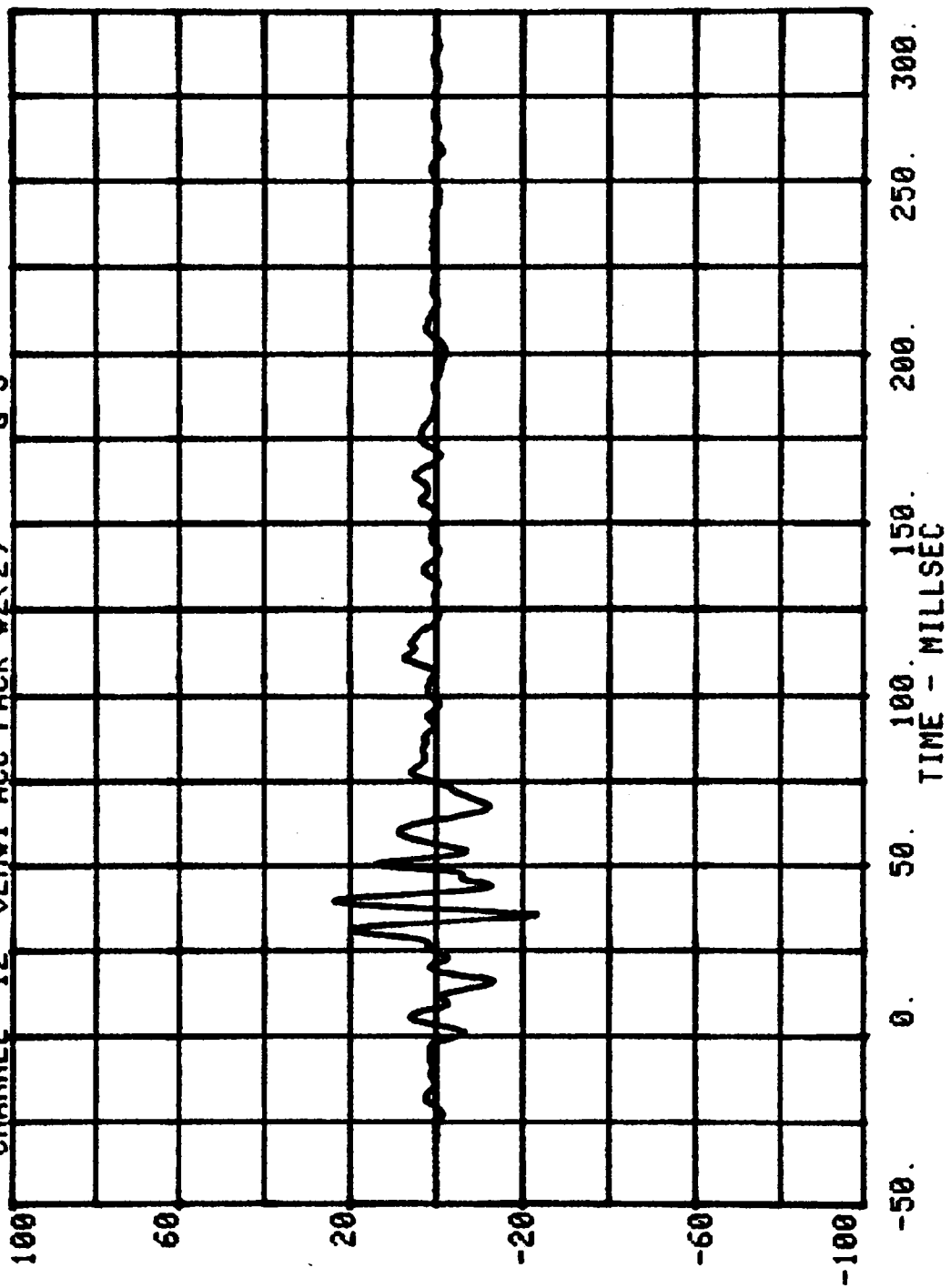


CHANNEL 10 DISPLACEMENT RUN= 492 SERIES= 34 INCHES VEHICLE #1 ACCELEROMETER PACK #:

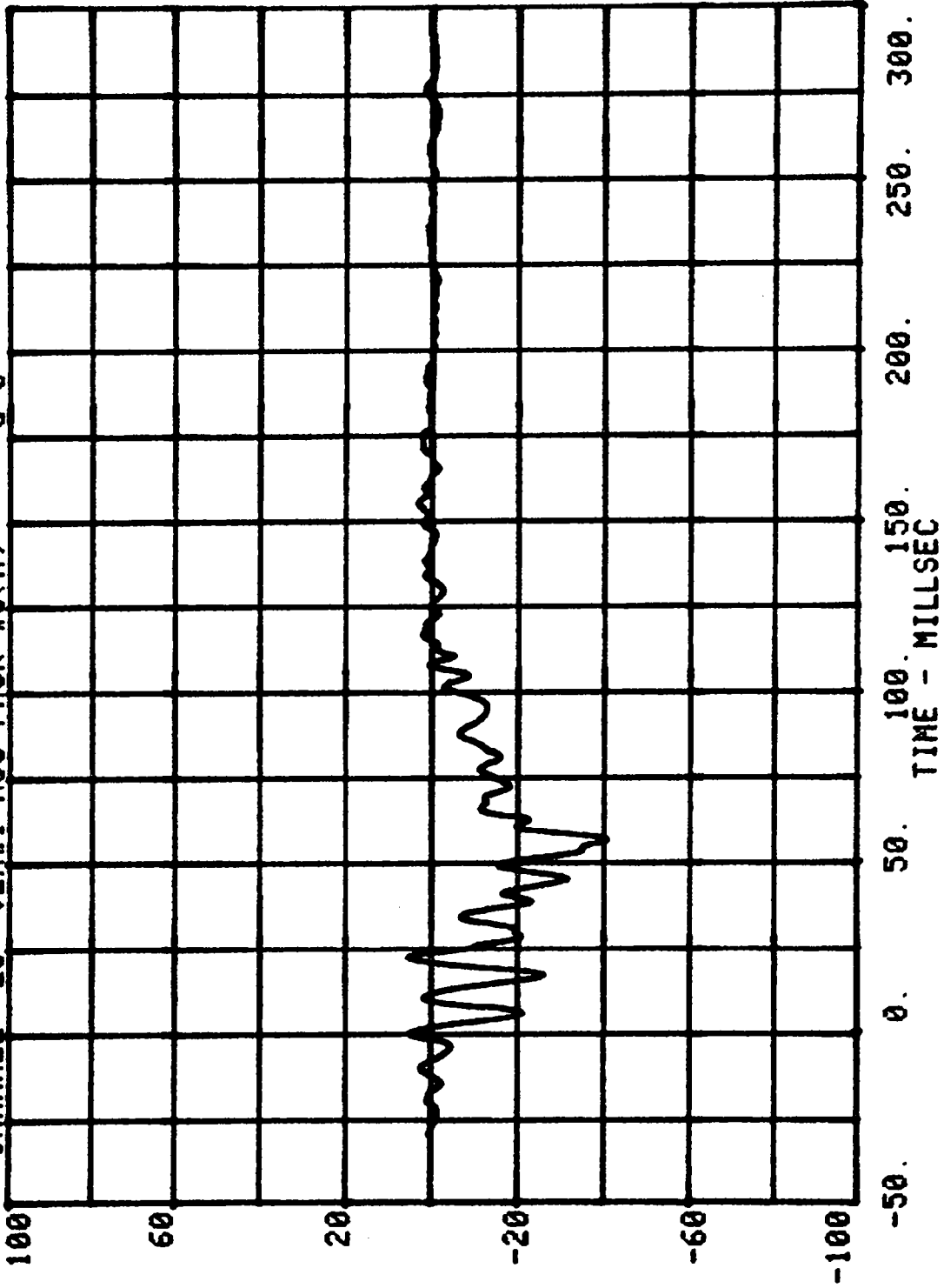


CHANNEL 12 VEH#1 ACC PACK #2(Z) G'S

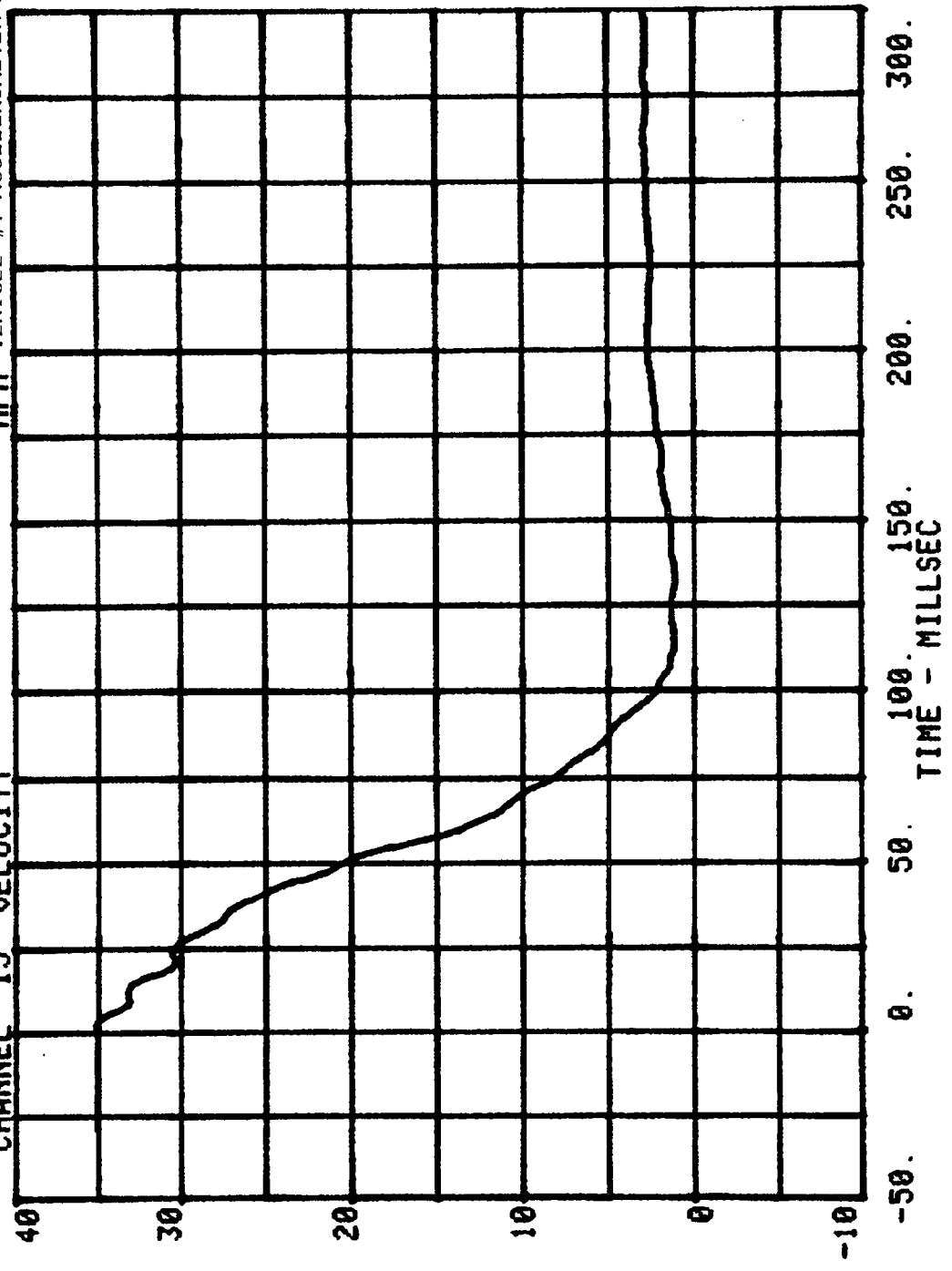
RUN= 492 SERIES= 34



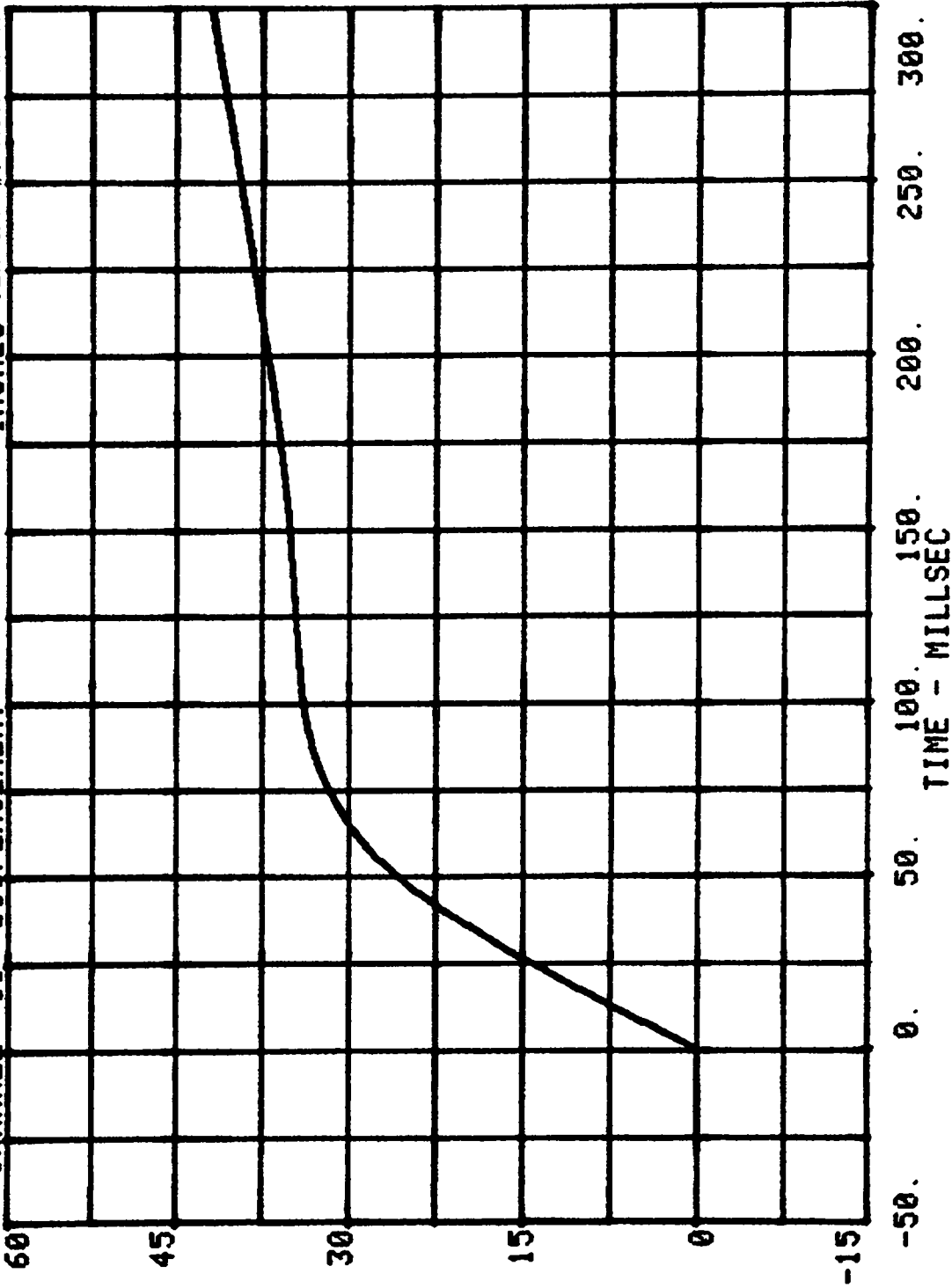
CHANNEL 26 VEH#1 ACC PACK #3(X) 34 G'S



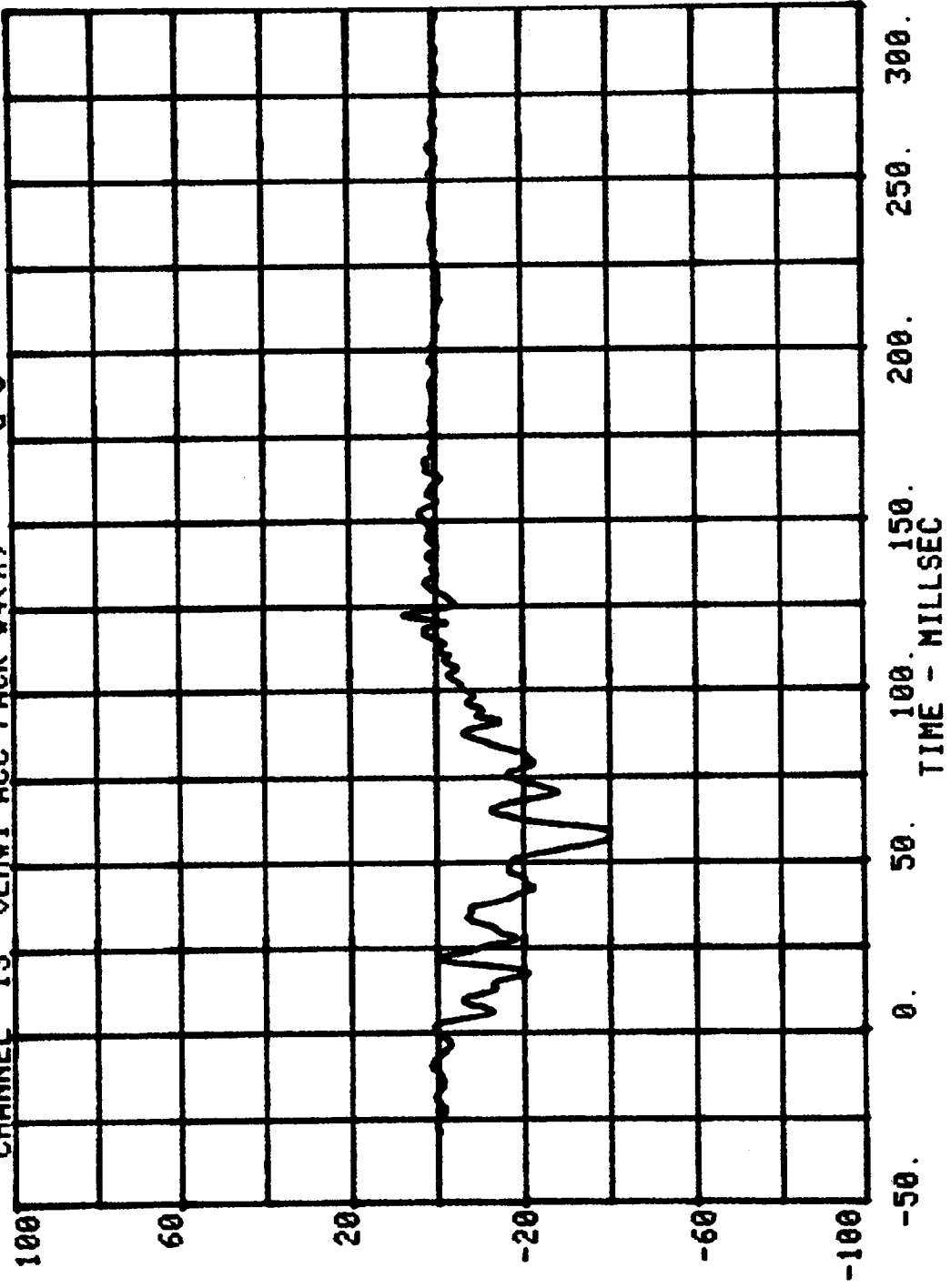
CHANNEL 15 VELOCITY
RUN= 492 SERIES= 34 MPH VEHICLE #1 ACCELEROMETER PACK #3 X



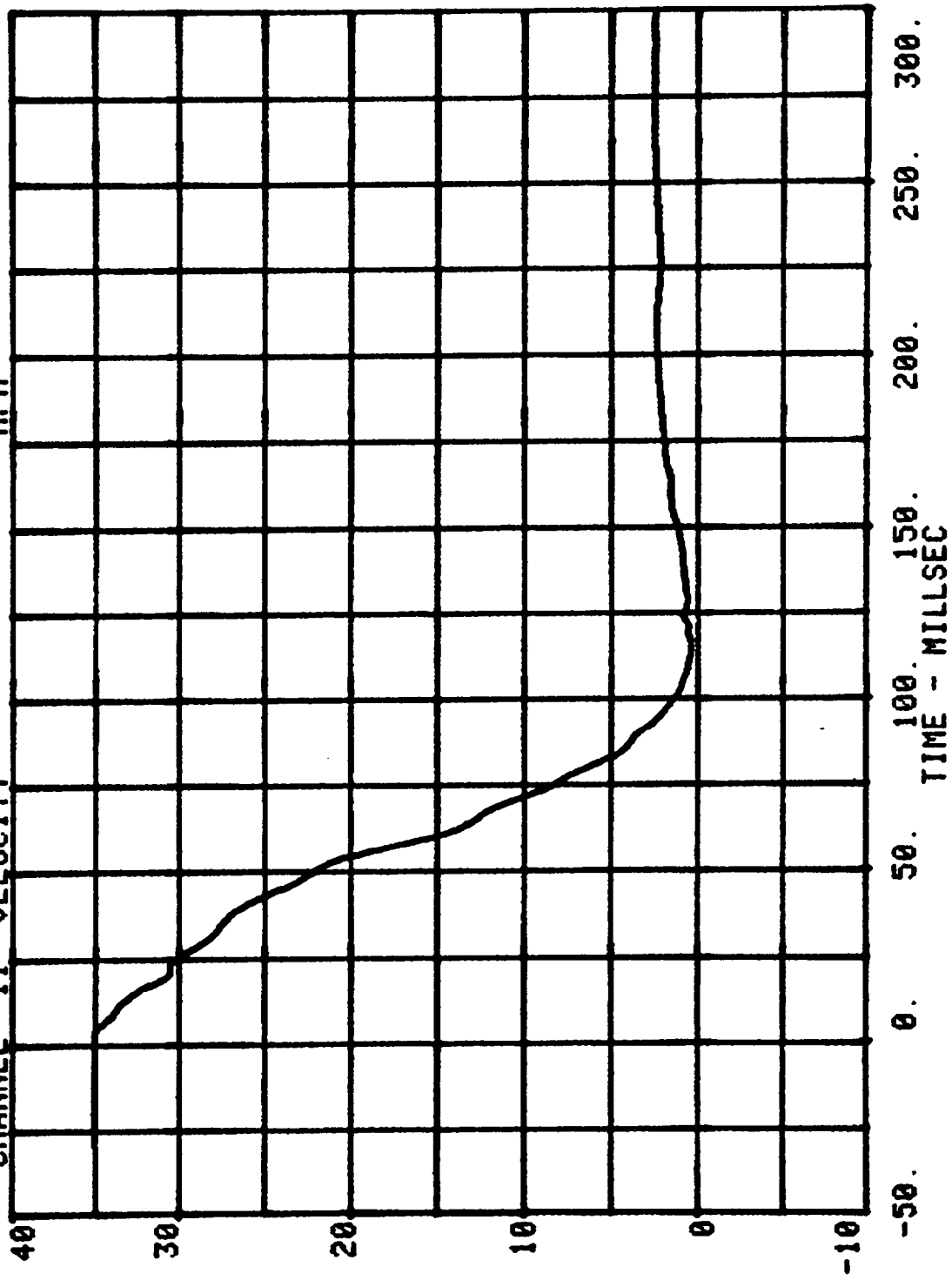
CHANNEL 16 DISPLACEMENT RUN= 492 SERIES= 34 INCHES VEHICLE #1 ACCELEROMETER PACK 1



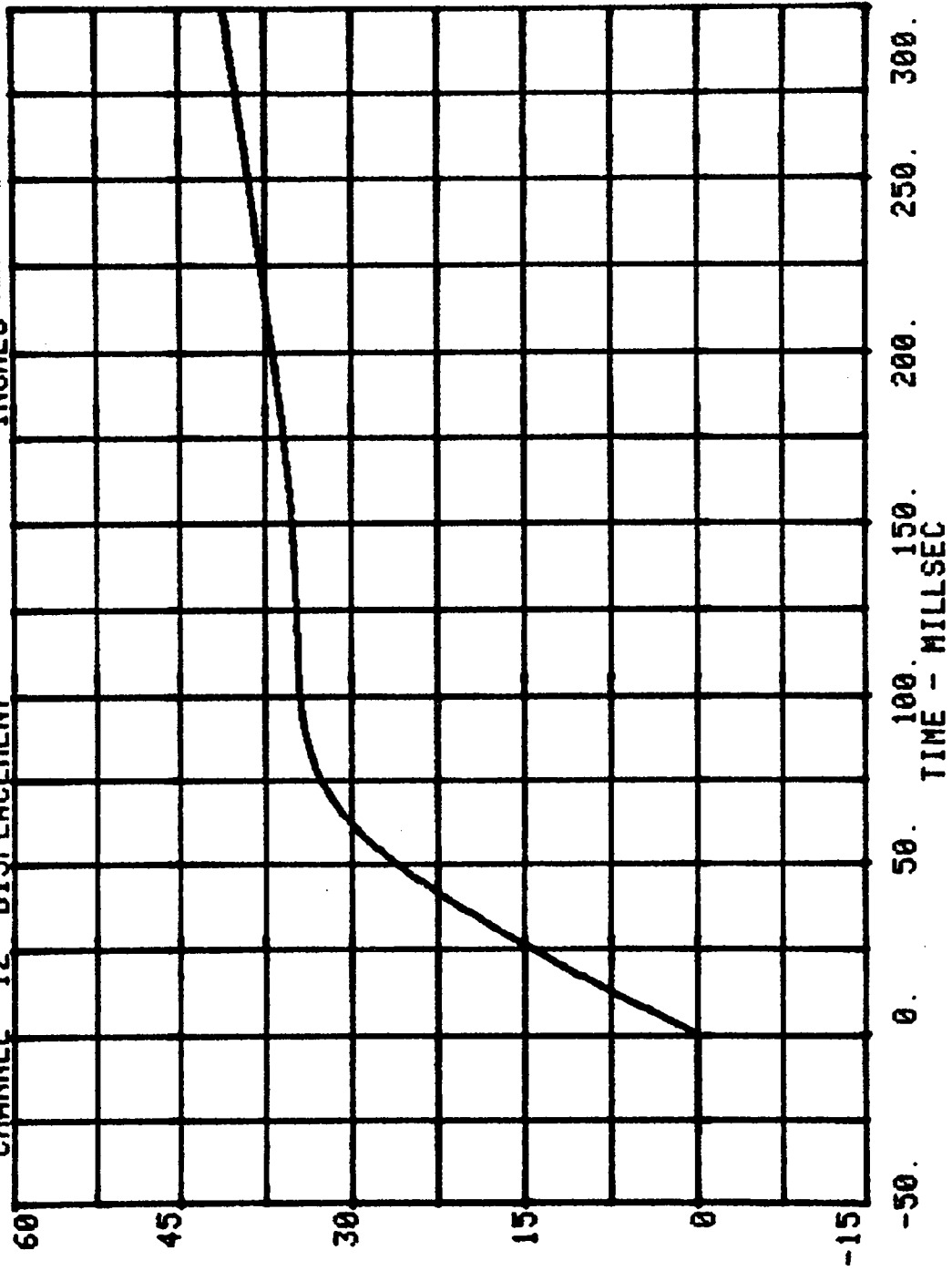
CHANNEL 13 VEH#1 ACC PACK #4(X) SERIES= 34 G'S



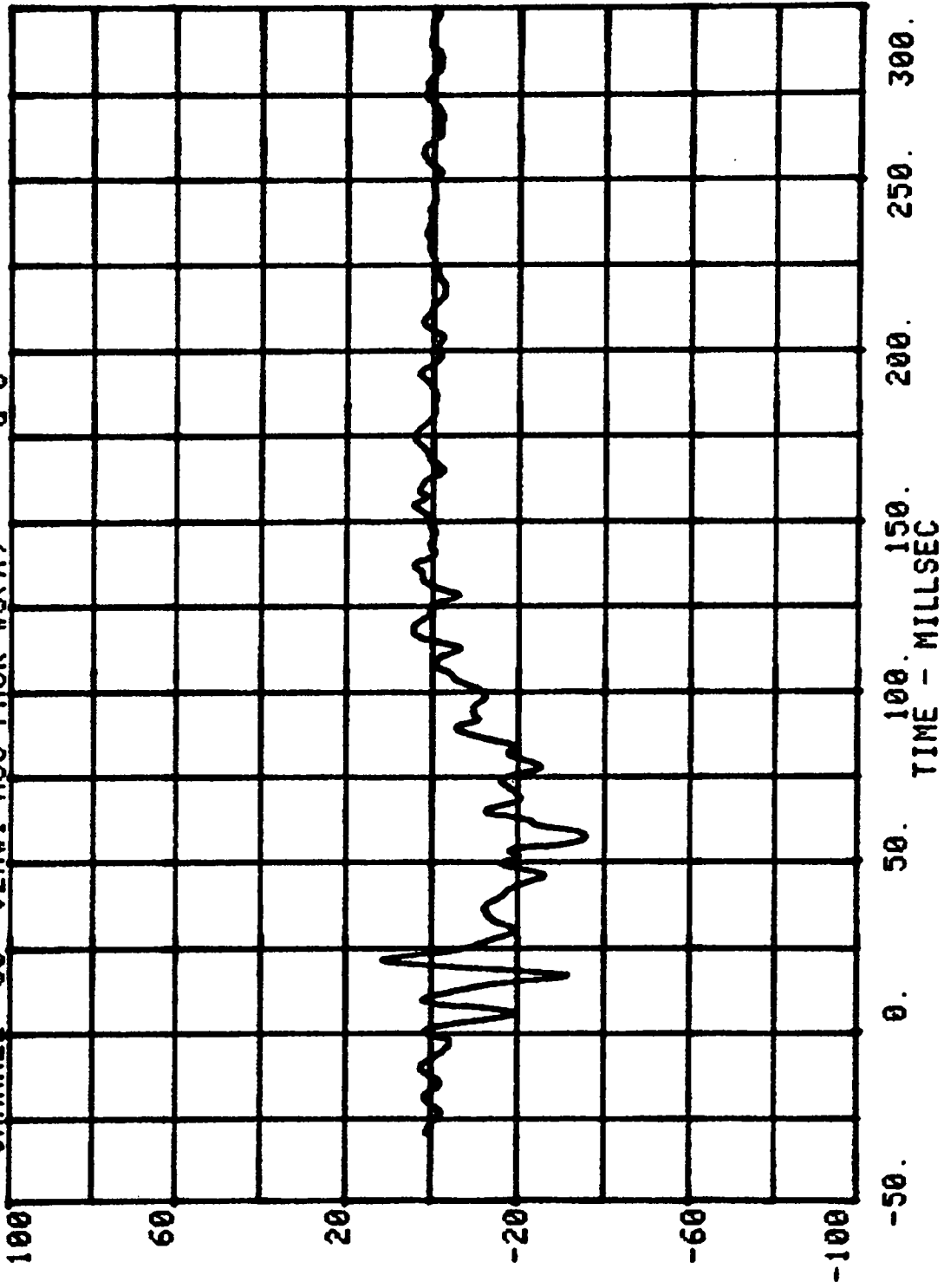
CHANNEL 11 VELOCITY
RUN= 492 SERIES= 34 MPH
VEHICLE #1 ACCELEROMETER PACK #4 X



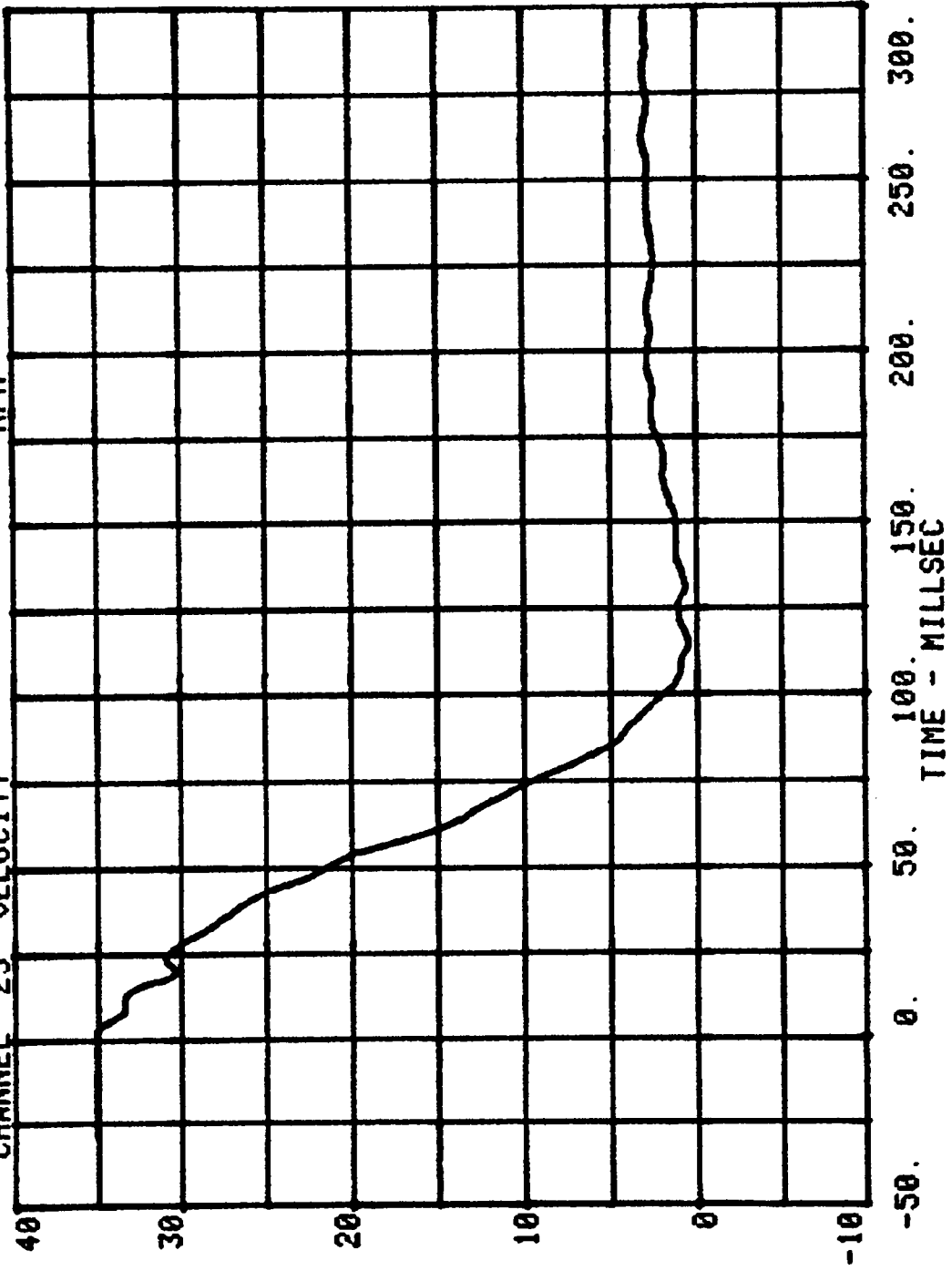
CHANNEL 12 DISPLACEMENT RUN= 492 SERIES= 34 INCHES VEHICLE #1 ACCELEROMETER PACK #4 X



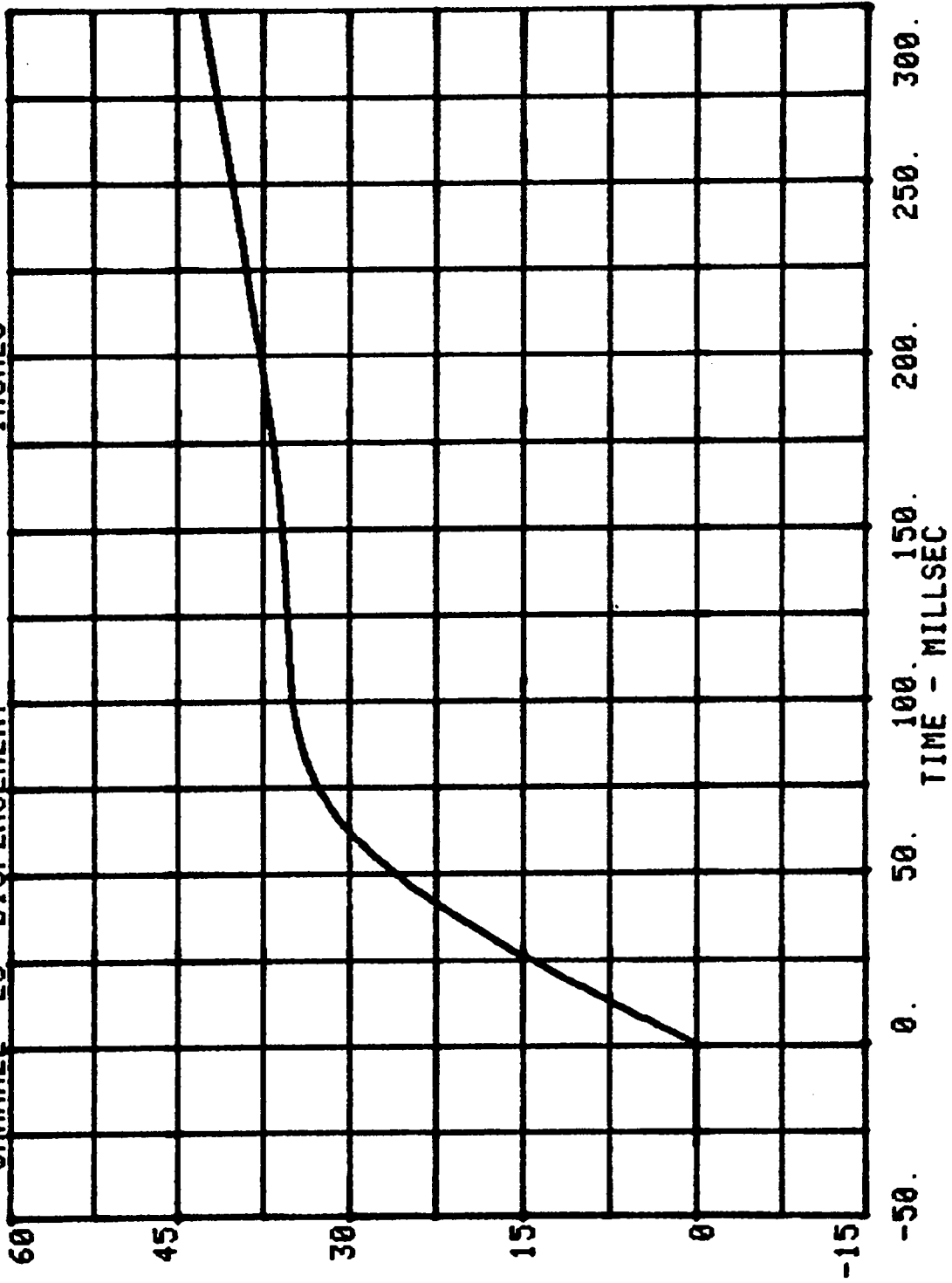
CHANNEL 53 RUN= 492 SERIES= 34 G'S
VEH#1 ACC PACK #5(X)



