

DOT 268

CALSPAN ADVANCED TECHNOLOGY CENTER

IMPROVED LIGHTWEIGHT SUBCOMPACT
SIDE STRUCTURE CRASH TEST REPORT

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Calspan Report No. 6225-V-20

Prepared For:

THE BUDD COMPANY
TECHNICAL CENTER
FORT WASHINGTON, PA 19034

PURCHASE ORDER NO. TC18542

TEST:	TEST NO. 17
TYPE OF TEST:	35 MPH CAR-TO-CAR FRONT-TO-SIDE OBLIQUE
TEST DATE:	30 MAY 1980

A DIVISION OF CALSPAN CORPORATION
AN ARVIN COMPANY P.O. BOX 400 BUFFALO, NEW YORK 14225

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TEST OBJECTIVE

The objective of this 60° oblique side impact was to obtain performance data on the modified side structure of a 1976 Volkswagen Rabbit. The Budd Co. performed the "heavyweight" (approximately 40 pounds per side) alteration. This test was a 35 MPH, 60° oblique impact by an unmodified 1978 Chevrolet Impala into the left side of the VW Rabbit at the DOR^{*} point.

A secondary test objective was the acquisition of side impact data using the newly modified side impact dummy developed by HSRI under contract to the DOT/NHTSA. This dummy was placed in the struck vehicle driver position with the VW Rabbit automatic seat belt system in place.

This test program is part of the National Highway Traffic Safety Administration (NHTSA) Contract DOT-HS-7-01588 to improve subcompact side structures.

* As defined in SAE J972a.

PRESENTATION OF RESULTS

This test report presents the test results from a car-to-car, front-to-side, 60° oblique, impact. Included in this document are still photographs, vehicle and dummy response data in plotted form, vehicle interior and exterior damage sketches, pre- and post-test measurements for side intrusion and door crush. High speed motion pictures and color photographs were obtained and submitted to the sponsor under separate cover.

Table 1

CRASH TEST SUMMARY

TEST NO. 17 PROJECT Improved Lightweight Subcompact Side Structure

DATE 5/30/80 TIME 2:55 TEMP. 88°F

TEST CONDITION Car-to-Car, 60° Oblique

VEHICLE NO. 1 1978 Chevrolet Impala

VEHICLE NO. 2 1976 VW Rabbit (Modified)

	VEH. NO. 1	VEH. NO. 2
TEST WEIGHT (lbs)	<u>3990</u>	<u>2240</u>
IMPACT ANGLE (deg)*	<u>0°</u>	<u>300°</u>
IMPACT VELOCITY (mph)**	<u>34.9</u>	<u>0</u>
MAX. CRUSH (in)	<u>8.1"</u>	<u>15.5"</u> at Window Sill Height
MAX. INTRUSION (in)	<u>-</u>	<u>10.3"</u> at Plane 3, Row 3

DUMMIES	VEH. NO. 1	VEH. NO. 2
TYPE	<u>Hybrid II, Part 572</u>	<u>Side Impact Dummy - S/N 873</u>
LOCATION	<u>LF (1)</u>	<u>LF (1)</u>
RESTRAINT	<u>Production 3-Pt. System</u>	<u>VW Automatic Restraint System</u>

NUMBER OF DATA CHANNELS 65
 NUMBER OF HIGH SPEED CAMERAS 10

* WITH RESPECT TO TOW TRACK CENTERLINE

** SPEED TRAP MEASUREMENT ($\pm 0.5\%$ ACCURACY)

Table 1 (Continued)

OBSERVATIONS (VEHICLE NO. 1)

GLAZING Undamaged

DOORS Undamaged

SEAT ANCHORAGES Intact

RESTRAINTS Intact

OBSERVATIONS (VEHICLE NO. 2)

GLAZING Windshield is cracked; Driver side front window is broken out; Driver side rear (plastic) window is intact.

DOORS Driver side is jammed closed; Passenger side is undamaged.

SEAT ANCHORAGES Intact

RESTRAINTS Passive seat belt system, including knee bar, is undamaged.

GENERAL COMMENTS VW Structure - Door hinges and interlocks held; A-pillar is rotated inward; B-pillar is buckled approximately twelve inches above seat riser; inner B-pillar surface is torn; Roof is deformed and rolled downward; Sill is only slightly deformed; Door is severely deformed due to Impala striking at DOR point and sliding along side to B-pillar; Damage extends to rear wheel well; Small amount of deformation at far side A-pillar; Floor pan is buckled down on struck side; Driver side seat is pushed over against passenger side seat but the far side space is not changed; the door intruded severely at window sill and struck steering wheel pushing it to the right; the knee bar may have provided a small amount of resistance to A-pillar inward movement.

Table 1 (Continued)

GENERAL COMMENTS VW Occupant - Driver is in his seat due to the passive belt holding him in position; there was no chalk on window sill or on Impala hood indicating that the belt prevents ejection of the head; Chalk was found on the driver side of the passenger head rest where occupant head struck on rebound; No knee bar contact occurred; Passive belt reduced head ejection and rebound motion. The driver HIC number was 1211.6, the upper spine resultant acceleration* was 102.8 g's, the lower spine resultant acceleration* was 96.5 g's, and the pelvis resultant acceleration* was 154.0 g's.

Data Quality:

- All channels were of good quality.

* Defined as exceeding .003 sec. duration.

Table 2

VEHICLE TEST WEIGHTS - TEST NO. 17

Bullet Vehicle - 1978 Chevrolet Impala

Left Front	<u>1120</u>	lbs.	Left Rear	<u>900</u>	lbs.
Right Front	<u>1110</u>	lbs.	Right Rear	<u>860</u>	lbs.
Total Front	<u>2230</u>	lbs.	Total Rear	<u>1760</u>	lbs.
Total Weight =	<u>2230</u>	lbs.	+	<u>1760</u>	lbs. = <u>3990</u> lbs.
Wheel Base	<u>115</u>	in.			
Cg _{FW}	=	<u>1760</u>	lbs.	<u>115</u>	in. = <u>50.72</u> in.
		<u>3990</u>	lbs.		

Target Vehicle - 1976 VW Rabbit (Modified)

Left Front	<u>700</u>	lbs.	Left Rear	<u>420</u>	lbs.
Right Front	<u>690</u>	lbs.	Right Rear	<u>430</u>	lbs.
Total Front	<u>1390</u>	lbs.	Total Rear	<u>850</u>	lbs.
Total Weight =	<u>1390</u>	lbs.	+	<u>850</u>	lbs. = <u>2240</u> lbs.
Wheel Base	<u>94.5</u>	in.			
Cg _{FW}	=	<u>850</u>	lbs.	<u>94.5</u>	in. = <u>35.85</u> in.
		<u>2240</u>	lbs.		

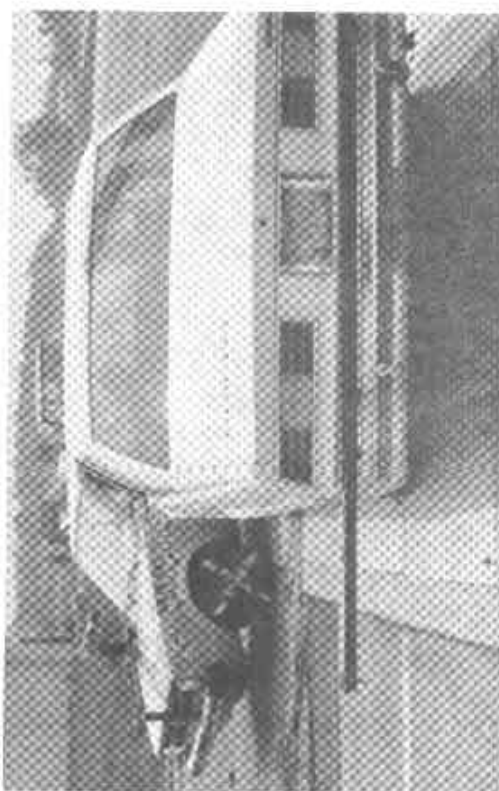
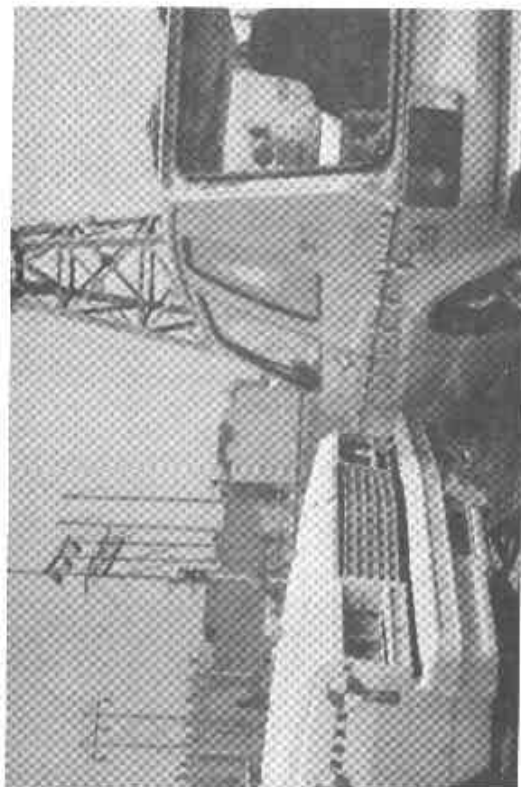
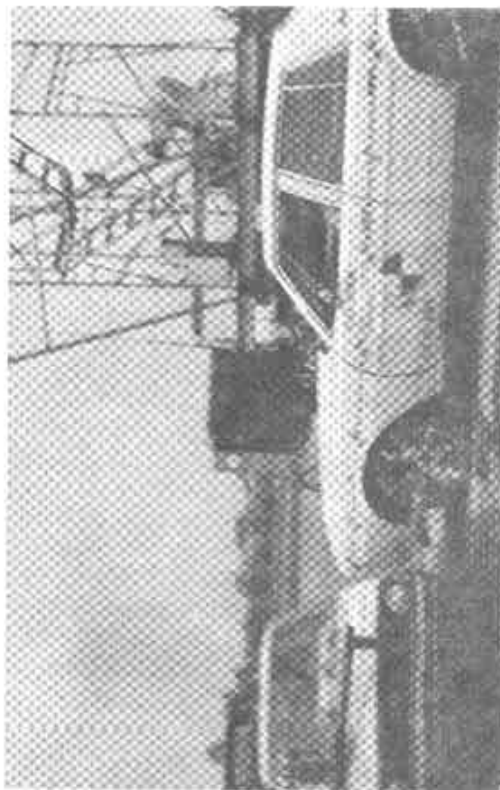
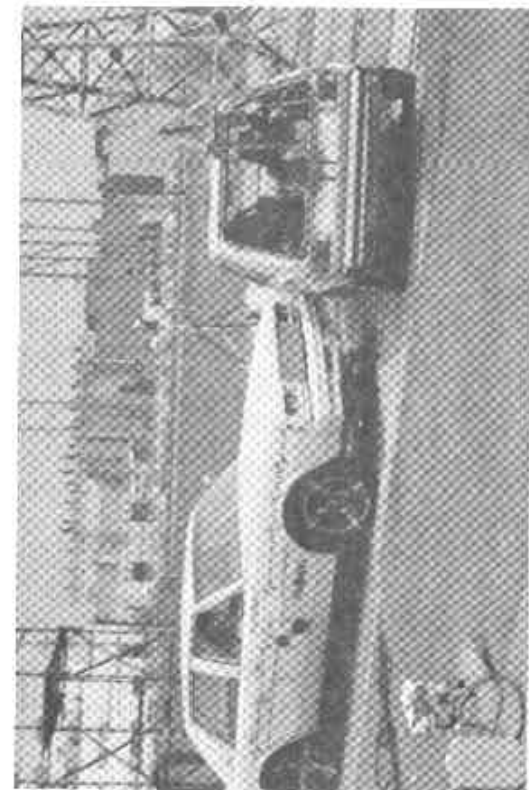


Figure 1 PRE-TEST NO. 17 - IMPACT CONFIGURATION

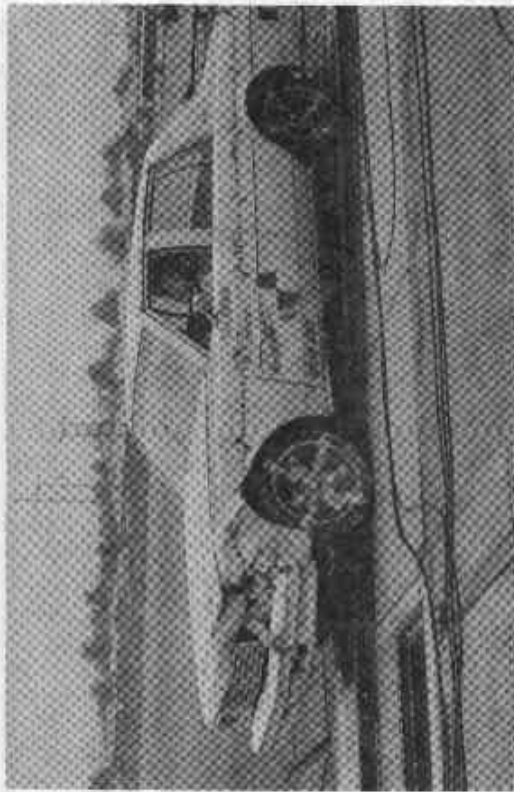
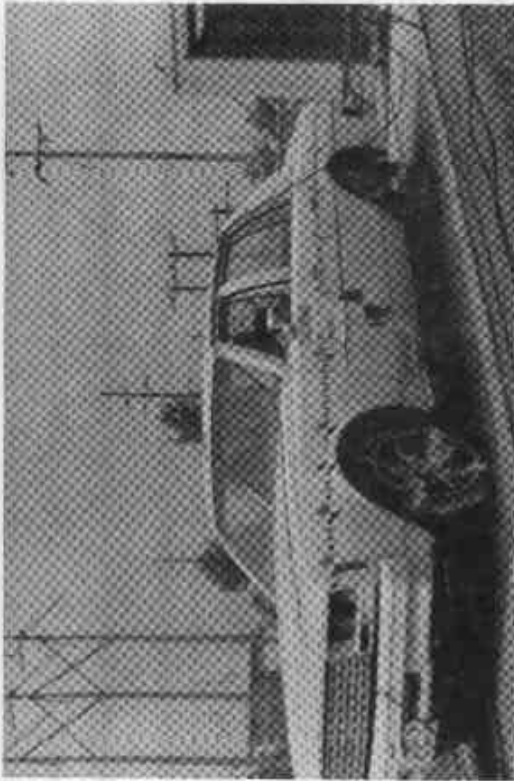


Figure 2 VEHICLE 1 (1978 CHEVROLET IMPALA) - PRE- AND POST-TEST FRONT THREE-QUARTER VIEW

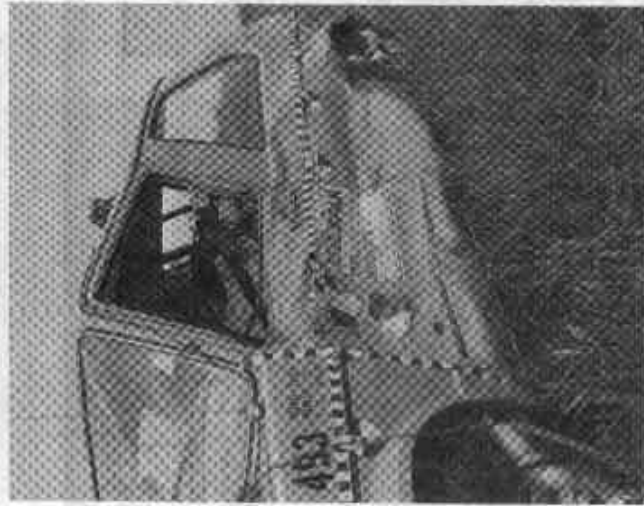
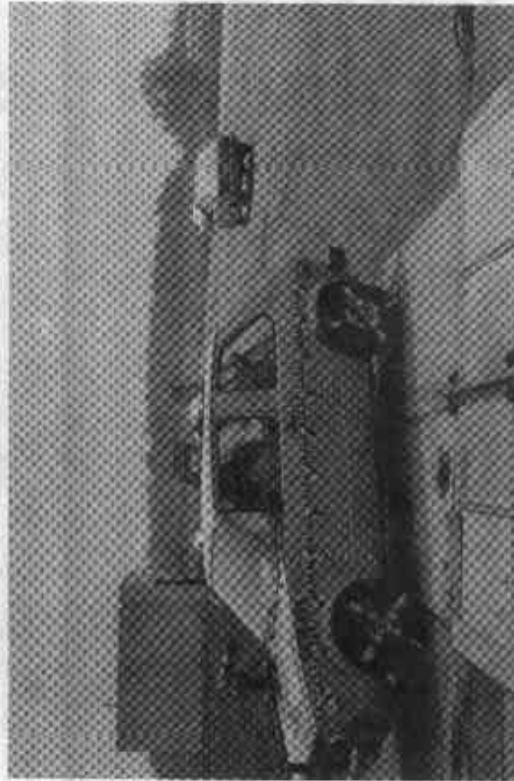


Figure 3 VEHICLE 2 (1976 VW RABBIT) - PRE- AND POST-TEST FRONT THREE-QUARTER VIEW

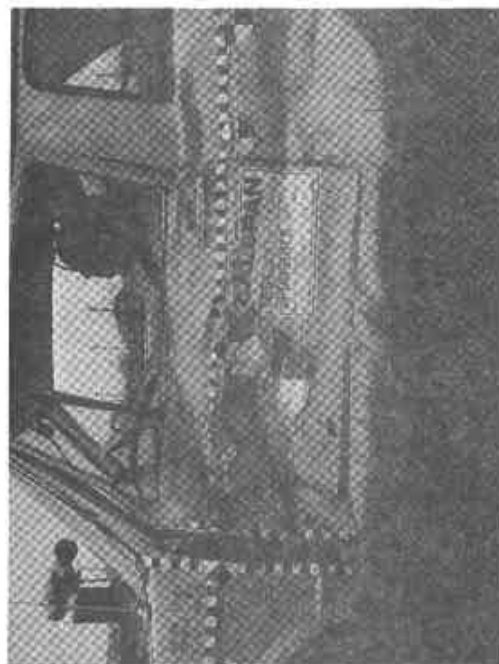
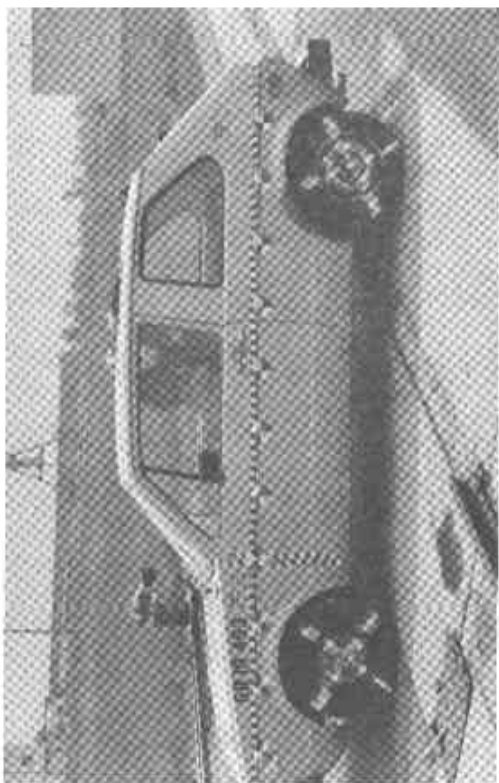


Figure 4 VEHICLE 2 (1976 VW RABBIT) - PRE- AND POST-TEST SIDE VIEW

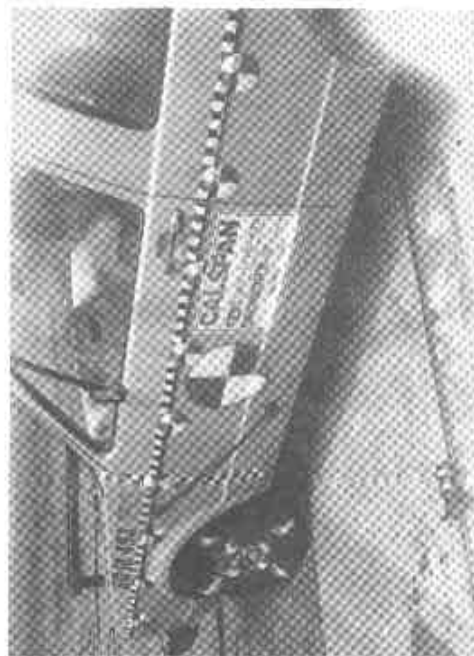


Figure 5 VEHICLE 2 (1976 VW RABBIT) - PRE- AND POST-TEST REAR THREE-QUARTER VIEW

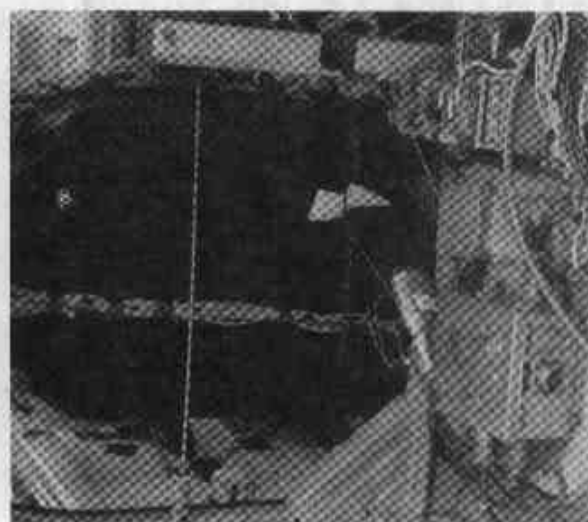
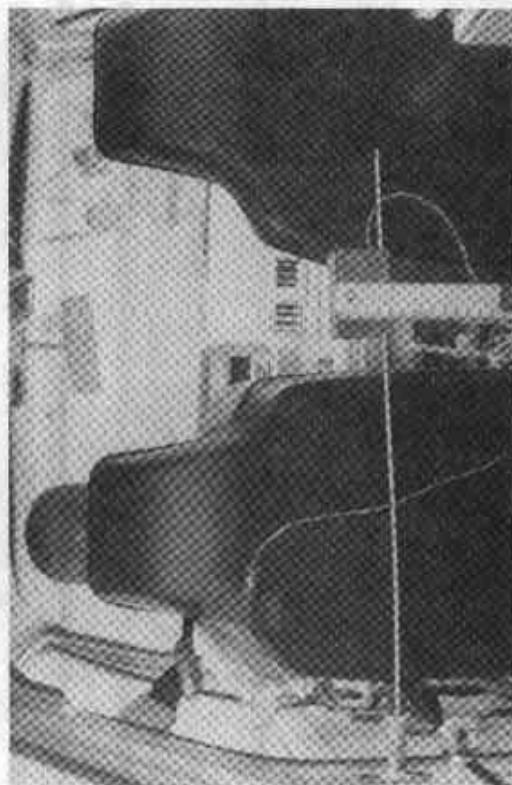


Figure 6 VEHICLE 2 (1976 VW RABBIT) - PRE- AND POST-TEST INTERIOR VIEWS

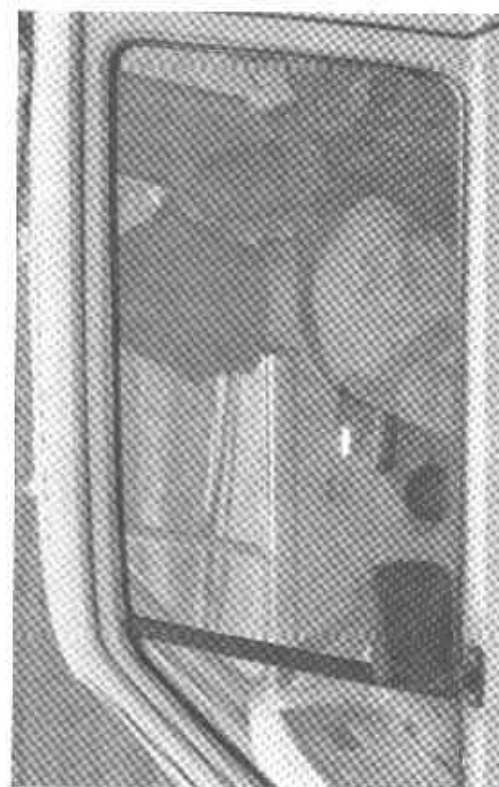
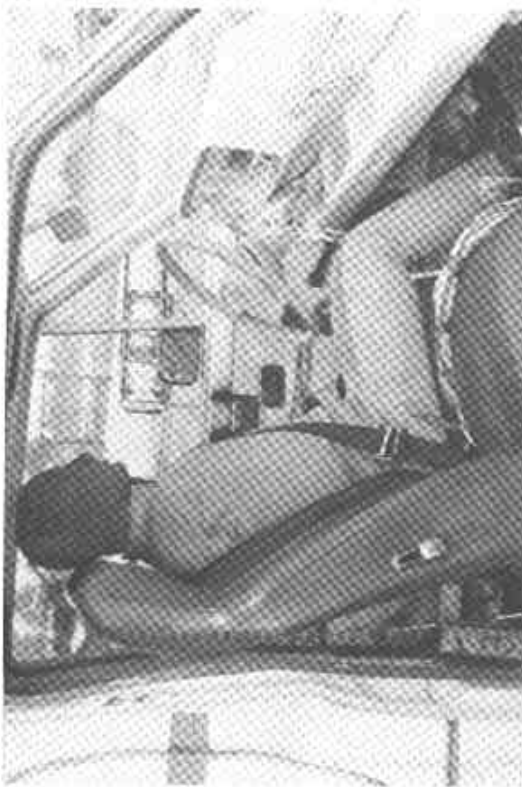
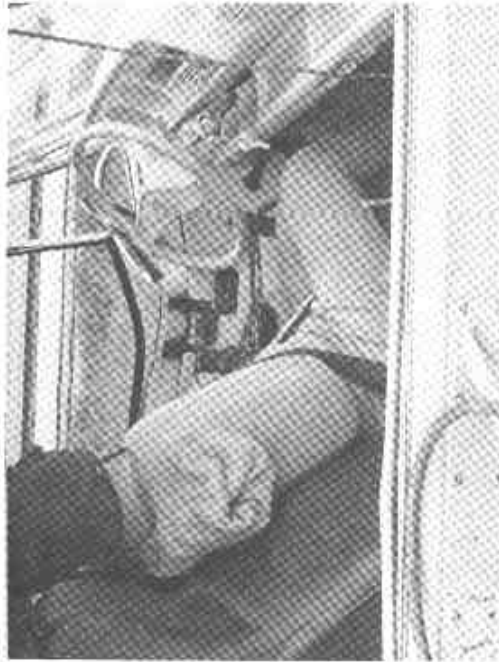
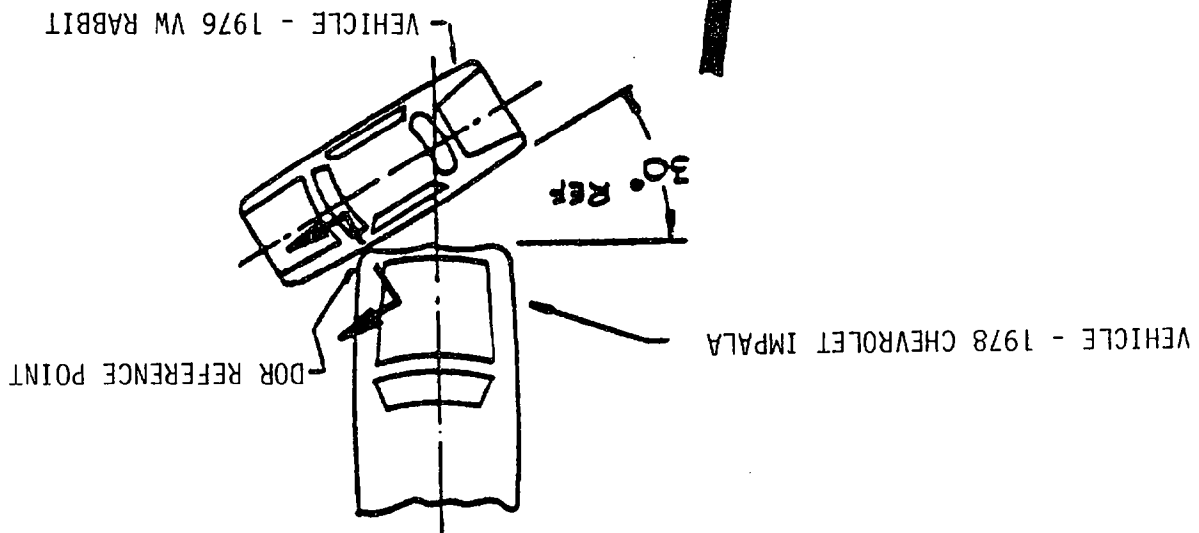
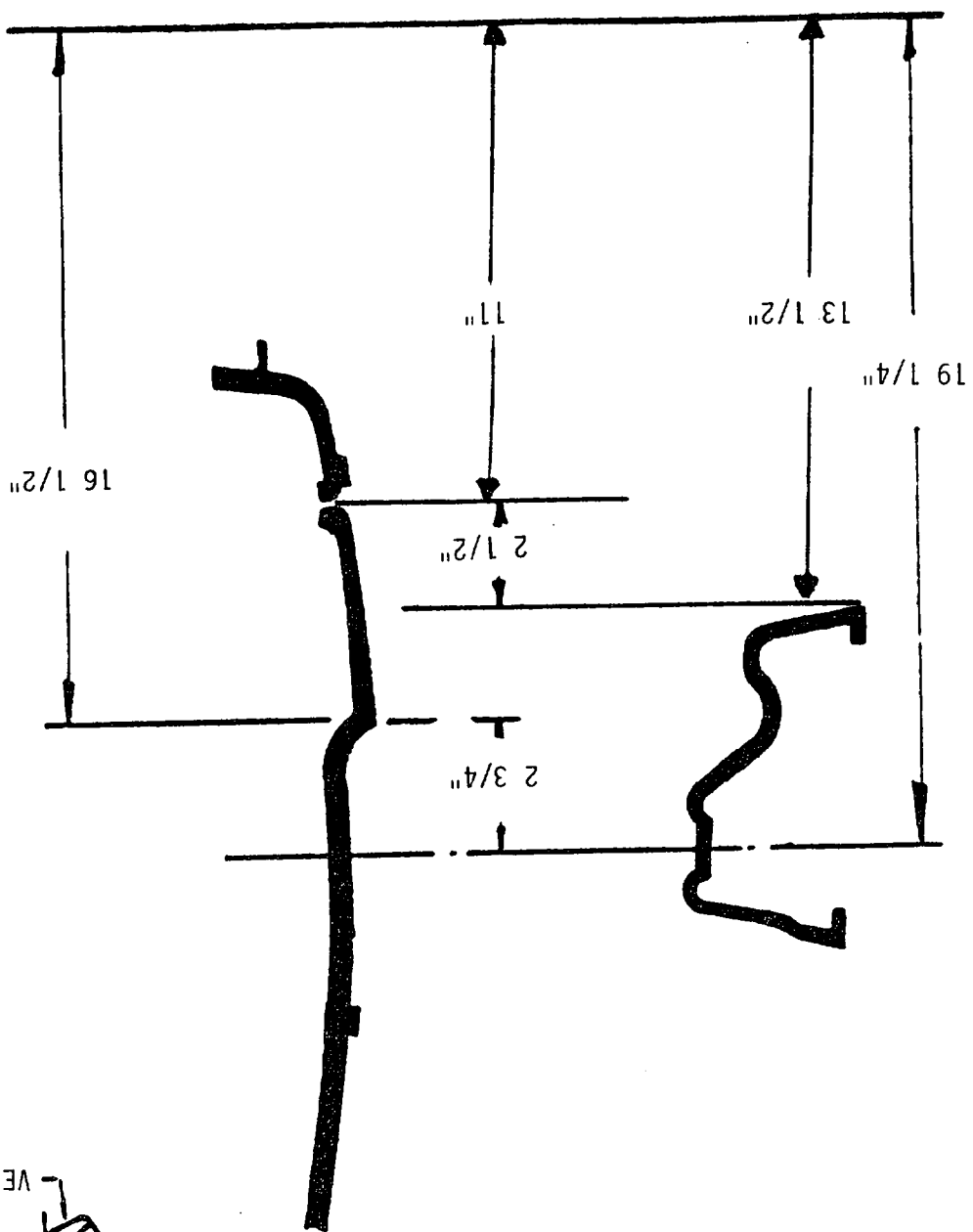
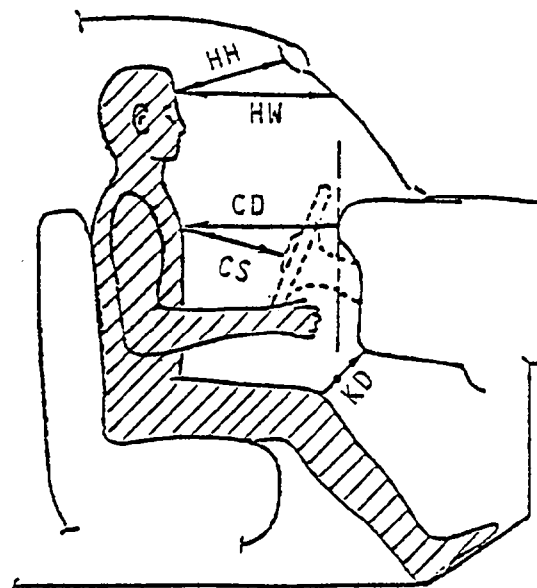


Figure 7 VEHICLE 2 (1976 VW RABBIT) - PRE- AND POST-TEST OCCUPANT POSITION

Figure 8 VEHICLE CRASH ATTITUDE



	VW DRIVER	IMPALA DRIVER
HH	16 3/8"	14 1/4"
HW	22 3/4"	22 1/4"
CD	21 3/8"	22 1/2"
CS	13 1/8"	16 3/8"
KDL	2"	5 1/2"
KDR	2 1/4"	5 3/4"



HR	6 1/8"	7 1/4"
HS	6 3/4"	9"
AD	3"	5 3/4"
HD	5 3/4"	6 1/2"

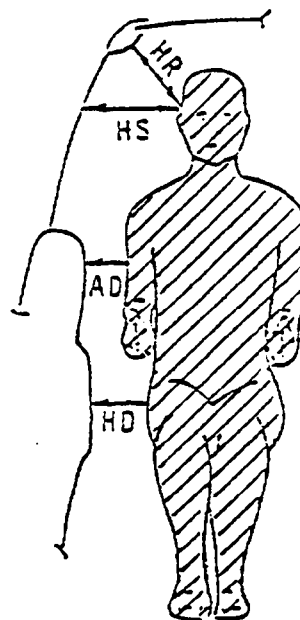


Figure 9 OCCUPANT CLEARANCE DIMENSIONS

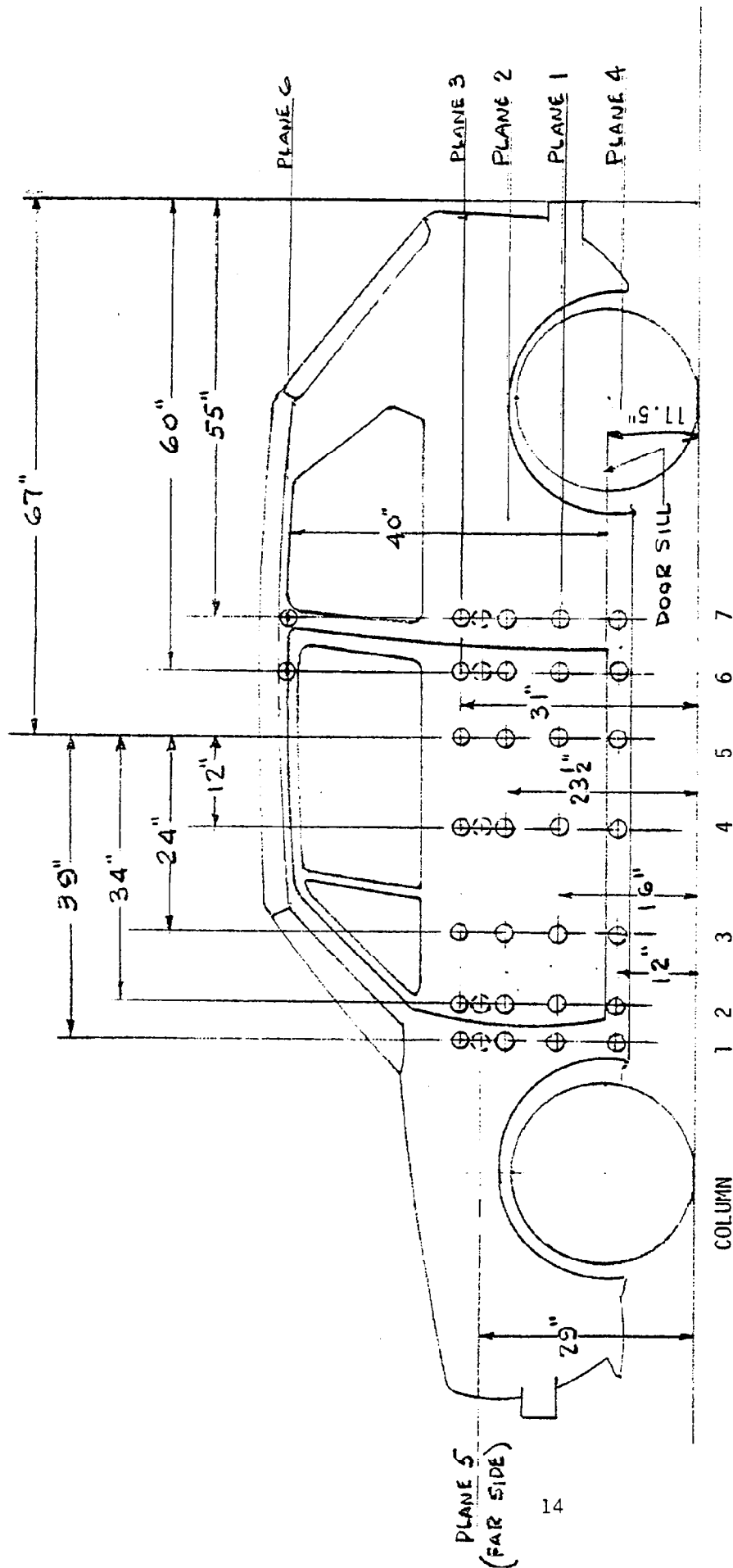


Figure 10 SIDE INTRUSION MEASUREMENT LOCATIONS

Table 3

SIDE INTRUSION MEASUREMENTS

DIMENSIONS LISTED BELOW ARE FROM POINTS SHOWN ON FIG. 10 TO REF. PLANES
LOCATED PARALLEL TO AND OUTBOARD FROM ϕ OF VEHICLE (L. SIDE 34" - R. SIDE 34")

PLANE NO.	DIMENSIONS (INCHES)						
	COLUMNS						
	1	2	3	4	5	6	7
1 PRE	4.3	4.5	4.5	4.6	4.7	4.8	4.9
1 POST	7.4	10.7	15.1	16.3	15.1	13.1	11.6
1 DIFF.	3.1	6.2	10.6	11.7	10.4	8.3	6.7
2 PRE	3.8	3.9	3.8	3.8	3.9	3.9	4.0
2 POST	6.7	10.4	16.2	17.6	16.1	14.8	13.6
2 DIFF.	2.9	6.5	12.4	13.8	12.2	10.9	9.6
3 PRE	4.5	4.5	4.4	4.3	4.2	4.2	4.2
3 POST	6.8	9.7	16.9	17.5	14.9	14.4	13.1
3 DIFF.	2.3	5.2	12.5	13.2	10.7	10.2	8.9
4 PRE	5.5	5.8	5.8	5.8	6.0	6.1	6.2
4 POST	7.7	10.6	11.4	12.4	11.7	10.6	9.8
4 DIFF.	7.2	4.8	5.6	6.6	5.7	4.5	3.6
5 PRE	3.6	3.6	3.6	3.6	3.6	3.7	3.7
5 POST	2.0	1.6	1.7	1.9	2.2	2.5	2.6
5 DIFF.	-1.6	-2.0	-1.9	-1.7	-1.4	-1.2	-1.1
6 PRE							
6 POST						11.7	11.7
6 DIFF.						13.6	13.5
						1.9	1.8
7 PRE							
7 POST							
7 DIFF.							

1976 VW RABBIT

BUDD DYNAMIC TEST NO. 17

Table 4

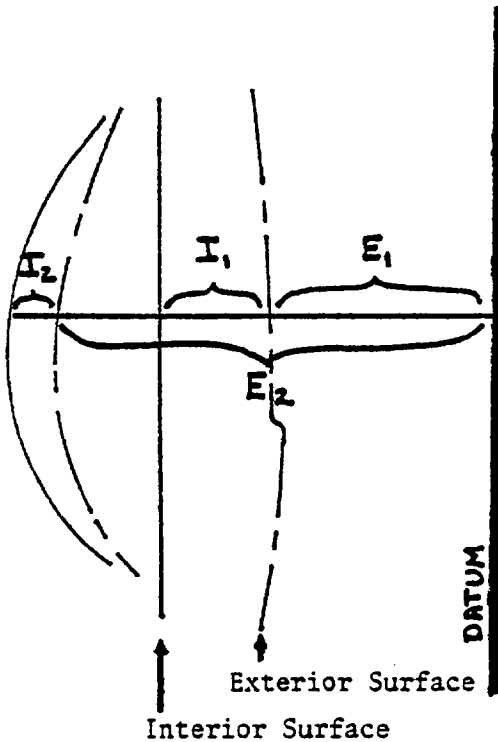
DOOR THICKNESS MEASUREMENTS

DIMENSIONS LISTED BELOW ARE MEASURED WITH A ROD THROUGH
A 1/8" HOLE AT EACH LOCATION AS SHOWN IN FIGURE 10

PLANE NO.		THICKNESS (INCHES)			
		3	4	5	6
1	PRE	4.7	3.6	2.6	3.2
	POST	0.2	0.1	0.2	2.6
	DIFF.	-4.5	-3.5	-2.4	-.6
2	PRE	4.2	4.2	4.2	3.9
	POST	0.4	0.2	0.1	0.2
	DIFF.	-3.8	-4.0	-4.1	-3.7
3	PRE	3.5	3.2	3.3	3.5
	POST	1.2	1.1	2.0	2.8
	DIFF.	-2.3	-2.1	-1.3	-0.7

Table 5

INTRUSION DIMENSIONS



NOTE: All dimensions taken
positive from datum
toward vehicle interior.

Where: E_1 = pre-test exterior surface (Table 3)
 E_2 = post-test exterior surface (Table 3)
 I_1 = pre-test door thickness (Table 4)
 I_2 = post-test door thickness (Table 4)

$$\text{Intrusion} = (E_2 + I_2) - (E_1 + I_1)$$

$$\therefore \text{Intrusion} = (E_2 - E_1) + (I_2 - I_1)$$

DIMENSION (INCHES)

(Dimensions listed below are for points shown on Figure 10.)

COLUMN NO.

PLANE NO.	3	4	5	6
1	6.1	8.2	8.0	7.7
2	8.5	9.8	8.1	7.2
3	10.2	11.1	9.4	9.5

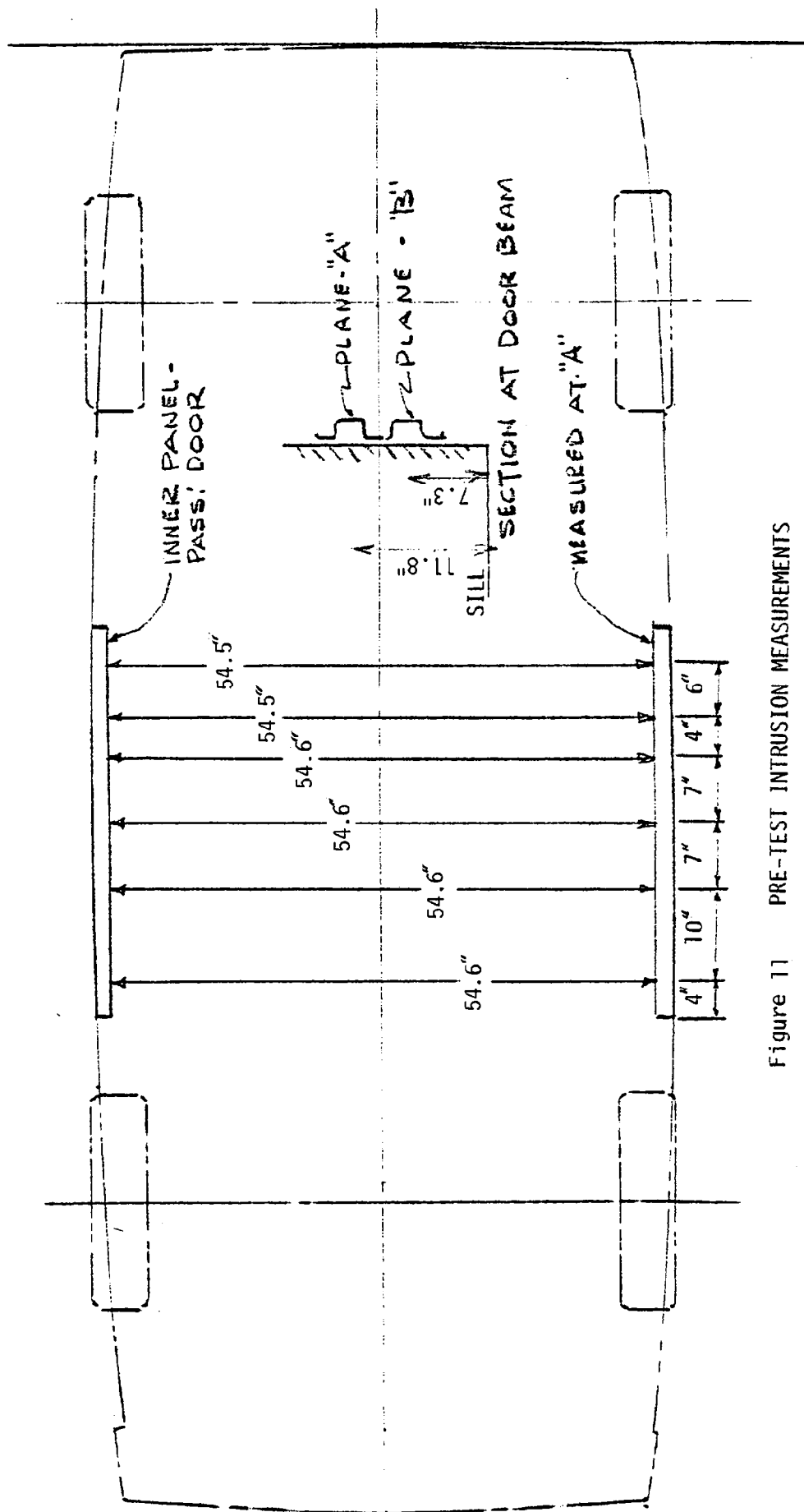


Figure 11 PRE-TEST INTRUSION MEASUREMENTS

PLANE "A"
PRE-TEST

1976 V.W. RABBIT

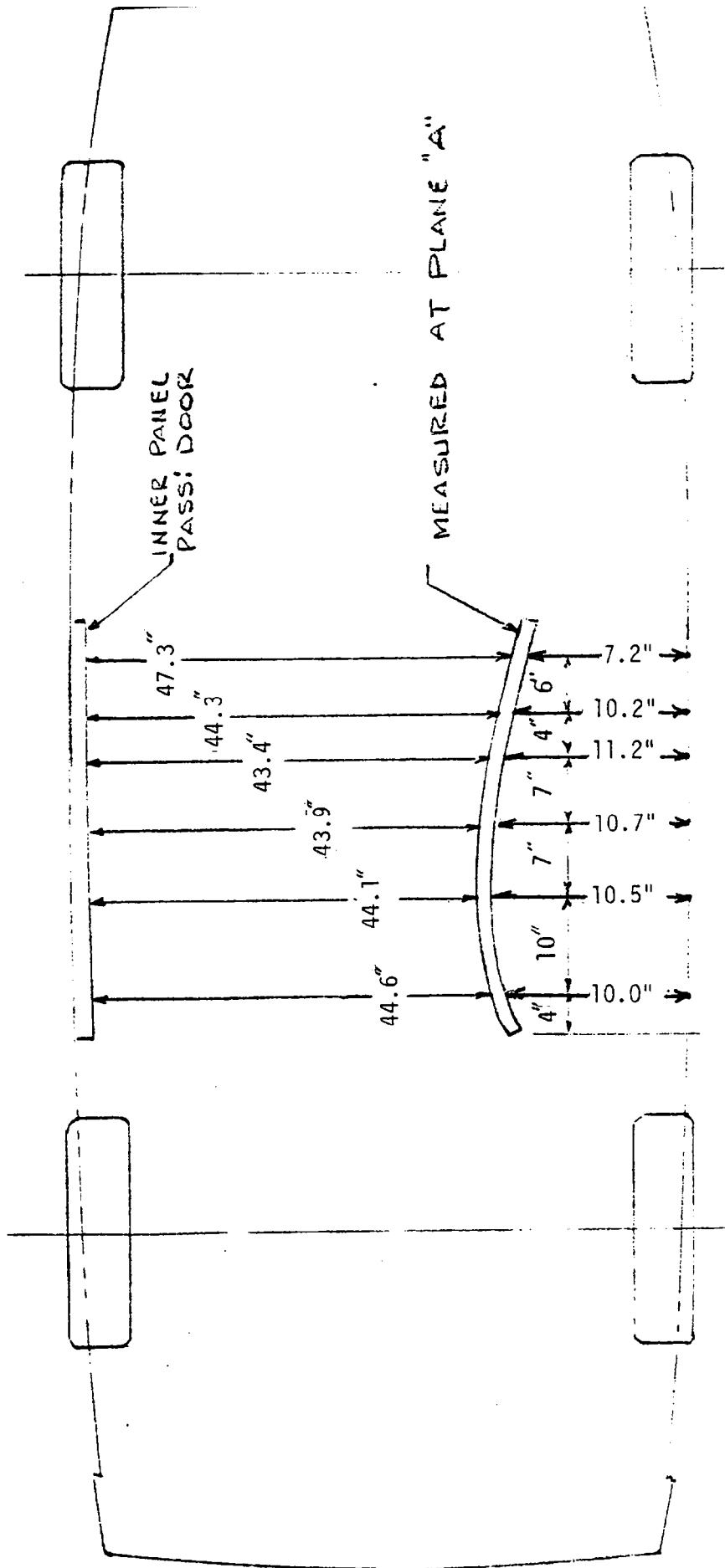


Figure 12 POST-TEST DOOR BEAM INTRUSION MEASUREMENTS

1976 V.W. RABBIT
SCALE .06" = 1"

PLANE "A"
POST-TEST

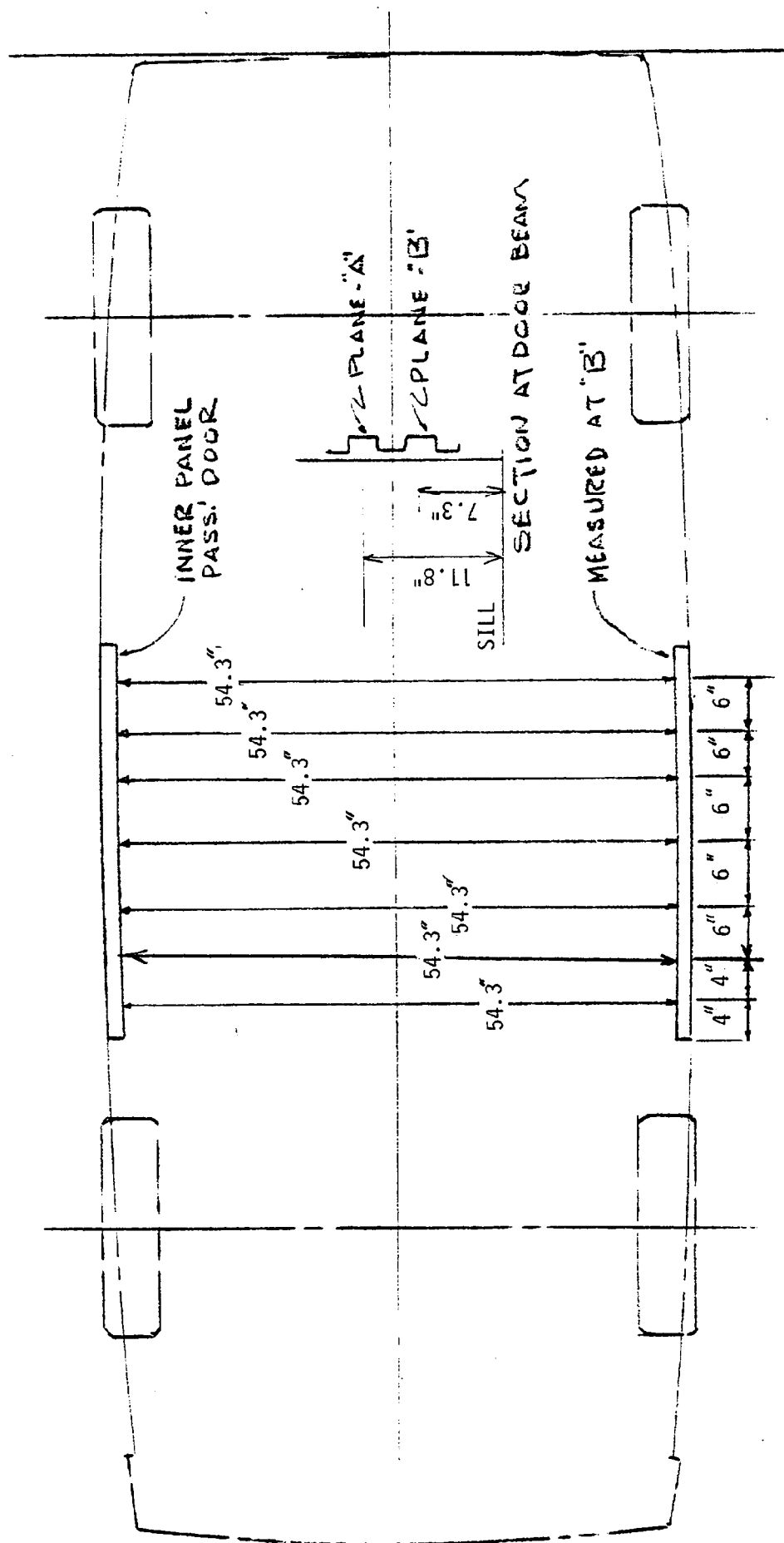


Figure 13 PRE-TEST DOOR BEAM INTRUSION MEASUREMENTS

PLANE "B"
PRE-TEST

1976 V.W. RABBIT
SCALE .06" = 1"

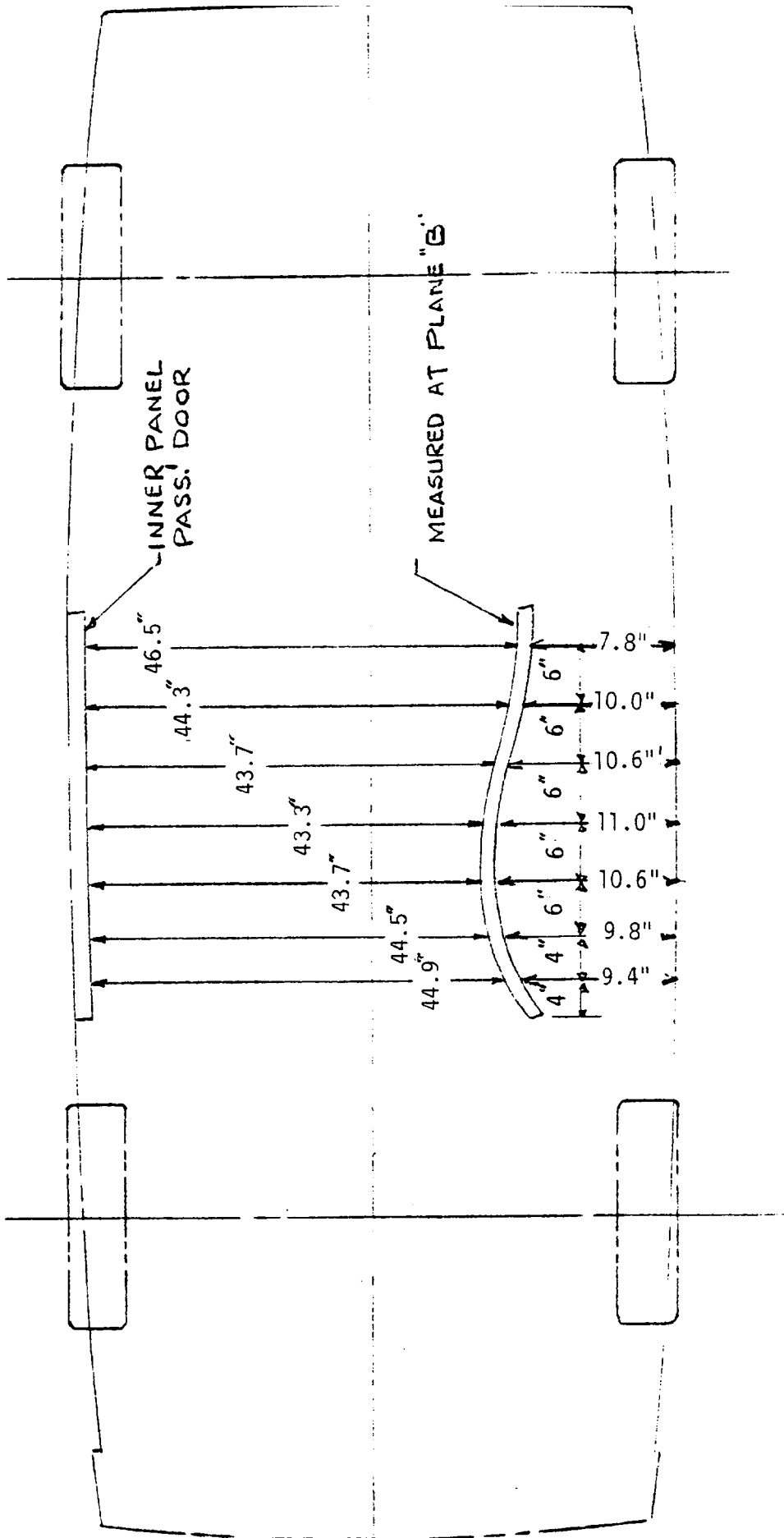


Figure 14 POST-TEST DOOR BEAM INTRUSION MEASUREMENTS

PLANE "B"
POST-TEST

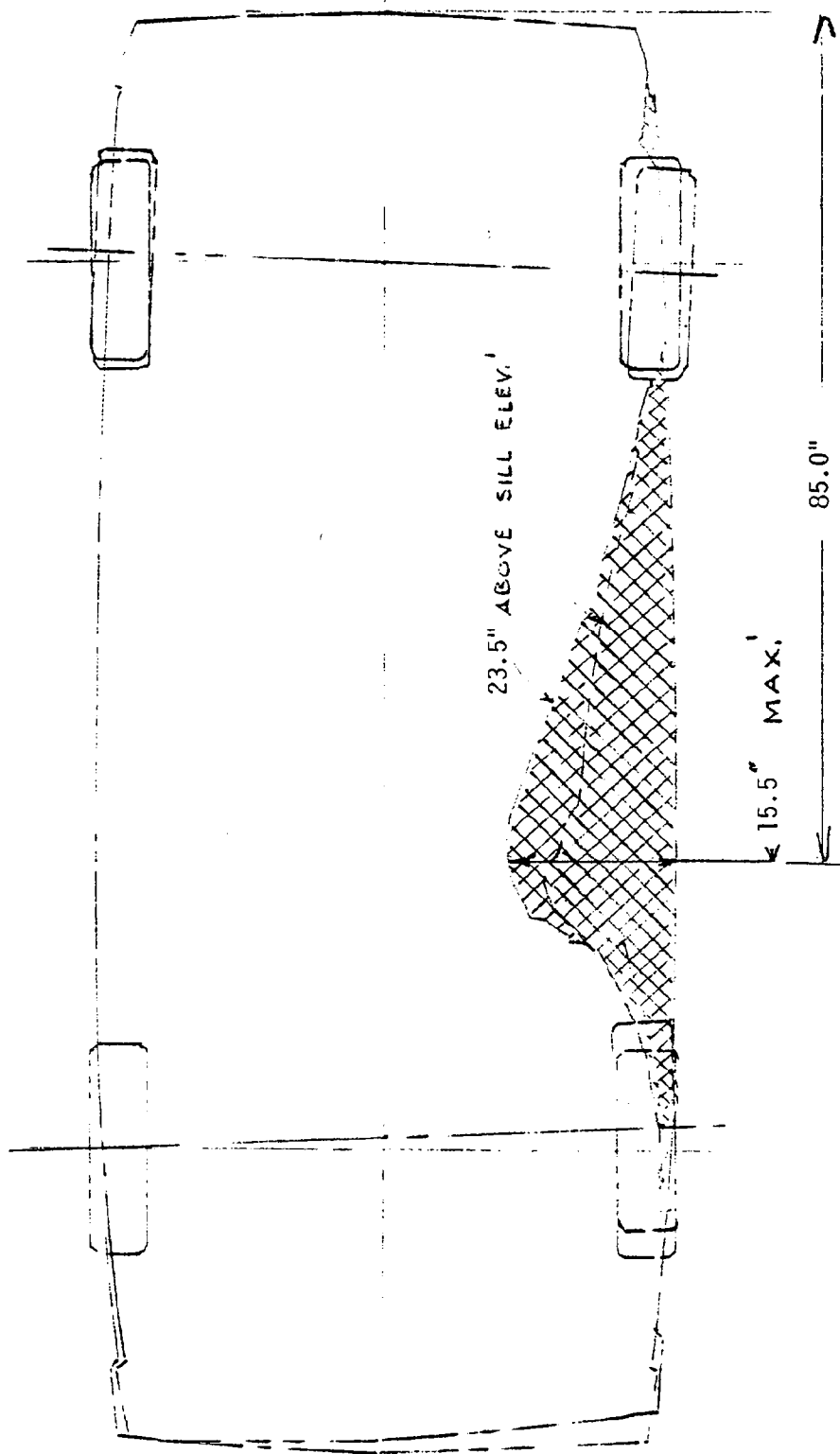


Figure 15 1976 VW RABBIT - EXTERIOR DEFORMATION

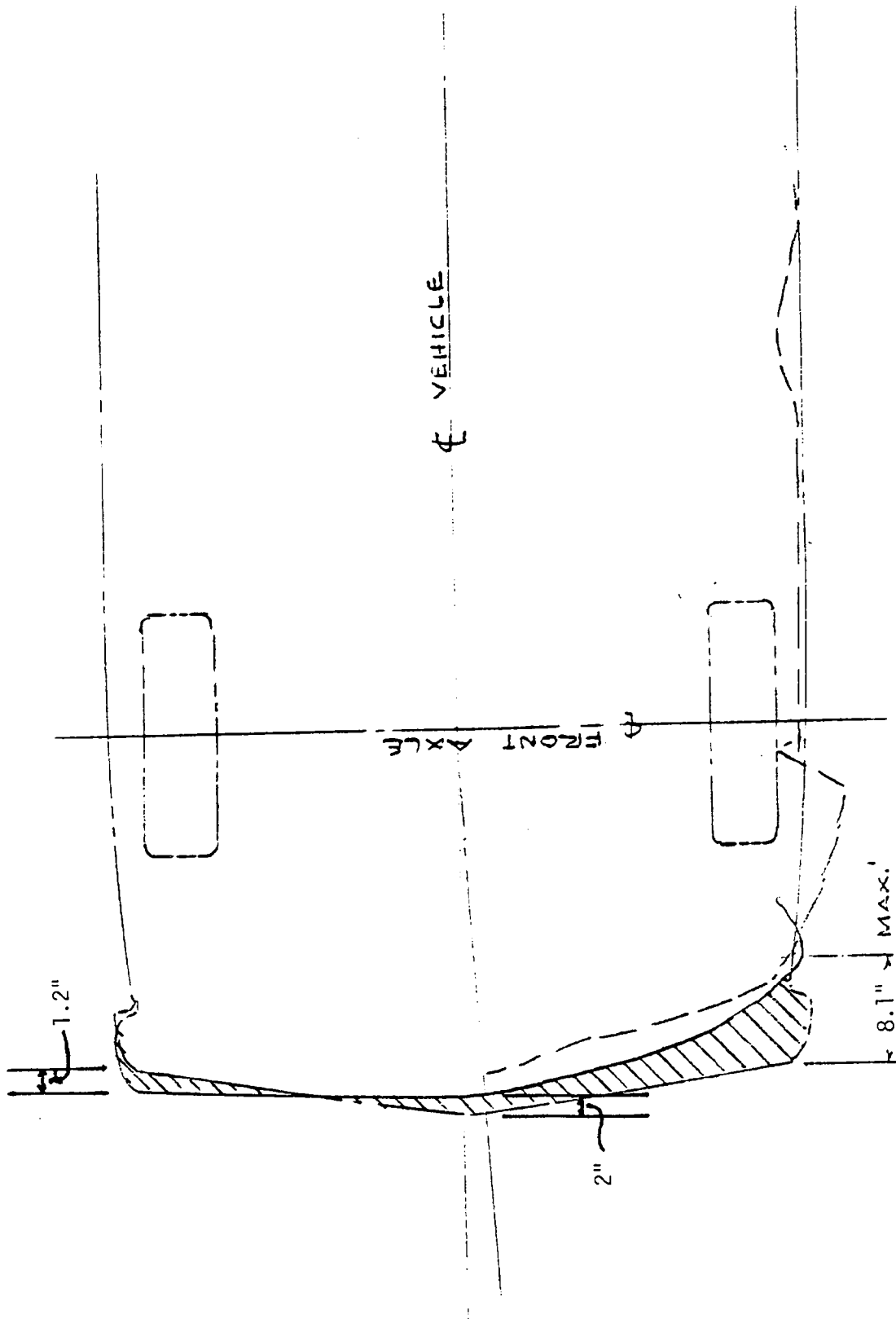


Figure 16 1978 CHEVROLET IMPALA - EXTERIOR DEFORMATION

Table 6

ELECTRONIC INSTRUMENTATION TEST NO. 17
Car 1 - Bullet Vehicle - 1978 Chevrolet Impala

TRANSDUCER DESCRIPTION OR ACCELEROMETER LOCATION*	DIRECTION OF PARAMETER BEING MEASURED	LOCATION ON VEHICLE	DESCRIPTION LISTED ON DATA PLOTS
<u>VEHICLE ACCELEROMETER</u>			
1	X	Left Sill next to Rear Seat	Veh. #1 Acc. Pack #1
2	X	Right Sill next to Rear Seat	Veh. #1 Acc. Pack #2
3	X, Y, Z	Deck Over Rear Axle	Veh. #1 Acc. Pack #3
4	X, Y, Z	Firewall	Veh. #1 Acc. Pack #4
5	X	Rear Compartment	Veh. #1 Acc. Pack #5
6	X, Y, Z	Top of Engine, Carburetor	Veh. #1 Acc. Pack #6
7	X	Front Crossmember	Veh. #1 Acc. Pack #7
8	X-Accel.	Bumper (rear face)	Veh. #1 Acc. Pack #8
9	X	Rear Compartment	Veh. #1 Acc. Pack #9
10	Yaw Rate	Centerline Behind Front Seats	Veh. #1 Yaw Rate
<u>DUMMY</u>			
LF Head (Dummy (1))	X, Y, Z	Left Front Seat	Veh. #1 Pos. #1 Head
LF Chest (Dummy (1))	X, Y, Z	Left Front Seat	Veh. #1 Pos. #1 Chest
LF Femurs (Dummy (1))	R, L**	Left Front Seat	Veh. #1 Pos. #1 Femur
LF Belts (Dummy (1))	U, R, L***	Left Front Seat	Veh. #1 Pos. #1 Belts

* See Accelerometer Layout Diagram, Figure 18

** Right and Left Femur Forces.

*** Upper, Lower Right and Lower Left Belt Forces.

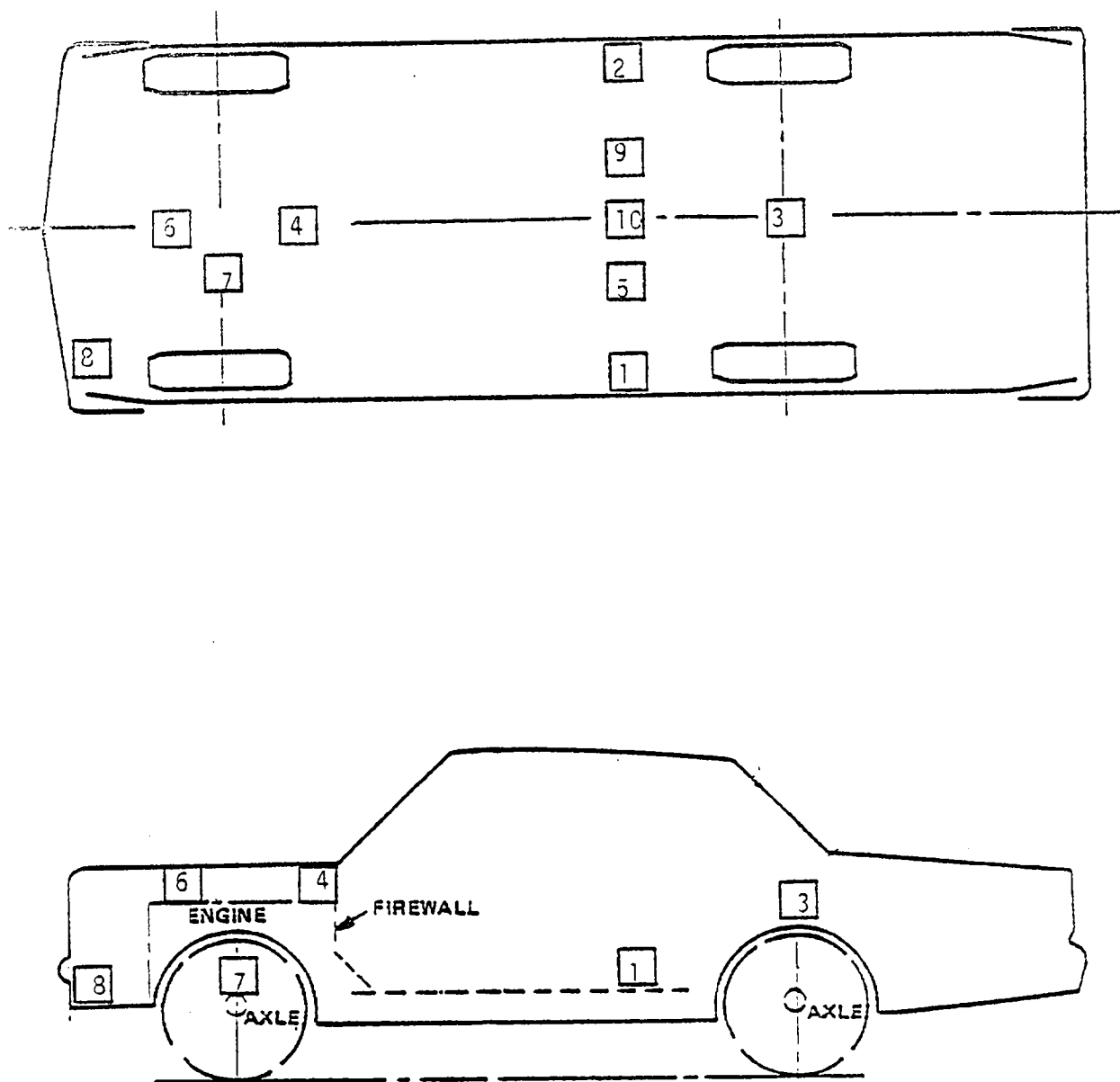


Figure 17 CHEVROLET IMPALA ACCELEROMETER LOCATIONS

Table 7

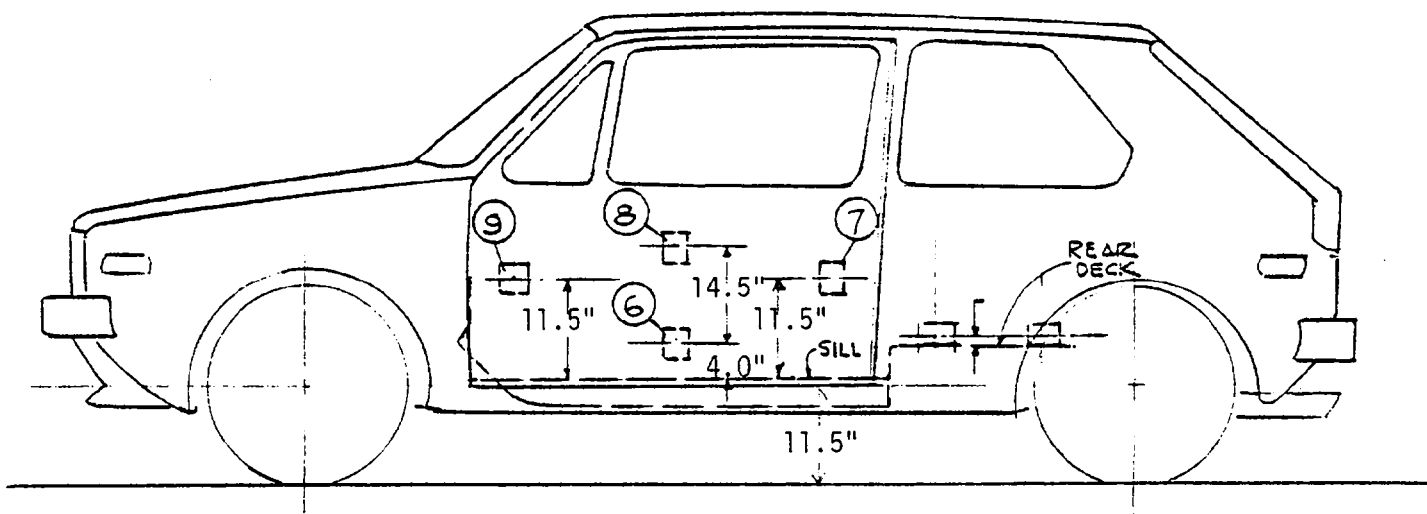
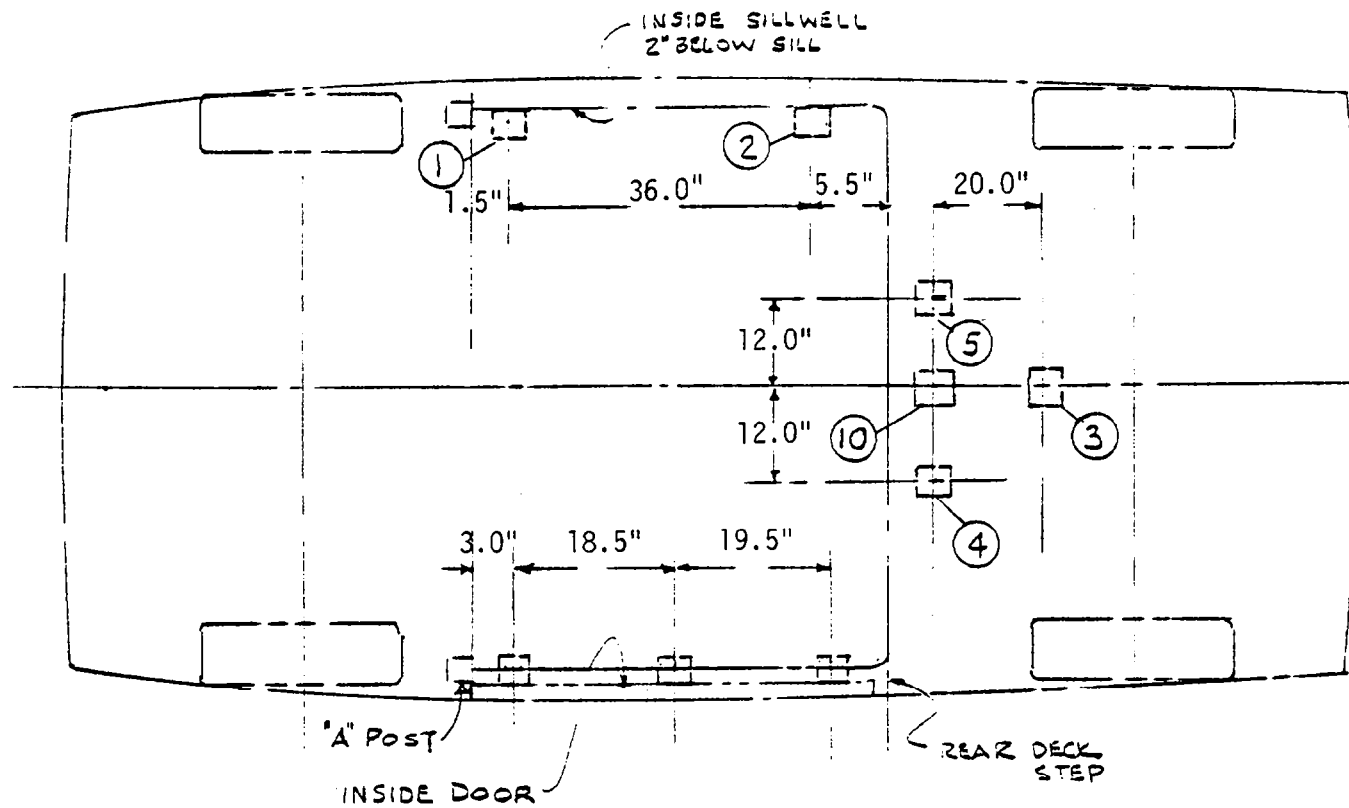
ELECTRONIC INSTRUMENTATION TEST NO. 17

Vehicle 2 - 1976 Volkswagen Rabbit

TRANSDUCER DESCRIPTION OR ACCELEROMETER LOCATION *	DIRECTION OF PARAMETER BEING MEASURED	LOCATION ON VEHICLE	DESCRIPTION LISTED ON DATA PLOTS
<u>VEHICLE ACCELEROMETER</u>			
1	X, Y, Z	Right Sill next to Front Seat	Acc. Pack #1
2	X, Y, Z	Right Sill next to Rear Seat	Acc. Pack #2
3	X, Y, Z	Deck over Rear Axle	Acc. Pack #3
4	X	Rear Compartment	Acc. Pack #4
5	X	Rear Compartment	Acc. Pack #5
6	Y	Lower Left Door Centerline	Acc. Pack #6
7	Y	Mid-Rear of Left Door	Acc. Pack #7
8	Y	Upper Left Door Centerline	Acc. Pack #8
9	Y	Mid-Front of Left Door	Acc. Pack #9
<u>DUMMY</u>			
LF Head (Dummy (1))	X, Y, Z	Left Front Seat	Pos. #1 Head
LF Upper Spine (Dummy (1))	X, Y, Z	Left Front Seat	Pos. #1 Upper Spine
LF Lower Spine (Dummy (1))	X, Y, Z	Left Front Seat	Pos. #1 Lower Spine
LF Pelvis (Dummy (1))	X, Y	Left Front Seat	Pos. #1 Pelvic
LF Upper Left Rib (Dummy (1))	Y	Left Front Seat	Pos. #1 Upper L Rib Y
LF Lower Left Rib (Dummy (1))	X	Left Front Seat	Pos. #1 Lower L Rib X
LF Upper Right Rib (Dummy (1))	Y	Left Front Seat	Pos. #1 Upper R Rib Y
LF Upper Sternum (Dummy (1))	X	Left Front Seat	Pos. #1 Upper Front X
LF Lower Sternum (Dummy (1))	X	Left Front Seat	Pos. #1 Lower Front X
LF Lower Right Rib (Dummy (1))	X	Left Front Seat	Pos. #1 Lower R Rib X
LF Belts (Dummy (1))	U, L**	Left Front Seat	Pos. #1 Belt Loads
<u>MISCELLANEOUS</u>			
10	Yaw Rate	Centerline behind Front Seats	Yaw Rate
11-12	Side Intrusion	Side Intrusion (Driver Side)	Pot. #1, 2, 3

* See Accelerometer Layout Diagram, Figure No. 18.

