

2014365

Dynamic Science Report No. 212-DYS-81-014
Dynamic Science Report No. 219-DYS-81-014
Dynamic Science Report No. 301-DYS-81-014

NEW VEHICLE ASSESSMENT AND
STANDARDS ENFORCEMENT INDICANT
TESTING

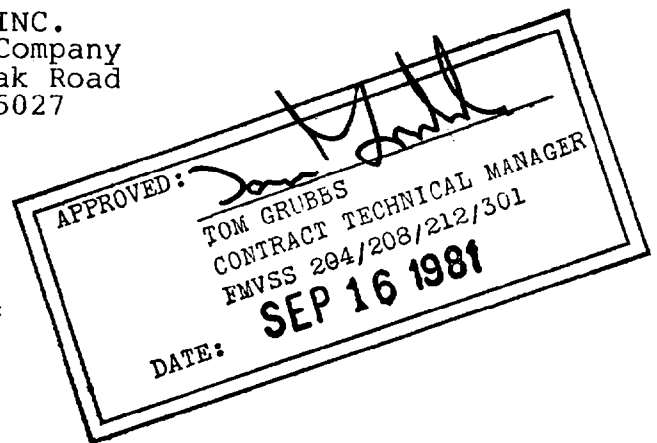
FMVSS 212, 219 AND 301-75

VOLKSWAGENWERK A.G., W. GERMANY
1981 VOLKSWAGEN JETTA 4-DOOR SEDAN

NHTSA NO. 810524

Prepared by:

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



August 1981

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

DYNAMIC
SCIENCE, INC. | **Talley**[™]
Industries

1850 West Pinnacle Peak Road · Phoenix, Arizona 85027
(602) 869-9331

Prepared for the Department of Transportation, National Highway Traffic Safety Administration under Contract No. DOT-HS-9-02274. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

Prepared by

Walter L. Lott

Approved by

Rod Carn

Date

9/8/81

Report Accepted by:

TOM GRUBBS

Contract Technical Manager
Office of Vehicle Safety Compliance

SEP 16 1981

Date

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. 212-DYS-81-014 219-DYS-81-014 301-DYS-81-014		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle FMVSS 212, 219, and 301-75 NEW VEHICLE ASSESSMENT AND STANDARDS ENFORCEMENT INDICANT TESTING - 1981 VOLKSWAGEN JETTA NHTSA 810524		5. Report Date August 1981			
		6. Performing Orgn Code			
		8. Performing Orgn Rpt No. 3103-81-069/1893			
7. Author(s) T. Bjork		10. Work Unit No.			
9. Performing Organization Name and Address Dynamic Science, Inc. A Talley Industries Company 1850 West Pinnacle Peak Road Phoenix, Arizona 85027		11. Contract or Grant No. DOT-HS-9-02274			
		13. Type of Report and Period Covered Final Report July 1981			
		14. Sponsoring Agency Code			
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance 400 Seventh Street S.W. Washington, D.C. 20590					
15. Supplementary Notes					
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 fixed load-measuring barrier at a speed of 34.88 mph. The test was conducted at the Dynamic Science, Inc. Deer Valley Facility on July 22, 1981, with the following results: a) FMVSS 212 - Loss of windshield periphery retention exceeded standard. b) FMVSS 219 - No intrusion into windshield protected zone. c) FMVSS 301 - Fuel leakage 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, Frontal Impact, Load Measuring Barrier, Occupant Response			18. Distribution Statement This report is available from the Technical Services Division, National Highway Traffic Safety Administration, Room 5108, Nassif Building, 400 7th St., S.W., Washington, D.C. 20590		
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. Pages 94	
				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	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
----	-----------------	-------------------	--------------------	----

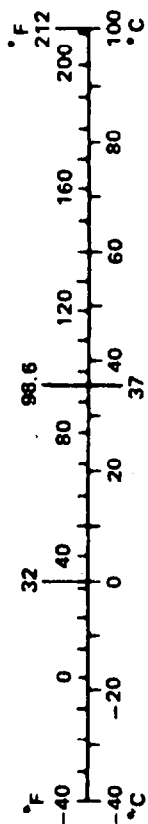


TABLE OF CONTENTS

	<u>Page</u>
1.0 PURPOSE AND INTRODUCTION	1-1
2.0 GENERAL TEST AND VEHICLE PARAMETER DATA	2-1
3.0 COMPLIANCE-RELATED DATA, FMVSS 301-75 INDICANT TESTING	3-1
4.0 DATA REQUIRED BY R&D AND OAR	4-1
APPENDIX A - PHOTOGRAPHS	A-1
APPENDIX B - CALCOMP PLOT PRESENTATION	B-1
APPENDIX C - DUMMY CALIBRATION	C-1

SECTION 1
PURPOSE AND INTRODUCTION

PURPOSE

The purpose of the test was to subject a 1981 Volkswagen Jetta 4-Door Sedan 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." Calibrated Part 572 50th-percentile male dummies were utilized to acquire data relative to FMVSS 208, "Occupant Crash Protection." 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 this test. 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 describe the General Test and Vehicle Parameter Data.

GENERAL TEST AND VEHICLE PARAMETER DATA

PRE-IMPACT DATA

Make/Model: Volkswagen Jetta
 Body Style: 4-Door Sedan Model Year: 1981
 NHTSA No.: 810524 DSI No. 1147 Color: White

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk A.G., West Germany
 Date of Manufacture: 9/80; VIN: WVGGA9163BW152048
 GVWR: 2887 lb; GAWR: Front = 1609 lb; Rear = 1345 lb

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL

Vehicle Capacity: FRONT REAR RECOMMENDED LOAD RANGE:
 Tire Pressure: 28 psi 34 psi TIRE SIZE: B
175-70/SR13
 Designated Seating: 2 Front 2 Rear 4 Total
 Cargo load = 207 lb Is Spare Tire: Space Saver? No
 TOTAL = 807 lb Standard Equipment? Yes
 Engine: 4 Cylinder, transverse, 1.7 litre displacement
 Transmission: 5 speed, manual, front-wheel drive
 Date Vehicle Received by Laboratory: 12/16/80; Odometer: 27.8
 Dealer Name & Address: Biddulph VW/Fiat 4434 West Glendale Ave
Glendale, Arizona
 Remarks: Vehicle has production automatic torso belt restraint
with knee bolster.

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

Right Front = 632 lb Right Rear = 404 lb
 Left Front = 646 lb Left Rear = 424 lb
 TOTAL FRONT WEIGHT = 1278 lb (60.7 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 828 lb (39.3 % of Total Vehicle Weight)
 TOTAL DELV. WEIGHT = 2106 lb

TARGET WEIGHT = UDW + Cargo Load + 328 lbs Dummies = 2641 lb

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 207 lb CARGO:

Right Front = 707 lb Right Rear = 642 lb
 Left Front = 671 lb Left Rear = 630 lb
 TOTAL FRONT WEIGHT = 1378 lb (52.0 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1272 lb (48.0 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 2650 lb

Weight of ballast secured in vehicle trunk area = 114 lb

VEHICLE ATTITUDE: (inches)

Delivered Attitude: RF 30.0 LF 30.0 RR 30.0 LR 30.0
 Test Attitude: RF 28.8 LF 29.5 RR 28.3 LR 27.8

GENERAL TEST AND VEHICLE PARAMETER DATA (CONTD)

POST-TEST DATA

Type of Test: Frontal (0°) Impact.Date of Test: 7/22/81 Time: 1013 Temperature 93 °FRequired Impact Velocity Range: 34.5 to 35.5 mphImpact Velocity: Primary = 34.88 mph Secondary = 34.93 mph

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

VEHICLE REBOUND AND CRUSH (in.)

Vehicle Length:	Pre-test = R	<u>167.4</u>	L	<u>167.4</u>
	Post-test = R	<u>146.1</u>	L	<u>145.8</u>
	Crash = R	<u>21.3</u>	L	<u>21.6</u>

Distance from front of test vehicle to point of impact:

R	<u>16.5</u>	L	<u>16.5</u>
---	-------------	---	-------------

VISIBLE DUMMY CONTACT POINTS

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Top of steering wheel rim; top of steering wheel hub.</u>	<u>Top front edge of glove box</u>
Chest	<u>Bottom of steering wheel hub; bottom rim</u>	<u>None</u>
Abdomen	<u>None</u>	<u>None</u>
Left Knee	<u>Left side steering column; underside of dash</u>	<u>Kneebar under dash</u>
Right Knee	<u>Kneebar; underside of dash</u>	<u>Kneebar under dash</u>

DOOR OPENING

<u>Front</u>		<u>Rear</u>	
<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
<u>Easy</u>	<u>Tools</u>	<u>Tools</u>	<u>Tools</u>
	<u>required</u>	<u>required</u>	<u>required</u>

SEAT MOVEMENT

Seatback Failure	<u>None</u>	<u>None</u>		
Seat Shift (in.)	<u>None</u>	<u>None</u>		

GLAZING DAMAGE

Backlight/Windshield: Backlight okay. Windshield cracked over most of surface, especially left side.
Retention loss on left and right sides.

OTHER NOTABLE IMPACT EFFECTS: Left side sill buckled just ahead of rear seat riser. Right side sill buckled 3-4 in. rearward of front of rear seat riser. Entire dash rotated upward and front of dash is separated from underlying metal structure. Left side of dash is separated from left A pillar. Front tires pinned front and rear against wheel wells. Fuel injection pump and air filter assembly separated from air cleaner cover.

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 FMVSS 212 DATA

PRE-IMPACT DATA

Make/Model: Volkswagen Jetta
Body Style: 4-door Sedan Model Year: 1981
NHTSA No. 810524 DSI No. 1147 Color: White

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk, AG West Germany
Date of Manufacture: 9/80 ; VIN WVGGA9163BW152048
GVWR: 2887 lb; GAWR: Front = 1609 lb; Rear 1345 lb

POST-IMPACT DATA

Type of Test: Frontal (0°) Impact
Date of Test: 7/22/81 Time: 1013 Temperature 93 °F
Required Impact Velocity Range: 34.5 to 35.5 mph
Impact Velocity: Primary = 34.88 mph Secondary = 34.93 mph
Test weight: 2650 lb Static crush: 25.0 in.
Rebound distance: 16.5 in.

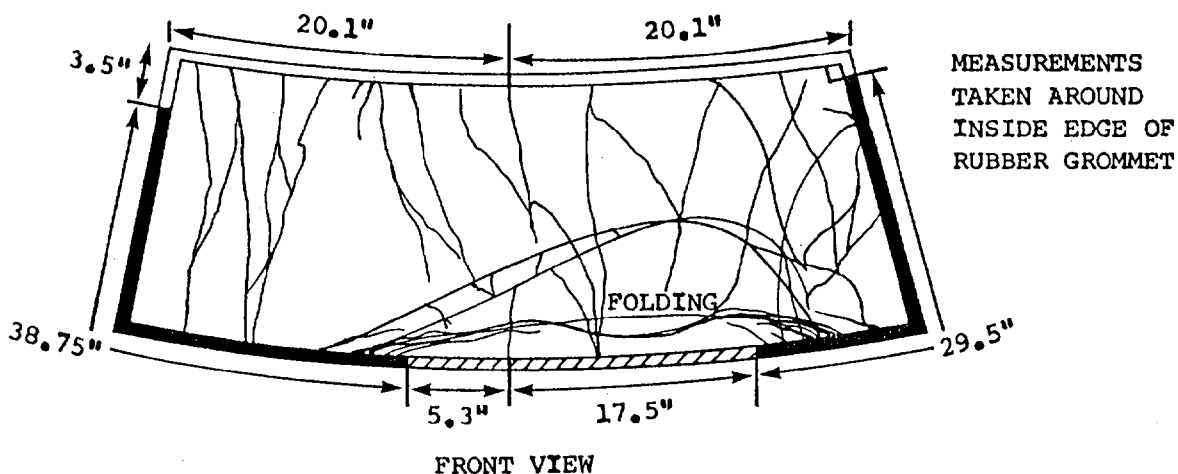
DETAILS OF WINDSHIELD MOUNTING: Windshield opening has a 3/8-in. high metal flange set 1/2 in. in from forward surface of windshield opening sheet metal creating a "channel" around the entire periphery. The windshield is held in place by a S-shaped rubber grommet pressed into this channel. The forward, inward-facing groove of the grommet holds the windshield. The rearward, outward-facing groove of the grommet fits over the flange, which has long U-shaped clips on it with rearward-facing teeth to grip the rubber grommet.

<u>WINDSHIELD PERIPHERY</u>		
	<u>Pre-test</u>	<u>Post-test</u>
<u>RIGHT SIDE</u>	<u>67.8</u>	<u>29</u>
<u>LEFT SIDE</u>	<u>67.8</u>	<u>38.3</u>
<u>***TOTAL***</u>	<u>135.5</u>	<u>67.3</u>

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

SUMMARY OF FMVSS 212 DATA (CONTD)

AREA OF RETENTION FAILURE: Total loss right side and portion of right bottom; also left side and portion of left bottom; partial loss along remainder of bottom.



NOTE: Solid dark area indicates total retention loss. Cross-hatched area indicates partial retention loss where forward side of S-shaped rubber grommet was still in contact with windshield periphery sheet metal, but rearward side of grommet was separated from the sheet metal flange. Forward side was apparently held in place by windshield wipers.

SUMMARY OF FMVSS 219 DATA

PRE-IMPACT DATA

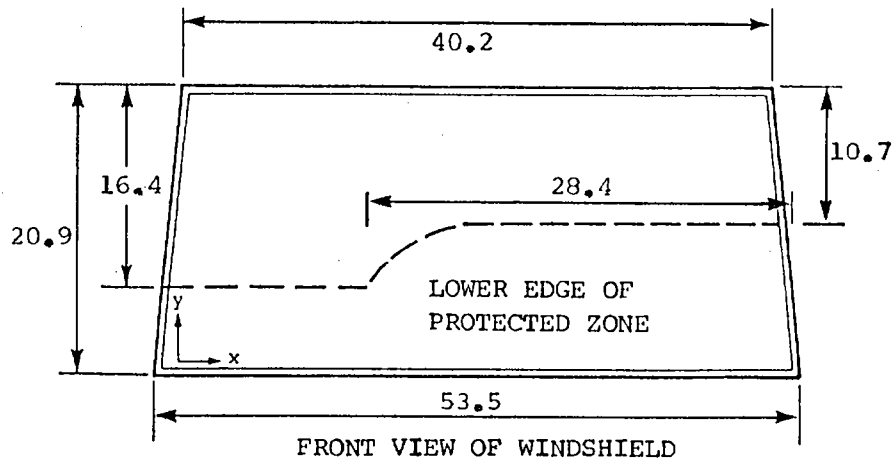
Make/Model: Volkswagen Jetta
Body Style: 4-Door Sedan Model Year: 1981
NHTSA No.: 810524 DSI No. 1147 Color: White

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk, AG West Germany
Date of Manufacture: 9/80; VIN: WWGA9163BW152048
GVWR: 2887 lb; GAWR: Front = 1609 lb; Rear = 1345 lb

POST-IMPACT DATA

Type of Test: Frontal (0°) Impact
Date of Test: 7/22/81 Time: 1013 Temperature 93 °F
Required Impact Velocity Range: 34.5 to 35.5 mph
Impact Velocity: Primary = 34.88 mph Secondary = 34.93 mph
Test weight 2650 lb Static Crush 25.0 in. Rebound 16.5 in.



- 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>None</u>	<u>None</u>

SUMMARY OF FMVSS 219 DATA (CONTD)

- 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>*</u>	<u>*</u>

*Front of dash contacted windshield across entire bottom.
Correlation flashbulb also contacted windshield.

PRE-IMPACT DATA

Make/Model: Volkswagen Jetta
Body Style: 4-door sedan Model Year: 1981
NHTSA No. 810524 DSI No. 1147 Color: White

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk, A.G., West Germany
Date of Manufacture: 9/80; VIN WVGGA9163BW152048
GVWR: 2887 lb; GAWR: Front = 1609 lb; Rear 1345 lb

POST-IMPACT DATA

Type of Test: Frontal (0°) Impact
Date of Test: 7/22/81 Time: 1013 Temperature 93 °F
Required Impact Velocity Range: 34.5 to 35.5 mph
Impact Velocity: Primary = 34.88 mph Secondary = 34.93 mph
Test weight: 2650 lb Static crush: 25.0 in.
Rebound distance: 16.5 ft.

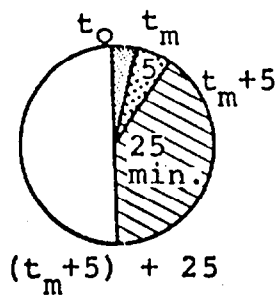
FUEL SYSTEM DATA

Test Fluid: Stoddard Solvent Specific Gravity: 0.764
Kinematic Viscosity: 0.99 centistokes Test Volume: 9.77 U.S. gal.

Test vehicle fuel tank filled to 93% of "usable" plus "unusable" capacity with Stoddard Solvent and with electric fuel pump operating (if it will operate without engine operation) until start of static roll. Part 572 test dummies located at each front designated seating position.