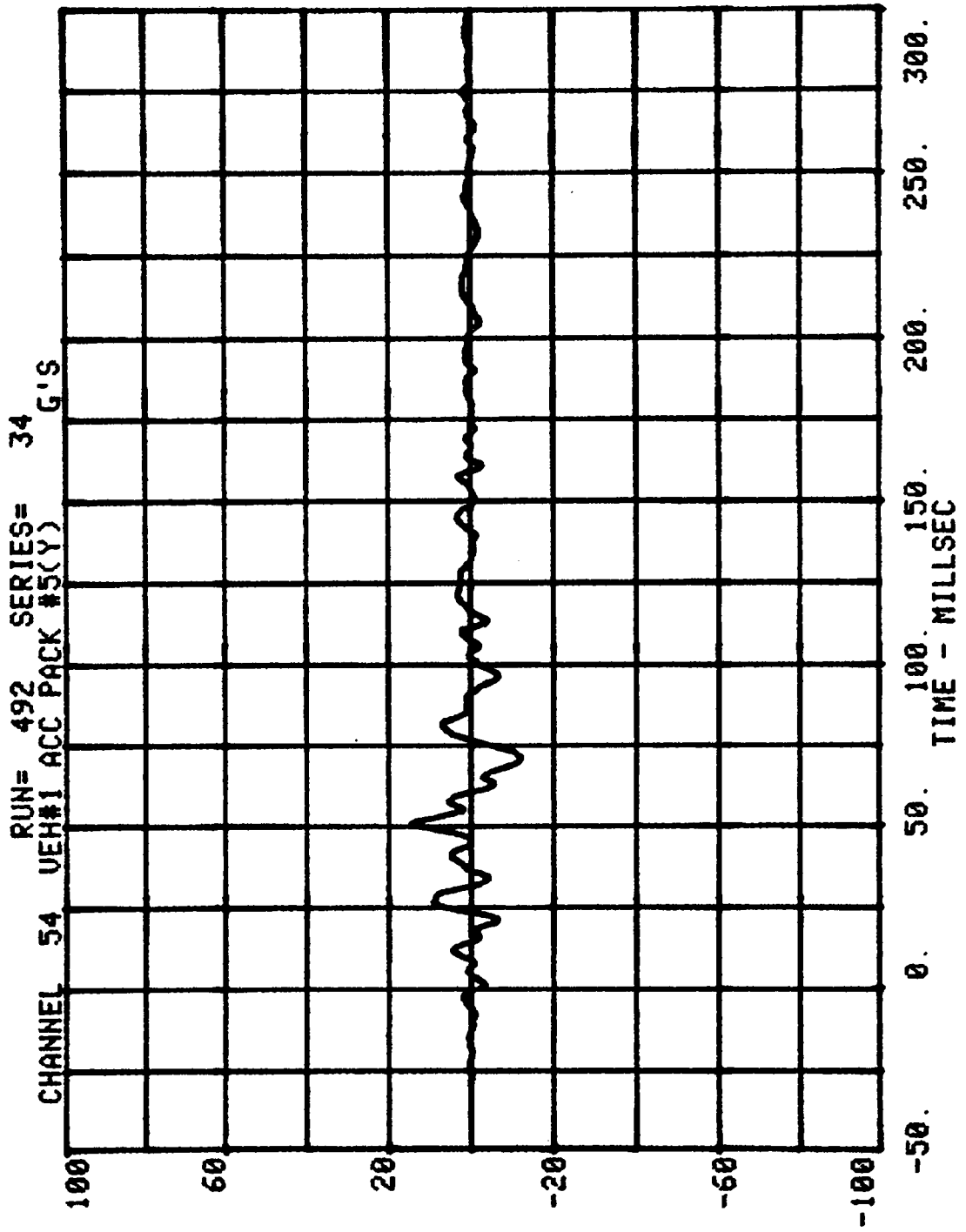
CHANNEL 25 VELOCITY
RUN= 492 SERIES= 34 MPH VEHICLE #1 ACCELEROMETER PACK #5 X



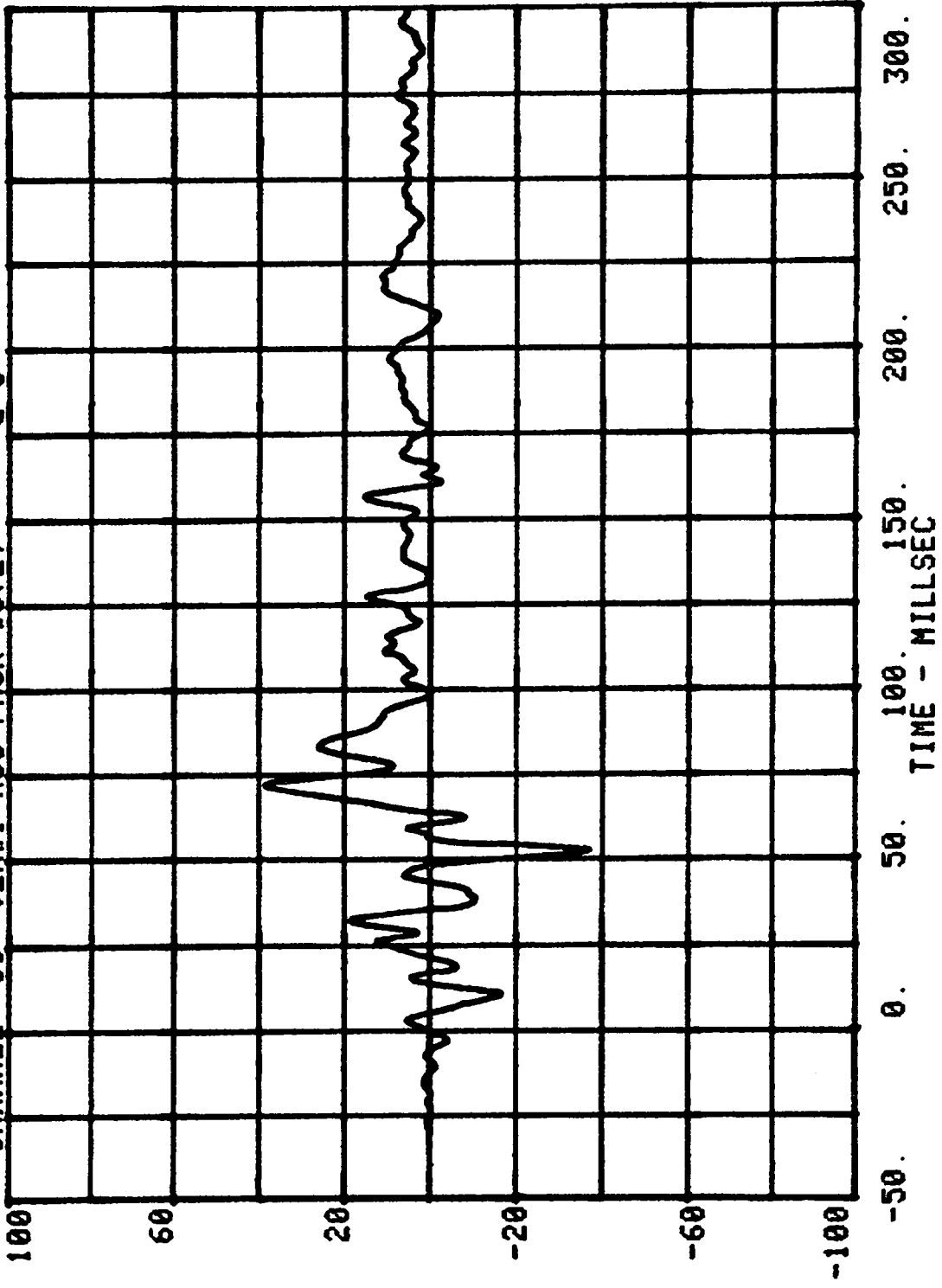
CHANNEL 26 DISPLACEMENT RUN= 492 SERIES= 34 INCHES VEHICLE #1 ACCELEROMETER PACK



CHANNEL 54 VEH#1 ACC PACK #5(Y) 34 G'S



CHANNEL 55 VEH#1 ACC PACK #5(Z) RUN= 492 SERIES= 34 G'S



Test No. 308-34-492

1980 FORD MUSTANG

DUMMY DATA

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

See Table 9 for Electronic Instrumentation Descriptor

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

BOA TASK 3 TEST #34 CAR-TO-CAR

RUN= 492

VEH#1 POS#1 HEAD R

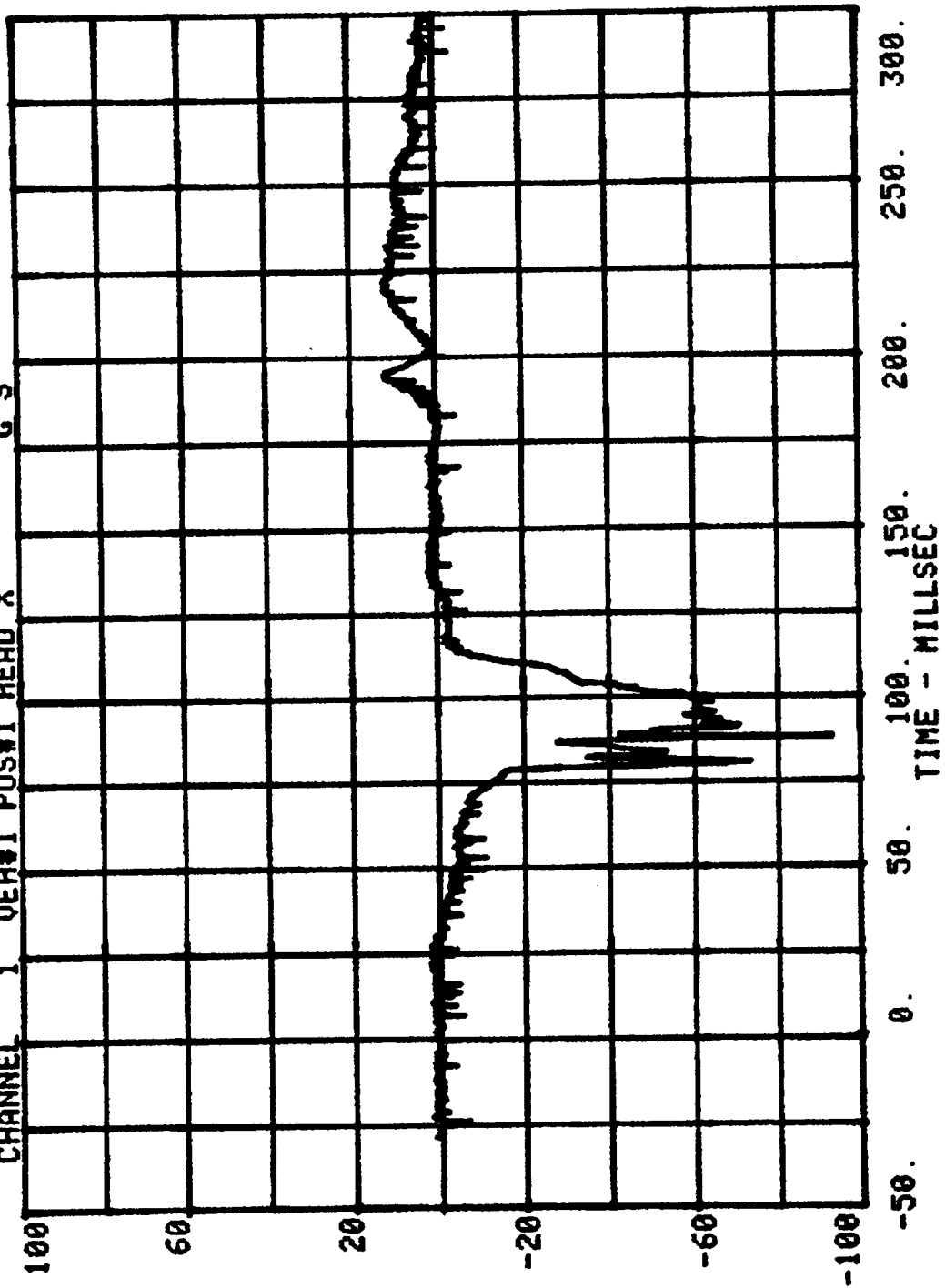
HIC= 704.2 FROM T1= .07890 TO T2= .10440

AVERAGE ACCELERATION BETWEEN T1 AND T2= 59.8G'S

EVENT TIME= 300.0 MSEC

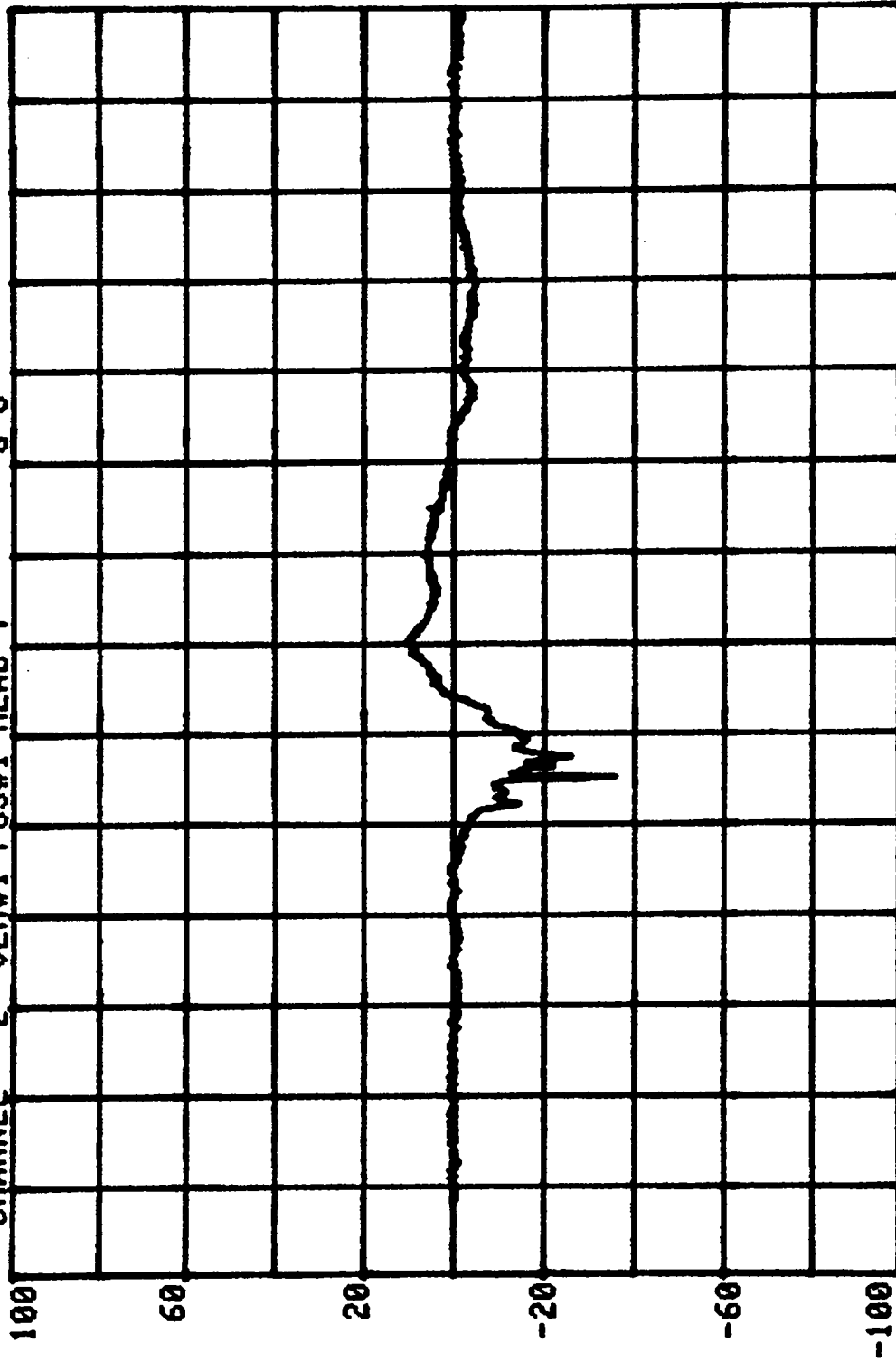
SEVERITY INDEX= 897.7

CHANNEL 1 RUN= 492 SERIES= 34 G'S
VEH#1 POS#1 HEAD X

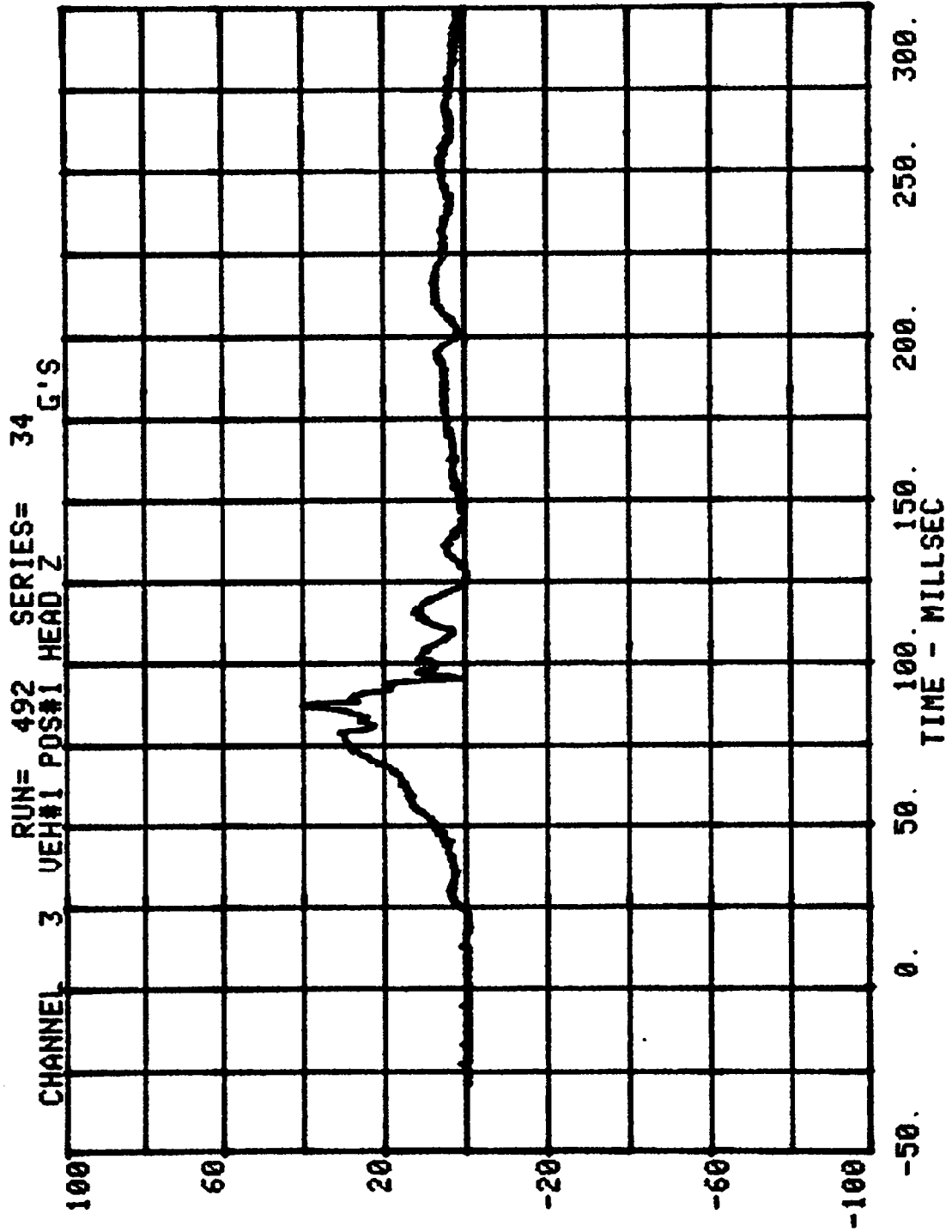


CHANNEL 2 VEH#1 POS#1 HEAD Y

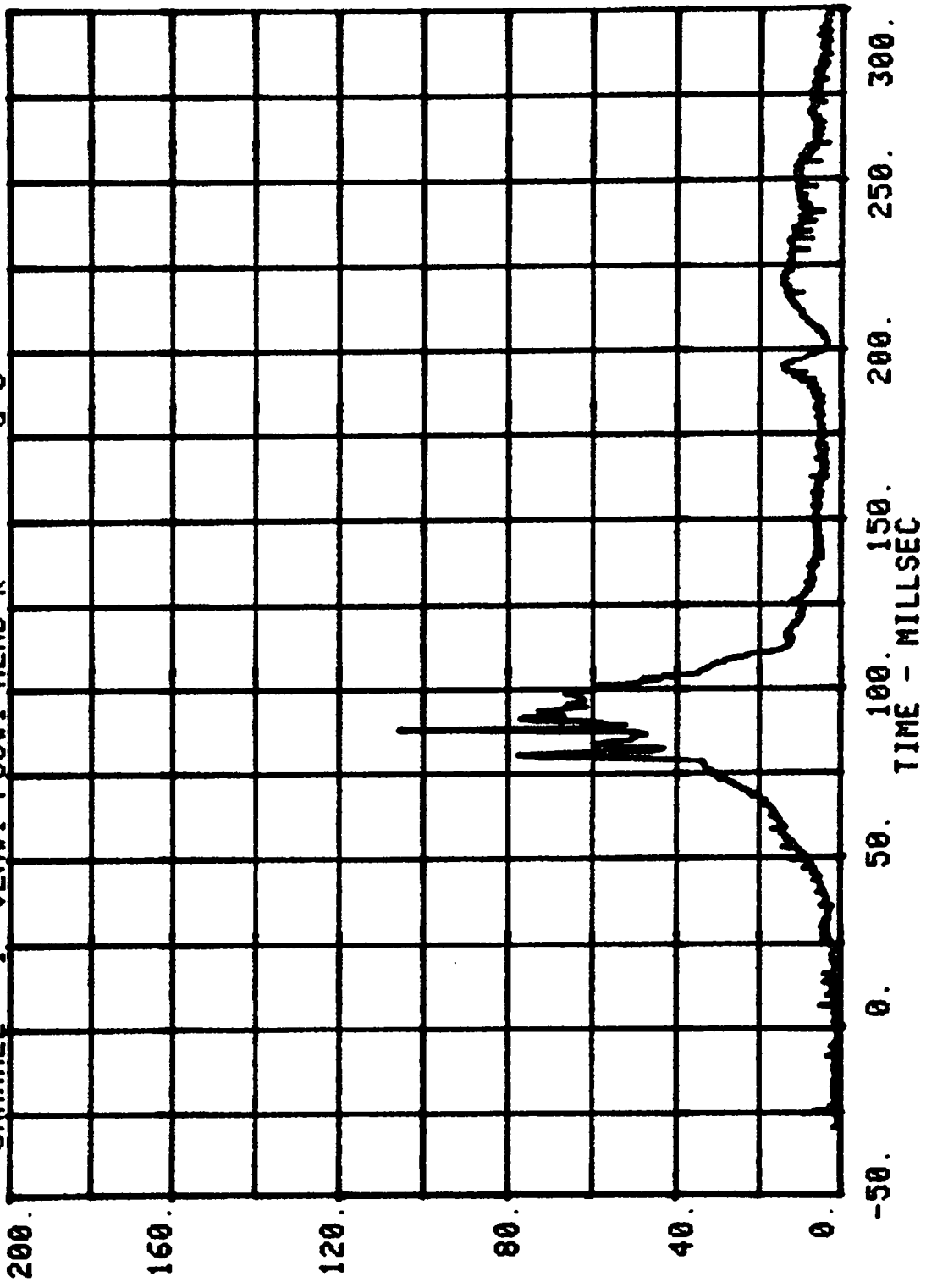
RUN= 492 SERIES= 34 G'S



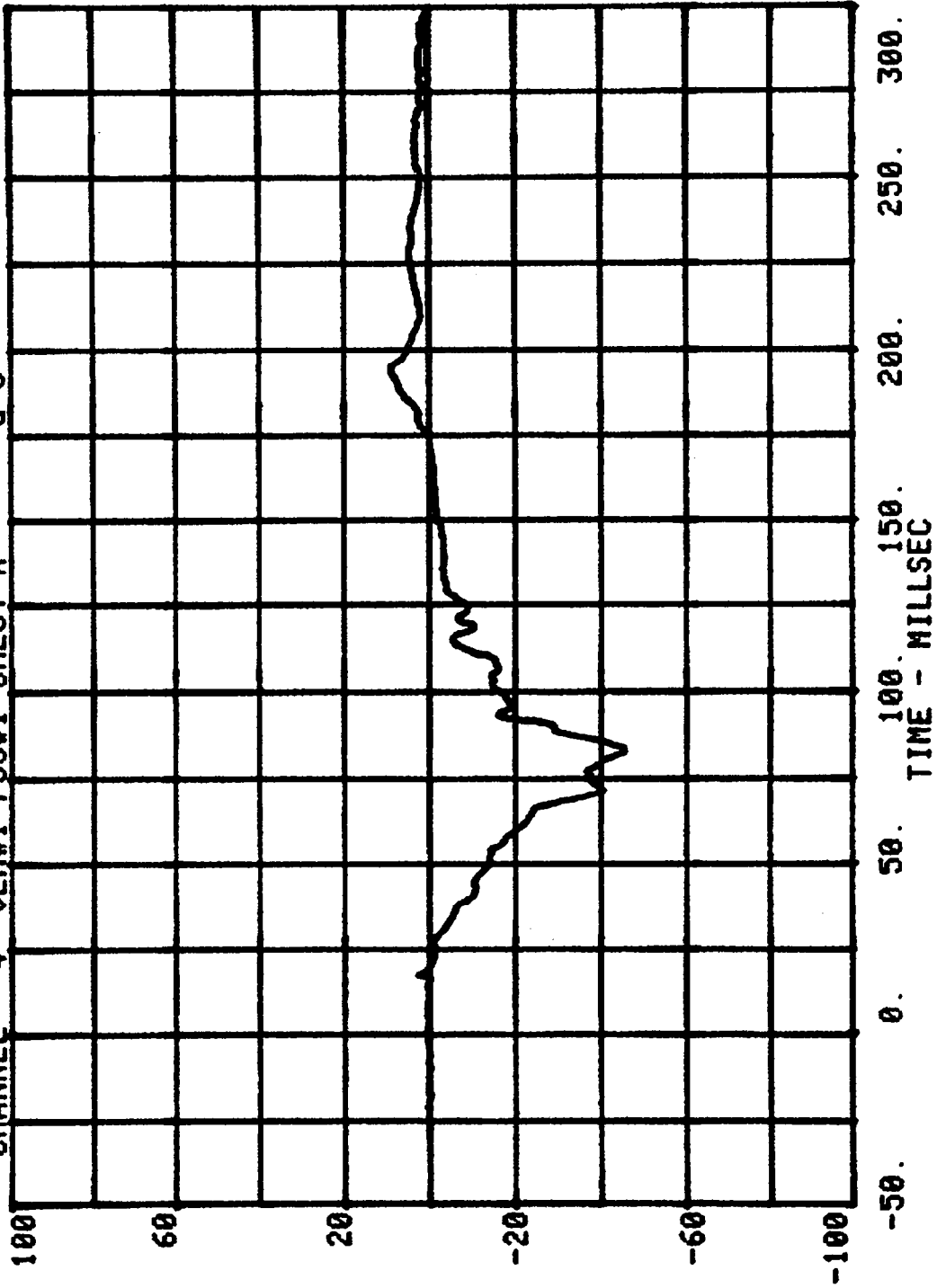
-50. 0. 50. 100. 150. 200. 250. 300.
TIME - MILLISEC