** Upper and Lower Belt Forces.



CAR NO. 2 - TARGET VEHICLE - 1976 VOLKSWAGEN RABBIT

Figure 18 VW RABBIT ACCELEROMETER LOCATIONS

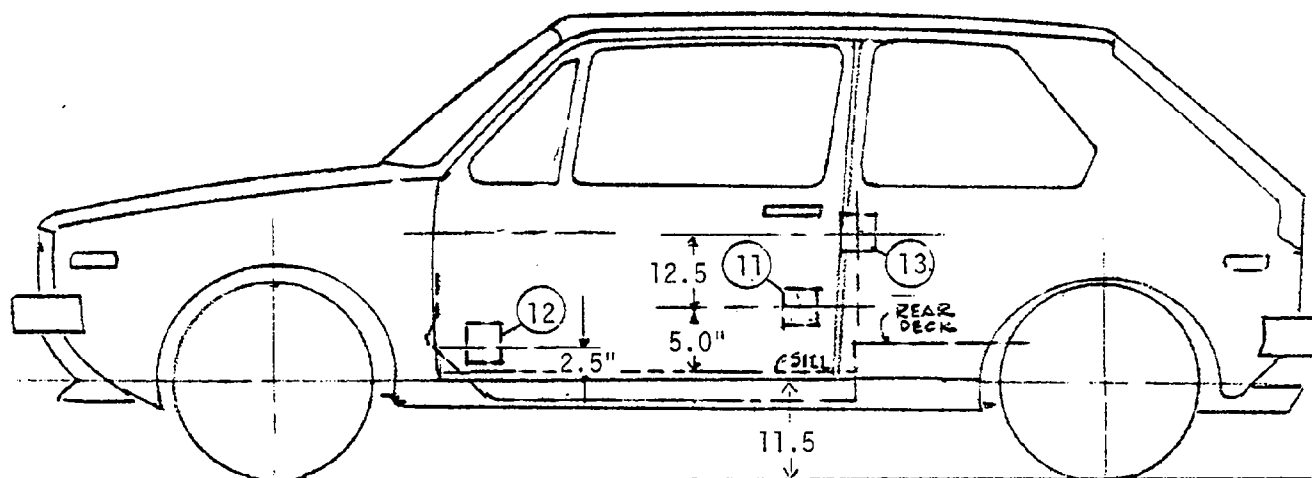
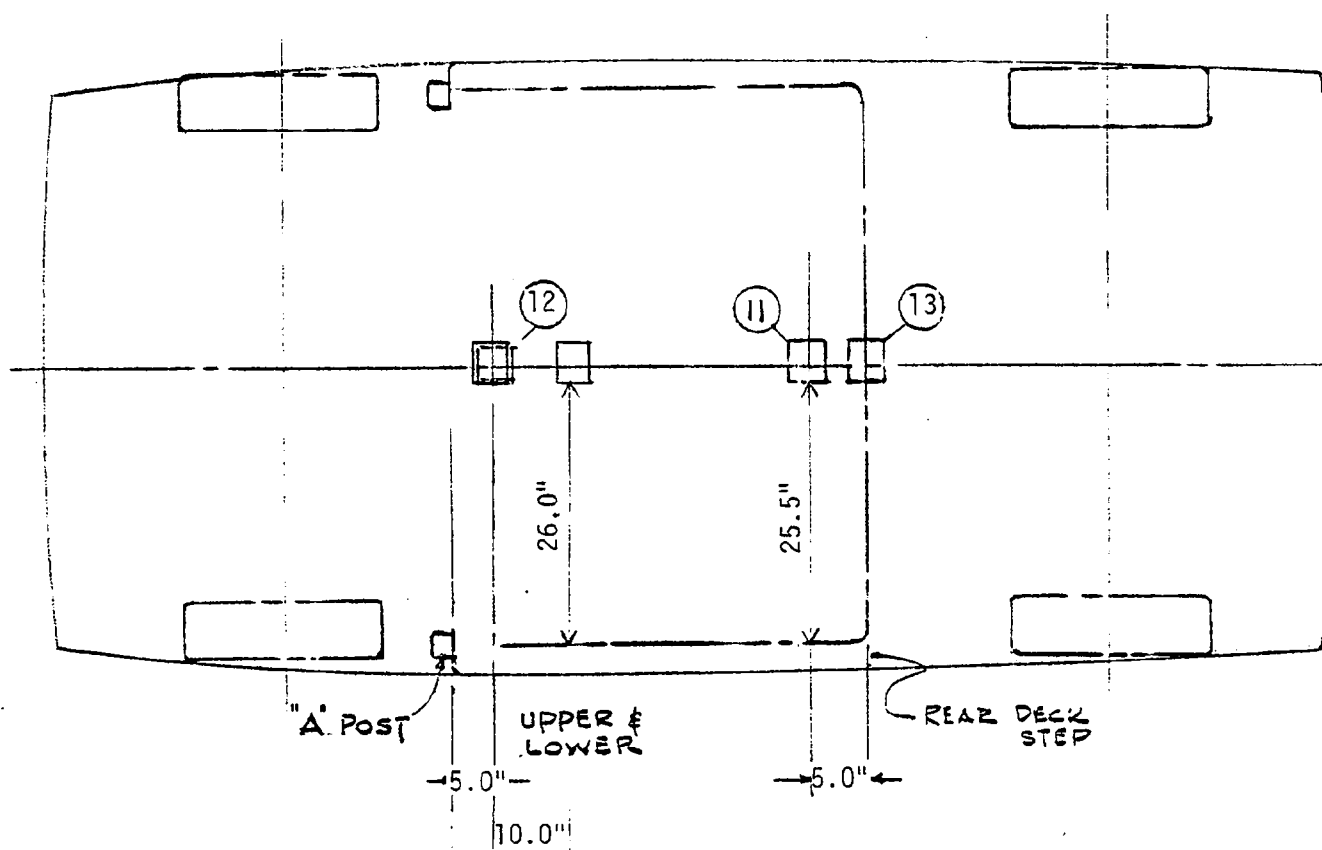


Figure 19 VW RABBIT POTENTIOMETER LOCATIONS

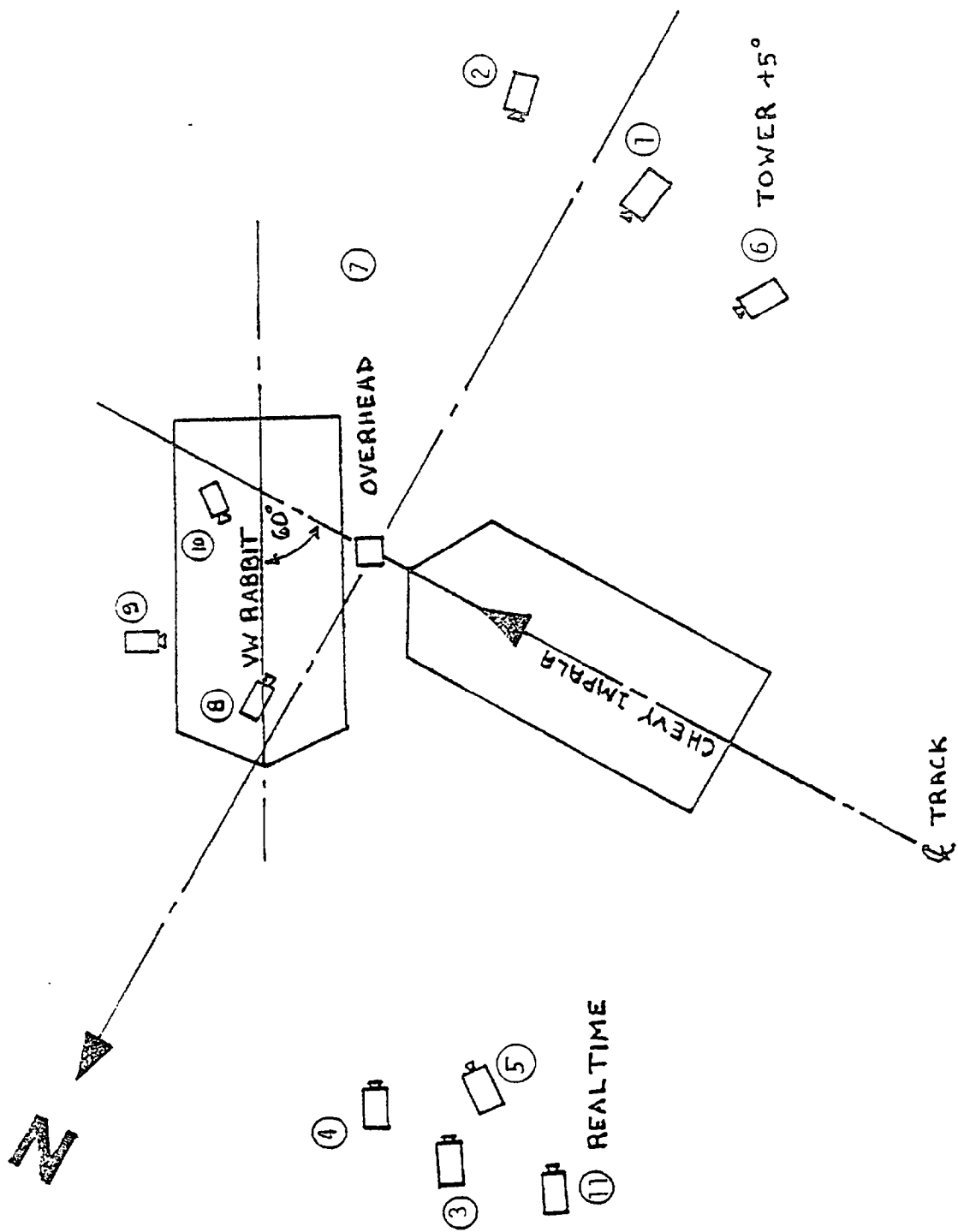


Figure 20 CAMERA POSITIONS

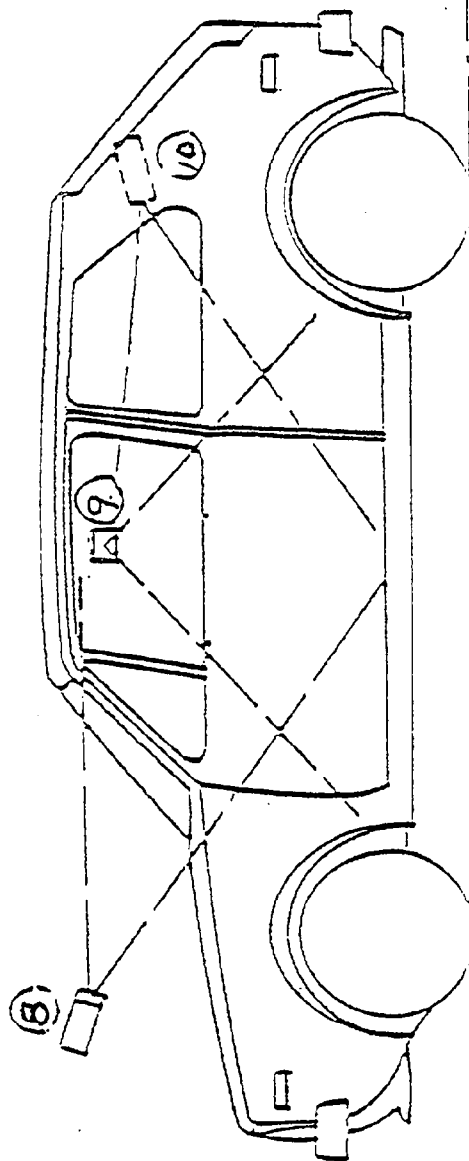


Figure 21 ON-BOARD HIGH SPEED CAMERA LOCATIONS

Table 8

HIGH SPEED CAMERA INFORMATION (TEST NO. 17)

CAMERA NO.	LOCATION	TYPE	SPEED (fps)
1	South Wide	Photosonic	900
2	South Close Low	Photosonic	900
3	North Wide	Photosonic	900
4	North Close Low	Photosonic	1000
5	North Close High	Photosonic	900
6	Tower 45 South	Photosonic	850
7	Overhead	Did Not Run	---
8	On-board Hood	Stalex	No Pulse
9	On-board Side	Stalex	No Pulse
10	On-board Rear	Stalex	No Pulse

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 AND END OF FILM.

Table 9
DUMMY INJURY CRITERIA VALUES
CAR 1 - STRIKING VEHICLE

	MAXIMUM ACCELERATION ("G") *											
	HEAD				CHEST				PELVIS			
	X	Y	Z	R**	X	Y	Z	R**	X	Y	Z	R**
DUMMY (1)	22	2	11	16	17	2	4	15.9				
DUMMY (2)												
DUMMY (3)												
DUMMY (4)												

	MAXIMUM FORCE-FEMUR LOAD (LBS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	104	224
DUMMY (2)		
DUMMY (3)		
DUMMY (4)		

	MAXIMUM FORCE-SEAT BELTS LOADS (LBS)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
DUMMY (1)	850	1015	470
DUMMY (2)			
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA ***				SEVERITY INDEX	
	HIC	t ₁ (SEC)	t ₂ (SEC)	AVE. ACC. (g) t ₁ TO t ₂	HEAD	CHEST
DUMMY (1)	44,3	.0810	.1611	12.5	60.9	
DUMMY (2)						
DUMMY (3)						
DUMMY (4)						

* Not Including Secondary Impacts

** Defined as Exceeding 0.003 Sec. Duration

*** As Defined in FMVSS No. 208

Table 10

VEHICLE 2 - STRUCK VEHICLESIDE IMPACT DUMMY INJURY CRITERIA VALUES
MAXIMUM ACCELERATION ("G") *

	X	Y	Z	RESULTANT **
HEAD	-97	148	64	81.1
UPPER SPINE	-19.2	105	29.3	102.8
LOWER SPINE	-52	108	22.5	96.5
PELVIC	-42.8	178	-23.0	154.0

UPPER LEFT RIB (Y)		99	
LOWER LEFT RIB (X)	39.8		
UPPER RIGHT RIB (Y)		93	
LOWER RIGHT RIB (X)	47.5		
UPPER STERNUM (X)	90		
LOWER STERNUM (X)	84		
RIB CAGE DEFLECTION (COMP. +)	-		

HIC	1211.6
T1 (Sec)	.0624
T2 (Sec)	.0948
AVE. ACC. (G)	67.5
HEAD SEVERITY	1756.2

* NOT INCLUDING SECONDARY IMPACTS

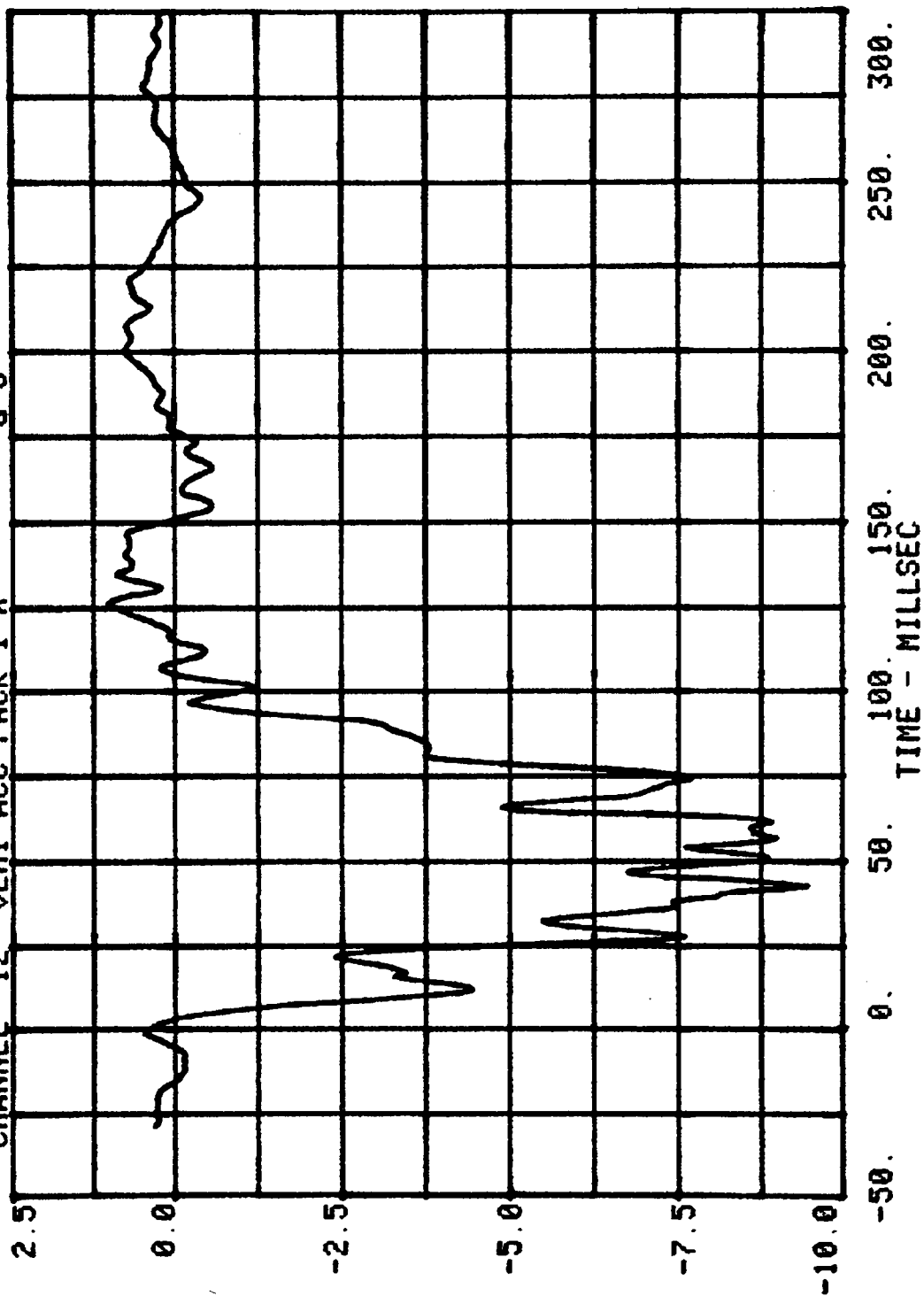
** DEFINED AS EXCEEDING .003 SEC. DURATION.

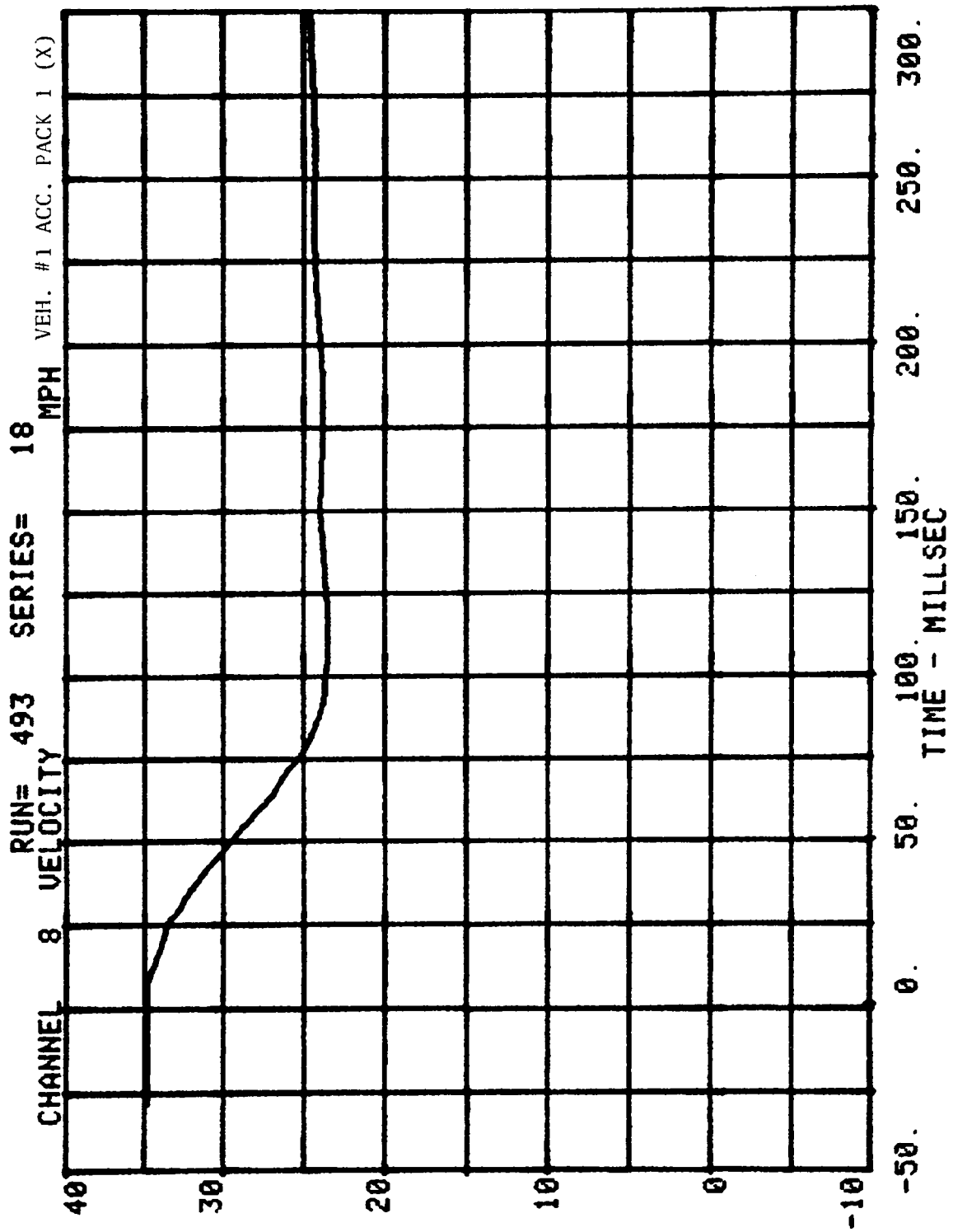
APPENDIX A

Test No. 17
Vehicle 1 - 1978 Chevrolet Impala
Vehicle Data

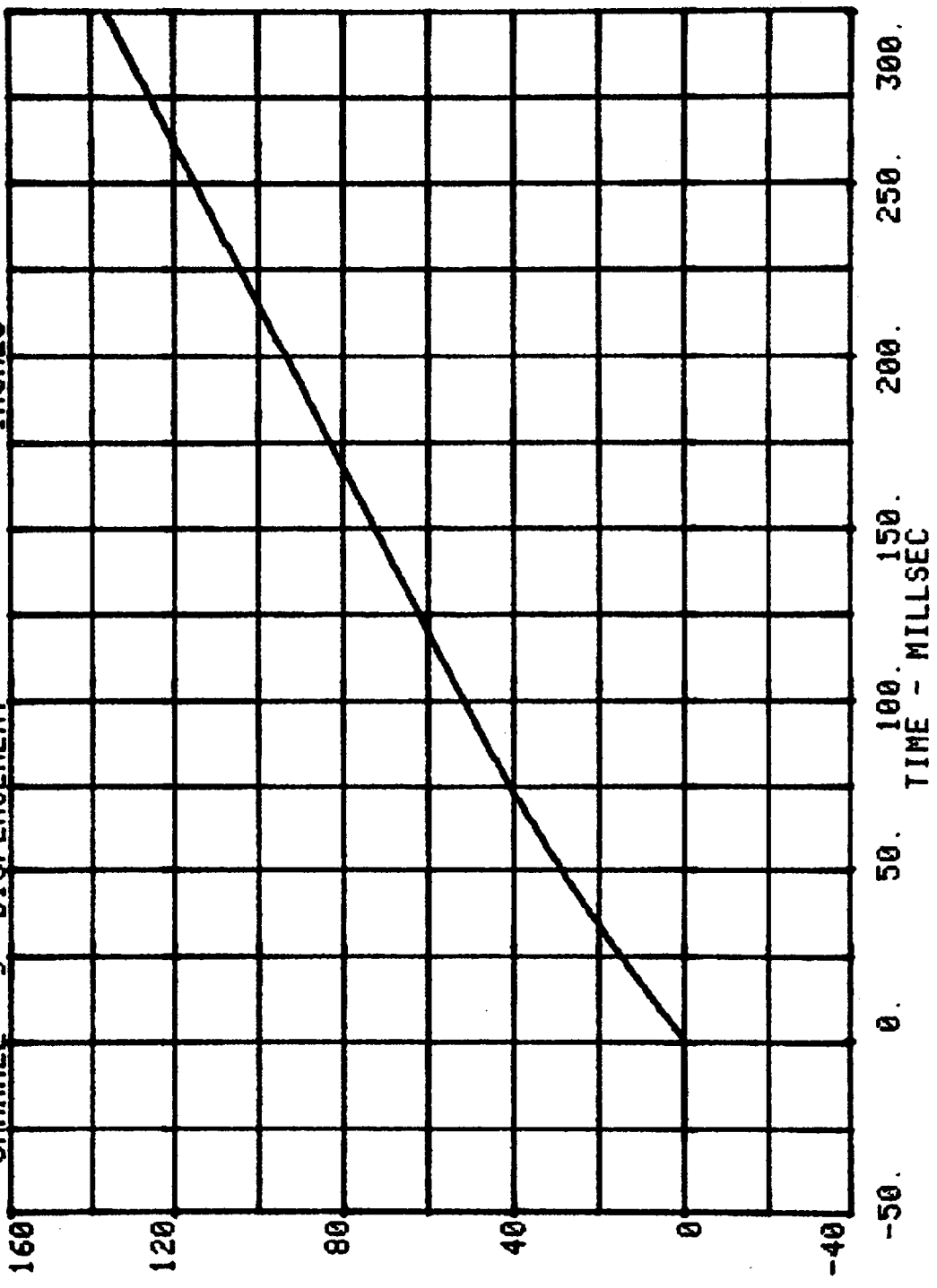
60 Hz Channel Class

CHANNEL 12 RUN= 493 SERIES= 18
VEH1 ACC PACK 1 X G'S

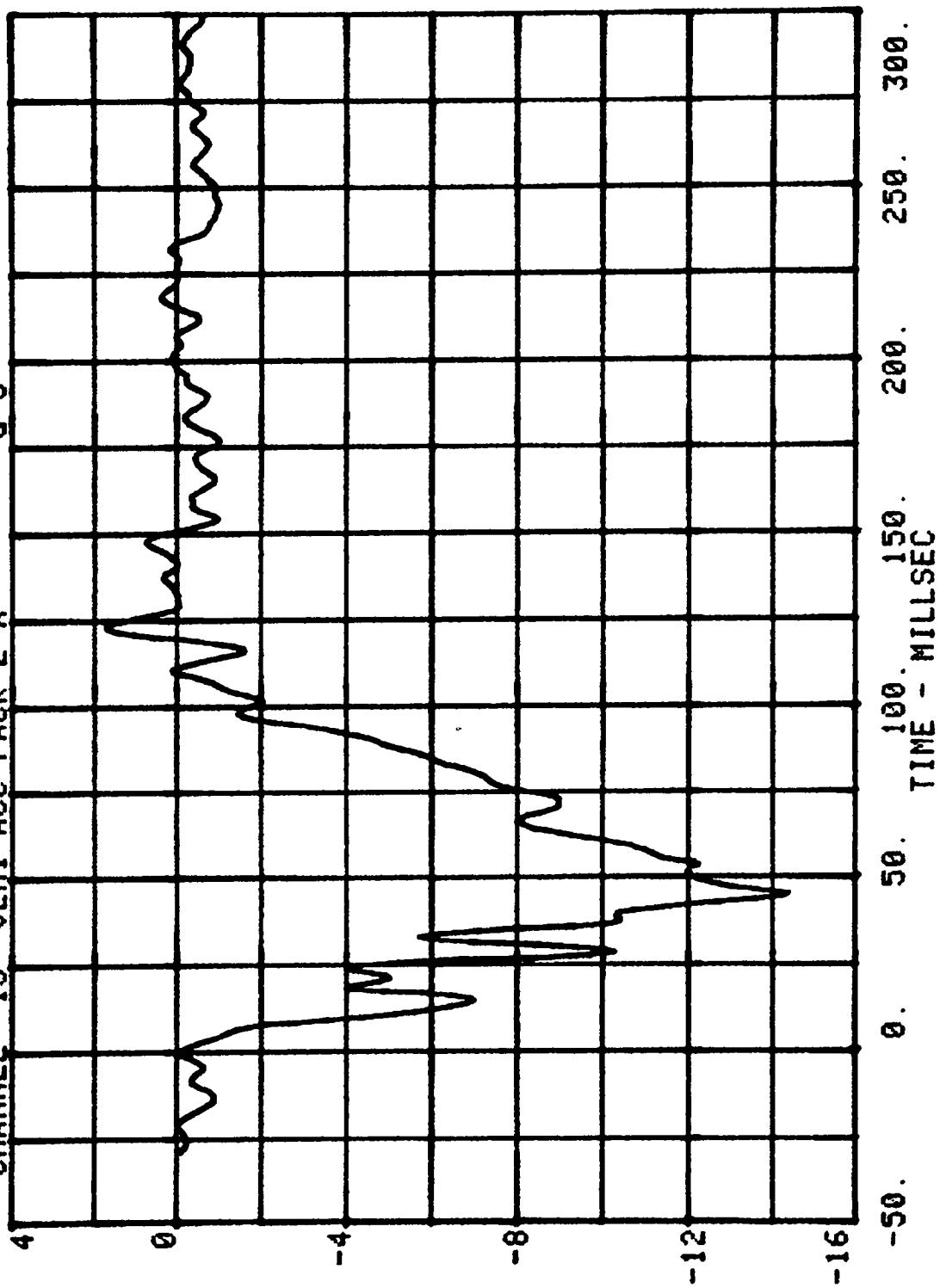


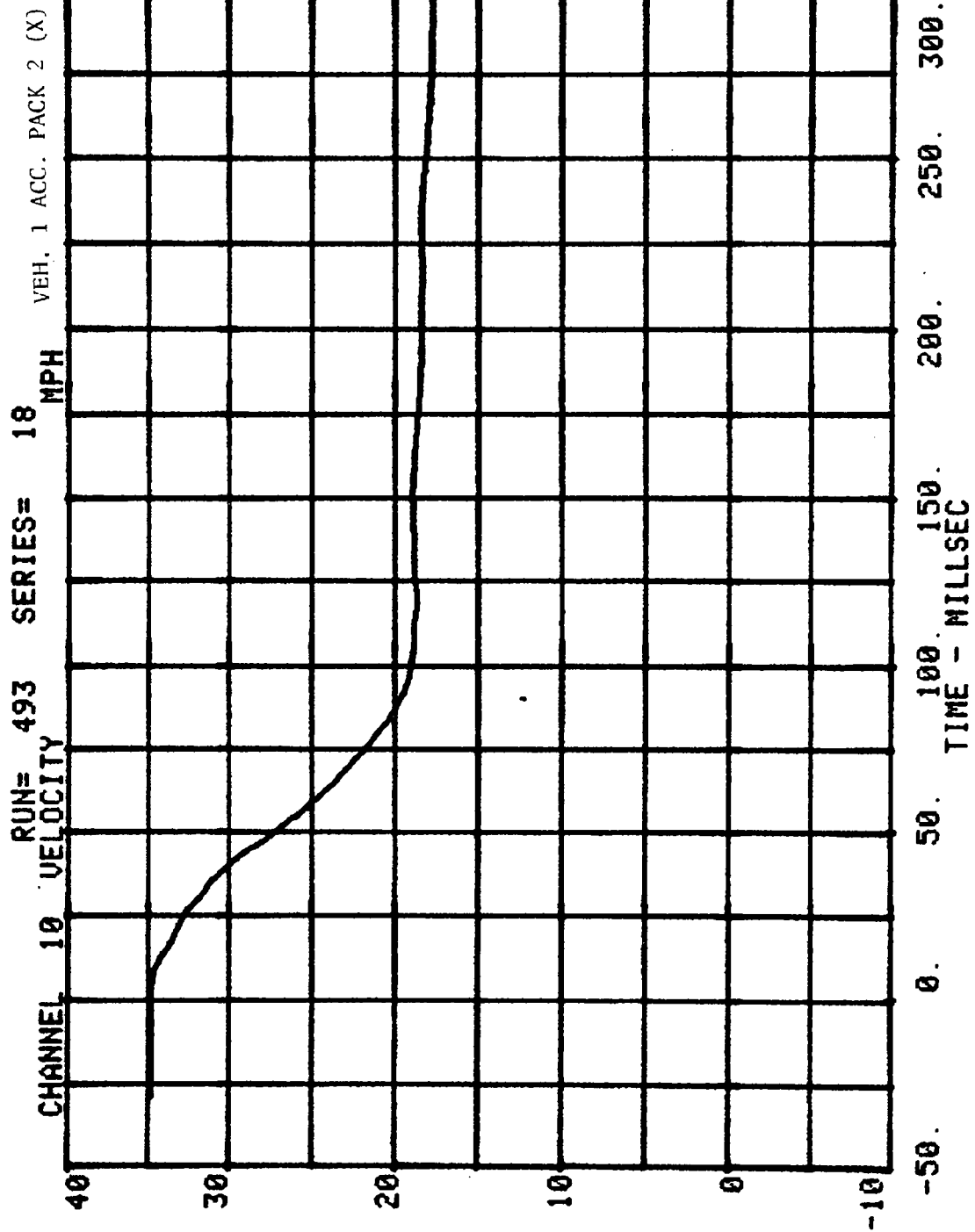


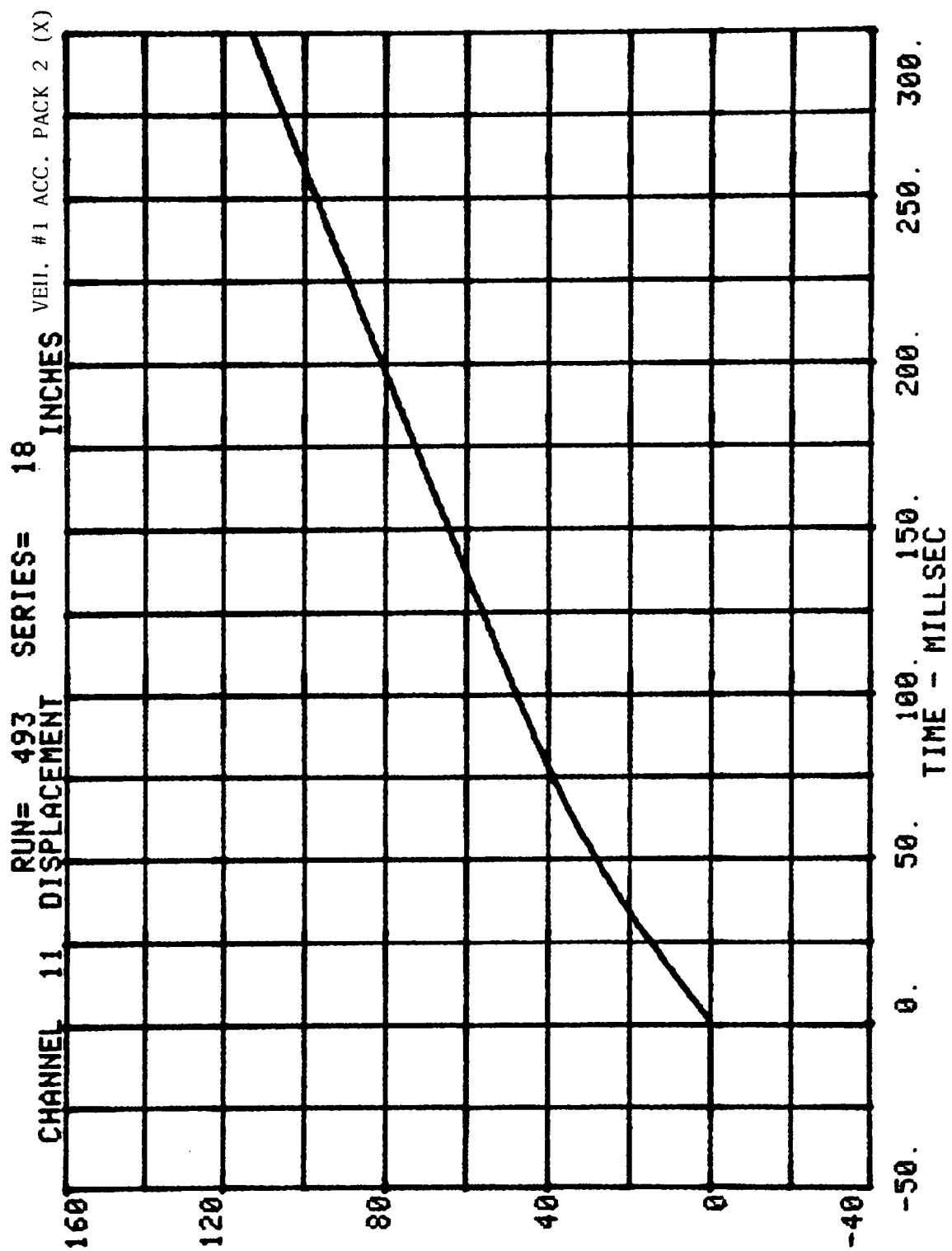
CHANNEL 9 DISPLACEMENT RUN= 493 SERIES= 18 INCHES VEH. 1 ACC. PACK 1 (X)



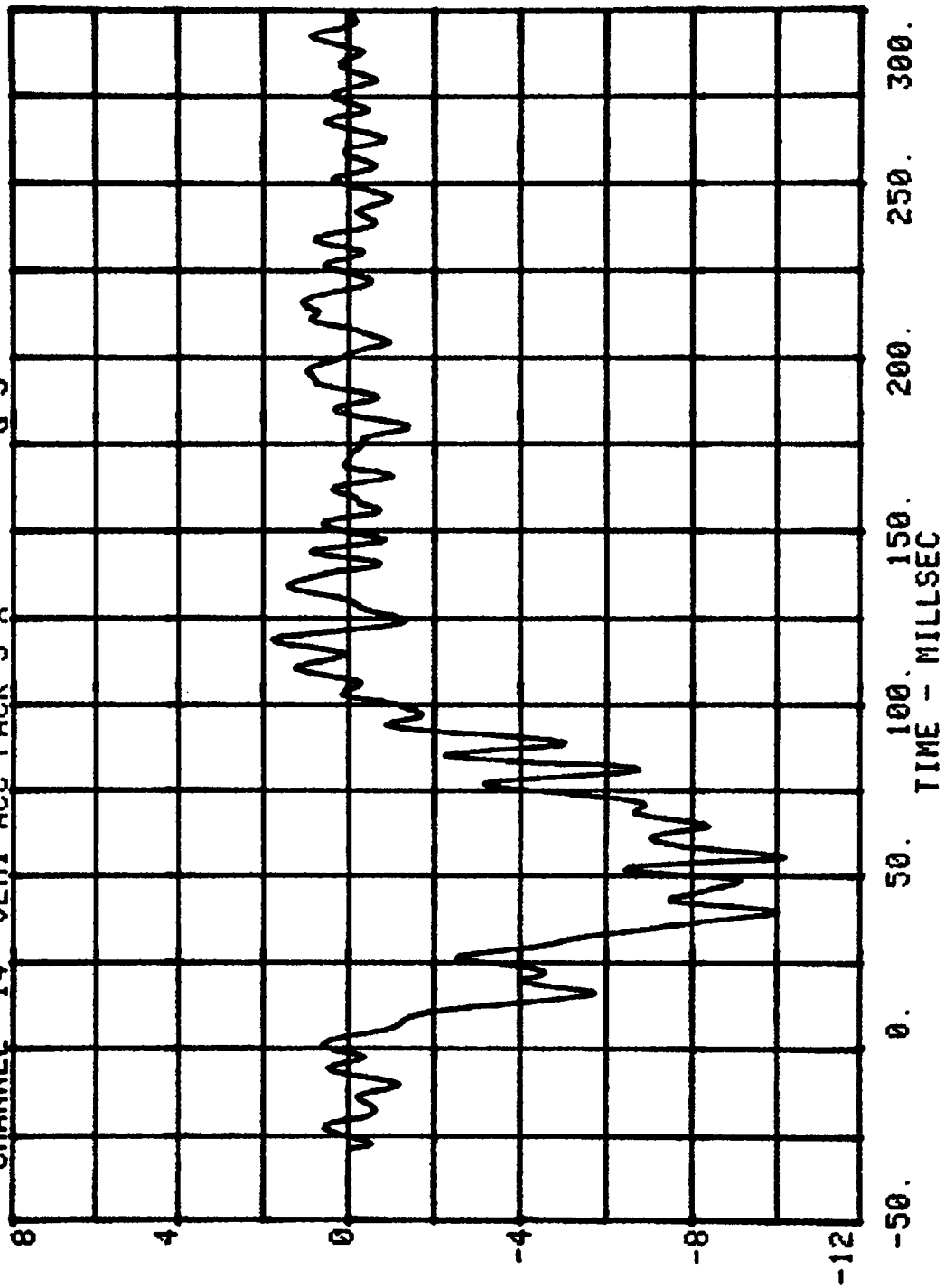
CHANNEL 13 RUN= 493 SERIES= 18 G'S
VEH1 ACC PACK 2 X



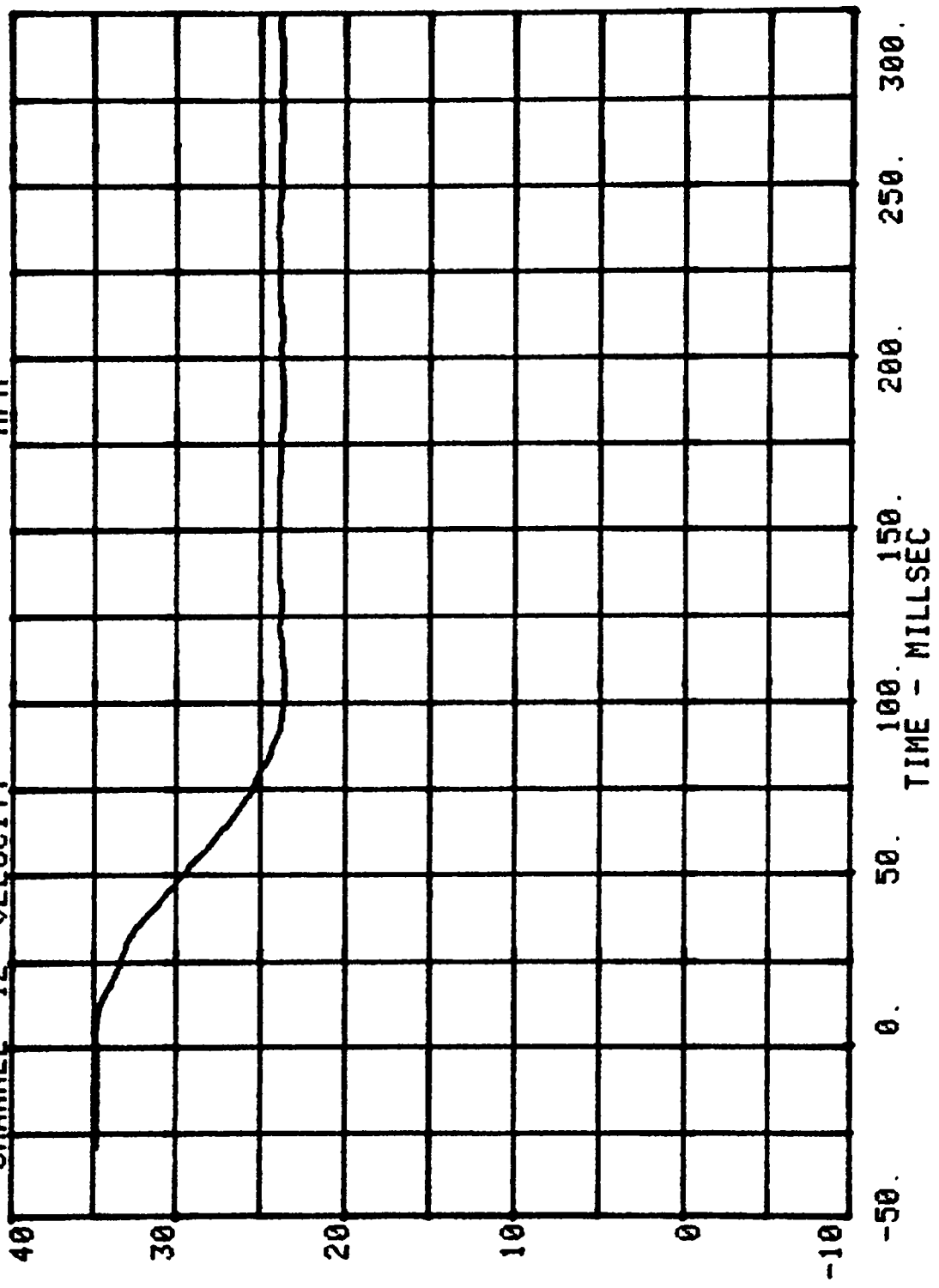




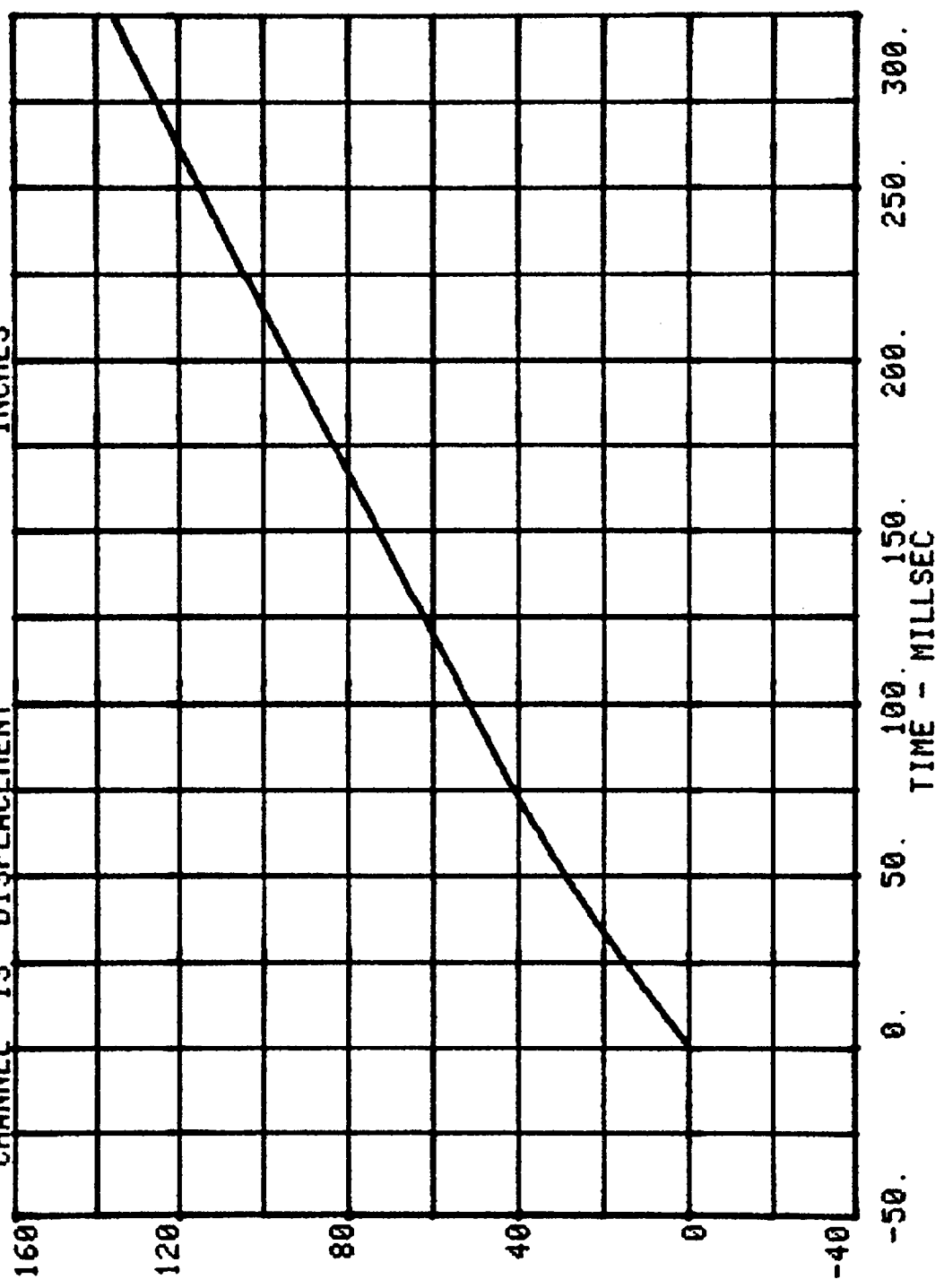
CHANNEL 14 RUN= 493 SERIES= 18
VEH1 ACC PACK 3 X G'S



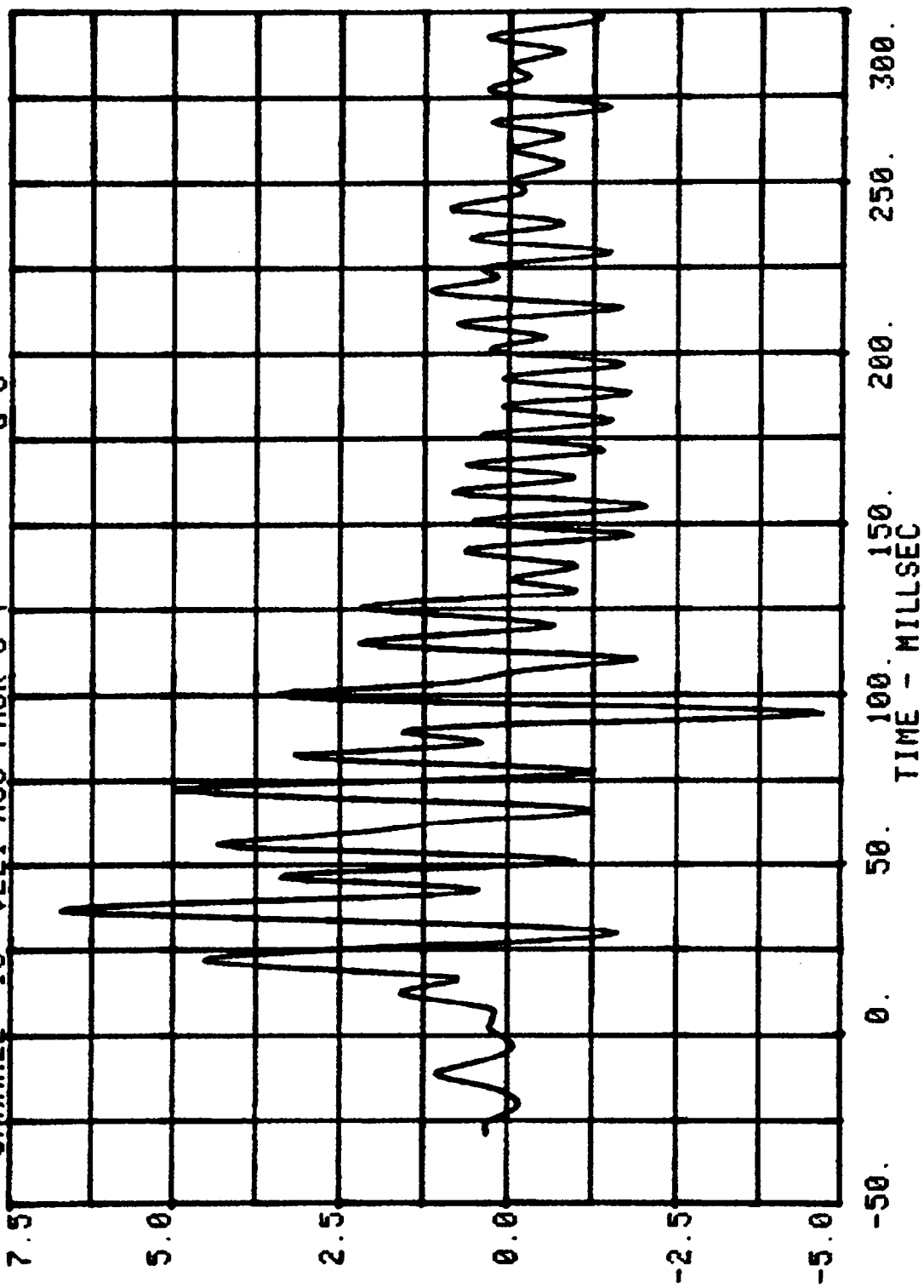
CHANNEL 12 VELOCITY RUN= 493 SERIES= 18 MPH VEH. #1 ACC. PACK 3 (X)



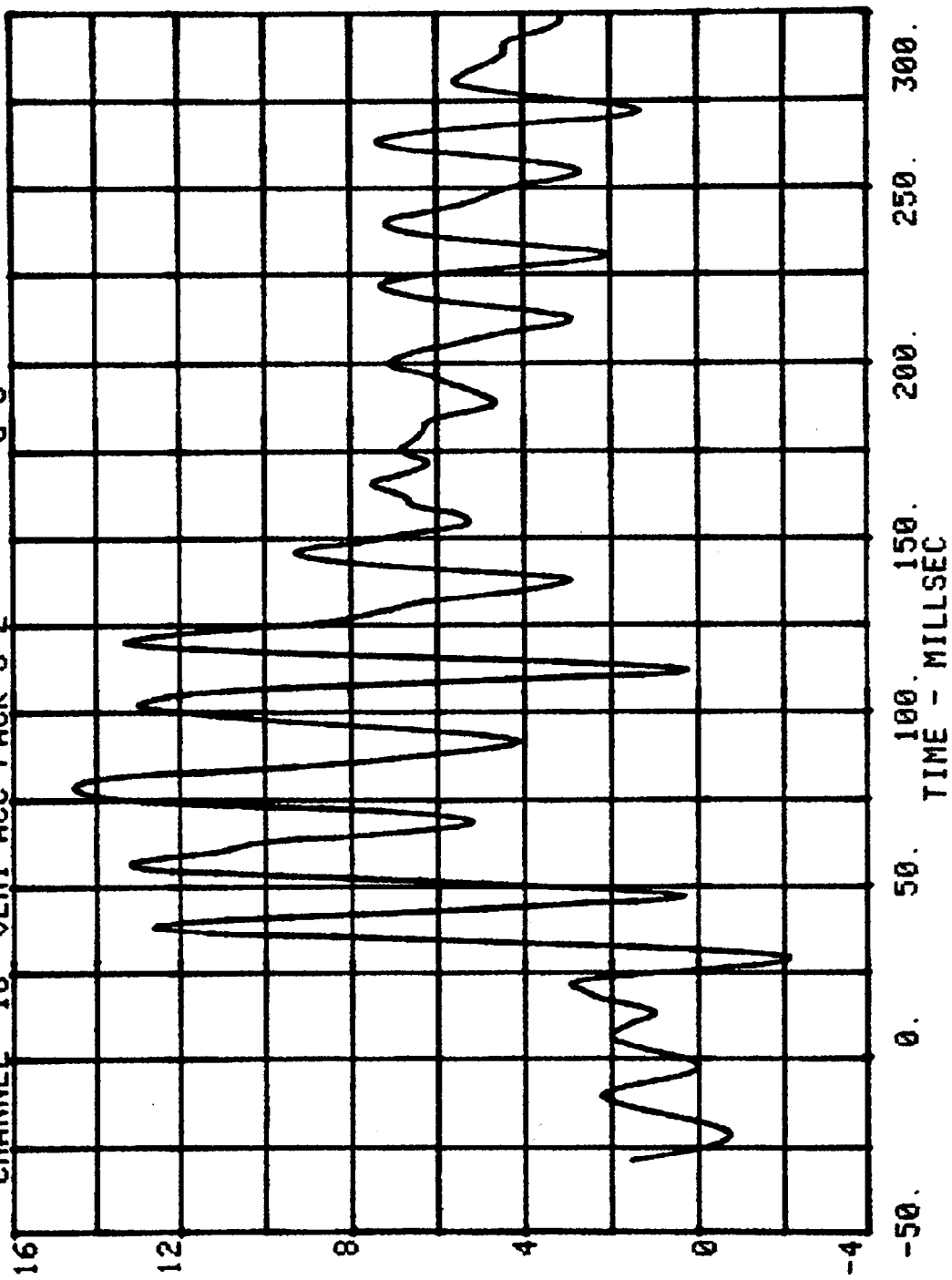
CHANNEL 13 DISPLACEMENT RUN= 493 SERIES= 18 INCHES VEH. #1 ACC. PACK 3 (X)