DETAILS OF FUEL SYSTEM: Rectangular metal fuel tank is mounted above the rear axle and under the rear seat by two longitudinal metal straps. The filler tube exits the tank as a flexible connection at the right rear corner. The metal remainder of the tube proceeds to the right of the spare tire and through the right rear wheel well to a locking twist cap located above and slightly aft of the right rear wheel. The metal sender lines are filled by an electric fuel pump on the right side of the tank. Lines loop back to a fuel filter at right rear corner of tank and then proceed forward along right floorpan and up through a hole in the unibody to the right side of the firewall. Lines proceed to left along firewall behind engine and up LF shock tower to another fuel filter mounted on a bracket attached to the injection pump. A short length of rubber hose leads into the injection pump. Four braided metal feeder lines run off the injection pump to the intake manifold at the rear of the engine and two braided metal lines run to a flow meter at the front of the engine.

FUEL SPILLAGE MEASUREMENT



1. From impact until vehicle motion ceases.....

	ACTUAL	MAXIMUM ALLOWABLE
--	--------	-------------------

0	1 oz
---	------

2. For 5-minute period after vehicle motion ceases.....

0	5 oz
---	------

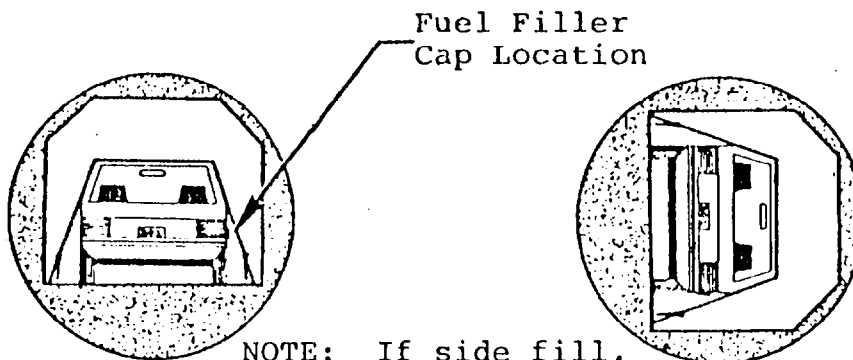
3. For next 25 minutes.

trace	1 oz/1 min
-------	------------

SOLVENT SPILLAGE DETAILS: Drips from a split in the rubber hose at the exit end of the fuel filter.

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 0° to 90° VEHICLE NHTSA NO. 810524



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

DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time.... = 1 min, 40 sec +
(Spec. Range = 1 to 3 min)
FMVSS 301 Position Hold Time..... = 5 min, 20 sec =
Total..... = 7 min, 0 sec
Next Whole Minute Interval..... = - min

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

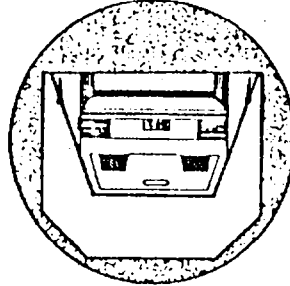
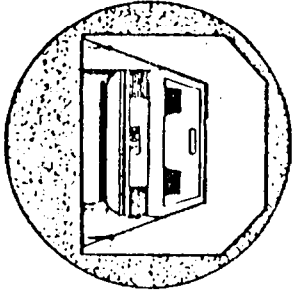
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	TRACE	0	0	-

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

SOLVENT SPILLAGE LOCATION(S): Trace spillage noted onto top of intake manifold during roll. Source unknown.

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 90° to 180° VEHICLE NHTSA NO. 810524



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, 22 sec =
 Total..... = 7 min, 0 sec
 Next Whole Minute Interval..... = - min

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

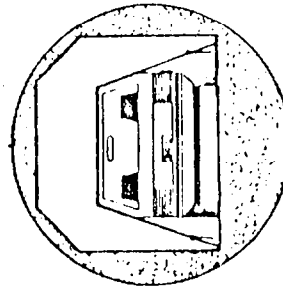
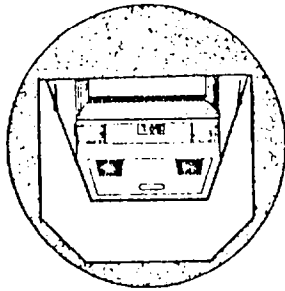
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	TRACE	TRACE	TRACE	-

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

SOLVENT SPILLAGE LOCATION(S): Split in fuel filter exit hose.

SECTION 3
FMVSS 301-75 INDICANT STATIC ROLLOVER DATA SHEET

TEST PHASE: 180° to 270° VEHICLE NHTSA NO. 810524



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, 23 sec =

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

Next Whole Minute Interval..... = - min

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

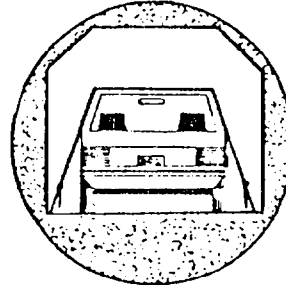
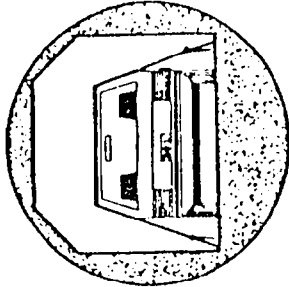
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	TRACE	0	0	-

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

SOLVENT SPILLAGE LOCATION(S): Split in fuel filter exit hose.

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 270° to 360° VEHICLE NHTSA NO. 810524



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, 21 sec =

Total..... = 7 min, 0 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	0	0	0	-

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

SOLVENT SPILLAGE LOCATION(S): NONE

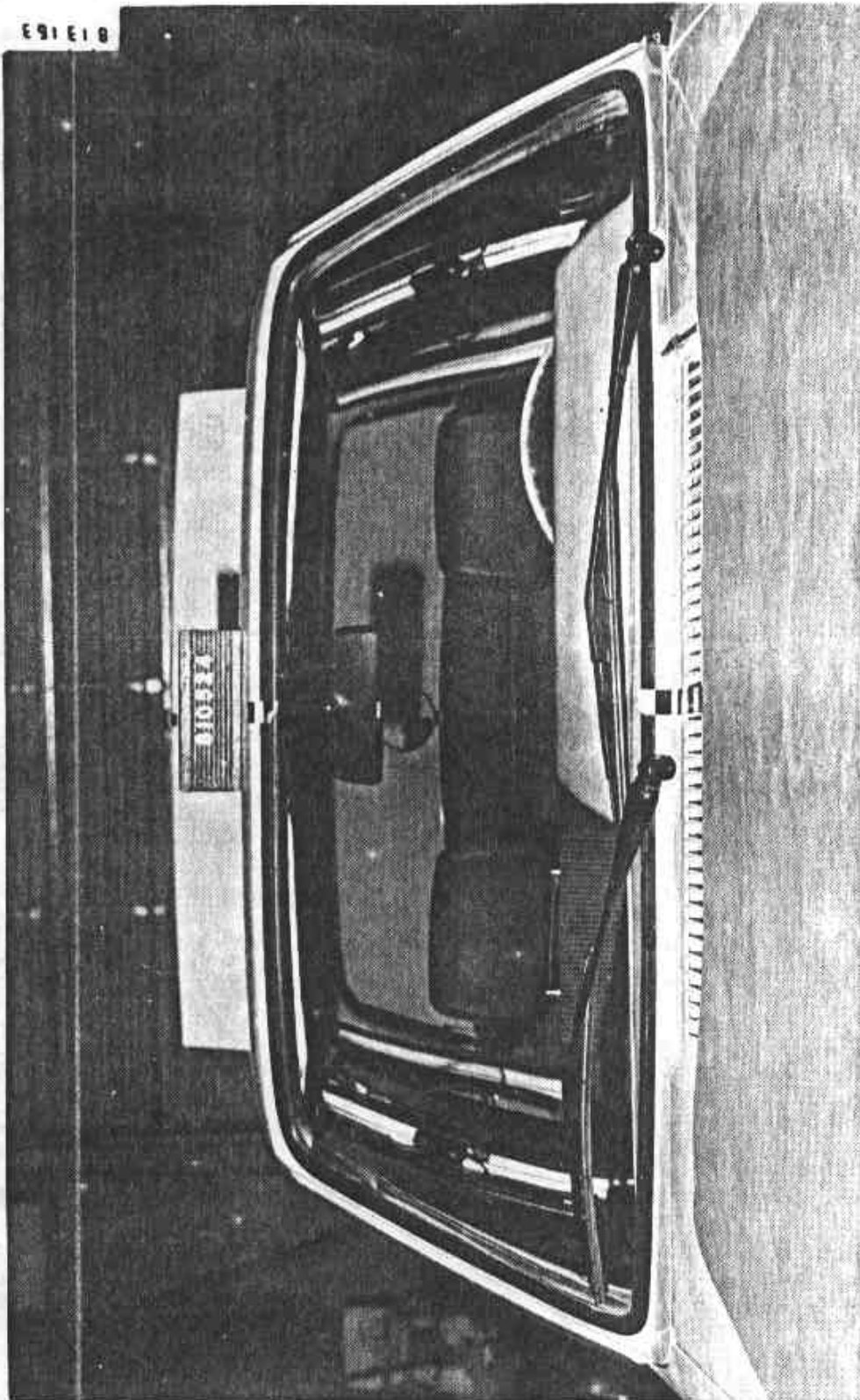


FIGURE 3-1. PRE-TEST WINDSHIELD - 1981 VOLKSWAGEN JETTA - NHTSA 810524.

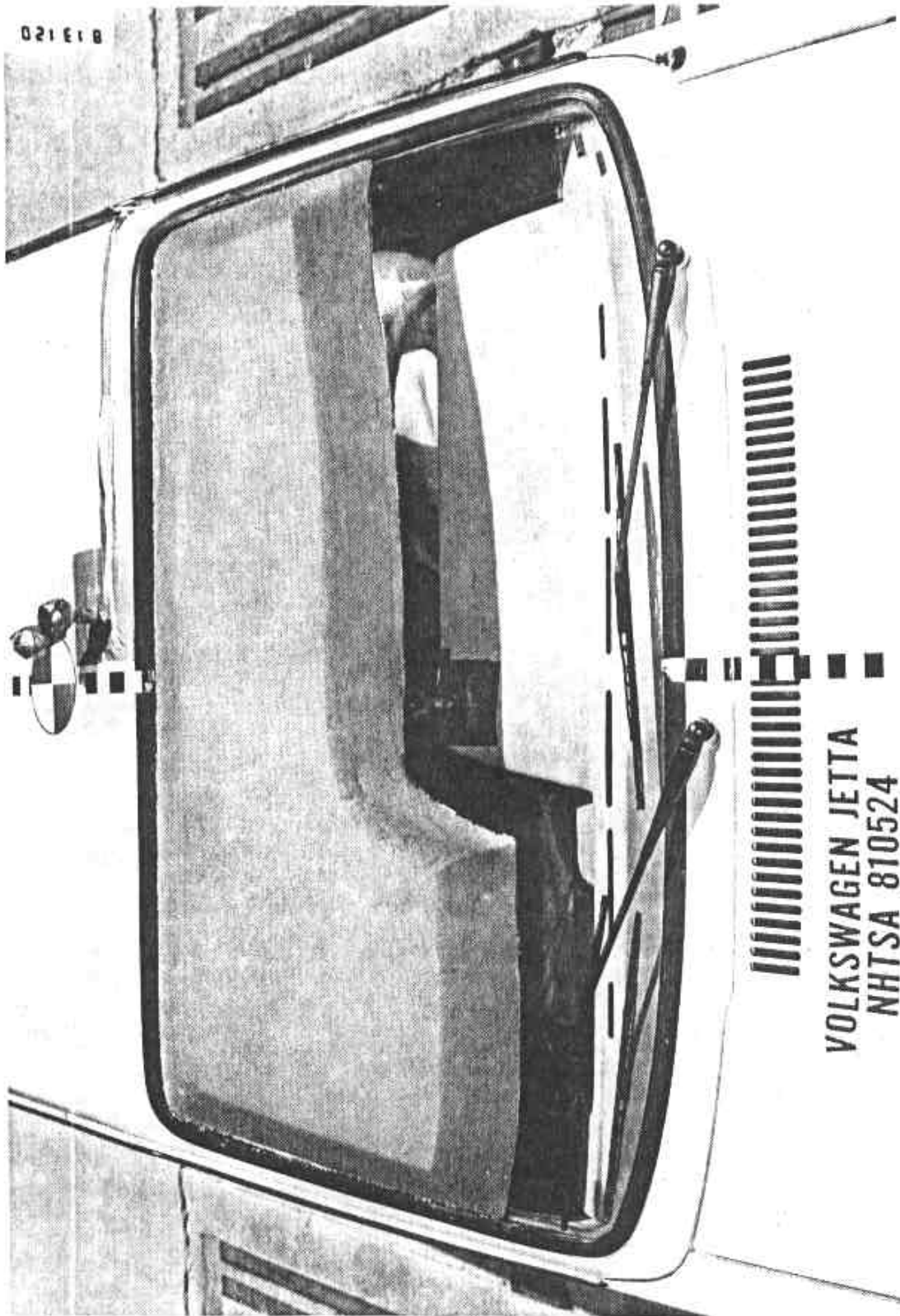


FIGURE 3-2. PRE-TEST WINDSHIELD WITH STYROFOAM TEMPLATE - 1981 VOLKSWAGEN JETTA - NHTSA 810524.

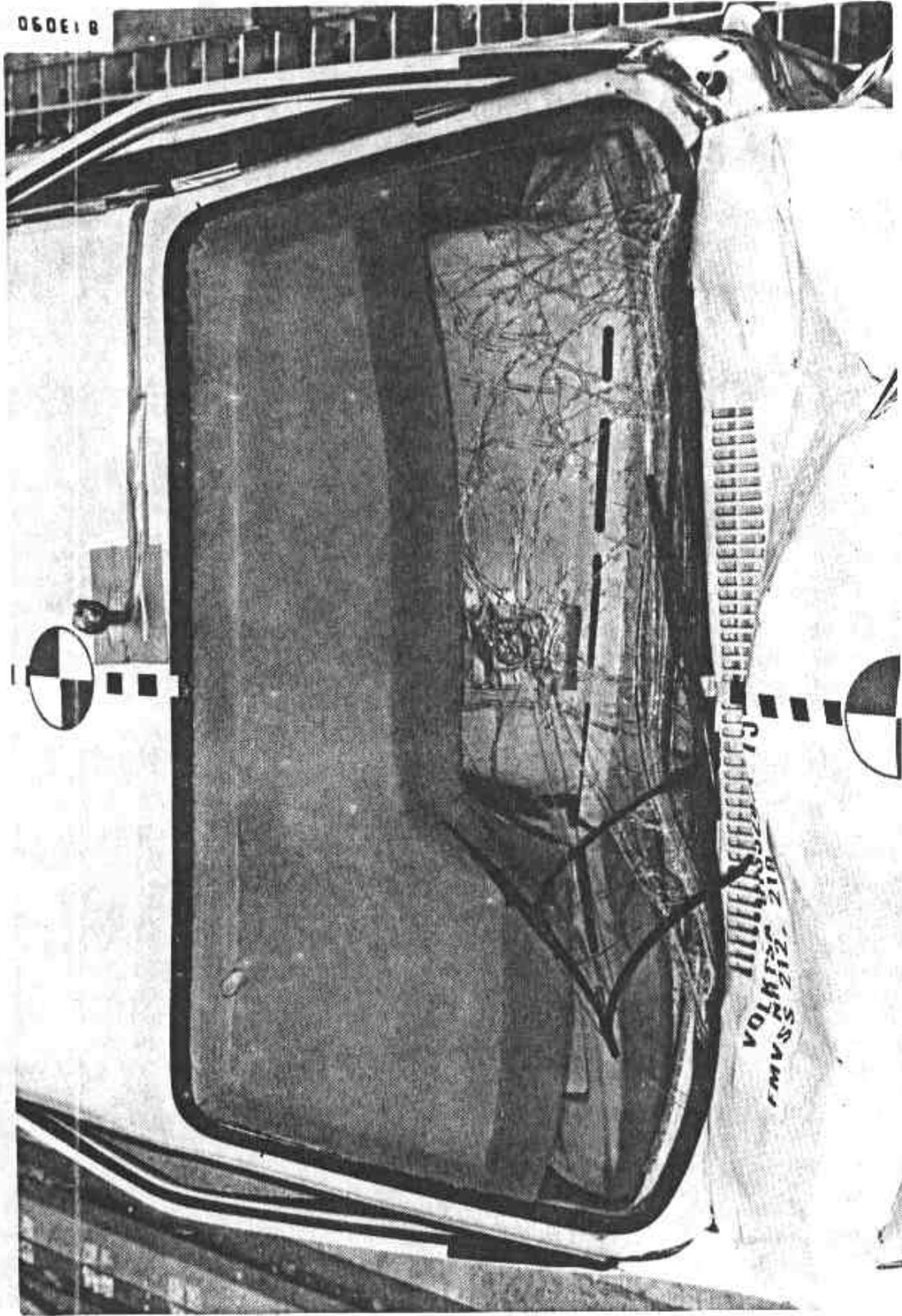


FIGURE 3-3. POST-TEST WINDSHIELD - 1981 VOLKSWAGEN JETTA - NHTSA 810524.