CHANNEL 1 VEH#1 POS#1 HEAD R RUN= 492 SERIES= 34 G'S

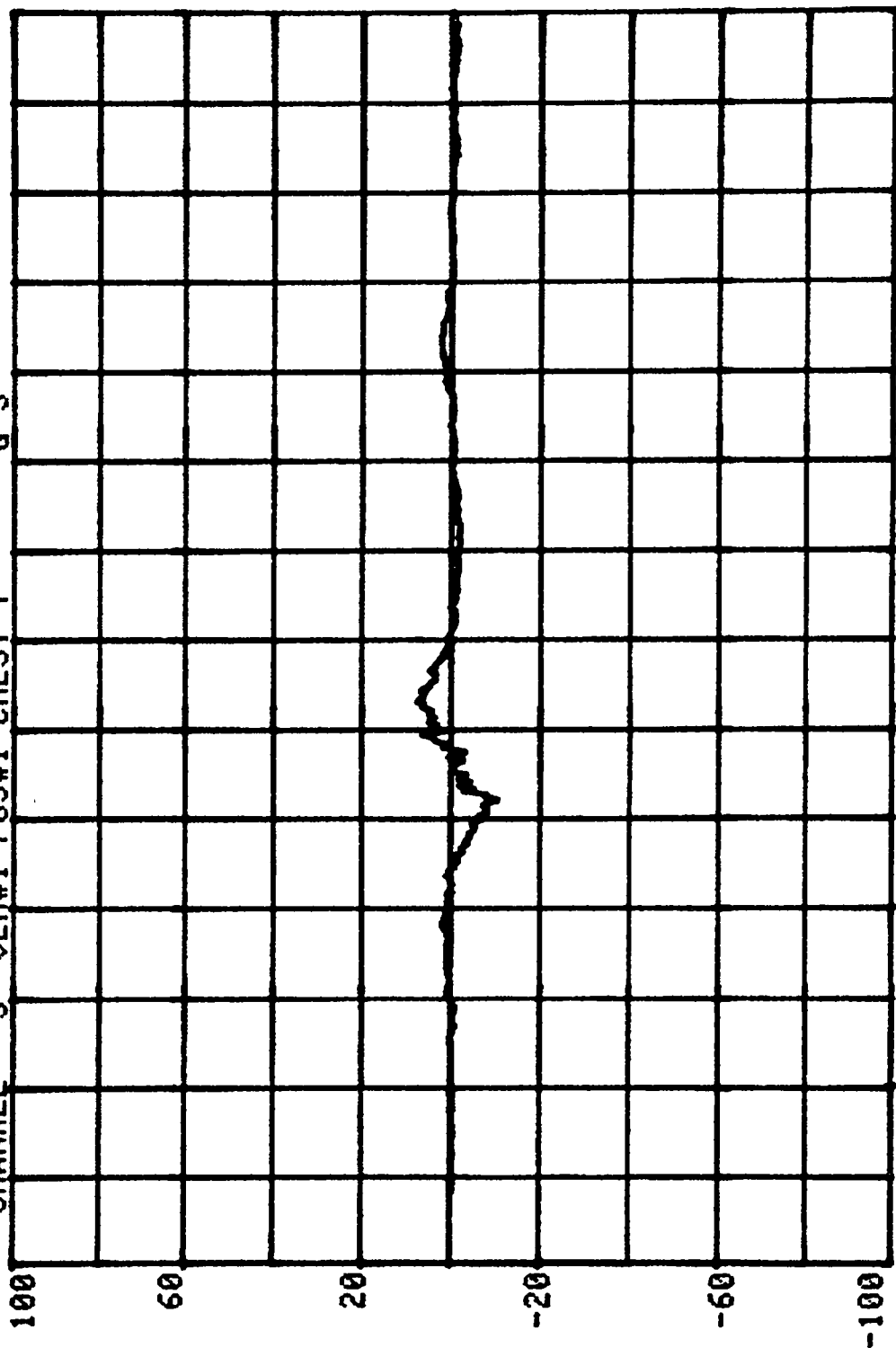


CHANNEL 4 VEH#1 POS#1 CHEST X
RUN= 492 SERIES= 34 G'S



CHANNEL 5 VEH#1 POS#1 CHEST Y 34 G'S

RUN= 492 SERIES=

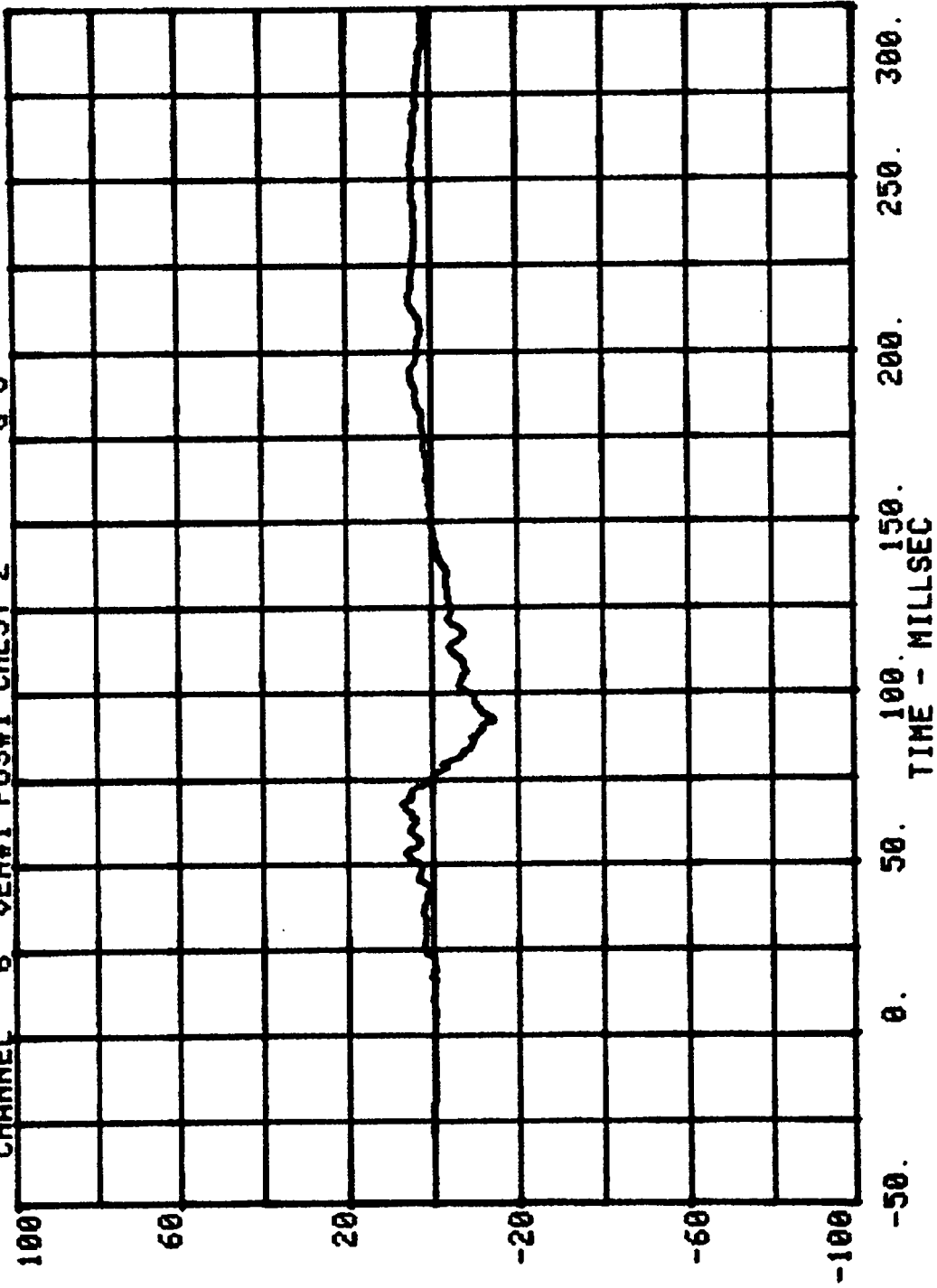


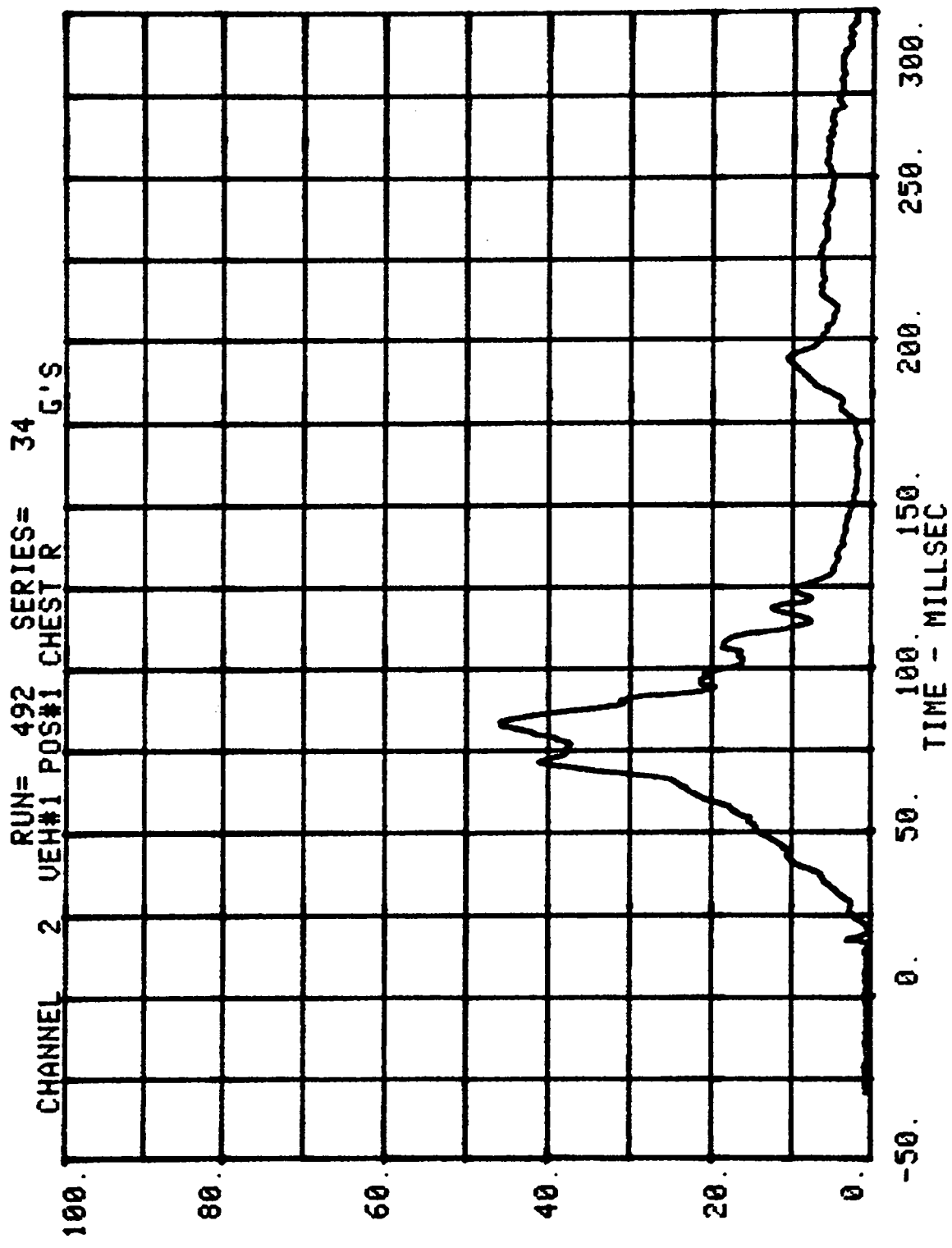
CHANNEL 6 VEH#1 POS#1 CHEST Z

RUN= 492

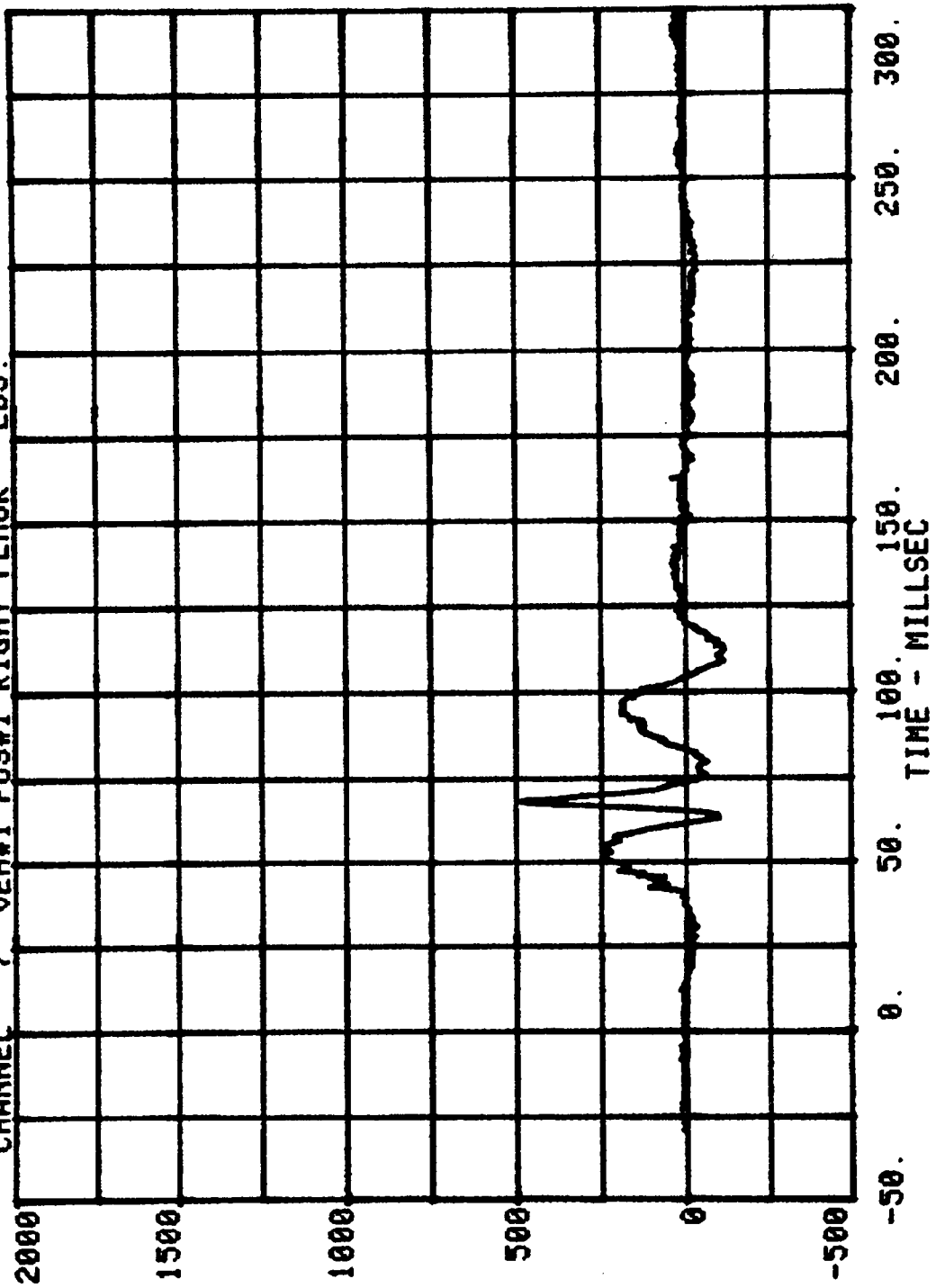
SERIES=

34 G'S

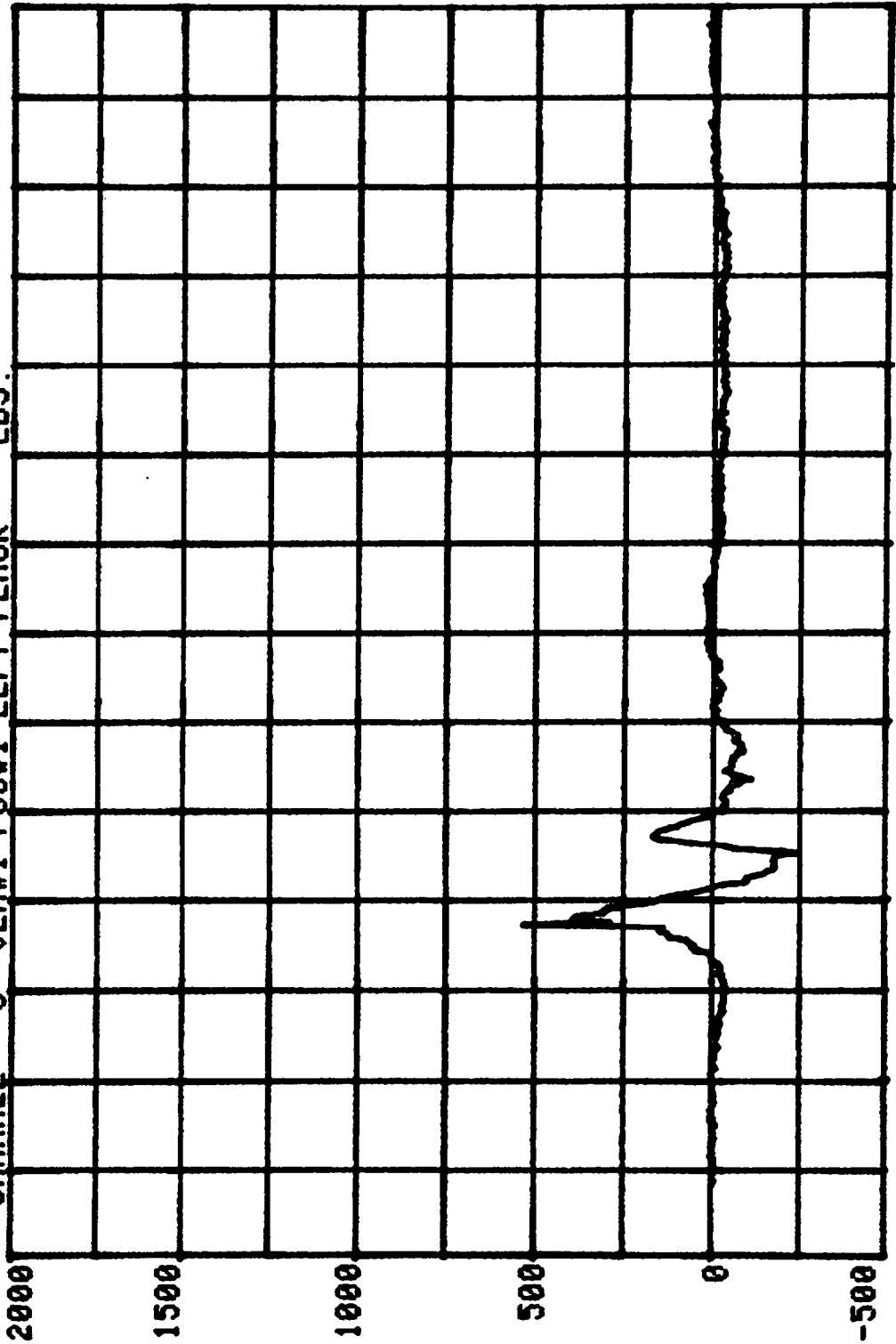




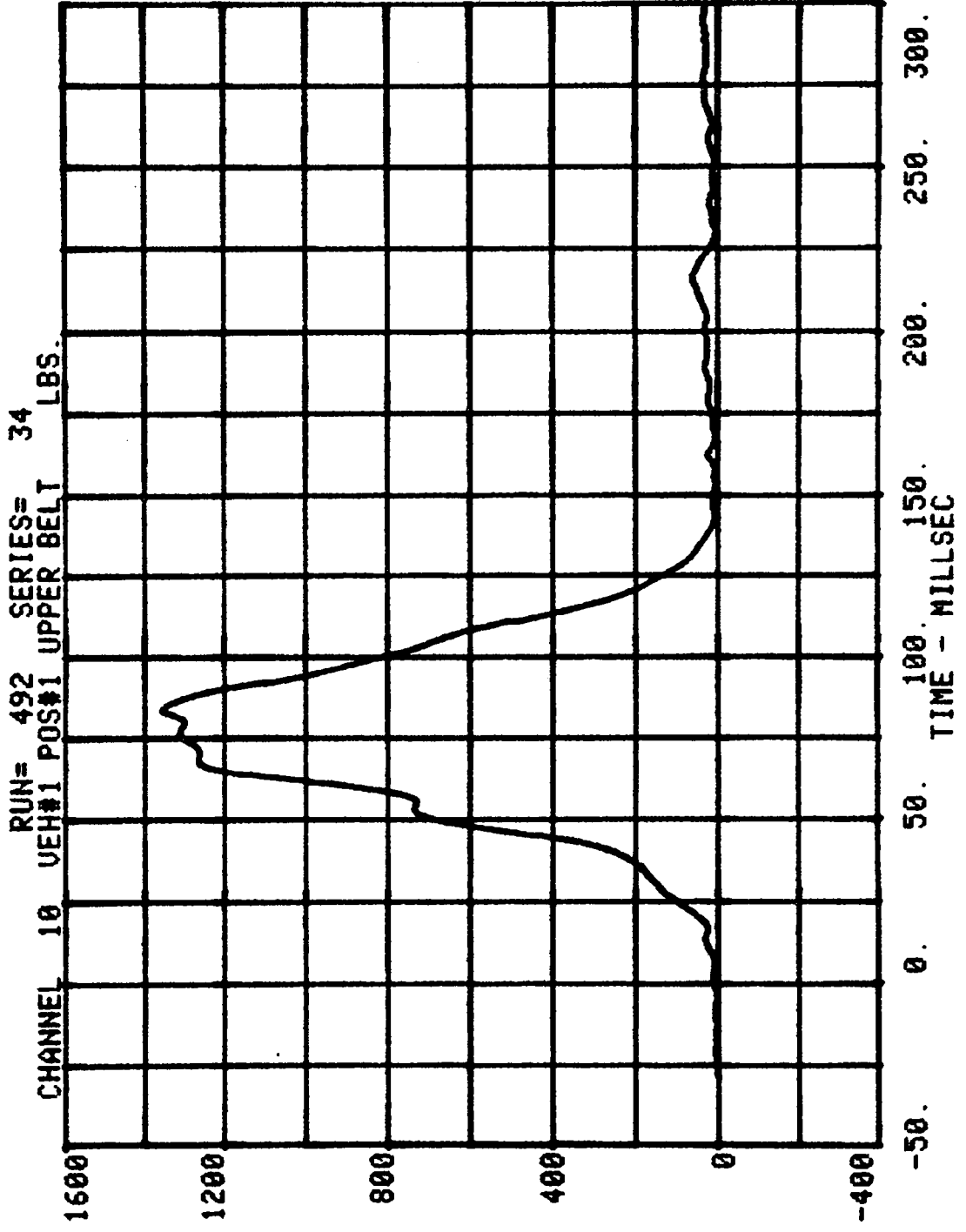
CHANNEL 7 RUN= 492 SERIES= 34
VEH#1 POS#1 RIGHT FEMUR LBS.



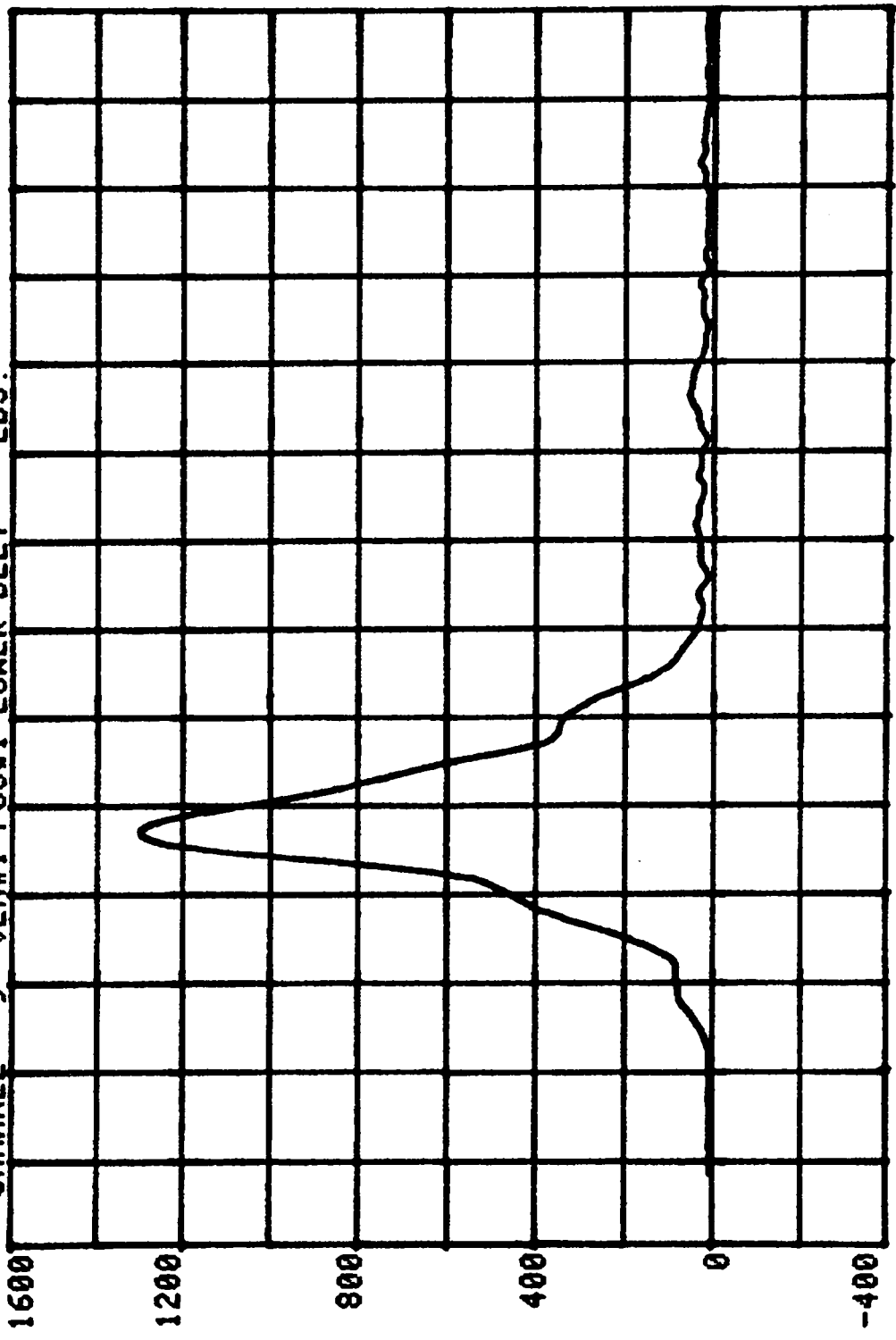
CHANNEL 8 VEH#1 POS#1 LEFT FEMUR 34 LBS. SERIES= 492 RUN= 492



-50. 0. 50. 100. 150. 200. 250. 300. TIME - MILLISEC



CHANNEL 9 RUN= 492 SERIES= 34 LBS.
VEH#1 POS#1 LOWER BELT



-50. 0. 50. 100. 150. 200. 250. 300.
TIME - MILLISEC

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

BOA TASK 3 TEST #34 CAR-TO-CAR

RUN= 492

VEH#1 POS#2 HEAD R

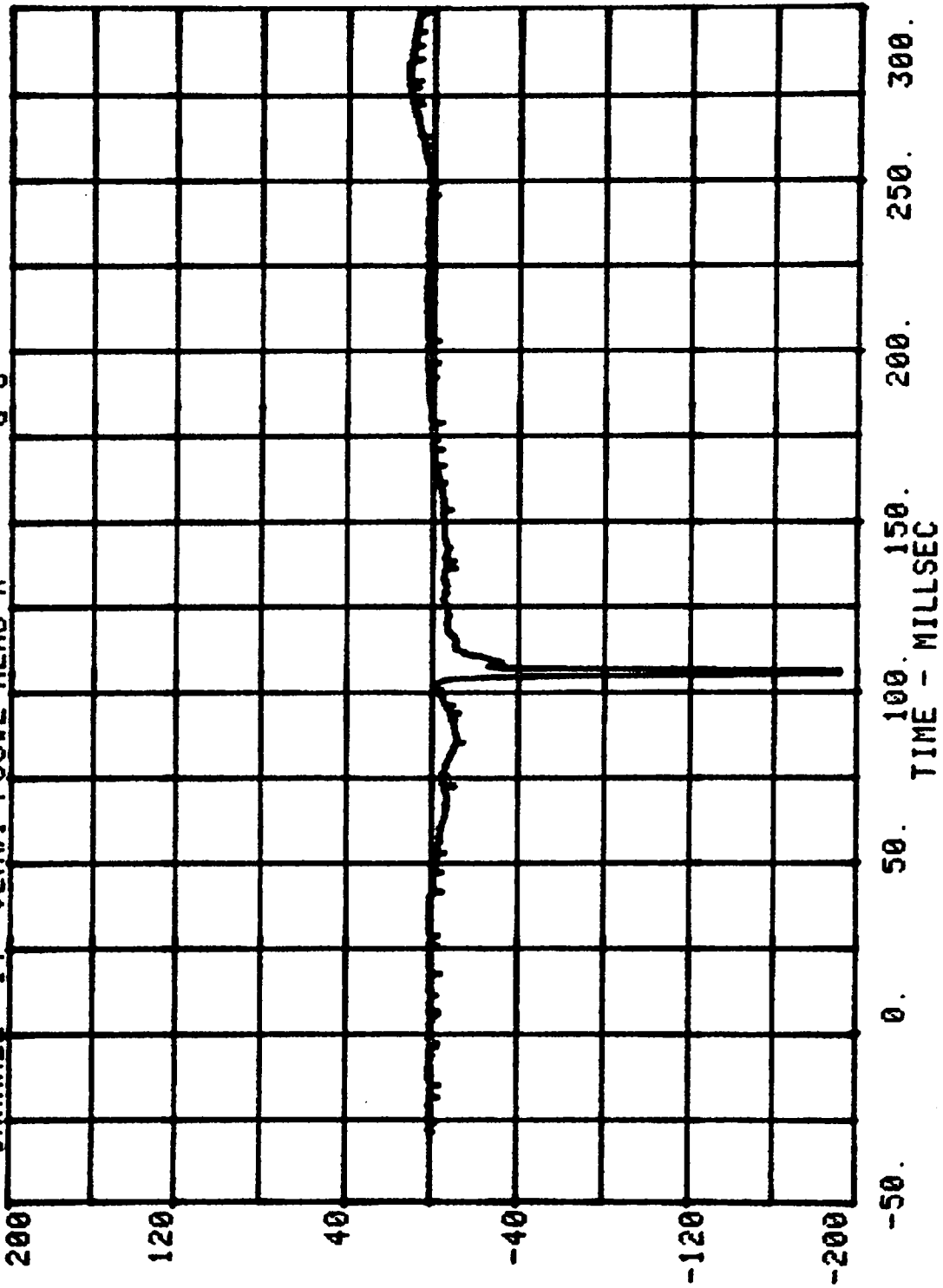
HIC=1967.0 FROM T1= 10530 TO T2= 10680

AVERAGE ACCELERATION BETWEEN T1 AND T2= 280.0G'S

EVENT TIME= 300.0 MSEC

SEVERITY INDEX=2760.8

CHANNEL 14 VEH#1 POS#2 HEAD X 34 G'S

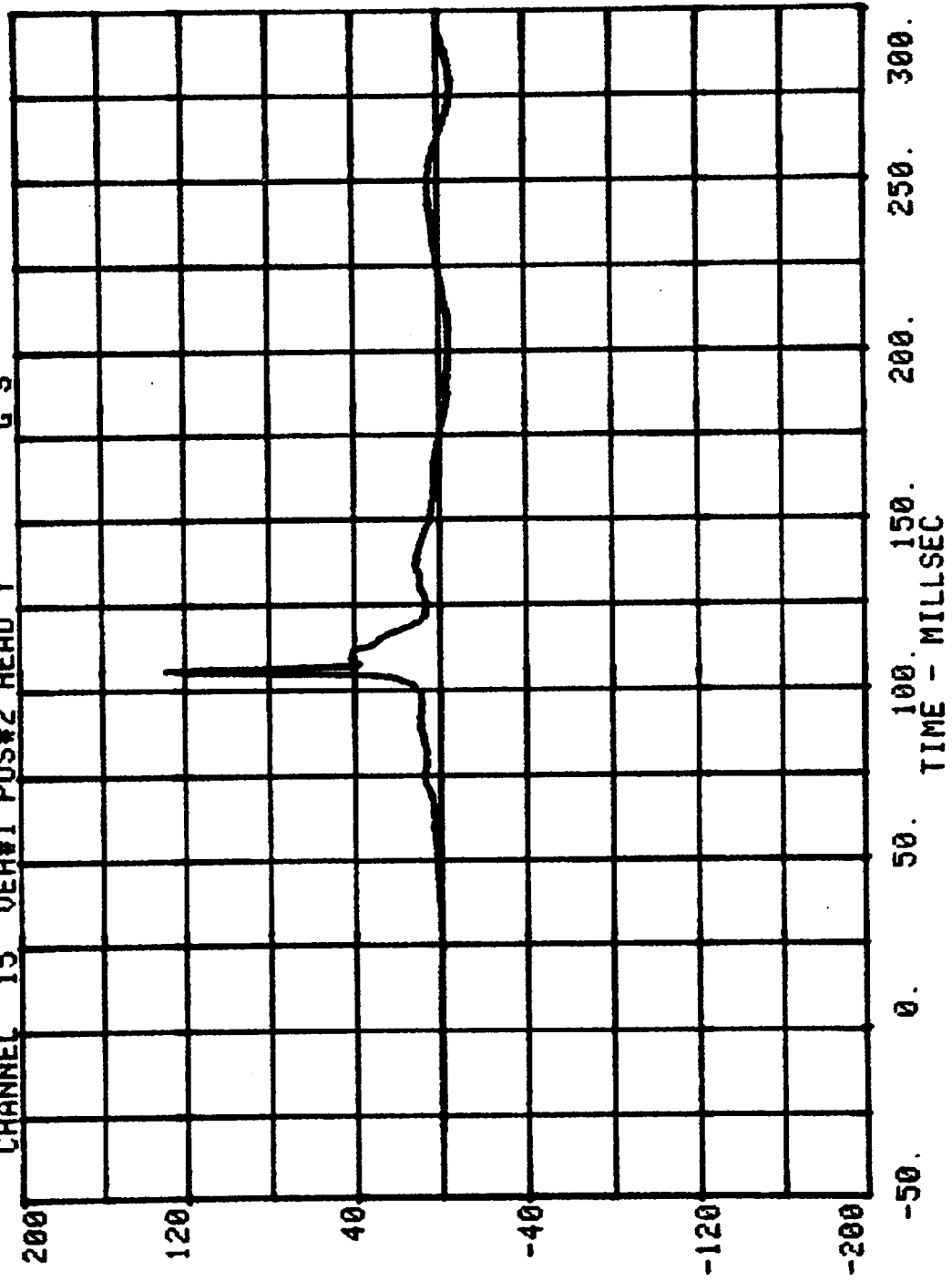


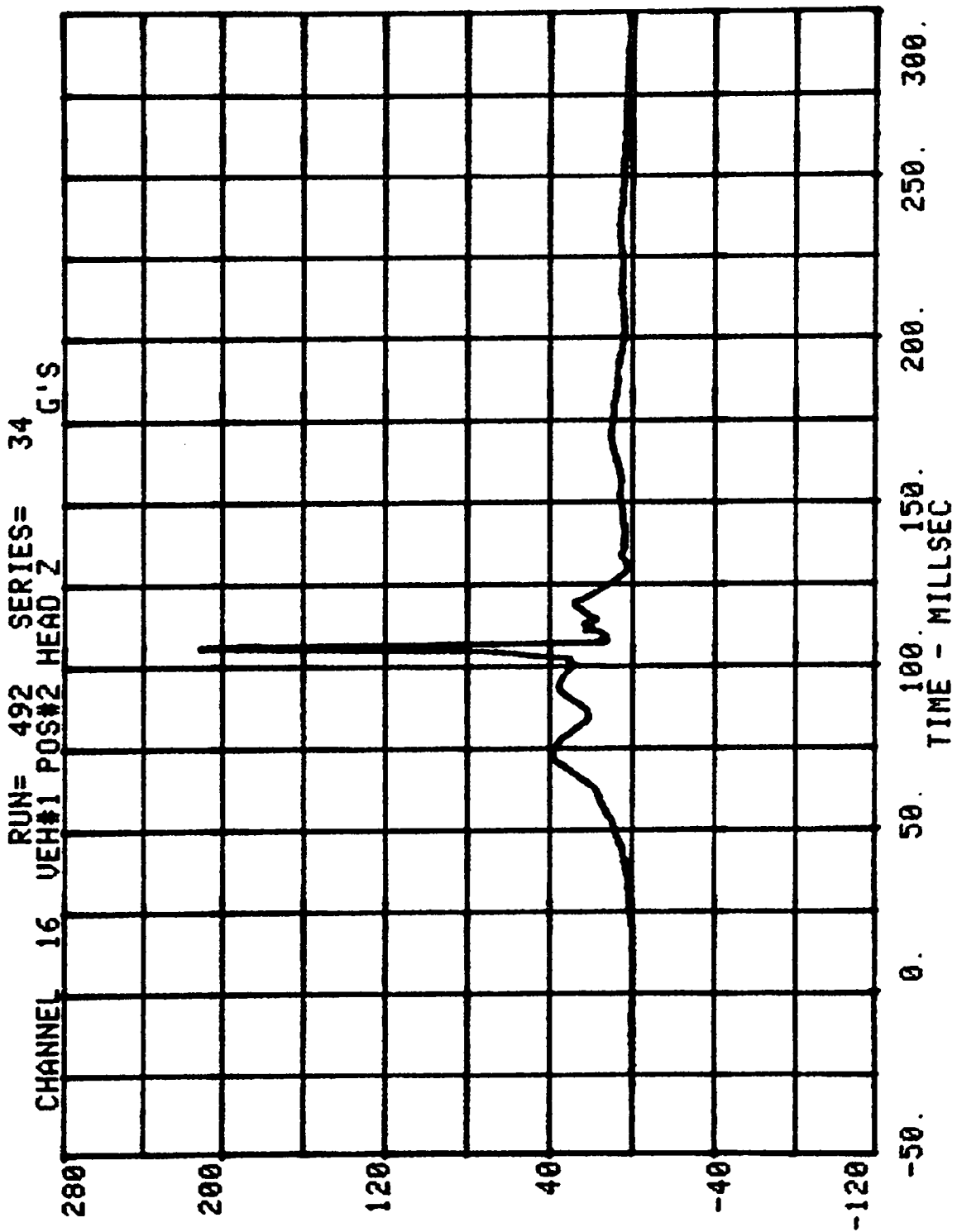
CHANNEL 15 VEH#1 POS#2 HEAD Y

RUN= 492

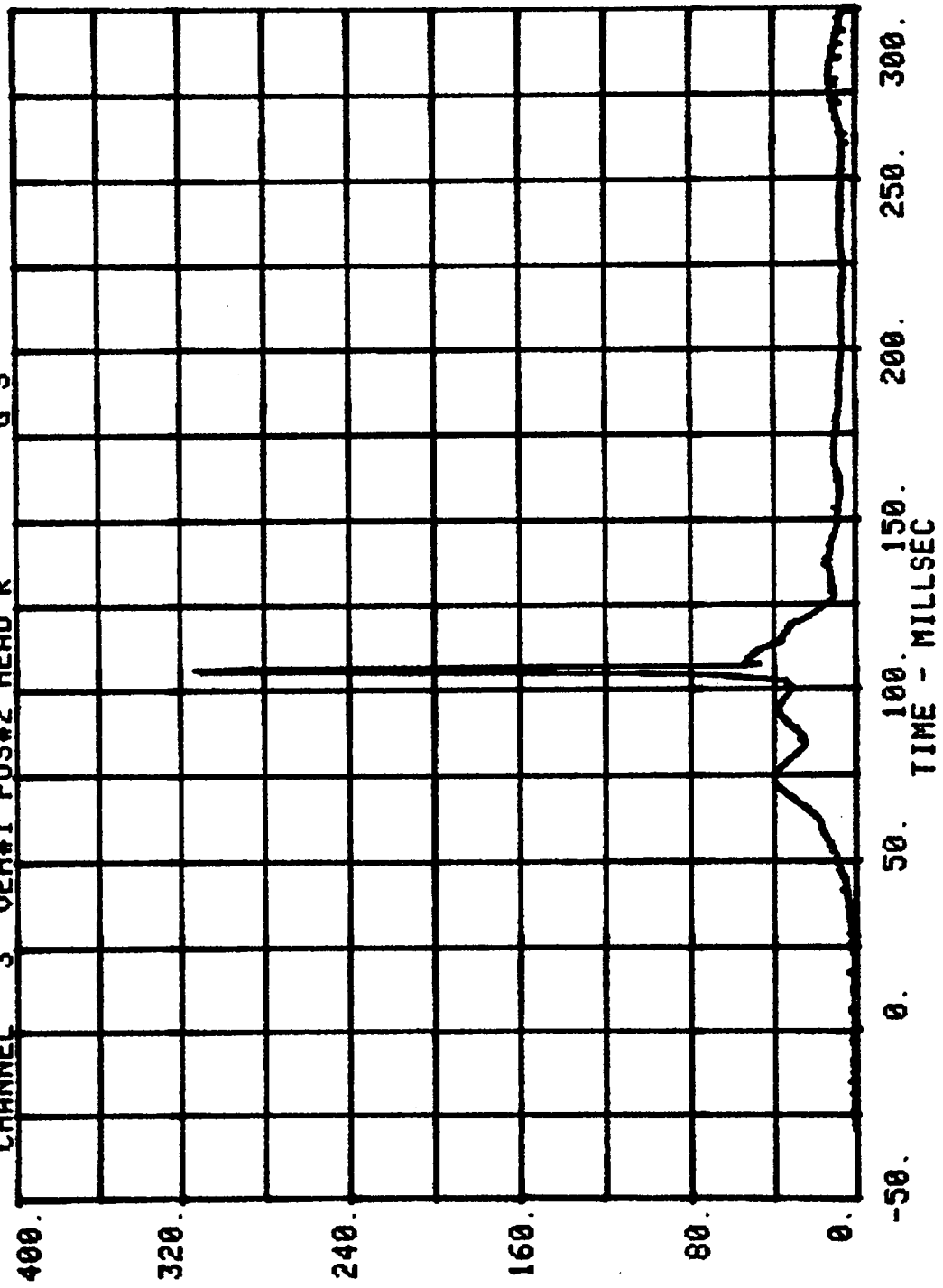
SERIES=

34 G'S

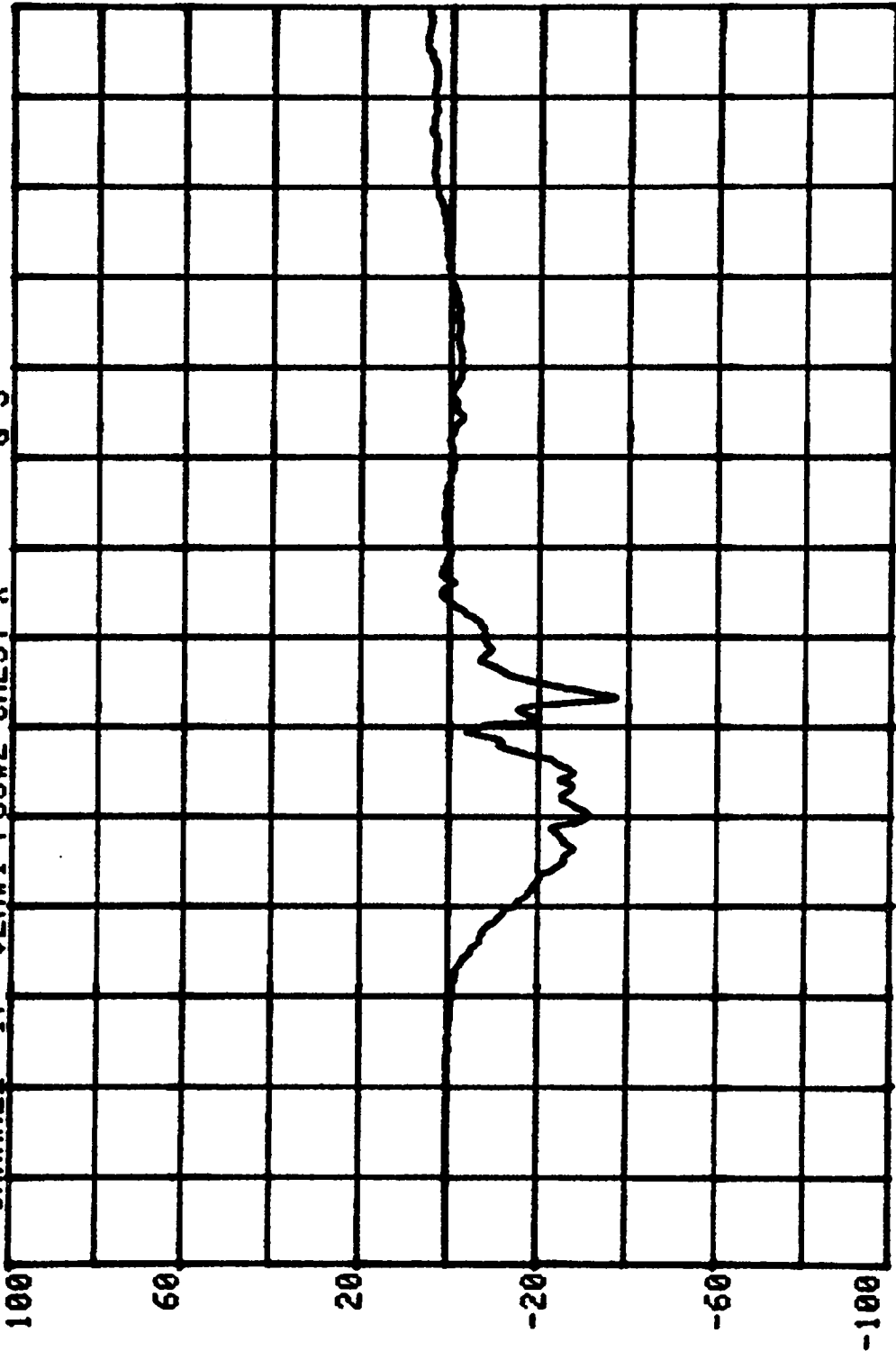




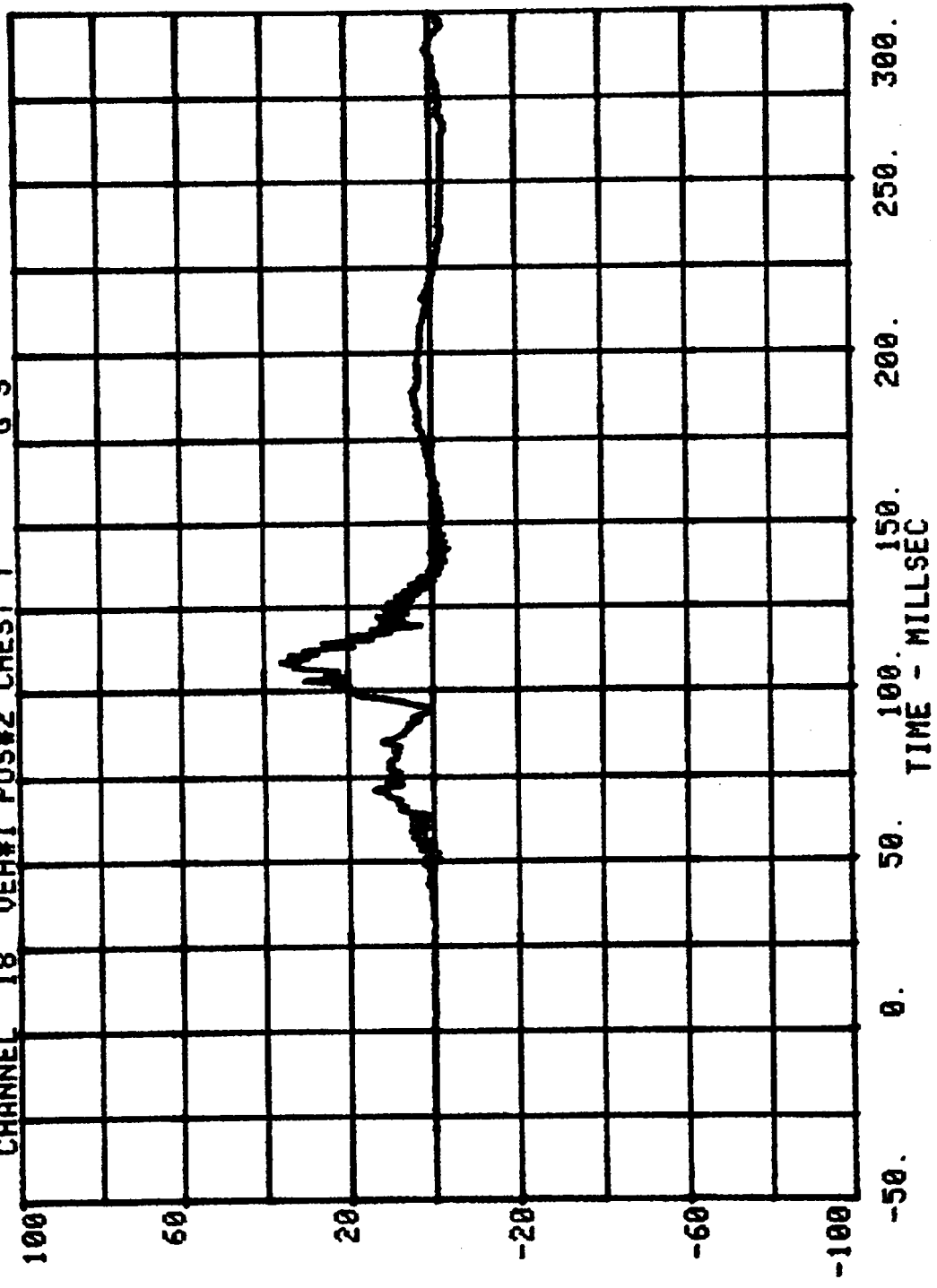
CHANNEL 3 RUN= 492 SERIES= 34 G'S
VEH#1 POS#2 HEAD R



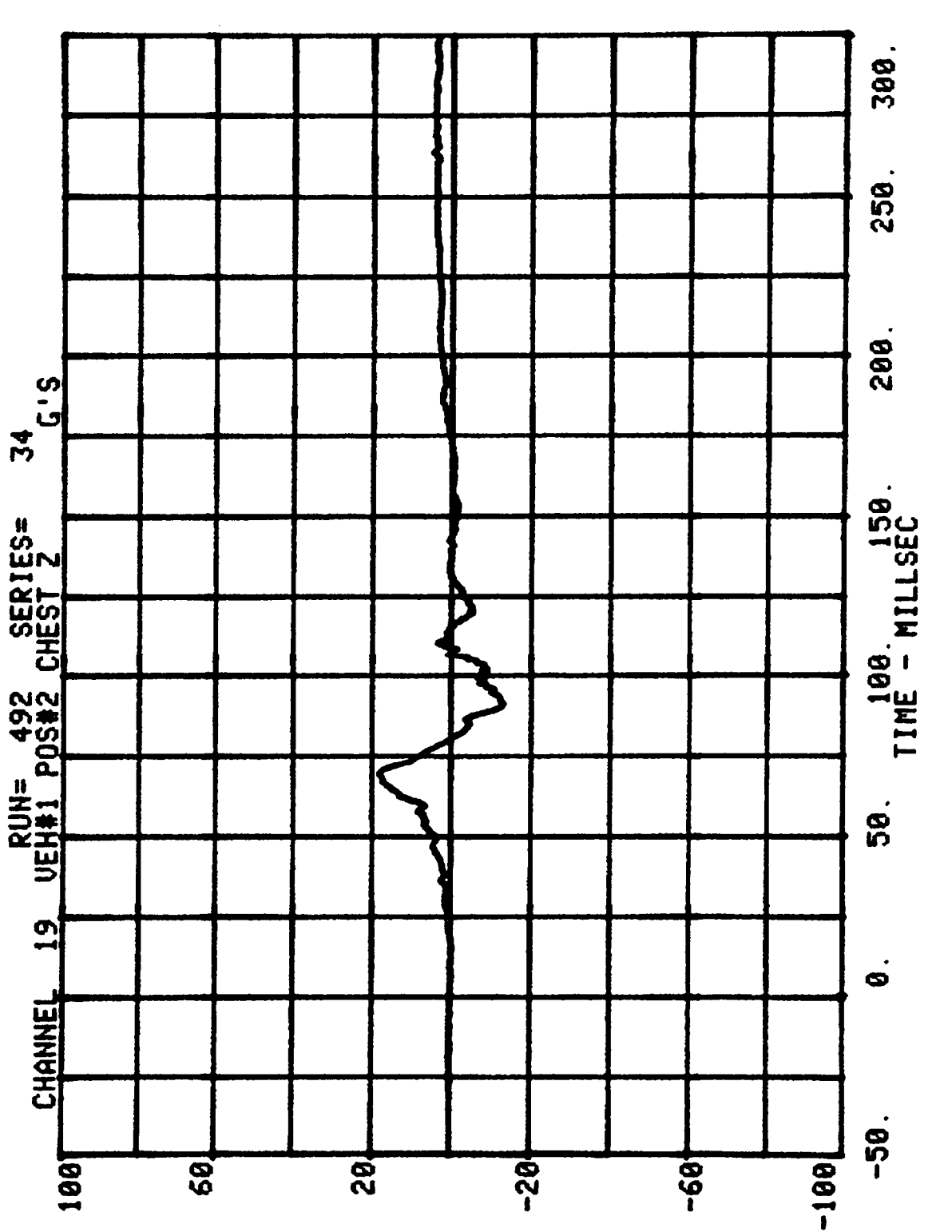
CHANNEL 17 VEH#1 POS#2 CHEST X SERIES= 34 G'S

