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CALSPAN ADVANCED TECHNOLOGY CENTER

EVALUATION OF AGGRESSIVENESS
TEST TECHNIQUES

Walter E. Levan

CALSPAN REPORT NO. 6707-V-4

TEST:	TEST NO. 4
TYPE OF TEST:	OFFSET FRONTAL CAR-TO-CAR IMPACT 1980 American Motors Concord 1980 Volkswagen Rabbit
TEST DATE:	30 January 1981
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16. Abstract

An offset frontal car-to-car crash test of a 1980 American Motors Concord, 2-door sedan and a 1980 Volkswagen Rabbit, 2-door hatchback was performed at Calspan Corporation, Advanced Technology Center, Transportation Research Department, Buffalo, New York on January 30, 1981.

Impact speed for each vehicle was 31.8 mph. Ambient temperature on the test date was 24°F.

Both occupants of the American Motors Concord and the Volkswagen Rabbit complied with FMVSS 208 Injury Criteria Value.

Maximum crush of the Concord was 20.8 inches and maximum firewall intrusion was 3.7 inches, as measured on the left side.

Maximum crush of the Volkswagen Rabbit was 40.3 inches (left side) and maximum firewall intrusion was 12.6 inches.

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TABLE OF CONTENTS

		Page No.
SECTION 1 -	TEST OBJECTIVE	1-1
SECTION 2 -	SUMMARY OF TEST NUMBER 4	2-1
SECTION 3 -	VEHICLE AND OCCUPANT INFORMATION	3-1
APPENDIX A -	STILL PHOTOGRAPHS	A-1
APPENDIX B -	VEHICLE AND DUMMY RESPONSE DATA	B-1
APPENDIX C -	DUMMY CERTIFICATION TESTS	C-1

LIST OF FIGURES

Figure No.		Page No.
1	PRE-TEST AND POST-TEST MEASUREMENT POINTS	3-4
2	REAR TARGET DISPLACEMENT WITH RESPECT TO FIXED GROUND REFERENCE	3-11
3	VEHICLE INSTRUMENTATION - 1980 AMERICAN MOTORS CONCORD	3-12
4	VEHICLE TRANSDUCER LOCATION MEASUREMENTS - 1980 AMERICAN MOTORS CONCORD	3-13
5	VEHICLE INSTRUMENTATION - 1980 VOLKSWAGEN RABBIT	3-14
6	VEHICLE TRANSDUCER LOCATION MEASUREMENT - 1980 VOLKSWAGEN RABBIT	3-15
7	CAMERA POSITION FOR FRONTAL IMPACTS	3-16
8	DRIVER SEAT POSITION - 1980 AMERICAN MOTORS CONCORD	3-19
9	DRIVER SEAT POSITION - 1980 VOLKSWAGEN RABBIT	3-20
10	PART 572 DUMMY IN-VEHICLE POSITION - 1980 AMERICAN MOTORS CONCORD	3-21
11	PART 572 DUMMY IN-VEHICLE POSITION - 1980 VOLKSWAGEN RABBIT	3-22
12	OCCUPANT CLEARANCE DIMENSIONS - 1980 AMERICAN MOTORS CONCORD	3-23
13	OCCUPANT CLEARANCE DIMENSIONS - 1980 VOLKSWAGEN RABBIT	3-24

APPENDIX A

A-1	VEHICLE NO. 1 & NO. 2 - PRE-TEST CONFIGURATION VIEWS	A-3
A-2	VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF FRONT AND REAR	A-4
A-3	VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT SIDES	A-5
A-4	VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT FRONT THREE-QUARTERS	A-6
A-5	VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT FRONT QUARTERS	A-7
A-6	VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF LEFT REAR	A-8
A-7	VEHICLE NO. 1 & NO. 2 - PRE-TEST OFFSET VIEWS	A-8

LIST OF FIGURES (Cont.)

Figure No.		Page No.
A-8	VEHICLE NO. 1 - POST-TEST VIEWS OF FRONT UNDERBODY	A-9
A-9	VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF DRIVER POSITIONS	A-10
A-10	VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF RIGHT FRONT PASSENGER POSITIONS	A-11
A-11	VEHICLE NO. 1 - POST-TEST INTERIOR VIEWS	A-12
A-12	VEHICLE NO. 1 - POST TEST VIEW OF WINDSHIELD	A-12
A-13	VELOCITY TRAP COUNTER DISPLAY	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 SIDES	A-15
A-16	VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF FRONT AND REAR THREE-QUARTERS	A-16
A-17	VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT FRONT QUARTERS	A-17
A-18	VEHICLE NO. 2 - POST-TEST VIEWS OF LEFT FRONT AND FRONT UNDERBODY	A-18
A-19	VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF DRIVER POSITIONS	A-19
A-20	VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF RIGHT FRONT PASSENGER POSITIONS	A-20
A-21	VEHICLE NO. 2 - POST-TEST VIEWS OF WINDSHIELD AND HOOD INTRUSION INTO WINDSHIELD	A-21
A-22	VEHICLE NO. 2 - POST-TEST INTERIOR VIEWS	A-21

LIST OF TABLES

Table No.		Page No.
1	CRASH TEST SUMMARY	2-3
2	VEHICLE TEST WEIGHTS AS TESTED - 1980 AMERICAN MOTORS CONCORD	2-5
3	VEHICLE TEST WEIGHTS AS TESTED - 1980 VOLKSWAGEN RABBIT	2-6
4	SUMMARY OF TEST CONDITIONS - 1980 AMERICAN MOTORS CONCORD	2-7
5	SUMMARY OF TEST CONDITIONS - 1980 VOLKSWAGEN RABBIT	2-9
6	VEHICLE WEIGHTS AND RIDE HEIGHTS - 1980 AMERICAN MOTORS CONCORD	3-5
7	VEHICLE MEASUREMENTS - 1980 AMERICAN MOTORS CONCORD	3-6
8	VERTICAL HEIGHTS AND HORIZONTAL DISTANCE FROM REFERENCE - 1980 AMERICAN MOTORS CONCORD	3-7
9	VEHICLE MEASUREMENTS - 1980 VOLKSWAGEN RABBIT	3-8
10	VERTICAL HEIGHTS AND HORIZONTAL DISTANCE FROM REFERENCE - 1980 VOLKSWAGEN RABBIT	3-9
11	VEHICLE TRAJECTORIES	3-10
12	HIGH SPEED CAMERA LOCATIONS	3-17
13	HIGH SPEED CAMERA INFORMATION	3-18
14	OCCUPANT INJURY CRITERIA VALUES - 1980 AMERICAN MOTORS CONCORD	3-25
15	OCCUPANT INJURY CRITERIA VALUES - 1980 VOLKSWAGEN RABBIT	3-26

SECTION 1

TEST OBJECTIVE

The test objective was to obtain Baseline data using one of two vehicles judged to have dissimilar aggressivity characteristics against a sub-impact vehicle.

This test was an offset frontal car-to-car impact involving a 1980 American Motors Concord and a 1980 Volkswagen Rabbit with a nominal closing speed of 63.6 mph. This test was performed at Calspan Corporation Advanced Technology Center on January 30, 1981.

This test program is part of the National Highway Traffic Safety Administration (NHTSA) Contract DOT-HS-8-01938, Task 5, to evaluate aggressiveness test techniques.

SECTION 2

SUMMARY OF TEST NUMBER 4

An offset frontal car-to-car impact (Figure A-1) of a 1980 American Motors Concord into a 1980 Volkswagen Rabbit,with each vehicle traveling at 31.8 mph,was performed at the Calspan Corporation, Advanced Technology Center on January 30, 1981. A summary of the test conditions can be found in Table 1 and pre- and post-test photographs can be found in Appendix A.

Each vehicle contained two Part 572, 50th percentile male anthropometric test devices (ATDs) placed in the driver's and right-front passenger's seating positions, according to the dummy placement procedure specified in Laboratory Procedure for Vehicle Assessment TP-212-02.

The occupant dummies were instrumented with head and chest triaxial accelerometers and femur load cells. Each of the dummies had been certified and had been used in a previous test, (614-3-512), and the FMVSS 208 Injury Criteria Value for each dummy was not exceeded in that test. The certification data sheets, along with instrumentation data, are presented in Appendix C.

The crash event was recorded by one real time and 11 high speed cameras. Camera locations and other pertinent camera information are found in Section 3 of this report.

DATA LOSSES EXPERIENCED DURING THE TEST

Vehicle No. 1

Accelerometer Pack #4(X) (Bumper Crossmember) zero shift.

Accelerometer Pack #7(X) and 7(Z) (Front Crossmember) noise on data.

Accelerometer Pack #9(X) (Bottom of Engine) cut wire.

Vehicle No. 2

Accelerometer Pack #5(x) and 5(Z) (Rear Axle) - Accelerometer pack broke loose, breaking the accelerometer wires.

Accelerometer Pack #6(X) (Top of Engine) cut wire.

Accelerometer Pack #7(X) and 7(Z) (Front Crossmember) cut wires.

Accelerometer Pack #9(X) and 9(Z) (Bottom of Engine) - Accelerometer pack broke loose, breaking the accelerometer wires.

Table 1

CRASH TEST SUMMARY

TEST NO. 4 PROJECT Evaluation of Aggressiveness Test Techniques

DATE 1/30/81 TIME 1500 hrs. TEMP. 24° F

TEST CONDITION Offset frontal - 63.6 mph closing speed.

VEHICLE NO. 1 1980 American Motors Concord - 2-door sedan

VEHICLE NO. 2 1980 Volkswagen Rabbit - 2-door hatchback

	VEH. NO. 1	VEH. NO. 2	
TEST WEIGHT (lbs)	3930	2580	
IMPACT ANGLE (deg)*	0	0	OFFSET
IMPACT VELOCITY (mph)**	31.8	31.8	
MAX. CRUSH (in) (static)	20.8 (LF Side)	40.3 (LF Side)	
MAX. INTRUSION (in)	3.7	12.6	

DUMMIES	VEH. NO. 1		VEH. NO. 2	
TYPE	Part 572, 50th Percentile Male		Part 572, 50th Percentile Male	
LOCATION	LF(1)	RF(2)	LF(1)	RF(2)
RESTRAINT	3-Point Belt System		3-Point Belt System	
ATD ID No.	109	183	162	320

NUMBER OF DATA CHANNELS 78
NUMBER OF HIGH SPEED CAMERAS 11 + Real Time

*WITH RESPECT TO TOW TRACK CENTERLINE

**SPEED TRAP MEASUREMENT (±0.5% ACCURACY)

OBSERVATIONS (VEHICLE NO. 1) - 1980 American Motors Concord

GLAZING Windshield has stress cracks on driver side (Figure A-12).

DOORS Both front doors could be opened after impact.

SEAT ANCHORAGES Intact

RESTRAINTS Intact - See General Comments below.

OBSERVATIONS (VEHICLE NO. 2) - 1980 Volkswagen Rabbit

GLAZING Windshield broken by hood of vehicle (Figure A-21).

DOORS Both doors could be opened after impact.

SEAT ANCHORAGES Intact

RESTRAINTS Intact - See General Comments below.

GENERAL COMMENTS The production-type 3-point retractor belt system was replaced in both vehicles with a 3-point adjustable belt with no retractors.

Table 2

VEHICLE TEST WEIGHTS AS TESTED

Vehicle No. 1 - 1980 American Motors Concord

Left Front	1130 lbs	Left Rear	900 lbs
Right Front	1010 lbs	Right Rear	890 lbs
TOTAL FRONT	2140 lbs	TOTAL REAR	1790 lbs

Total Weight = 2140 + 1790 = 3930 lbs

Wheel Base = 108 inches

$Cg_{F.W.}$ = $\frac{1790 \text{ lbs} \times 108 \text{ inches}}{3930 \text{ lbs}}$ = 49.19 inches

CALCULATION FOR TEST WEIGHT

RCLW = Rated Cargo and Luggage Weight
UDW = Unloaded Delivered Weight (3360 lbs)
VCW = Vehicle Capacity Weight (775 lbs)
DSC = Designated Seating Capacity (4)

RCLW = VCW - 150 (DSC)
RCLW = 775 - 150 (4) = 175 lbs

TEST WEIGHT = UDW + RCLW + (No. Dummies x 164 lbs)
TEST WEIGHT = 3360 lbs + 175 lbs + 2 (164 lbs)
TEST WEIGHT = 3863 lbs (CALCULATED)

Table 3

VEHICLE TEST WEIGHTS AS TESTED

Vehicle No. 2 - 1980 Volkswagen Rabbit

Left Front	760	lbs	Left Rear	550	lbs
Right Front	720	lbs	Right Rear	550	lbs
TOTAL FRONT	1480	lbs	TOTAL REAR	1100	lbs

Total Weight = 1480 + 1100 = 2580 lbs

Wheel Base = 95 inches

$$Cg_{F.W.} = \frac{1100 \text{ lbs} \times 95 \text{ inches}}{2580 \text{ lbs}} = 40.5 \text{ inches}$$

CALCULATION FOR TEST WEIGHT

RCLW = Rated Cargo and Luggage Weight
UDW = Unloaded Delivered Weight (2040 lbs)
VCW = Vehicle Capacity Weight (837 lbs)
DSC = Designated Seating Capacity (4)

RCLW = VCW - 150 (DSC)
RCLW = 837 - 150 (4) = 237 lbs

TEST WEIGHT = UDW + RCLW + (No. Dummies x 164 lbs)
TEST WEIGHT = 2040 lbs + 237 lbs + 2 (164 lbs)
TEST WEIGHT = 2605 lbs (CALCULATED)

SUMMARY OF TEST CONDITIONS

TEST VEHICLE INFORMATION

Vehicle Manufacturer American Motors Corporation

Make/Model American Motors Concord

Body Style 2-Door Model Year 1980

VIN A0A065C168012 Build Date 10/79

NHTSA No. 614-4-513 Color White

Engine Data: 6 cylinders 258 in^3/&& displacement

Transmission Data: 3 speed ( ) Manual (x) Automatic

Date Rec'd 1/14/81 Air Cond. ___ PW. STR. X PW. BR. X ___

Dealer's Name & Address Holiday Olds, Williamsville, N. Y. 14221

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

Vehicle Manufactured by American Motors Corporation

Date of Manufacture 10/79 VIN A0A065C168012

GVRW 4142 lbs GAWR: Front 2156 lbs Rear 2008 lbs

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

Vehicle Load (up to capacity) - Front 24 psi
Rear 24 psi

Recommended Tire Size P195/75R14 Load Range: X B ___ C ___ D

Vehicle Capacity: Types of Seats ___ Bench ___ Bucket X Split Bench

Number of Occupants (Designated Seating Capacity): 2 Front
2 Rear
4 TOTAL

Cargo Load = 175 lbs

TOTAL = 775 lbs

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

Right Front = 950 lbs Right Rear = 750 lbs

Left Front = 980 lbs Left Rear = 680 lbs

TOTAL FRONT WEIGHT = 1930 lbs (57.4 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1430 lbs (42.6 % of Total Vehicle Weight)

TOTAL DELV. WEIGHT = 3360 lbs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 242 lbs CARGO

Right Front = 1010 lbs Right Rear = 890 lbs

Left Front = 1130 lbs Left Rear = 900 lbs

TOTAL FRONT WEIGHT = 2140 lbs (54.5 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1790 lbs (45.6 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 3930 lbs

Weight of ballast secured in vehicle trunk area = 0 lbs

Table 4
SUMMARY OF TEST CONDITIONS (Cont'd)

TEST CONDITIONS

Date of Test 1/30/81 Time of Test 1500 hrs. ~~am/pm~~

Ambient Temperature 24 °F at impact area

Temperature in Occupant Compartment 67 °F

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude:	RF	27.5	LF	27.5	RR	27.5	LR	27.75
Test Attitude:	RF	27.5	LF	27.3	RR	25.2	LR	25.5

VEHICLE TIRE DATA

Recommended Cold Tire Pressure: Front = 24 psi Rear = 24 psi

Recommended Tire Size P195/75R14 Load Range B

Tires on Vehicle Goodyear P195/75R14

Is Spare Tire a "Space Saver" X yes _____ 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 22 gal

Test Volume 20.4 gal (93% of EPA Capacity)

Fuel System Capacity (data from Owner's Manual) 22 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 fuel tube is at rear center of vehicle and sealed by a screw-on type cap and is concealed by the hinged license plate 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 -- Yes -- No

VEHICLE REBOUND AND CRUSH

Overall Length of Test Vehicle: Pre-Test = R 184.9 /L 184.9 inches

Post-Test = R 188.5 /L 164.1 inches

Crush = R -3.6 /L 20.8

SUMMARY OF TEST CONDITIONS

TEST VEHICLE INFORMATION

Vehicle Manufacturer Volkswagen of America, Inc.

Make/Model Volkswagen Rabbit, 2-Door Hatchback

Body Style 2-Door Model Year 1980

VIN 17A0964107 Build Date 7/80

NHTSA No. 614-4-513 Color Black

Engine Data: 4 cylinders 97 in^3/xx displacement

Transmission Data: 4 speed (X) Manual ( ) Automatic

Date Rec'd 1/8/81 Air Cond. ____ PW. STR. ____ PW. BR. X ____

Dealer's Name & Address Kelly's Volkswagen, Cheektowaga, N. Y. 14225

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

Vehicle Manufactured by Volkswagen of America, Cheektowaga, N. Y. 14225

Date of Manufacture 7/80 VIN 17A0964107

GVRW 2822 lbs GAWR: Front 1609 lbs Rear 1278 lbs

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

Vehicle Load (up to capacity) - Front 27 psi
Rear 31 psi

Recommended Tire Size 155-R-13 Load Range: X B ___ C ___ D

Vehicle Capacity: Types of Seats ___ Bench X Bucket ___ Split Bench

Number of Occupants (Designated Seating Capacity): 2 Front
2 Rear
4 TOTAL

Cargo Load = 237 lbs

TOTAL = 837 lbs

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

Right Front = 630 lbs Right Rear = 380 lbs

Left Front = 640 lbs Left Rear = 390 lbs

TOTAL FRONT WEIGHT = 1270 lbs (62.2 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 770 lbs (37.8 % of Total Vehicle Weight)

TOTAL DELV. WEIGHT = 2040 lbs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 212 lbs CARGO

Right Front = 720 lbs Right Rear = 550 lbs

Left Front = 760 lbs Left Rear = 550 lbs

TOTAL FRONT WEIGHT = 1480 lbs (57.4 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1100 lbs (42.6 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 2580 lbs

Weight of ballast secured in vehicle trunk area = 0 lbs

Table 5
SUMMARY OF TEST CONDITIONS (Cont'd)

TEST CONDITIONS

Date of Test 1/30/81 Time of Test 1500 hrs. ~~AM/PM~~

Ambient Temperature 24 °F at impact area

Temperature in Occupant Compartment 69 °F

VEHICLE ATTITUDE (all dimensions in inches)

Delivered Attitude: RF 25.5 LF 25.5 RR 25.25 LR 25.25

Test Attitude: RF 24.5 LF 24.6 RR 22.6 LR 22.75

VEHICLE TIRE DATA

Recommended Cold Tire Pressure: Front = 27 psi Rear = 31 psi

Recommended Tire Size 155-R-13 Load Range B

Tires on Vehicle Michelin 155-SR-13

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 10 gal

Test Volume 93 gal (93% of EPA Capacity)

Fuel System Capacity (data from Owner's Manual) 10 gal

Details of fuel system Engine operated fuel pump. Fuel tank is located forward of rear wheels and held in place by 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 X Yes ____ 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 153.4 /L 153.4 inches

Post-Test = R 147.3 /L 113.1 inches

Crush = R 6.1 /L 40.3

SECTION 3

VEHICLE AND OCCUPANT INFORMATION

The production-type 3-point retractor belt system was removed from each vehicle and replaced with a 3-point adjustable belt with no retractors. The belt for each occupant was instrumented to measure lap and torso belt loads.

The driver's seat of each vehicle was adjusted with respect to the brake pedal using a box beam measuring 20.5 inches long, 3 inches high and 2 inches wide. The box beam was placed on the driver's seat cushion and the seat was adjusted per instructions of the CTM as shown in Figure 8 for the American Motors Concord and Figure 9 for the Volkswagen Rabbit. The passenger's seat was then adjusted so that the seatback was in line with the driver's seatback.

Vehicle No. 1

The American Motors Concord was a 2-door sedan equipped with a 258 cubic inch, 6-cylinder engine with a 3-speed automatic transmission, power brakes and power steering. The fuel tank, which is located aft of the rear axle, was filled to ninety-three percent (20.4 gallons) with red Stoddard fluid. The total test weight with two dummies, instrumentation and cameras was 3930 pounds.

Vehicle No. 2

The Volkswagen Rabbit was a 2-door hatchback having a 97 cubic inch, 4-cylinder engine equipped with a 4-speed manual transmission and power brakes. The fuel

tank, which is located forward of the rear wheels, was filled with red Stoddard fluid to ninety-three percent (9.3 gallons) of its rated capacity. Total test weight with two dummies, instrumentation and cameras was 2580 pounds; this was 1350 pounds lighter than the American Motors Concord.

POST-TEST OBSERVATIONS

Vehicle No. 1 - 1980 American Motors Concord

Both the driver and the right front passenger complied with the FMVSS 208 Injury Criteria requirements for head, chest and femurs. No interior contact of the dummies was observed from the high-speed film. Occupant results are summarized in Table 14 and the data traces, along with the vehicle data traces, are presented in Appendix B.

The vehicle sustained slight damage to the dash panel (Figure A-11) and to the windshield (Figure A-12). Both front doors were operable and there was no fuel leakage after impact.

Maximum crush of the vehicle was 20.8 inches and maximum interior intrusion was 3.7 inches. Both were measured on the left side of the vehicle.

Vehicle No. 2 - 1980 Volkswagen Rabbit

Both occupants of the Volkswagen Rabbit complied with the injury criteria requirements of FMVSS 208. The driver's head struck the steering wheel rim and the right-front passenger's head contacted the dash panel as illustrated by the chalk mark in Figures A-20 and A-22. Occupant results are summarized in Table 15 and data traces, along with vehicle data traces, are presented in Appendix B.

The vehicle was severely damaged on both the exterior (Figure A-17 and Figure A-18) and the interior (Figure A-22). Maximum exterior crush was 40.3 inches on the left side and maximum firewall intrusion was 12.6 inches.

The hood of the vehicle buckled and penetrated into the windshield (Figure A-21) and both front doors separated at the roof line (Figure A-16).

There was no fuel leakage, and the driver's door and right-front passenger's door could be opened after impact.

Due to the impact configuration, film analysis to determine dynamic crush for each vehicle was not possible. Figure 2 presents each vehicle's displacement from a fixed ground reference with respect to time.

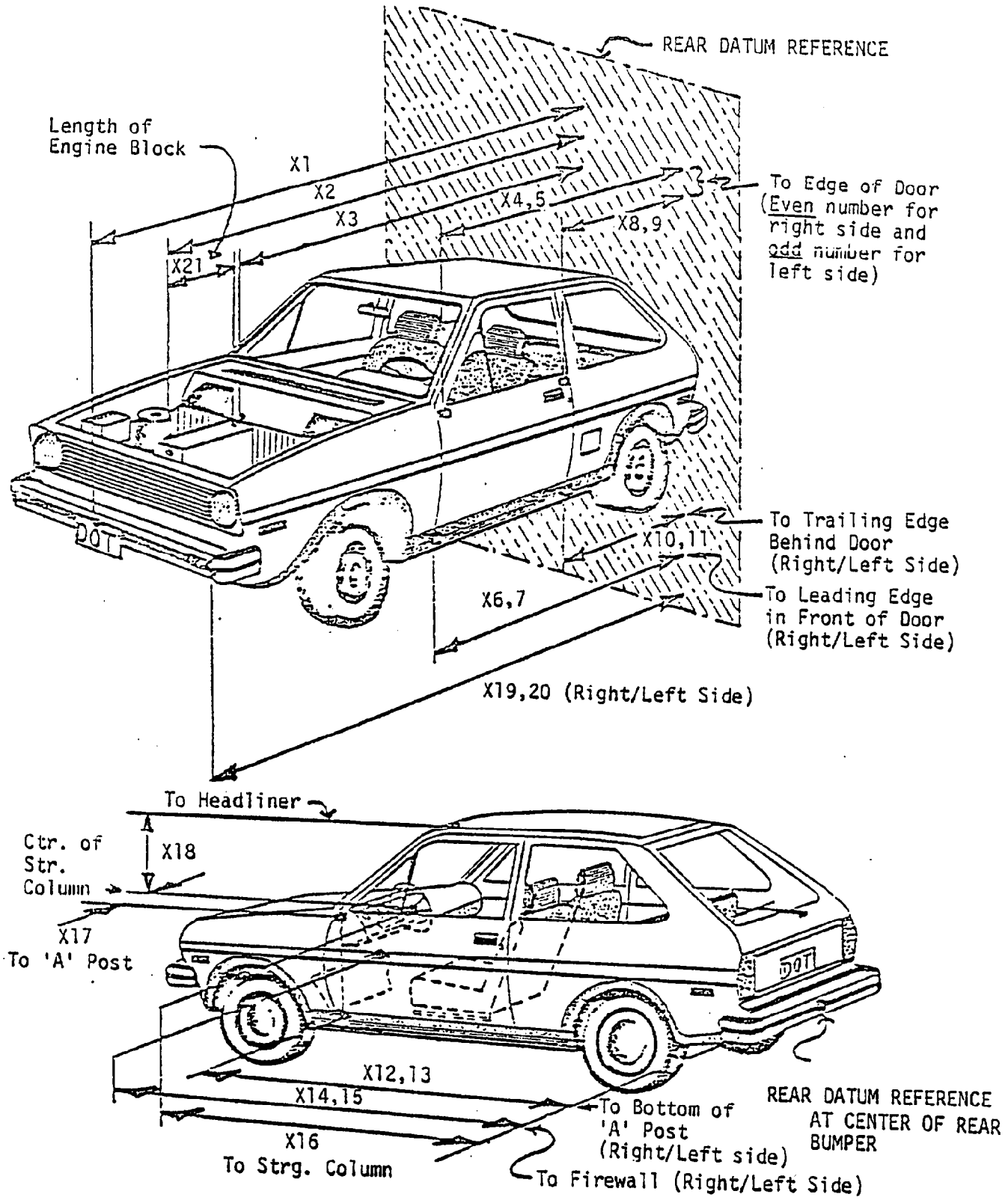


Figure 1 PRE-TEST AND POST-TEST MEASUREMENT POINTS

Table 6

VEHICLE WEIGHTS AND RIDE HEIGHTS

Test No. 4

Vehicle No. 1 - 1980 American Motors Concord

		BUMPER & RIDE HEIGHTS				L. BUMPER		R. BUMPER		CENTERLINE E. A.	
		L.F.	R.F.	R.R.	L.R.	Upper	Lower	Upper	Lower	Left	Right
CURB WEIGHT	Pounds	980	950	750	680						
RIDE HEIGHTS	Inches	27.5	27.5	27.5	27.75	20.9	14.8	21.0	15.0	17.5	17.6
CURB WEIGHT PLUS DUMMIES	Pounds	1090	1040	820	760						
RIDE HEIGHTS	Inches	27.6	27.5	26.7	27.3	20.3	14.2	20.3	14.3	16.8	16.9
FINAL WEIGHT INSTRUMENTATION AND DUMMIES	Pounds	1130	1010	890	900						
RIDE HEIGHTS	Inches	27.3	27.5	25.2	25.5	20.75	14.7	20.7	14.7	17.3	16.5

Vehicle No. 2 - 1980 Volkswagen Rabbit

CURB WEIGHT	Pounds	640	630	380	390						
RIDE HEIGHTS	Inches	25.4	25.3	25.3	25.2	20.5	15.6	20.2	15.3	18.0	17.9
CURB WEIGHT PLUS DUMMIES	Pounds	730	760	450	460						
RIDE HEIGHTS	Inches	24.5	24.5	24.25	24.25	19.8	15.0	19.6	14.7	17.2	17.0
FINAL WEIGHT INSTRUMENTATION AND DUMMIES	Pounds	760	720	550	550						
RIDE HEIGHTS	Inches	24.6	24.5	22.6	22.75	20.1	15.2	19.7	14.8	17.3	17.2

Table 7

NO.	VEHICLE MEASUREMENTS 1980 American Motors Concord TYPE OF MEASUREMENT	ALL DIMENSIONS IN INCHES PRE-TEST	 POST TEST	DIFF.
X1	Total Length of Vehicle at Centerline	187.1	176.2	10.9
X2	Rear Surface of Vehicle to Front of Engine	167.0	164.7	2.3
X3	Rear Surface of Vehicle to Firewall	138.5	137.7	.8
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	129.3	129.3	0
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	129.5	129.5	0
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	129.1	129.1	0
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	129.2	129.0	.2
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	79.2	79.2	0
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	79.3	79.3	0
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	79.0	79.0	0
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	79.1	79.1	0
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	125.6	125.6	0
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	125.6	125.6	0
X14	Rear Surface of Vehicle to Firewall - Right Side Under F.F.B. Control Box	138.0	138.0	0
X15	Rear Surface of Vehicle to Firewall - Left Side	137.5	133.8	3.7
X16	Rear Surface of Vehicle to Steering Column	109.0	107.7	1.3
X17	Center of Steering Column to "A" Post	15.7	15.7	.2
X18	Center of Steering Column to Headliner	16.2	17.3	-1.1
X19	Rear Surface of Vehicle to Right Side of Front Bumper	184.9	188.5	-3.6
X20	Rear Surface of Vehicle to Left Side of Front Bumper	184.9	164.1	20.8
X21	Length of Engine Block	28.2	28.2	0

Table 8

VEHICLE NO. 1 - 1980 American Motors Concord DATE January 30, 1981

REFERENCE DISTANCE FROM REAR 187.1

VERTICAL HEIGHTS

		Inches Left					C/L	Inches Right					
		36	30	24	18	12	6	0	6	12	18	24	30	36
Lower Bumper	Pre		←					16.2	→				→	
	Post		←					17.5	→				→	
Upper Bumper	Pre		←					20.5	→				→	
	Post		←					22.5	→				→	
1/2 Bumper To Hood	Pre		←					26.7	→				→	
	Post		←					28.0	→				→	
Hood	Pre		←					31.5	→				→	
	Post		←					33.5	→				→	

HORIZONTAL DISTANCE FROM REFERENCE

Lower Bumper	Pre		2.5	2.1	1.6	1.4	1.2	1.1	1.2	1.4	1.6	2.0	2.4
	Post		26.7	24.3	20.8	18.9	16.9	14.5	11.8	8.8	6.1	2.2	+ .5
			24.2	22.2	19.2	17.5	15.7	13.4	10.6	7.4	4.5	.2	+ .5
Upper Bumper	Pre		1.75	1.4	.9	.6	.3	.0	.3	.6	.9	1.4	1.75
	Post		23.2	21.2	17.2	15.9	13.6	11.4	9.1	6.7	4.1	1.3	+1.0
			21.45	19.8	16.3	15.3	13.3	11.4	8.8	6.1	3.2	+ .1	+1.0
1/2 Bumper To Hood	Pre		6.8	7.6	7.2	5.4	5.2	5.0	5.2	5.4	7.2	7.6	6.8
	Post		23.1	21.5	21.5	22.5	17.0	14.8	13.9	8.2	7.6	7.6	6.8
			16.3	13.9	14.3	17.1	11.8	9.8	8.7	2.8	.4	0	0
Hood	Pre		8.15	7.7	7.3	7.0	6.6	6.5	6.6	7.0	7.3	7.7	8.15
	Post		20.80	17.1	11.1	10.3	9.4	8.8	8.3	8.1	7.9	7.9	8.30
			12.65	9.4	3.8	3.3	2.8	2.3	1.7	1.1	.6	.2	.15

Table 9

NO.	VEHICLE MEASUREMENTS 1980 Volkswagen Rabbit TYPE OF MEASUREMENT	ALL DIMENSIONS IN INCHES PRE-TEST	POST TEST	DIFF.
X1	Total Length of Vehicle at Centerline	155.0	125.4	29.6
X2	Rear Surface of Vehicle to Front of Engine	131.0	111.4	19.6
X3	Rear Surface of Vehicle to Firewall	114.1	101.5	12.6
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	102.4	103.1	-.7
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	102.3	95.8	6.5
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	102.6	102.4	.2
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	102.5	98.4	4.1
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	58.1	58.1	0
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	57.9	58.3	-.4
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	58.3	58.3	0
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	58.2	57.5	.7
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	98.2	98.2	0
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	98.2	97.0	1.2
X14	Rear Surface of Vehicle to Firewall - Right Side	111.9	103.4	8.5
X15	Rear Surface of Vehicle to Firewall - Left Side	114.3	110.9	3.4
X16	Rear Surface of Vehicle to Steering Column	87.6	81.7	5.9
X17	Center of Steering Column to "A" Post	14.2	11.9	2.3
X18	Center of Steering Column to Headliner	17.3	19.6	-2.3
X19	Rear Surface of Vehicle to Right Side of Front Bumper	153.4	147.3	6.1
X20	Rear Surface of Vehicle to Left Side of Front Bumper	153.4	113.1	40.3
X21	Length of Engine Block	17.5	17.5	0

Table 10

VEHICLE NO. 2 - 1980 Volkswagen Rabbit DATE January 21, 1981

REFERENCE DISTANCE FROM REAR 155.0

VERTICAL HEIGHTS

		Inches Left						C/L						Inches Right	
		36	30	24	18	12	6	0	6	12	18	24	30	36	
Lower Bumper	Pre							16.5							
	Post			24.5			24.5	26.4	28.3	30.2	32.1	34.0			
Upper Bumper	Pre							19.5							
	Post			27.5			27.5	29.4	31.3	33.2	35.1	37.0			
1/2 Bumper To Hood	Pre							25.0							
	Post							32.0							
Hood	Pre							28.7							
	Post							34.0							

HORIZONTAL DISTANCE FROM REFERENCE

Lower Bumper	Pre			.8	.5	.2	.1	0	.1	.2	.5	.8			
	Post			40.9	37.6	35.1	32.0	28.1	23.5	18.9	14.1	9.7			
				40.1	37.1	34.9	31.9	28.1	23.4	18.7	13.6	8.9			
Upper Bumper	Pre			.8	.5	.2	.1	0	.1	.2	.5	.8			
	Post			43.2	40.0	37.2	34.5	30.4	25.3	20.5	16.0	11.3			
				42.4	39.5	37.0	34.4	30.4	25.2	20.3	15.5	10.5			
1/2 Bumper To Hood	Pre			7.3	7.3	5.6	5.4	5.2	5.4	5.6	7.3	7.2			
	Post			46.1	44.0	40.6	39.1	36.5	32.8	31.0	23.3	16.5			
				38.8	36.7	35.0	33.7	31.3	27.4	25.4	16.0	9.3			
Hood	Pre			6.4	5.8	5.5	5.4	5.3	5.4	5.5	5.8	6.4			
	Post			42.9	39.4	36.4	33.5	30.4	27.3	24.6	19.7	15.2			
				36.5	33.3	30.9	28.1	25.1	21.9	19.1	13.9	8.8			

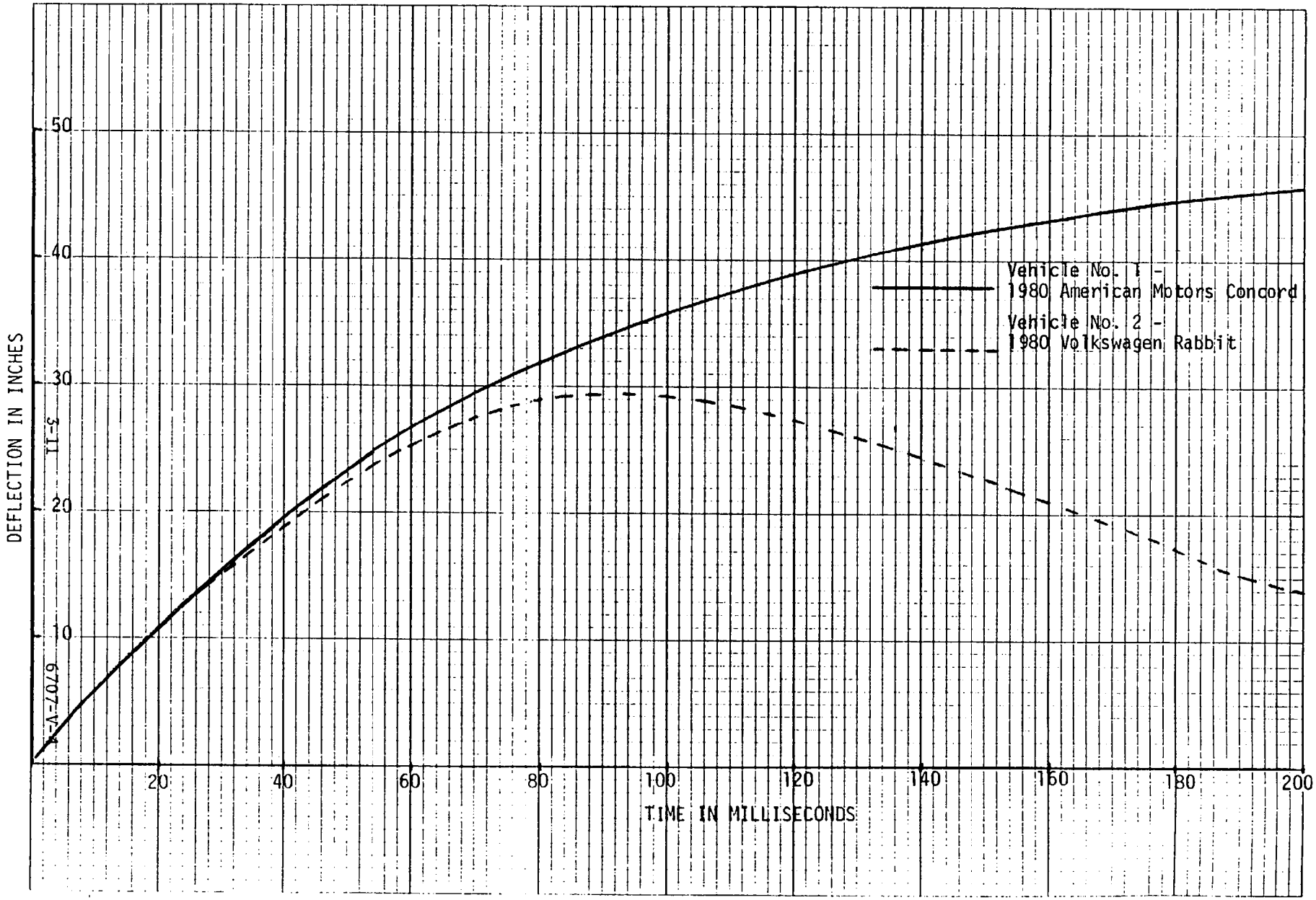
Table 11

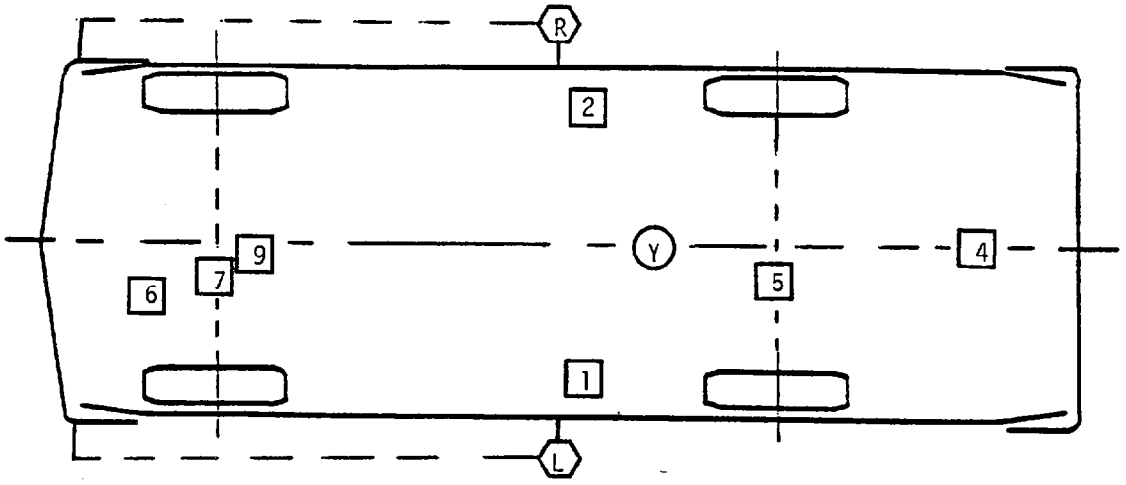
VEHICLE TRAJECTORIES

		CONCORD	RABBIT
IMPACT	X (ft.)	7.21	-6.5
	Y (ft.)	-1.6	.72
	HEADING (deg.)	180	0
FINAL REST	X (ft.)	-2.44	-13.8
	Y (ft.)	-2.76	6.62
	HEADING (deg.)	160	315

K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

FIGURE 2 REAR TARGET DISPLACEMENT WITH RESPECT TO FIXED GROUND REFERENCE





ACCELEROMETER NUMBER *	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Rocker Panel Near Left "B" Pillar	X		X
2	Rocker Panel Near Right "B" Pillar	X		X
4	Bumper Crossmember Support	X		X
5	Rear Axle	X		X
6	Top of Engine Block	X		X
7	Front Crossmember	X		X
9	Bottom of Engine	X		X
Y	Yaw Rate Gyro			
R	Right Bumper Deflection	X		
L	Left Bumper Deflection	X		

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

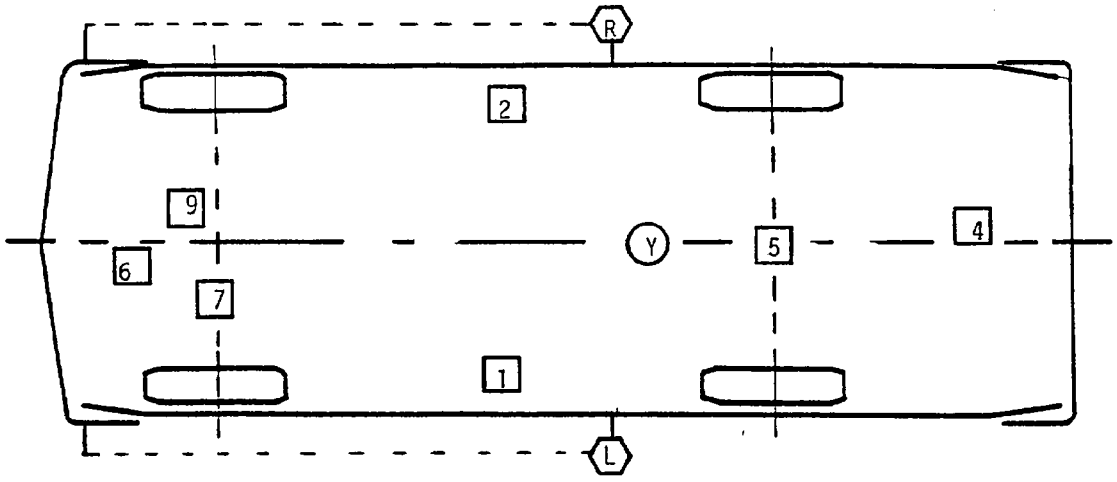
FIGURE 3 VEHICLE INSTRUMENTATION
1980 American Motors Concord

VEHICLE No. 1 - 1980 American Motors Concord

TEST 4

TRANSDUCER NUMBER	INCHES FROM REAR	INCHES LEFT OF C/L	ON C/L	INCHES RIGHT OF C/L
1	70.4	22.2		
2	70.4			22.2
3	NOT USED			
4	22.5		X	
5	42.6	10.1		
6	152.2	8.0		
7	151.5	5.2		
8	NOT USED			
9	146.4	3.2		
10				

FIGURE 4 VEHICLE TRANSDUCER LOCATION MEASUREMENTS



ACCELEROMETER NUMBER *	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Rocker Panel Near "B" Pillar	X		X
2	Rocker Panel Near Right "B" Pillar	X		X
4	Bumper Crossmember Support	X		X
5	Rear Axle	X		X
6	Top of Engine Axle	X		X
7	Front Crossmember	X		X
9	Bottom of Engine	X		X
Y	Yaw Rate Gyro			
R	Right Bumper Deflection	X		
L	Left Bumper Deflection	X		

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

FIGURE 5 VEHICLE ACCELEROMETER LOCATIONS
1980 Volkswagen Rabbit

VEHICLE No. 2 - 1980 Volkswagen Rabbit

TEST 4

TRANSDUCER NUMBER	INCHES FROM REAR	INCHES LEFT OF C/L	ON C/L	INCHES RIGHT OF C/L
1	58.6	21.0		
2	58.6			21.0
3	NOT USED			
4	8.5			3.8
5	41.4		X	
6	127.0	2.5		
7	124.0	11.4		
8	NOT USED			
9	126.2			7.5
10	45.1		X	

FIGURE 6 VEHICLE TRANSDUCER LOCATION MEASUREMENTS

NOTE: Camera Information Shown on Tables 12 and 13.

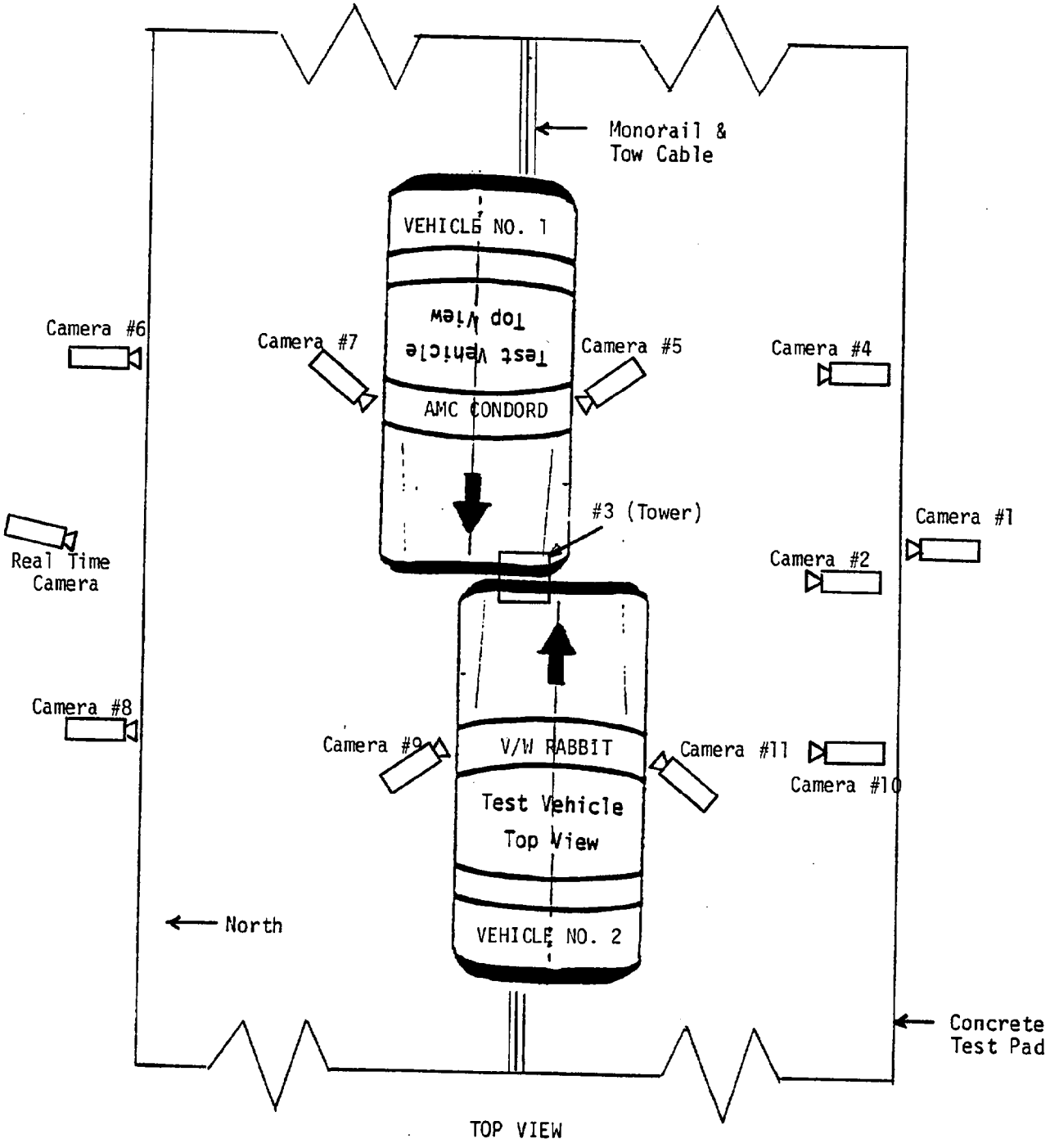


FIGURE 7 CAMERA POSITION FOR FRONTAL IMPACTS

Table 12

HIGH SPEED CAMERA LOCATIONS

Test No. 614-4-513

Vehicle 1 - 1980 American Motors Concord
Vehicle 2 - 1980 Volkswagen Rabbit

CAMERA NUMBER	VIEW	CAMERA POSITIONS (IN)* X	Y	Z	CAMERA ANGLE** (DEG)	FILM PLANE TO HEAD TARGET (IN) X
1	Impact Event	585	80	41	-1	--
2	Impact Event (Close-up)	481	85	52	-3	--
3	Tower	0	75	388	-80	--
4	Vehicle #1 Left Side	502	120	41	0	491
5	Vehicle #1 Driver	--	ON-BOARD --			
6	Vehicle #1 Right Side	385	95	42	-2	360
7	Vehicle #1 Right Front Pass	--	ON-BOARD --			
8	Vehicle #2 Left Side	310	58	43	0	300
9	Vehicle #2 Driver	--	ON-BOARD --			
10	Vehicle #2 Right Side	305	60	42	-2	275
11	Vehicle #2 Right Front Passenger	--	ON-BOARD --			

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

**Referenced to Horizontal Plane

Table 13

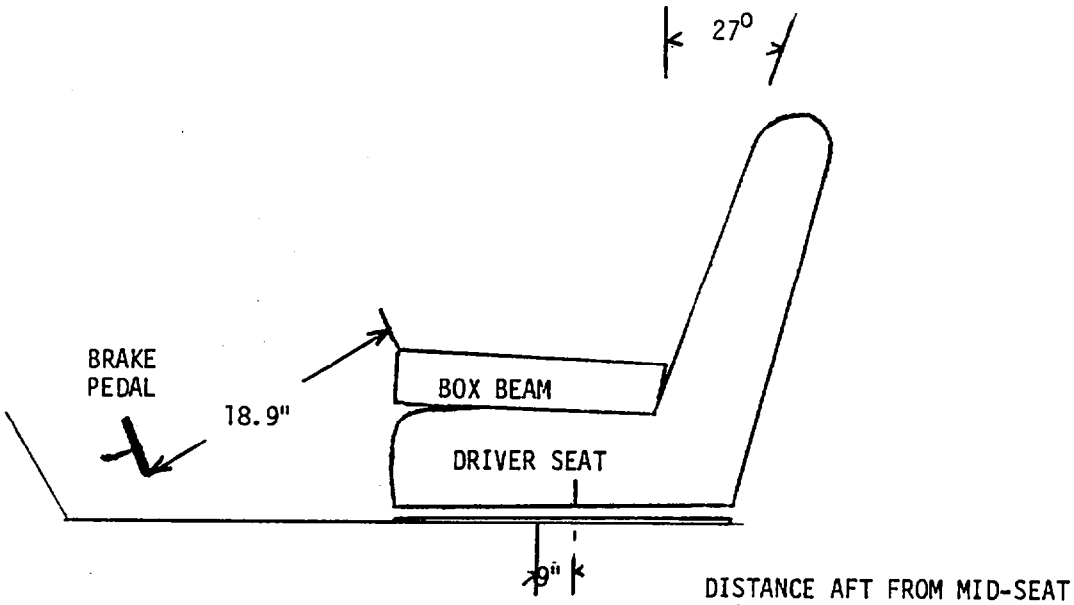
HIGH SPEED CAMERA INFORMATION (TEST 614-4-513)

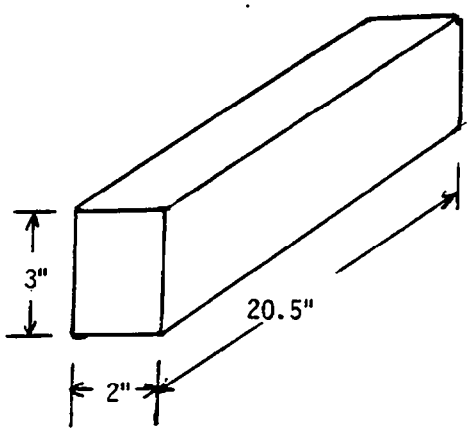
CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)
1	Impact Event	Photosonic	13 mm	900
2	Impact (Close-up)	Photosonic	13 mm	850
3	Tower	Photosonic	13 mm	900
4	Veh. No. 1 Left Side	Photosonic	35 mm	900
5	Veh. No. 1 Driver	Stalex	8 mm	1000
6	Veh. No. 1 Right Side	Photosonic	35 mm	800
7	Veh. No. 1 Rt. Ft. Passenger	Stalex	8 mm	1100
8	Veh. No. 2 Left Side	Photosonic	35 mm	900
9	Veh. No. 2 Driver	Stalex	8 mm	1400
10	Veh. No. 2 Right Side	Photosonic	35 mm	900
11	Veh. No. 2 Rt. Ft. Passenger	Stalex	8 mm	1150

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.

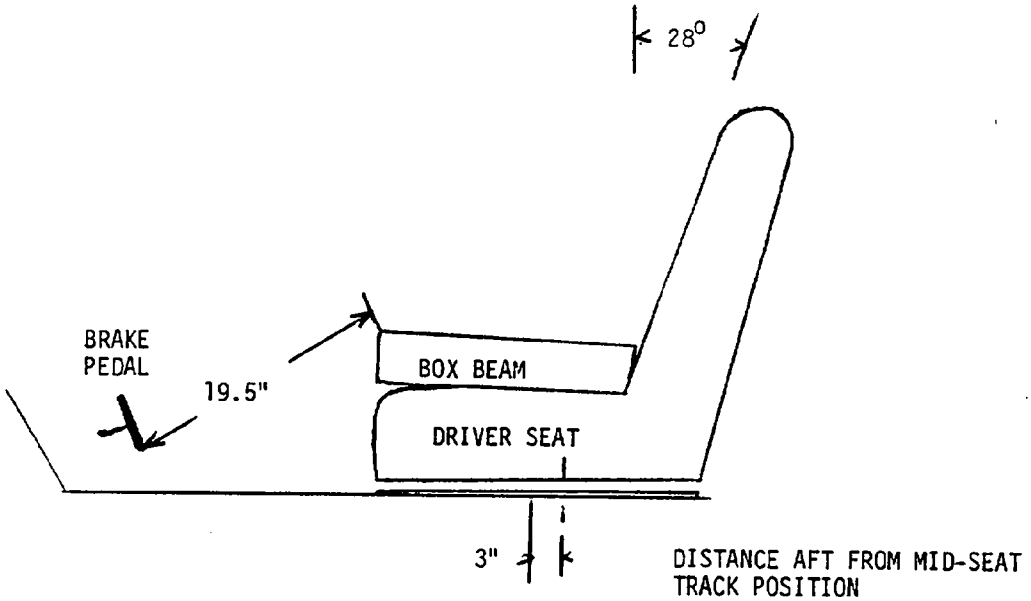
TIMING MARKS ARE 10 MILLISECONDS APART (100 Hz).

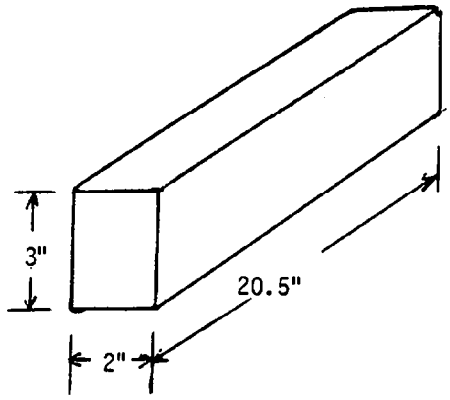




BOX BEAM DIMENSIONS

FIGURE 8 DRIVER SEAT POSITION





BOX BEAM DIMENSIONS

FIGURE 9 DRIVER SEAT POSITION

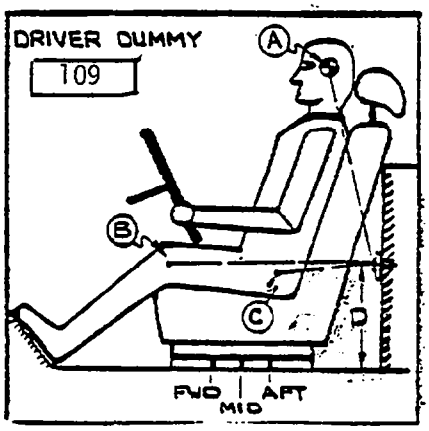
FIGURE 10
PART 572 DUMMY IN-VEHICLE POSITION

Test No. 614-4-513 Vehicle No. 1 - 1980 American Motors Concord

SEAT TYPE:
___ Bench
X Bucket
___ Split Bench

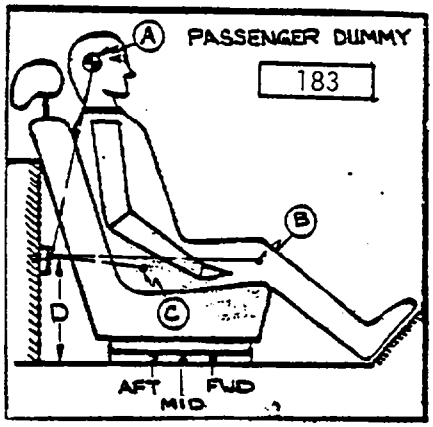
ADJUSTER TYPE:
X Manual
___ Power

BUCKET SEAT BACK TYPE:
___ Fixed
X Adjustable Reclining



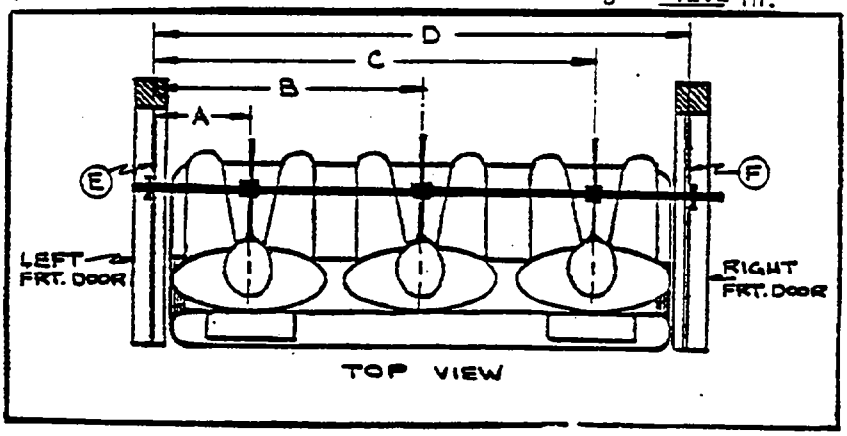
MEASUREMENT LOCATION

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



A = 24 in. 16 Degrees
B = 30 in. 90 Degrees
C = 15 in. 108 Degrees
D = 12.2 in.

A = 23.7 in. 13 Degrees
B = 30.2 in. 92 Degrees
C = 15 in. 106 Degrees
D = 12.2 in.



DUMMY ID

109	--	183

A	=	Left Door to Driver Centerline	14.2 in.
B	=	Left Door to Center Passenger Centerline	-- in.
C	=	Left Door to Right Passenger Centerline	40 in.
D	=	Left Door to Right Door	53.5 in.
E, F	=	Window Glass Height (Right and Left Must be Equal)	9.5 in.

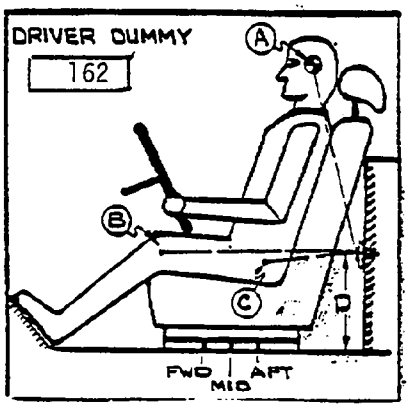
FIGURE 11
PART 572 DUMMY IN-VEHICLE POSITION

Test No. 614-4-513 Vehicle No. 2 - 1980 Volkswagen Rabbit

SEAT TYPE:
____ Bench
_X_ Bucket
____ Split Bench

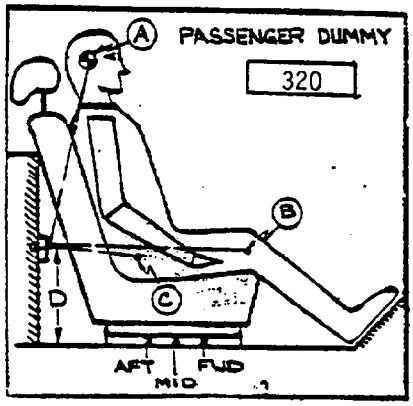
ADJUSTER TYPE:
_X_ Manual
____ Power

BUCKET SEAT BACK TYPE:
____ Fixed
_X_ Adjustable Reclining



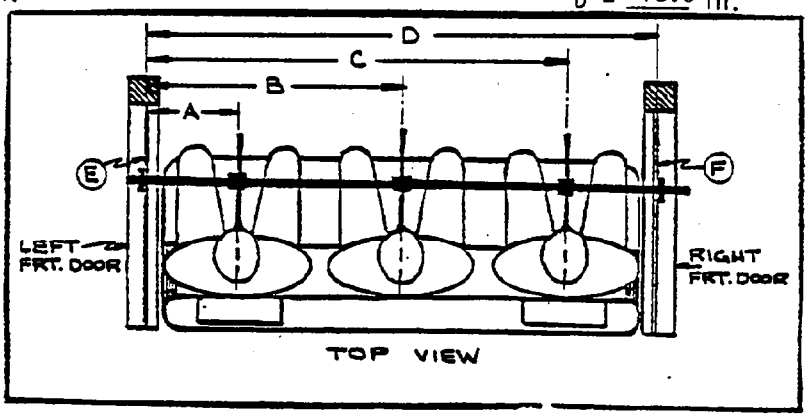
MEASUREMENT LOCATION

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



A = 17.7 in. 14 Degrees
B = 28.7 in. 102 Degrees
C = 16.0 in. 128 Degrees
D = 18.0 in.

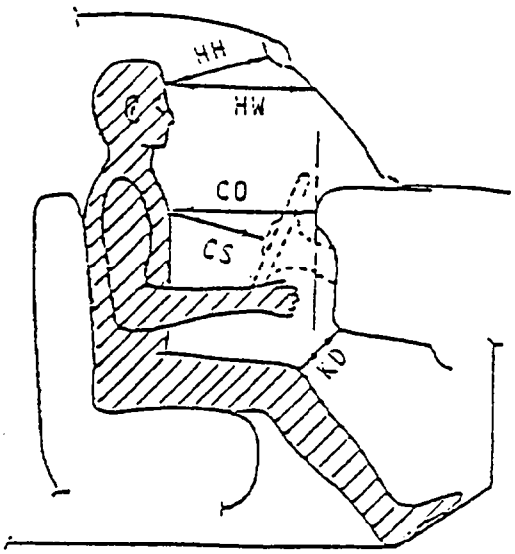
A = 20.0 in. 15 Degrees
B = 30.0 in. 105 Degrees
C = 15.0 in. 127 Degrees
D = 18.0 in.



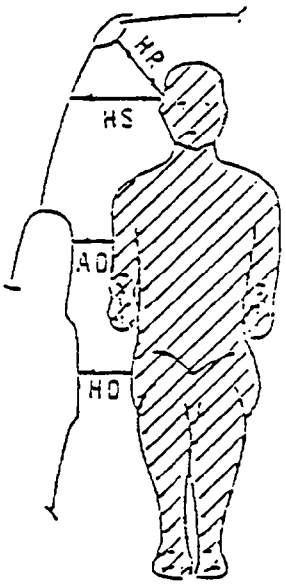
DUMMY ID

	162	--	320	
A =	Left Door to Driver Centerline			11.7 in.
B =	Left Door to Center Passenger Centerline			-- in.
C =	Left Door to Right Passenger Centerline			37 in.
D =	Left Door to Right Door			48.7 in.
E, F =	Window Glass Height (Right and Left Must be Equal)			10 in.

	DRIVER	PASS
HH	16.0	15.8
HW	21.5	20.0
CD	26.0	25.2
CS	18.2	--
KDL	12.0	11.0
KDR	12.5	11.0



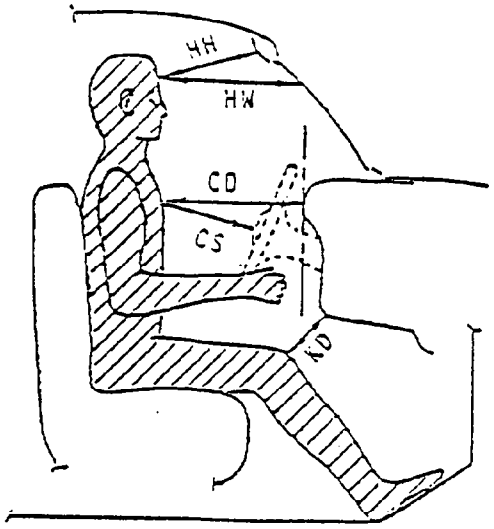
HR	6.20	5.00
HS	7.70	7.25
AD	4.00	4.50
HD	6.20	7.60



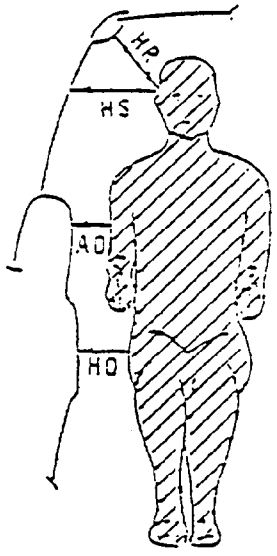
ALL DIMENSIONS ARE IN INCHES

FIGURE 12 OCCUPANT CLEARANCE DIMENSIONS
1980 American Motors Concord

	DRIVER	PASS
HH	22.0	21.0
HW	26.2	26.0
CD	26.0	27.5
CS	18.5	--
KDL	10.7	11.7
KDR	11.5	11.7



HR	6.0	6.3
HS	6.6	7.0
AD	3.5	4.0
HD	5.4	5.9



ALL DIMENSIONS ARE IN INCHES.

