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Report Number to be assigned by NHTSA

FMVSS 212/219/301
ELECTRIC VEHICLE TESTING - GROUP V

Jet Industries Inc.
1981 Electrica 007

Prepared by:

DYNAMIC SCIENCE, INC.
A Talley Industries Company
1850 West Pinnacle Peak Road
Phoenix, Arizona 85027

November 1981

TEST REPORT

Prepared for:

U.S. DEPARTMENT OF TRANSPORTATION
OFFICE OF PASSENGER VEHICLE RESEARCH
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
WASHINGTON, D.C. 20590

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NOTICE

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16. Abstract

This report presents the results of an electric vehicle to load-measuring fixed barrier, head-on crash test. This test was conducted to determine if the vehicle would comply with the windshield retention requirements of the Federal Motor Vehicle Safety Standard (FMVSS) 212, the windshield zone intrusion requirements of FMVSS 219, and the fuel integrity requirements of FMVSS 301-75. The standard fixed barrier was replaced by the 36-cell load-measuring fixed barrier. The electric vehicle, a 1981 Electrica 007, manufactured by Chrysler Corp./Jet Industries Inc., was tested on October 23, 1981 at a speed of 30.52 mph. The 1981 Electrica 007 appears to meet the requirements of FMVSS 212, 219, and 301-75.

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Unclassified	Unclassified	89	

Form DOT F 1700.7 (8-69)

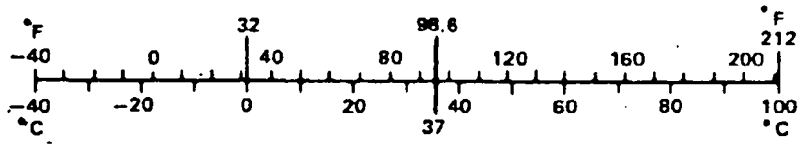
METRIC CONVERSION FACTORS

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 (2000 lb)	0.9	metric ton	t
	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 (10 000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	metric ton (1000 kg)	1.1	short tons	
	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 INTRODUCTION

This report presents the results of an electric vehicle to load-measuring fixed barrier, head-on crash test. This test was conducted to determine if the vehicle would comply with the windshield retention requirements of Federal Motor Vehicle Safety Standard (FMVSS) 212, the windshield zone intrusion requirements of FMVSS 219, and the fuel spillage requirements of FMVSS 301-75. The electric vehicle tested was the 1981 Electrica 007 manufactured by Jet Industries Inc.

Table 1-1 contains a summary of the electric vehicle crash test conditions for Test No. 3126-3.

TABLE 1-1. SUMMARY OF ELECTRIC VEHICLE CRASH TEST CONDITIONS

Test Date	Test Configuration	Vehicle Model/ Dynamic Science Number	Vehicle Weight (lb)	Closing Speed (mph)
10/23/81	Car-to-Load Cell Barrier, Head-on	Electrica 007 DSI 1211	4035	30.52

The load cell barrier face is pictured in Figure 1-1. The barrier consists of a 9 X 4 array of 50 klb load cells each faced with a section of 1-3/4-inch thick plywood. Plywood sections for Rows C and D (upper two rows) each measure ten inches high and nine inches wide. Plywood sections for Rows A and B (lower two rows) each measure nine inches high and nine inches wide. Overall width of the barrier is 83 inches and overall height is 38-3/4 inches. The lower edge of the barrier is 2-5/8 inches above the surface of the ground.

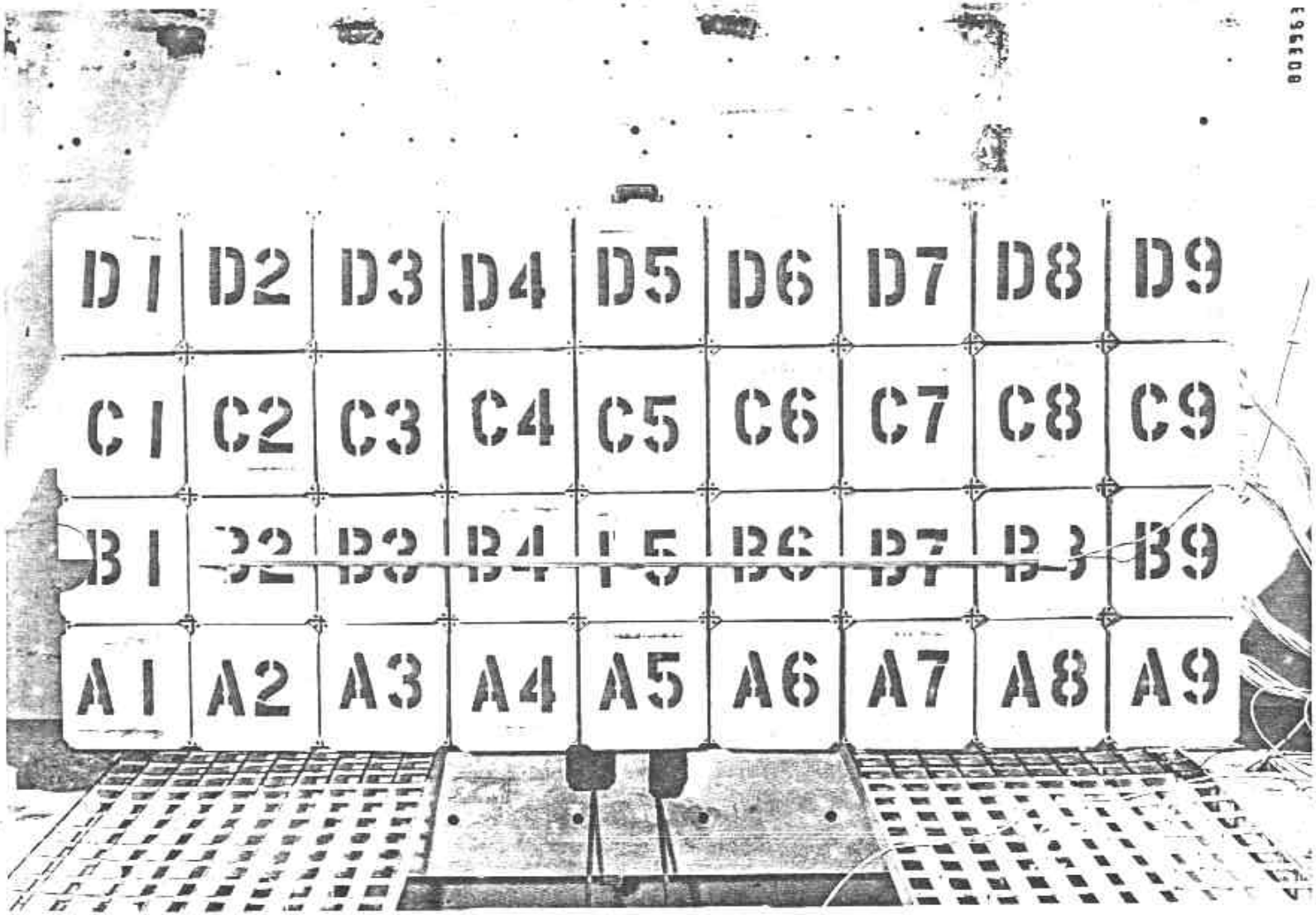


FIGURE 1-1. LOAD CELL BARRIER FACE.

2.0 HIGHLIGHTS OF TEST RESULTS

This section of the report highlights the results of the three compliance tests (FMVSS 212, 219, and 301-75) conducted on the electric vehicle. Paragraphs 2-1 through 2-3 contain general FMVSS test and performance requirements followed by summaries of the Electrica 007 performance. Section 3.0 presents a detailed summary of the structural and dummy performance results obtained.

2.1 FMVSS 212 - WINDSHIELD RETENTION TESTING

FMVSS 212 specifies the following requirements:

> "When the vehicle traveling longitudinally forward at any speed up to and including 30 mph impacts a fixed collision barrier that is perpendicular to the line of travel of the vehicle...the windshield mounting of the vehicle shall... retain not less than 75 percent of the windshield periphery."
>
> (Code of Federal Regulations, Title 49, Section 571.212)

Summary of the Electrica 007 Performance - 212 Test

Although the windshield mounting pulled loose for 22 inches, the windshield was retained over 84 percent of its periphery. The vehicle consequently appears to meet the requirement of FMVSS 212.

2.2 FMVSS 219 - WINDSHIELD ZONE INTRUSION

FMVSS 219 requires that:

> "When the vehicle traveling longitudinally forward at... 30 mph, impacts a fixed collision barrier that is perpendicular to the line of travel of the vehicle...no part of the vehicle outside the occupant compartment, except windshield molding and other components designed to be normally in contact with the windshield, shall penetrate the protected zone template, affixed according to (Standard 219), to depth of

more than one-quarter inch, and no such part of a vehicle shall penetrate the inner surface of that portion of the windshield below the protected zone.."

(Code of Federal Regulations, Title 49, Section 571.219)

Summary of the Electrica 007 Performance - 219 Test

During the frontal barrier crash, there was no intrusion into the windshield protected zone. Therefore, the vehicle appears to meet the requirements of FMVSS 219.

2.3 FMVSS 301 - FRONTAL IMPACT FOR INTEGRITY OF MOTOR VEHICLE FUEL SYSTEMS

FMVSS 301 specifies the following compliance requirements:

"When the vehicle traveling longitudinally forward at...30 mph impacts a fixed collision barrier that is perpendicular to the line of travel of the vehicle...fuel spillage shall not exceed a total of five ounces by weight in the five-minute period following cessation of motion. For the subsequent 25-minute period, fuel spillage during any one-minute interval shall not exceed one ounce by weight."

(Code of Federal Regulations, Title 49, Section 571.301-75)

During the static rollover which follows barrier impact, the following requirements must be met:

"When the vehicle is rotated on its longitudinal axis to each successive increment of 90 degrees...fuel spillage shall not exceed a total of five ounces by weight for the first five minutes of testing at each successive 90-degree increment. For the remaining testing period, at each increment of 90 degrees, fuel spillage during any one-minute interval shall not exceed one ounce by weight."

(Code of Federal Regulations, Title 49, Section 571.301-75)

Summary of the Electrica 007 Performance - 301 Test

The vehicle impacted the barrier at a speed of 30.52 mph.

In the five-minute period following the barrier impact there was no fuel leakage.

When the vehicle was placed in the static rollover fixture and rotated, there was no fuel leakage throughout the test. The vehicle thus appears to meet the requirements of FMVSS 301-75.

2.4 BATTERY SAFETY

During impact the front battery box was shoved rearward into the top of the firewall and cowl. There was considerable battery electrolyte leakage. The box, however, remained intact and the batteries remained in place. There was no leakage into the passenger compartment.

The rear battery box moved forward approximately one inch during impact, the bolts tearing the sheet metal floor pan. All batteries remained in place and there was no leakage at this time.

The front batteries leaked all of their contents during the rollover test, but none of this electrolyte entered the occupant compartment. However, there was massive leakage from the rear batteries into the rear compartment when the vehicle was rotated to 180°. This spillage reached as far as the windshield header area and firewall.

There was intermittent, severe sparking from the front battery box when the vehicle was at the 180° attitude. During the five-to-six minutes required hold time in the 180° position, two holes were burned through the metal lid of the box. The sparking continued intermittently when the vehicle was turned to the 270° position. Severe sparking occurred when the rotation was started toward 360°, and flames were visible from the front battery box. They were readily extinguished with a portable fire extinguisher.

3.0 RESULTS

This section presents all test results without analysis or discussion. Included in this document are: data summary sheets for each Federal Motor Vehicle Safety Standard, summaries of the simulated occupant data including injury criteria values, tabulated pre- and post-test dimensions, and a summary of vehicle accelerometer locations and data. Section 4 contains pre- and post-test dummy and vehicle photographs. High-speed motion pictures were also obtained and have been submitted to NHTSA. Section 5.0 contains Calcomp plots for all vehicle accelerometer data, occupant response data, seat belt loads, and barrier load cell data.

GENERAL TEST AND VEHICLE PARAMETER DATA

PRE-IMPACT DATA

Make/Model: Electrica 007

Body Style: 3-Door Hatchback Model Year: 1981

NHTSA No.: R&D DSI No. 1211 Color: White

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Chrysler Corp./Jet Industries Inc.

Date of Manufacture: 9/80 ; VIN: 1P3BL24A8BD134085

GVWR: 3970 lb; GAWR: Front = 1930 lb; Rear = 2150 lb

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL

Vehicle Capacity:	FRONT	REAR	RECOMMENDED	LOAD RANGE:
Tire Pressure:	45 psi	45 psi	TIRE SIZE: P165/75R13	STD

Designated Seating: 2 Front 2 Rear 4 Total

Cargo load = N/A lb Is Spare Tire: Space Saver? No

TOTAL = 500* lb Standard Equipment? Yes**

Engine: Electric

Transmission: 4-Speed, Manual, front-wheel drive

Date Vehicle Received by Laboratory: 9/14/81 ; Odometer: 845.2

Dealer Name & Address: Jet Industries Inc.
Austin, Texas

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

Right Front = 810 lb Right Rear = 1081 lb

Left Front = 768 lb Left Rear = 1089 lb

TOTAL FRONT WEIGHT = 1578 lb (42.1 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 2170 lb (57.9 % of Total Vehicle Weight)

TOTAL DELV. WEIGHT = 3748 lb

TARGET WEIGHT = UDW + Cargo Load + 328 lbs Dummies = 4076 lb

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 0 lb CARGO:

Right Front = 814 lb Right Rear = 1177 lb

Left Front = 850 lb Left Rear = 1194 lb

TOTAL FRONT WEIGHT = 1664 lb (41.2 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 2371 lb (58.8 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 4035 lb

Weight of ballast secured in vehicle trunk area = 0 lb

VEHICLE ATTITUDE: (inches)

Delivered Attitude:	RF	30.0	LF	30.0	RR	30.0	LR 30.0
Test Attitude:	RF	29.5	LF	29.5	RR	29.3	LR 29.5

REMARKS: Dodge Omni modified by Jet Industries, Inc., 11/80.

*Difference between published curb weight and GVWR.

**Located in rear seat footwell.

GENERAL TEST AND VEHICLE PARAMETER DATA (CONT)

POST-IMPACT DATA

Type of Test: Frontal (0°) Impact

Date of Test: 10/23/81 Time: 1343 Temperature 82 °F

Required Impact Velocity Range: 30.0 to 31.0 mph

Impact Velocity: Primary = 30.52 mph Secondary = 30.50 mph

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.)

		R	℄	L
Vehicle Length:	Pre-test =	170.4	172.0	170.1
	Post-test =	144.0	142.9	141.6
	Crush =	26.4	29.1	28.5
Distance from front of test vehicle to point of impact:		18.5	18.5	17.0

VISIBLE DUMMY CONTACT POINTS

	Driver	Passenger
Head	Steering wheel rim Upper edge of dash	Top of dash
Chest	Steering wheel hub and rim	None
Abdomen	Steering wheel rim	None
Left Knee	Lower dash	Lower dash
Right Knee	Lower dash	Lower dash

DOOR OPENING	Front		Rear	
	Left	Right	Left	Right
	Tools Required	Tools Required	N/A	N/A
SEAT MOVEMENT				
Seatback Failure	None	None	Seat removed before test	
Seat Shift (in.)	None	1" forward		

GLAZING DAMAGE

Backlight/Windshield Windshield shattered over 100% of surface. Severe folding in lower three inches.

OTHER NOTABLE IMPACT EFFECTS: Steering wheel rim bent. Driver seat belt guide broke off. Front floor pan buckled. Both seats inclined downward toward front approximately 10° after test. The firewall and cowl area were pushed rearward. The left front

OTHER NOTABLE IMPACT EFFECTS (Continued):

quarter panel was pushed rearward over the door; the right front quarter panel was pushed under the door. The left sill buckled downward. Both doors were pushed rearward over the latch posts. The sheet metal buckled between the latch post and rear wheel on both sides. Both front wheels were pinned in crushed sheet metal.

SUMMARY OF FMVSS 212 DATA

PRE-IMPACT DATA

Make/Model: Electrica 007
Body Style: 3-Door Hatchback Model Year: 1981
NHTSA No. R&D DSI No. 1211 Color: White

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Chrysler Corp/Jet Industries, Inc.
Date of Manufacture: 9/80 ; VIN 1P3BL24A8BD134085
GVWR: 3970 lb; GAWR: Front = 1930 lb; Rear 2150 lb

POST-IMPACT DATA

Type of Test: Frontal (0°) Impact
Date of Test: 10/23/81 Time: 1343 Temperature 82 °F
Required Impact Velocity Range: 30.0 to 31.0 mph
Impact Velocity: Primary = 30.52 mph Secondary = 30.50 mph
Test weight: 4035 lb Static crush: 29.1 in.
Rebound distance: 18.5 in.

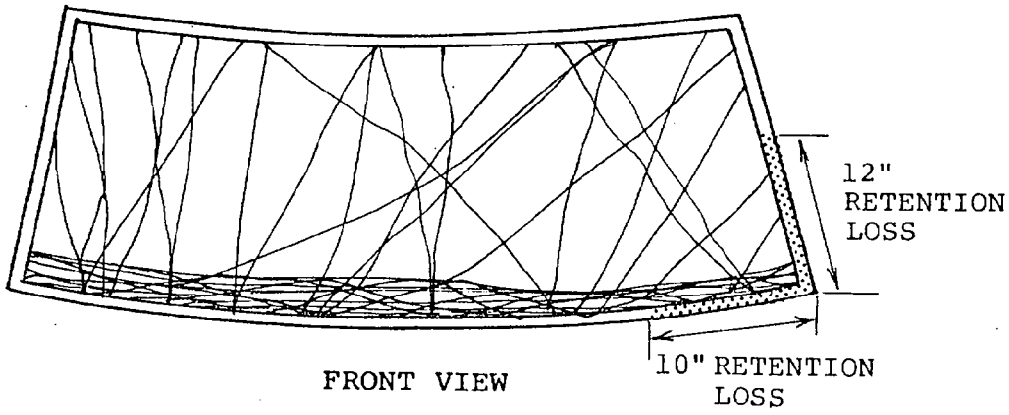
DETAILS OF WINDSHIELD MOUNTING: Windshield is bonded around entire periphery with one-inch wide mastic. The periphery is overlaid by one-inch wide metal trim. No retainer clips are visible.

	WINDSHIELD PERIPHERY	
	Pre-test	Post-test
RIGHT SIDE	69.4	47.4
LEFT SIDE	69.4	69.4
TOTAL	138.8	116.8

The standard requires that POST-TEST be a minimum of 75 percent of the PRE-TEST total periphery measurement for vehicles not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles which are equipped with occupant passive restraints.

SUMMARY OF FMVSS 212 DATA (CONTD)

AREA OF RETENTION FAILURE: Lower 12 inches of left side, left lower corner, and 10 inches of bottom at extreme left side. Severe folding in lower three inches for entire length.



FRONT VIEW

SUMMARY OF FMVSS 219 DATA

PRE-IMPACT DATA

Make/Model: Electrica 007

Body Style: 3-Door Hatchback Model Year: 1981

NHTSA No. R&D DSI No. 1211 Color: White

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Chrysler Corp./Jet Industries Inc.

Date of Manufacture: 9/80 ; VIN 1P3BL24A8BD134085

GVWR: 3970 lb; GAWR: Front = 1930 lb; Rear 2150 lb

POST-IMPACT DATA

Type of Test: Frontal (0°) Impact

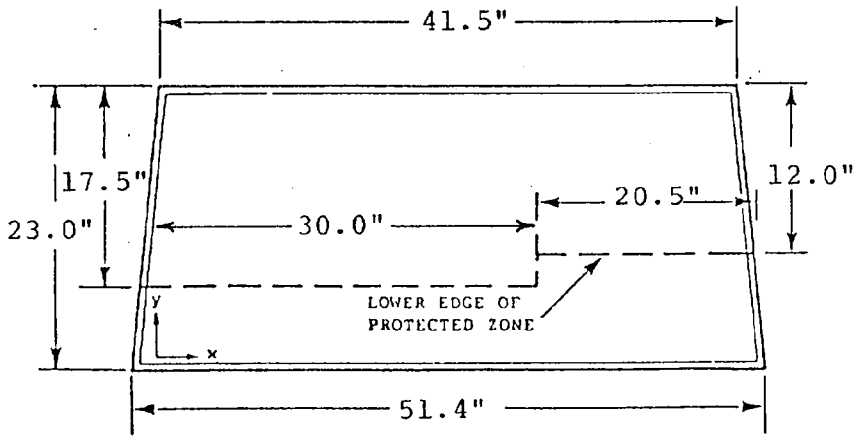
Date of Test: 10/23/81 Time: 1343 Temperature 82 °F

Required Impact Velocity Range: 30.0 to 31.0 mph

Impact Velocity: Primary = 30.52 mph Secondary = 30.50 mph

Test weight: 4035 lb Static crush: 29.1 in.

Rebound distance: 18.5 in.



FRONT VIEW OF WINDSHIELD

A. The area that the "Protected Zone" template was penetrated more than 0.25 inch by a vehicle component other than one which is normally in contact with the windshield.

Coordinates

X	Y
N/A	N/A

B. The area beneath the "Protected Zone" that the inner surface of the windshield was penetrated by a vehicle component.

Coordinates

X	Y
N/A	N/A

PRE-IMPACT DATA

Make/Model: Electrica 007
Body Style: 3-Door Hatchback Model Year: 1981
NHTSA No.: R&D DSI No. 1211 Color: White

DATA FROM CERTIFICATION LABEL

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Type of Test: Frontal (0°) Impact
Date of Test: 10/23/81 Time: 1343 Temperature 82 °F
Required Impact Velocity Range: 30.0 to 31.0 mph
Impact Velocity: Primary = 30.52 mph Secondary = 30.50 mph
Test Weight 4035 lb Static Crush 29.1 in. Rebound 18.5 in.

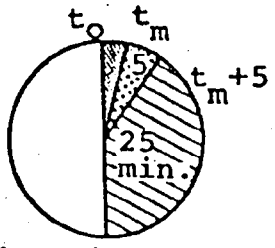
FUEL SYSTEM DATA

Test fluid: Red Stoddard Solvent Specific Gravity: 0.764
Temperature: 70 °F
Kinematic Viscosity: 0.99 centistokes Test Volume: 1.6 U.S. gal

Test vehicle fuel tank filled to 93% of "usable" plus "unusable" capacity with Stoddard Solvent and with electric fuel pump operating (if it will operate without engine operation) until start of static roll.

Details of fuel system: The 2.5-gallon rectangular metal fuel tank is bolted under the center floor pan in front of the rear axle. Filler cap is located in right rear quarter panel just aft of the axle centerline. Metal fill pipe runs through wheel well and under car to right side of fuel tank. Fuel line exits front of tank and runs up center tunnel to engine compartment firewall and heater.

FUEL SPILLAGE MEASUREMENT



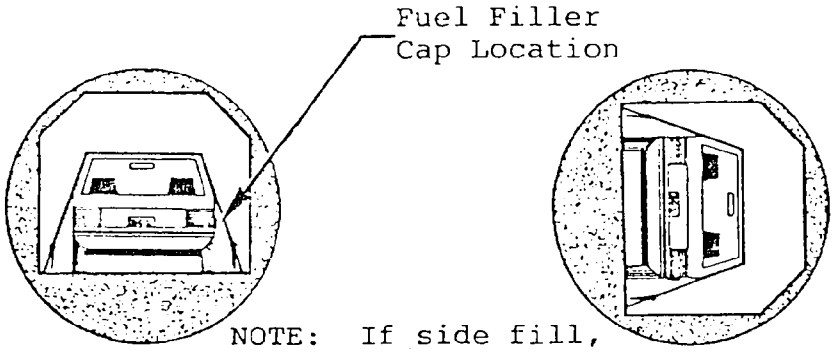
$(t_m+5) + 25$

		ACTUAL	MAXIMUM ALLOWABLE
1.	From impact until vehicle motion ceases. . . .	0	1 oz
2.	For 5-minute period after vehicle motion ceases	0	5 oz
3.	For next 25 minutes. . .	0	1 oz/1 min

SOLVENT SPILLAGE DETAILS: None

FMVSS 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE: 0° to 90° VEHICLE: Electrica 007



NOTE: If side fill, rotate so that filler cap is down.

DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time . . = 1 min, 34 sec +
(Spec. Range = 1 to 3 minute)

FMVSS 301 Position Hold Time . . . . . = 5 min, 26 sec =

Total . . . . . = 7 min, 0 sec

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

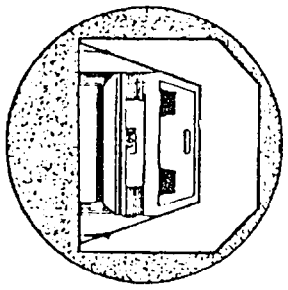
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	0	0	0	---

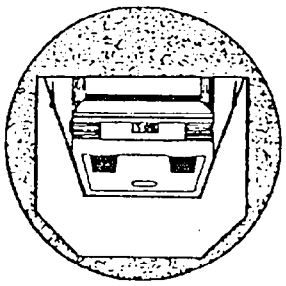
NOTE: Spillage is recorded in whole minute intervals only - as determined above.

SOLVENT SPILLAGE LOCATION(S): None. Electrolyte leakage from front battery compartment, but none into passenger compartment.

FMVSS 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE: **90°** to **180°** VEHICLE: Electrica 007





DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time . . = 1 min, 38 sec +
(Spec. Range = 1 to 3 minute)

FMVSS 301 Position Hold Time . . . . . = 5 min, 22 sec =

Total . . . . . = 7 min, 0 sec

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

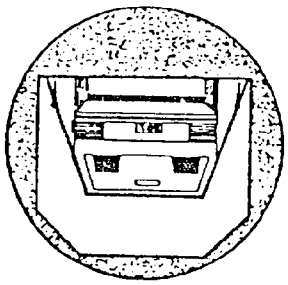
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	0	0	0	---

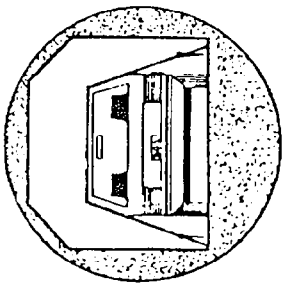
NOTE: Spillage is recorded in whole minute intervals only - as determined above.

SOLVENT SPILLAGE LOCATION(S): None. Massive electrolyte leakage from front battery compartment, did not spill into passenger compartment. Massive leakage from rear batteries into passenger compartment.

FMVSS 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE: 180° to 270° VEHICLE: Electrica 007





DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time . . = 1 min, 36 sec +
(Spec. Range = 1 to 3 minute)

FMVSS 301 Position Hold Time . . . . . = 5 min, 24 sec =

Total . . . . . = 7 min, 0 sec

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

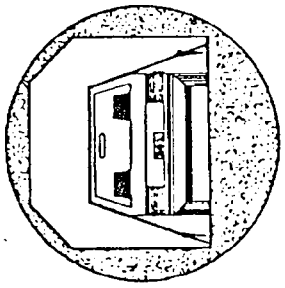
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	0	0	0	---

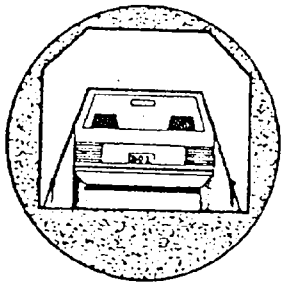
NOTE: Spillage is recorded in whole minute intervals only - as determined above.

SOLVENT SPILLAGE LOCATION(S): None. Minor sustained electrolyte leakage from rear batteries into passenger compartment.

FMVSS 301-75 STATIC ROLLOVER DATA SHEET

TEST PHASE: 270° to 360° VEHICLE: Electrica 007





DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time . . = 1 min, 38 sec +
(Spec. Range = 1 to 3 minute)

FMVSS 301 Position Hold Time . . . . . = 5 min, 22 sec =

Total . . . . . = 7 min, 0 sec

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	0	0	0	---

NOTE: Spillage is recorded in whole minute intervals only - as determined above.

SOLVENT SPILLAGE LOCATION(S): None.

PART 572 DUMMY IN-VEHICLE POSITION RECORDING SHEET

PRE-IMPACT DATA

Make/Model: Electrica 007

Body Style: 3-Door Hatchback Model Year: 1981

NHTSA No. R&D DSI No. 1211 Color: White

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Chrysler Corp./Jet Industries Inc.