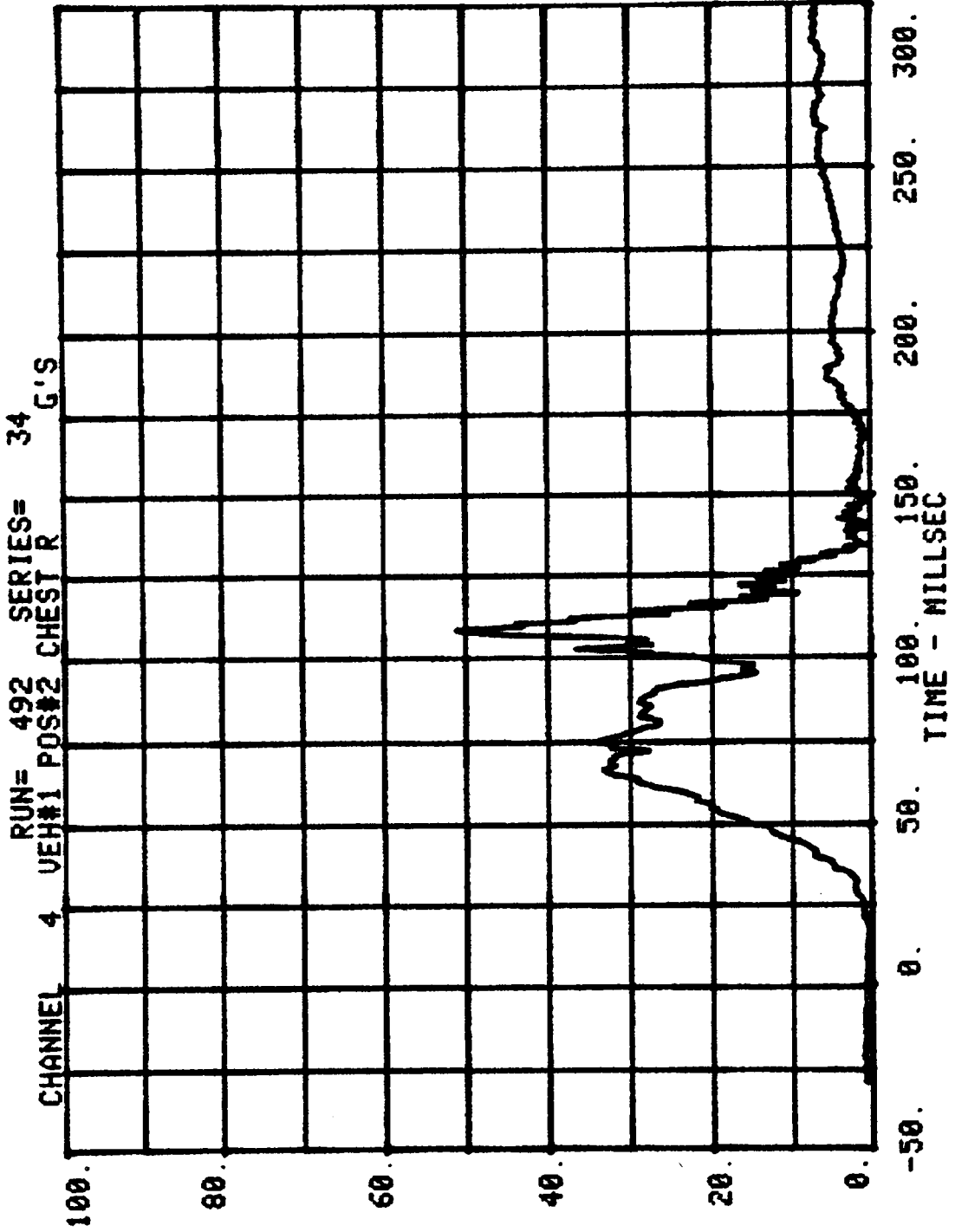


CHANNEL 18 VEH#1 POS#2 CHEST Y 34 G'S

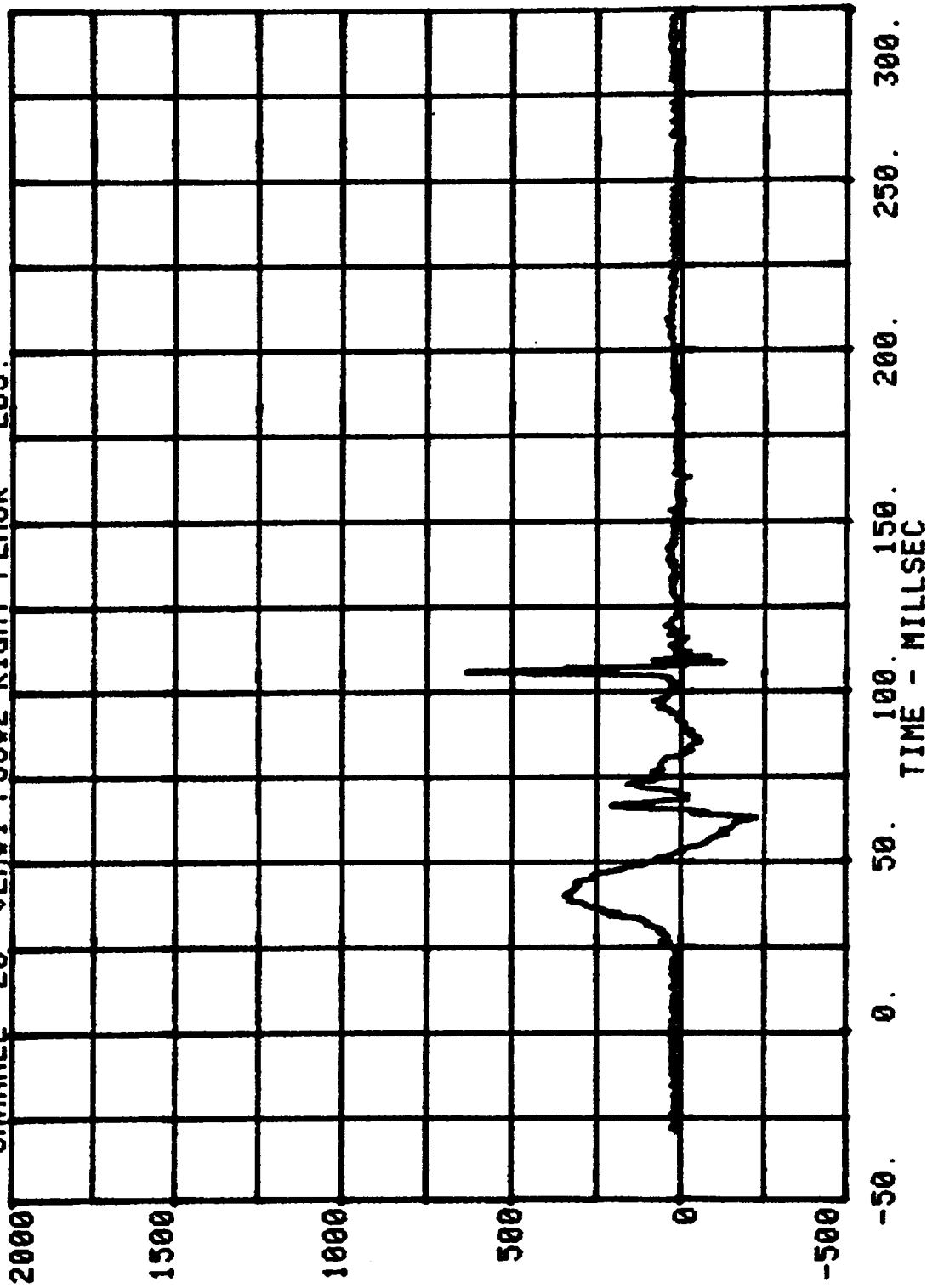


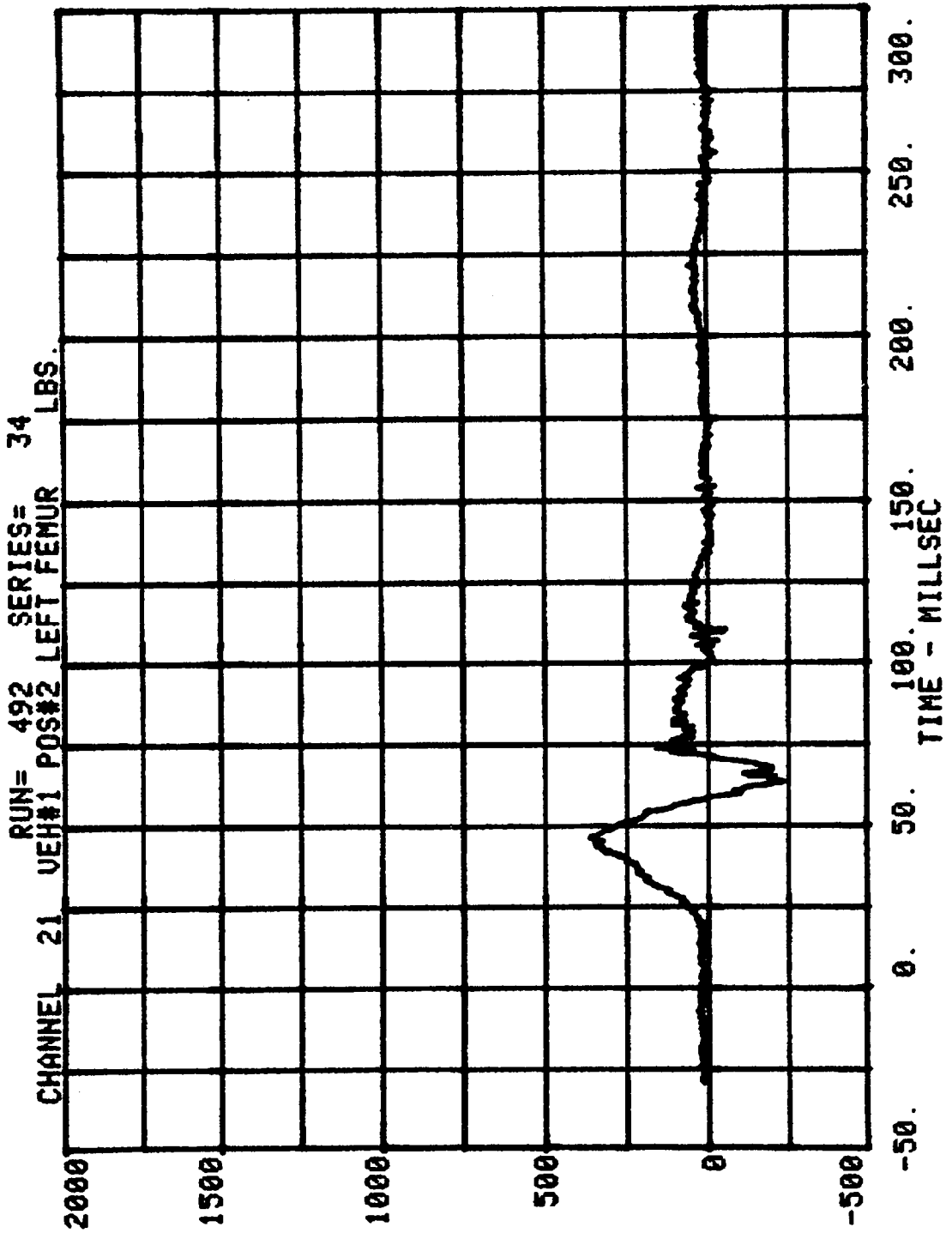
CHANNEL 19 VE#1 POS#2 CHEST Z 34 G'S



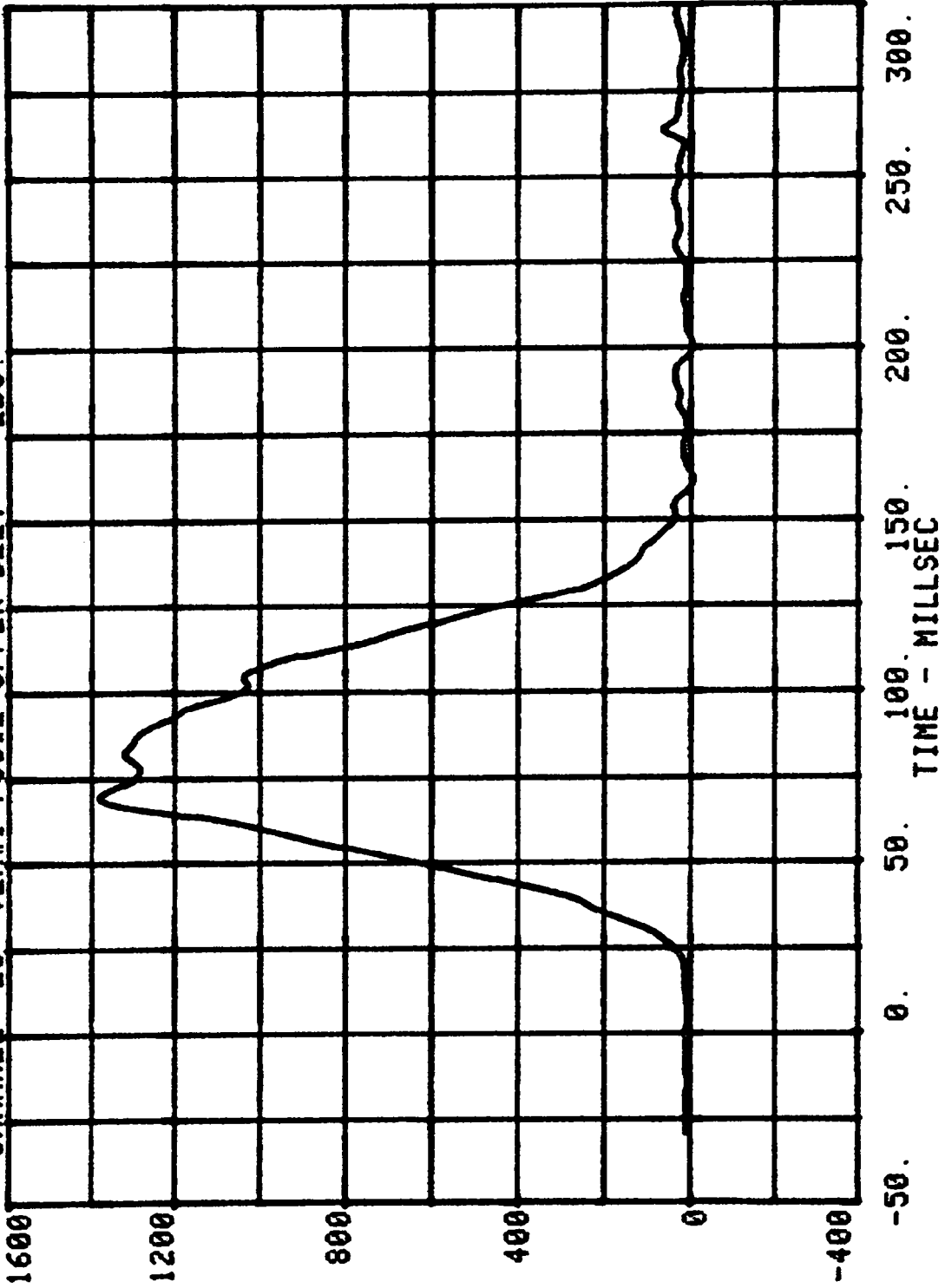


RUN= 492 SERIES= 34
CHANNEL 20 VEH#1 POS#2 RIGHT FEMUR LBS.

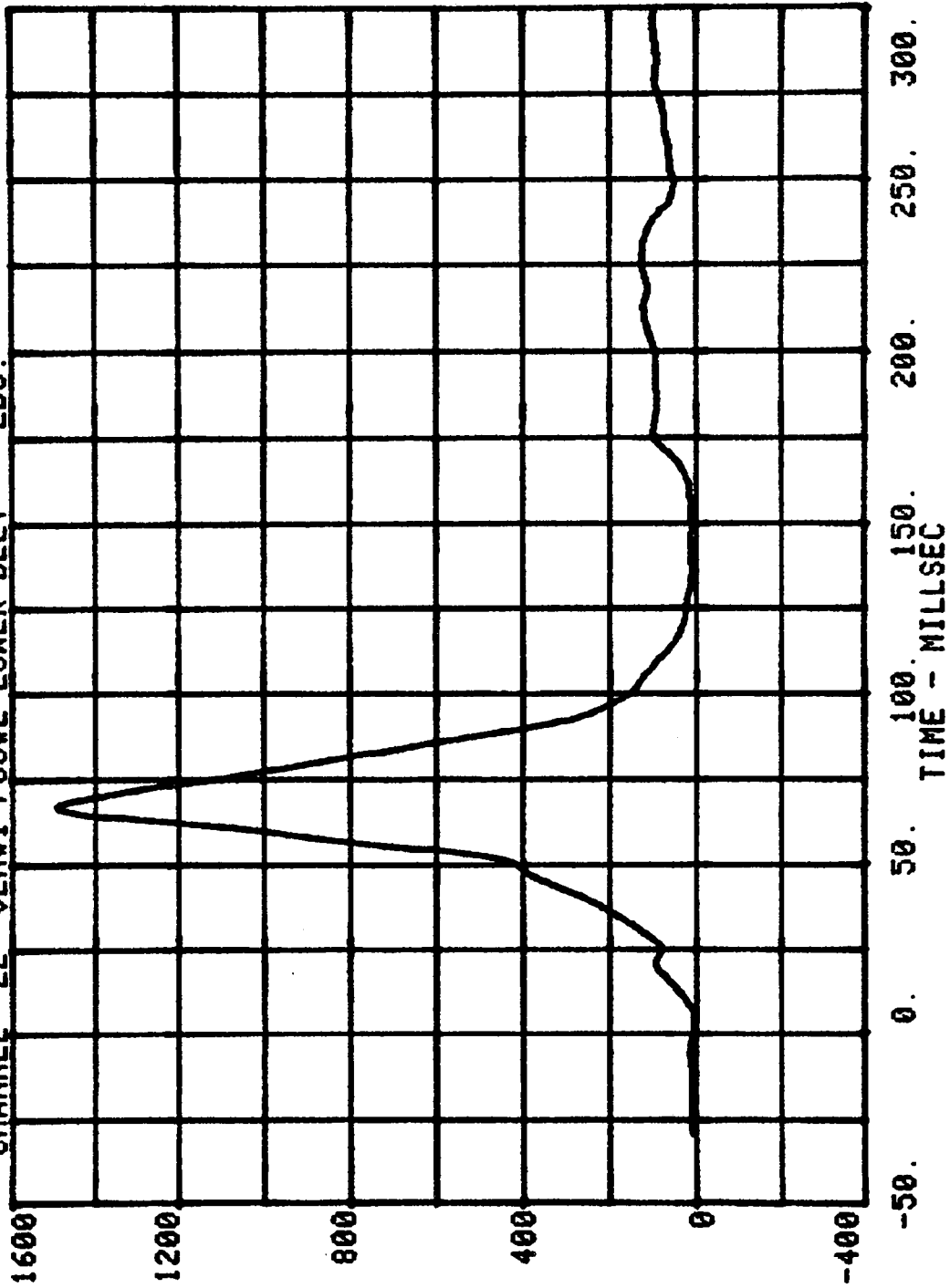




CHANNEL 23 RUN= 492 SERIES= 34
VEH#1 POS#2 UPPER BELT LBS.



CHANNEL 22 VEH#1 POS#2 LOWER BELT SERIES= 34 LBS.



Test No. 308-34-492

1980 PLYMOUTH HORIZON

VEHICLE NO. 2 DATA

FILTER CHANNEL CLASS

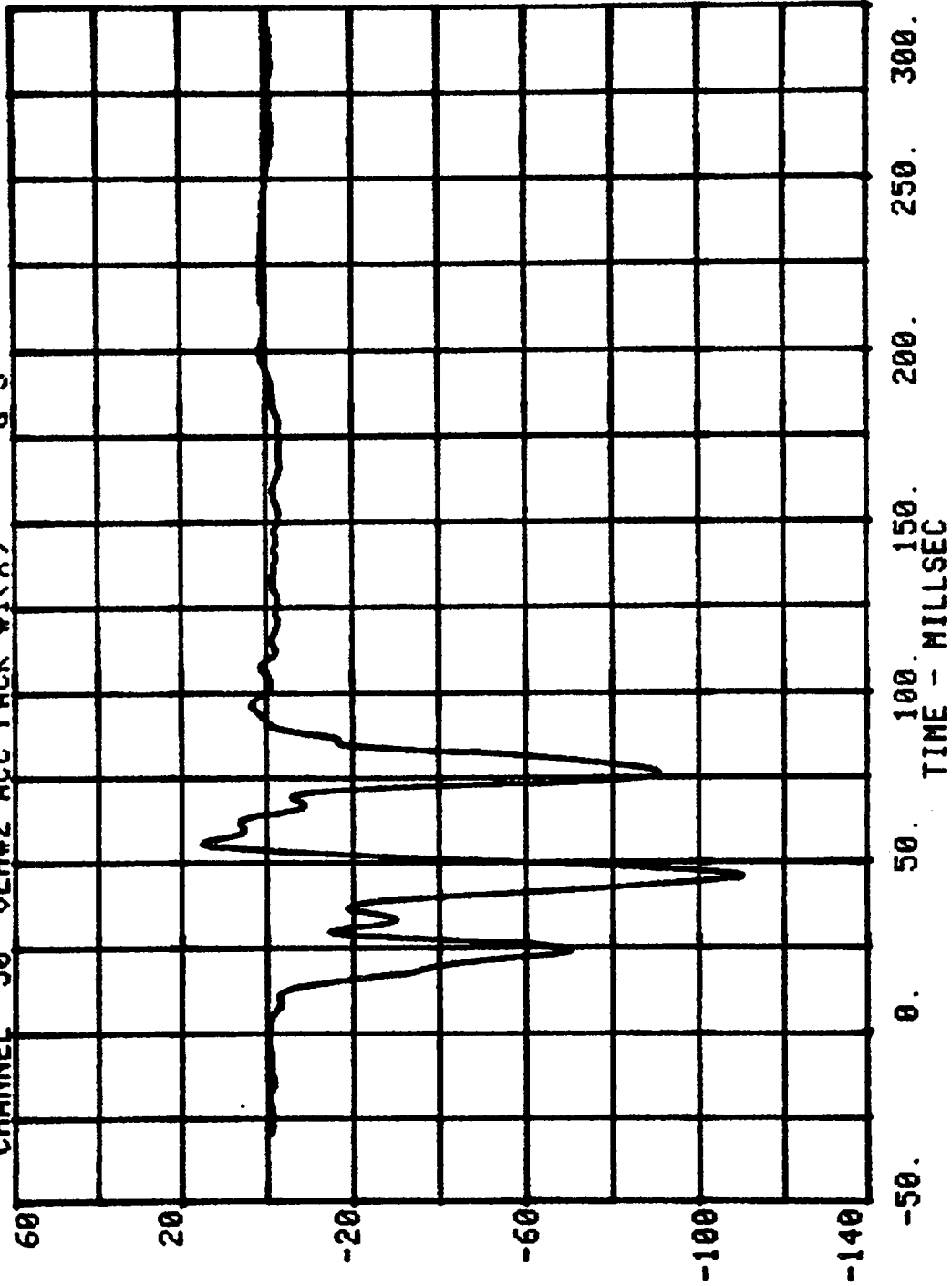
VEHICLE DATA

60

See Figure 2 for Accelerometer Layout

See Table 8 for Electronic Instrumentation Descriptors

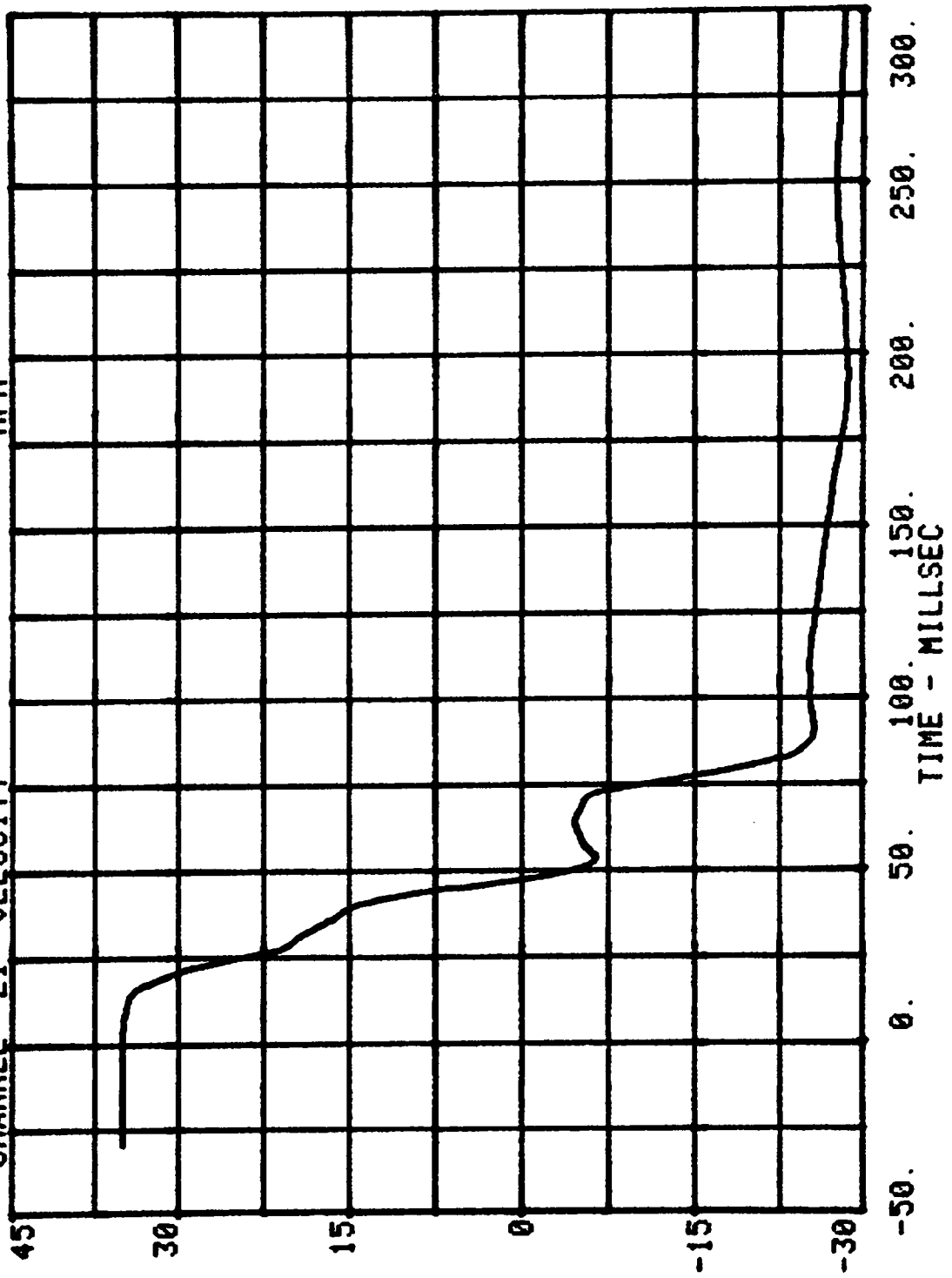
CHANNEL 50 VEH#2 ACC PACK #1(X) 34 G'S



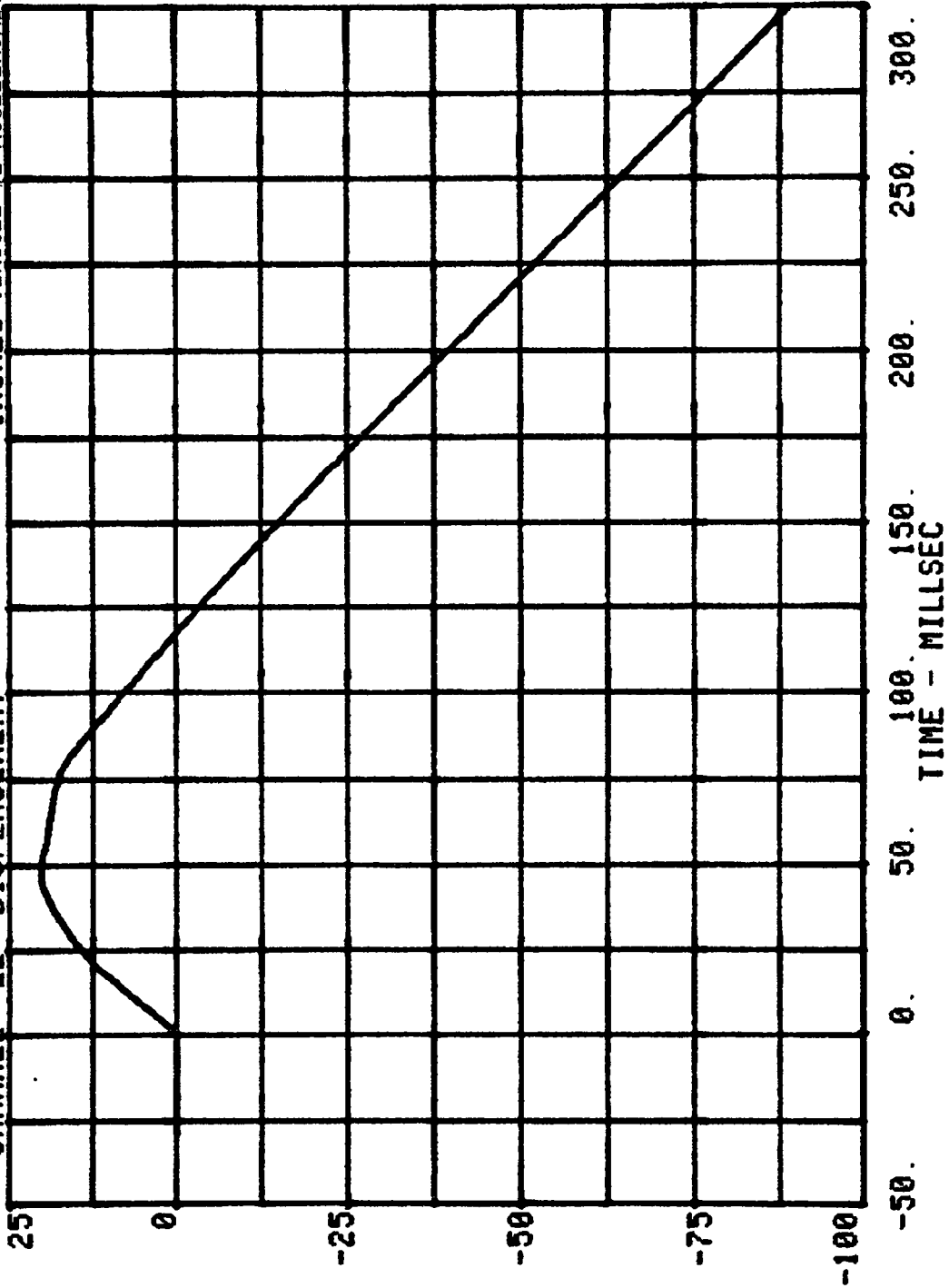
B-50

6525-V-34

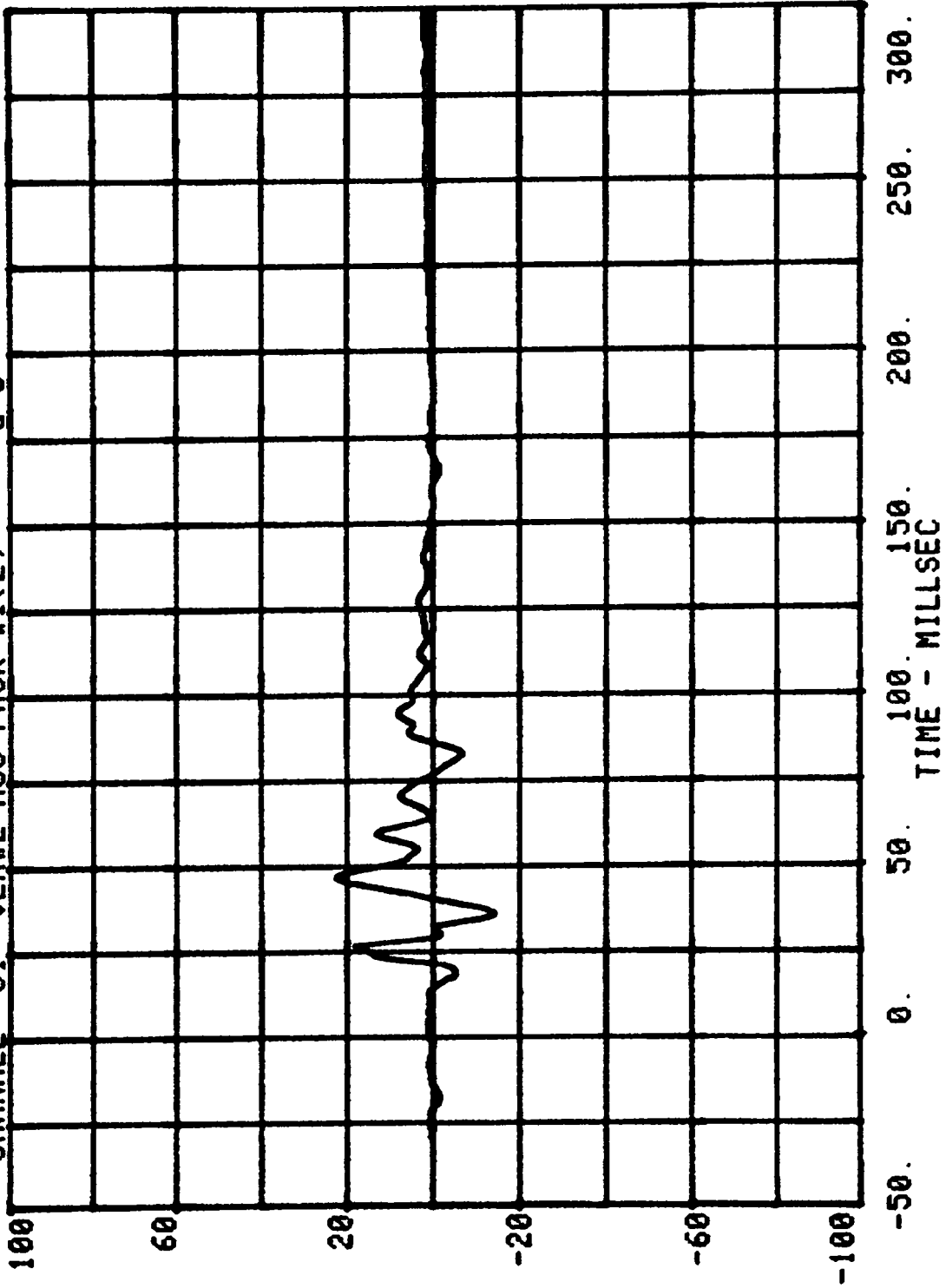
CHANNEL 21 VELOCITY
RUN= 492 SERIES= 34 MPH
VEHICLE #2 ACCELEROMETER PACK #1 X



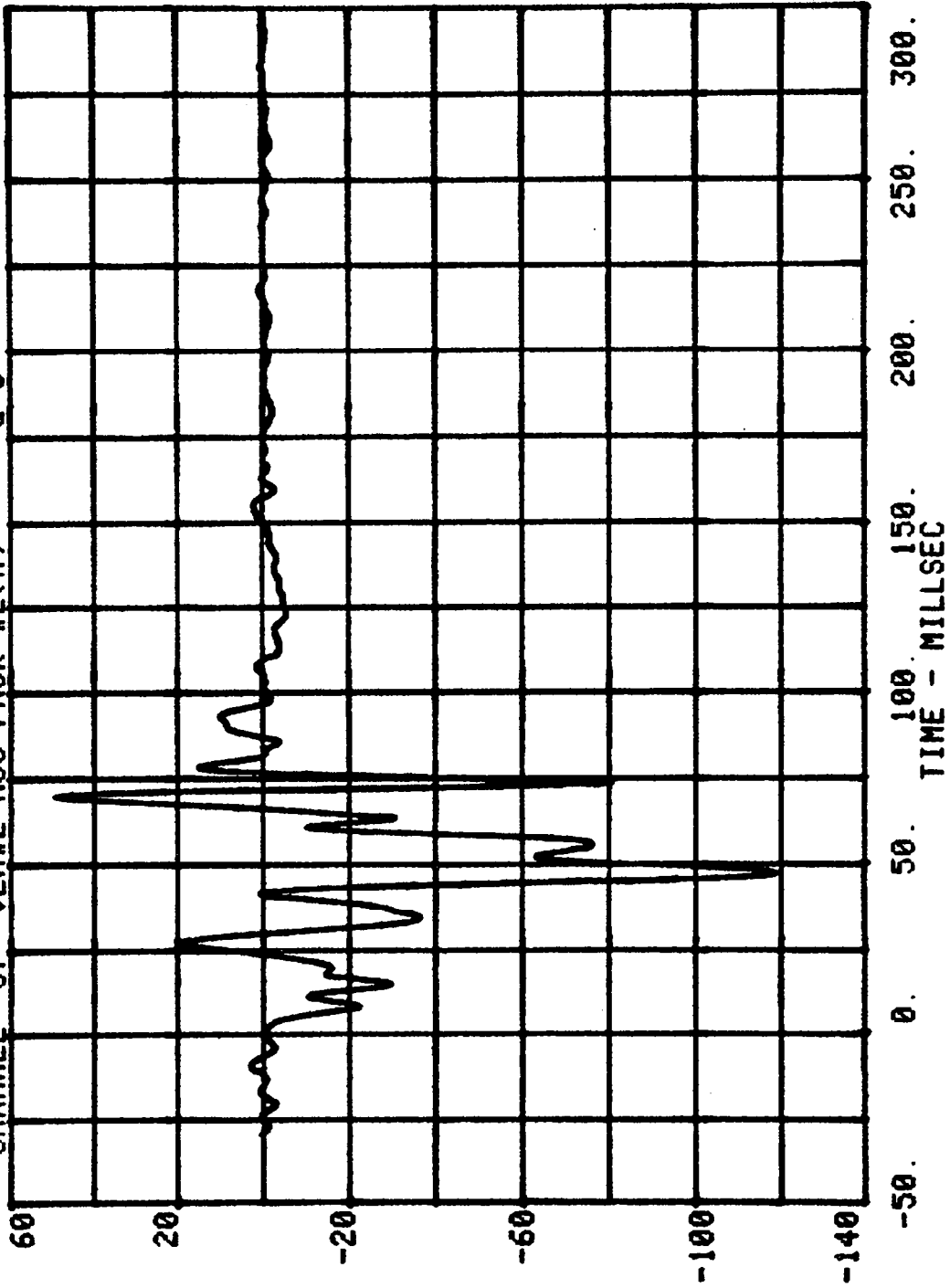
CHANNEL 22 DISPLACEMENT
RUN= 492 SERIES= 34 INCHES VEHICLE #2 ACCELEROMETER PACK #1 X