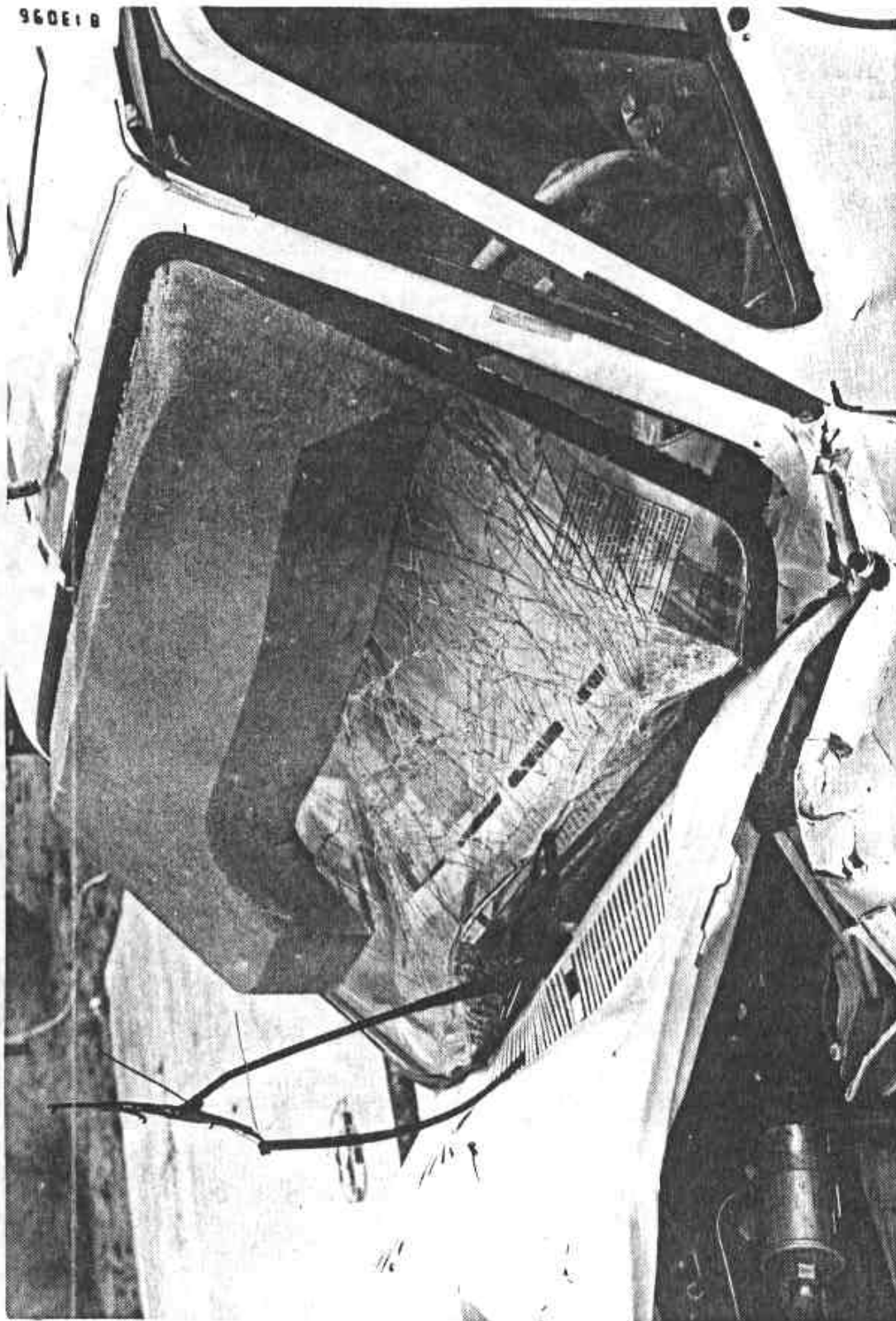


FIGURE 3-4. LEFT SIDE OF WINDSHIELD SHOWING RETENTION FAILURE - 1981
VOLKSWAGEN JETTA - NHTSA 810524.



FIGURE 3-5. RIGHT SIDE OF WINDSHIELD SHOWING RETENTION FAILURE - 1981 VOLKSWAGEN JETTA -
NHTSA 810524.

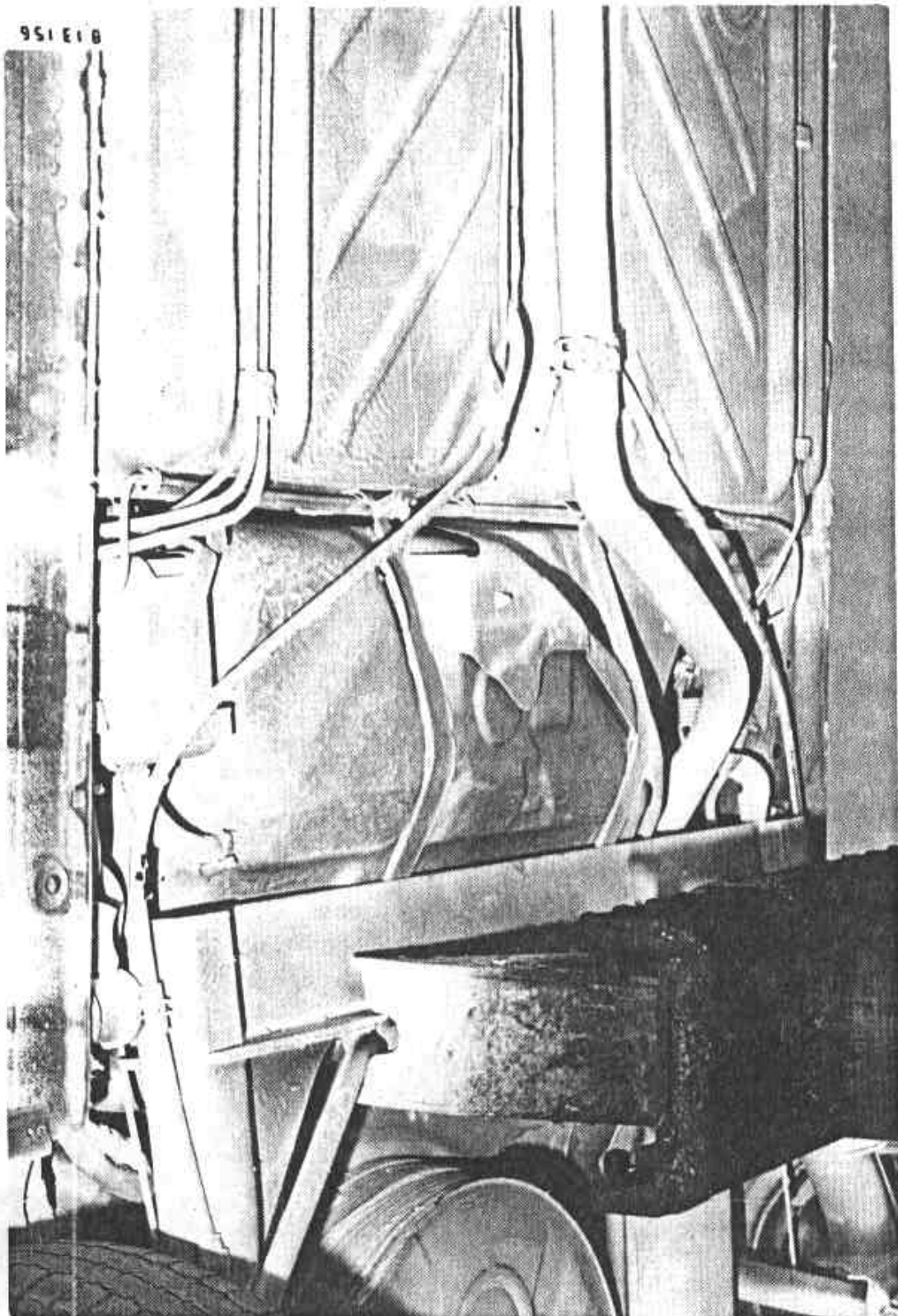


FIGURE 3-6. PRE-TEST FUEL TANK - 1981 VOLKSWAGEN JETTA - NHTSA 810524.

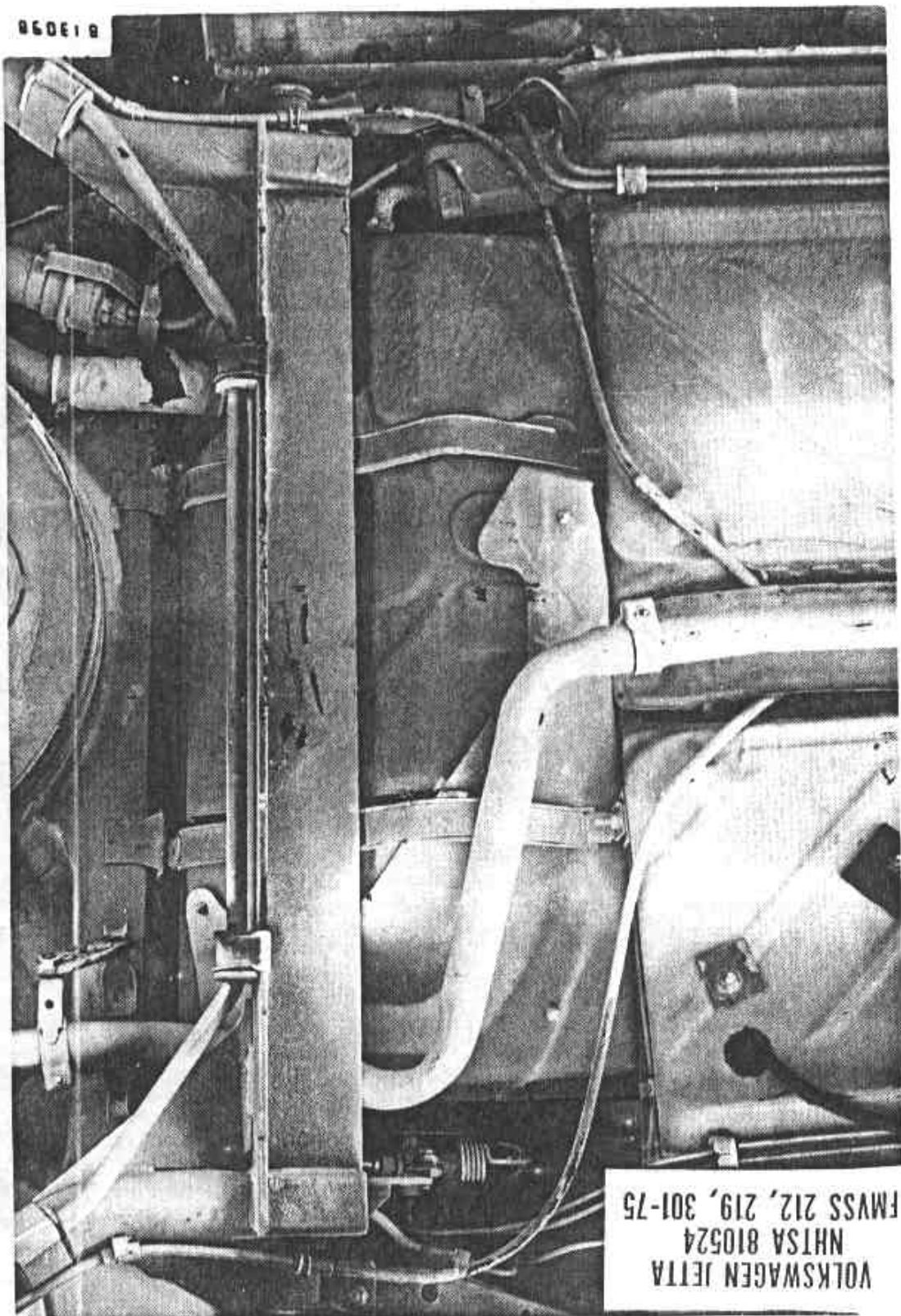


FIGURE 3-7. POST-TEST FUEL TANK - 1981 VOLKSWAGEN JETTA - NHTSA 810524.

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.

PART 572 DUMMY IN-VEHICLE POSITION RECORDING SHEET

PRE-IMPACT DATA

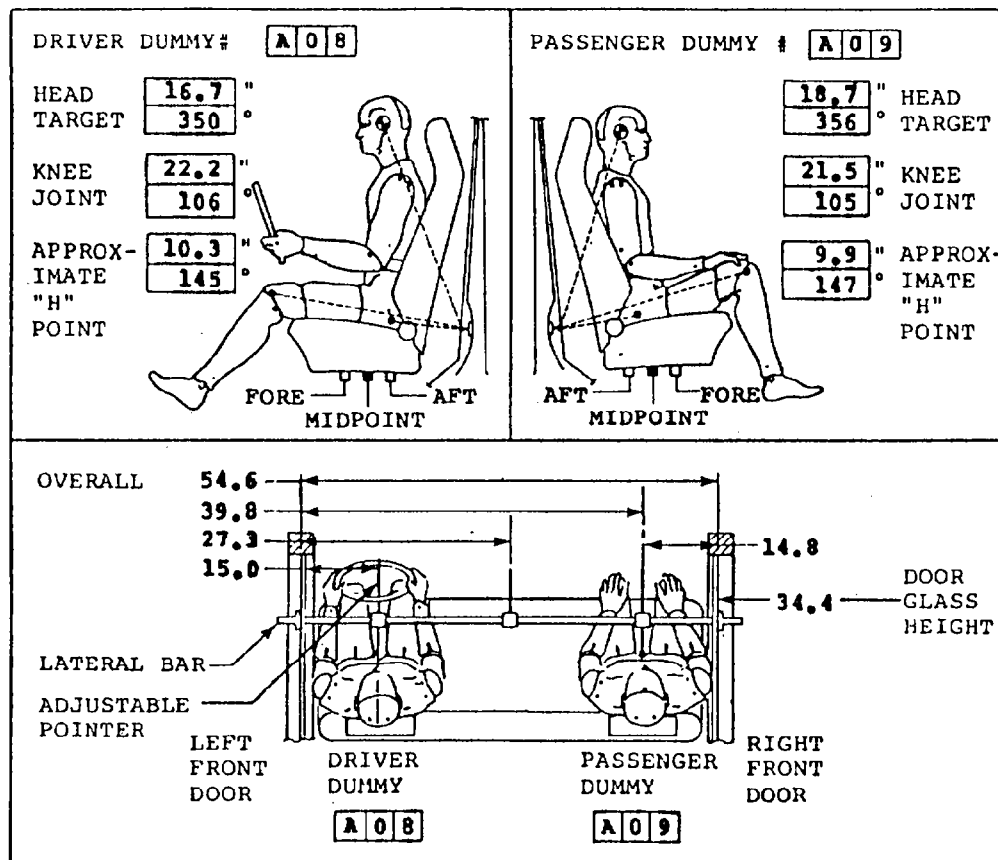
Make/Model: Volkswagen Jetta
 Body Style: 4-Door Sedan Model Year: 1981
 NHTSA No.: 810524 DSI No. 1147 Color: White

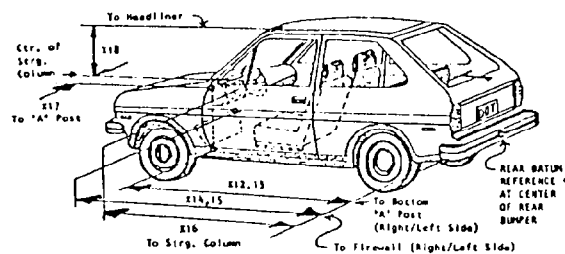
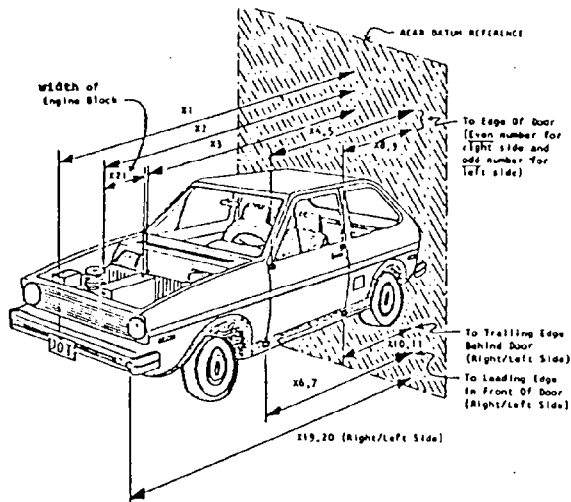
DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk, A.G., West Germany
 Date of Manufacture: 9/80 ; VIN: WVGGA9163BW152048
 GVWR: 2887 lb; GAWR: Front = 1609 lb; Rear = 1345 lb

POST-IMPACT DATA

Type of Test: Frontal (0°) Impact
 Date of Test: 7/22/81 Time: 1013 Temperature 93 °F
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: Primary = 34.88 mph Secondary = 34.93 mph
 Seat Type: Bucket Adjuster Type: Manual
 Bucket Seat Back Type: Adjustable
 Technicians: Terry Bjork, Mike Rodack