Date of Manufacture: 9/80 ; VIN 1P3BL24A8BD134085

GVWR: 3970 lb; GAWR: Front = 1930 lb; Rear 2150 lb

POST-IMPACT DATA

Type of Test: Frontal (0°) Impact

Date of Test: 10/23/81 Time: 1343 Temperature 82 °F

Required Impact Velocity Range: 30.0 to 31.0 mph

Impact Velocity: Primary = 30.52 mph Secondary = 30.50 mph

Seat Type: Bucket Adjuster Type: Manual

Bucket Seat Back Type: Fixed

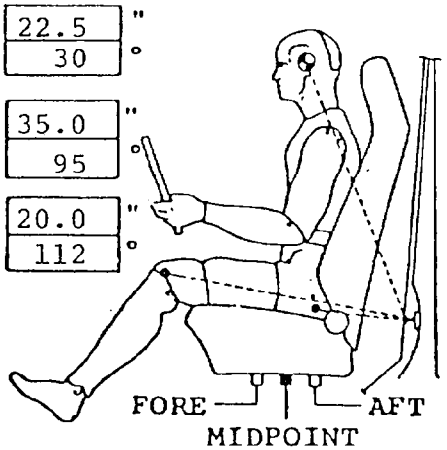
Technicians: N. Johnson, M. Rodack

DRIVER DUMMY# A 0 8

HEAD TARGET 22.5 " 30 °

KNEE JOINT 35.0 " 95 °

APPROX-IMATE "H" POINT 20.0 " 112 °

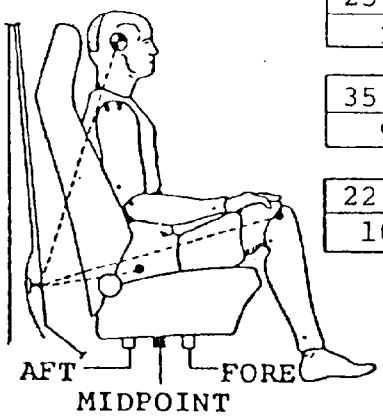


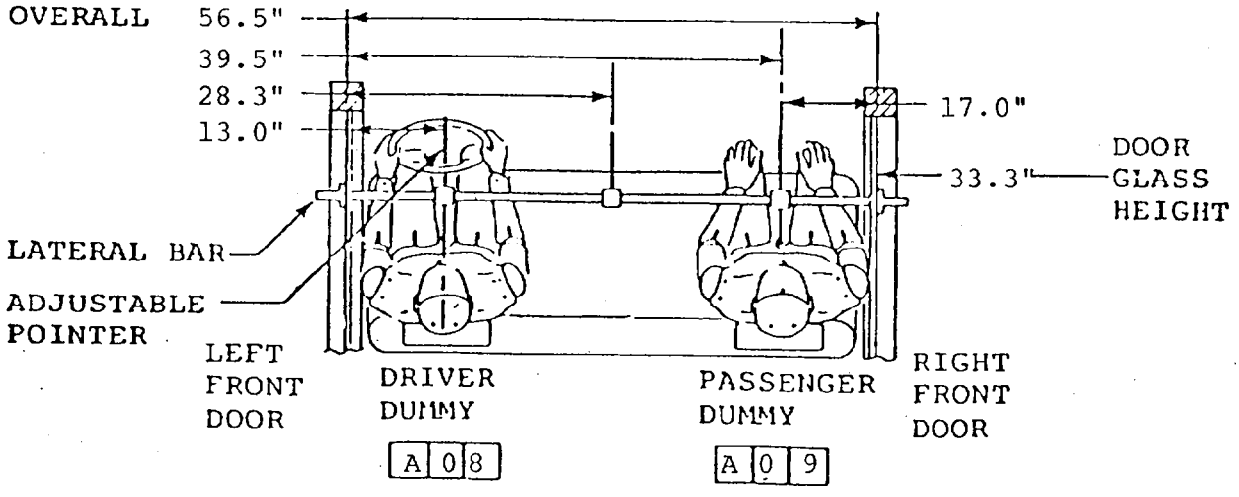
PASSENGER DUMMY # A 0 9

25.0 " 34 ° HEAD TARGET

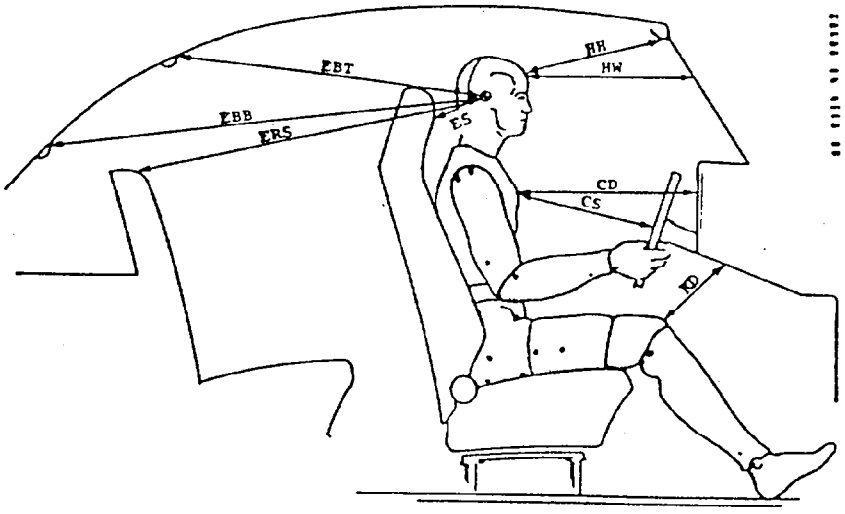
35.3 " 94 ° KNEE JOINT

22.3 " 108 ° APPROX-IMATE "H" POINT





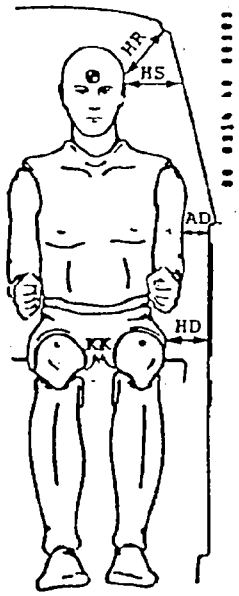
PART 572 DUMMY IN-VEHICLE POSITION RECORDING SHEET - STRUCK VEHICLE (CONTD)



	Driver	Passenger
HH	12.3	11.5
HW	18.0	18.5
CD	20.5	23.0
CS	18.0	N/A
KD	L-8.0 R-8.0	L-8.0 R-8.0
ES	N/A	N/A
EBT	N/A	N/A
EBB	N/A	N/A
ERS	N/A	N/A
Torso Angle	21 °	Torso Angle 25°
Seat Back Angle	27 °	Seat Back Angle 25°

HH = Head to Windshield Header
HW = Head to Windshield
CD = Chest to Dash
CS = Chest to Steering Wheel
KD = Knees to Dash
ES = Ear to Seat Back
EBT = Ear to Backlight Top
EBB = Ear to Backlight Bottom
ERS = Ear to Rear Seat Back
HR = Head to Side Roof
HS = Head to Side Window
AD = Arm to Door
HD = Hip to Door
KK = Knee to Knee
Torso and seat back angles are relative to vertical.

REMARKS: Dummies positioned according to OVSC recommended procedure for positioning Part 572 dummies in test vehicle.



	Driver	Passenger
HR	5.5	6.8
HS	9.8	10.3
AD	3.5	5.0
HD	6.3	6.5
KK	10.0	10.0
AA	11.0	11.0

FMVSS 208 DUMMY DATA SUMMARY

	Driver Dummy				Passenger Dummy			
	Positive Direction*		Negative Direction**		Positive Direction*		Negative Direction**	
	Peak (G)	Time (msec)	Peak (G)	Time (msec)	Peak (G)	Time (msec)	Peak (G)	Time (msec)
Head Acceleration								
Longitudinal	9.8	43	90.0	107	6.7	51	78.5	107
Lateral	11.1	100	61.4	119	50.4	113	7.2	140
Vertical	87.0	98	14.4	128	52.4	107	12.0	138
Resultant	127.2	98			102.3	107		
HIC	965.8 between 93 and 114 msec†				670.3 between 105 and 117 msec			
Chest Acceleration								
Longitudinal	7.6	130	56.4	73	1.0	149	31.5	116
Lateral	11.2	82	10.7	97	34.8	117	8.3	89
Vertical	15.5	58	24.5	120	6.9	89	3.8	116
Resultant (Max.)	57.4	73			45.8	117		
Resultant (clip)	43.3	71			40.7	115		
TIME > 60 G	0 msec				0 msec			
SEVERITY INDEX	301.6 @ 200 msec				198.0 @ 200 msec			
	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)
Femur Loads								
Left	225.5	58	1372.4	86	248.2	46	806.6	81
Right	233.5	58	1775.6	85	208.1	61	1019.4	77
Belt Loads								
Lap	Not Monitored				1060.6	64	18.0	113
Torso	Not Monitored				839.5	81	5.1	.22

Vehicle Impact Speed (mph): 30.52

*Longitudinal: Forward
Lateral: Rightward
Vertical: Downward

**Longitudinal: Rearward
Lateral: Leftward
Vertical: Upward

†See film analysis of dummy kinematics, page 3-17.

DUMMY KINEMATIC SUMMARY

DRIVER - The steering wheel began moving rearward approximately 50 msec after impact. Ten msec later the entire dash could be seen moving rearward. The steering wheel contacted the driver dummy's chest as the dummy was still moving straight forward. The steering wheel rim passed under the dummy's chin and struck the throat. The dummy's head then flexed downward over the rim, which was still in contact with its throat. The dash panel was pushed into the top of the dummy's head while it was flexed over the steering wheel rim. (The steering wheel did not move upward - the dummy moved downward as the left sill buckled.) Dummy rebound was limited by being trapped between the steering wheel and the seat.

PASSENGER - The passenger dummy moved straight forward. The dash was pushed rearward as the dummy's torso began to flex downward and the dummy hit the top of the dash with its forehead. The dummy rebounded straight back into its seat.

OTHER COMMENTS - The vehicle buckled downward near the front seat front crossmember, resulting in the entire front compartment floor pan being tipped downward toward the front of the vehicle. Post-test measurements showed that both front seats were tipped downward 10 degrees.

The front of the driver's seat had to be unbolted from the floor and the seat forced backward to remove the driver dummy. The steering wheel had been forced rearward more than 12 inches during the crash.

VEHICLE PROFILE DATA SHEET

PRE-IMPACT DATA

Make/Model: Electrica 007
Body Style: 3-Door Hatchback Model Year: 1981
NHTSA No.: R&D DSI No. 1211 Color: White

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Chrysler Corp./Jet Industries Inc.
Date of Manufacture: 9/80 ; VIN: 1P3BL24A8BD134085
GVWR: 3970 lb; GAWR: Front = 1930 lb; Rear = 2150 lb

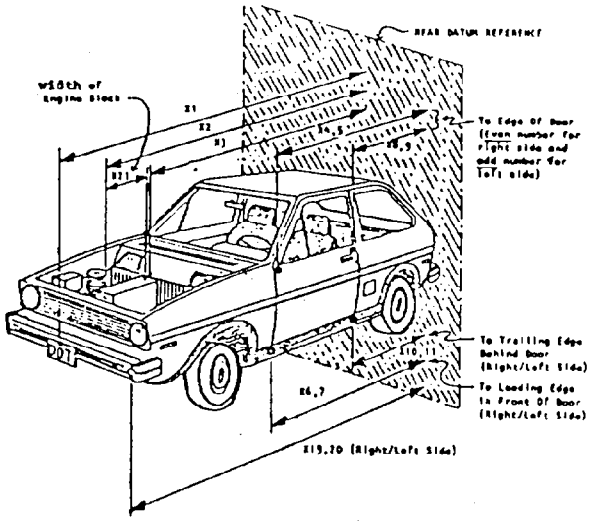
POST-IMPACT DATA

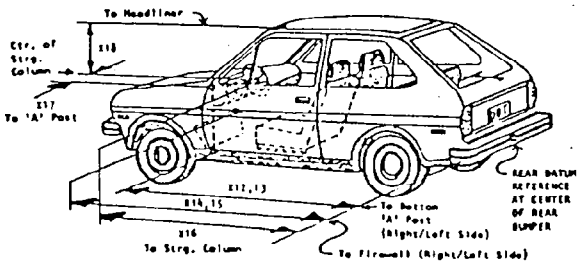
Type of Test: Front (0°) Impact
Date of Test: 10/23/81 Time: 1343 Temperature 82 °F
Required Impact Velocity Range: 30.0 to 31.0 mph
Impact Velocity: Primary = 30.52 mph Secondary = 30.50 mph

Measurements Referenced to Plane 15 Feet Forward of Rear Bumper ℄

Location	Height	Vehicle Left (in.)					Vehicle Right (in.)			
		28	24	16	8	℄	8	16	24	28
Pre-test Profile (in.)										
Top of Front Bumper	21.3	9.9	9.5	8.9	8.4	8.1	8.4	8.8	9.4	9.6
Front of Hood	30.5	-	19.0	18.9	18.8	18.4	18.5	18.8	18.6	-
Post-test Profile (in.)										
Top of Front Bumper	18.5	38.4	39.1	39.0	38.0	37.4	37.0	36.4	36.0	36.0
Front of Hood	29.5	-	43.4	42.4	42.3	40.6	40.9	40.3	40.8	-
Post-test Static Crush (in.)										
Top of Front Bumper	2.8	28.5	29.6	30.1	29.6	29.3	28.6	27.6	26.6	26.4
Front of Hood	1.0	-	24.4	23.5	23.5	22.2	22.4	21.5	43.7	-

PRE-/POST-TEST STATIC MEASUREMENT DATA



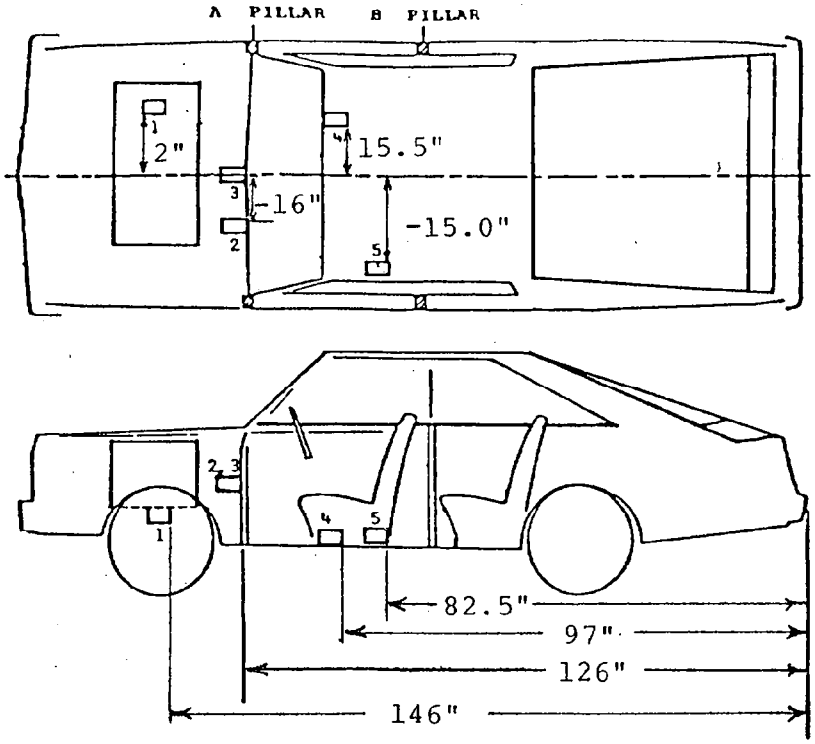


Vehicle: Electrica 007 NHTSA No.: R&D

Test Date: 10/23/81 D.S. No.: 1211

Reference Dimension	Pre-test Measurement	Post-test Measurement	Change
X_1	172.0	142.9	29.1
X_2	148.5	134.5	14.0
X_3	127.8	114.0	13.8
X_4	111.2	107.8	3.4
X_5	110.6	106.8	3.8
X_6	114.2	110.0	4.2
X_7	113.6	110.0	3.6
X_8	66.6	64.0	2.6
X_9	66.4	64.3	2.1
X_{10}	65.9	61.8	4.1
X_{11}	65.6	62.3	3.3
X_{12}	114.6	111.0	3.6
X_{13}	114.1	109.5	4.6
X_{14}	127.3	117.5	9.8
X_{15}	126.1	112.8	13.3
X_{16}	101.2	88.6	12.6
Y_{17}	13.0	13.0	0.0
Z_{18}	17.0	22.0	5.0
X_{19}	170.4	144.0	26.4
X_{20}	170.1	141.6	28.5
X_{21}	8.5	8.5	0.0

VEHICLE ACCELEROMETER LOCATIONS AND SUMMARY



No.	Location Description	Component Direction* X	Y	Z	Data Summary Peak G @ msec X "+"	X "−"	Y "+"	Y "−"	Z "+"	Z "−"
1	Engine (Underside)	✓		✓	63.0 51	106.0 44			26.2 71	19.3 50
2	Firewall (Above Steering Column)	✓		✓	6.7 92	59.2 46			43.8 47	28.4 26
3	Firewall (At Vehicle ℄	✓		✓	74.4 51	124.4 46			32.0 44	38.2 40
4	Front Seat Front Crossmember	✓			13.8 169	30.8 73			-	-
5	Front Seat Rear Crossmember	✓		✓	15.7 50	34.8 90			27.4 12	22.4 26

*Positive: X = Forward Y = Rightward Z = Downward
Negative: X = Rearward Y = Leftward Z = Upward

4.0 PHOTOGRAPHIC COVERAGE

This section consists of pre-test and post-test photographs of the overall vehicle, windshield, fuel system, and occupants.

FIGURE 4-1. PRE-TEST FRONT VIEW - 1981 ELECTRICA 007.

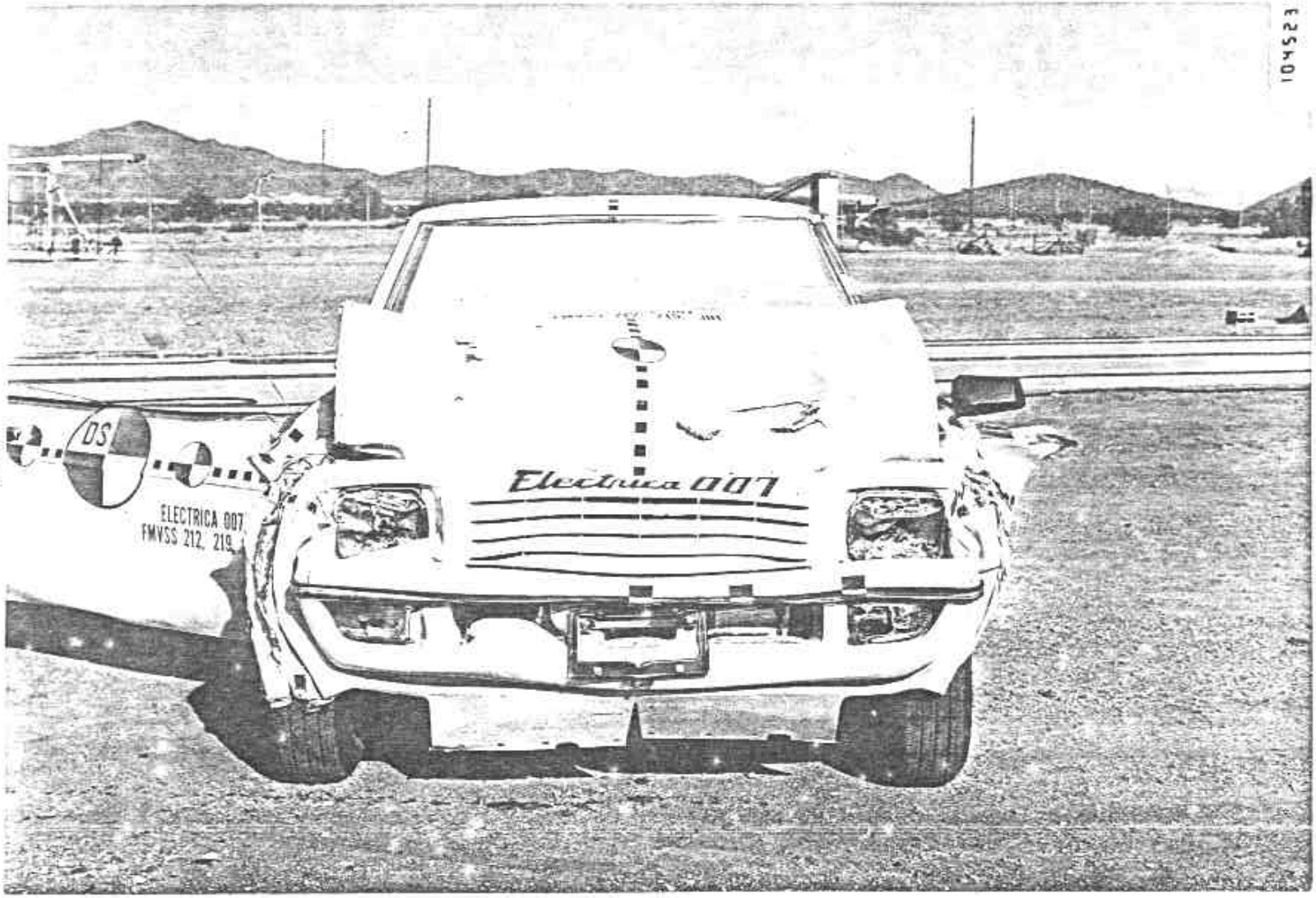


FIGURE 4-2. POST-TEST FRONT VIEW - 1981 ELECTRICA 007.

FIGURE 4-3. PRE-TEST SIDE VIEW - 1981 ELECTRICA 007.

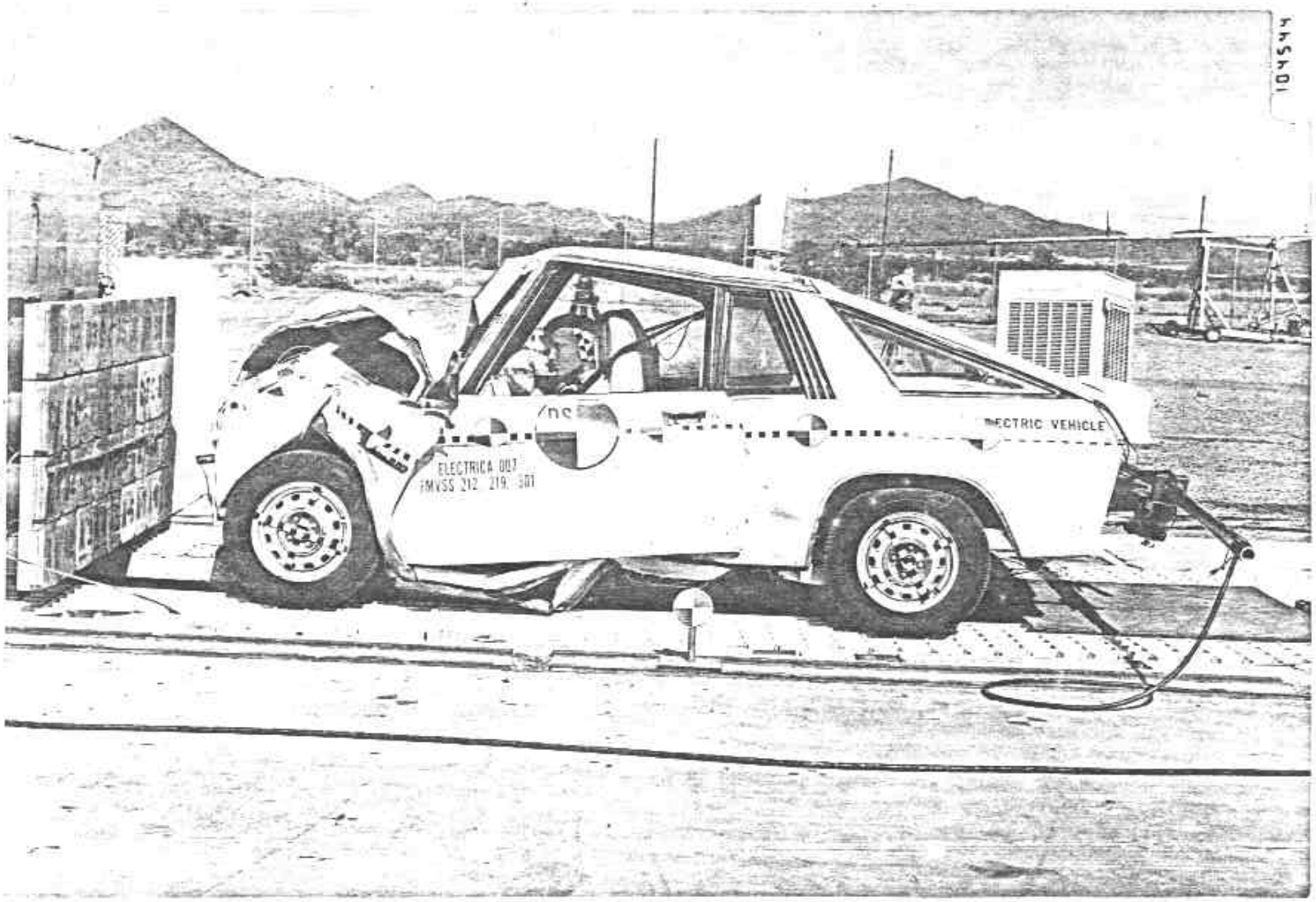


FIGURE 4-4. POST-TEST SIDE VIEW - 1981 ELECTRICA 007.

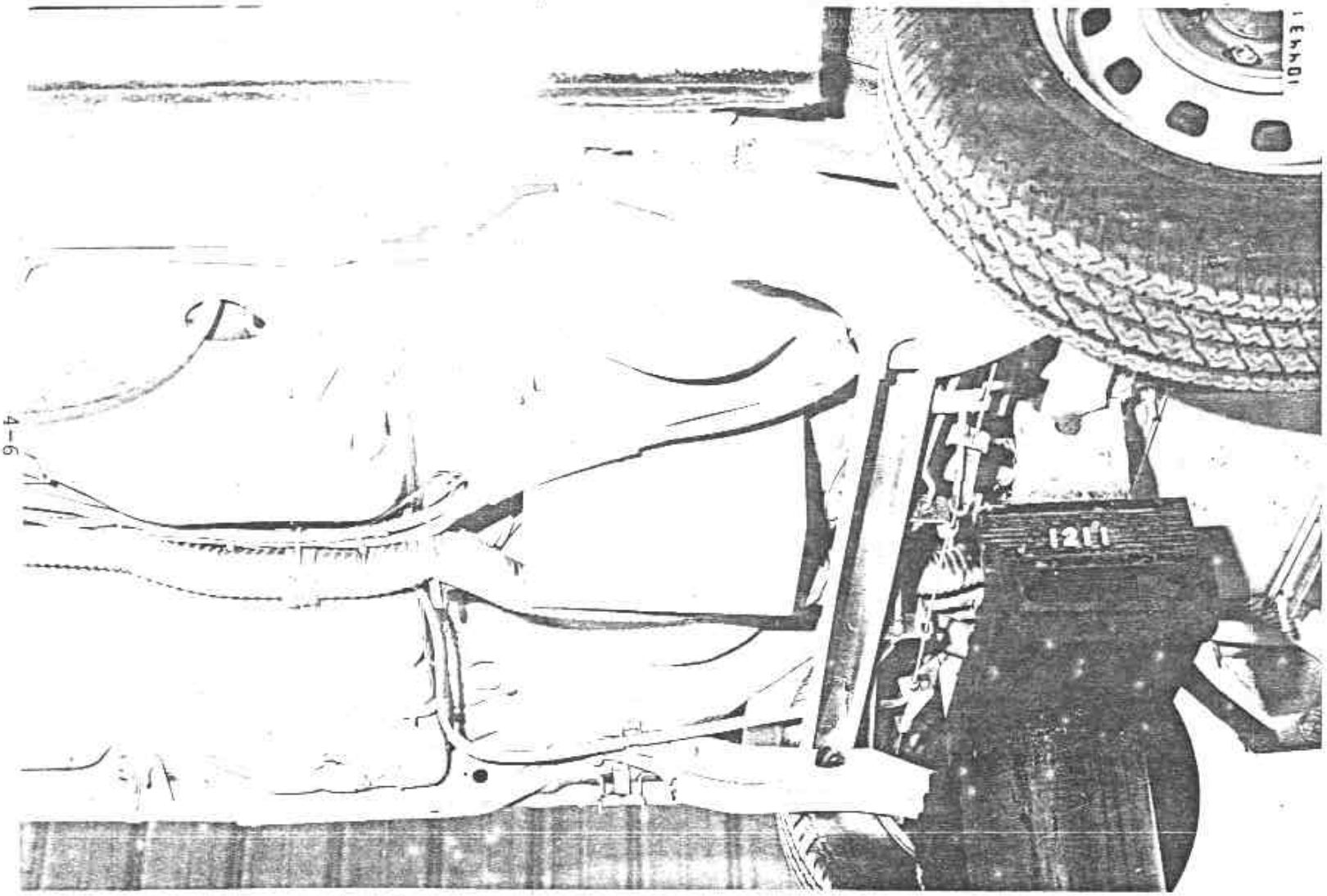


FIGURE 4-5. PRE-TEST VIEW OF FUEL TANK - 1981 ELECTRICA 007.

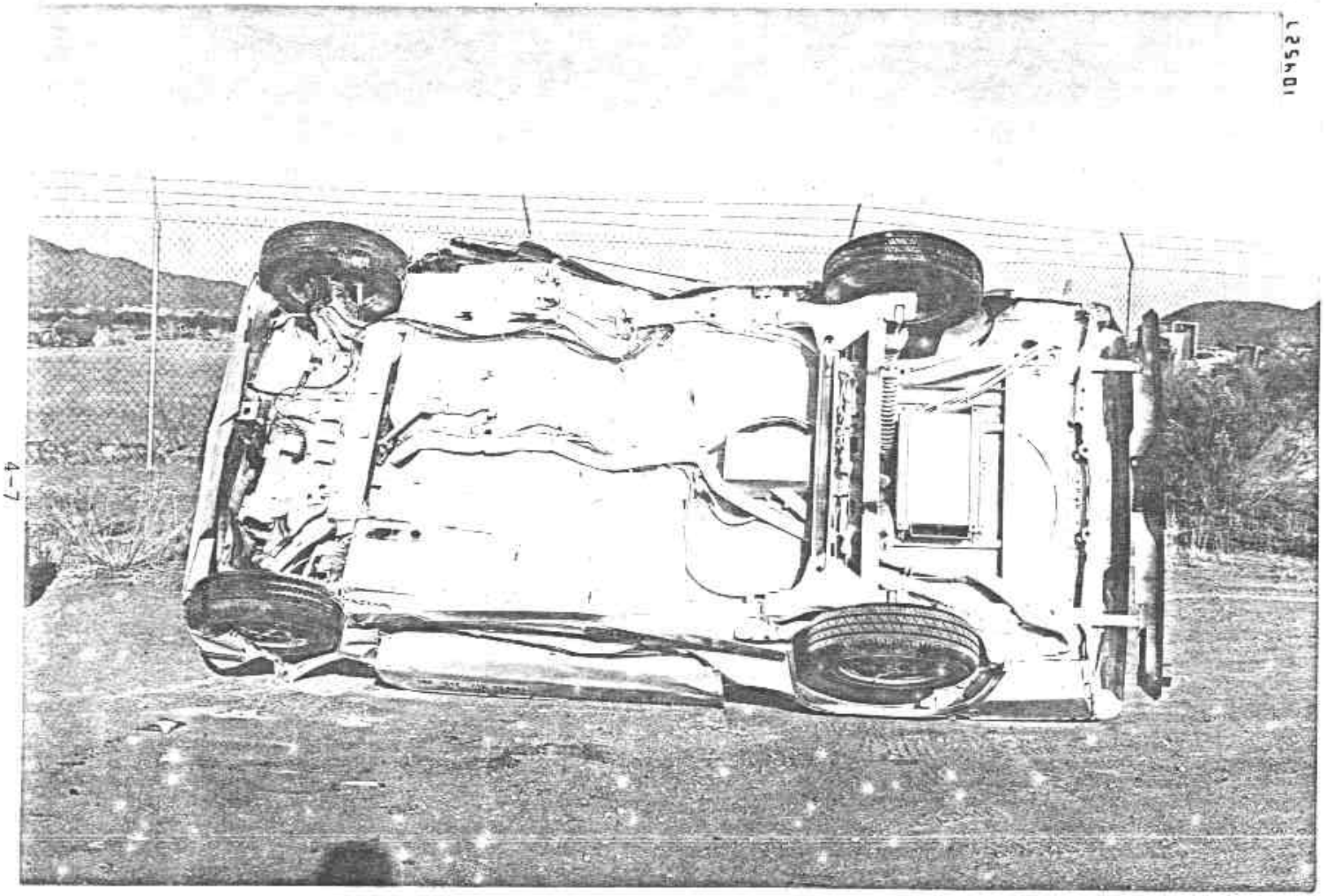


FIGURE 4-6. POST-TEST VIEW OF OVERALL UNDERSIDE - 1981 ELECTRICA 007.

