

Tim A. Smyth

Dynamic Science Report No. 212-DYS-80-028
Dynamic Science Report No. 219-DYS-80-028
Dynamic Science Report No. 301-DYS-80-028

DOT 118

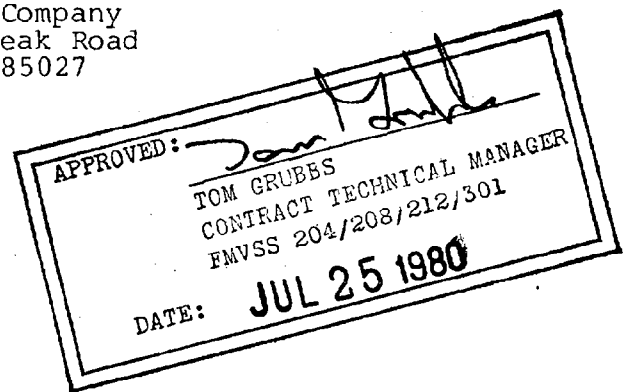
NEW VEHICLE ASSESSMENT AND
STANDARDS ENFORCEMENT INDICANT
TESTING

FMVSS 212, 219, AND 301-75

TOYO KOGYO CO., LTD.
1980 MAZDA 626
NHTSA NO. 800560

Prepared by:

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



JUNE 1980

FINAL REPORT

Prepared for:

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

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Prepared by Mark Poggi

Approved by G. Everett

Date July 1, 1980

Report Accepted by:

TOM GRUBBS

Contract Technical Manager
Office of Vehicle Safety Compliance

JUL 25 1980

Date

TECHNICAL REPORT STANDARD TITLE PAGE

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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 NHTSA load-measuring barrier at a speed of 35.21 mph. The test was conducted at the Dynamic Science, Inc. Deer Valley facility on May 17, 1980, with the following results: a) FMVSS 212 - Loss of windshield retention was within the allowable range. b) FMVSS 219 - No intrusion into windshield protected zone. c) FMVSS 301 - Fuel spillage was within the allowable range					
17. Key Words FMVSS 212 - Windshield Mounting, FMVSS 219 - Windshield Zone Intrusion, FMVSS 301-75 - Fuel System Integrity, Vehicle Assessment, Occupant Response			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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				22. Price	

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

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

Approximate Conversions from Metric Measures

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

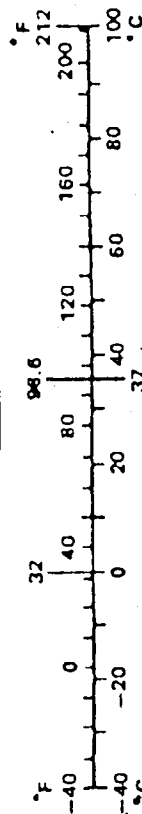


TABLE OF CONTENTS

	<u>Page</u>
PURPOSE AND INTRODUCTION	1
GENERAL TEST AND VEHICLE PARAMETER DATA	2
COMPLIANCE-RELATED DATA, FMVSS 212, 219, 301-75 INDICANT TESTING	6
DATA REQUIRED BY R&D AND OAR	21
APPENDIX A - OVERALL VEHICLE PHOTOS AND DUMMY PHOTOS	A-1
APPENDIX B - CALCOMP PLOT PRESENTATION	B-1
APPENDIX C - DUMMY CERTIFICATION DATA	C-1

LIST OF ILLUSTRATIONS

<u>Figure</u>		<u>Page</u>
3-1	Pre-test Windshield - Overall View - 1980 Mazda 626 - NHTSA 800560	16
3-2	Pre-test Windshield - Overall View - 1980 Mazda 626 - NHTSA 800560	17
3-3	Post-test Windshield - Overall View - 1980 Mazda 626 - NHTSA 800560	18
3-4	Pre-test View of Fuel Tank - 1980 Mazda 626 - NHTSA 800560	19
3-5	Post-test View of Fuel Tank - 1980 Mazda 626 - NHTSA 800560	20
A-1	Pre-test Front View - 1980 Mazda 626 - NHTSA 800560	A-2
A-2	Post-test Front View - 1980 Mazda 626 - NHTSA 800560	A-3
A-3	Post-test Overall Underside View - 1980 Mazda 626 - NHTSA 800560	A-4
A-4	Pre-test Side View - 1980 Mazda 626 - NHTSA 800560	A-5
A-5	Post-test Side View - 1980 Mazda 626 - NHTSA 800560	A-6
A-6	Pre-test Driver Dummy Position - 1980 Mazda 626 - NHTSA 800560	A-7
A-7	Post-test Driver Dummy Position - 1980 Mazda 626 - NHTSA 800560	A-8

LIST OF ILLUSTRATIONS (CONTD)

<u>Figure</u>		<u>Page</u>
A-8	Pre-test Passenger Position - 1980 Mazda 626 - NHTSA 800560	A-9
A-9	Post-test Passenger Position - 1980 Mazda 626 - NHTSA 800560	A-10
A-10	Post-test Vehicle Interior Deformation - 1980 Mazda 626 - NHTSA 800560	A-11
A-11	Post-test Vehicle Interior Deformation - 1980 Mazda 626 - NHTSA 800560	A-12
A-12	Pre-test View of Driver Torso Belt - 1980 Mazda 626 - NHTSA 800560	A-13
A-13	Post-test View of Driver Torso Belt - 1980 Mazda 626 - NHTSA 800560	A-14
A-14	Pre-test View of Passenger Torso Belt - 1980 Mazda 626 - NHTSA 800560	A-15
A-15	Post-test View of Passenger Torso Belt - 1980 Mazda 626 - NHTSA 800560	A-16

SECTION 1
PURPOSE AND INTRODUCTION

PURPOSE:

The purpose of the test was to subject a 1980 Mazda 626 to the indicant test requirements of DOT Test Plan TP-212-02, April 1, 1980, Standards 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: Toyo Kogyo Co., Ltd.
 Make/Model: Mazda 626
 Body Style: 2-door coupe Model Year: 1980
 VIN: CB2MS-625497 Build Date: 3/80
 NHTSA No.: 800560 Color: Silver
 Engine Data: 4 cylinders; 120.2 in.³ displacement
 Transmission Data: 5 speed (X) Manual () Automatic
 Date Vehicle Received by Laboratory: 5/12/80
 Dealer Name & Address: Meyers Mazda
4539 W. Glendale Ave., Glendale, AZ 85301

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

Vehicle Manufactured By: Toyo Kogyo Co., Ltd.
 Date of Manufacture: 3/80; VIN: CB2MS-625497
 GVWR: 3310 lb; GAWR: Front = 1750 lb; Rear = 1750 lb

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

Vehicle Load:	FRONT	REAR	RECOMMENDED	LOAD RANGE:
Up to Capacity	<u>26</u> psi	<u>26</u> psi	TIRE SIZE:	
Vehicle Capacity:			<u>165-70SR13/185-70SR13</u>	<u>B</u>
Type of Seats -	<u>Bench</u>	Number of Occupants =	<u>2</u>	Front
	<u>X</u> <u>Bucket</u>	(Designated Seating	<u>2</u>	Rear
	<u>Split Bench</u>	Capacity)	<u>4</u>	Total
CARGO LOAD =	<u>80</u> lb			
TOTAL =	<u>680</u> lb			

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

Right Front =	<u>669</u> lb	Right Rear =	<u>572</u> lb
Left Front =	<u>732</u> lb	Left Rear =	<u>605</u> lb
TOTAL FRONT WEIGHT =	<u>1401</u> lb (<u>54.3%</u> of Total Vehicle Weight)		
TOTAL REAR WEIGHT =	<u>1177</u> lb (<u>45.7%</u> of Total Vehicle Weight)		
TOTAL DELV. WEIGHT =	<u>2578</u> lb		

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 80 lb CARGO:

Right Front =	<u>737</u> lb	Right Rear =	<u>757</u> lb
Left Front =	<u>784</u> lb	Left Rear =	<u>788</u> lb
TOTAL FRONT WEIGHT =	<u>1521</u> lb (<u>49.6%</u> of Total Vehicle Weight)		
TOTAL REAR WEIGHT =	<u>1545</u> lb (<u>50.4%</u> of Total Vehicle Weight)		
TOTAL TEST WEIGHT =	<u>3066</u> lb		

Weight of ballast secured in vehicle trunk area = 0 lb

TARGET WEIGHT = CARGO LOAD + UDW + 164 (NO. OF DUMMIES) = 2986 lb*

*High test weight due to addition of seat belt retractor cameras and lights.

GENERAL TEST AND VEHICLE PARAMETER DATA (CONTD)

TEST CONDITIONS:

Date of Test: May 17, 1980 Time of Test: 1205
 Ambient Temperature: 85 °F at impact area.
 Temperature in Windshield Molding
 Occupant Compartment: 72 °F Temperature: 85 °F

VEHICLE ATTITUDE: (all dimensions in inches)

Delivered Attitude: RF 28.0 LF 28.0 RR 28.0 LR 28.0
 Test Attitude: RF 27.8 LF 27.8 RR 25.9 LR 26.0

VEHICLE TIRE DATA:

Recommended Cold Tire Pressure: Front = 26 psi
 Rear = 26 psi

Recommended Tire Size: 185/70SR13

Load Range: B

Tires on Vehicle: 185/70SR13

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: 13.7 Gallons

Fuel System Capacity (data from Owner's Manual): 14.5 gallons

Details of Fuel System: Rectangular metal fuel tank is bolted to chassis by two longitudinal metal straps. A shield is placed between left rear wheel and tank. Sender and vacuum tubes exit top of tank and are filled by an electric fuel pump. Filler tube exits top of tank and terminates at a metal twist cap concealed by a locking access door located behind the left rear wheel.

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

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

VEHICLE REBOUND AND CRUSH:

Overall Length of Pre-test = R 174.4 L 174.4 inches

Test Vehicle Post-test = R 149.0 L 150.1 inches

CRUSH = R 25.4 L 24.3

FOR FRONTAL IMPACTS, distance from front of test vehicle to the barrier after impact = 10.2 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

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Steering column, up-</u> <u>per steering wheel</u> <u>rim, dash</u>	<u>Dash</u>
Chest	<u>Steering wheel hub</u>	<u>None</u>
Abdomen	<u>Lower steering wheel</u> <u>rim</u>	<u>None</u>
Left Knee	<u>Steering column, dash</u>	<u>Glovebox</u>
Right Knee	<u>Dash</u>	<u>Glovebox</u>

	<u>Front</u>		<u>Rear</u>	
<u>DOOR OPENING</u>	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Easy				
Difficult				
Tools Required	<u>X</u>	<u>X</u>		

<u>SEAT BACK</u>	<u>Left</u>	<u>Right</u>	
Failure	<u>X</u>	<u>X</u>	Both on rebound

<u>GLAZING DAMAGE</u>	
Windshield	<u>Entire windshield is cracked. Severe fold-</u> <u>ing and splitting of lowest 4 inches. 30.3"</u> <u>retention loss.</u>
Backlight	
Others	

OTHER NOTABLE IMPACT EFFECTS: Both front tires pinned. Rear axle
bent forward, permitting both rear wheels to touch front edge of
wheelwells. Roof buckled between "B" and "C" pillars. Both torso
belts folded in "D" ring. Both head restraints extended fully dur-
ing event. No movement of seats in seat track. Both front seat
backs failed during rebound. Severe distortion of doors; required
use of forklift and chains to open.

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: Toyo Kogyo Co., Ltd. Model Year: 1980
Make/Model: Mazda 626
Body Style: 2-door coupe Manufacture Date: 3/80
VIN: CB2MS-625497 NHTSA No.: 800560
Delivery Weight: 2578 lb; Test Weight: 3066 lb; GVWR: 3310 lb
Engine: No. of Cylinders 4 Displacement 120.2 in.³
Vehicle Mileage: 28.3 miles
Remarks: _____

GENERAL TEST CONDITIONS:

Vehicle Impact Speed:
Primary 35.21 mph; Secondary 35.23 mph
Speed Range Specified by CTM: 34.5 to 35.5 mph
Ambient Temperature at Time of Test: 85 °F
Date of Test: May 17, 1980 Time: 1205
Windshield Molding Temperature: 85 °F
Static Crush: 25.4 in. (right) 24.3 in. (left)

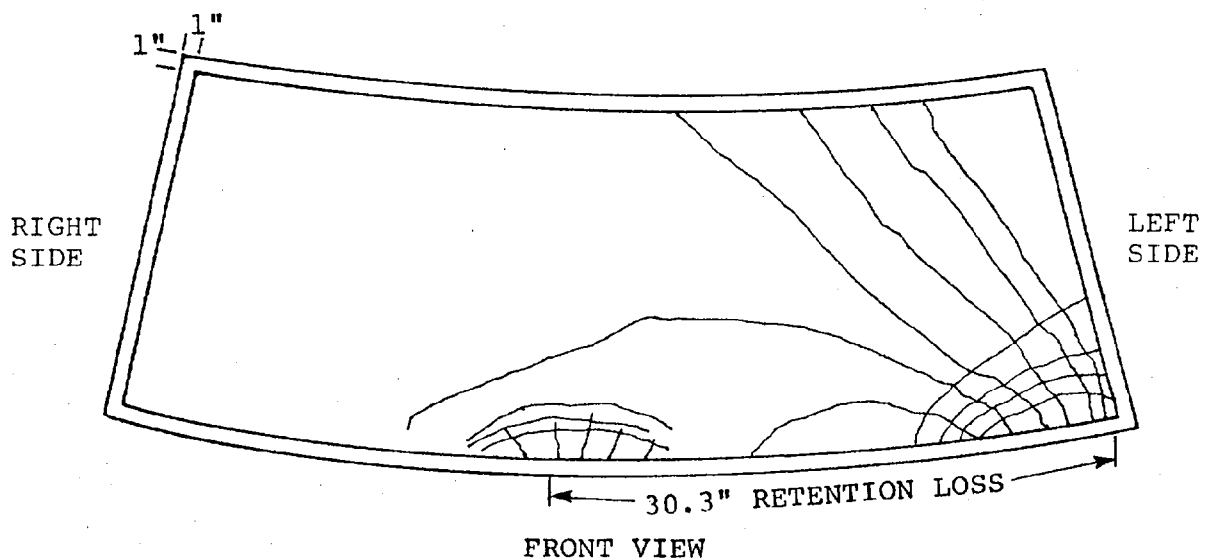
SUMMARY OF FMVSS 212 DATA

Details of windshield mounting (method of retention, type of trim, etc.): Windshield is bonded to vehicle on all sides by a 0.5-inch-wide strip of black mastic. A 1.0-inch-wide metal retainer strip is affixed over the edge of the windshield by metal circlips screwed to vehicle body 5.5 inches apart, on the top and sides. The bottom retainer is affixed by sheet metal screws 10.5 inches apart.

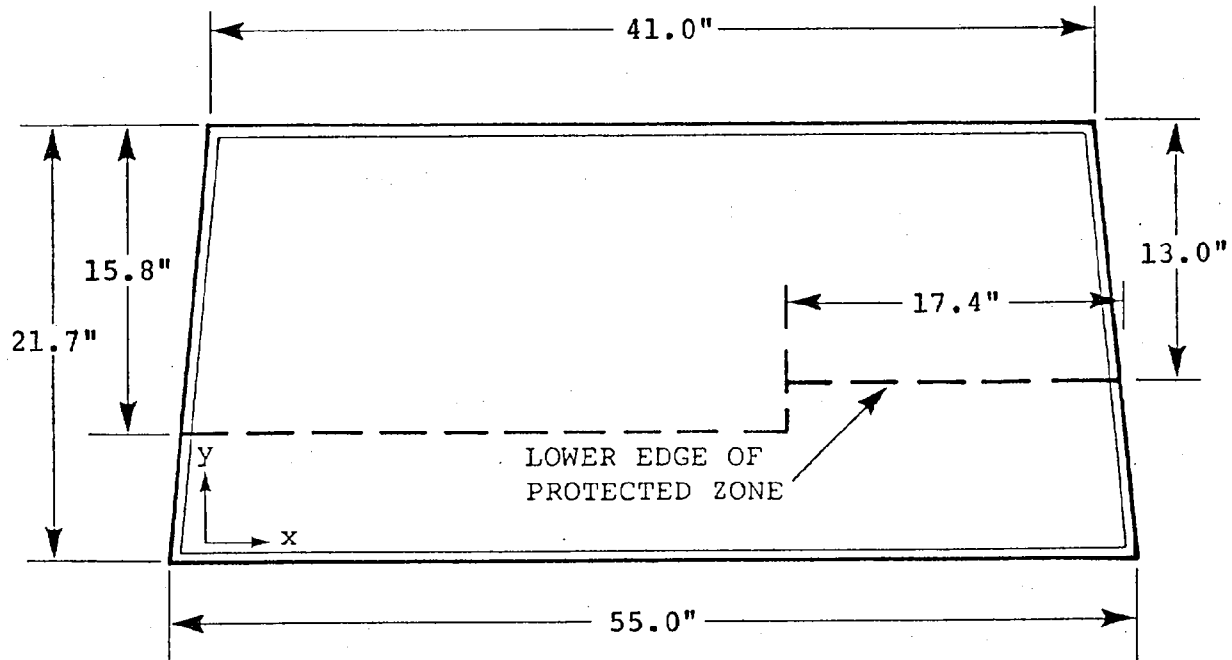
	WINDSHIELD PERIPHERY	
	Pre-test	Post-test
RIGHT SIDE	69.7	67.4
LEFT SIDE	69.7	41.7
TOTAL	139.4	109.1

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): 22% retention loss along lower left edge of windshield.



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	
<u>X</u>	<u>Y</u>
<u>N/A</u>	<u>N/A</u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>

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

Coordinates	
<u>X</u>	<u>Y</u>
<u>N/A</u>	<u>N/A</u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>

- C. Record any windshield retention clips or brackets used to ensure that the windshield would not disengage from the body. No retention clips are evident.

POST IMPACT DATA

TYPE OF TEST:

☒ 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 17, 1980 ; TIME: 1205 ; TEMP: 85 ° F

NHTSA NO.: 800560 ; VIN: CB2MS-625497

REQUIRED VEHICLE VELOCITY RANGE: 34.5 to 35.5 mph

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

Primary = 35.21 mph; Secondary = 35.23 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 = 24.3 in.; Passenger's Side = 25.4 in.

Average = 24.9 in.

Crush Details: Direct crush to "A" pillar. Roof buckled between "B" and "C" pillars. Both front tires pinned. Rear axle bent forward, permitting both rear wheels to touch front edge of wheelwells.

(For Side Impacts Only)

Amount of Crush = _____ in. on _____ side

Crush Details:

VEHICLE REBOUND:

(From rigid barrier only)

Driver's Side = 9.1 in.; Passenger's Side = 11.3 in.

Average = 10.2 in.

REMARKS: Steel bumper has 2.1"-wide, 0.3"-thick, soft rubber strip
affixed slightly above bumper centerline. Two 2.0" x 6.0" x 1.3"
hard rubber bumper guards are located 15.5" from vehicle center-
line.

FUEL SYSTEM INTEGRITY POST-IMPACT

TEST DATA, FMVSS NO. 301-75

TEST VEHICLE NHTSA NO.: 800560 ; TEST DATE: May 17, 1980

VEHICLE MANUFACTURER/

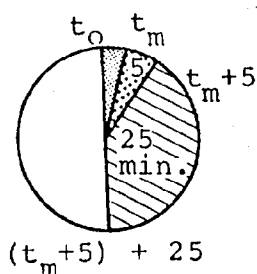
MAKE/MODEL: Toyo Kogyo Co., Ltd., Mazda 626, 2-door coupe

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:

- ☒ Frontal (35 mph)
☐ Oblique (35 mph) with ° barrier face first contacting
 driver / passenger side.
☐ Rear Moving Barrier (30 mph)
☐ Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT



	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

B. SOLVENT SPILLAGE DETAILS: None

C. FUEL SYSTEM DATA:

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

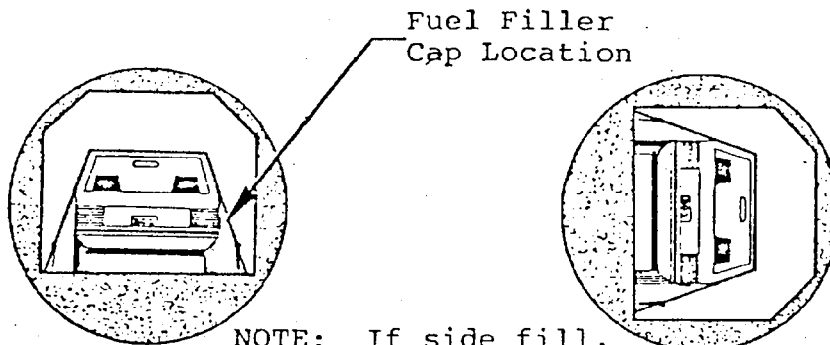
Kinematic Viscosity: 0.99 centistokes

Test Volume: 13.7 U.S. gal/lb Liquid Temp: 85 °F

Details of Fuel Tank, Filler Pipes, and Connections: Rectangular metal fuel tank is bolted to chassis by two longitudinal metal straps. A shield is placed between left rear wheel and tank. Sender and vacuum tubes exit top of tank and are filled by an electric fuel pump. Filler tube exits top of tank and terminates at a metal twist cap concealed by a locking access door located behind the left rear wheel.

FMVSS 301-75 INDICANT STATIC ROLLOVER DATA SHEET

TEST PHASE: 0° to 90° VEHICLE NHTSA NO. 800560



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

DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

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

FMVSS 301 Position Hold Time..... = 5 min, 0 sec =

Total..... = 6 min, 38 sec

Next Whole Minute Interval..... = 7 min

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

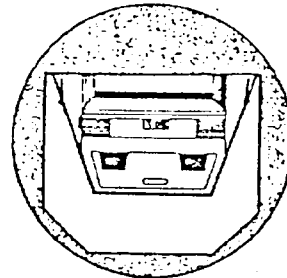
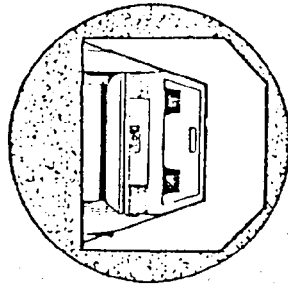
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	0	0	0	-

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

SOLVENT SPILLAGE LOCATION(S): None

FMVSS 301-75 INDICANT STATIC ROLLOVER DATA SHEET

TEST PHASE: 90° to 180° VEHICLE NHTSA NO. 800560



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time.... = 1 min, 37 sec +
(Spec. Range = 1 to 3 min)

FMVSS 301 Position Hold Time..... = 5 min, 0 sec =

Total..... = 6 min, 37 sec

Next Whole Minute Interval..... = 7 min

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

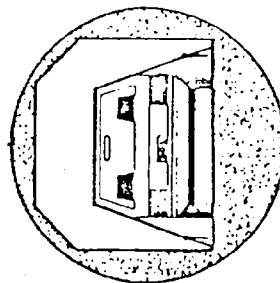
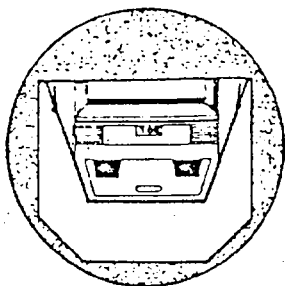
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	0	0	0	-

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

SOLVENT SPILLAGE LOCATION(S): None

FMVSS 301-75 INDICANT STATIC ROLLOVER DATA SHEET

TEST PHASE: 180° to 270° VEHICLE NHTSA NO. 800560



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time.... = 1 min, 37 sec +
(Spec. Range = 1 to 3 min)

FMVSS 301 Position Hold Time..... = 5 min, 0 sec =

Total..... = 6 min, 37 sec

Next Whole Minute Interval..... = 7 min

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

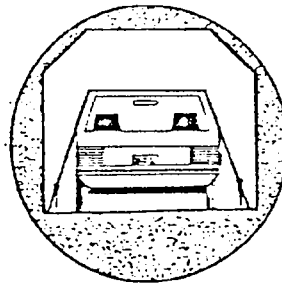
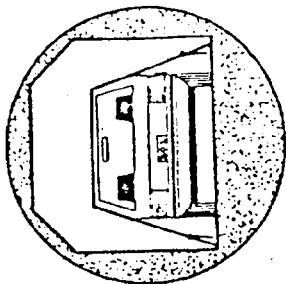
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	Trace	0	0	-

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

SOLVENT SPILLAGE LOCATION(S): Carburetor

FMVSS 301-75 INDICANT STATIC ROLLOVER DATA SHEET

TEST PHASE: 270° to 360° VEHICLE NHTSA NO. 800560



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time.... = 1 min, 39 sec +
(Spec. Range = 1 to 3 min)

FMVSS 301 Position Hold Time..... = 5 min, 0 sec =

Total..... = 6 min, 39 sec

Next Whole Minute Interval..... = 7 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	0	0	0	-

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

SOLVENT SPILLAGE LOCATION(S): None

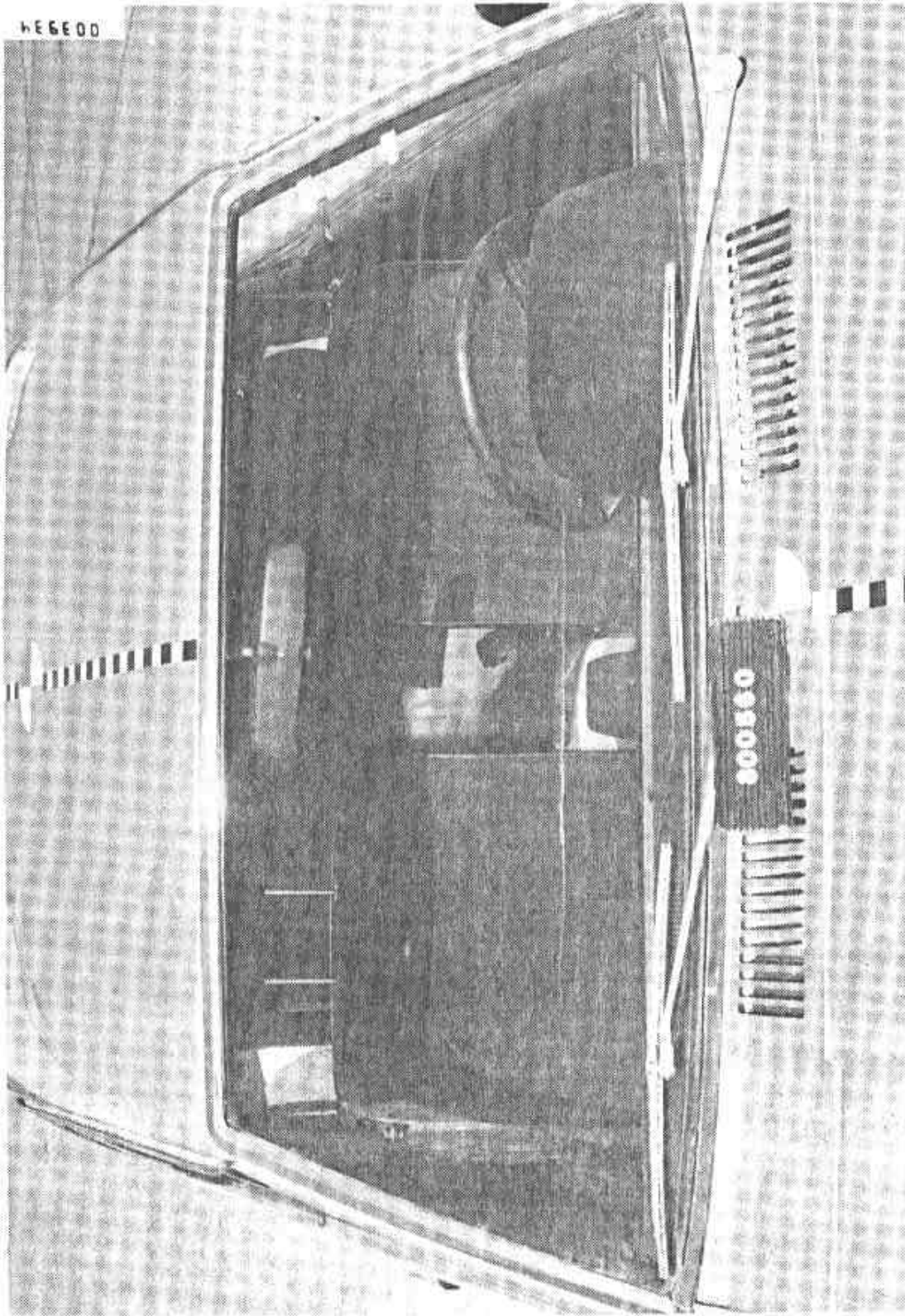


Figure 3-1. Pre-test Windshield - Overall View - 1980 Mazda 626 - NHTSA 800560.

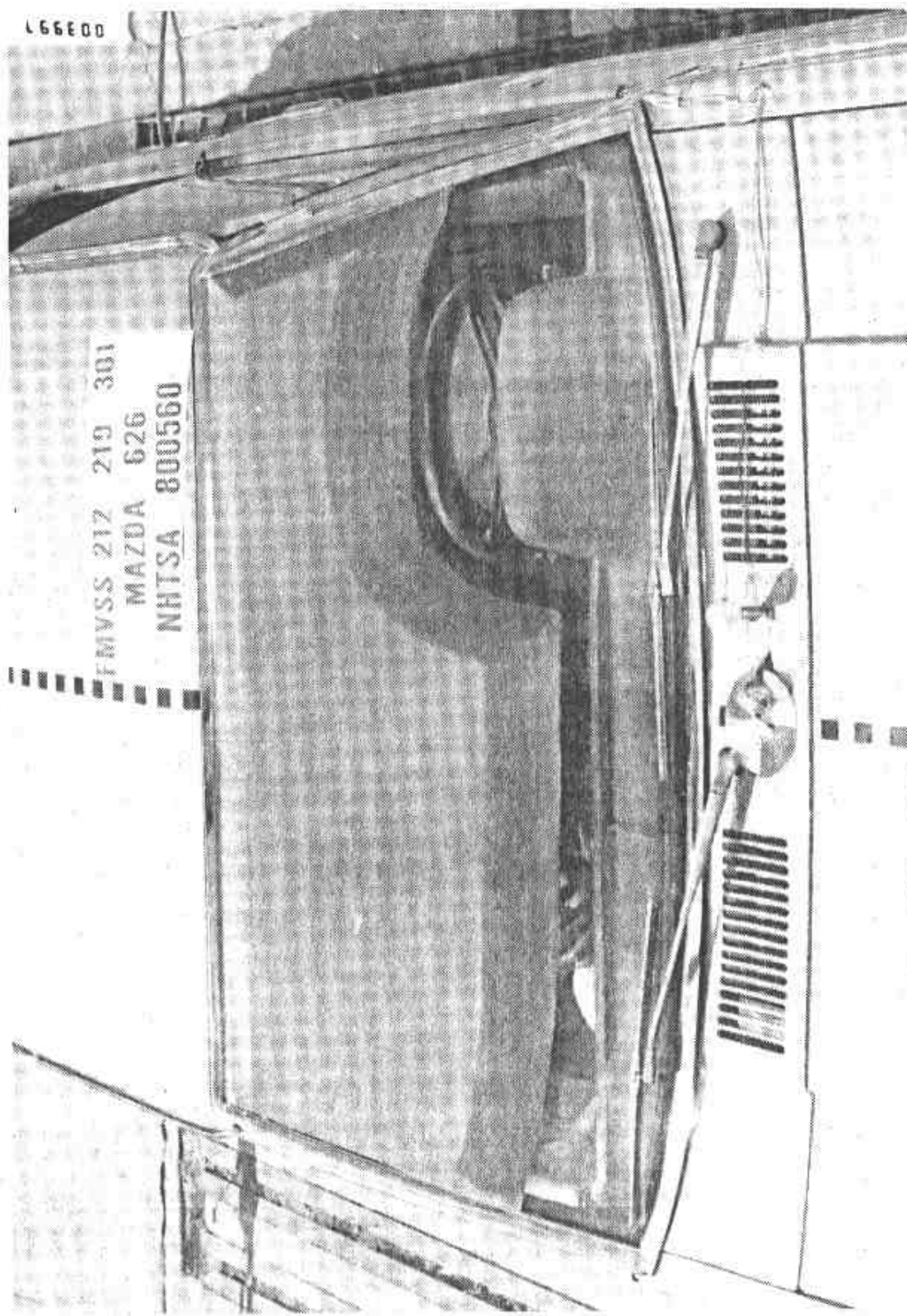


Figure 3-2. Pre-test Windshield - Overall View - 1980 Mazda 626 - NHTSA 800560.