FIGURE 13 OCCUPANT CLEARANCE DIMENSIONS
1980 Volkswagen Rabbit

Table 14

OCCUPANT INJURY CRITERIA VALUES

Vehicle No. 1 - 1980 American Motors Concord

	MAXIMUM ACCELERATION ("G")*							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R
(1)	-28	4	19	28.6	-24	5	-11	23.3
(2)	-28	11	15	30.0	-22	5	-12	22.0
(3)								
(4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
(1)	400	300
(2)	240	180
(3)		
(4)		

	MAXIMUM FORCE-SEAT BELTS LOADS (LBS)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
(1)	975	1000	350
(2)	1088	1137	1000
(3)			
(4)			

	HEAD INJURY CRITERIA**				SEVERITY INDEX
	HIC	t_1 (SEC)	t_2 (SEC)	AVE. ACC. (g) t_1 TO t_2	HEAD
(1)	161.0	.05430	.12240	22.4	197.6
(2)	177.1	.04980	.11670	23.4	221.1
(3)					
(4)					

*DEFINED AS EXCEEDING 0.003 SEC. DURATION
**AS DEFINED IN FMVSS NO. 208

Table 15

OCCUPANT INJURY CRITERIA VALUES

Vehicle No. 2 - 1980 Volkswagen Rabbit

	MAXIMUM ACCELERATION ("G")*							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R
(1)	-78	-27	36	81	-44	-16	-20	44
(2)	-40	32	30	56	-24	20	14	28
(3)								
(4)								

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
(1)	1080	1800
(2)	40	760
(3)		
(4)		

	MAXIMUM FORCE-SEAT BELTS LOADS (LBS)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
(1)	1840	1440	1275
(2)	1375	1300	1965
(3)			
(4)			

	HEAD INJURY CRITERIA**				SEVERITY INDEX	
	HIC	t_1 (SEC)	t_2 (SEC)	AVE. ACC. (g) t_1 TO t_2	HEAD	CHEST
(1)	630.9	.09480	.11370	64.5	871.1	
(2)	363.9	.05640	.13770	28.9	505.3	
(3)						
(4)						

*DEFINED AS EXCEEDING 0.003 SEC. DURATION

**AS DEFINED IN FMVSS NO. 208

1980 AMERICAN MOTORS CONCORD

TEST PROCEDURE CHECK LIST

ITEM NO.	DESCRIPTION	CHECK BY	DATE	COMMENTS
1.	Inflate tires to recommended mfg's cold pressure for vehicle capacity weight (including spare). Check tires for recommended size.	JC	1/10	
2.	Fill out summary sheet. Apply identification number to vehicle.	JC	1-19	
3.	Inspect vehicle and record any damage or missing parts.	JC	1-19	
4.	Add fluids to specified levels or fill to capacity.	JC	1-19	
5.	Weigh vehicle and record weight at each wheel on summary sheet.	JC	1-19	
6.	Apply reference height marks at each wheel and record on summary sheet.	JC	1-19	
7.	Pump fuel from tank and run engine until fuel lines are empty.	JC	1-20	
8.	Drain following fluids from vehicle and check N/A if not applicable: ✓ a) coolant ✓ b) engine oil ✓ c) transmission fluid ✓ d) windshield washer fluid ___ e) battery acid (drain & flush) ✓ f) power steering fluid	JC	1-21	
9.	Fill fuel tank to recommended EPA capacity with red dyed Stoddard solvent. Record volume of Stoddard on Summary Sheet. Crank engine to fill carburetor.	JC	1-21	
10.	Siphon 7% of solvent from fuel tank and record amount removed on Summary Sheet.	JC	1-21	

ITEM NO.	DESCRIPTION	CHECKED BY	DATE	COMMENTS
11.	Perform pre-test vehicle dimensions as specified in Figure 5 of Test Plan and recorded on Table 7.	W. S	1-20	
12.	Mark forward-most and rear-most positions of seat. Measure and mark seat and sill mid-positions.	JR	1-19	
13.	Install mounting plates for accelerometers as specified in Figure 1 of Test Plan.	MR	1-29	
14.	Install mounting plate and instrumentation in trunk area.	MR	1-29	
15.	Install accelerometers.	MR	1-29	
16.	Place certified dummies in both front seats with seats in mid-position.	MR	1-29	
17.	Install seat belt load cells on lap and torso portions on both front seat belts and make provisions to remove weight of the load cells.	MR	1-29	
18.	Install on-board lighting to illuminate field of view of ground cameras.	MR	1-29	
19.	Route and secure all electrical cables.	MR	1-29	
20.	Intall speed trap breaker bar on vehicle.	MR	1-29	
21.	Install guide rollers and abort straps to vehicle.	MR	1-29	
22.	Weigh vehicle and add ballast if required. Place ballast so that weight distribution will be as close as possible to delivered distribution. Record on Summary Sheet.	MR	1-29	
23.	Measure and record ride height.	W. S	1-29	
24.	Apply targets and tape striping as specified in TP-212-02 - (Laboratory Procedure for Vehicle Assessment.)	MR	1-29	

AT IMPACT SITE

ITEM NO.	DESCRIPTION	CHECKED BY	DATE	COMMENTS
25.	Position vehicle front to bumper at impact point.	W.S	1-30	
26.	Photograph the following:			
	a) Vehicle overall & closeup left and right views.	WL		
	b) Windshields overall and close-up left and right quarter views	WL		
	c) Real time documentary	WL	1-30	
27.	Align and focus stationary high speed cameras.	WL		
28.	Measure and document camera positions on Table 6 of Test Plan.	WL	1/30	
29.	Test operation of all high speed cameras.	WL	1/30	
30.	Set up speed traps and measure breaker bar when vehicles are at impact point.	[illegible]	1-30	
31.	Check vehicle attitude and ride height and document on summary sheet.	WL	1/30	
32.	Ready fuel leakage sample bottles, drip pan and stop switch.	WL	1/30	
33.	Check speed traps operation.	W.S	1-30	
34.	Move test vehicles to starting point.	W.S	1-30	
	STARTING POINT PROCEDURE			
35.	Adjust dummy positions as per dummy positioning check list and make required measurements.	WL	1-30	
36.	Connect umbilical cables.			
37.	Make operation check of all instrumentation and calibrate system.	DWH	1-30	
38.	Take all pre-test photographs.	WL	1/30	

ITEM NO.	DESCRIPTION	CHECKED BY	DATE	COMMENTS
39.	Check operation of camera interlock and flash bulbs correlation.	MZ	1/30	—
40.	Latch trunk and leave key in lock.	MZ	1-30	
41.	Verify that fuel tank cap is tight.	MZ	1-30	
42.	Place transmission in neutral. Release parking brake, turn ignition key on.	MZ	1-30	
43.	Verify that hood latch is latched.	MZ	1-30	
44.	Close all windows & vents (except front windows).	MZ	1-30	
45.	Close doors, leave unlocked.	MZ	1-30	
46.	Check operation of all systems.	W.S	1-30	
47.	Record temperature of interior of vehicle.	MZ	1/30	
48.	Complete countdown procedures and proceed with test.	W.S	1-30	
	POST-TEST PROCEDURES			
49.	Start-stop watch at moment of impact - collect samples of leaking fuel if leakage occurs. Take movies of all leakage.	MZ	1/30	
50.	If loss of windshield retention occurs, mark opening. Measure windshield retention record.	MZ	1/30	
51.	Make operational check of all instrumentation.	DLN	1-30	
52.	Photograph with real time camera:	MZ	1/30	
	a) Post-test overall scene.	MZ	1/30	
	b) Close-up of pertinent damage to windshield or fuel system.	MZ	1/30	
	c) Dummies failed restraints or failed seat anchorages.	MZ	1/30	
	d) Any other type of failure.	MZ	1/30	
	e) Opening of vehicle doors .	MZ	1/30	

ITEM NO.	DESCRIPTION	CHECKED BY	DATE	COMMENTS
53.	Take post-test still photographs. Record visual observations of vehicle condition, dummy positions, any anomalies, etc.	[illegible]	1/30	
54.	Separate vehicles and photograph front of each vehicle.	[illegible]	1/30	
55.	Remove umbilicals.	[illegible]	1-30	
56.	Remove vehicles from test track.	[illegible]	1-30	

1980 VOLKSWAGEN RABBIT

TEST PROCEDURE CHECK LIST

ITEM NO.	DESCRIPTION	CHECK BY	DATE	COMMENTS
1.	Inflate tires to recommended mfg's cold pressure for vehicle capacity weight (including spare). Check tires for recommended size.	[illegible]	1-19	
2.	Fill out summary sheet. Apply identification number to vehicle.	[illegible]	1-19	
3.	Inspect vehicle and record any damage or missing parts.	[illegible]	1-19	
4.	Add fluids to specified levels or fill to capacity.	[illegible]	1-19	
5.	Weigh vehicle and record weight at each wheel on summary sheet.	[illegible]	1-19	
6.	Apply reference height marks at each wheel and record on summary sheet.	[illegible]	1-19	
7.	Pump fuel from tank and run engine until fuel lines are empty.	[illegible]	1-19	
8.	Drain following fluids from vehicle and check N/A if not applicable: V a) coolant V b) engine oil V c) transmission fluid V d) windshield washer fluid V e) battery acid (drain & flush) N/A f) power steering fluid	[illegible]	1-22	
9.	Fill fuel tank to recommended EPA capacity with red dyed Stoddard solvent. Record volume of Stoddard on Summary Sheet. Crank engine to fill carburetor.	[illegible]	1-22	
10.	Siphon 7% of solvent from fuel tank and record amount removed on Summary Sheet.	[illegible]	1-22	

ITEM NO.	DESCRIPTION	CHECKED BY	DATE	COMMENTS
11.	Perform pre-test vehicle dimensions as specified in Figure 5 of Test Plan and recorded on Table 7.	W.S	1-21	
12.	Mark forward-most and rear-most positions of seat. Measure and mark seat and sill mid-positions.	[signature]	1-19	
13.	Install mounting plates for accelerometers as specified in Figure 1 of Test Plan.	[signature]	1-26	
14.	Install mounting plate and instrumentation in trunk area.	[signature]	1-29	
15.	Install accelerometers.	[signature]	1-29	
16.	Place certified dummies in both front seats with seats in mid-position.	[signature]	1-29	
17.	Install seat belt load cells on lap and torso portions on both front seat belts and make provisions to remove weight of the load cells.	DWN	1-29	
18.	Install on-board lighting to illuminate field of view of ground cameras.	[signature]	1-29	
19.	Route and secure all electrical cables.	DWN	1-29	
20.	Intall speed trap breaker bar on vehicle.	[signature]	1-30	
21.	Install guide rollers and abort straps to vehicle.	[signature]	1-30	
22.	Weigh vehicle and add ballast if required. Place ballast so that weight distribution will be as close as possible to delivered distribution. Record on Summary Sheet.	[signature]	1-30	
23.	Measure and record ride height.	W.S	1-29	
24.	Apply targets and tape striping as specified in TP-212-02 - (Laboratory Procedure for Vehicle Assessment.)	[signature]	1-29	

AT IMPACT SITE

ITEM NO.	DESCRIPTION	CHECKED BY	DATE	COMMENTS
25.	Position vehicle front to bumper at impact point.	W.S	1-30	
26.	Photograph the following:			
	a) Vehicle overall & closeup left and right views.	WL		
	b) Windshields overall and close-up left and right quarter views	WL	1/30	
	c) Real time documentary	WL		
27.	Align and focus stationary high speed cameras.	WL		
28.	Measure and document camera positions on Table 6 of Test Plan.	WL	1/30	
29.	Test operation of all high speed cameras.	WL	1/30	
30.	Set up speed traps and measure breaker bar when vehicles are at impact point.	[illegible]	1-30	
31.	Check vehicle attitude and ride height and document on summary sheet.	W.S.	1-29	
32.	Ready fuel leakage sample bottles, drip pan and stop switch.	WL	1/30	
33.	Check speed traps operation.	W.S	1-30	
34.	Move test vehicles to starting point.	W.S	1-30	
	STARTING POINT PROCEDURE			
35.	Adjust dummy positions as per dummy positioning check list and make required measurements.	WL	1/30	
36.	Connect umbilical cables.	DWH	1-30	
37.	Make operation check of all instrumentation and calibrate system.	WL	1/30	
38.	Take all pre-test photographs.	WL	1/30	

ITEM NO.	DESCRIPTION	CHECKED BY	DATE	COMMENTS
39.	Check operation of camera interlock and flash bulbs correlation.	MZ	1/30	—
40.	Latch trunk and leave key in lock.	MZ	1/30	
41.	Verify that fuel tank cap is tight.	MZ	1/30	
42.	Place transmission in neutral. Release parking brake, turn ignition key on.	MZ	1/30	
43.	Verify that hood latch is latched.	MZ	1/30	
44.	Close all windows & vents (except front windows).	MZ	1/30	
45.	Close doors, leave unlocked.	MZ	1/30	
46.	Check operation of all systems.	W.S	1-30	
47.	Record temperature of interior of vehicle.	MZ	1/30	
48.	Complete countdown procedures and proceed with test.	W.S	1-30	
	POST-TEST PROCEDURES			
49.	Start-stop watch at moment of impact - collect samples of leaking fuel if leakage occurs. Take movies of all leakage.	MZ	1/30	
50.	If loss of windshield retention occurs, mark opening. Measure windshield retention record.	MZ	1/30	
51.	Make operational check of all instrumentation.	DJH	1-30	
52.	Photograph with real time camera:			
	a) Post-test overall scene.	MZ	1/30	
	b) Close-up of pertinent damage to windshield or fuel system.	MZ	1/30	
	c) Dummies failed restraints or failed seat anchorages.	MZ	1/30	
	d) Any other type of failure.	MZ	1/30	
	e) Opening of vehicle doors .	MZ	1/30	

ITEM NO.	DESCRIPTION	CHECKED BY	DATE	COMMENTS
53.	Take post-test still photographs. Record visual observations of vehicle condition, dummy positions, any anomalies, etc.	[illegible]	1/30	
54.	Separate vehicles and photograph front of each vehicle.	[illegible]	1/30	
55.	Remove umbilicals.	[illegible]	1-30	
56.	Remove vehicles from test track.	[illegible]	1-30	

APPENDIX A

STILL PHOTOGRAPHS

STILL PHOTOGRAPHS

VEHICLE NO. 1 - 1980 AMERICAN MOTORS CONCORD

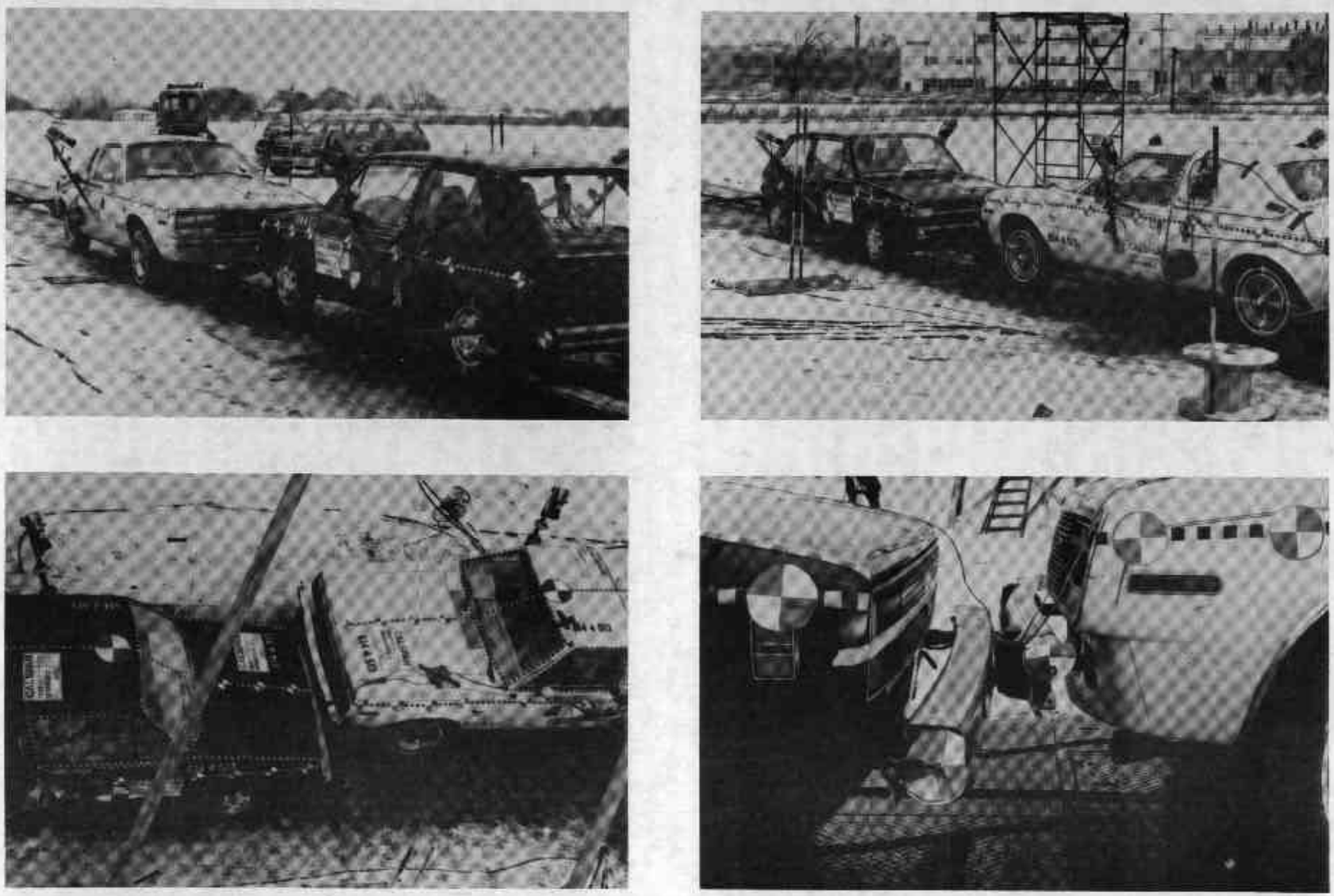


FIGURE A-1 VEHICLE NO. 1 & NO. 2 - PRE-TEST CONFIGURATION VIEWS

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

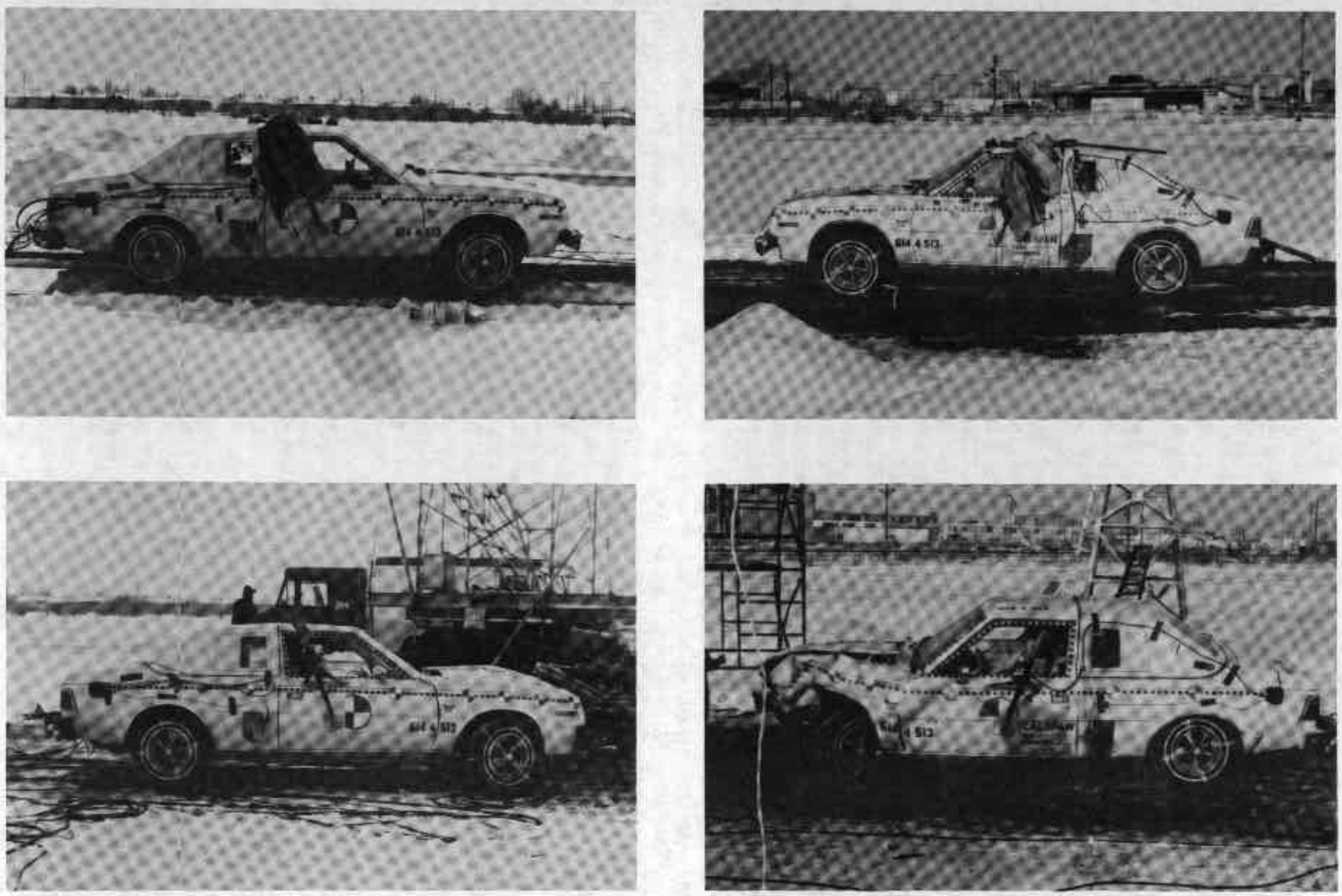


FIGURE A-3 VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT SIDES

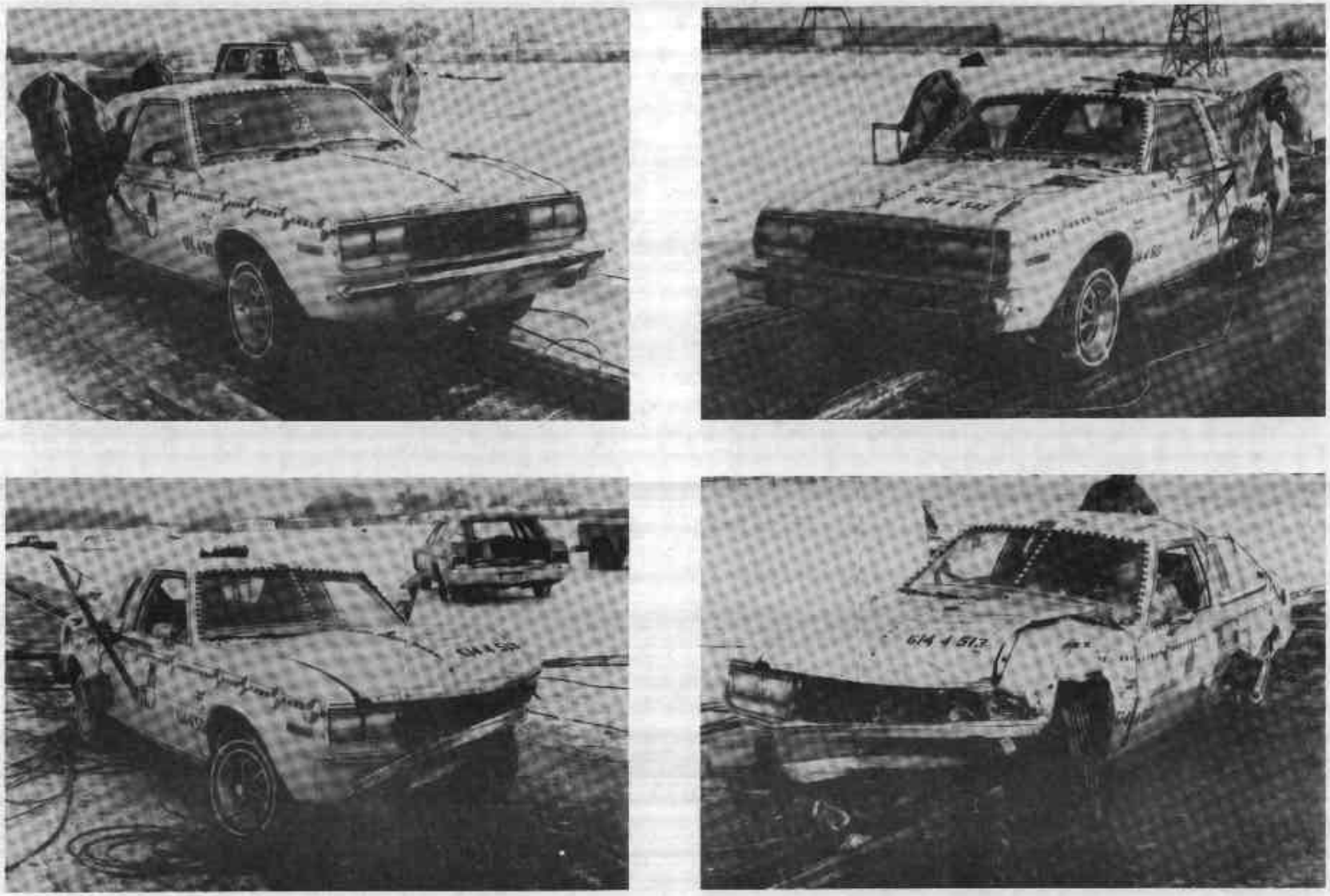


FIGURE A-4 VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT FRONT THREE-QUARTERS

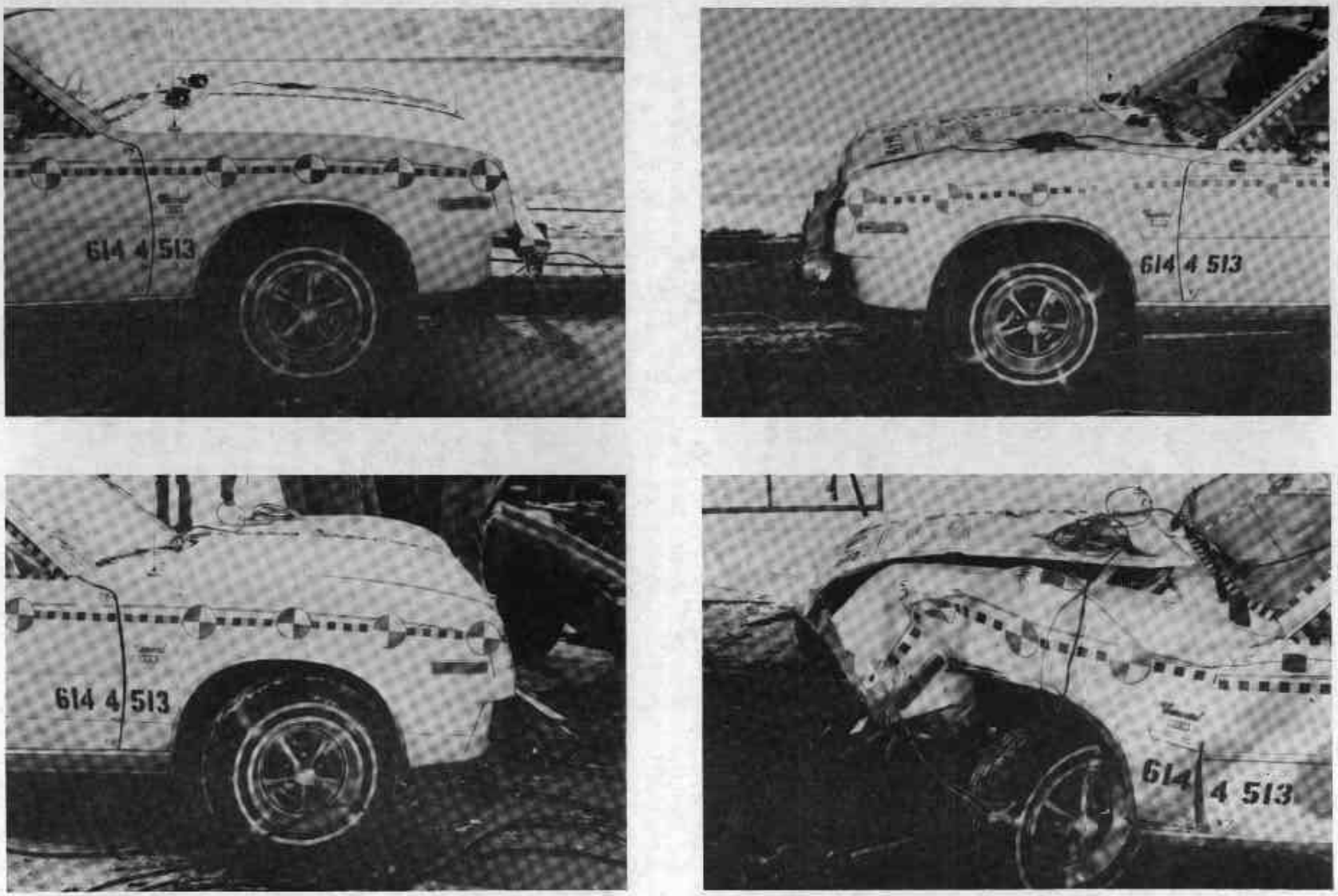


FIGURE A-5 VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT FRONT QUARTERS

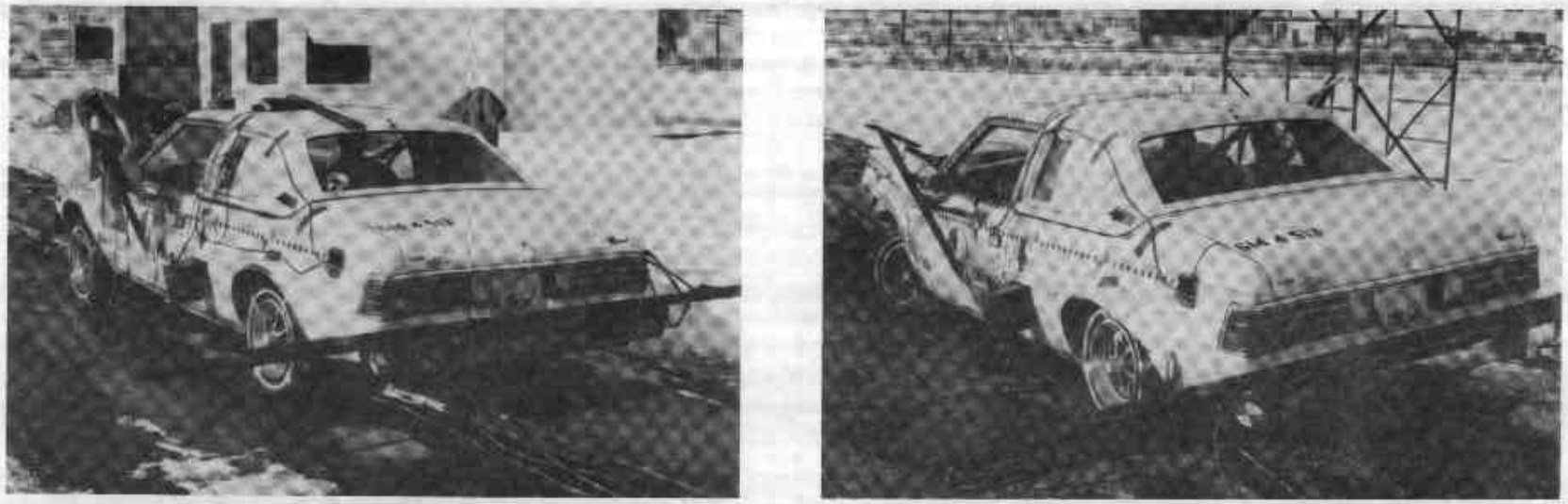


FIGURE A-6 VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF LEFT REAR

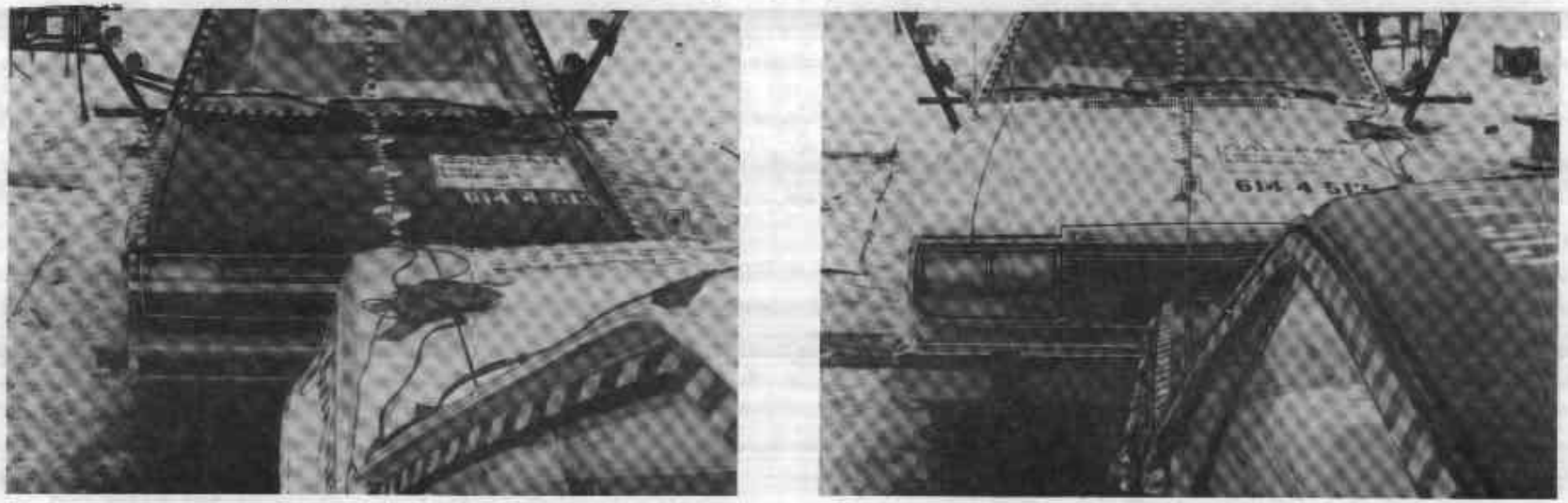


FIGURE A-7 VEHICLE NO. 1 & NO. 2 - PRE-TEST OFFSET VIEWS

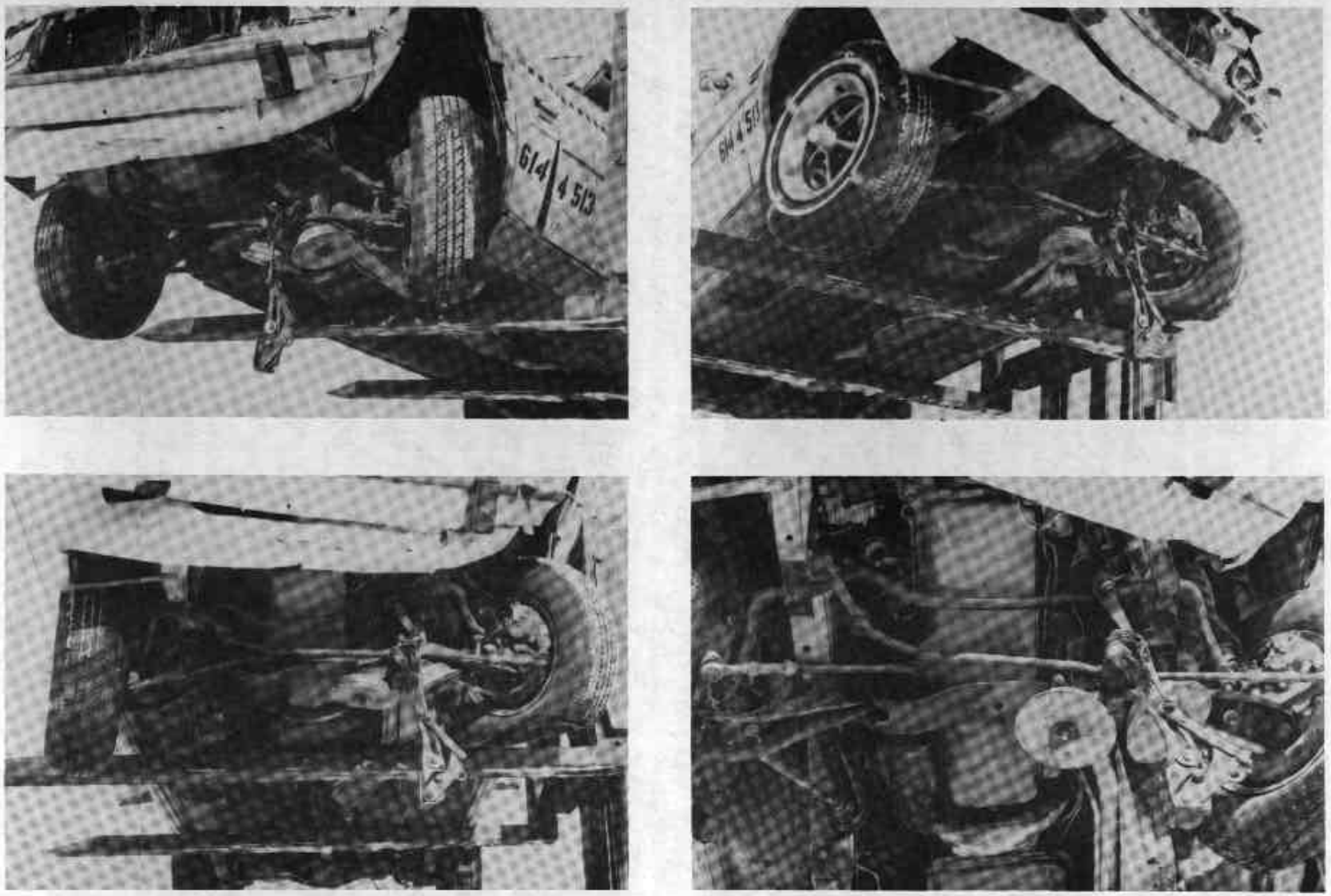


FIGURE A-8 VEHICLE NO. 1 - POST-TEST VIEWS OF FRONT UNDERBODY

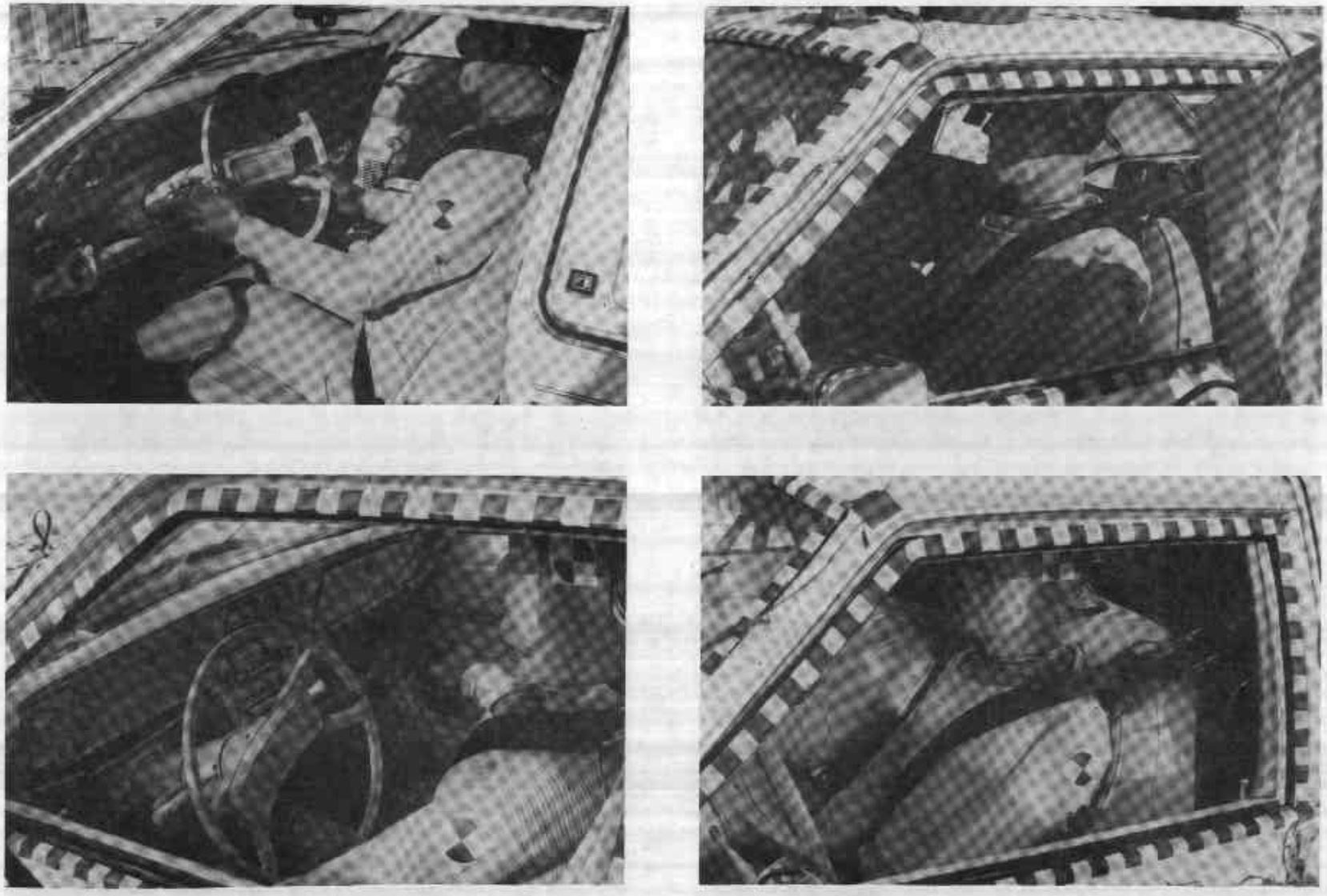


FIGURE A-9 VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF DRIVER POSITIONS

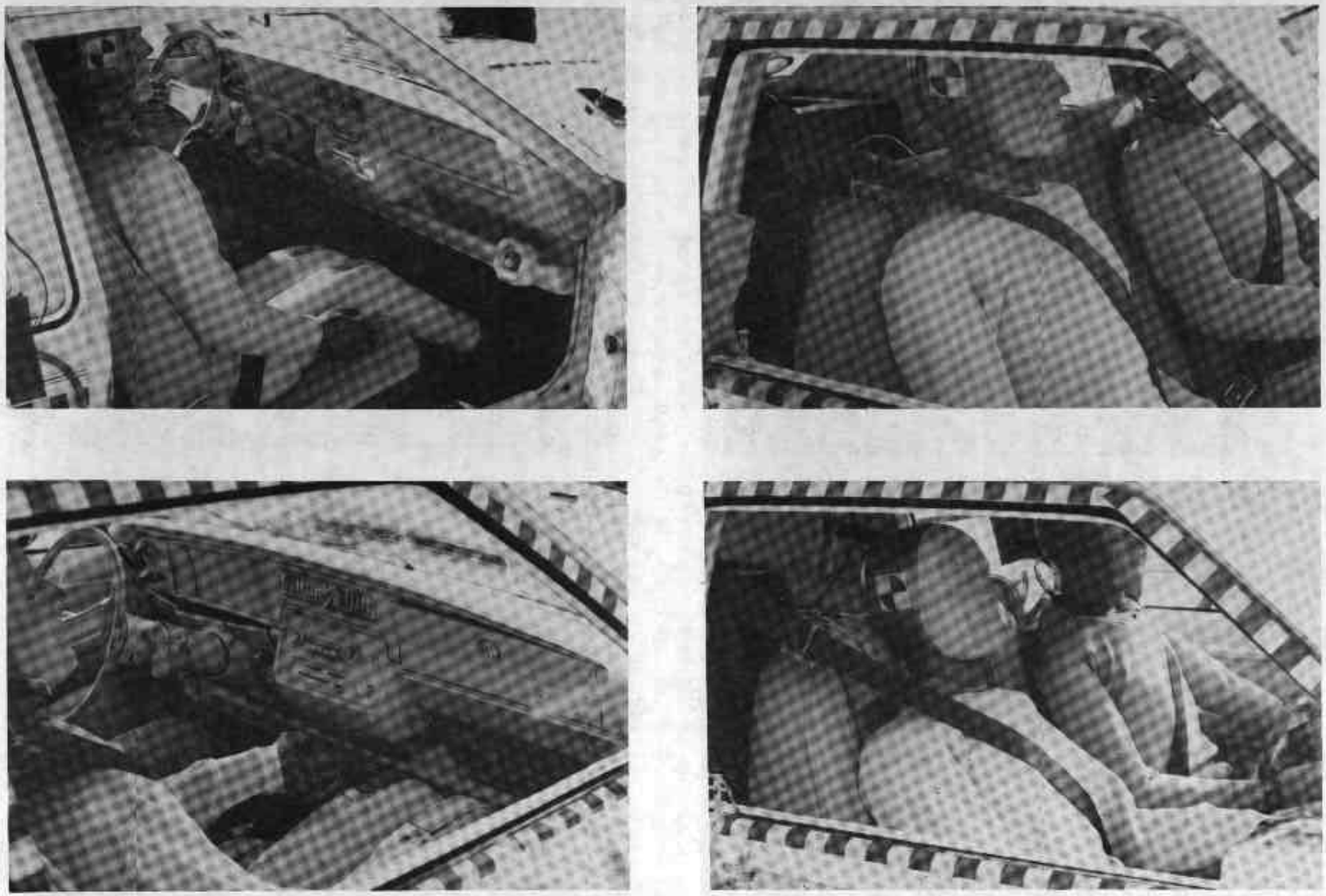
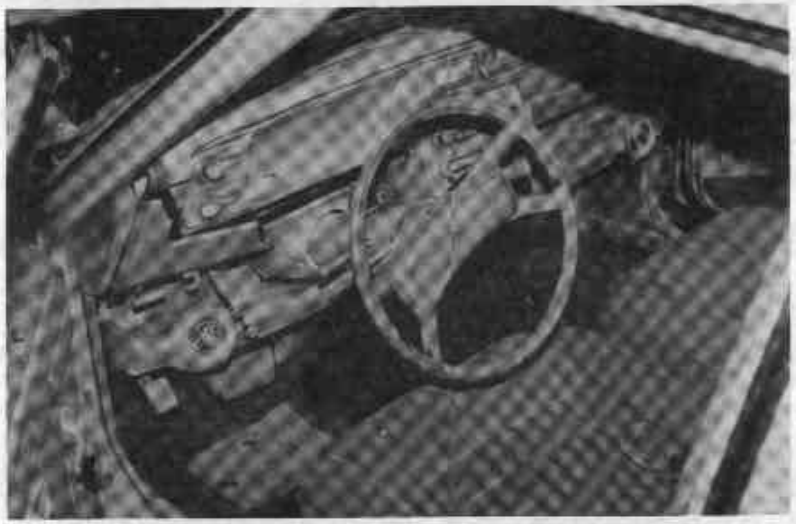


FIGURE A-10 VEHICLE NO. 1 - PRE- AND POST-TEST VIEWS OF RIGHT FRONT PASSENGER POSITIONS



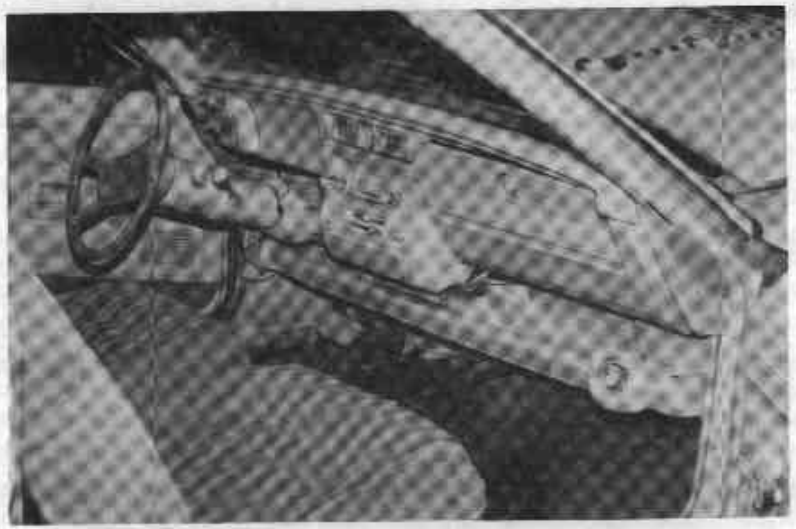


FIGURE A-11 VEHICLE NO. 1 - POST-TEST INTERIOR VIEWS

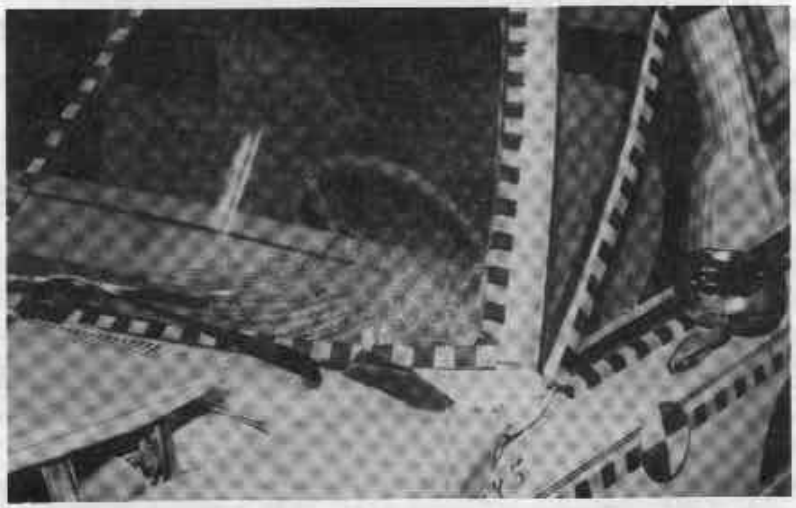


FIGURE A-12 VEHICLE NO. 1 - POST-TEST VIEW OF WINDSHIELD

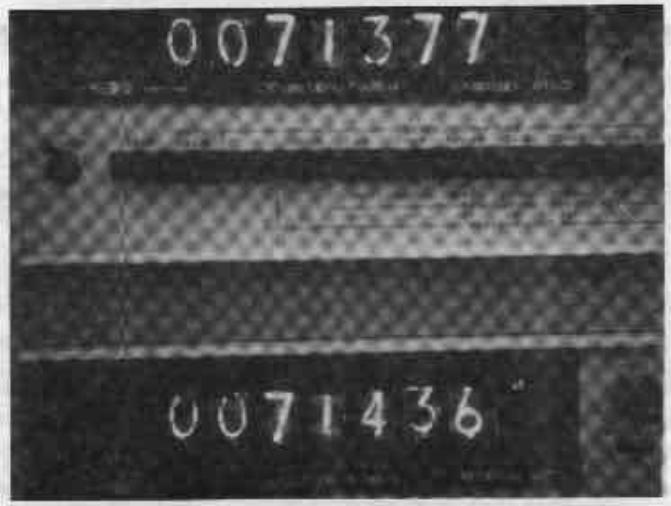


FIGURE A-13 VELOCITY TRAP COUNTER DISPLAY

STILL PHOTOGRAPHS

VEHICLE NO. 2 - 1980 VOLKSWAGEN RABBIT

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

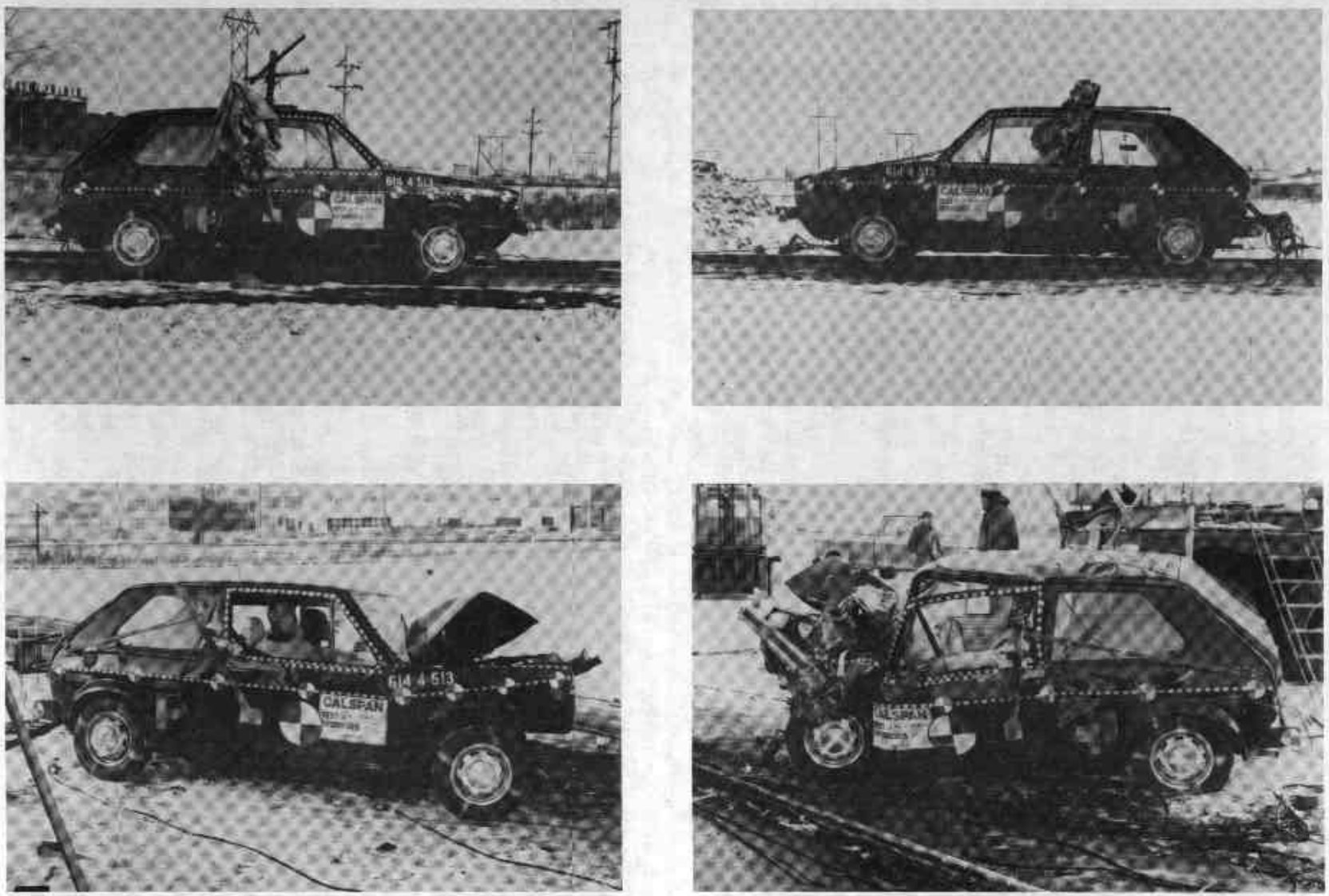


FIGURE A-15 VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT SIDES

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

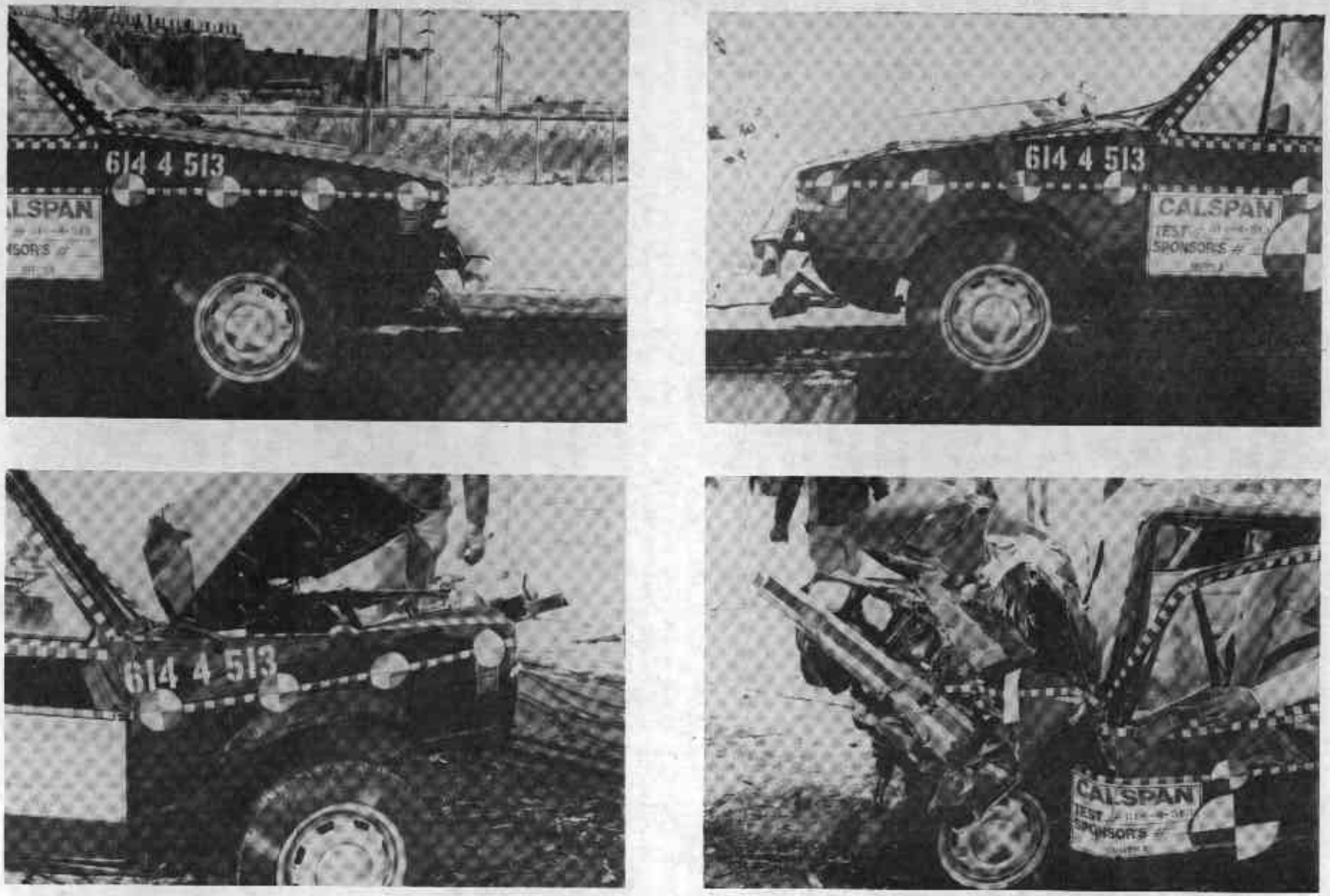


FIGURE A-17 VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF RIGHT AND LEFT FRONT QUARTERS

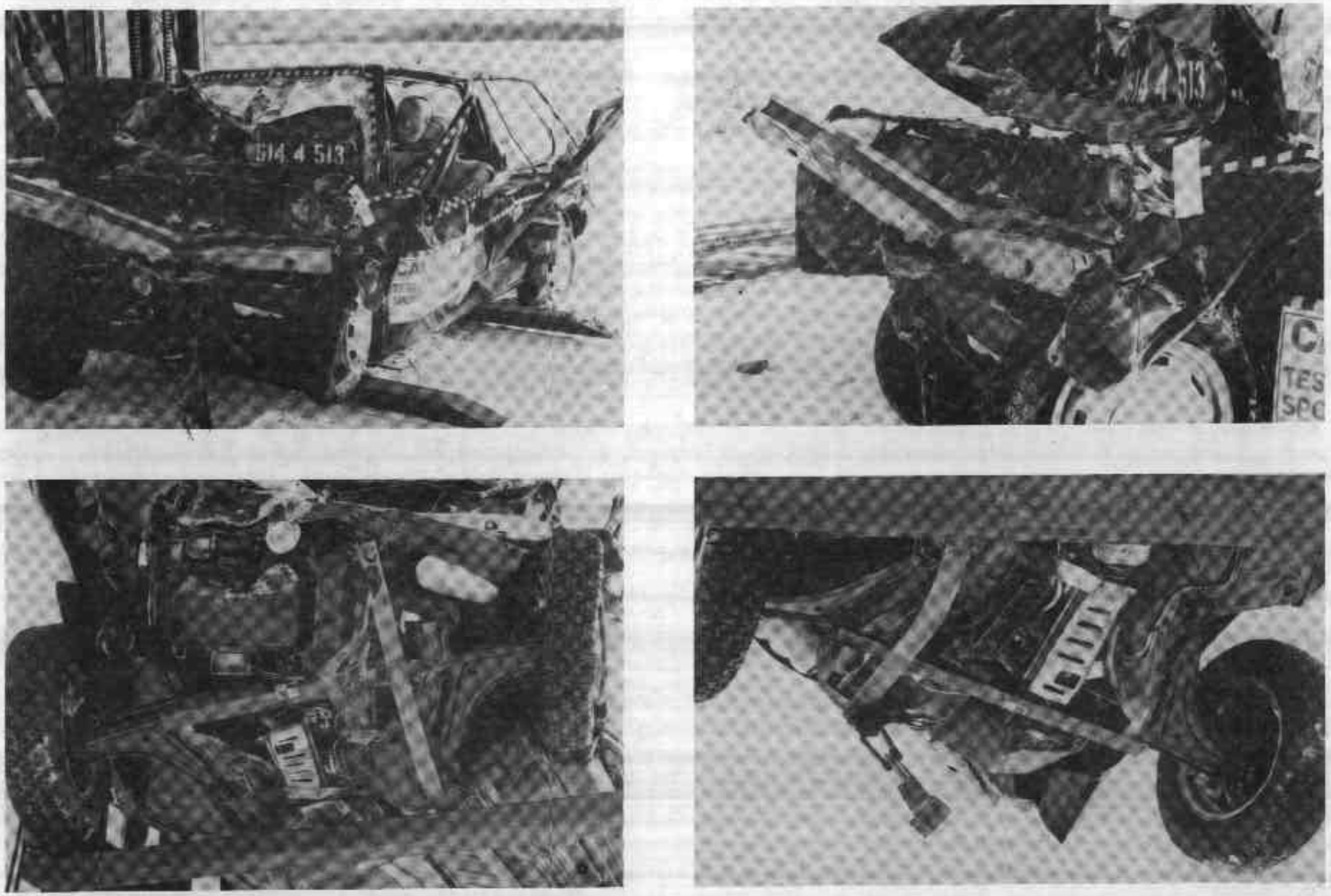


FIGURE A-18 VEHICLE NO. 2 - POST-TEST VIEWS OF LEFT FRONT AND FRONT UNDERBODY

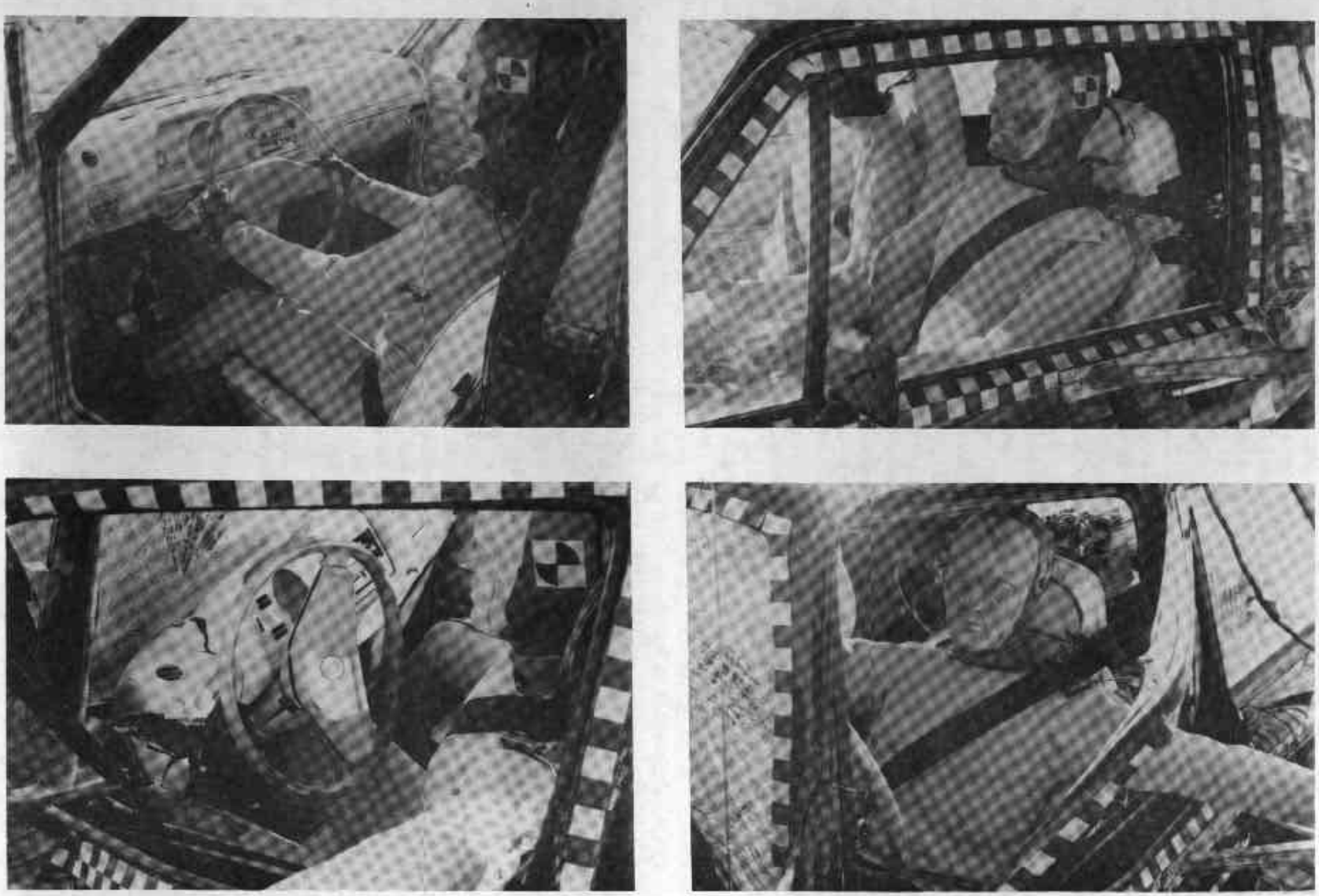


FIGURE A-19 VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF DRIVER POSITIONS