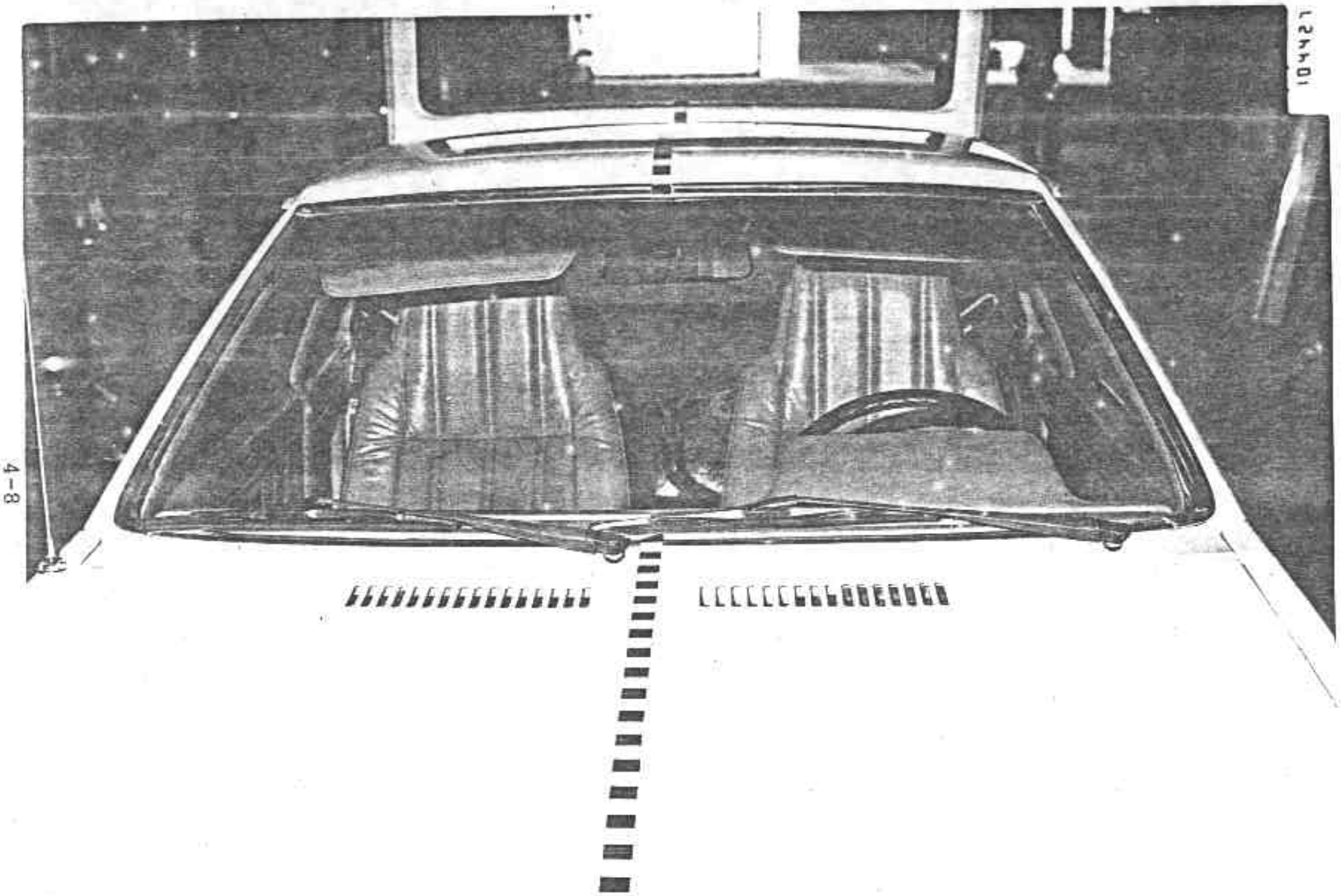


FIGURE 4-7. PRE-TEST VIEW OF WINDSHIELD - 1981 ELECTRICA 007.

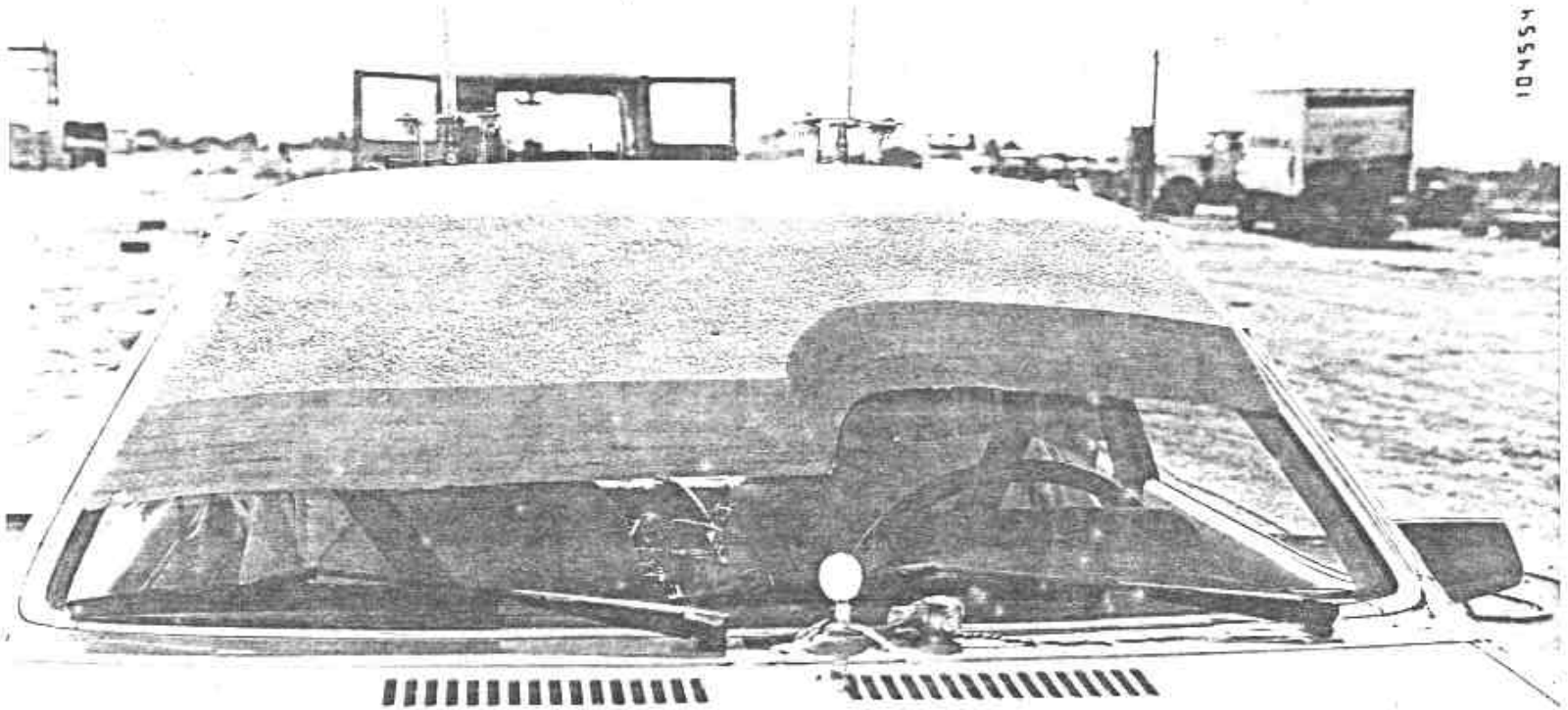


FIGURE 4-8. PRE-TEST VIEW OF WINDSHIELD WITH STYROFOAM - 1981 ELECTRICA 007.

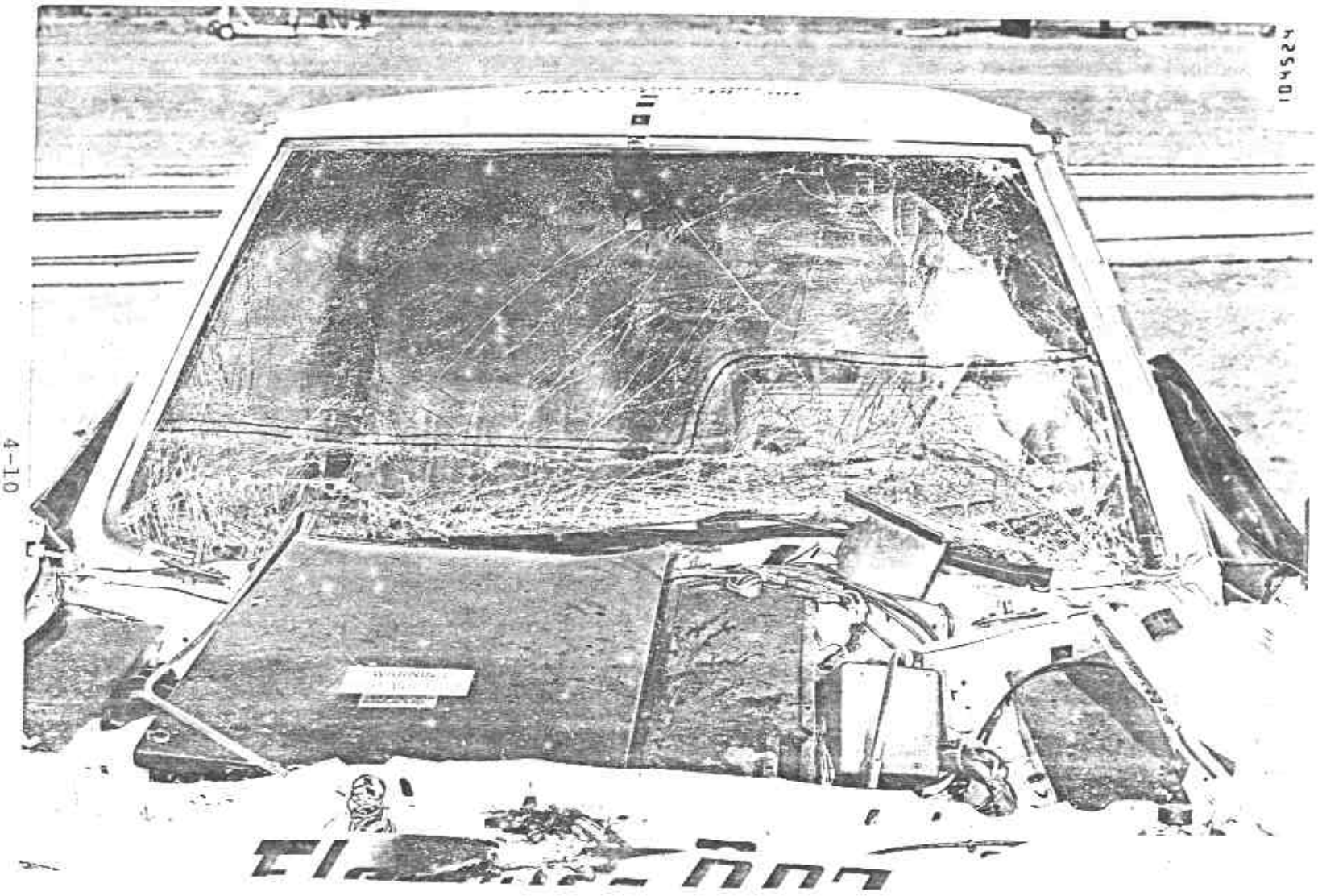


FIGURE 4-9. POST-TEST VIEW OF WINDSHIELD - 1981 ELECTRICA 007.

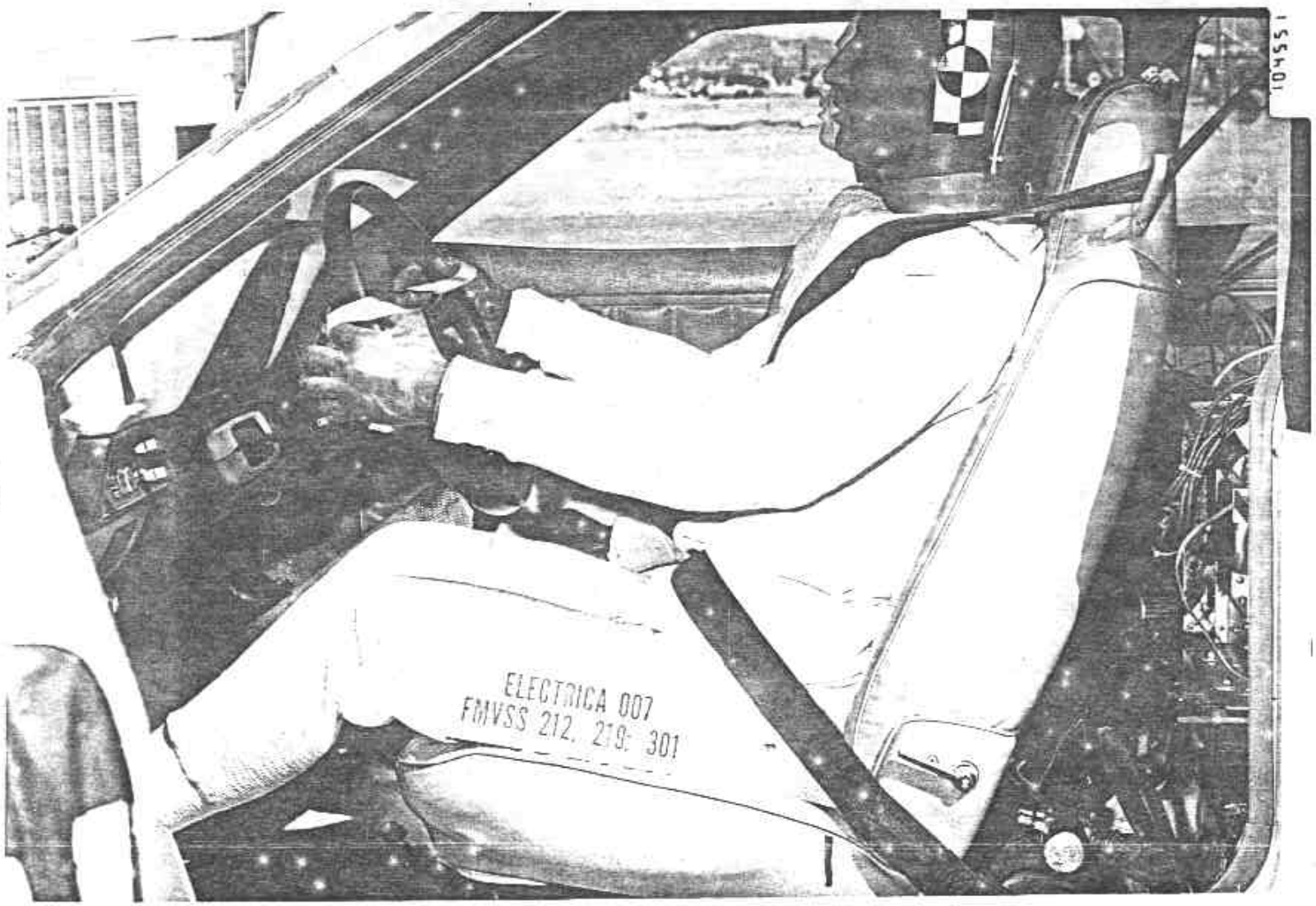


FIGURE 4-10. PRE-TEST VIEW OF DRIVER DUMMY - 1981 ELECTRICA 007.

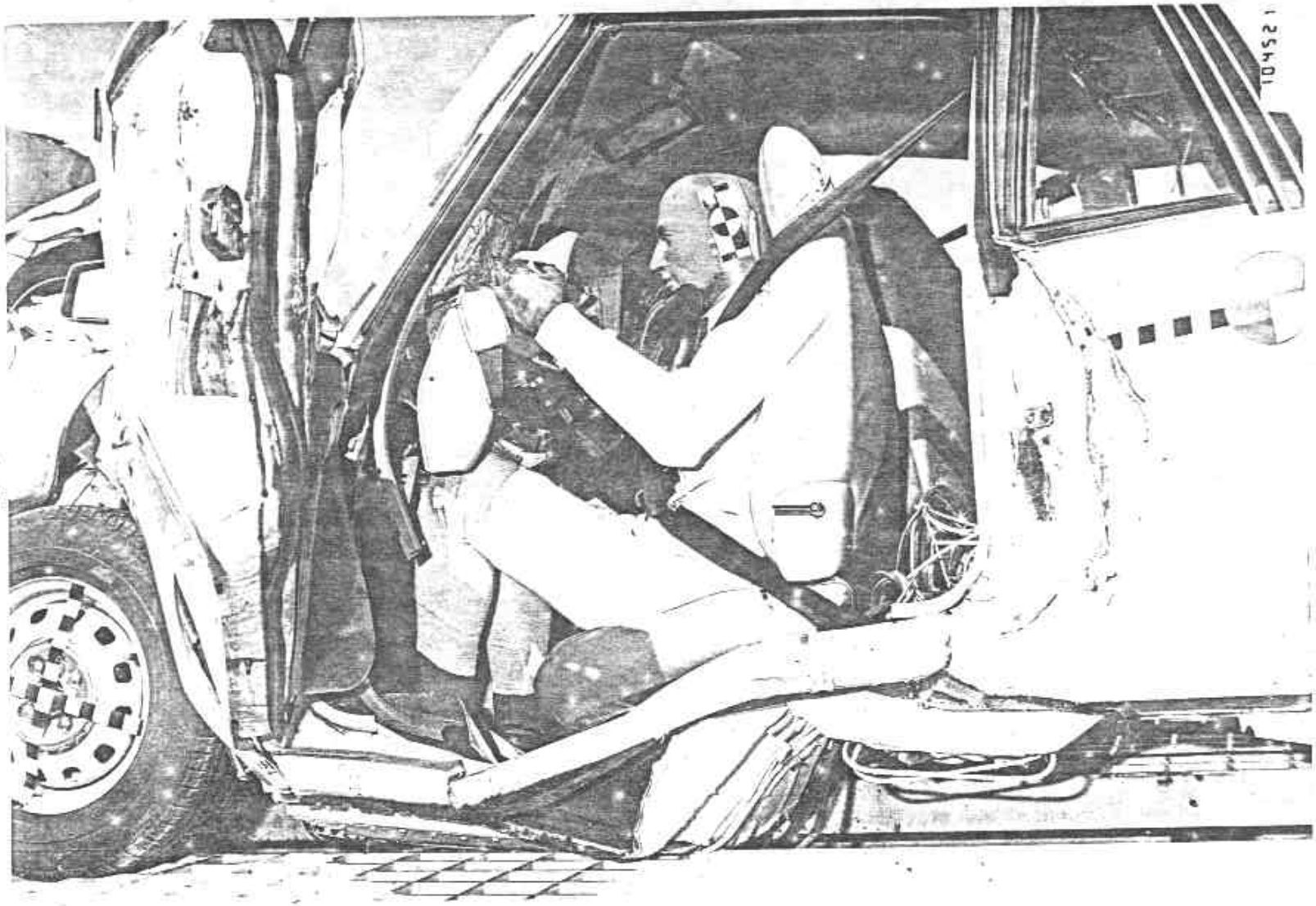


FIGURE 4-11. POST-TEST VIEW OF DRIVER DUMMY - 1981 ELECTRICA 007.

FIGURE 4-12. PRE-TEST VIEW OF PASSENGER DUMMY - 1981 ELECTRICA 007.

FIGURE 4-13. POST-TEST VIEW OF PASSENGER DUMMY - 1981 ELECTRICA 007.

5.0 CALCOMP PLOT PRESENTATION

Calcomp plots generated from the crash test data are presented on the following pages. All data will be recorded on magnetic tape for inclusion in the NHTSA crash test data base system. All data was filtered according to SAE J211. Plot legends and test anomalies are listed below:

PLOT LEGEND

Dummy Data*

Driver	RF Outboard Passenger	Data Description
LF Head	RF Head	Head Acceleration (G)
LF Chest	RF Chest	Chest Acceleration (G)
LF Femurs	RF Femurs	Femur Loads (lb)
	RF Belt Loads	Torso and Lap Belt Loads (lb)

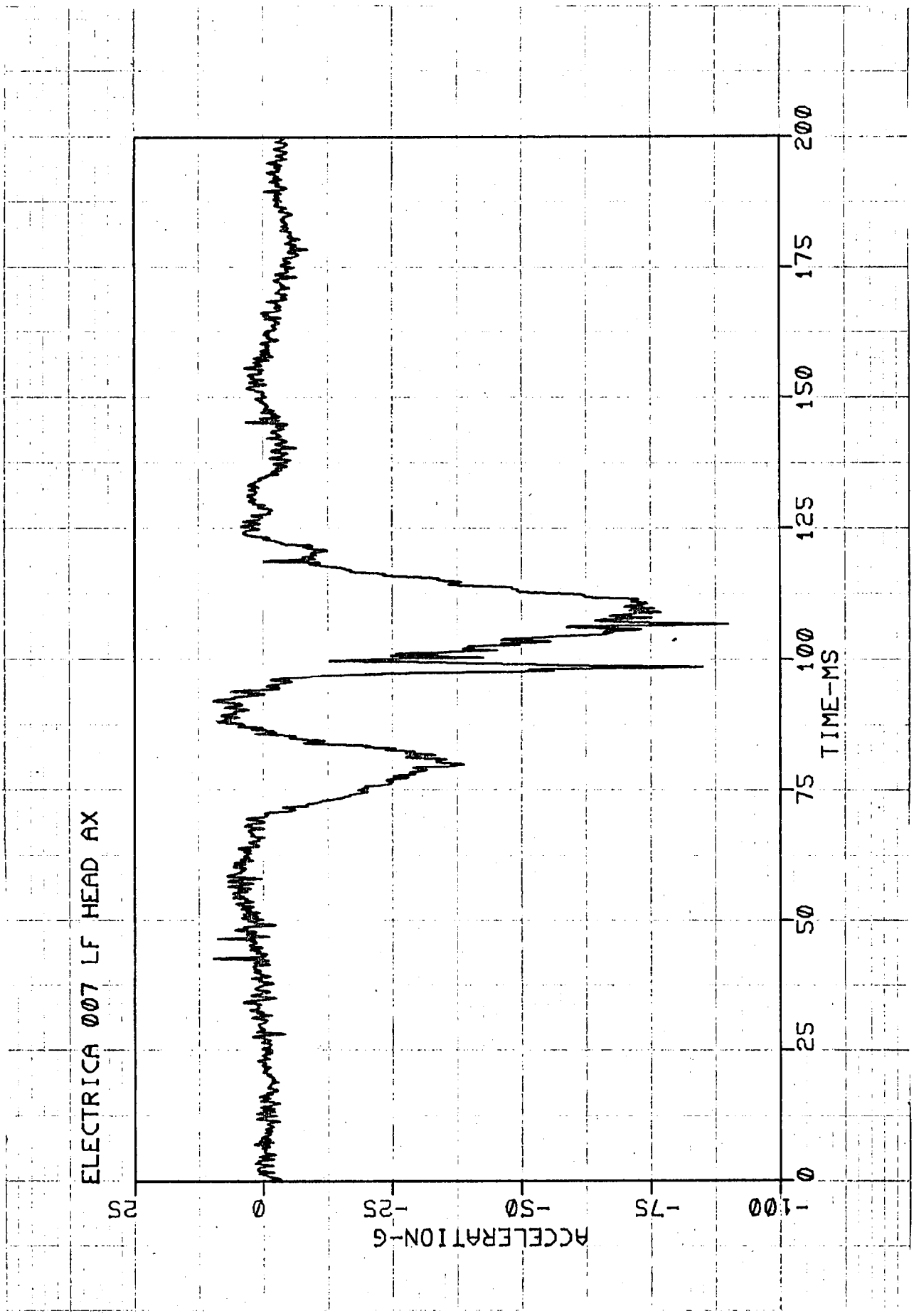
Vehicle Data**

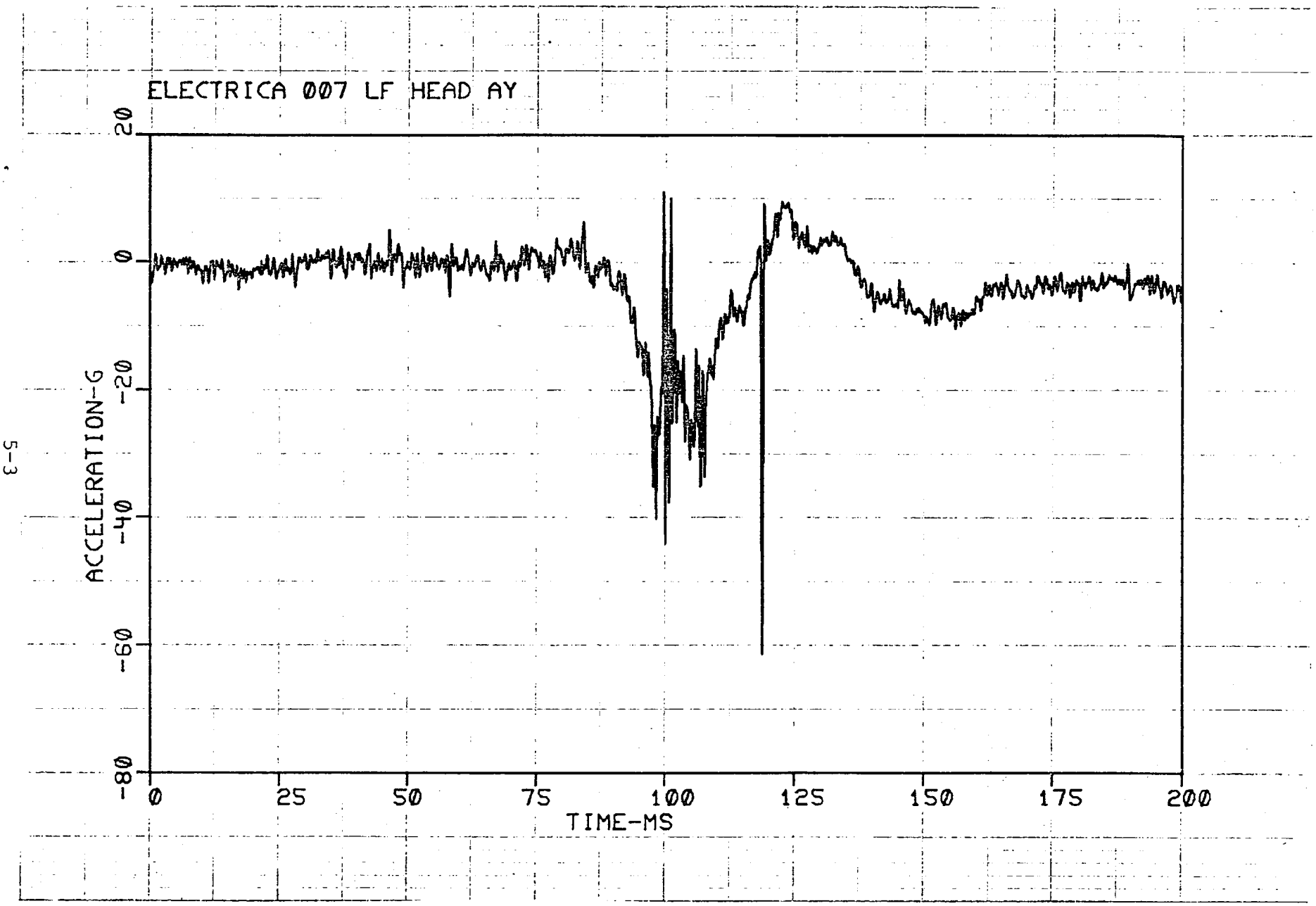
	Location
Loc 1	Engine (Underside) Acceleration (G)
Loc 2	Firewall (Above Steering Column) Acceleration (G)
Loc 3	Firewall (At Vehicle Centerline) Acceleration (G)
Loc 4	Front Seat Front Crossmember (Right Side) Acceleration (G)
Loc 5	Front Seat Rear Crossmember (Left Side) Acceleration (G)

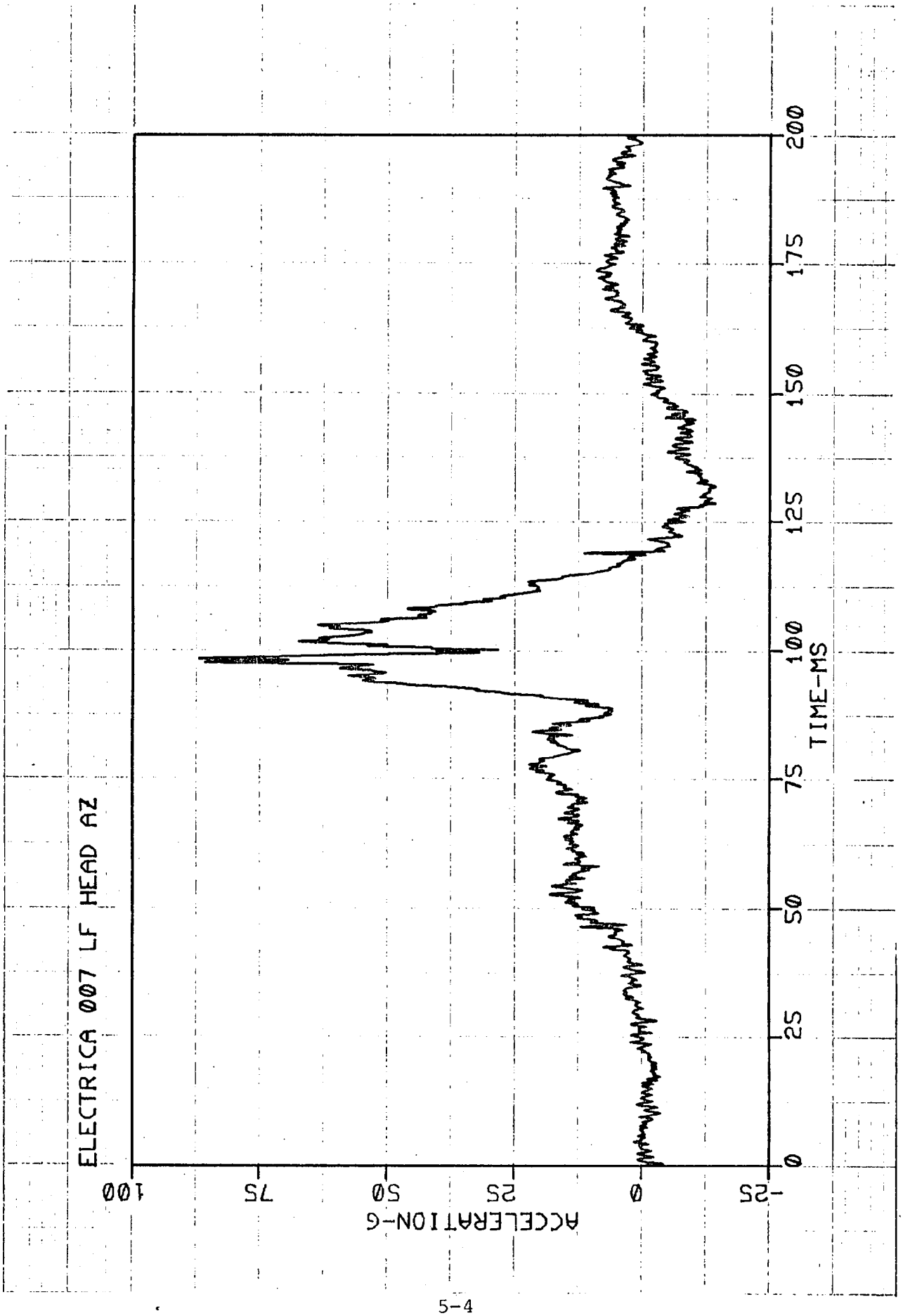
Barrier Data

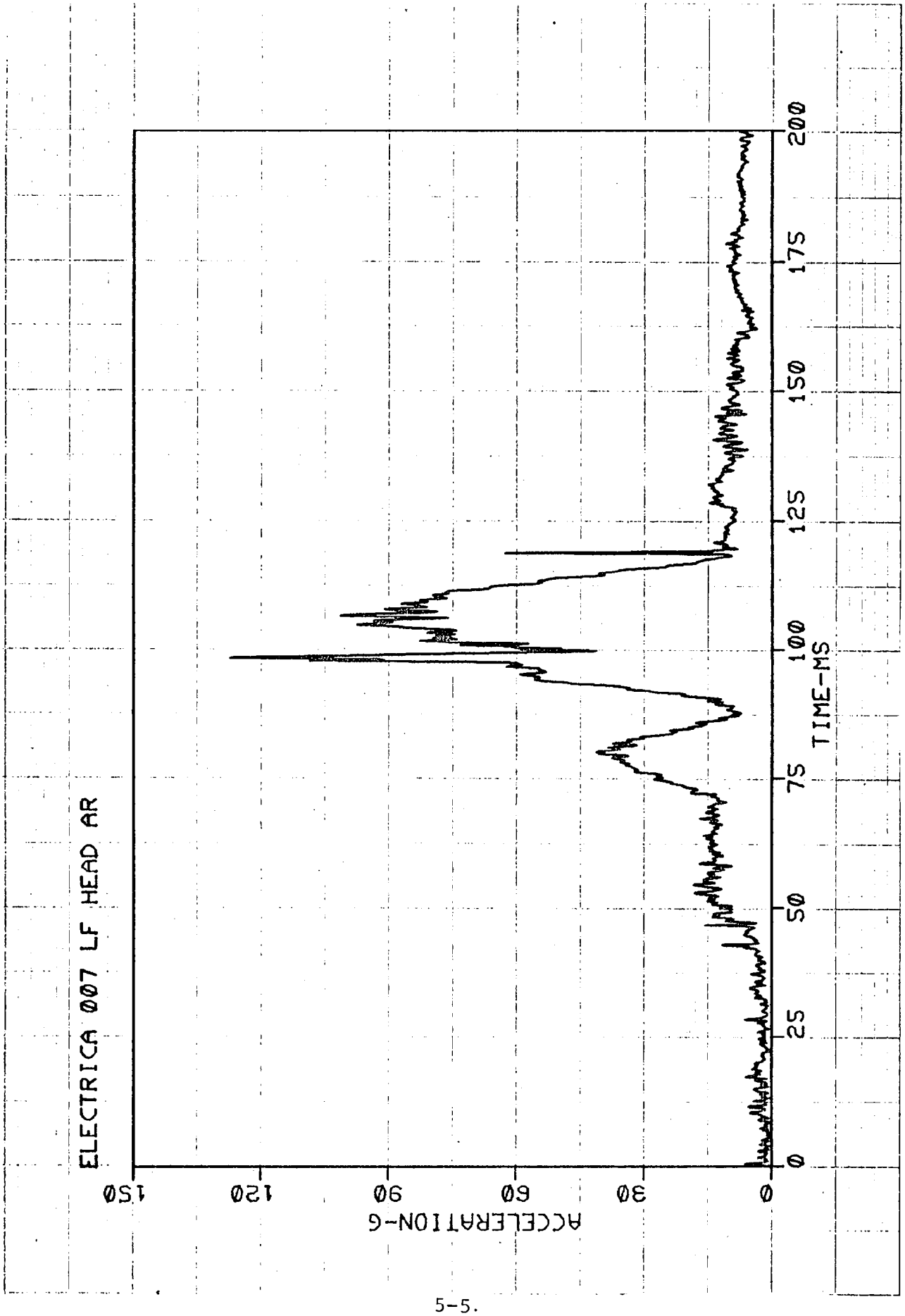
Columns 1-9	Force (lb)
Sum A&B	Force (lb)
Sum C&D	Force (lb)
Total Load	Force (lb)
Total Force	(Barrier) Versus Displacement (Location 5)