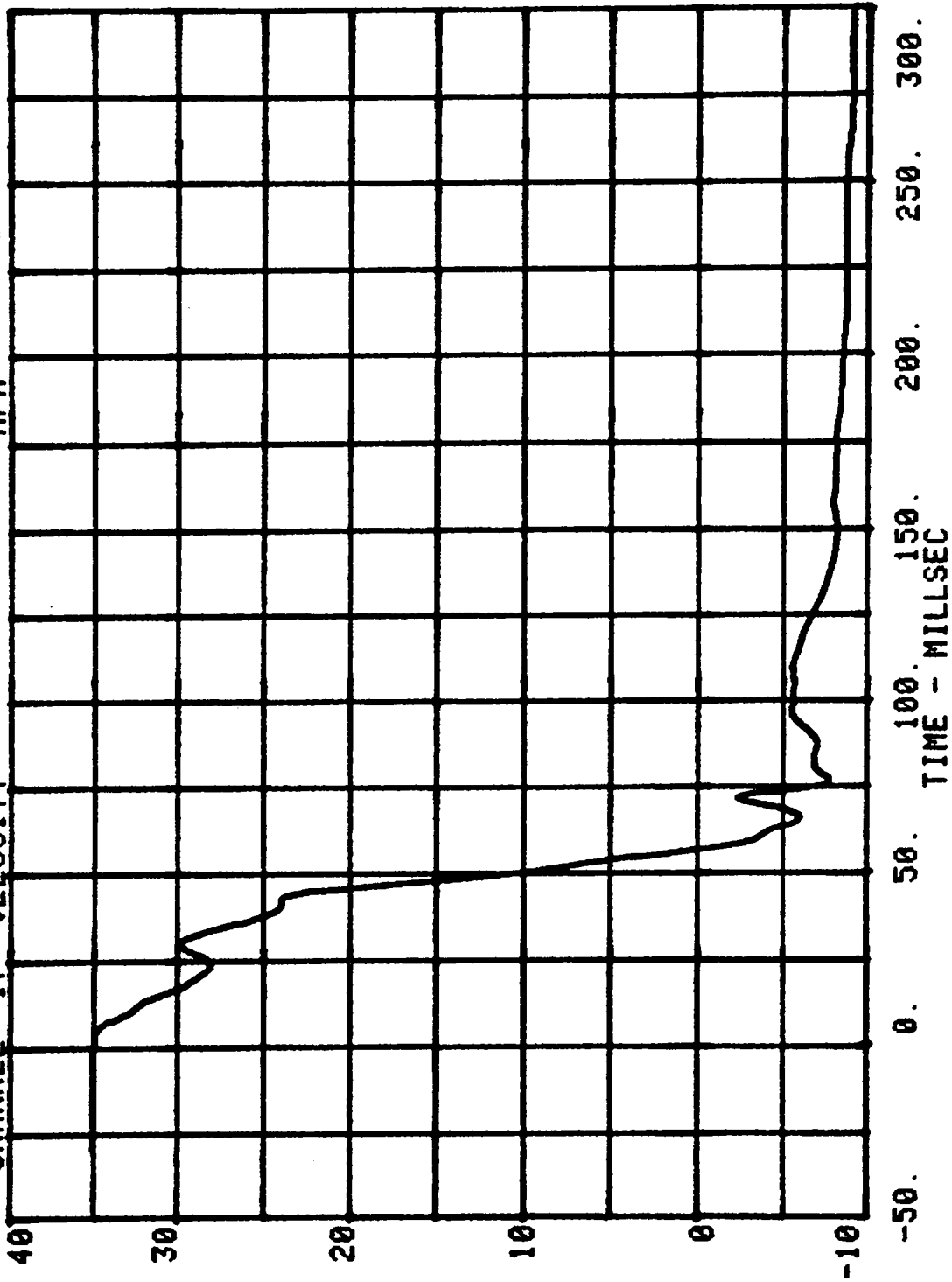
CHANNEL 51 VEH#2 ACC PACK #1(Z) 34 G'S



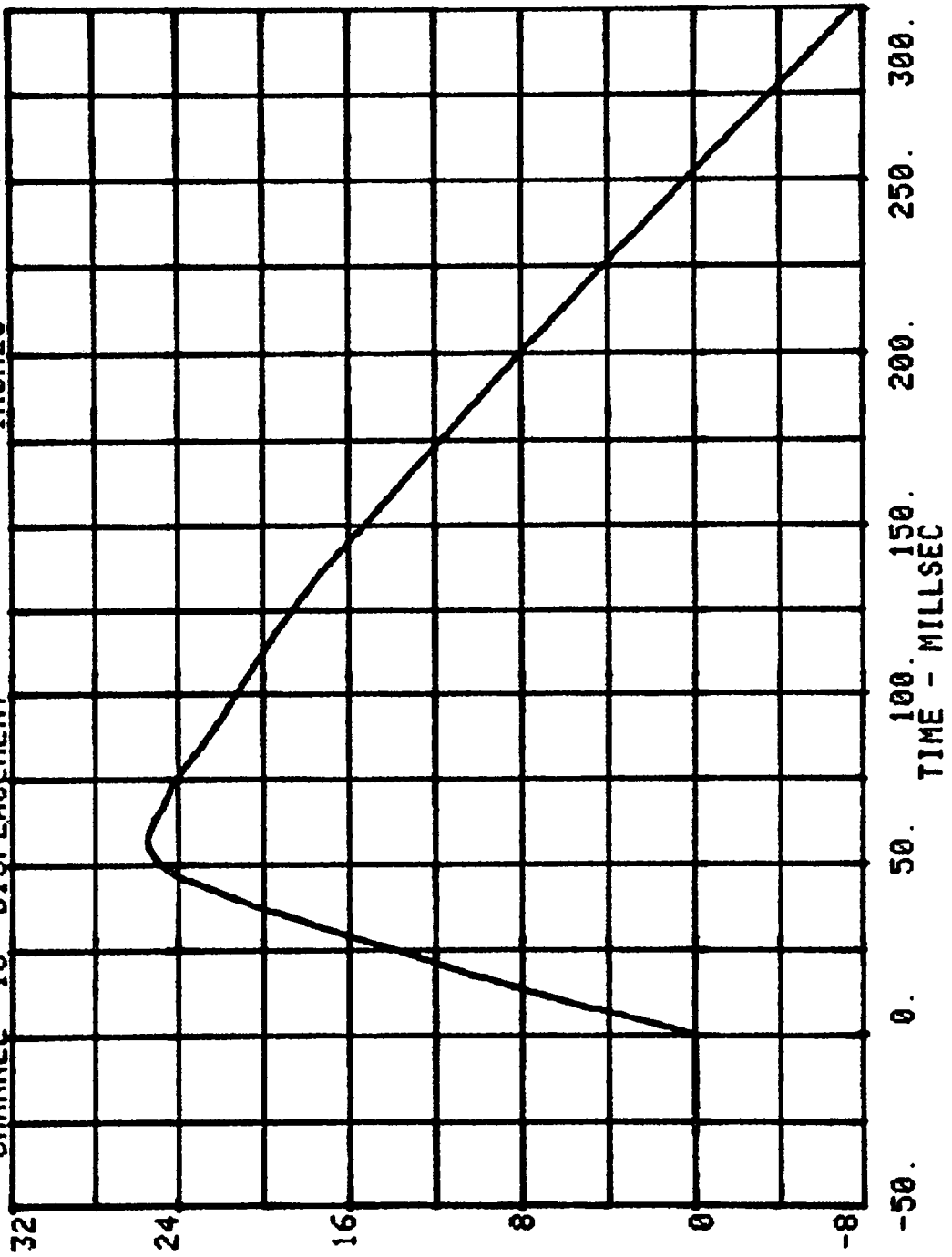
CHANNEL 37 RUN= 492 SERIES= 34 G'S
VEH#2 ACC PACK #2(X)



CHANNEL 17 VELOCITY RUN= 492 SERIES= 34 MPH VEHICLE #2 ACCELEROMETER PACK #2 X

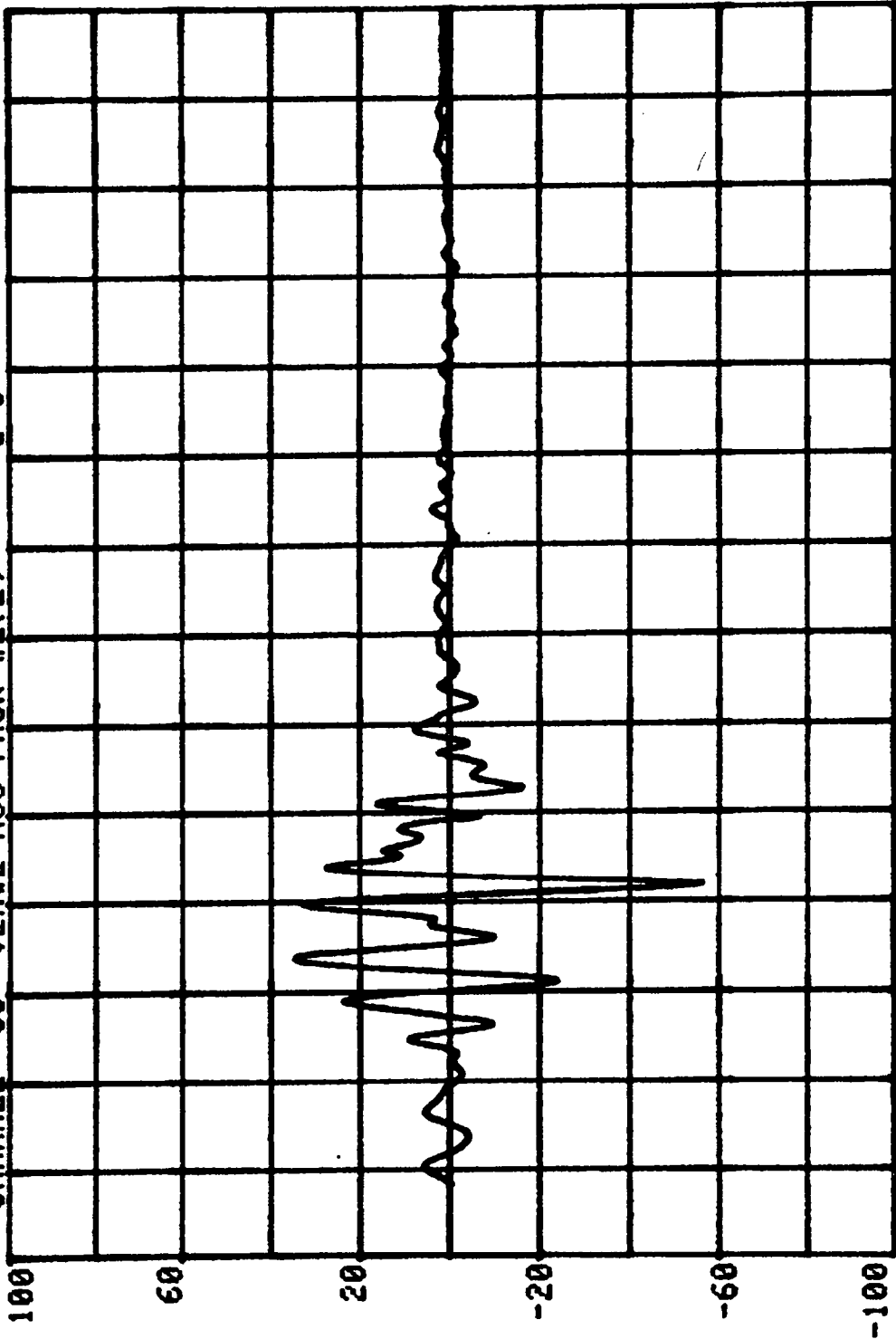


CHANNEL 18 DISPLACEMENT RUN= 492 SERIES= 34 INCHES VEHICLE #2 ACCELEROMETER PACK #2 X



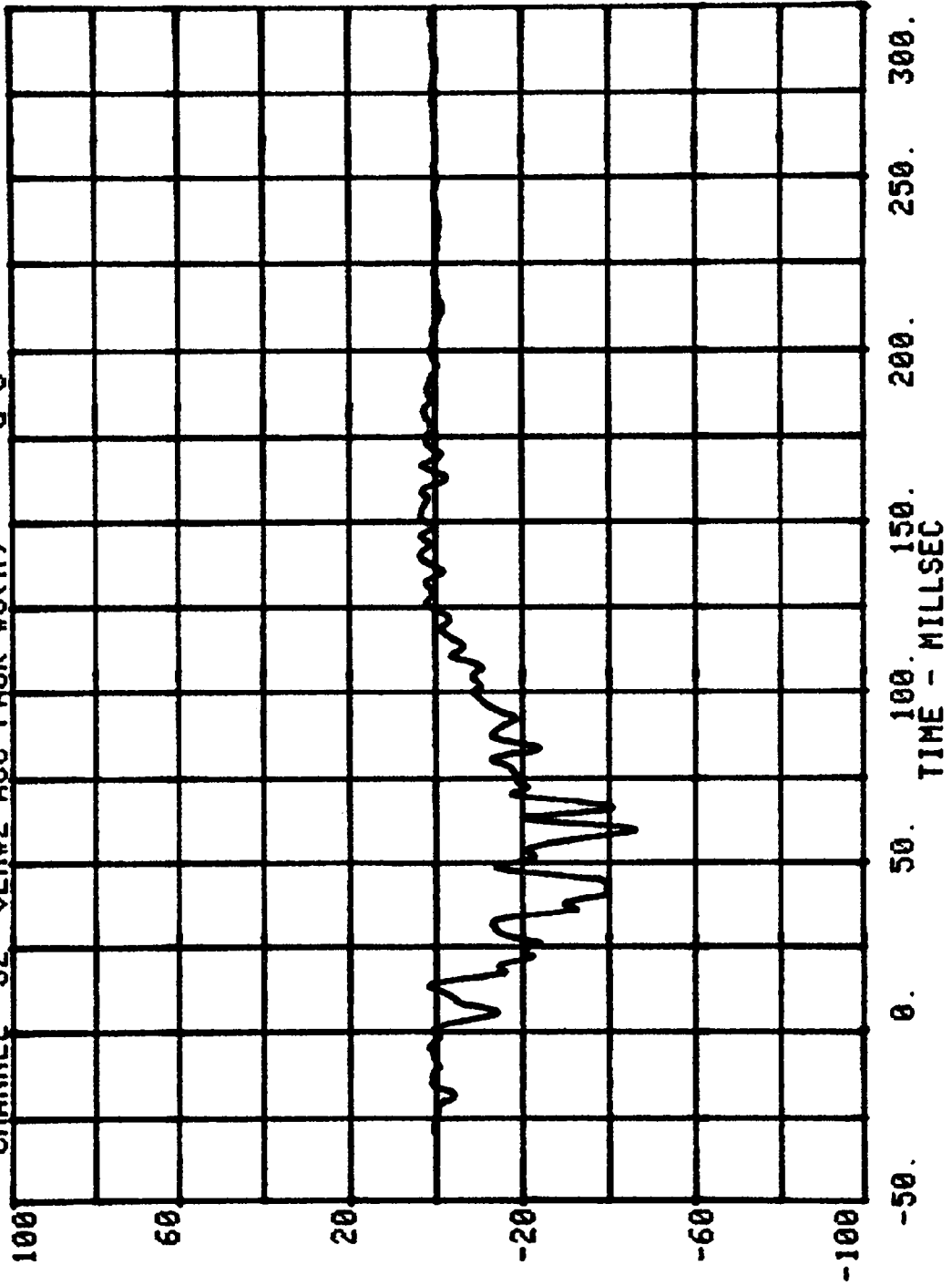
CHANNEL 38 VEH#2 ACC PACK #2(Z) G'S

RUN= 492 SERIES= 34

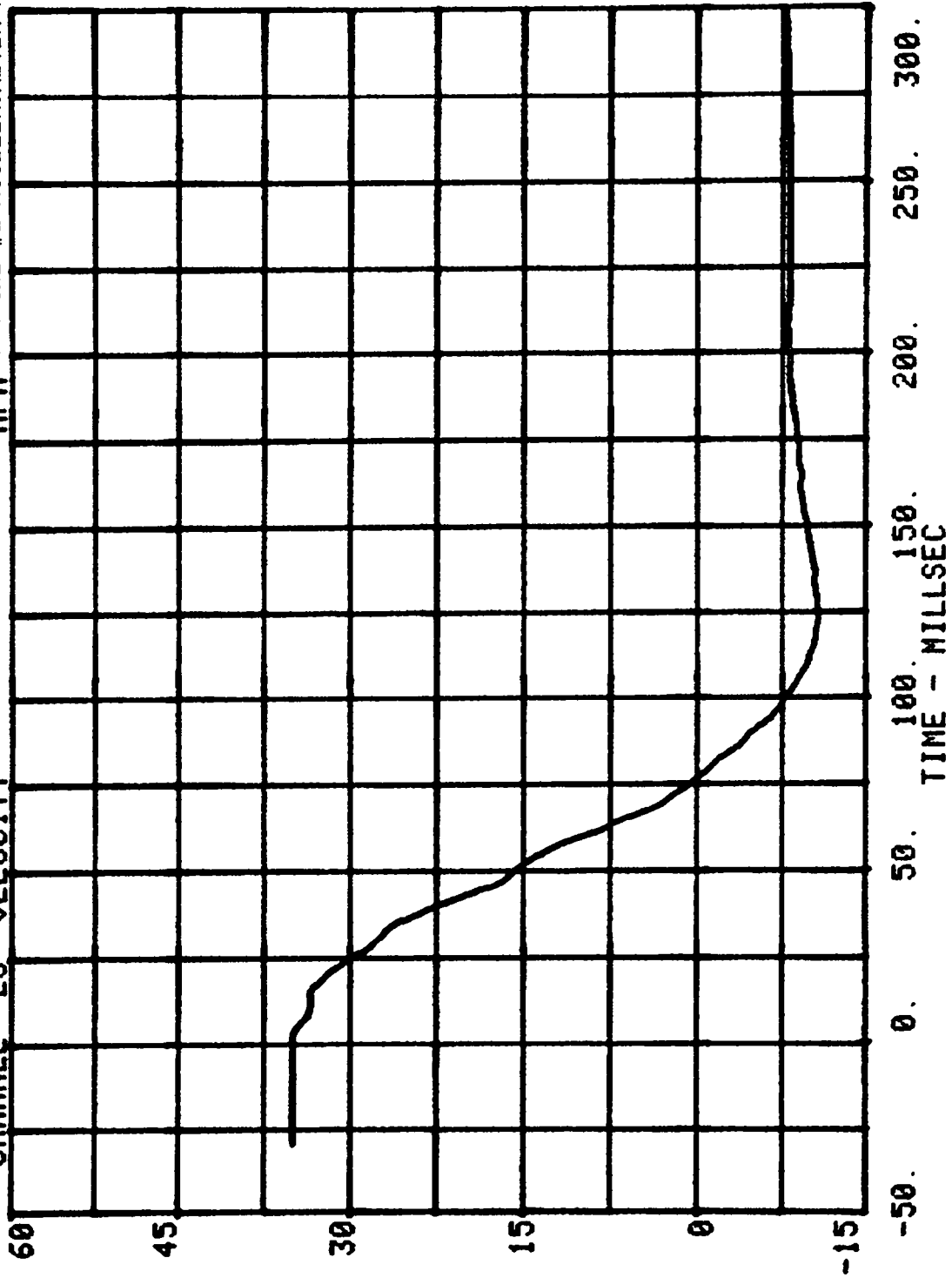


-50. 0. 50. 100. 150. 200. 250. 300.
TIME - MILLISEC

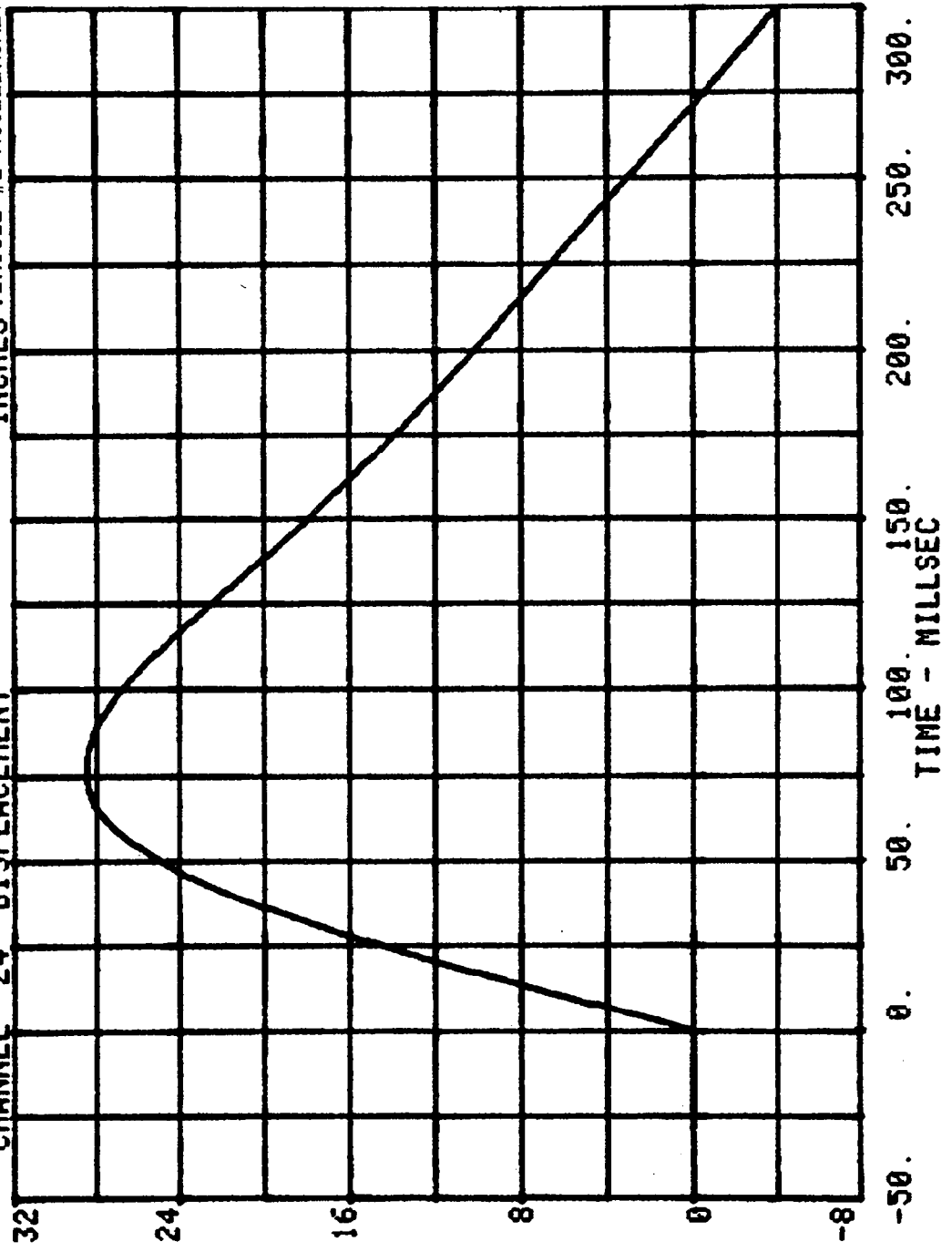
CHANNEL 52 RUN= 492 SERIES= 34 G'S
VEH#2 ACC PACK #3(X)



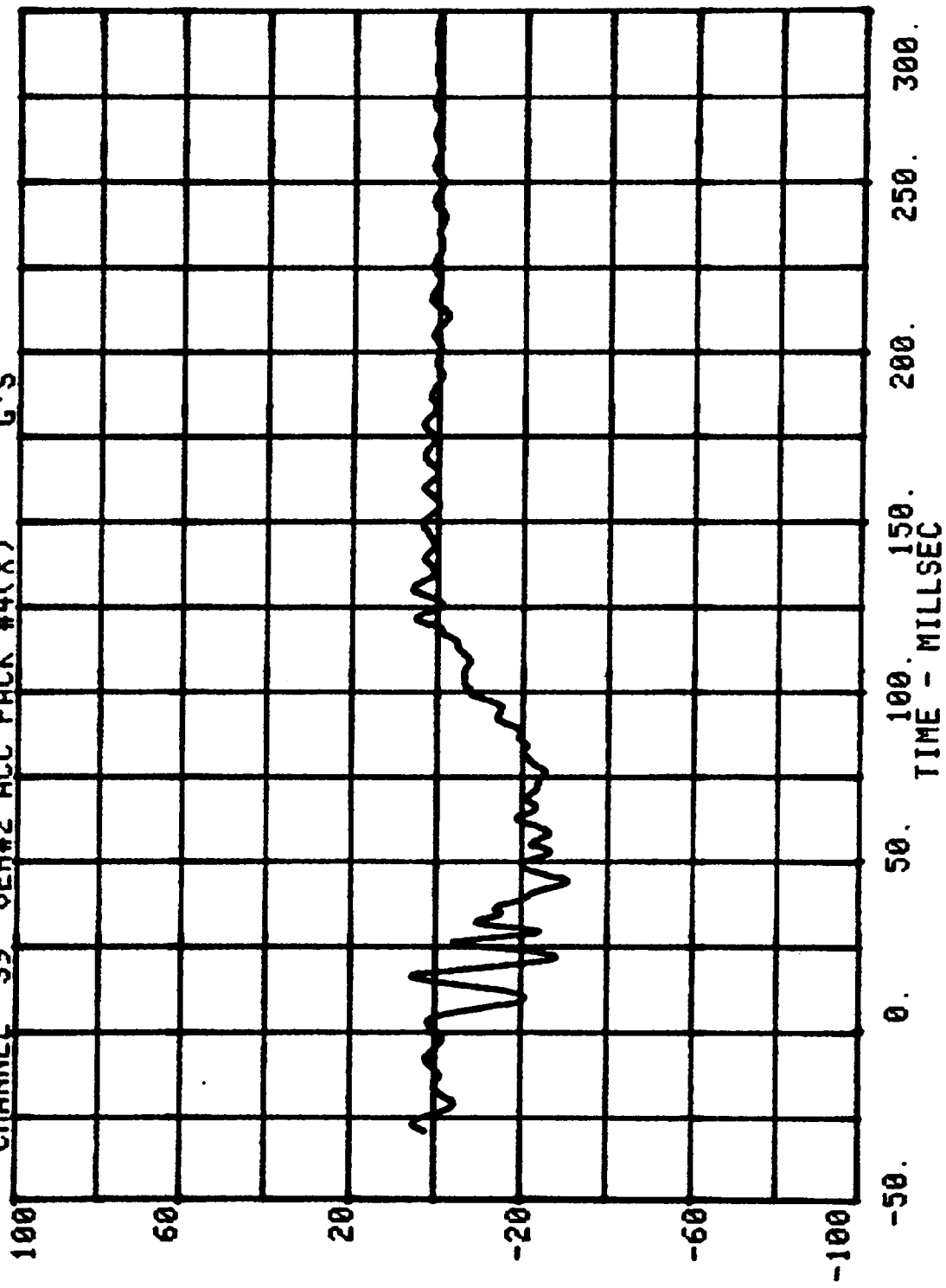
CHANNEL 23 VELOCITY
RUN= 492 SERIES= 34 MPH VEHICLE #2 ACCELEROMETER PACK #3 X



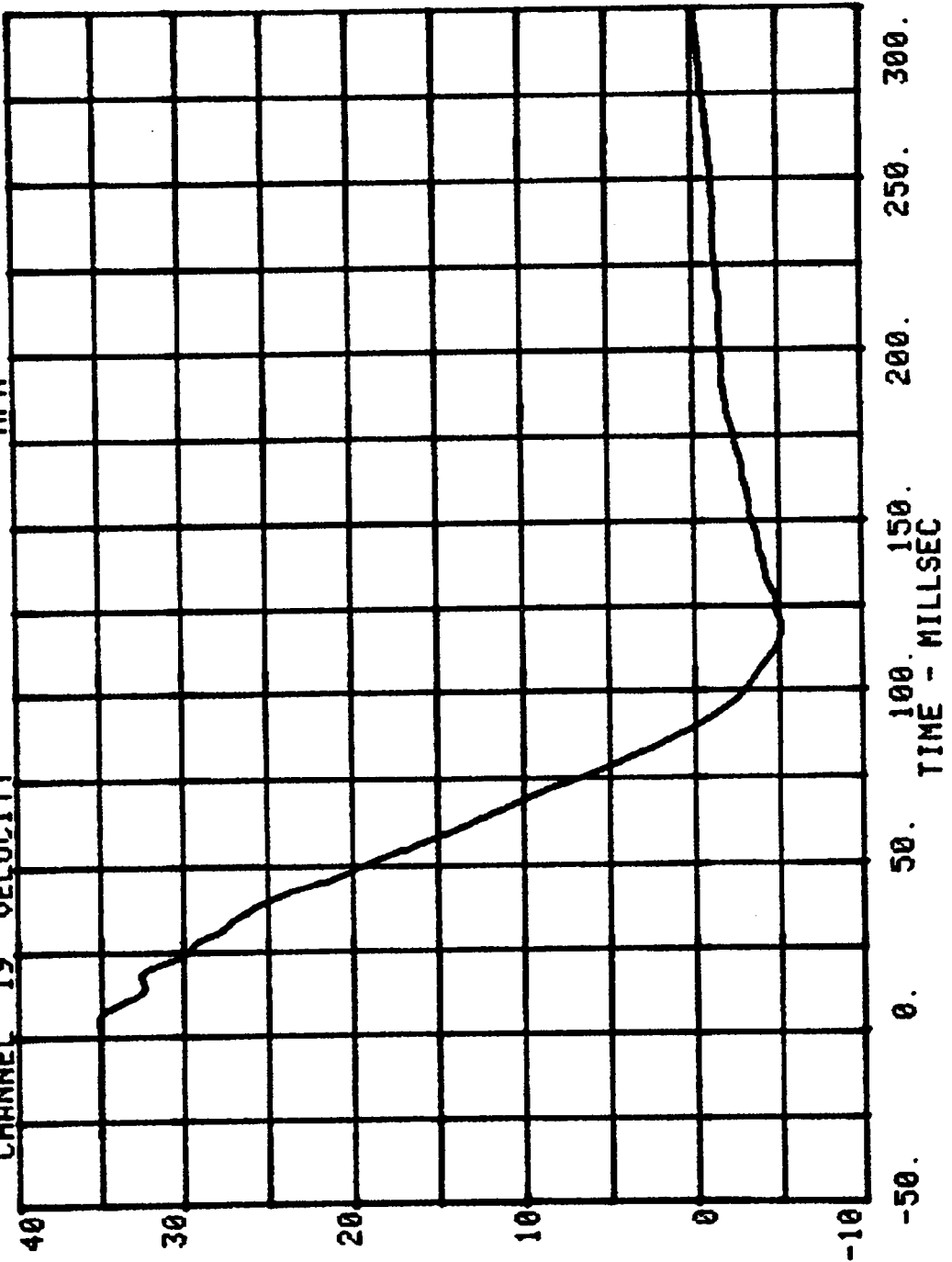
CHANNEL 24 DISPLACEMENT RUN= 492 SERIES= 34 INCHES VEHICLE #2 ACCELEROMETER PACK #3 X



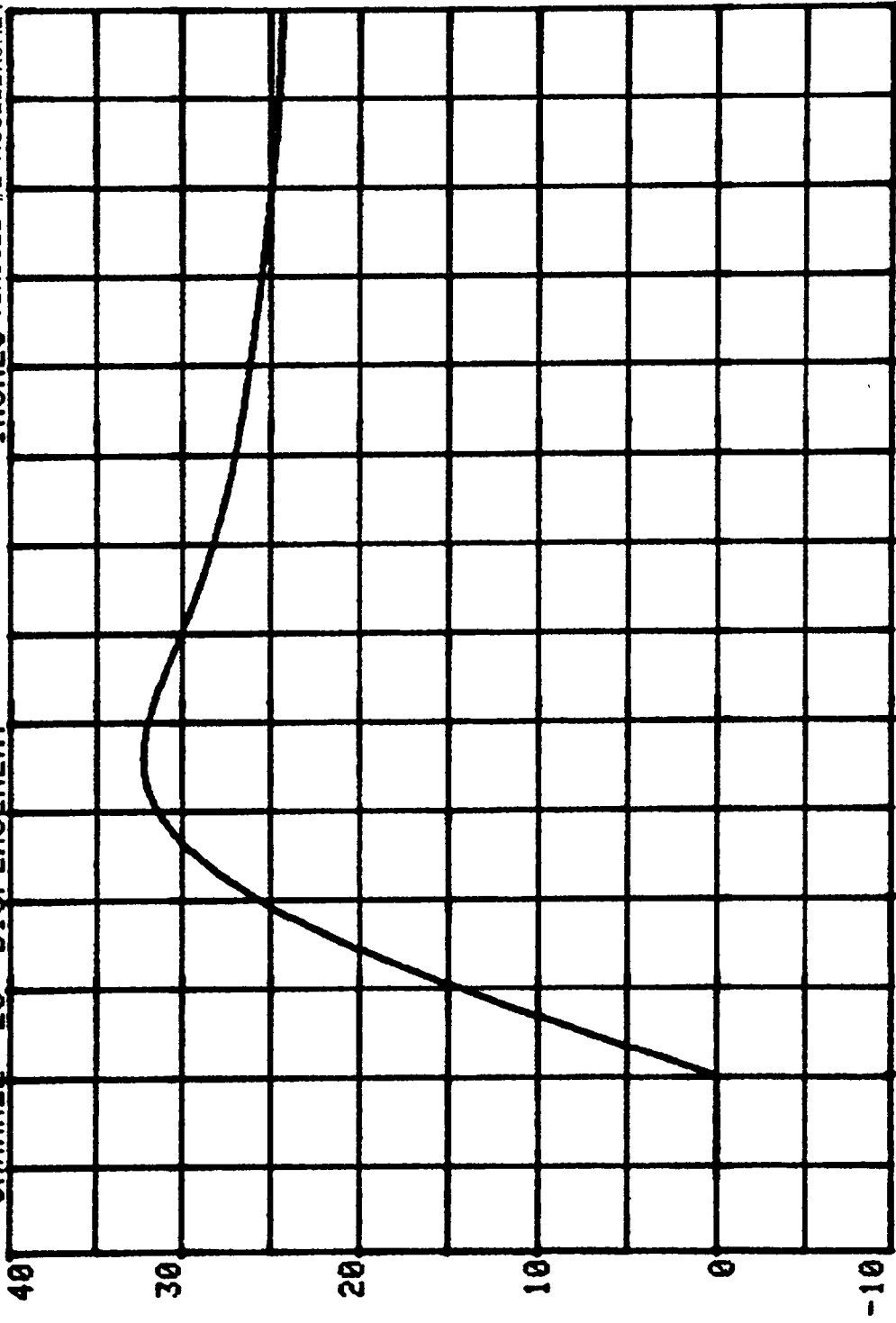
CHANNEL 39 VEH#2 ACC PACK #4(X) 34 G'S



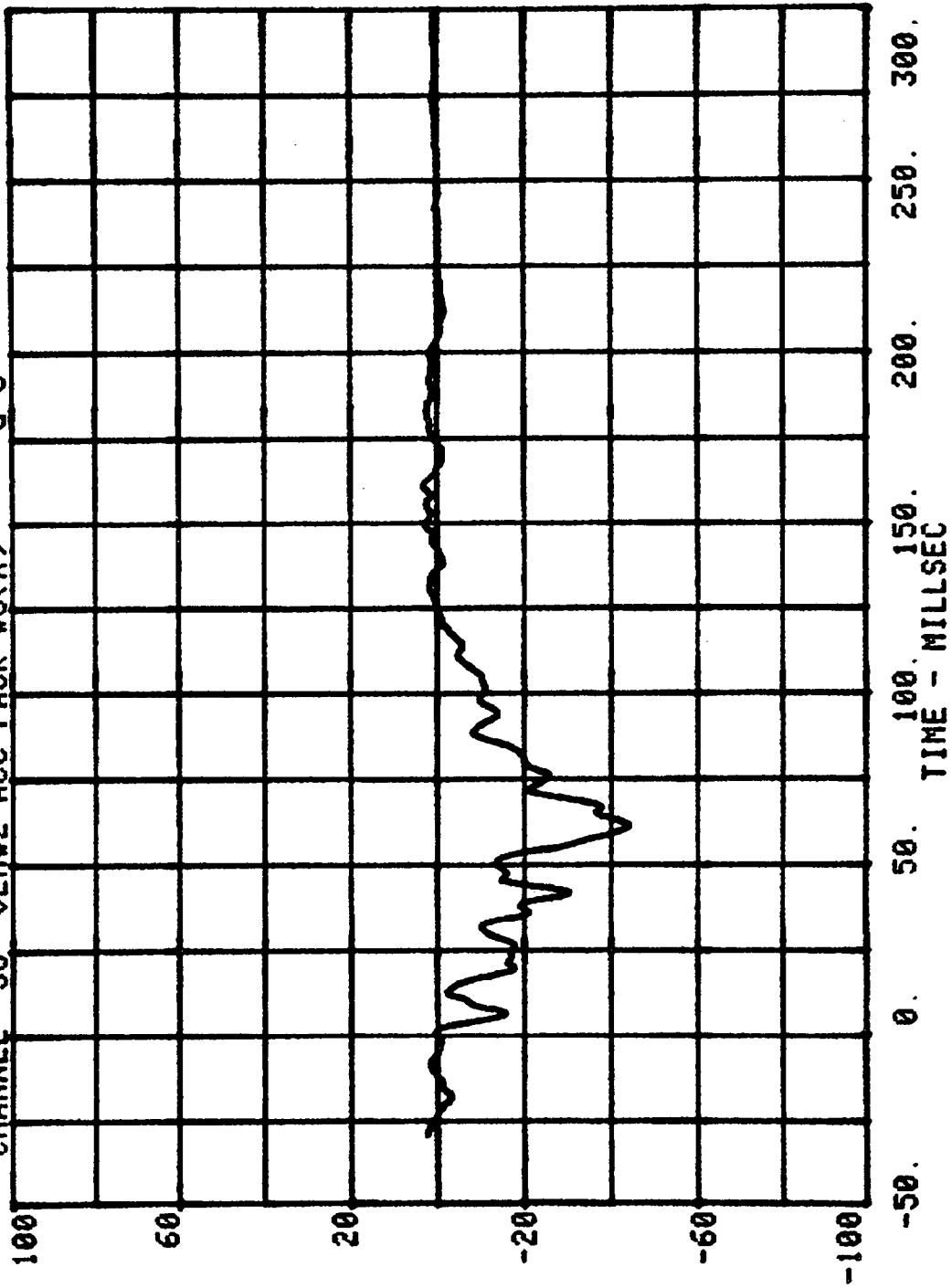
CHANNEL 19 VELOCITY RUN= 492 SERIES= 34 MPH VEHICLE #2 ACCELEROMETER PACK #4 X



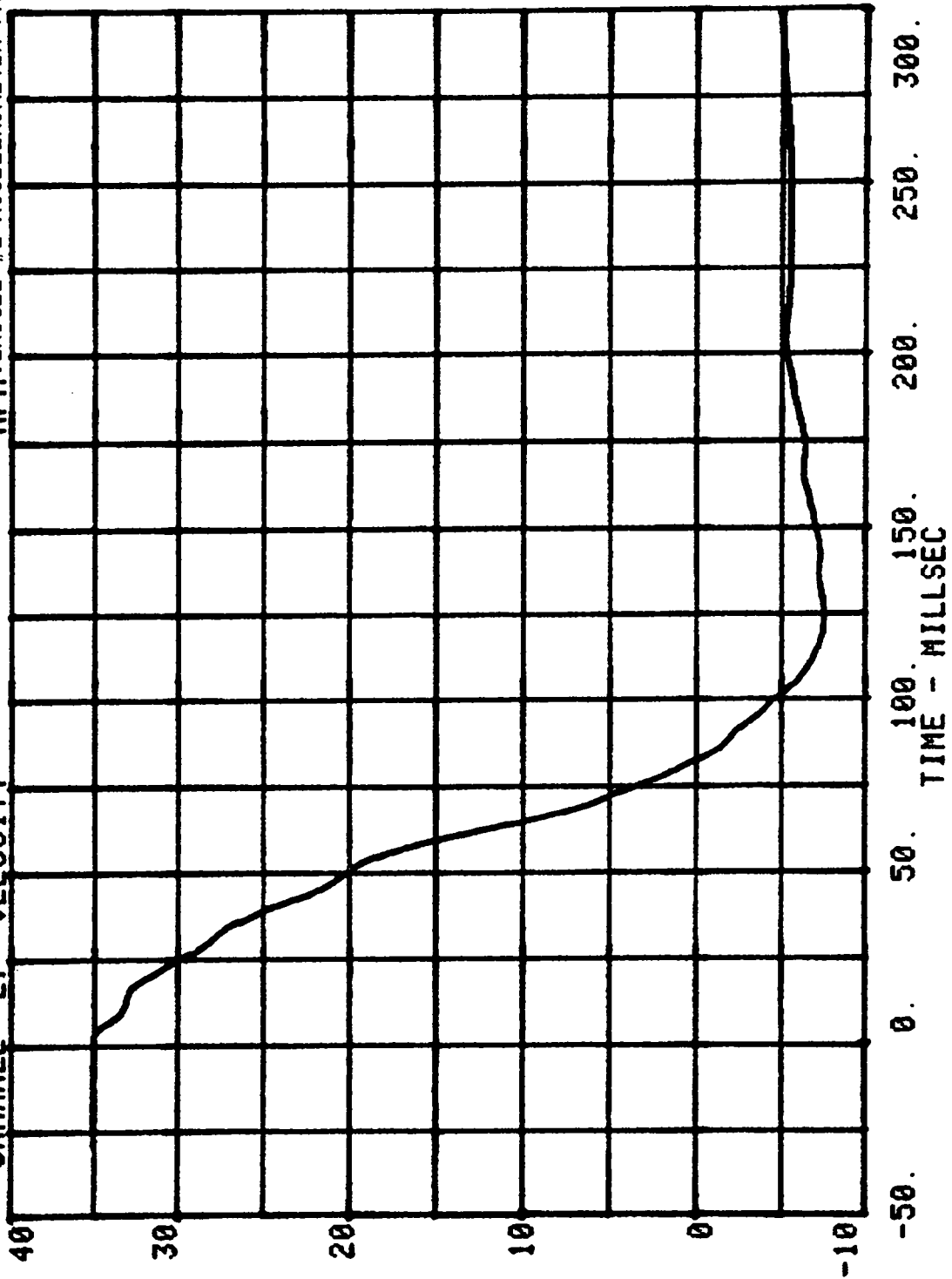
CHANNEL 20 DISPLACEMENT RUH= 492 SERIES= 34 INCHES VEHICLE #2 ACCELEROMETER PACK #4