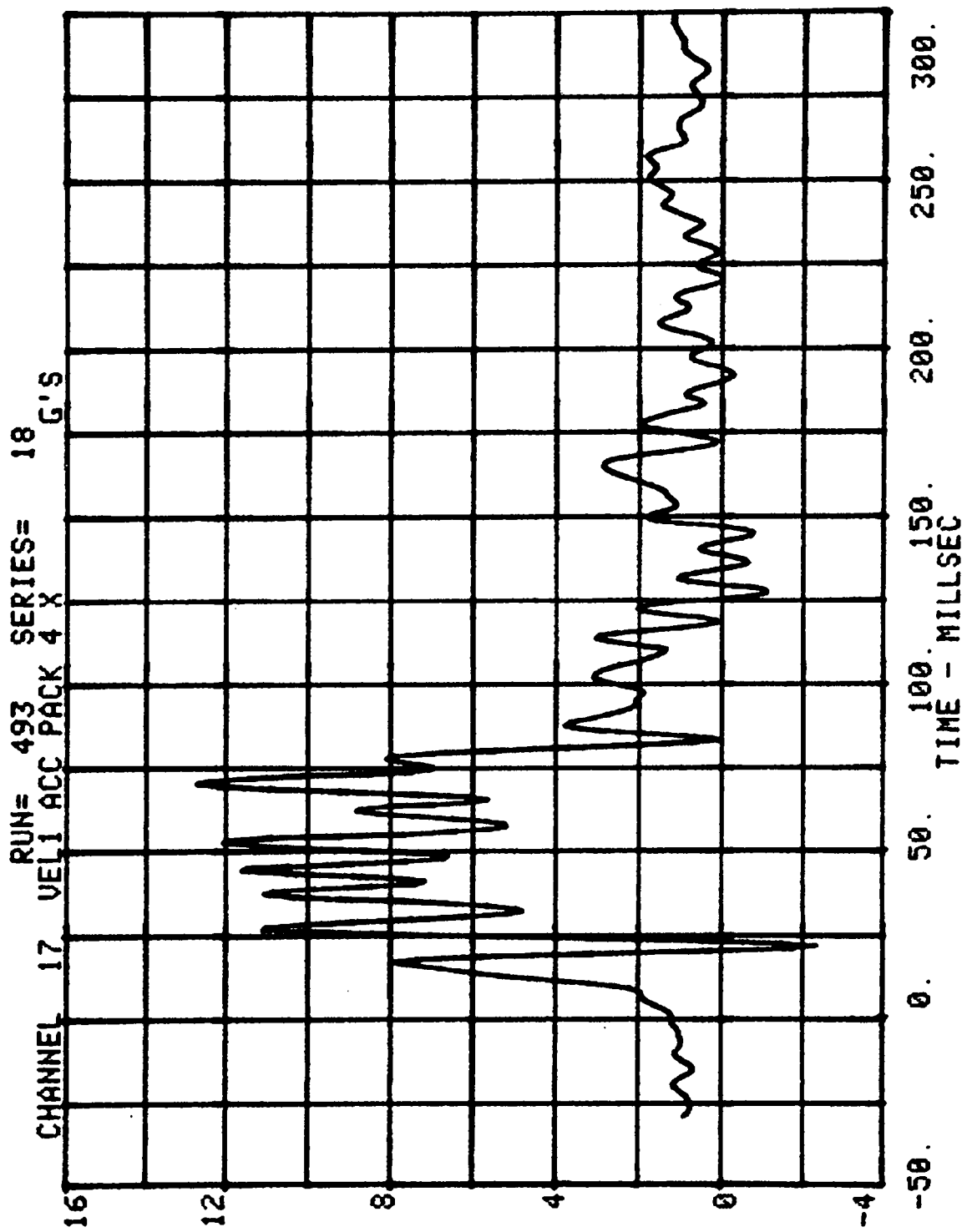


CHANNEL 15 VEL1 ACC PACK 3 Y RUN= 493 SERIES= 18 G'S

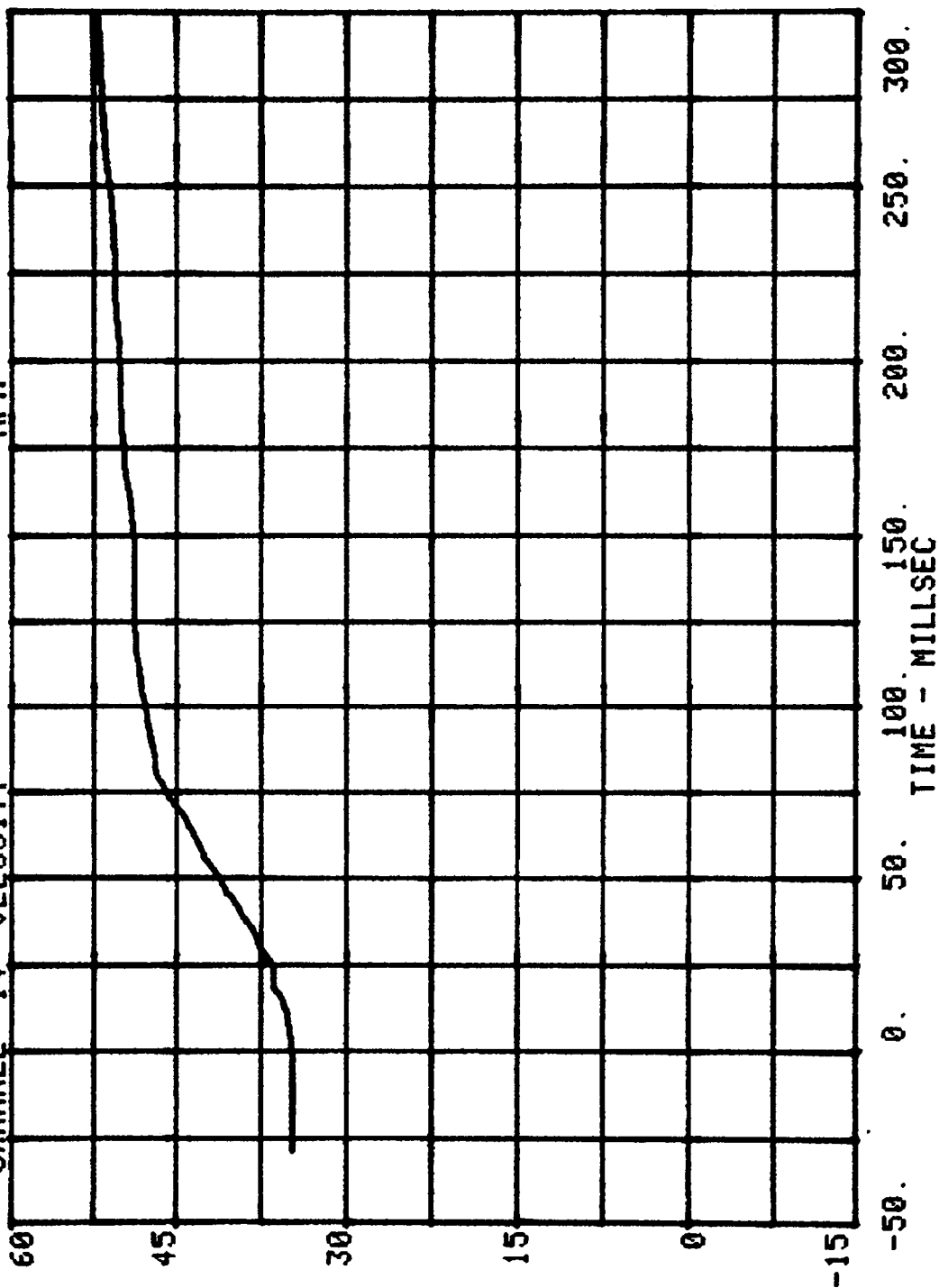


RUN= 493 SERIES= 18 G'S
CHANNEL 16 VEH1 ACC PACK 3 Z

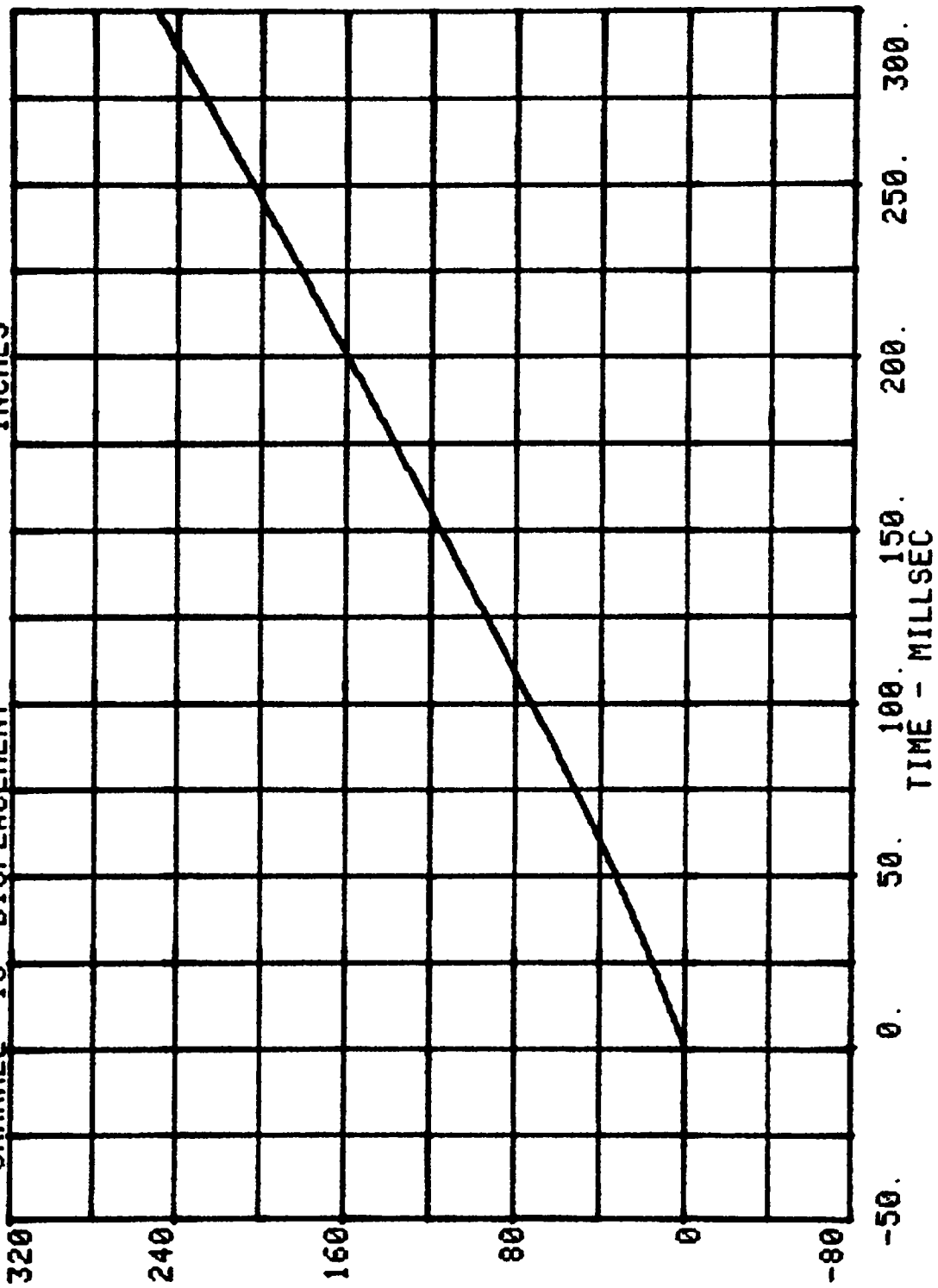




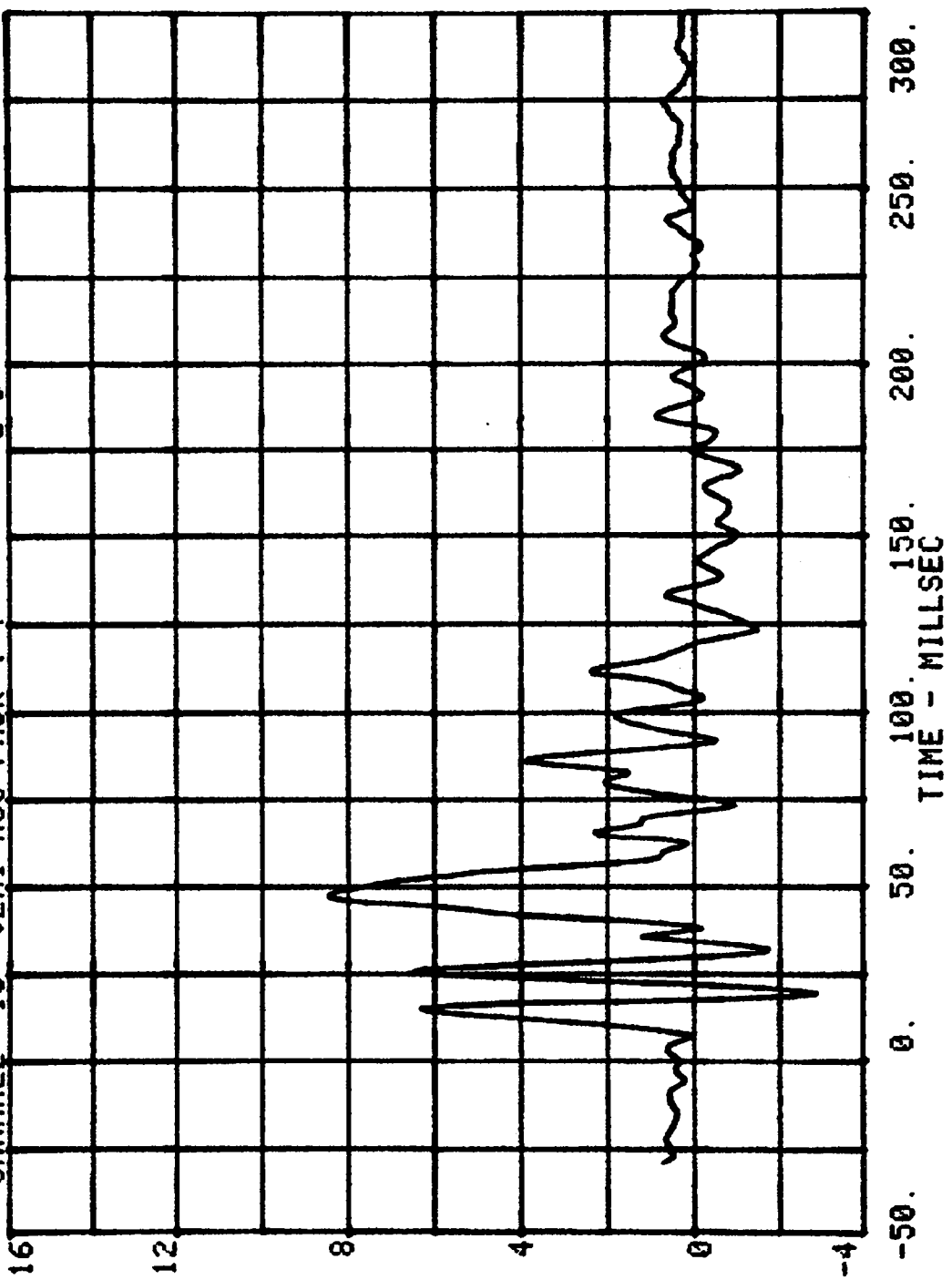
CHANNEL 14 VELOCITY RUN= 493 SERIES= 18 MPH
VEH. #1 ACC. PACK 4 (X)

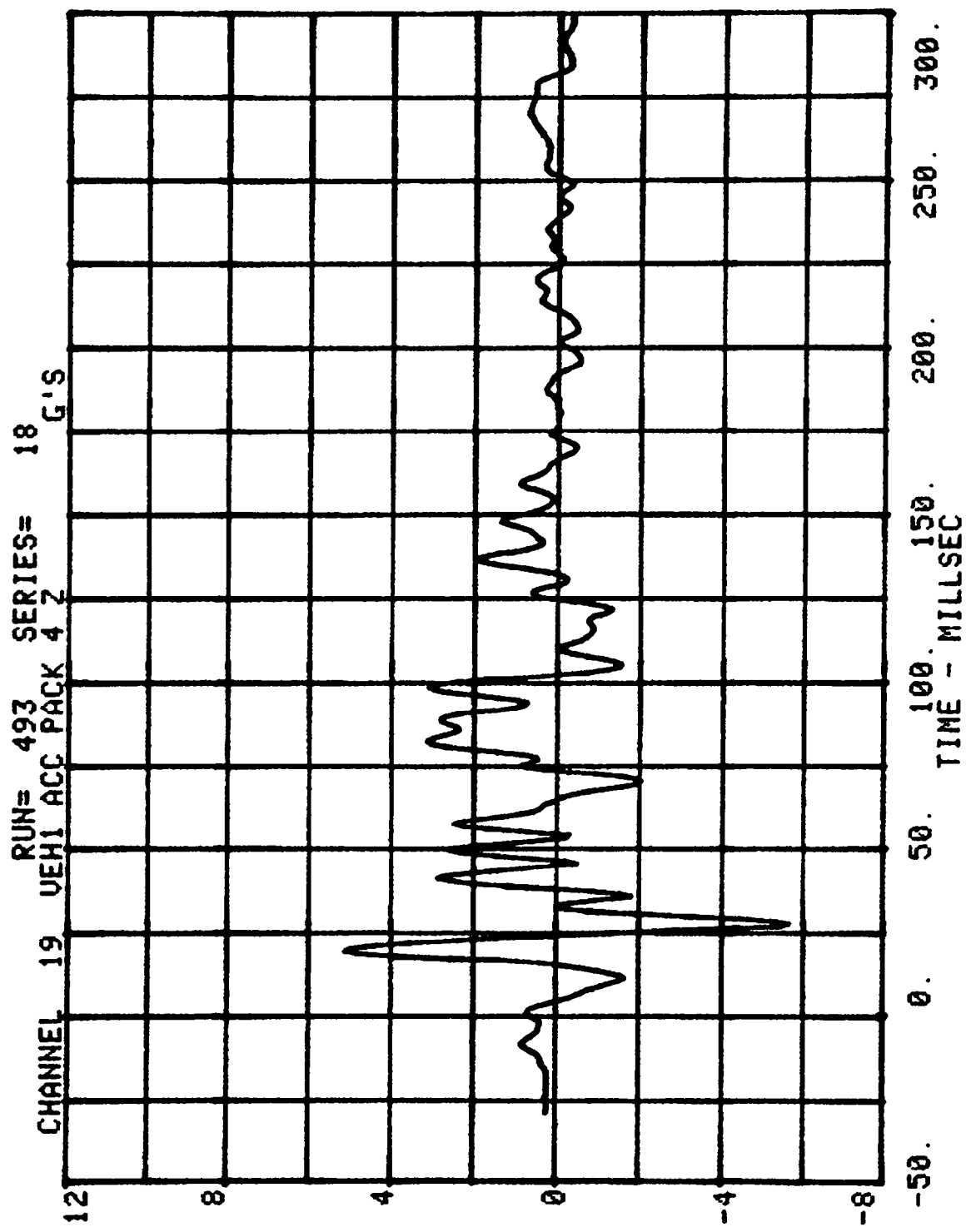


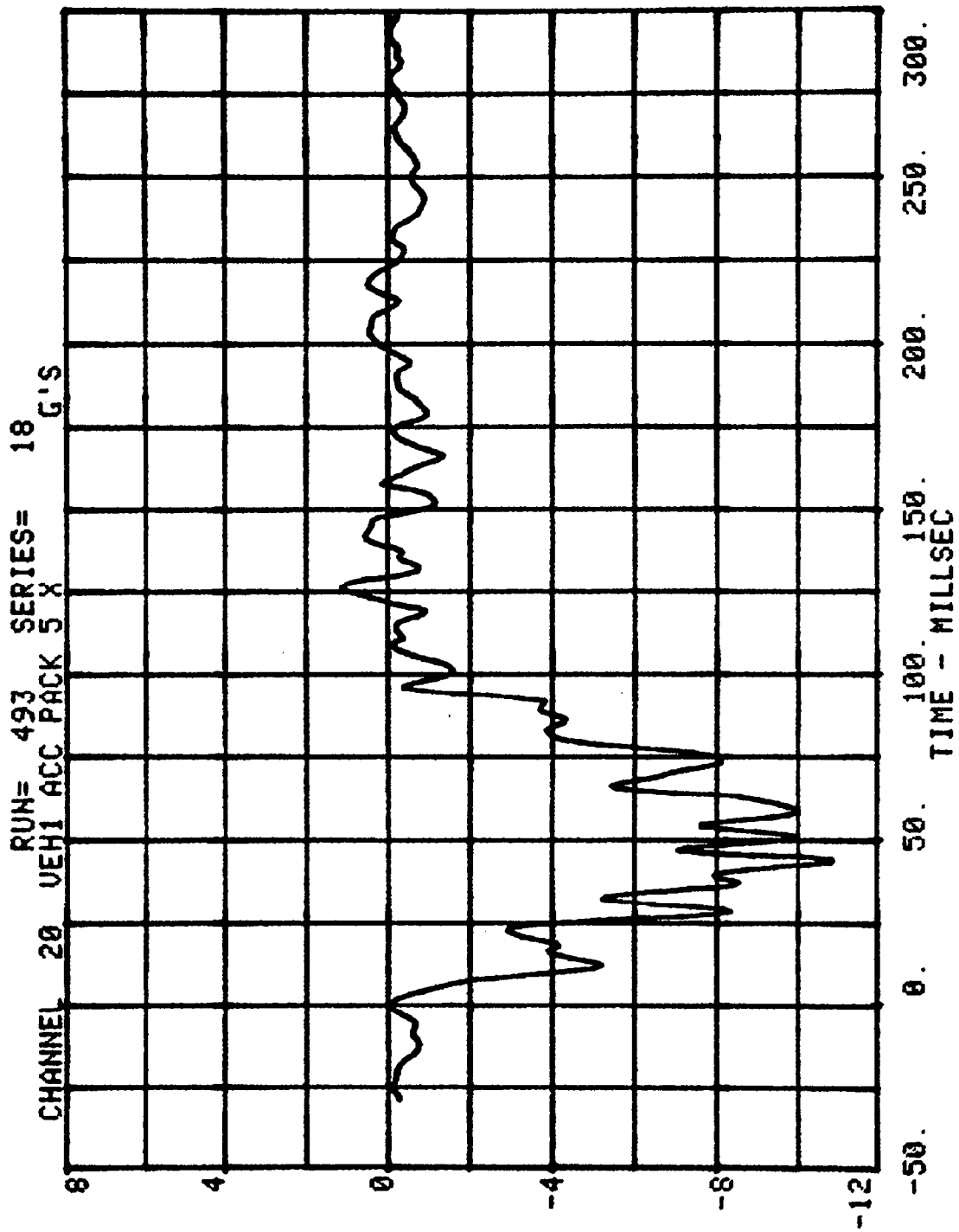
CHANNEL 15 DISPLACEMENT RUN= 493 SERIES= 18 INCHES VEH. #1 ACC. PACK #4 (X)

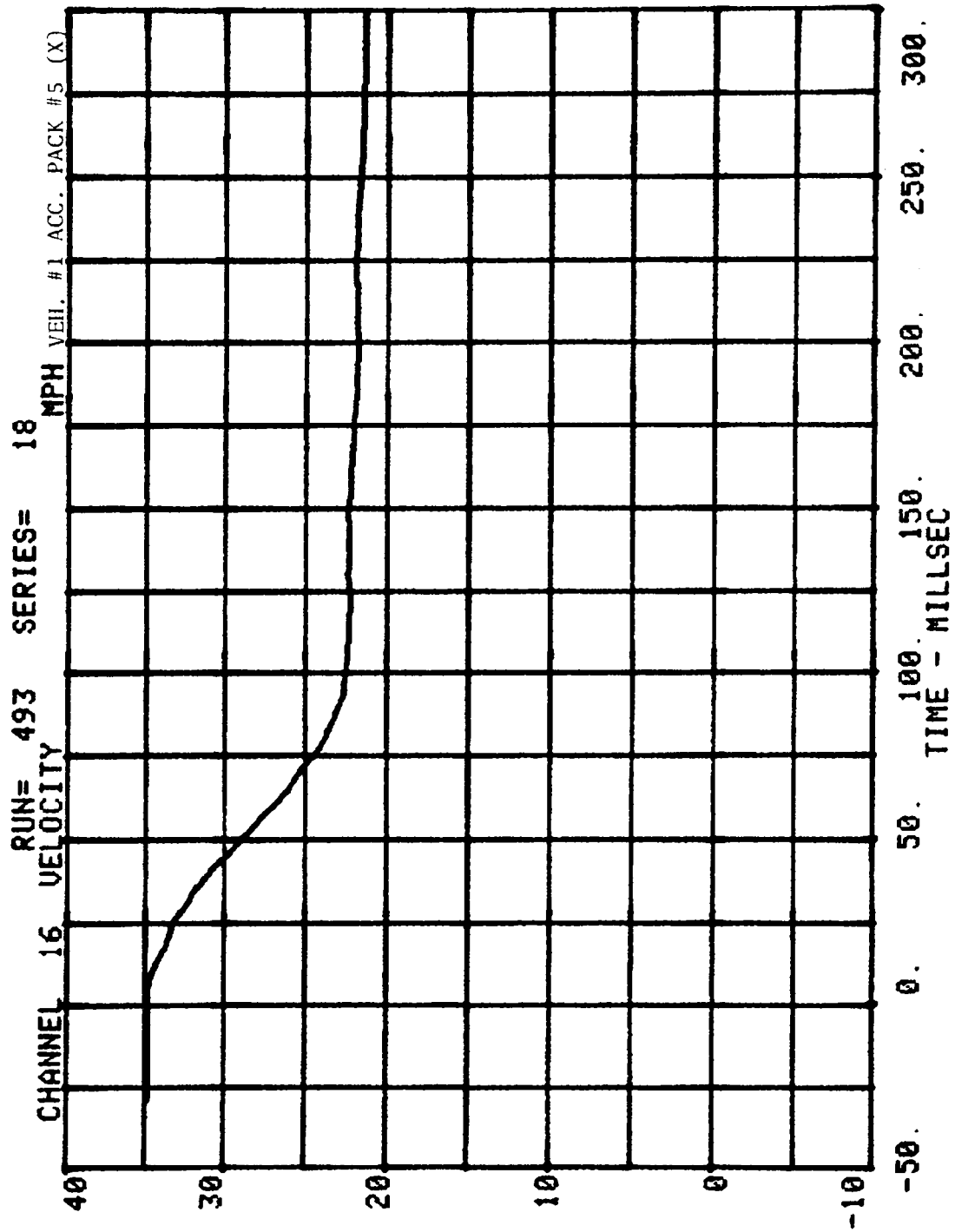


CHANNEL 18 VEHI ACC PACK 4 Y RUN= 493 SERIES= 18 G'S

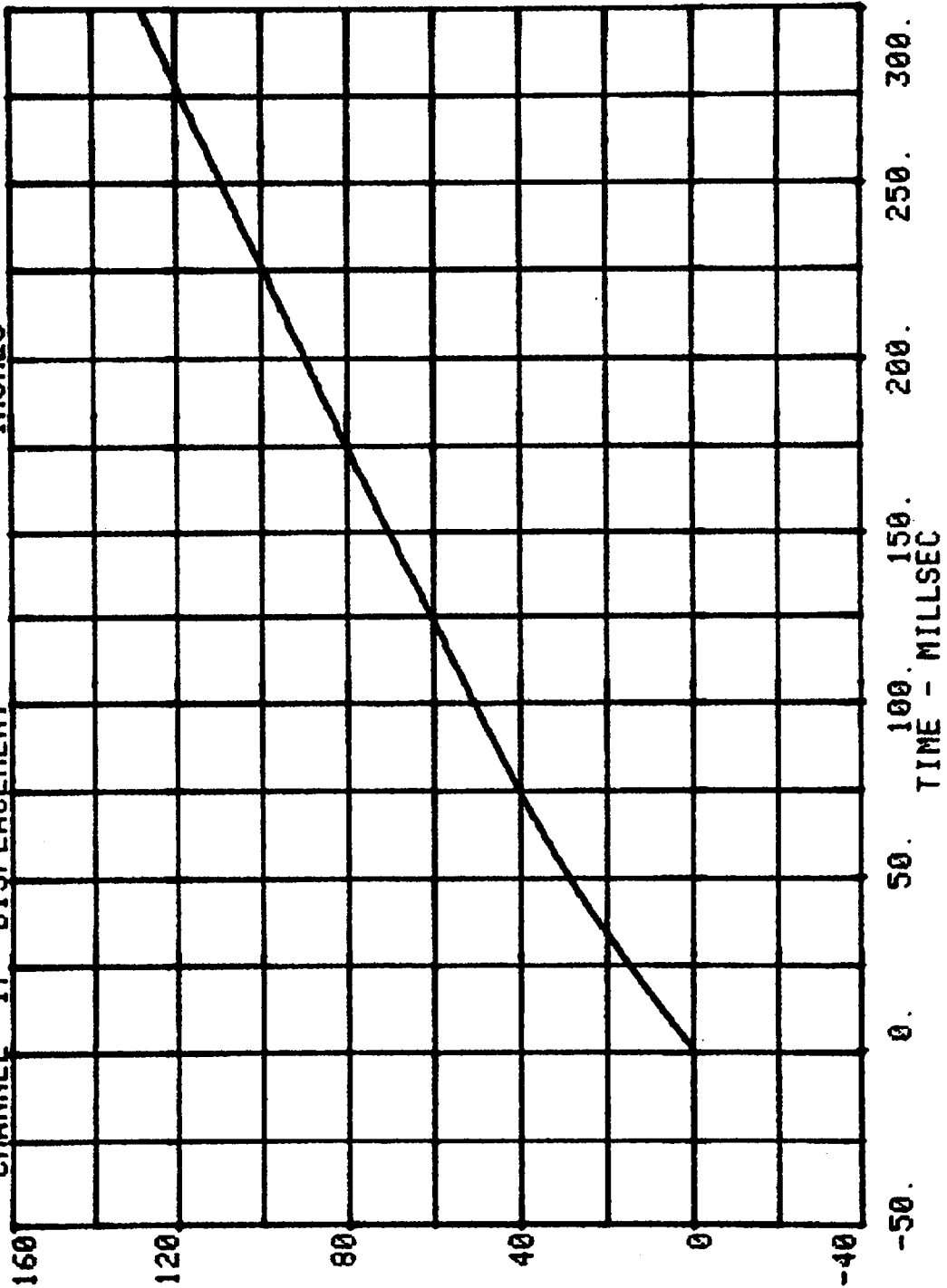




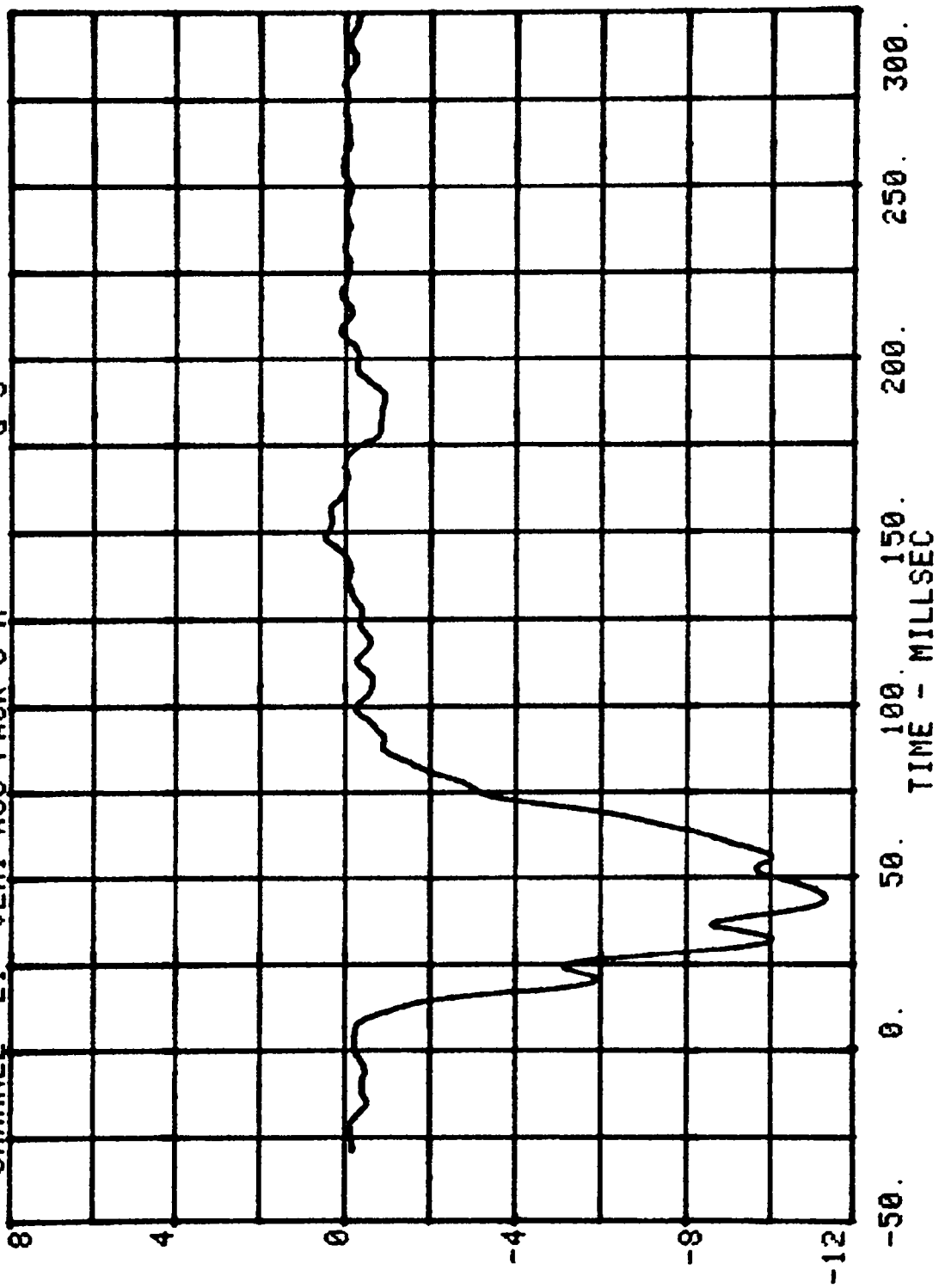


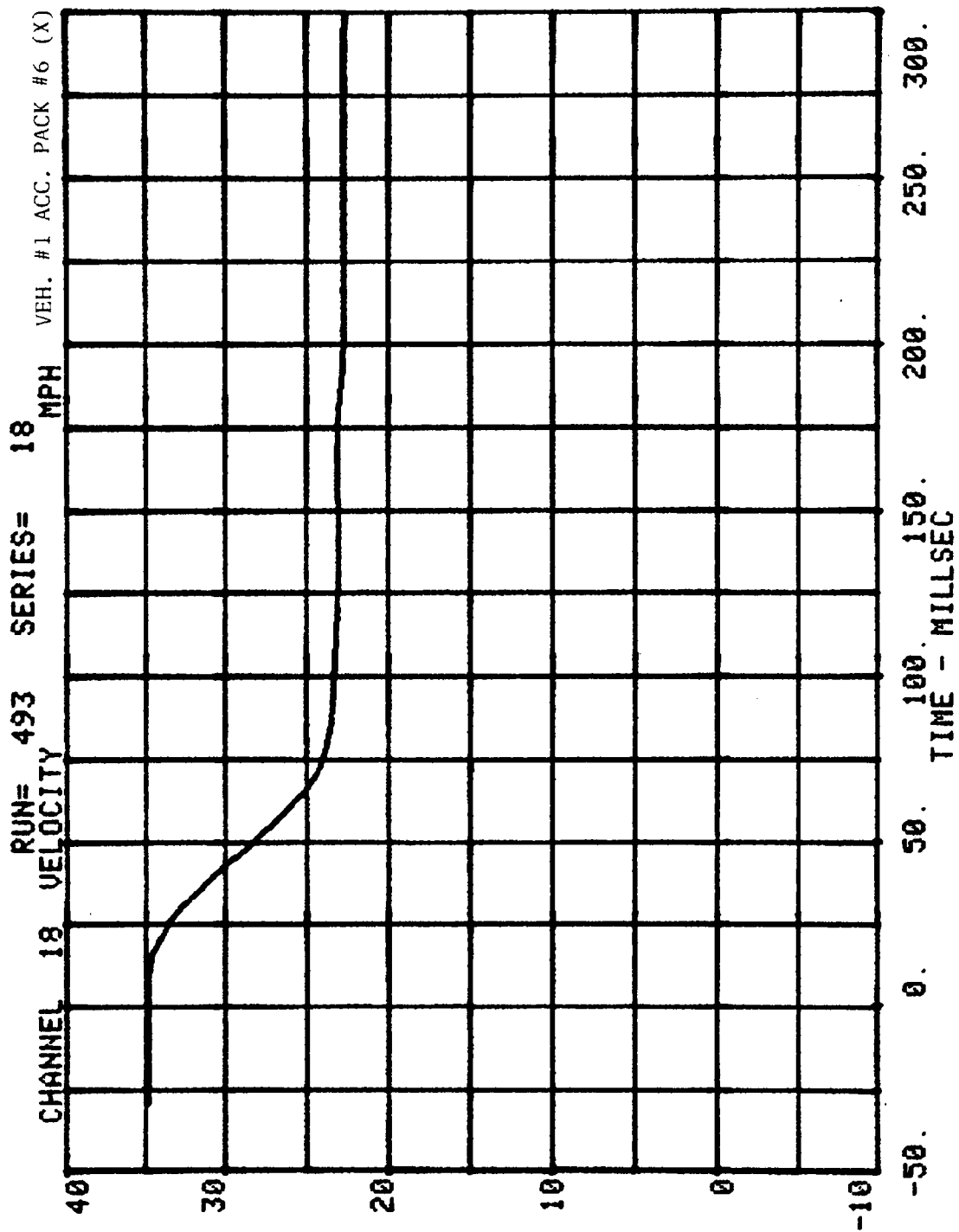


CHANNEL 17 DISPLACEMENT RUN= 493 SERIES= 18 INCHES VEH. #1 ACC. PACK #5 (X)

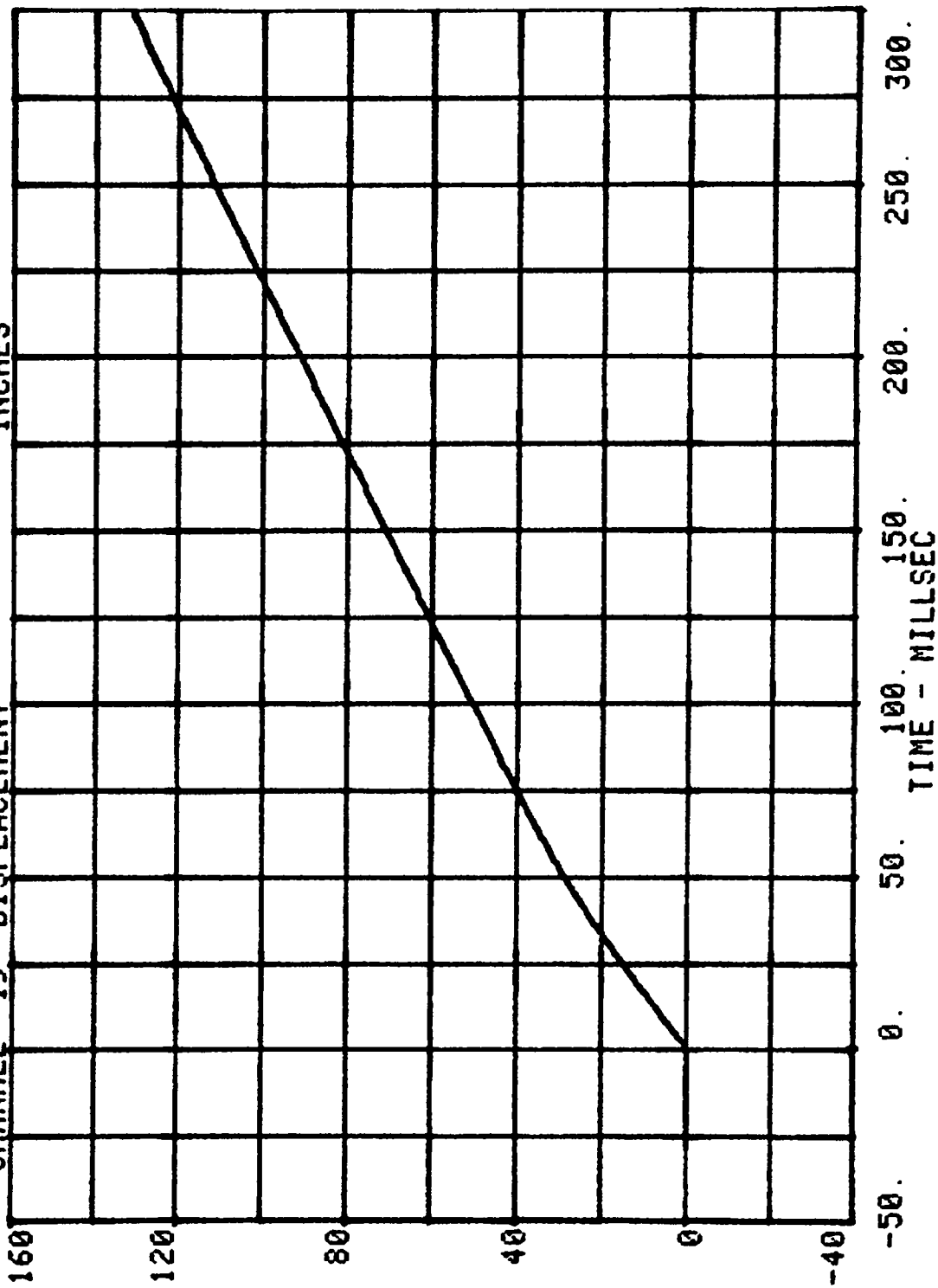


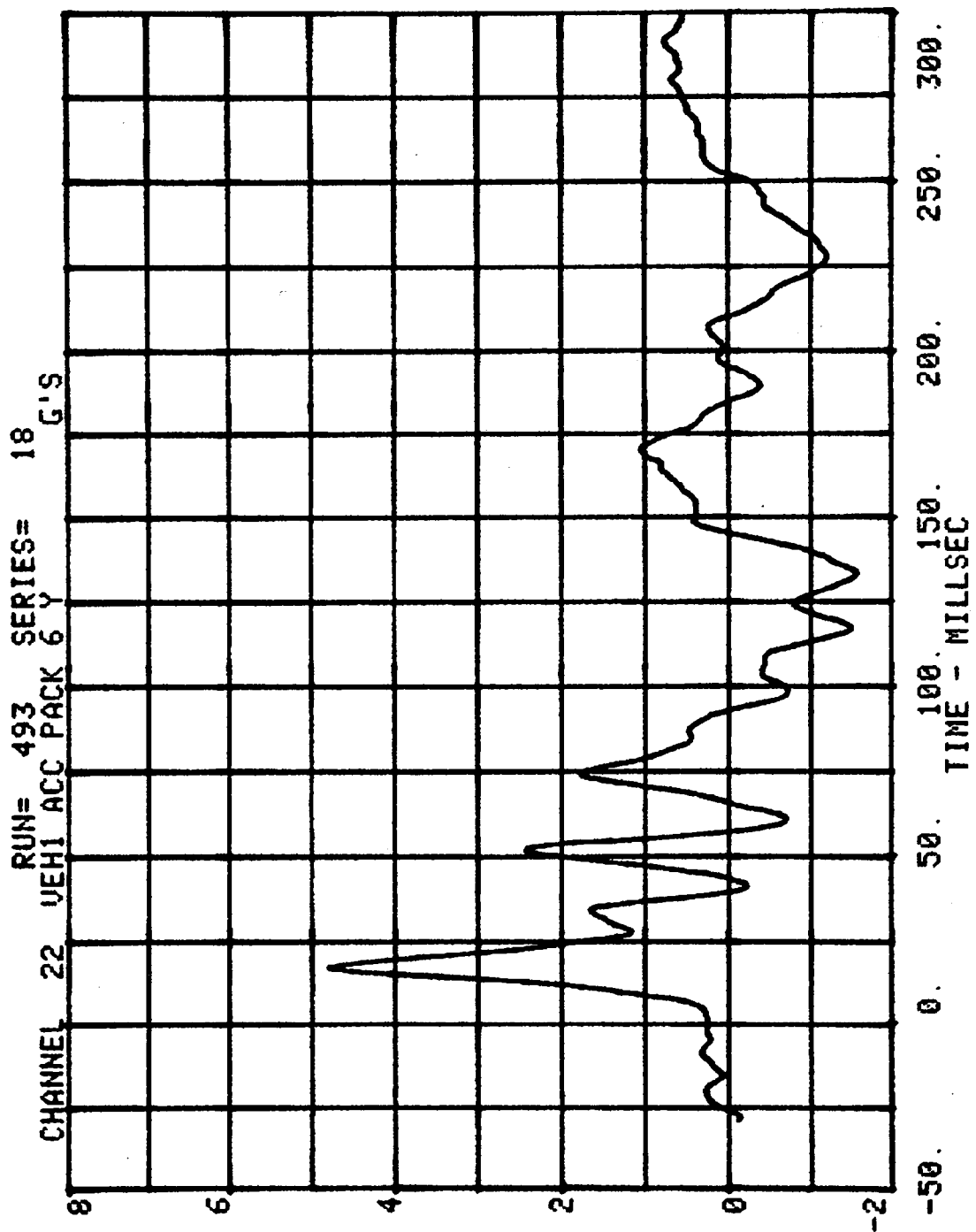
CHANNEL 21 RUN= 493 SERIES= 18 G'S
VEH1 ACC PACK 6 X

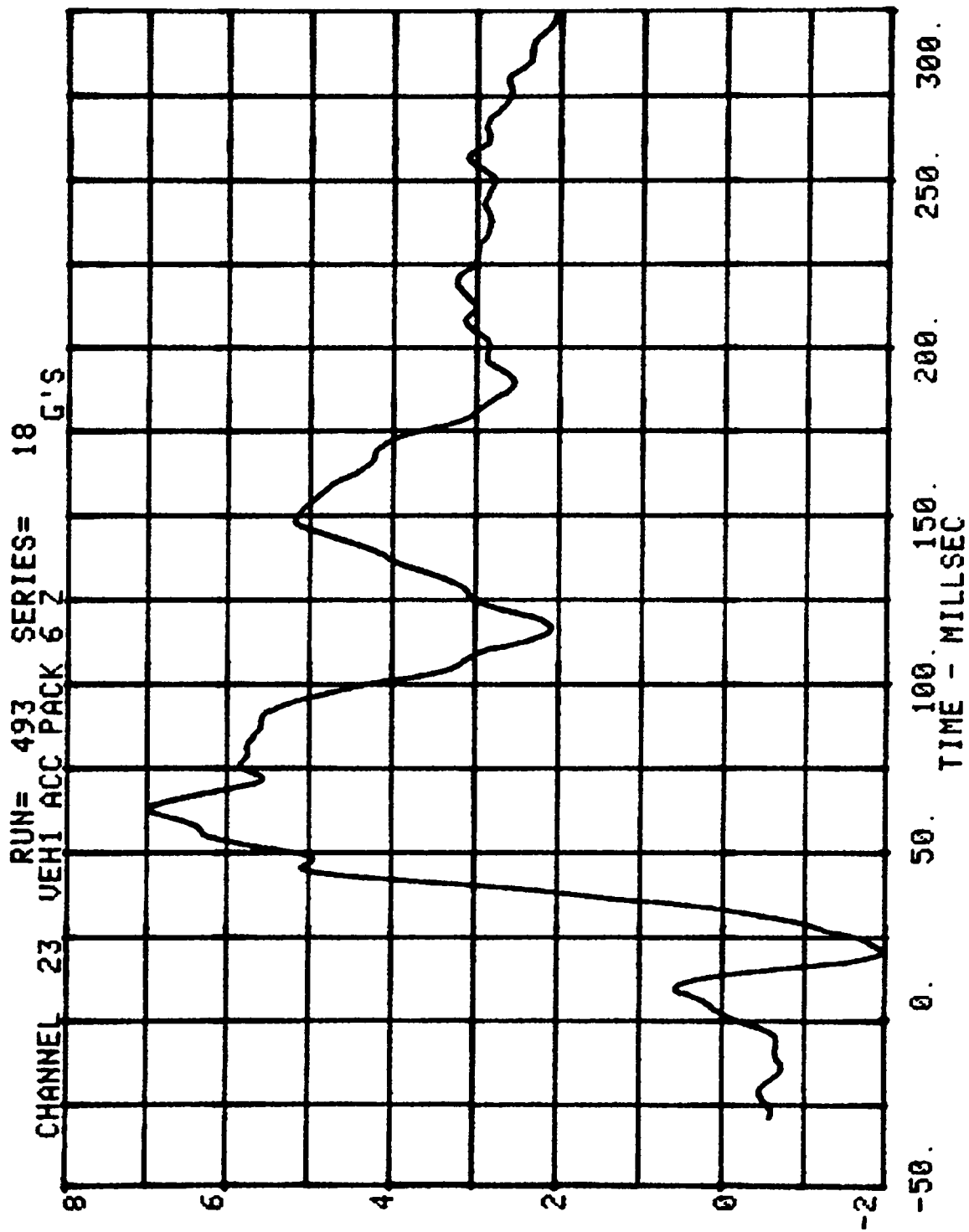




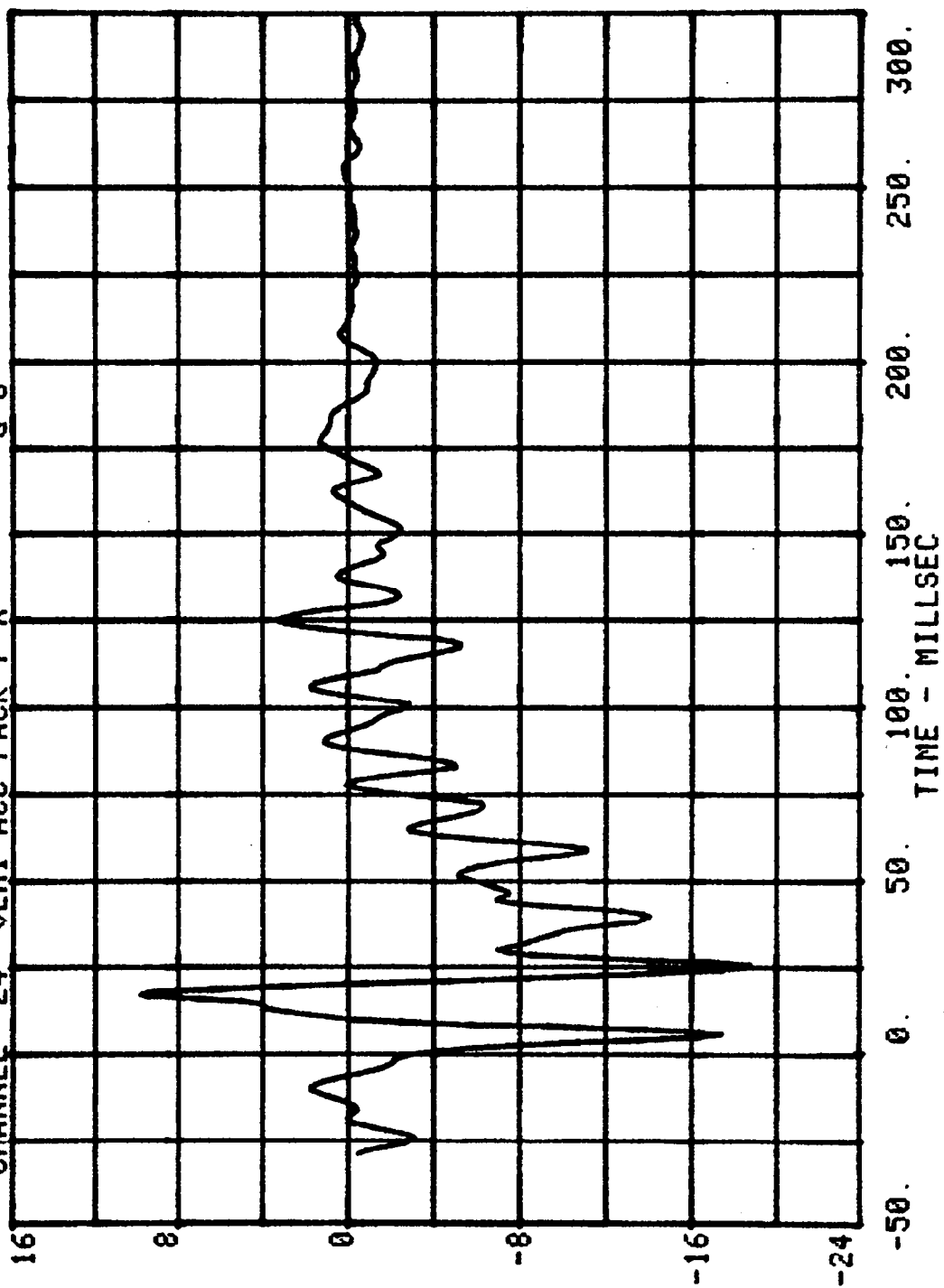
RUN= 493 SERIES= 18 INCHES
CHANNEL 19 DISPLACEMENT VEH. #1 ACC. PACK #6 (X)

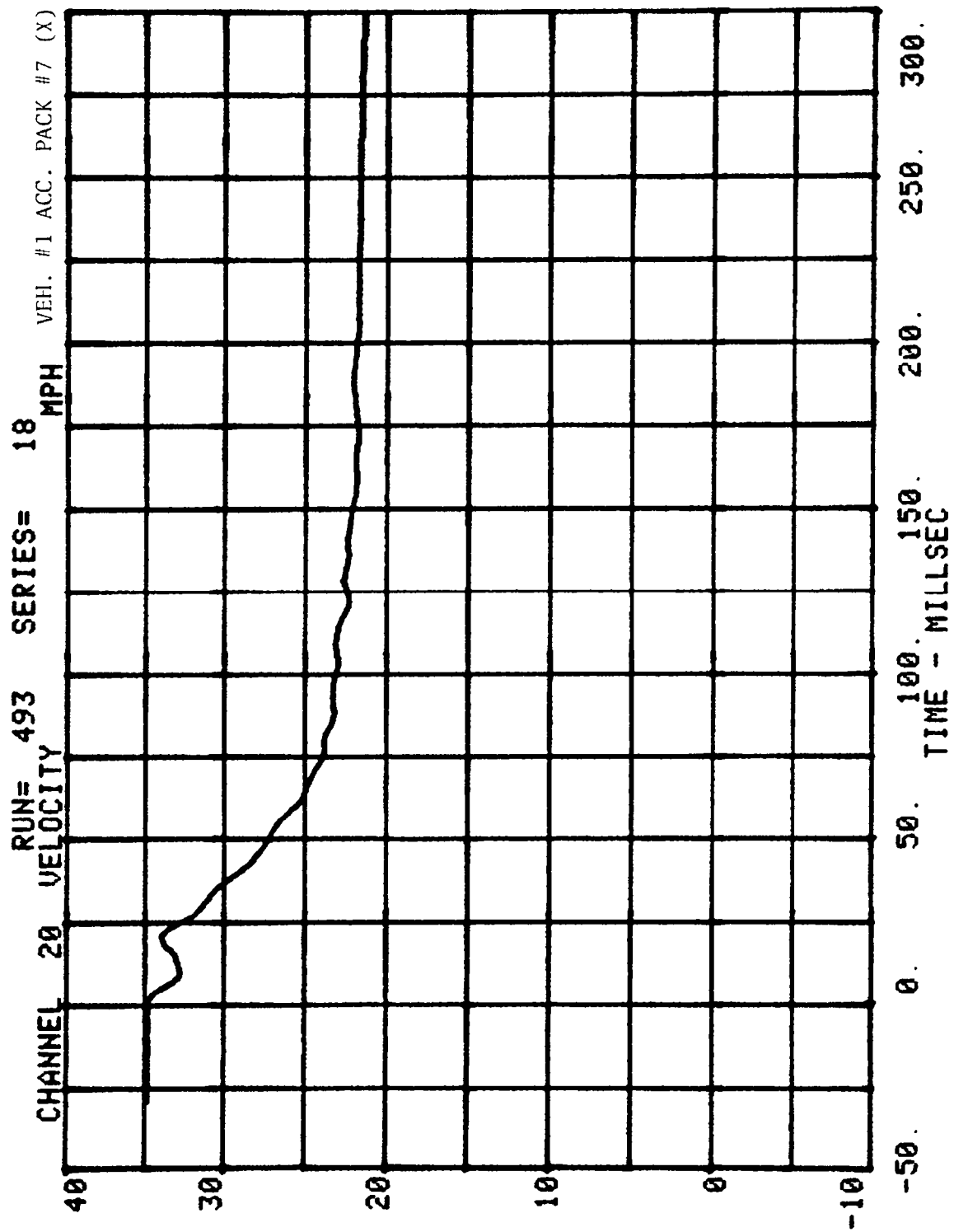




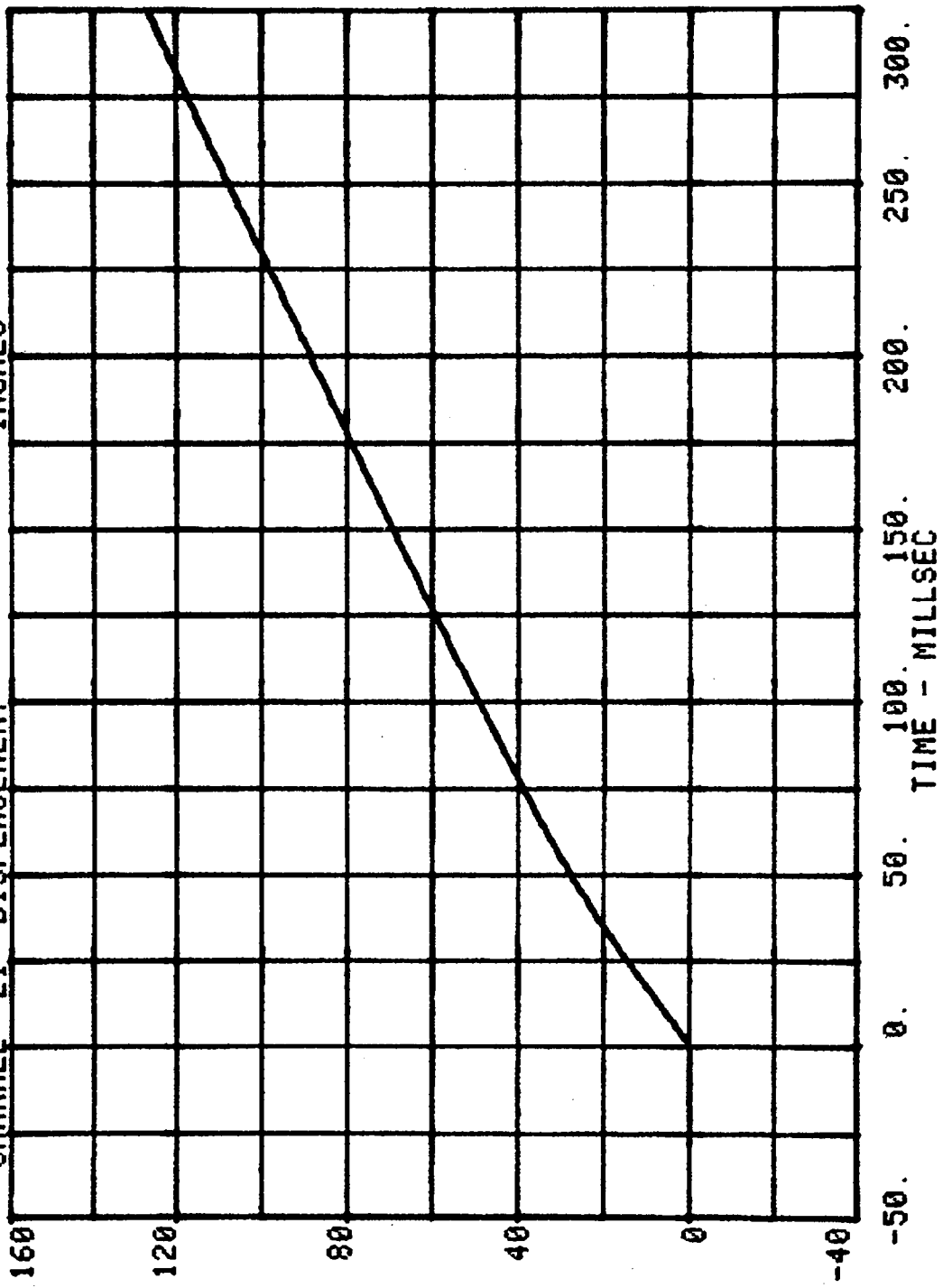


CHANNEL 24 RUN= 493 SERIES= 18
VEH1 ACC PACK 7 X G'S

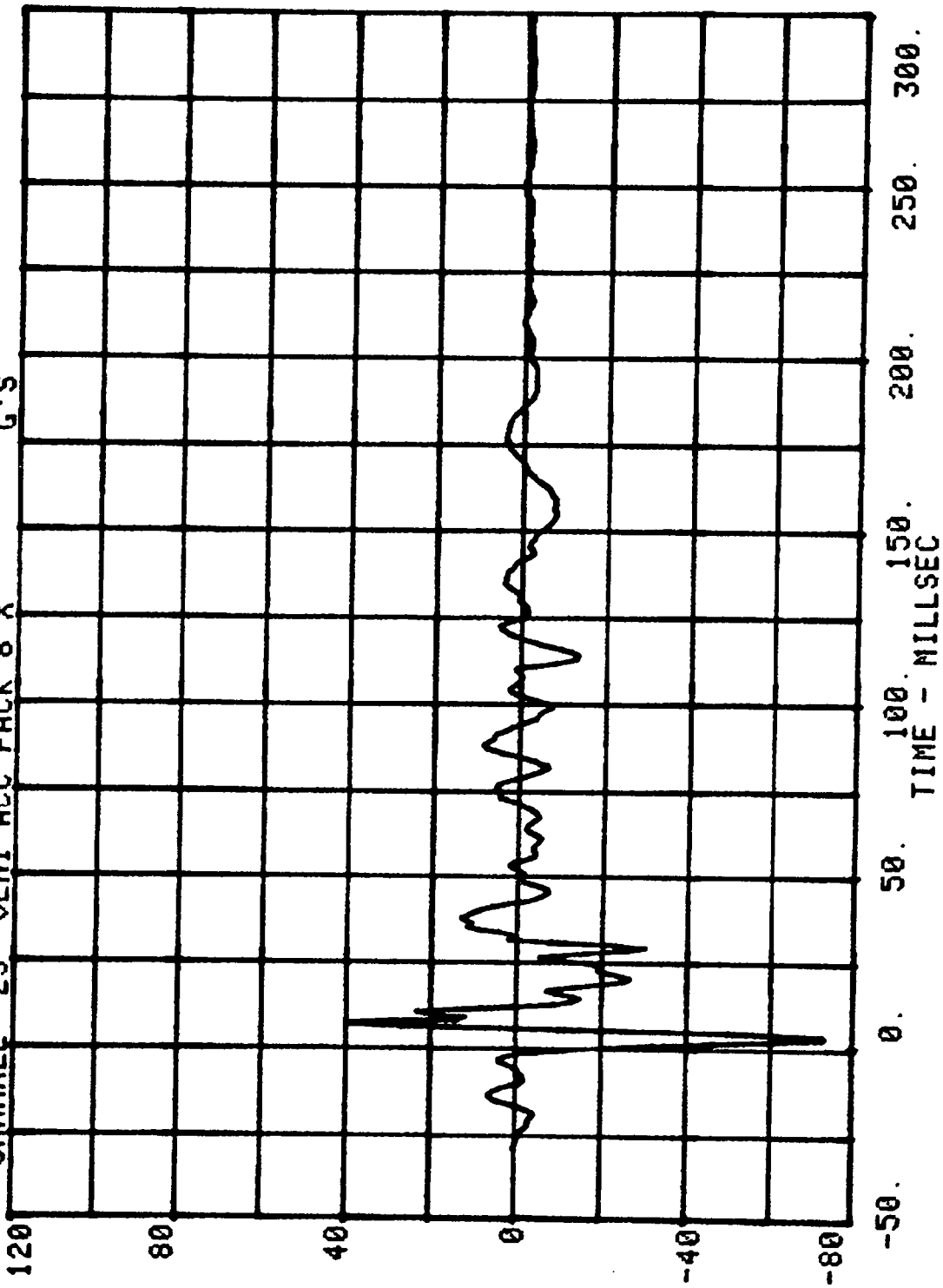


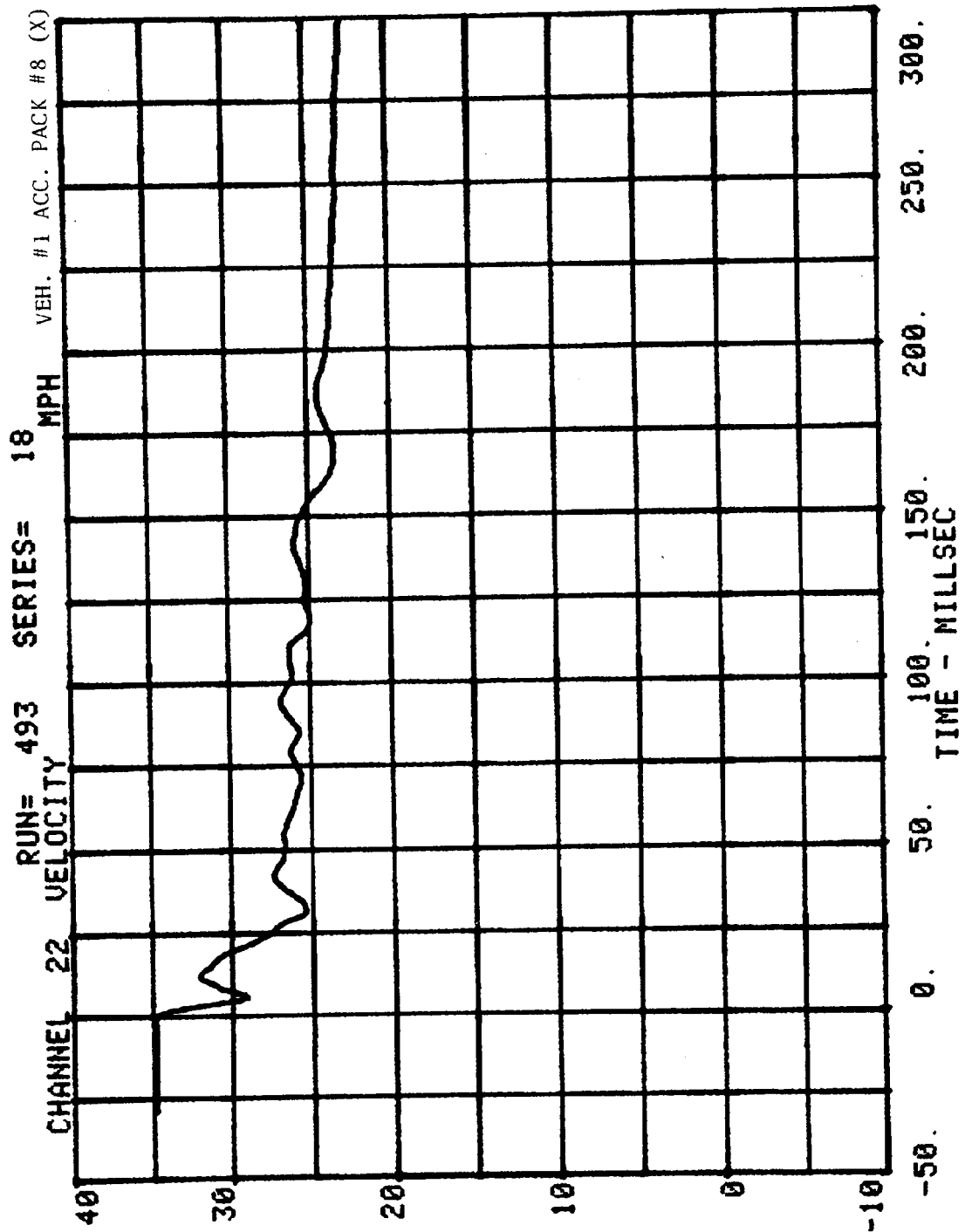


RUN= 493 SERIES= 18 INCHES VEIL. #1 ACC. PACK #7 (X)
CHANNEL 21 DISPLACEMENT

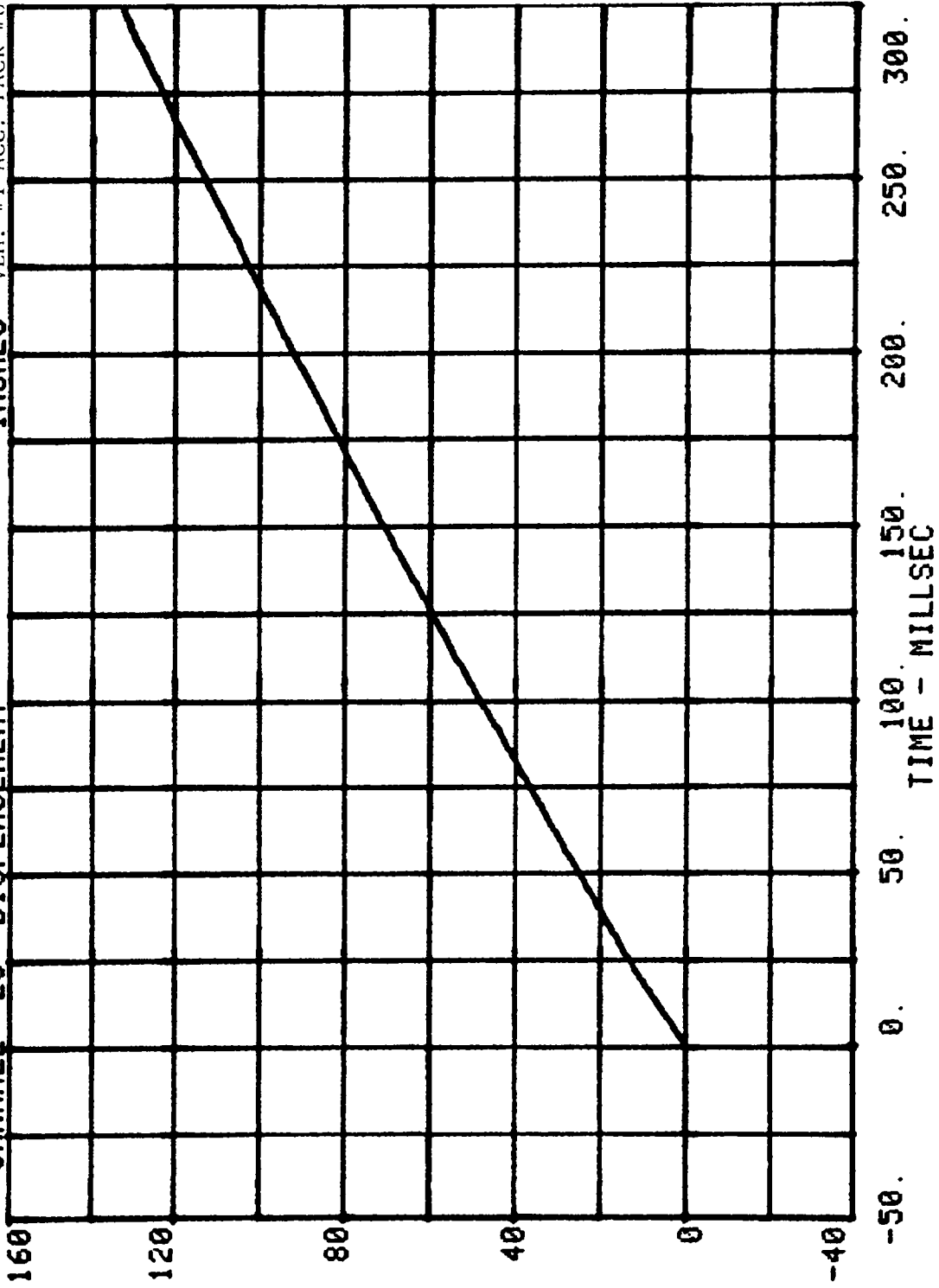


CHANNEL 25 RUN= 493 SERIES= 18 G'S
VEH1 ACC PACK 8 X

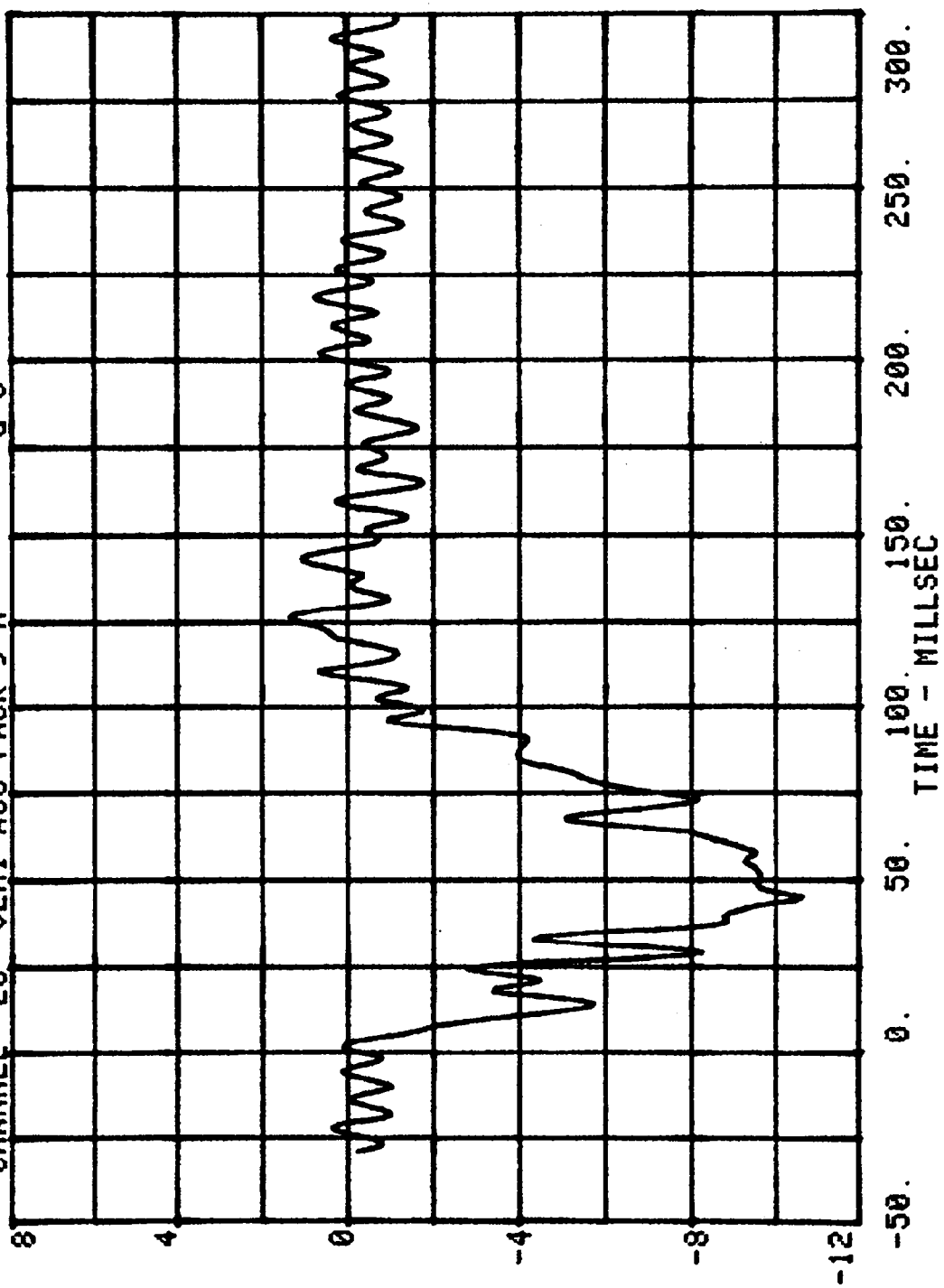




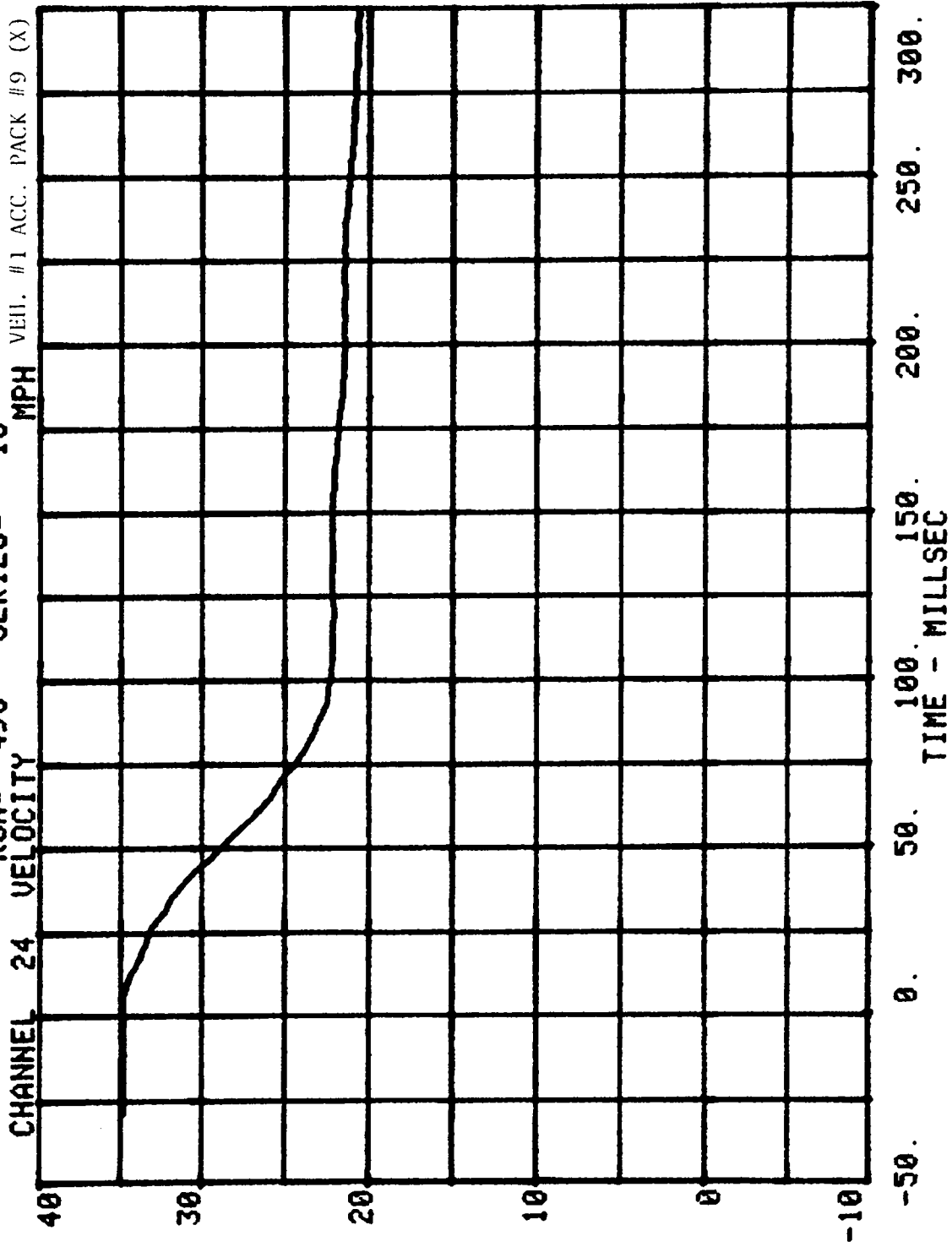
CHANNEL 23 DISPLACEMENT RUN= 493 SERIES= 18 INCHES VEH. #1 ACC. PACK #8 (X)