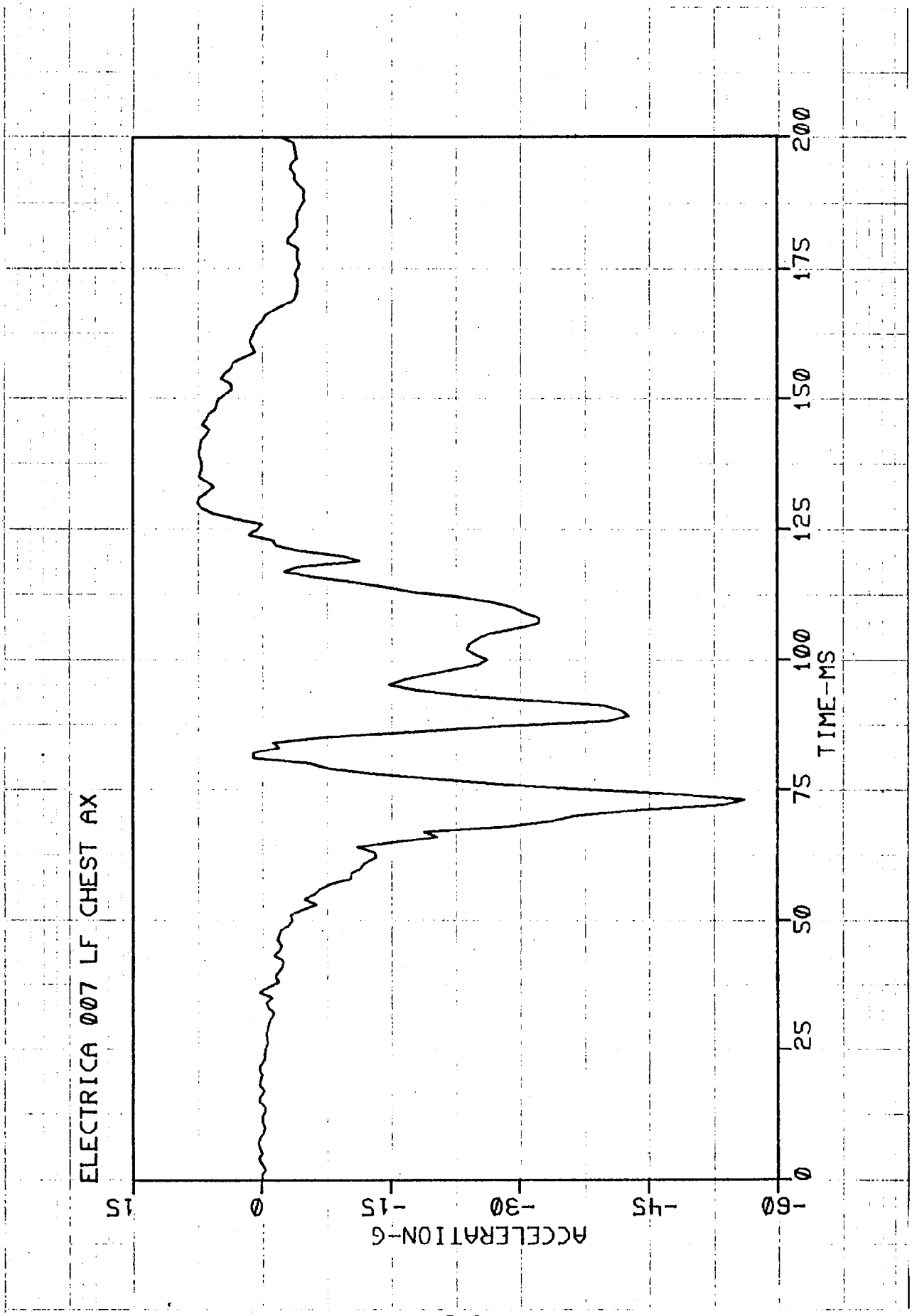
*Dummy Injury Summary presented on pages 3-16 and 3-17.
**Vehicle accelerometer location and data summarized on page 3-20.