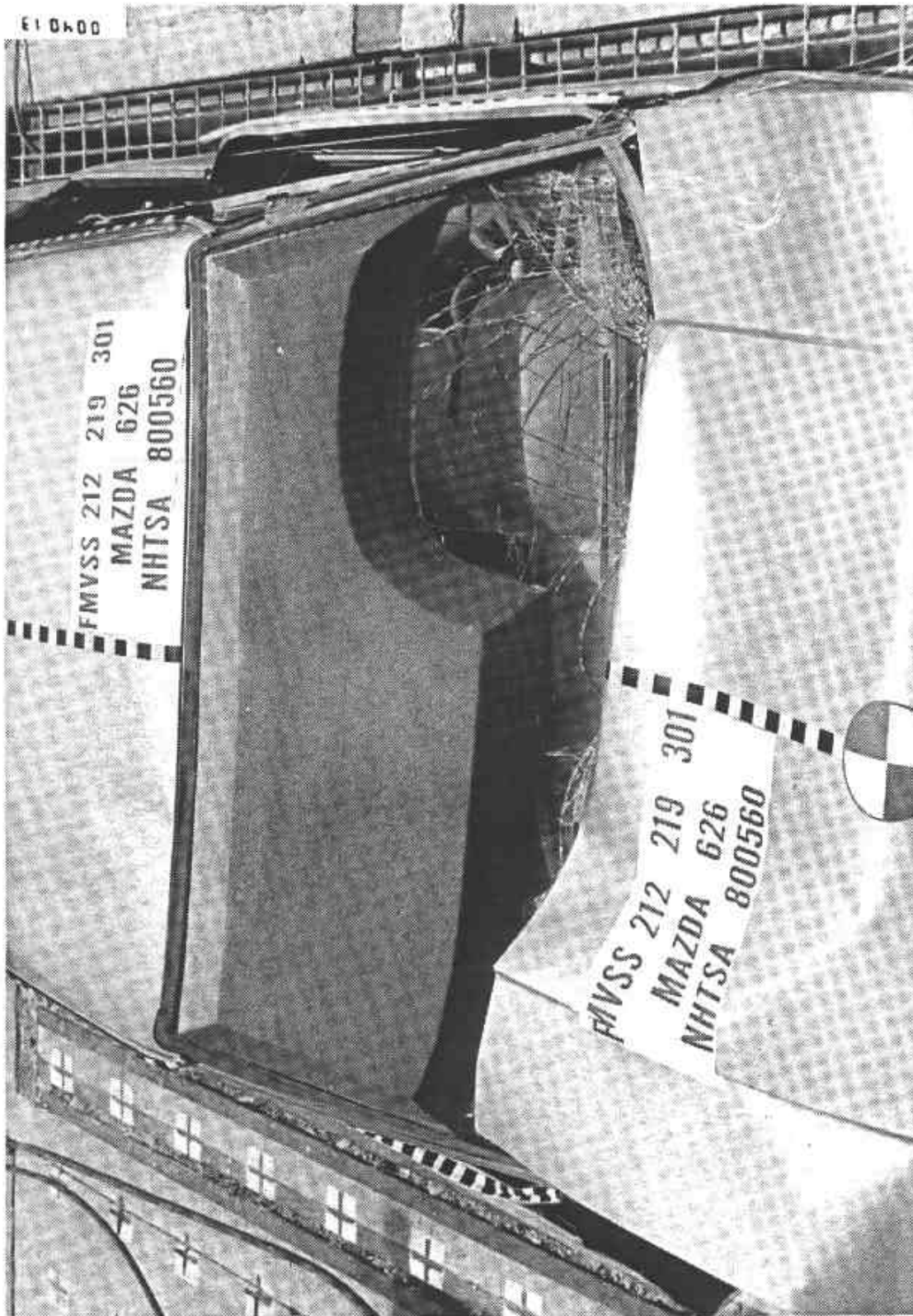


Figure 3-3. Post-test Windshield - Overall View - 1980 Mazda 626 - NHTSA 800560.

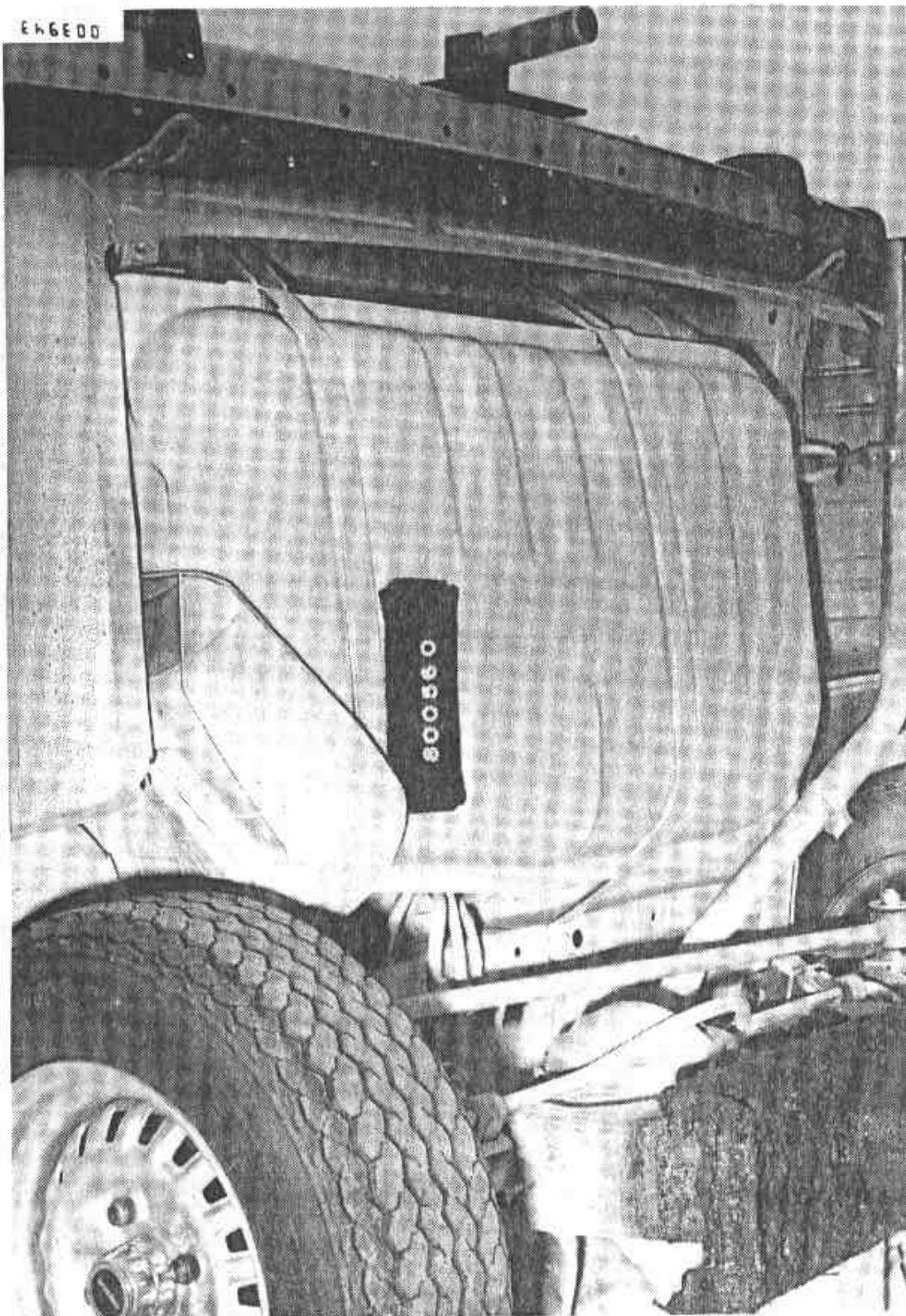


Figure 3-4. Pre-test View of Fuel Tank - 1980 Mazda 626 - NHTSA 800560.

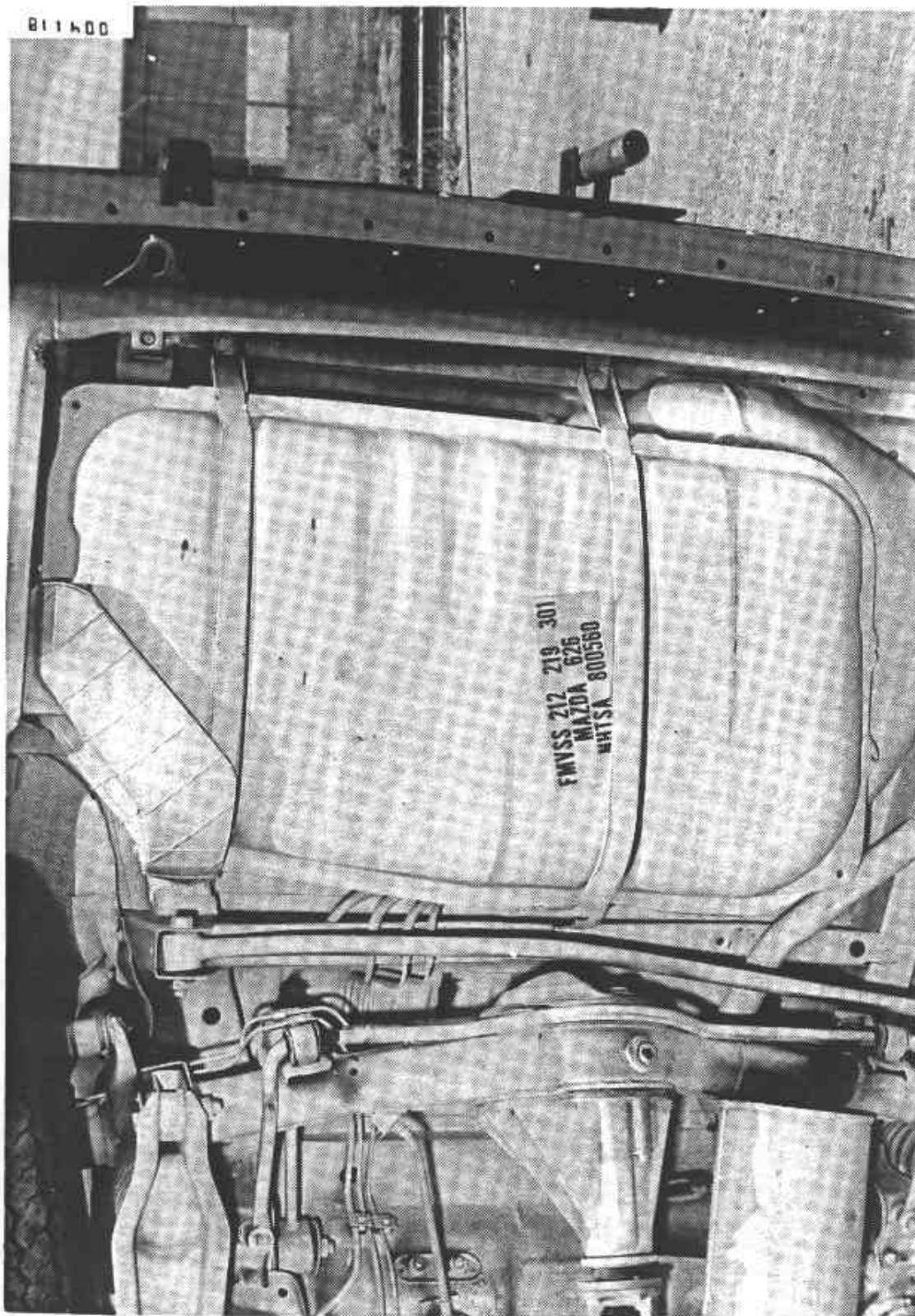


Figure 3-5. Post-test View of Fuel Tank - 1980 Mazda 626 - NHTSA 800560.

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

<u>Measurement</u>	<u>Driver (in.)</u>	<u>Passenger (in.)</u>
Dummy Centerline to Vehicle Centerline	<u>12.9</u>	<u>12.4</u>
Nose to Upper Rim Steering Wheel	<u>16.8</u>	<u>NA</u>
Nose to Windshield (Horizontal Distance)	<u>17.0</u>	<u>18.0</u>
Left Knee to Closest Point on Lower Panel	<u>3.8</u>	<u>5.0</u>
Right Knee to Closest Point on Lower Panel	<u>3.0</u>	<u>5.9</u>
Ankle Distance	<u>10.0</u>	<u>10.0</u>
Knee Distance	<u>9.0</u>	<u>9.0</u>
Head to Windshield Header	<u>12.0</u>	<u>13.0</u>
Chest to Dash	<u>20.5</u>	<u>20.8</u>
Chest to Steering Wheel	<u>12.0</u>	<u>NA</u>

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

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	14.7	125	-123.1	80	6.0	190	-132.8	90
Lateral	41.8	81	-20.7	63	15.6	74	-88.9	57
Vertical	61.7	79	-26.8	62	78.3	82	-8.6	126
Resultant	143.3	80			152.1	84		
HIC	1435 between 69 and 96 msec				2206 between 78 and 96 msec			
Chest Acceleration								
Longitudinal	7.7	175	-114.3	78	8.0	187	-53.7	90
Lateral	9.4	66	-8.1	77	31.9	69	-12.8	87
Vertical	19.5	56	-17.9	78	18.6	59	-9.6	121
Resultant (Max)	115.8	78			58.7	69		
Resultant (clip)	100.6	68			53.6	89		
TIME > 60 G	10 msec				0 msec			
SEVERITY INDEX	1132.5 @ 200 msec				602.4 @ 200 msec			
	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)
Femur Loads								
Left			-922.6	59			-380.0	53
Right			-939.2	60			-208.6	39
Belt Loads								
Lap	1597.6	67			1898.9	72		
Torso	1696.7	69			1807.1	87		
Vehicle Impact Speed (mph): 35.21								
*Longitudinal:	Forward							
Lateral:	Rightward							
Vertical:	Downward							
**Longitudinal:	Rearward							
Lateral:	Leftward							
Vertical:	Upward							

DUMMY KINEMATIC SUMMARY

DRIVER - Struck lower steering wheel rim with abdomen and steering wheel hub with sternum. Dummy head contacted upper steering wheel rim with nose and mouth, then struck upper dash with forehead and steering column with lower half of face. Dummy rebounded into seatback, causing a partial failure of the latch mechanism. Dummy came to rest reclining in seat.

PASSENGER - Struck upper dash with center of face and rebounded into seatback, causing a total failure of the latch mechanism. The seatback was fully extended to the rear. Dummy came to rest reclining in seat.

OTHER COMMENTS: The high occupant response exhibited in this test was partly due to restraint system performance. A large amount of webbing spool-out occurred after retractor lock-up, and the left front torso belt showed a stretch of 14 percent.

SEAT BELT RETRACTOR LOCKUP PERFORMANCE EVALUATION

VEHICLE INFORMATION:

Manufacturer: Toyo Kogyo Co., Ltd.

Make/Model: Mazda 626 2-door coupe NHTSA No. 800560

SHOULDER BELT INFORMATION: (Info. taken from belt label)

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

Manufacturer: NSK - Warner K.K.

Build Date (or Code): 1980

Belt Manufacturers Part No.: NSB17YLB5 Lot No. 002

Vehicle Manufacturers Part No.: None

TORSO BELT AND RETRACTOR DATA

<u>Parameter</u>	<u>Driver</u>	<u>Passenger</u>
Length of Webbing (in.)		
On Reel	<u>24.0</u>	<u>23.0</u>
From Reel to D Ring	<u>25.0</u>	<u>25.0</u>
From D Ring to Slip Buckle	<u>37.0</u>	<u>36.0</u>
Front D Ring to Fixed Buckle	<u>N/A</u>	<u>N/A</u>
Between Potentiometer Attachment Points	<u>5.0</u>	<u>5.0</u>
Webbing Elongation at Maximum Belt Load	<u>14%</u>	<u>No Data</u>

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 = 16 milliseconds

Amount of webbing travel prior to retractor lockup = 0.8 in.

Amount of webbing travel after retractor lockup = 4.2 in.

FOR LEFT SIDE UNIT:

Time duration from initial barrier contact to retractor lockup = 24 milliseconds

Amount of webbing travel prior to retractor lockup = 0.7 in.

Amount of Webbing travel after retractor lockup = 3.5 in.

UPPER TORSO BELT LOAD INFORMATION:

Right Side Belt Load = 1807.1 lb @ 87 ms after time 0.

Left Side Belt Load = 1696.7 lb @ 69 ms after time 0.

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

Vehicle: 1980 Mazda 626

NHTSA No.: 800560

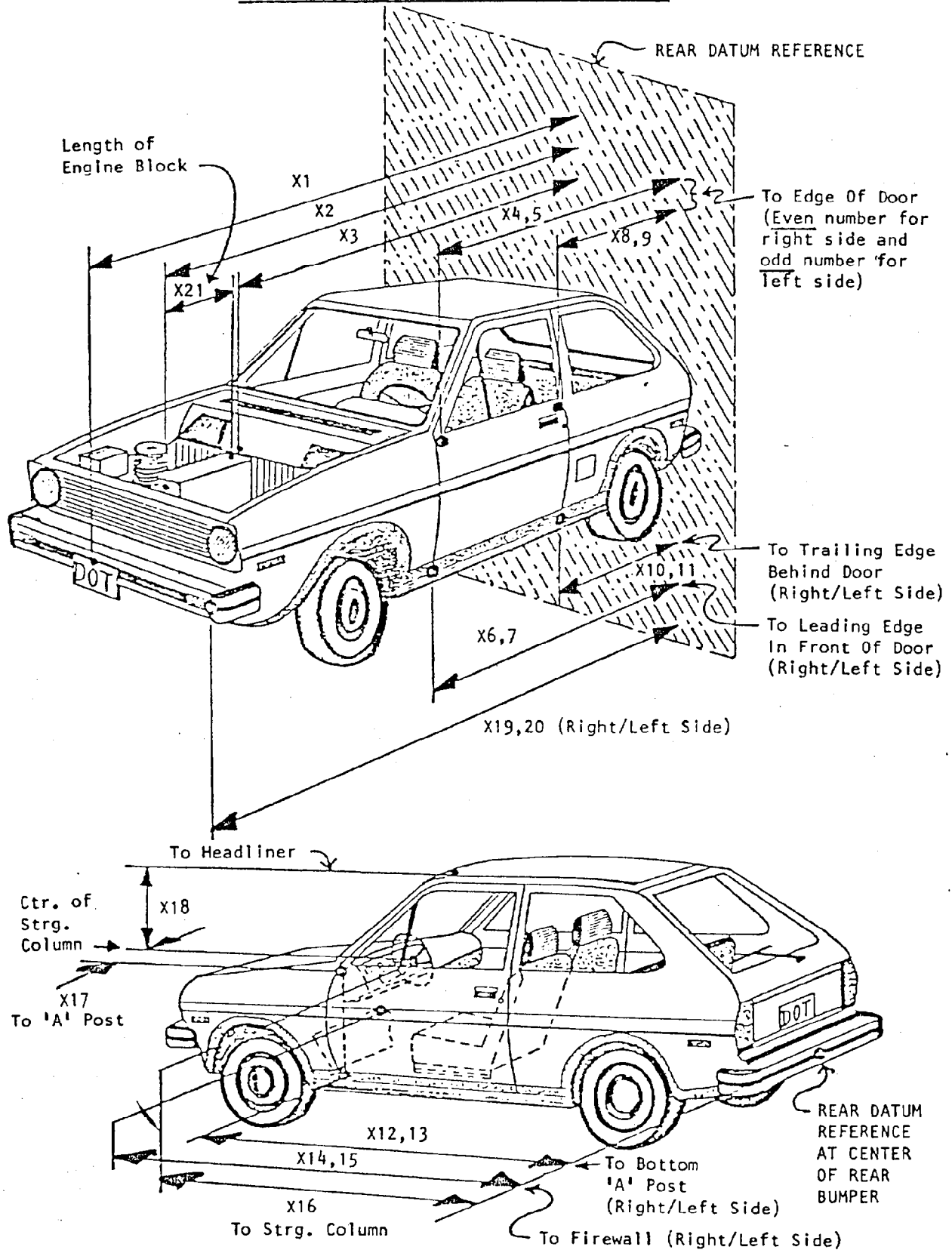
Test Date: May 17, 1980

D.S. No.: 1067

<u>Reference Dimension</u>	<u>Pre-test Measurement</u>	<u>Post-test Measurement</u>	<u>Change</u>
X ₁ *	176.0	150.6	25.4
X ₂	151.0	142.2	8.8
X ₃	131.0	122.3	8.7
X ₄	116.5	113.1	3.4
X ₅	116.5	111.9	4.6
X ₆	120.8	118.4	2.4
X ₇	120.8	118.5	2.3
X ₈ *	74.5	71.7	2.8
X ₉ *	74.5	70.8	3.7
X ₁₀	75.1	72.9	2.2
X ₁₁	75.1	72.8	2.3
X ₁₂	121.4	118.1	3.3
X ₁₃	121.4	117.9	3.5
X ₁₄	131.7	122.3	9.4
X ₁₅	131.7	125.5	6.2
X ₁₆	102.0	99.3	2.7
Y ₁₇	14.2	13.5	0.7
Z ₁₈	15.8	18.5	2.7
X ₁₉ *	174.4	148.6	25.8
X ₂₀ *	174.4	149.8	24.6
X ₂₁	18.2	18.0	0.2

*Rear impact data requirements.

PRE-TEST AND POST-TEST MEASUREMENT POINTS



VEHICLE PROFILE DATA SHEET

Vehicle: 1980 Mazda 626 2-door coupe D.S. No.: 1067

Test Date: May 17, 1980

Measurement Date: Pre-test: May 17, 1980 Post-test: May 19, 1980

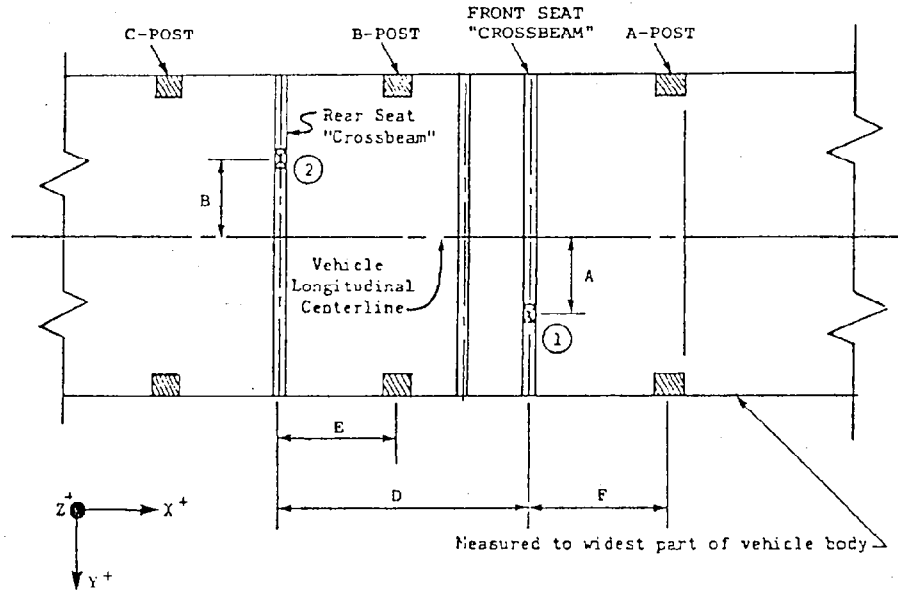
Exterior Measurements Referenced to Plane: 180 inches

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	20.9	-	6.0	5.3	4.9	4.6	4.5	4.6	4.9	5.3	6.0	-
Front of Hood	26.5	-	11.5	10.9	10.4	10.2	9.9	10.2	10.4	10.9	11.5	-
Post-test Profile (in.)												
Top of Front Bumper	26.5	-	30.3	30.1	29.7	29.5	29.4	29.8	30.4	30.8	31.4	-
Front of Hood	35.5	-	30.9	30.9	30.7	30.6	30.5	31.0	31.5	31.6	31.4	-
Post-test Static Crush (in.)												
Top of Front Bumper	5.6	-	24.3	24.8	24.8	24.9	24.9	25.2	25.5	25.5	25.4	-
Front of Hood	9.0	-	19.4	20.0	20.3	20.4	20.6	20.8	21.1	20.7	19.9	-

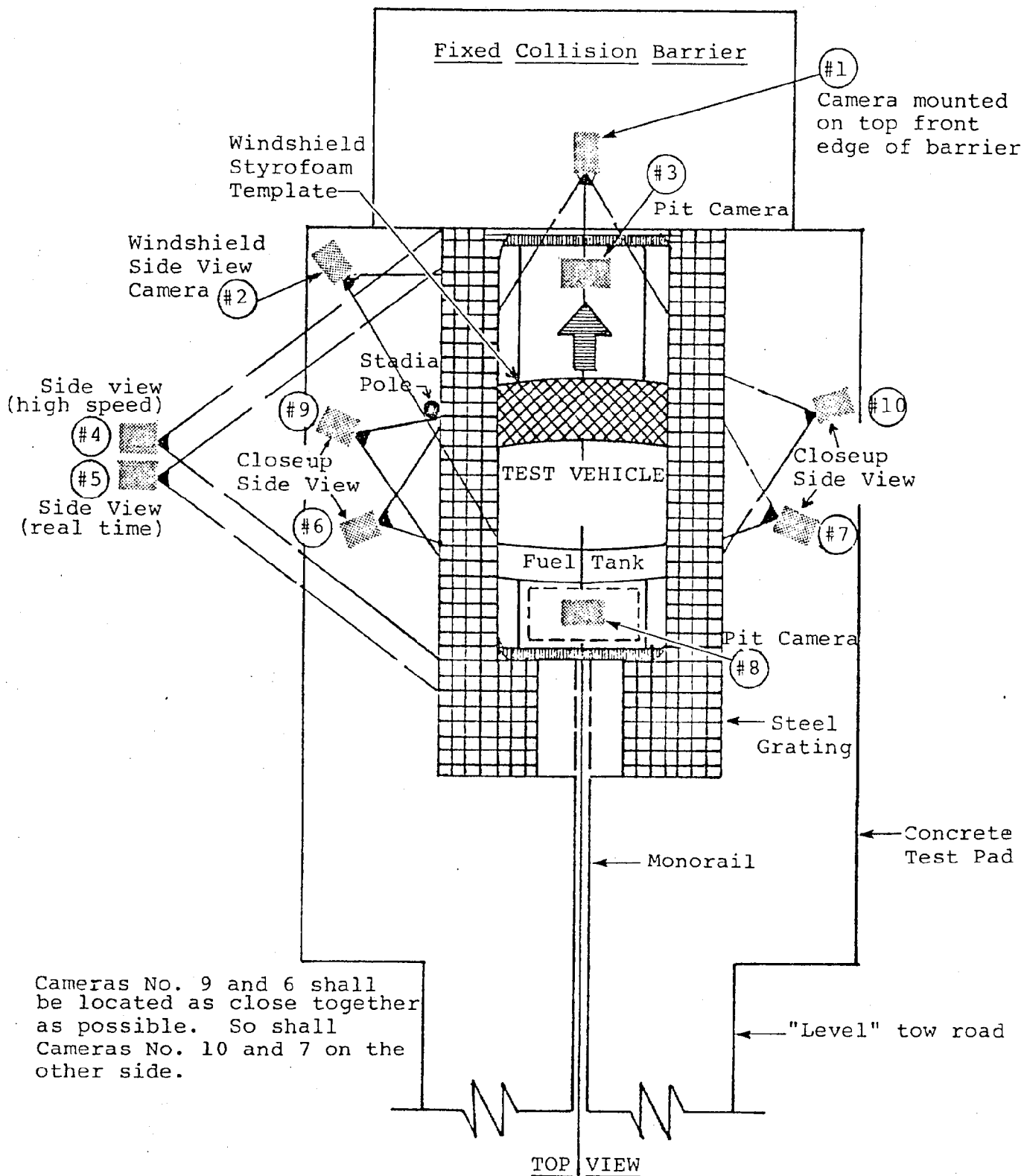
TEST VEHICLE ACCELEROMETER LOCATION DEFINITION AND DATA SUMMARY

Dim.	Length (in.)
A	13.0
B	13.0
C	N/A
D	32.3
E	8.0
F	14.0



90701702

No.	Location Description	Component Direction	Data Summary Peak G @ msec					
			X		Y		Z	
			"+"	"-"	"+"	"-"	"+"	"-"
1	Below front seat area	X	4.9 @ 126	-60.7 @ 52	@	@	@	@
2	Below rear seat area	X	4.1 @ 136	-44.0 @ 46	@	@	@	@



Cameras No. 9 and 6 shall be located as close together as possible. So shall Cameras No. 10 and 7 on the other side.

SUMMARY OF CAMERA LOCATIONS AND DESCRIPTIONS

Loc. No.	Location	Field of View	Lens Size	Frame Rate	Timing Speed	Ser No.	Impact Dist-X	Center-line Dist-Y	Camera Height
1	Overhead (Barrier)	Windshield styrofoam up to barrier-vehicle contact if possible	15mm	1400	99 HZ	M3	-1.0	0.0	12.0
2	Ground Based (Left)	Windshield	15mm	400	None	M8	3.8	13.5	5.2
3	Pit	Engine underside and fuel pump	8mm	1000	100 HZ	7	3.5	0.0	-8.0
4	Ground Based (Left)	Views entire left side of vehicle	25mm	1400	104 HZ	M8	4.5	-28.0	4.0
5	Ground Based (Real Time)	Documentary	Zoom	24	N/A	N/A	5.0	-25.0	6.0
6	Ground Based (Left)	Driver dummy closeup	15mm	1000	100 HZ	8	4.0	-14.0	5.0
7	Ground Based (Right)	Passenger dummy closeup	25mm	1000	100 HZ	5	5.5	15.0	4.5
8	Pit	Fuel tank	8mm	1000	104 HZ	6	11.0	0.0	-8.0
9	Ground Based (Left)	Same view as Camera No. 6	15mm	1000	101 HZ	4	5.0	-14.0	5.0
10	Ground Based (Right)	Same view as Camera No. 7	25mm	1000	104 HZ	10	4.5	15.0	4.5
11	On Board	Driver Seatbelt Retractor	8mm	1000	100 HZ	12	9.0	-1.5	1.5
12	On Board	Passenger Seatbelt Retractor	8mm	1000	102 HZ	11	9.0	1.5	1.5
Note: All distances are in feet.									

APPENDIX A
PHOTOGRAPHS

000400

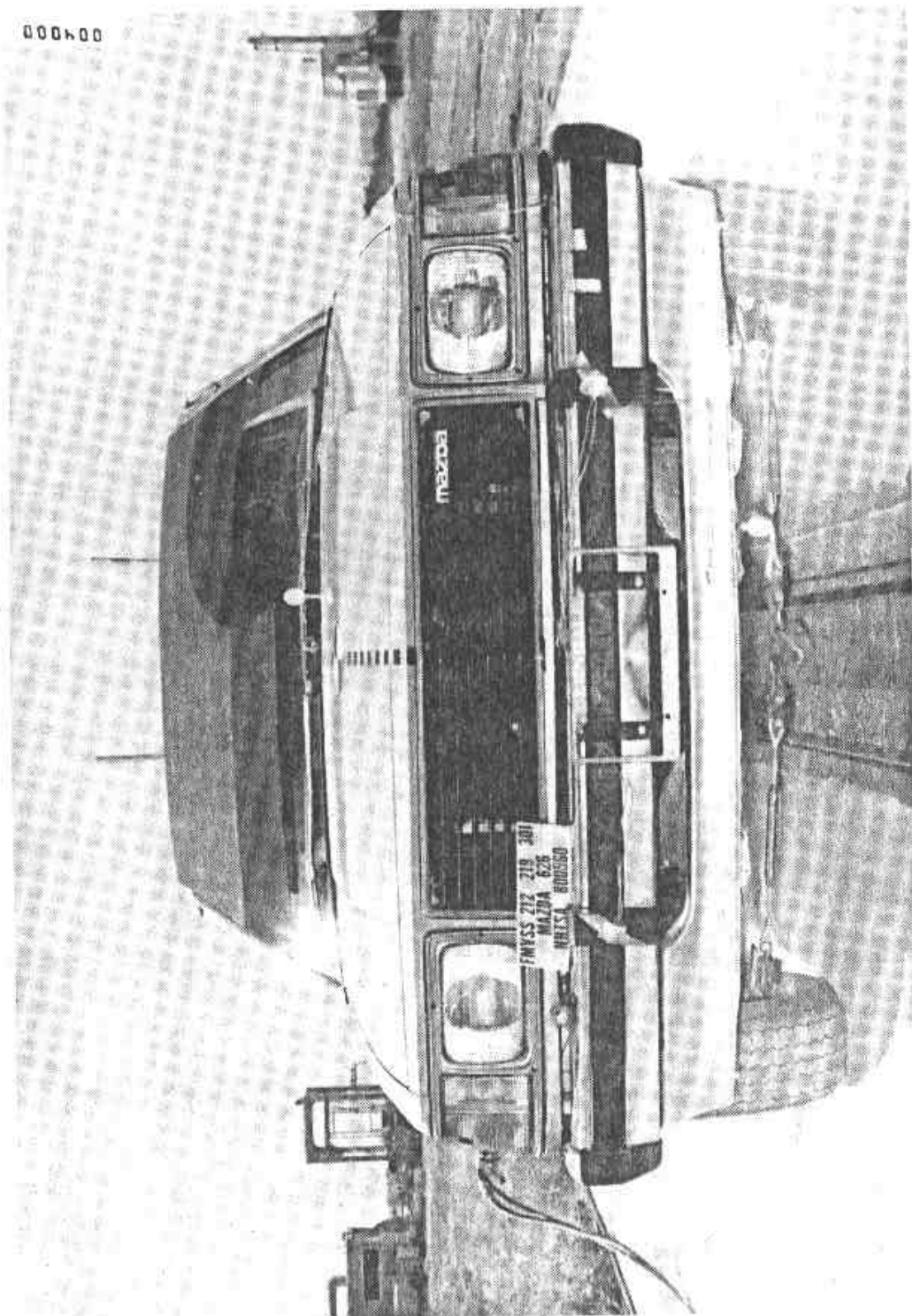


Figure A-1. Pre-test Front View - 1980 Mazda 626 - NHTSA 800560.

