

DOT 571

Dynamic Science Report No. RD1-DYS-83-012

NEW VEHICLE ASSESSMENT FOR
SIDE IMPACT PROTECTION

CAR-TO-CAR SIDE IMPACT TESTING
TWO VEHICLE MOVING
90° SIDE IMPACT TEST
1981 CHEVROLET CITATION
AT 34.56 MPH
TO 1982 VOLKSWAGEN RABBIT
AT 17.6 MPH

Prepared by:

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TEST REPORT
June 1983

Prepared for:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
400 SEVENTH STREET, S.W.
WASHINGTON, D.C. 20590

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Date 7-6-83

Report Accepted by:

Contract Technical Manager
Office of Vehicle Safety Compliance

Date

TECHNICAL REPORT STANDARD TITLE PAGE

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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
acres	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons	0.9	metric ton	t
	(2000 lb)			
VOLUME				
tsp	teaspoons	5	milliliters	ml.
Tbsp	tablespoons	15	milliliters	ml.
in ³	cubic inches	16	milliliters	ml.
fl oz	fluid ounces	30	milliliters	ml.
c	cups	0.24	liters	L
pt	pints	0.47	liters	L
qt	quarts	0.95	liters	L
gal	gallons	3.8	liters	L
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	degrees Fahrenheit	5/9 (after subtracting 32)	degrees Celsius	°C

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
km	kilometers	1.1	yards	yd
		0.6	miles	mi
AREA				
cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares	2.5	acres	acres
	(10 000 m ²)			
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	metric ton	1.1	short tons	
	(1000 kg)			
VOLUME				
ml.	milliliters	0.03	fluid ounces	fl oz
ml.	milliliters	0.06	cubic inches	in ³
L	liters	2.1	pints	pt
L	liters	1.06	quarts	qt
L	liters	0.26	gallons	gal
m ³	cubic meters	.35	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³
TEMPERATURE (exact)				
°C	degrees Celsius	9/5 (then add 32)	degrees Fahrenheit	°F

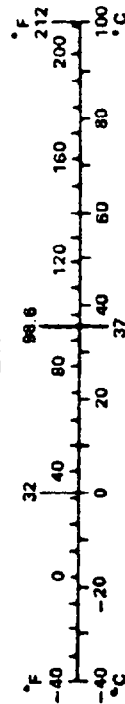


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1.0 PURPOSE AND TEST INTRODUCTION

1.1 PURPOSE

The purpose of the test is to obtain the necessary data to determine the degree of protection which a specific vehicle provides for the occupant during a side impact collision. The vehicle was tested using test parameters which are not currently contained in a FMVSS to obtain research and vehicle rating baseline data.

1.2 INTRODUCTION

This 90° impact test was one of four side impact tests between two moving vehicles that were conducted at the Dynamic Science Side Impact facility (see Table 1-1). The test conducted on April 28, 1983 appears as Test Number 3148-4 in the test matrix. The test involved a 1981 Chevrolet Citation traveling at 34.56 mph impacting the left side of a 1982 Volkswagen Rabbit traveling at 17.6 mph. The target vehicle was struck such that the left front corner of the bullet vehicle contacted 37.8 inches forward of the midpoint of the centerline of the front and rear wheels.

The 1982 Volkswagen Rabbit (target vehicle) contained two of the latest NHTSA side impact dummies, located in the left front and left rear outboard seating positions, along with vehicle accelerometers and on-board cameras. The side impact dummy contained 19 data channels - 3 head accelerometers, 12 chest accelerometers, 3 pelvic accelerometers, and one chest deflection sensor. The dummies were bumped prior to testing and positioned to the procedures outlined in pages 18-23 of TP-RD-01.

Section 2 contains general test and vehicle parameter data as well as vehicle response data for both bullet and target vehicles. Section 3 contains occupant response data. Appendix A contains pre- and post-test vehicle and dummy photographs. Calcomp plots are contained in Appendix B. Appendix C contains the dummy certification data.

TABLE 1-1. TEST MATRIX - COUNTERMEASURES FOR SIDE IMPACT

Test Number	Test Date	Test Configuration	Test Vehicle*/ Dynamic Science Number	Vehicle Weight (lb)	Vehicle Speed (mph)
3148-1	4/14/83	Car-to-Car 60° Side Impact	B - 1982 Chevrolet Citation/ T - 1982 Volkswagen Rabbit	2998 2473	25.72 13.1
3148-2	4/06/83	Car-to-Car 60° Side Impact	B - 1982 Chevrolet Citation/ T - 1982 Chevrolet Citation	3009 2988	35.17 17.9
3148-3	4/21/83	Car-to-Car 90° Side Impact	B - 1981 Chevrolet Citation/ T - 1982 Chevrolet Citation	2996 3049	25.52 13.0
3148-4	4/28/83	Car-to-Car 90° Side Impact	B - 1981 Chevrolet Citation/ T - 1982 Volkswagen Rabbit	2994 2461	34.56 17.6

*B = Bullet Vehicle; T = Target Vehicle.

2.0 GENERAL TEST AND VEHICLE PARAMETER DATA

The following data sheets describe the General Test and Vehicle Parameter Data as well as vehicle response data. This includes test conditions, pre- and post-test vehicle measurements, accelerometer locations and data summary, and photoinstrumentation camera location and specification summary.

GENERAL TEST AND VEHICLE PARAMETER DATA

PRE-IMPACT DATA

Make/Model: Chevrolet Citation
 Body Style: 4-Door Hatchback Model Year 1981
 NHTSA No.: R&D DSI No. 1323 Color: Light Green

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: General Motors Corporation
 Date of Manufacture: 12/80; VIN: 1G1AX6856BT146089
 GVWR: 3471 lb; GAWR: Front = 1855 lb; Rear = 1612 lb

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL

Vehicle Capacity: FRONT REAR RECOMMENDED LOAD RANGE:
 Tire Pressure: 35 psi 35 psi TIRE SIZE: B
P185/80R13

Designated Seating: 2 Front 3 Rear 5 Total
 Cargo load = 145 lb Is Spare Tire: Space Saver? Yes
 TOTAL = 895 lb Standard Equipment? Yes

Engine: 2.5 Liter Transverse Mount 4 Cylinder
 Transmission: 4 Speed Manual Front Wheel Drive
 Date Vehicle Received by Laboratory: 1/20/83; Odometer 83
 Dealer Name & Address: TRC

East Liberty, Ohio

WEIGHT (LB) OF TEST VEHICLE AS RECEIVED (WITH MAX. FLUIDS) = UDW

Right Front = 778 lb Right Rear = 510 lb
 Left Front = 838 lb Left Rear = 464 lb
 TOTAL FRONT WEIGHT = 1616 lb (62 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 974 lb (38 % of Total Vehicle Weight)
 TOTAL DELV. WEIGHT = 2590 lb

TARGET WEIGHT = UDW + Cargo Load + 328 lbs Dummies = 3000 lb

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 145 LB CARGO:

Right Front = 840 lb Right Rear = 650 lb
 Left Front = 907 lb Left Rear = 597 lb
 TOTAL FRONT WEIGHT = 1747 lb (58 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1247 lb (42 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 2994 lb

Weight of ballast secured in vehicle seating area = 415 lb

VEHICLE ATTITUDE: (inches)

Delivered Attitude: RF 30 LF 30 RR 30 LR 30
 Test Attitude: RF 29-1/2 LF 29-1/2 RR 28-1/2 LR 28

REMARKS: _____

GENERAL TEST AND VEHICLE PARAMETER DATA

POST-IMPACT DATA

Type of Test: Side (90°) Impact
 Date of Test: 4/28/83 Time: 1220 Temperature 79 °F
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: Primary = 34.52 mph Secondary = 34.56 mph
 Temperature in Occupant Compartment: NA °F
 Windshield Moulding Temperature: 79 °F

Distance from the vehicle's front bumper to barrier face entering the vehicle velocity measurement device is 5.0 feet and distance exiting the vehicle velocity measurement device is 1.0 foot.

VEHICLE REBOUND AND CRUSH (in.)

Measurements Referenced to Plane 15 Feet Forward of Rear Bumper &

Location	Vehicle Left (in.)					Vehicle Right (in.)				
	31.5	28.4	18.9	6.4	<u>6.4</u>	6.4	18.9	28.4	31.5	
	Post-Test Centerline 5.5 inches to the left									
Top of Front Bumper (Pre)	9.3	6.6	5.5	4.5	3.8	4.5	5.5	6.8	9.3	
Top of Front Bumper (Post)	10.6	7.8	7.3	6.8	6.7	7.4	8.9	10.3	13.5	
Crush	1.3	1.2	1.8	2.3	2.9	2.9	3.4	3.5	4.2	

DOOR OPENING

Front		Rear	
Left	Right	Left	Right
Easily	Easily	Easily	Easily

SEAT MOVEMENT

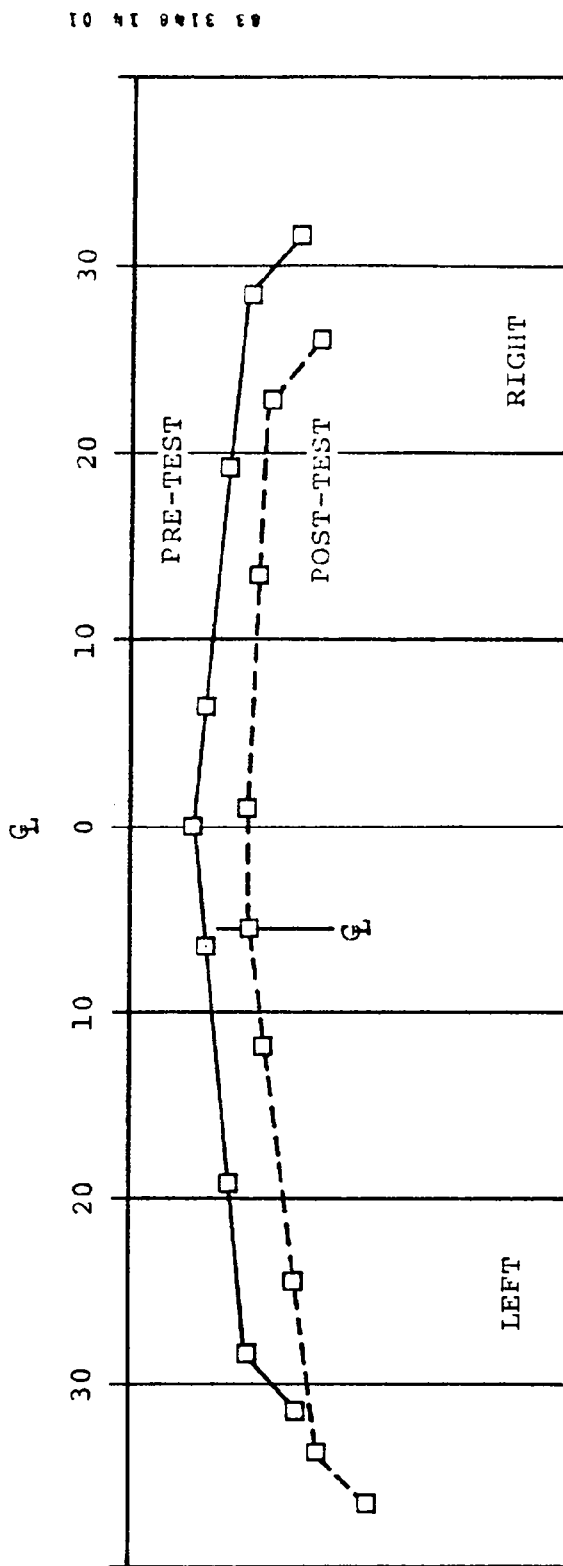
Seat Back Failure	None	None
Seat Shift (in.)	0	0
		N/A

GLAZING DAMAGE

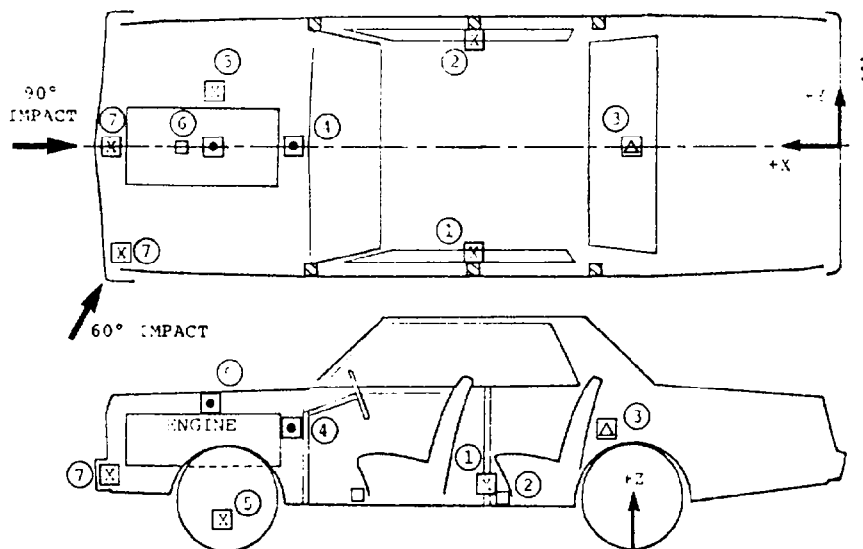
Backlight/Windshield None

OTHER NOTABLE IMPACT EFFECTS: Slight damage to left front corner centerline was 5.5 inches to the left post-test.

REFERENCE PLANE - INCHES



BULLET VEHICLE STATIC CRUSH PROFILE - 2-CAR MOVING, 90 DEGREE SIDE IMPACT TEST - 1981 CHEVROLET CITATION AT 34.56 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.6 MPH.



TEST VEHICLE ACCELEROMETER LOCATIONS AND PHYSICAL COORDINATES

No.	Description of Location	X*	Y*	Z*	Positive		Negative	
					G	MS	G	MS
1	Left occupant compartment near B-pillar on doorsill (Longitudinal)	80.0	26.0	13.0				
		$\Delta V = 21.1$ mph			2.3	165	19.6	31
2	Right occupant compartment near B-pillar on doorsill (Longitudinal)	80.0	-26.0	13.0				
		$\Delta V = 15.7$ mph			0.9	198	15.0	42
3	Truck floor behind rear seat on vehicle (Longitudinal)	42.8	0.0	20.0				
	(Lateral)	$\Delta V = 2.4$ mph			2.1	120	14.5	47
		$\Delta V = 17.0$ mph			6.5	91	4.6	89
4	Front firewall over vehicle centerline (Longitudinal)	131.2	-2.5	34.0				
	(Lateral)	$\Delta V = 19.3$ mph			2.2	20	18.9	27
	(Vertical)	$\Delta V = 10.0$ mph			3.5	169	8.3	74
		$\Delta V = 0.3$ mph			6.7	14	5.1	25
5	Front Crossmember near vehicle centerline (Longitudinal)	154.7	-3.5	9.0				
		$\Delta V = 12.6$ mph			37.9	45	60.2	35
6	Top of engine block (Longitudinal)	147.7	1.5	31.5				
	(Lateral)	$\Delta V = 18.6$ mph			12.6	90	20.5	60
	(Vertical)	$\Delta V = 10.3$ mph			2.7	199	15.6	50
					5.4	68	3.4	37
7	Front bumper near impact point (Longitudinal)	173.7	27.0	20.8				
		$\Delta V = 18.3$ mph			42.1	12	86.1	25
	Average B-pillar accelerometers	$\Delta V = 17.7$ mph			1.2	198	15.9	30

*Reference Plane: X - rear reference point, Y - vehicle centerline, Z - ground

GENERAL TEST AND VEHICLE PARAMETER DATA

PRE-IMPACT DATA

Make/Model: Volkswagen Rabbit
Body Style: 2-Door Hatchback Model Year 1982
NHTSA No.: R&D DSI No. 1326 Color: White

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagen of America
Date of Manufacture: 7/82; VIN: 1VWBA0171CV116703
GVWR: 2822 lb; GAWR: Front = 1609 lb; Rear = 1278 lb

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL

Vehicle Capacity:	FRONT	REAR	RECOMMENDED	LOAD RANGE:
Tire Pressure:	<u>27</u> psi	<u>27</u> psi	TIRE SIZE: <u>155/80R13</u>	<u>Standard</u>

Designated Seating: 2 Front 2 Rear 4 Total
Cargo load = 185 lb Is Spare Tire: Space Saver? No
TOTAL = 785 lb Standard Equipment? Yes

Engine: 4 Cylinder Transverse Mount 105 CID

Transmission: 4 Speed Manual Front Wheel Drive

Date Vehicle Received by Laboratory: 1/20/83; Odometer 119

Dealer Name & Address: TRC
East Liberty, Ohio

WEIGHT (LB) OF TEST VEHICLE AS RECEIVED (WITH MAX. FLUIDS) = UDW

Right Front = <u>626</u> lb	Right Rear = <u>340</u> lb
Left Front = <u>625</u> lb	Left Rear = <u>367</u> lb
TOTAL FRONT WEIGHT = <u>1251</u> lb (<u>64</u> % of Total Vehicle Weight)	
TOTAL REAR WEIGHT = <u>707</u> lb (<u>36</u> % of Total Vehicle Weight)	
TOTAL DELV. WEIGHT = <u>1958</u> lb	

TARGET WEIGHT = UDW + Cargo Load + 328 lbs Dummies = 2471 lb

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 185 LB CARGO:

Right Front = <u>663</u> lb	Right Rear = <u>515</u> lb
Left Front = <u>702</u> lb	Left Rear = <u>581</u> lb
TOTAL FRONT WEIGHT = <u>1365</u> lb (<u>55</u> % of Total Vehicle Weight)	
TOTAL REAR WEIGHT = <u>1096</u> lb (<u>45</u> % of Total Vehicle Weight)	
TOTAL TEST WEIGHT = <u>2461</u> lb	

Weight of ballast secured in vehicle trunk area = 8 lb

VEHICLE ATTITUDE: (inches)

Delivered Attitude:	RF <u>31</u>	LF <u>31</u>	RR <u>31</u>	LR <u>31</u>
Test Attitude:	RF <u>30.1</u>	LF <u>30.1</u>	RR <u>28.3</u>	LR <u>27.9</u>

REMARKS: Bumpers removed to obtain proper test configuration.

GENERAL TEST AND VEHICLE PARAMETER DATA (CONT)

POST-IMPACT DATA

Type of Test: Side (90°) Impact
 Date of Test: 4/28/83 Time: 1220 Temperature 79 °F
 Required Impact Velocity Range: 17.0 to 18.0 mph
 Impact Velocity: Primary = 17.6 mph Secondary = - mph
 Temperature in Occupant Compartment: 72 °F
 windshield Mounting Temperature: 79 °F

Distance from the vehicle's front bumper to barrier face entering the vehicle velocity measurement device is 5.0 feet and distance exiting the vehicle velocity measurement device is 1.0 foot.

VEHICLE REBOUND AND CRUSH (in.)

Vehicle Width:	Pre-test = A	<u>60.2</u>	B	<u>59.8</u>	C	<u>63.2</u>
	Post-test = A	<u>44.6</u>	B	<u>38.8</u>	C	<u>53.8</u>
	Crush = A	<u>15.6</u>	B	<u>21.0</u>	C	<u>9.4</u>

VISIBLE DUMMY CONTACT POINTS

	<u>Driver (HSRI 122)</u>	<u>Passenger (SID 7)</u>
Head	<u>None</u>	<u>Headliner</u>
Chest	<u>Left front door</u>	<u>Left side 1/4 panel</u>
Abdomen	<u>Left front door</u>	<u>Left side 1/4 panel</u>
Left Knee	<u>Left front door</u>	<u>Left side 1/4 panel</u>
Right Knee	<u>Left knee</u>	<u>Left knee</u>

DOOR OPENING

	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
	<u>Tools</u>	<u>Easily</u>	<u>NA</u>	<u>NA</u>
	<u>required</u>			

SEAT MOVEMENT

Seat Back Failure	<u>Yes</u>	<u>NA</u>
Seat Shift (in.)	<u>NA</u>	<u>NA</u>

GLAZING DAMAGE

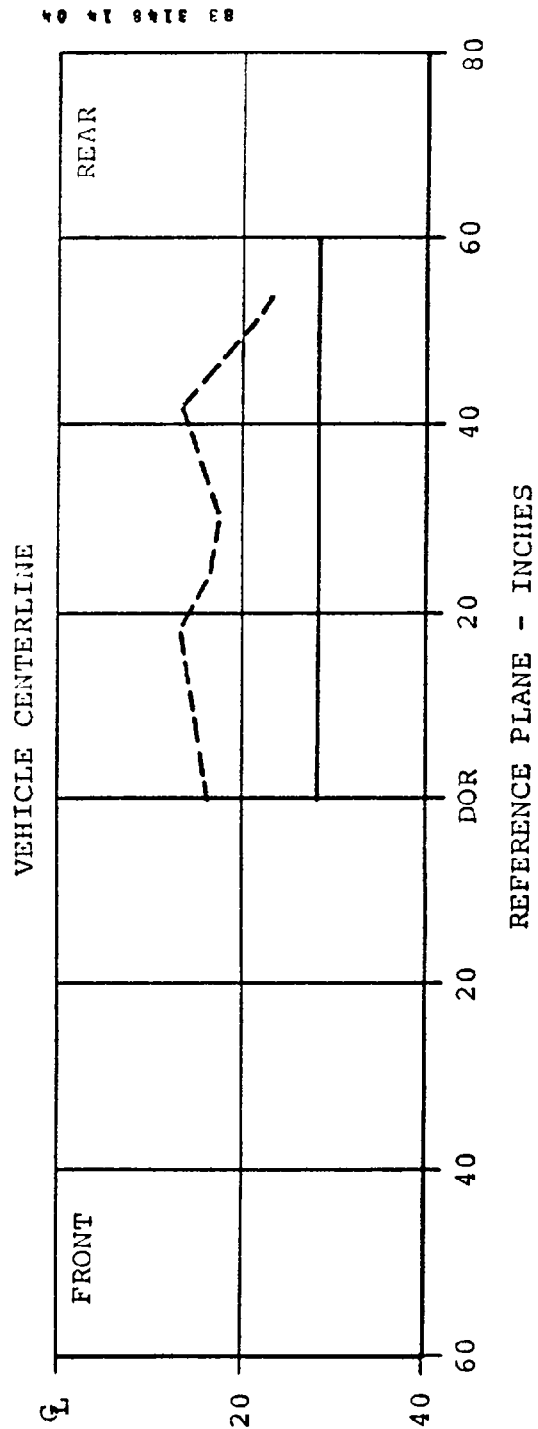
Backlight/Windshield Windshield cracked but intact. Left side window broken. Some retention loss on left side of windshield.

OTHER NOTABLE IMPACT EFFECTS: Both seat backs bent towards the right. Vehicle crushed from A-pillar aft to rear axle. Door sill was deformed upwards and inboard. Slight buckle in roof near B-pillar. Windshield support on the left side forced upward.

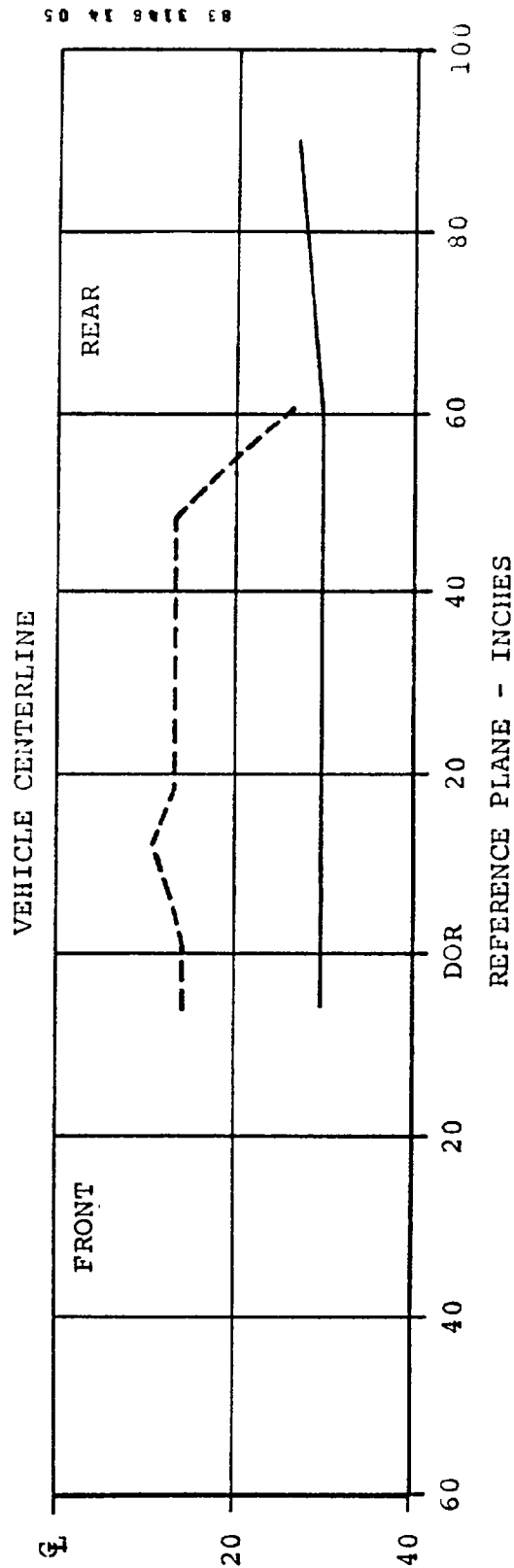
TEST VEHICLE EXTERIOR PROFILES AND STATIC CRUSH

R.P.* Height Location (in.)		Zero Distance Starting at DOR (in.)																					
		30	24	18	12	6	0	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
Pre-test Profile (Distance from R.P. - in.)																							
Axle Height		X	X	X	X	X	11.8	11.7	11.7	11.7	11.7	11.8	11.8	11.8	11.8	11.7	X	X	X	X	X	X	X
DOR		X	X	X	X	X	10.2	10.3	10.1	10.1	9.9	9.9	9.9	9.9	10.1	10.2	10.3	X	X	X	X	X	X
Door Center		X	X	X	9.2	9.9	10.0	9.8	9.9	9.7	9.7	9.6	9.6	9.7	9.8	10.0	8.6	8.4	8.6	11.3	12.2	X	X
Window Sill		X	X	12.1	11.8	11.6	11.6	11.5	11.6	11.4	11.5	11.3	11.4	11.3	11.3	11.4	11.7	11.8	12.0	12.2	12.7	13.7	X
Window Top		X	X	X	X	X	X	X	18.5	18.0	18.3	18.1	18.1	18.0	17.8	17.9	18.2	18.5	X	X	X	X	X
Post-test Profile (Distance From R.P. - in.)																							
Axle Height		X	X	X	X	X	24.4	24.9	26.2	27.2	24.0	23.1	24.9	27.5	20.7	17.2	X	X	X	X	X	X	X
DOR		X	X	X	X	X	26.0	25.9	26.9	29.3	26.6	26.4	26.6	26.5	26.6	27.2	20.8	14.0	X	X	X	X	X
Door Center		X	X	X	19.8	22.2	24.1	26.1	25.8	30.3	30.7	31.5	31.8	32.0	32.4	27.7	18.0	11.4	-	10.0	12.0	X	X
Window Sill		X	X	14.9	16.3	17.0	17.5	20.8	22.3	23.1	24.0	24.5	26.0	27.7	28.1	25.5	18.0	13.4	13.1	12.5	13.2	X	X
Window Top		X	X	X	X	X	X	X	21.5	22.7	23.0	23.4	24.0	24.8	23.7	22.1	21.4	20.5	X	X	X	X	X
Post-test Static Crush (in.)																							
Axle Height		X	X	X	X	X	12.5	13.2	14.5	15.5	12.3	11.4	13.1	15.7	8.9	5.4	X	X	X	X	X	X	X
DOR		X	X	X	X	X	15.8	15.6	16.8	19.2	15.7	15.5	15.7	15.6	15.7	17.1	10.6	3.7	X	X	X	X	X
Door Center		X	X	X	10.6	12.3	14.1	16.3	15.9	20.6	21.0	21.9	22.2	22.3	22.6	17.7	9.4	3.0	-	1.3	-0.2	X	X
Window Sill		X	X	2.8	4.5	5.4	5.9	9.3	10.7	11.7	12.5	13.2	14.6	16.4	16.8	14.1	6.3	1.6	1.1	0.3	0.5	X	X
Window Top		X	X	X	X	X	X	X	3.0	4.7	4.7	5.3	5.9	6.8	5.9	4.2	3.2	2.0	X	X	X	X	X

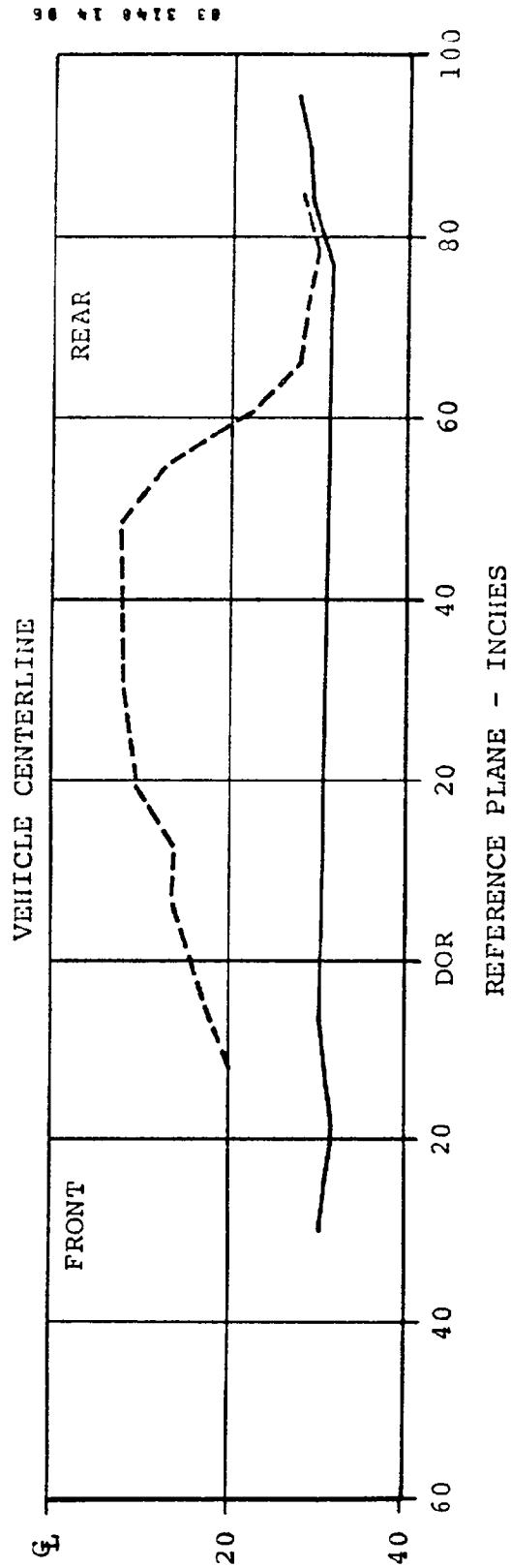
*Zero plane set up 40 inches from rear bumper centerline and 40 inches from front bumper centerline. This plane was set up parallel to the vehicle centerline.



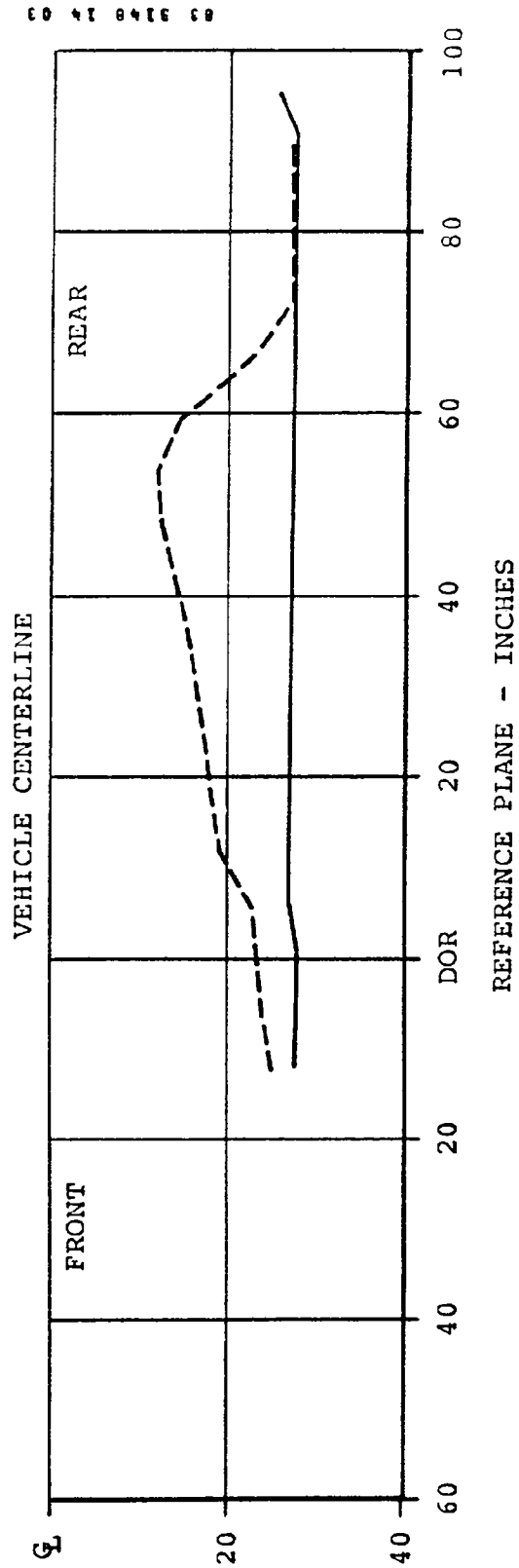
EXTERIOR VEHICLE PROFILE AND STATIC CRUSH MEASUREMENTS - AXLE HEIGHT LEVEL-- TWO CAR
MOVING, 90 DEGREE SIDE IMPACT TEST - 1981 CHEVROLET CITATION AT 34.56 MPH TO 1982
VOLKSWAGEN RABBIT AT 17.6 MPH.



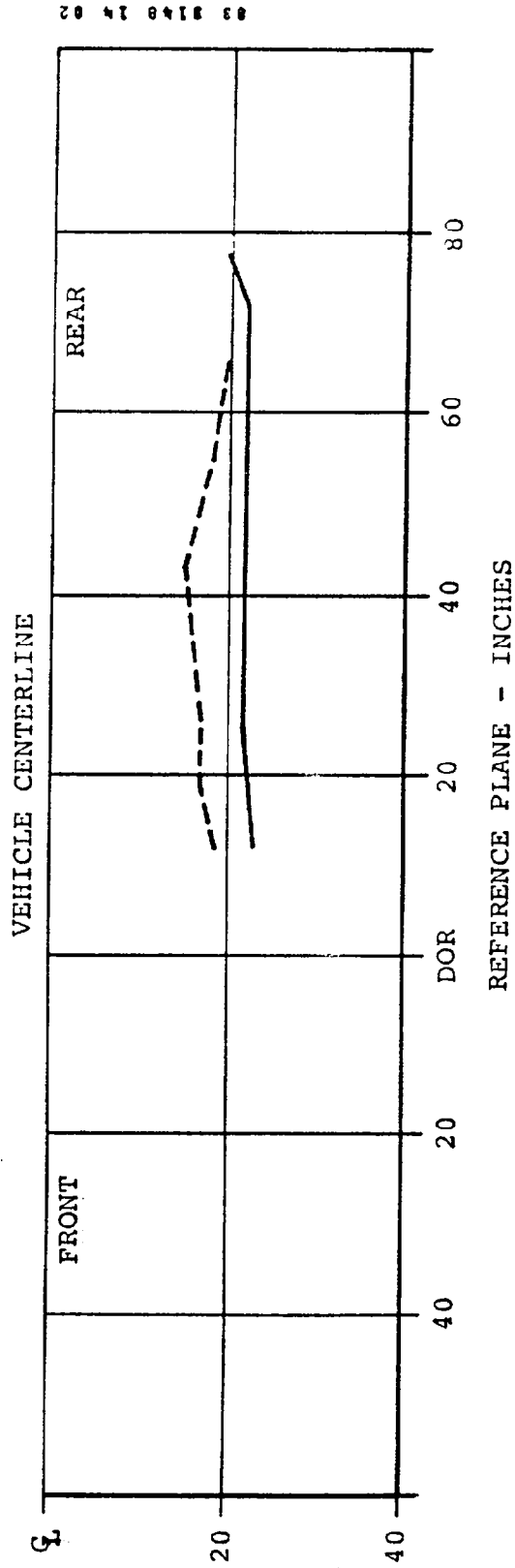
EXTERIOR VEHICLE PROFILE AND STATIC CRUSH MEASUREMENTS - DOR LEVEL - TWO CAR MOVING,
 90 DEGREE SIDE IMPACT TEST - 1981 CHEVROLET CITATION AT 34.56 MPH TO 1982 VOLKSWAGEN
 RABBIT AT 17.6 MPH.



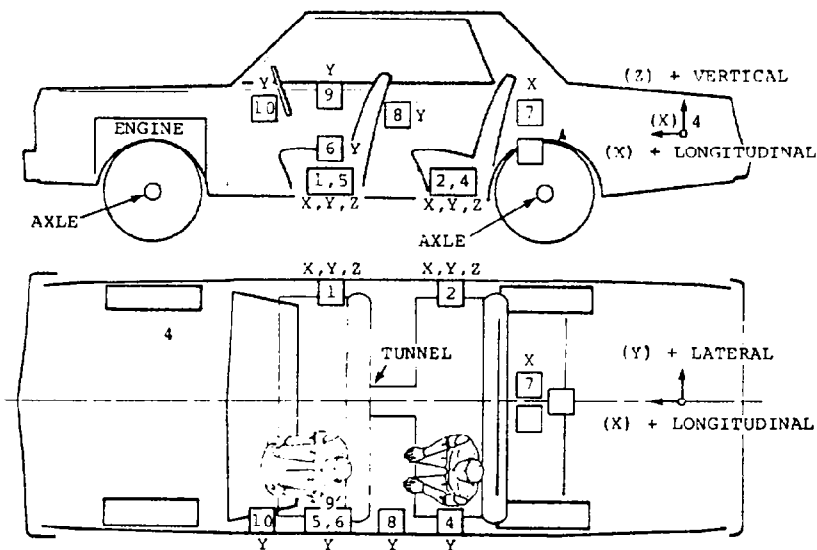
EXTERIOR VEHICLE PROFILE AND STATIC CRUSH MEASUREMENTS - DOOR CENTER LEVEL - TWO CAR MOVING, 90 DEGREE SIDE IMPACT TEST - 1981 CHEVROLET CITATION AT 34.56 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.6 MPH.



EXTERIOR VEHICLE PROFILE AND STATIC CRUSH MEASUREMENTS - WINDOW SILL LEVEL - TWO CAR
MOVING, 90 DEGREE SIDE IMPACT TEST - 1981 CHEVROLET CITATION AT 34.56 MPH TO 1982
VOLKSWAGEN RABBIT AT 17.6 MPH.



EXTERIOR VEHICLE PROFILE AND STATIC CRUSH MEASUREMENTS - WINDOW TOP LEVEL - TWO CAR
MOVING, 90 DEGREE SIDE IMPACT TEST - 1981 CHEVROLET CITATION AT 34.56 MPH TO 1982
VOLKSWAGEN RABBIT AT 17.6 MPH.



TARGET VEHICLE ACCELEROMETER LOCATIONS AND PHYSICAL COORDINATES

No.	Description of Location	X*	Y*	Z*	Positive		Negative	
					G	MS	G	MS
1	Right sill next to front seat							
	(Longitudinal)	83.4	22.3	11.2	2.2	19	5.2	14
	(Lateral)	$\Delta V = 19.6$ mph			20.4	15	4.8	210
	(Vertical)				13.3	34	14.2	64
2	Right sill next to rear seat							
	(Longitudinal)	62.8	22.8	9.8	3.1	45	5.9	22
	(Lateral)	$\Delta V = 21.3$ mph			25.1	35	3.5	255
	(Vertical)				10.1	37	6.2	74
3	Deck over rear axle							
	(Longitudinal)	36.0	2.0	14.5	5.5	35	9.7	76
	(Lateral)	$\Delta V = 21.0$ mph			15.2	36	2.2	152
	(Vertical)				7.2	36	4.7	55
4	Left sill next to rear seat							
	(Lateral)	62.4	-23.4	10.5	72.7	36	59.9	30
		$\Delta V = 16.8$ mph						
5	Left sill next to front seat							
	(Lateral)	83.5	-23.1	10.8	79.9	11	71.9	20
		$\Delta V = 9.3$ mph						
6	Left front door centerline							
	(Lateral)	83.2	-25.5	23.8	Sensor Damage at 22 ms			
		$\Delta V = 44.7$ mph			216.0	10	NA	NA
7	Right rear compartment							
	(Longitudinal)	35.0	15.0	17.2	3.4	35	6.8	65
8	Midrear of left front door							
	(Lateral)	60.0	-25.8	23.8	165.3	8	47.9	4
		$\Delta V = 17.8$ mph						
9	Upper left front door centerline							
	(Lateral)	80.7	-25.8	32.8	214.0	16	123.8	30
		$\Delta V = 26.5$ mph						
10	Midfront of left front door							
	(Lateral)	100.5	-25.8	23.8	70.4	5	37.6	39
		$\Delta V = 10.5$ mph						

*Reference Plane: X - rear reference point, Y - vehicle centerline, Z - ground

SUMMARY OF CAMERA LOCATIONS AND DESCRIPTIONS

Loc. No.	Location	Field of View	Camera Angle	Lens Size	Frame Rate	Timing Speed	Serial Number	Impact Dist-X	Center-line Dist-Y	Camera Height
1	Right side perpendicular to barrier	Left side of test vehicle	0°	25 mm	376 fps	100 Hz	M9	372 in.	264 in.	51 in.
2	Right side parallel to vehicle	Barrier contact - left side of vehicle	0°	17 mm	400 fps	100 Hz	M7	72 in.	540 in.	54 in.
3	Left side perpendicular to track	Front of test vehicle	0°	25 mm	388 fps	102 Hz	LC 326	0 in.	684 in.	54 in.
4	Overhead	Barrier/vehicle contact	90°	10 mm	398 fps	100 Hz	M3	0 in.	0 in.	360 in.
5	Right side bullet vehicle	Real time documentary	N/A	Var	24 fps	-	Scoopic	-	-	-
6	Onboard front	Left front occupant compartment (front)	0°	8 mm	306 fps	100 Hz	4	-	-	-
7	Onboard side front	Left front occupant compartment (side)	0°	8 mm	417 fps	100 Hz	7	-	-	-
8	Onboard side rear	Left rear occupant compartment (side)	0°	8 mm	400 fps	99 Hz	6	-	-	-
9	Onboard rear	Left rear occupant compartment (rear)	0°	8 mm	432 fps	108 Hz	12	-	-	-

3.0 OCCUPANT RESPONSE DATA AND PRE-TEST POSITIONING VALUES

The following sheets describe the occupant response data and pre-test positioning values.

DUMMY IN-VEHICLE POSITION RECORDING SHEET

PRE-IMPACT DATA

Make/Model: Volkswagen Rabbit

Body Style: 2-Door Hatchback

Model Year: 1982

NHTSA No. R&D

DSI No. 1326

Color: White

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagen of America

Date of Manufacture: 7/82

VIN: 1VWBA0171CV116703

GVWR: 2822 lb;

GAWR: Front = 1609 lb;

Rear = 1278 lb

POST-IMPACT DATA

Type of Test: Side (90°) Impact

Date of Test: 4/28/83

Time: 1220

Temperature 79 °F

Bullet Impact Velocity Range: 34.5

to 35.5 mph

Impact Velocity: Bullet = 34.56 mph

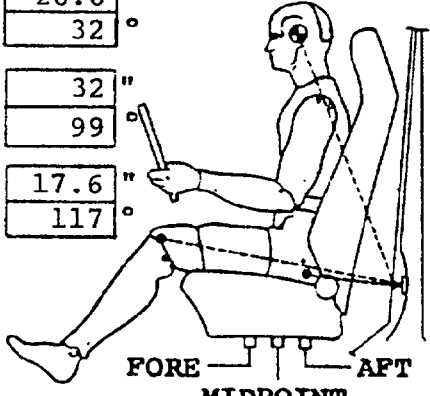
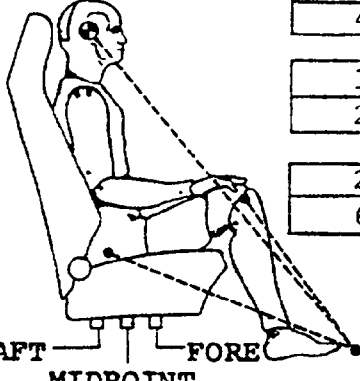
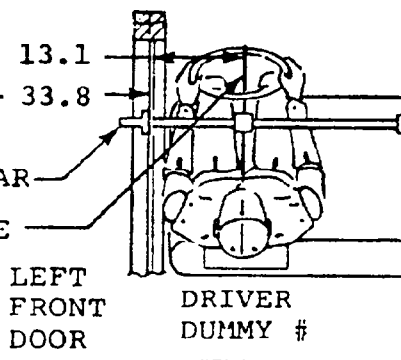
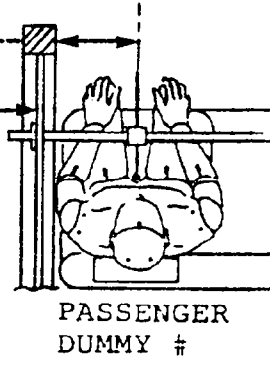
Target = 17.6 mph

Seat Type: Bucket

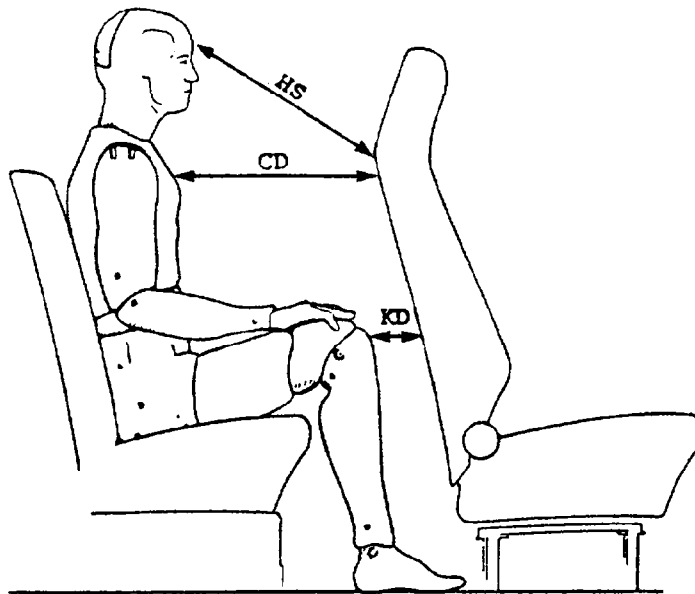
Adjuster Type: Manual

Bucket Seat Type Back: High back

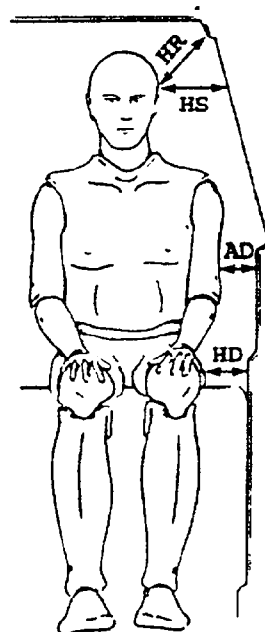
Technicians: M. Rodack, C. Brugaletta

DRIVER DUMMY# <u>1 2 2</u> HEAD TARGET <u>20.0</u> " <u>32</u> ° KNEE JOINT <u>32</u> " <u>99</u> ° APPROXIMATE "H" POINT <u>17.6</u> " <u>117</u> °  FORE MIDPOINT AFT	PASSENGER DUMMY # <u>SID 7</u> <u>48</u> " HEAD <u>40</u> ° TARGET <u>16</u> " KNEE <u>20</u> ° JOINT <u>23</u> " APPROXIMATE "H" POINT <u>68</u> °  AFT MIDPOINT FORE
DOOR * <u>13.1</u> GLASS <u>33.8</u> HEIGHT LATERAL BAR ADJUSTABLE POINTER LEFT FRONT DOOR DRIVER DUMMY # <u>1 2 2</u> 	<u>13.2</u> DOOR <u>33.7</u> GLASS HEIGHT LEFT SIDE OF CAR PASSENGER DUMMY # <u>SID 7</u> 

*Door glass height is equal on the right and left side of vehicle.

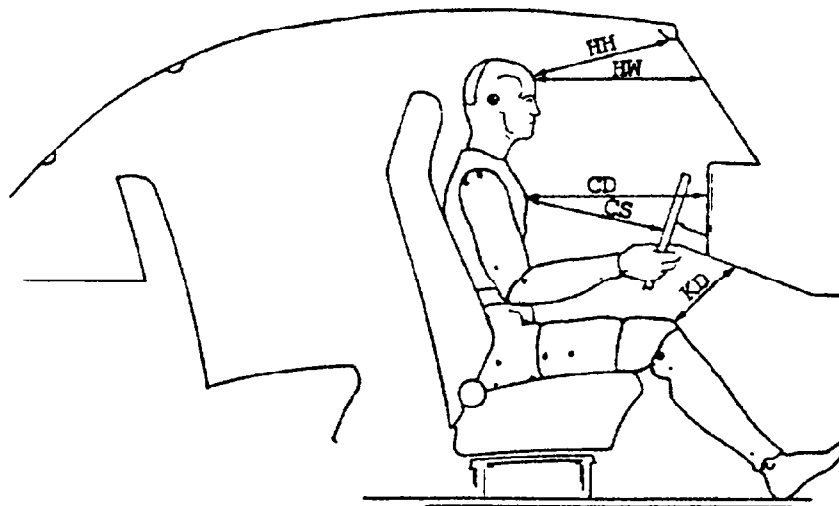


HS = 22.3 INCHES
 CD = 17.2 INCHES
 KD = 3.5/3.8 INCHES



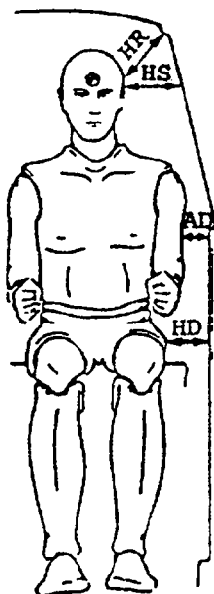
HR = 6.3 INCHES
 HS = 8.0 INCHES
 AD = 4.0 INCHES
 HD = 6.1 INCHES

REAR PASSENGER CLEARANCE DIMENSIONS



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HH = 16.0 INCHES
 HW = 23.0 INCHES
 CD = 19.7 INCHES
 CS = 12.0 INCHES
 KD = 3.5 INCHES/3.5 INCHES



HR = 6.5 INCHES
 HS = 7.5 INCHES
 AD = 3.3 INCHES
 HD = 6.1 INCHES

DRIVER CLEARANCE DIMENSIONS

SIDE IMPACT DUMMY RESPONSE SUMMARY

TEST NO. 3148-4

TEST DATE 4/28/83

TEST CONFIGURATION:

Target Vehicle	<u>1982 Volkswagen Rabbit</u>	Speed	<u>17.6 mph</u>
Bullet Vehicle	<u>1981 Chevrolet Citation</u>	Speed	<u>34.52 mph</u>
Impact Location	<u>Left edge of bumper struck 37 inches forward of the</u>		
	<u>Rabbit wheelbase centerline</u>	Angle	<u>90°</u>
Dummy Model	<u>HSRI 122 (Driver)</u>		

HEAD RESPONSE:

	Positive Peak (G)	ms	Negative Peak (G)	ms
Longitudinal	69.1	57	130.0	58
Lateral	173.2	56	108.6	59
Vertical	75.2	64	141.2	57
Resultant	176.3	57	-	-
HIC	914.3 Between 51 and 86 ms			

CHEST RESPONSE:

DEFLECTION (IN.): LRDY 1.77 in. @ 60 ms

Location	Pk A (G @ ms)		3ms Clip (G)	SI	ΔV_y (MPH)	Impact Time (ms)
	+	-				
Upper Thorax						
Longitudinal	33.5 @ 61	52.4 @ 39	-	-	-	-
Lateral (P)	150.1 @ 42	163.6 @ 62	92.8	-	22.8	19
Lateral (R)	102.4 @ 38	103.0 @ 61	95.3	-	26.7	22
Vertical	42.4 @ 62	82.2 @ 61	-	-	-	-
Resultant	169.0 @ 62	-	98.1	1696	-	-
Resultant (R)	132.1 @ 61	-	99.9	1121	-	-
Lower Thorax						
Longitudinal	146.2 @ 42	134.1 @ 40	-	-	-	-
Lateral (P)	116.9 @ 34	103.5 @ 61	110.0	-	30.2	22
Lateral (R)	129.8 @ 42	91.5 @ 61	118.1	-	38.1	20
Vertical	47.6 @ 62	197.7 @ 40	-	-	-	-
Resultant	222.7 @ 40	-	122.8	2732	-	-
Resultant (R)	245.6 @ 40	-	133.2	3325	-	-
Left Upper Rib						
Lateral (P)	72.3 @ 36	8.2 @ 96	64.1	-	26.8	21
Lateral (R)	76.3 @ 35	5.0 @ 96	70.3	-	27.5	22
Left Lower Rib						
Lateral (P)	143.2 @ 33	31.9 @ 61	124.3	-	27.4	22
Lateral (R)	125.6 @ 33	33.9 @ 66	118.9	-	28.6	21

SIDE IMPACT DUMMY RESPONSE SUMMARY (Continued)

PELVIS RESPONSE

	Positive Peak (G)	ms	Negative Peak (G)	ms
Longitudinal	20.0	63	56.6	27
Lateral	235.8	27	15.5	48
Vertical	9.7	86	53.6	31
Resultant	242.8	27	-	-
ΔV_y 31.0 mph SI 3183	Contact Time 16 ms			

COMMENTS: HSRI-122 (Driver) - No damage to dummy recorded post-test.

SIDE IMPACT DUMMY RESPONSE SUMMARY

TEST NO. 3148-4 TEST DATE 4/28/83

TEST CONFIGURATION:

Target Vehicle	<u>1982 Volkswagen Rabbit</u>	Speed	<u>17.6 mph</u>
Bullet Vehicle	<u>1981 Chevrolet Citation</u>	Speed	<u>34.52 mph</u>
Impact Location	<u>Left edge of bumper struck 37 inches forward of the target</u>		
	<u>Rabbit wheelbase centerline</u>	Angle	<u>90°</u>
Dummy Model	<u>SID 7 (Left Rear Passenger)</u>		

HEAD RESPONSE:

	Positive Peak (G)	ms	Negative Peak (G)	ms
Longitudinal	66.5	62	25.4	111
Lateral	143.2	62	15.9	102
Vertical	68.1	62	33.8	85
Resultant	171.3	62	-	-
HIC	533.8 Between 60.6 and 63.3 ms			

CHEST RESPONSE:

DEFLECTION (IN.): LRDY 2.48 in. @ 48 ms

Location	Pk A (G @ ms)		3ms Clip (G)	SI	ΔV_y (MPH)	Impact Time (ms)
	+	-				
Upper Thorax						
Longitudinal	38.0 @ 60	108.6 @ 75	-	-	-	-
Lateral (P)	43.9 @ 93	11.7 @ 60	40.1	-	30.0	61
Lateral (R)	46.6 @ 75	13.8 @ 60	39.4	-	28.2	61
Vertical	32.3 @ 75	15.7 @ 76	-	-	-	-
Resultant	116.5 @ 75	-	51.4	569	-	-
Resultant (R)	119.5 @ 75	-	52.2	583	-	-
Lower Thorax						
Longitudinal	113.5 @ 59	27.3 @ 90	-	-	-	-
Lateral (P)	52.5 @ 60	7.8 @ 187	31.1	-	24.0	42
Lateral (R)	49.2 @ 60	9.6 @ 28	33.7	-	20.7	42
Vertical	75.6 @ 59	13.4 @ 53	-	-	-	-
Resultant	138.4 @ 59	-	46.7	362	-	-
Resultant (R)	136.3 @ 59	-	47.2	347	-	-
Left Upper Rib						
Lateral (P)	36.2 @ 72	9.0 @ 144	34.7	-	28.2	41
Lateral (R)	37.5 @ 72	9.5 @ 143	35.3	-	27.8	46
Left Lower Rib						
Lateral (P)	39.5 @ 67	17.6 @ 143	38.7	-	28.6	36
Lateral (R)	40.7 @ 63	6.0 @ 144	39.7	-	24.1	36

SIDE IMPACT DUMMY RESPONSE SUMMARY (Continued)

PELVIS RESPONSE

	Positive Peak (G)	ms	Negative Peak (G)	ms
Longitudinal	20.0	81	46.6	38
Lateral	80.5	46	57.6	26
Vertical	16.3	89	30.1	60
Resultant	88.1	38	-	-
ΔV_y 20.9 mph SI 701	Contact Time 17 ms			

COMMENTS: SID 7 (Left Rear Passenger Dummy) - Left knee was broken during test event.

APPENDIX A
PERTINENT PHOTOGRAPHS



FIGURE A-1. PRE-TEST FRONT VIEW OF "BULLET" VEHICLE - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-2. POST-TEST FRONT VIEW OF "BULLET" VEHICLE - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-3. PRE-TEST LEFT SIDE VIEW OF "BULLET" VEHICLE - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-4. POST-TEST LEFT SIDE VIEW OF "BULLET" VEHICLE - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-5. PRE-TEST RIGHT SIDE "BULLET" VEHICLE - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-6. POST-TEST RIGHT SIDE VIEW OF "BULLET" VEHICLE - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.

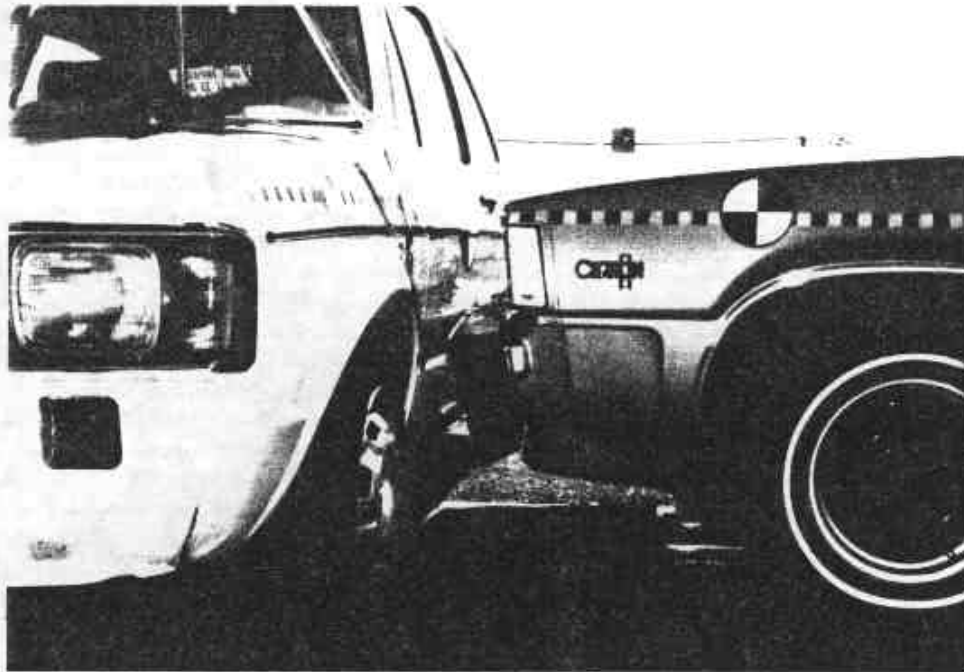


FIGURE A-7. PRE-TEST FRONT VIEW OF VEHICLE MATCHUP - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-8. POST-TEST FRONT VIEW OF VEHICLE MATCHUP - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-9. PRE-TEST REAR VIEW OF VEHICLE MATCHUP - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-10. POST-TEST REAR VIEW OF VEHICLE MATCHUP - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-11. PRE-TEST FRONT VIEW OF VOLKSWAGEN RABBIT - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-12. POST-TEST FRONT VIEW OF VOLKSWAGEN RABBIT - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-13. PRE-TEST FRONT OBLIQUE VIEW OF VOLKSWAGEN RABBIT -
90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION
AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-14. PRE-TEST LEFT SIDE VIEW OF VOLKSWAGEN RABBIT - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-15. POST-TEST LEFT SIDE OF VOLKSWAGEN RABBIT - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-16. PRE-TEST REAR OBLIQUE OF VOLKSWAGEN RABBIT - 90°
TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT
35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.

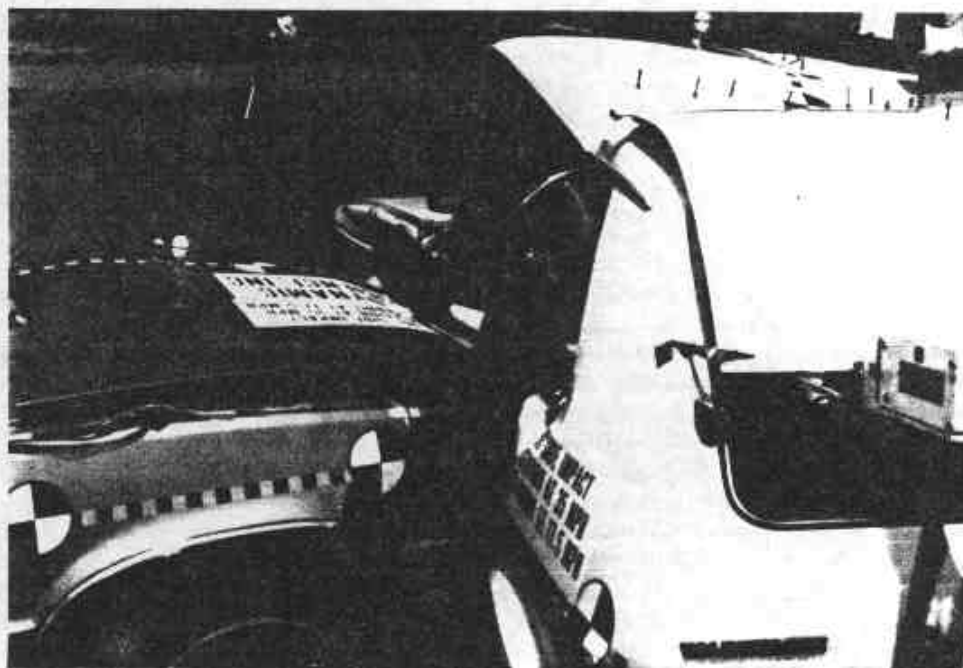


FIGURE A-17. POST-TEST REAR OBLIQUE OF VOLKSWAGEN RABBIT - 90°
TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT
35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.

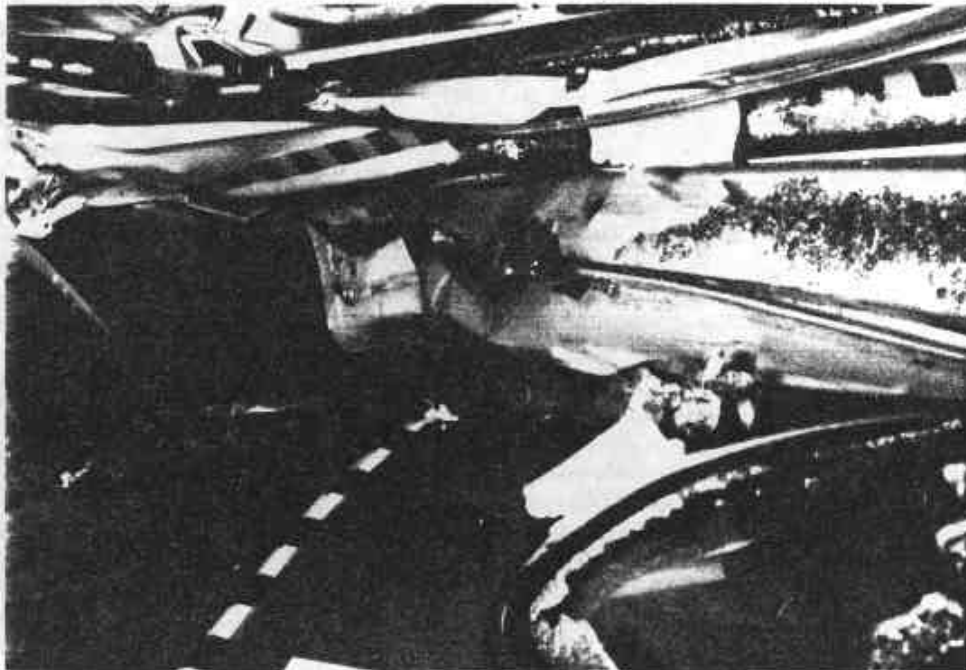


FIGURE A-18a. POST-TEST DAMAGE - 90° TWO VEHICLE MOVING
SIDE IMPACT - 1981 CITATION AT 35 MPH TO
1982 VOLKSWAGEN RABBIT AT 17.5 MPH.

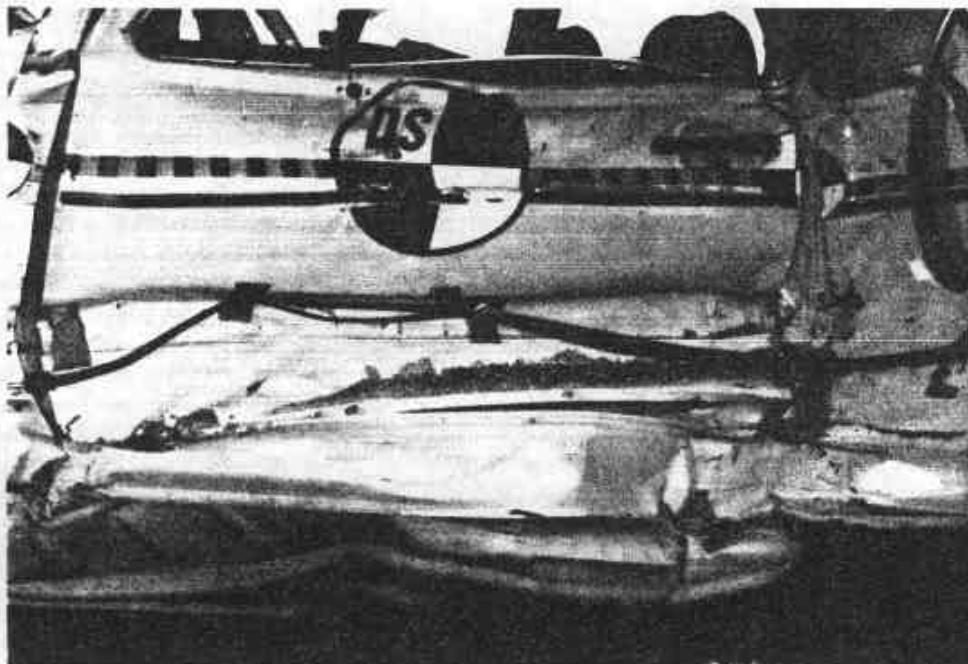


FIGURE A-18b. POST-TEST DAMAGE - 90° TWO VEHICLE MOVING
SIDE IMPACT - 1981 CITATION AT 35 MPH TO
1982 VOLKSWAGEN RABBIT AT 17.5 MPH.

