

**NEW VEHICLE ASSESSMENT FOR
SIDE IMPACT PROTECTION**

**CAR-TO-CAR SIDE IMPACT TESTING
26.5° CRABBED SIDE IMPACTOR TO
1982 VOLKSWAGEN RABBIT
2-DOOR HATCHBACK
AT 39.6 MPH**

Prepared by:

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**TEST REPORT
FEBRUARY 1983**

Prepared for:

**U.S. DEPARTMENT OF TRANSPORTATION
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400 SEVENTH STREET, S.W.
WASHINGTON, D.C. 20590**

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Approved by Rod Garn

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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	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
m	meters	1.1	yards	yd
km	kilometers	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	
	(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

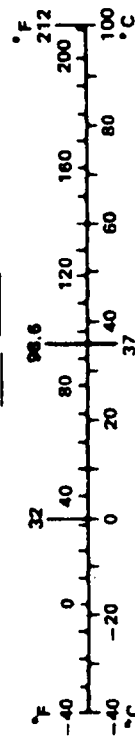


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1.0 PURPOSE AND TEST INTRODUCTION

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 deformable moving barrier-to-stationary vehicle crash test was conducted at the Dynamic Science side impact facility on January 19, 1983. The 26.5 degree side impactor was accelerated to a test speed of 39.60 mph and allowed to impact the left side of a stationary 1982 Volkswagen Rabbit, such that the left front corner of the side impactor contacted the target vehicle 37 inches forward of the midpoint of the centerline of the front and rear wheels. This test simulated a two vehicle moving, 90 degree impact with the side impactor moving at 35.4 mph and the target vehicle moving at 17.7 mph.

Section 2 contains general test and vehicle parameter data. Section 3 contains occupant and vehicle response data. Appendix A contains pre-test and post-test vehicle and dummy photographs. Appendix B contains Calcomp plots. Appendix C contains dummy certification data.

2.0 GENERAL TEST AND VEHICLE PARAMETER DATA

The following data sheets describe the General Test and Vehicle Parameter Data.

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. 1301 Color: Black

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagen of America
 Date of Manufacture: 3/82 ; VIN: 1VWBA0179CV069484
 GVWR: 2822 lb; GAWR: Front = 1609 lb; Rear = 1275 lb

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL

Vehicle Capacity: FRONT REAR RECOMMENDED LOAD RANGE:
 Tire Pressure: 27 psi 27 psi TIRE SIZE: Standard
 Type of Seats: Bucket P155/80R-13
 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 cu. in. Displacement
 Transmission: 4 Speed Manual Front Wheel Drive
 Date Vehicle Received by Laboratory: 10/26/82 ; Odometer 1014
 Dealer Name & Address: Biddulph VW/Fiat/Lancia,
4434 W. Glendale Ave, Glendale, AZ

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

Right Front = 628 lb Right Rear = 358 lb
 Left Front = 616 lb Left Rear = 345 lb
 TOTAL FRONT WEIGHT = 1244 lb (64 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 703 lb (36 % of Total Vehicle Weight)
 TOTAL DELV. WEIGHT = 1947 lb

TARGET WEIGHT = UDW + Cargo Load + 328 lbs Dummies = 2460 lb

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 197 LB CARGO:

Right Front = 661 lb Right Rear = 511 lb
 Left Front = 713 lb Left Rear = 587 lb
 TOTAL FRONT WEIGHT = 1374 lb (56 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1098 lb (44 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 2472 lb
 Weight of ballast secured in vehicle trunk area = 0 lb

VEHICLE ATTITUDE: (inches)

Delivered Attitude: RF 27 LF 27 RR 27 LR 27
 Test Attitude: RF 26-3/4 LF 26-1/2 RR 25 LR 24-3/8

REMARKS: _____

GENERAL TEST AND VEHICLE PARAMETER DATA (CONT)

POST-IMPACT DATA

Type of Test: Side (90°) Impact
 Date of Test: 1/19/83 Time: 1357 Temperature 56 °F
 Required Impact Velocity Range: 44.2 to 45.2 mph
 Impact Velocity: Primary = 39.60 mph Secondary = 39.67 mph
 Temperature in Occupant Compartment: 77 °F
 Windshield Moulding Temperature: 56 °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>59.4</u>	B	<u>60.2</u>	C	<u>63.2</u>
	Post-test = A	<u>43.5</u>	B	<u>44.5</u>	C	<u>58.6</u>
	Crush = A	<u>15.9</u>	B	<u>15.7</u>	C	<u>4.6</u>

26.5 Degree Crabbed Side Impactor Weight 3011 pounds.

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

GLAZING DAMAGE

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

OTHER NOTABLE IMPACT EFFECTS: Both seatbacks 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. Left front axle is bent on Volkswagen. Wheels are turned to right.

3.0 DATA REQUIRED BY OAR AND R&D

This section of the report contains all data required by OAR and R&D. This includes test conditions, dummy position measurements, dummy injury criteria values, pre- and post-test vehicle measurements, accelerometer locations and data summary, and the photoinstrumentation camera location and specification summary. Also contained in this section are the dummy damage data sheets and a "Test Anomalies and Loss of Data Channels" summary.

Pertinent photographs are presented in Appendix A. Calcomp plots of dummy and vehicle accelerometer data are presented in Appendix B.

POST SIDE IMPACT DATA SHEET

POST-IMPACT DATA

Type of Test: Side (90°) Impact Left (Driver's) Side

Date of Test: 1/19/83 Time: 1357 Temperature 56 °F

NHTSA No.: R&D VIN: LVWBA0179CV069484

Required Impact Velocity Range: 44.2 to 45.2 mph

Impact Velocity: Primary = 39.60 mph Secondary = 39.67 mph

Vehicle Static Crush: Amount of Crush = 16.4 inches on left side

Other Notable Impact Effects: Both seatbacks 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 left side forced upward. Left front axle is bent on Volkswagen. Wheels are turned to right.

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. 1301

Color: Black

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagen of America

Date of Manufacture: 3/82

VIN: 1VWBA0179CV069484

GVWR: 2822 lb;

GAWR:

Front = 1609 lb;

Rear = 1278 lb

POST-IMPACT DATA

Type of Test: Side (90°) Impact

Date of Test: 1/19/83

Time: 1357

Temperature 56 °F

Required Impact Velocity Range: 44.2 to 45.2 mph

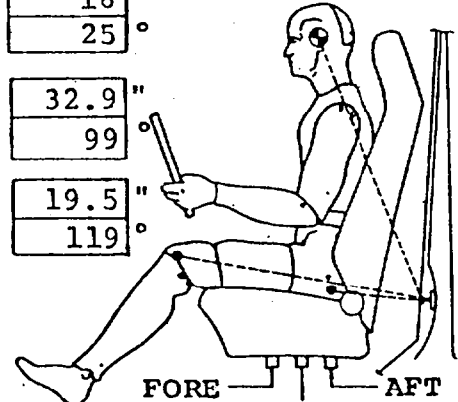
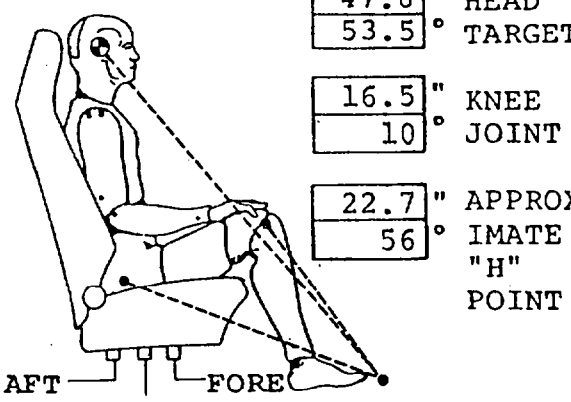
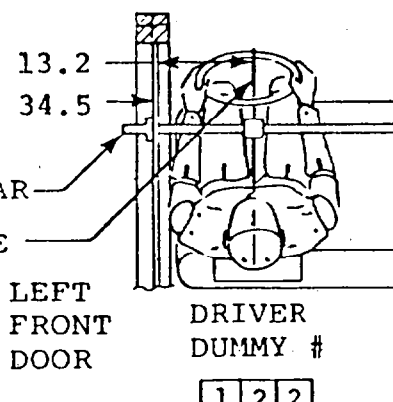
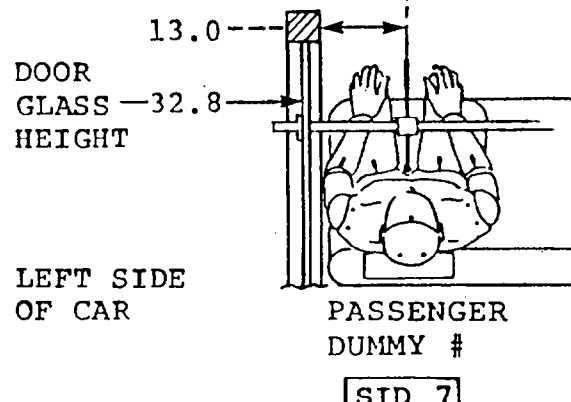
Impact Velocity: Primary = 39.60 mph Secondary = 39.67 mph

Seat Type: Bucket

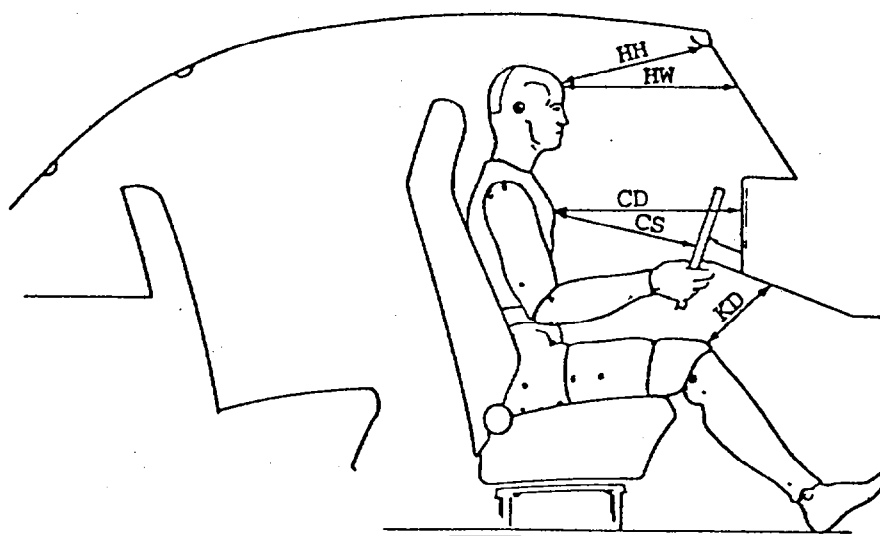
Adjuster Type: Manual

Bucket Seat Type Back: High back (27° with vert.)

Technicians: M. Rodack, C. Brugaletta

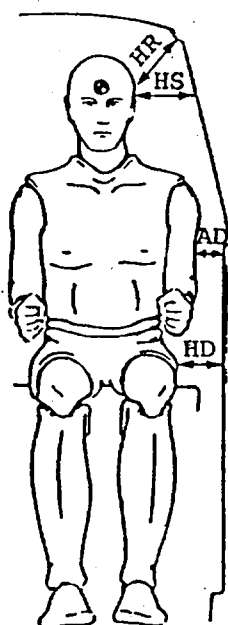
DRIVER DUMMY# 1 2 2 HEAD TARGET 18 " 25 ° KNEE JOINT 32.9 " 99 ° APPROXIMATE "H" POINT 19.5 " 119 ° 	PASSENGER DUMMY # SID 7 47.8 " HEAD 53.5 ° TARGET 16.5 " KNEE 10 ° JOINT 22.7 " APPROXIMATE "H" POINT 56 ° 
DOOR * 13.2 GLASS HEIGHT 34.5 LATERAL BAR ADJUSTABLE POINTER LEFT FRONT DOOR DRIVER DUMMY # 1 2 2 	13.0 DOOR GLASS HEIGHT 32.8 LEFT SIDE OF CAR PASSENGER DUMMY # SID 7 

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



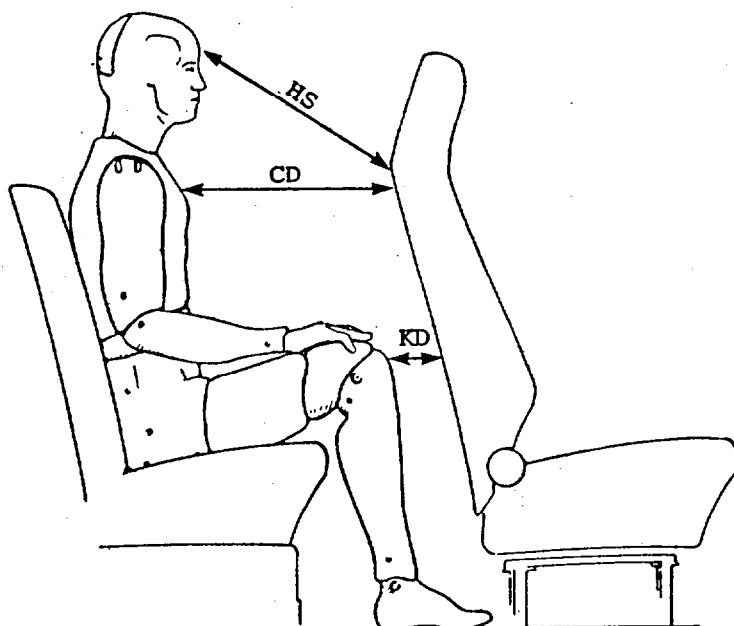
301

HH = 19.0 INCHES
 HW = 26.0 INCHES
 CD = 21.0 INCHES
 CS = 13.4 INCHES
 KD = 2.9 INCHES/2.8 INCHES

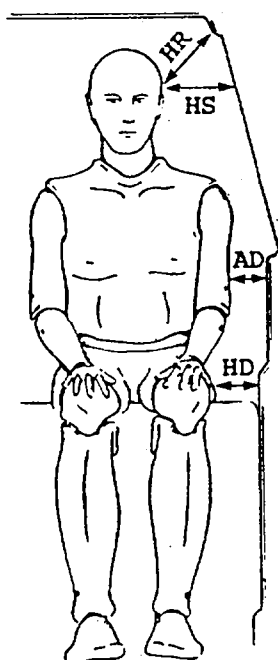


HR = 8.0 INCHES
 HS = 8.4 INCHES
 AD = 3.3 INCHES
 HD = 6.0 INCHES

DRIVER CLEARANCE DIMENSIONS



HS = 22.0 INCHES
 CD = 16.0 INCHES
 KD = 2.6 INCHES/2.5 INCHES



HR = 6.9 INCHES
 HS = 7.6 INCHES
 AD = 3.4 INCHES
 HD = 6.0 INCHES

REAR PASSENGER CLEARANCE DIMENSIONS

SIDE IMPACT DUMMY RESPONSE SUMMARY

TEST NO. 3144-6 TEST DATE 1/19/83

TEST CONFIGURATION:

Target Vehicle	<u>1982 VW Rabbit</u>	Speed	<u>0.0 mph</u>
Bullet Vehicle	<u>26.5° Crabbed Side Impactor</u>	Speed	<u>39.60 mph</u>
Impact Location	<u>Left edge of barrier face 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	17.6	57	62.1	86
Lateral	65.0	49	19.9	35
Vertical	74.2	60	26.5	95
Resultant	77.3	86	-	-
HIC	680.97 Between 40.4 and 91.6 ms			

CHEST RESPONSE:

DEFLECTION (IN.): LRDY 1.85 in. @ 50 ms

Location	Pk A (G @ ms)		3ms Clip (G)	SI	ΔV_y (MPH)	Impact Time (ms)
	+	-				
Upper Thorax						
Longitudinal	50.4 @ 32	53.8 @ 36	-	-	-	-
Lateral (P)	284.3 @ 32	205.1 @ 58	156.2	-	35.1	20
Lateral (R)	178.3 @ 34	113.5 @ 56	138.3	-	33.8	20
Vertical	52.0 @ 32	61.9 @ 58	-	-	-	-
Resultant	287.6 @ 32	-	162.0	4142	-	-
Resultant (R)	183.8 @ 35	-	145.3	2518	-	-
Lower Thorax						
Longitudinal	119.3 @ 32	84.7 @ 34	-	-	-	-
Lateral (P)	171.1 @ 30	162.3 @ 57	145.2	-	41.2	16
Lateral (R)	153.5 @ 29	102.3 @ 48	131.7	-	38.3	15
Vertical	76.2 @ 57	155.6 @ 58	-	-	-	-
Resultant	195.6 @ 33	-	160.9	3846	-	-
Resultant (R)	199.9 @ 32	-	145.1	3326	-	-
Left Upper Rib						
Lateral (P)	183.0 @ 31	25.1 @ 67	152.9	-	31.0	22
Lateral (R)	196.9 @ 29	25.0 @ 34	159.5	-	28.8	19
Left Lower Rib						
Lateral (P)	174.5 @ 31	14.1 @ 52	152.9	-	34.6	20
Lateral (R)	173.4 @ 29	14.1 @ 48	145.8	-	28.9	18

SIDE IMPACT DUMMY RESPONSE SUMMARY (Continued)

PELVIS RESPONSE

	Positive Peak (G)	ms	Negative Peak (G)	ms
Longitudinal	46.4	32	66.2	30
Lateral	243.8	24	28.5	39
Vertical	50.6	32	48.9	30
Resultant	245.5	24	-	-
ΔV_y <u>32.4</u> mph	SI. <u>3679</u>		Contact Time <u>16</u>	ms

COMMENTS: No damage recorded during post-test inspection of dummy.

SIDE IMPACT DUMMY RESPONSE SUMMARY

TEST NO. 3144-6 TEST DATE 1/19/83

TEST CONFIGURATION:

Target Vehicle	<u>1982 VW Rabbit</u>	Speed	<u>0.0 mph</u>
Bullet Vehicle	<u>26.5° Crabbed Side Impactor</u>	Speed	<u>39.60 mph</u>
Impact Location	<u>Left edge of barrier face struck 37 inches forward of the</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	36.4	195	24.9	59
Lateral	165.7	47	15.0	34
Vertical	36.0	40	49.4	54
Resultant	167.4	47	-	-
HIC	988.45 Between 44.6 and 51.8 ms			

CHEST RESPONSE:

DEFLECTION (IN.): LRDY 2.36 in. @ 50 ms

Location	Pk A (G @ ms)		3ms Clip (G)	SI	ΔV_y (MPH)	Impact Time (ms)
	+	-				
Upper Thorax						
Longitudinal	82.3 @ 31	158.7 @ 33	-	-	-	-
Lateral (P)	92.0 @ 44	38.0 @ 51	77.4	-	22.7	23
Lateral (R)	84.7 @ 43	69.5 @ 31	73.7	-	21.4	24
Vertical	73.3 @ 33	57.0 @ 31	-	-	-	-
Resultant	175.0 @ 33	-	89.7	1379	-	-
Resultant (R)	175.5 @ 33	-	97.5	1299	-	-
Lower Thorax						
Longitudinal	41.3 @ 95	169.4 @ 30	-	-	-	-
Lateral (P)	115.6 @ 35	46.4 @ 32	95.1	-	29.3	16
Lateral (R)	206.8 @ 32	67.7 @ 30	104.1	-	35.9	16
Vertical	84.8 @ 33	80.7 @ 42	-	-	-	-
Resultant	177.2 @ 30	-	109.4	1564	-	-
Resultant (R)	212.9 @ 32	-	125.6	2358	-	-
Left Upper Rib						
Lateral (P)	132.8 @ 31	23.1 @ 52	106.7	-	27.2	21
Lateral (R)	117.4 @ 30	21.1 @ 35	93.9	-	22.8	19
Left Lower Rib						
Lateral (P)	184.7 @ 29	19.9 @ 56	153.6	-	30.2	19
Lateral (R)	178.8 @ 29	29.0 @ 34	136.3	-	30.6	22

SIDE IMPACT DUMMY RESPONSE SUMMARY (Continued)

PELVIS RESPONSE

	Positive Peak (G)	ms	Negative Peak (G)	ms
Longitudinal	21.2	26	63.3	30
Lateral	153.6	26	21.6	95
Vertical	45.8	25	116.8	33
Resultant	160.3	25	-	-
V _y 35.3 mph	SI 1879		Contact Time 15	ms

COMMENTS: Sid 7 was utilized as the left rear passenger. Post-test inspection revealed the left side ribs to be bent. Heim joint slightly bent, jacket torn near zipper.

TEST VEHICLE EXTERIOR PROFILES AND STATIC CRUSH

Zero Distance Starting at DDR (IN.)

R.P.* Height

Location	30	24	18	12	6	0	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
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Pre-test Profile (Distance from R.P. - in.)

Axle Height	19.5	X	X	X	X	11.7	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	-
DOR	26.0	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	-
Door Center	29.5	9.9	-	-	9.2	9.9	10.0	9.8	9.9	9.7	9.7	9.6	9.6	9.6	9.7	9.8	10.0	8.6	8.4	8.6	11.3	12.2
Window Sill	43.0	-	-	12.1	11.8	11.6	11.6	11.5	11.6	11.4	11.5	11.3	11.4	11.3	11.4	11.7	11.8	12.0	12.2	12.7	13.7	-
Window Top	60.0	-	-	-	-	-	-	-	18.5	18.0	18.3	18.1	18.0	17.8	17.9	18.2	18.5	18.5	-	-	-	-

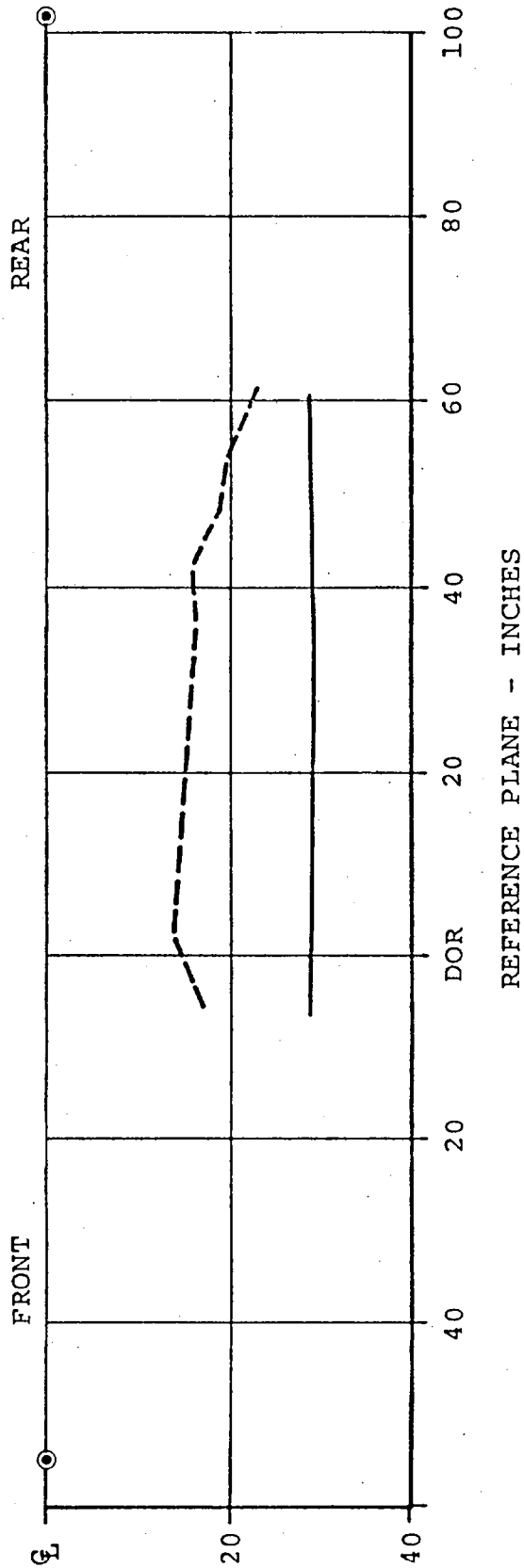
Post-test Profile (Distance from R.P. - in.)

Axle Height	23.0	X	X	X	X	22.9	23.8	25.8	25.0	24.7	24.4	23.9	23.5	23.1	21.9	20.1	17.8	X	X	X	X	-
DOR	28.8	X	X	X	X	22.8	26.2	26.5	26.5	26.3	26.2	26.0	25.2	25.6	25.1	24.4	22.1	X	X	X	X	-
Door Center	32.5	11.8	-	-	16.3	20.3	24.4	24.1	23.8	24.0	24.0	24.0	23.8	23.8	24.3	23.2	23.1	16.1	13.0	11.2	12.0	12.2
Window Sill	43.0	-	-	14.0	14.9	15.6	21.1	21.7	22.7	22.9	23.1	23.5	23.5	24.0	24.7	24.5	21.4	18.2	13.0	12.3	12.5	13.1
Window Top	57.5	-	-	-	-	-	-	-	20.6	20.2	20.3	20.6	20.2	20.0	19.6	19.4	19.1	19.0	18.8	-	-	-

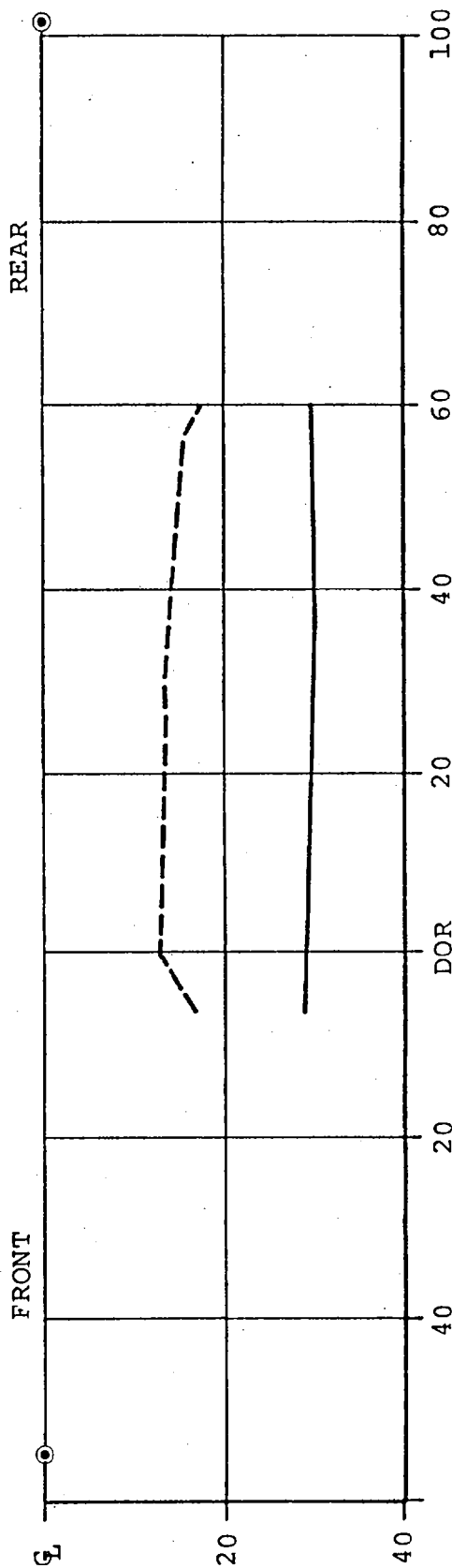
Post-test Static Crush (in.)

Axle Height	X	X	X	X	X	11.2	14.0	14.1	13.3	13.0	12.7	12.2	11.7	11.3	10.1	8.3	6.1	X	X	X	X	-
DOR	X	X	X	X	X	12.6	15.9	16.4	16.4	16.4	16.3	16.1	15.3	15.7	15.0	14.2	11.8	X	X	X	X	-
Door Center	1.9	-	-	-	7.1	10.4	14.4	14.3	13.9	14.3	14.3	14.4	14.2	14.2	14.6	13.5	13.1	7.5	4.6	2.6	0.7	0.0
Window Sill	-	-	1.9	3.1	4.0	9.5	10.2	11.1	11.5	11.6	12.2	12.1	12.7	13.4	13.1	9.7	6.4	1.0	0.1	-0.2	-0.6	-
Window Top	-	-	-	-	-	-	-	-	2.1	2.2	2.0	2.5	2.1	2.0	1.8	1.5	0.9	0.5	0.3	-	-	-

*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.

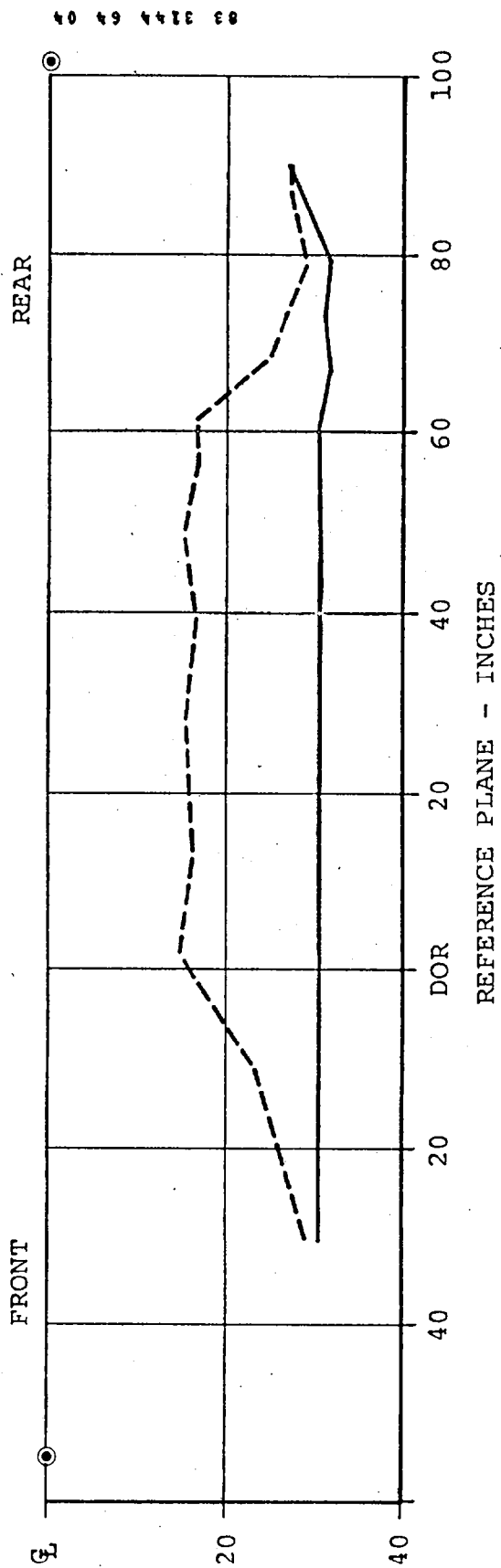


EXTERIOR VEHICLE PROFILE AND STATIC CRUSH MEASUREMENTS - AXLE HEIGHT - 26.5 DEGREE
CRABBED SIDE IMPACTOR TO 1982 VOLKSWAGEN RABBIT - 39.6 MPH.

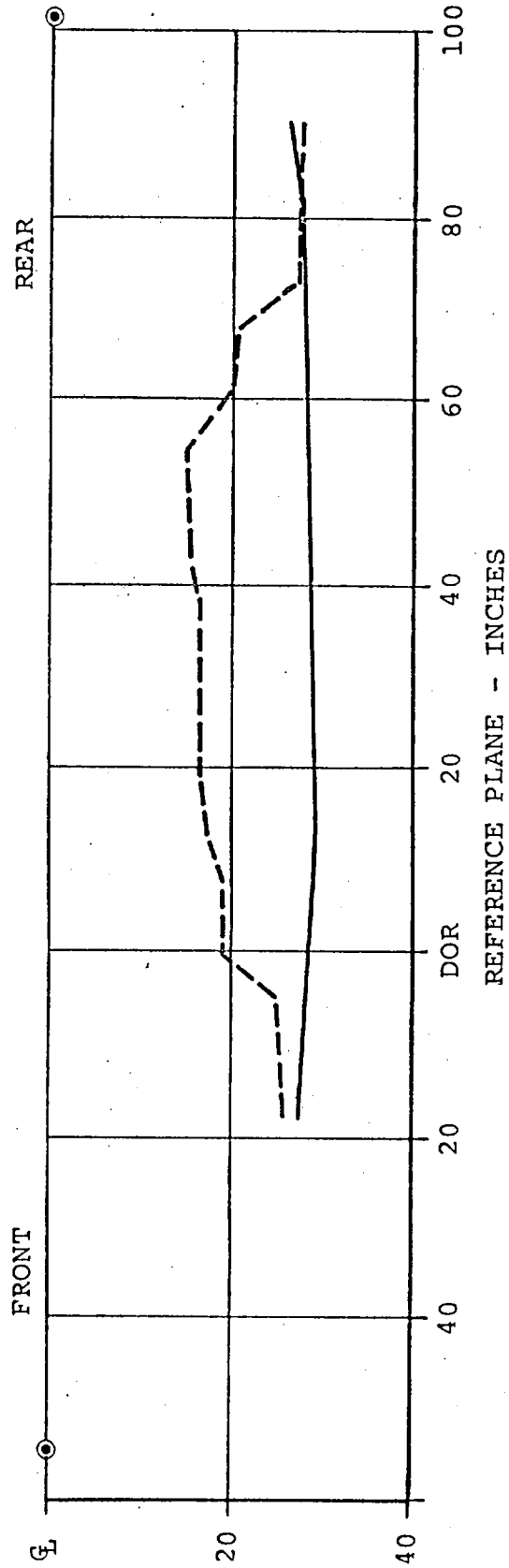


REFERENCE PLANE - INCHES

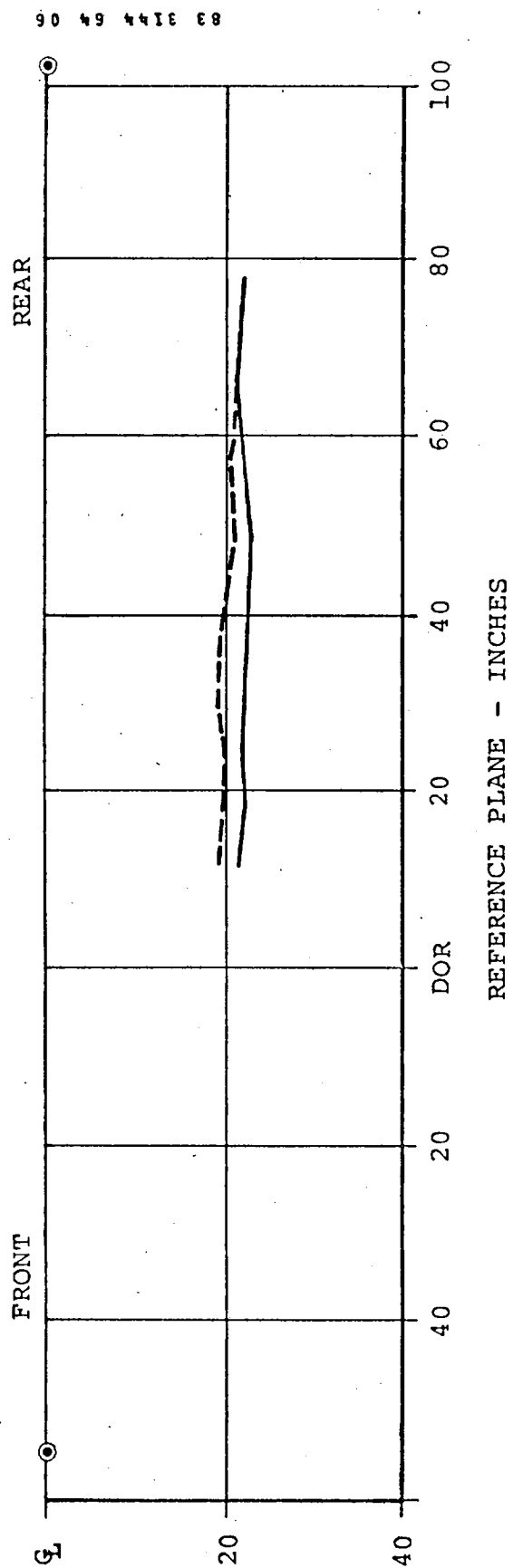
EXTERIOR VEHICLE PROFILE AND STATIC CRUSH MEASUREMENTS - DOR HEIGHT - 26.5 DEGREE CRABBED
SIDE IMPACTOR TO 1982 VOLKSWAGEN RABBIT - 39.6 MPH.



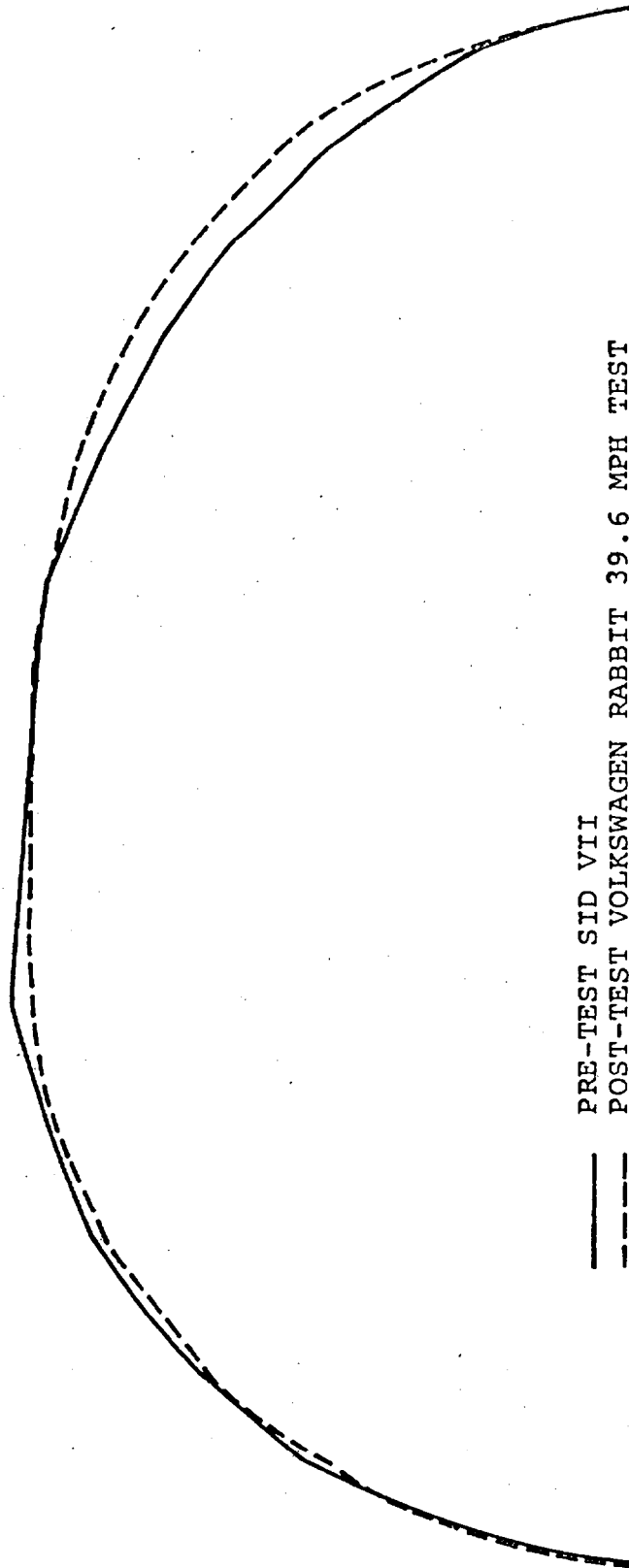
EXTERIOR VEHICLE PROFILE AND STATIC CRUSH MEASUREMENTS - MID-DOOR HEIGHT - 26.5 DEGREE
 CRABBED SIDE IMPACTOR TO 1982 VOLKSWAGEN RABBIT - 39.6 MPH.

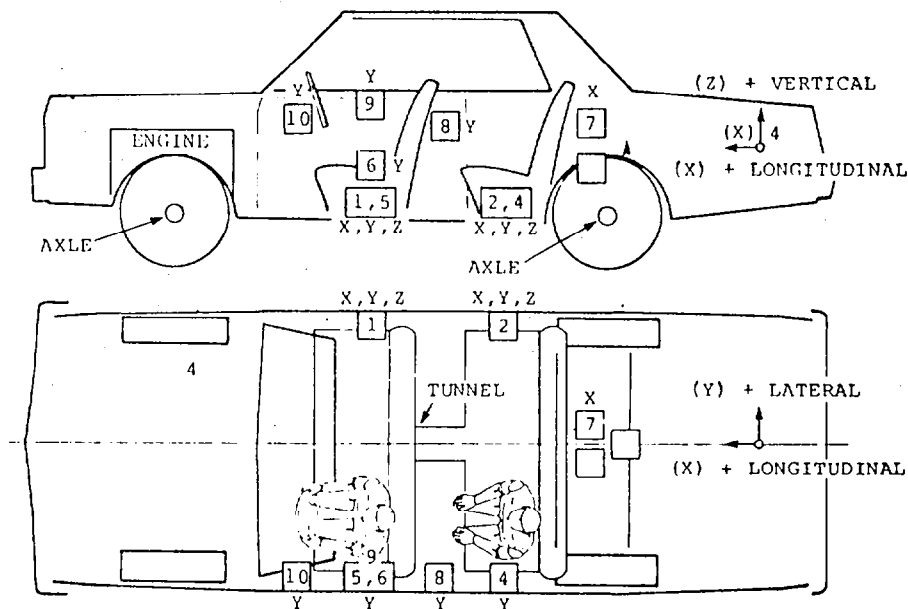


EXTERIOR VEHICLE PROFILE AND STATIC CRUSH MEASUREMENTS - WINDOW SILL LEVEL - 26.5 DEGREE CRABBED SIDE IMPACTOR TO 1982 VOLKSWAGEN RABBIT - 39.6 MPH.



EXTERIOR VEHICLE PROFILE AND STATIC CRUSH MEASUREMENTS - WINDOW TOP LEVEL - 26.5 DEGREE
CRABBED SIDE IMPACTOR TO 1982 VOLKSWAGEN RABBIT - 39.6 MPH.



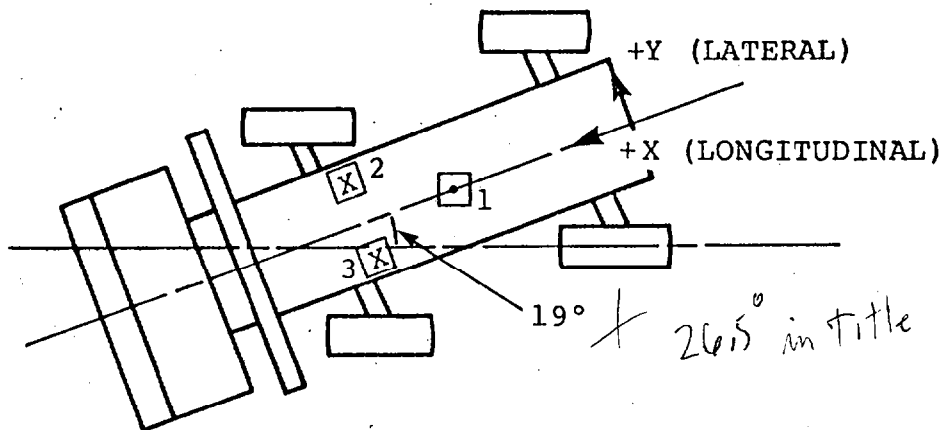


TEST VEHICLE ACCELEROMETER LOCATIONS AND PHYSICAL COORDINATES

No.	Description of Location	X*	Y*	Z*	Positive		Negative	
					G	MS	G	MS
1	Right sill next to front seat							
	(Longitudinal)	77.4	22.3	11.2	5.3	61	9.2	15
	(Lateral)	V = 19.0 mph			31.5	33	4.1	87
	(Vertical)				14.5	30	9.4	41
2	Right sill next to rear seat							
	(Longitudinal)	56.8	22.8	9.8	5.4	61	9.6	15
	(Lateral)	V = 19.4 mph			25.7	33	3.2	110
	(Vertical)				10.6	30	6.9	61
3	Deck over rear axle							
	(Longitudinal)	30.0	2.0	14.5	3.7	62	11.4	30
	(Lateral)	V = 23.6 mph			26.6	37	3.1	110
	(Vertical)				5.8	60	15.9	20
4	Left sill next to rear seat							
	(Lateral)	56.4	23.4	10.5	54.0	4	27.8	22
		V = 22.5 mph						
5	Left sill next to front seat							
	(Lateral)	77.5	23.1	10.8	Sensor Damaged			
6	Left front door centerline							
	(Lateral)	77.2	25.5	23.8	184.6	10	105.4	21
		V = 28.0 mph						
7	Right rear compartment							
	(Longitudinal)	29.0	15.0	17.2	4.9	64	9.2	15
8	Midrear of left front door							
	(Lateral)	54.9	25.8	23.8	63.2	23	53.5	29
		V = 6.7 mph						
9	Upper left front door centerline							
	(Lateral)	74.7	25.8	32.8	124.6	14	150.4	25
		V = 17.2 mph						
10	Midfront of left front door							
	(Lateral)	94.5	25.8	23.8	62.9	3	36.3	20
		V = 15.4 mph						

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

VEHICLE ACCELEROMETER LOCATIONS AND PHYSICAL COORDINATES



83 3144 14 07

No.	Description of Location	X*	Y*	Z*	Positive		Negative	
					G	MS	G	MS
1	Center of gravity	76.0	0.0	13.25				
	(Longitudinal)	$\Delta V = 17.8$ mph			1.5	103	19.2	37
	(Lateral)	$\Delta V = 4.2$ mph			2.6	70	8.7	37
	(Vertical)	$\Delta V = 2.2$ mph			26.0	55	25.6	44
2	Left side frame	67.5	23.0	14.0				
	(Longitudinal)	$\Delta V = 19.5$ mph			2.0	22	21.4	37
3	Right side frame	67.5	23.0	14.0				
	(Longitudinal)	$\Delta V = 15.6$ mph			1.8	119	16.3	37

Crush Displacement Data 2.0 in. @ 64 ms

*Positive values are forward of rear frame of side impactor, right of vehicle centerline.

SUMMARY OF CAMERA LOCATIONS AND DESCRIPTIONS

Loc. No.	Location	Field of View	Camera Lens Angle	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	403 fps	100 Hz	M7	264 in.	450 in. 60 in.
2	Right side parallel to vehicle	Barrier contact - left side of vehicle	0°	17 mm	326 fps	100 Hz	LC 327	324 in.	462 in. 56.5 in.
3	Right side perpendicular to track	Left side of test vehicle	0°	25 mm	400 fps	100 Hz	LC 326	84 in.	798 in. 51.5 in.
4	Overhead	Barrier/vehicle contact	90°	10 mm	383 fps	100 Hz	M3	60 in.	48.5 in. 360 in.
5	Right side bullet vehicle	Real time documentary	0°	Var	24 fps	-	Scoopic	-	-
6	Onboard front	Left front occupant compartment (front)	0°	8 mm	357 fps	100 Hz	7	-	-
7	Onboard side front	Left front occupant compartment (side)	0°	8 mm	322 fps	103 Hz	12	-	-
8	Onboard side rear	Left rear occupant compartment (side)	0°	8 mm	362 fps	100 Hz	6	-	-
9	Onboard rear	Left rear occupant compartment (rear)	0°	8 mm	198 fps	99 Hz	4	-	-

TEST ANOMALIES AND LOSS OF DATA CHANNEL SUMMARY

The desired configuration for this test included a desired impact speed of 44.7 ± 0.5 mph to simulate a 40:20 mph, 90°, two car moving side impact. Although the test speed was less than nominal, a significant amount of damage was recorded for the test vehicle and the side impact dummy. After careful review of all data to this point, the CTM has re-directed that all future 40:20 mph simulations will be replaced with 35:17.5 mph simulations.

Damage to the side impact dummies for this test, as well as previously conducted tests are contained in the "Test Log of Anthropomorphic Test Device" forms contained in this report.

One data channel was lost during the conduct of this test. The cable connected to the accelerometer installed in the left sill near the front seat position was severed during the test event.

TEST LOG OF ANTHROPOMORPHIC TEST DEVICE

Contractor: Dynamic Science, Inc.

Contract Title: Car-to-Car Side Impact Testing

Contract No.: DTNH22-81-C-07113, T.O. 5

Contract Technical Manager: W.T. Hollowell

ATD Mfr.: ARL

ATD Serial No.: S1 D 7/174

Date Submitted:

Test Date	Test No.	Test Description*	$\Delta v,^{\dagger}$ mph	< ** deg.	Location and Description of Damage (if any)	Project Engineer
10/27/82	3144-00	Initial Inspection	-	-	Head skin indicates SN 175, pelvis indicates SN 174. Abdominal sack is damaged, shelf and outer skin torn	Michael T. Rodack 10/27/83
11/19/82	3144-2	LR Position, S.I. to VW Rabbit 600 side impact 2 car moving simulation	53.38	300	Left knee casting broken damper heim joint bent rib ballast on right side dented, rib displacement transducer installed for remaining tests.	Michael T. Rodack 1/3/83
1/5/83	3144-1	LR Position, S.I. to VW Rabbit 600 side impact 2 car moving simulation	34.23	300	Heim joint broken on damper shaft. Displacement pot shaft bent.	Michael T. Rodack 1/10/83
1/12/83	3144-5	LR Position, S.I. to VW Rabbit 900 side impact 2 car moving simulation	28.60	270	No damage recorder Leather backing replaced post-test.	Michael T. Rodack 1/14/83
1/19/83	3144-6	LR Position, S.I. to VW Rabbit 900 side impact 2 car moving simulation	39.60	270	Left side ribs bent (Attached are profiles) Heim joint bent, jacket is torn near zipper	Michael T. Rodack 1/21/83 ✓

* Describe, as: Pendulum Impact Simulator, sled wall, car door, restraint, etc. If vehicle test, indicate position of ATD in vehicle.
† If a sled test, the closing speed between vehicles immediately before impact.

** Head-on impact is defined as zero degrees. Other angles of impact measured counterclockwise from zero degrees.

TEST LOG OF ANTHROPOMORPHIC TEST DEVICE

Contractor: Dynamic Science, Inc.

Contract Title: Car-to-Car Side Impact Testing

Contract No.: DTNH22-81-C-07113, T.O. 5

Contract Technical Manager: W.T. Hollowell

ATD Mfr.: HSRI

ATD Serial No.: Thorax 122/Body 8 Date Submitted:

Test Date	Test No.	Test Description*	$\Delta v, \uparrow$ mph	<... deg	Location and Description of Damage (if any)	Project Engineer
10/27/82	3144-00	Initial Inspection	-	-	Skin on pelvis and legs is loose, abdominal sack is damaged.	Michael T. Rodack 10/27/82
11/19/82	3144-2	LF Position, S.I. to VW Rabbit 600 Side Impact 2 car moving simulation	53.38	300	Rib ballast on right side dented, slight cracking in leather backing. Displacement transducer installed for remaining tests.	Michael T. Rodack 1/3/83
1/5/83	3144-1	LF Position, S.I. to VW Rabbit 600 side impact 2 car moving simulation	34.23	300	Left knee casting broken cracking a little worse in leather backing.	Michael T. Rodack 1/10/83
1/12/83	3144-5	LF Position, S.I. to VW Rabbit 900 side impact 2 car moving simulation	28.60	270	No damage recorded Leather backing replaced post-test	Michael T. Rodack 1/14/83
1/19/83	3144-6	LF Position S.I. to VW Rabbit 900 side impact 2 car moving simulation	39.60	270	No damage recorded	Michael T. Rodack 1/21/83 MR

*Describe, as: Pendulum Impact Simulator, sled wall, car door, restraint, etc. If vehicle test, indicate position of ATD in vehicle.

† If a sled test, the closing speed between vehicles immediately before impact.

**Head-on impact is defined as zero degrees. Other angles of impact measured counterclockwise from zero degrees.

APPENDIX A
PERTINENT PHOTOGRAPHS

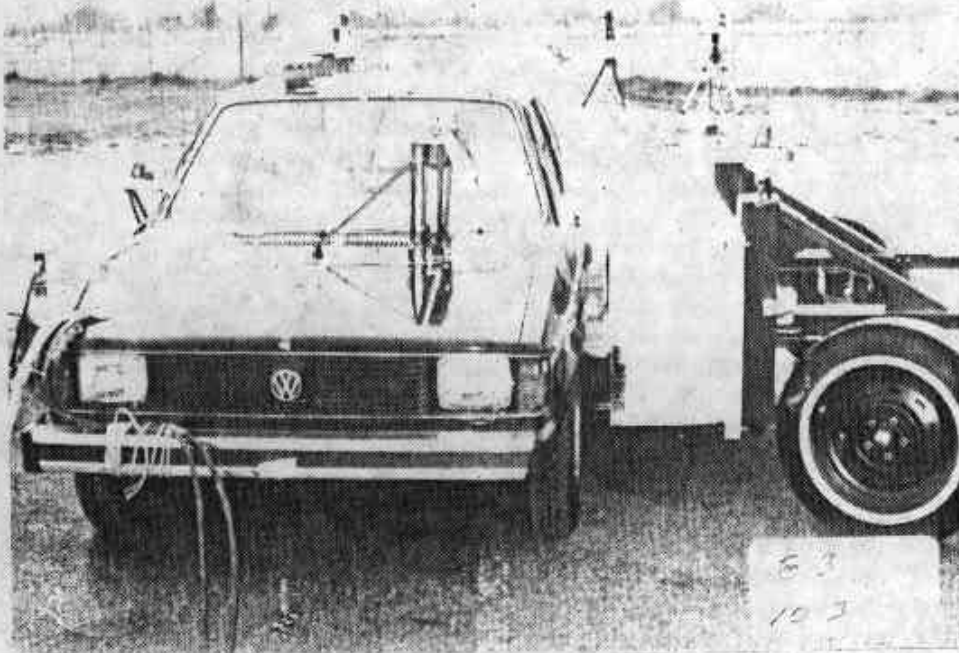
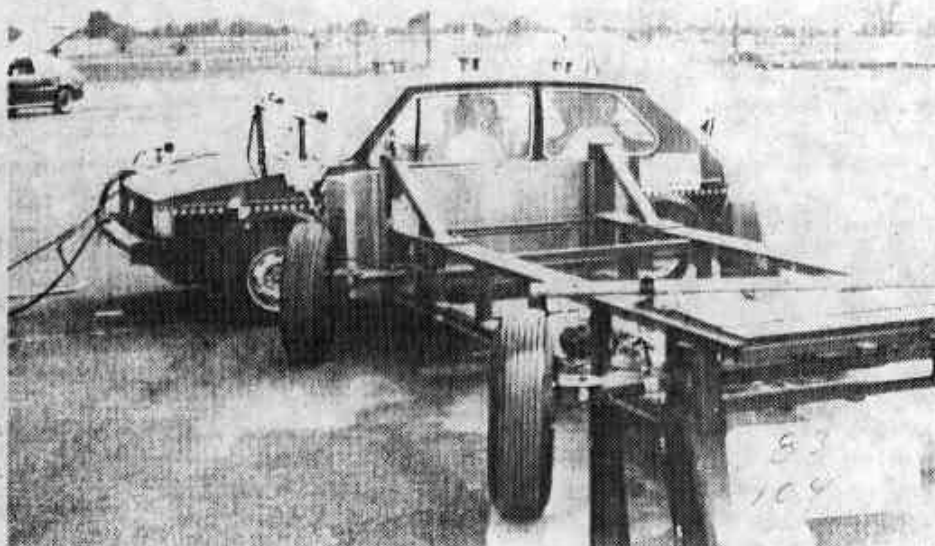


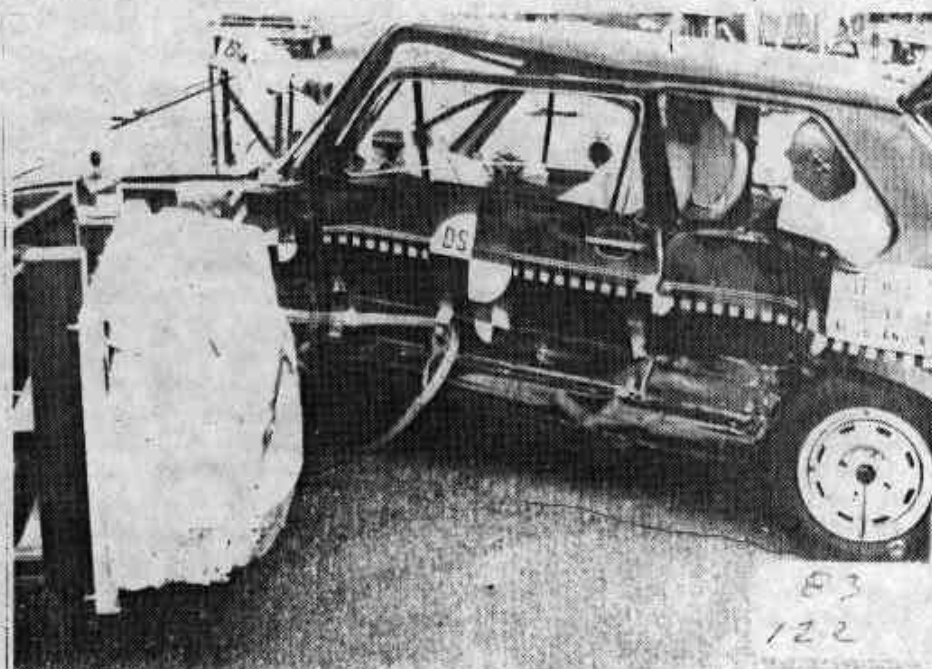
FIGURE A-1. PRE-TEST FRONT VIEW OF TARGET VEHICLE - 26° CRABBED
SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.



FIGURE A-2. PRE-TEST REAR VIEW OF TARGET VEHICLE - 26° CRABBED
SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.



**FIGURE A-3. PRE-TEST LEFT SIDE VIEW OF TARGET VEHICLE -
26° CRABBED SIDE IMPACTOR TO 1982 VW RABBIT
AT 39.60 MPH.**



**FIGURE A-4. POST-TEST LEFT SIDE VIEW OF TARGET VEHICLE -
26° CRABBED SIDE IMPACTOR TO 1982 VW RABBIT
AT 39.60 MPH.**

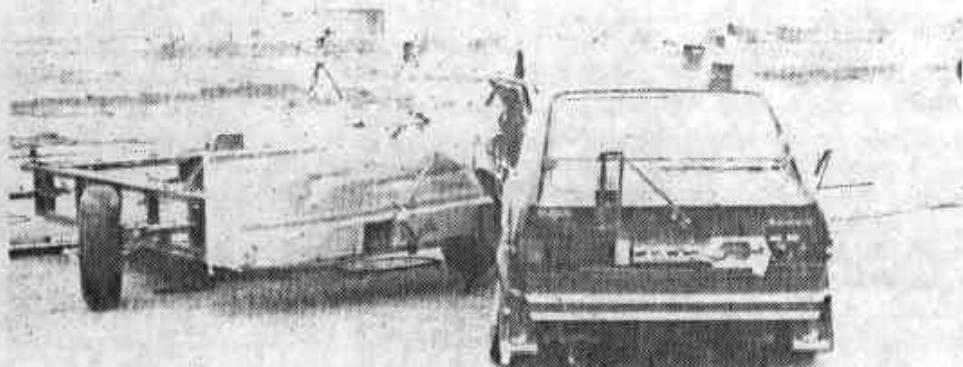


FIGURE A-5. POST-TEST REAR VIEW OF TARGET VEHICLE - 26° CRABBED SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.

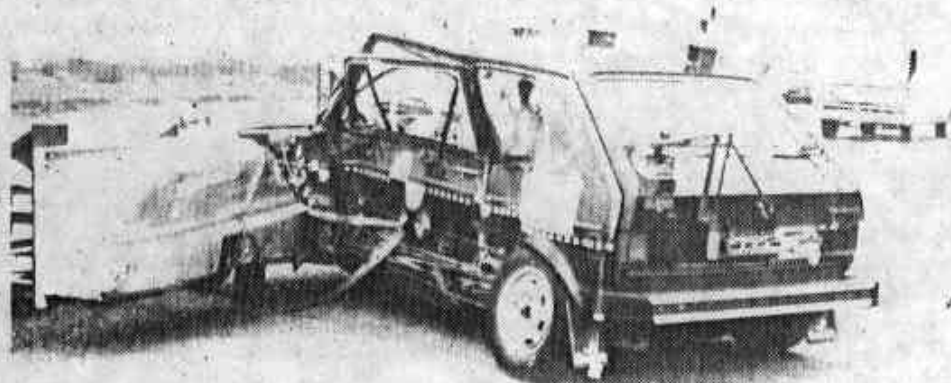


FIGURE A-6. POST-TEST REAR OBLIQUE VIEW OF TARGET VEHICLE - 26° CRABBED SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.

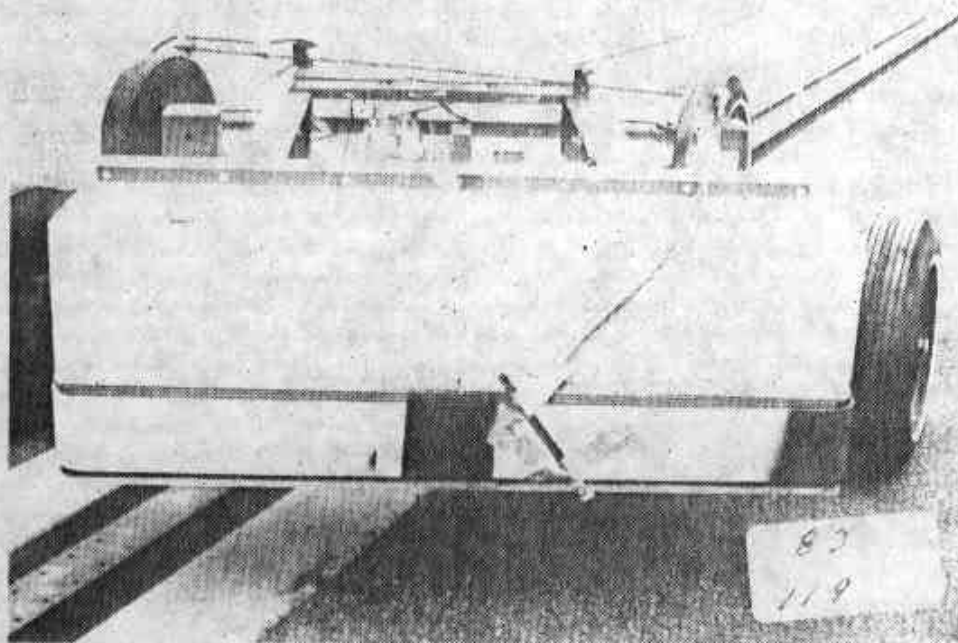


FIGURE A-7. PRE-TEST FRONT VIEW OF BARRIER - 26° CRABBED SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.