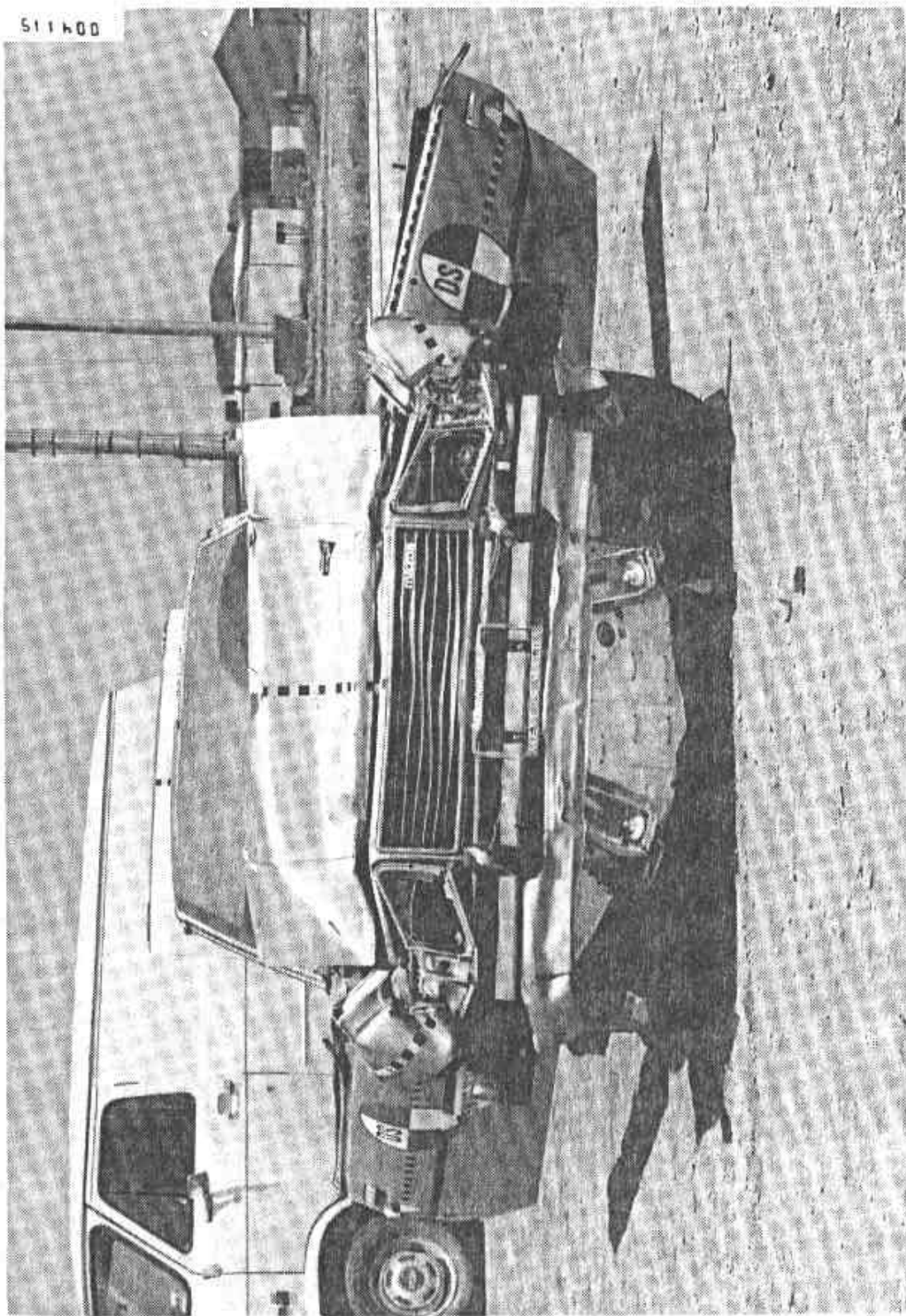


Figure A-2. Post-test Front View - 1980 Mazda 626 - NHTSA 800560.

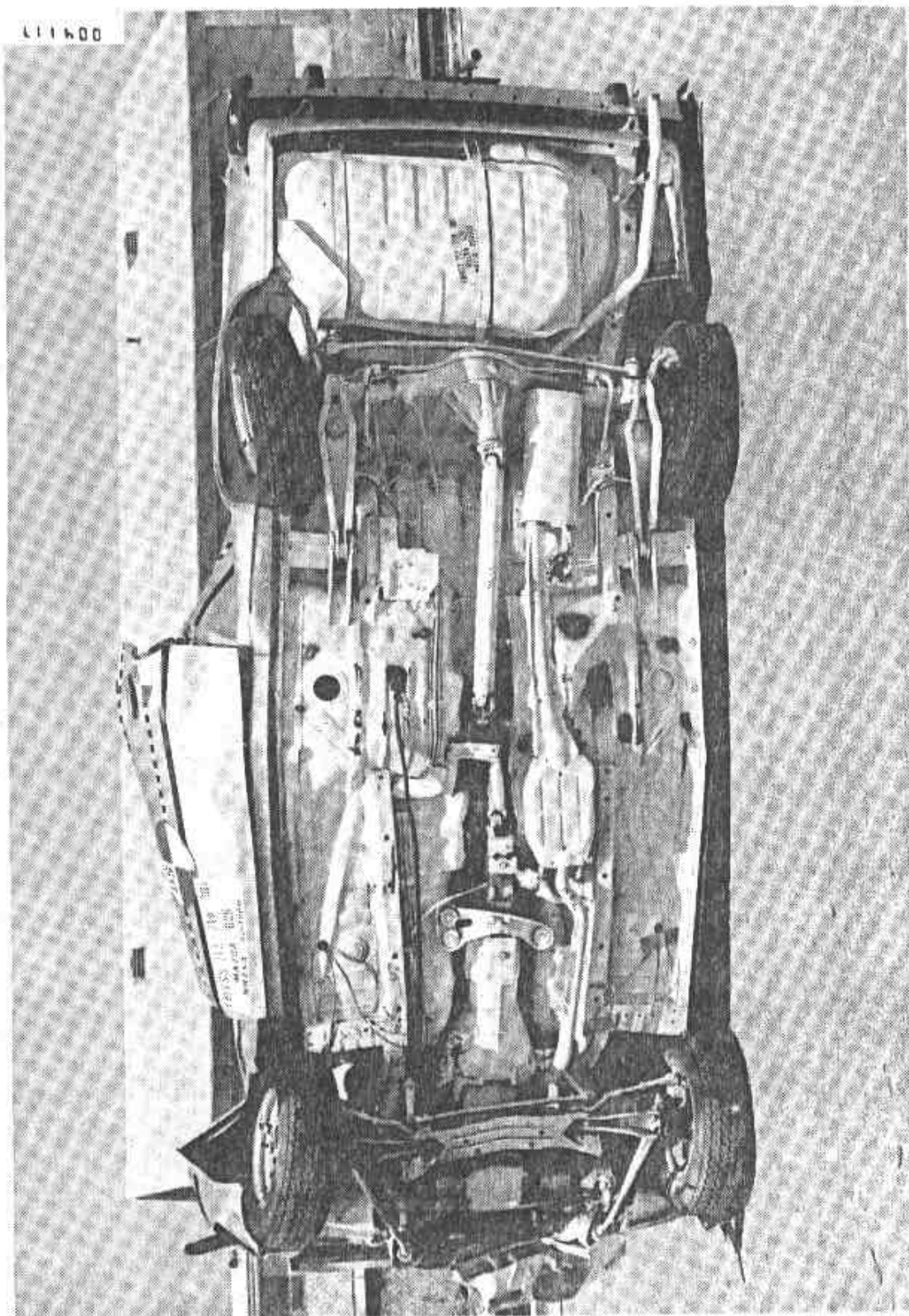


Figure A-3. Post-test Overall Underside View - 1980 Mazda 626 - NHTSA 800560.

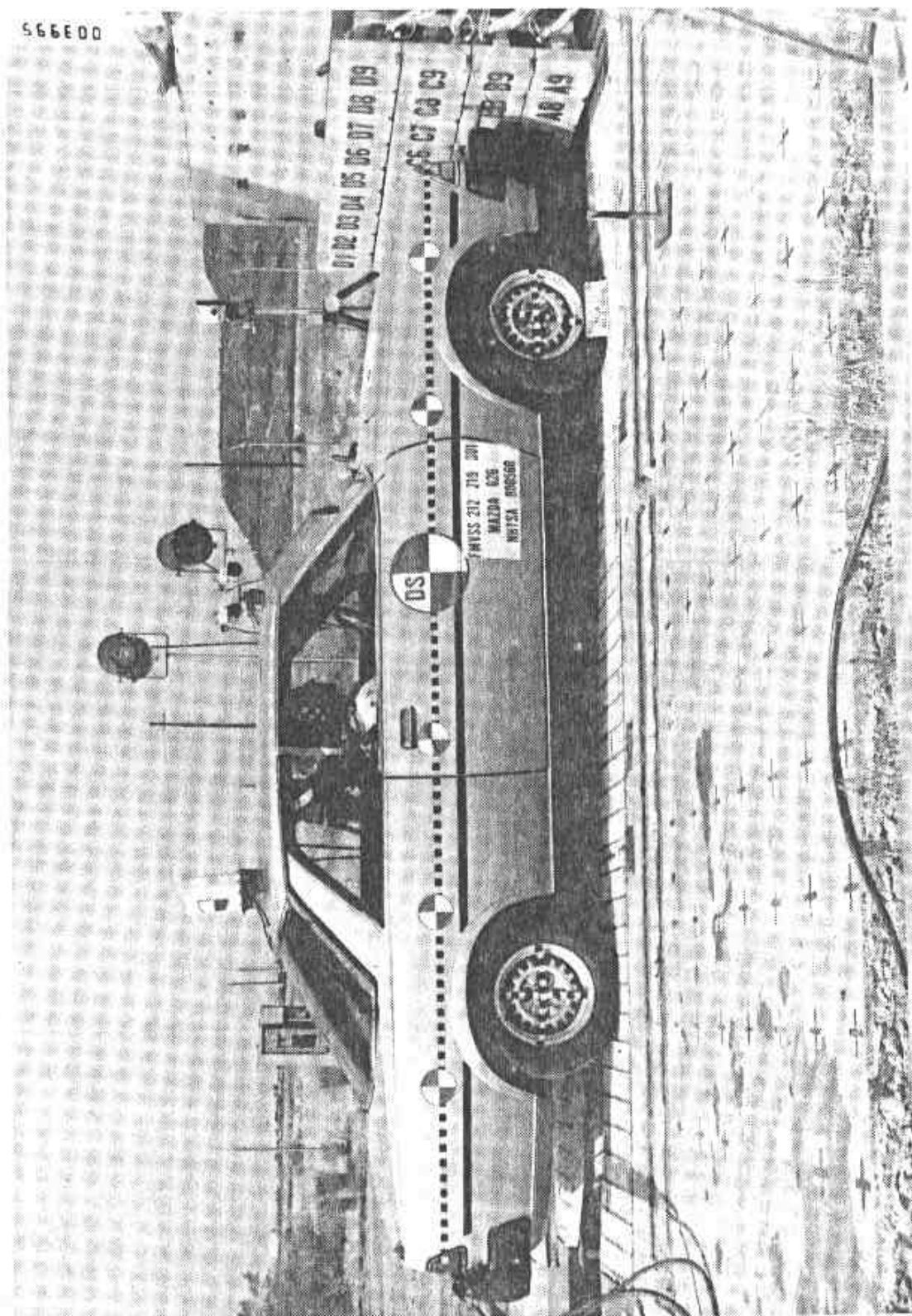


Figure A-4. Pre-test Side View - 1980 Mazda 626 - NHTSA 800560.

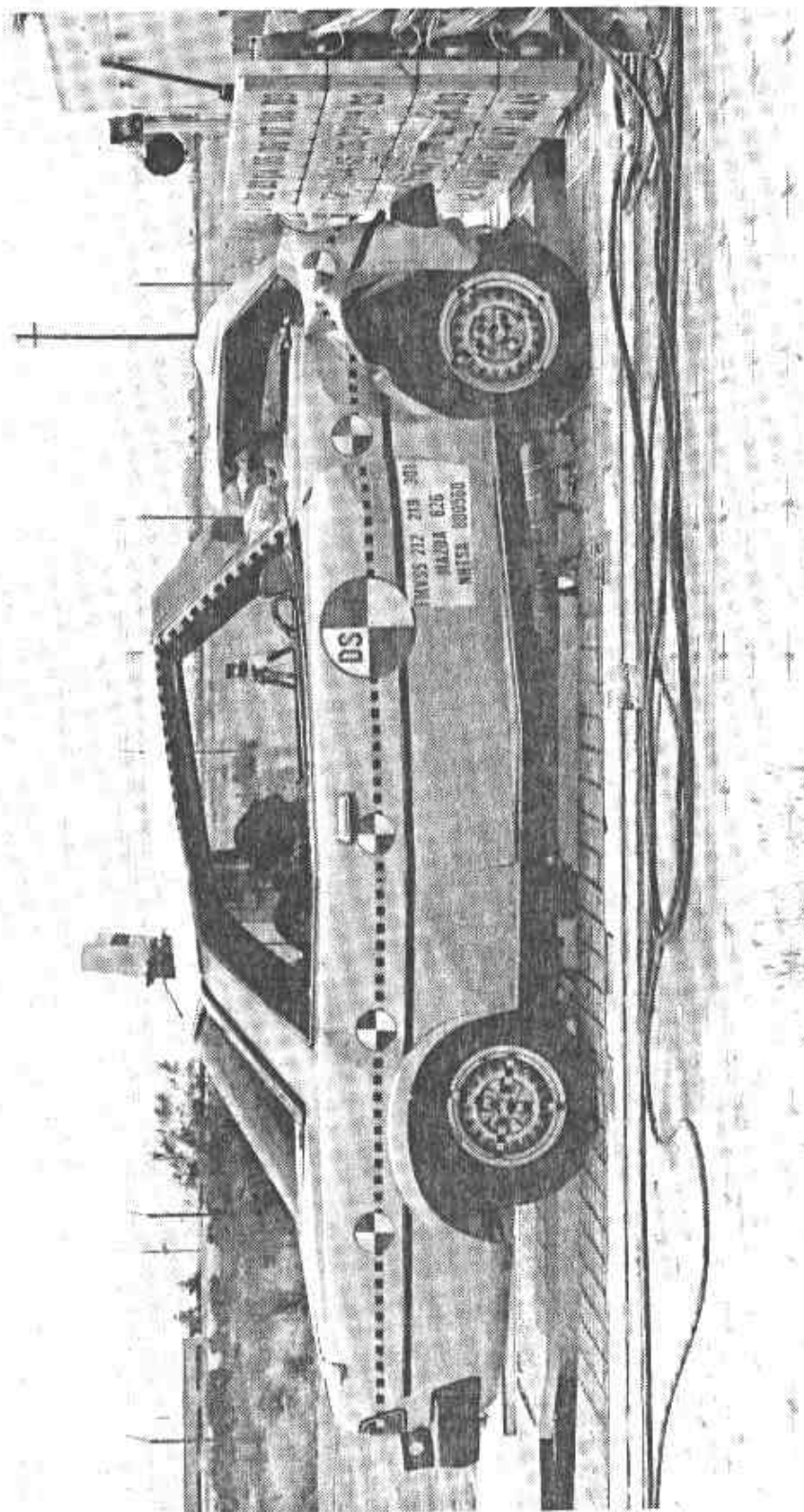


Figure A-5. Post-test Side View - 1980 Mazda 626 - NHTSA 800560.



Figure A-6. Pre-test Driver Dummy Position - 1980 Mazda 626 - NHTSA 800560.

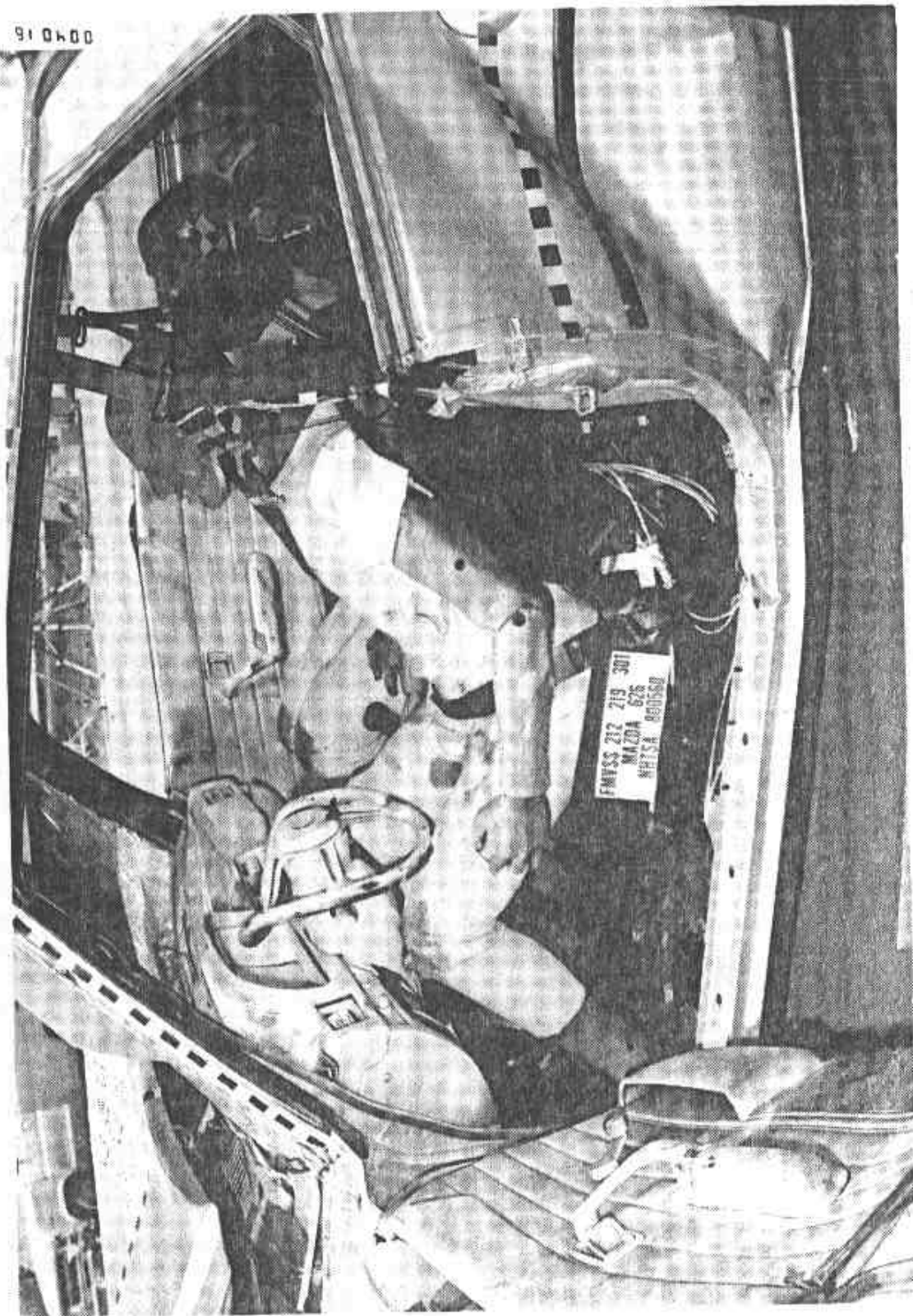


Figure A-7. Post-test Driver Dummy Position - 1980 Mazda 626 - NHTSA 800560.

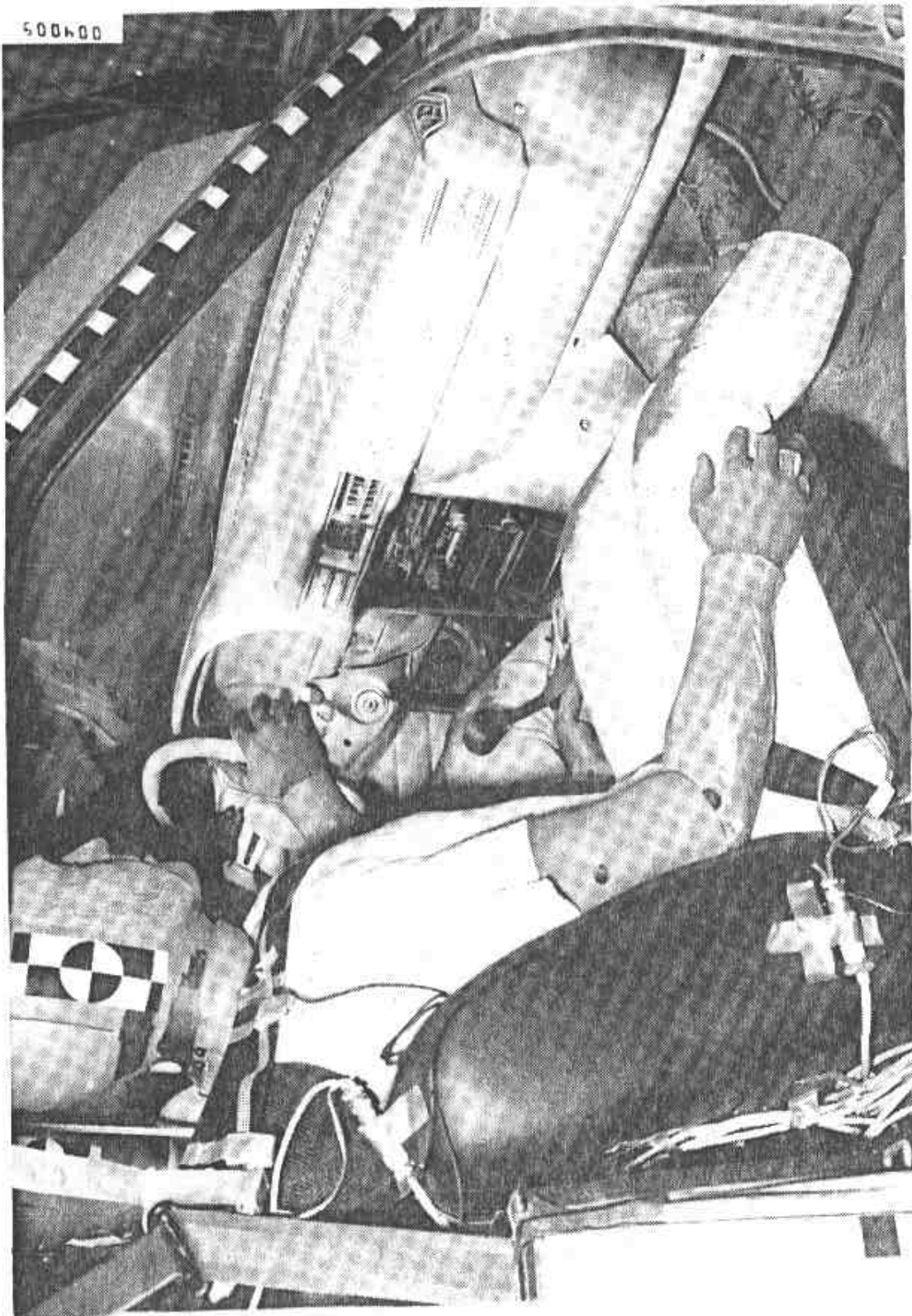


Figure A-8. Pre-test Passenger Position - 1980 Mazda 626 - NHTSA 800560.



Figure A-9. Post-test Passenger Position - 1980 Mazda 626 - NHTSA 800560.



Figure A-10. Post-test Vehicle Interior Deformation - 1980 Mazda 626 - NHTSA 800560.



Figure A-11. Post-test Vehicle Interior Deformation - 1980 Mazda 626 - NHTSA 800560.



Figure A-12. Pre-test View of Driver Torso Belt - 1980 Mazda 626 -
NHTSA 800560.

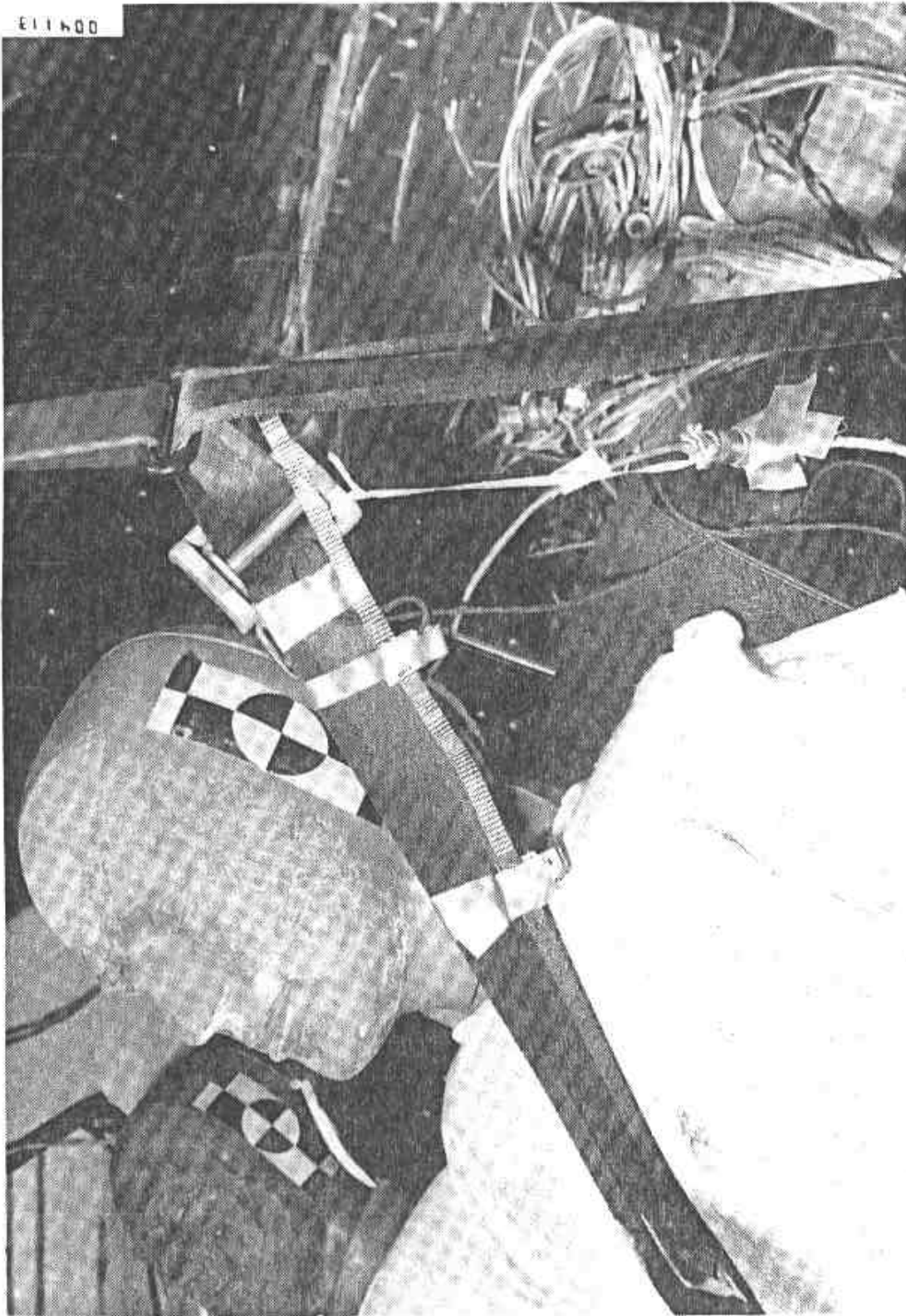


Figure A-13. Post-test View of Driver Torso Belt - 1980 Mazda 626 -
NHTSA 800560.

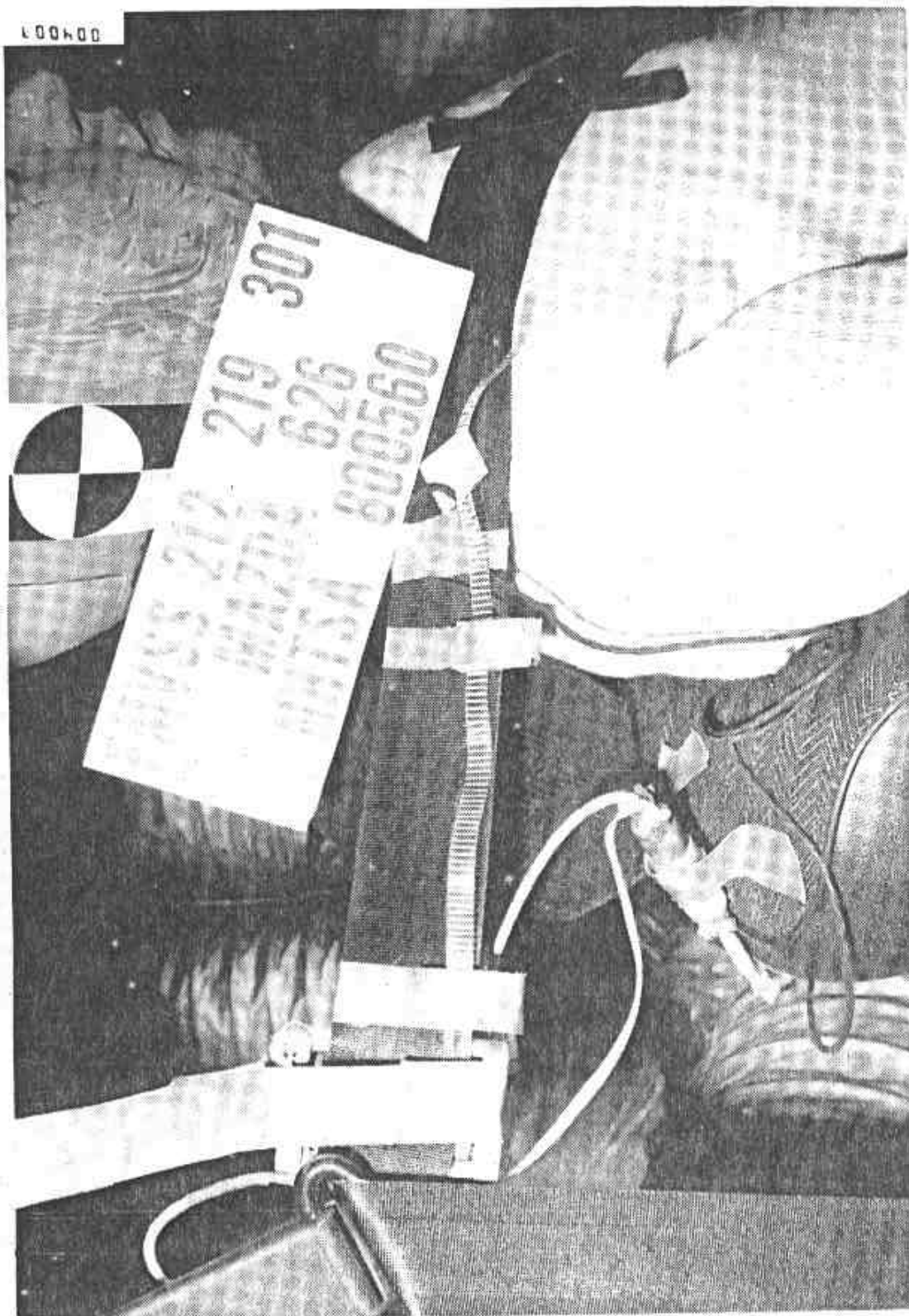


Figure A-14. Pre-test View of Passenger Torso Belt - 1980 Mazda 626 -
NHTSA 800560..