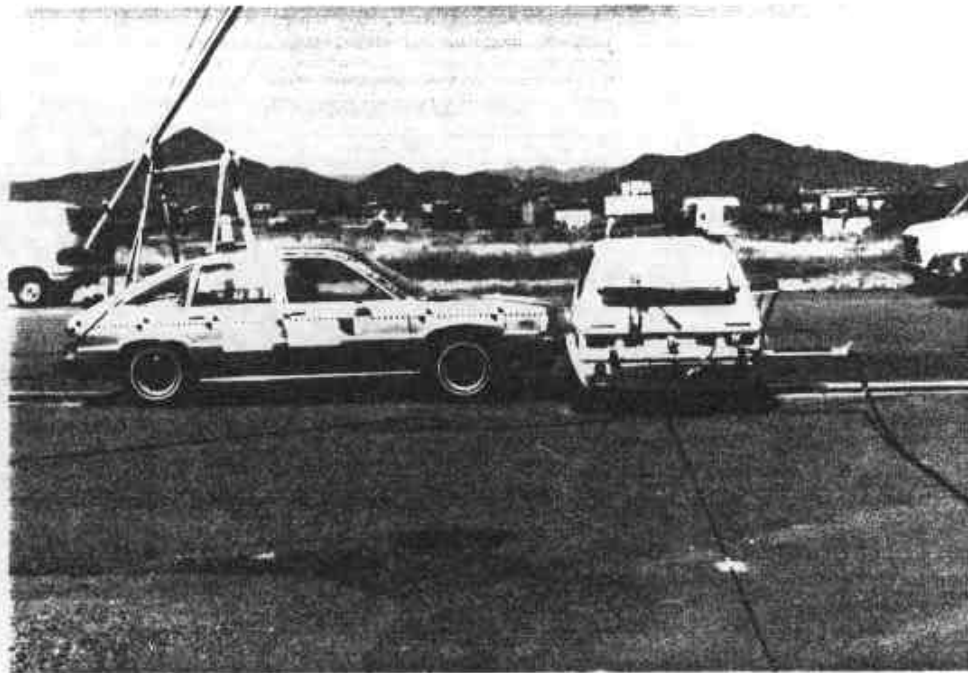


FIGURE A-19. PRE-TEST REAR OF VOLKSWAGEN RABBIT - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSAGEN RABBIT AT 17.5 MPH.



FIGURE A-20. POST-TEST REAR VIEW OF VOLKSWAGEN RABBIT - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.

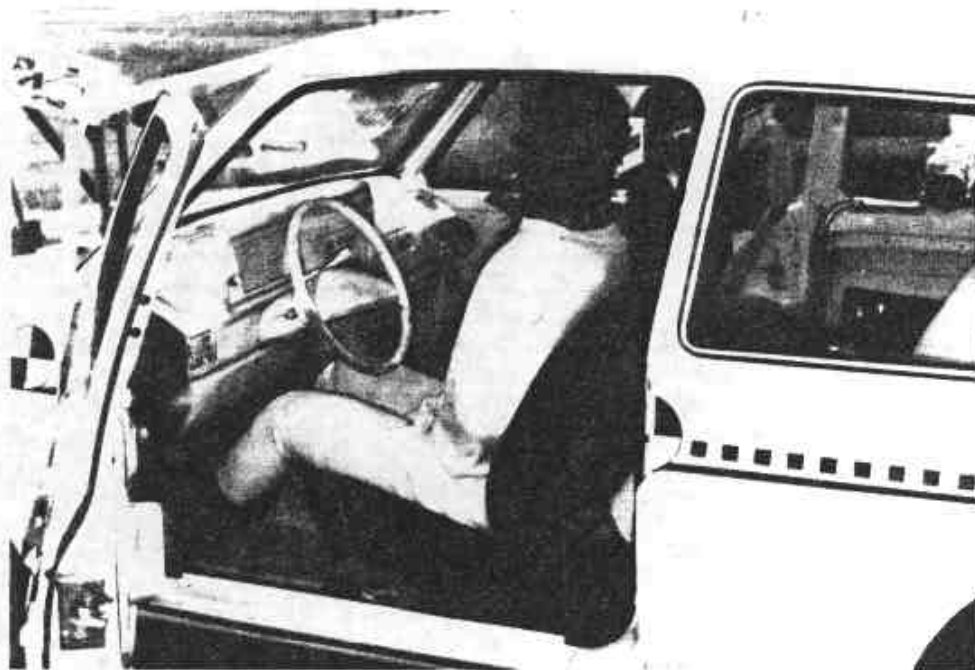


FIGURE A-21a. PRE-TEST DRIVER DUMMY POSITION (LEFT SIDE) - 90°
TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION
AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-21b. PRE-TEST DRIVER DUMMY POSITION (LEFT SIDE) - 90°
TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION
AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-22a. PRE-TEST DRIVER DUMMY POSITION (RIGHT SIDE) - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-22b. PRE-TEST DRIVER DUMMY POSITION (RIGHT SIDE) - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.

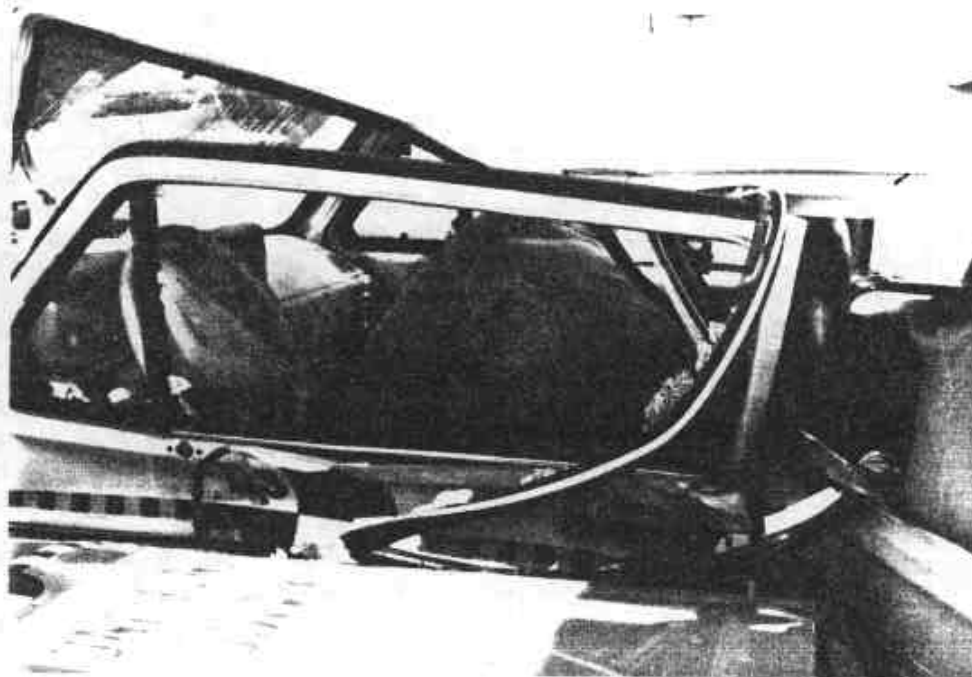


FIGURE A-23a. POST-TEST DRIVER DUMMY POSITION - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-23b. POST-TEST DRIVER DUMMY POSITION - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.

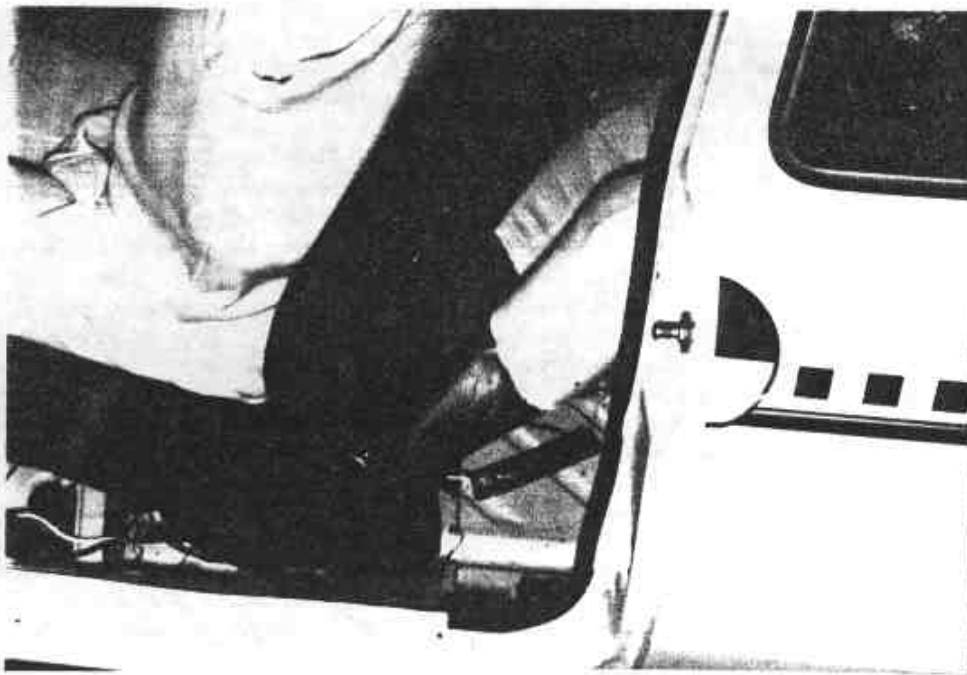


FIGURE A-24. PRE-TEST PASSENGER DUMMY POSITION (LEFT SIDE) - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-25. PRE-TEST PASSENGER DUMMY POSITION (REAR) - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-26a. PRE-TEST PASSENGER DUMMY POSITON (RIGHT SIDE) - 90°
TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT
35 MPH to 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.

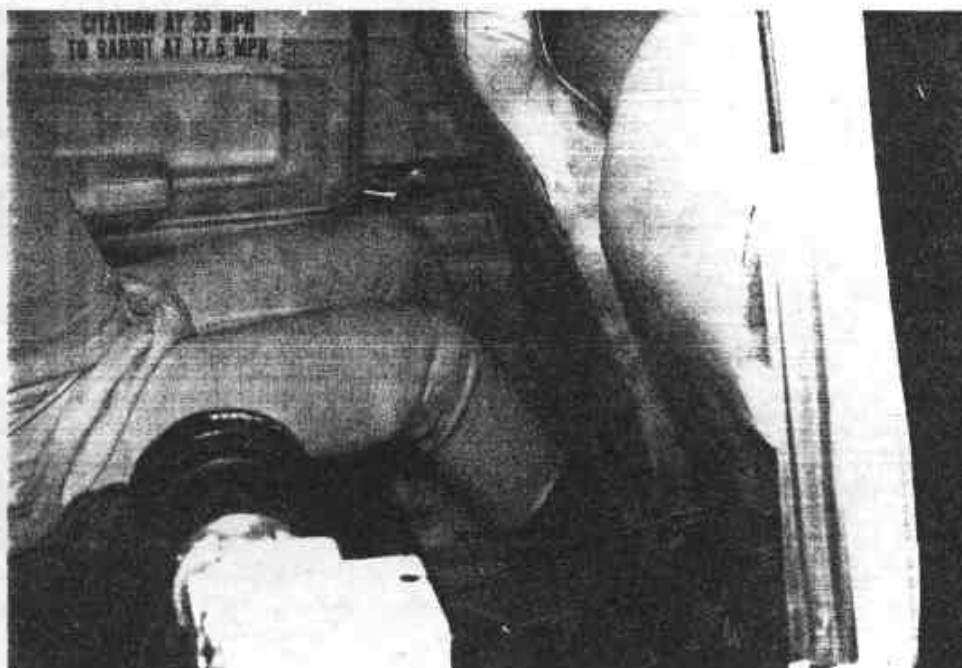


FIGURE A-26b. PRE-TEST PASSENGER DUMMY POSITON (RIGHT SIDE) - 90°
TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT
35 MPH to 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.

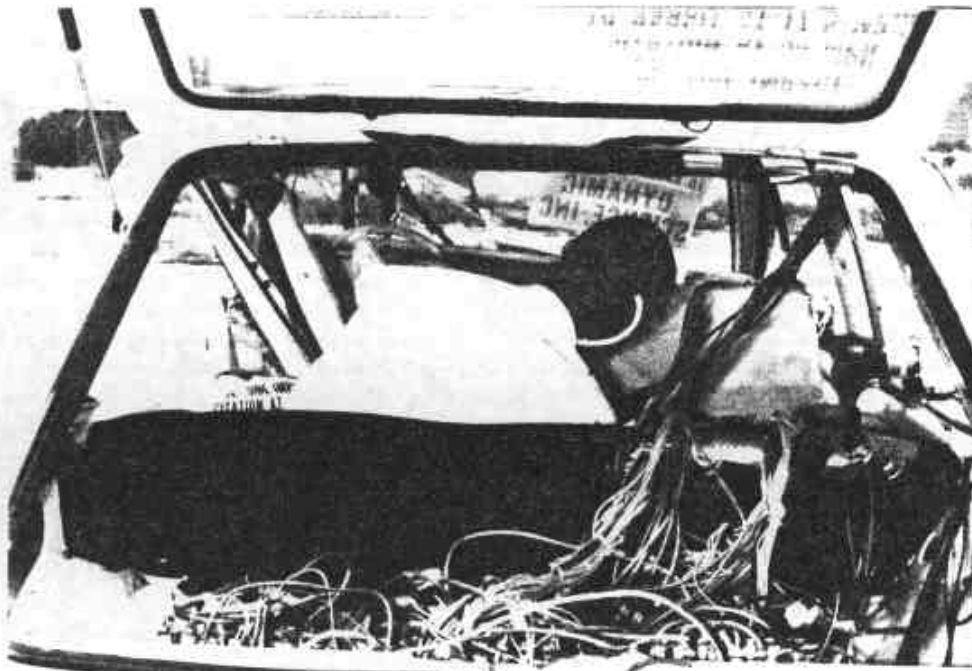


FIGURE A-27a. POST-TEST PASSENGER DUMMY POSITION (RIGHT SIDE) - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.

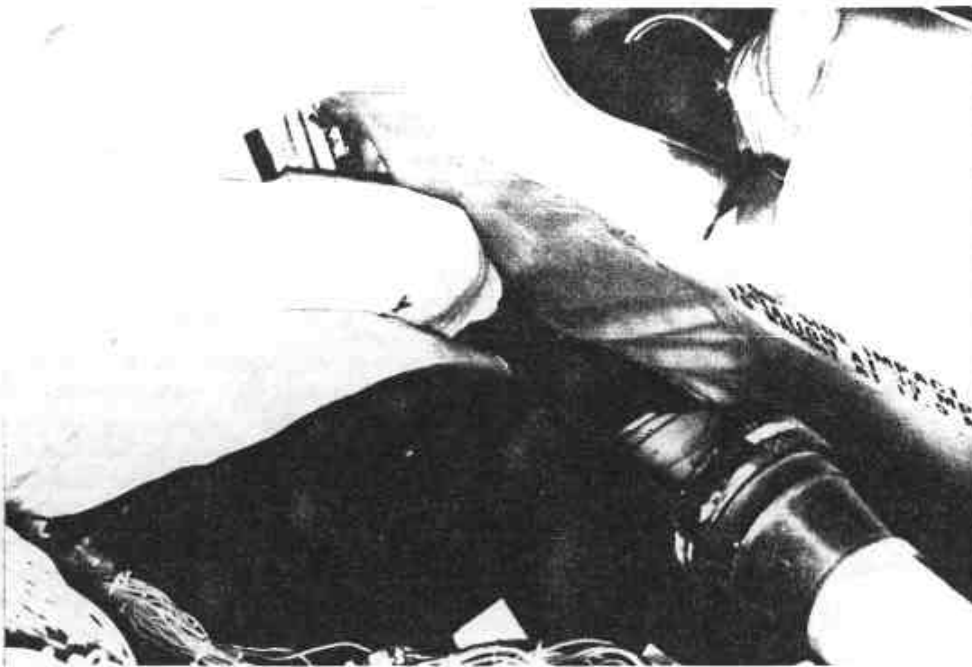


FIGURE A-27b. POST-TEST PASSENGER DUMMY POSITION (RIGHT SIDE) - 90° TWO VEHICLE MOVING SIDE IMPACT - 1981 CITATION AT 35 MPH TO 1982 VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-28a. IMPACT SEQUENCE - 90° TWO VEHICLE MOVING SIDE
IMPACT - 1981 CITATION AT 35 MPH TO 1982
VOLKSWAGEN RABBIT AT 17.5 MPH.



FIGURE A-28b. IMPACT SEQUENCE - 90° TWO VEHICLE MOVING SIDE
IMPACT - 1981 CITATION AT 35 MPH TO 1982
VOLKSWAGEN RABBIT AT 17.5 MPH.

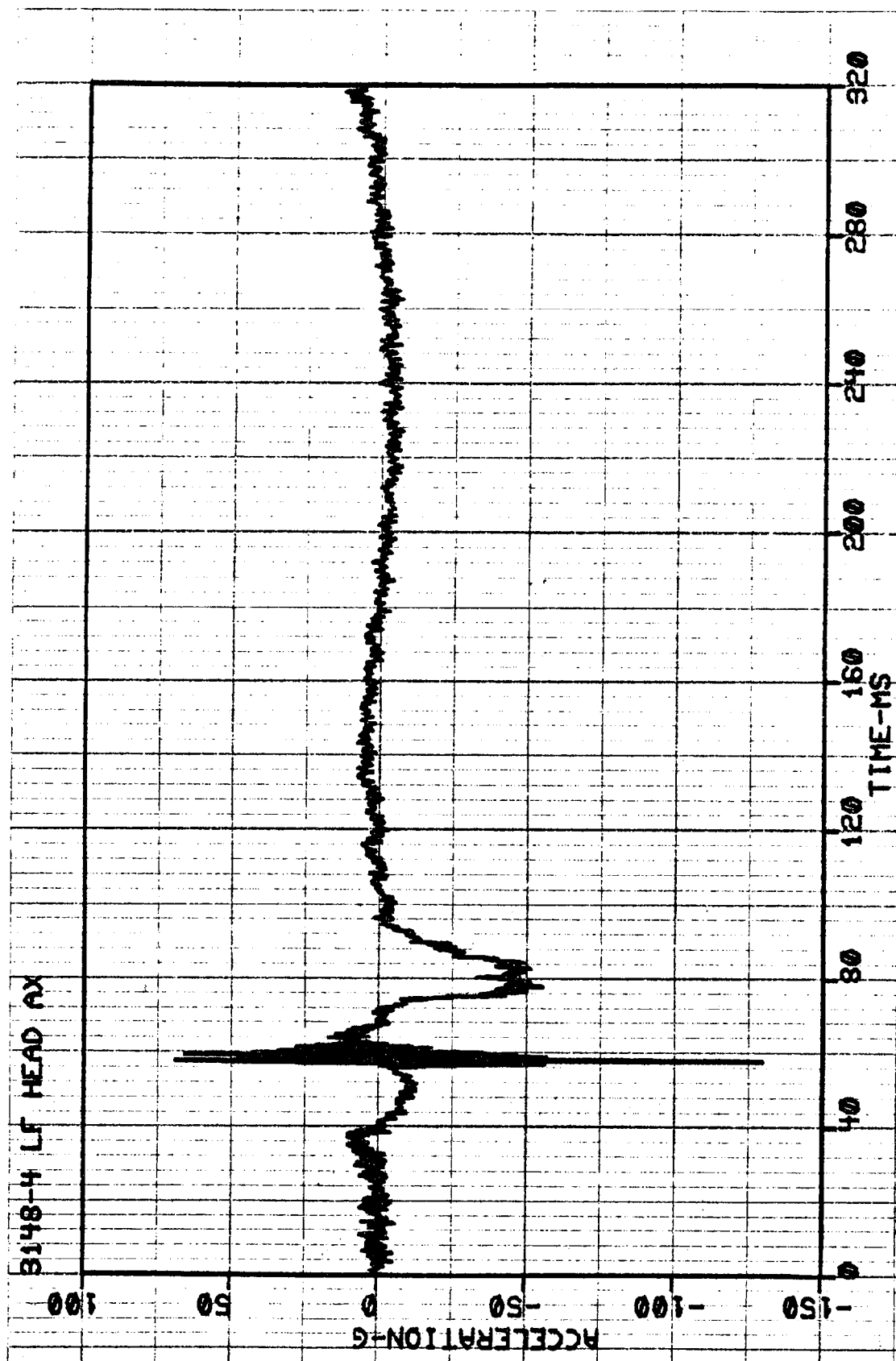


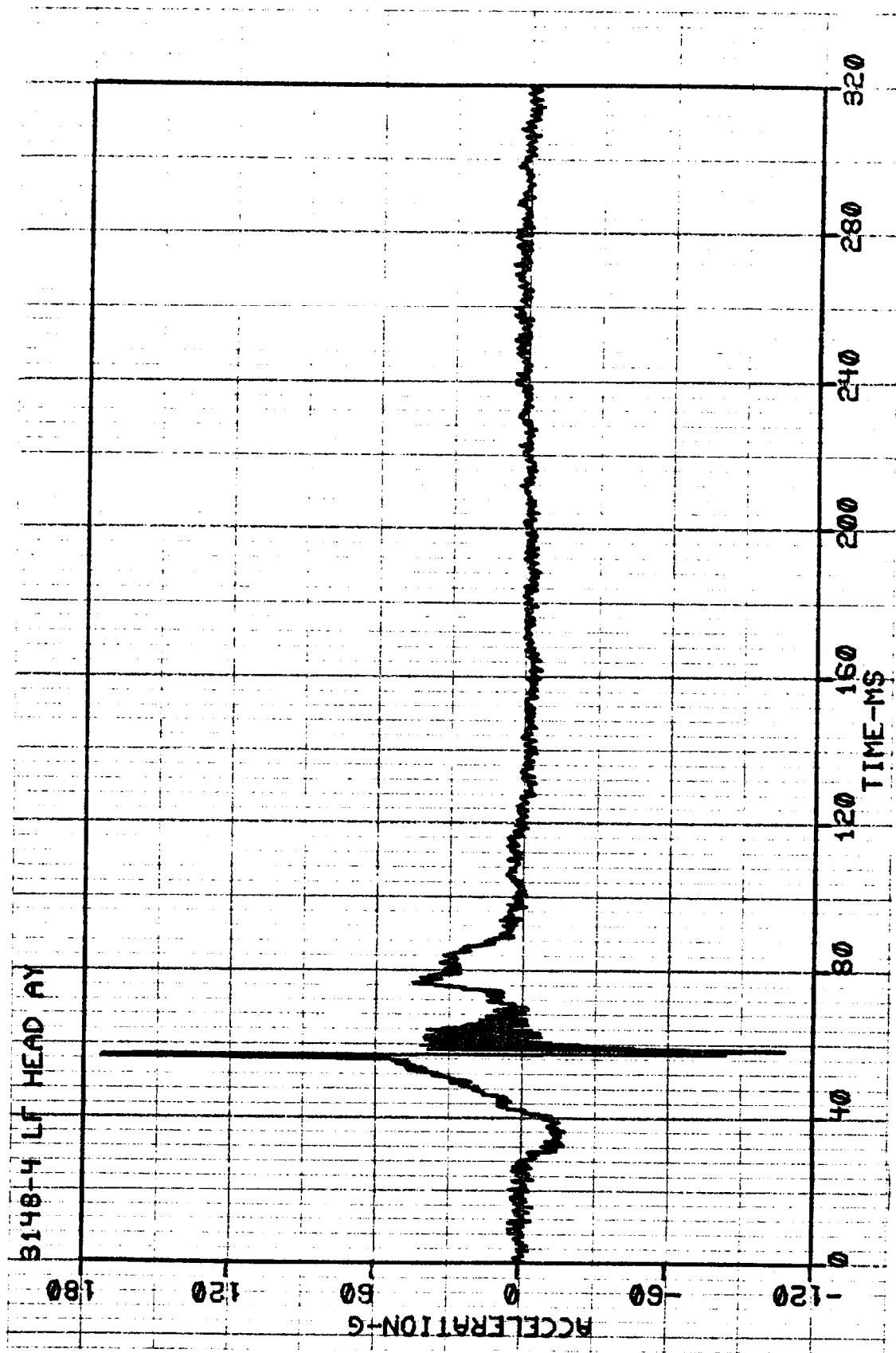
**FIGURE A-28c. IMPACT SEQUENCE - 90° TWO VEHICLE MOVING SIDE
IMPACT - 1981 CITATION AT 35 MPH TO 1982
VOLKSWAGEN RABBIT AT 17.5 MPH.**

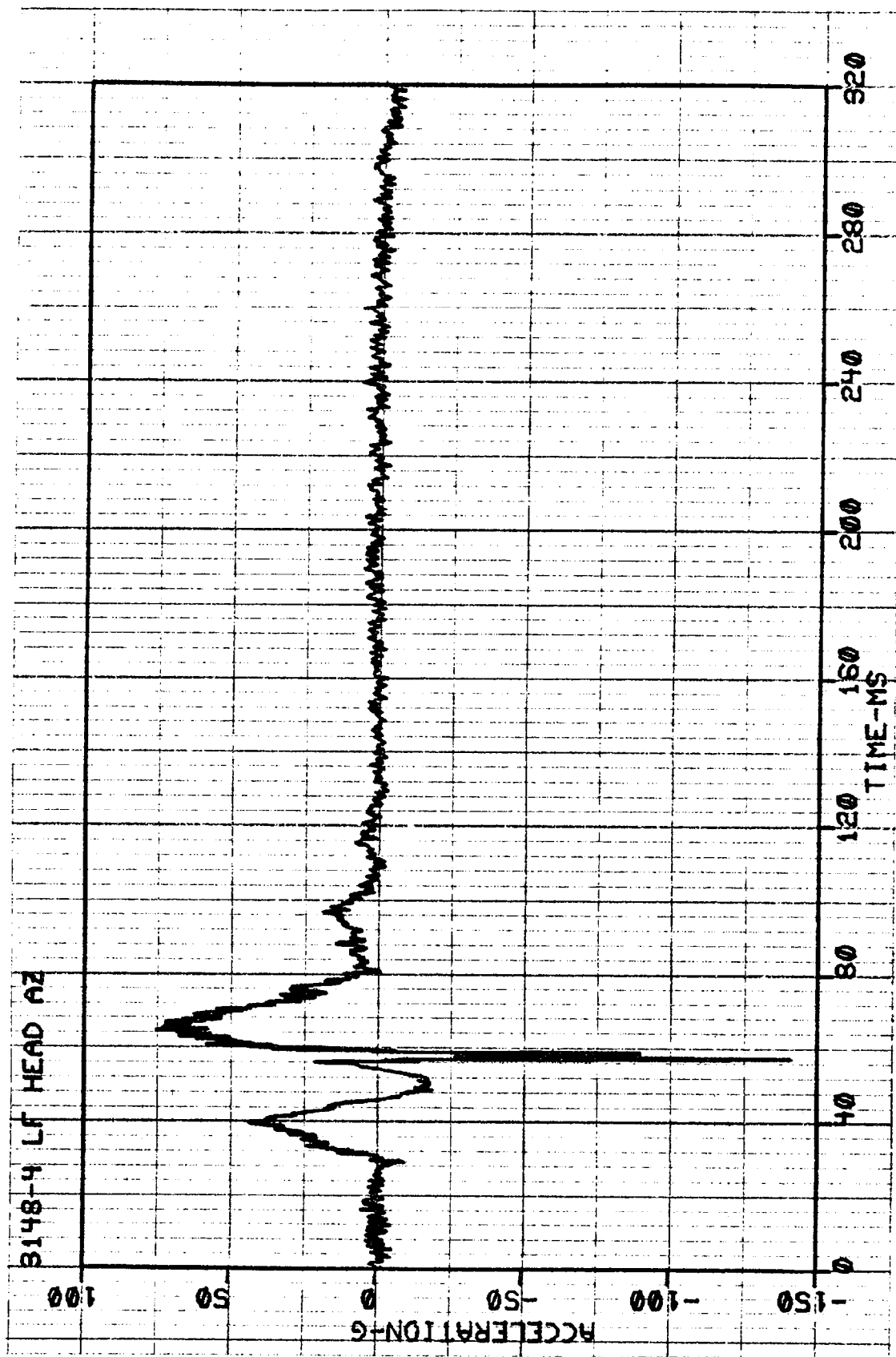


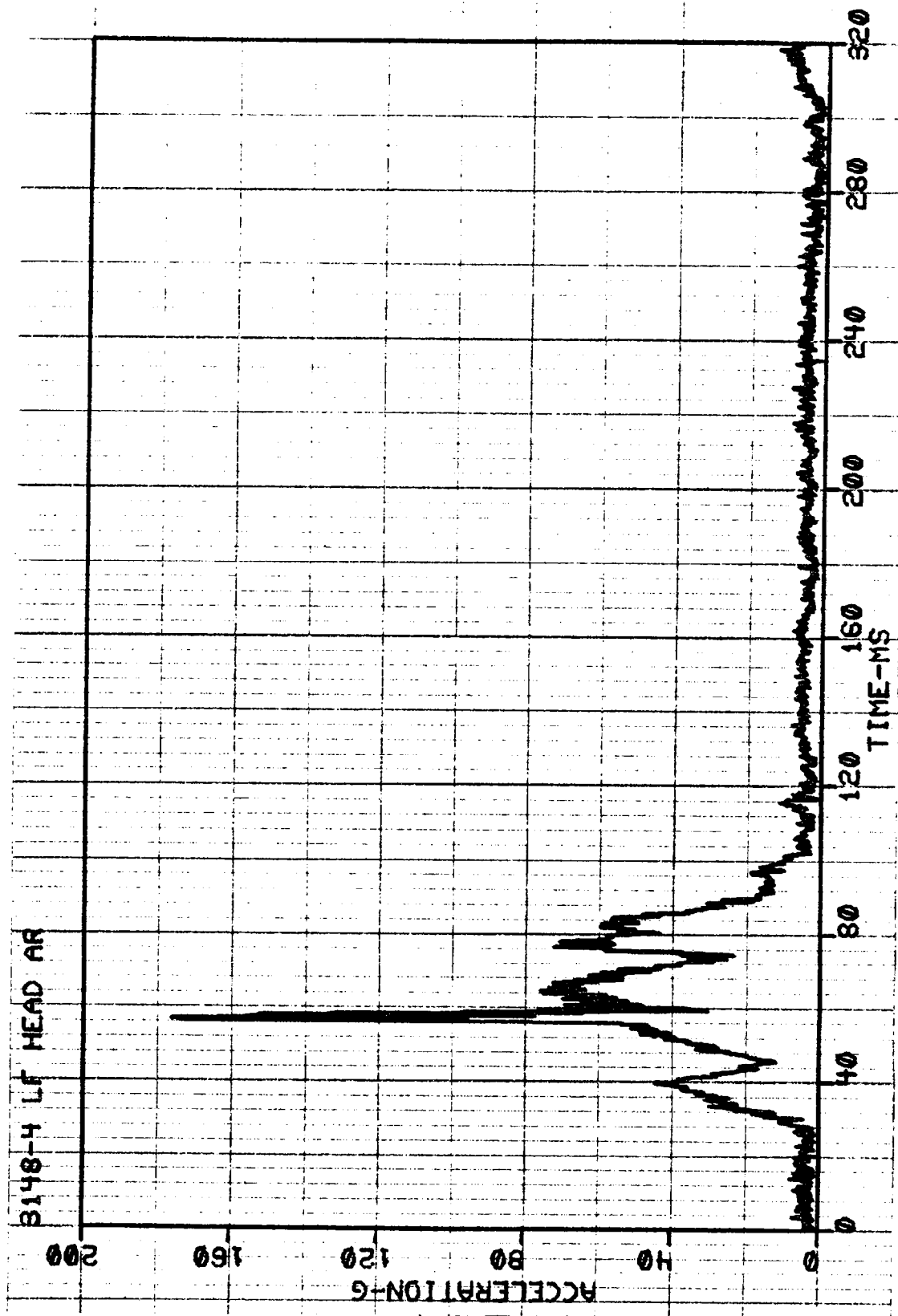
**FIGURE A-28d. IMPACT SEQUENCE - 90° TWO VEHICLE MOVING SIDE
IMPACT - 1981 CITATION AT 35 MPH TO 1982
VOLKSWAGEN RABBIT AT 17.5 MPH.**

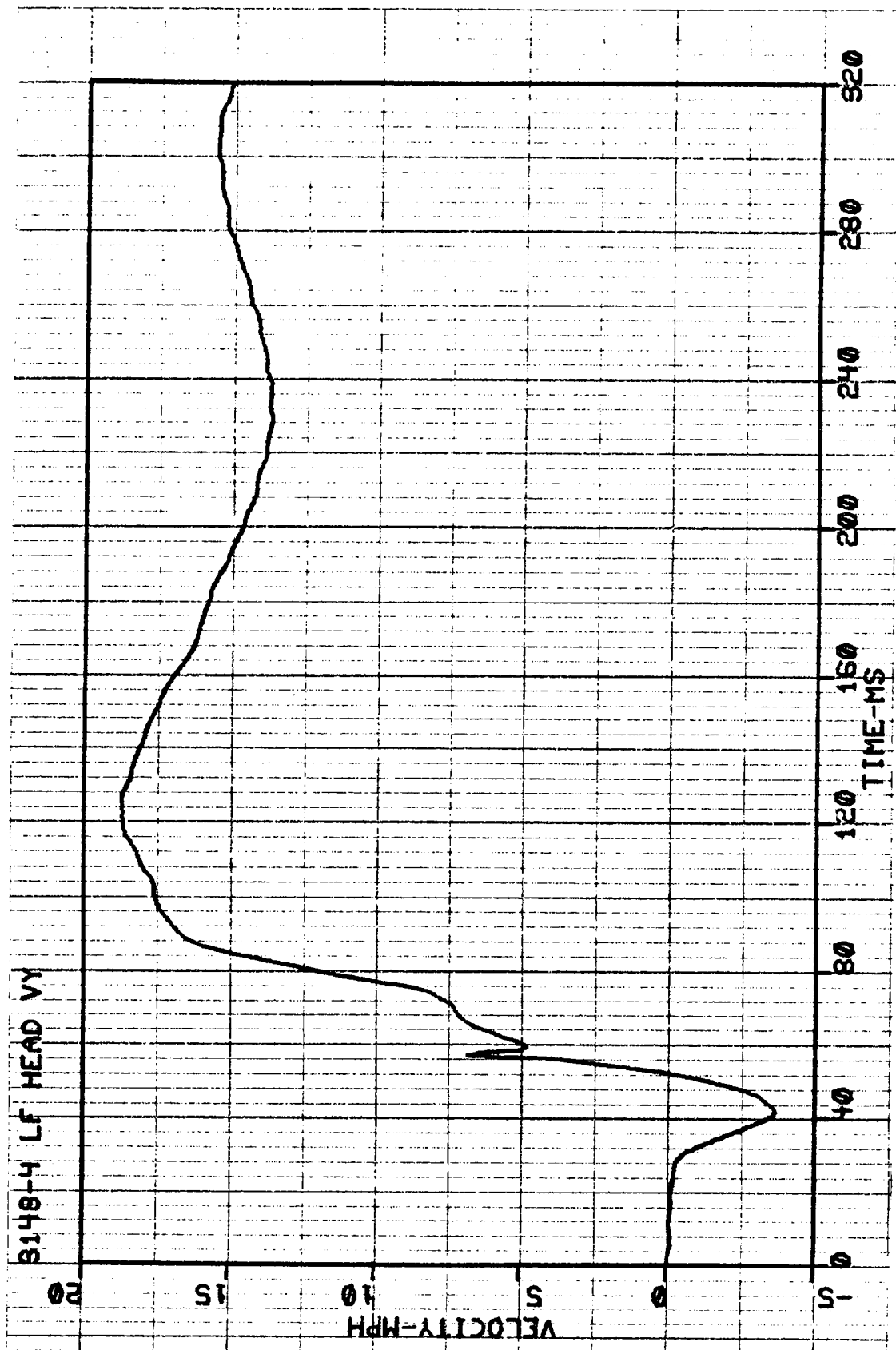
APPENDIX B
CALCOMP PLOTS FOR
1981 CHEVROLET CITATION
AT 34.56 MPH
TO 1982 VOLKSWAGEN RABBIT
AT 17.6 MPH

