Tim A.

Dynamic Science Report No. 212-DYS-80-027
Dynamic Science Report No. 219-DYS-80-027
Dynamic Science Report No. 301-DYS-80-027

DOT 194

NEW VEHICLE ASSESSMENT AND STANDARDS ENFORCEMENT INDICANT TESTING

FMVSS 212, 219, AND 301-75

FIAT AUTO S.p.A.
1980 FIAT STRADA
NHTSA NO. 800563

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DATE: JUL 25 1980

JUNE 1980

FINAL REPORT

Prepared for:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
-----ENFORCEMENT-----
OFFICE OF VEHICLE SAFETY COMPLIANCE
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Prepared by Mark Pozzi

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Date 7-14-80

Report Accepted by:

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Office of Vehicle Safety Compliance

JUL 25 1980

Date

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16. Abstract

The vehicle was tested using test parameter values which are in excess of the current upper limits of the subject FMVSS in order to obtain research and vehicle rating data. This test, therefore, can only be viewed as an "indicant" test by the Office of Vehicle Safety Compliance.

The front of the test vehicle impacted the fixed, load-measuring collision barrier at a speed of 34.78 mph.

The test was conducted at the Dynamic Science, Inc. Deer Valley facility on May 20, 1980, with the following results:

a) FMVSS 212 - Loss of winshield retention was within the acceptable range.

b) FMVSS 219 - No intrusion into windshield protected zone.

c) FMVSS 301 - Leakage rates from the fuel lines directly aft of the transmission midline exceeded the allowable range, causing an apparent failure.

17. Key Words Occupant Response, FMVSS 212 - Windshield Mounting, FMVSS 219 - Windshield Zone Intrusion, FMVSS 301-75 - Fuel System Integrity, Vehicle Assessment, Load-Measuring Barrier	18. Distribution Statement Copies of this report are available from Technical Reference Division, National Highway Traffic Safety Administration, Room 5108, Nassif Building, 400 7th Street, S.W., Washington, D.C. 20590		
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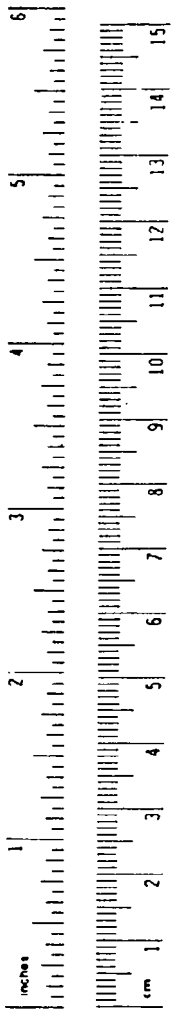
Form DOT F 1700.7 (8-69)

METRIC CONVERSION FACTORS

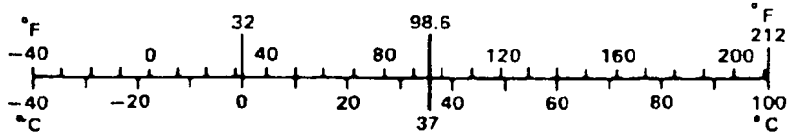
Approximate Conversions to Metric Measures

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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LIST OF ILLUSTRATIONS (CONTD)

SECTION 1
PURPOSE AND INTRODUCTION

PURPOSE:

The purpose of the test was to subject a 1980 Fiat Strada to the indicant test requirements of DOT Test Plan TP-212-02, April 1, 1980, Standard Enforcement Indicant Testing for FMVSS No. 212, "Windshield Mounting," FMVSS No. 219, "Windshield Zone Intrusion," and FMVSS 301-75, "Fuel System Integrity." The vehicle was tested using test parameters which are in excess of the current upper limits of the subject FMVSS in order to obtain research and vehicle rating data. This test, therefore, can only be viewed as an "indicant" test by the Office of Vehicle Safety Compliance (OVSC).

INTRODUCTION:

Section 2 contains General Test and Vehicle Parameter Data. Section 3 contains Compliance Related Data for FMVSS 212, 219, 301-75 Indicant Testing, together with photographs related to these tests. Appendix A contains pre-test and post-test vehicle and dummy photographs. Appendix B contains Calcomp plots. Appendix C contains dummy certification data.

SECTION 2
GENERAL TEST AND VEHICLE PARAMETER DATA

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

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Vehicle Manufacturer: Fiat Auto S.p.A.
Make/Model: Fiat Strada
Body Style: 4-door Hatchback Model Year: 1980
VIN: 138A0002384894 Build Date: 12-79
NHTSA No.: 800563 Color: Silver
Engine Data: 4 cylinders; 1498 cc displacement
Transmission Data: 5 speed (X) Manual ( ) Automatic
Date Vehicle Received by Laboratory: May 6, 1980
Dealer Name & Address: Biddulph VW Fiat, 4434 W. Glendale Ave., Glendale, Az. 85301

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

Vehicle Manufactured By: Fiat Auto S.p.A.
Date of Manufacture: 12-79 ; VIN: 138A0002384894
GVWR: 3010 lb; GAWR: Front = 1645 lb; Rear = 1365 lb

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

Vehicle Load:	FRONT	REAR	RECOMMENDED TIRE SIZE:	LOAD RANGE:
Up to Capacity	32 psi	32 psi		
Vehicle Capacity:			145SR-13	B

Type of Seats - ___ Bench, X Bucket, ___ Split Bench
Number of Occupants (Designated Seating Capacity) = 2 Front, 2 Rear, 4 Total

CARGO LOAD = 150 lb
TOTAL = 750 lb

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with max. fluids) (UDW)

Right Front = 721 lb Right Rear = 402 lb
Left Front = 686 lb Left Rear = 412 lb
TOTAL FRONT WEIGHT = 1407 lb (63 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 814 lb (37 % of Total Vehicle Weight)
TOTAL DELV. WEIGHT = 2221 lb

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 150 lb CARGO:

Right Front = 789 lb Right Rear = 598 lb
Left Front = 735 lb Left Rear = 585 lb
TOTAL FRONT WEIGHT = 1524 lb (56 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1183 lb (44 % of Total Vehicle Weight)
TOTAL TEST WEIGHT = 2707 lb

Weight of ballast secured in vehicle trunk area = 0 lb

TARGET WEIGHT = CARGO LOAD + UDW + 164 (NO. OF DUMMIES) = 2699 lb

GENERAL TEST AND VEHICLE PARAMETER DATA (CONTD)

TEST CONDITIONS:

Date of Test: May 20, 1980 Time of Test: 1148

Ambient Temperature: 96 °F at impact area.

Temperature in Occupant Compartment: 77 °F Windshield Molding Temperature: 96 °F

VEHICLE ATTITUDE: (all dimensions in inches)

	RF	LF	RR	LR
Delivered Attitude:	30.0	30.0	30.0	30.0
Test Attitude:	29.1	29.9	26.9	27.8

VEHICLE TIRE DATA:

Recommended Cold Tire Pressure: Front = 32 psi
Rear = 32 psi

Recommended Tire Size: 145SR-13
Load Range: B

Tires on Vehicle: 145SR13

Is Spare Tire a "Space Saver": No (yes/no)

Is Spare Tire standard equipment: Yes (yes/no)

TEST FLUID DATA:

Test Fluid Type: Red Stoddard Solvent ; Spec. Grav.: 0.764

Kinematic Viscosity: 0.99 Centistokes

*Spill Point Volume: - Gallons

Test Volume: 11.3 Gallons

Fuel System Capacity (data from Owner's Manual): 12.1 gallons

Details of Fuel System: Rectangular metal fuel tank is mounted aft of rear wheels by flange bolts. Sender and vapor tubes exit front vertical side of tank and proceed forward along left rocker panel, then run transversely across the bottom of the firewall. Filler tube exits left vertical side of tank aft of left rear wheel and proceeds to body wall, where it is sealed by a twist cap.

Electric Fuel Pump: No (yes/no); Fuel Injection: No (yes/no)

Does electric fuel pump operate with ignition switch "on" and the engine not operating: N/A (yes/no)

VEHICLE REBOUND AND CRUSH:

		R	L	
Overall Length of Test Vehicle	Pre-test =	156.6	156.6	inches
	Post-test =	131.0	131.2	inches
CRUSH =		25.6	25.4	

FOR FRONTAL IMPACTS, distance from front of test vehicle to the barrier after impact = 14.3 inches

*Spill point was not determined. Test volume is 93% of "usable capacity" as defined in the vehicle manufacturer's Part 1 submission to the EPA plus "unusable capacity." Specified capacities are supplied by the OVSC CTM.

GENERAL TEST AND VEHICLE PARAMETER DATA (CONTD)

VISIBLE DUMMY CONTACT POINTS

	Driver	Passenger
Head	Steering wheel hub, lower rim	Upper dash, glovebox
Chest	None	None
Abdomen	None	None
Left Knee	Steering column, dash	Lower dash
Right Knee	Steering column, dash	Lower dash

	Front		Rear	
DOOR OPENING	Left	Right	Left	Right
Easy				
Difficult				
Tools Required	X	X	X	X
SEAT BACK				
Failure	None	None		
GLAZING DAMAGE				
Windshield	Shattered throughout, severe folding of lowest 6 inches			
Backlight				
Others				

OTHER NOTABLE IMPACT EFFECTS: Entire dash and steering column rotated upward, with contact between upper rim of steering wheel and windshield. No movement of seat in seat track. Both front tires pinned by crushed sheet metal, with total deflation of right front tire at impact. Right side mounts of dash ripped loose from "A" pillar; floorpan separated from rocker panel for 8 inches aft of "A" pillar.

SECTION 3

COMPLIANCE-RELATED DATA
FMVSS 212, 219, 301-75 INDICANT TESTING

The following data sheets and photographs document compliance data related to FMVSS 212, 219, and 301-75.

SUMMARY OF RESULTS
FMVSS 212 INDICANT DATA

VEHICLE DATA:

Manufacturer: Fiat Auto S.p.A. Model Year: 1980

Make/Model: Fiat Strada

Body Style: 4-door Hatchback Manufacture Date: 12/79

VIN: 138A0002384894 NHTSA No.: 800563

Delivery Weight: 2221 lb; Test Weight: 2707 lb; GVWR: 3010 lb

Engine: No. of Cylinders 4 Displacement 1498 cc

Vehicle Mileage: 44.8 miles

Remarks:

GENERAL TEST CONDITIONS:

Vehicle Impact Speed:

Primary 34.78 mph; Secondary 34.78 mph

Speed Range Specified by CTM: 34.5 to 35.5 mph

Ambient Temperature at Time of Test: 96 °F

Date of Test: May 20, 1980 Time: 1148

Windshield Molding Temperature: 96 °F

Static Crush: 25.6 in. (right) 25.4 in. (left)

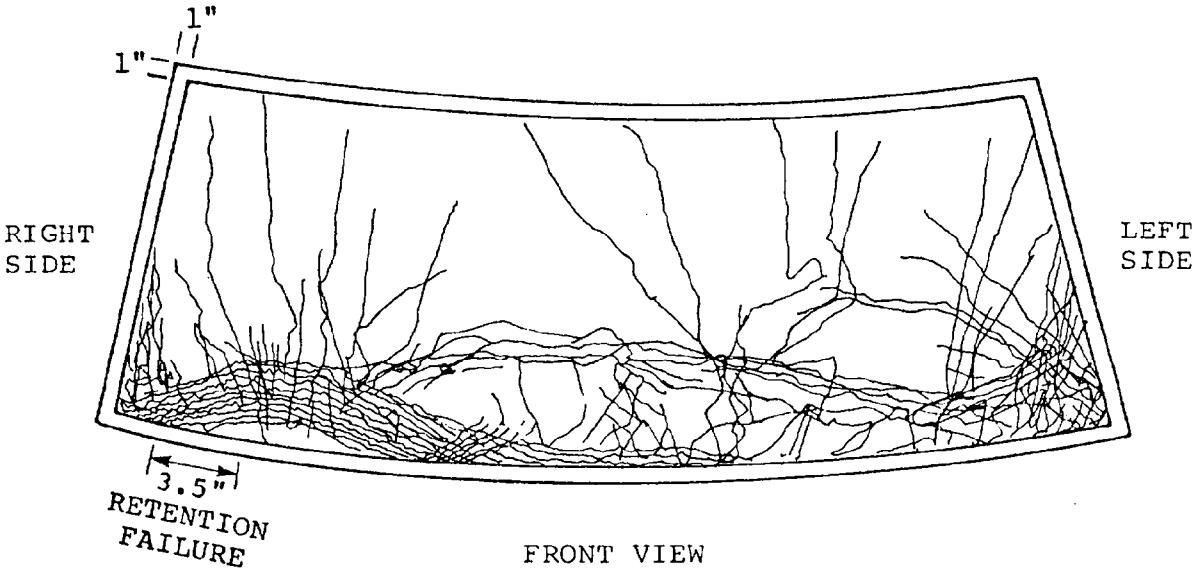
SUMMARY OF FMVSS 212 DATA

Details of windshield mounting (method of retention, type of trim, etc.): Windshield is held in place around the periphery by a one-inch black mastic, which is overlaid by a 3/4-inch metal trim strip.

	WINDSHIELD PERIPHERY	
	Pre-test	Post-test
RIGHT SIDE	72.8	69.3
LEFT SIDE	72.8	72.8
TOTAL	145.6	142.1

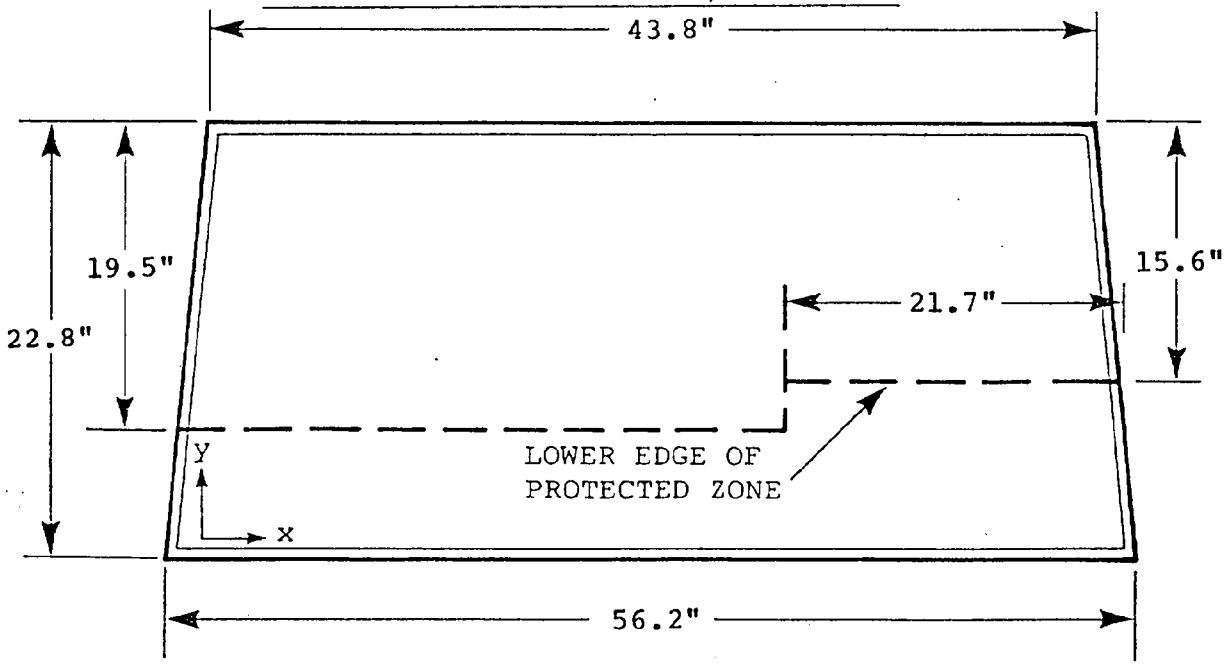
The standard requires that POST-TEST be a minimum of 75 percent of the PRE-TEST total periphery measurement for vehicles not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles which are equipped with occupant passive restraints.

AREA OF RETENTION FAILURE (as noted):



FRONT VIEW

WINDSHIELD ZONE INTRUSION, FMVSS 219



FRONT VIEW OF WINDSHIELD

With the zero coordinate for the X-Y grid located at the lower right corner (passenger side) of the windshield, record the following positions:

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

C. Record any windshield retention clips or brackets used to ensure that the windshield would not disengage from the body.

No retention clips or brackets are evident.

POST IMPACT DATA

TYPE OF TEST: X Frontal (90°) Impact

___ Oblique (___°) Impact on ___ Left (Driver's) Side
___ Right Side

___ Lateral or Side Impact on ___ Left (Driver's) Side
___ Right Side

___ Rear Impact

DATE OF TEST: May 20, 1980 ; TIME: 1148 ; TEMP: 96 ° F

NHTSA NO.: 800563 ; VIN: 138A0002384894

REQUIRED VEHICLE VELOCITY RANGE: 34.5 to 35.5 mph

IMPACT VELOCITY: (traps within 5 feet of impact event)

Primary = 34.78 mph; Secondary = 34.78 mph

Distance from the vehicle's front bumper to the barrier face entering the vehicle velocity measurement device = 5.0 ft

exiting the vehicle velocity measurement device = 1.0 ft

VEHICLE STATIC CRUSH:

(For Frontal and Rear Impacts Only)

Driver's Side = 25.4 in.; Passenger's Side = 25.6 in.

Average = 25.5 in.

Crush Details: Direct crush to "A" pillar. Entire dash and steering column rotated upward, with contact between upper rim of steering wheel and windshield. Both front tires pinned by crushed sheet metal. Right side mounts of dash ripped loose from "A" pillar. Floorpan separated from rocker panel for 8 inches aft of "A" pillar.

(For Side Impacts Only)

Amount of Crush = _____ in. on _____ side

Crush Details: _____

VEHICLE REBOUND:

(From rigid barrier only)

Driver's Side = 14.3 in.; Passenger's Side = 14.8 in.

Average = 14.55 in.

REMARKS: Bumper is completely covered with a soft-faced material which contains cutouts at either end to accommodate turn signal lights.

FUEL SYSTEM INTEGRITY POST-IMPACT
TEST DATA, FMVSS NO. 301-75

TEST VEHICLE NHTSA NO.: 800563 ; TEST DATE: May 20, 1980

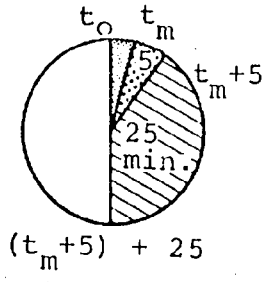
VEHICLE MANUFACTURER/
MAKE/MODEL: Fiat Auto S.p.A., Fiat Strada

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). Part 572 test dummies located at each front designated seating position.

A. TEST VEHICLE IMPACT TYPE:

X Frontal (35 mph)
___ Oblique (35 mph) with ___° barrier face first contacting ___ driver / ___ passenger side.
___ Rear Moving Barrier (35 mph)
___ Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT



	ACTUAL	MAXIMUM ALLOWABLE
1. From impact until vehicle motion ceases. . . .	0.8	1 oz
2. For 5-minute period after vehicle motion ceases	4.0	5 oz
3. For next 25 minutes. . .	24.0	1 oz/1 min

B. SOLVENT SPILLAGE DETAILS: Fuel collected during the 24th to the 34th minute after barrier impact ranged from 1.3 to 1.6 ounces by weight per minute. Leakage site was on fuel line directly aft of transmission midline.

C. FUEL SYSTEM DATA:

Test Fluid: Stoddard Solvent No. 2 Specific Gravity: 0.764

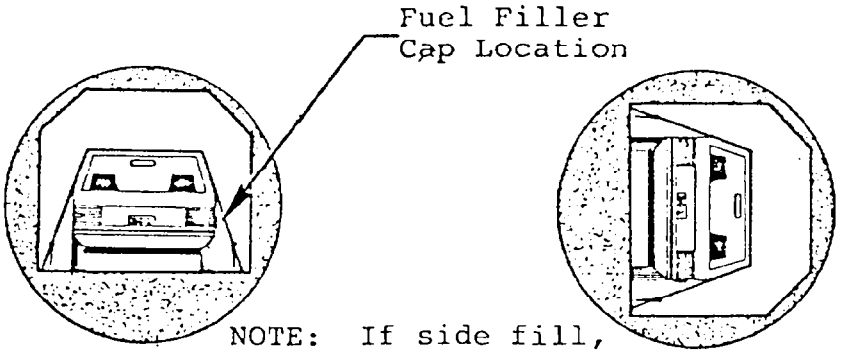
Kinematic Viscosity: 0.99 centistokes

Test Volume: 11.3 U.S. gal/lb Liquid Temp: 96 °F

Details of Fuel Tank, Filler Pipes, and Connections: Rectangular metal fuel tank is mounted aft of rear wheels by flange bolts. Sender and vapor tubes exit front vertical side of tank and proceed forward along left rocker panel, then run transversely across the bottom of the firewall. Filler tube exits left vertical side of tank aft of left rear wheel and proceeds to body wall, where it is sealed by a twist cap.

FMVSS 301-75 INDICANT STATIC ROLLOVER DATA SHEET*

TEST PHASE: 0° to 90° VEHICLE NHTSA NO. 800563



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

DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time.... = _____min, _____sec +
(Spec. Range = 1 to 3 min)

FMVSS 301 Position Hold Time..... = _____min, _____sec =

Total..... = _____min, _____sec

Next Whole Minute Interval..... = _____min

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				

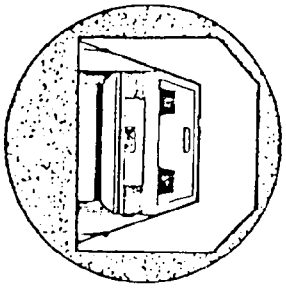
NOTE: Spillage is recorded in whole minute intervals only - as determined above.

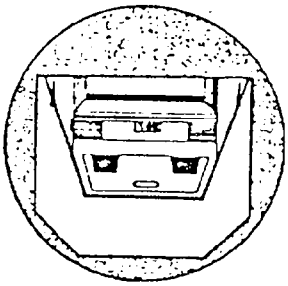
SOLVENT SPILLAGE LOCATION(S):

*Rollover portion of test not performed due to apparent FMVSS-301-75 failure at barrier site during 24th - 34th minute after impact.

FMVSS 301-75 INDICANT STATIC ROLLOVER DATA SHEET*

TEST PHASE: 90° to 180° VEHICLE NHTSA NO. 800563





DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time.... = _____min, _____sec +
(Spec. Range = 1 to 3 min)

FMVSS 301 Position Hold Time..... = _____min, _____sec =

Total..... = _____min, _____sec

Next Whole Minute Interval..... = _____min

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				

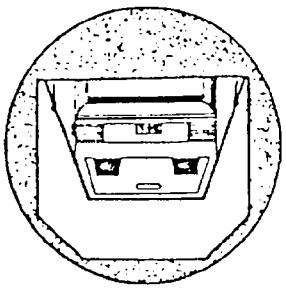
NOTE: Spillage is recorded in whole minute intervals only - as determined above.

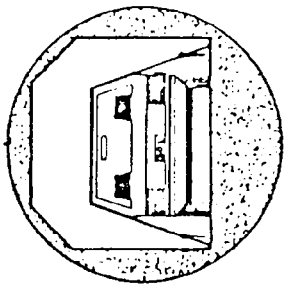
SOLVENT SPILLAGE LOCATION(S):

*Rollover portion of test not performed due to apparent FMVSS-301-75 failure at barrier site during 24th - 34th minute after impact.

FMVSS 301-75 INDICANT STATIC ROLLOVER DATA SHEET*

TEST PHASE: 180° to 270° VEHICLE NHTSA NO. 800563





DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time.... = _____min, _____sec +
(Spec. Range = 1 to 3 min)

FMVSS 301 Position Hold Time..... = _____min, _____sec =

Total..... = _____min, _____sec

Next Whole Minute Interval..... = _____min

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				

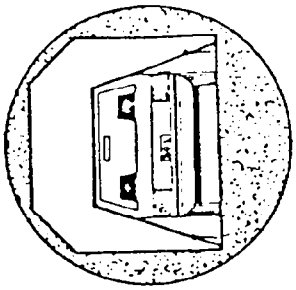
NOTE: Spillage is recorded in whole minute intervals only - as determined above.

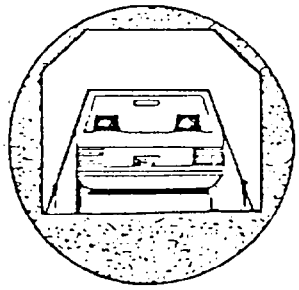
SOLVENT SPILLAGE LOCATION(S):

*Rollover portion of test not performed due to apparent FMVSS-301-75 failure at barrier site during 24th - 34th minute after impact.

FMVSS 301-75 INDICANT STATIC ROLLOVER DATA SHEET*

TEST PHASE: 270° to 360° VEHICLE NHTSA NO. 800563





DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time.... = _____min, _____sec +
(Spec. Range = 1 to 3 min)

FMVSS 301 Position Hold Time..... = _____min, _____sec =

Total..... = _____min, _____sec

Next Whole Minute Interval..... = _____min

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				

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

SOLVENT SPILLAGE LOCATION(S):

*Rollover portion of test not performed due to apparent FMVSS-301-75 failure at barrier site during 24th - 34th minute after impact.

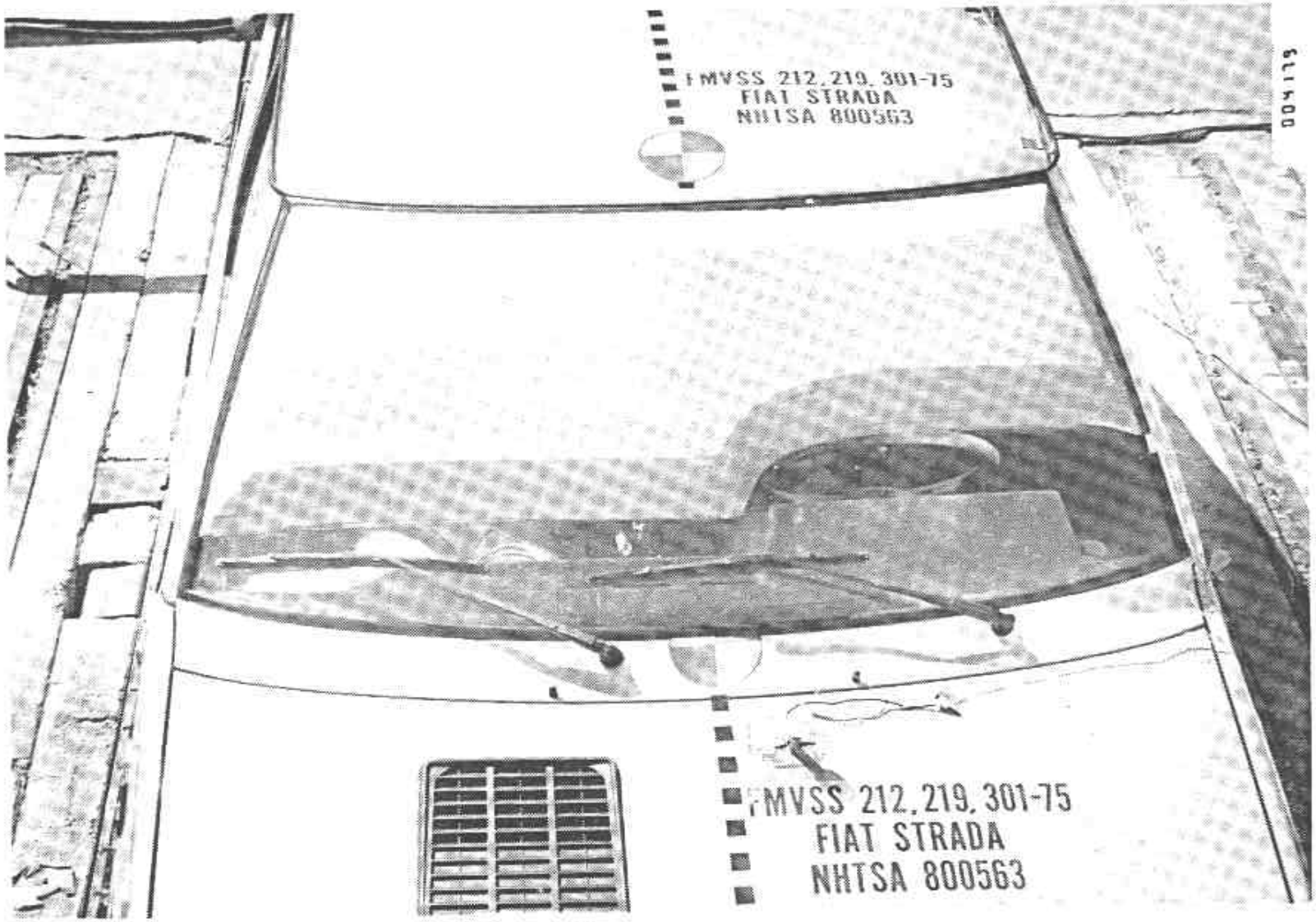


Figure 3-1. Pre-test Windshield - Overall View - 1980 Fiat Strada - NHTSA 800563.

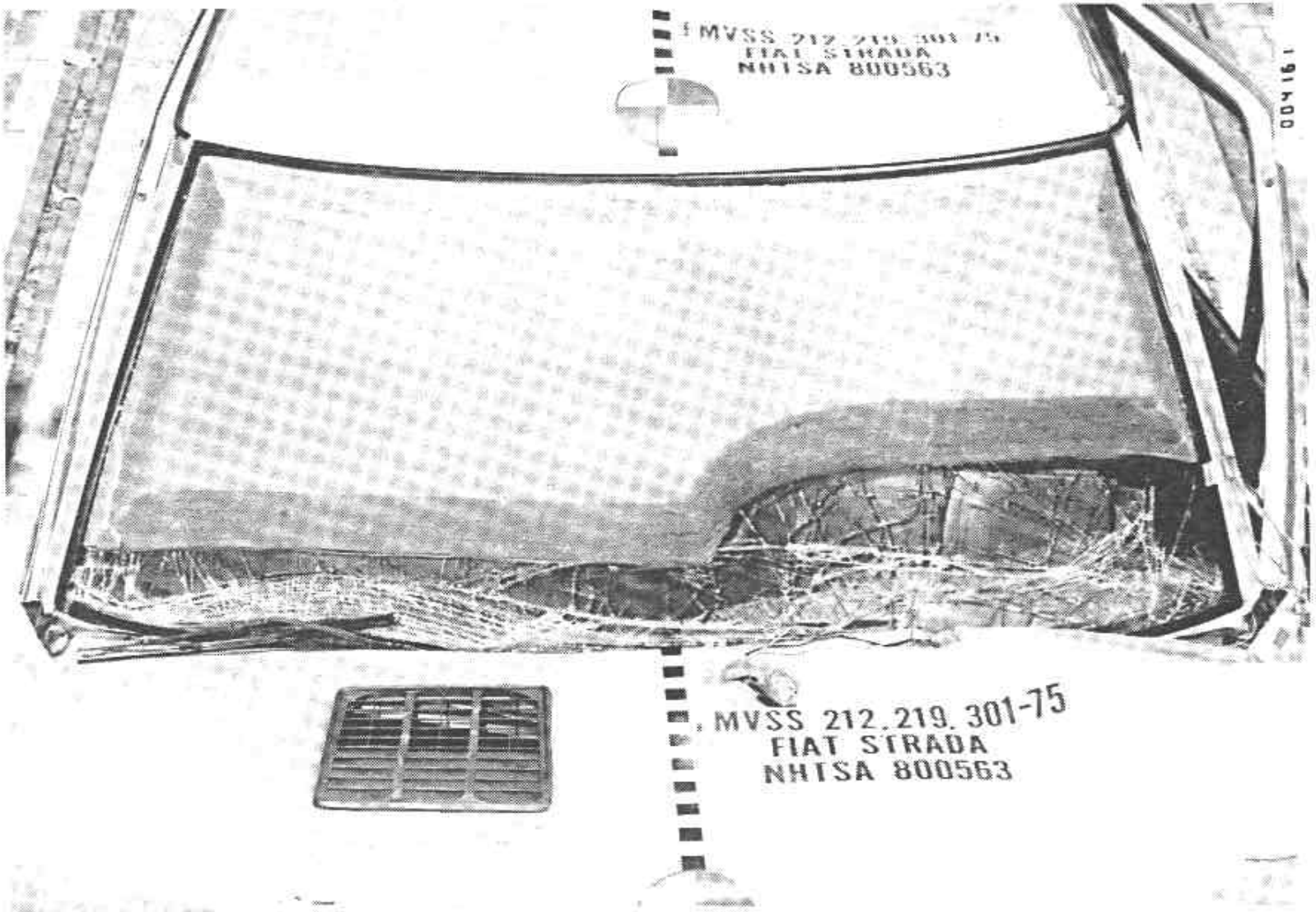


Figure 3-2. Post-test Windshield - Overall View - 1980 Fiat Strada - NHTSA 800563.