PRE-/POST-TEST STATIC MEASUREMENT DATA

Vehicle: Volkswagen Jetta

NHTSA No.: 810524

Test Date: 7/22/81

D.S. No.: 1147

Reference Dimension	Pre-test Measurement	Post-test Measurement	Change
X ₁ *	169.0	144.0	25.0
X ₂	143.0	131.1	11.9
X ₃	129.0	120.5	8.5
X ₄	116.1	114.4	1.7
X ₅	116.1	115.9	0.2
X ₆	116.5	113.8	2.7
X ₇	116.5	115.7	0.8
X ₈ *	80.1	78.5	1.6
X ₉ *	80.1	80.0	0.1
X ₁₀	80.4	77.6	2.8
X ₁₁	80.4	79.6	0.8
X ₁₂	115.9	113.1	2.8
X ₁₃	115.9	115.1	0.8
X ₁₄	130.1	122.1	8.0
X ₁₅	130.9	123.2	7.7
X ₁₆	101.0	99.6	1.4
X ₁₇	15.2	15.4	0.2
X ₁₈	18.0	16.0	2.0
X ₁₉	167.4	146.1	21.3
X ₂₀	167.4	145.8	21.6
X ₂₁	10.8	10.8	0.0

NOTE: Rear Bumper Foam Removed

VEHICLE PROFILE DATA

PRE-IMPACT DATA

Make/Model Volkswagen Jetta
 Body Style 4-door sedan Model Year 1981
 NHTSA No. 810524 DSI No. 1147 Color White

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer Volkswagenwerk A.G., West Germany
 Date of Manufacture 9/80 VIN WVGGA9163BW152048
 GVWR 2887 lb; GAWR: Front = 1609 lb; Rear 1345 lb

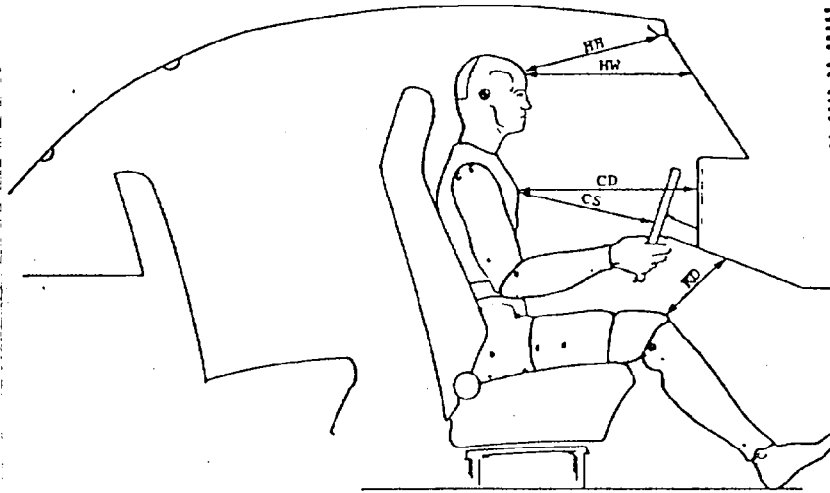
POST-IMPACT DATA

Type of Test: Frontal (0°) Impact
 Date of Test: 7-22-81 Time: 1013 Temperature 93 °F
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: Primary = 34.88 mph Secondary = 34.93 mph

Measurements Referenced to Plane 14' 5.8" Feet Forward Rear
 Bumper G_L.

Location	Height	Vehicle Left (in.)				Vehicle Right (in.)		
		27.0	16.2	5.4	G _L	5.4	16.2	27.0
Pre-Test Profile (in.)								
Top of Front Bumper	18.8	6.2	5.2	4.8	4.8	4.8	5.2	6.2
Front of Hood	28.7	12.6	11.2	10.7	10.6	10.7	11.2	12.6
Post-test Profile (in.)								
Top of Front Bumper	20.5	28.3	28.9	29.6	29.8	29.5	28.9	28.8
Front of Hood	28.8	31.1	31.2	31.6	31.8	32.3	31.6	32.7
Post-test Static Crush (in.)								
Top of Front Bumper	1.7	22.1	23.7	24.8	25.0	24.7	23.7	22.6
Front of Hood	0.1	18.5	20.0	20.9	21.2	21.6	20.4	20.1

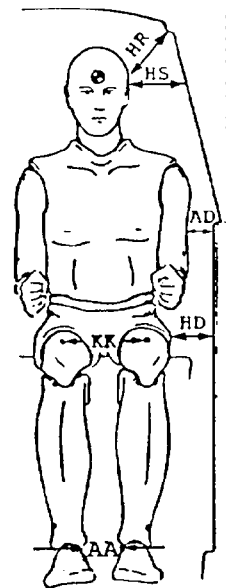
PART 572 DUMMY IN-VEHICLE POSITION RECORDING SHEET



	Driver	Passenger
HH	19.6	18.9
HW	26.2	25.7
CD	23.1	22.8
CS	14.9	N/A
KD	L5.7/R5.1	L4.3/R4.3
Torso Angle	27°	26°
Seat Back Angle	27°	27°

HH = Head to Windshield Header
 HW = Head to Windshield
 CD = Chest to Dash
 CS = Chest to Steering Wheel
 KD = Knees to Dash
 HR = Head to Side Roof
 HS = Head to Side Window
 AD = Arm to Door
 HD = Hip to Door
 KK = Knee to Knee
 AA = Ankle to Ankle
 Torso and seat back angles are relative to vertical.

Remarks: Dummies positioned according to OVSC recommended procedure for positioning part 572 dummies in test vehicle. Seat backs 1.45 adjuster turns rear of full forward. Head rests in full up position. AA and KK measured between limb centers.



	Driver	Passenger
HR	7.0	6.7
HS	8.8	8.3
AD	3.9	3.6
HD	6.0	5.8
KK	9.3	9.0
AA	10.5	10.5

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	12.4	45	126.0	73	14.0	45	69.0	95
Lateral	2.6	46	32.2	88	50.9	109	6.1	164
Vertical	68.8	96	10.6	108	74.8	99	6.1	27
Resultant	127.3	73			106.8	95		
HIC	1209.7 between 72 and 104 msec				1271.7 between 78 and 116 msec			
Chest Acceleration								
Longitudinal	13.6	190	70.7	76	0.8	199	42.5	86
Lateral	26.6	85	9.4	80	8.1	79	48.2	89
Vertical	9.7	43	17.0	79	14.2	77	10.0	89
Resultant (Max)	73.1	76			58.9	89		
Resultant (clip)	68.3 between 75 and 79 msec				52.1 between 85 and 91 msec			
TIME > 60 G	6 msec				0 msec			
SEVERITY INDEX	617.5 @ 200 msec				400.0 @ 200 msec			
	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)
Femur Loads								
Left			1276.3	63			1558.6	62
Right			1190.9	62			1286.0	71
Belt Loads								
Torso	2285.4	86			2298.9	85		
Vehicle Impact Speed (mph): 34.88								
*Longitudinal:	Forward				**Longitudinal:	Rearward		
Lateral:	Rightward				Lateral:	Leftward		
Vertical:	Downward				Vertical:	Upward		

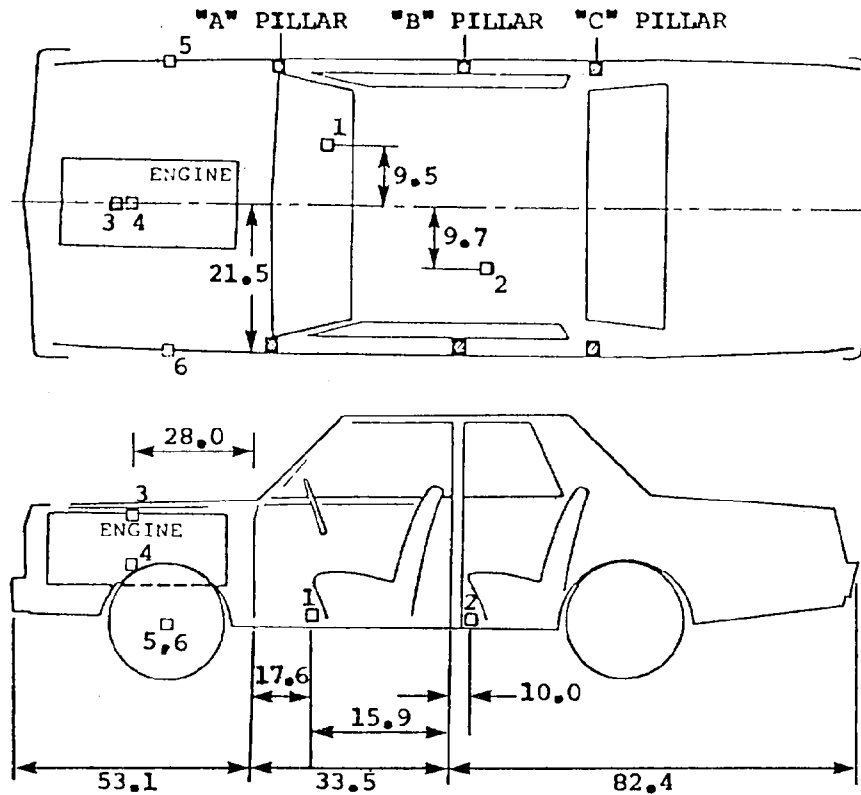
DUMMY KINEMATIC SUMMARY

DRIVER - After impact, lower legs were pushed rearward and knees were forced upward, loading into underside of dash. Torso rotated forward and lower chest struck lower rim of steering wheel. As torso belt tightened, upper chest struck steering wheel hub and mouth area of dummy struck upper steering wheel rim. Head continued forward rotation and chin impacted top of steering wheel hub. Dummy rebounded off column with a counterclockwise rotation and rightward lean and recontacted seat such that head plane was right of headrest. Head continued rearward rotation past 90° rear of vertical as seatback arrested torso rebound.

PASSENGER - After impact, knees were forced upward only slightly and loaded into kneebar. Torso rotated forward. After torso belt tightened, head continued forward with a slight clockwise rotation, striking the top of the glove box first with the left cheek and then the entire left front quarter of the head. Dummy rebounded with a slight clockwise rotation and recontacted seat.

OTHER: Entire dash assembly broke loose of underlying sheet metal and moved forward pushing out bottom of windshield.

VEHICLE ACCELEROMETER SUMMARY

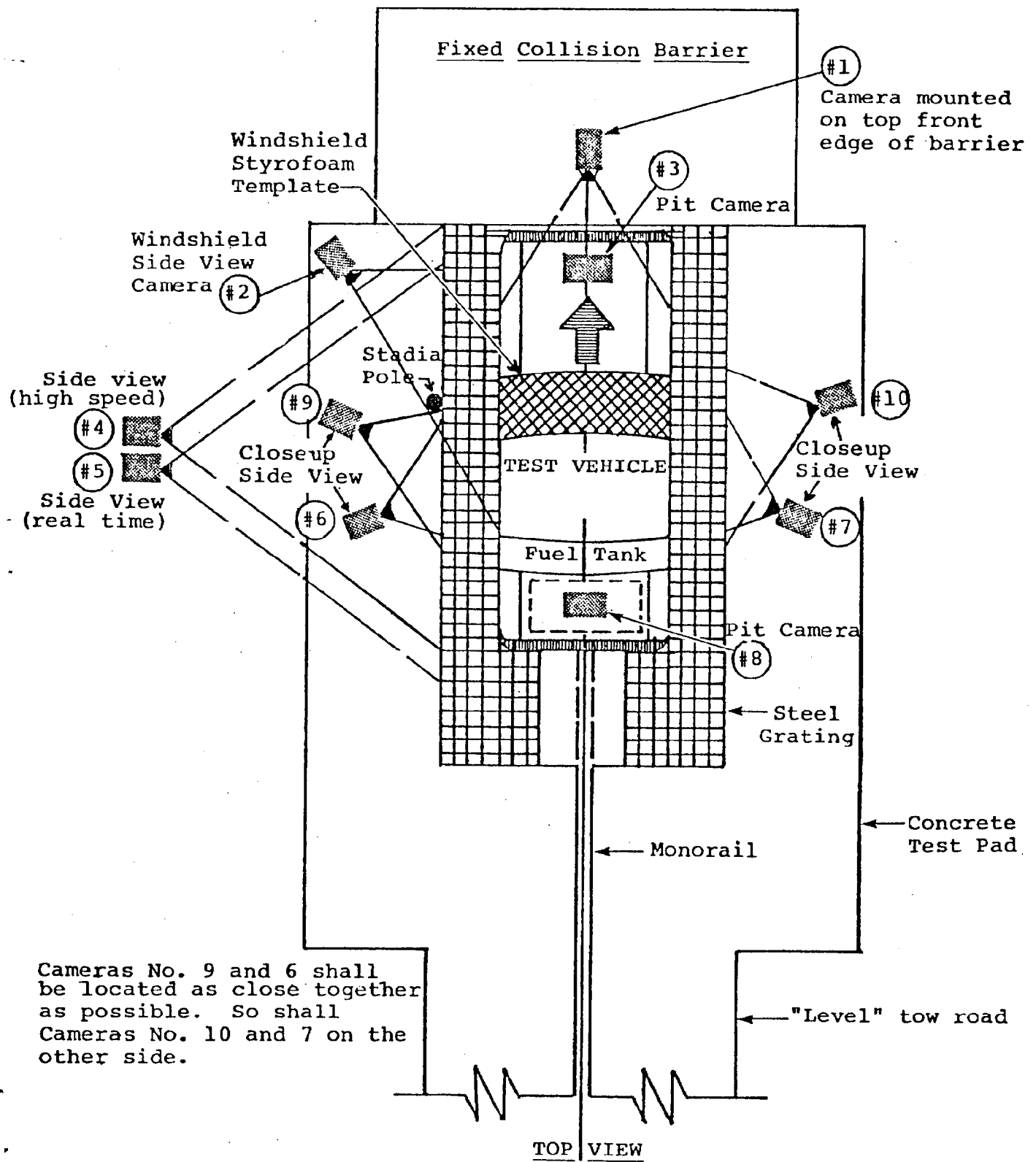


No.	Location Description	Component Direction	Data Summary Peak G @ msec							
			X	Y	Z	"+"	"-"	"+"	"-"	"+"
1	Left front Floor pan	✓	10.6	83.2		13	48			
2	Left Rear Floor pan	✓	3.7	37.2		143	52			
3	Top of Engine	✓	48.6	260.3		43	29			
4	Bottom of Engine	✓	39.2	181.4		40	24			
5	RF Brake Caliper	✓	30.9	173.7		54	41			
6	LF Brake Caliper	✓	71.2	146.6		49	41			
*Positive:			X = Forward	Y = Rightward	Z = Downward					
Negative:			X = Rearward	Y = Leftward	Z = Upward					

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	16	400	99	LC326	-40"	0"	N/A
2	Ground Based (Left)	Windshield	16	400	100	M9	-31"	126"	N/A
3	Pit	Engine underside and fuel pump	8	1000	100	P5	34"	0"	-8"
4	Ground Based (Left)	Views entire left side of vehicle	30	400	99	LC327	54"	661"	N/A
5	Ground Based (Real Time)	Documentary	24						
6	Ground Based (Left)	Driver dummy closeup	13	1000	99	P11	58"	113"	63"
7	Ground Based (Right)	Passenger dummy closeup	15	1000	99	P6	59"	129"	61"
8	Pit	Fuel tank	8	1000	99	P10	99"	0	-8"
9	Ground Based (Left)	Same view as Camera No. 6*	13	1000	99	P7	69"	113"	63"
10	Ground Based (Right)	Same view as Camera No. 7*	15	1000	101	P8	74"	129"	61"

*View included in test film



APPENDIX A
PHOTOGRAPHS

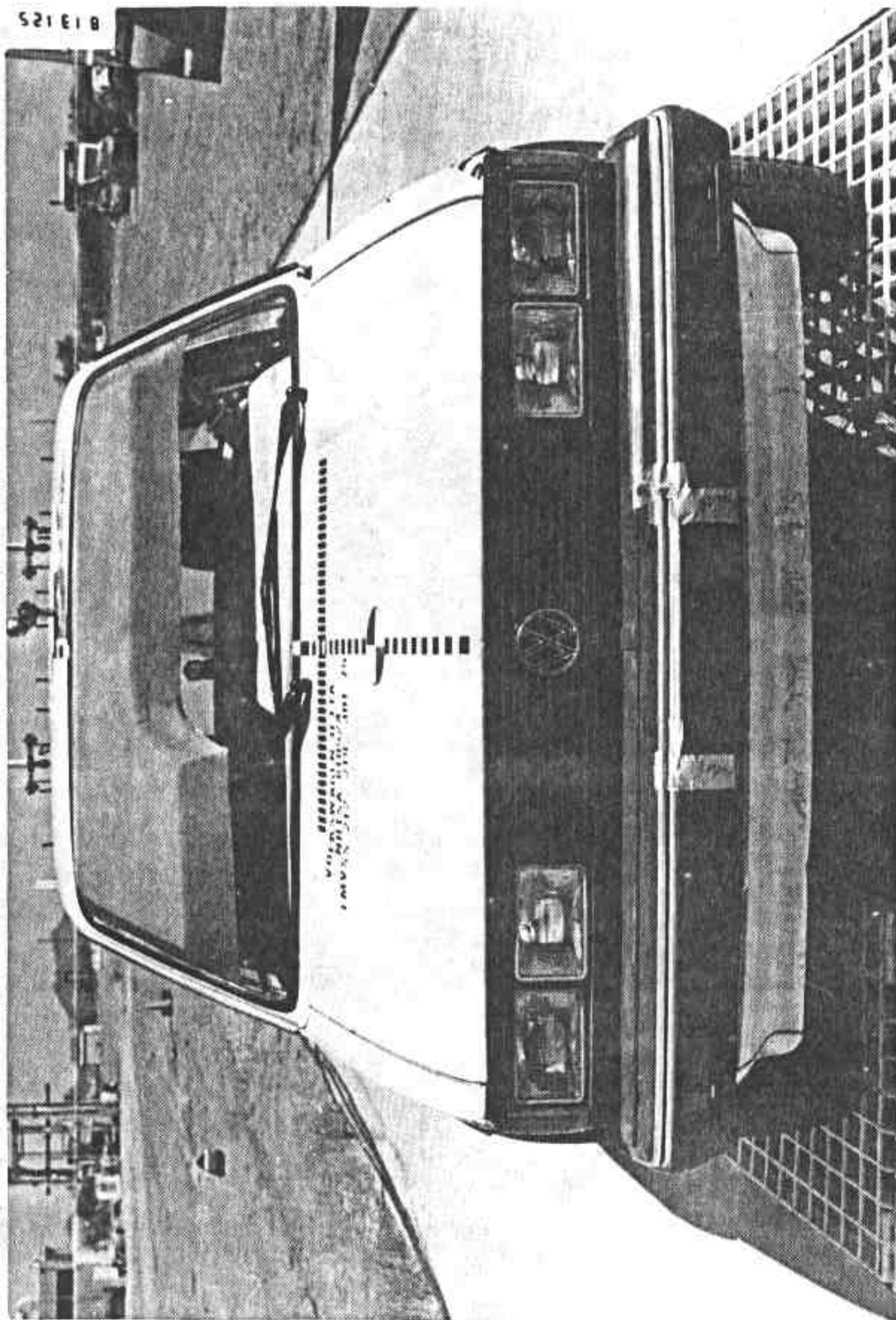


FIGURE A-1. PRE-TEST FRONT VIEW - 1981 VOLKSWAGEN JETTA - NHTSA 810524.