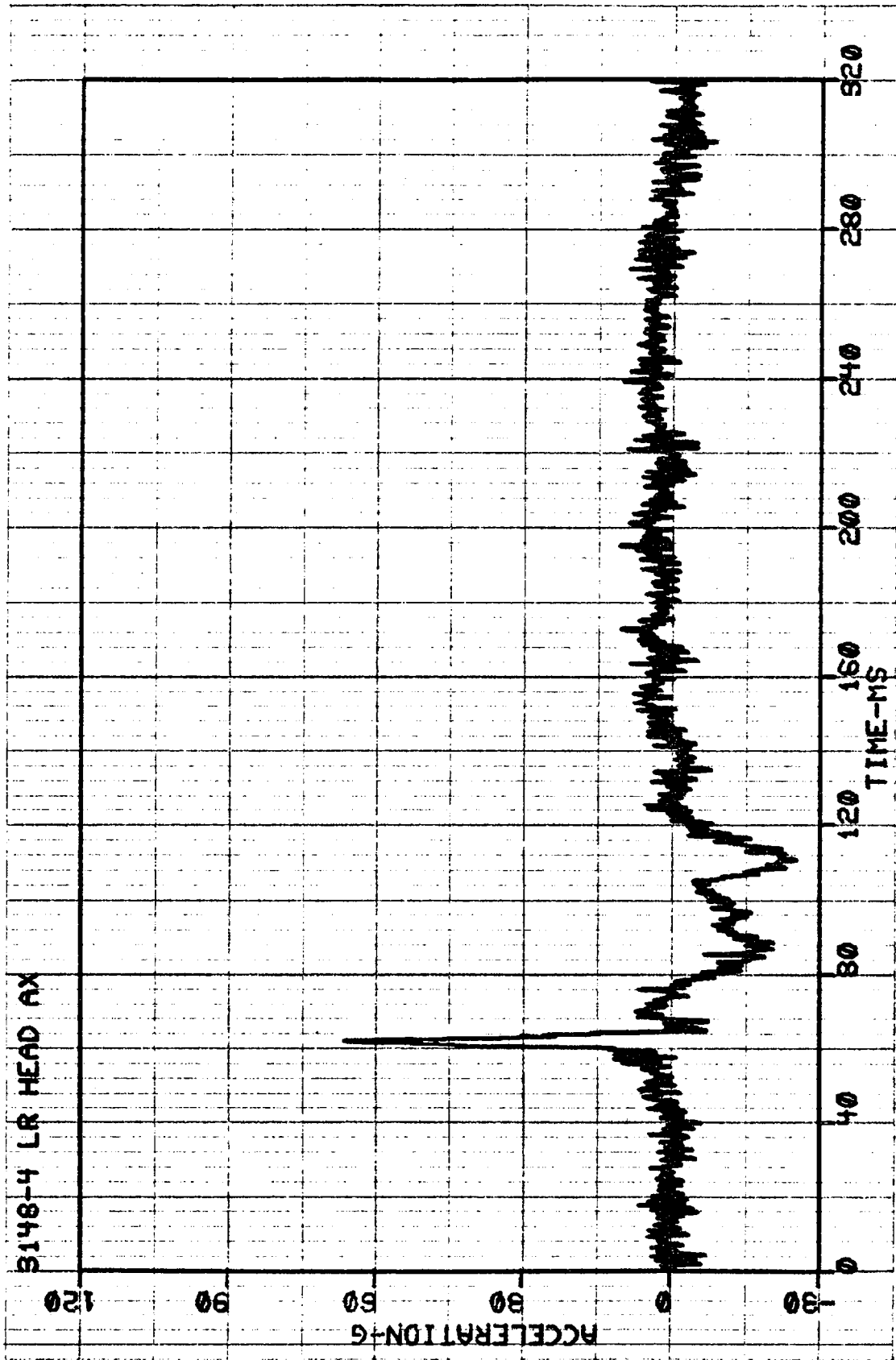


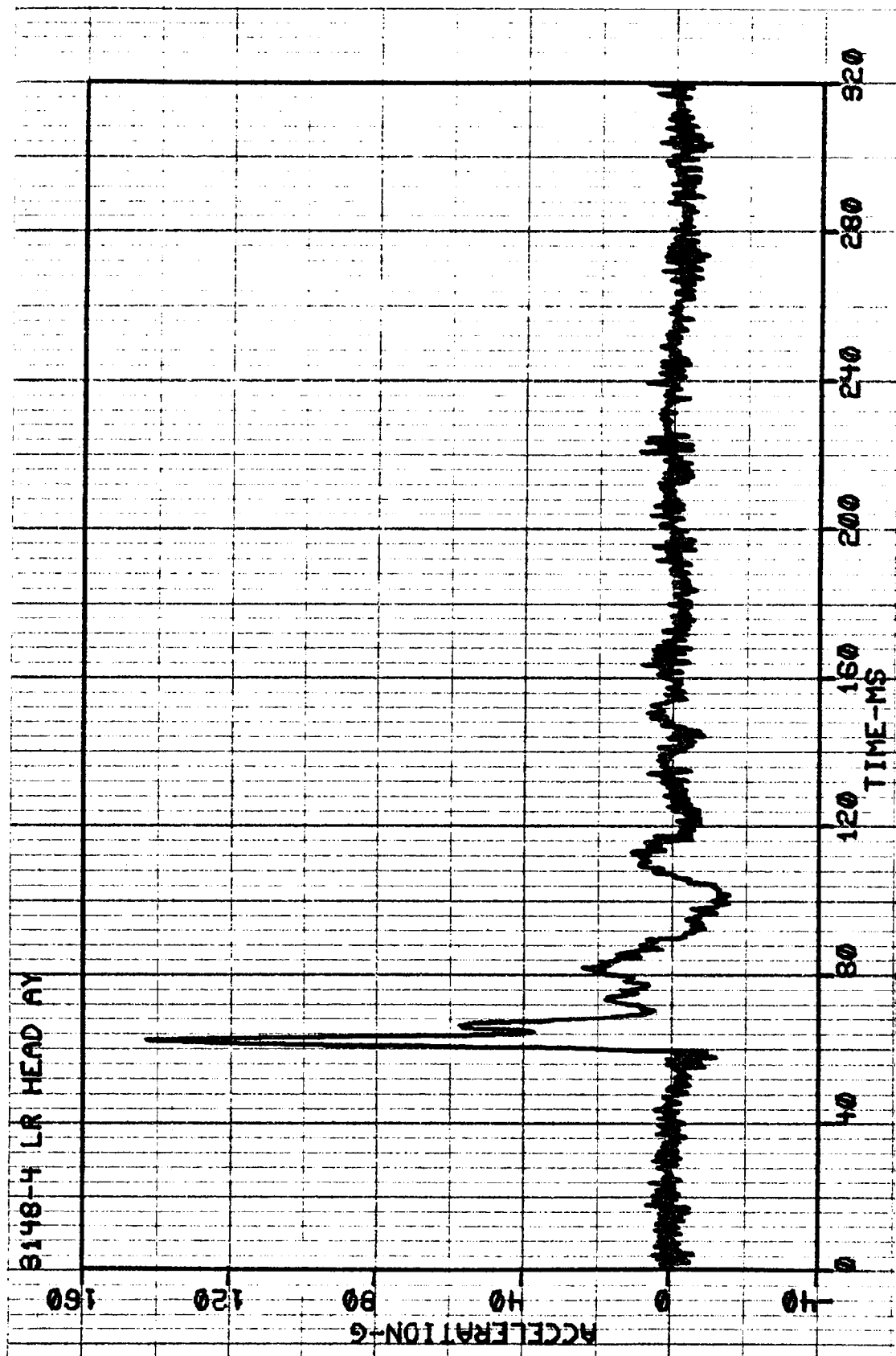


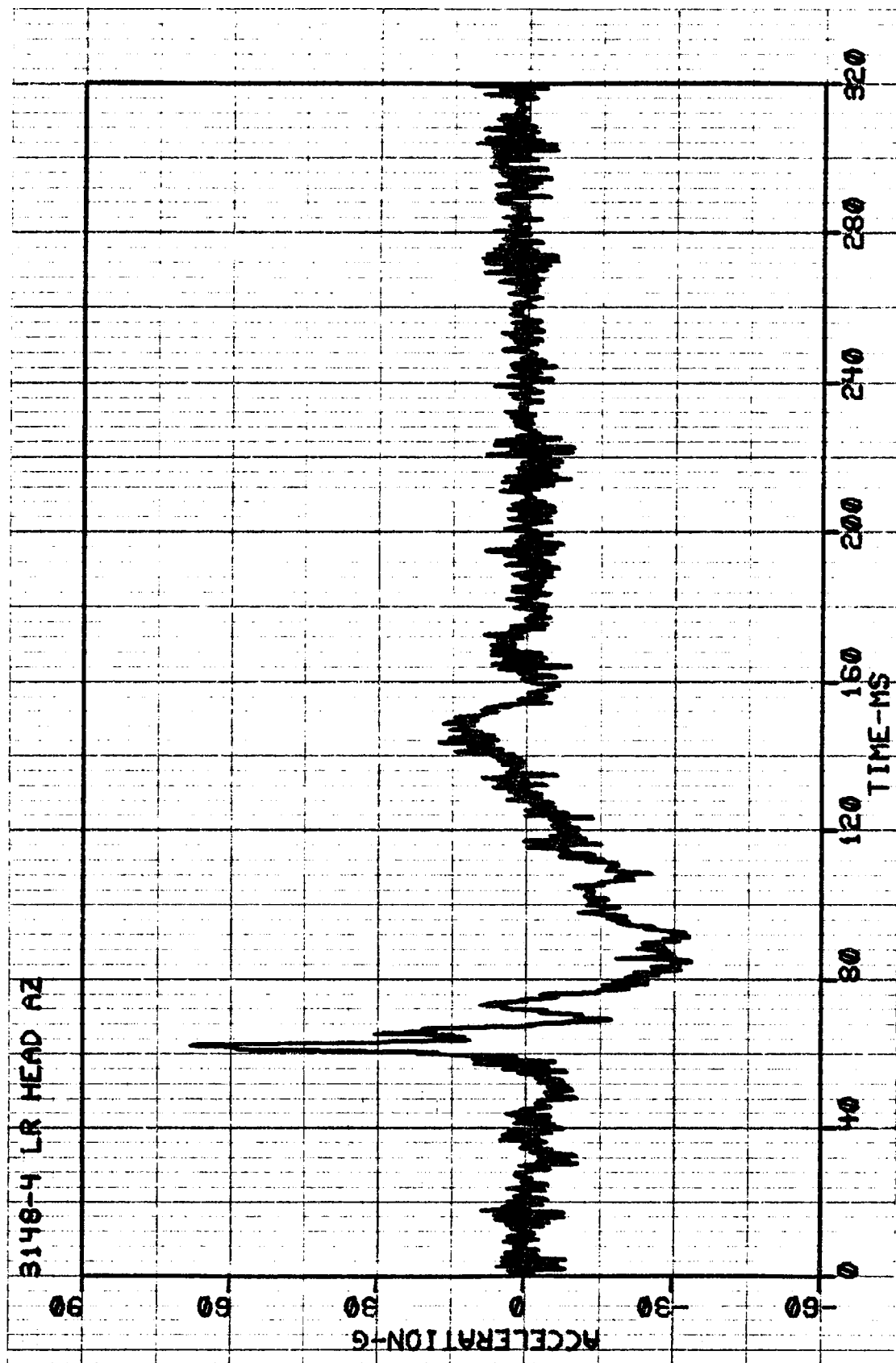


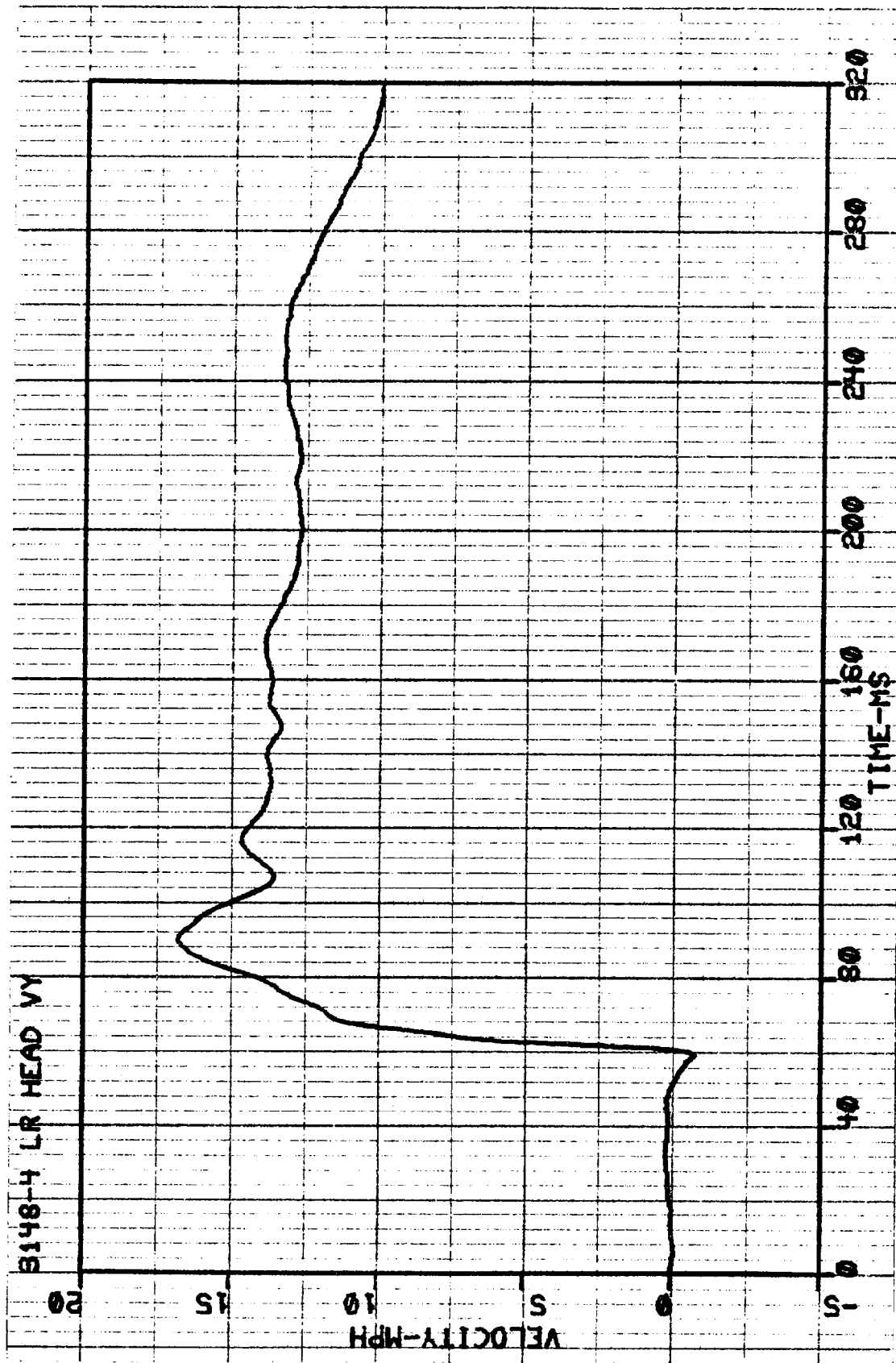


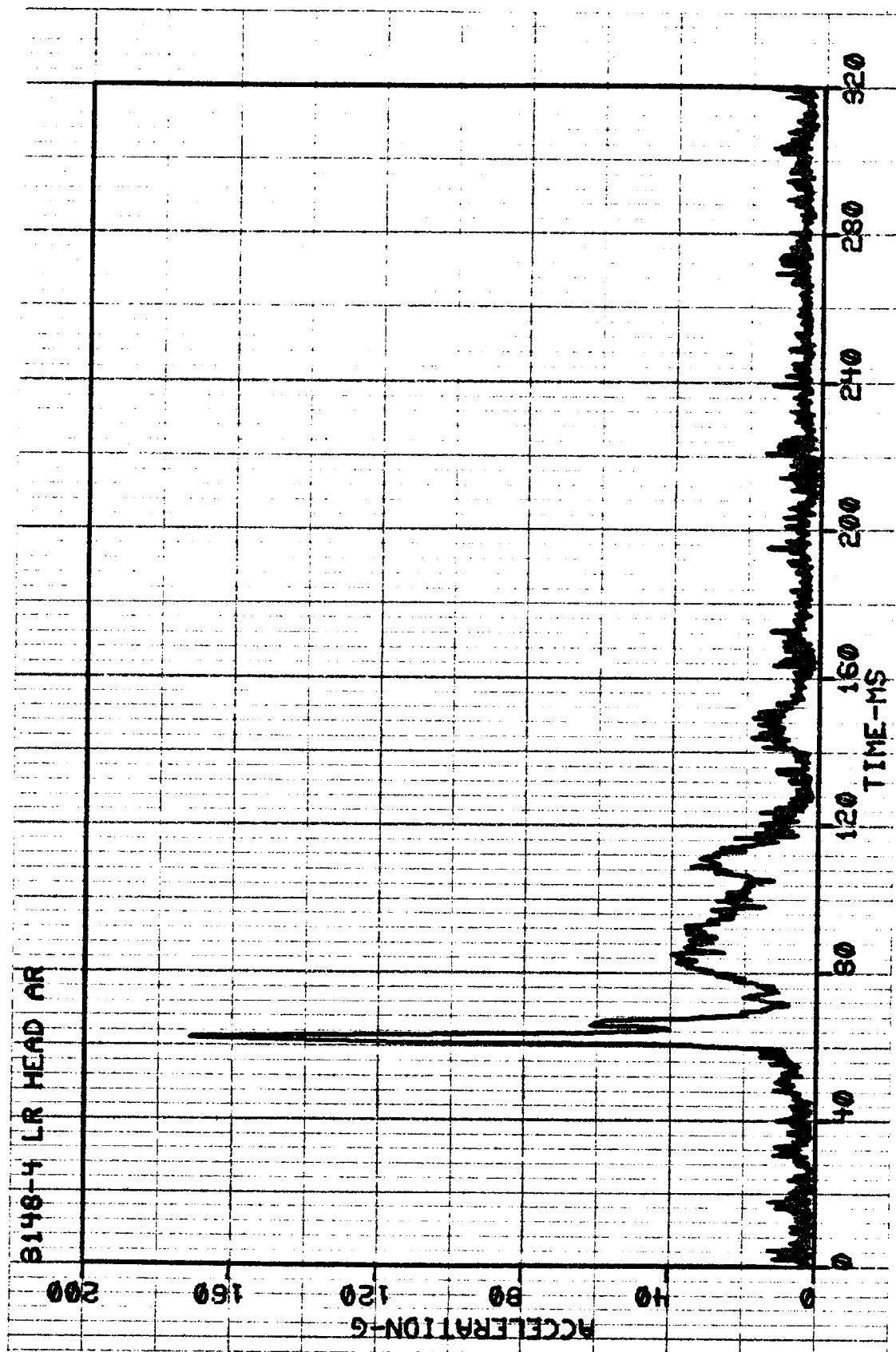


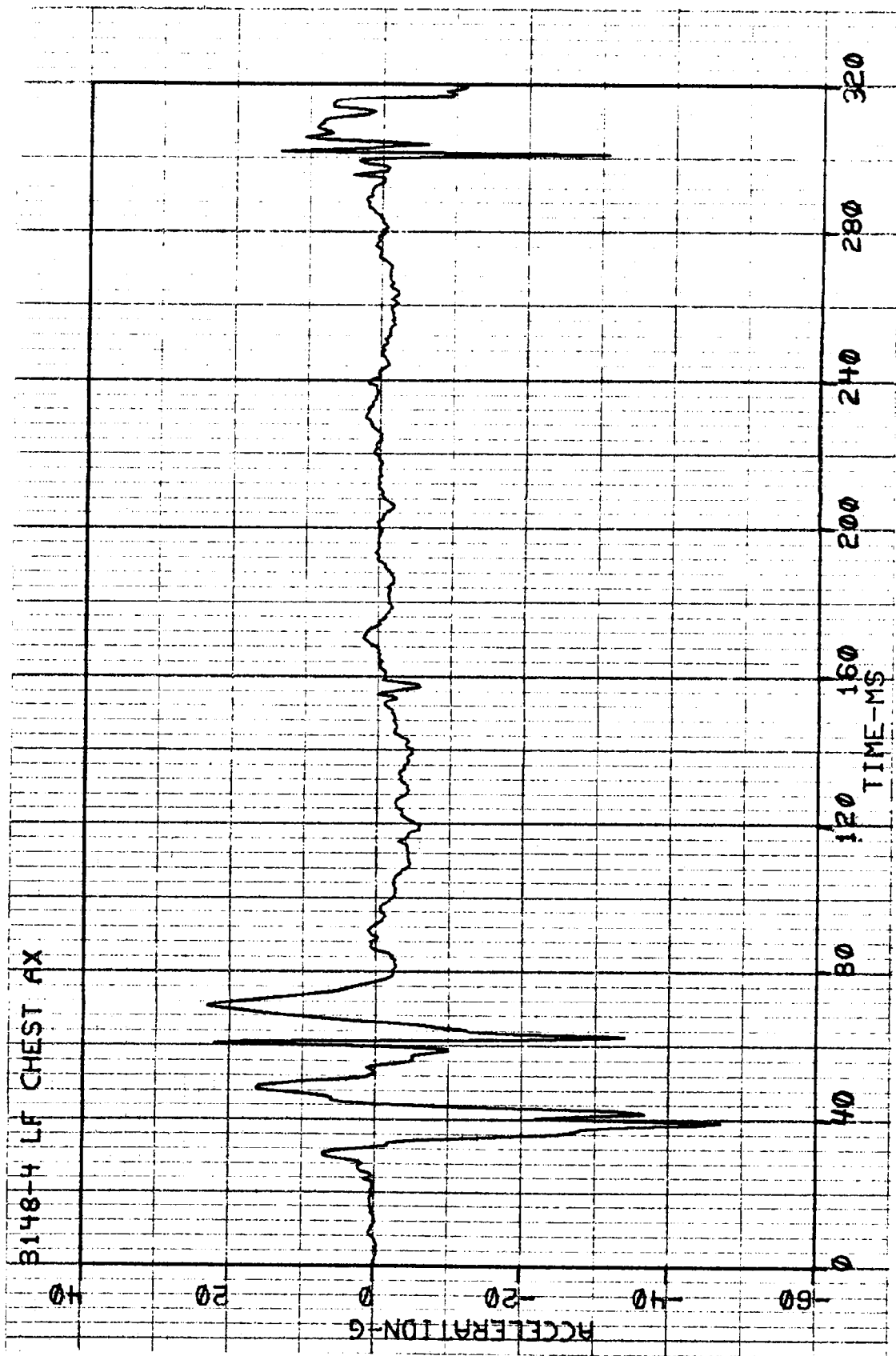


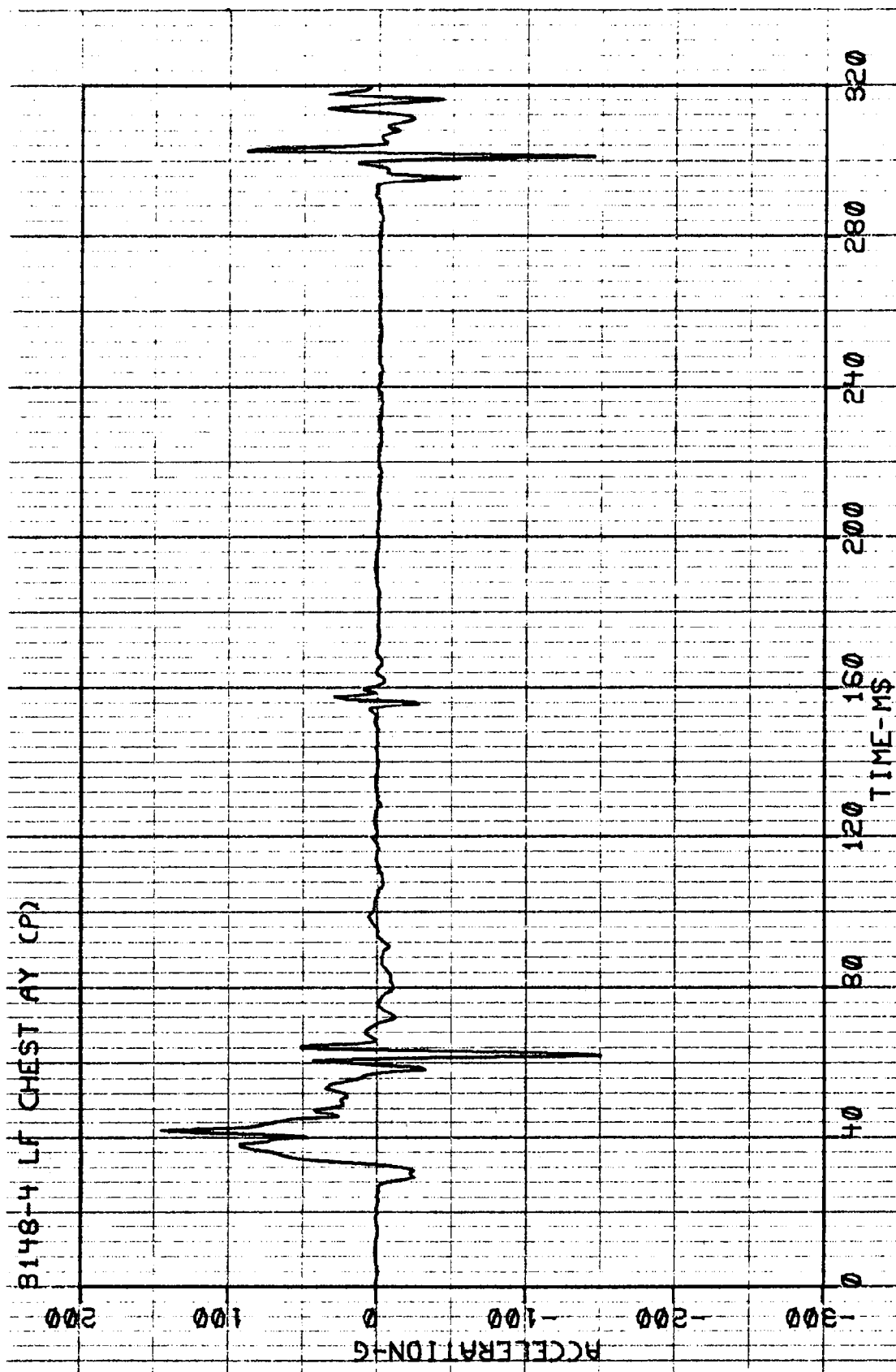


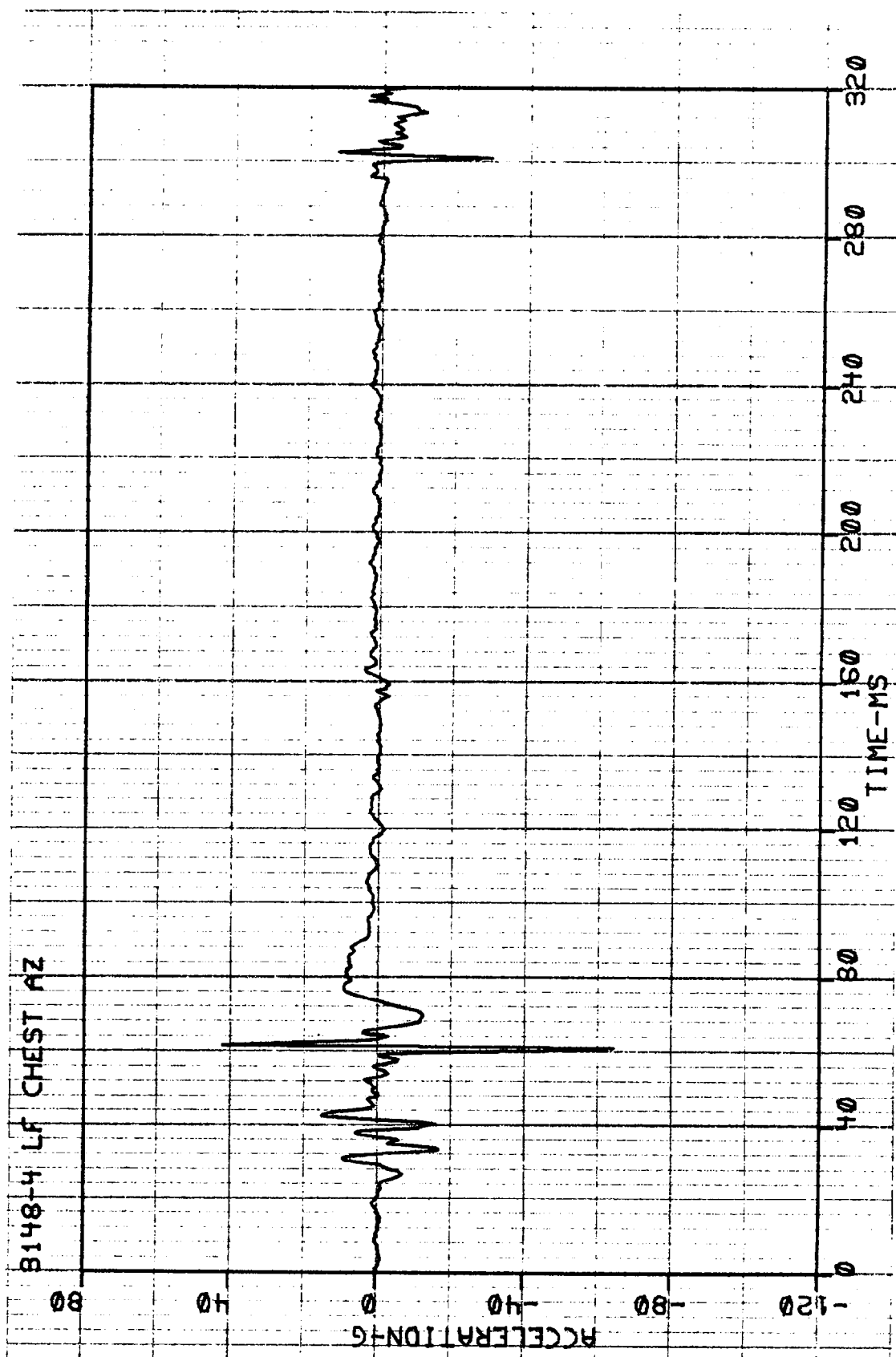


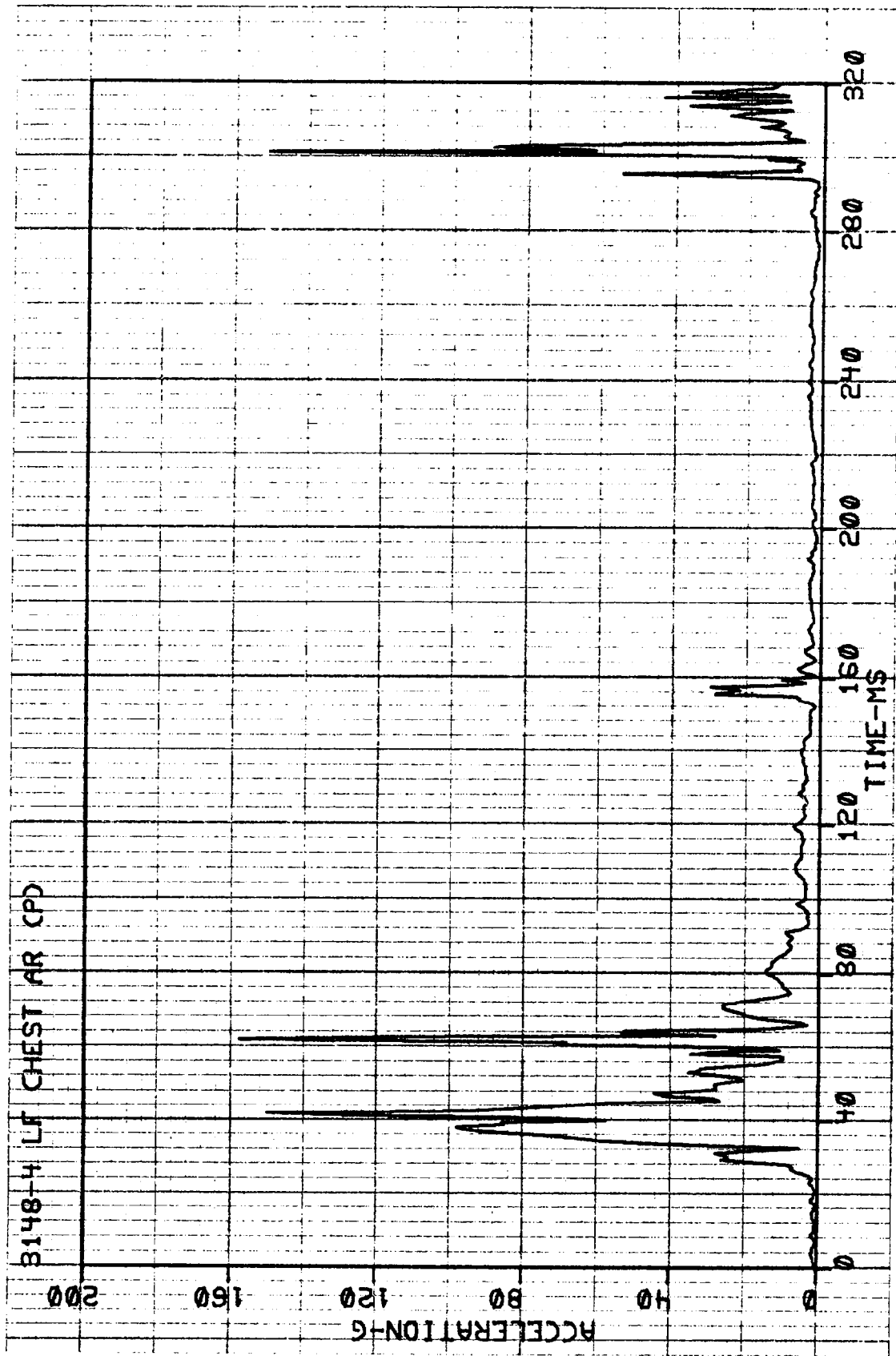


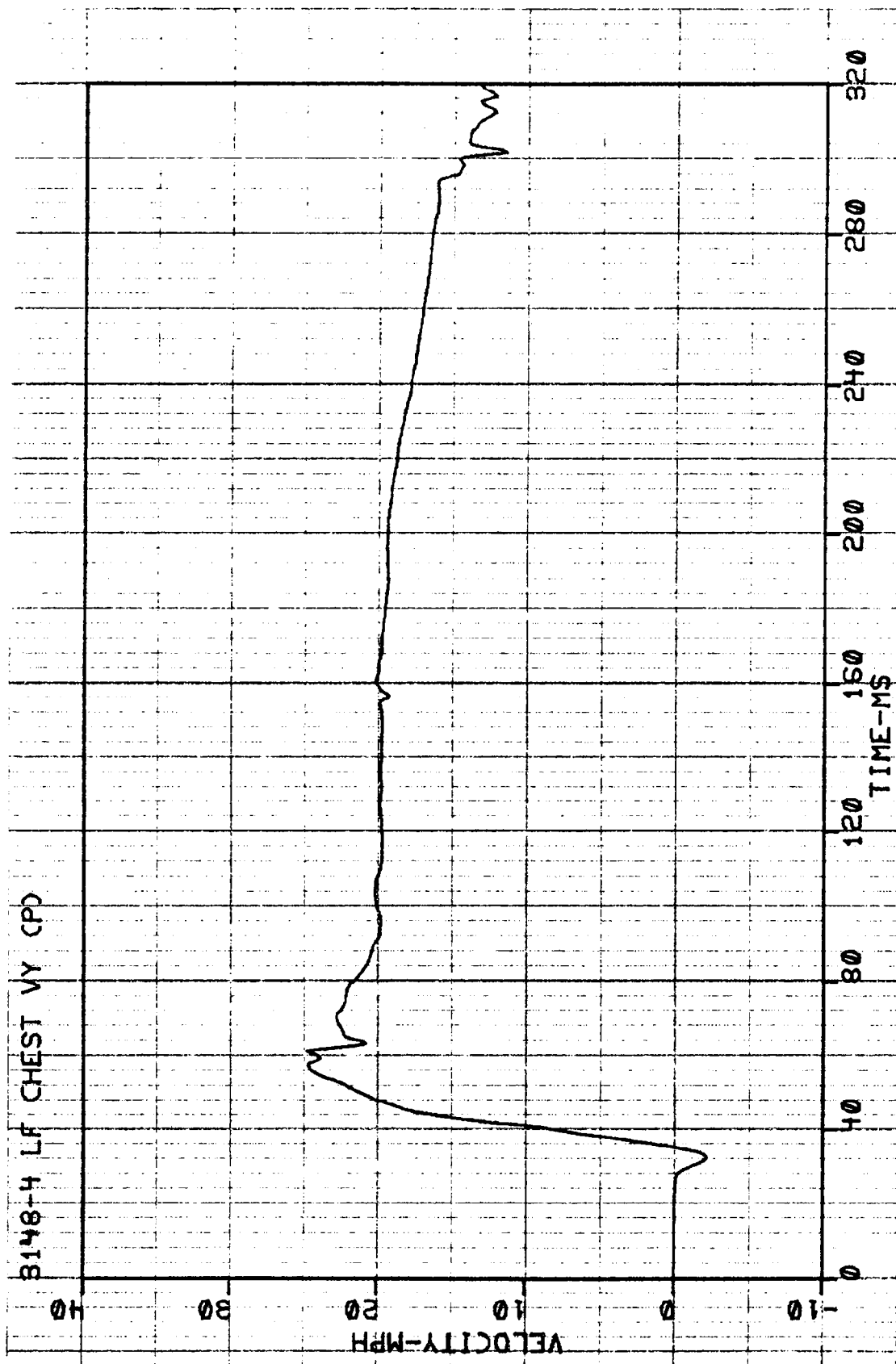


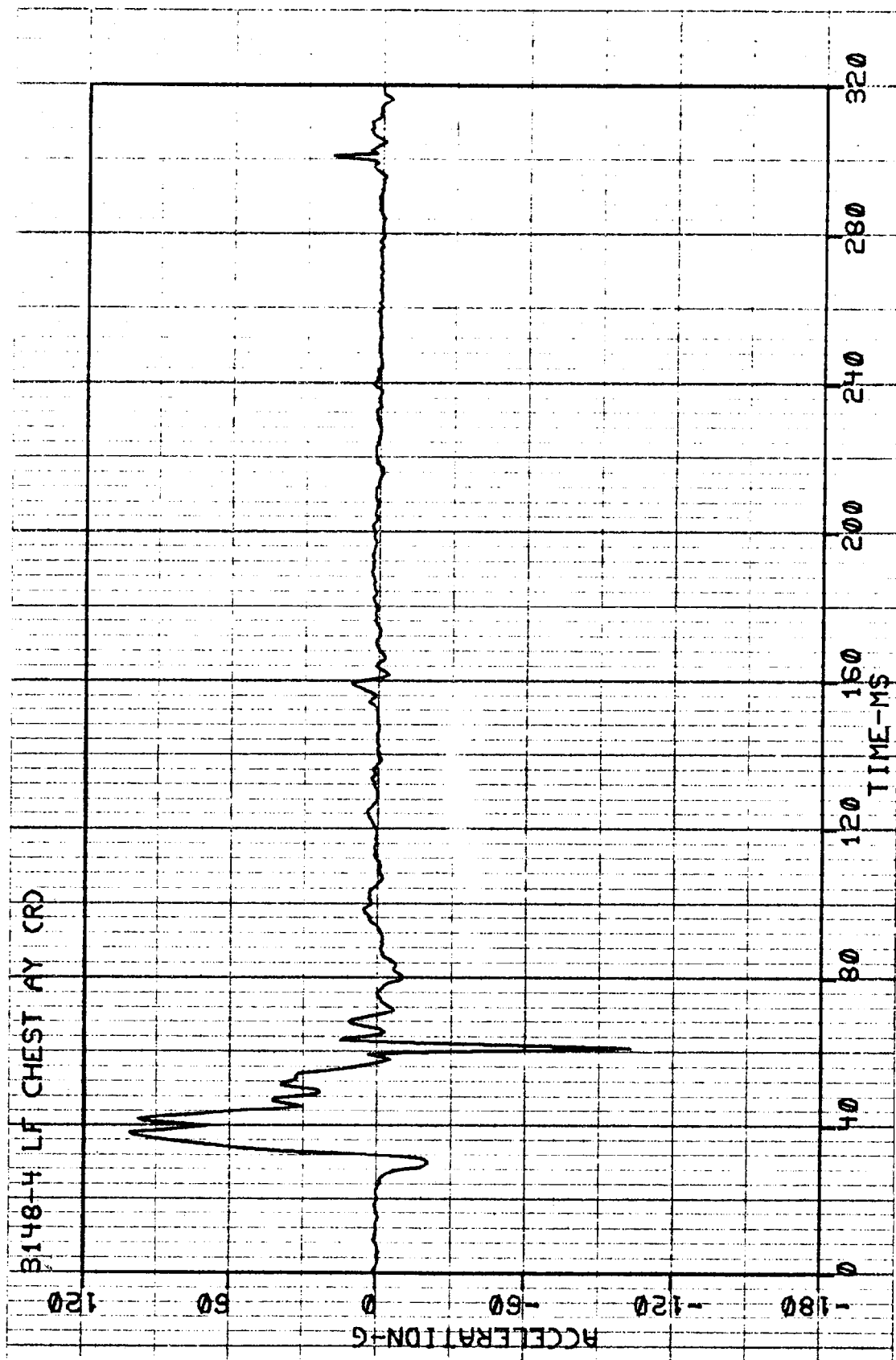


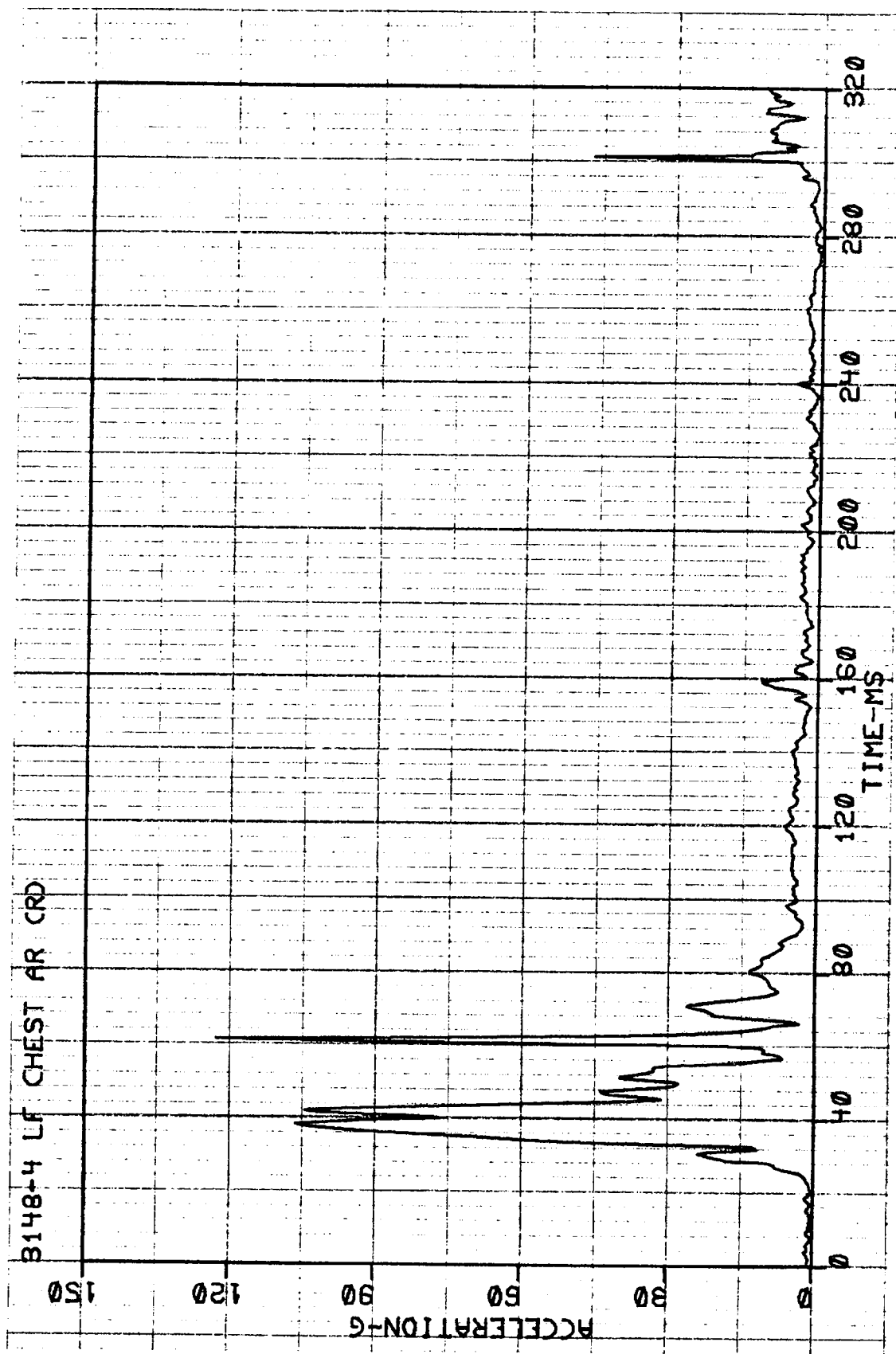


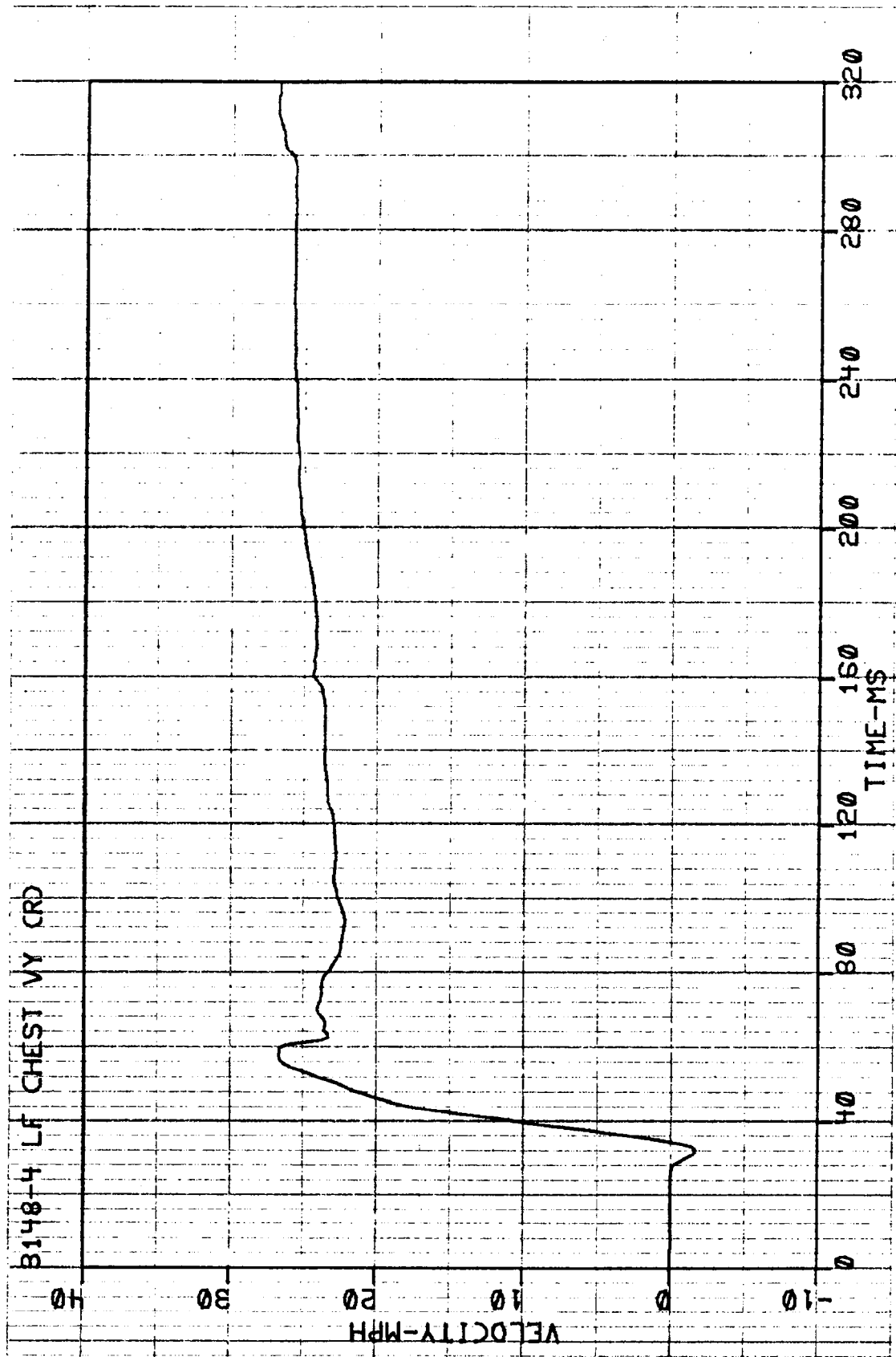


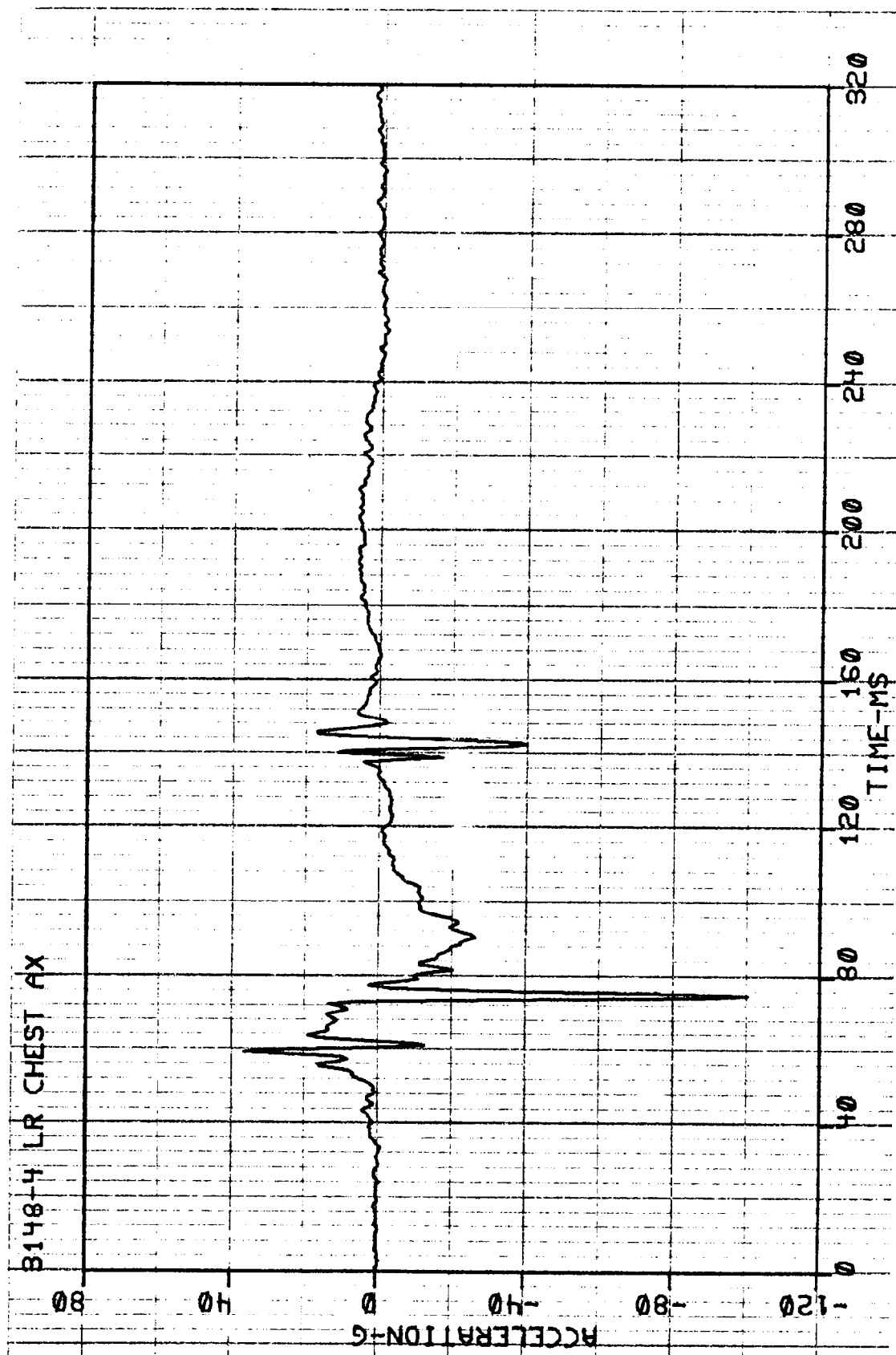


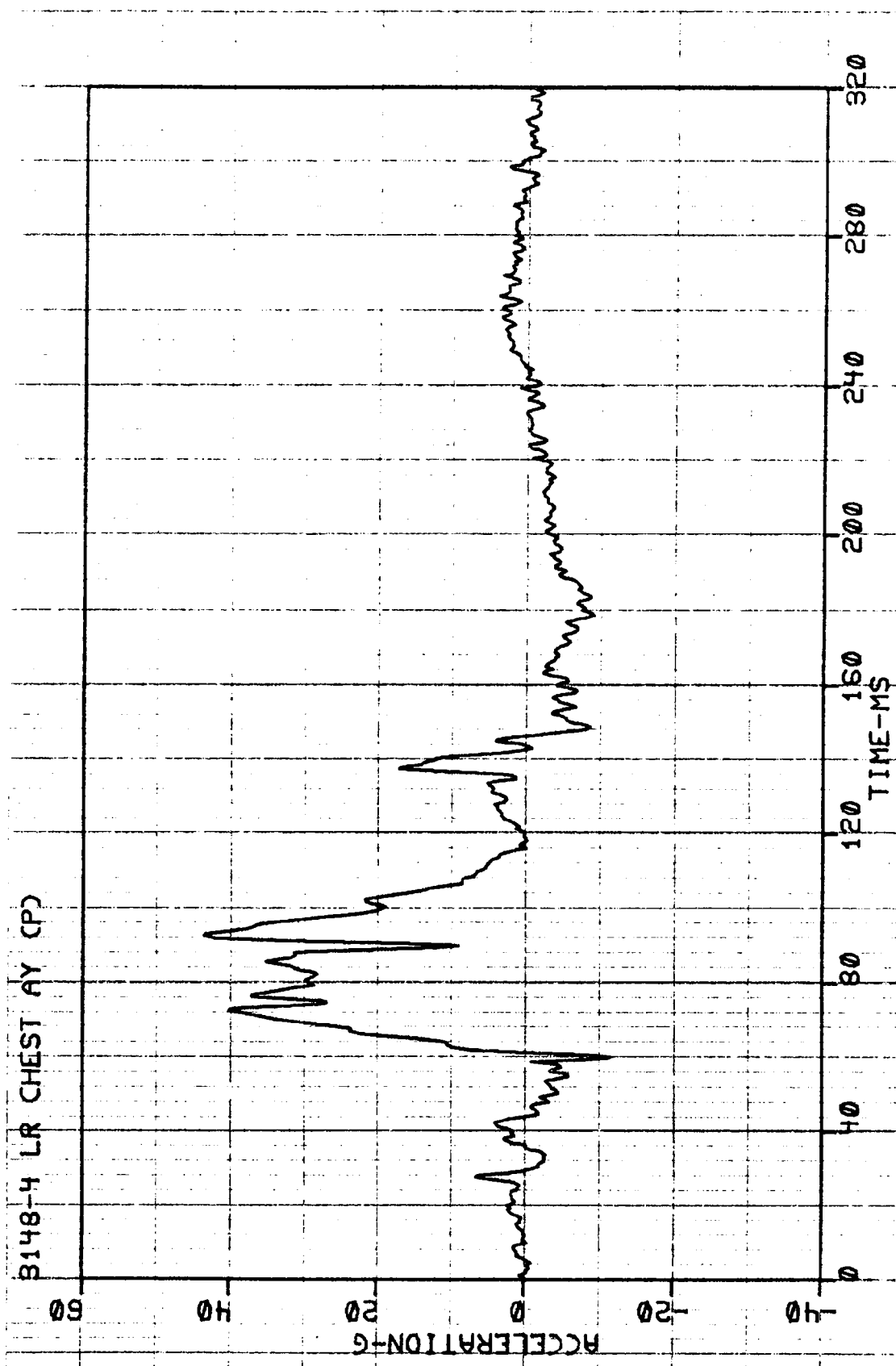


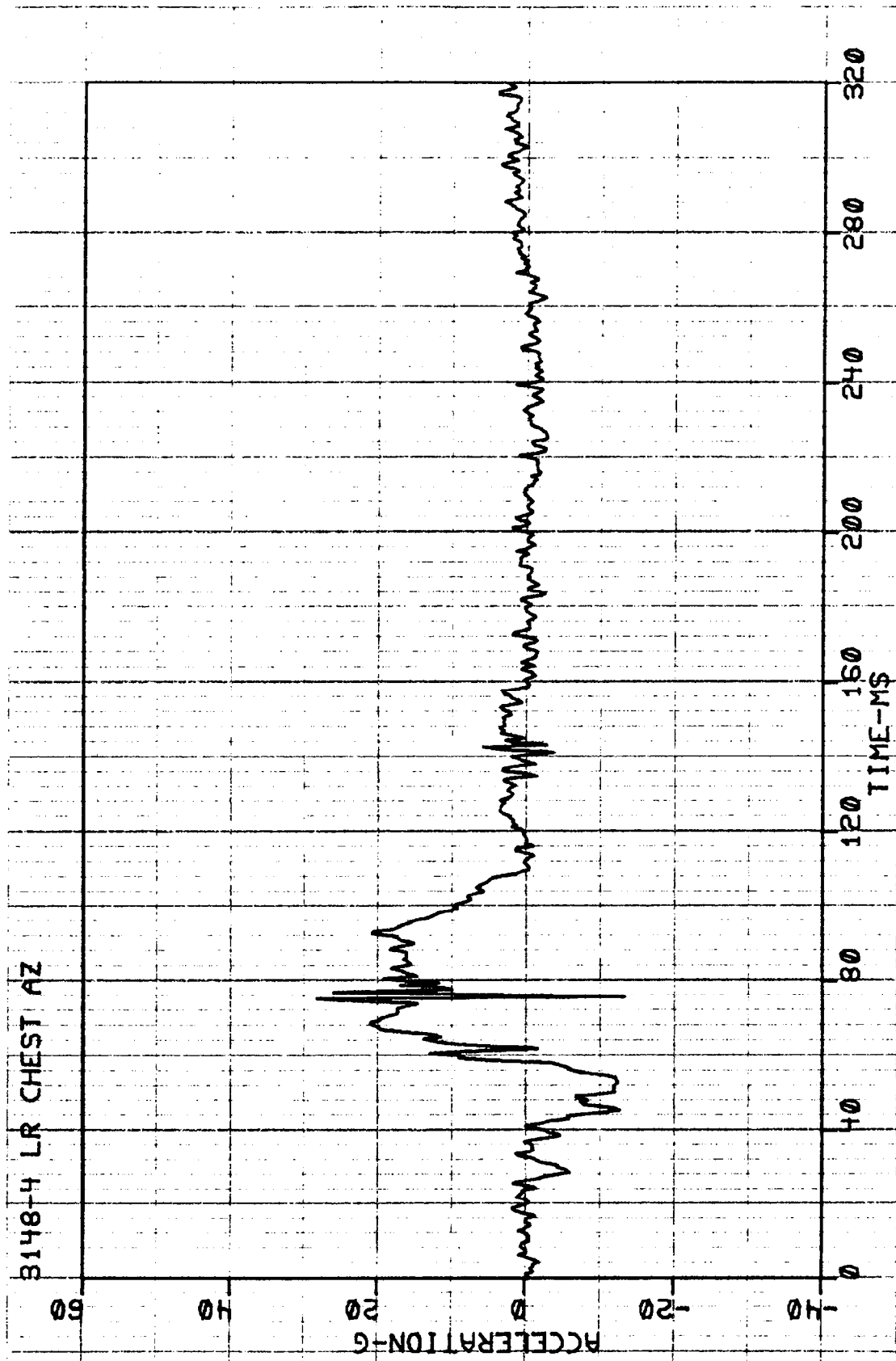


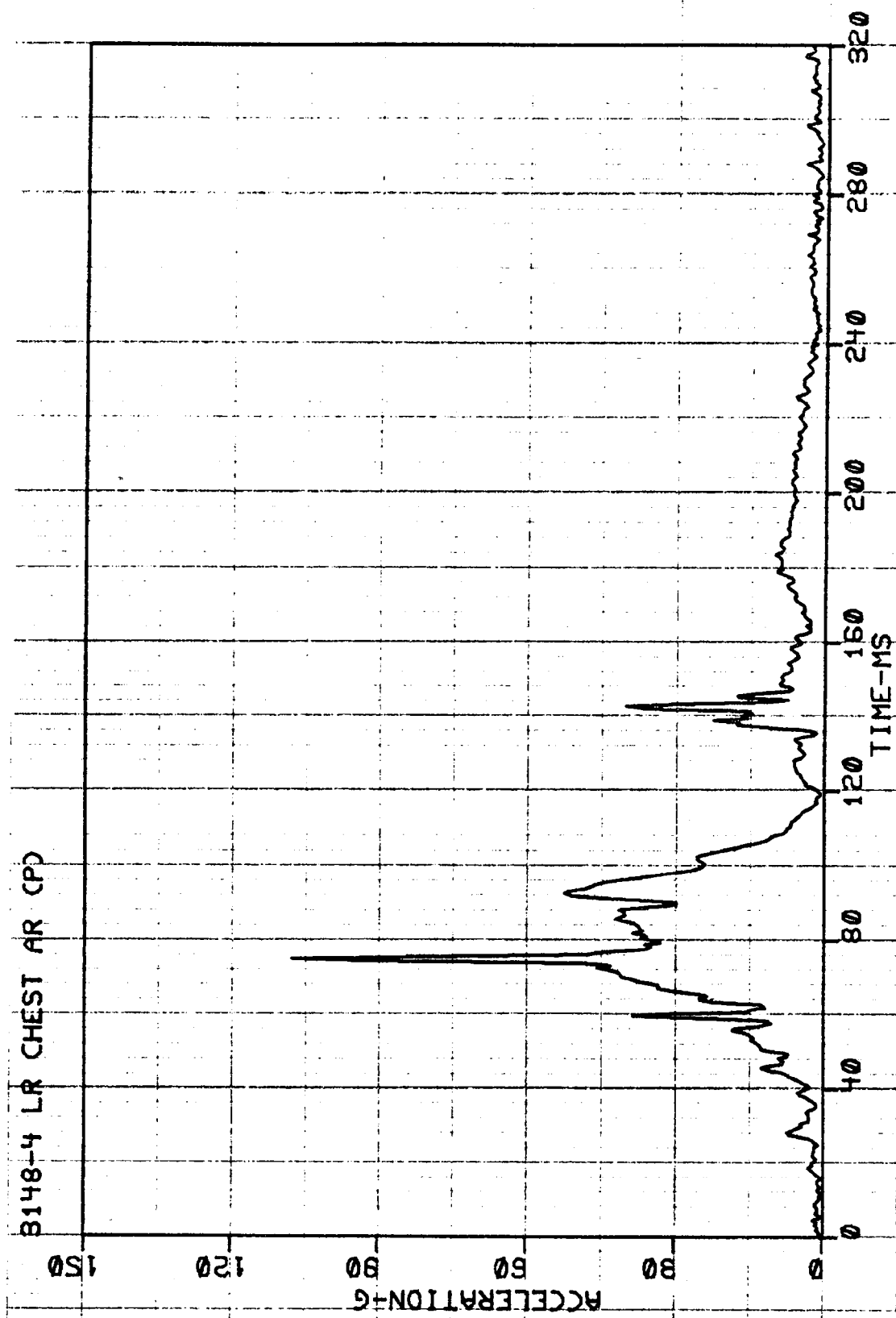


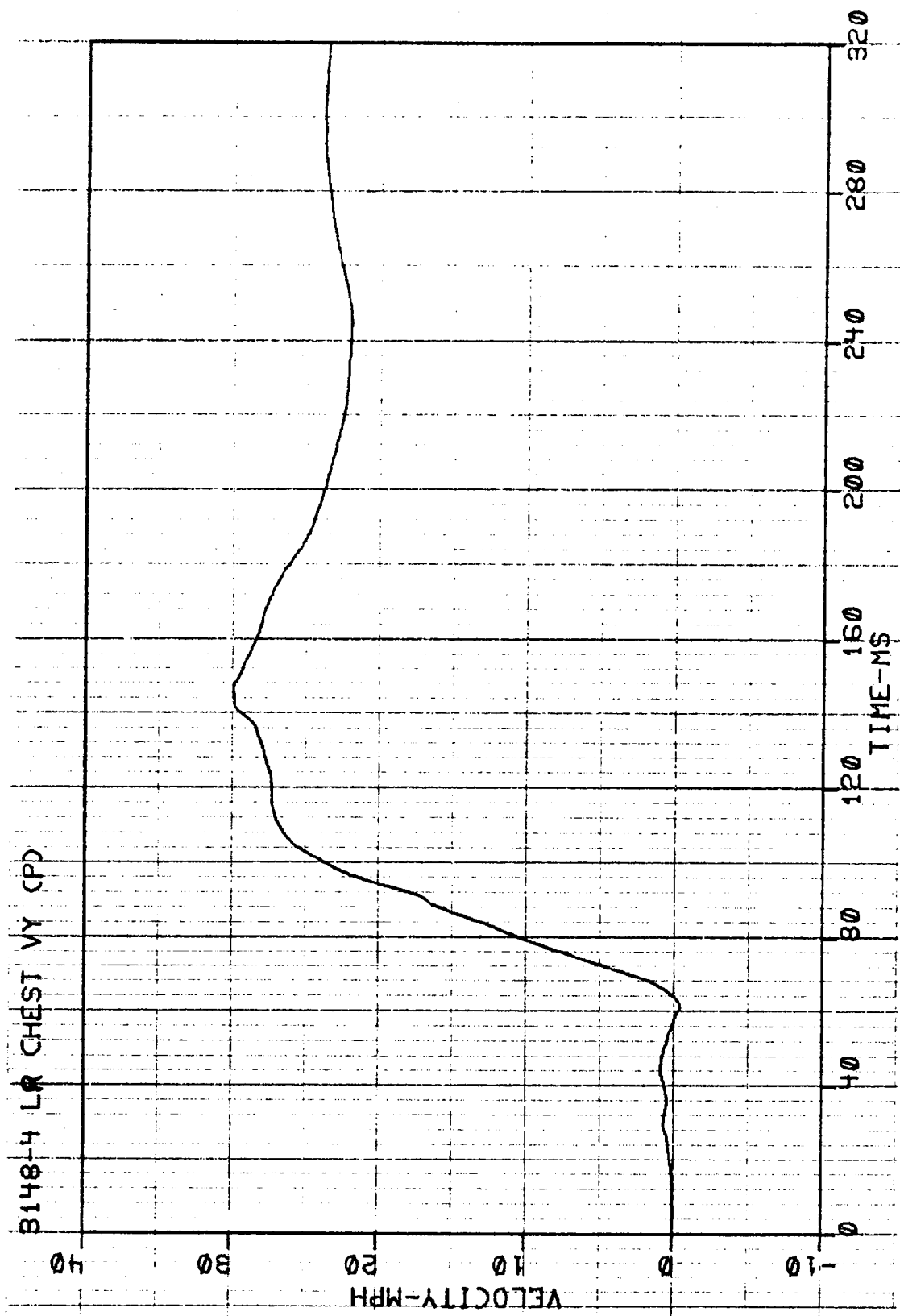


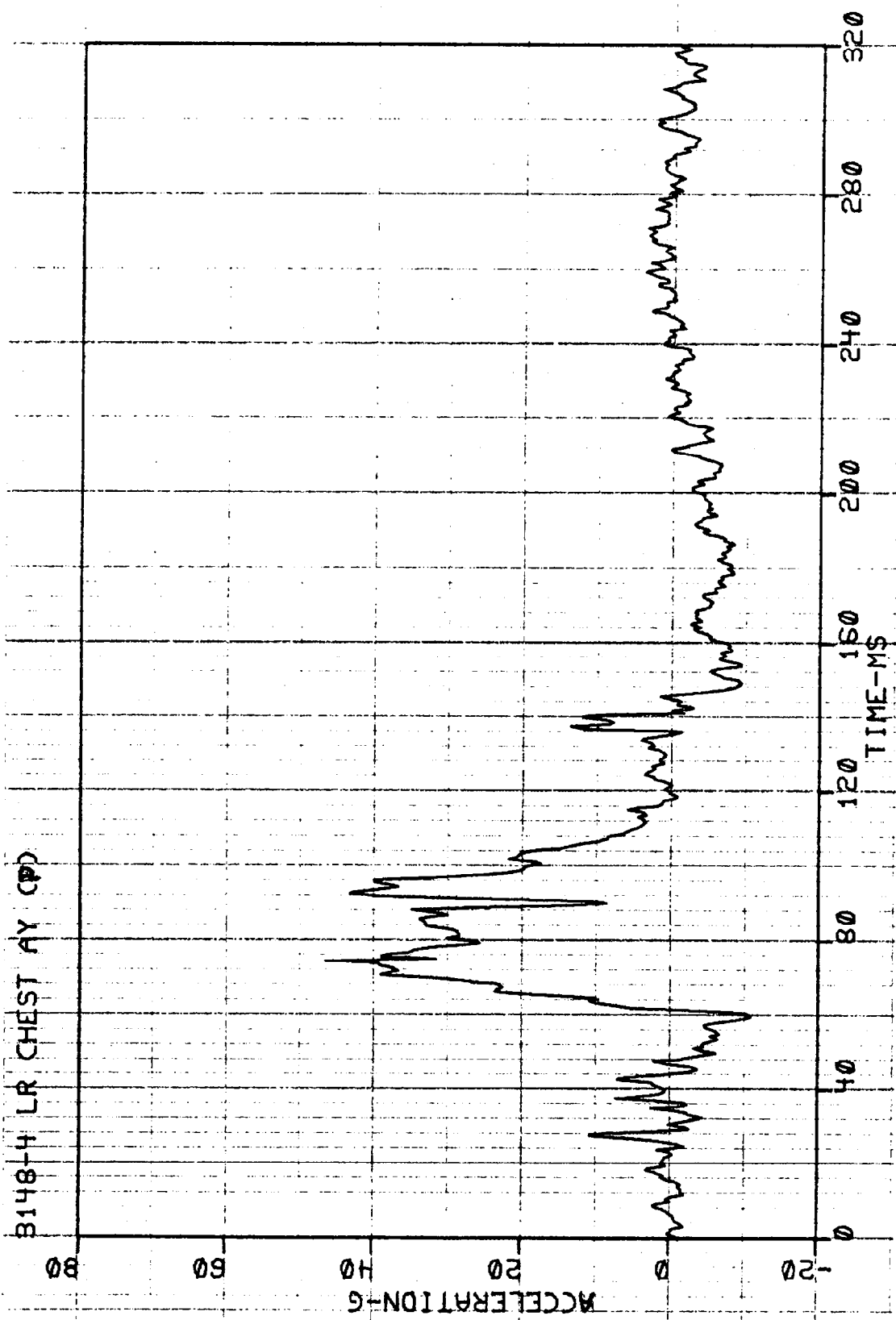


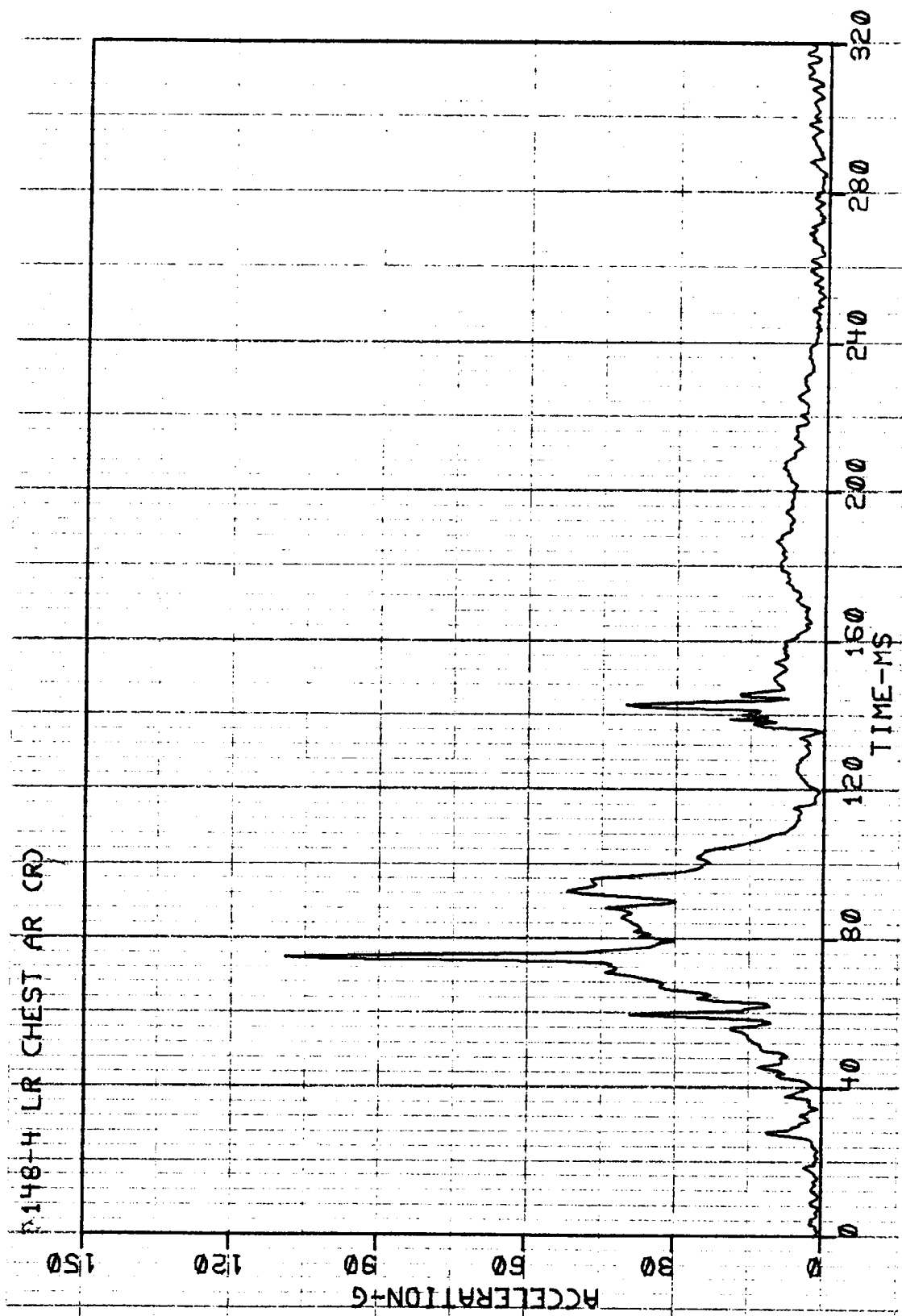