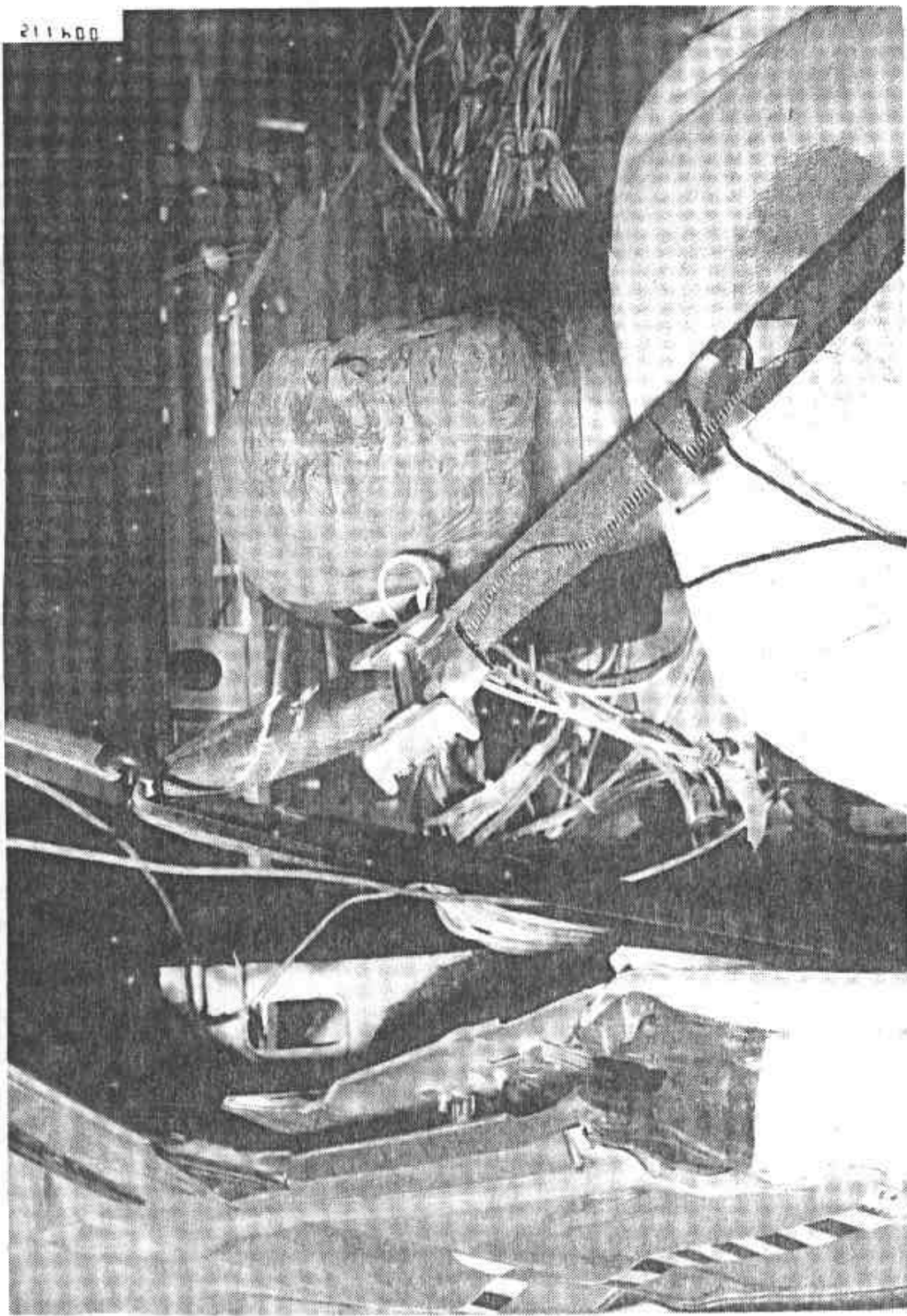


Figure A-15. Post-test View of Passenger Torso Belt - 1980 Mazda 626 -
NHTSA 800560.

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*

<u>Driver</u>	<u>RF Outboard Passenger</u>	<u>Data Description</u>
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**

	<u>Location</u>
Loc 1	Front Seat Area Acceleration (G)
Loc 2	Rear Seat Area Acceleration (G)

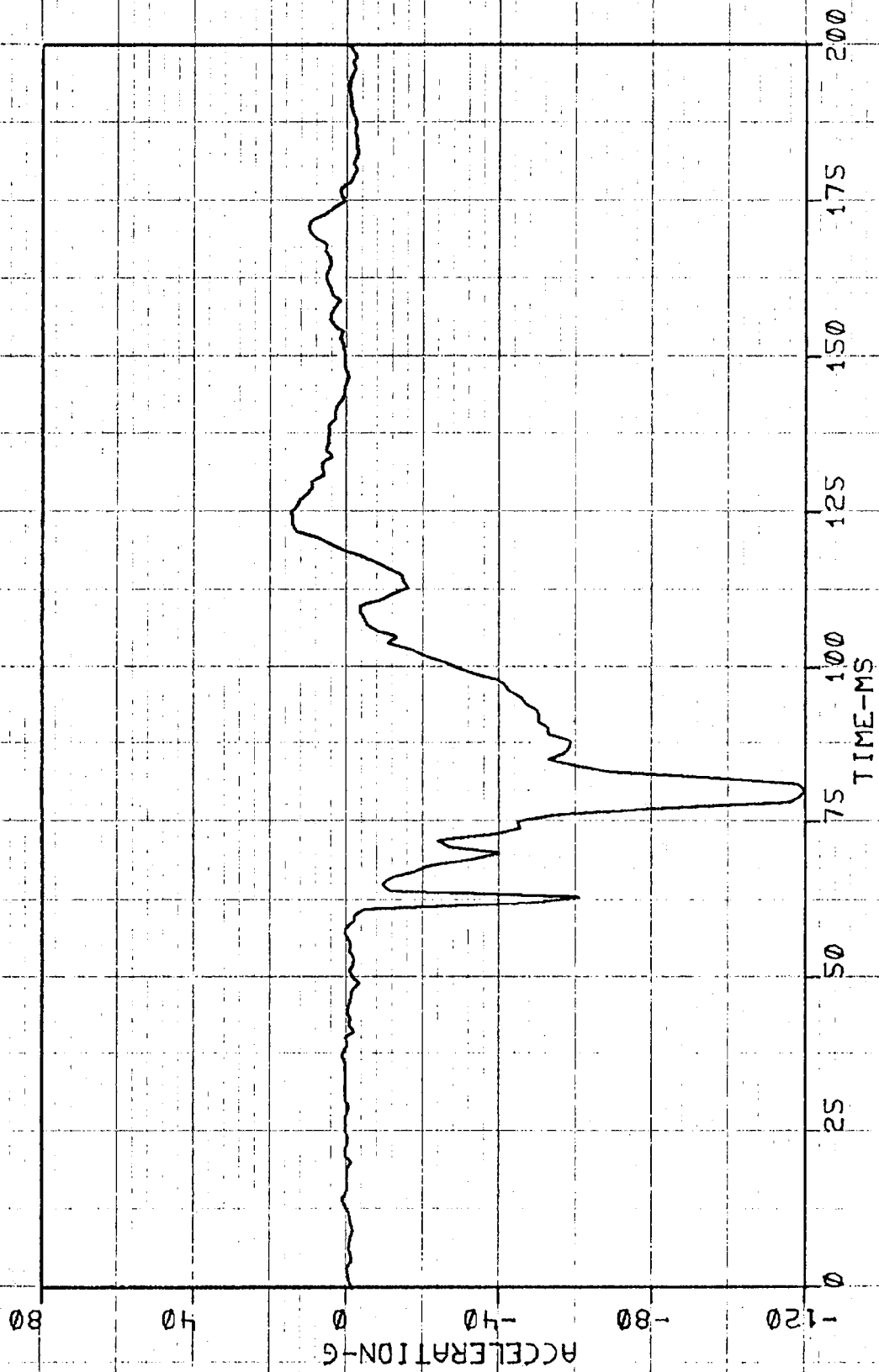
*Dummy Injury Summary presented on pages 4-4 and 4-5.

**Vehicle accelerometer location and data summarized on page 4-10.

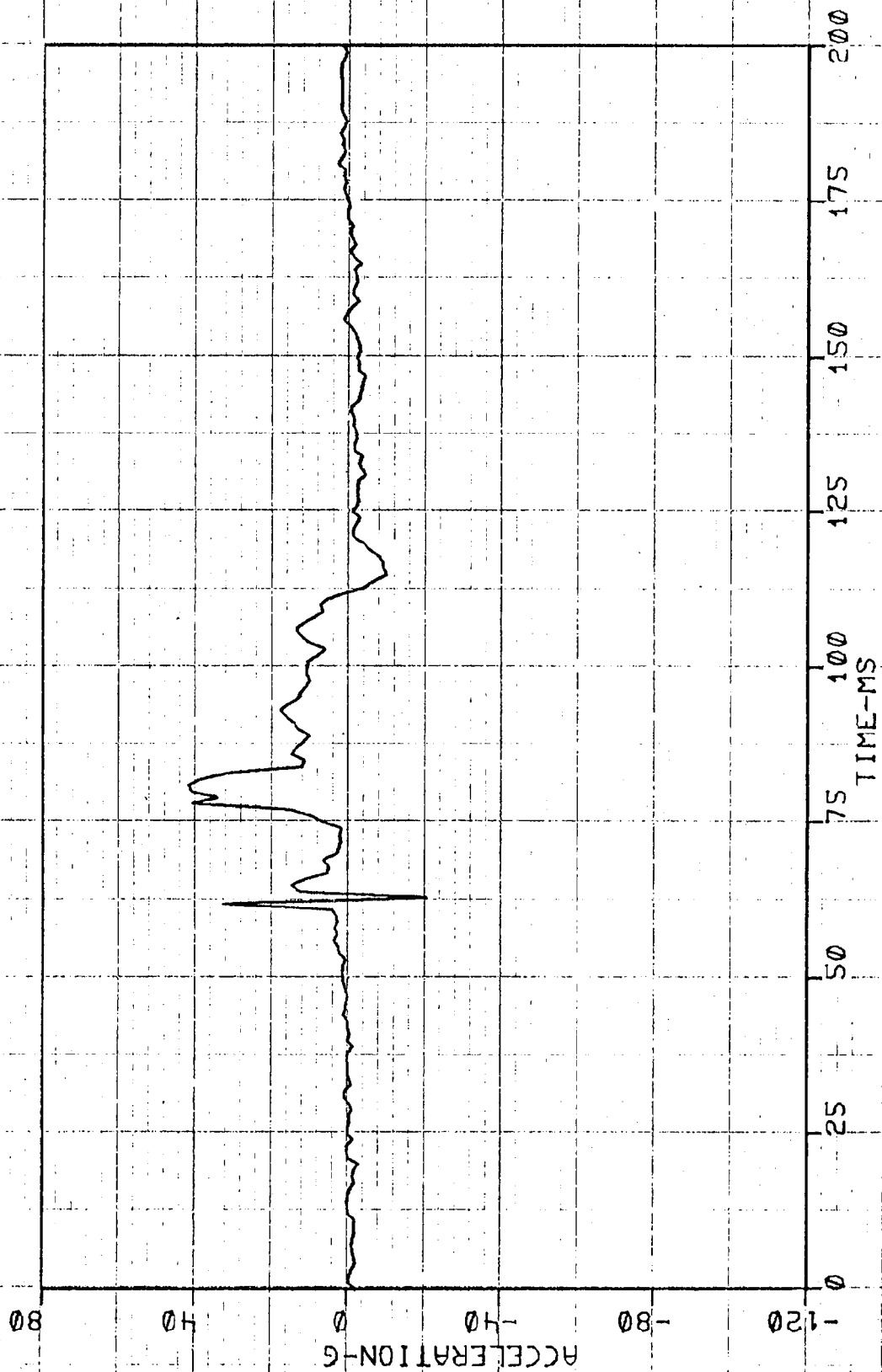
APPENDIX B (CONTD)

Test Anomalies: None

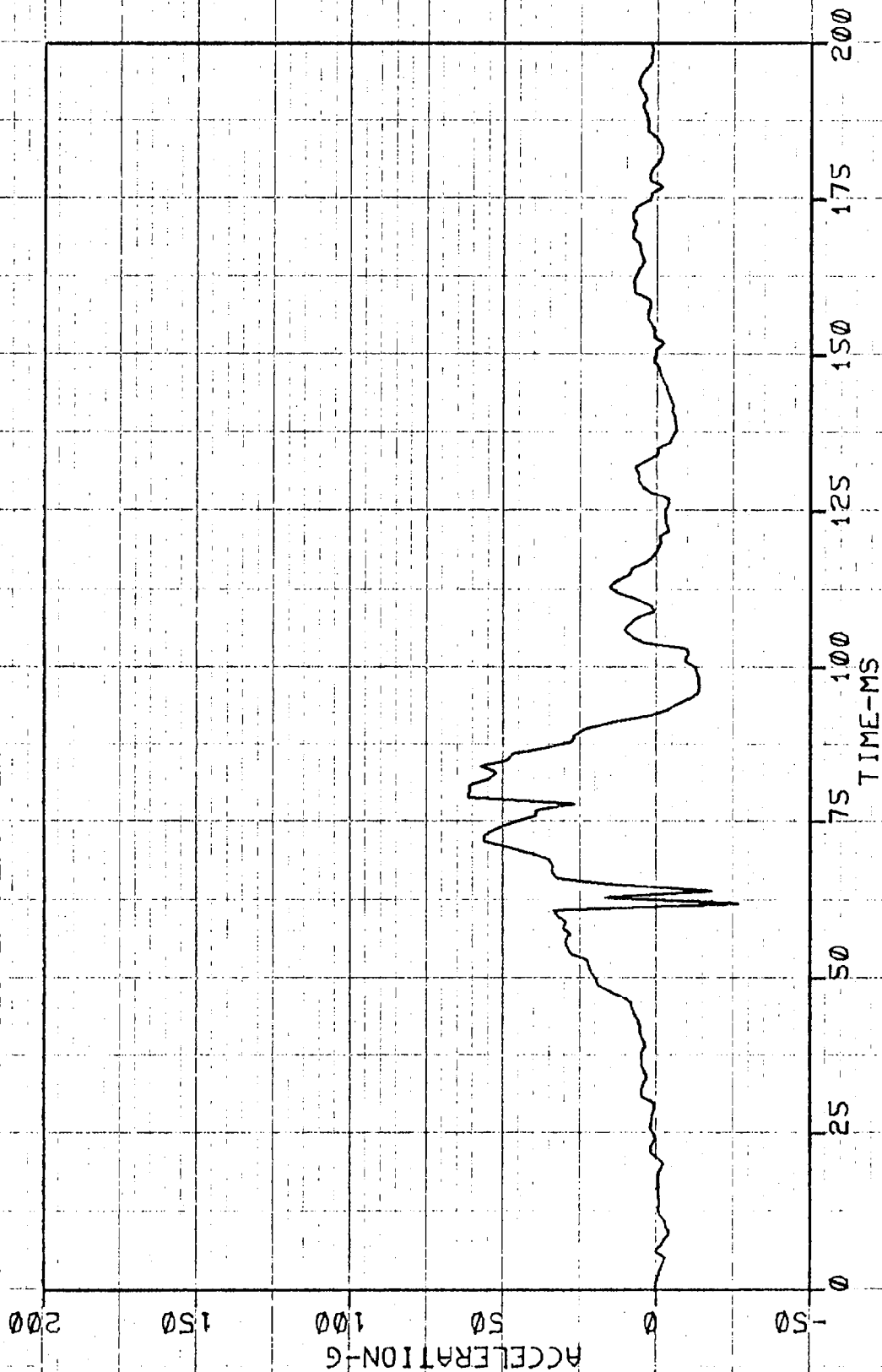
TEST#27 MAZDA 626 LF HEAD LONG



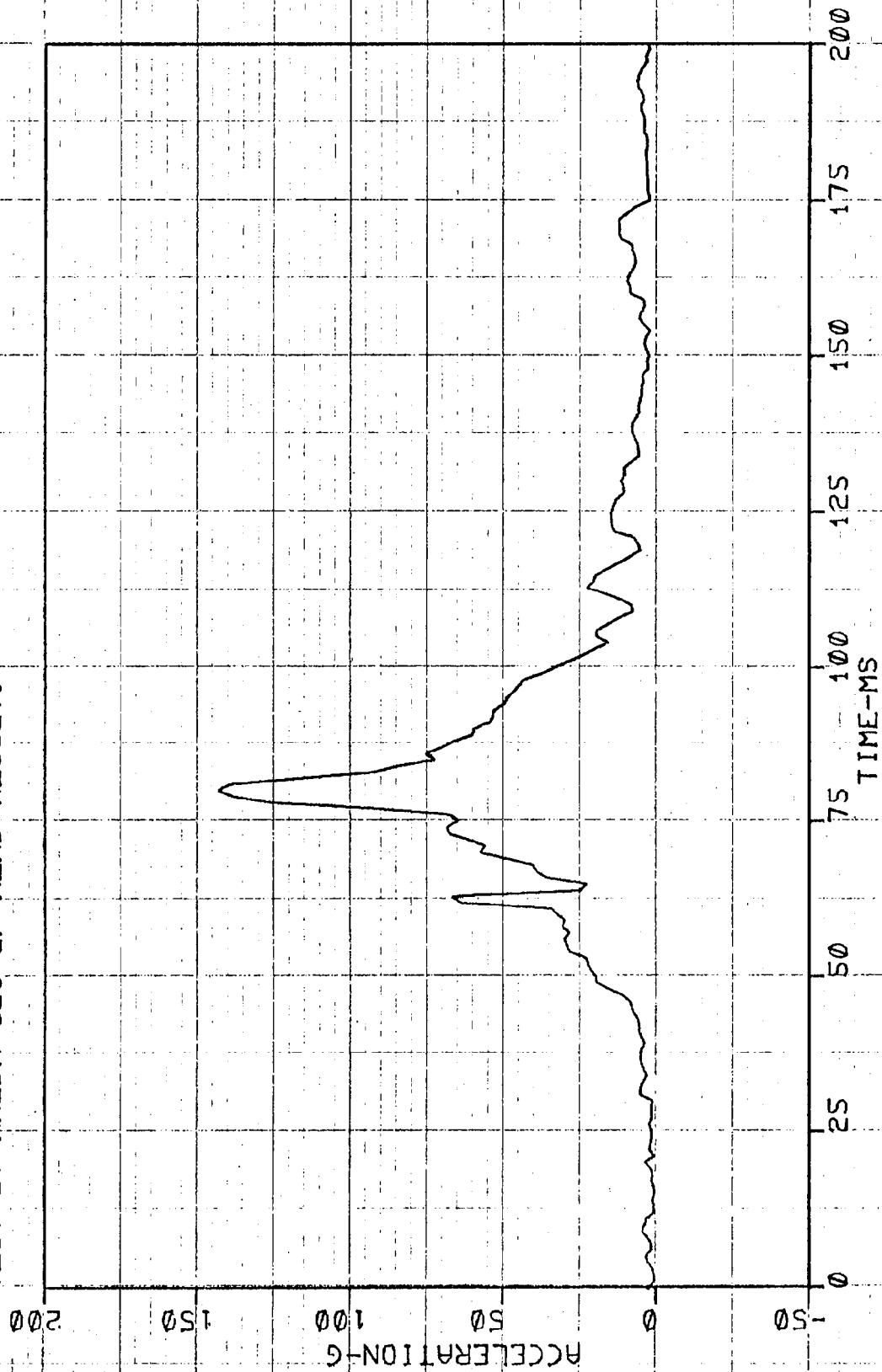
TEST#27 MAZDA 626 LF HEAD LAT



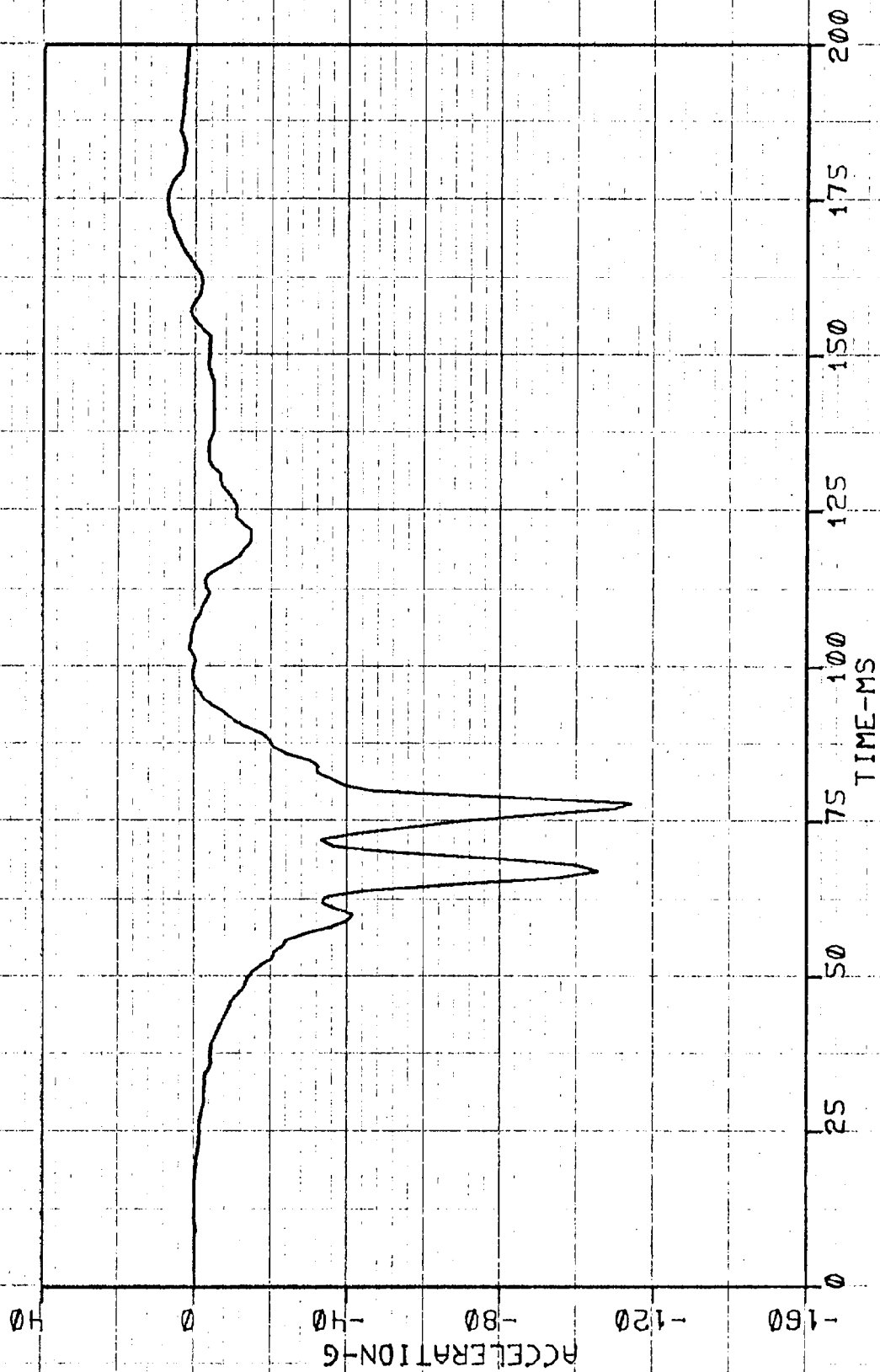
TEST#27 MAZDA 626 LF HEAD VERT



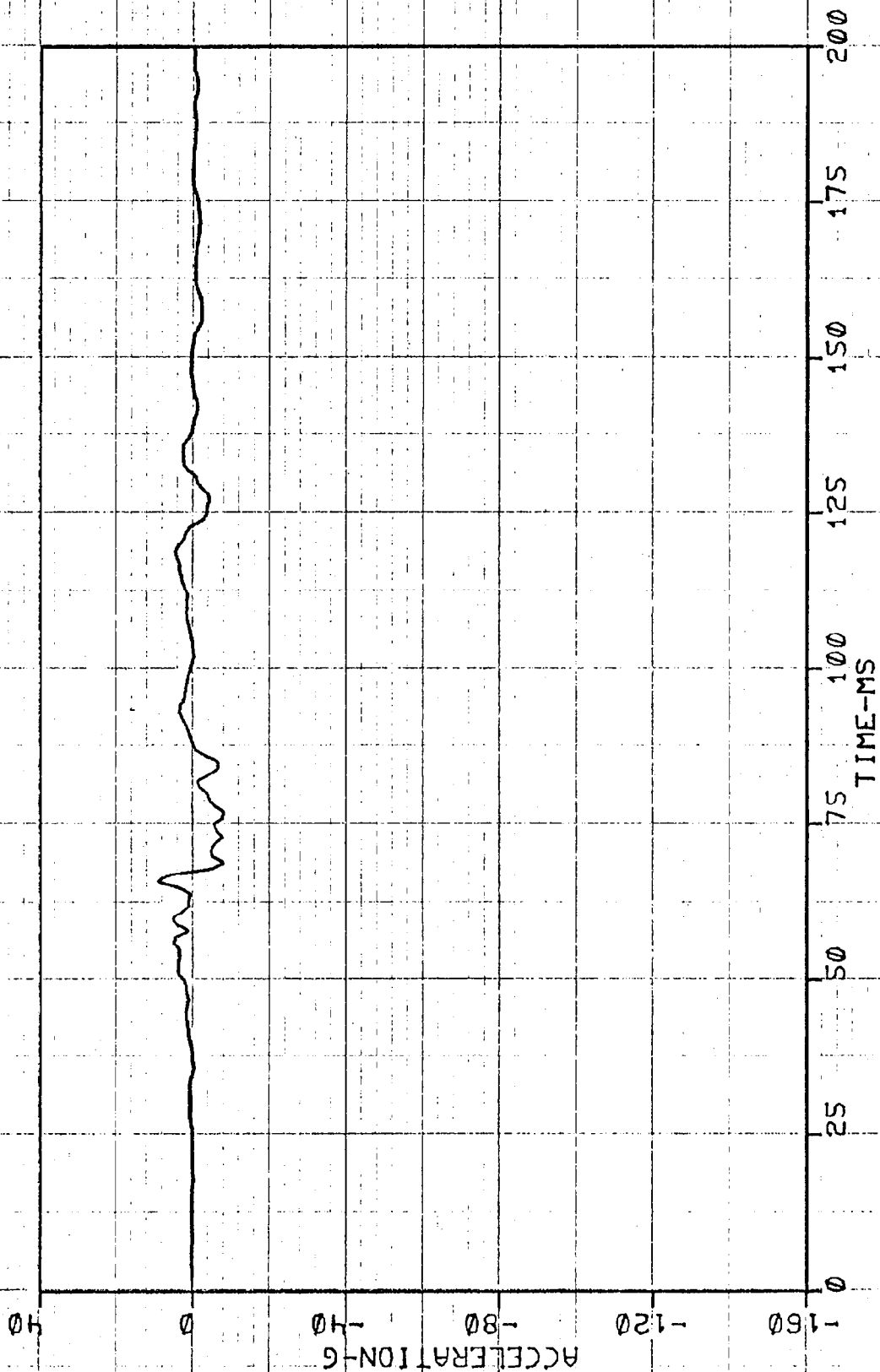
TEST#27 MAZDA 626 LF HEAD RESULT.



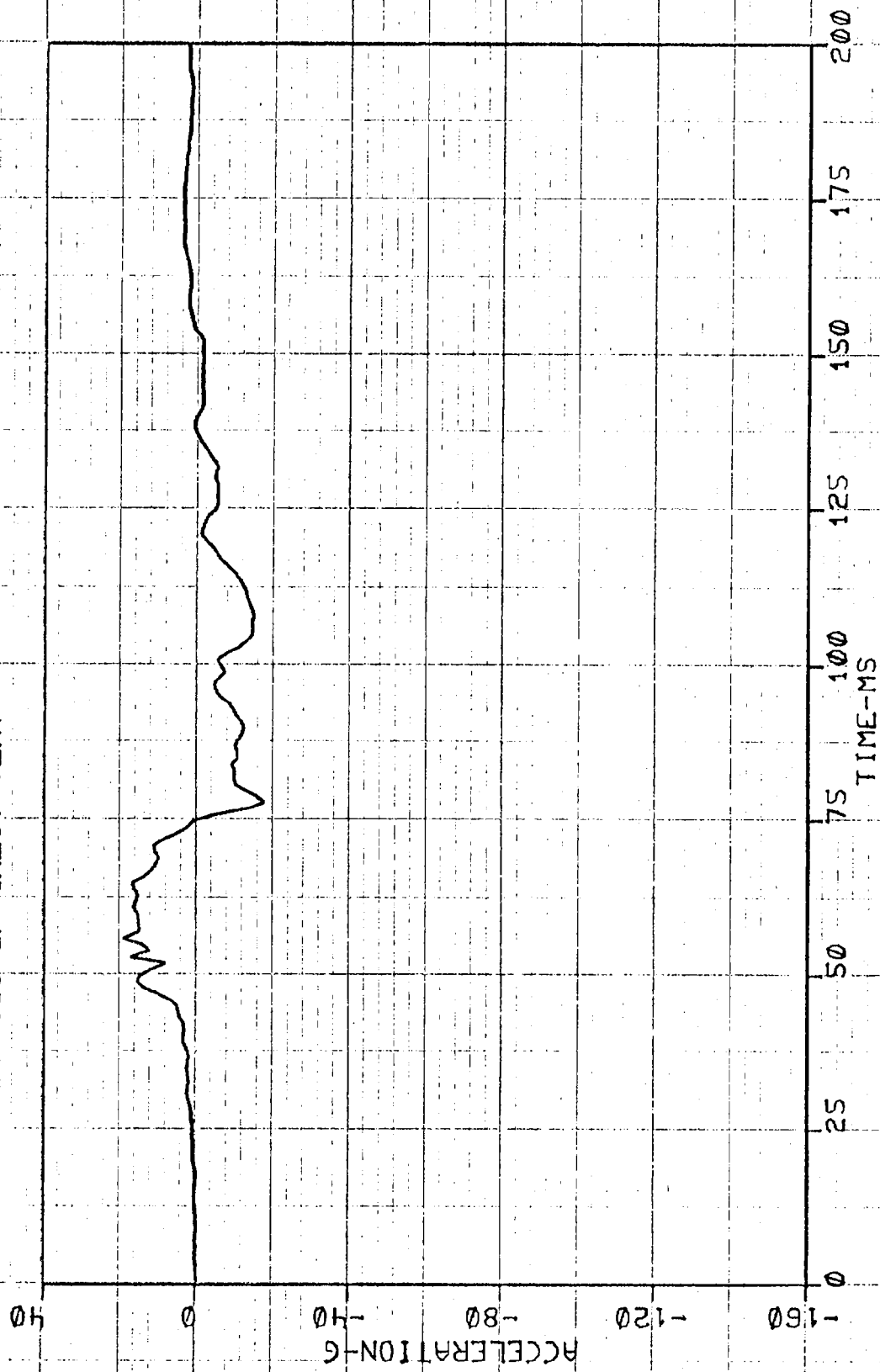
TEST#27 MAZDA 626 LF CHEST LONG



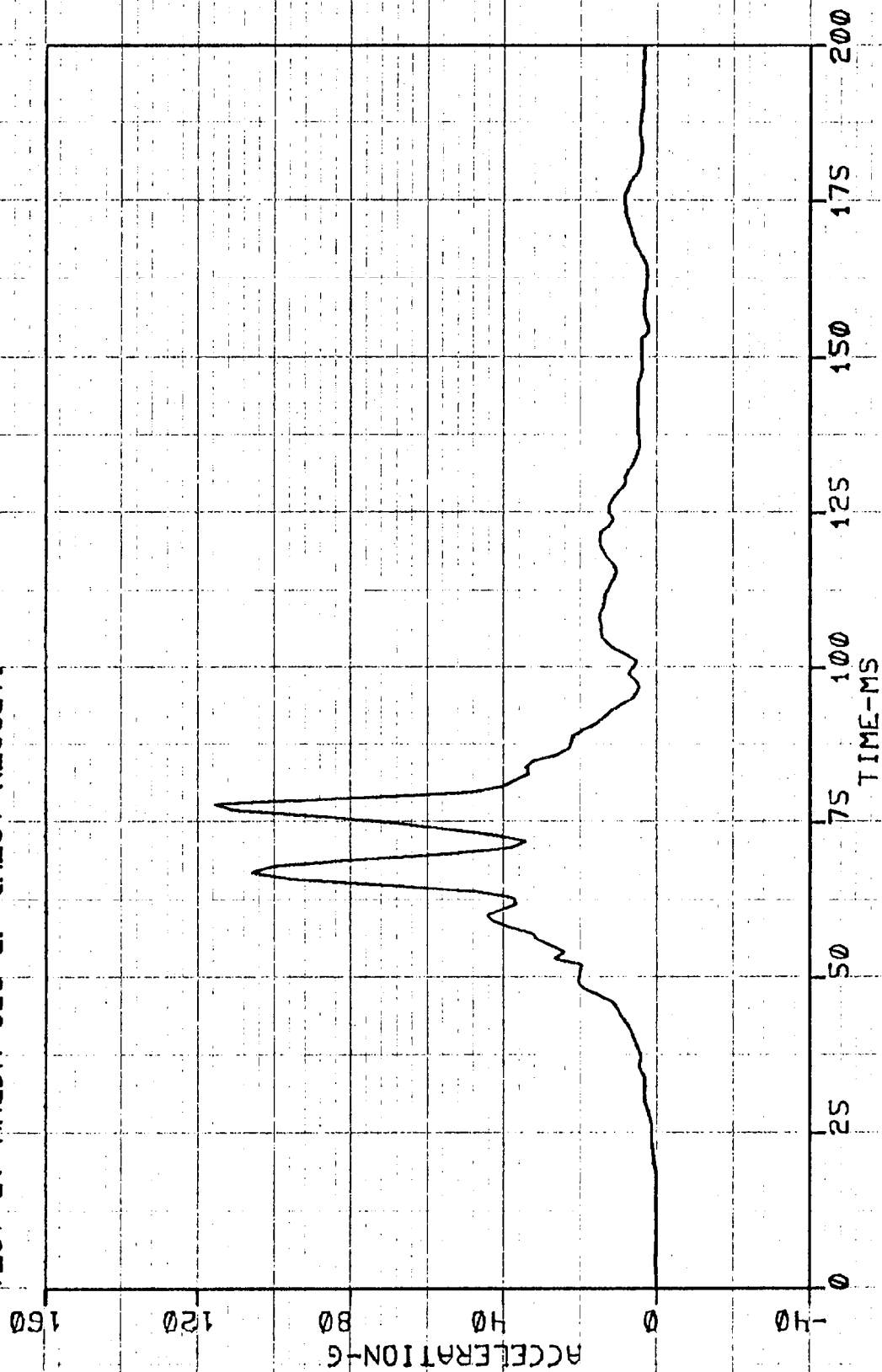
TEST#27 MAZDA 626 LF CHEST LAT



TEST#27 MAZDA 626 LF CHEST VERT

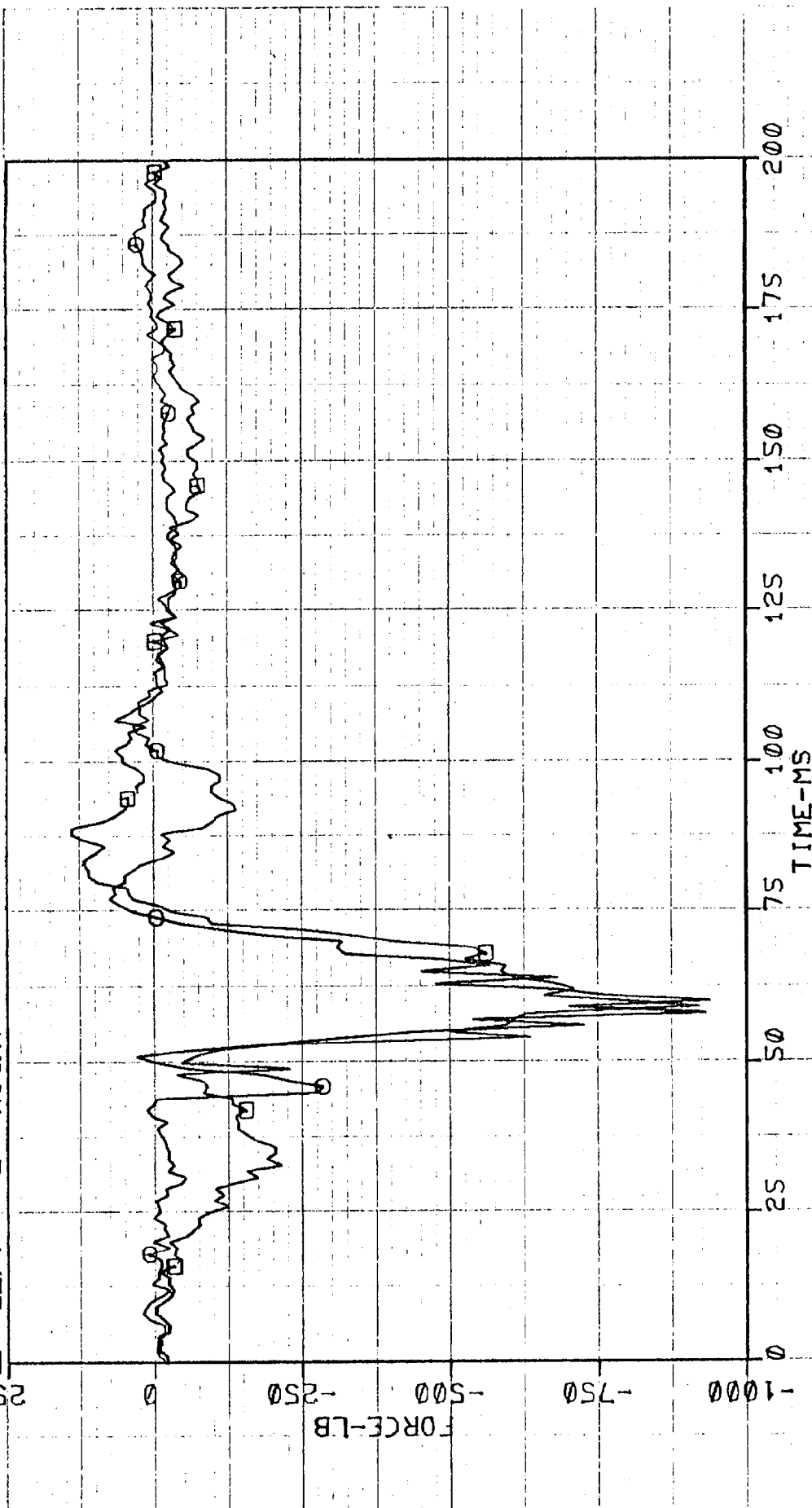


TEST#27 MAZDA 626 LF CHEST RESULT.