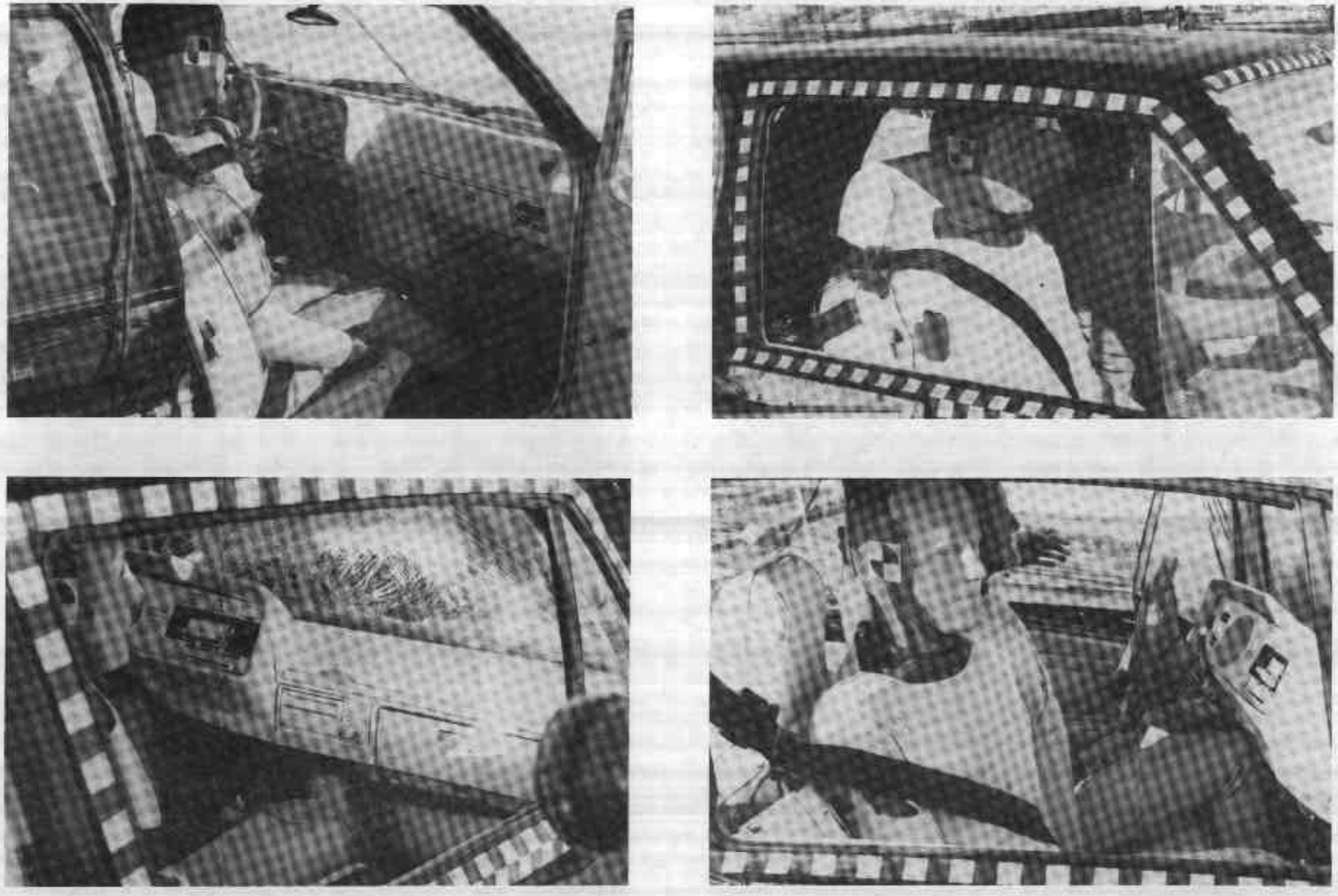


FIGURE A-20 VEHICLE NO. 2 - PRE- AND POST-TEST VIEWS OF RIGHT FRONT PASSENGER POSITIONS

FIGURE A-21 VEHICLE NO. 2 - POST-TEST VIEWS OF WINDSHIELD AND HOOD INTRUSION INTO WINDSHIELD

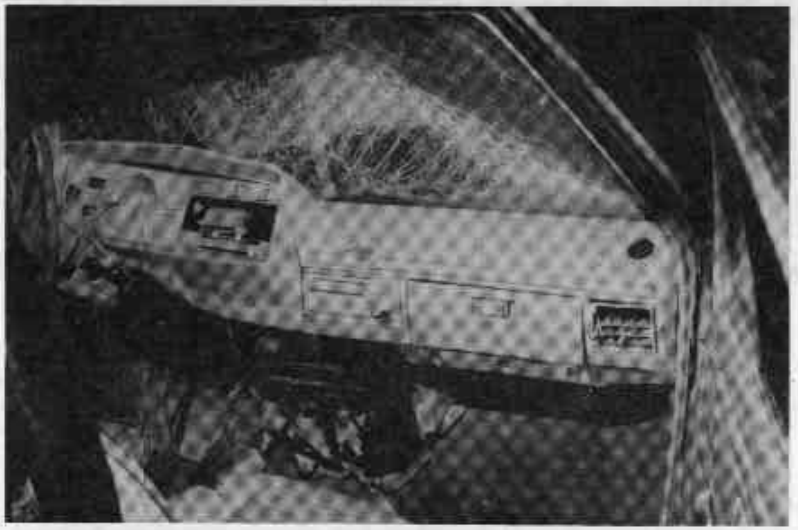


FIGURE A-22 VEHICLE NO. 2 - POST-TEST INTERIOR VIEWS

APPENDIX B

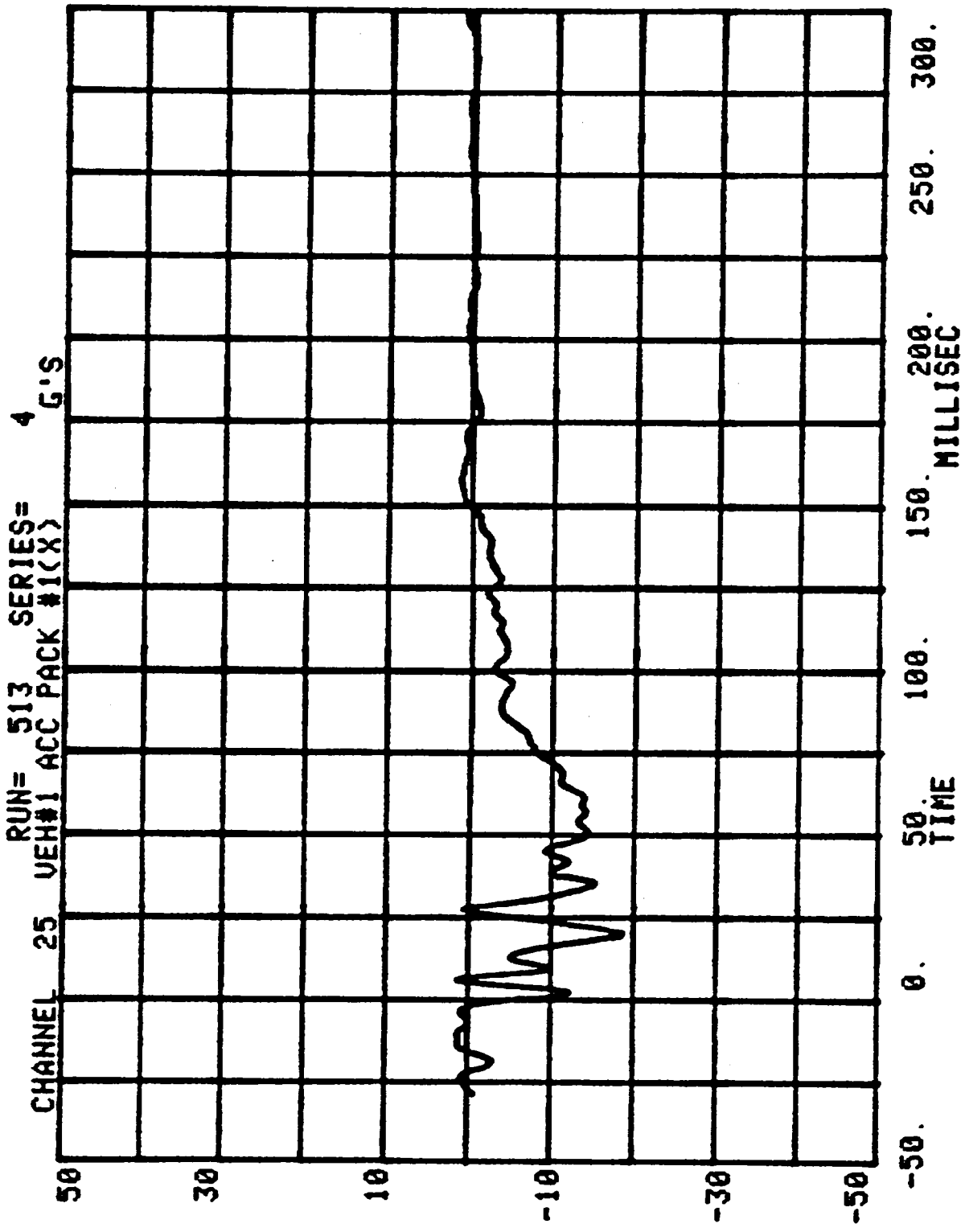
VEHICLE AND DUMMY RESPONSE DATA

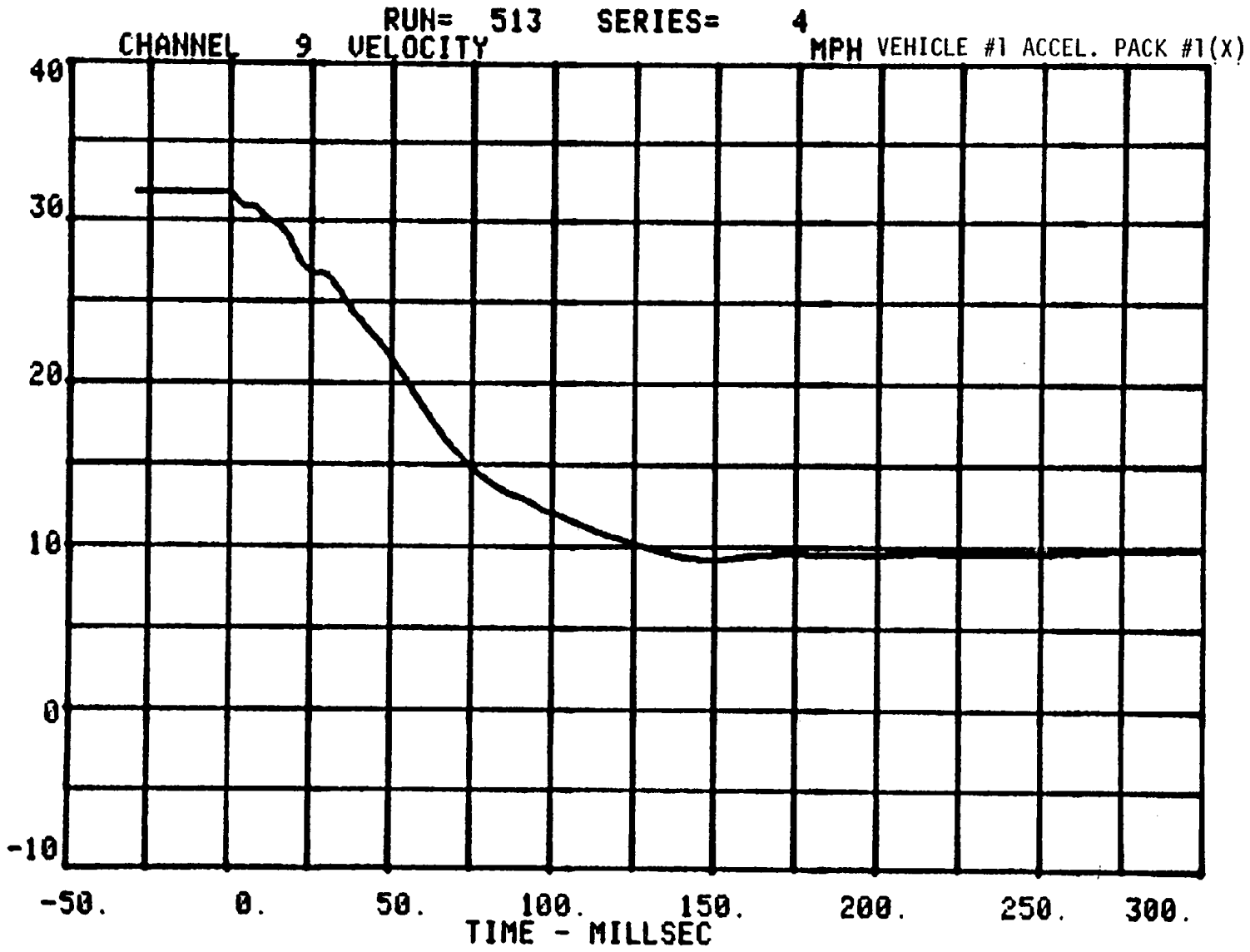
TEST NO. 614-4-513

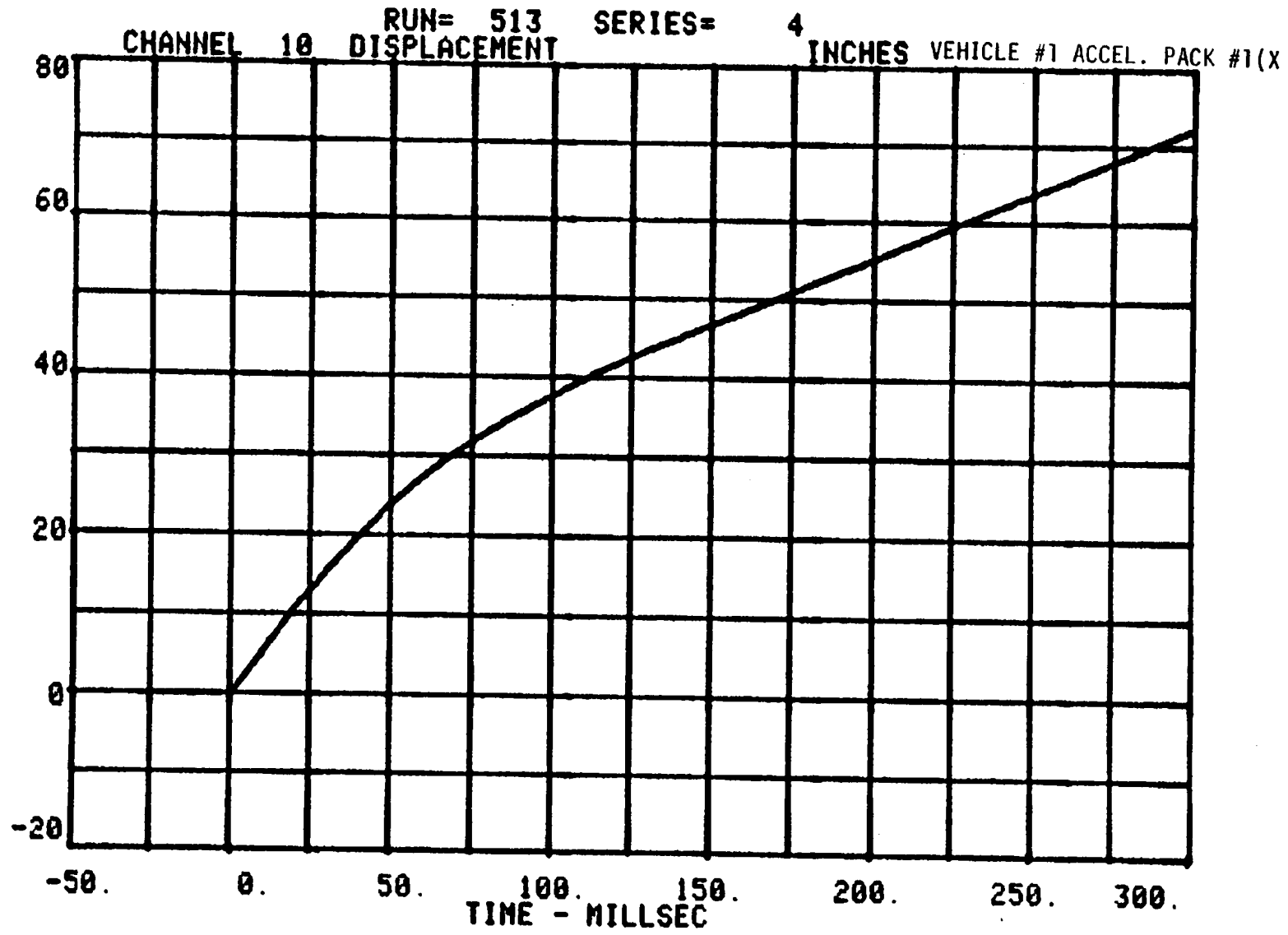
1980 AMERICAN MOTORS CONCORD

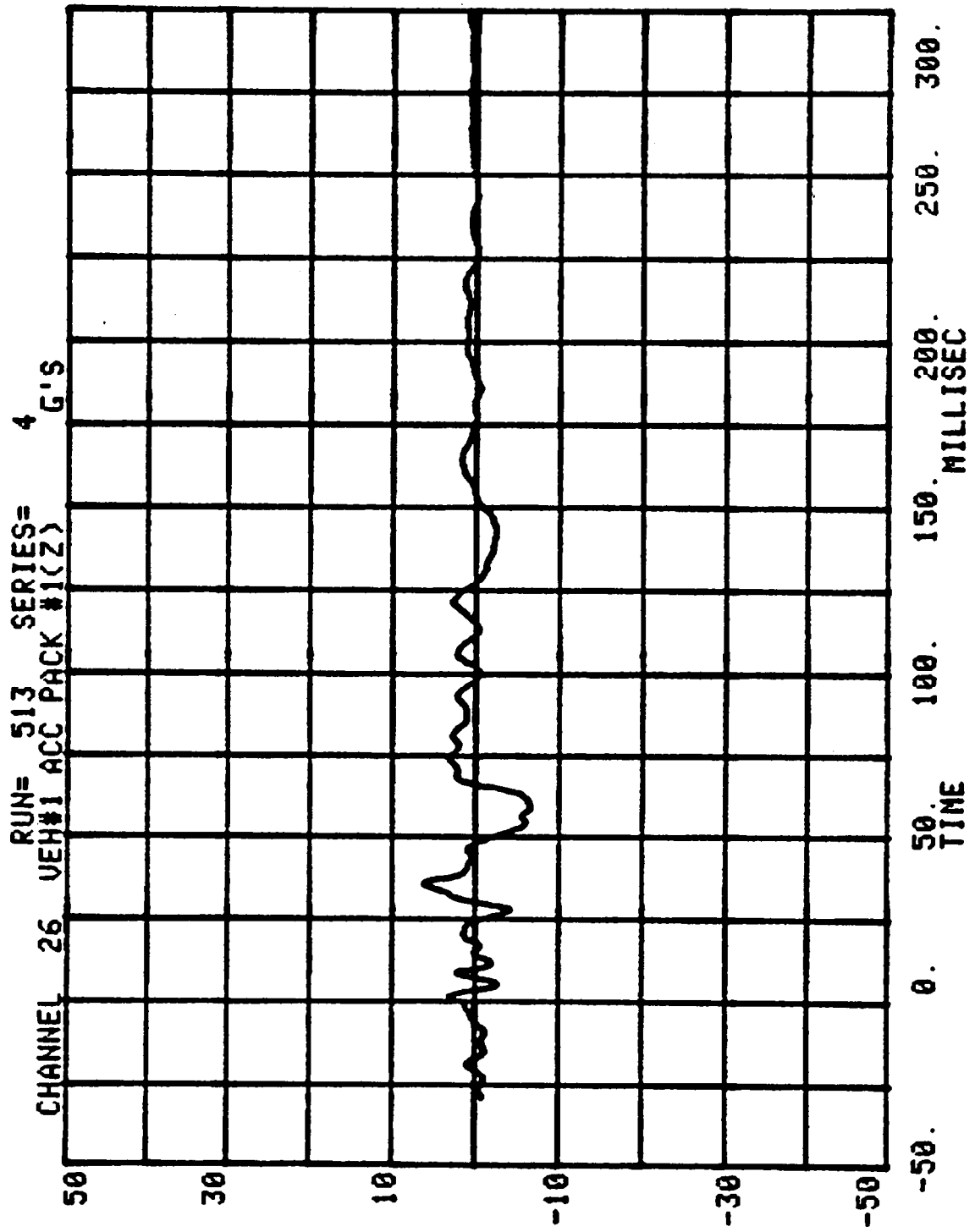
VEHICLE NO. 1 DATA

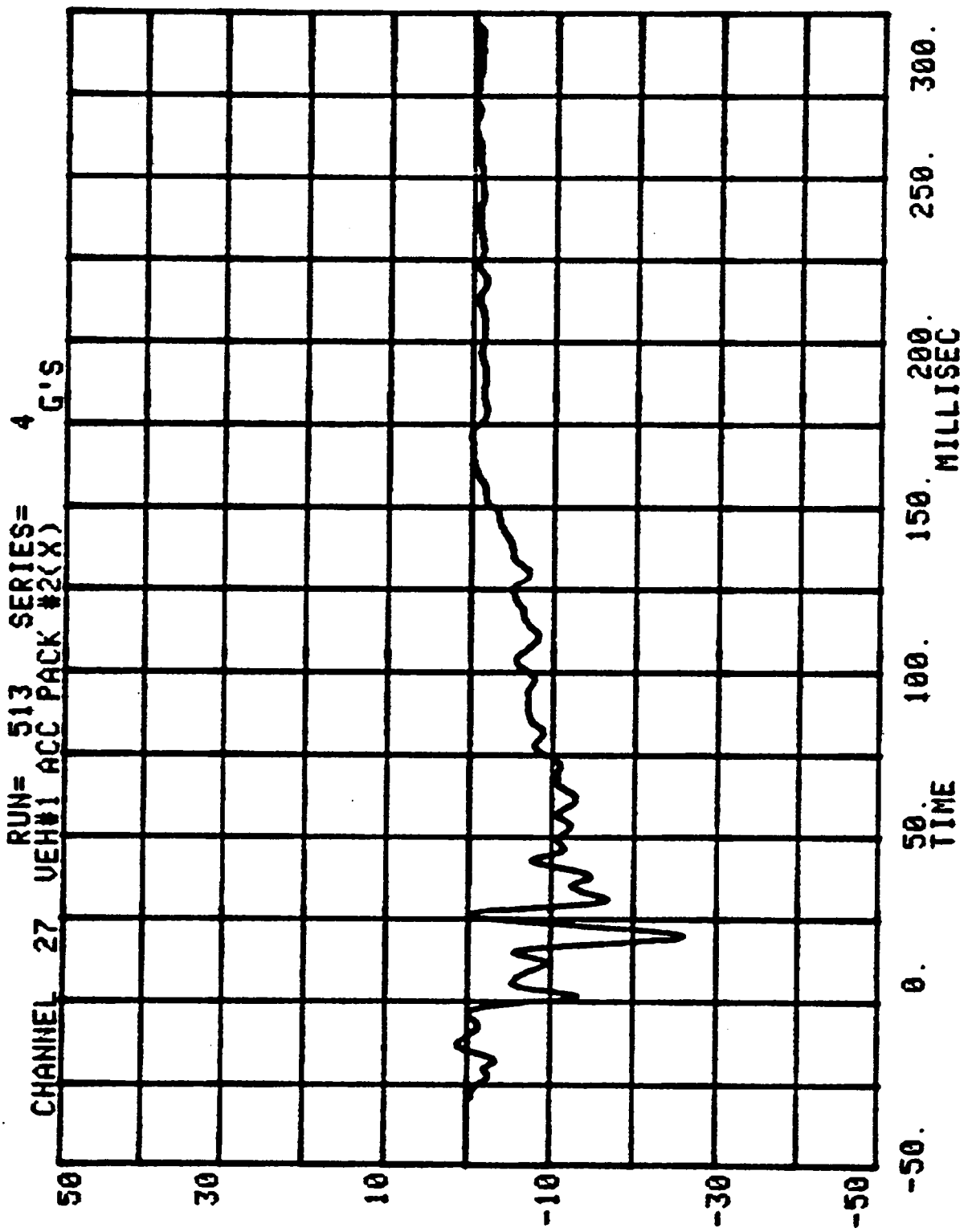
VEHICLE DATA	FILTER CHANNEL CLASS
	60

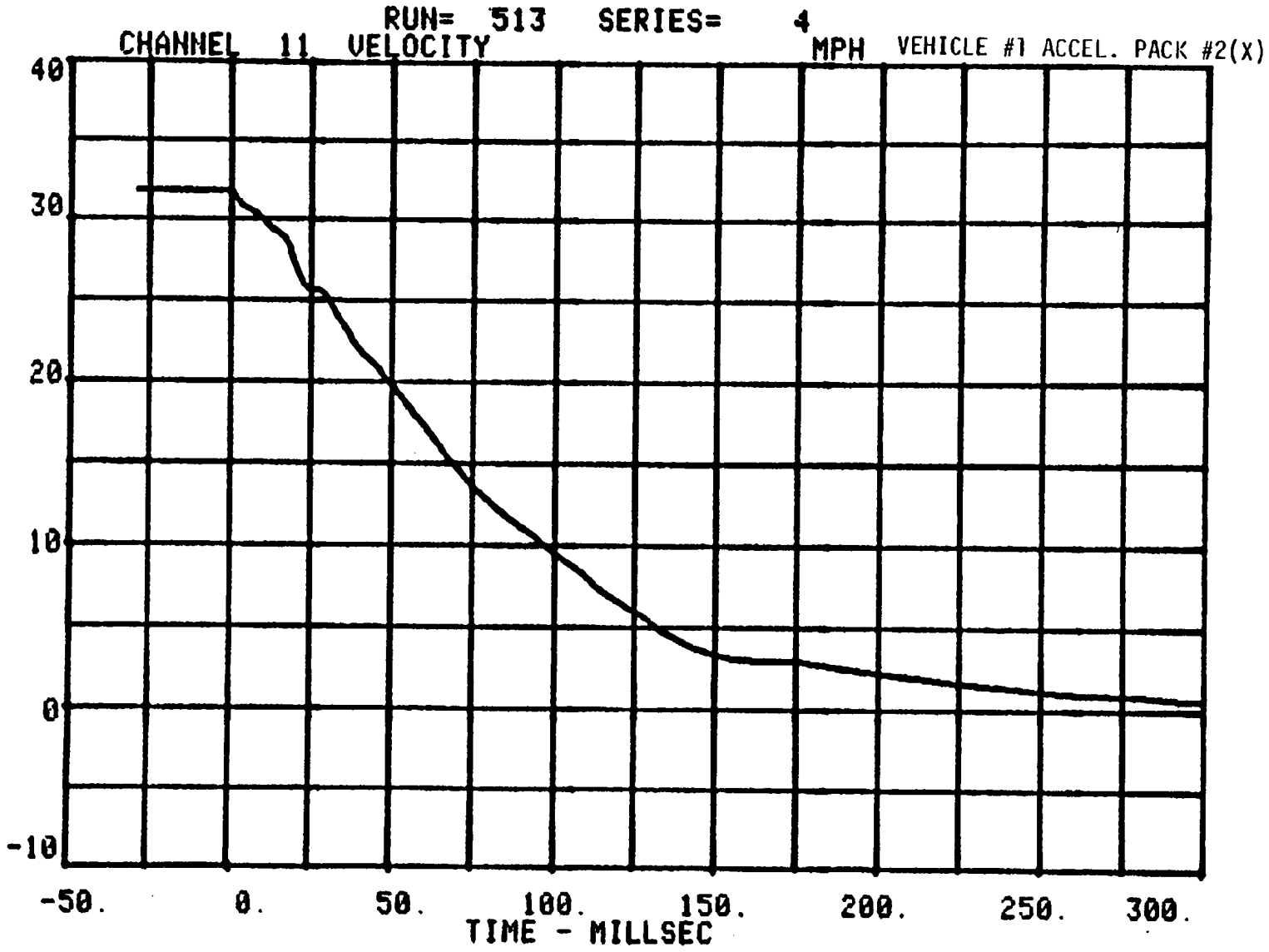

CHANNEL 25 VEH#1 ACC PACK #1(X)
RUN= 513 SERIES= 4
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

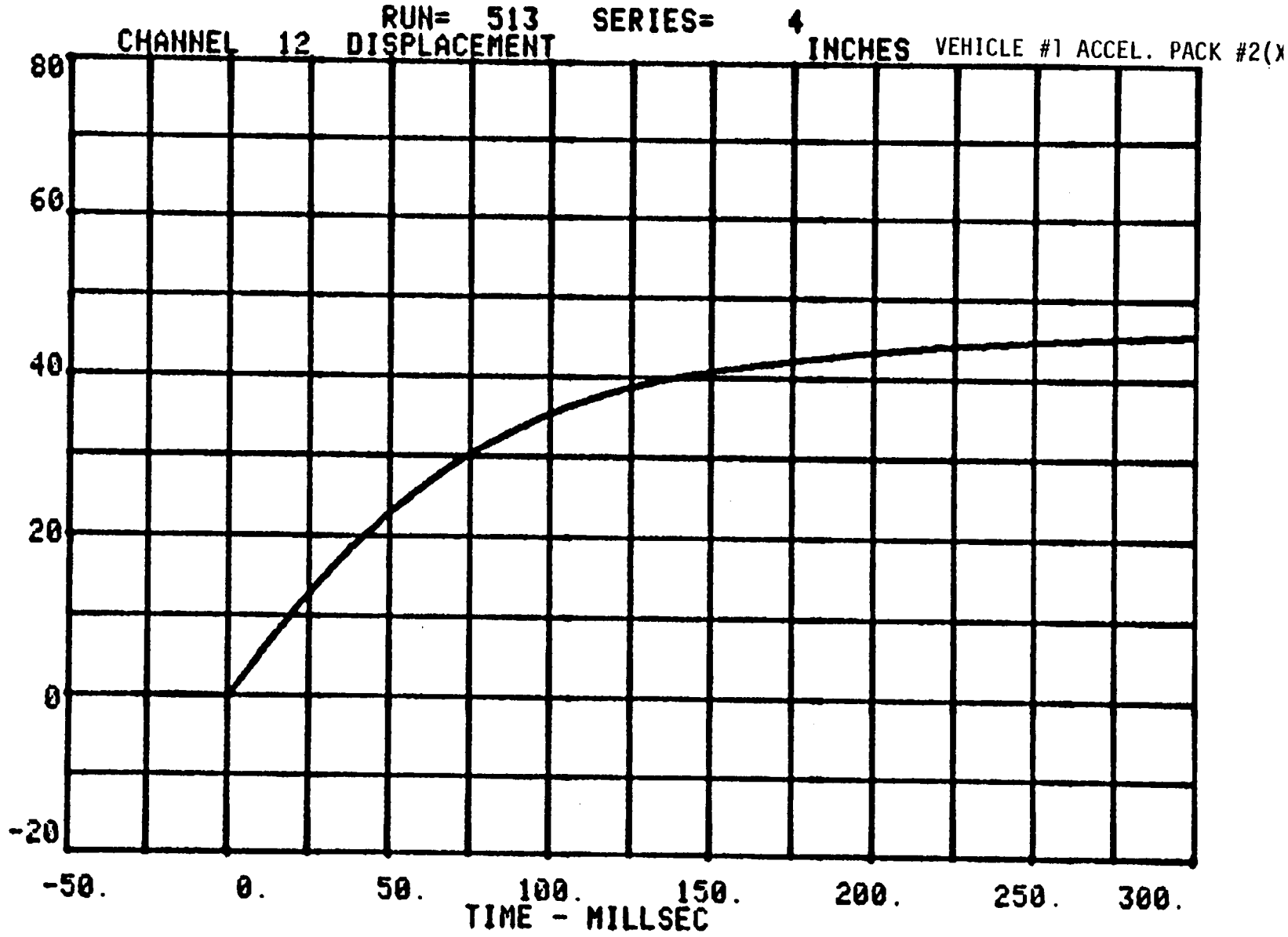

RUN= 513 SERIES= 4
CHANNEL 9 VELOCITY
MPH VEHICLE #1 ACCEL. PACK #1(X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

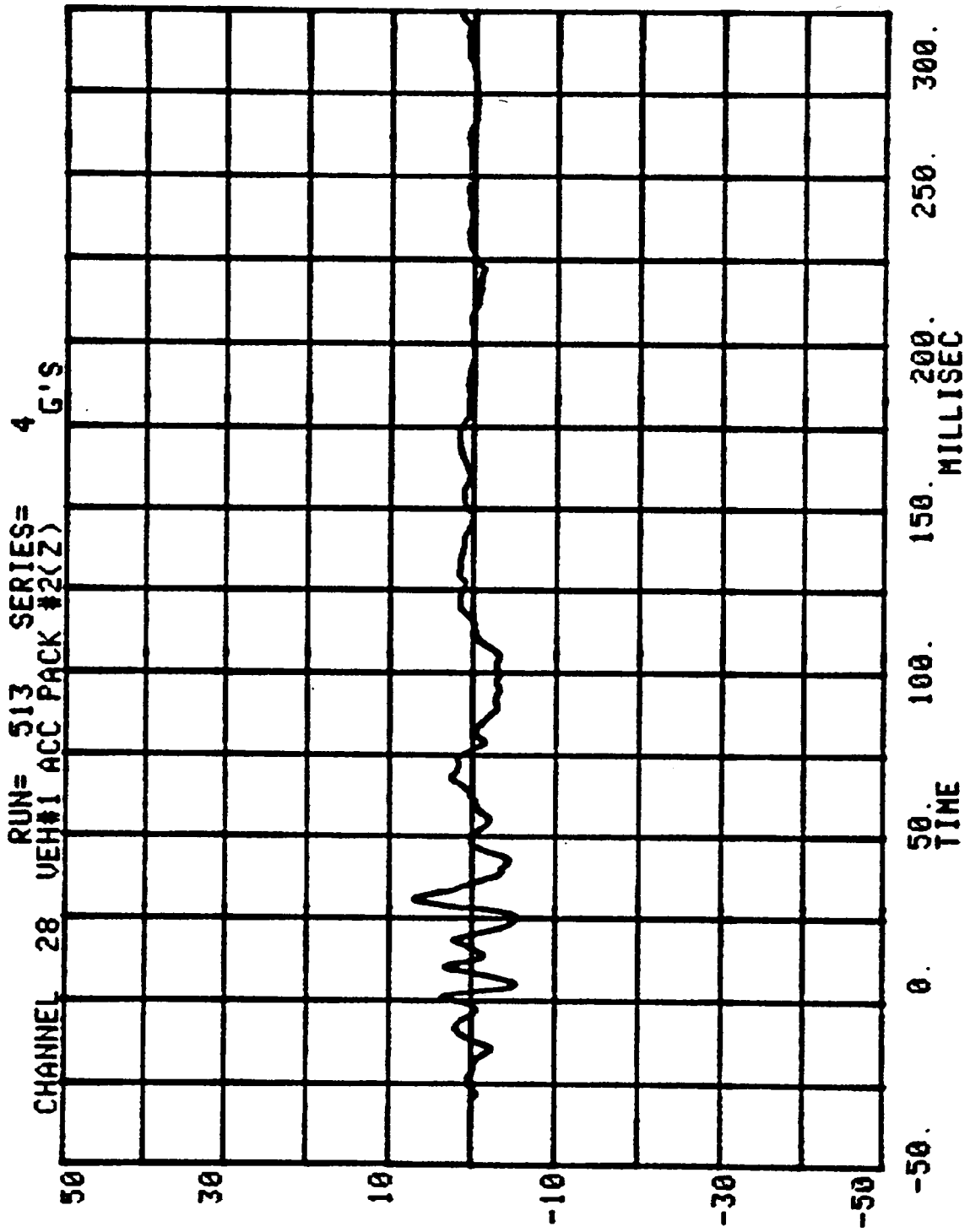

RUN= 513 SERIES= 4
CHANNEL 10 DISPLACEMENT
INCHES
VEHICLE #1 ACCEL. PACK #1(X
80
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

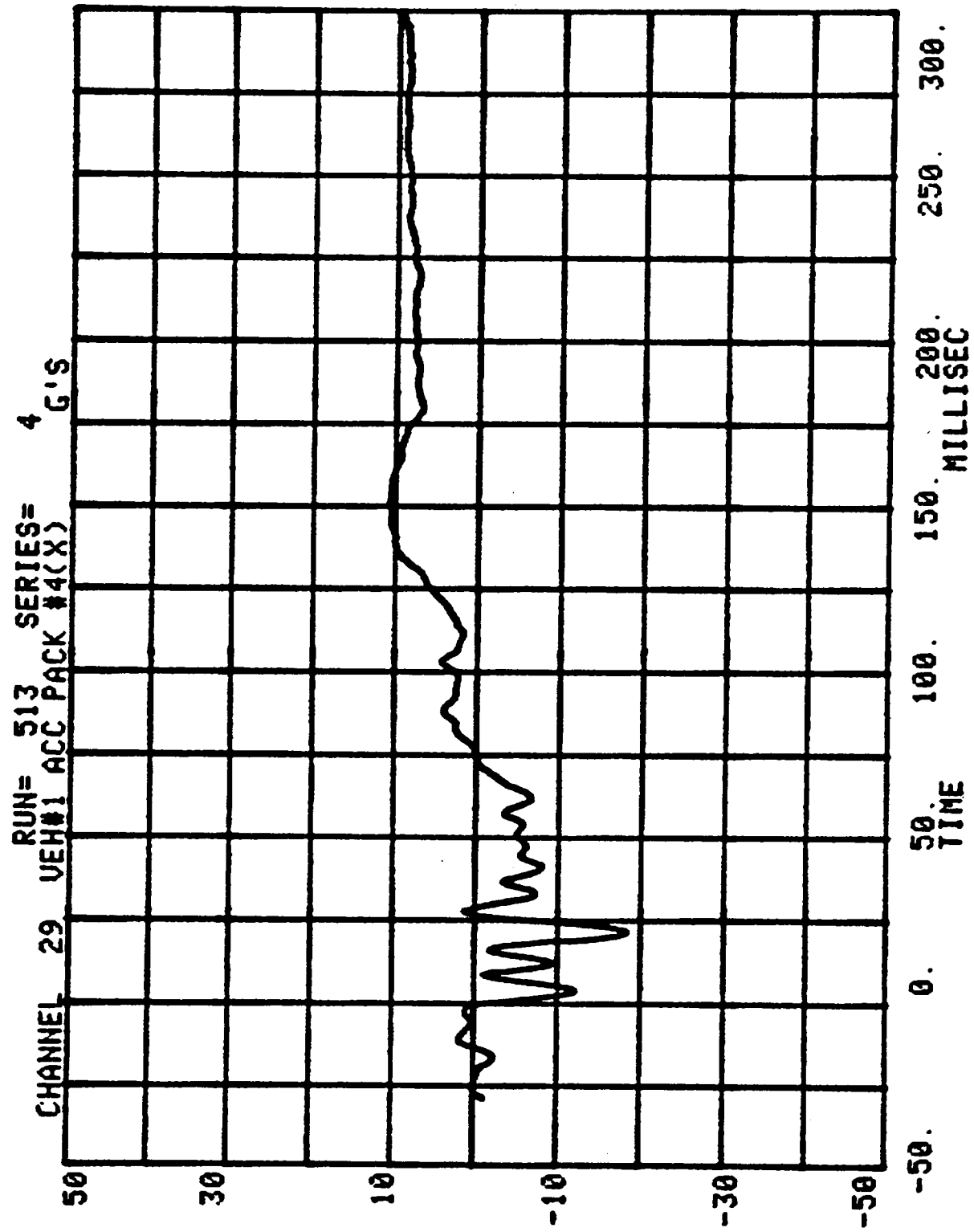

CHANNEL 26
RUN= 513 SERIES= 4
VEH#1 ACC PACK #1(Z)
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 27 VEH#1 ACC PACK #2(X)
RUN= 513 SERIES= 4
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

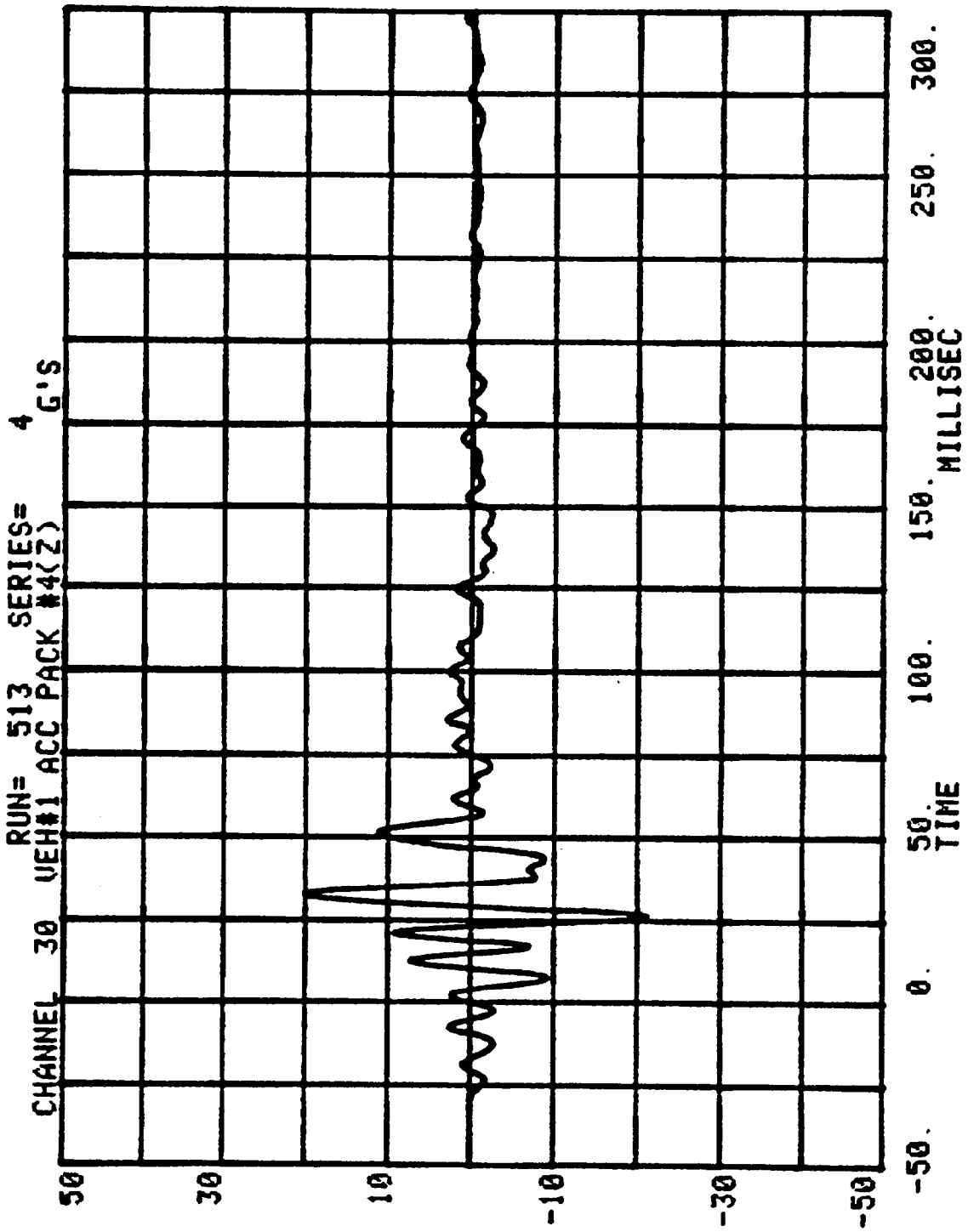

RUN= 513 SERIES= 4
CHANNEL 11 VELOCITY
MPH
VEHICLE #1 ACCEL. PACK #2(X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

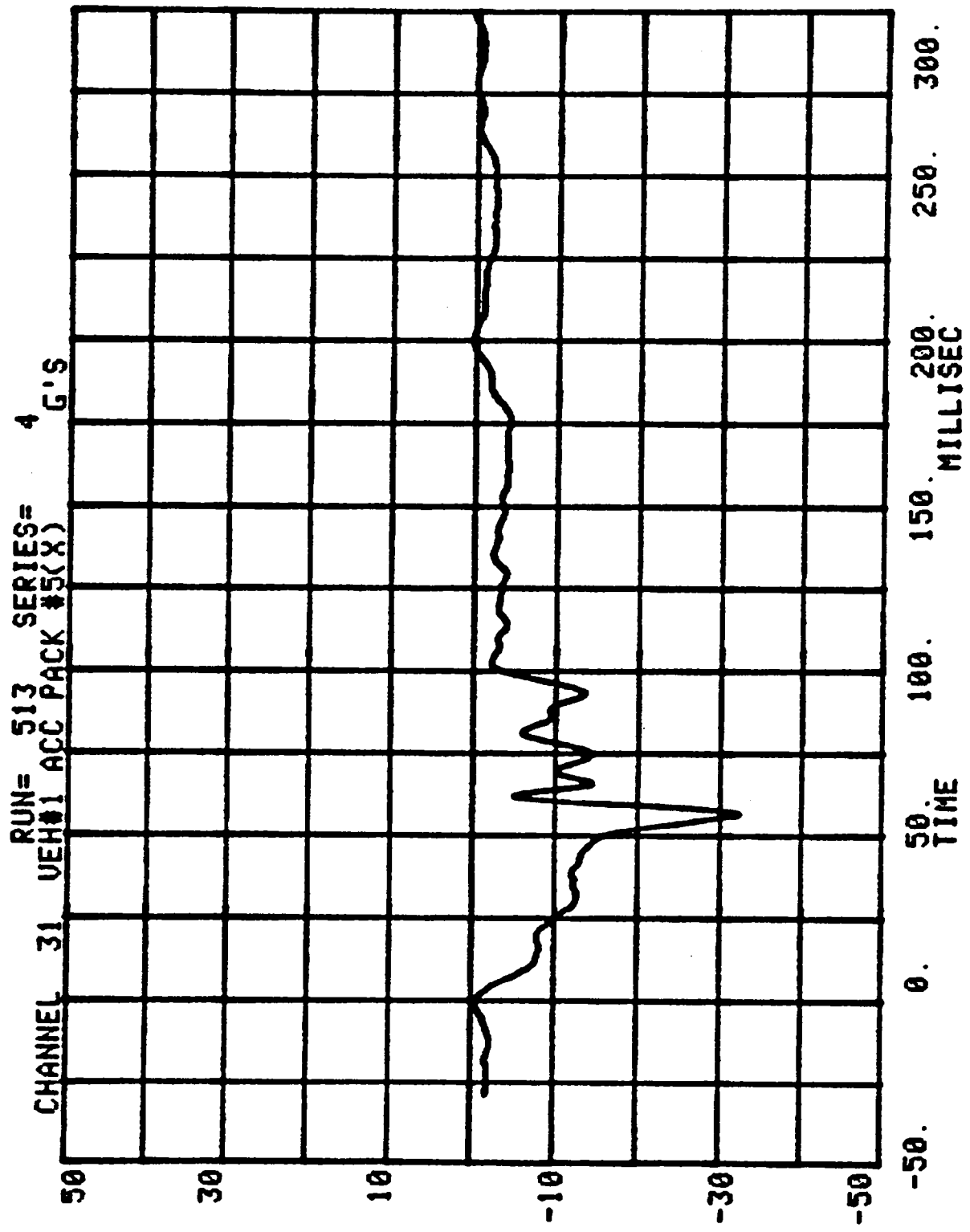

RUN= 513 SERIES= 4
CHANNEL 12 DISPLACEMENT
INCHES
VEHICLE #1 ACCEL. PACK #2(X
80
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

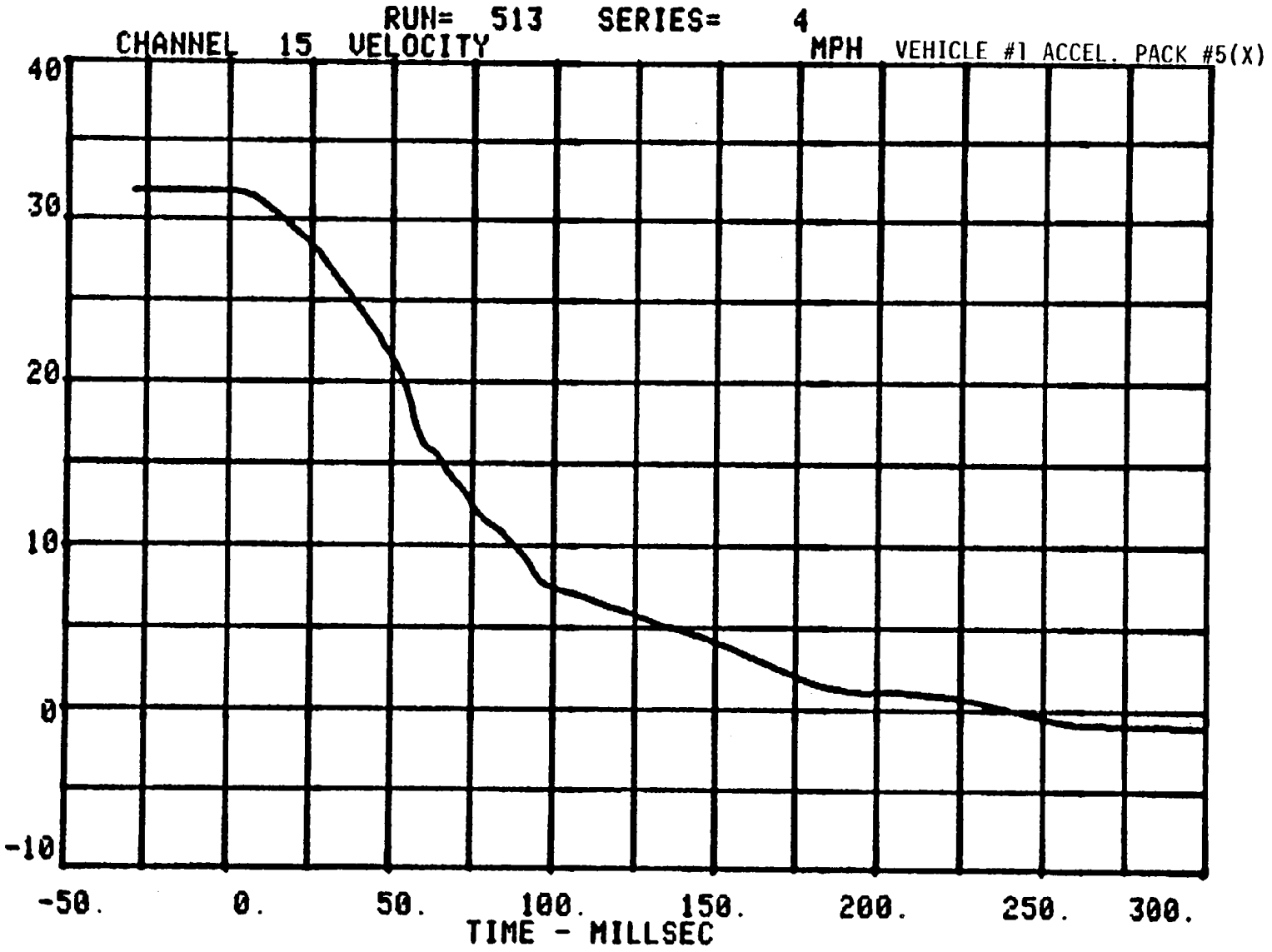

CHANNEL 28
RUN= 513 SERIES= 4
VEH#1 ACC PACK #2(Z)
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

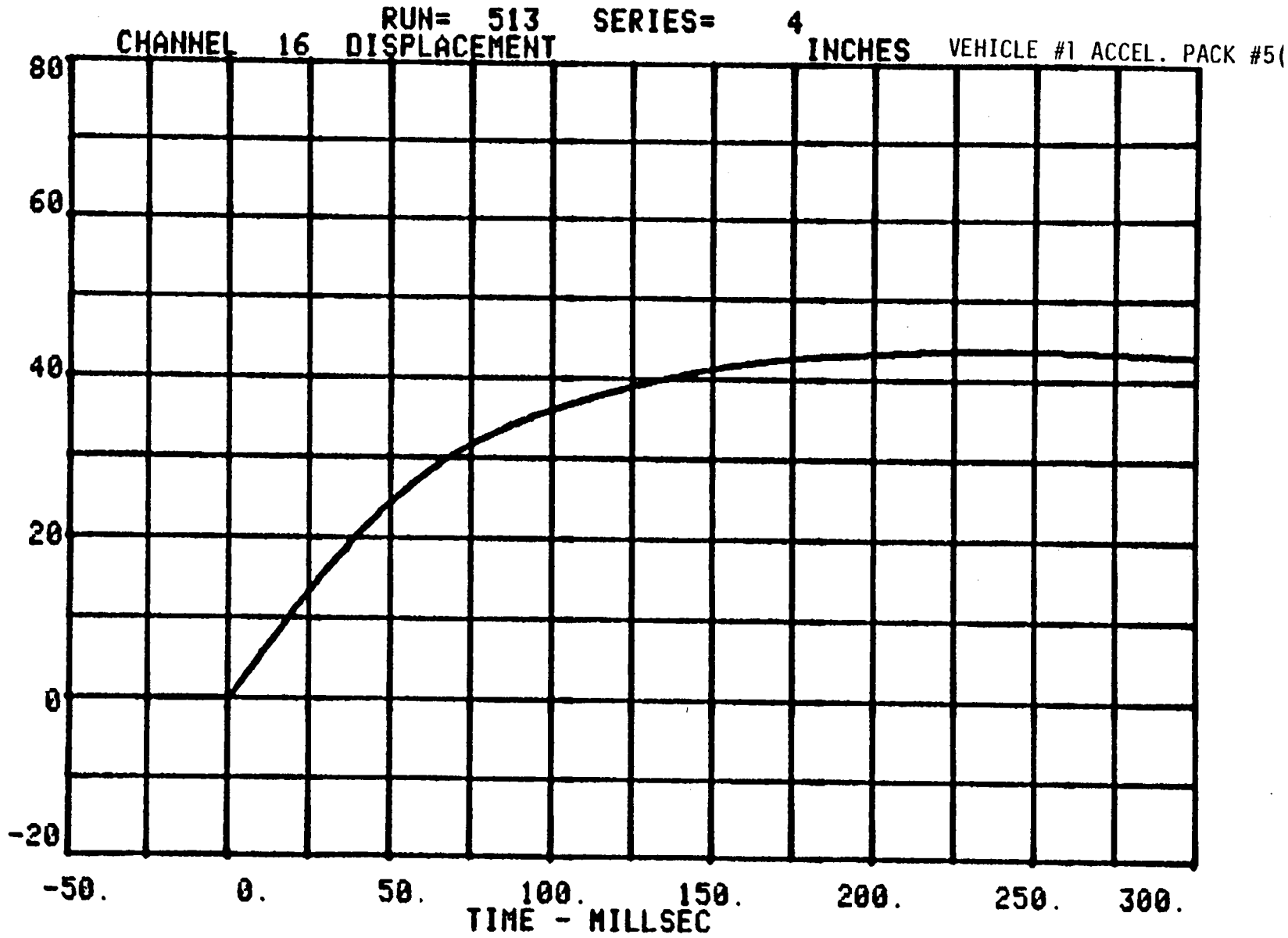

CHANNEL 29
RUN= 513
VEH#1 ACC PACK #4(X)
SERIES= 4
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

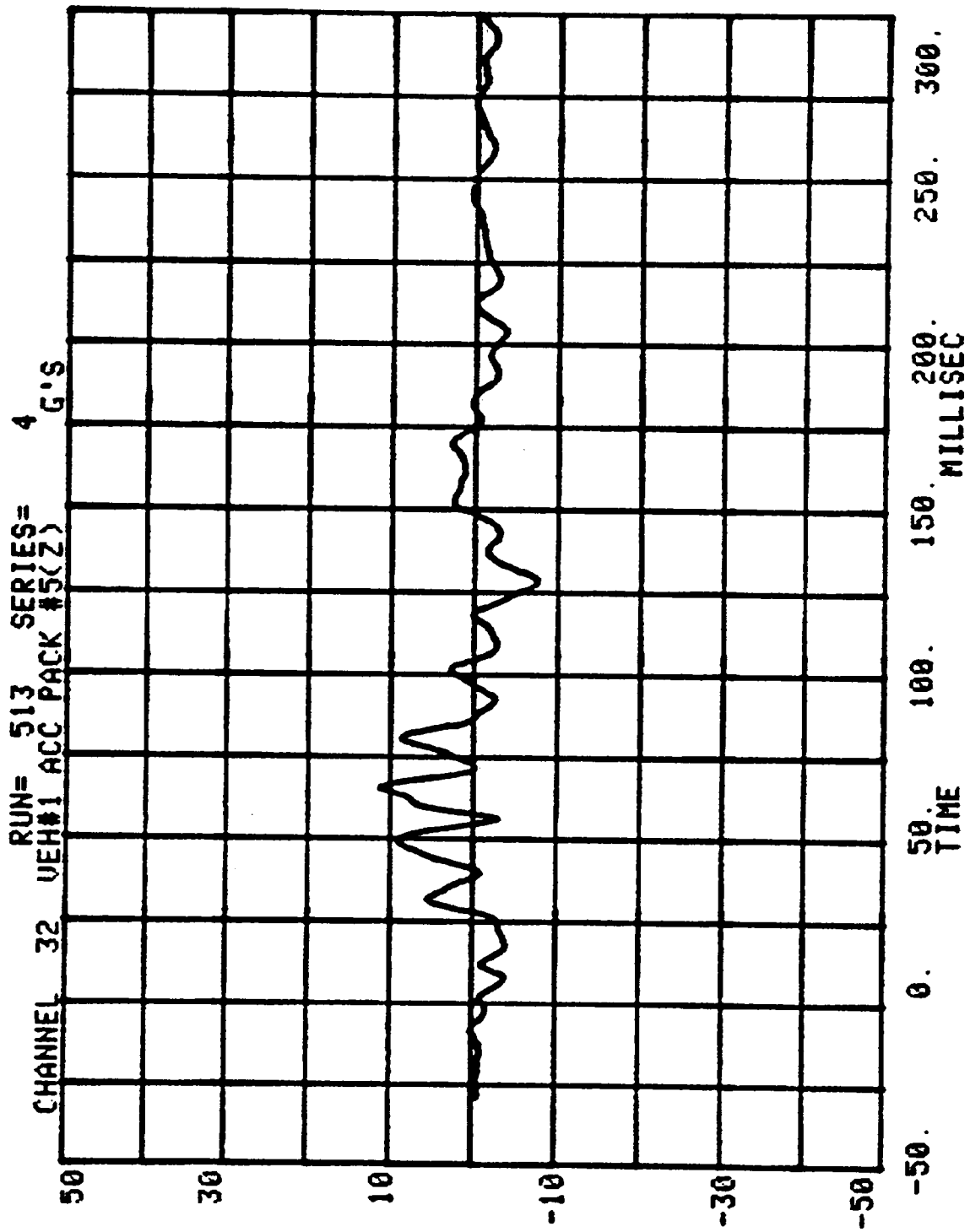
6707-V-4

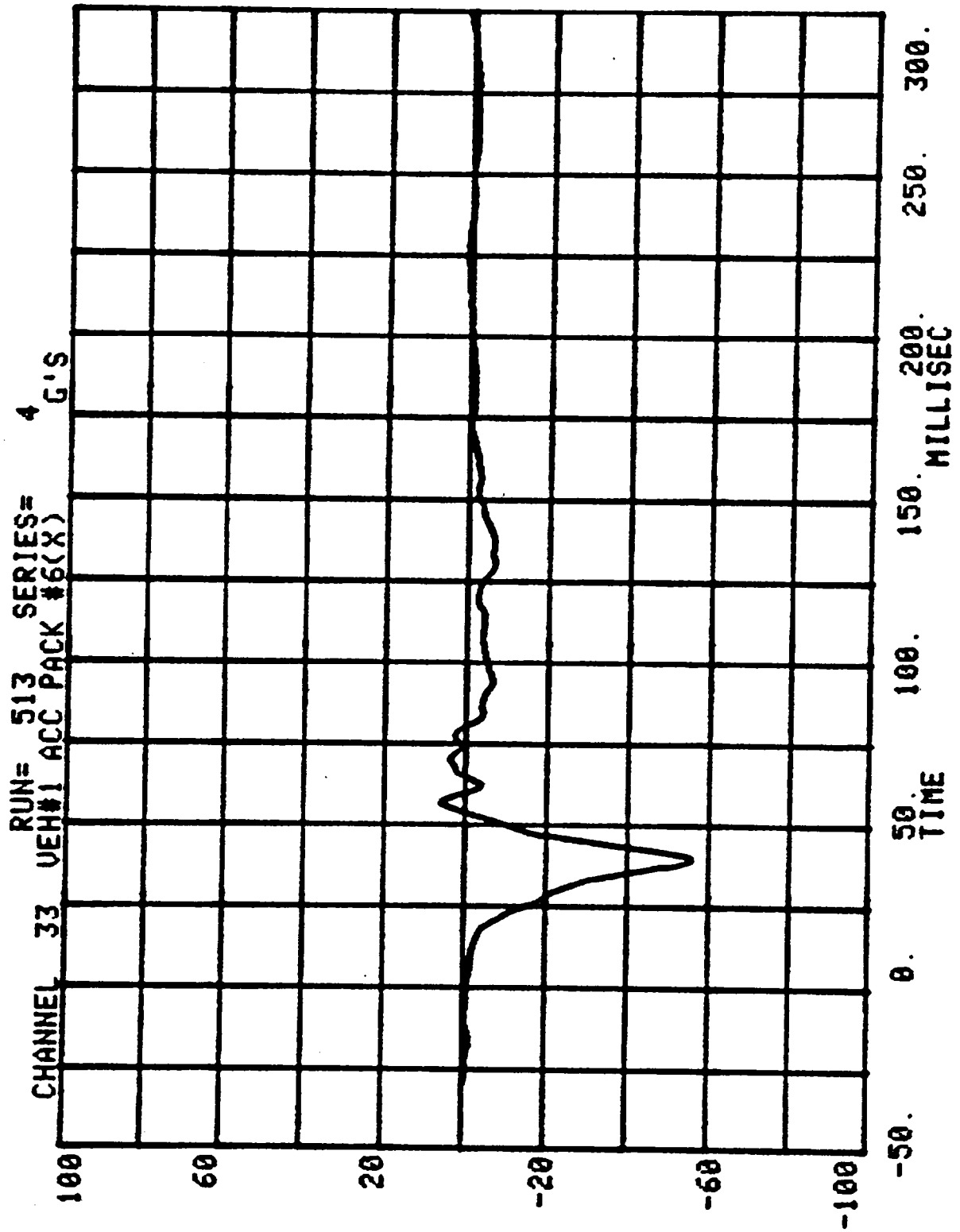

CHANNEL 30 VEH#1 ACC PACK #4(Z)
RUN= 513 SERIES= 4
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 31 VEH#1 ACC PACK #5(X)
RUN= 513 SERIES= 4
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

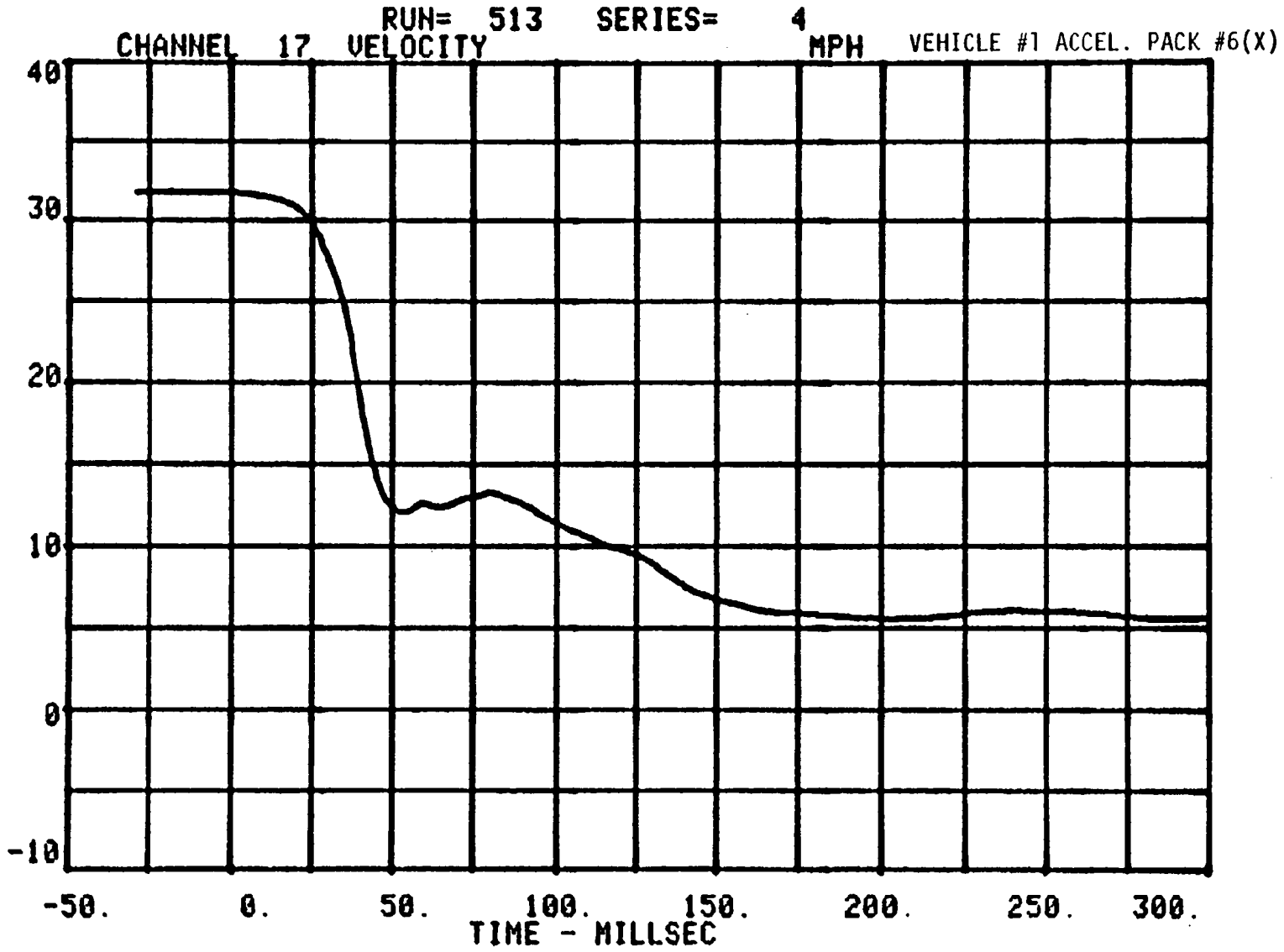

RUN= 513 SERIES= 4
CHANNEL 15 VELOCITY MPH
VEHICLE #1 ACCEL. PACK #5(X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

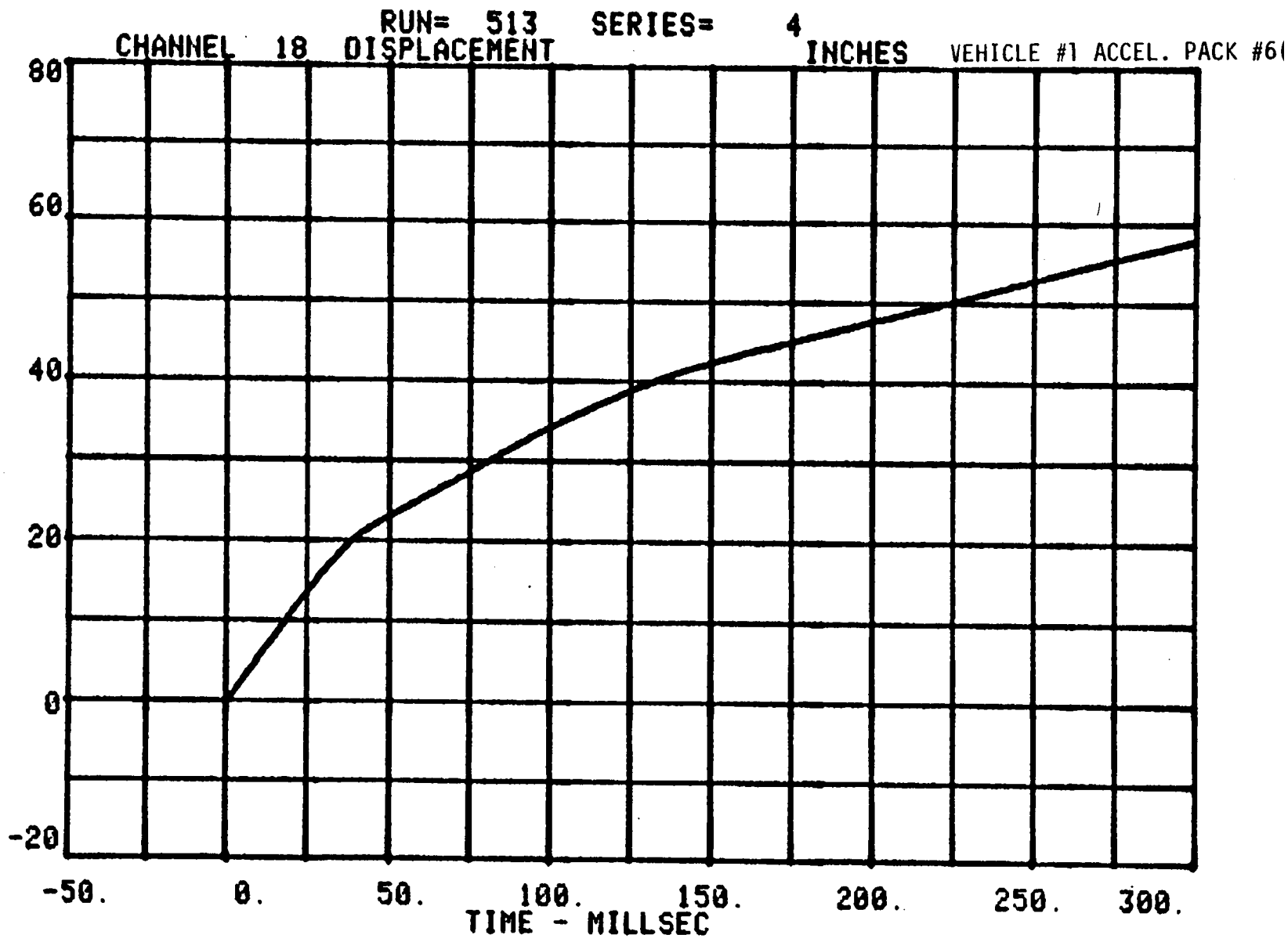

RUN= 513 SERIES= 4
CHANNEL 16 DISPLACEMENT INCHES
VEHICLE #1 ACCEL. PACK #5(
80
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

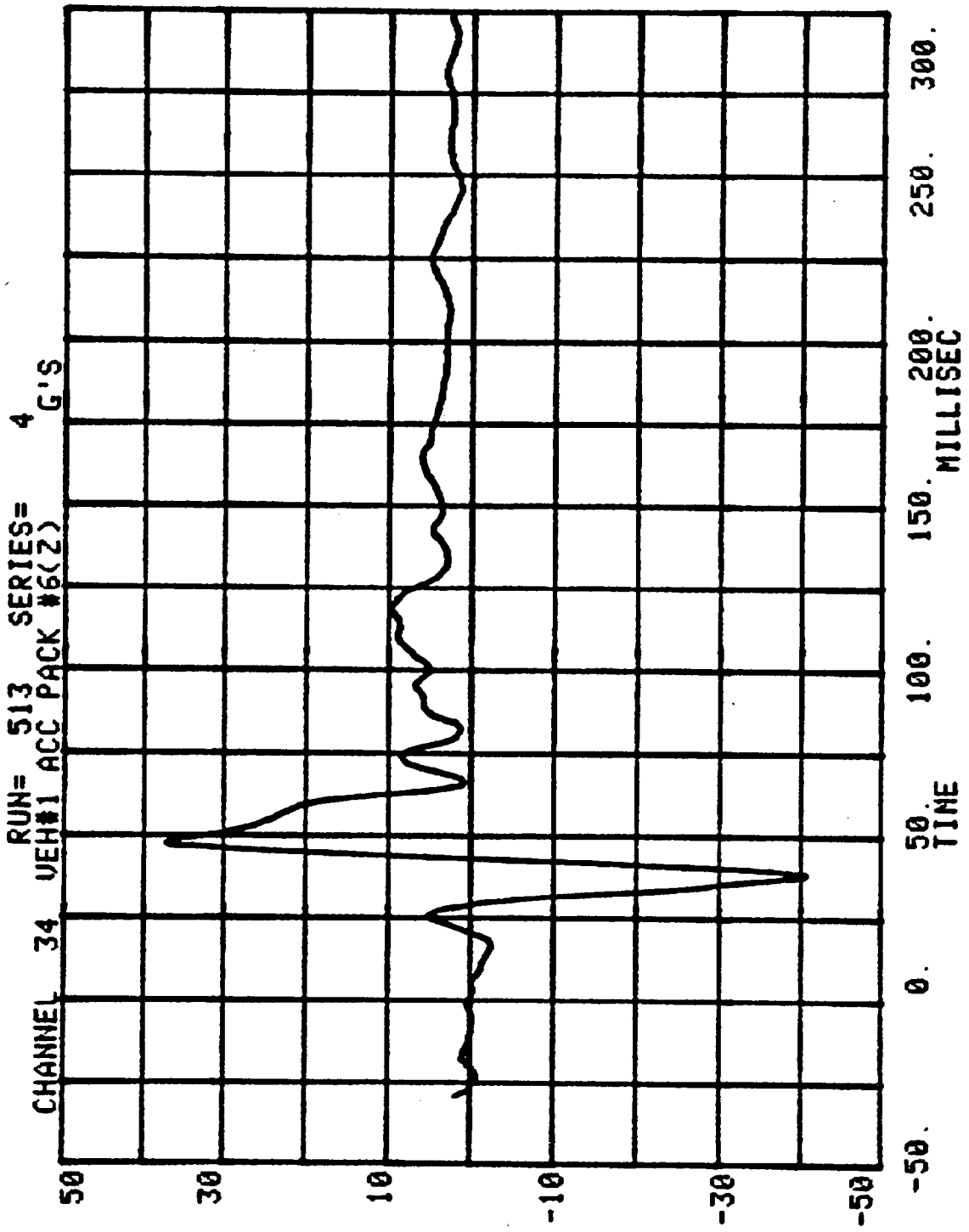

CHANNEL 32 VEH#1 ACC PACK #5(Z)
RUN= 513 SERIES= 4
G'S
50
30
10
-10
-30
-50
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC
-50.