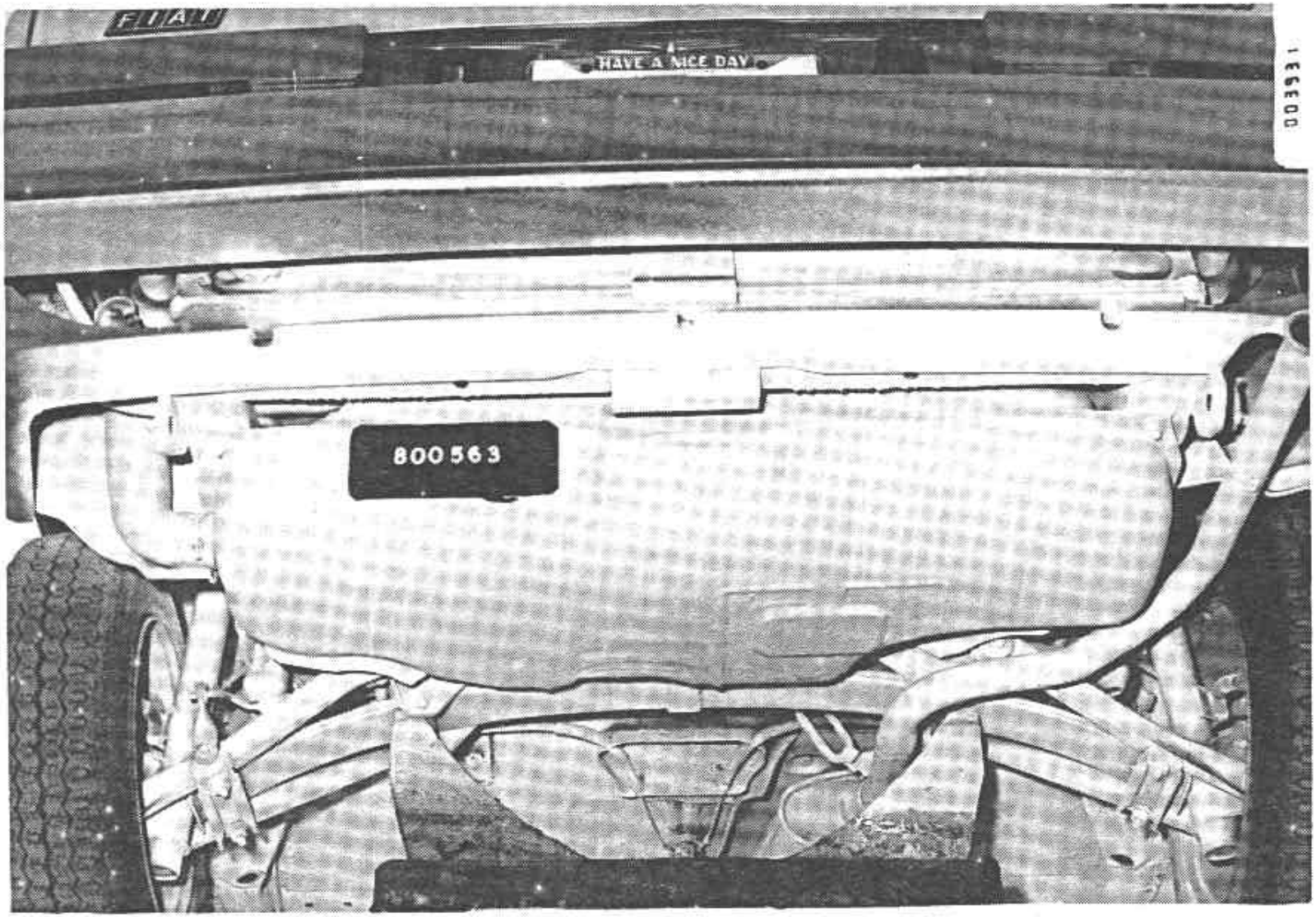


Figure 3-3. Pre-test View of Fuel Tank - 1980 Fiat Strada - NHTSA 800563.

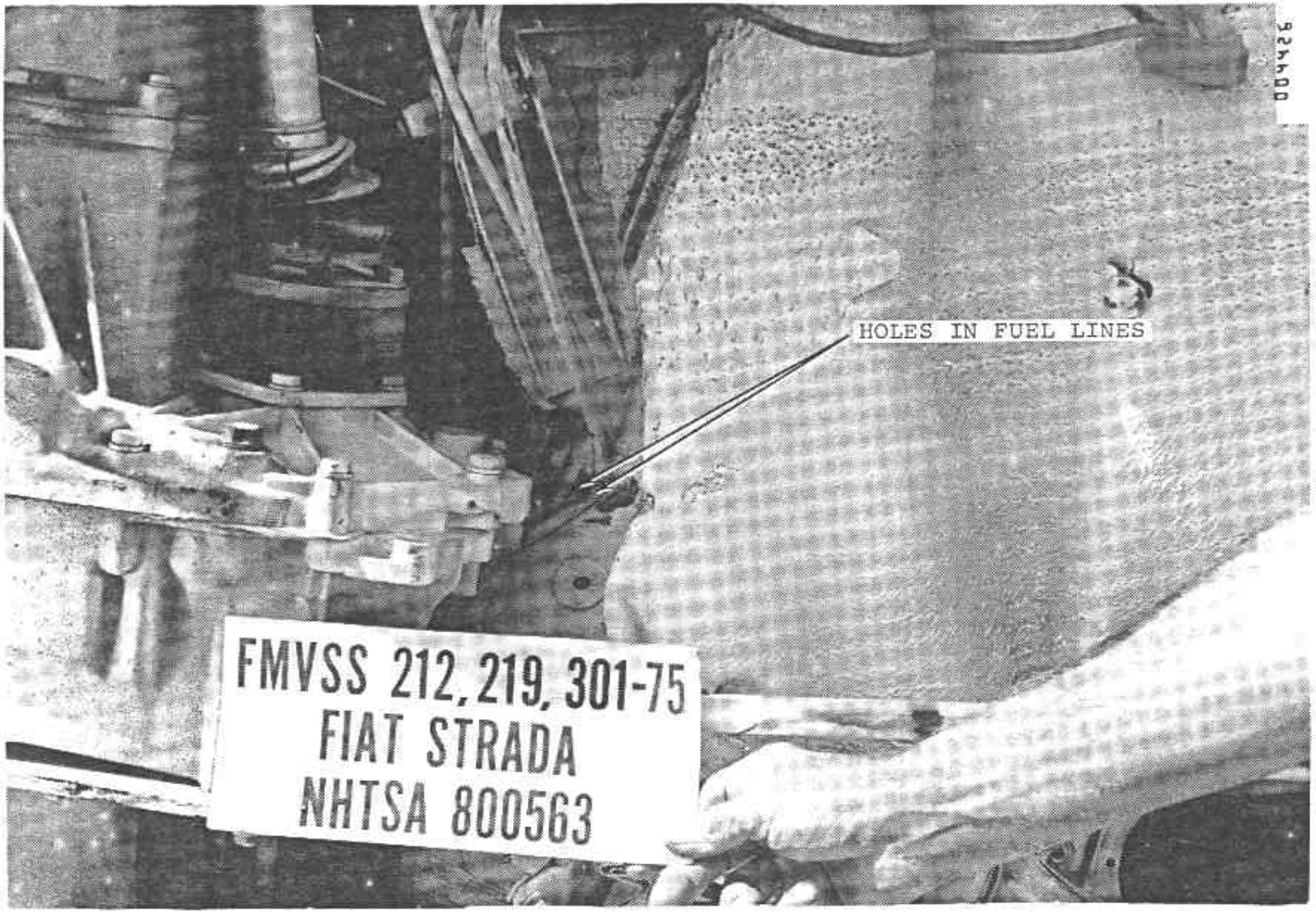


Figure 3-4. Post-test Site of Fuel Leakage - 1980 Fiat Strada - NHTSA 800563.

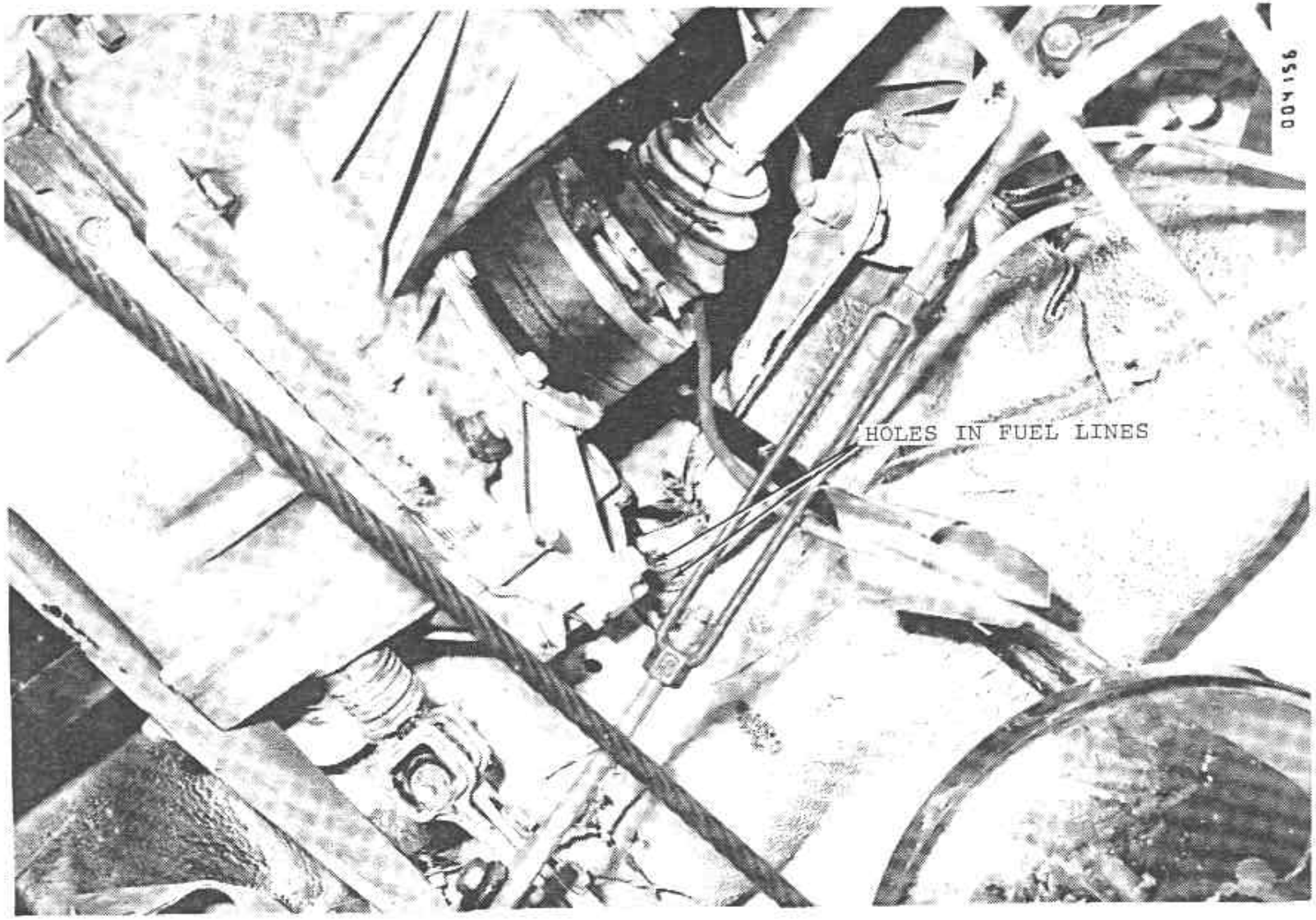


Figure 3-5. Post-test Site of Fuel Leakage - 1980 Fiat Strada - NHTSA 800563.

SECTION 4
DATA REQUIRED BY R&D AND OAR

The following pages are included in this section:

1. Dummy positional data
2. Dummy injury summaries
3. Vehicle crush data
4. Accelerometer location and data summary
5. High-speed movie camera location and specification summary.

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

DUMMY POSITIONING

Pre-test Dummy Positions

Measurement	Driver (in.)	Passenger (in.)
Dummy Centerline to Vehicle Centerline	12.4	12.9
Nose to Upper Rim Steering Wheel	23.5	N/A
Nose to Windshield (Horizontal Distance)	19.8	16.8
Left Knee to Closest Point on Lower Panel	4.3	6.3
Right Knee to Closest Point on Lower Panel	4.3	6.7
Ankle Distance	10.0	8.5
Knee Distance	9.0	9.0
Head to Windshield, HW Header	16.3	13.3
Chest to Dash, CD	21.3	20.3
Chest to Steering, CS Wheel Hub	16.6	N/A
Abdomen to Lower Rim	8.3	N/A

Additional dummy positioning information is presented in the PART 572 DUMMY IN-VEHICLE POSITION RECORDING SHEET which follows.

PART 572 DUMMY IN-VEHICLE POSITION RECORDING SHEET

NHTSA No.: 800563 Manufacturer: Fiat Auto S.p.A.

Make/Model: Fiat Strada Model Year: 1980

SEAT TYPE:
___ Bench X Bucket
___ Split Bench

ADJUSTER TYPE:
X Manual
___ Power

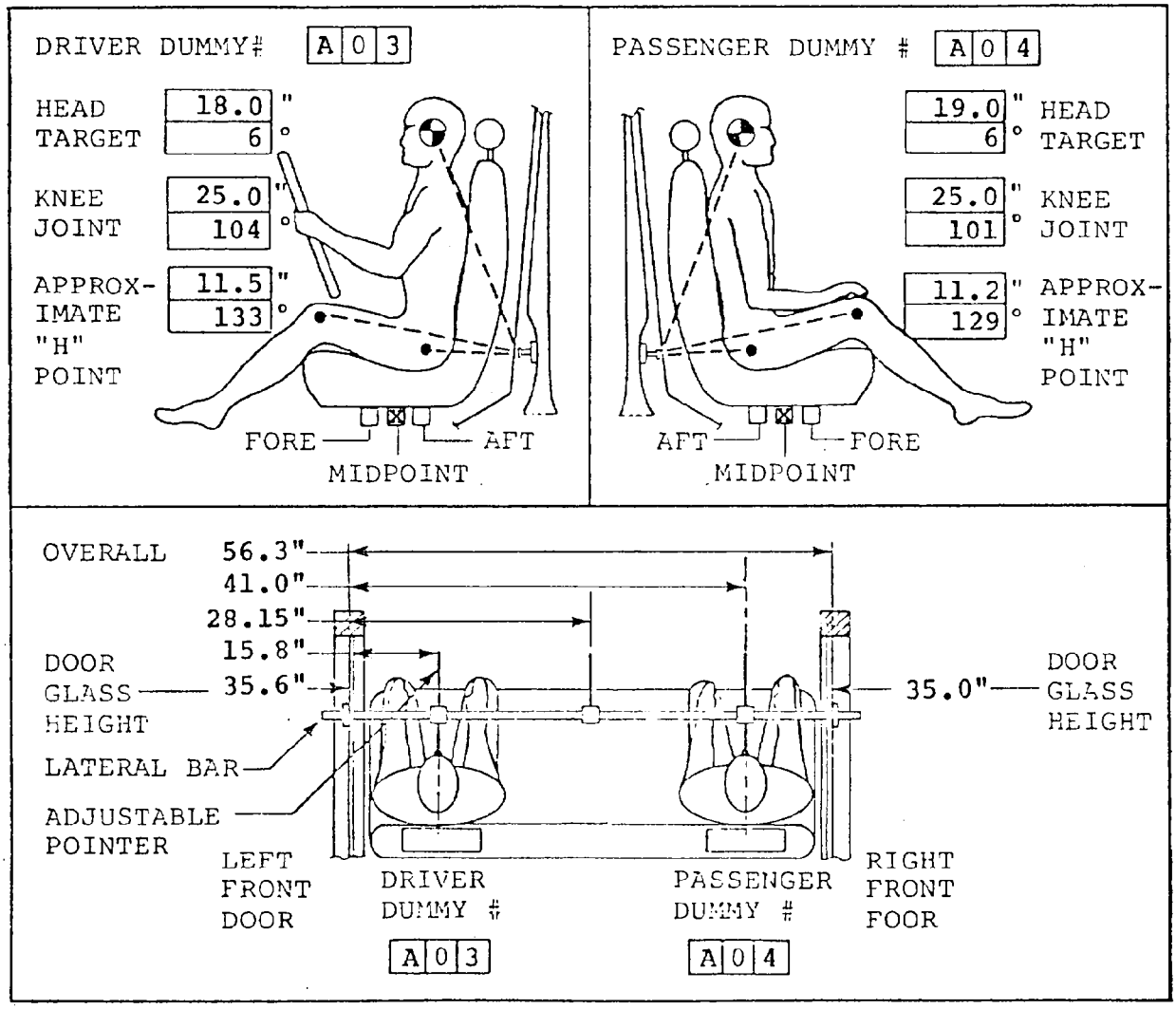
BUCKET SEAT BACK TYPE:
X Adjustable Reclining
___ Fixed

AMBIENT TEMPERATURE: 96 °F; TIME: 1148

POSITIONING DATE: May 20, 1980

TECHNICIANS: 1. M. Pozzi
2. P. Lanser

All front seat dummies are positioned according to the procedure "OSE RECOMMENDED PROCEDURE FOR POSITIONING PART 572 DUMMIES IN TEST VEHICLE."



PART 572 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	35.3	71	-138.4	87	3.3	39	-108.4	87
Lateral	21.3	111	-61.4	87	32.0	92	-5.0	135
Vertical	51.2	72	-63.0	67	51.3	92	-3.2	8
Resultant	155.3	87			110.0	87		
HIC	790.0 between 85 and 95 msec				961.6 between 84 and 101 msec			
Chest Acceleration								
Longitudinal	1.2	154	-42.7	95	2.3	146	-43.1	94
Lateral	8.7	104	-7.1	76	16.6	91	-2.1	195
Vertical	6.6	69	-10.1	95	7.7	73	-9.9	93
Resultant (Max)	43.9	95			44.8	94		
Resultant (clip)	41.3	97			42.9	104		
TIME > 60 G	0 msec				0 msec			
SEVERITY INDEX	335.2 @ 200 msec				341.0 @ 200 msec			
	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)
Femur Loads								
Left			-1159.2	67			-1100.6	66
Right			-2142.6	61			-463.7	48
Belt Loads								
Lap	360.6	78			894.0	79		
Torso	1284.7	77			1522.2	88		
Vehicle Impact Speed (mph): 34.78								

*Longitudinal: Forward
Lateral: Rightward
Vertical: Downward
**Longitudinal: Rearward
Lateral: Leftward
Vertical: Upward

DUMMY KINEMATIC SUMMARY

DRIVER - Steering column stroked upward and to the rear prior to any dummy contact. Top of steering wheel rim was level with dummy head target when contact occurred. Dummy struck lower rim of steering wheel with its chin, then made additional facial contact with steering wheel hub and left hub spoke. Dummy head struck torso belt load cell and "B" pillar on rebound and came to rest upright, leaning laterally into door.

PASSENGER - Struck upper edge of dash panel squarely with upper half of face and forehead. Dummy rebounded into seatback and came to rest upright, with negligible lateral lean.

OTHER COMMENTS: Severe upward displacement of entire dash and steering column. Steering wheel rim struck windshield, cracking foam template. Both dummies would have had lower responses if the dash and steering components had remained stationary relative to the rest of the vehicle.

SEAT BELT RETRACTOR LOCKUP PERFORMANCE EVALUATION

VEHICLE INFORMATION:

Manufacturer: Fiat Auto S.p.A.

Make/Model: Fiat Strada NHTSA No. 800563

SHOULDER BELT INFORMATION: (Information taken from belt label)

Note: Data should be the same for the right and left side shoulder belts. If not, so note.

Manufacturer: Klippan

Build Date (or Code): 1979

Belt Manufacturers Part No.: Model 4582

Vehicle Manufacturers Part No.: None

TORSO BELT AND RETRACTOR DATA

Parameter	Driver	Passenger
Length of Webbing (in.)		
On Reel	19.0	15.0
From Reel to D Ring	28.5	28.5
From D Ring to Slip Buckle	34.0	36.5
Front D Ring to Fixed Buckle	N/A	N/A
Between Potentiometer Attachment Points	5 in.	5 in.
Webbing Elongation at Maximum Belt Load	4%	8%

ELR RETRACTOR LOCKUP INFORMATION:

Did Lockup Occur? Right Side: Yes Left Side: Yes

FOR RIGHT SIDE UNIT:

Time duration from initial barrier contact to retractor lockup = undetectable milliseconds

Amount of webbing travel prior to retractor lockup = 0.78 in.*

Amount of webbing travel after retractor lockup = 2.36 in.

FOR LEFT SIDE UNIT:

Time duration from initial barrier contact to retractor lockup = 21.0 milliseconds

Amount of webbing travel prior to retractor lockup = 0.86 in.

Amount of webbing travel after retractor lockup = 2.06 in.

UPPER TORSO BELT LOAD INFORMATION:

Right Side Belt Load = 1,522.2 lb @ 88 ms after time 0.

Left Side Belt Load = 1,284.7 lb @ 77 ms after time 0.

*Using 21 msec lockup for comparison with left belt.

PRE-/POST-TEST STATIC MEASUREMENT DATA
(See Following Page for Dimension Definition)

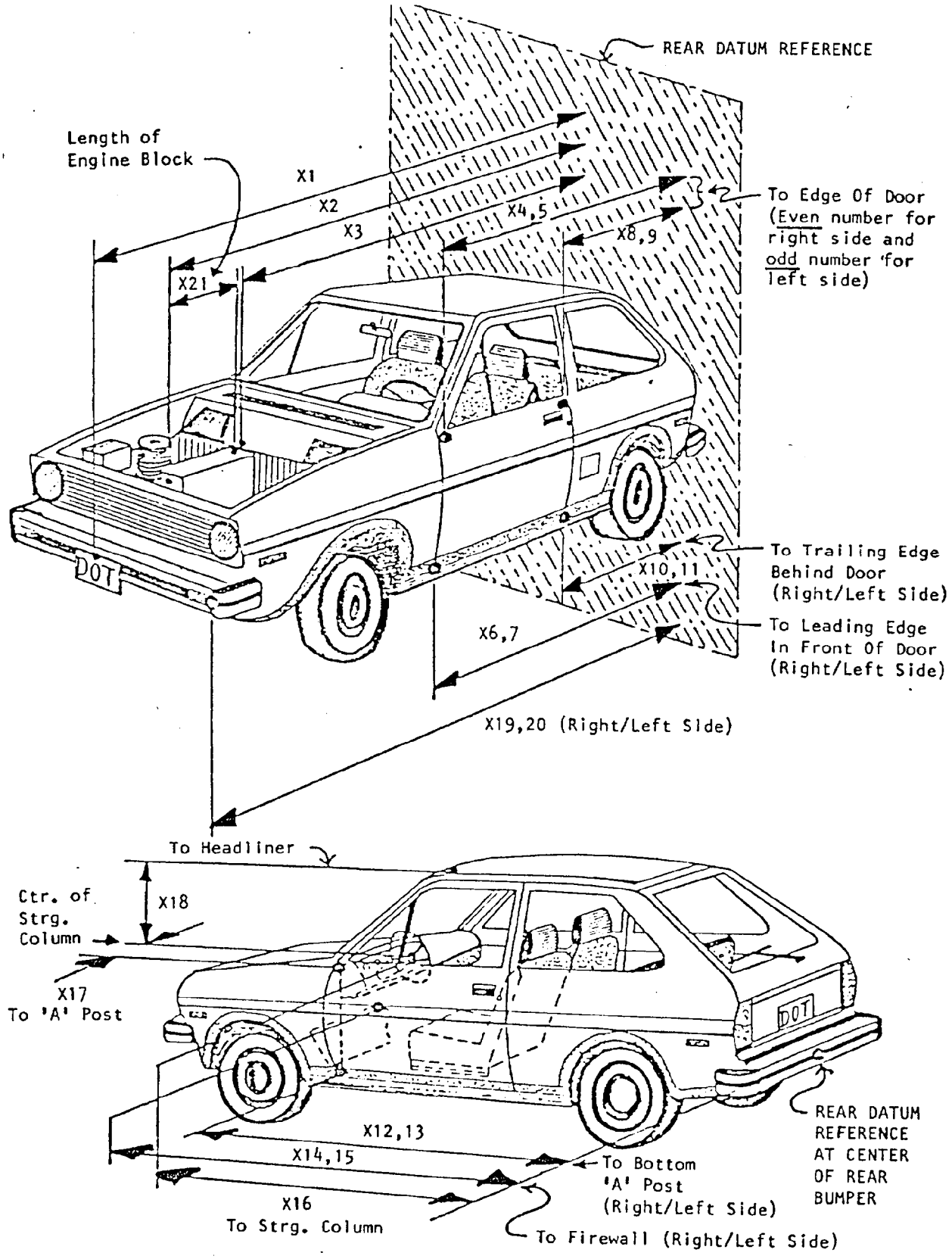
Vehicle: 1980 Fiat Strada NHTSA No.: 800563

Test Date: May 20, 1980 D.S. No.: 1066

Reference Dimension	Pre-test Measurement	Post-test Measurement	Change
X_1*	161.0	132.3	28.7
X_2	139.9	124.8	15.1
X_3	111.4	108.0**	3.4
X_4	105.6	104.8	0.8
X_5	105.6	104.6	1.0
X_6	108.8	106.7	2.1
X_7	108.8	107.0	1.8
X_8*	69.8	69.6	0.2
X_9*	69.8	69.5	0.3
X_{10}	71.1	69.4	1.7
X_{11}	71.1	69.5	1.6
X_{12}	108.6	105.5	3.1
X_{13}	108.6	105.7	2.9
X_{14}	123.0	111.4	11.6
X_{15}	124.4	114.5	9.9
X_{16}	95.4	91.4	4.0
Y_{17}	15.8	16.0	0.2
Z_{18}	18.1	12.8	5.3
X_{19}*	156.6	131.0	25.6
X_{20}*	156.6	131.2	25.4
X_{21}	6.1	6.0	0.1

*Rear impact data requirements.
**Estimated; mark obscured.

PRE-TEST AND POST-TEST MEASUREMENT POINTS



VEHICLE PROFILE DATA SHEET

Vehicle: 1980 Fiat Strada D.S. No.: 1066 Test Date: May 20, 1980

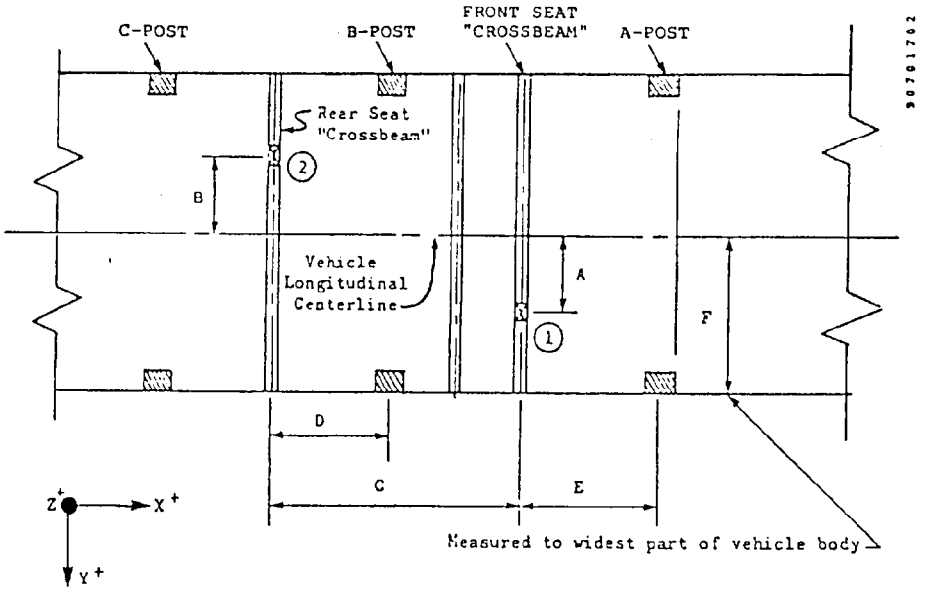
Measurement Date: Pre-test: May 19, 1980 Post-test June 2, 1980

Exterior Measurements Referenced to Plane: 14' Forward of: Rear bumper

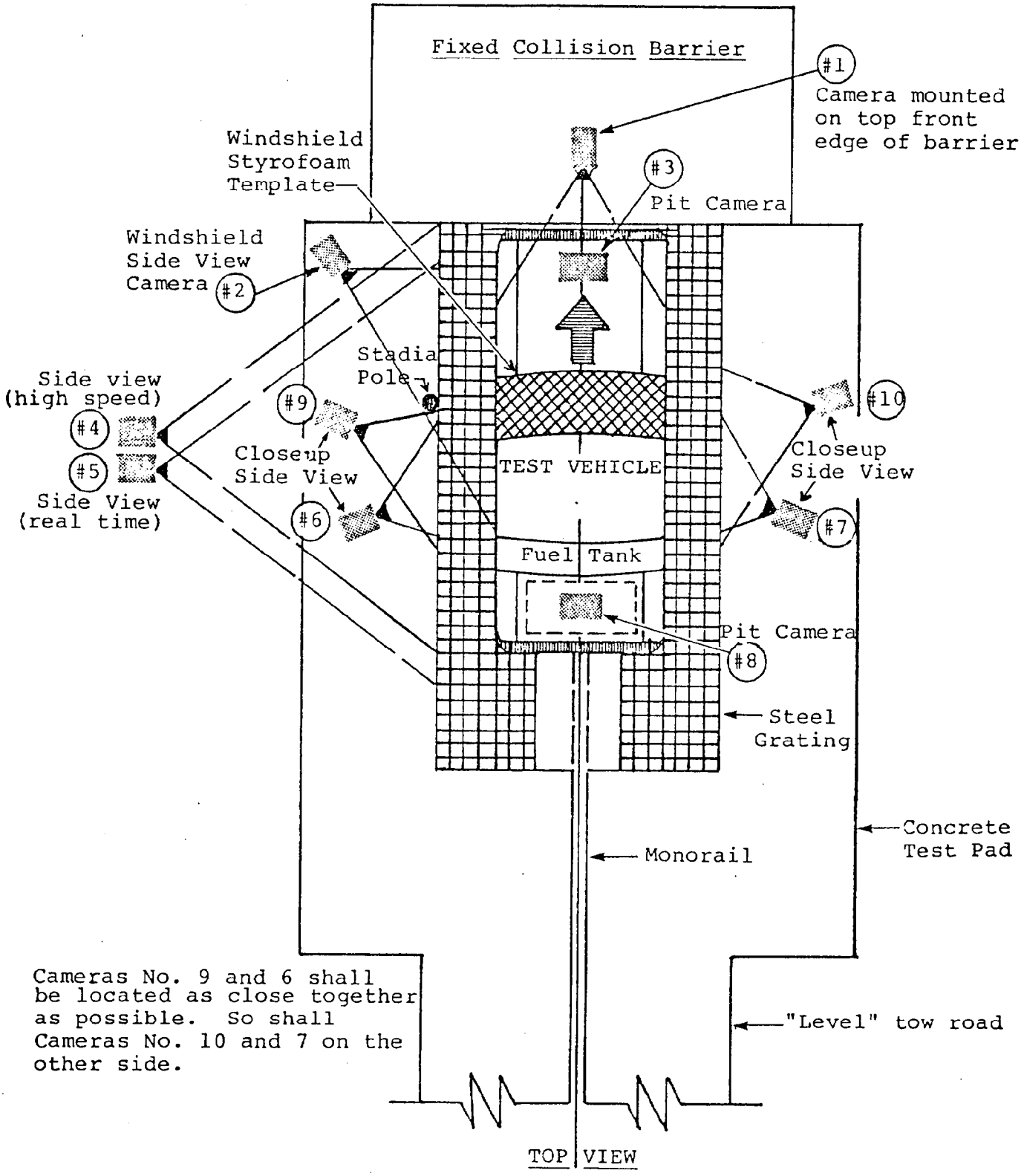
Location	Height	Vehicle Left (in.) 30	24	18	12	6	0	Vehicle Right (in.) 6	12	18	24	30
Pre-test Profile (in.)												
Top of Front Bumper	20.3	-	10.3	9.0	8.0	7.7	7.7	7.7	8.1	9.0	10.3	-
Front of Hood	27.1	-	14.6	13.8	11.3	11.0	10.8	10.9	11.3	13.7	14.5	-
Post-test Profile (in.)												
Top of Front Bumper	16.0	-	37.8	37.0	36.8	36.8	36.8	36.8	36.8	37.2	37.7	-
Front of Hood	26.5	-	37.8	37.8	37.8	37.8	37.8	37.7	37.1	37.3	37.1	-
Post-test Static Crush (in.)												
Top of Front Bumper	4.3	-	27.5	28.0	28.8	29.1	29.1	29.1	28.7	28.2	27.4	- 28.4"
Front of Hood	0.6	-	23.2	24.0	26.5	27.0	27.0	26.8	25.8	23.6	22.6	-

TEST VEHICLE ACCELEROMETER LOCATION DEFINITION AND DATA SUMMARY

Dim.	Length (in.)
A	20.5
B	33.0
C	26.3
D	12.0
E	24.0
F	32.5



No.	Location Description	Component Direction X	Y	Z	Data Summary Peak G @ msec X "+"	X "−"	Y "+"	Y "−"	Z "+"	Z "−"
1	Below front seat area	✓			2.28 @ 163	-39.1 @ 50	@	@	@	@
2	Below rear seat area	✓			2.33 @ 163	-26.0 @ 55	@	@	@	@


Fixed Collision Barrier
#1
Camera mounted on top front edge of barrier
Windshield Styrofoam Template
#3
Pit Camera
Windshield Side View Camera
#2
Stadia Pole
Side view (high speed)
#4
#5
Side View (real time)
#9
Closeup Side View
#6
TEST VEHICLE
#10
Closeup Side View
#7
Fuel Tank
Pit Camera
#8
Steel Grating
Concrete Test Pad
Monorail
"Level" tow road
Cameras No. 9 and 6 shall be located as close together as possible. So shall Cameras No. 10 and 7 on the other side.
TOP VIEW

SUMMARY OF CAMERA LOCATIONS AND DESCRIPTIONS

Loc. No.	Location	Field of View	Lens Size	Frame Rate	Timing Speed (HZ)	Ser No.	Impact Dist-X	Center-line Dist-Y	Camera Height
1	Overhead (Barrier)	Windshield styrofoam up to barrier-vehicle contact if possible	13mm	400	102	11	-3.5	0.0	12.0
2	Ground Based (Left)	Windshield	16mm	400	105	M8	-3.0	13.3	6.0
3	Pit	Engine underside and fuel pump	8mm	1000	100	6	-1.5	0.0	-8.0
4	Ground Based (Left)	Views entire left side of vehicle	16mm	400	98	9	5.0	-26.0	4.0
5	Ground Based (Real Time)	Documentary	Zoom	24	N/A	-	10.0	-26.0	6.0
6	Ground Based (Left)	Driver dummy closeup	15mm	1000	102	8	3.5	-11.0	5.0
7	Ground Based (Right)	Passenger dummy closeup	25mm	1000	100	5	5.0	16.0	4.5
8	Pit	Fuel tank	8mm	1000	105	7	7.5	0.0	-8.0
9	Ground Based (Left)	Same view as Camera No. 6	15mm	1000	104	10	4.0	-11.0	5.0
10	Ground Based (Right)	Same view as Camera No. 7	25mm	1000	100	4	6.0	16.0	4.5
11	On Board	Driver Seatbelt Retractor	8mm	1000	100	12	9.0	-1.5	1.5
12	On Board	Passenger Seatbelt Retractor	8mm	1000	102	11	9.0	1.5	1.5

Note: All distances are in feet.

APPENDIX A

PHOTOGRAPHS

Figure A-1. Pre-test Front View - 1980 Fiat Strada - NHTSA 800563.