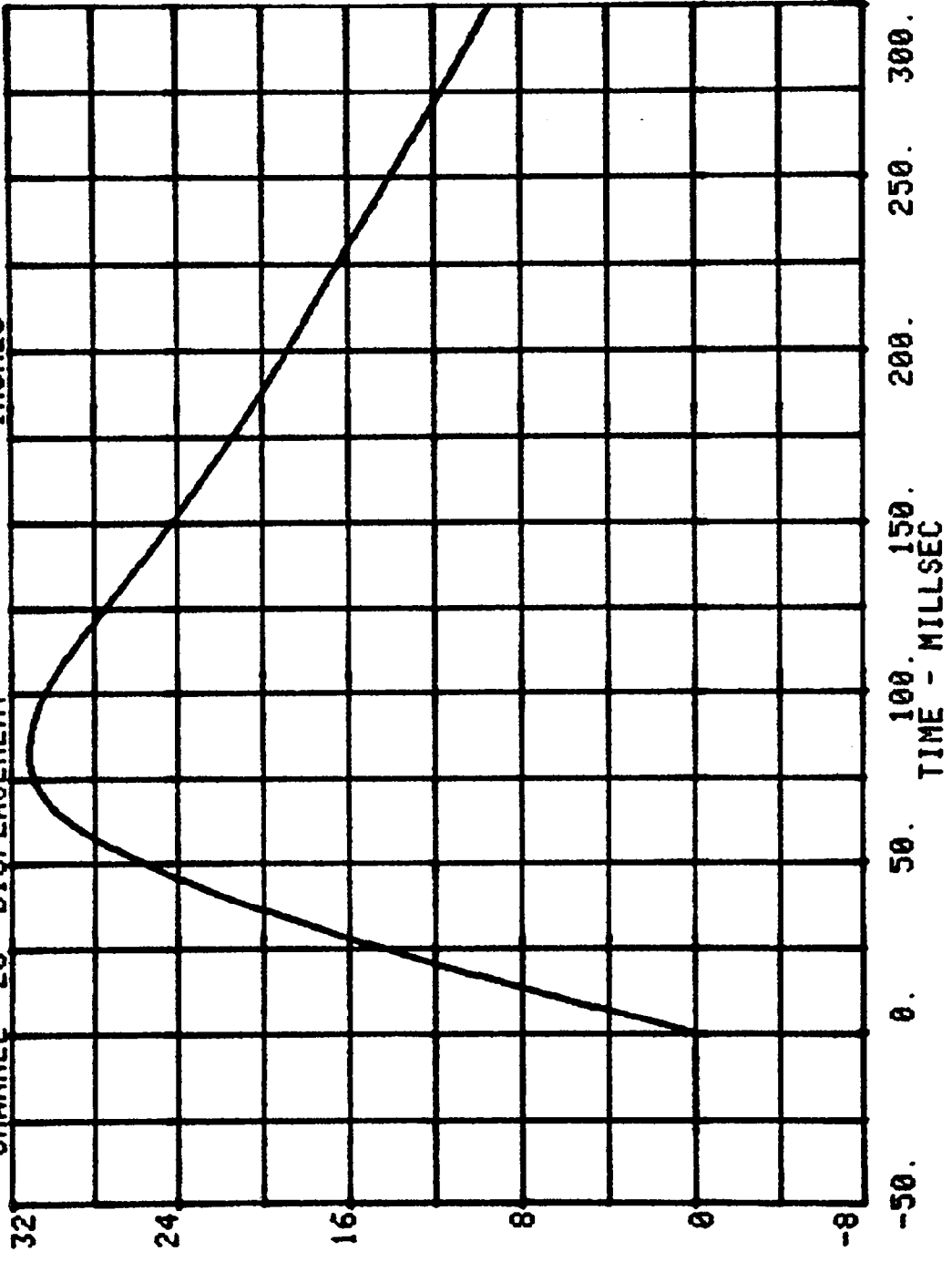
CHANNEL 56 RUN= 492 SERIES= 34 G'S
VEH#2 ACC PACK #5(X)



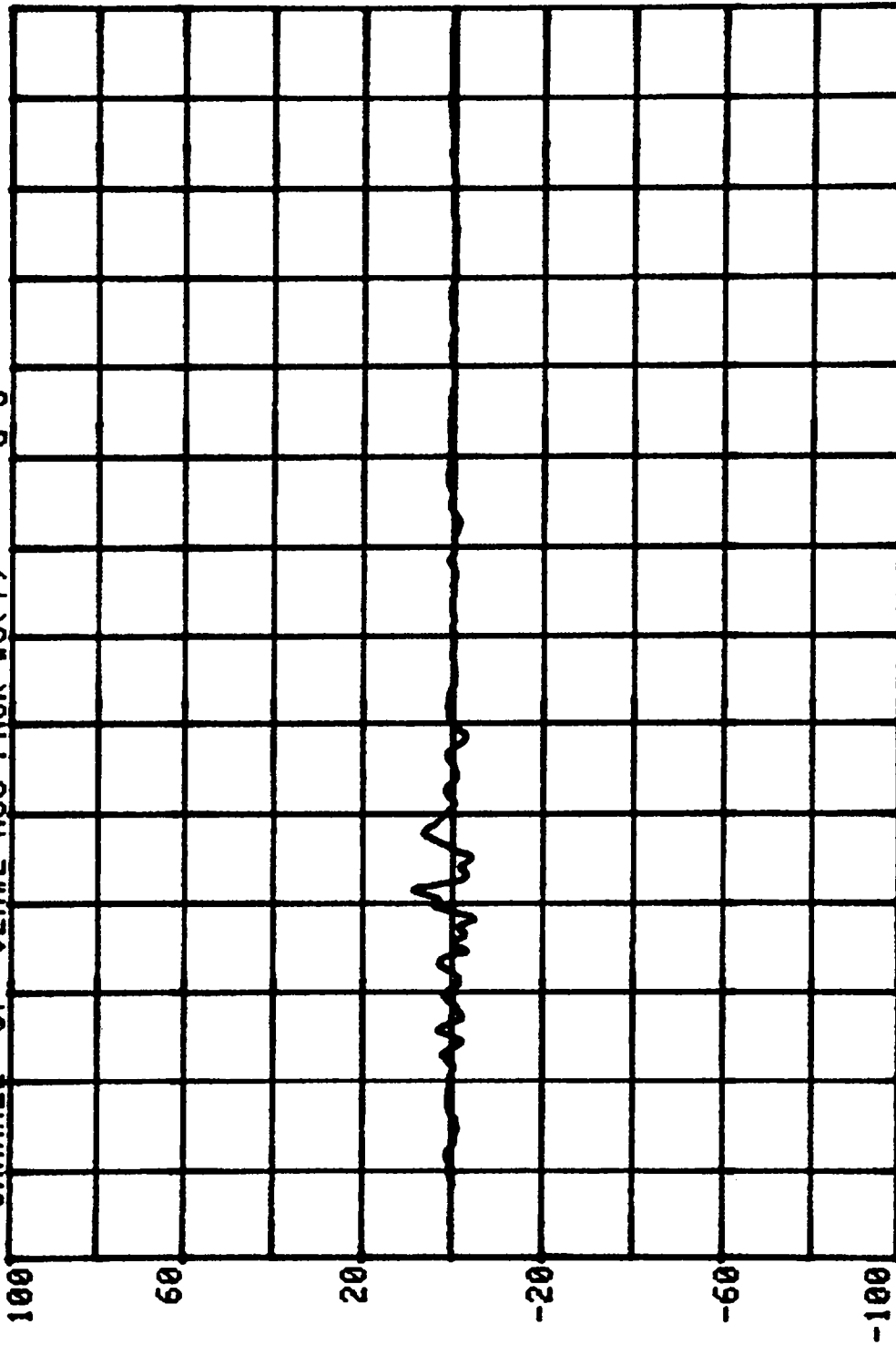
CHANNEL 27 VELOCITY
RUN= 492 SERIES= 34 MPHVEHICLE #2 ACCELEROMETER PACK #5 X



RUN= 492 SERIES= 34 INCHES VEHICLE #2 ACCELEROMETER PACK #5 X
CHANNEL 28 DISPLACEMENT

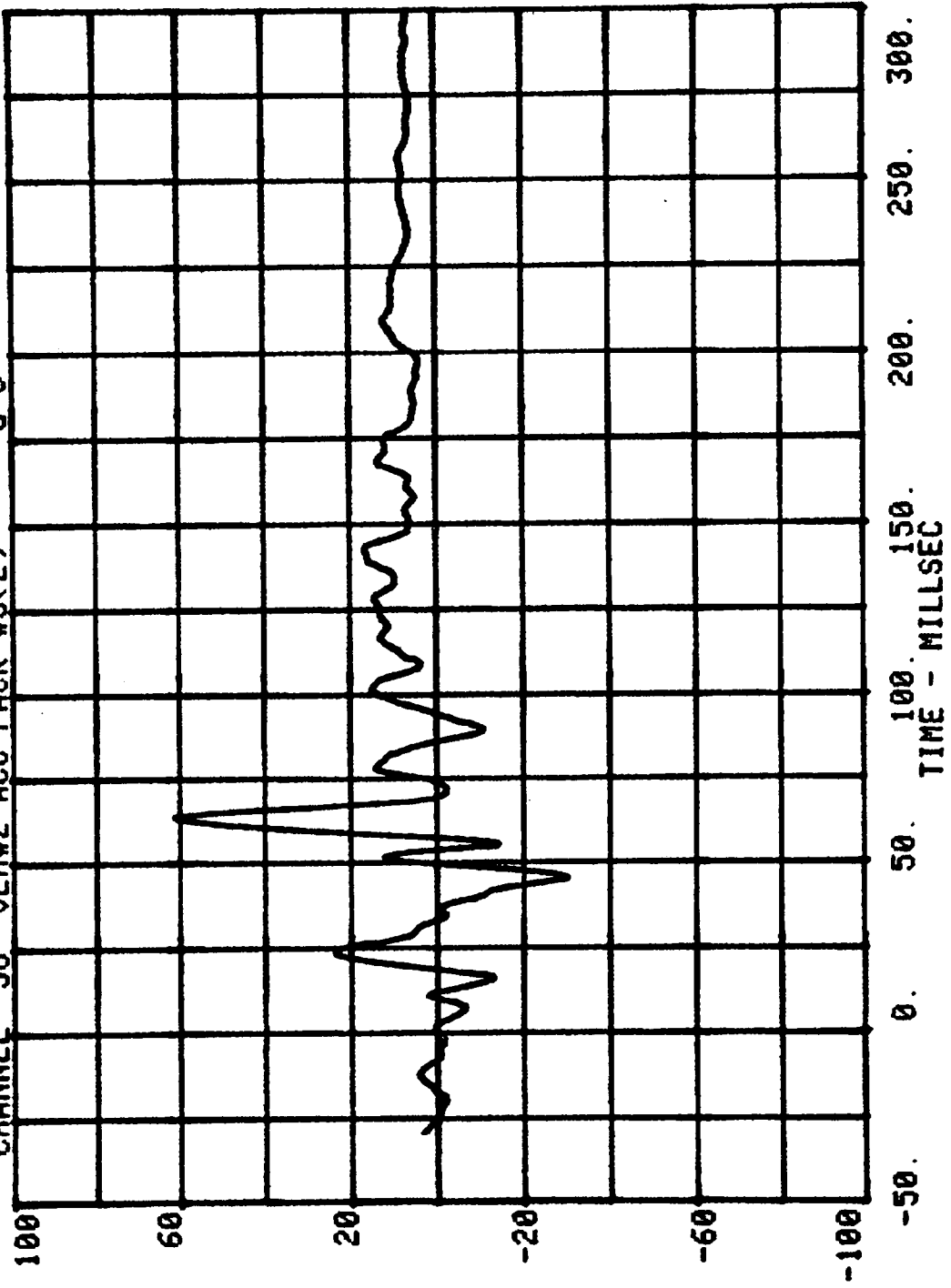


CHANNEL 57. VEH#2 ACC PACK #5(Y) RUN= 492 SERIES= 34 G'S



-50. 0. 50. 100. 150. 200. 250. 300.
TIME - MILLISEC

CHANNEL 58 RUN= 492 SERIES= 34 G'S
VEH#2 ACC PACK #5(Z)



Test No. 308-34-492

1980 PLYMOUTH HORIZON

DUMMY DATA

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

See Table 9 for Electronic Instrumentation Descriptor.

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

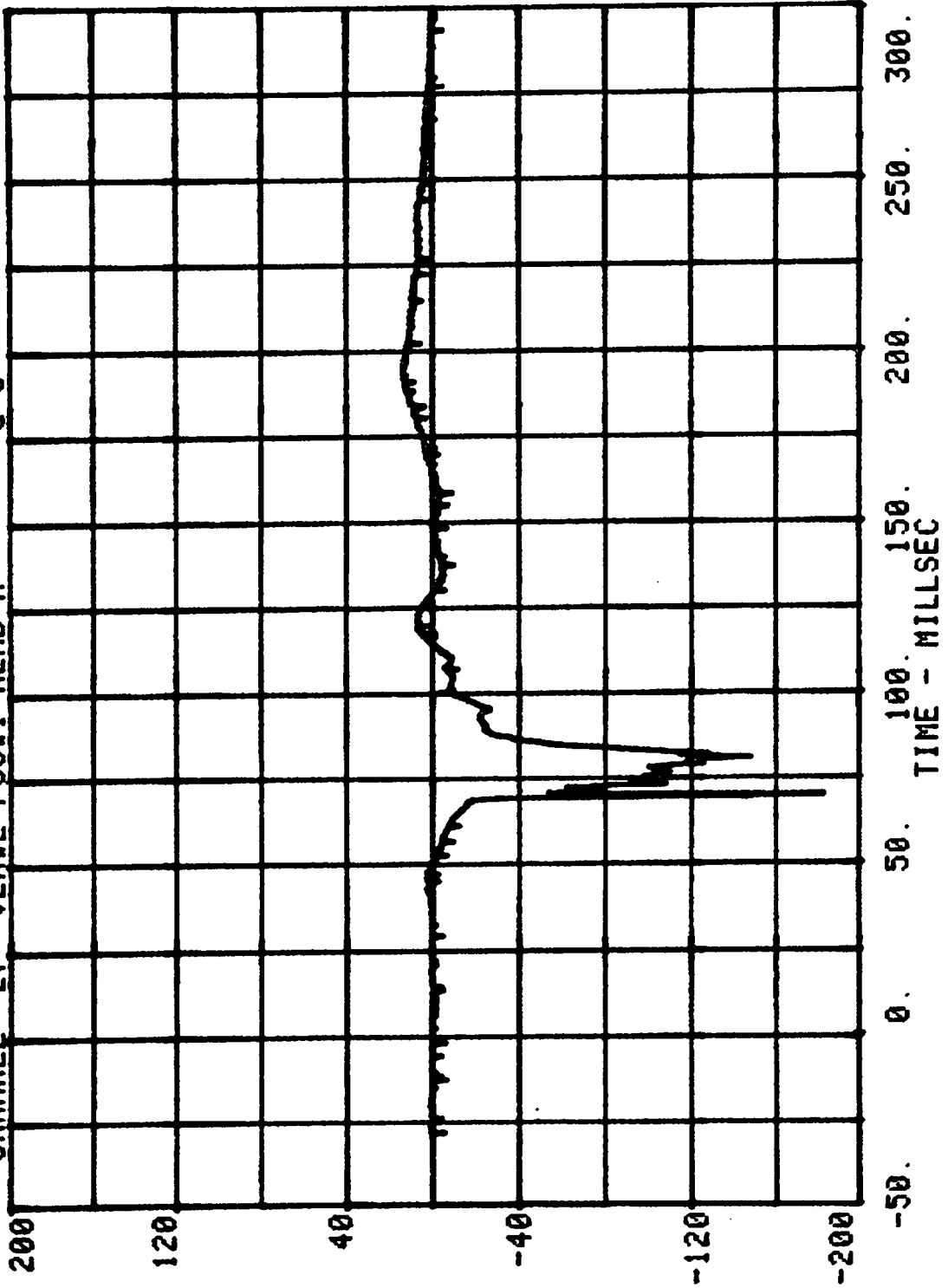
BOA TASK 3 TEST #34 CAR-TO-CAR

RUN= 492

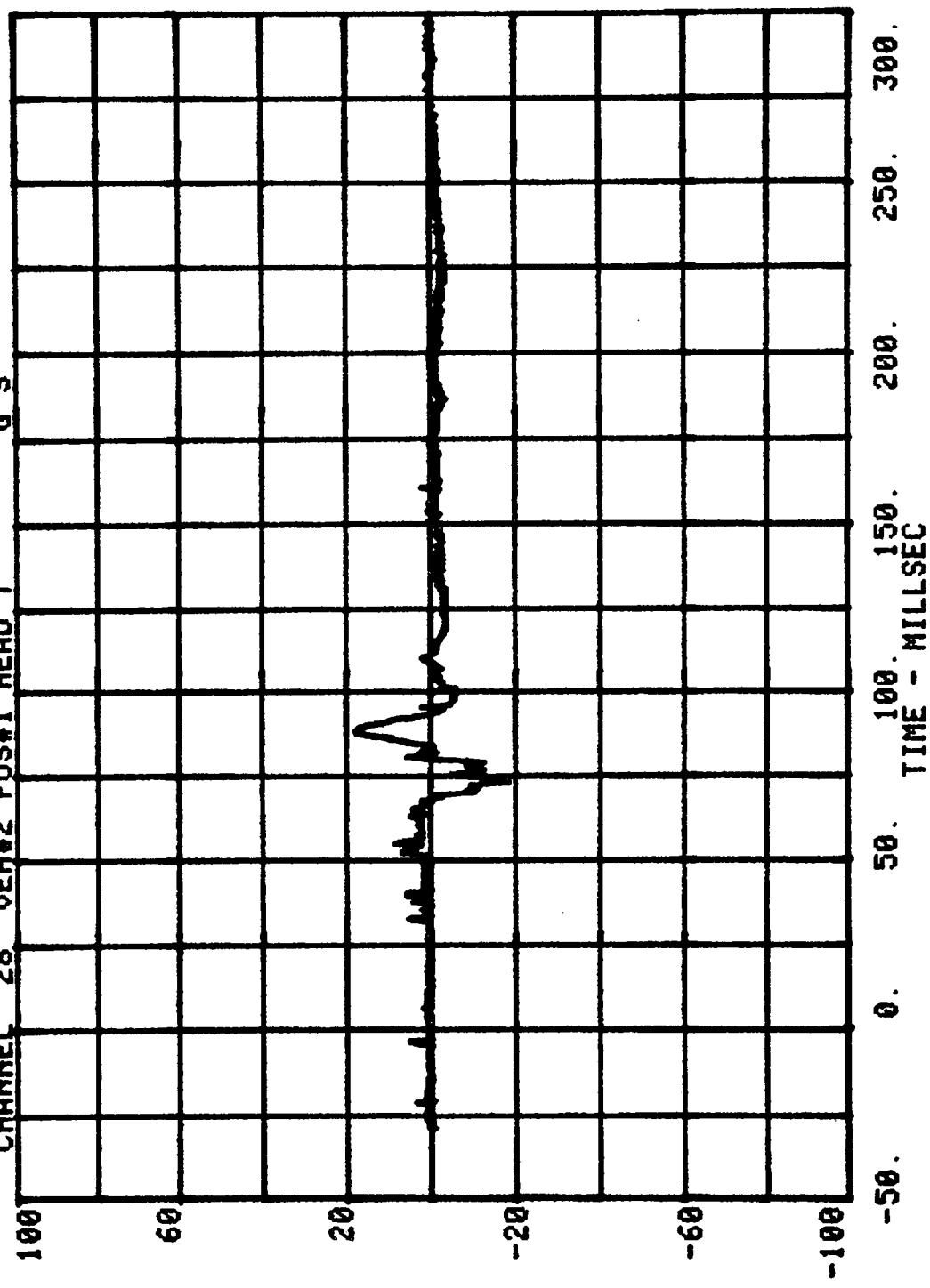
VEH#2 POS#1 HEAD R

HIC=1816.9 FROM T1= .06930 TO T2= .08490
AVERAGE ACCELERATION BETWEEN T1 AND T2= 106.3G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=2224.3

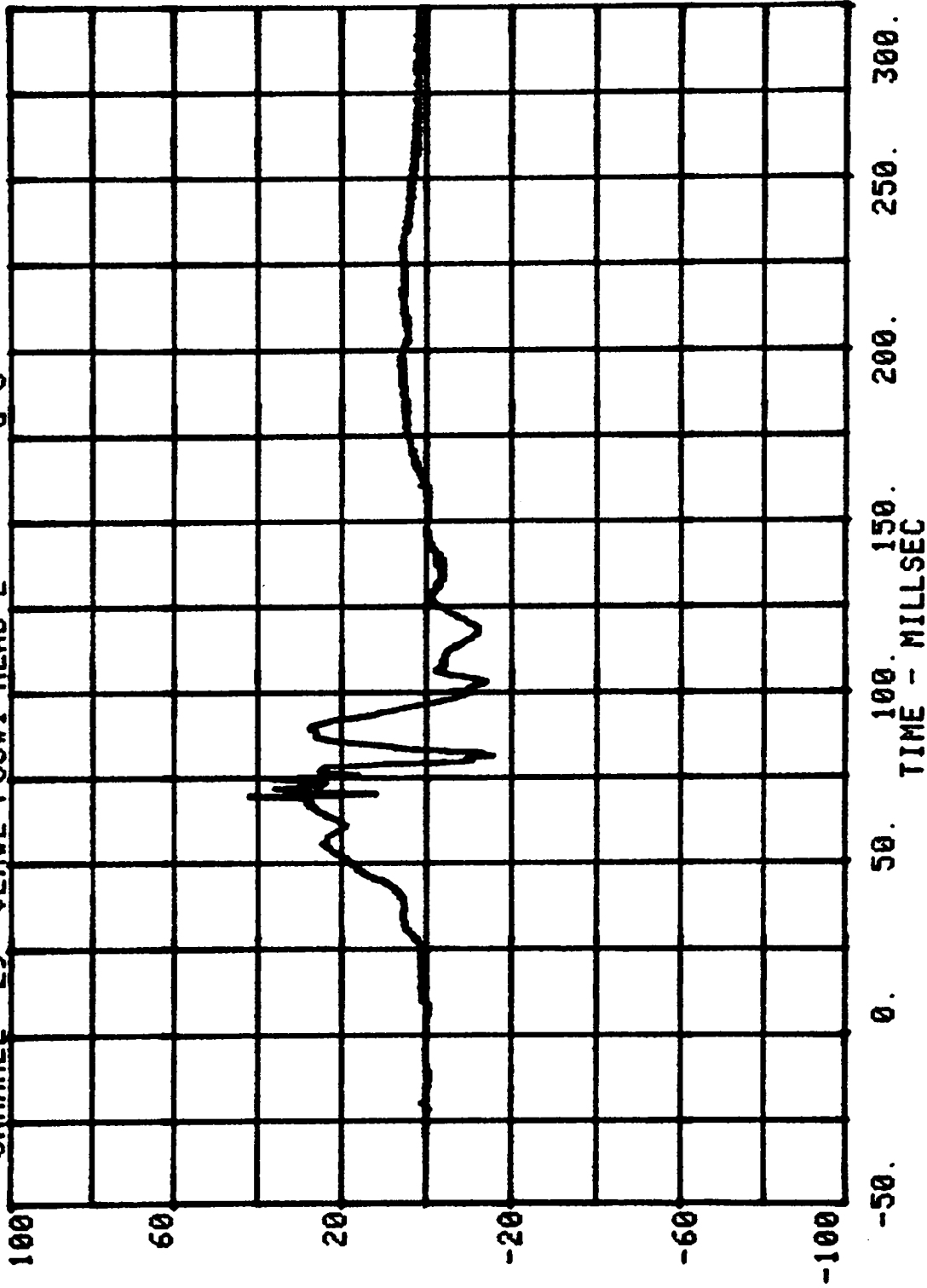
CHANNEL 27 RUN= 492 SERIES= 34 G'S
VEH#2 POS#1 HEAD X



CHANNEL 28 VE#2 POS#1 HEAD Y SERIES= 34 G'S



CHANNEL 29 RUN= 492 SERIES= 34 G'S
VEH#2 POS#1 HEAD Z



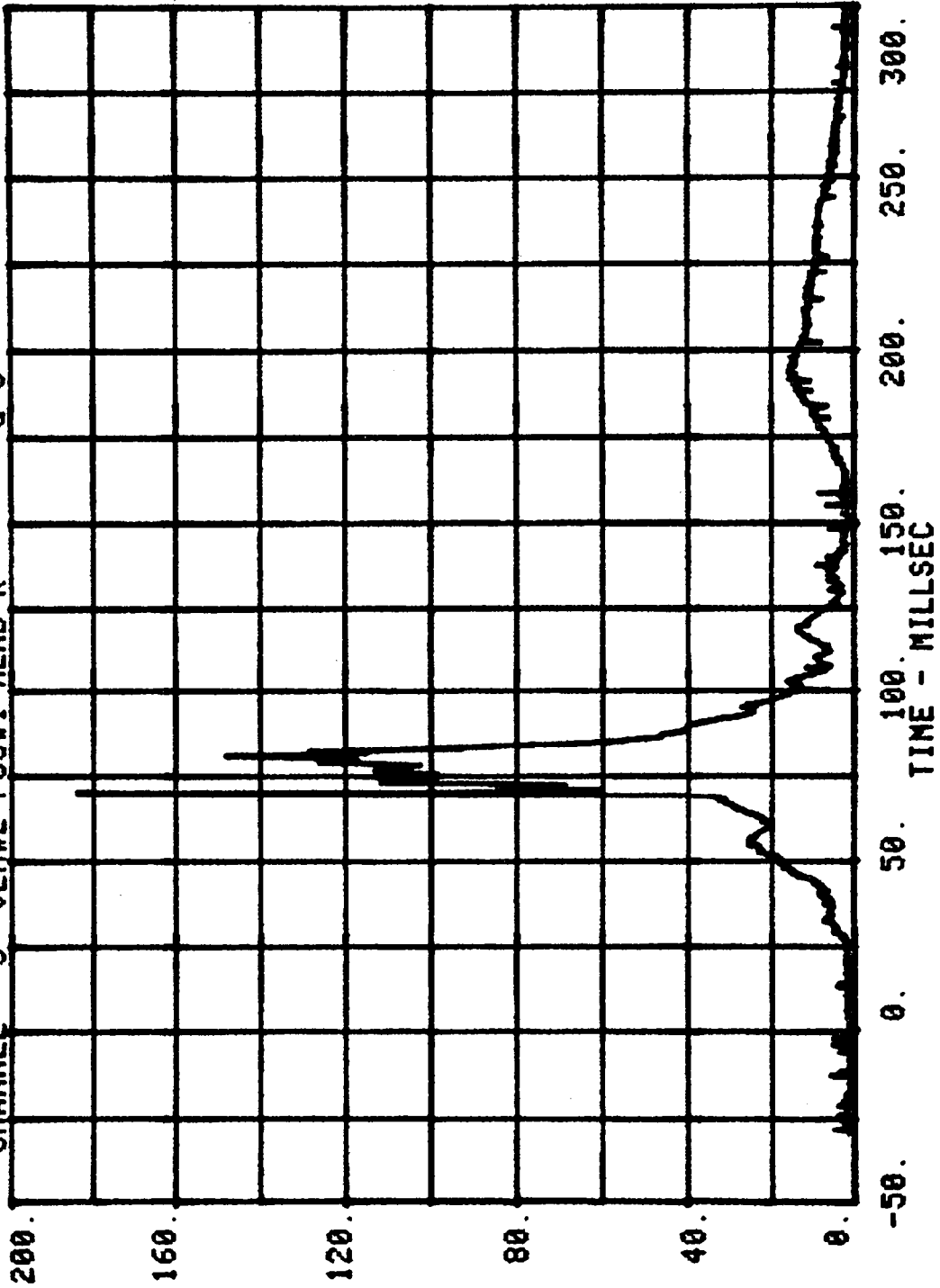
CHANNEL 5 VEH#2 POS#1 HEAD R

RUN= 492

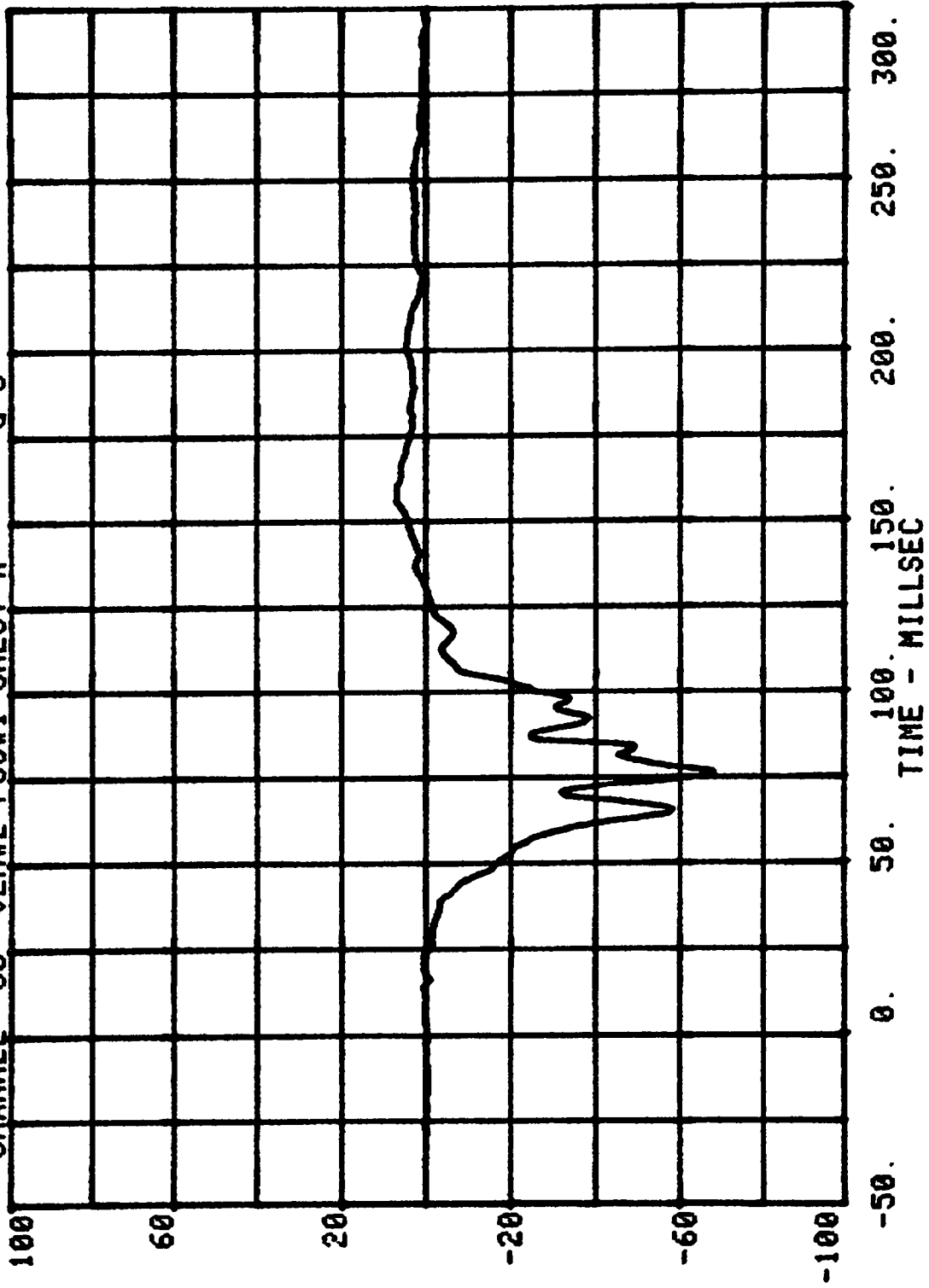
SERIES=

34

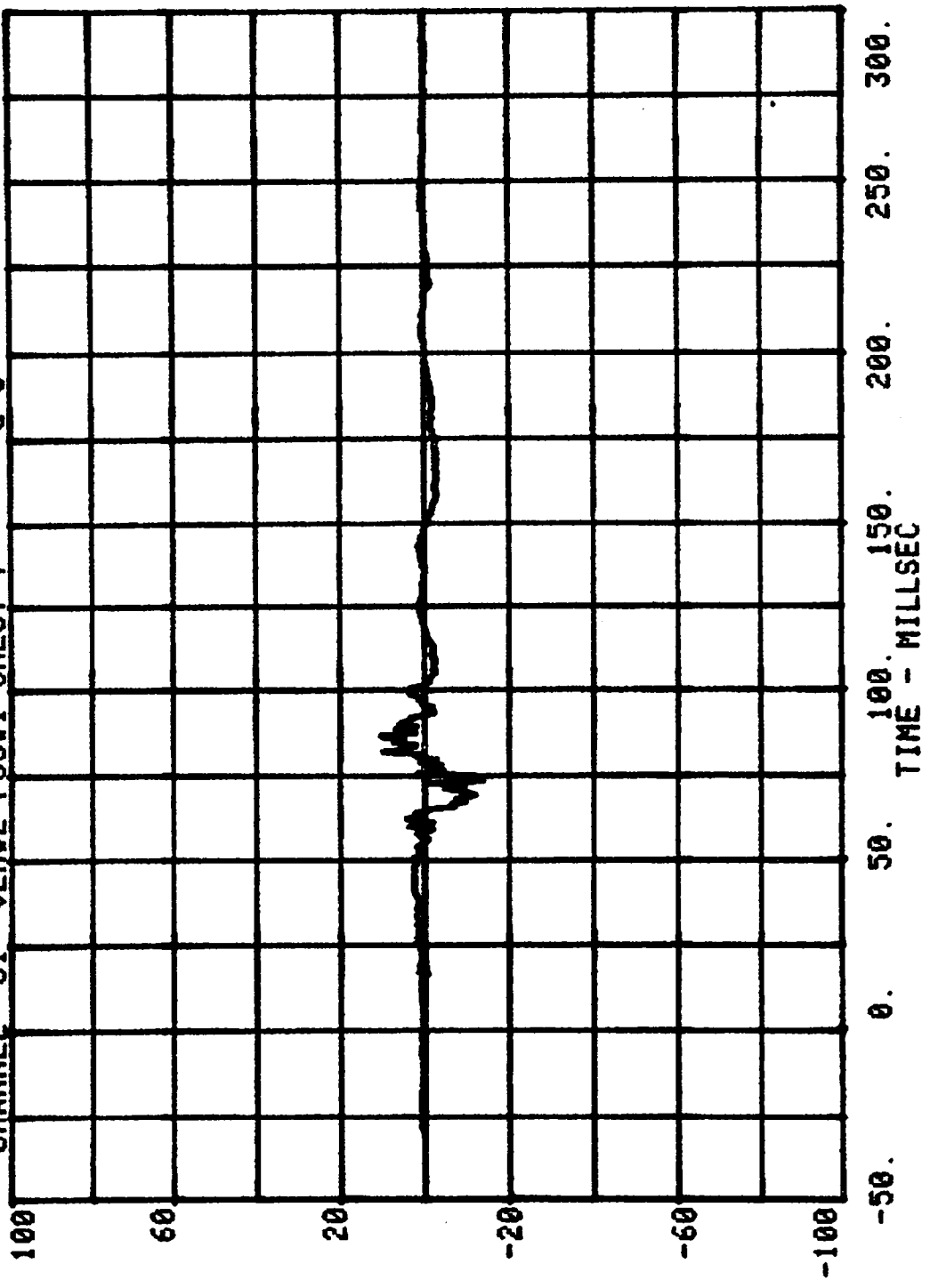
G'S



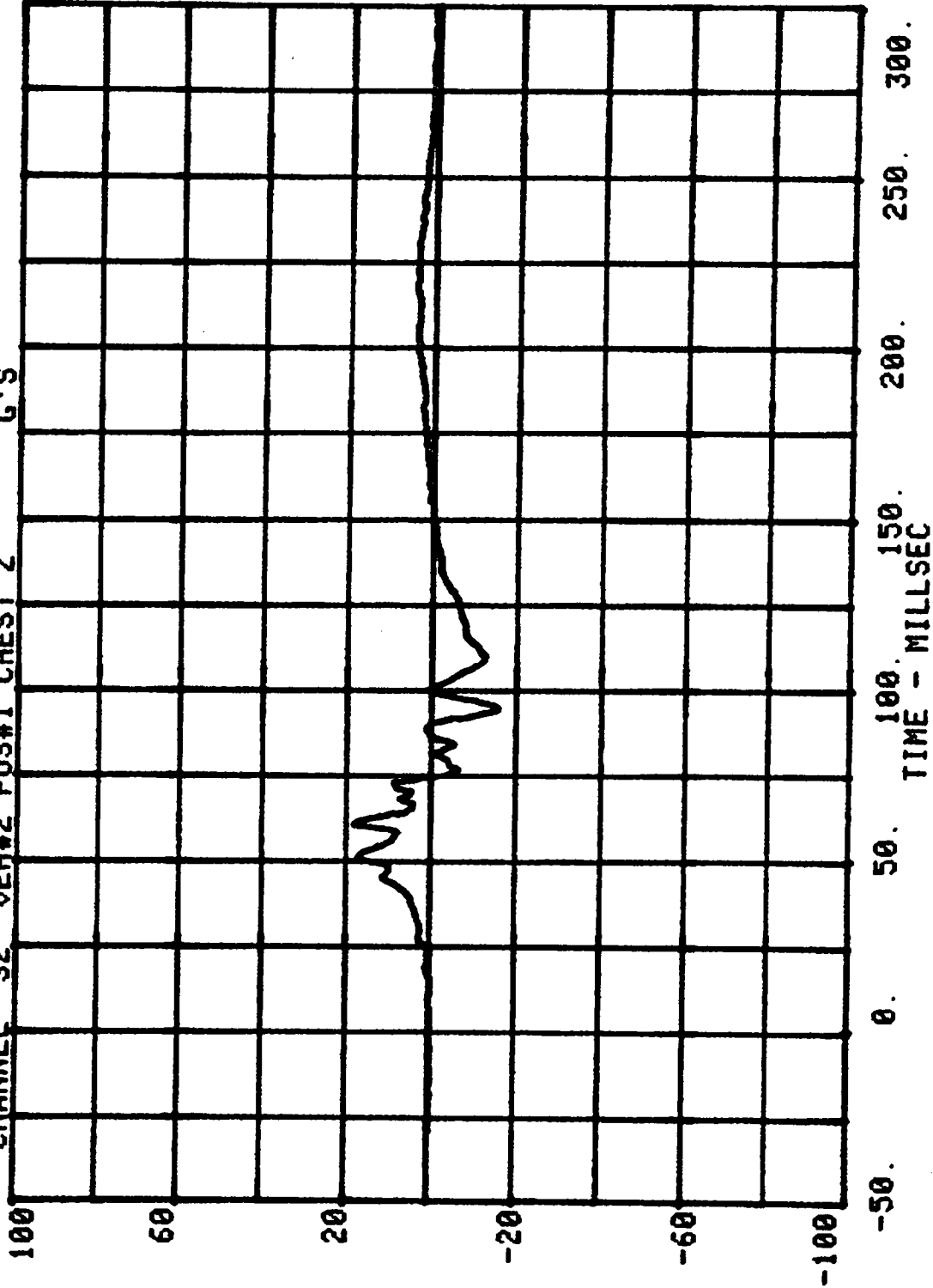
CHANNEL 30 VEH#2 POS#1 CHEST X SERIES= 34 G'S