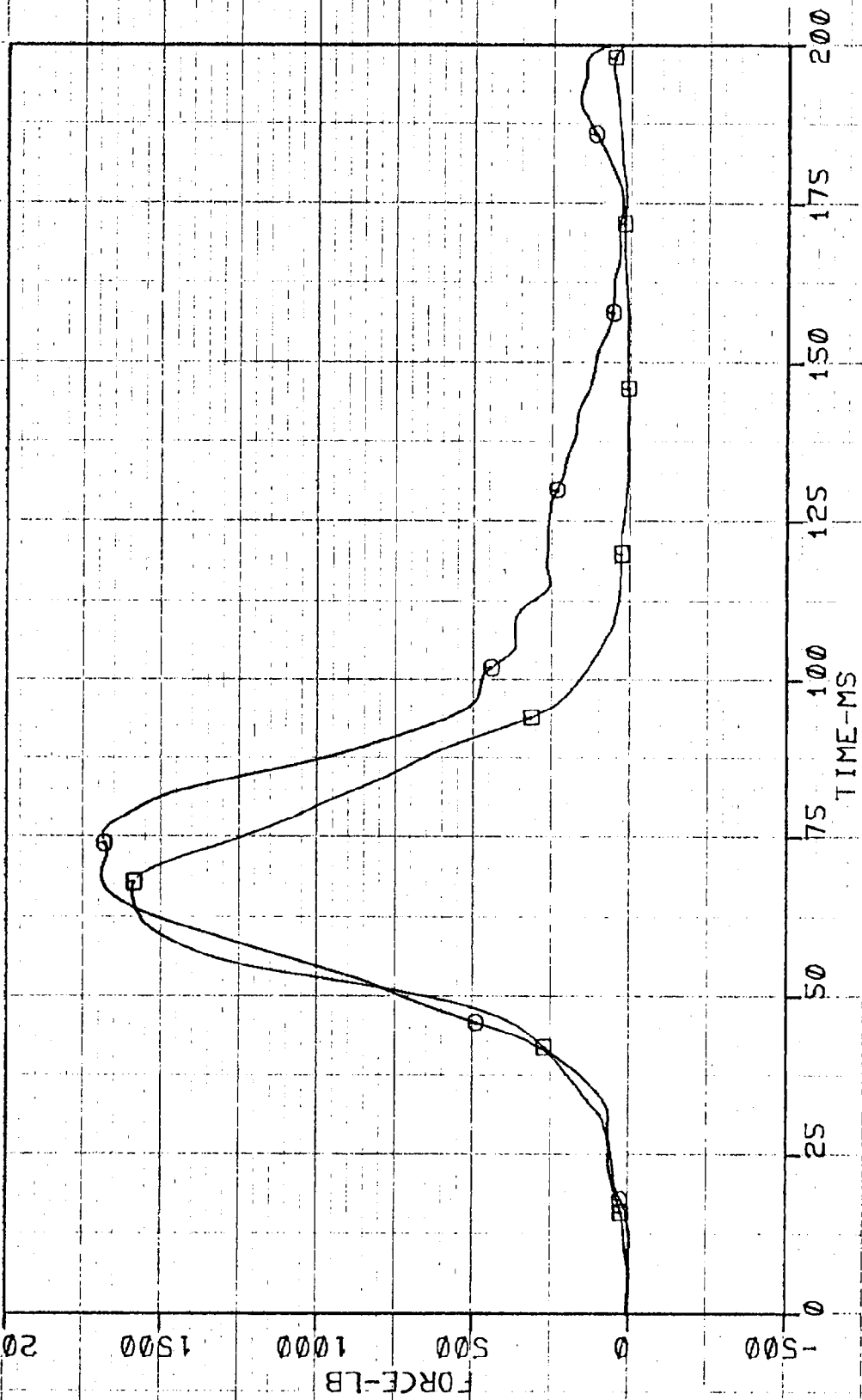
TEST#27 MAZDA 626 LF FEMURS

□ = LEFT ○ = RIGHT

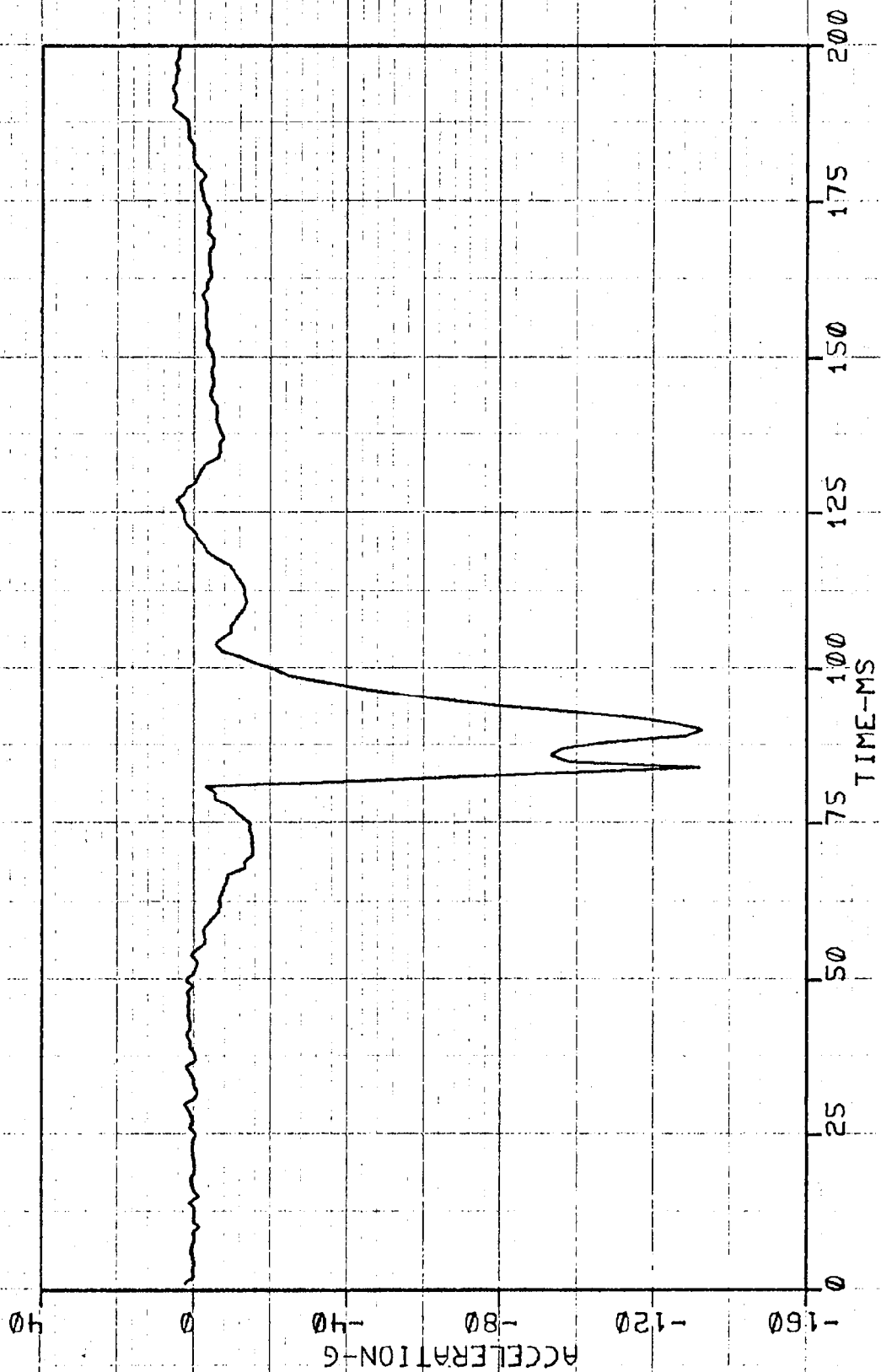


TEST#27 MAZDA 626 LF BELT LOADS

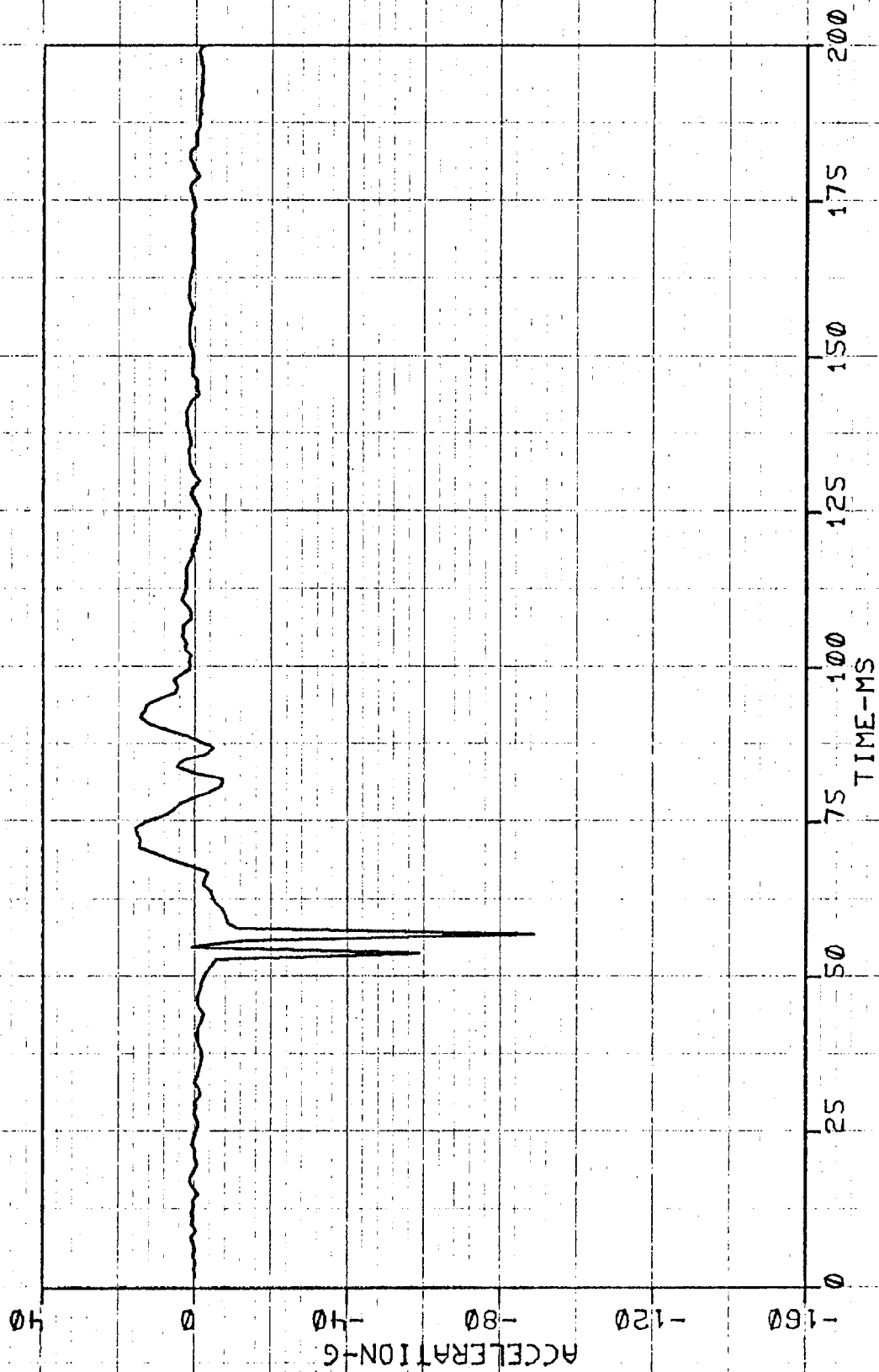
□=LAP BELT ○=TORSO



TEST#27 MAZDA 626 RF HEAD LONG



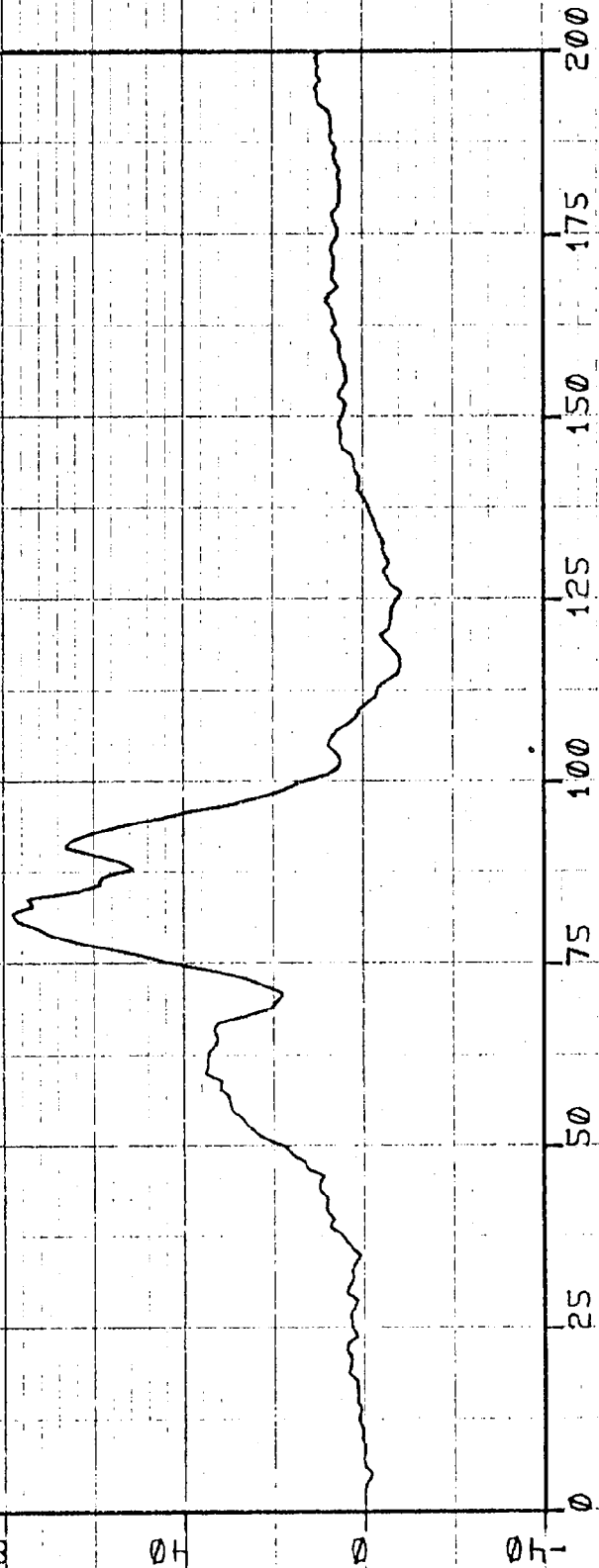
TEST#27 MAZDA 626 RF HEAD LAT



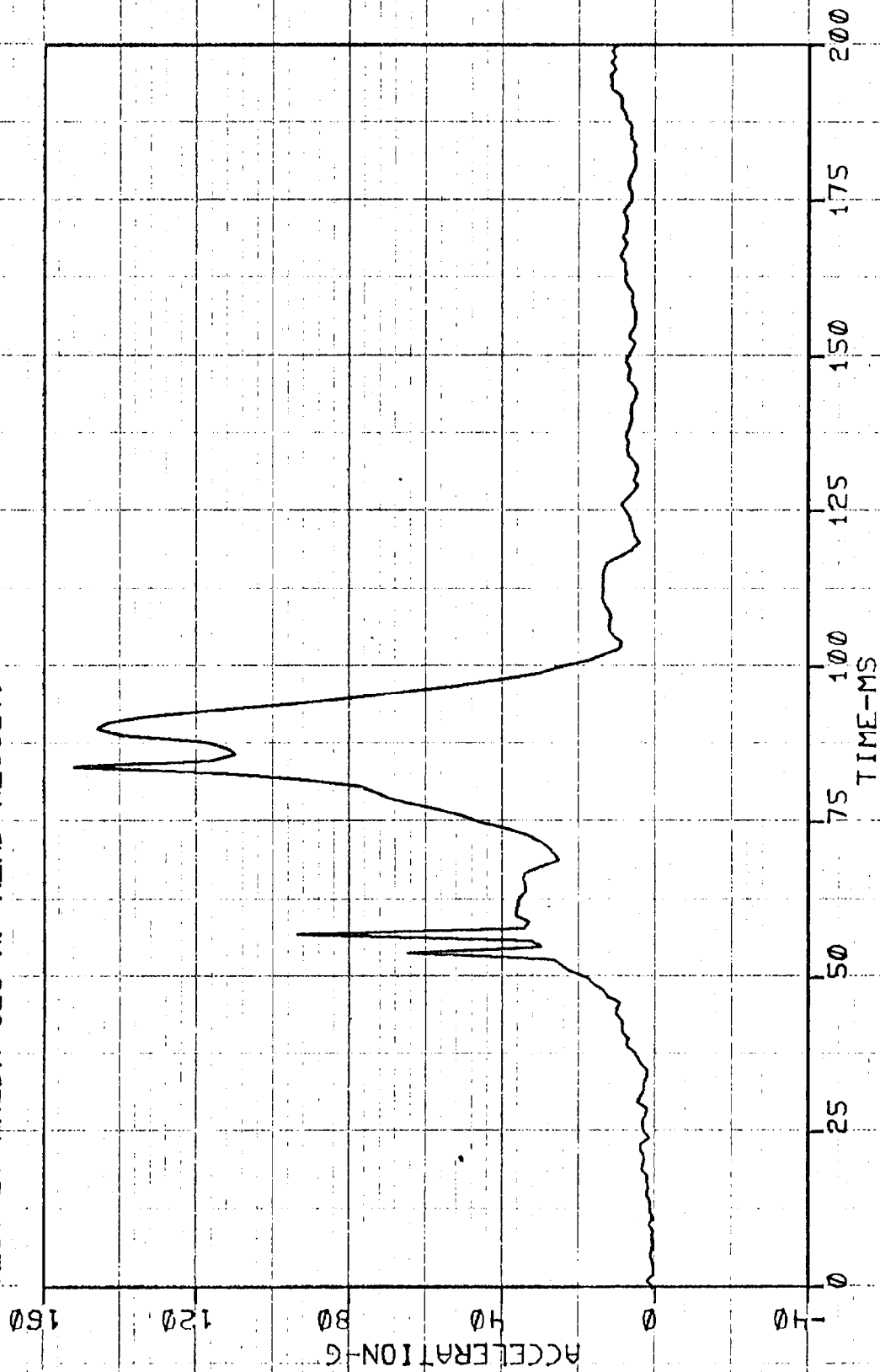
TEST#27 MAZDA 626 RF HEAD VERT

ACCELERATION-G

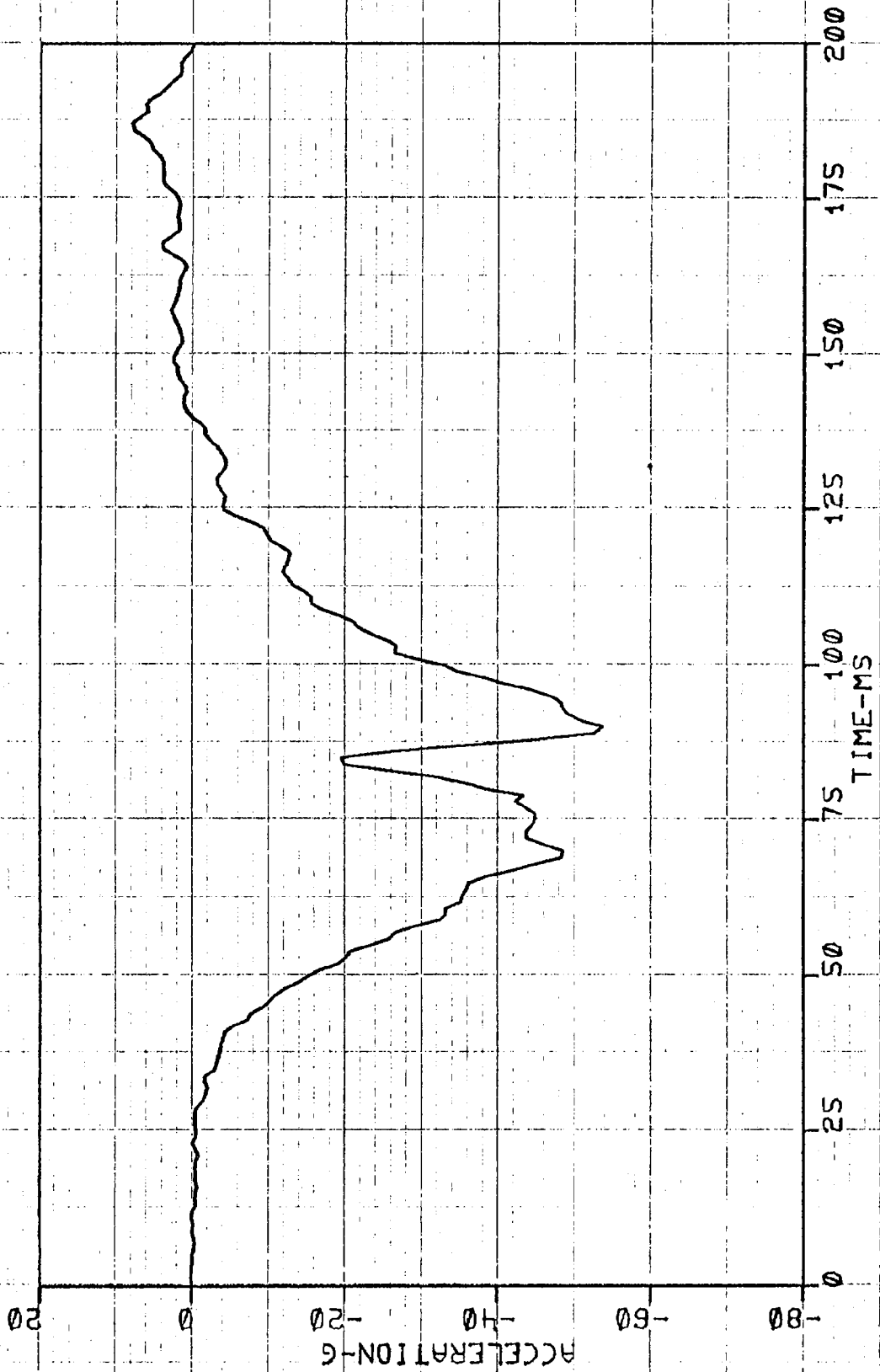
TIME-MS



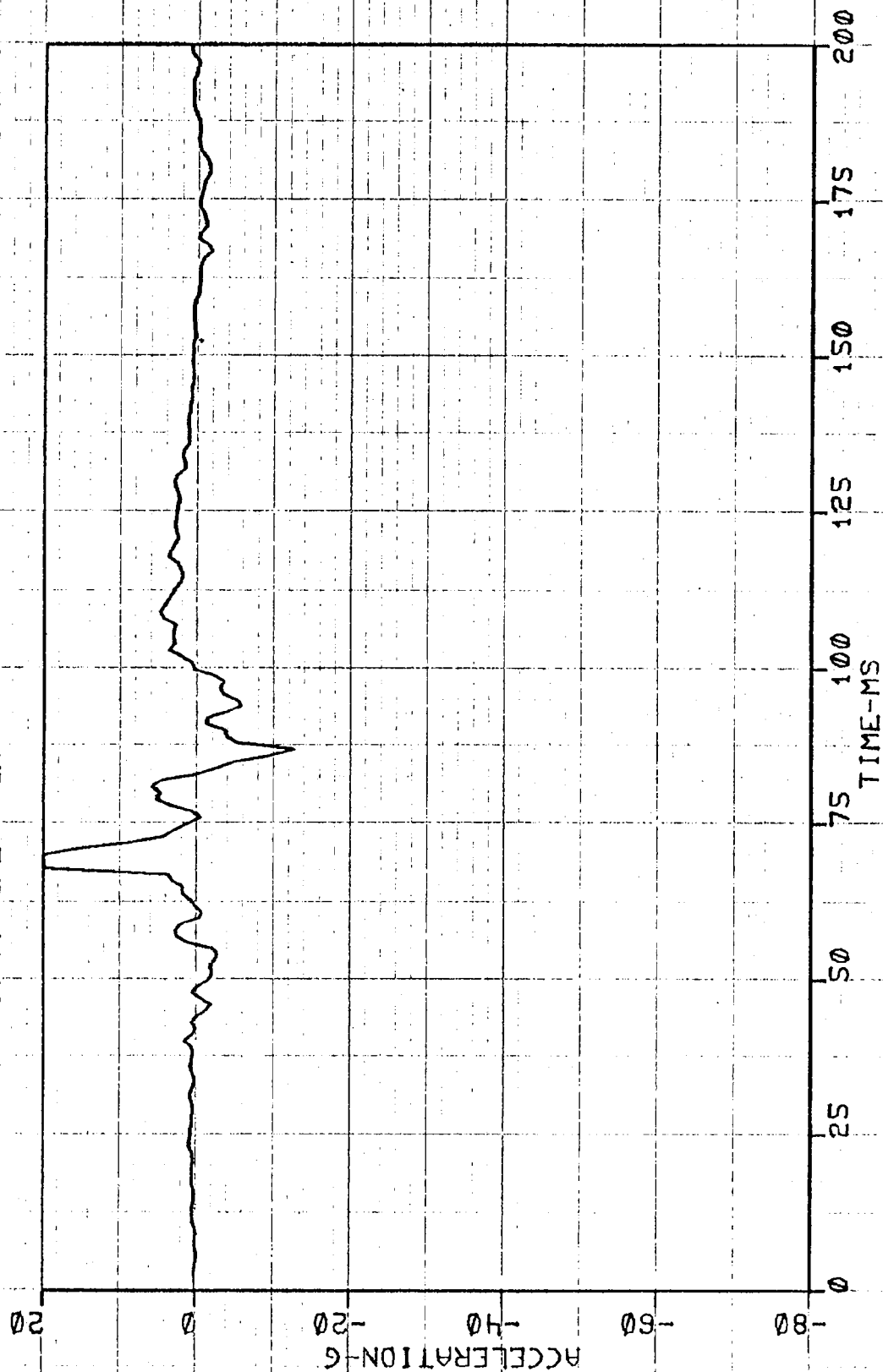
TEST#27 MAZDA 626 RF HEAD RESULT.