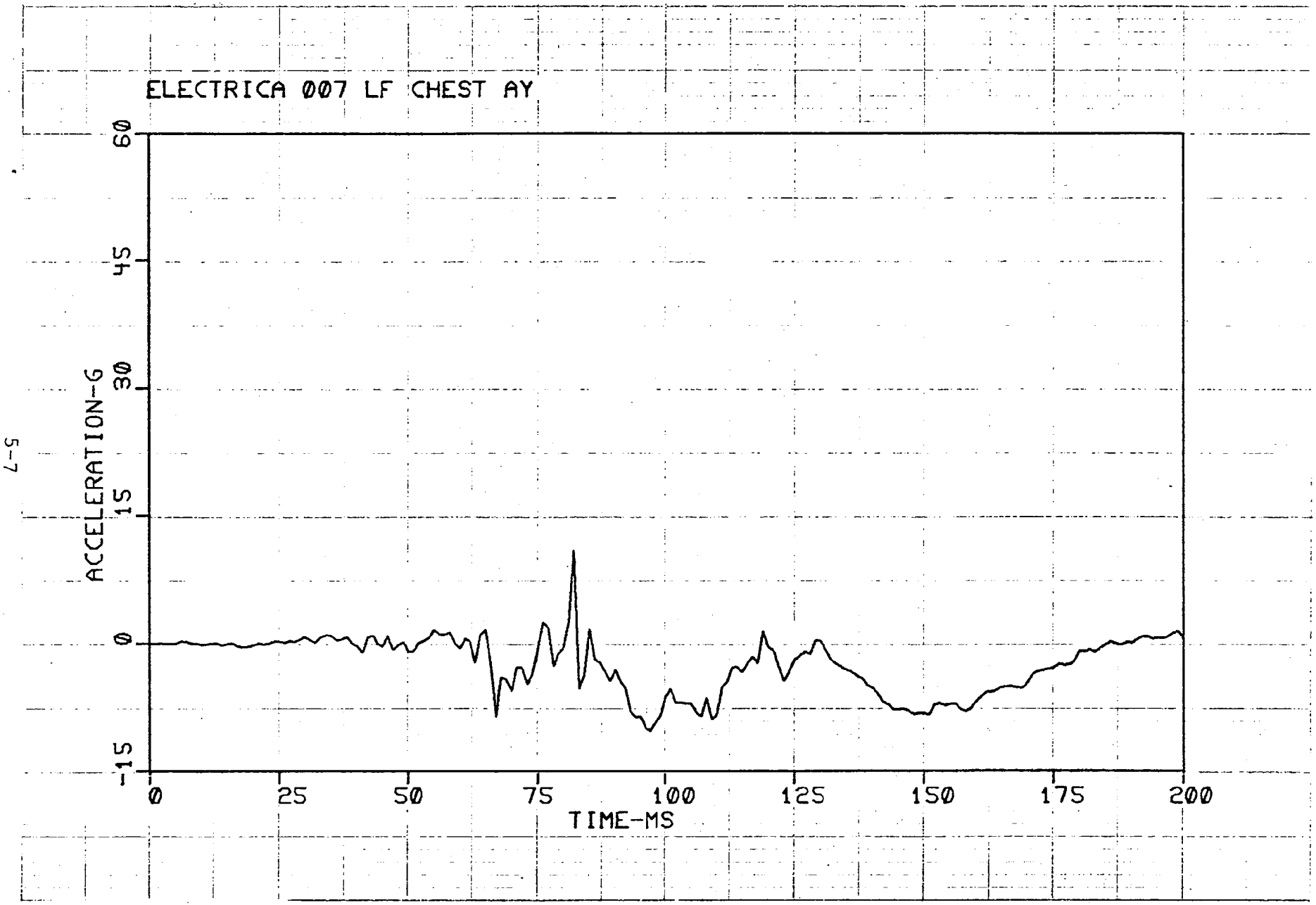

ELECTRICA 007 LF HEAD AX
ACCELERATION-G
25
0
-25
-50
-75
-100
TIME-MS
0
25
50
75
100
125
150
175
200

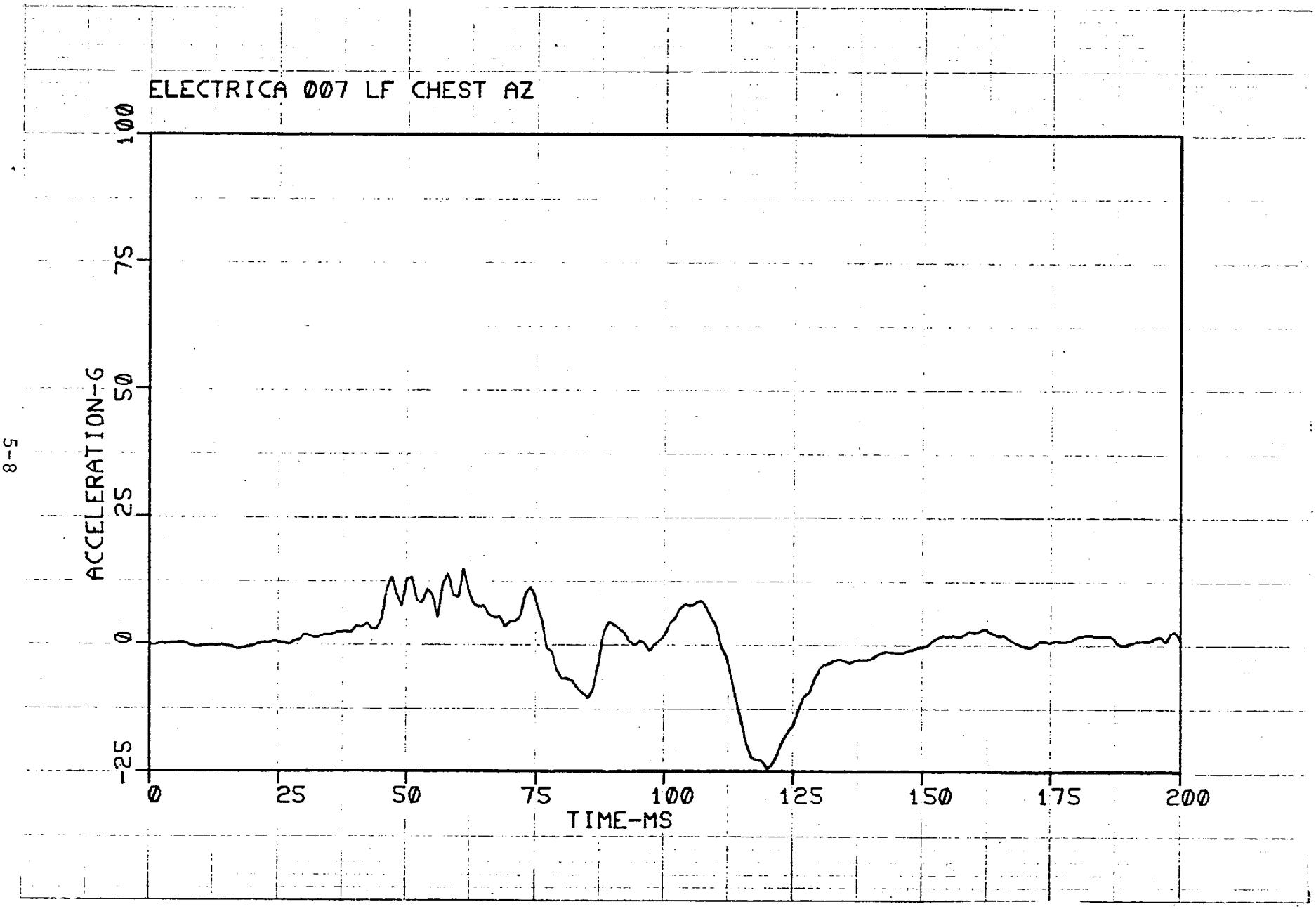

ELECTRICA 007 LF HEAD AY
20
0
-20
-40
-60
-80
ACCELERATION-G
0
25
50
75
100
125
150
175
200
TIME-MS

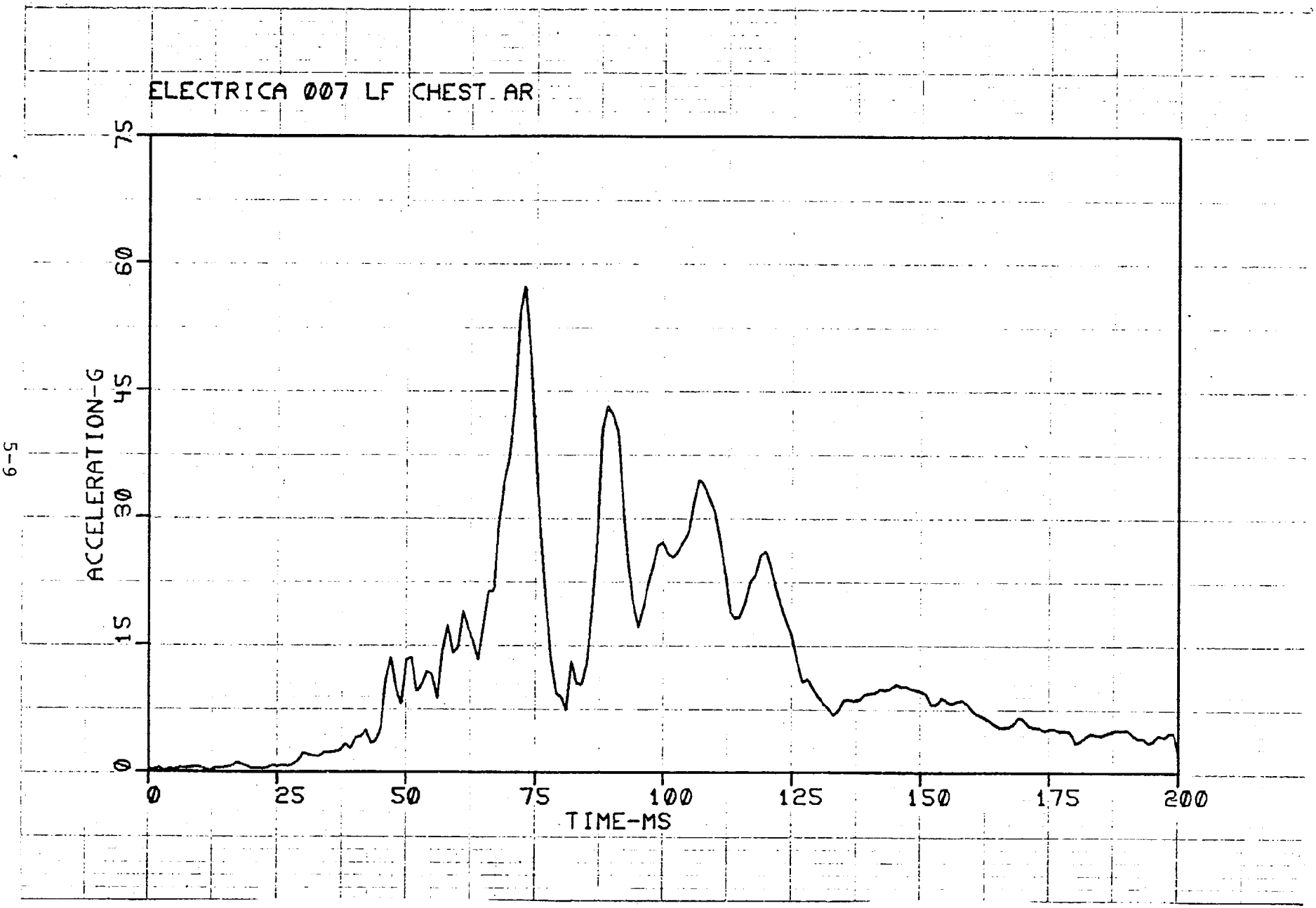

ELECTRICA 007 LF HEAD AZ
ACCELERATION-G
100
75
50
25
0
-25
TIME-MS
0
25
50
75
100
125
150
175
200

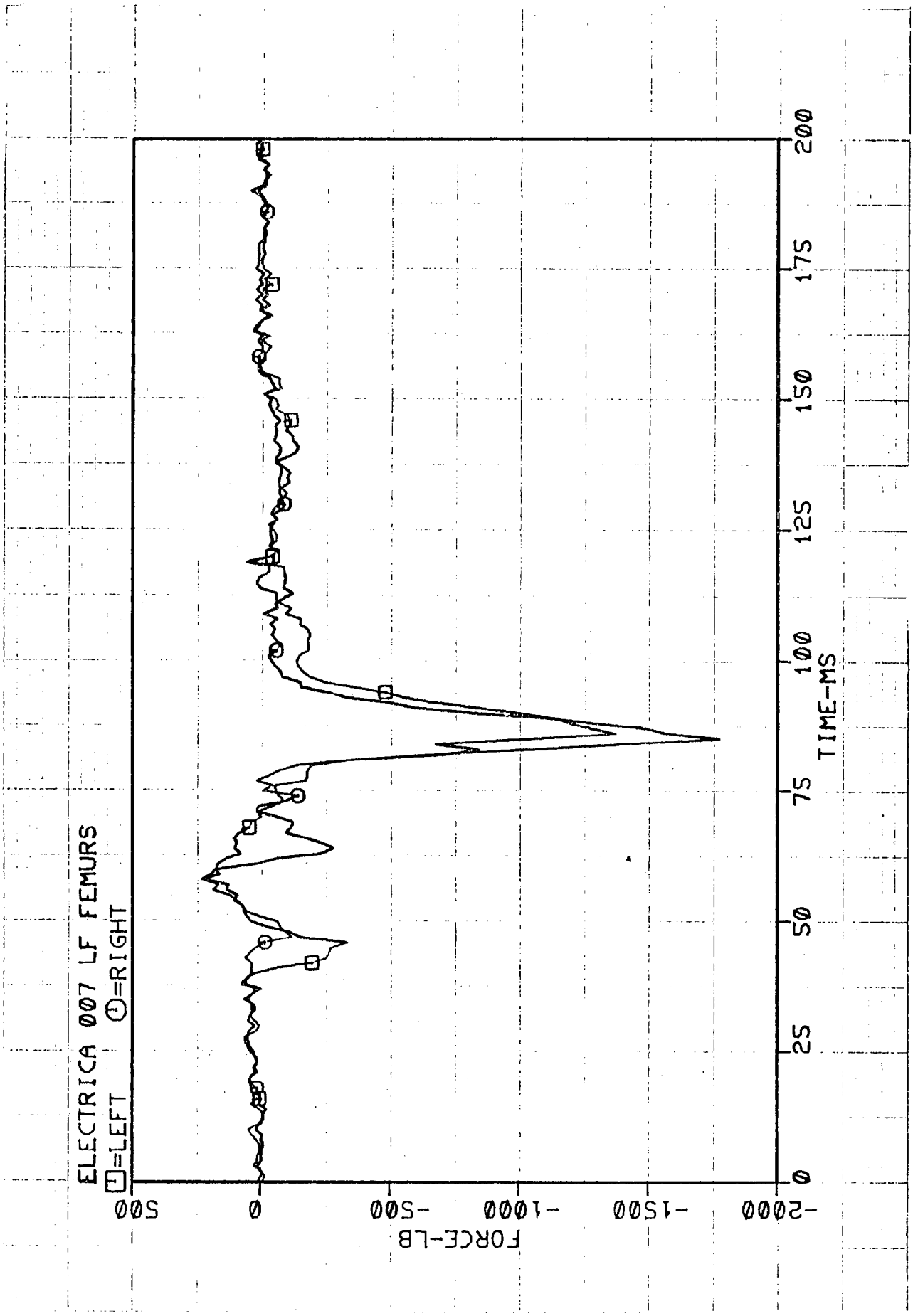

ELECTRICA 007 LF HEAD AR
ACCELERATION-G
0
30
60
90
120
150
TIME-MS
0
25
50
75
100
125
150
175
200

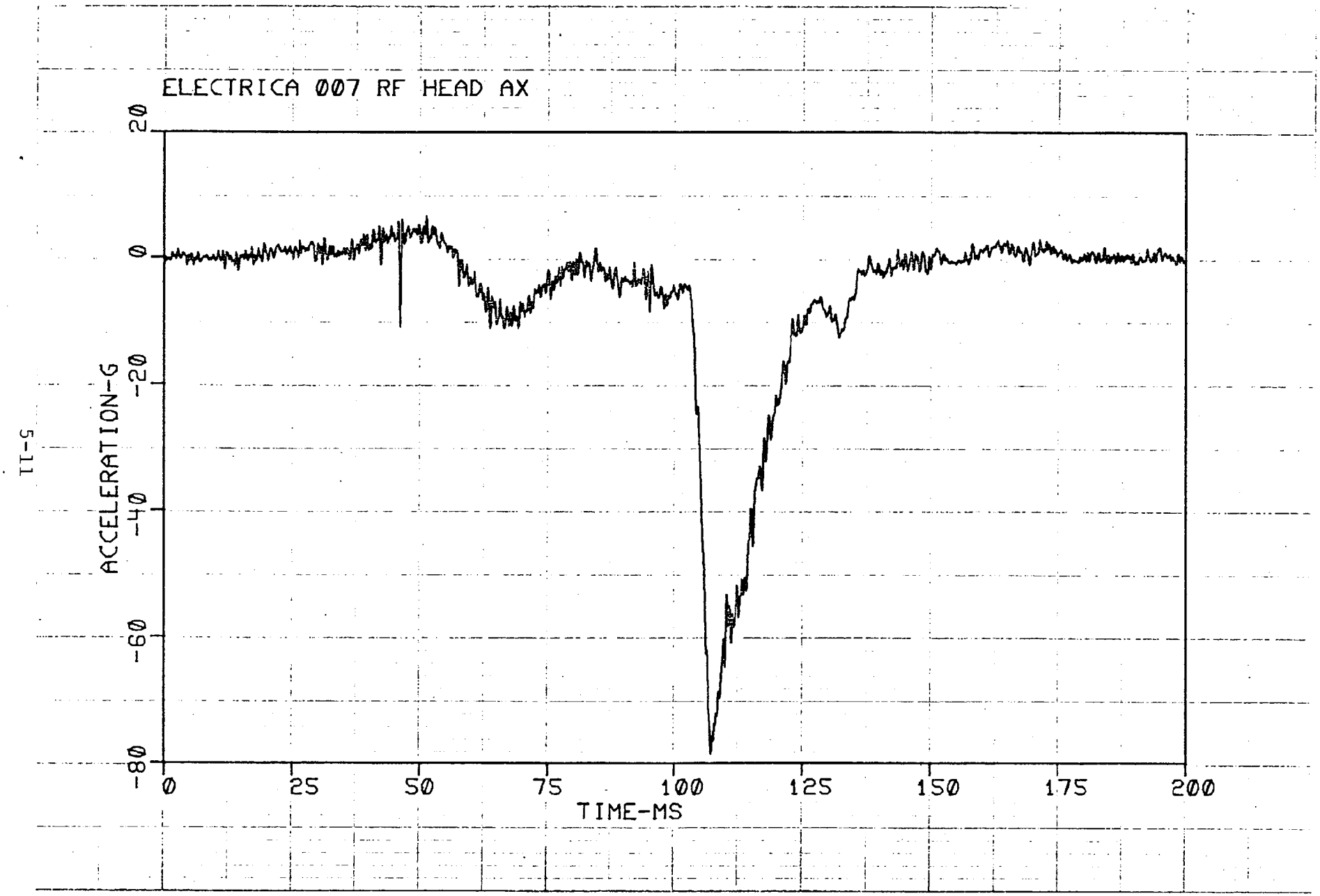

ELECTRICA 007 LF CHEST AX
ACCELERATION-G
15
0
-15
-30
-45
-60
0
25
50
75
100
125
150
175
200
TIME-MS

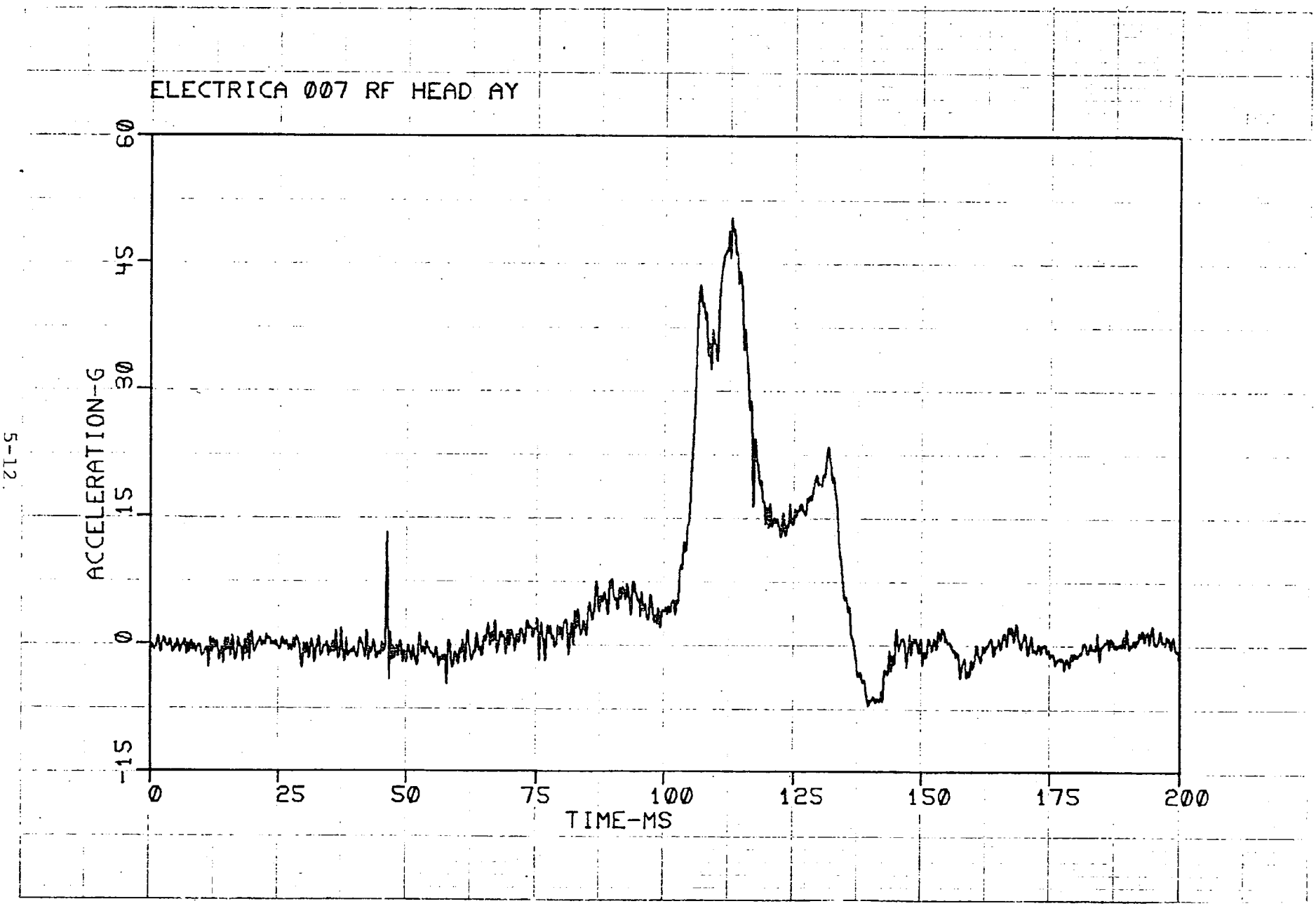

ELECTRICA 007 LF CHEST AY
ACCELERATION-G
60
45
30
15
0
-15
0
25
50
75
100
125
150
175
200
TIME-MS

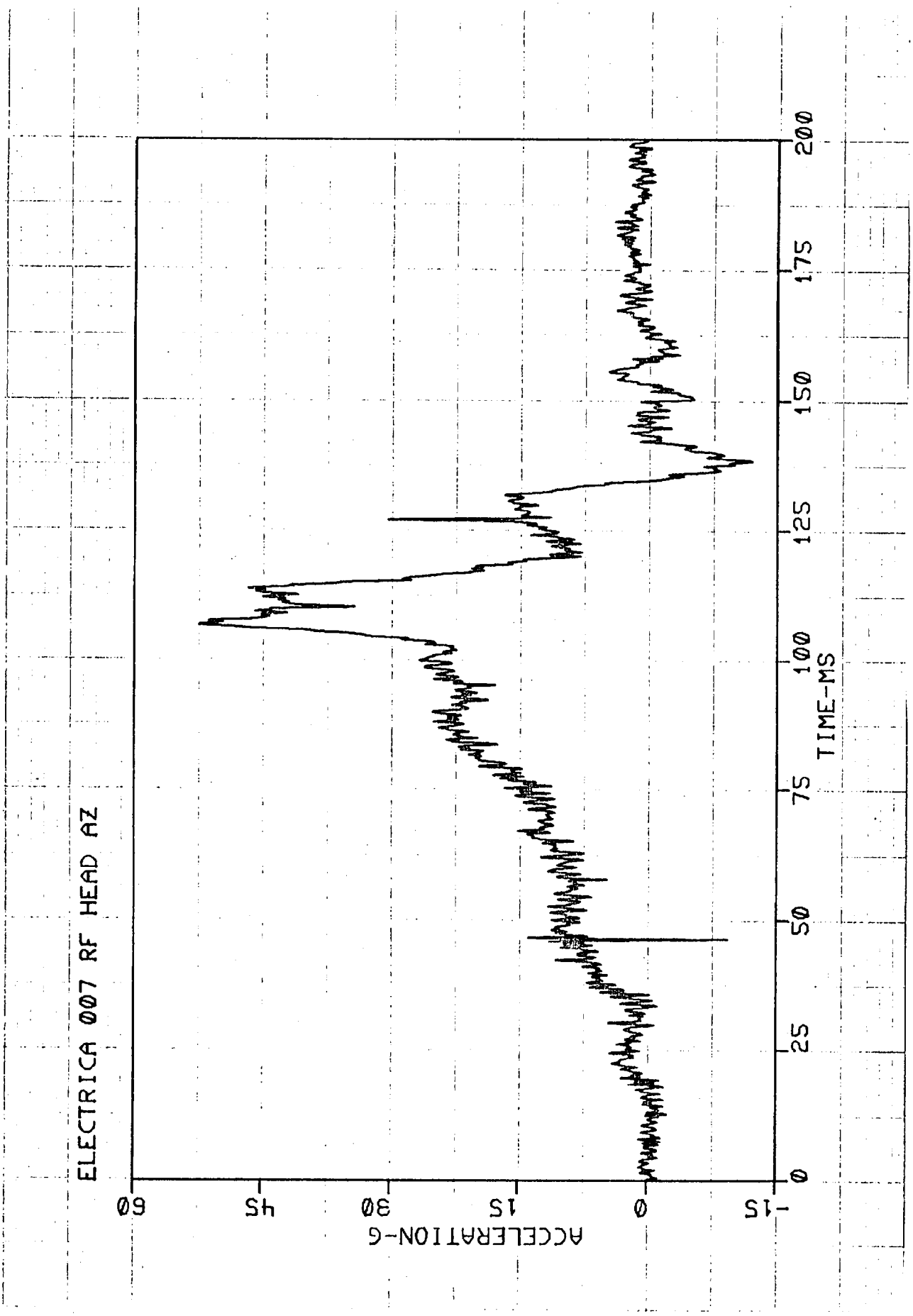

ELECTRICA 007 LF CHEST AZ
ACCELERATION-G
100
75
50
25
0
-25
0
25
50
75
100
125
150
175
200
TIME-MS

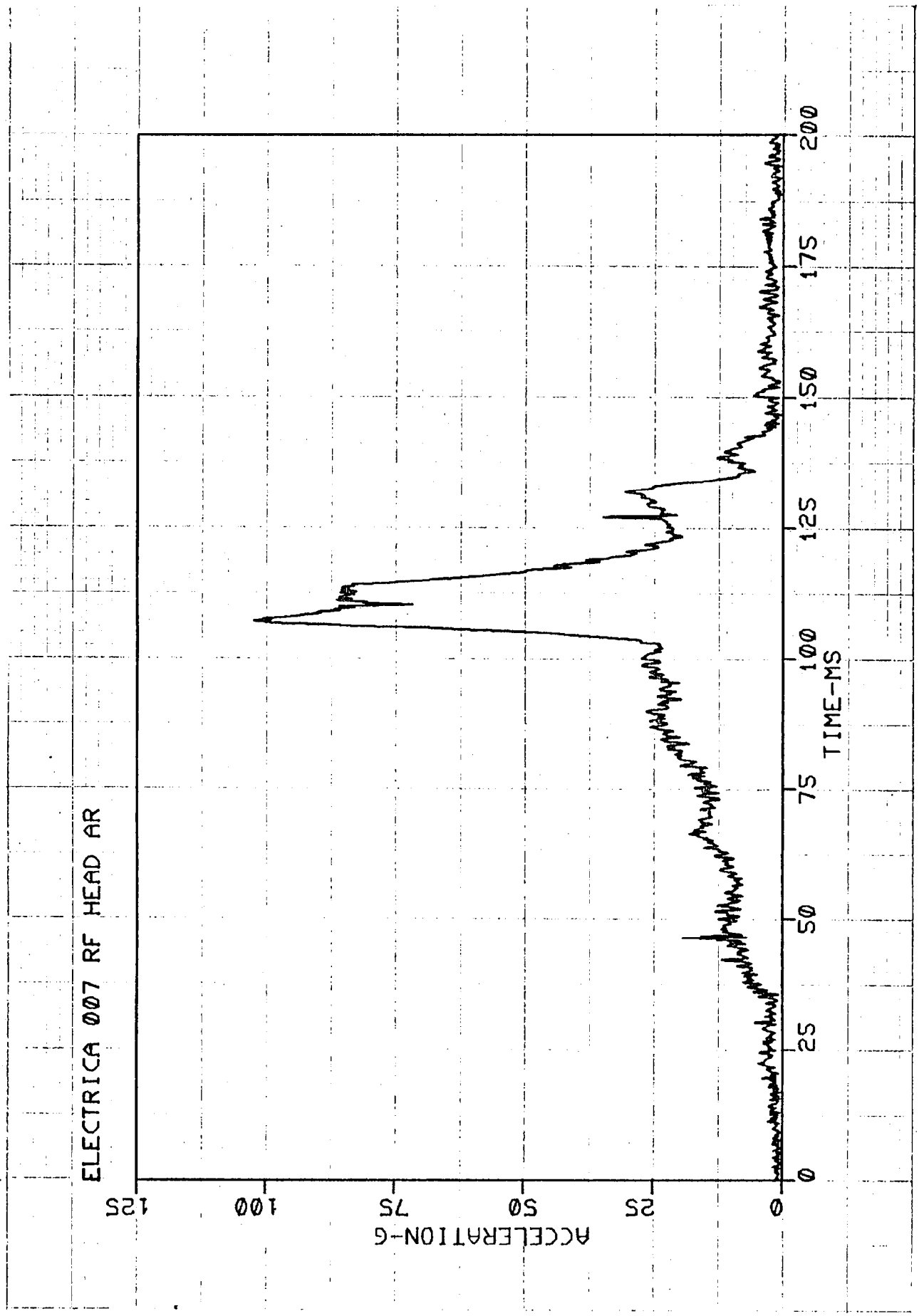

ELECTRICA 007 LF CHEST AR
ACCELERATION-G
0
15
30
45
60
75
0
25
50
75
100
125
150
175
200
TIME-MS

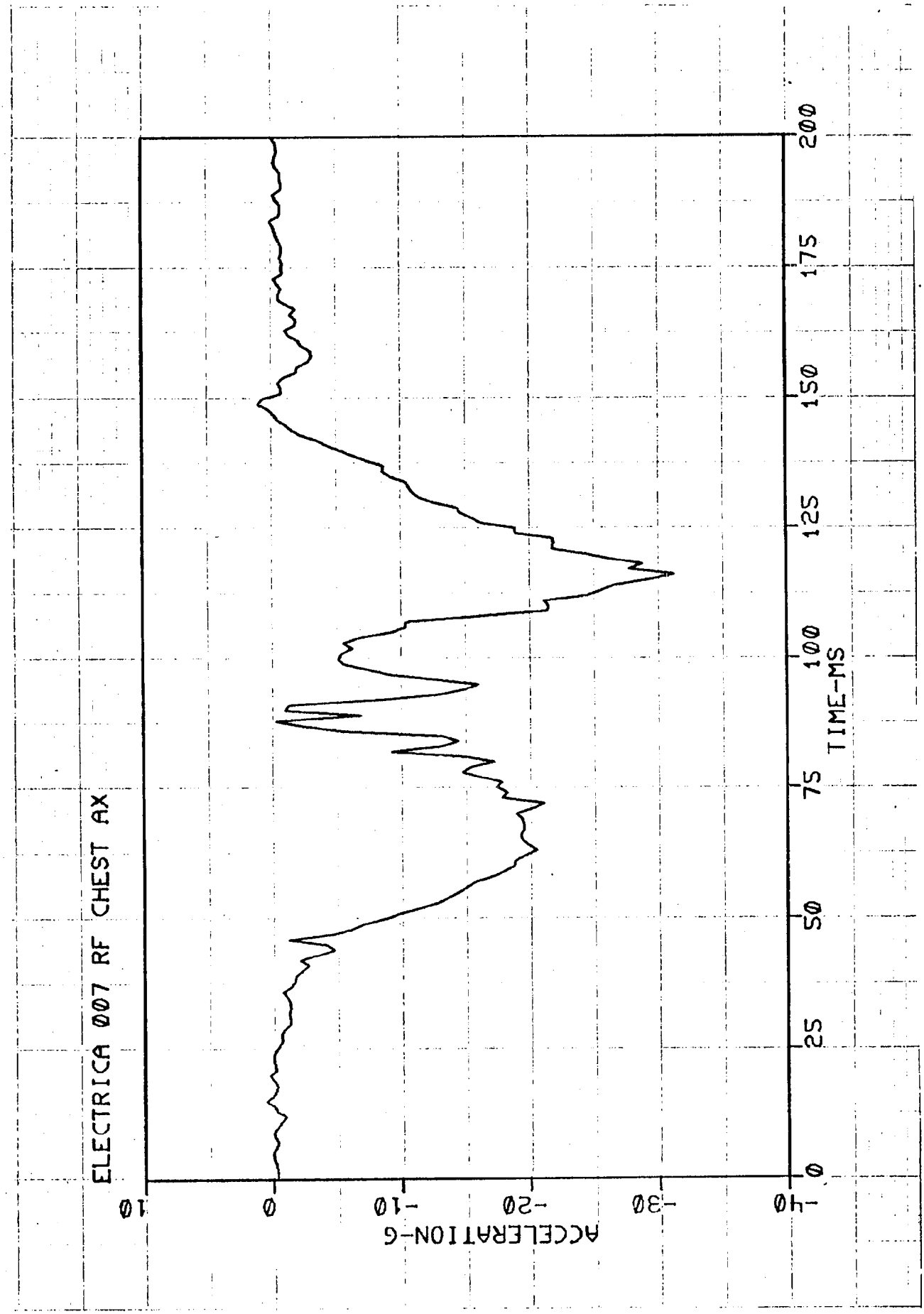

ELECTRICA 007 LF FEMURS
□=LEFT ○=RIGHT
FORCE-LB
500
0
-500
-1000
-1500
-2000
0
25
50
75
100
125
150
175
200
TIME-MS

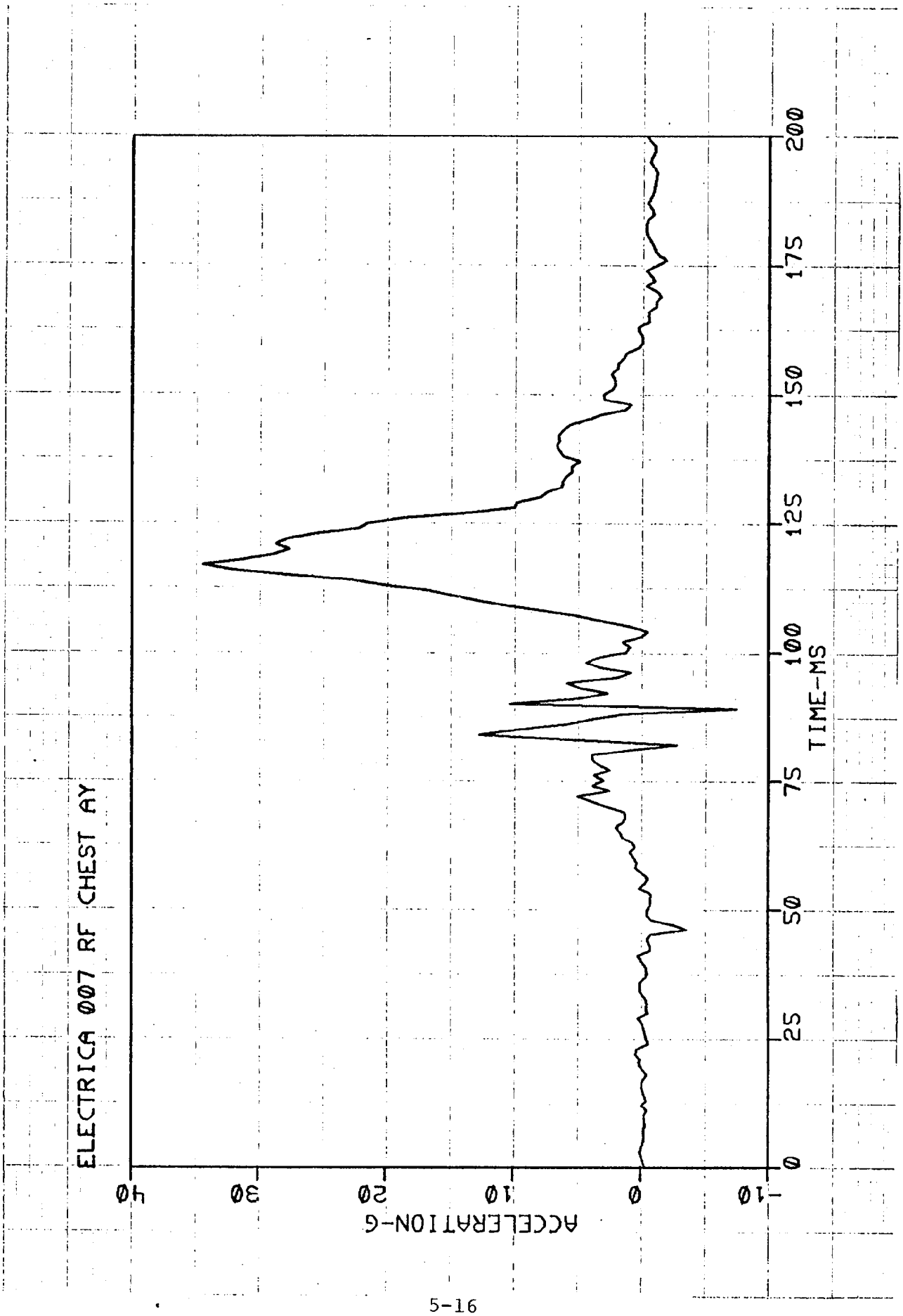

ELECTRICA 007 RF HEAD AX
ACCELERATION-G
20
0
-20
-40
-60
-80
0
25
50
75
100
125
150
175
200
TIME-MS