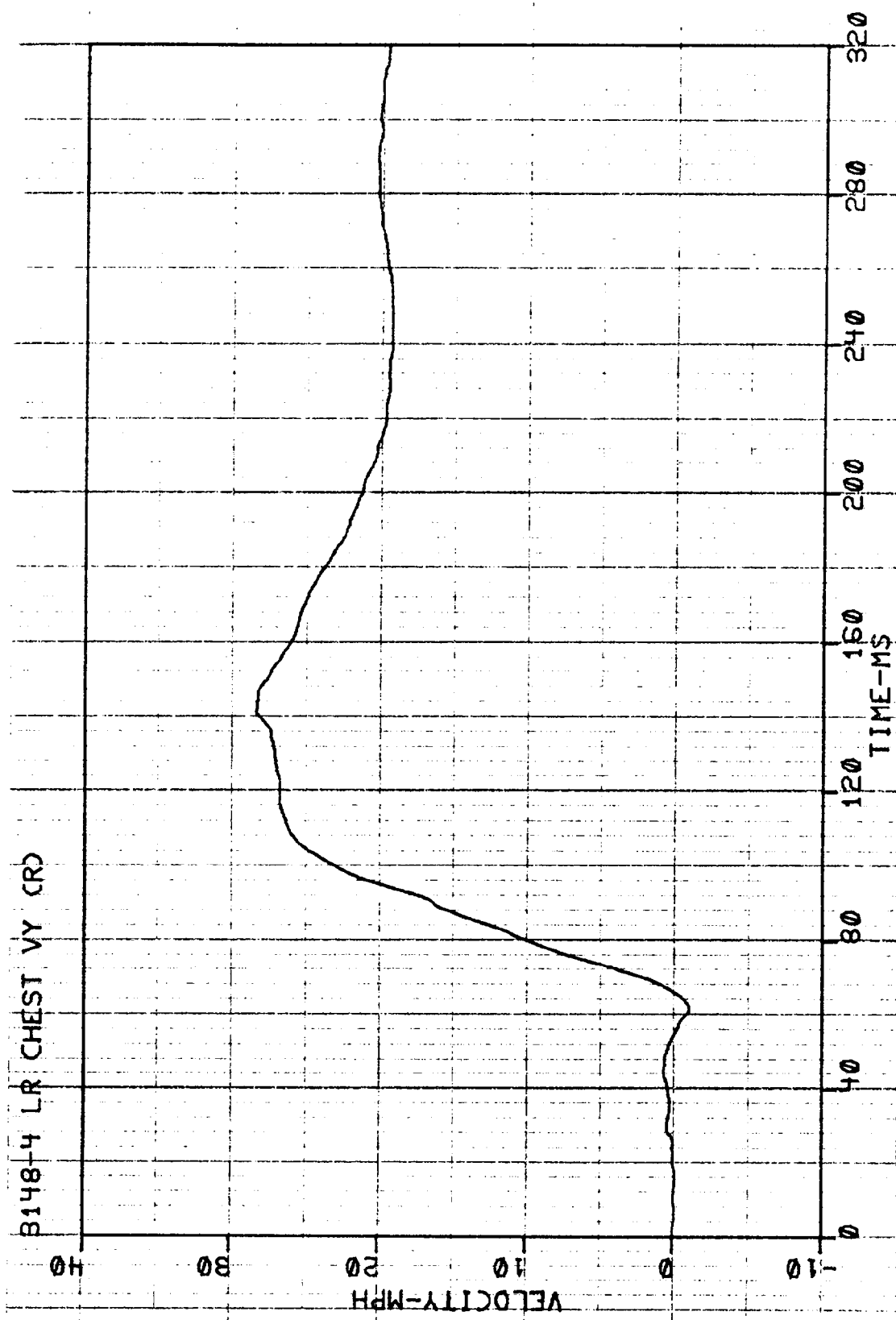


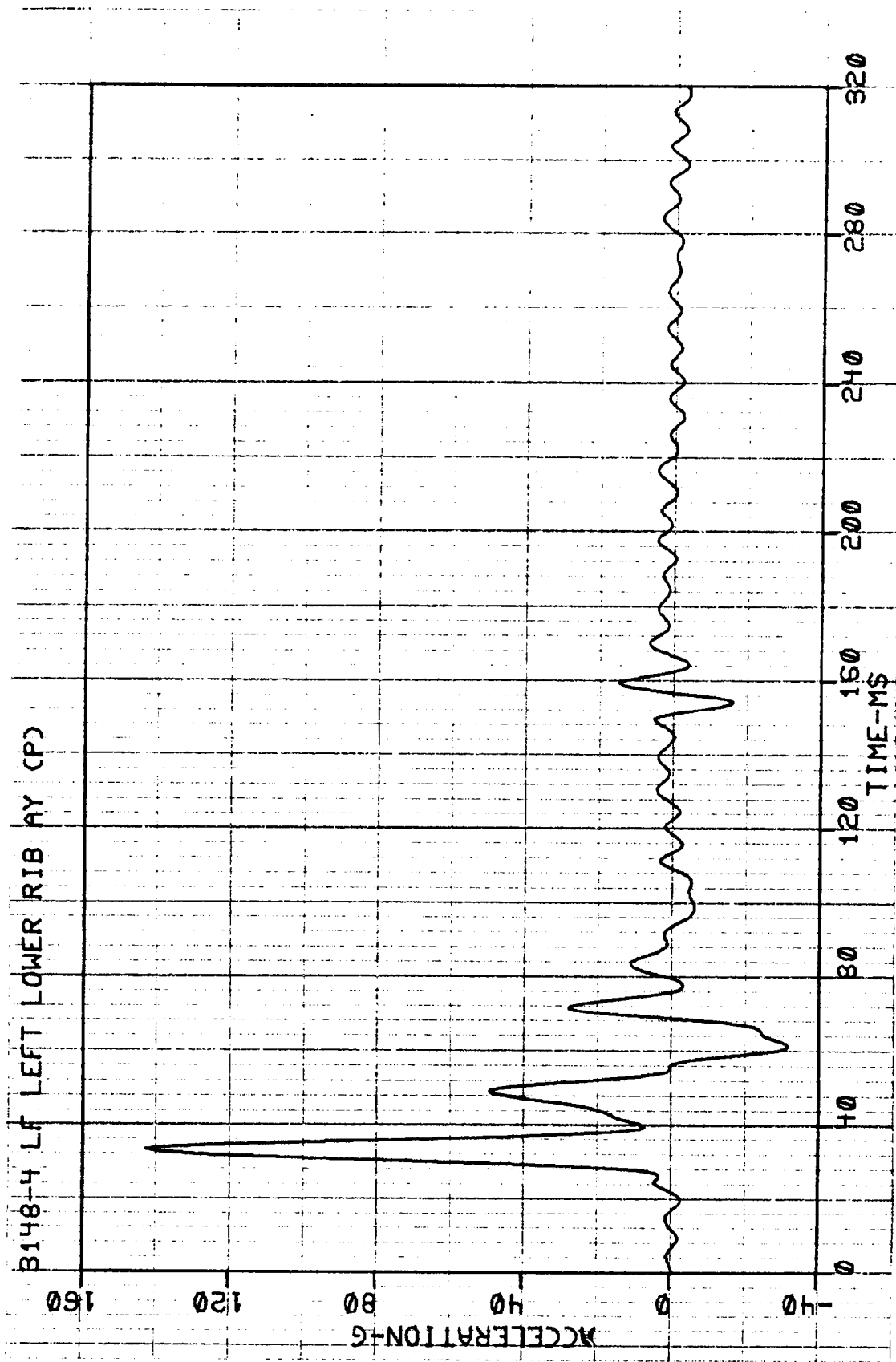


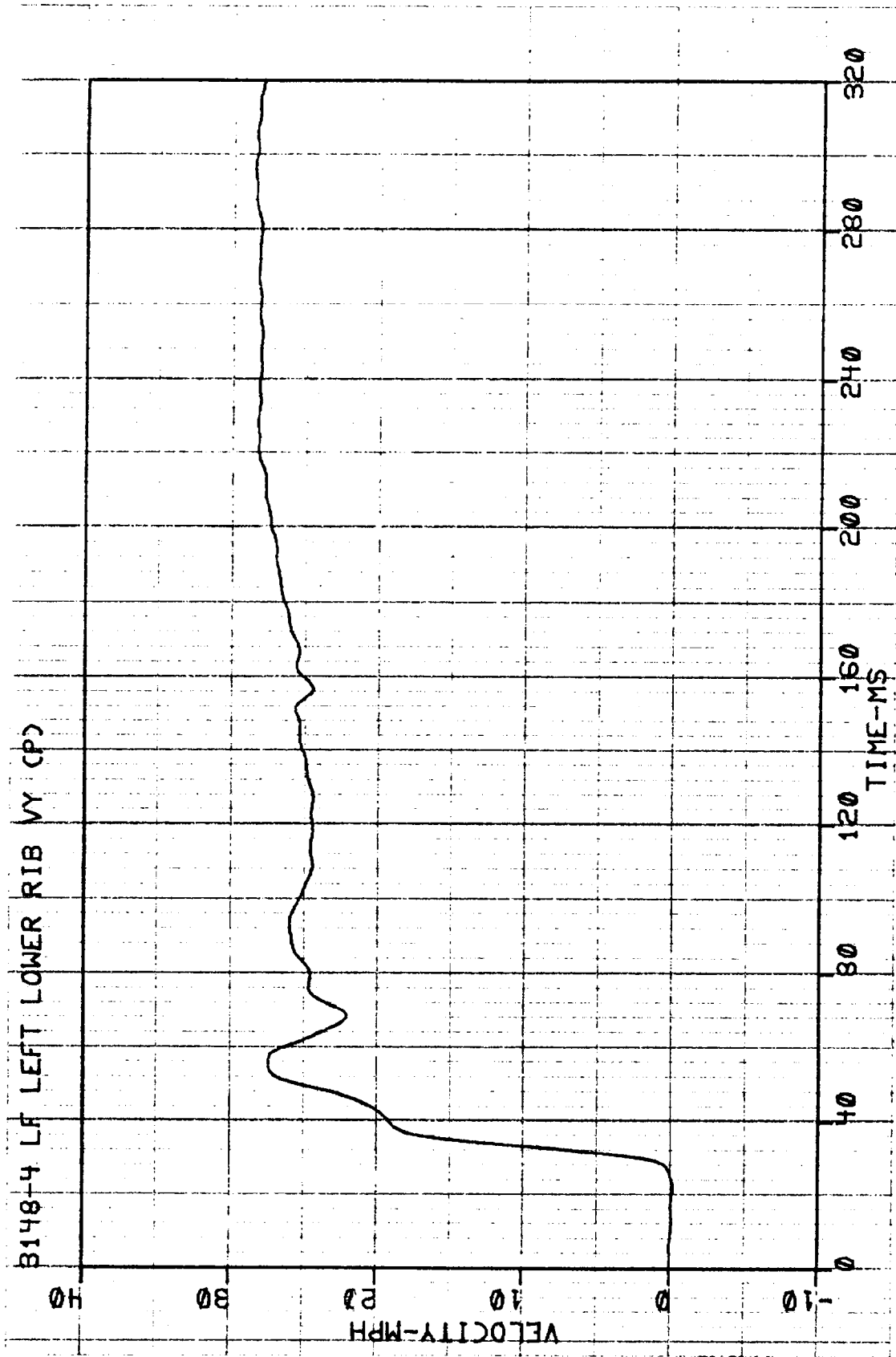


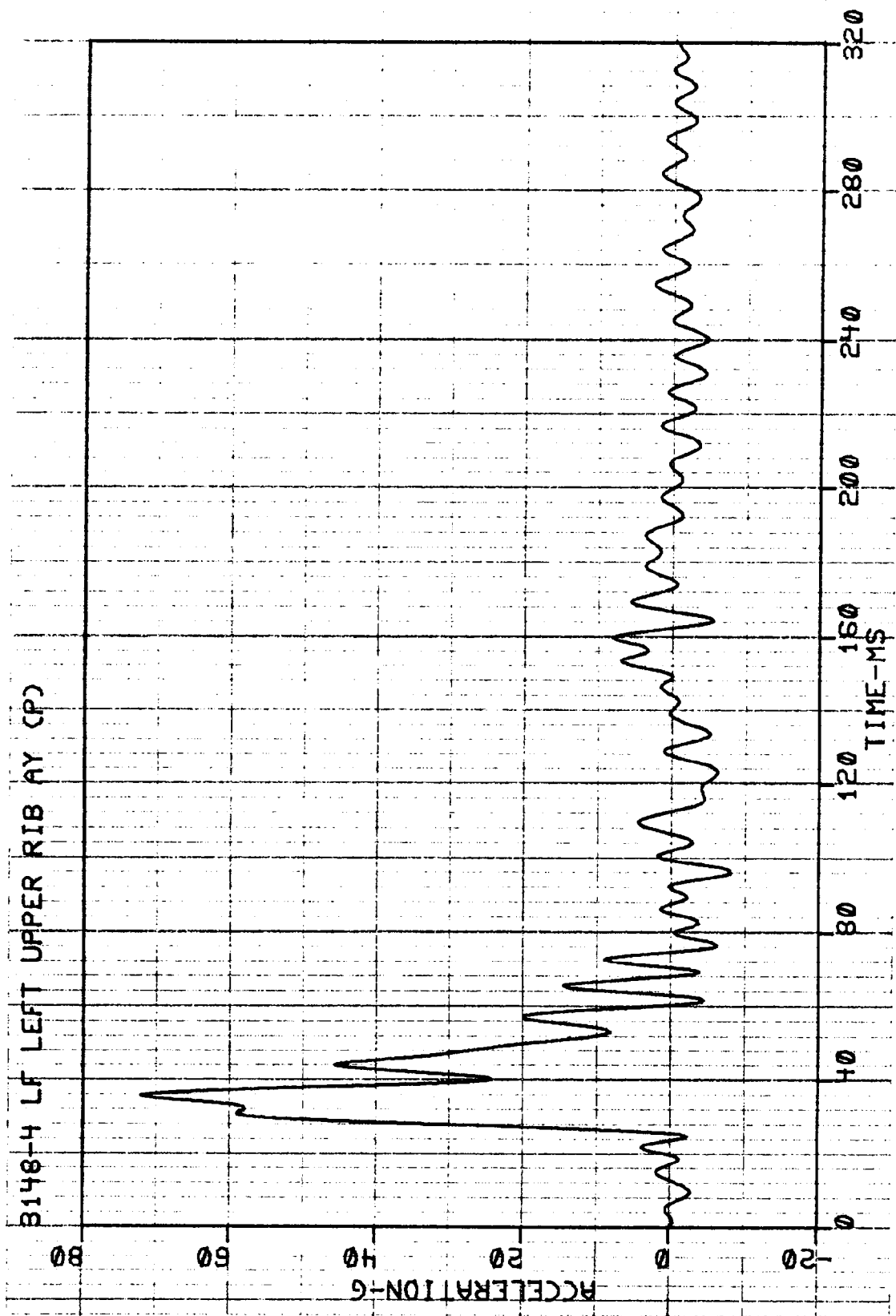


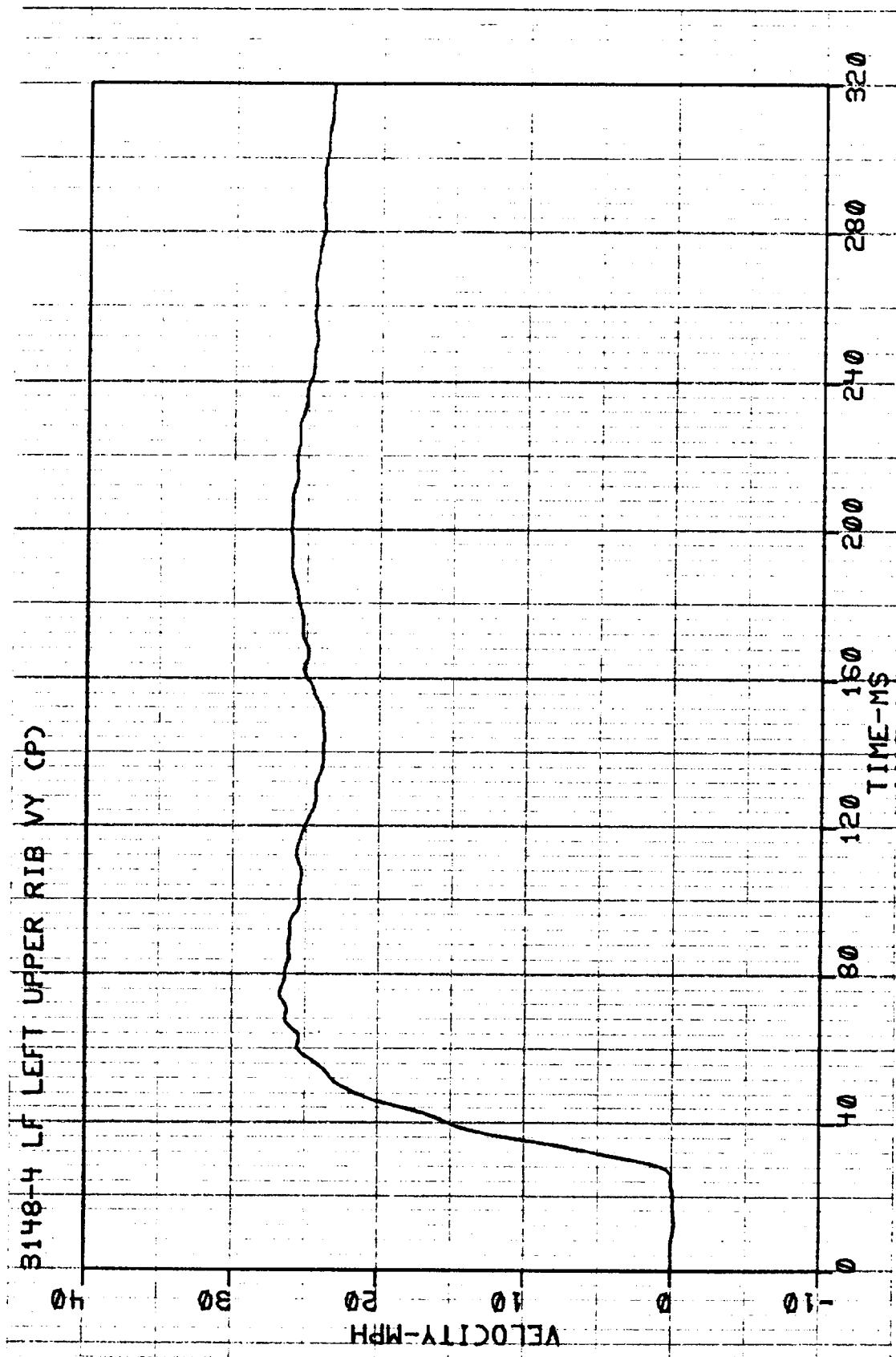


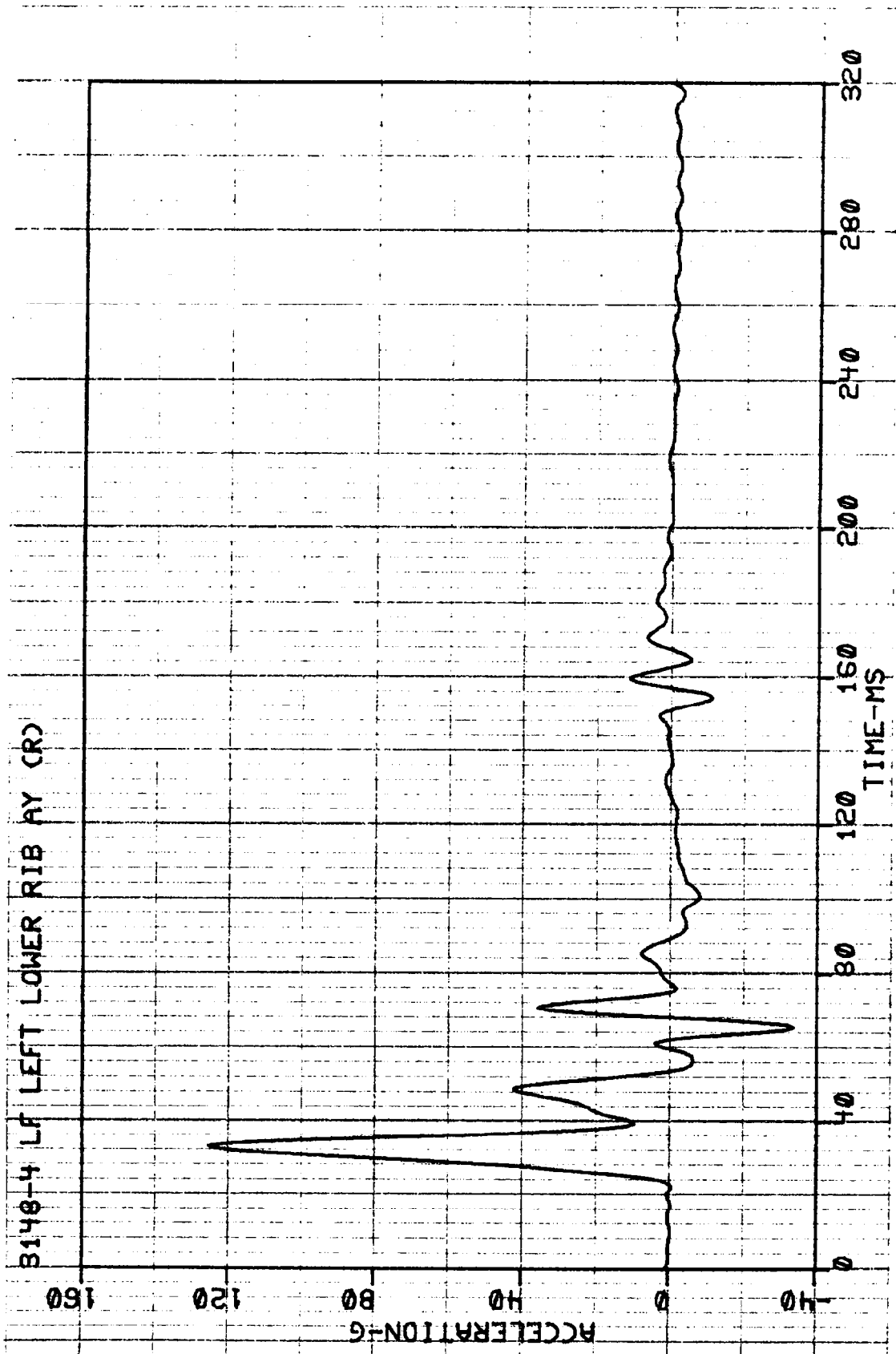


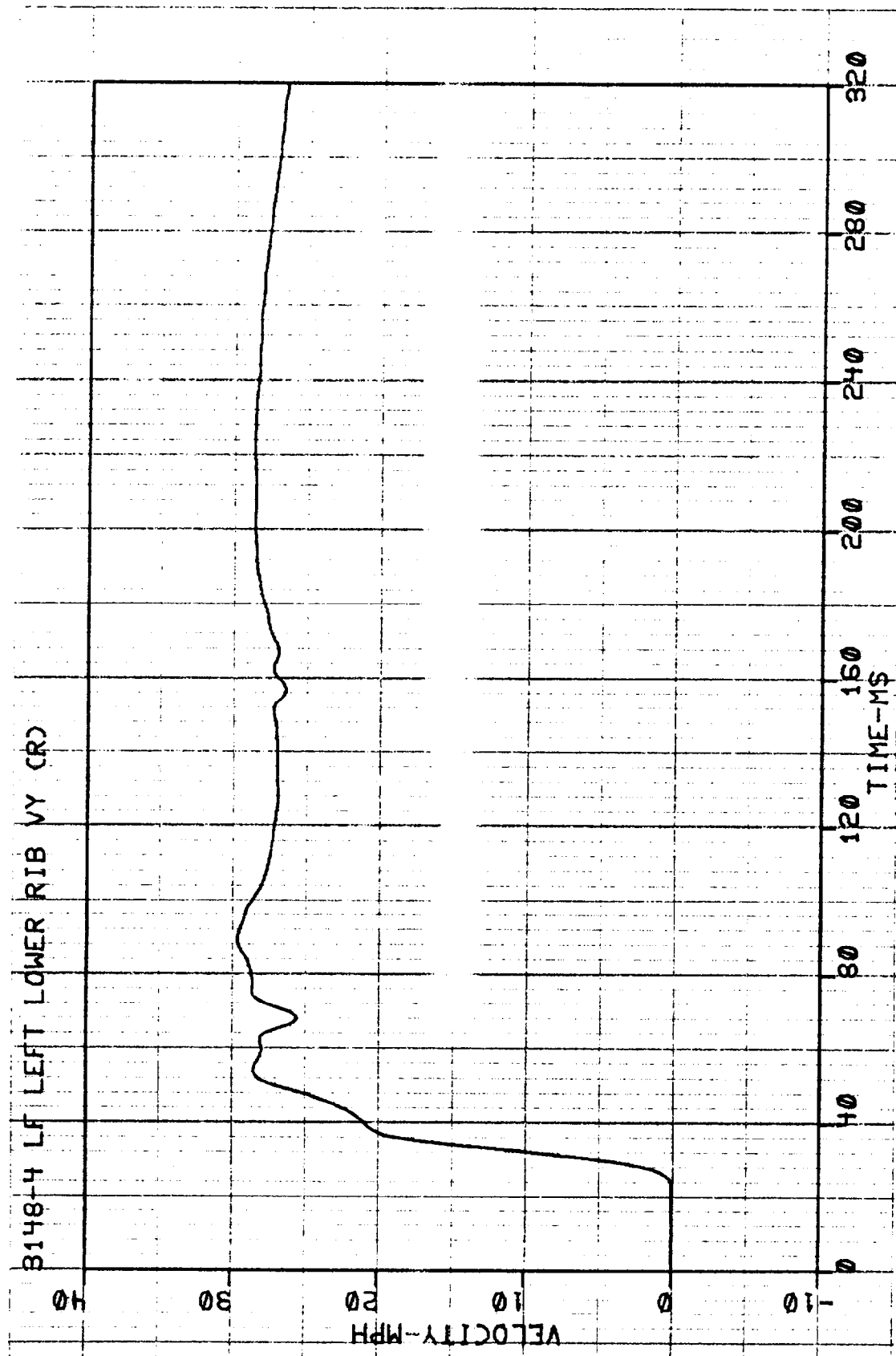


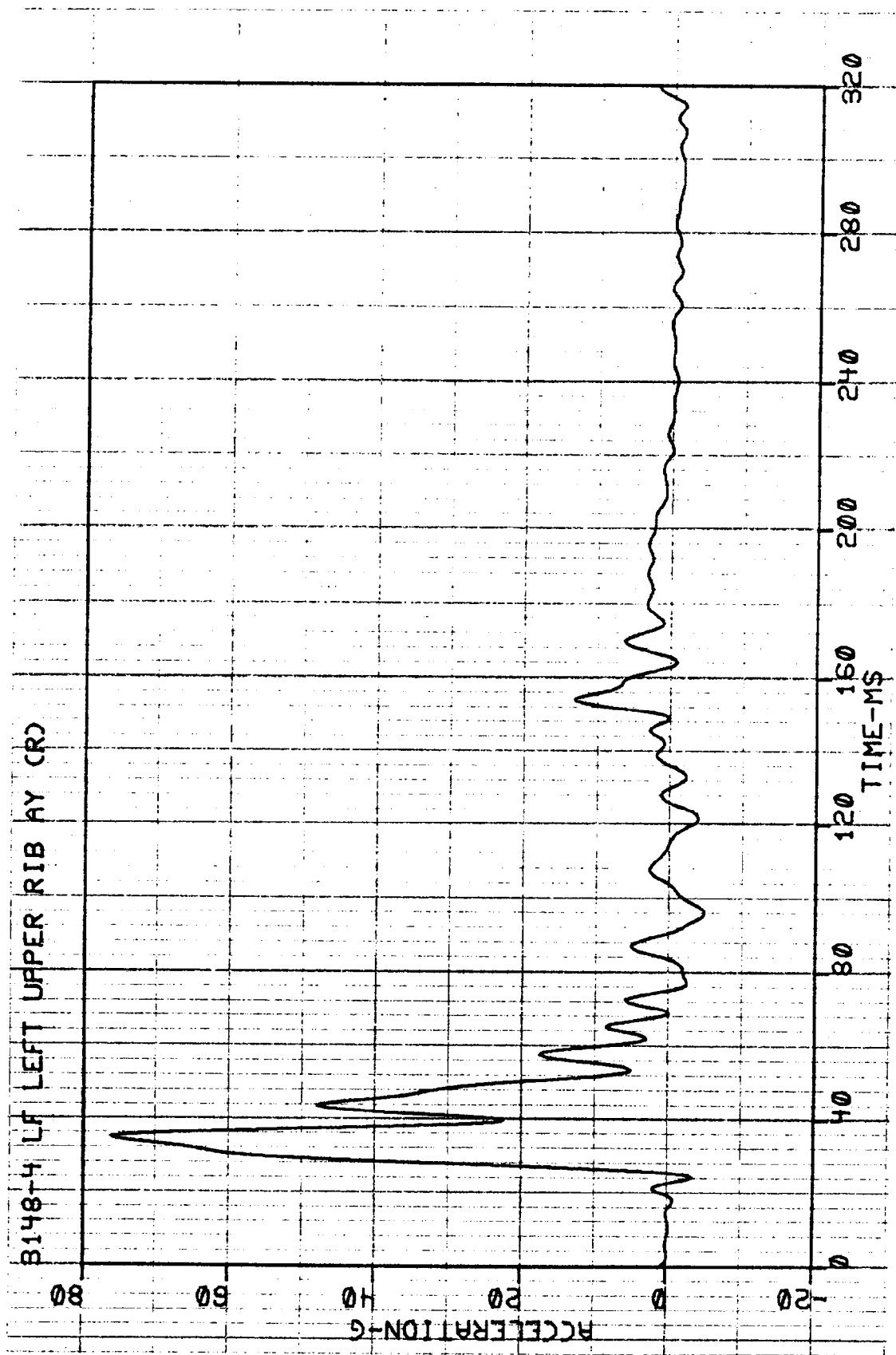


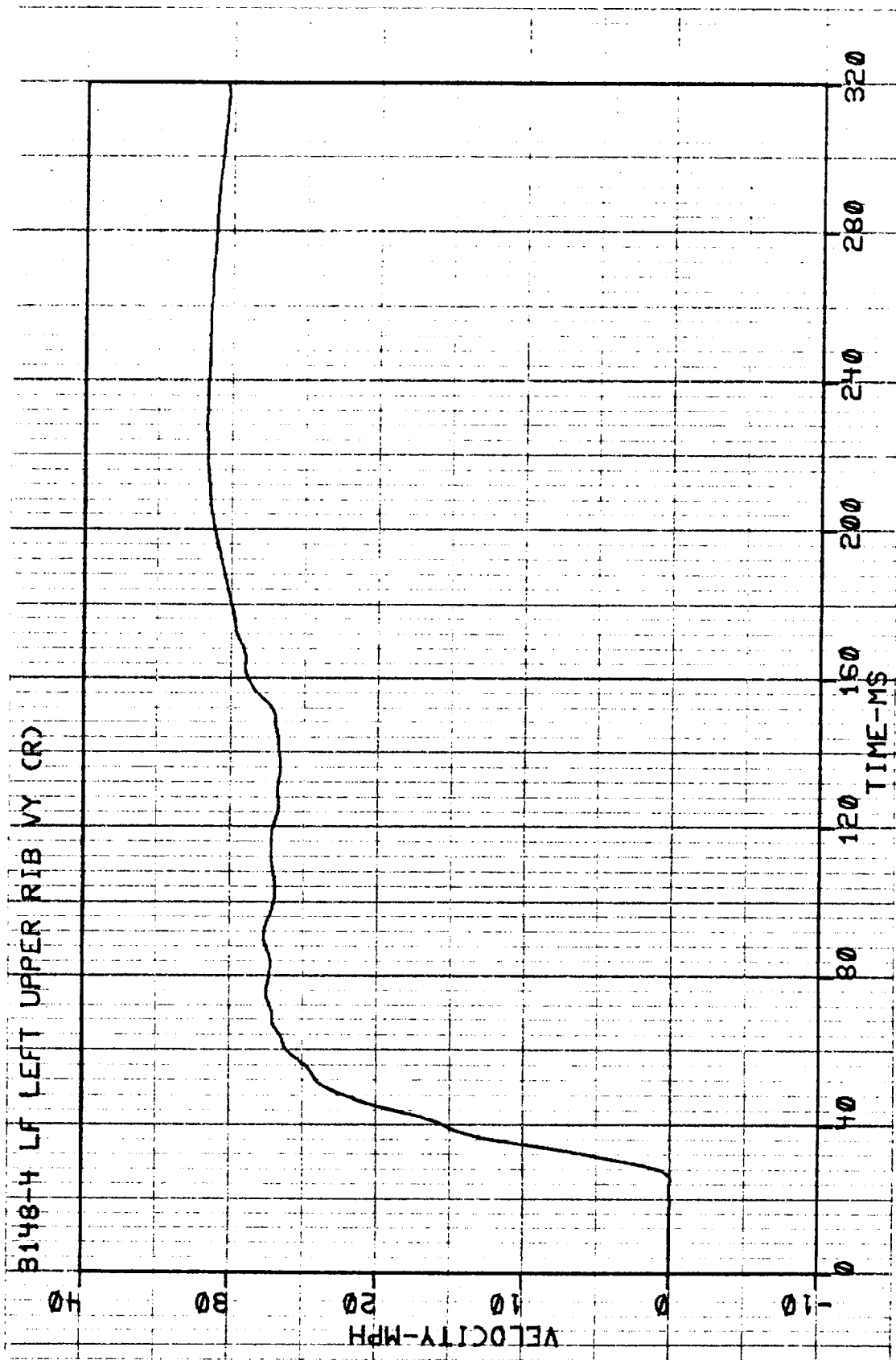


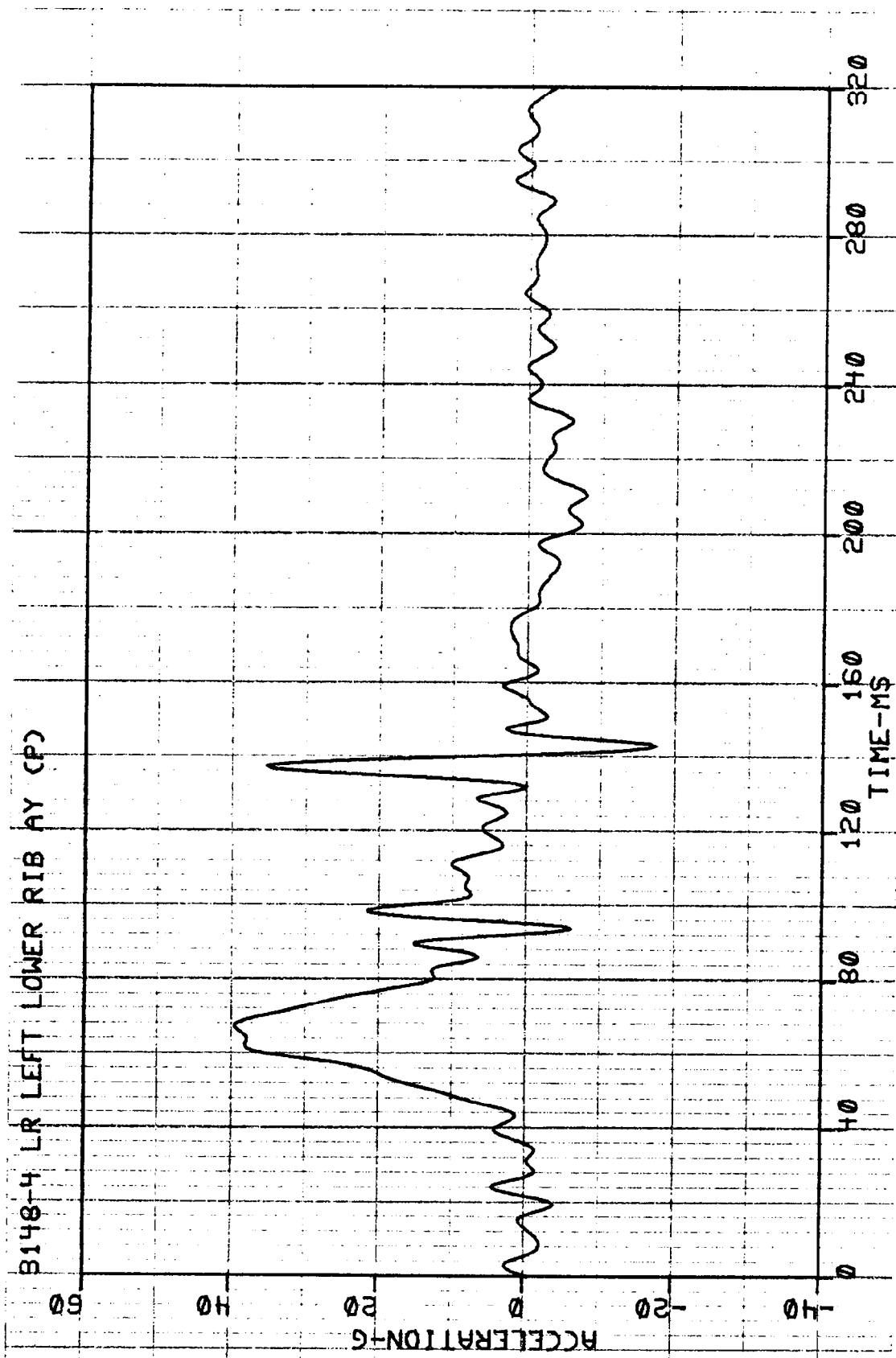


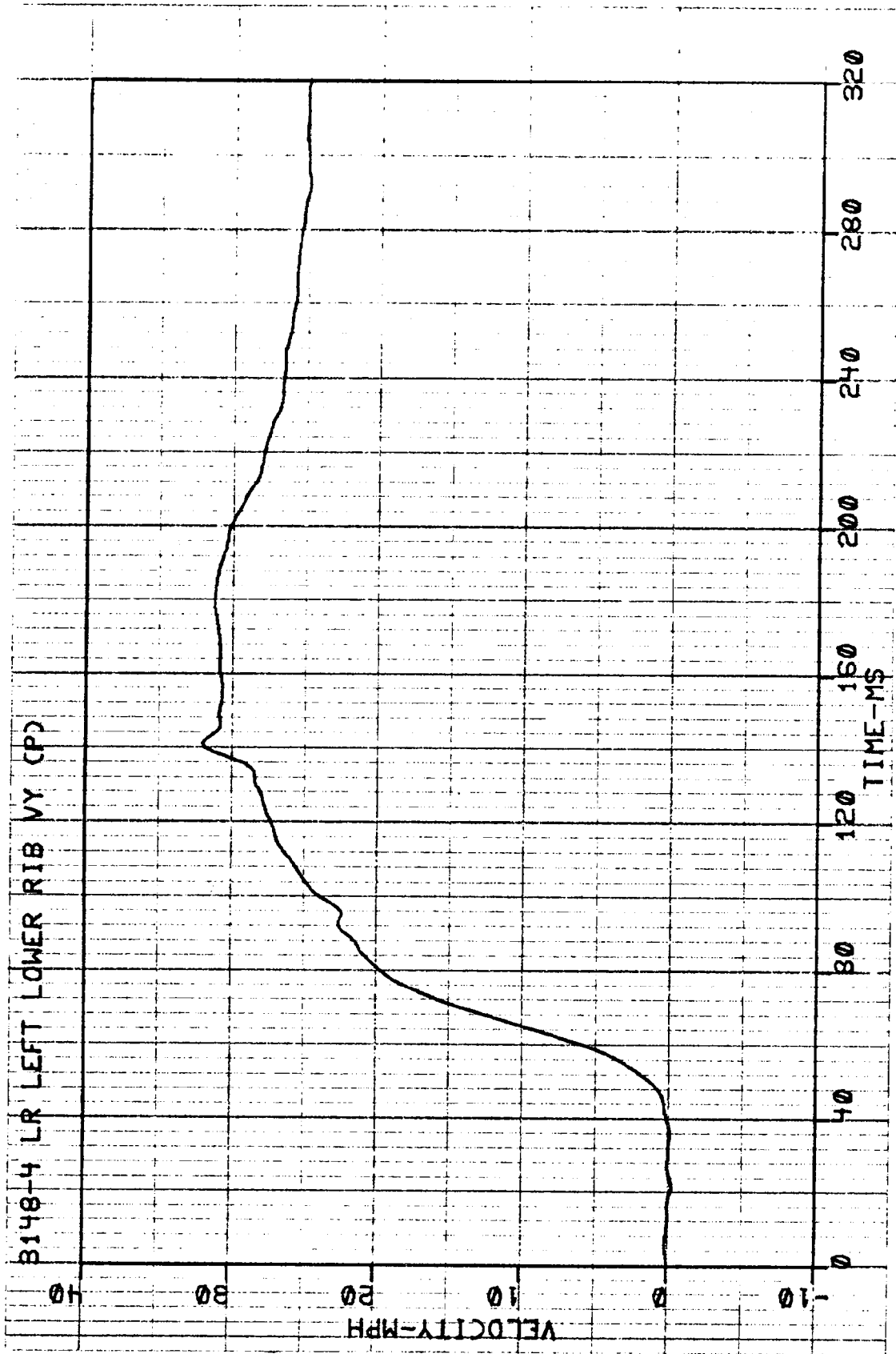


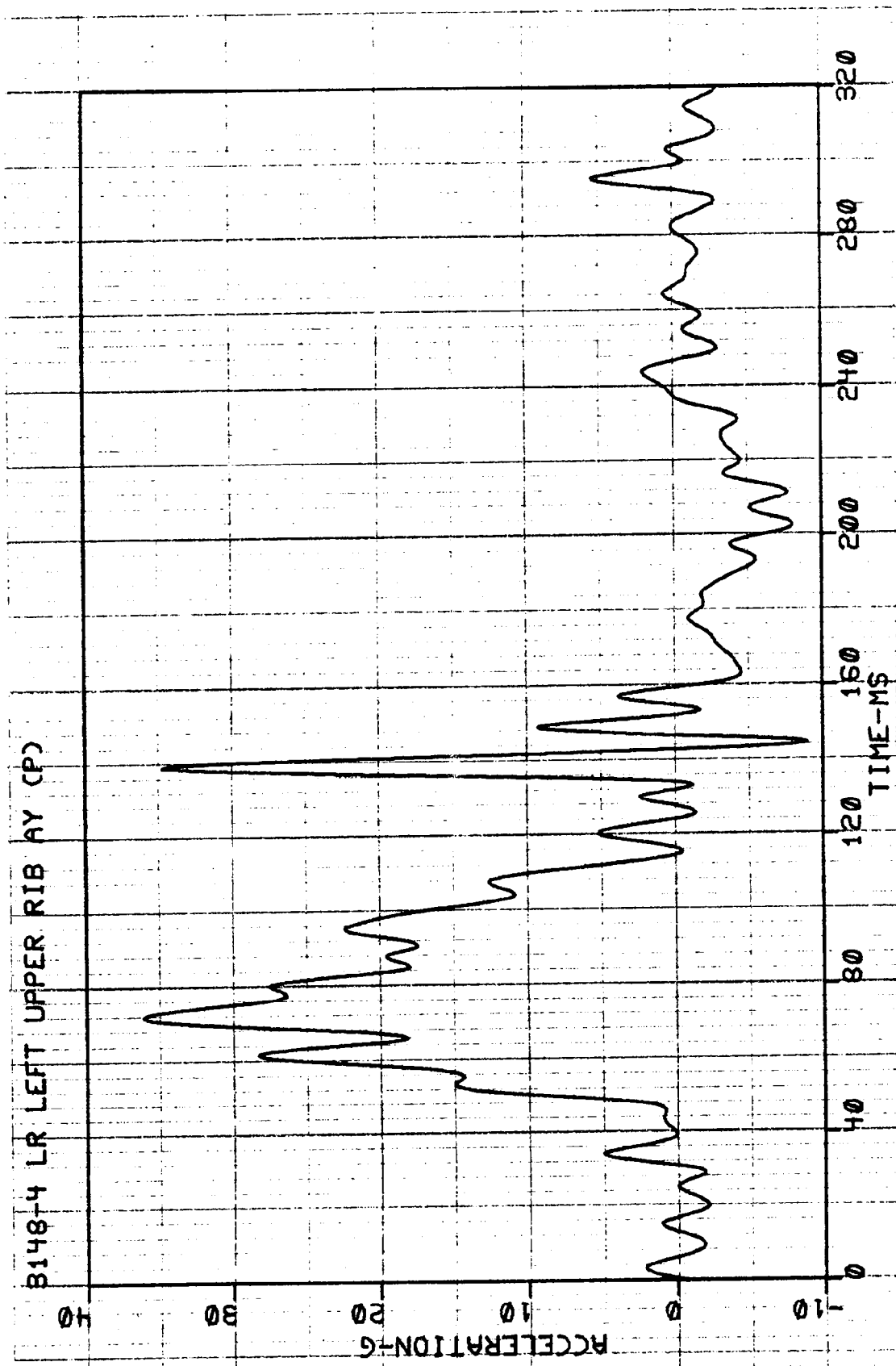


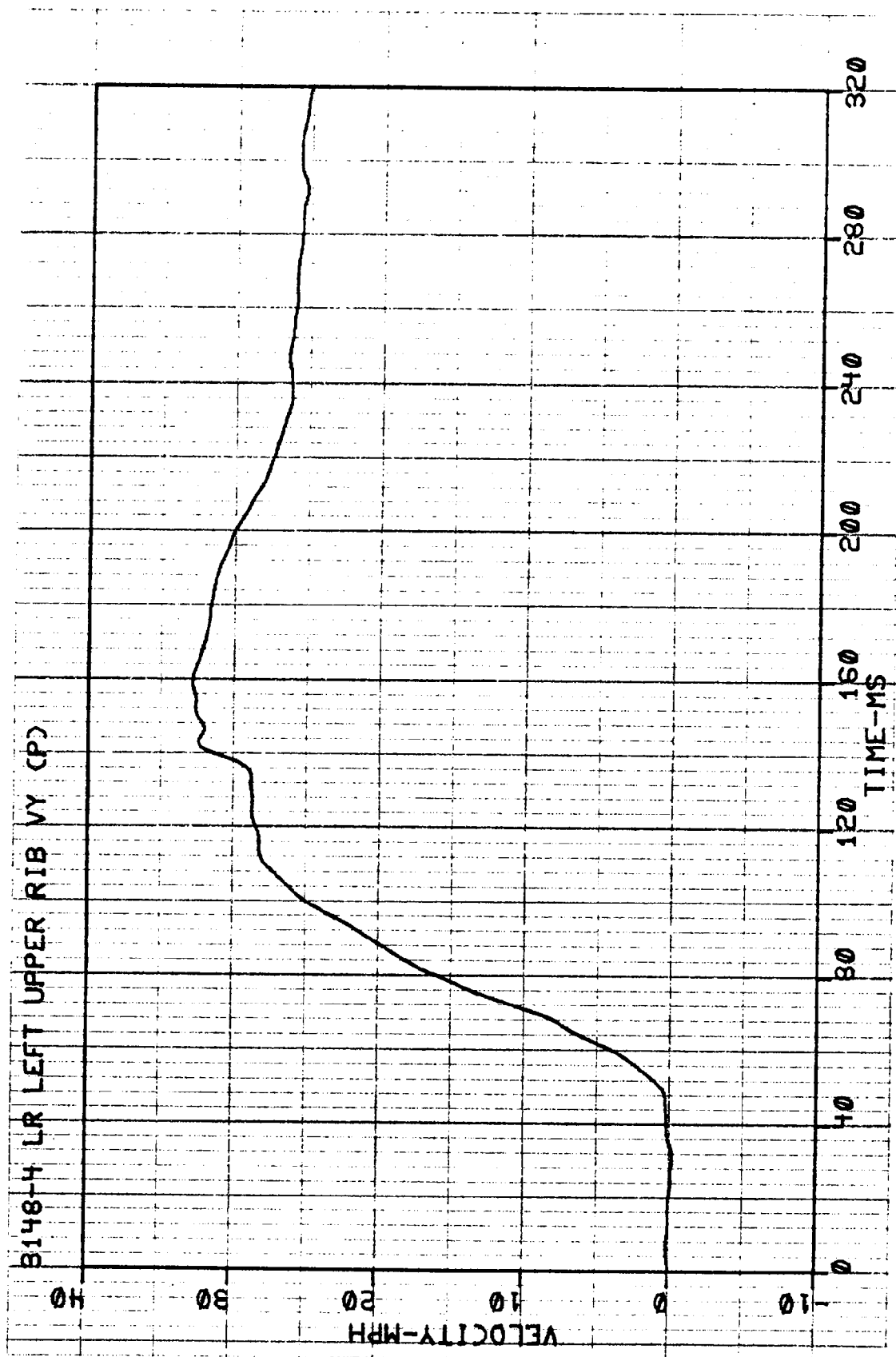


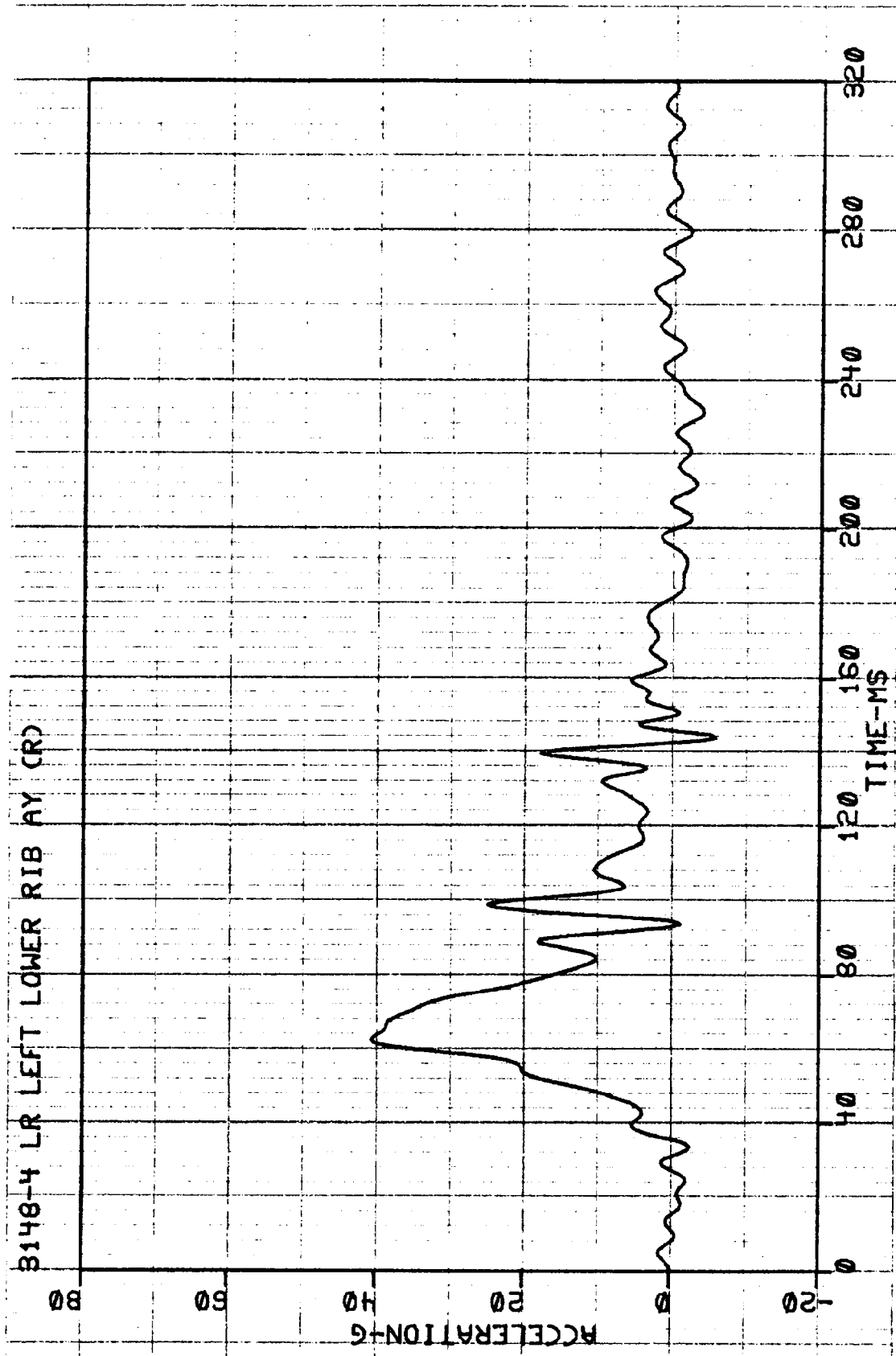


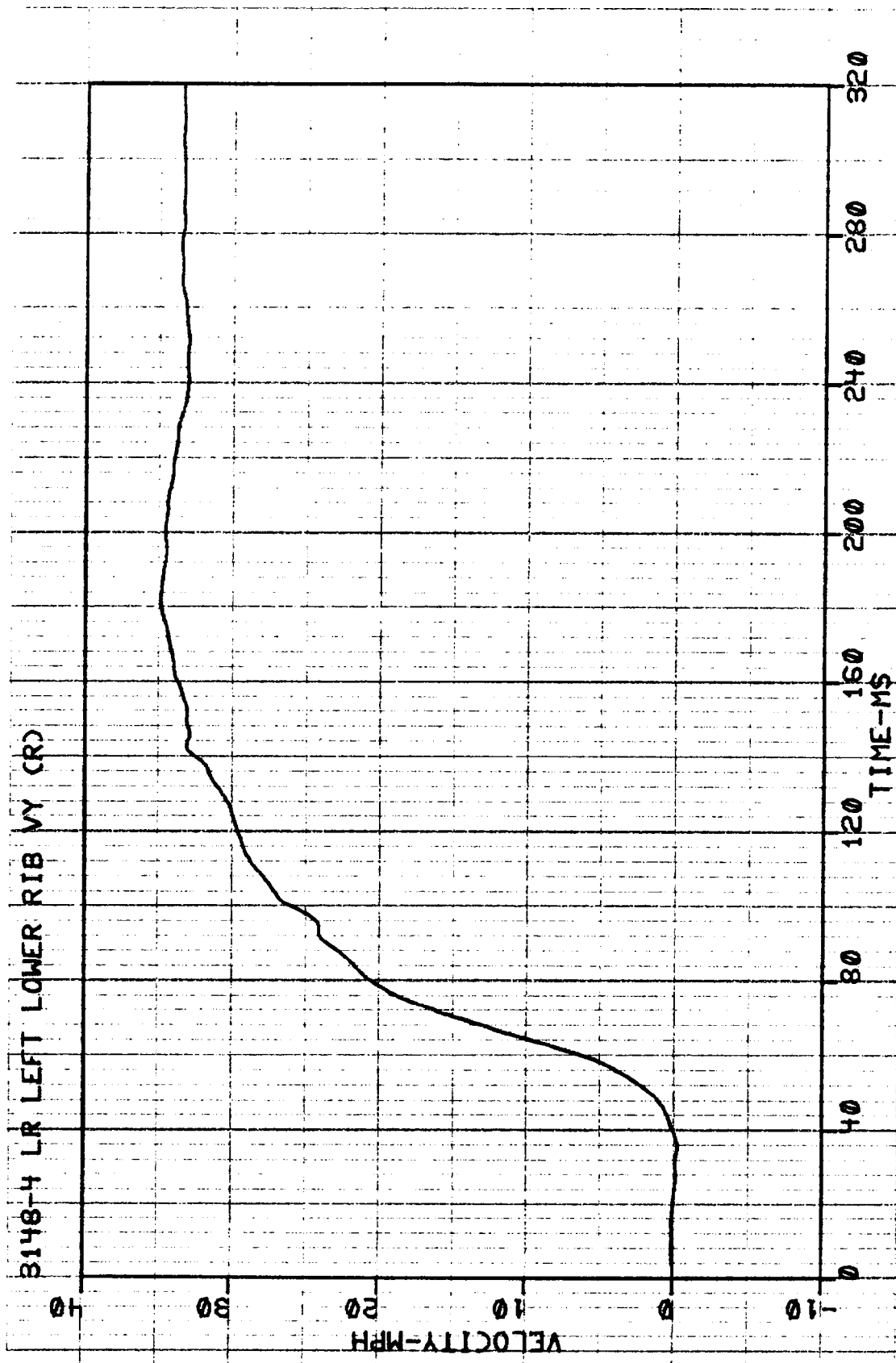


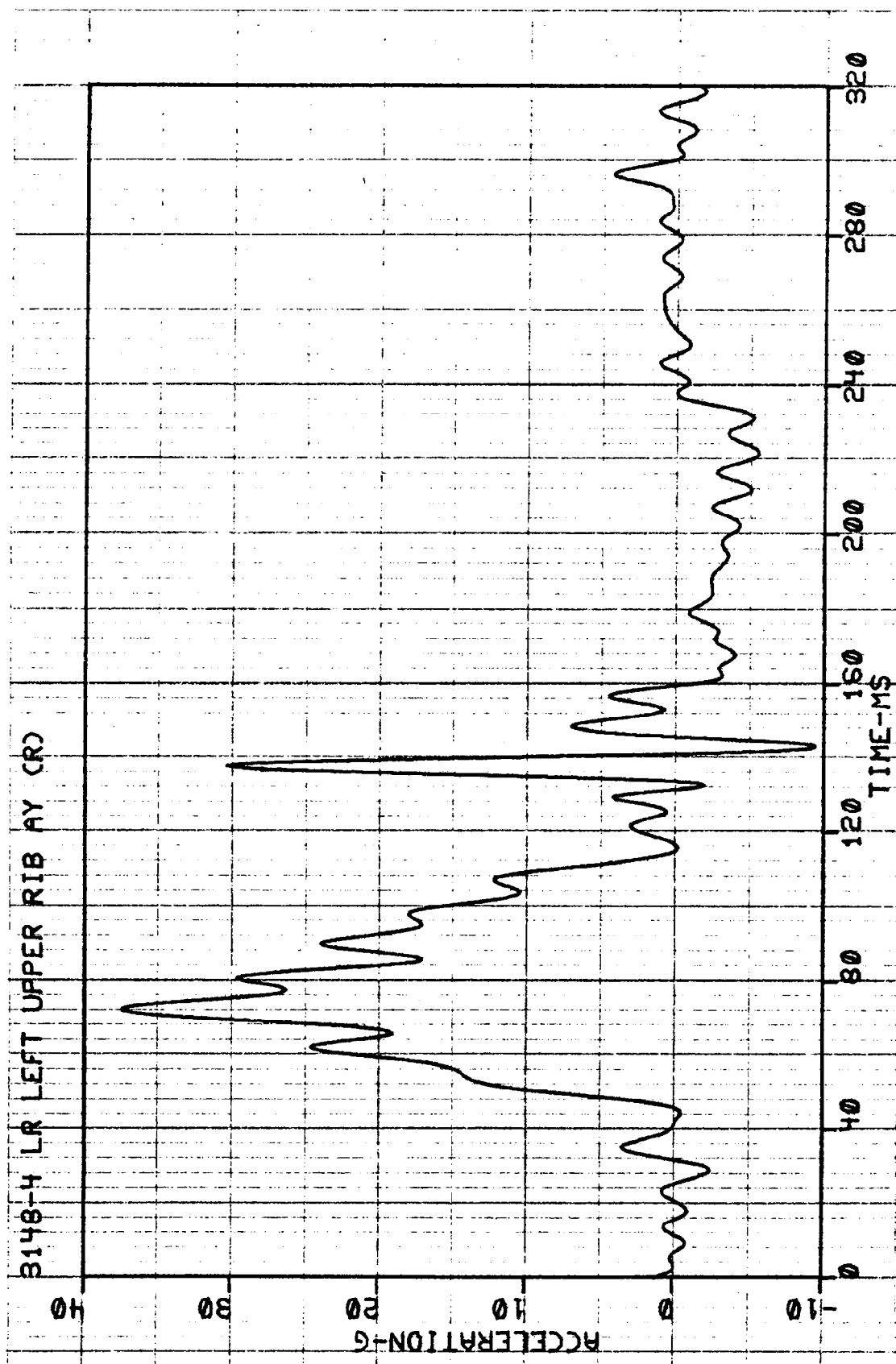


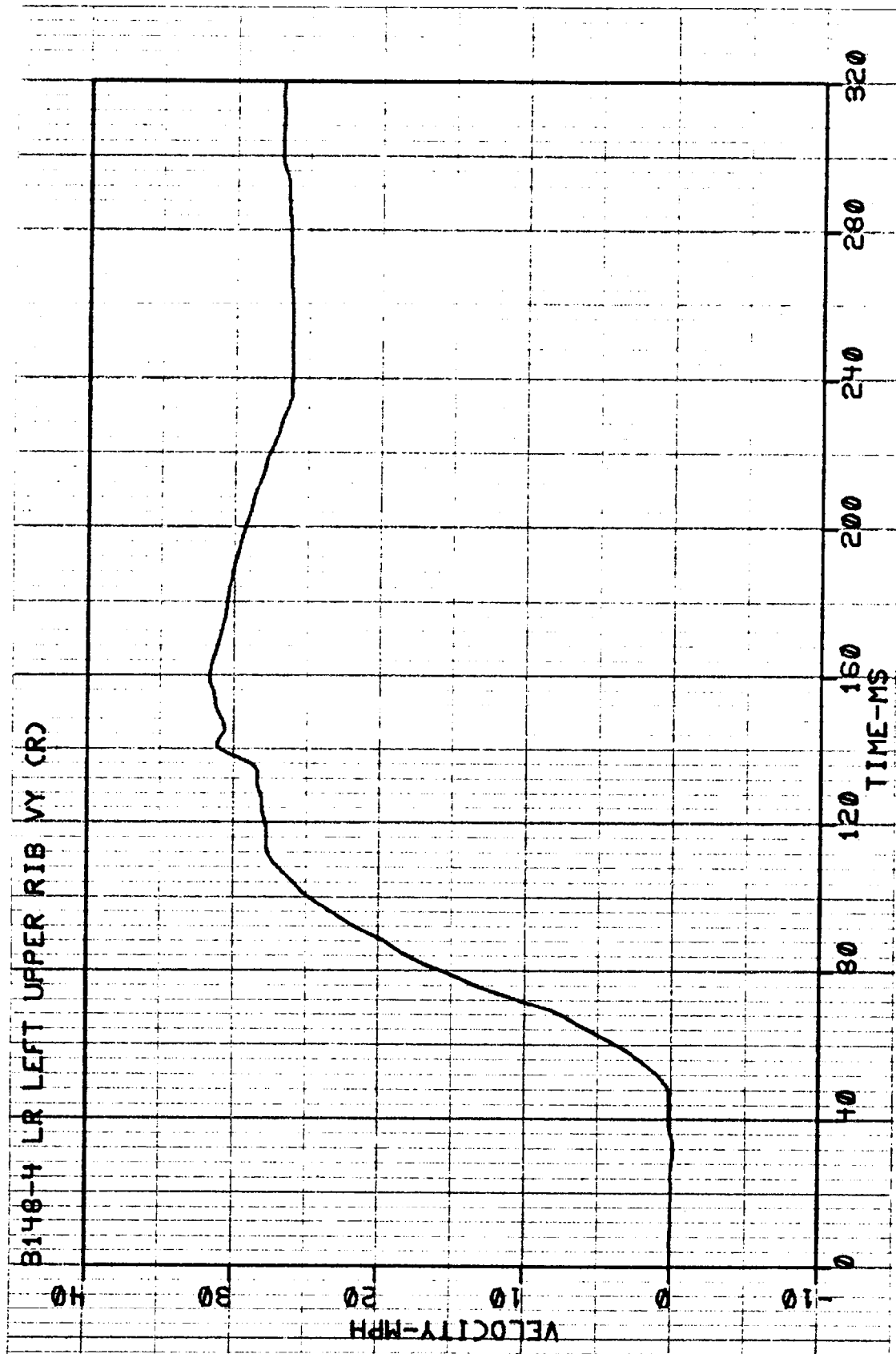


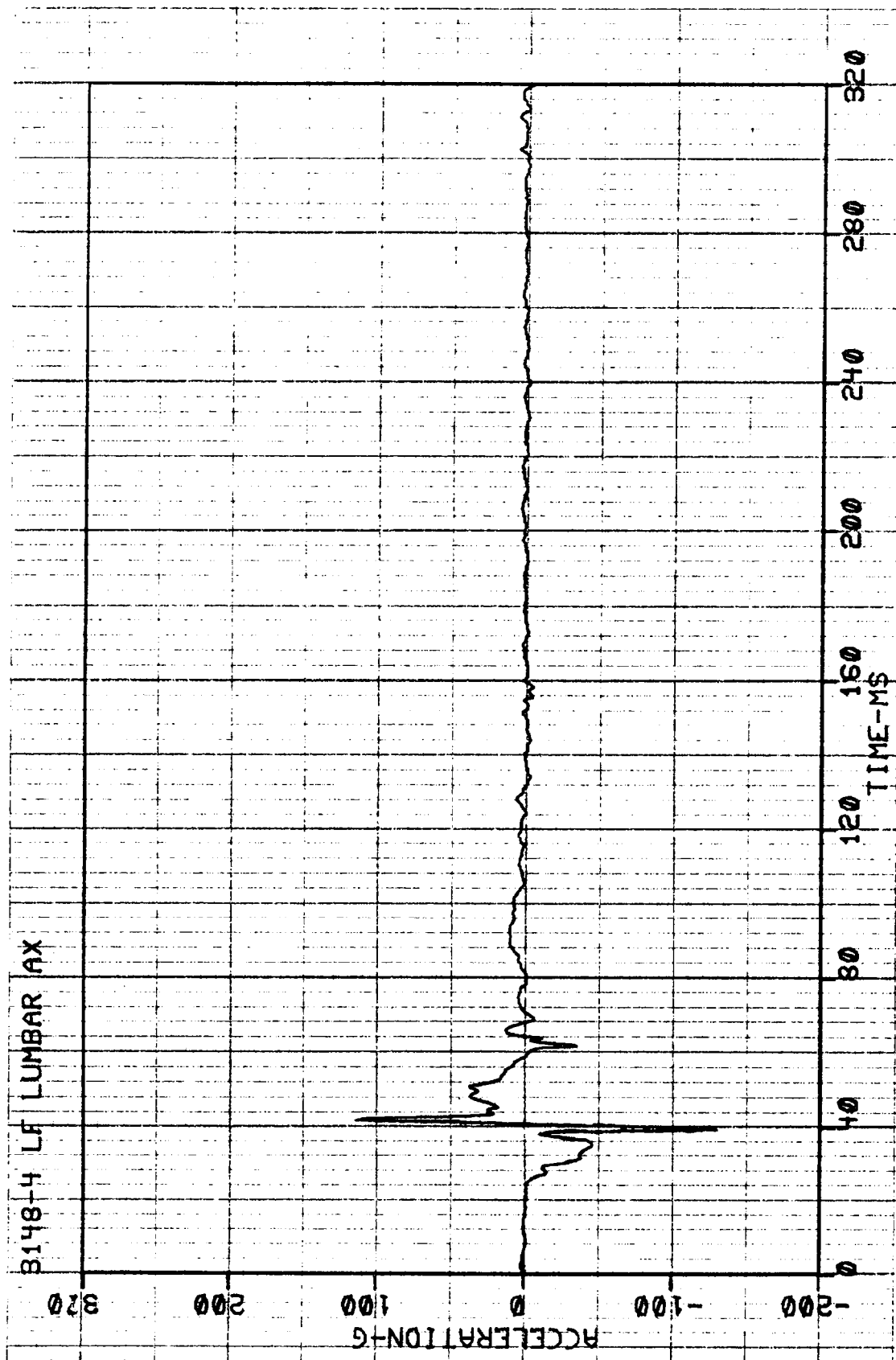


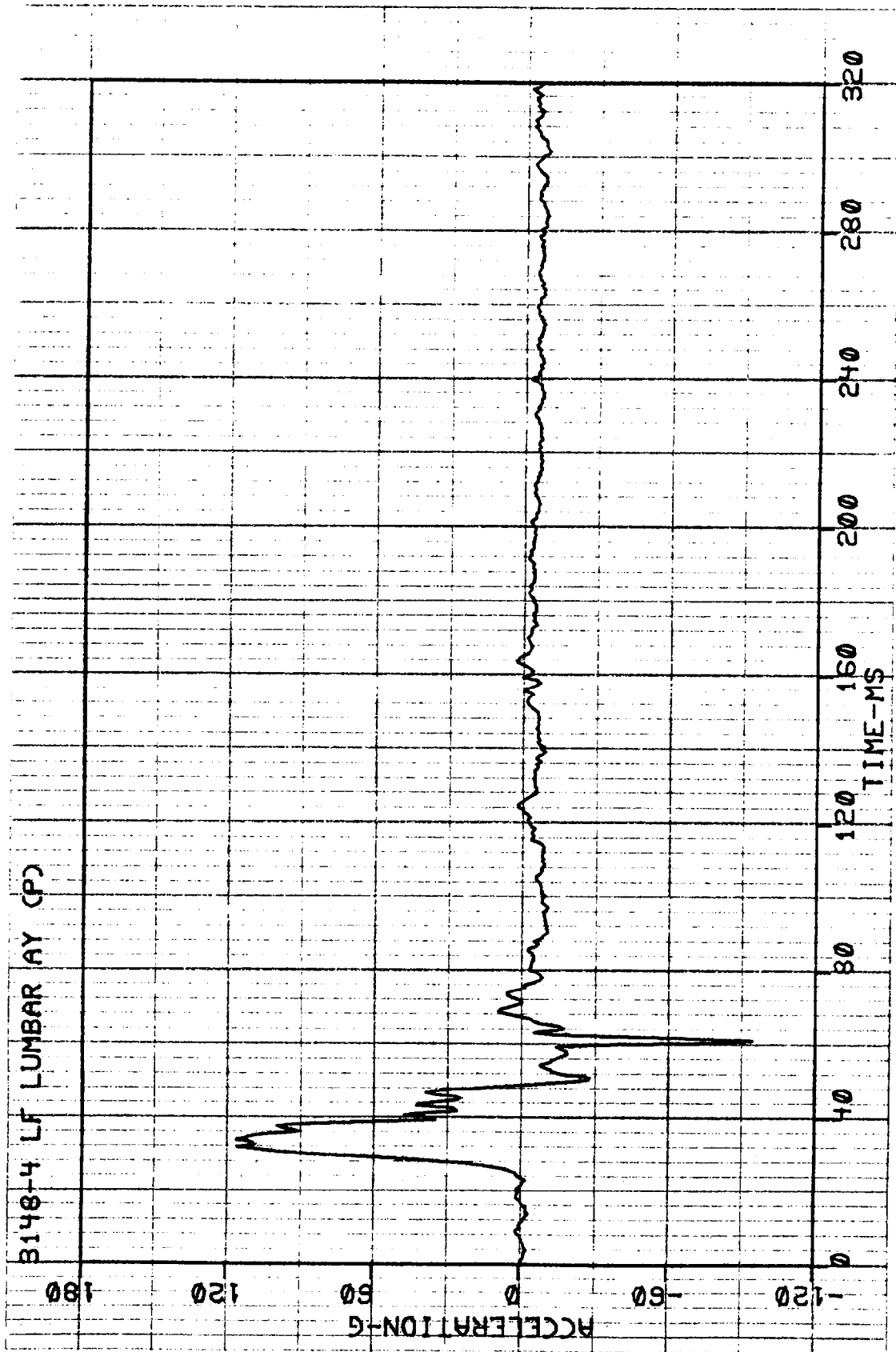