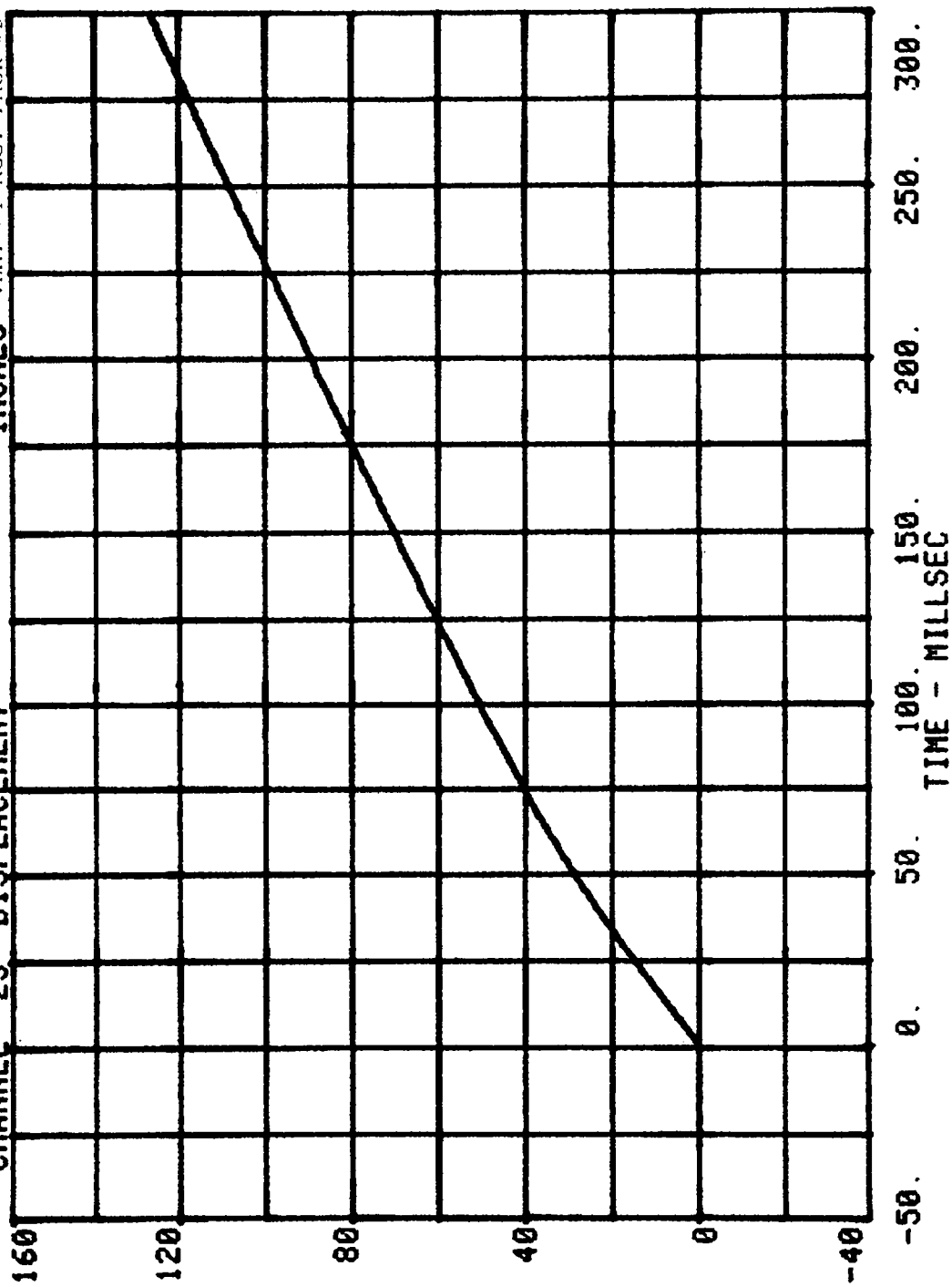
RUN= 493 SERIES= 18 G'S
CHANNEL 26 VEH1 ACC PACK 9 X

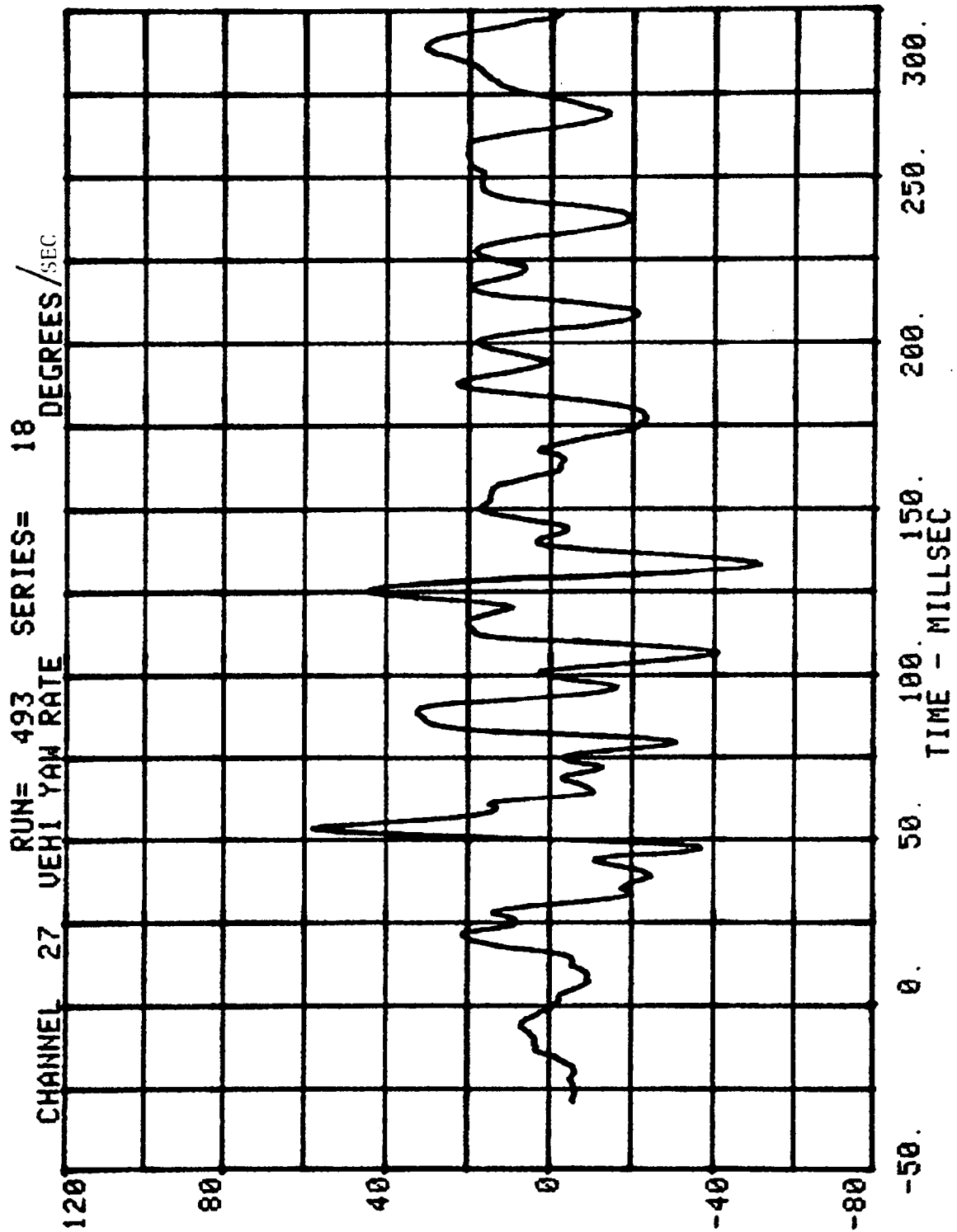


RUN= 493 SERIES= 18 MPH VEIL. #1 ACC. PACK #9 (X)



RUN= 493 SERIES= 18 INCHES VEIL. #1 ACC. PACK #9 (X)
CHANNEL 25 DISPLACEMENT





Test No. 17
Vehicle 1 - 1978 Chevrolet Impala
Dummy Data

	Filter Channel Class
Head Accelerations	1000
Chest	180
Femur	600

HEAD INJURY CRITERION
HEAD SEVERITY INDEX

SIDE IMPACT CAR TO CAR BUDD #17

RUN= 493

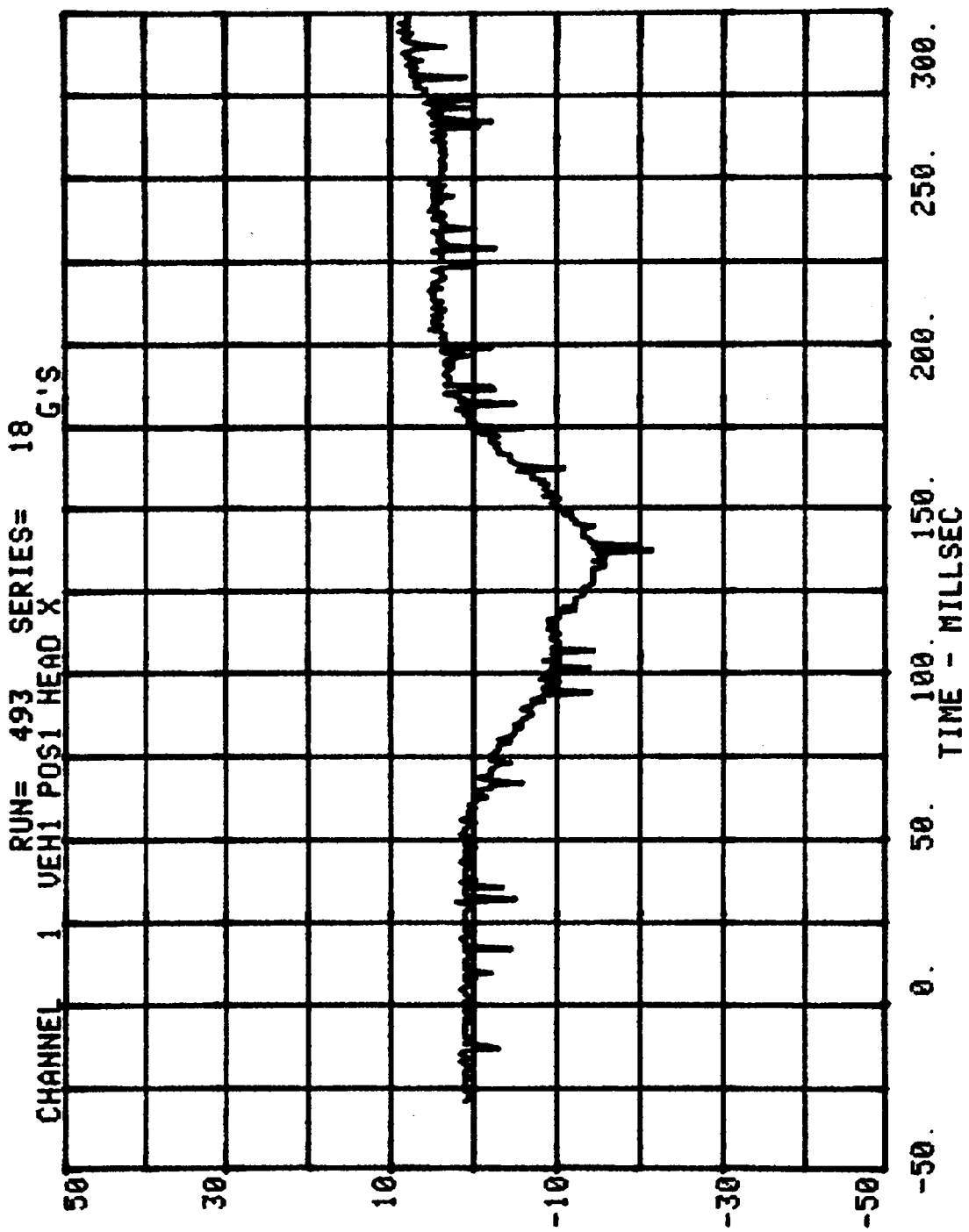
VEH #1 POS #1 HEAD R

HIC= 44.3 FROM T1= .08100 TO T2= .16110

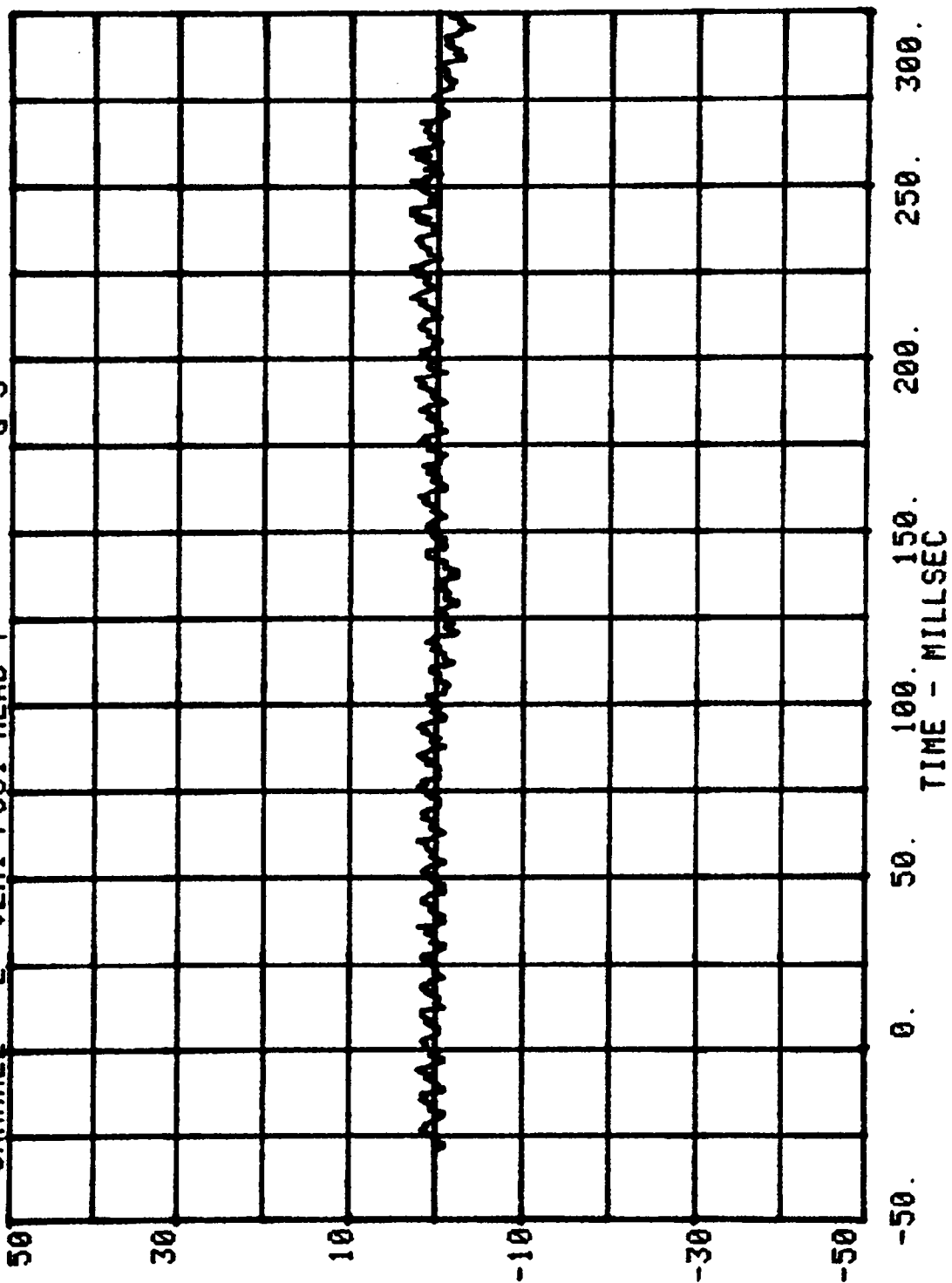
AVERAGE ACCELERATION BETWEEN T1 AND T2= 12.5G'S

EVENT TIME= 300.0 MSEC

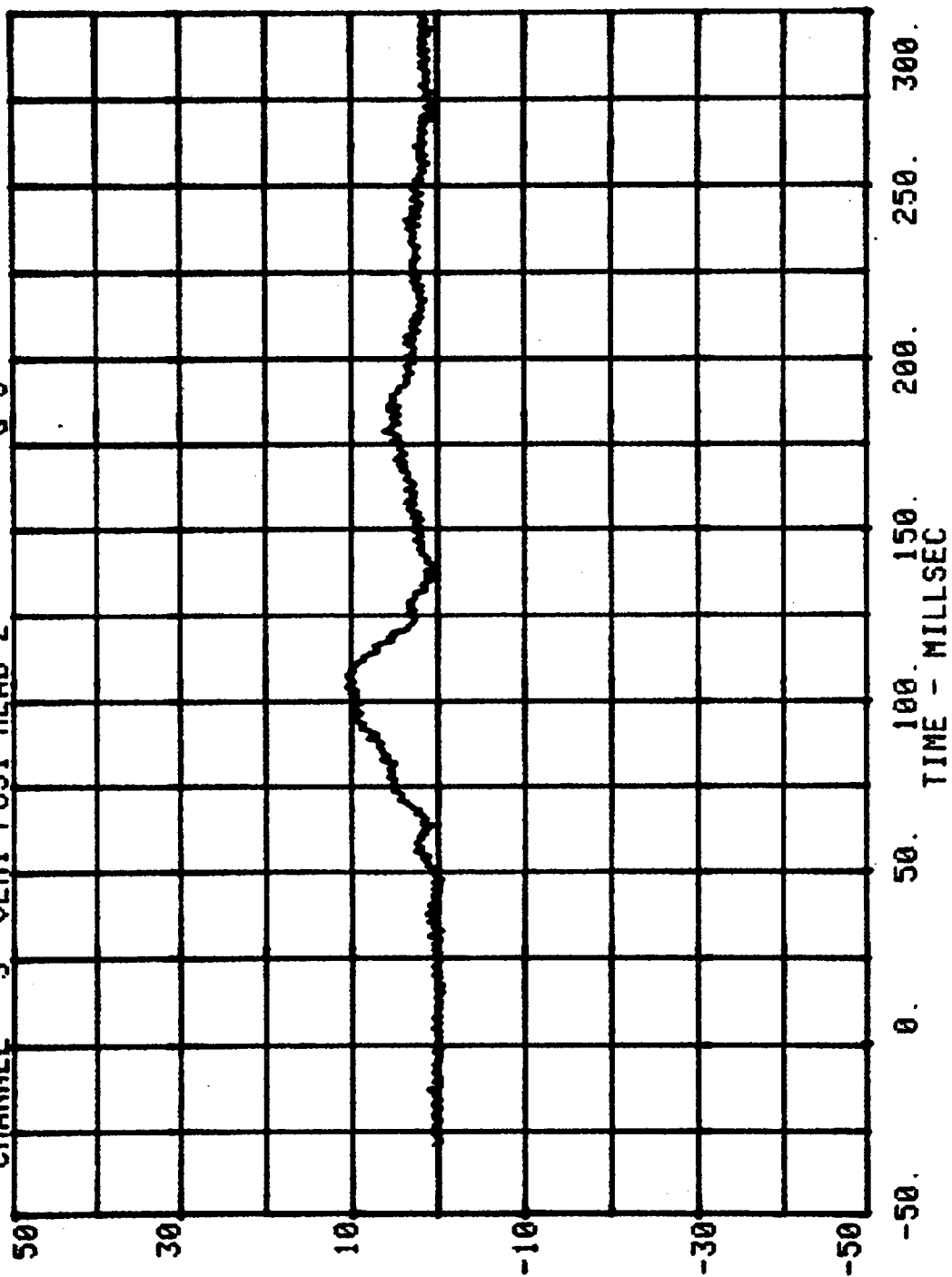
SEVERITY INDEX= 60.9



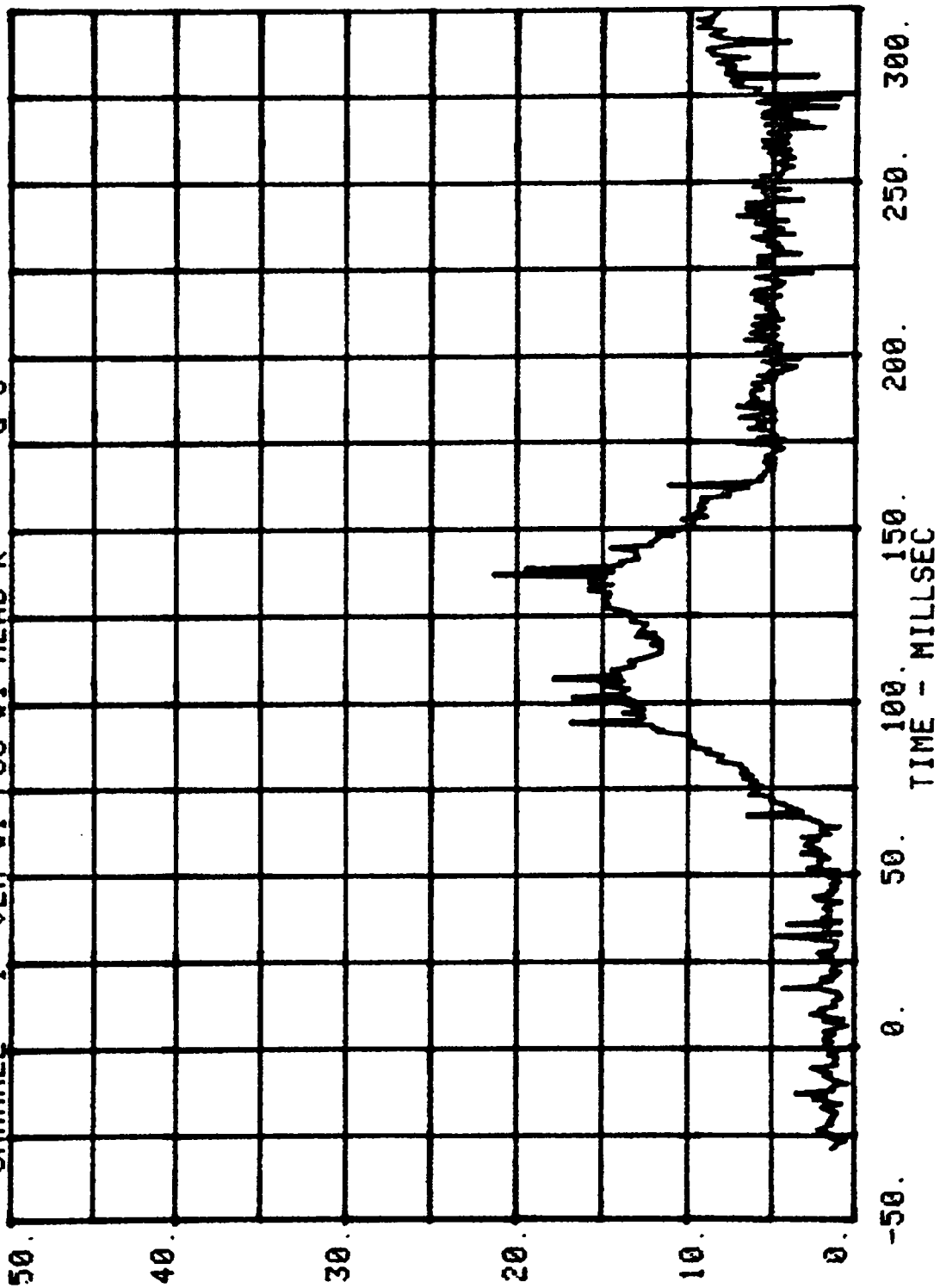
RUN= 493 SERIES= 18
CHANNEL 2 VEH1 POS1 HEAD Y G'S



CHANNEL 3 RUN= 493 SERIES= 18
VEH1 POS1 HEAD 2 G'S



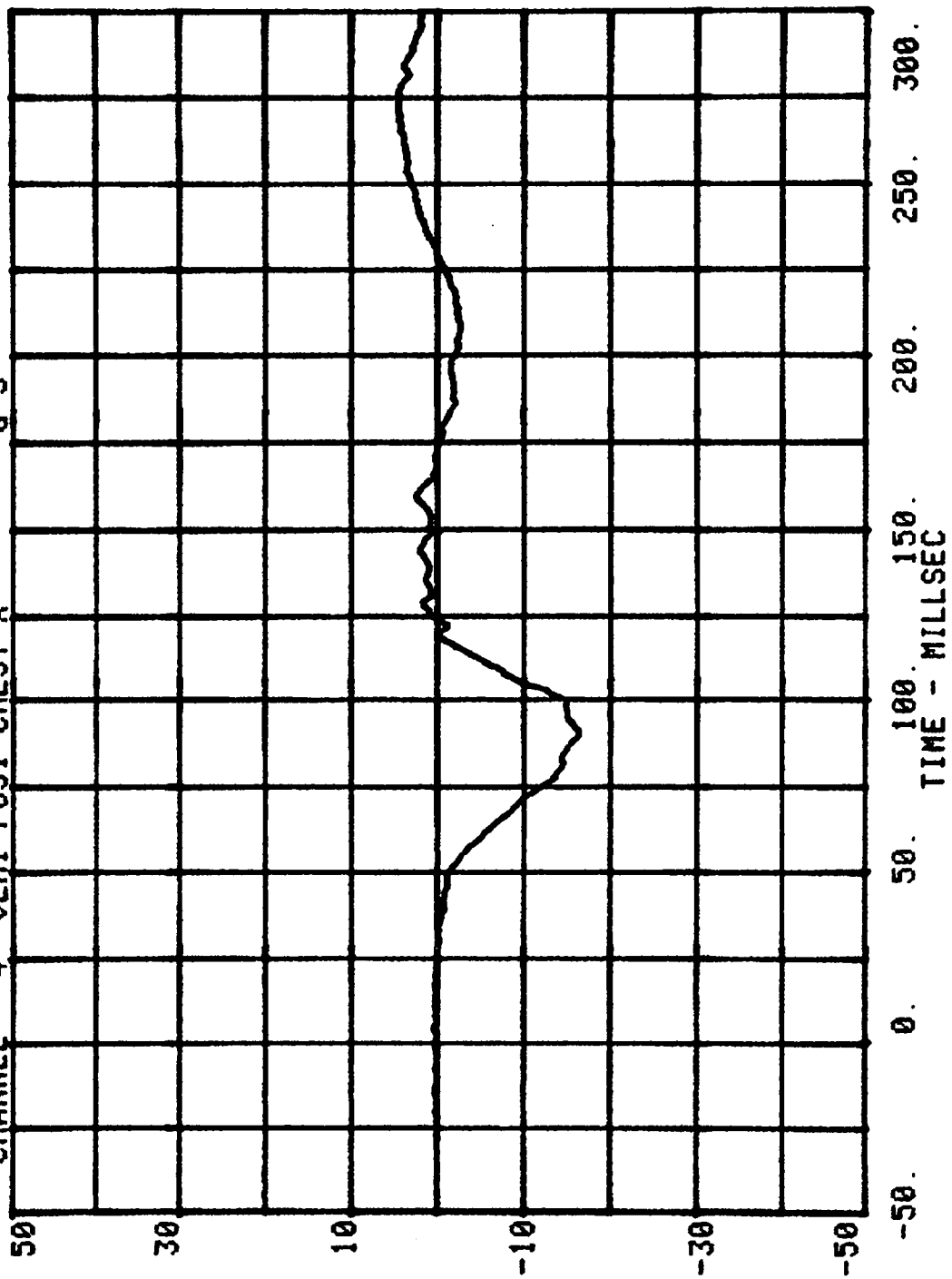
CHANNEL 1 RUN= 493 SERIES= 18
VEH #1 POS #1 HEAD R G'S



CHANNEL 4 VEH1 POS1 CHEST X

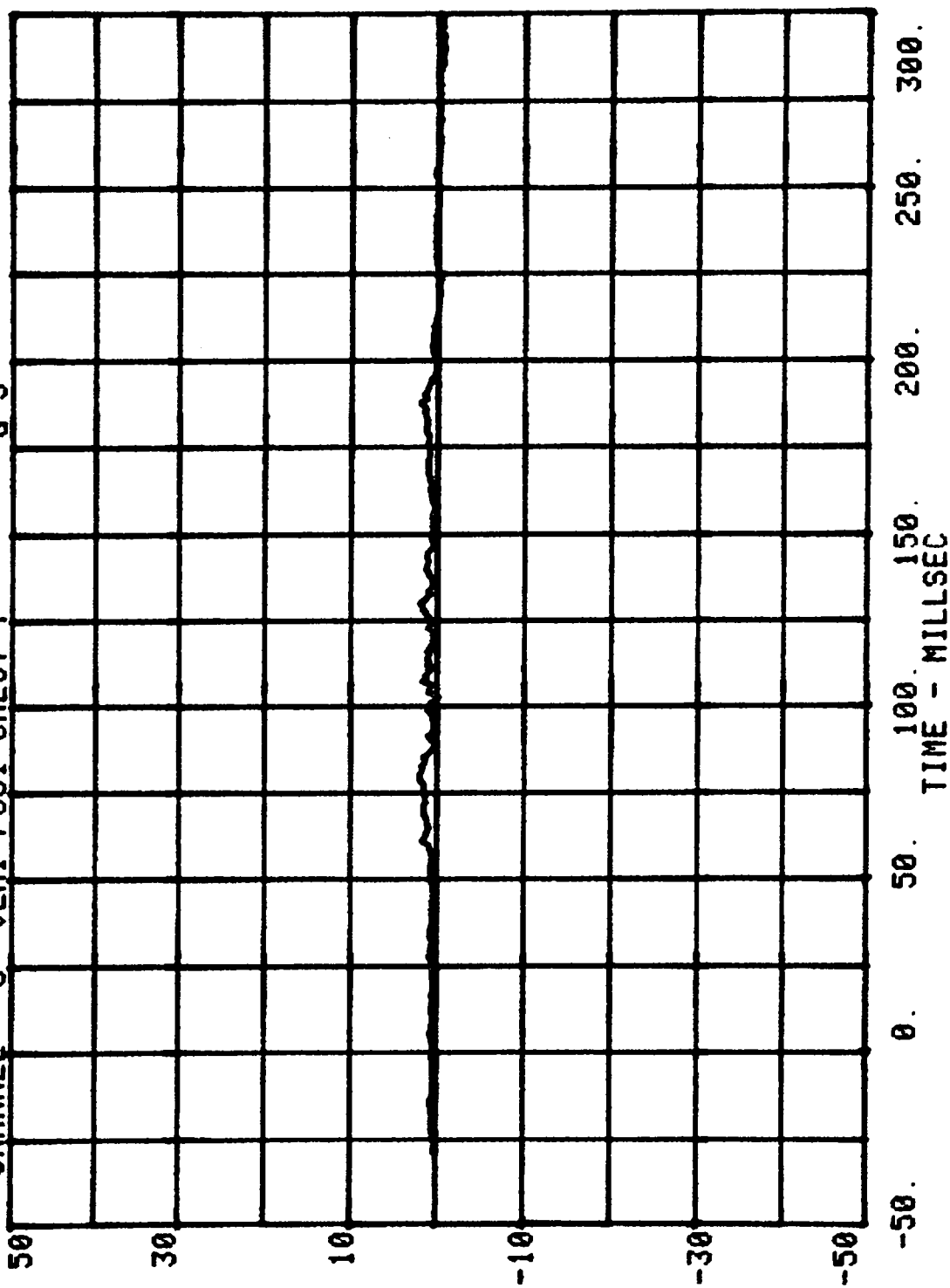
RUN= 493 SERIES= 18

G'S

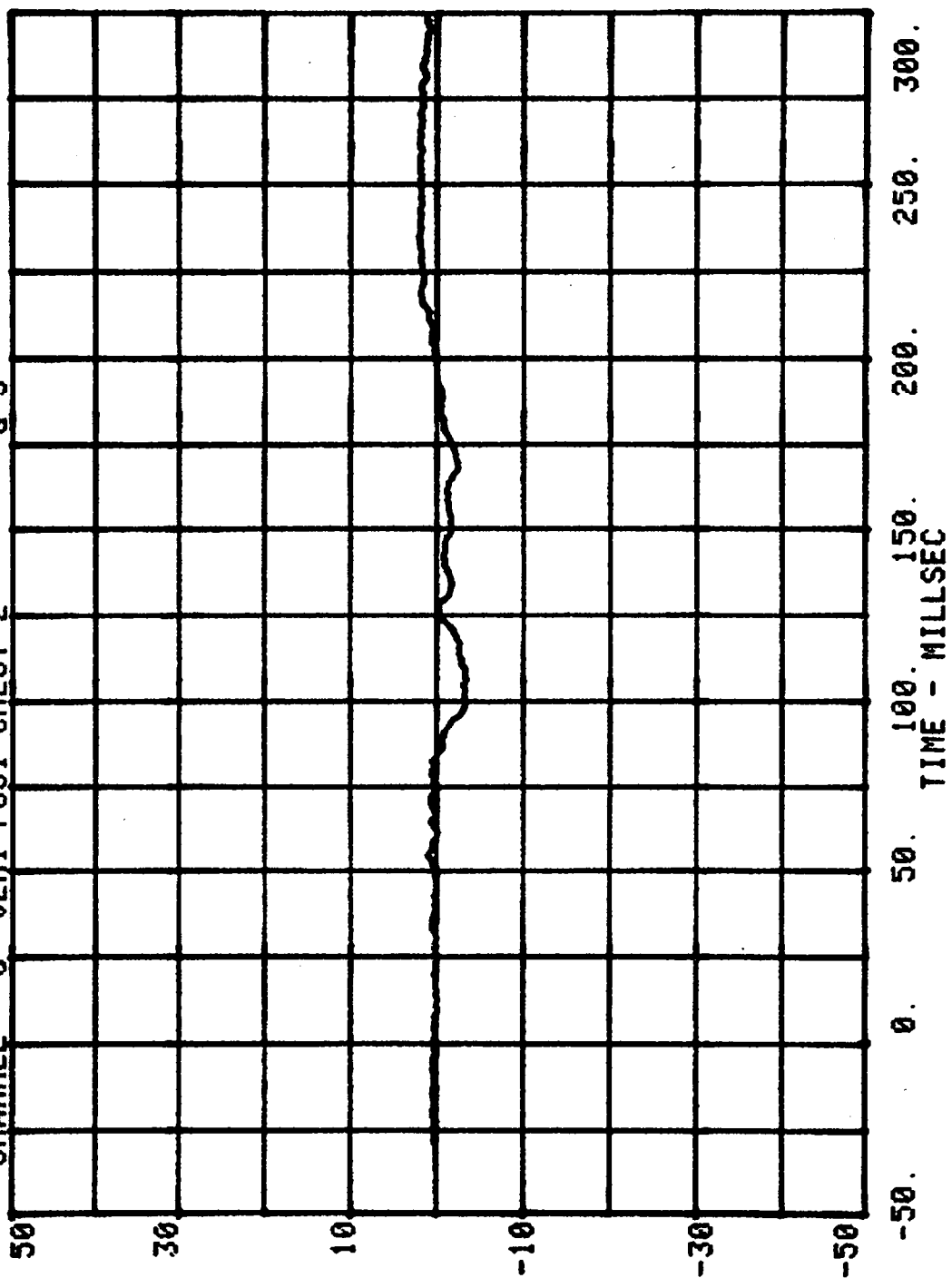


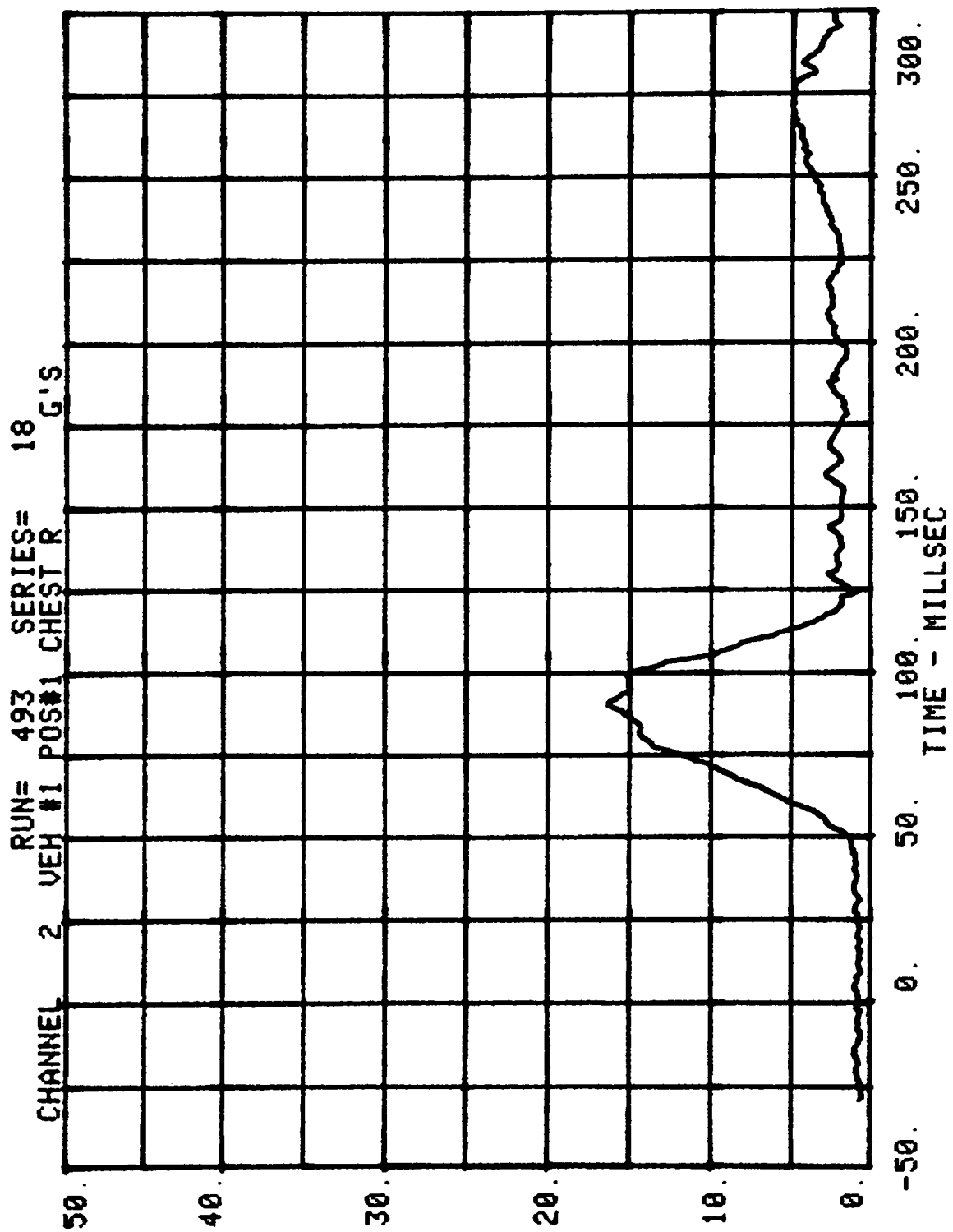
CHANNEL 5 VEH1 POS1 CHEST Y 18 G'S

RUN= 493 SERIES=

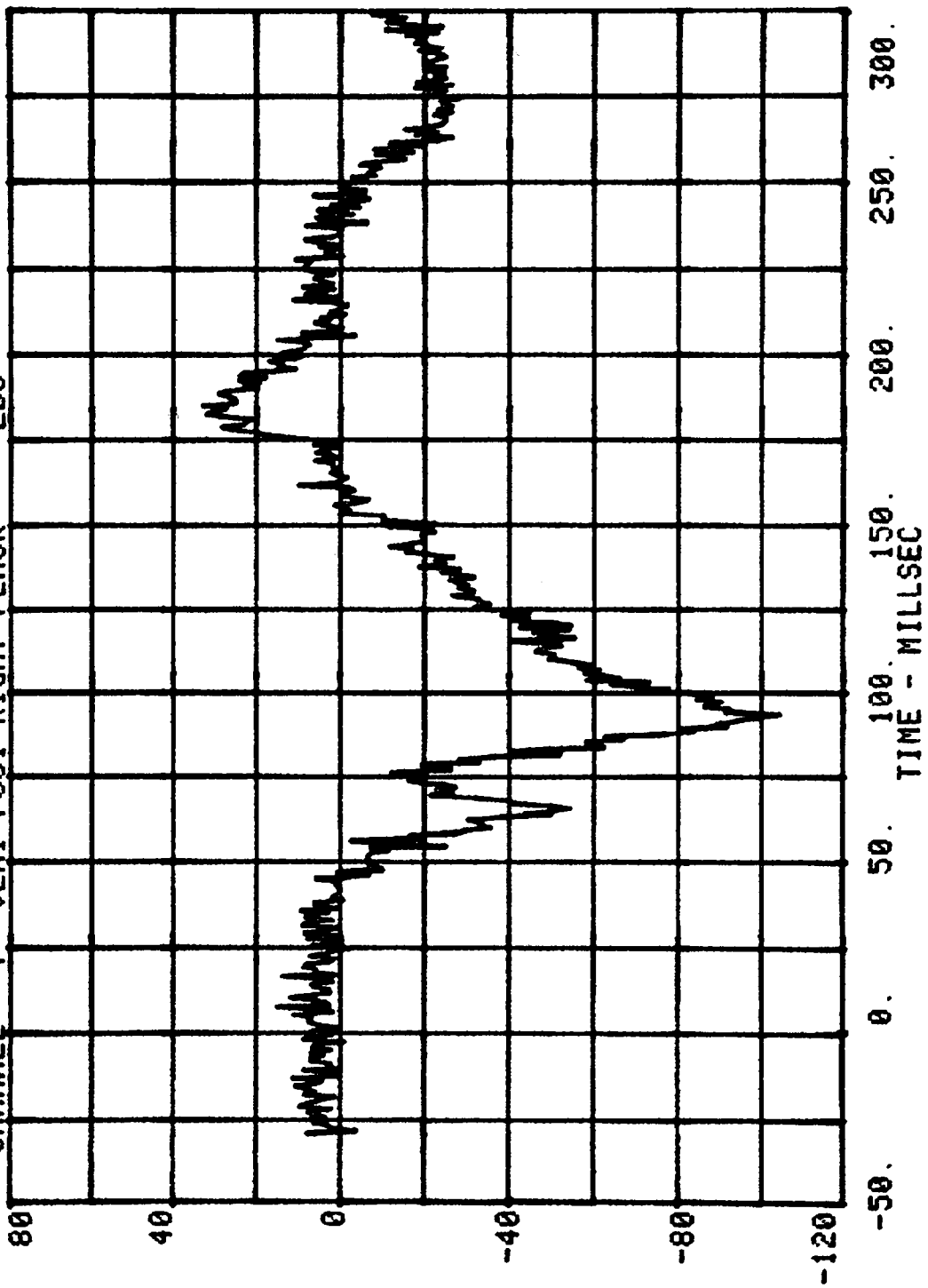


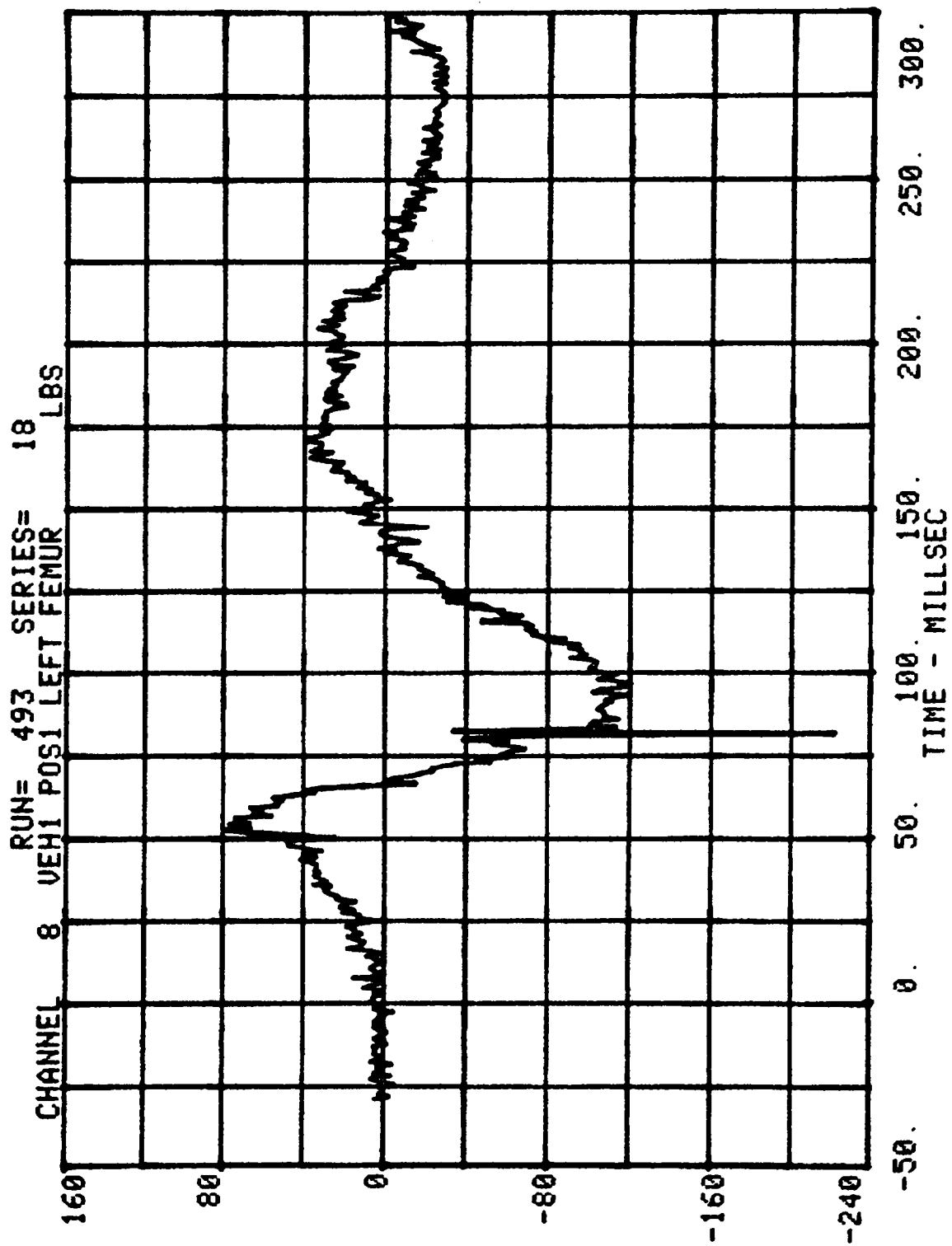
RUN= 493 SERIES= 18
CHANNEL 6 VEH1 POS1 CHEST Z G'S

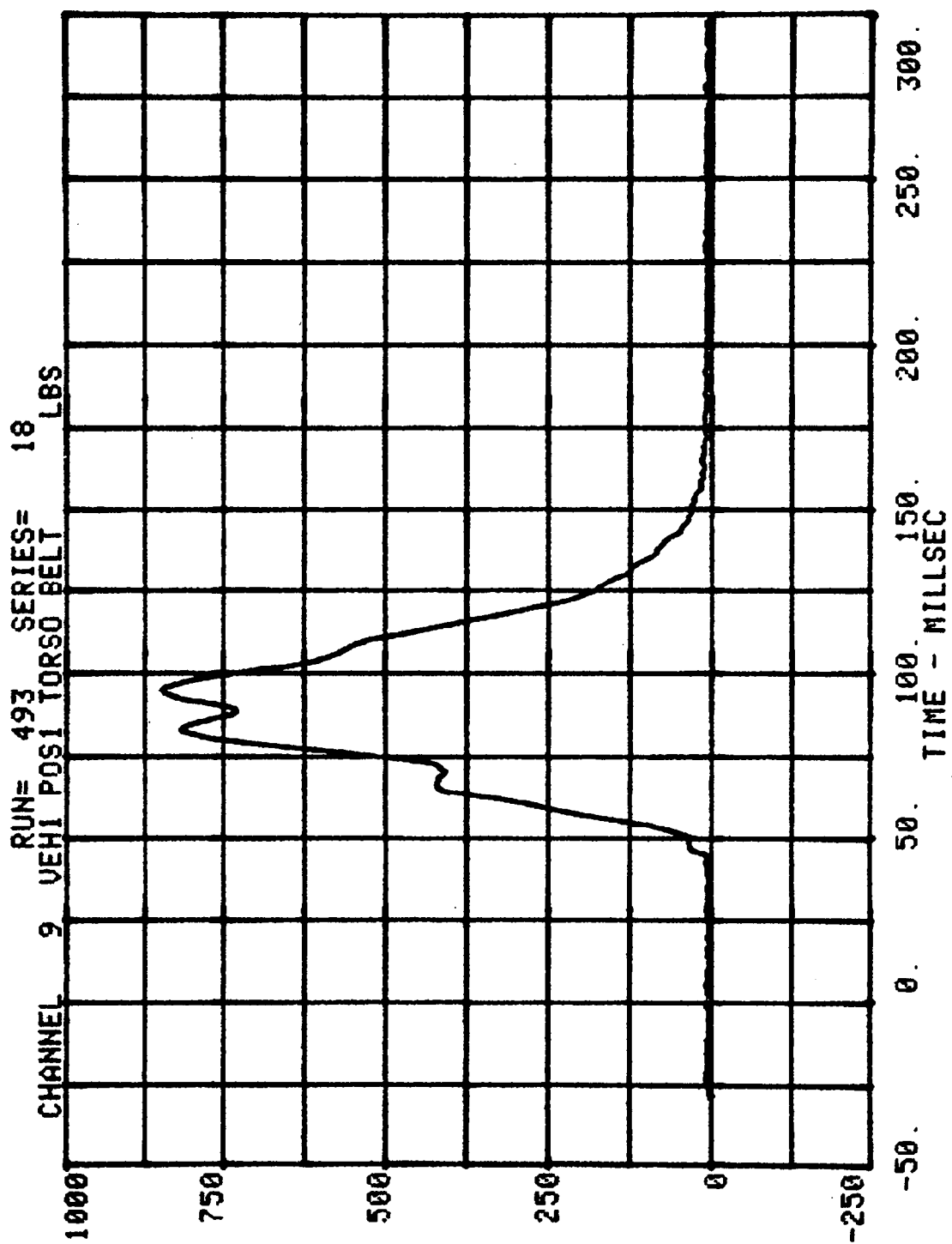


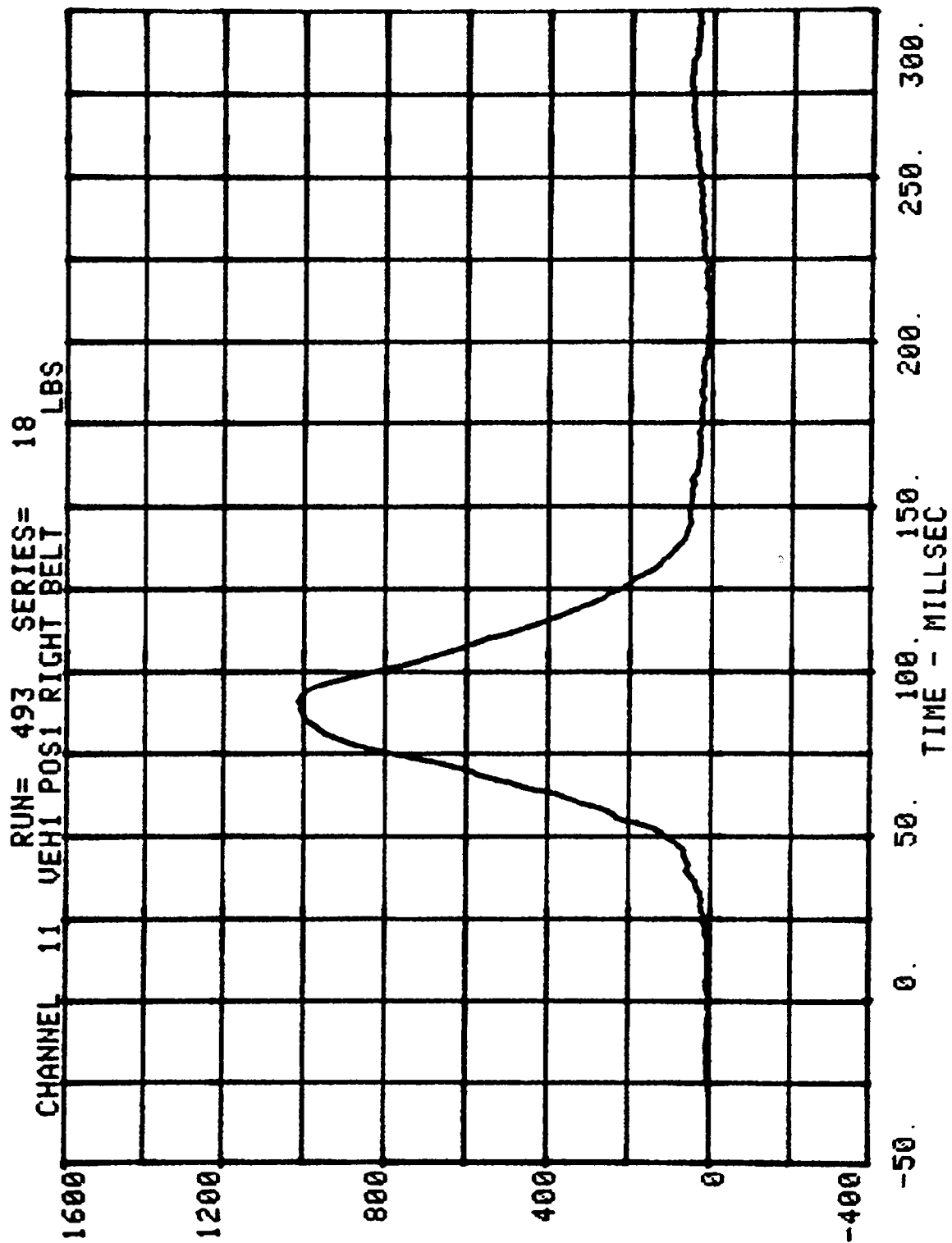


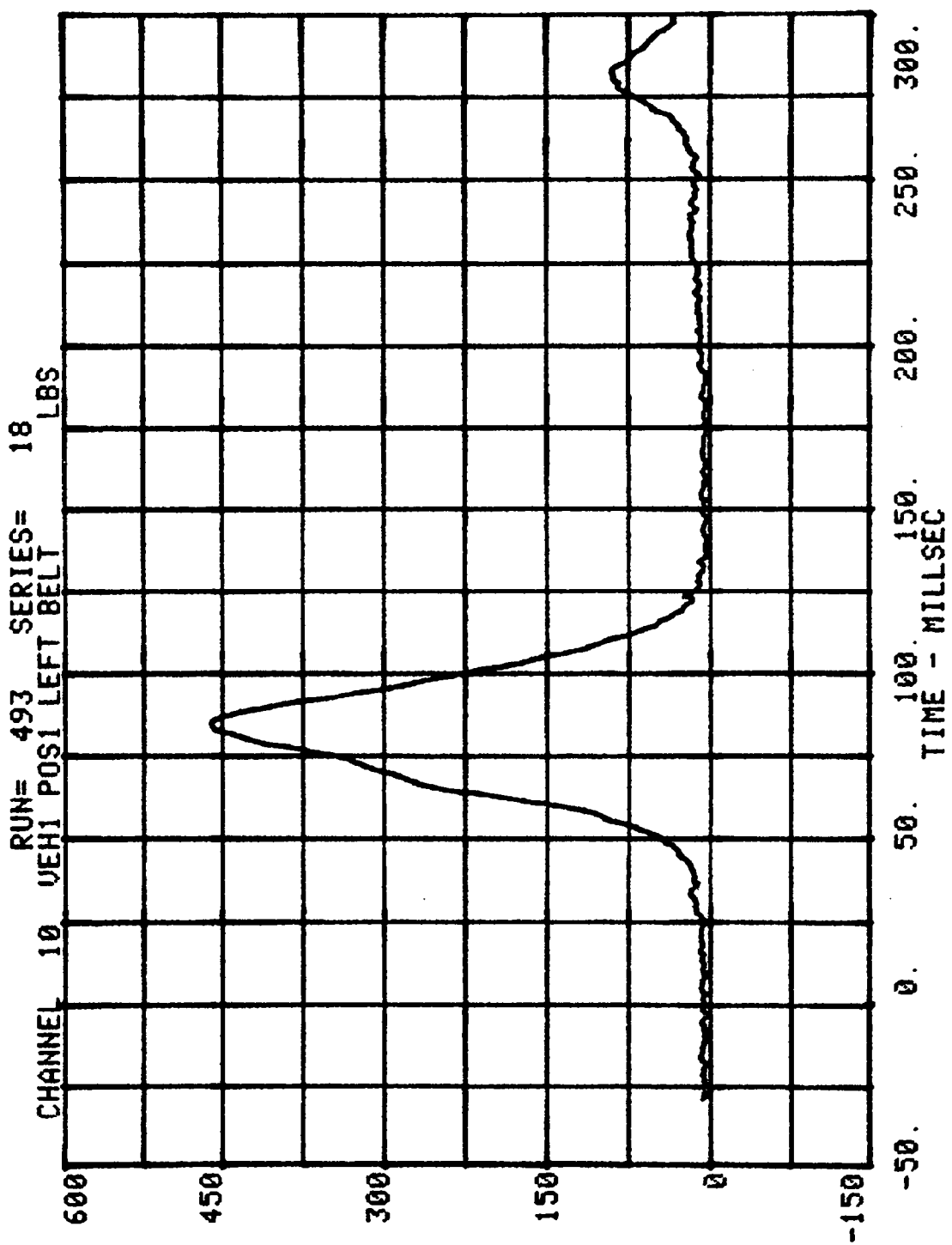
CHANNEL 7 VEH1 POS1 RIGHT FEMUR 18 LBS







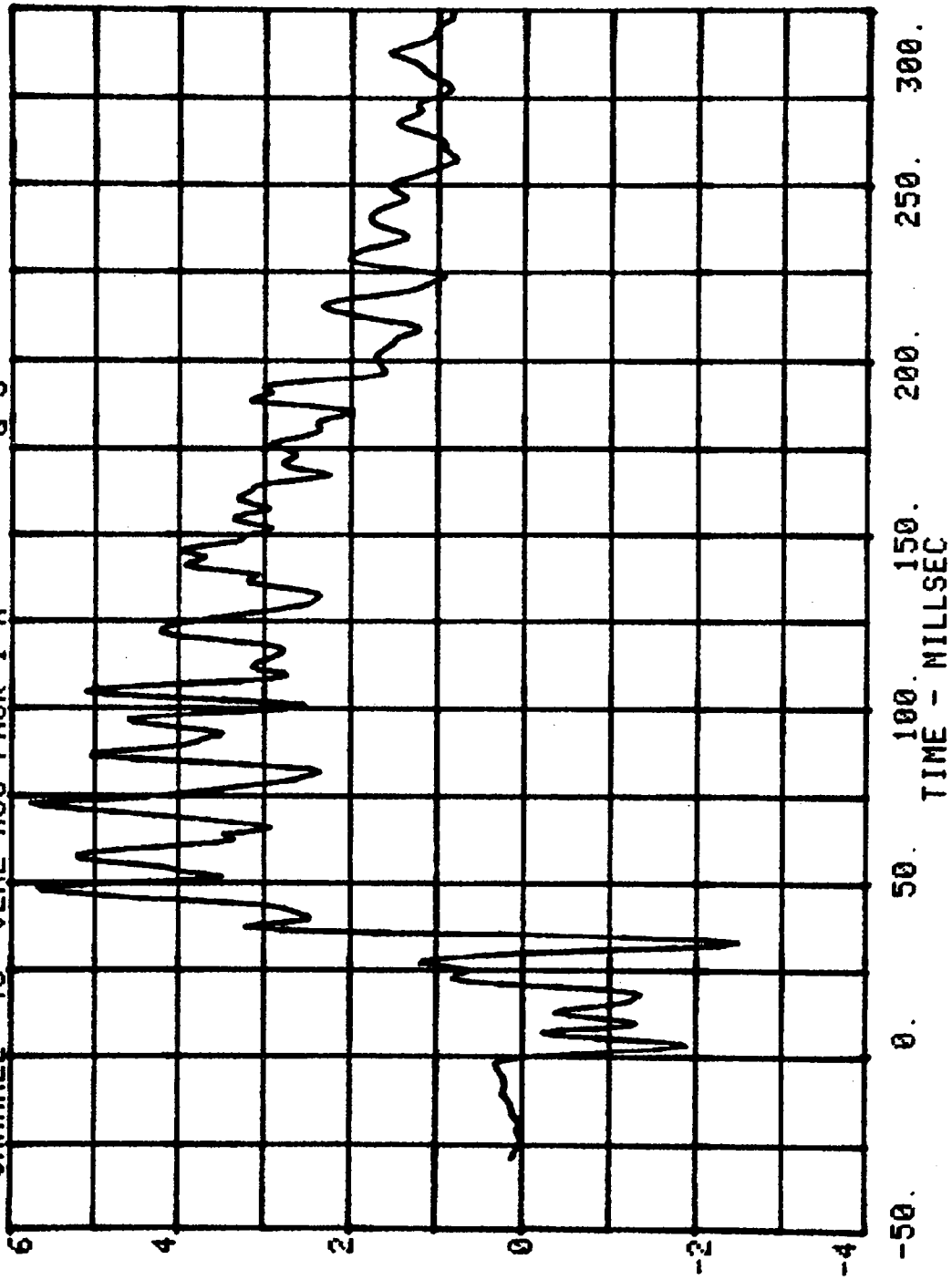


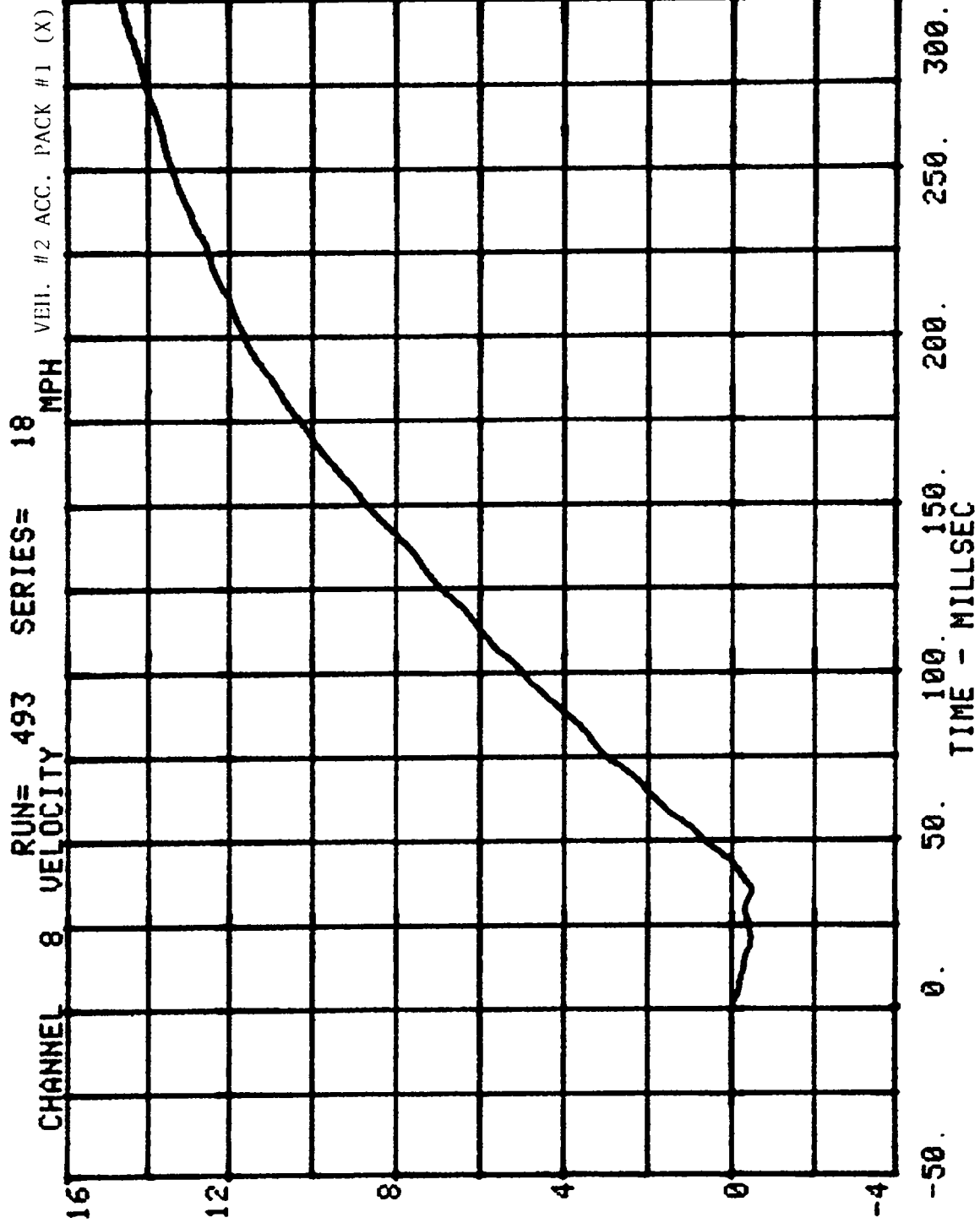


Test No. 17
Vehicle 2 - 1976 Volkswagen Rabbit
Vehicle Data

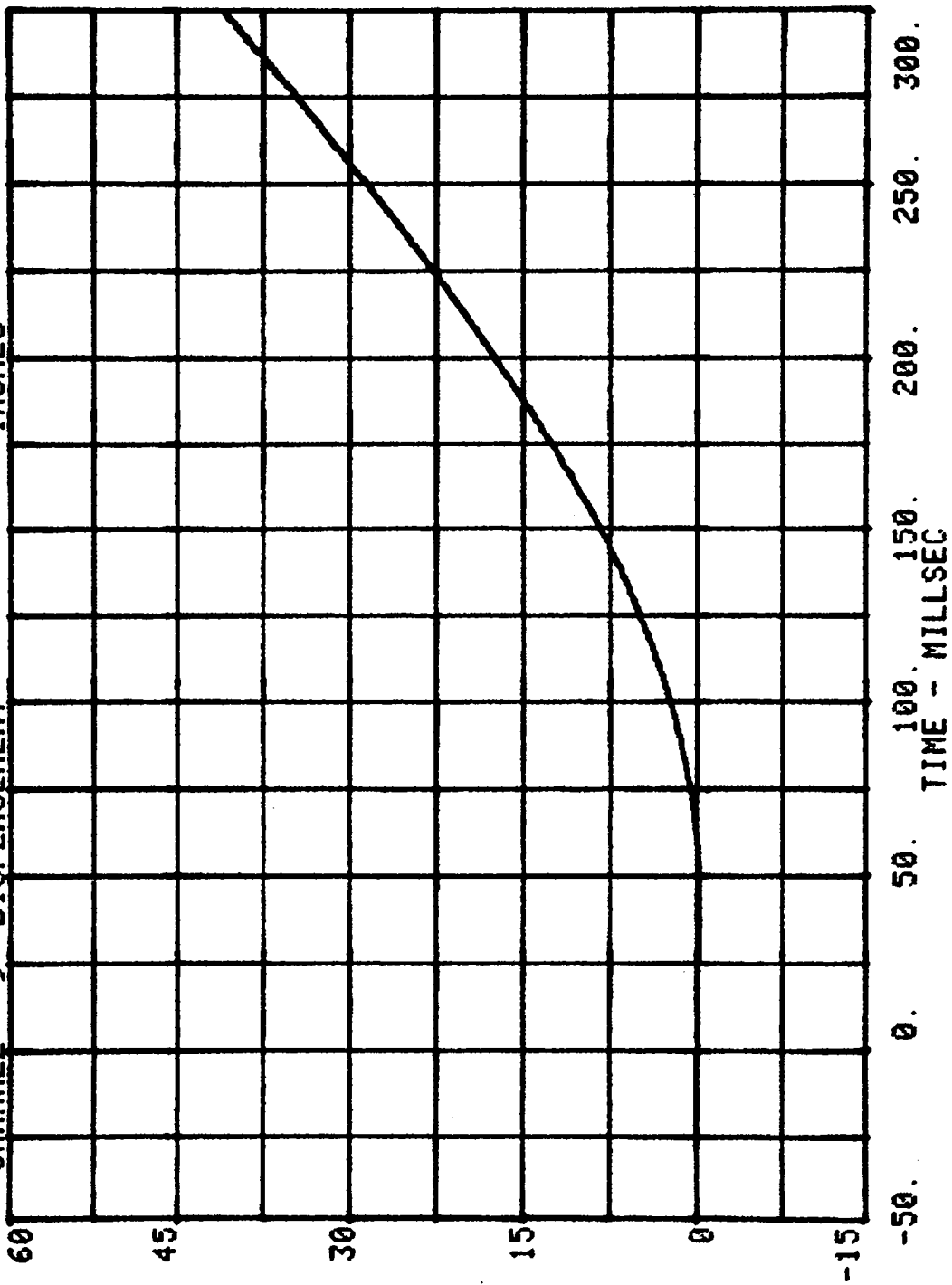
60 Hz Channel Class

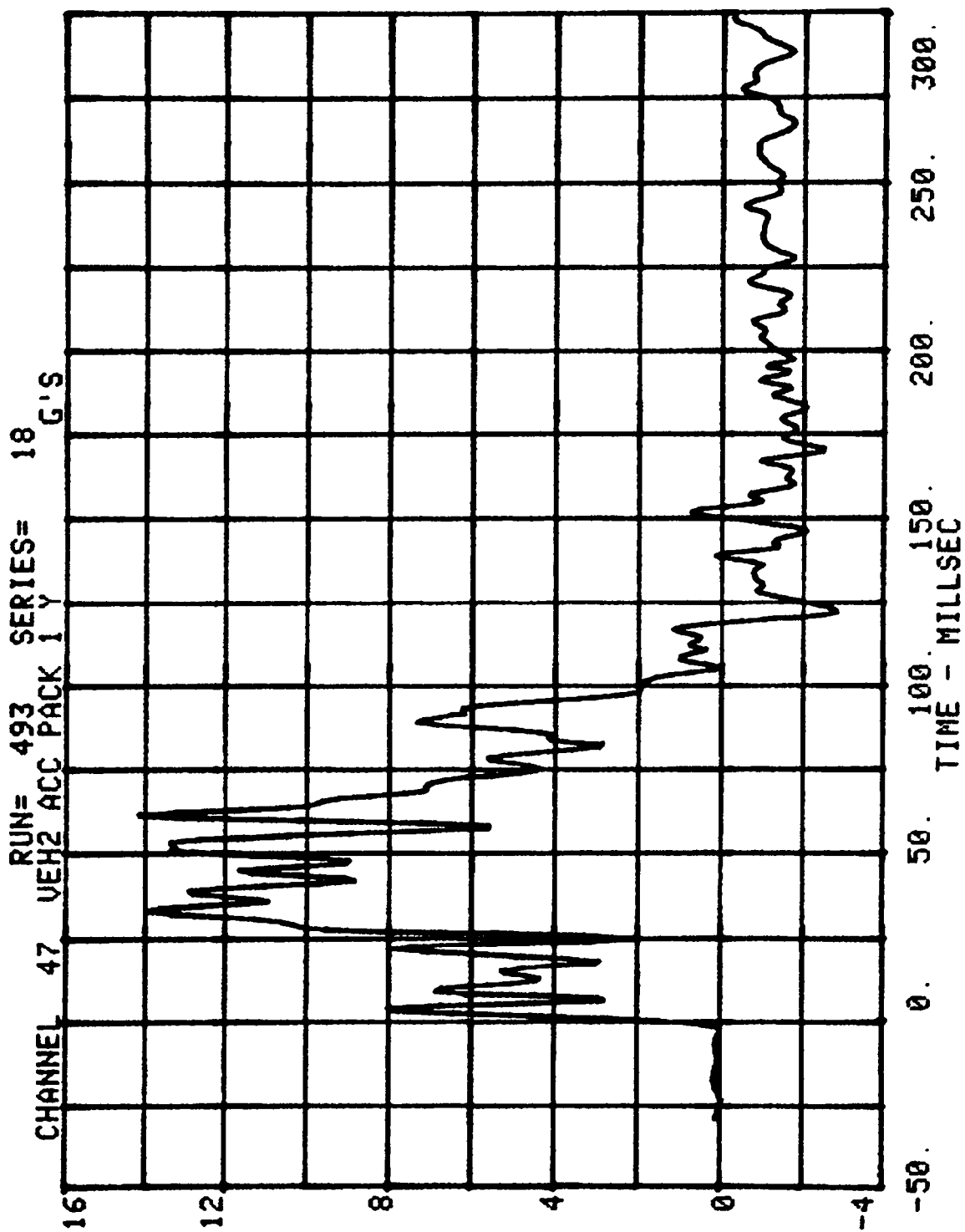
RUN= 493 SERIES= 18
CHANNEL 46 VEH2 ACC PACK 1 X G'S