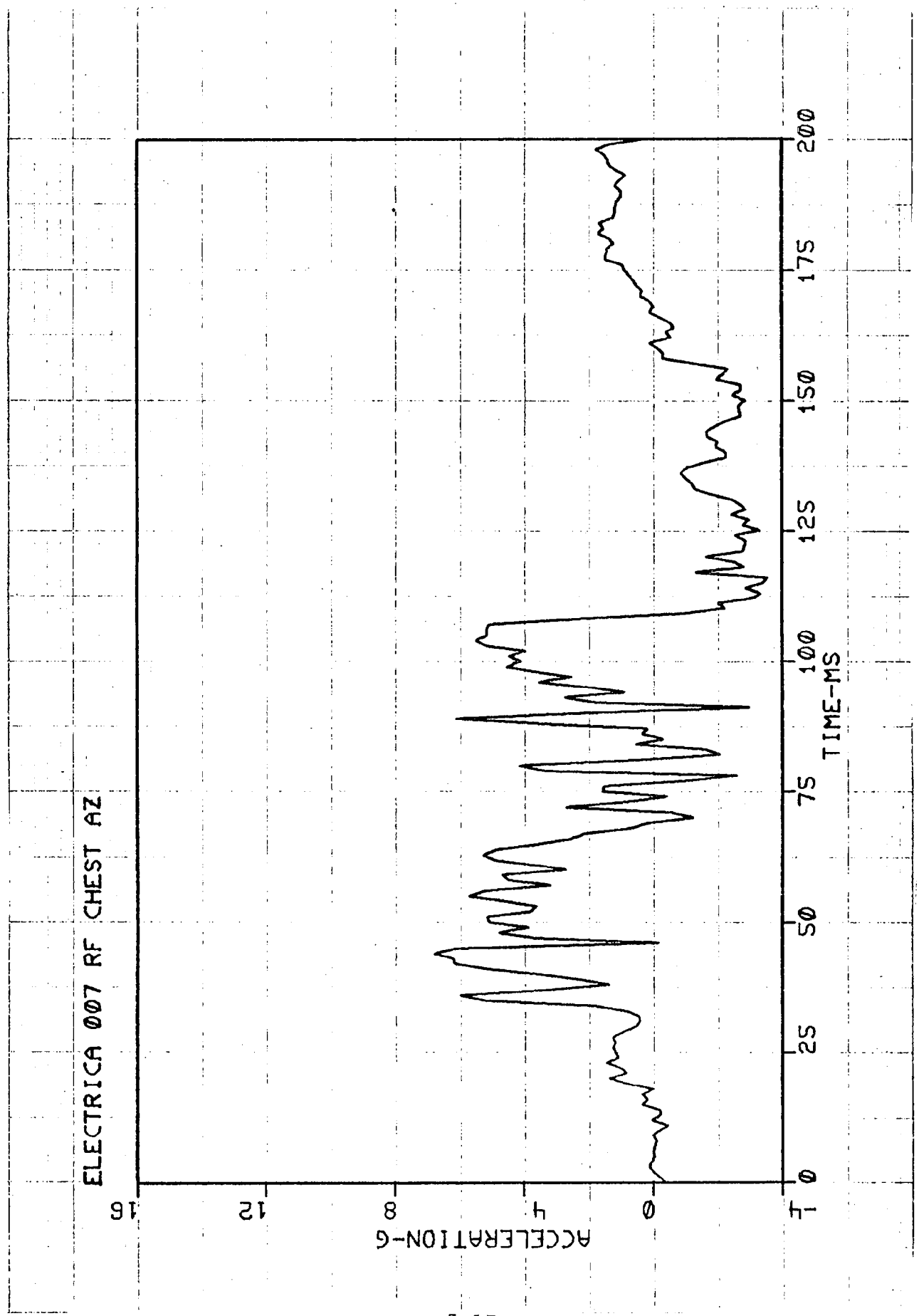

ELECTRICA 007 RF HEAD AY
ACCELERATION-G
60
45
30
15
0
-15
0
25
50
75
100
125
150
175
200
TIME-MS

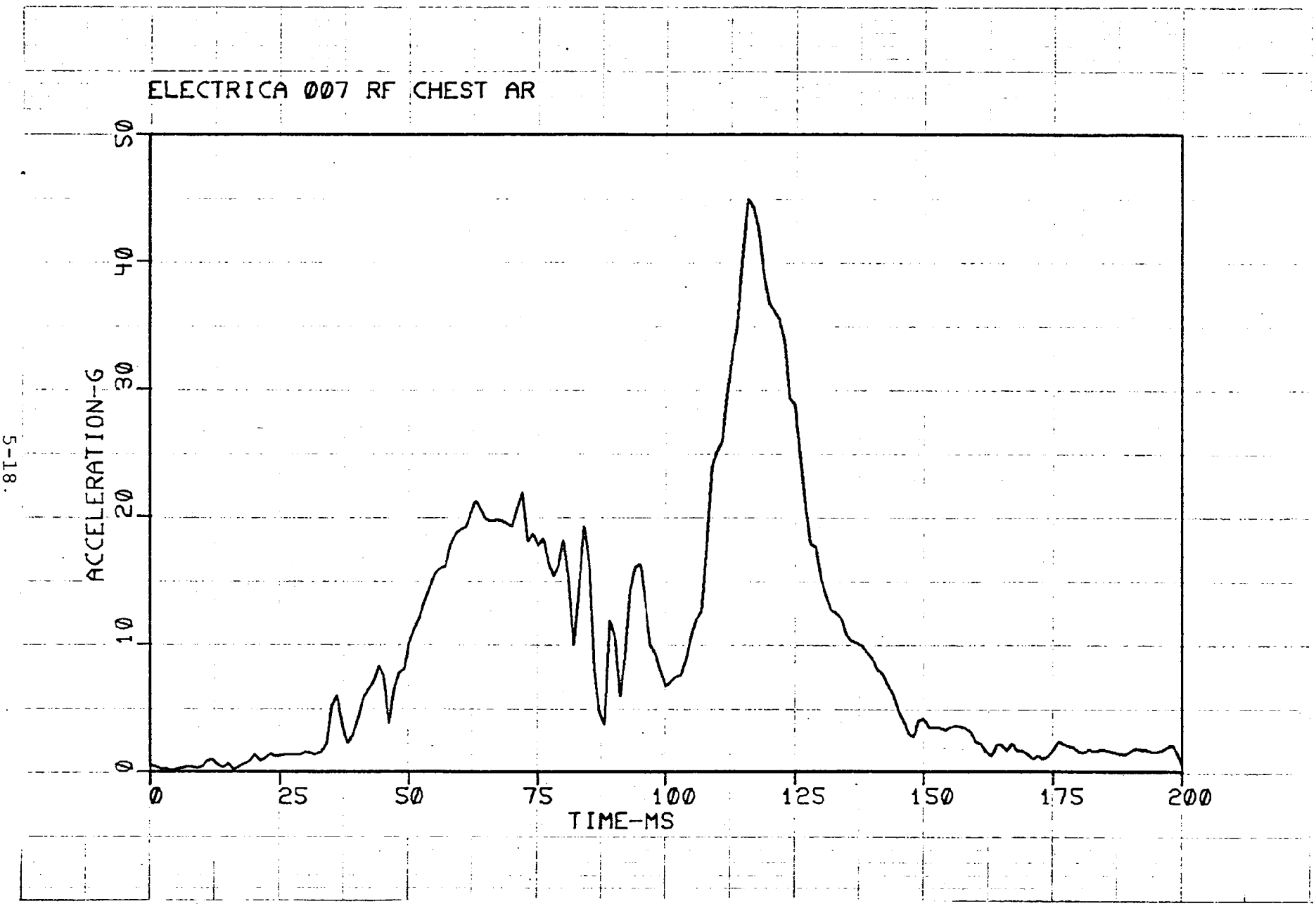

ELECTRICA 007 RF HEAD AZ
ACCELERATION-G
60
45
30
15
0
-15
0
25
50
75
100
125
150
175
200
TIME-MS

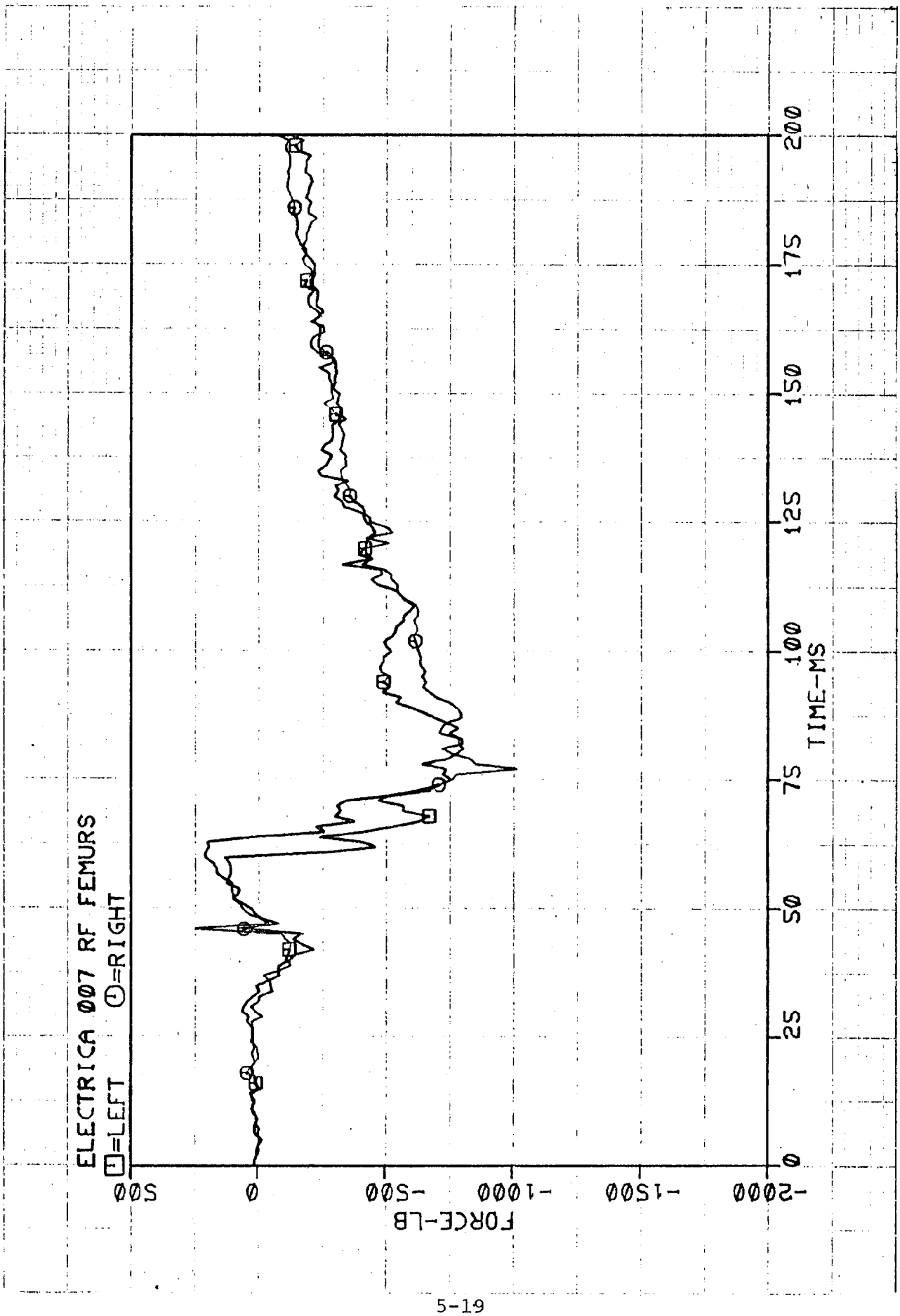

ELECTRICA 007 RF HEAD AR
ACCELERATION-G
0
25
50
75
100
125
150
175
200
TIME-MS
0
25
50
75
100
125

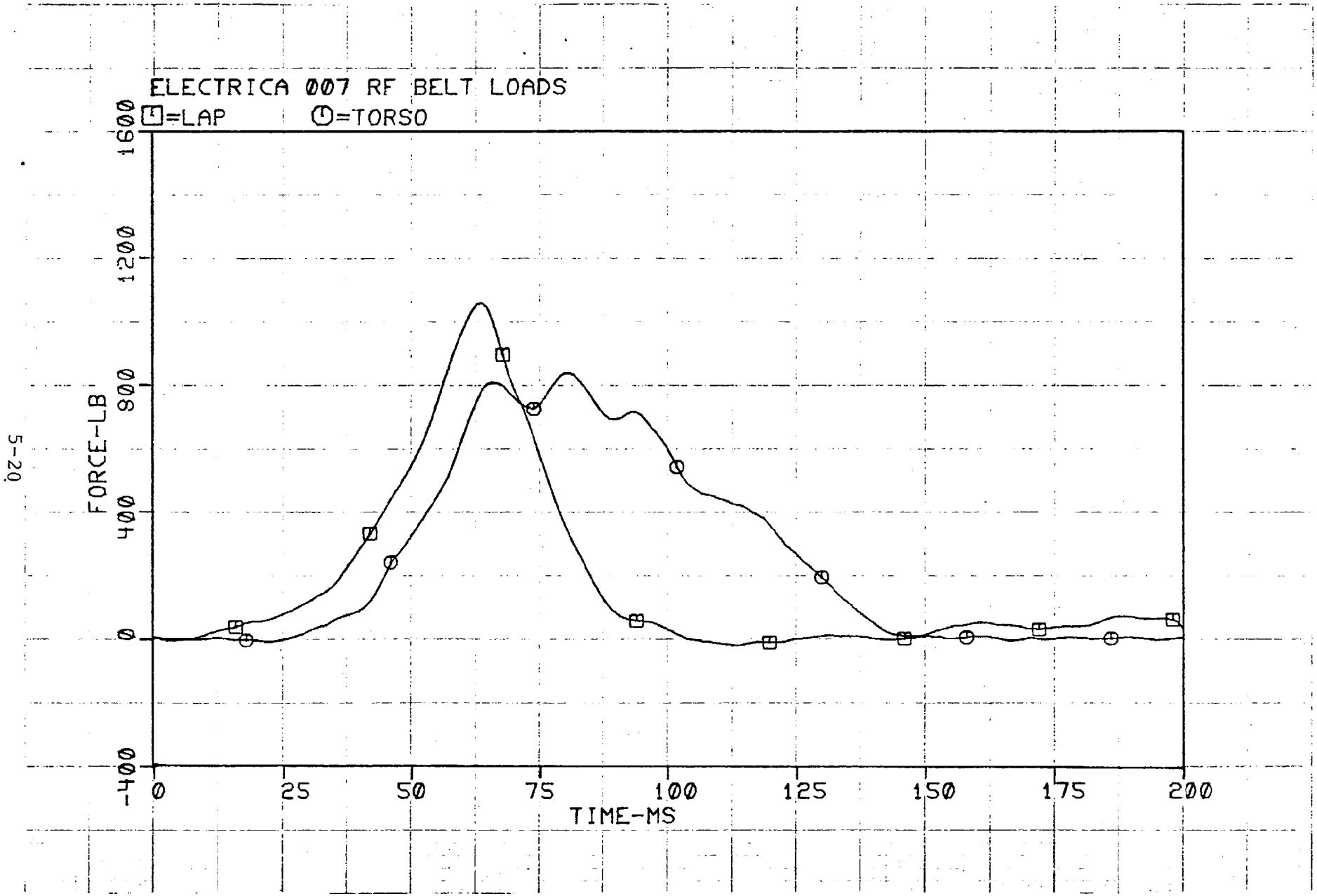

ELECTRICA 007 RF CHEST AX
ACCELERATION-G
10
0
-10
-20
-30
-40
0
25
50
75
100
125
150
175
200
TIME-MS

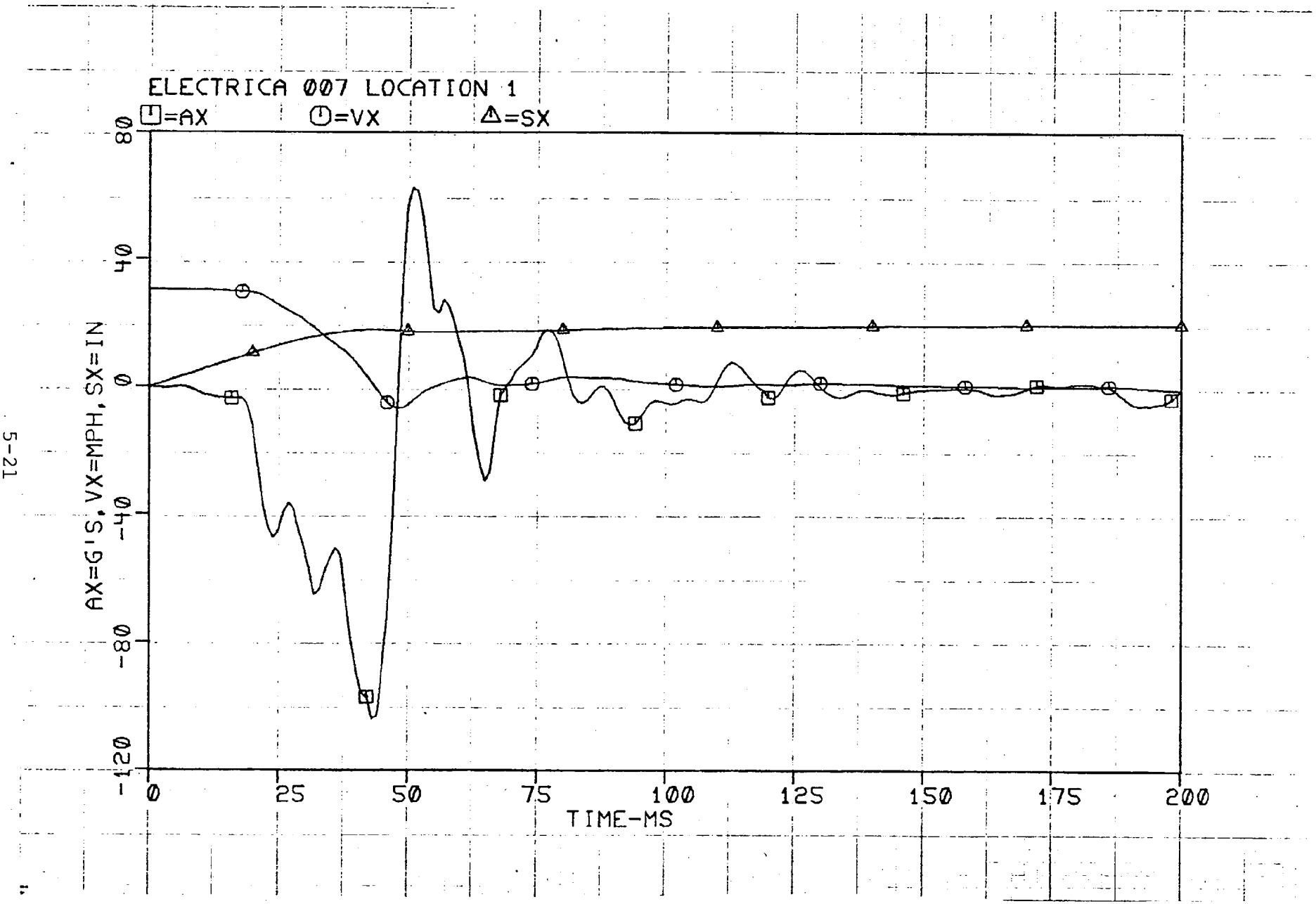

ELECTRICA 007 RF CHEST AY
ACCELERATION-G
40
30
20
10
0
-10
TIME-MS
0
25
50
75
100
125
150
175
200

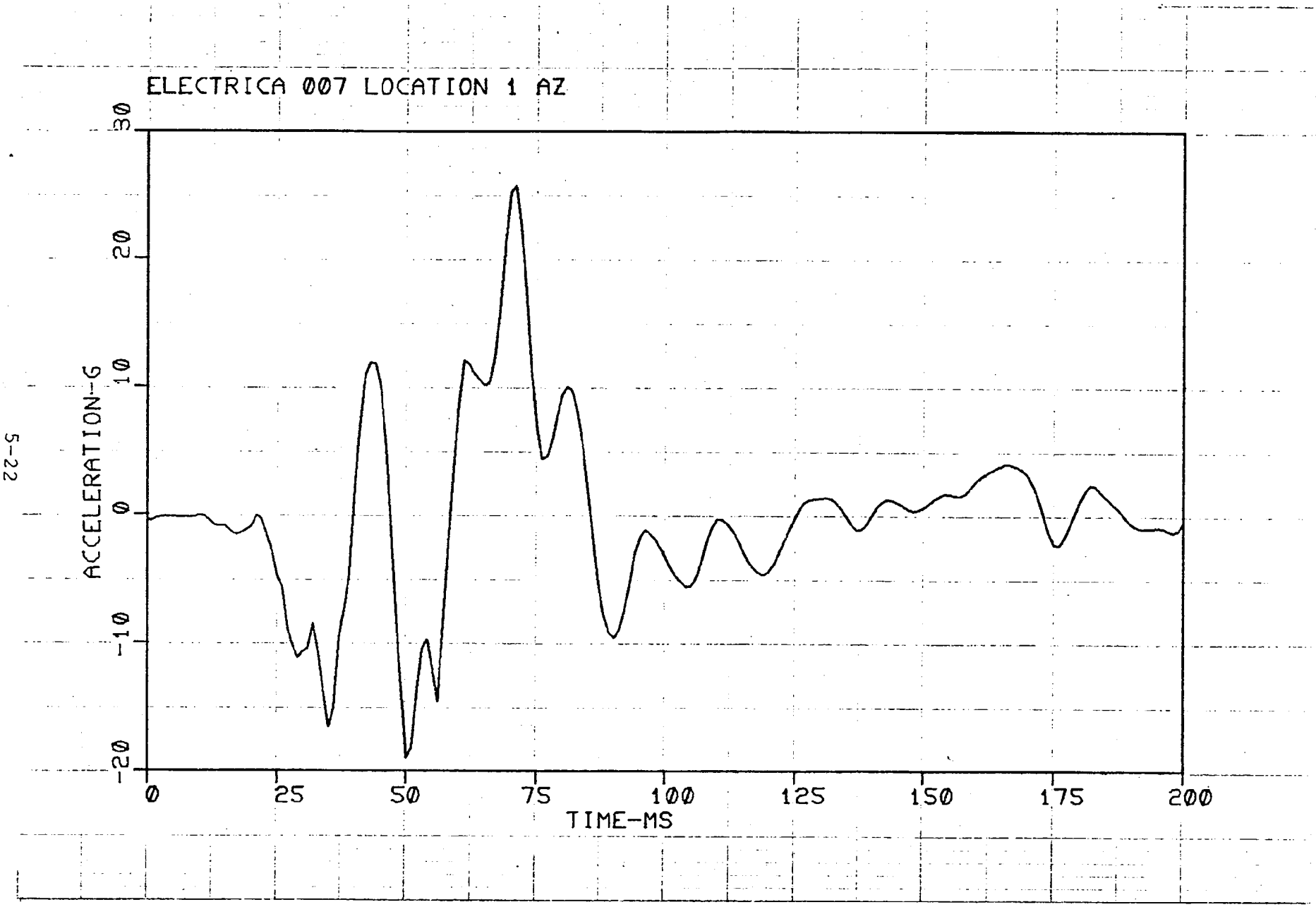

ELECTRICA 007 RF CHEST AZ
ACCELERATION-G
16
12
8
4
0
-4
0
25
50
75
100
125
150
175
200
TIME-MS

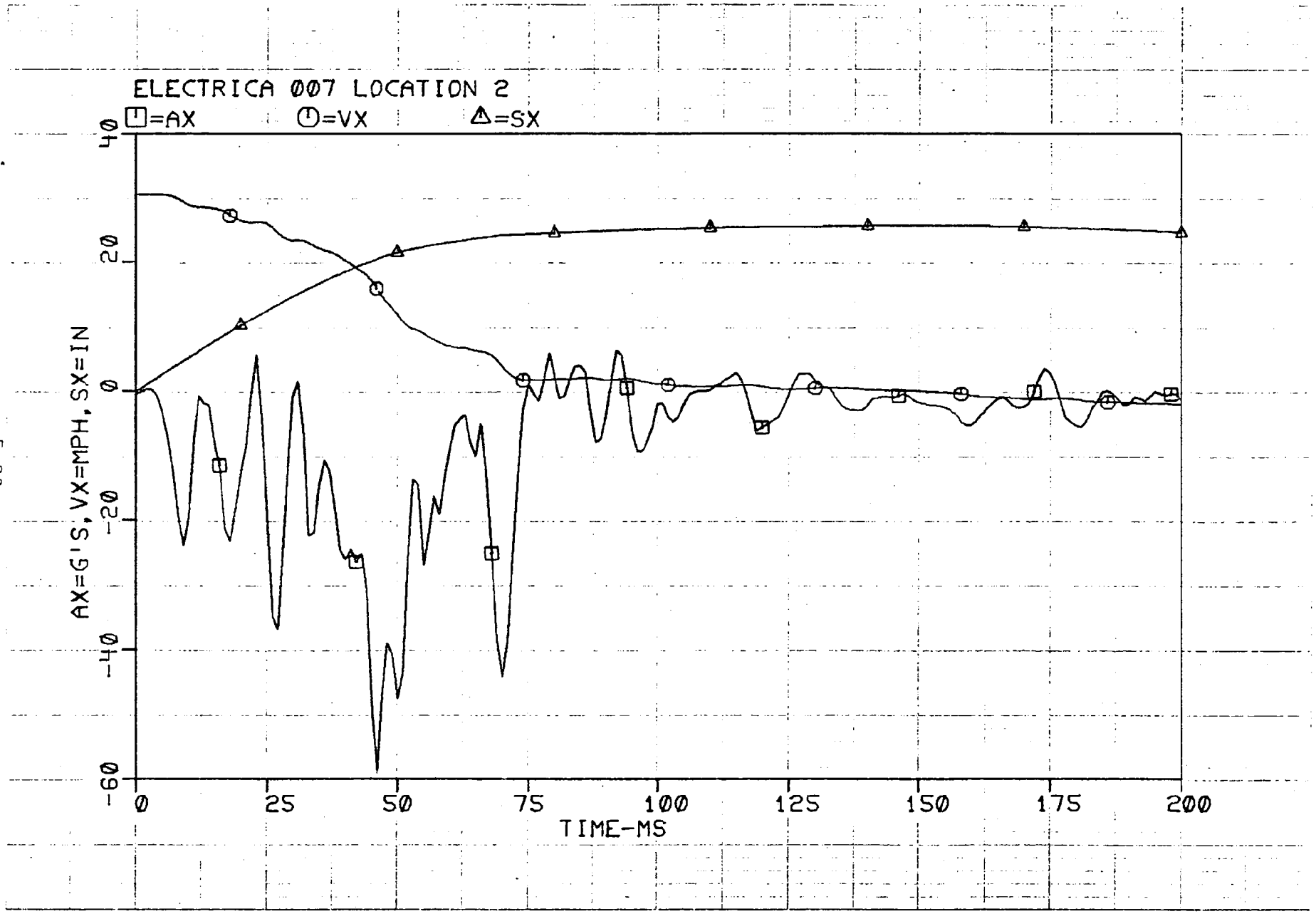

ELECTRICA 007 RF CHEST AR
ACCELERATION-G
0
10
20
30
40
50
0
25
50
75
100
125
150
175
200
TIME-MS

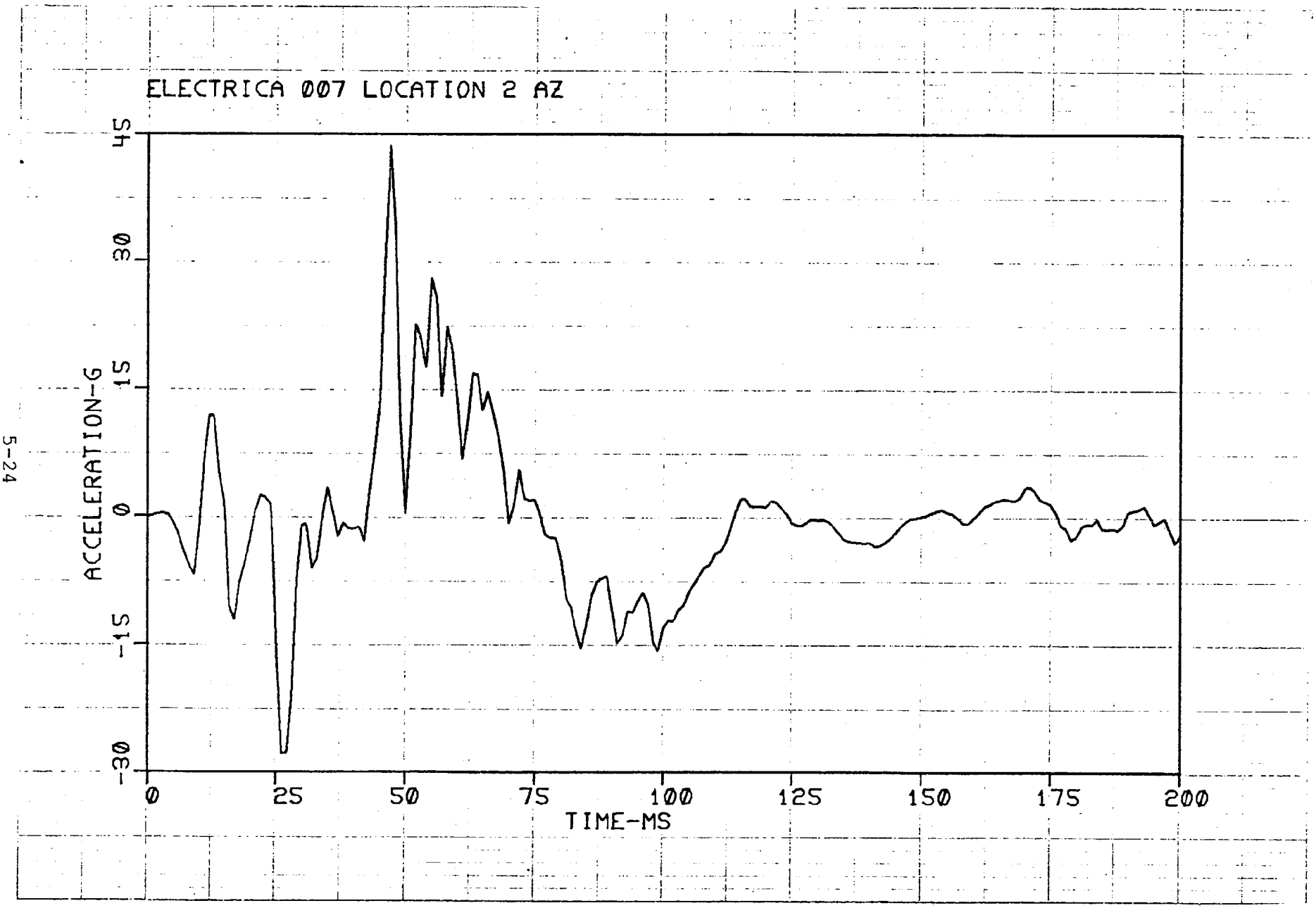

ELECTRICA 007 RF FEMURS
□=LEFT ○=RIGHT
FORCE-LB
500
0
-500
-1000
-1500
-2000
0
25
50
75
100
125
150
175
200
TIME-MS

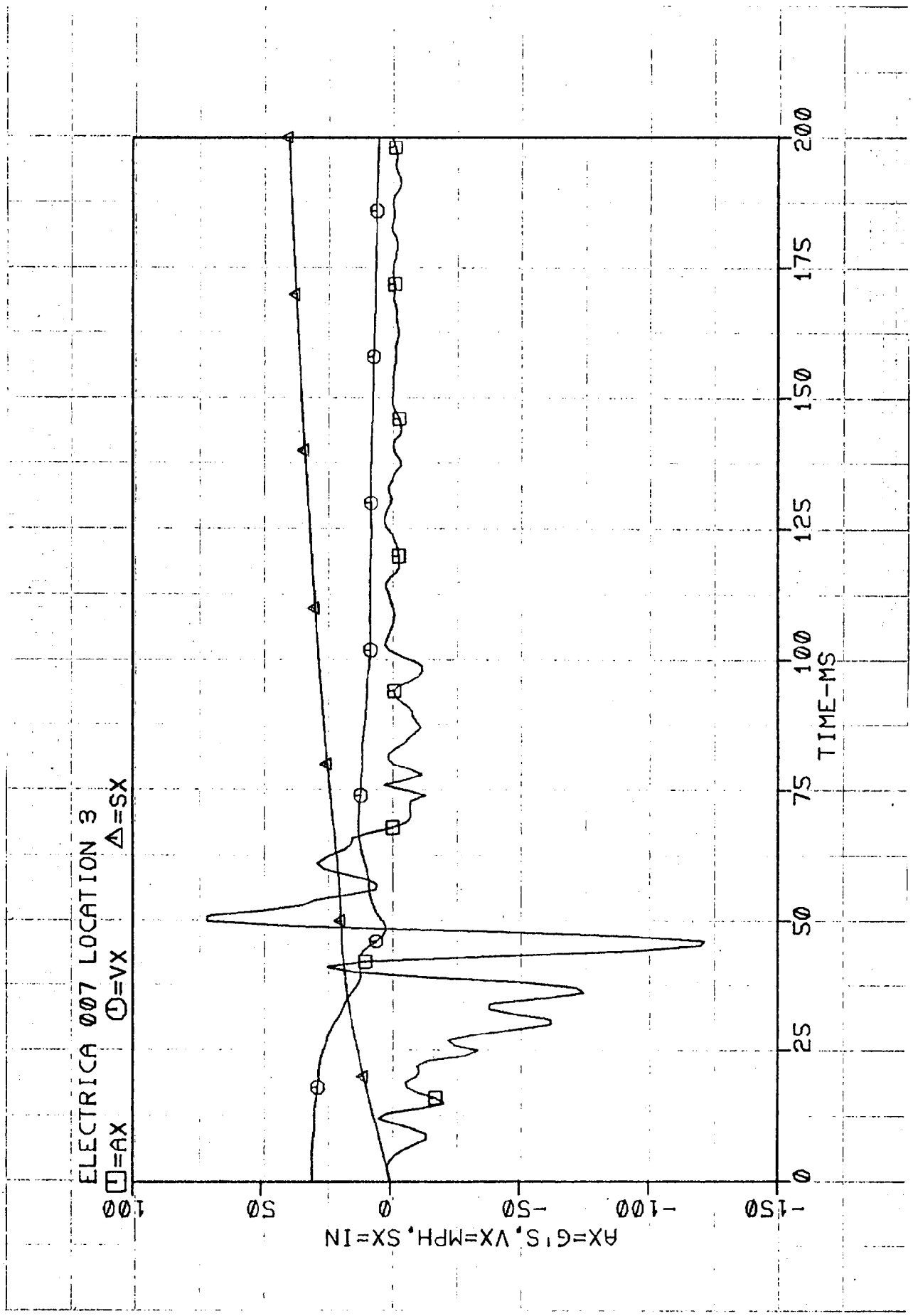

ELECTRICA 007 RF BELT LOADS
□=LAP
○=TORSO
FORCE-LB
1600
1200
800
400
0
-400
0
25
50
75
100
125
150
175
200
TIME-MS

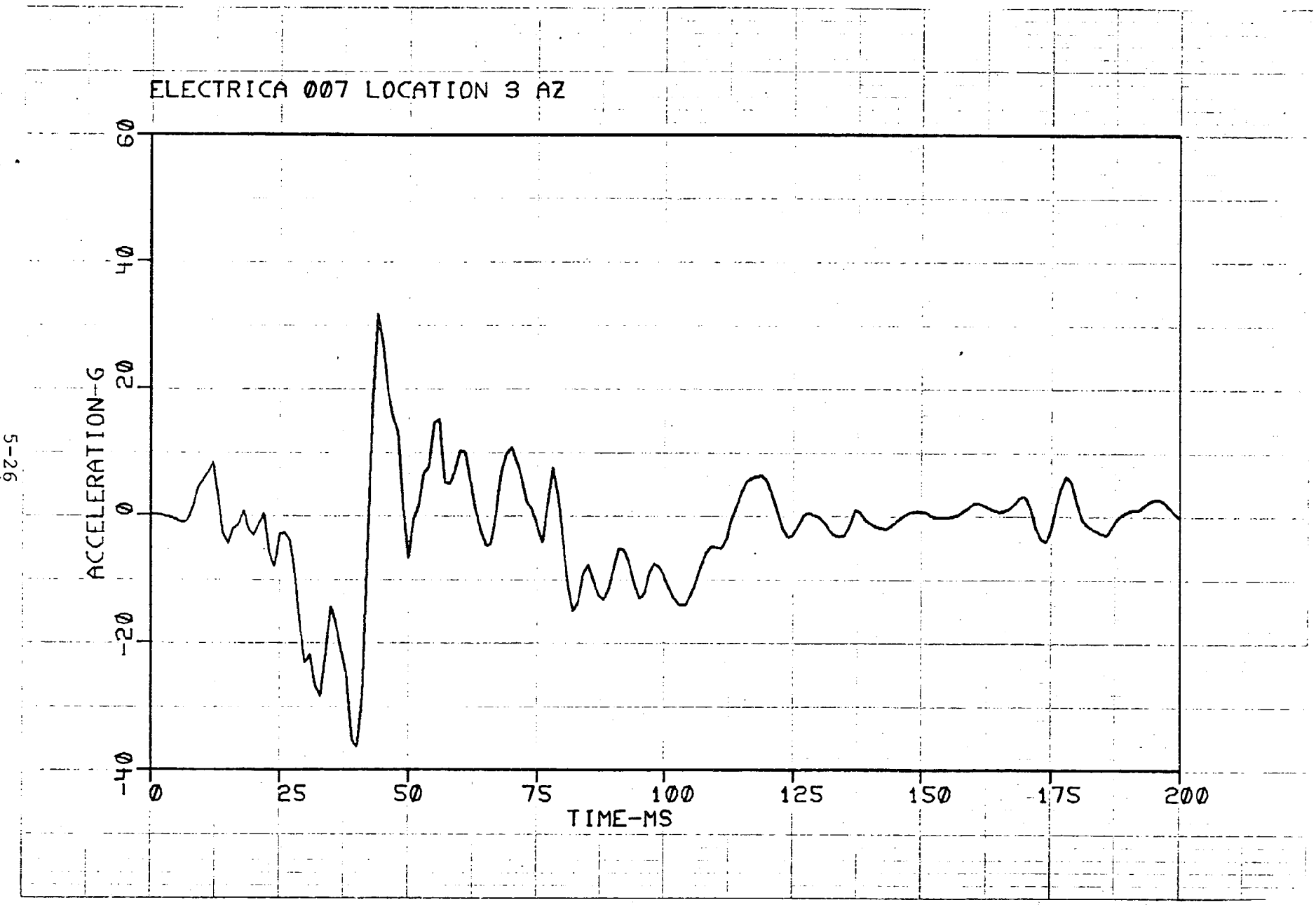

ELECTRICA 007 LOCATION 1
□=AX
○=VX
△=SX
80
40
0
-40
-80
-120
AX=G'S, VX=MPH, SX=IN
0
25
50
75
100
125
150
175
200
TIME-MS