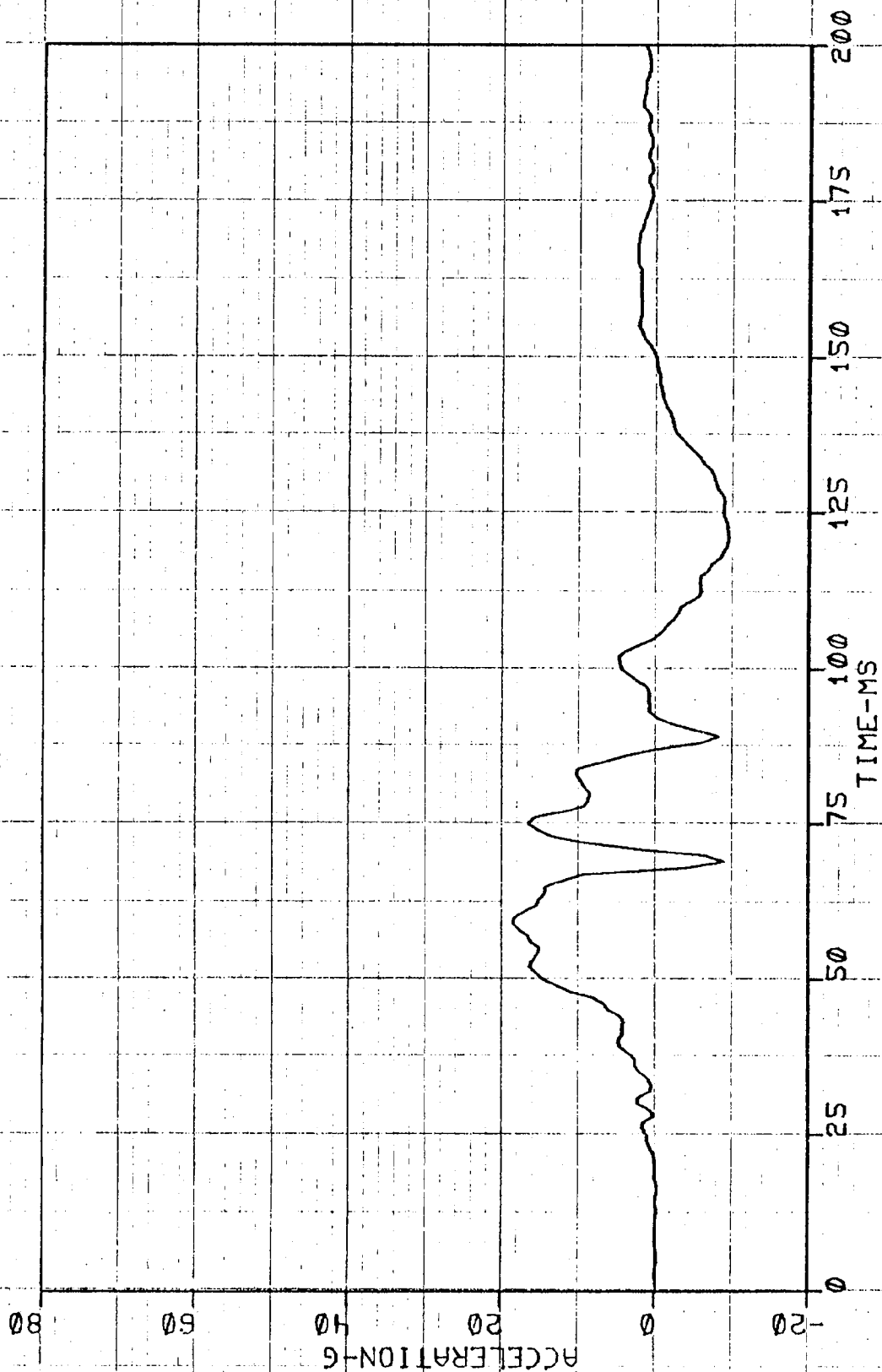
TEST#27 MAZDA 626 RF CHEST LONG



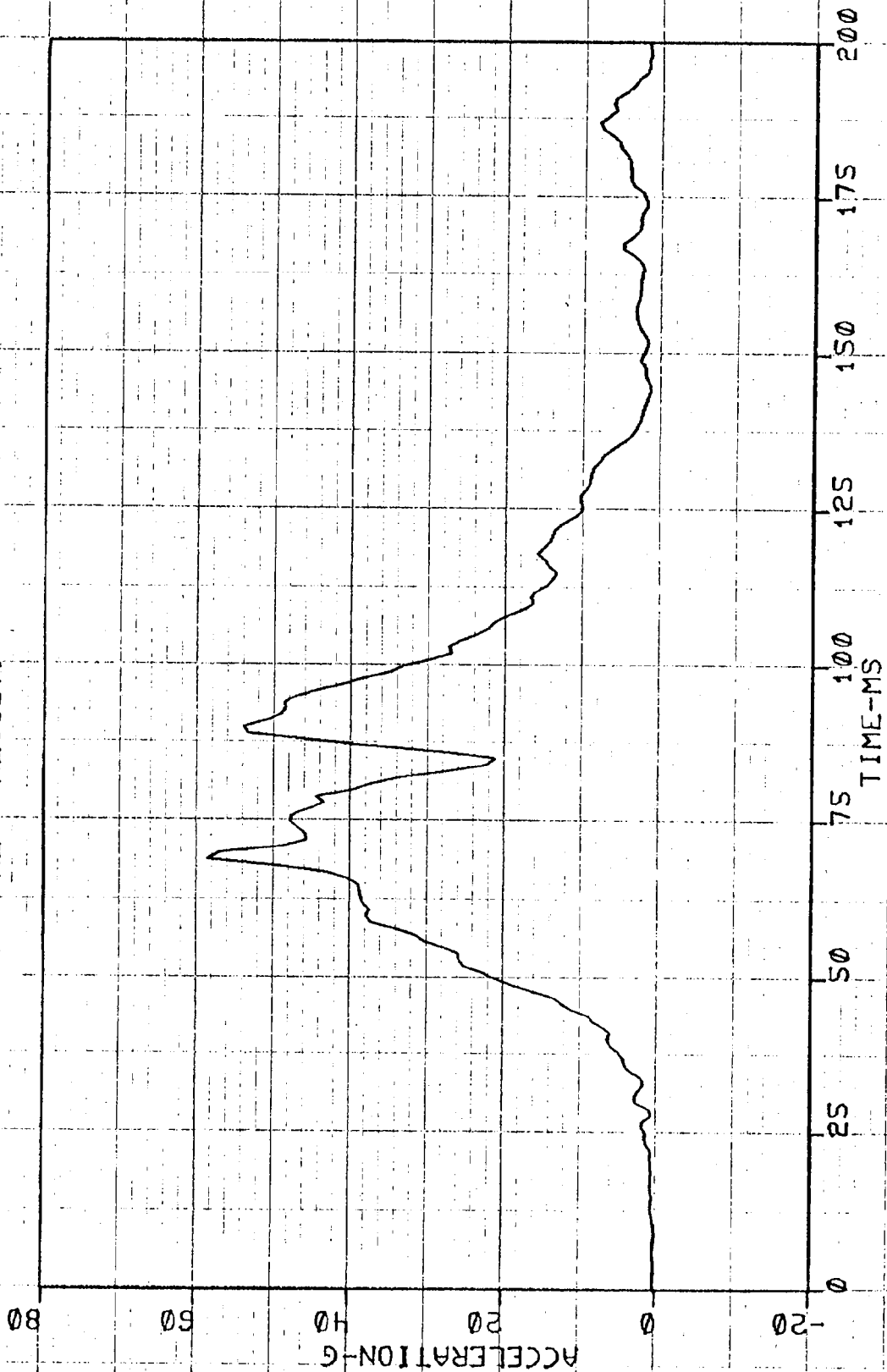
TEST#27 MAZDA 626 RF CHEST LAT



TEST#27 MAZDA 626 RF CHEST VERT



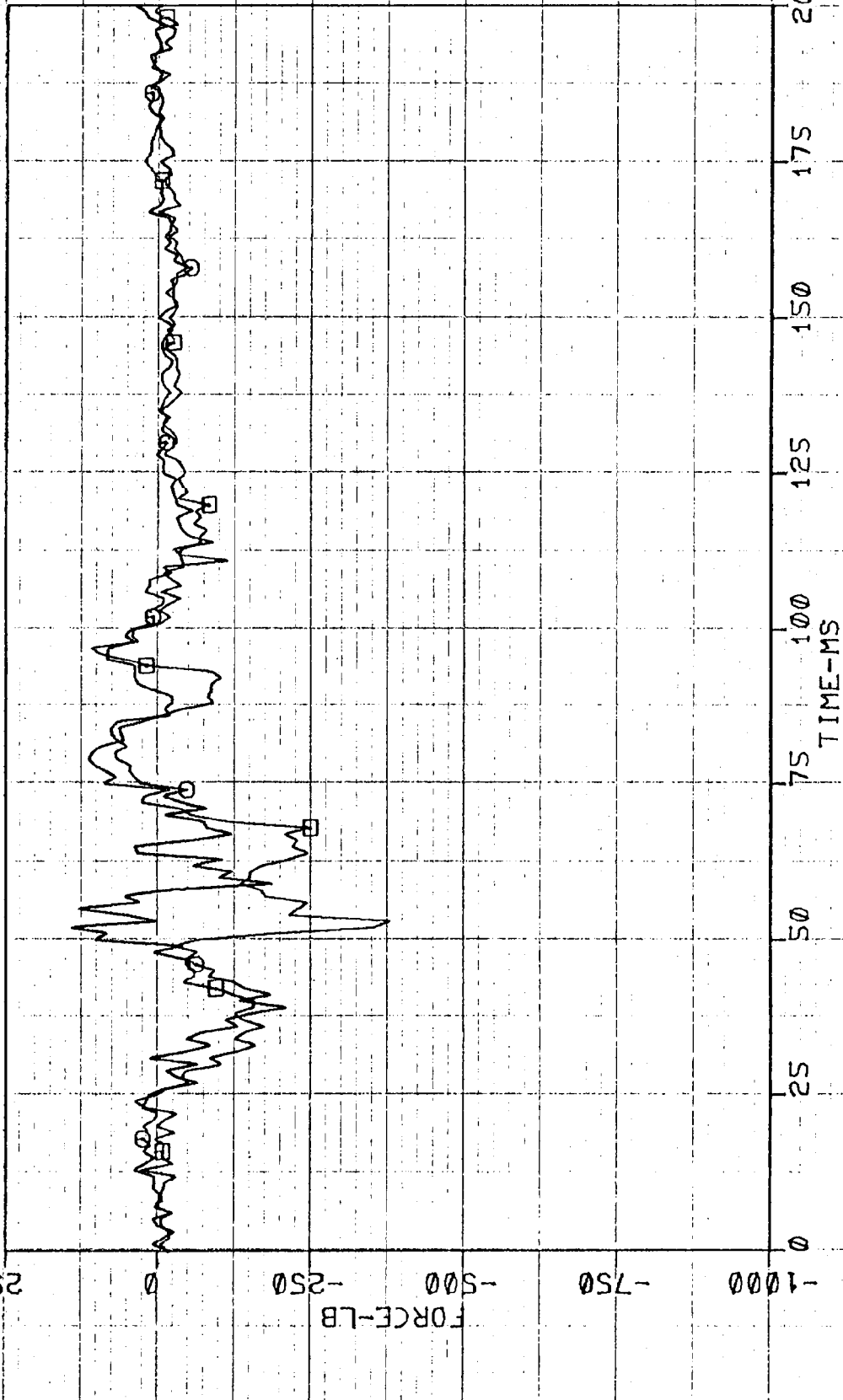
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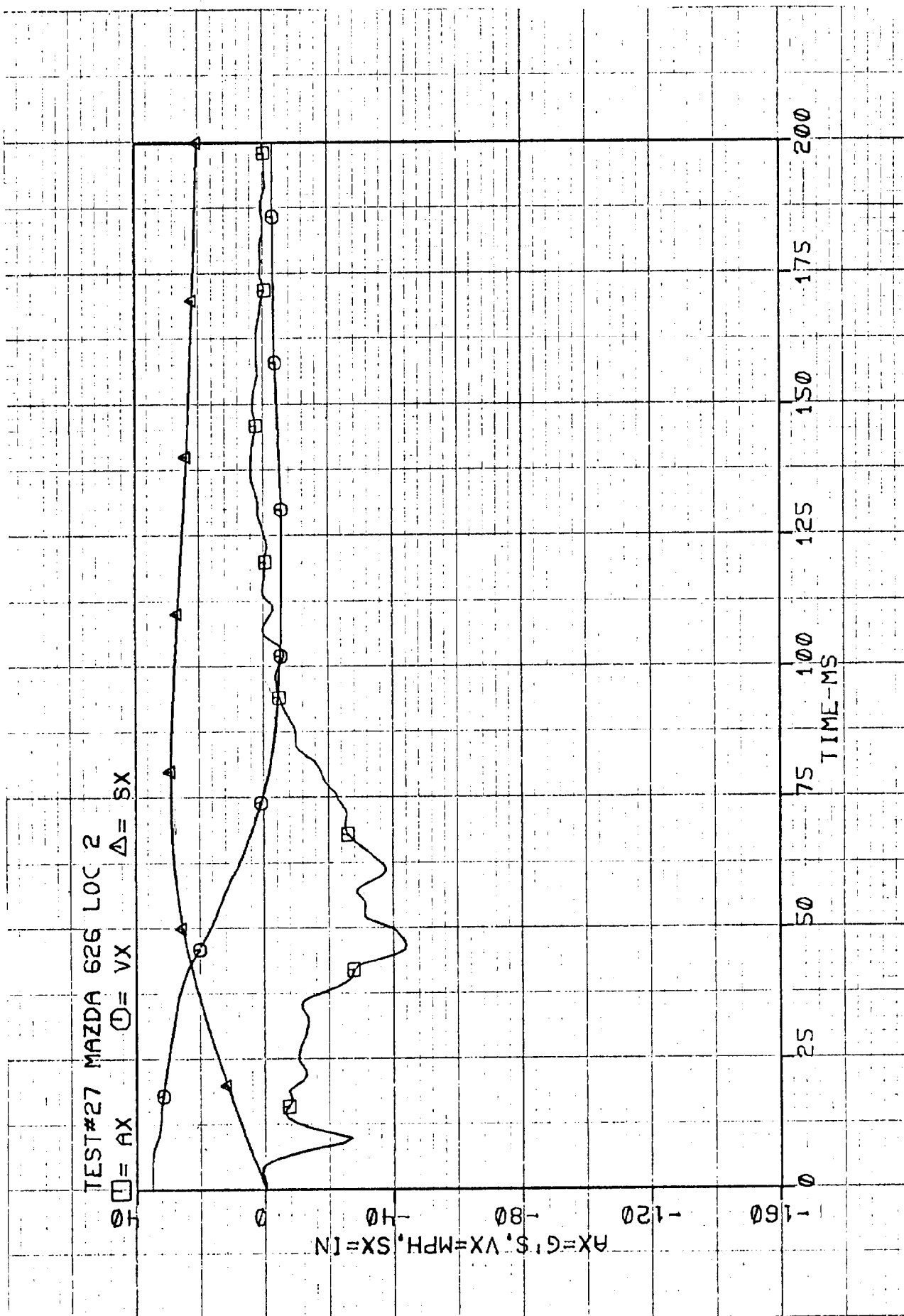


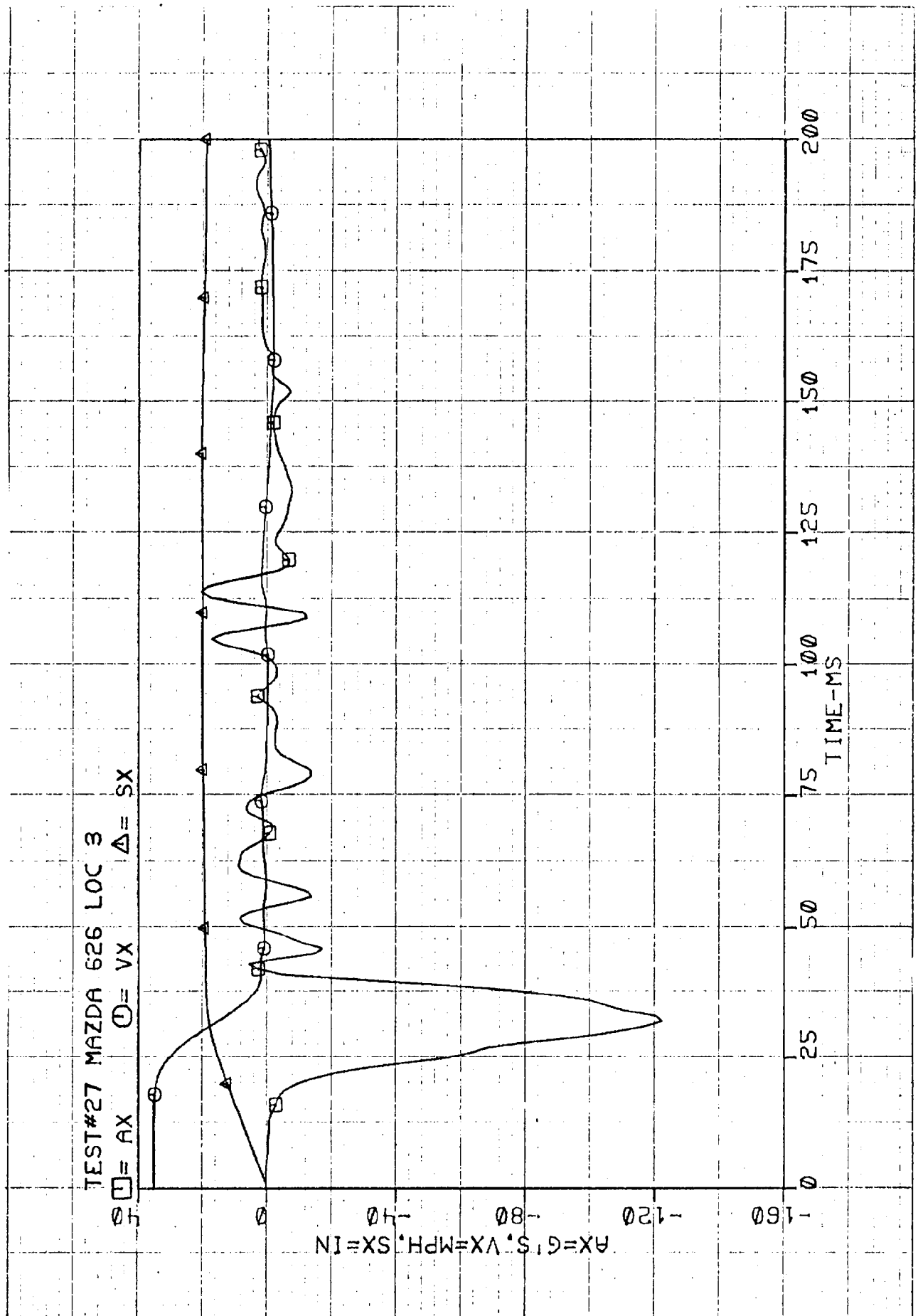
TEST#27 MAZDA 626 RF FEMURS

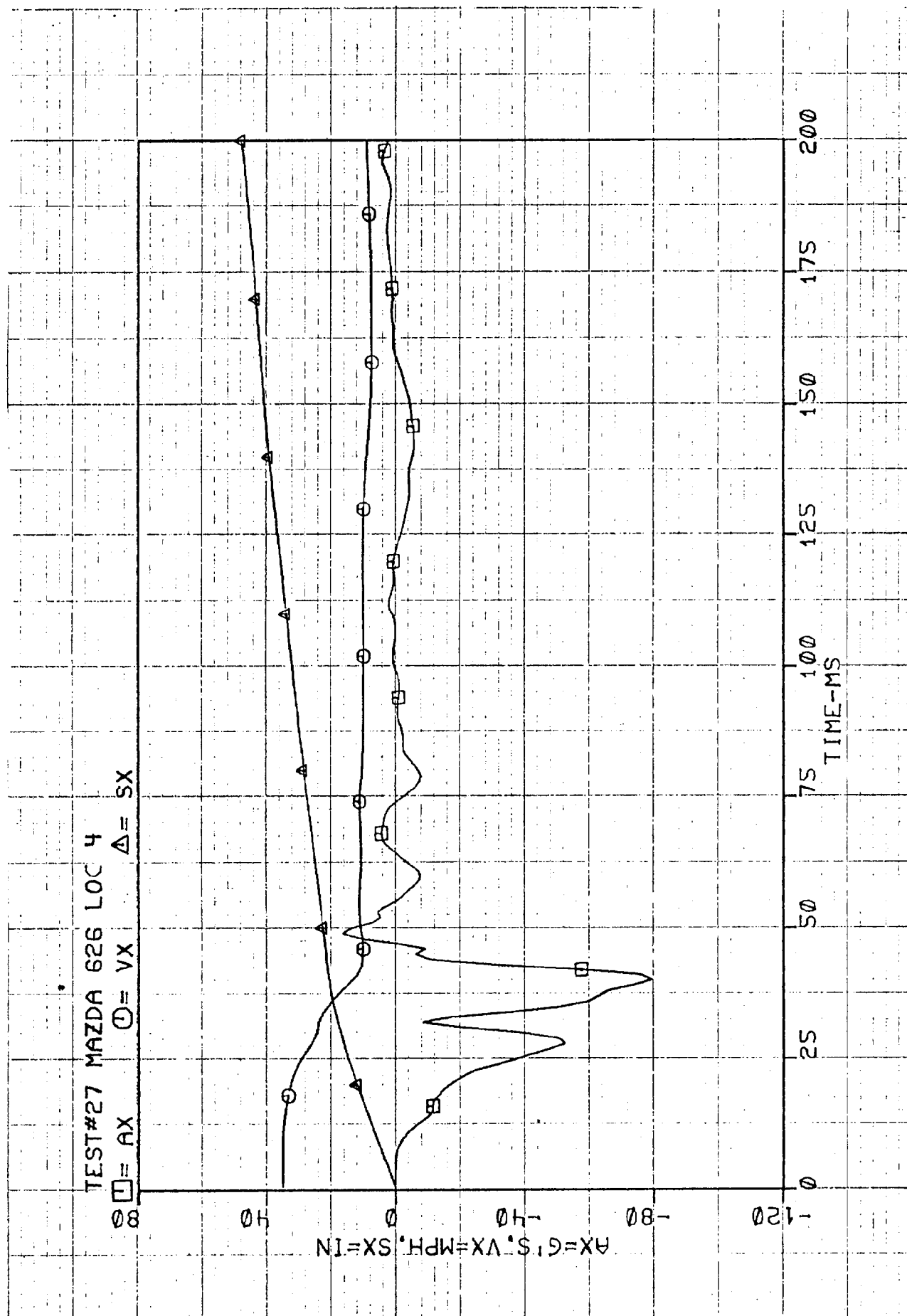
□ = LEFT ○ = RIGHT

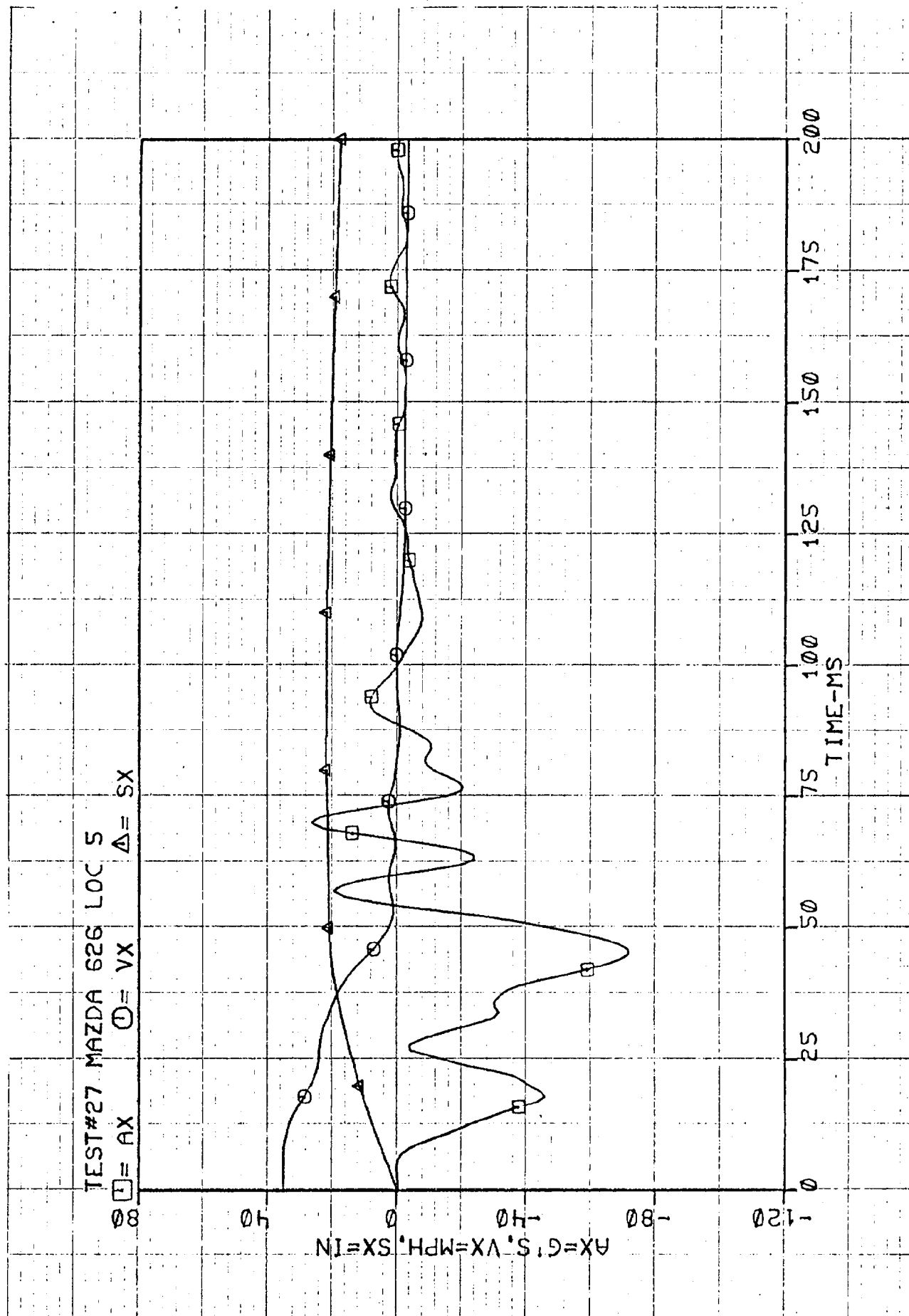
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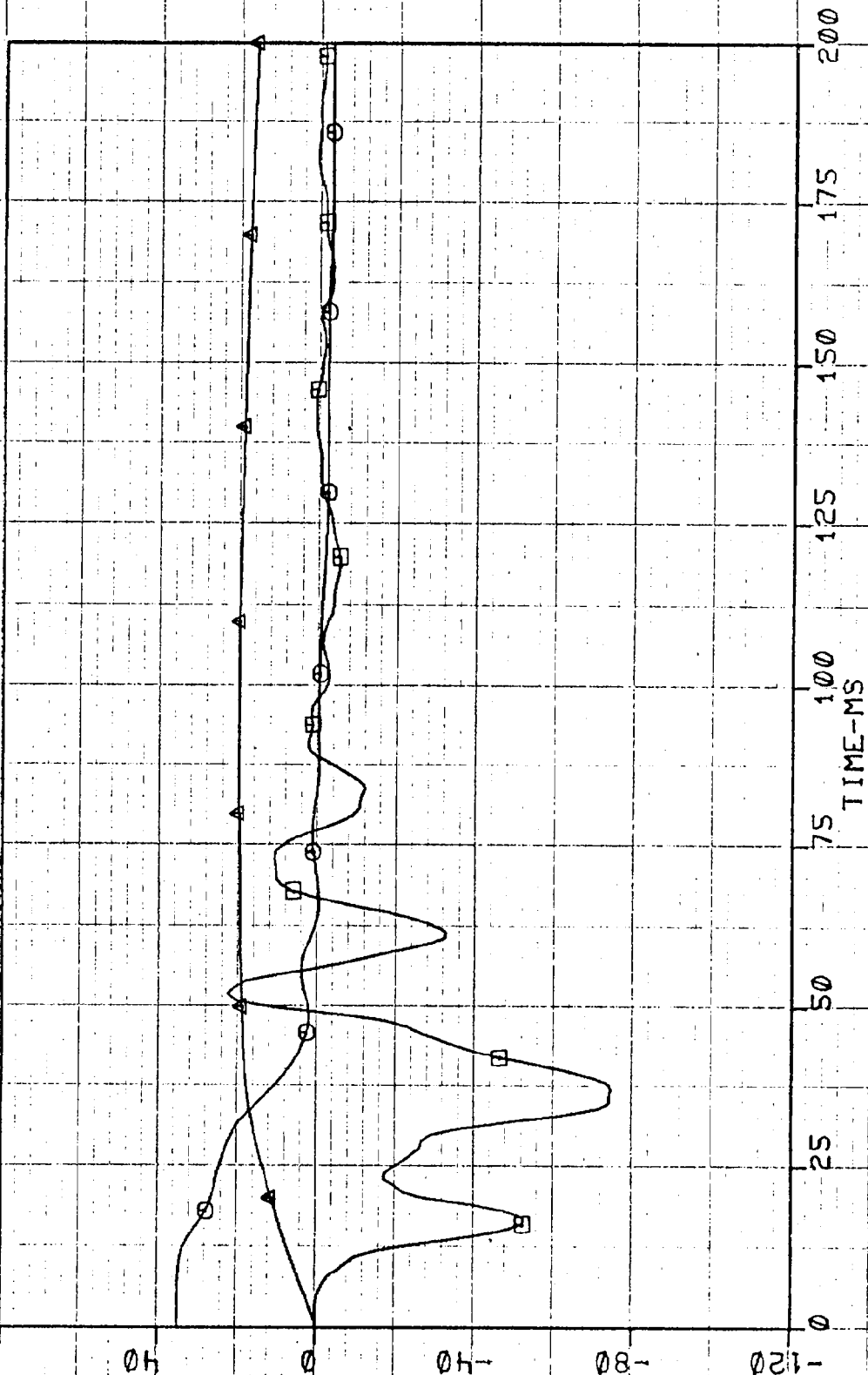






TEST#27 MAZDA 626 LOC 6
 □ = AX ○ = VX Δ = SX

AX=61'S, VX=MPH, SX=IN



TEST#27 MAZDA 626 TOTAL LOAD

FORCE-LB

200

175

150

125

100

75

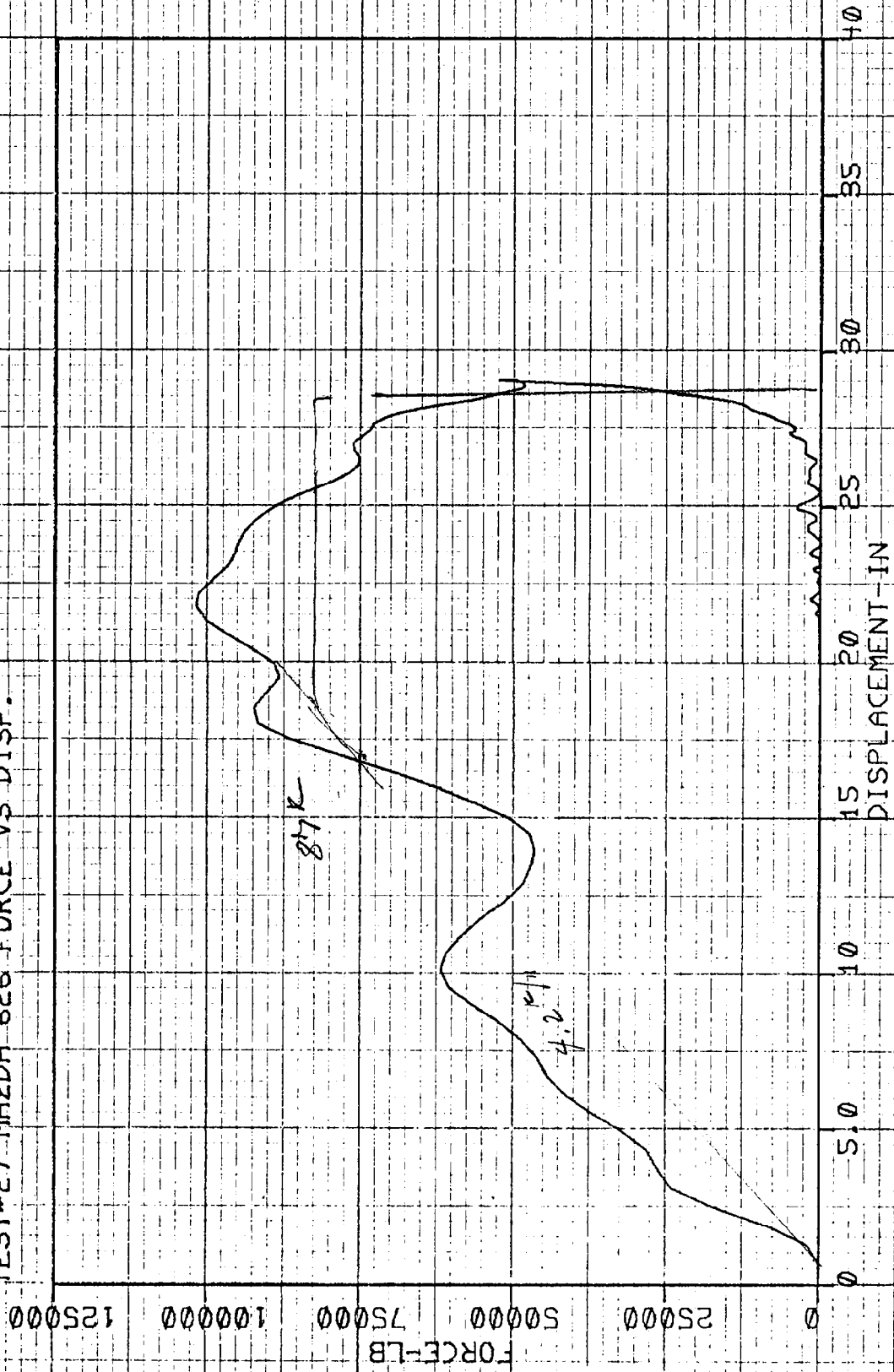
50

25

0

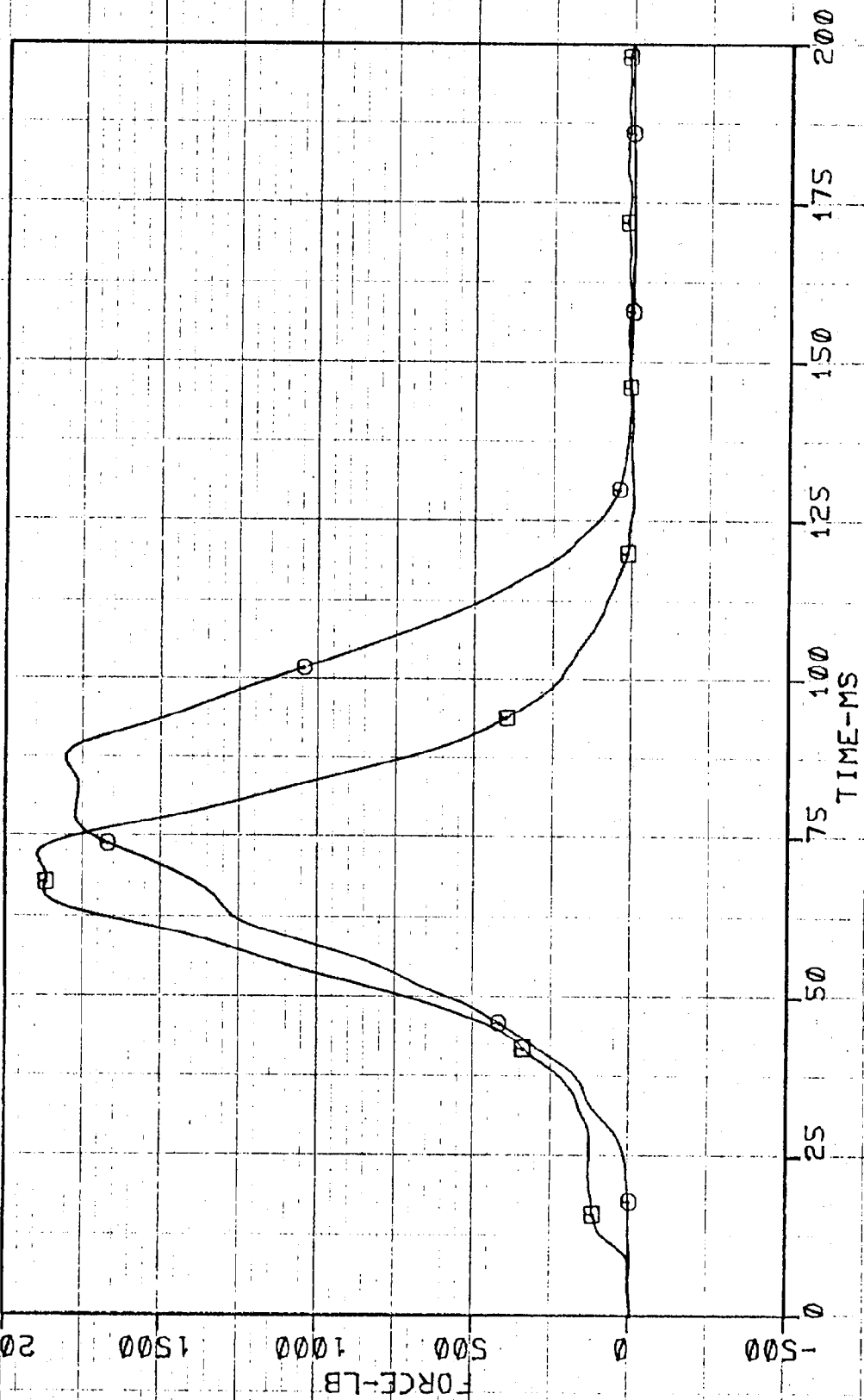
TIME-MS

TEST#27 MAZDA 626 FORCE VS DISP.