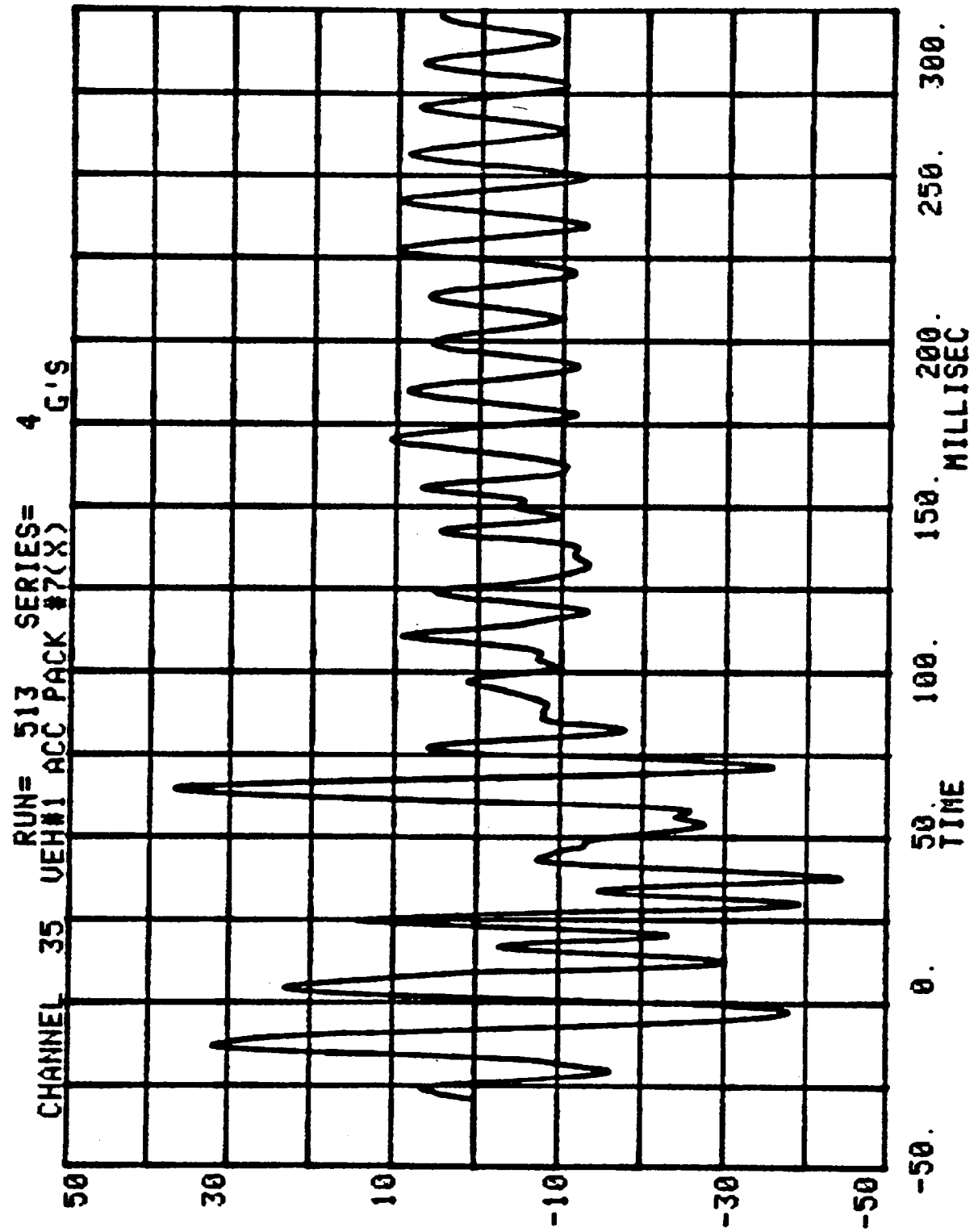

CHANNEL 33 VEH#1 ACC PACK #6(X)
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

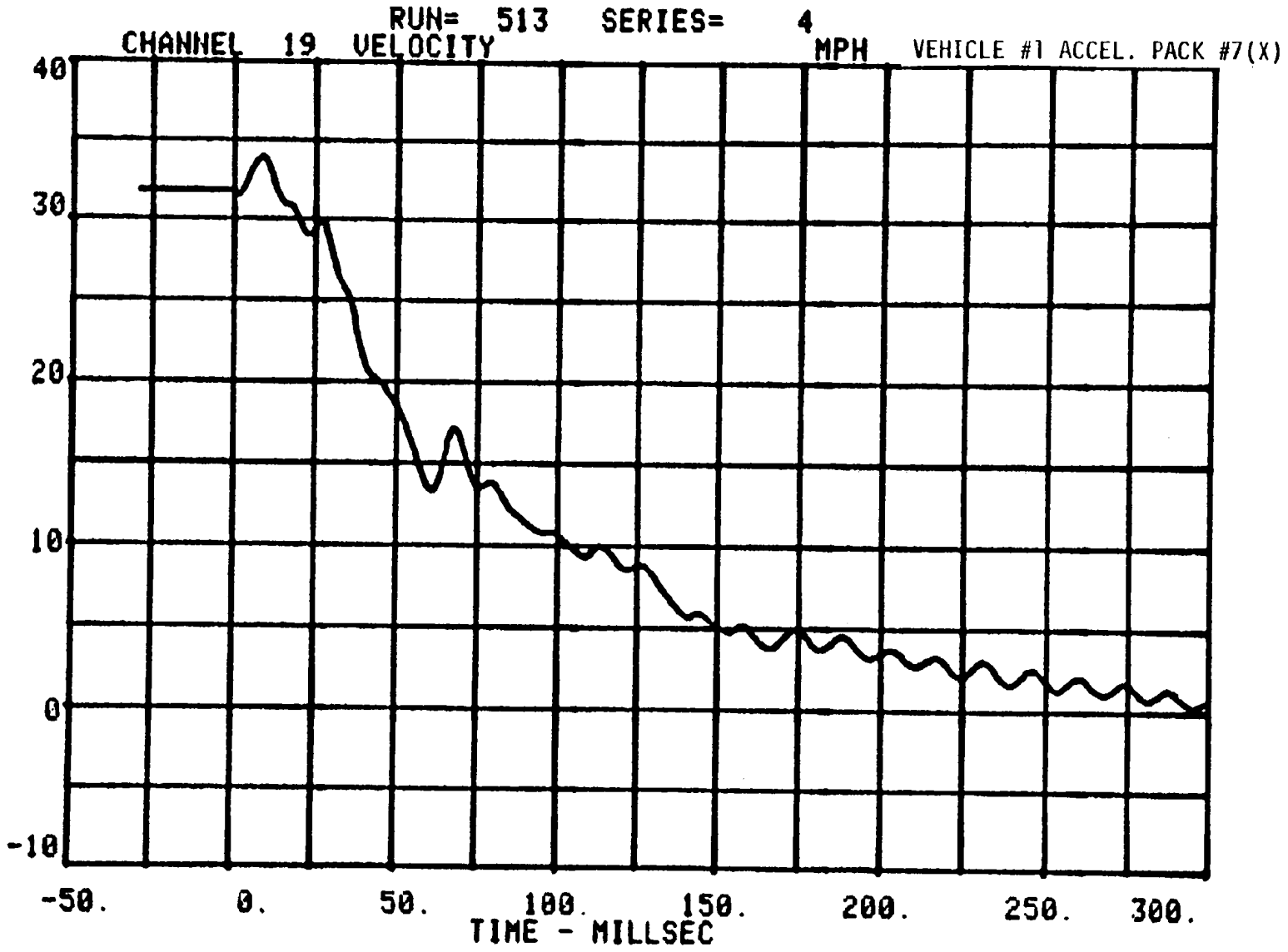
6707-V-4

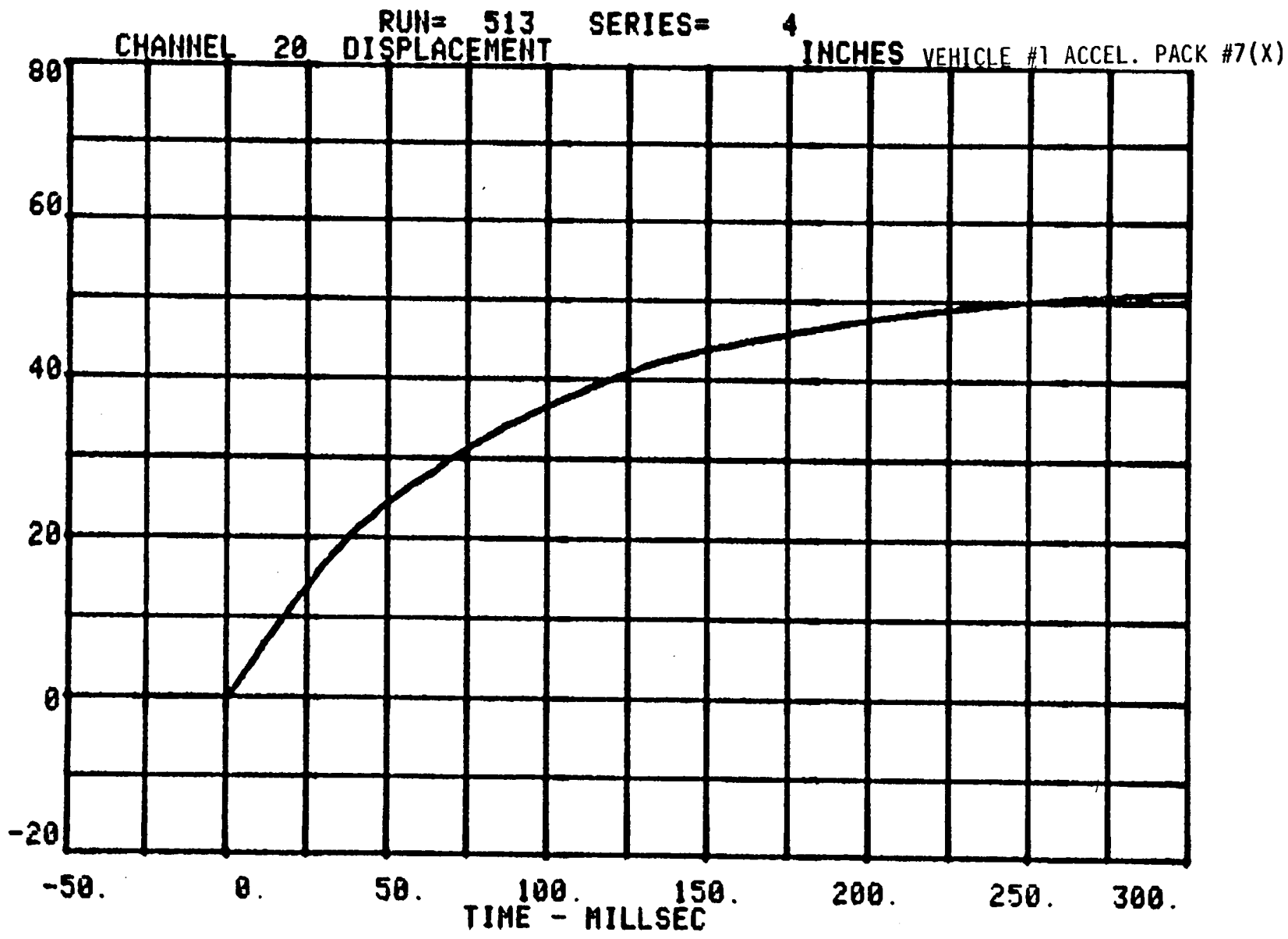

RUN= 513 SERIES= 4
CHANNEL 17 VELOCITY MPH
VEHICLE #1 ACCEL. PACK #6(X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

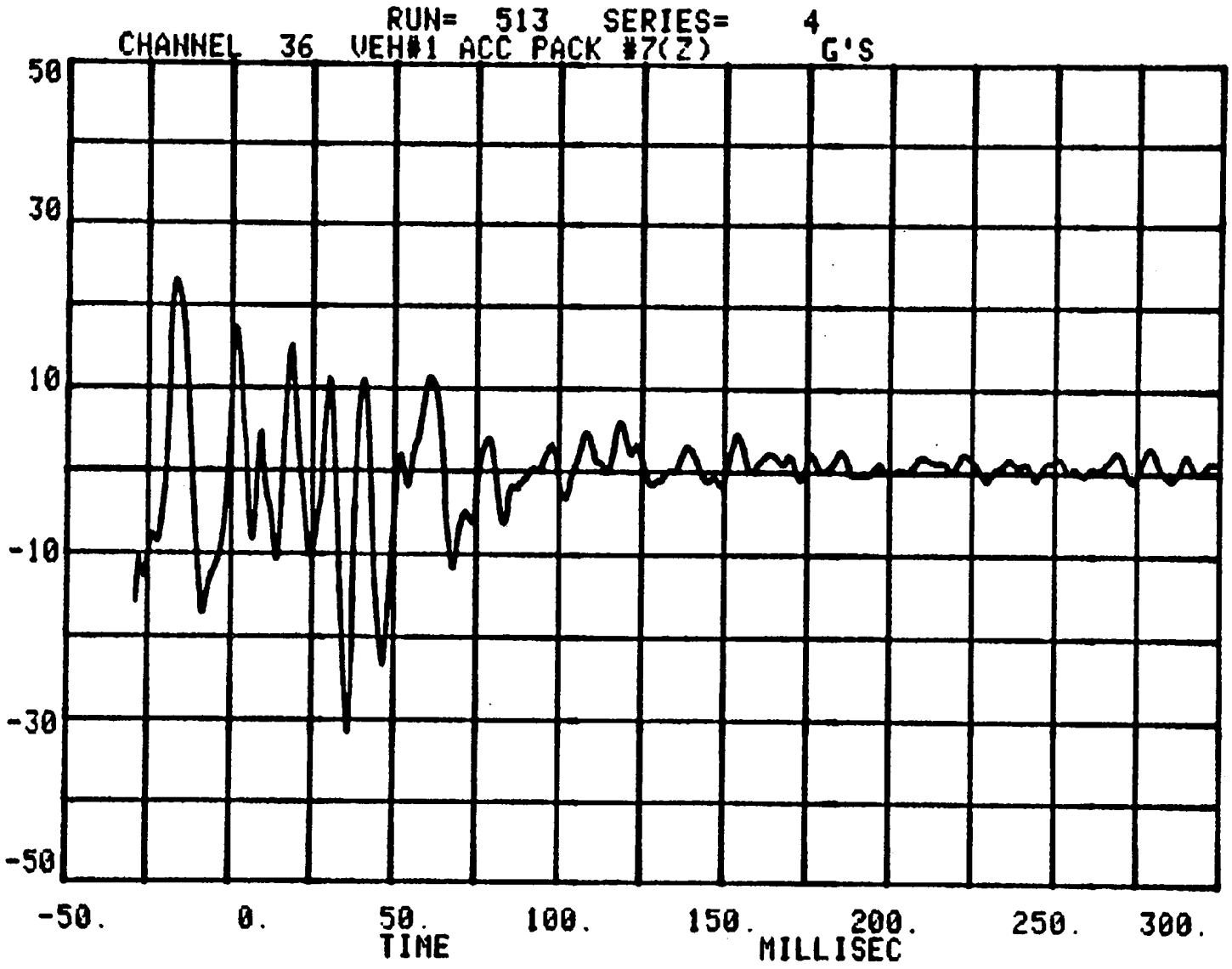

RUN= 513 SERIES= 4
CHANNEL 18 DISPLACEMENT INCHES
VEHICLE #1 ACCEL. PACK #6
80
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

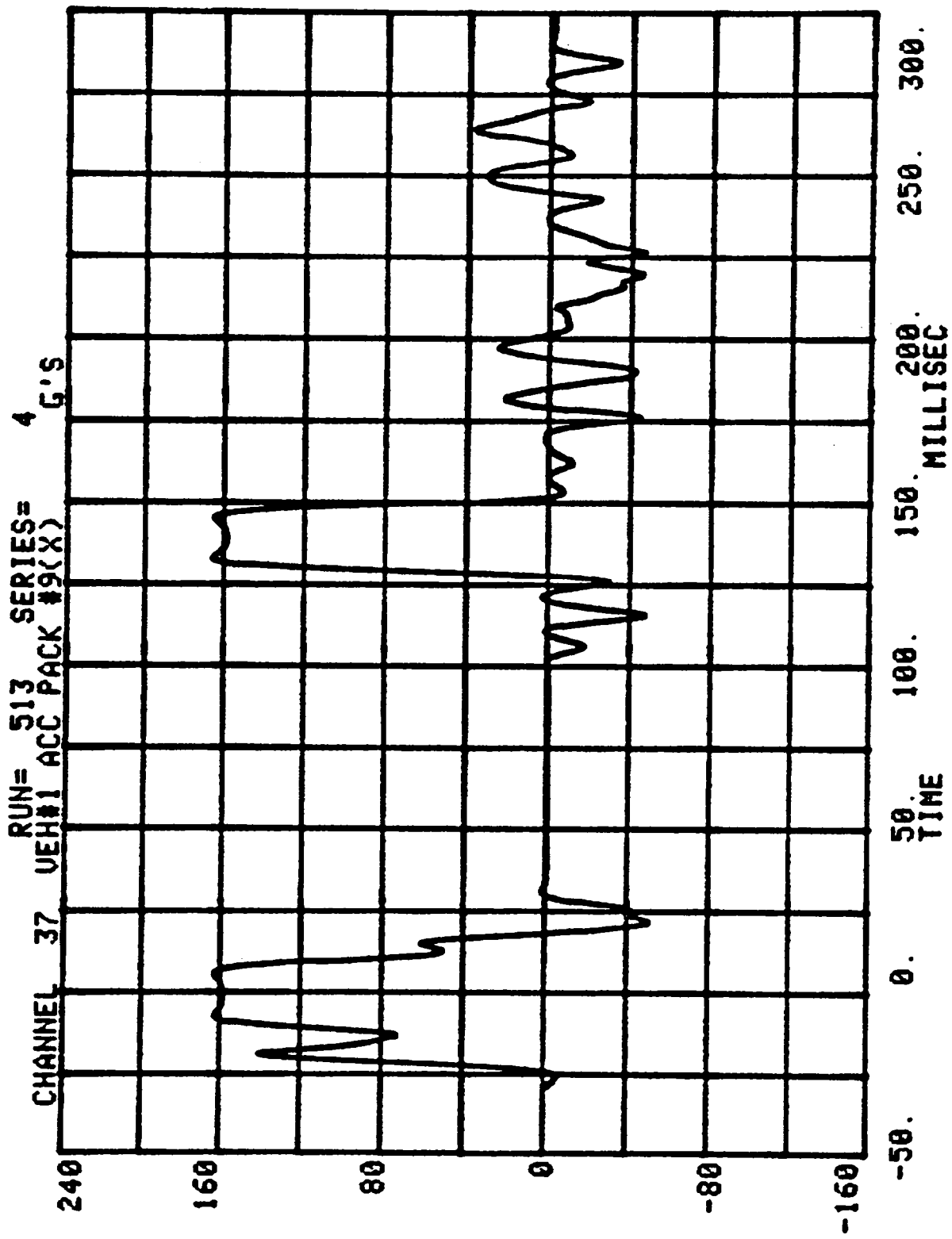

CHANNEL 34 VEH#1 ACC PACK #6(Z)
RUN= 513 SERIES= 4
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

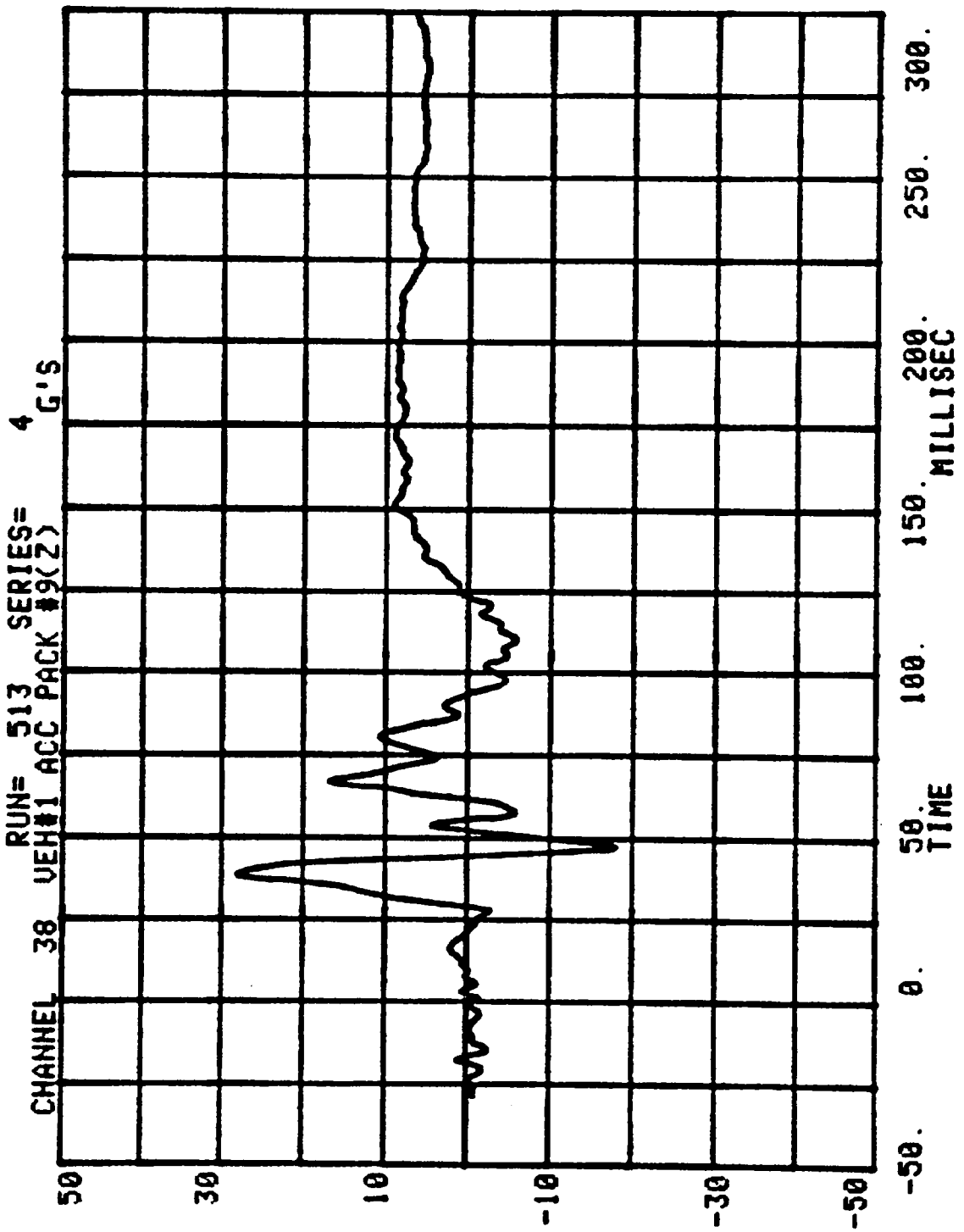

CHANNEL 35 VEH#1 ACC PACK #7(X)
RUN= 513 SERIES= 4
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

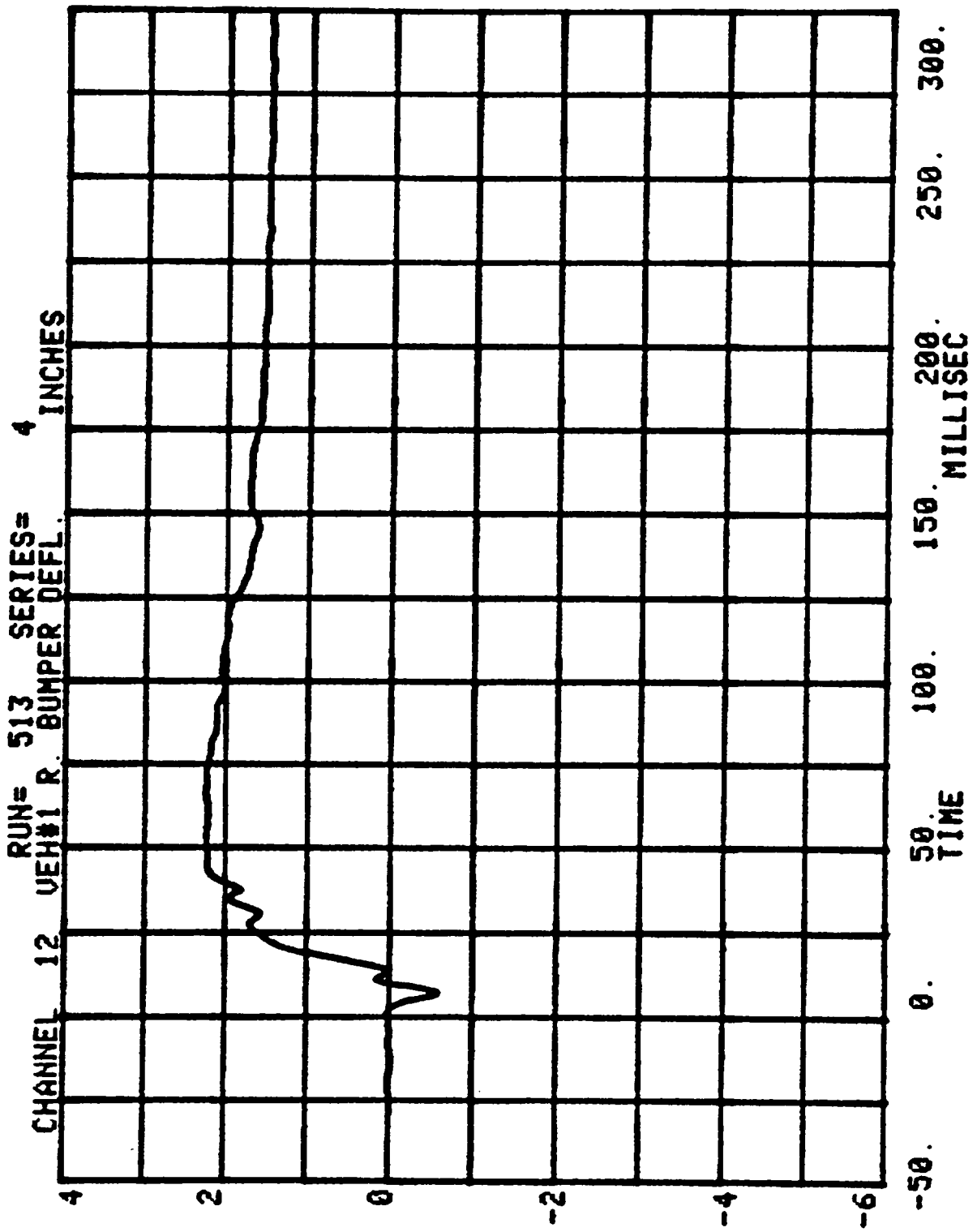

RUN= 513 SERIES= 4
CHANNEL 19 VELOCITY
MPH
VEHICLE #1 ACCEL. PACK #7(X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

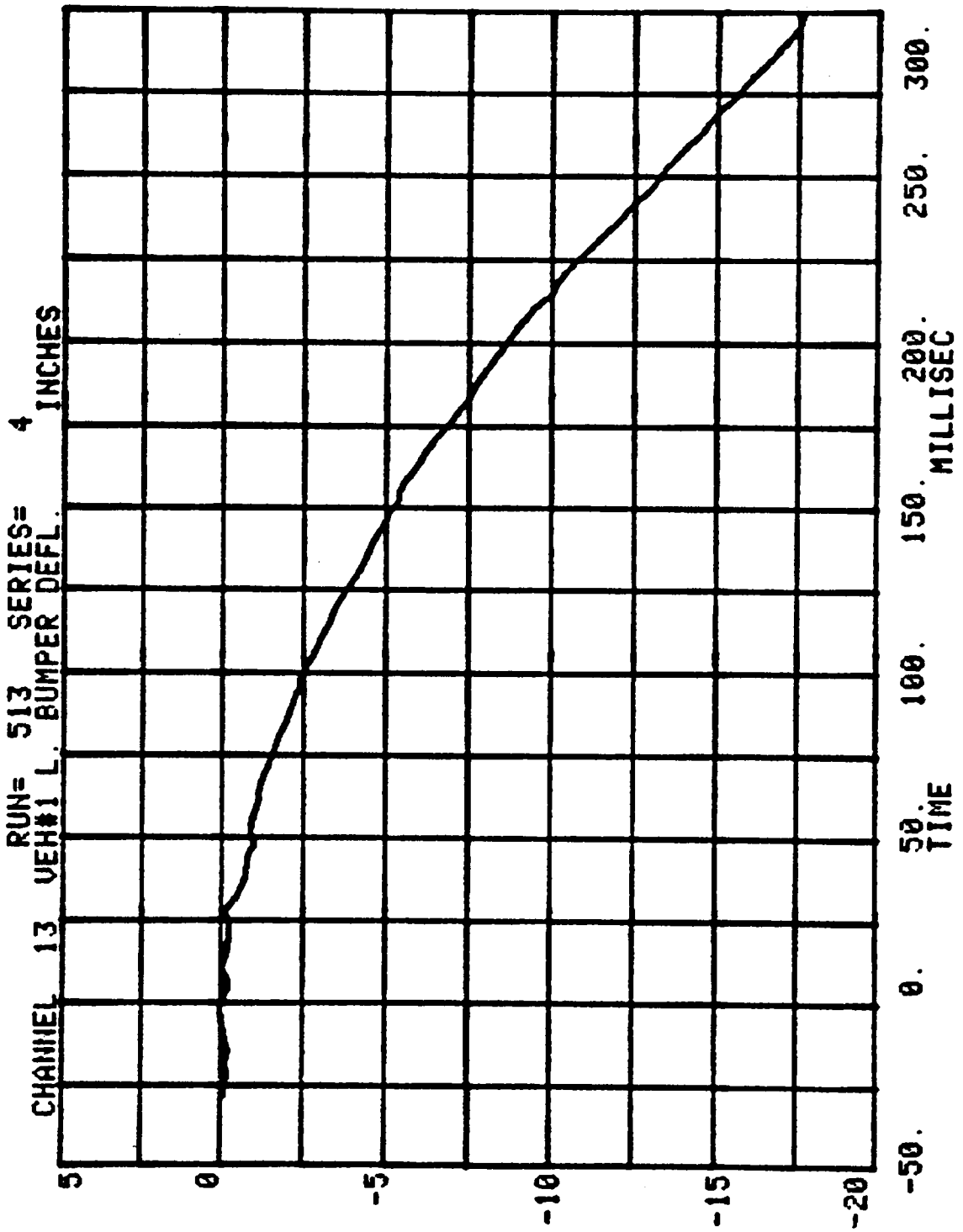

RUN= 513 SERIES= 4
CHANNEL 20 DISPLACEMENT
INCHES
VEHICLE #1 ACCEL. PACK #7(X)
80
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

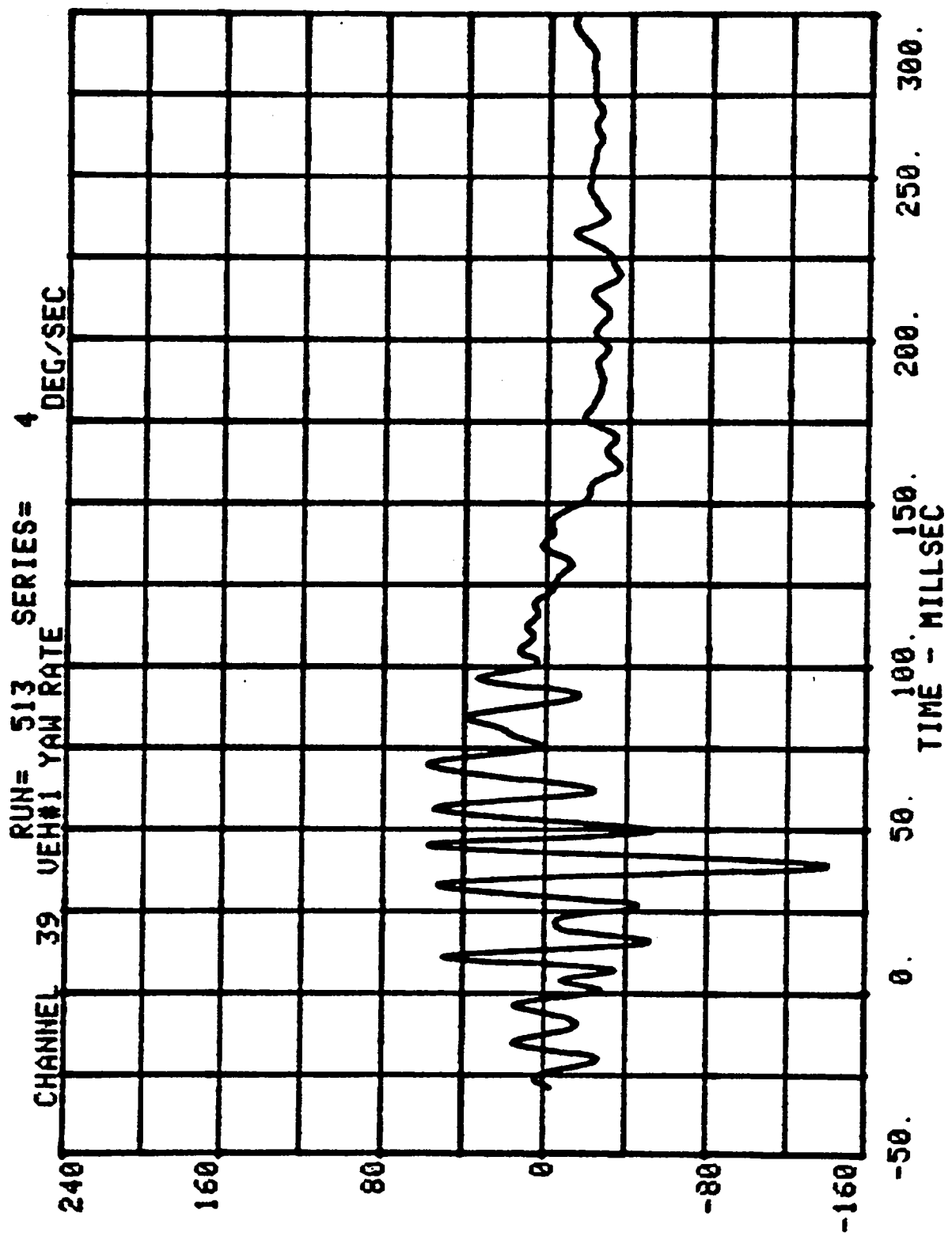

RUN= 513 SERIES= 4
CHANNEL 36 VEH#1 ACC PACK #7(Z) G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 37 VEH#1 ACC PACK #9(X)
RUN= 513 SERIES= 4
G'S
240
160
80
0
-80
-160
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

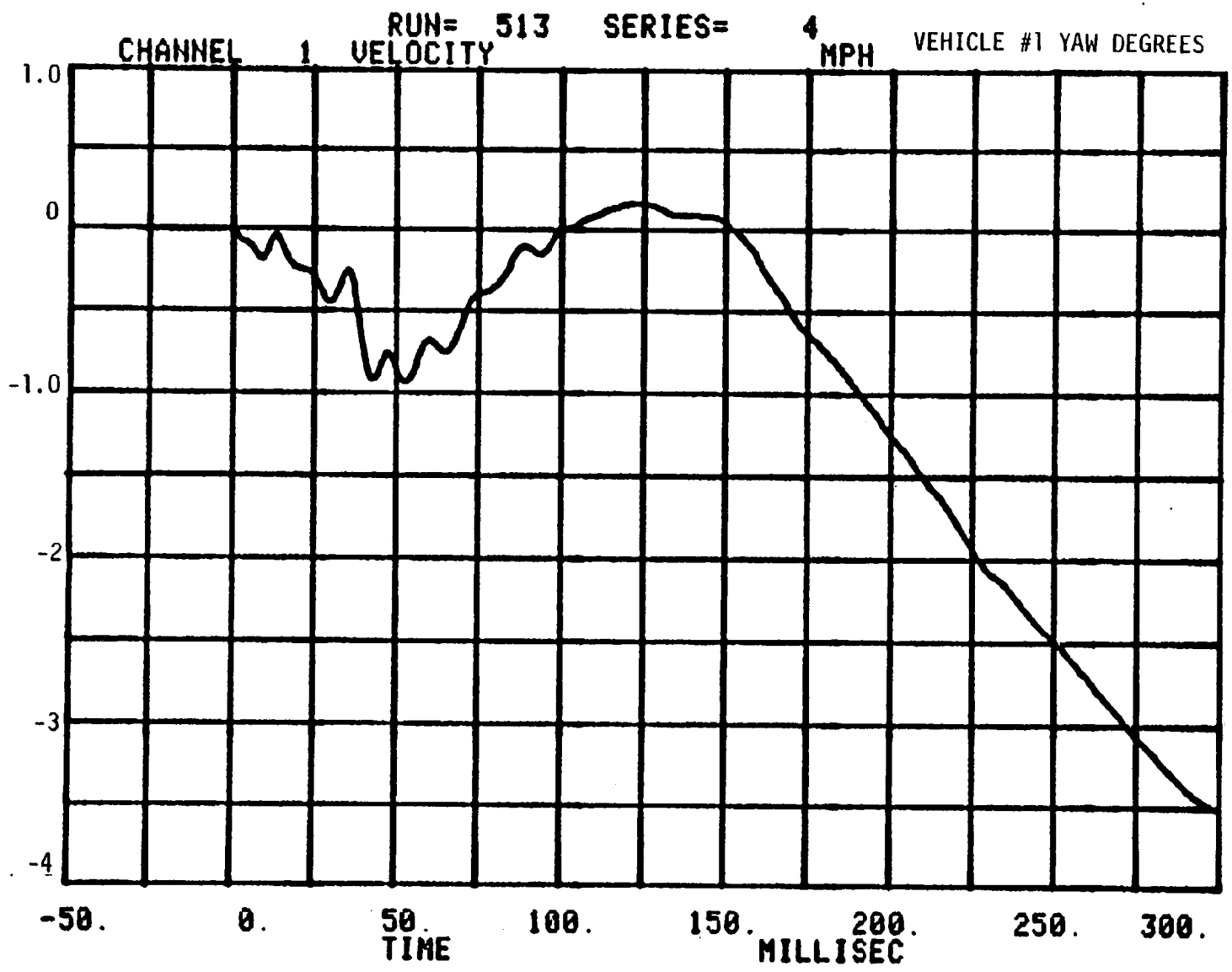

CHANNEL 38 VEH#1 ACC PACK #9(Z)
RUN= 513 SERIES= 4
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 12 VEH#1 R. BUMPER DEFL.
RUN= 513 SERIES= 4
INCHES
4
2
0
-2
-4
-6
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 13 VEH#1 L. BUMPER DEFL.
RUN= 513 SERIES= 4
INCHES
5
0
-5
-10
-15
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 39 VEH#1 YAW RATE
RUN= 513 SERIES= 4 DEG/SEC
240
160
80
0
-80
-160
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

VEHICLE #1 YAW ~ DEGREES



TEST NO. 614-4-513

1980 AMERICAN MOTORS CONCORD

DUMMY DATA

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

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

VEHICLE AGGRESSIVENESS CAR-TO-CAR TEST #4

RUN= 513

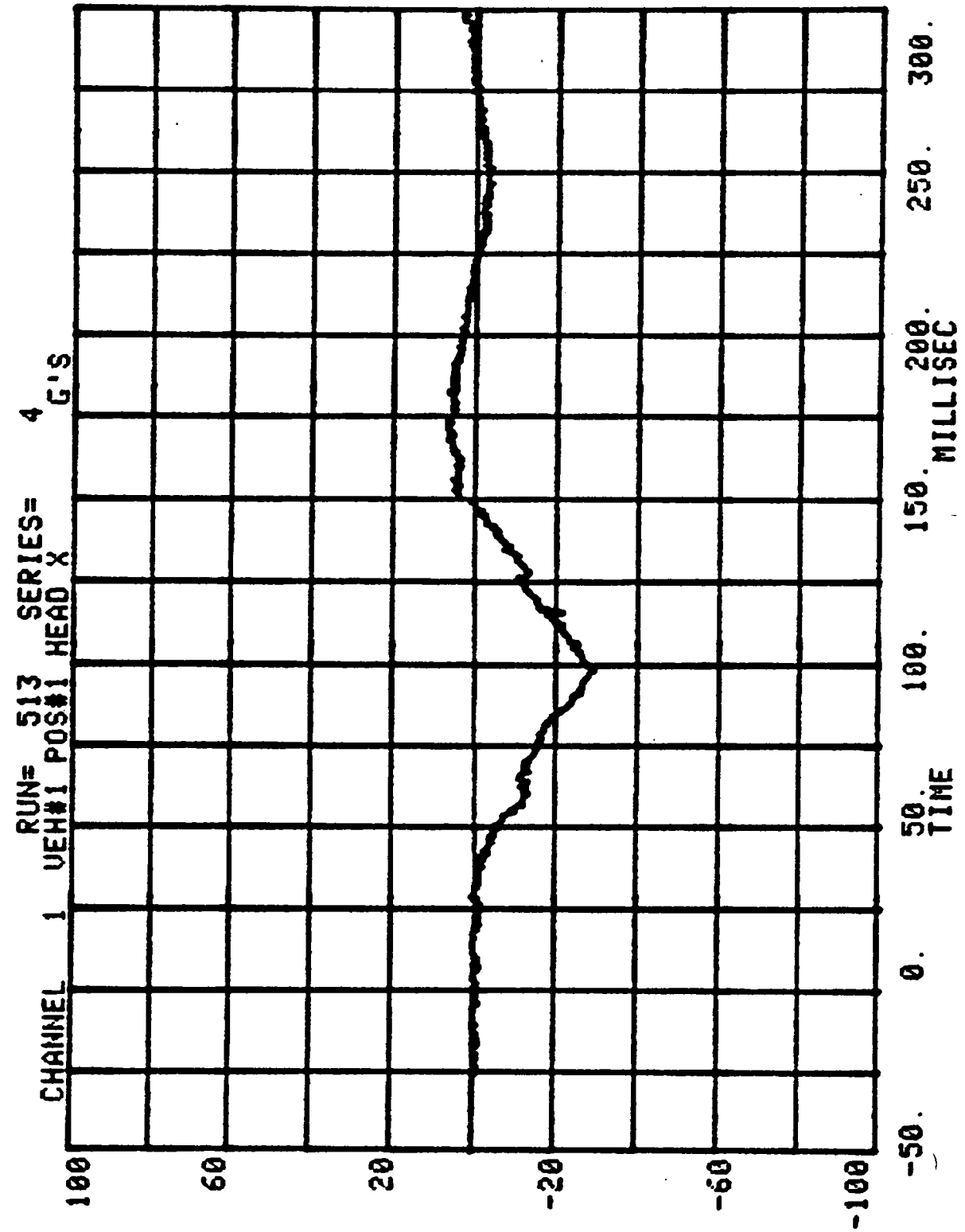
VEH#1 POS#1 HEAD RESULT

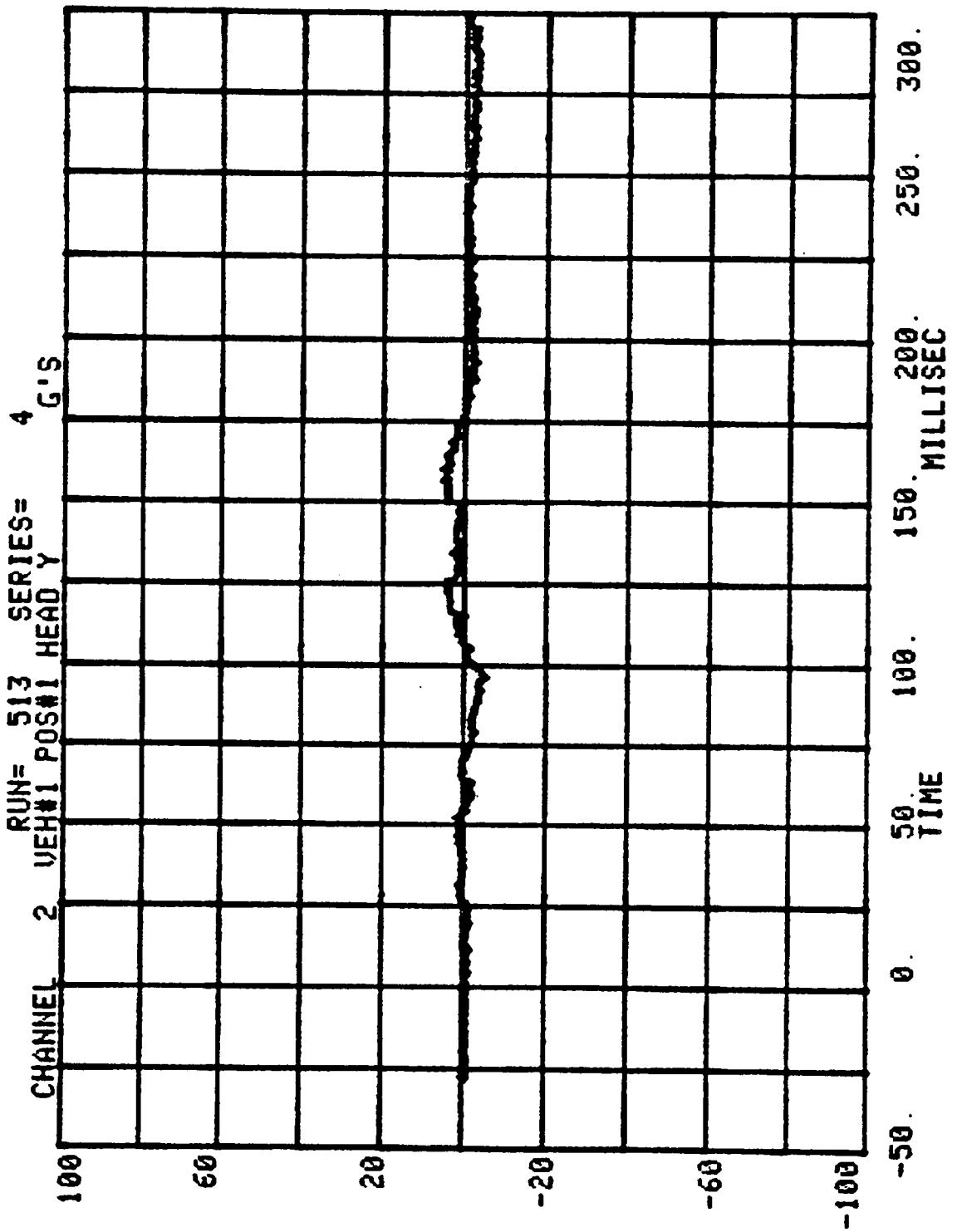
HIC= 161.0 FROM T1= .05430 TO T2= .12240

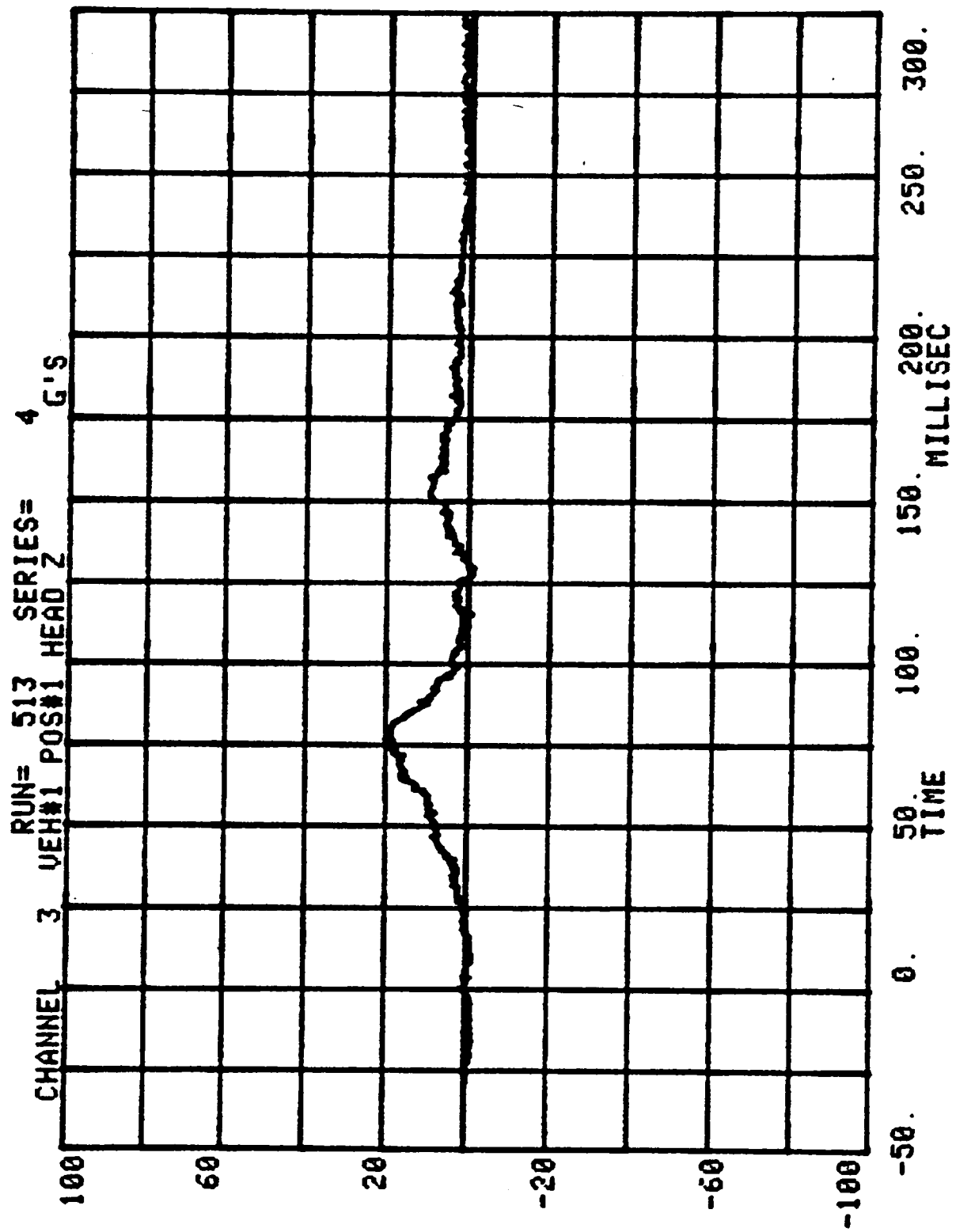
AVERAGE ACCELERATION BETWEEN T1 AND T2= 22.4G'S

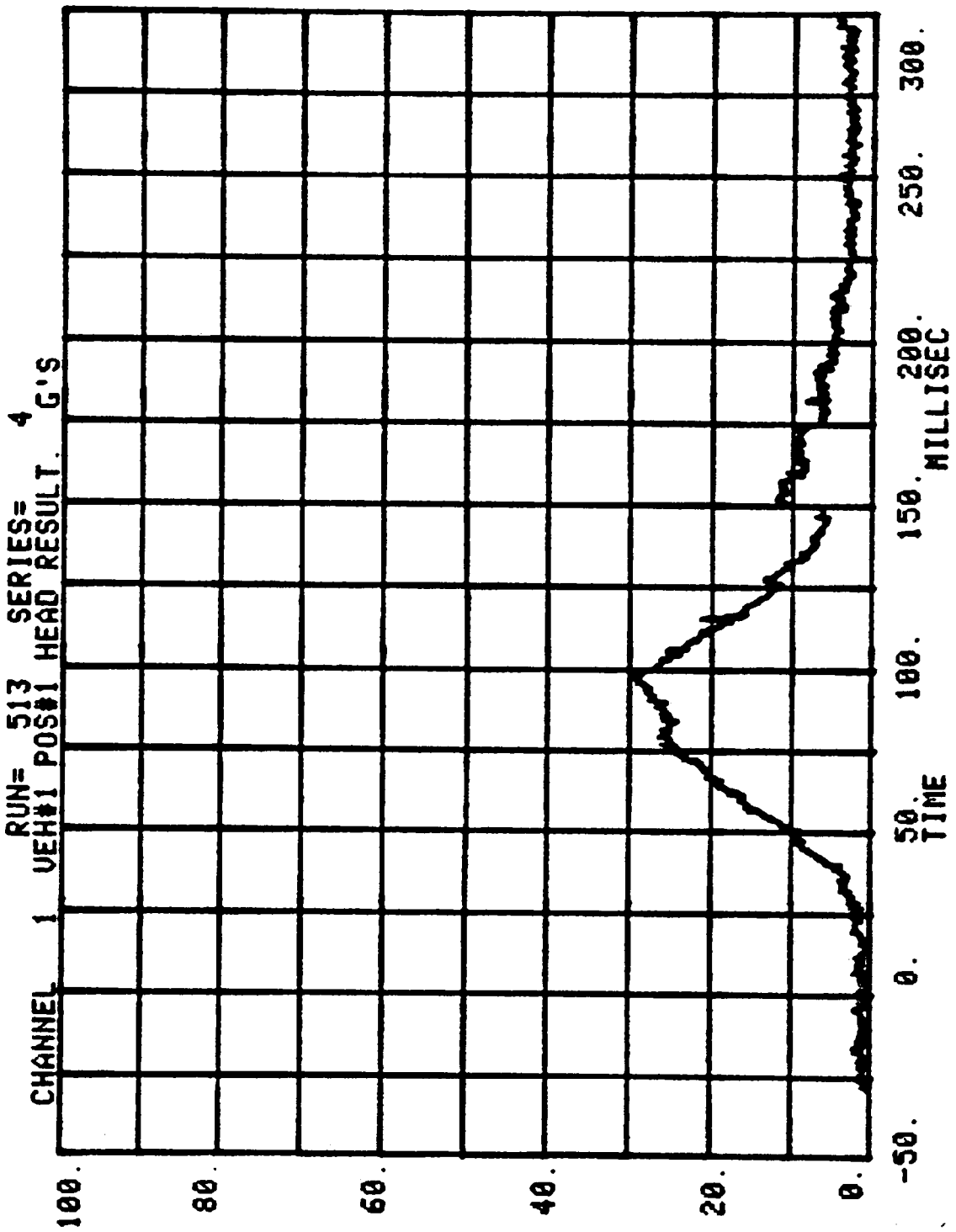
EVENT TIME= 300.0 MSEC

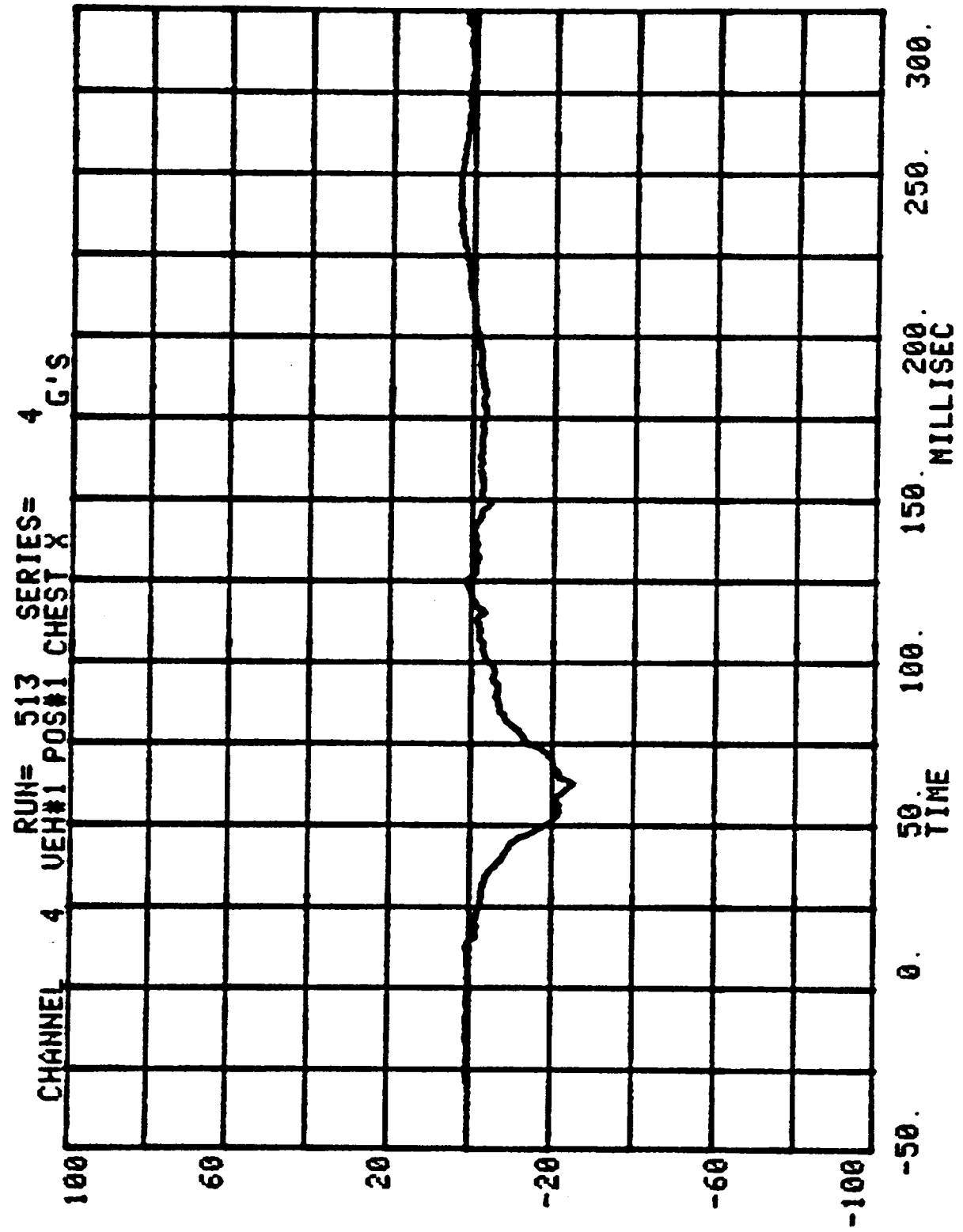
SEVERITY INDEX= 197.6

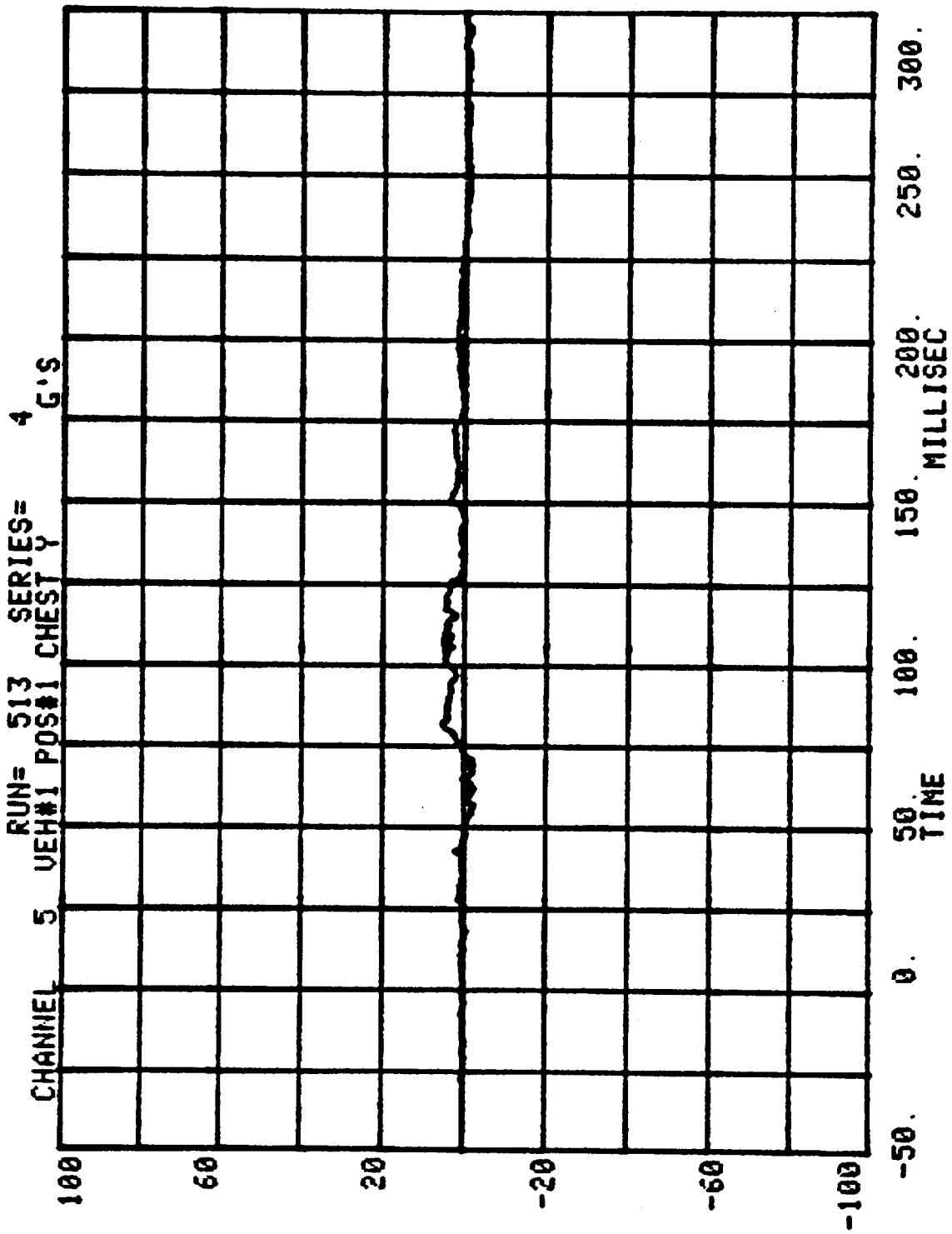

CHANNEL 1 VEH#1 POS#1 HEAD X
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

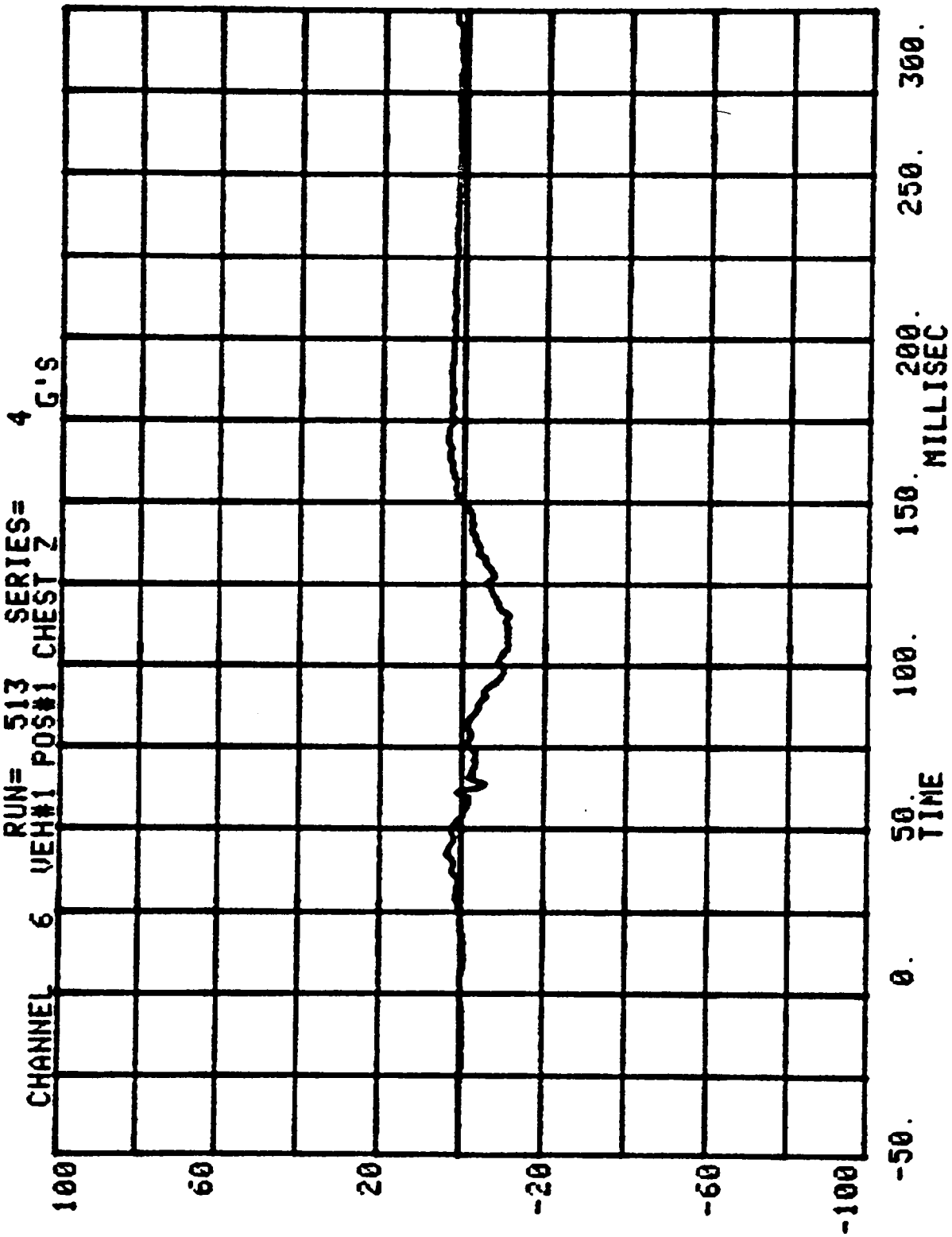

CHANNEL 2 VEH#1 POS#1 HEAD Y
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

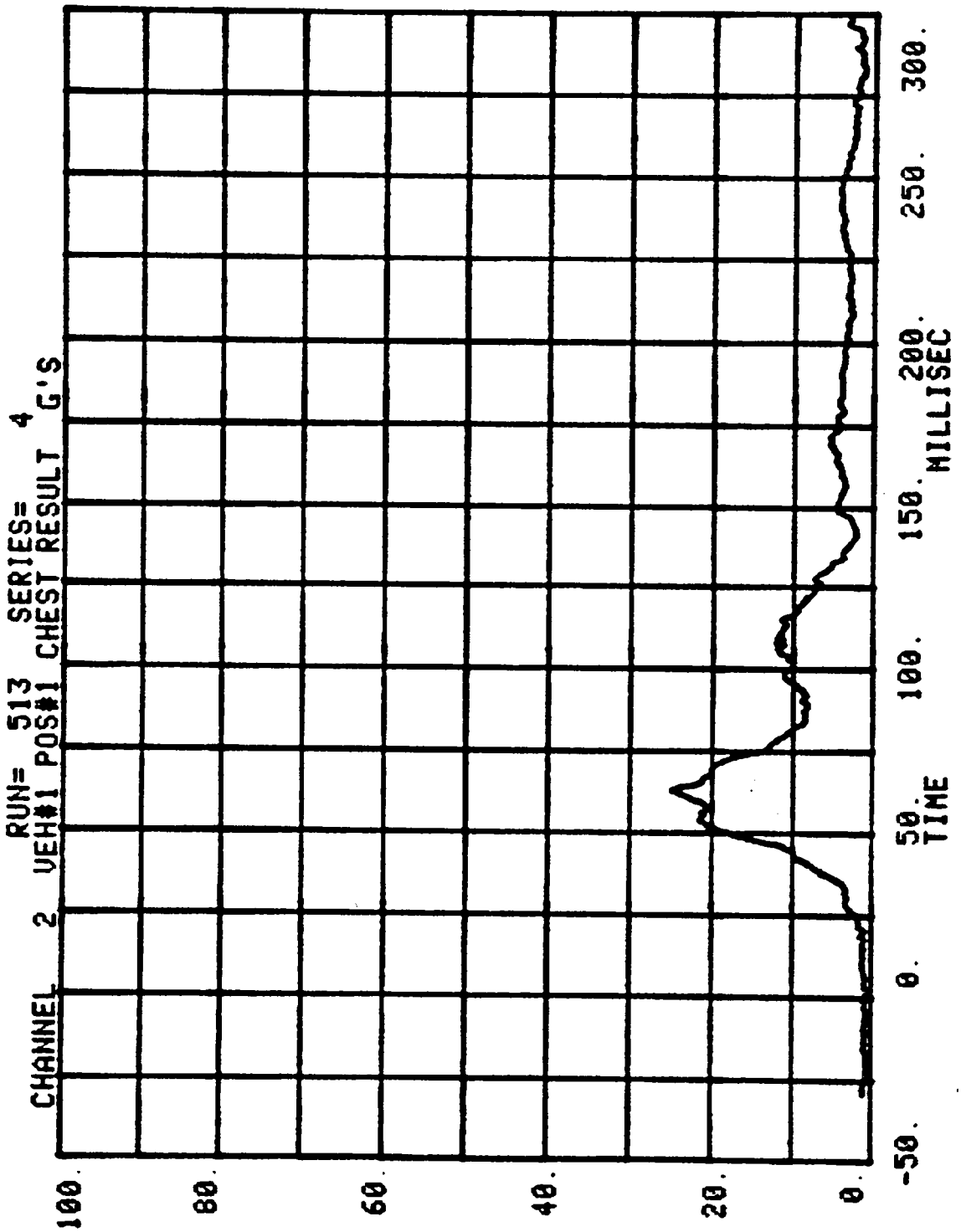

CHANNEL 3 VEH#1 POS#1 HEAD Z
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

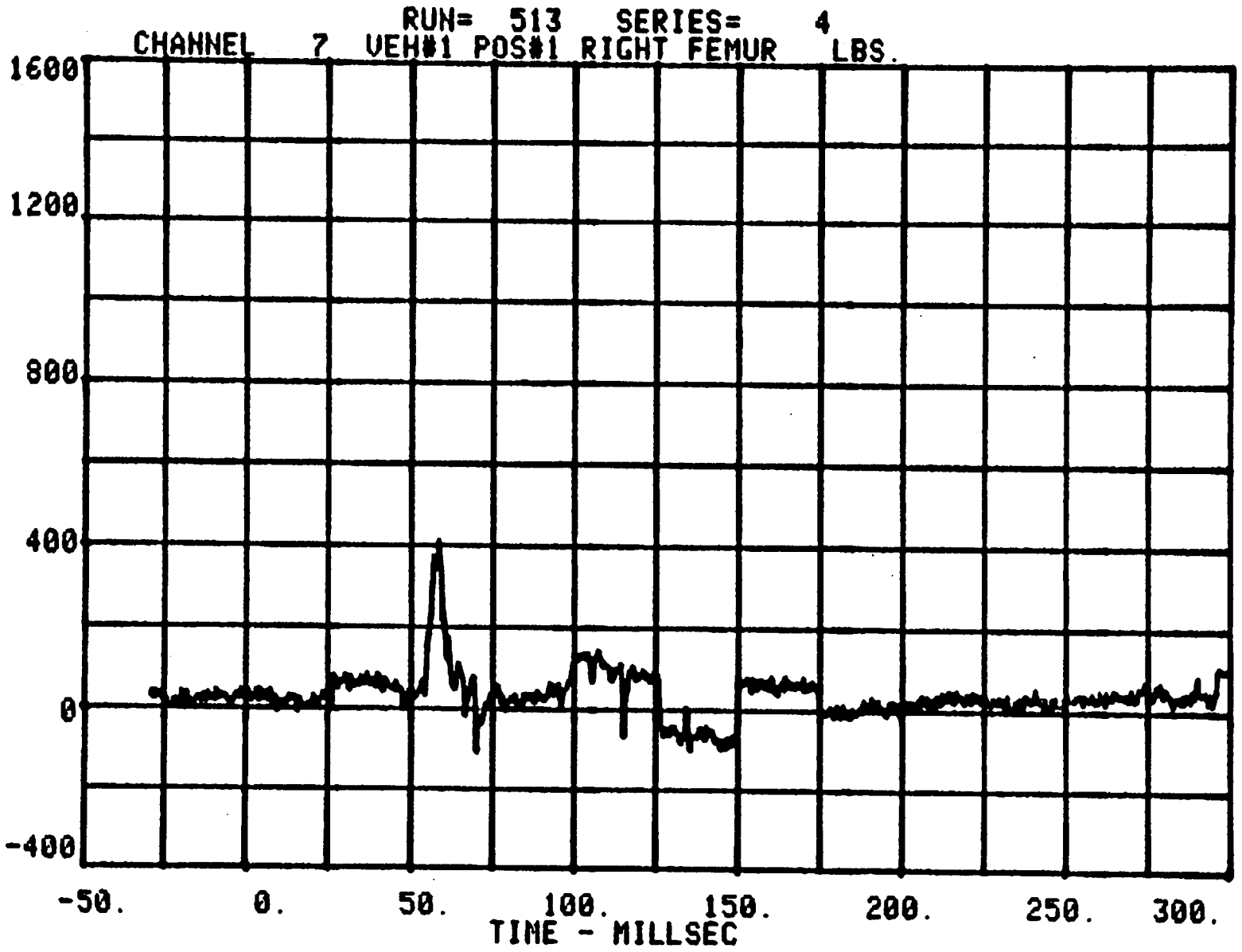

CHANNEL 1 VEH#1 POS#1 RUN= 513 SERIES= 4
HEAD RESULT. G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

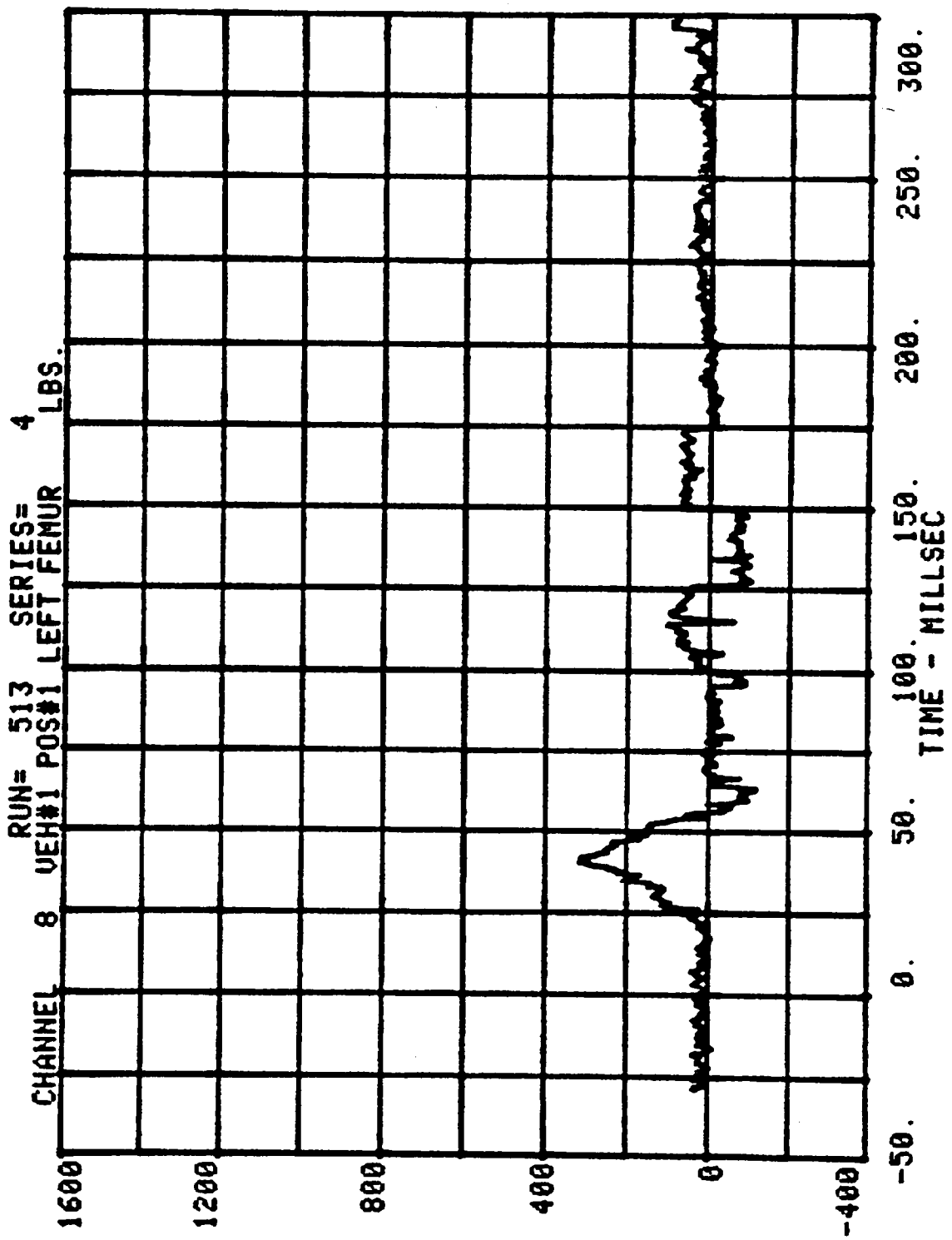

CHANNEL 4 VEH#1 POS#1 CHEST X
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