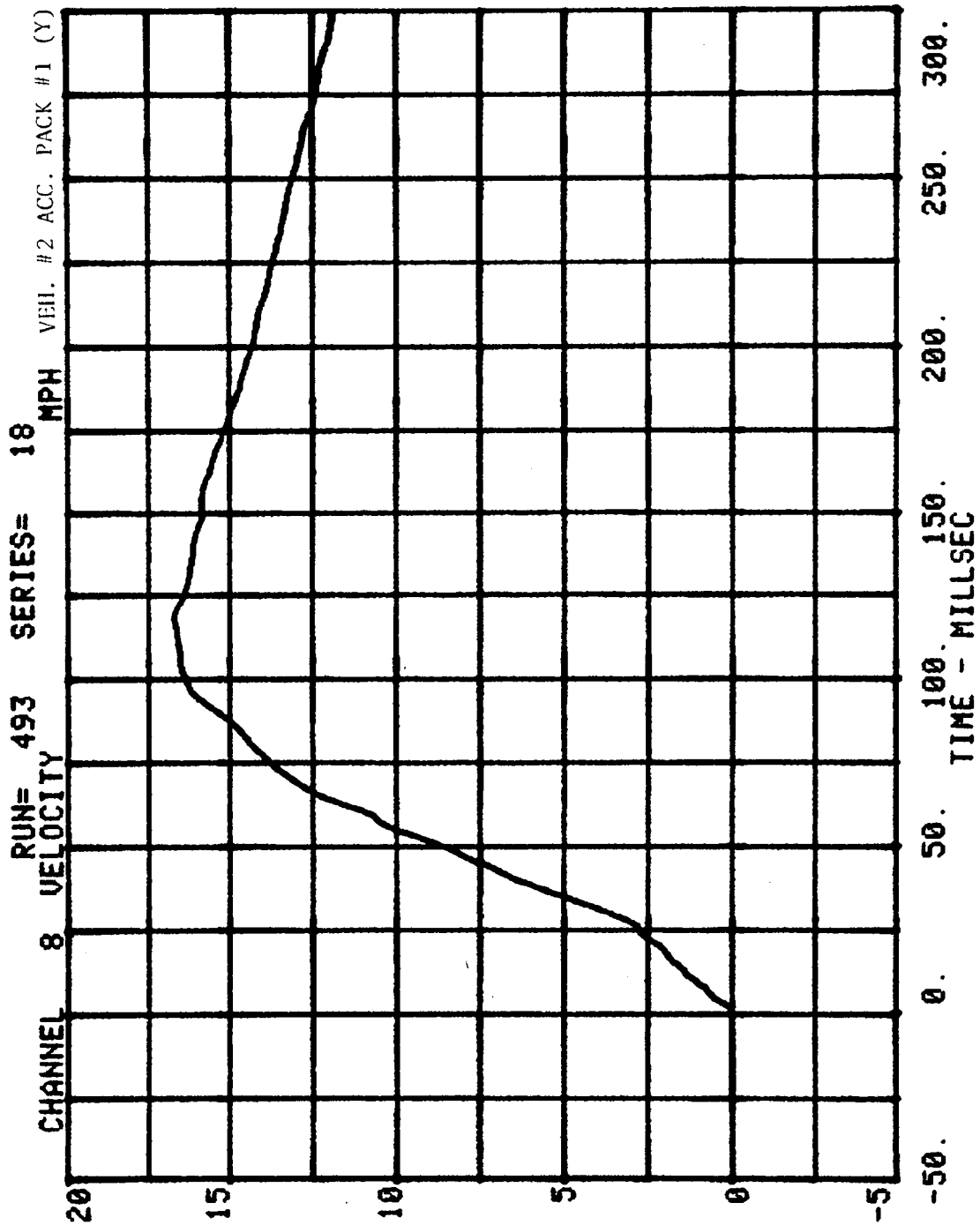


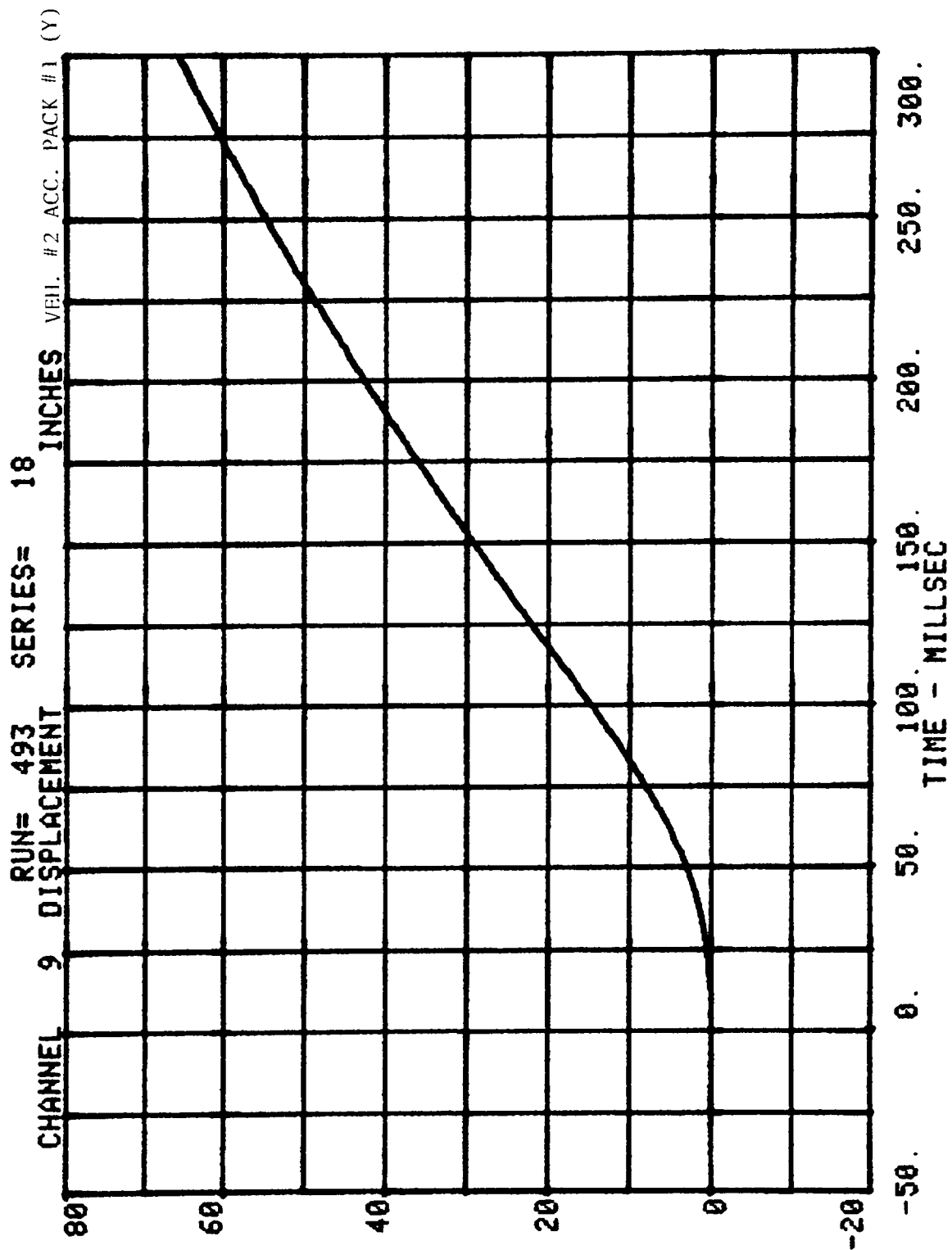


CHANNEL 9 DISPLACEMENT
 RUN= 493 SERIES= 18 INCHES VEH. #2 ACC. PACK #1 (X)

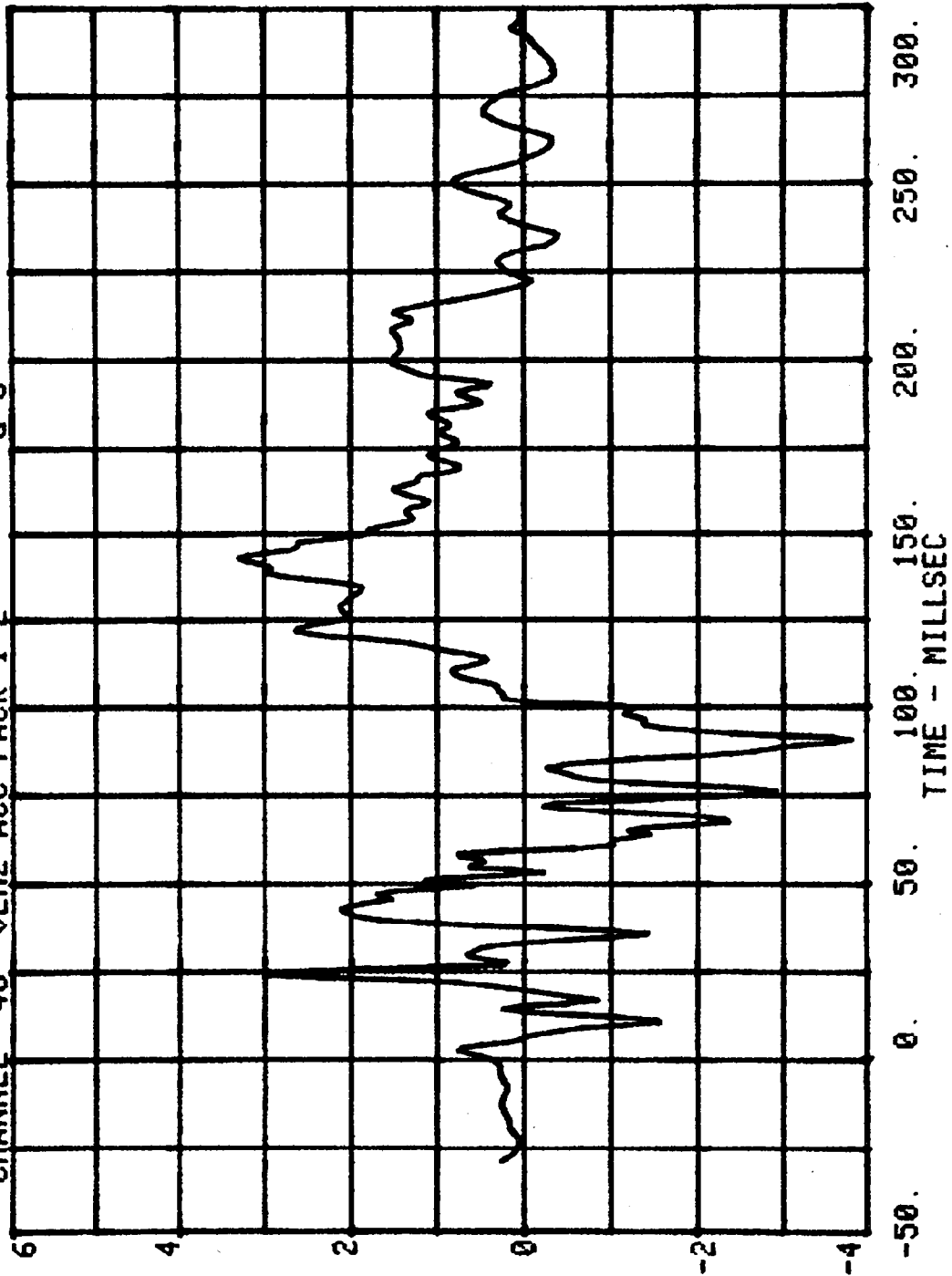




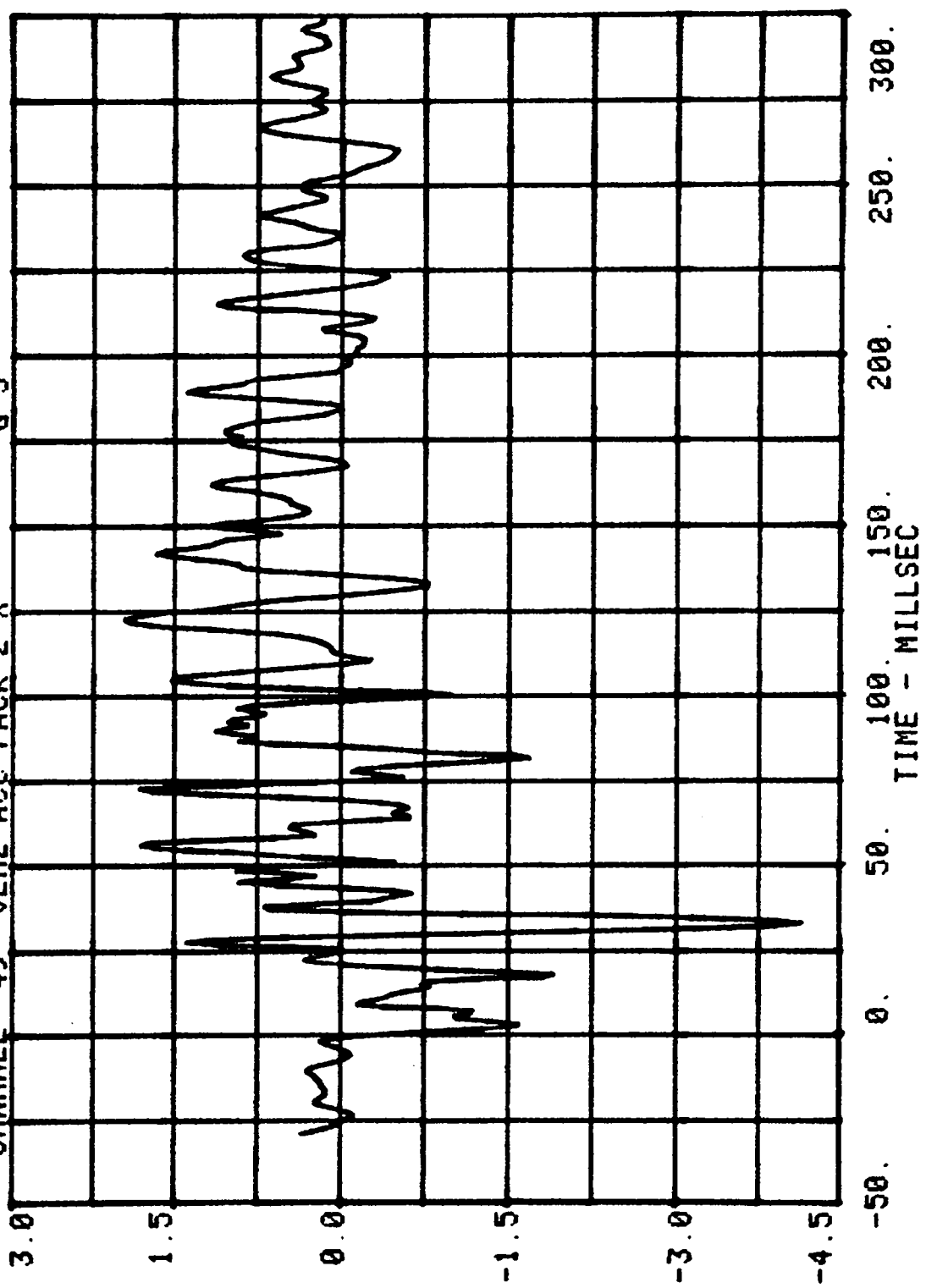


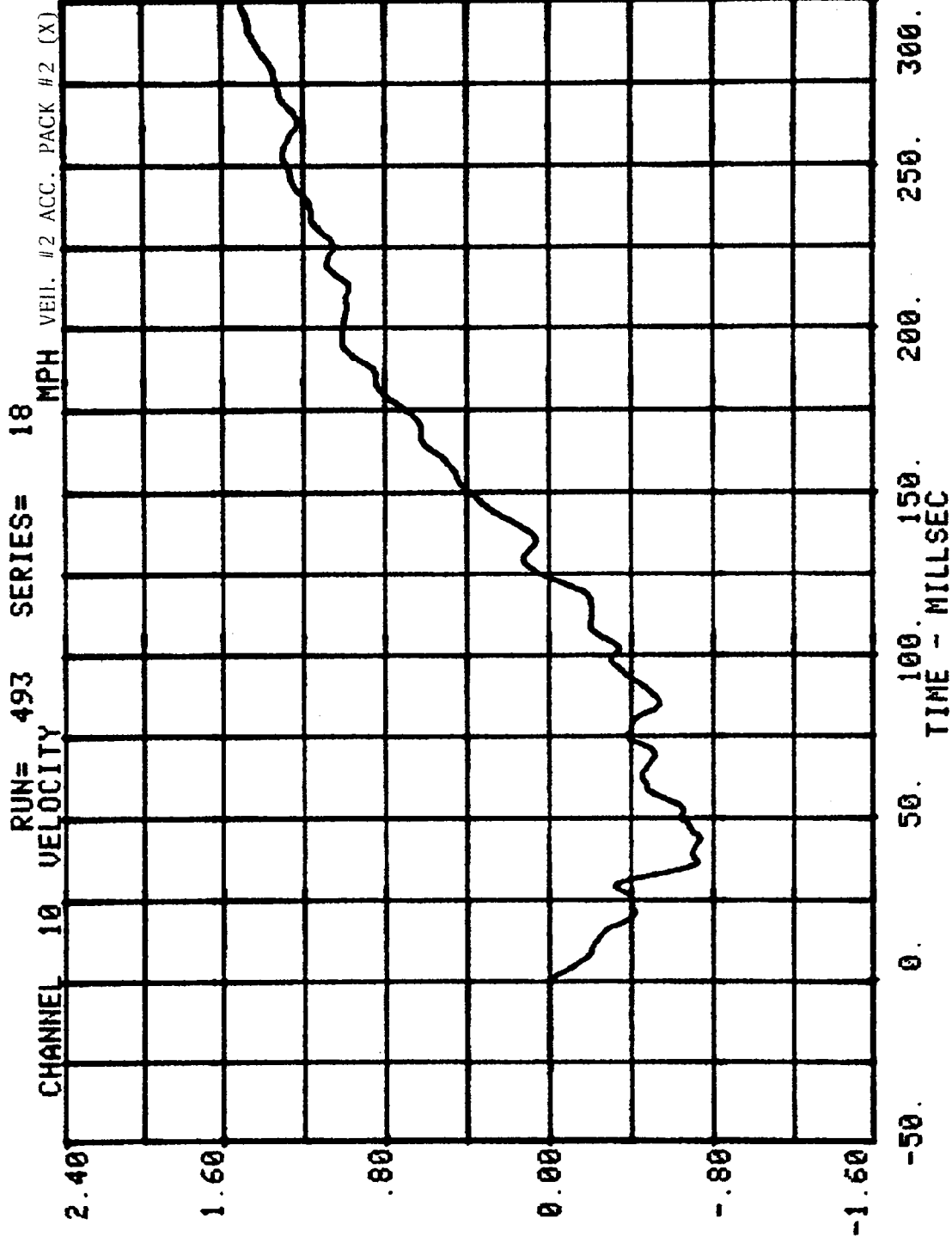


CHANNEL 48 RUN= 493 SERIES= 18
VEH2 ACC PACK 1 2 G'S

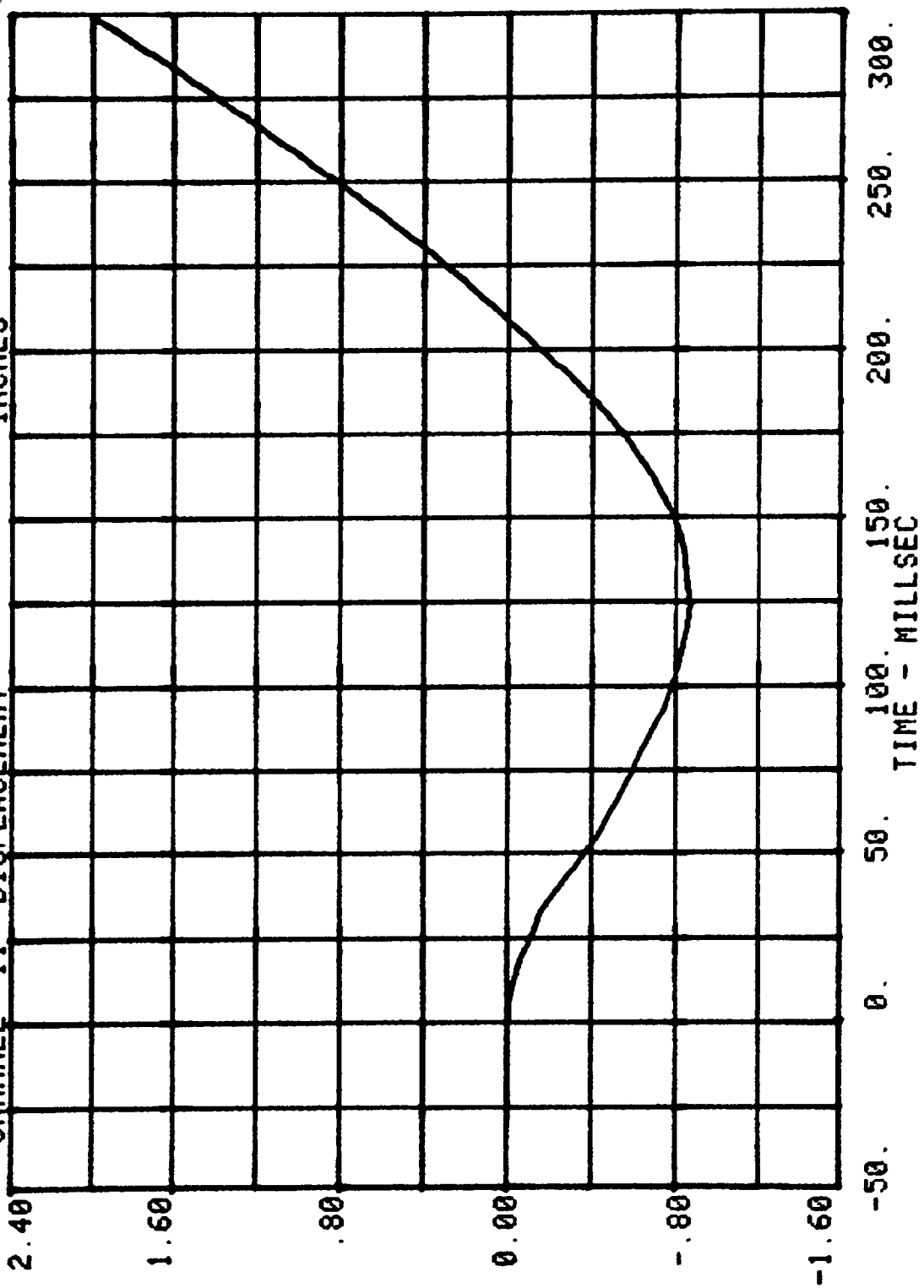


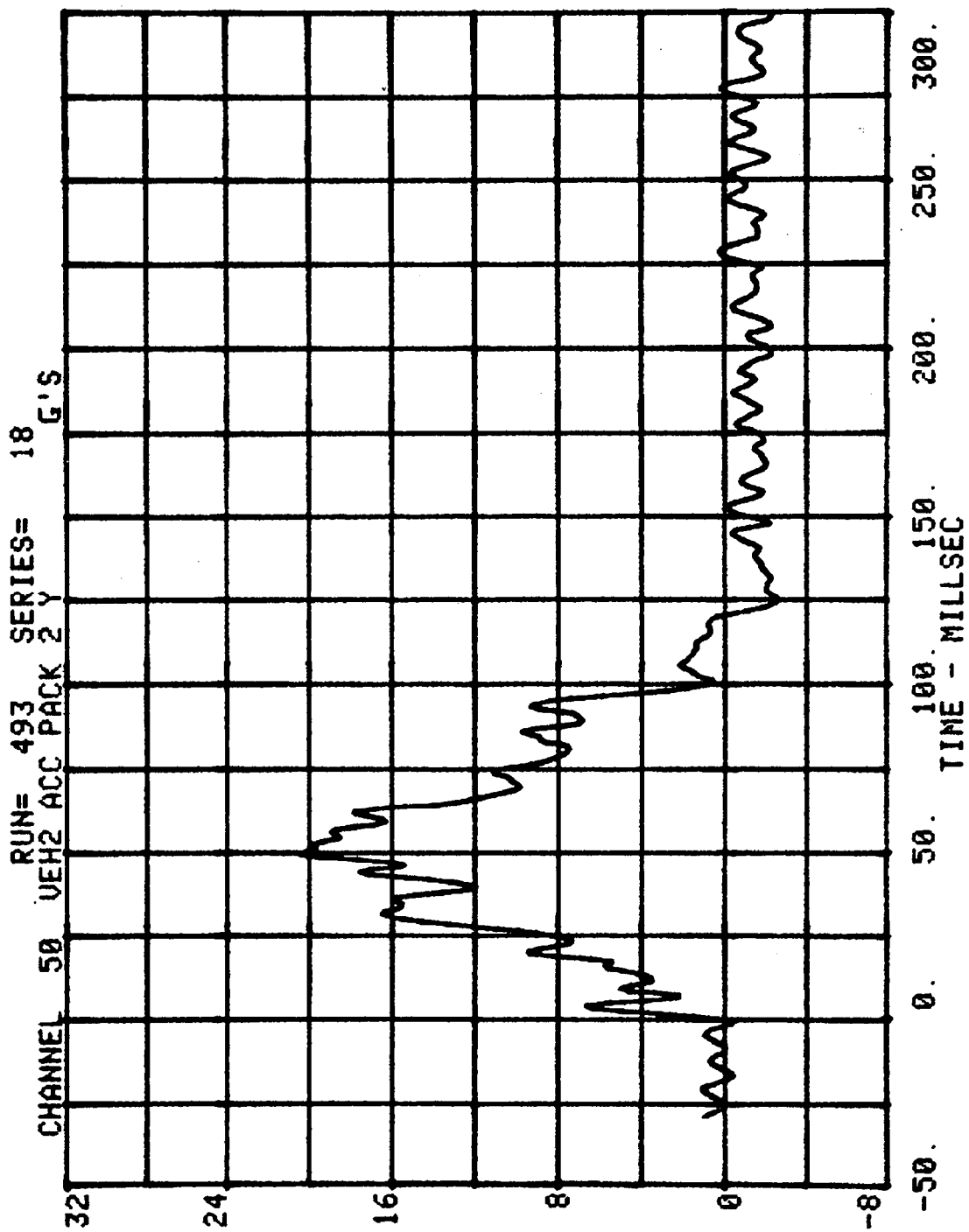
CHANNEL 49 RUN= 493 SERIES= 18
VEH2 ACC PACK 2 X G'S



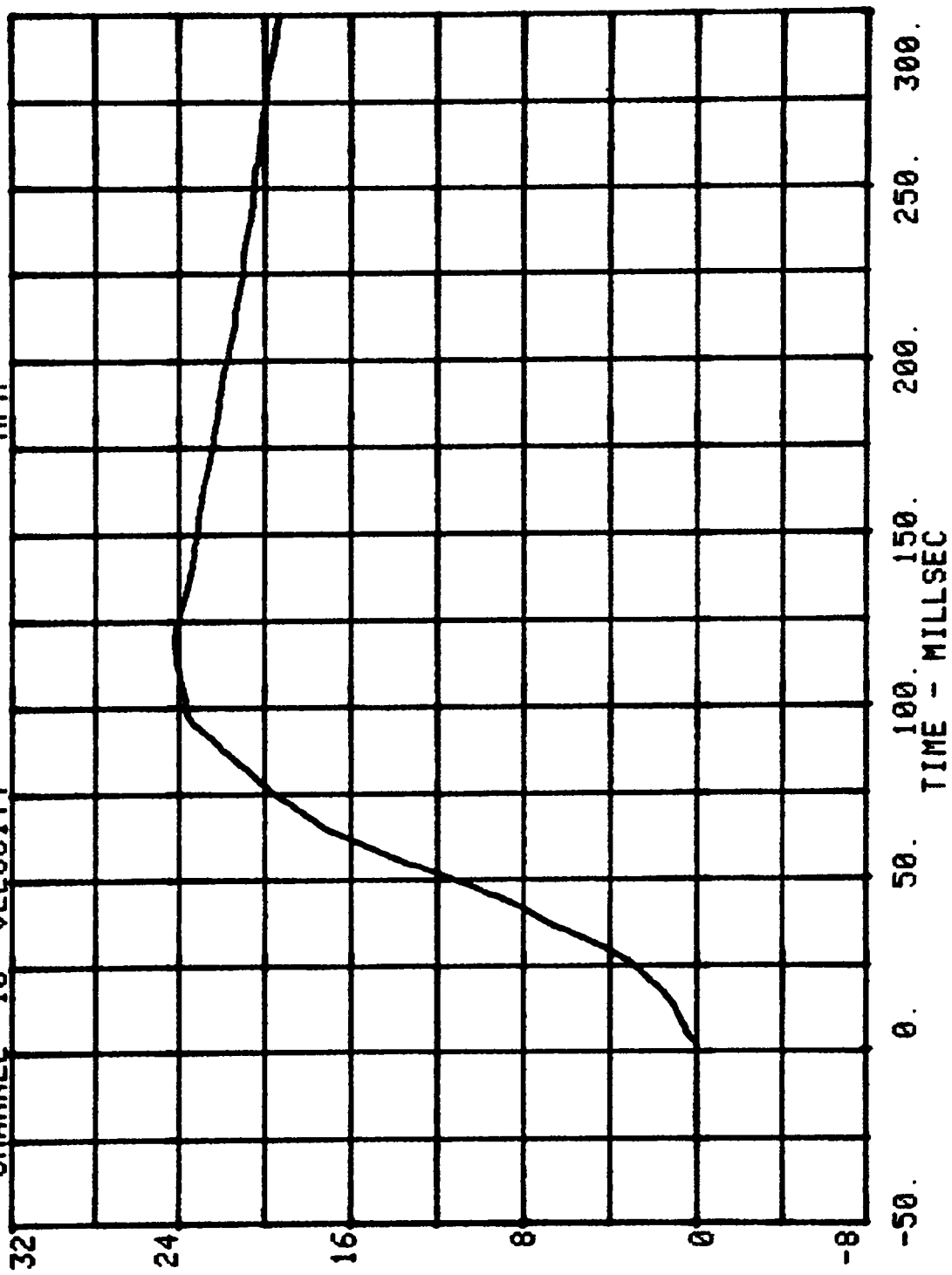


CHANNEL 11 DISPLACEMENT RUN= 493 SERIES= 18 INCHES VEIL. #2 ACC. PACK #2 (X)

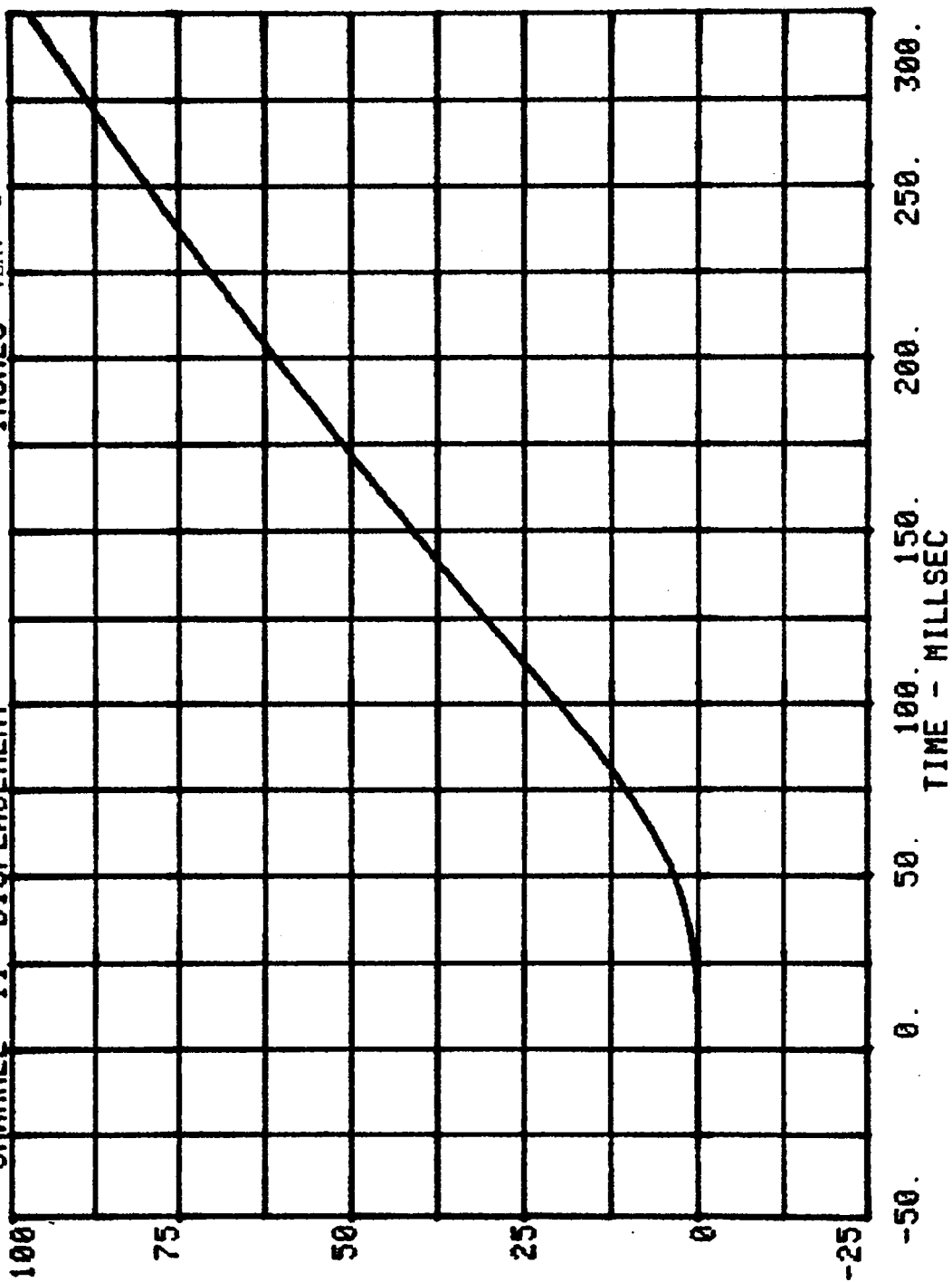


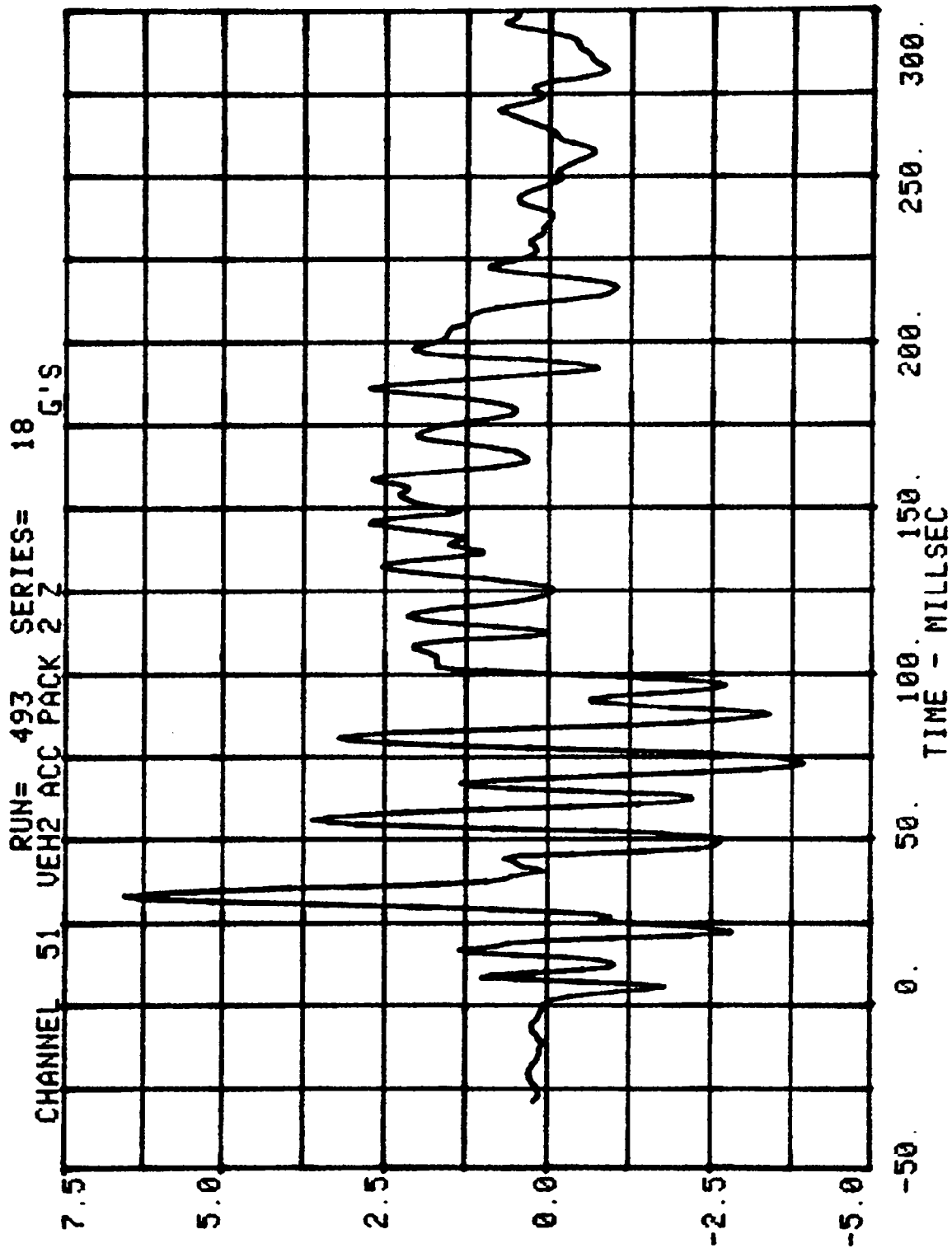


RUN= 493 SERIES= 18 MPH
CHANNEL 10 VELOCITY VEIL. #2 ACC. PACK #2 (Y)

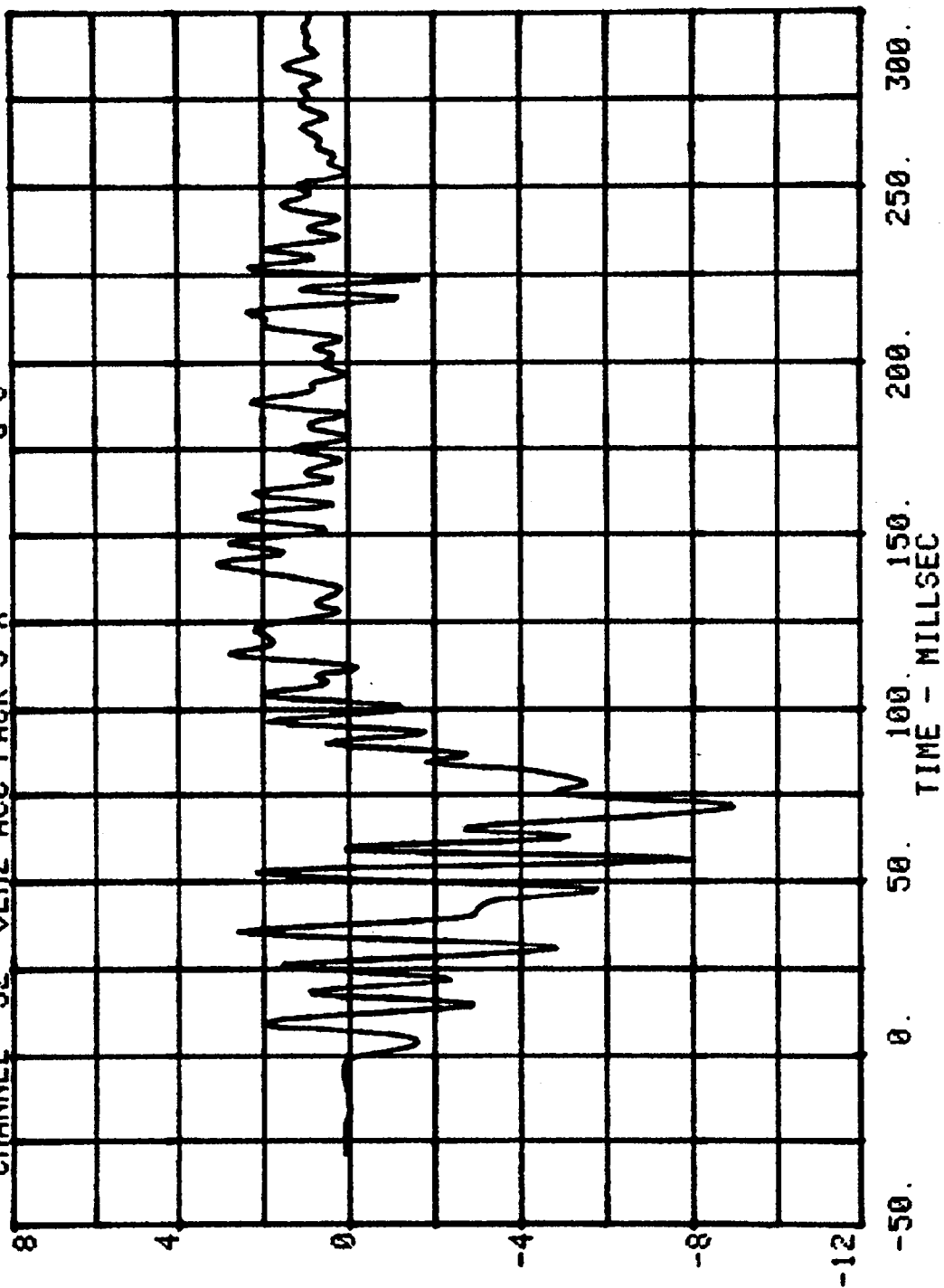


CHANNEL 11 DISPLACEMENT RUN= 493 SERIES= 18 INCHES VEHL. #2 ACC. PACK #2 (Y)

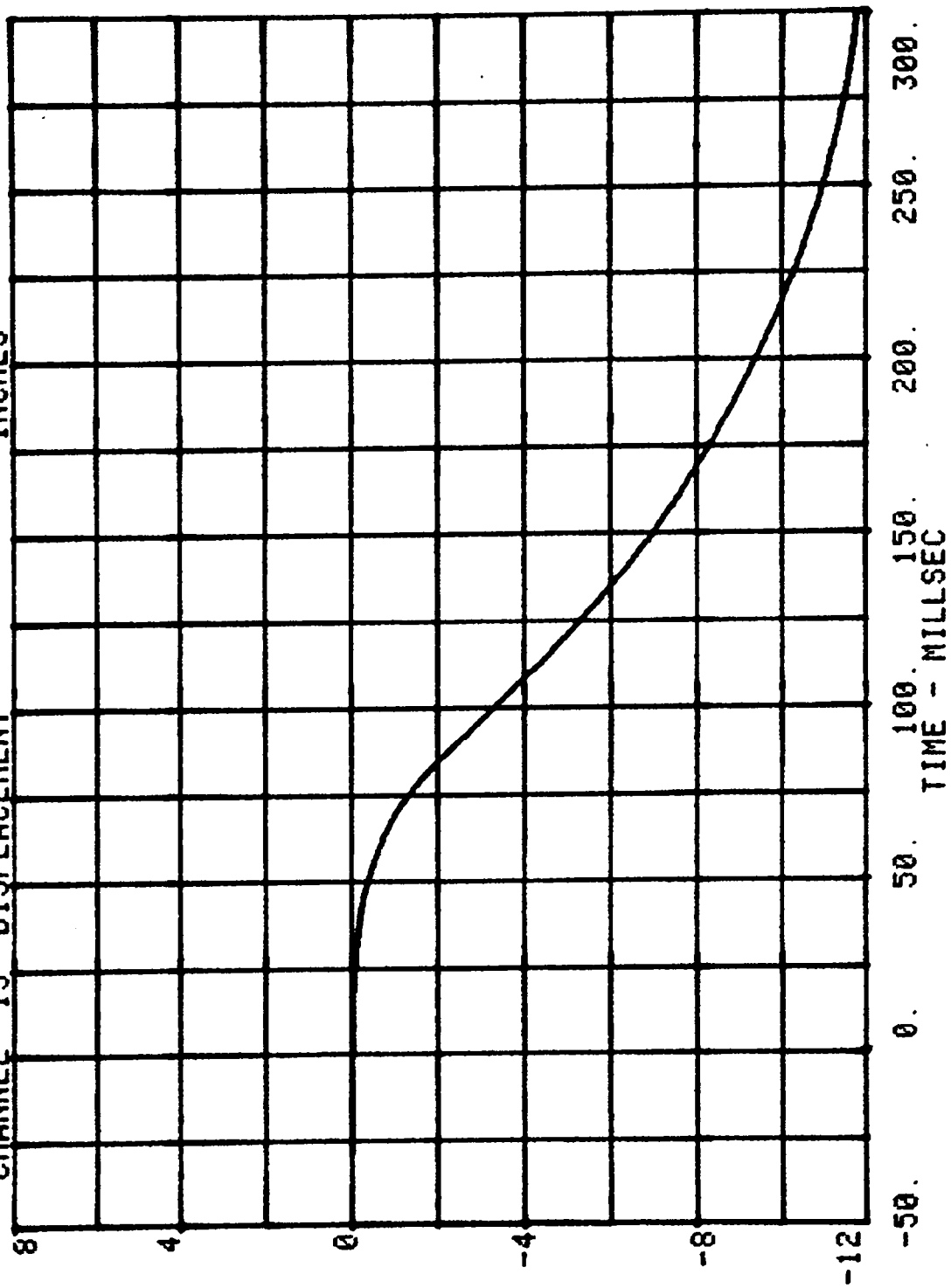


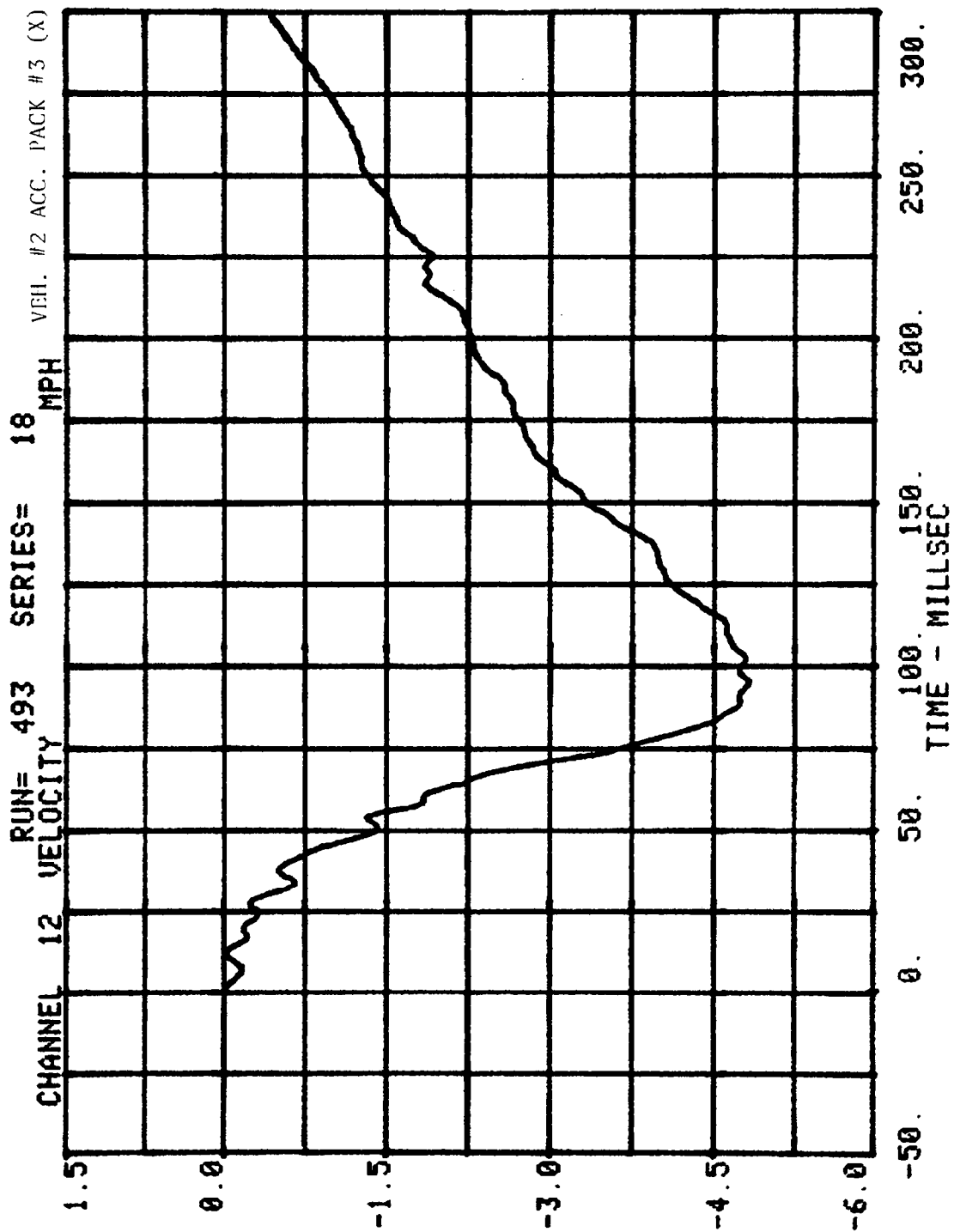


CHANNEL 52 RUN= 493 SERIES= 18
VEH2 ACC PACK 3 X G'S

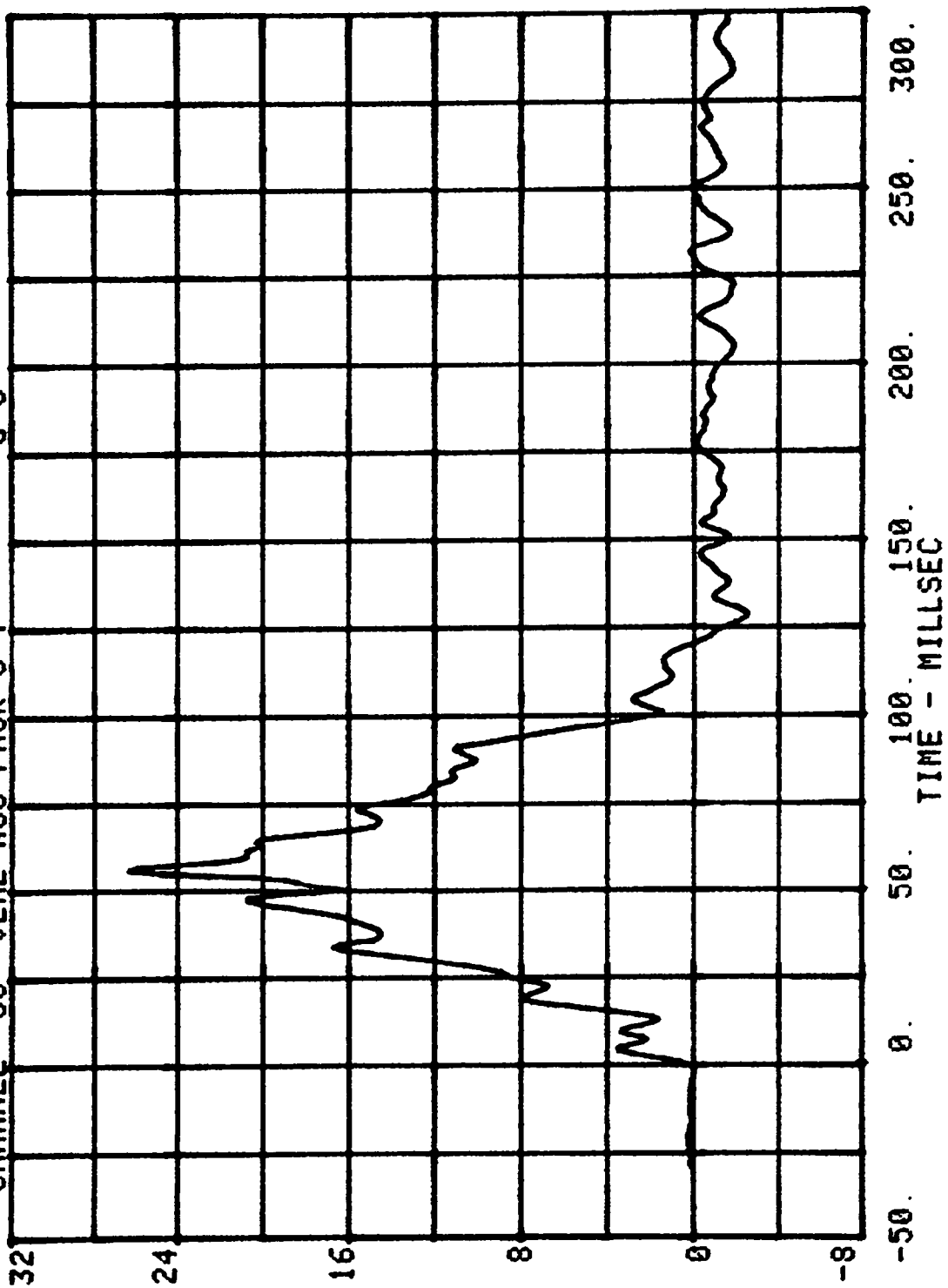


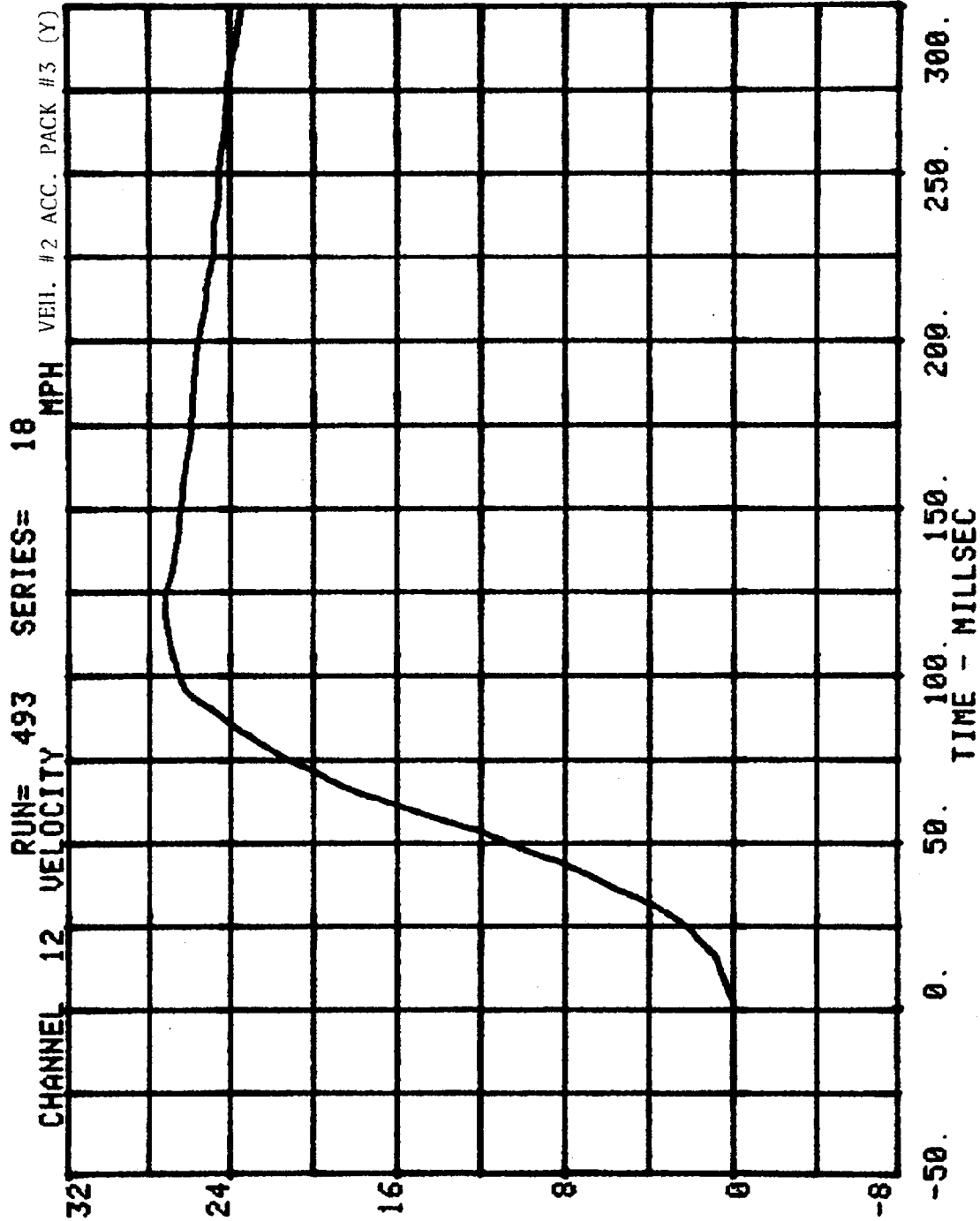
CHANNEL 13 DISPLACEMENT
 RUN= 493 SERIES= 18
 VEIL. #2 ACC PACK #3 (X)





CHANNEL 53 RUN= 493 SERIES= 18
VEH2 ACC PACK 3 Y G'S





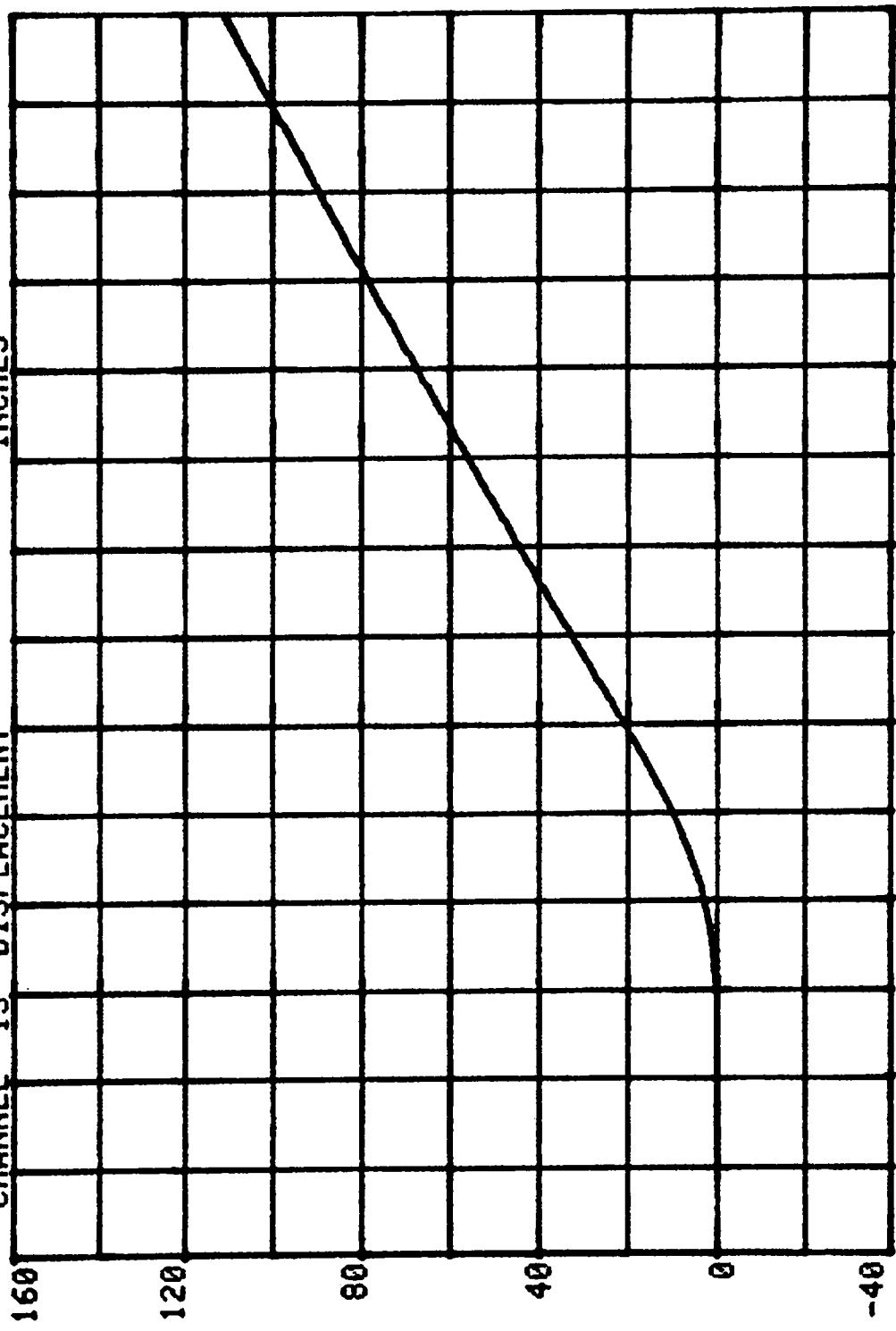
VEH. #2 ACC. PACK #3 (Y)