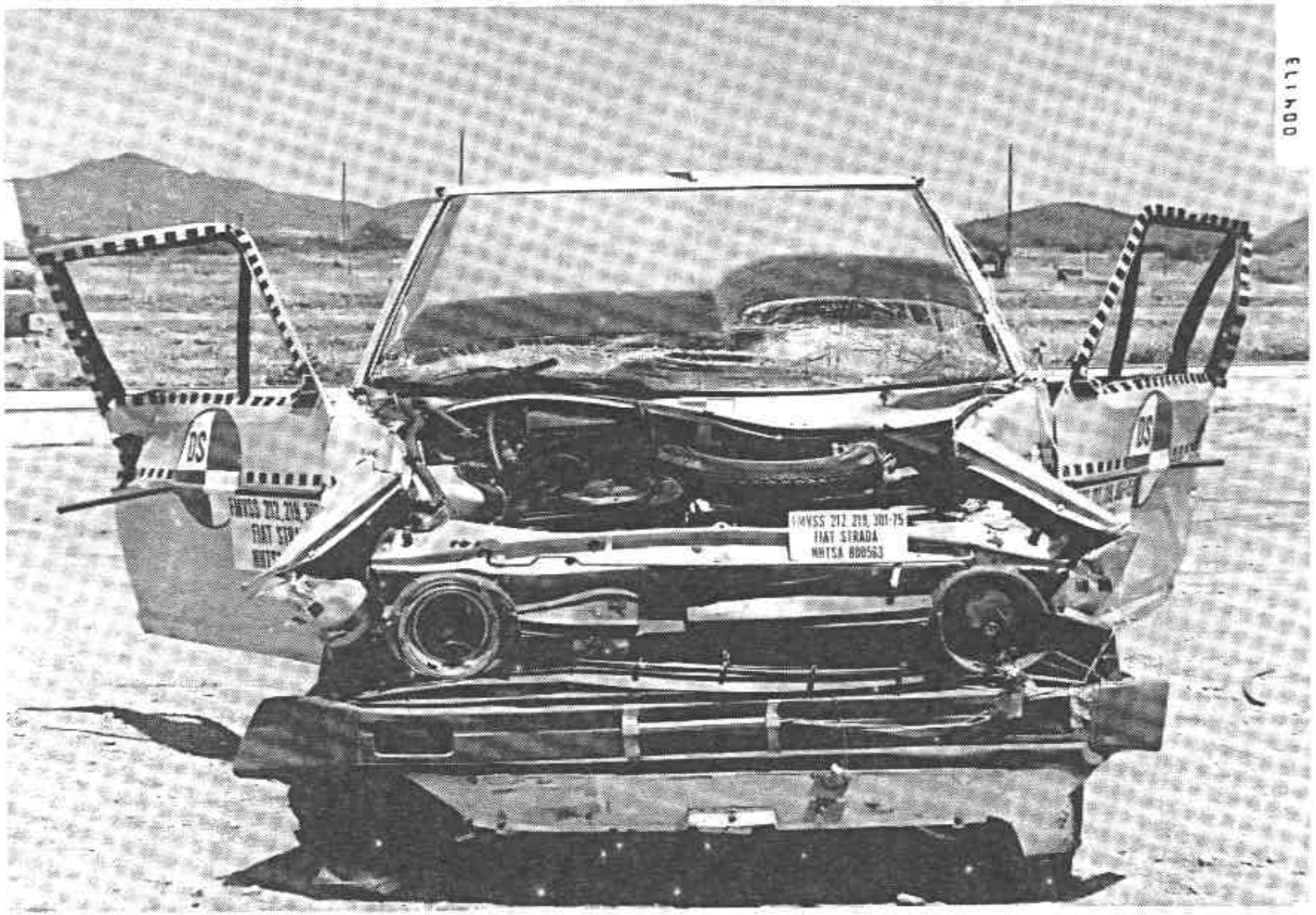


Figure A-2. Post-test Front View - 1980 Fiat Strada - NHTSA 800563.

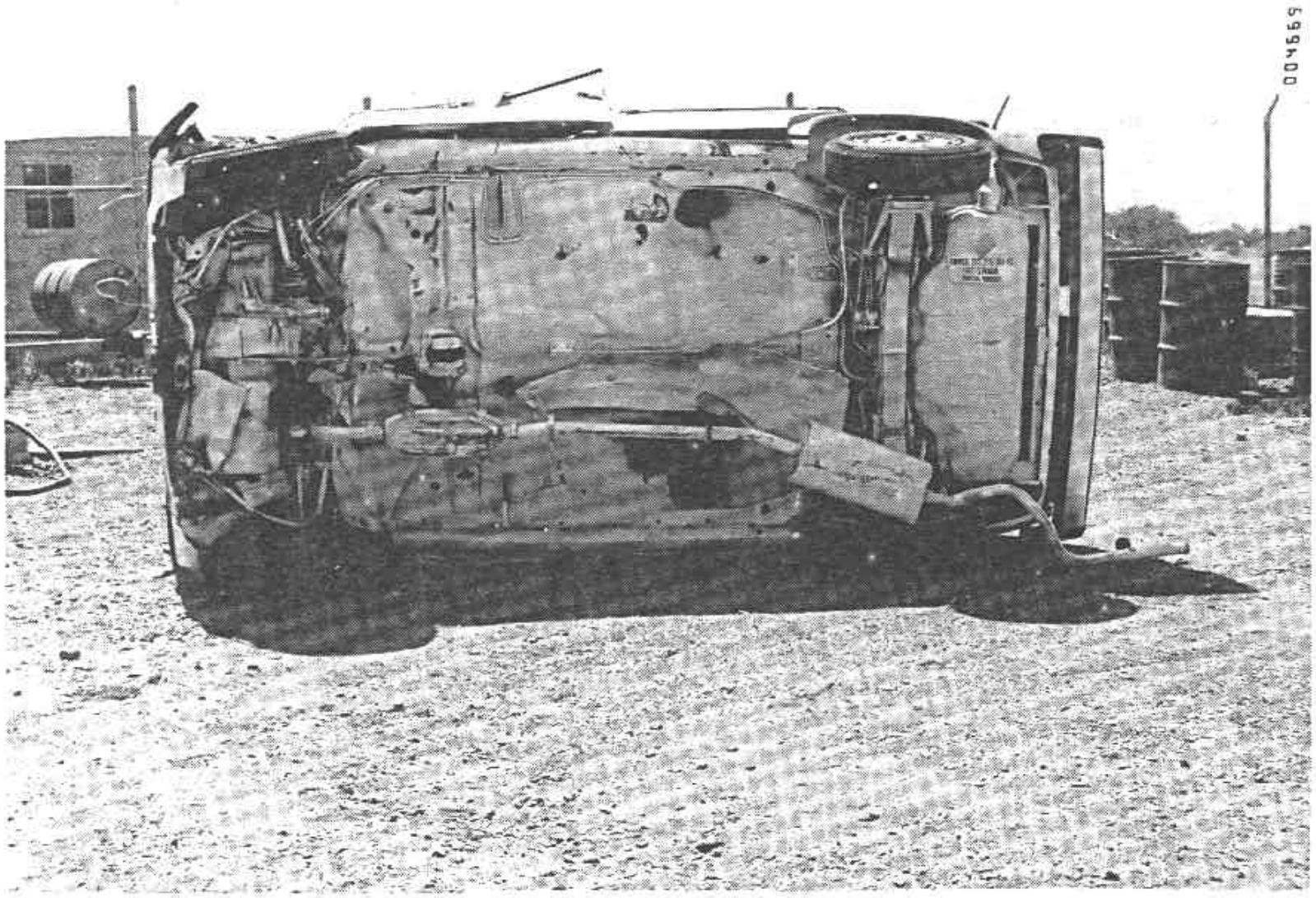


Figure A-3. Post-test Overall Underside View - 1980 Fiat Strada - NHTSA 800563.

Figure A-4. Pre-test Side View - 1980 Fiat Strada - NHTSA 800563.

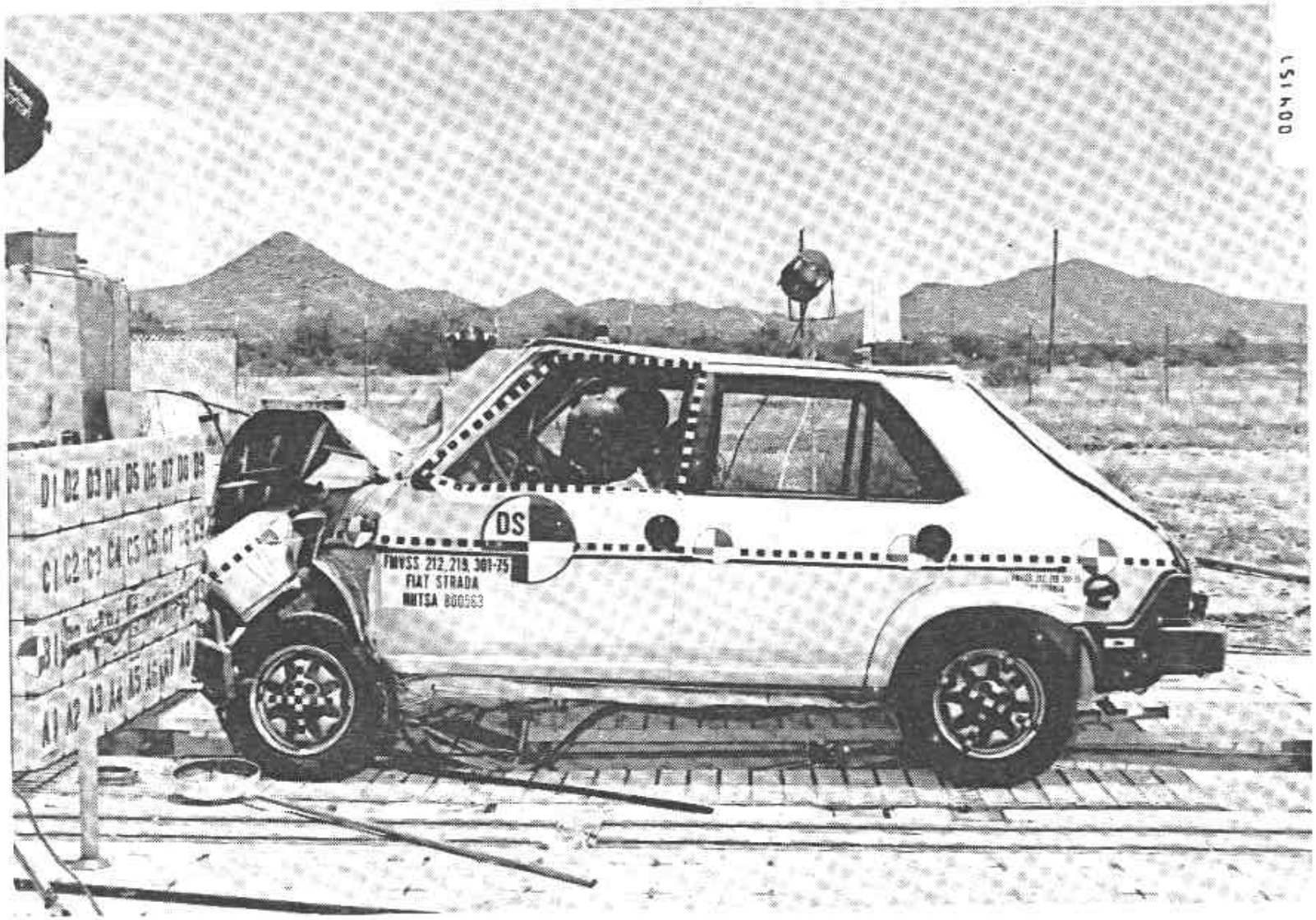


Figure A-5. Post-test Side View - 1980 Fiat Strada - NHTSA 800563.

Figure A-6. Pre-test Driver Dummy Position - 1980 Fiat Strada - NHTSA 800563.

Figure A-7. Post-test Driver Dummy Position - 1980 Fiat Strata - NHTSA 800563.

Figure A-8. Pre-test Passenger Position - 1980 Fiat Strada - NHTSA 800563.

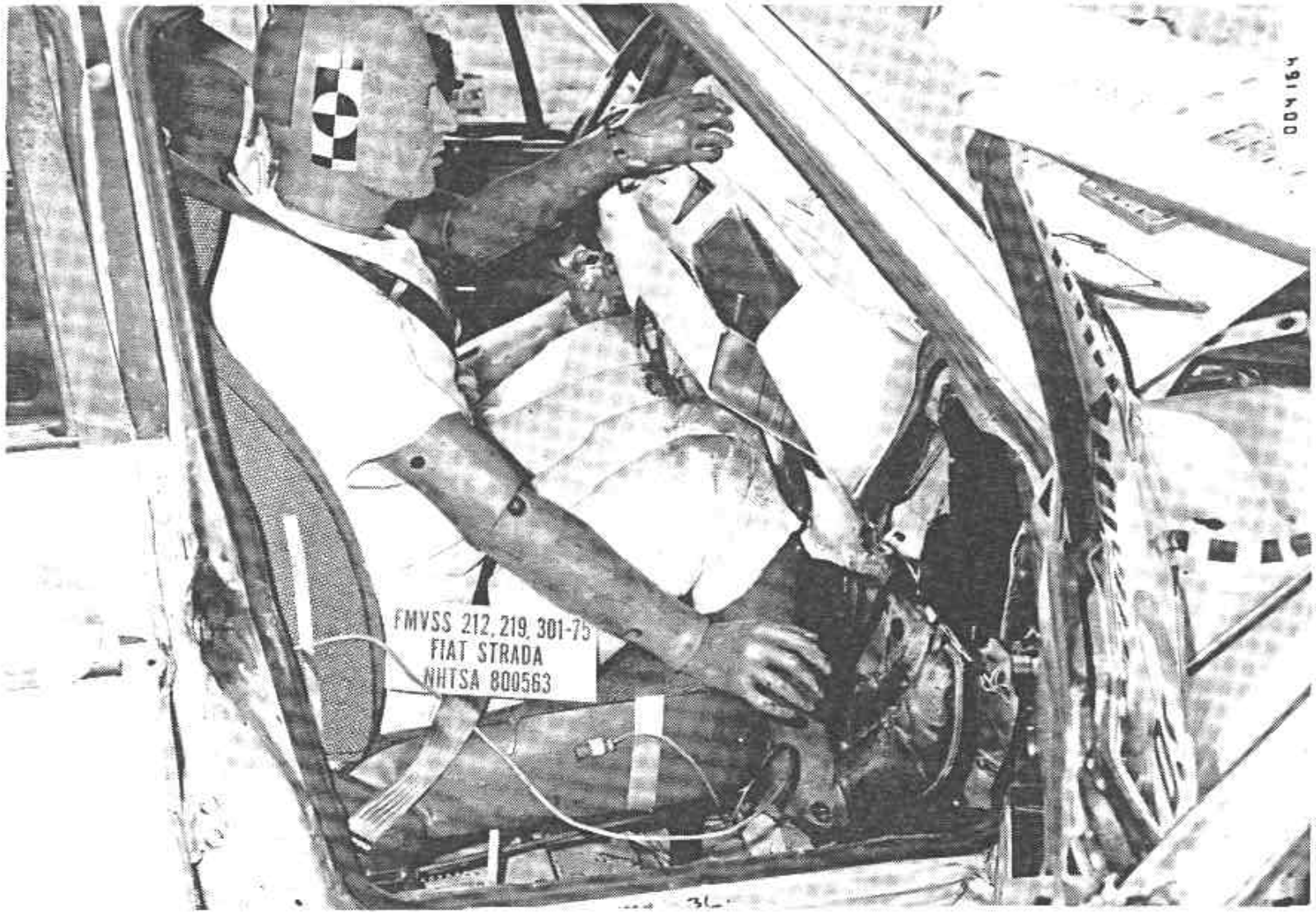


Figure A-9. Post-test Passenger Position - 1980 Fiat Strada - NHTSA 800563.

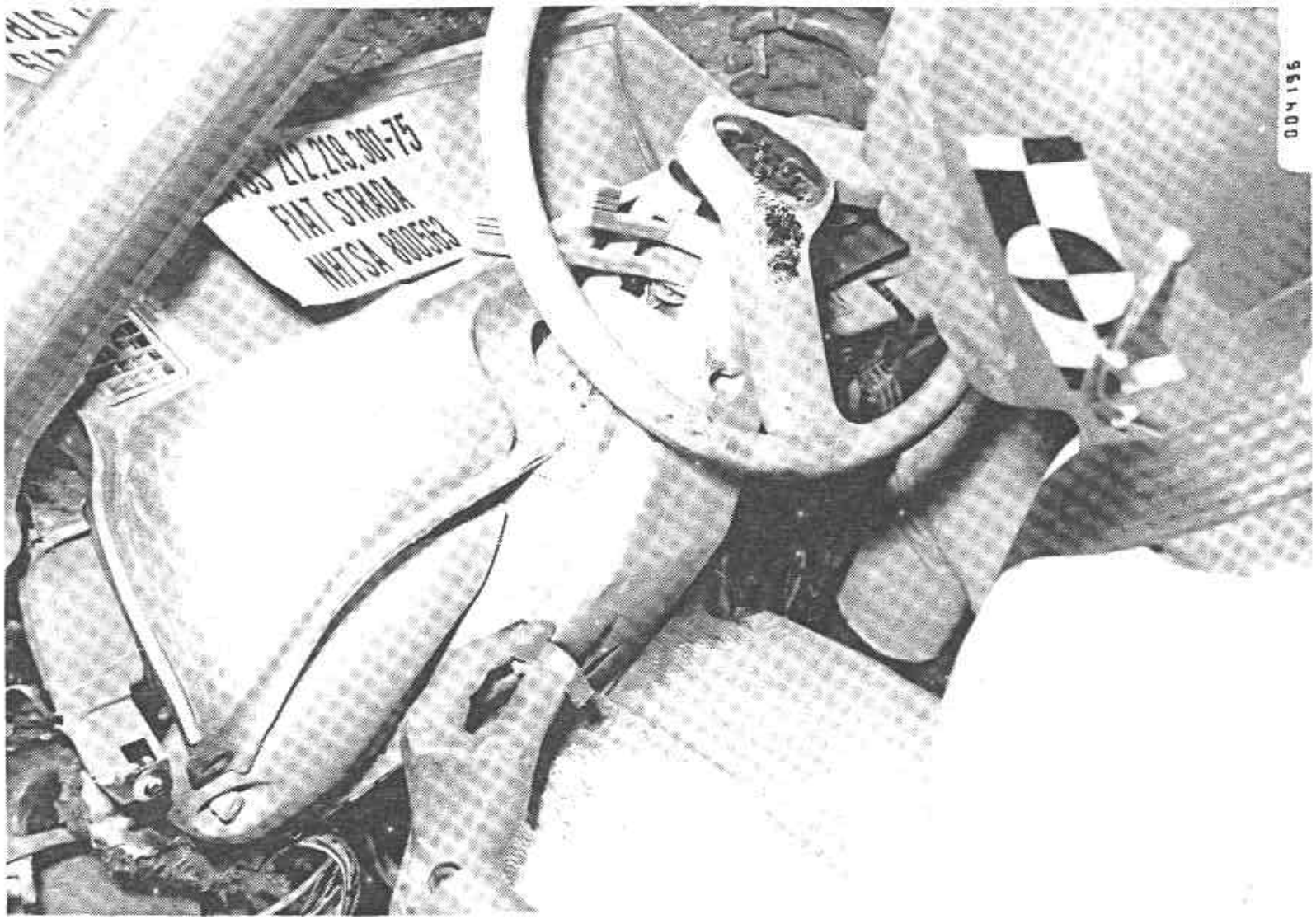


Figure A-10. Post-test Dummy-Vehicle Contact Points - 1980 Fiat Strada - NHTSA 800563.

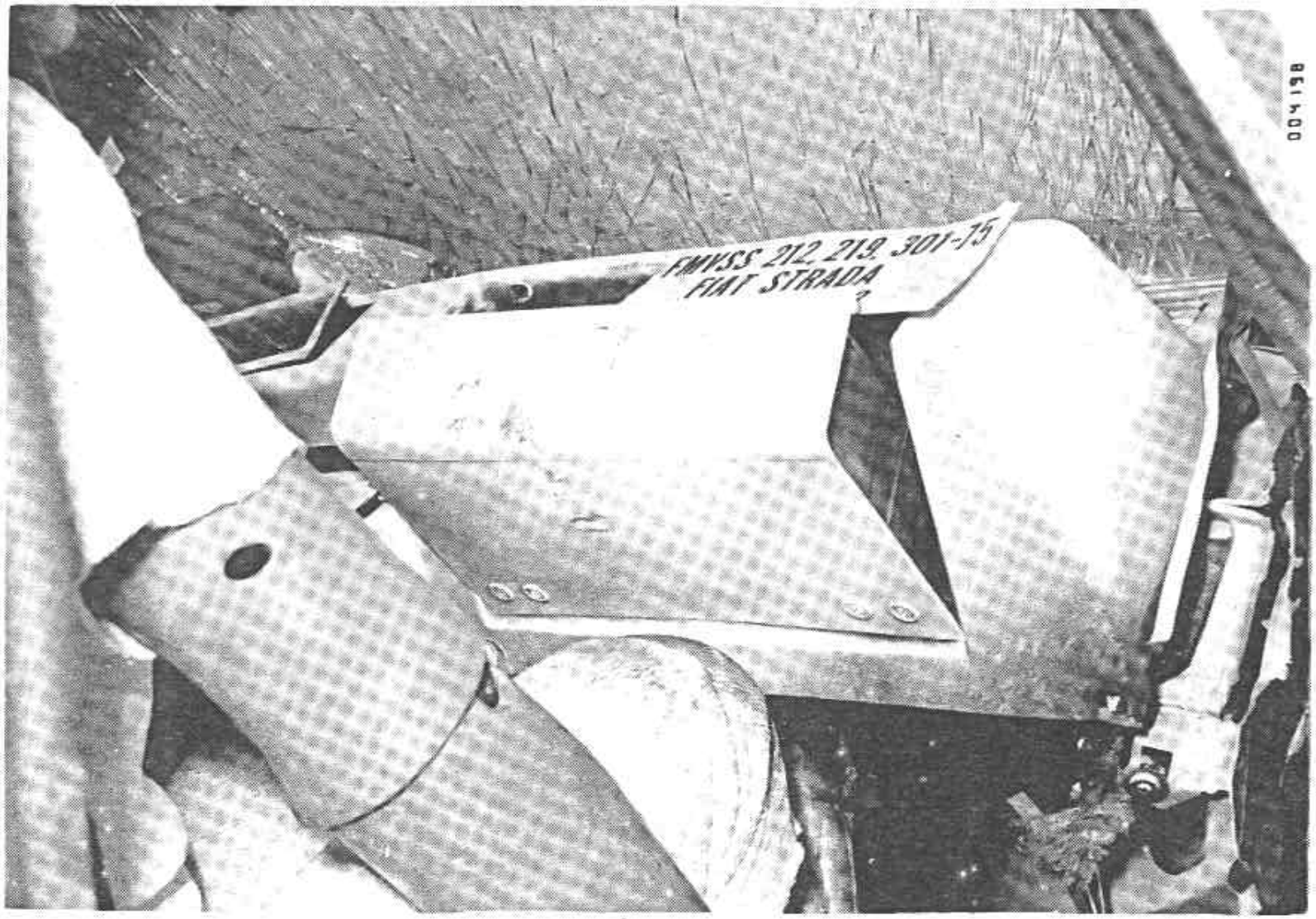


Figure A-11. Post-test Vehicle Interior Deformation - 1980 Fiat Strada - NHTSA 800563.

APPENDIX B

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*

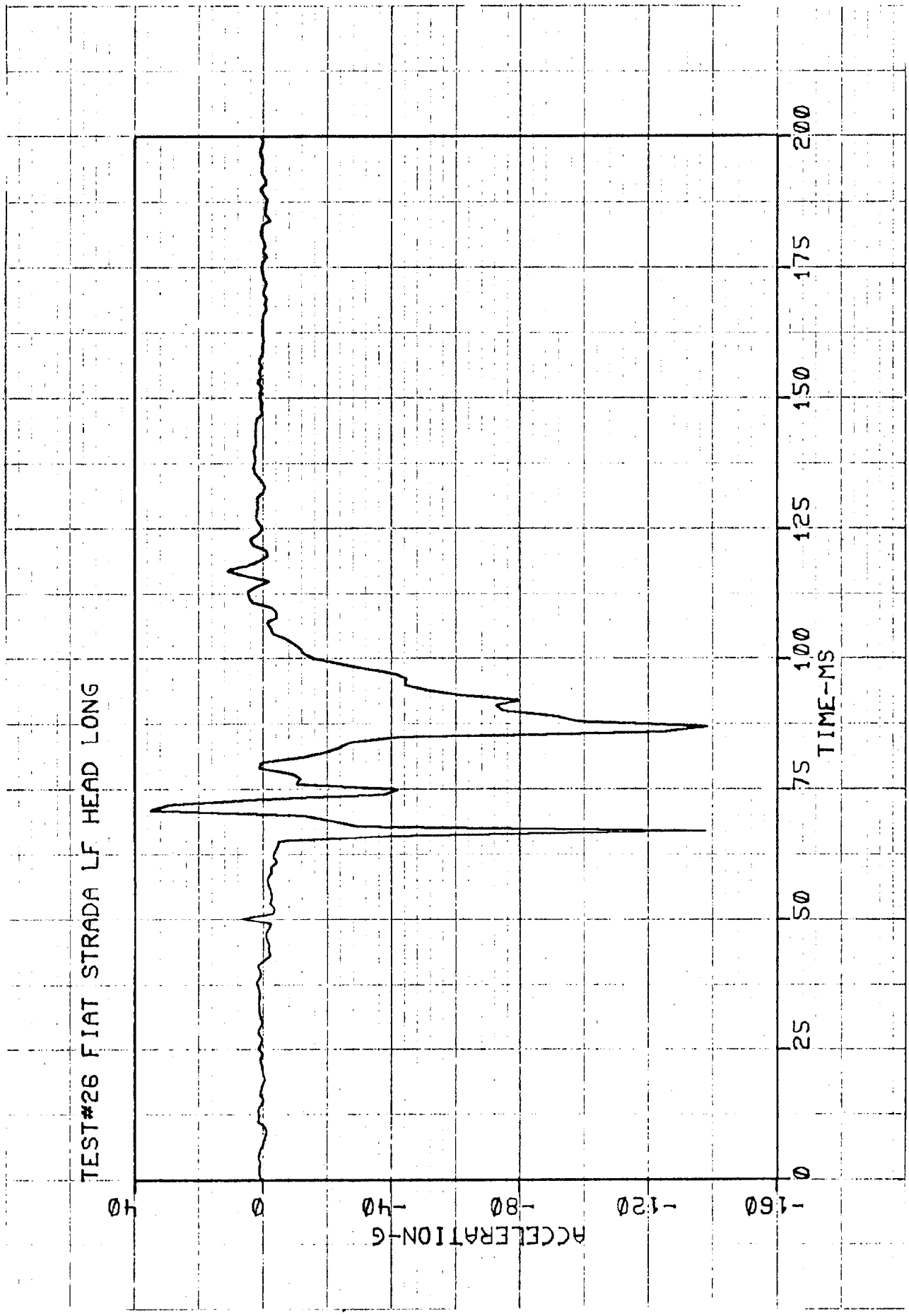
Driver	RF Outboard Passenger	Data Description
LF Head	RF Head	Head Acceleration (G)
LF Chest	RF Chest	Chest Acceleration (G)
LF Femurs	RF Femurs	Femur Loads (lb)
LF Belt Loads	RF Belt Loads	Lap and Torso Belt Loads (lb)

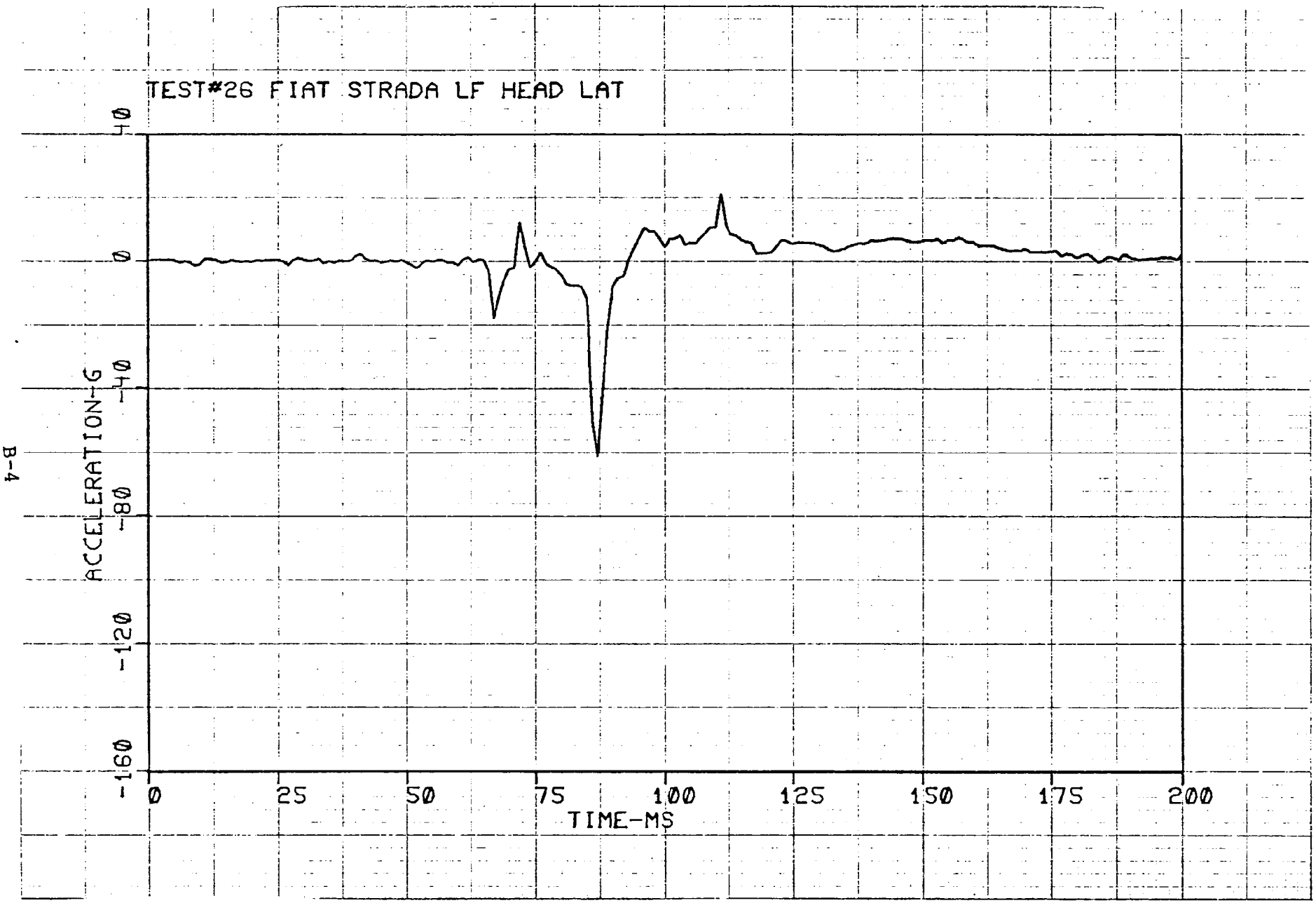
Vehicle Data**

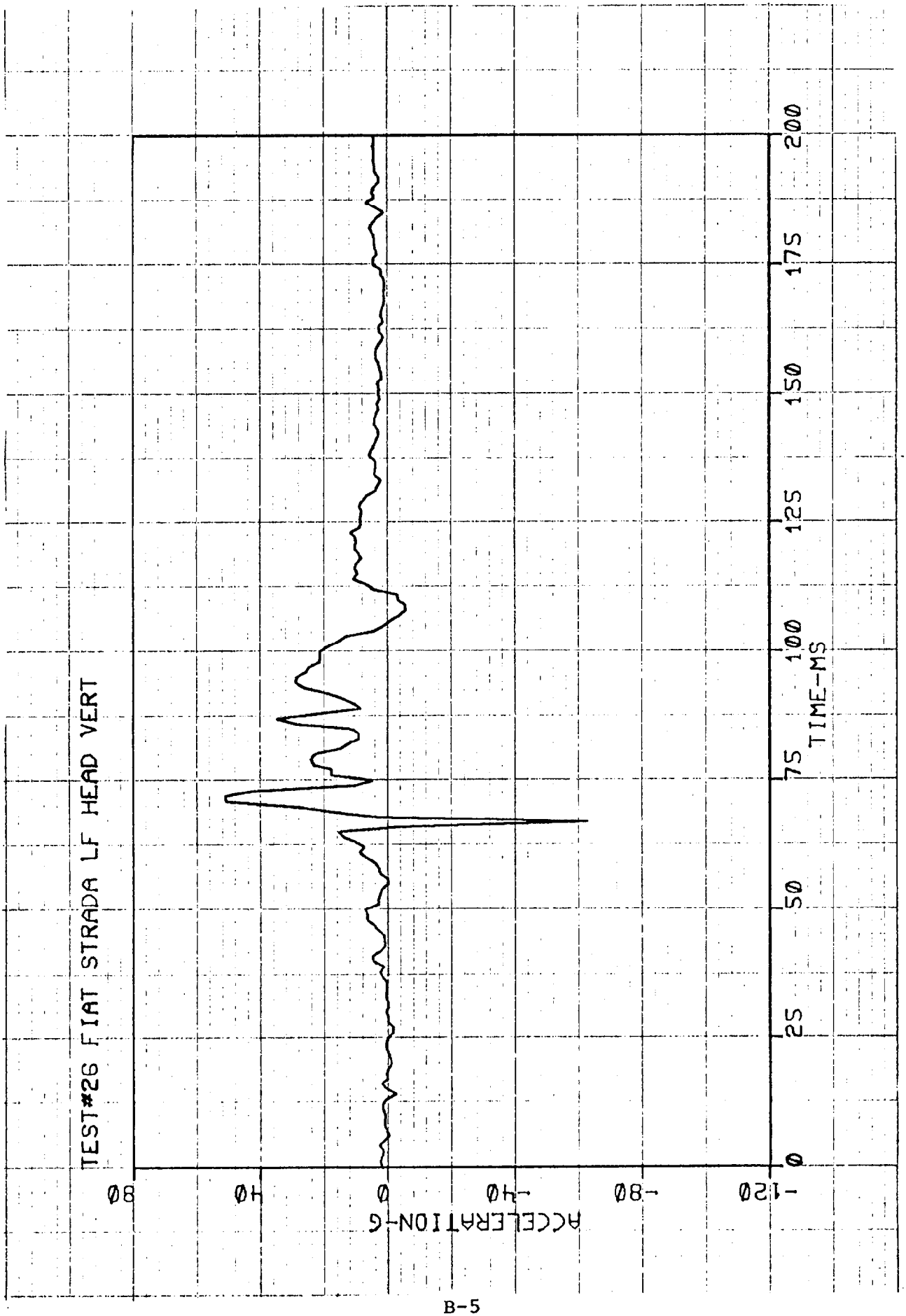
	Location
Loc 1	Front Seat Area Acceleration (G)
Loc 2	Rear Seat Area Acceleration (G)

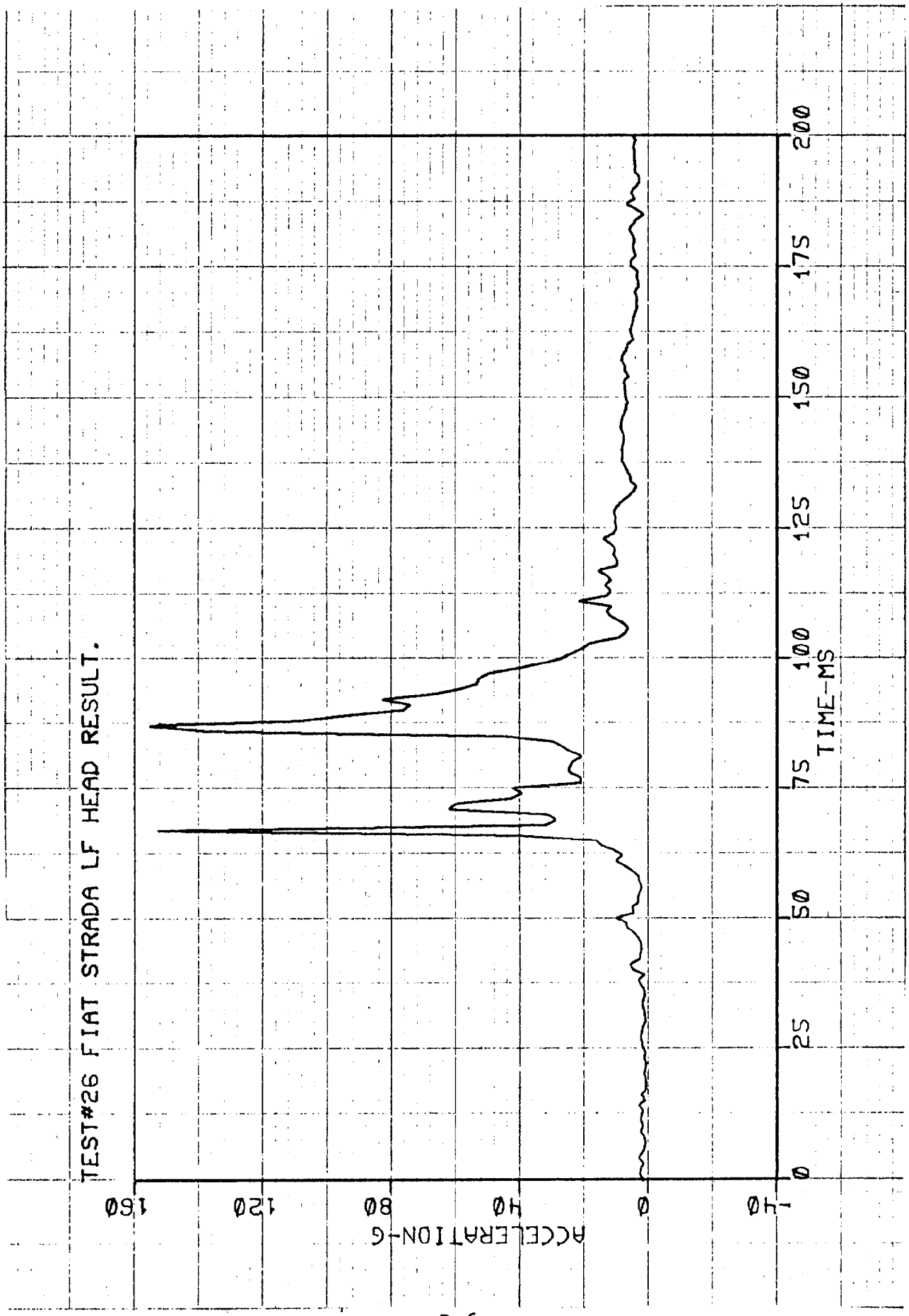
*Dummy Injury Summary presented on pages 4-4 and 4-5.
**Vehicle accelerometer location and data summarized on page 4-9.