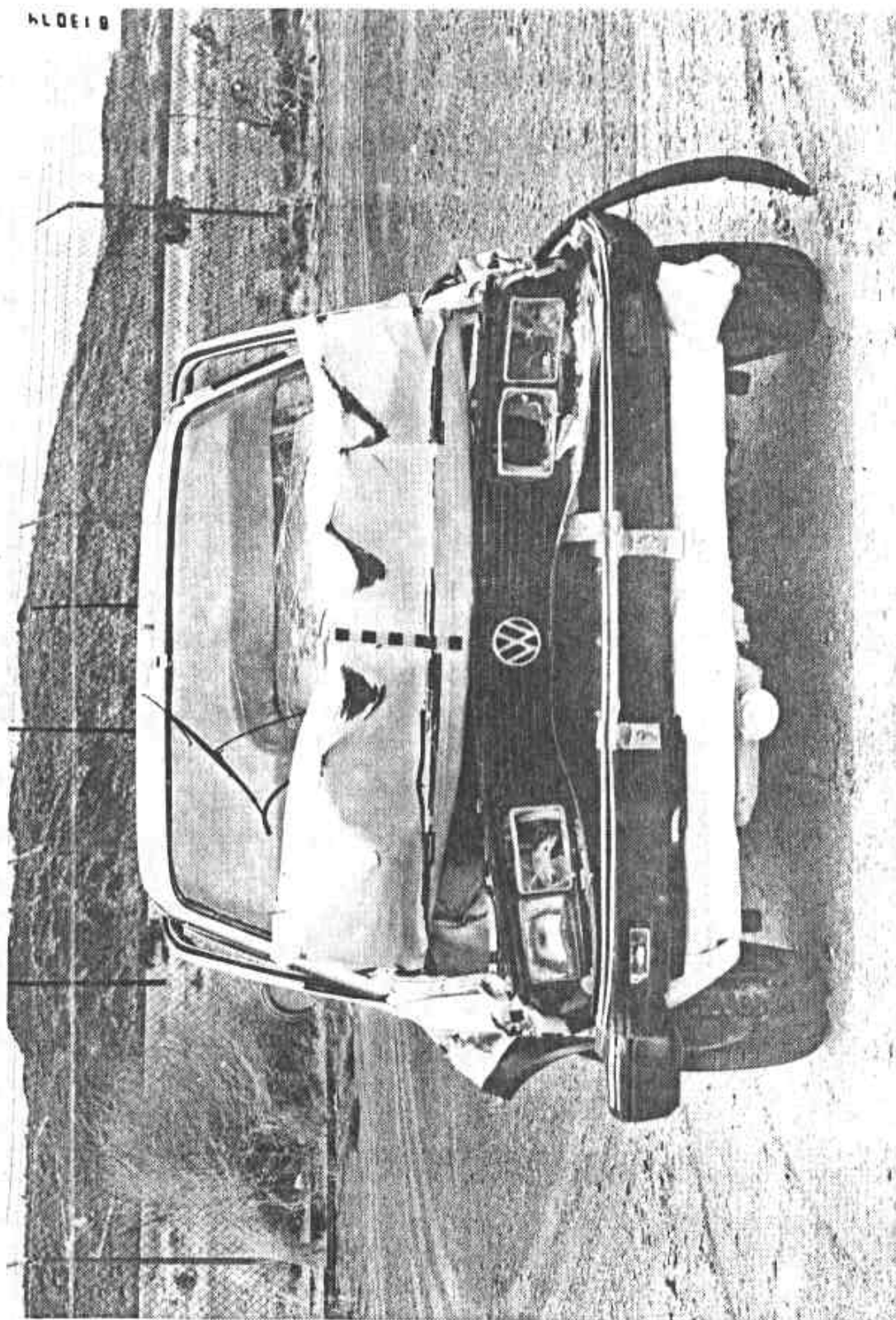


FIGURE A-2. POST-TEST FRONT VIEW - 1981 VOLKSWAGEN JETTA - NHTSA 810524.

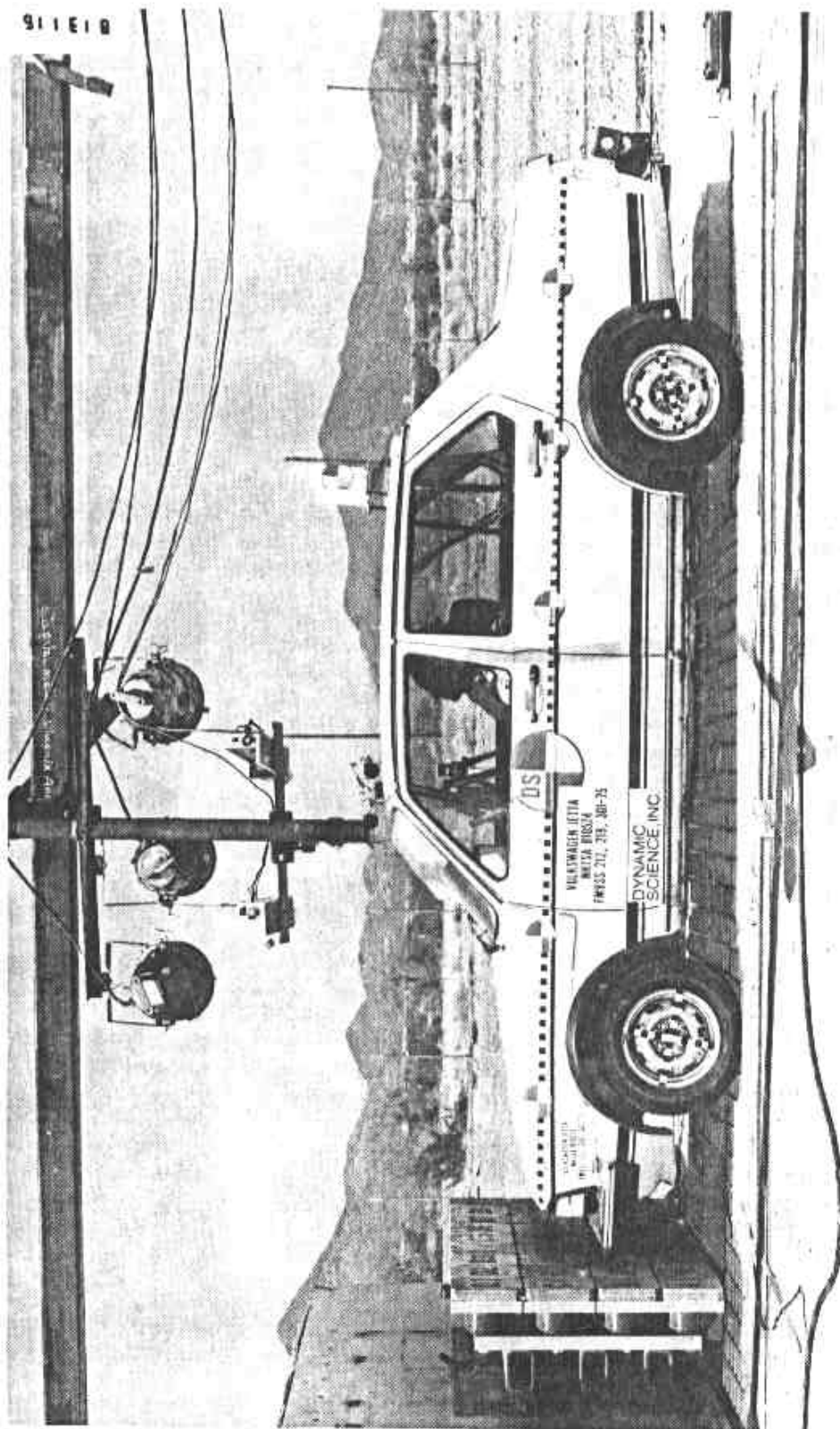


FIGURE A-3. PRE-TEST SIDE VIEW - 1981 VOLKSWAGEN JETTA - NHTSA 810524.

800E1B

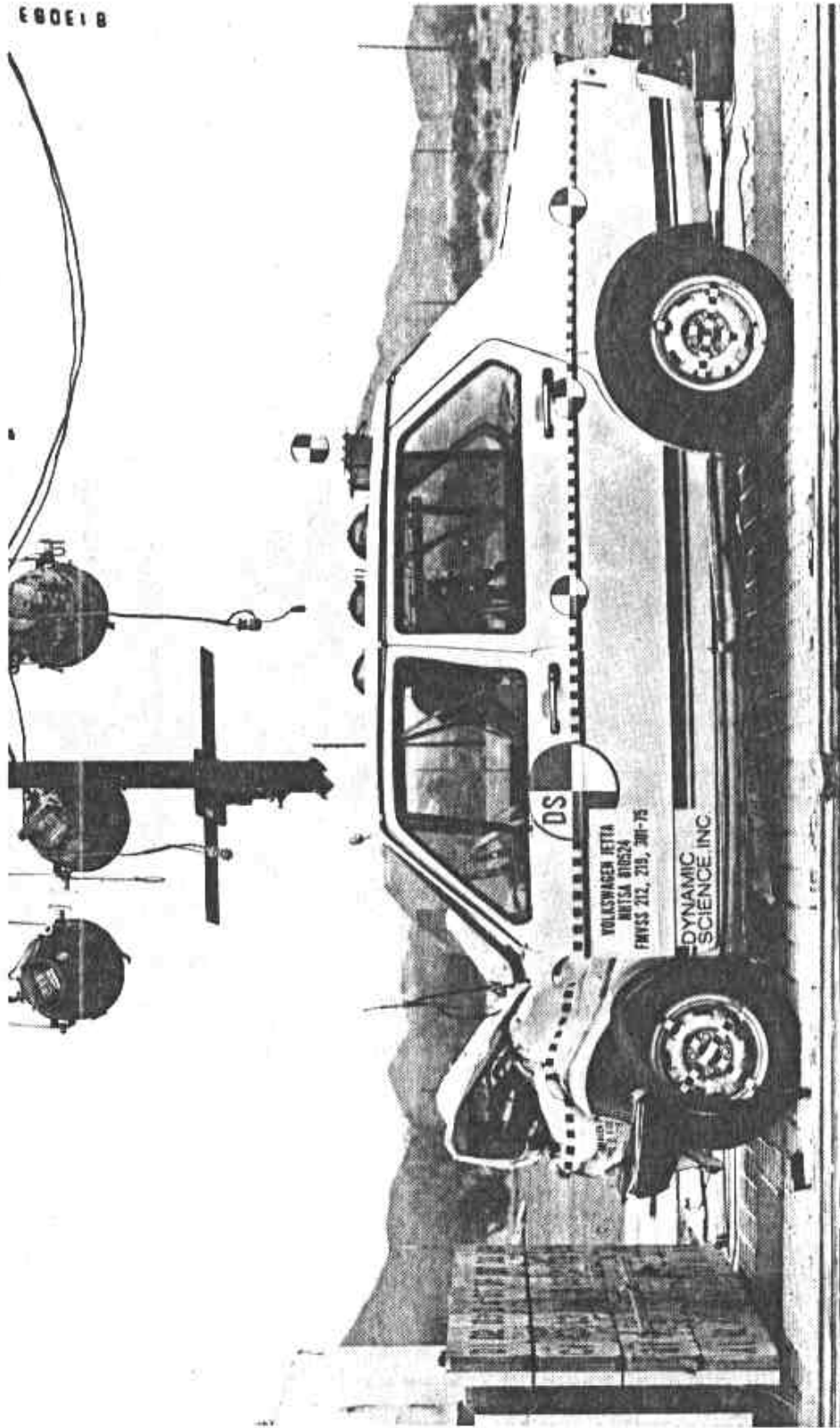


FIGURE A-4. POST-TEST SIDE VIEW - 1981 VOLKSWAGEN JETTA - NHTSA 810524.