18 INCHES

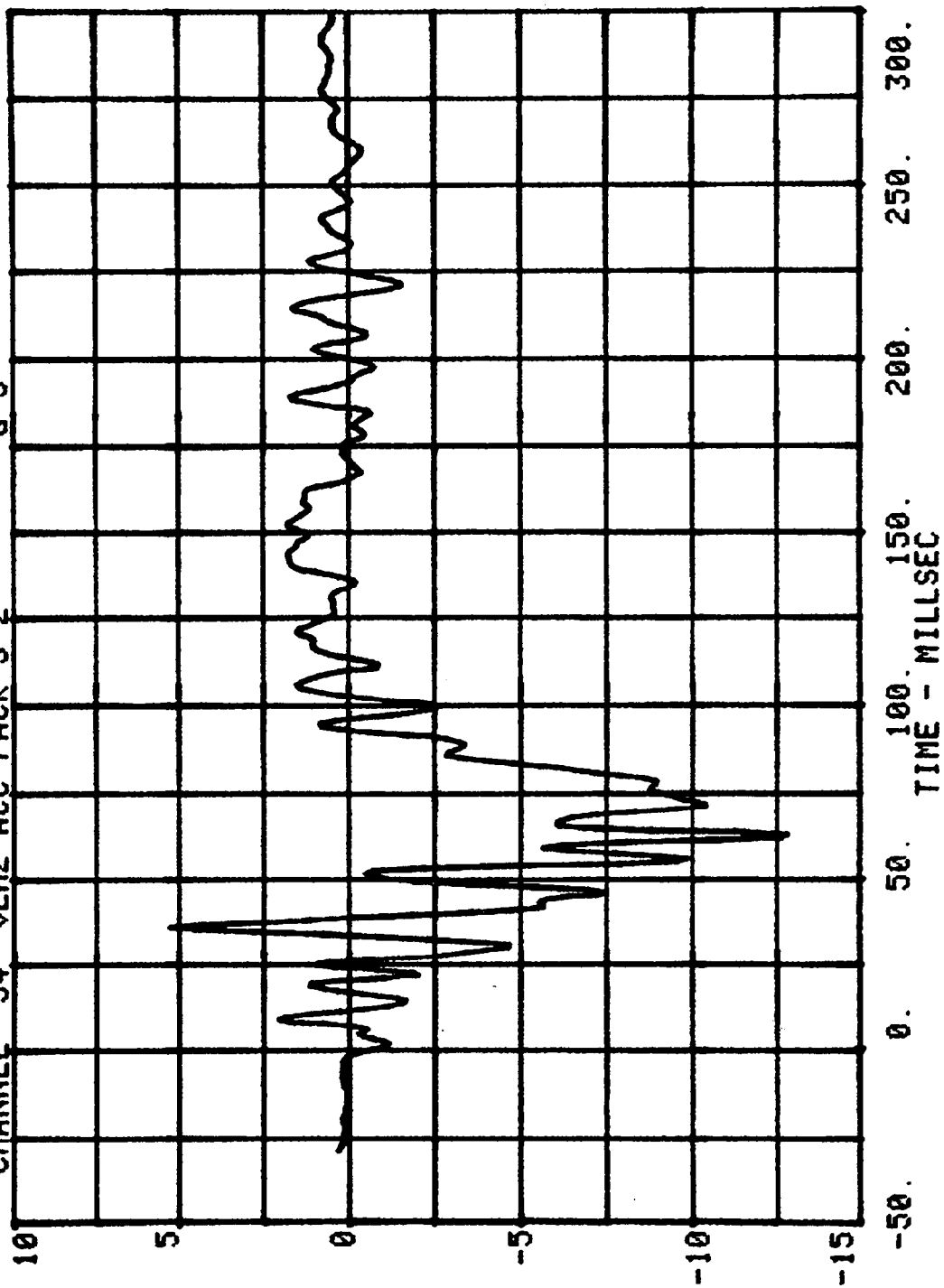
SERIES=

RUN= 493

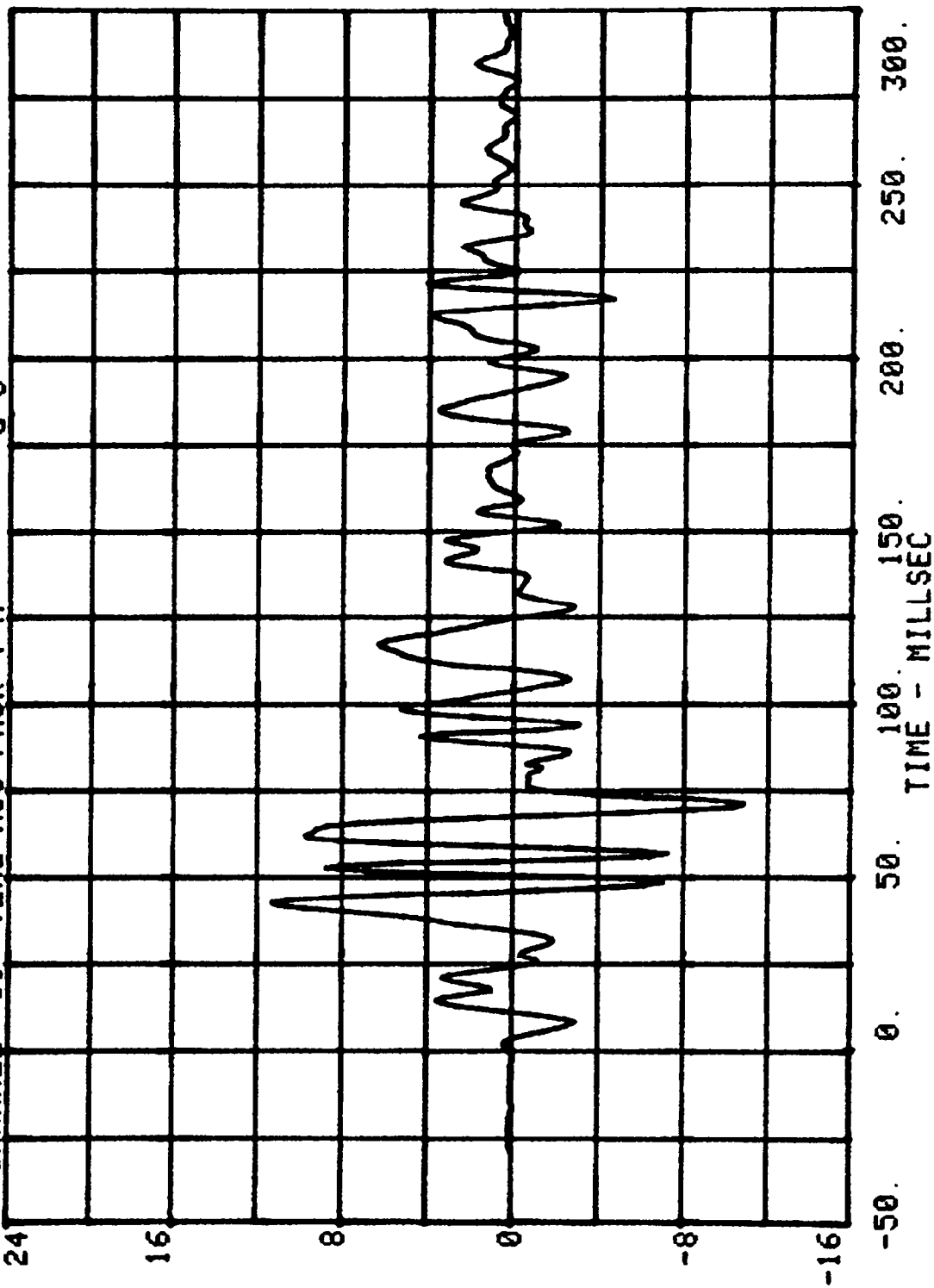
CHANNEL 13 DISPLACEMENT

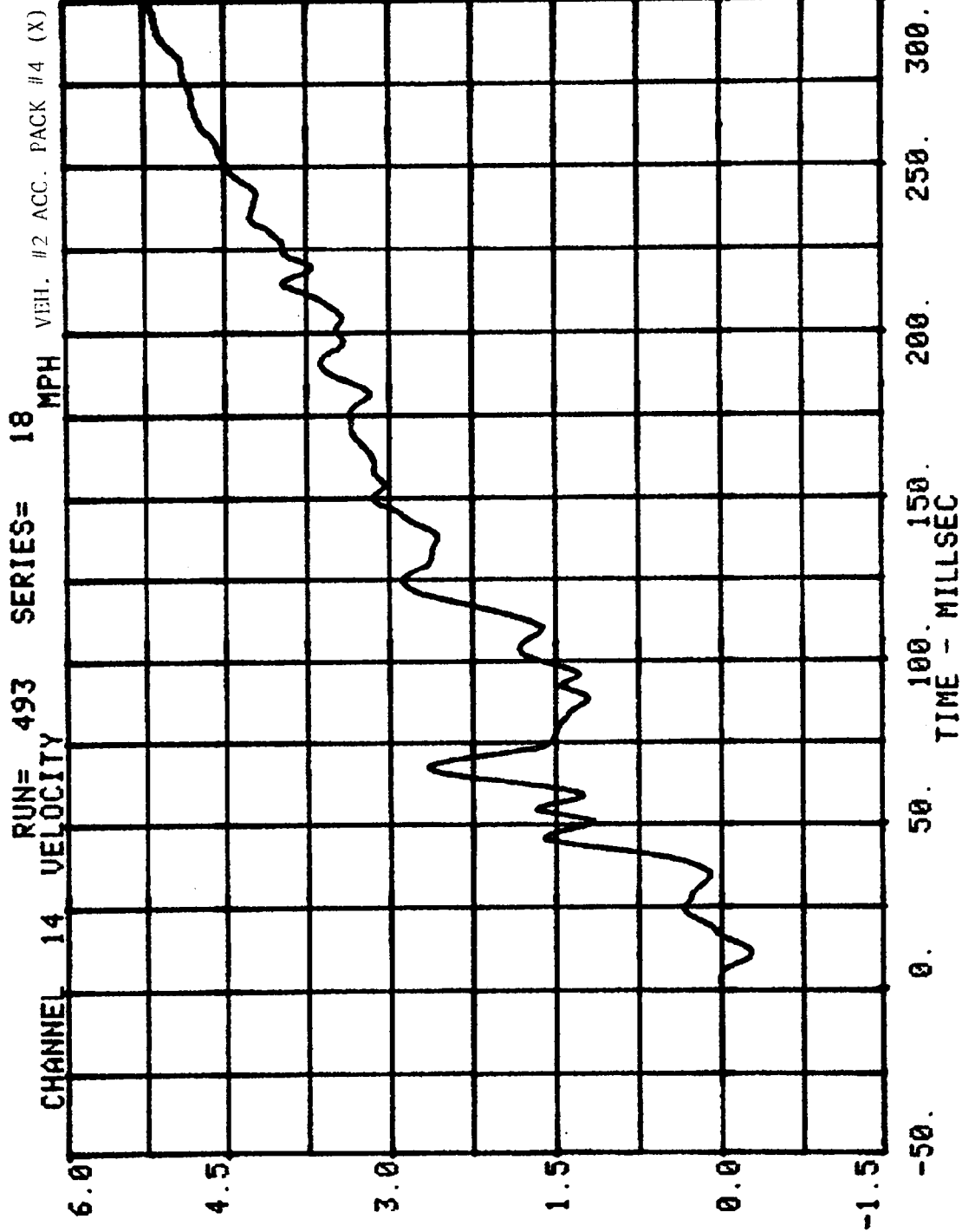


CHANNEL 54 RUN= 493 SERIES= 18
VEH2 ACC PACK 3 2 G'S

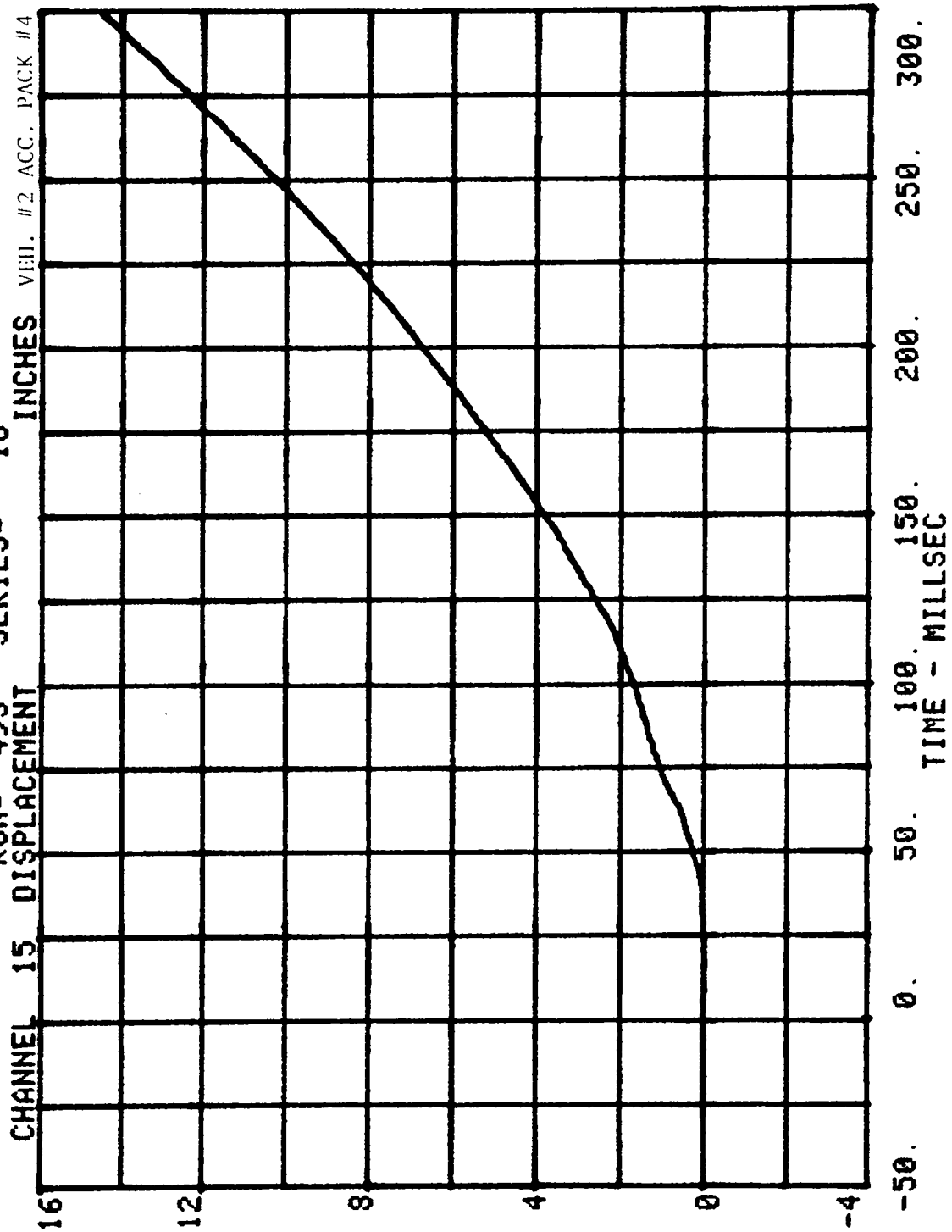


CHANNEL 55 RUN= 493 SERIES= 18
VEH2 ACC PACK 4 X G'S

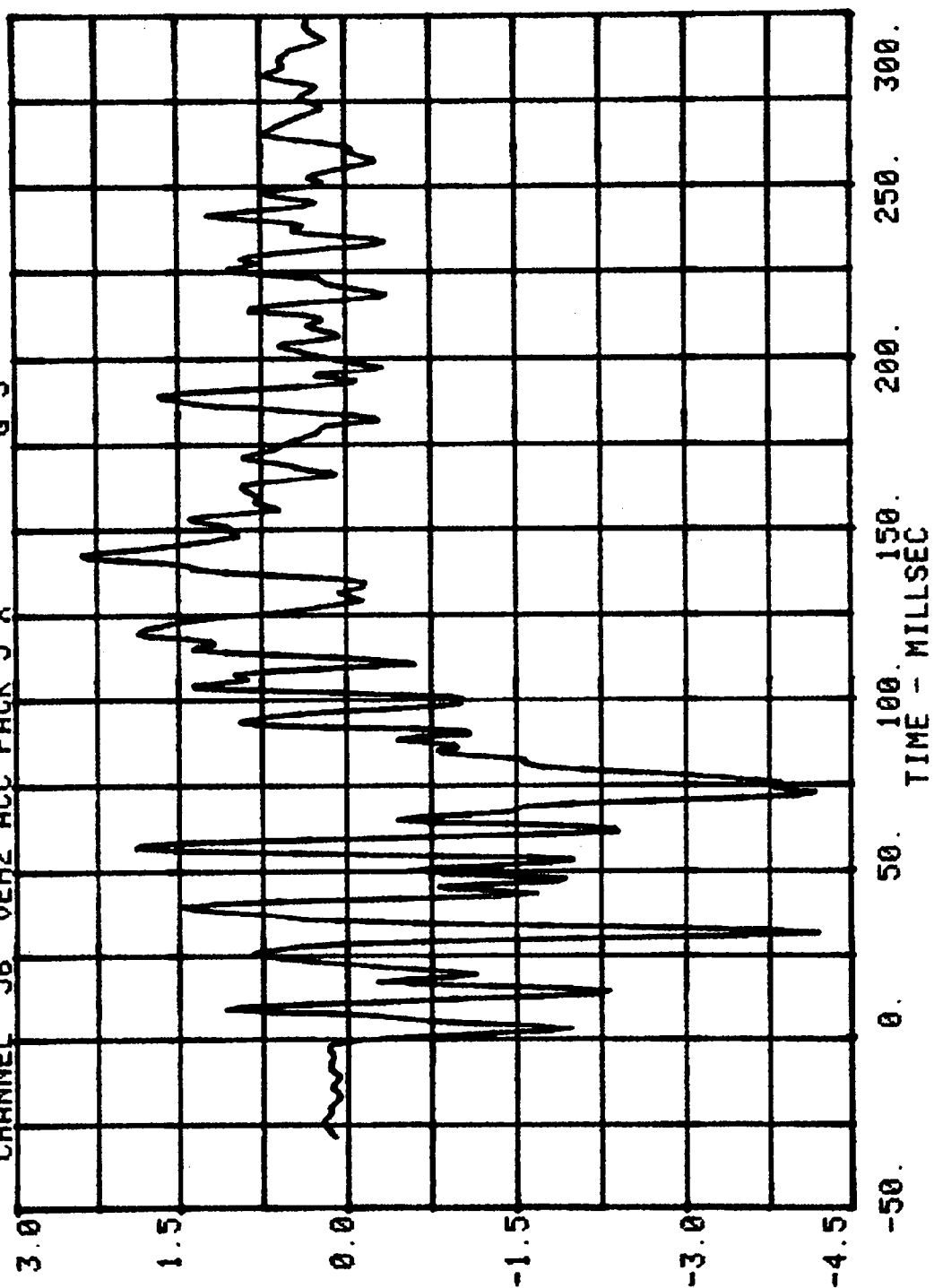


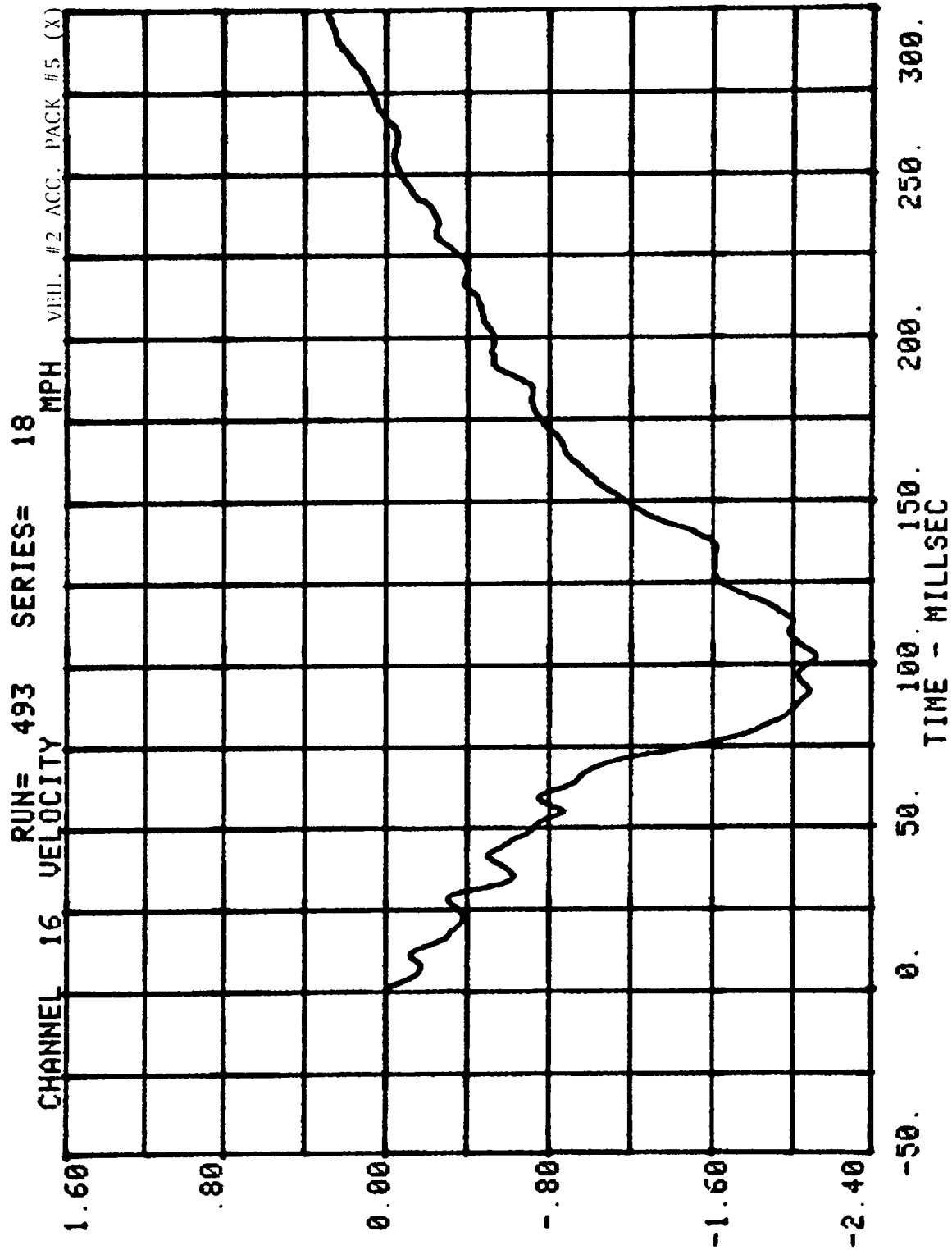


RUN= 493 SERIES= 18 INCHES VEIL. #2 ACC. PACK #4 (X)



CHANNEL 56 RUN= 493 SERIES= 18 G'S
VEH2 ACC PACK 5 X





VEH. #2 ACC. PACK #5 (X)

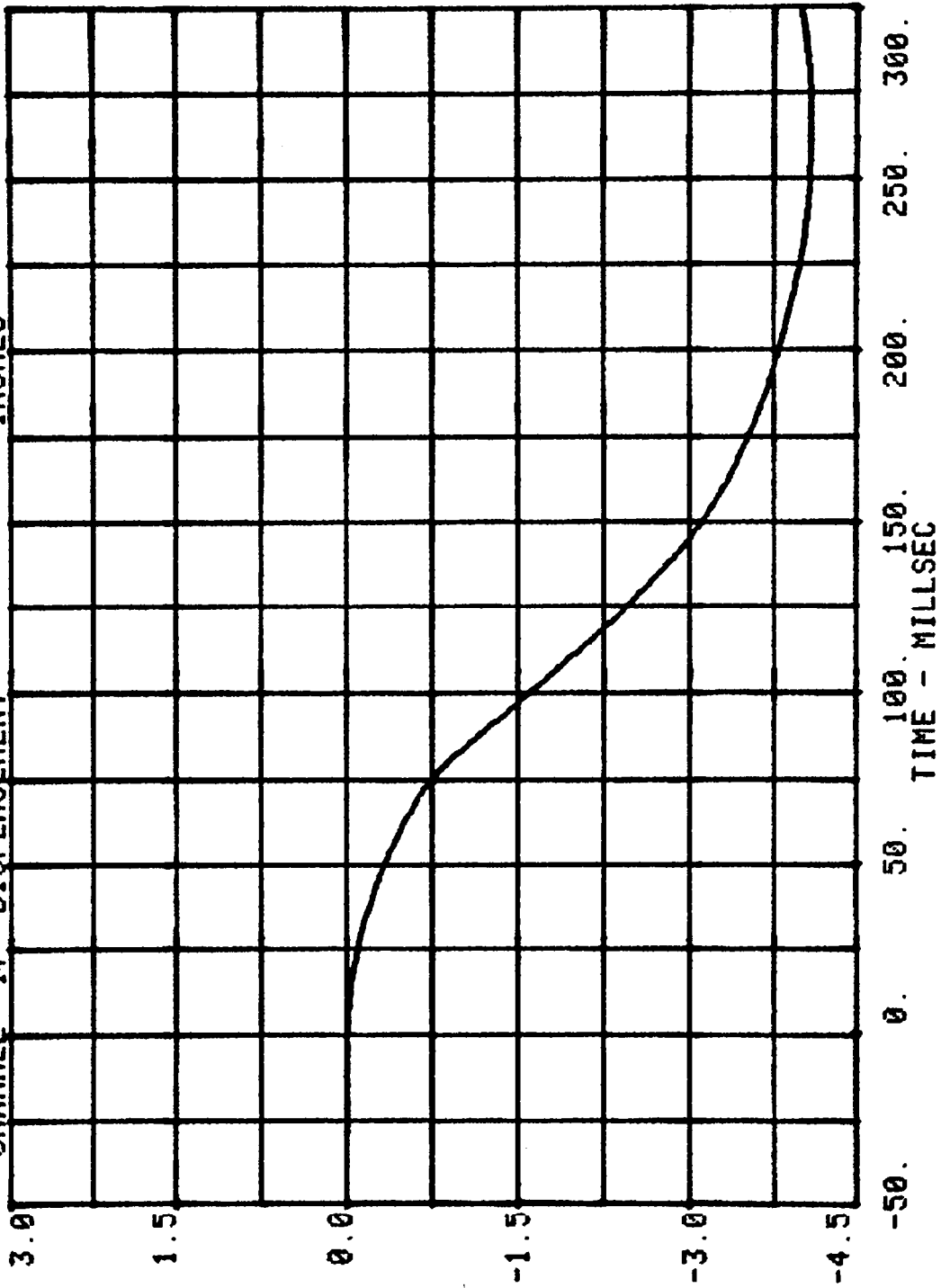
CHANNEL 17 DISPLACEMENT

RUN= 493

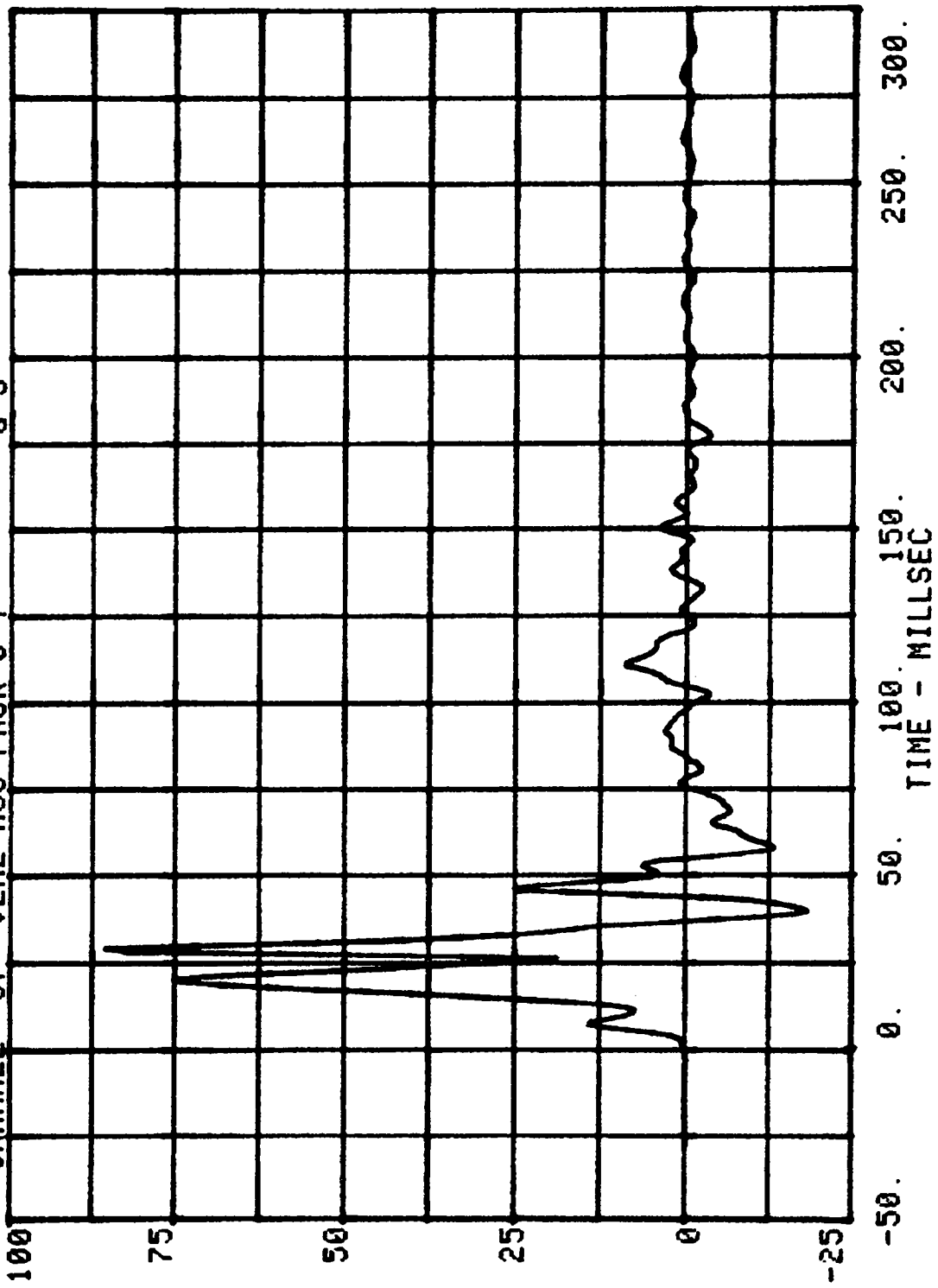
SERIES=

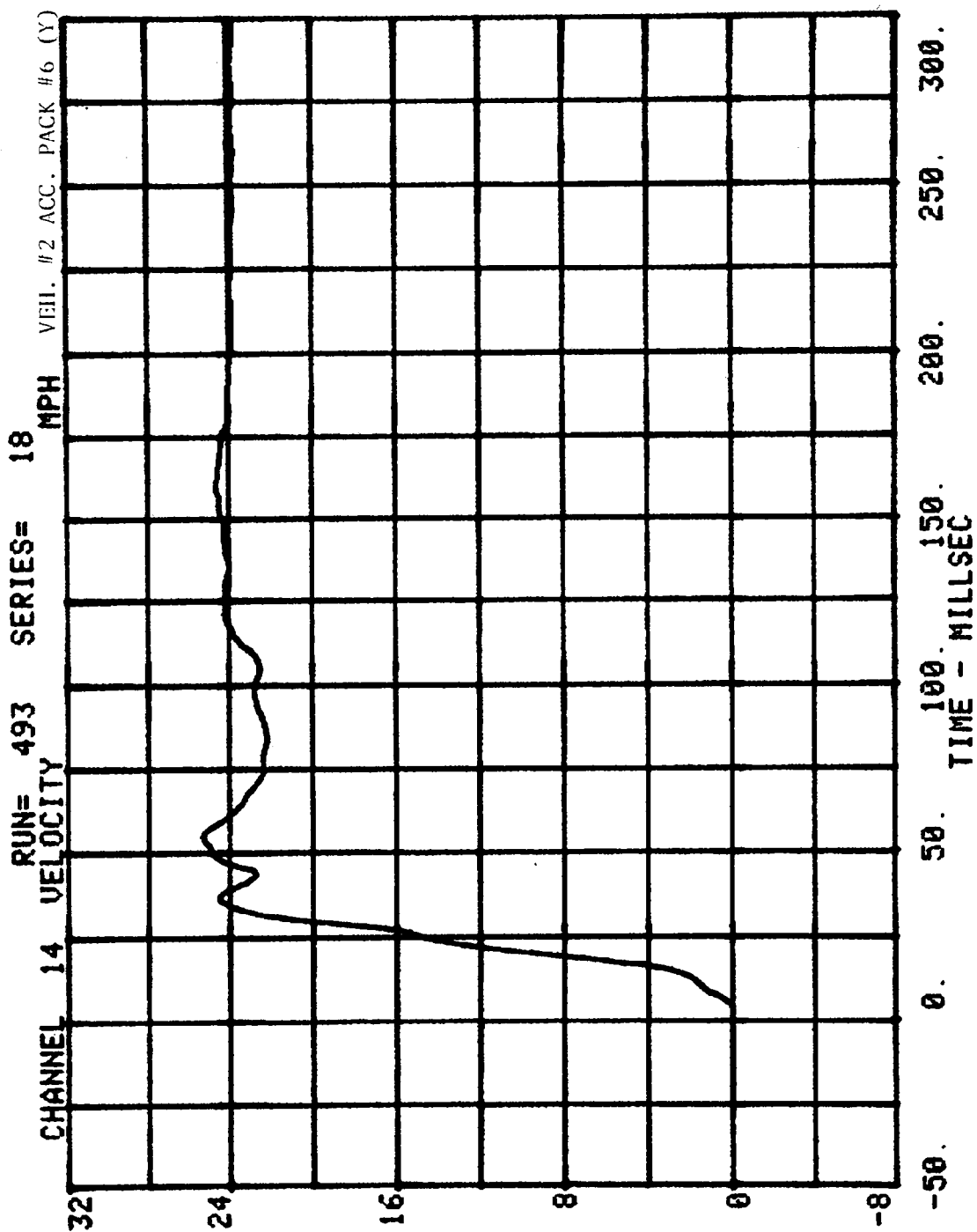
18

INCHES

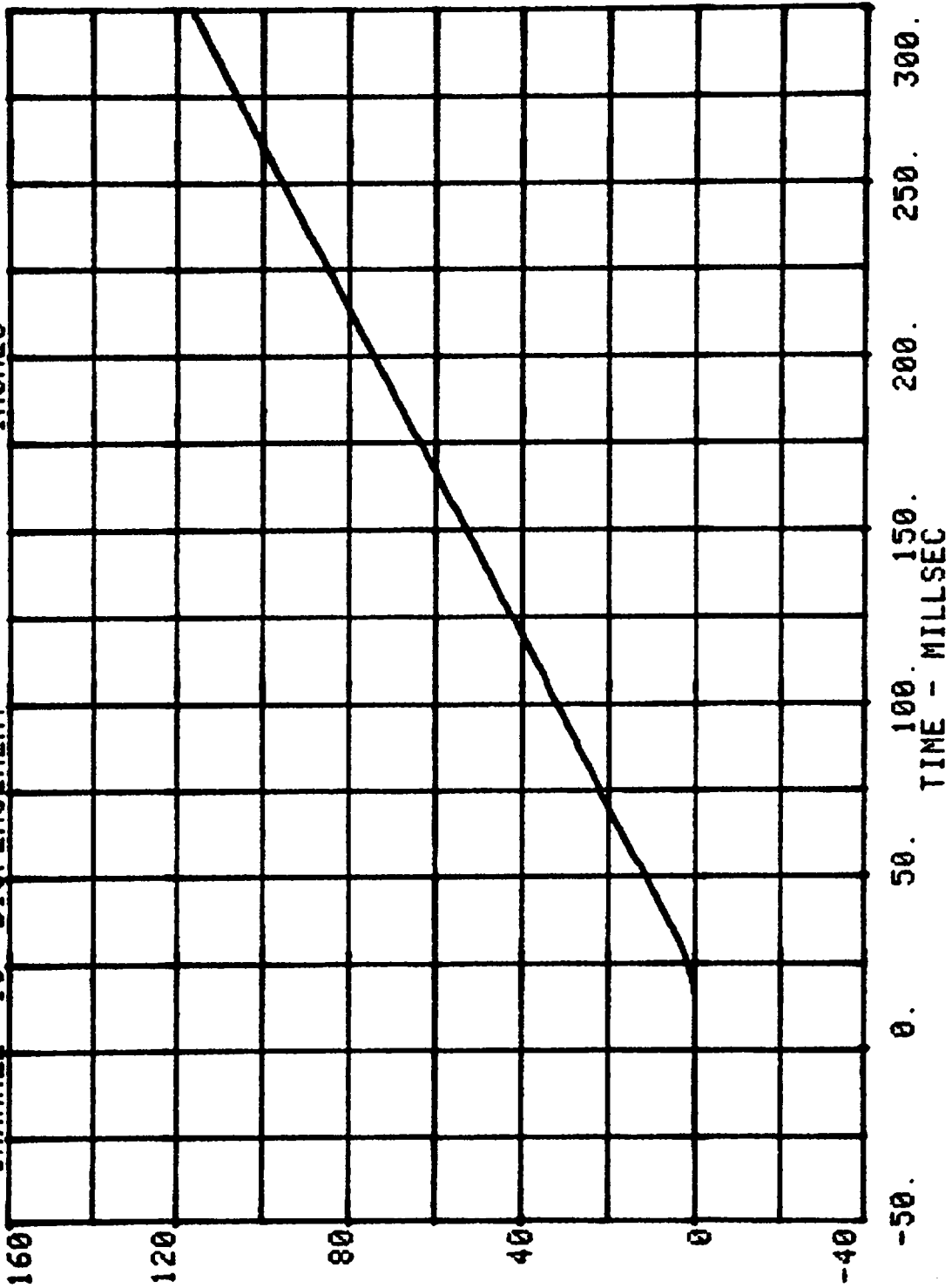


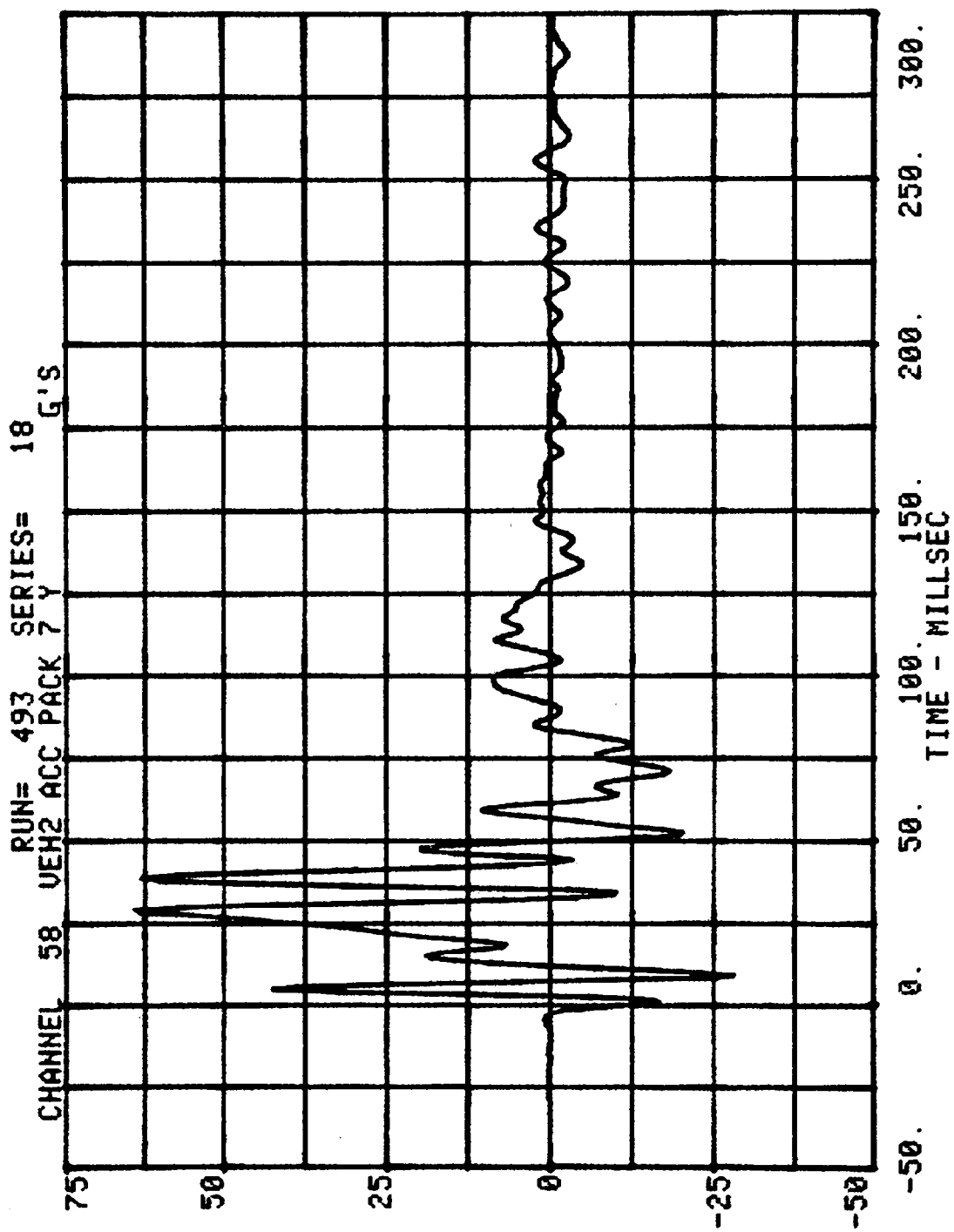
CHANNEL 57 RUN= 493 SERIES= 18
VEH2 ACC PACK 6 Y G'S

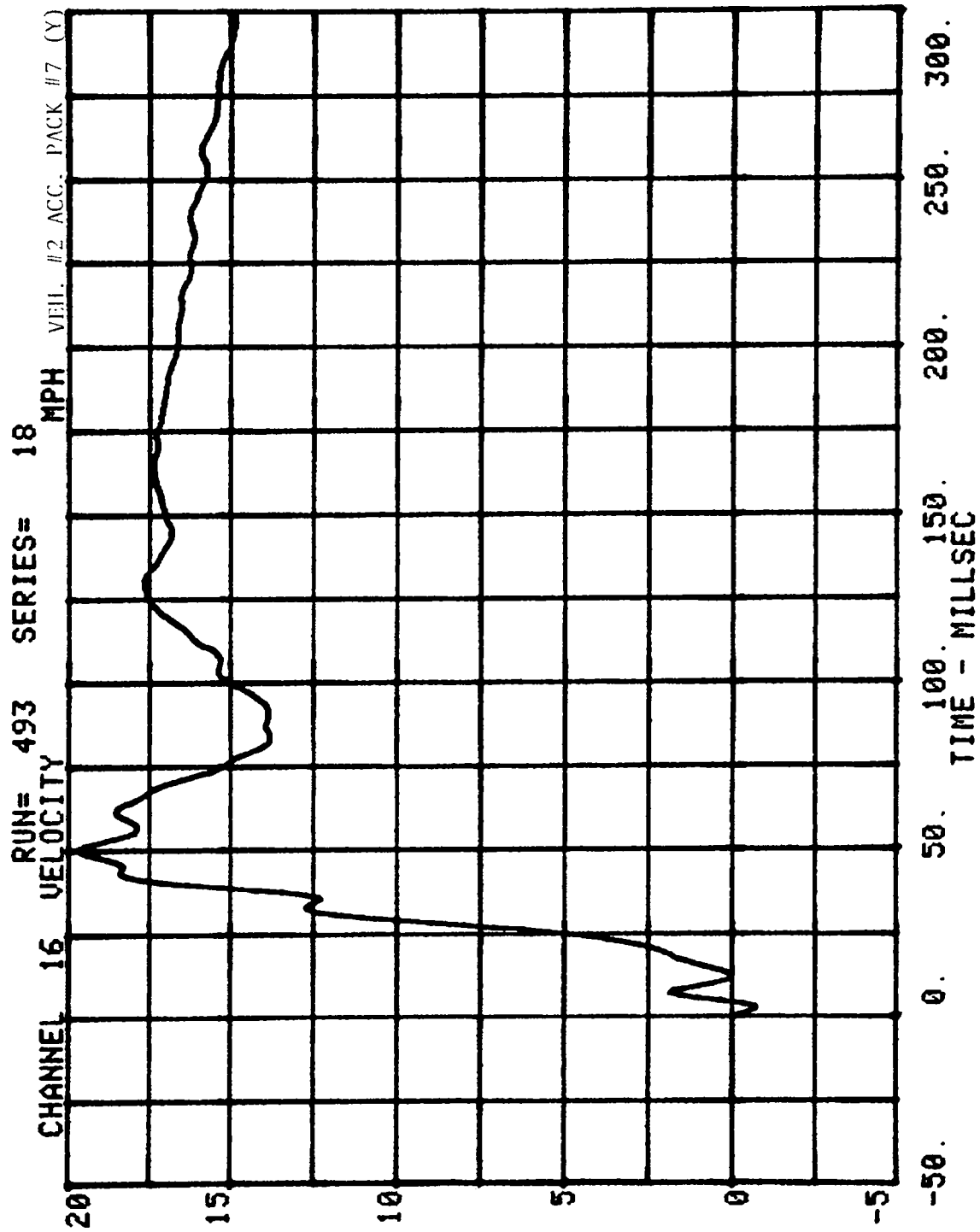




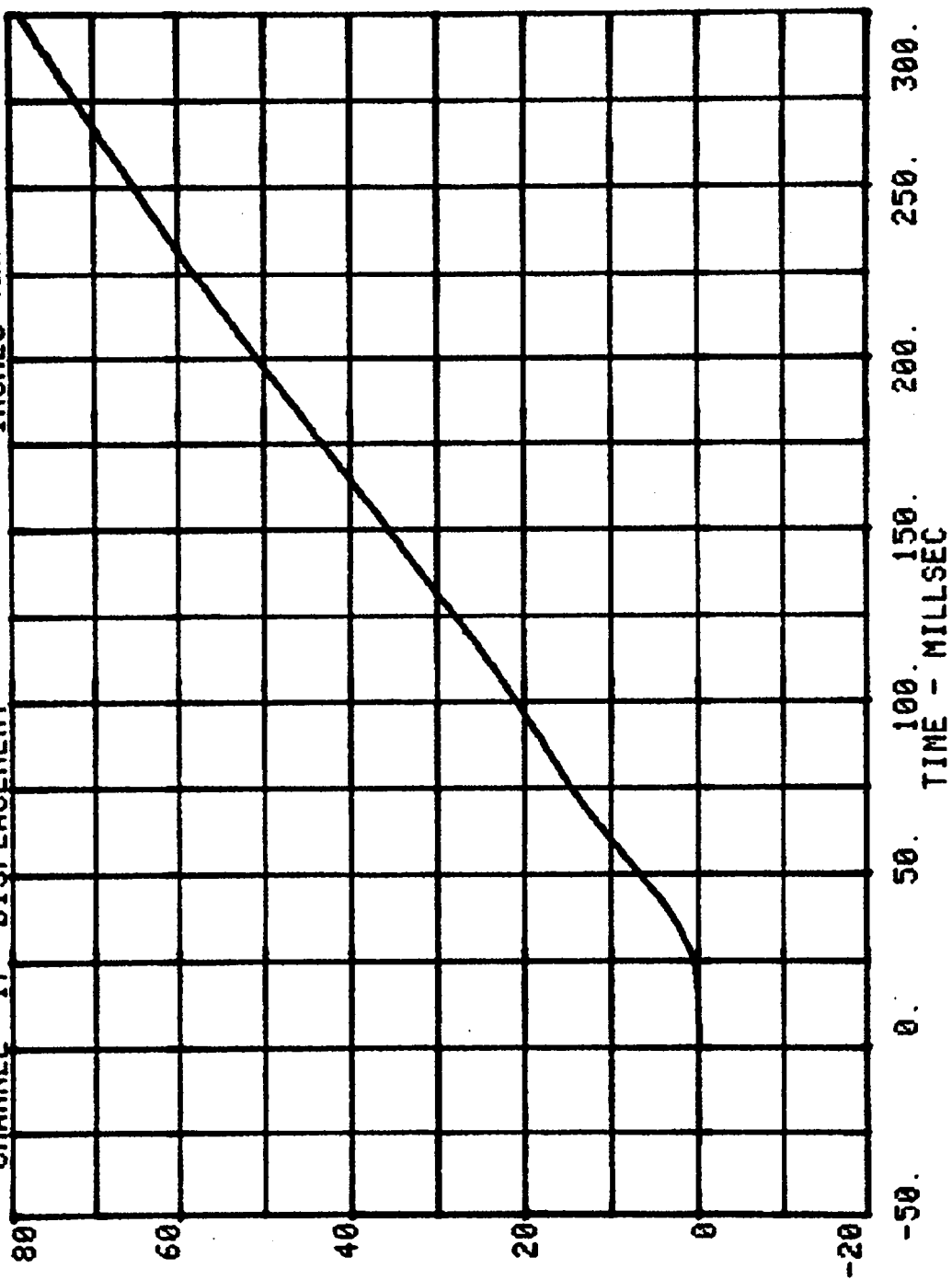
RUN= 493 SERIES= 18 INCHES
 CHANNEL 15 DISPLACEMENT VEIL. #2 ACC. PACK #6 (Y)