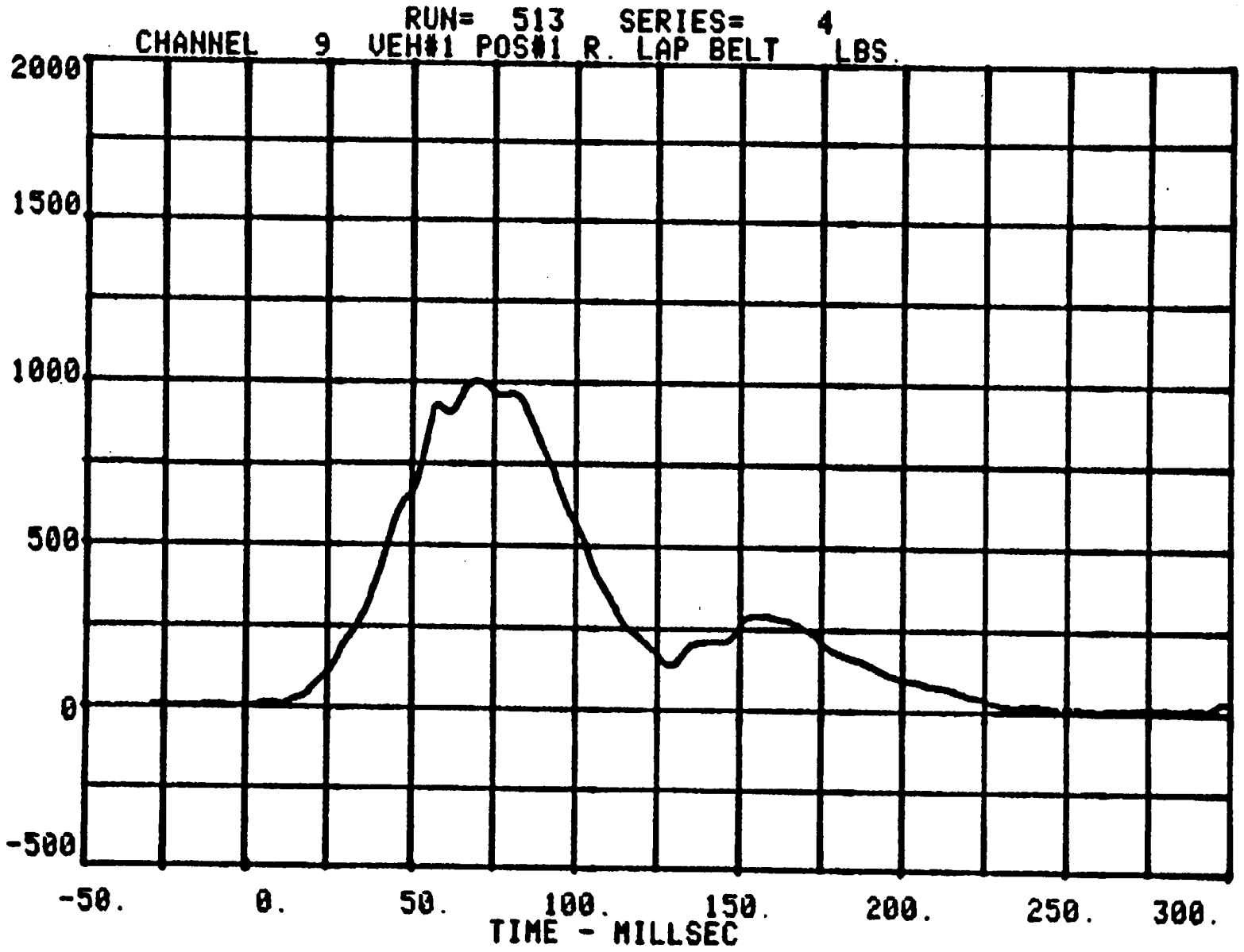

CHANNEL 5 VEH#1 POS#1 CHEST Y
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

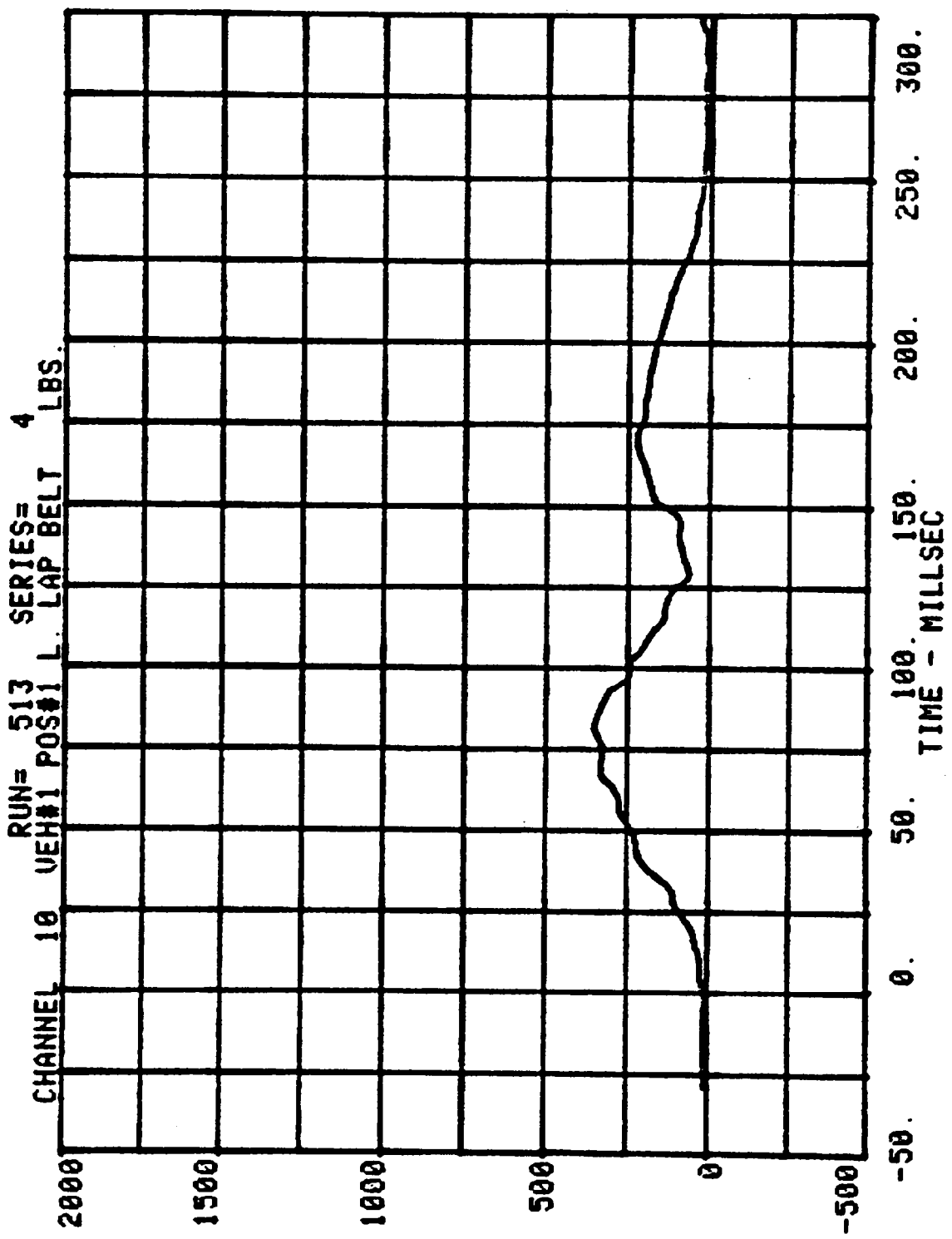

CHANNEL 6 VEH#1 POS#1 CHEST Z
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

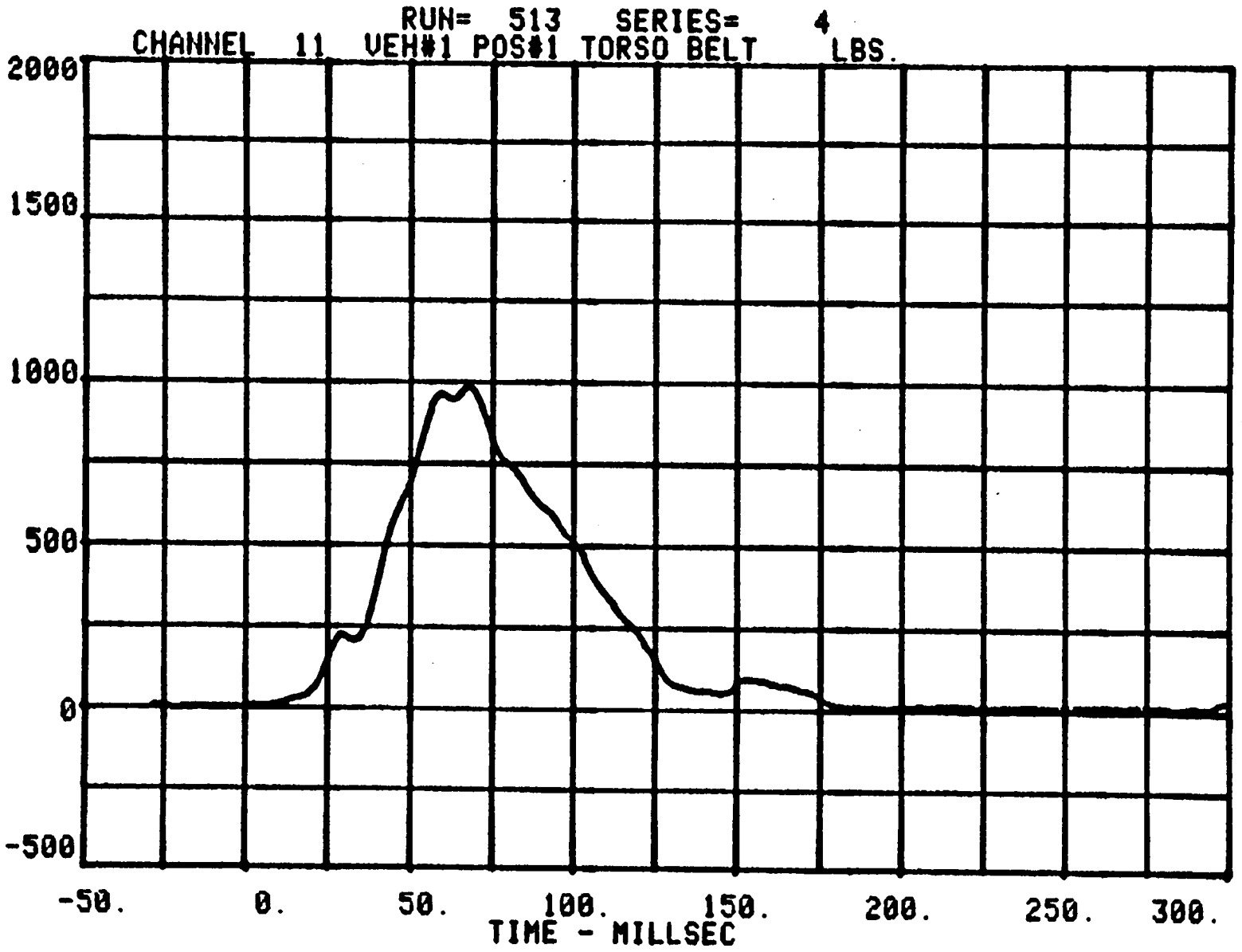

CHANNEL 2 RUN= 513 SERIES= 4
VEH#1 POS#1 CHEST RESULT G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


RUN= 513 SERIES= 4
CHANNEL 7 VEH#1 POS#1 RIGHT FEMUR LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


CHANNEL 8 VEH#1 POS#1 LEFT FEMUR
RUN= 513 SERIES= 4
LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


RUN= 513 SERIES= 4
CHANNEL 9 VEH#1 POS#1 R. LAP BELT LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


CHANNEL 10 VEH#1 POS#1 L. LAP BELT
RUN= 513 SERIES= 4
LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


RUN= 513 SERIES= 4
CHANNEL 11 VEH#1 POS#1 TORSO BELT LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

VEHICLE AGGRESSIVENESS CAR-TO-CAR TEST #4

RUN= 513

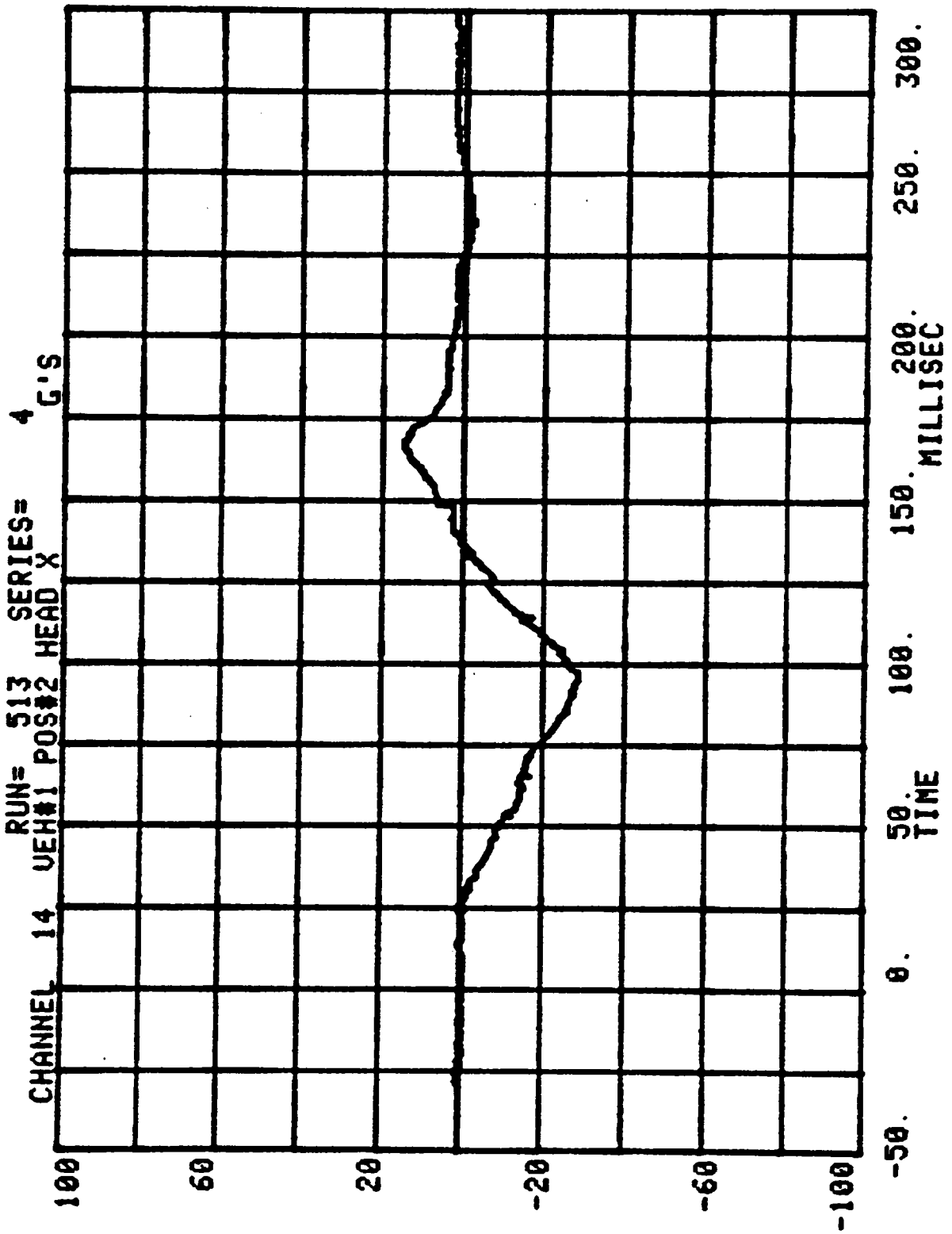
VEH#1 POS#2 HEAD RESULT.

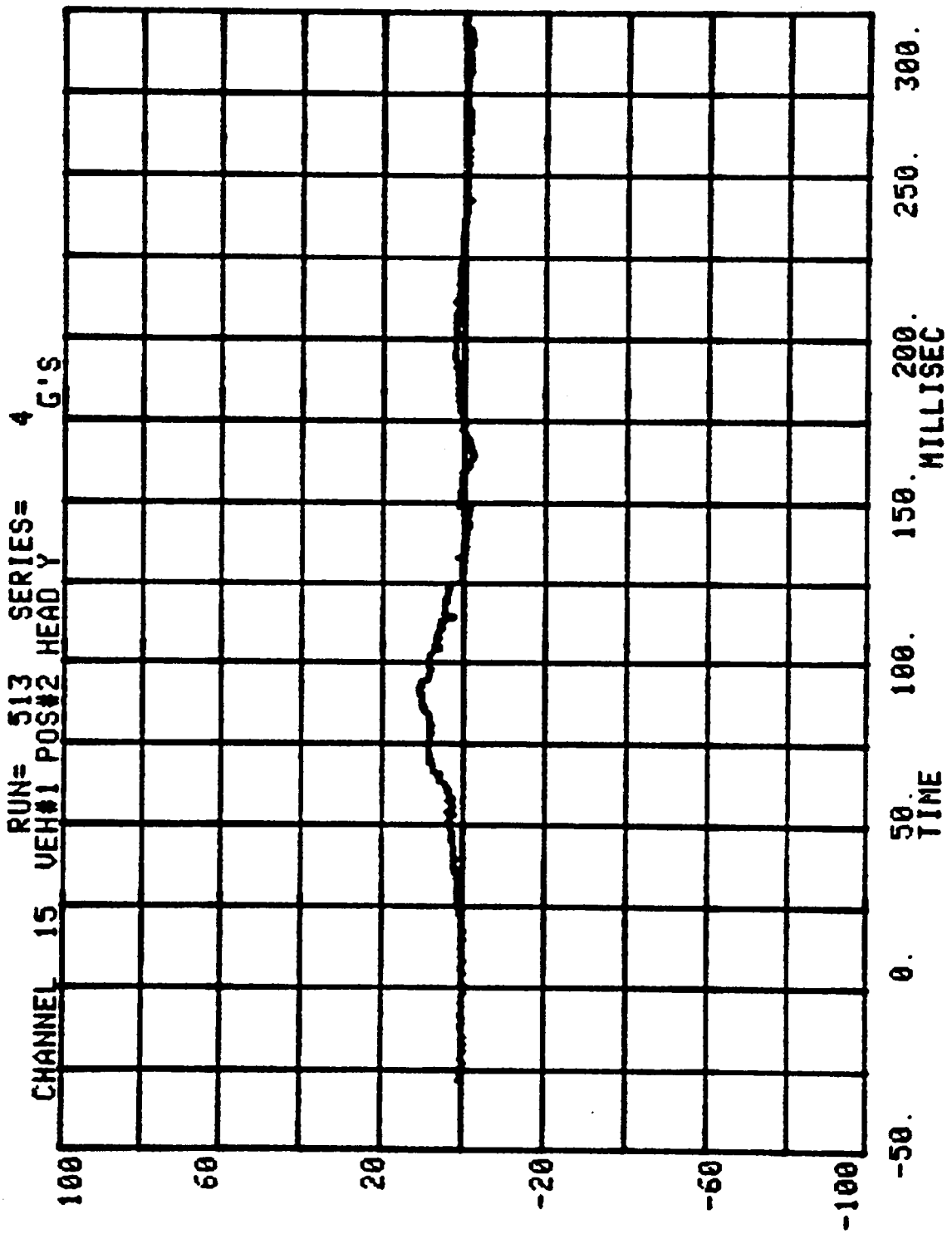
HIC= 177.1 FROM T1= .04980 TO T2= .11670

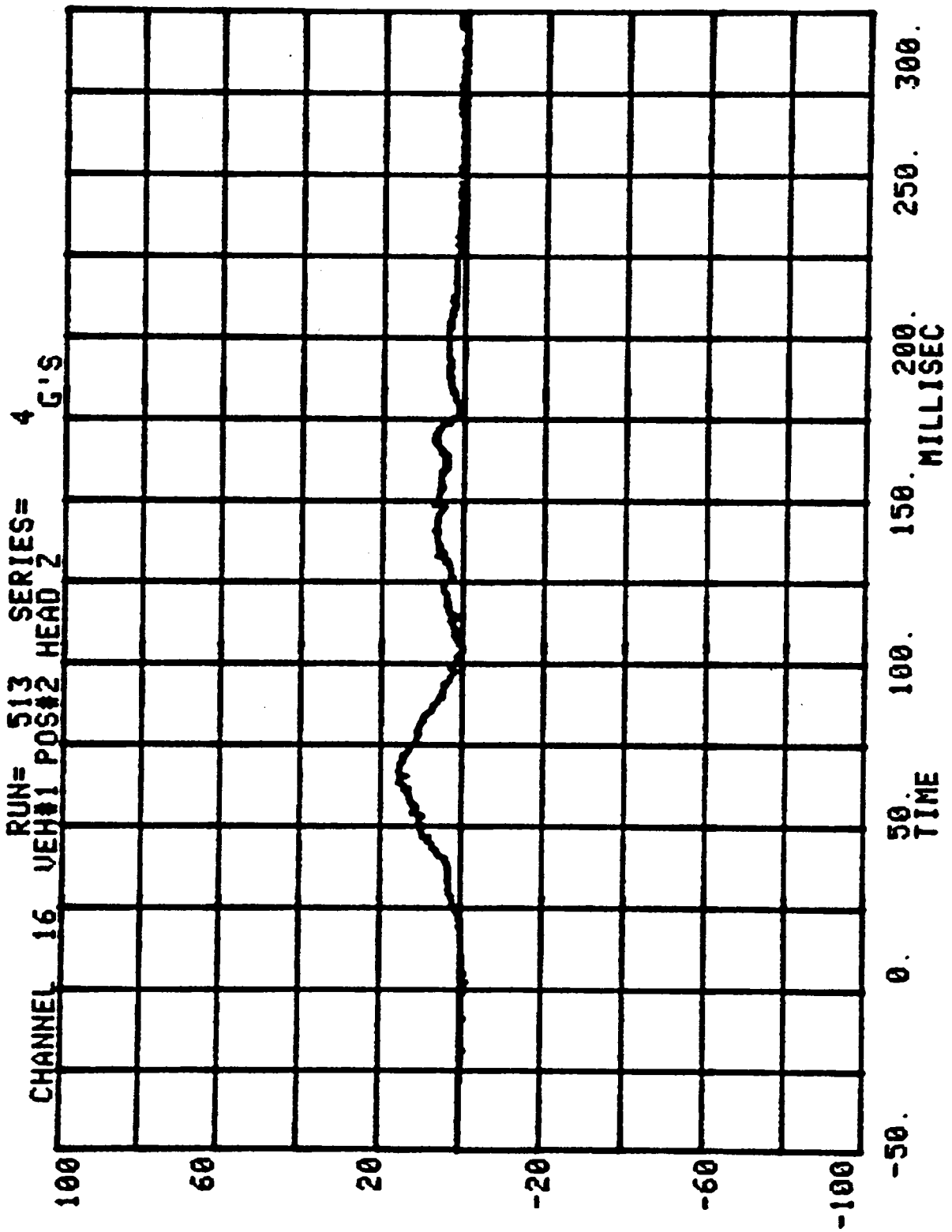
AVERAGE ACCELERATION BETWEEN T1 AND T2= 23.4G'S

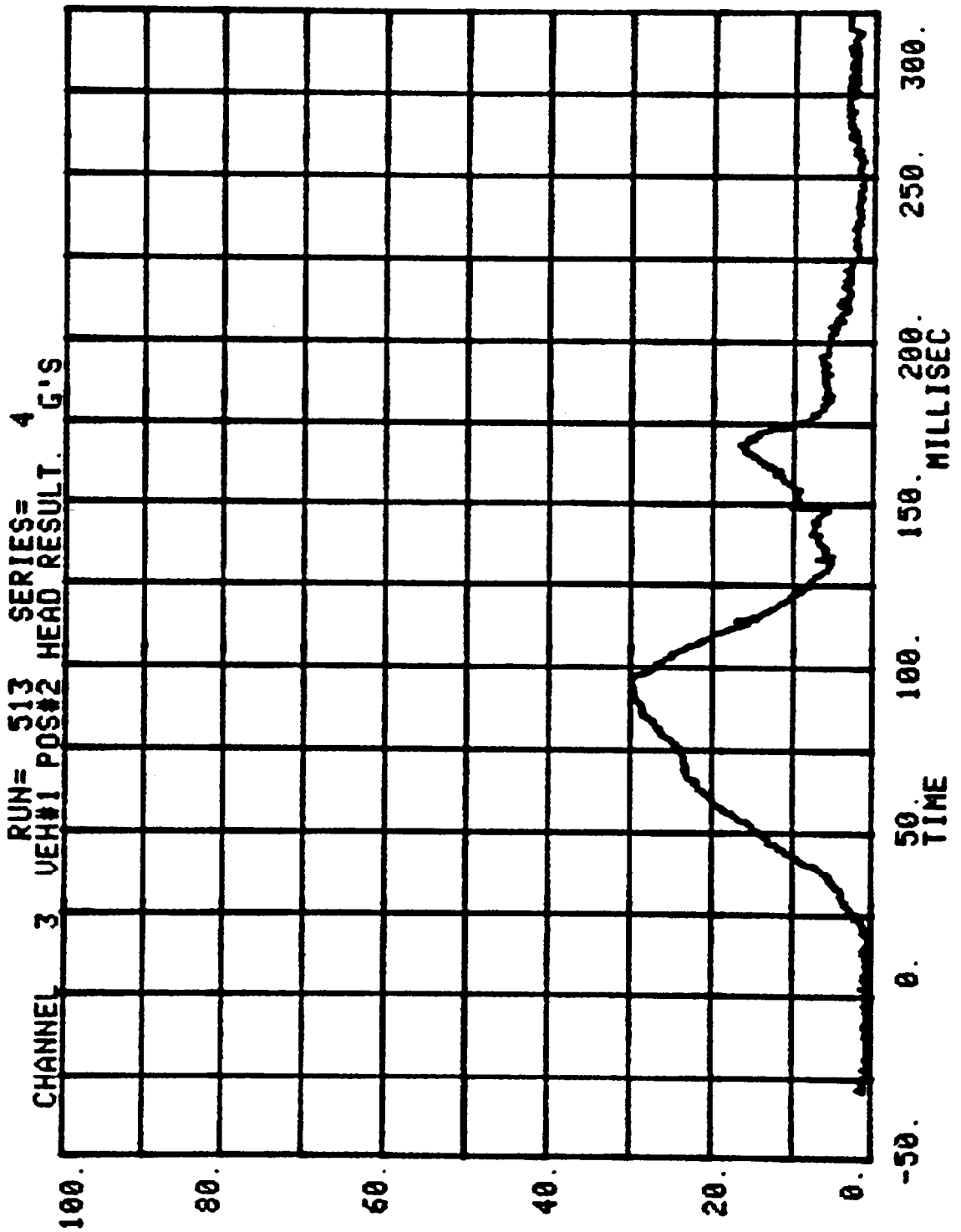
EVENT TIME= 300.0 MSEC

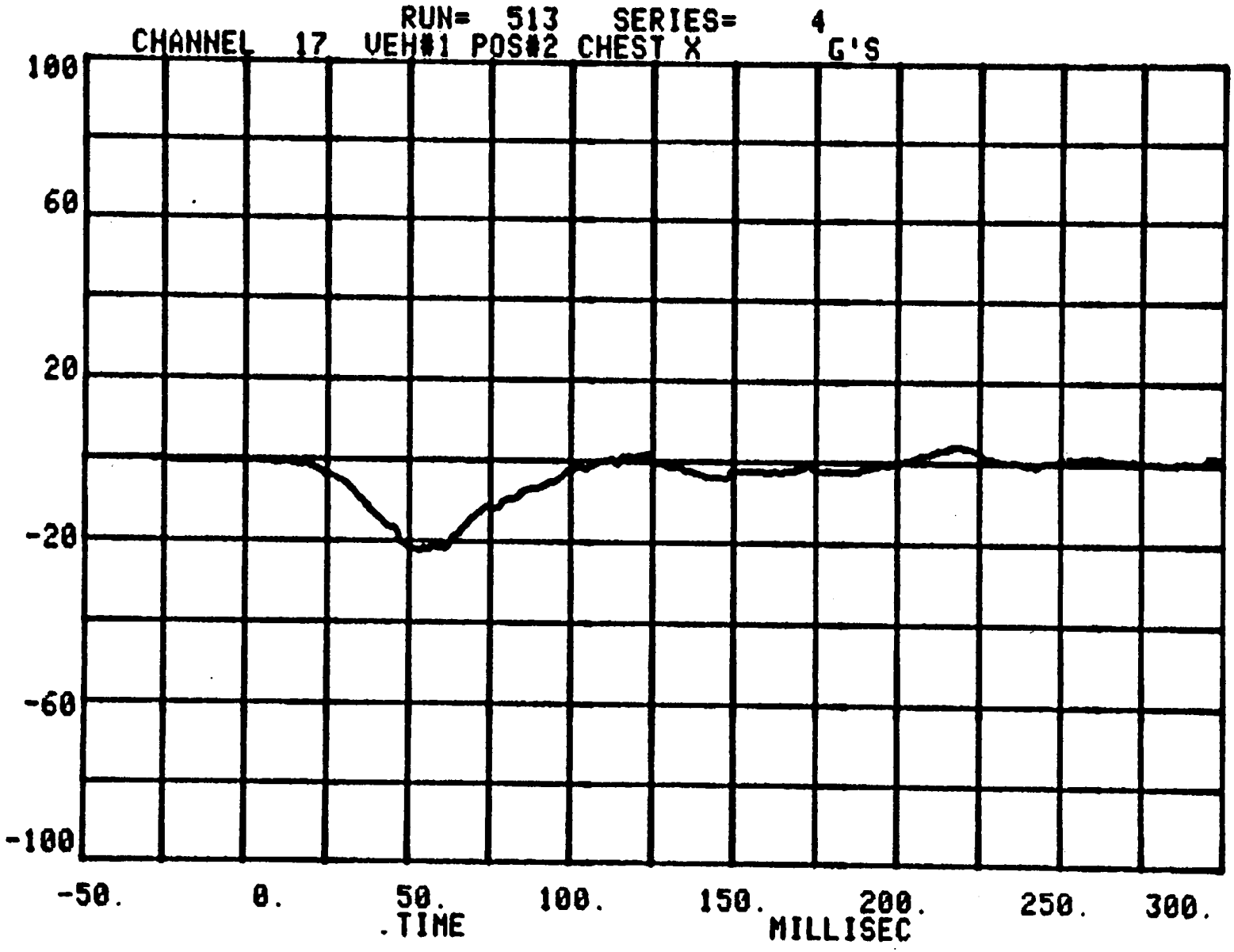
SEVERITY INDEX= 221.1

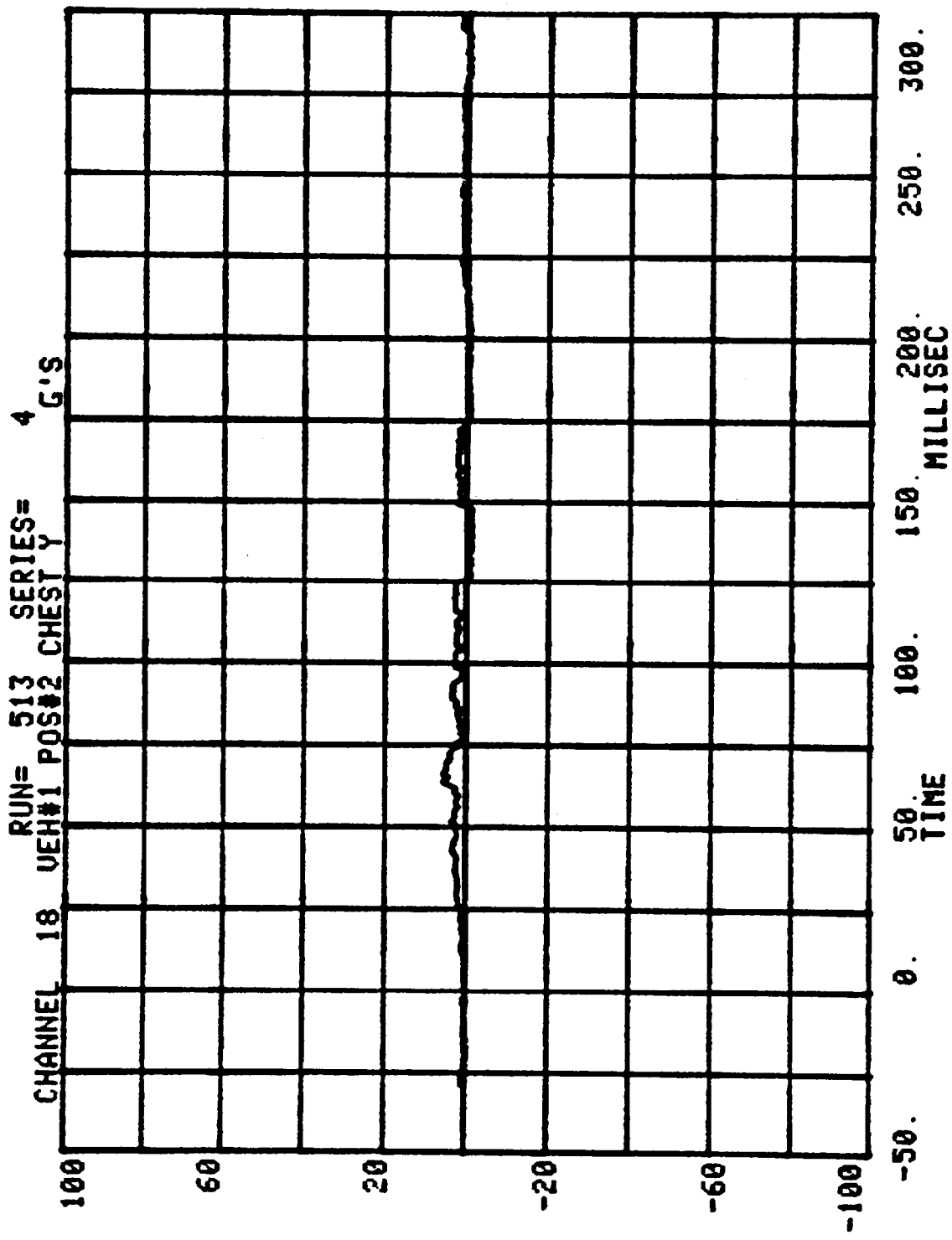

CHANNEL 14 VEH#1 POS#2 HEAD X
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 15 VEH#1 POS#2 HEAD Y
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

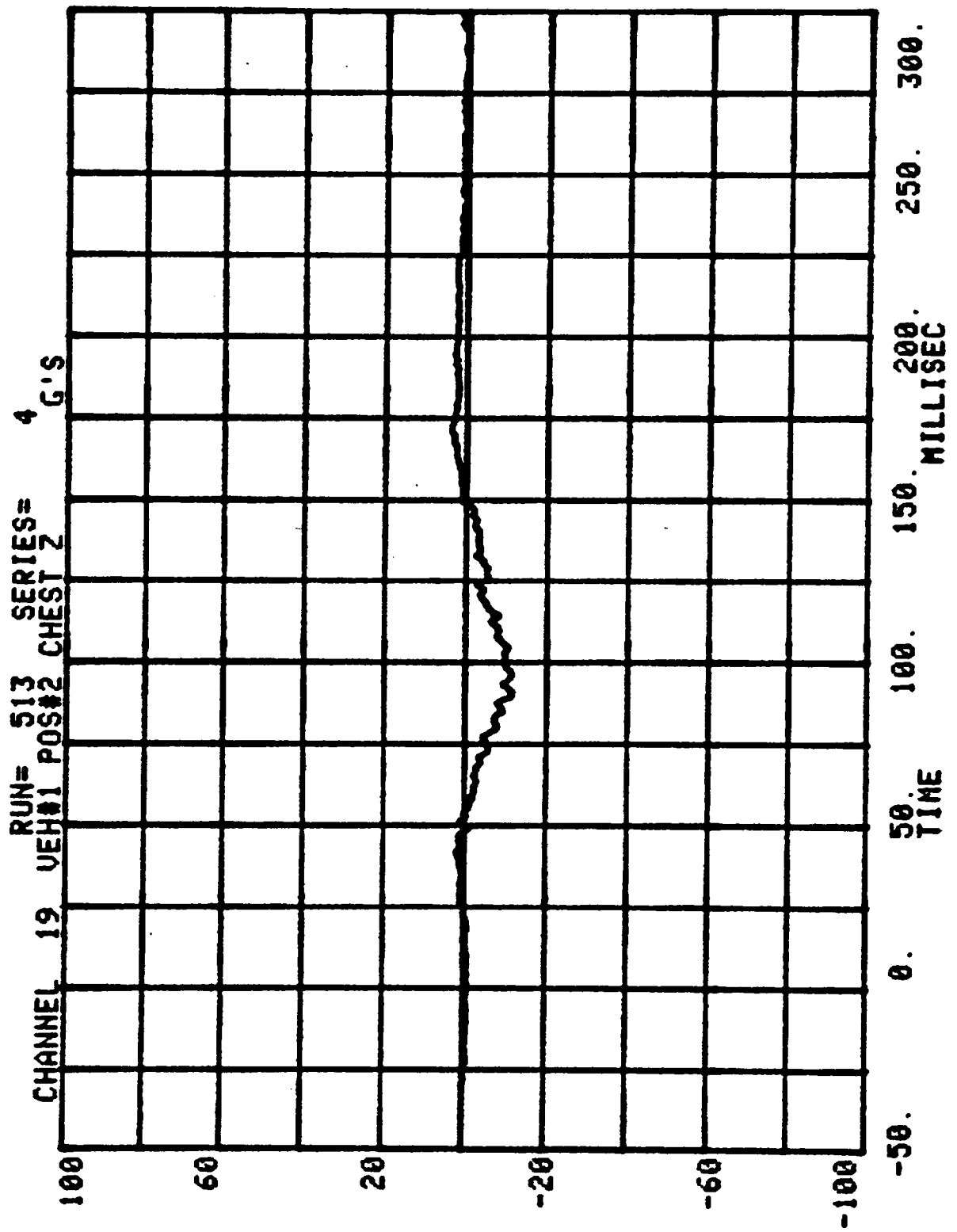

CHANNEL 16
RUN= 513
VEH#1 POS#2
SERIES= 4
HEAD 2
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

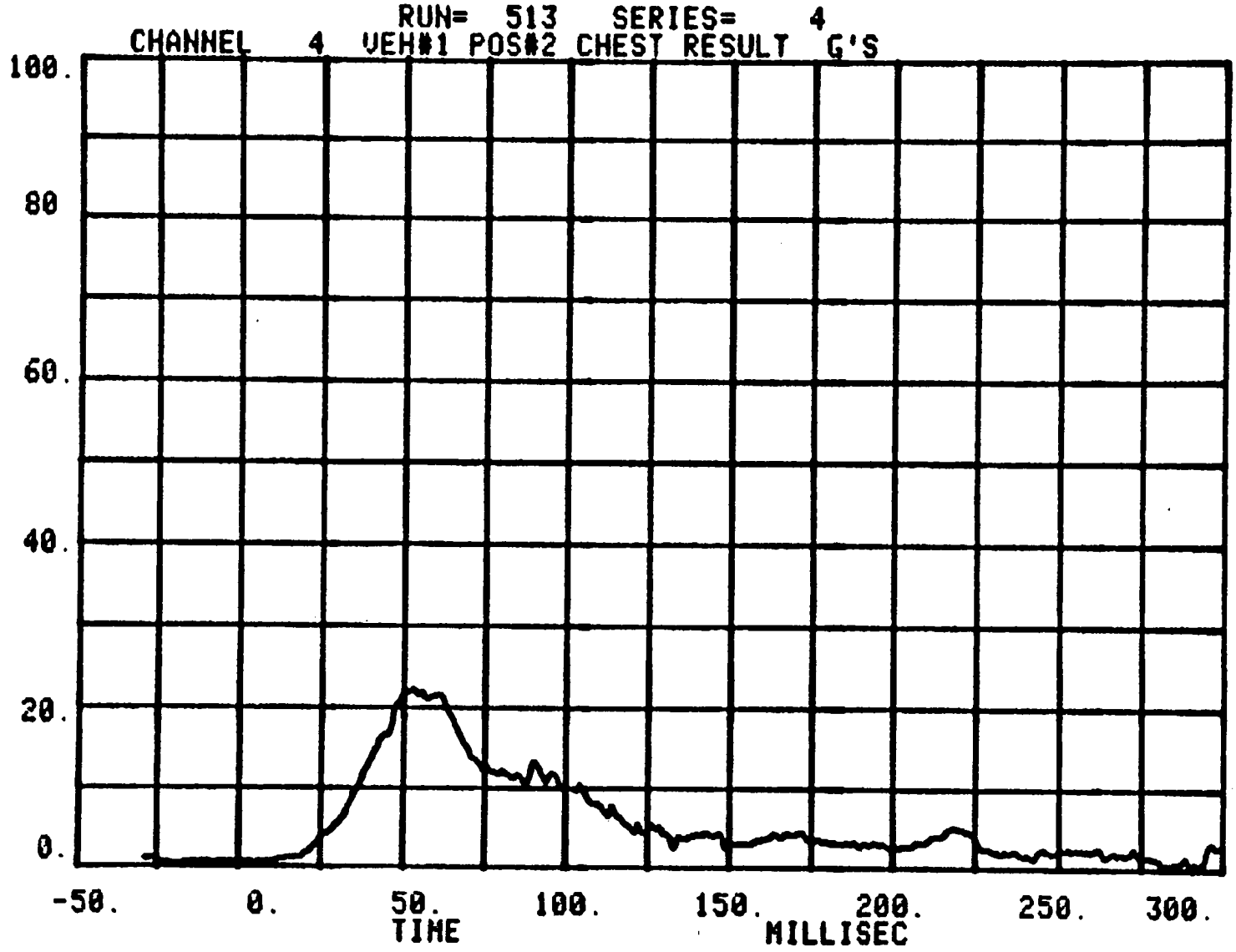

CHANNEL 3 RUN= 513 SERIES= 4
VEH#1 POS#2 HEAD RESULT. G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

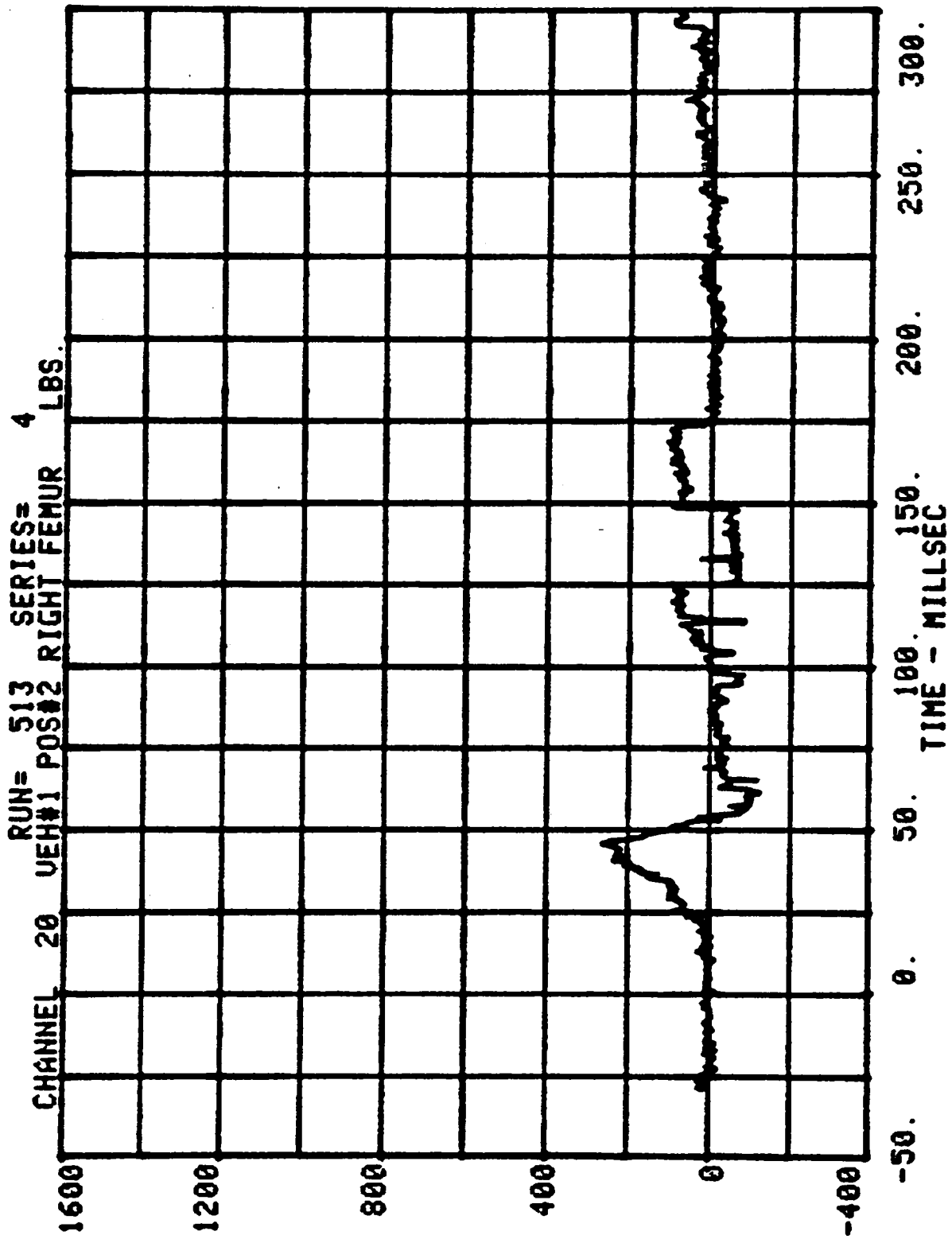

RUN= 513 SERIES= 4
CHANNEL 17 VEH#1 POS#2 CHEST X G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

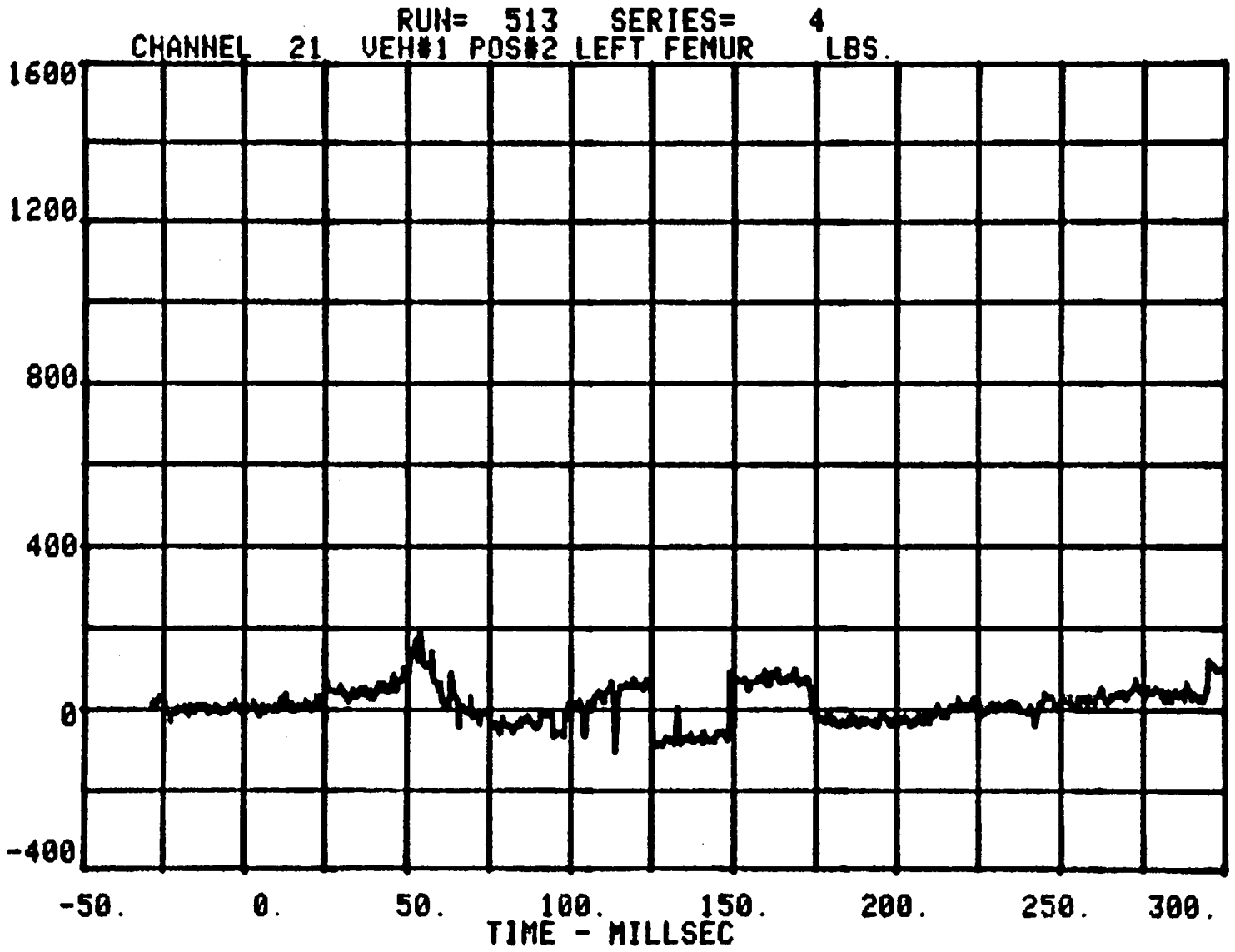

CHANNEL 18 VEH#1 POS#2 CHEST Y
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

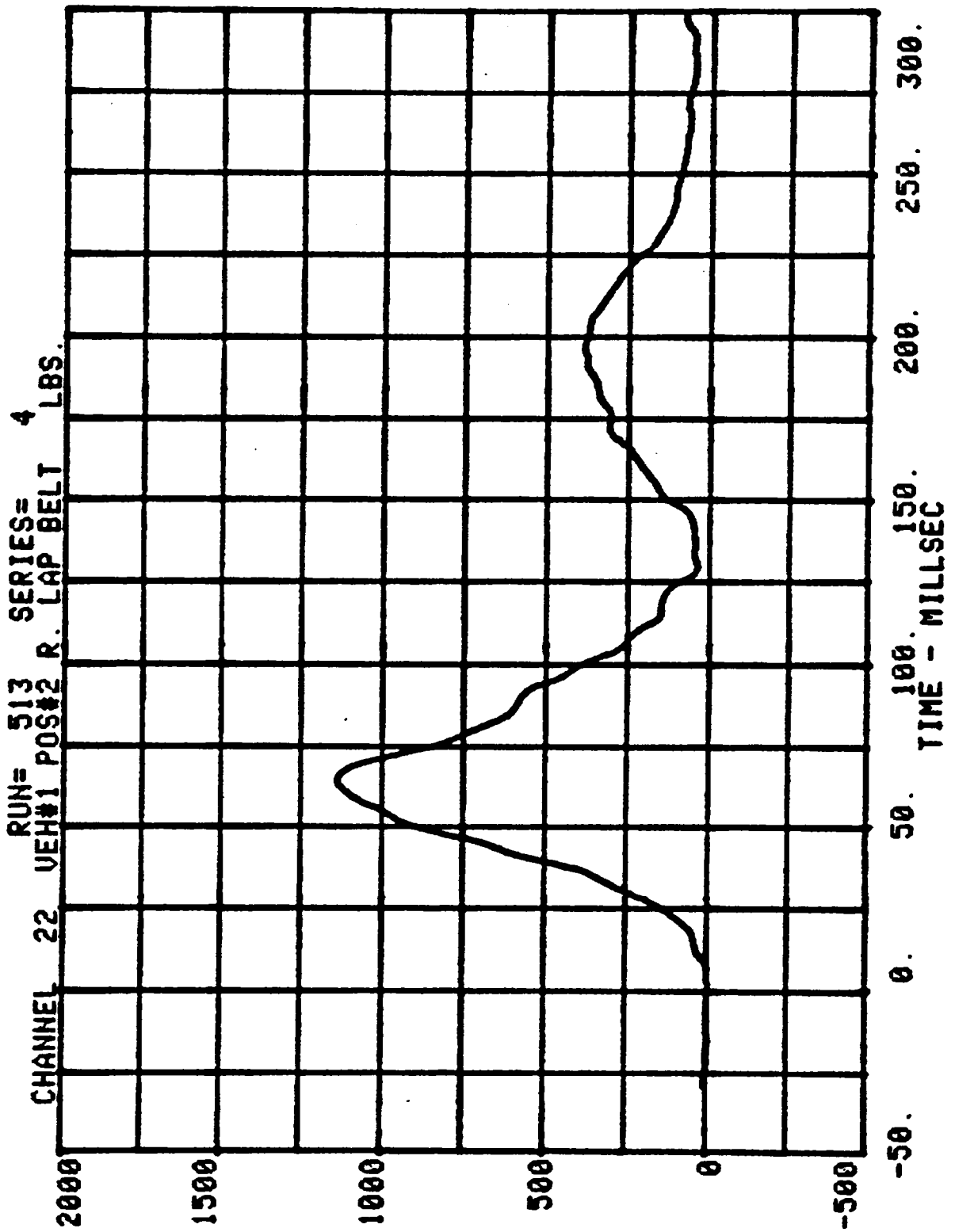
6707-V-4

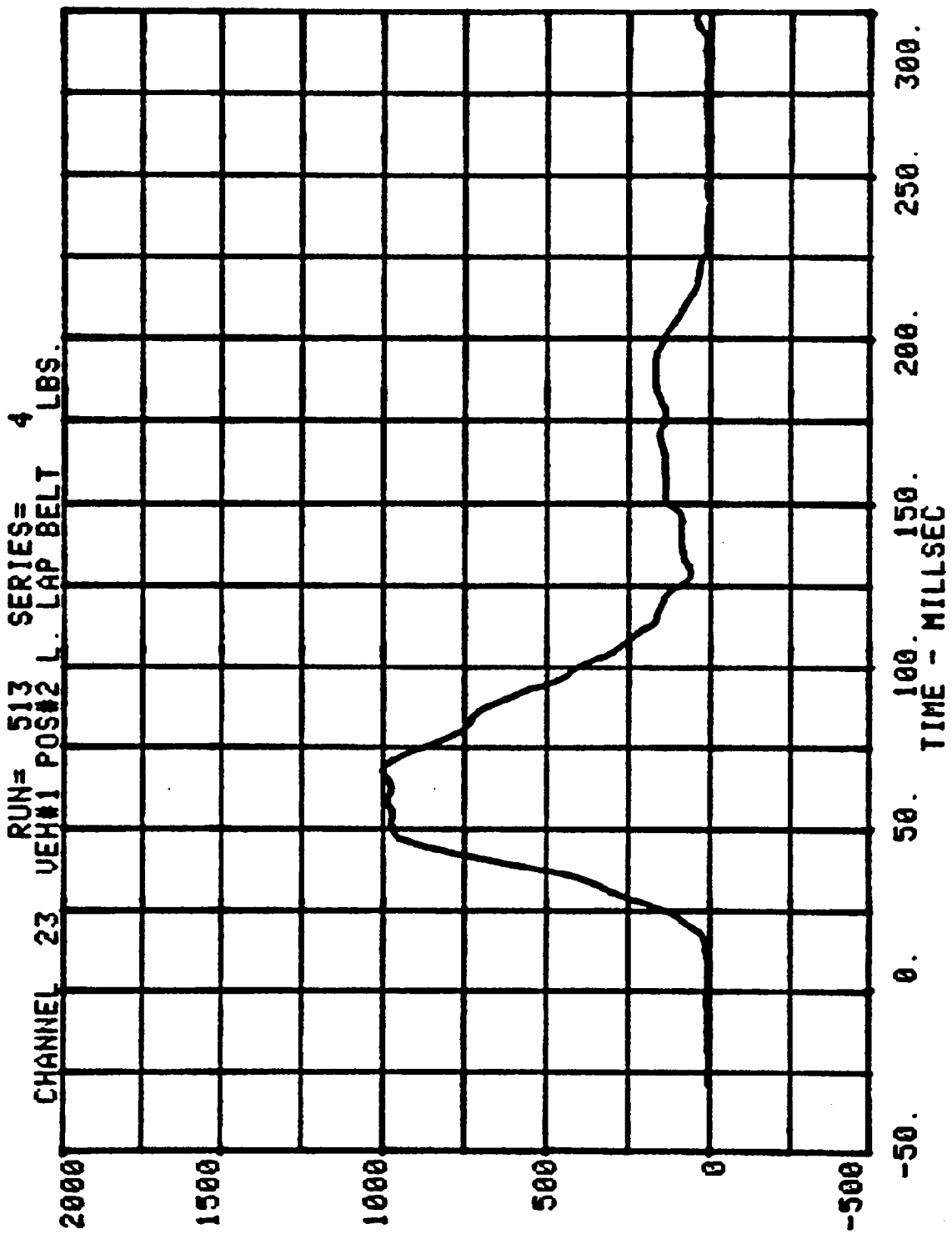

CHANNEL 19 VEH#1 POS#2 CHEST 2
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

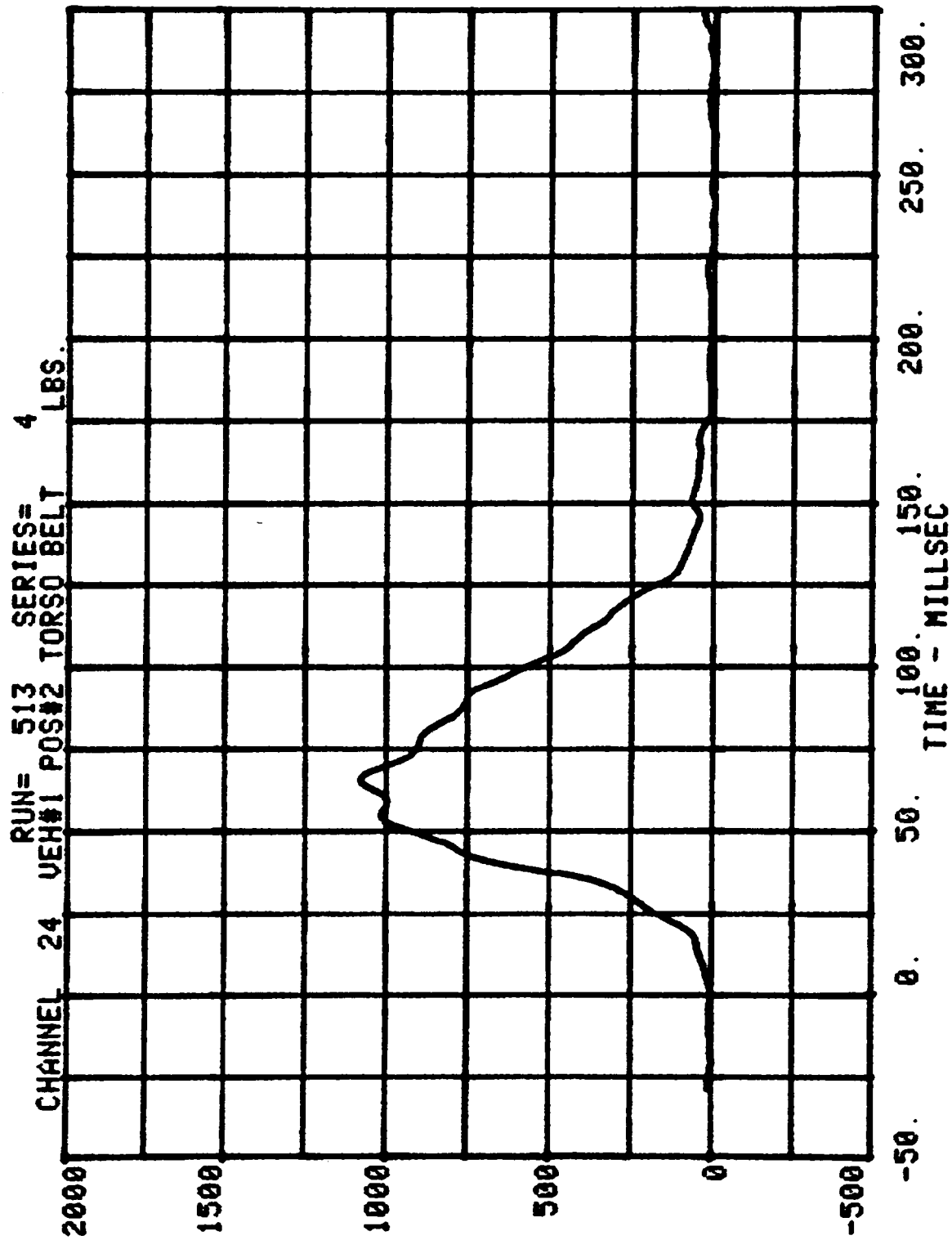

RUN= 513 SERIES= 4
CHANNEL 4 VEH#1 POS#2 CHEST RESULT G'S
100.
80
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 20 VEH#1 POS#2 RIGHT FEMUR
RUN= 513 SERIES= 4
LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


RUN= 513 SERIES= 4
CHANNEL 21 VEH#1 POS#2 LEFT FEMUR LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


CHANNEL 22
RUN= 513
VEH#1 POS#2
SERIES= 4
R. LAP BELT
LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


CHANNEL 23 VEH#1 POS#2 L. LAP BELT
RUN= 513 SERIES= 4
LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


CHANNEL 24 VEH#1 POS#2 RUN= 513 SERIES= 4
TORSO BELT LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

TEST NO. 614-4-513

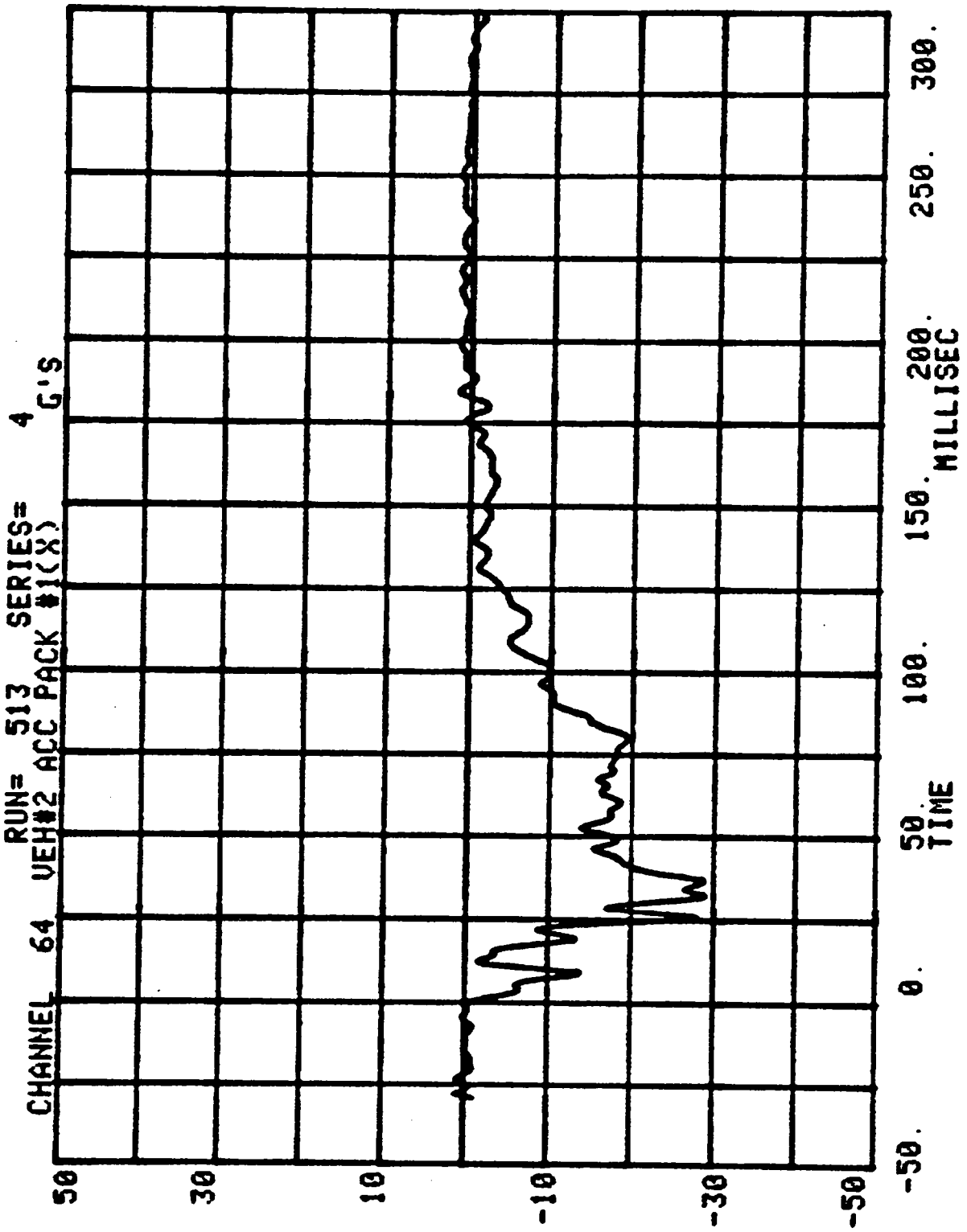
1980 VOLKSWAGEN RABBIT

VEHICLE NO. 1 DATA

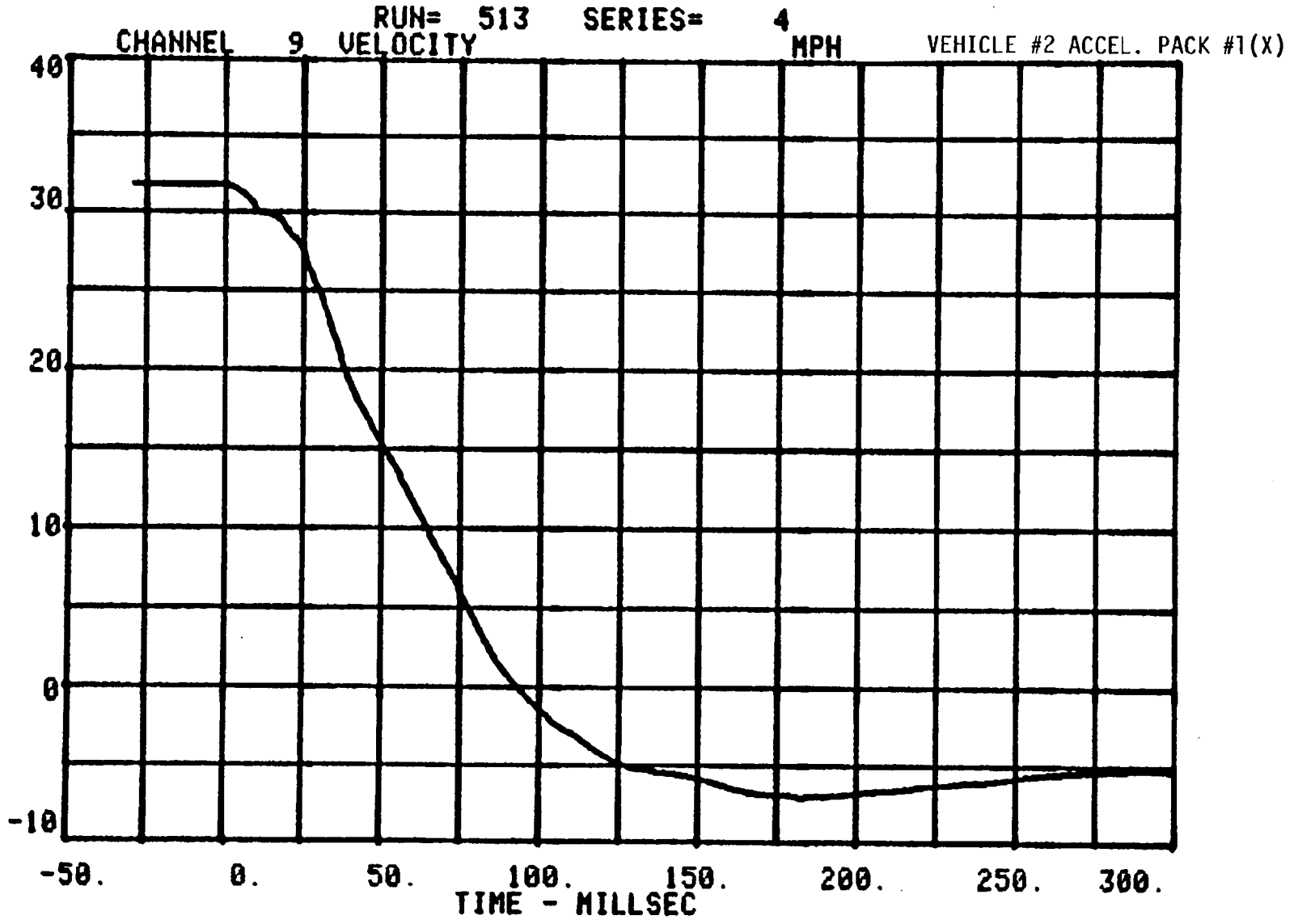
VEHICLE DATA

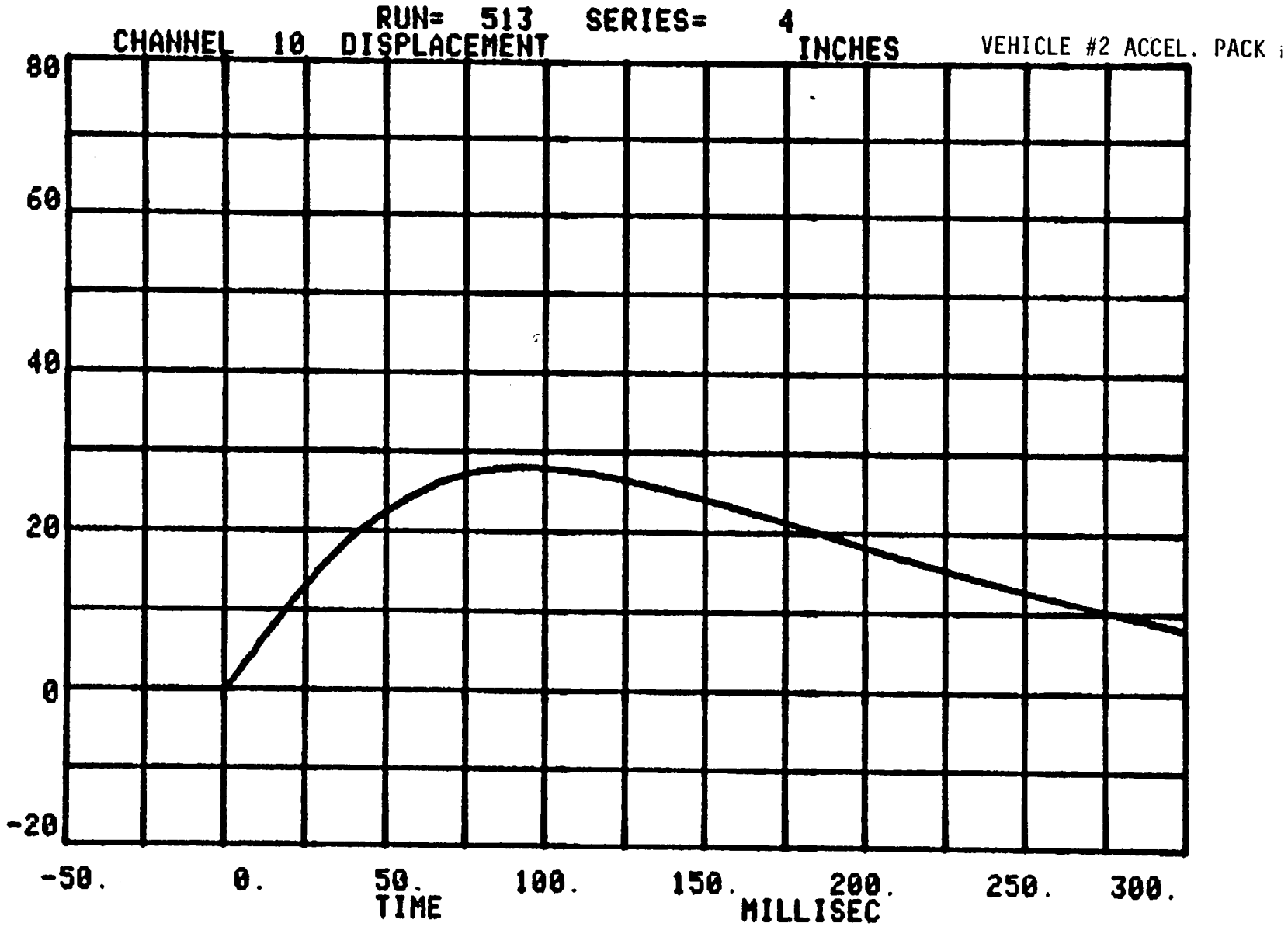
FILTER CHANNEL CLASS

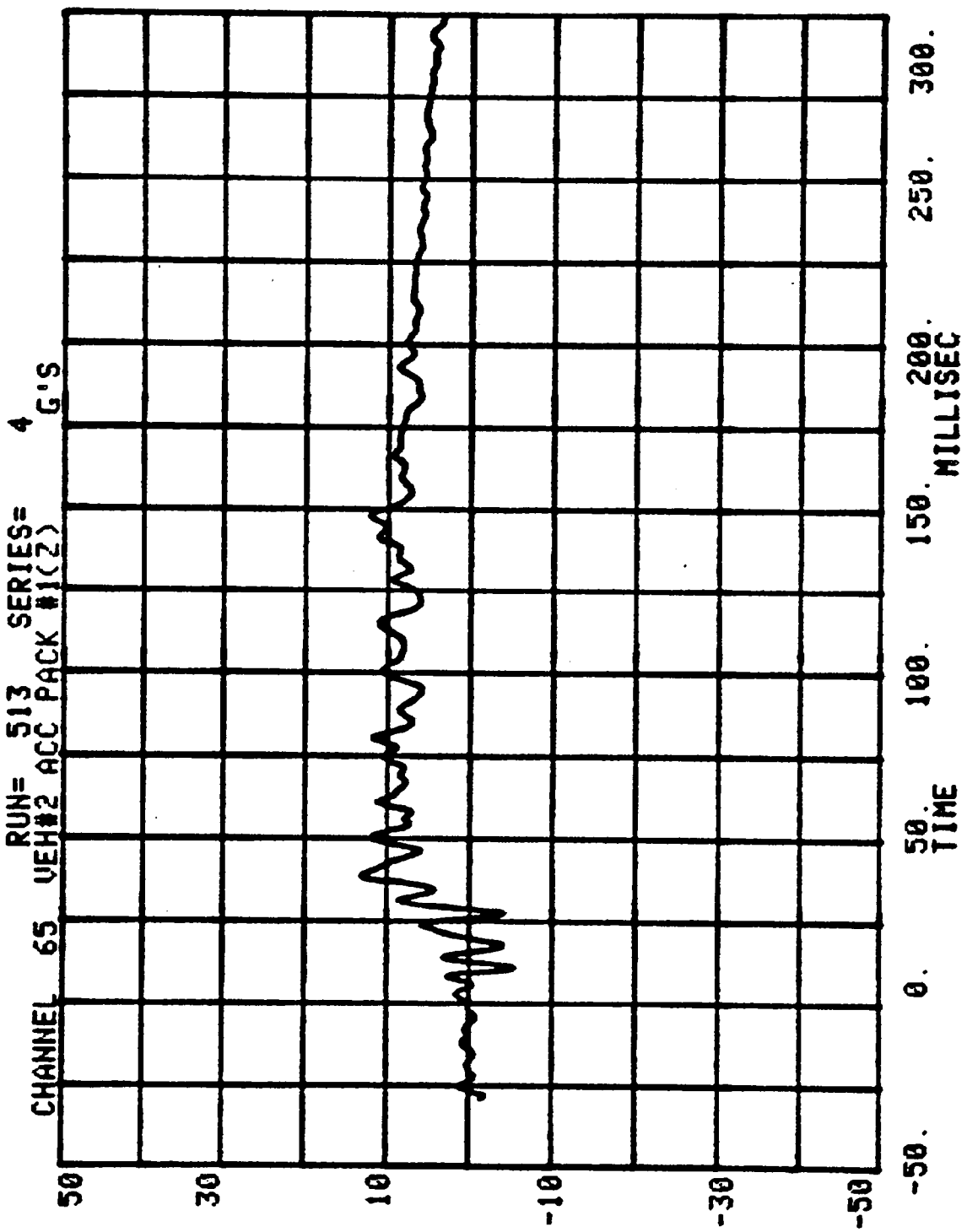
60


CHANNEL 64
RUN= 513 SERIES= 4
VEH#2 ACC PACK #1(X)
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