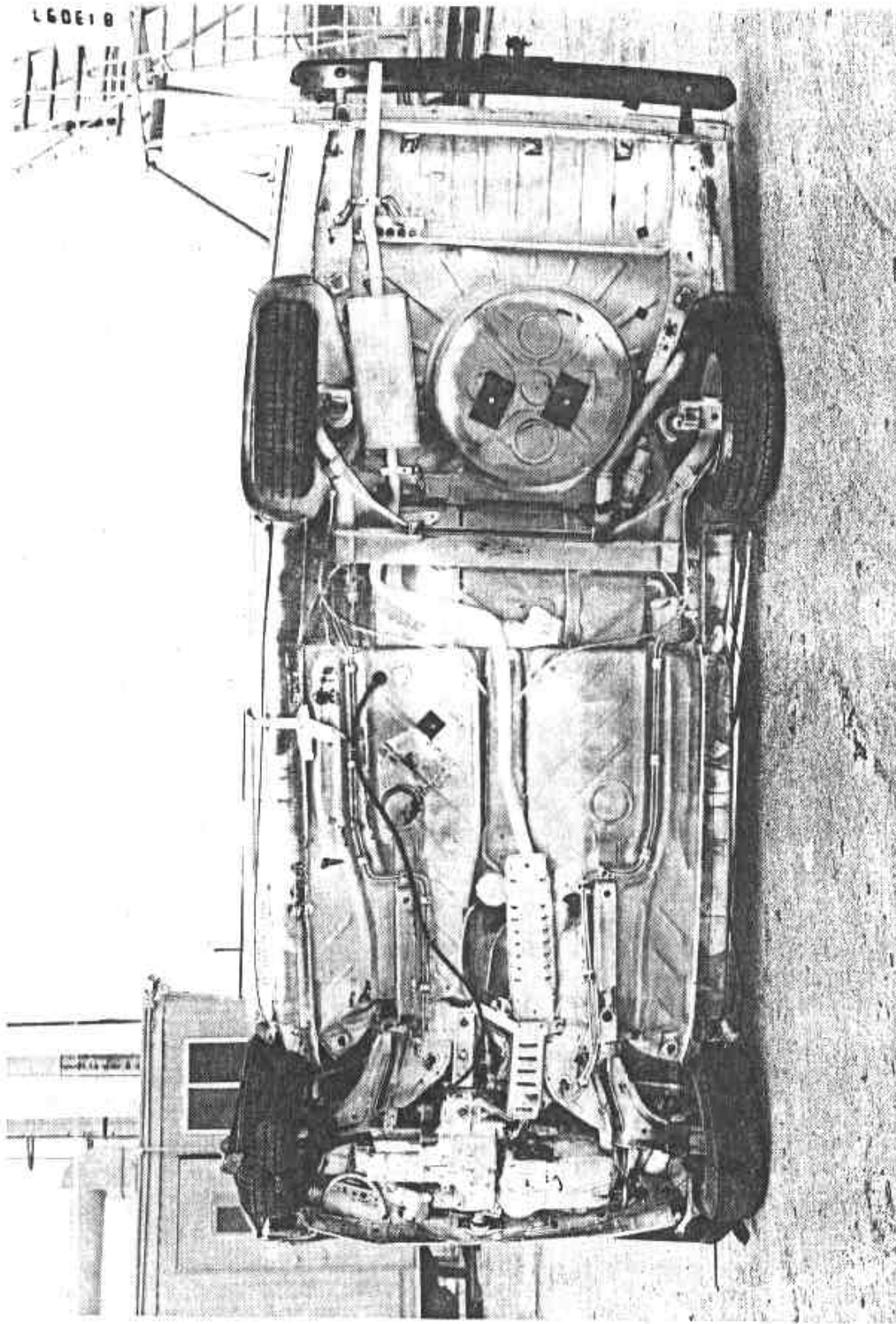
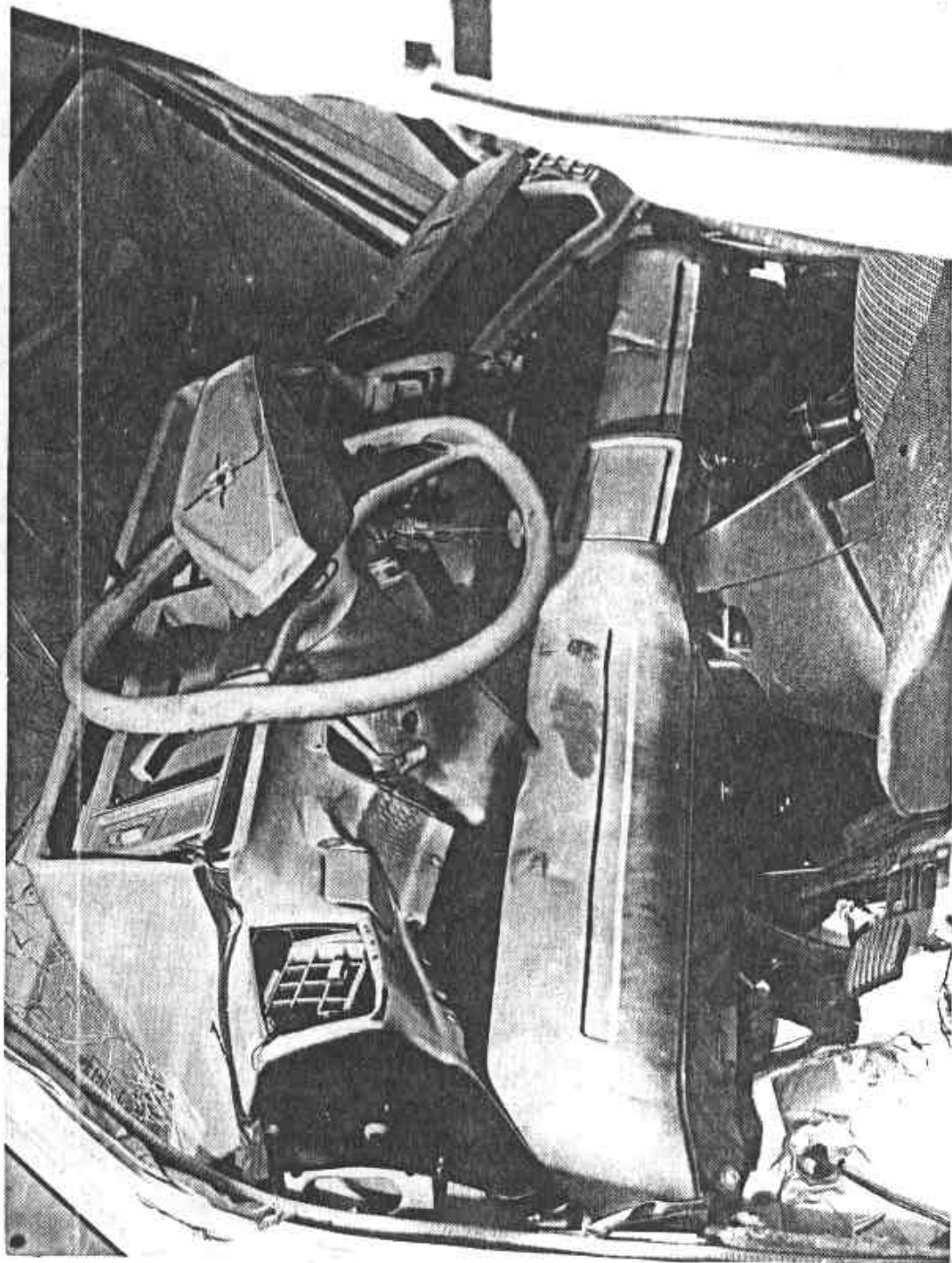


FIGURE A-5. POST-TEST OVERALL UNDERSIDE - 1981 VOLKSWAGEN JETTA - NHTSA 810524.



190610

FIGURE A-6. POST-TEST DRIVER COMPARTMENT DASH DEFORMATION - 1981 VOLKSWAGEN JETTA -
NHTSA 810524.

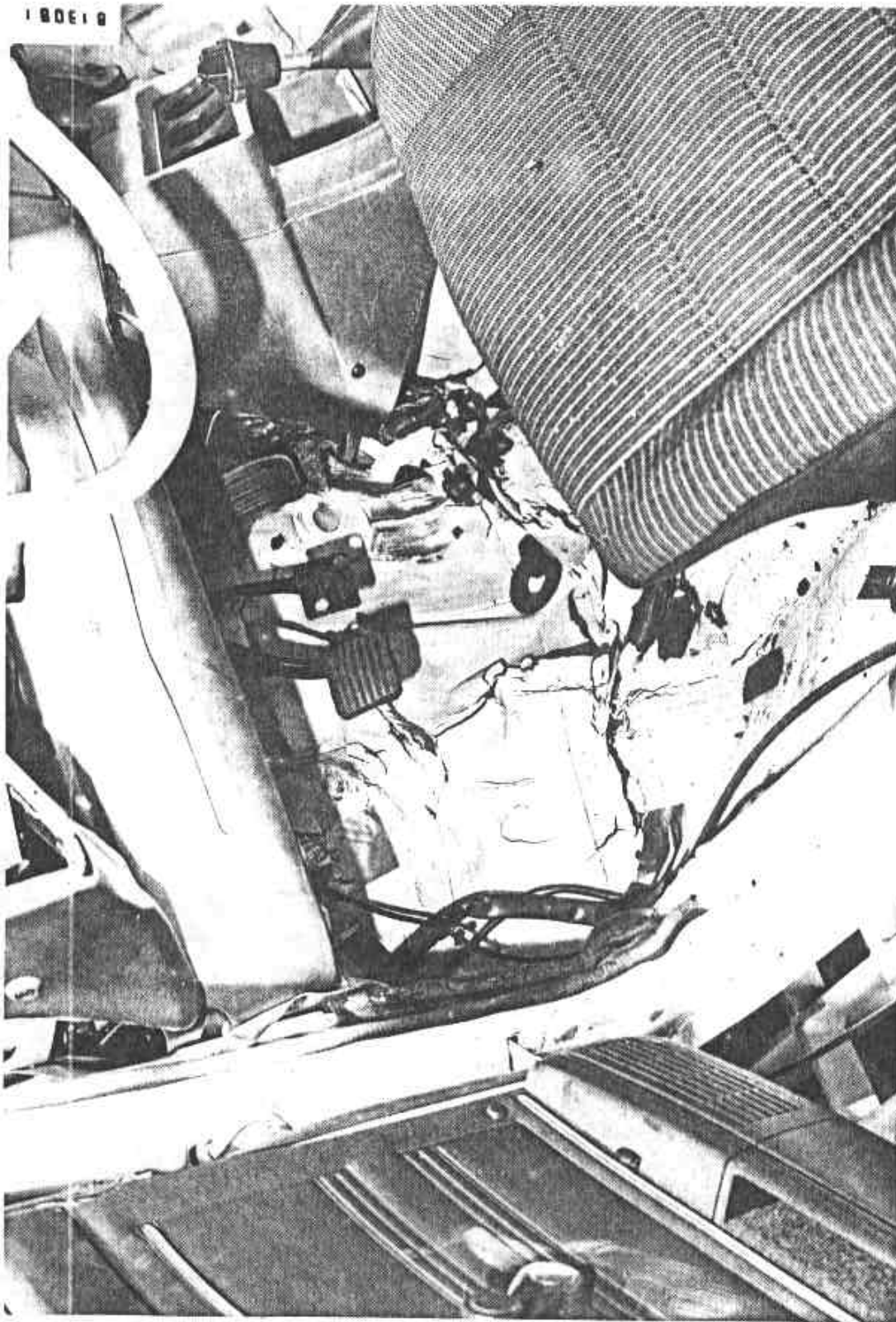


FIGURE A-7. POST-TEST DRIVER COMPARTMENT FLOOR DEFORMATION - 1981 VOLKSWAGEN JETTA -
NHTSA 810524.



FIGURE A-8. POST-TEST PASSENGER COMPARTMENT DASH DEFORMATION - 1981 VOLKSWAGEN JETTA - NHTSA 810524.



FIGURE A-9. PRE-TEST DRIVER DUMMY POSITION - 1981 VOLKSWAGEN
JETTA - NHTSA 810524.



FIGURE A-10. POST-TEST DRIVER DUMMY POSITION - 1981
VOLKSWAGEN JETTA - NHTSA 810524.
A-11

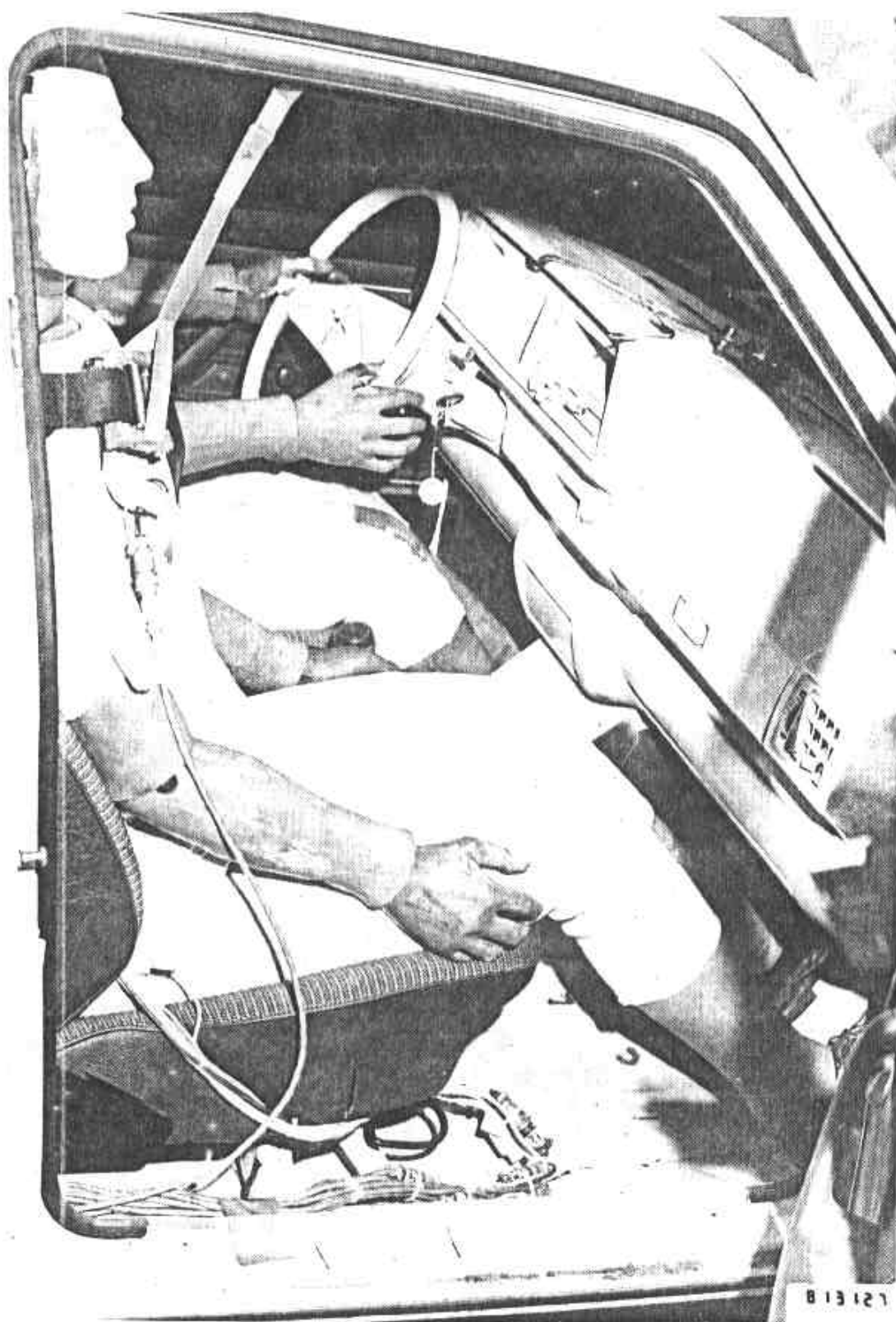


FIGURE A-11. PRE-TEST PASSENGER DUMMY POSITION - 1981
VOLKSWAGEN JETTA - NHTSA 810524.



FIGURE A-12. POST-TEST PASSENGER DUMMY POSITION - 1981
VOLKSWAGEN JETTA - NHTSA 810524.

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)