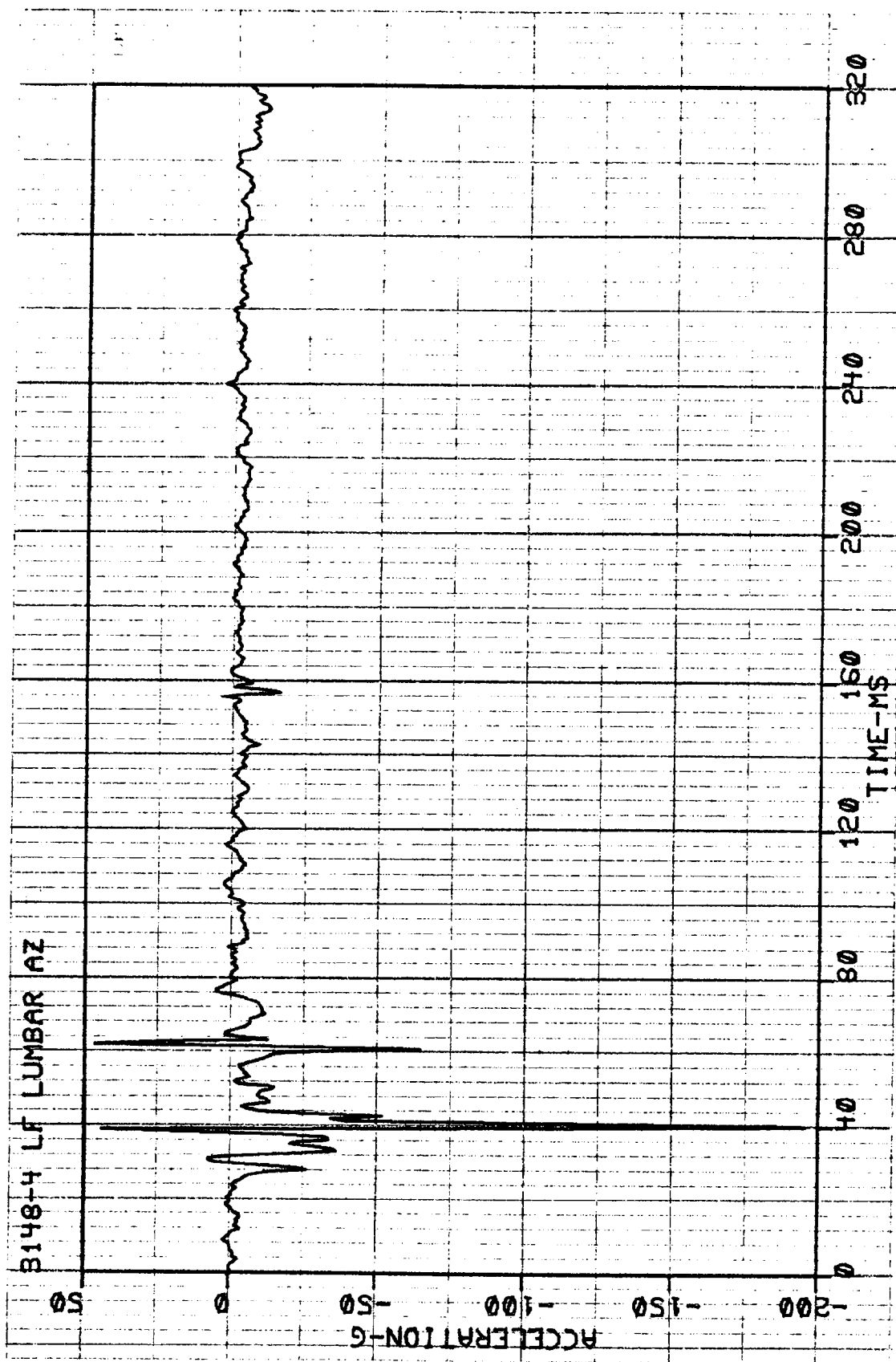


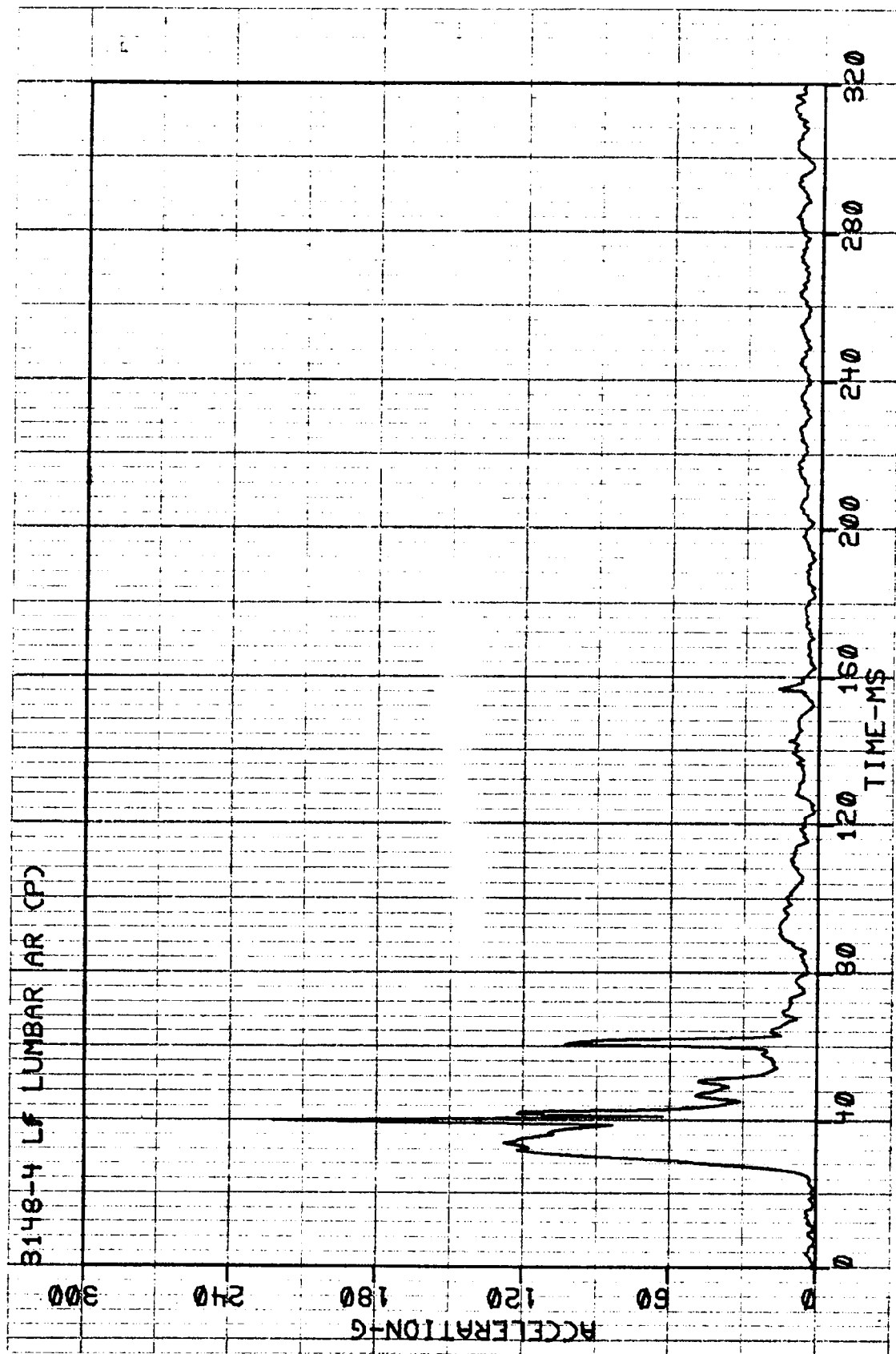


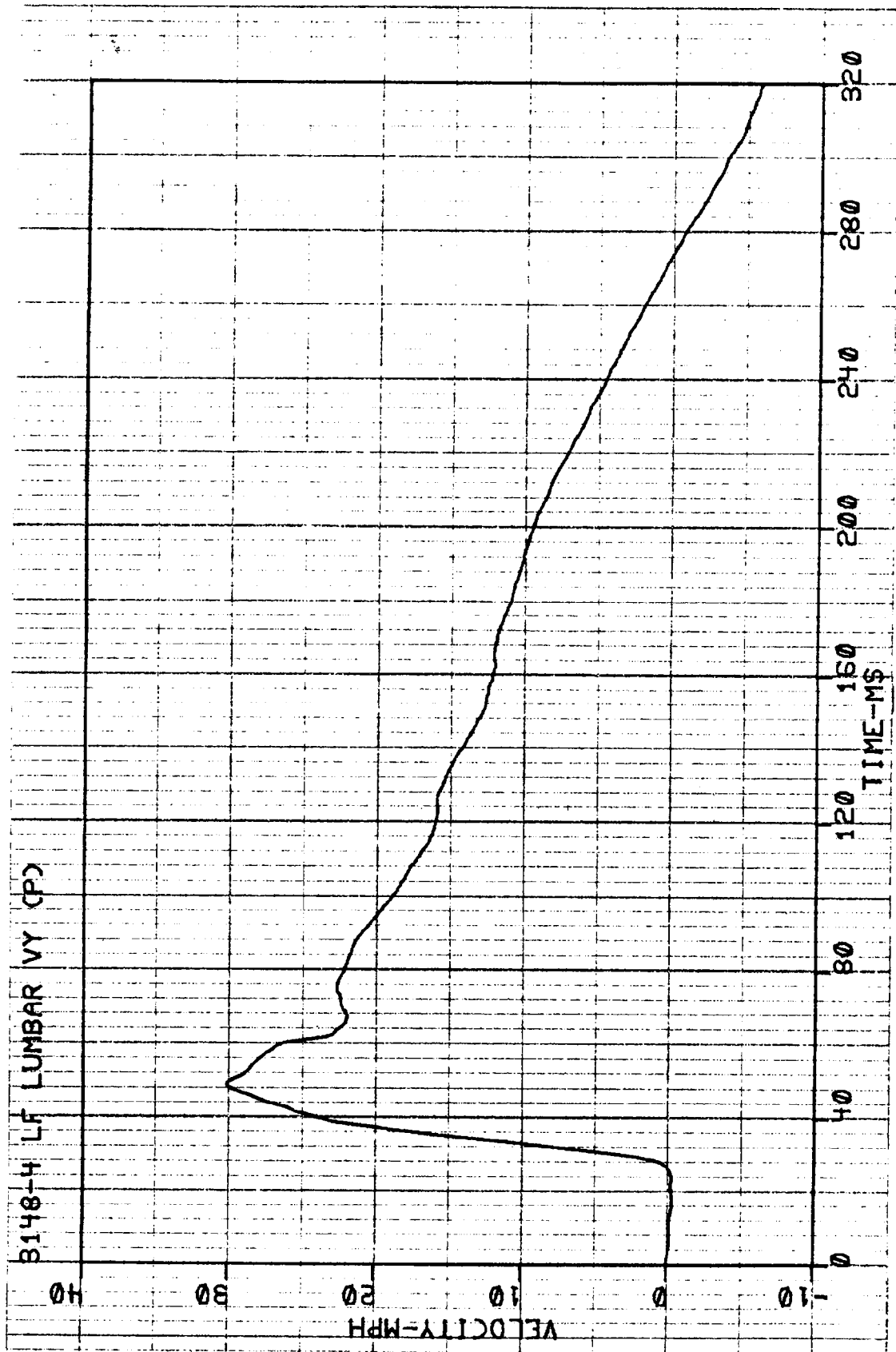


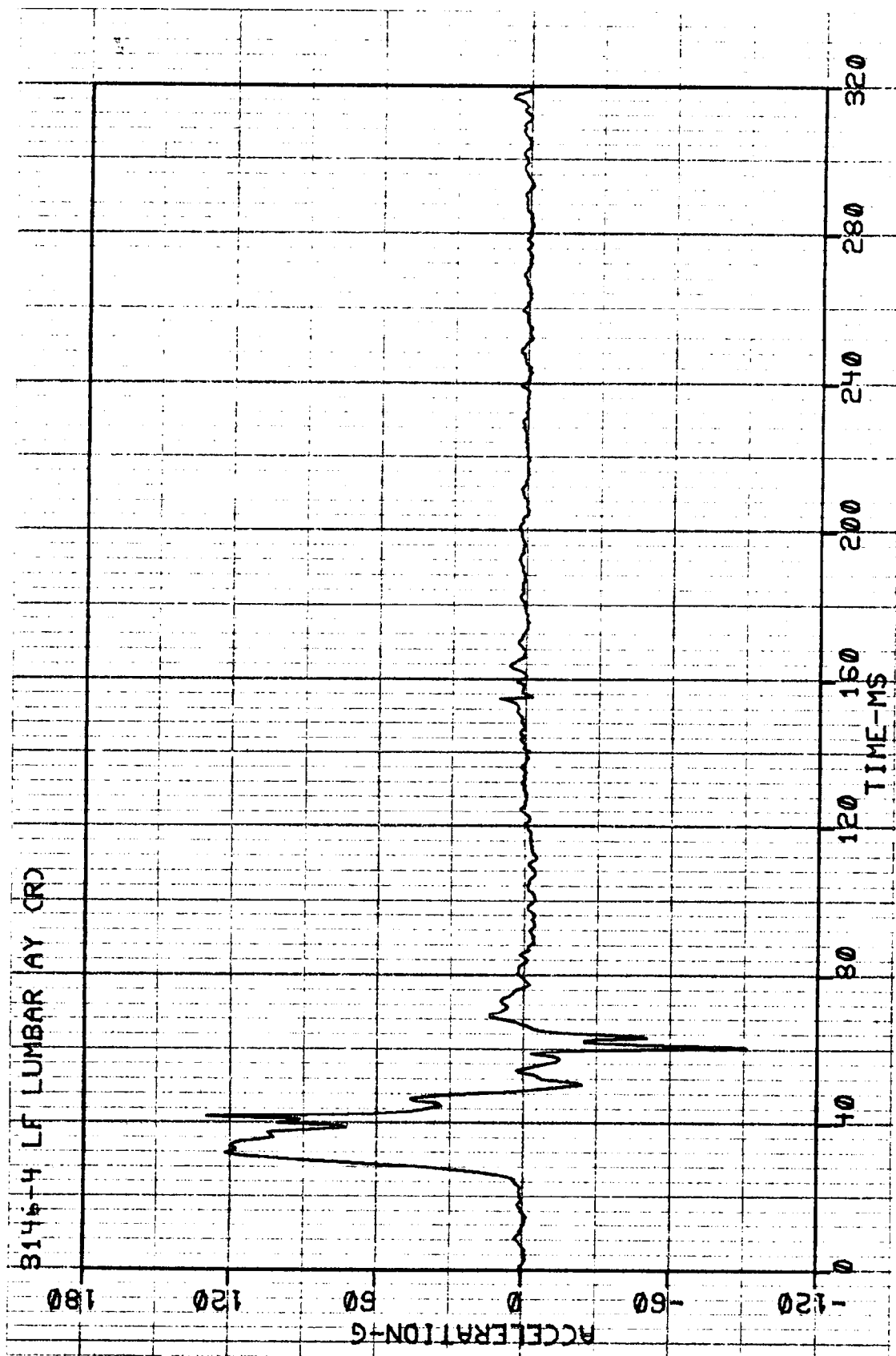


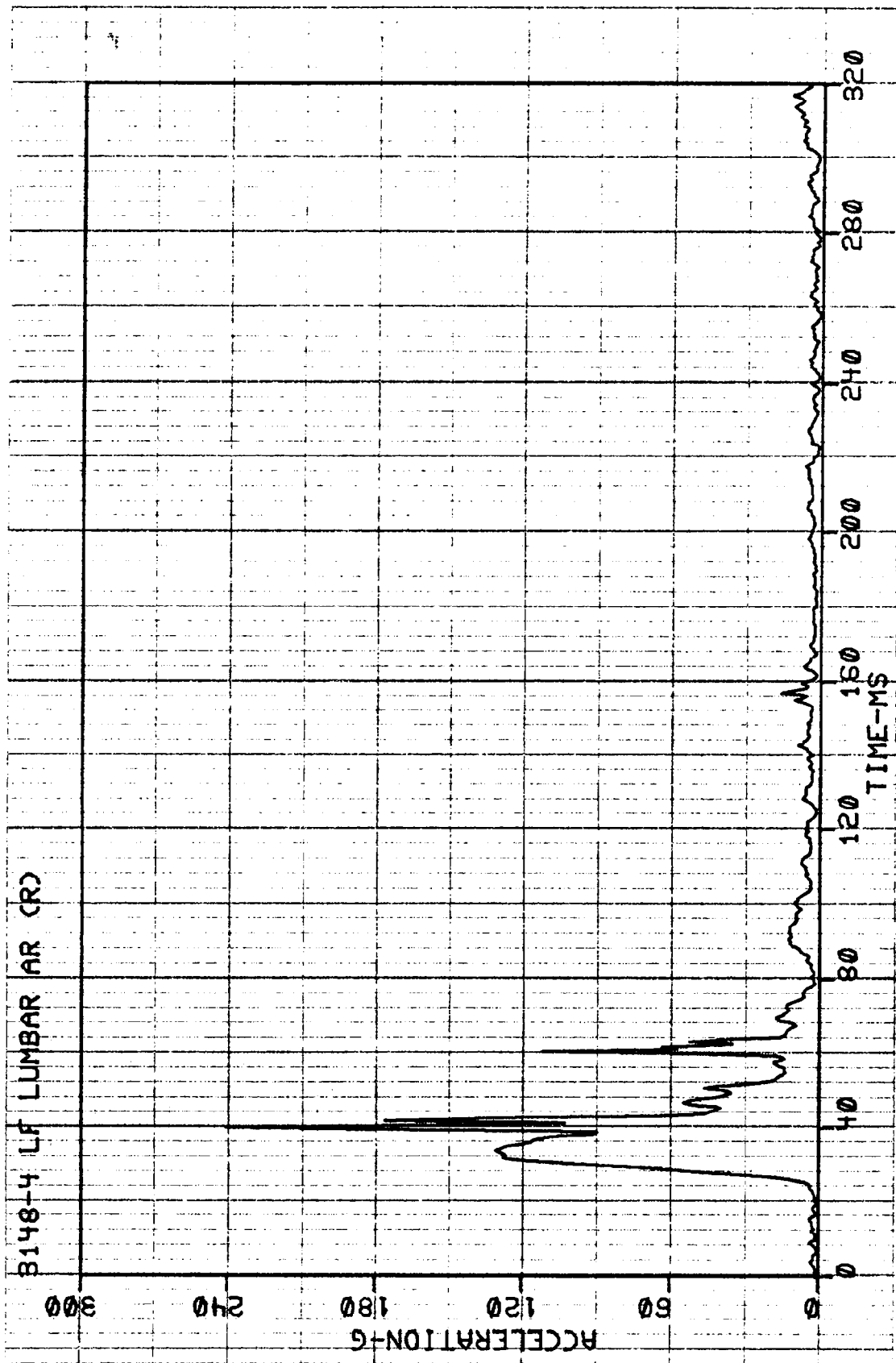


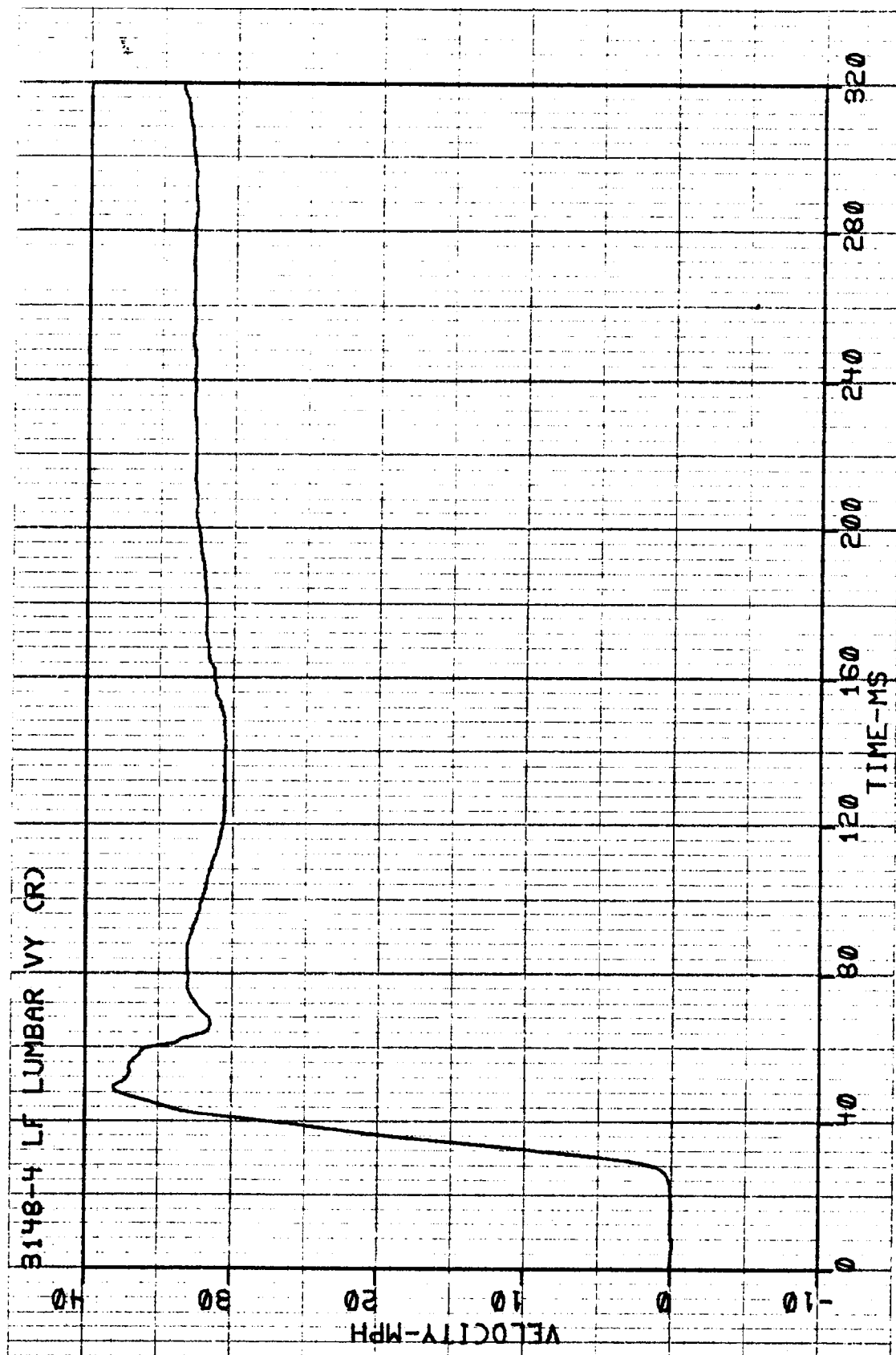


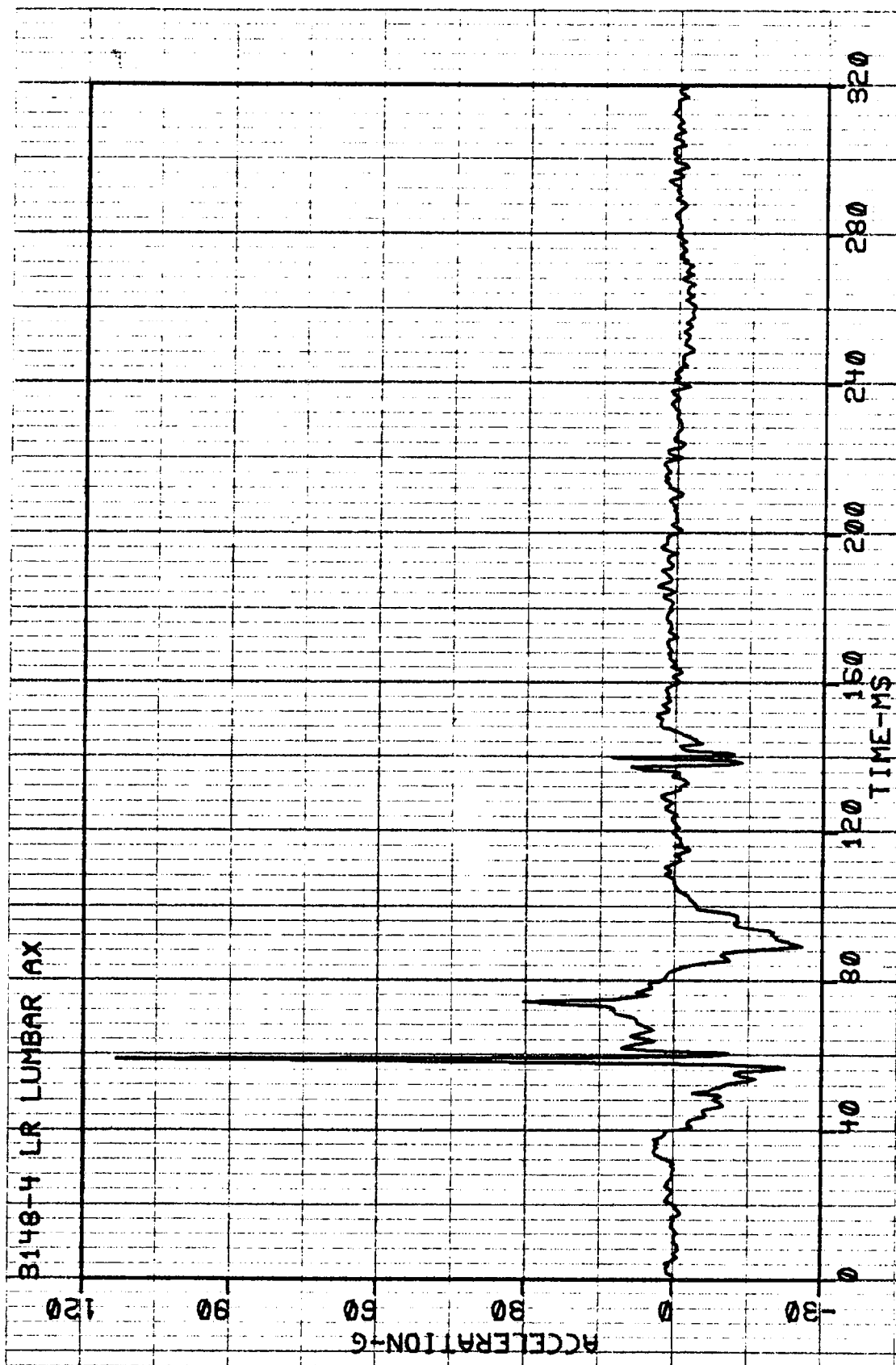


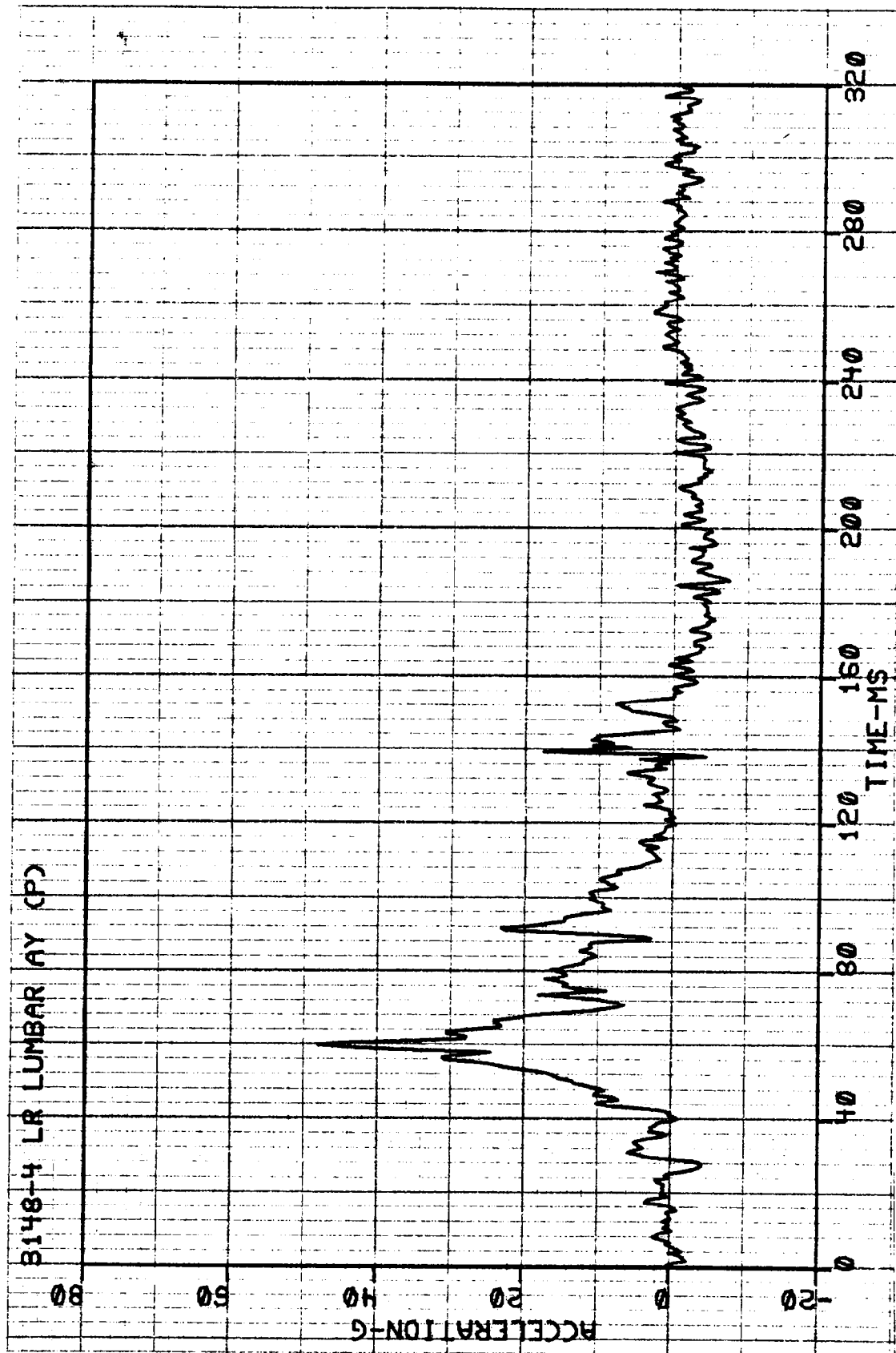


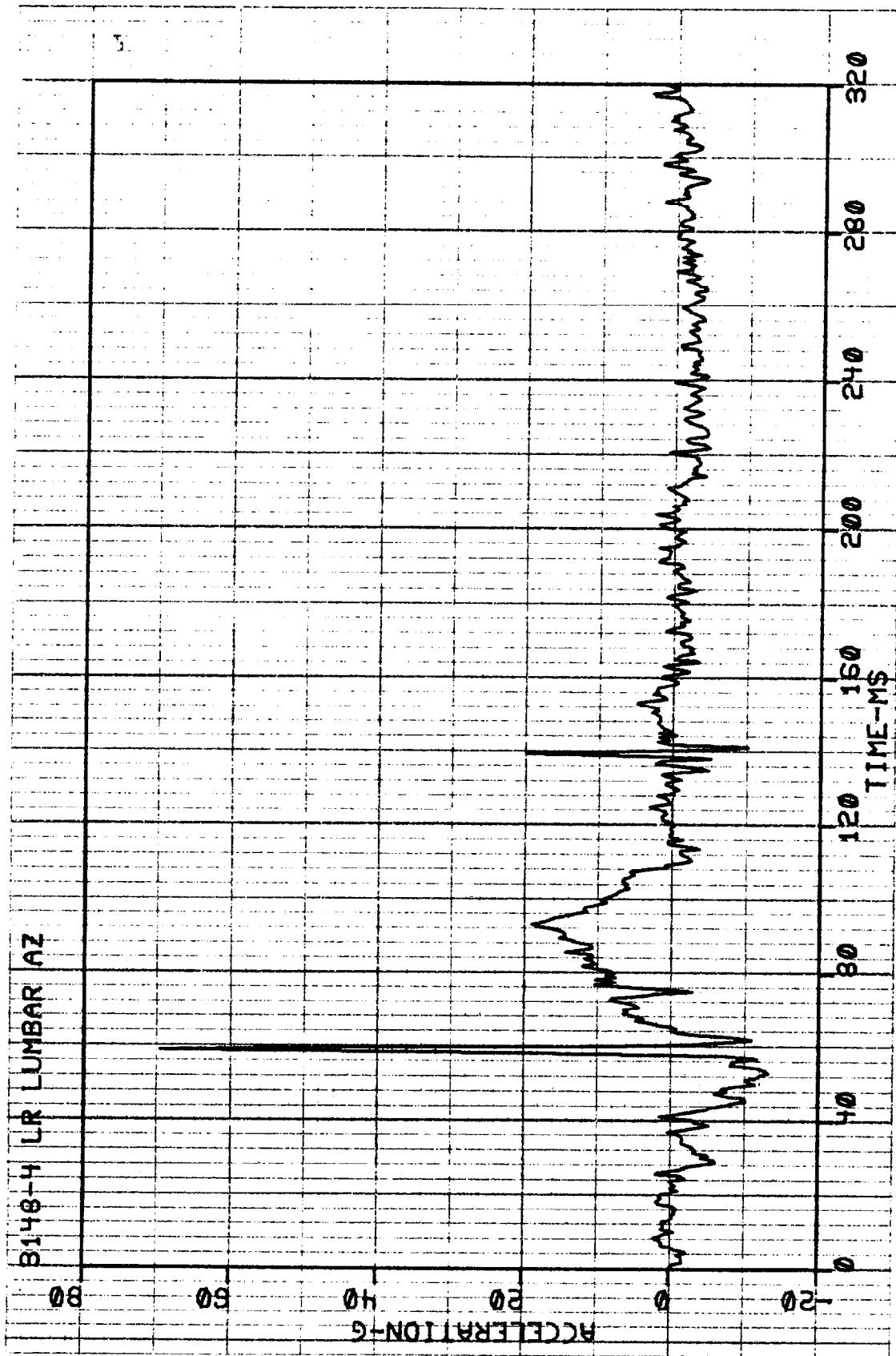


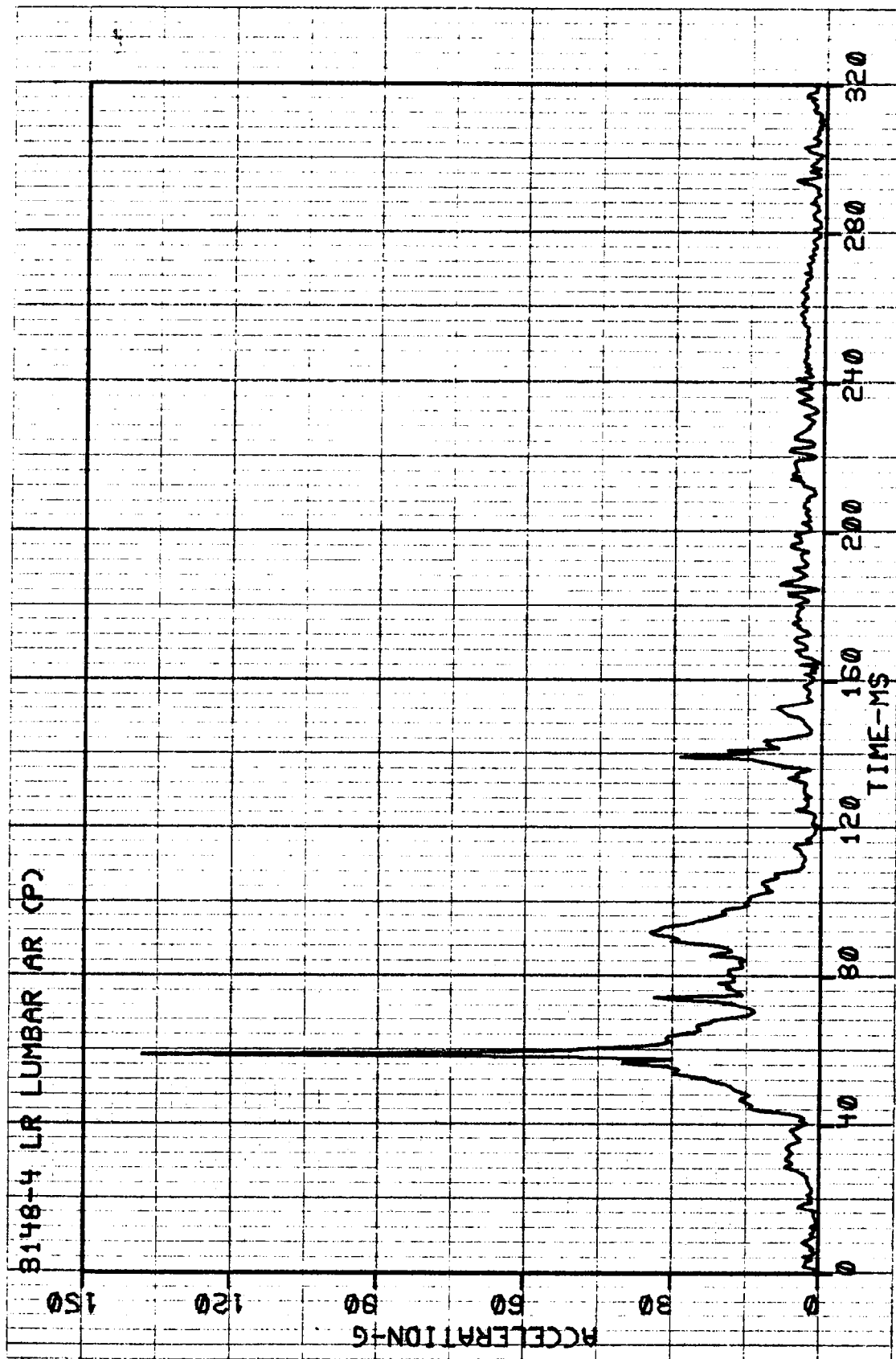


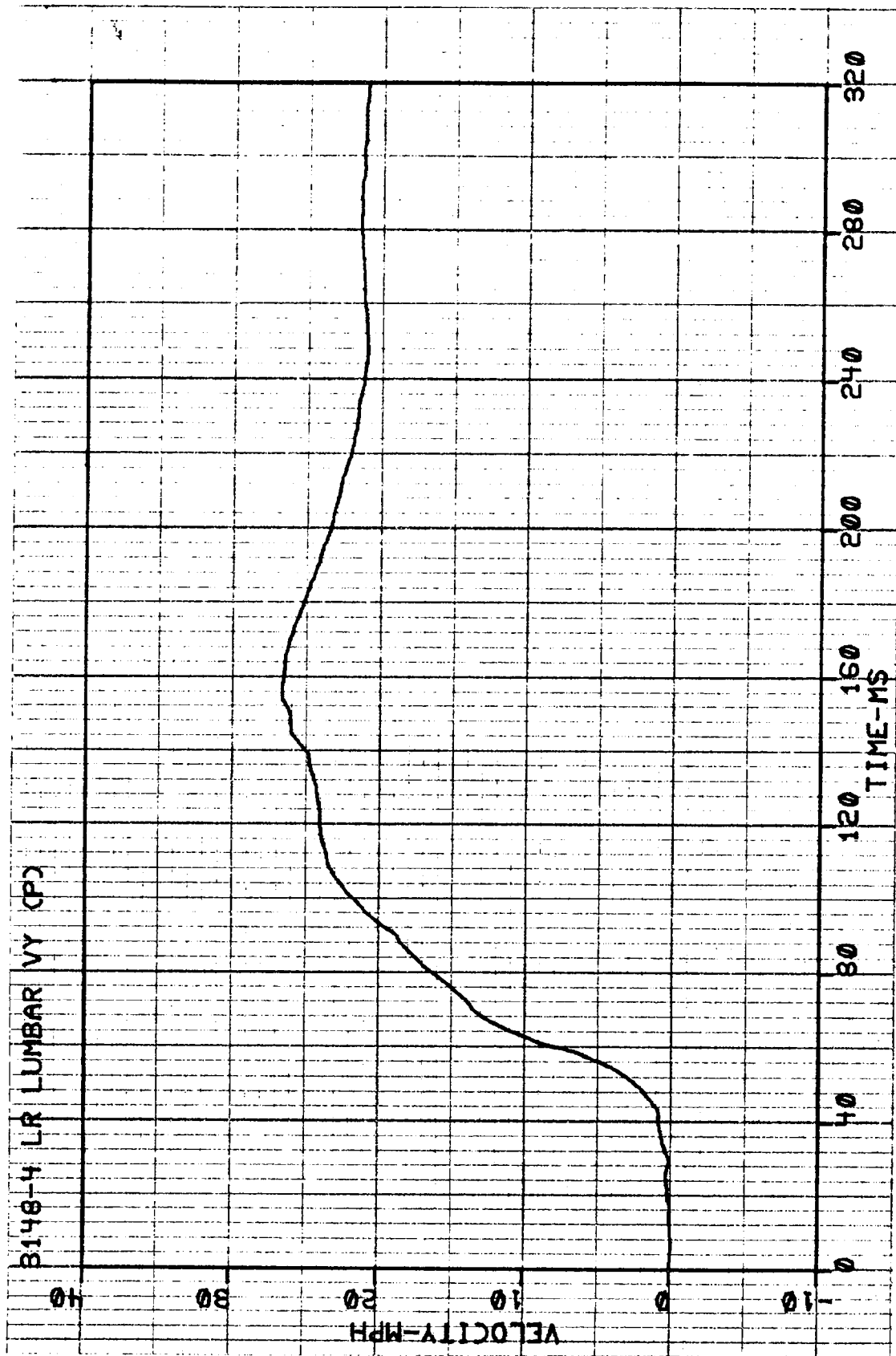


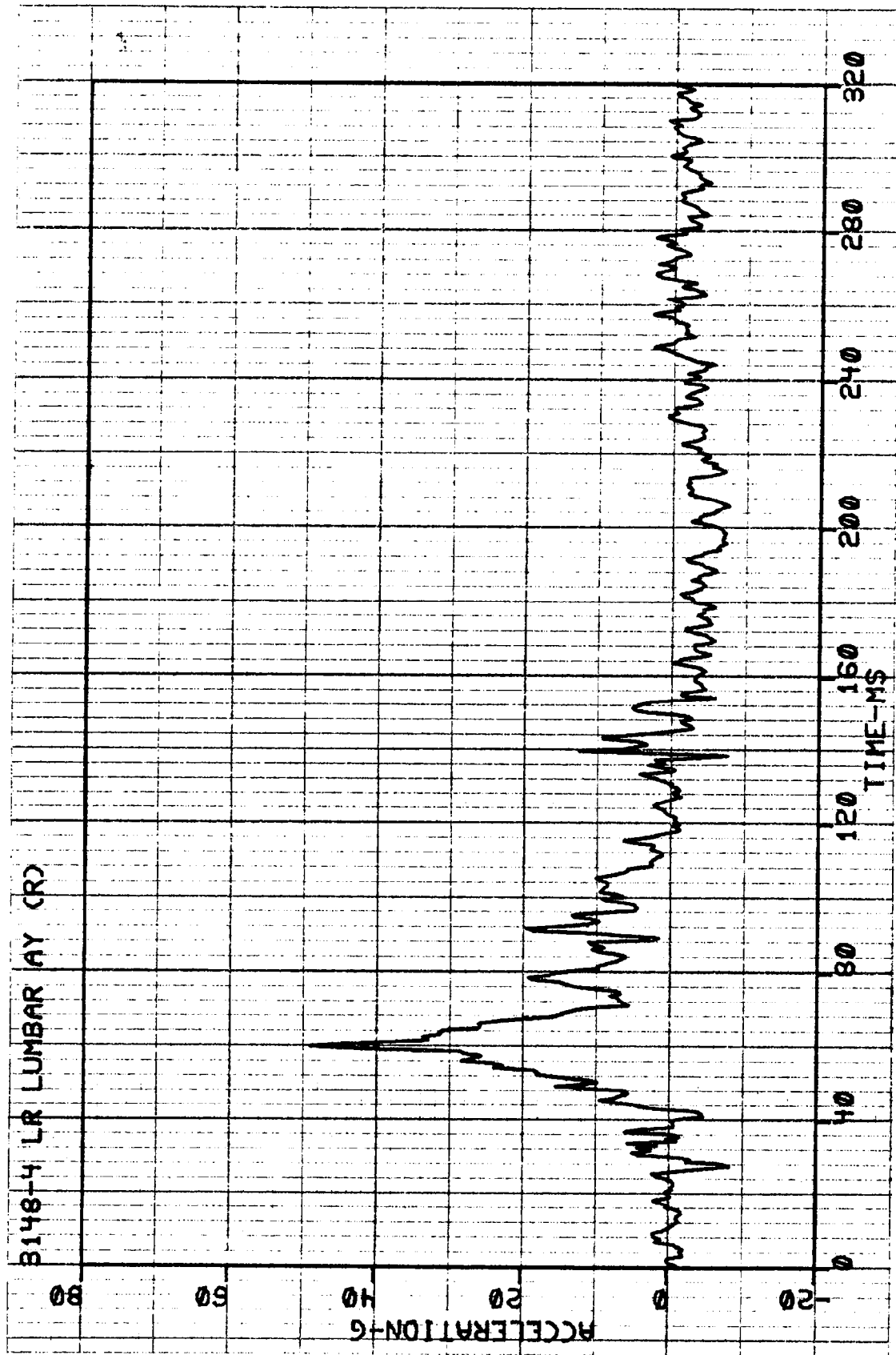


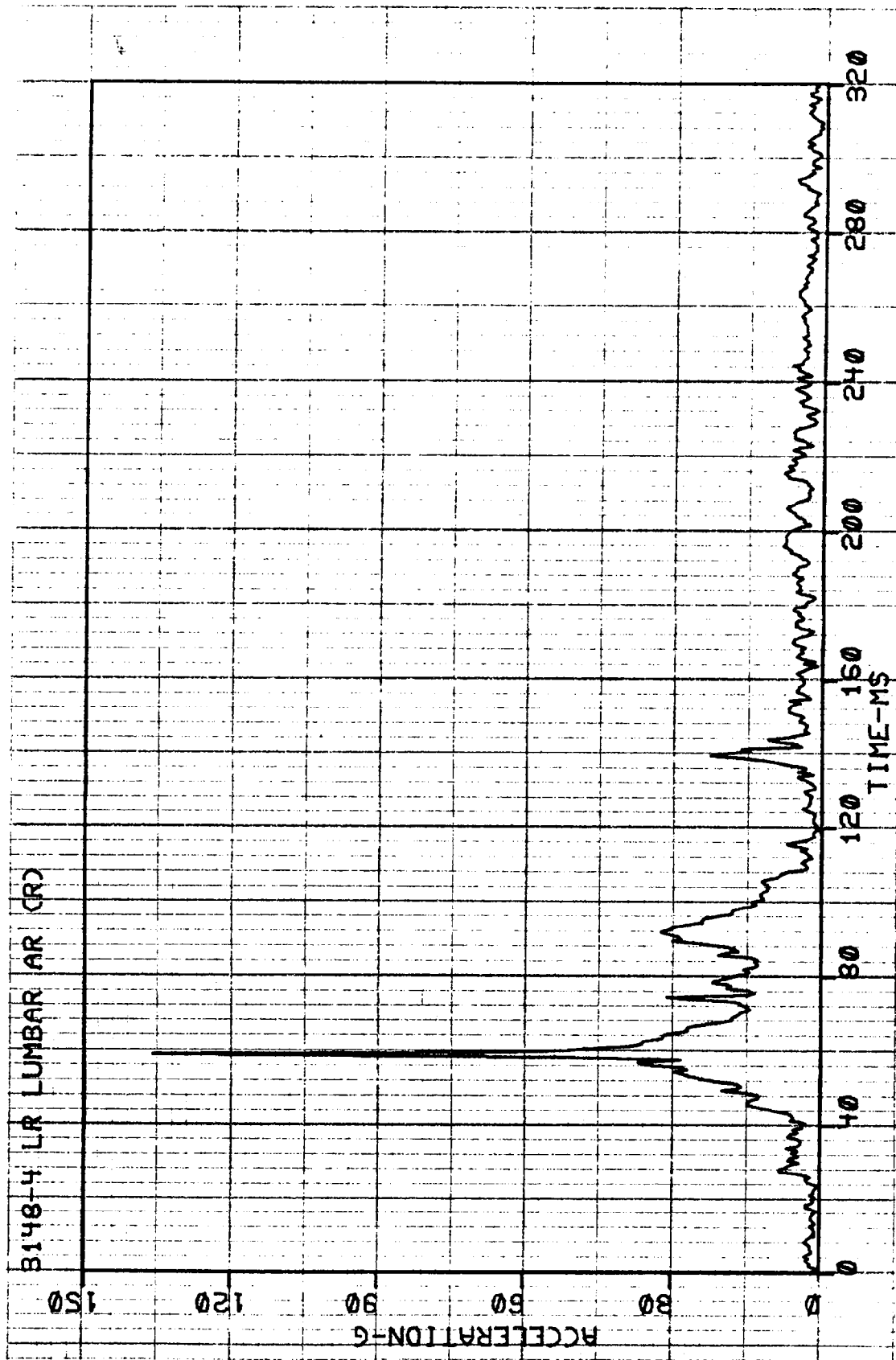


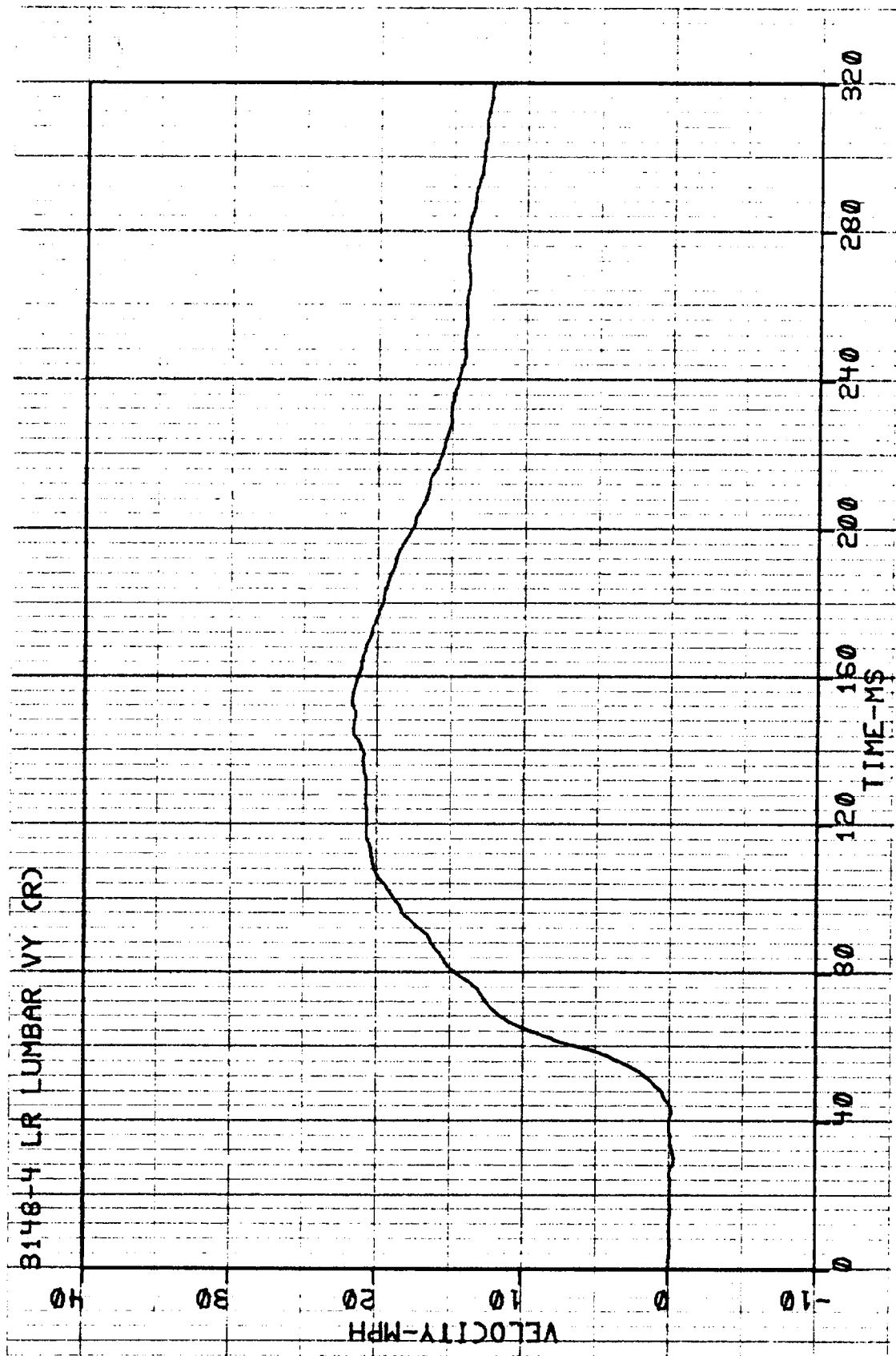


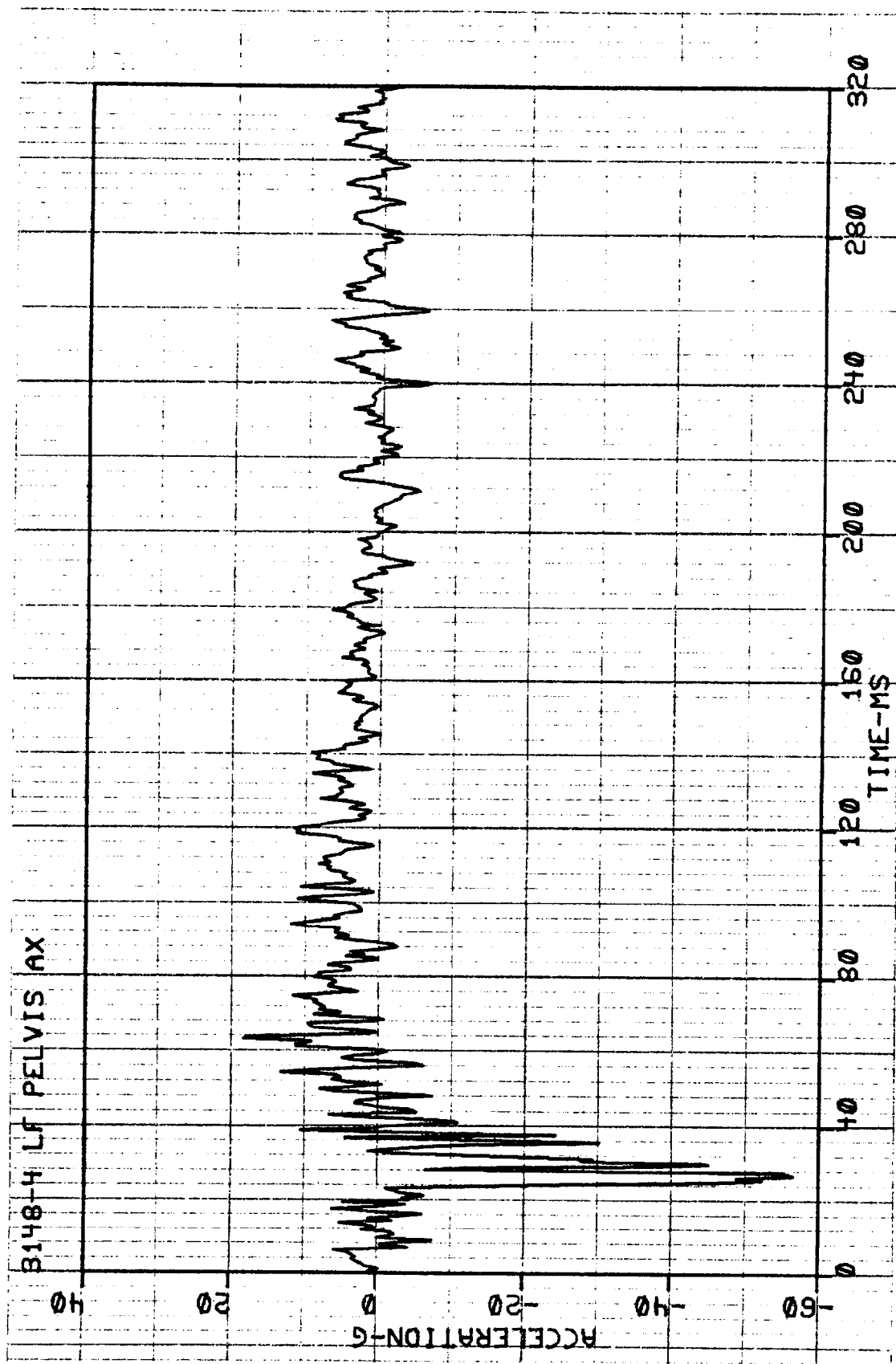


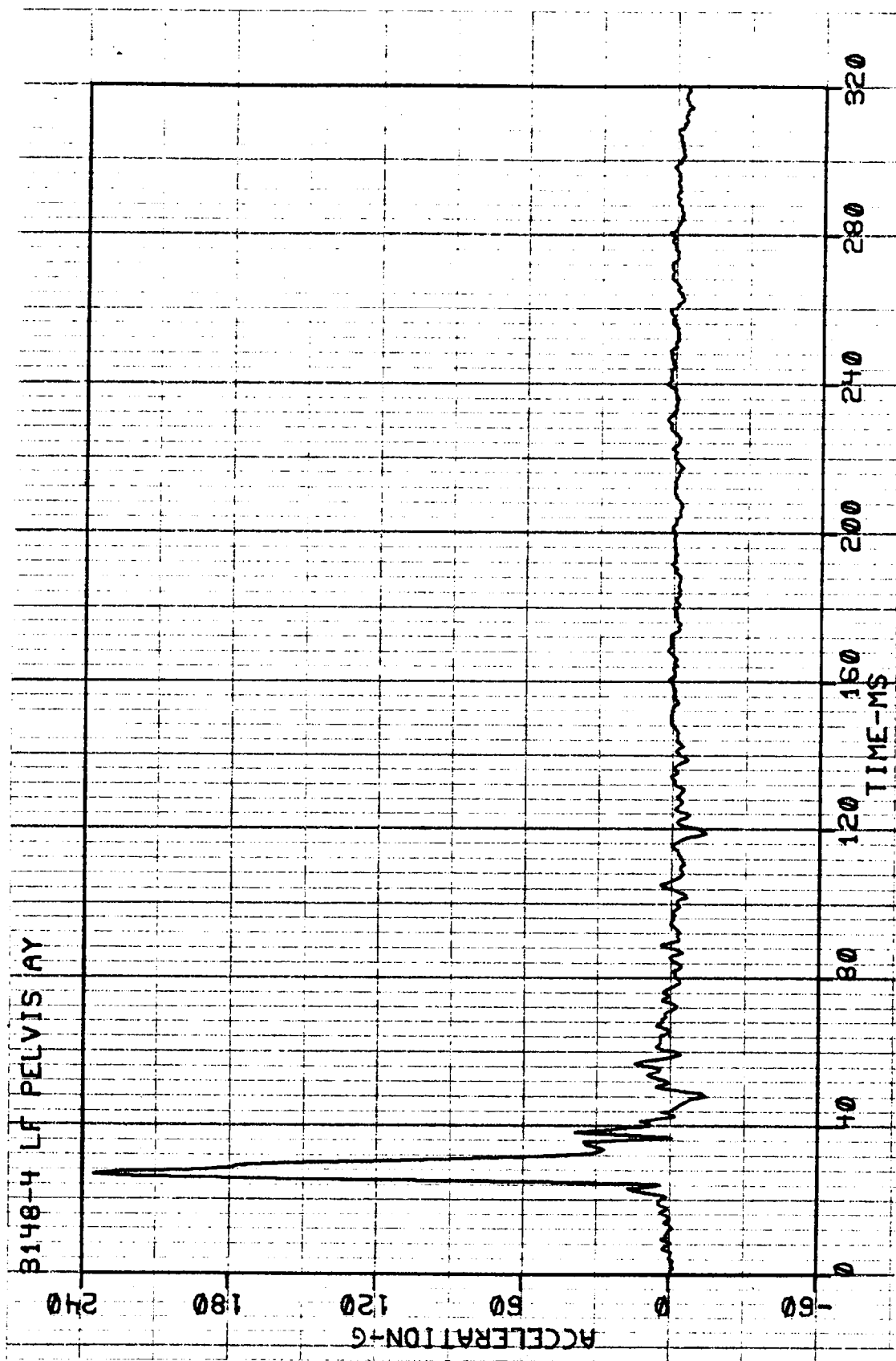


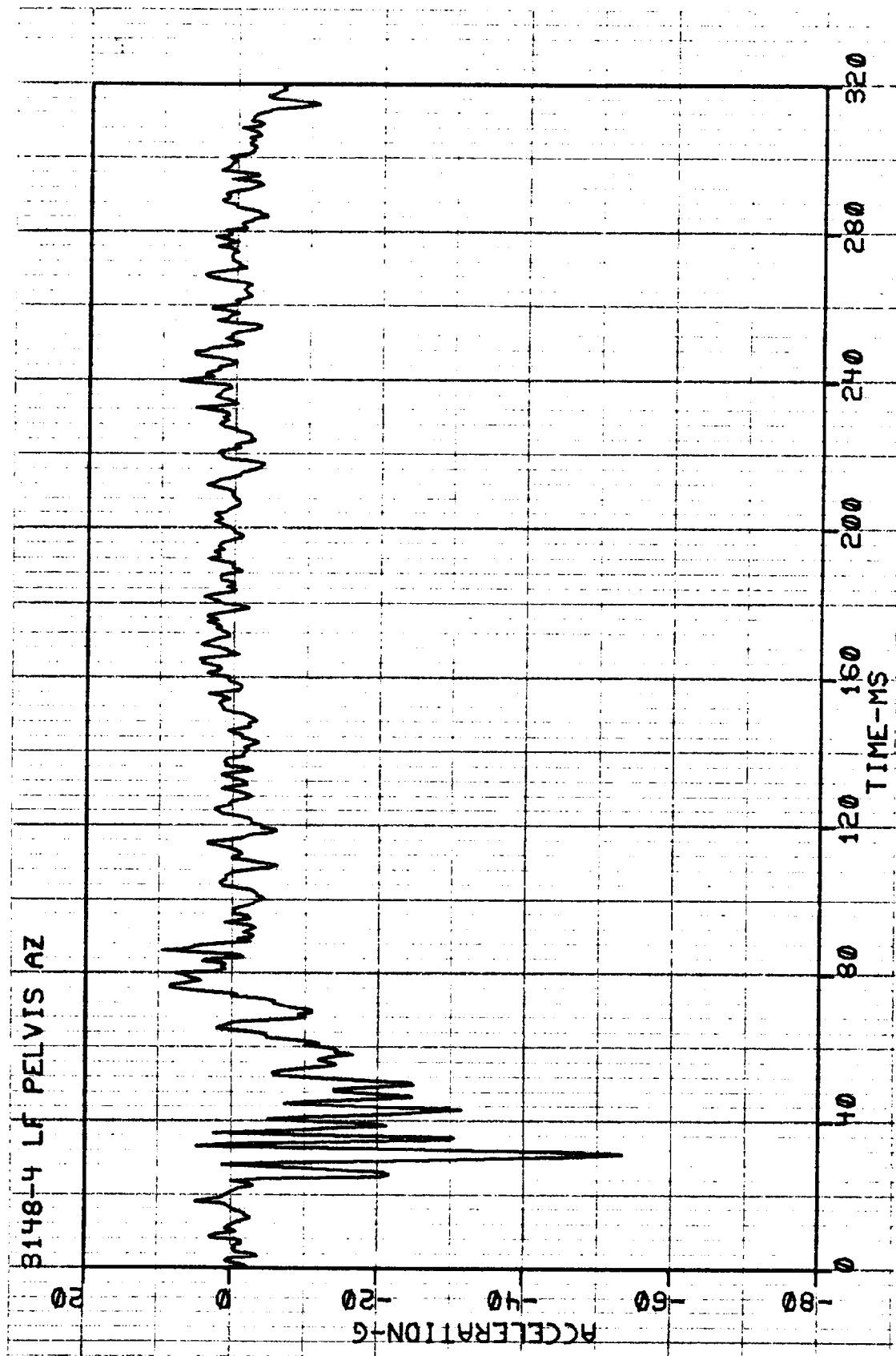


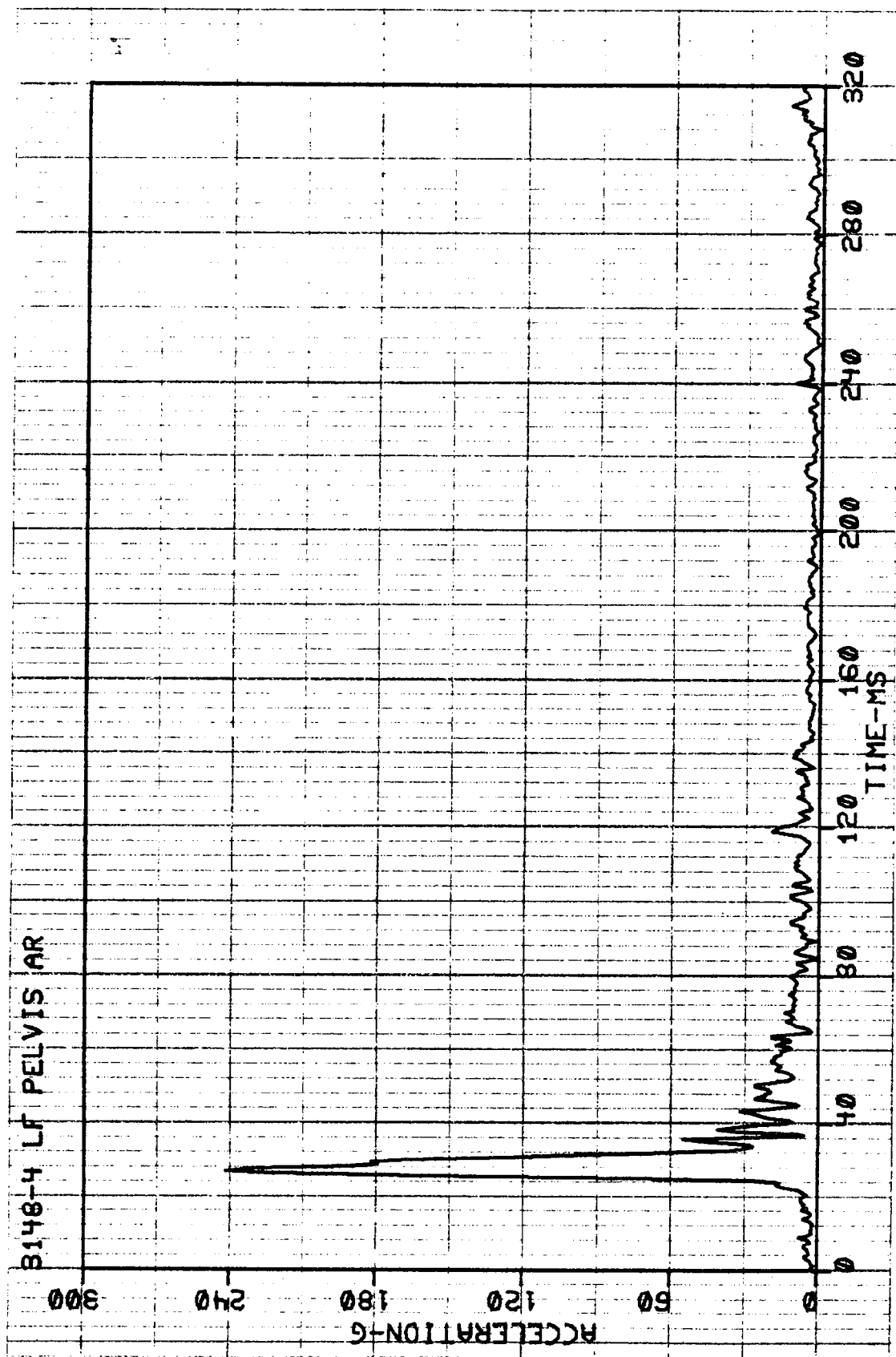


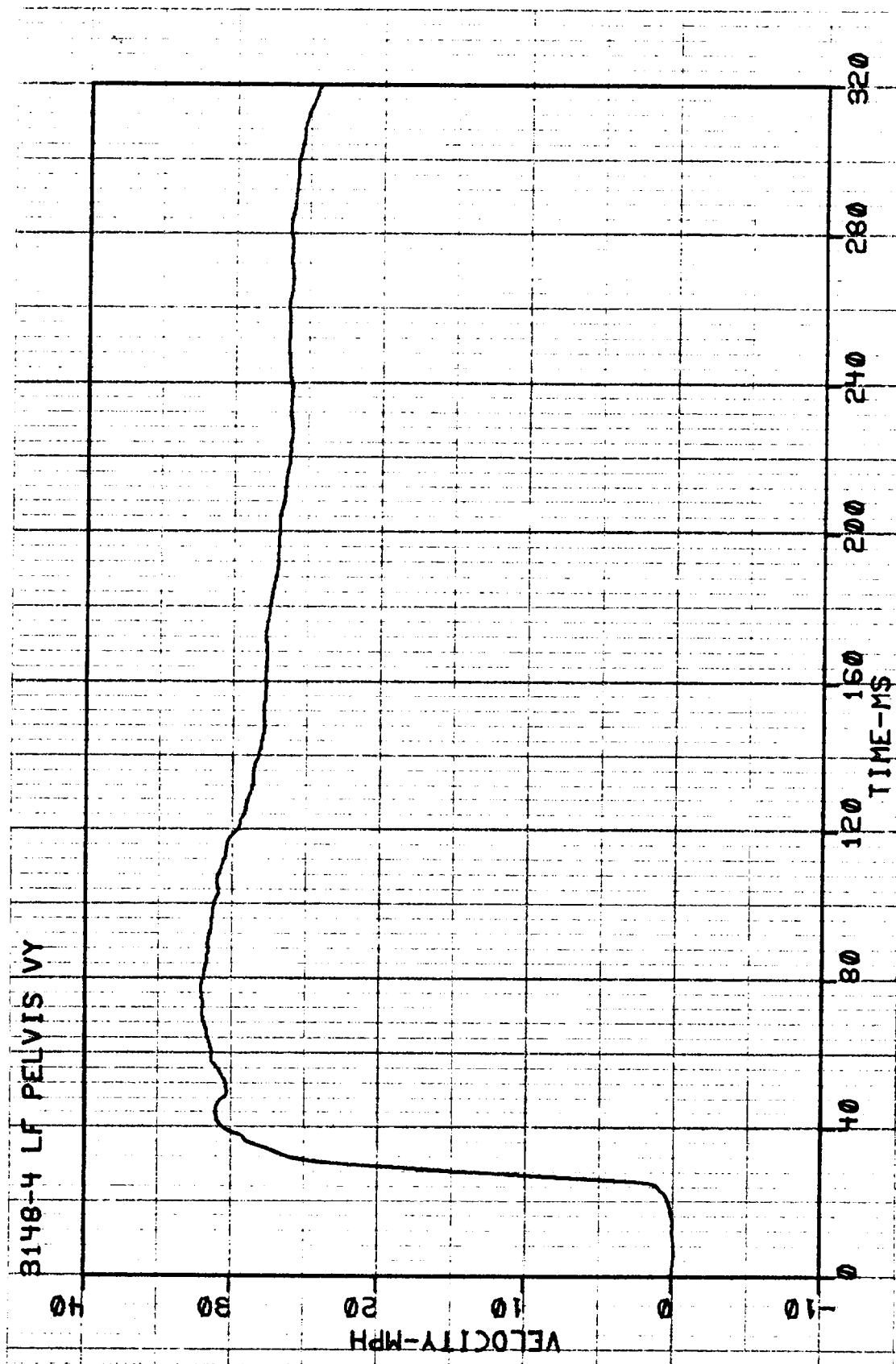


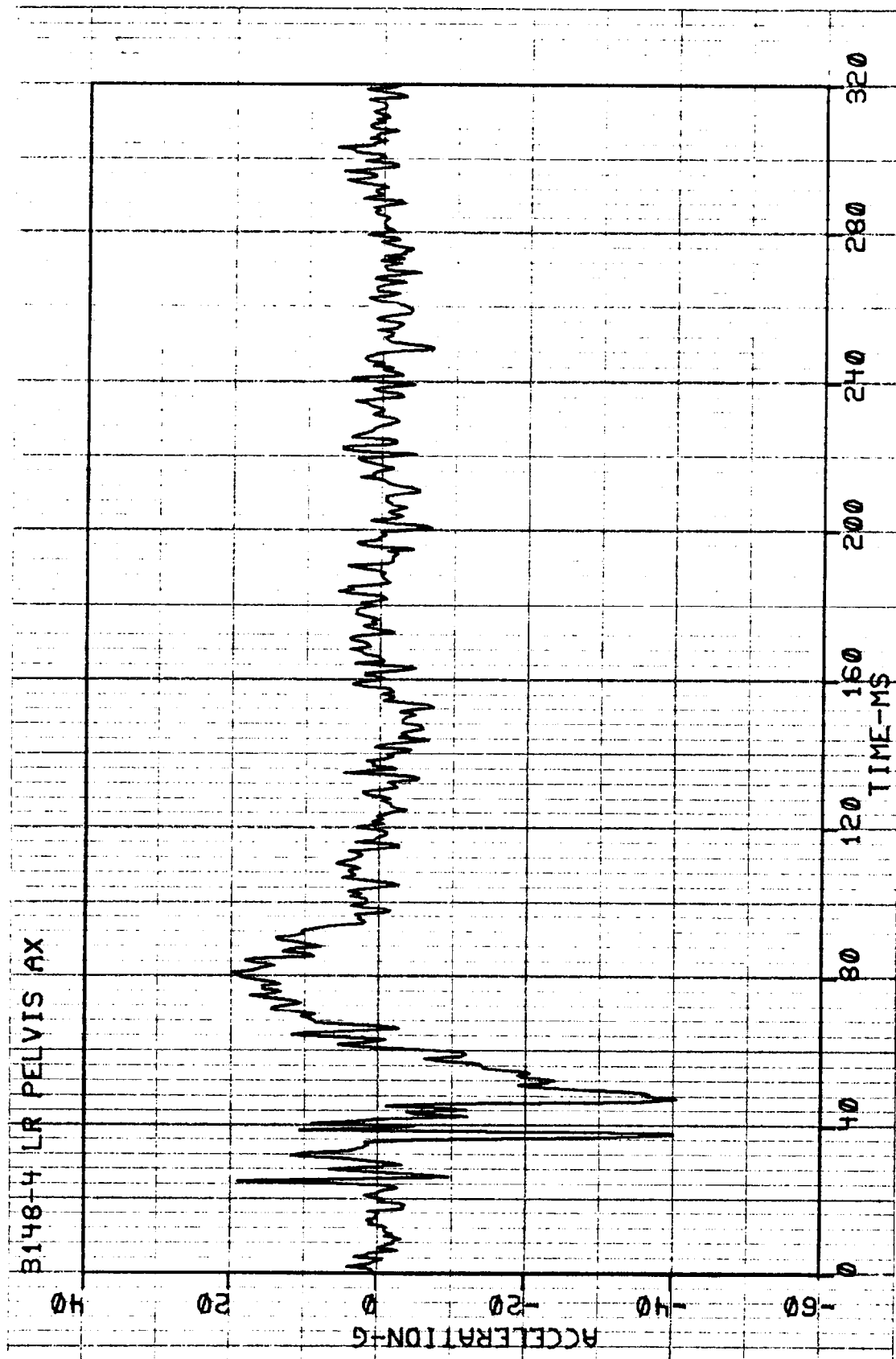