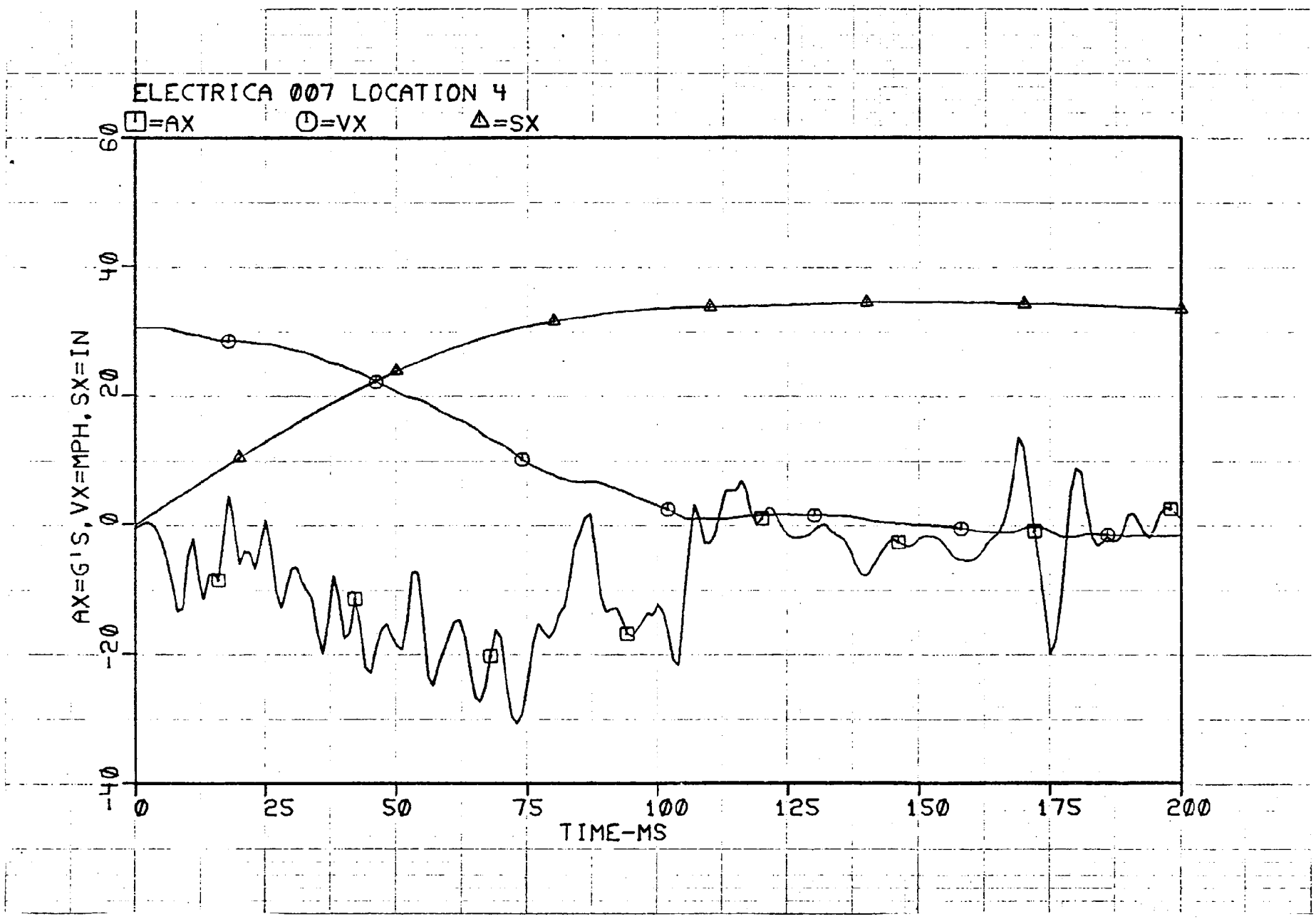

ELECTRICA 007 LOCATION 1 AZ
ACCELERATION-G
30
20
10
0
-10
-20
0
25
50
75
100
125
150
175
200
TIME-MS

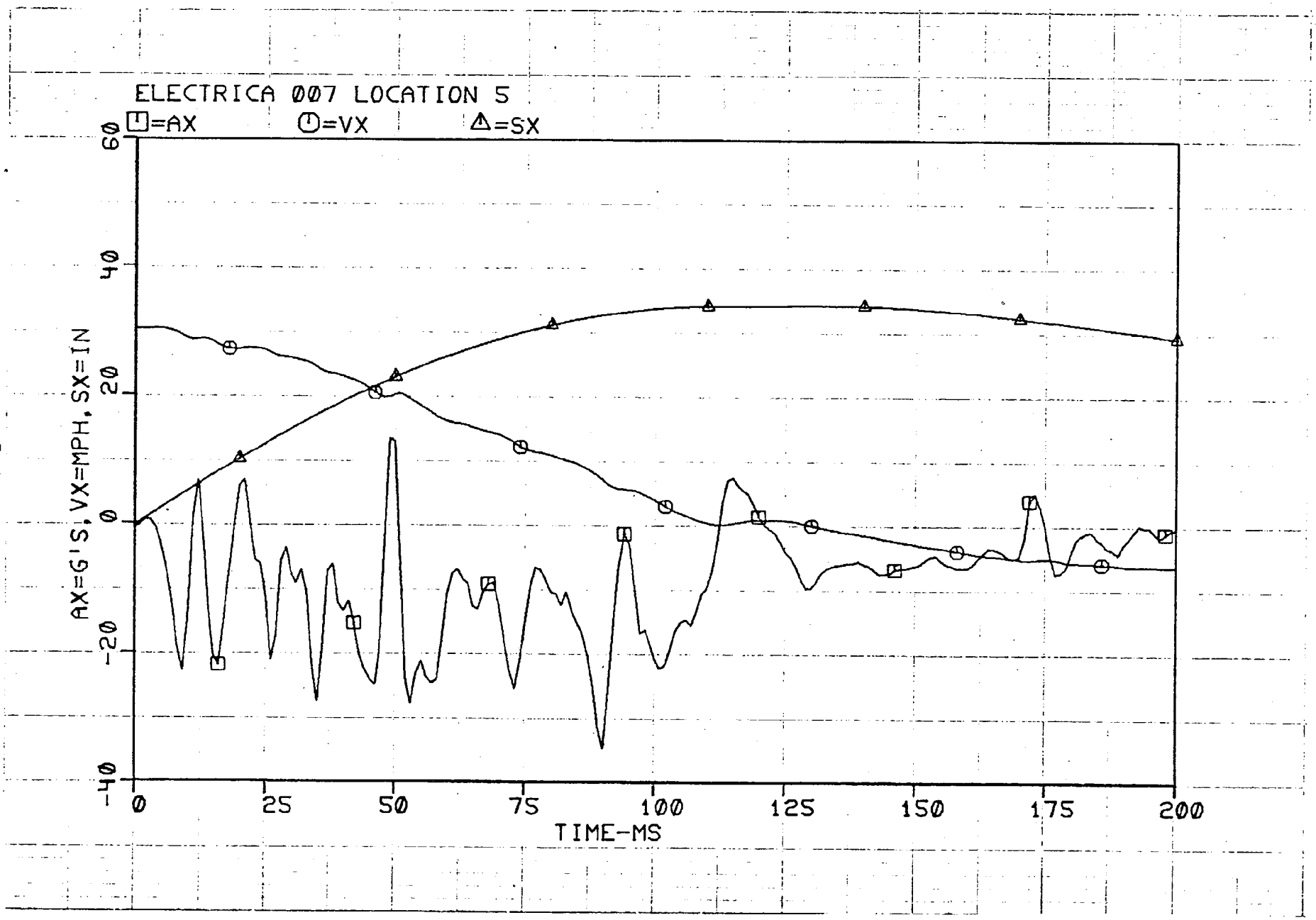

ELECTRICA 007 LOCATION 2
□=AX
⏲=VX
△=SX
AX=G'S, VX=MPH, SX=IN
40
20
0
-20
-40
-60
0
25
50
75
100
125
150
175
200
TIME-MS

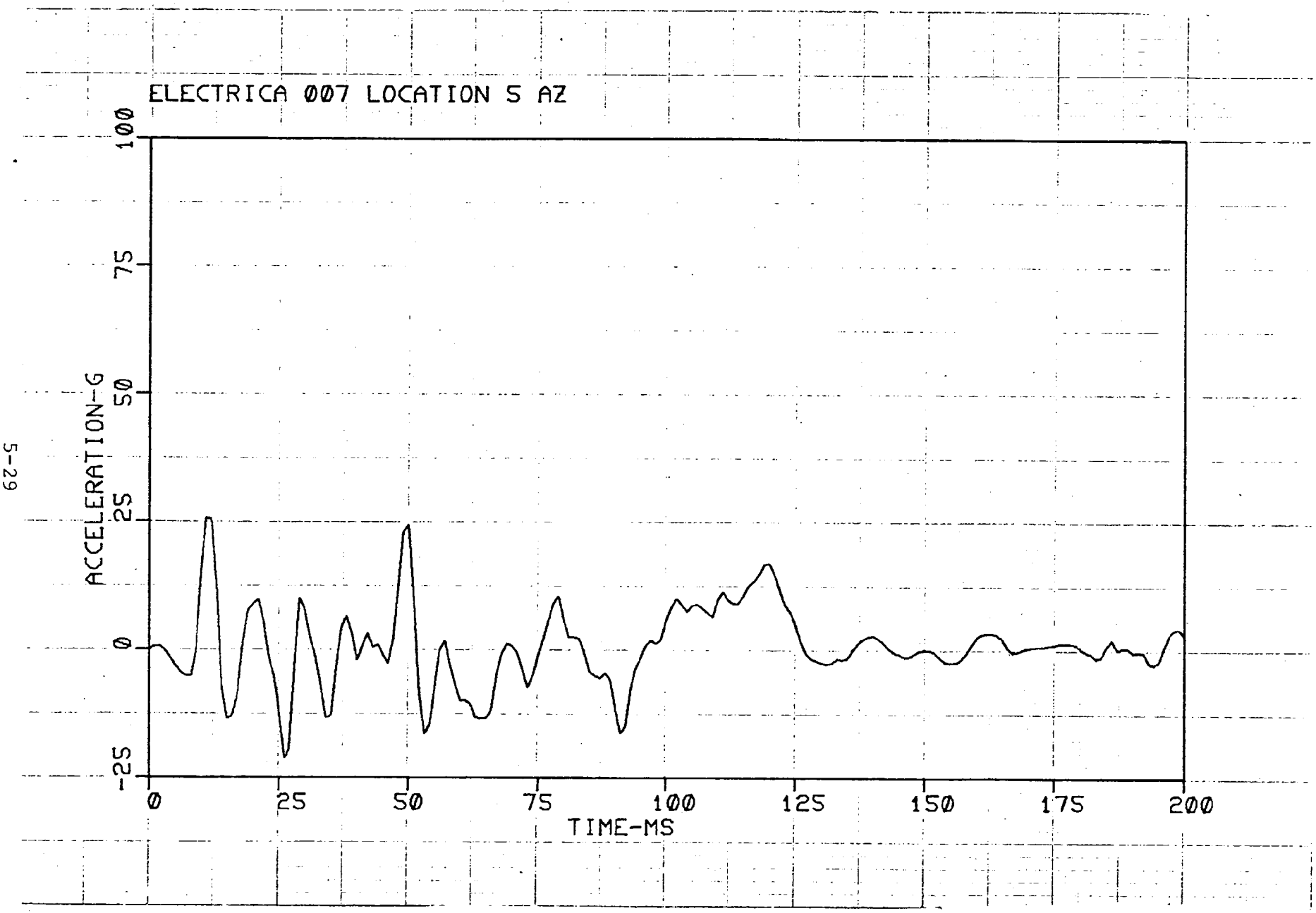

ELECTRICA 007 LOCATION 2 AZ
ACCELERATION-G
45
30
15
0
-15
-30
0
25
50
75
100
125
150
175
200
TIME-MS

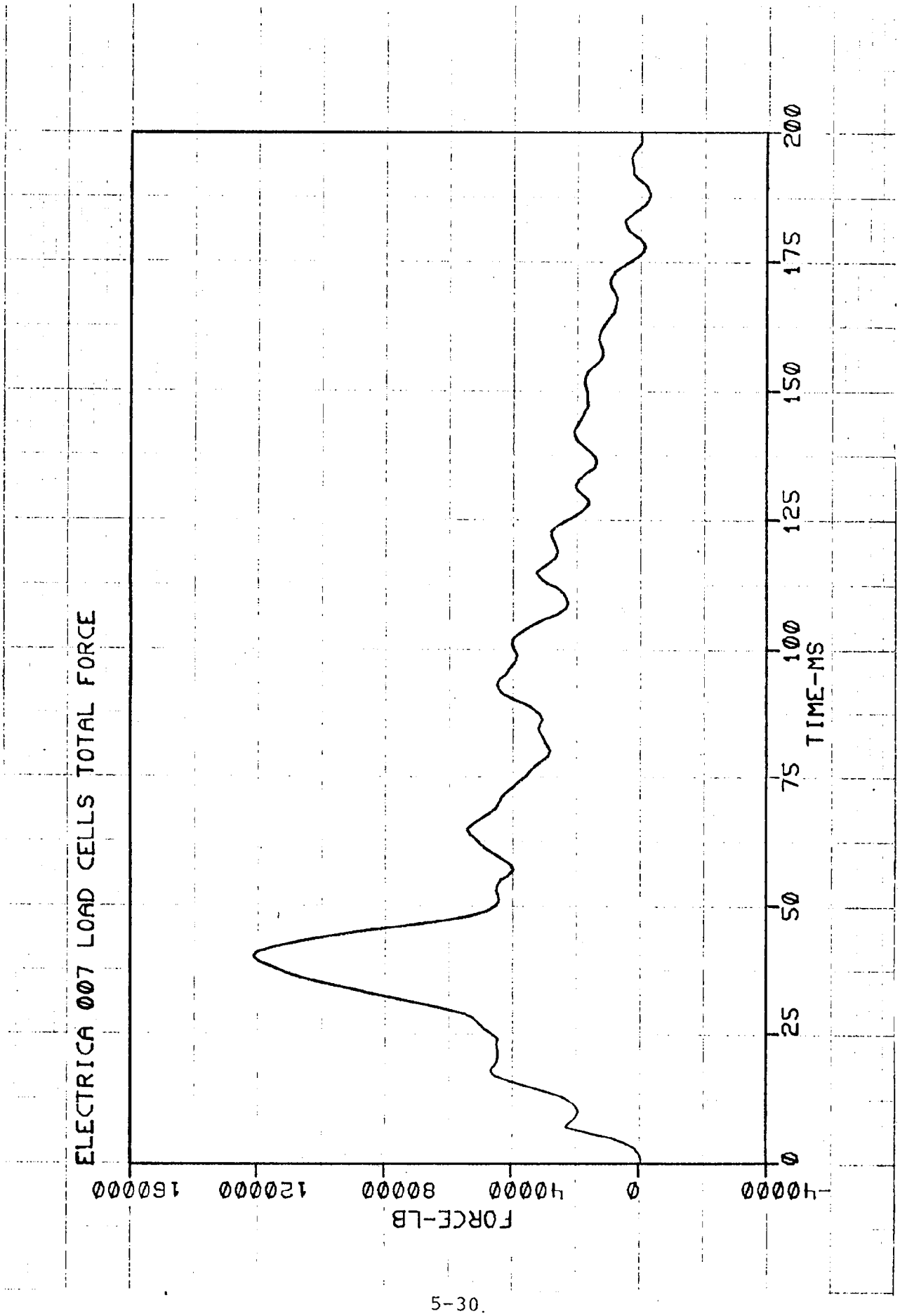

ELECTRICA 007 LOCATION 3
□=AX
○=VX
Δ=SX
AX=G'S, VX=MPH, SX=IN
100
50
0
-50
-100
-150
0
25
50
75
100
125
150
175
200
TIME-MS

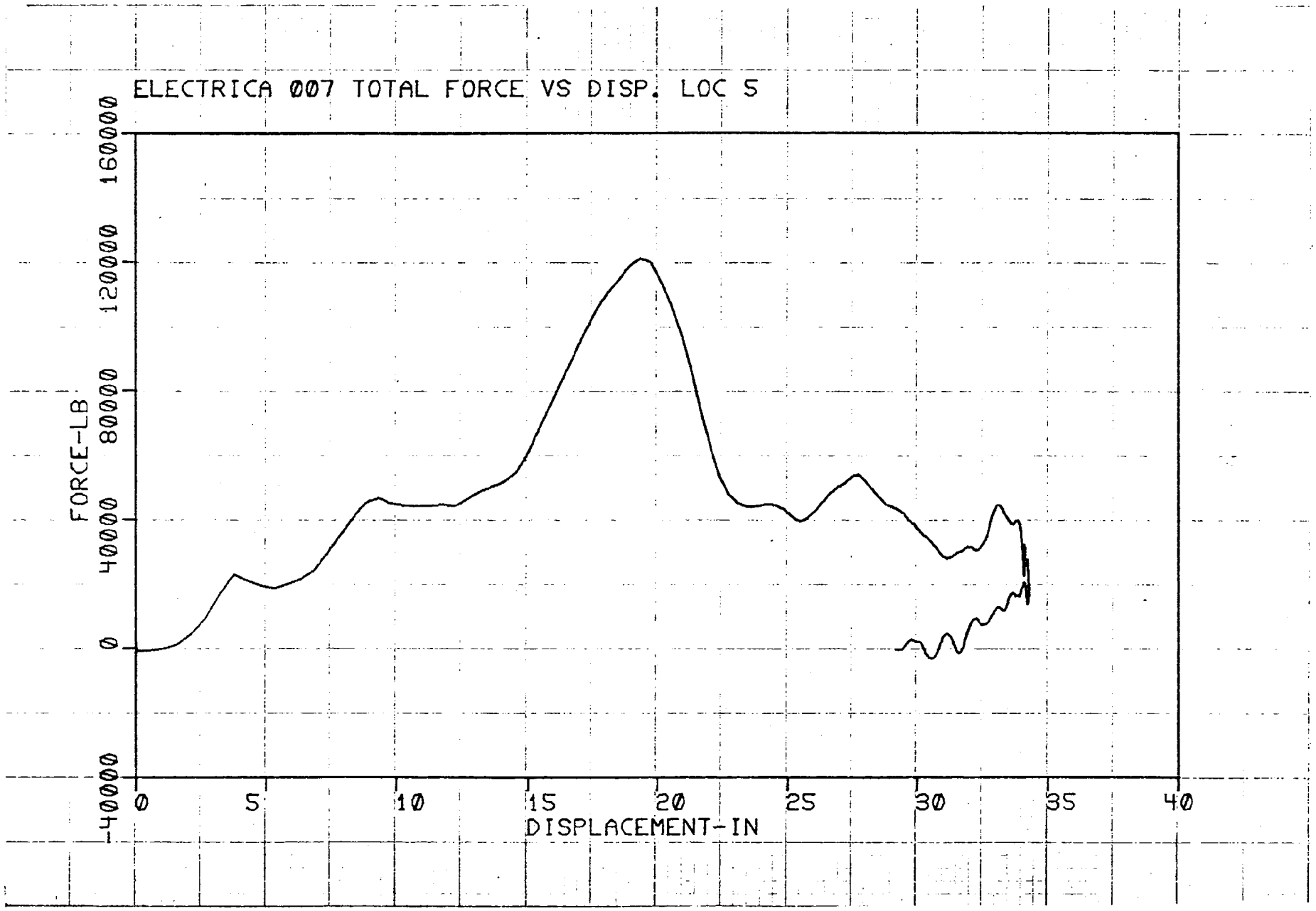

ELECTRICA 007 LOCATION 3 AZ
ACCELERATION-G
60
40
20
0
-20
-40
0
25
50
75
100
125
150
175
200
TIME-MS

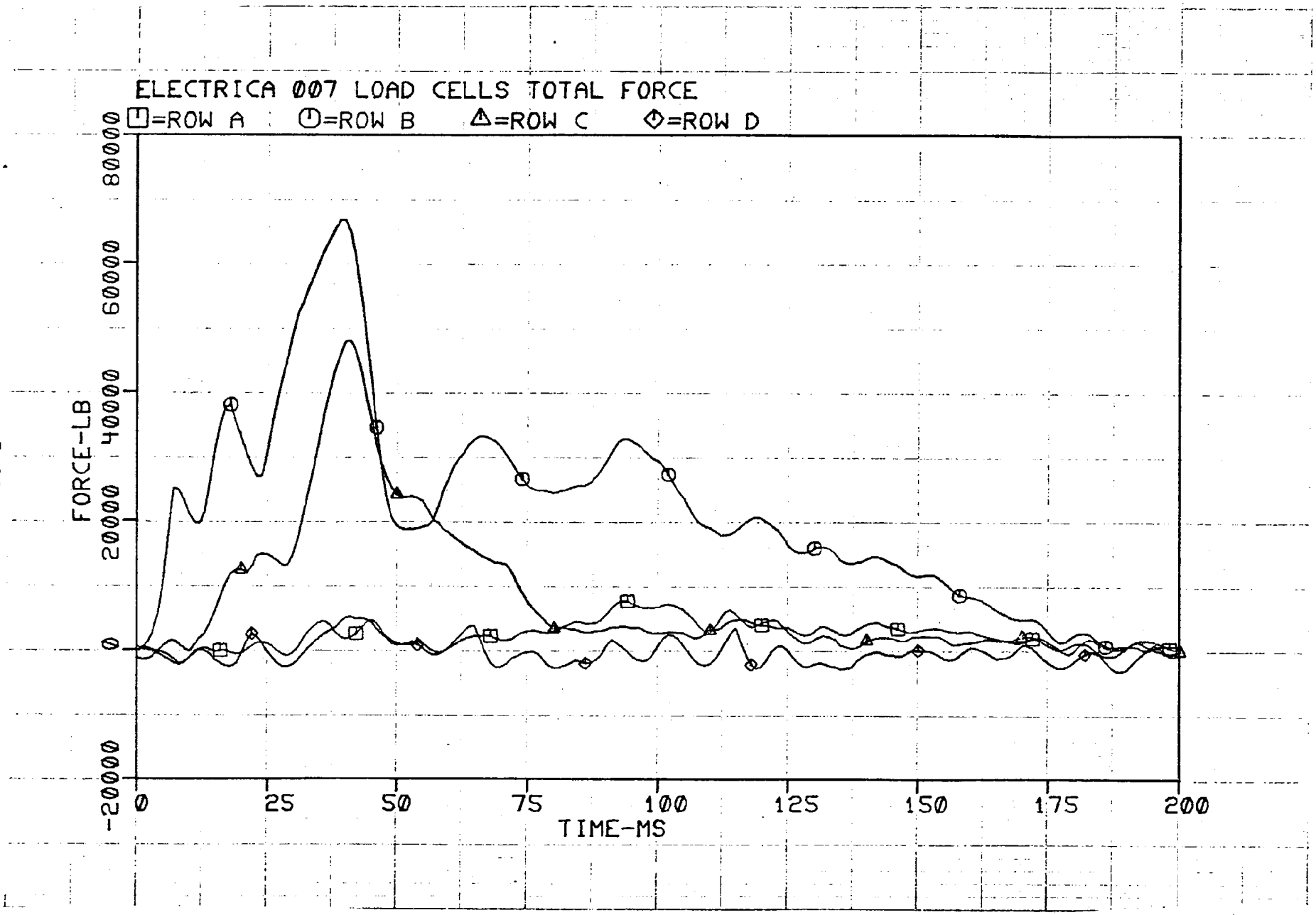

ELECTRICA 007 LOCATION 4
□=AX
○=VX
△=SX
AX=G'S, VX=MPH, SX=IN
60
40
20
0
-20
-40
0
25
50
75
100
125
150
175
200
TIME-MS

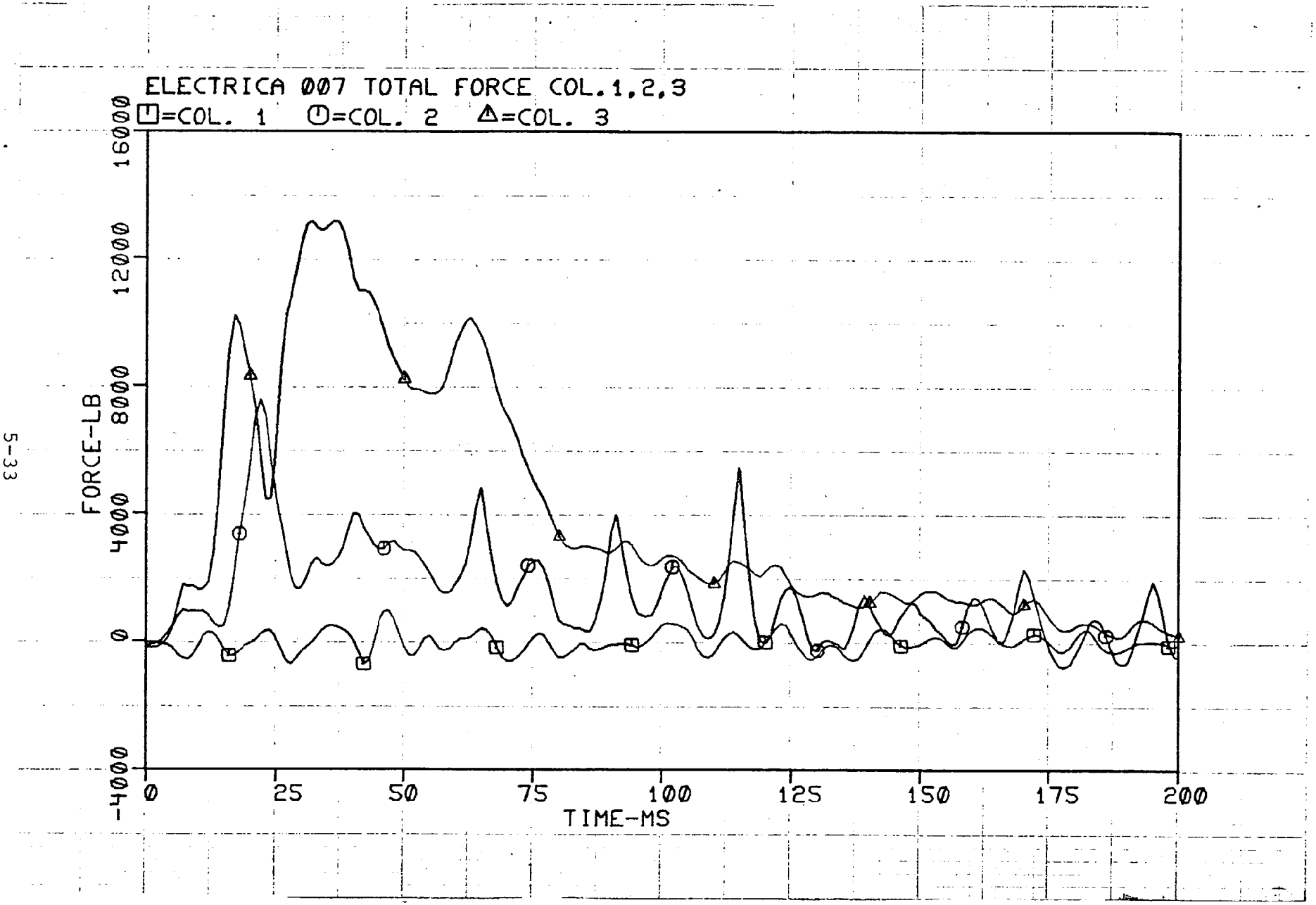

ELECTRICA 007 LOCATION 5
□=AX
○=VX
△=SX
AX=G'S, VX=MPH, SX=IN
60
40
20
0
-20
-40
0
25
50
75
100
125
150
175
200
TIME-MS

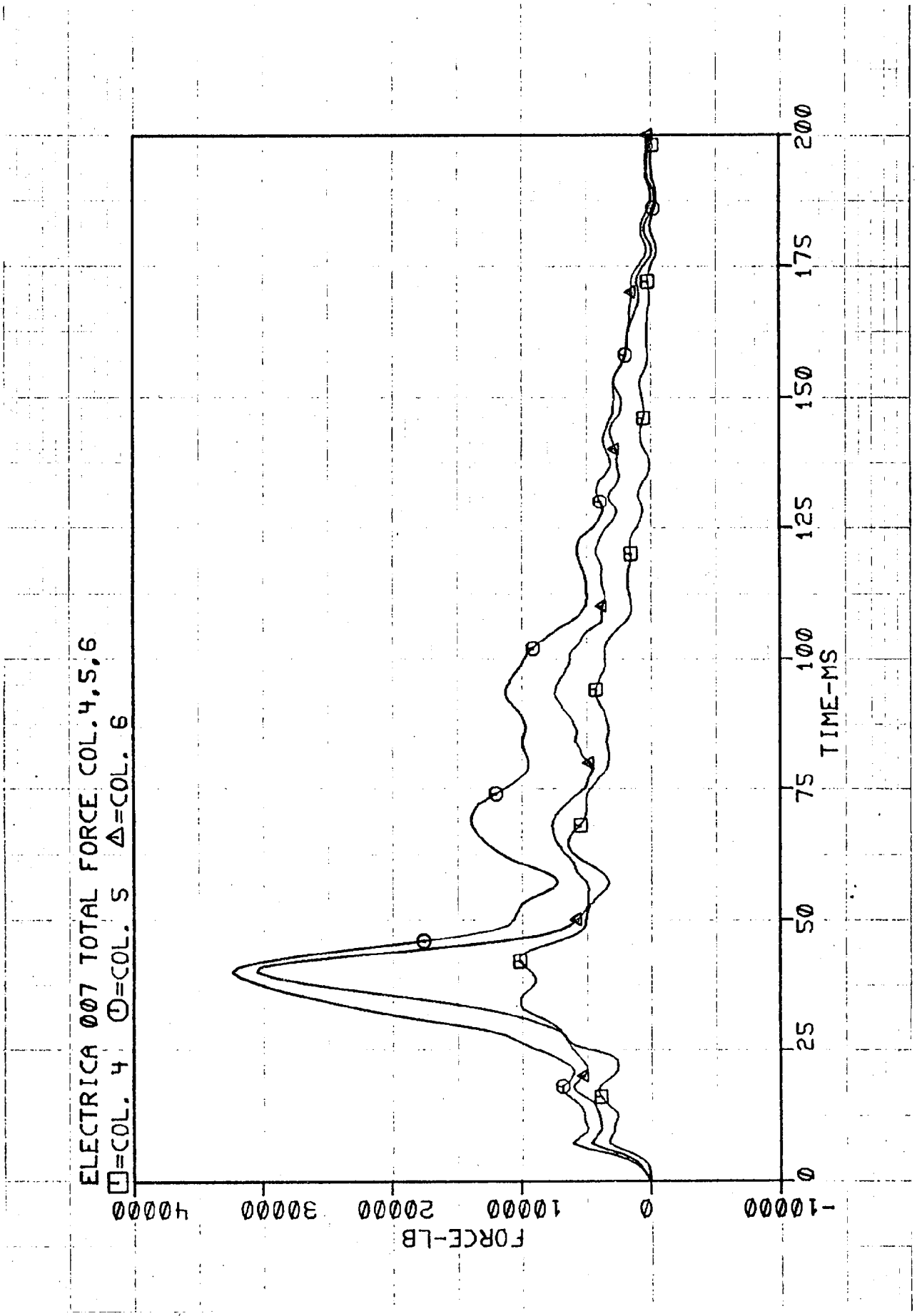

ELECTRICA 007 LOCATION 5 AZ
ACCELERATION-G
100
75
50
25
0
-25
0
25
50
75
100
125
150
175
200
TIME-MS

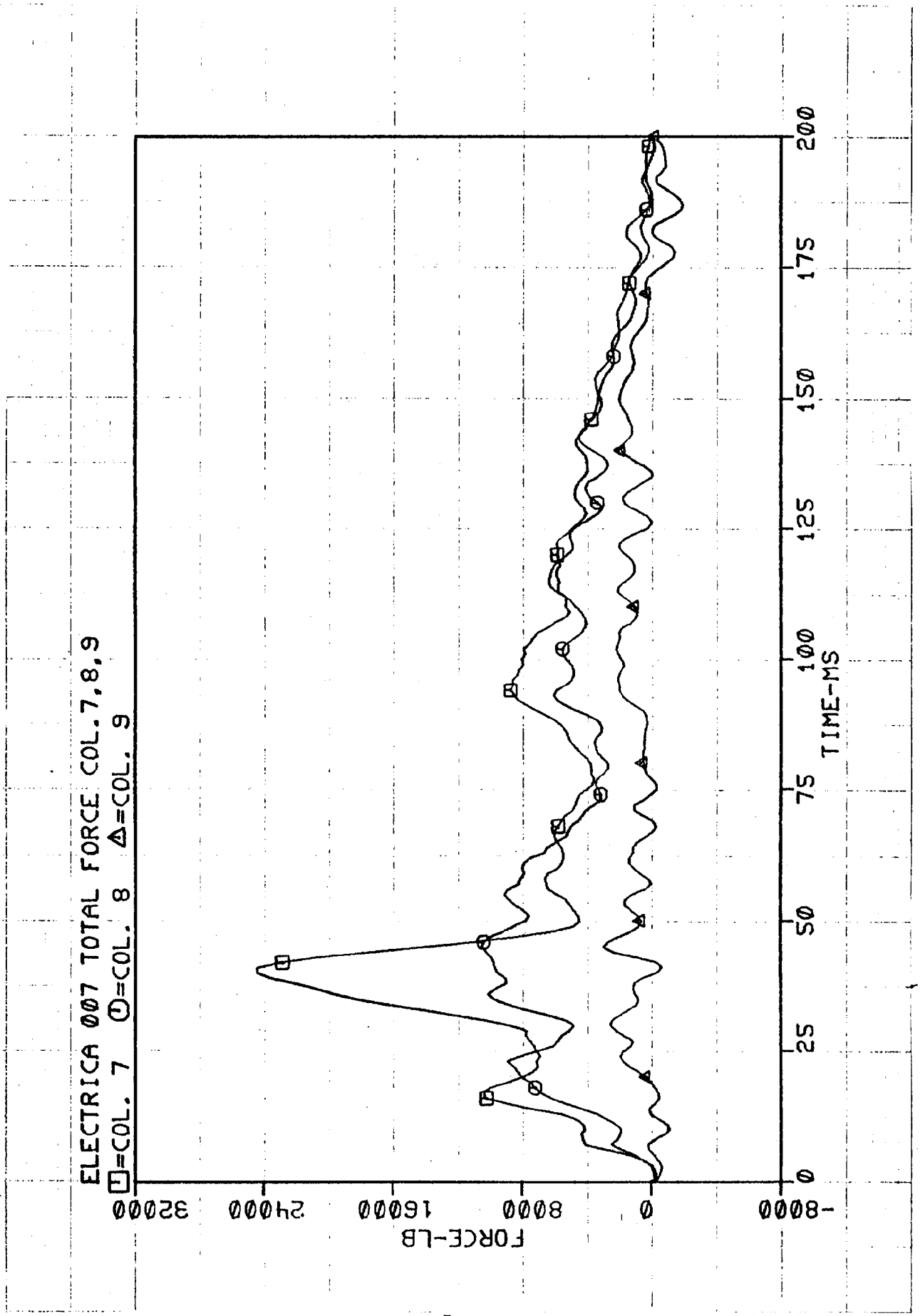

ELECTRICA 007 LOAD CELLS TOTAL FORCE
FORCE-LB
160000
120000
80000
40000
0
40000
TIME-MS
0
25
50
75
100
125
150
175
200

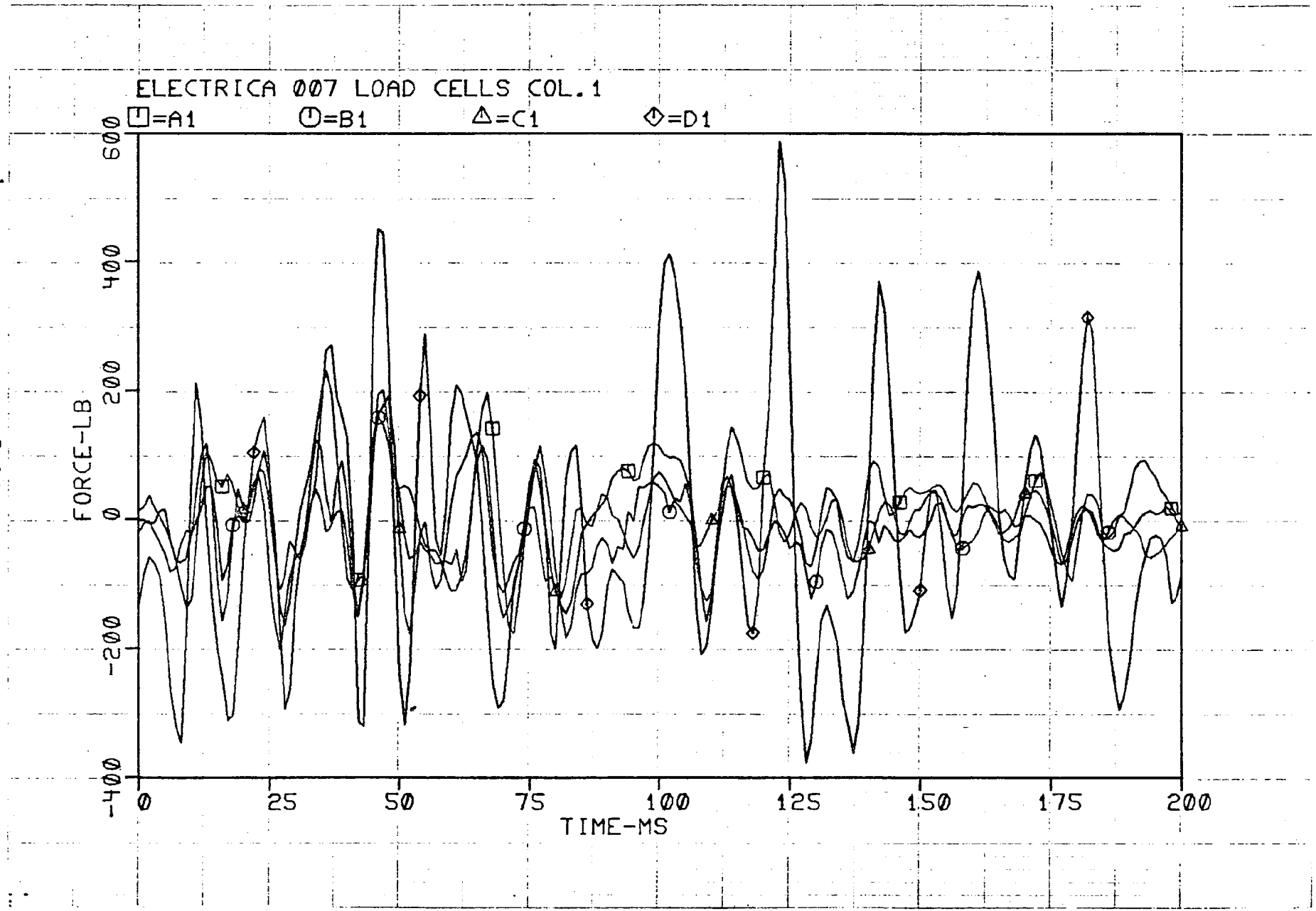

ELECTRICA 007 TOTAL FORCE VS DISP. LOC 5
FORCE-LB
160000
120000
80000
40000
0
-40000
0
5
10
15
20
25
30
35
40
DISPLACEMENT-IN