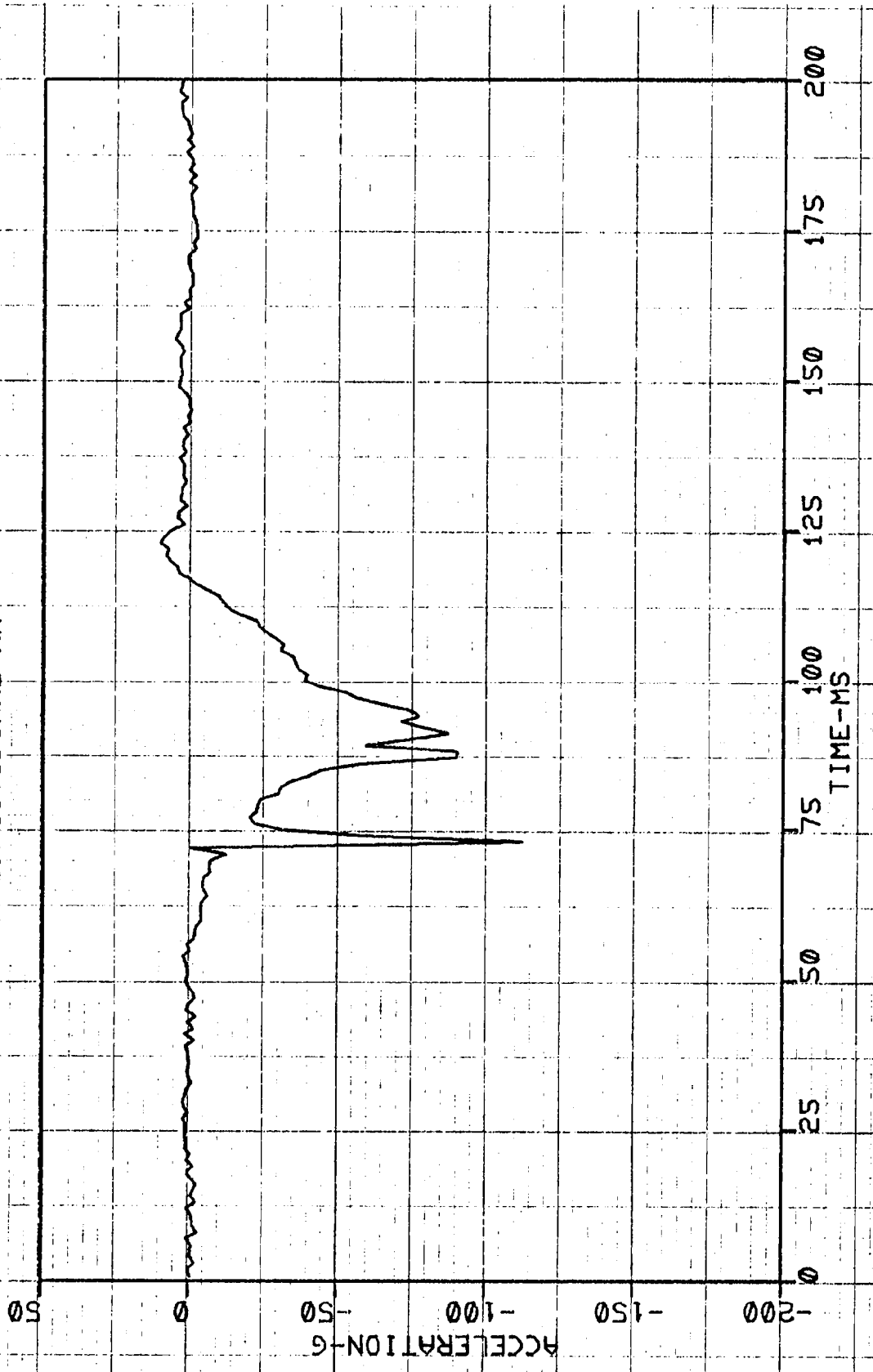
Vehicle Data**

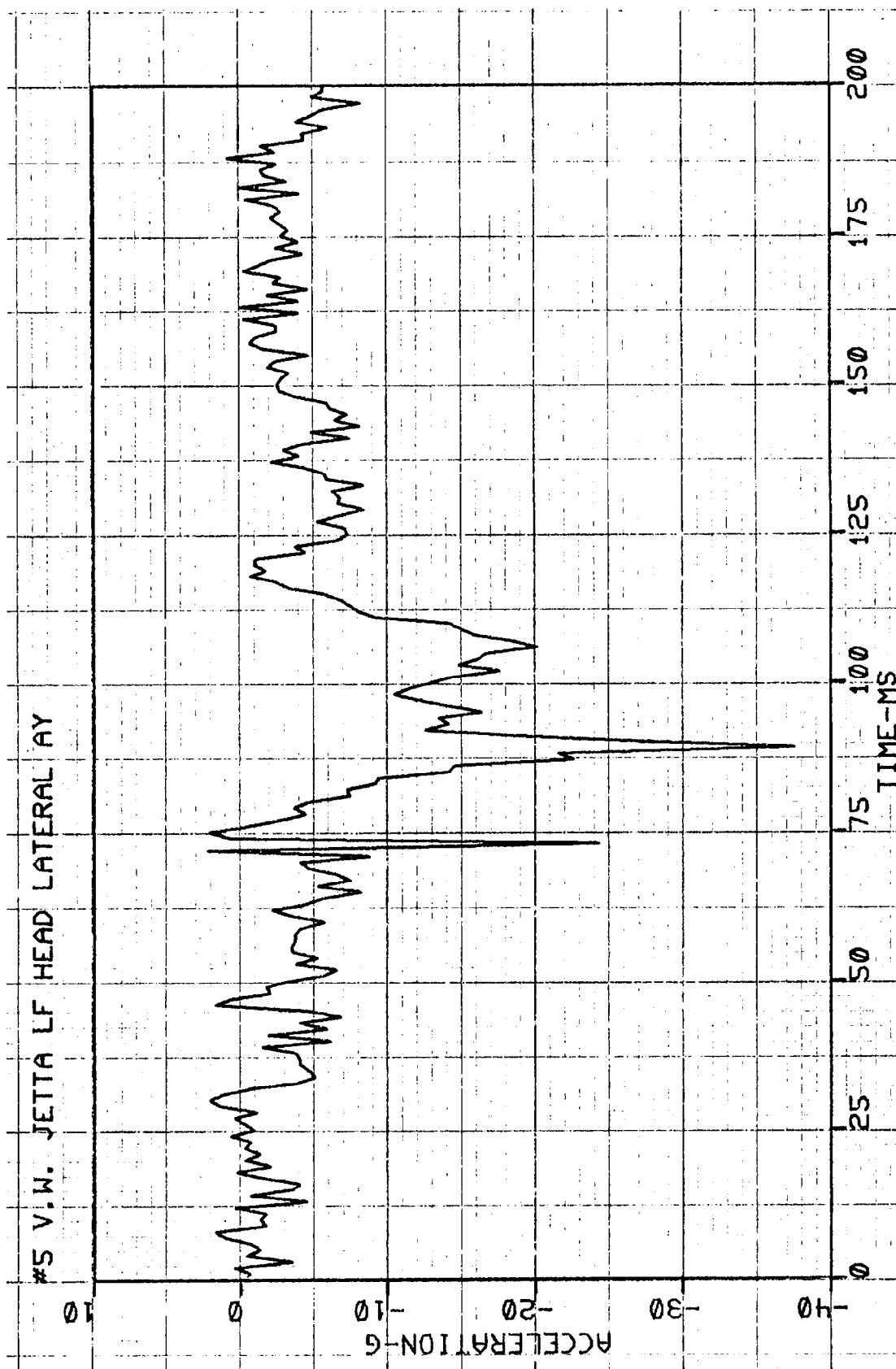
	<u>Location</u>
Loc 1	Front Seat Area Acceleration (G)
Loc 2	Rear Seat Area Acceleration (G)

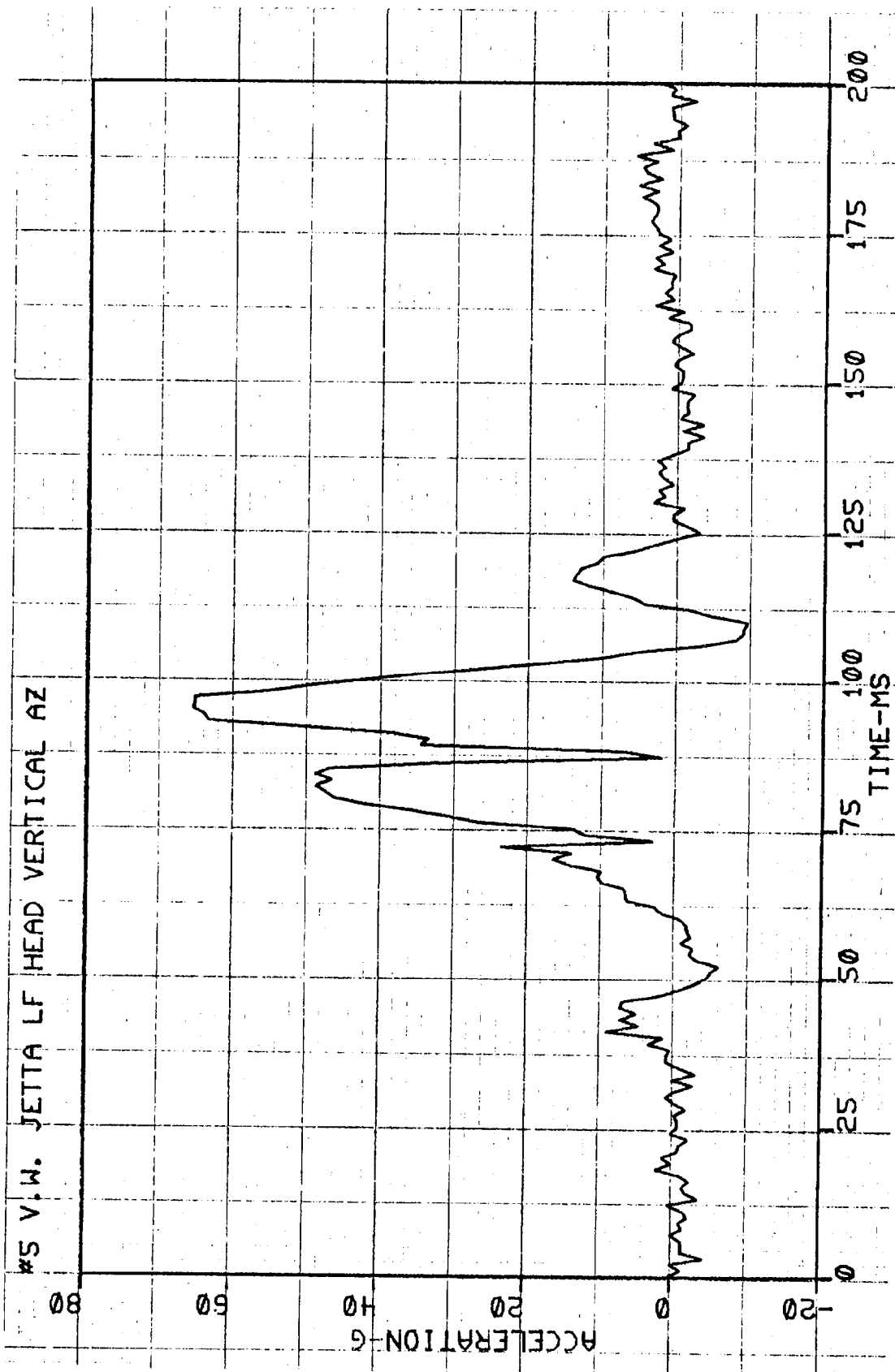
*Dummy Injury Summary presented on pages 4-6 and 4-7.

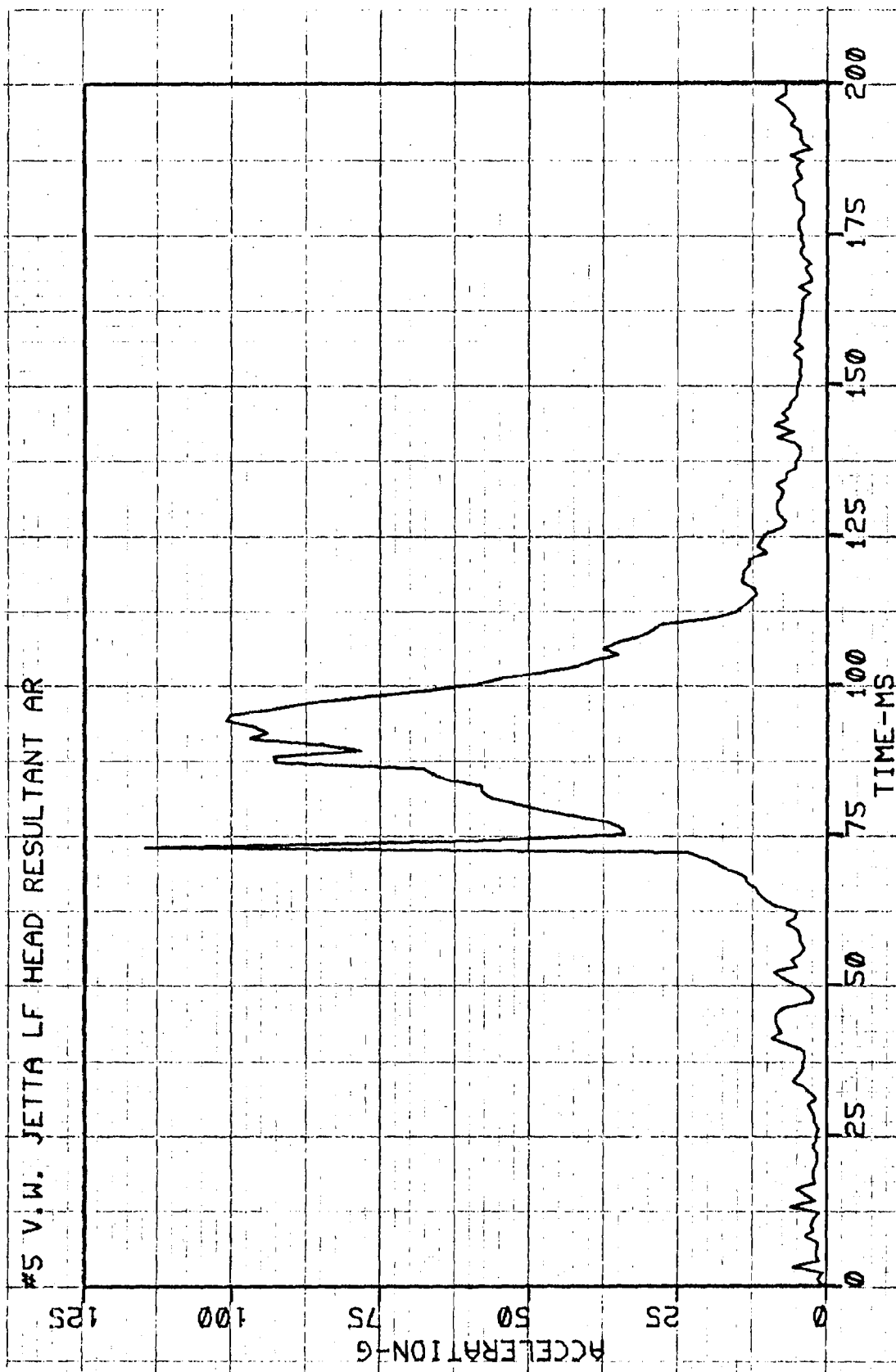
**Vehicle accelerometer location and data summarized on page 4-8.