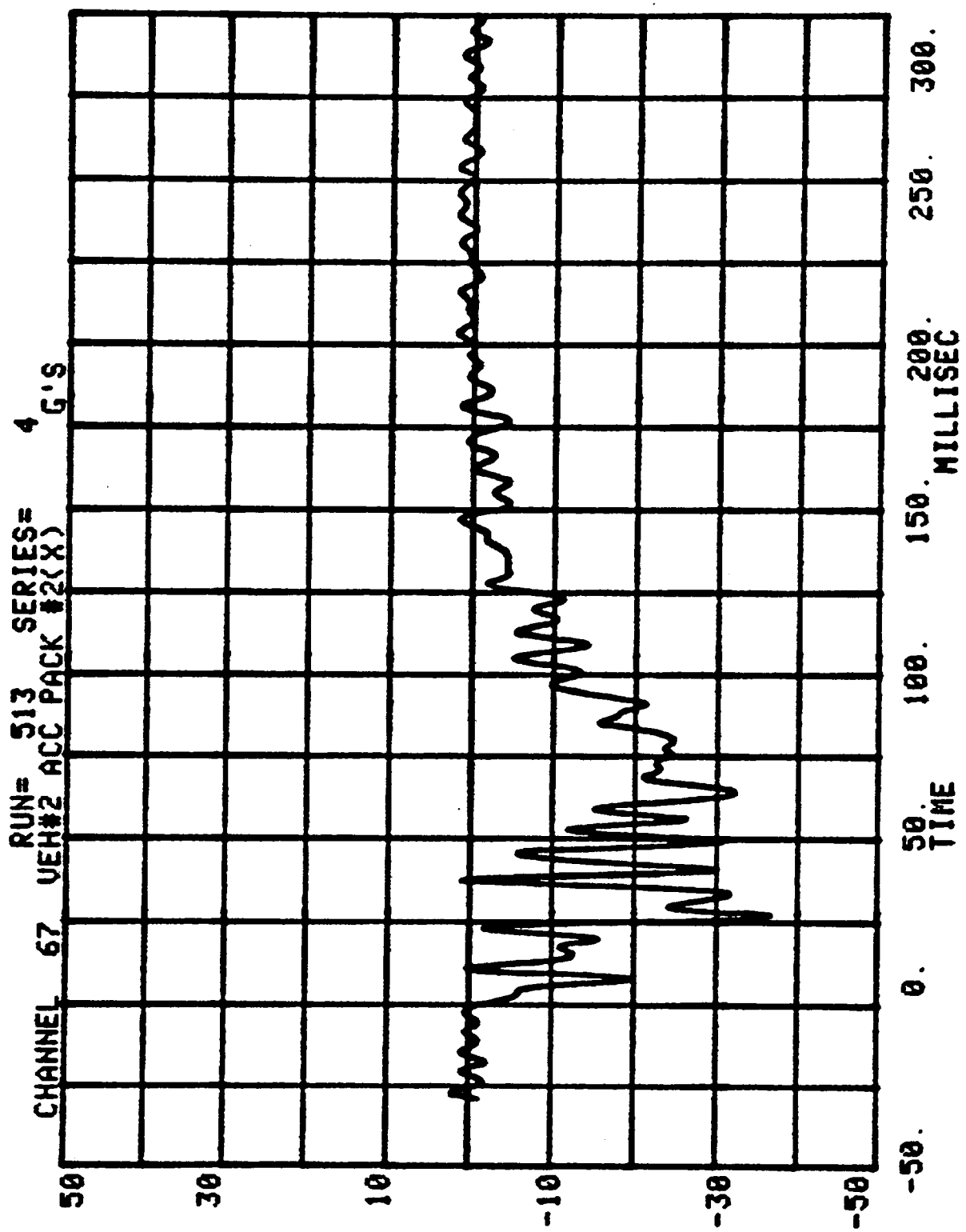
6707-V-4

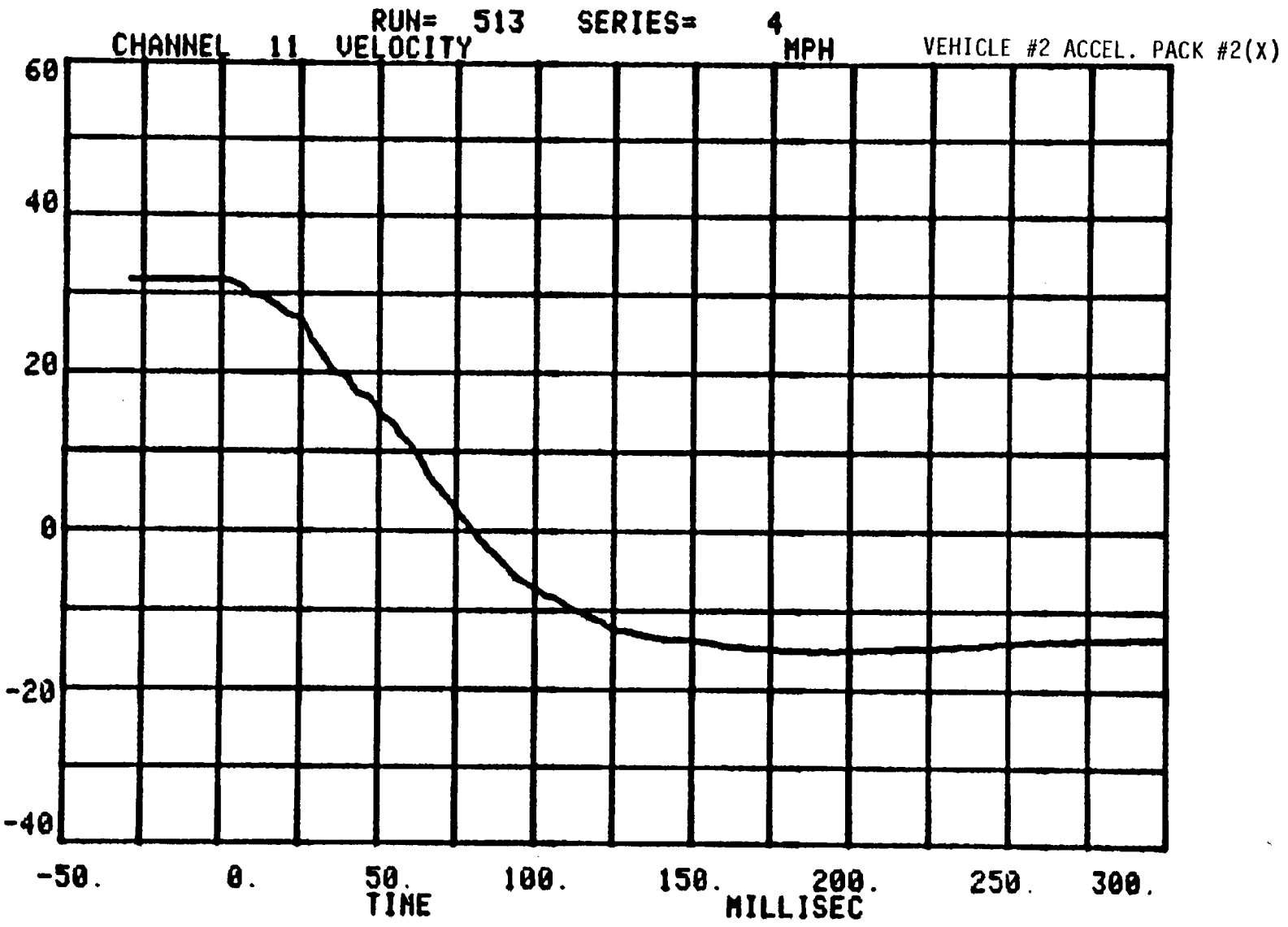

RUN= 513 SERIES= 4
CHANNEL 9 VELOCITY MPH
VEHICLE #2 ACCEL. PACK #1(X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

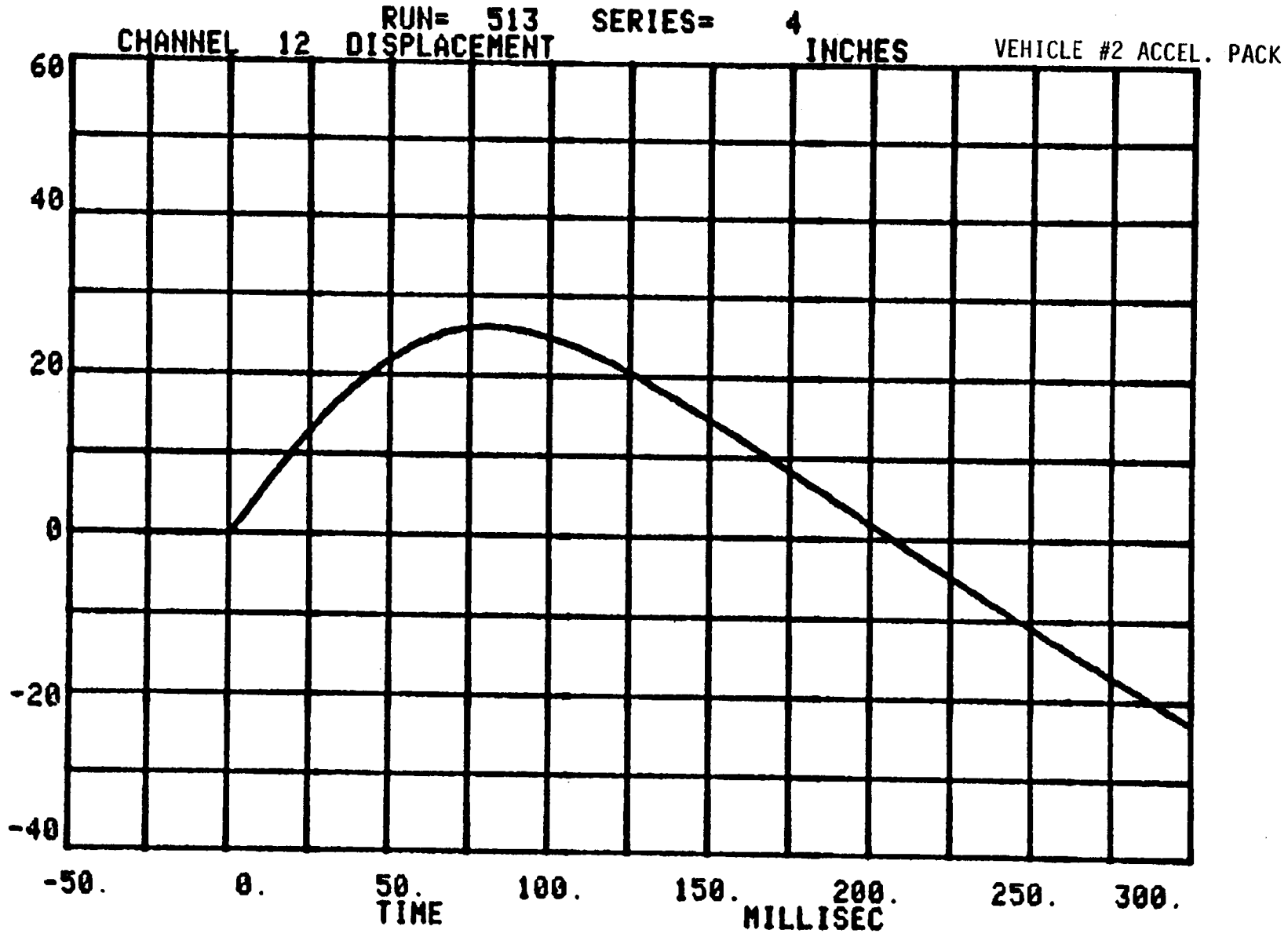

RUN= 513 SERIES= 4
CHANNEL 10 DISPLACEMENT
INCHES
VEHICLE #2 ACCEL. PACK
80
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

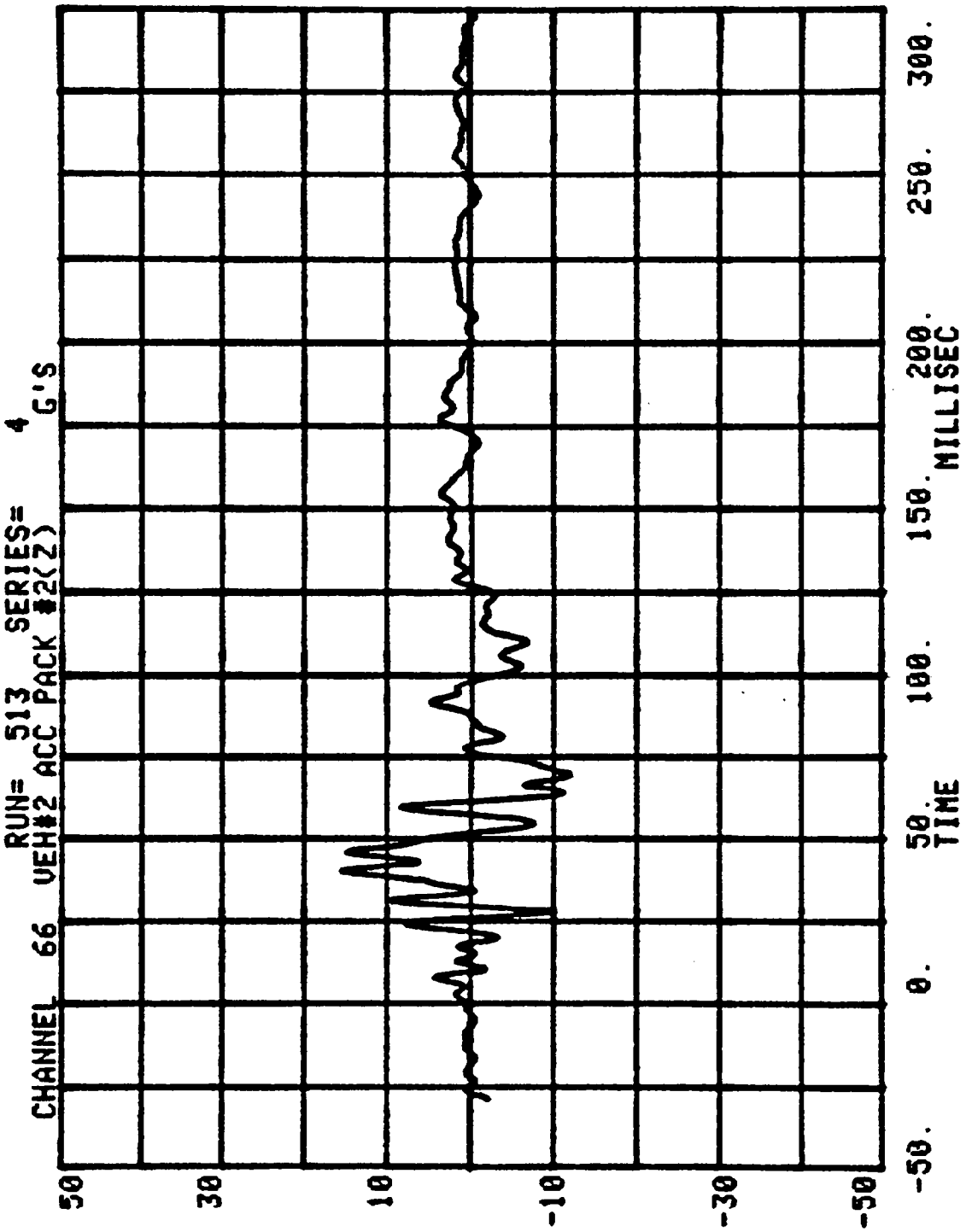

CHANNEL 65 VEH#2 ACC PACK #1(Z)
RUN= 513 SERIES= 4
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

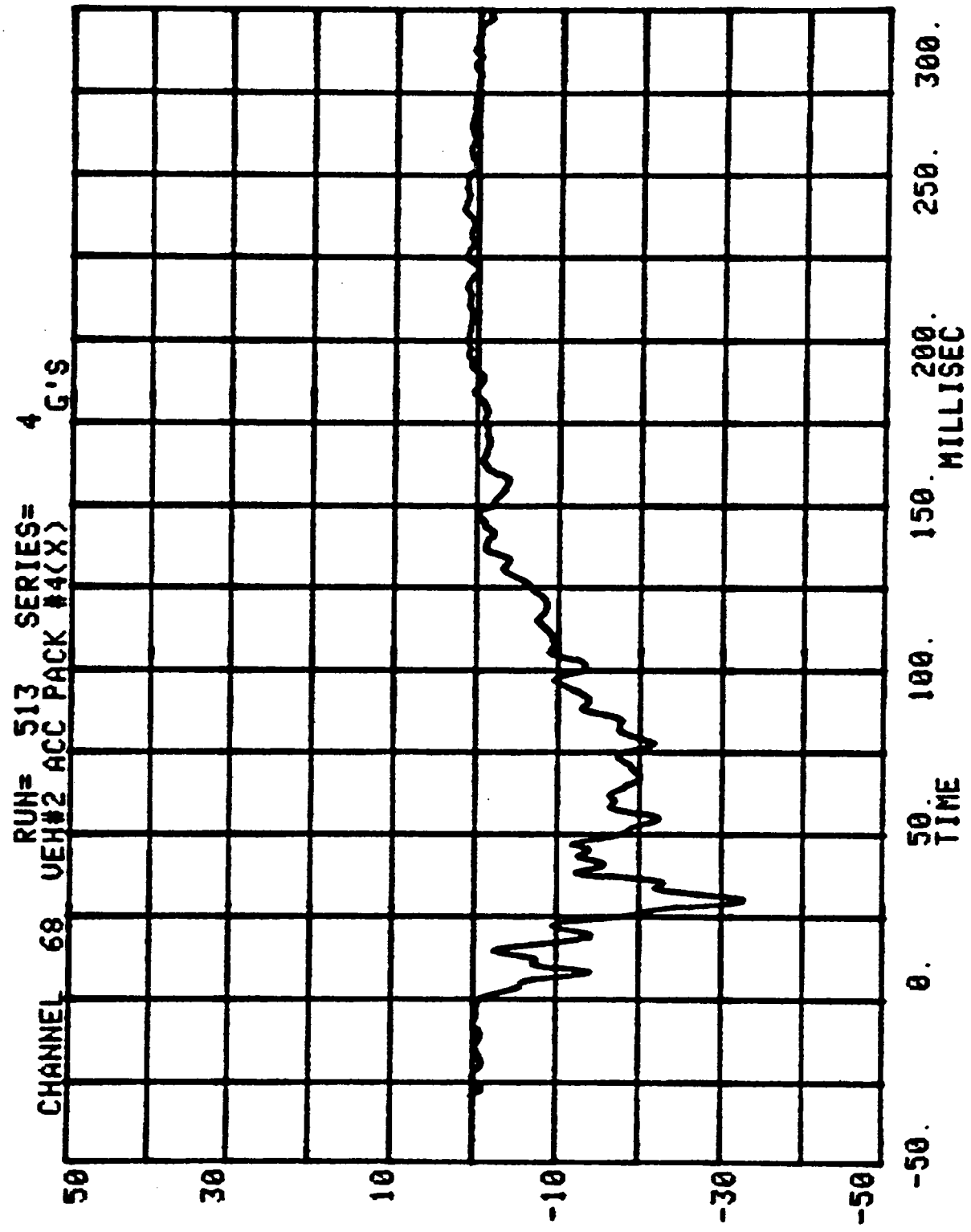
6707-V-4

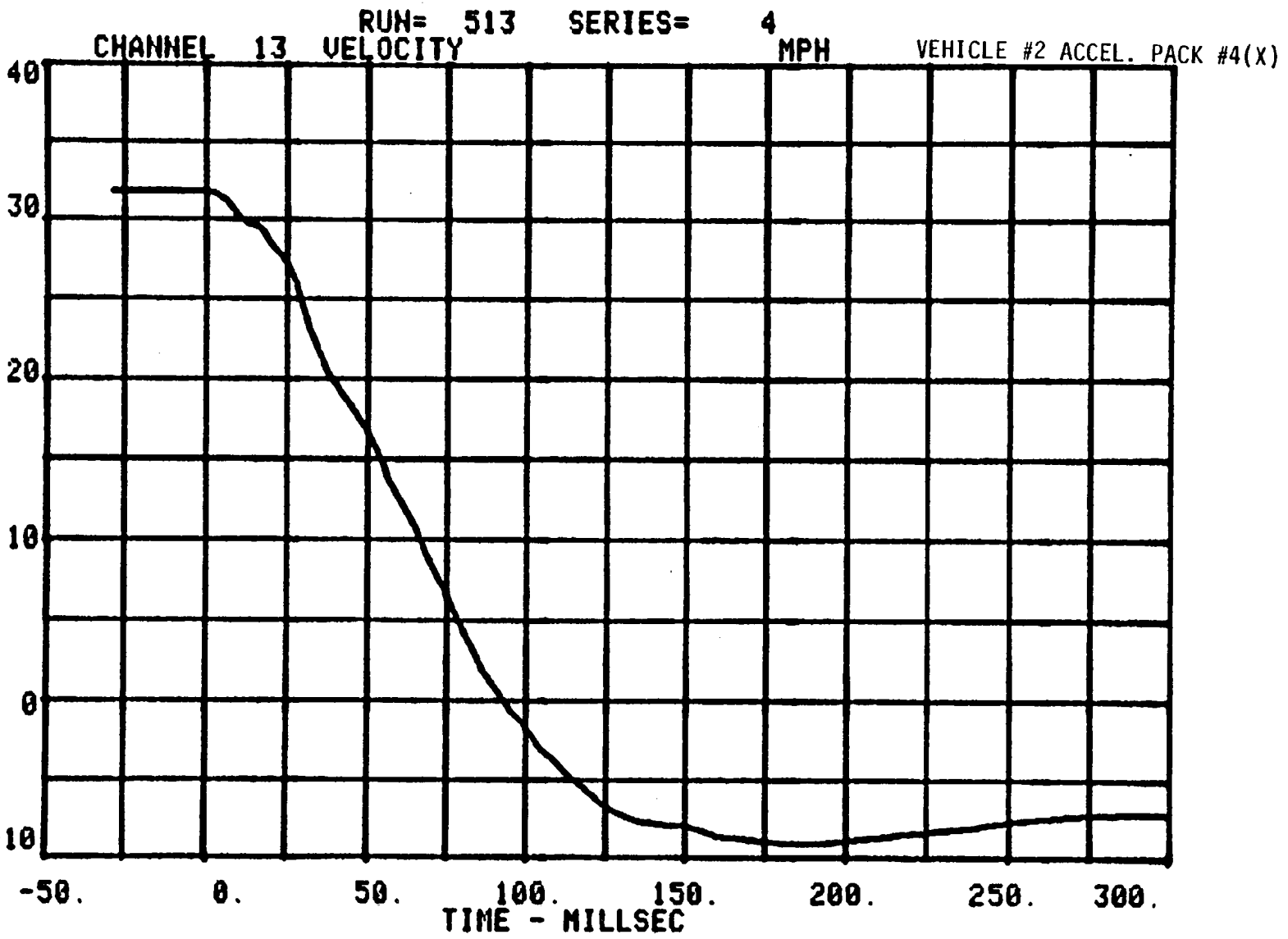

CHANNEL 67 VEH#2 ACC PACK #2(X)
RUN= 513 SERIES= 4
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

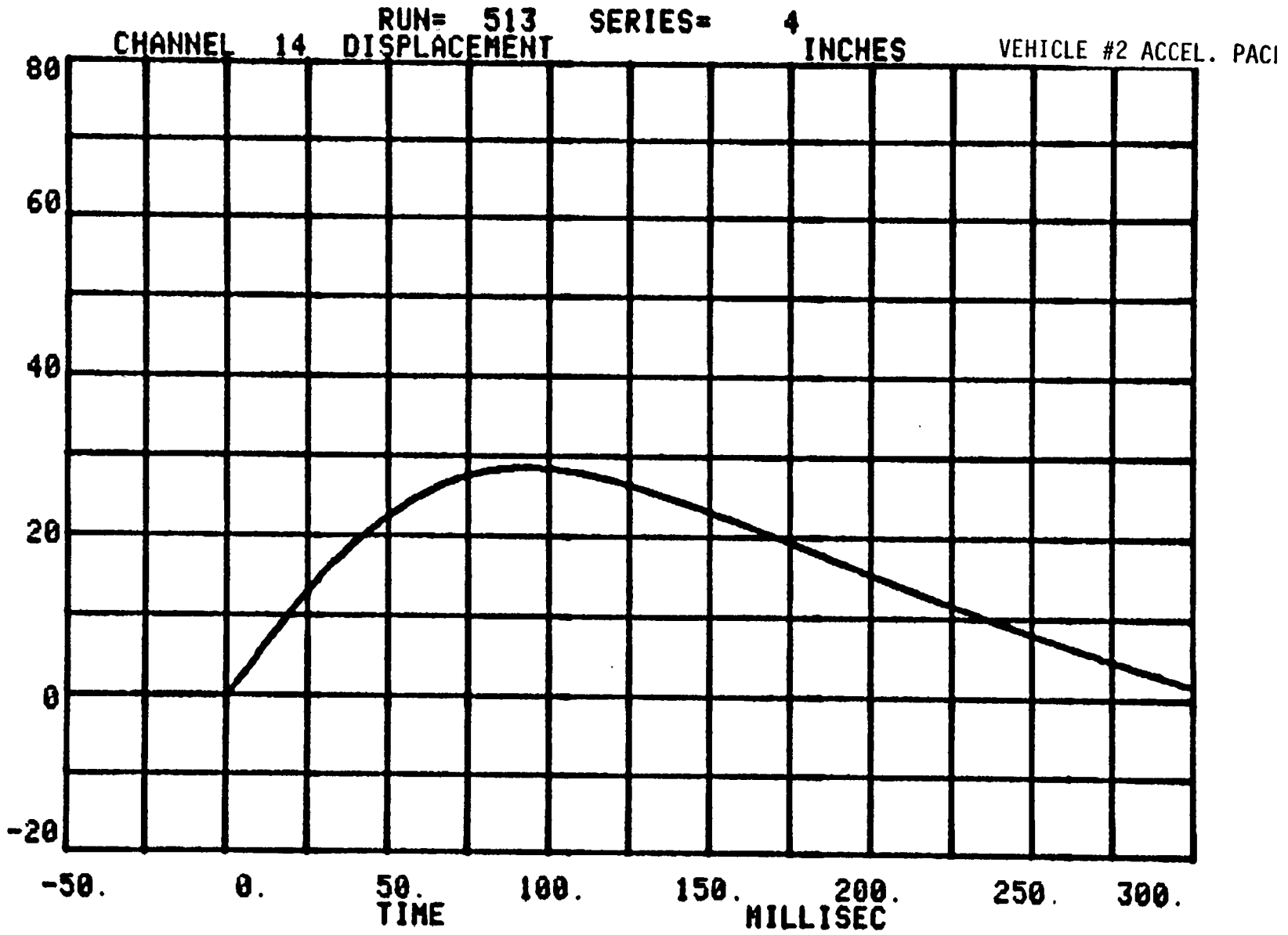

RUN= 513 SERIES= 4
CHANNEL 11 VELOCITY
MPH
VEHICLE #2 ACCEL. PACK #2(X)
60
40
20
0
-20
-40
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

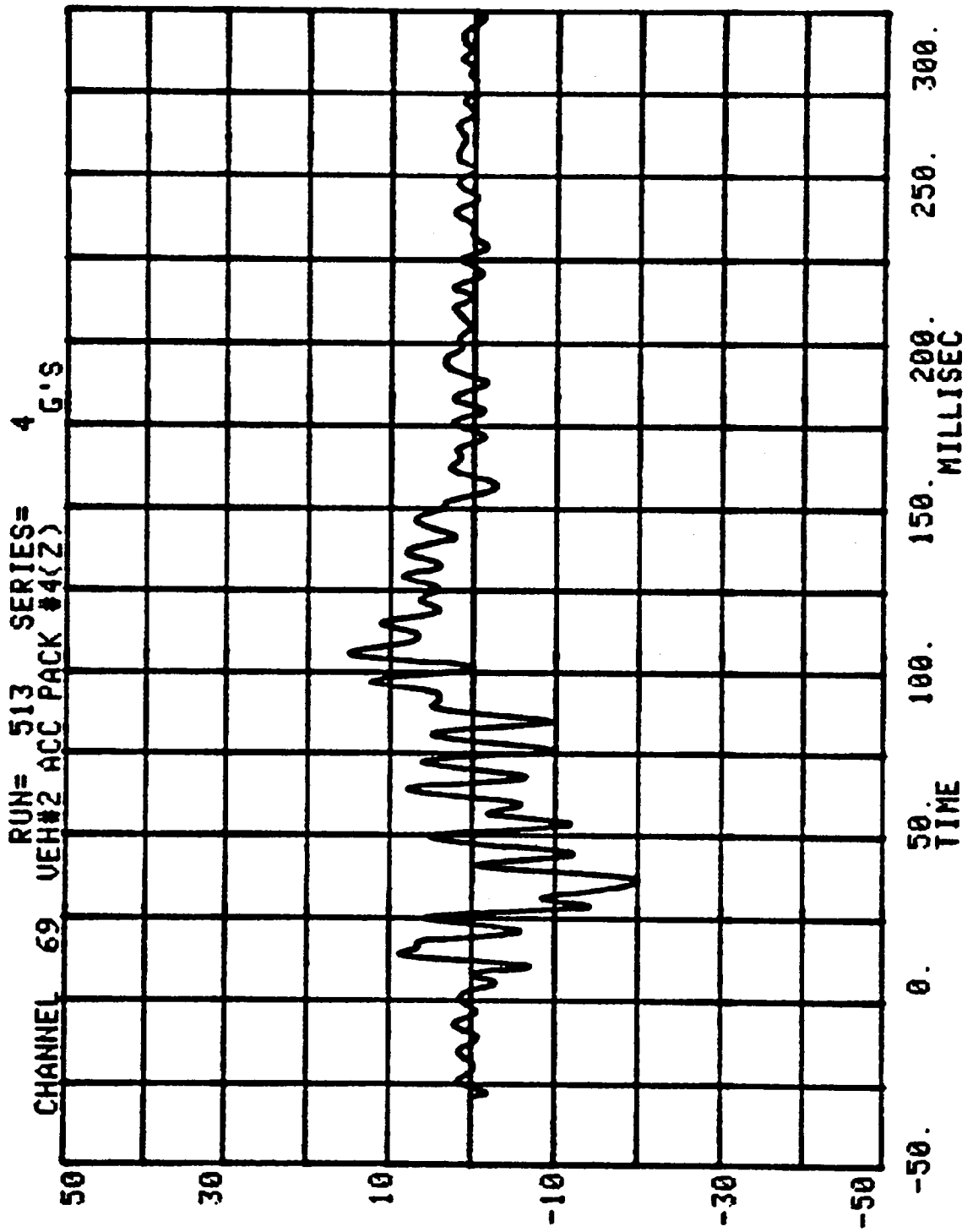

RUN= 513 SERIES= 4
CHANNEL 12 DISPLACEMENT
INCHES
VEHICLE #2 ACCEL. PACK
60
40
20
0
-20
-40
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 66
RUN= 513 SERIES= 4
VEH#2 ACC PACK #2(2)
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

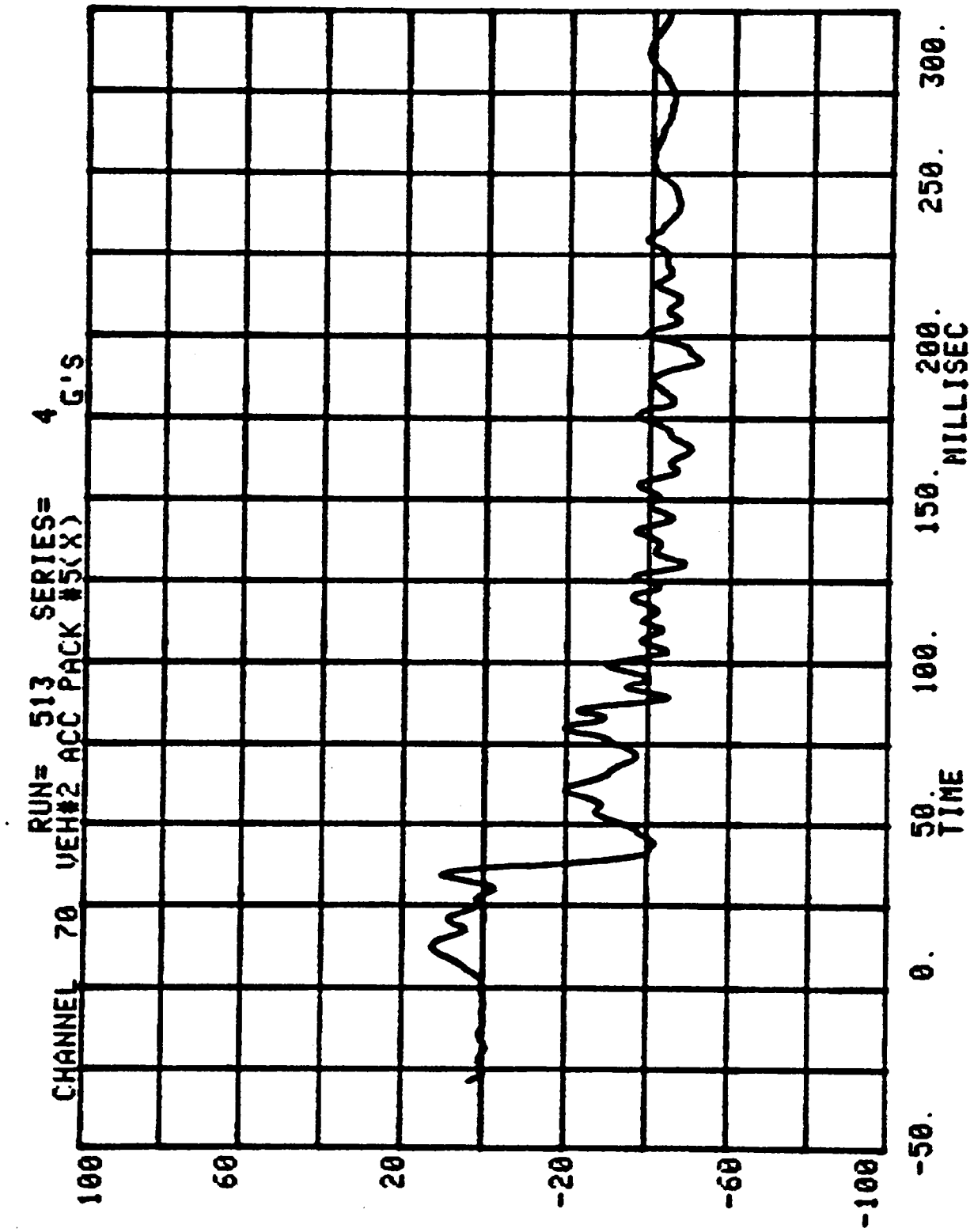

CHANNEL 68 VEH#2 ACC PACK #4(X)
RUN= 513 SERIES= 4
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

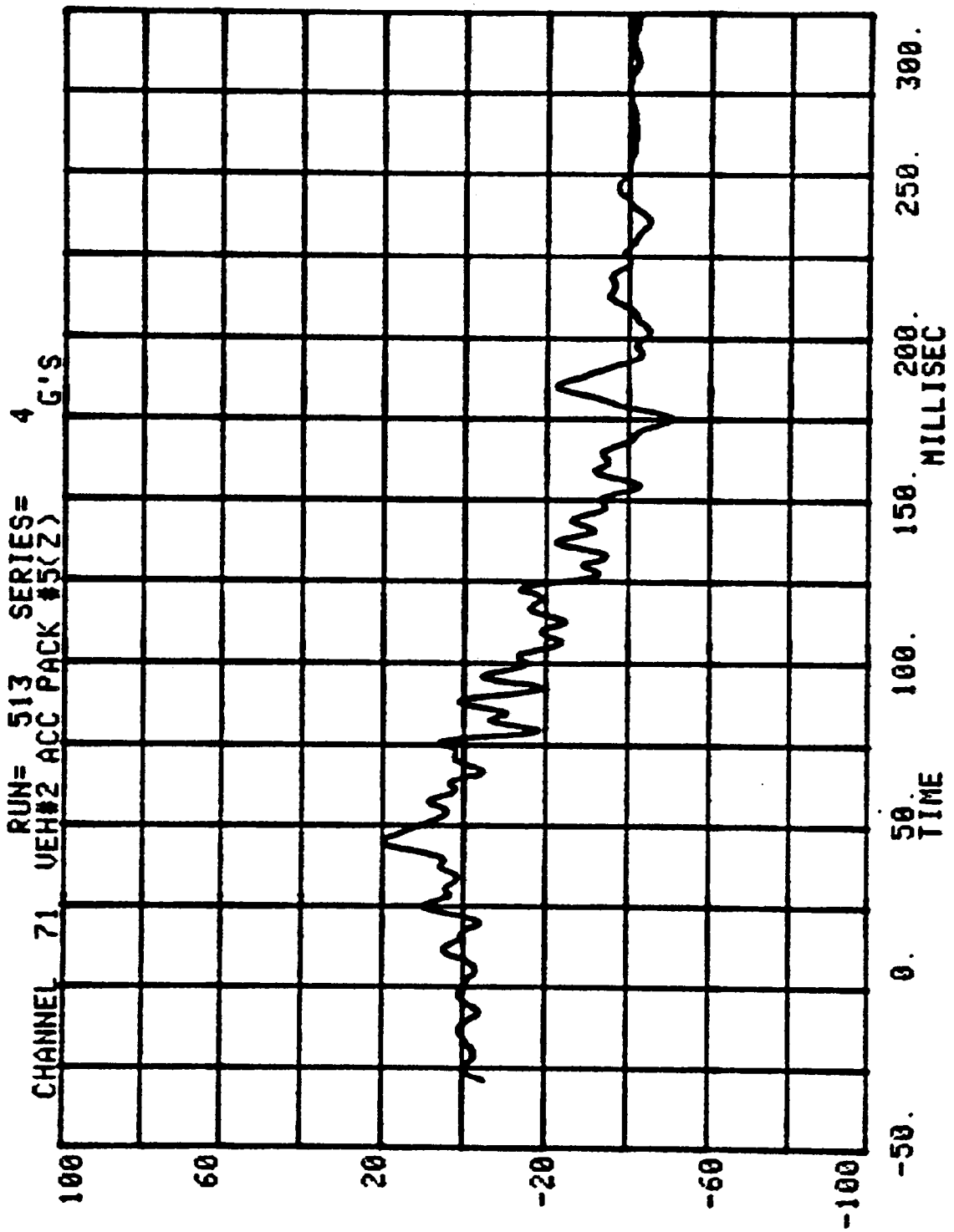

RUN= 513 SERIES= 4
CHANNEL 13 VELOCITY MPH
VEHICLE #2 ACCEL. PACK #4(X)
40
30
20
10
0
-10
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

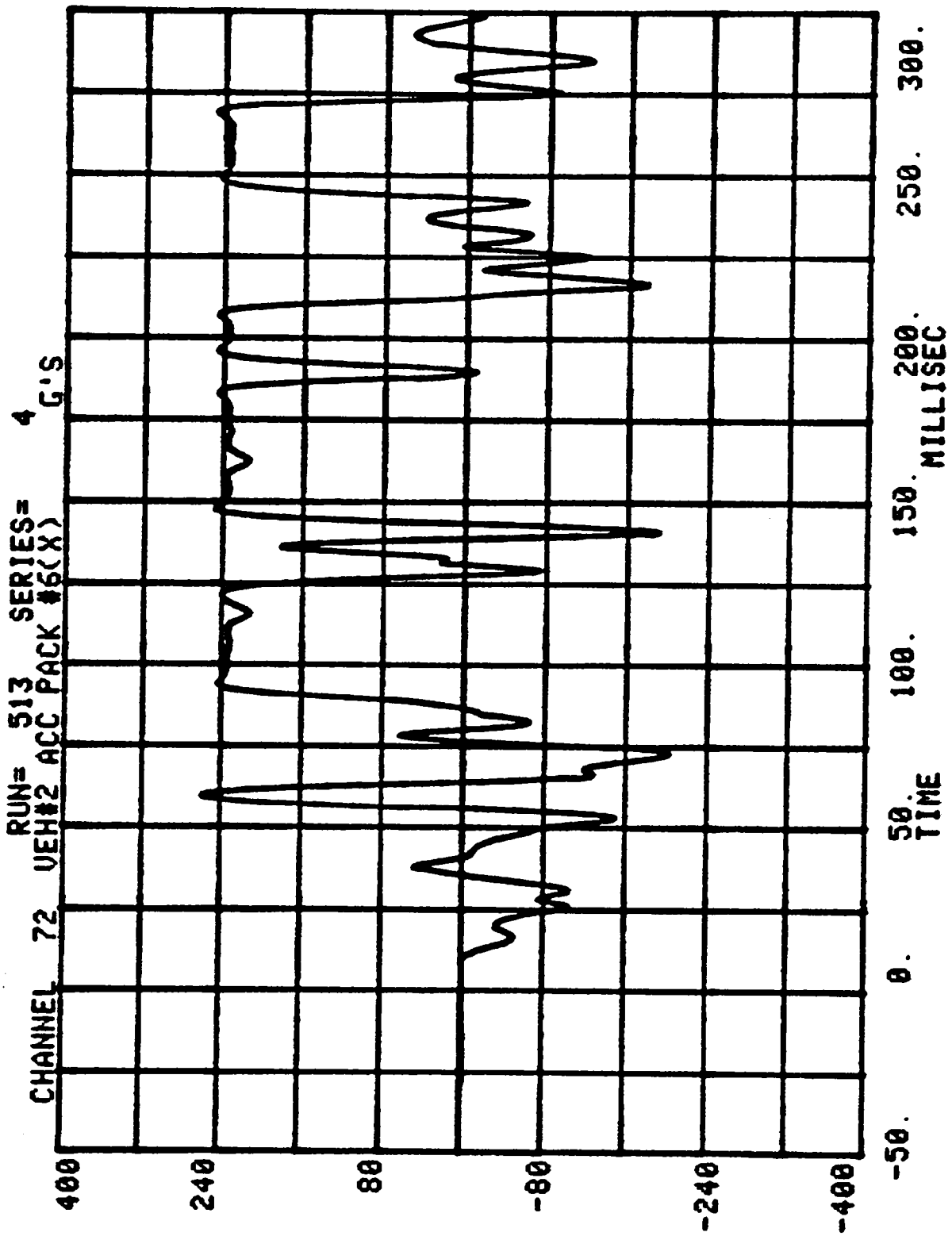

RUN= 513 SERIES= 4
CHANNEL 14 DISPLACEMENT INCHES
VEHICLE #2 ACCEL. PACI
80
60
40
20
0
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

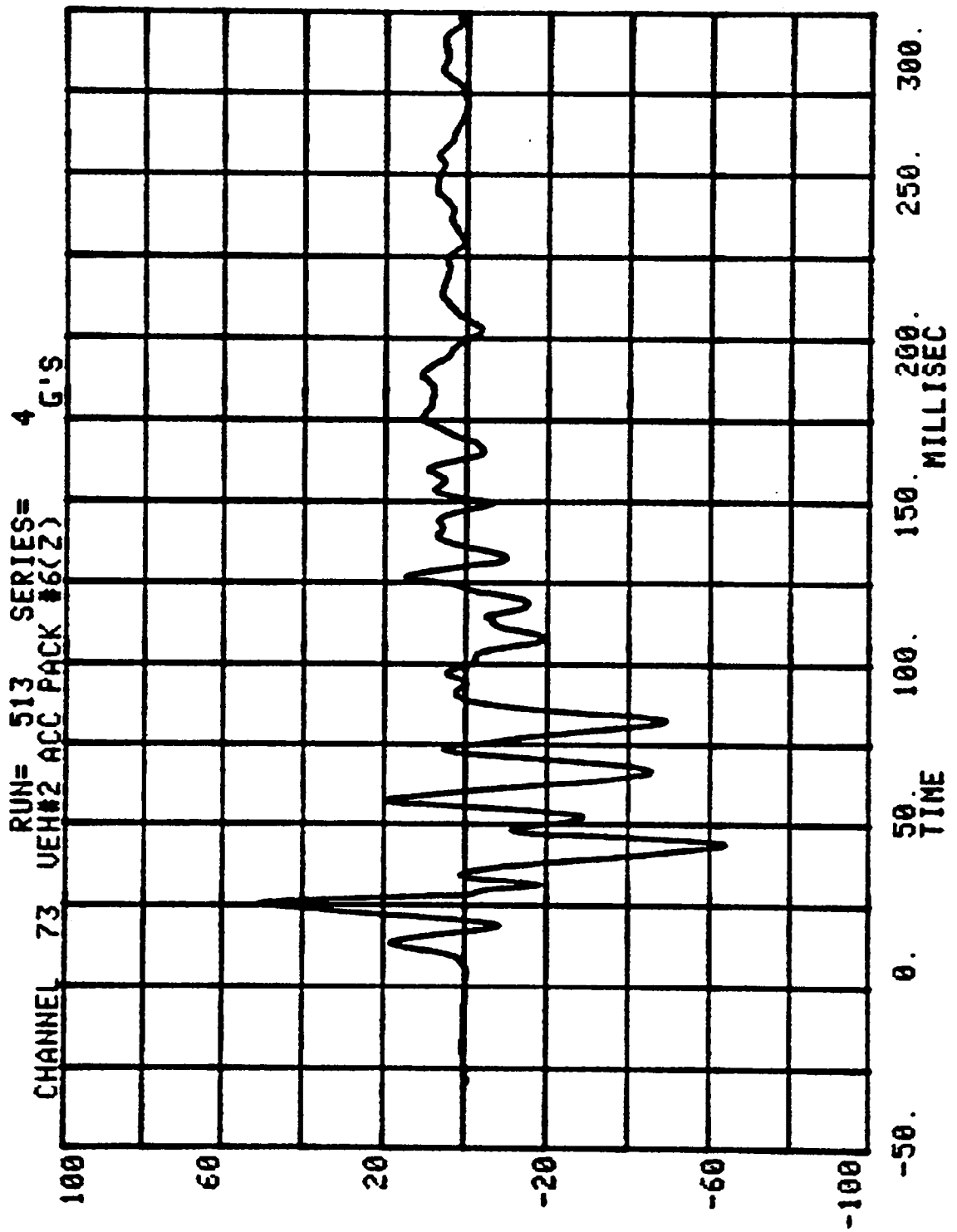

CHANNEL 69 VEH#2 ACC PACK #4(Z)
RUN= 513 SERIES= 4
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

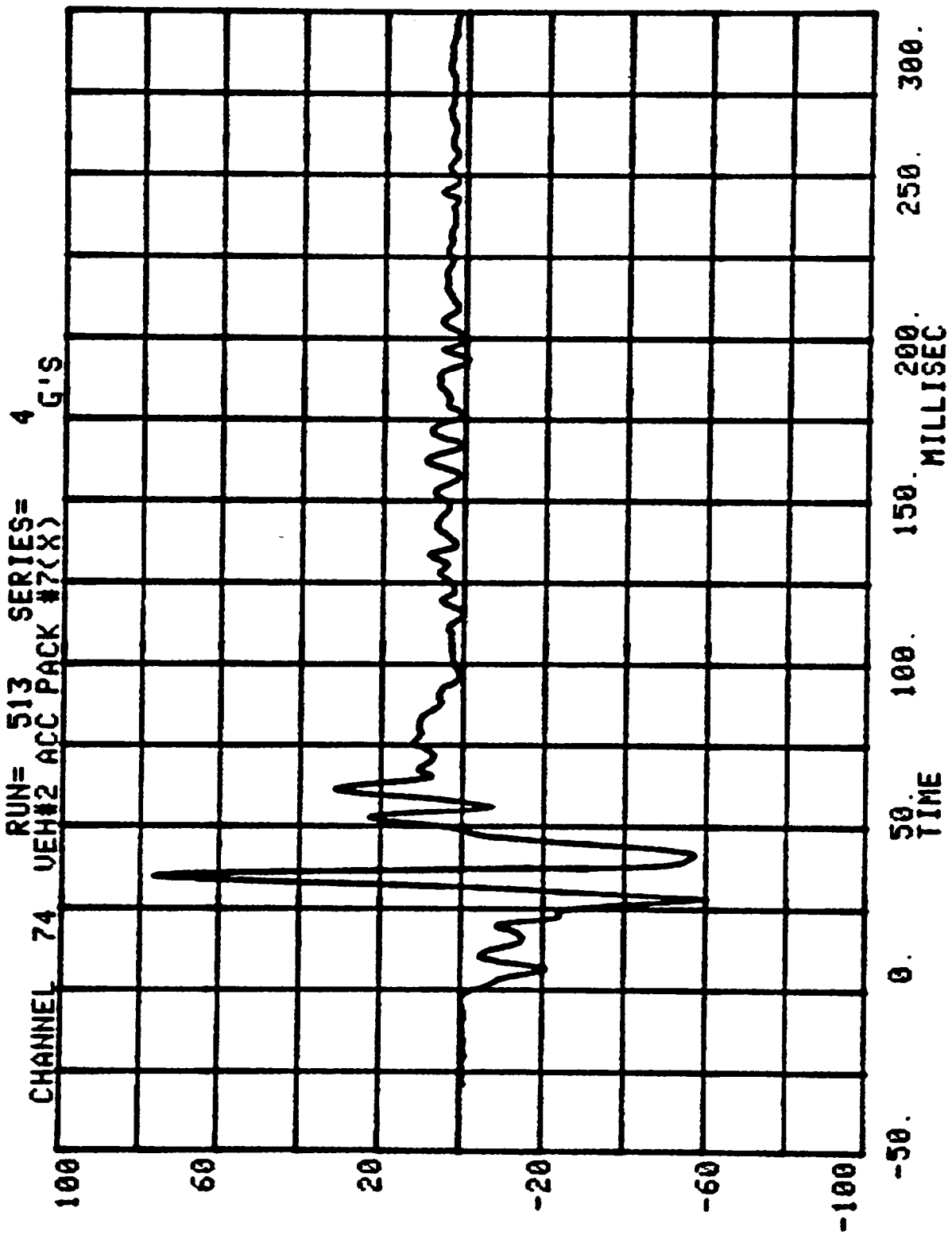
6707-V-4

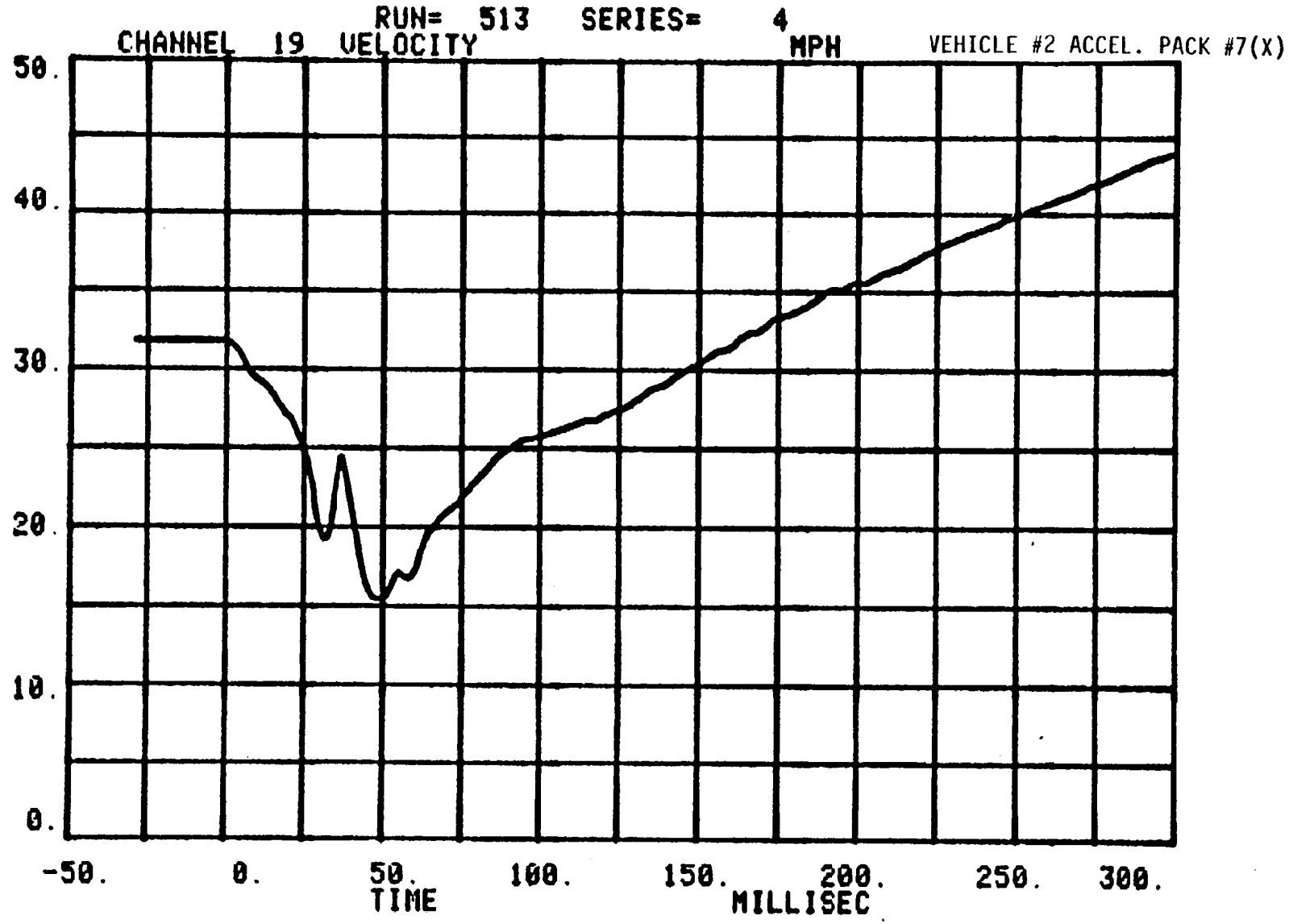

CHANNEL 70 VEH#2 ACC PACK #5(X)
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

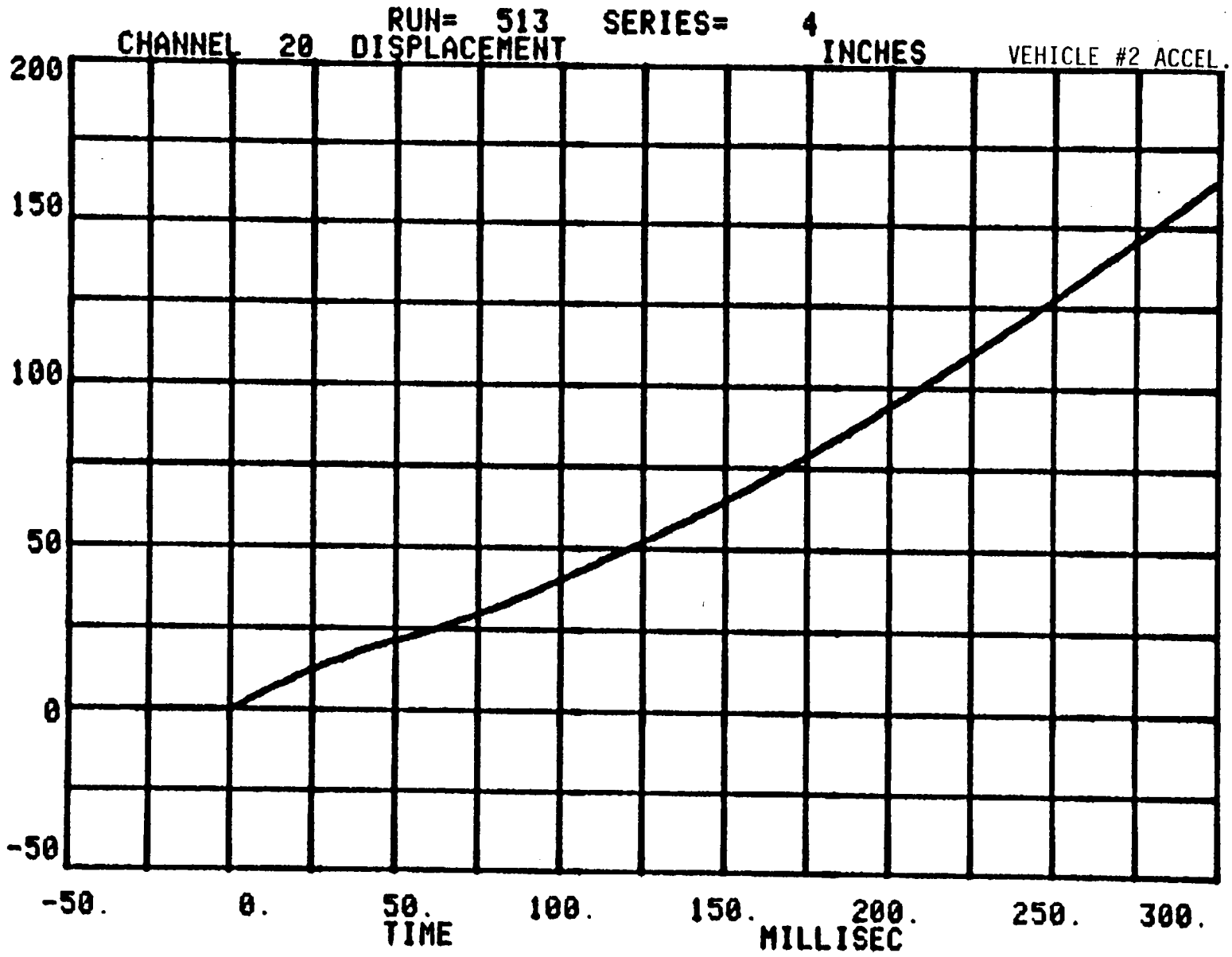

CHANNEL 71 VEH#2 ACC PACK #5(Z)
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

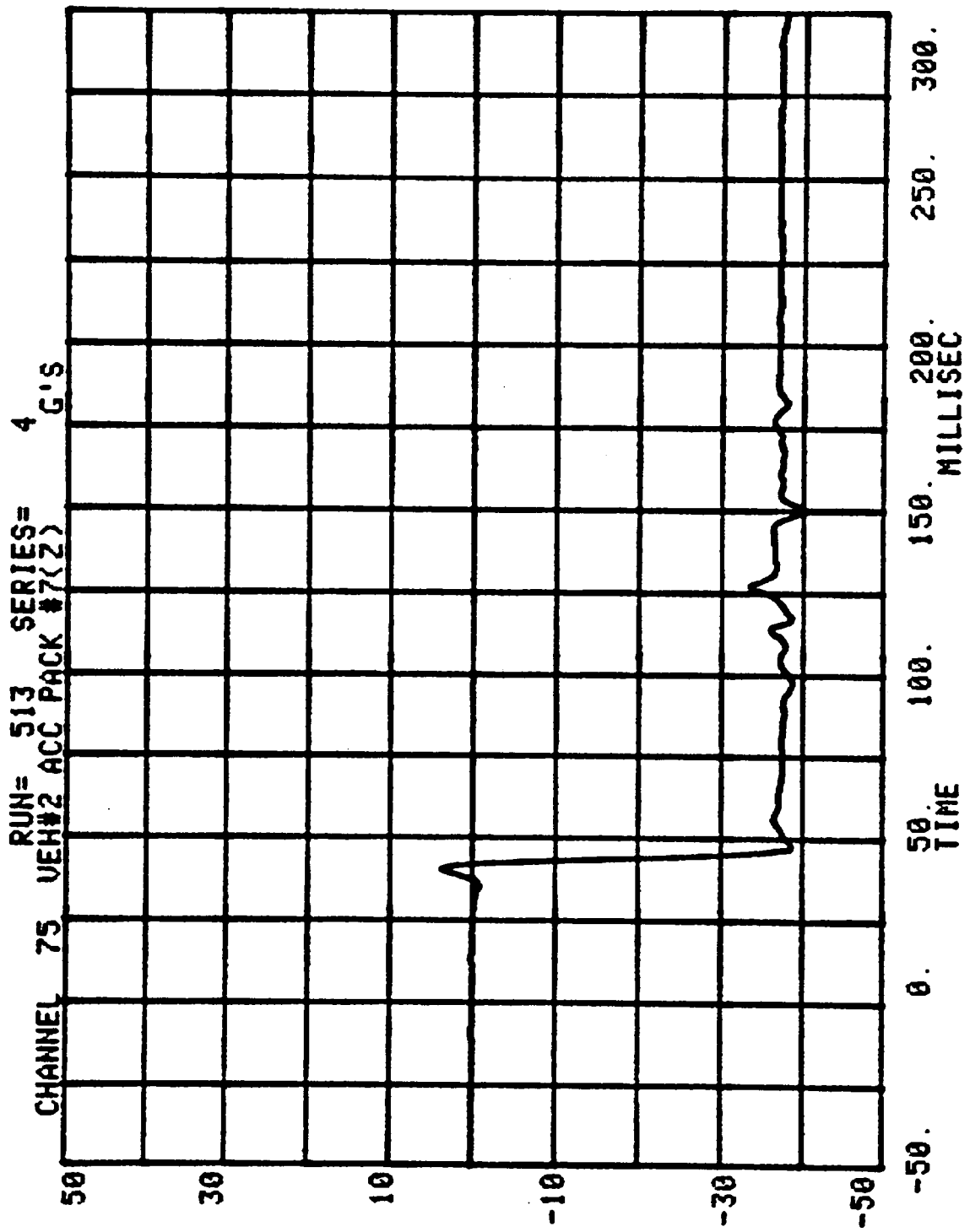

CHANNEL 72 VEH#2 ACC PACK #6(X)
RUN= 513 SERIES= 4
G'S
400
240
80
-80
-240
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 73 VEH#2 ACC PACK #6(Z)
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

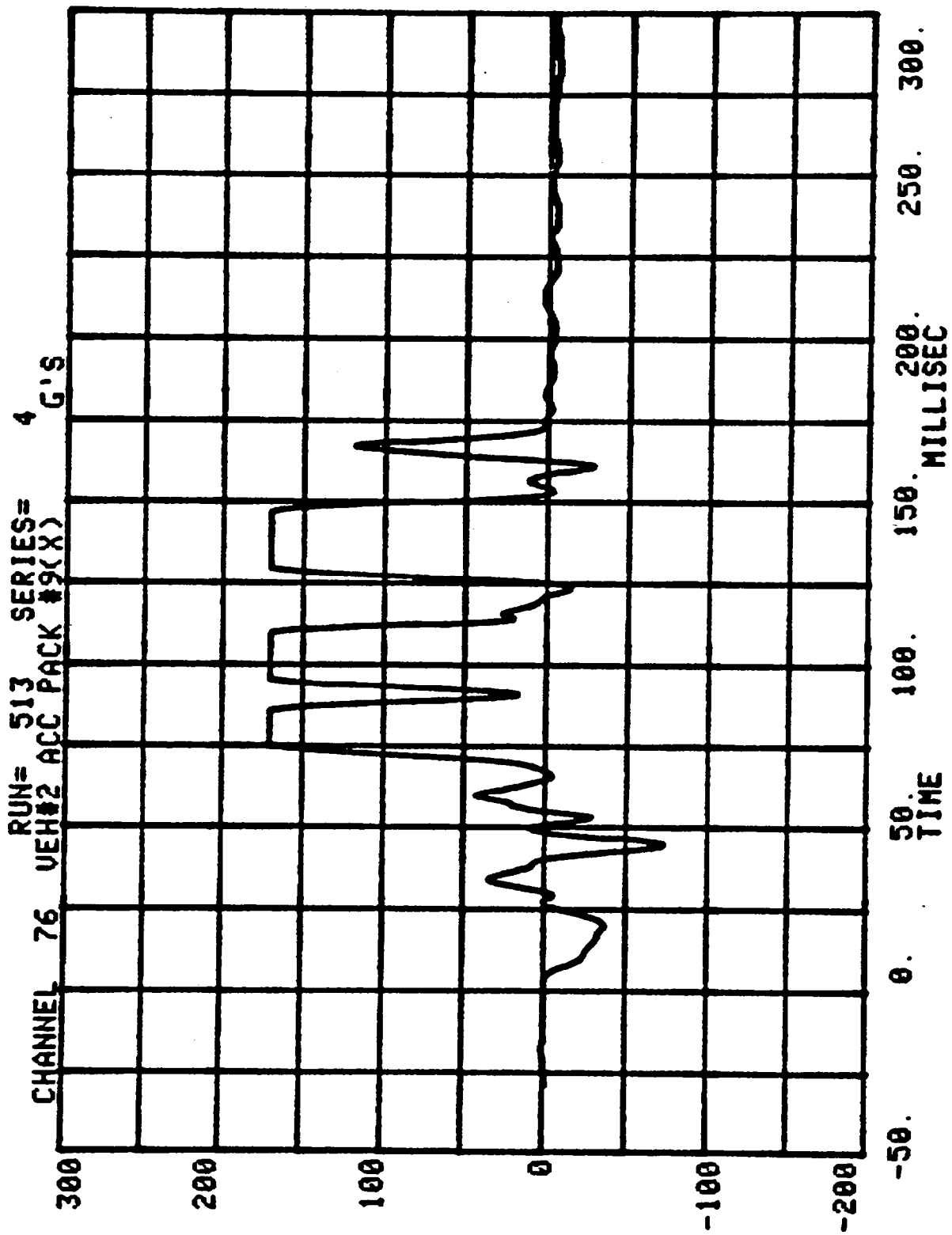

CHANNEL 74 VEH#2 ACC PACK #7(X)
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