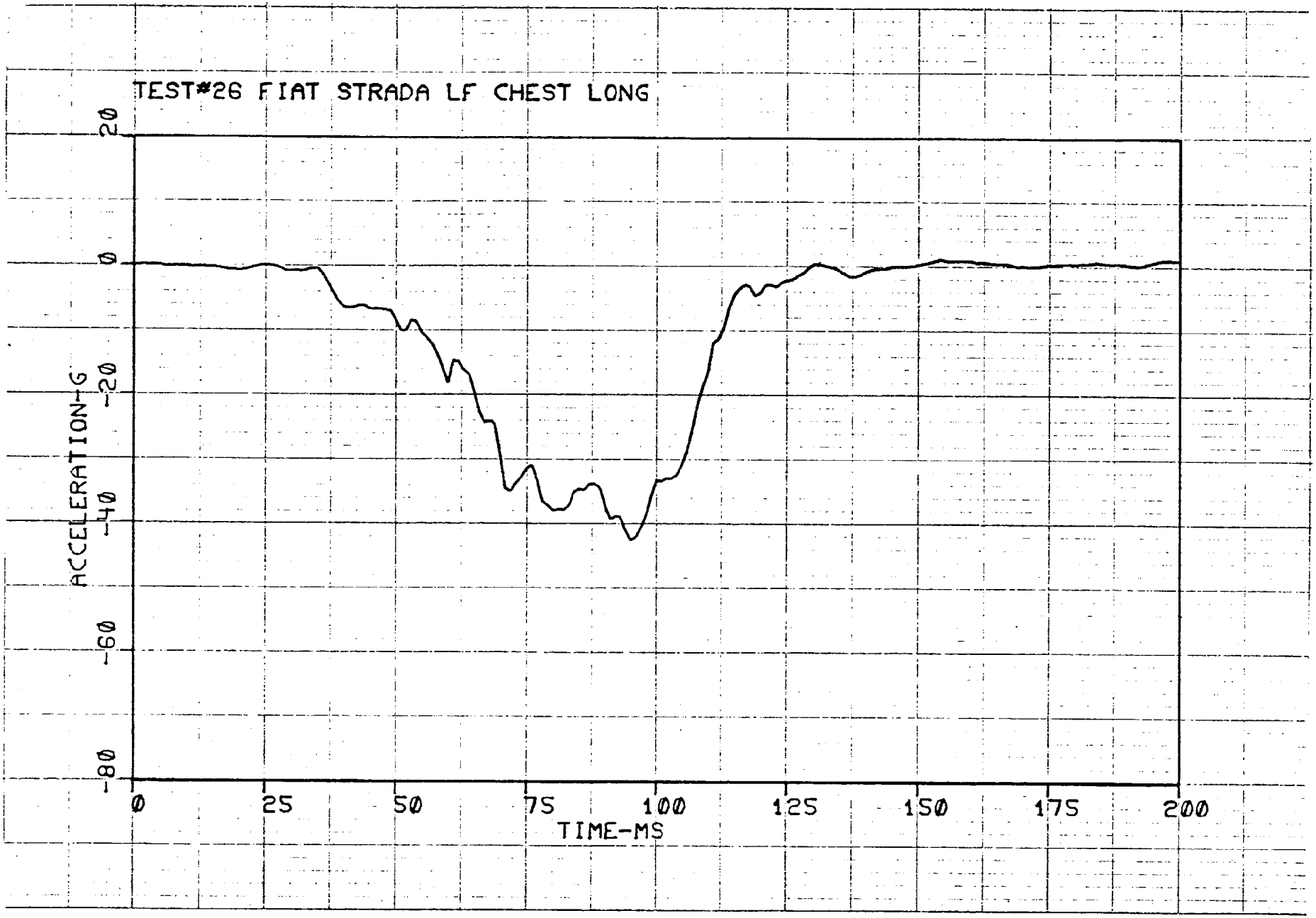
Test Anomalies: None

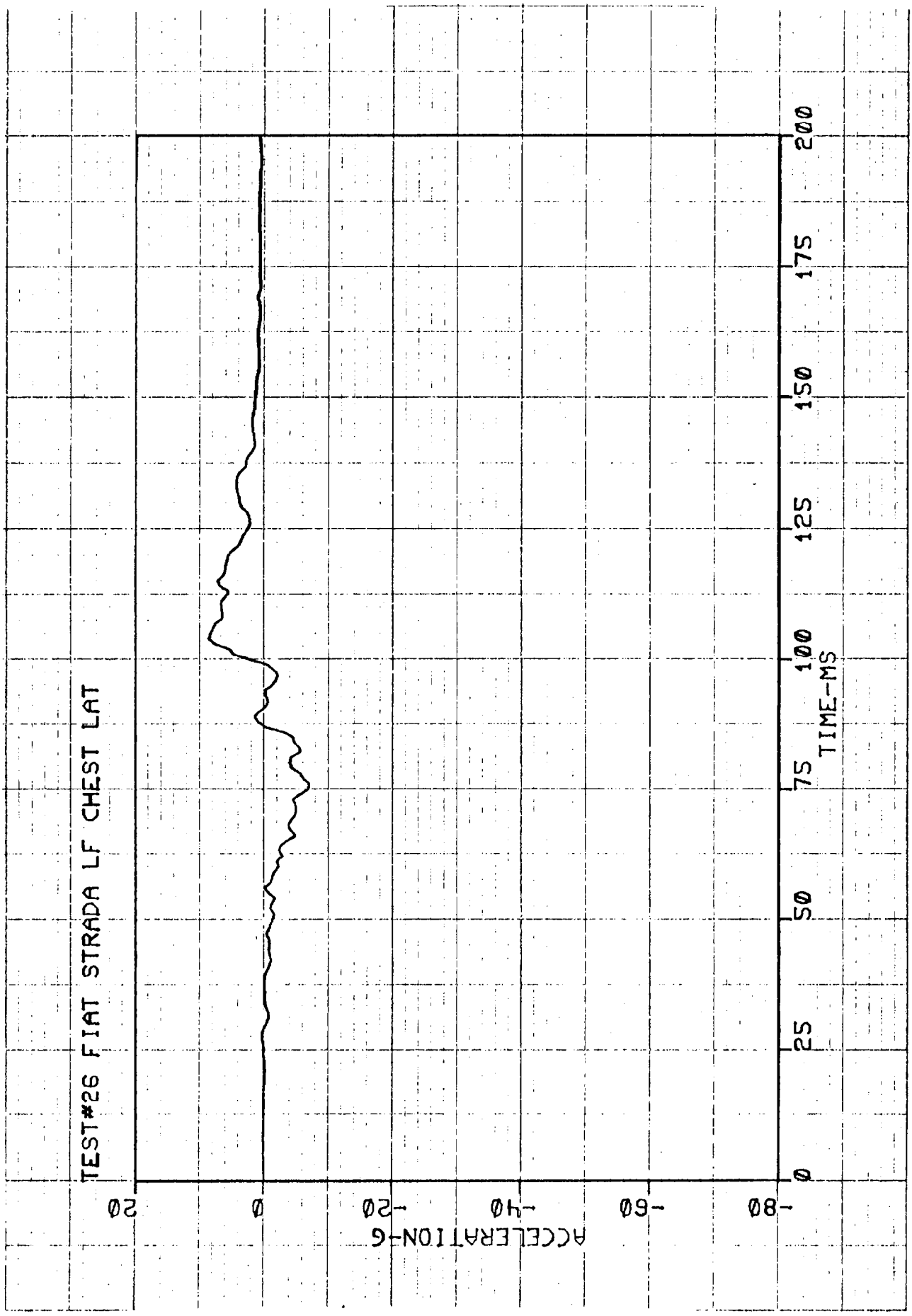

TEST#26 FIAT STRADA LF HEAD LONG
ACCELERATION-G
40
0
-40
-80
-120
-160
0
25
50
75
100
125
150
175
200
TIME-MS

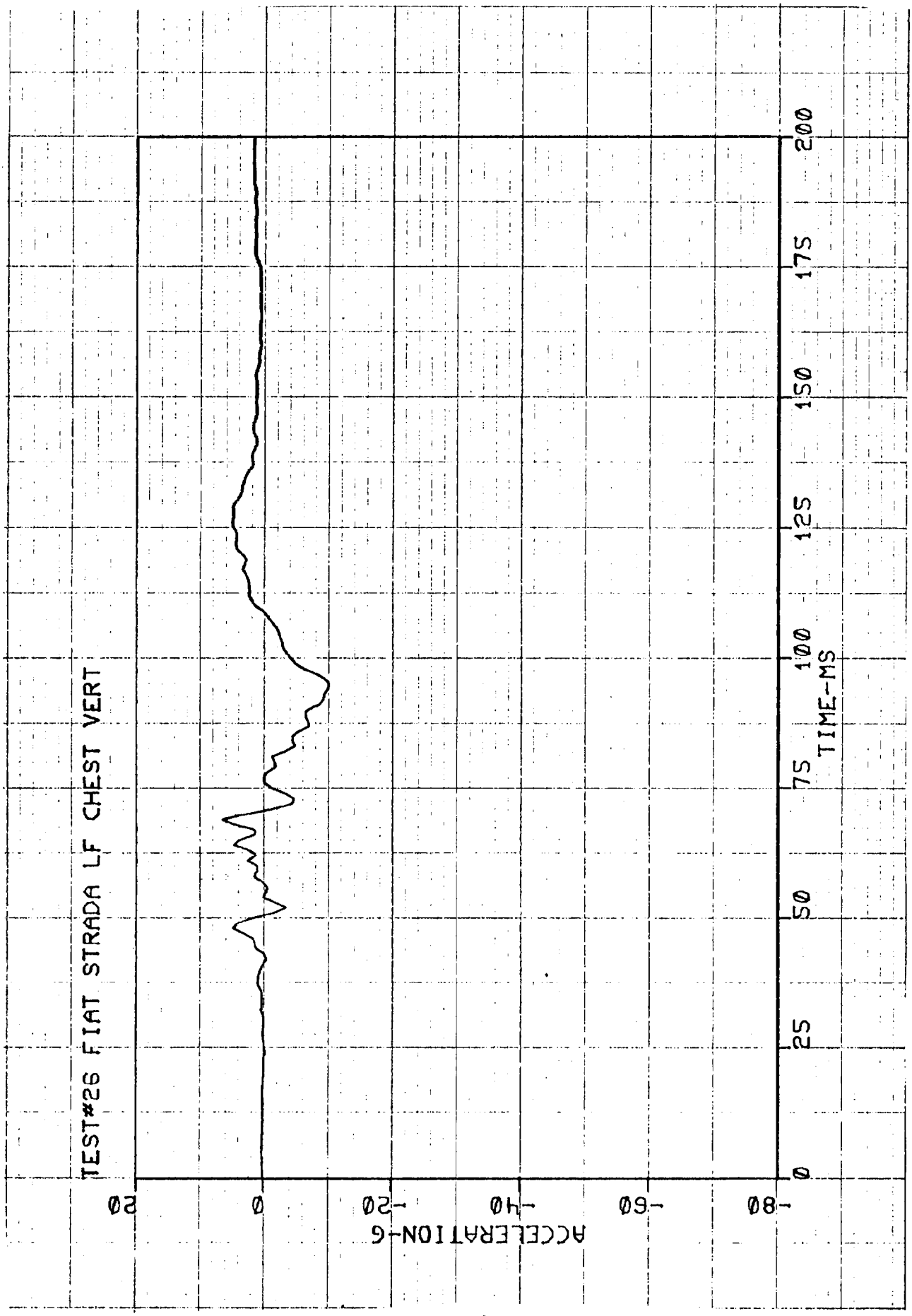

TEST#26 FIAT STRADA LF HEAD LAT
40
0
-40
-80
-120
-160
ACCELERATION-G
0
25
50
75
100
125
150
175
200
TIME-MS

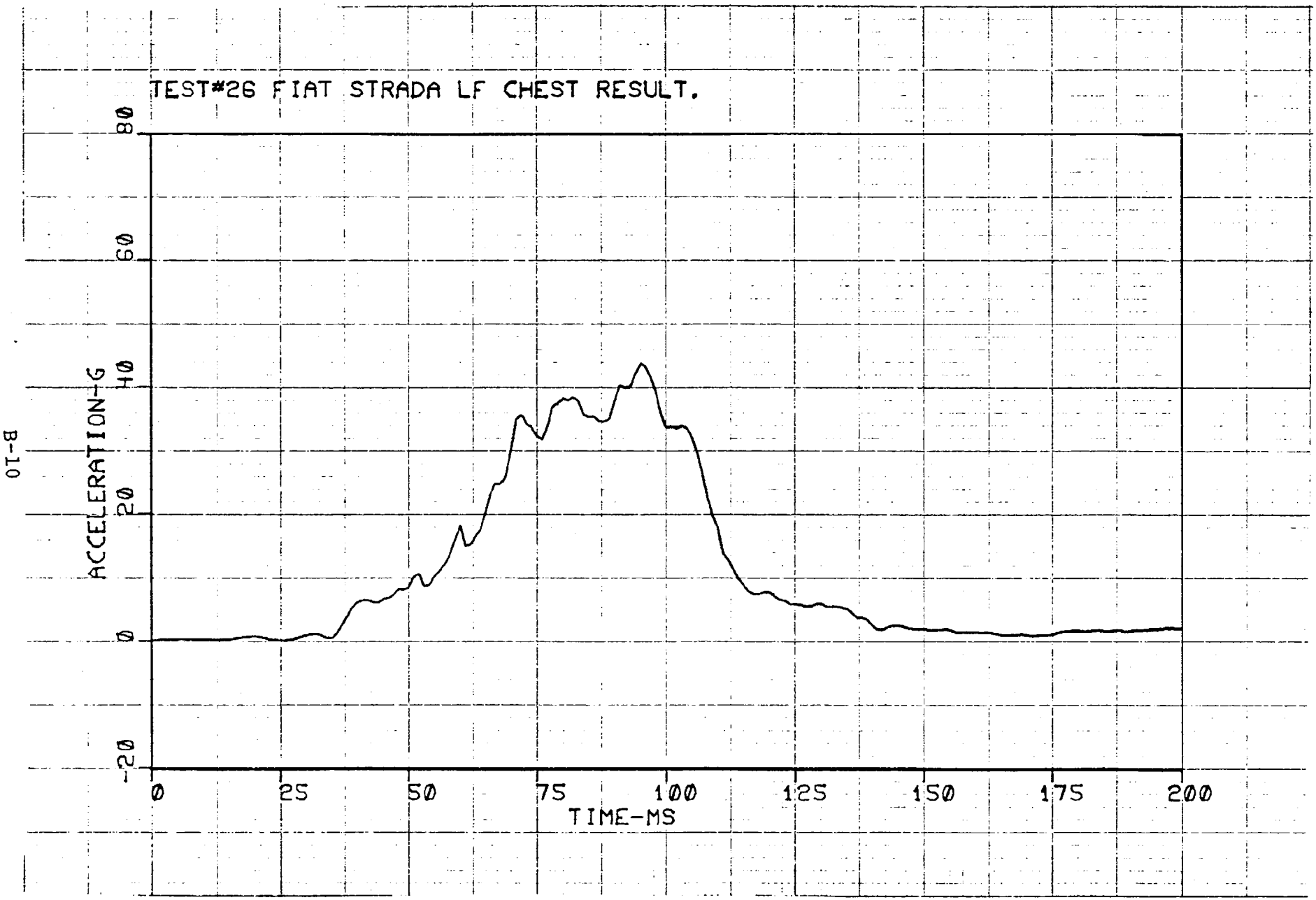

TEST#26 FIAT STRADA LF HEAD VERT
ACCELERATION-G
80
40
0
-40
-80
-120
0
25
50
75
100
125
150
175
200
TIME-MS

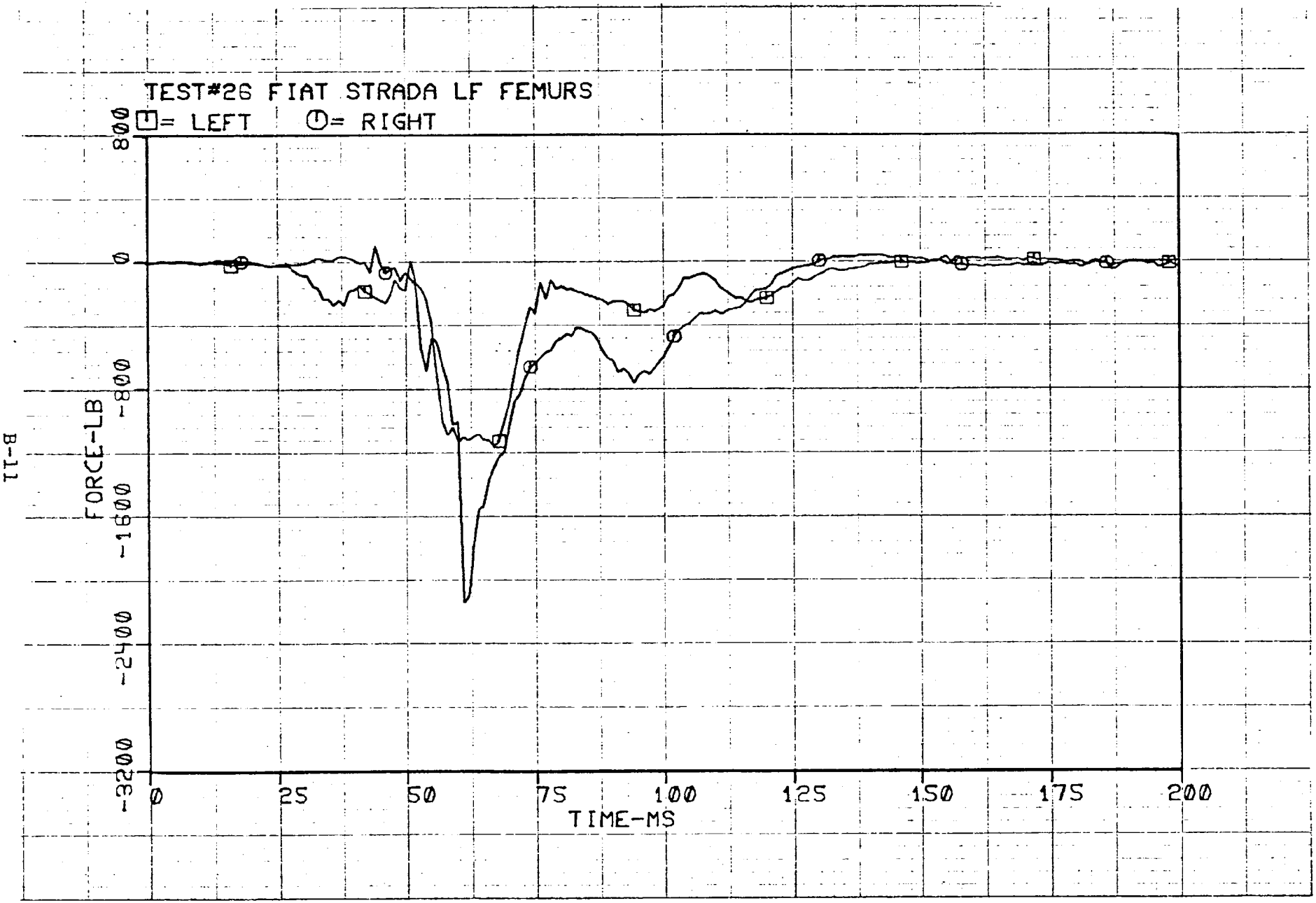

TEST#26 FIAT STRADA LF HEAD RESULT.
ACCELERATION-G
-40
0
40
80
120
160
TIME-MS
0
25
50
75
100
125
150
175
200

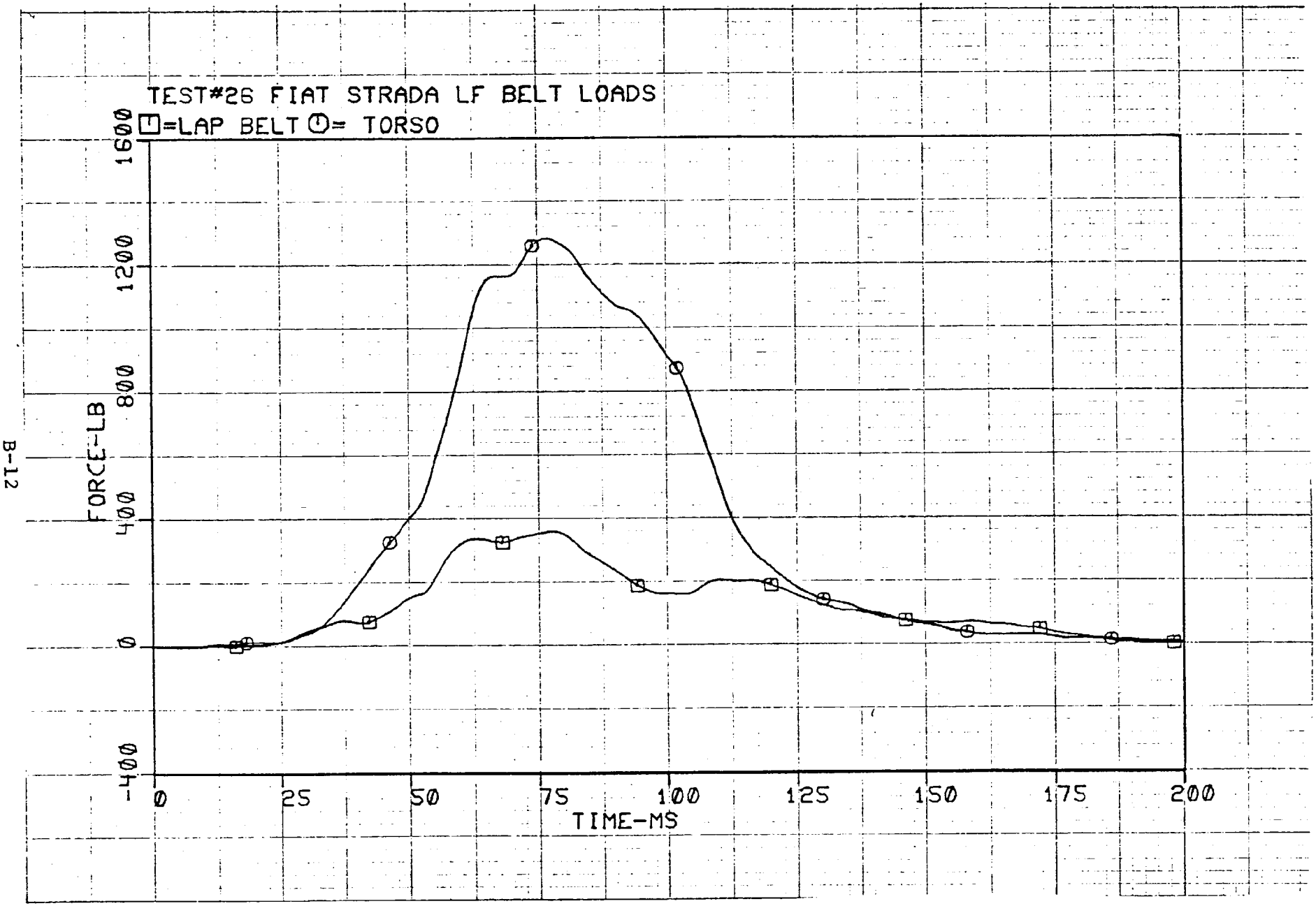

TEST*26 FIAT STRADA LF CHEST LONG
20
0
-20
-40
-60
-80
ACCELERATION-G
0
25
50
75
100
125
150
175
200
TIME-MS


TEST#26 FIAT STRADA LF CHEST LAT
ACCELERATION-G
20
0
-20
-40
-60
-80
0
25
50
75
100
125
150
175
200
TIME-MS


TEST#26 FIAT STRADA LF CHEST VERT
ACCELERATION-G
20
0
-20
-40
-60
-80
0
25
50
75
100
125
150
175
200
TIME-MS


TEST#26 FIAT STRADA LF CHEST RESULT.
80
60
40
20
0
-20
ACCELERATION-G
0
25
50
75
100
125
150
175
200
TIME-MS


TEST#26 FIAT STRADA LF FEMURS
= LEFT
= RIGHT
800
0
-800
-1600
-2400
-3200
FORCE-LB
0
25
50
75
100
125
150
175
200