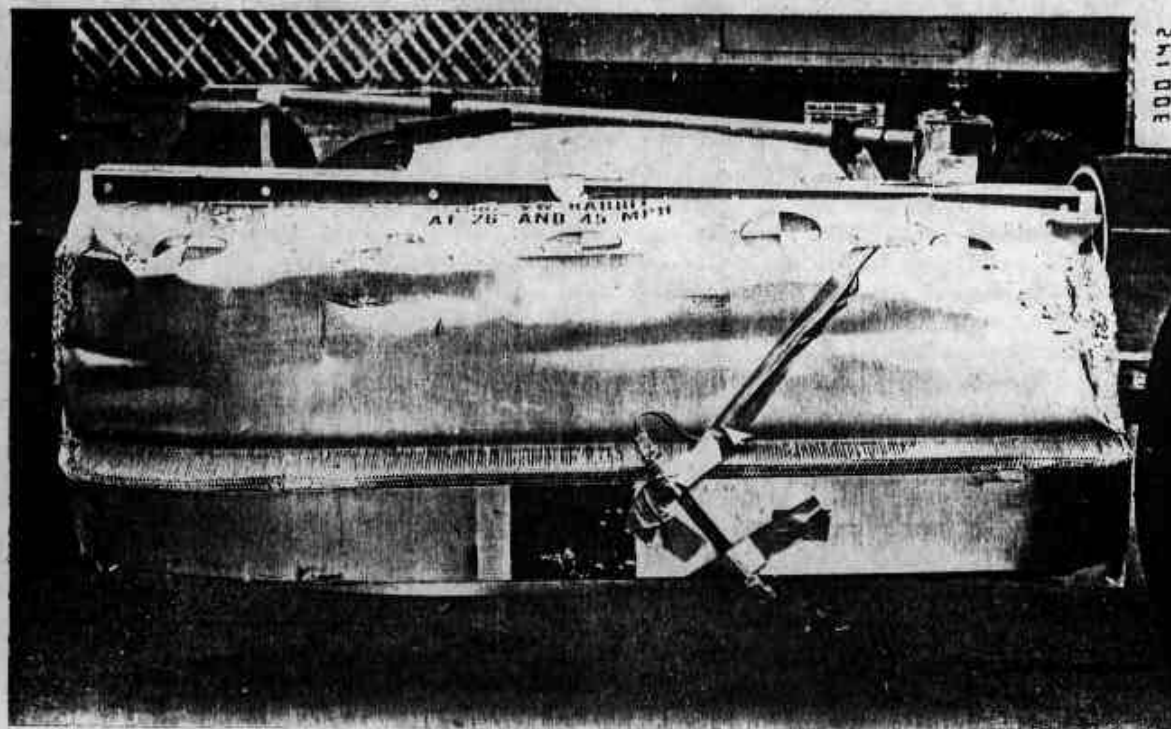


FIGURE A-8. POST-TEST FRONT VIEW OF BARRIER - 26° CRABBED SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.

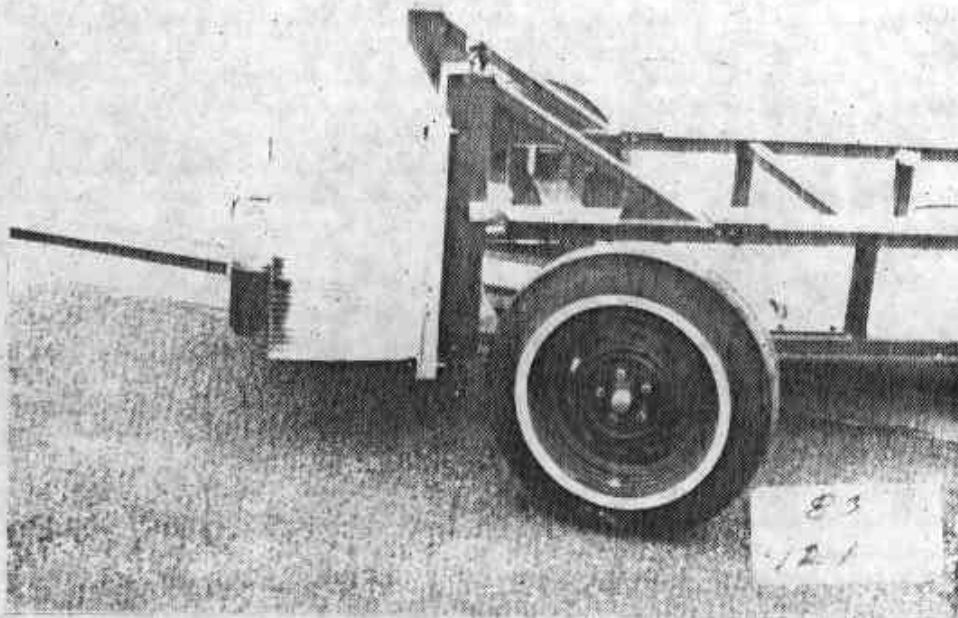


FIGURE A-9. PRE-TEST SIDE VIEW OF BARRIER - 26° CRABBED SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.

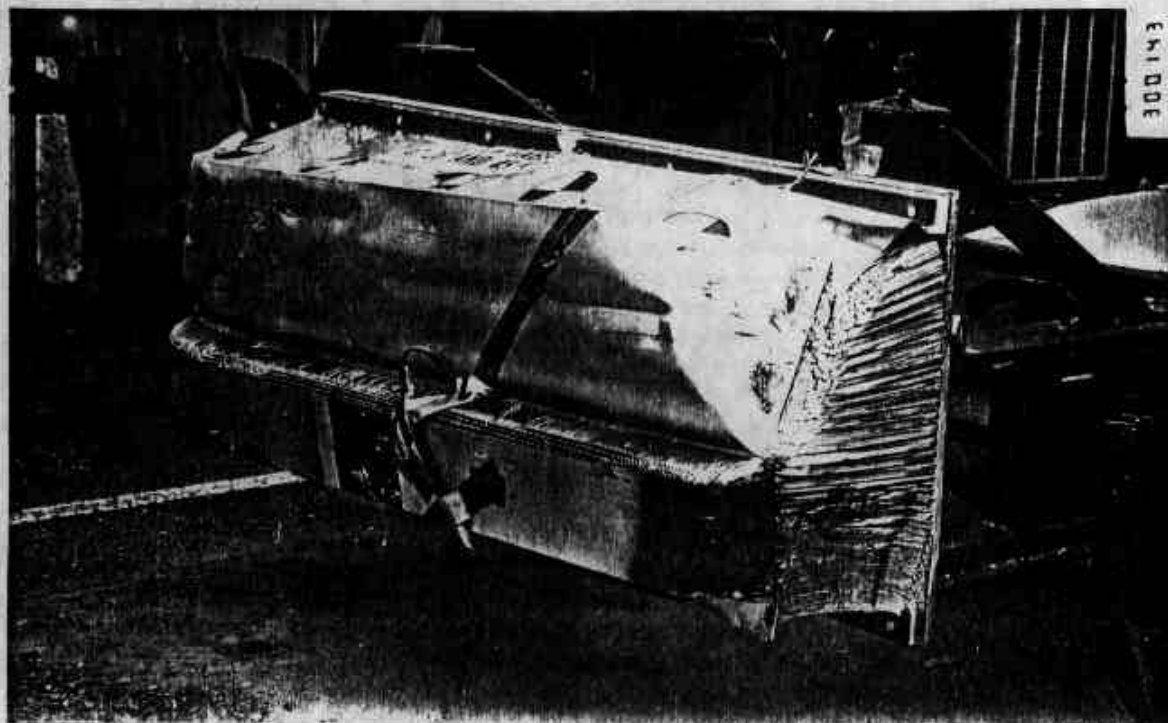


FIGURE A-10. POST-TEST LEFT SIDE VIEW OF BARRIER - 26° CRABBED IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.

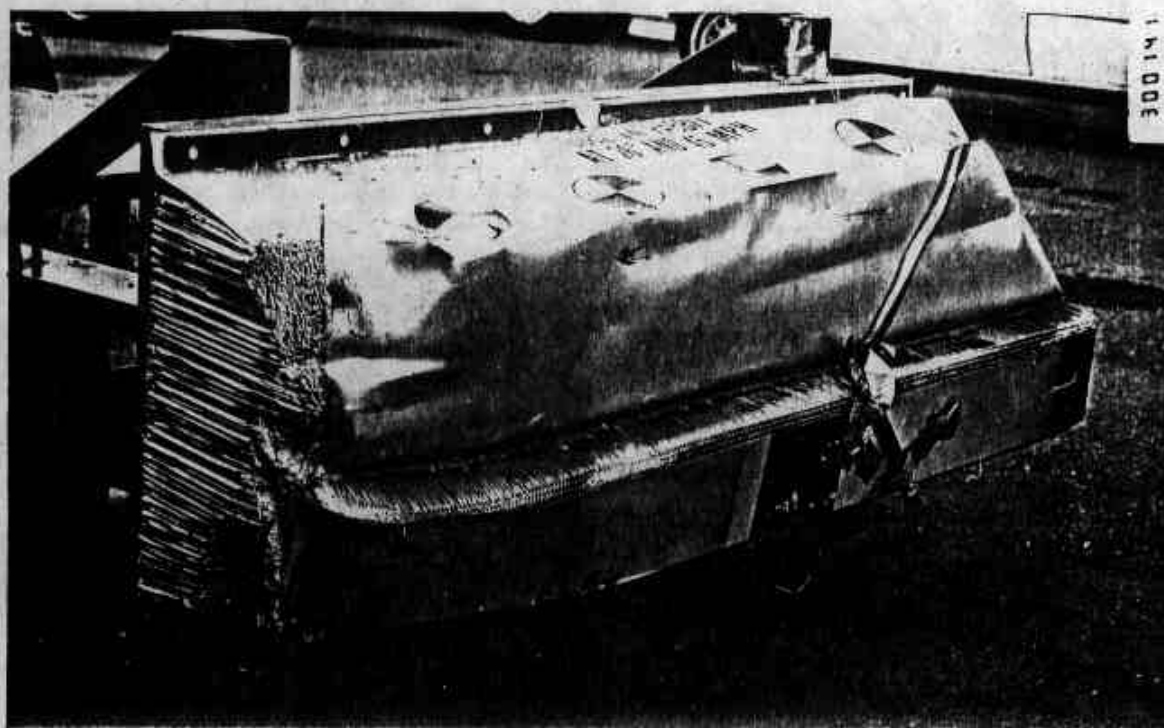


FIGURE A-11. POST-TEST RIGHT SIDE VIEW OF BARRIER - 26°
CRABBED SIDE IMPACTOR TO 1982 VW RABBIT AT
39.60 MPH.

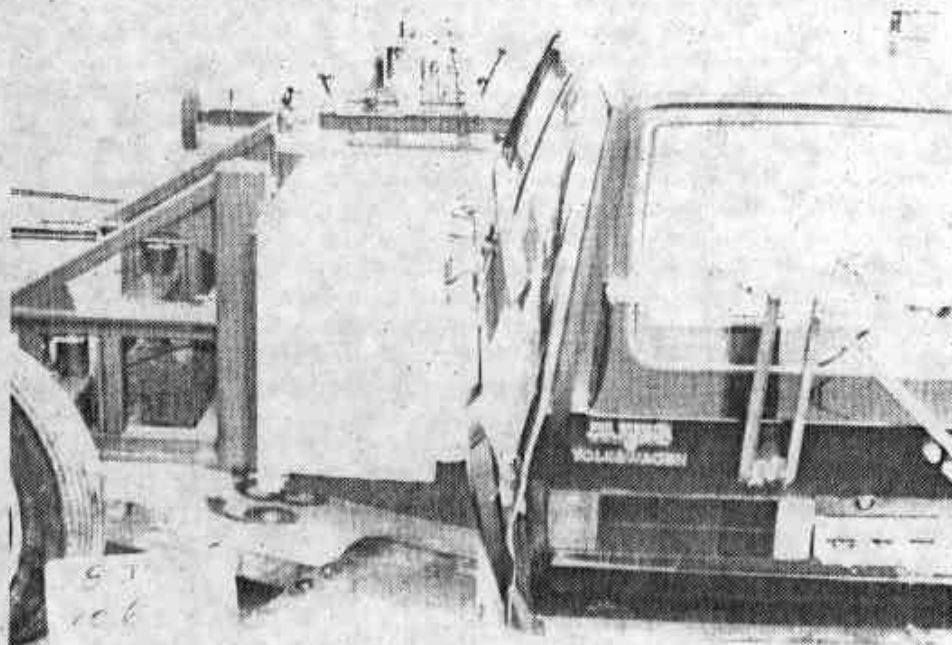


FIGURE A-12. PRE-TEST SIDE IMPACTOR/VW RABBIT MATCHUP - 26°
CRABBED SIDE IMPACTOR TO 1982 VW RABBIT AT
39.60 MPH.

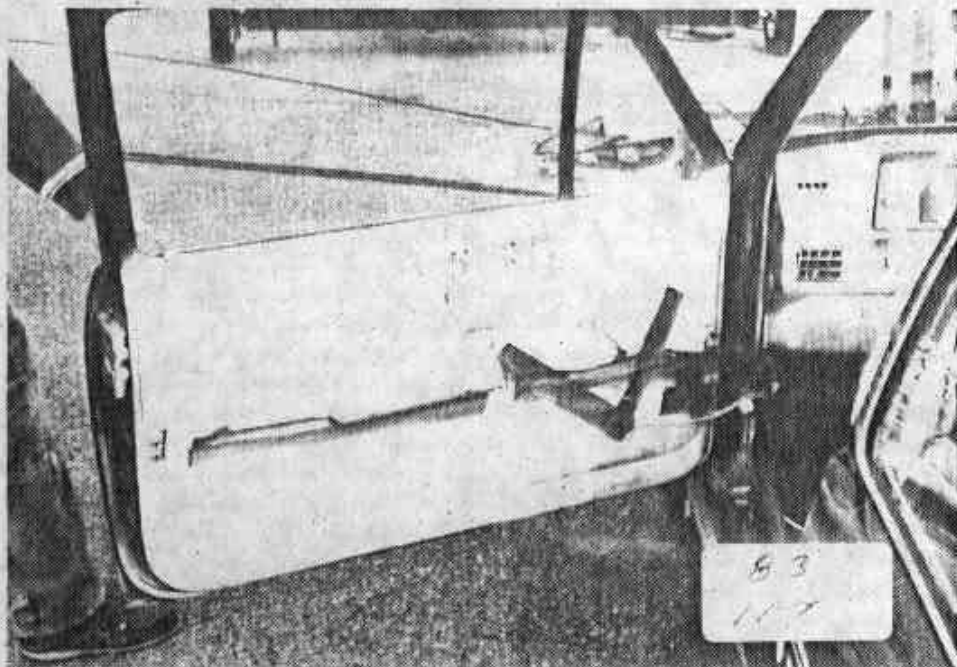


FIGURE A-13. PRE-TEST VW DOOR ACCELEROMETER LOCATIONS - 26° CRABBED SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.



FIGURE A-14a. POST-TEST INTERIOR DEFORMATION, VW RABBIT - 26° CRABBED SIDE IMPACTOR TO 1982 VW RABBIT @ 39.60 MPH.

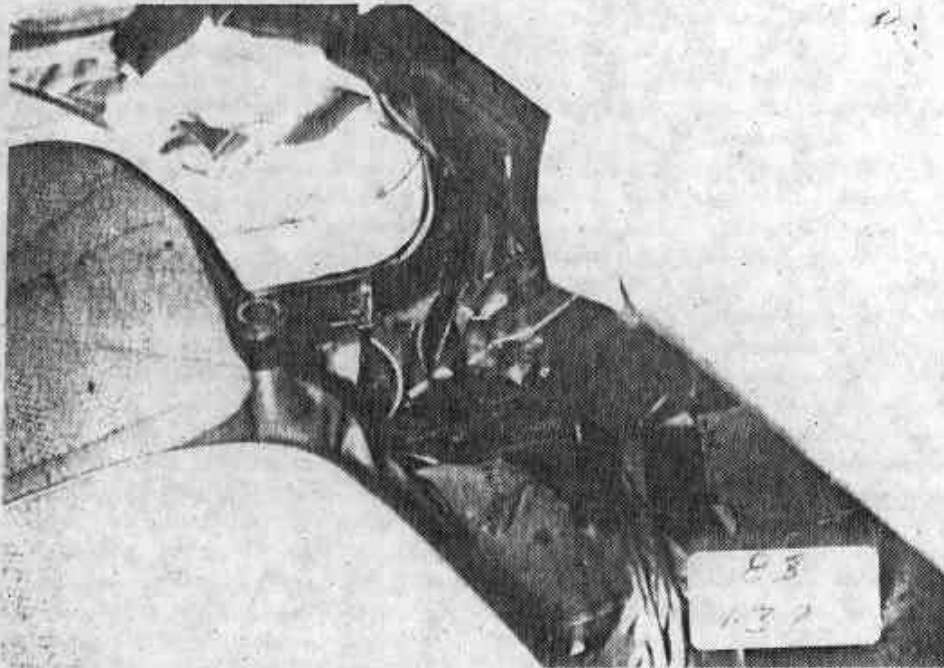


FIGURE A-14b. POST-TEST INTERIOR DEFORMATION, VW RABBIT - 26° CRABBED SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.

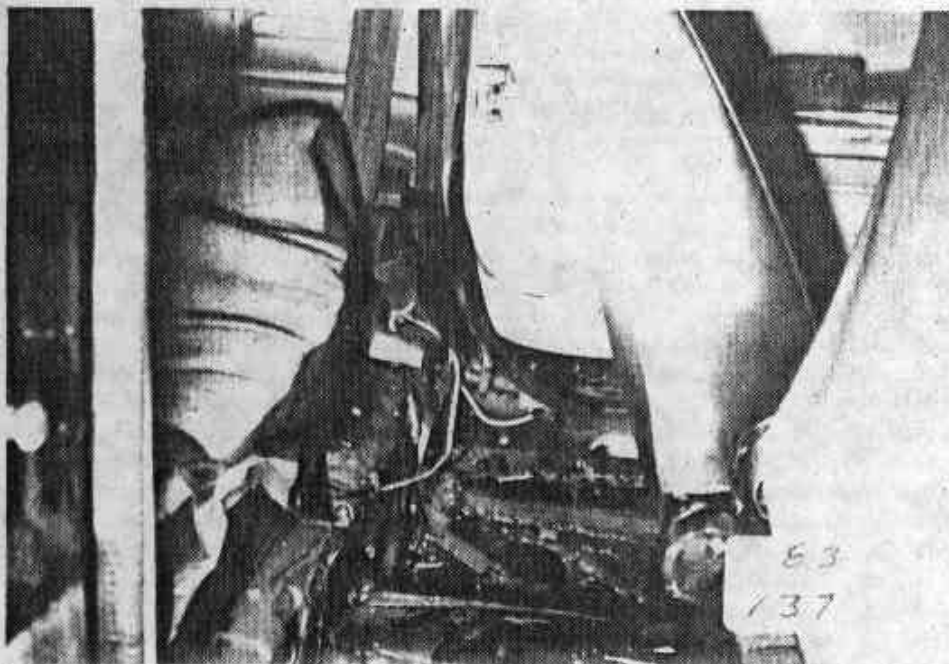


FIGURE A-14c. POST-TEST INTERIOR DEFORMATION, VW RABBIT - 26° CRABBED SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.

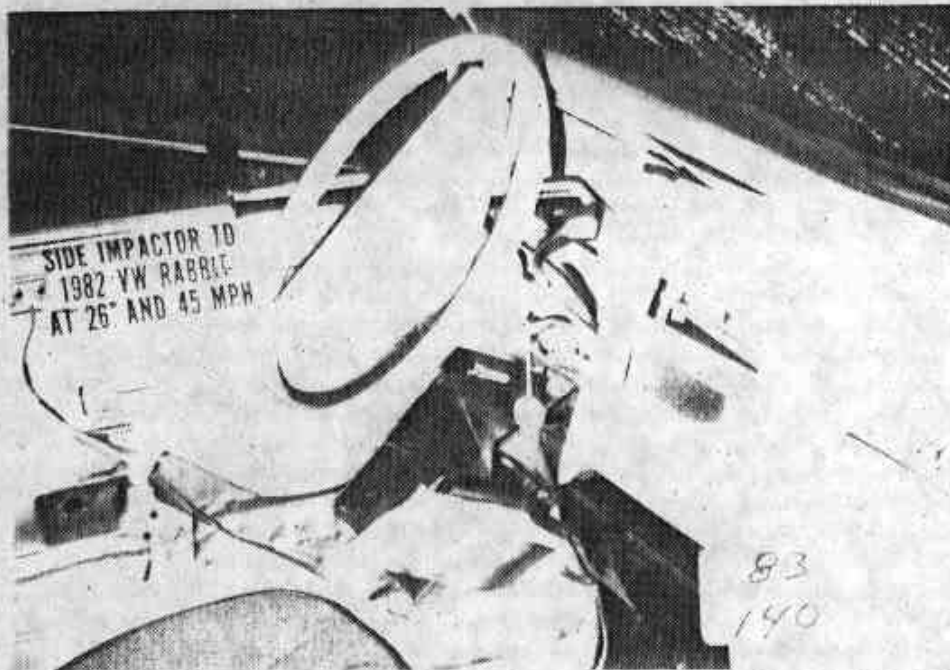


FIGURE A-14d. POST-TEST INTERIOR DEFORMATION, VW RABBIT - 26° CRABBED SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.



FIGURE A-15a. PRE-TEST DRIVER DUMMY POSITION - 26° CRABBED SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.

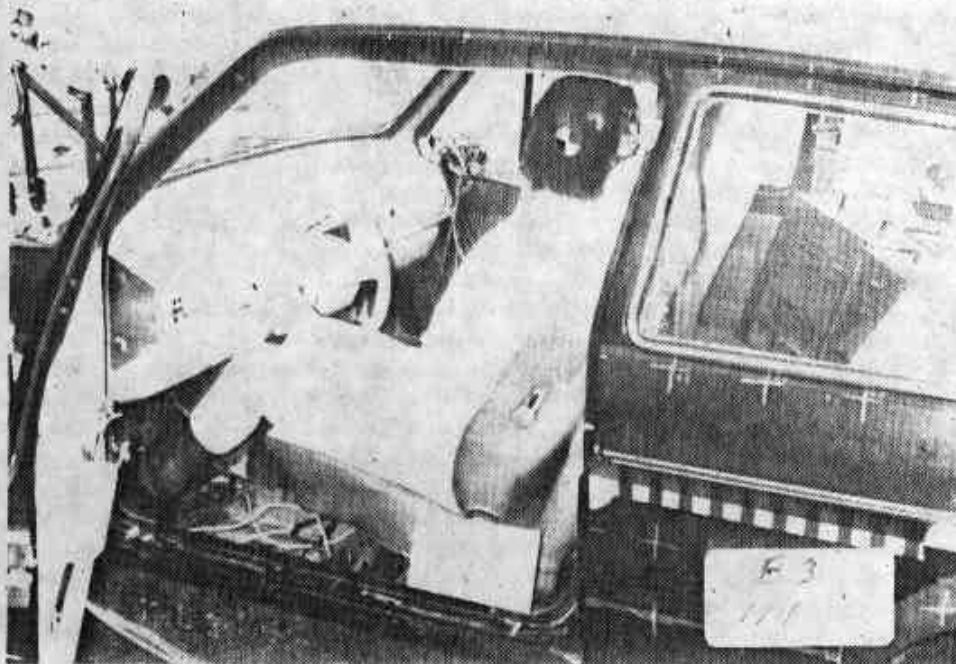
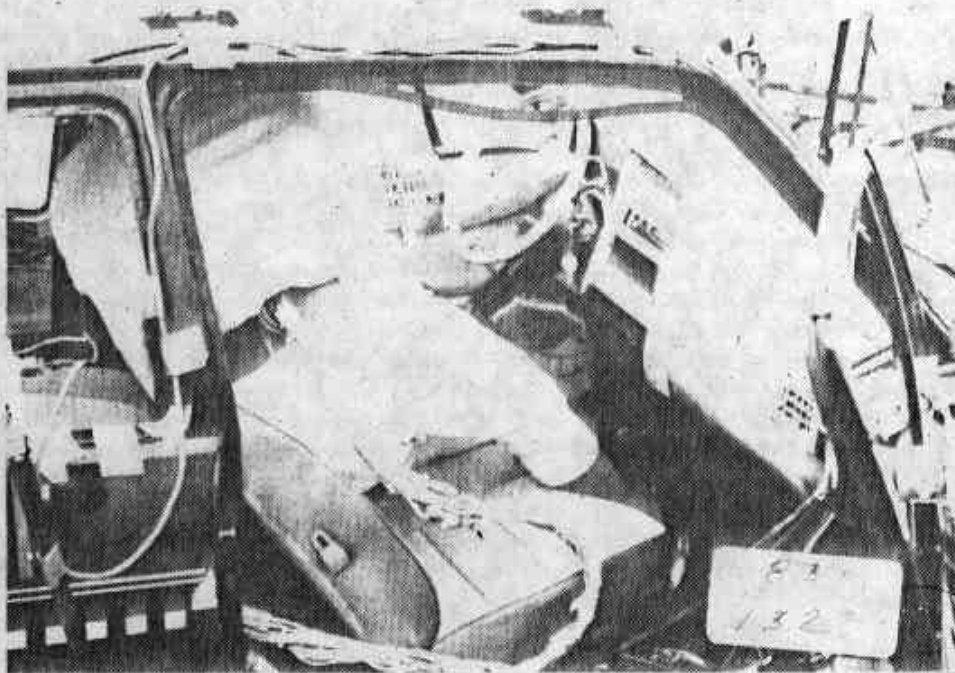


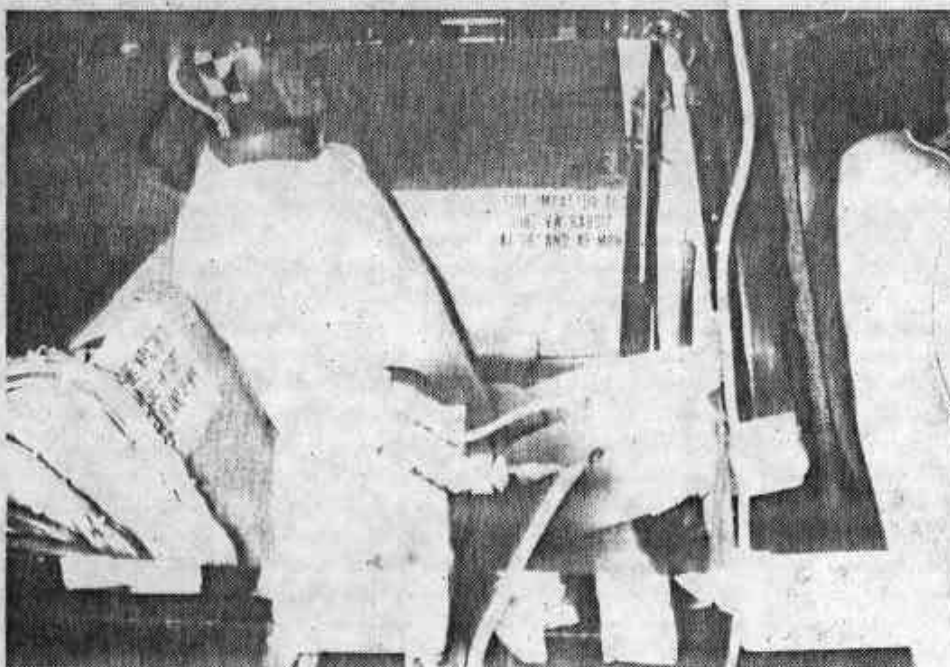
FIGURE A-15b. PRE-TEST DRIVER DUMMY POSITION - 26° CRABBED
SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.



FIGURE A-15c. PRE-TEST DRIVER DUMMY POSITION - 26° CRABBED
SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.



**FIGURE A-16. POST-TEST DRIVER DUMMY POSITION - 26° CRABBED
SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.**



**FIGURE A-17a. PRE-TEST PASSENGER DUMMY POSITION - 26° CRABBED
SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.**

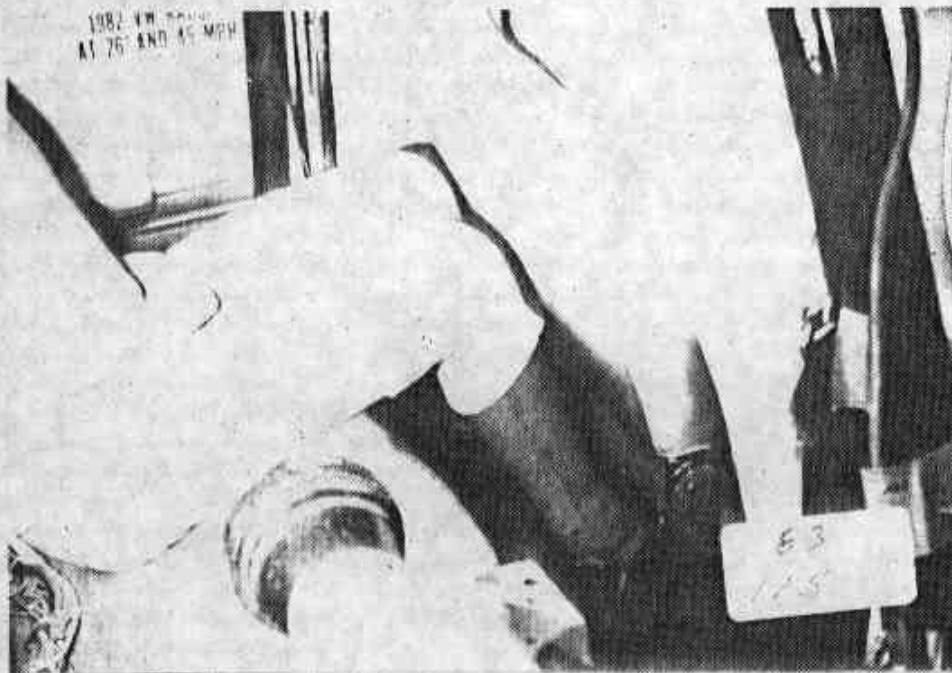
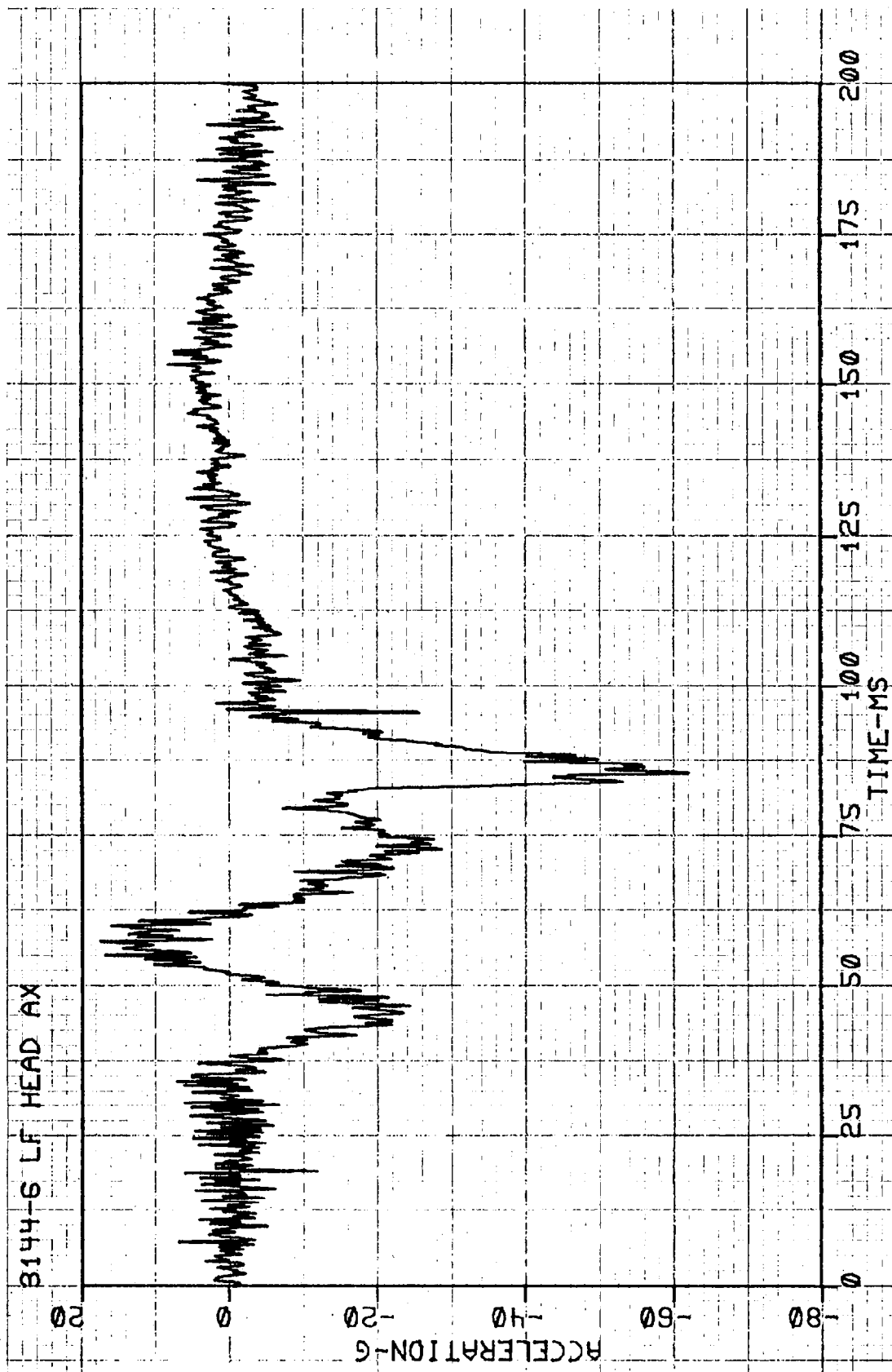


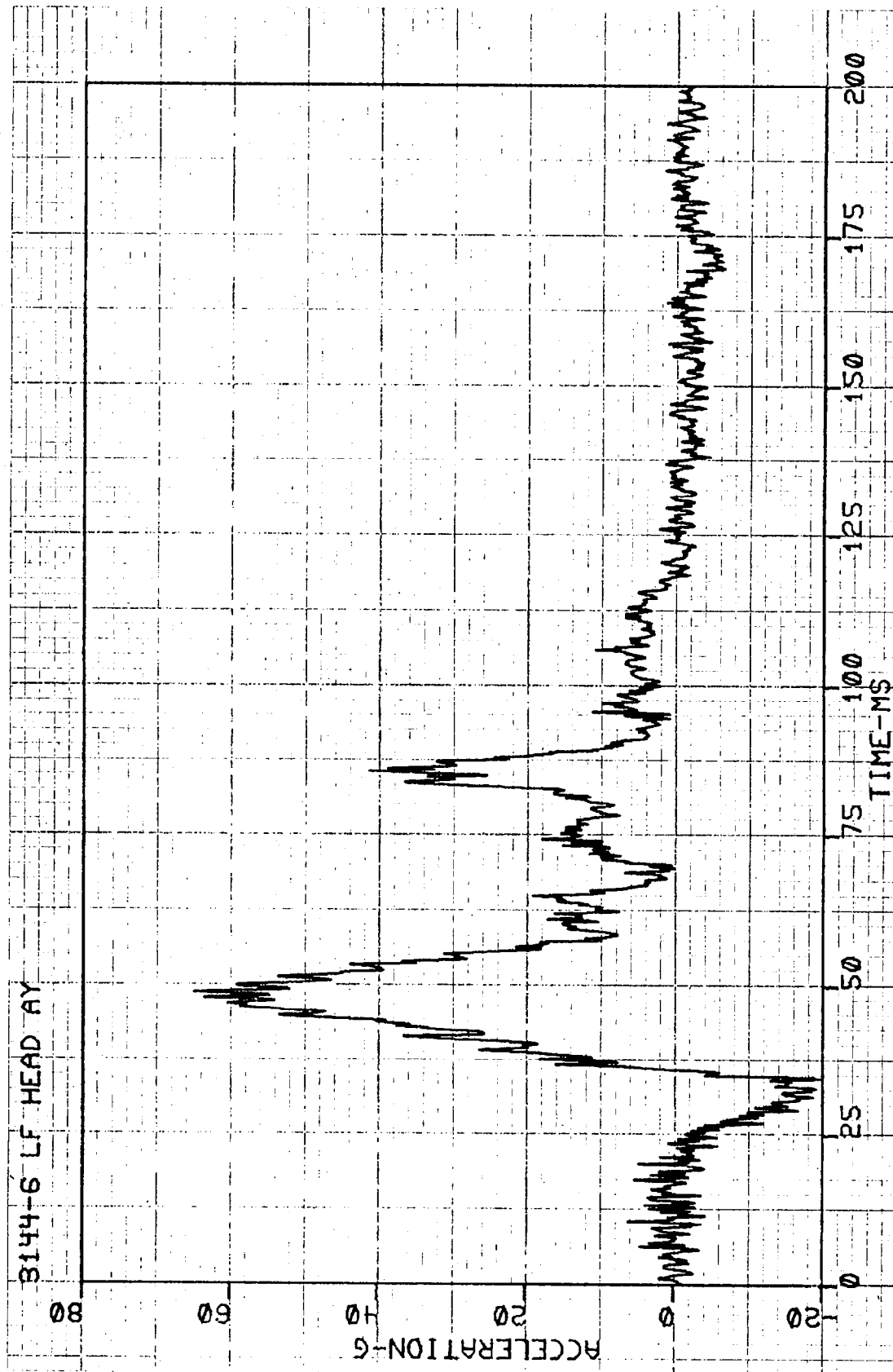
FIGURE A-17b. PRE-TEST PASSENGER DUMMY POSITION - 26° CRABBED
SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.

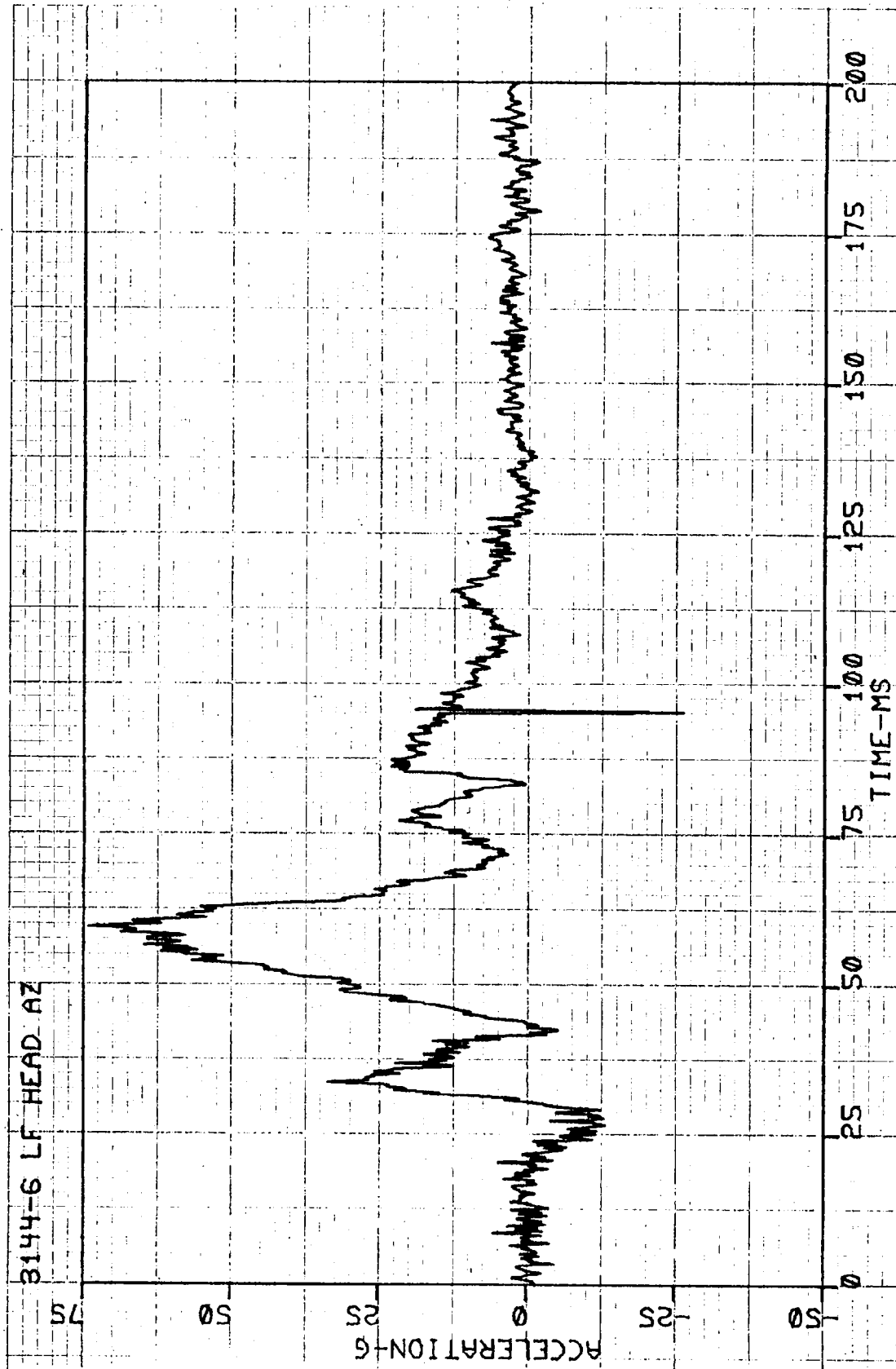


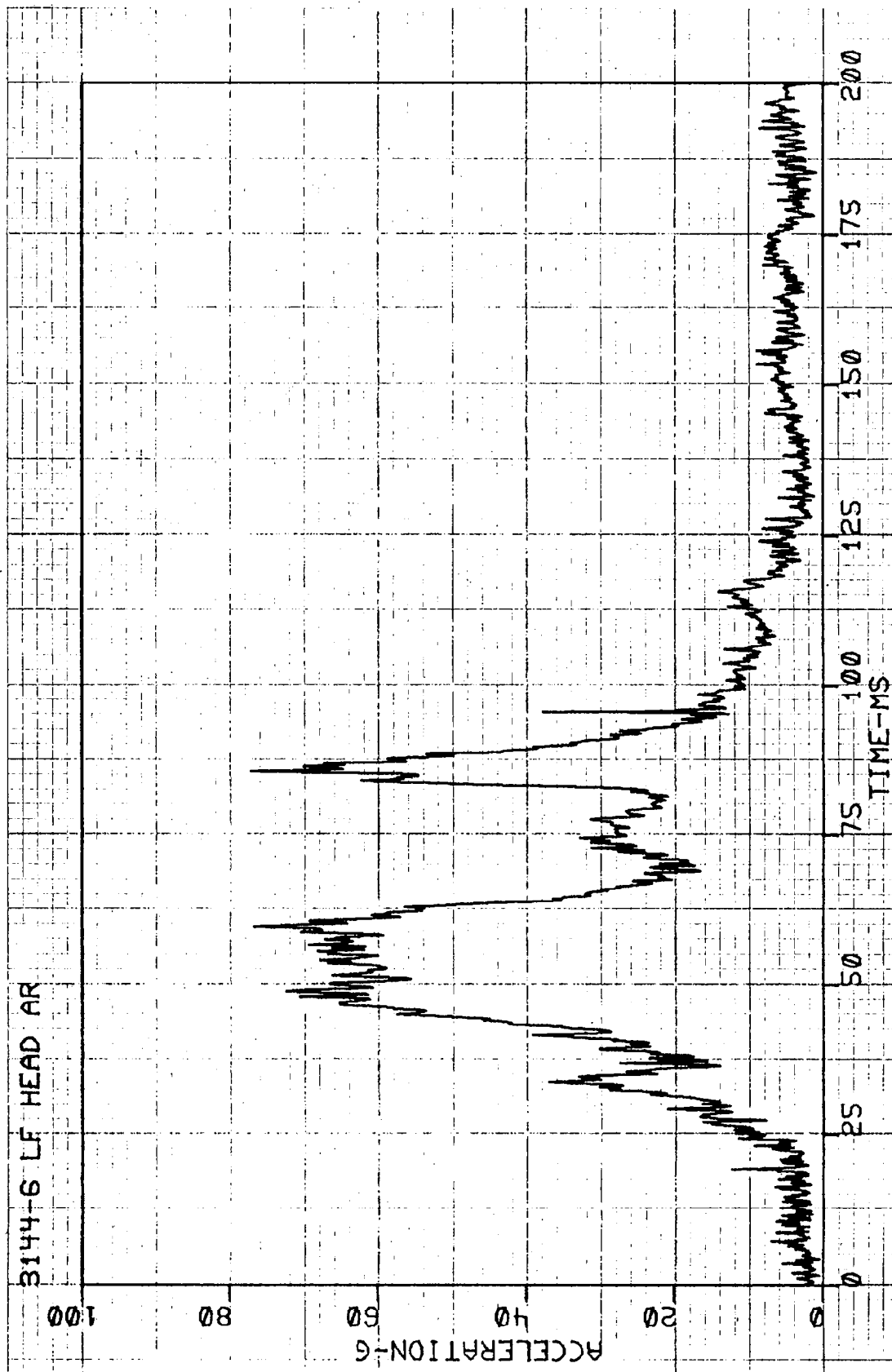
FIGURE A-18. POST-TEST PASSENGER DUMMY POSITION - 26° CRABBED
SIDE IMPACTOR TO 1982 VW RABBIT AT 39.60 MPH.

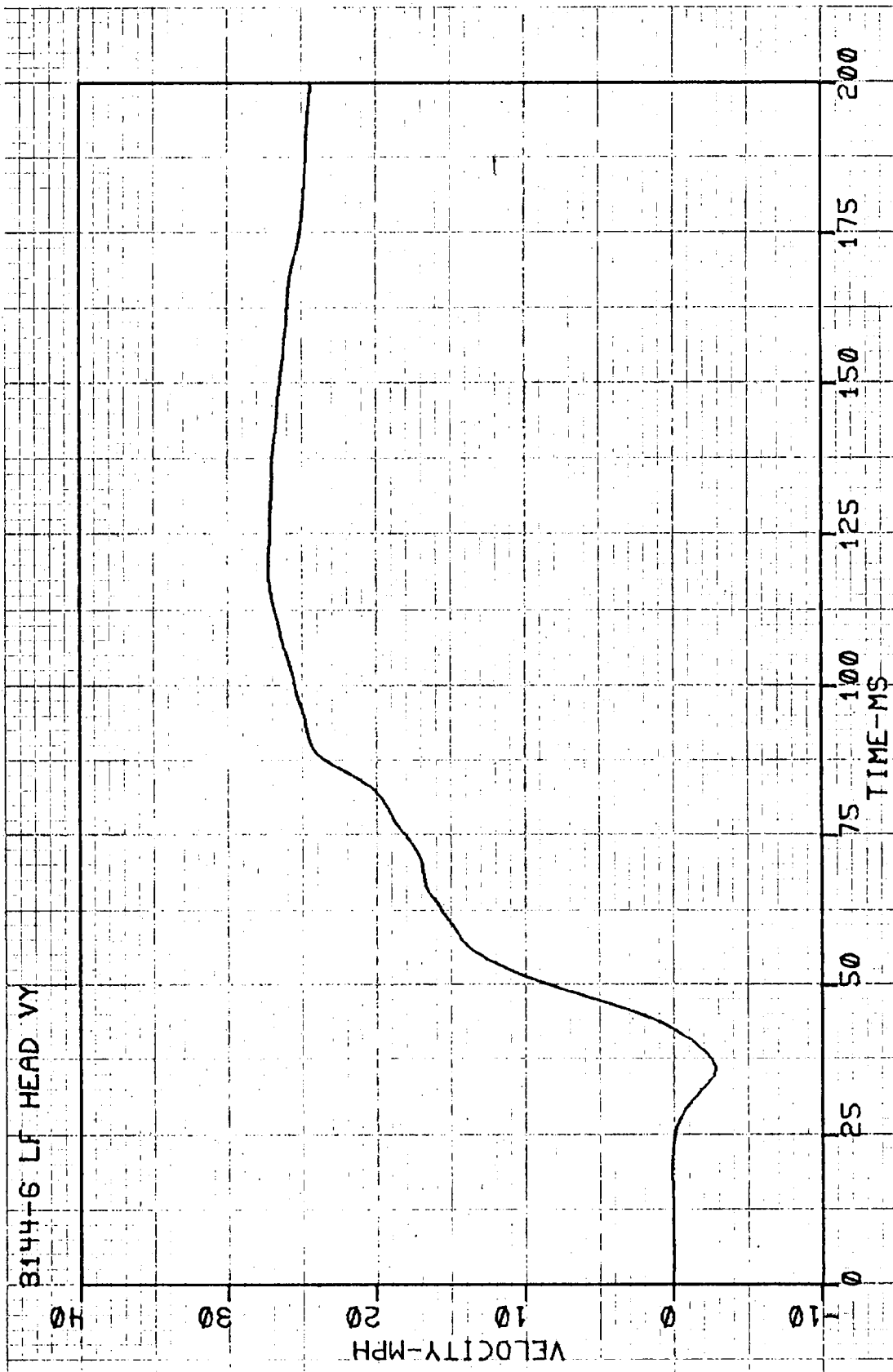
APPENDIX B
CALCOMP PLOTS FOR
19° CRABBED SIDE IMPACTOR
TO 1982 VOLKSWAGEN RABBIT
AT 39.6 MPH