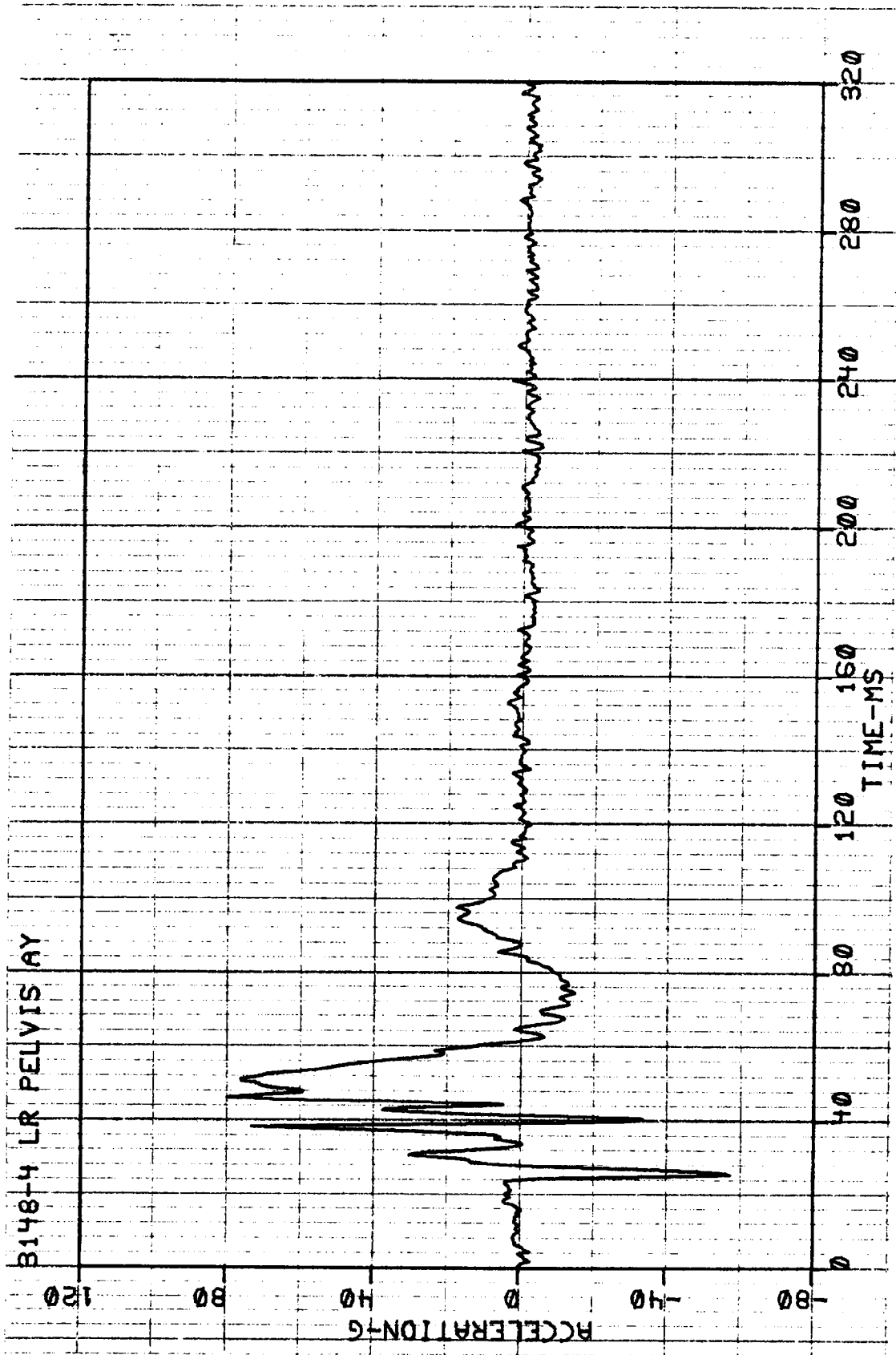


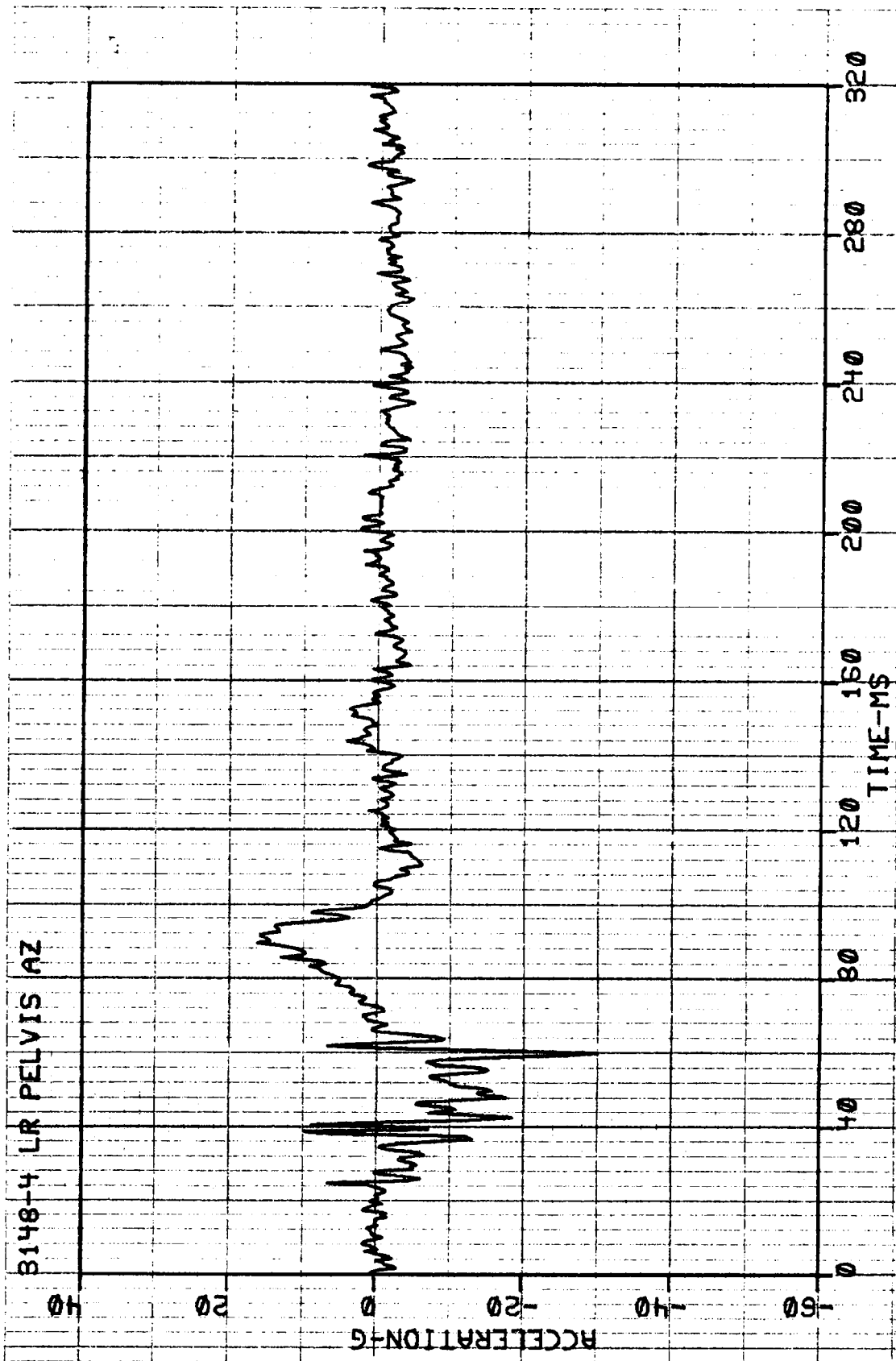


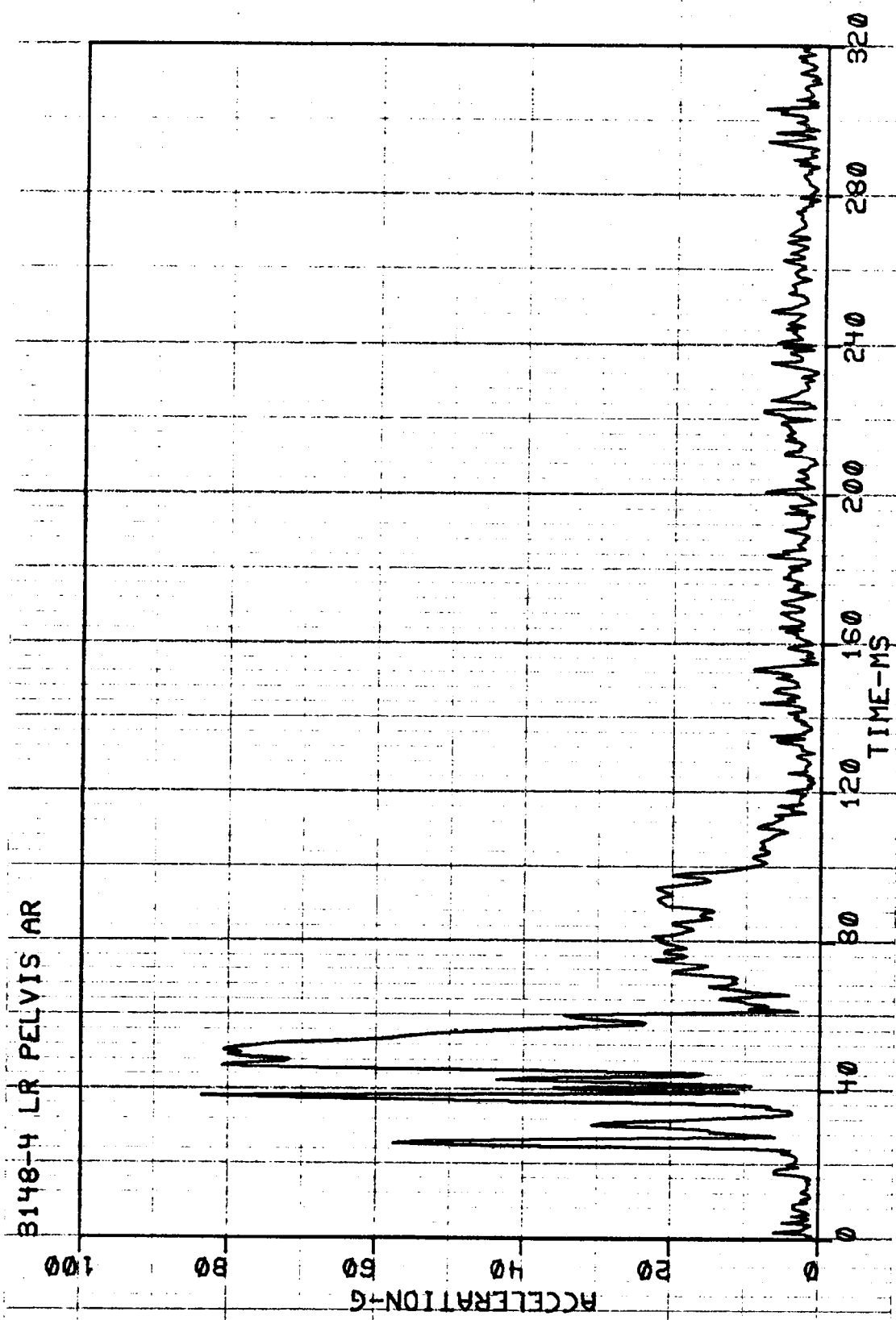


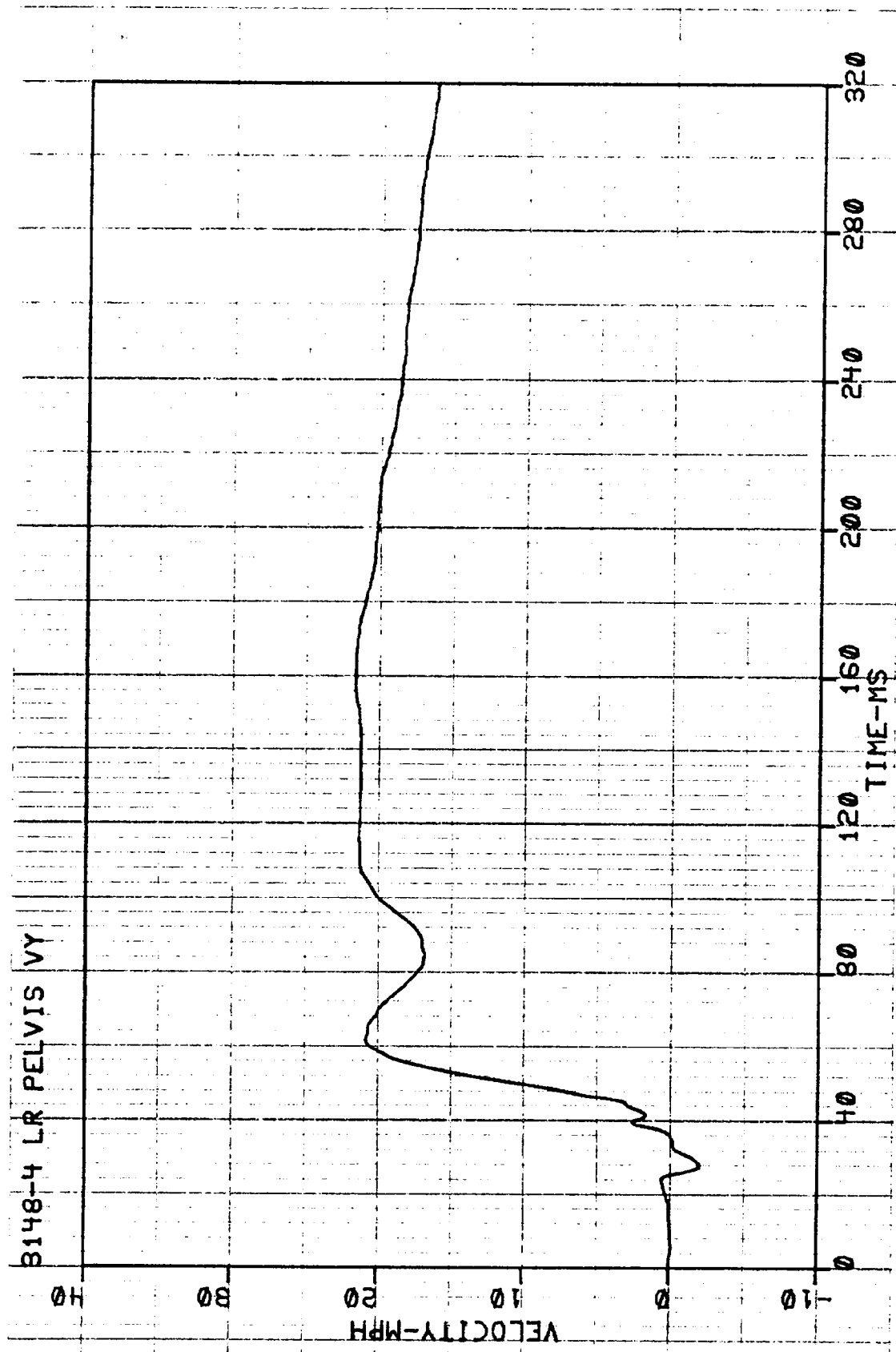


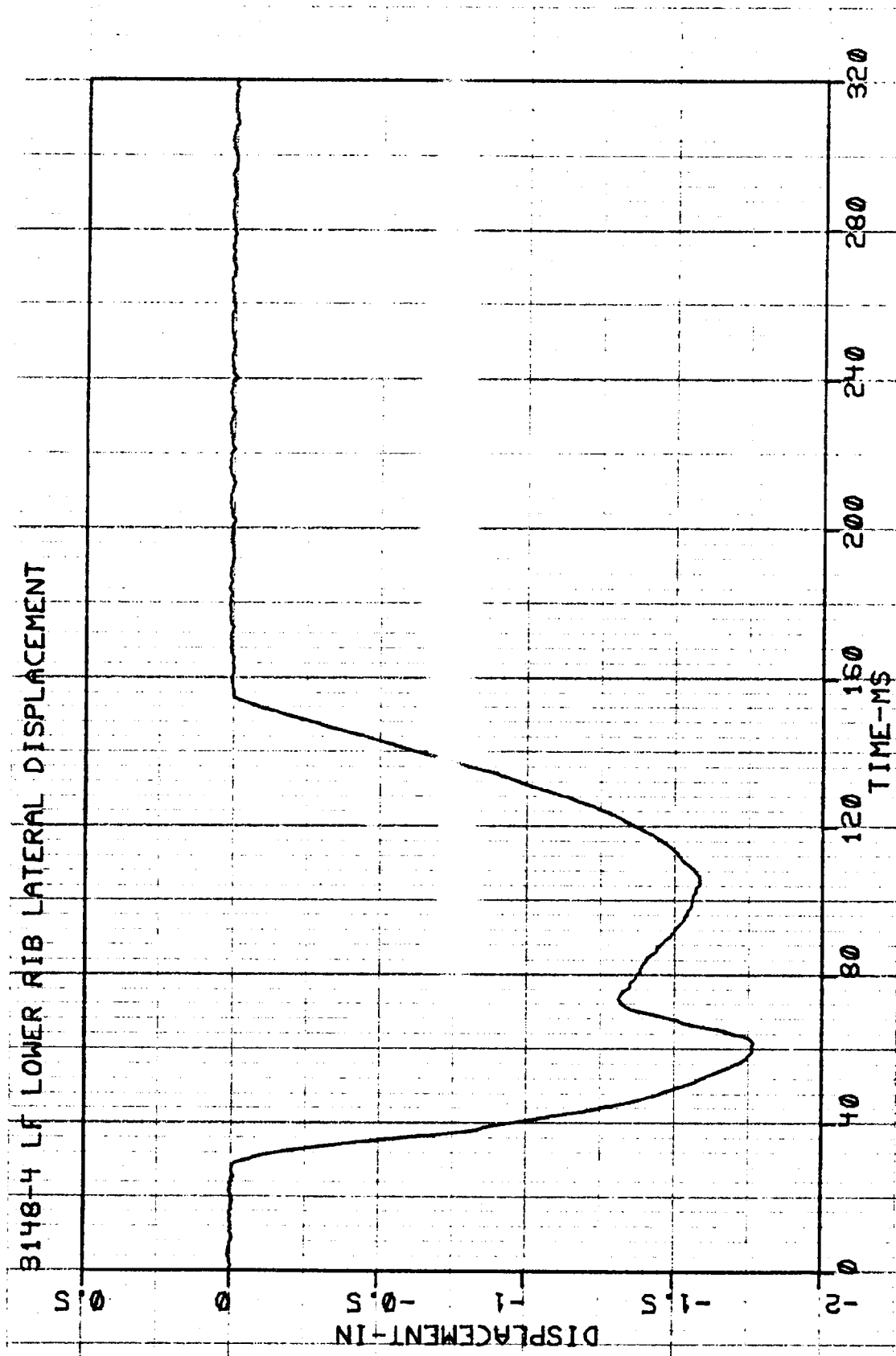


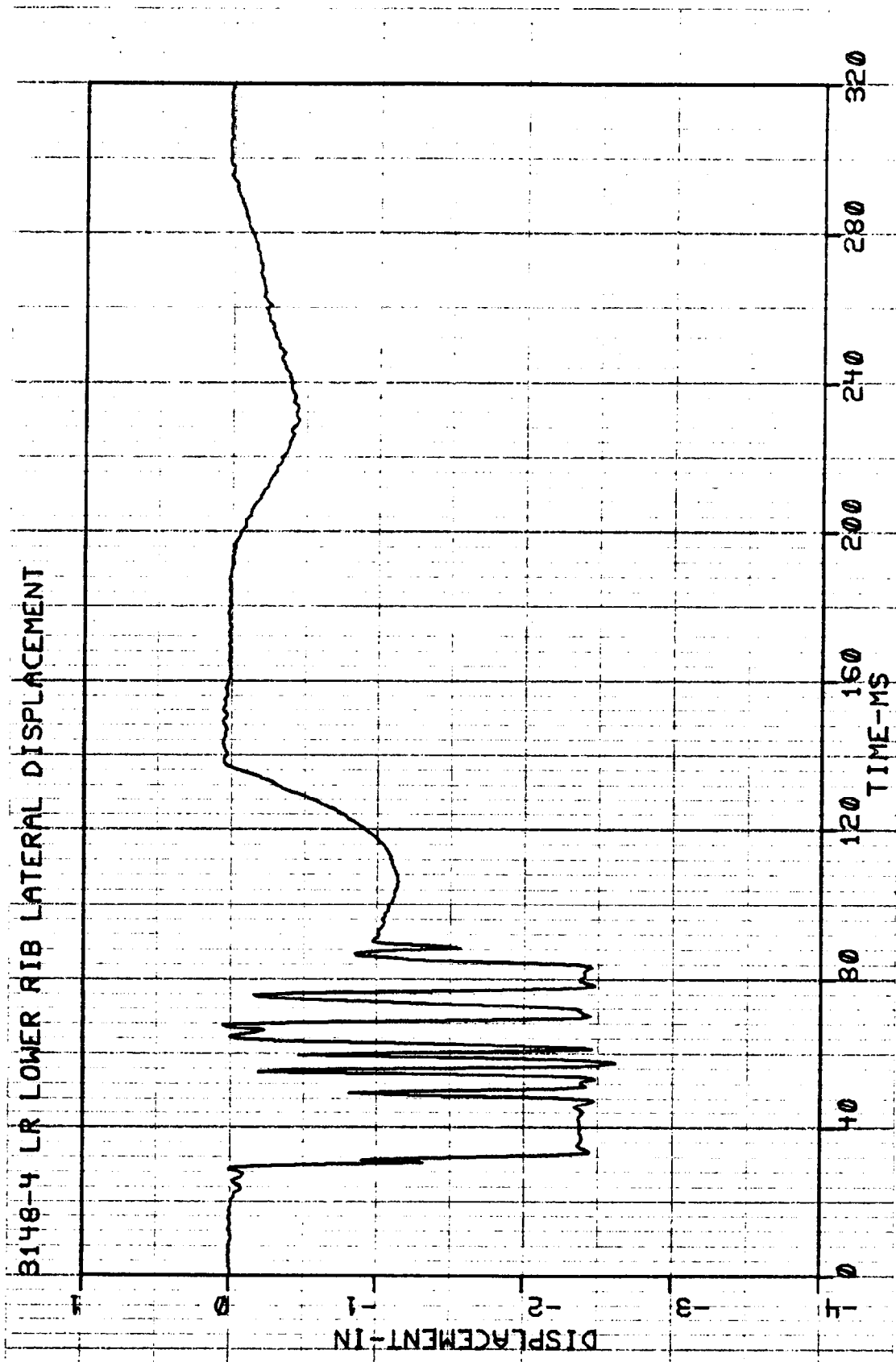


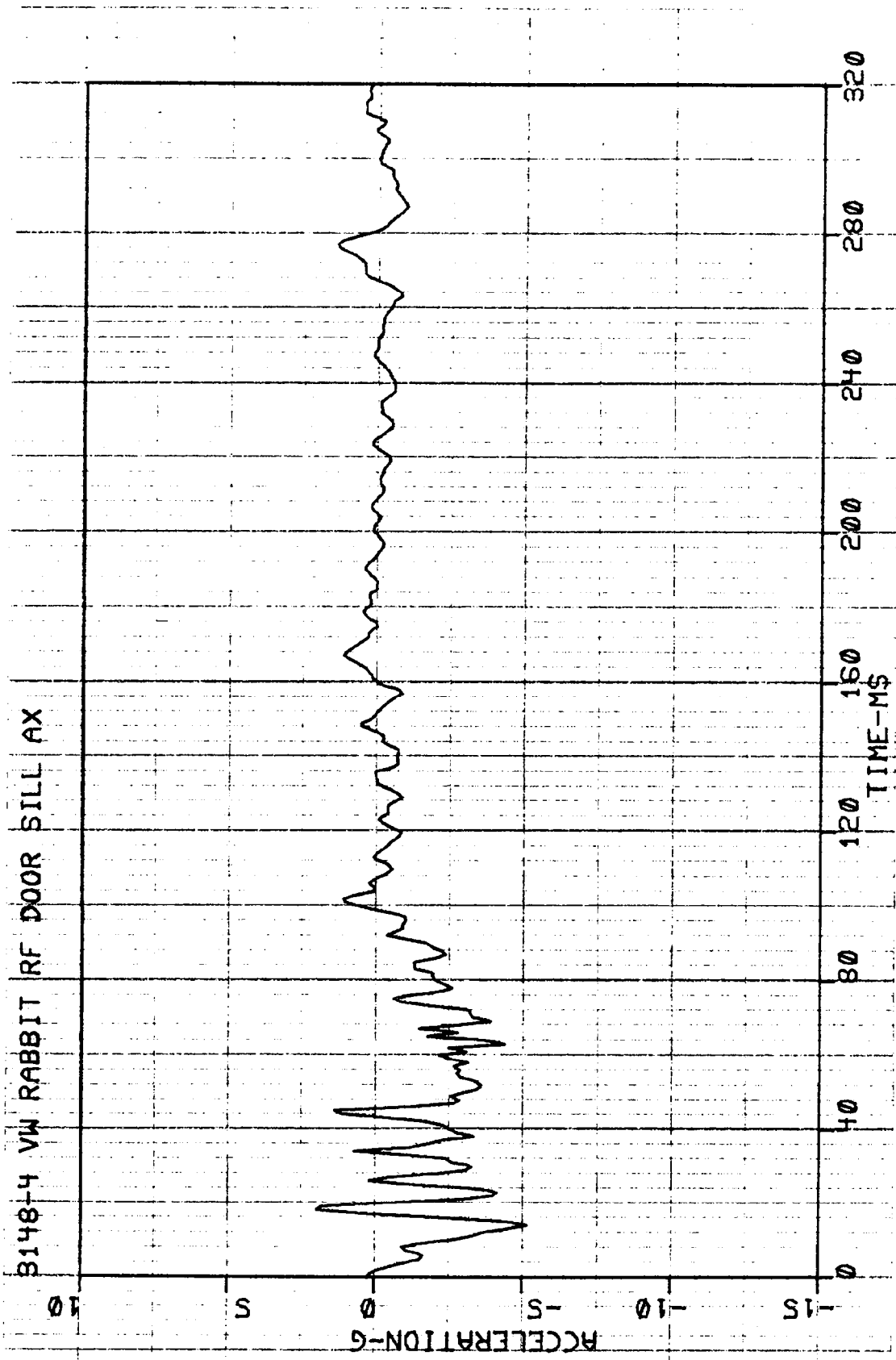


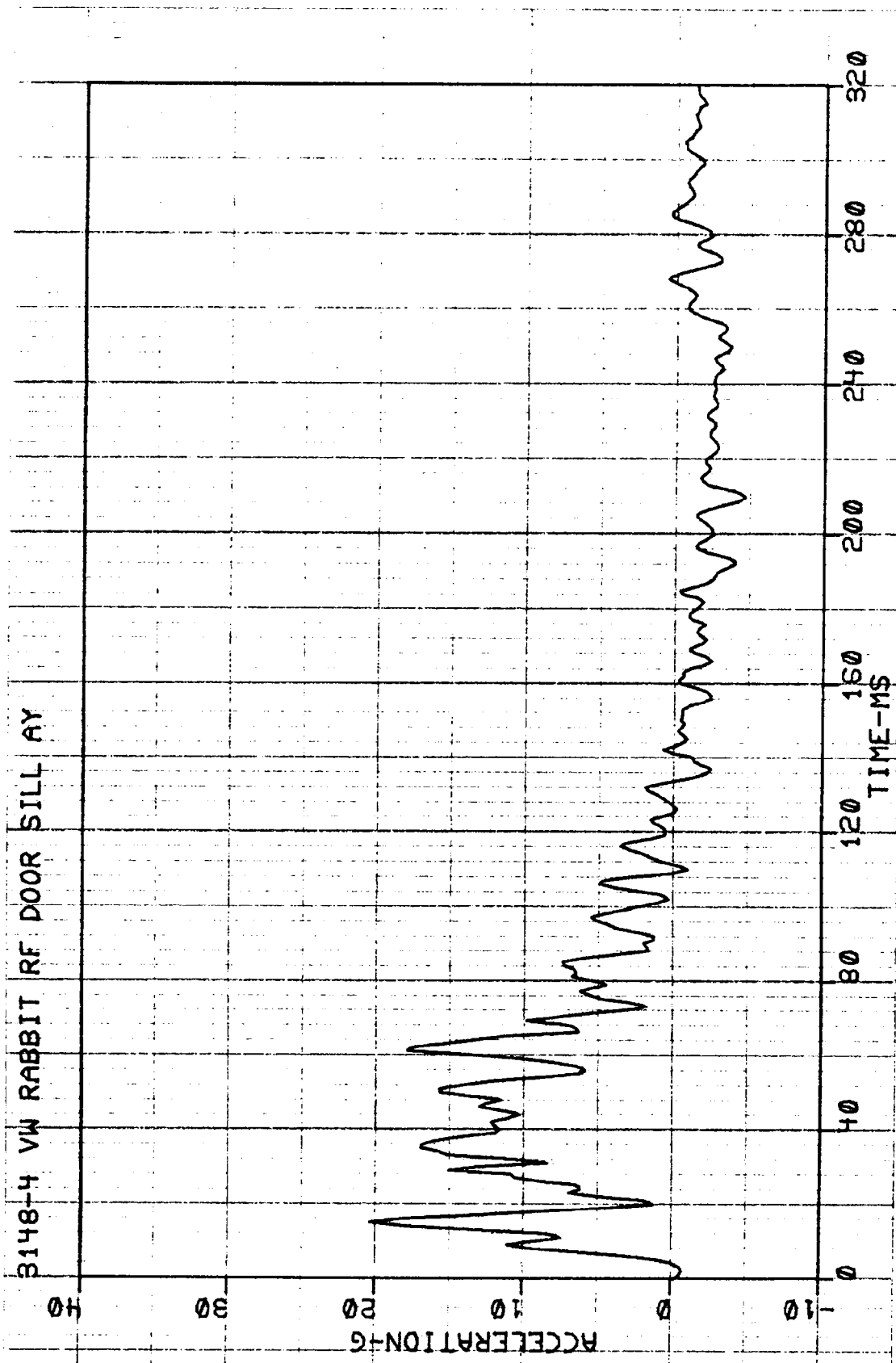


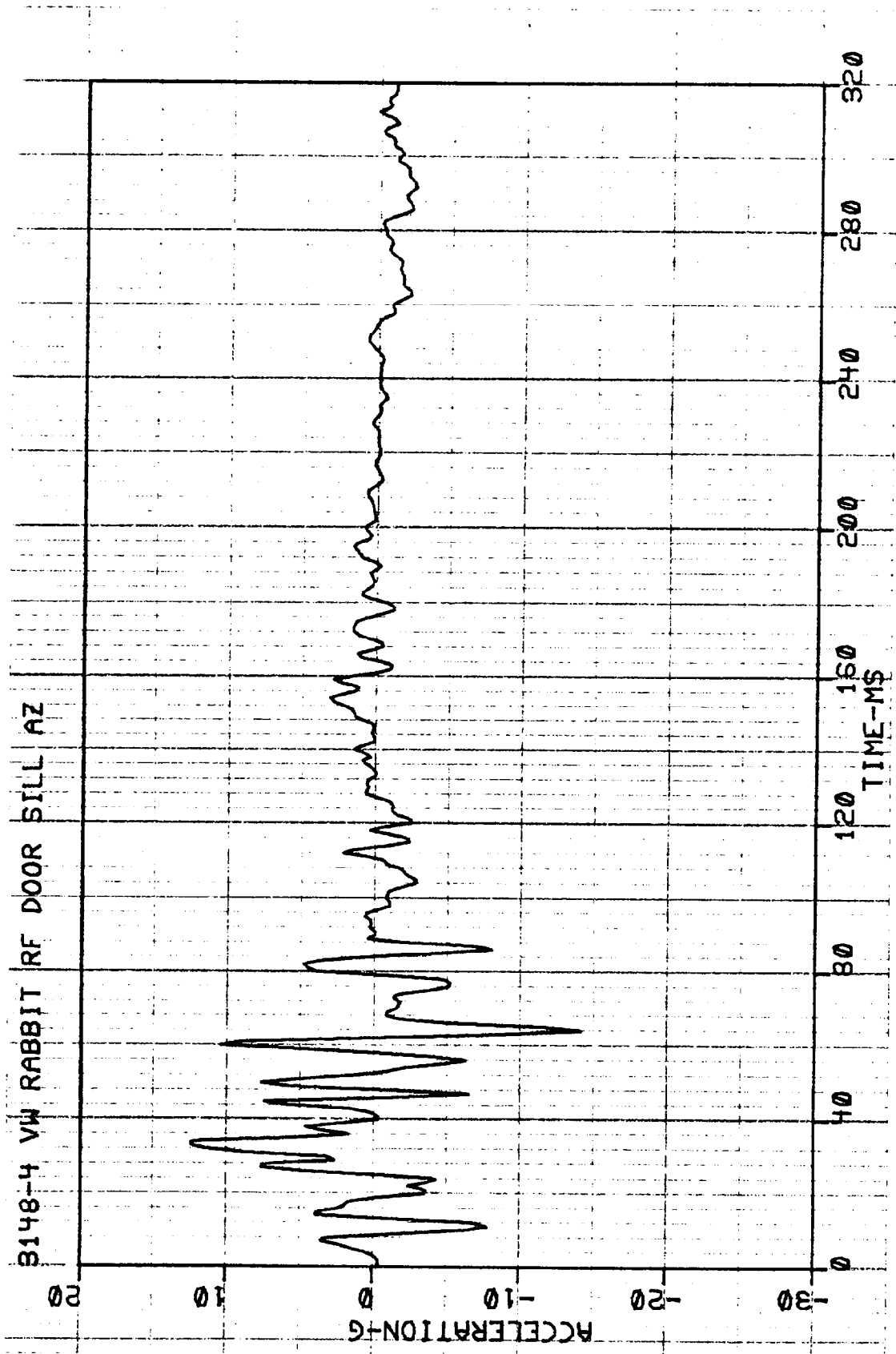


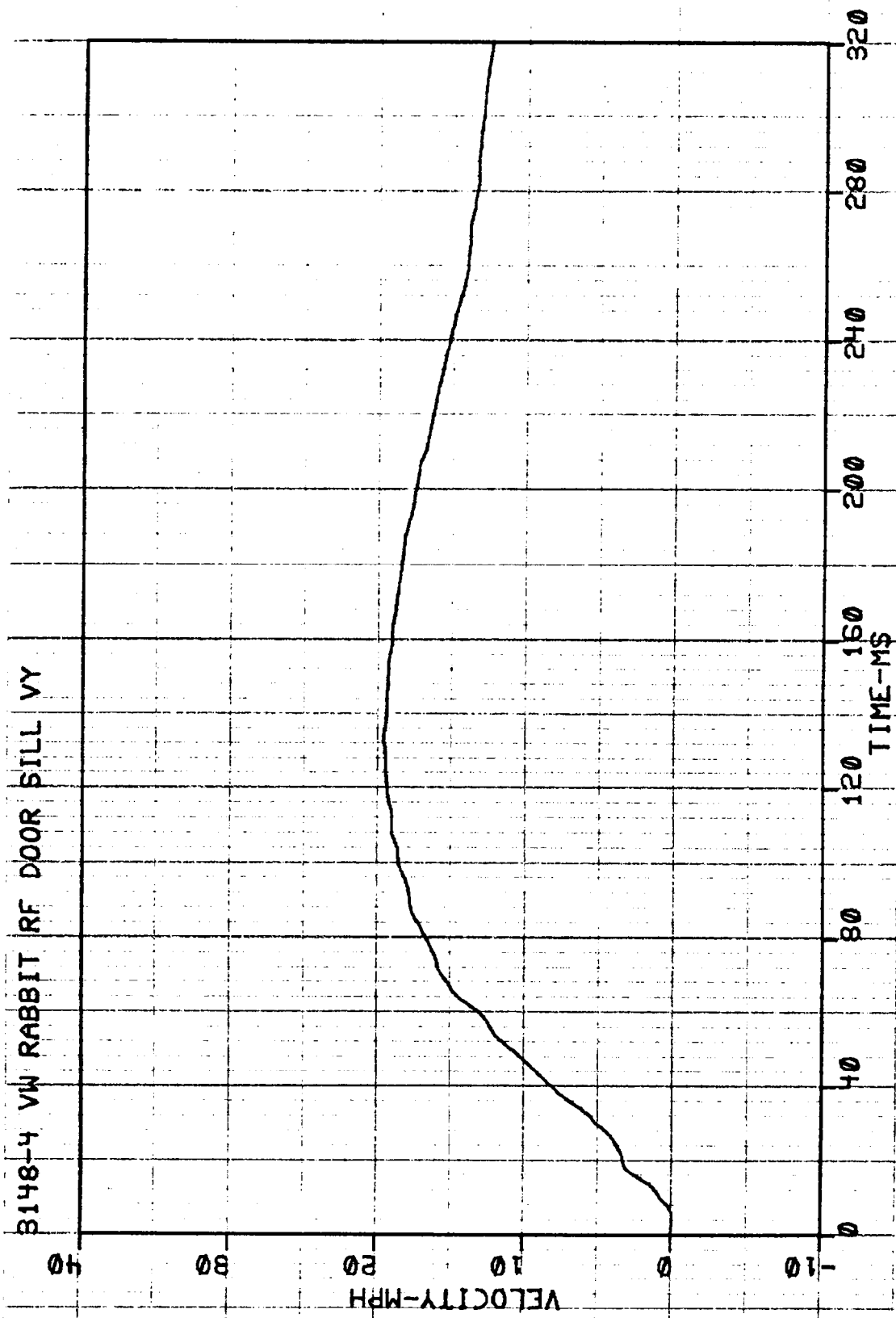


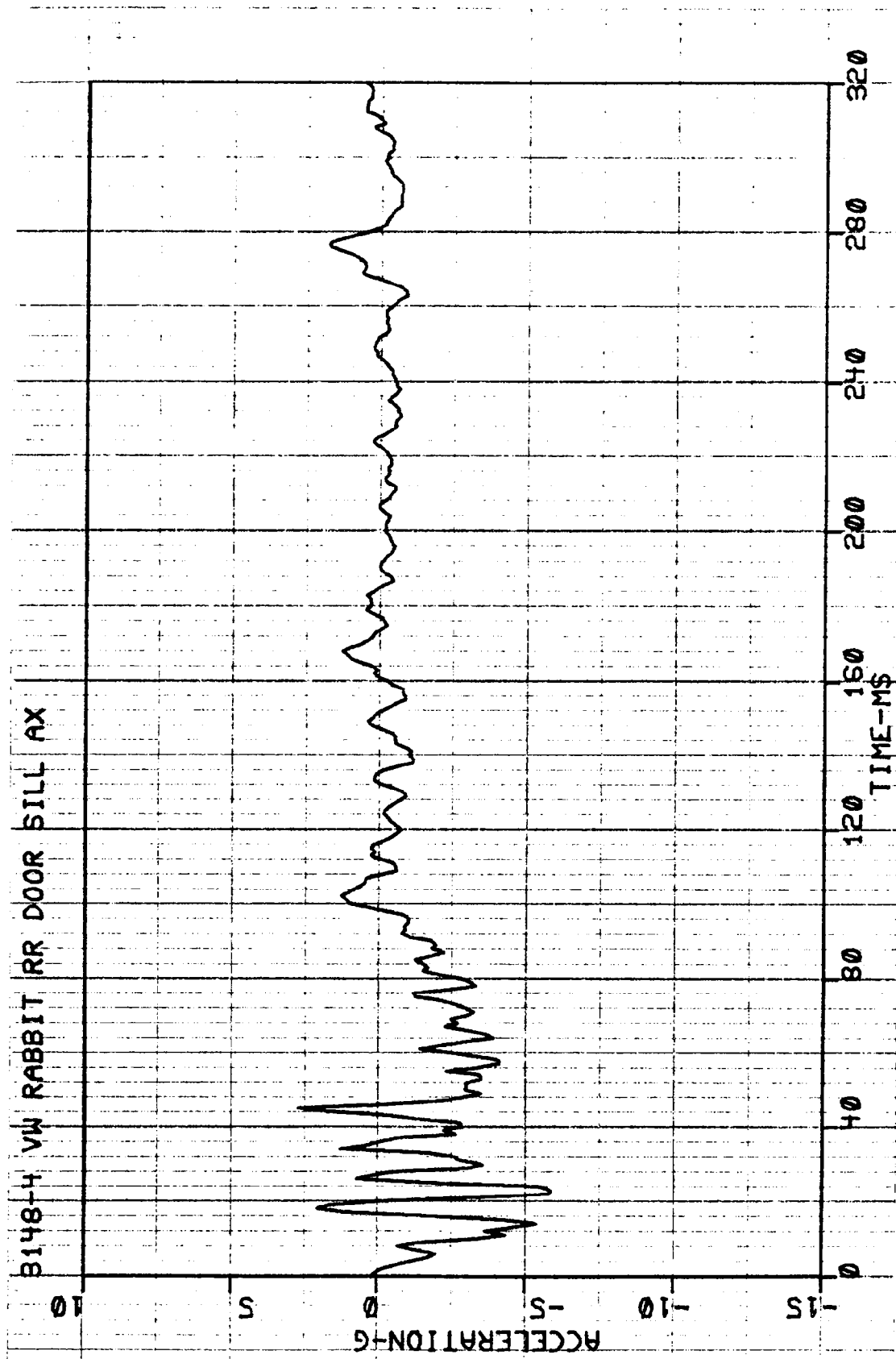


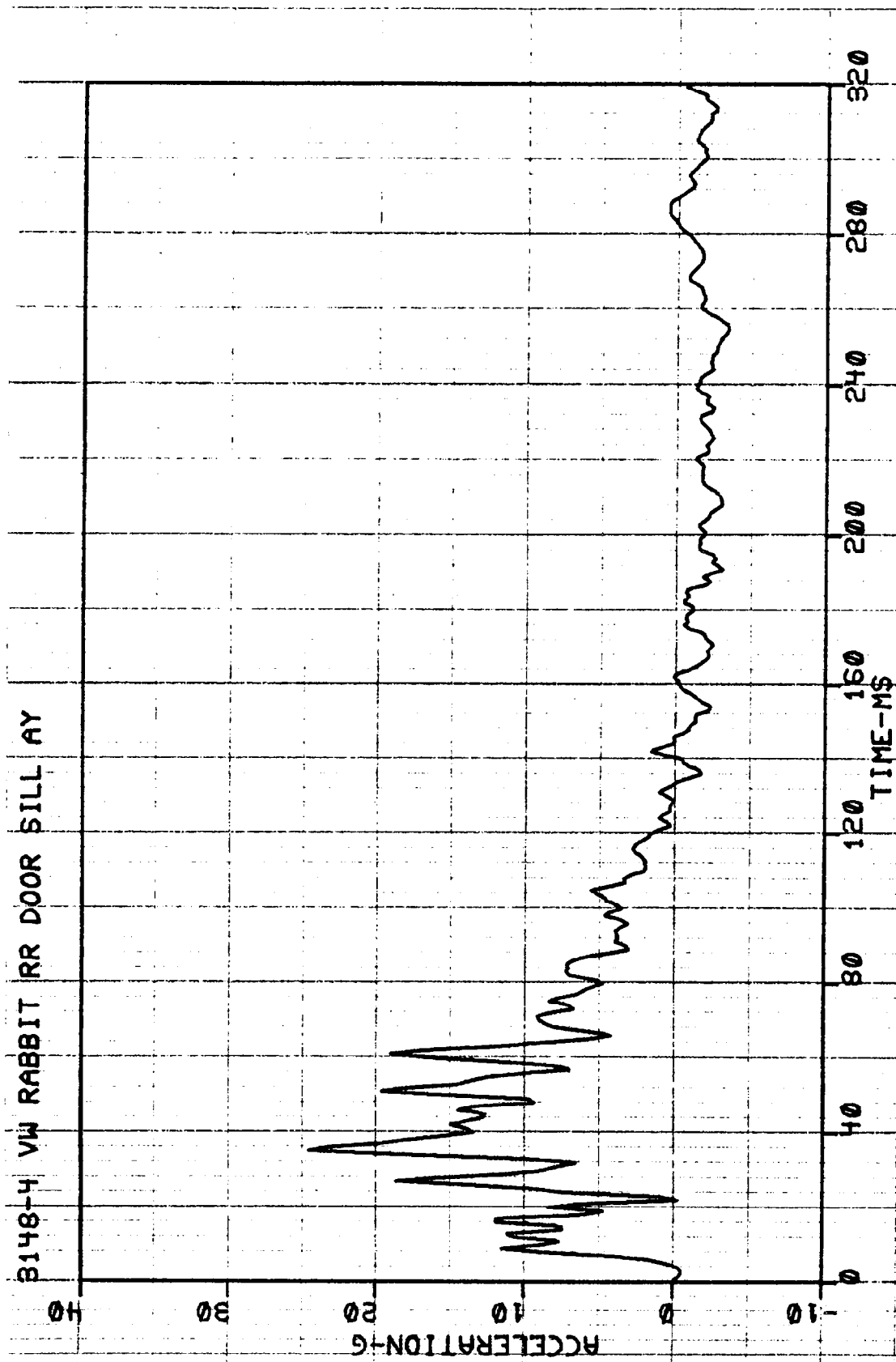


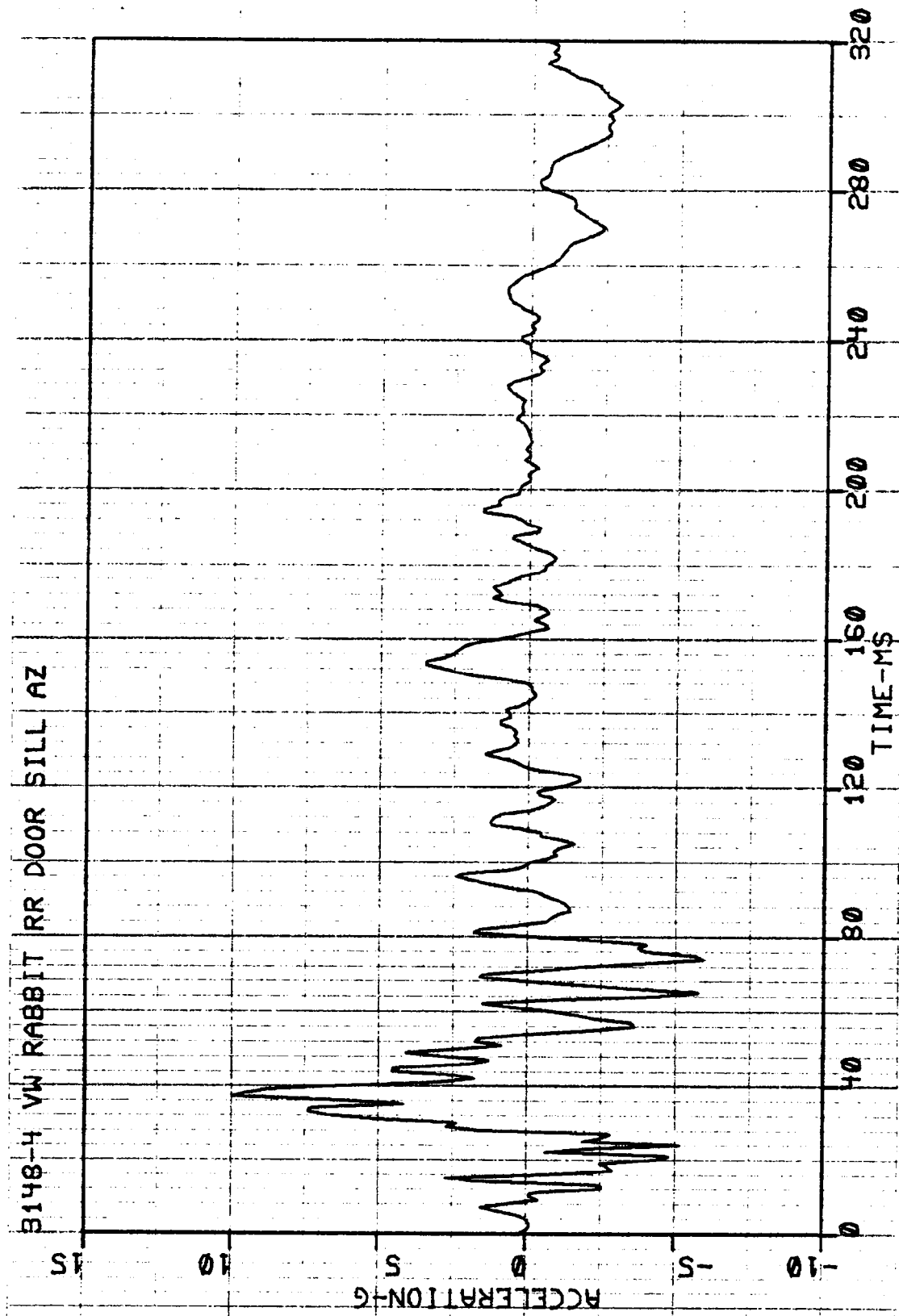


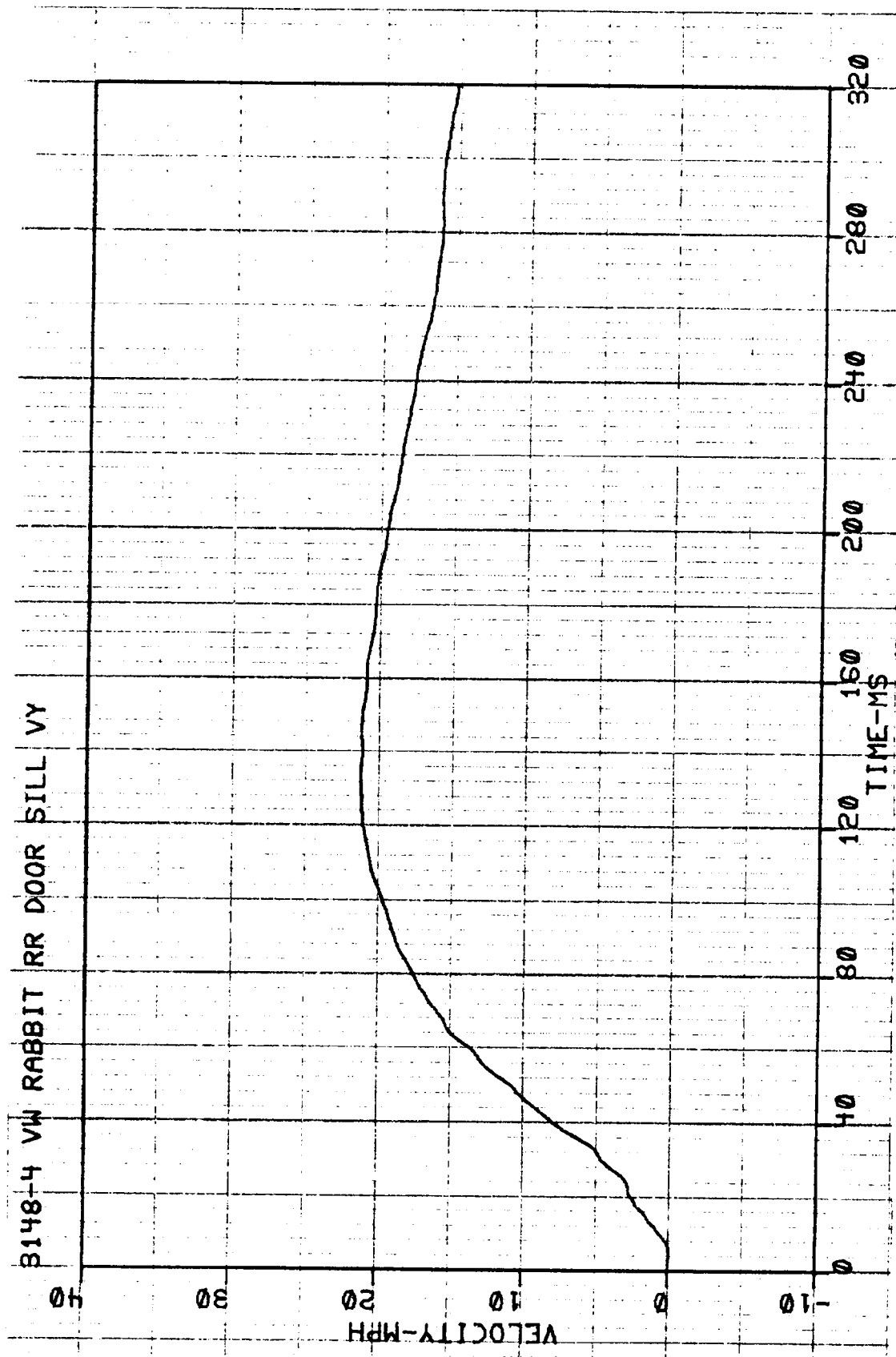


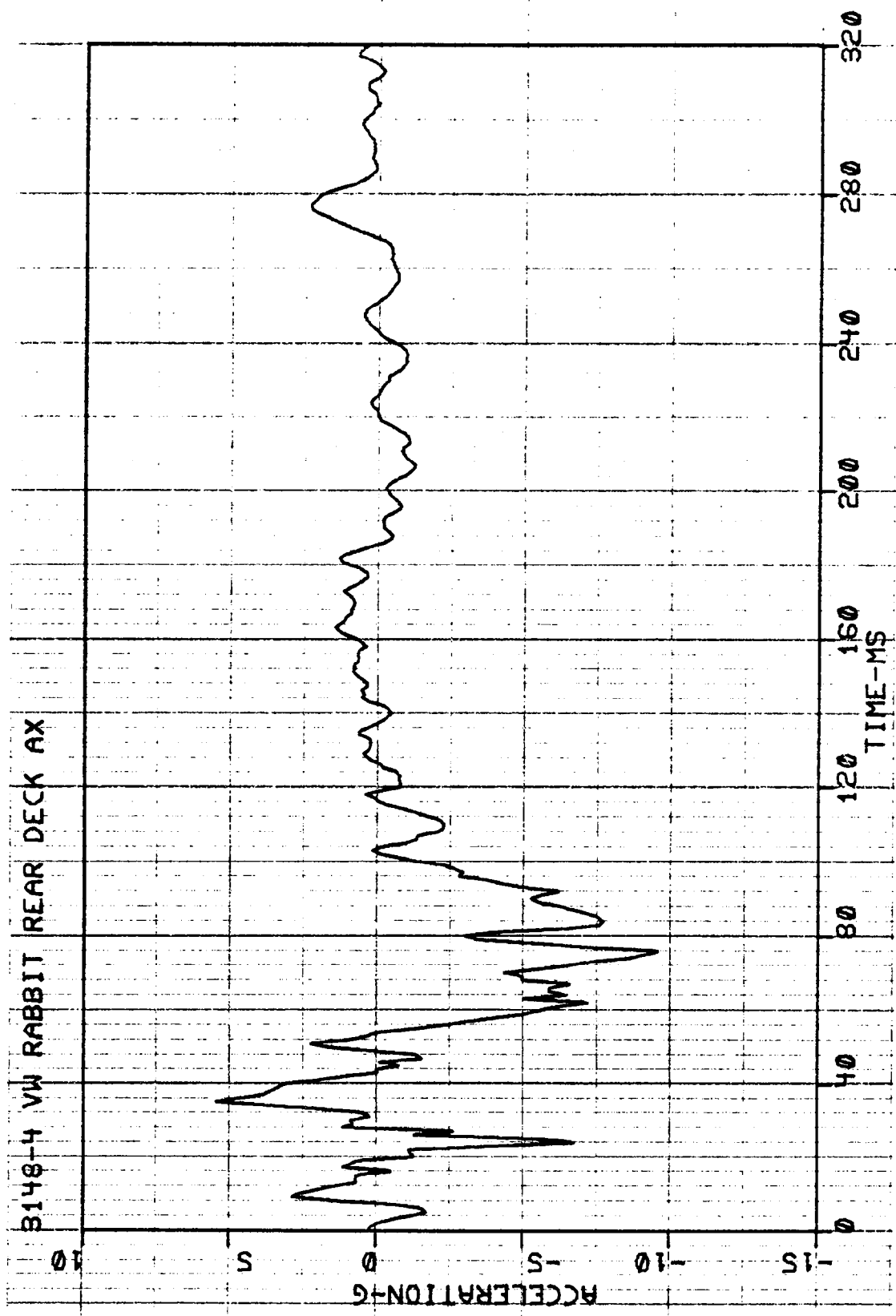


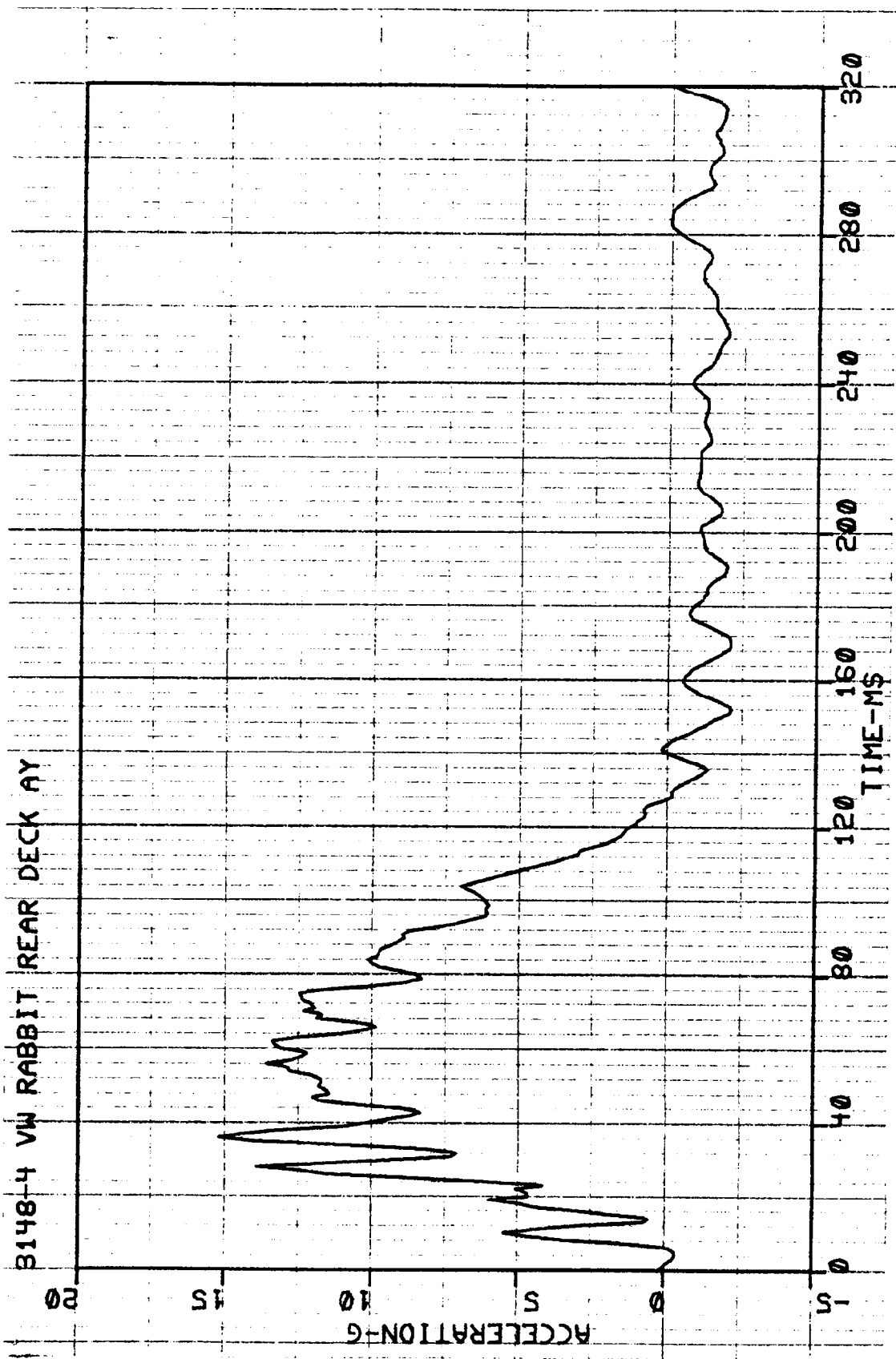


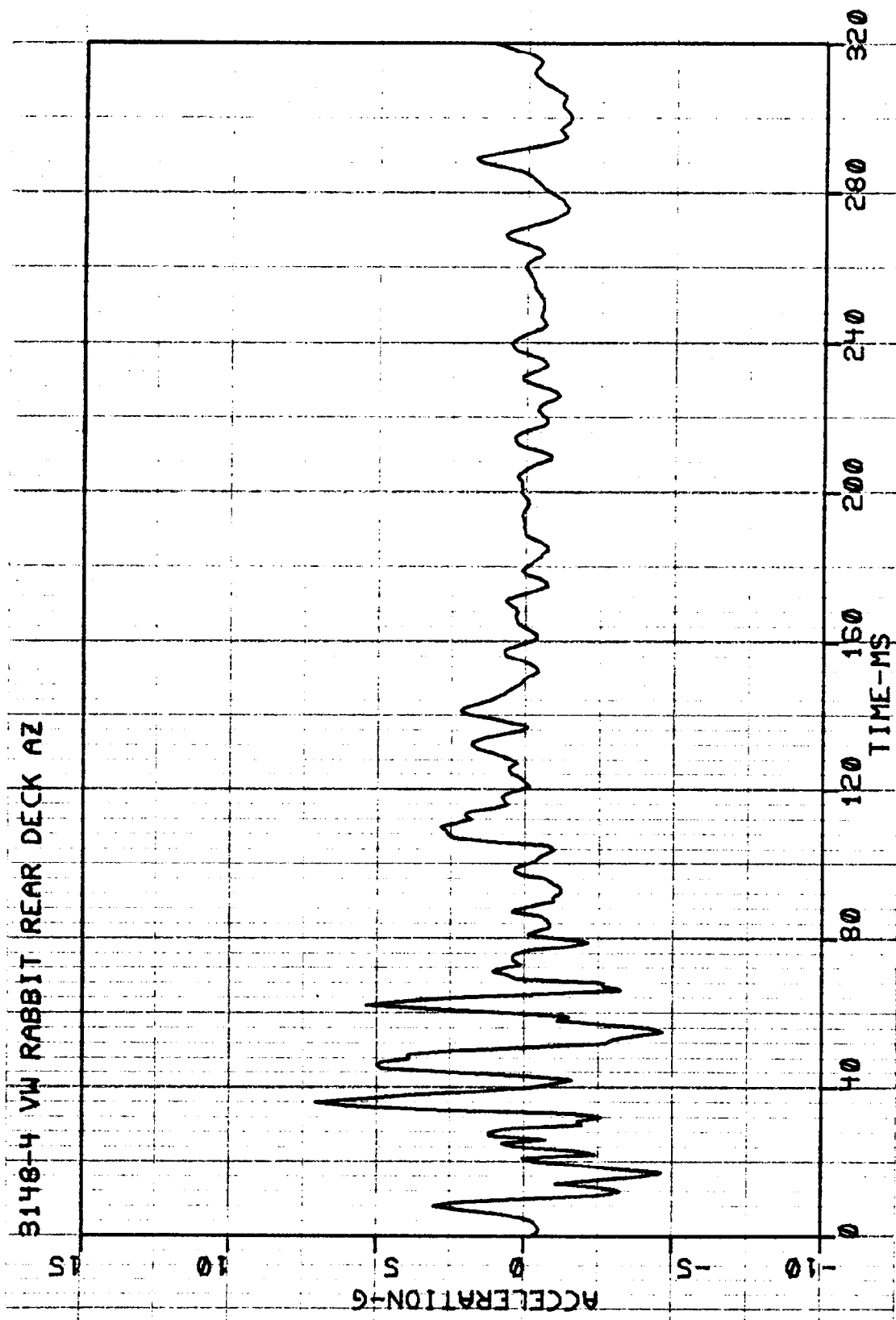


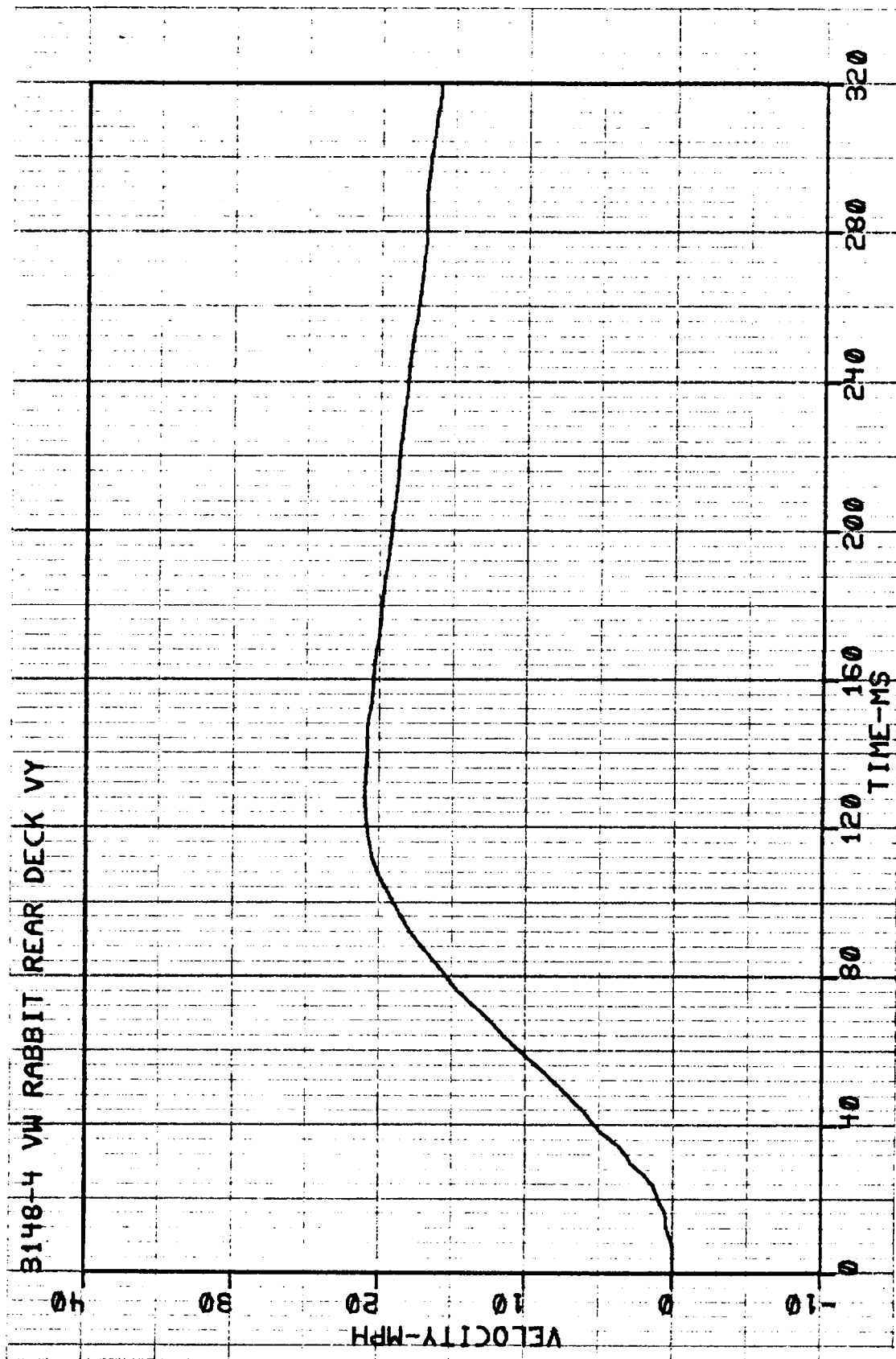


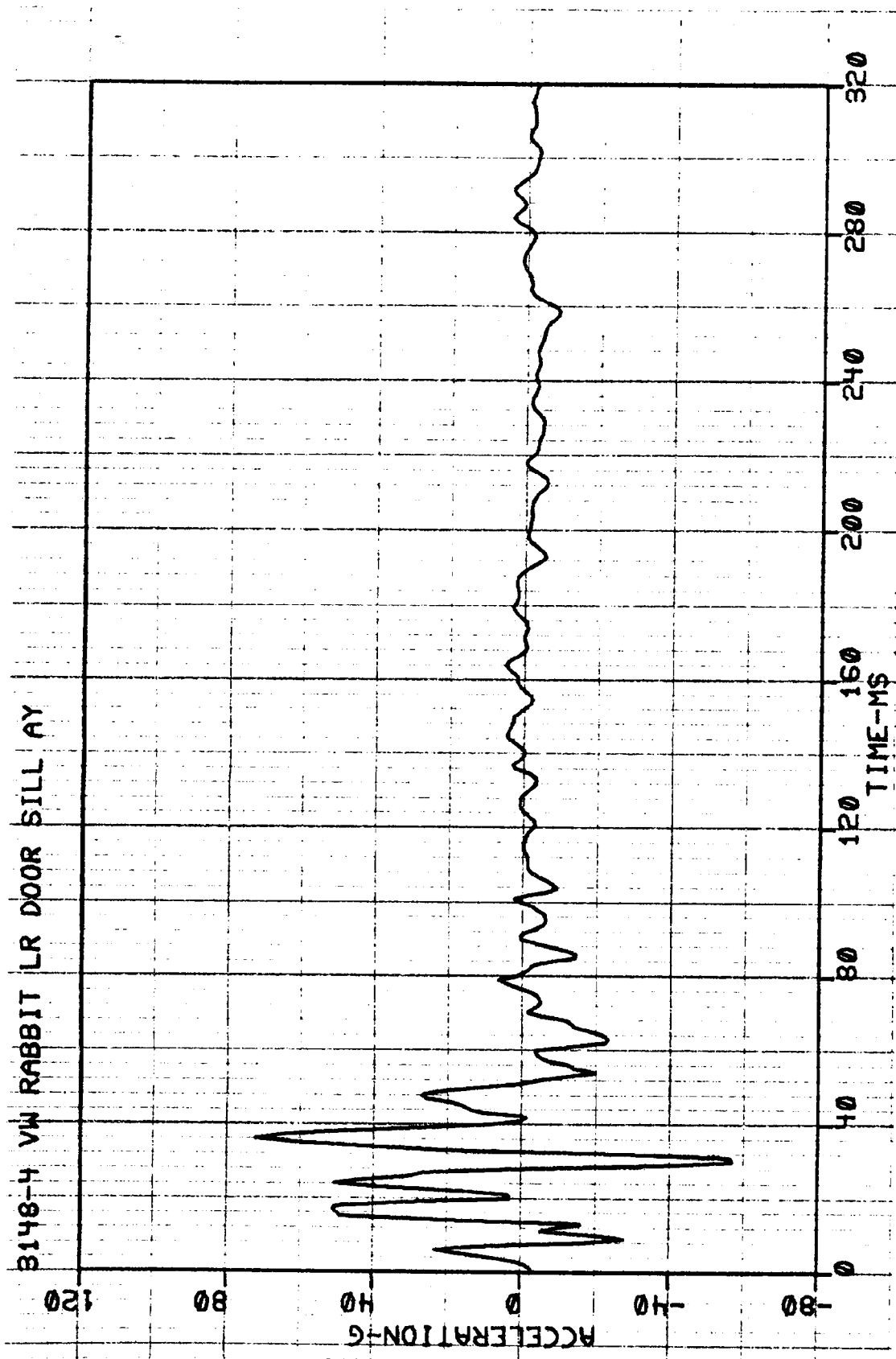