TIME-MS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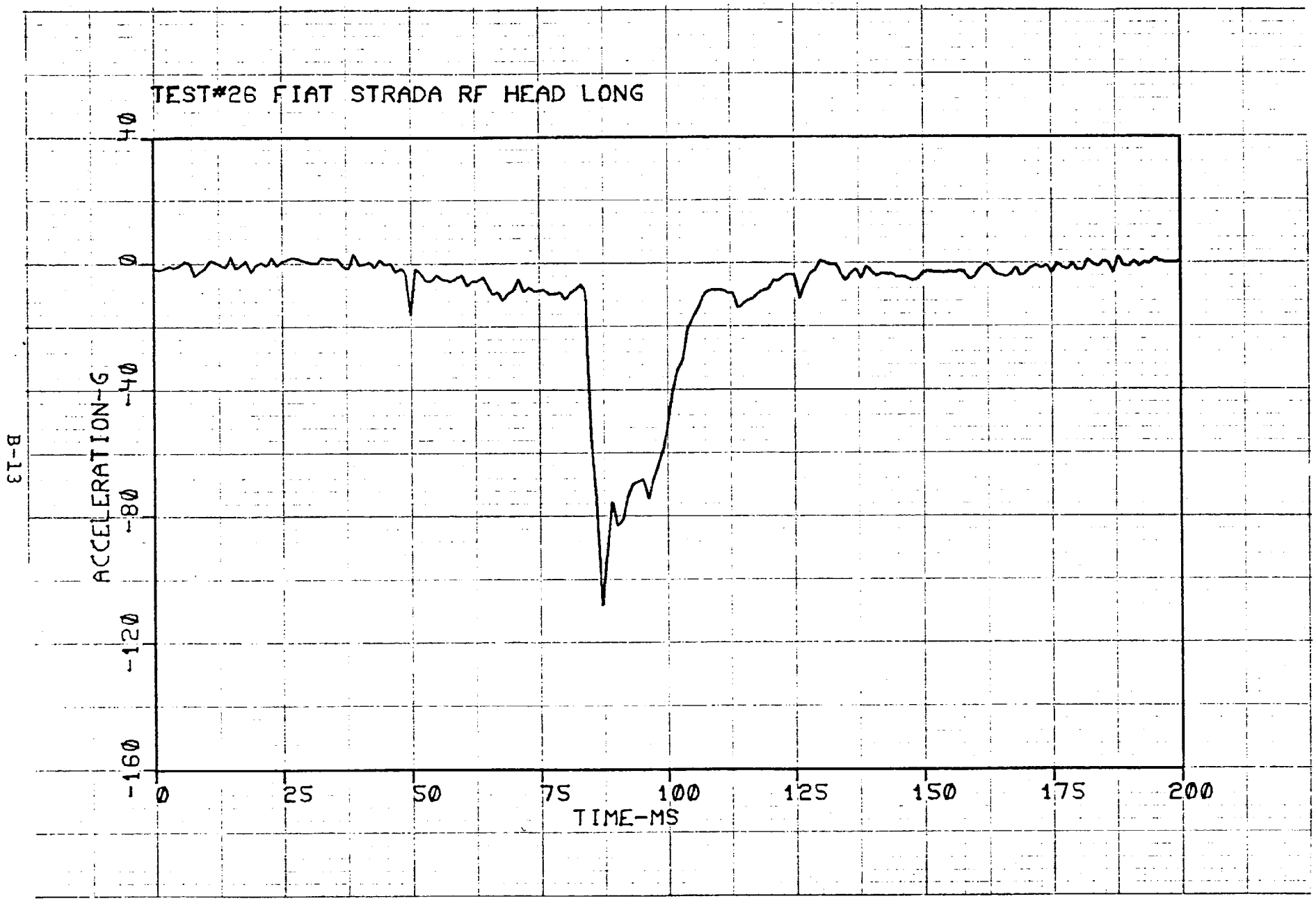
□=LAP BELT ⓘ= TORSO
FORCE-LB
1600
1200
800
400
0
-400
0
25
50
75
100
125
150
175
200
TIME-MS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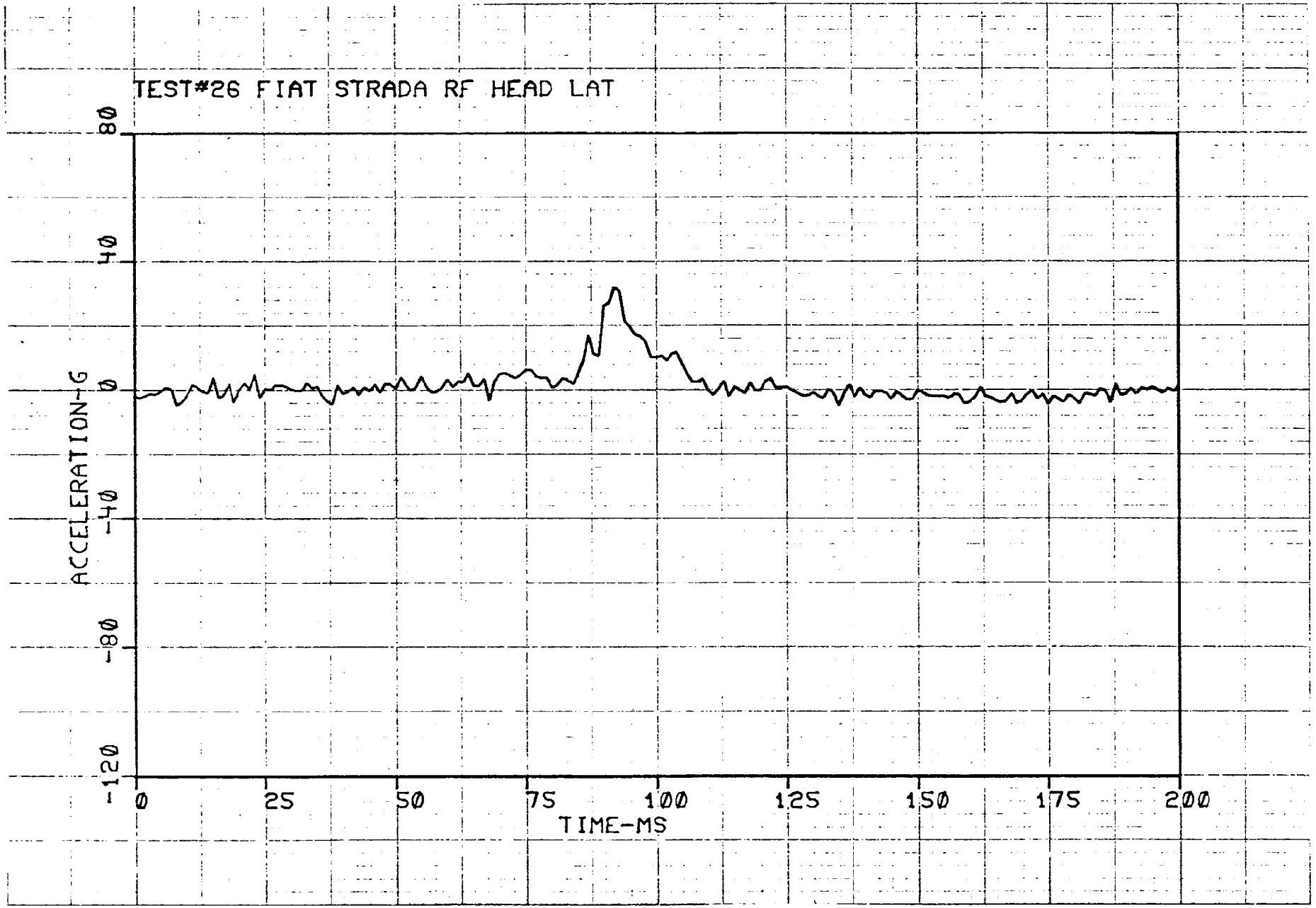
40
0
-40
-80
-120
-160
ACCELERATION-G
0
25
50
75
100
125
150
175
200
TIME-MS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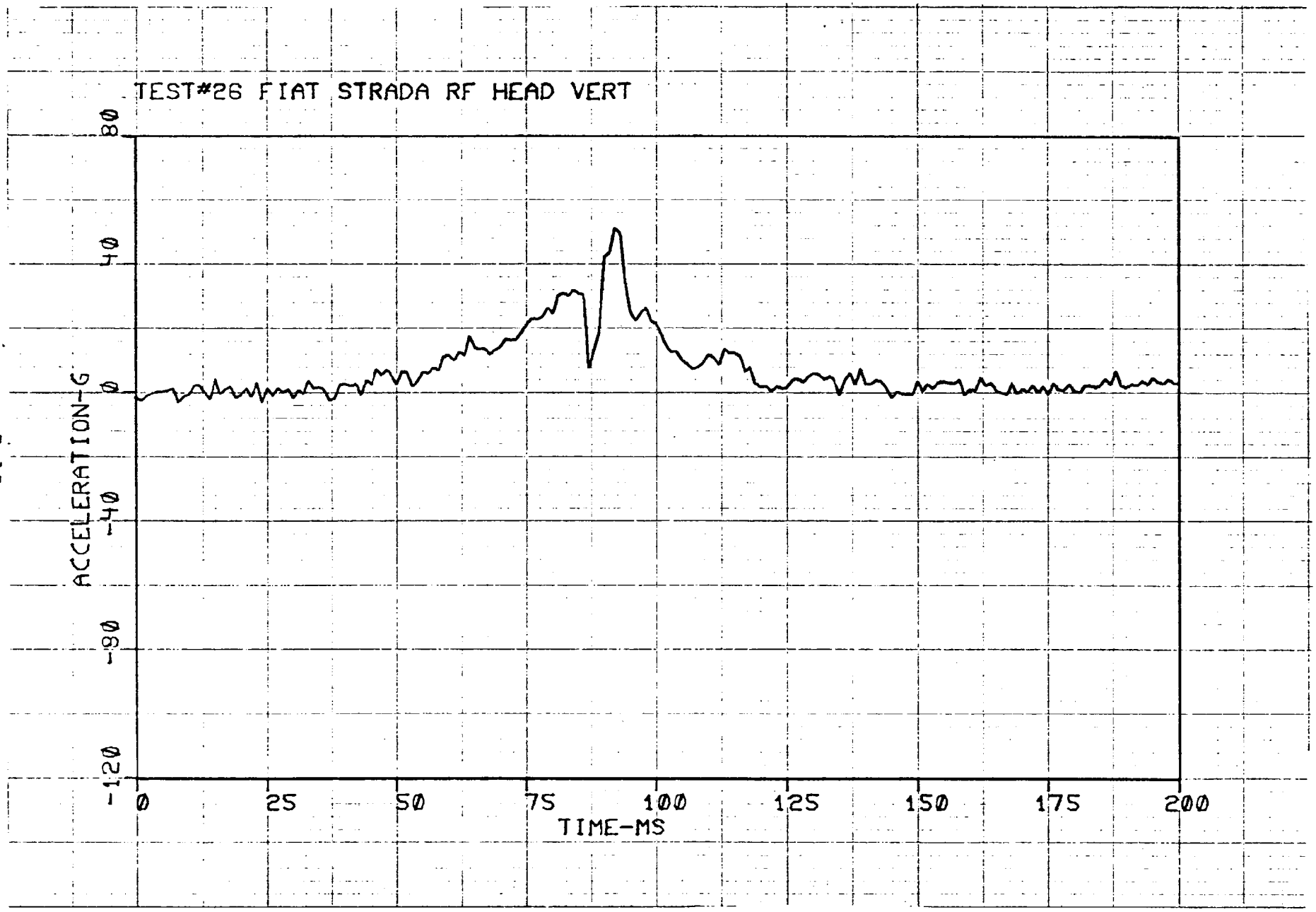
80
40
0
-40
-80
-120
ACCELERATION-G
0
25
50
75
100
125
150
175
200
TIME-MS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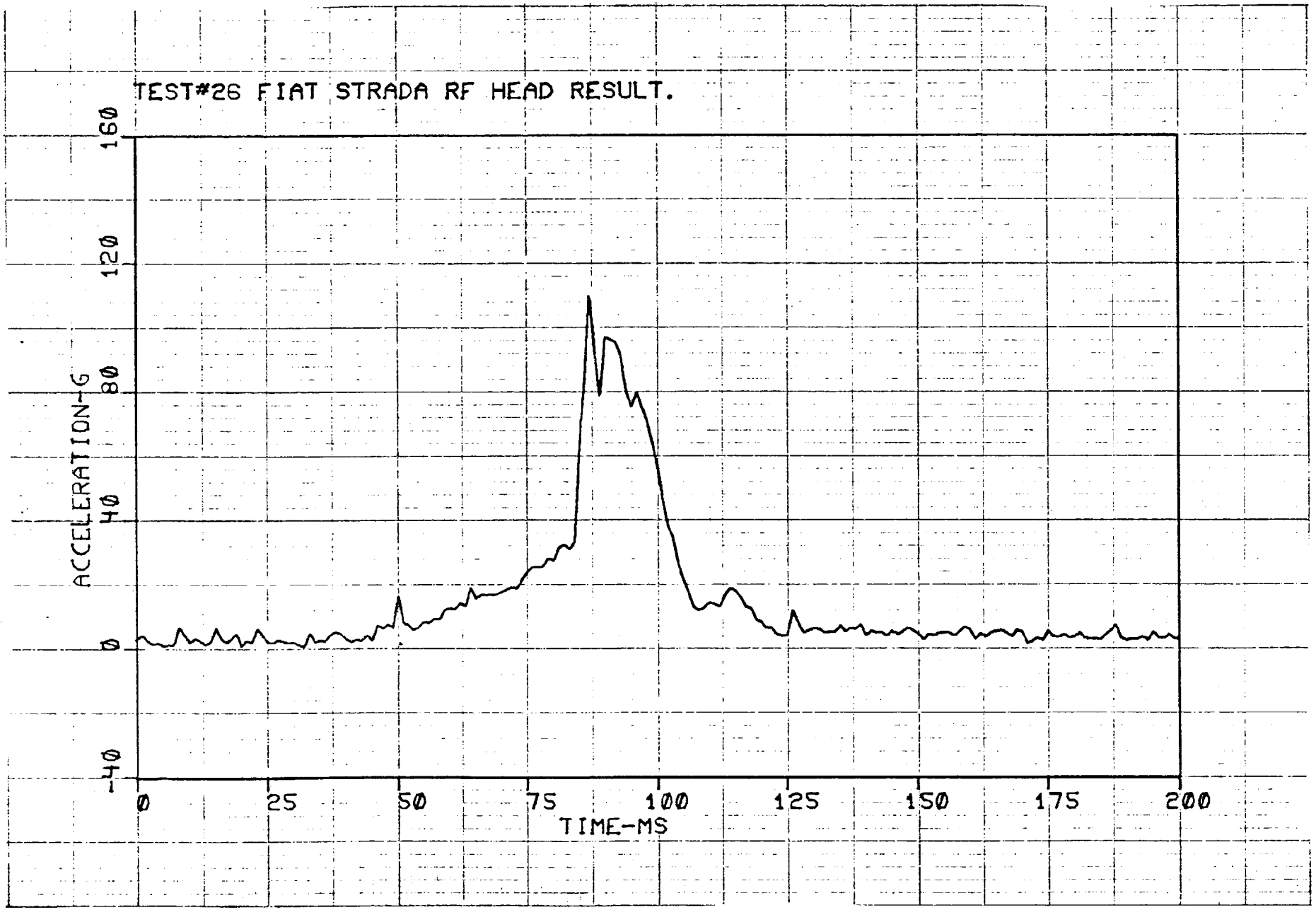
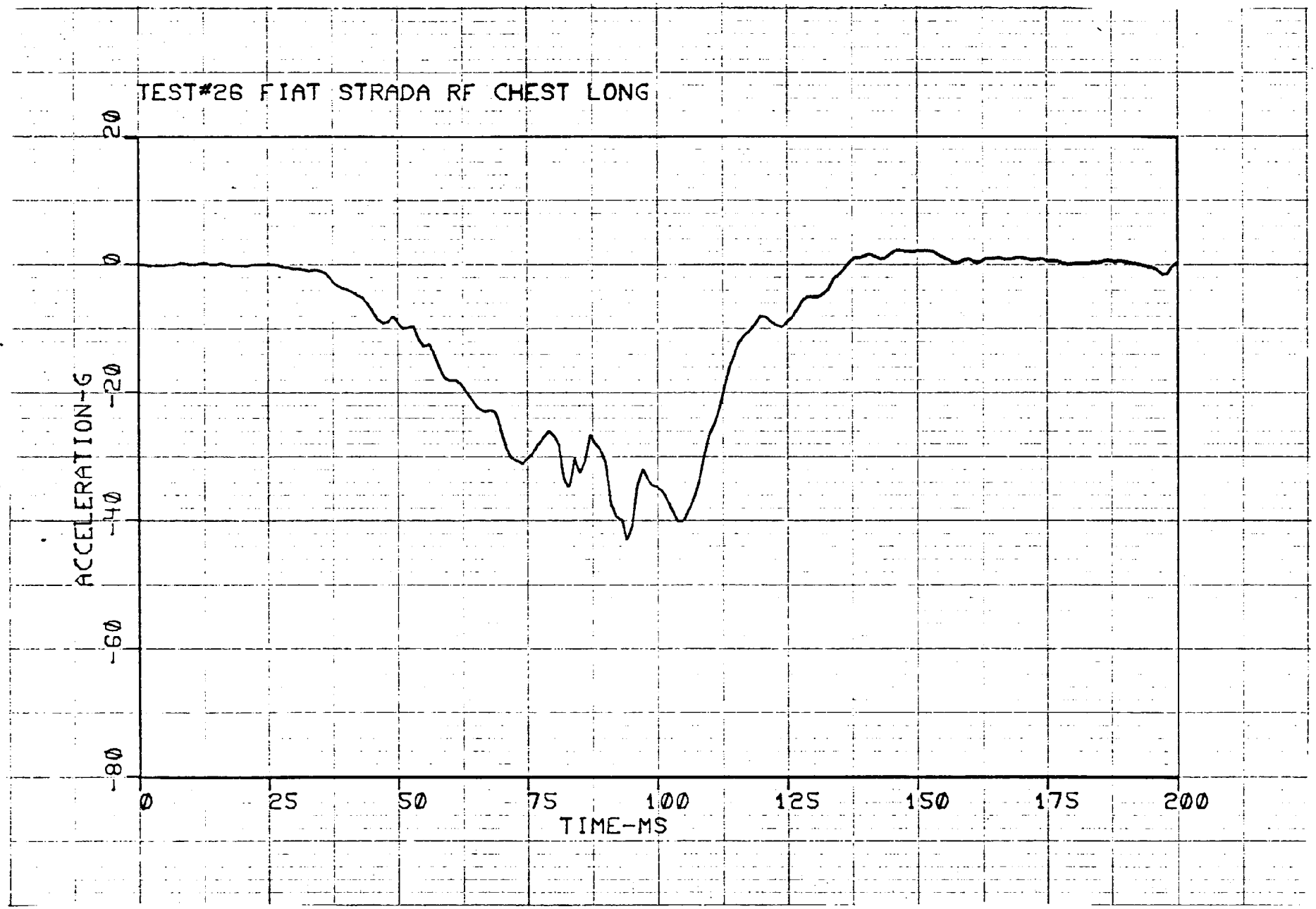
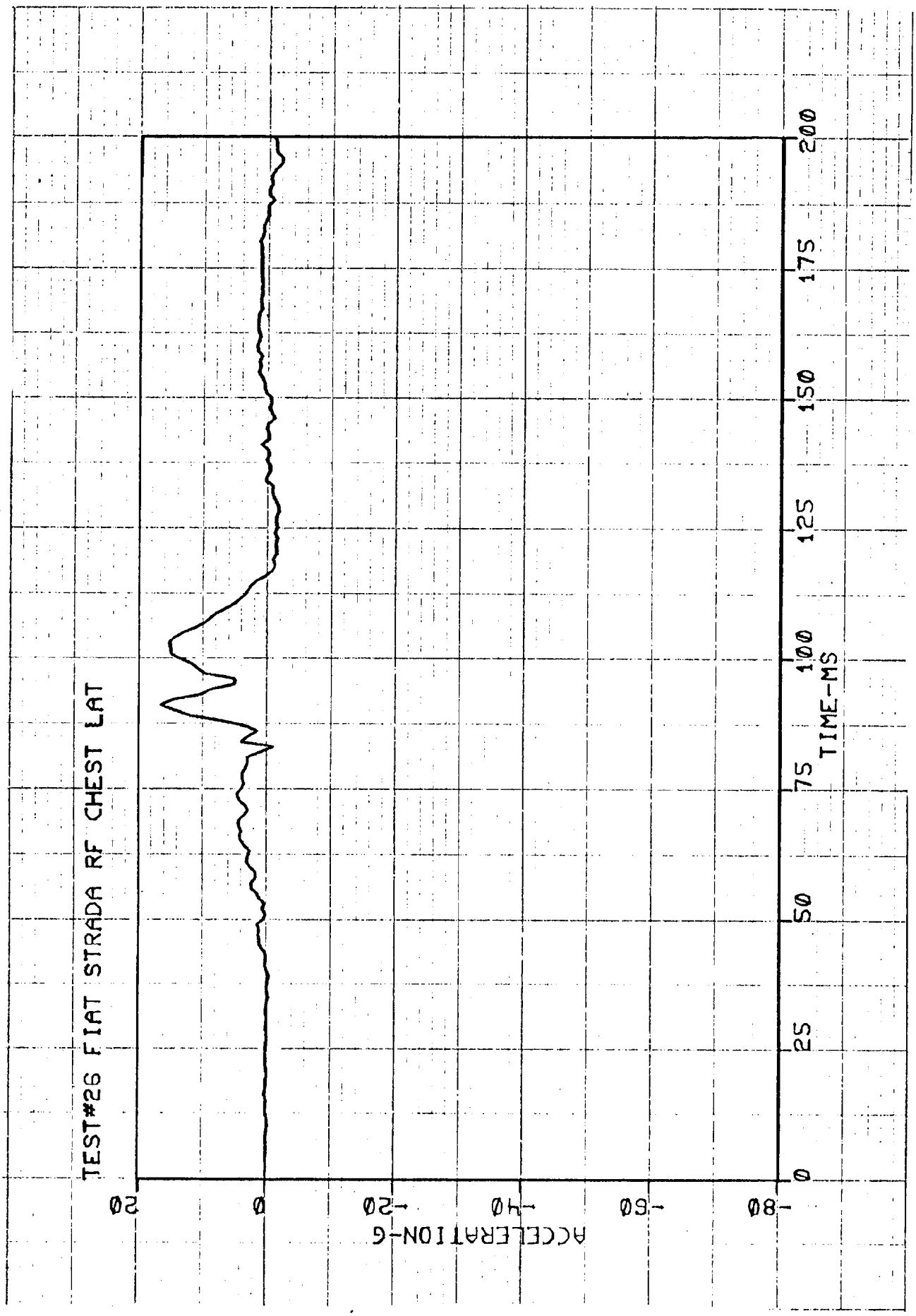
40
0
-40
-80
-120
ACCELERATION-G
0
25
50
75
100
125
150
175
200
TIME-MS


TEST#26 FIAT STRADA RF HEAD RESULT.
160
120
80
40
0
-40
ACCELERATION-G
0
25
50
75
100
125
150
175
200
TIME-MS


TEST#26 FIAT STRADA RF CHEST LONG
20
0
-20
-40
-60
-80
ACCELERATION-G
0
25
50
75
100
125
150
175
200
TIME-MS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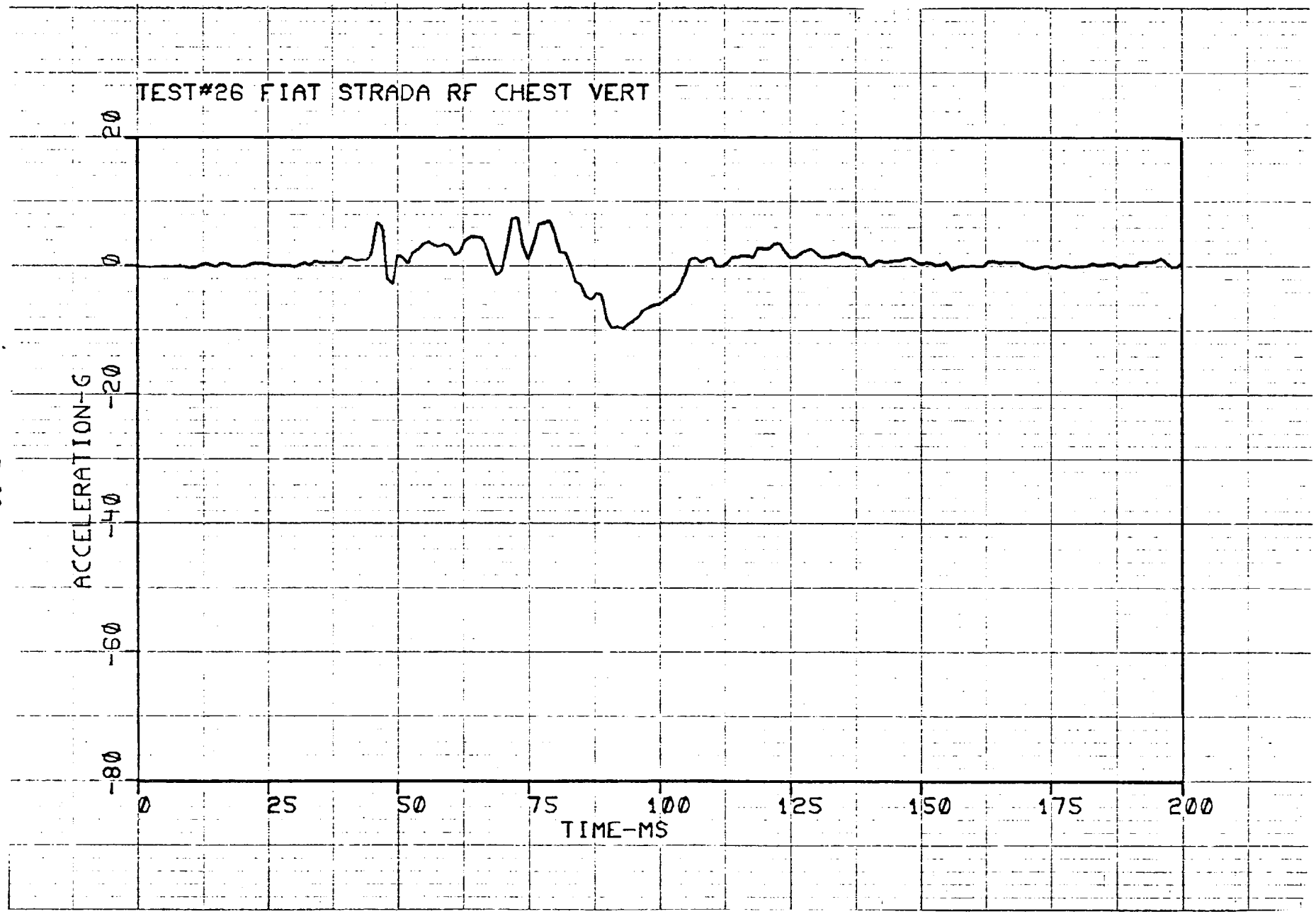
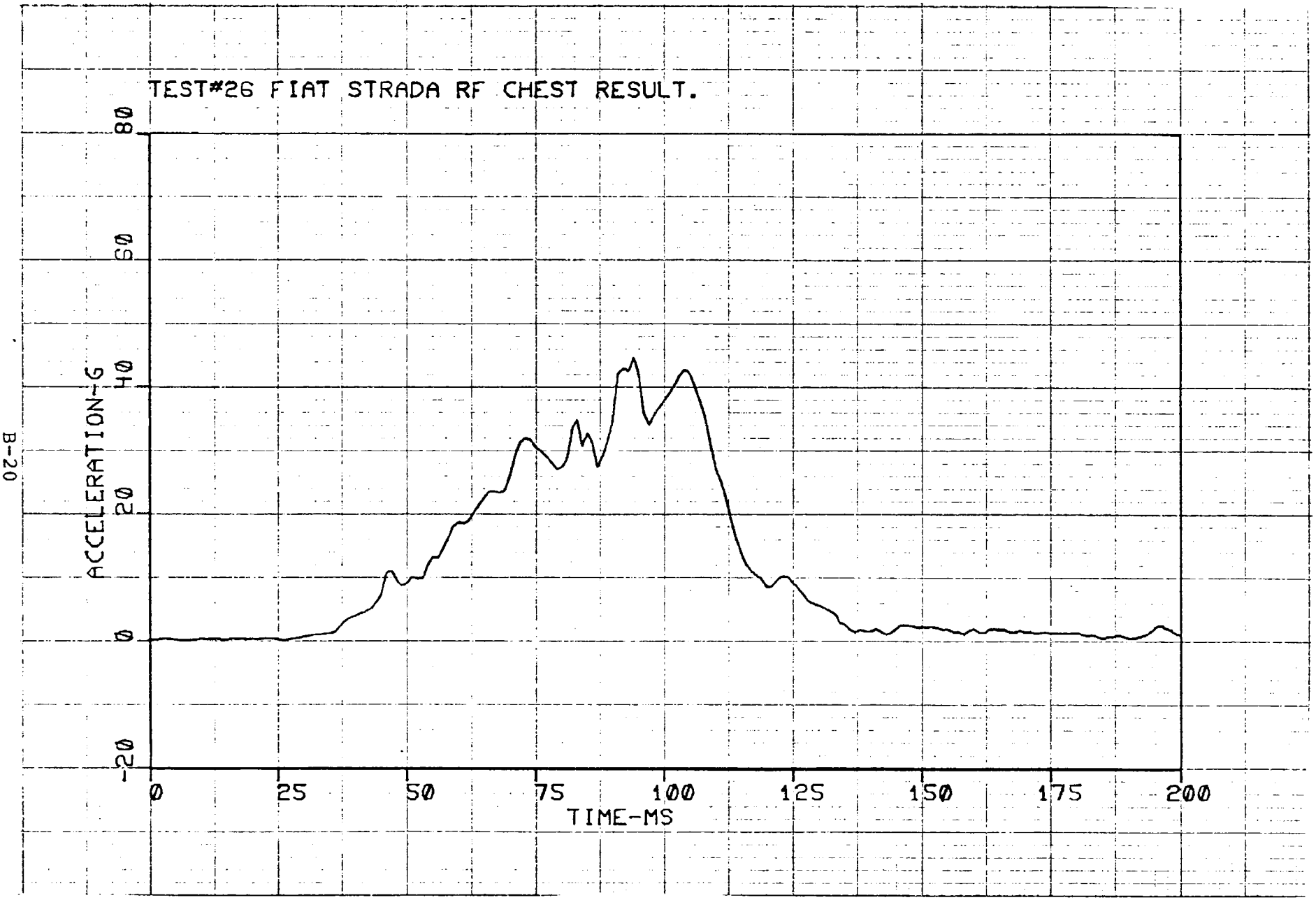
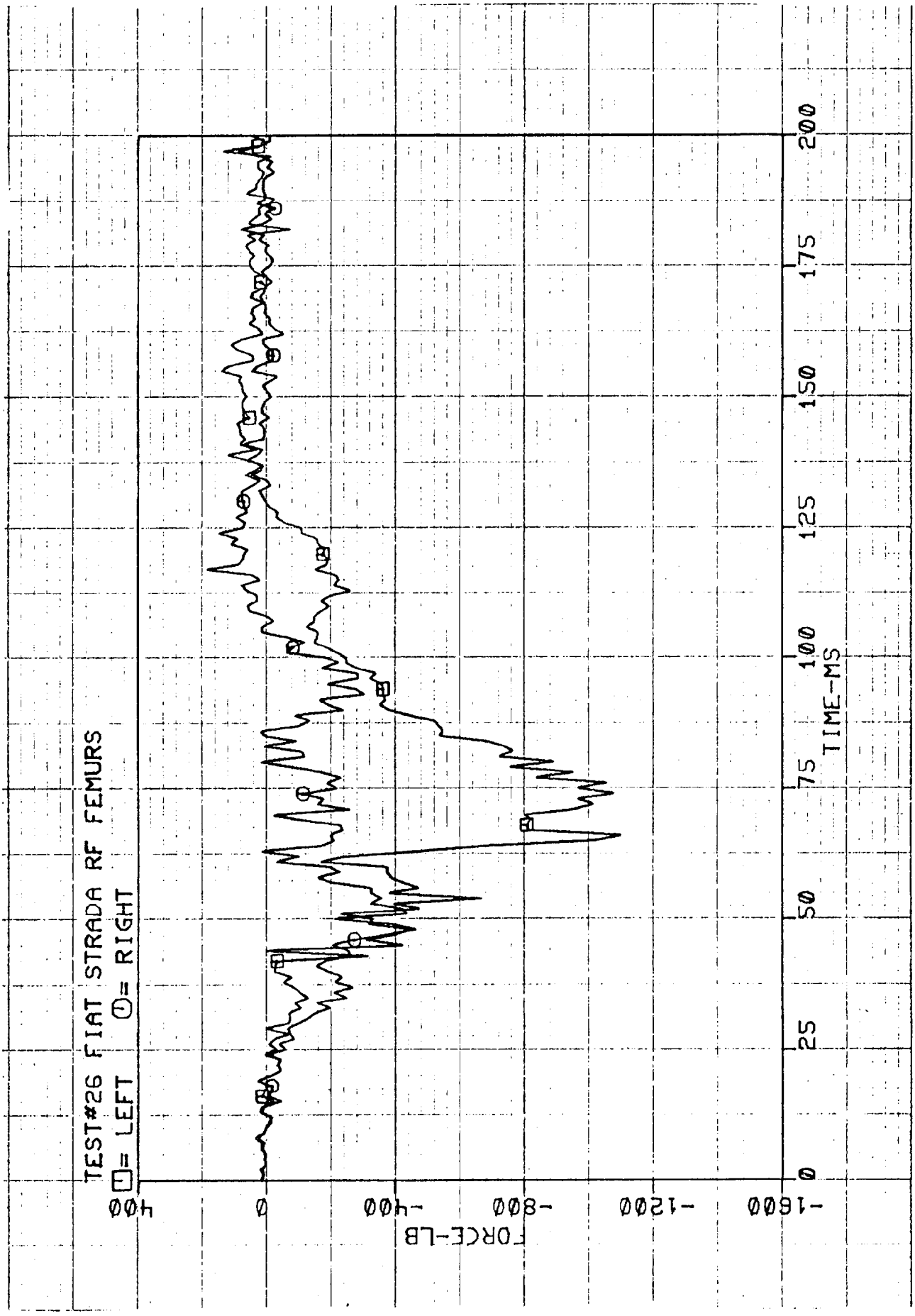
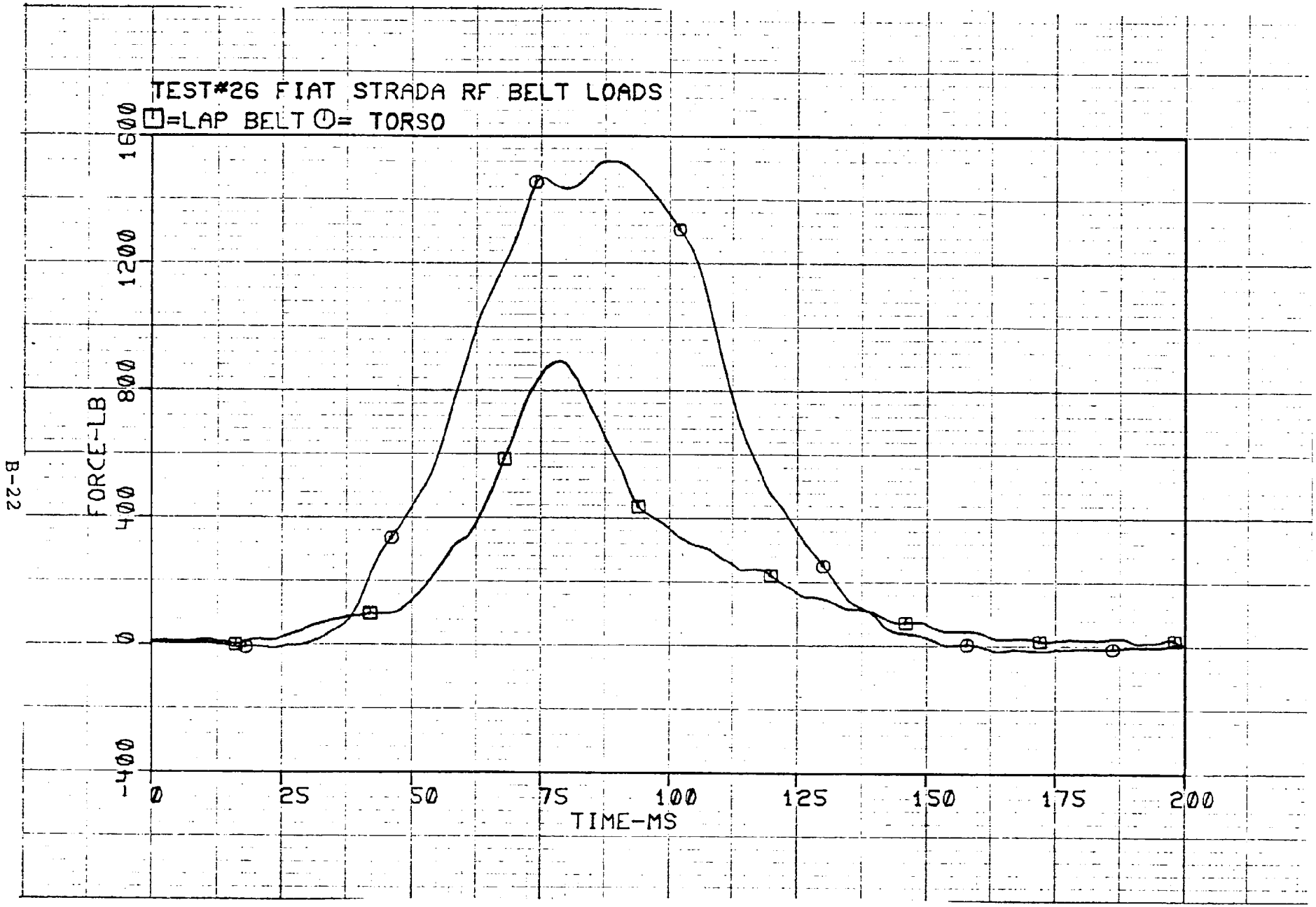
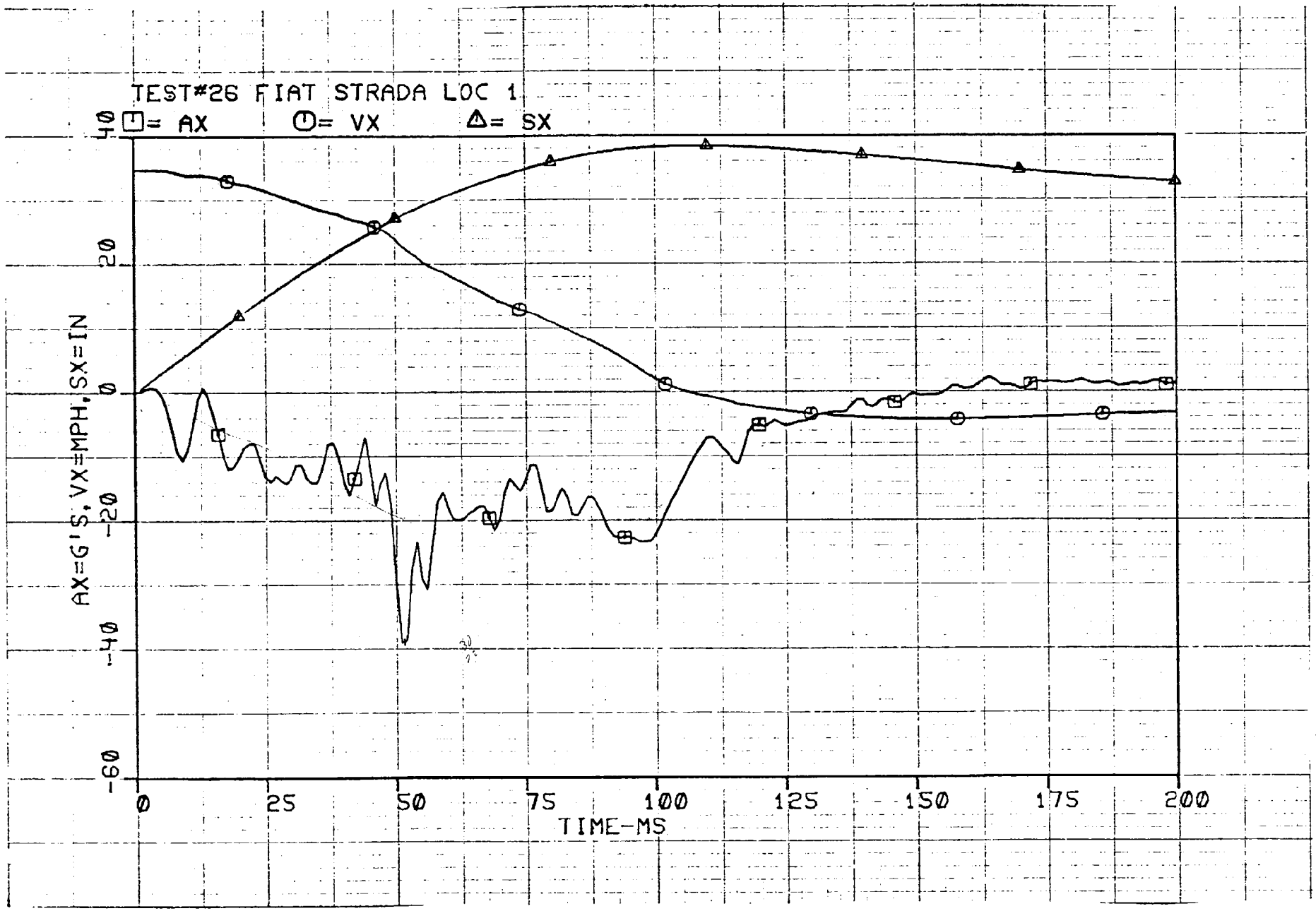
ACCELERATION-G
20
0
-20
-40
-60
-80
0
25
50
75
100
125
150
175
200
TIME-MS