TEST#27 MAZDA 626 RF BELT LOADS

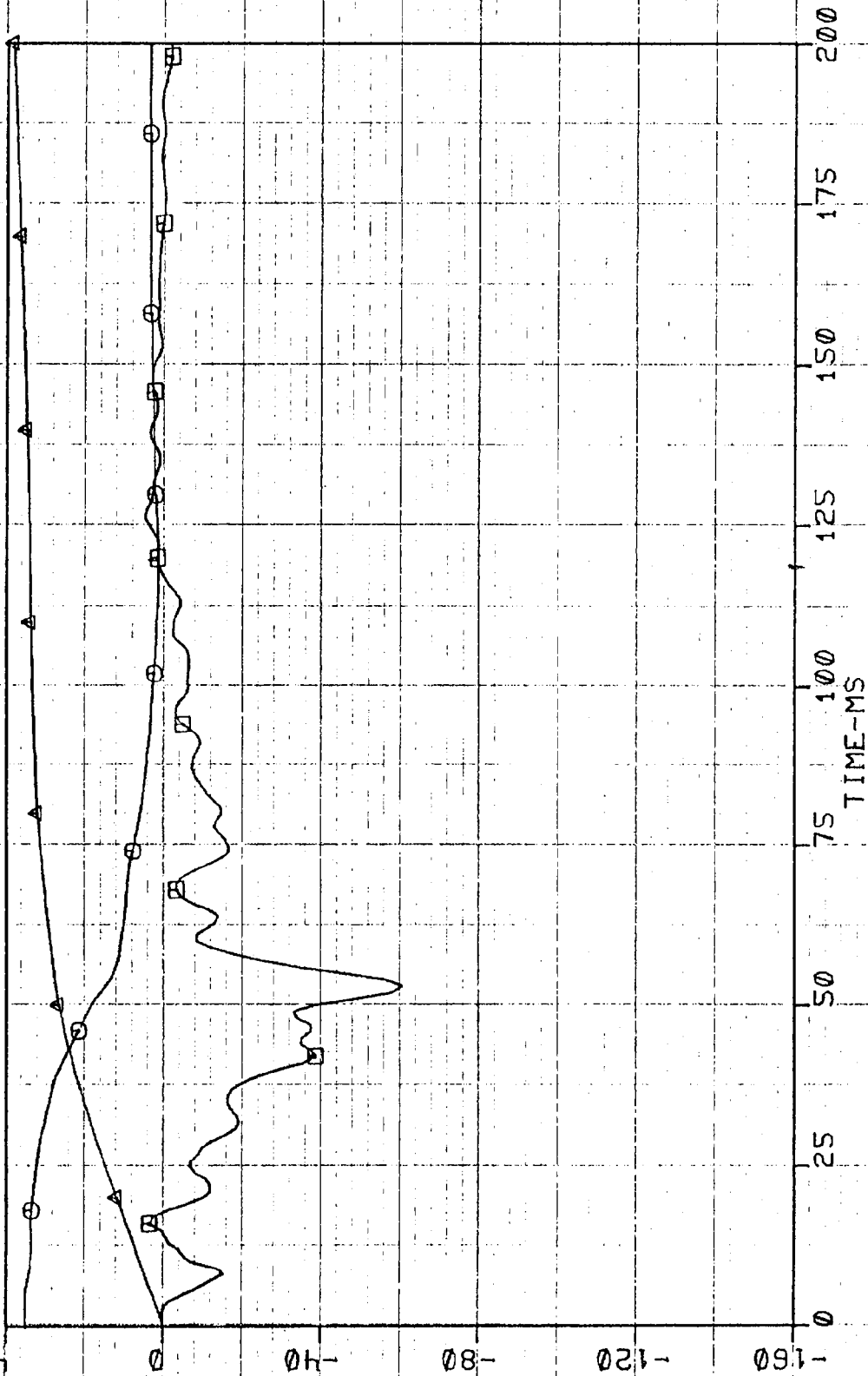
□=LAP BELT ○=TORSO



TEST#27 MAZDA 626 LOC 1

□ = AX ○ = VX Δ = SX

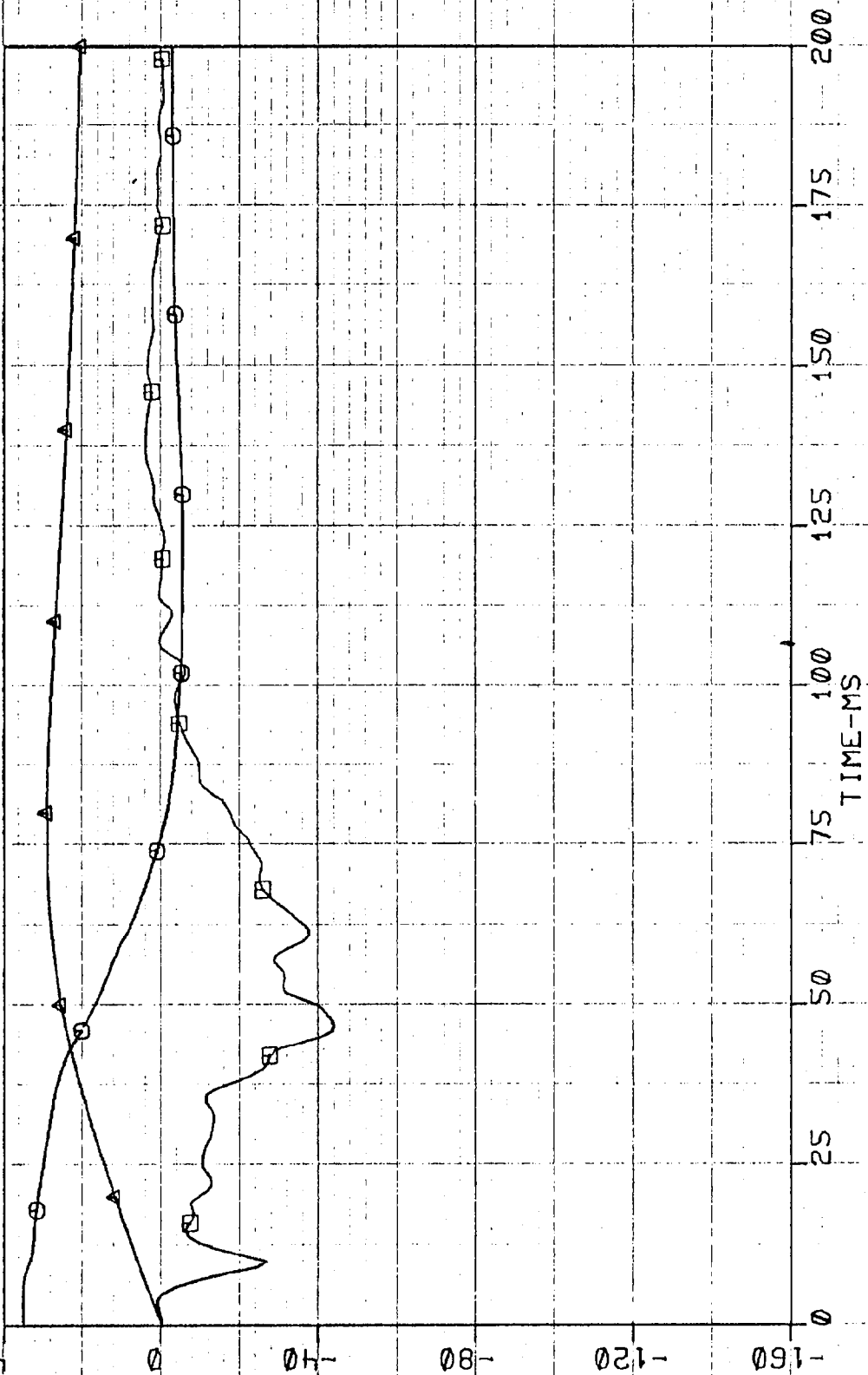
AX=6'S, VX=MPH, SX=IN



TEST#27 MAZDA 626 LOC 2

□ = AX ○ = VX △ = SX

AX=G'S, VX=MPH, SX=IN



APPENDIX C
DUMMY CERTIFICATION DATA

PART 572 DUMMY CALIBRATION TEST DATA

NHTSA Dummy I.D. No.: A 0 8

Laboratory Technician: R. Bishop, V. Agnihotri

	Pre-test Calibration	Post-test Calibration
Date of Dummy Calibration	5/14/80	5/20/80
Calibration Sequential Number for Dummy	22	24
Temperature in Lab. (Spec. = 66 to 78 °F)	72°	74°
Relative Humidity in Lab. (Spec. = 10 to 70%)		

Test Parameter	Specification			
1. Head Drop Test:				
a. Peak Resultant Accel	210 - 260G	216.3	221.1	
b. Peak Lateral Accel	$\leq$ 10G	2.7	7.1	
c. Time above 100G	0.9 - 1.5 ms	1.4	1.0	
2. Neck Bending Test:				
a. Pendulum Speed	21.5 - 25.5 fps	21.9	21.9	
b. Pendulum Avg Decel (over $t_3 - t_2$)	20 - 24G	23.5	22.2	
c. Peak Resultant Head Acceleration	26G Maximum	22.79	21.7	
d. Pendulum Decel ($t_2 - t_1$)	$\leq$ 3 ms	1.75	2.0	
e. Pendulum Decel (t_3-t_2)	25 - 30 ms	27.0	29.5	
f. Pendulum Decel (t_4-t_3)	$\leq$ 10 ms	2.0	3.0	
g. Pendulum Direction Reversal Time	$\geq$ 123 ms			
h. Maximum Head Rota- tion	63 to 73°	73.0°	72.6°	
i. Chordal Displacement:				
Head Rotation Angle				
0°	Time	-2 - 2 ms	0.0	0.0
	Displ	-0.5 - 0.5 in.	0.0	0.0
30°	Time	25.6 - 34.4 ms	26.0	26.0
	Displ	2.1 - 3.1 in.	2.28	2.3
60°	Time	40.3 - 51.7 ms	42.0	41.0
	Displ	4.3 - 5.3 in.	4.40	4.5
Maximum (73°)	Time	53.2 - 66.8 ms	60.0	58.0
	Displ	5.0 - 6.0 in.	5.24	5.3

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A 0 8

Test Parameter		Specification	Pre-test Calibration	Post-test Calibration
2. Neck Bending Test: (Continued)				
Head Rotation Angle				
60°	Time	67.0 - 83.0 ms	74.0	73.0
	Displ	4.3 - 5.3 in.	4.38	4.4
30°	Time	85.4 - 104.6 ms	91.0	90.0
	Displ	2.1 - 3.1 in.	2.27	2.3
0°	Time	101.0 - 123.0 ms	103.0	105.0
	Displ	-0.5 - 0.5 in.	0.0	0.0
3. Abdominal Compression Test: (Preload = 10 pounds)				
a. Force at 0.5 in.		14 - 26 lb	20.8	18.5
b. Force at 0.75 in.		27 - 40 lb	32.4	28.9
c. Force at 1.0 in.		40 - 53 lb	46.3	44.0
d. Force at 1.3 in.		63 - 78 lb	68.8	63.7
4. Lumbar Flexion Test:				
a. Force at 20°		22 - 34 lb	28.9	27.2
b. Force at 30°		34 - 46 lb	44.6	41.7
c. Force at 40°		46 - 58 lb	52.1	48.6
d. Return Angle		12° Maximum	3.6°	3.1°
5. Chest Impact Tests:				
a. High Speed				
1) Probe Speed		21.78-22.22 fps	22.02	22.11
2) Peak Deflection		1.7 in. Maximum	1.585	1.592
3) Peak Resistive Force		2250 lb Maximum	1616.8	1663.7
4) Internal Hysteresis		50 - 70%	54.0%	62.8%
a. Low Speed				
1) Probe Speed		13.86-14.14 fps	13.9	13.99
2) Peak Deflection		1.1 in. Maximum	1.067	0.979
3) Peak Resistive Force		1450 lb Maximum	1031.0	1007.6
4) Internal Hysteresis		50 - 70%	61.0%	66.4%

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A 0 8

		Pre-test	Post-test
Test Parameter	Specification	Calibration	Calibration
6. Knee Impact Tests:			
a. Right Side			
1) Probe Speed	6.76 - 7.04 fps	6.87	6.8
2) Maximum Force	1850 - 2500 lb	1970.0	2000.3
3) Time >1000 lb	1.7 ms Minimum	1.75	1.75
a. Left Side			
1) Probe Speed	6.76 - 7.04 fps	6.87	6.8
2) Maximum Force	1850 - 2500 lb	2420.6	2357.7
3) Time >1000 lb	1.7 ms Minimum	1.75	2.0

PART 572 DUMMY CALIBRATION TEST DATA

NHTSA Dummy I.D. No.: A 0 9

Laboratory Technician: R. Bishop, V. Agnihotri

	Pre-test Calibration	Post-test Calibration
Date of Dummy Calibration	5/14/80	5/20/80
Calibration Sequential Number for Dummy	20	22
Temperature in Lab. (Spec. = 66 to 78 °F)	72°	74°
Relative Humidity in Lab. (Spec. = 10 to 70%)		

Test Parameter	Specification			
1. Head Drop Test:				
a. Peak Resultant Accel	210 - 260G	244.9	243.6	
b. Peak Lateral Accel	≤ 10G	1.0	5.3	
c. Time above 100G	0.9 - 1.5 ms	1.25	1.0	
2. Neck Bending Test:				
a. Pendulum Speed	21.5 - 25.5 fps	21.9	21.9	
b. Pendulum Avg Decel (over t ₃ - t ₂)	20 - 24G	22.0	22.0	
c. Peak Resultant Head Acceleration	26G Maximum	21.86	19.7	
d. Pendulum Decel (t ₂ - t ₁)	≤ 3 ms	2.0	2.0	
e. Pendulum Decel (t ₃ -t ₂)	25 - 30 ms	26.0	26.0	
f. Pendulum Decel (t ₄ -t ₃)	≤ 10 ms	5.0	5.0	
g. Pendulum Direction Reversal Time	≥ 123 ms			
h. Maximum Head Rota- tion	63 to 73°	69.62°	71.02°	
i. Chordal Displacement:				
Head Rotation Angle				
0°	Time	-2 - 2 ms	0.0	0.0
	Displ	-0.5 - 0.5 in.	0.0	0.0
30°	Time	25.6 - 34.4 ms	26.0	28.5
	Displ	2.1 - 3.1 in.	2.28	2.4
60°	Time	40.3 - 51.7 ms	45.0	46.5
	Displ	4.3 - 5.3 in.	4.54	4.6
Maximum (73°)	Time	53.2 - 66.8 ms	61.0	58.5
	Displ	5.0 - 6.0 in.	5.14	5.4

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A 0 9

Test Parameter		Specification	Pre-test Calibration	Post-test Calibration
2. Neck Bending Test: (Continued)				
Head Rotation Angle				
60°	Time	67.0 - 83.0 ms	70.0	74.0
	Displ	4.3 - 5.3 in.	4.52	4.6
30°	Time	85.4 - 104.6 ms	99.0	91.0
	Displ	2.1 - 3.1 in.	2.27	2.4
0°	Time	101.0 - 123.0 ms	104.0	108.0
	Displ	-0.5 - 0.5 in.	0.0	0.0
3. Abdominal Compression Test: (Preload = 10 pounds)				
a. Force at 0.5 in.		14 - 26 lb	20.8	19.7
b. Force at 0.75 in.		27 - 40 lb	32.4	28.9
c. Force at 1.0 in.		40 - 53 lb	47.46	42.3
d. Force at 1.3 in.		63 - 78 lb	67.7	66.6
4. Lumbar Flexion Test:				
a. Force at 20°		22 - 34 lb	29.5	31.8
b. Force at 30°		34 - 46 lb	45.6	41.7
c. Force at 40°		46 - 58 lb	46.9	50.9
d. Return Angle		12° Maximum	4.5°	6.7°
5. Chest Impact Tests:				
a. High Speed				
1) Probe Speed		21.78-22.22 fps	22.08	22.1
2) Peak Deflection		1.7 in. Maximum	1.615	1.545
3) Peak Resistive Force		2250 lb Maximum	1595.5	1687.0
4) Internal Hysteresis		50 - 70%	63.0%	56.0%
a. Low Speed				
1) Probe Speed		13.86-14.14 fps	13.96	14.0
2) Peak Deflection		1.1 in. Maximum	1.077	0.959
3) Peak Resistive Force		1450 lb Maximum	1055.0	1031.0
4) Internal Hysteresis		50 - 70%	56.0%	64.0%

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A 0 9

Test Parameter	Specification	Pre-test	Post-test
		Calibration	Calibration

6. Knee Impact Tests:

a. Right Side

1) Probe Speed	6.76 - 7.04 fps	6.86	6.8
2) Maximum Force	1850 - 2500 lb	1903.2	1970.0
3) Time >1000 lb	1.7 ms Minimum	2.0	2.0

a. Left Side

1) Probe Speed	6.76 - 7.04 fps	6.86	6.8
2) Maximum Force	1850 - 2500 lb	2169.0	2027.6
3) Time >1000 lb	1.7 ms Minimum	2.0	1.75

Dynamic Science Report No.
3102-80-117A

BARRIER IMPACT LOAD DATA
1980 MAZDA 626
NHTSA 800560

Prepared by:

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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

118 Copy

TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1-1
2.0 INSTRUMENTATION DESCRIPTION	2-1
3.0 GENERAL TEST AND VEHICLE PARAMETER DATA	3-1
4.0 DATA PRESENTATION	4-1

1.0 INTRODUCTION

This report is an addendum to Report No. 301-DYS-80-028 and presents the barrier load measurement data acquired in testing a 1980 Mazda 626 (NHTSA No. 800560).

Barrier impact speed was 35.21 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.

0-3963

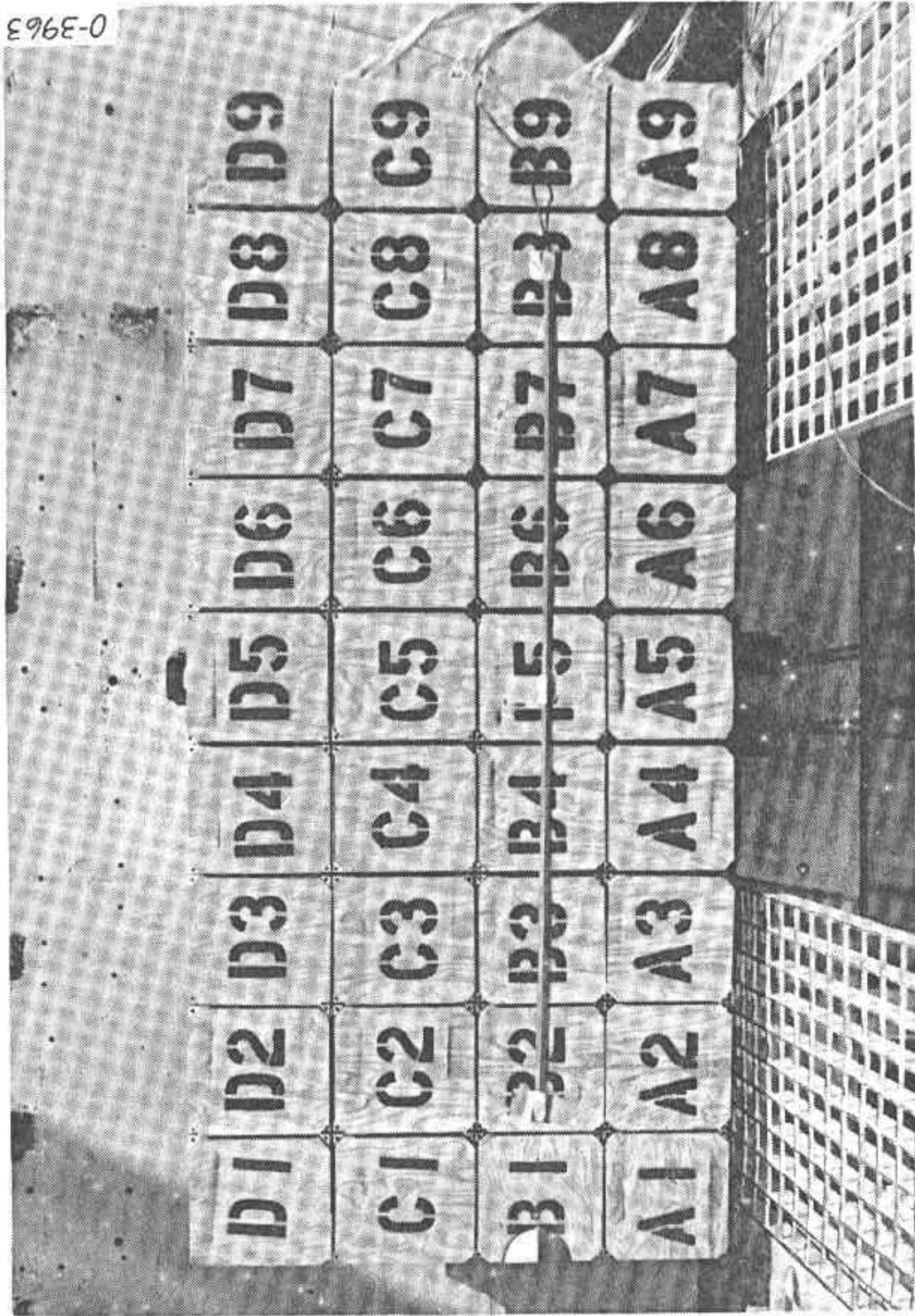
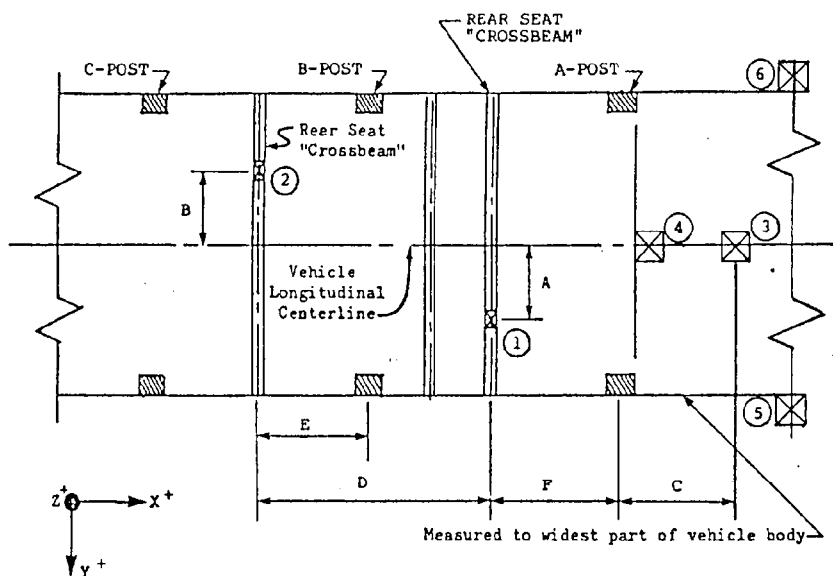


Figure 2-1. Load Cell Barrier Face.

TEST VEHICLE ACCELEROMETER LOCATION DEFINITION AND DATA SUMMARY

Dim.	Length (in.)
A	13.0
B	13.0
C	N/A
D	32.3
E	8.0
F	14.0



No.	Location Description	Component Direction X Y Z	Data Summary Peak G @ msec					
			X		Y		Z	
			"+"	"-"	"+"	"-"	"+"	"-"
1	Below front seat area	✓	4.9 @ 126	-60.7 @ 52	@	@	@	@
2	Below rear seat area	✓	4.1 @ 136	-44.0 @ 46	@	@	@	@
3	Engine top	✓	20.7 @ 113	-112.5 @ 31	@	@	@	@
4	Engine bottom	✓	16.8 @ 48	-79.3 @ 39	@	@	@	@
5	RF brake caliper	✓	26.8 @ 69	-71.7 @ 44	@	@	@	@
6	LF brake caliper	✓	22.9 @ 51	-74.7 @ 36	@	@	@	@

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: Toyo Kogyo Co., Ltd.
 Make/Model: Mazda 626
 Body Style: 2-door coupe Model Year: 1980
 VIN: CB2MS-625497 Build Date: 3/80
 NHTSA No.: 800560 Color: Silver
 Engine Data: 4 cylinders; 120.2 in.³ displacement
 Transmission Data: 5 speed (☒) Manual (☐) Automatic
 Date Vehicle Received by Laboratory: 5/12/80
 Dealer Name & Address: Meyers Mazda
4539 W. Glendale Ave., Glendale, AZ 85301

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

Vehicle Manufactured By: Toyo Kogyo Co., Ltd.
 Date of Manufacture: 3/80; VIN: CB2MS-625497
 GVWR: 3310 lb; GAWR: Front = 1750 lb; Rear = 1750 lb

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

Vehicle Load:	FRONT	REAR	RECOMMENDED	LOAD RANGE:
Up to Capacity	<u>26</u> psi	<u>26</u> psi	TIRE SIZE:	
Vehicle Capacity:			<u>165-SR13/185-70SR13</u>	<u>B</u>
Type of Seats -	<u>Bench</u>	Number of Occupants =	<u>2</u>	Front
	☒ <u>Bucket</u>	(Designated Seating	<u>2</u>	Rear
	<u>Split Bench</u>	Capacity)	<u>4</u>	Total
CARGO LOAD =	<u>80</u> lb			
TOTAL =	<u>680</u> lb			

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

Right Front =	<u>669</u> lb	Right Rear =	<u>572</u> lb
Left Front =	<u>732</u> lb	Left Rear =	<u>605</u> lb
TOTAL FRONT WEIGHT =	<u>1401</u> lb (<u>54.3%</u> of Total Vehicle Weight)		
TOTAL REAR WEIGHT =	<u>1177</u> lb (<u>45.7%</u> of Total Vehicle Weight)		
TOTAL DELV. WEIGHT =	<u>2578</u> lb		

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 80 lb CARGO:

Right Front =	<u>737</u> lb	Right Rear =	<u>757</u> lb
Left Front =	<u>784</u> lb	Left Rear =	<u>788</u> lb
TOTAL FRONT WEIGHT =	<u>1521</u> lb (<u>49.6%</u> of Total Vehicle Weight)		
TOTAL REAR WEIGHT =	<u>1545</u> lb (<u>50.4%</u> of Total Vehicle Weight)		
TOTAL TEST WEIGHT =	<u>3066</u> lb		

Weight of ballast secured in vehicle trunk area = 0 lb

TARGET WEIGHT = CARGO LOAD + UDW + 164 (NO. OF DUMMIES) = 2986 lb*

*High test weight due to addition of seat belt retractor cameras and lights.

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 17, 1980 ; TIME: 1205 ; TEMP: 85 ° F

NHTSA NO.: 800560 ; VIN: CB2MS-625497

REQUIRED VEHICLE VELOCITY RANGE: 34.5 to 35.5 mph

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

Primary = 35.21 mph; Secondary = 35.23 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 = 24.3 in.; Passenger's Side = 25.4 in.

Average = 24.9 in.

Crush Details: Direct crush to "A" pillar. Roof buckled between "B" and "C" pillars. Both front tires pinned. Rear axle bent forward, permitting both rear wheels to touch front edge of wheelwells.

(For Side Impacts Only)

Amount of Crush = in. on side

Crush Details:

VEHICLE REBOUND:

(From rigid barrier only)

Driver's Side = 9.1 in.; Passenger's Side = 11.3 in.

Average = 10.2 in.

REMARKS: Steel bumper has 2.1"-wide, 0.3"-thick, soft rubber strip affixed slightly above bumper centerline. Two 2.0" x 6.0" x 1.3" hard rubber bumper guards are located 15.5" from vehicle centerline.