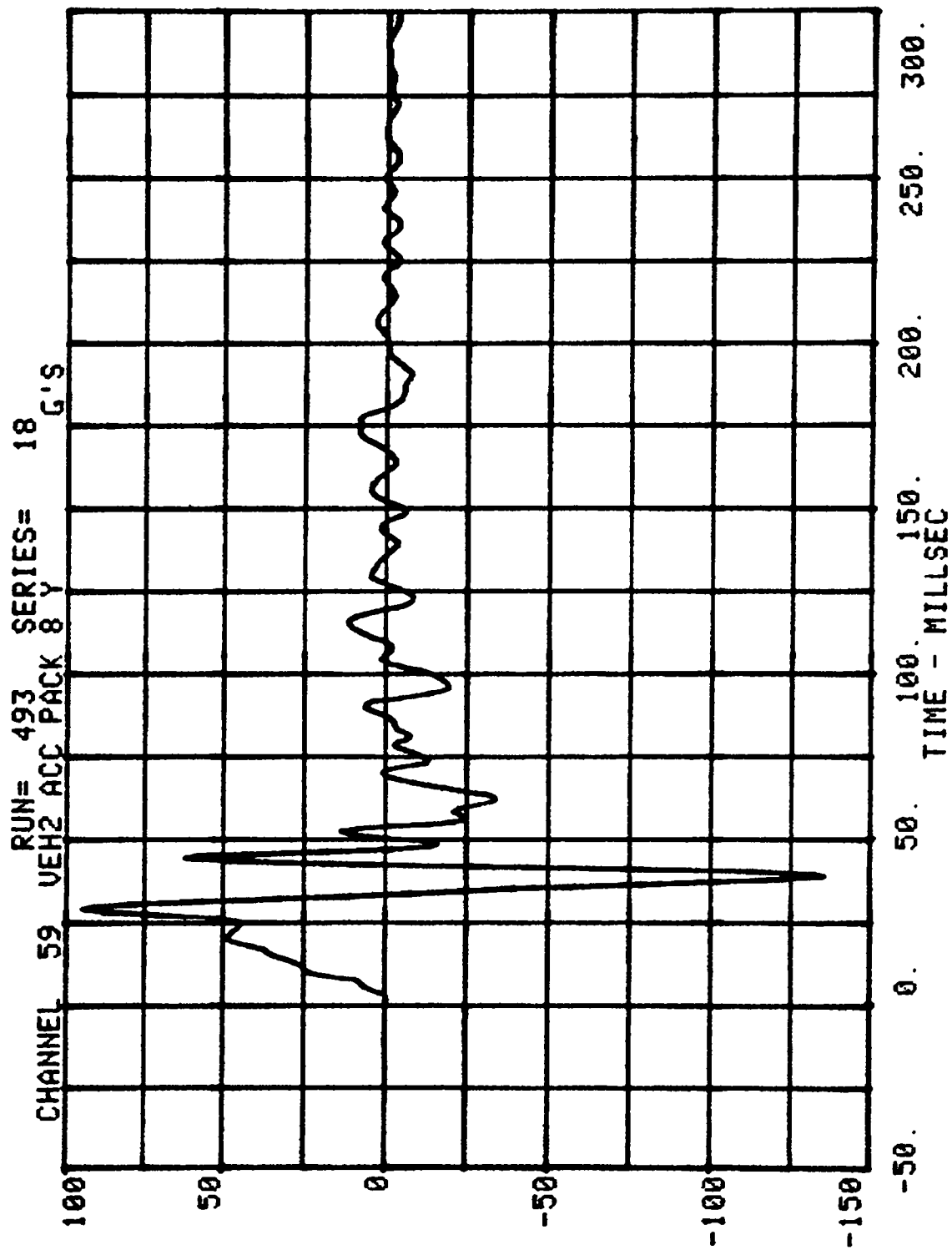


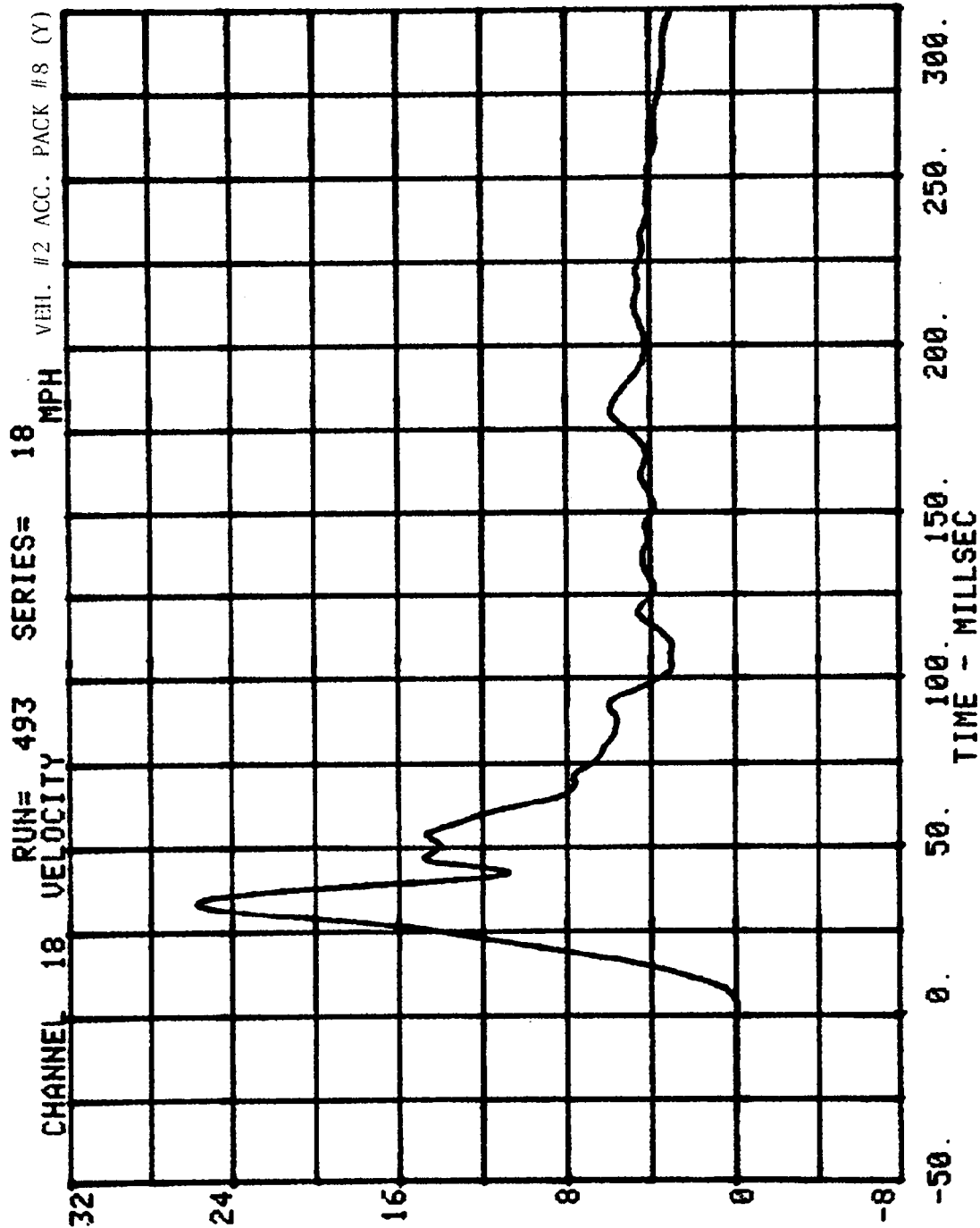


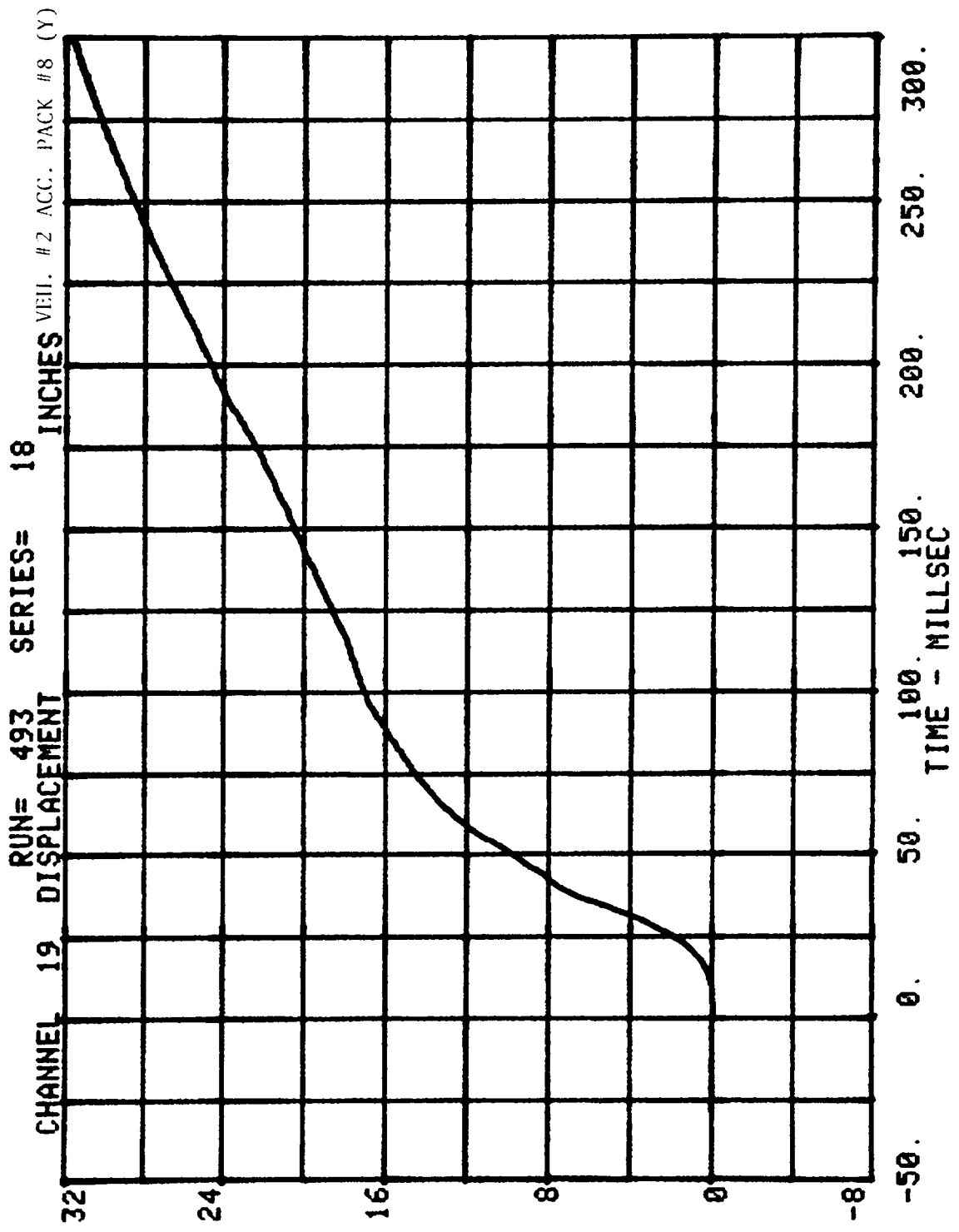


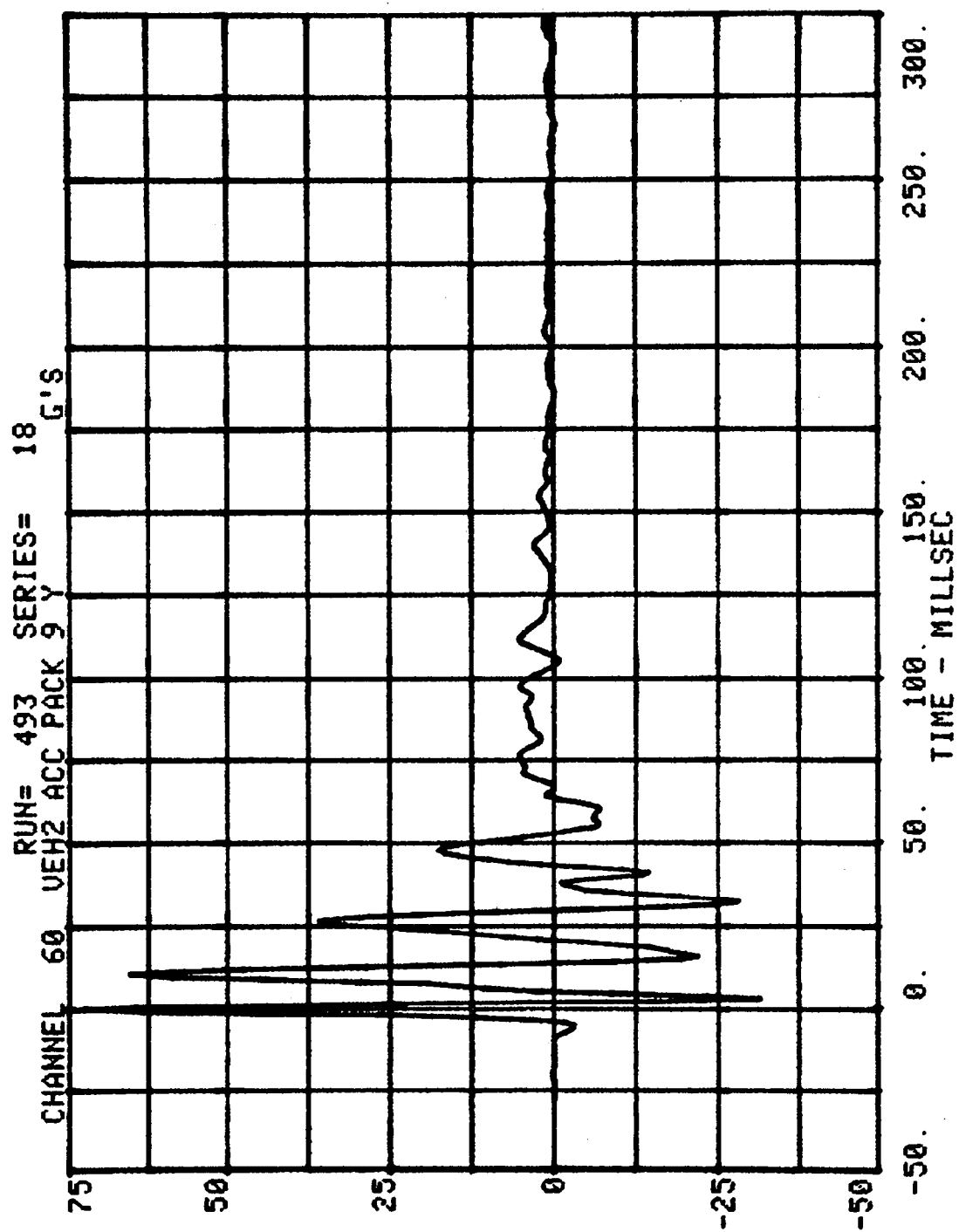
RUN= 493 SERIES= 18 INCHES VEH. #2 ACC. PACK #7 (Y)
 CHANNEL 17 DISPLACEMENT

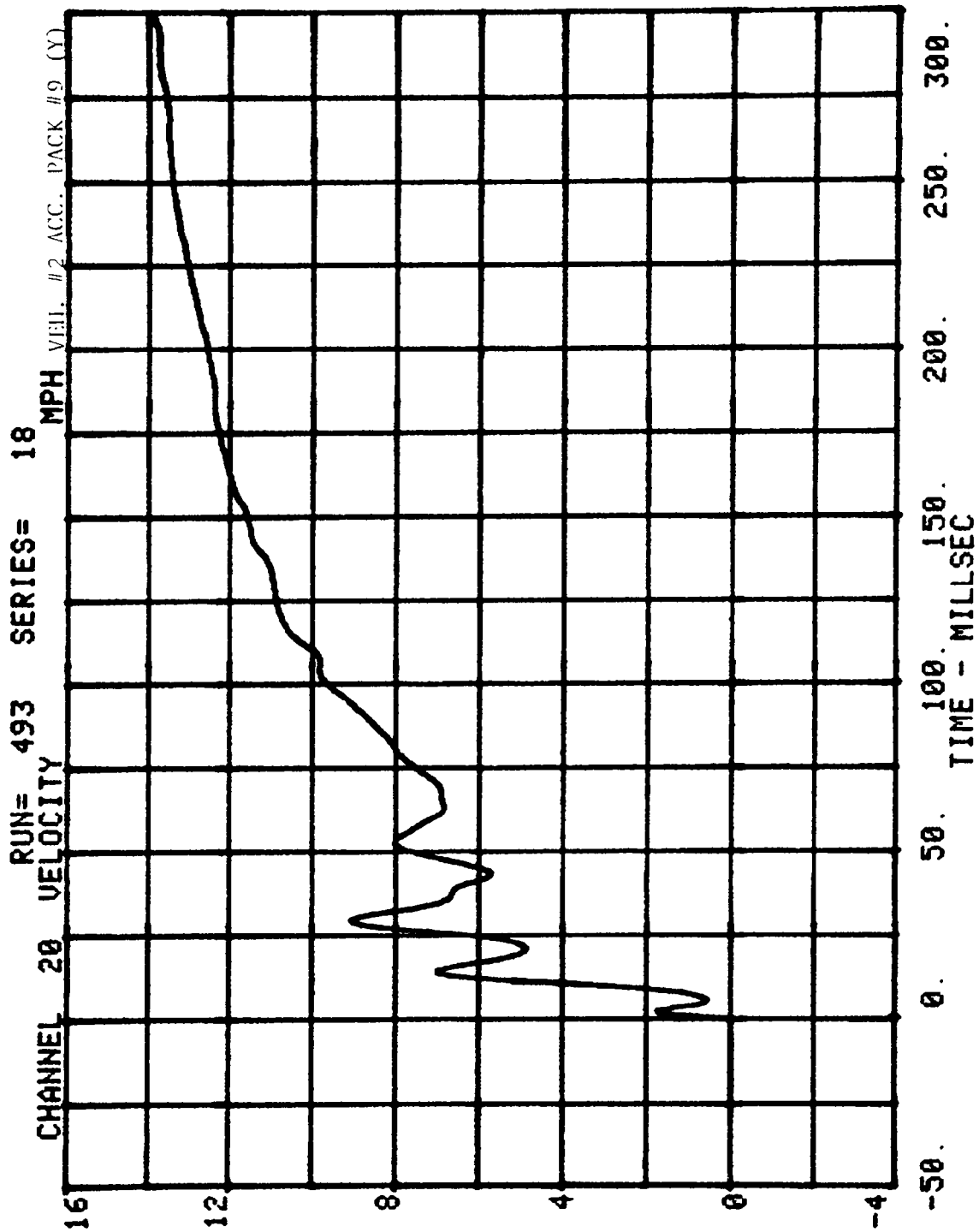


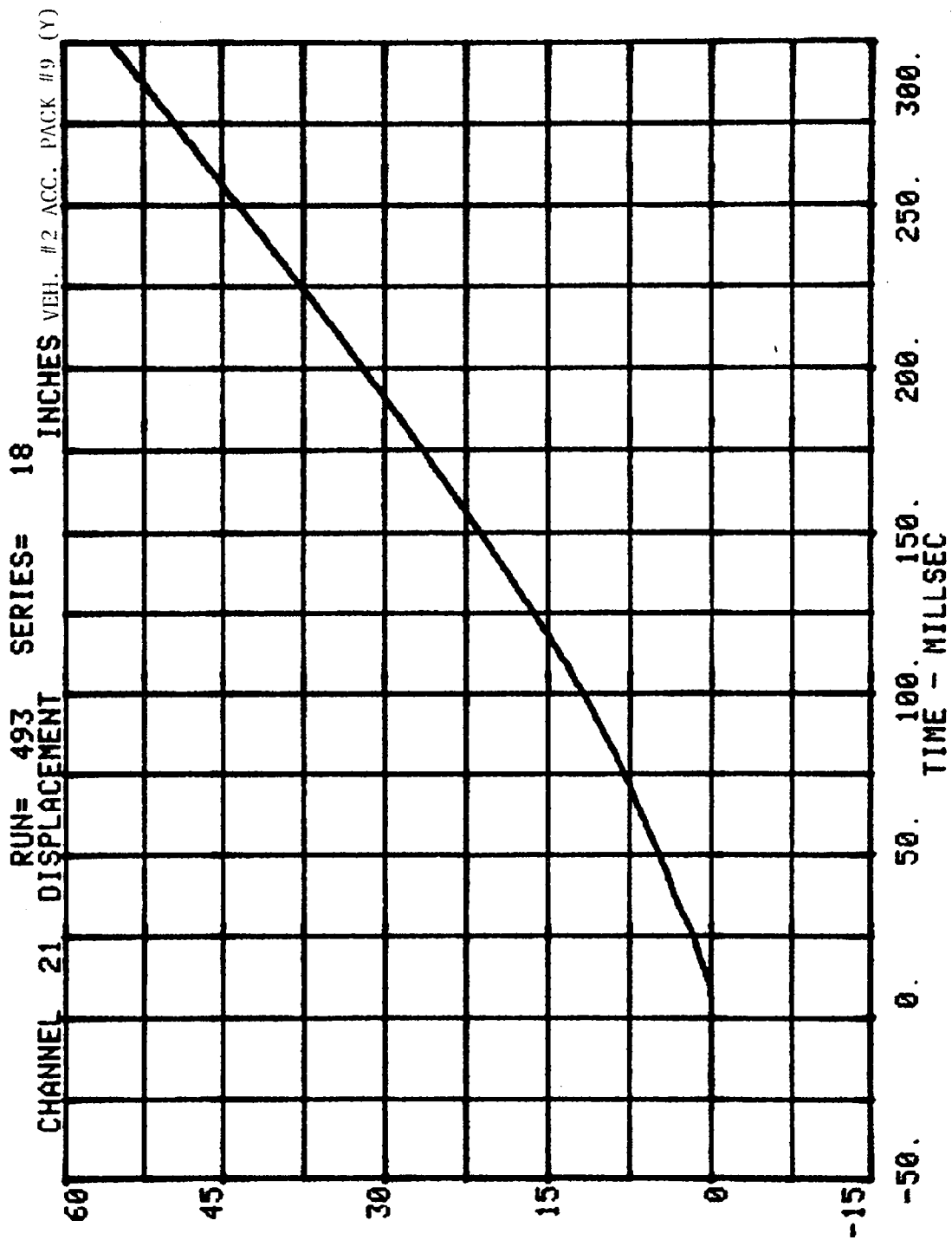


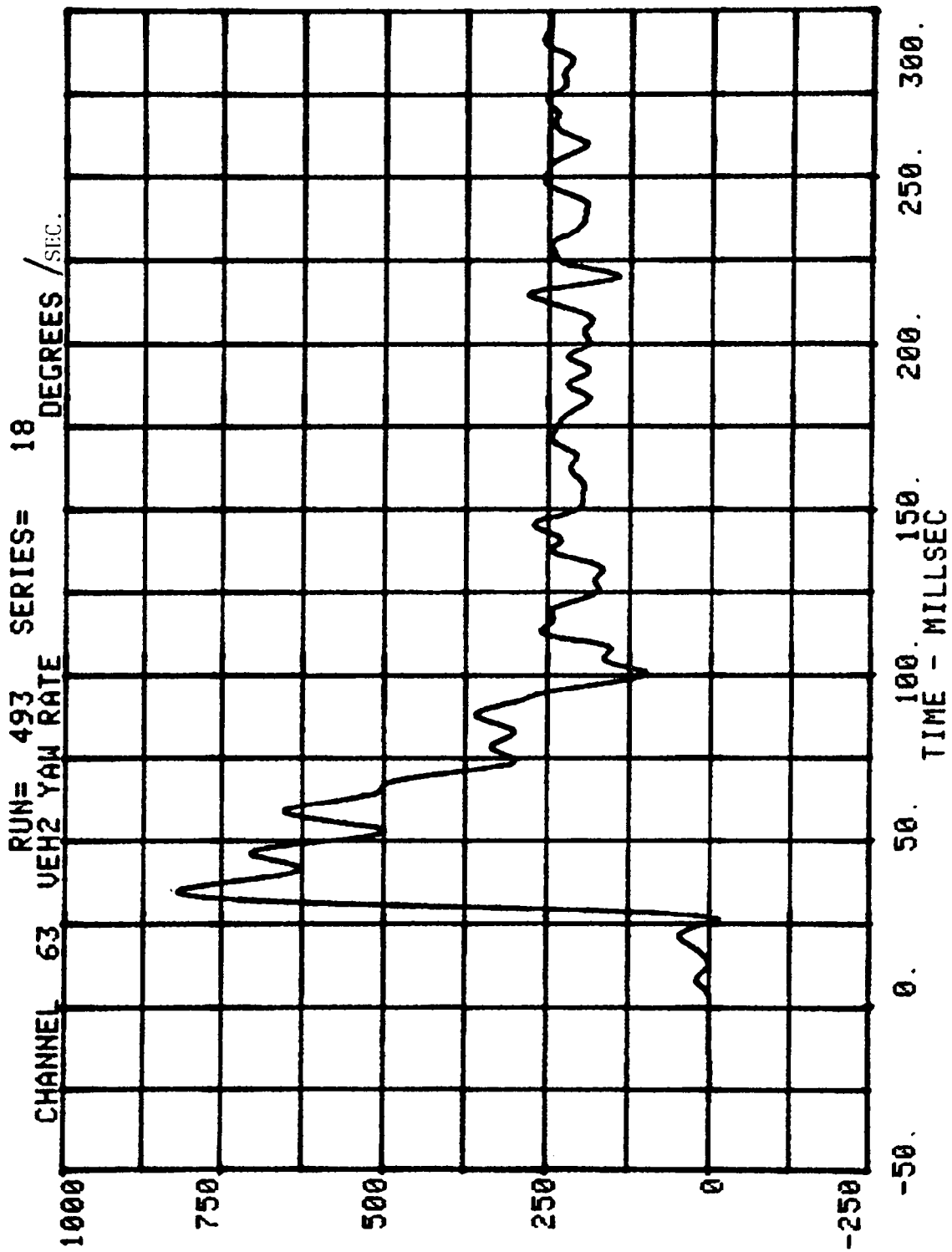


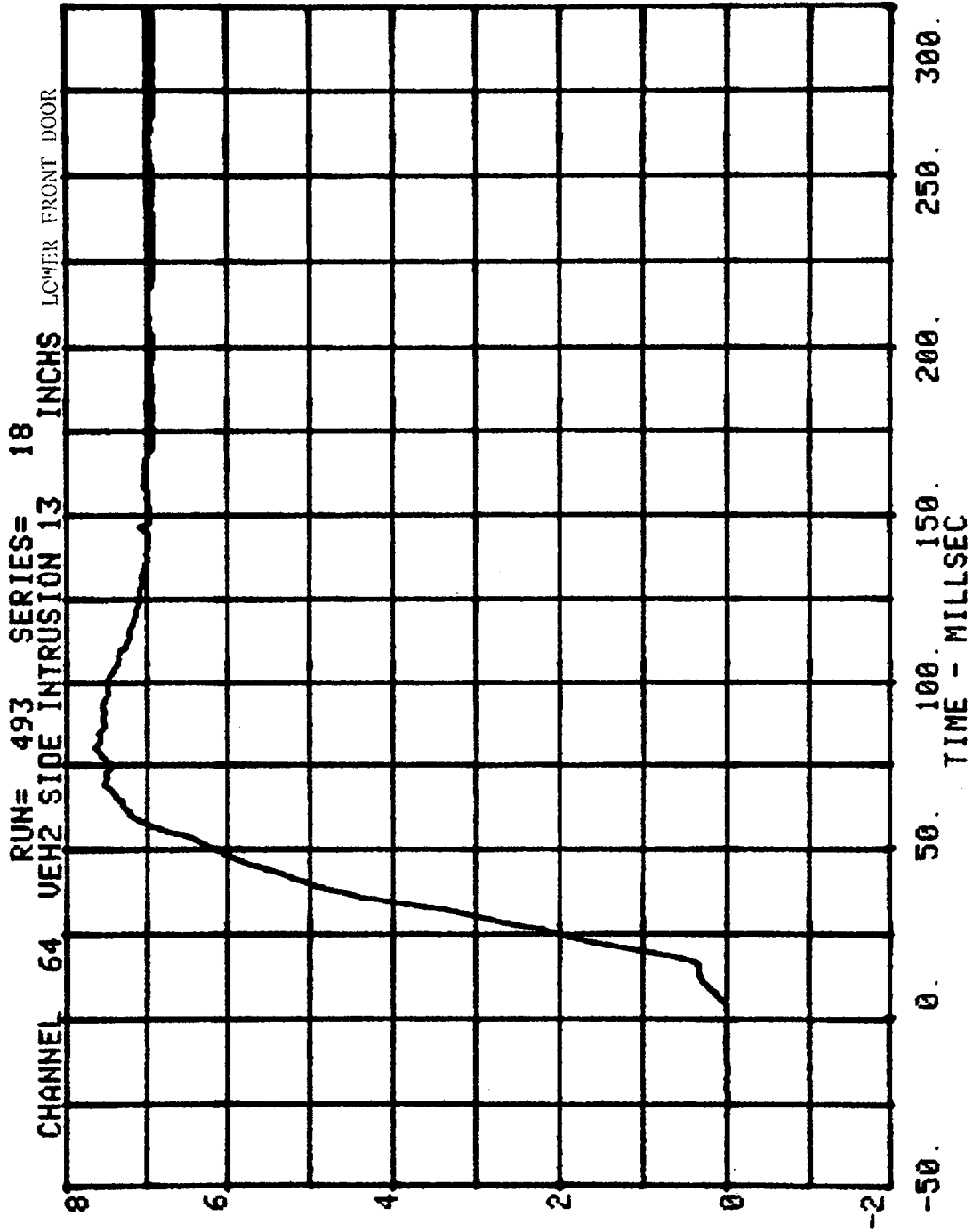


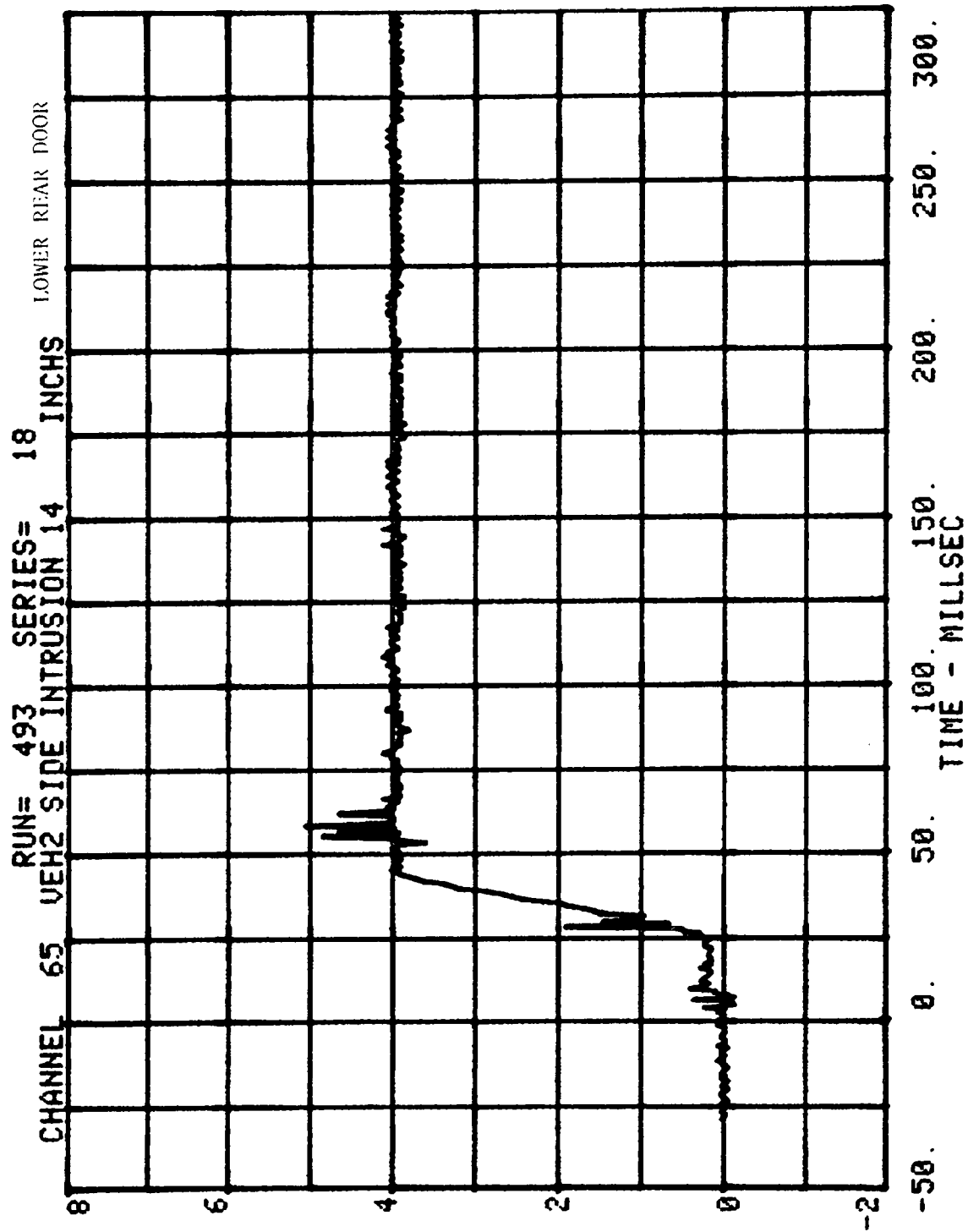


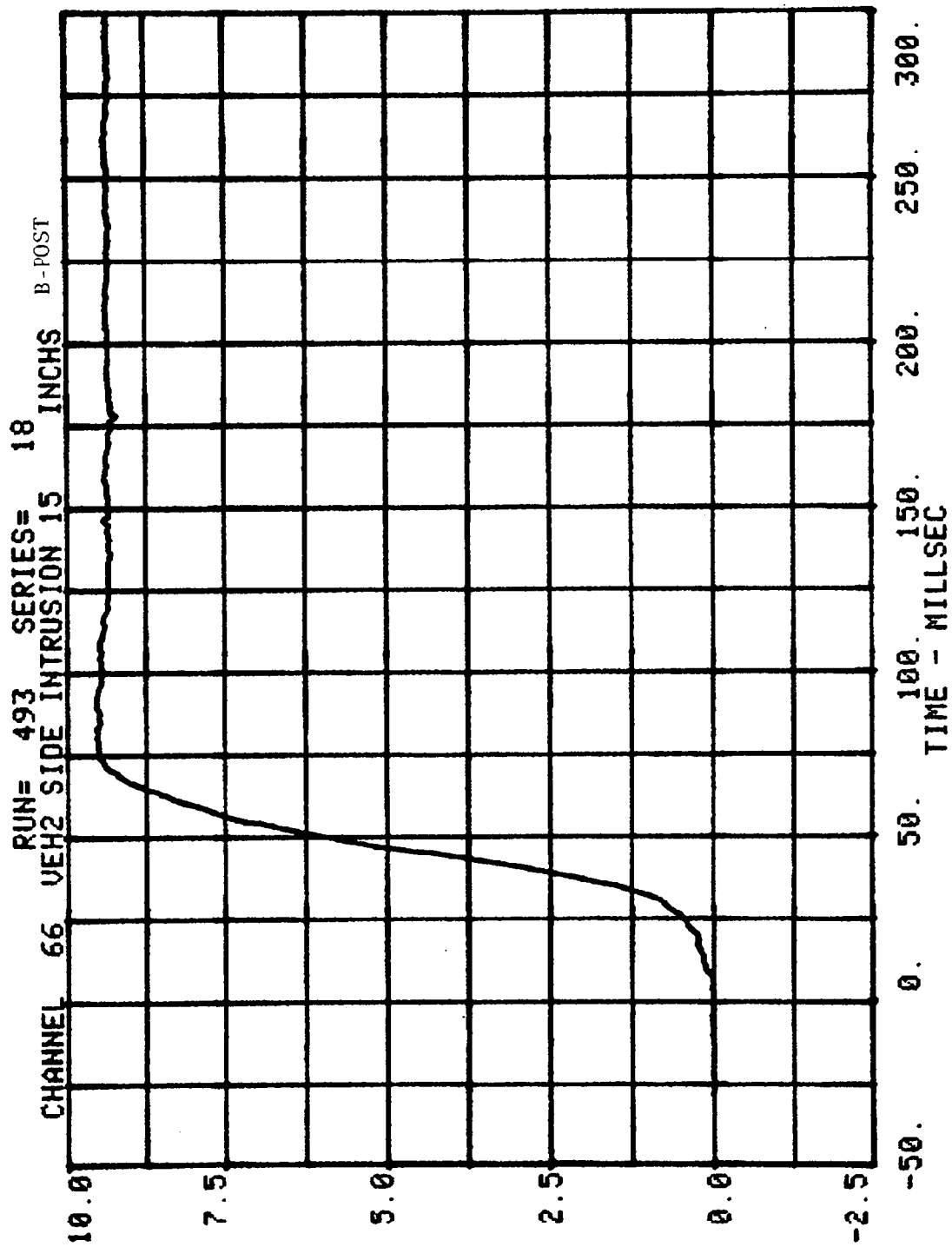












Test No, 17
Vehicle 2 - 1976 Volkswagen Rabbit
Dummy Data

	Filter Channel Class
Head Accelerations	1000
Chest Accelerations	180
Pelvic Accelerations	180

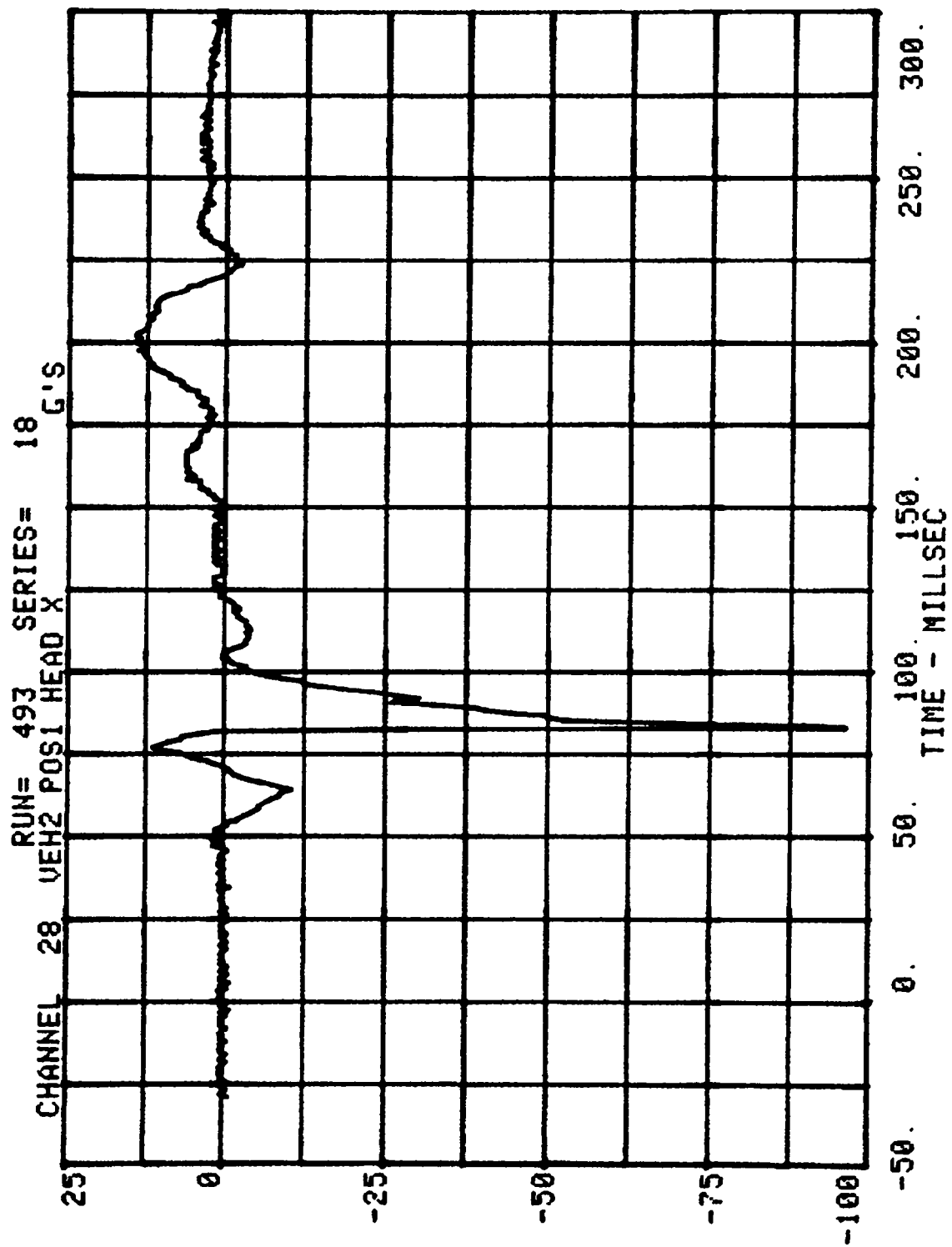
HEAD INJURY CRITERION
HEAD SEVERITY INDEX

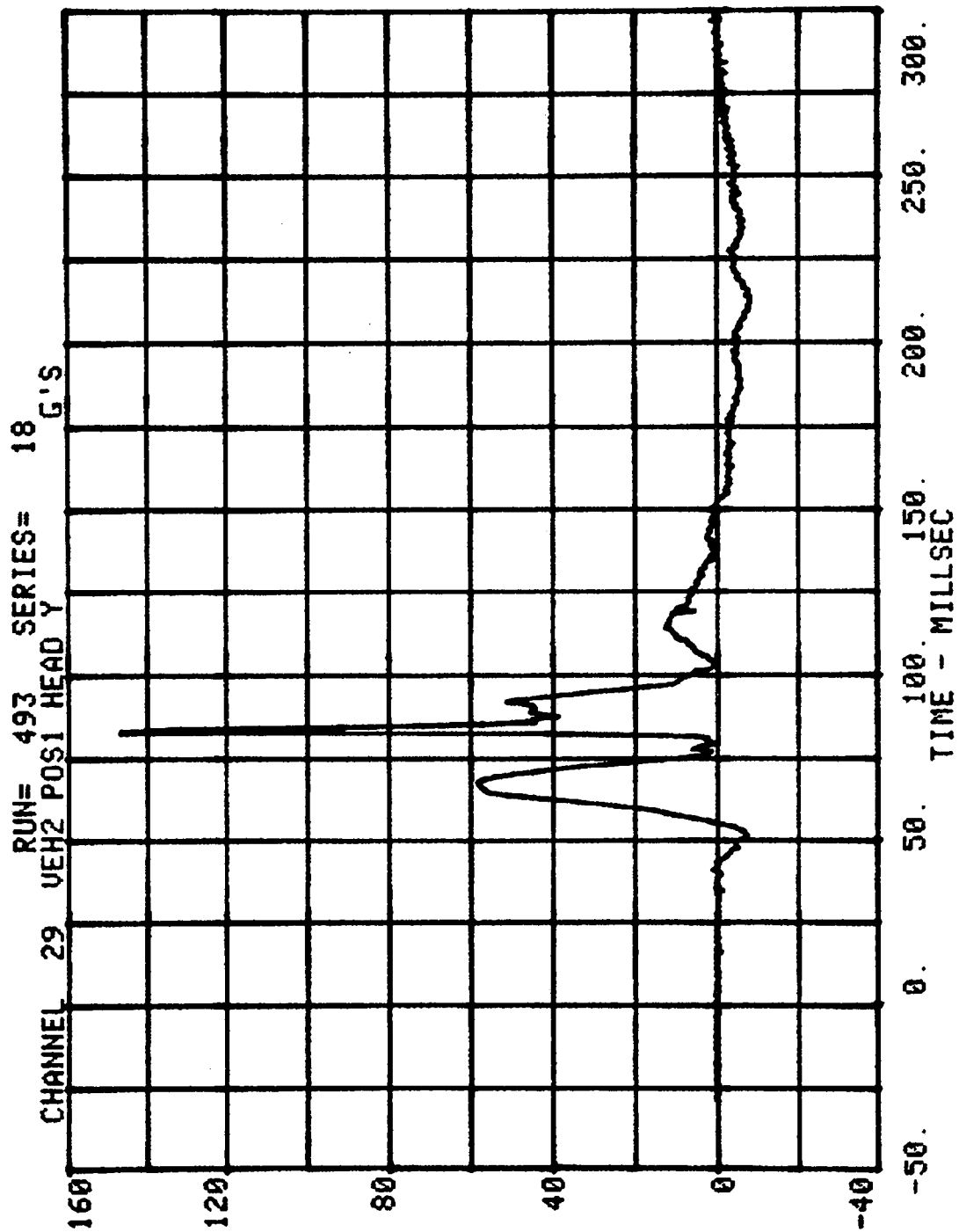
SIDE IMPACT CAR TO CAR BUDD #17

RUN= 493

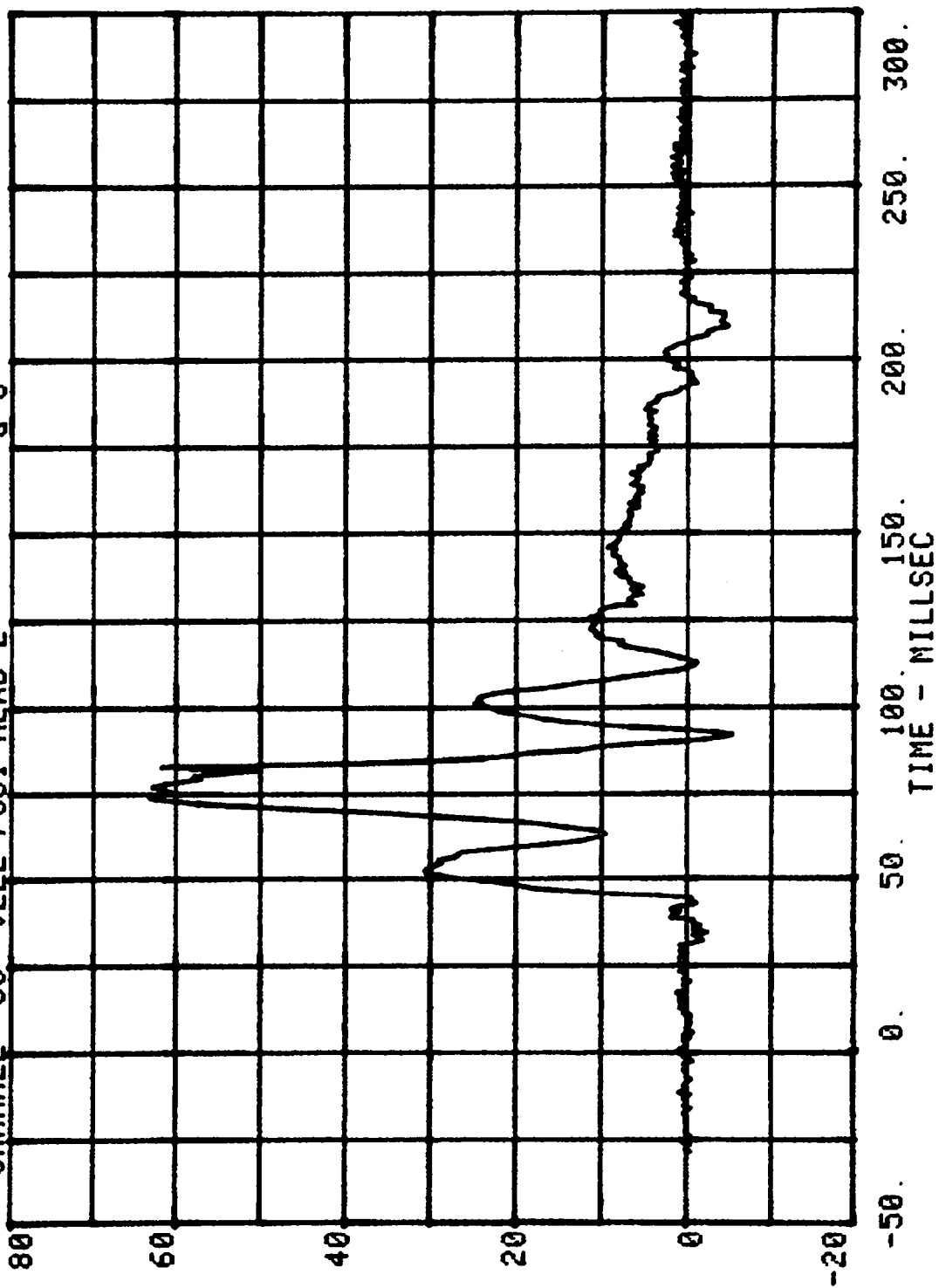
VEL #2 POS #1 HEAD R

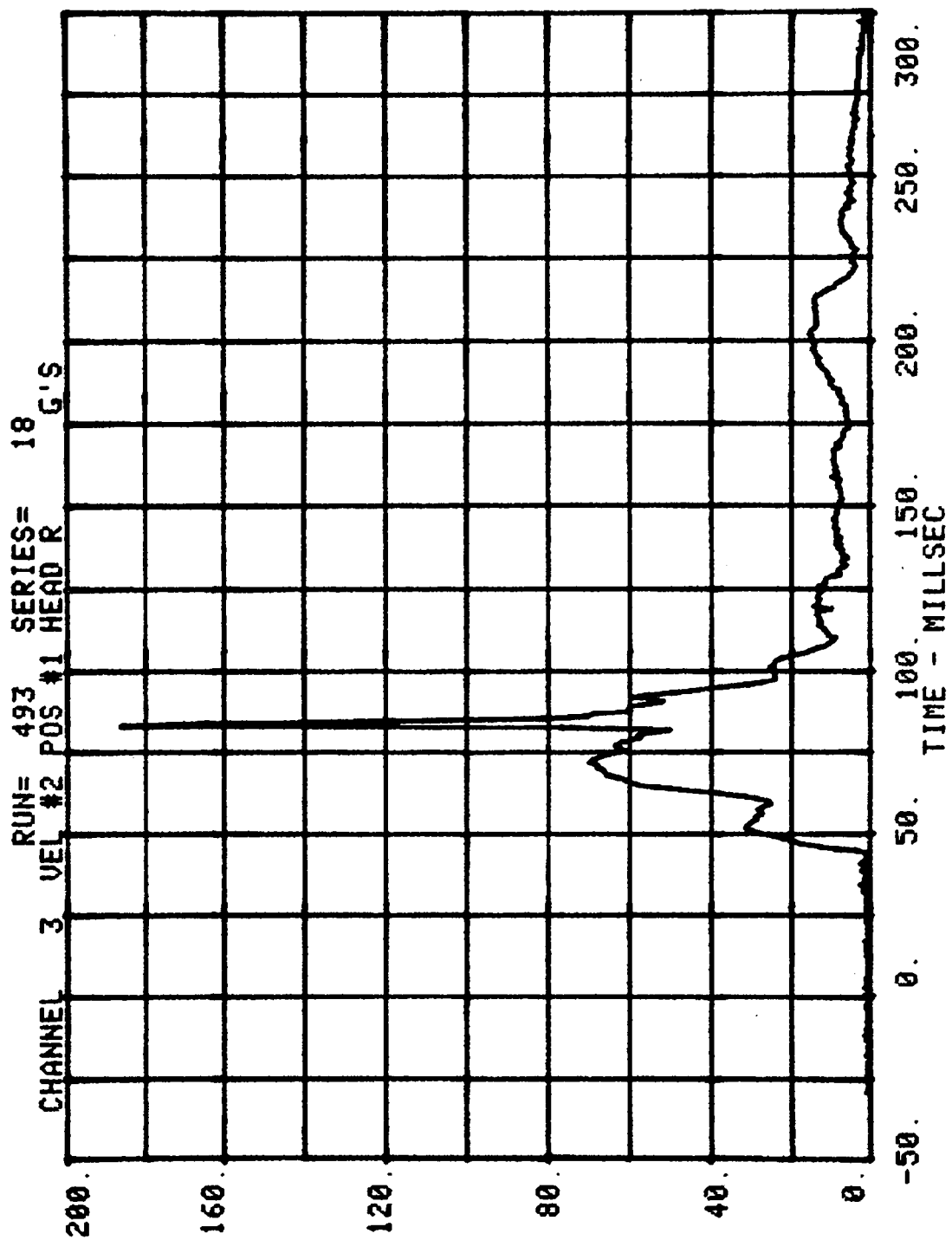
HIC=1211.6 FROM T1= .06240 TO T2= .09480
AVERAGE ACCELERATION BETWEEN T1 AND T2= 67.5G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX=1756.2



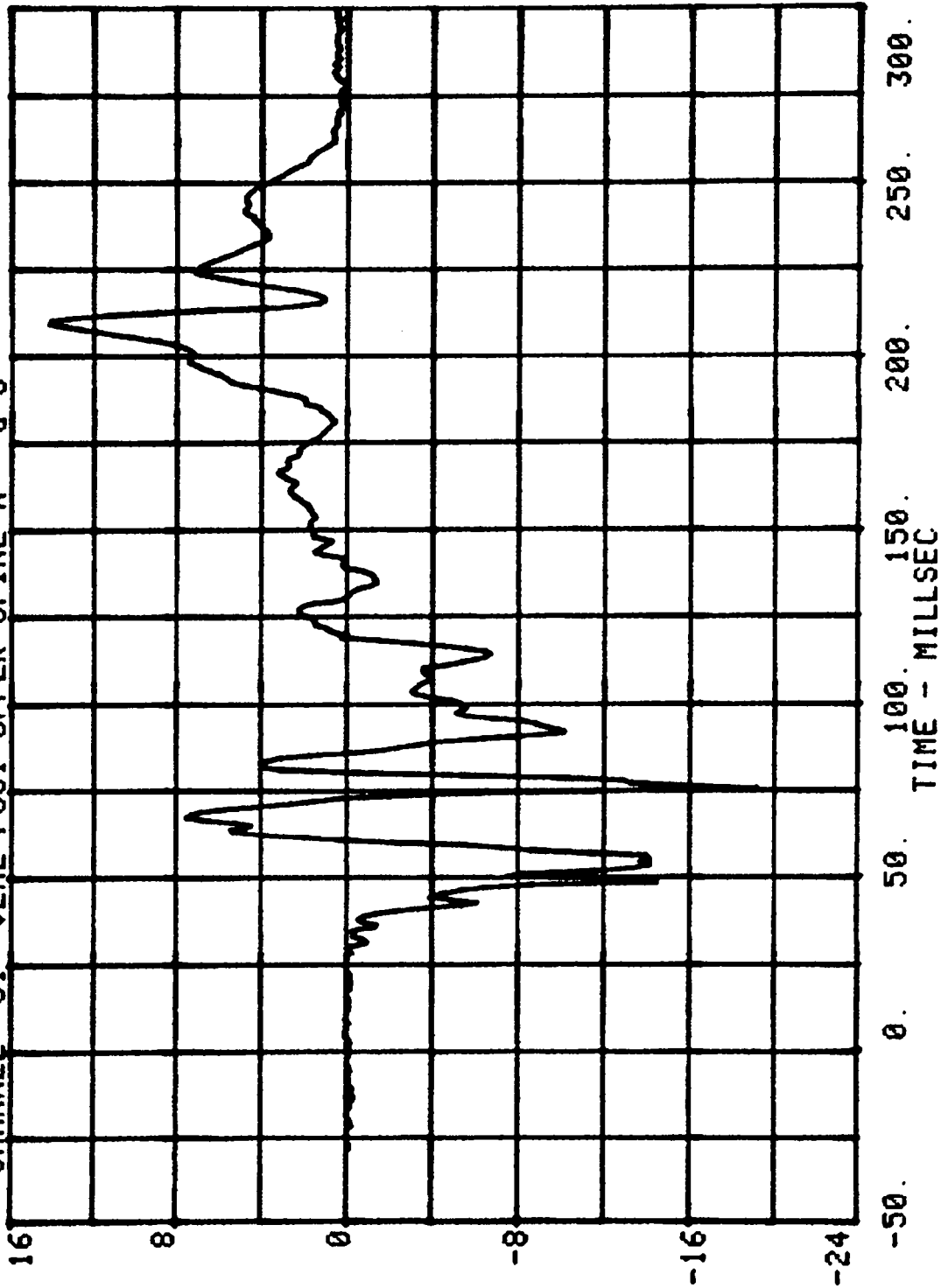


CHANNEL 30 VEL2 POS1 HEAD Z RUN= 493 SERIES= 18 G'S

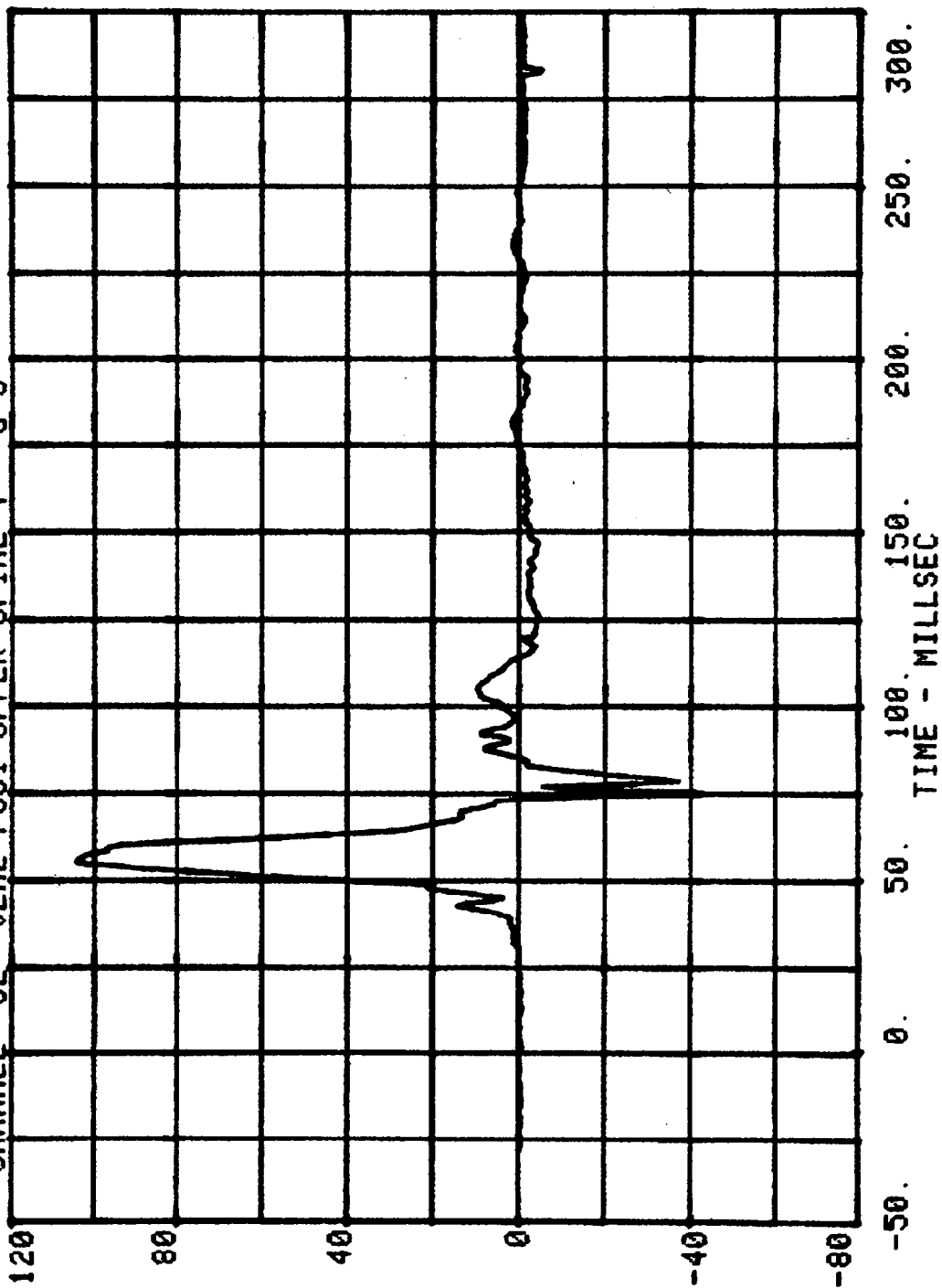




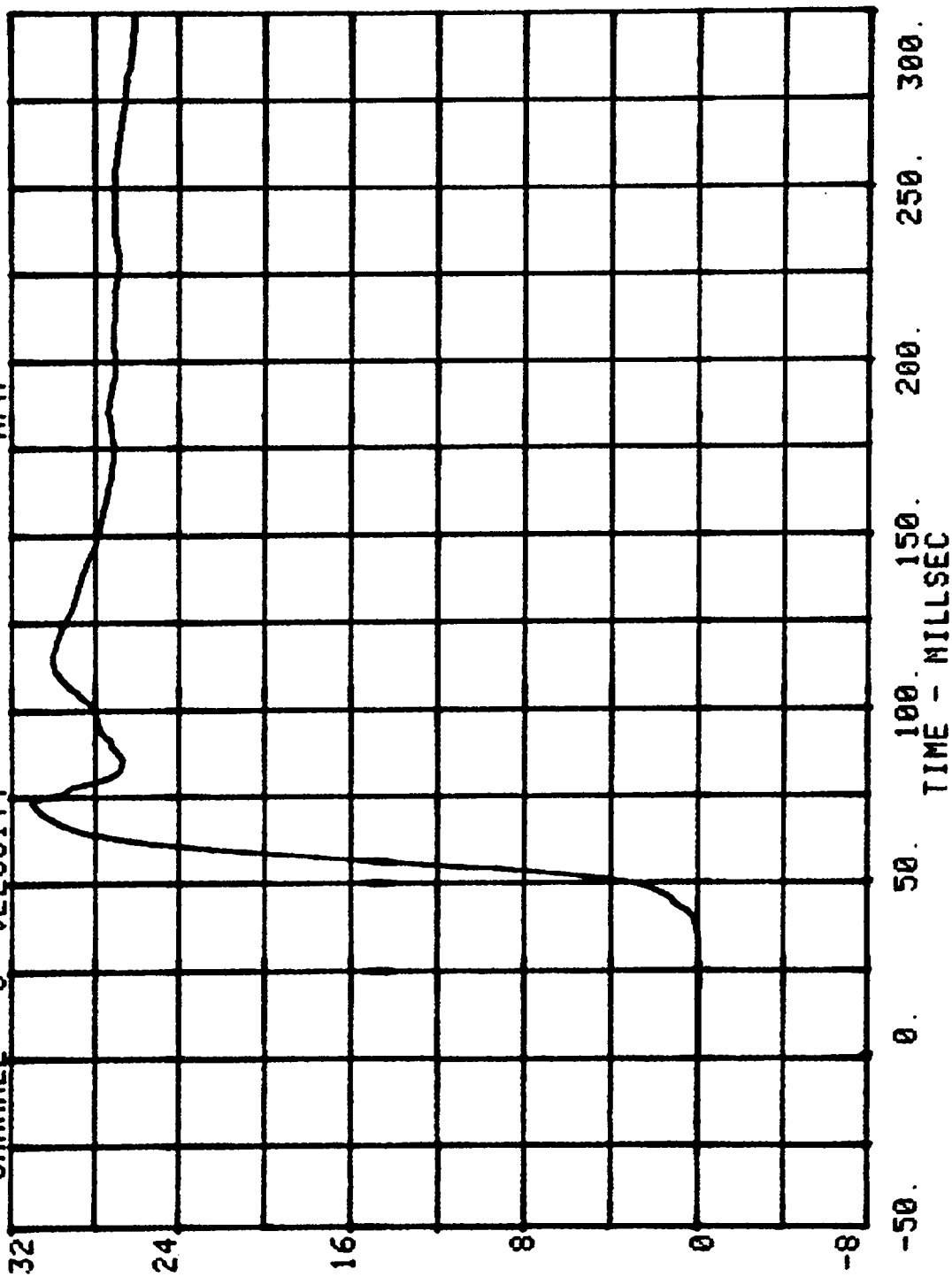
CHANNEL 31 RUN= 493 SERIES= 18
VEH2 POS1 UPPER SPINE X G'S



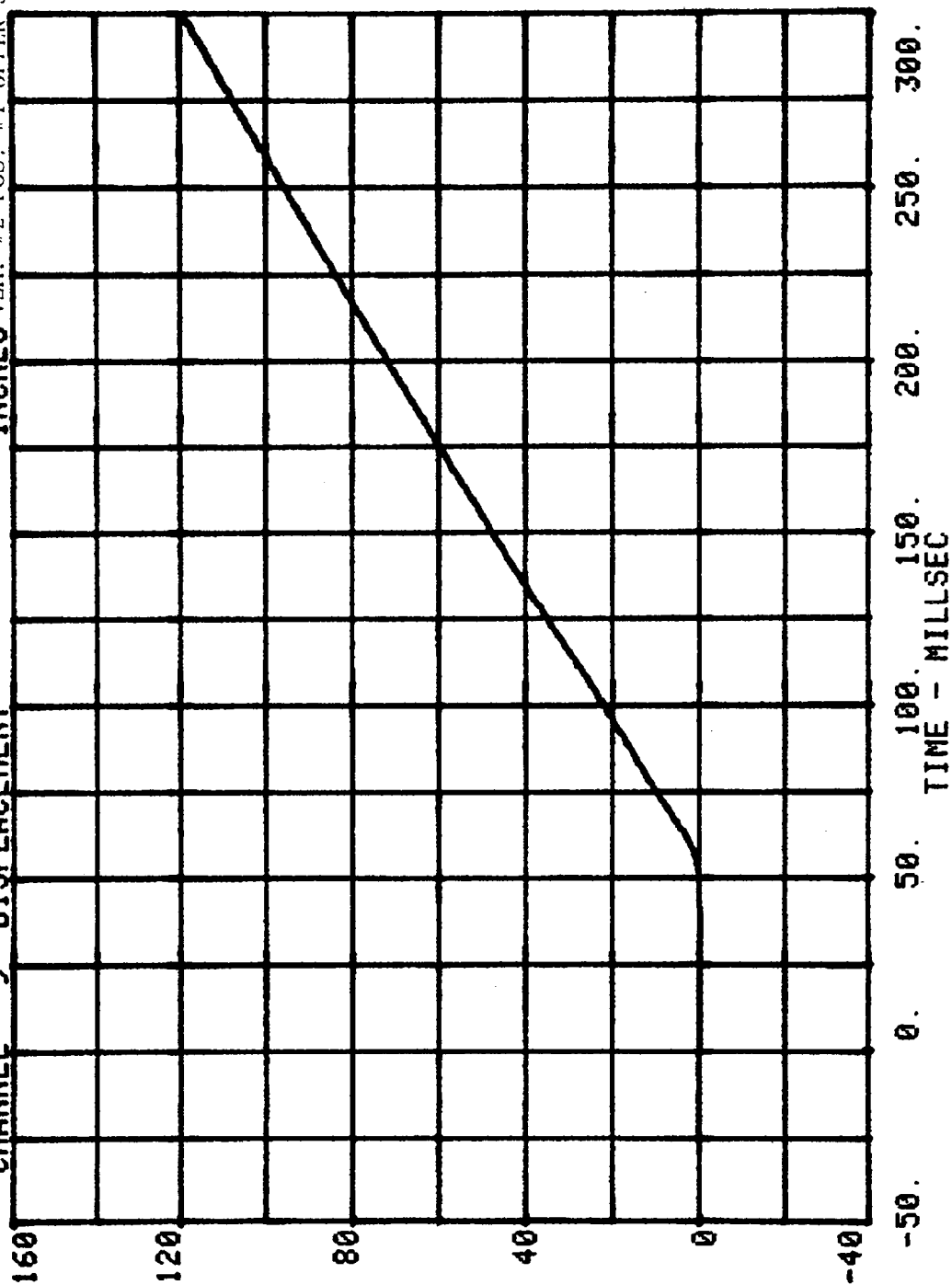
CHANNEL 32 RUN= 493 SERIES= 18
VEH2 POS1 UPPER SPINE Y G'S



CHANNEL 8 VELOCITY RUN= 493 SERIES= 18 MPH VEI. #2 POS. #1 UPPER SPINE Y

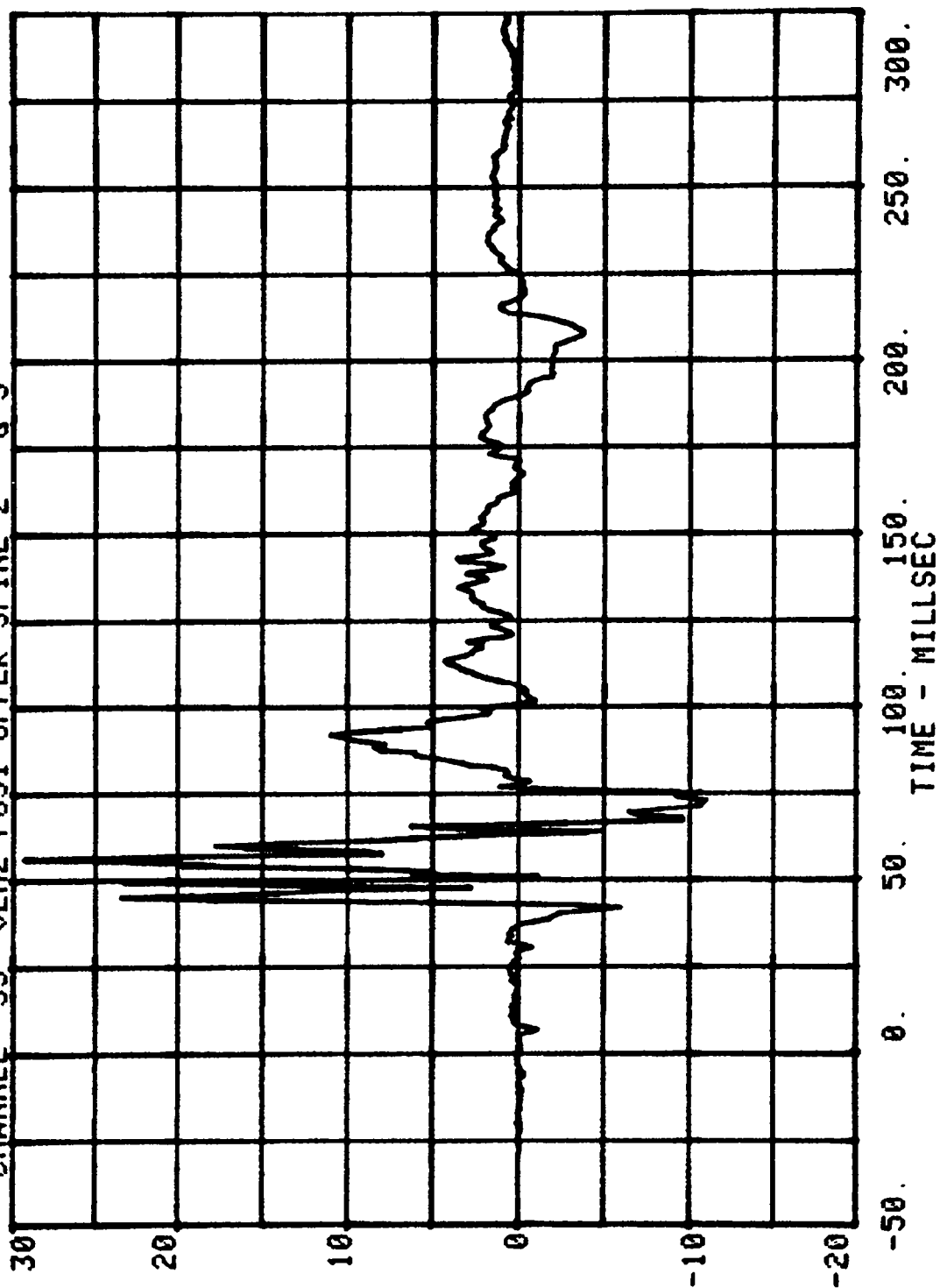


CHANNEL 9 DISPLACEMENT RUN= 493 SERIES= 18 INCHES VEIL. #2 POS. #1 UPPER SPINE Y

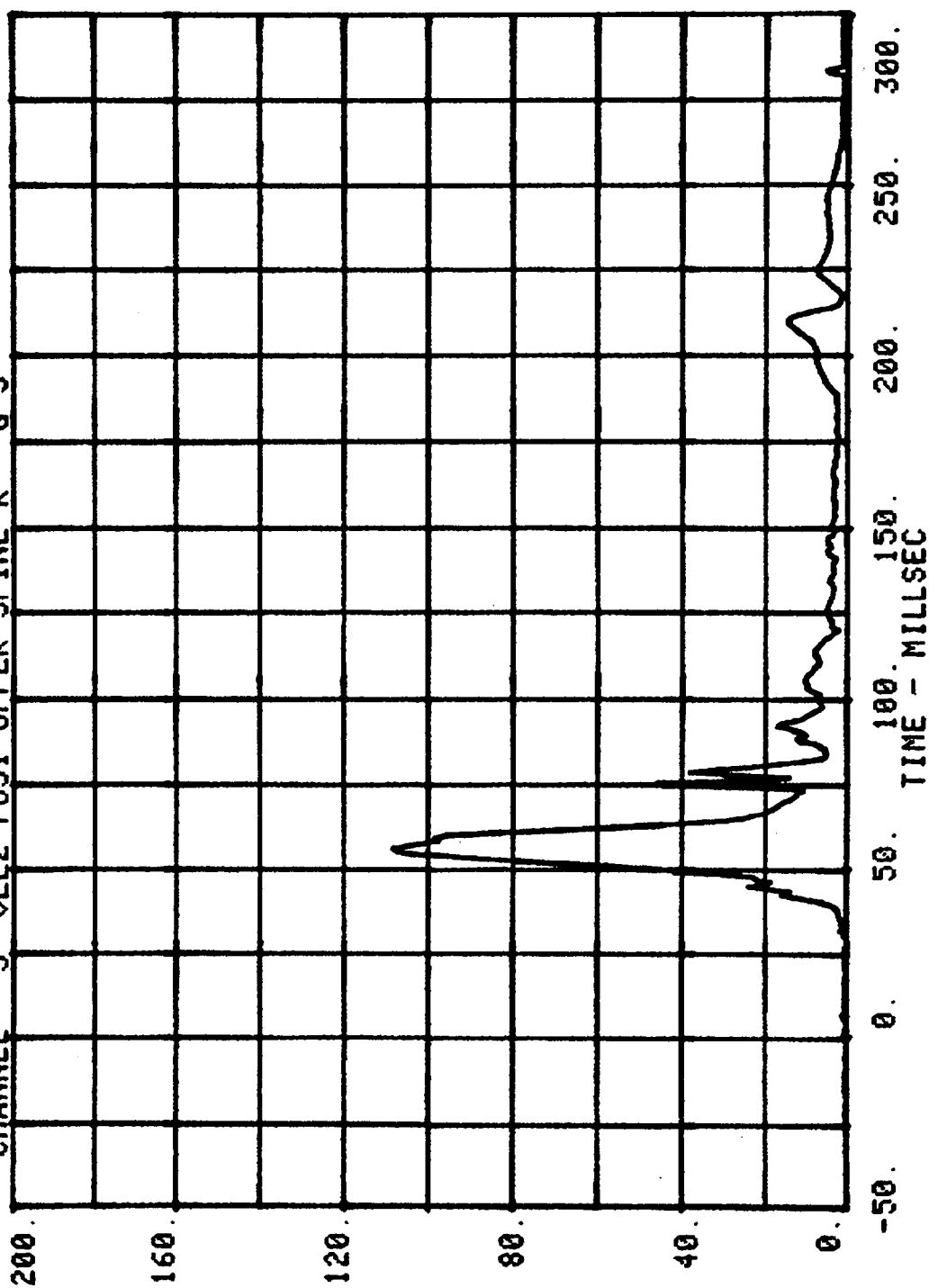


CHANNEL 33 VEH2 POS1 UPPER SPINE 2 G'S

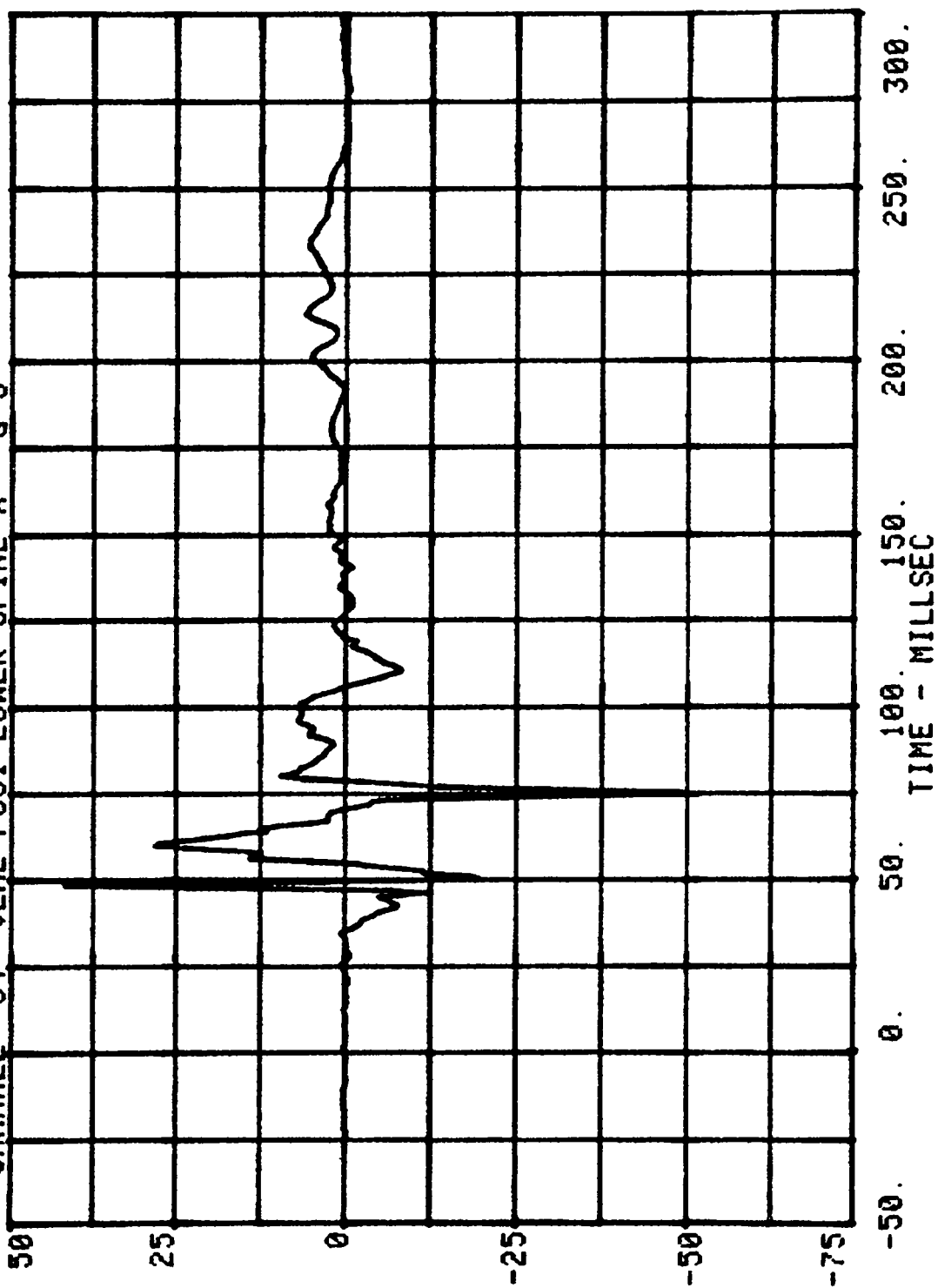
RUN= 493 SERIES= 18



CHANNEL 5 VEL2 POS1 UPPER SPINE R 18 G'S

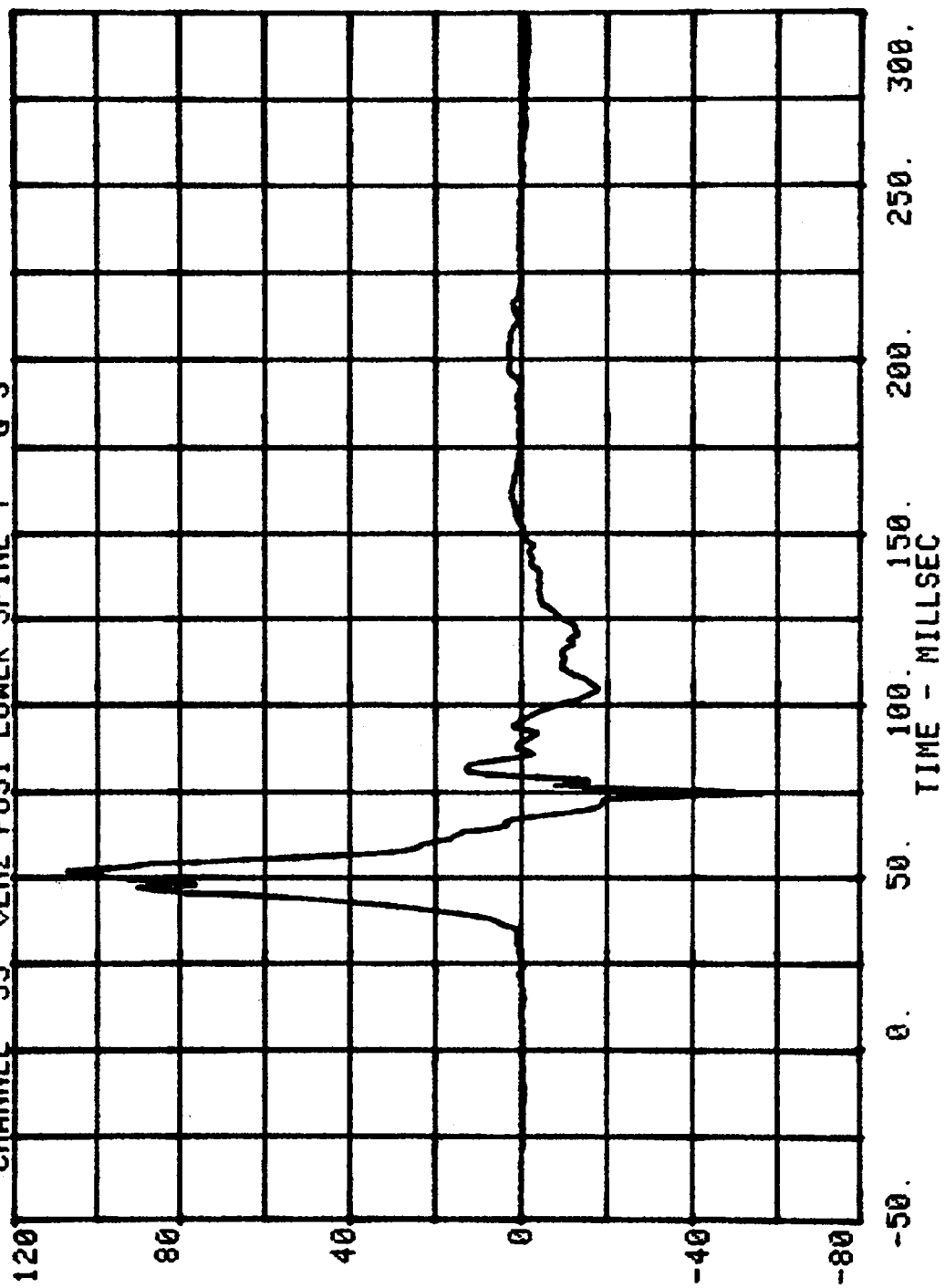


CHANNEL 34 RUN= 493 SERIES= 18
VEH2 POS1 LOWER SPINE X G'S

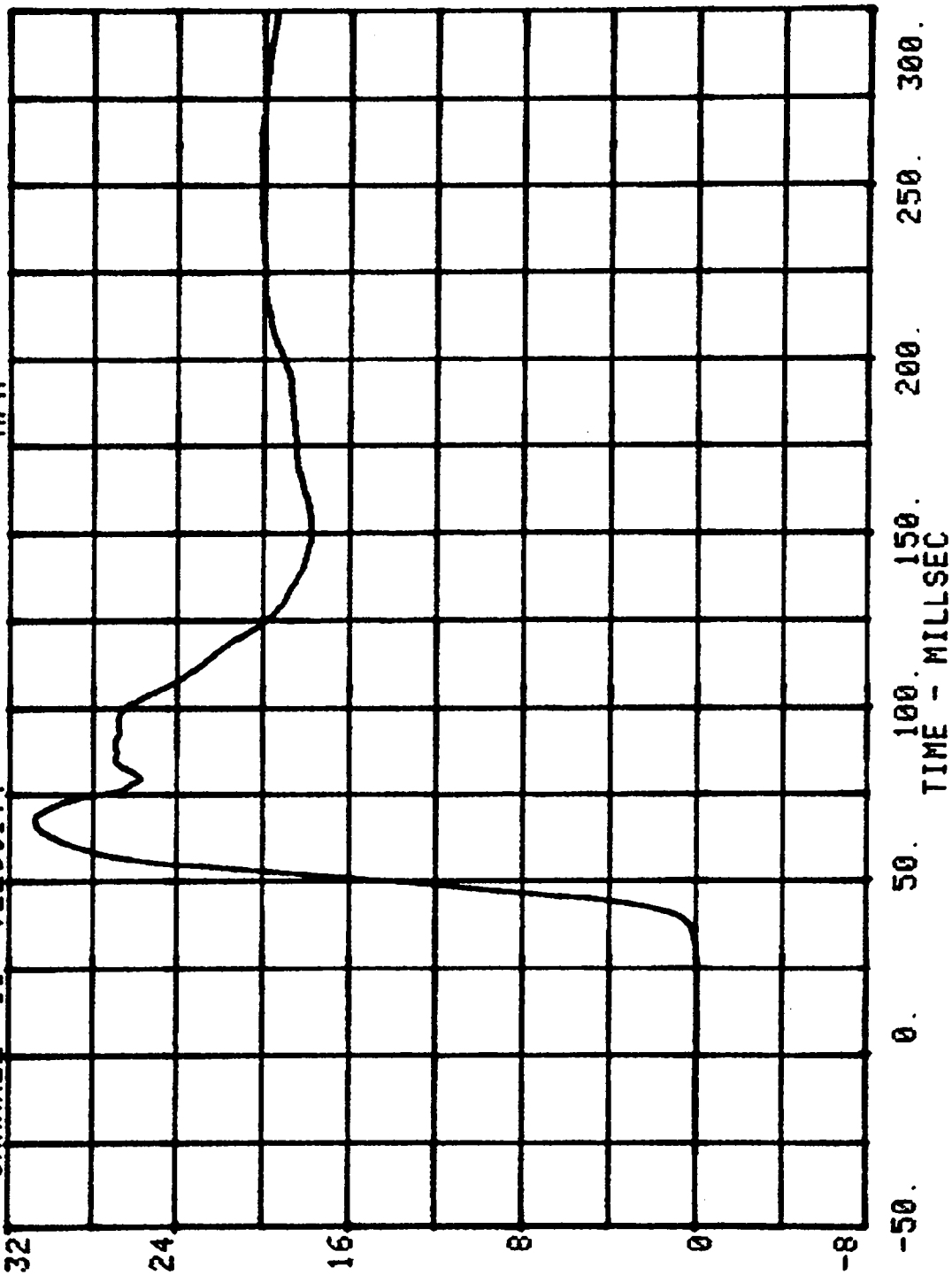


CHANNEL 35 VEH2 POS1 LOWER SPINE Y G'S

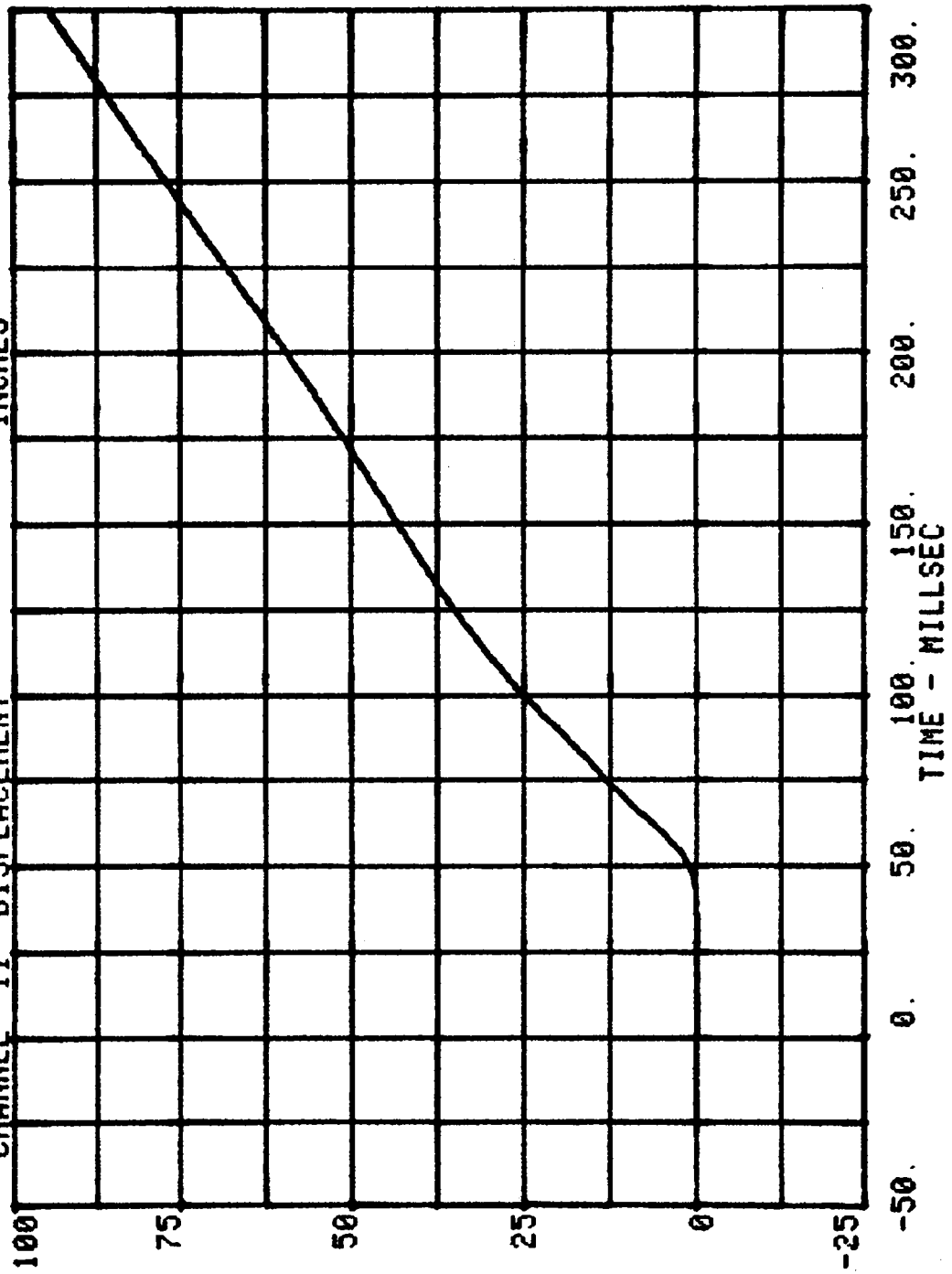
RUN= 493 SERIES= 18



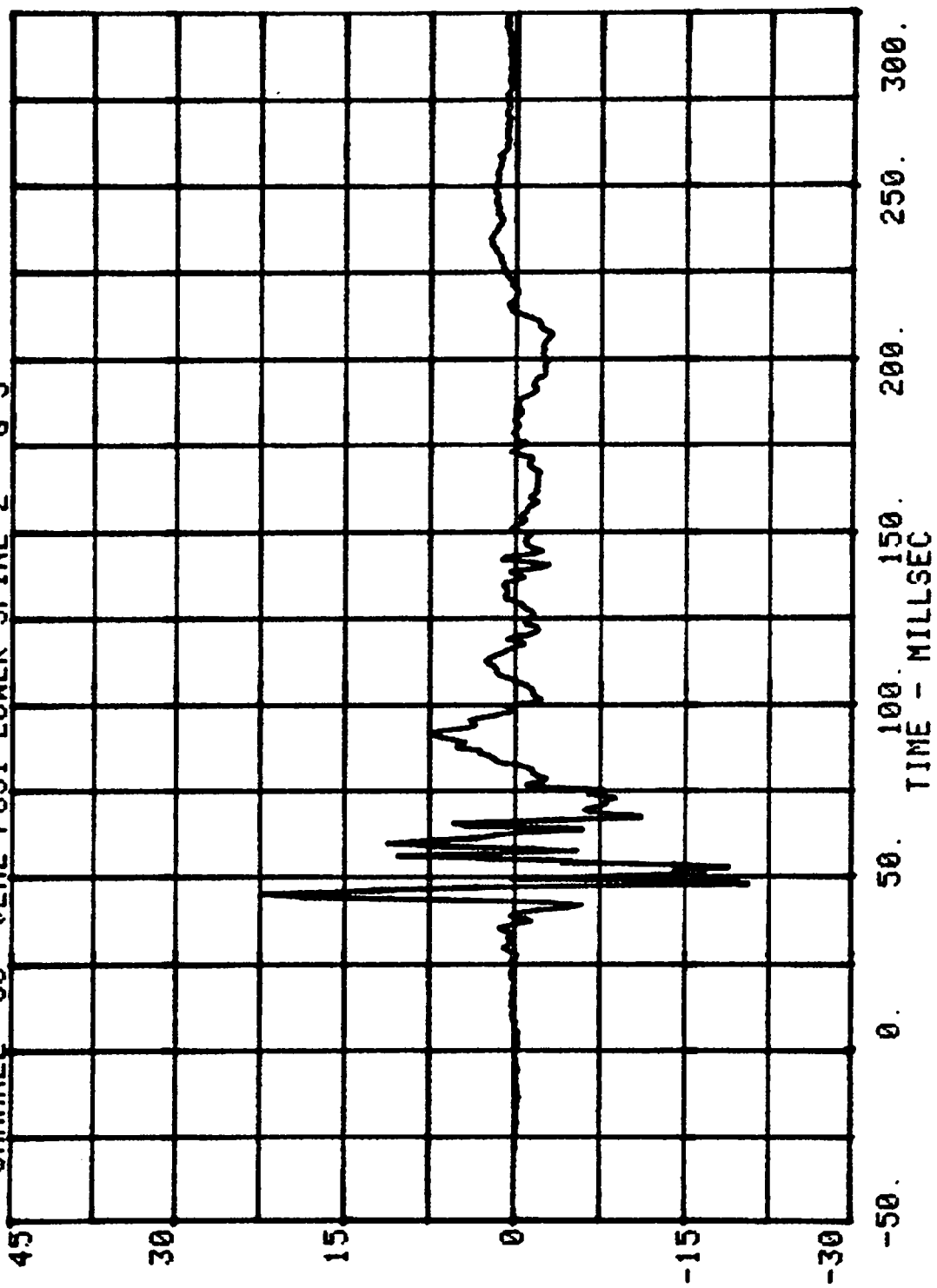
RUN= 493 SERIES= 18
CHANNEL 10 VELOCITY MPH VEIL. #2 POS. #1 LOWER SPINE Y

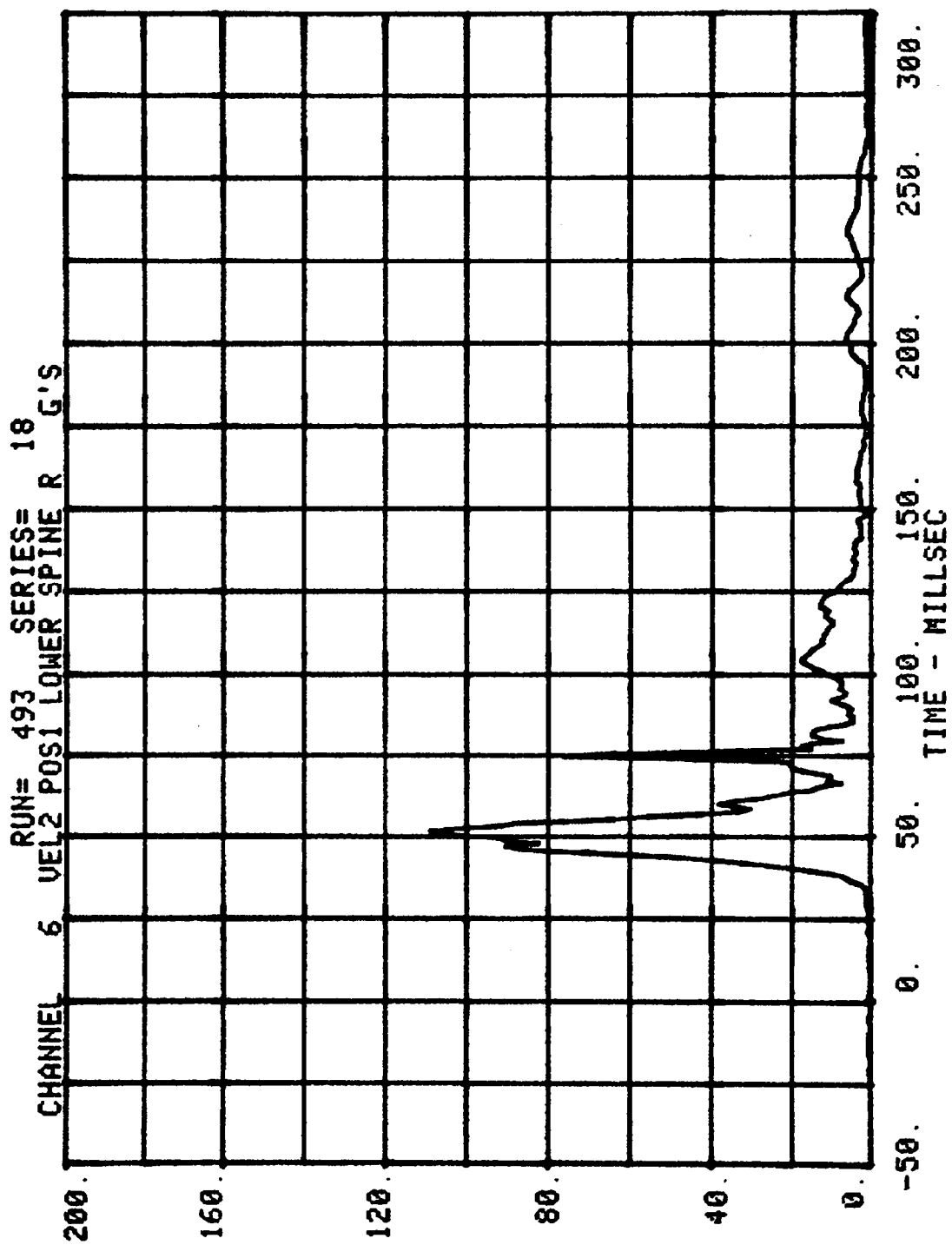


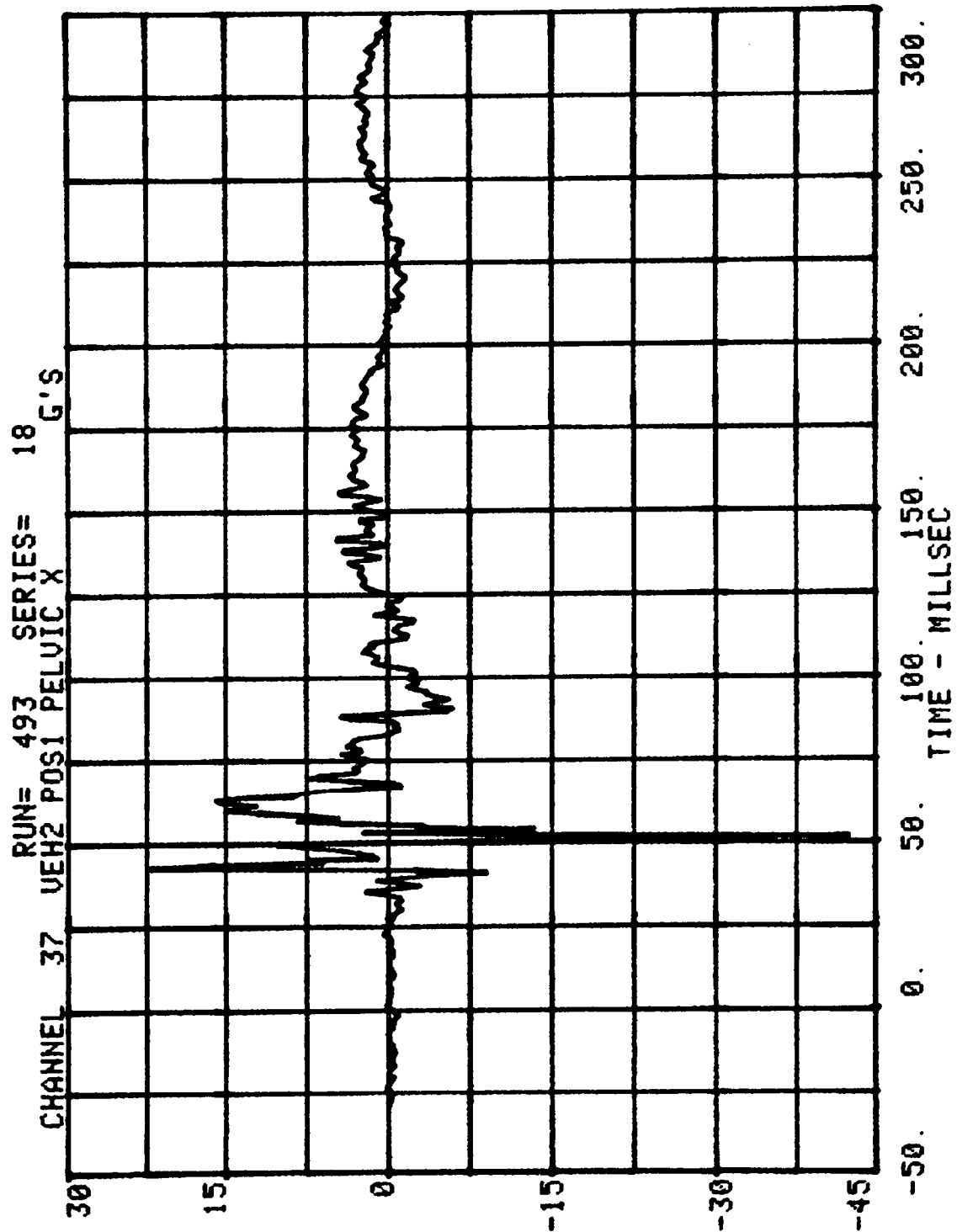
CHANNEL 11 DISPLACEMENT RUN= 493 SERIES= 18 INCHES VEH. #2 POS. #1 LOWER SPINE Y