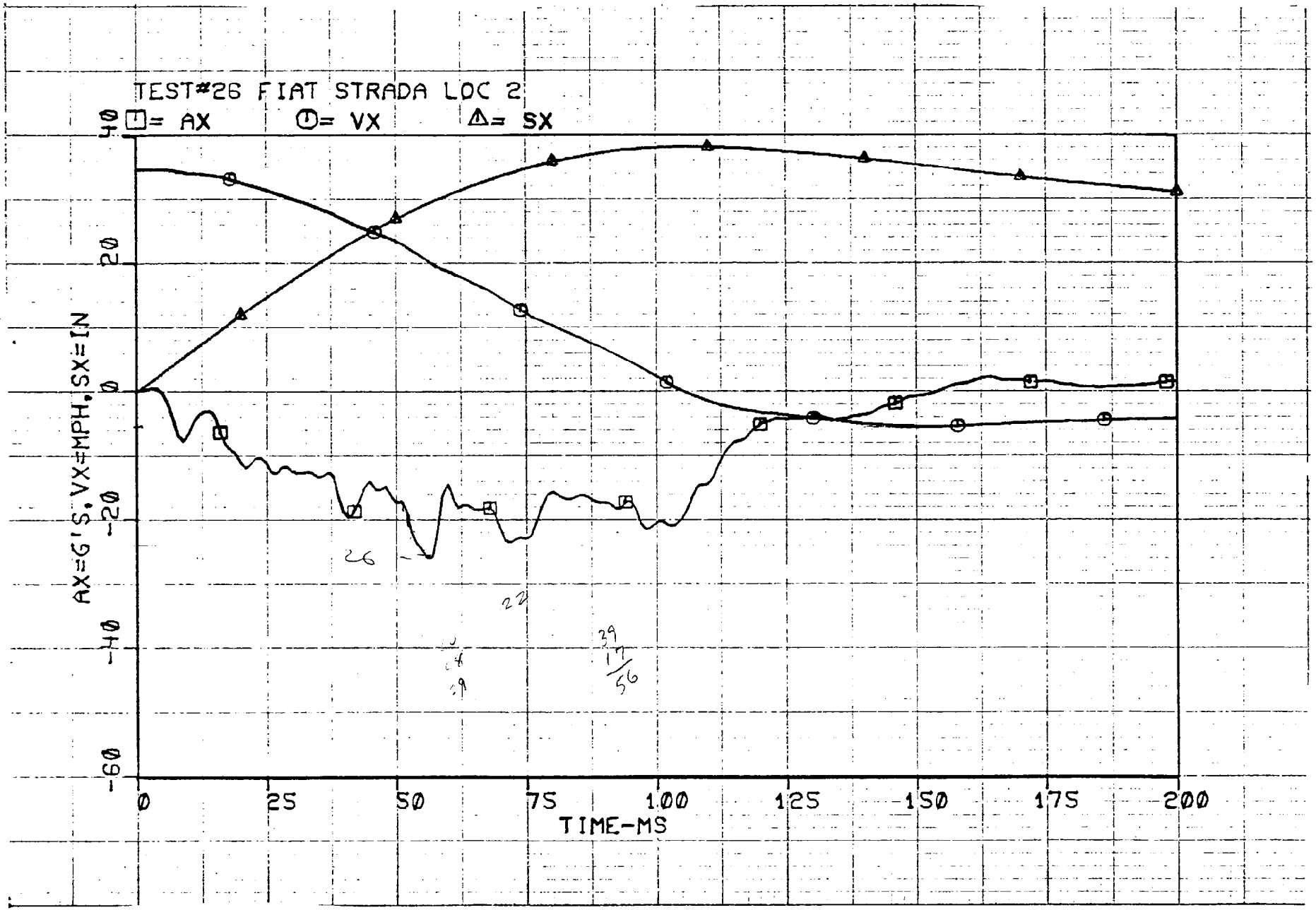

TEST#26 FIAT STRADA RF CHEST VERT
20
0
-20
-40
-60
-80
ACCELERATION-G
0
25
50
75
100
125
150
175
200
TIME-MS


TEST#26 FIAT STRADA RF CHEST RESULT.
ACCELERATION-G
80
60
40
20
0
-20
0
25
50
75
100
125
150
175
200
TIME-MS


TEST#26 FIAT STRADA RF FEMURS
□= LEFT ○= RIGHT
FORCE-LB
400
0
-400
-800
-1200
-1600
0
25
50
75
100
125
150
175
200
TIME-MS


TEST#26 FIAT STRADA RF BELT LOADS
□=LAP BELT ⊙= TORSO
FORCE-LB
1600
1200
800
400
0
-400
0
25
50
75
100
125
150
175
200
TIME-MS


TEST#26 FIAT STRADA LOC 1
□= 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


TEST#26 FIAT STRADA LOC 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
26
22
39
17
56

APPENDIX C

DUMMY CERTIFICATION DATA

PART 572 DUMMY CALIBRATION TEST DATA

NHTSA Dummy I.D. No.: A 0 3

Laboratory Technician: _____

		Pre-test Calibration	Post-test* Calibration
Date of Dummy Calibration		5/17/80	
Calibration Sequential Number for Dummy		12	
Temperature in Lab. (Spec. = 66 to 78 °F)			
Relative Humidity in Lab. (Spec. = 10 to 70%)			
Test Parameter	**Specification**		
1. Head Drop Test:			
a. Peak Resultant Accel	210 - 260G	234.9	
b. Peak Lateral Accel	$\leq$ 10G	0.0	
c. Time above 100G	0.9 - 1.5 ms	1.25	
2. Neck Bending Test:			
a. Pendulum Speed	21.5 - 25.5 fps	21.87	
b. Pendulum Avg Decel (over $t_3 - t_2$)	20 - 24G	22.31	
c. Peak Resultant Head Acceleration	26G Maximum	18.97	
d. Pendulum Decel ($t_2 - t_1$)	$\leq$ 3 ms	2.25	
e. Pendulum Decel ($t_3 - t_2$)	25 - 30 ms	25.0	
f. Pendulum Decel ($t_4 - t_3$)	$\leq$ 10 ms	6.5	
g. Pendulum Direction Reversal Time	$\geq$ 123 ms		
h. Maximum Head Rotation	63 to 73°	71.36°	
i. Chordal Displacement:			
Head Rotation Angle			
0°	Time	-2 - 2 ms	0.0
	Displ	-0.5 - 0.5 in.	0.0
30°	Time	25.6 - 34.4 ms	26.0
	Displ	2.1 - 3.1 in.	2.51
60°	Time	40.3 - 51.7 ms	44.5
	Displ	4.3 - 5.3 in.	4.82
Maximum 73°	Time	53.2 - 66.8 ms	59.0
	Displ	5.0 - 6.0 in.	5.507

*According to criteria established in NHTSA Laboratory Procedure TP-212-02, dated April 1, 1980, no post-test dummy calibration was required.

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A 0 3

Test Parameter		Specification	Pre-test Calibration	Post-test Calibration
2. Neck Bending Test: (Continued)				
Head Rotation Angle				
60°	Time	67.0 - 83.0 ms	72.5	
	Displ	4.3 - 5.3 in.	4.82	
30°	Time	85.4 - 104.6 ms	91.0	
	Displ	2.1 - 3.1 in.	2.498	
0°	Time	101.0 - 123.0 ms	108.0	
	Displ	-0.5 - 0.5 in.	-0.0999	
3. Abdominal Compression Test: (Preload = 10 pounds)				
a. Force at 0.5 in.		14 - 26 lb	22.57	
b. Force at 0.75 in.		27 - 40 lb	34.15	
c. Force at 1.0 in.		40 - 53 lb	48.05	
d. Force at 1.3 in.		63 - 78 lb	67.73	
4. Lumbar Flexion Test:				
a. Force at 20°		22 - 34 lb	32.99	
b. Force at 30°		34 - 46 lb	44.57	
c. Force at 40°		46 - 58 lb	53.26	
d. Return Angle		12° Maximum	3.25°	
5. Chest Impact Tests:				
a. High Speed				
1) Probe Speed		21.78-22.22 fps	22.0	
2) Peak Deflection		1.7 in. Maximum	1.626	
3) Peak Resistive Force		2250 lb Maximum	1616.8	
4) Internal Hysteresis		50 - 70%	62.0%	
a. Low Speed				
1) Probe Speed		13.86-14.14 fps	13.95	
2) Peak Deflection		1.1 in. Maximum	1.064	
3) Peak Resistive Force		1450 lb Maximum	1007.6	
4) Internal Hysteresis		50 - 70%	54.0%	

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A 0 3

Test Parameter	Specification	Pre-test Calibration	Post-test Calibration
6. Knee Impact Tests:			
a. Right Side			
1) Probe Speed	6.76 - 7.04 fps	6.95	
2) Maximum Force	1850 - 2500 lb	1936.6	
3) Time >1000 lb	1.7 ms Minimum	2.0	
a. Left Side			
1) Probe Speed	6.76 - 7.04 fps	6.89	
2) Maximum Force	1850 - 2500 lb	2452.0	
3) Time >1000 lb	1.7 ms Minimum	1.75	

PART 572 DUMMY CALIBRATION TEST DATA

NHTSA Dummy I.D. No.: A 0 4

Laboratory Technician: _____

		Pre-test Calibration	Post-test* Calibration
Date of Dummy Calibration		5/17/80	
Calibration Sequential Number for Dummy		12	
Temperature in Lab. (Spec. = 66 to 78 °F)		74°	
Relative Humidity in Lab. (Spec. = 10 to 70%)			
Test Parameter	**Specification**		
1. Head Drop Test:			
a. Peak Resultant Accel	210 - 260G	246.7	
b. Peak Lateral Accel	$\leq$ 10G	4.5	
c. Time above 100G	0.9 - 1.5 ms	1.25	
2. Neck Bending Test:			
a. Pendulum Speed	21.5 - 25.5 fps	21.86	
b. Pendulum Avg Decel (over $t_3 - t_2$)	20 - 24G	21.28	
c. Peak Resultant Head Acceleration	26G Maximum	18.24	
d. Pendulum Decel ($t_2 - t_1$)	$\leq$ 3 ms	2.5	
e. Pendulum Decel ($t_3 - t_2$)	25 - 30 ms	26.25	
f. Pendulum Decel ($t_4 - t_3$)	$\leq$ 10 ms	9.0	
g. Pendulum Direction Reversal Time	$\geq$ 123 ms		
h. Maximum Head Rotation	63 to 73°	71.81°	
i. Chordal Displacement:			
Head Rotation Angle			
0° Time	-2 - 2 ms	0.0	
0° Displ	-0.5 - 0.5 in.	0.0	
30° Time	25.6 - 34.4 ms	25.7	
30° Displ	2.1 - 3.1 in.	2.32	
60° Time	40.3 - 51.7 ms	41.0	
60° Displ	4.3 - 5.3 in.	4.496	
Maximum 73° Time	53.2 - 66.8 ms	59.5	
Maximum 73° Displ	5.0 - 6.0 in.	5.29	

*According to criteria established in NHTSA Laboratory Procedure TP-212-02, dated April 1, 1980, no post-test dummy calibration was required.

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A 0 4

Test Parameter		Specification	Pre-test Calibration	Post-test Calibration
2. Neck Bending Test: (Continued)				
Head Rotation Angle				
60°	Time	67.0 - 83.0 ms	76.0	
	Displ	4.3 - 5.3 in.	4.484	
30°	Time	85.4 - 104.6 ms	91.0	
	Displ	2.1 - 3.1 in.	2.31	
0°	Time	101.0 - 123.0 ms	106.0	
	Displ	-0.5 - 0.5 in.	-0.123	
3. Abdominal Compression Test: (Preload = 10 pounds)				
a. Force at 0.5 in.		14 - 26 lb	22.60	
b. Force at 0.75 in.		27 - 40 lb	34.15	
c. Force at 1.0 in.		40 - 53 lb	52.68	
d. Force at 1.3 in.		63 - 78 lb	76.99	
4. Lumbar Flexion Test:				
a. Force at 20°		22 - 34 lb	27.79	
b. Force at 30°		34 - 46 lb	39.36	
c. Force at 40°		46 - 58 lb	46.89	
d. Return Angle		12° Maximum	7.45°	
5. Chest Impact Tests:				
a. High Speed				
1) Probe Speed		21.78-22.22 fps	22.0	
2) Peak Deflection		1.7 in. Maximum	1.702	
3) Peak Resistive Force		2250 lb Maximum	1499.68	
4) Internal Hysteresis		50 - 70%	56.0%	
a. Low Speed				
1) Probe Speed		13.86-14.14 fps	13.95	
2) Peak Deflection		1.1 in. Maximum	1.110	
3) Peak Resistive Force		1450 lb Maximum	913.8	
4) Internal Hysteresis		50 - 70%	61.4%	

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A 0 4

Test Parameter	Specification	Pre-test Calibration	Post-test Calibration
6. Knee Impact Tests:			
a. Right Side			
1) Probe Speed	6.76 - 7.04 fps	6.88	
2) Maximum Force	1850 - 2500 lb	2370.7	
3) Time >1000 lb	1.7 ms Minimum	1.75	
a. Left Side			
1) Probe Speed	6.76 - 7.04 fps	6.88	
2) Maximum Force	1850 - 2500 lb	1886.0	
3) Time >1000 lb	1.7 ms Minimum	1.75	

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Dynamic Science Report No.
3102-80-119A

BARRIER IMPACT LOAD DATA
1980 FIAT STRADA
NHTSA 800563

Prepared by:

Dynamic Science, Inc.
1850 W. Pinnacle Peak Road
Phoenix, Arizona 85027

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
Office of Passenger Vehicle Research
400 Seventh Street, S.W.
Washington, D.C. 20590

TABLE OF CONTENTS

1.0 INTRODUCTION

This report is an addendum to Report No. 301-DYS-80-027 and presents the barrier load measurement data acquired in testing a 1980 Fiat Strada (NHTSA No. 800563).

Barrier impact speed was 34.78 mph.

Section 2.0 presents information on the load cell barrier and vehicle accelerometers.

Section 3.0 provides general test and vehicle parametric data.

Section 4.0 presents plots of load cell and accelerometer data versus time.

2.0 INSTRUMENTATION DESCRIPTION

2.1 LOAD CELL BARRIER

The load cell barrier face is pictured in Figure 2-1. 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 10 inches high and 9 inches wide. Plywood sections for Rows A and B (lower two rows) each measure 9 inches high and 9 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.

2.2 PLACEMENT OF VEHICLE ACCELEROMETERS

Six longitudinal accelerometers were located on the vehicle as schematically illustrated in Figure 2-2. Two instruments (Loc. 1 and 2) represent occupant compartment accelerations. Two (Loc. 3 and 4) represent engine accelerations and two (Loc. 5 and 6) represent front wheel accelerations.

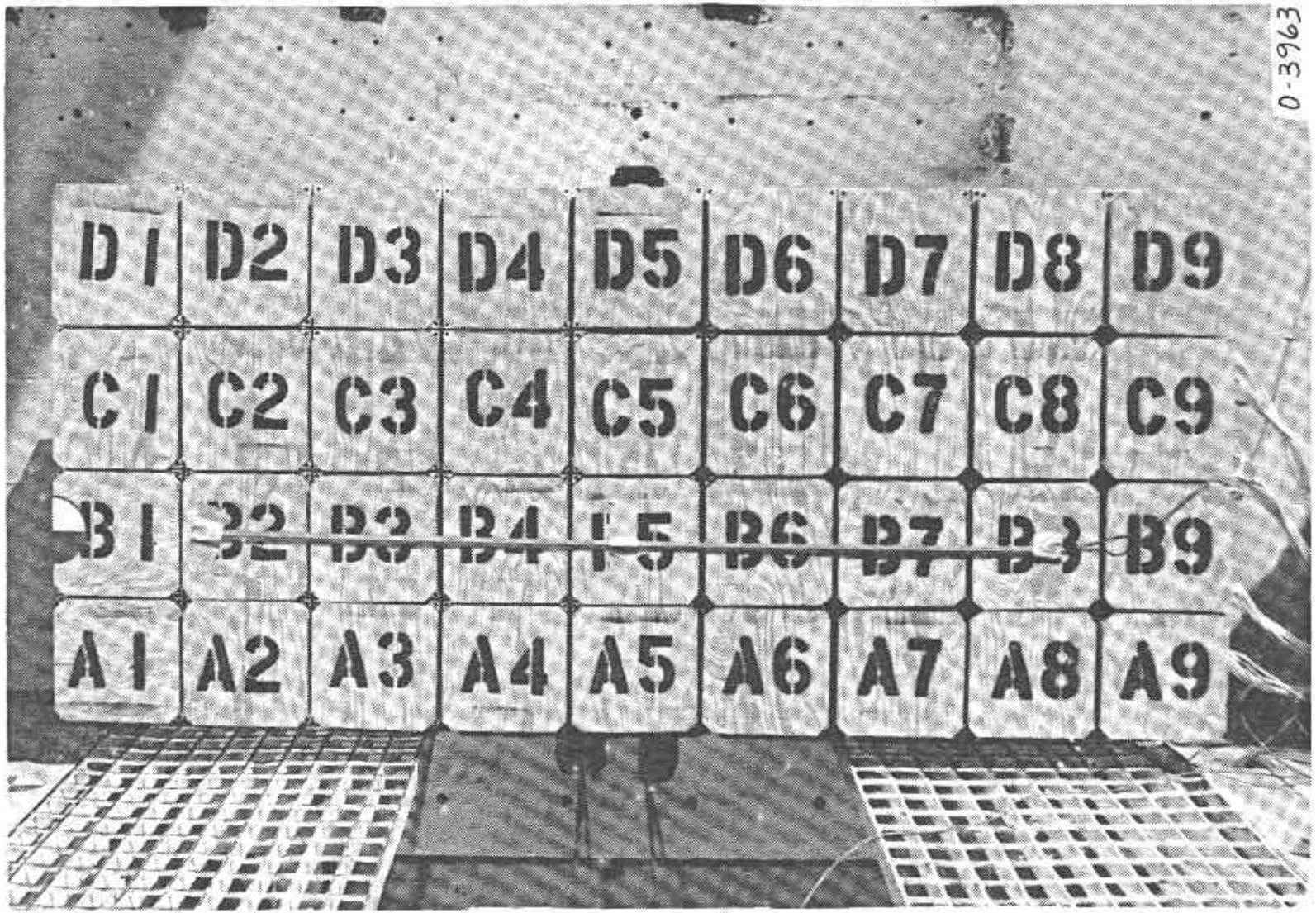
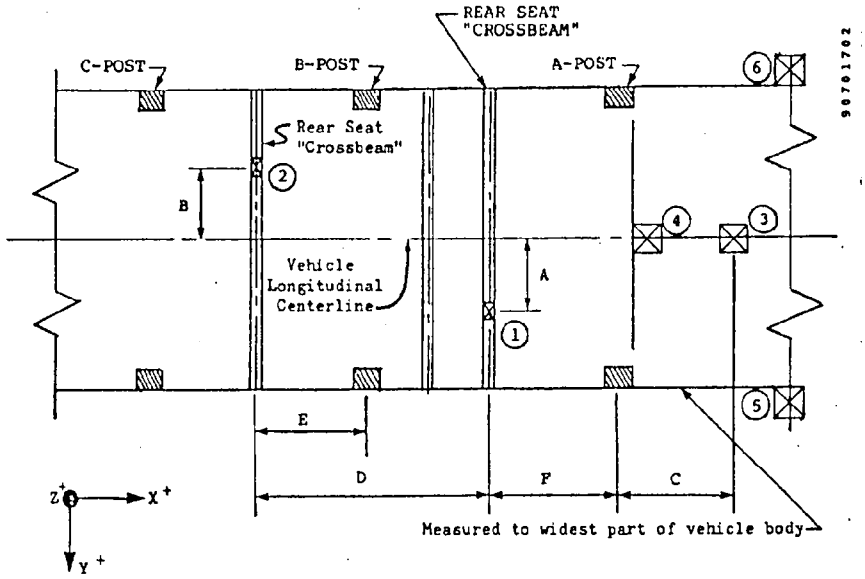


Figure 2-1. Load Cell Barrier Face.

TEST VEHICLE ACCELEROMETER LOCATION DEFINITION AND DATA SUMMARY

Dim.	Length (in.)
A	20.5
B	33.0
C	26.3
D	12.0
E	24.0
F	32.5



No.	Location Description	Component Direction X	Y	Z	Data Summary Peak G @ msec X "+"	X "−"	Y "+"	Y "−"	Z "+"	Z "−"
1	Below front seat area	✓			2.3 @ 163	-39.1 @ 50	@	@	@	@
2	Below rear seat area	✓			2.3 @ 163	-26.0 @ 55	@	@	@	@
3	Engine top	✓			45.3 @ 45	-77.1 @ 35	@	@	@	@
4	Engine bottom	✓			52.7 @ 41	-84.6 @ 30	@	@	@	@
5	RF brake caliper	✓			63.0 @ 57	-126.4 @ 32	@	@	@	@
6	LF brake caliper	✓			72.7 @ 59	-137.7 @ 30	@	@	@	@

3.0 GENERAL TEST AND VEHICLE PARAMETER DATA

This section consists of three tables which document vehicle information, test conditions, and the post-impact crush configuration.

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Vehicle Manufacturer: Fiat Auto S.p.A.
Make/Model: Fiat Strada
Body Style: 4-door Hatchback — Model Year: 1980
VIN: 138A0002384894 — Build Date: 12-79
NHTSA No.: 800563 — Color: Silver
Engine Data: 4 cylinders; 1498 cc displacement
Transmission Data: 5 speed (X) Manual ( ) Automatic
Date Vehicle Received by Laboratory: May 6, 1980
Dealer Name & Address: Biddulph VW Fiat, 4434 W. Glendale Ave., Glendale, Az. 85301

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

Vehicle Manufactured By: Fiat Auto S.p.A.
Date of Manufacture: 12-79 ; VIN: 138A0002384894
GVWR: 3010 lb; GAWR: Front = 1645 lb; Rear = 1365 lb

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

Vehicle Load:	FRONT	REAR	RECOMMENDED TIRE SIZE:	LOAD RANGE:
Up to Capacity	32 psi	32 psi	145SR-13	B

Vehicle Capacity:
Type of Seats - ___ Bench, X Bucket, ___ Split Bench
Number of Occupants (Designated Seating Capacity) = 2 Front, 2 Rear, 4 Total

CARGO LOAD = 150 lb
TOTAL = 750 lb

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with max. fluids) (UDW)

Right Front = 721 lb — Right Rear = 402 lb
Left Front = 686 lb — Left Rear = 412 lb
TOTAL FRONT WEIGHT = 1407 lb (63 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 814 lb (37 % of Total Vehicle Weight)
TOTAL DELV. WEIGHT = 2221 lb

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 150 lb CARGO:

Right Front = 789 lb — Right Rear = 598 lb
Left Front = 735 lb — Left Rear = 585 lb
TOTAL FRONT WEIGHT = 1524 lb (56 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1183 lb (44 % of Total Vehicle Weight)
TOTAL TEST WEIGHT = 2707 lb

Weight of ballast secured in vehicle trunk area = 0 lb

TARGET WEIGHT = CARGO LOAD + UDW + 164 (NO. OF DUMMIES) = 2699 lb

POST IMPACT DATA

TYPE OF TEST: X Frontal (90°) Impact

___ Oblique (___°) Impact on ___ Left (Driver's) Side
___ Right Side

___ Lateral or Side Impact on ___ Left (Driver's) Side
___ Right Side

___ Rear Impact

DATE OF TEST: May 20, 1980 ; TIME: 1148 ; TEMP: 96 ° F

NHTSA NO.: 800563 ; VIN: 138A0002384894

REQUIRED VEHICLE VELOCITY RANGE: 34.5 to 35.5 mph

IMPACT VELOCITY: (traps within 5 feet of impact event)

Primary = 34.78 mph; Secondary = 34.78 mph

Distance from the vehicle's front bumper to the barrier face entering the vehicle velocity measurement device = 5.0 ft

exiting the vehicle velocity measurement device = 1.0 ft

VEHICLE STATIC CRUSH:

(For Frontal and Rear Impacts Only)

Driver's Side = 25.4 in.; Passenger's Side = 25.6 in.

Average = 25.5 in.

Crush Details: Direct crush to "A" pillar. Entire dash and steering column rotated upward, with contact between upper rim of steering wheel and windshield. Both front tires pinned by crushed sheet metal. Right side mounts of dash ripped loose from "A" pillar. Floorpan separated from rocker panel for 8 inches aft of "A" pillar.

(For Side Impacts Only)

Amount of Crush = _____ in. on _____ side

Crush Details: _____

VEHICLE REBOUND:

(From rigid barrier only)

Driver's Side = 14.3 in.; Passenger's Side = 14.8 in.

Average = 14.55 in.

REMARKS: Bumper is completely covered with a soft-faced material which contains cutouts at either end to accommodate turn signal lights.

VEHICLE PROFILE DATA SHEET

Vehicle: 1980 Fiat Strada D.S. No.: 1066 Test Date: May 20, 1980

Measurement Date: Pre-test: May 19, 1980 Post-test June 2, 1980

Exterior Measurements Referenced to Plane: 14' Forward of: Rear bumper

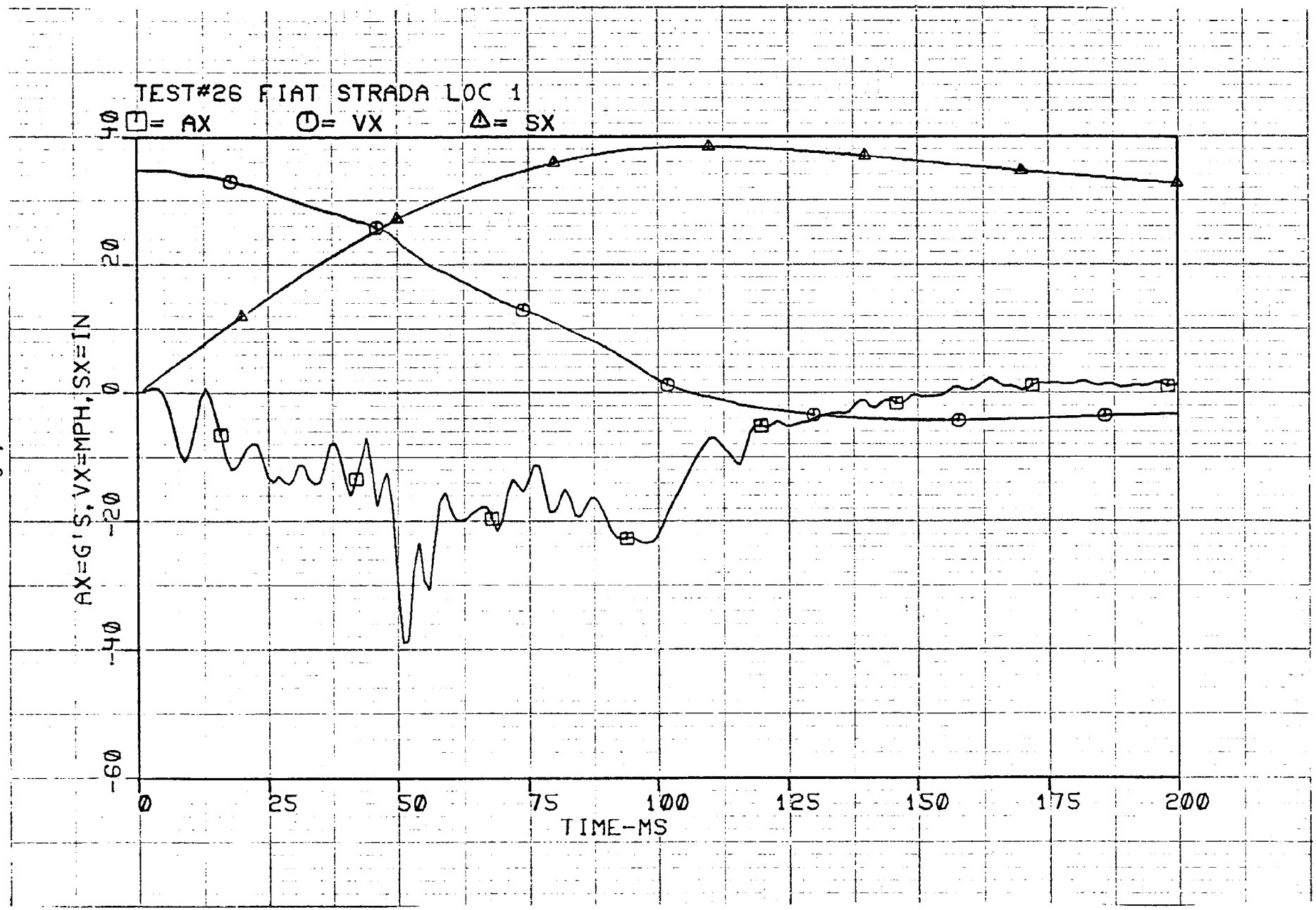
Location	Height	Vehicle Left (in.)						Vehicle Right (in.)				
		30	24	18	12	6	0	6	12	18	24	30
Pre-test Profile (in.)												
Top of Front Bumper	20.3	-	10.3	9.0	8.0	7.7	7.7	7.7	8.1	9.0	10.3	-
Front of Hood	27.1	-	14.6	13.8	11.3	11.0	10.8	10.9	11.3	13.7	14.5	-
Post-test Profile (in.)												
Top of Front Bumper	16.0	-	37.8	37.0	36.8	36.8	36.8	36.8	36.8	37.2	37.7	-
Front of Hood	26.5	-	37.8	37.8	37.8	37.8	37.8	37.7	37.1	37.3	37.1	-
Post-test Static Crush (in.)												
Top of Front Bumper	4.3	-	27.5	28.0	28.8	29.1	29.1	29.1	28.7	28.2	27.4	-
Front of Hood	0.6	-	23.2	24.0	26.5	27.0	27.0	26.8	25.8	23.6	22.6	-

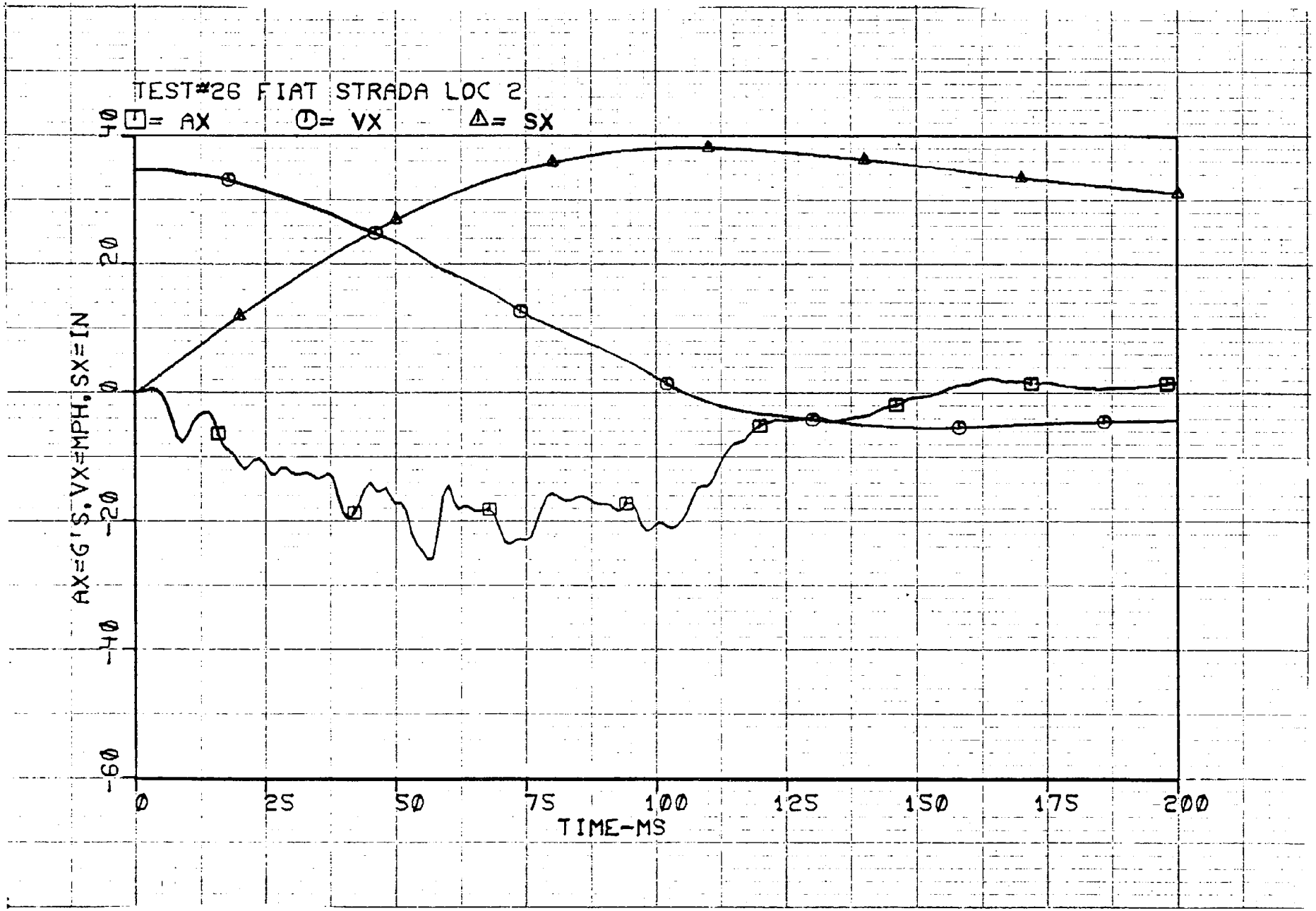
*Estimated values due to hood removal for rollover portion of test.