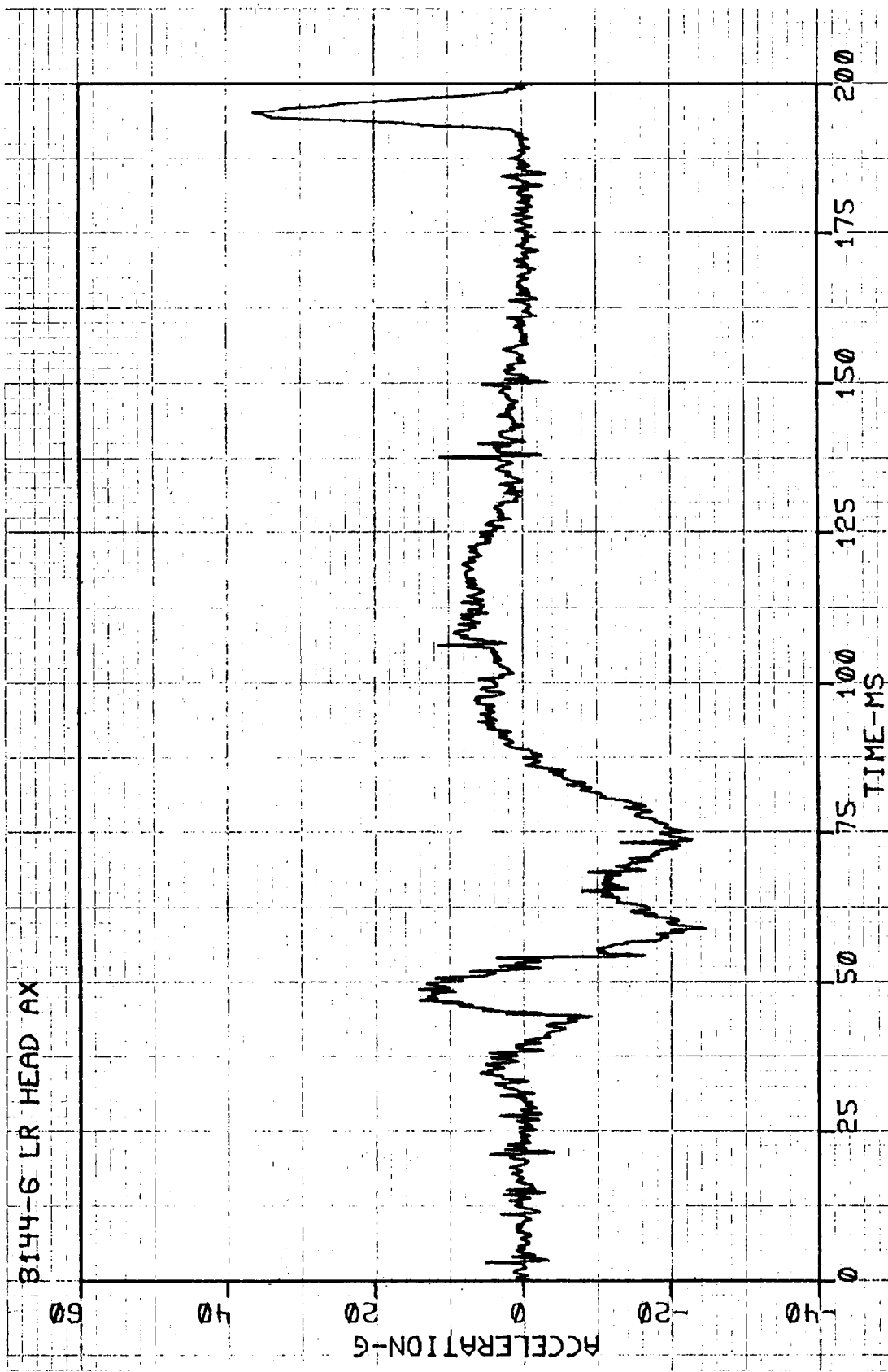


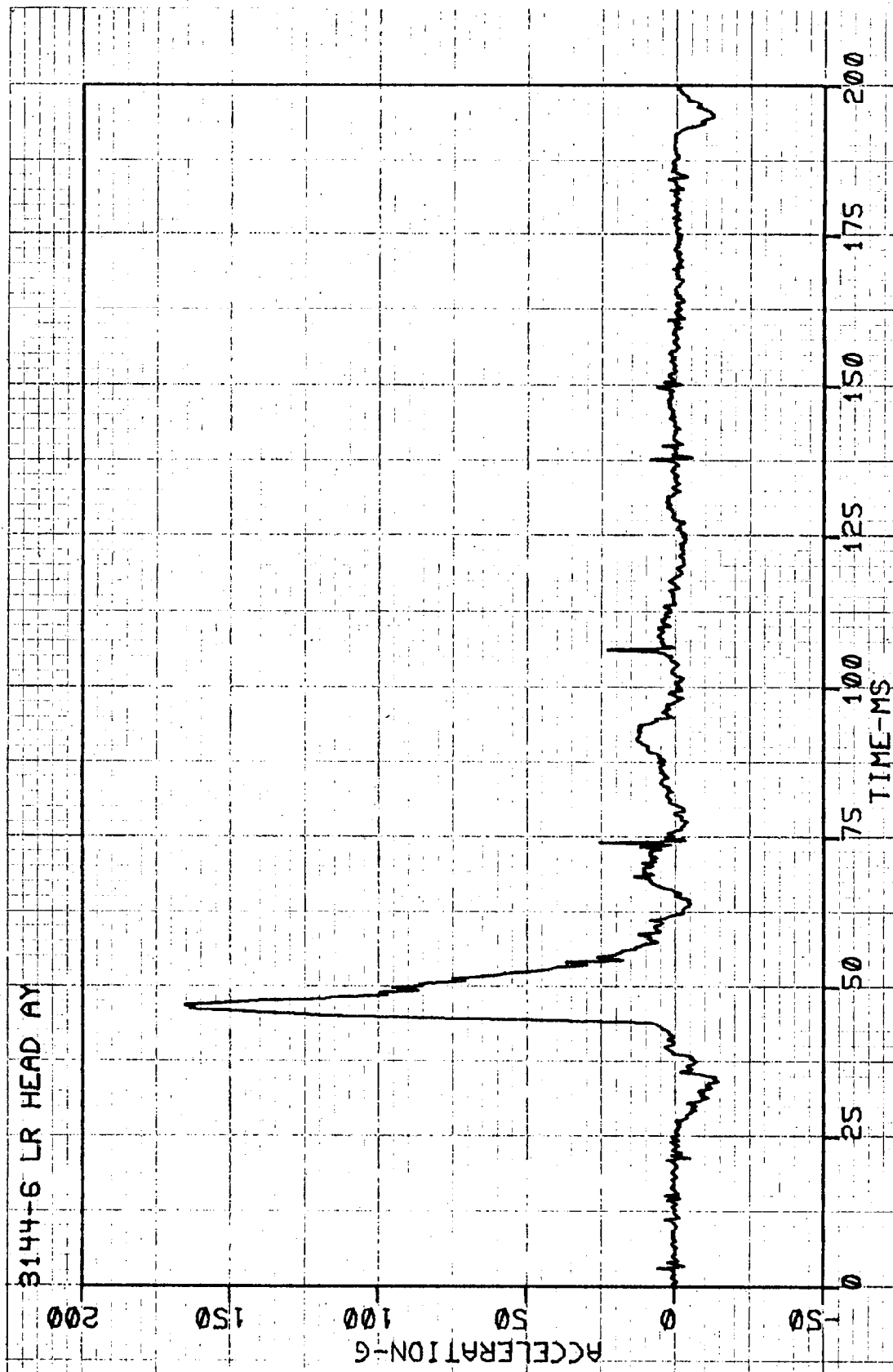


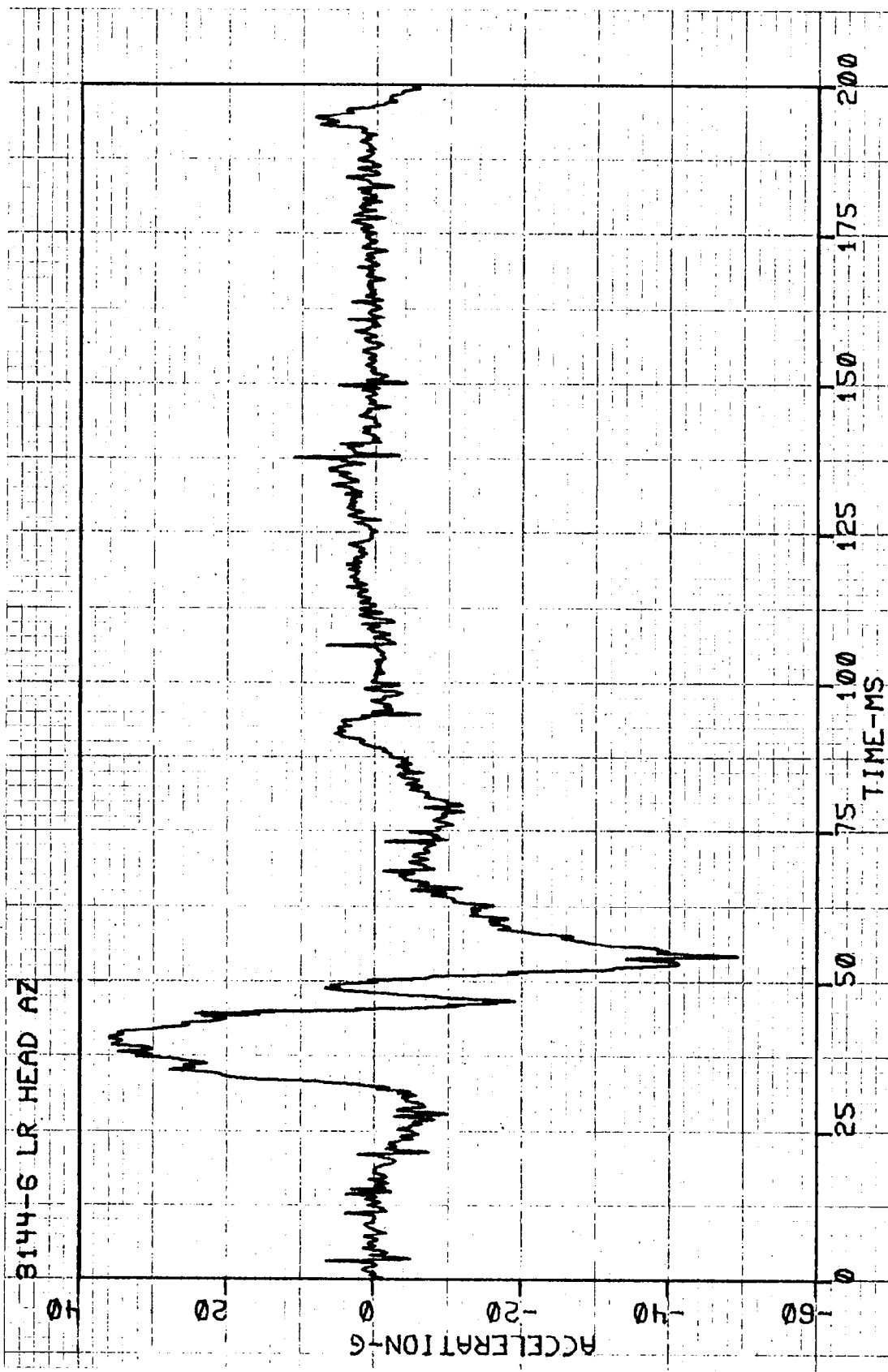


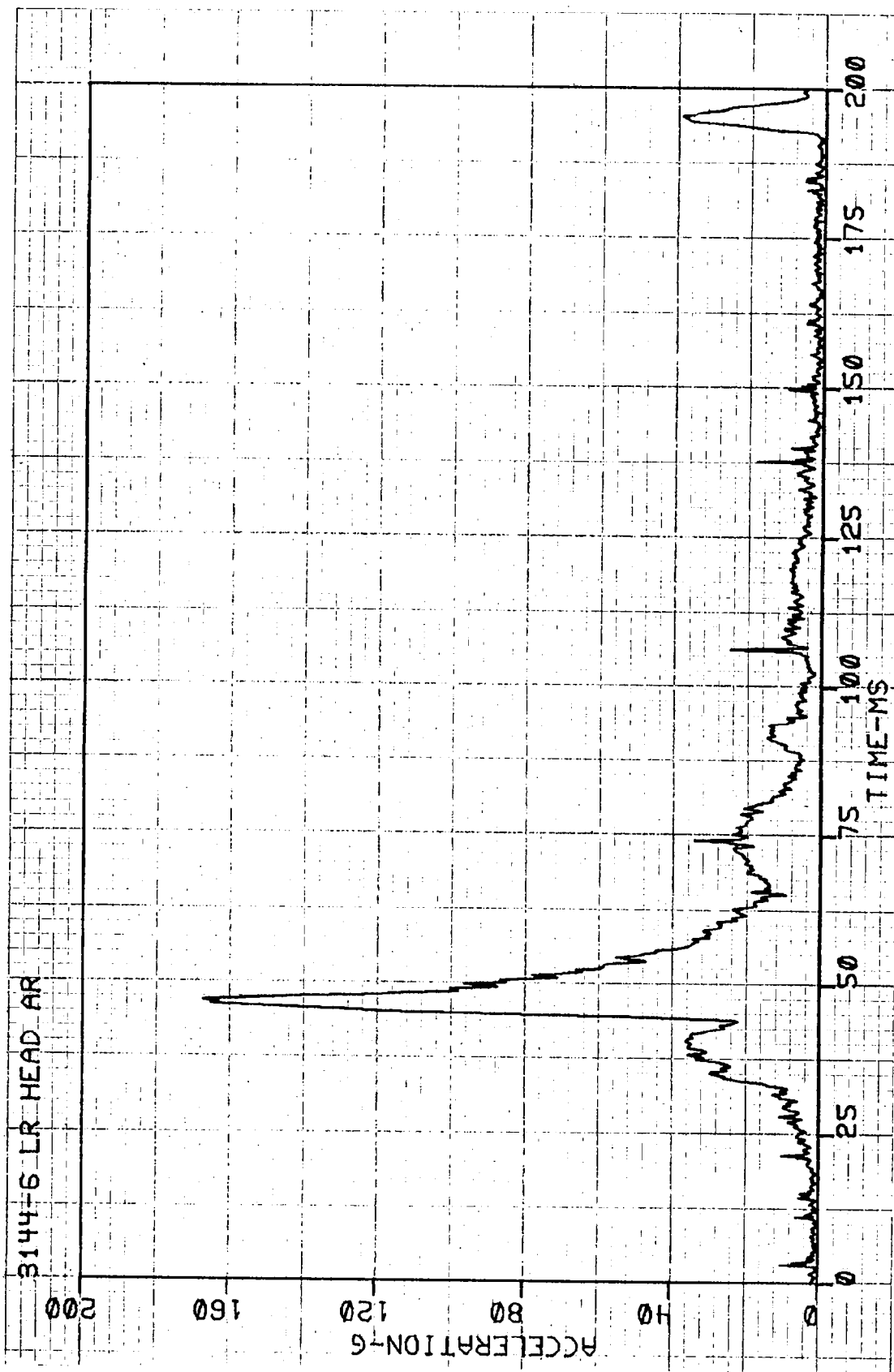


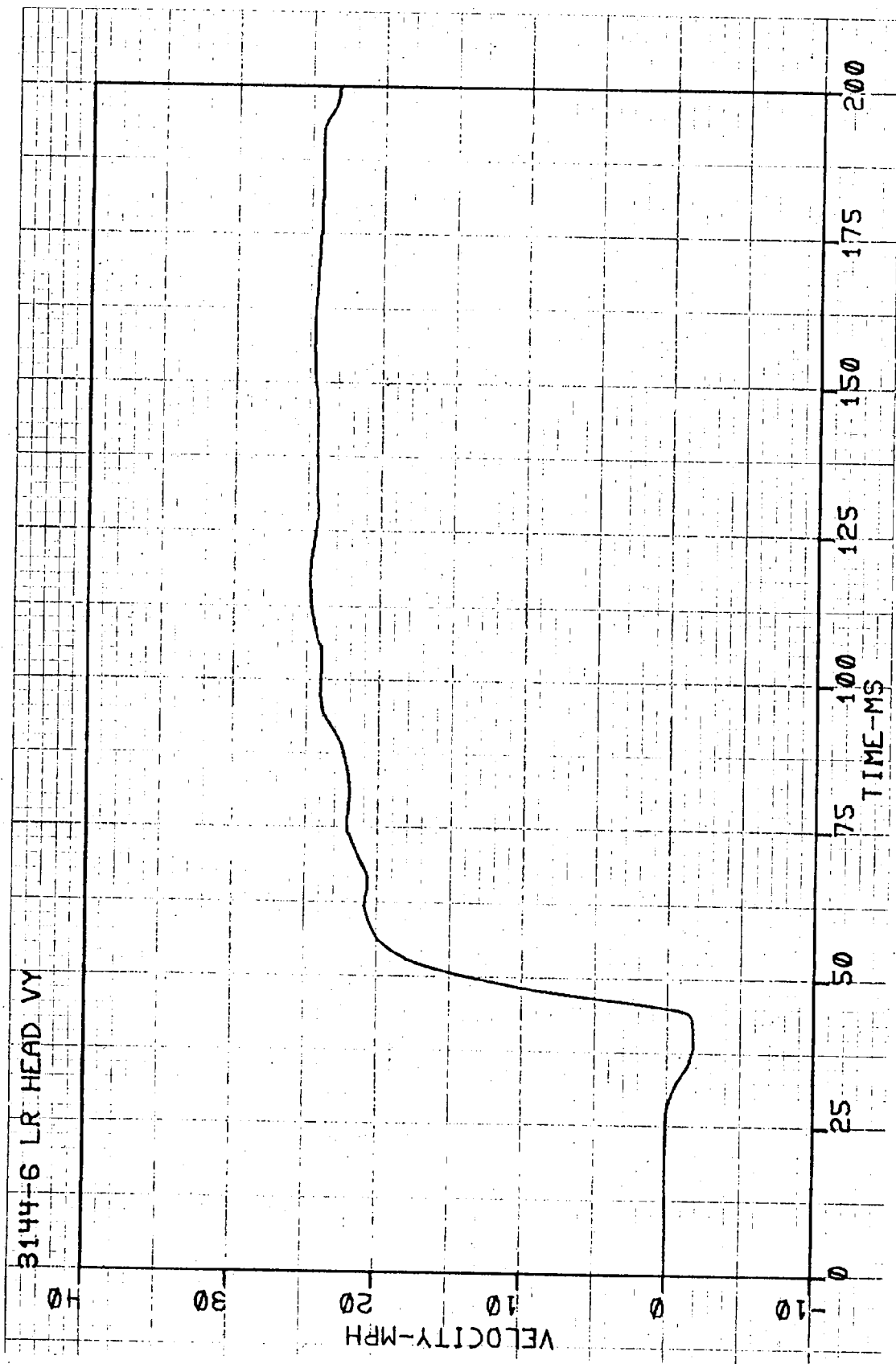


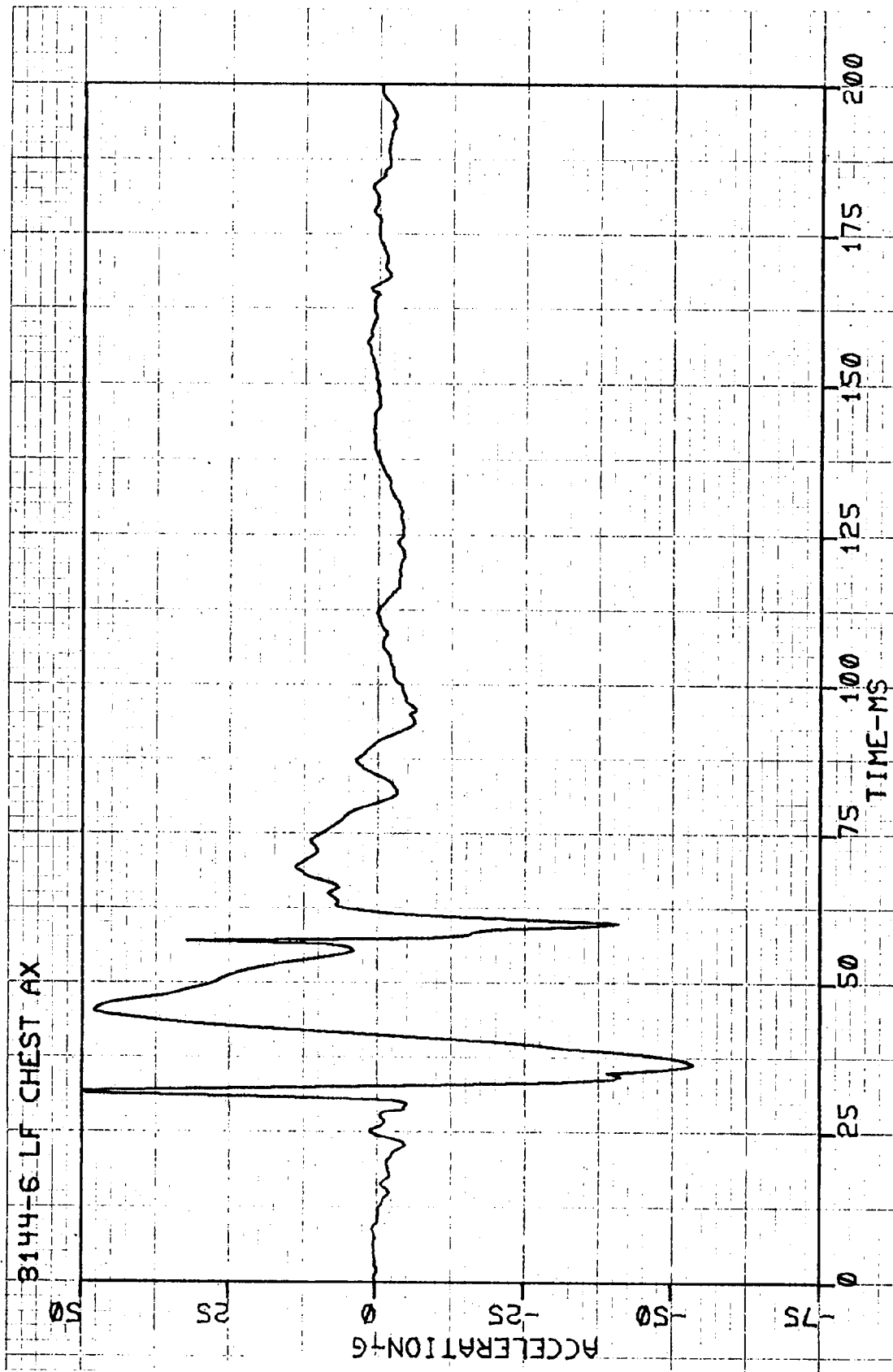


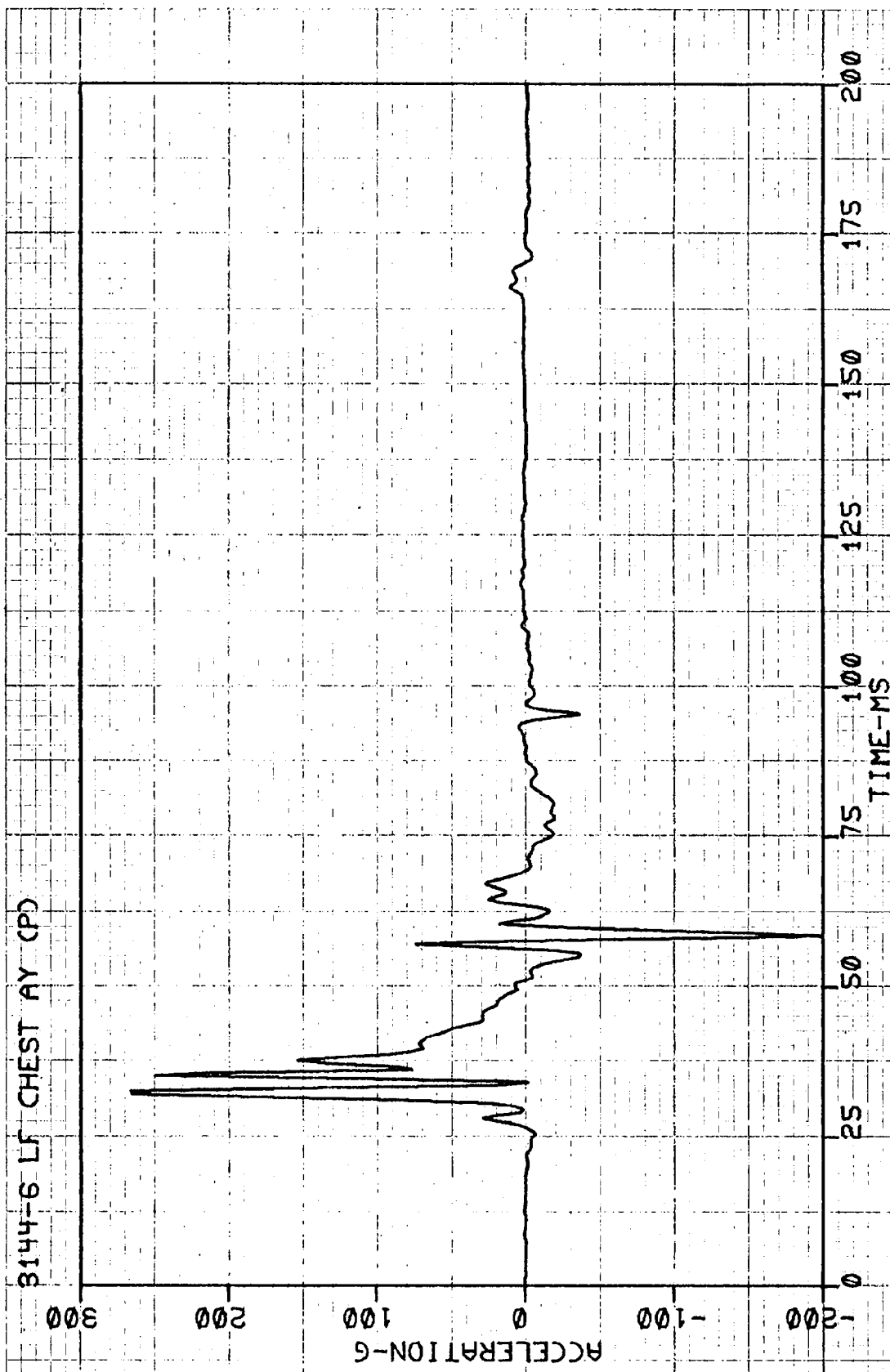


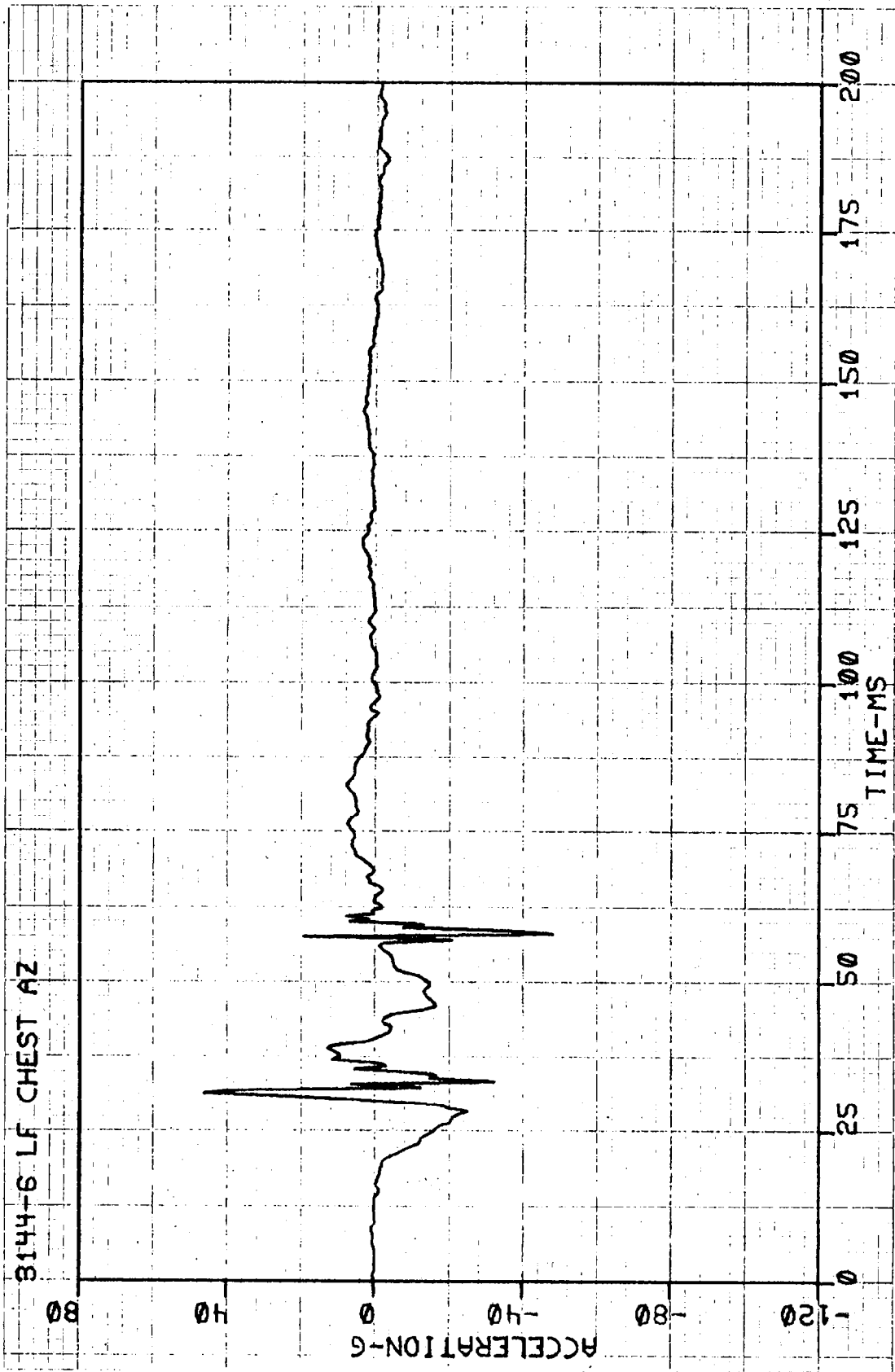


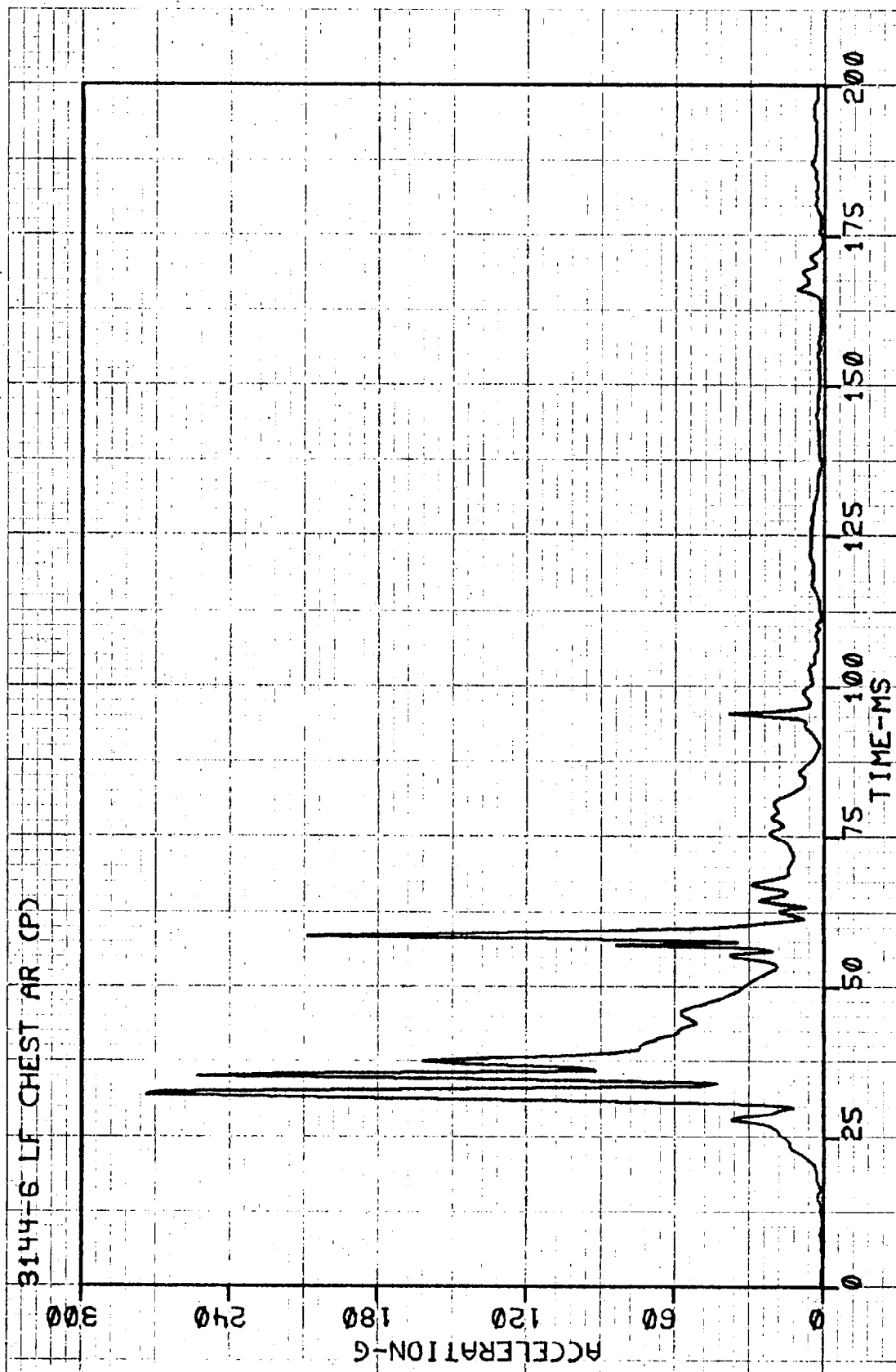


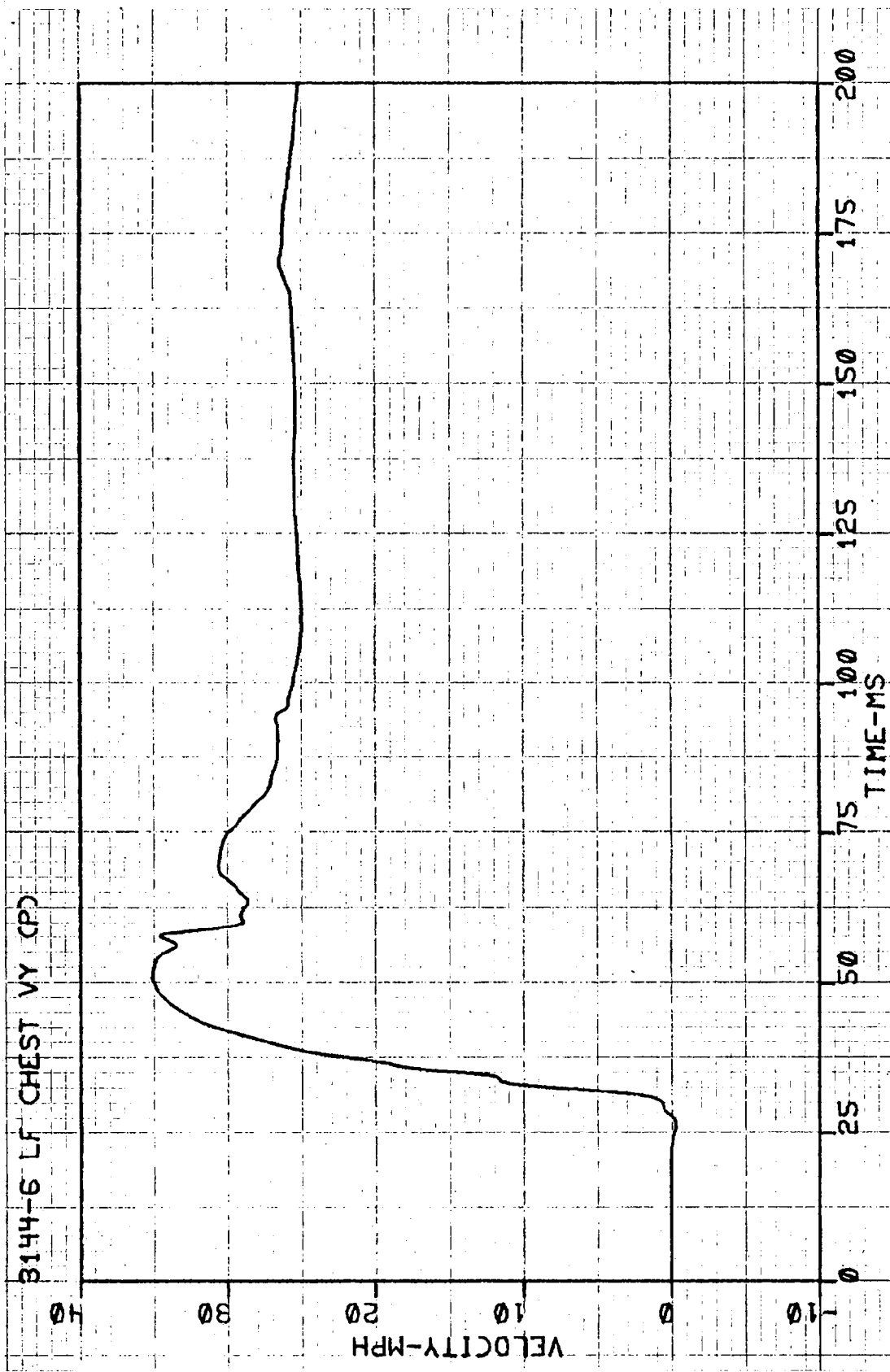


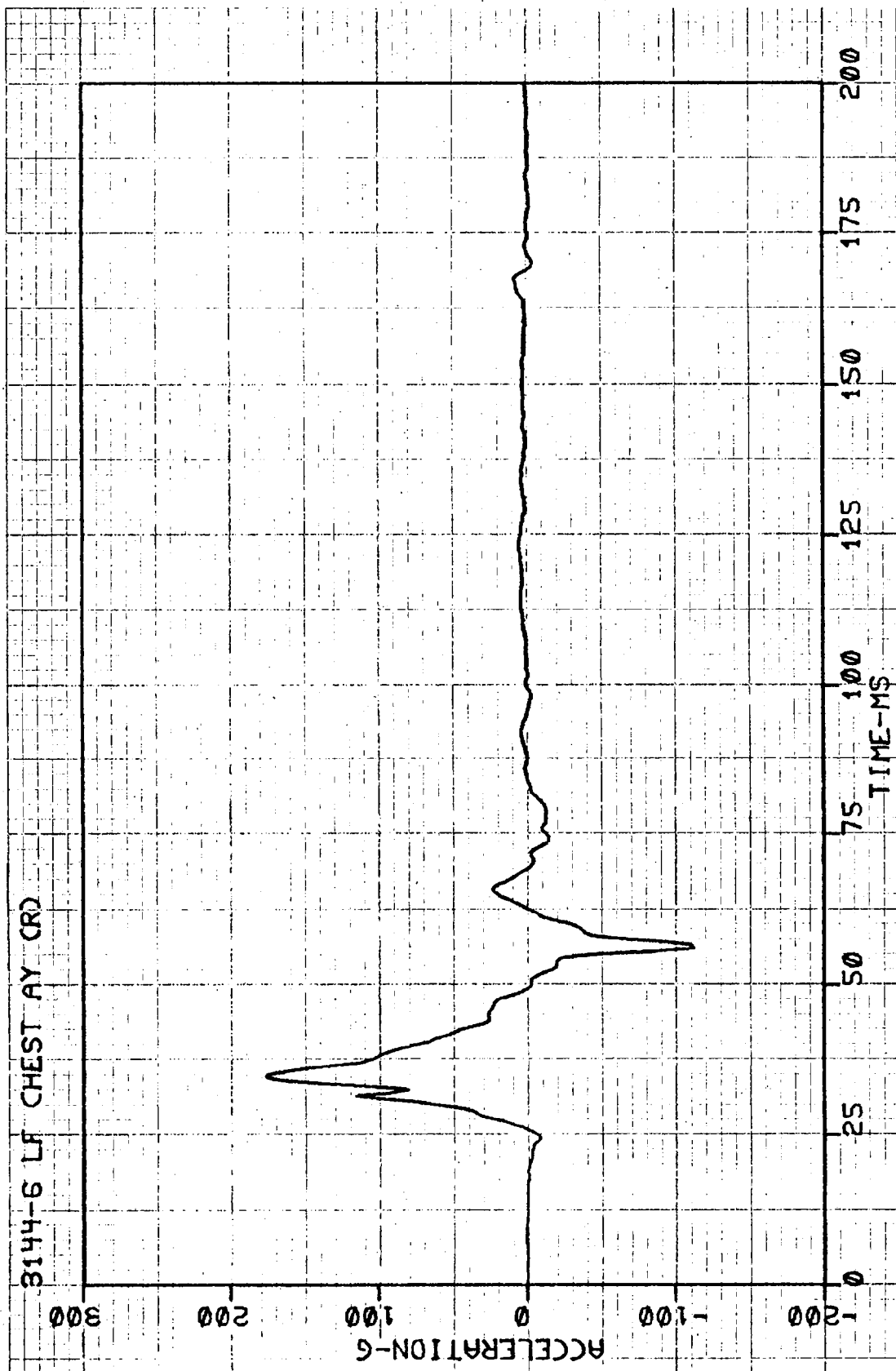


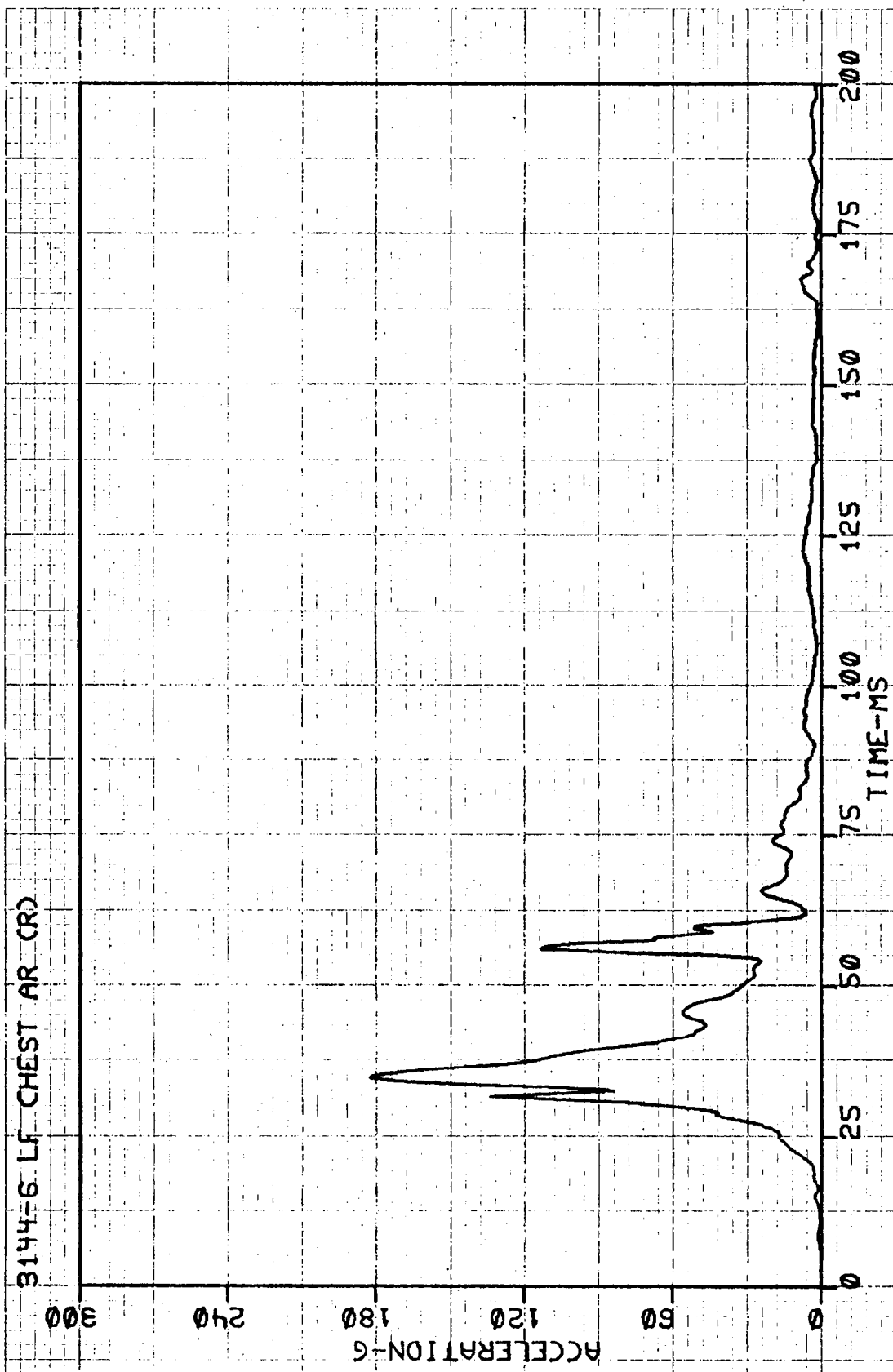




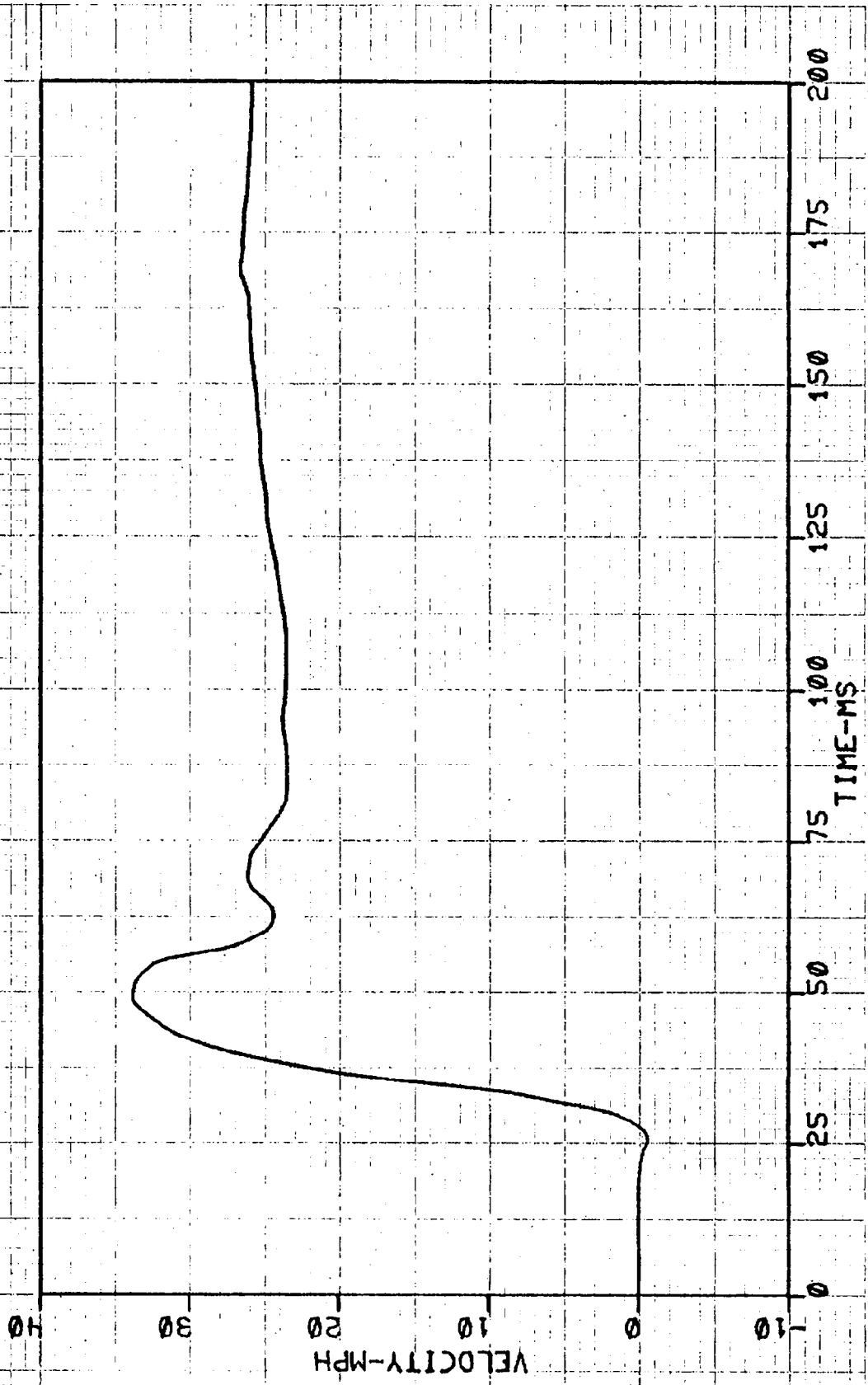


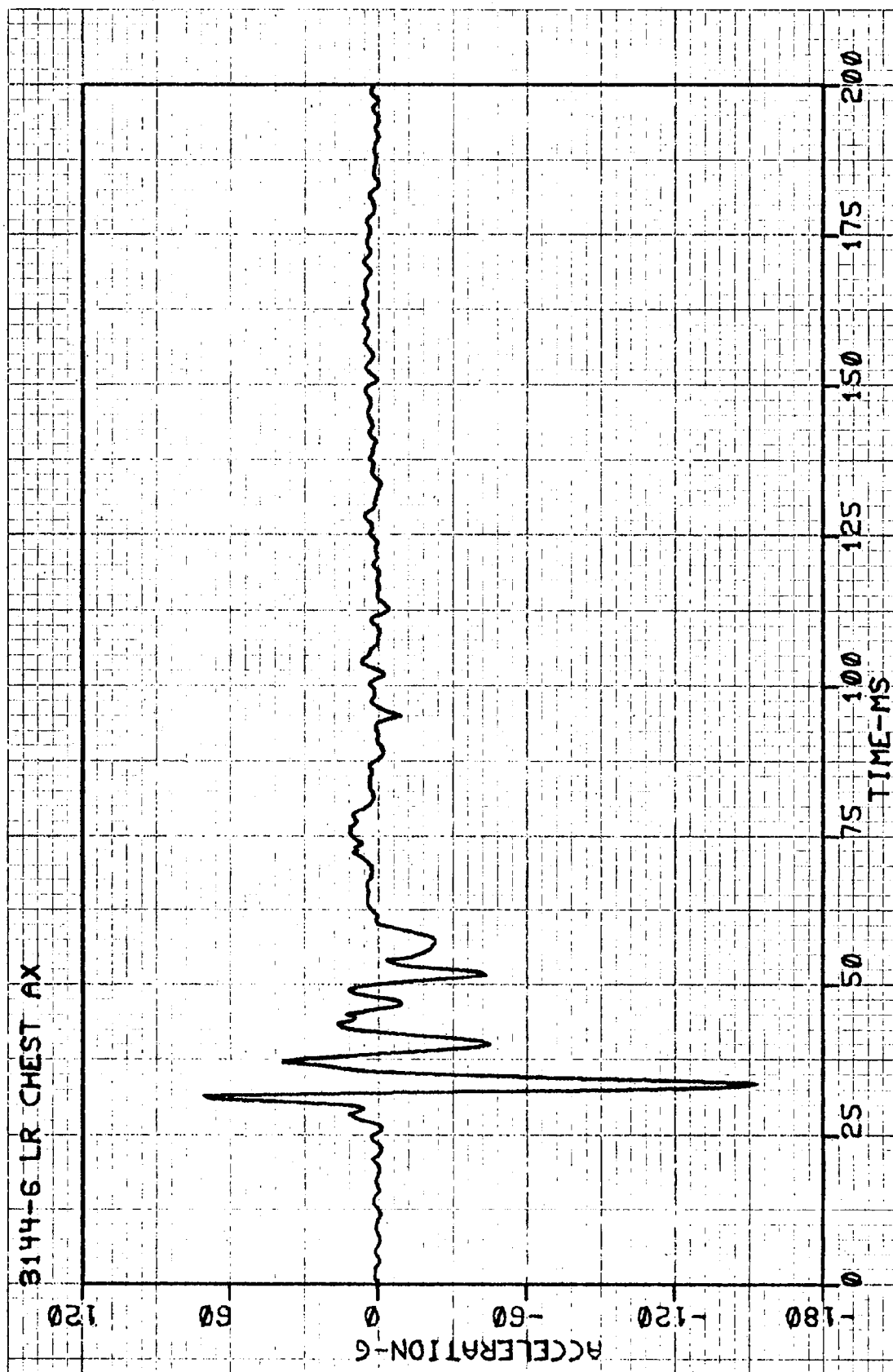


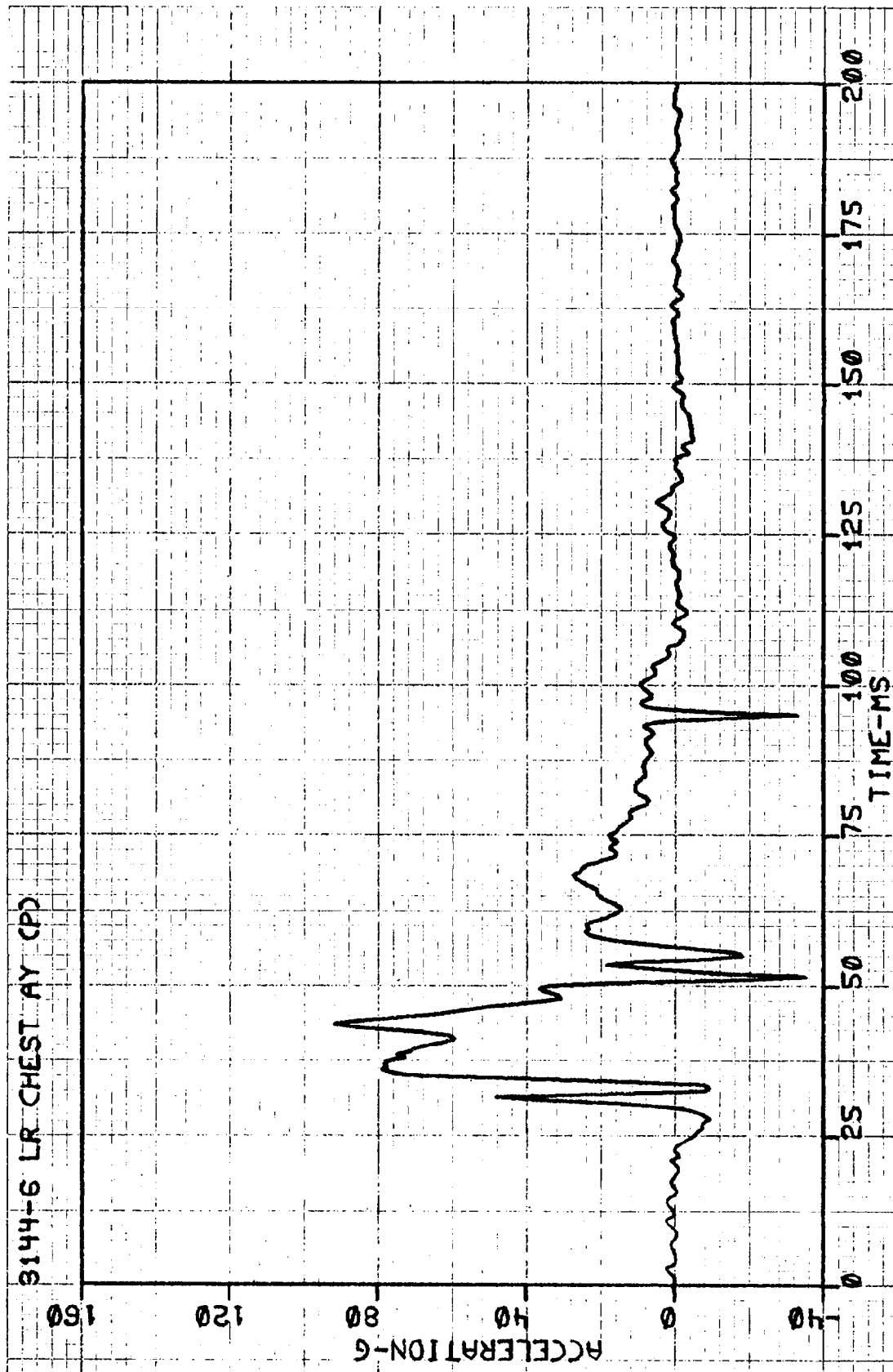


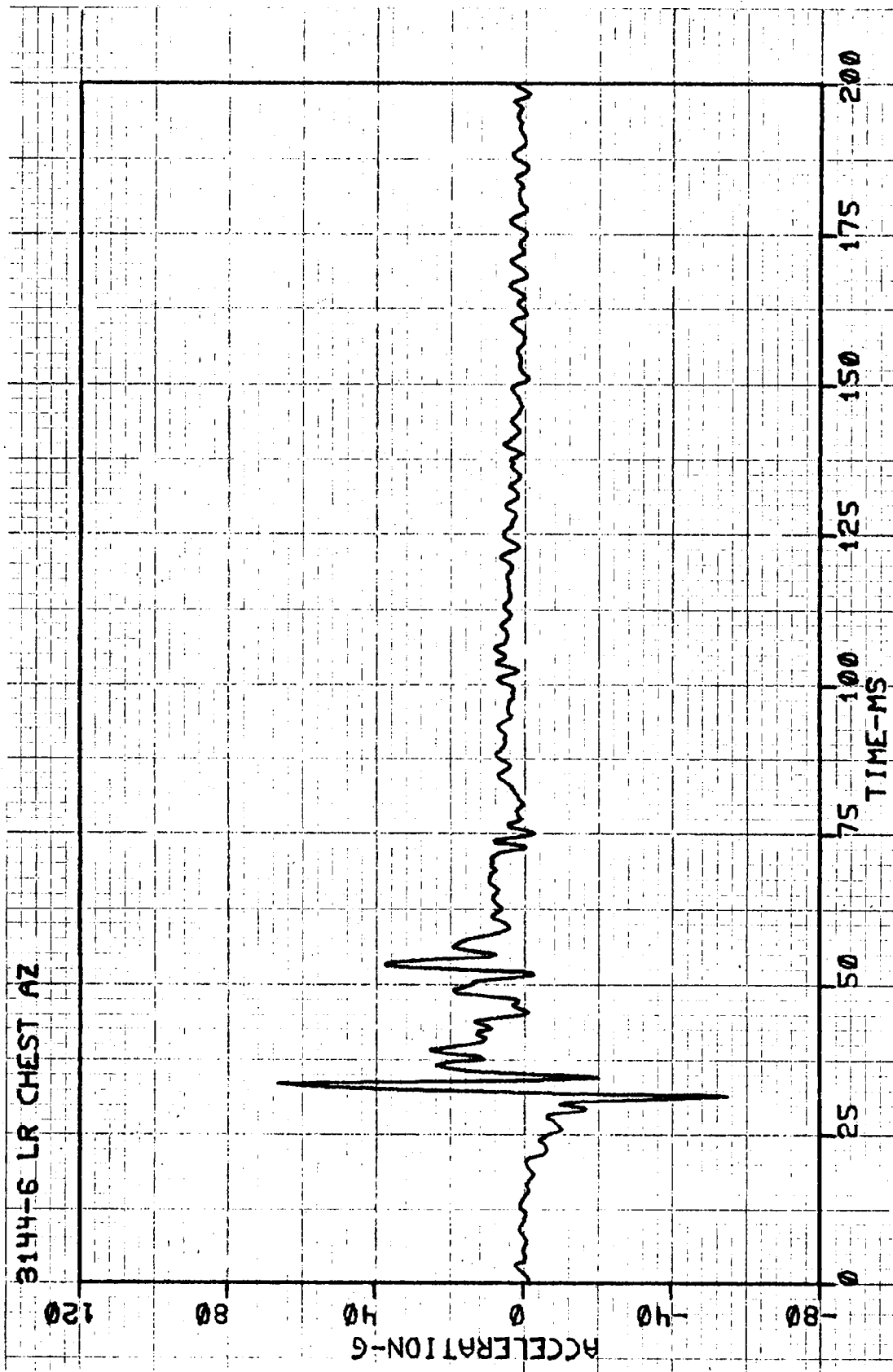


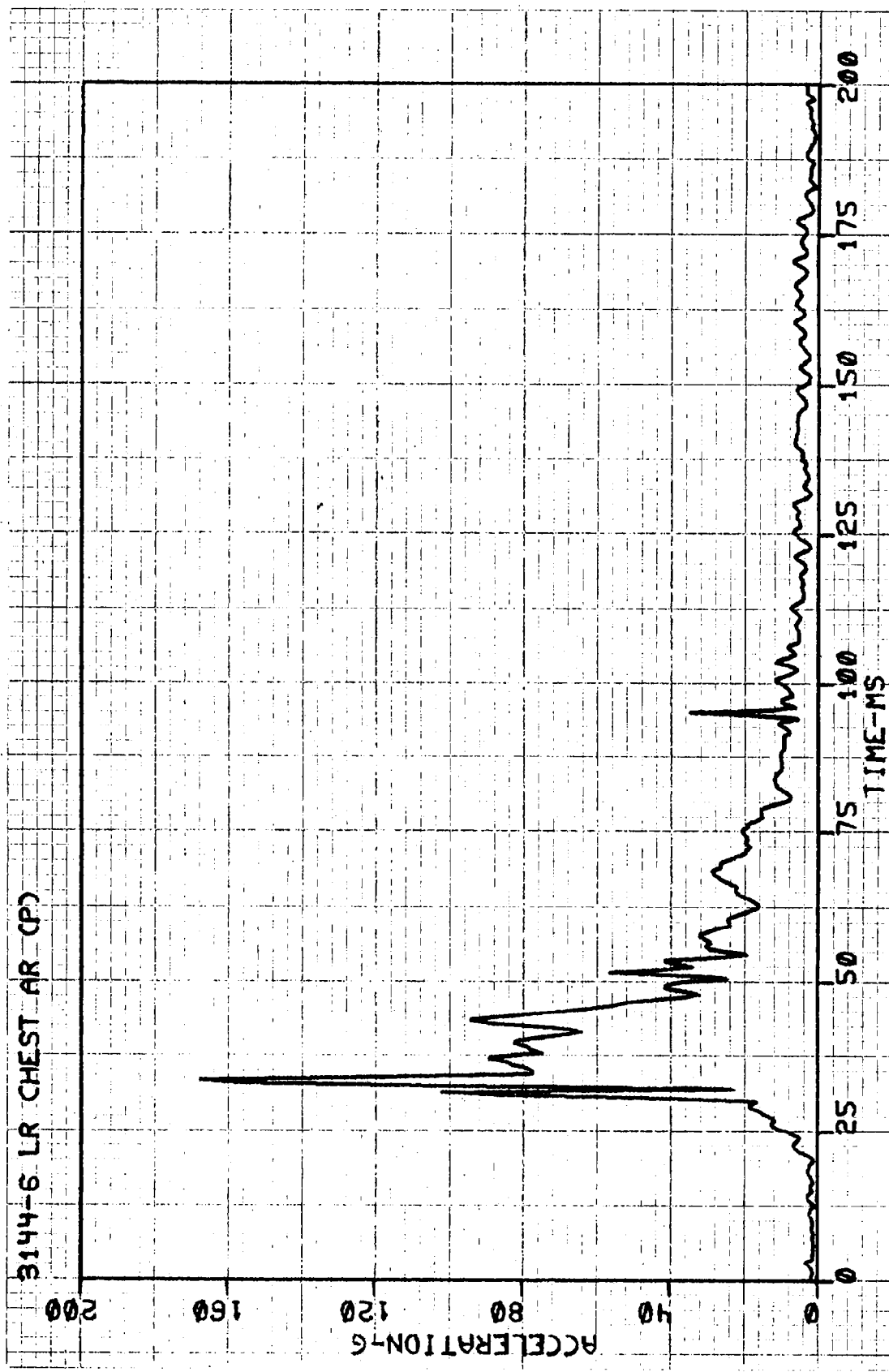
3144-6 LF CHEST VY (R)