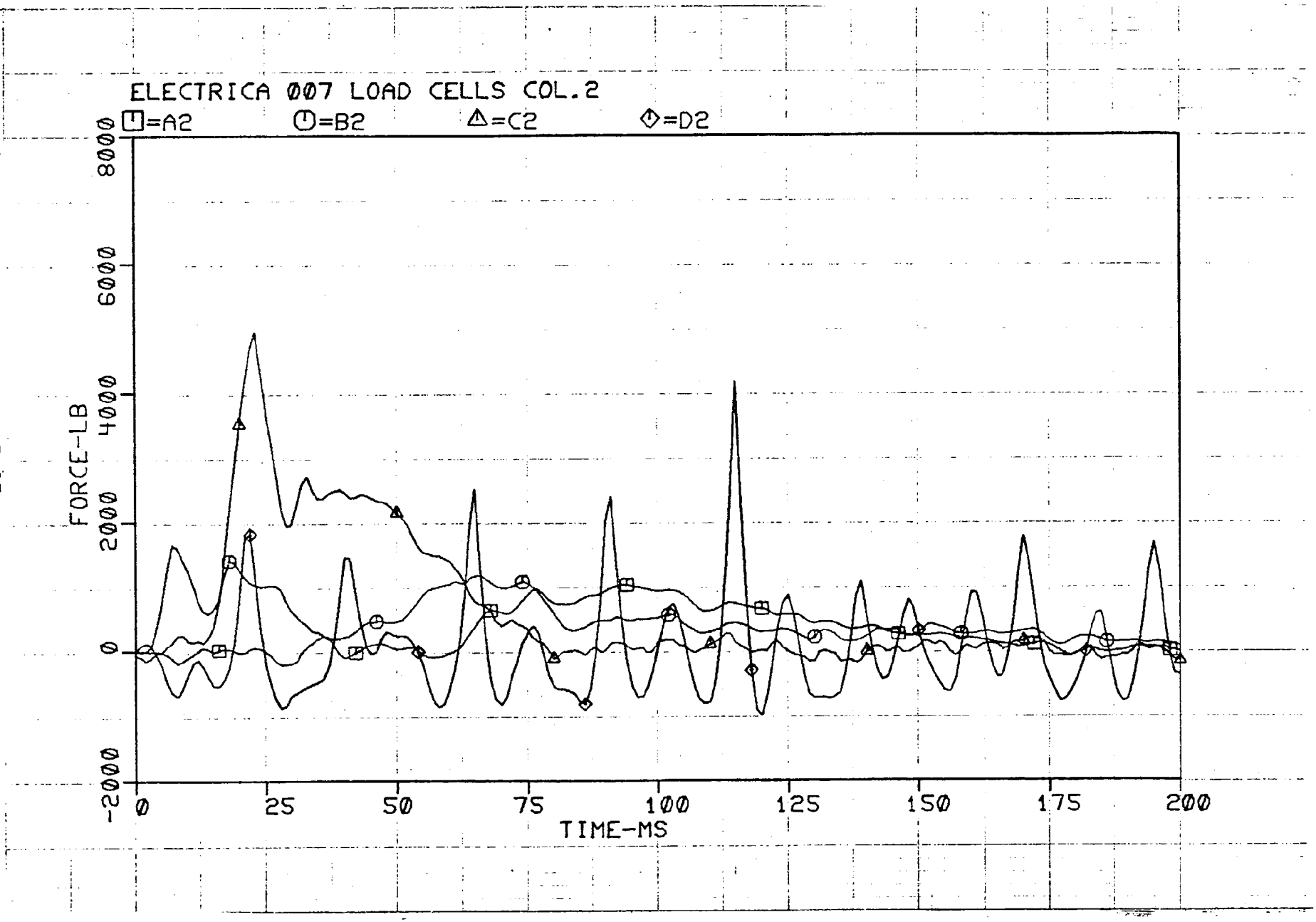

ELECTRICA 007 LOAD CELLS TOTAL FORCE
=ROW A
=ROW B
=ROW C
=ROW D
FORCE-LB
80000
60000
40000
20000
0
-20000
0
25
50
75
100
125
150
175
200
TIME-MS

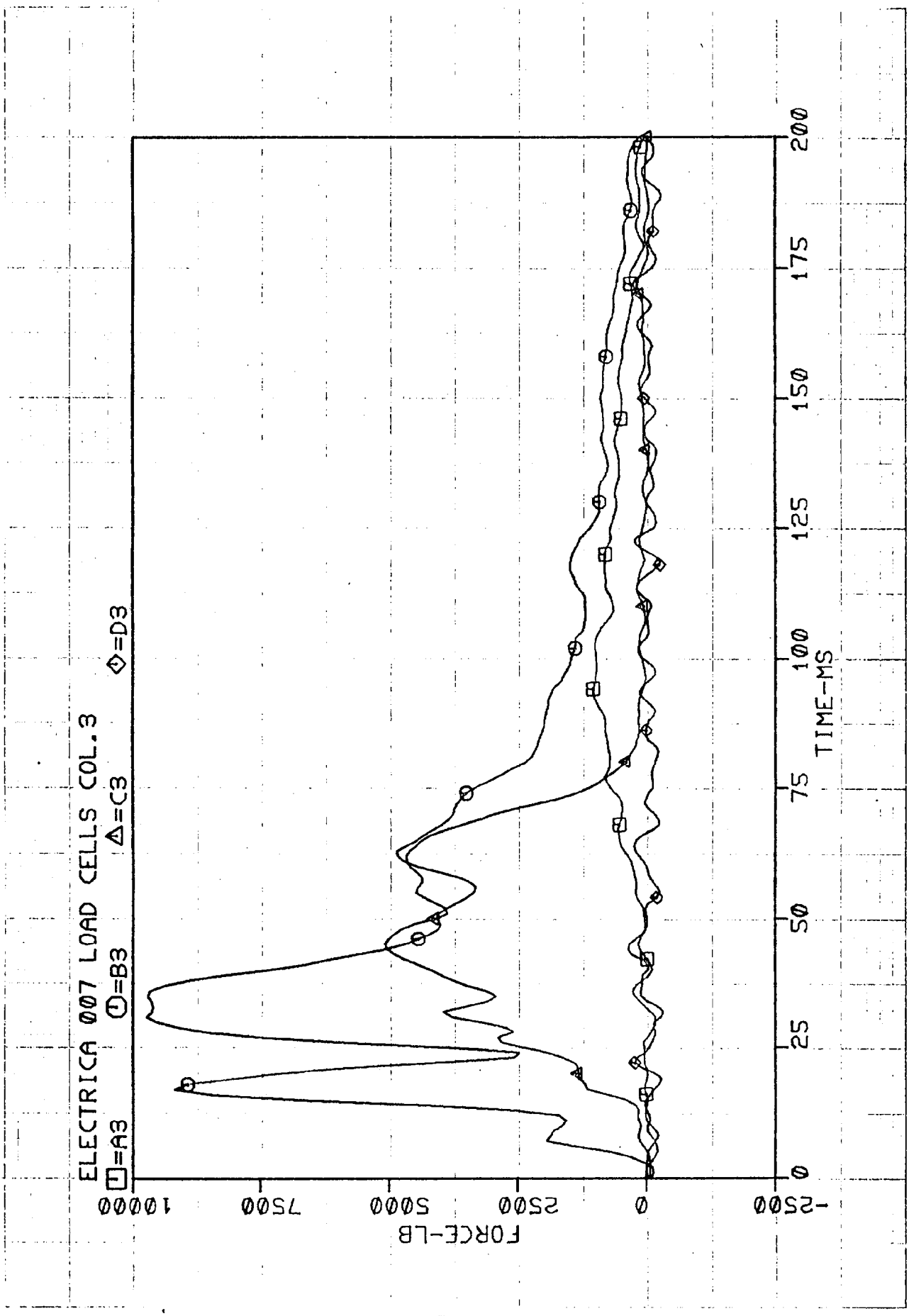

ELECTRICA 007 TOTAL FORCE COL.1,2,3
□=COL. 1 ○=COL. 2 △=COL. 3
FORCE-LB
16000
12000
8000
4000
0
-4000
0
25
50
75
100
125
150
175
200
TIME-MS

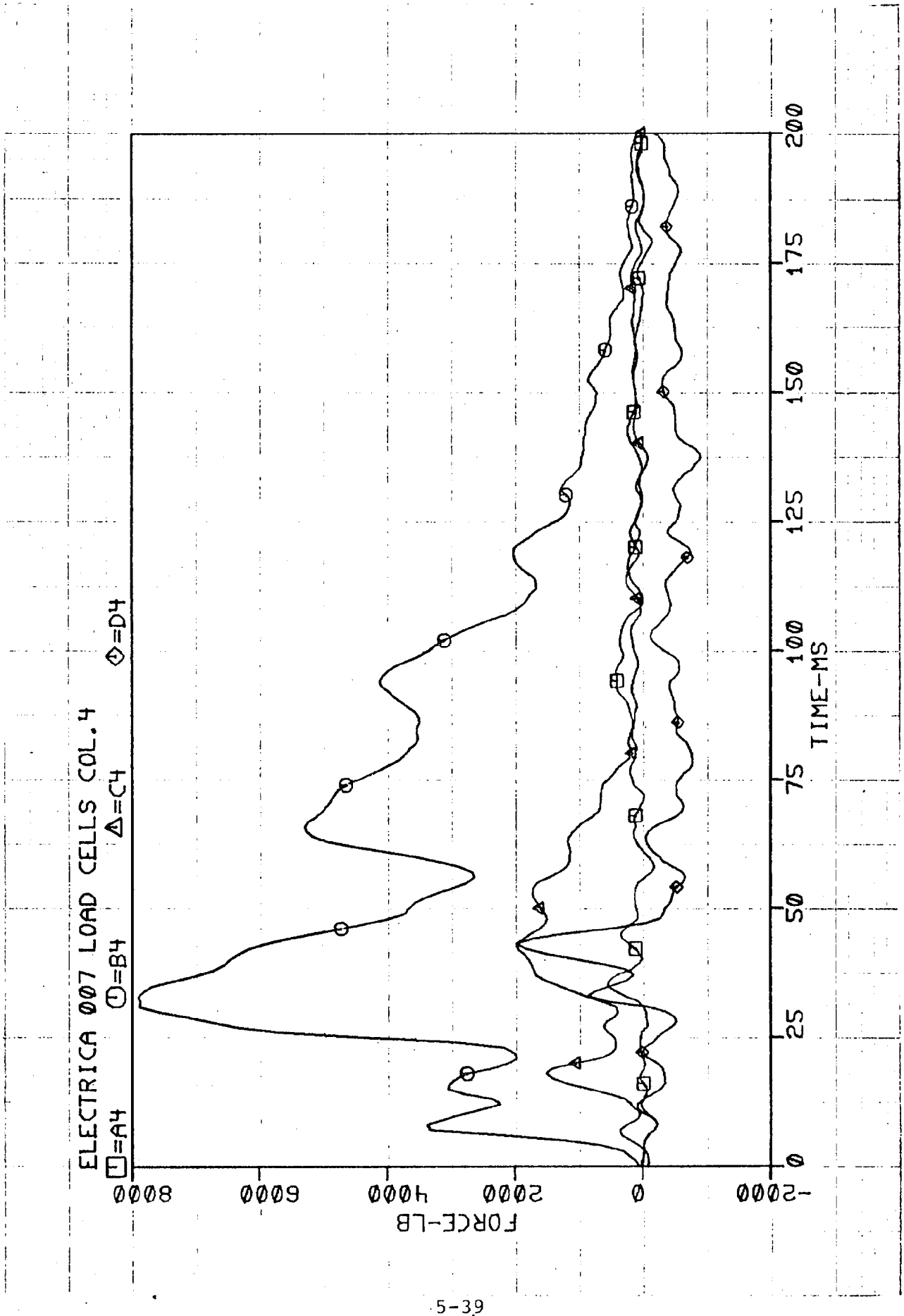

ELECTRICA 007 TOTAL FORCE COL.4,5,6
□=COL. 4 ○=COL. 5 Δ=COL. 6
FORCE-LB
-10000
0
10000
20000
30000
40000
TIME-MS
0
25
50
75
100
125
150
175
200

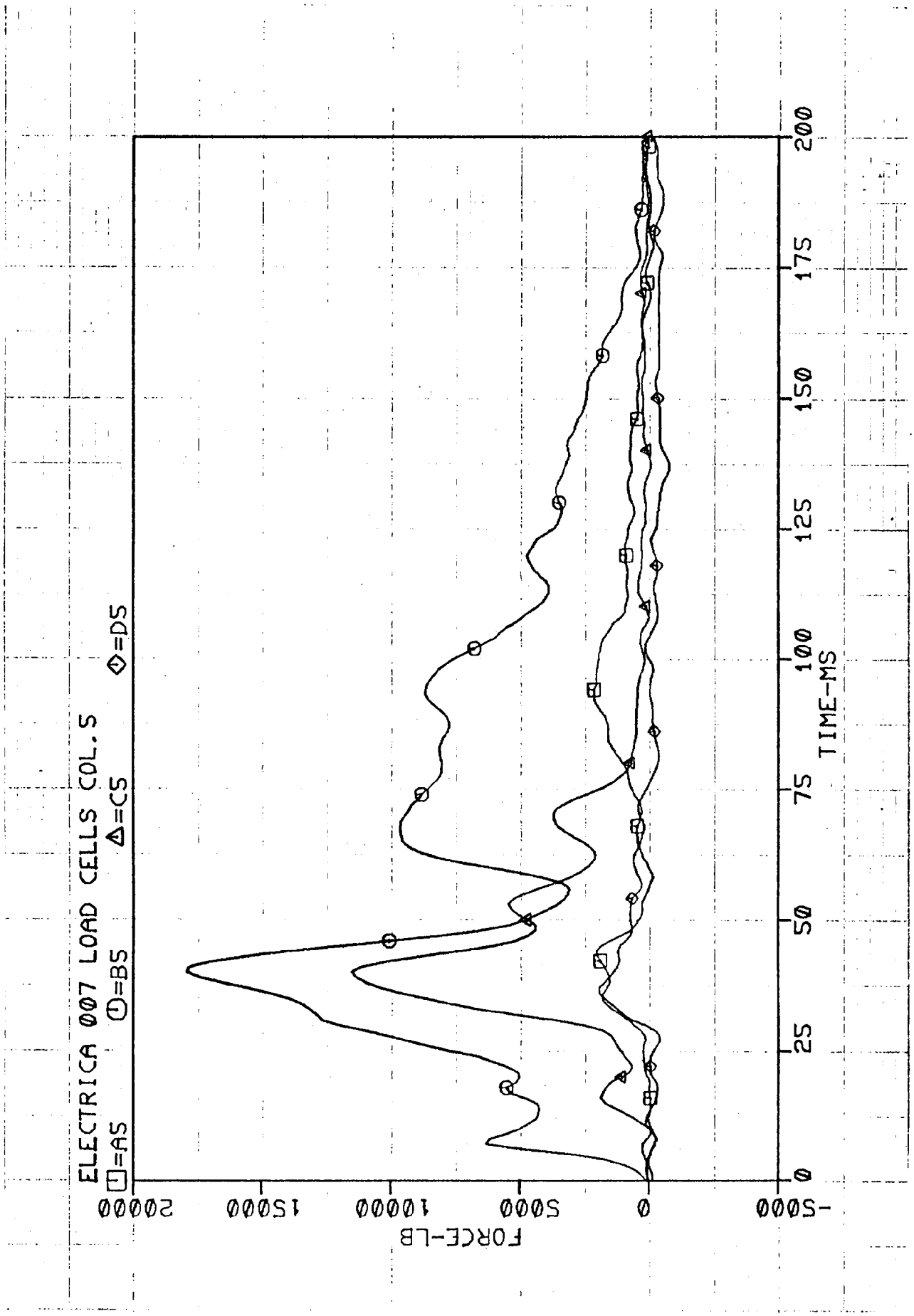

ELECTRICA 007 TOTAL FORCE COL.7,8,9
□=COL. 7 ○=COL. 8 △=COL. 9
FORCE-LB
32000
24000
16000
8000
0
-8000
0
25
50
75
100
125
150
175
200
TIME-MS

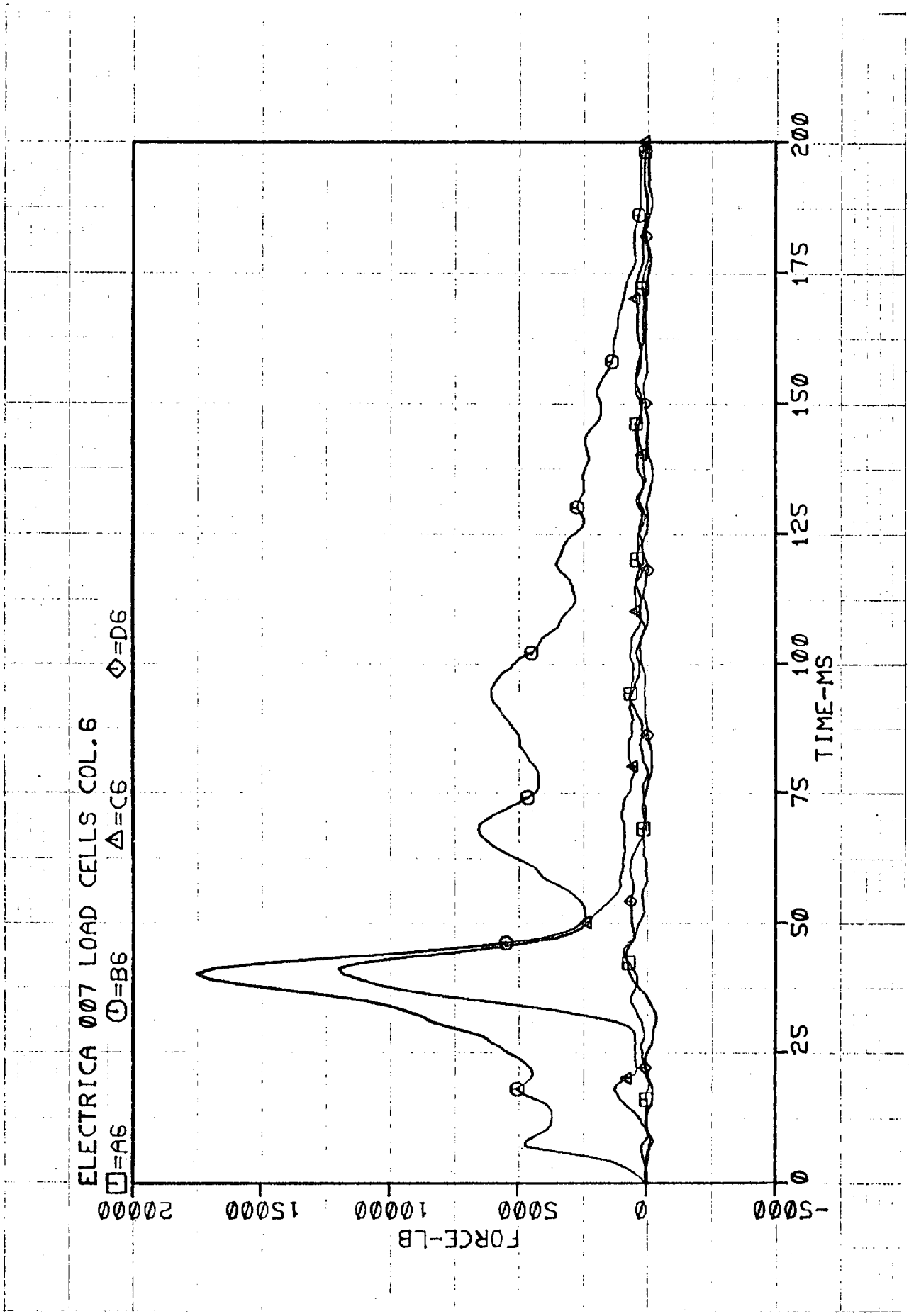

ELECTRICA 007 LOAD CELLS COL.1
□=A1
○=B1
△=C1
◇=D1
FORCE-LB
600
400
200
0
-200
-400
0
25
50
75
100
125
150
175
200
TIME-MS

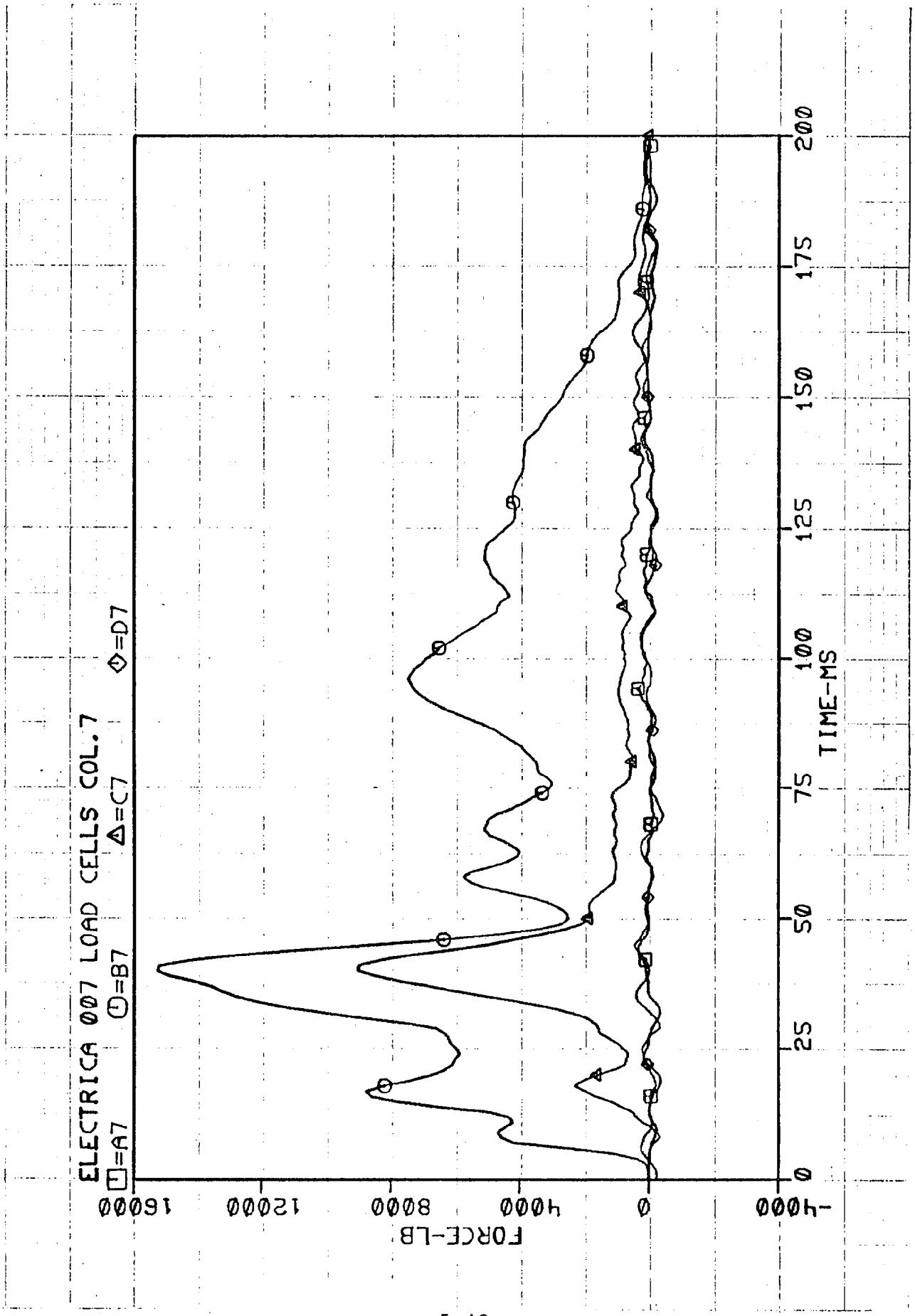

ELECTRICA 007 LOAD CELLS COL.2
=A2
=B2
=C2
=D2
8000
6000
4000
2000
0
-2000
FORCE-LB
0
25
50
75
100
125
150
175
200
TIME-MS

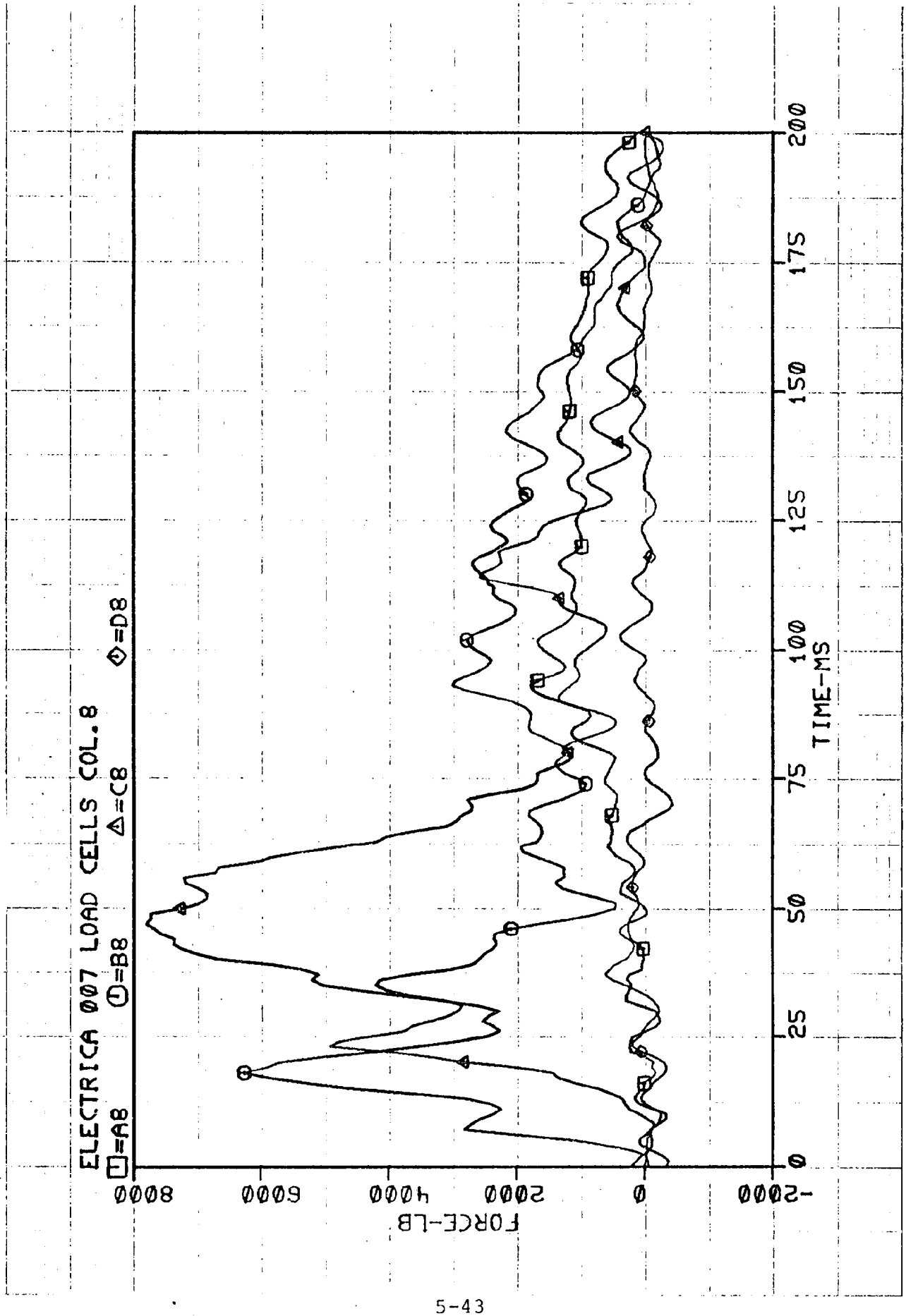

ELECTRICA 007 LOAD CELLS COL.3
□=A3
○=B3
△=C3
◇=D3
FORCE-LB
10000
7500
5000
2500
0
-2500
TIME-MS
0
25
50
75
100
125
150
175
200

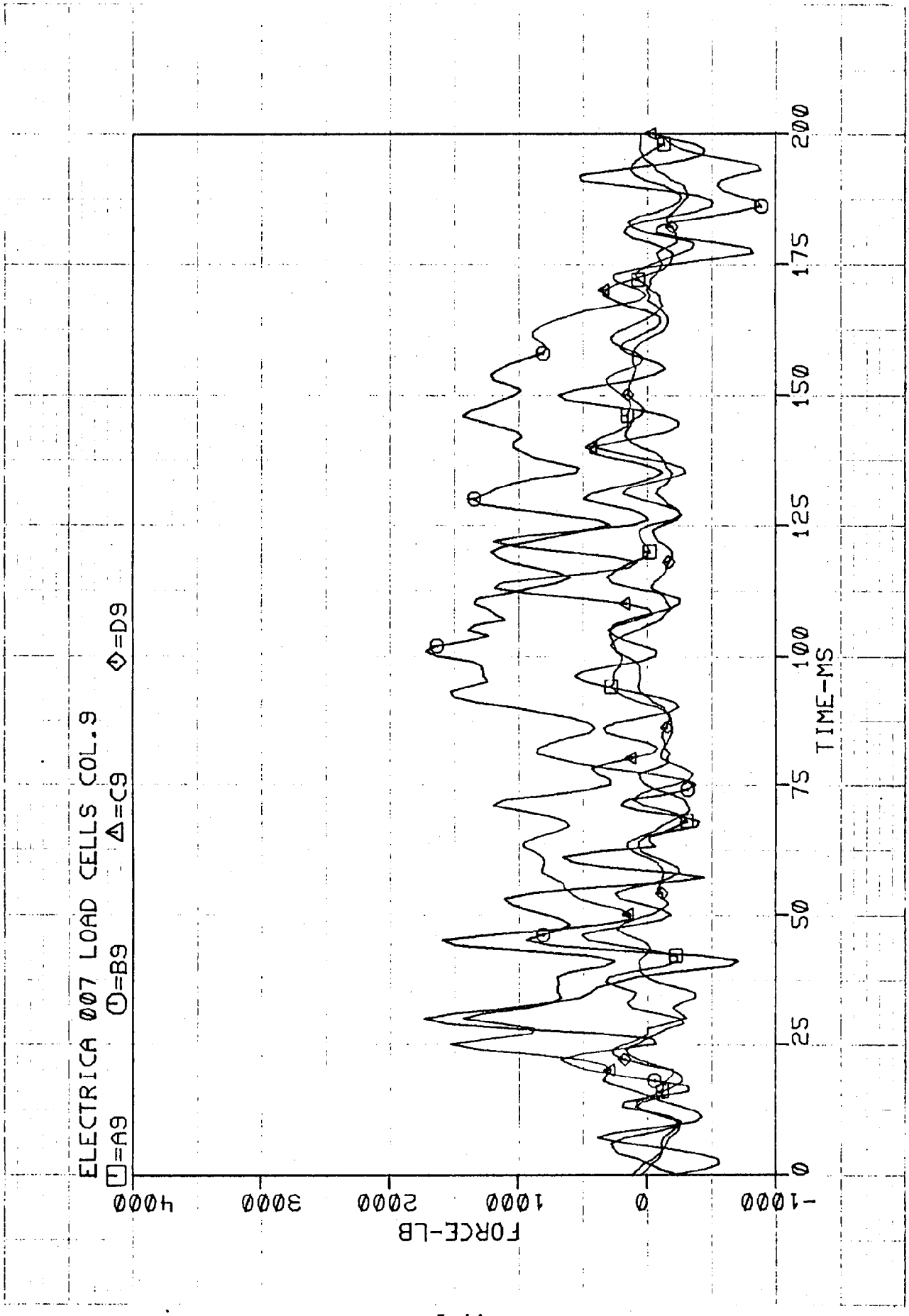

ELECTRICA 007 LOAD CELLS COL.4
□=A4
○=B4
△=C4
◇=D4
FORCE-LB
8000
6000
4000
2000
0
-2000
TIME-MS
0
25
50
75
100
125
150
175
200


ELECTRICA 007 LOAD CELLS COL.S
□=AS
○=BS
△=CS
◇=DS
FORCE-LB
20000
15000
10000
5000
0
-5000
0
25
50
75
100
125
150
175
200
TIME-MS


ELECTRICA 007 LOAD CELLS COL.6
□=A6
○=B6
△=C6
◇=D6
FORCE-LB
-5000
0
5000
10000
15000
20000
TIME-MS
0
25
50
75
100
125
150
175
200


ELECTRICA 007 LOAD CELLS COL.7
□=A7
○=B7
△=C7
◇=D7
FORCE-LB
16000
12000
8000
4000
0
-4000
0
25
50
75
100
125
150
175
200
TIME-MS


ELECTRICA 007 LOAD CELLS COL.8
□=A8
○=B8
△=C8
◇=D8
FORCE-LB
8000
6000
4000
2000
0
-2000
TIME-MS
0
25
50
75
100
125
150
175
200


ELECTRICA 007 LOAD CELLS COL.9
□=A9
○=B9
△=C9
◇=D9
FORCE-LB
4000
3000
2000
1000
0
-1000
TIME-MS
0
25
50
75
100
125
150
175
200