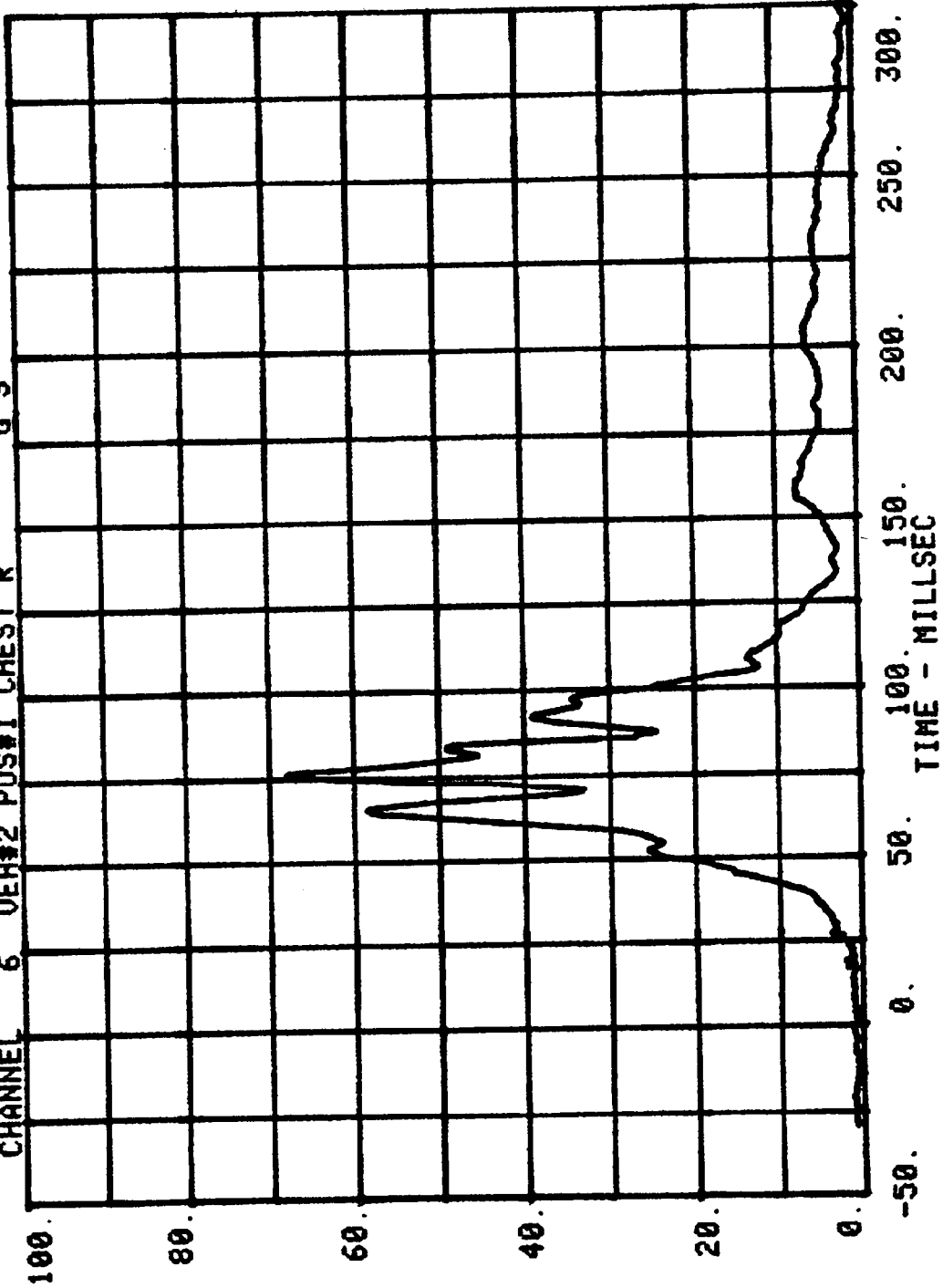
CHANNEL 31 VEH#2 POS#1 CHEST Y 34 G'S



CHANNEL 32 VEH#2 POS#1 CHEST Z SERIES= 34 G'S

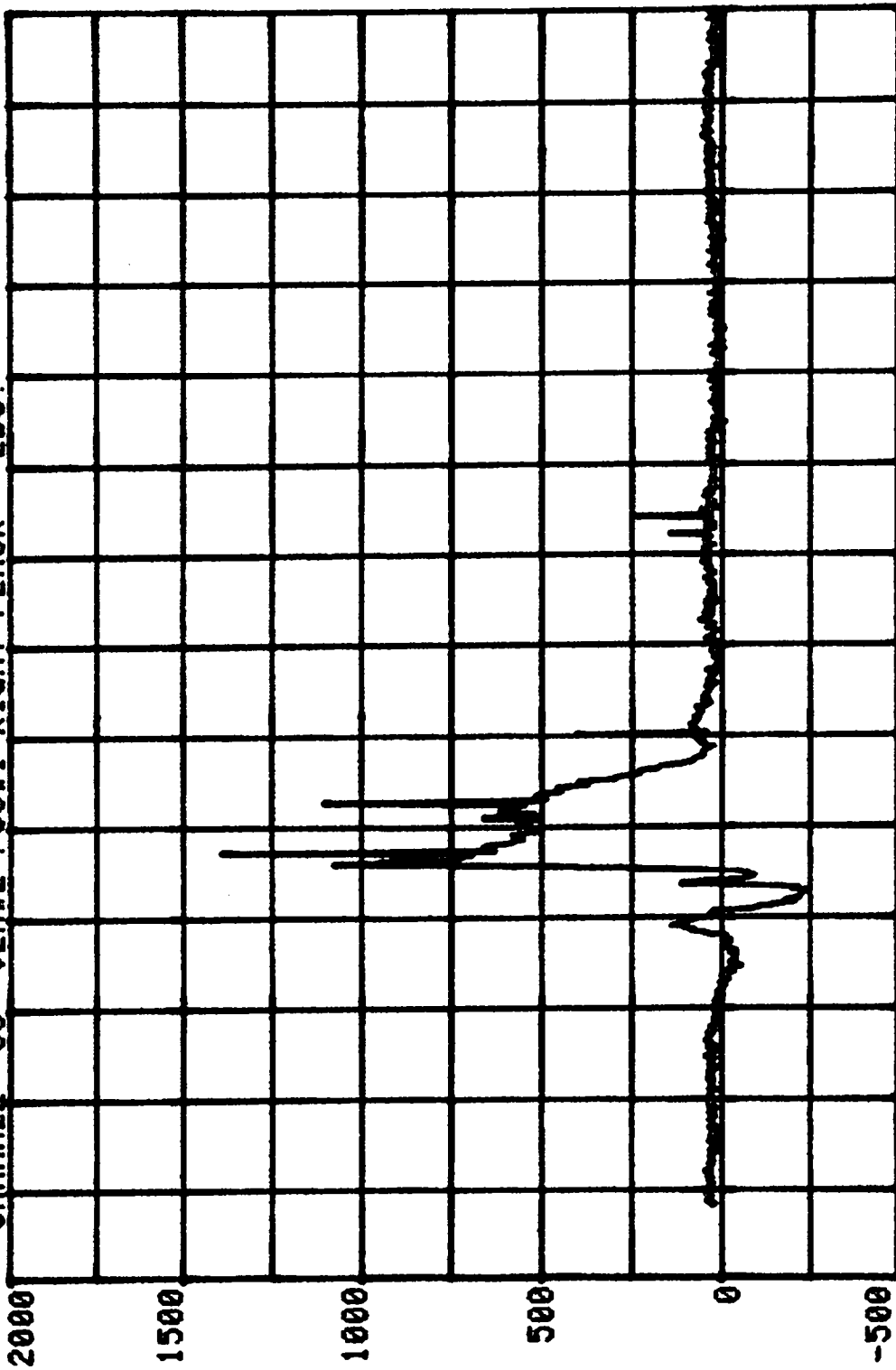


CHANNEL 6 RUN= 492 SERIES= 34 G'S
VEH#2 POS#1 CHEST R

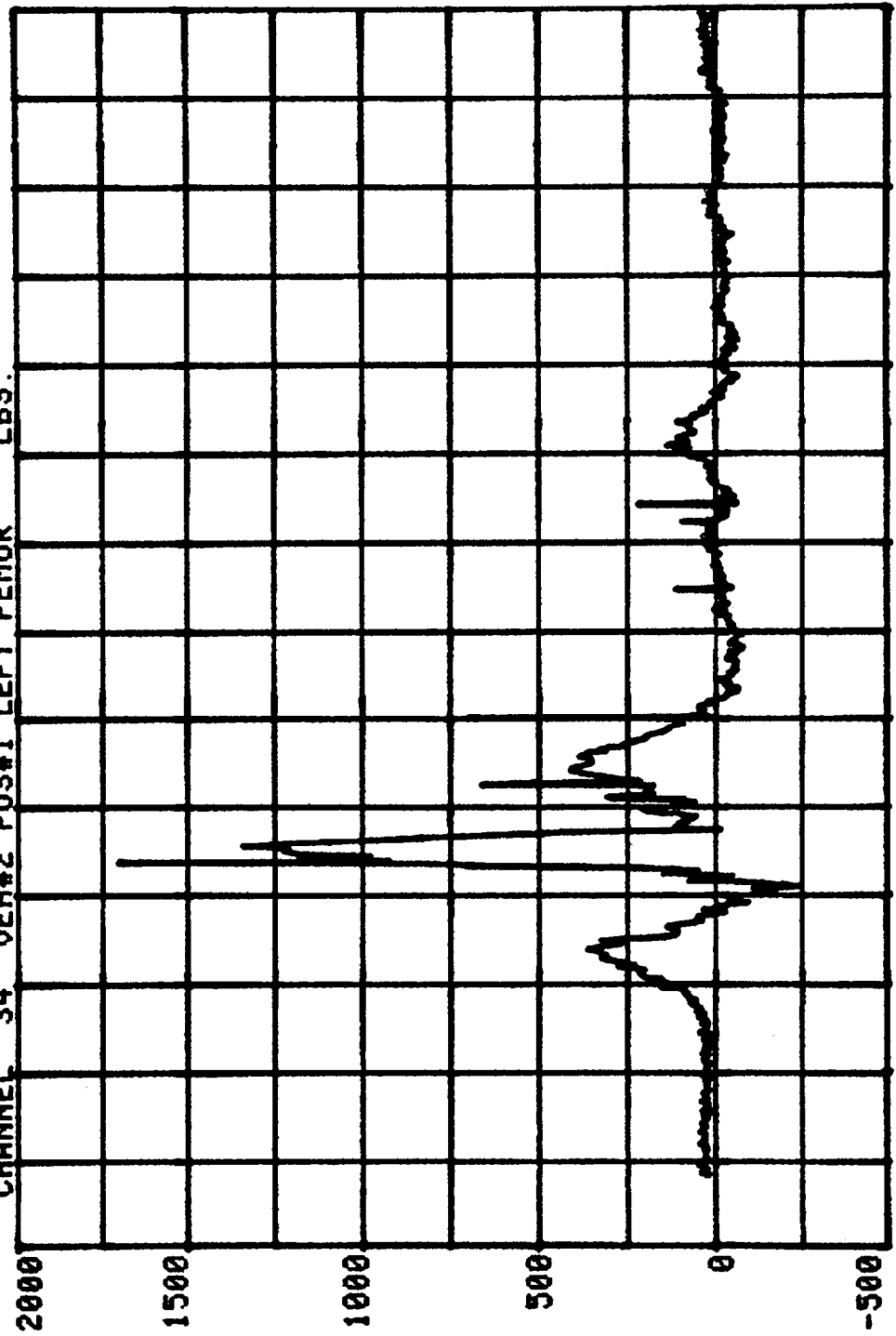


CHANNEL 33 VEH#2 POS#1 RIGHT FEMUR LBS.

RUN= 492 SERIES= 34

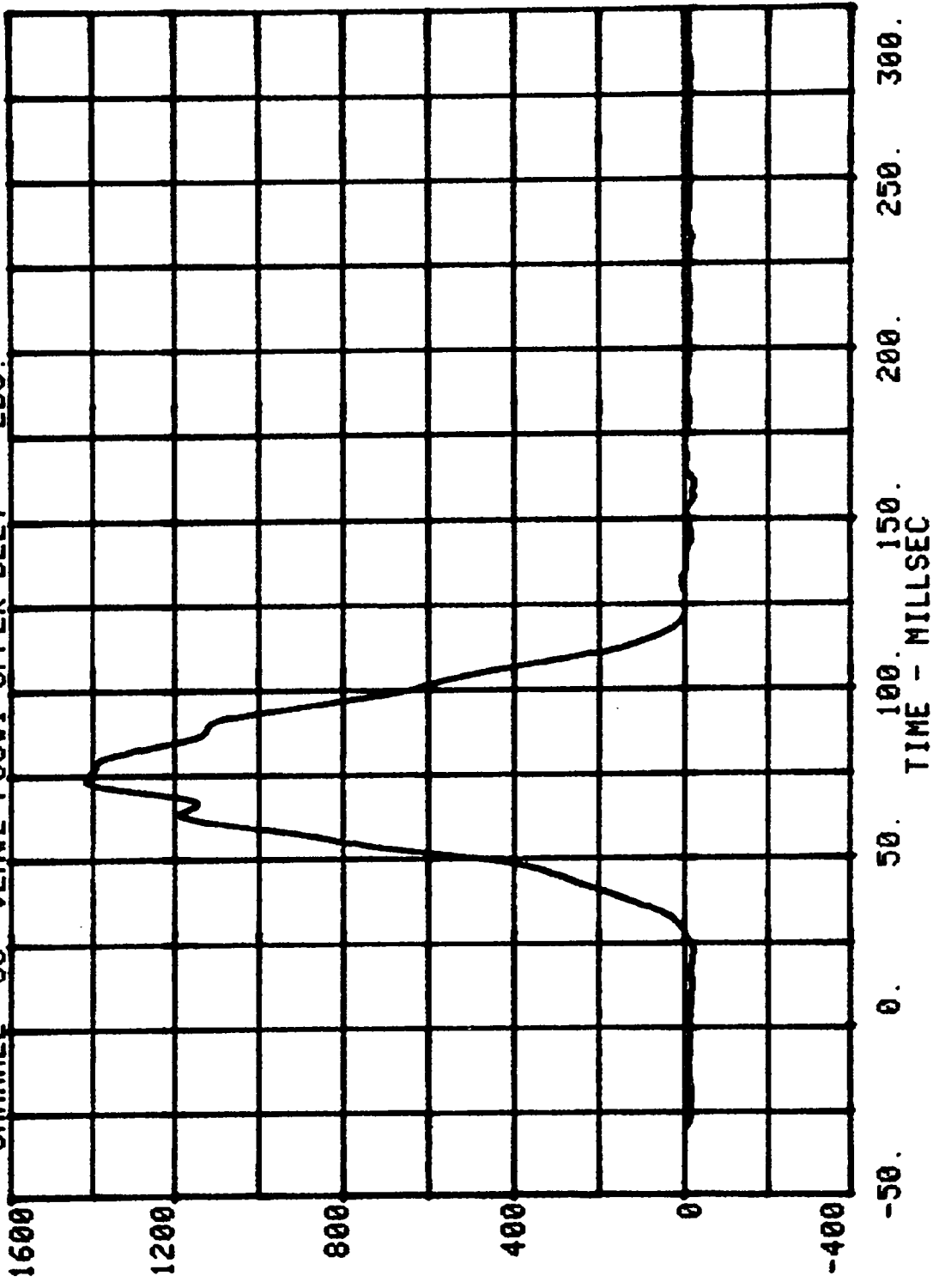


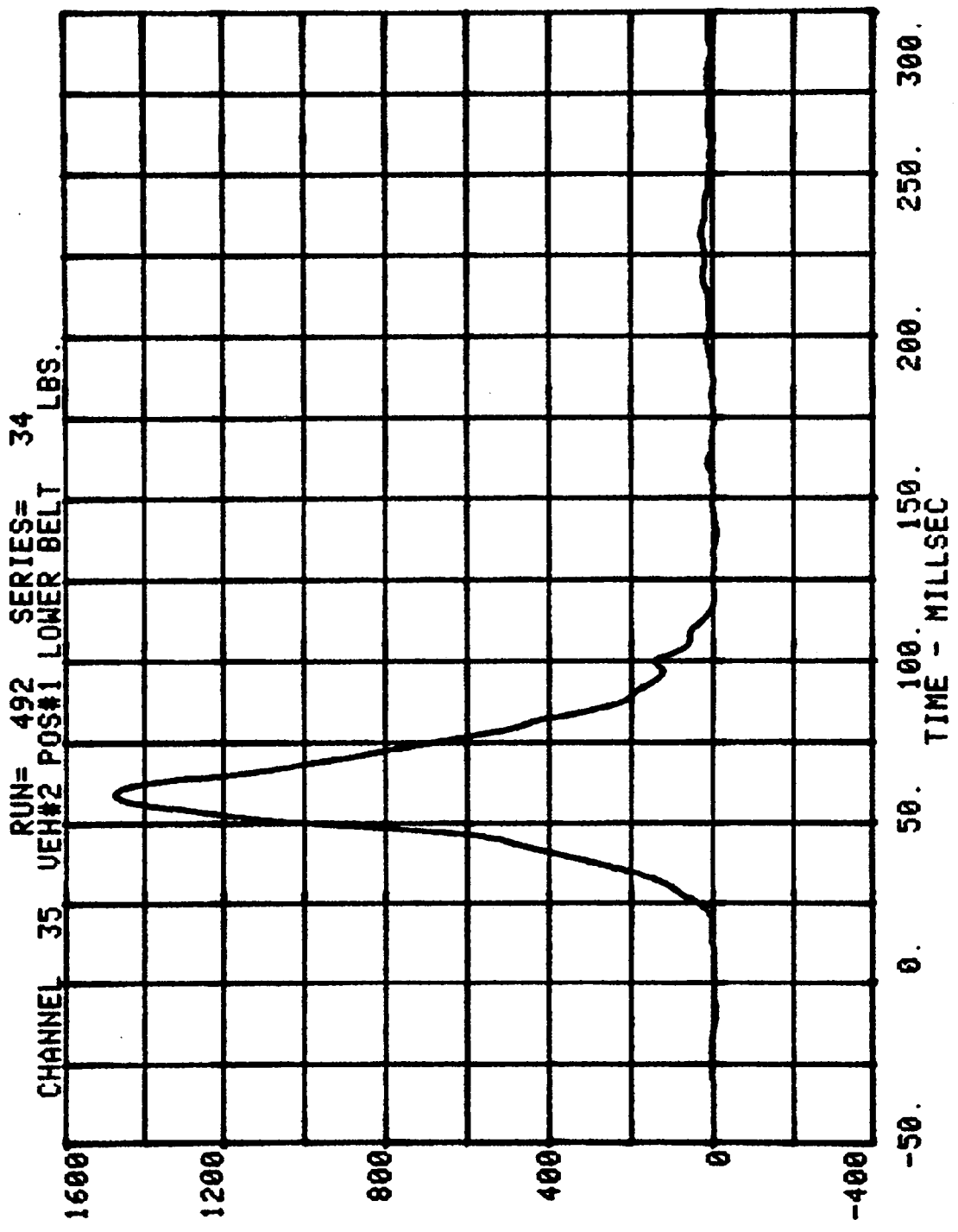
CHANNEL 34 VEH#2 POS#1 LEFT FEMUR 34 LBS.
RUN= 492 SERIES=



-50. 0. 50. 100. 150. 200. 250. 300.
TIME - MILLISEC

CHANNEL 36 VEH#2 POS#1 UPPER BELT SERIES= 34 LBS.





HEAD INJURY CRITERION
HEAD SEVERITY INDEX

BOA TASK 3 TEST #34 CAR-TO-CAR

RUN= 492

VEH#2 POS#2 HEAD R

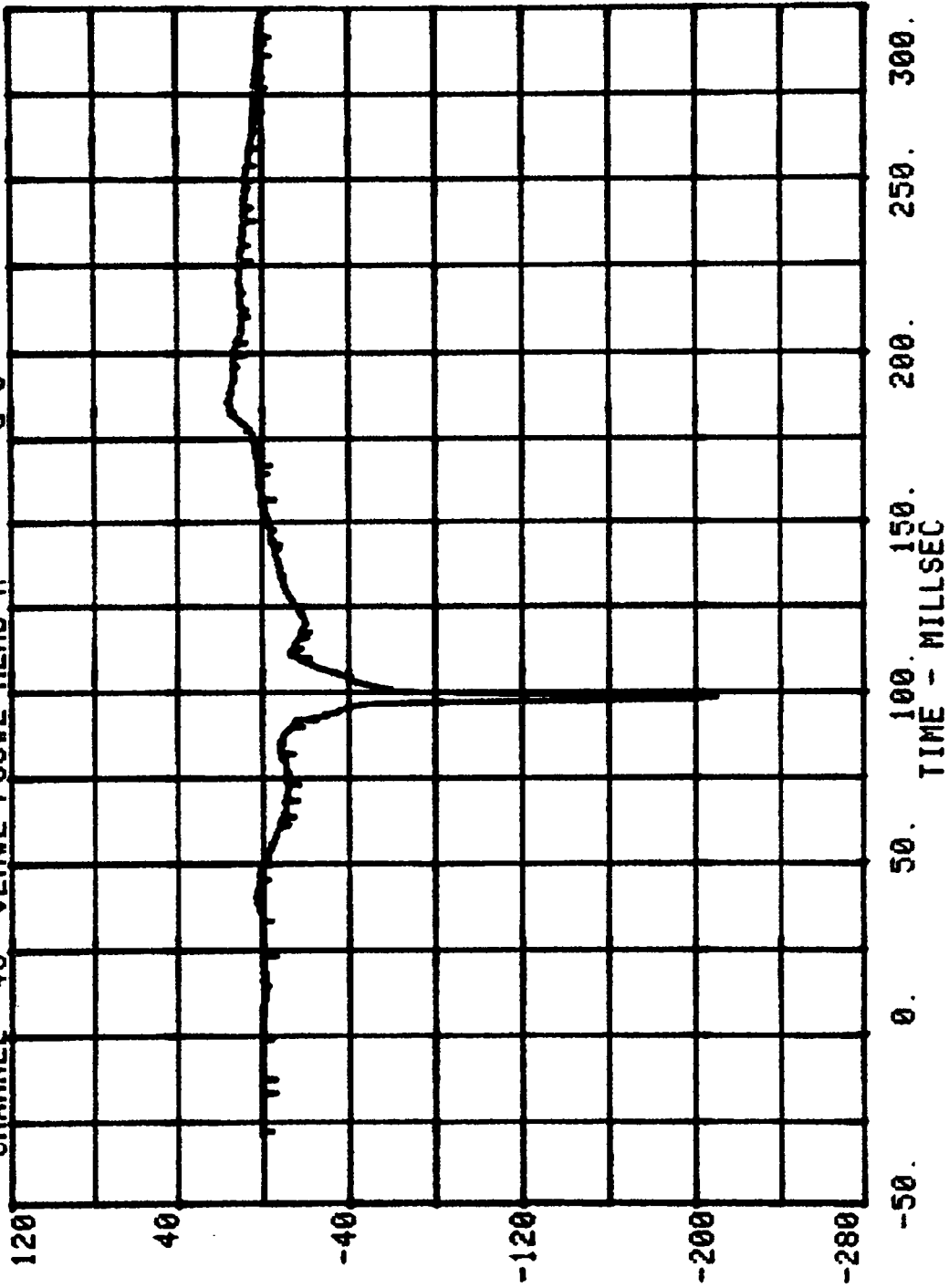
HIC=2095.7 FROM T1= .09210 TO T2= .10110

AVERAGE ACCELERATION BETWEEN T1 AND T2= 140.2G'S

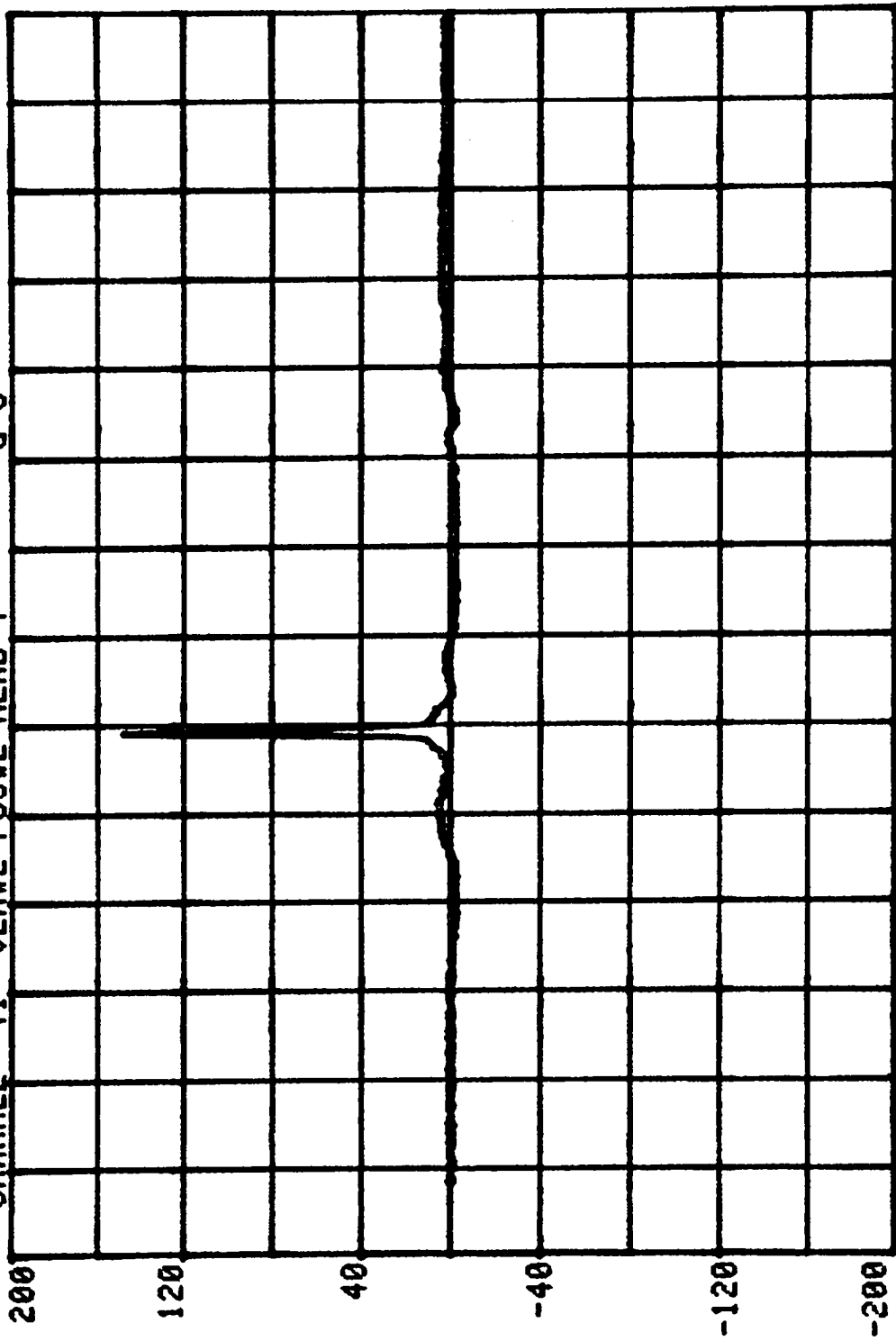
EVENT TIME= 300.0 MSEC

SEVERITY INDEX=3649.1

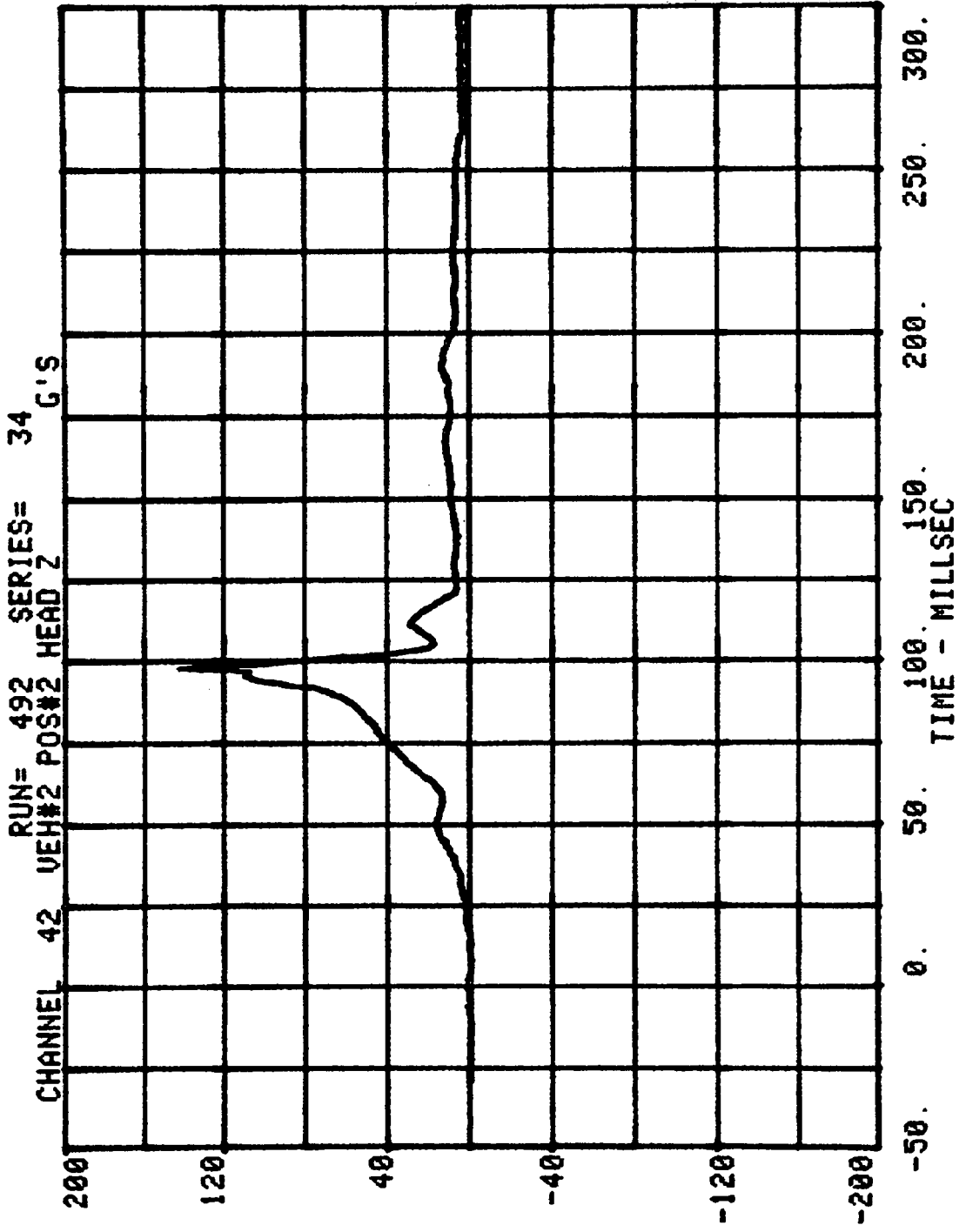
CHANNEL 40 VEH#2 POS#2 HEAD X
RUN= 492 SERIES= 34 G'S



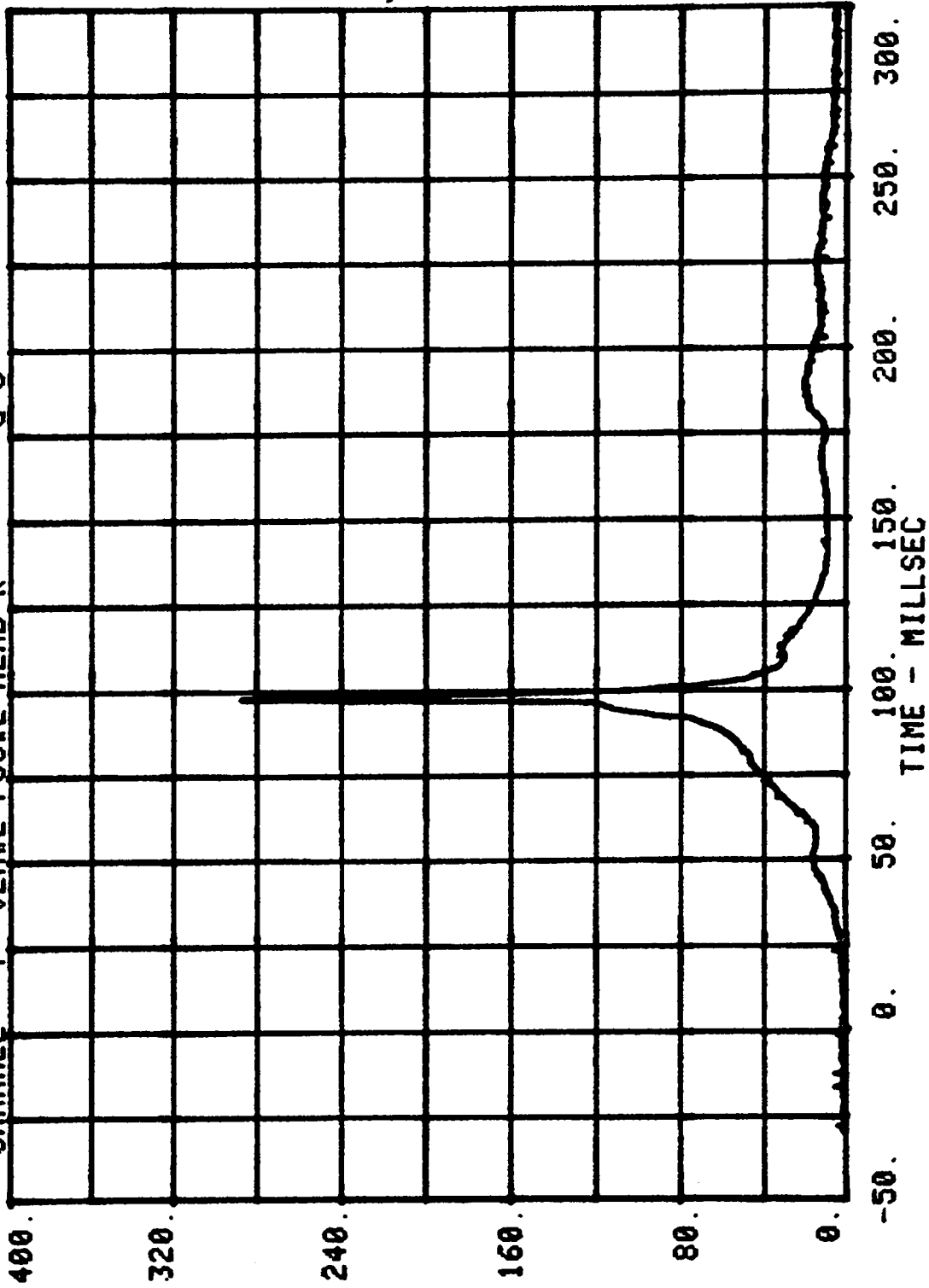
CHANNEL 41 VEH#2 POS#2 HEAD Y SERIES= 34 G'S



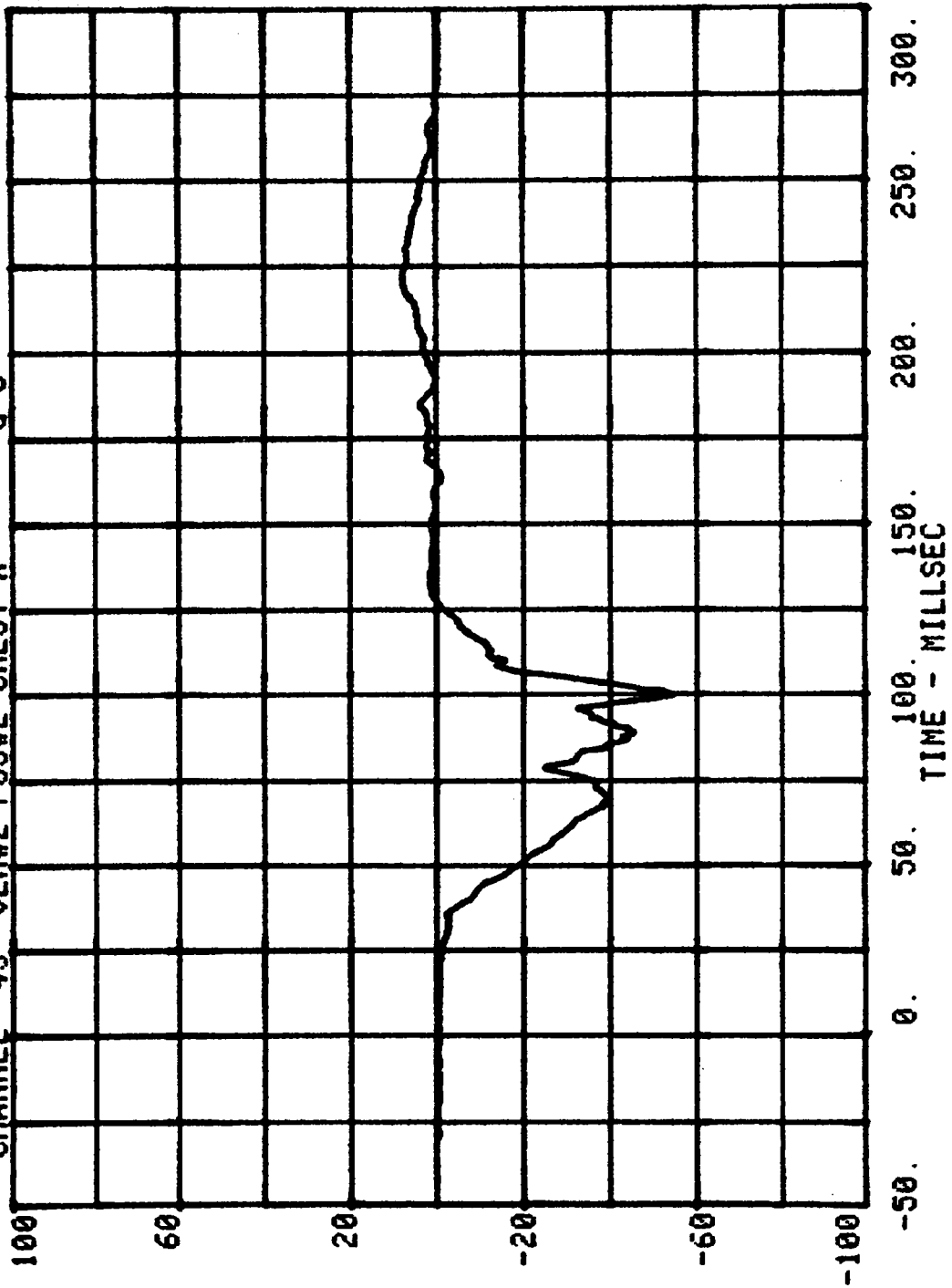
-50. 0. 50. 100. 150. 200. 250. 300.
TIME - MILLISEC