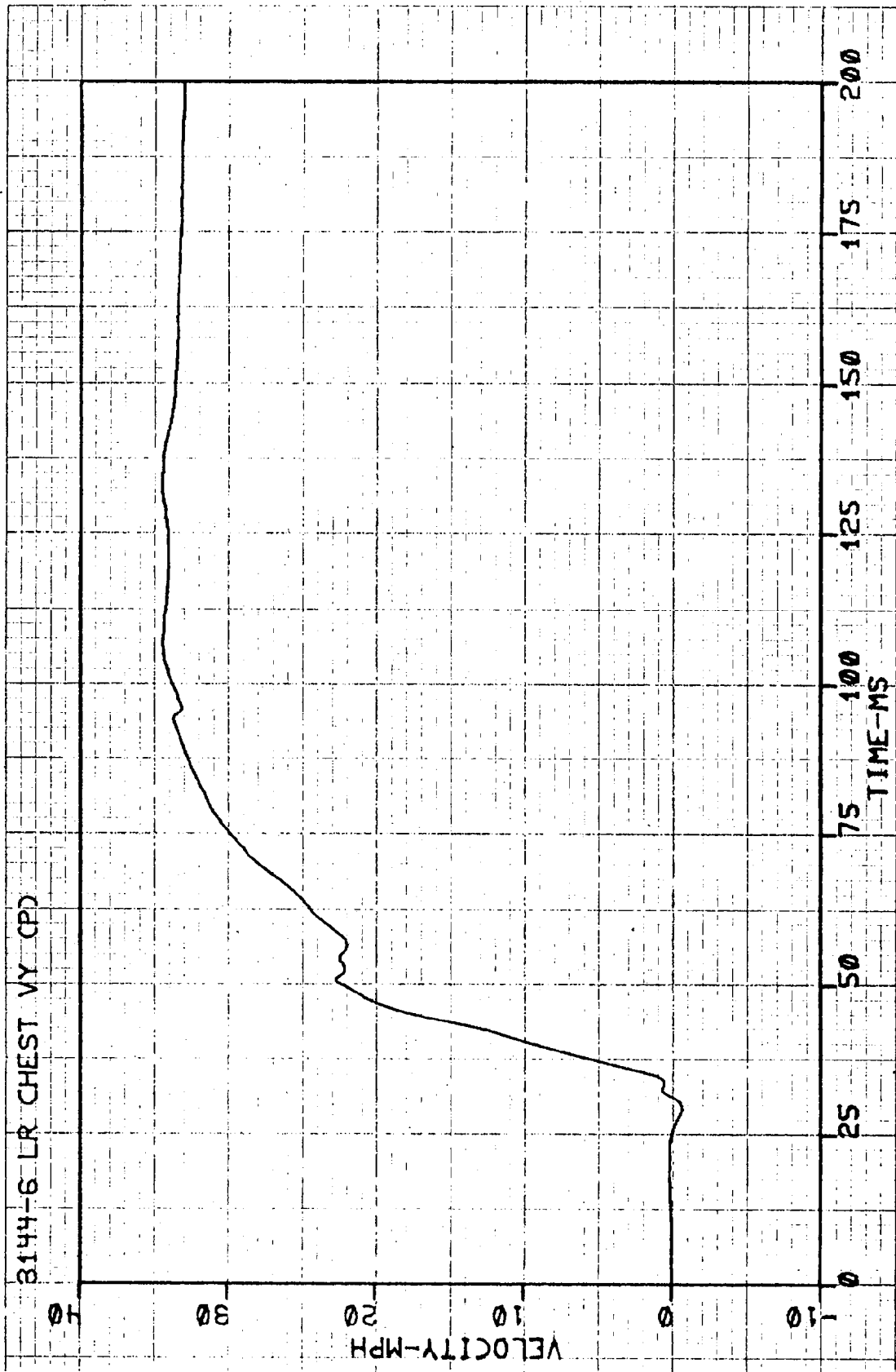


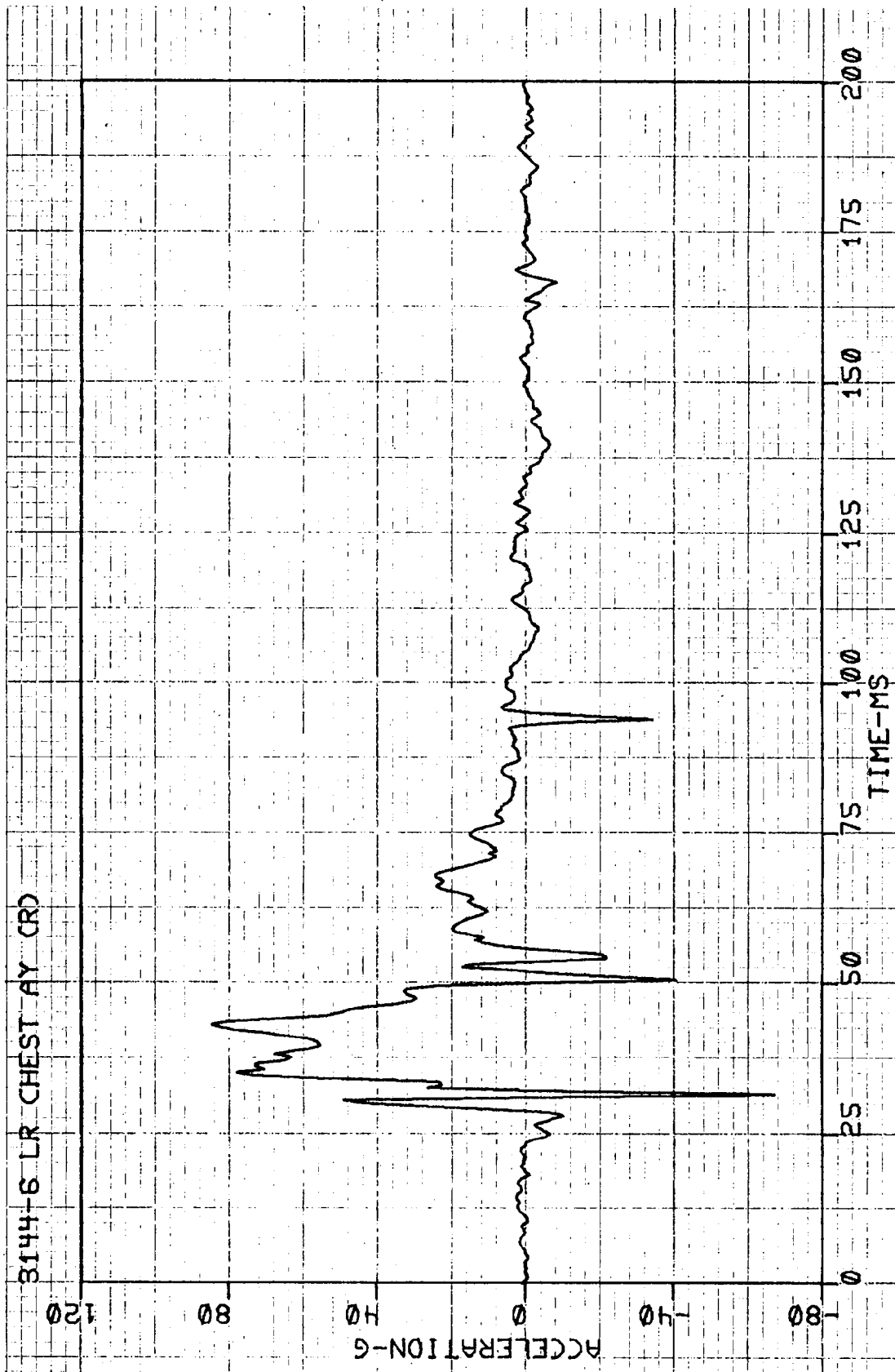


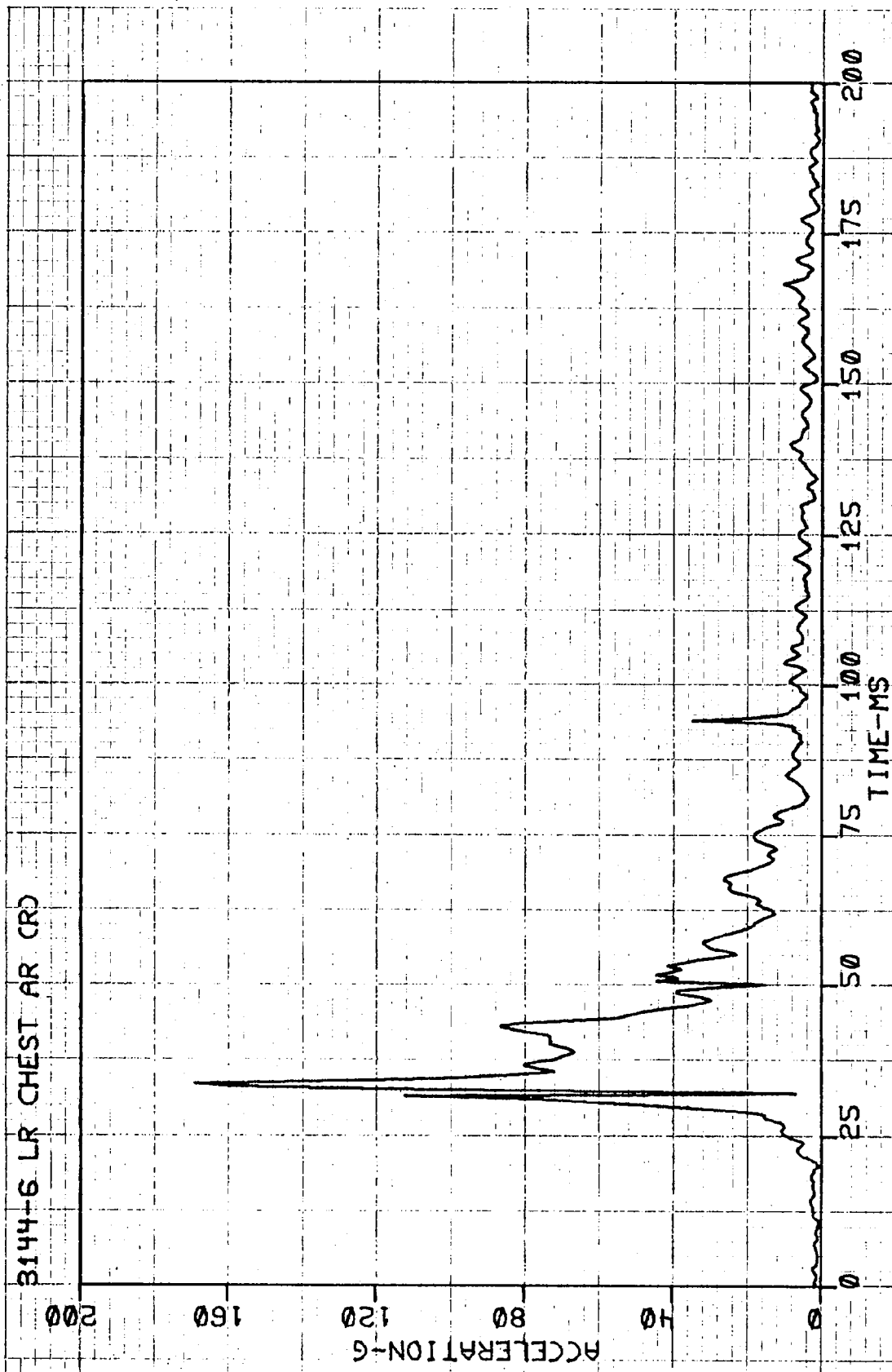


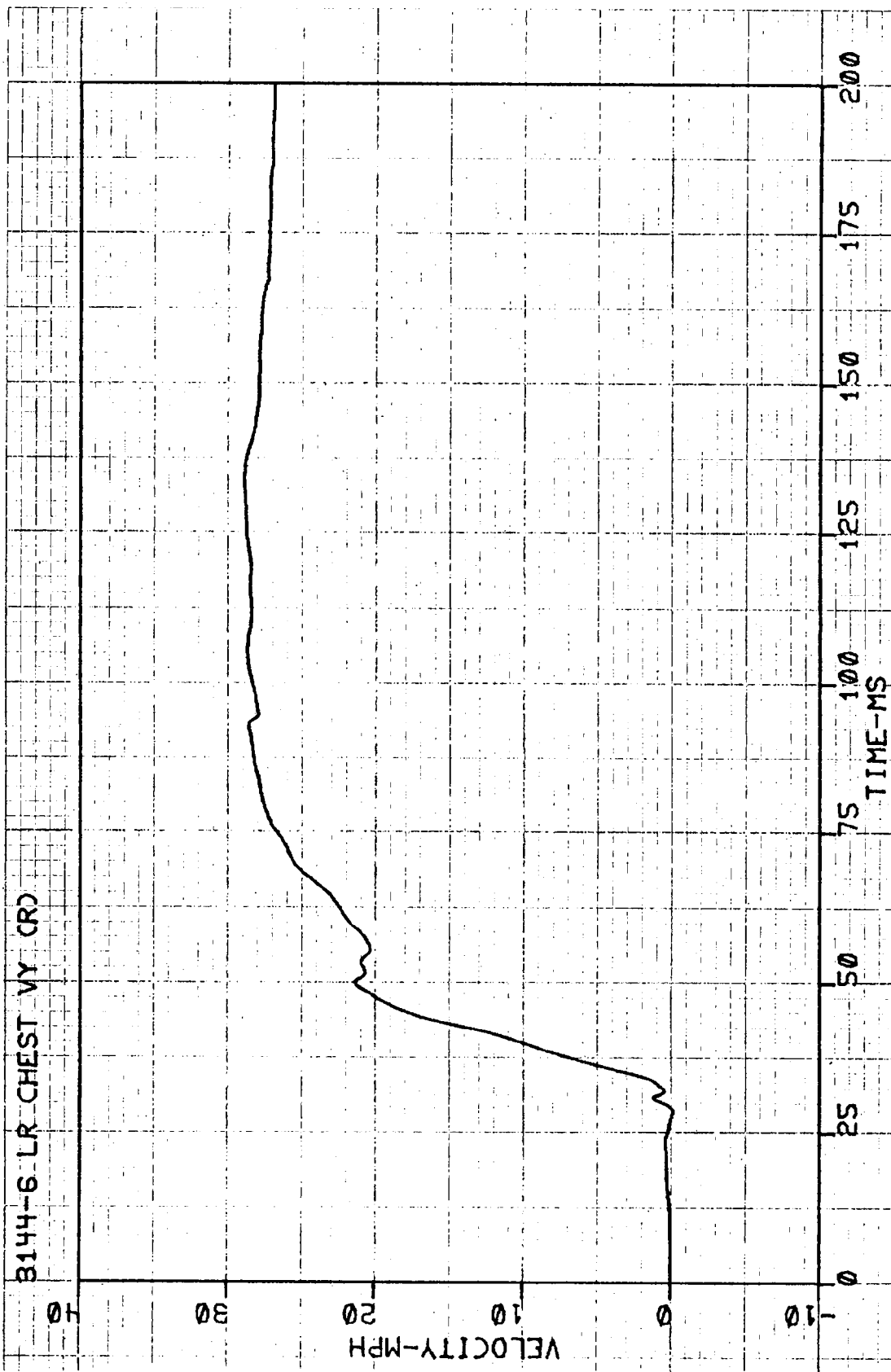


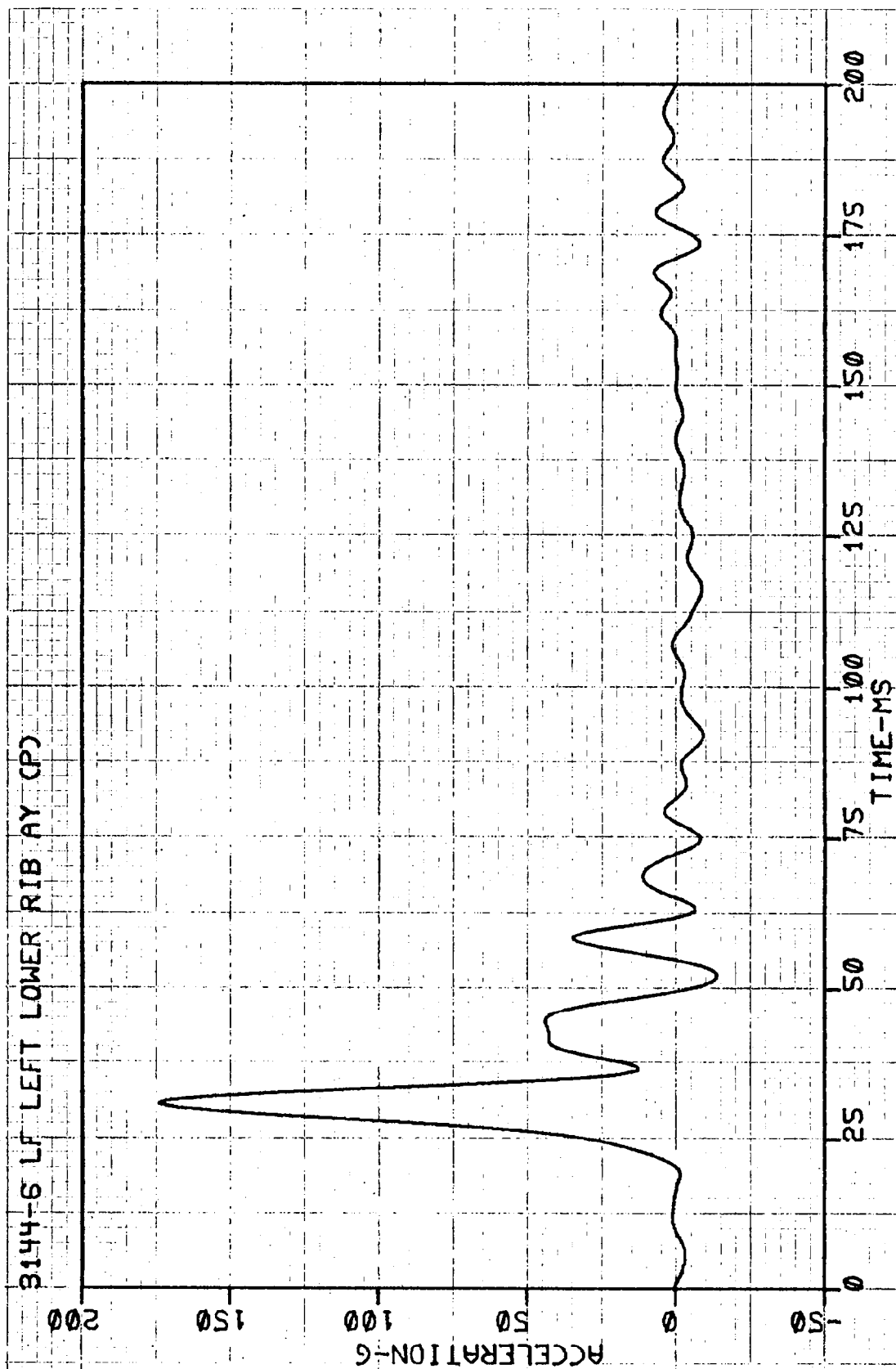


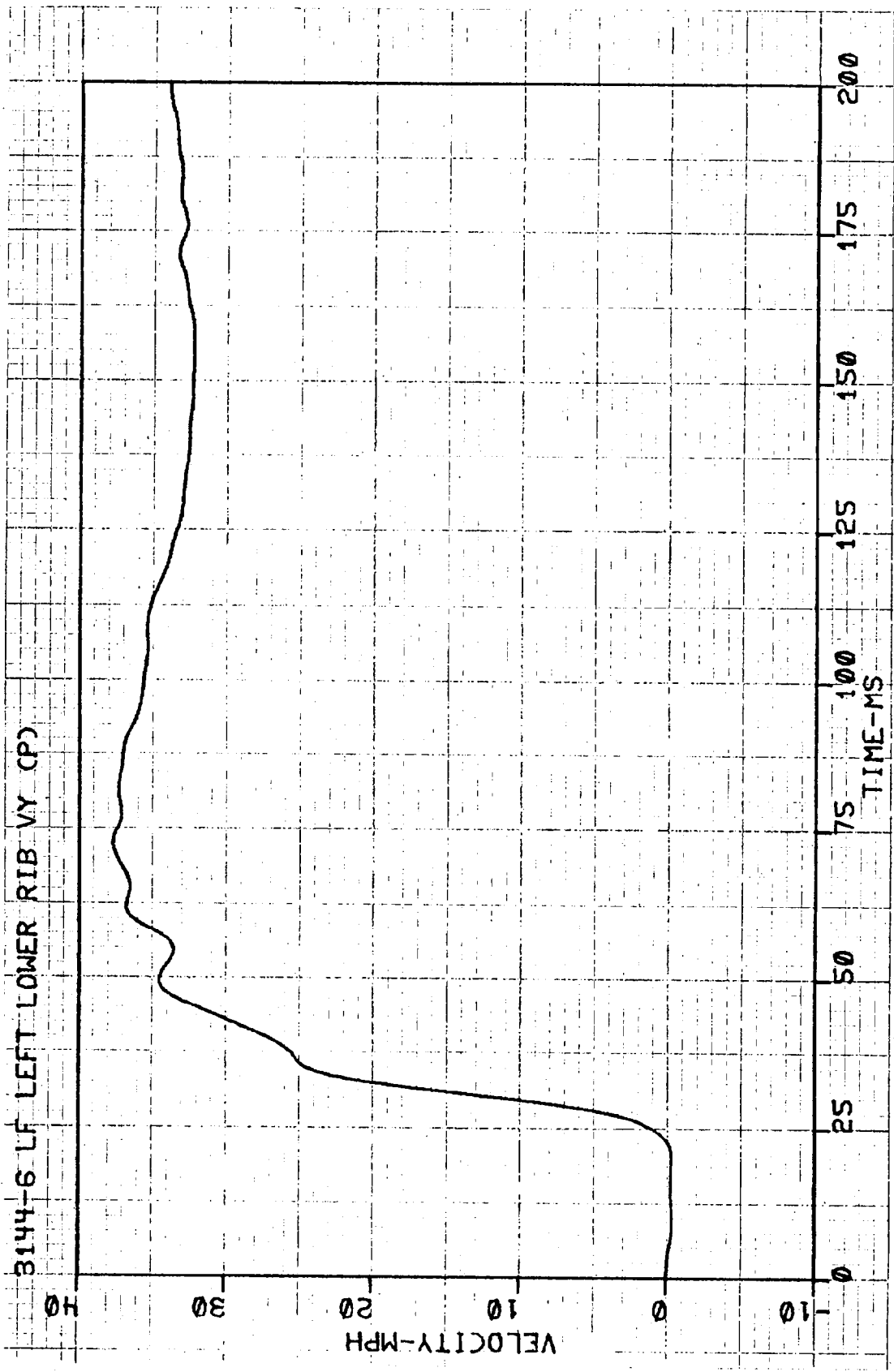


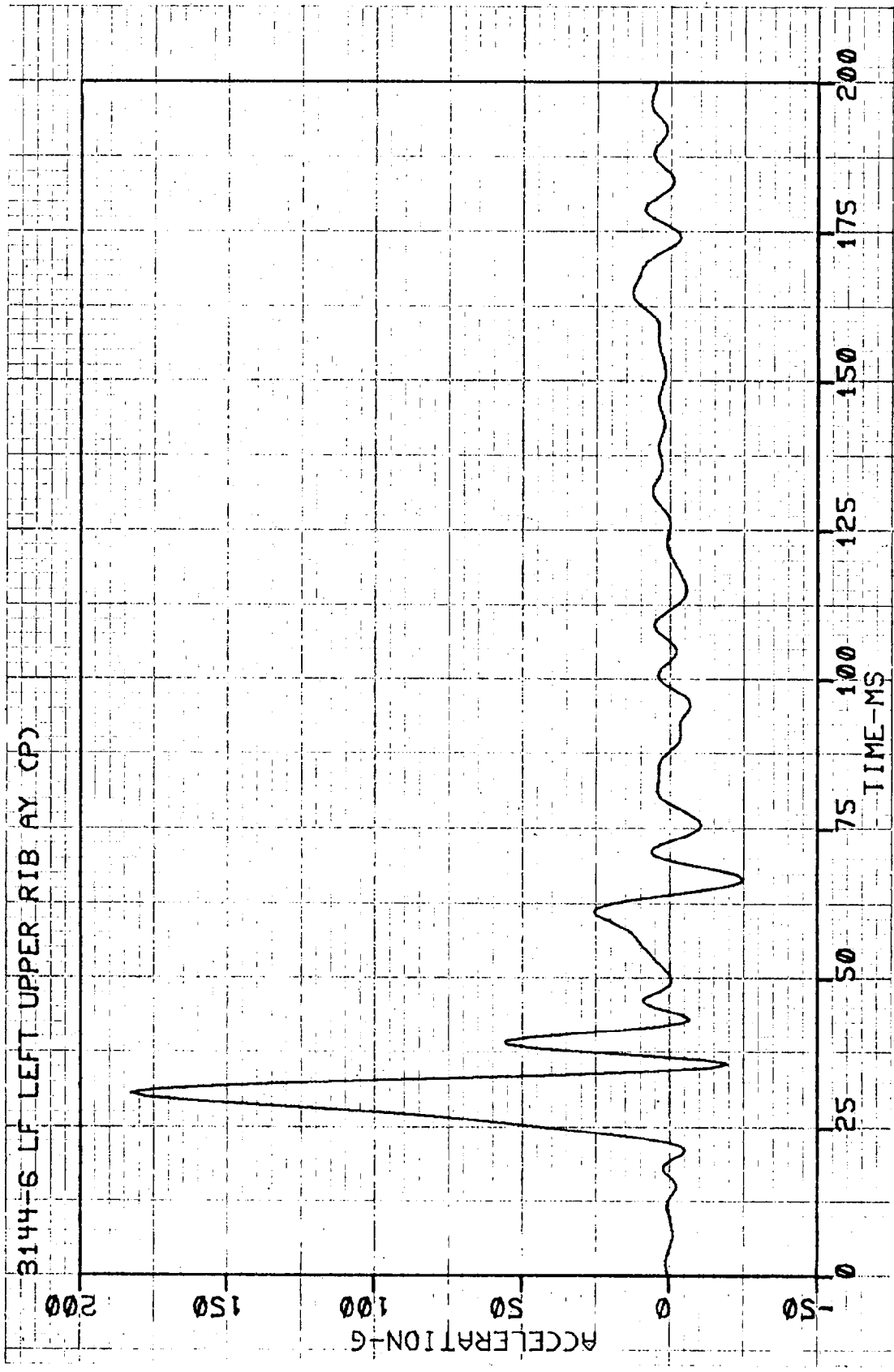


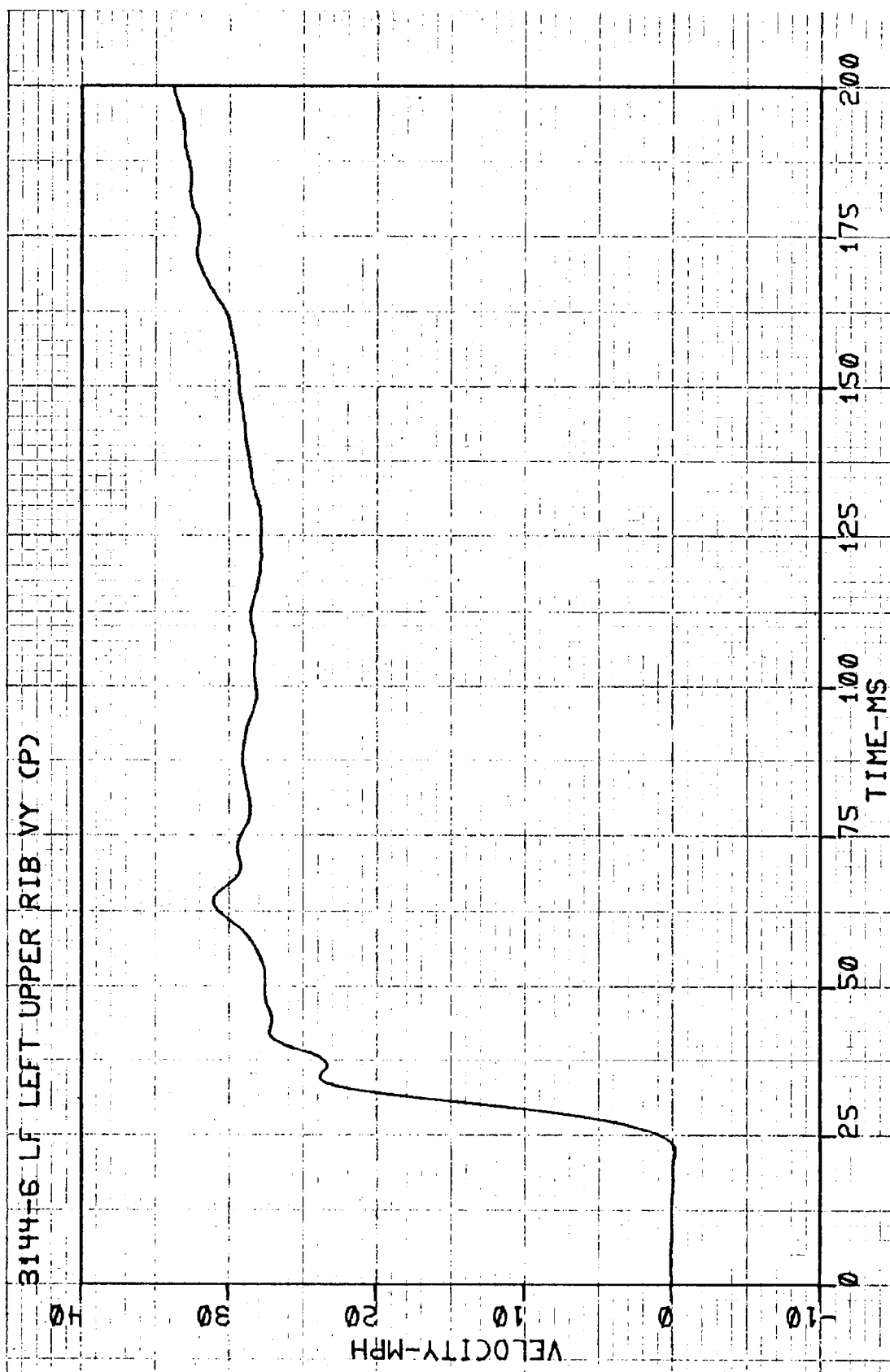


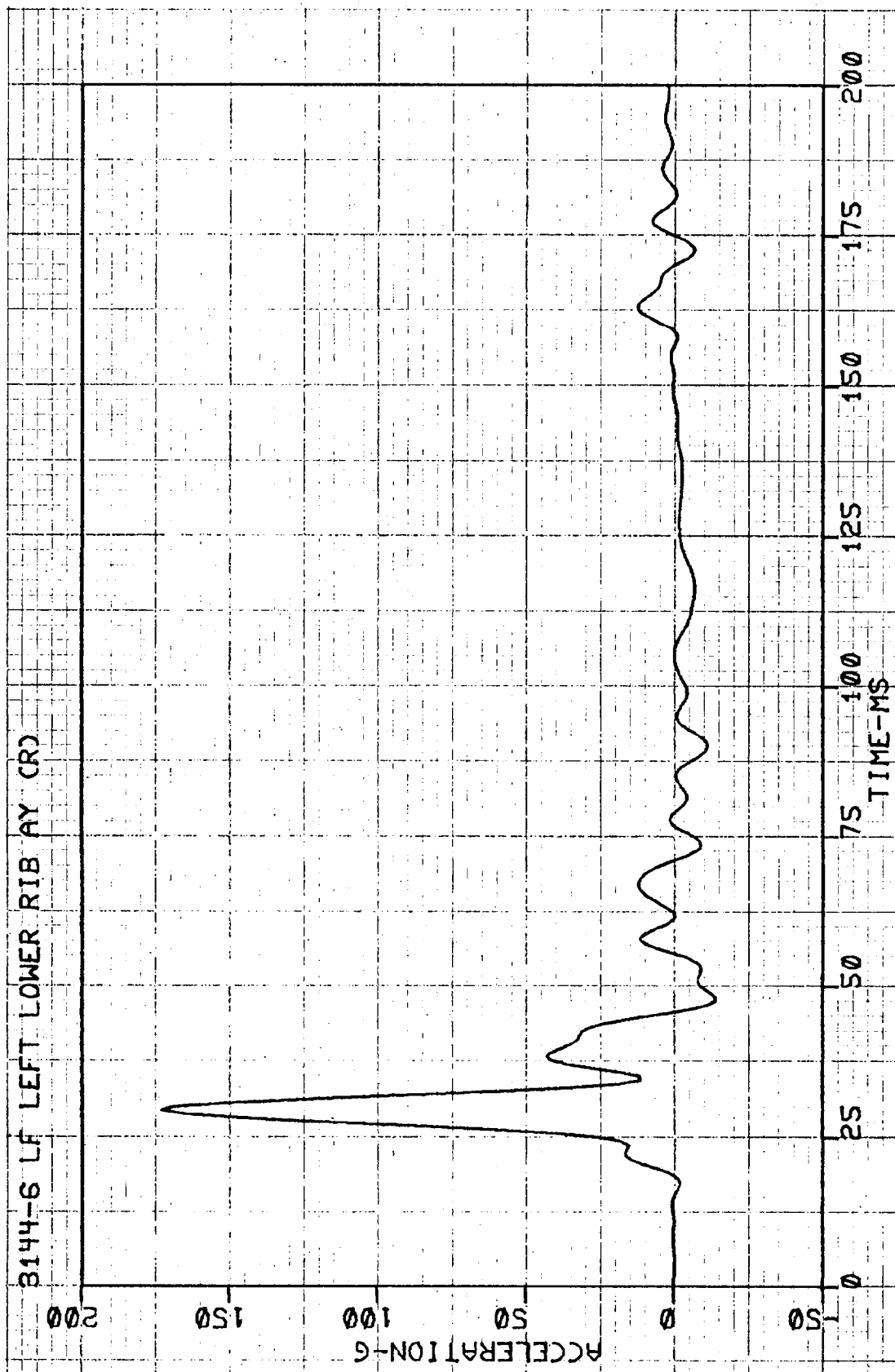


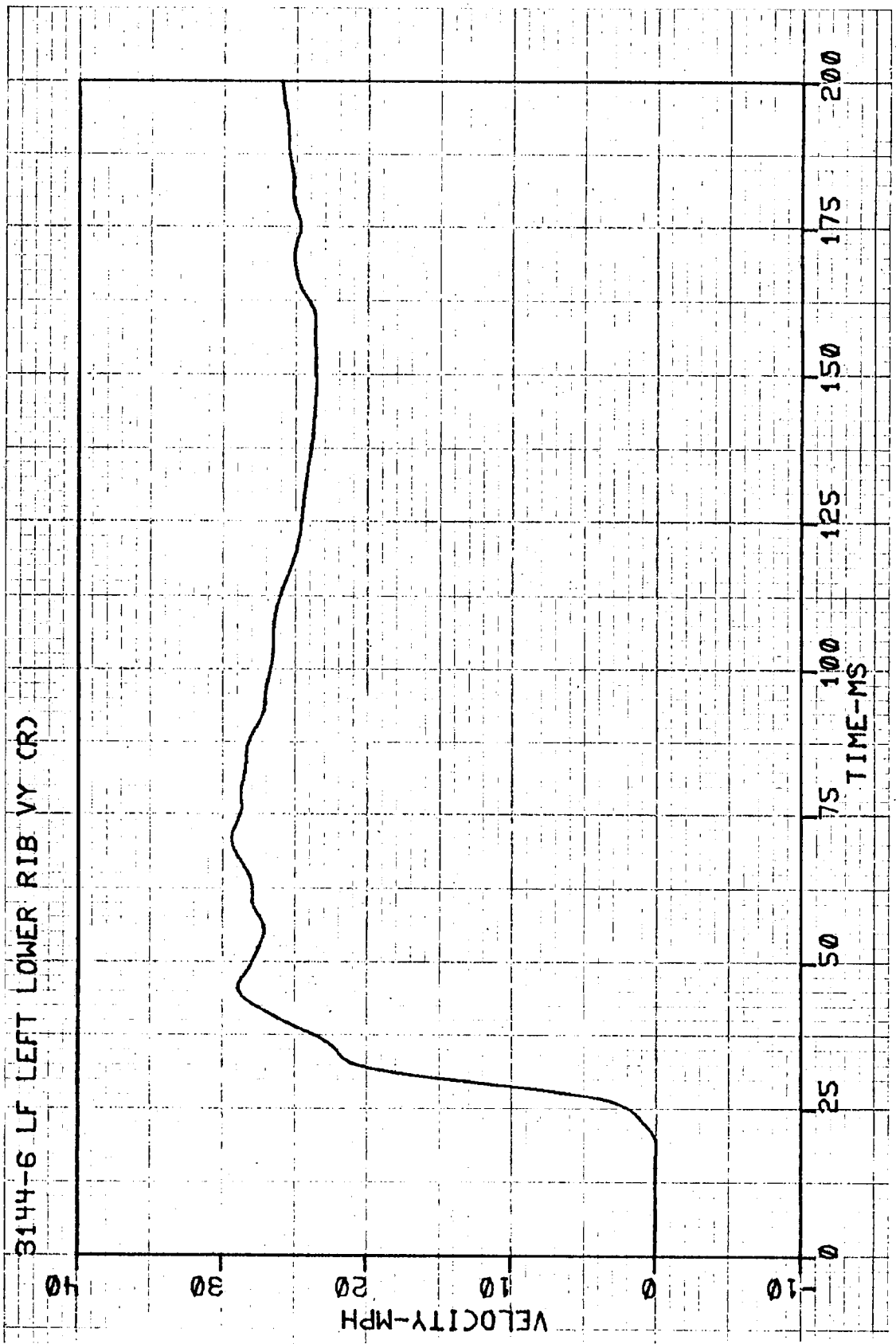


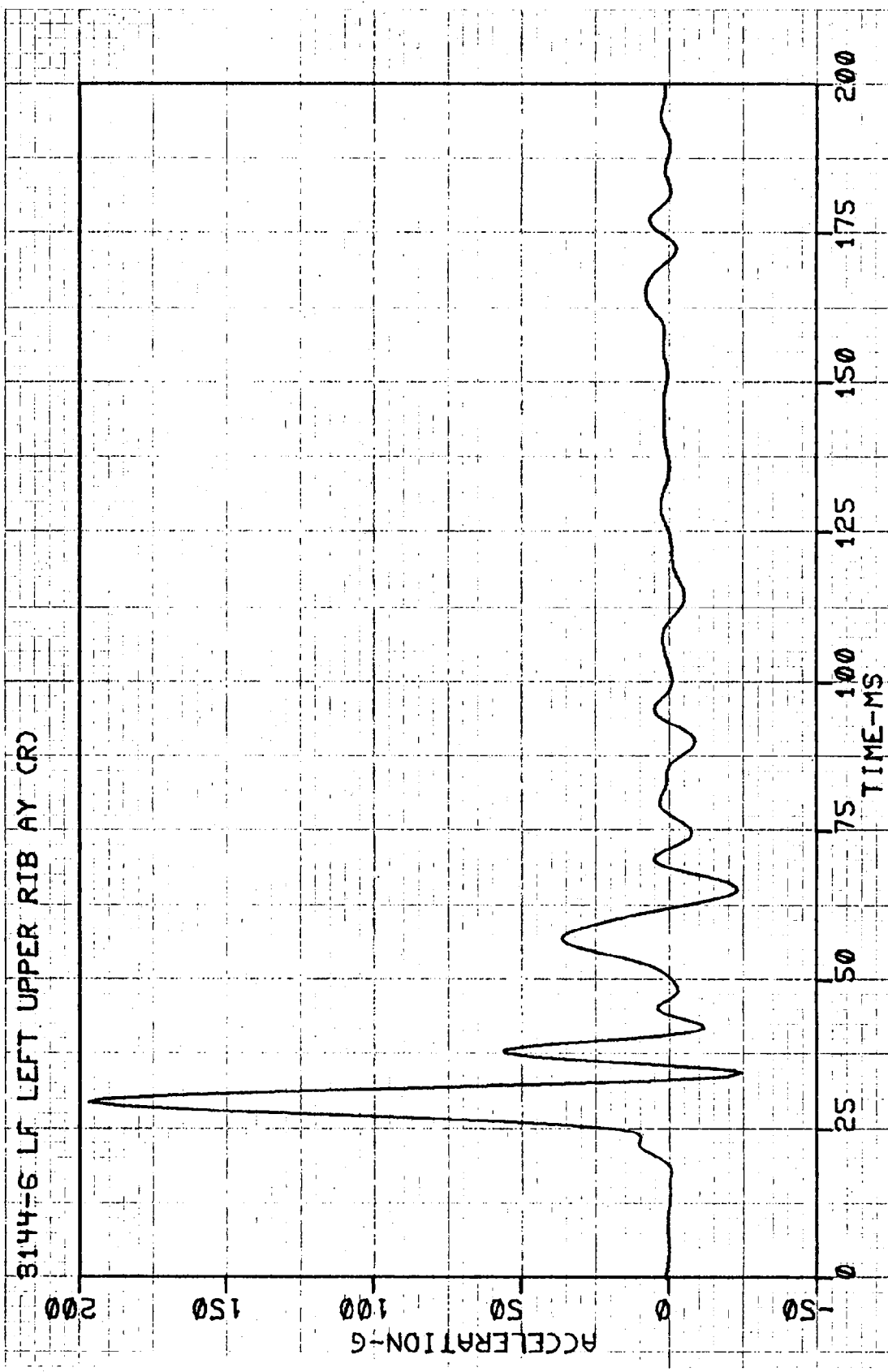


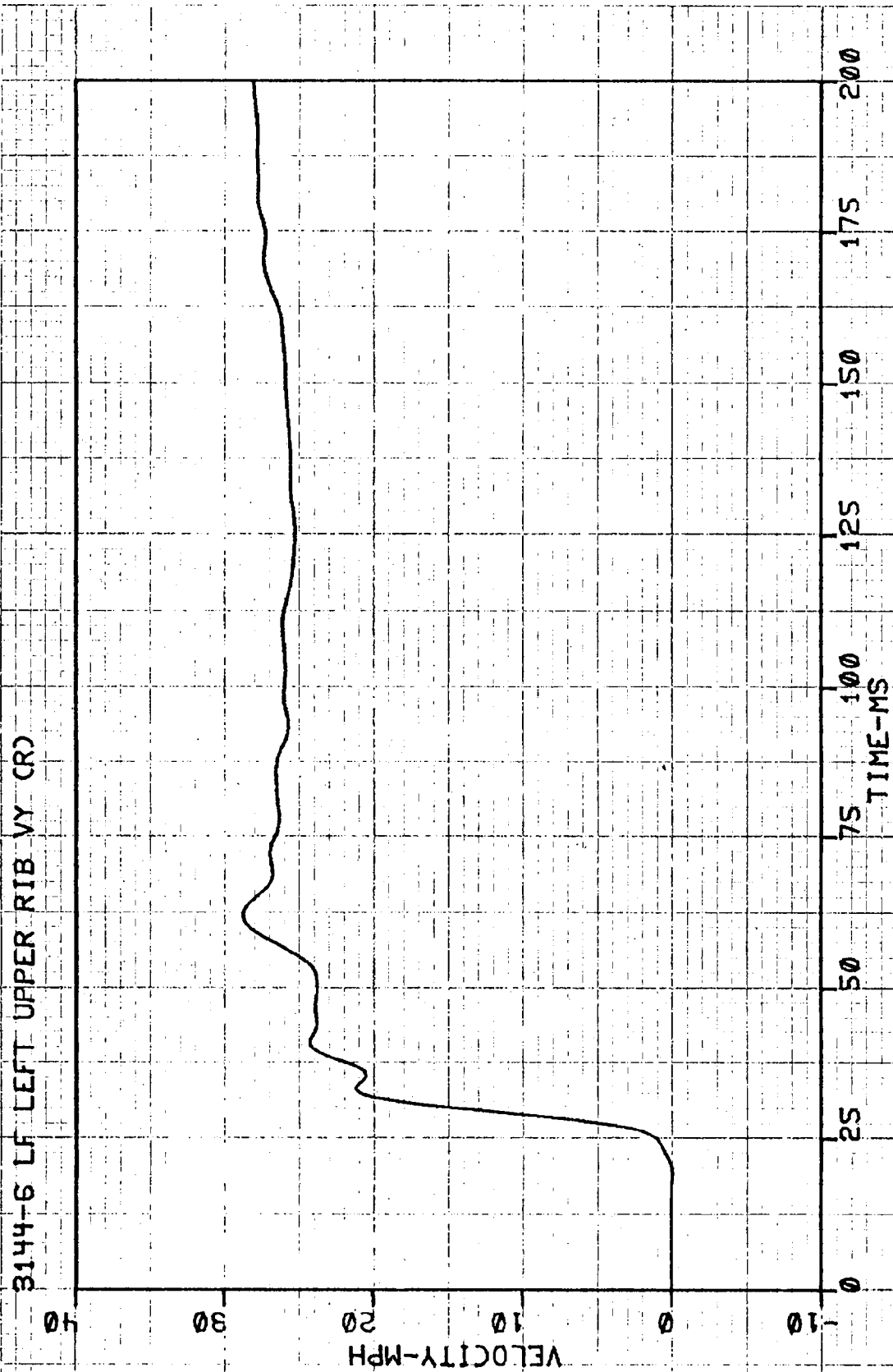


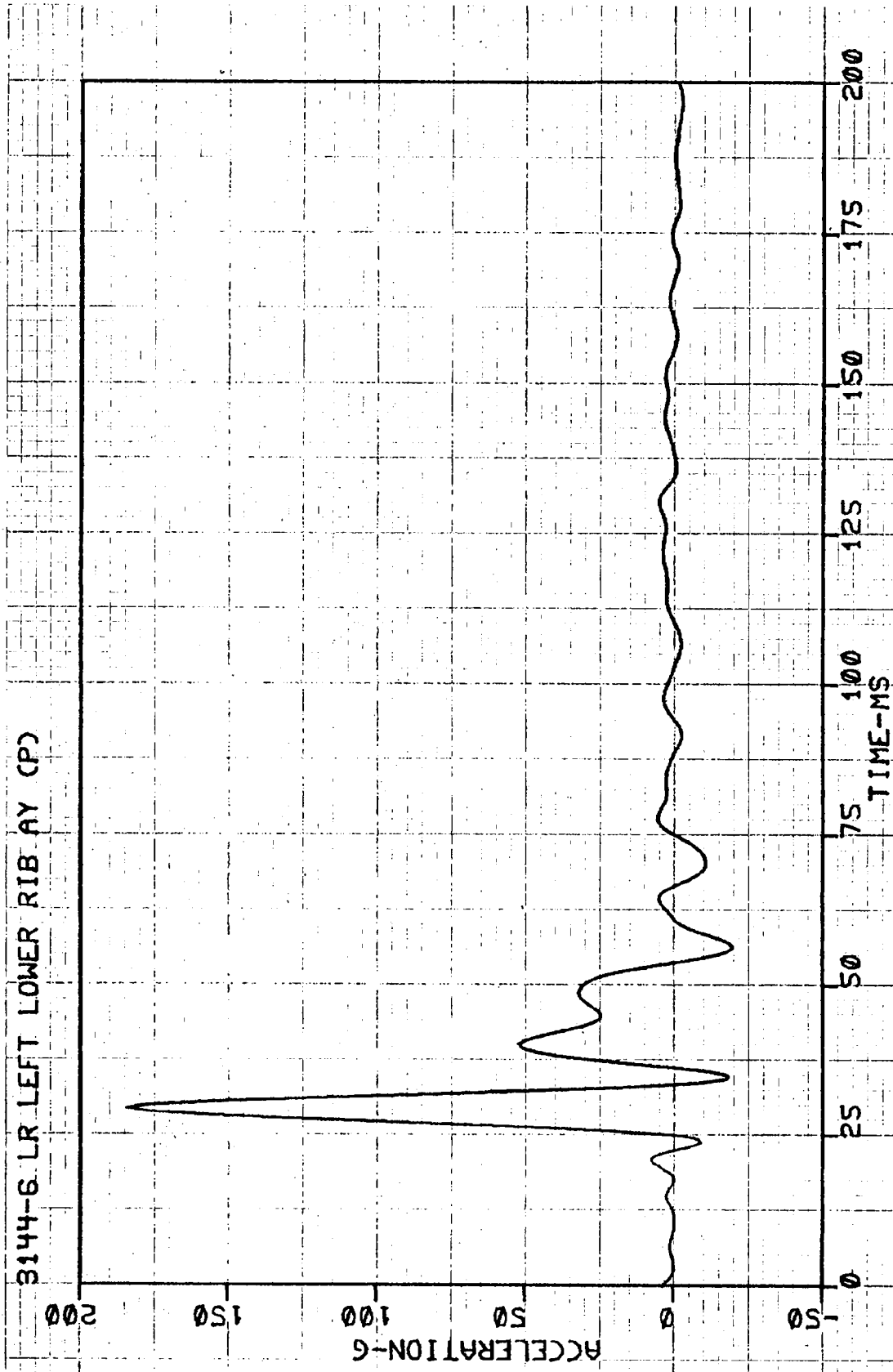


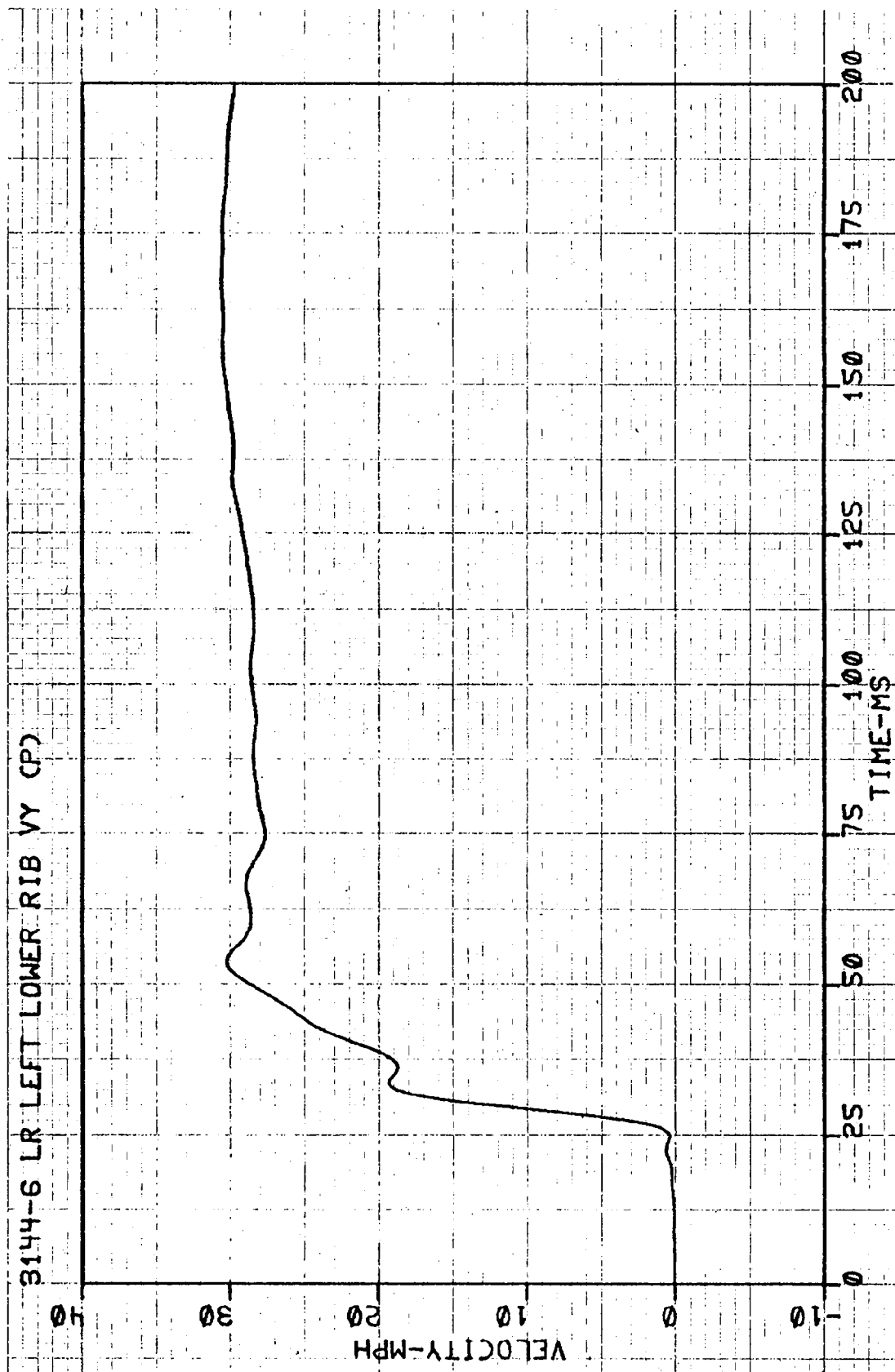


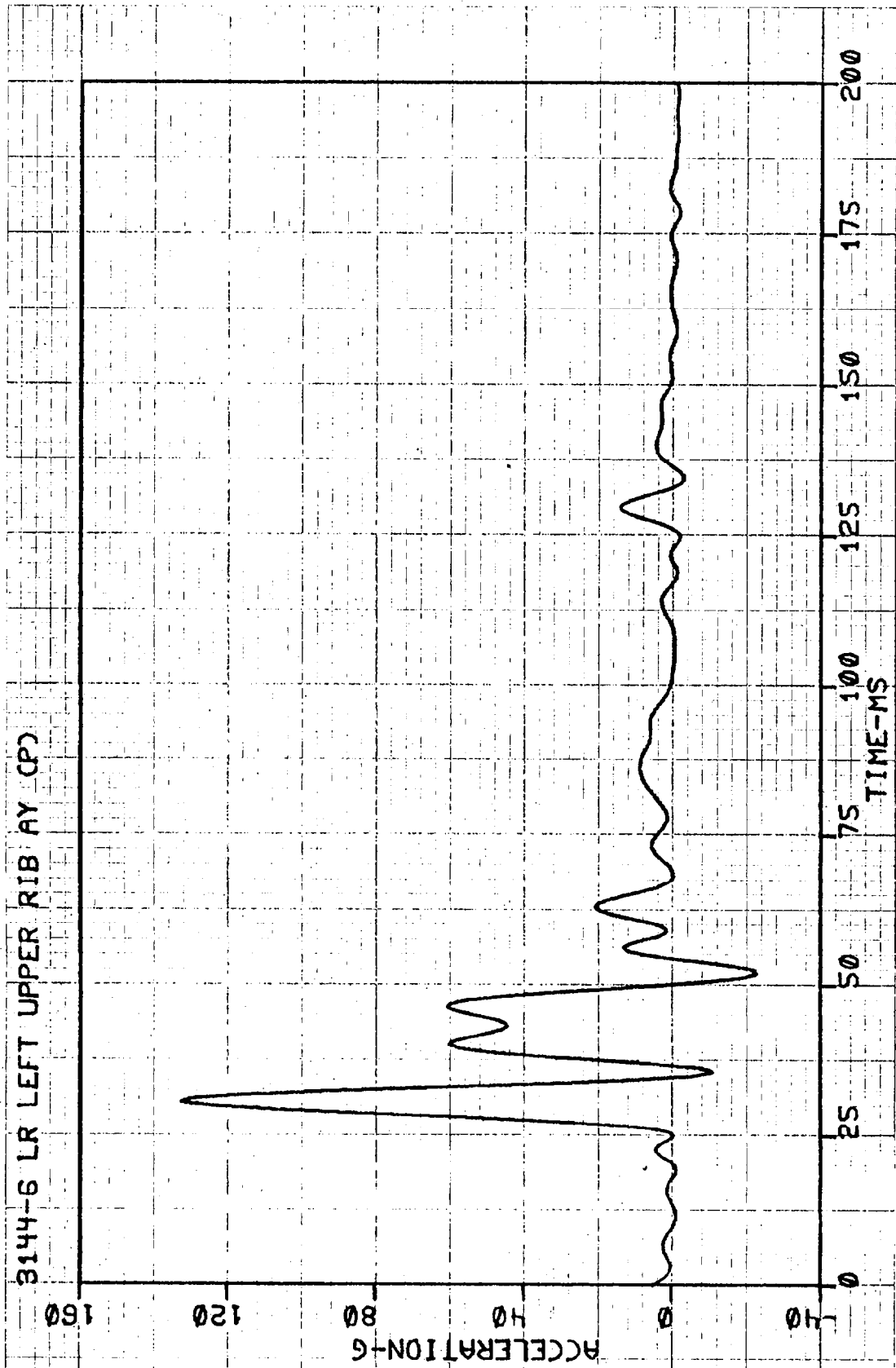






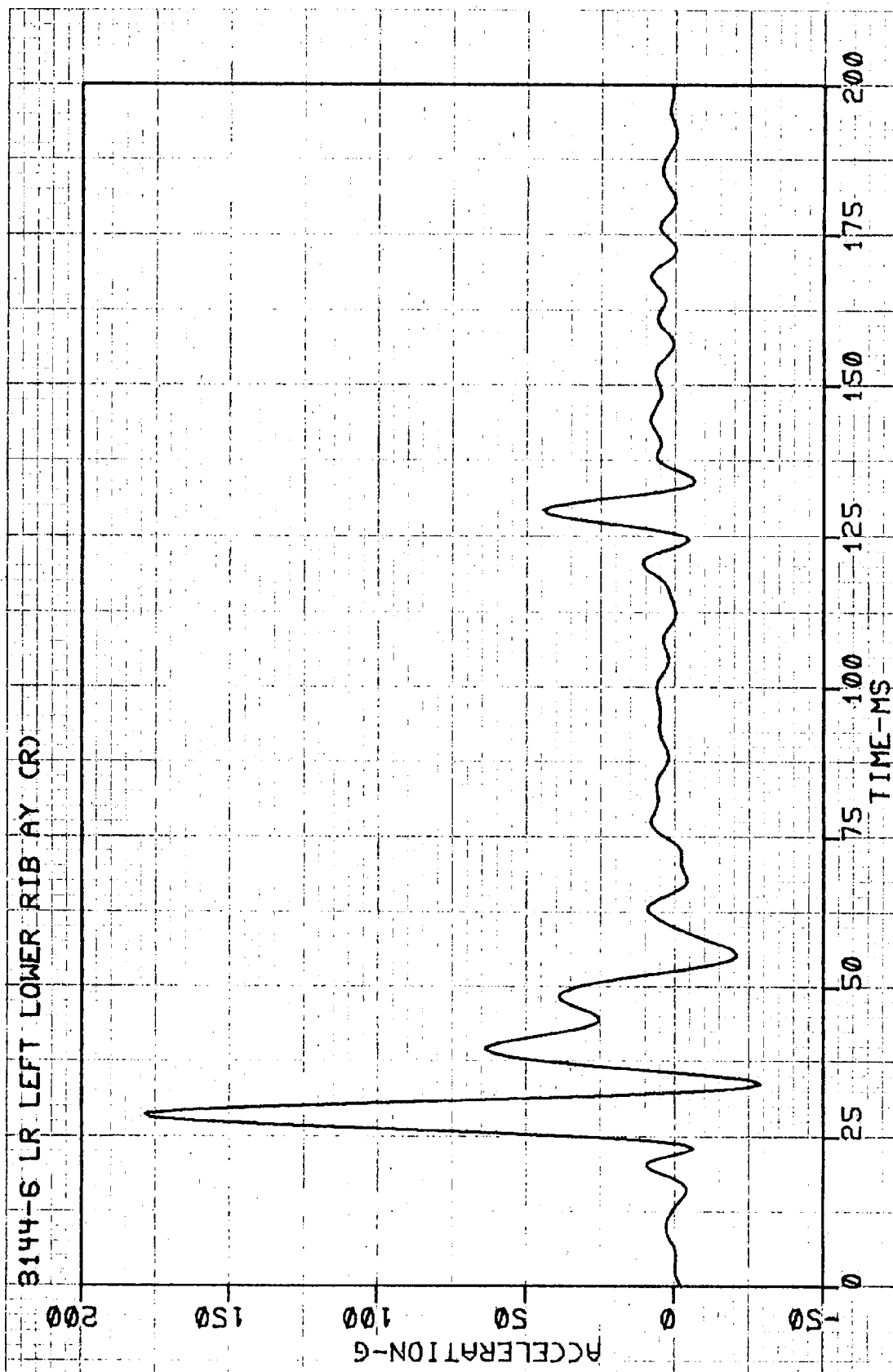


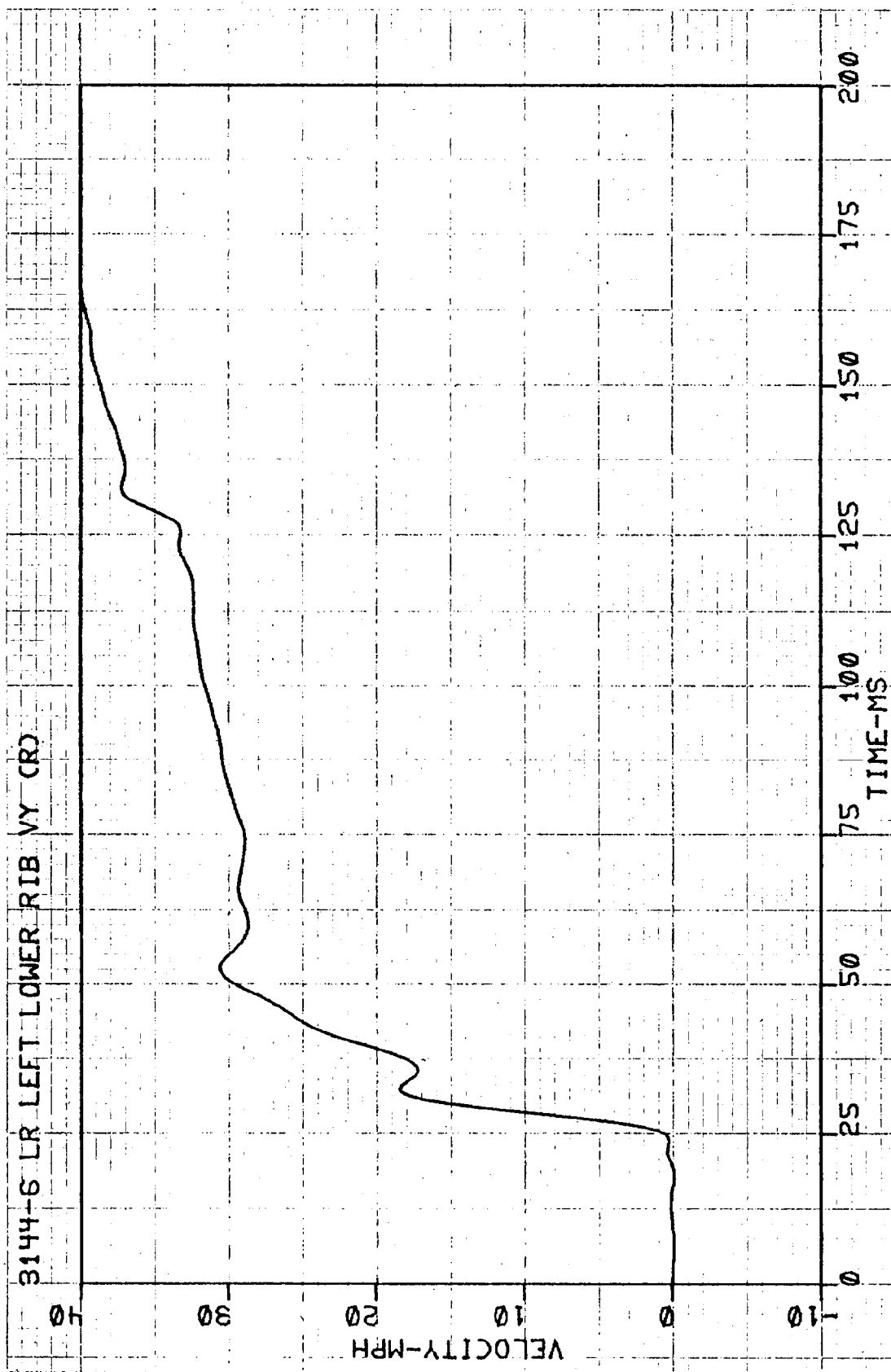


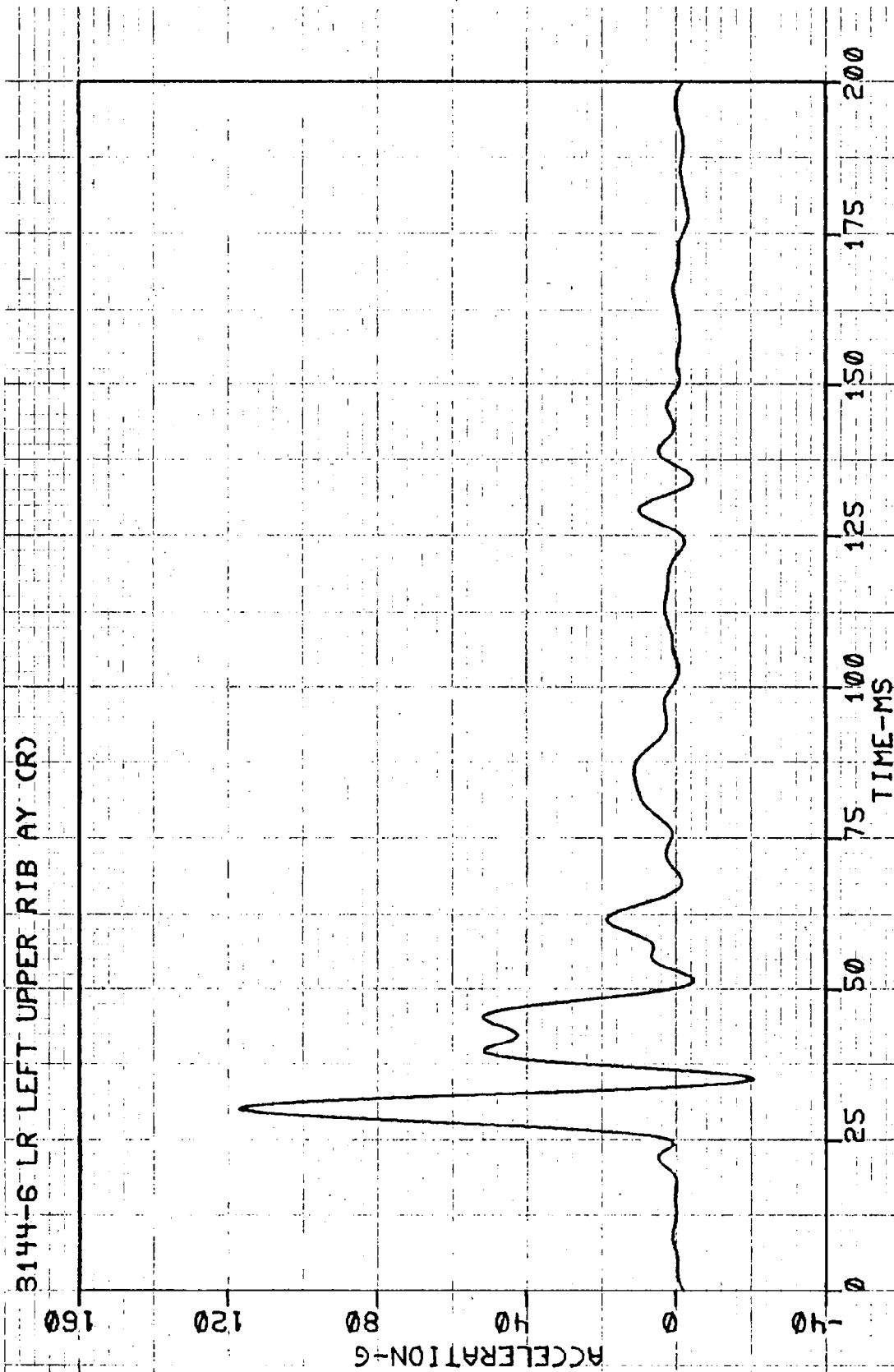


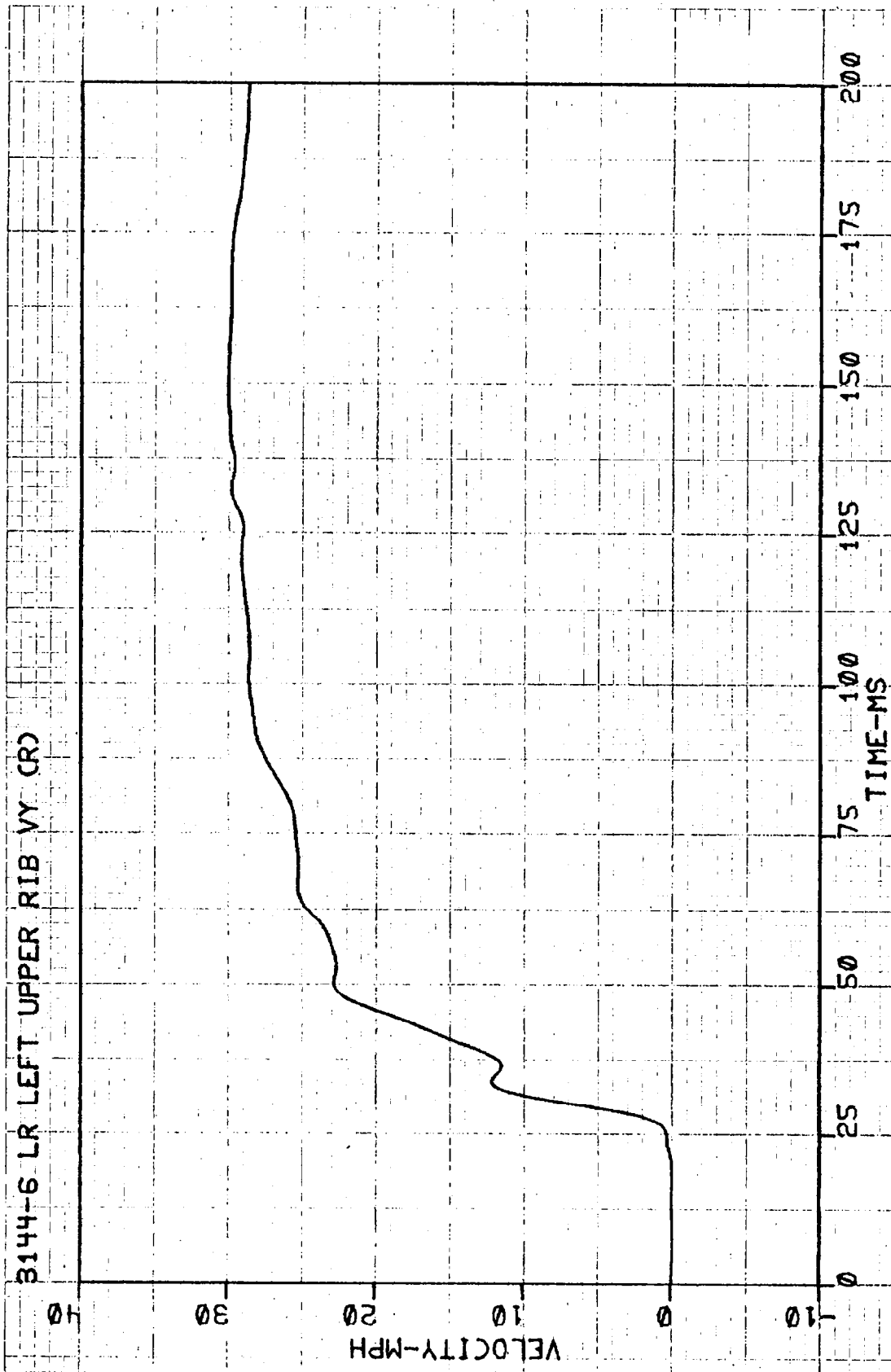
8144-6 LR LEFT UPPER RIB VY (P)