VEHICLE PROFILE DATA SHEET

Vehicle: 1980 Mazda 626 2-door coupe D.S. No.: 1067

Test Date: May 17, 1980

Measurement Date: Pre-test: May 17, 1980 Post-test May 19, 1980

Exterior Measurements Referenced to Plane: 180 inches

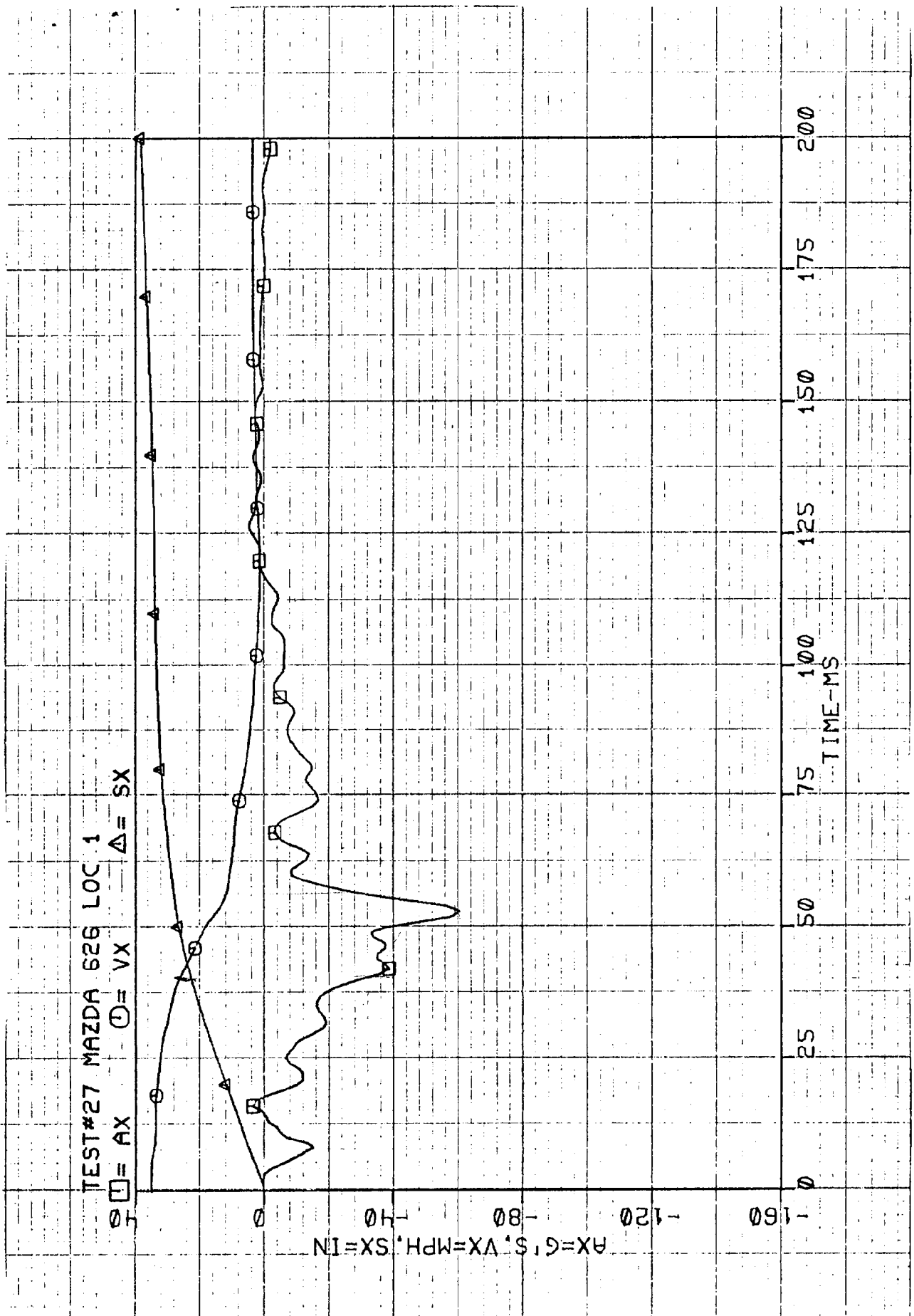
Forward of: Rear Bumper

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	20.9	-	6.0	5.3	4.9	4.6	4.5	4.6	4.9	5.3	6.0	-
Front of Hood	26.5	-	11.5	10.9	10.4	10.2	9.9	10.2	10.4	10.9	11.5	-
Post-test Profile (in.)												
Top of Front Bumper	26.5	-	30.3	30.1	29.7	29.5	29.4	29.8	30.4	30.8	31.4	-
Front of Hood	35.5	-	30.9	30.9	30.7	30.6	30.5	31.0	31.5	31.6	31.4	-
Post-test Static Crush (in.)												
Top of Front Bumper	5.6	-	24.3	24.8	24.8	24.9	24.9	25.2	25.5	25.5	25.4	-
Front of Hood	9.0	-	19.4	20.0	20.3	20.4	20.6	20.8	21.1	20.7	19.9	-

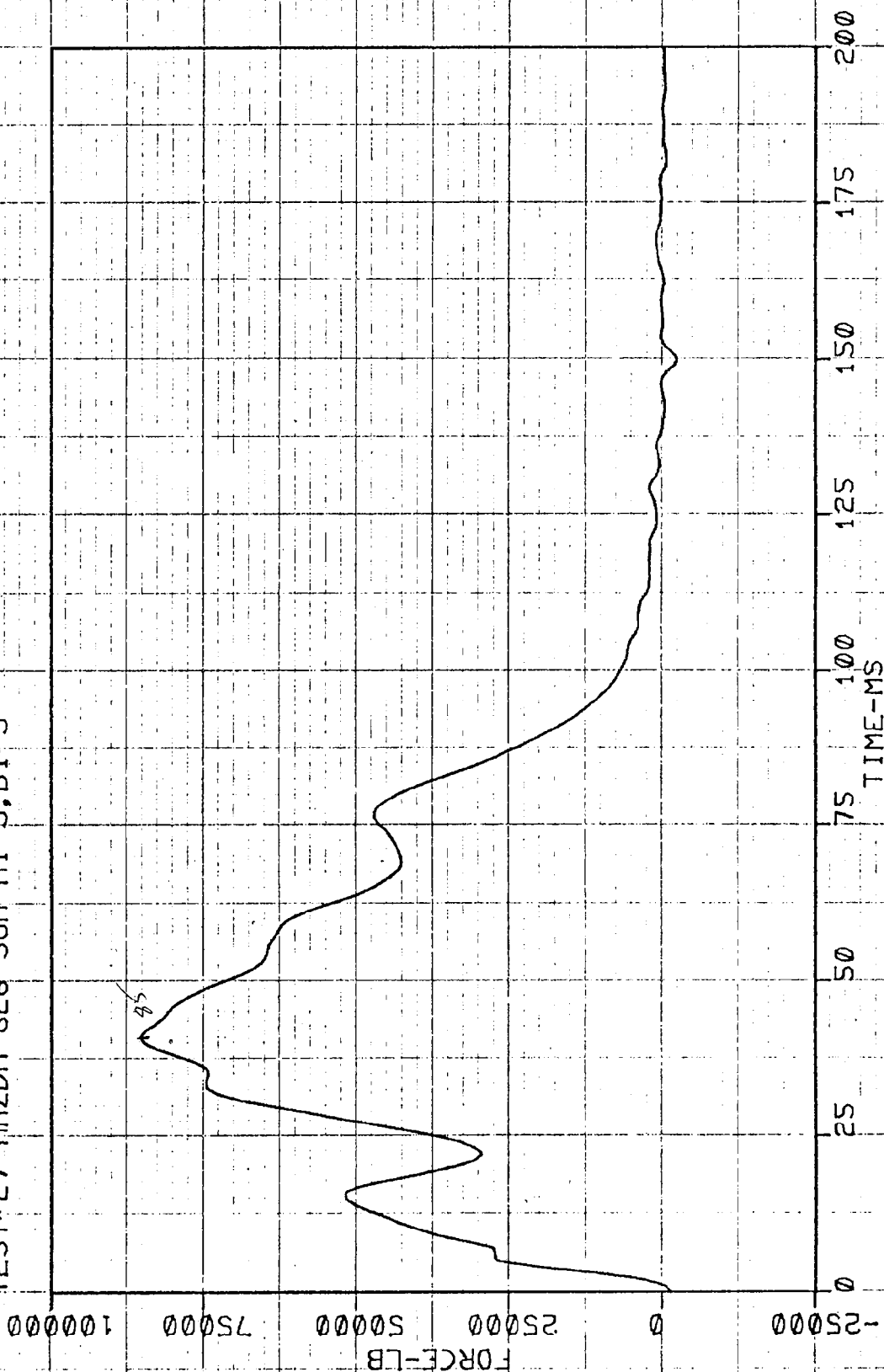
4.0 DATA PRESENTATION

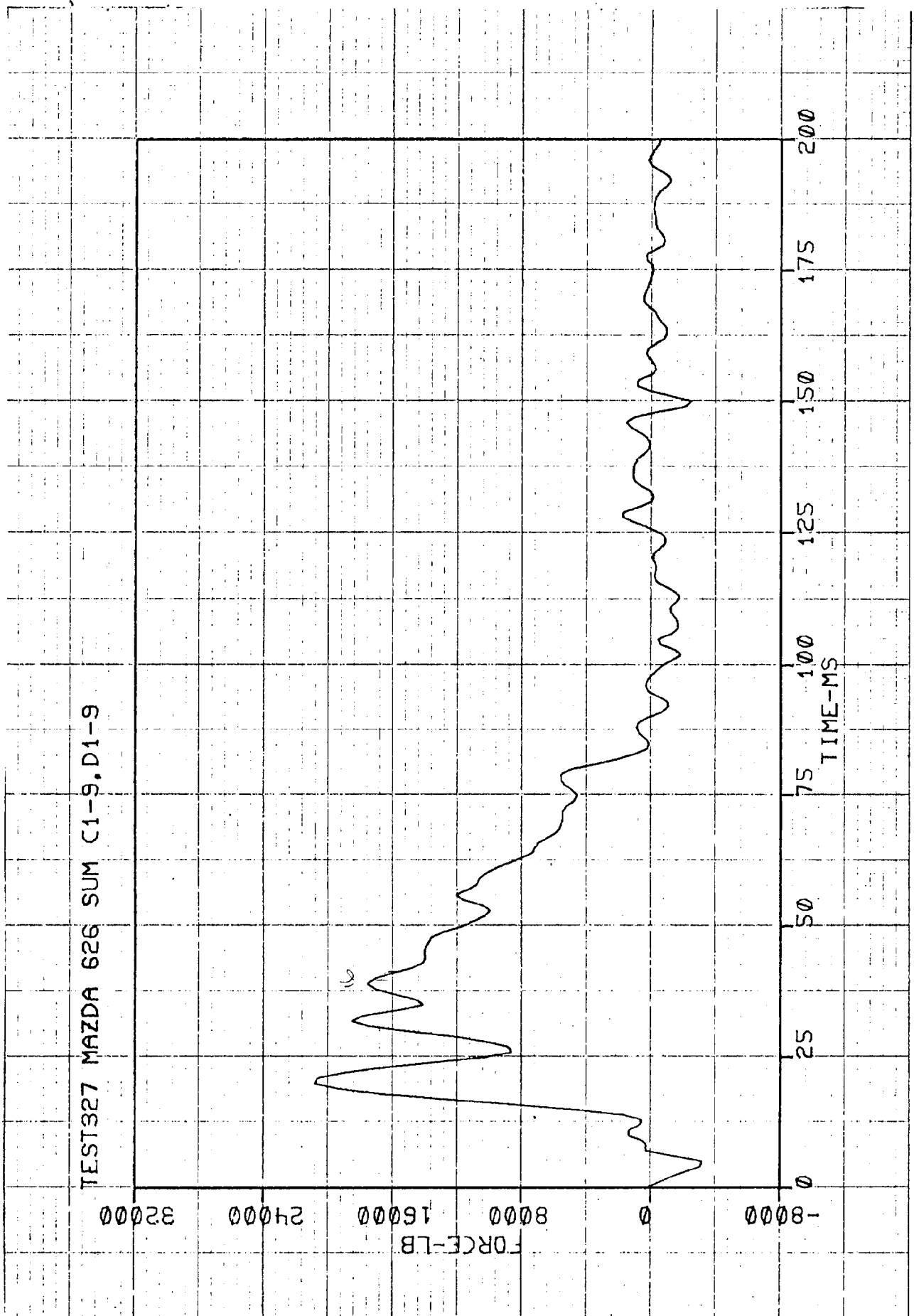
Data plots are presented for each accelerometer and consist of the accelerometer data plus the first integral versus time (velocity) and the second integral versus time (displacement) of the acceleration data.

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#27 MAZDA 626 SUM A1-9,B1-9





TEST#27 MAZDA 626 LOAD CELLS COL. 1

□ = A1

○ = B1

△ = C1

◇ = D1

1000

750

500

250

0

-250

FORCE-LB

200

175

150

125

100

75

50

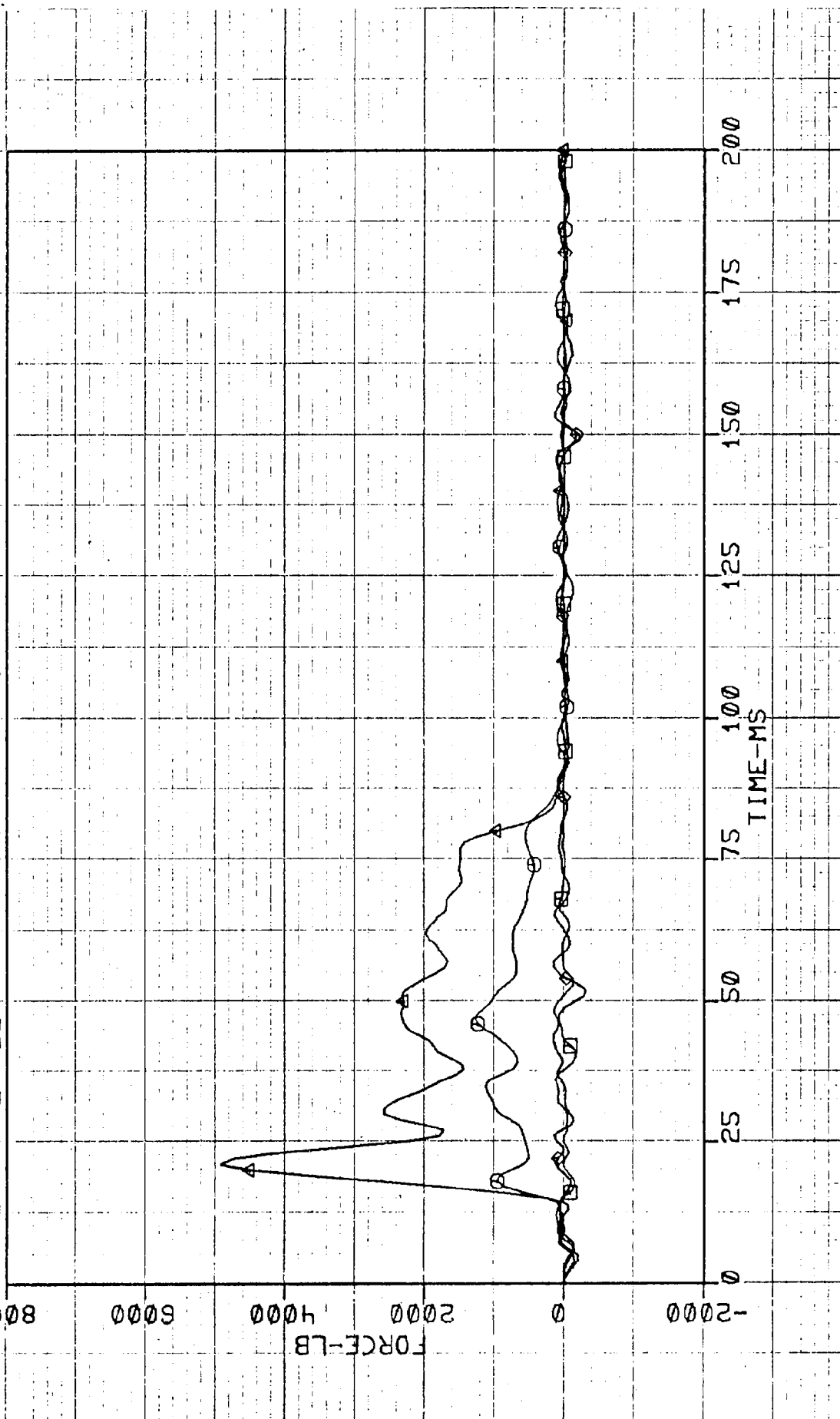
25

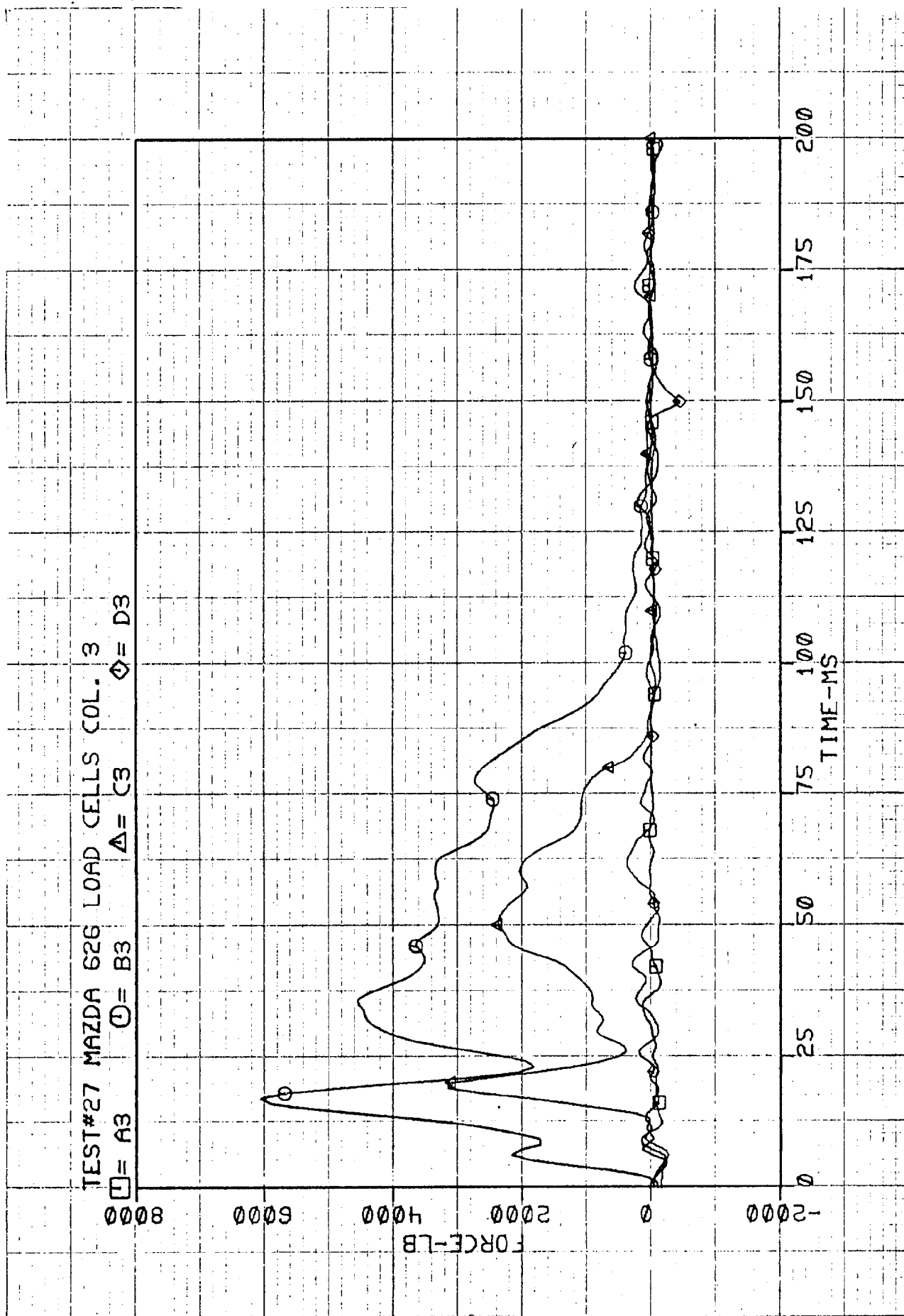
0

TIME-MS

TEST#27 MAZDA 626 LOAD CELLS COL. 2

□ = A2 ○ = B2 △ = C2 ◇ = D2





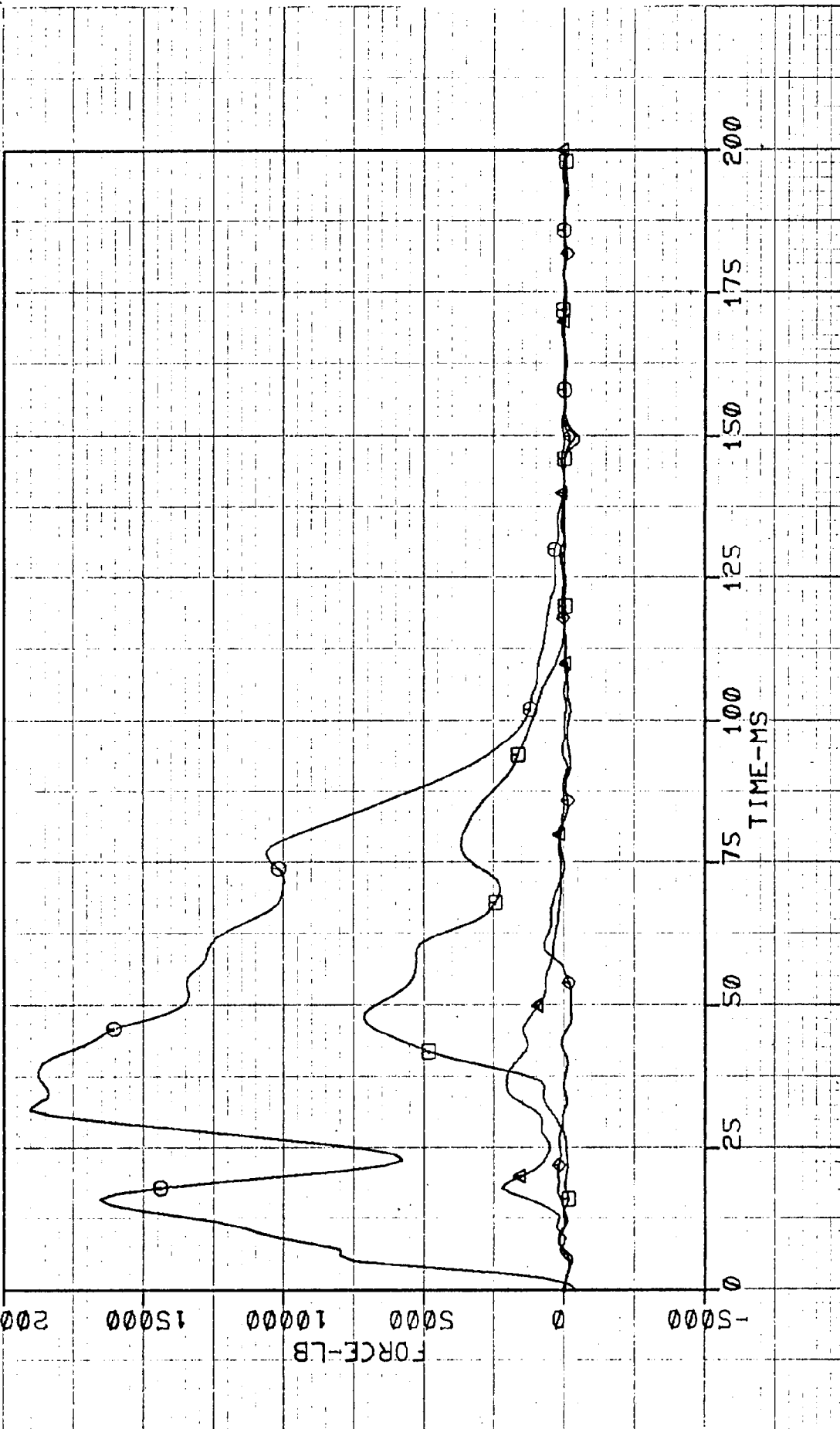
TEST#27 MAZDA 626 LOAD CELLS COL. 4

□ = A4

○ = B4

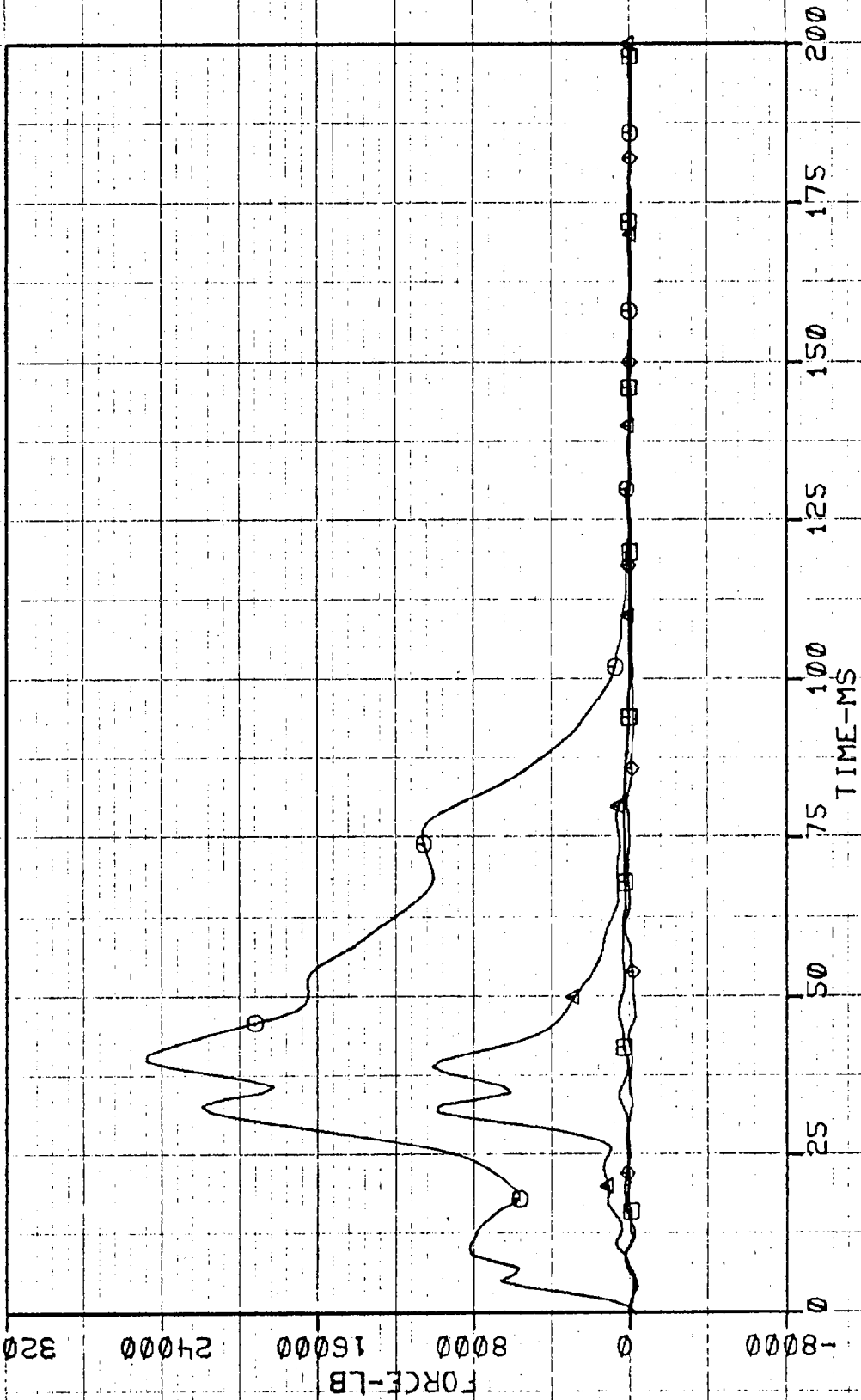
△ = C4

◇ = D4

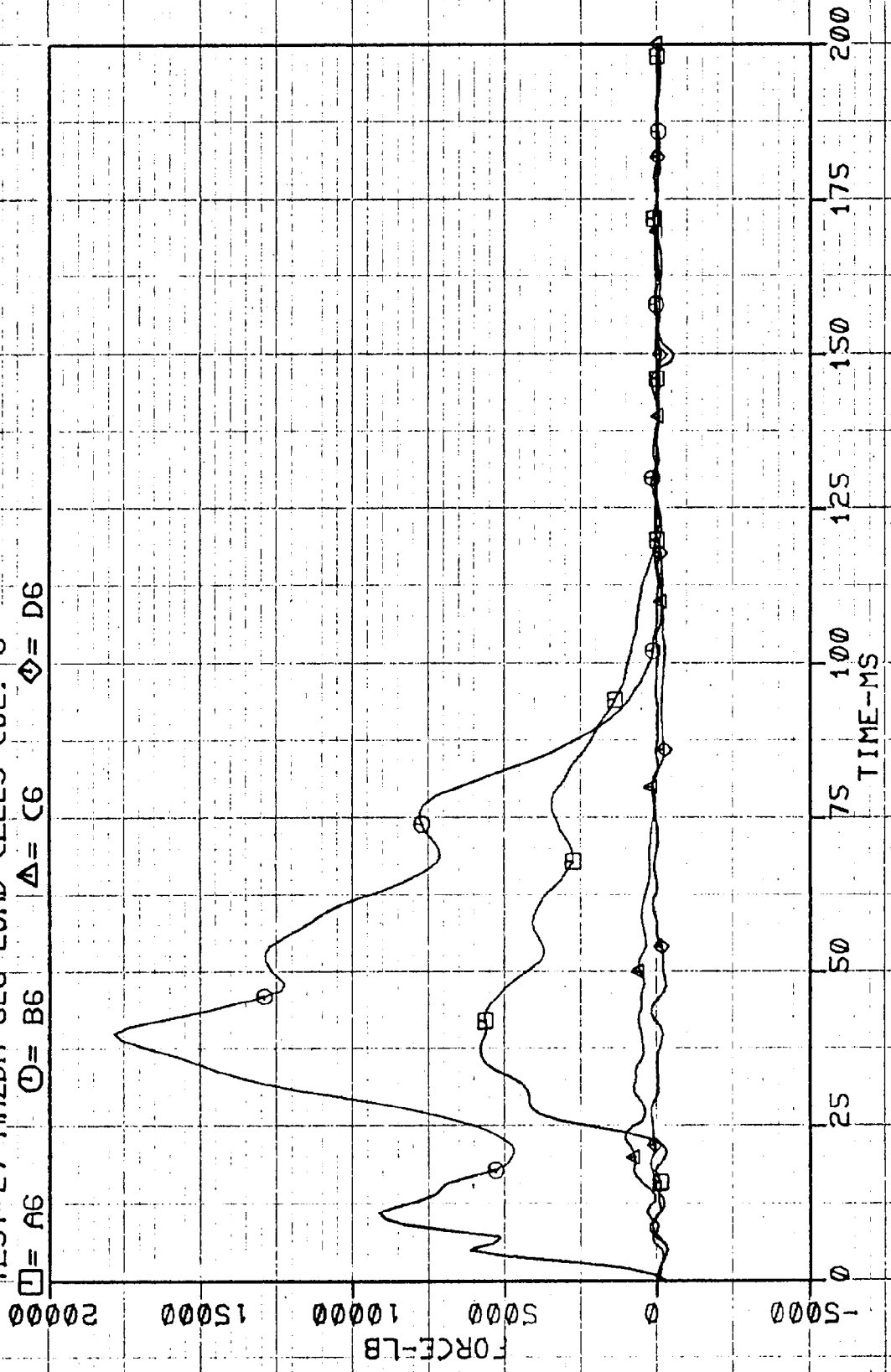


TEST#27 MAZDA 626 LOAD CELLS COL. 5

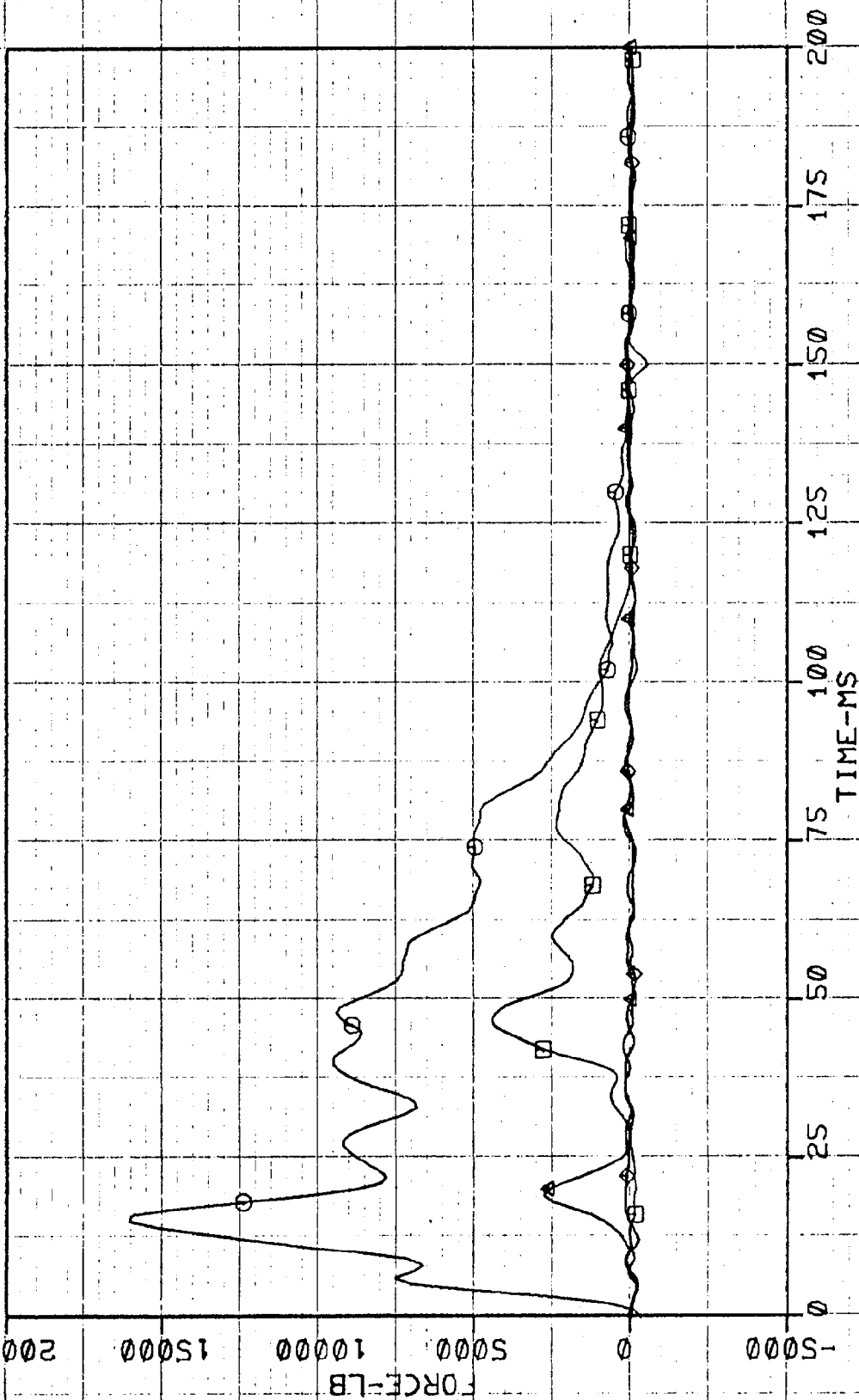
□ = A5 ○ = B5 △ = C5 ◇ = D5



TEST#27 MAZDA 626 LOAD CELLS COL. 6
□ = A6 ○ = B6 △ = C6 ◇ = D6



TEST#27 MAZDA 626 LOAD CELLS COL. 7
□ = A7 ○ = B7 △ = C7 ◇ = D7



TEST#27 MAZDA 626 LOAD CELLS COL. 8

□ = A8

⊕ = B8

△ = C8

◇ = D8