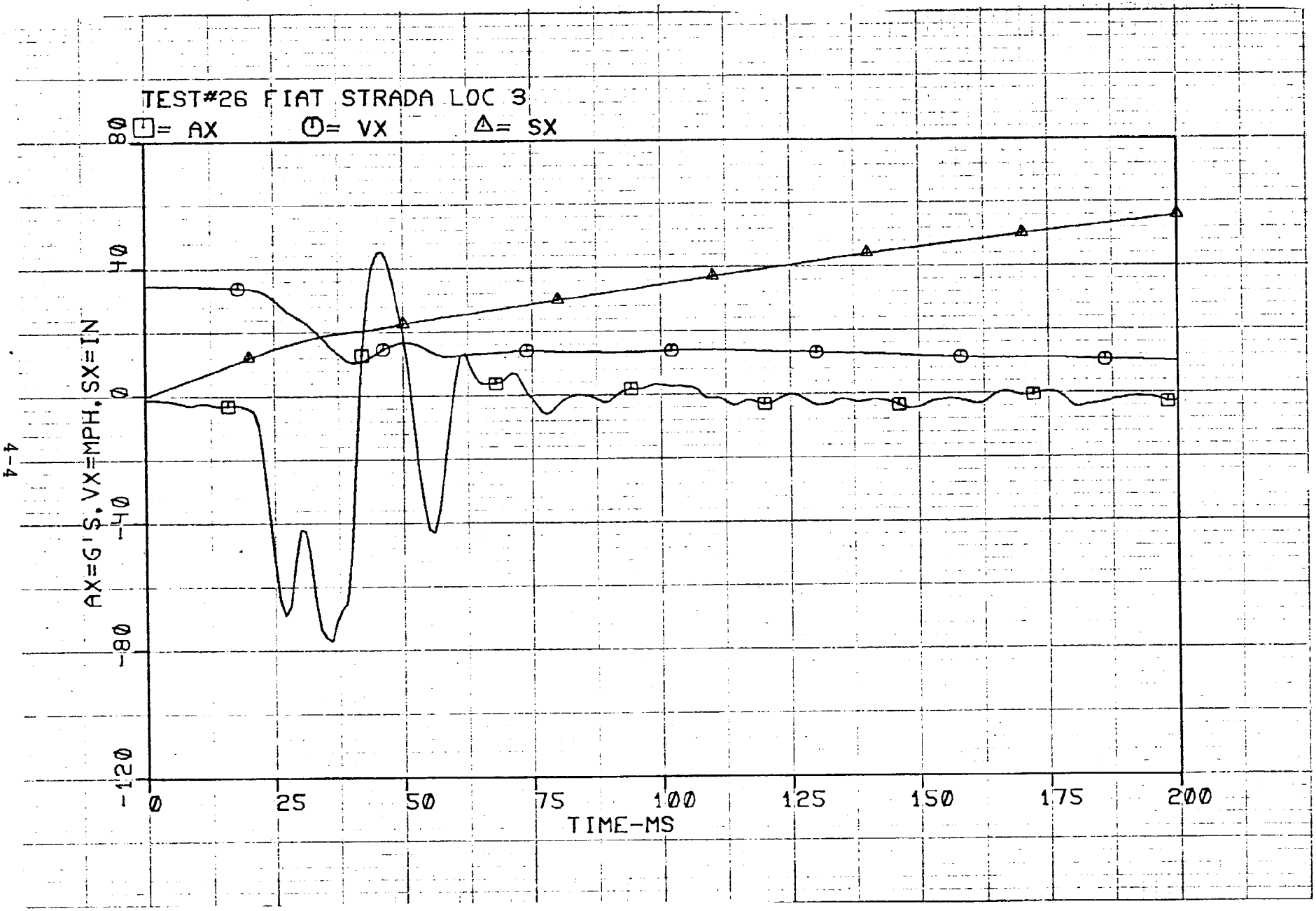
4.0 DATA PRESENTATION

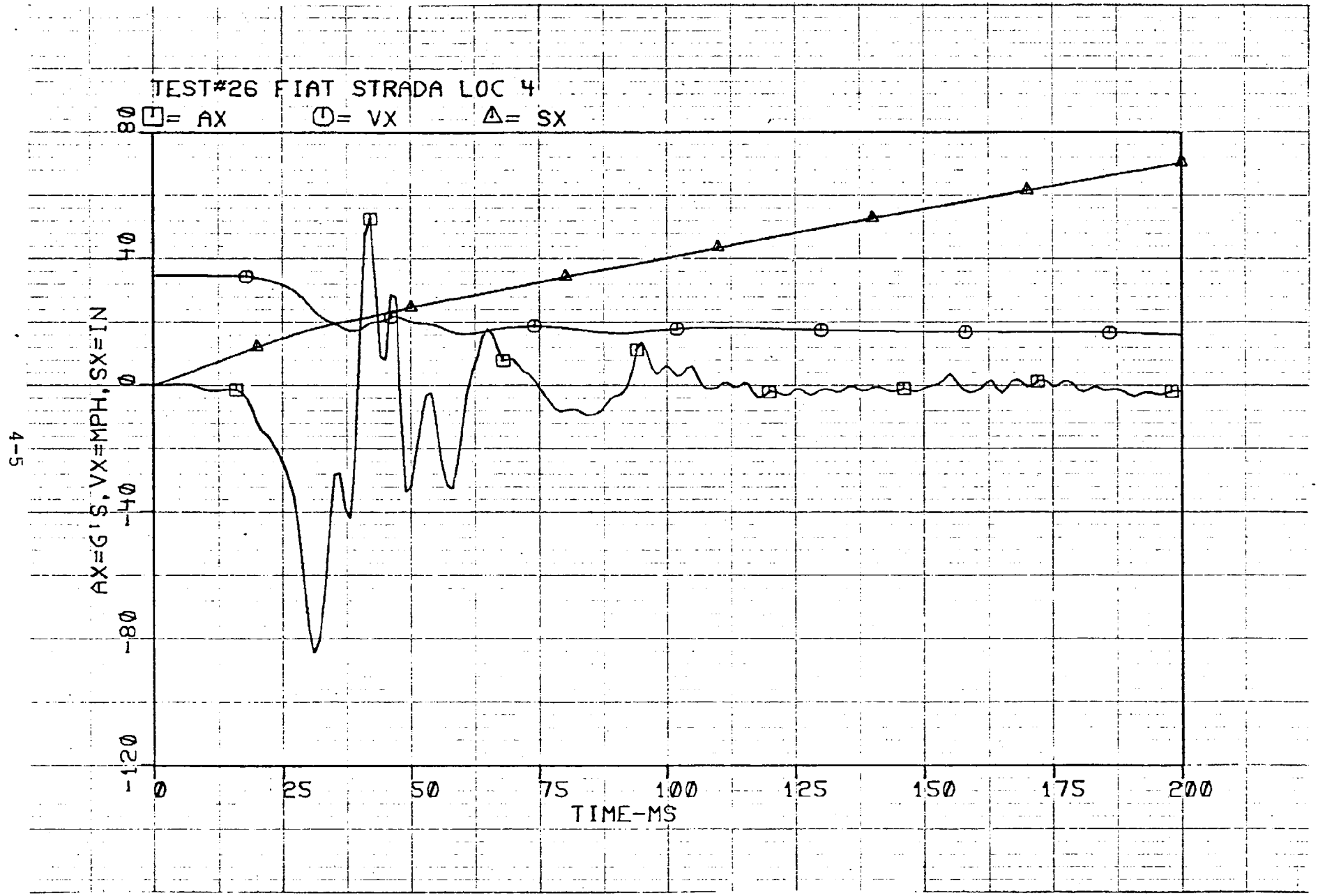
Data plots are presented for each accelerometer and consist of the accelerometer data plus the first integral versus time (velocity) and the second integral versus time (displacement) of the acceleration data.

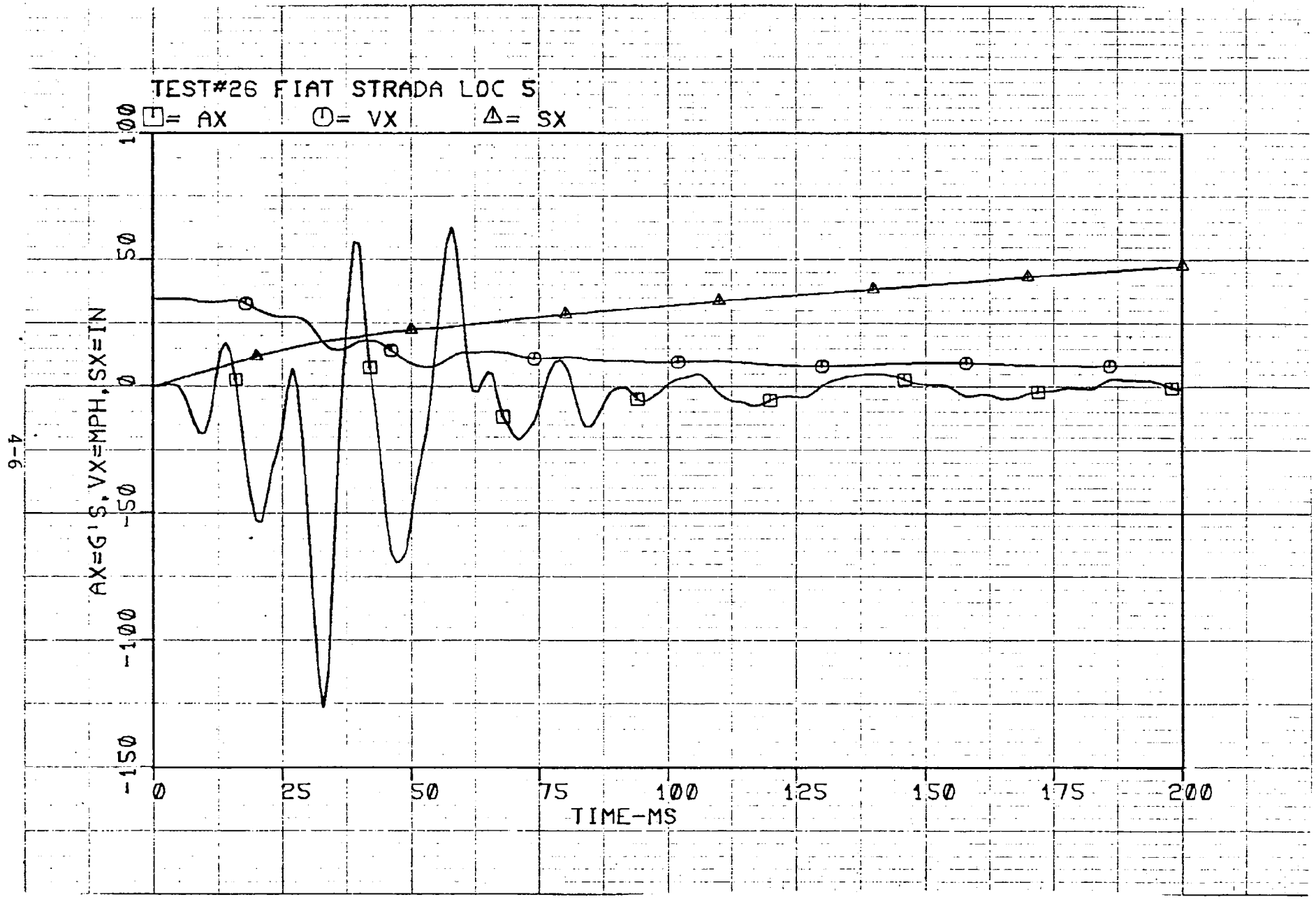
For the load cells, all data are summed and presented as total load versus time, upper two rows (C and D) summed versus time and lower two rows (A and B) summed versus time. Additional plots are presented for each cell multi-plotted by column. Individual loads may be difficult to discern on some of these plots. Tabular data can be provided if necessary.

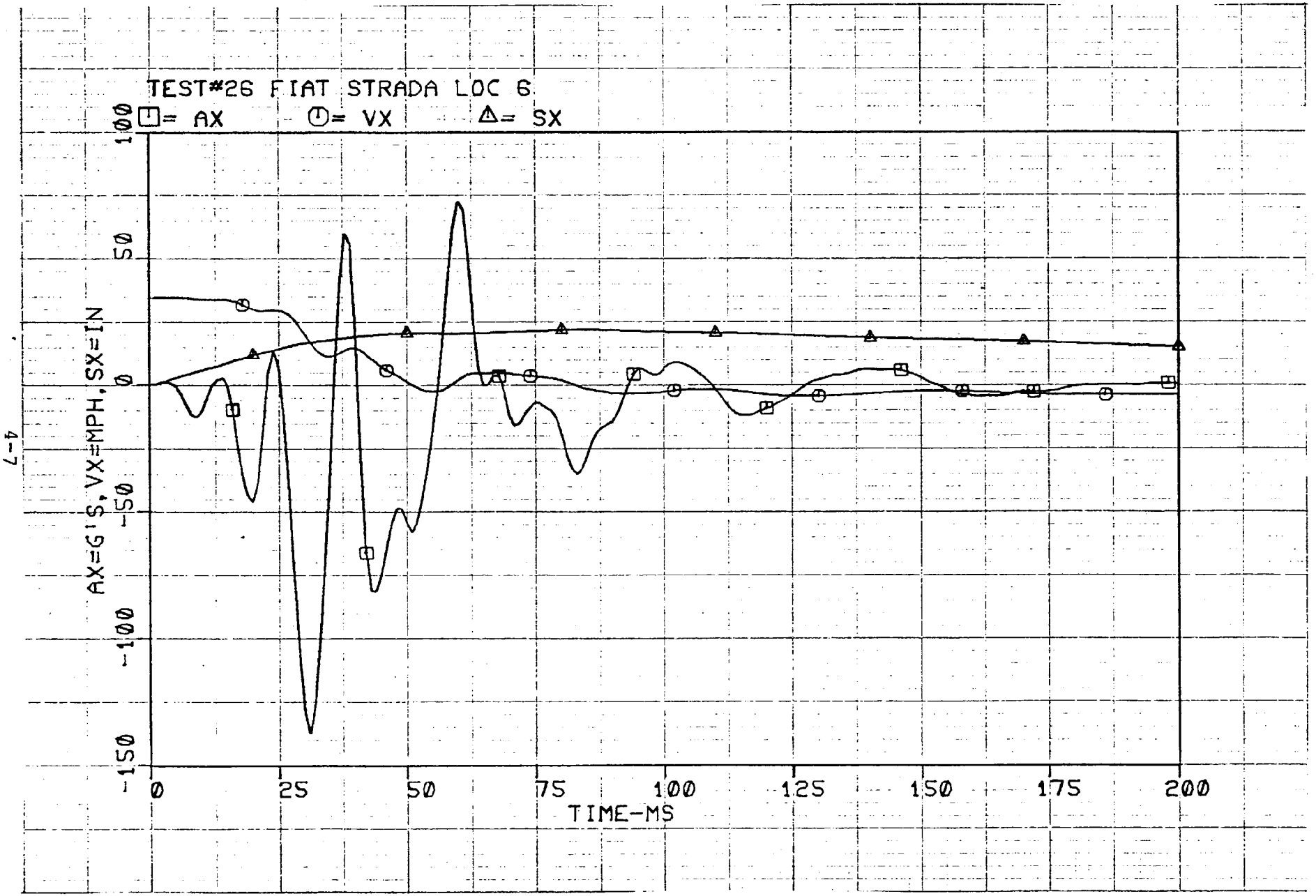

TEST#26 FIAT STRADA LOC 1
□= AX
○= VX
△= SX
AX=G'S, VX=MPH, SX=IN
40
20
0
-20
-40
-60
0
25
50
75
100
125
150
175
200
TIME-MS

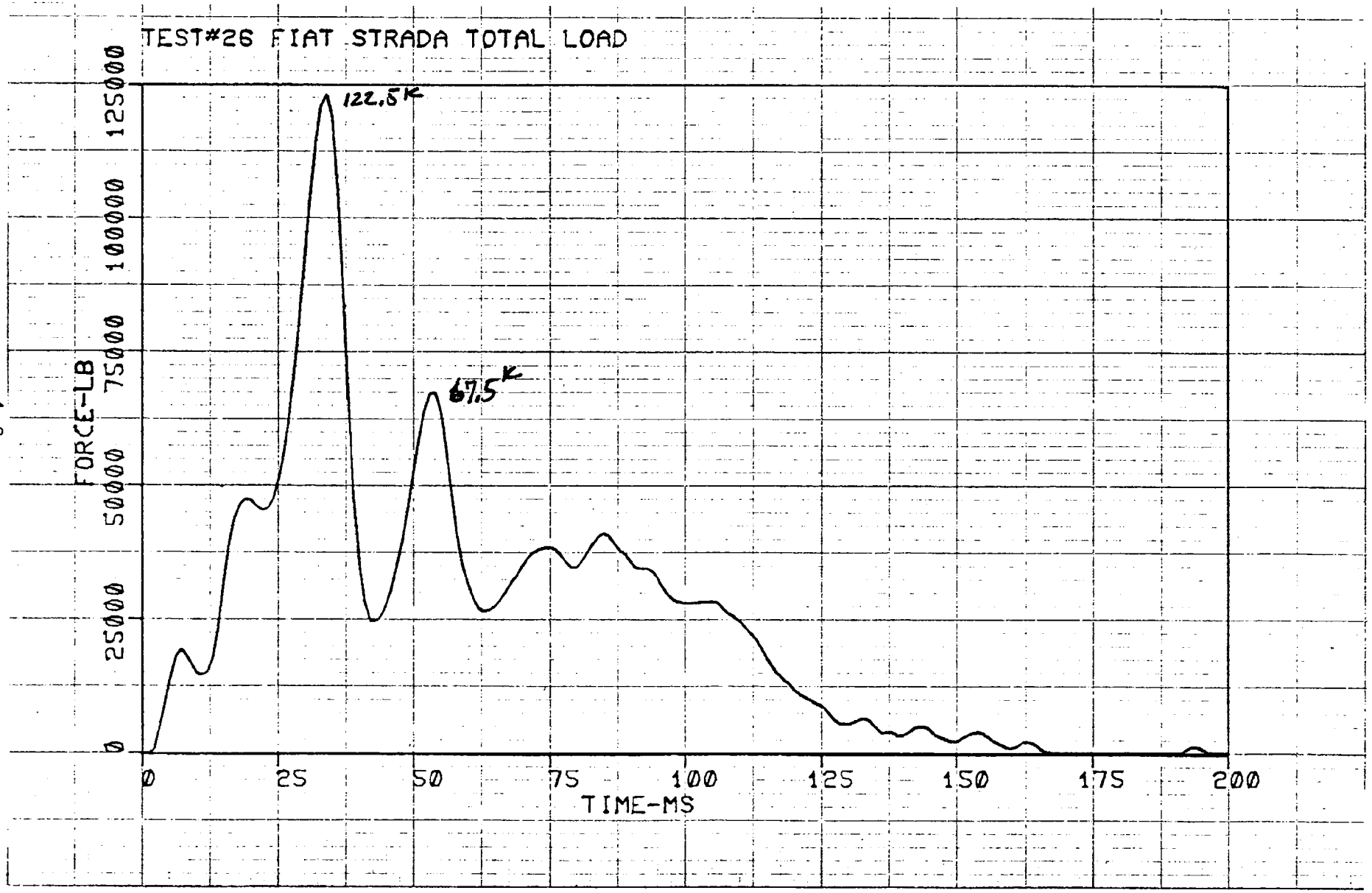

TEST#26 FIAT STRADA LOC 2
□= AX
○= VX
△= SX
AX=G'S, VX=MPH, SX=IN
40
20
0
-20
-40
-60
0
25
50
75
100
125
150
175
200
TIME-MS

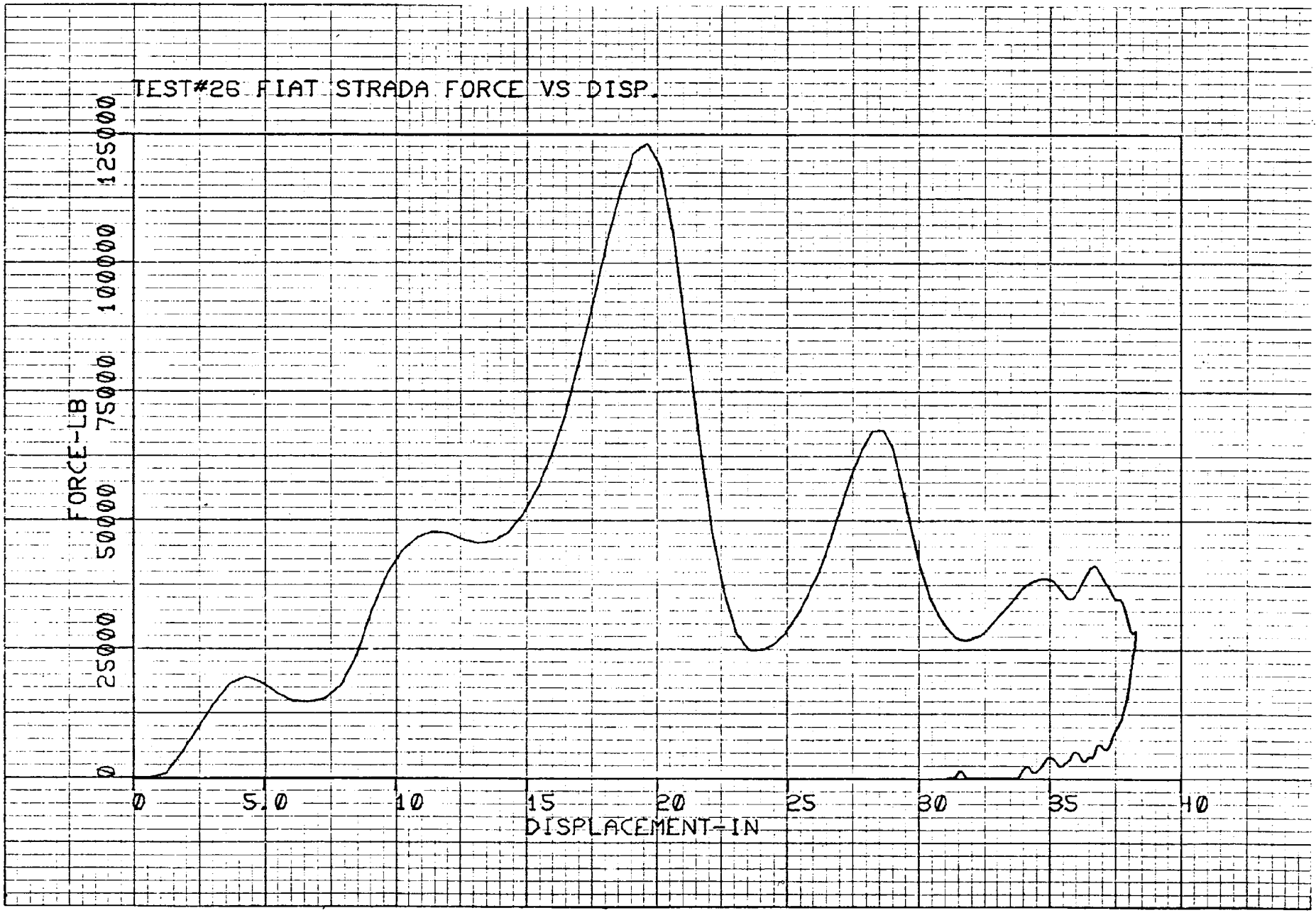

TEST#26 FIAT STRADA LOC 3
□= AX
○= VX
△= SX
AX=G'S, VX=MPH, SX=IN
80
40
0
-40
-80
-120
0
25
50
75
100
125
150
175
200
TIME-MS

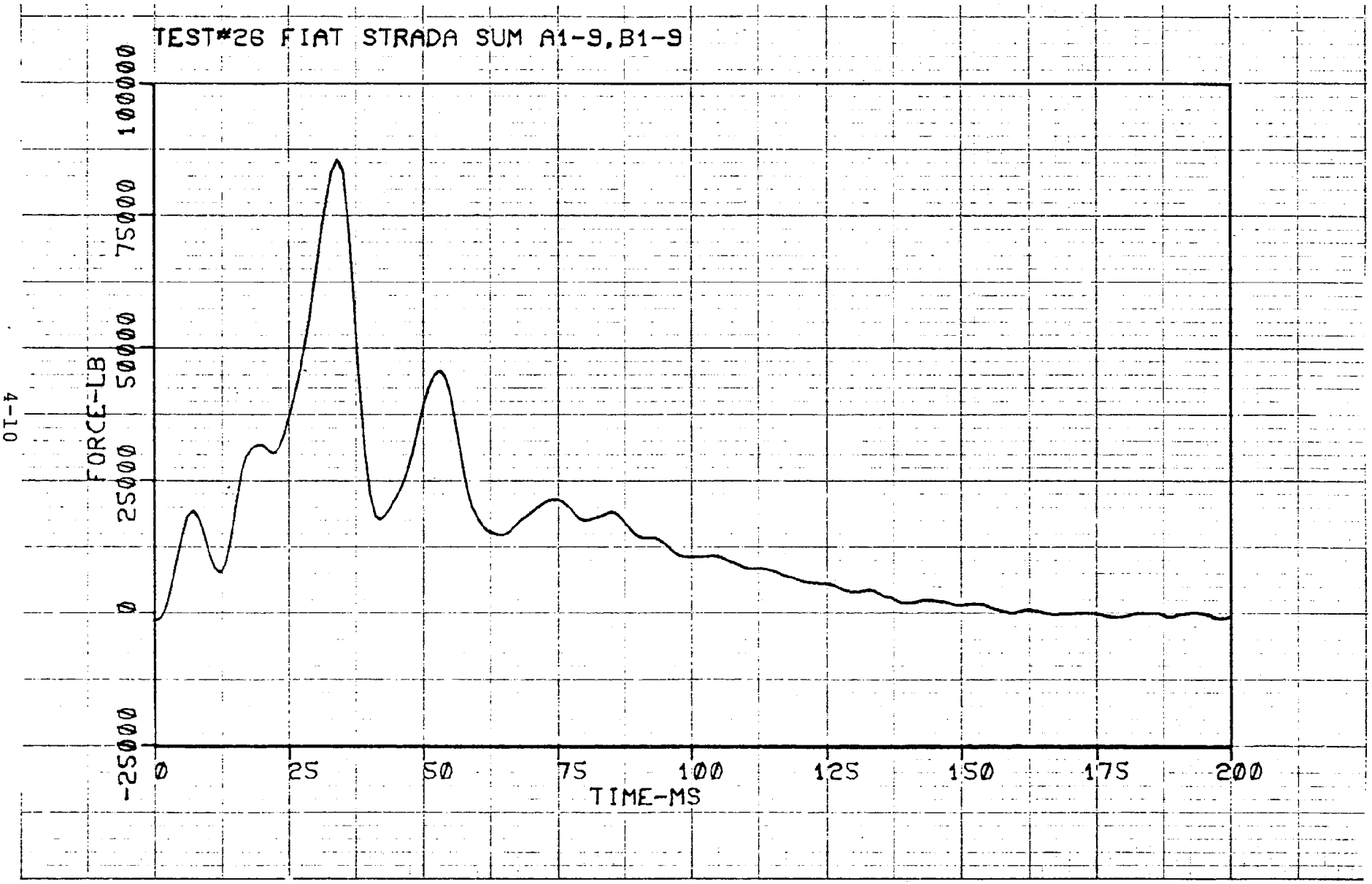

TEST#26 FIAT STRADA LOC 4
□= AX
○= VX
△= SX
80
40
0
-40
-80
-120
AX=G'S, VX=MPH, SX=IN
0
25
50
75
100
125
150
175
200
TIME-MS

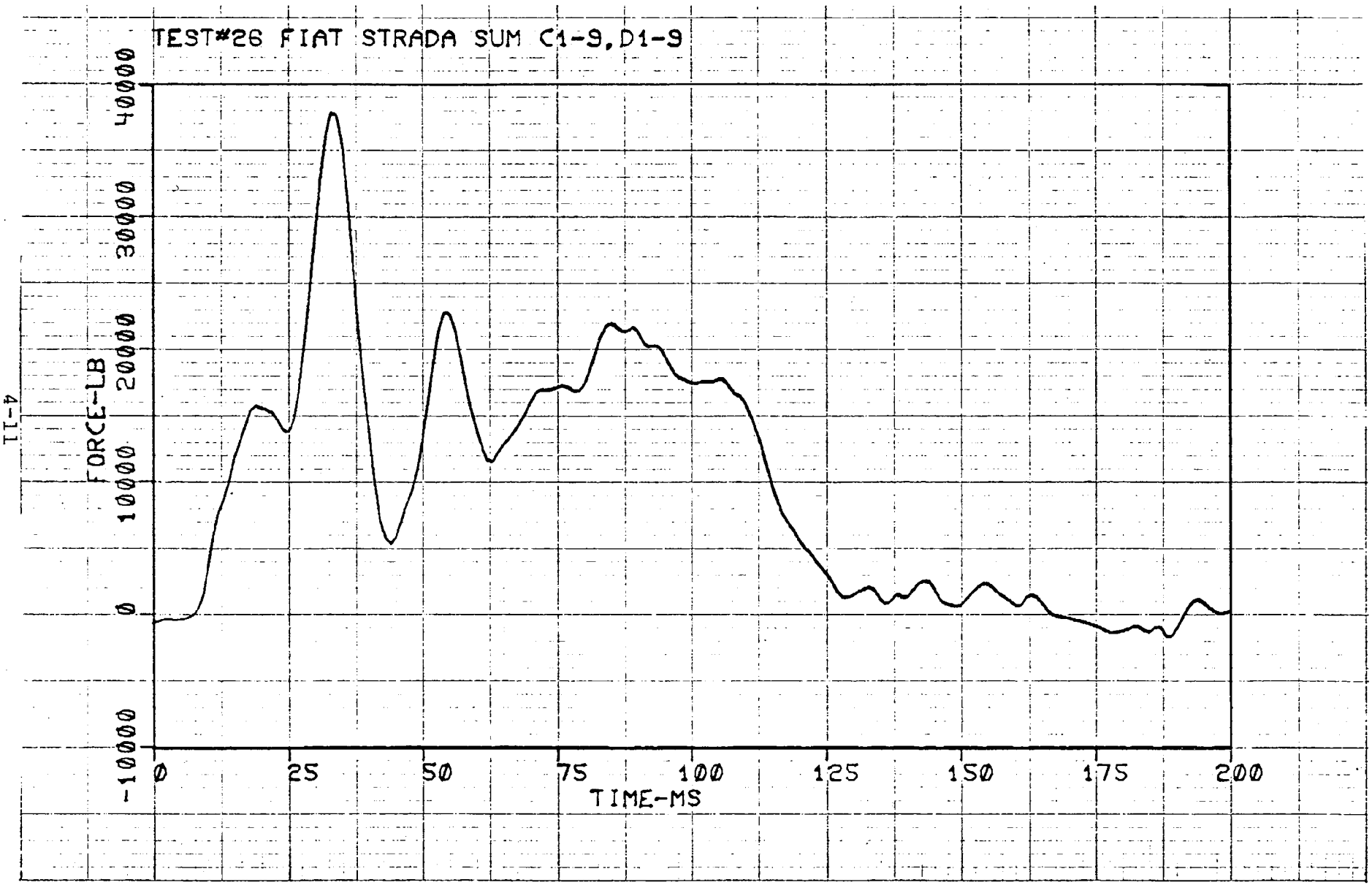

TEST#26 FIAT STRADA LOC 5
□= AX
Ⓘ= VX
△= SX
AX=G'S, VX=MPH, SX=IN
100
50
0
-50
-100
-150
0
25
50
75
100
125
150
175
200
TIME-MS

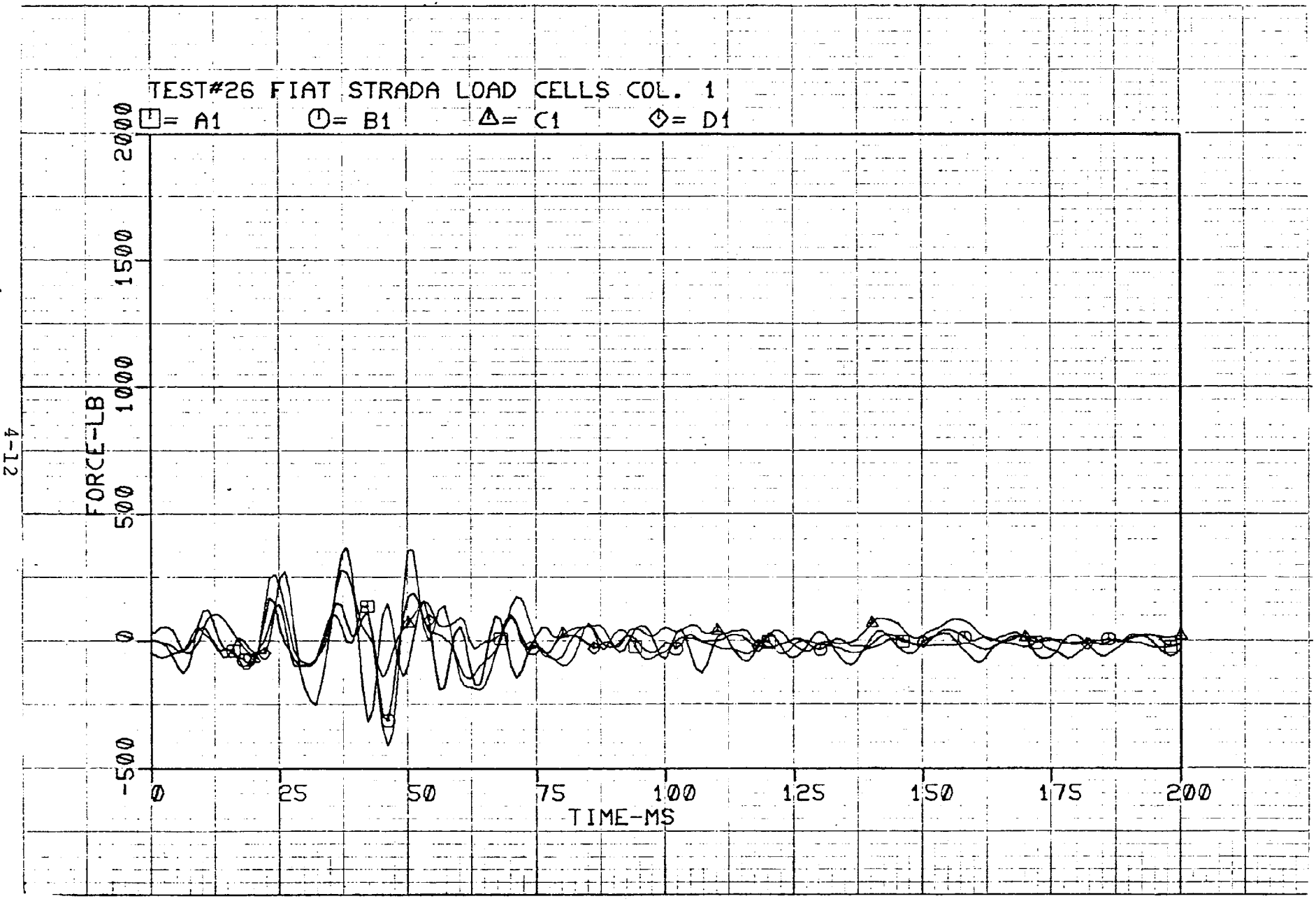

TEST#26 FIAT STRADA LOC 6
□= AX
⏲= VX
△= SX
AX=G'S, VX=MPH, SX=IN
100
50
0
-50
-100
-150
0
25
50
75
100
125
150
175
200
TIME-MS