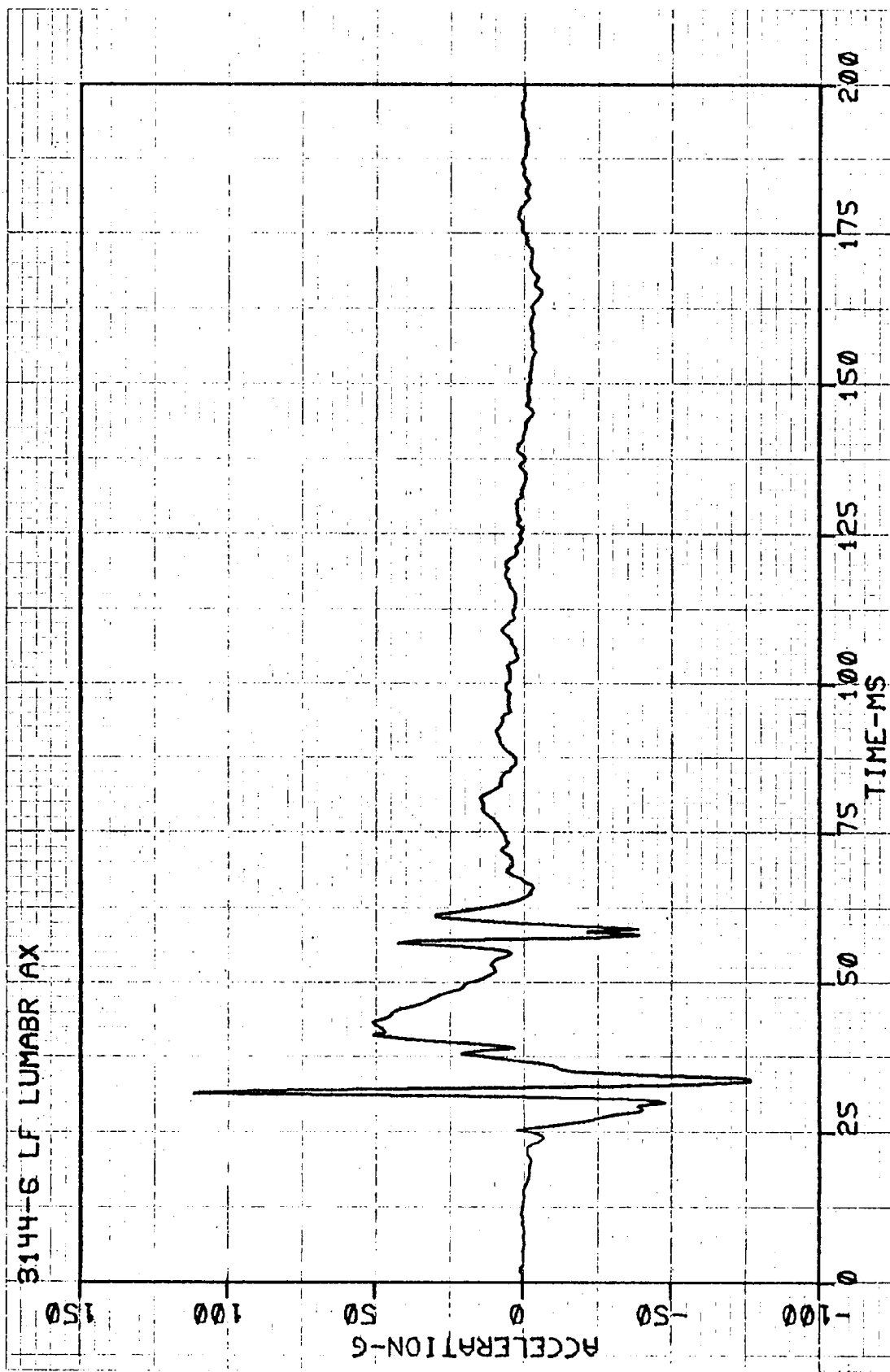


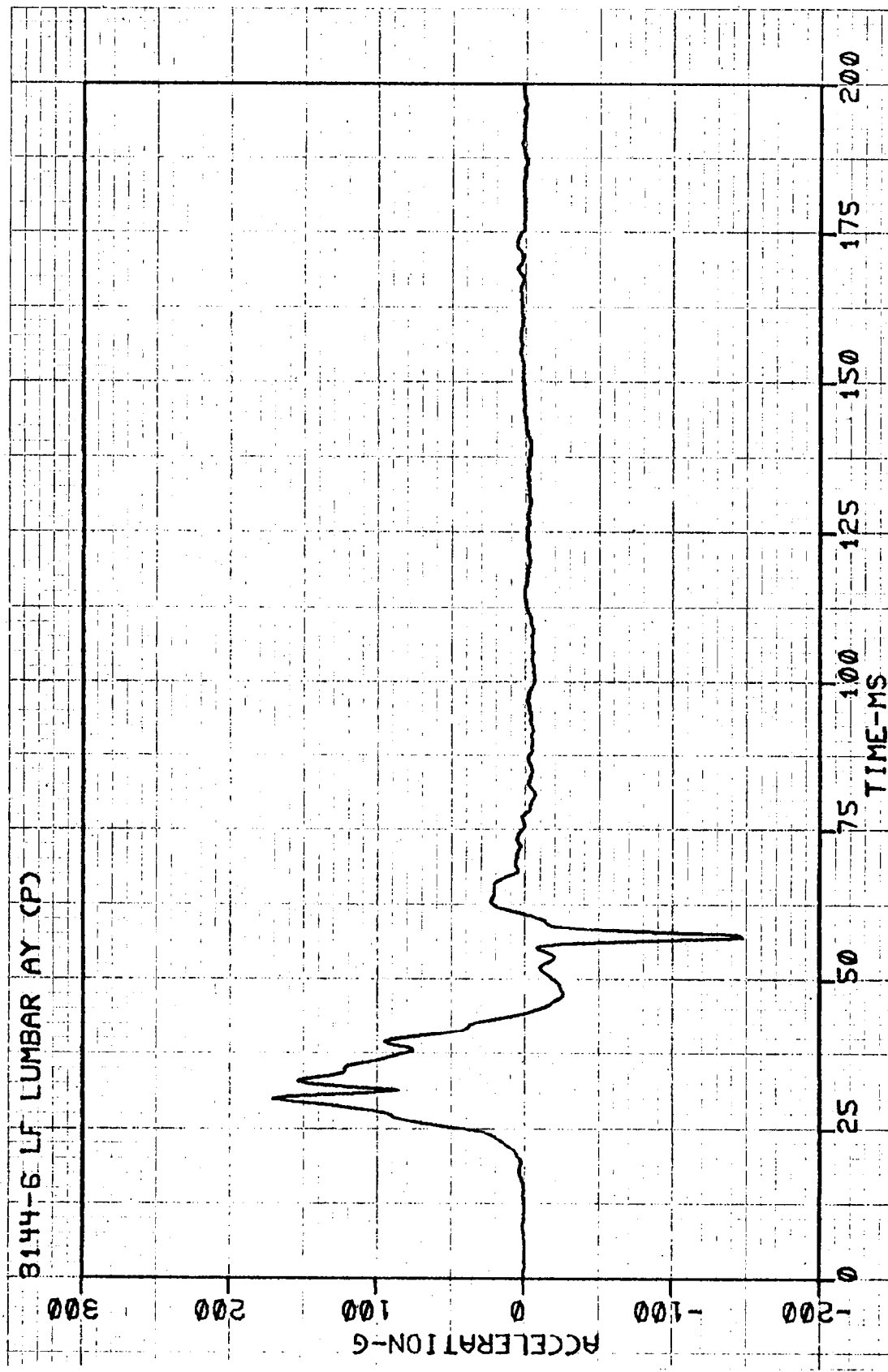


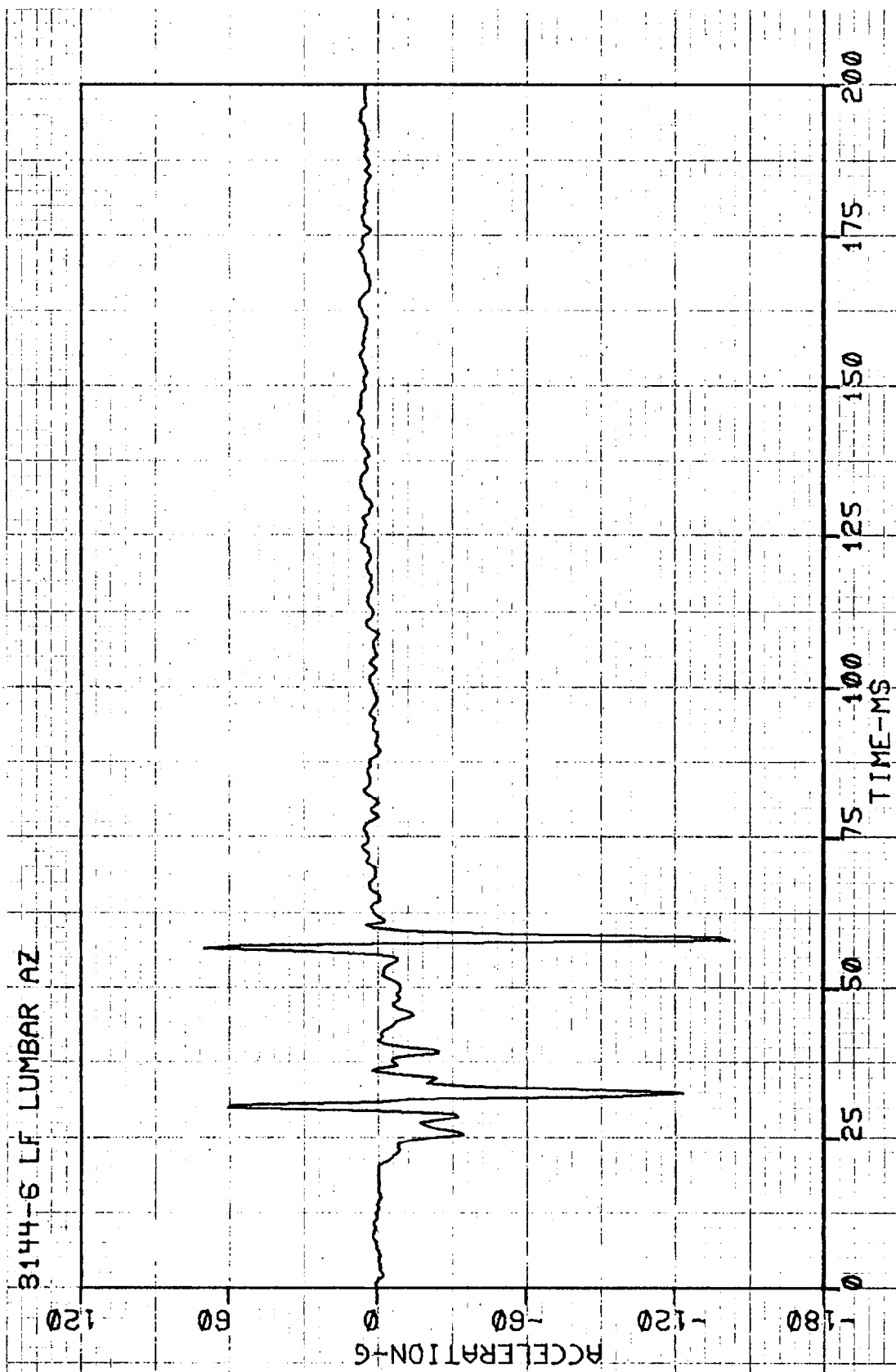


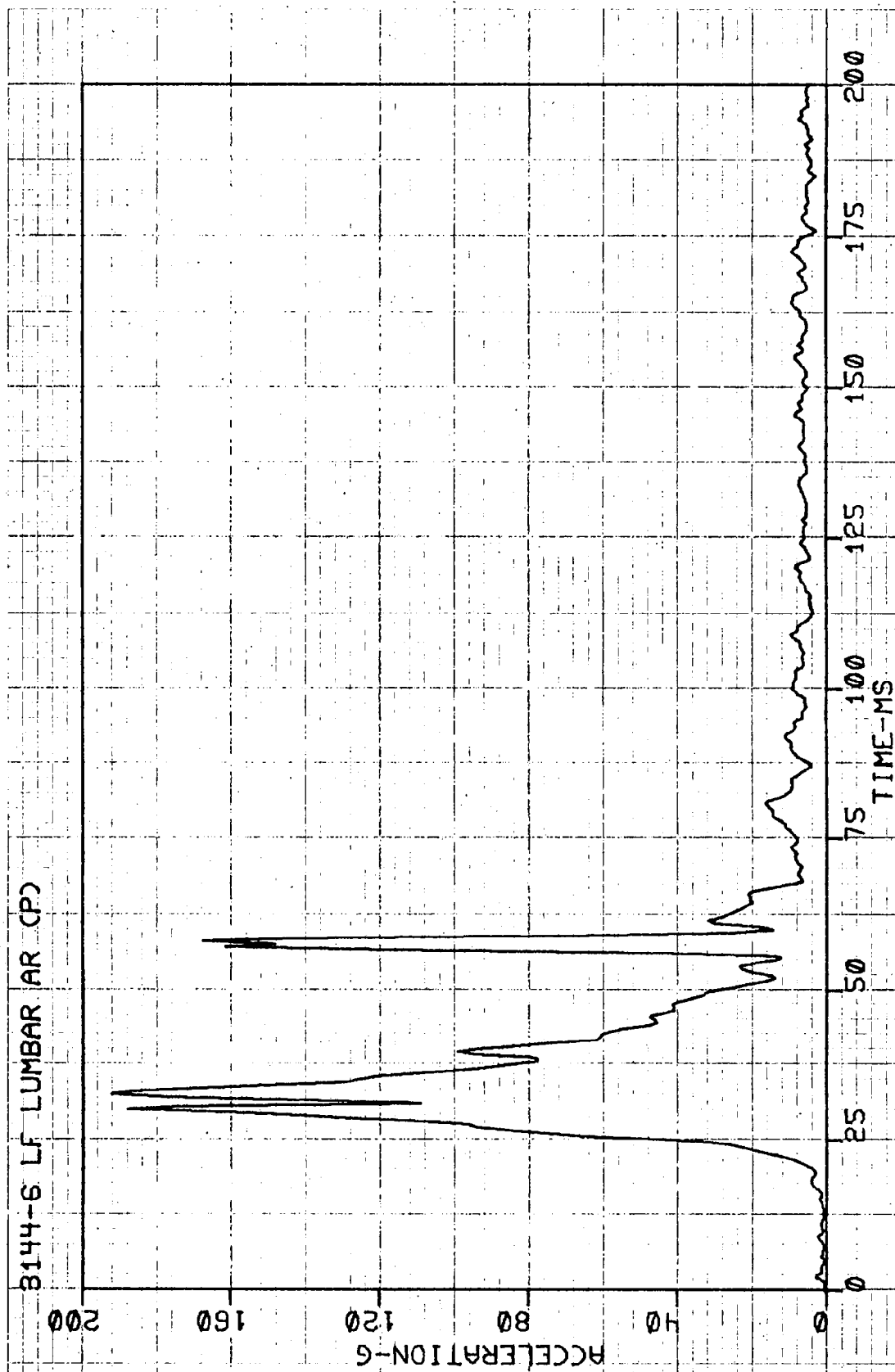


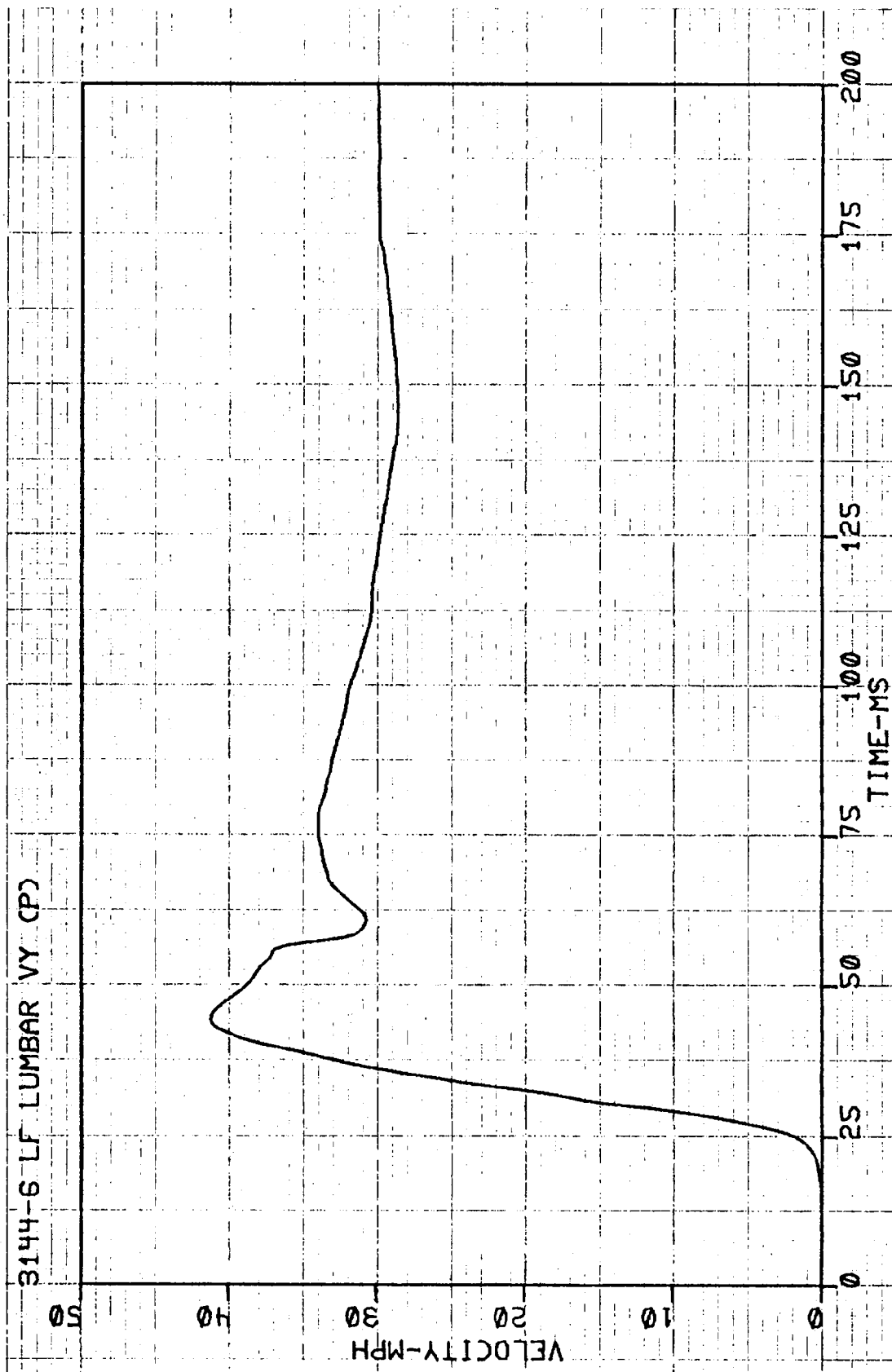


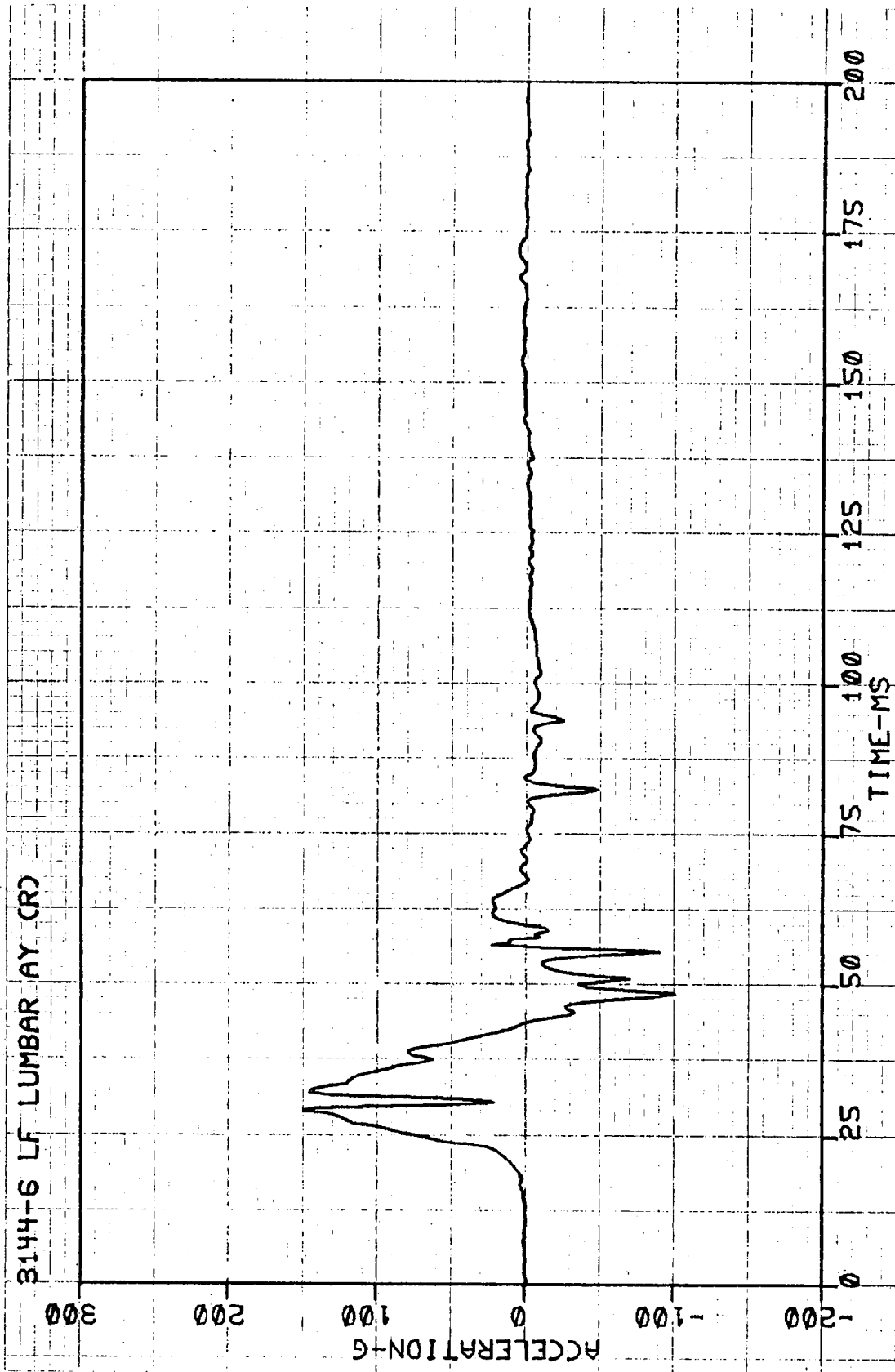


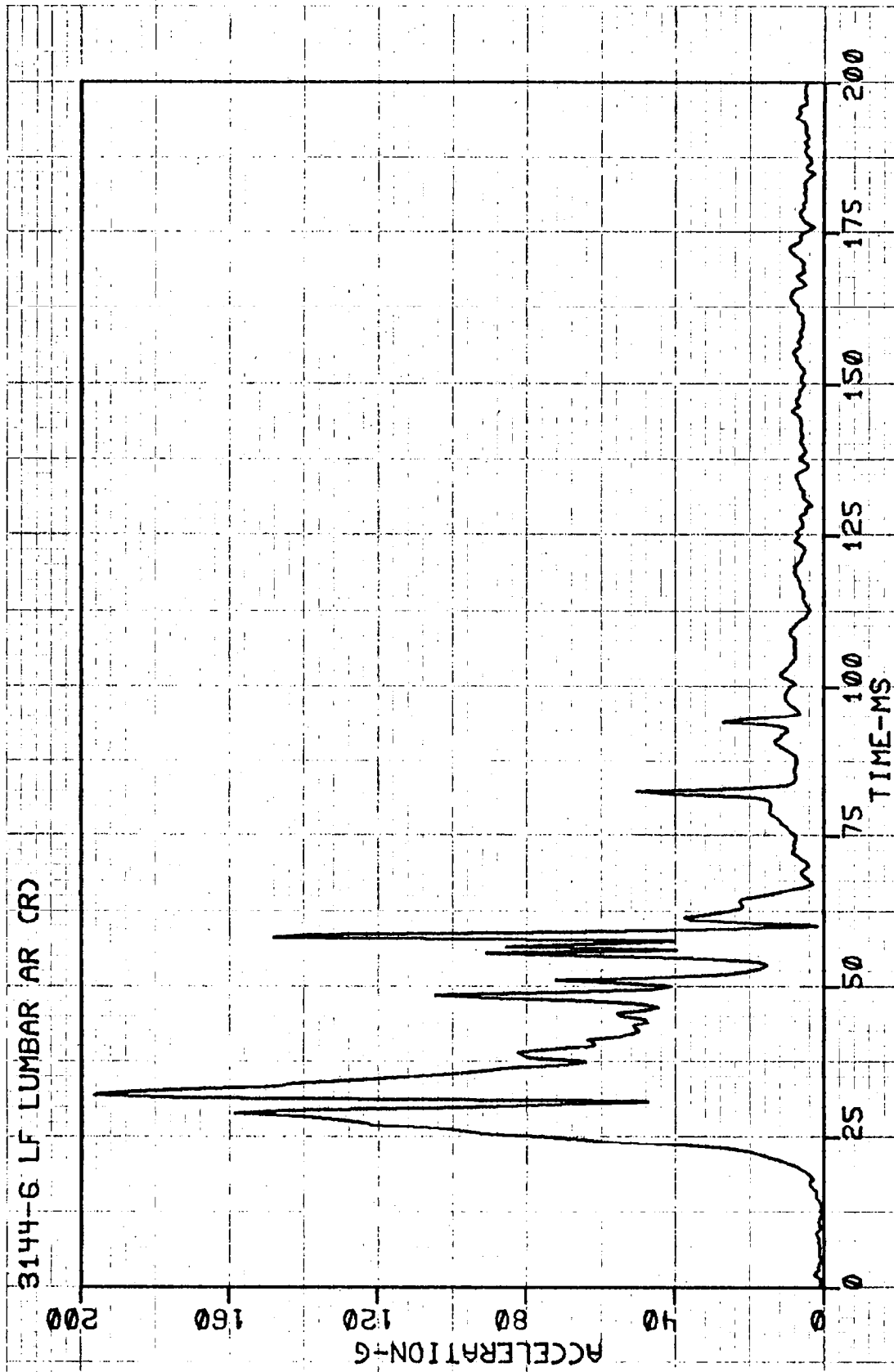


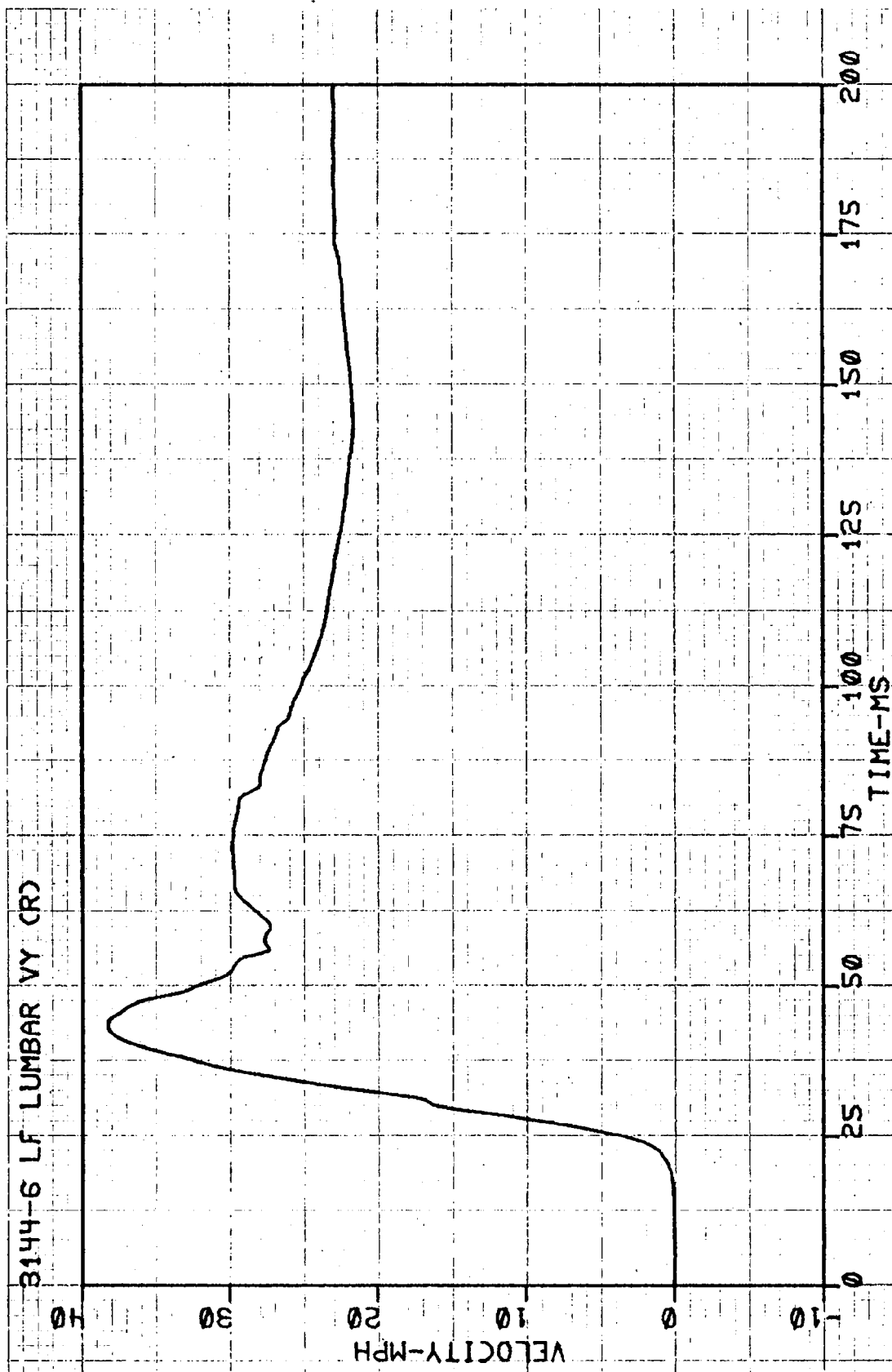


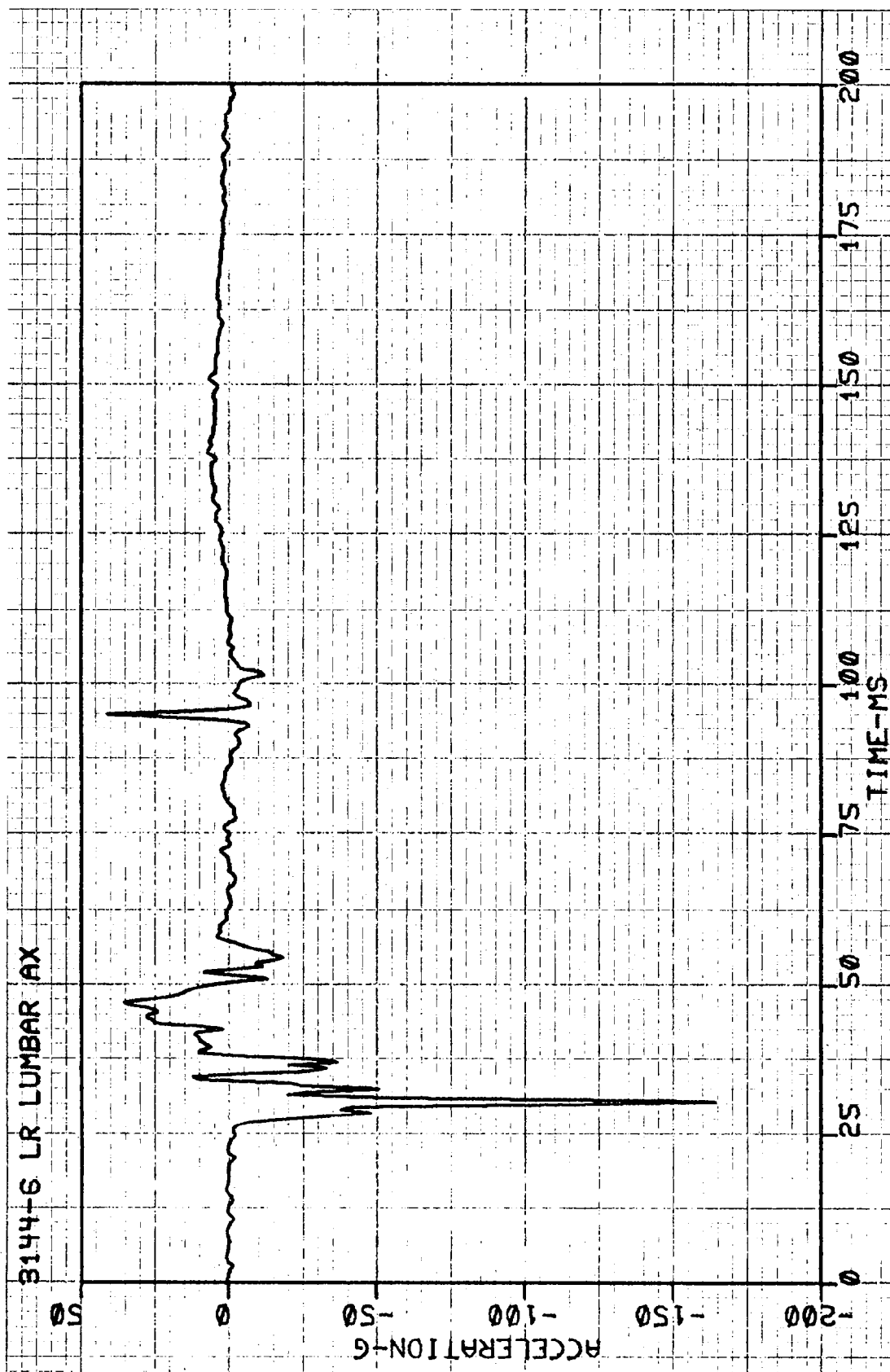


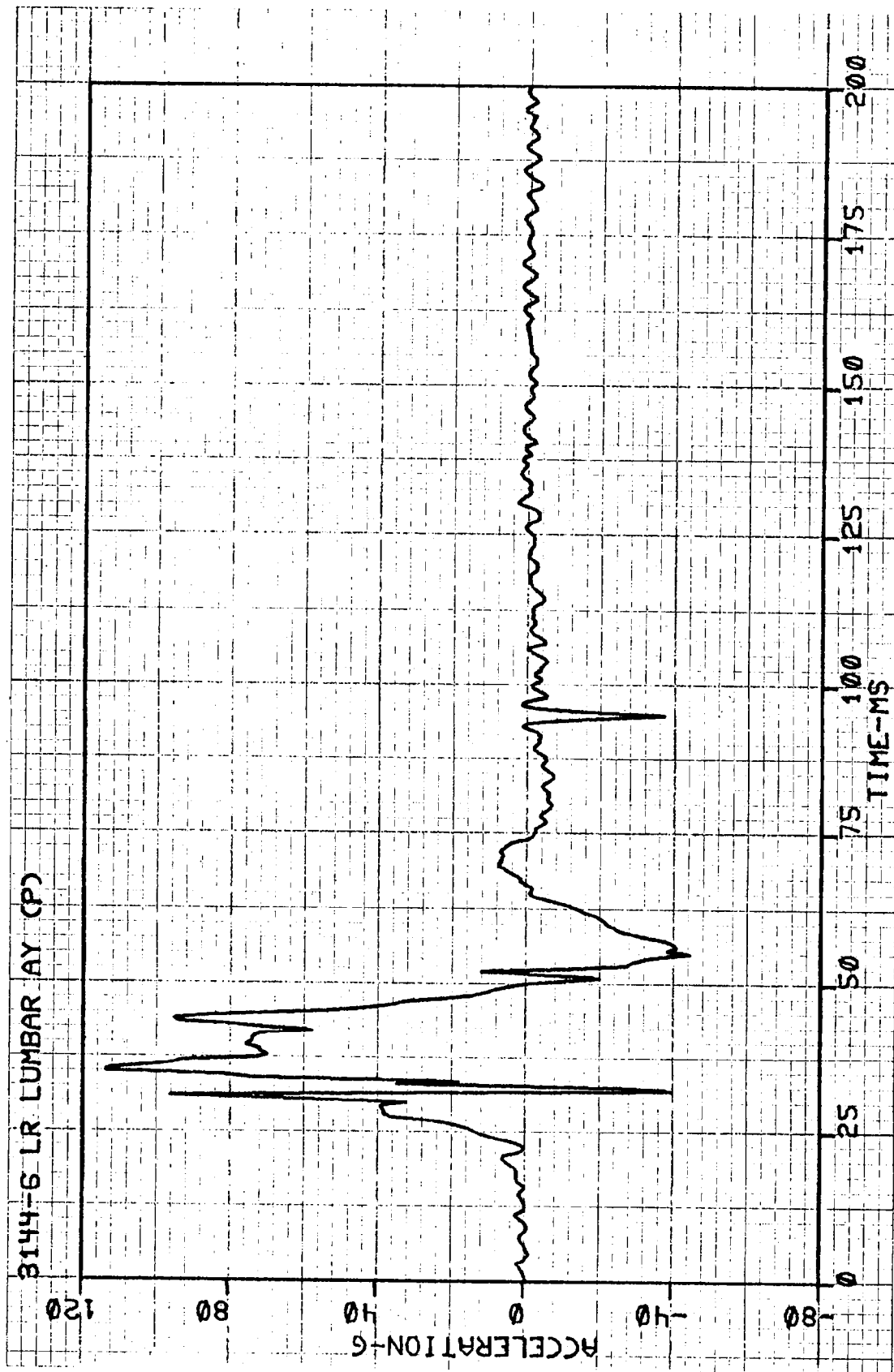


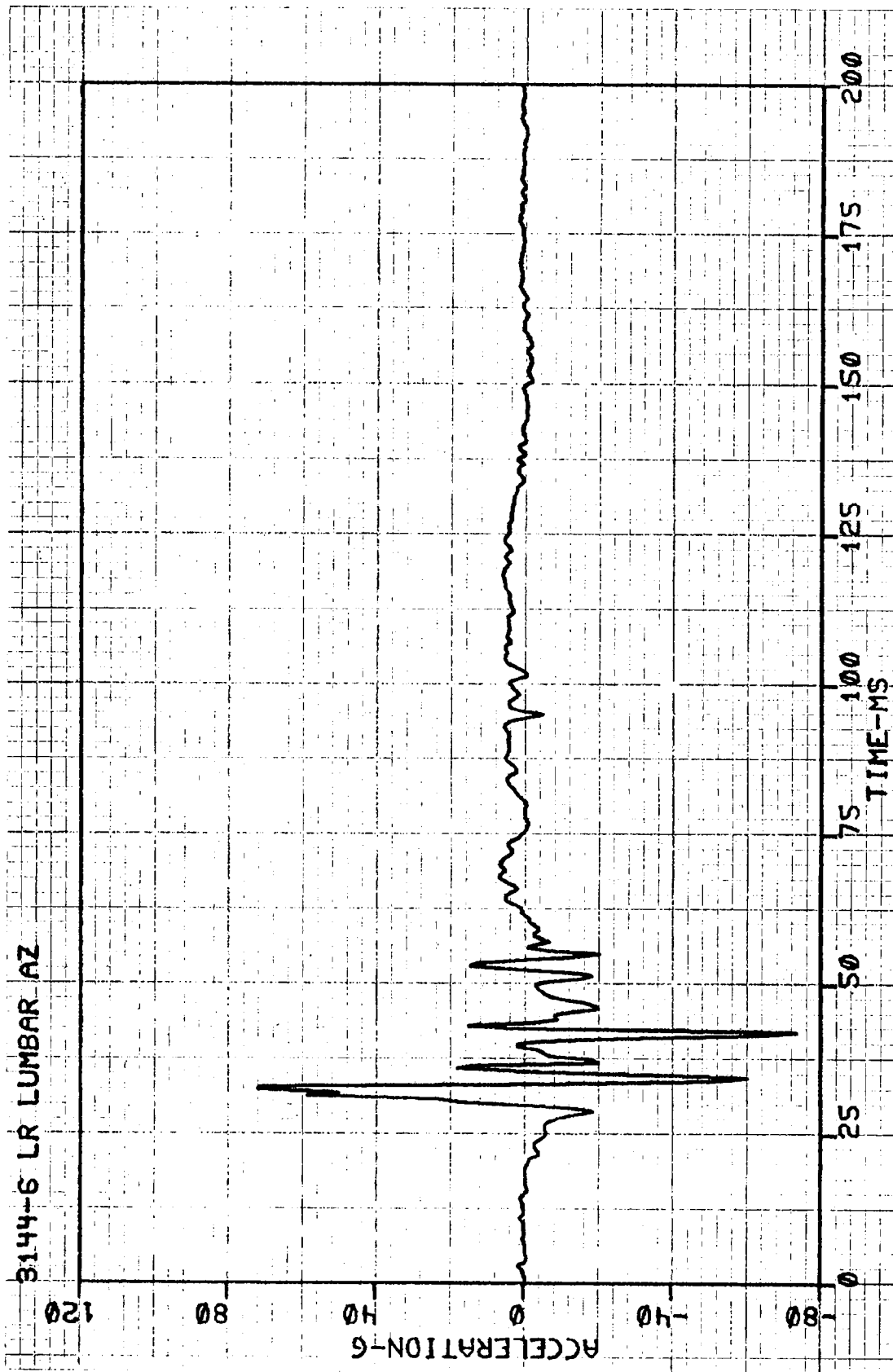


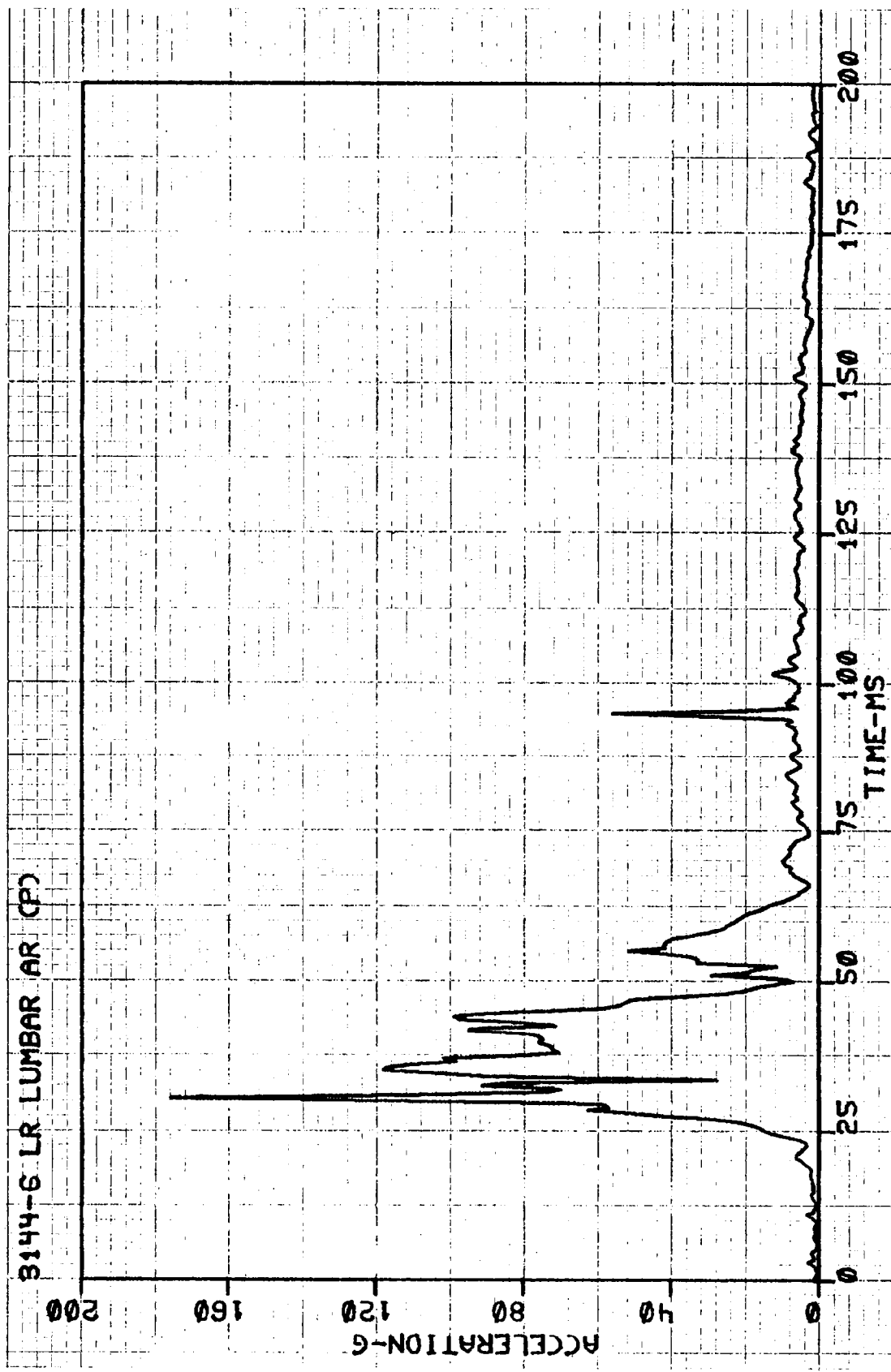


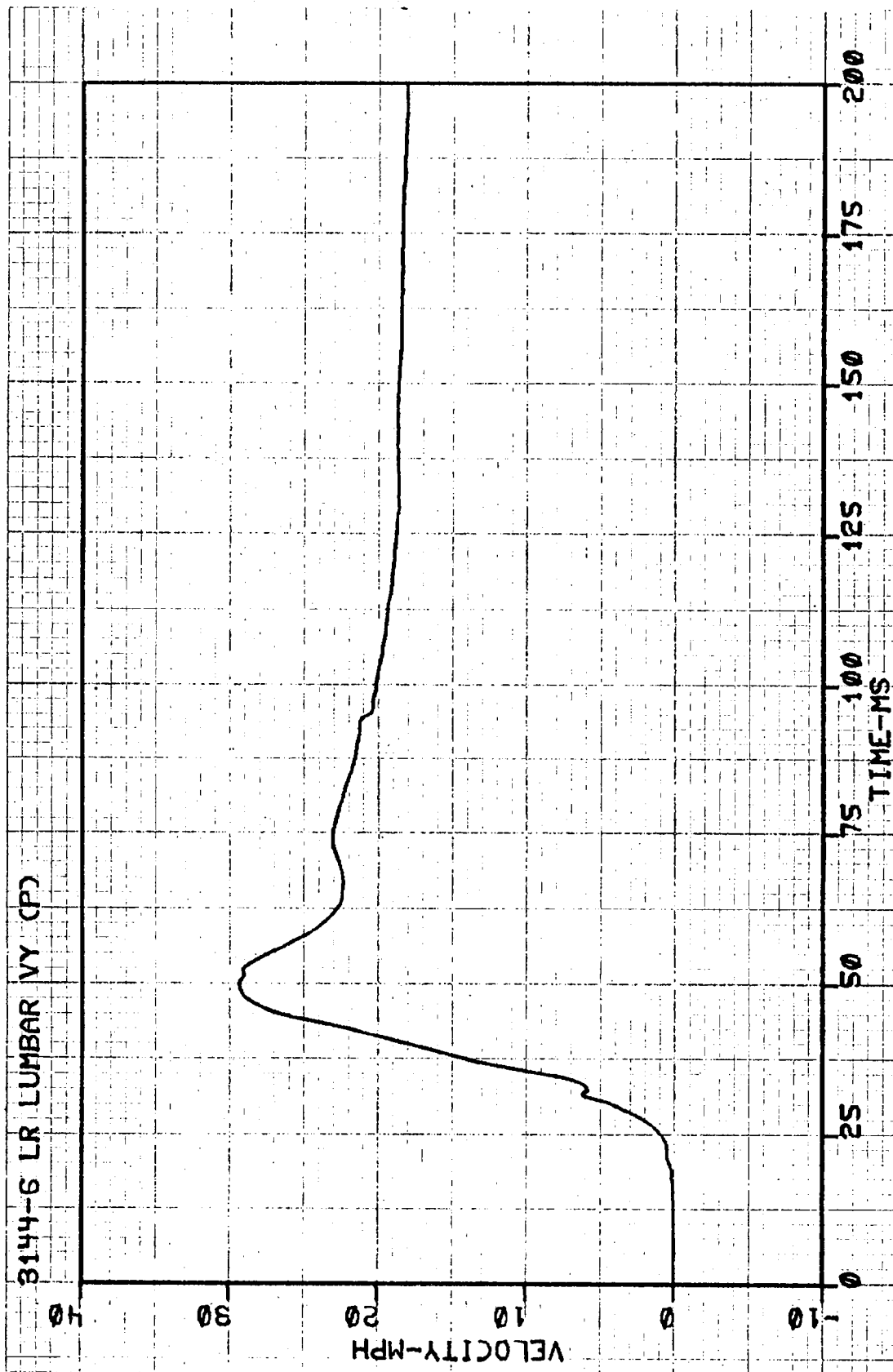


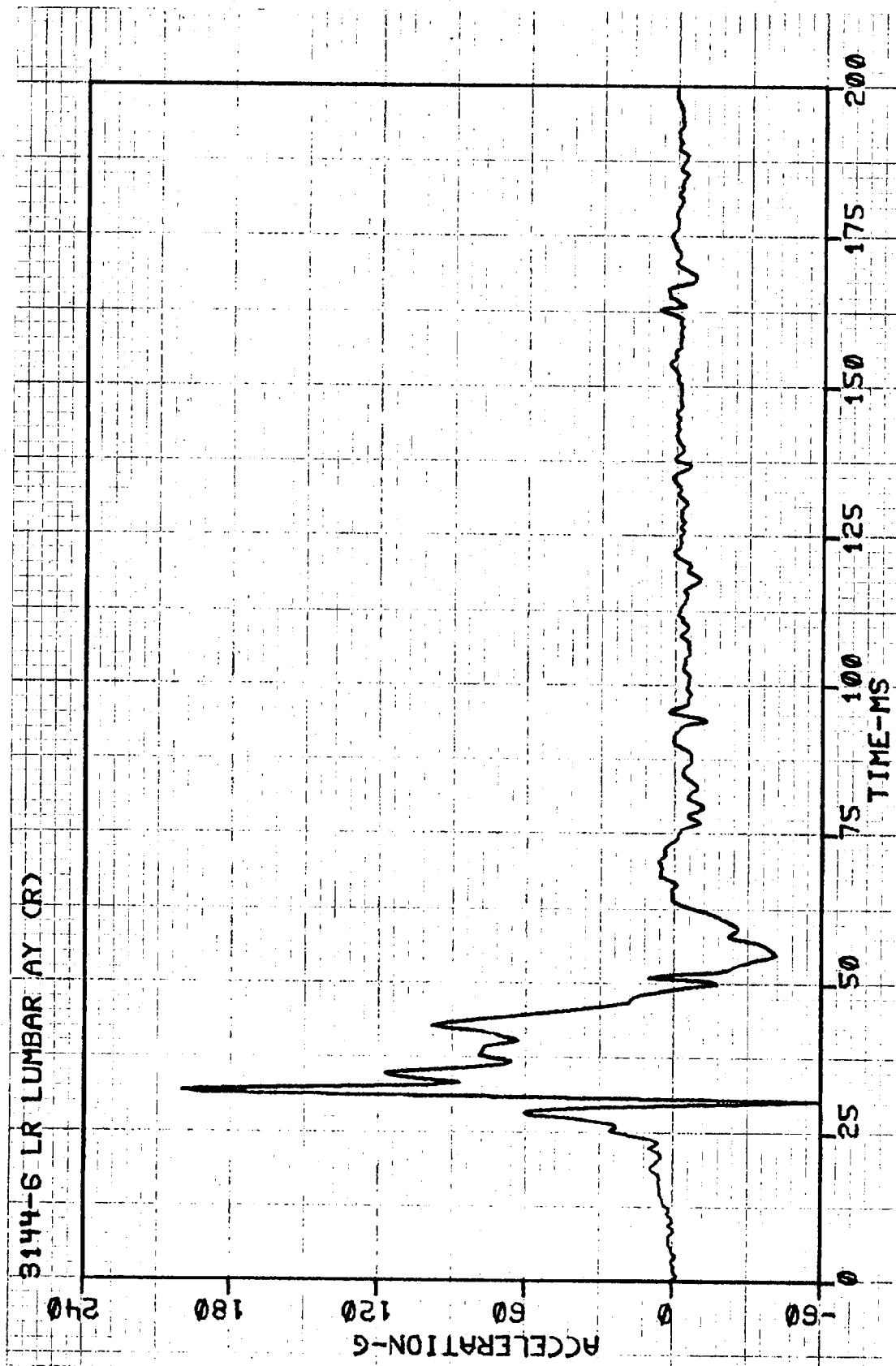


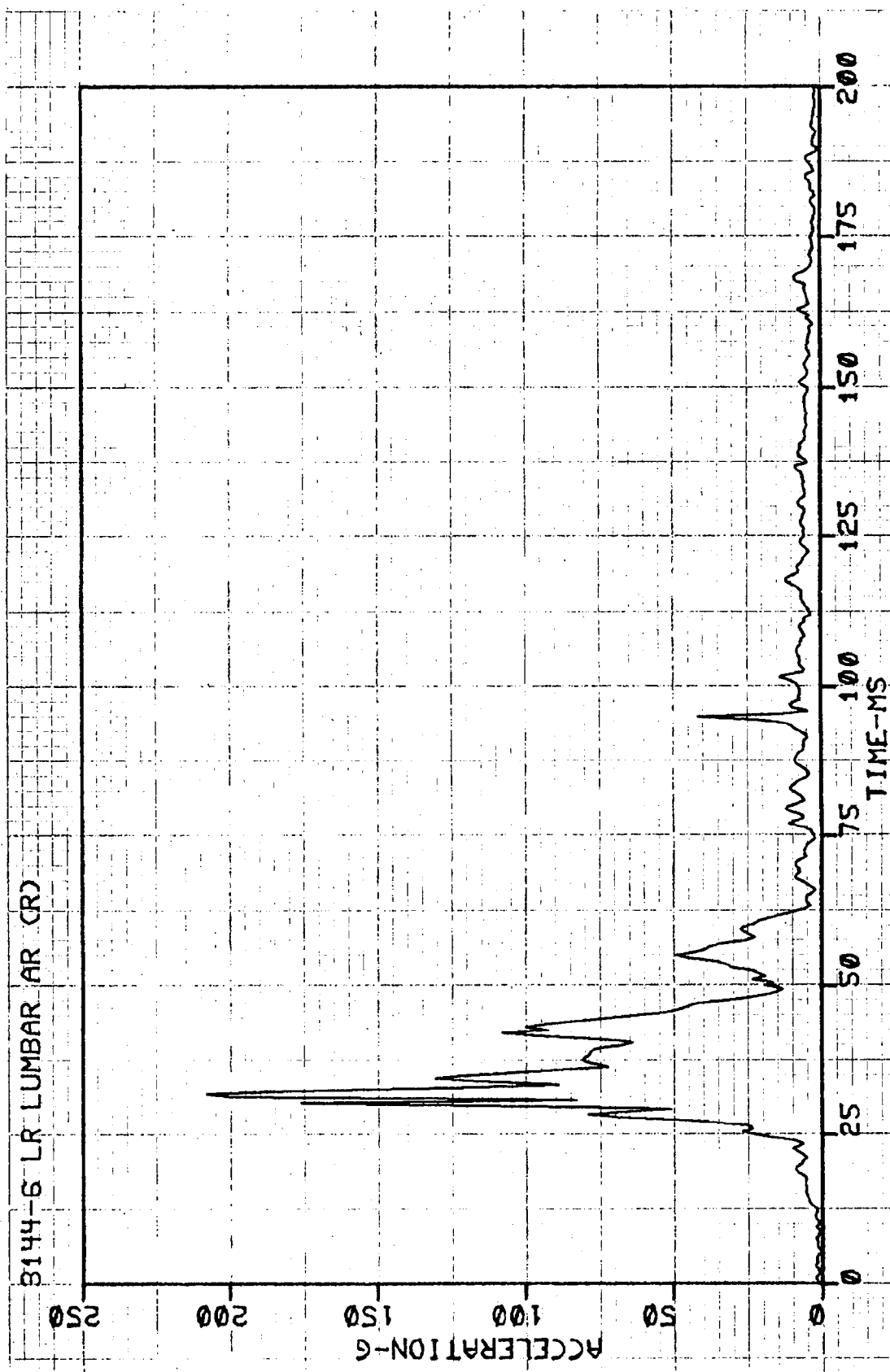


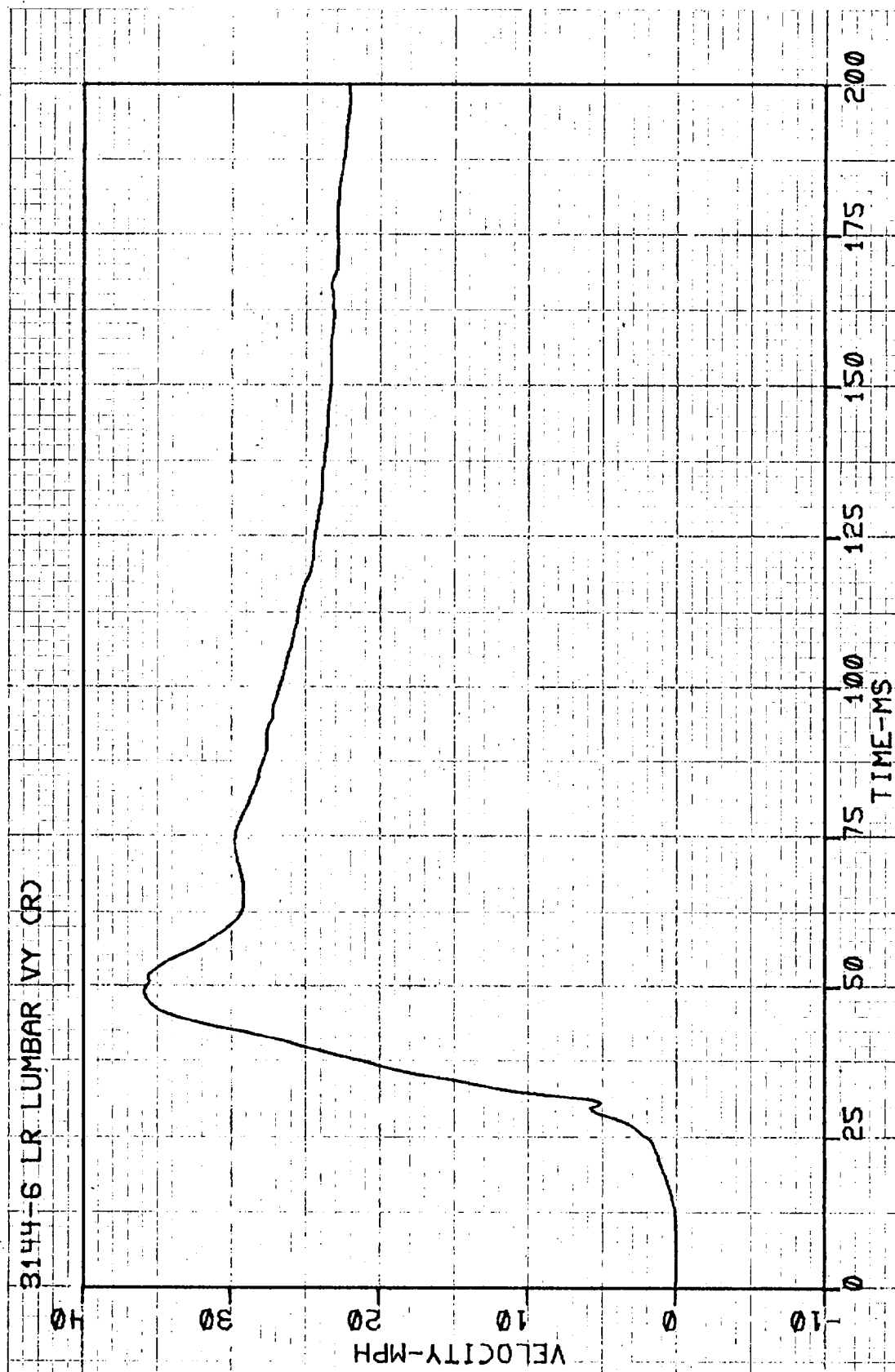