CHANNEL 7 RUN= 492 SERIES= 34 G'S
VEH#2 POS#2 HEAD R

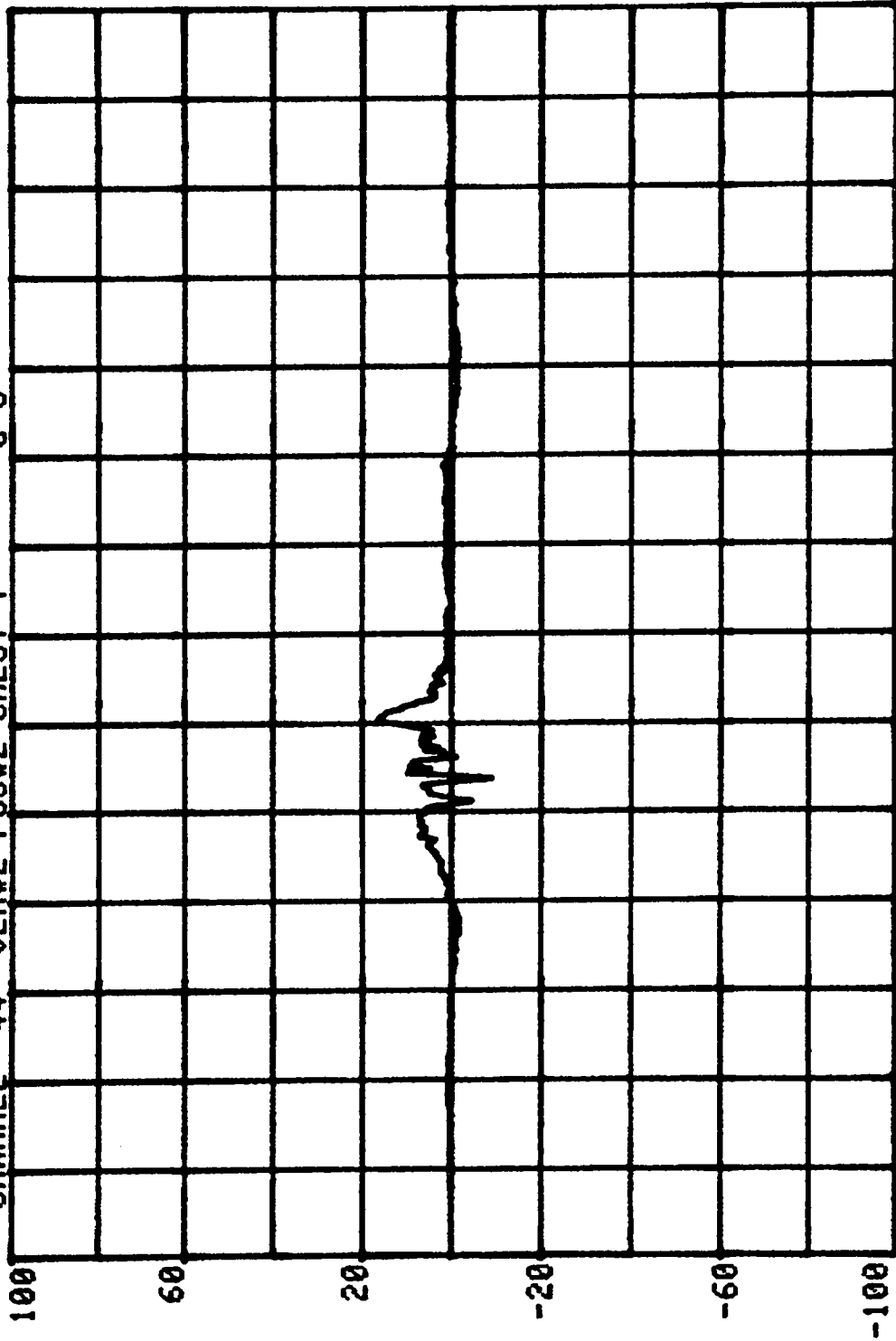


CHANNEL 43 VEH#2 POS#2 CHEST X
RUN= 492 SERIES= 34 G'S

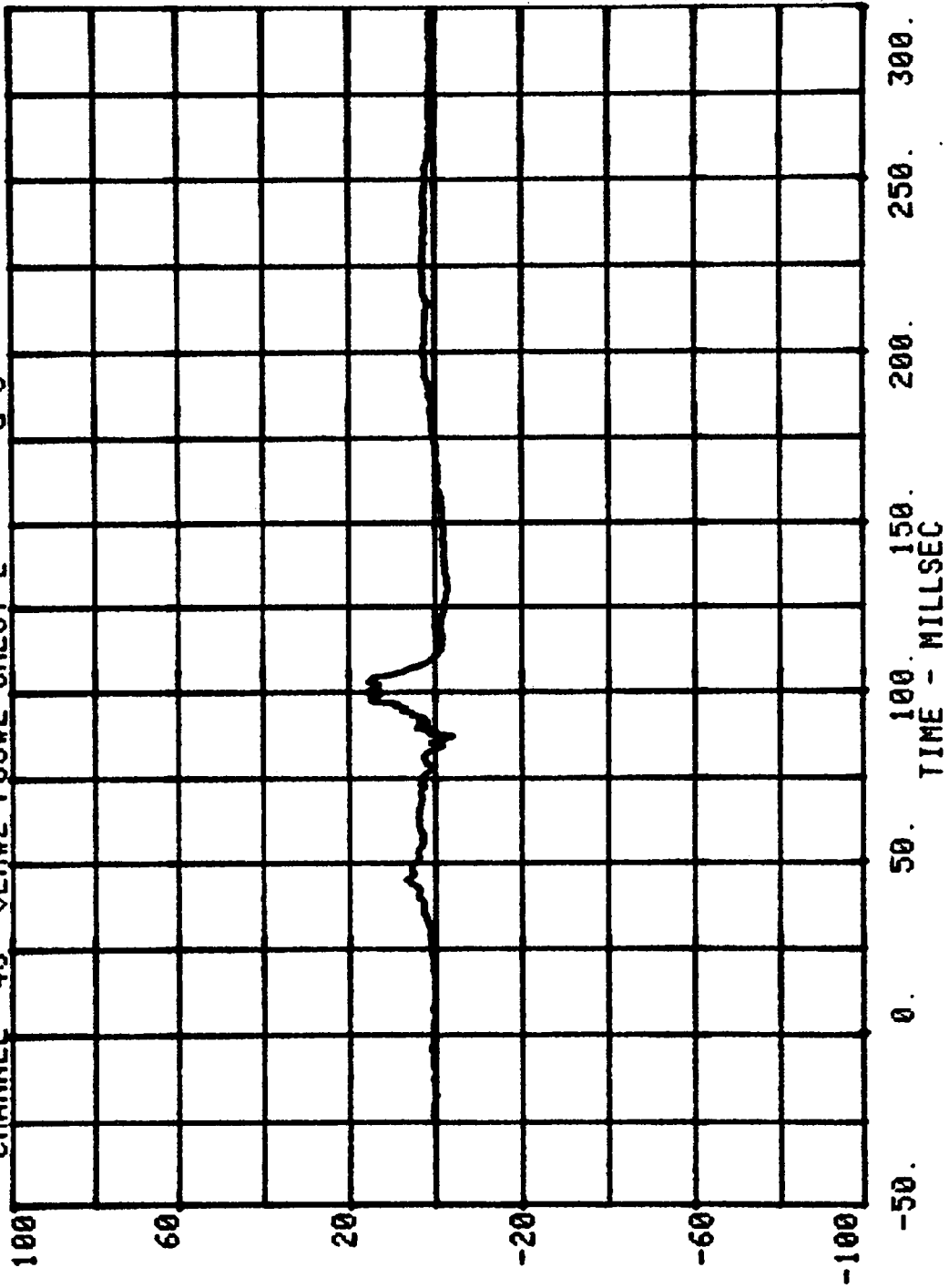


CHANNEL 44 VEH#2 POS#2 CHEST Y 34 G'S

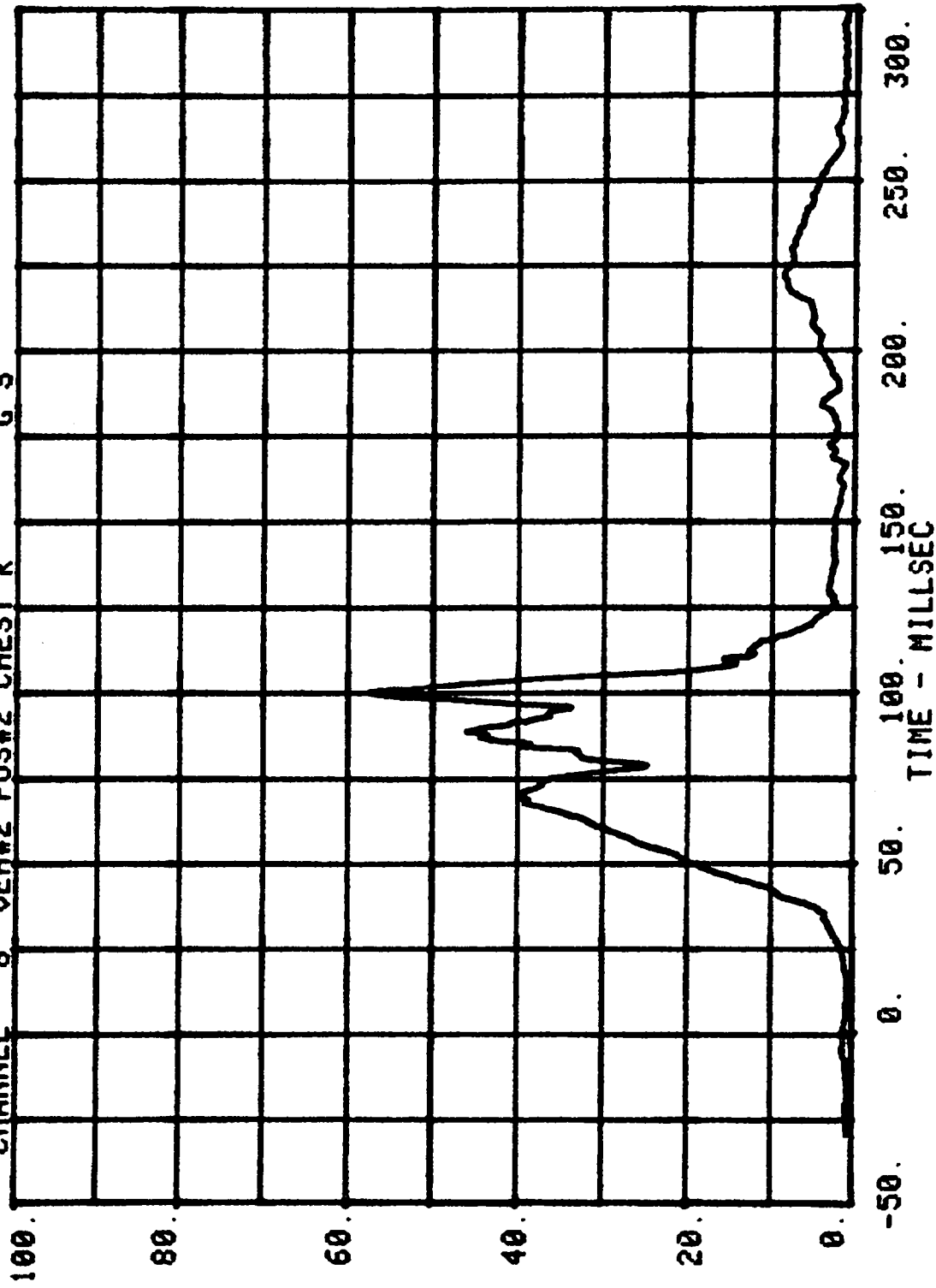
RUN= 492 SERIES=



CHANNEL 45 RUN= 492 SERIES= 34
VEH#2 POS#2 CHEST 2 G'S

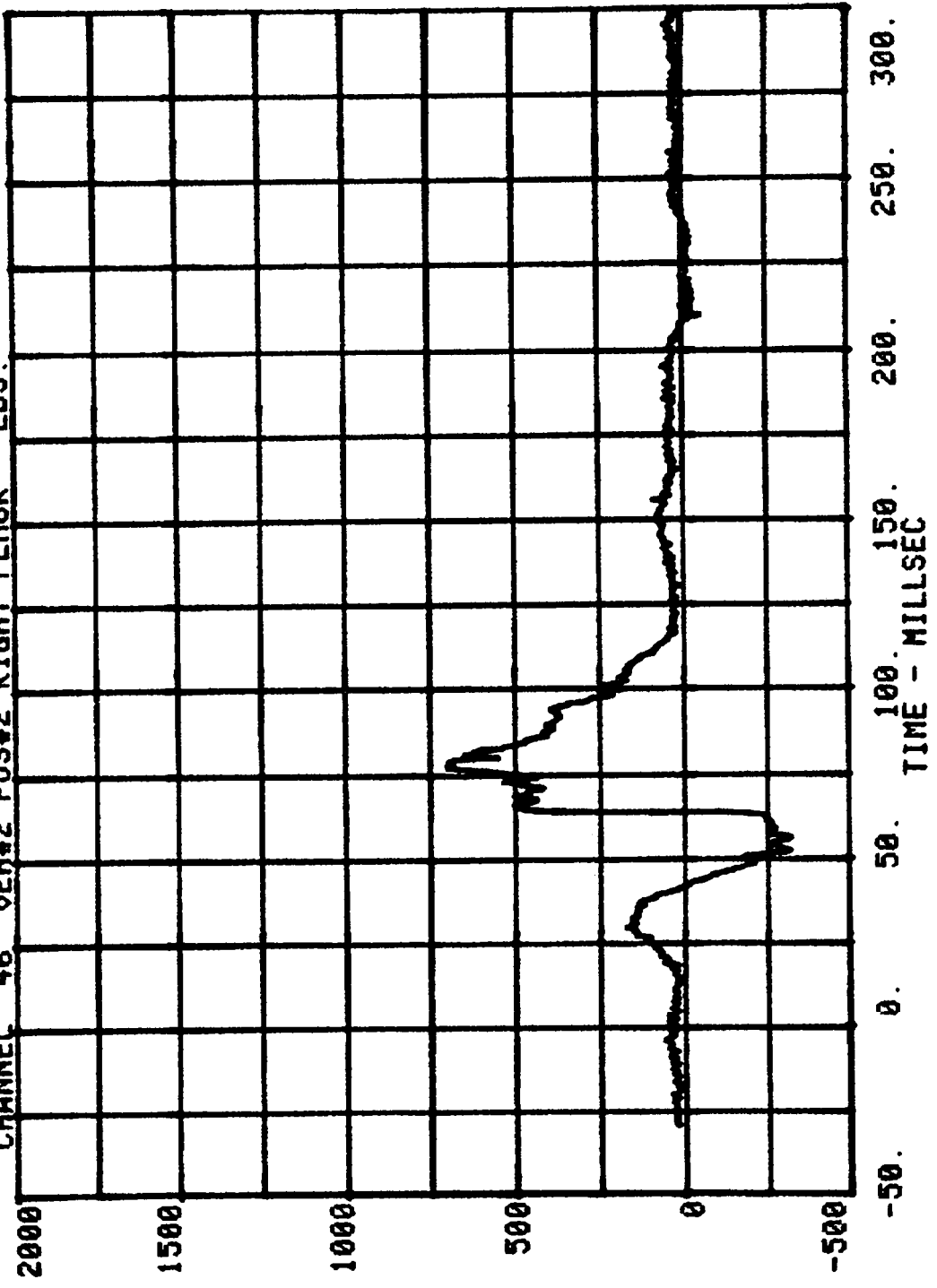


CHANNEL 8 VEH#2 POS#2 CHEST R
RUN= 492 SERIES= 34 G'S



CHANNEL 46 VEH#2 POS#2 RIGHT FEMUR LBS.

RUN= 492 SERIES= 34

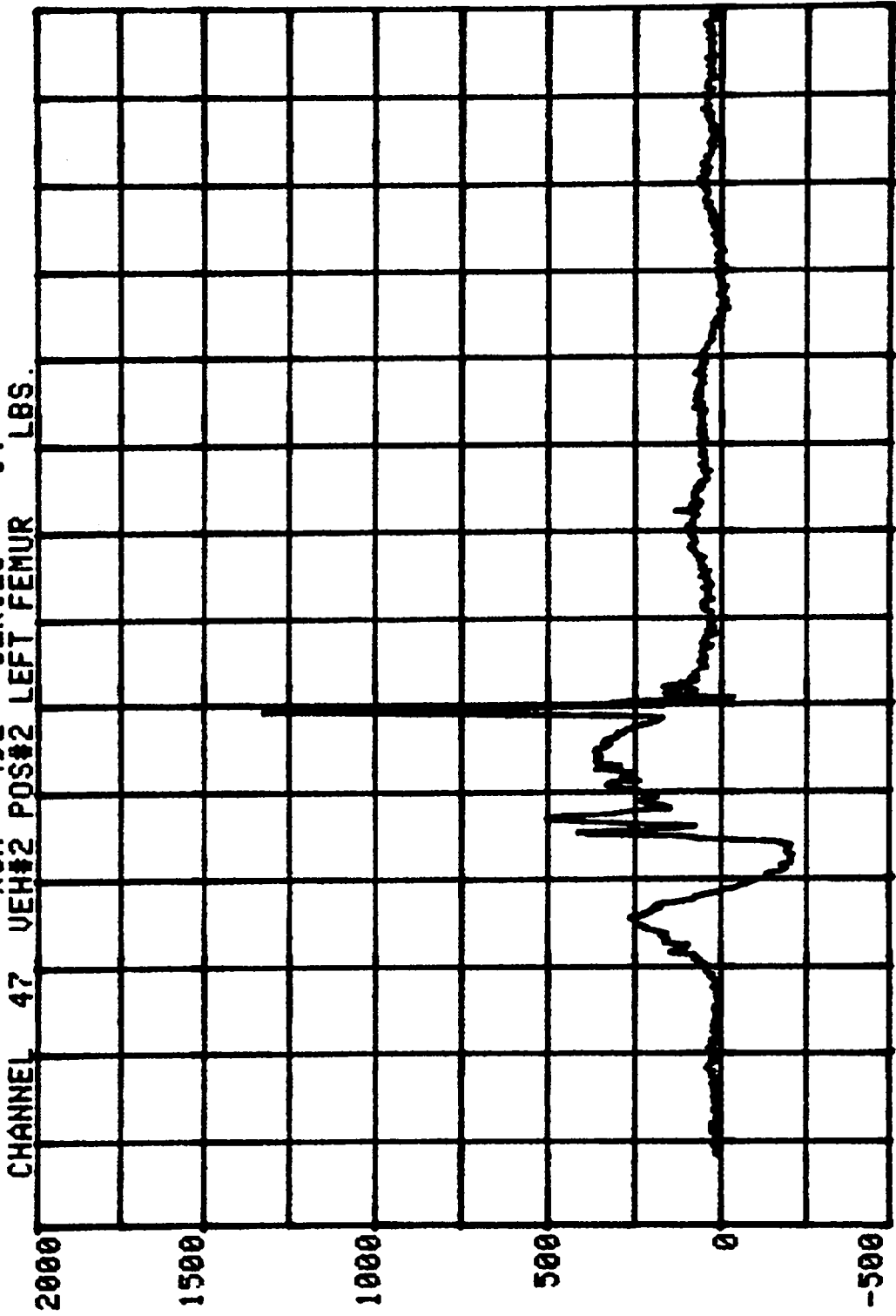


CHANNEL 47 VEH#2 POS#2 LEFT FEMUR 34 LBS. SERIES=

RUN= 492

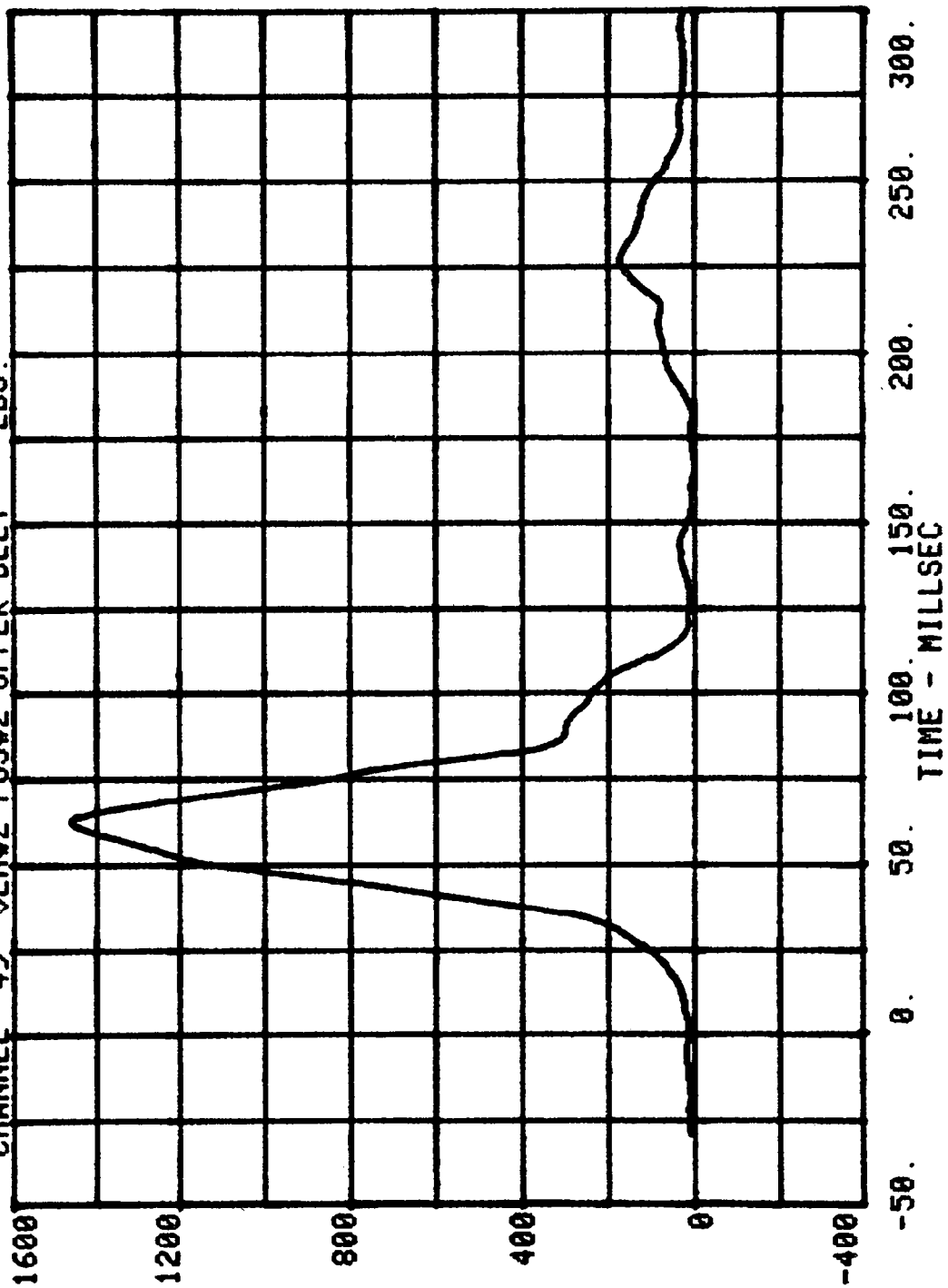
SERIES=

34



-50. 0. 50. 100. 150. 200. 250. 300. TIME - MILLSEC

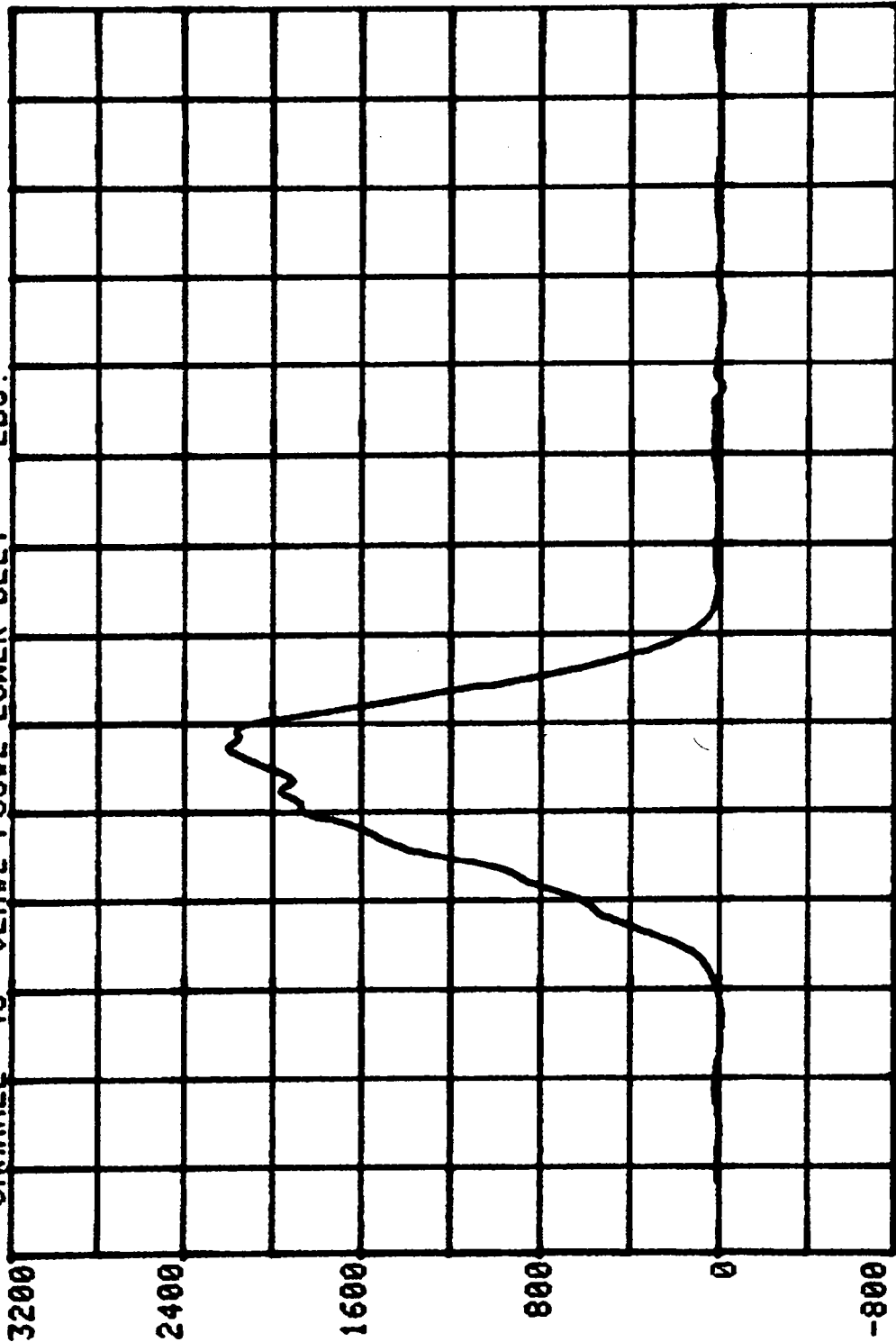
CHANNEL 49 RUN= 492 SERIES= 34
VEH#2 POS#2 UPPER BELT LBS.



CHANNEL 48 VEH#2 POS#2 LOWER BELT

RUN= 492 SERIES= 34

LBS.



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 472, 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, Part 572 specifications and instrument calibration information is included in this Appendix.

Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Date</u>
320	4/25/80
163	4/25/80
111	5/2/80
110	5/2/80

Electronic Test Equipment

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

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY I.D. NO.:

3	2	0
---	---	---

LABORATORY TECHNICIAN: Fred F. Juliano and Gary Gestwick

APPROVED BY: B Killehn

	Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -	4/23 - 4/25	
Calibration Sequential Number for Dummy - - - -	10	
Temperature in Lab. (Spec. = 66 to 78°F) - - - -	67-74	
Relative Humidity in Lab. (Spec. = 10 to 70%) -	38-40	

TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST:			
a. Peak Resultant Accel. -	210 to 260G	225	
b. Peak Lateral Accel. - -	≤10G	8	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.15	
2. NECK BENDING TEST:			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	21.96	
b. Pendulum Avg. Decel. (over t ₃ - t ₂) - - - -	20 to 24G	23	
c. Peak Resultant Head Acceleration - - - -	26G maximum	21	
d. Pendulum Decel. (t ₂ -t ₁)	≤3 ms	2.5	
e. Pendulum Decel. (t ₃ -t ₂)	25 to 30 ms	25	
f. Pendulum Decel. (t ₄ -t ₃)	≤10 ms	5	
g. Pendulum Direction Reversal Time - - - -	≥123 ms	110	
h. Max. Head Rotation - -	63 to 73°	69°	
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	27
	Displ.	2.1 to 3.1 in.	2.8
60°	Time	40.3 to 51.7 ms	42
	Displ.	4.3 to 5.3 in.	4.8
Maximum (°)	Time	53.2 to 66.8 ms	62
	Displ.	5.0 to 6.0 in.	5.7

Continued

P. 572 DUMMY CALIBRATION TEST DATA Continued:

Dummy I.D. No.:

3	2	0
---	---	---

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	74
	Displ.	4.3 to 5.3 in.	4.9
30°	Time	85.4 to 104.6 ms	93
	Displ.	2.1 to 3.1 in.	2.3
0°	Time	101.0 to 123.0 ms	107
	Displ.	-.5 to 0.5 in.	0
3. ABDOMINAL COMPRESSION TEST:			
(Preload = 10 pounds)			
a. Force @ 1" - - - - -	50 to 63 lbs.	52	
b. Force @ 1.3" - - - - -	73 to 88 lbs.	73.2	
4. LUMBAR FLEXION TEST:			
a. Force @ 20° - - - - -	22 to 34 lbs.	30.5	
b. Force @ 30° - - - - -	34 to 46 lbs.	44	
c. Force @ 40° - - - - -	46 to 58 lbs.	57.5	
d. Return Angle - - - - -	12° maximum	7	
5. CHEST IMPACT TESTS:			
a. High Speed			
(1) Probe Speed - - - - -	21.78-22.22 fps	21.90	
(2) Peak Deflection - - - - -	1.7" maximum	1.22	
(3) Peak Resistive Force - - - - -	2250 lbs. maximum	1813	
(4) Internal Hysteresis - - - - -	50 to 70%	70%	
b. Low Speed			
(1) Probe Speed - - - - -	13.86-14.14 fps	14.0	
(2) Peak Deflection - - - - -	1.1" maximum	1.05	
(3) Peak Resistive Force - - - - -	1450 lbs. maximum	1087	
(4) Internal Hysteresis - - - - -	50 to 70%	67%	

P.572 DUMMY CALIBRATION TEST DATAContinued:

Dummy I.D. No.:

3	2	0
---	---	---

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	6.99	
(2) Maximum Force - -	1850 to 2500 lbs	2250	
(3) Time Above 1000#	1.7 ms minimum	1.9	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.03	
(2) Maximum Force - -	1850 to 2500 lbs.	1855	
(3) Time Above 1000#	1.7 ms minimum	2.1	

INSTRUMENT CALIBRATION INFORMATION

DUMMY I.D. NO.:

3	2	0
---	---	---

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	CK78	1/80	
Endevco	CG34	1/80	
Endevco	CN24	1/80	
CEC	A514 17816	1/80	
Endevco	CK11	1/80	
CEC	A115 17839	1/80	
Humanoid Special	--	4/80	
DJ Instr.	1926	1/80	
DJ Instr.	1707	1/80	
CEC	2437	1/80	
CEC	22960	1/80	
Transducers Inc.	20051	4/80	
BLH	72952	8/79	
CIC	567-11	8/79	
C-6		6525-V-34	

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY I.D. NO.:

1	6	3
---	---	---

LABORATORY TECHNICIAN: Fred J. Juliano and Gary Gestwick

APPROVED BY: B. Kelleher

	Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -	4/23 - 4/25	
Calibration Sequential Number for Dummy - - - -	1	
Temperature in Lab. (Spec. = 66 to 78°F)- - - -	66-74	
Relative Humidity in Lab. (Spec. = 10 to 70%) -	29-40	

TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST:			
a. Peak Resultant Accel. -	210 to 260G	245	
b. Peak Lateral Accel. - -	≤10G	2.5	
c. Time above 100G - - - -	0.9 to 1.5 ms	1.1	
2. NECK BENDING TEST:			
a. Pendulum Speed - - - -	21.5 to 25.5 fps	21.69	
b. Pendulum Avg. Decel. (over t ₃ - t ₂) - - - -	20 to 24G	24	
c. Peak Resultant Head Acceleration - - - -	26G maximum	22	
d. Pendulum Decel. (t ₂ -t ₁)	≤3 ms	1.25	
e. Pendulum Decel. (t ₃ -t ₂)	25 to 30 ms	28	
f. Pendulum Decel. (t ₄ -t ₃)	≤10 ms	4	
g. Pendulum Direction Reversal Time - - - -	≥123 ms	105	
h. Max. Head Rotation - -	63 to 73°	69	
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	27
	Displ.	2.1 to 3.1 in.	2.5
60°	Time	40.3 to 51.7 ms	41
	Displ.	4.3 to 5.3 in.	4.6
Maximum (°)	Time	53.2 to 66.8 ms	62
	Displ.	5.0 to 6.0 in.	5.2

Continued

P. 572 DUMMY CALIBRATION TEST DATA Continued:

Dummy I.D. No.:

1	6	3
---	---	---

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	74
	Displ.	4.3 to 5.3 in.	4.6
30°	Time	85.4 to 104.6 ms	92
	Displ.	2.1 to 3.1 in.	2.2
0°	Time	101.0 to 123.0 ms	106
	Displ.	-.5 to 0.5 in.	0
3. ABDOMINAL COMPRESSION TEST:			
(Preload = 10 pounds)			
a. Force @ 1" - - - -	50 to 63 lbs.	53.5	
b. Force @ 1.3" - - - -	73 to 88 lbs.	78	
4. LUMBAR FLEXION TEST:			
a. Force @ 20° - - - -	22 to 34 lbs.	30.5	
b. Force @ 30° - - - -	34 to 46 lbs.	38	
c. Force @ 40° - - - -	46 to 58 lbs.	48	
d. Return Angle - - - -	12° maximum	8	
5. CHEST IMPACT TESTS:			
a. High Speed			
(1) Probe Speed - -	21.78-22.22 fps	21.89	
(2) Peak Deflection -	1.7" maximum	1.68	
(3) Peak Resistive Force - - - - -	2250 lbs. maximum	1968	
(4) Internal Hysteresis - - - -	50 to 70%	51.7%	
b. Low Speed			
(1) Probe Speed - - -	13.86-14.14 fps	14.07	
(2) Peak Deflection -	1.1" maximum	1.05	
(3) Peak Resistive Force - - - - -	1450 lbs. maximum	1228	
(4) Internal Hysteresis - - - -	50 to 70%	55.4%	

P.572 DUMMY CALIBRATION TEST DATAContinued:

Dummy I.D. No.:

1	6	3
---	---	---

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	6.98	
(2) Maximum Force - -	1850 to 2500 lbs	1850	
(3) Time Above 1000#	1.7 ms minimum	2	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.99	
(2) Maximum Force - -	1850 to 2500 lbs.	2000	
(3) Time Above 1000#	1.7 ms minimum	2.0	

INSTRUMENT CALIBRATION INFORMATION

DUMMY I.D. NO.:

1	6	3
---	---	---

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	DB47	1/80	
Endevco	CX05	1/80	
Endevco	CJ54	2/80	
CEC	A128 18259	1/80	
Endevco	CE06	1/80	
CEC	AS12 17811	1/80	
Humanoid Special	--	4/80	
GSE	549	1/80	
GSE	548	1/80	
CEC	2437	1/80	
CEC	22960	1/80	
Transducers Inc.	20051	4/80	
BLH	72952	8/79	
BLH	567-11	8/79	
C-10		6525-V-34	

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 111

LABORATORY TECHNICIAN: Gary Gestwick and Fred F. Juliano

APPROVED BY: _____

	Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -	4/30/80-5/2/80	
Calibration Sequential Number for Dummy - - - -	6	
Temperature in Lab. (Spec. = 66 to 78°F)- - - -	70° - 75°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -	50% - 55%	

TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST:			
a. Peak Resultant Accel. -	210 to 260G	258 g	
b. Peak Lateral Accel. - -	≤10G	2.5 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	22.96 fps	
b. Pendulum Avg. Decel. (over t ₃ - t ₂) - - - -	20 to 24G	23.5 g	
c. Peak Resultant Head Acceleration - - - -	26G maximum	22 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 - - - -	≥123 ms	103 ms	
h. Max. Head Rotation - -	63 to 73°	64°	
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	27.5 ms
	Displ.	2.1 to 3.1 in.	2.7 in
60°	Time	40.3 to 51.7 ms	47.5 ms
	Displ.	4.3 to 5.3 in.	5.2 in
Maximum (°)	Time	53.2 to 66.8 ms	60 ms
	Displ.	5.0 to 6.0 in.	5.5 in

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	68 ms
	Displ.	4.3 to 5.3 in.	5.1 in
30°	Time	85.4 to 104.6 ms	89 ms
	Displ.	2.1 to 3.1 in.	2.5 in
0°	Time	101.0 to 123.0 ms	102 ms
	Displ.	-.5 to 0.5 in.	.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.	83 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20° - - - - -	22 to 34 lbs.	27 lbs	
b. Force @ 30° - - - - -	34 to 46 lbs.	39 lbs	
c. Force @ 40° - - - - -	46 to 58 lbs.	48 lbs	
d. Return Angle - - - - -	12° maximum	11°	
5. CHEST IMPACT TESTS:			
a. High Speed			
(1) Probe Speed - - - - -	21.78-22.22 fps	21.94 fps	
(2) Peak Deflection - - - - -	1.7" maximum	1.45 in	
(3) Peak Resistive Force - - - - -	2250 lbs. maximum	1968 lbs	
(4) Internal Hysteresis - - - - -	50 to 70%	53.2%	
b. Low Speed			
(1) Probe Speed - - - - -	13.86-14.14 fps	13.94 fps	
(2) Peak Deflection - - - - -	1.1" maximum	1.07 in	
(3) Peak Resistive Force - - - - -	1450 lbs. maximum	1165 lbs	
(4) Internal Hysteresis - - - - -	50 to 70%	50.8%	

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	6.80 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2100 lbs	
(3) Time Above 1000#	1.7 ms minimum	1.9 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.83 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2350 lbs	
(3) Time Above 1000#	1.7 ms minimum	1.8 ms	

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NO. 111 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	CJ22	1-80	
ENDEVCO	CS41	1-80	
ENDEVCO	CH21	1-80	
CEC	22290 A23	1-80	
ENDEVCO	CJ92	1-80	
CEC	22722 A69	1-80	
GSE	81	1-80	
GSE	80	1-80	
CEC	2437	1-80	
CEC	22960	1-80	
Transducers Inc.	20051	4-80	
BLH	72952	8-79	
BLH	567-11	8-79	

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY ID NO. 110

LABORATORY TECHNICIAN: Gary Gestwick and Fred F. Juliano

APPROVED BY: *R. K. ...*

	Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - -	4/30/80-5/2/80	
Calibration Sequential Number for Dummy - - - -	7	
Temperature in Lab. (Spec. = 66 to 78°F)- - - -	70° - 75°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -	50 - 55%	

TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST:			
a. Peak Resultant Accel. -	210 to 260G	254 g	
b. Peak Lateral Accel. - -	≤10G	7 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	
b. Pendulum Avg. Decel. (over t ₃ - t ₂) - - - -	20 to 24G	23.5 g	
c. Peak Resultant Head Acceleration - - - -	26G maximum	25 g	
d. Pendulum Decel. (t ₂ -t ₁)	≤3 ms	1 ms	
e. Pendulum Decel. (t ₃ -t ₂)	25 to 30 ms	29 ms	
f. Pendulum Decel. (t ₄ -t ₃)	≤10 ms	4.5 ms	
g. Pendulum Direction Reversal Time - - - -	≥123 ms	107	
h. Max. Head Rotation - -	63 to 73°	66°	
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	27 ms
	Displ.	2.1 to 3.1 in.	2.7 in
60°	Time	40.3 to 51.7 ms	45 ms
	Displ.	4.3 to 5.3 in.	5.1 in
Maximum (°)	Time	53.2 to 66.8 ms	62 ms
	Displ.	5.0 to 6.0 in.	5.5 in

Continued

P. 572 DUMMY CALIBRATION TEST DATA Continued:

Dummy I.D. No.:

1	1	0
---	---	---

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	69 ms
	Displ.	4.3 to 5.3 in.	5.1 in
30°	Time	85.4 to 104.6 ms	90 ms
	Displ.	2.1 to 3.1 in.	2.5 in
0°	Time	101.0 to 123.0 ms	105 ms
	Displ.	-.5 to 0.5 in.	2 in
3. ABDOMINAL COMPRESSION TEST:			
(Preload = 10 pounds)			
a. Force @ 1" - - - - -	50 to 63 lbs.	54 lbs	
b. Force @ 1.3" - - - - -	73 to 88 lbs.	78 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20° - - - - -	22 to 34 lbs.	24.5 lbs	
b. Force @ 30° - - - - -	34 to 46 lbs.	37.5 lbs	
c. Force @ 40° - - - - -	46 to 58 lbs.	49.0 lbs	
d. Return Angle - - - - -	12° maximum	6°	
5. CHEST IMPACT TESTS:			
a. High Speed			
(1) Probe Speed - - - - -	21.78-22.22 fps	21.95	
(2) Peak Deflection - - - - -	1.7" maximum	1.7 in	
(3) Peak Resistive Force - - - - -	2250 lbs. maximum	1916 lbs	
(4) Internal Hysteresis - - - - -	50 to 70%	63.8%	
b. Low Speed			
(1) Probe Speed - - - - -	13.86-14.14 fps	13.92 fps	
(2) Peak Deflection - - - - -	1.1" maximum	1.1 in	
(3) Peak Resistive Force - - - - -	1450 lbs. maximum	1195 lbs	
(4) Internal Hysteresis - - - - -	50 to 70%	66.7%	

P.572 DUMMY CALIBRATION TEST DATAContinued:

Dummy I.D. No.:

1	1	0
---	---	---

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	6.83 fps	
(2) Maximum Force - -	1850 to 2500 lbs	1950 lbs	
(3) Time Above 1000#	1.7 ms minimum	1.9 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.82 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2500 lbs	
(3) Time Above 1000#	1.7 ms minimum	1.8 ms	

INSTRUMENT CALIBRATION INFORMATION

DUMMY I.D. NO.:

1	1	0
---	---	---

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	CM86	1-80	
ENDEVCO	CL60	1-80	
ENDEVCO	CN64	1-80	
CEC	17814 A510	1-80	
ENDEVCO	DA87	1-80	
CEC	17932 A122	1-80	
GSE	77	1-80	
GSE	76	1-80	
CEC	2437	1-80	
CEC	22960	1-80	
Transducers Inc.	20051	4-80	
BLH	72952	8-79	
BLH	567-11	8-79	
C-18		6525-V-34	