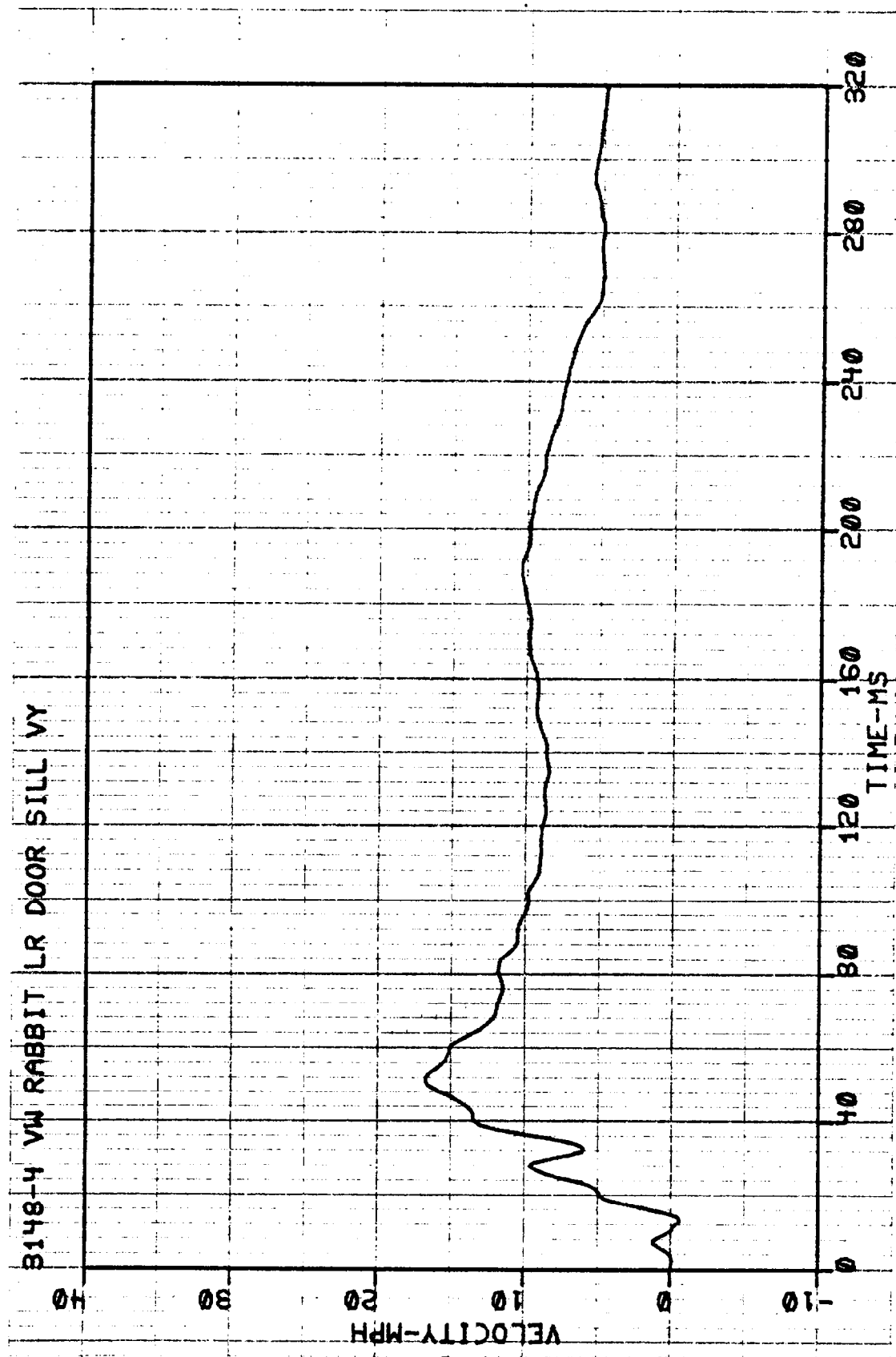


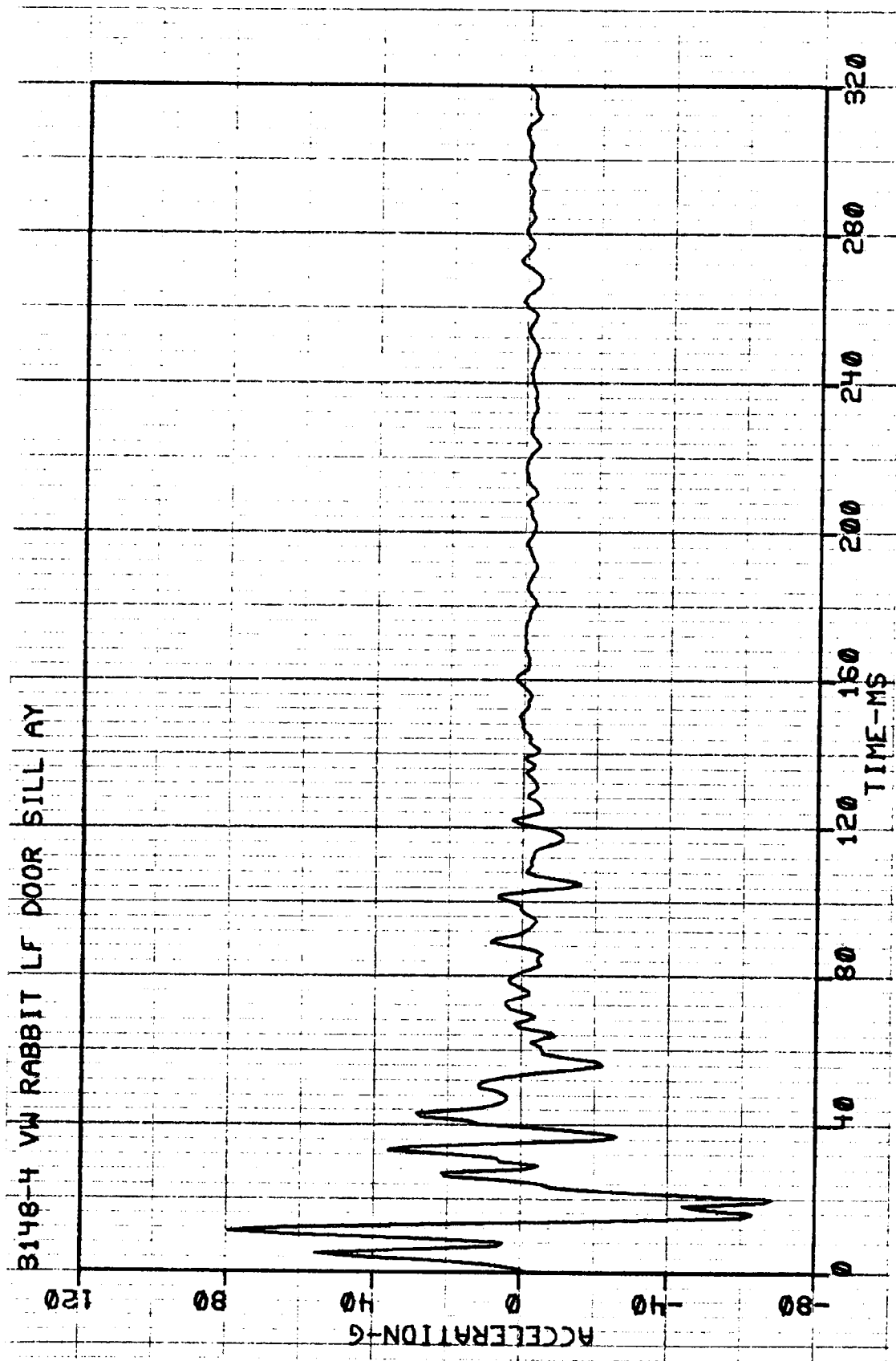


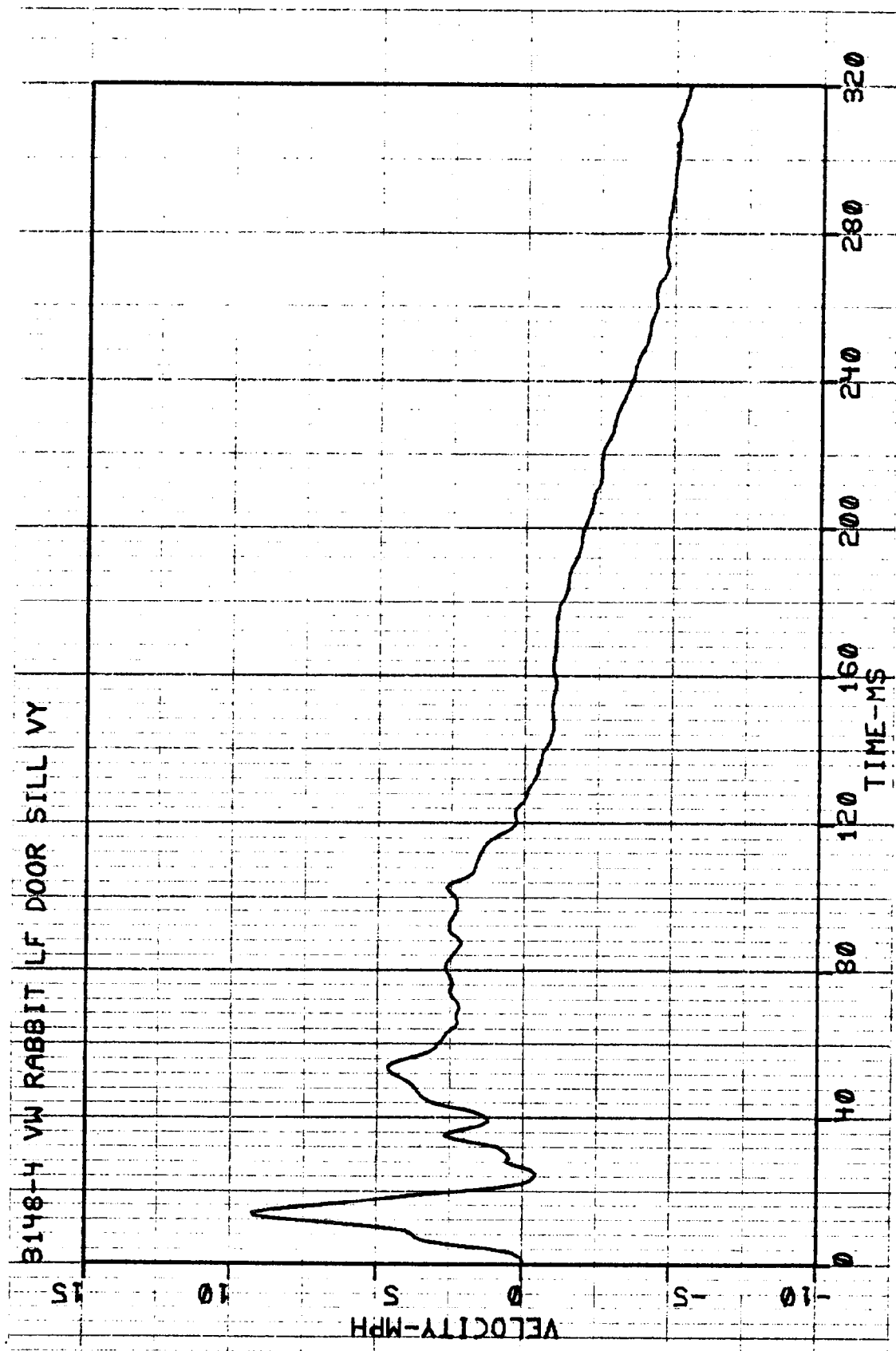


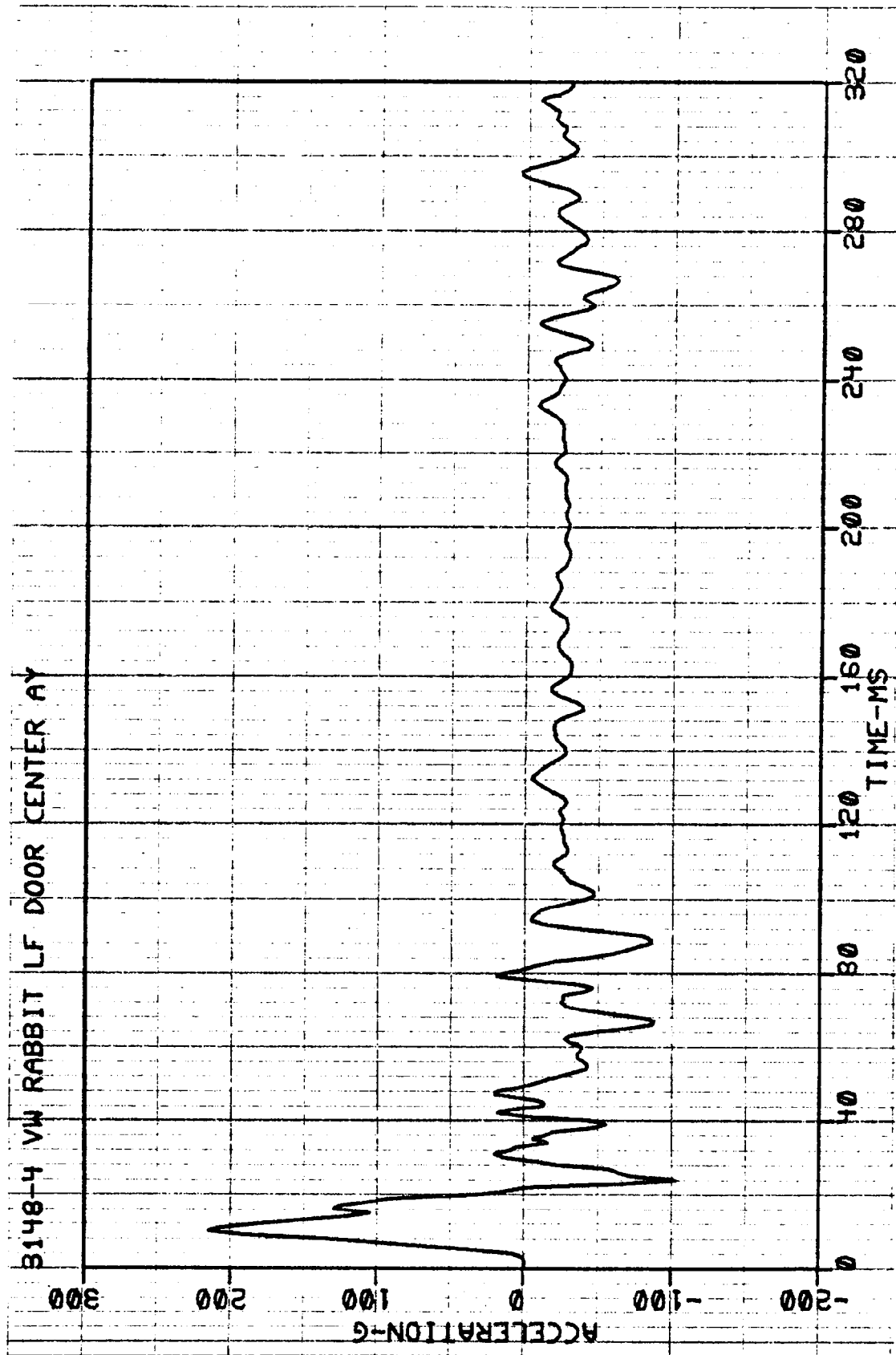


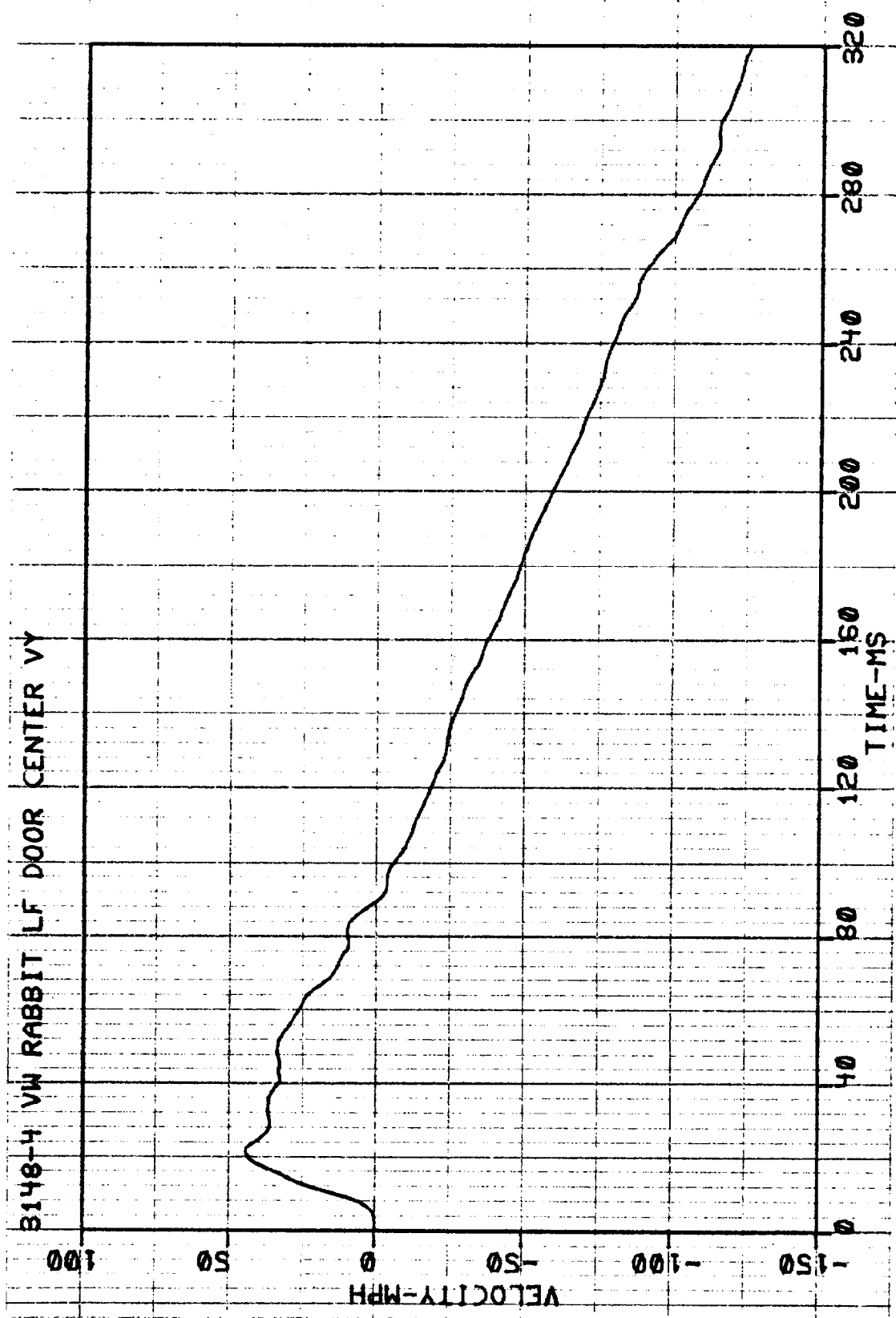


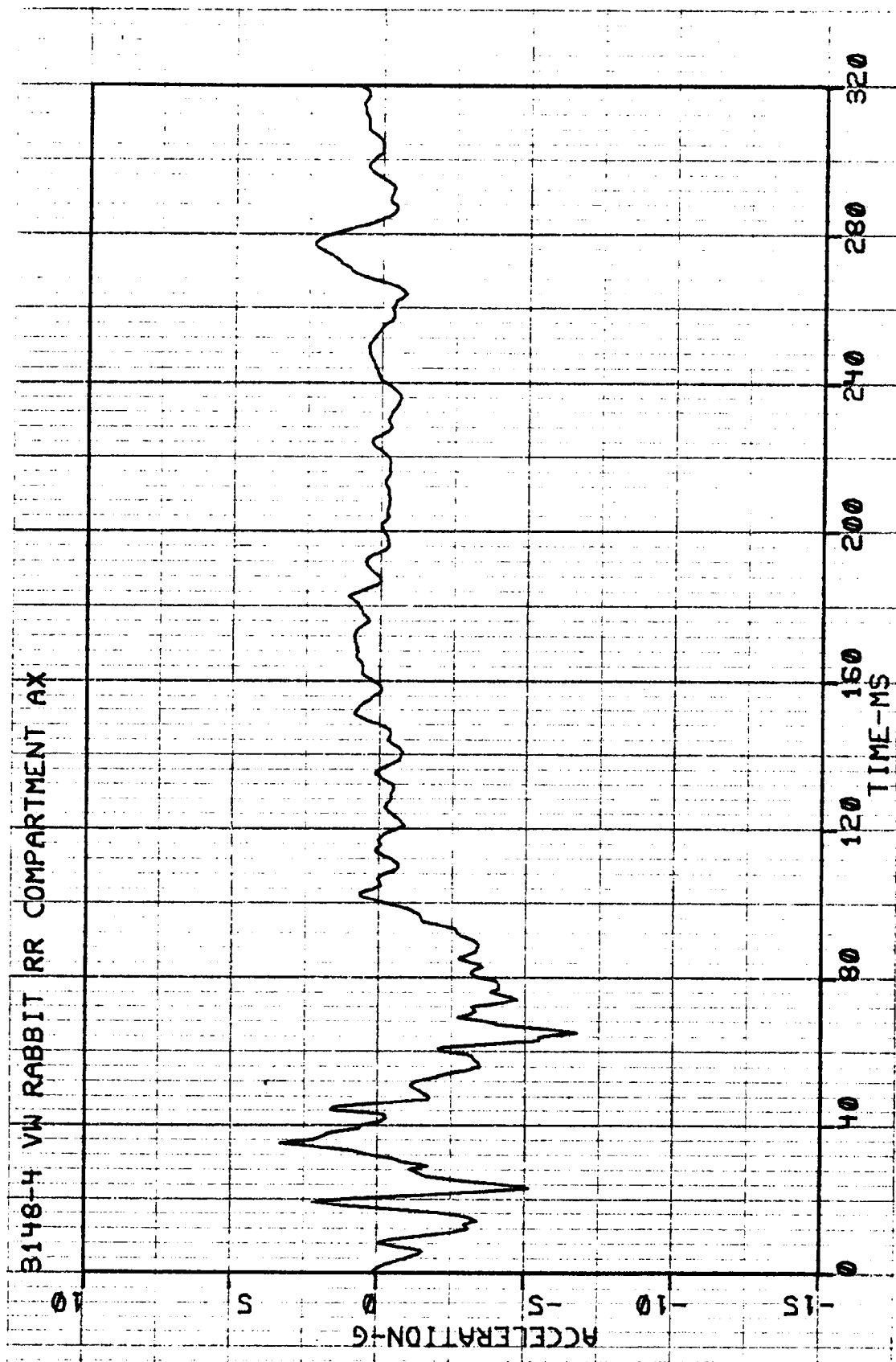


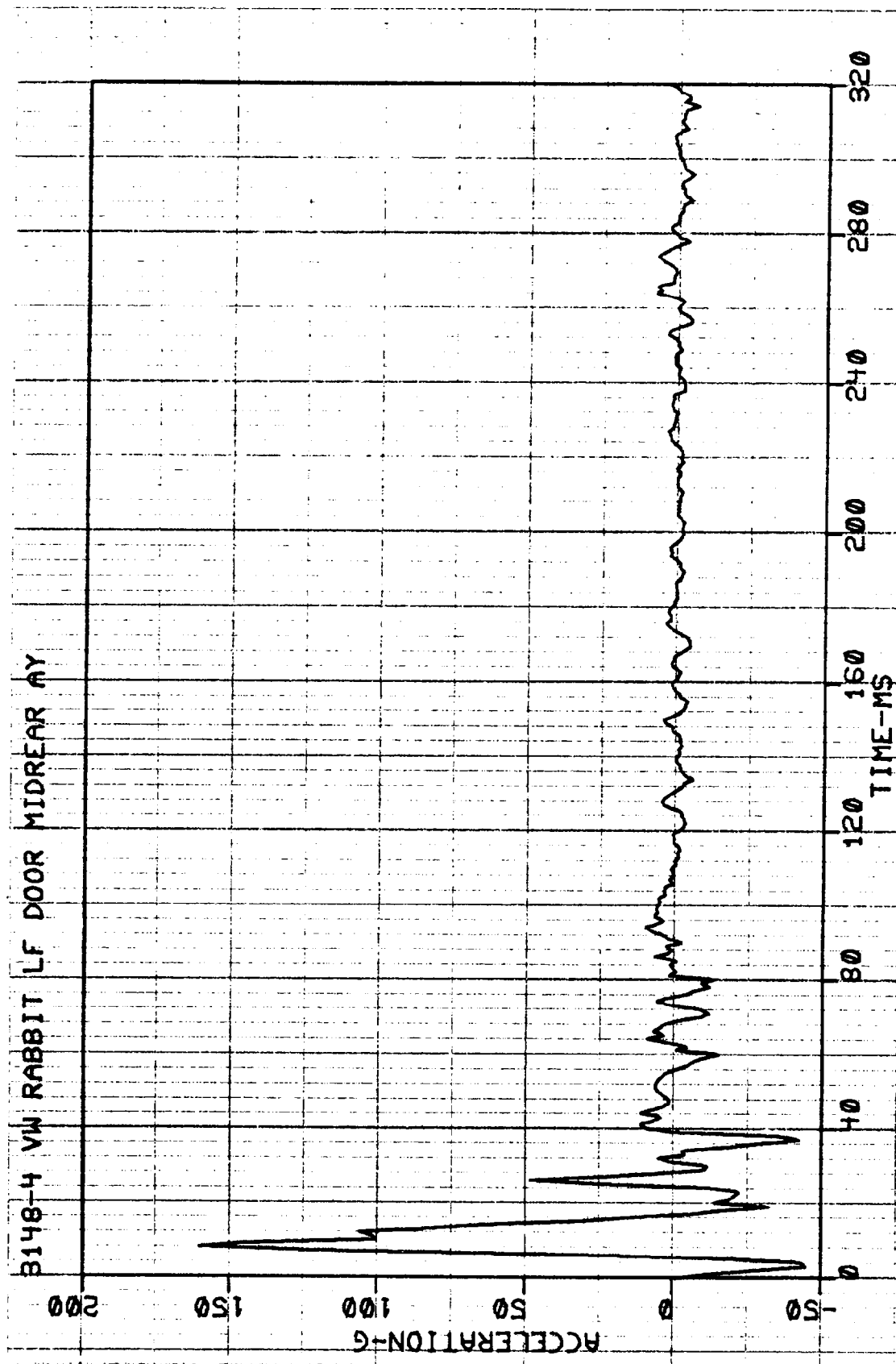


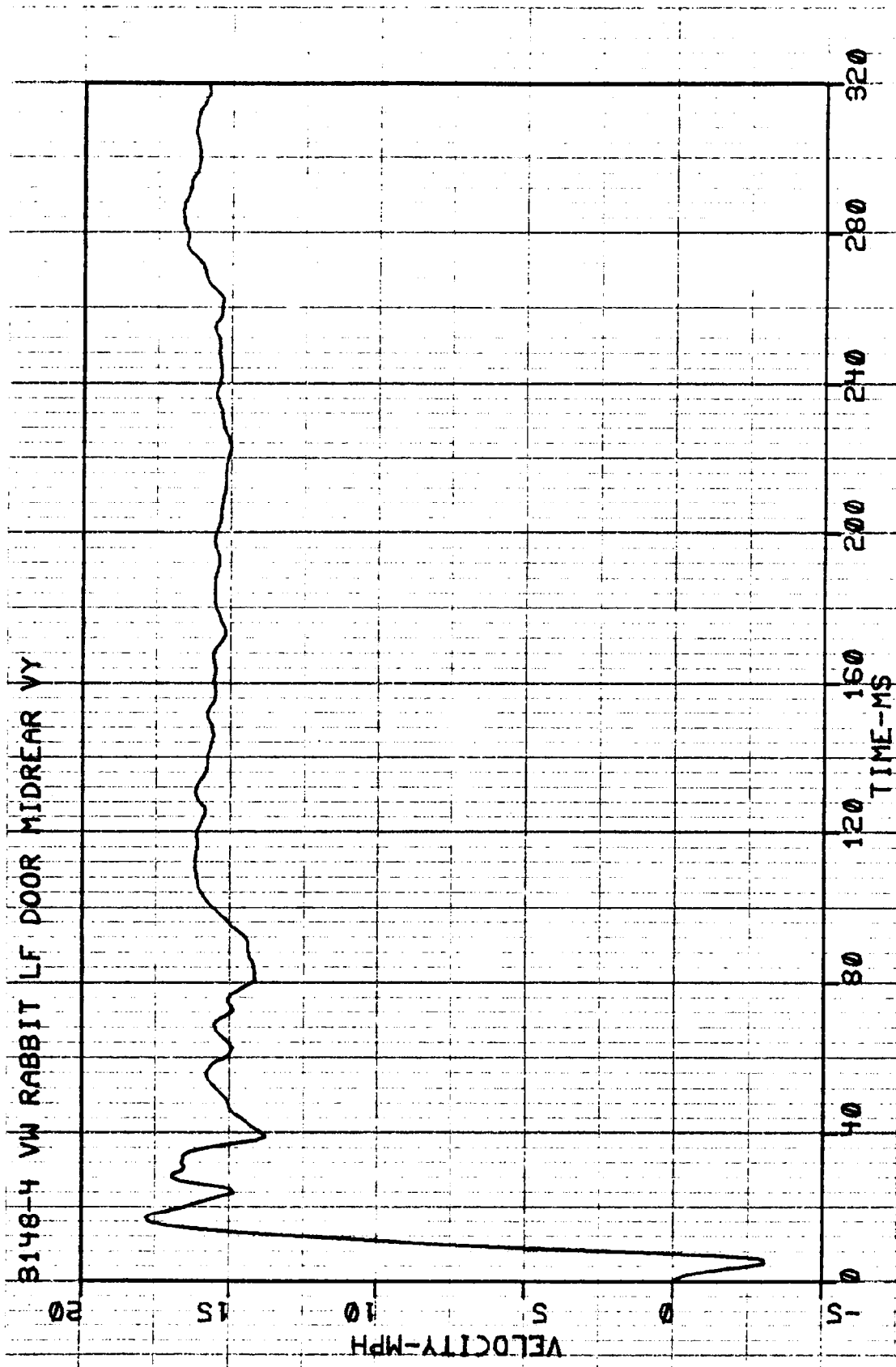


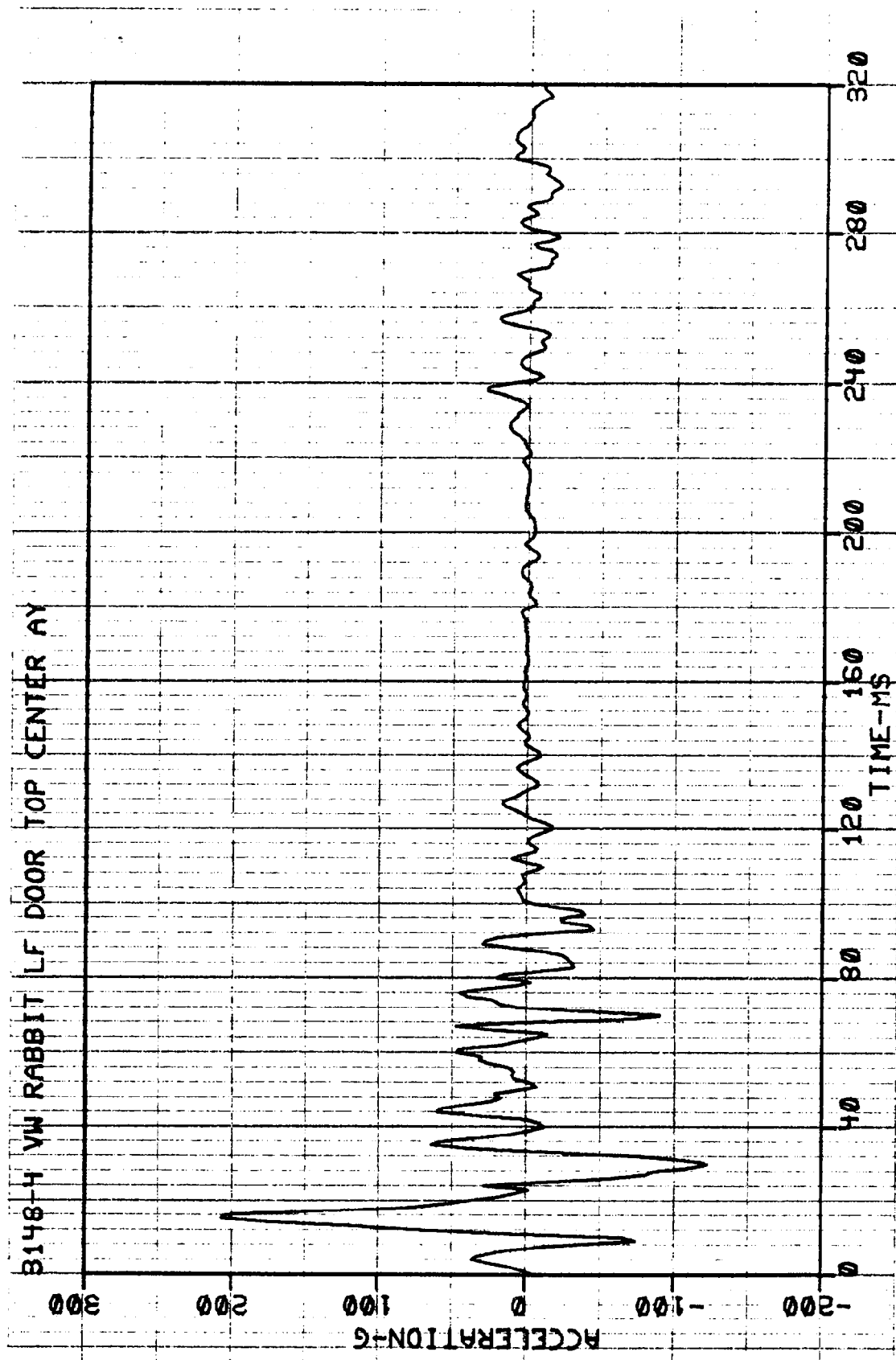


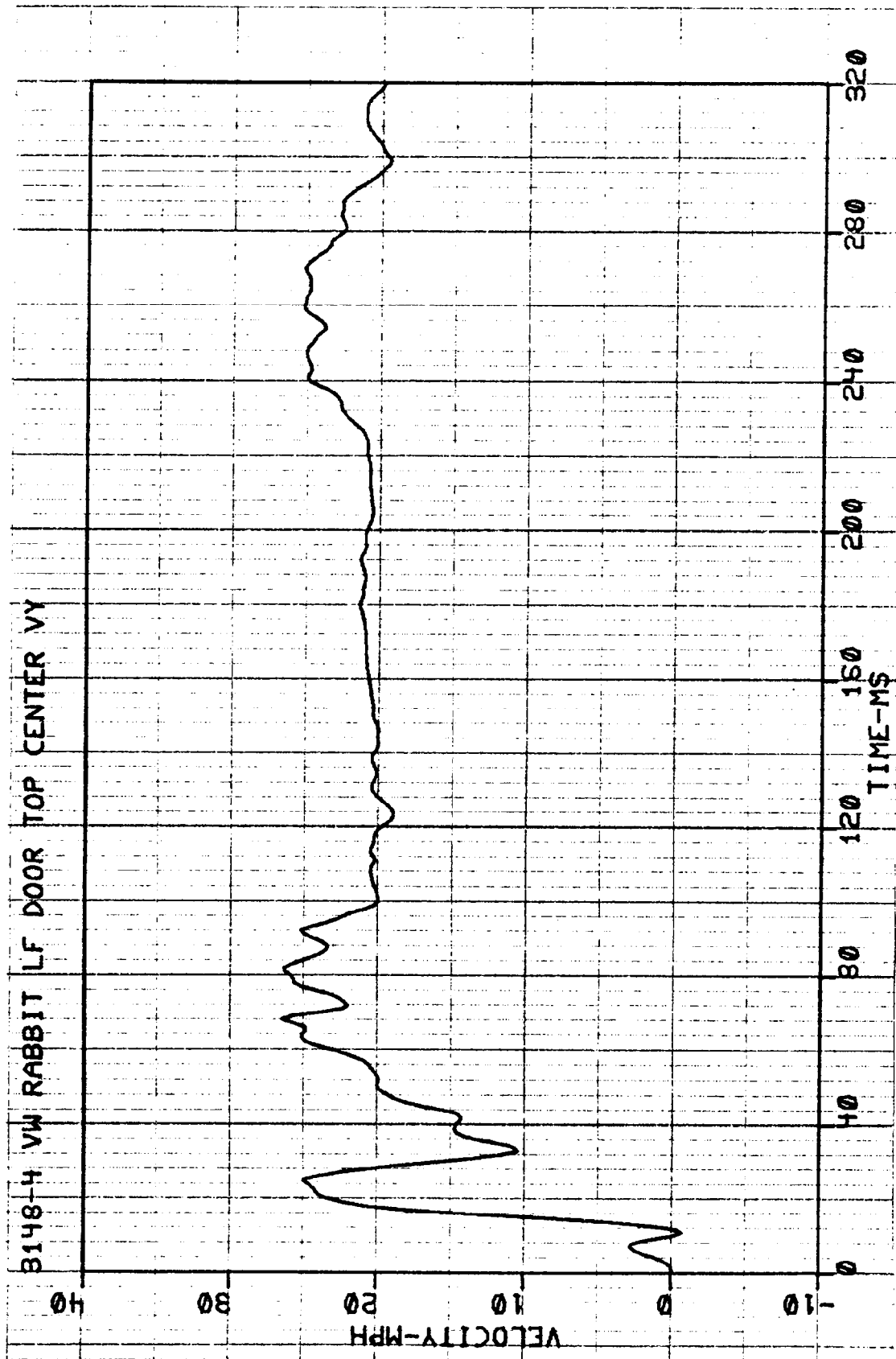


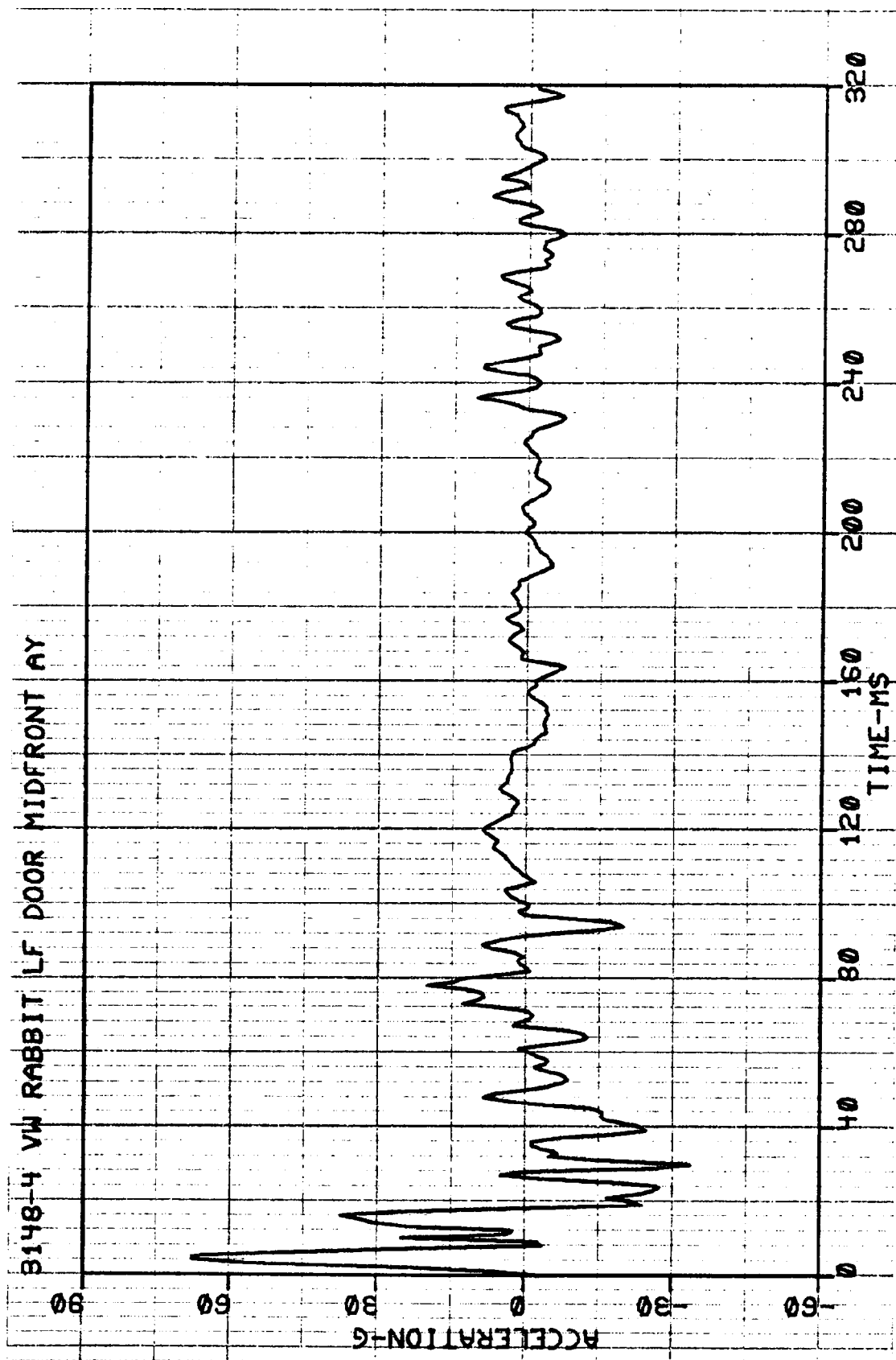


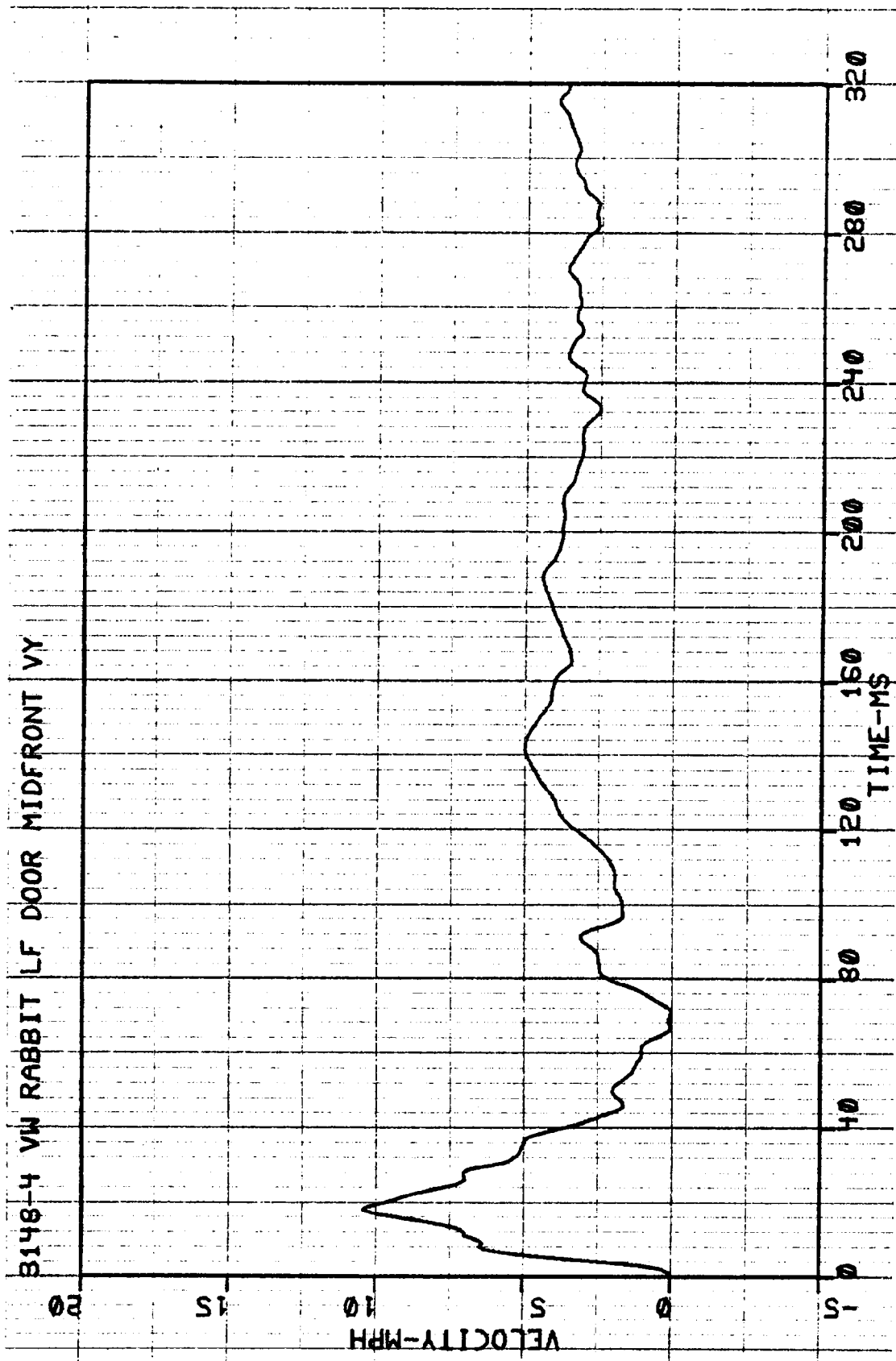


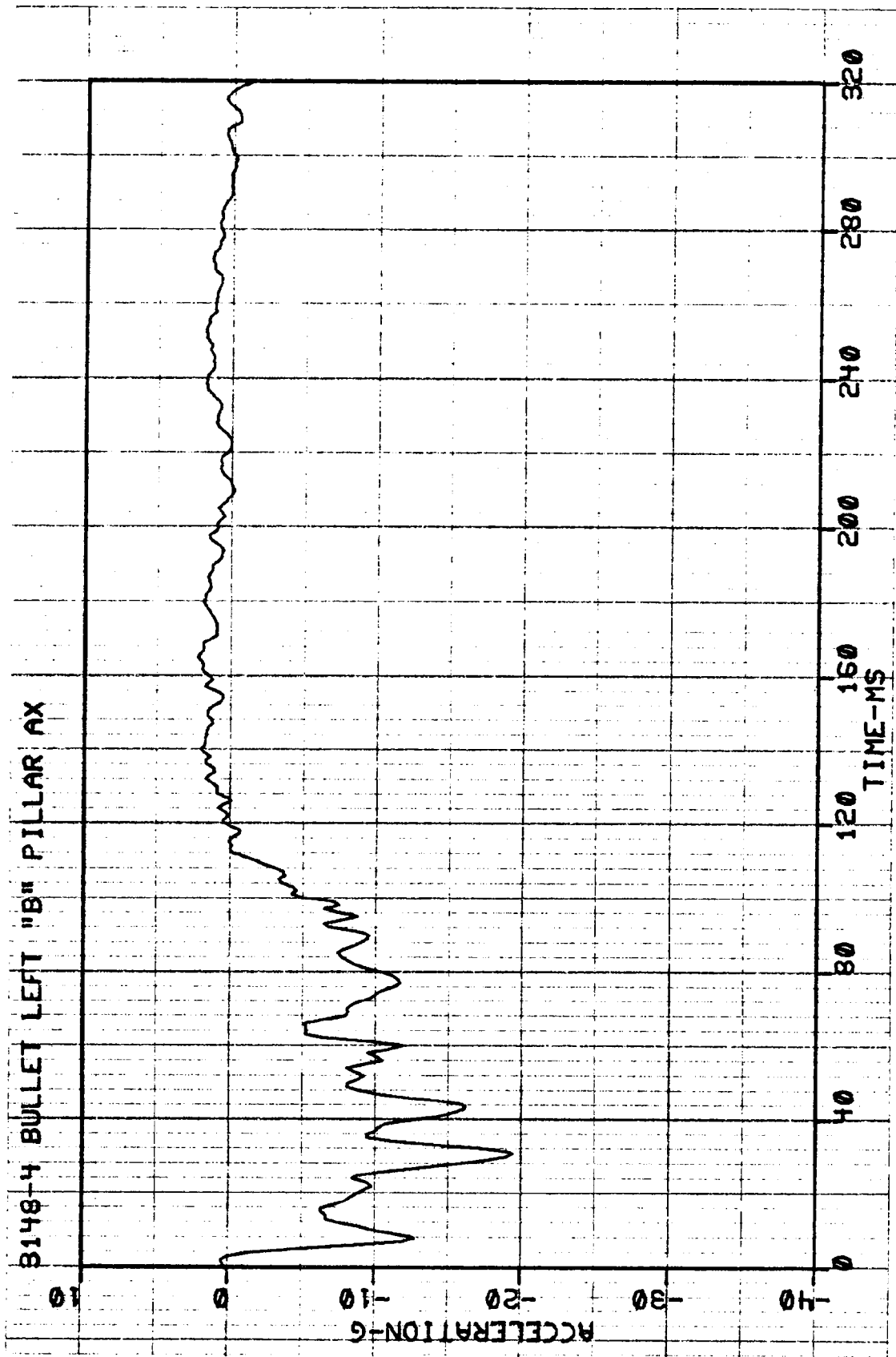


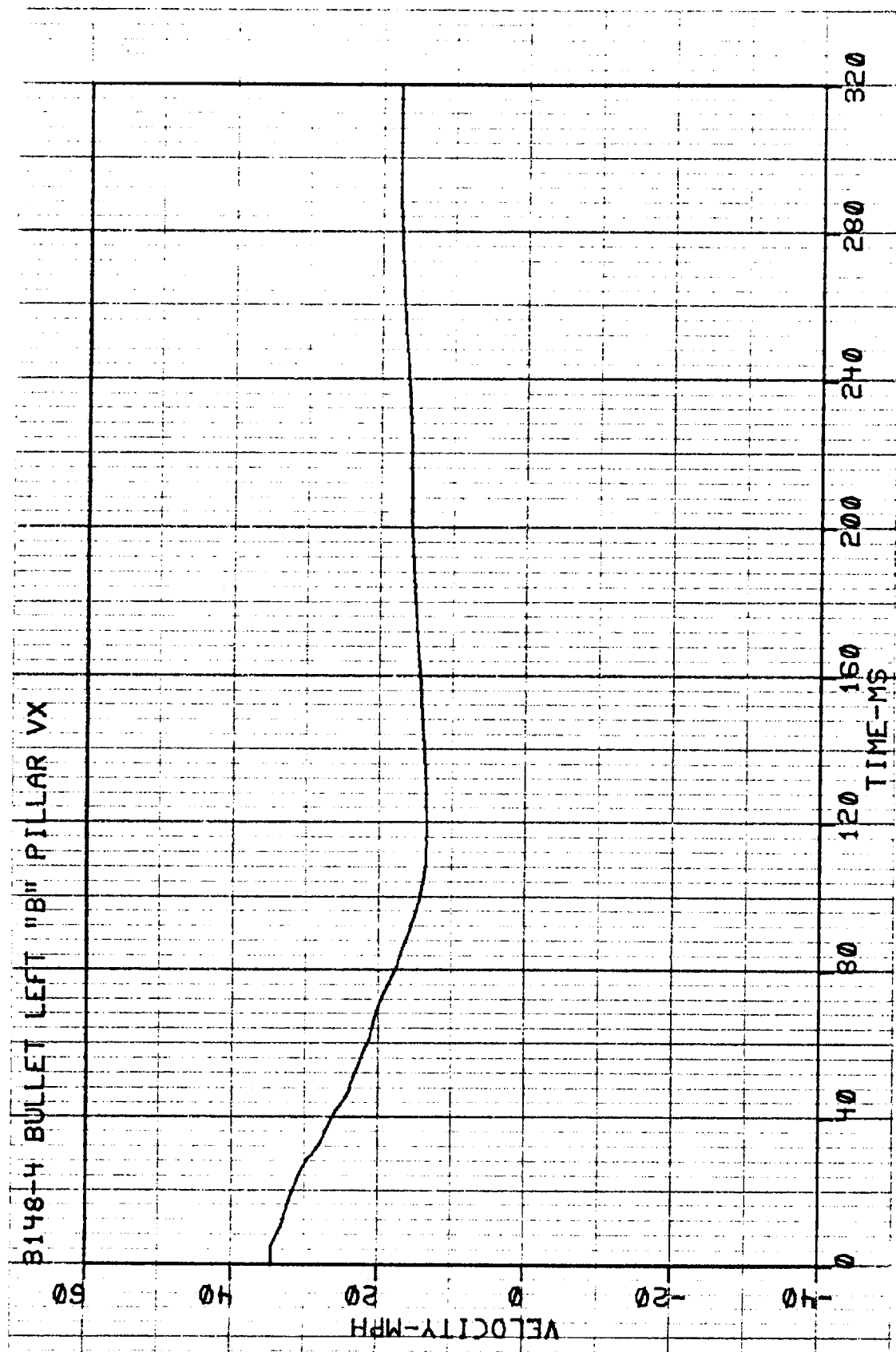


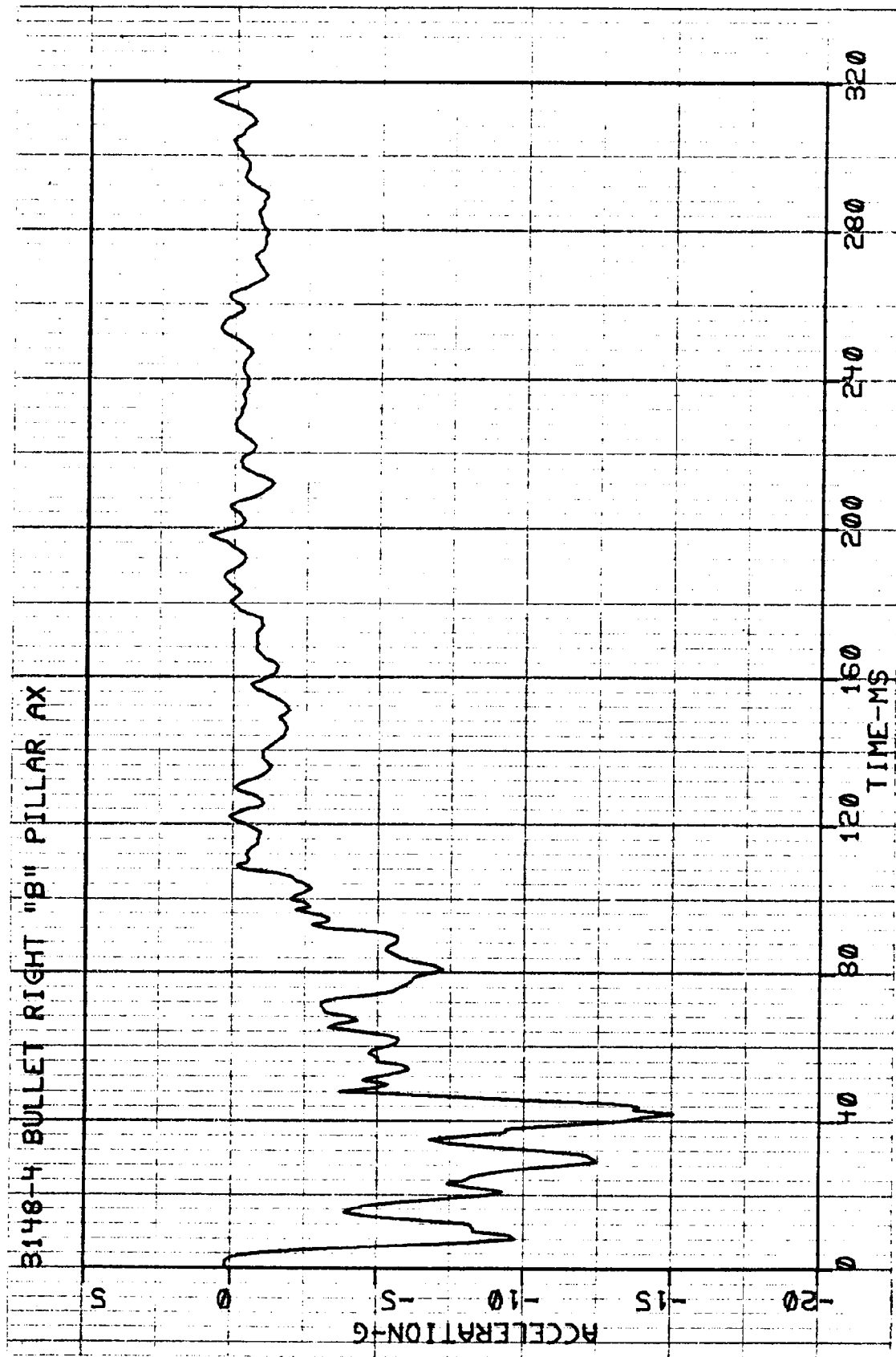


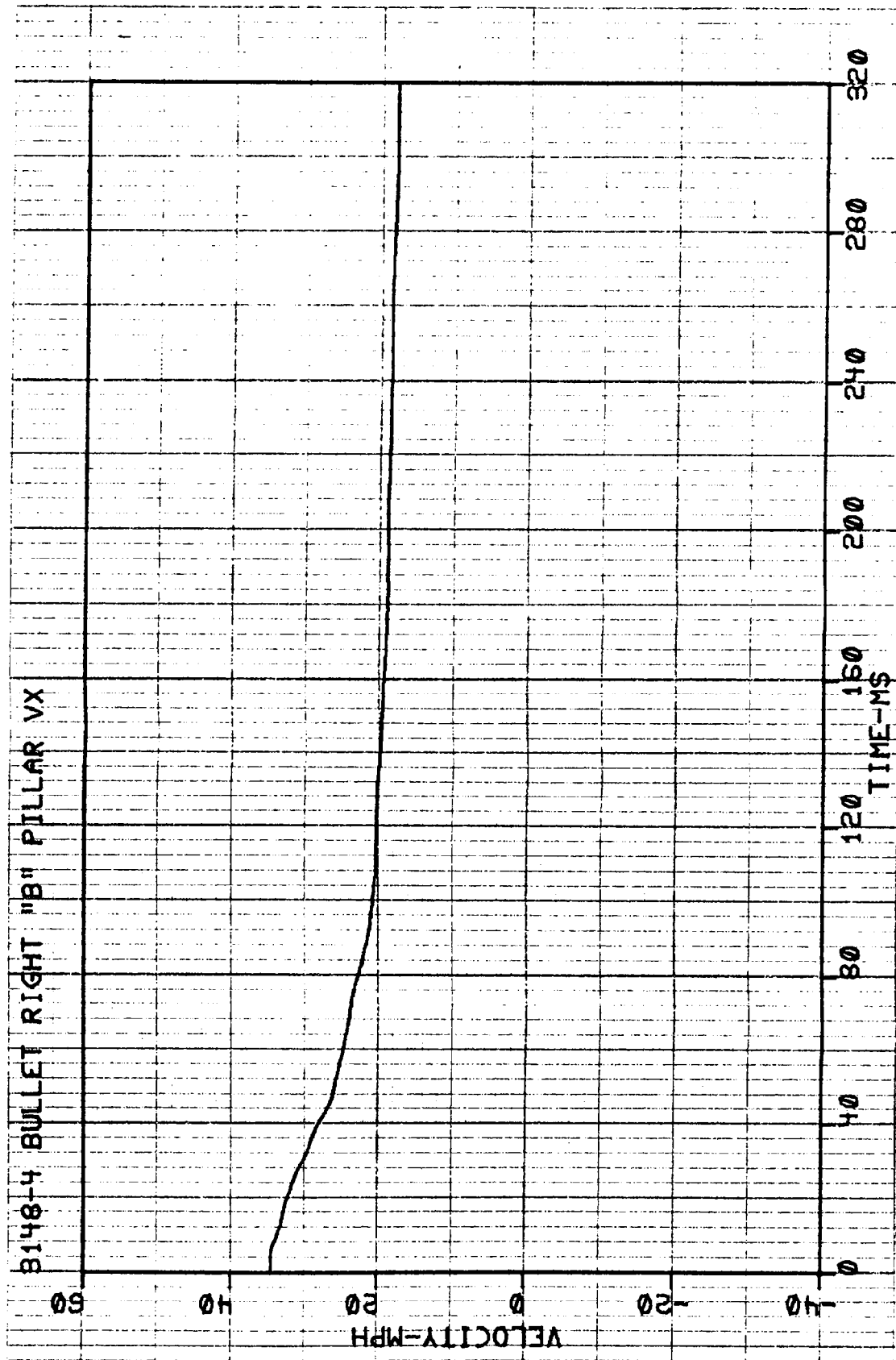


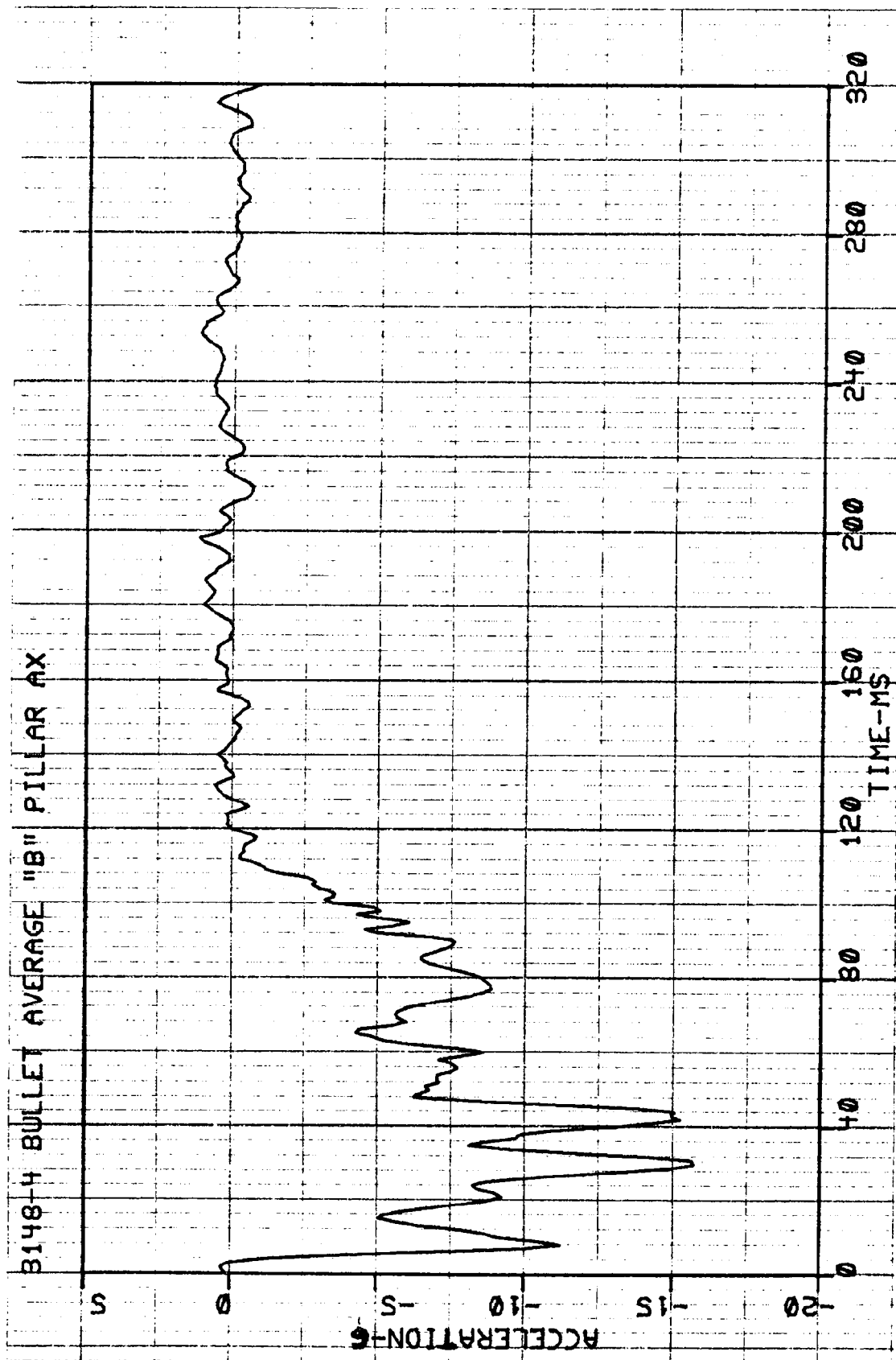


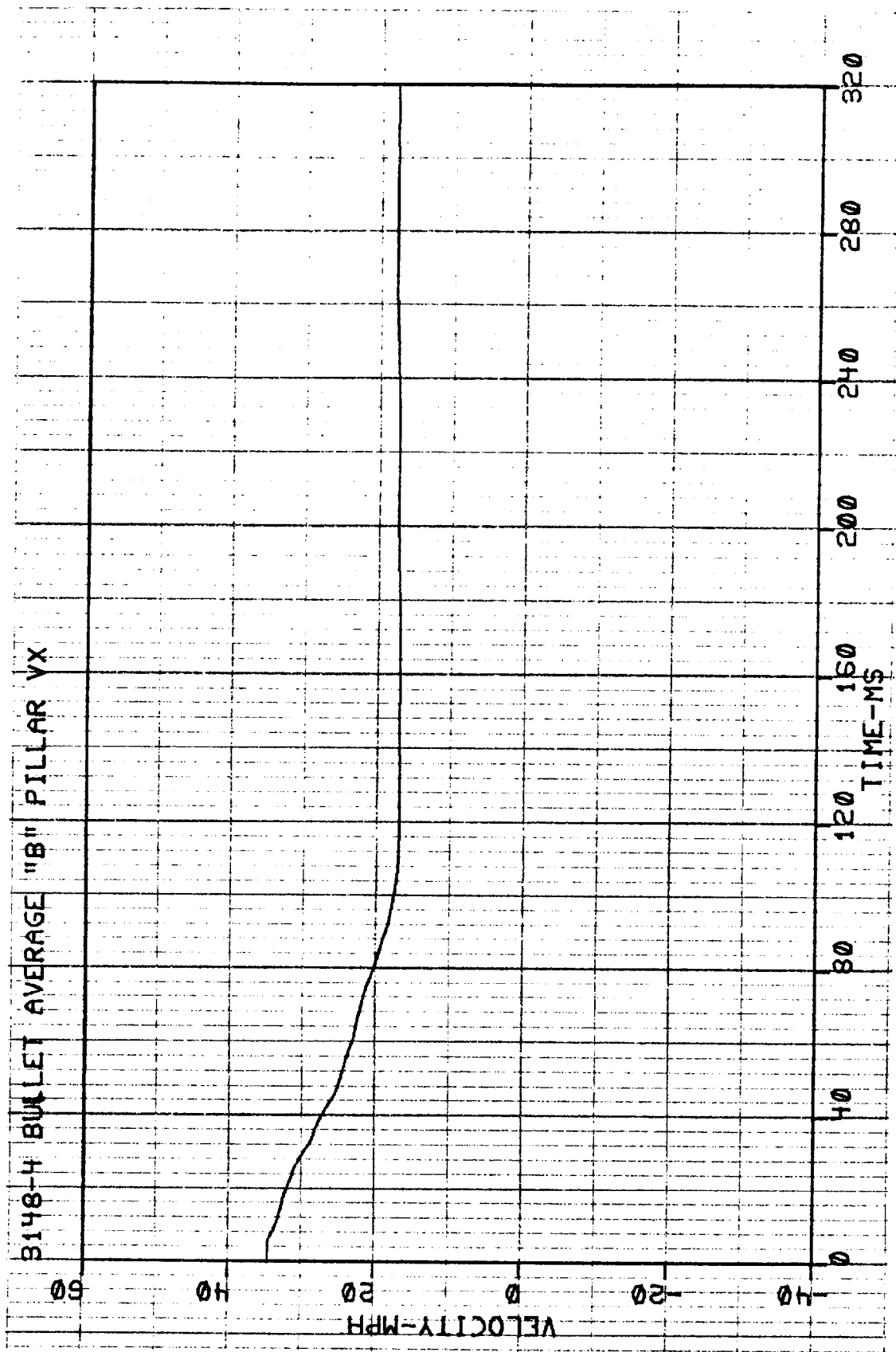


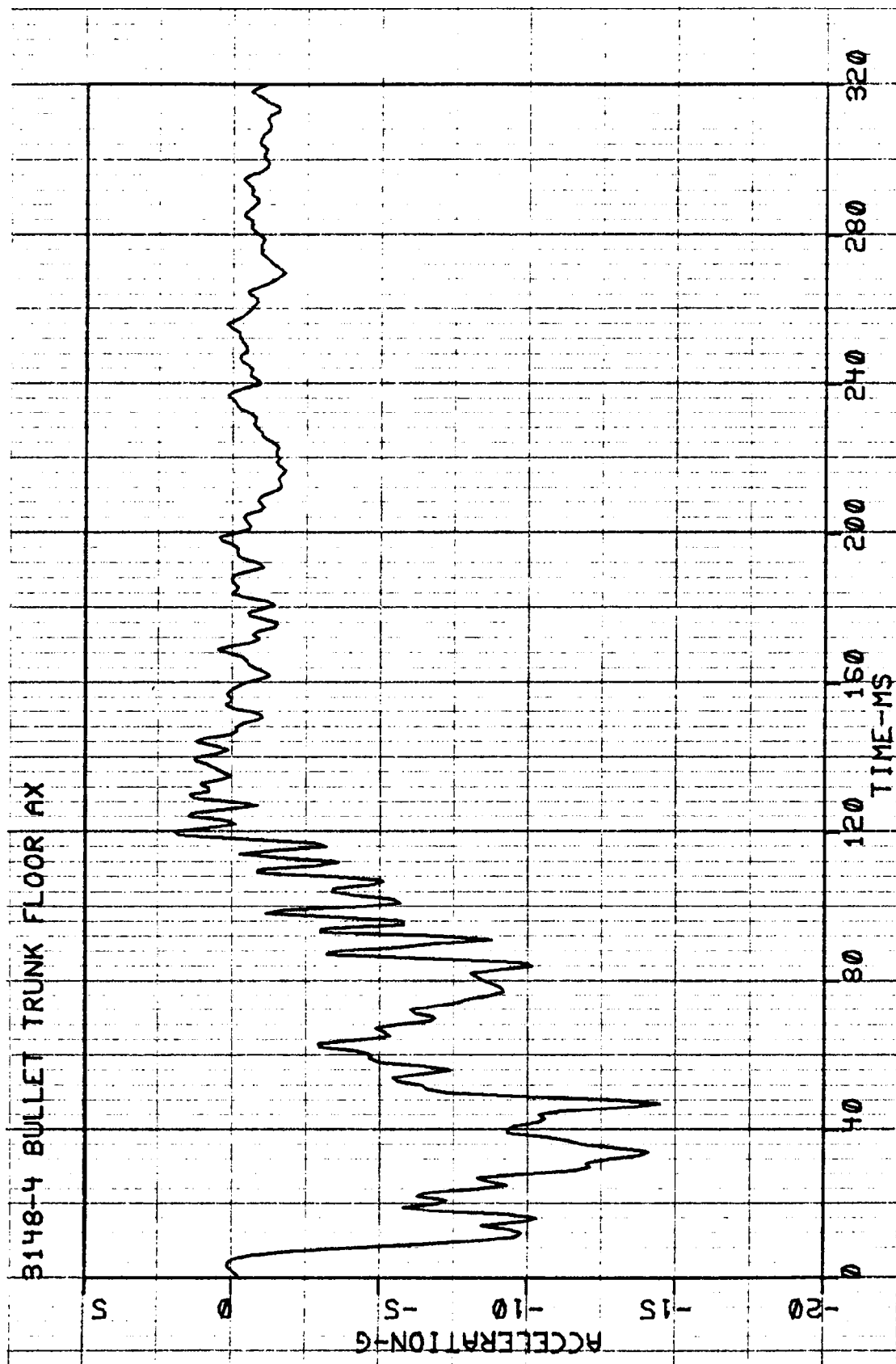


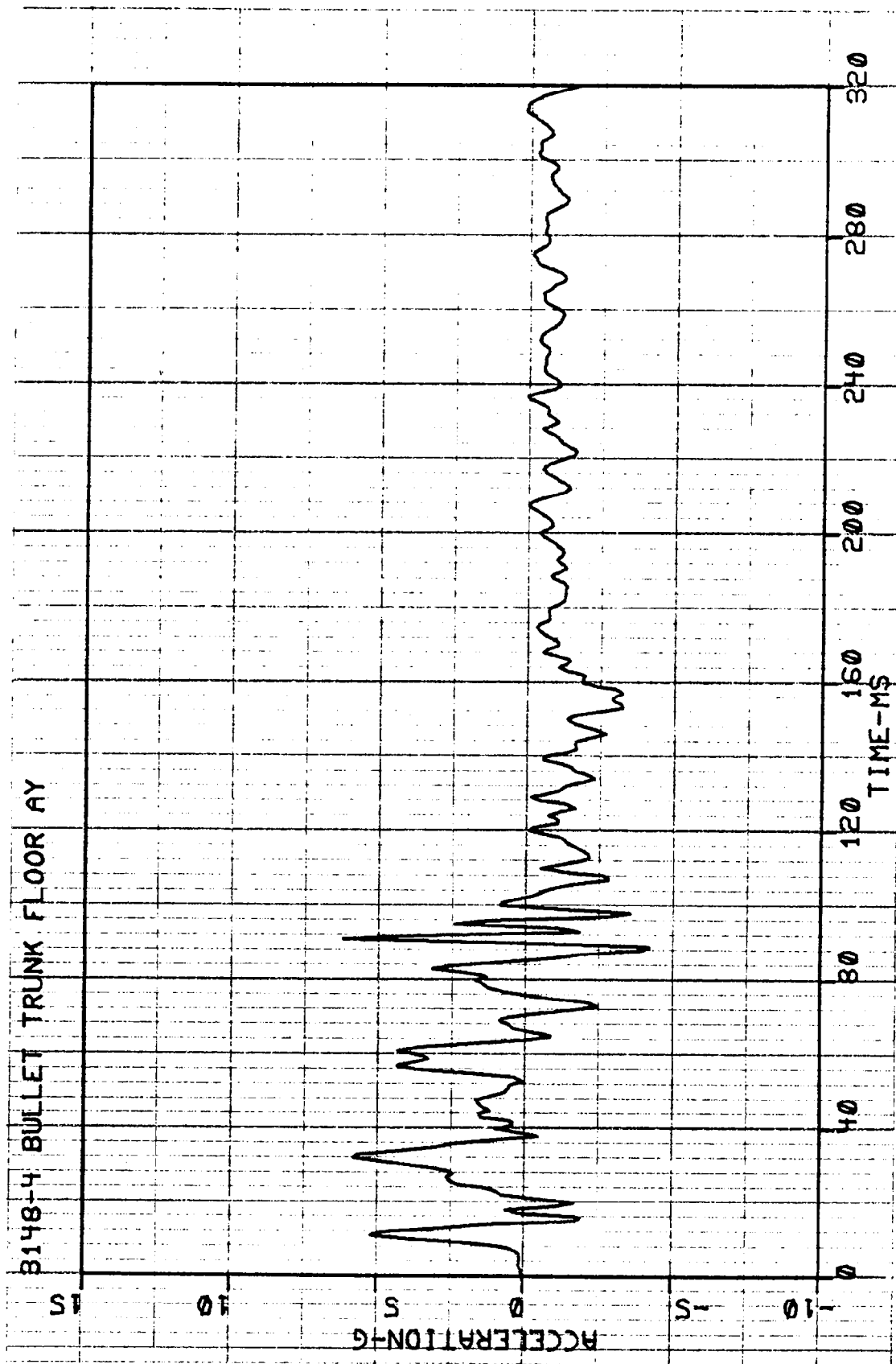