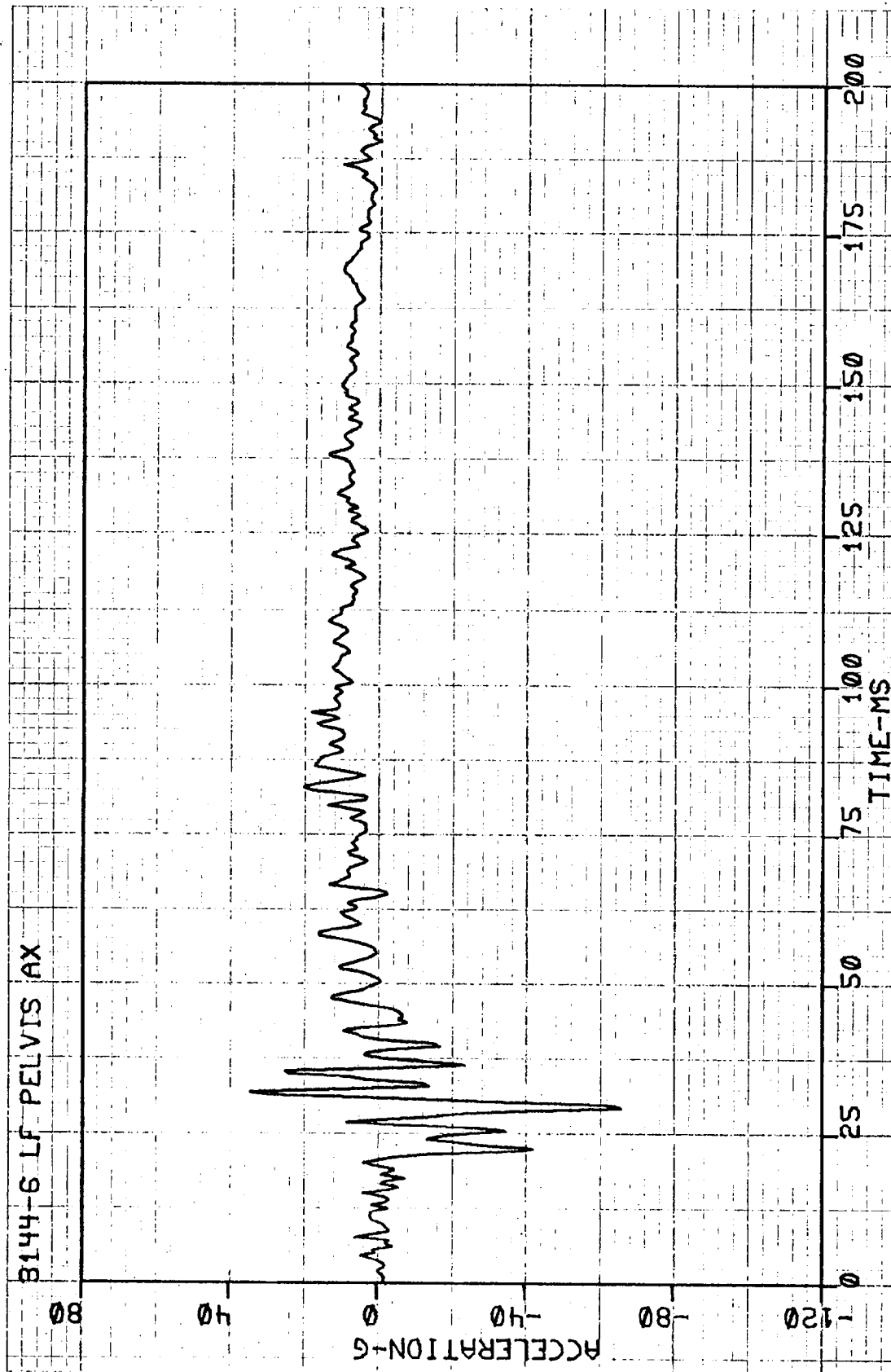


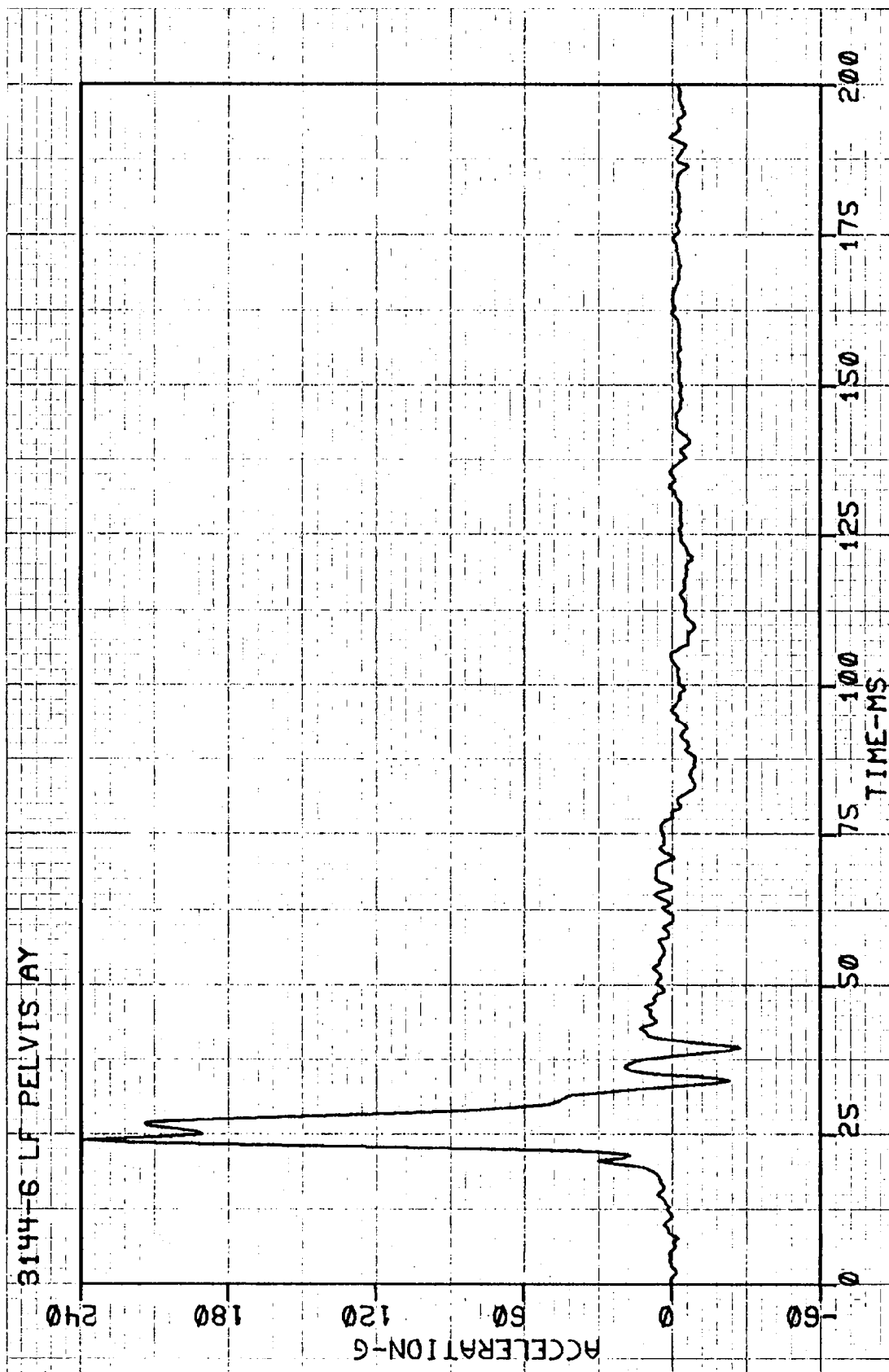


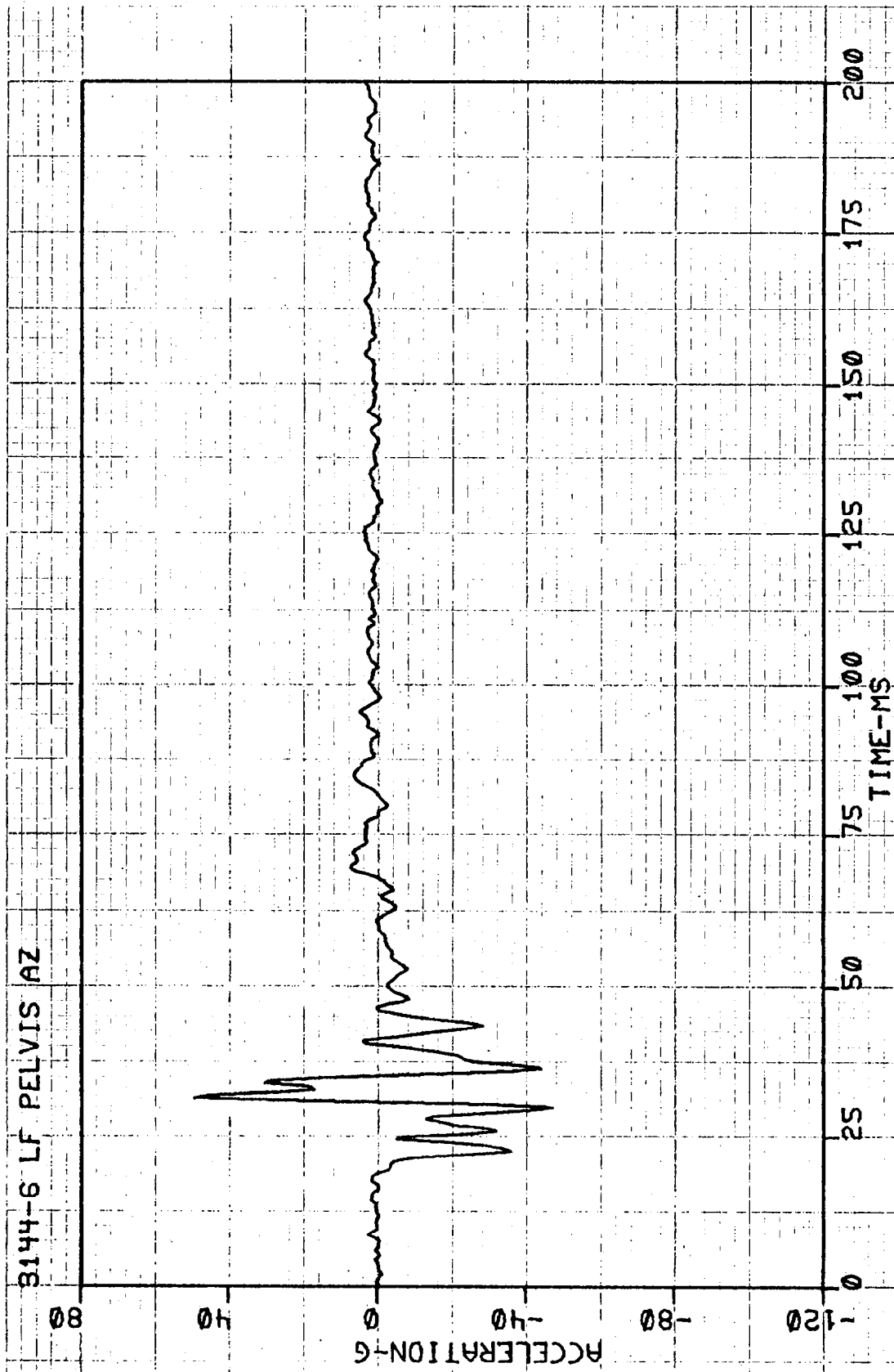


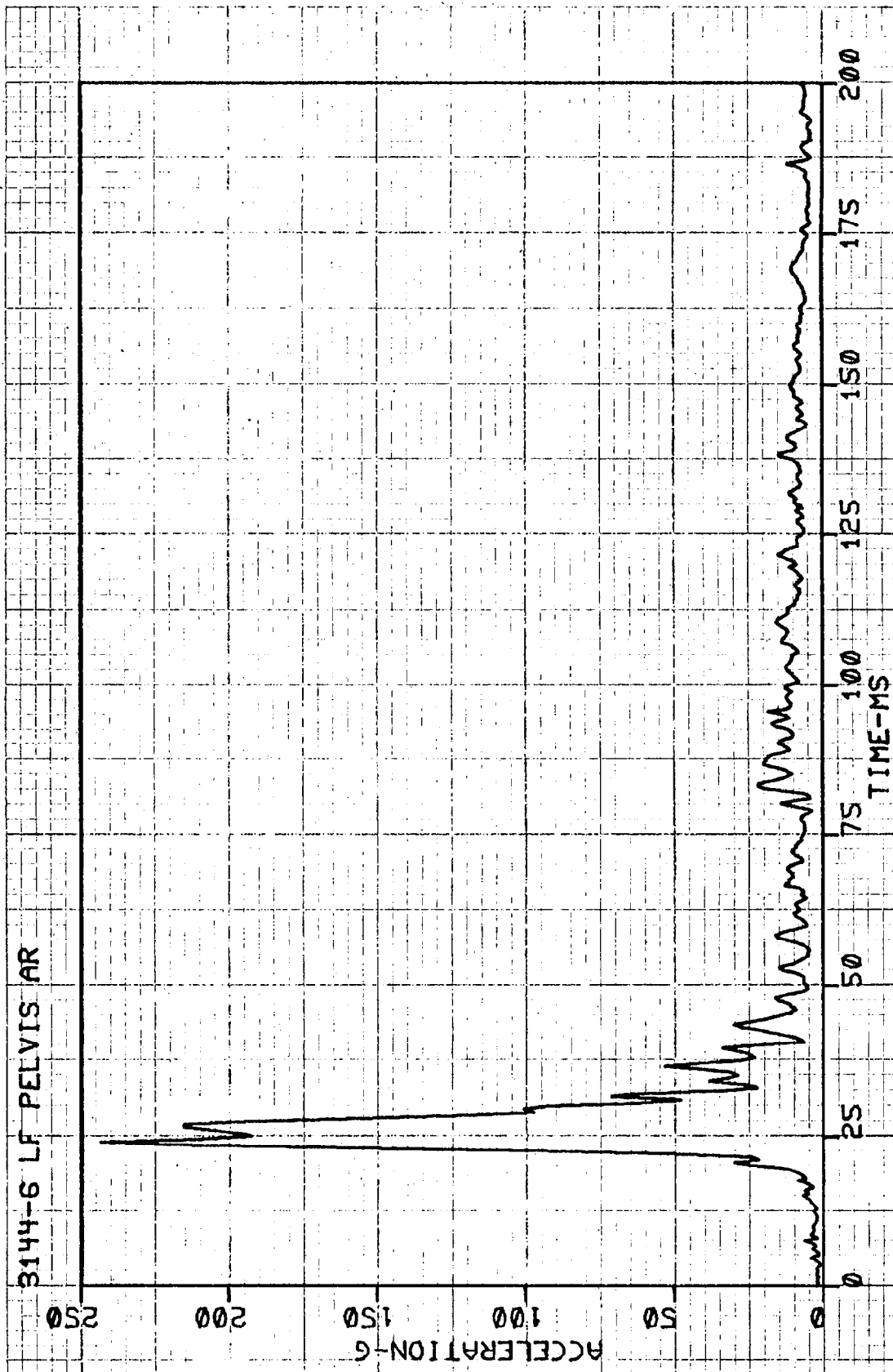


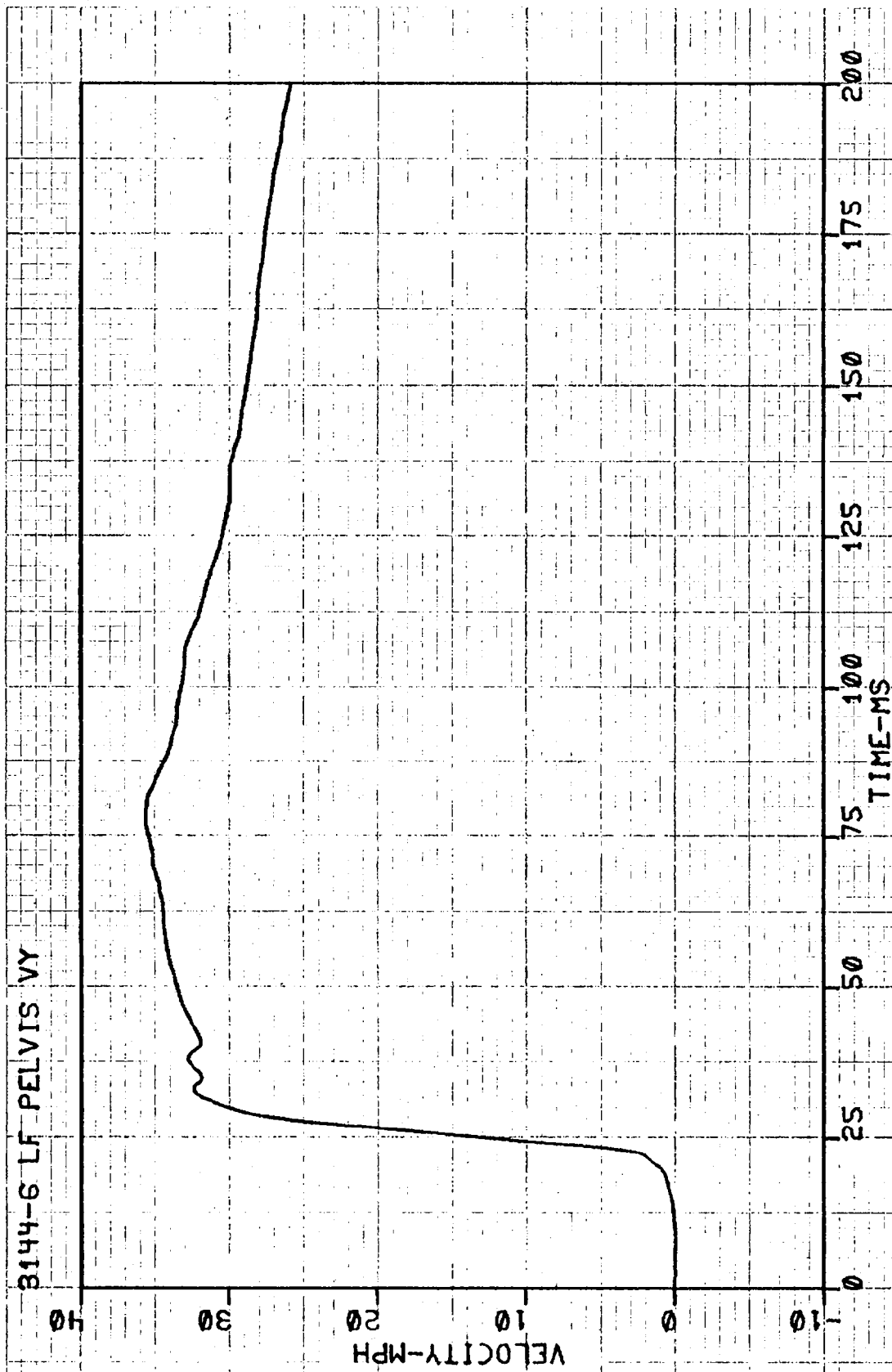


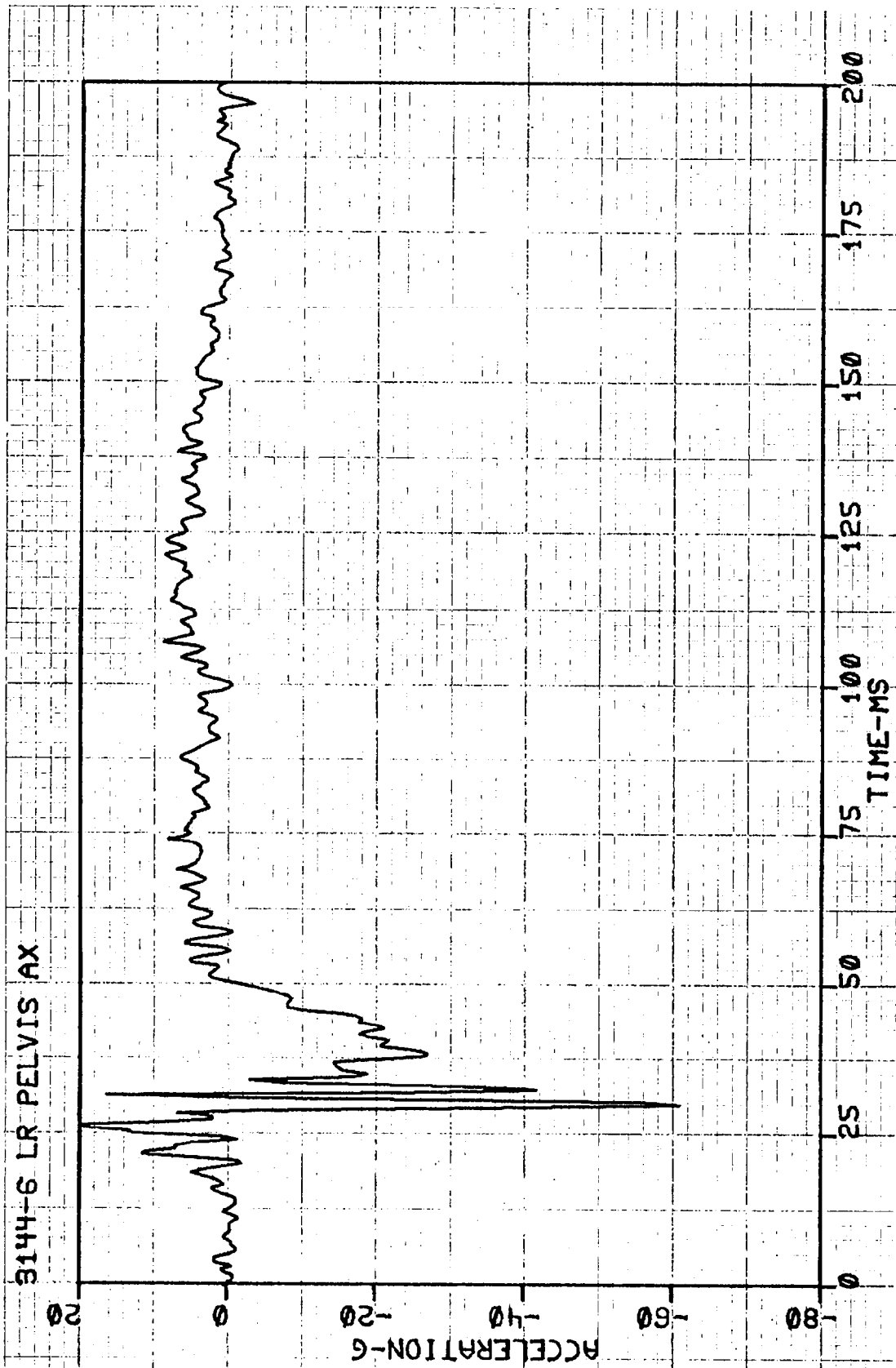


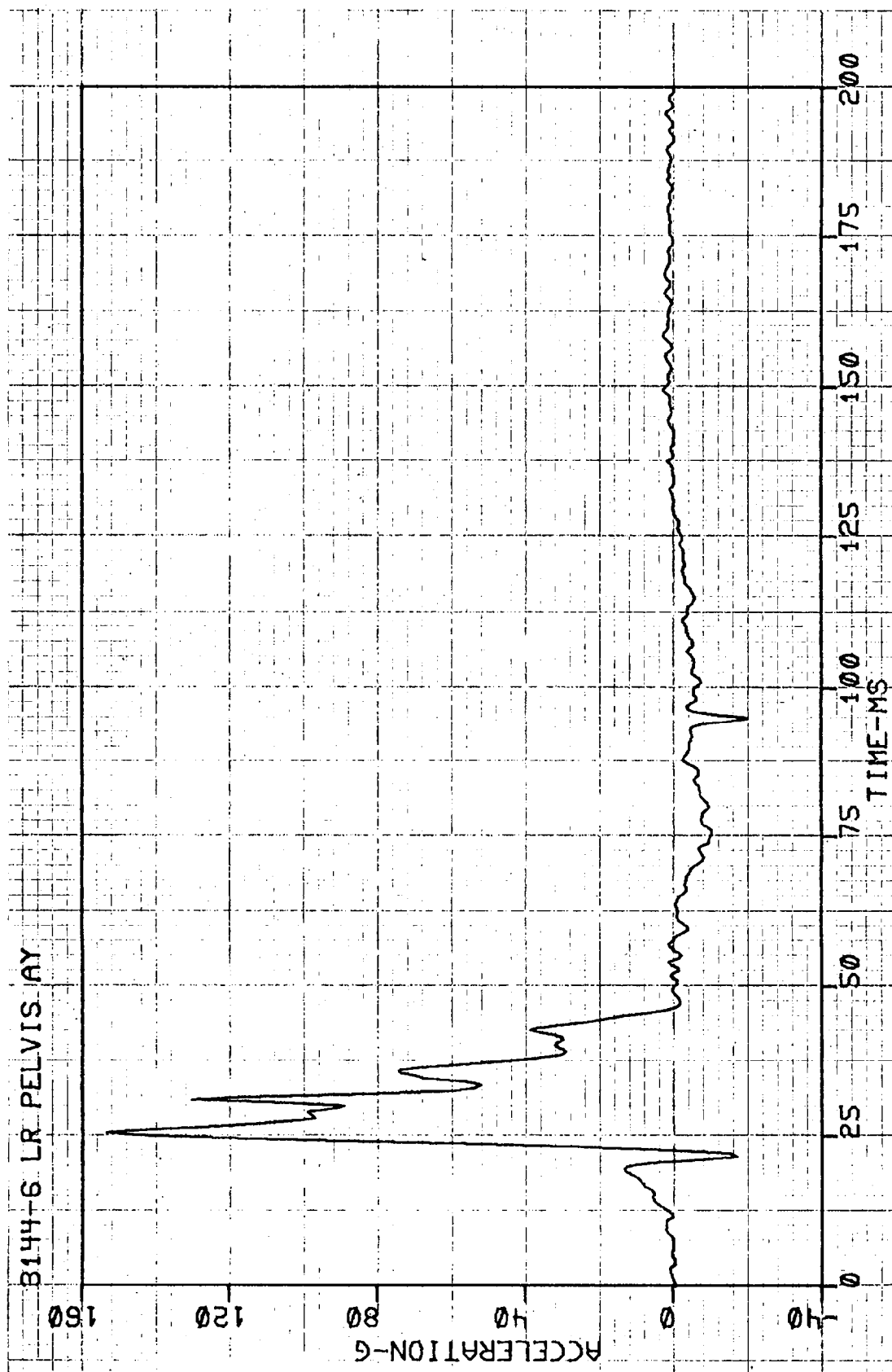


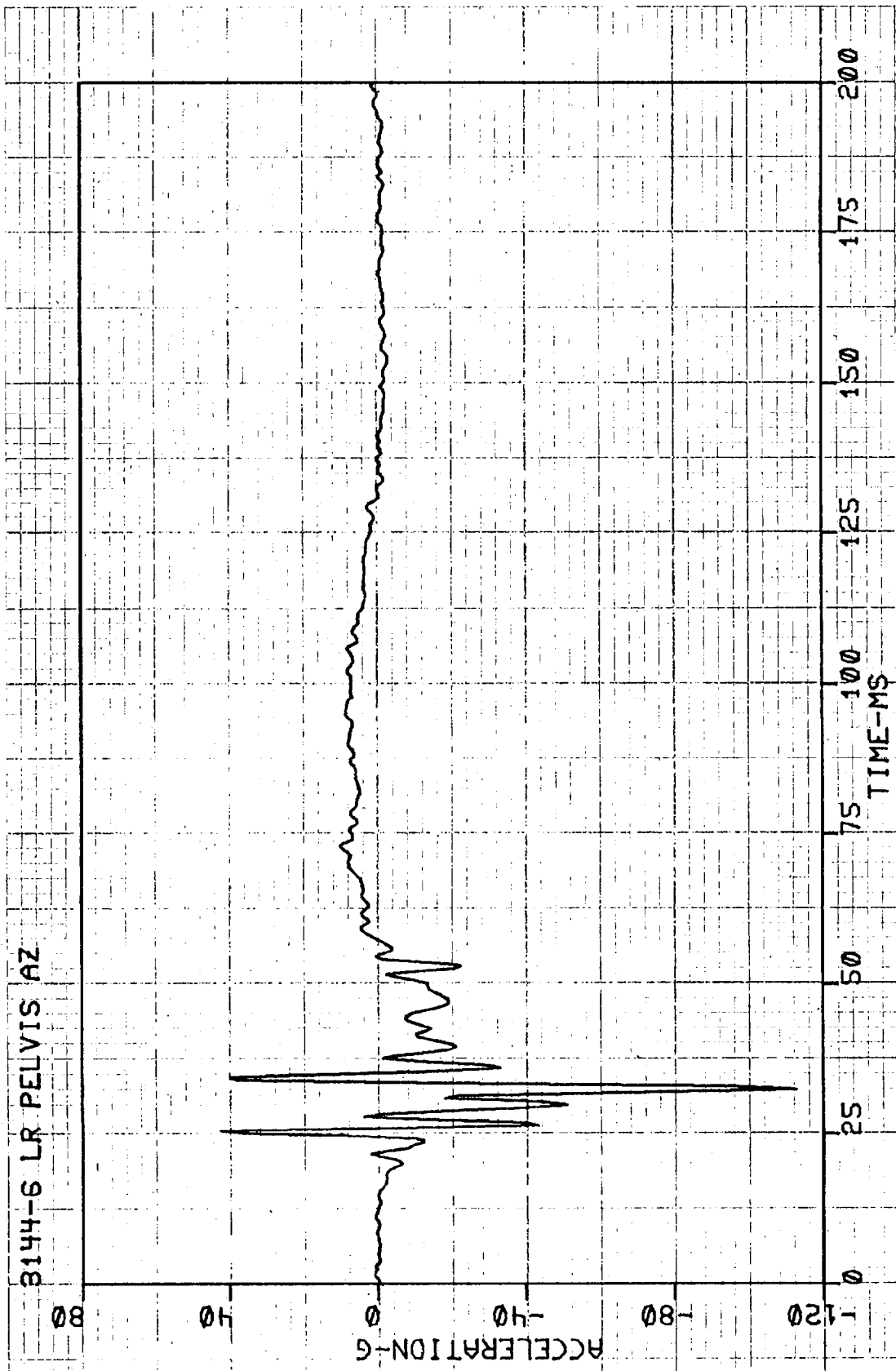


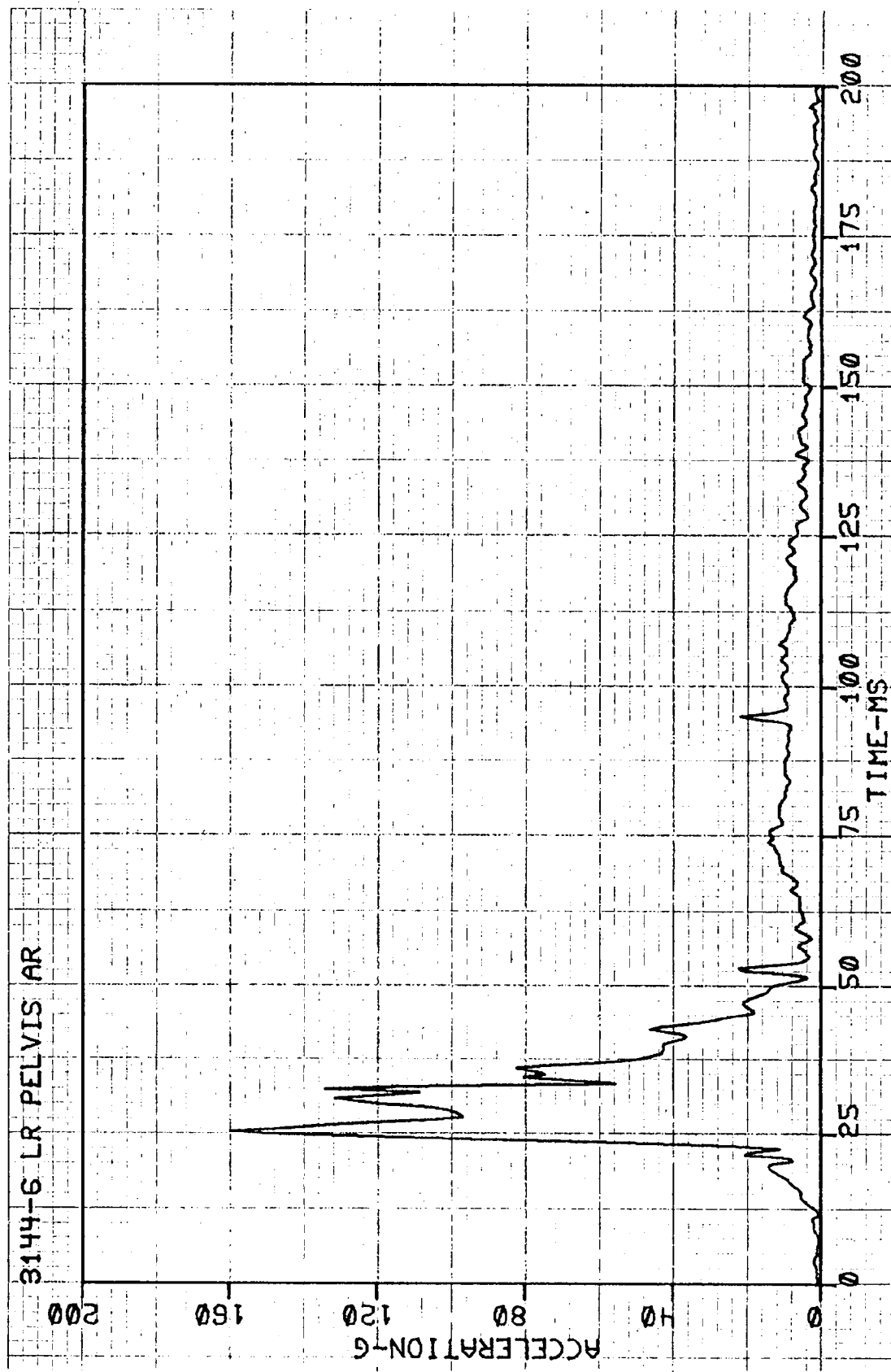


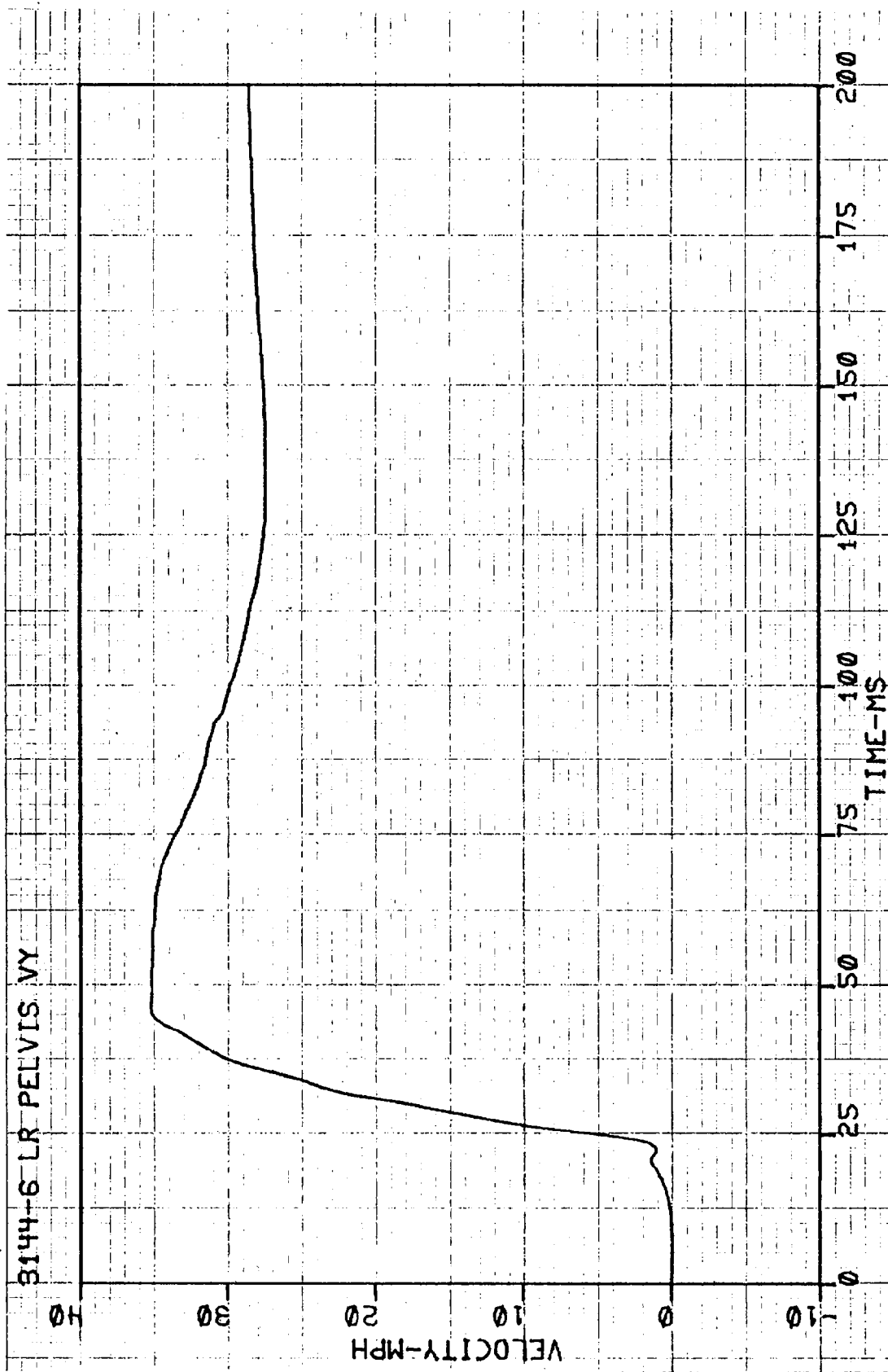




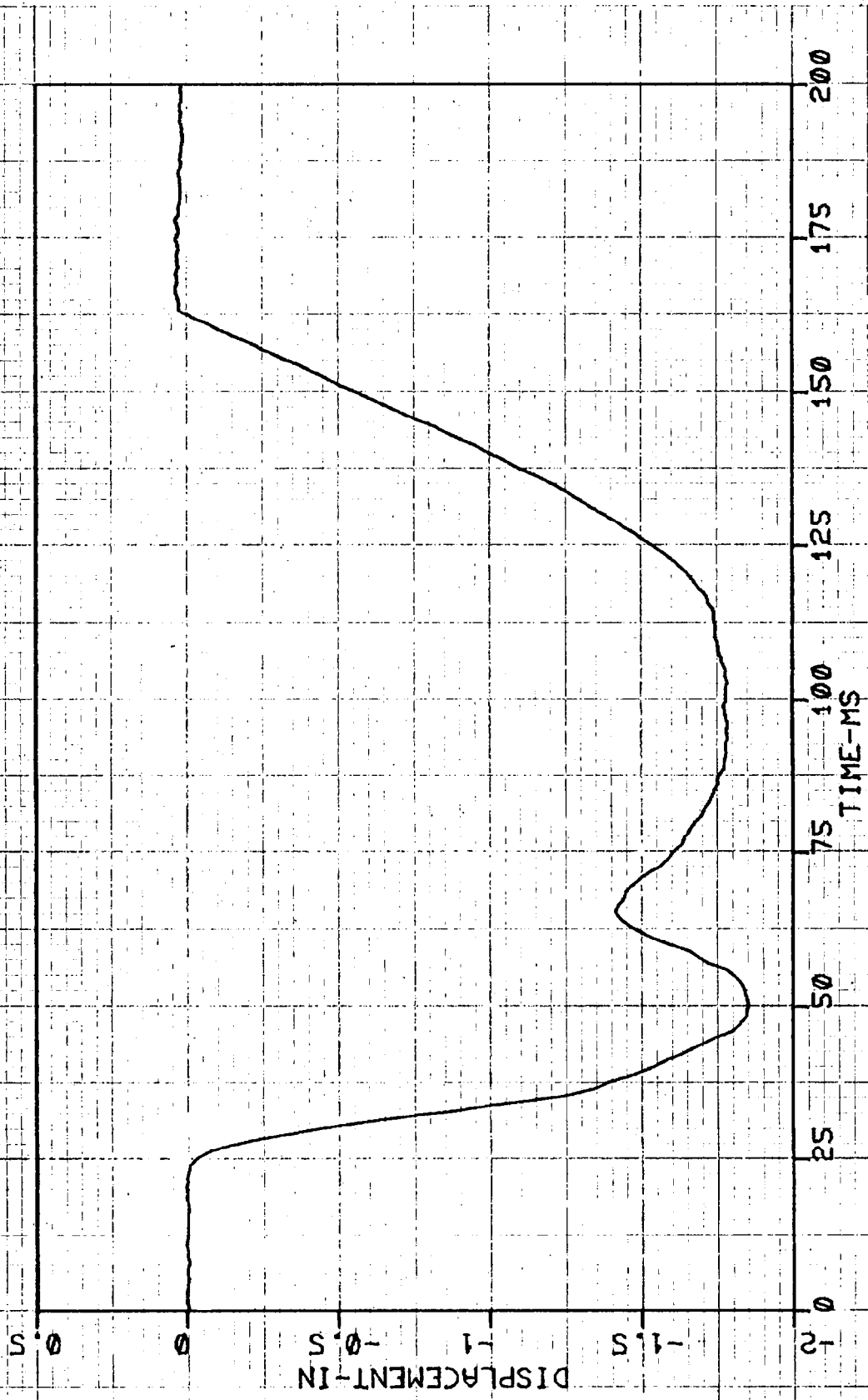


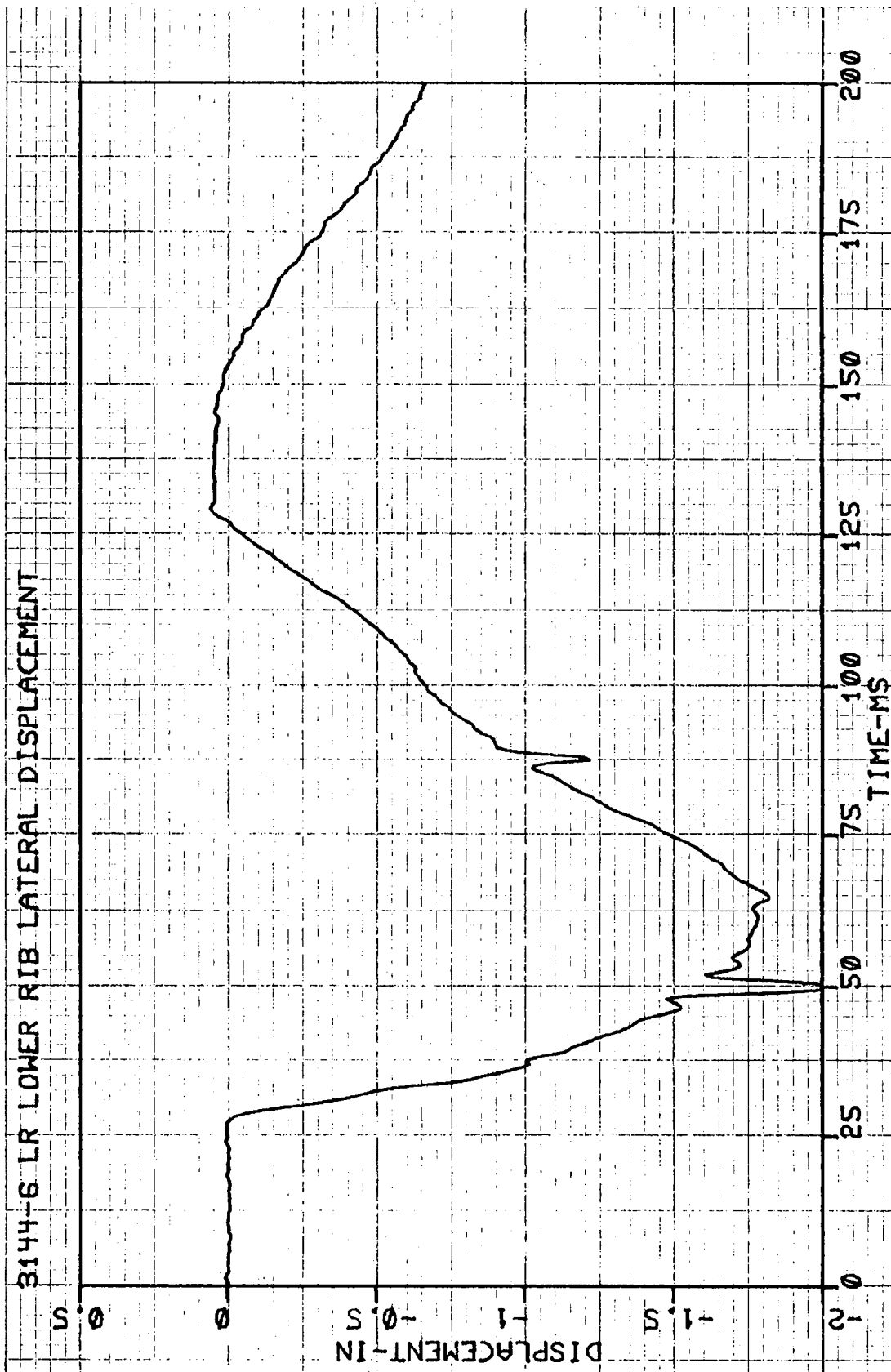


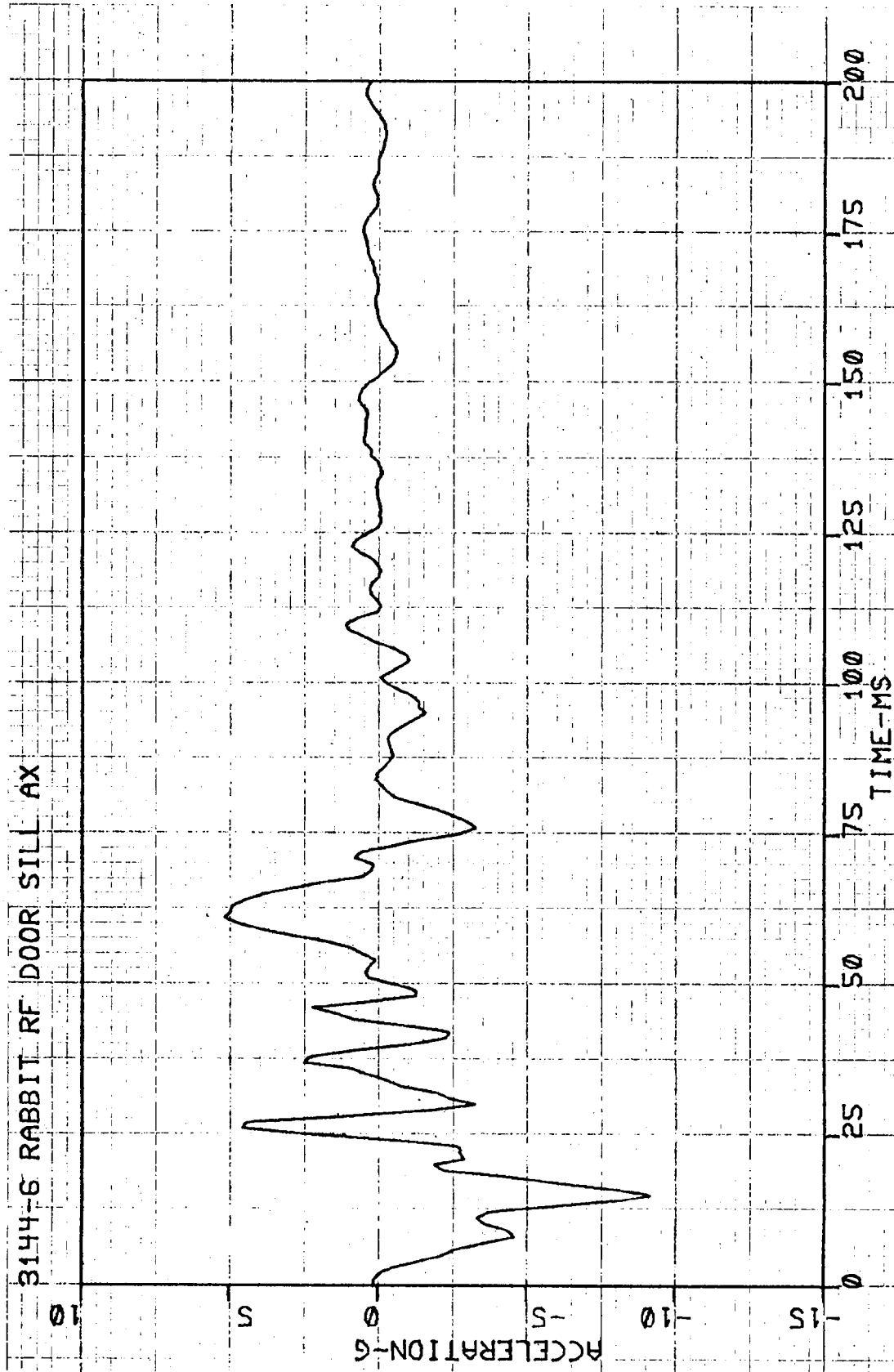


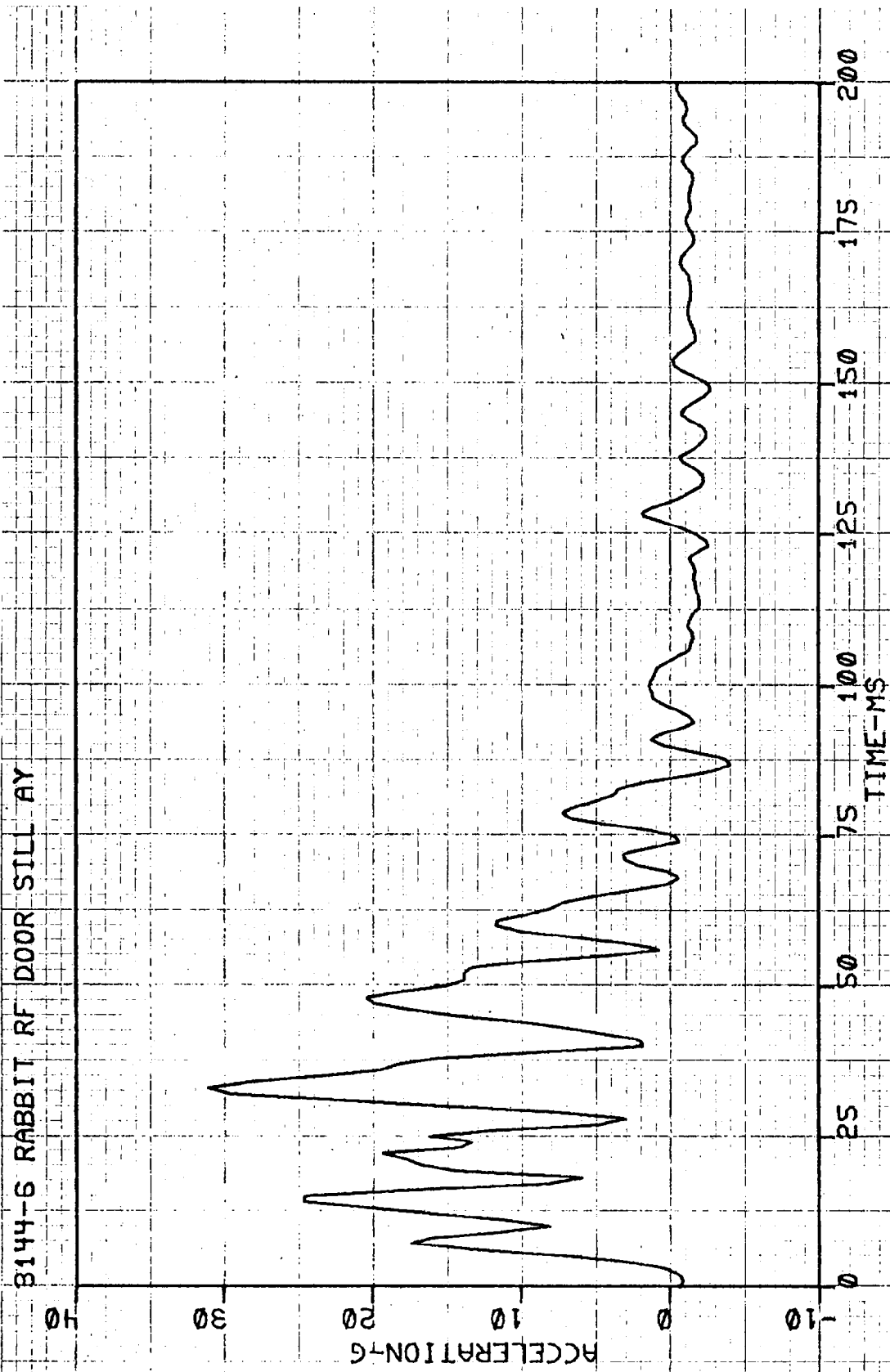


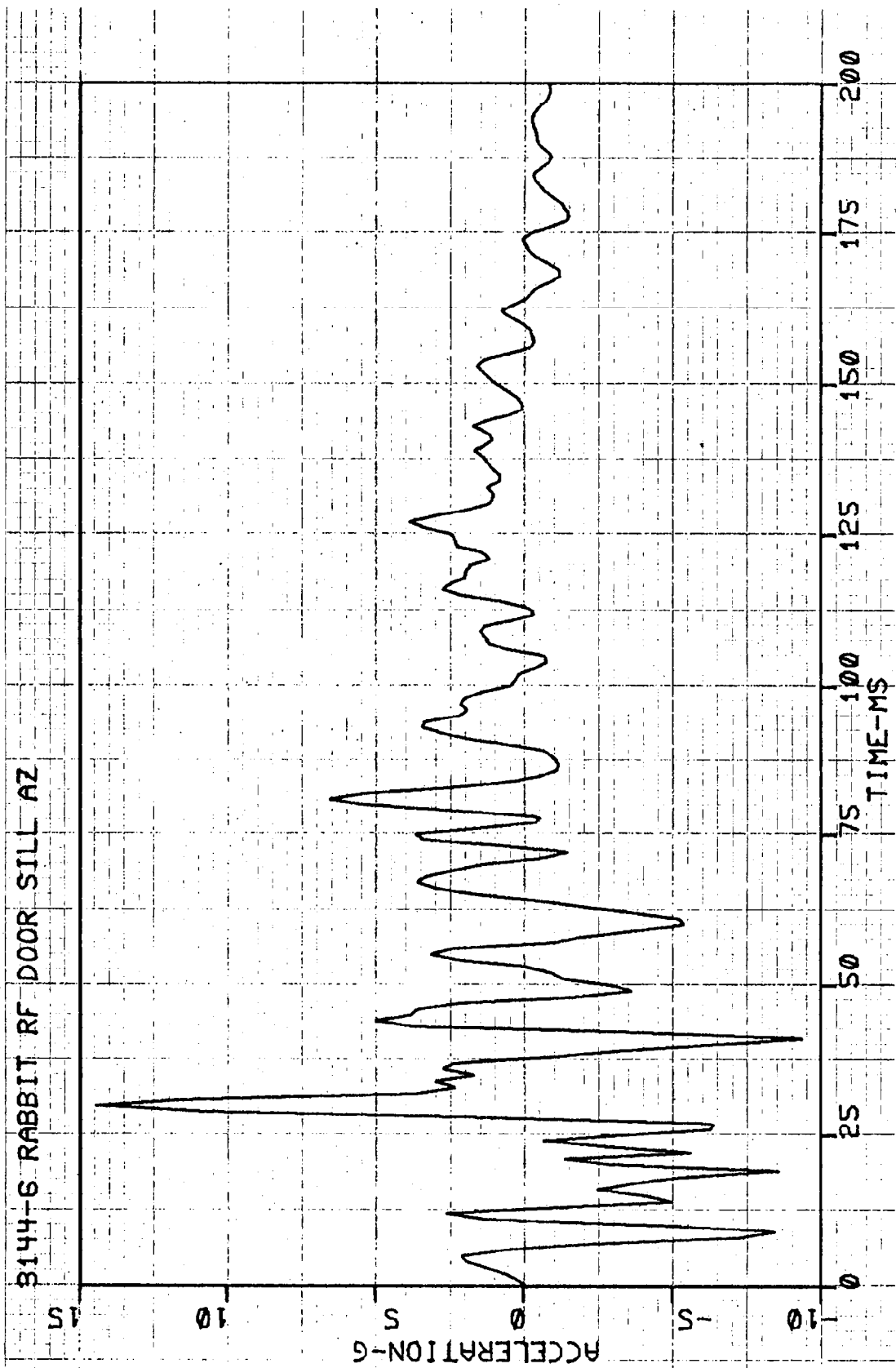
3144-6 LF LOWER RIB LATERAL DISPLACEMENT