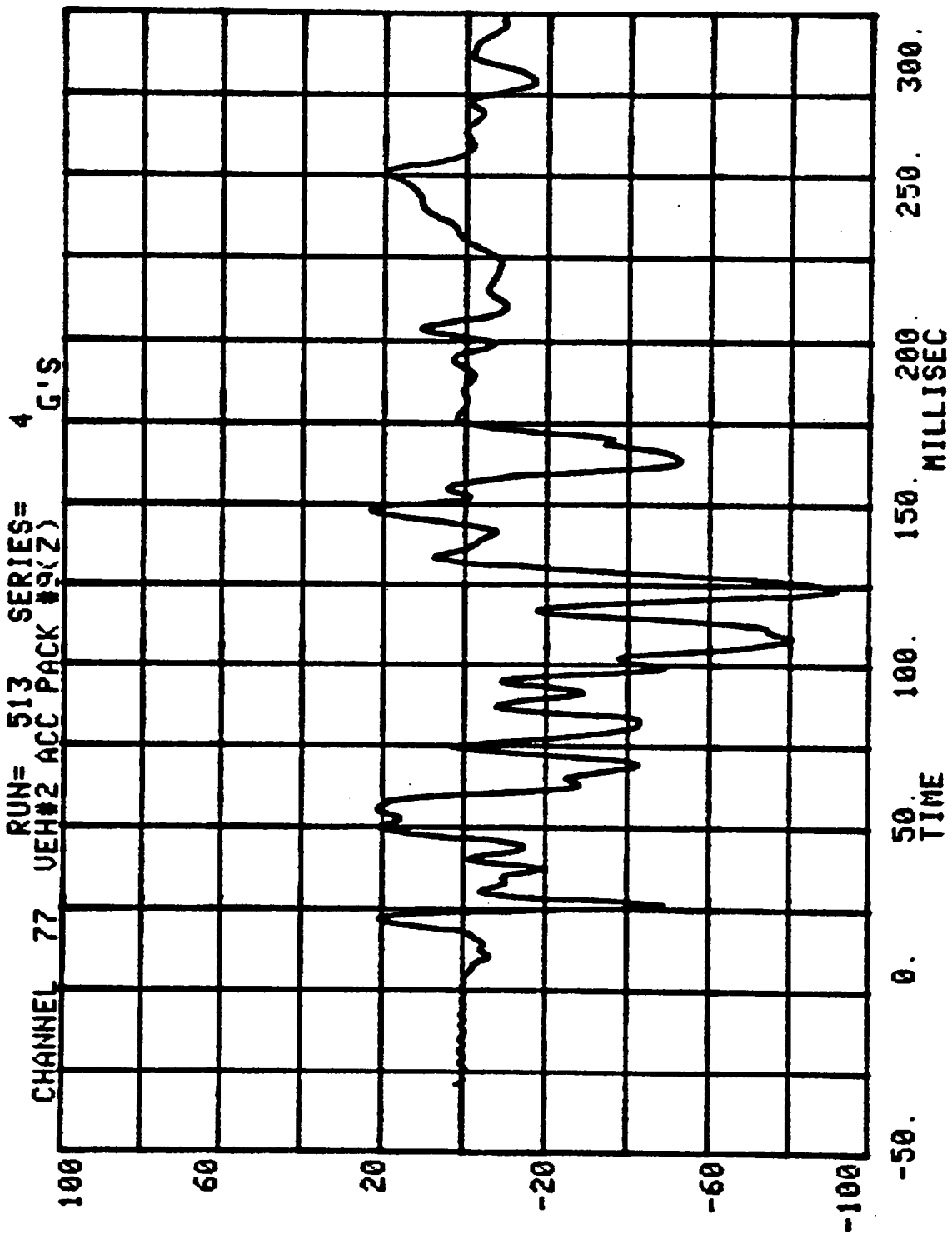

RUN= 513 SERIES= 4
CHANNEL 19 VELOCITY
MPH
VEHICLE #2 ACCEL. PACK #7(X)
50.
40.
30.
20.
10.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

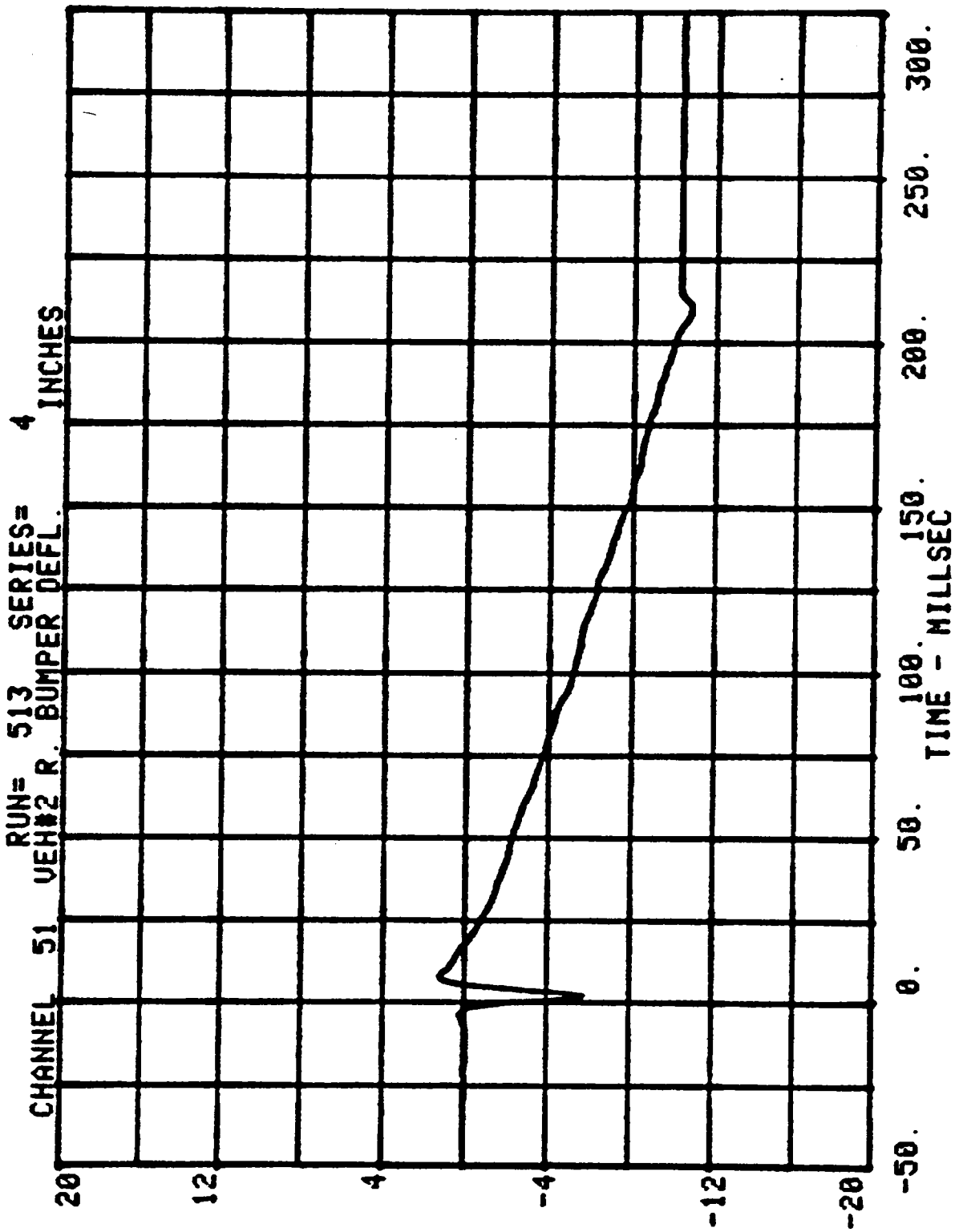

RUN= 513 SERIES= 4
CHANNEL 20 DISPLACEMENT INCHES
VEHICLE #2 ACCEL. PACK
200
150
100
50
0
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

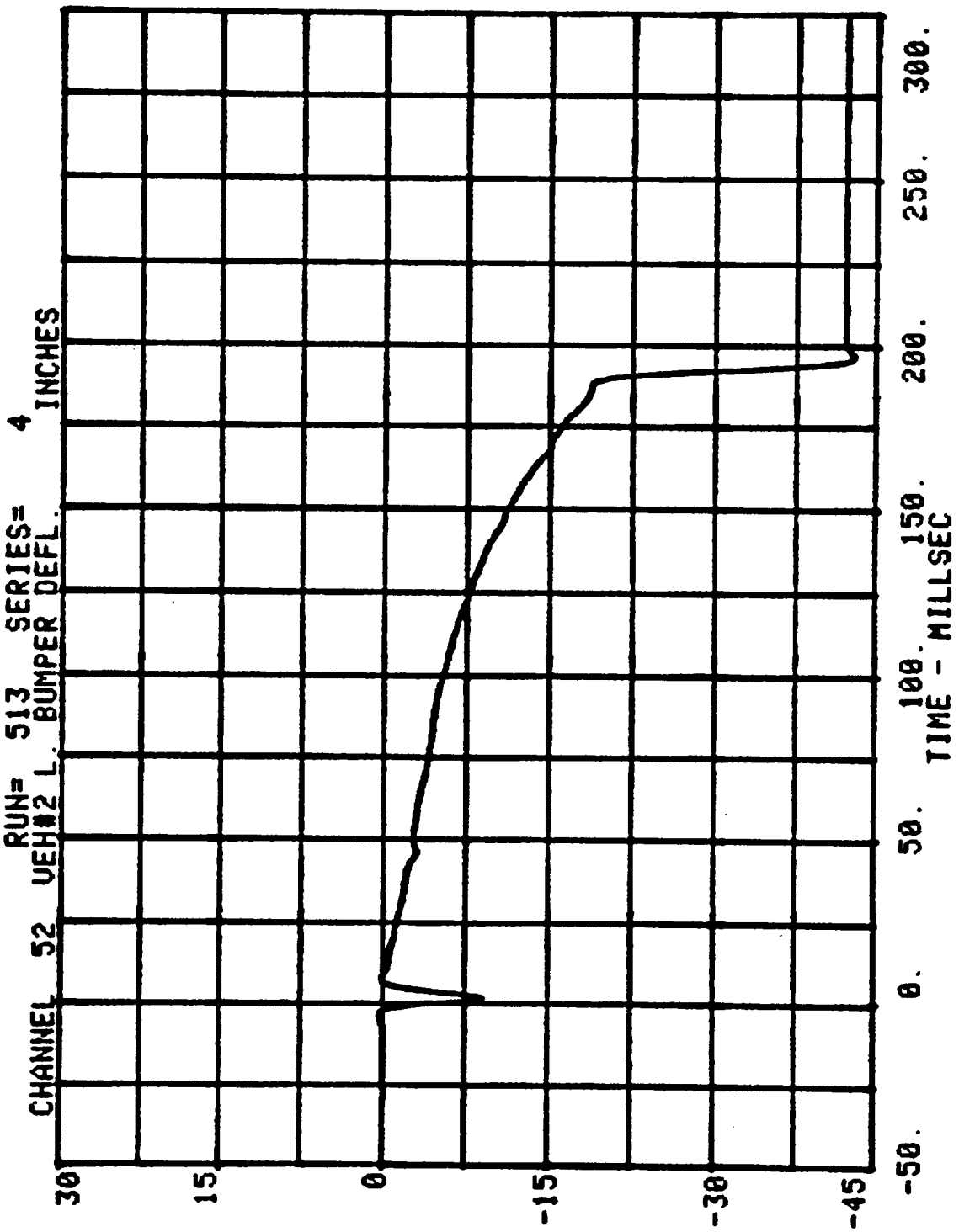

CHANNEL 75 VEH#2 ACC PACK #7(Z)
RUN= 513 SERIES= 4
G'S
50
30
10
-10
-30
-50
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

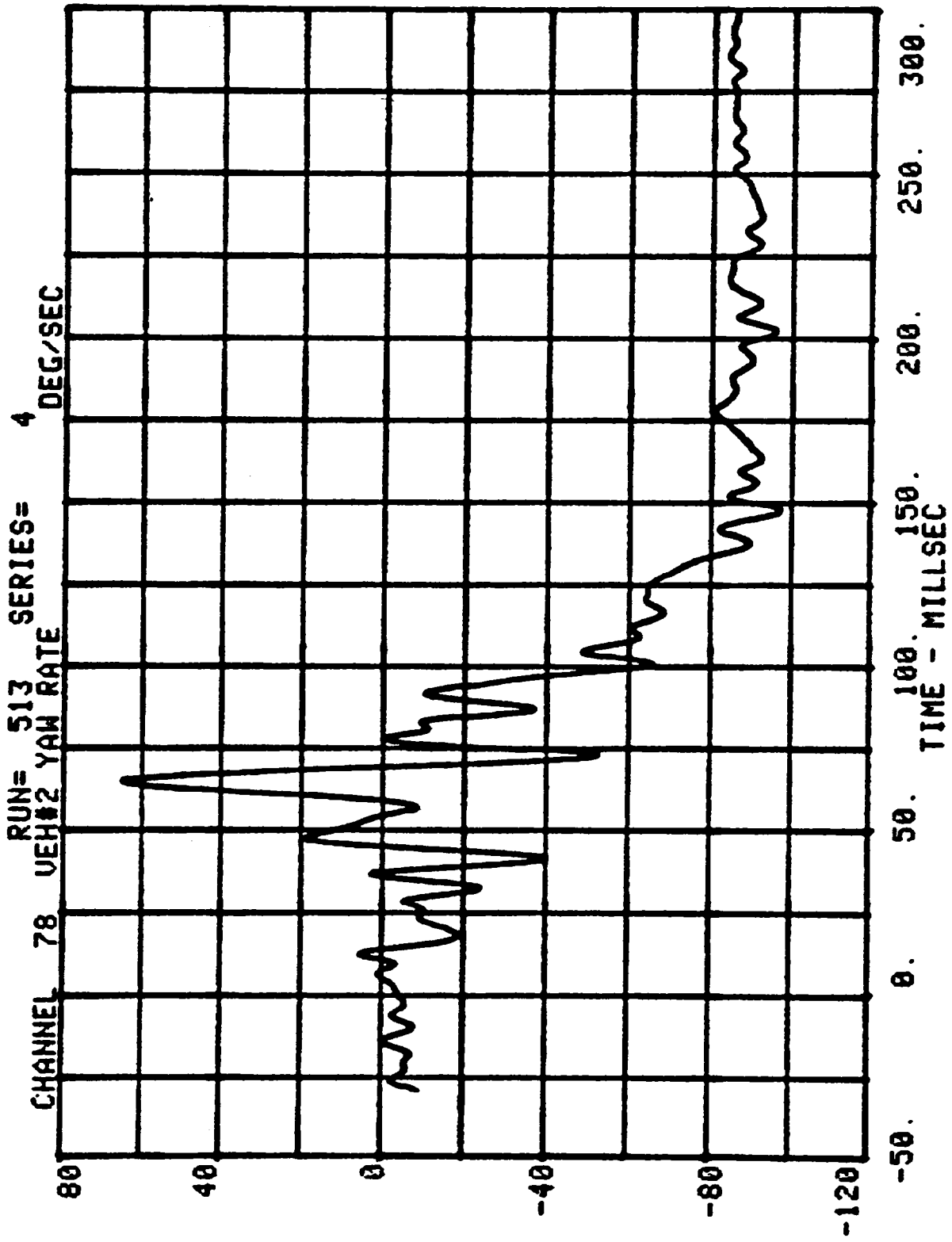
6707-V-4


CHANNEL 76 VEH#2 ACC PACK #9(X)
RUN= 513 SERIES= 4
G'S
300
200
100
0
-100
-200
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

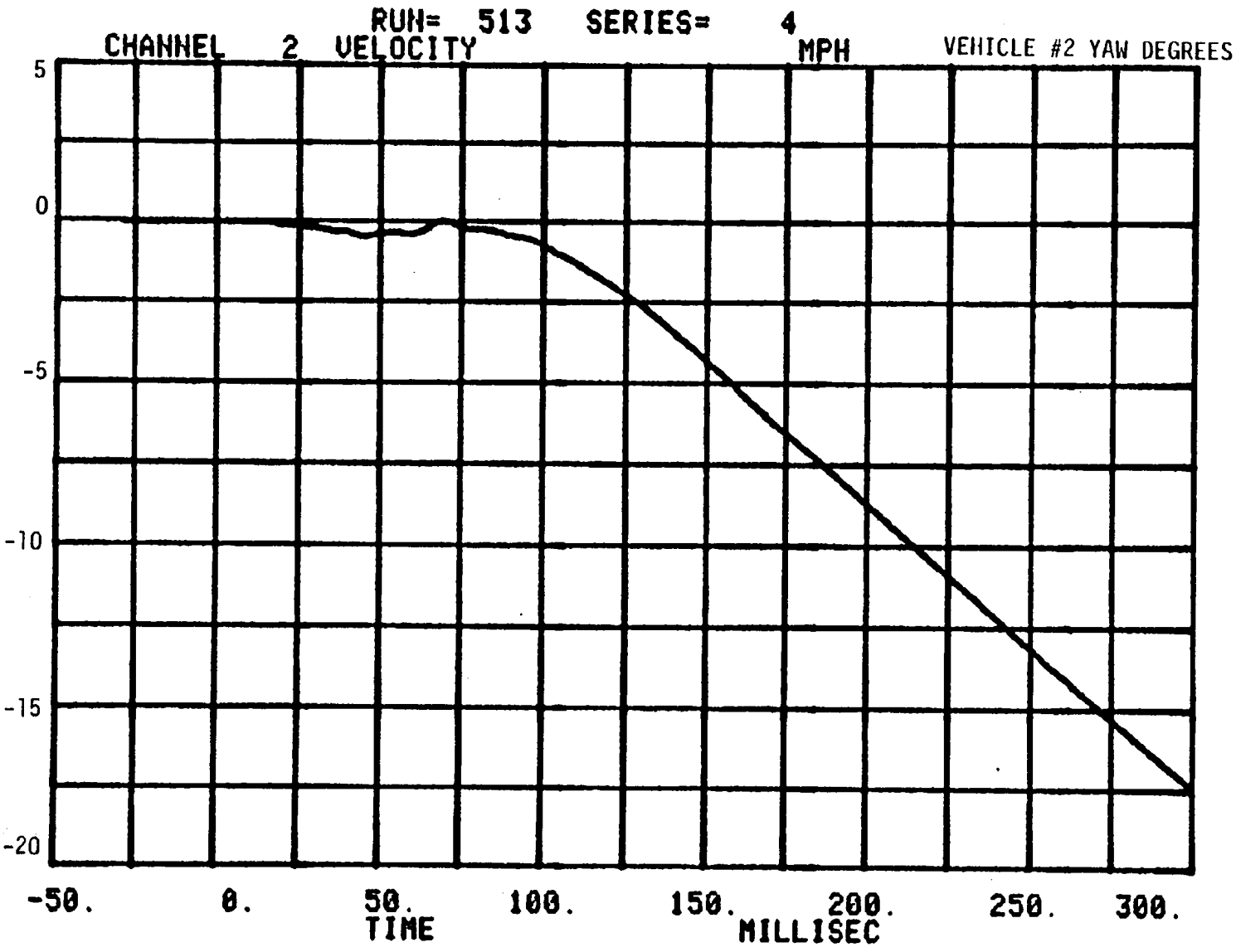

CHANNEL 77 VEH#2 ACC PACK #9(Z)
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 51 VEH#2 R. BUMPER DEFL.
RUN= 513 SERIES= 4
INCHES
20
12
4
-4
-12
-20
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


CHANNEL 52 VEH#2 L. BUMPER DEFL.
RUN= 513 SERIES= 4
INCHES
30
15
0
-15
-30
-45
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


CHANNEL 78 VEH#2 YAW RATE
RUN= 513 SERIES= 4 DEG/SEC
80
40
0
-40
-80
-120
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

VEHICLE #2 YAW ~ DEGREES



6707-V-4

TEST NO. 614-4-513

1980 VOLKSWAGEN RABBIT

DUMMY DATA

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

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

VEHICLE AGGRESSIVENESS CAR-TO-CAR TEST #4

RUN= 513

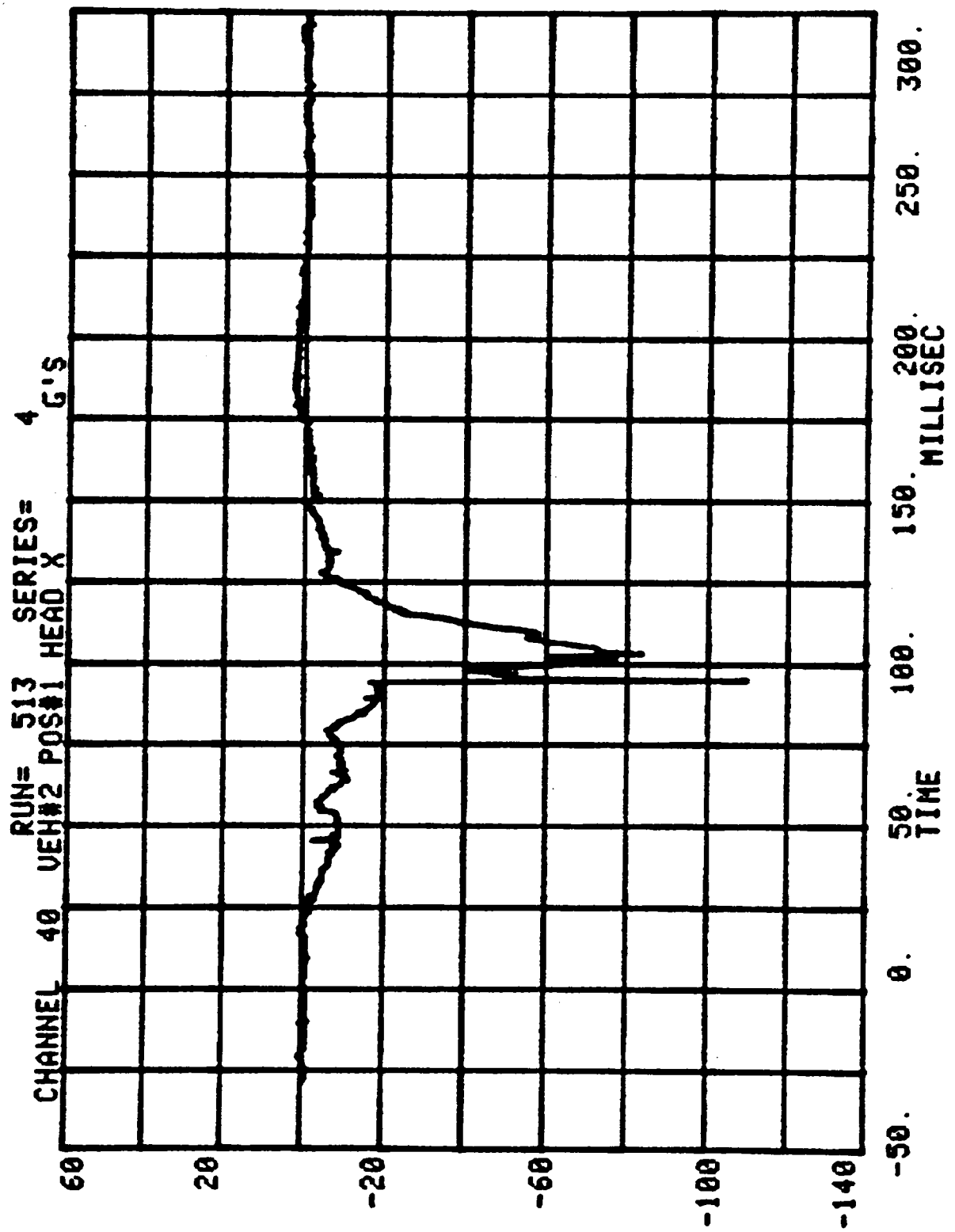
VEH#2 POS#1 HEAD RESULT.

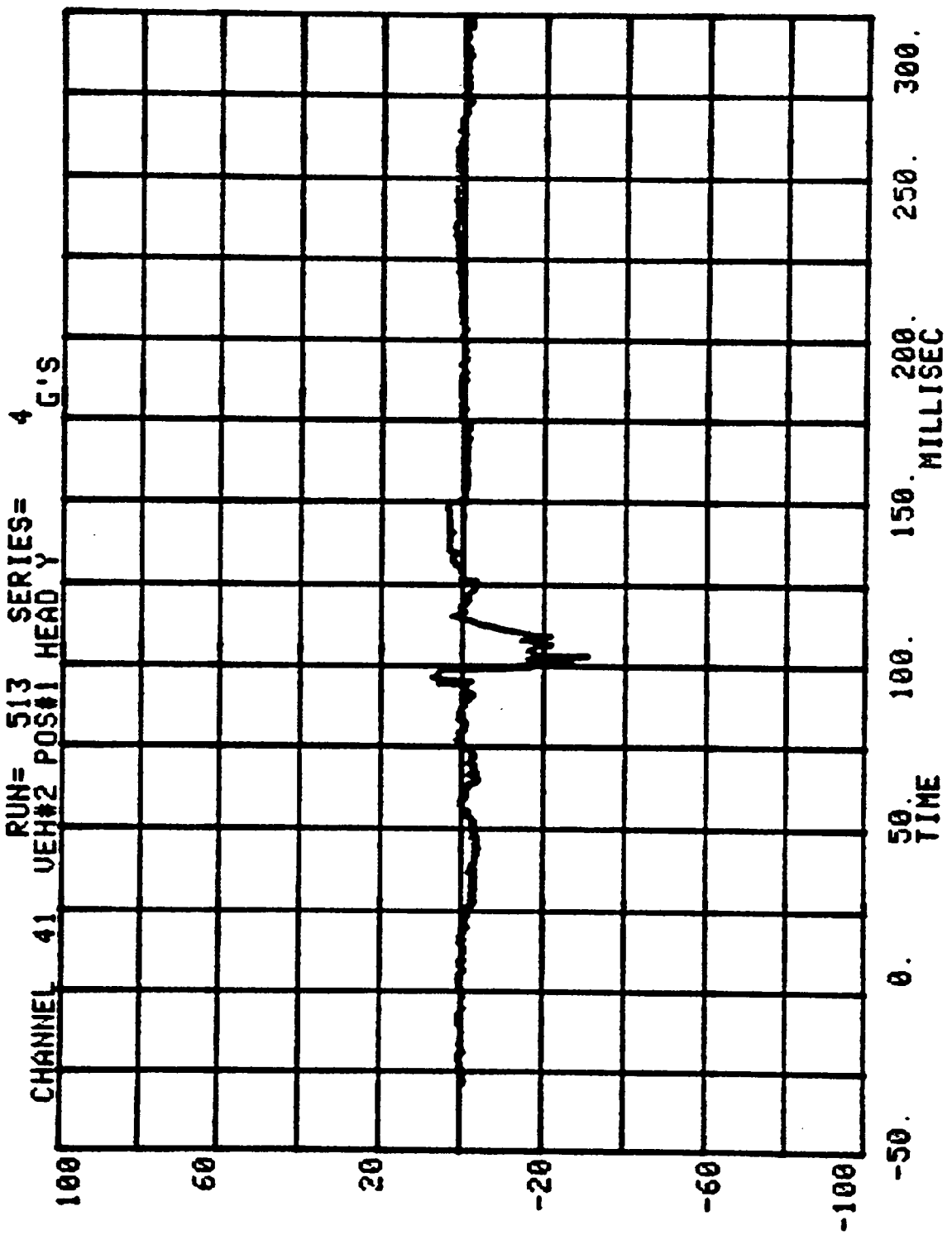
HIC= 630.9 FROM T1= .09480 TO T2= .11370

AVERAGE ACCELERATION BETWEEN T1 AND T2= 64.5G'S

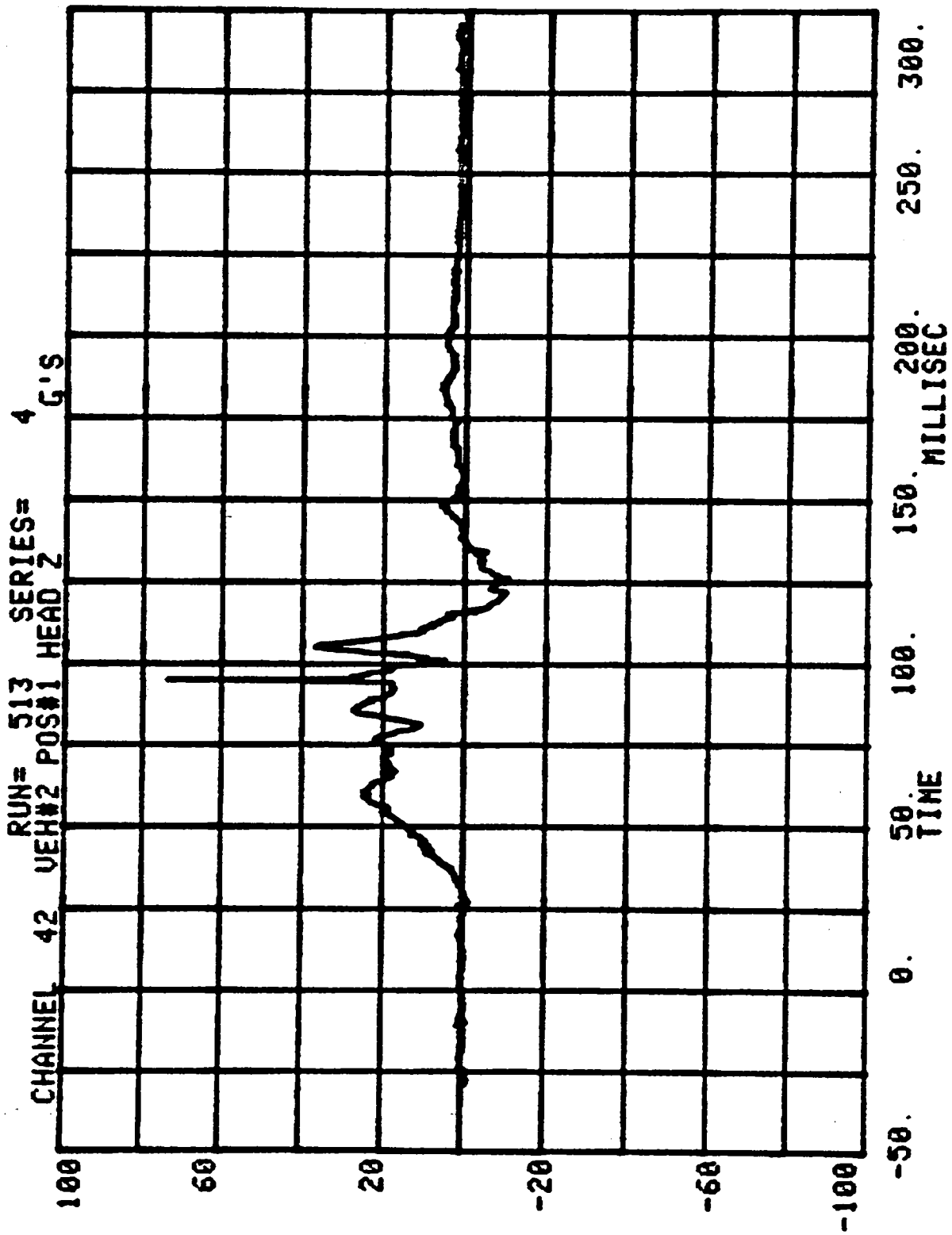
EVENT TIME= 300.0 MSEC

SEVERITY INDEX= 871.1

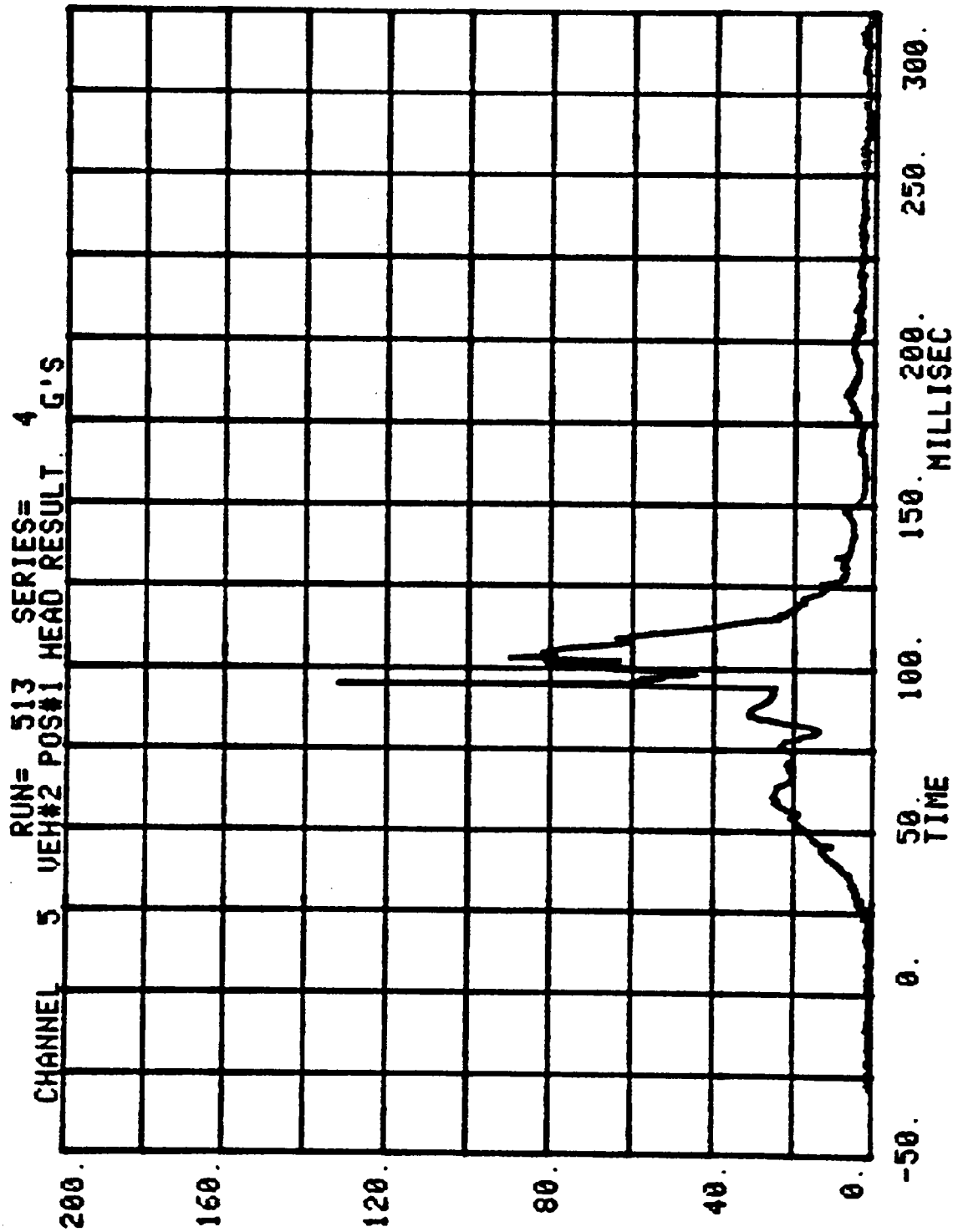

CHANNEL 40 VEH#2 POS#1 HEAD X
RUN= 513 SERIES= 4
G'S
60
20
-20
-60
-100
-140
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

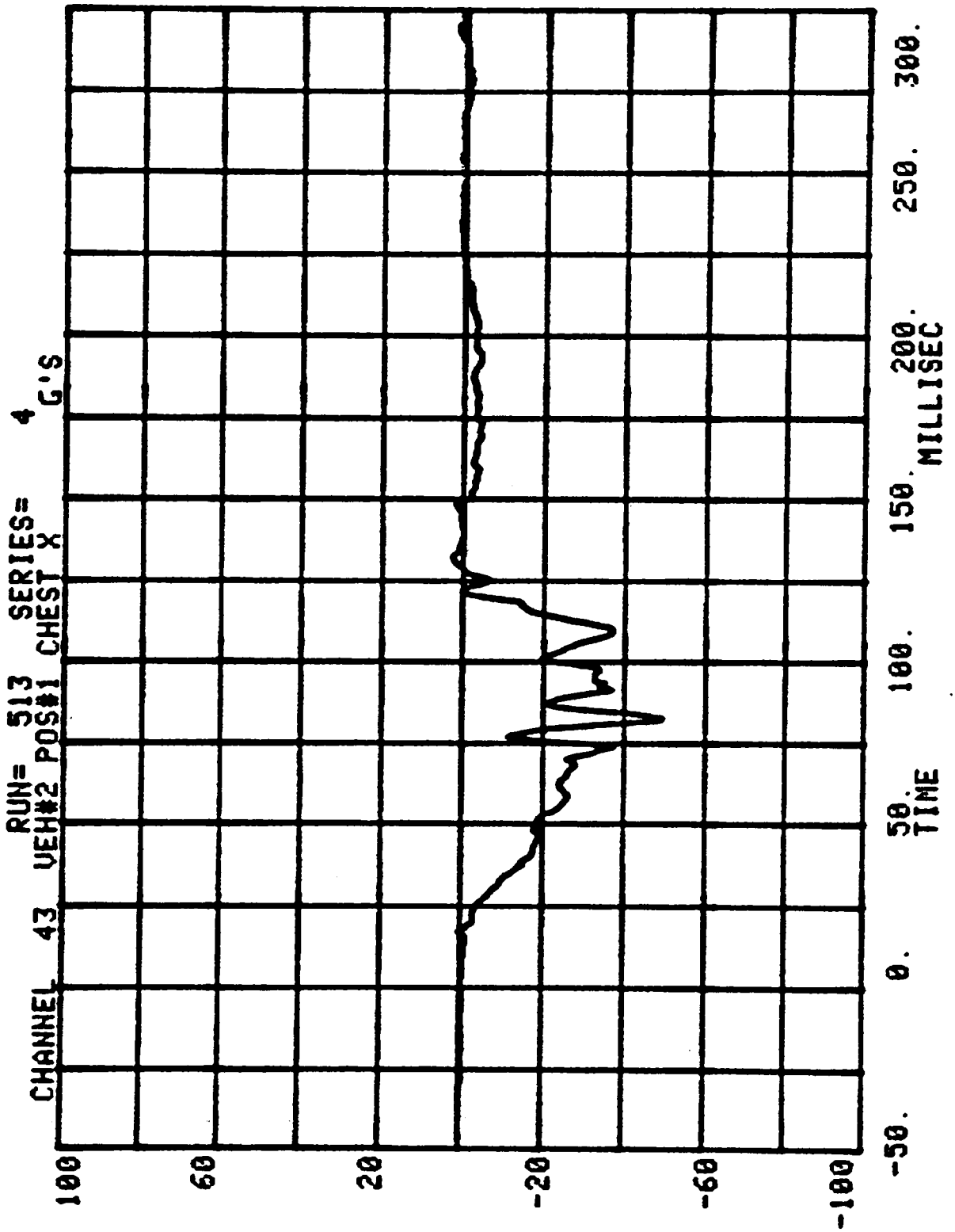

CHANNEL 41 VEH#2 POS#1 HEAD Y
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

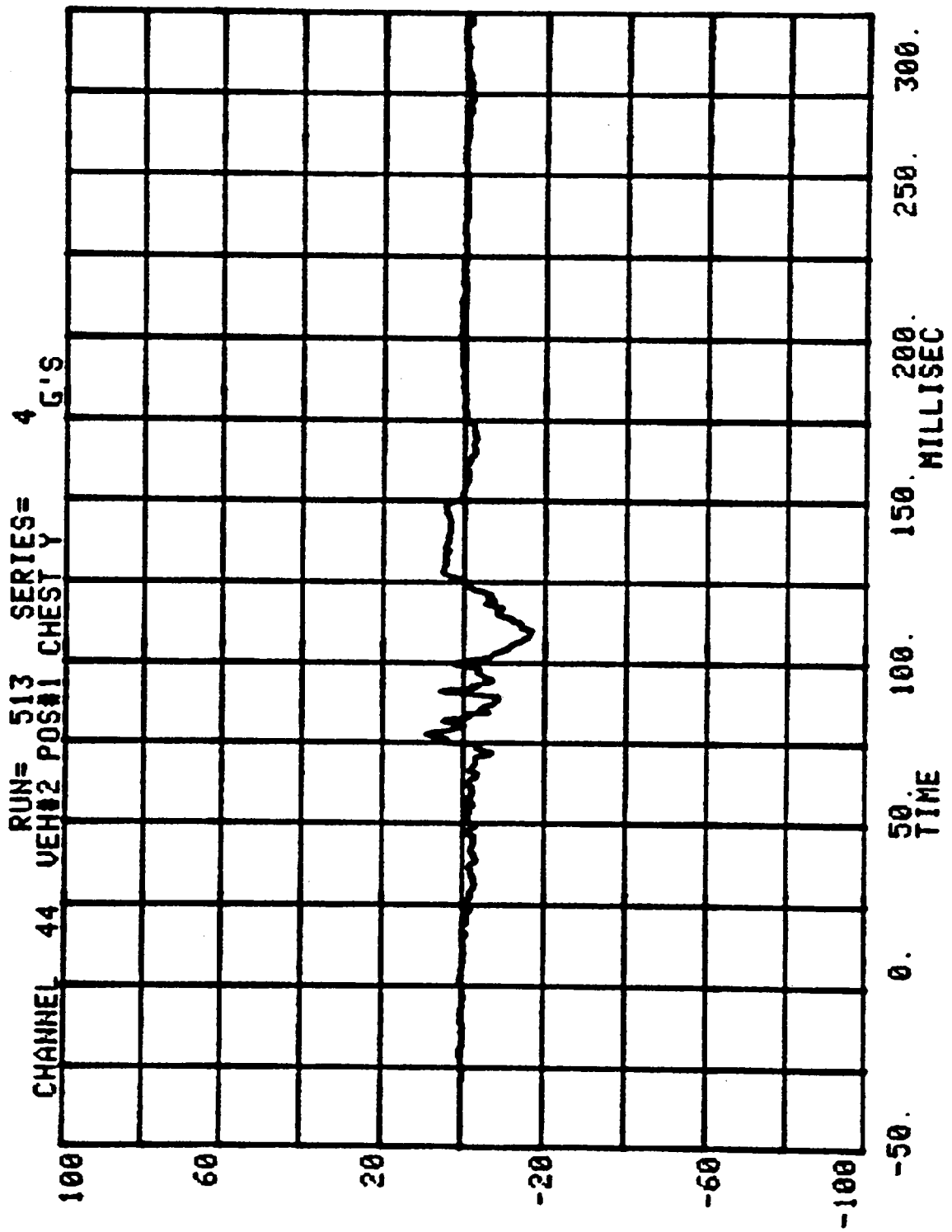
6707-V-4

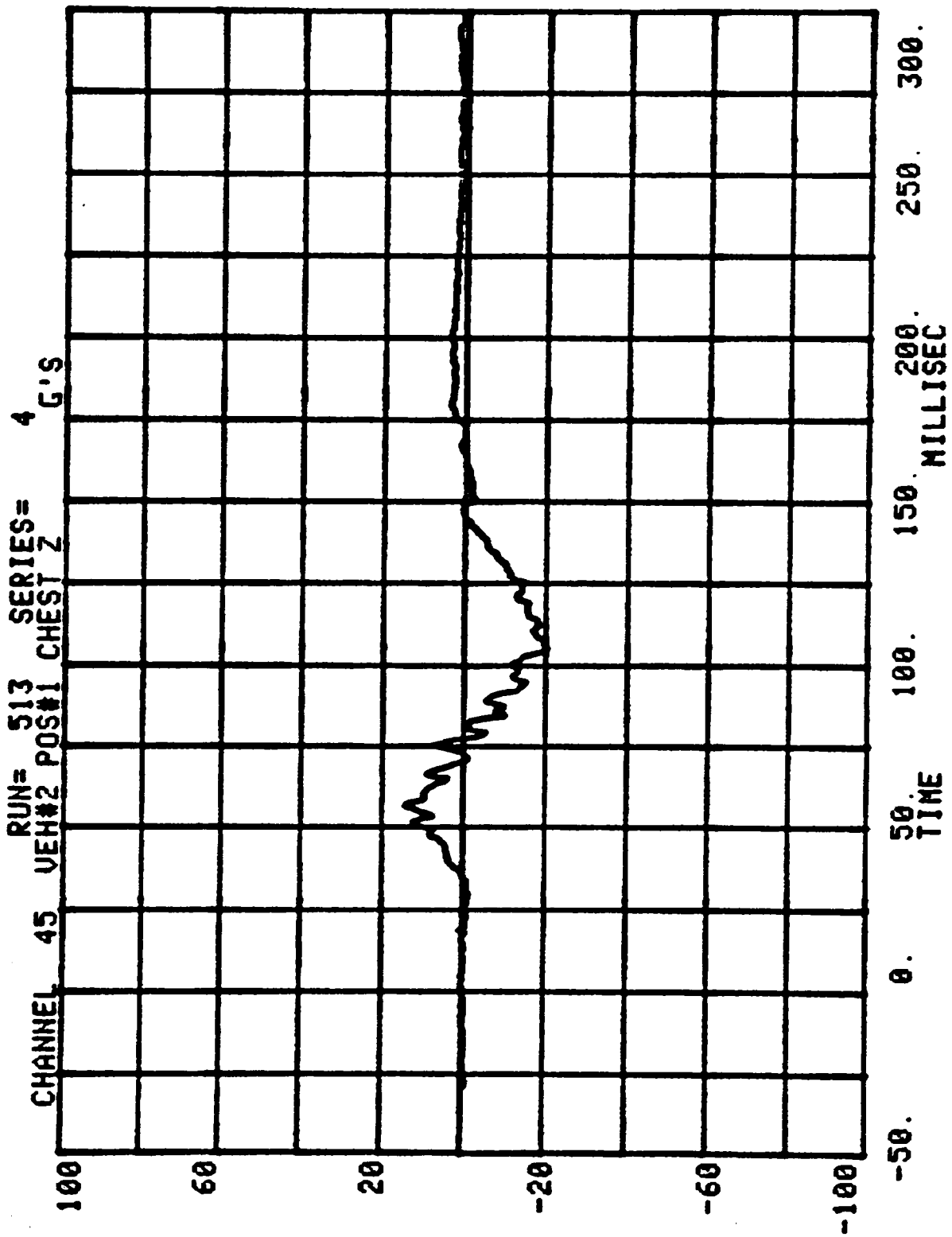

CHANNEL 42
RUN= 513 SERIES= 4
VEH#2 POS#1 HEAD 2
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

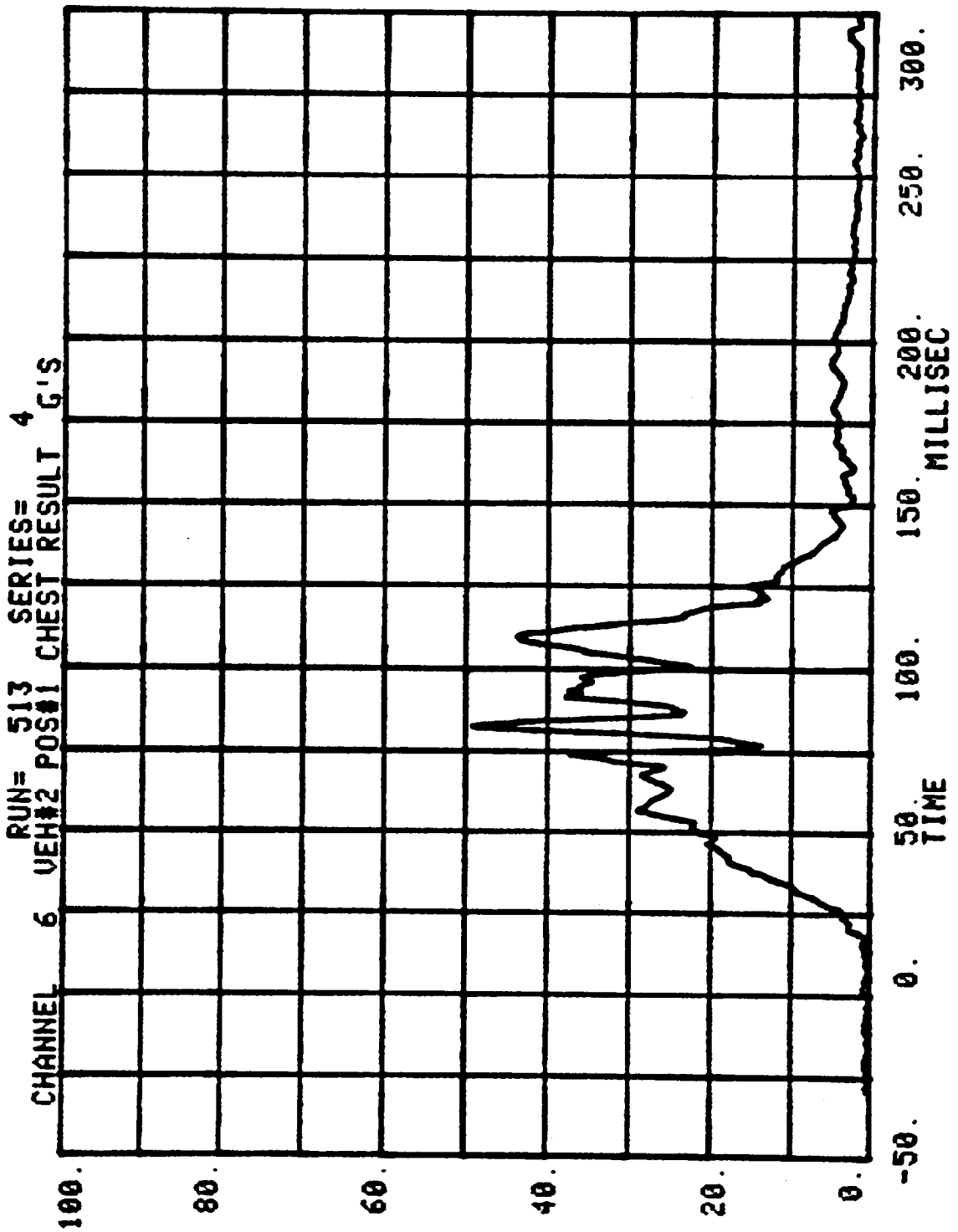
6707-V-4

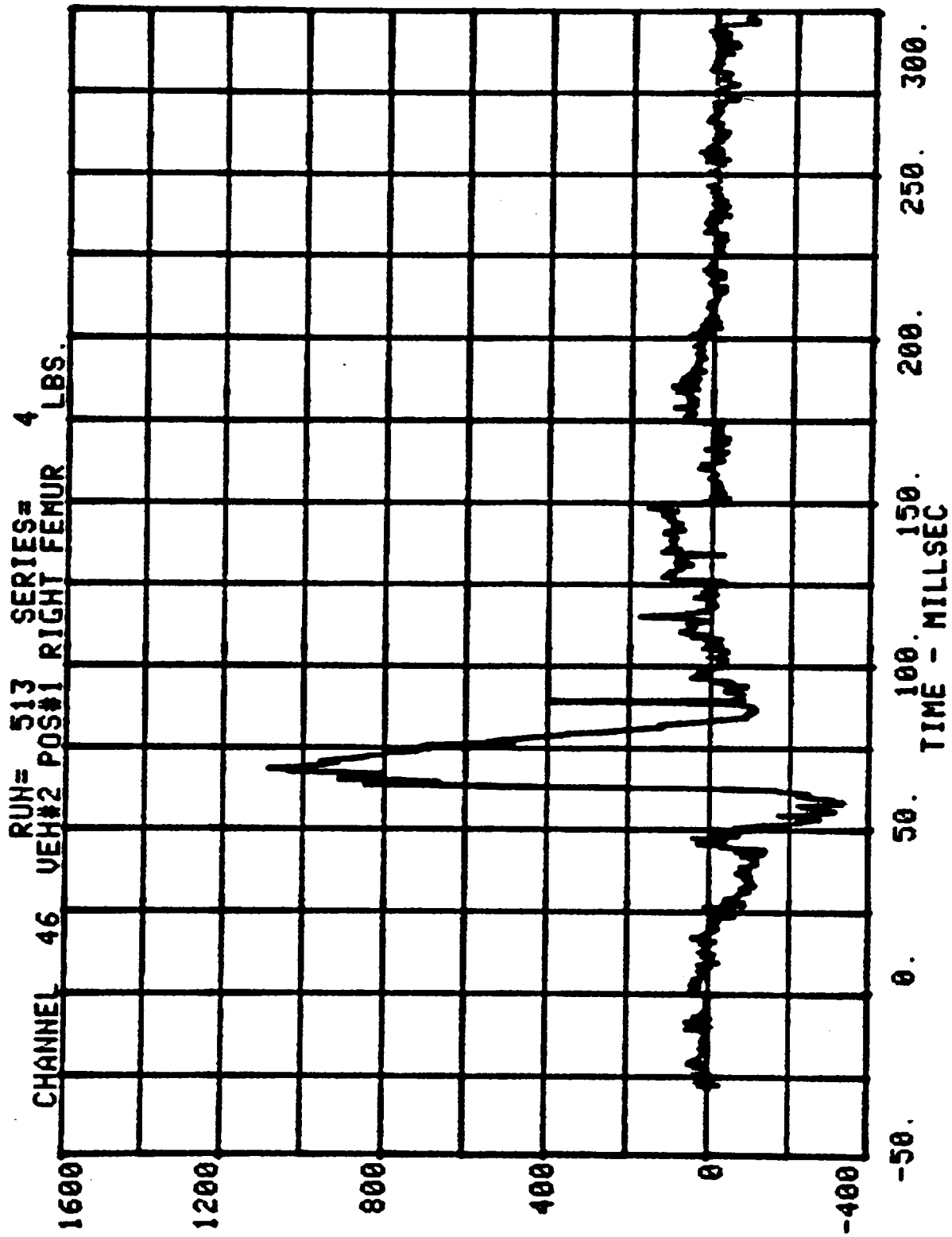

CHANNEL 5 RUN= 513 SERIES= 4
VEH#2 POS#1 HEAD RESULT. G'S
200.
160.
120.
80.
40.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

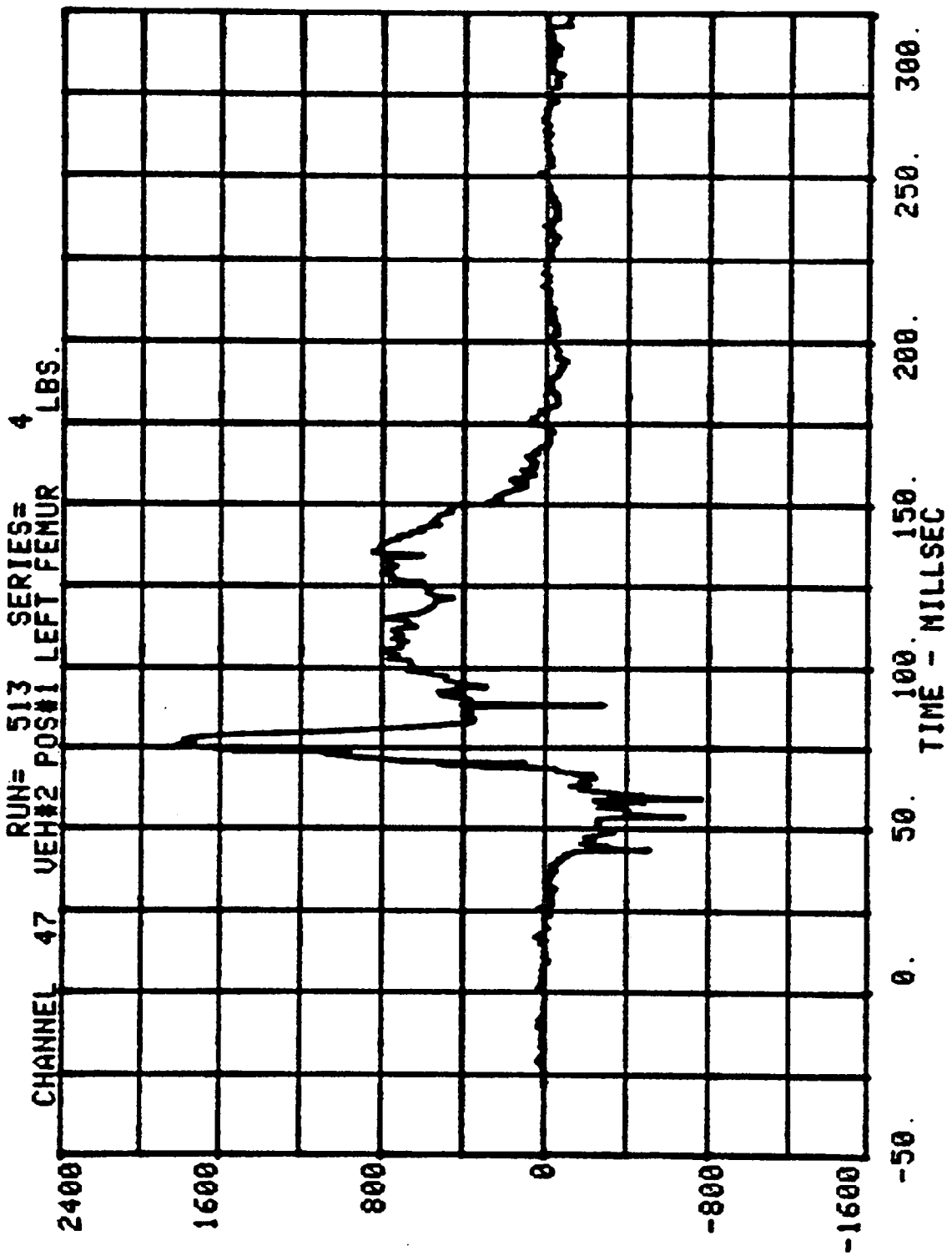

CHANNEL 43 RUN= 513 SERIES= 4
VEH#2 POS#1 CHEST X G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC


CHANNEL 44
RUN= 513
VEH#2 POS#1 CHEST Y
SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

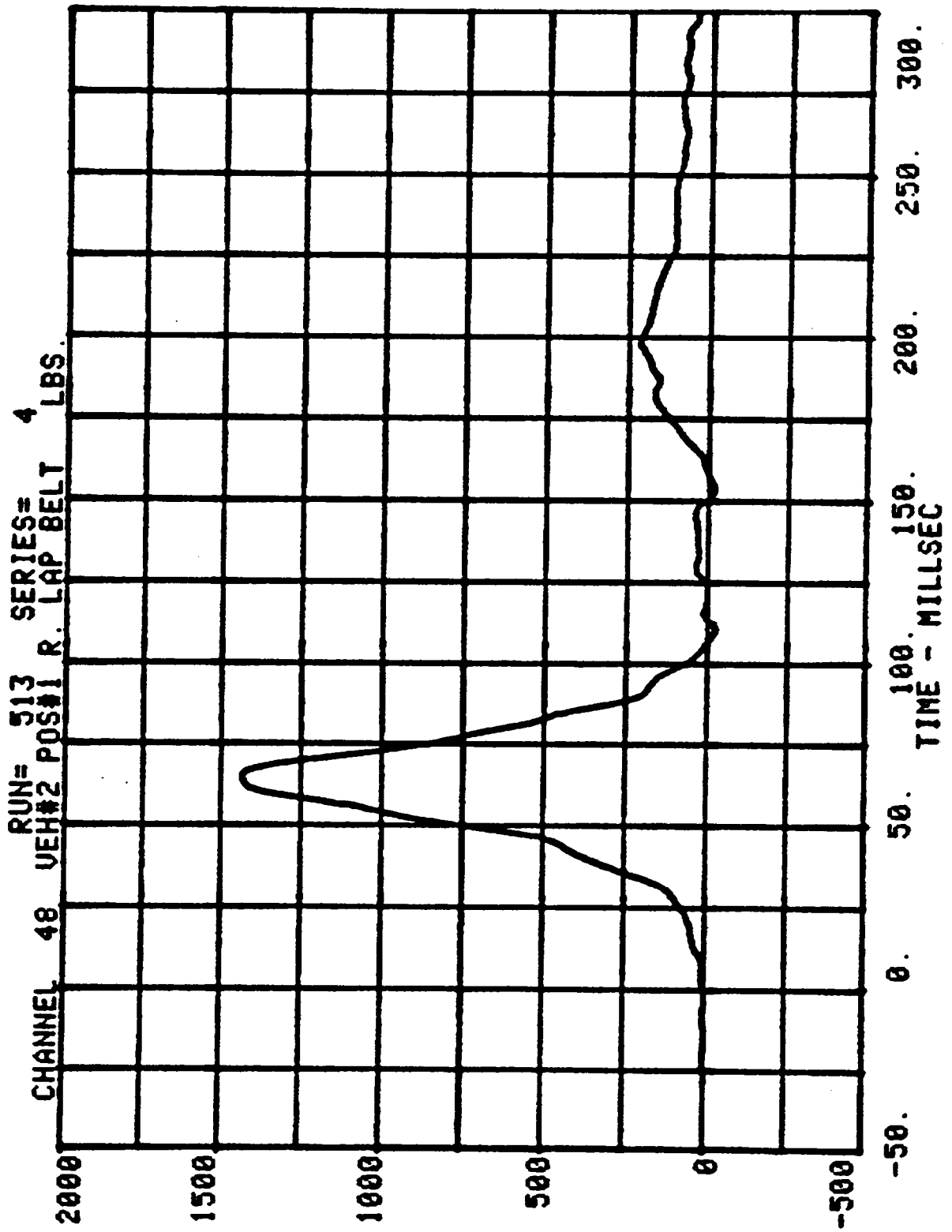

CHANNEL 45 VEH#2 POS#1 CHEST Z
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

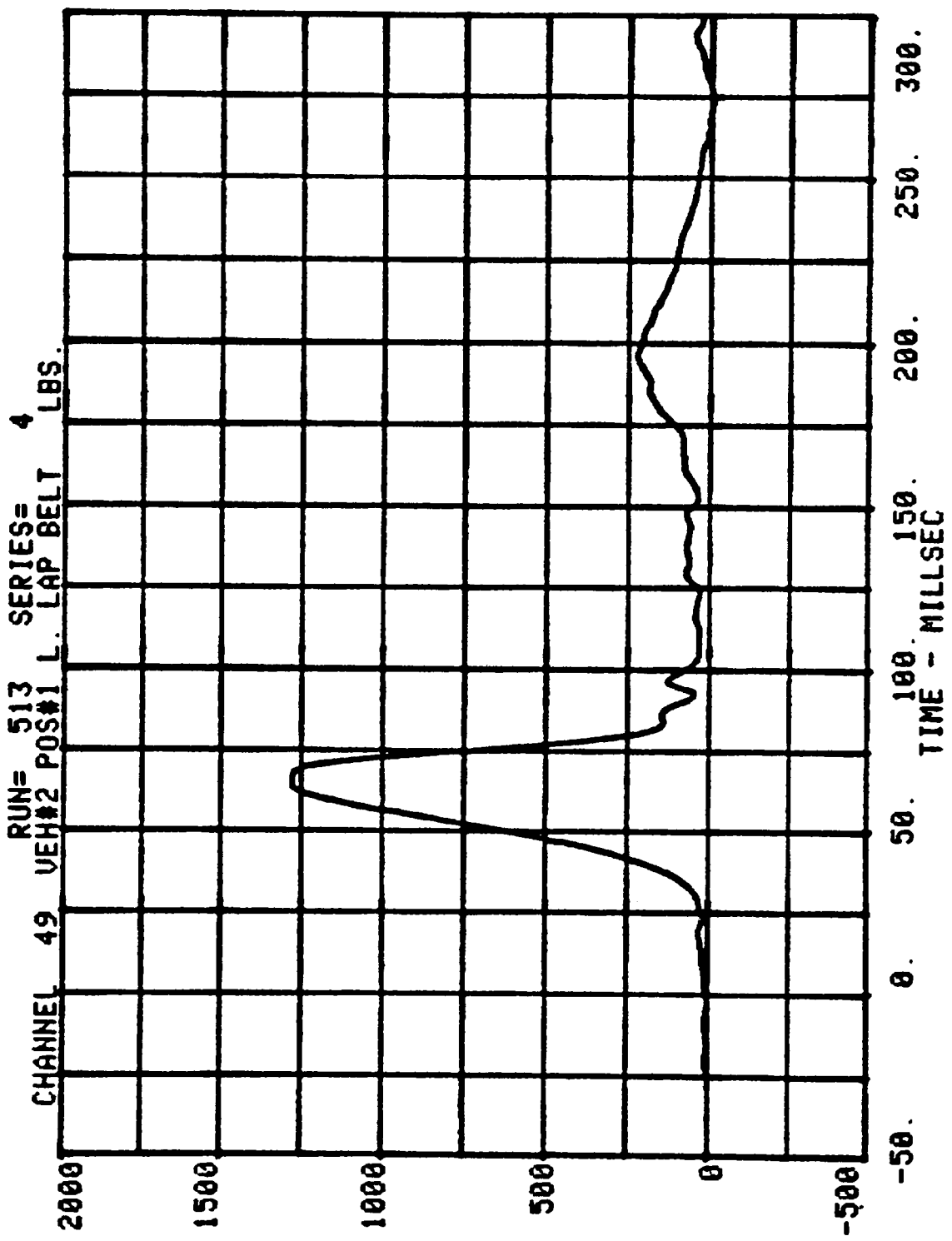

CHANNEL 6 VEH#2 POS#1 CHEST RESULT G'S
RUN= 513 SERIES= 4
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

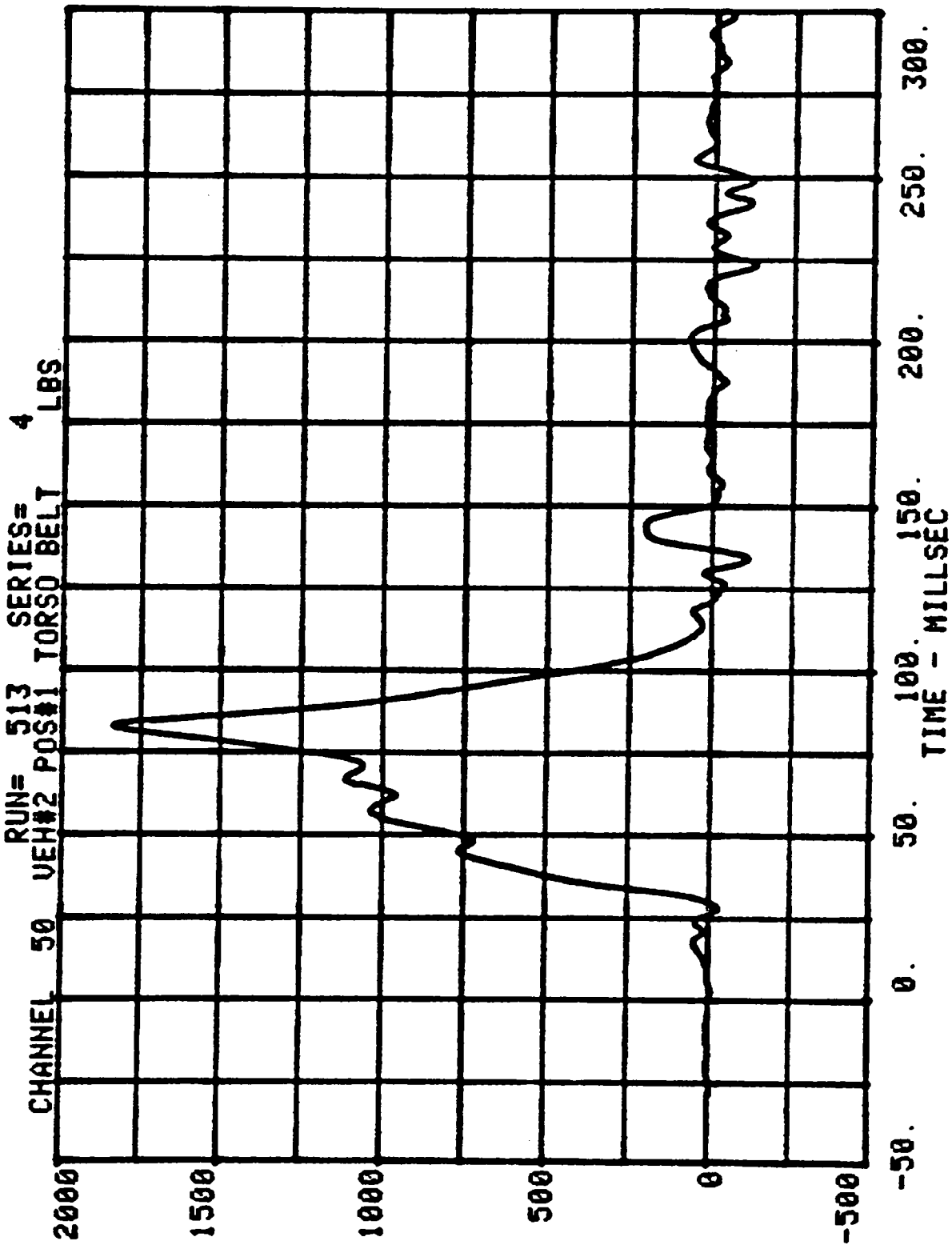

CHANNEL 46 VEH#2 POS#1 RIGHT FEMUR
RUN= 513 SERIES= 4
LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


CHANNEL 47 VEH#2 POS#1 LEFT FEMUR
RUN= 513 SERIES= 4
LBS.
2400
1600
800
0
-800
-1600
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

6707-V-4


CHANNEL 48 RUN= 513 SERIES= 4
VEH#2 POS#1 R. LAP BELT LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


CHANNEL 49 RUN= 513 SERIES= 4
VEH#2 POS#1 L. LAP BELT LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


CHANNEL 50 VEH#2 POS#1 TORSO BELT
RUN= 513 SERIES= 4
LBS
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

VEHICLE AGGRESSIVENESS CAR-TO-CAR TEST #4

RUN= 513

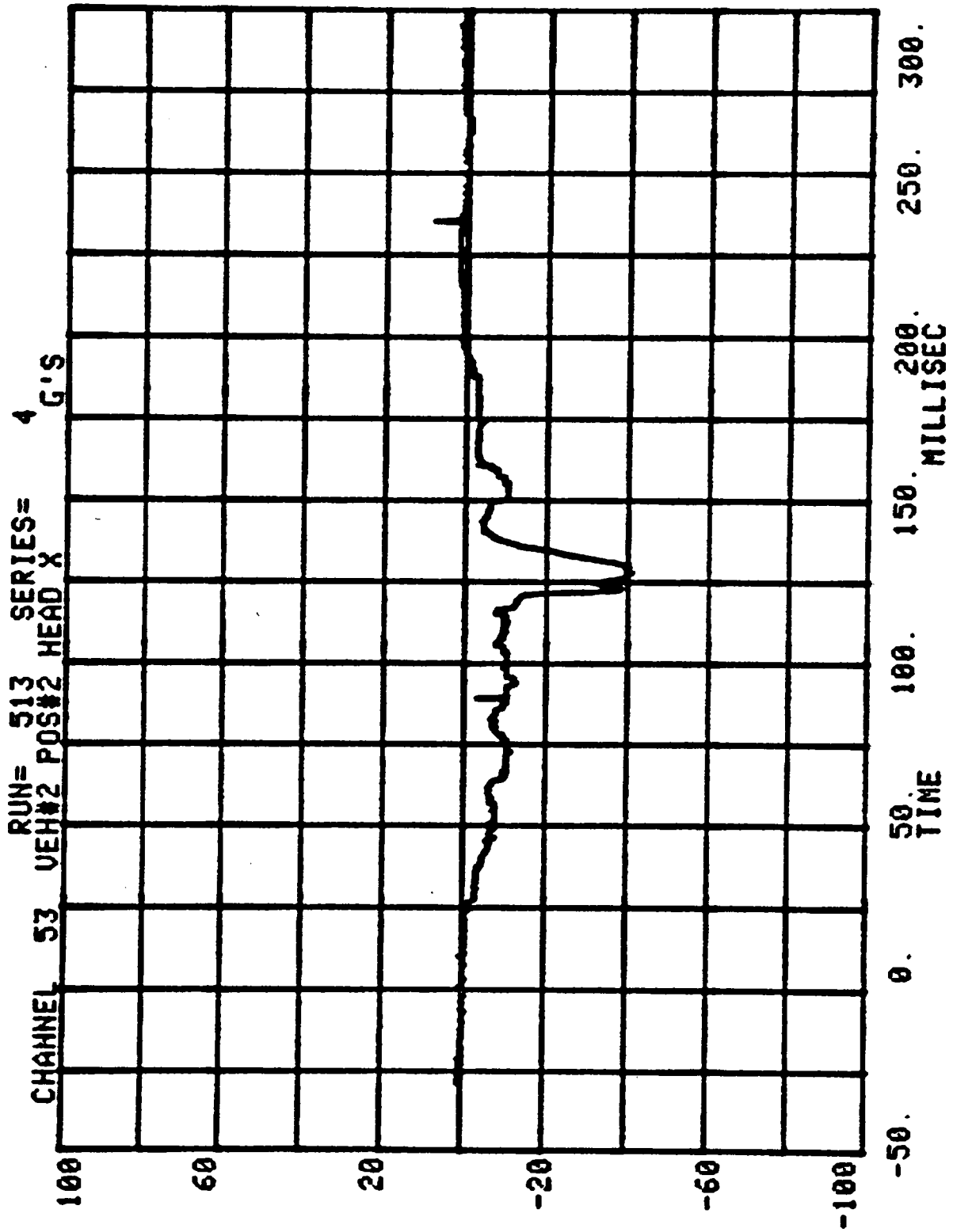
VEH#2 POS#2 HEAD RESULT.