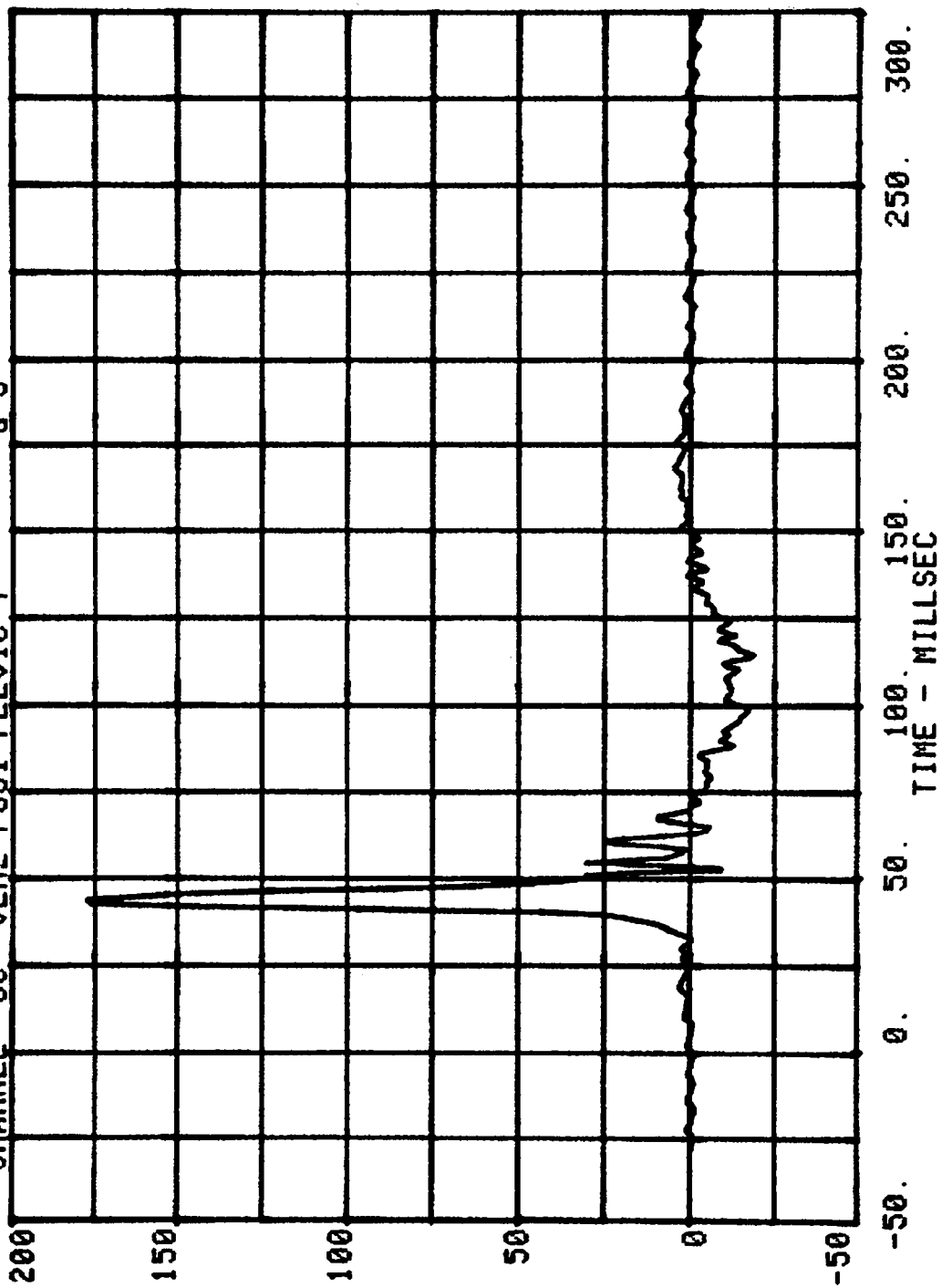
RUN= 493 SERIES= 18
CHANNEL 36 VEH2 POS1 LOWER SPINE Z G'S

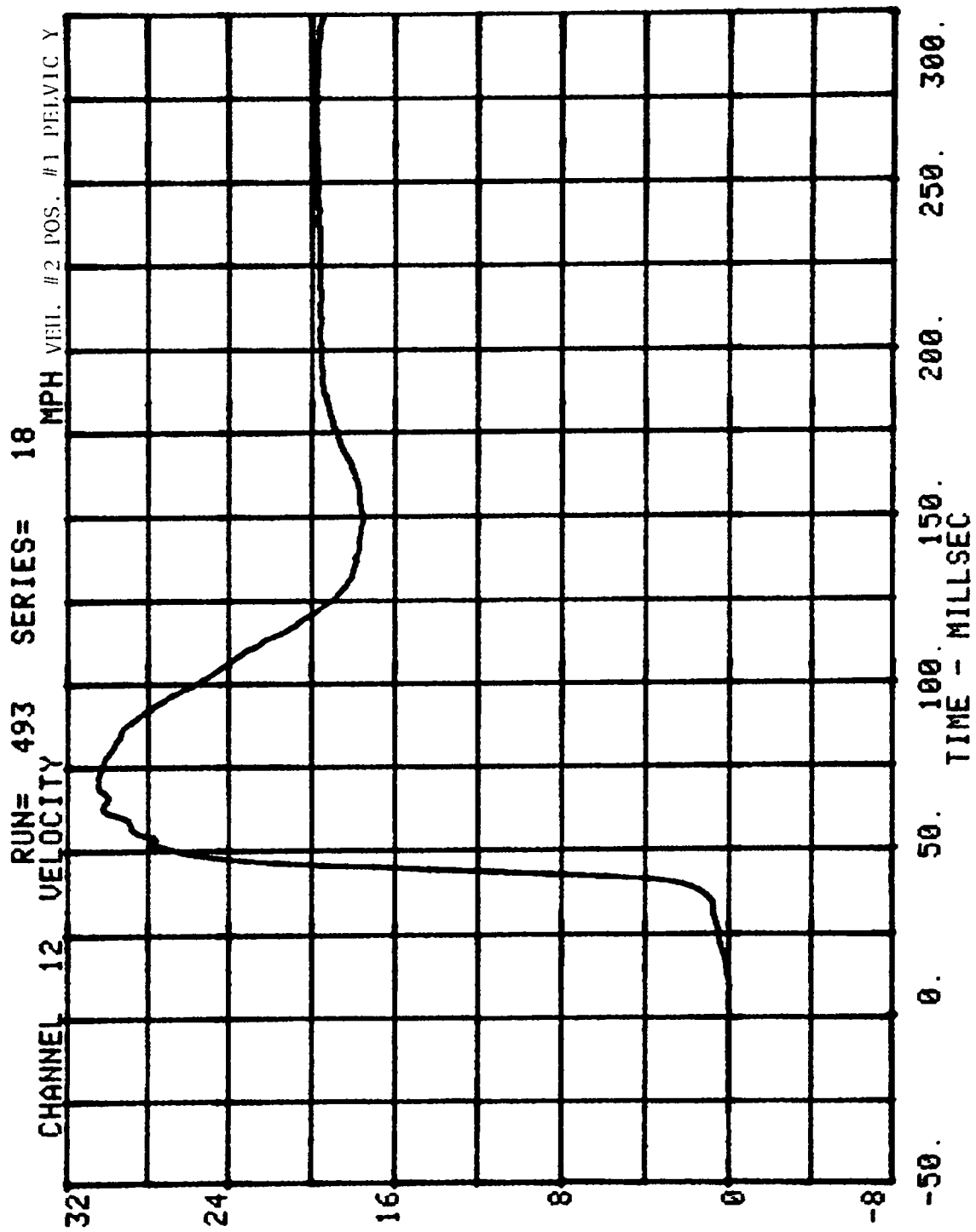




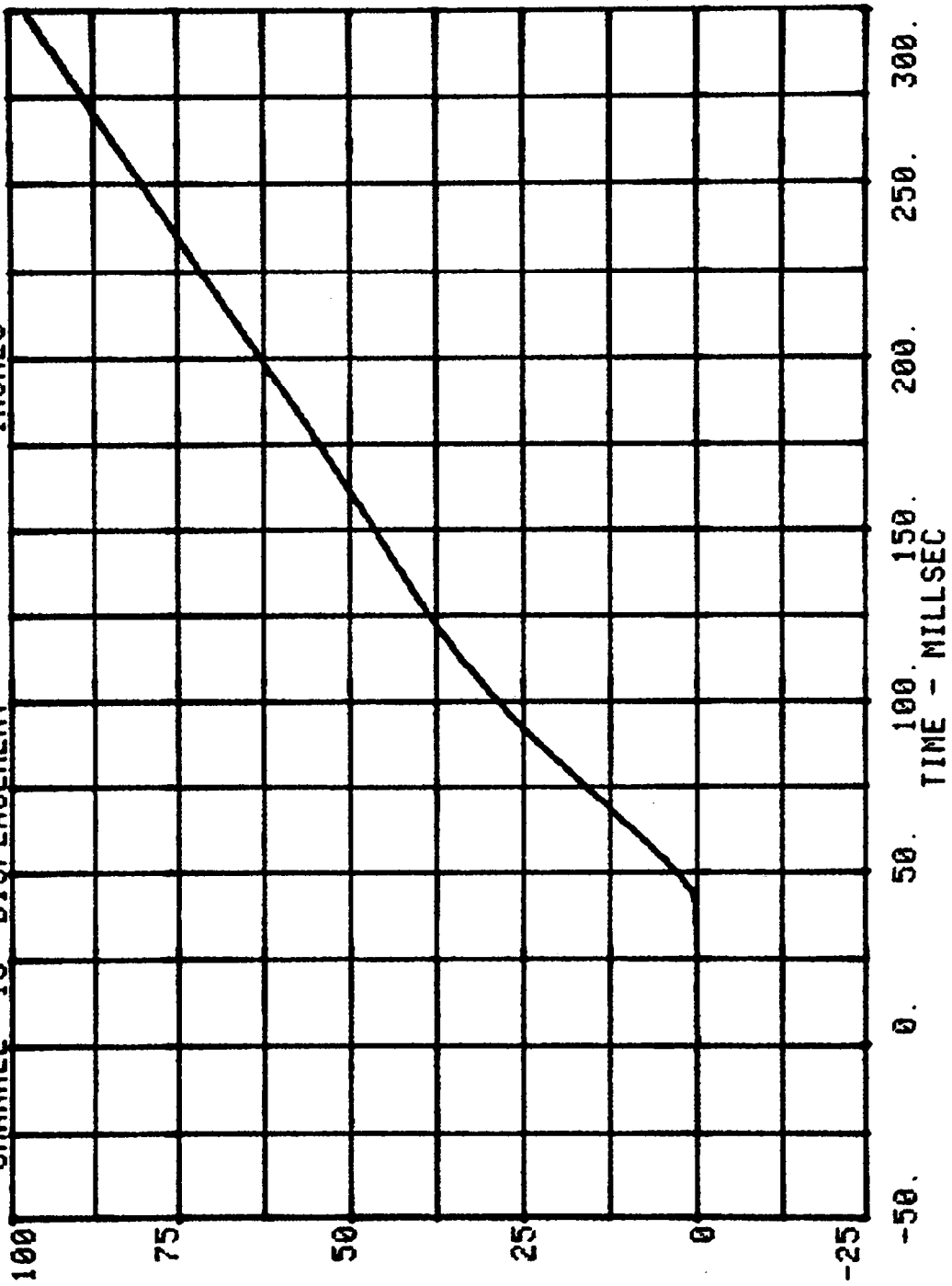


CHANNEL 38 VEH2 POS1 PELVIC Y RUN= 493 SERIES= 18 G'S

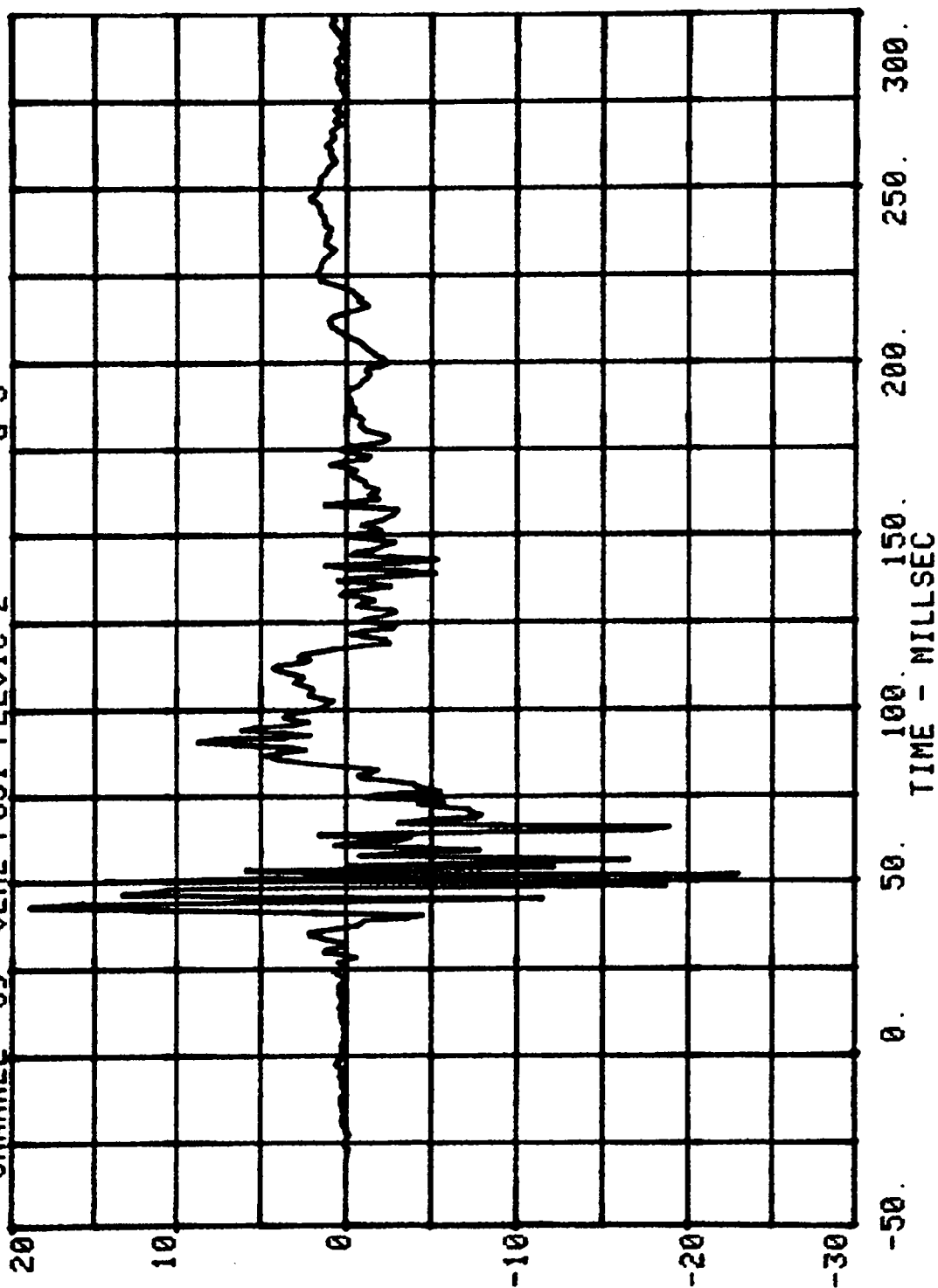




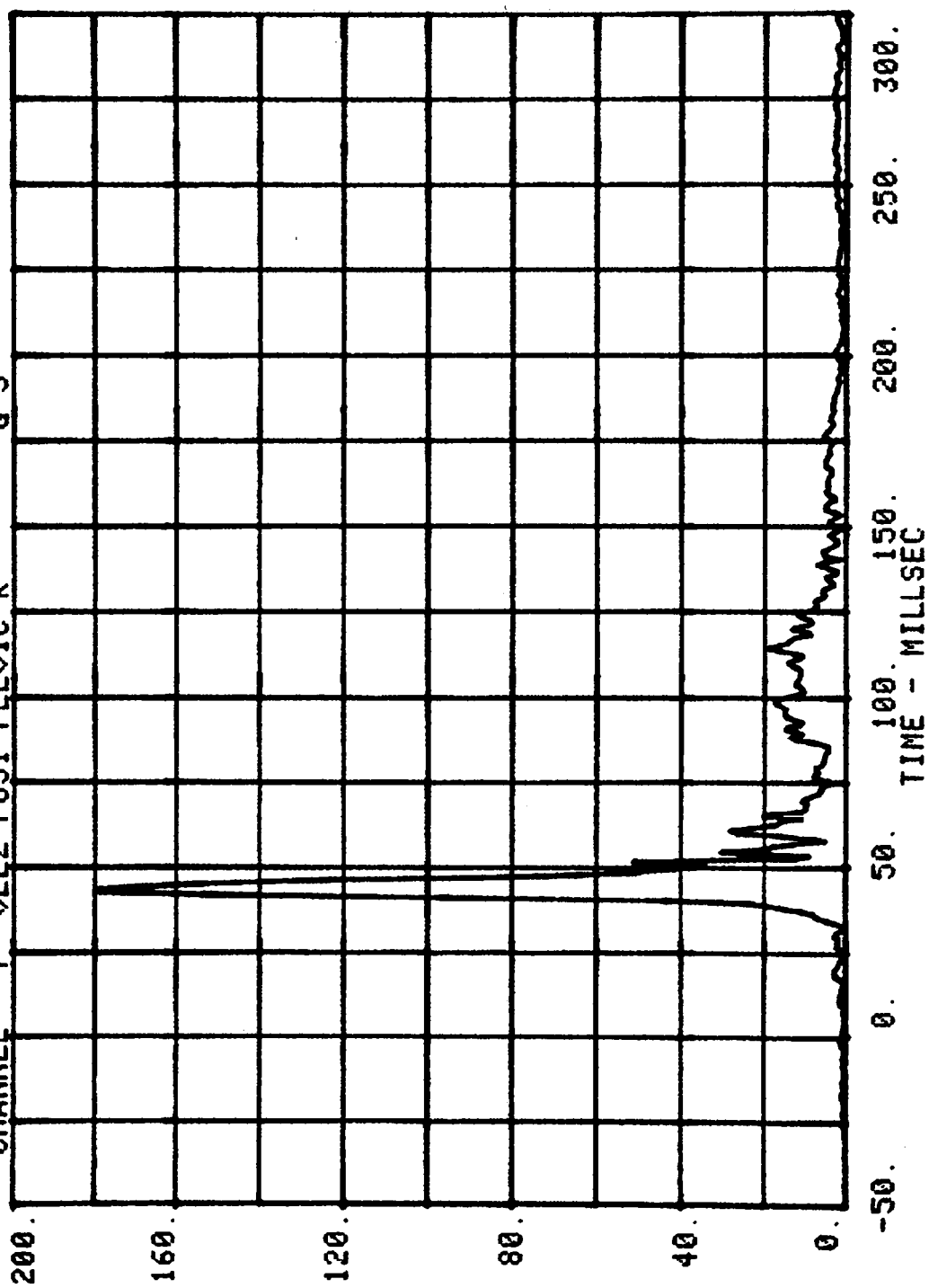
CHANNEL 13 DISPLACEMENT
 RUN= 493 SERIES= 18
 INCHES VEI. #2 POS. #1 PELVIC Y



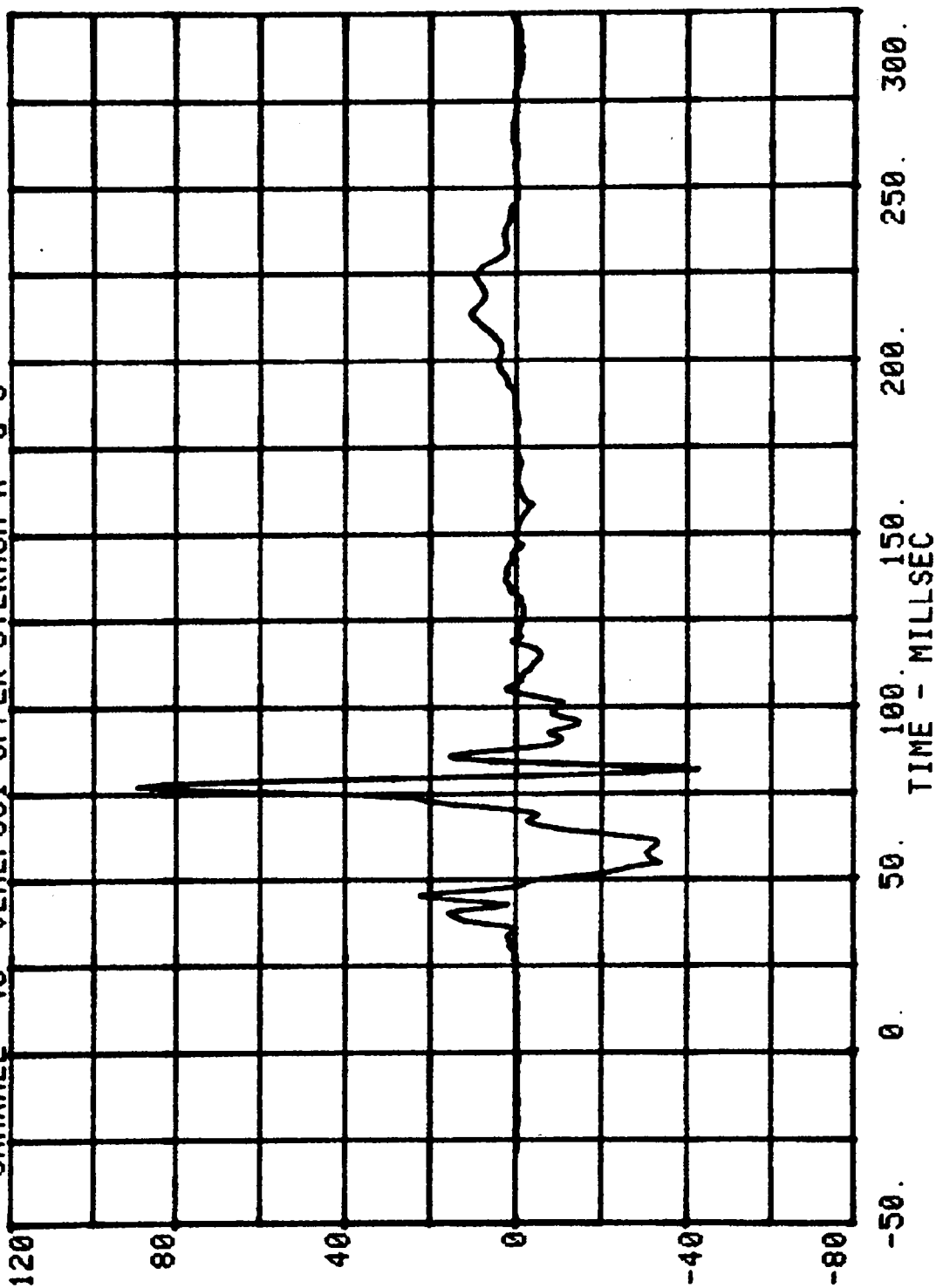
CHANNEL 39 VEH2 POS1 PELVIC Z RUN= 493 SERIES= 18 G'S

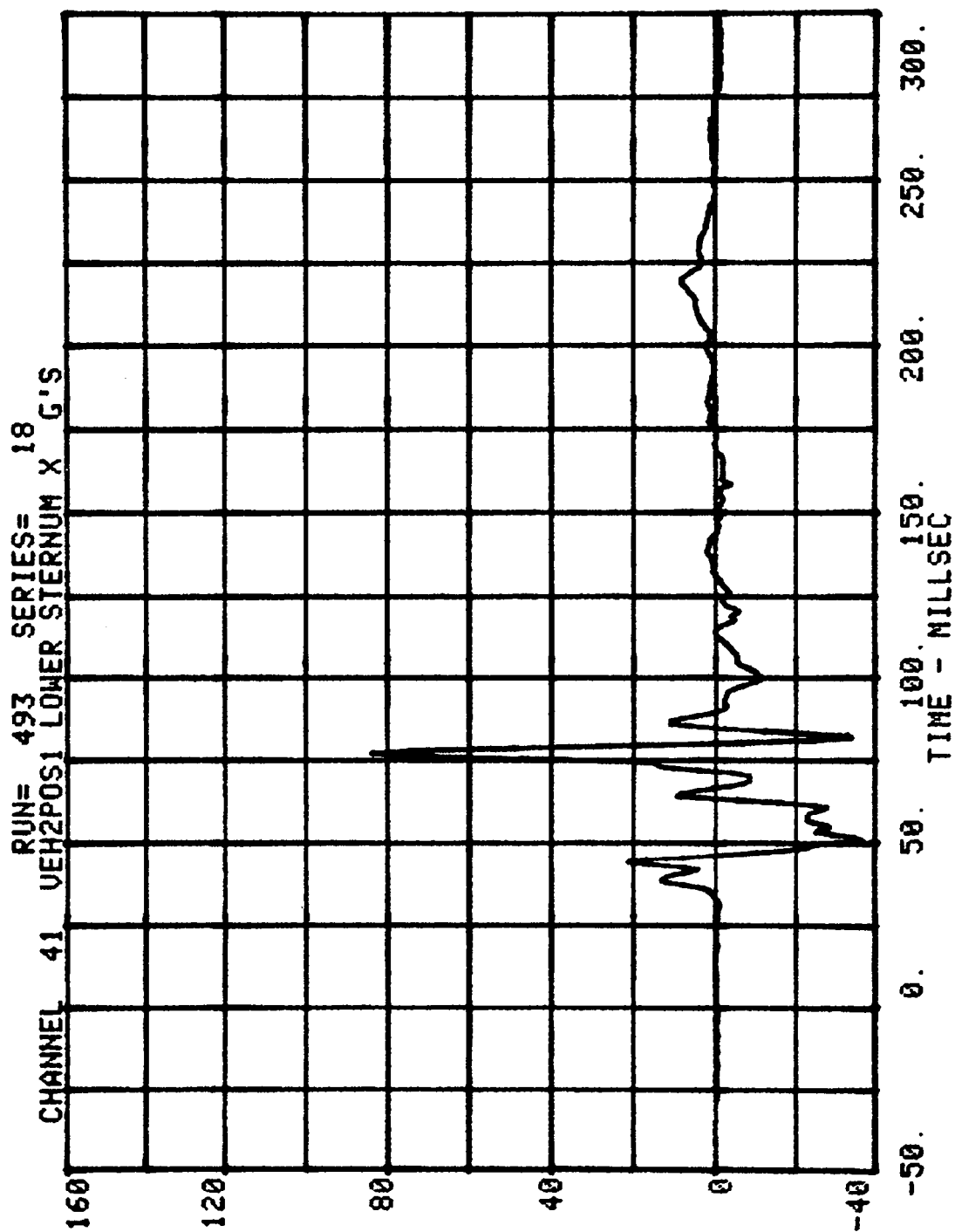


CHANNEL 7 VEL2 POS1 PELVIC R RUN= 493 SERIES= 18 G'S

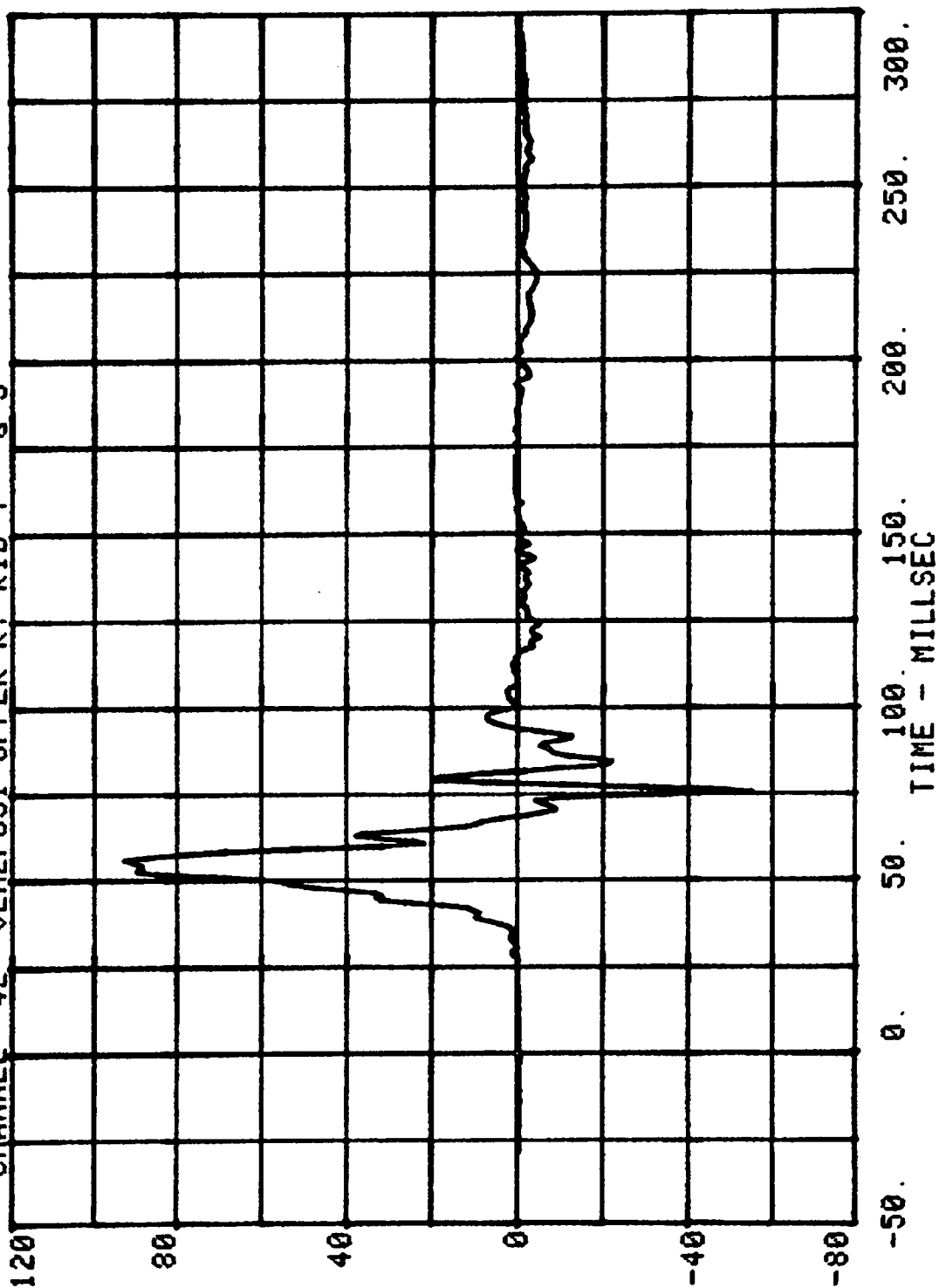


CHANNEL 40 RUN= 493 SERIES= 18
VEH2POS1 UPPER STERNUM X G'S

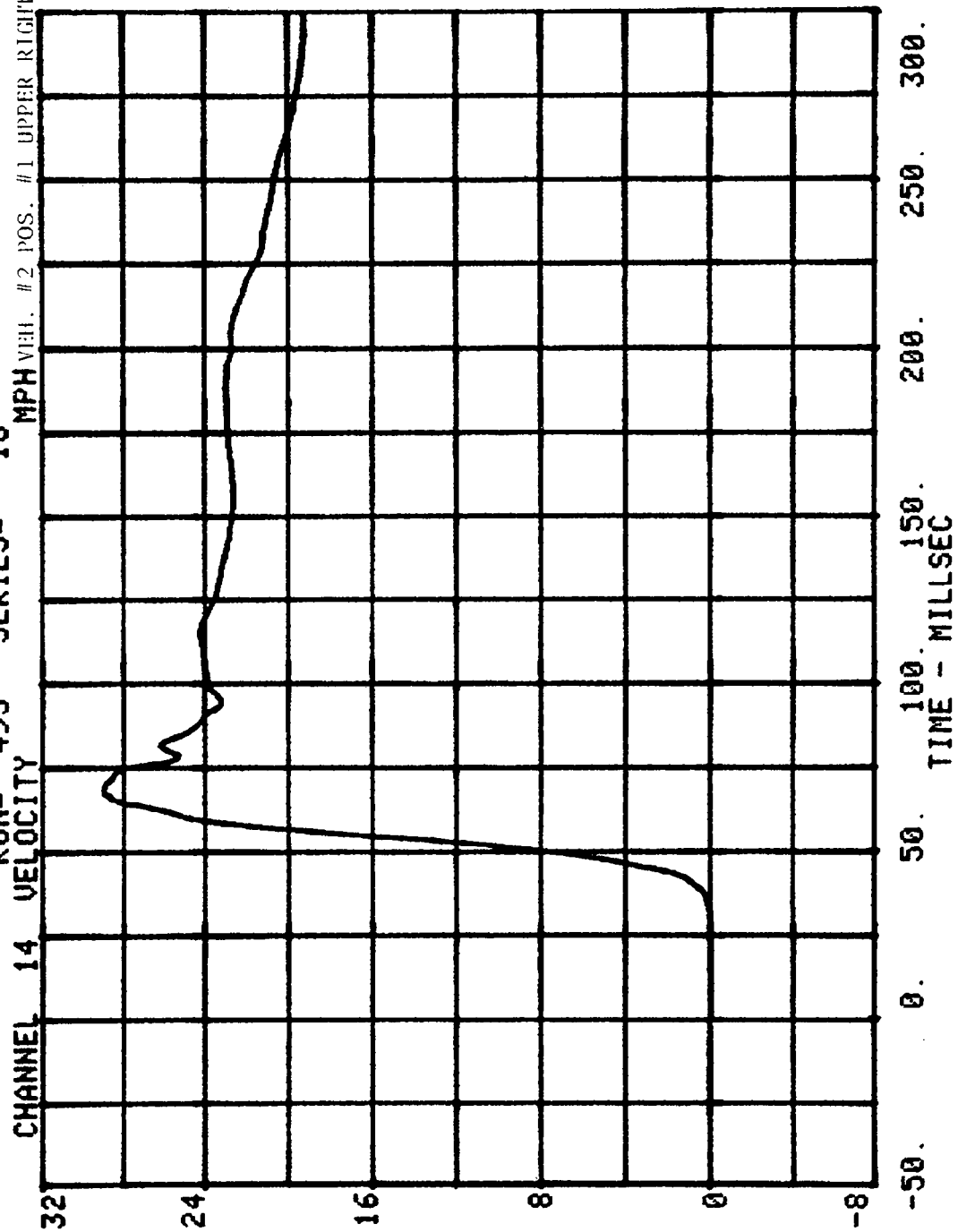




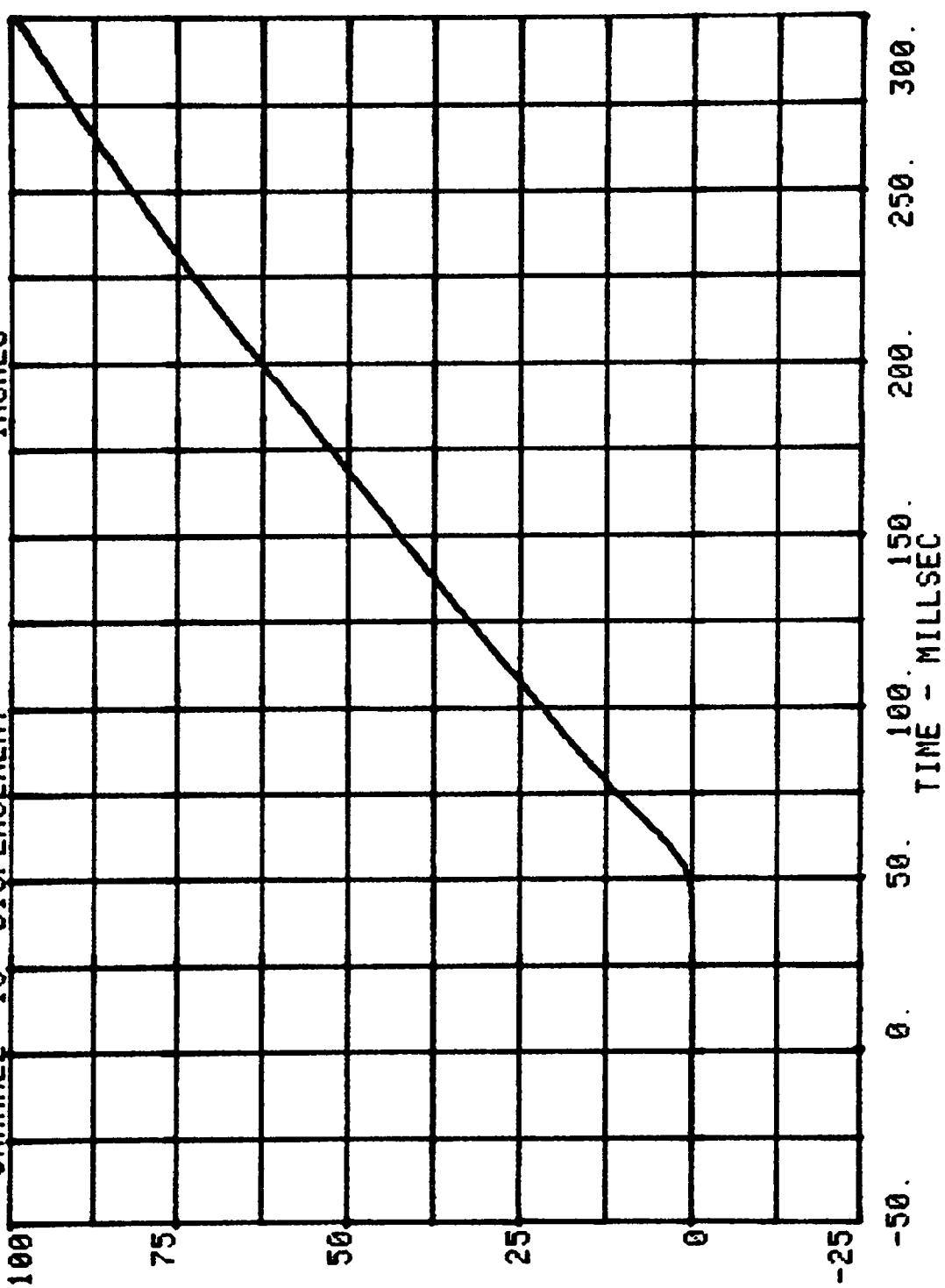
CHANNEL 42 RUN= 493 SERIES= 18
VEH2POS1 UPPER RT RIB Y G'S

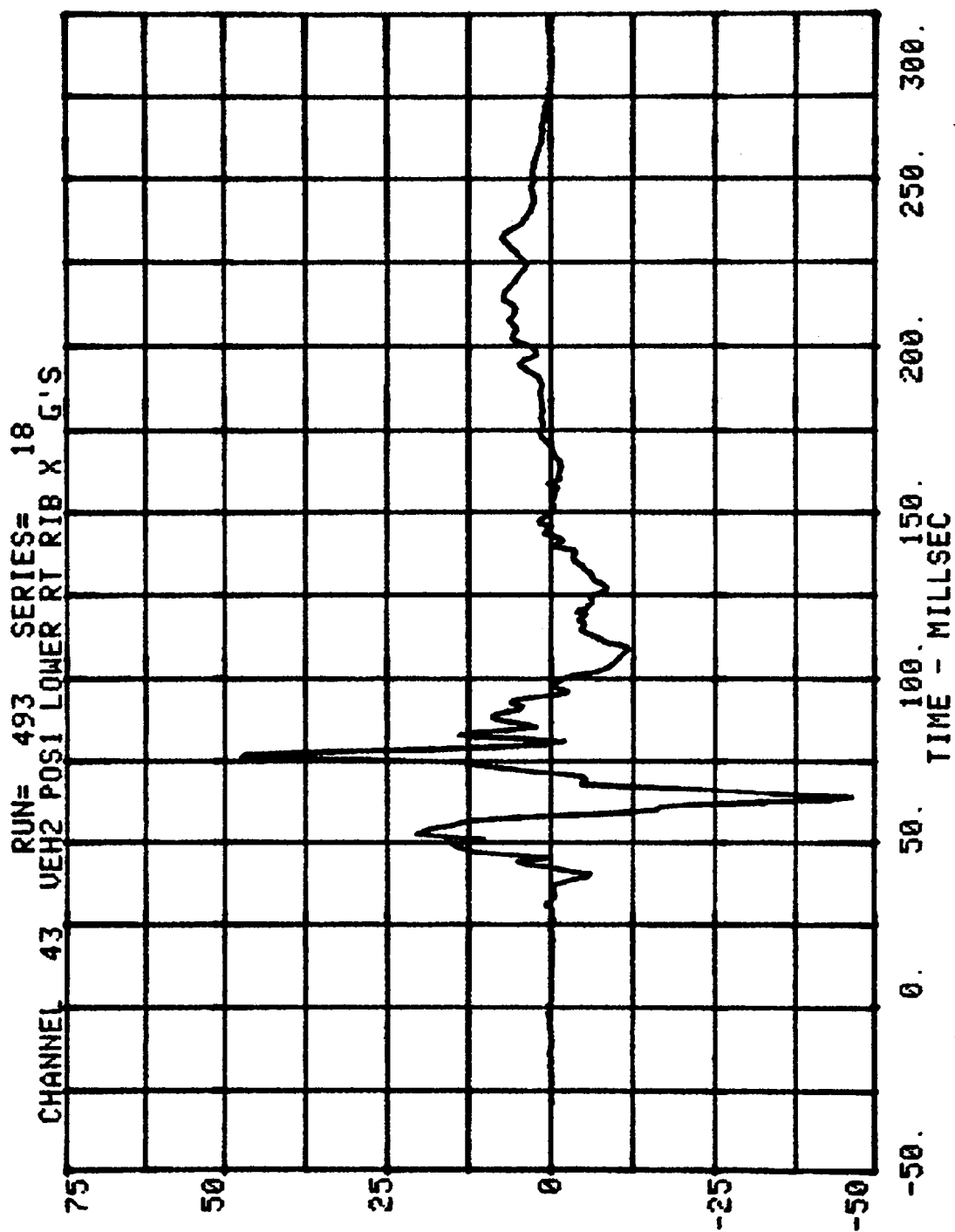


RUN= 493 SERIES= 18 MPH VEH. #2 POS. #1 UPPER RIGHT RIB Y

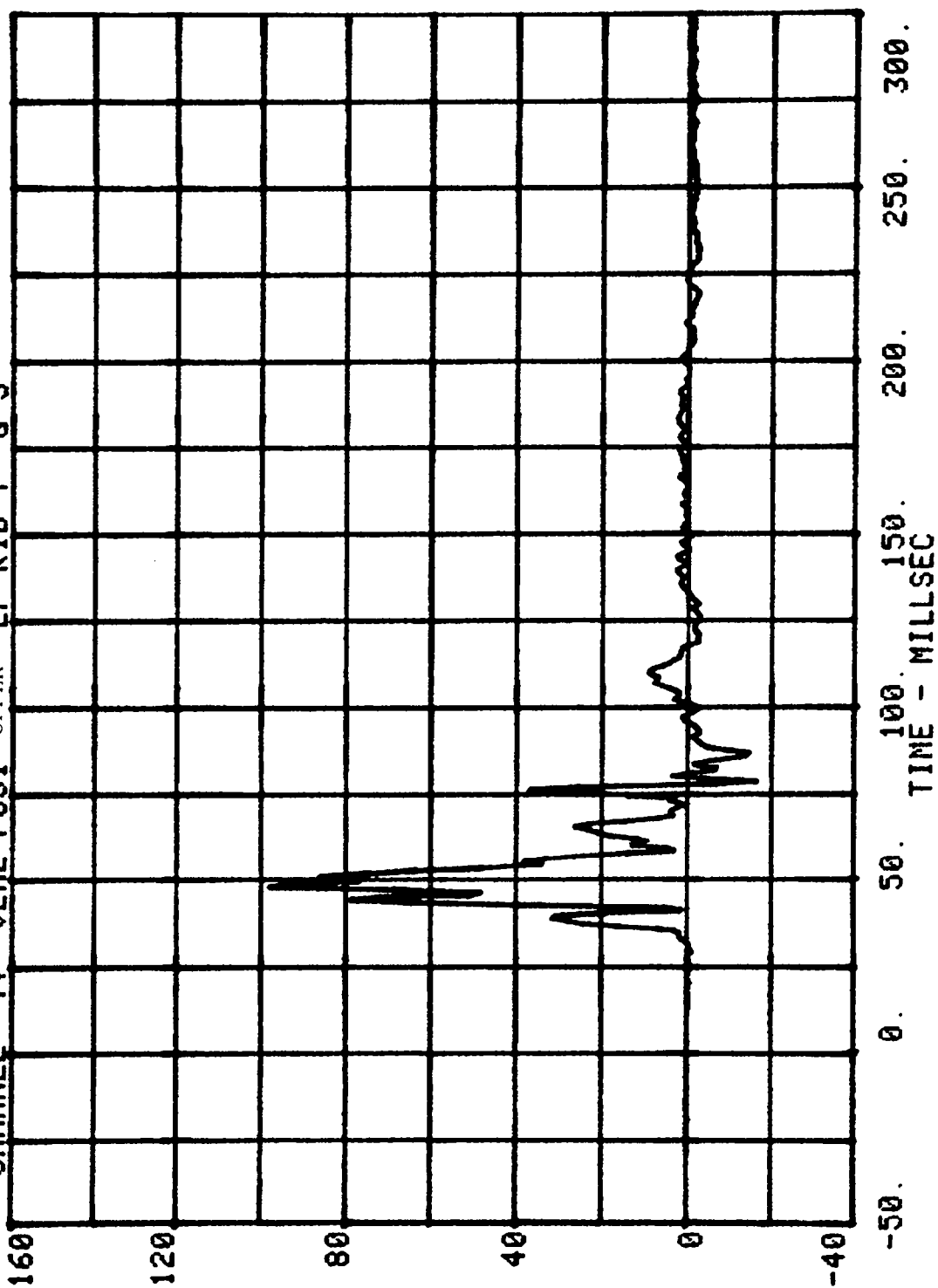


CHANNEL 15 DISPLACEMENT
 RUN= 493
 SERIES= 18
 INCHES
 VEH. #2 POS. #1 UPPER RIGHT RI

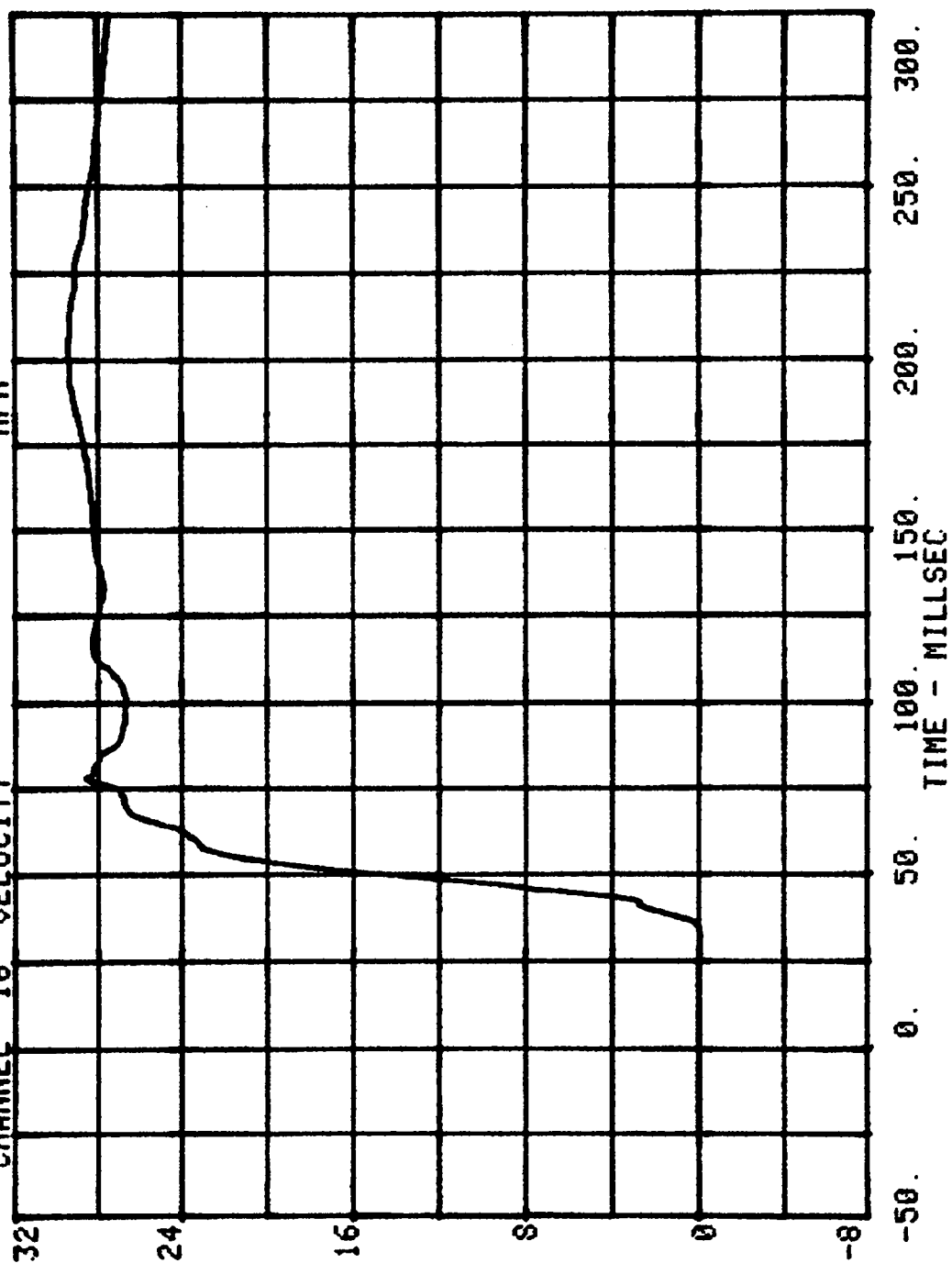




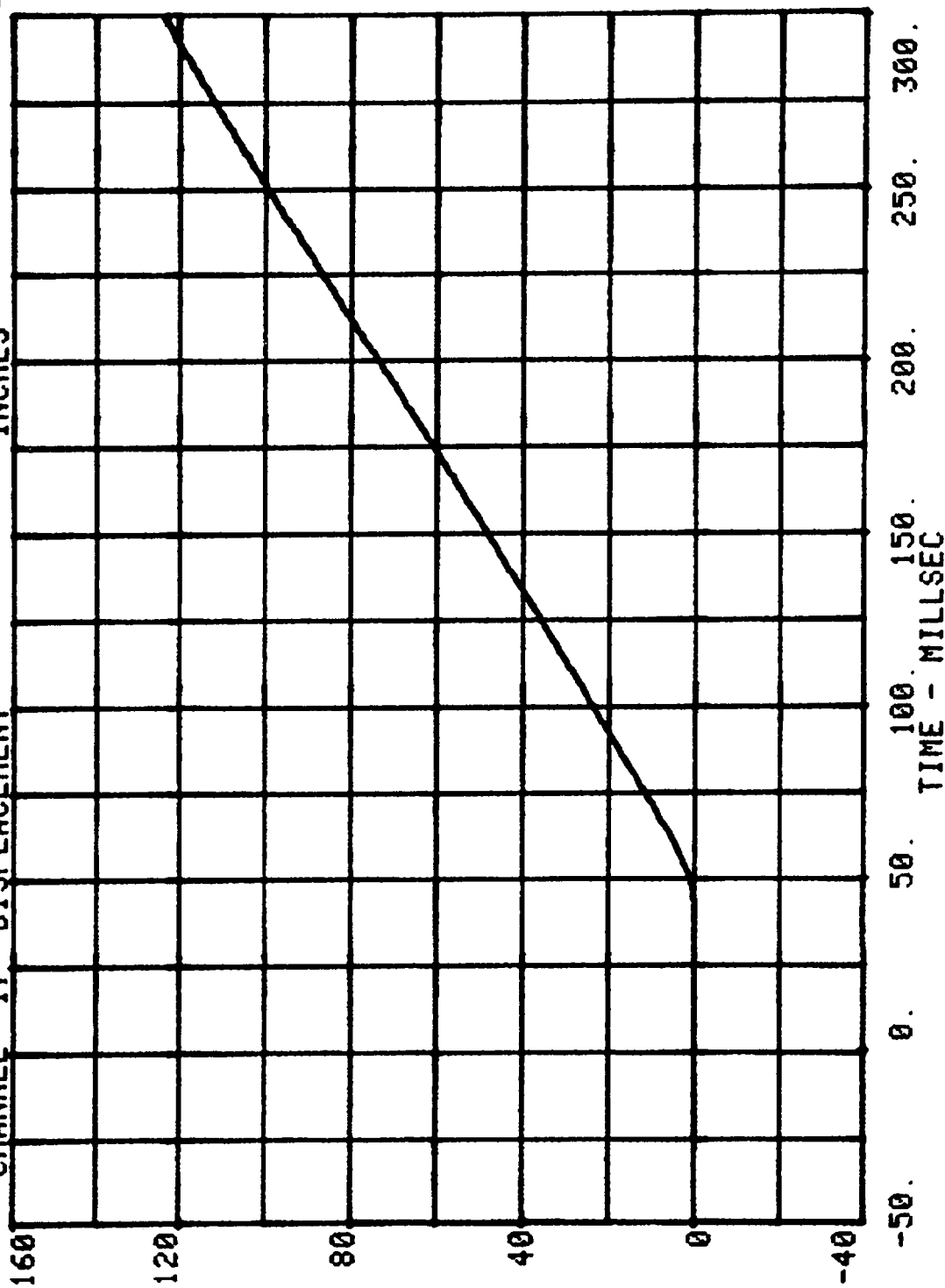
CHANNEL 44 RUN= 493 SERIES= 18
VEH2 POS1 UPPER LF RIB Y G'S

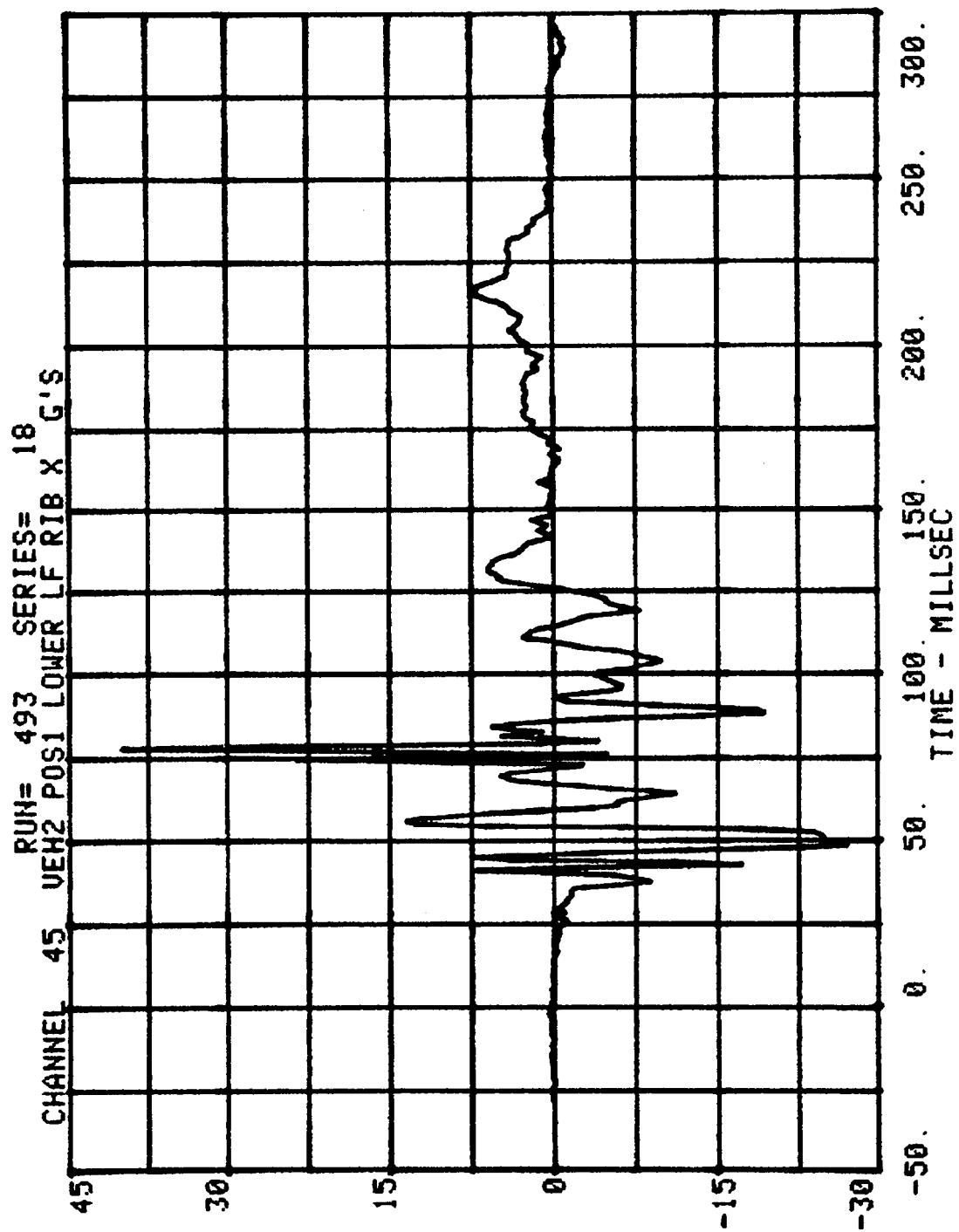


CHANNEL 16 VELOCITY RUN= 493 SERIES= 18 MPH VEH. #2 POS. #1 UPPER LF RTB Y

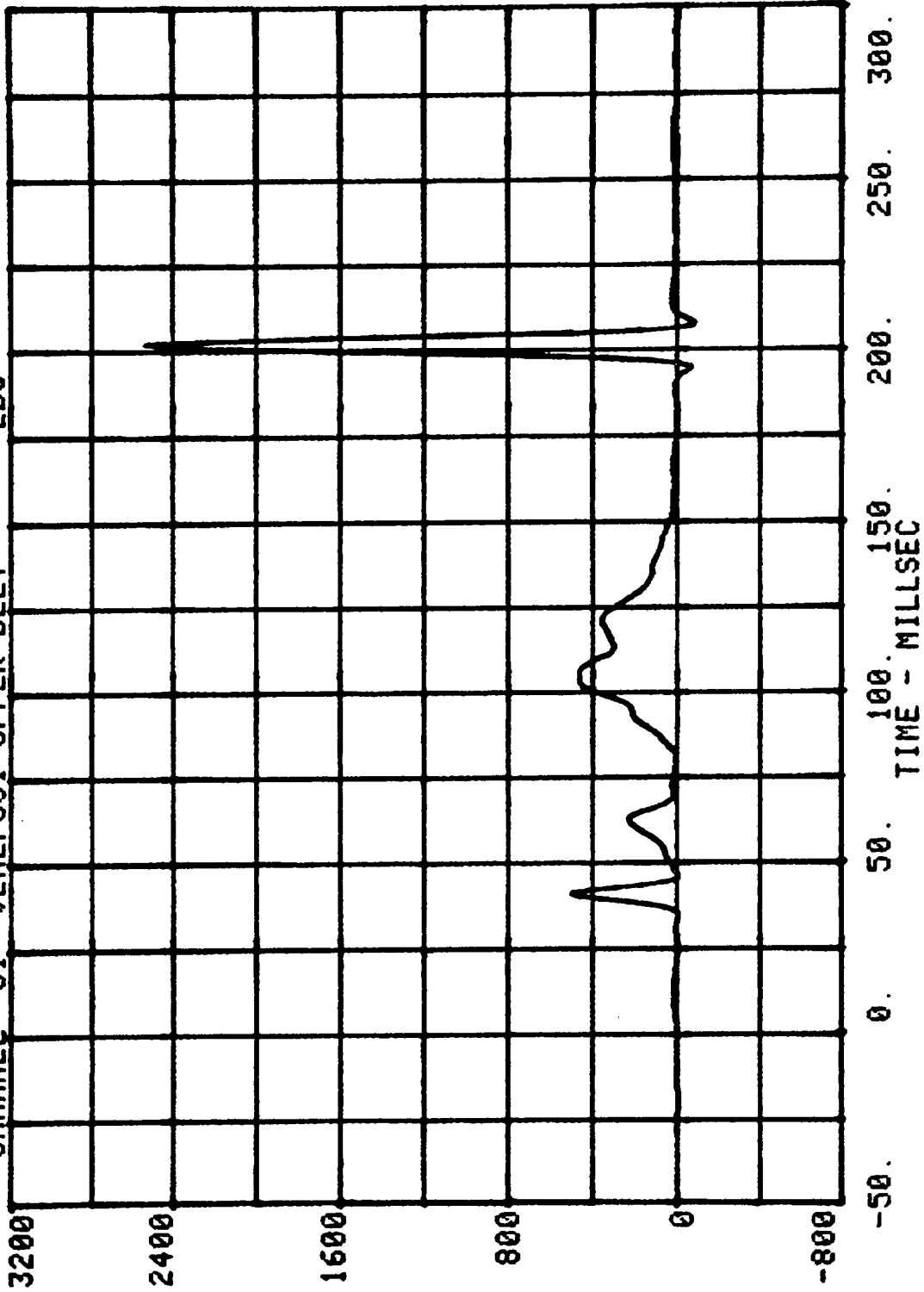


CHANNEL 17 DISPLACEMENT
 RUN= 493 SERIES= 18
 INCHES VEIL. #2 POS. #1 UPPER LF RIB Y





CHANNEL 61 RUN= 493 SERIES= 18
VEH2POS1 UPPER BELT LBS



CHANNEL 62 VEH2 POS1 LOWER BELT 18 LBS