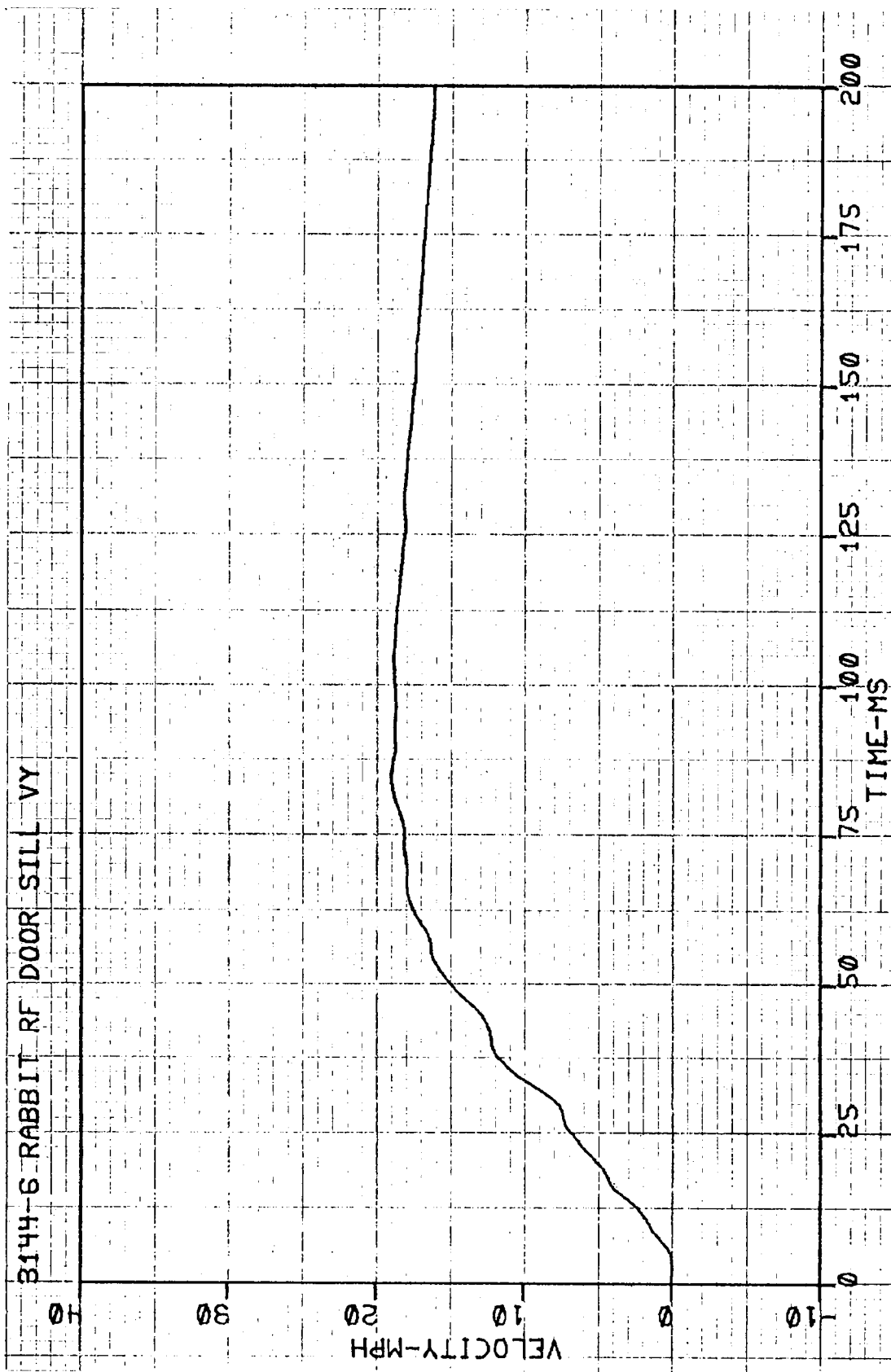




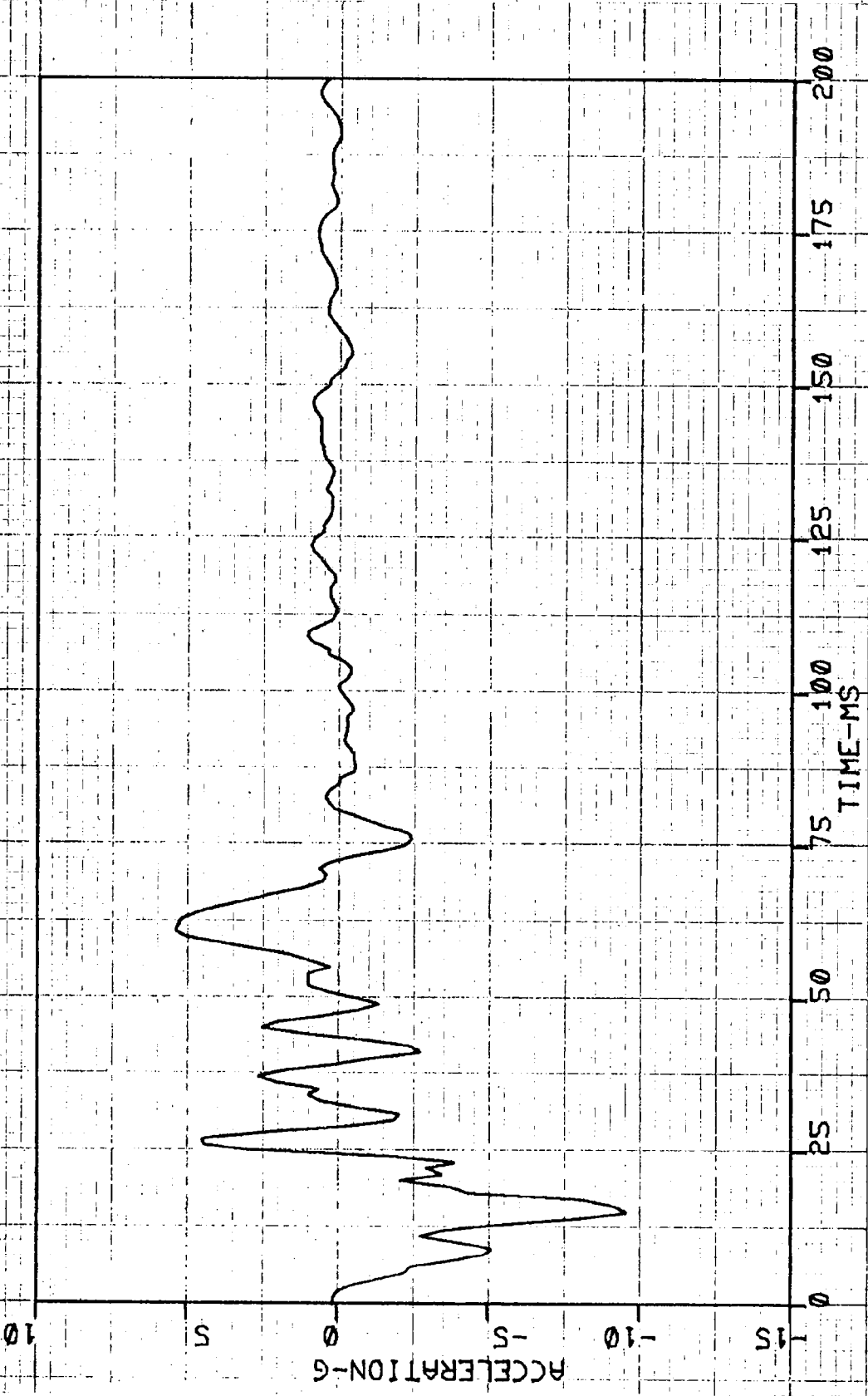


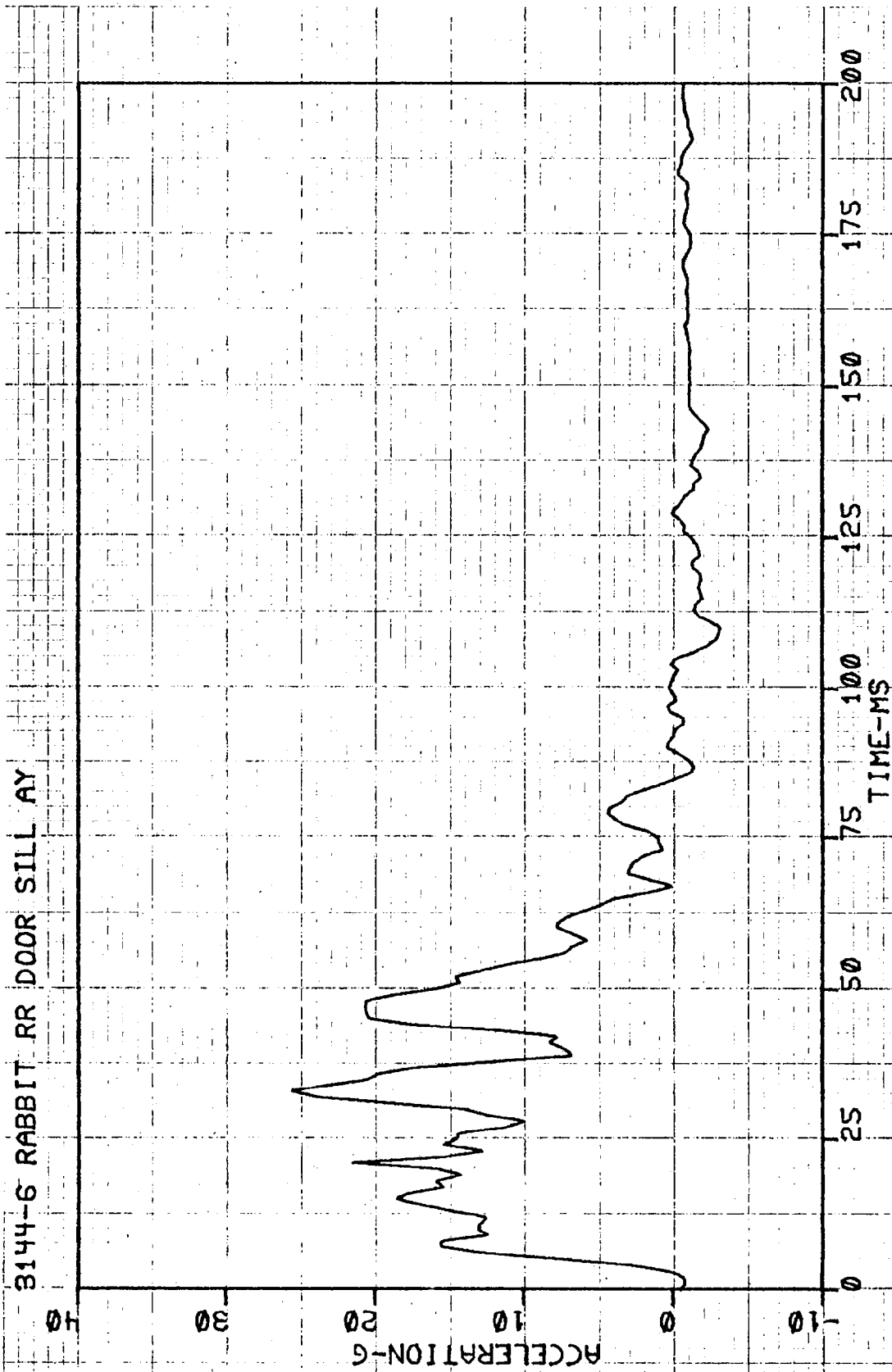


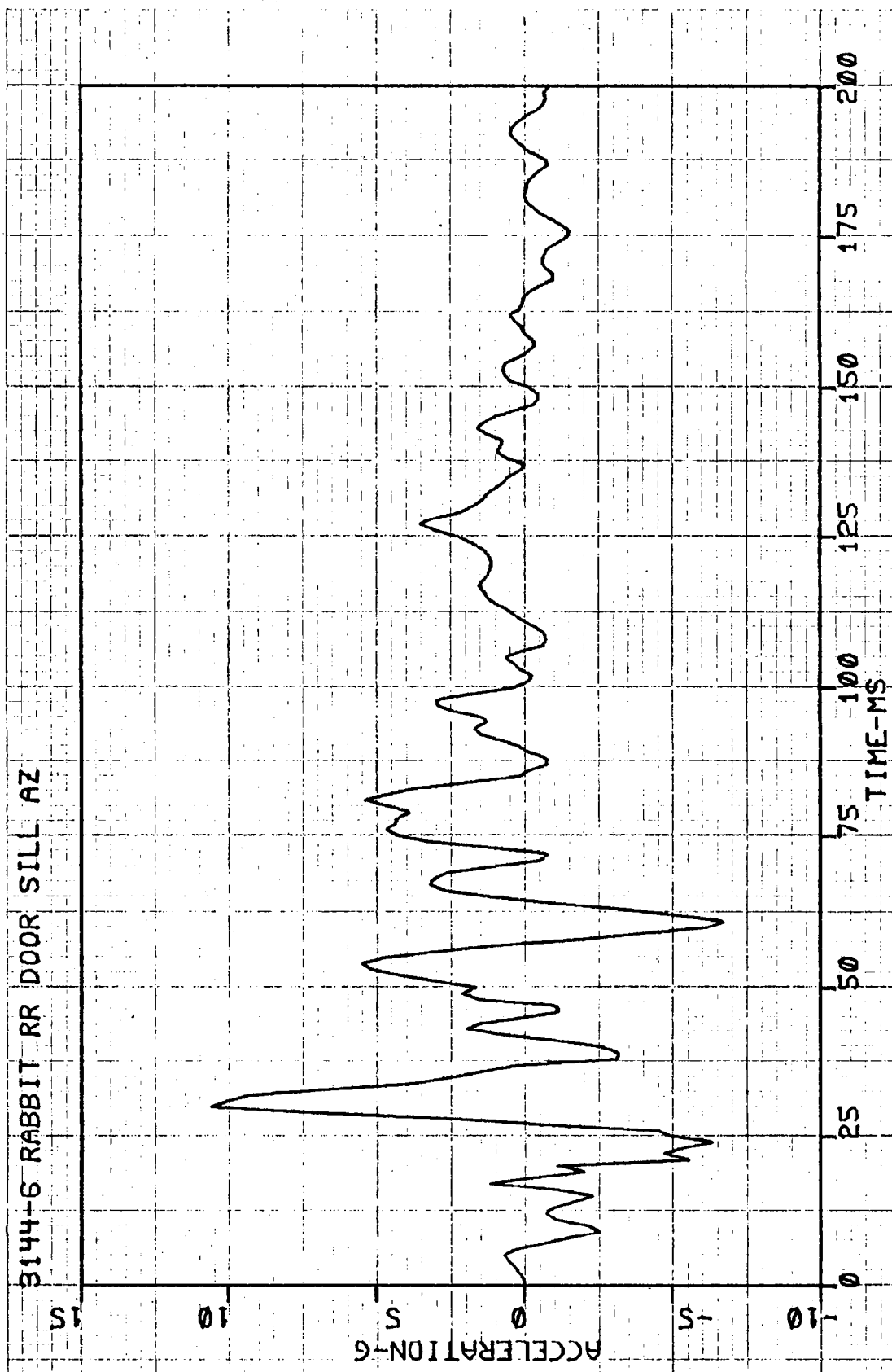


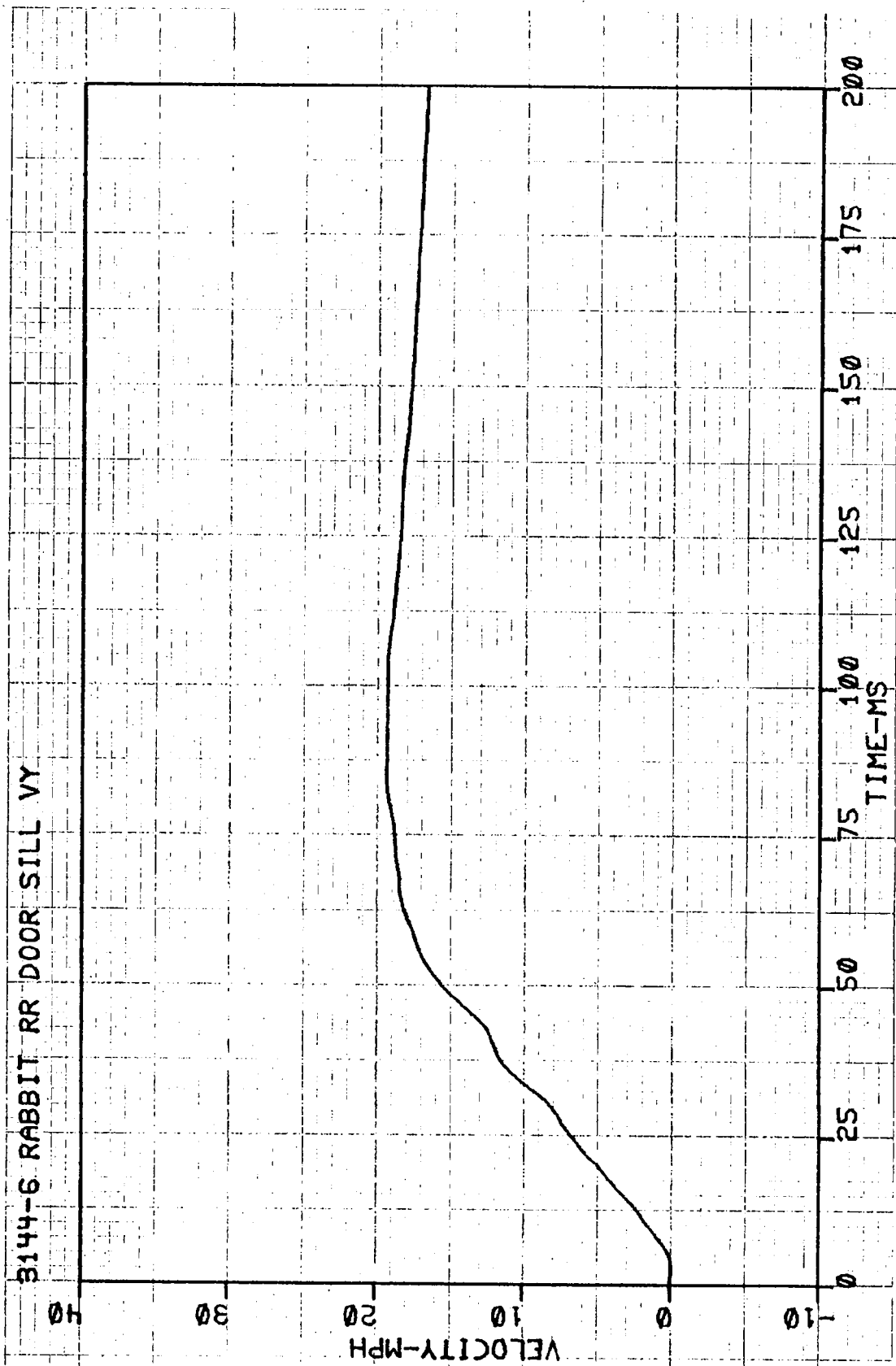


3144-6 RABBIT RR DOOR SILL AX

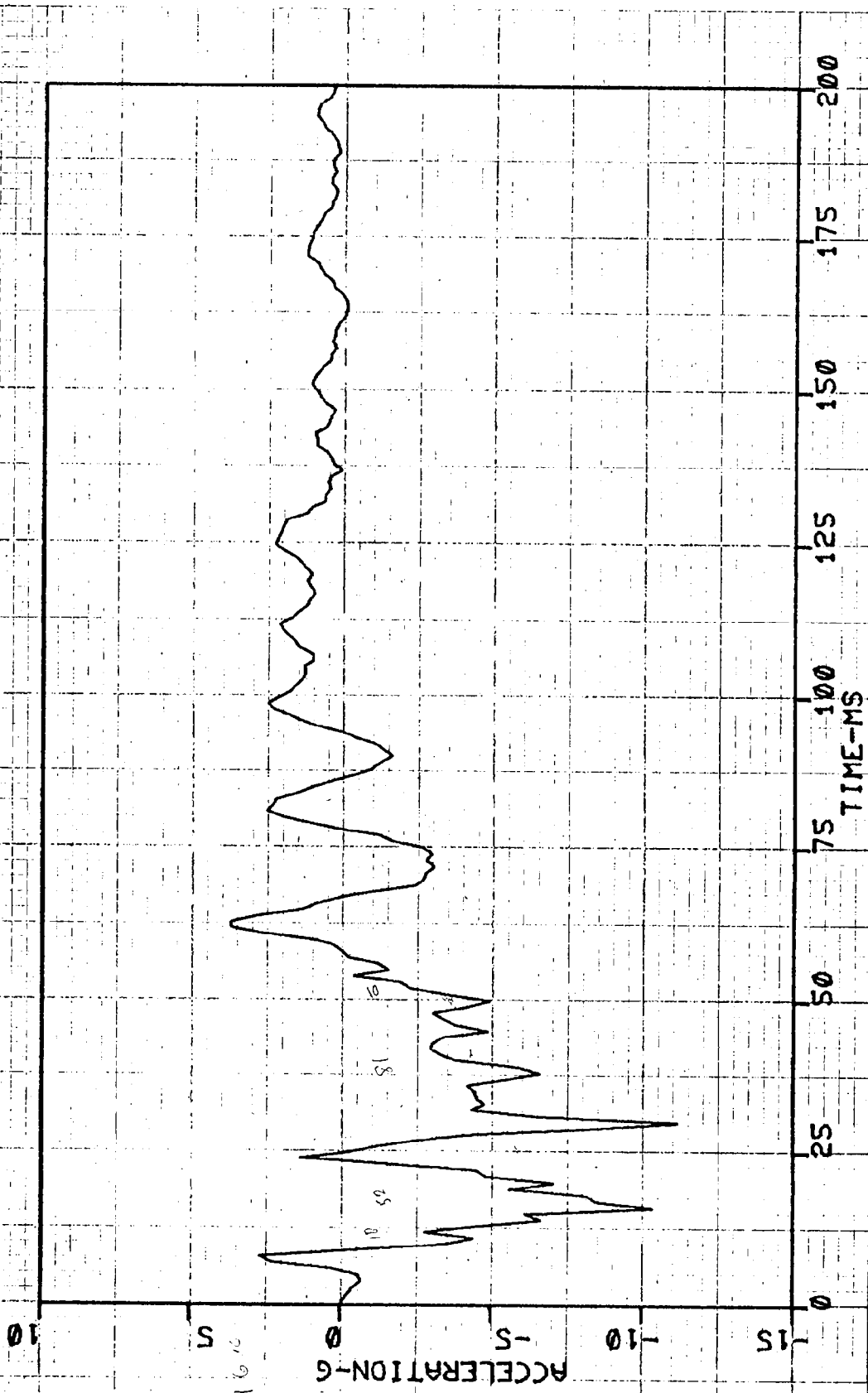


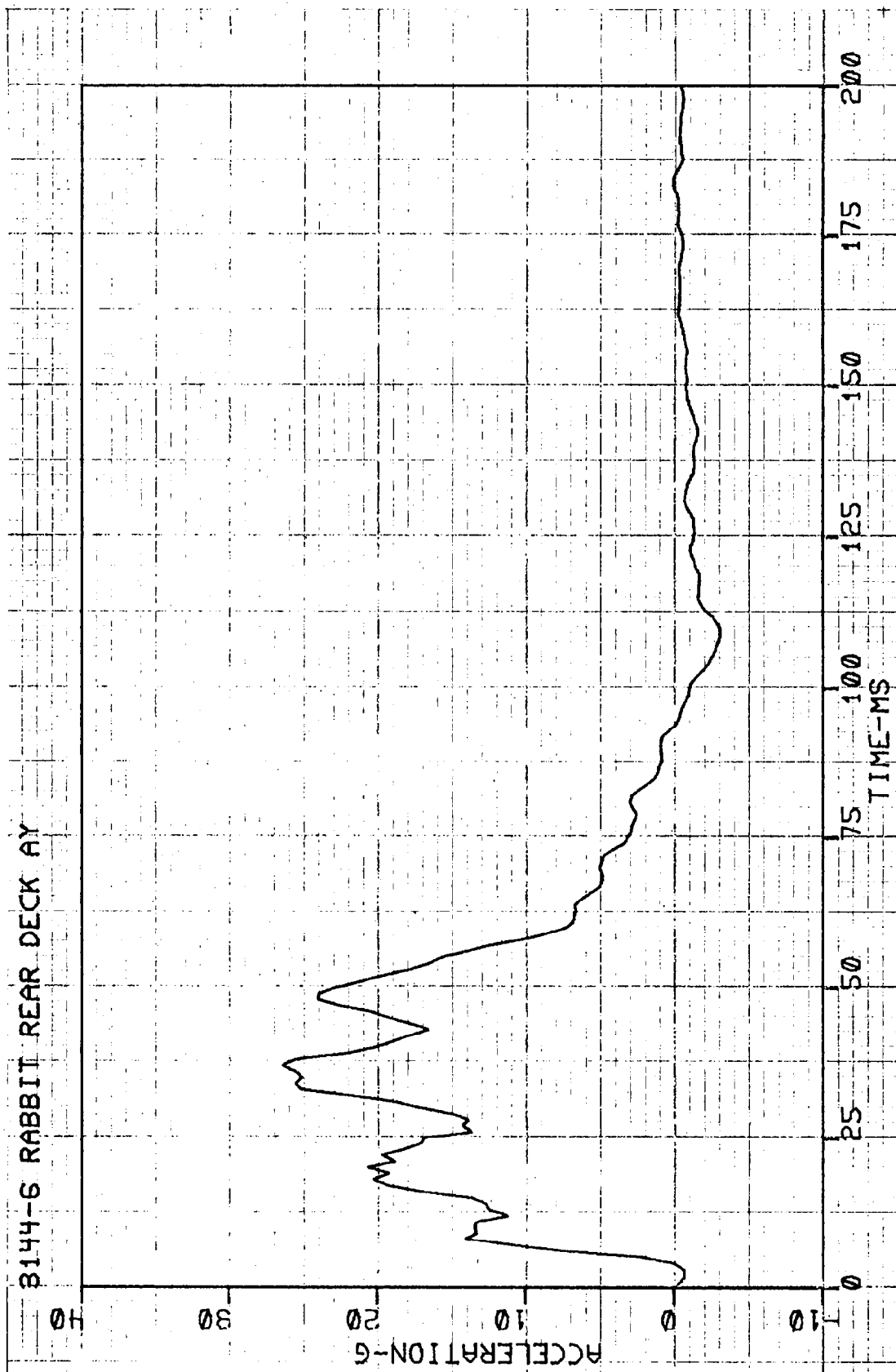


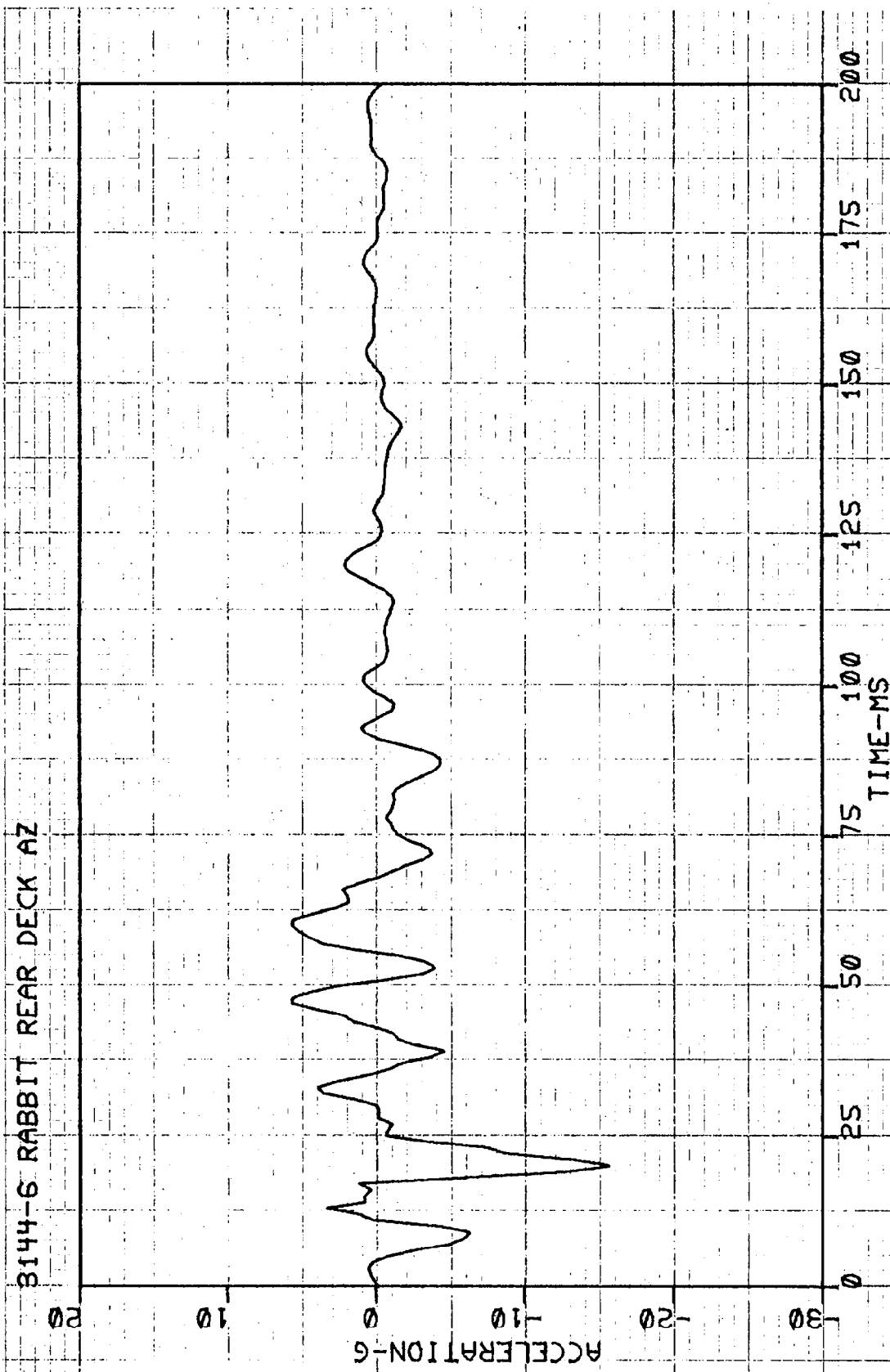


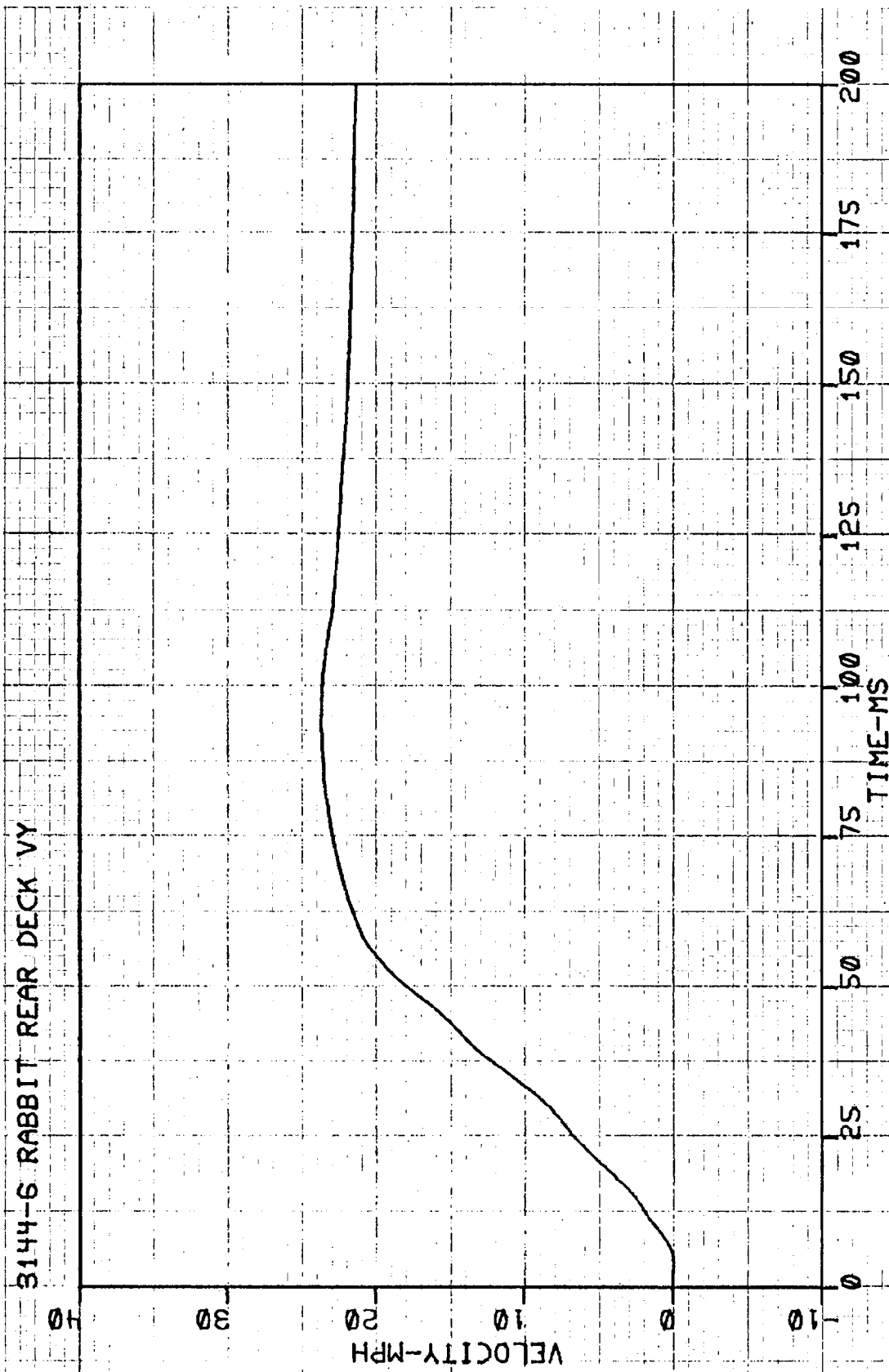


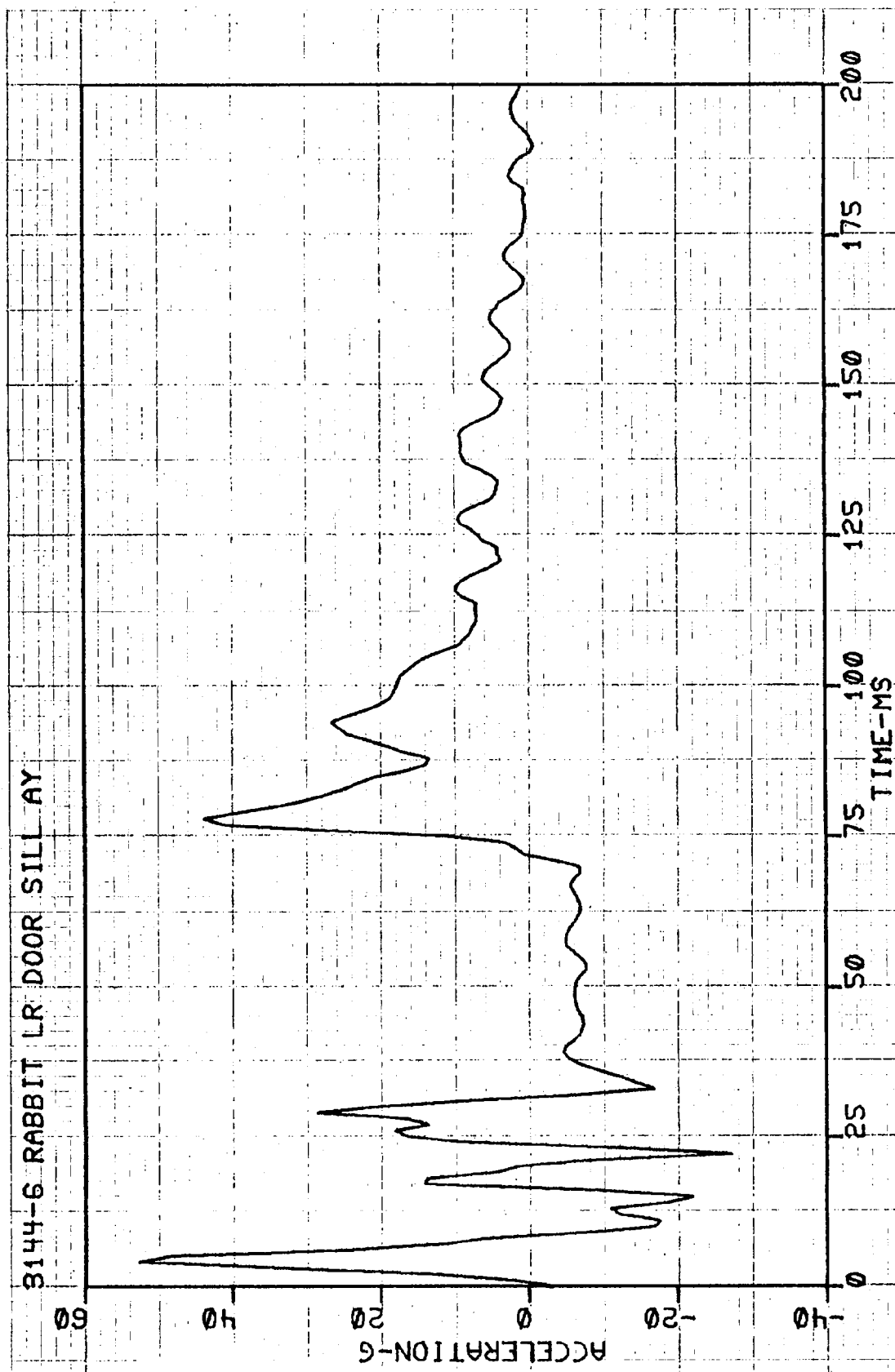
8144-6 RABBIT REAR DECK AX

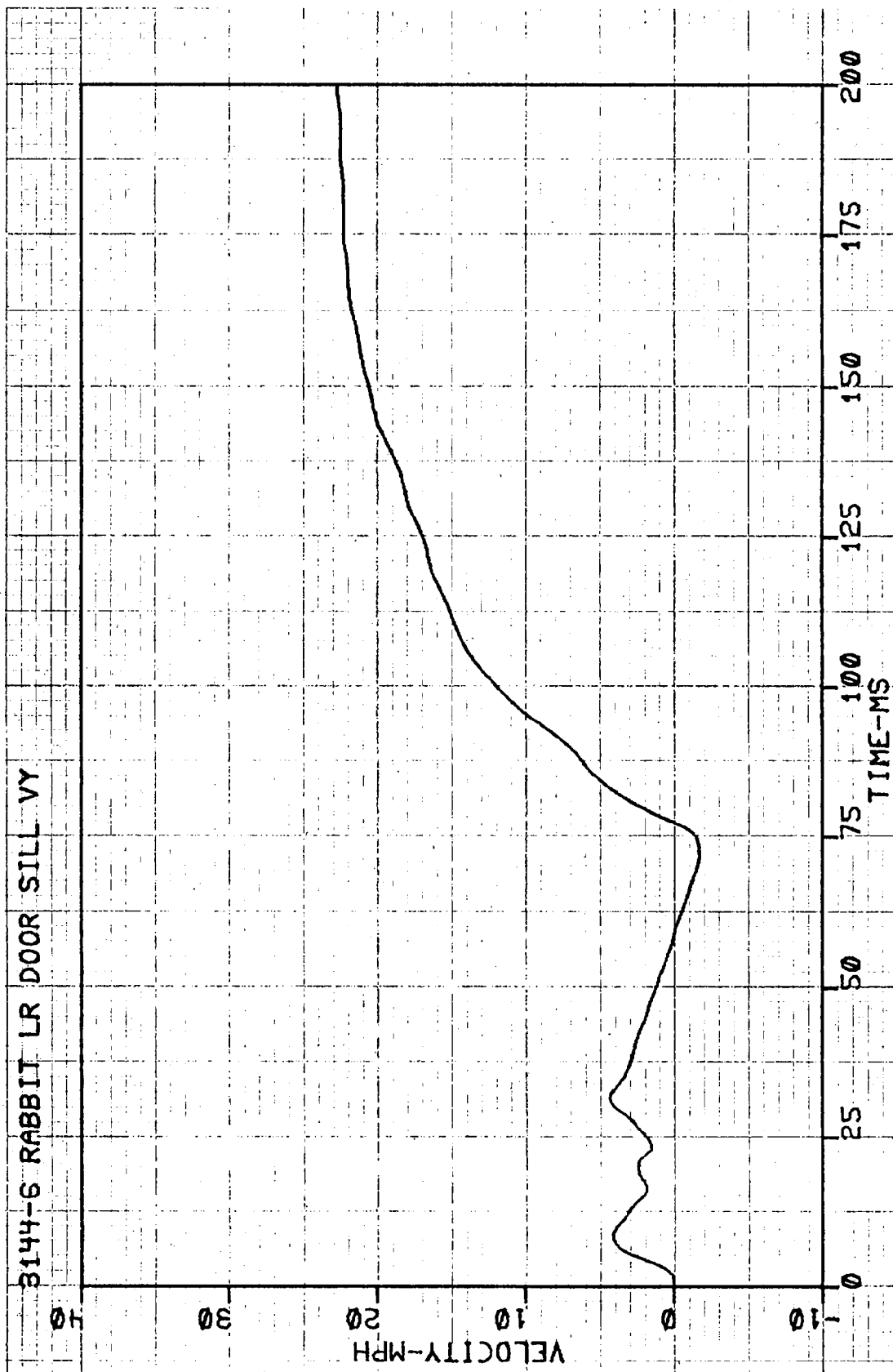


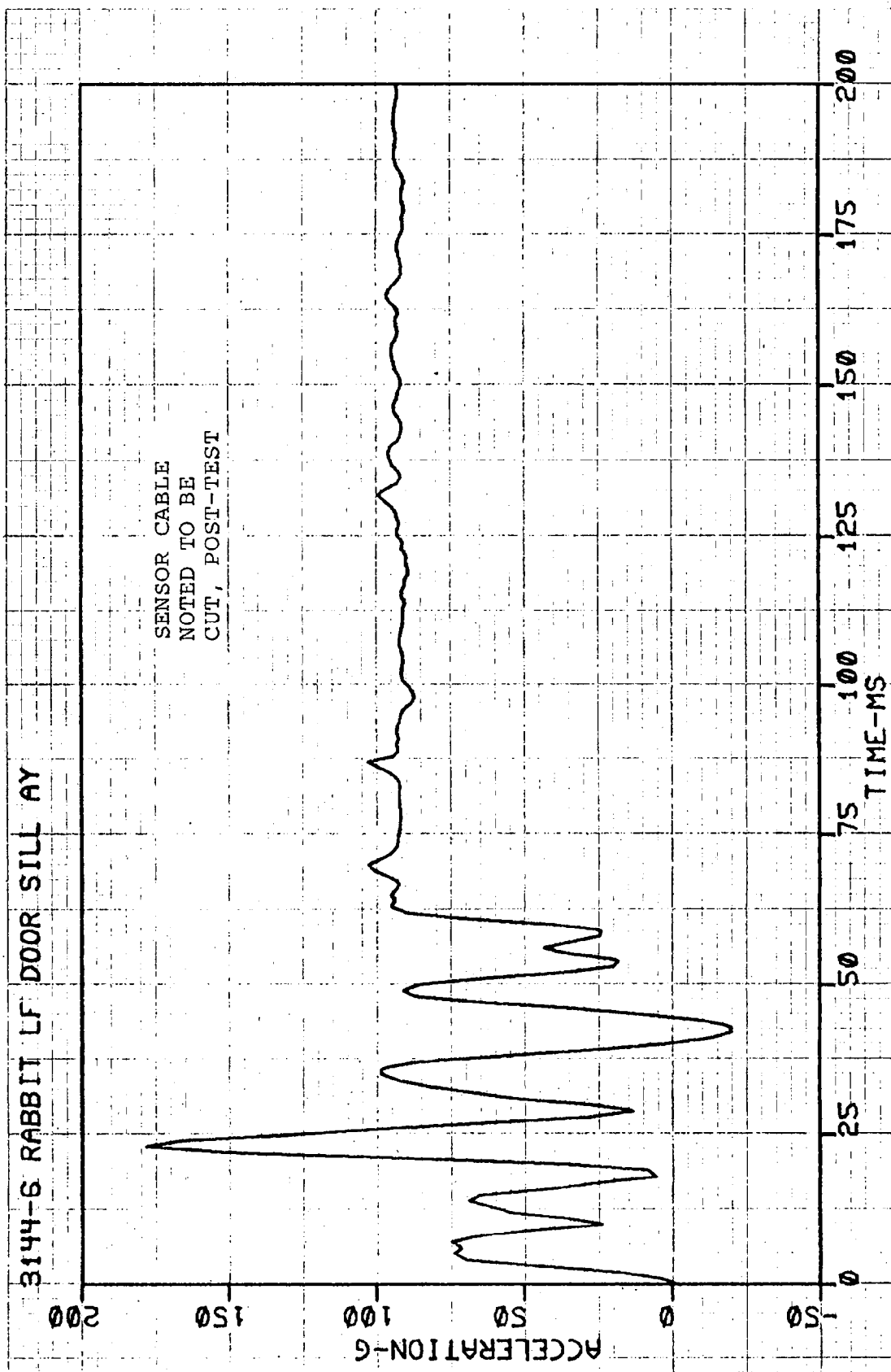


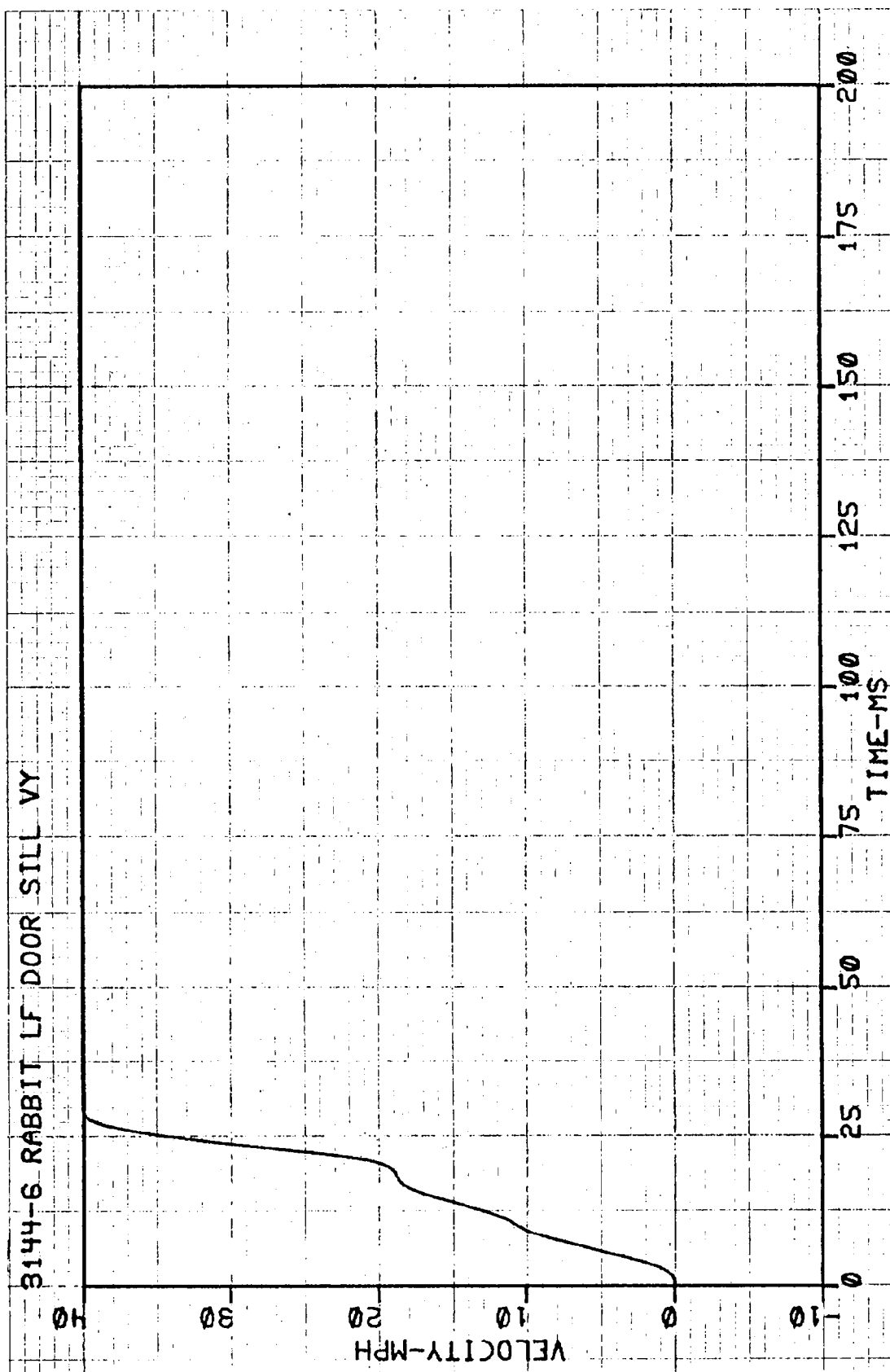


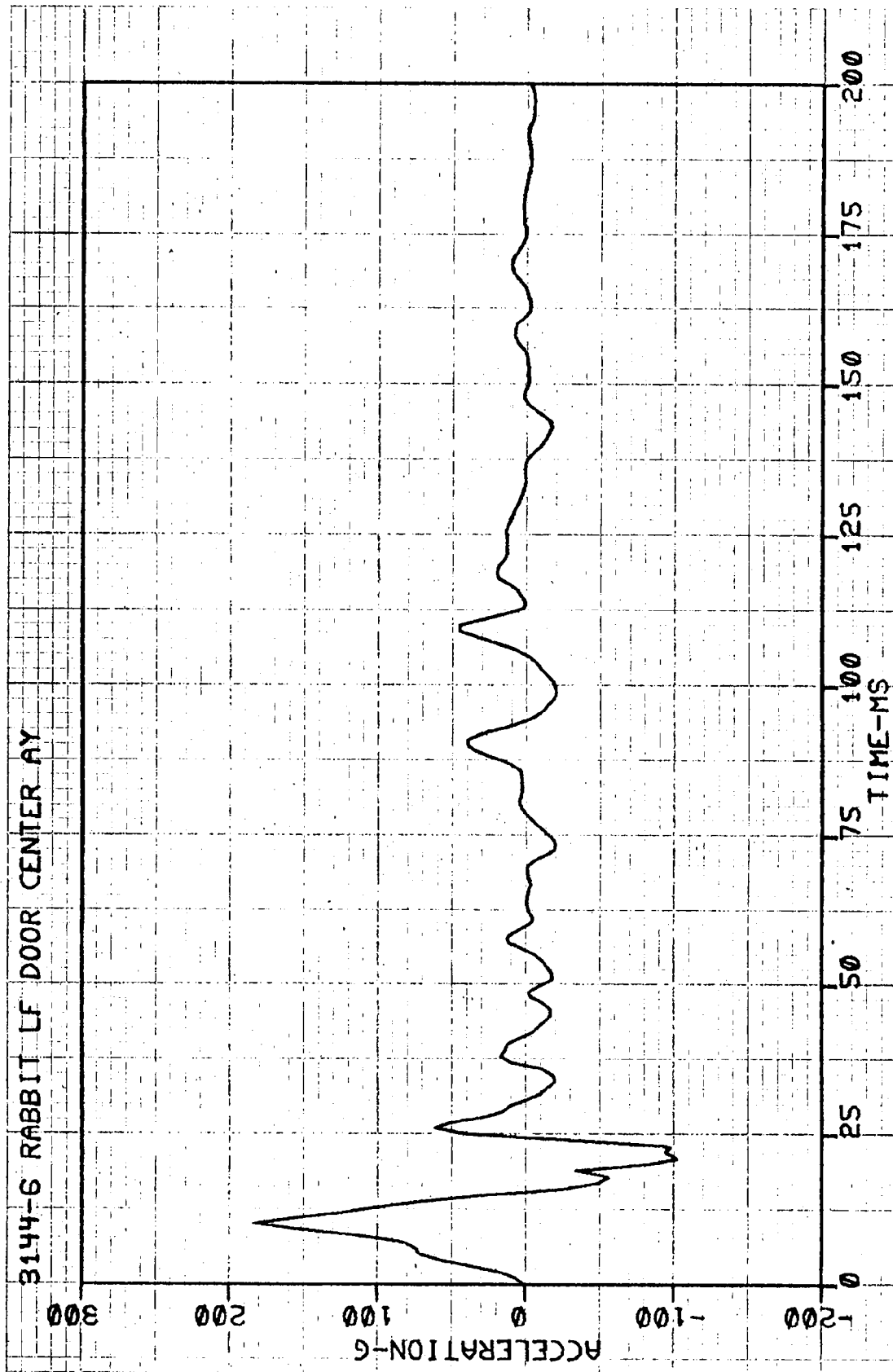


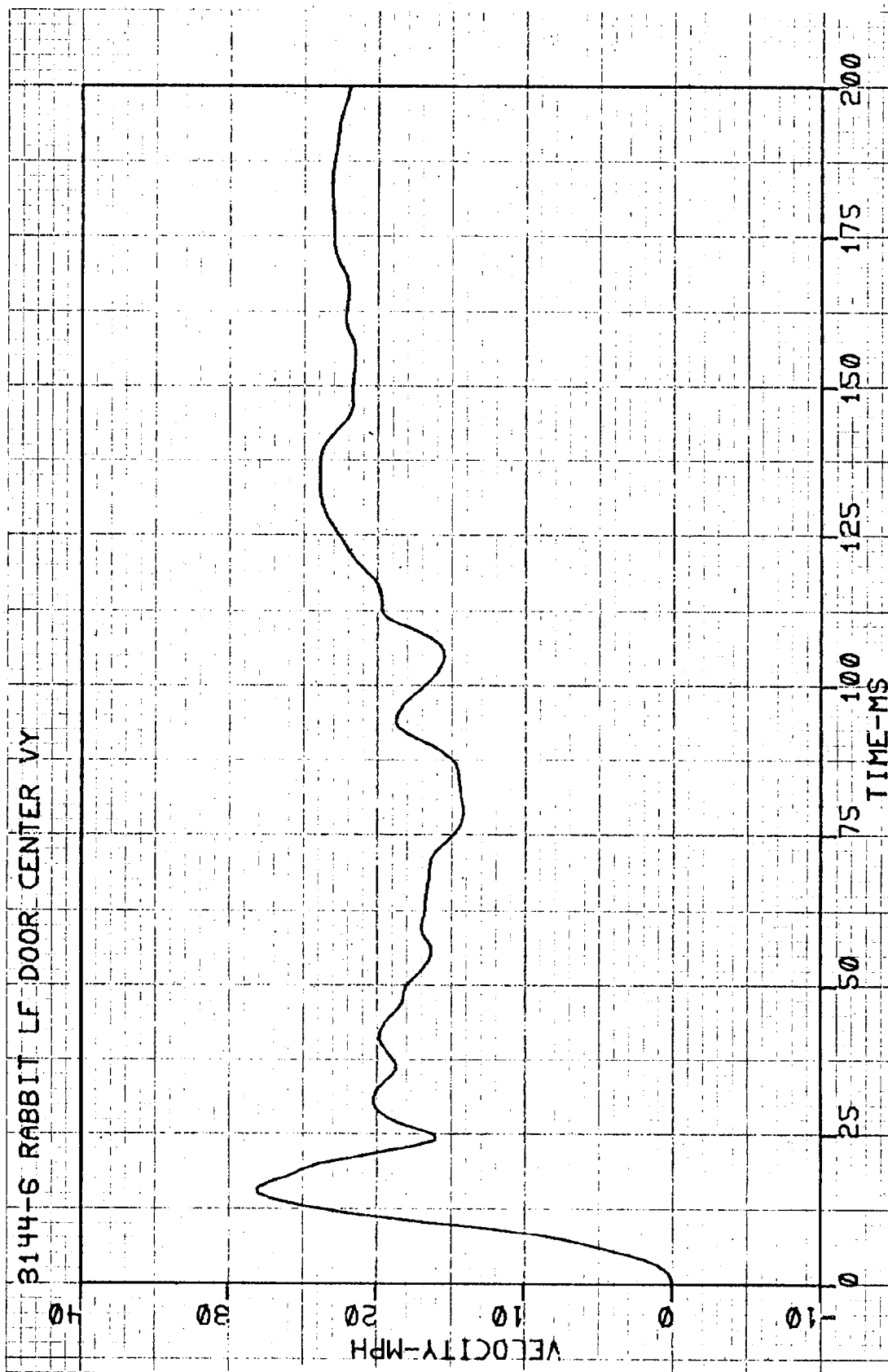


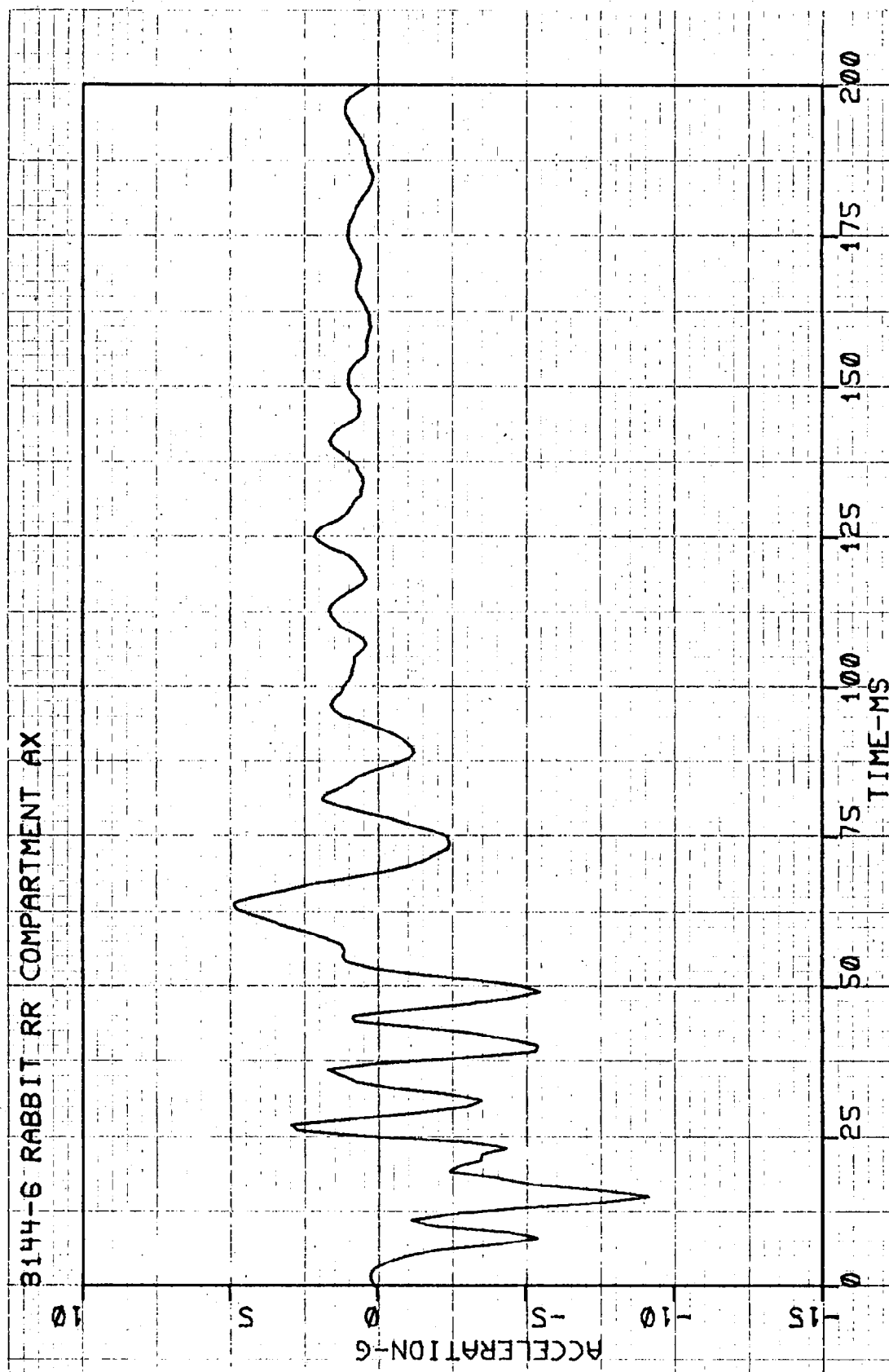


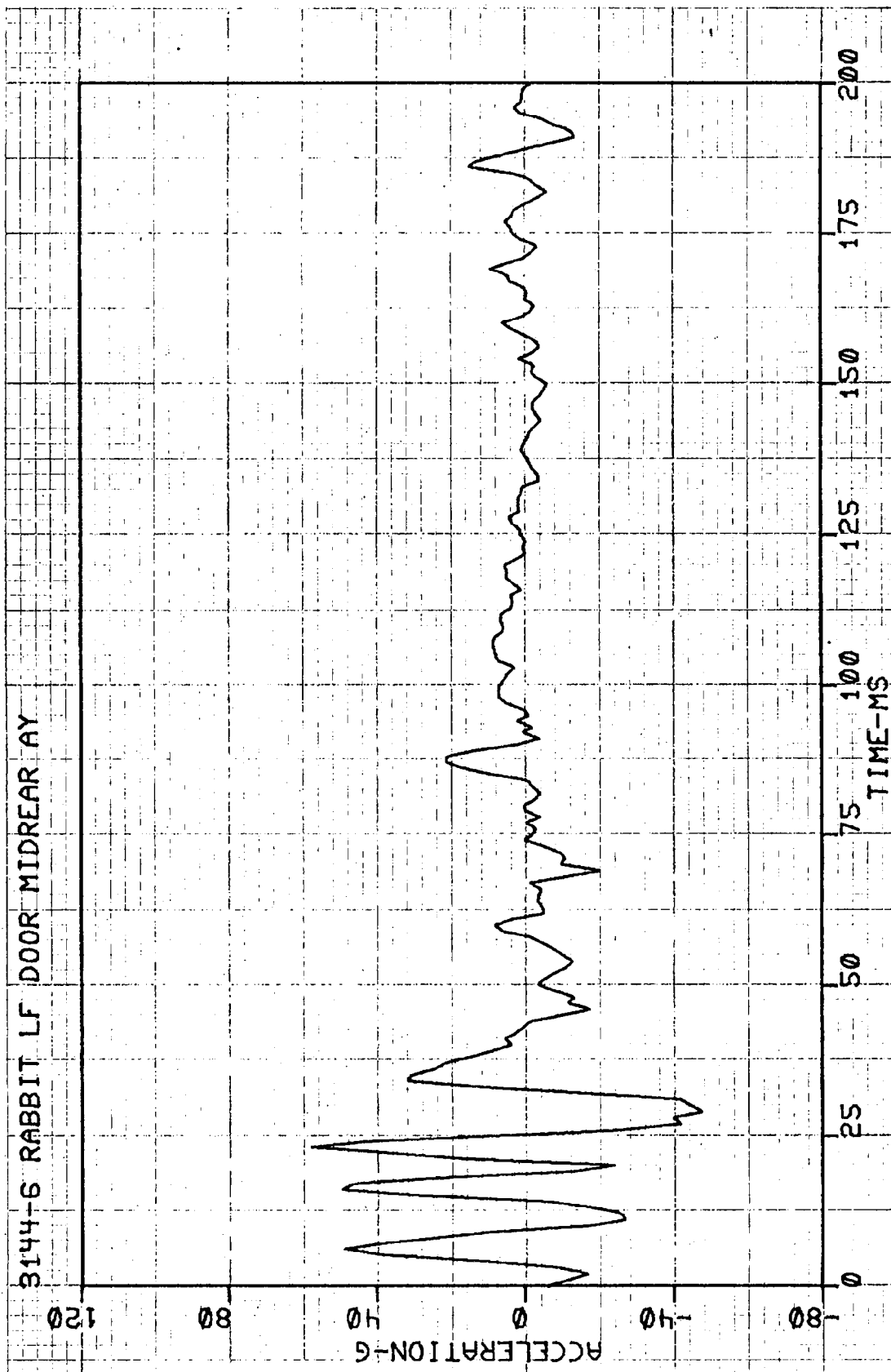


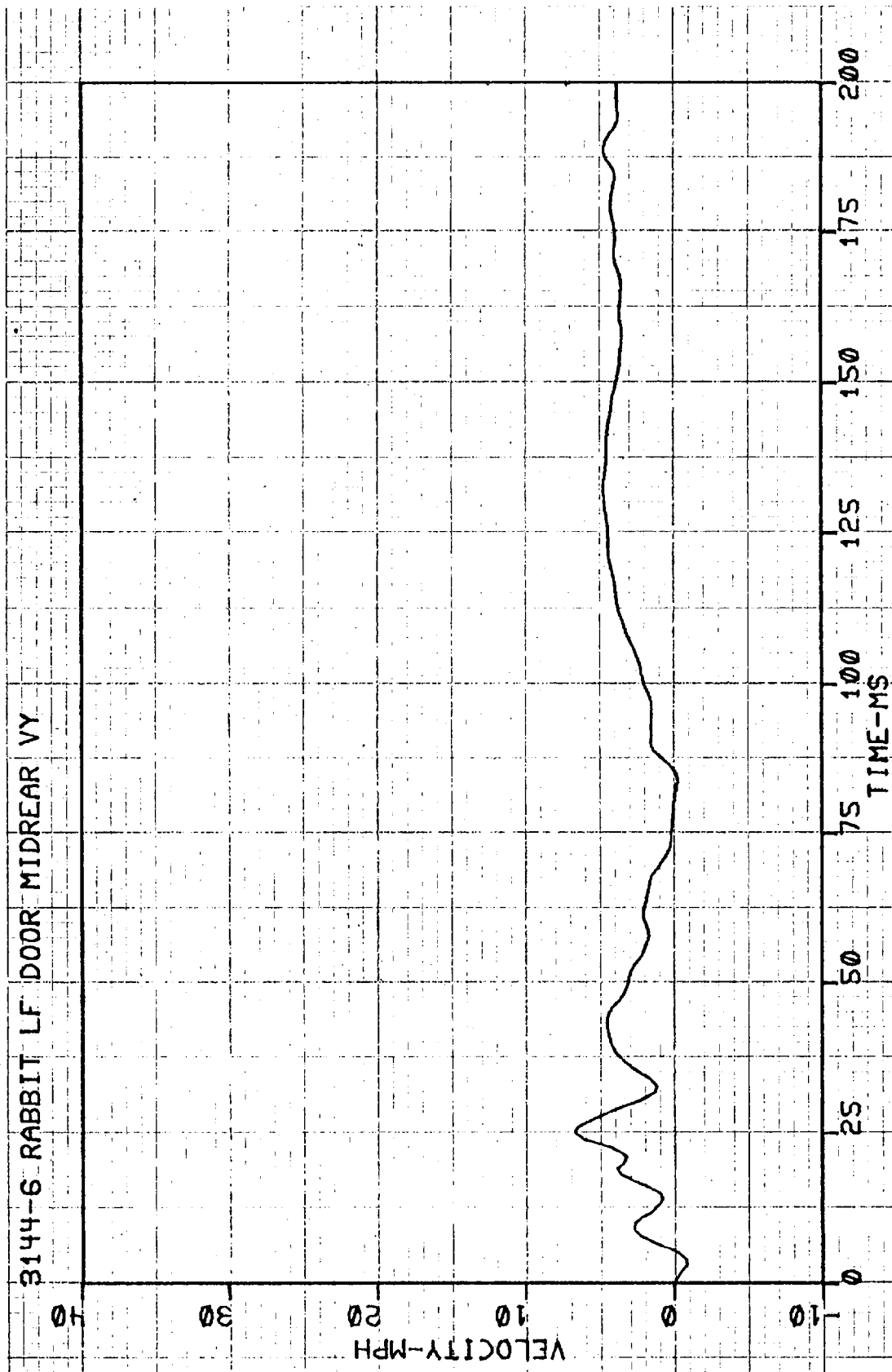


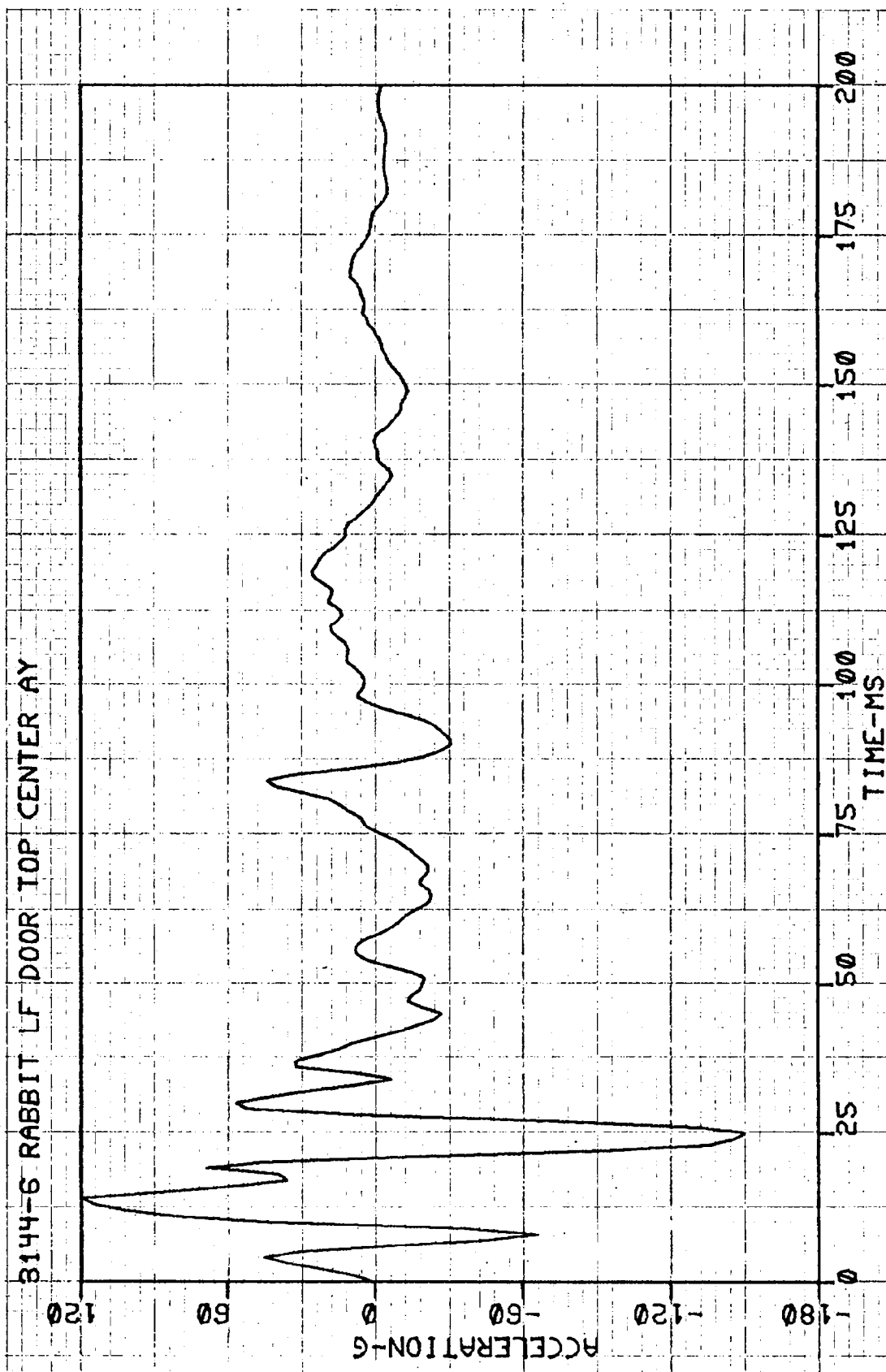


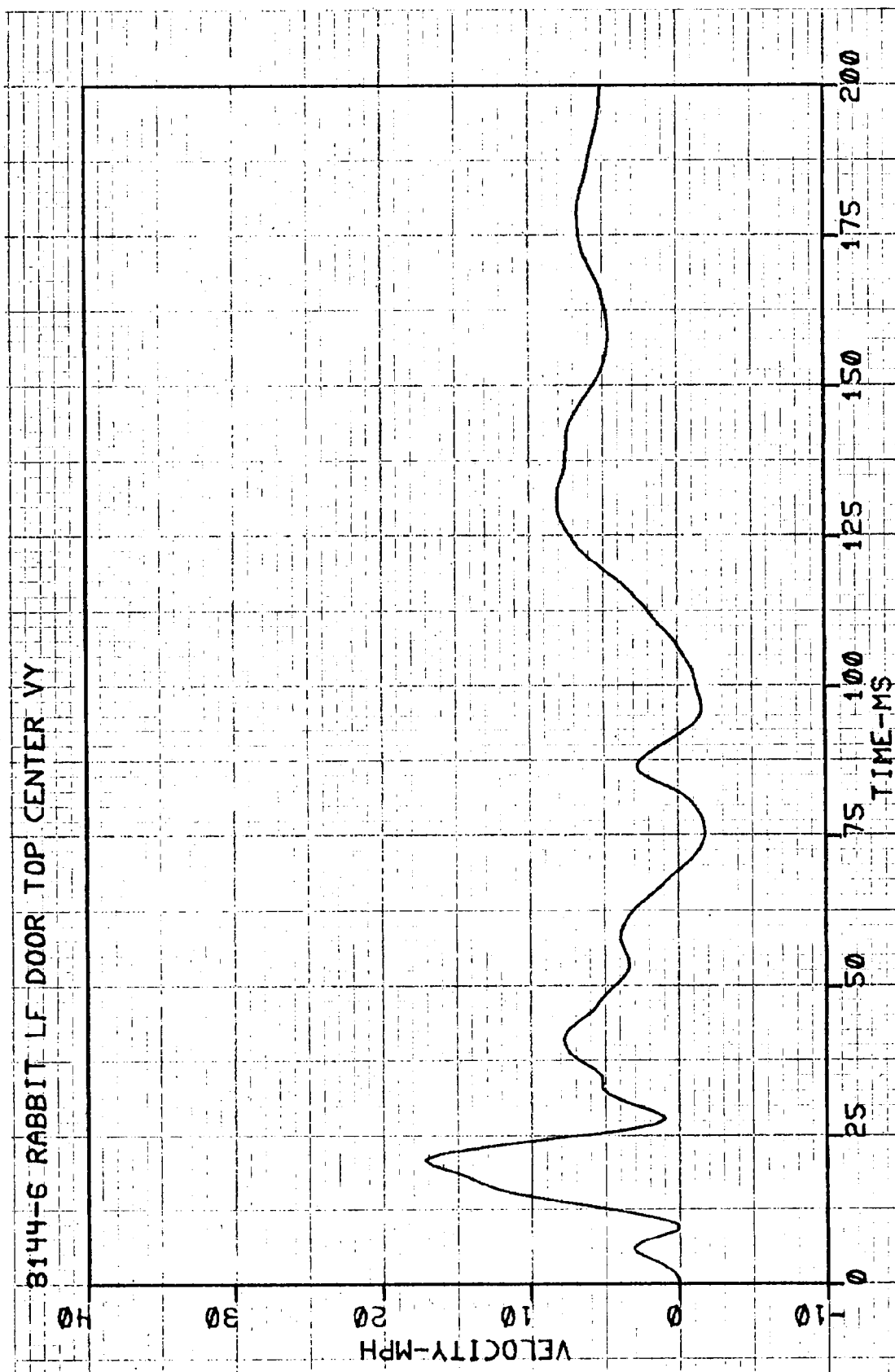


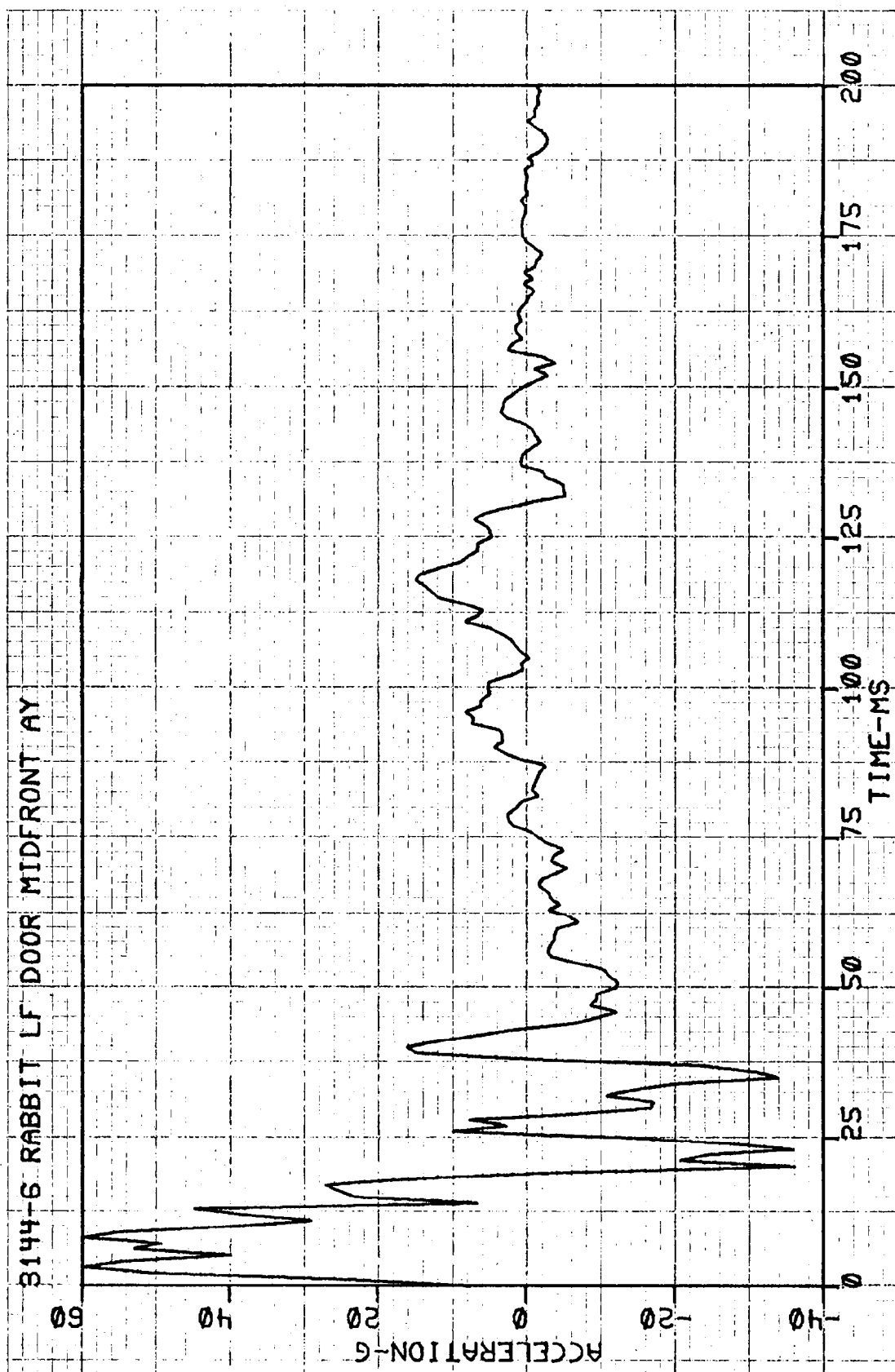