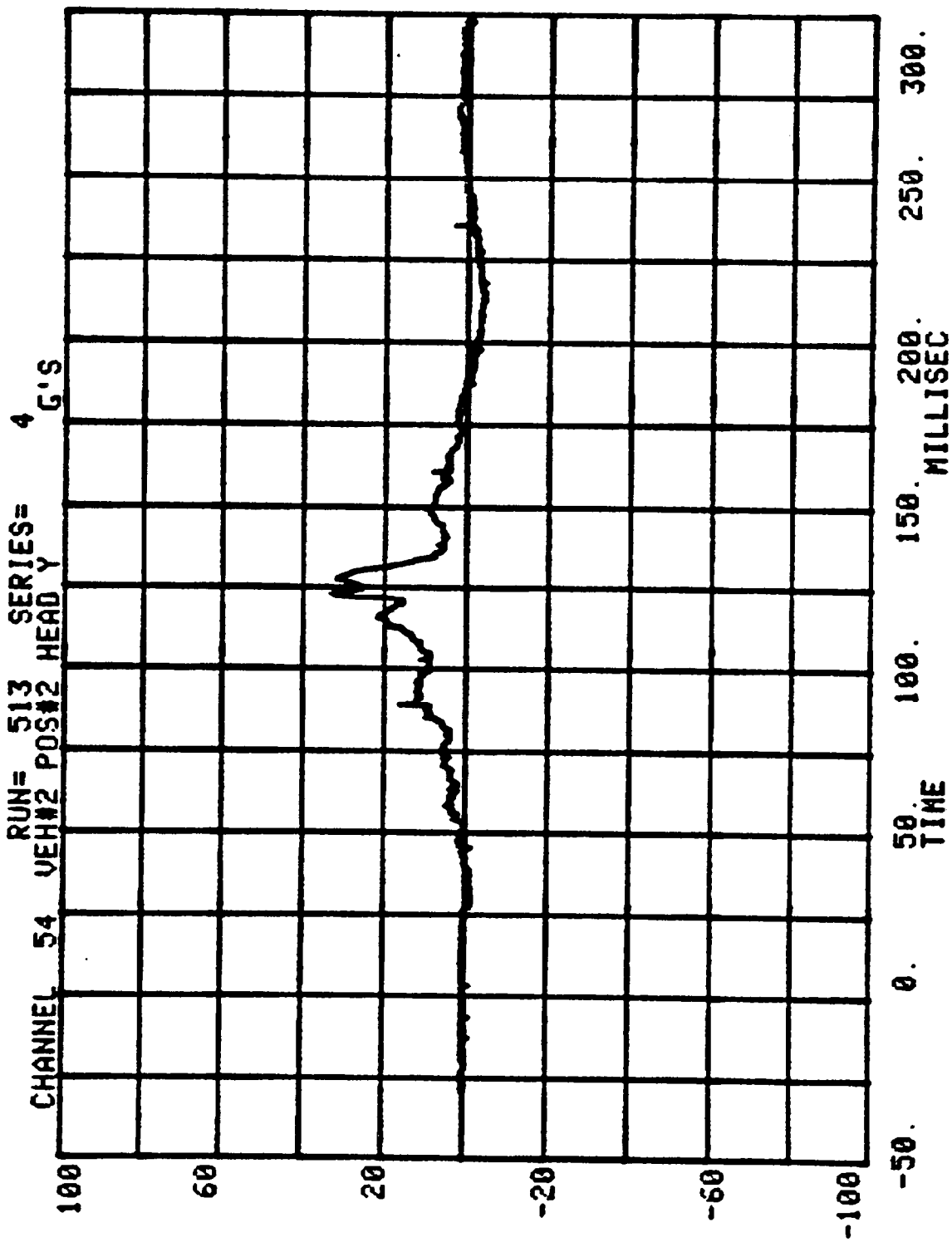
HIC= 363.9 FROM T1= .05640 TO T2= .13770

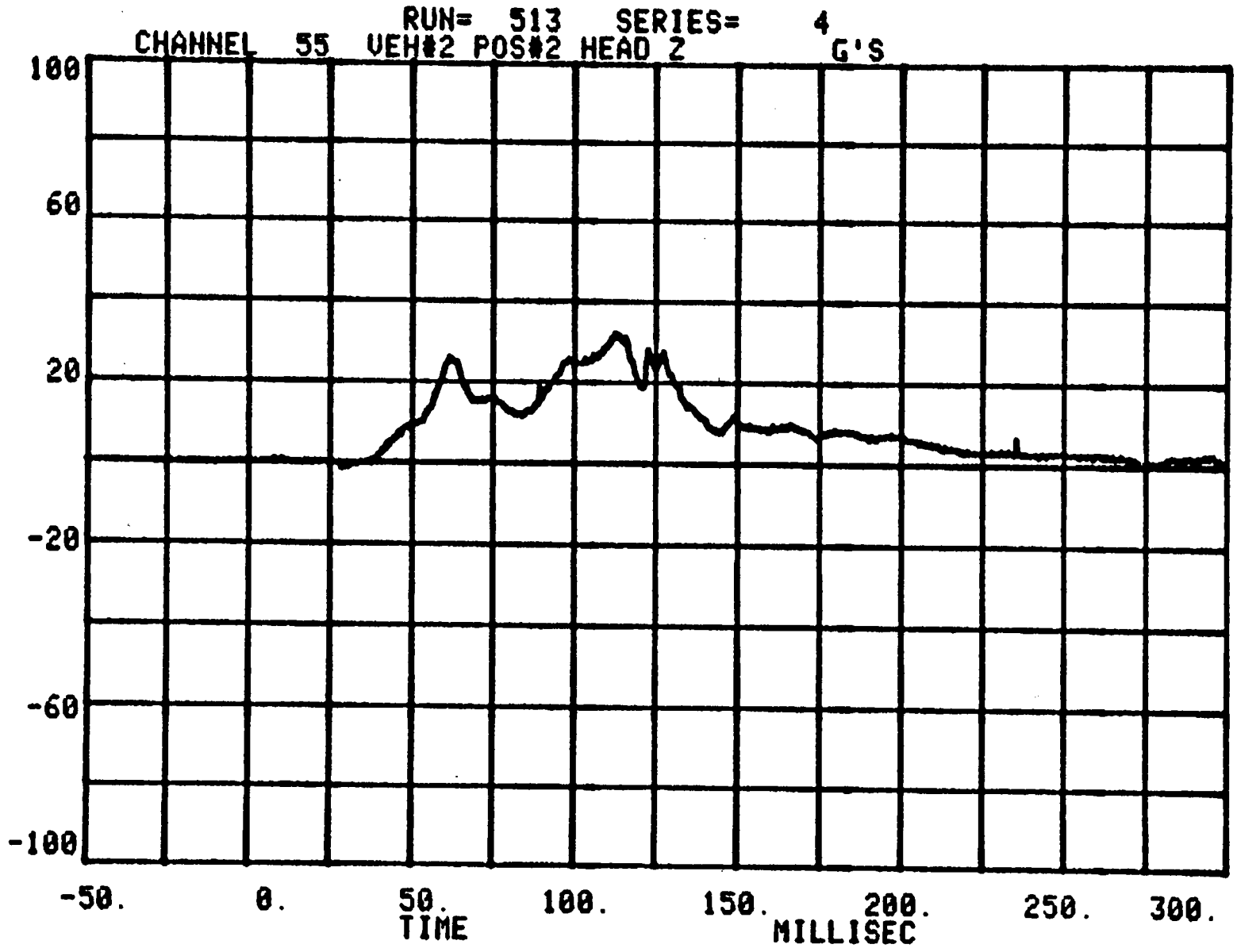
AVERAGE ACCELERATION BETWEEN T1 AND T2= 28.9G'S

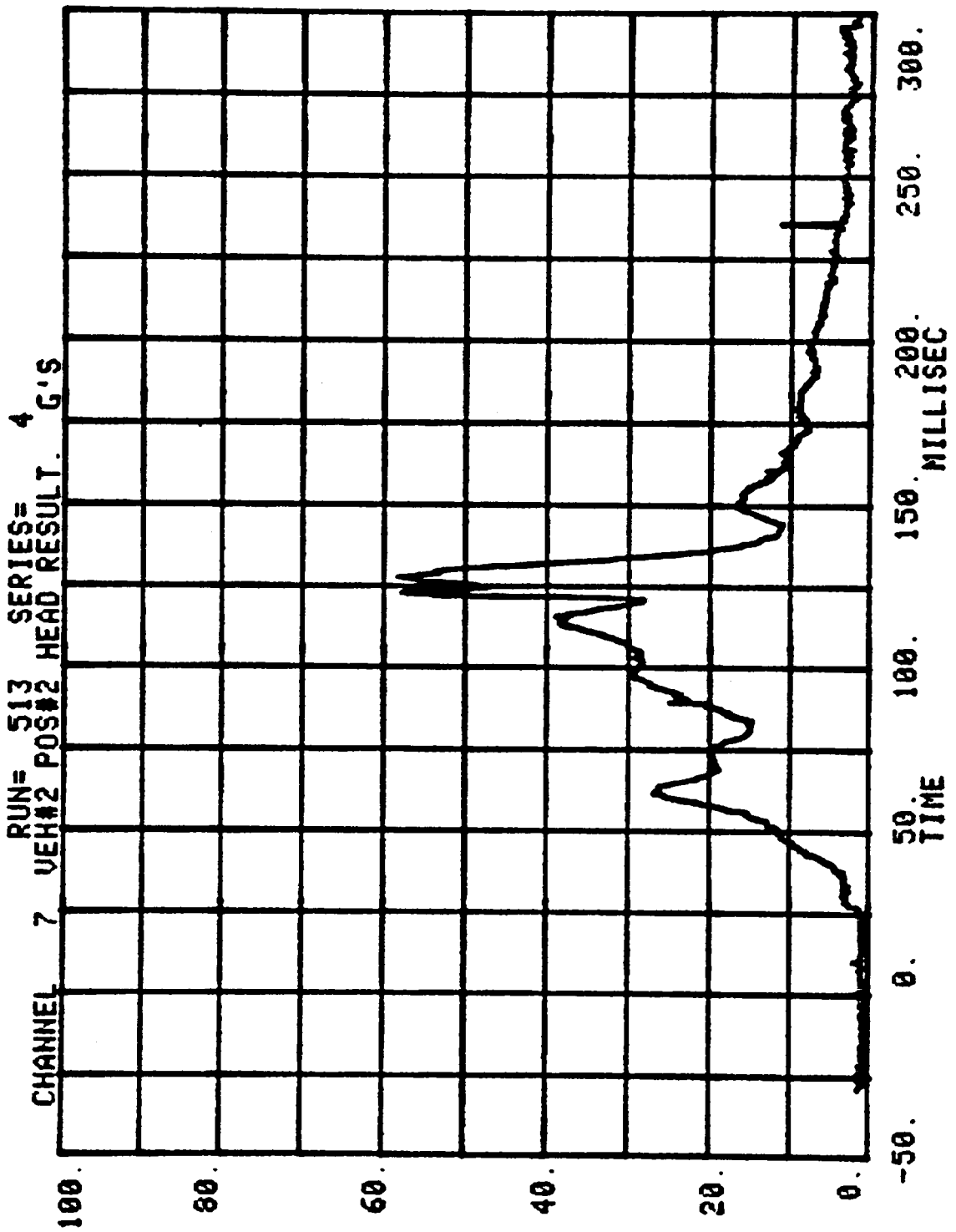
EVENT TIME= 300.0 MSEC

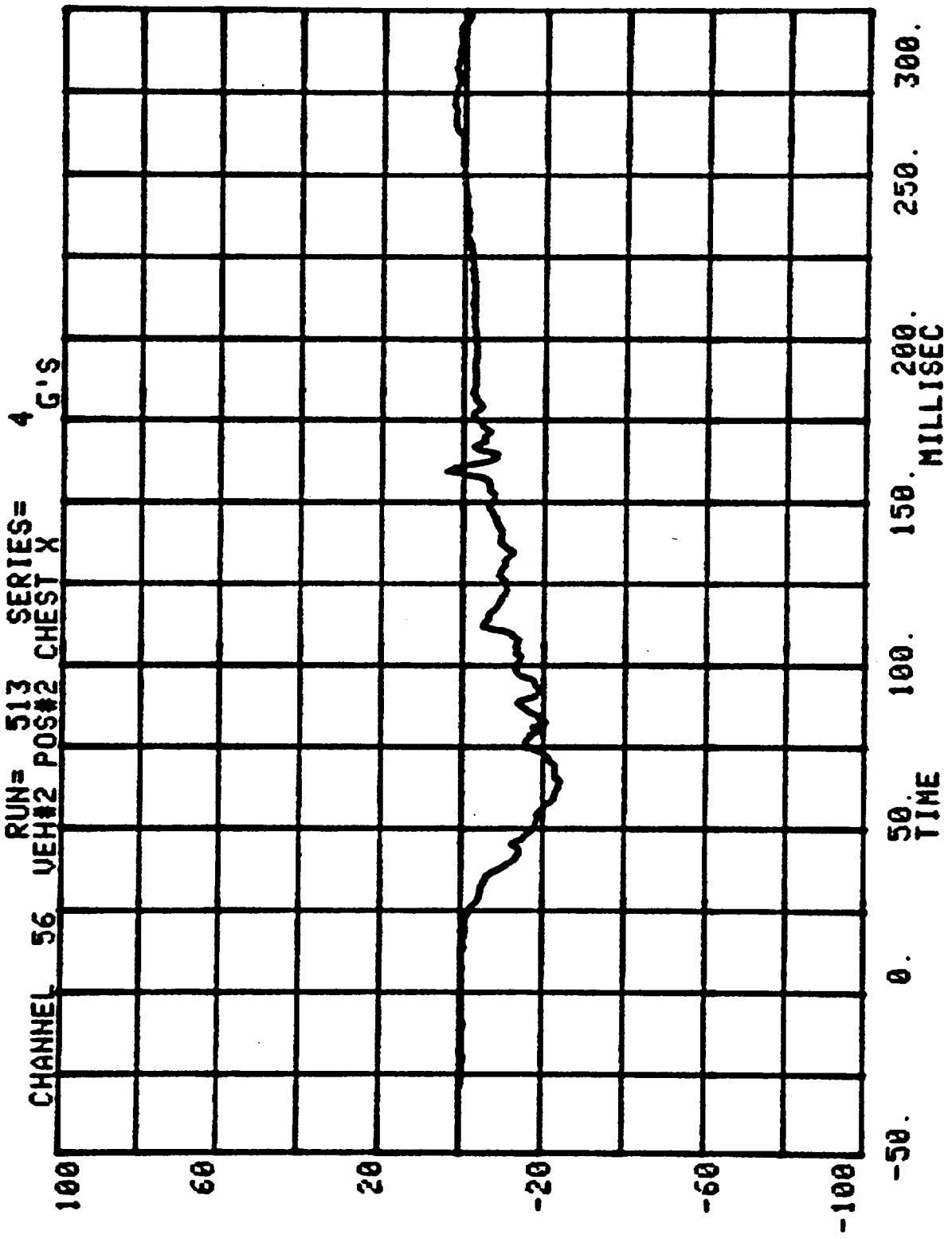
SEVERITY INDEX= 505.3

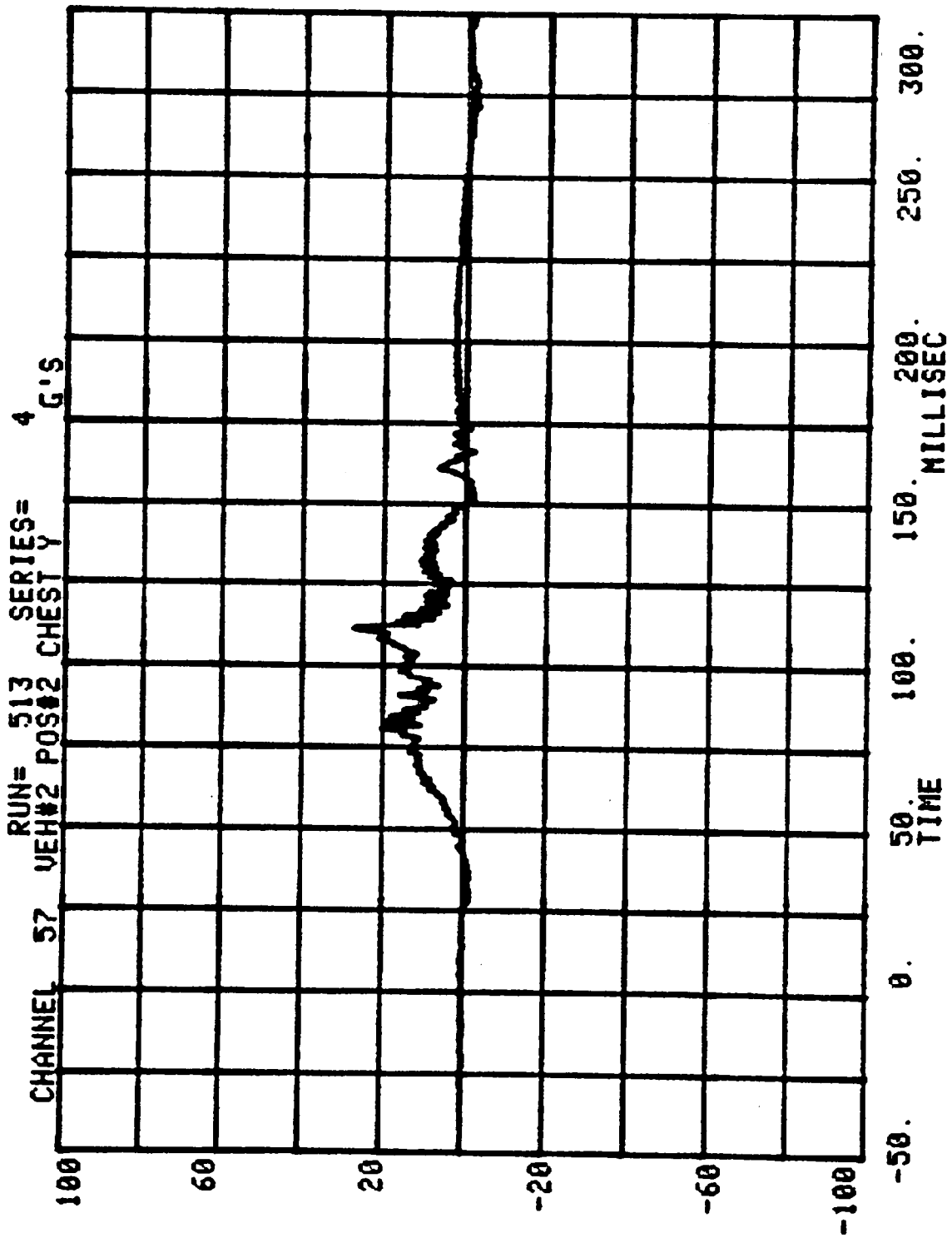

CHANNEL 53 VEH#2 POS#2 HEAD X
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

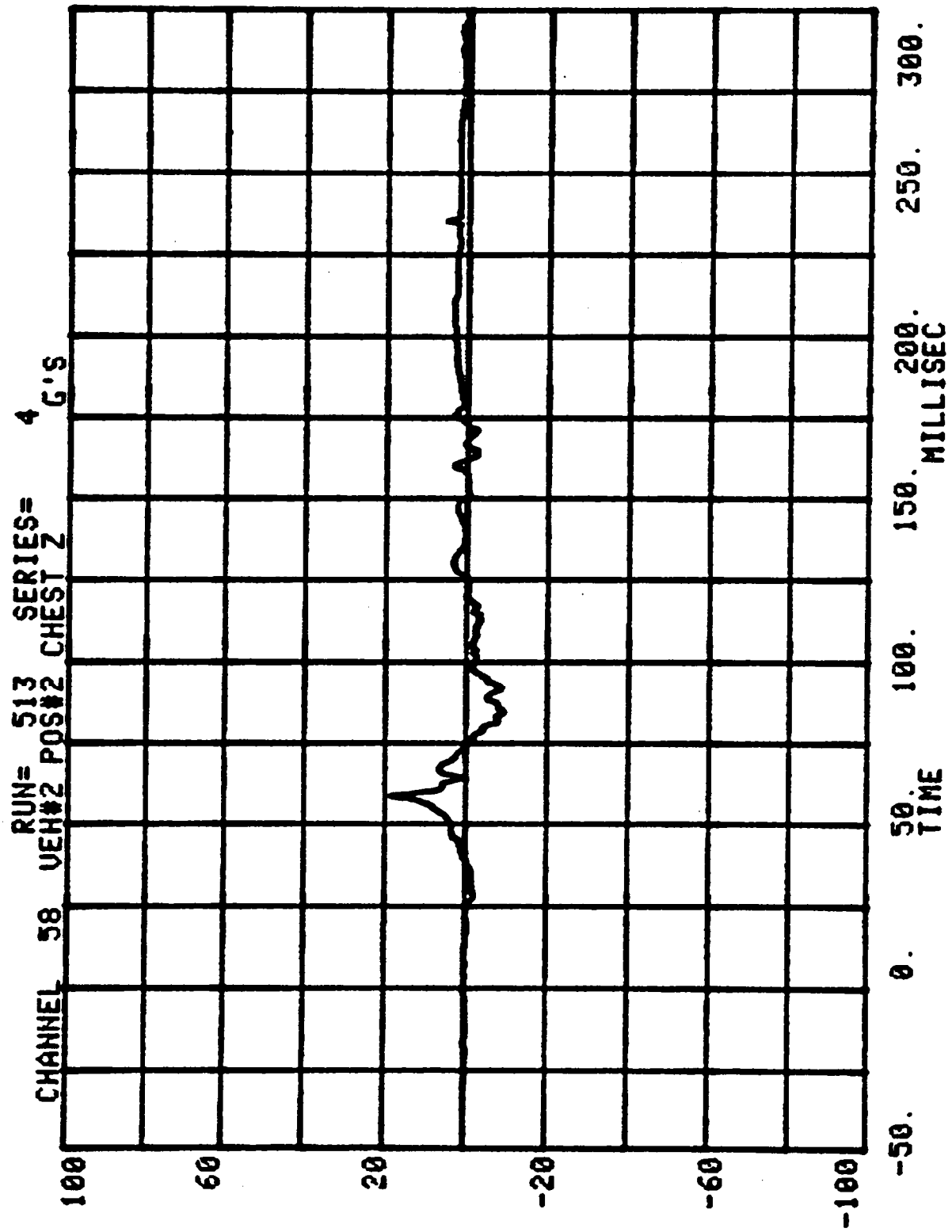

CHANNEL 54 VEH#2 POS#2 HEAD Y
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

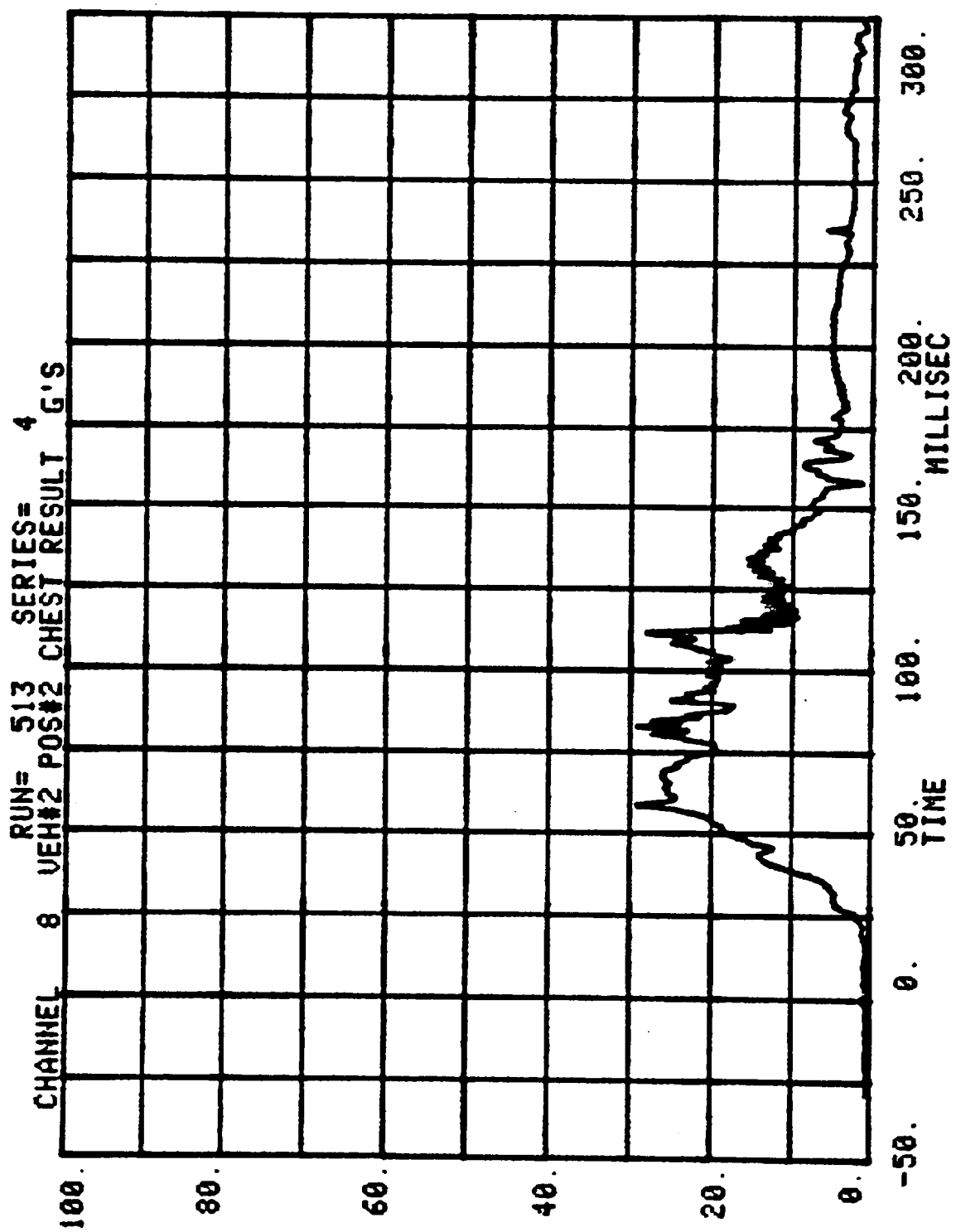

RUN= 513 SERIES= 4
CHANNEL 55 VEH#2 POS#2 HEAD Z
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

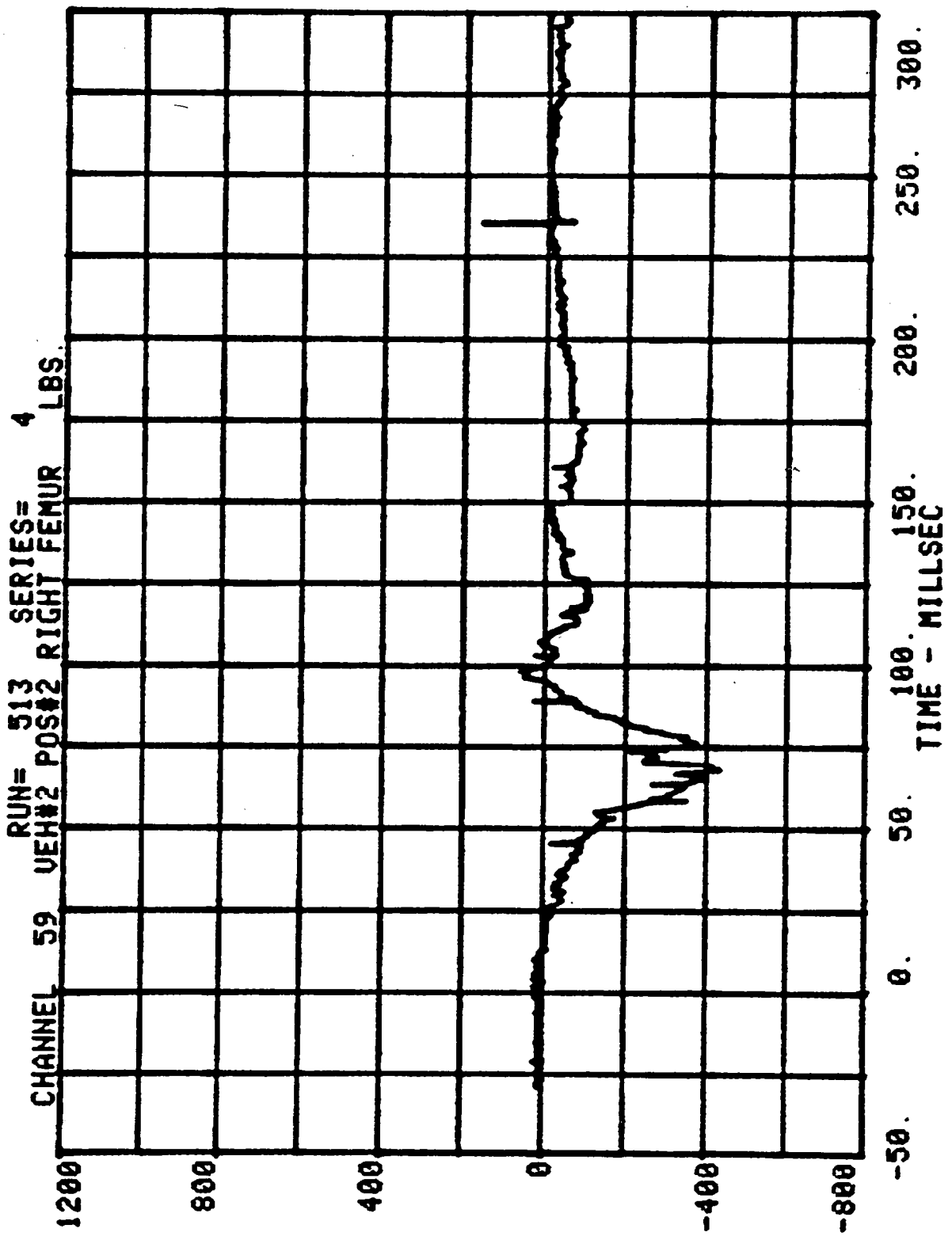

CHANNEL 7 VEH#2 POS#2 HEAD RESULT. G'S
RUN= 513 SERIES= 4
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

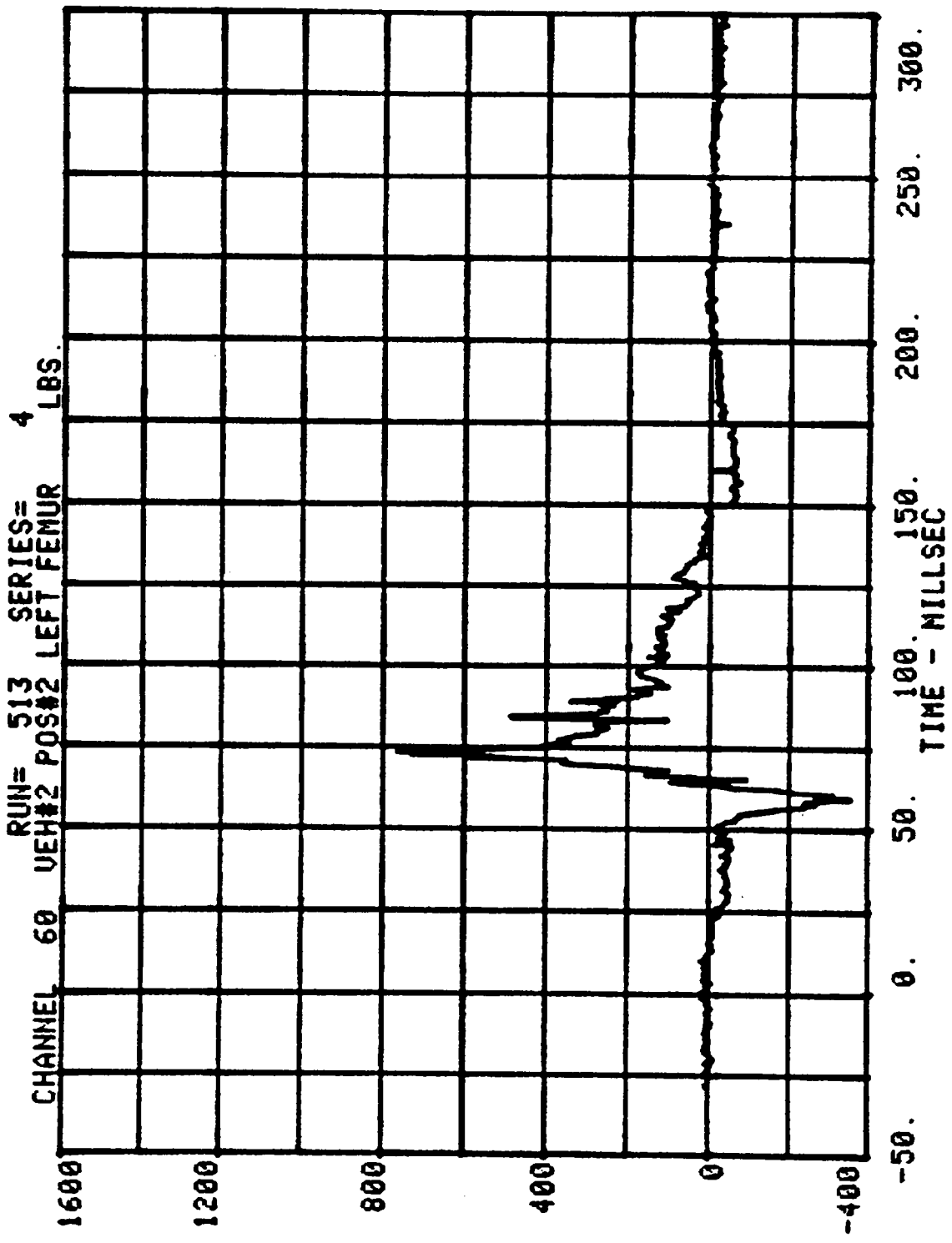

CHANNEL 56 VEH#2 POS#2 CHEST X
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

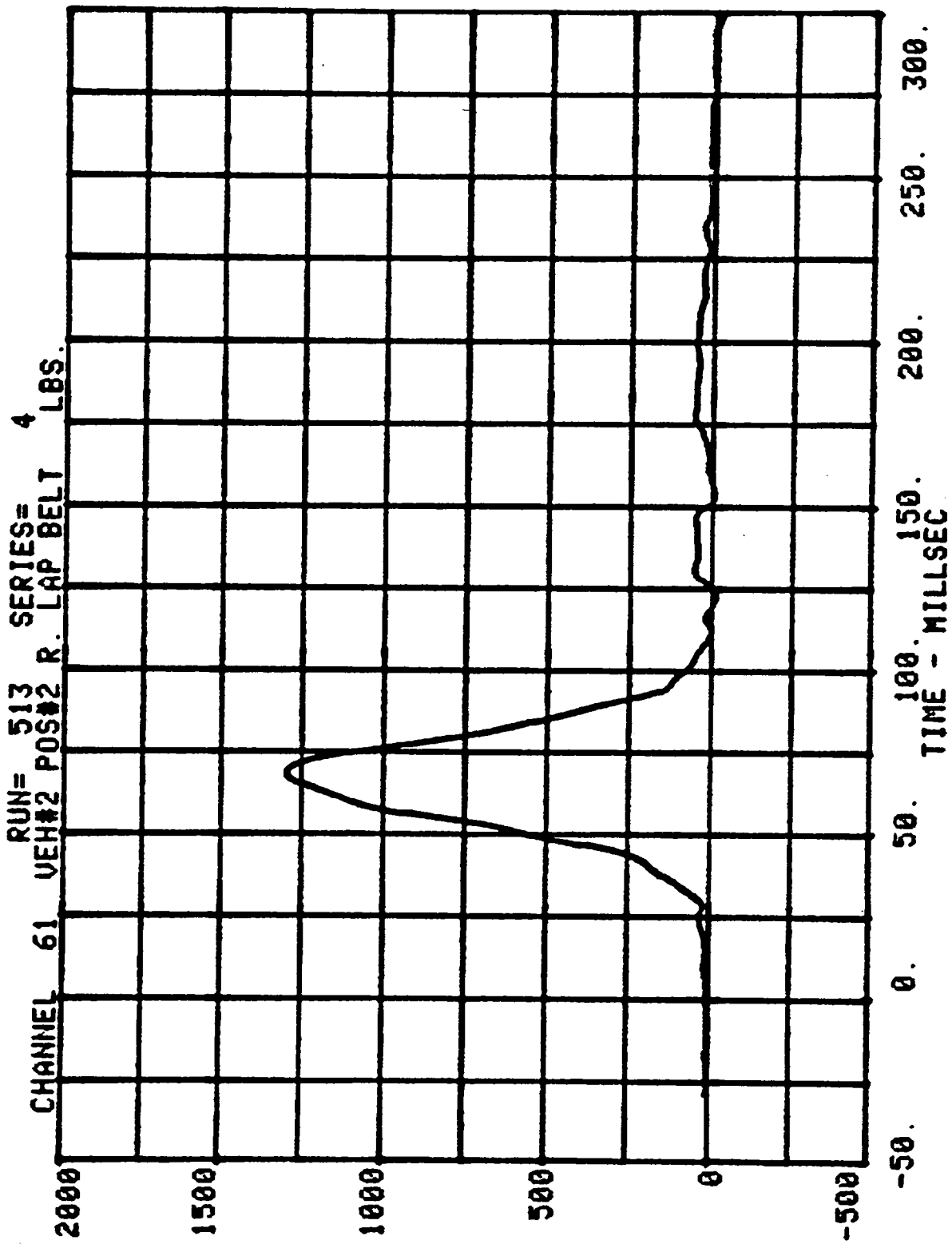

CHANNEL 57 VEH#2 POS#2 CHEST Y
RUN= 513 SERIES= 4
G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC

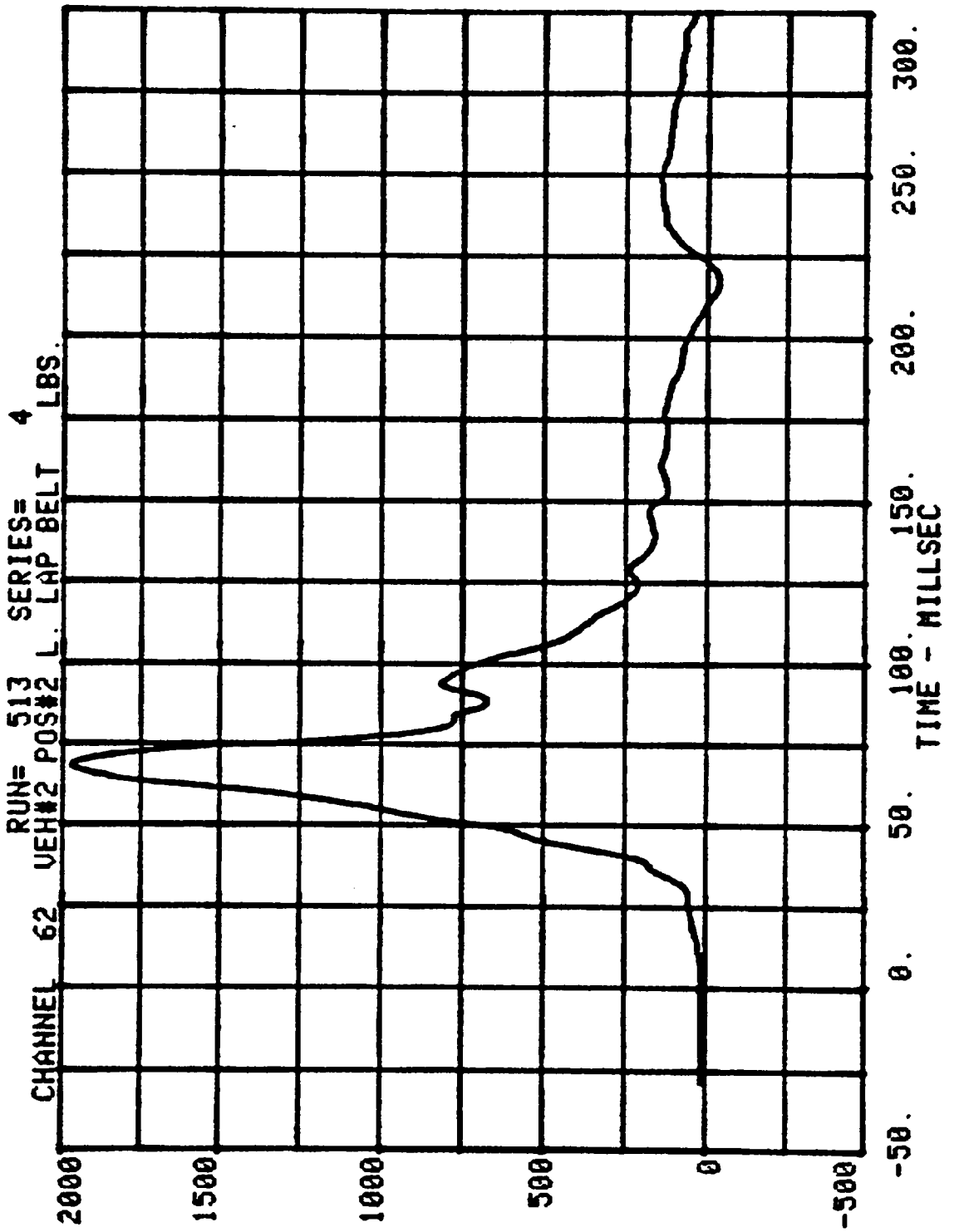

CHANNEL 58 RUN= 513 SERIES= 4
VEH#2 POS#2 CHEST Z G'S
100
60
20
-20
-60
-100
-50.
0.
50.
100.
150.
200.
250.
300.
TIME MILLISEC

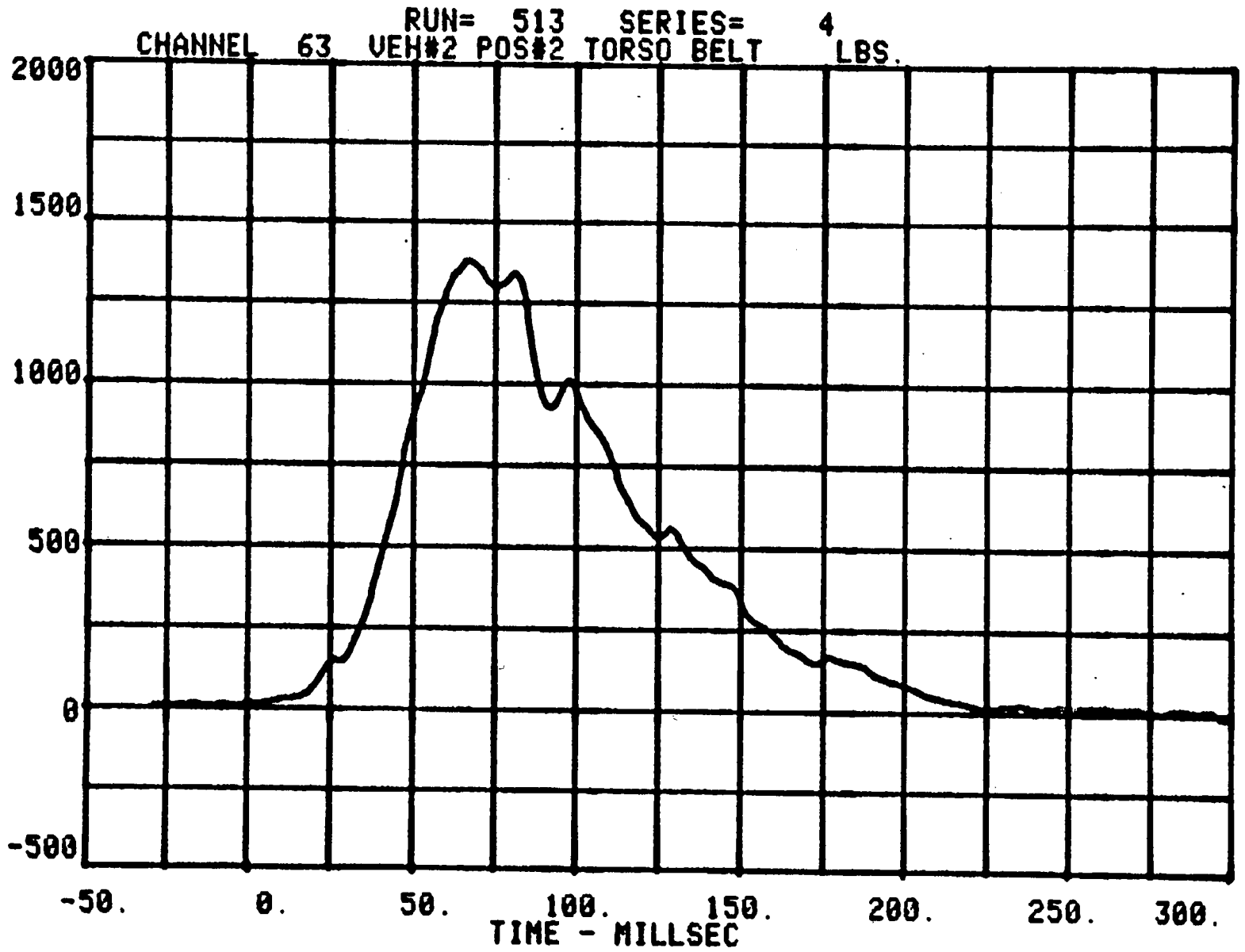

CHANNEL 8 VEH#2 POS#2 RUN= 513 SERIES= 4
CHEST RESULT G'S
100.
80.
60.
40.
20.
0.
-50.
0.
50.
100.
150.
200.
250.
300.
TIME
MILLISEC


CHANNEL 59 RUN= 513 SERIES= 4
VEH#2 POS#2 RIGHT FEMUR LBS.
1200
800
400
0
-400
-800
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


CHANNEL 60 VEH#2 POS#2 LEFT FEMUR
RUN= 513 SERIES= 4
LBS.
1600
1200
800
400
0
-400
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


CHANNEL 61 VEH#2 POS#2 R. LAP BELT
RUN= 513 SERIES= 4
LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


CHANNEL 62 VEH#2 POS#2 L. LAP BELT
RUN= 513 SERIES= 4
LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC


RUN= 513 SERIES= 4
CHANNEL 63 VEH#2 POS#2 TORSO BELT LBS.
2000
1500
1000
500
0
-500
-50.
0.
50.
100.
150.
200.
250.
300.
TIME - MILLSEC

APPENDIX C

DUMMY CERTIFICATION TESTS

Appendix C contains the results from certification tests performed on the Alderson Research Laboratories Model ATD 30034, 50th percentile male anthropometric test devices utilized for this crash test. The results indicate that the dummies meet all of the performance requirements of the six standard tests as specified in 49 CFR Part 572, Federal Register, Vol. 42, No. 25, dated February 7, 1977.

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

Dummy serial numbers and certification dates are:

Serial No.	Completion Date
109	1/9/81
162	1/9/81
183	1/9/81
320	1/9/81

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.: 1 0 9

LABORATORY TECHNICIAN: Gary R. Gestwick

APPROVED BY: O. Alvarado

	Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - - - - - - - - -	1/5/81 - 1/9/81	
Calibration Sequential Number for Dummy - - - -	12	
Temperature in Lab. (Spec. = 66 to 78°F)- - - -	69° - 70°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -	40% - 44%	

TEST PARAMETER		SPECIFICATION		
1. HEAD DROP TEST:				
a. Peak Resultant Accel. -		210 to 260G	225 g	
b. Peak Lateral Accel. - -		≤10G	2 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	23.5 fps	
b. Pendulum Avg. Decel. (over $t_3 - t_2$) - - - -		20 to 24G	23.5 g	
c. Peak Resultant Head Acceleration - - - -		26G maximum	26 g	
d. Pendulum Decel. (t_2-t_1)		≤3 ms	1 ms	
e. Pendulum Decel. (t_3-t_2)		25 to 30 ms	27 ms	
f. Pendulum Decel. (t_4-t_3)		≤10 ms	5 ms	
g. Pendulum Direction Reversal Time - - - -			103 ms	
h. Max. Head Rotation - -		63 to 73°	66°	
i. Chordal Displacement:				
Head Rotation Angle - -				
0°	Time	-2 to 2 ms	0 ms	
	Displ.	-.5 to .5 in	0.0 ms	
30°	Time	25.6 to 34.4 ms	28 ms	
	Displ.	2.1 to 3.1 in.	2.7 in.	
60°	Time	40.3 to 51.7 ms	44 ms	
	Displ.	4.3 to 5.3 in.	4.8 in.	
Maximum (°)	Time	53.2 to 66.8 ms	57.5 ms	
	Displ.	5.0 to 6.0 in.	5.3 ms	

Continued

P. 572 DUMMY CALIBRATION TEST DATA .... Continued:

Dummy I.D. No.: 1 0 9

TEST PARAMETER		SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
2. NECK BENDING TEST .... Continued				
i. Chordal Displacement:				
Head Rotation Angle --				
60°	Time	67.0 to 83.0 ms	67.5 ms	
	Displ.	4.3 to 5.3 in.	4.8 in.	
30°	Time	85.4 to 104.6 ms	87 ms	
	Displ.	2.1 to 3.1 in.	2.4 in.	
0°	Time	101.0 to 123.0 ms	102 ms	
	Displ.	-.5 to 0.5 in.	0.0 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.	75 lbs	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - -		22 to 34 lbs.	25.5 lbs	
b. Force @ 30° - - - -		34 to 46 lbs.	37.0 lbs	
c. Force @ 40° - - - -		46 to 58 lbs.	47.5 lbs	
d. Return Angle - - -		12° maximum	2°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed - -		21.78-22.22 fps	21.82 fps	
(2) Peak Delfection -		1.7" maximum	1.38 in.	
(3) Peak Resistive Force - - - - - -		2250 lbs. maximum	1845 lbs	
(4) Internal Hysteresis - - - -		50 to 70%	56.78%	
b. Low Speed				
(1) Probe Speed - - -		13.86-14.14 fps	14.07 fps	
(2) Peak Deflection -		1.1" maximum	.9 in.	
(3) Peak Resistive Force - - - - - -		1450 lbs. maximum	1219 lbs	
(4) Internal Hysteresis- - - -		50 to 70%	53.17%	

P.572 DUMMY CALIBRATION TEST DATA .....Continued:

Dummy I.D. No.: 1 0 9

TEST PARAMETER	SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
6. KNEE IMPACT TESTS:			
a. Right Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.01 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2150 lbs	
(3) Time Above 1000#	1.7 ms minimum	1.95 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.03 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	1900 lbs	
(3) Time Above 1000#	1.7 ms minimum	2.0 ms	

INSTRUMENT CALIBRATION INFORMATION

DUMMY I.D. NO.: | 1 | 0 | 9 | CALIB. SEQ. NOS. FOR DUMMY: _____ & _____

	MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
A. DUMMY INSTRUMENTS:				
1. Head Accelerometers--				
a. Triaxial unit - - - - -				
b. Uniaxial units				
(1) Longitudinal (A_x) -	ENDEVCO	CS75	1/81	7/81
(2) Lateral (A_y) - - -	ENDEVCO	CU62	1/81	7/81
(3) Vertical (A_z) - - -	ENDEVCO	CE18	1/81	7/81
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 - - - - - -	GSE	75	1/81	7/81
b. Left Side	GSE	74	1/81	7/81
B. CALIB. LAB. INSTRUMENTS:				
1. Pendulum Accelerometer - -	CEC	A72 22958	1/81	7/81
2. Test Probe Accelerometer -	CEC	A52 16929	1/81	7/81
3. Lumbar Flexion Test Push Force Gauge - - - - - - -	TRANSDUCER INC.	20051	1/81	7/81
4. Abdominal Compression Test Force Gauge - - - - - - -	BLH	72952	1/81	7/81
5. Abdominal Compression Test Displacement Gauge - - - -	CIC	567-11	1/81	7/81

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY I.D. NO.: 162

LABORATORY TECHNICIAN: Gary R. Gestwick

APPROVED BY: D. Chiarello

	Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration - - - - - - - - - - - -	1/5/81 - 1/9/81	
Calibration Sequential Number for Dummy - - - -	4	
Temperature in Lab. (Spec. = 66 to 78°F)- - - -	69° - 70°	
Relative Humidity in Lab. (Spec. = 10 to 70%) -	40% - 44%	

TEST PARAMETER		SPECIFICATION		
1. HEAD DROP TEST:				
a. Peak Resultant Accel. -		210 to 260G	237 g	
b. Peak Lateral Accel. - -		≤10G	4 g	
c. Time above 100G - - - -		0.9 to 1.5 ms	1.15 ms	
2. NECK BENDING TEST:				
a. Pendulum Speed - - - -		21.5 to 25.5 fps	23.4 fps	
b. Pendulum Avg. Decel. (over $t_3 - t_2$) - - - -		20 to 24G	22 g	
c. Peak Resultant Head Acceleration - - - -		26G maximum	23 g	
d. Pendulum Decel. (t_2-t_1)		≤ 3 ms	1.5 ms	
e. Pendulum Decel. (t_3-t_2)		25 to 30 ms	26 ms	
f. Pendulum Decel. (t_4-t_3)		≤10 ms	6 ms	
g. Pendulum Direction Reversal Time - - - -			107 ms	
h. Max. Head Rotation - -		63 to 73°	65°	
i. Chordal Displacement:				
Head Rotation Angle - -				
0°	Time	-2 to 2 ms	0 ms	
	Displ.	-.5 to .5 in	0.0 in	
30°	Time	25.6 to 34.4 ms	30 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.	4.8 in.	
Maximum (°)	Time	53.2 to 66.8 ms	58.5 ms	
	Displ.	5.0 to 6.0 in.	5.2 in.	

Continued

P. 572 DUMMY CALIBRATION TEST DATA .... Continued:

Dummy I.D. No.: 1 6 2

TEST PARAMETER		SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
2. NECK BENDING TEST .... Continued				
1. Chordal Displacement:				
Head Rotation Angle --				
60°	Time	67.0 to 83.0 ms	69 ms	
	Displ.	4.3 to 5.3 in.	4.8 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	106 ms	
	Displ.	-.5 to 0.5 in.	0.1 in.	
3. ABDOMINAL COMPRESSION TEST:				
(Preload = 10 pounds)				
a. Force @ 1" - - - - -		50 to 63 lbs.	61 lbs	
b. Force @ 1.3" - - - -		73 to 88 lbs.	83 lbs	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - -		22 to 34 lbs.	29 lbs	
b. Force @ 30° - - - -		34 to 46 lbs.	40.5 lbs	
c. Force @ 40° - - - -		46 to 58 lbs.	52 lbs	
d. Return Angle - - -		12° maximum	5°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed - -		21.78-22.22 fps	21.86 fps	
(2) Peak Deflection -		1.7" maximum	1.28 in.	
(3) Peak Resistive Force - - - - - -		2250 lbs. maximum	1930 lbs	
(4) Internal - - - - Hysteresis		50 to 70%	56.58%	
b. Low Speed				
(1) Probe Speed - - -		13.86-14.14 fps	14.09 fps	
(2) Peak Deflection -		1.1" maximum	.8 in.	
(3) Peak Resistive Force - - - - - -		1450 lbs. maximum	1245 lbs	
(4) Internal Hysteresis- - - -		50 to 70%	58.24%	

P.572 DUMMY CALIBRATION TEST DATA .....Continued:

Dummy I.D. No.: 162

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	6.91 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2200 lbs	
(3) Time Above 1000#	1.7 ms minimum	1.9 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.99 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2000 lbs	
(3) Time Above 1000#	1.7 ms minimum	2.2 ms	

INSTRUMENT CALIBRATION INFORMATION

DUMMY I.D. NO.: | 1 | 6 | 2 |

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

	MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
A. DUMMY INSTRUMENTS:				
1. Head Accelerometers--				
a. Triaxial unit - - - - -				
b. Uniaxial units				
(1) Longitudinal (A_x) -	ENDEVCO	CS75	1/81	7/81
(2) Lateral (A_y) - - -	ENDEVCO	CU62	1/81	7/81
(3) Vertical (A_z) - - -	ENDEVCO	CE18	1/81	7/81
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 - - - - - -	GSE	75	1/81	7/81
b. Left Side	GSE	74	1/81	7/81
B. CALIB. LAB. INSTRUMENTS:				
1. Pendulum Accelerometer - -	CEC	A72 22958	1/81	7/81
2. Test Probe Accelerometer -	CEC	A52 16929	1/81	7/81
3. Lumbar Flexion Test Push Force Gauge - - - - - - -	TRANSDUCER INC.	20051	1/81	7/81
4. Abdominal Compression Test Force Gauge - - - - - - -	BLH	72952	1/81	7/81
5. Abdominal Compression Test Displacement Gauge - - - -	CIC	567-11	1/81	7/81

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY I.D. NO.: 183

LABORATORY TECHNICIAN: Gary R. Gestwick

APPROVED BY: D Alessandro

	Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration	1/5/81 - 1/9/81	
Calibration Sequential Number for Dummy	1	
Temperature in Lab. (Spec. = 66 to 78°F)	69° - 70°	
Relative Humidity in Lab. (Spec. = 10 to 70%)	40% - 44%	

TEST PARAMETER		SPECIFICATION		
1. HEAD DROP TEST:				
a. Peak Resultant Accel.		210 to 260G	222 g	
b. Peak Lateral Accel.		≤10G	4 g	
c. Time above 100G		0.9 to 1.5 ms	1.2 ms	
2. NECK BENDING TEST:				
a. Pendulum Speed		21.5 to 25.5 fps	23.94 fps	
b. Pendulum Avg. Decel. (over $t_3 - t_2$)		20 to 24G	23 g	
c. Peak Resultant Head Acceleration		26G maximum	23 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	4.5 ms	
g. Pendulum Direction Reversal Time			106 ms	
h. Max. Head Rotation		63 to 73°	65°	
i. Chordal Displacement:				
Head Rotation Angle				
0°	Time	-2 to 2 ms	0 ms	
	Displ.	-.5 to .5 in	0.0 in.	
30°	Time	25.6 to 34.4 ms	29 ms	
	Displ.	2.1 to 3.1 in.	2.8 in.	
60°	Time	40.3 to 51.7 ms	46.5 ms	
	Displ.	4.3 to 5.3 in.	5.0 in.	
Maximum (°)	Time	53.2 to 66.8 ms	57 ms	
	Displ.	5.0 to 6.0 in.	5.3 in.	

Continued

P, 572 DUMMY CALIBRATION TEST DATA .... Continued:

Dummy I.D. No.: 1 8 3

TEST PARAMETER		SPECIFICATION	Pre-Test Calibration	Post-Test Calibration
2. NECK BENDING TEST .... Continued				
i. Chordal Displacement:				
Head Rotation Angle --				
60°	Time	67.0 to 83.0 ms	67 ms	
	Displ.	4.3 to 5.3 in.	5.0 in.	
30°	Time	85.4 to 104.6 ms	86 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.	0.1 in.	
3. ABDOMINAL COMPRESSION TEST:				
(Preload = 10 pounds)				
a. Force @ 1" - - - - -		50 to 63 lbs.	60 lbs	
b. Force @ 1.3" - - - -		73 to 88 lbs.	87 lbs	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - -		22 to 34 lbs.	30 lbs	
b. Force @ 30° - - - -		34 to 46 lbs.	36 lbs	
c. Force @ 40° - - - -		46 to 58 lbs.	49 lbs	
d. Return Angle - - -		12° maximum	5°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed - -		21.78-22.22 fps	13.88 fps	
(2) Peak Delfection -		1.7" maximum	1.52 in.	
(3) Peak Resistive Force - - - - - -		2250 lbs. maximum	1864 lbs	
(4) Internal Hysteresis - - - -		50 to 70%	51.5%	
b. Low Speed				
(1) Probe Speed - - -		13.86-14.14 fps	14.10 fps	
(2) Peak Deflection -		1.1" maximum	1.02 in.	
(3) Peak Resistive Force - - - - - -		1450 lbs. maximum	1217 lbs	
(4) Internal Hysteresis- - - -		50 to 70%	51.35%	

P.572 DUMMY CALIBRATION TEST DATA .....Continued:

Dummy I.D. No.: 1 8 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	7.04 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2450 lbs	
(3) Time Above 1000#	1.7 ms minimum	1.95 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.02 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2200 lbs	
(3) Time Above 1000#	1.7 ms minimum	2.1 ms	

INSTRUMENT CALIBRATION INFORMATION

DUMMY I.D. NO.: | 1 | 8 | 3 |

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

	MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
A. DUMMY INSTRUMENTS:				
1. Head Accelerometers--				
a. Triaxial unit - - - - -				
b. Uniaxial units				
(1) Longitudinal (A_x) -	ENDEVCO	CS75	1/81	7/81
(2) Lateral (A_y) - - -	ENDEVCO	CU62	1/81	7/81
(3) Vertical (A_z) - - -	ENDEVCO	CE18	1/81	7/81
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 - - - - - -	GSE	75	1/81	7/81
b. Left Side	GSE	74		
B. CALIB. LAB. INSTRUMENTS:				
1. Pendulum Accelerometer - -	CEC	A72 22958	1/81	7/81
2. Test Probe Accelerometer -	CEC	A52 16929	1/81	7/81
3. Lumbar Flexion Test Push Force Gauge - - - - - - -	TRANSDUCER INC.	20051	1/81	7/81
4. Abdominal Compression Test Force Gauge - - - - - - -	BLH	72952	1/81	7/81
5. Abdominal Compression Test Displacement Gauge - - - -	CIC	567-11	1/81	7/81

P.572 DUMMY CALIBRATION TEST DATA

NHTSA DUMMY I.D. NO.: 3 2 0

LABORATORY TECHNICIAN: Gary R. Gestwick

APPROVED BY: D Alexander

		Pre-Test Calibration	Post-Test Calibration
Date of Dummy Calibration		1/5/81 - 1/9/81	
Calibration Sequential Number for Dummy		13	
Temperature in Lab. (Spec. = 66 to 78°F)		69° - 70°	
Relative Humidity in Lab. (Spec. = 10 to 70%)		40% - 44%	
TEST PARAMETER		**SPECIFICATION**	
1. HEAD DROP TEST:			
a. Peak Resultant Accel.		210 to 260G	238 g
b. Peak Lateral Accel.		≤10G	6 g
c. Time above 100G		0.9 to 1.5 ms	1.2 ms
2. NECK BENDING TEST:			
a. Pendulum Speed		21.5 to 25.5 fps	24.1 fps
b. Pendulum Avg. Decel. (over $t_3 - t_2$)		20 to 24G	23.5 g
c. Peak Resultant Head Acceleration		26G maximum	26 g
d. Pendulum Decel. (t_2-t_1)		≤3 ms	1 ms
e. Pendulum Decel. (t_3-t_2)		25 to 30 ms	28 ms
f. Pendulum Decel. (t_4-t_3)		≤10 ms	2.5 ms
g. Pendulum Direction Reversal Time			105 ms
h. Max. Head Rotation		63 to 73°	64°
i. Chordal Displacement:			
Head Rotation Angle			
0°	Time	-2 to 2 ms	0 ms
	Displ.	-.5 to .5 in	0.0 in.
30°	Time	25.6 to 34.4 ms	28 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.	4.8 in.
Maximum (°)	Time	53.2 to 66.8 ms	57.5 ms
	Displ.	5.0 to 6.0 in.	5.2 in.

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 .... Continued				
i. Chordal Displacement:				
Head Rotation Angle --				
60°	Time	67.0 to 83.0 ms	67.5 ms	
	Displ.	4.3 to 5.3 in.	4.9 in.	
30°	Time	85.4 to 104.6 ms	85.5 ms	
	Displ.	2.1 to 3.1 in.	2.4 in.	
0°	Time	101.0 to 123.0 ms	104.5 ms	
	Displ.	-.5 to 0.5 in.	0.0 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.	82 lbs	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - -		22 to 34 lbs.	34 lbs	
b. Force @ 30° - - - -		34 to 46 lbs.	45 lbs	
c. Force @ 40° - - - -		46 to 58 lbs.	55 lbs	
d. Return Angle - - -		12° maximum	6°	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed - -		21.78-22.22 fps	21.82 fps	
(2) Peak Delfection -		1.7" maximum	1.46 in.	
(3) Peak Resistive Force - - - - - -		2250 lbs. maximum	1840 lbs	
(4) Internal Hysteresis - - - -		50 to 70%	51.62%	
b. Low Speed				
(1) Probe Speed - - -		13.86-14.14 fps	14.10 fps	
(2) Peak Deflection -		1.1" maximum	.98 in.	
(3) Peak Resistive Force - - - - - -		1450 lbs. maximum	1190 lbs	
(4) Internal Hysteresis- - - -		50 to 70%	51.33%	

P.572 DUMMY CALIBRATION TEST DATA .....Continued:

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	7.00 fps	
(2) Maximum Force - -	1850 to 2500 lbs	2100 lbs	
(3) Time Above 1000#	1.7 ms minimum	1.75 ms	
b. Left Side --			
(1) Probe Speed - - -	6.76 to 7.04 fps	7.02 fps	
(2) Maximum Force - -	1850 to 2500 lbs.	2300 lbs	
(3) Time Above 1000#	1.7 ms minimum	2.15 ms	

INSTRUMENT CALIBRATION INFORMATION

DUMMY I.D. NO.: | 3 | 2 | 0 |

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

	MANUFACTURER	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
A. DUMMY INSTRUMENTS:				
1. Head Accelerometers--				
a. Triaxial unit - - - - -				
b. Uniaxial units				
(1) Longitudinal (A_x) -	ENDEVCO	CS75	1/81.	7/81
(2) Lateral (A_y) - - -	ENDEVCO	CU62	1/81	7/81
(3) Vertical (A_z) - - -	ENDEVCO	CE18	1/81	7/81
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 - - - - - -	GSE	75	1/81	7/81
b. Left Side	GSE	74	1/81	7/81
B. CALIB. LAB. INSTRUMENTS:				
1. Pendulum Accelerometer - -	CEC	A72 22958	1/81	7/81
2. Test Probe Accelerometer -	CEC	A52 16929	1/81	7/81
3. Lumbar Flexion Test Push Force Gauge - - - - - - -	TRANSDUCER INC.	20051	1/81	7/81
4. Abdominal Compression Test Force Gauge - - - - - - -	BLH	72952	1/81	7/81
5. Abdominal Compression Test Displacement Gauge - - - -	CIC	567-11	1/81	7/81