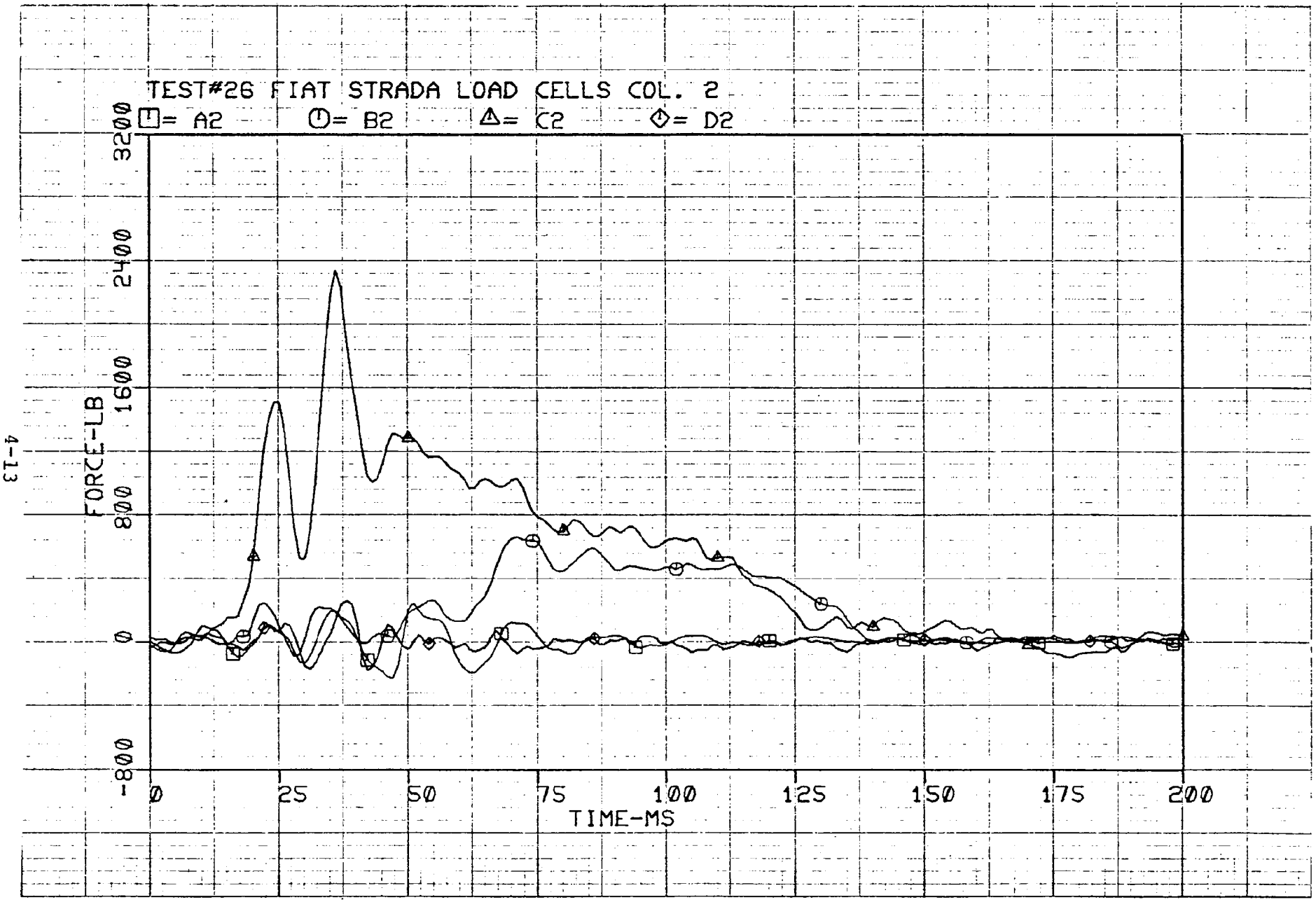

TEST#26 FIAT STRADA TOTAL LOAD
122.5K
67.5K
FORCE-LB
125000
100000
75000
50000
25000
0
0
25
50
75
100
125
150
175
200
TIME-MS

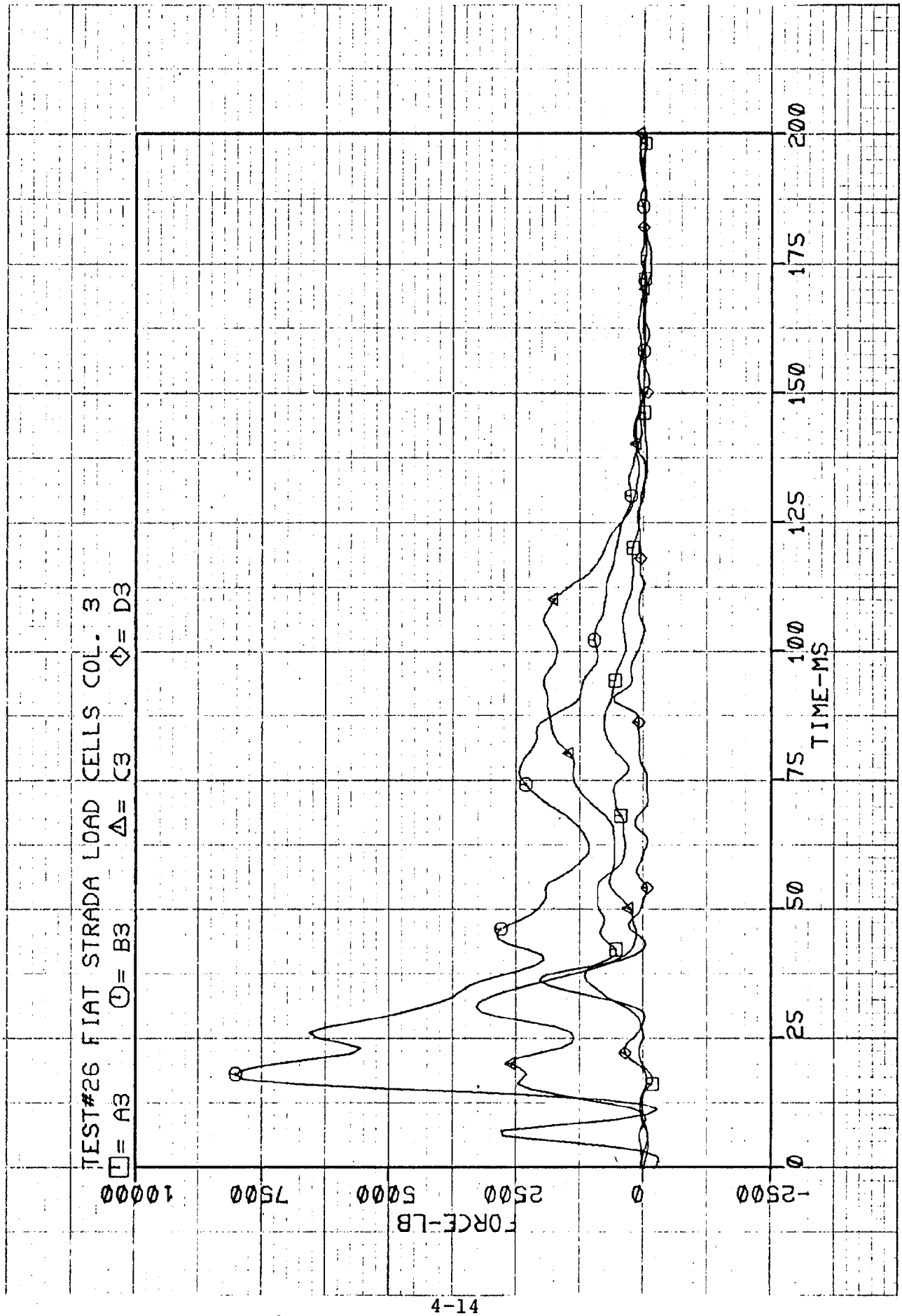

TEST#26 FIAT STRADA FORCE VS DISP.
FORCE-LB
0
25000
50000
75000
100000
125000
0
5.0
10
15
20
25
30
35
40
DISPLACEMENT-IN

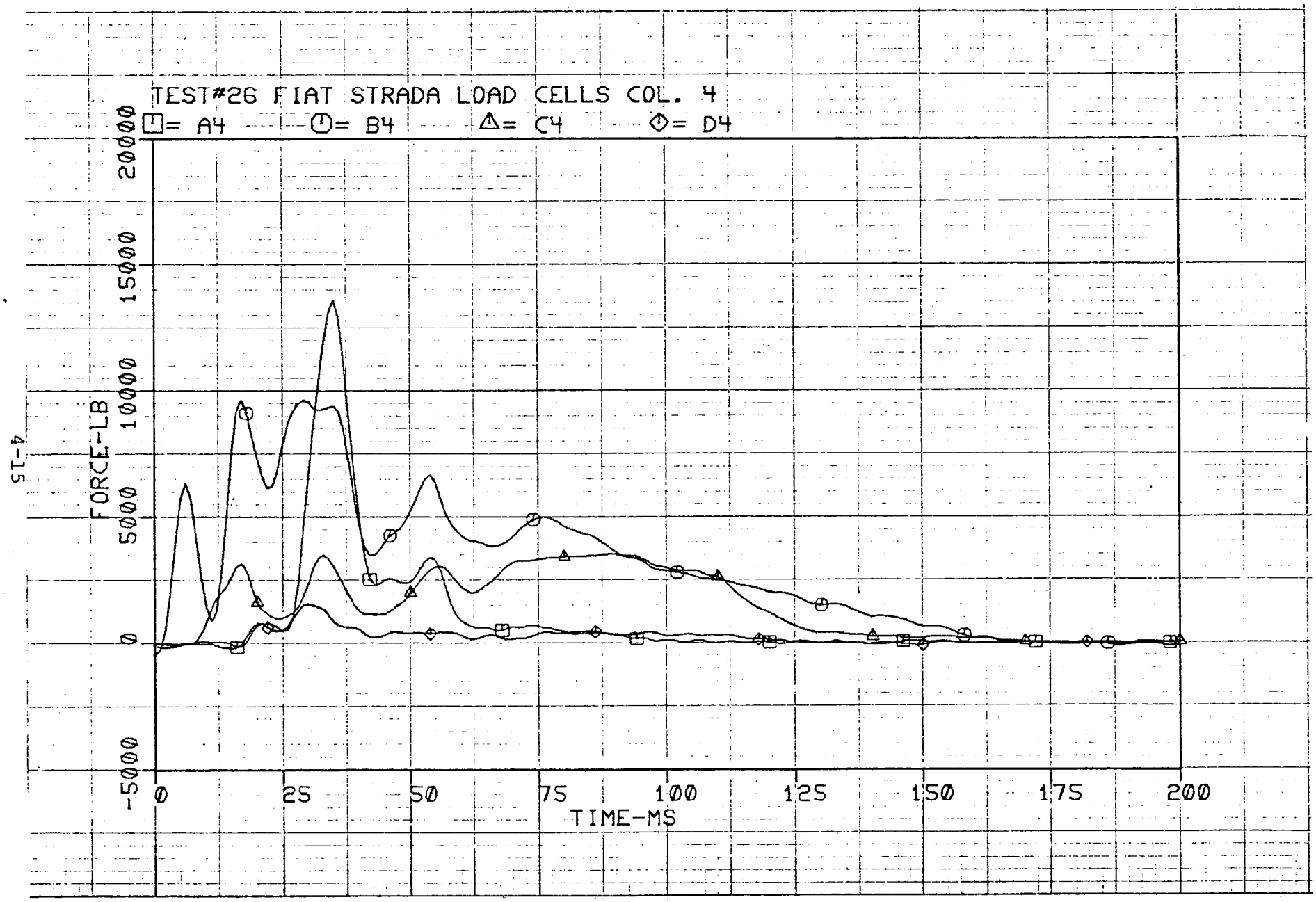

TEST#28 FIAT STRADA SUM A1-9,B1-9
FORCE-LB
100000
75000
50000
25000
0
-25000
0
25
50
75
100
125
150
175
200
TIME-MS

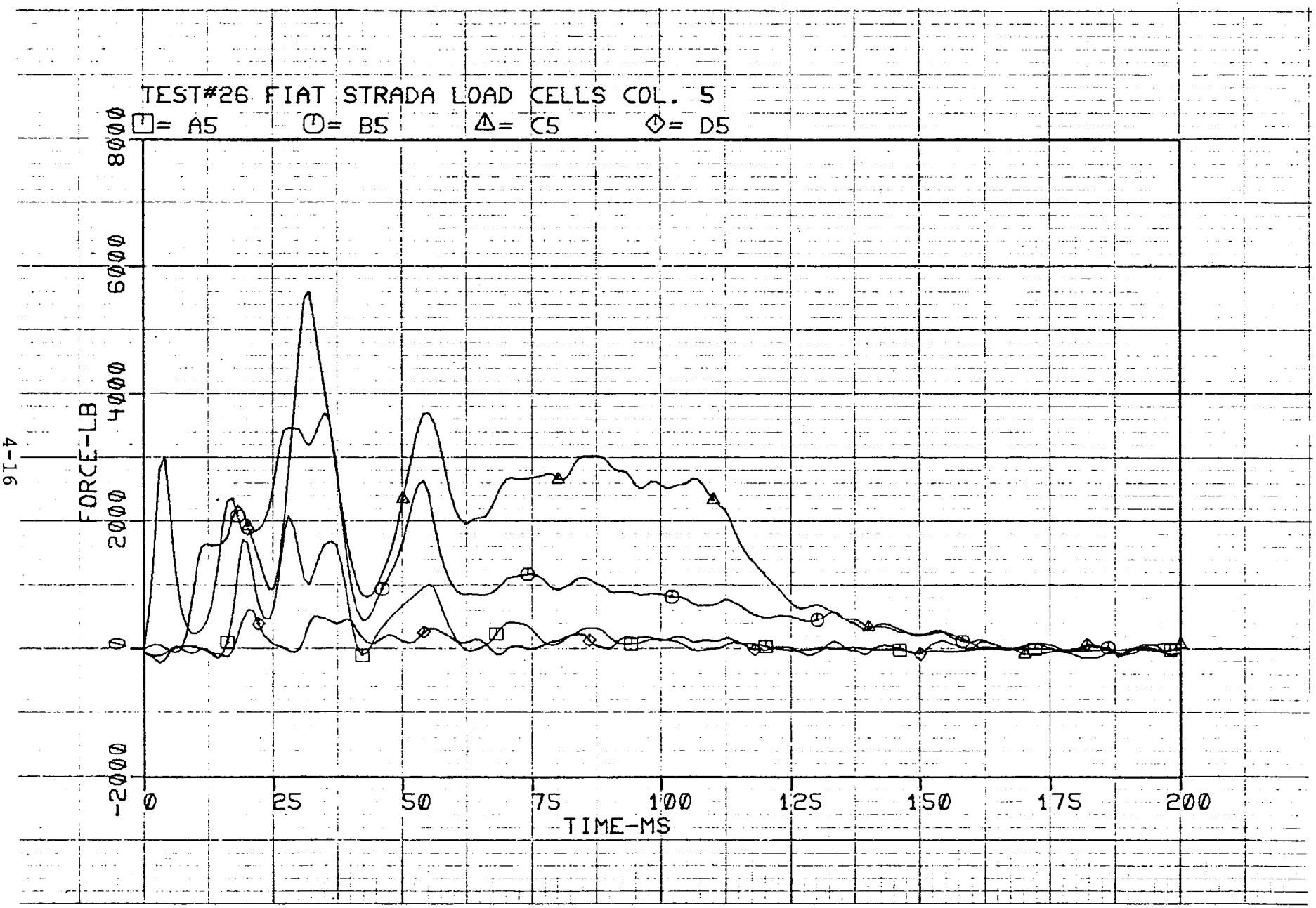

TEST#26 FIAT STRADA SUM C1-9,D1-9
FORCE-LB
40000
30000
20000
10000
0
-10000
0
25
50
75
100
125
150
175
200
TIME-MS

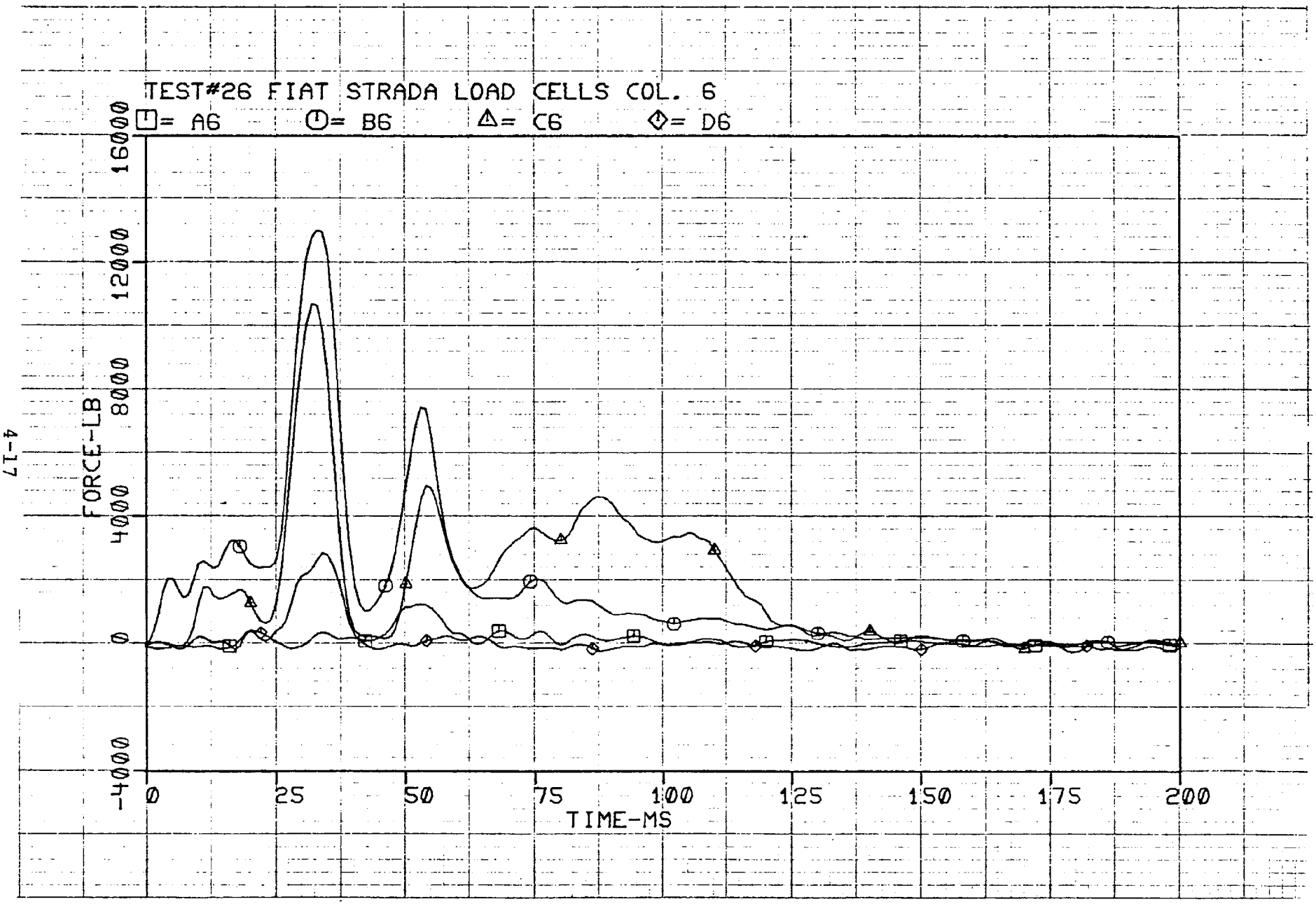

TEST#26 FIAT STRADA LOAD CELLS COL. 1
□= A1
○= B1
△= C1
◇= D1
FORCE-LB
2000
1500
1000
500
0
-500
0
25
50
75
100
125
150
175
200
TIME-MS

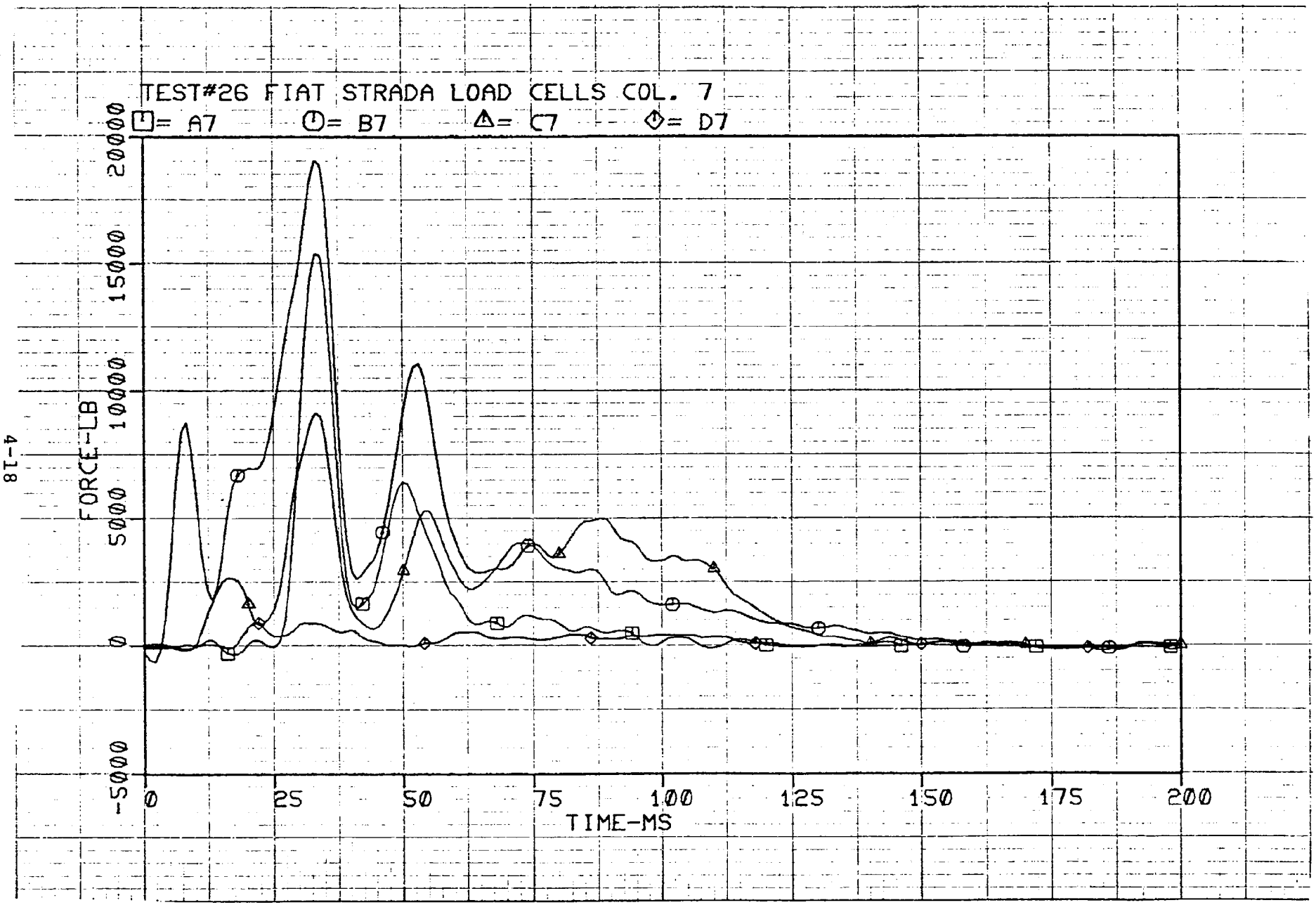

TEST#26 FIAT STRADA LOAD CELLS COL. 2
□= A2
○= B2
△= C2
◇= D2
FORCE-LB
3200
2400
1600
800
0
-800
0
25
50
75
100
125
150
175
200
TIME-MS

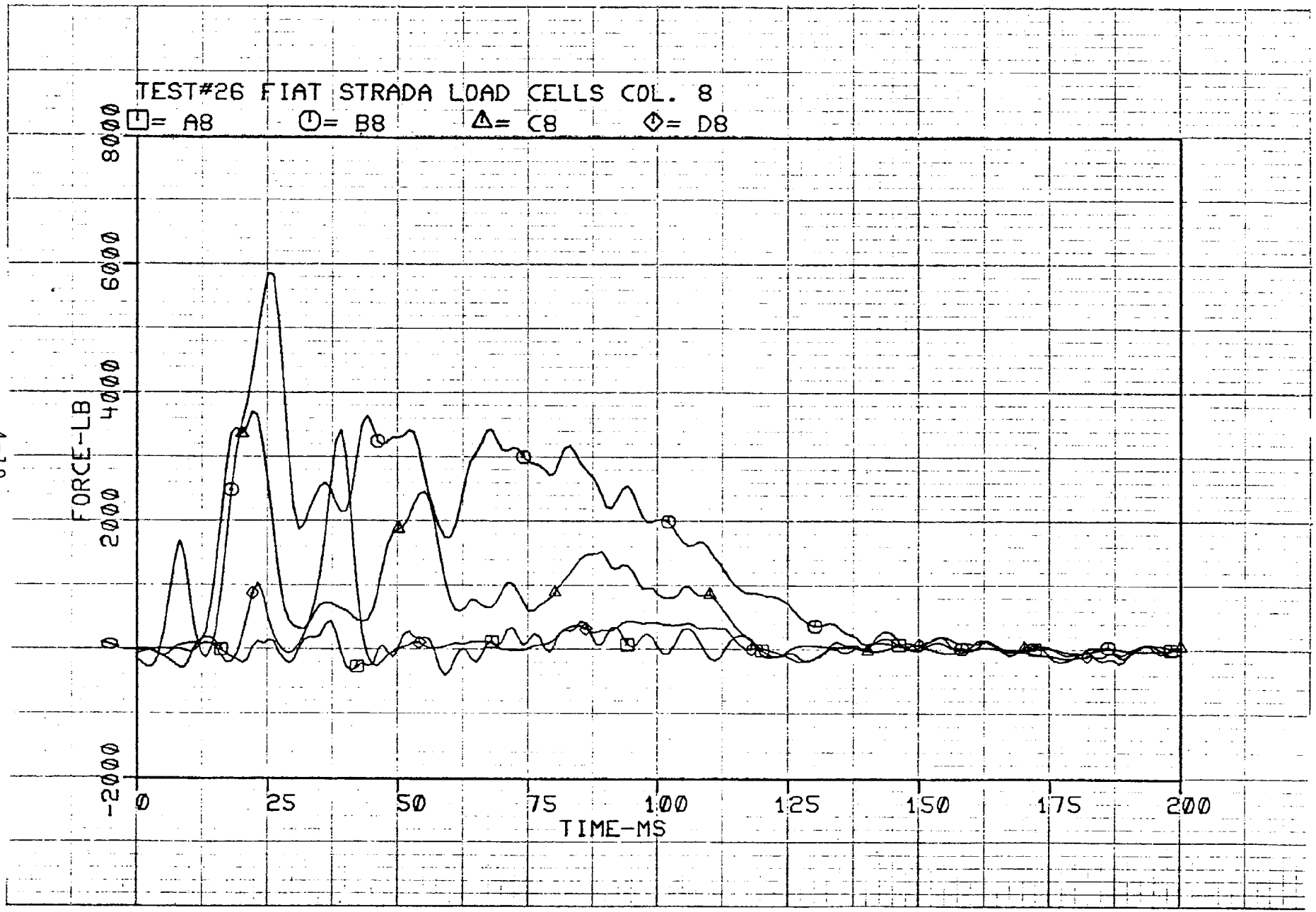

TEST#26 FIAT STRADA LOAD CELLS COL. 3
□= A3
○= B3
△= C3
◇= D3
FORCE-LB
10000
7500
5000
2500
0
-2500
0
25
50
75
100
125
150
175
200
TIME-MS

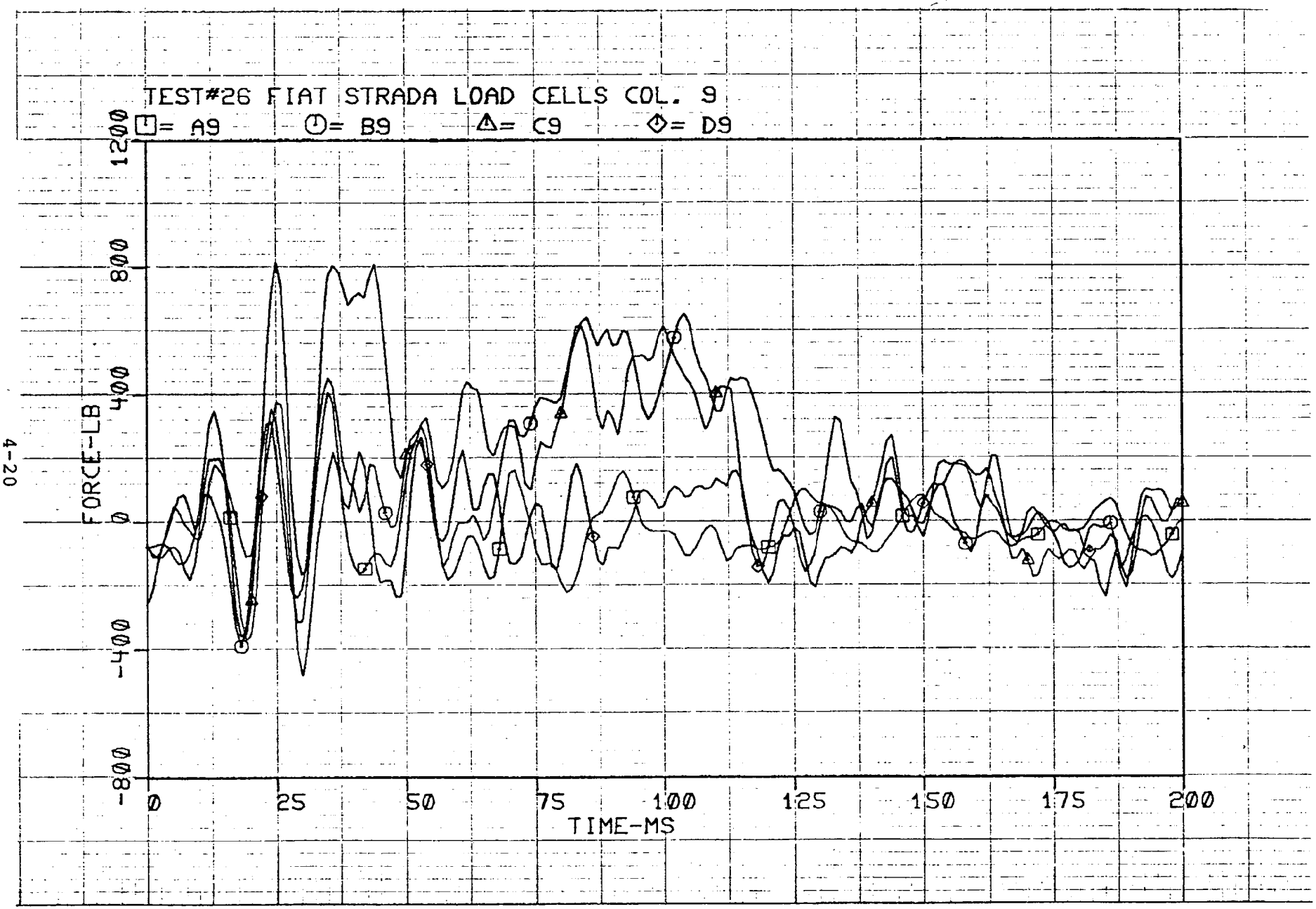

TEST#26 FIAT STRADA LOAD CELLS COL. 4
□= A4
○= B4
△= C4
◇= D4
FORCE-LB
20000
15000
10000
5000
0
-5000
0
25
50
75
100
125
150
175
200
TIME-MS


TEST#26 FIAT STRADA LOAD CELLS COL. 5
□= A5
○= B5
△= C5
◇= D5
FORCE-LB
8000
6000
4000
2000
0
-2000
0
25
50
75
100
125
150
175
200
TIME-MS


TEST#26 FIAT STRADA LOAD CELLS COL. 6
= A6
= B6
= C6
= D6
FORCE-LB
16000
12000
8000
4000
0
-4000
0
25
50
75
100
125
150
175
200
TIME-MS


TEST#26 FIAT STRADA LOAD CELLS COL. 7
□= A7
○= B7
△= C7
◇= D7
FORCE-LB
20000
15000
10000
5000
0
-5000
0
25
50
75
100
125
150
175
200
TIME-MS


TEST#26 FIAT STRADA LOAD CELLS COL. 8
□= A8
○= B8
△= C8
◇= D8
8000
6000
4000
2000
0
-2000
FORCE-LB
0
25
50
75
100
125
150
175
200
TIME-MS


TEST#26 FIAT STRADA LOAD CELLS COL. 9
= A9
= B9
= C9
= D9
1200
800
400
0
-400
-800
FORCE-LB
0
25
50
75
100
125
150
175
200
TIME-MS