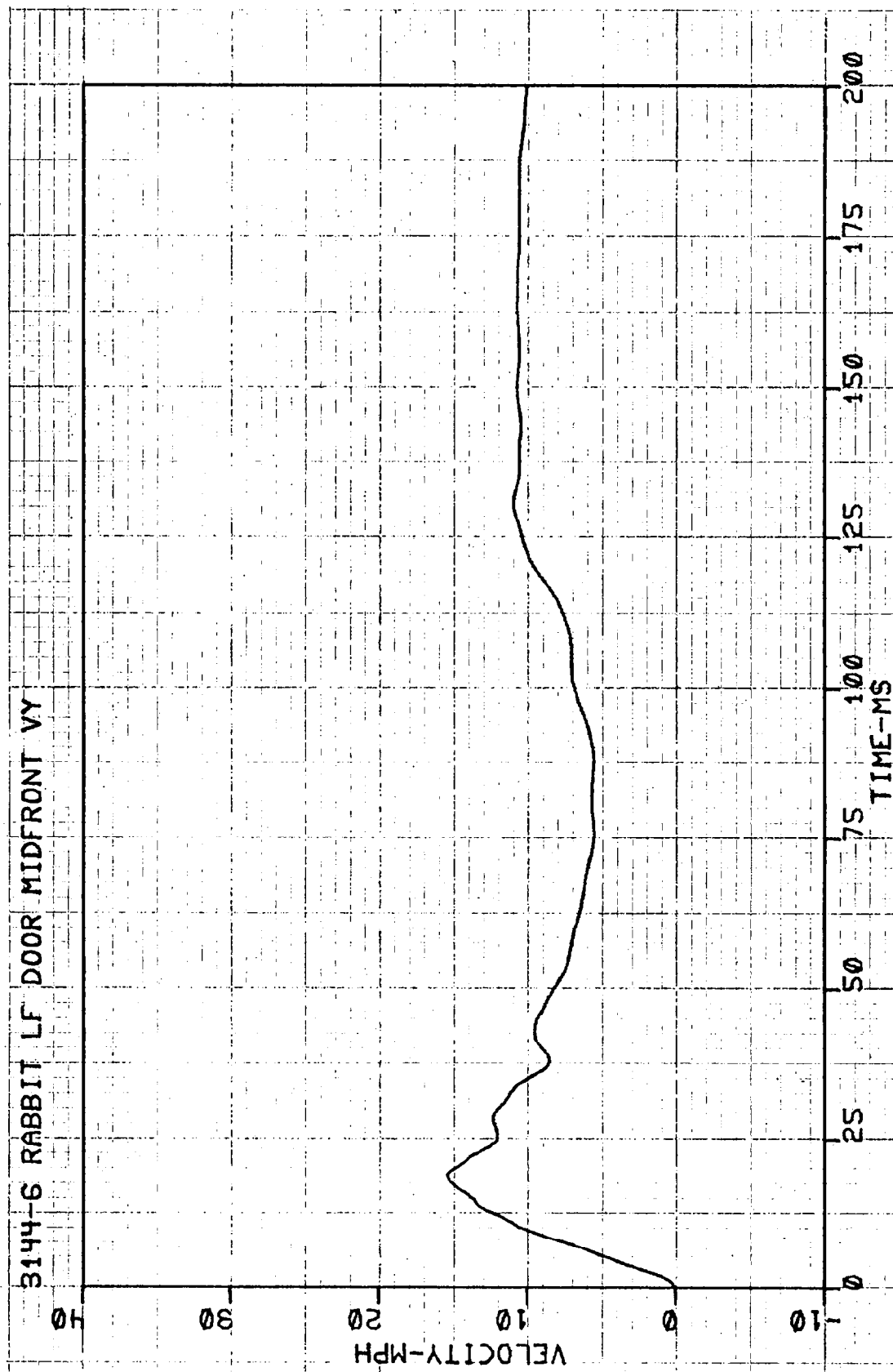


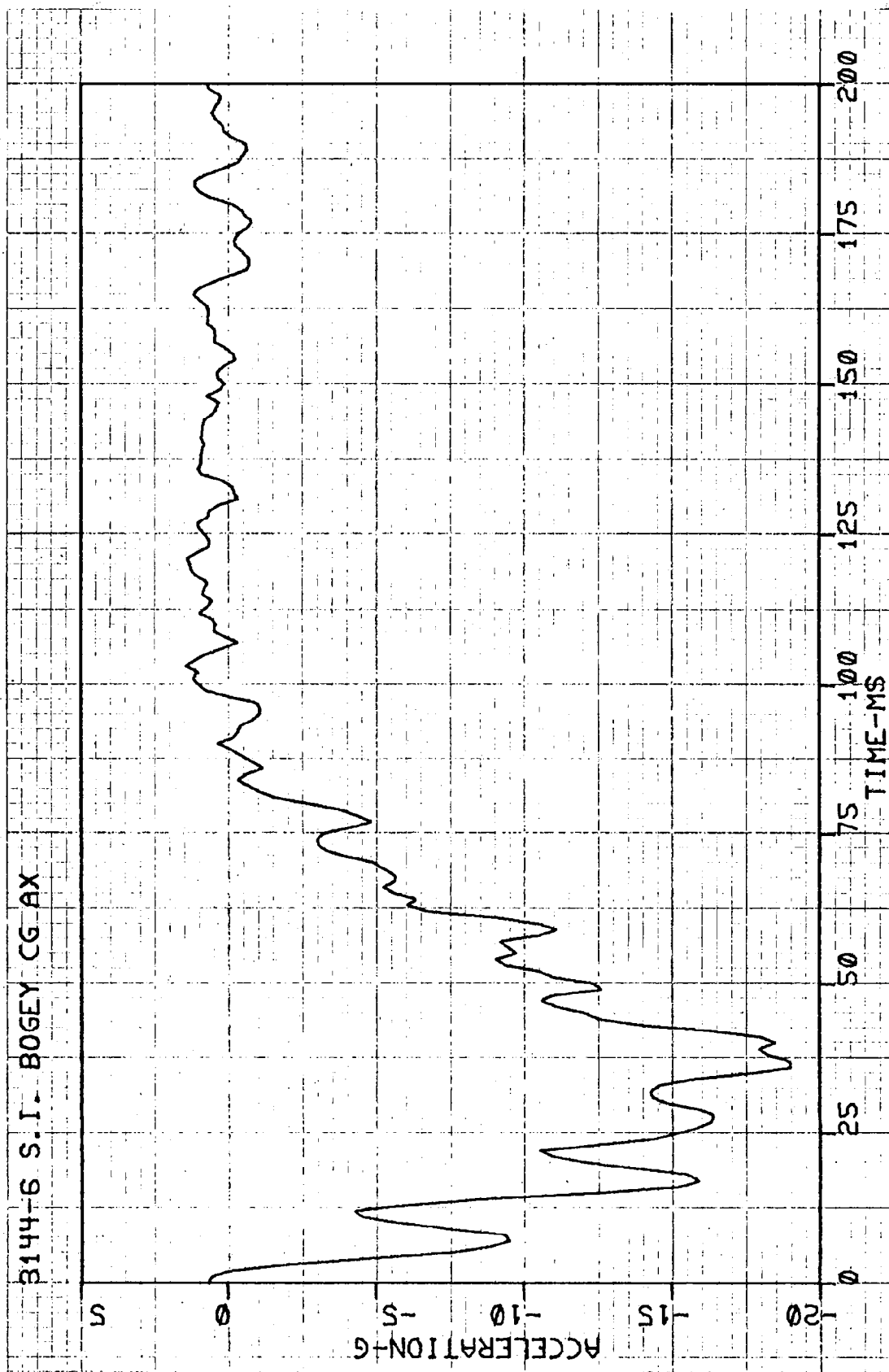


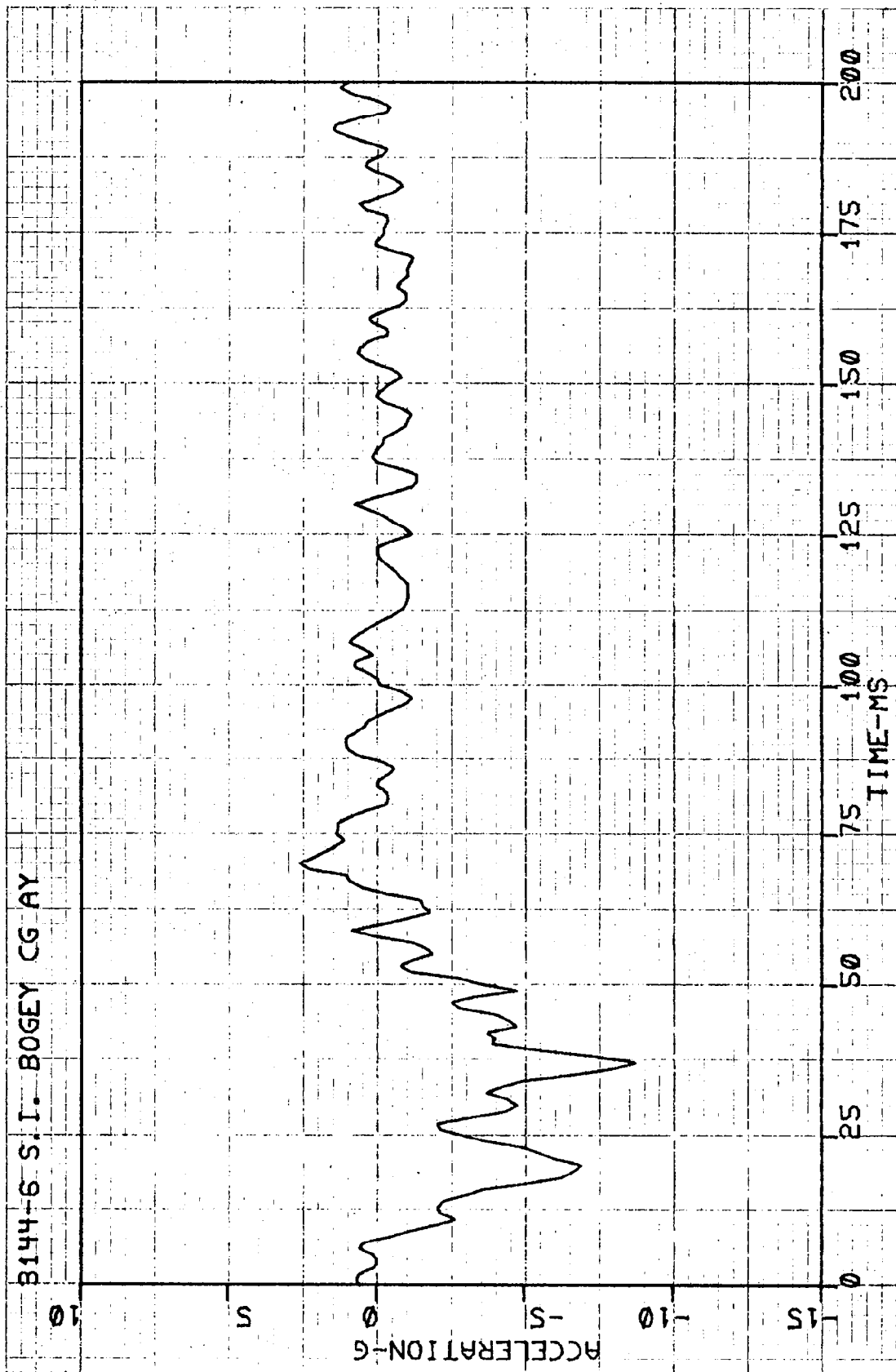


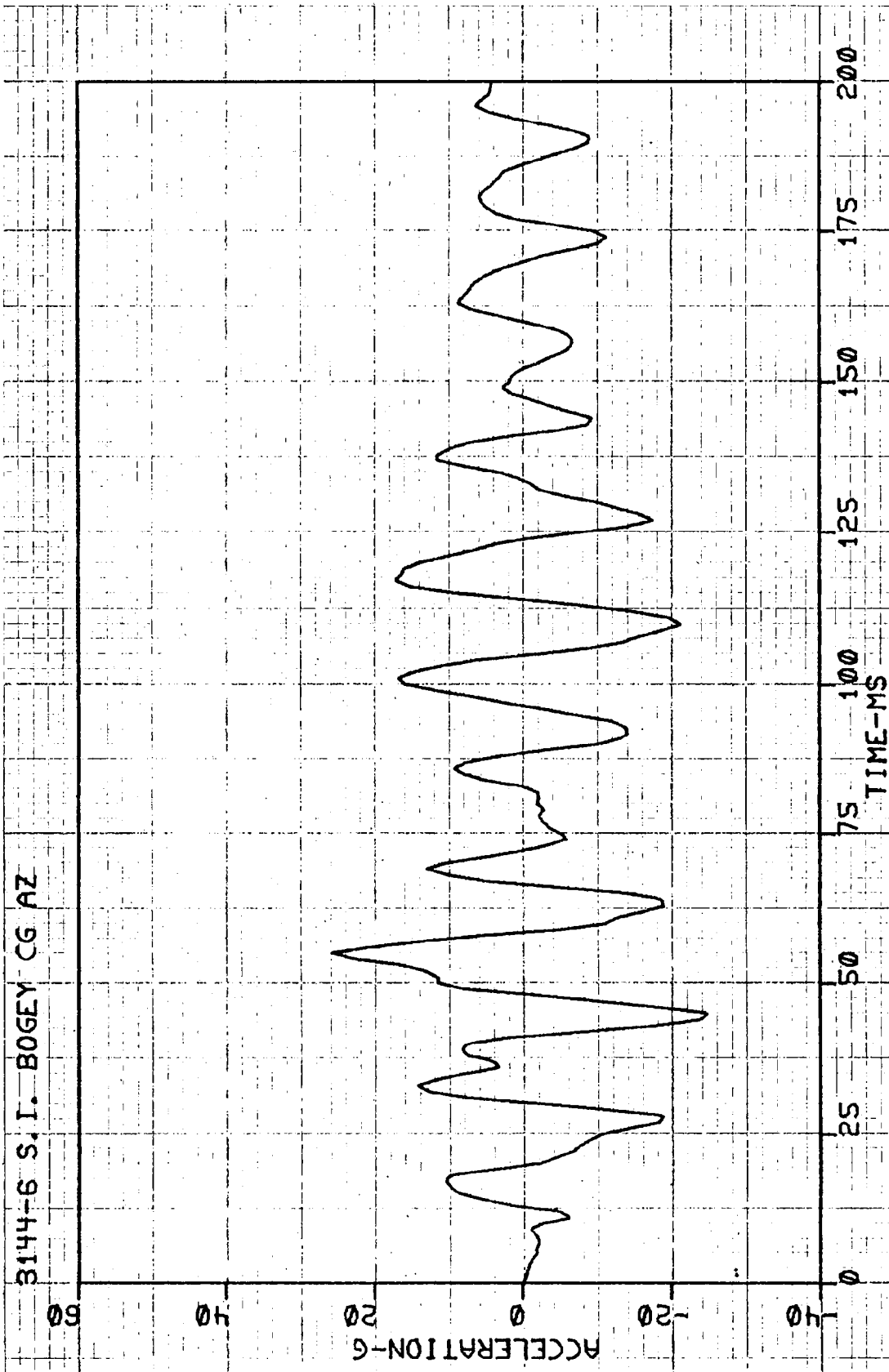


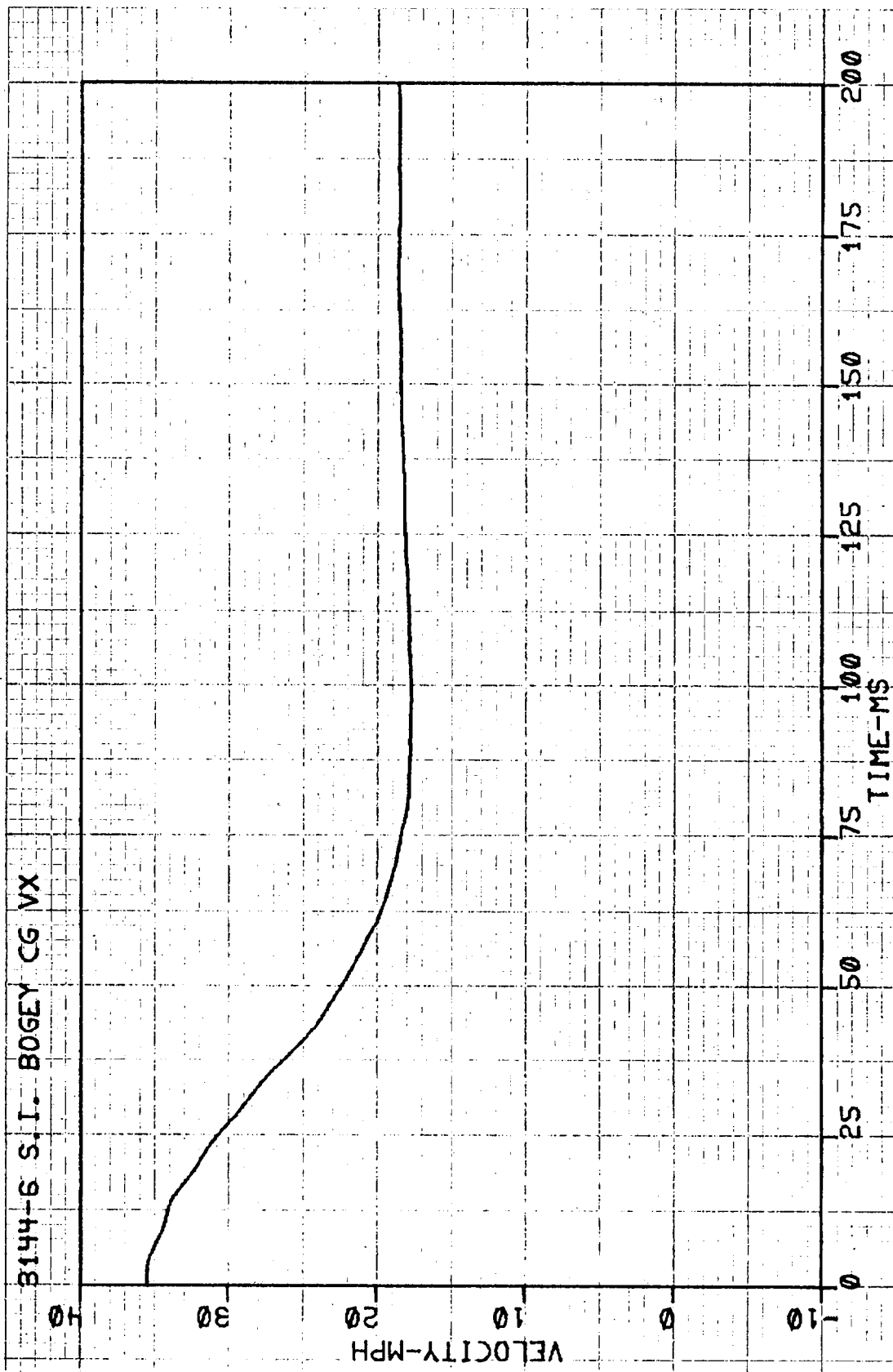


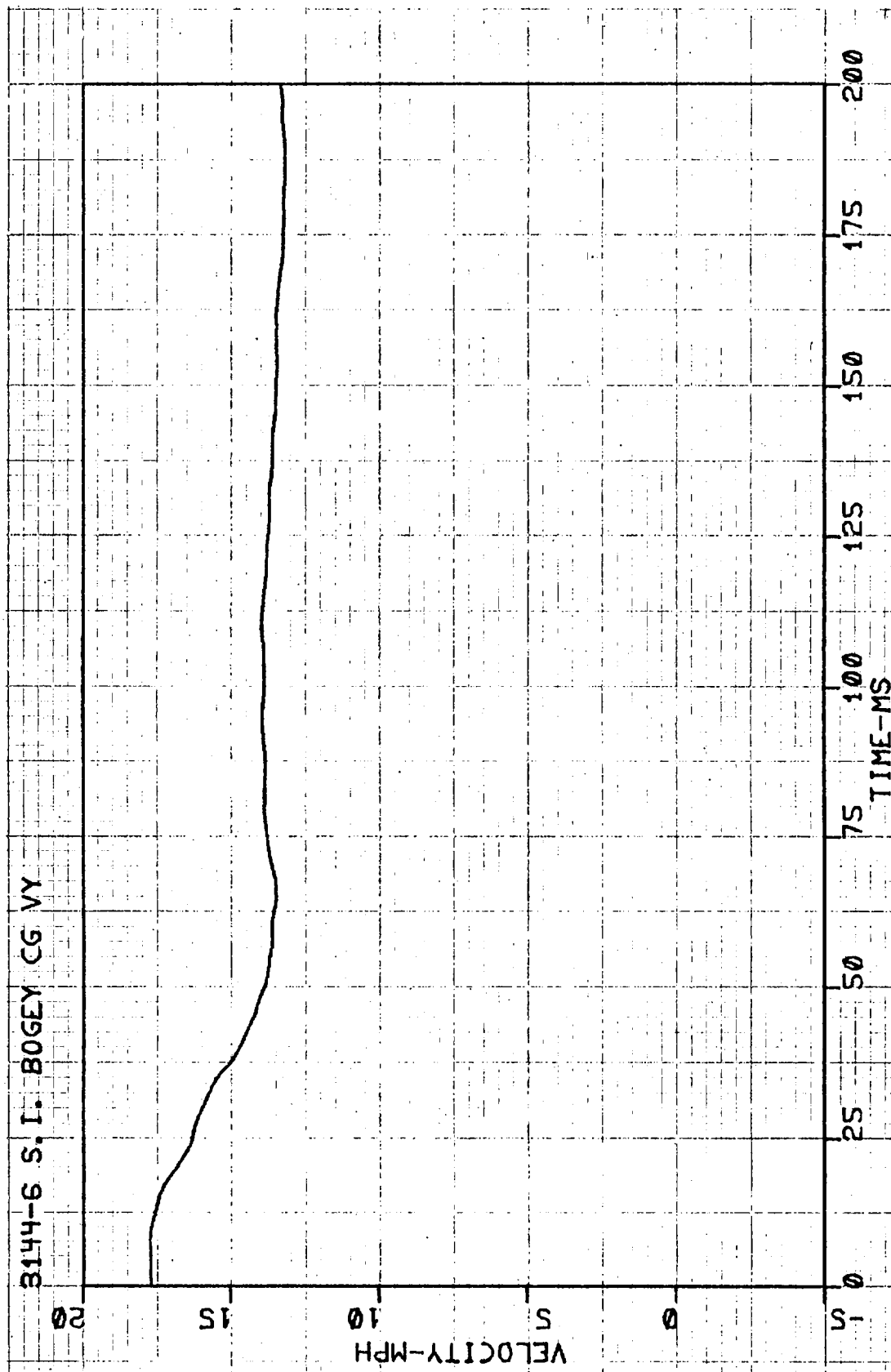


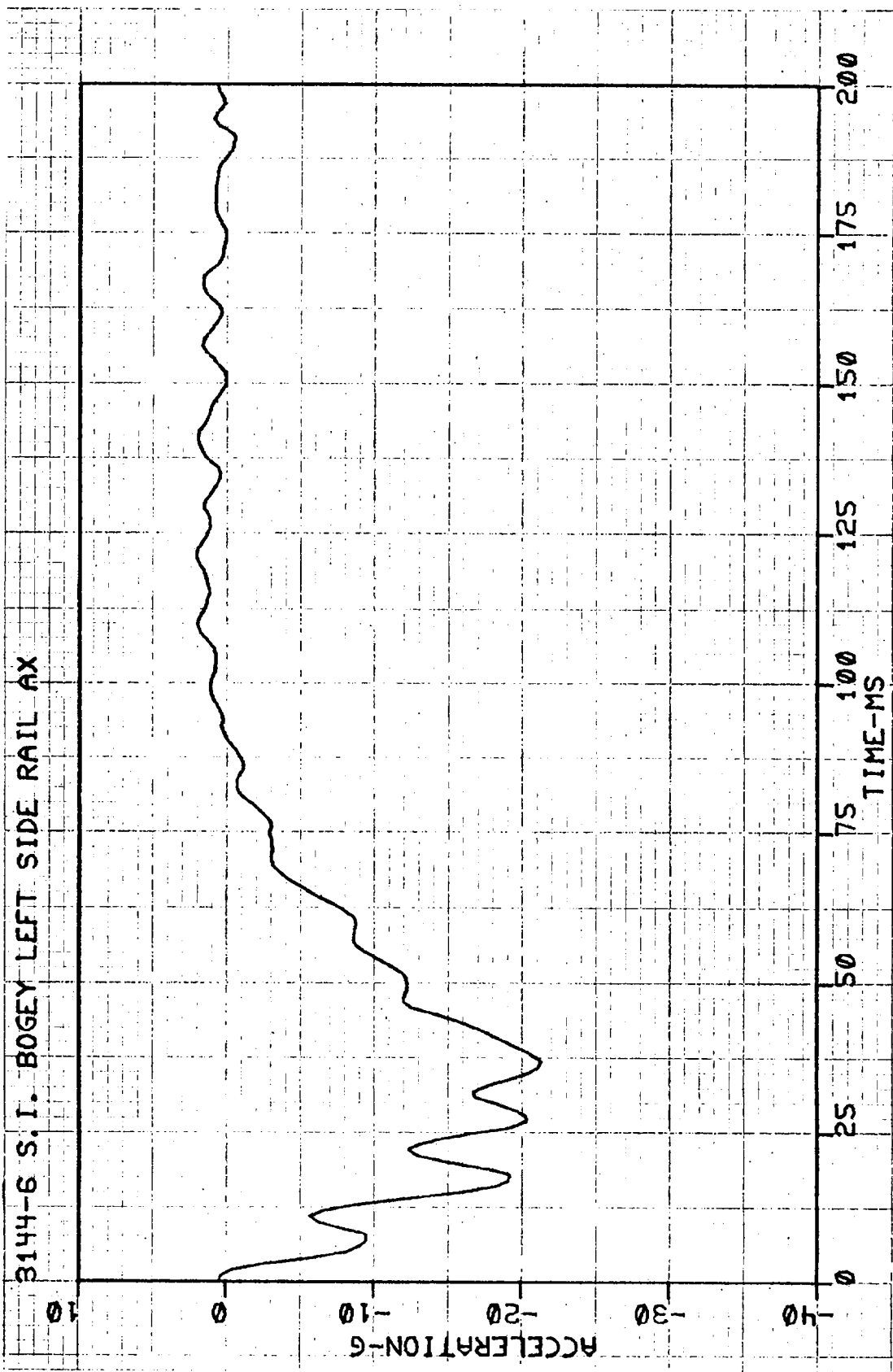




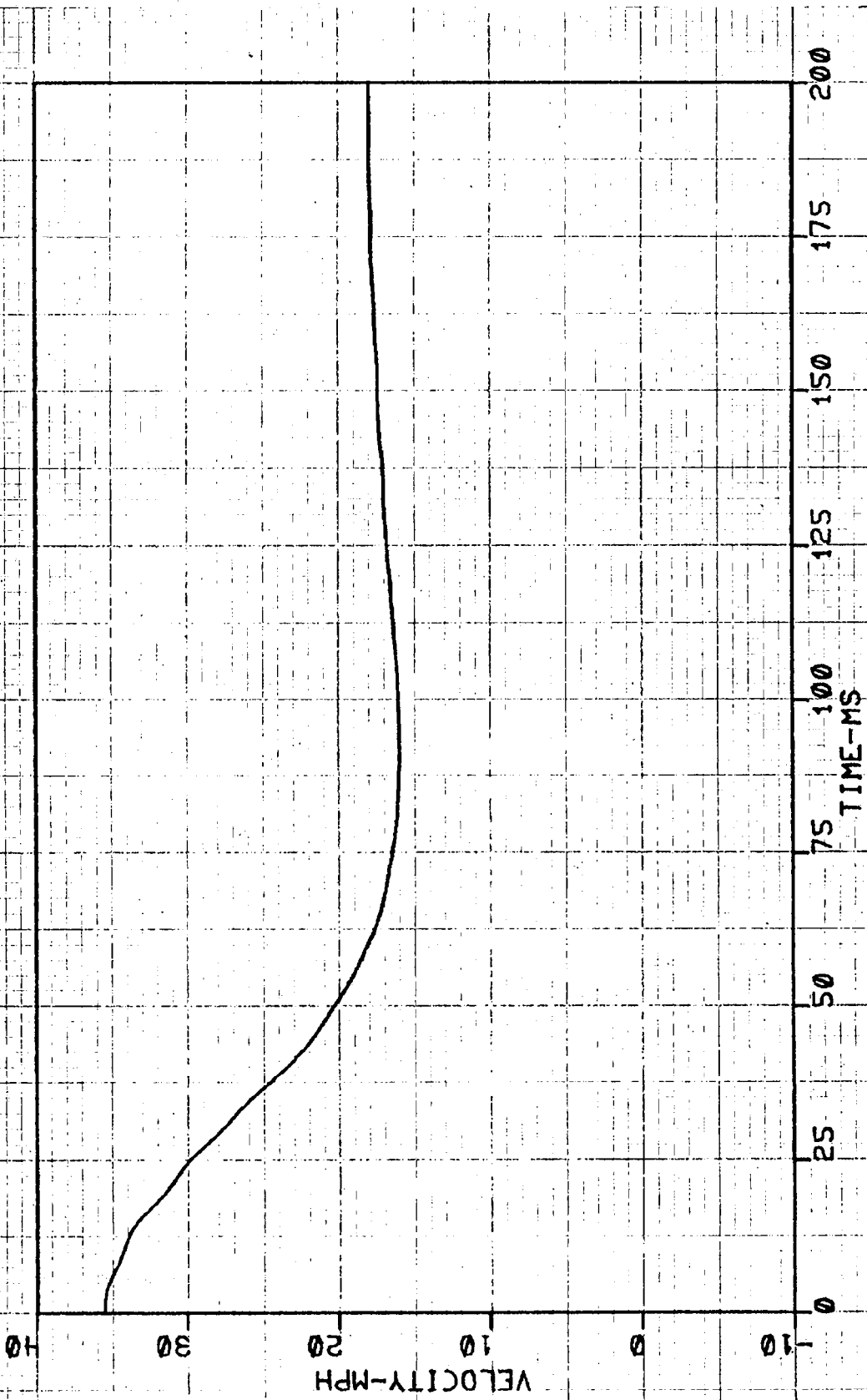


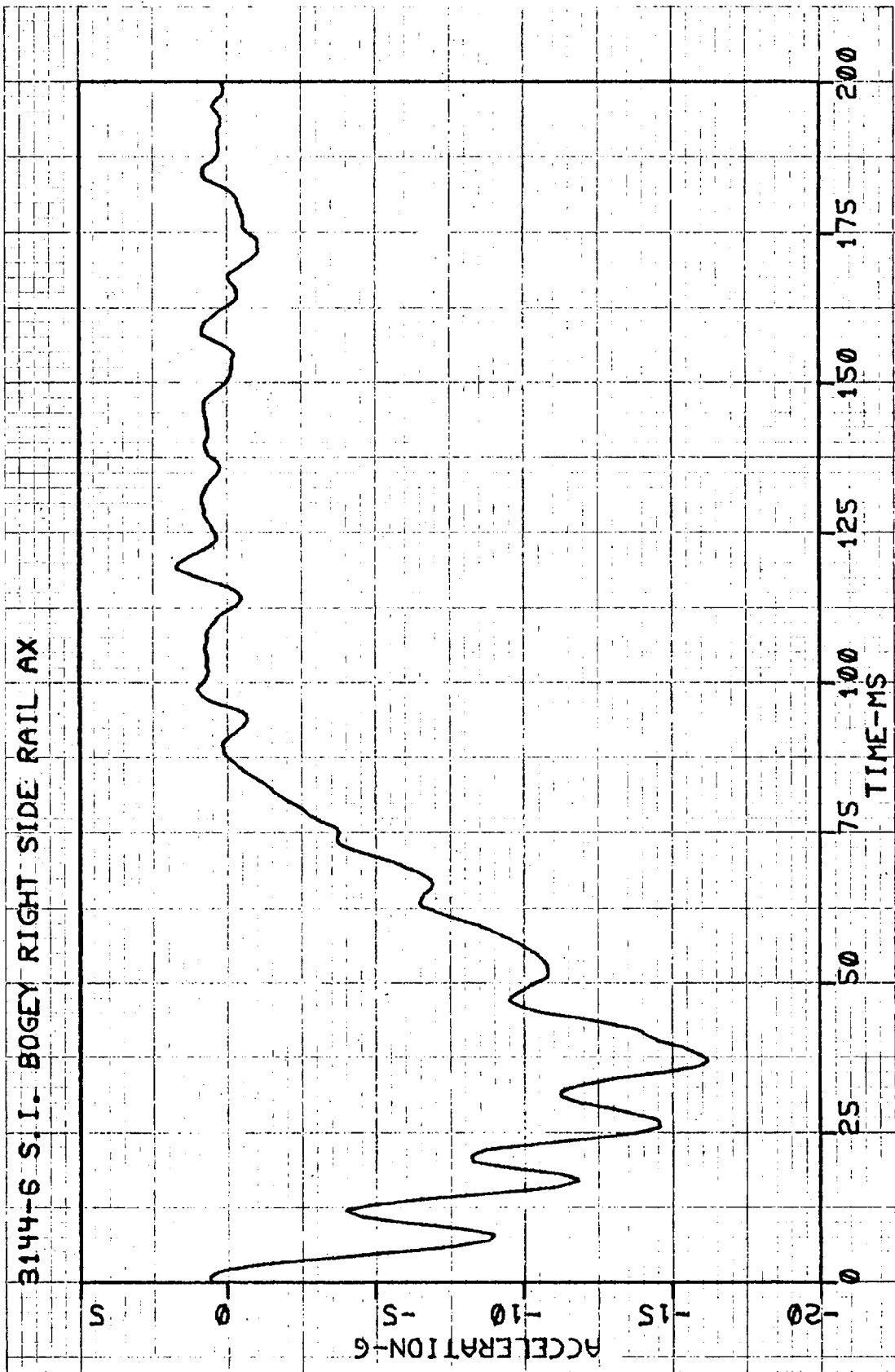


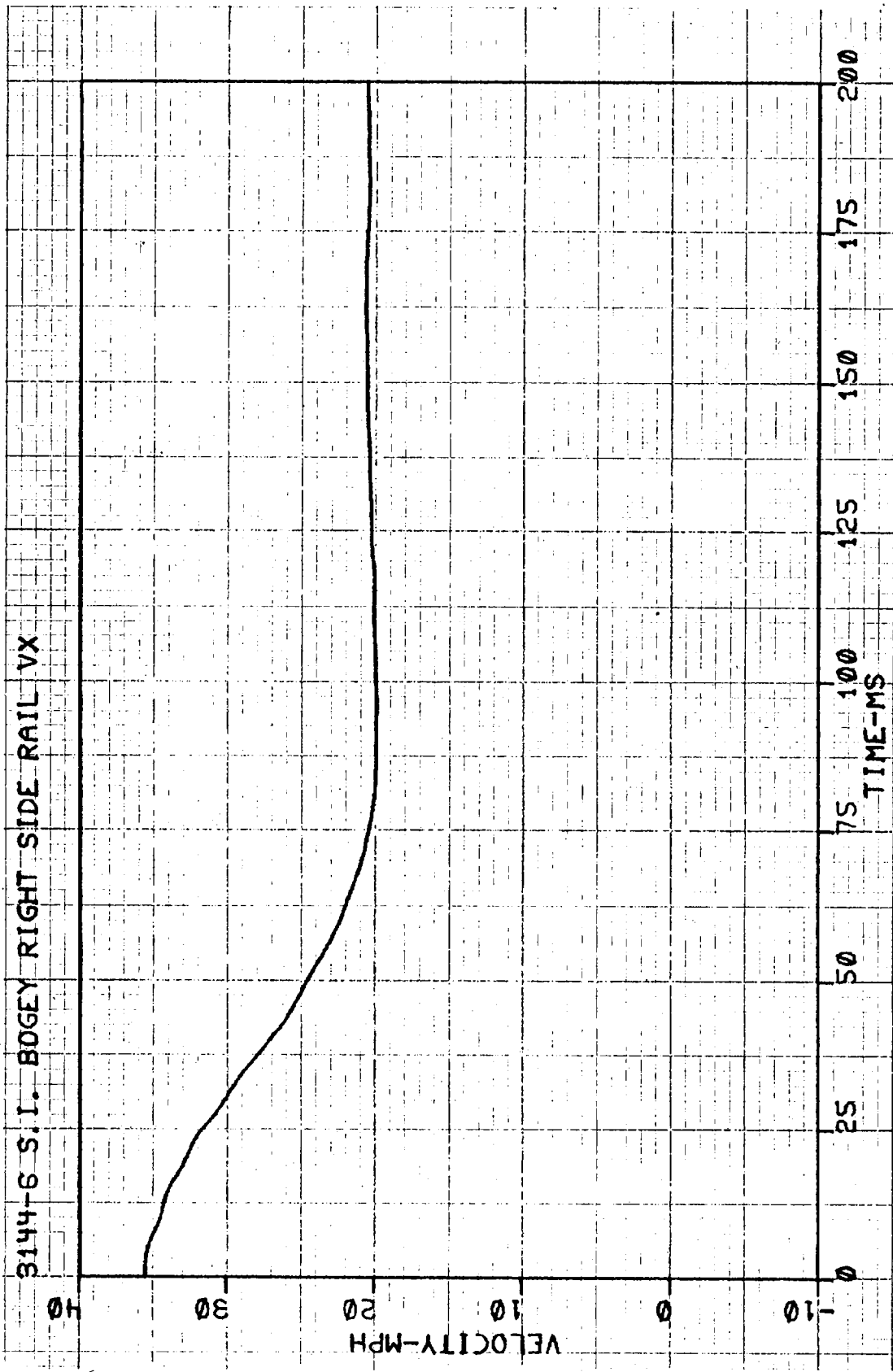




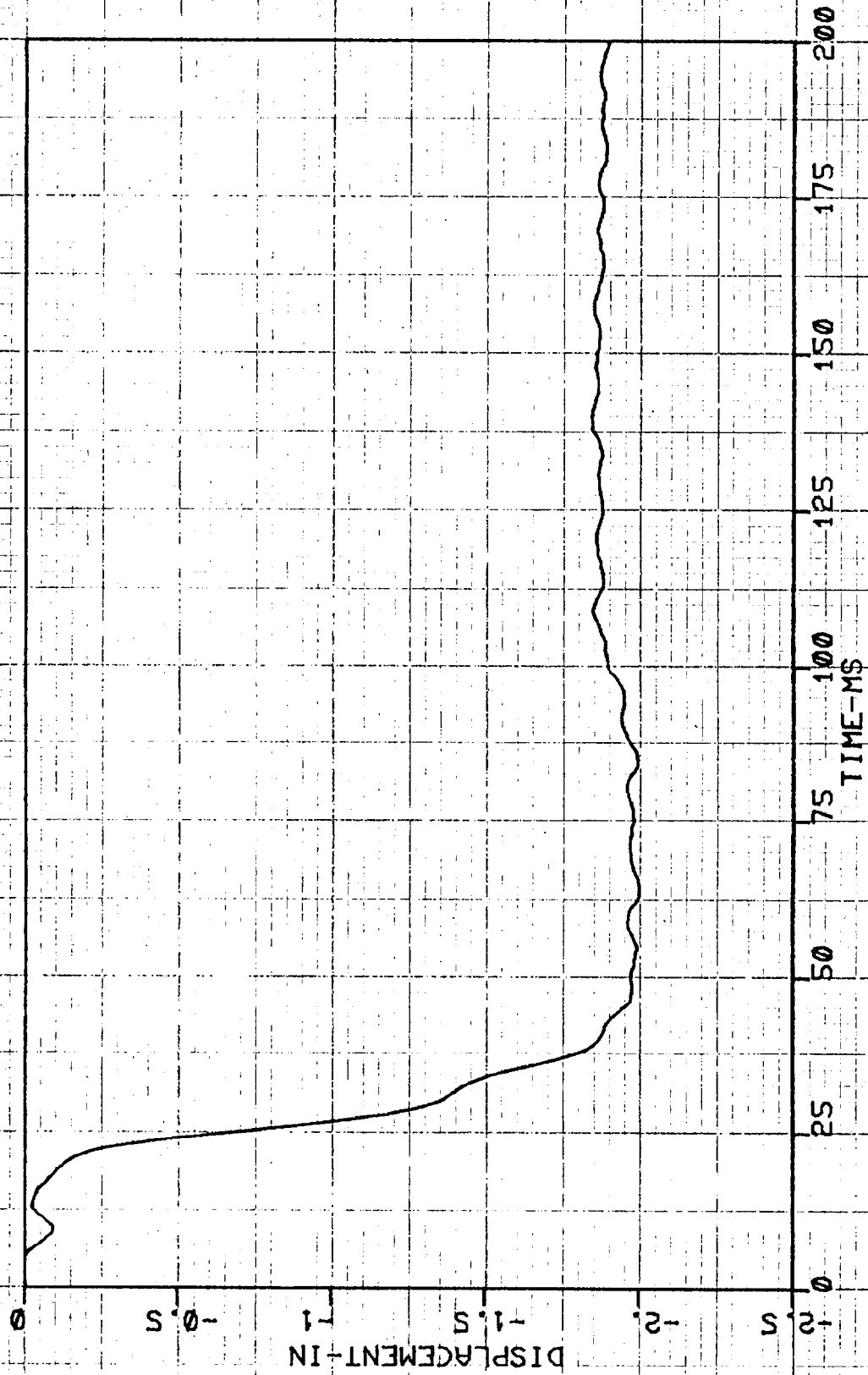
3144-6 S. I. BOGEY LEFT SIDE RAIL Vx



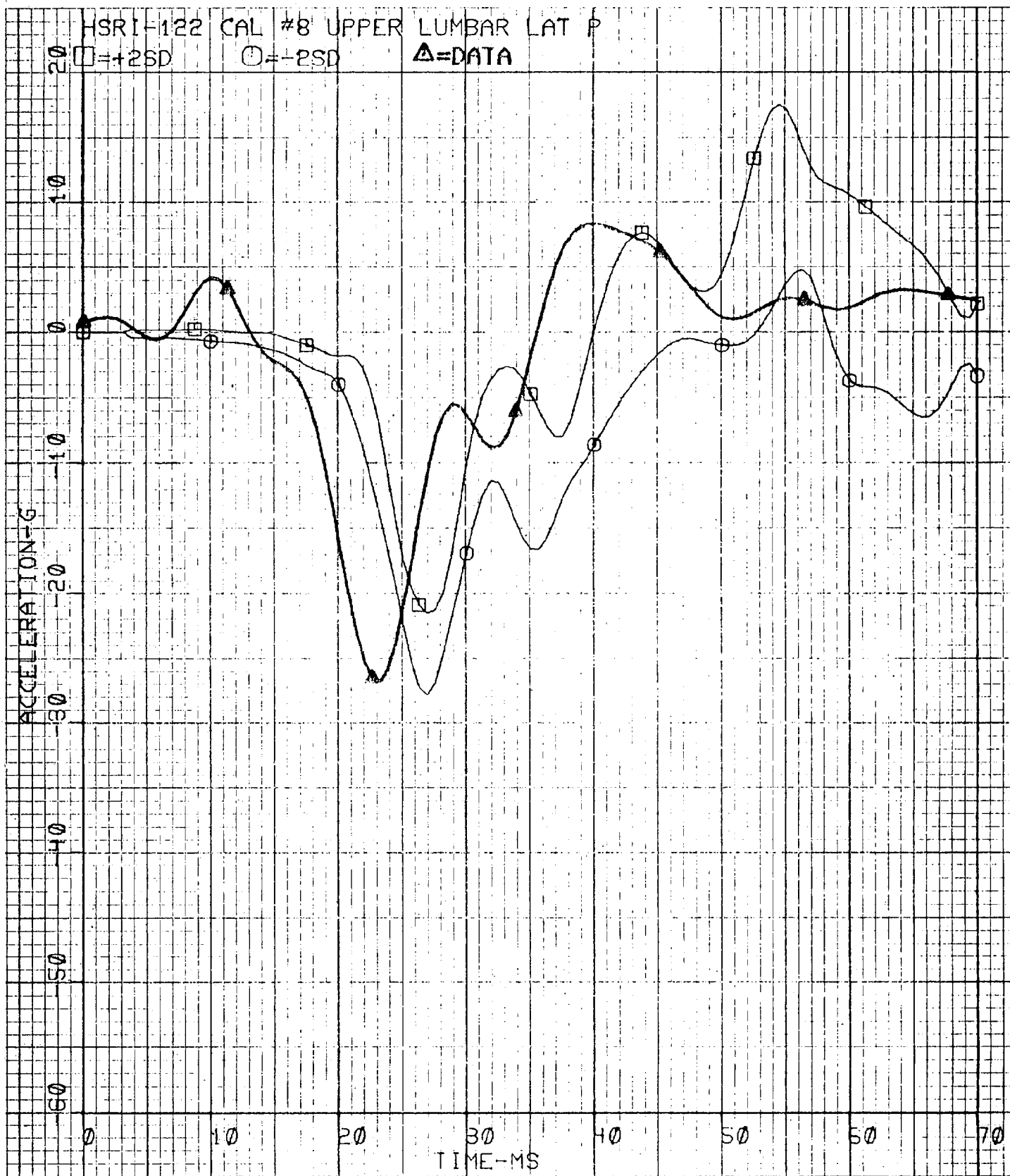


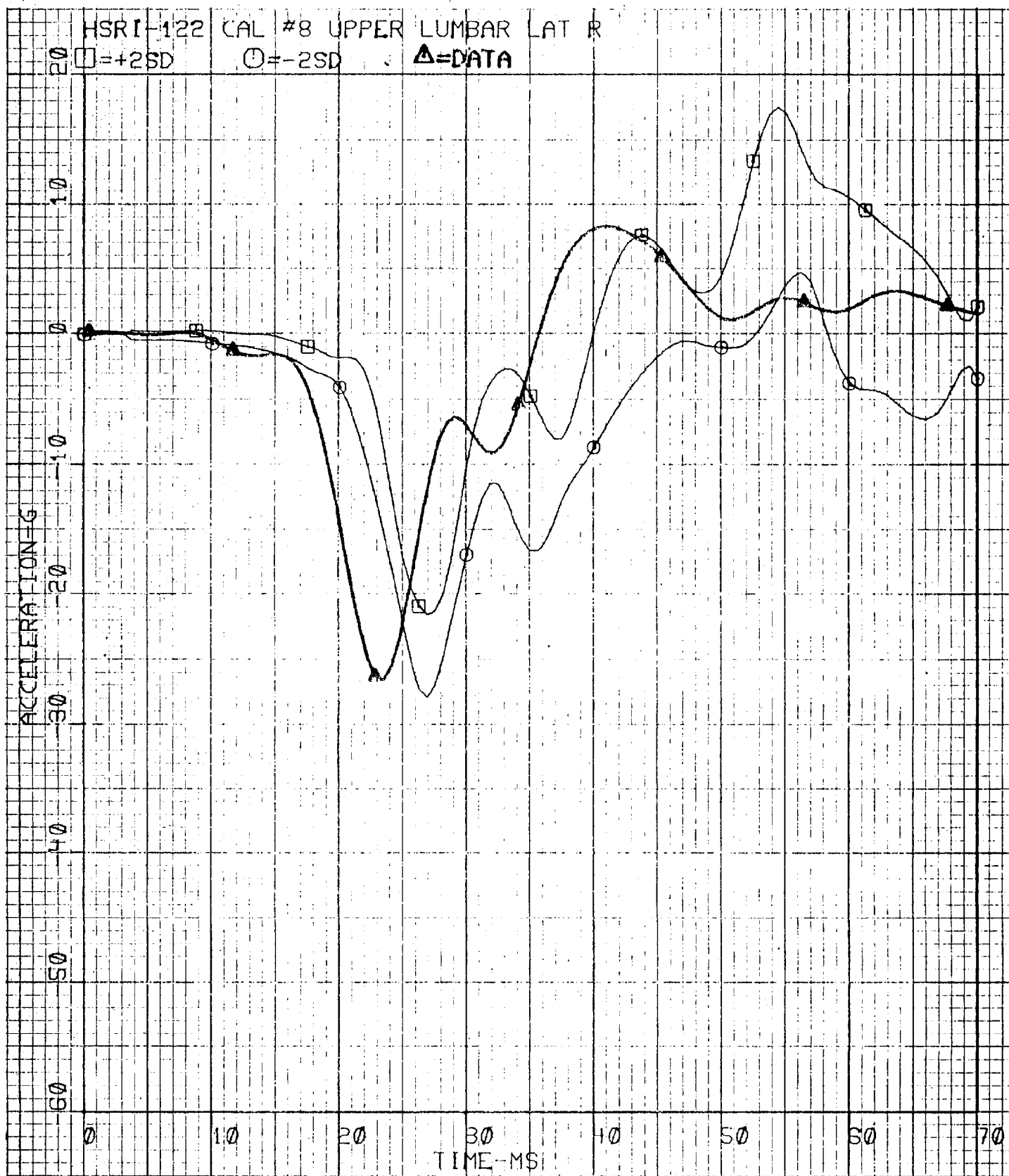


3144-6 S.I. BOGEY DSL-1285 CRUSH

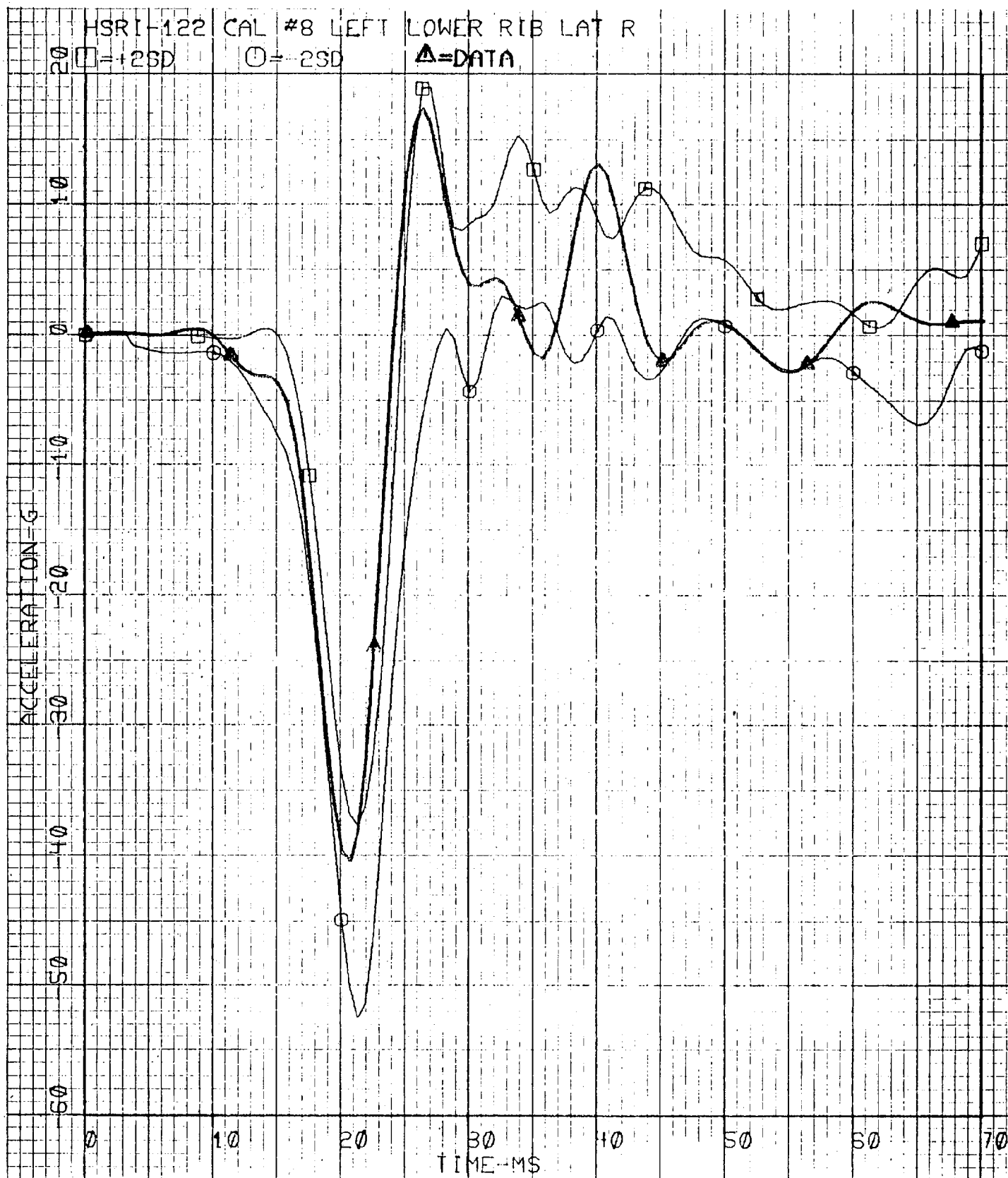


APPENDIX C
DUMMY CALIBRATION DATA
FOR HSRI 122 AND SID 7
19° CRABBED SIDE IMPACTOR TO
1982 VOLKSWAGEN RABBIT
AT 39.6 MPH



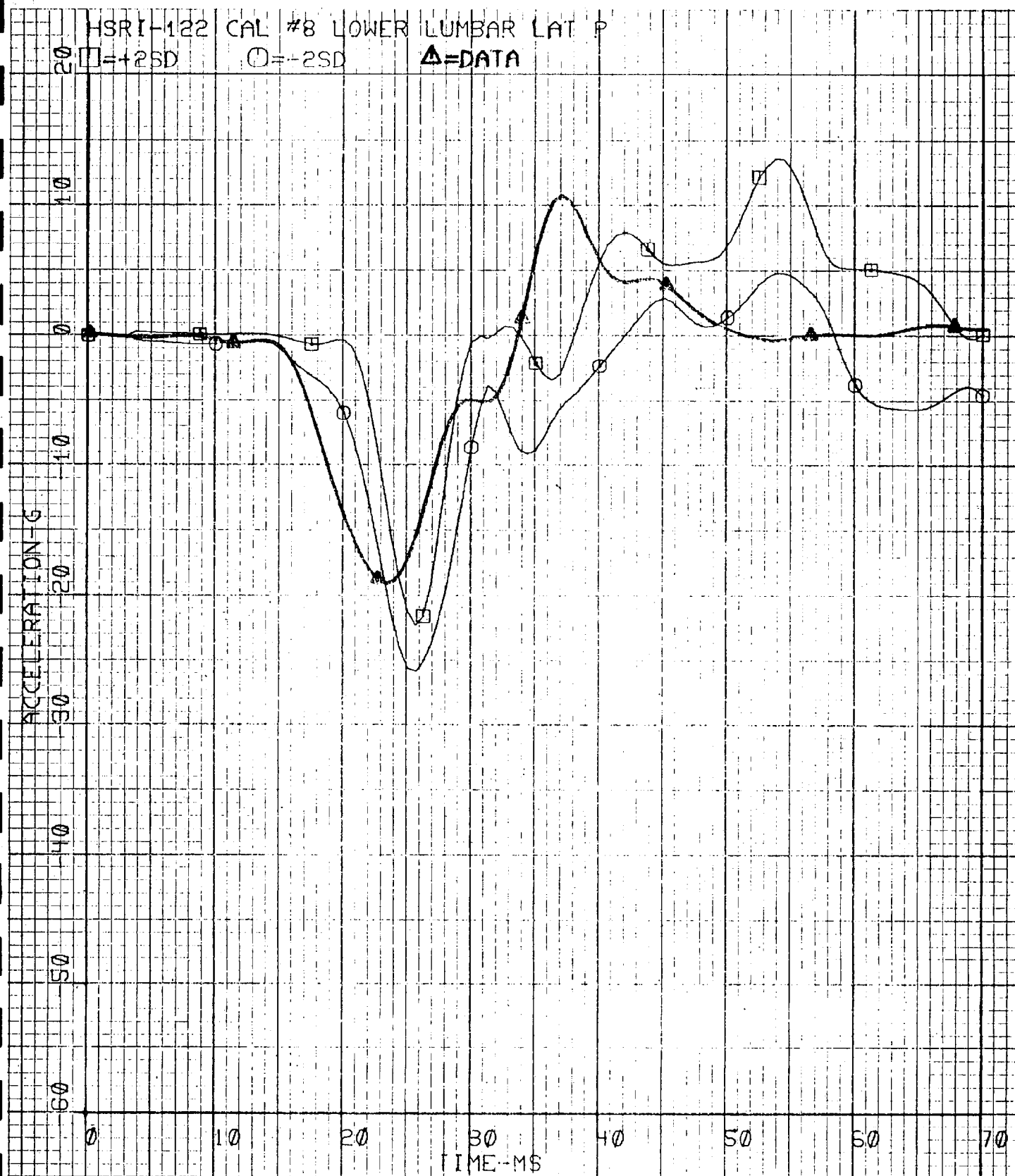












HSRI-122 CAL #8 LOWER LUMBAR LAT R

□=+2SD

○=-2SD

△=DATA

ACCELERATION-G

TIME-MS