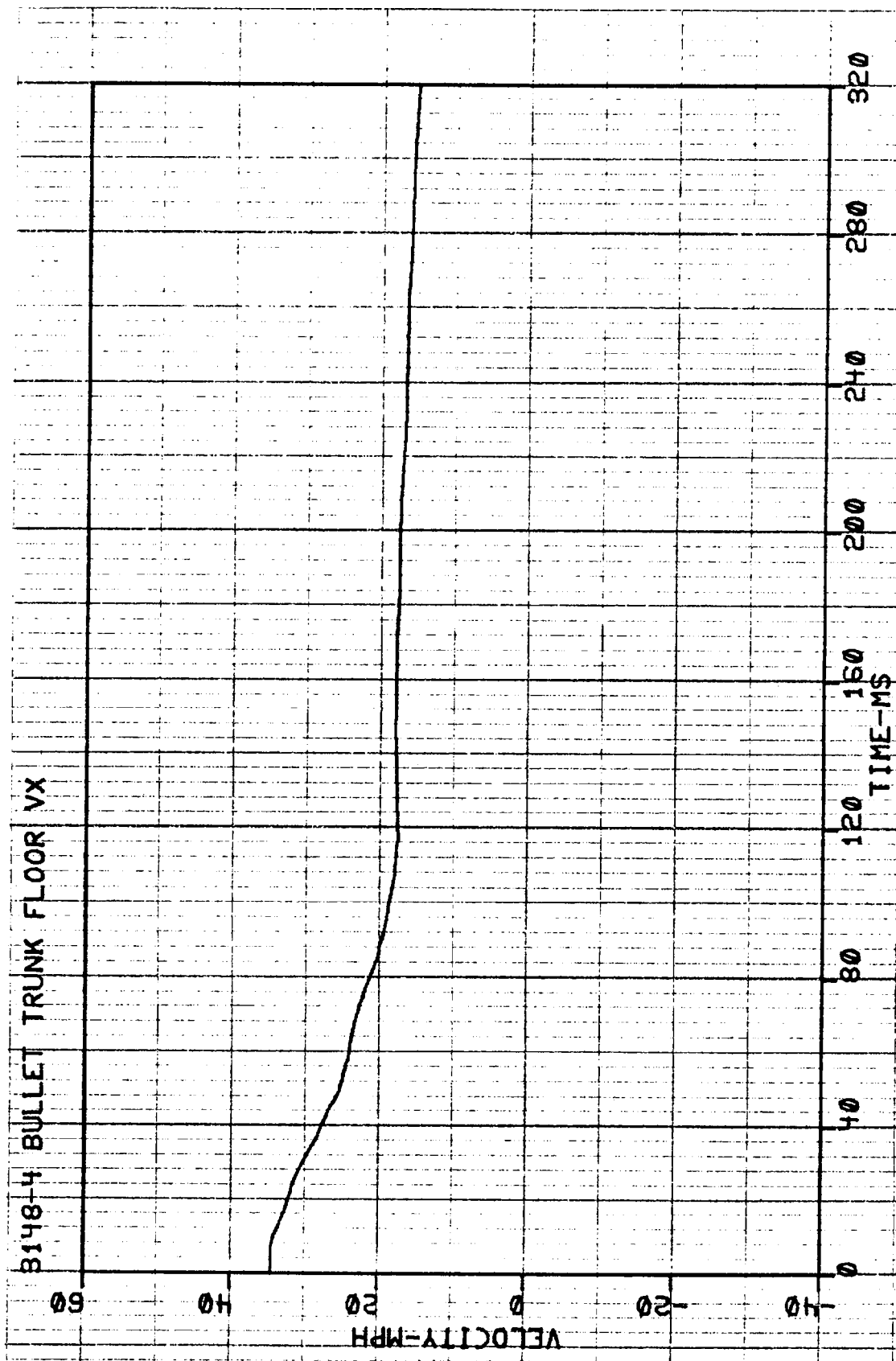


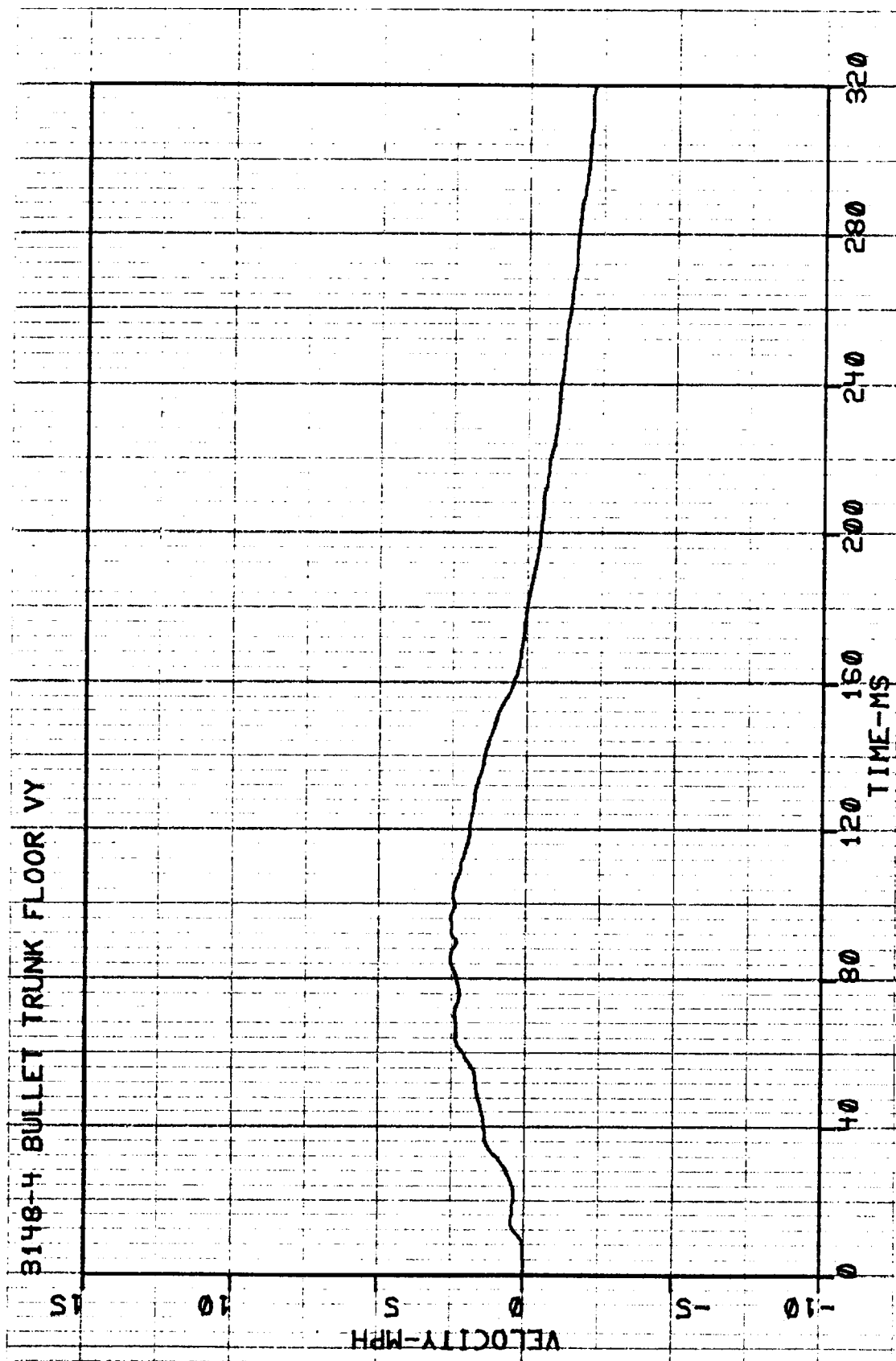


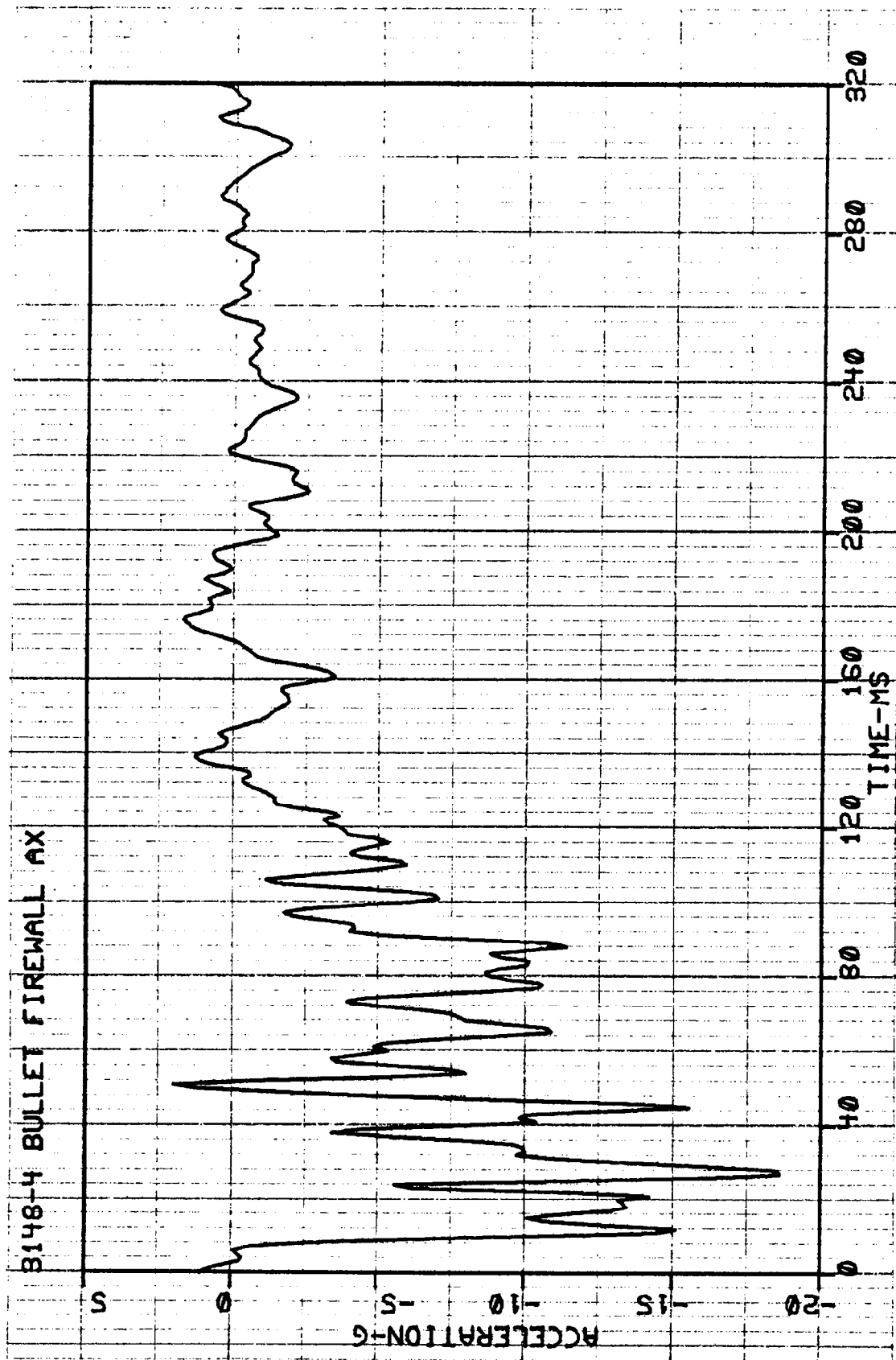


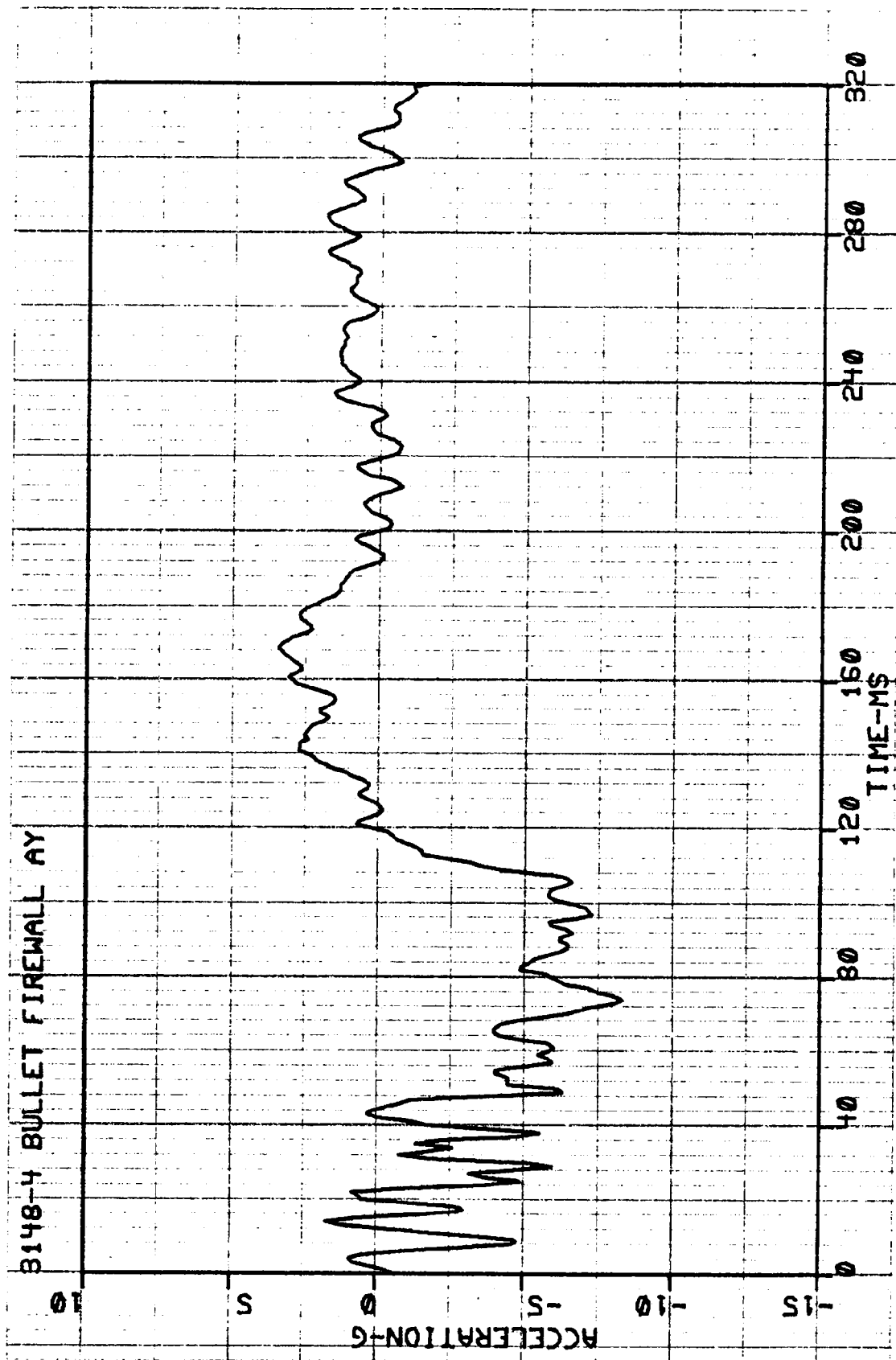


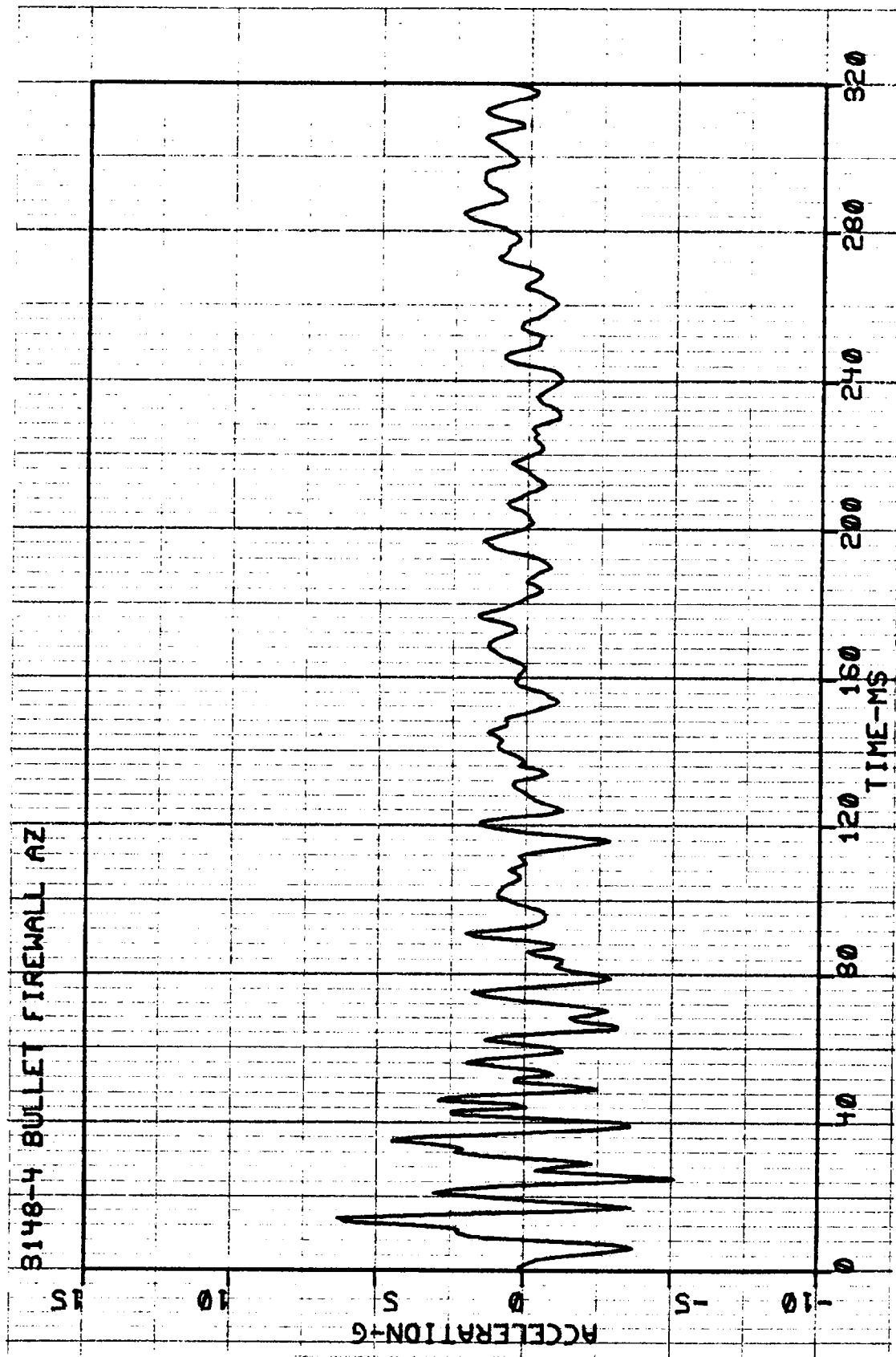


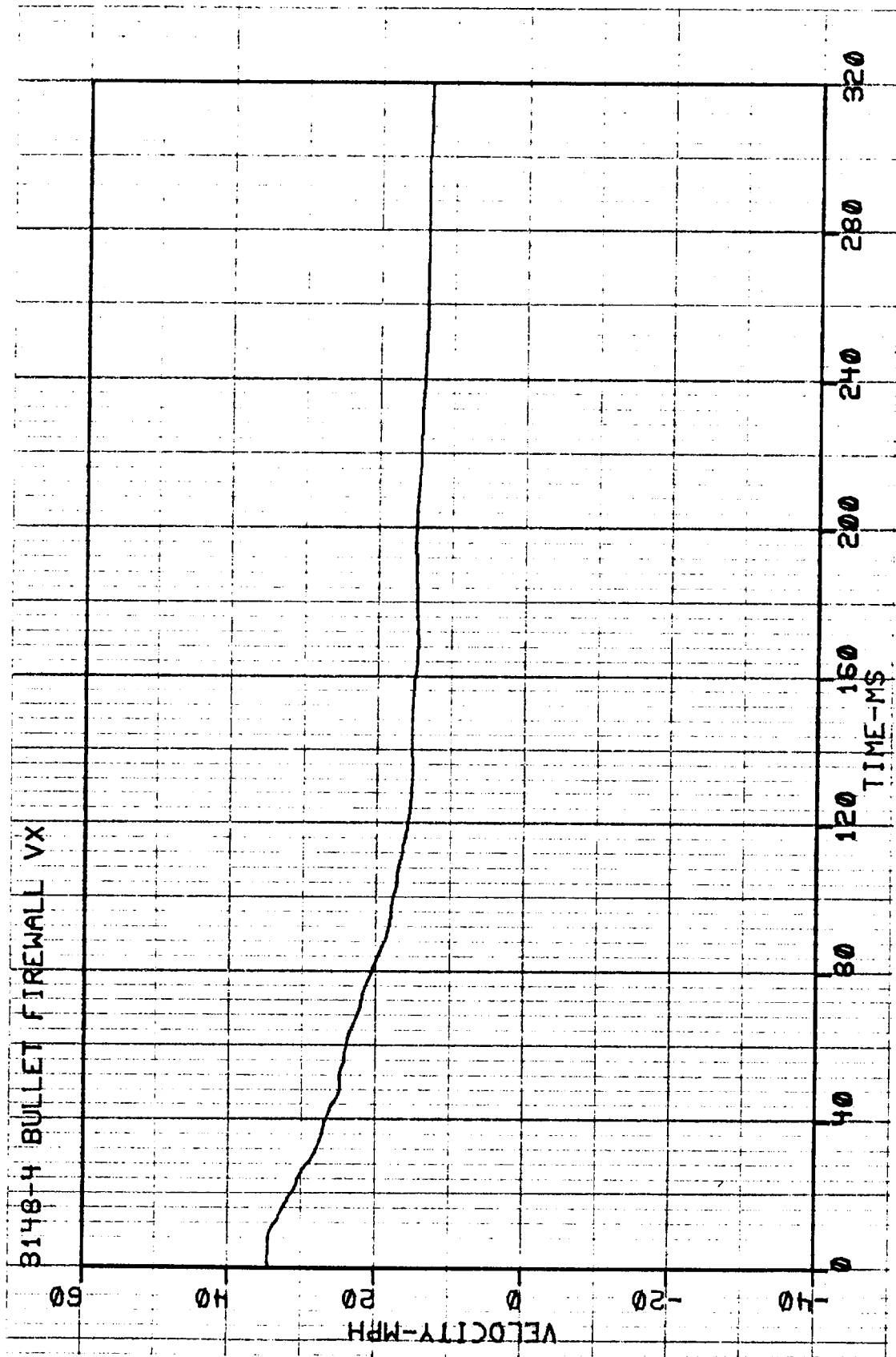


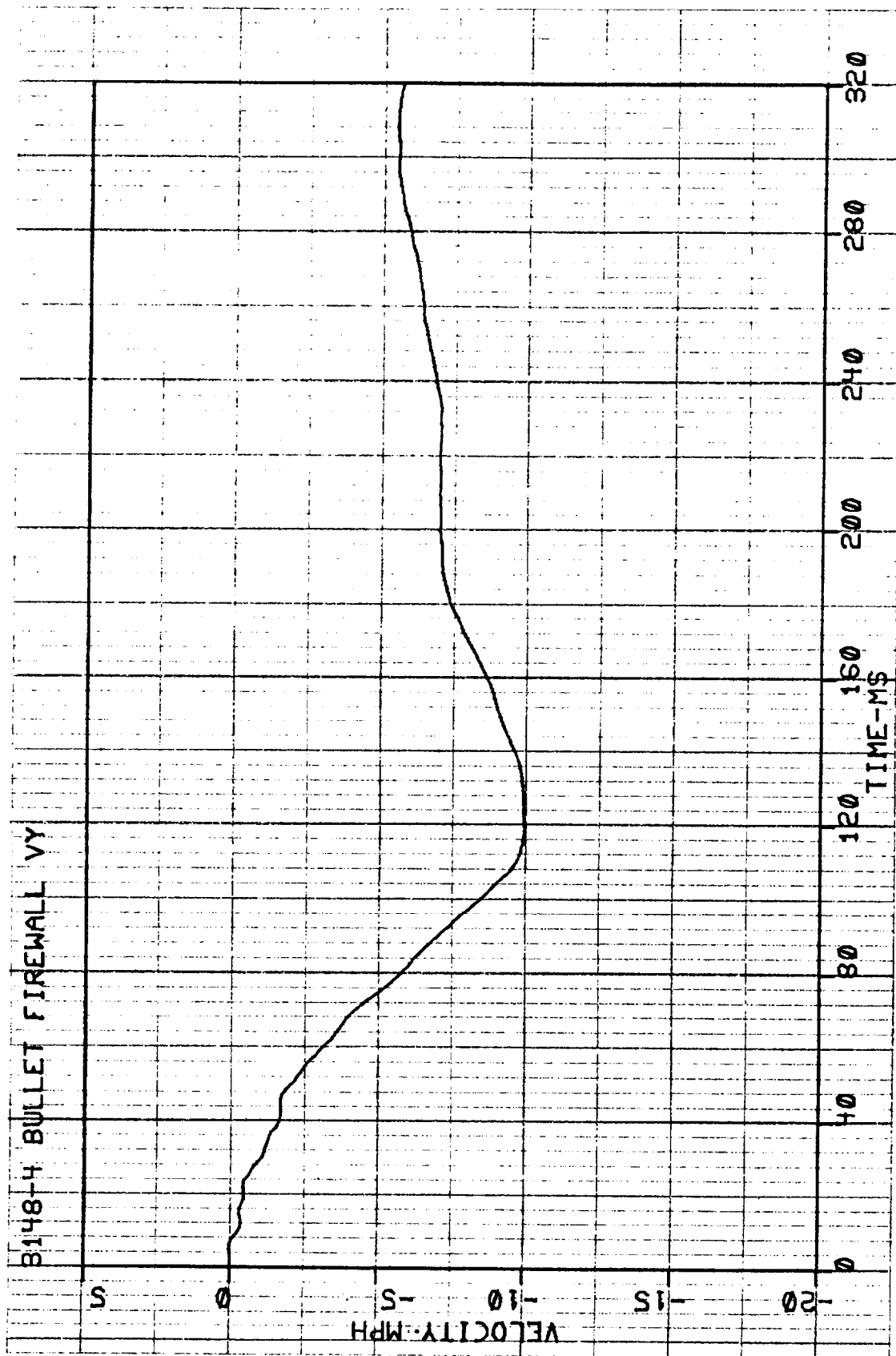


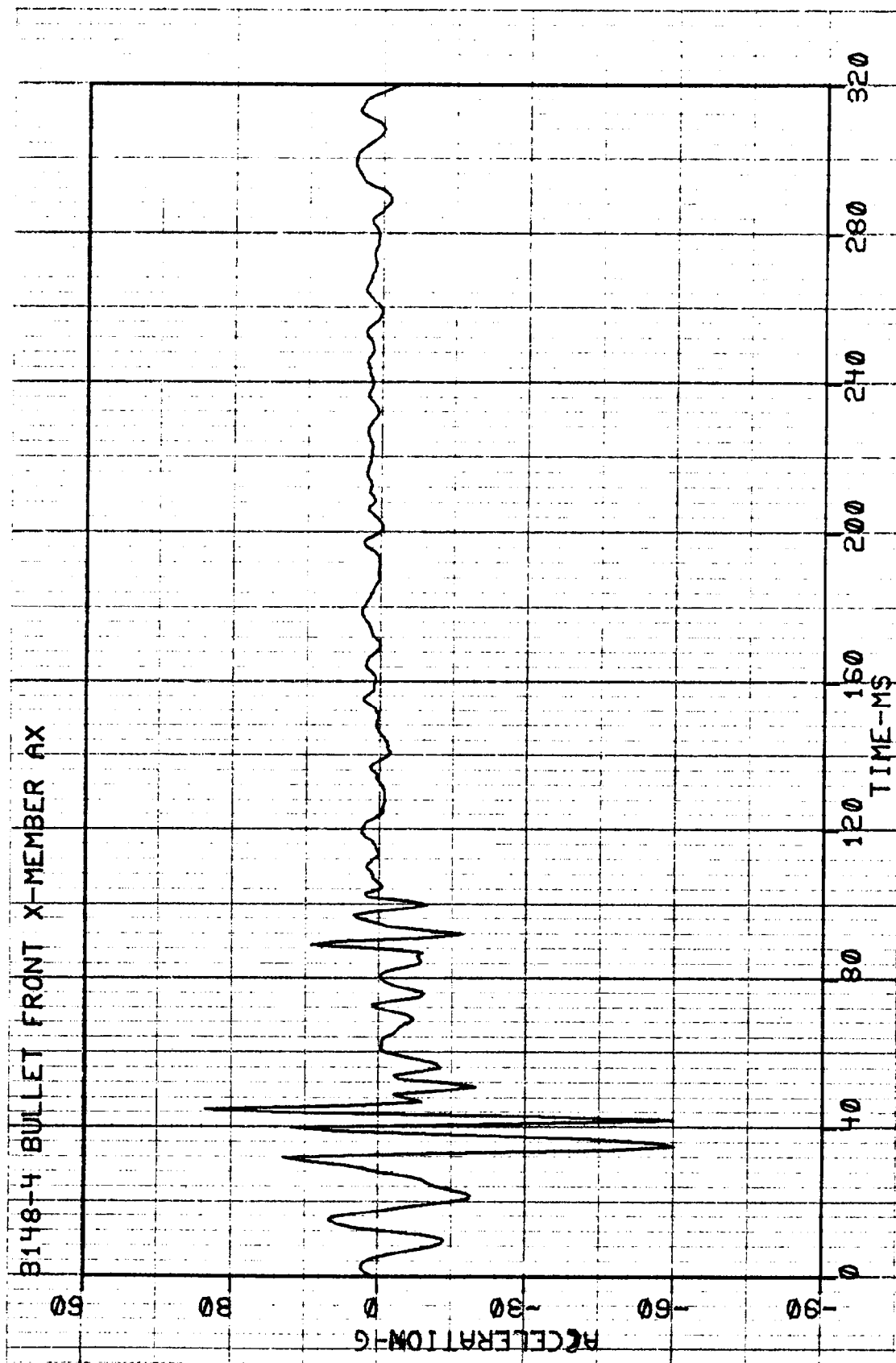


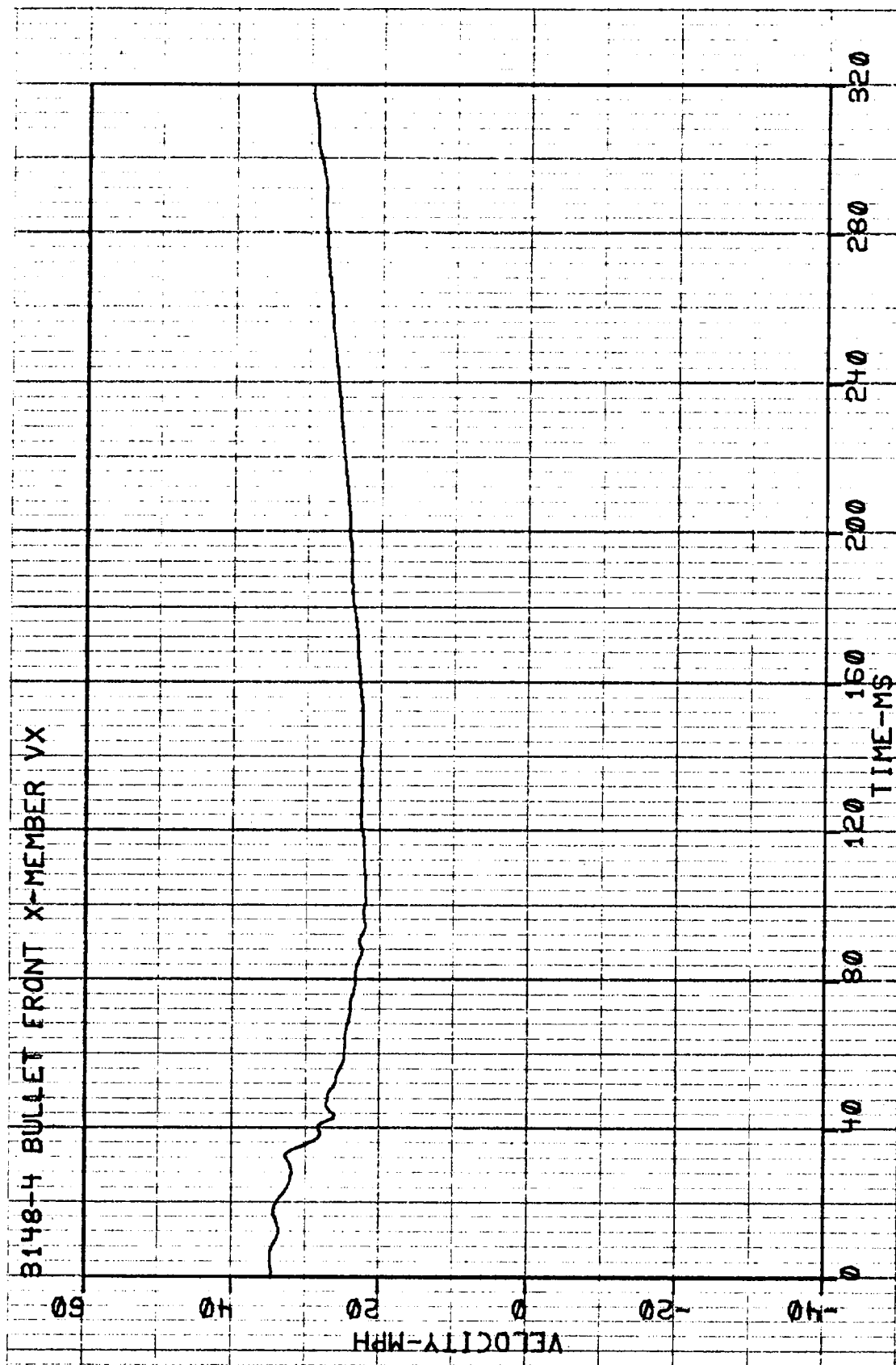


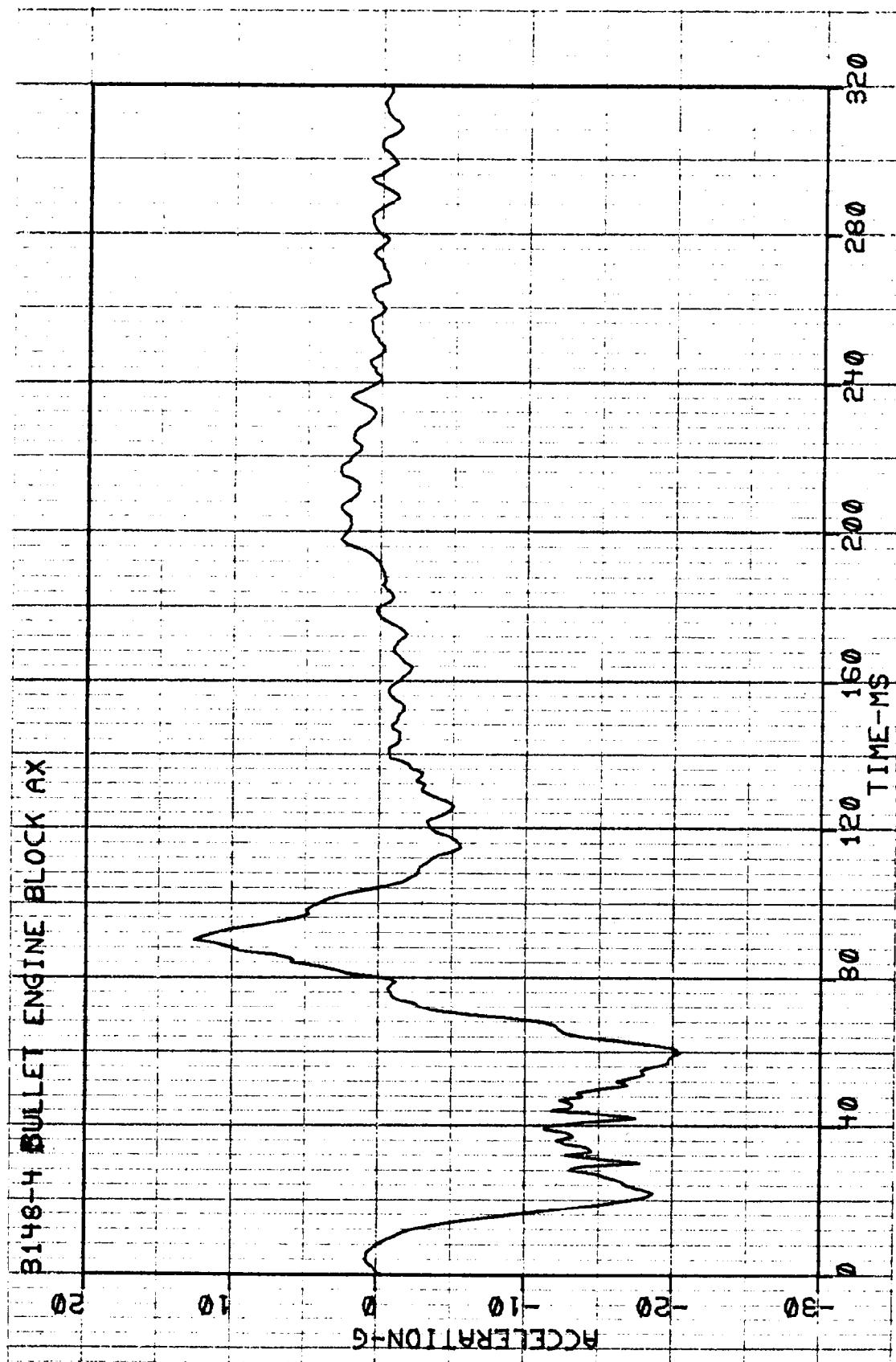


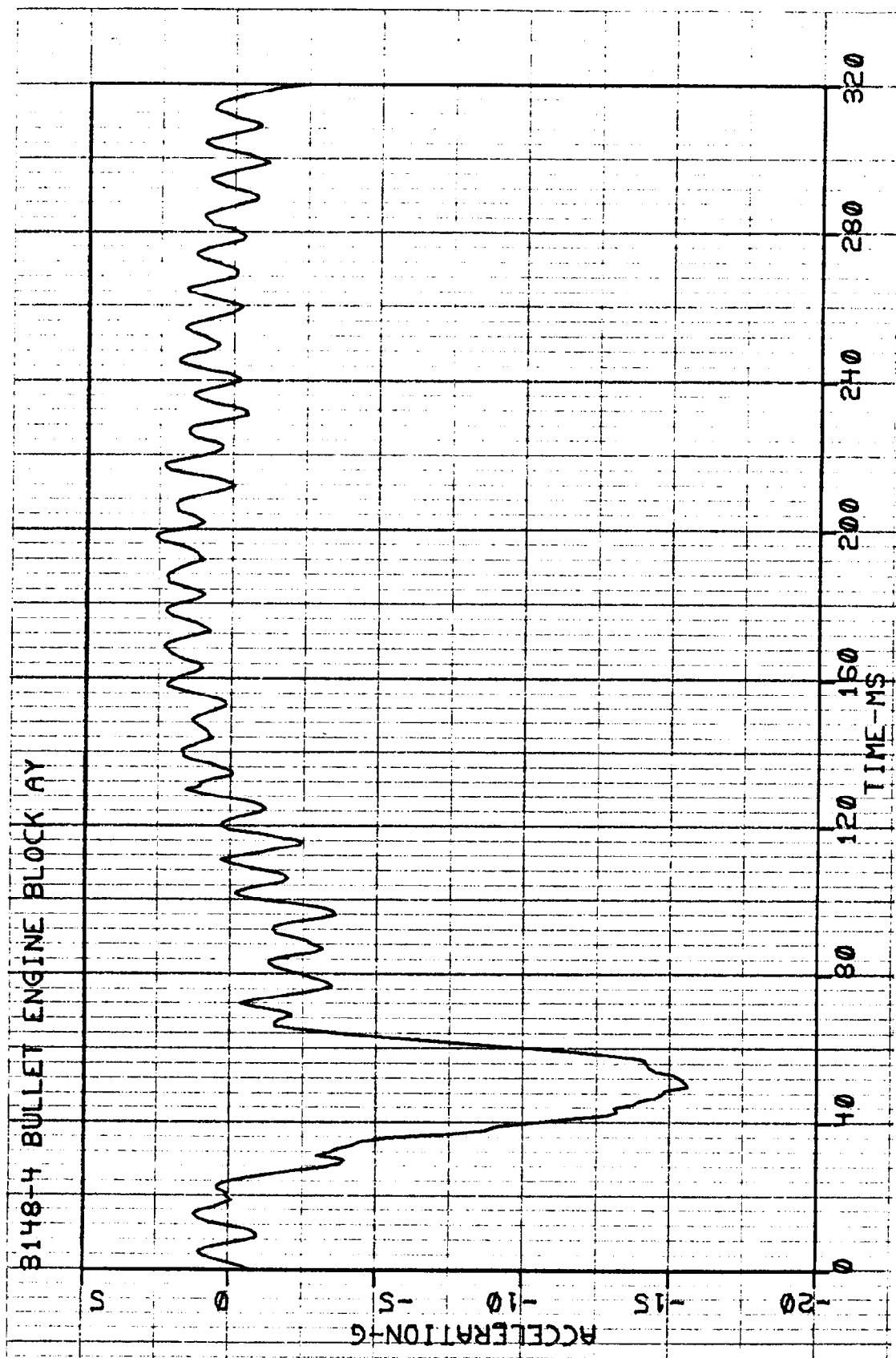


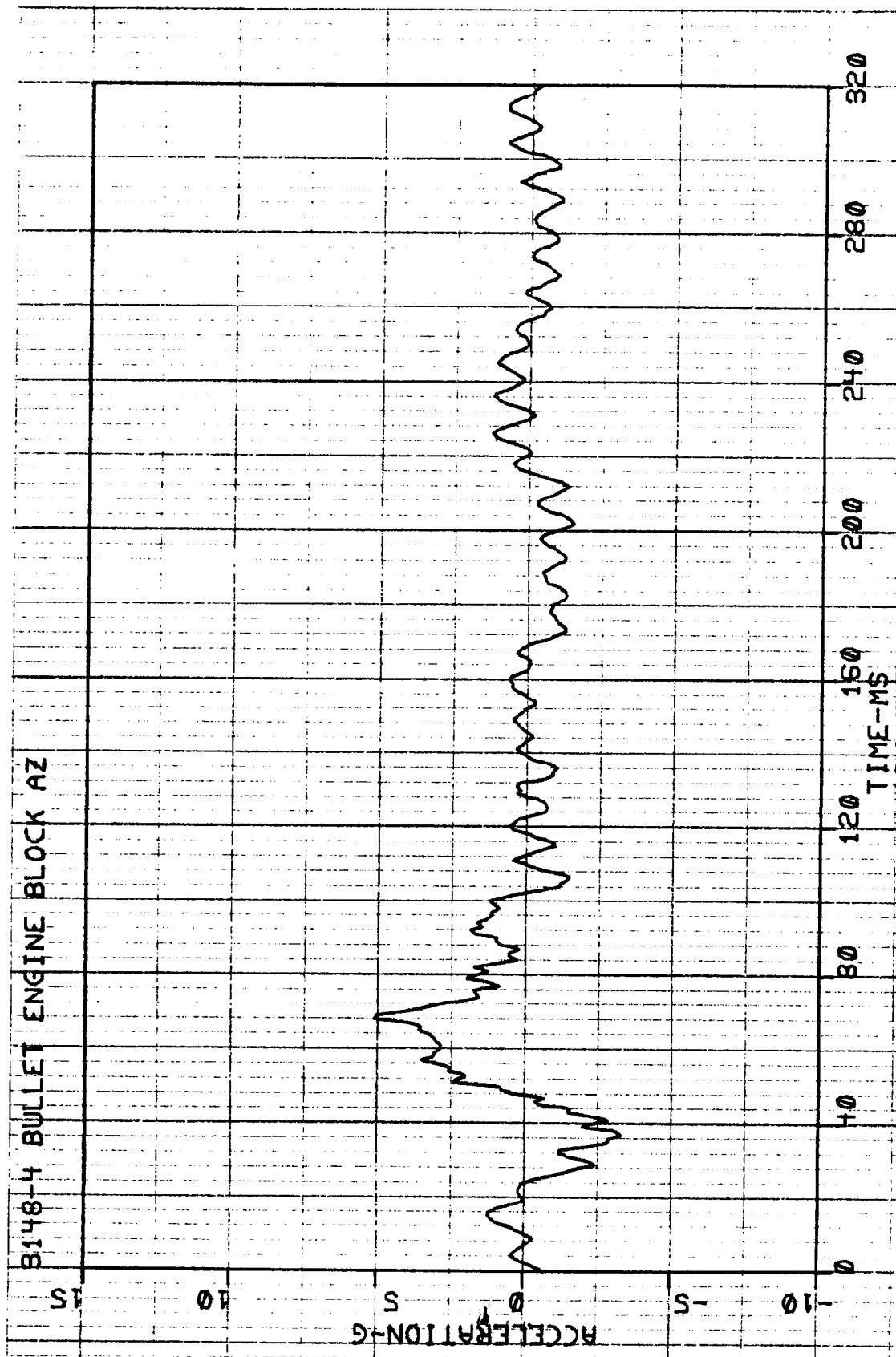


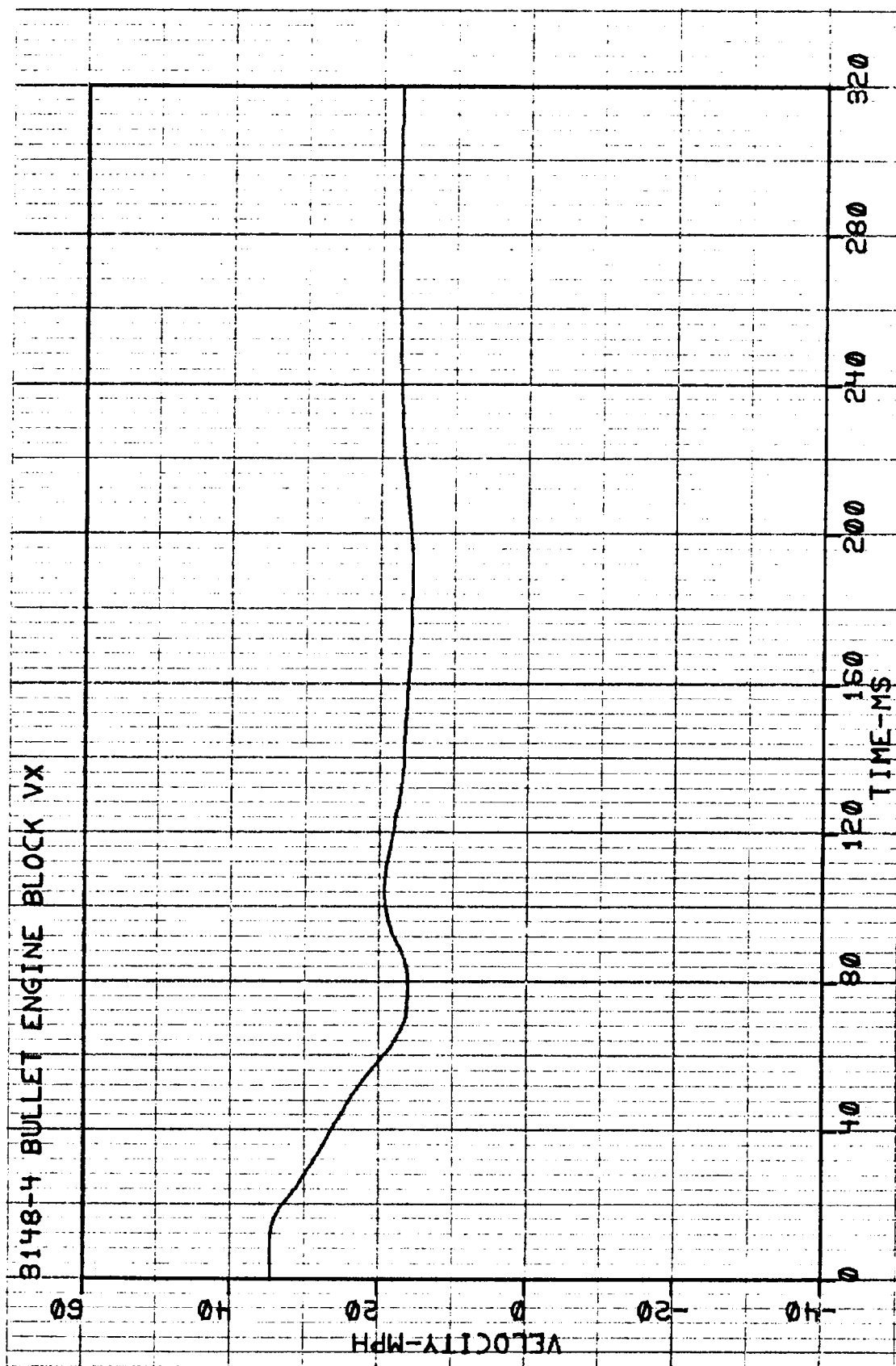


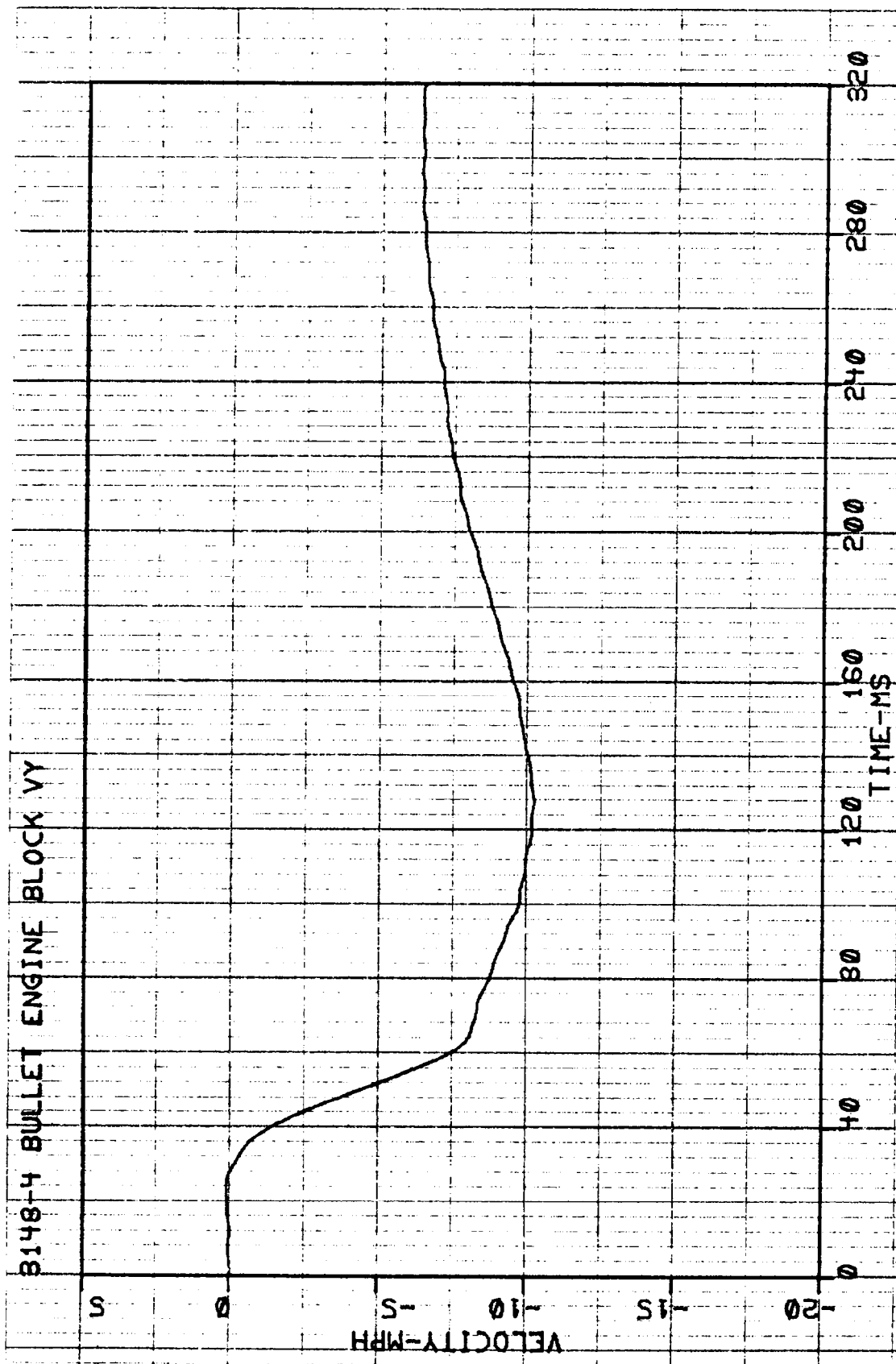


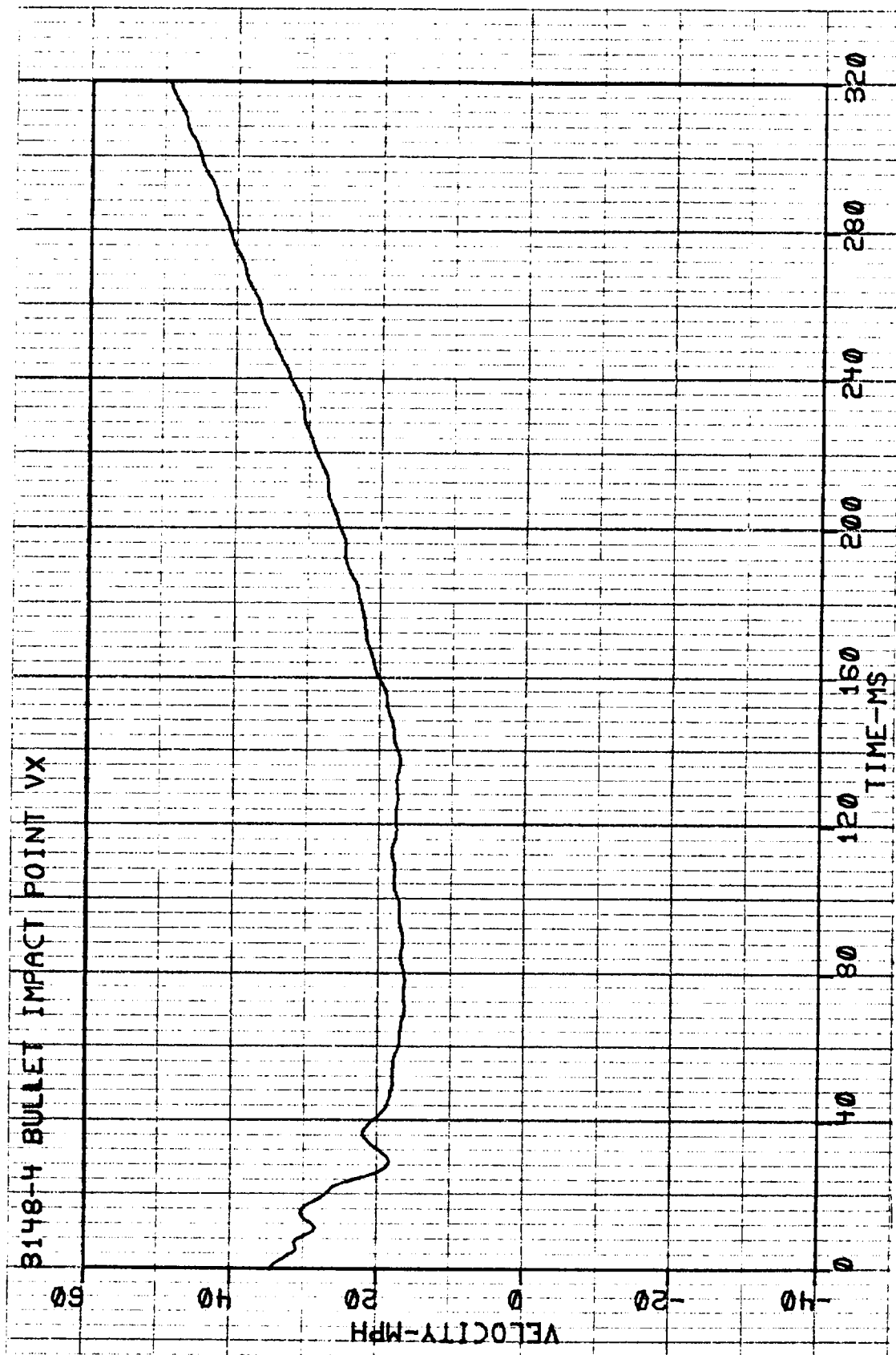


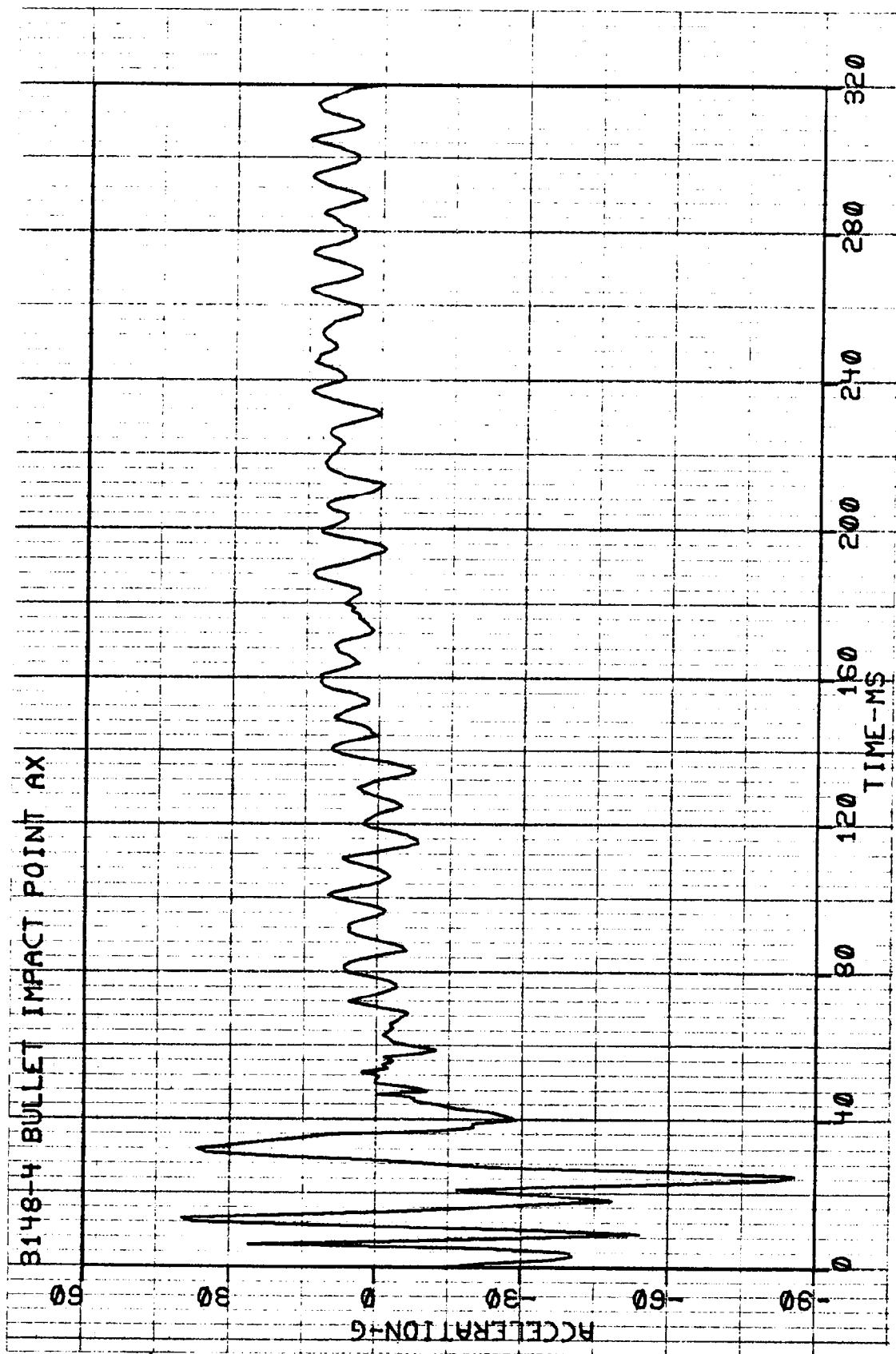












APPENDIX C
DUMMY CALIBRATION DATA
FOR HSRI 122 AND SID 7
90° SIDE IMPACT TO
1981 CHEVROLET CITATION
AT 34.56
TO 1982 VOLKSWAGEN RABBIT
AT 17.6 MPH