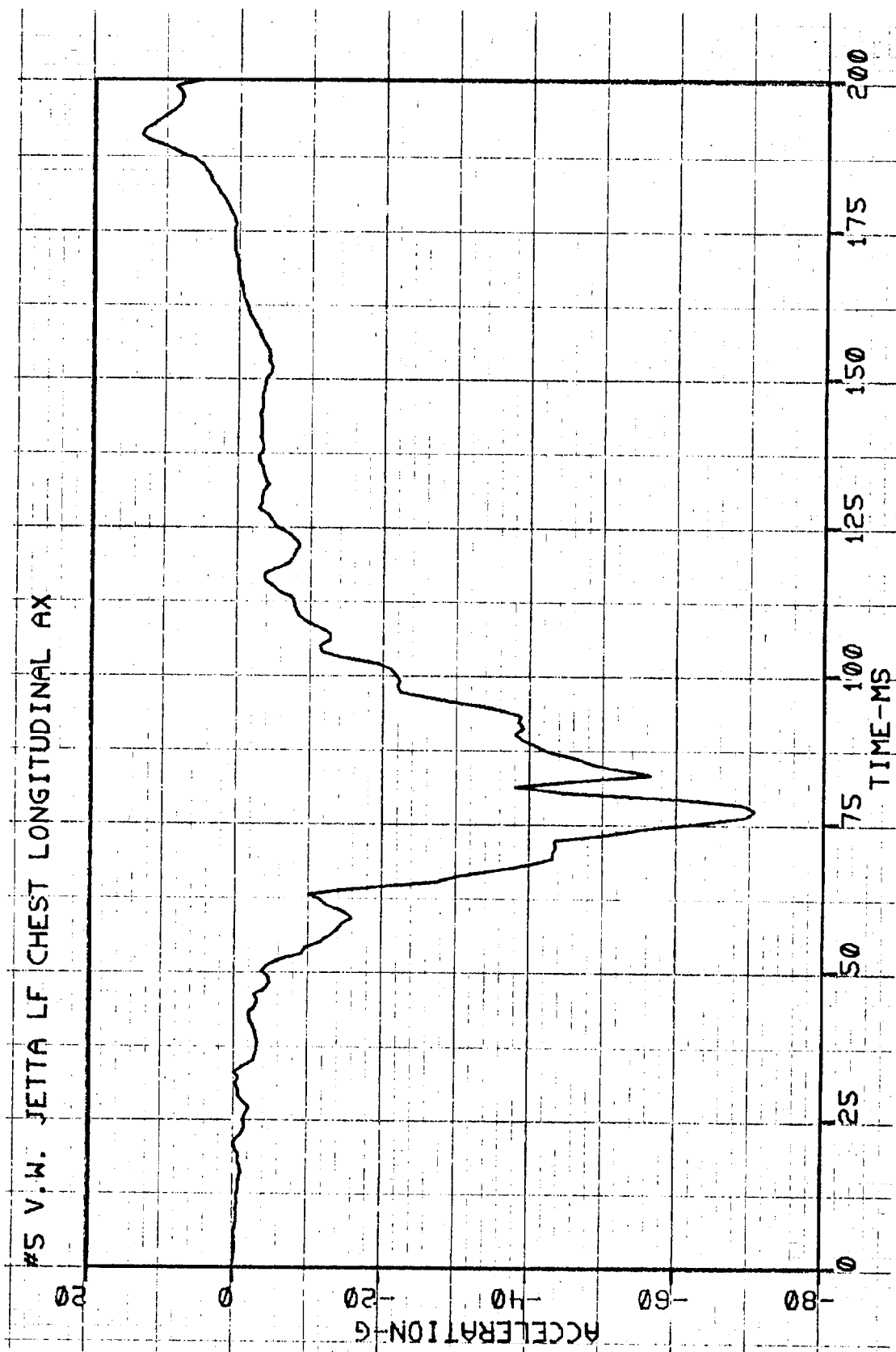
#5 V.W. JETTA LF HEAD LONGITUDINAL AX

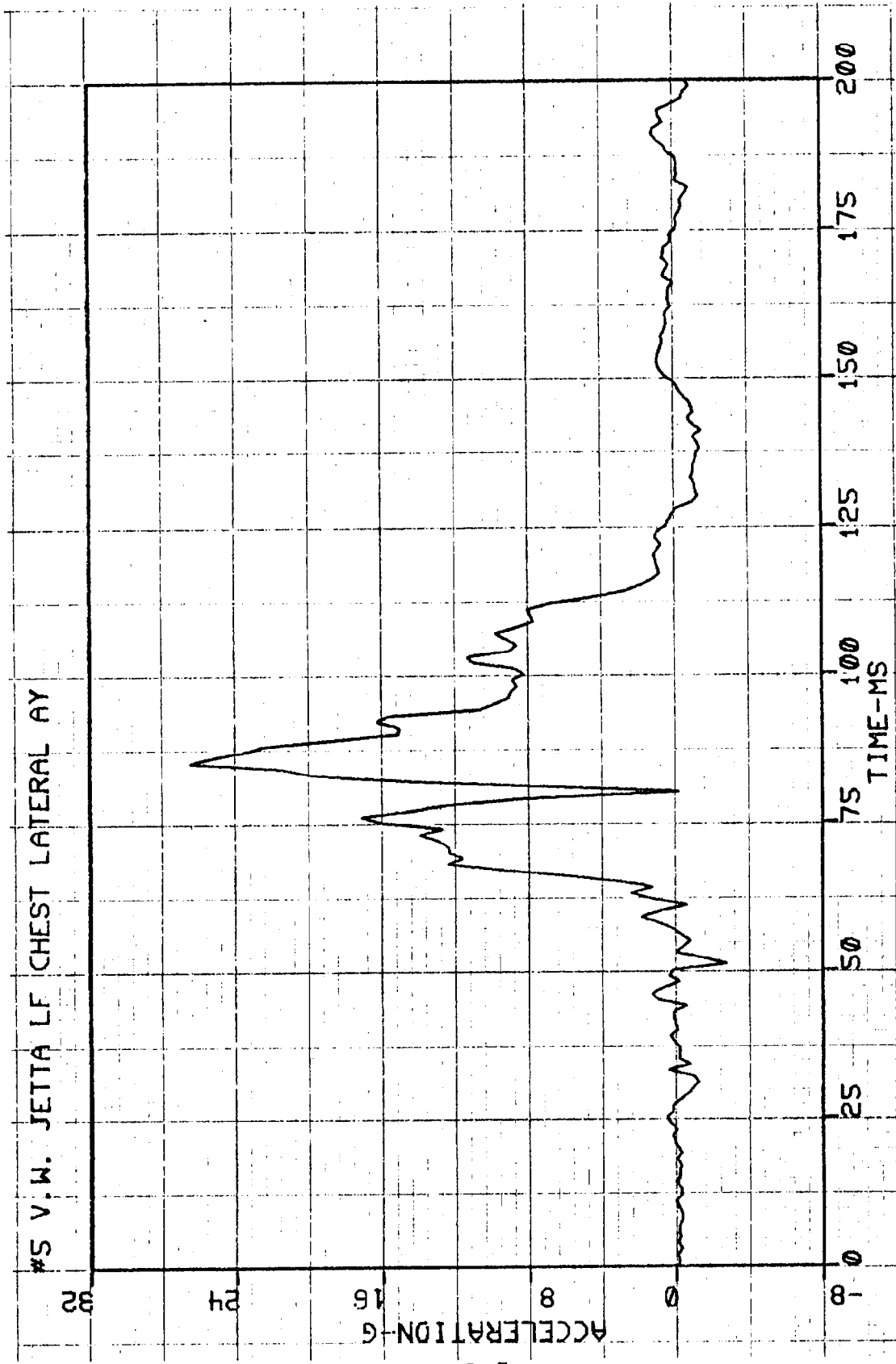


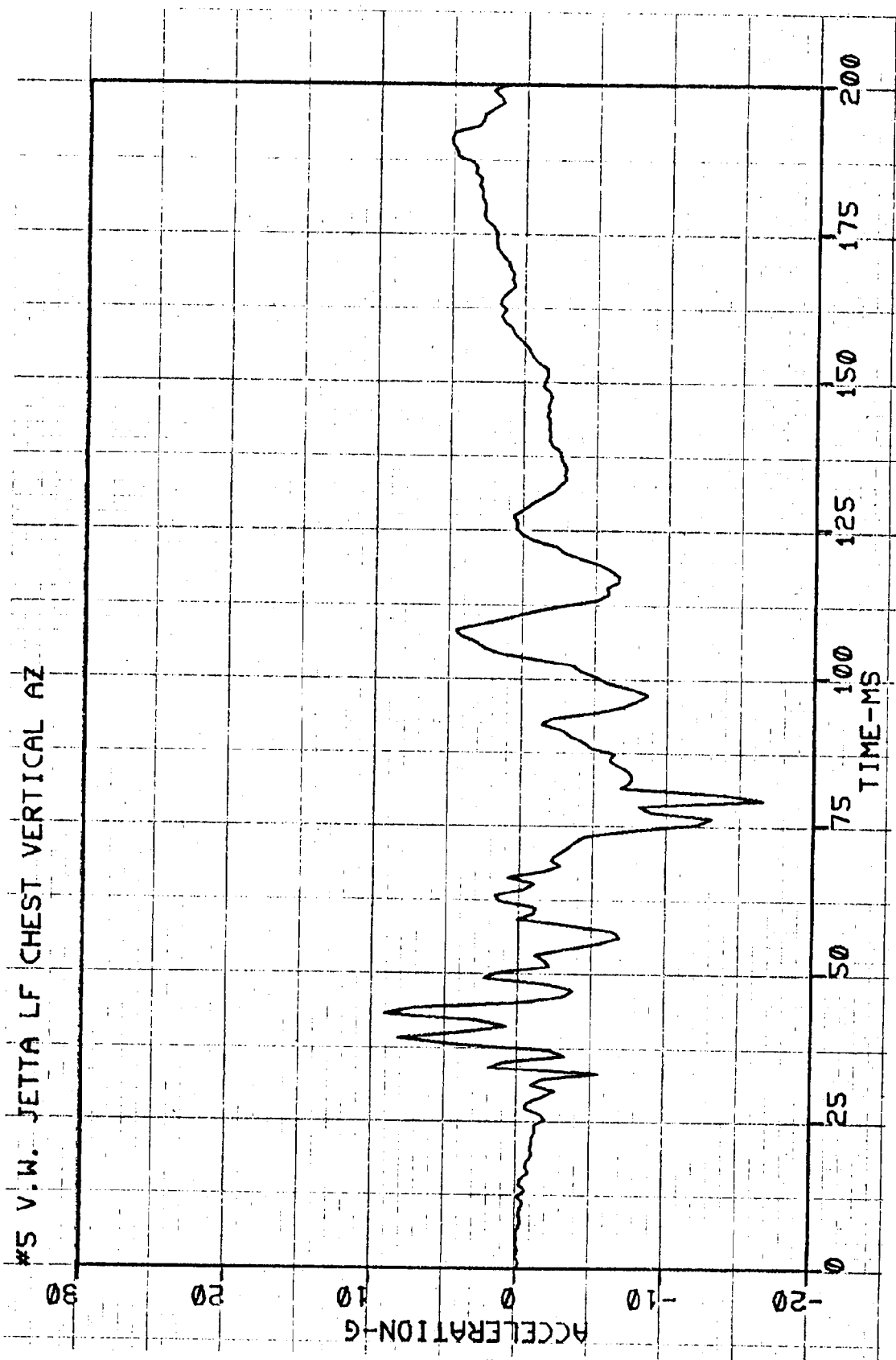




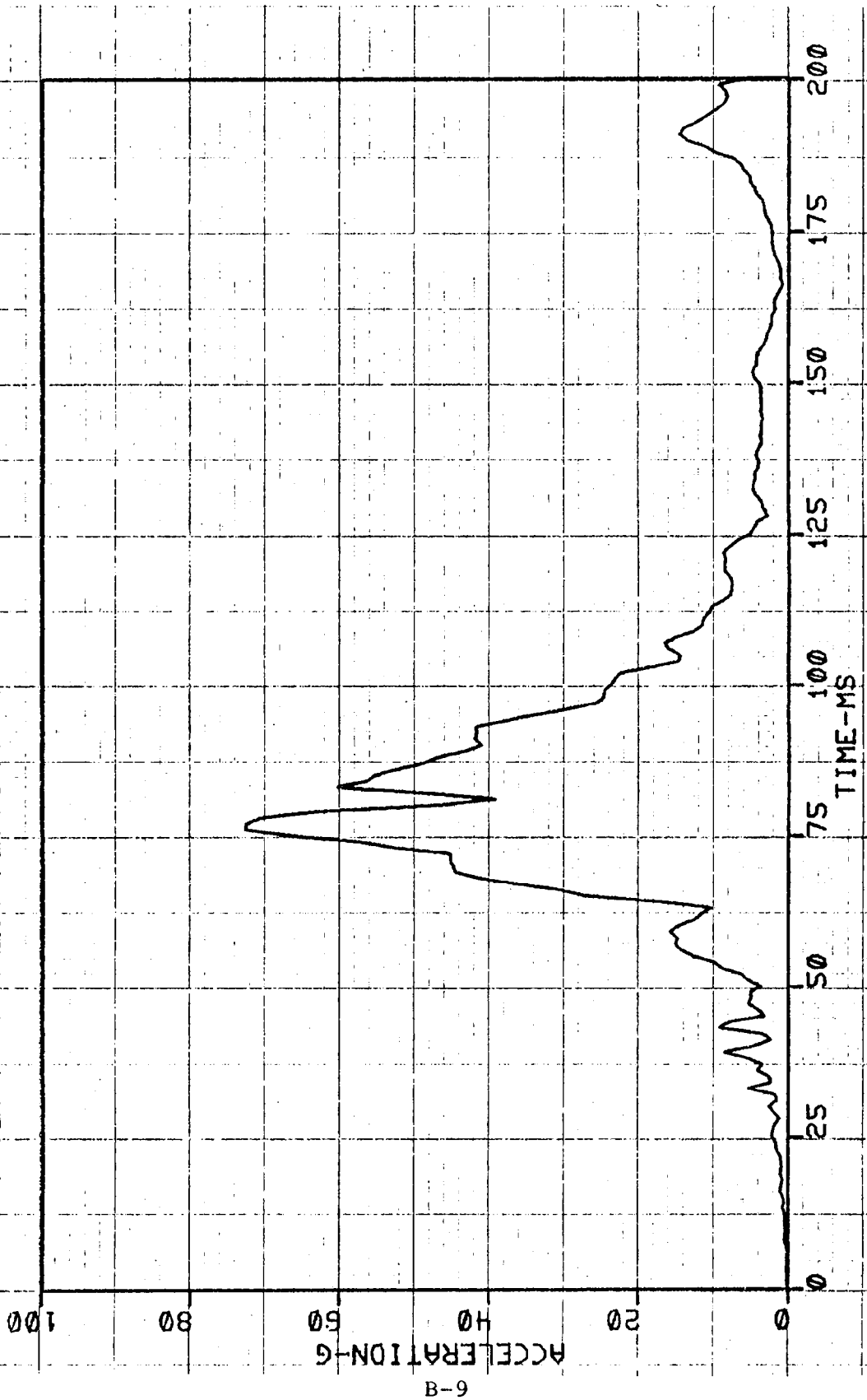


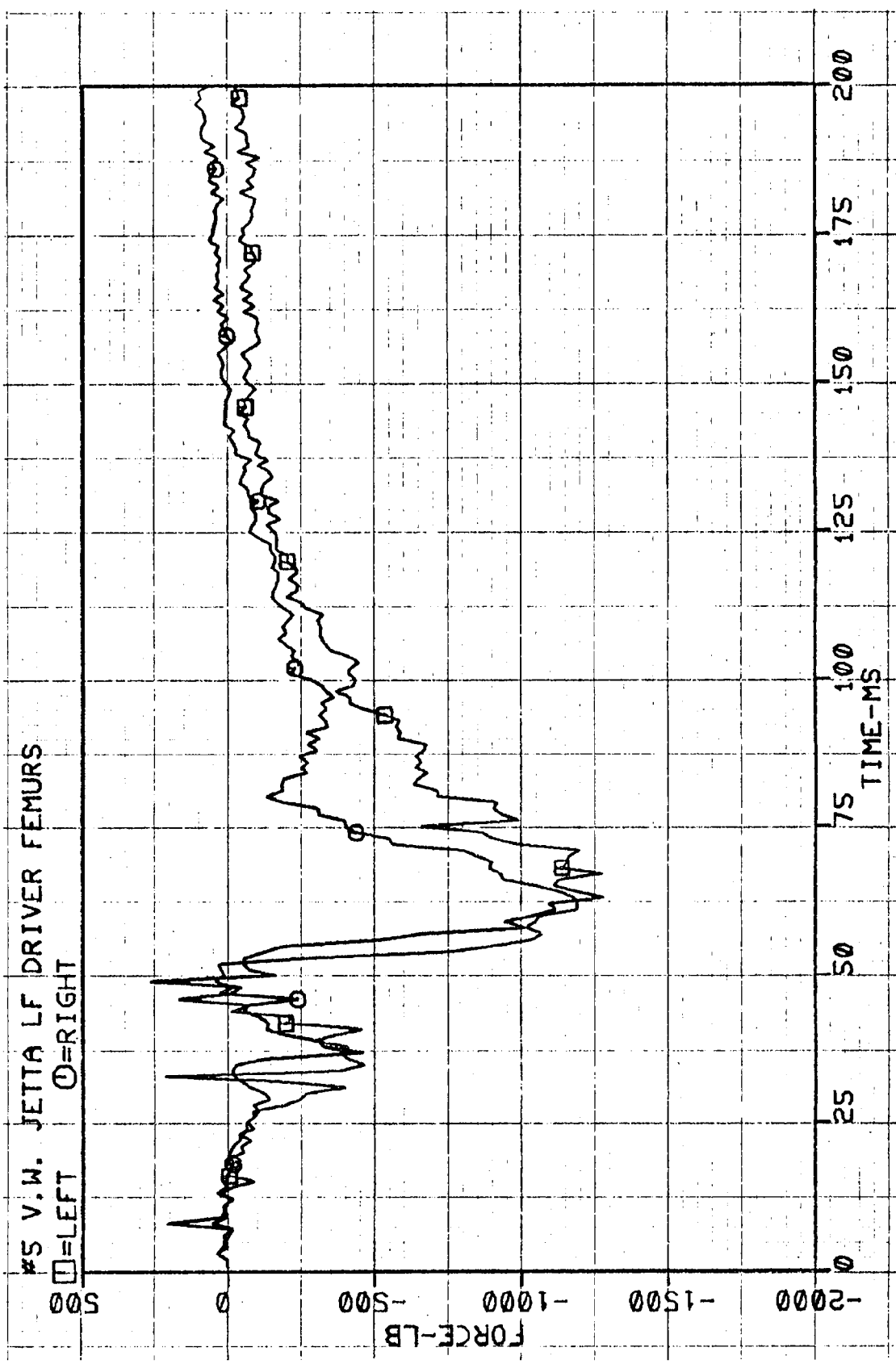




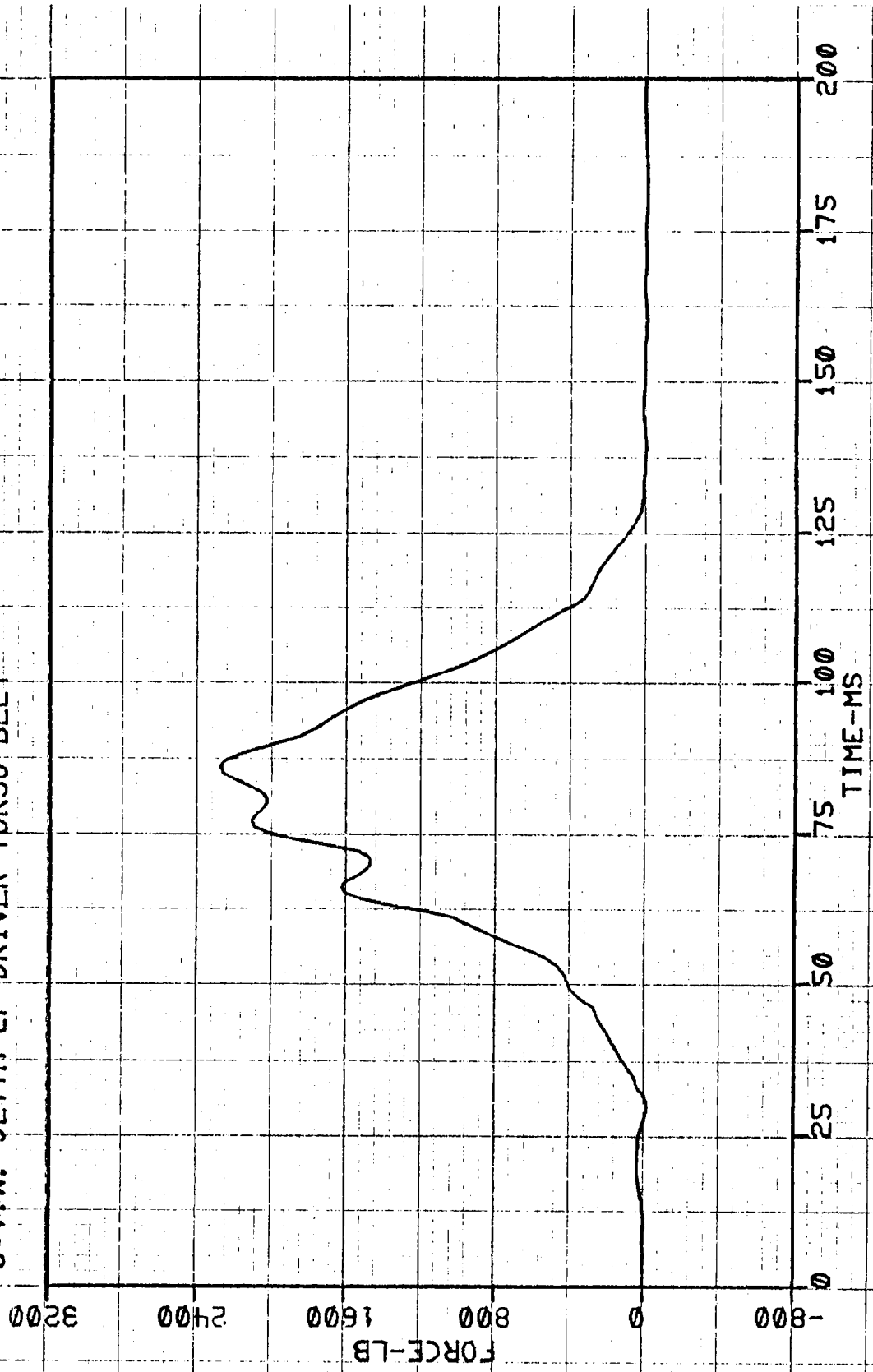


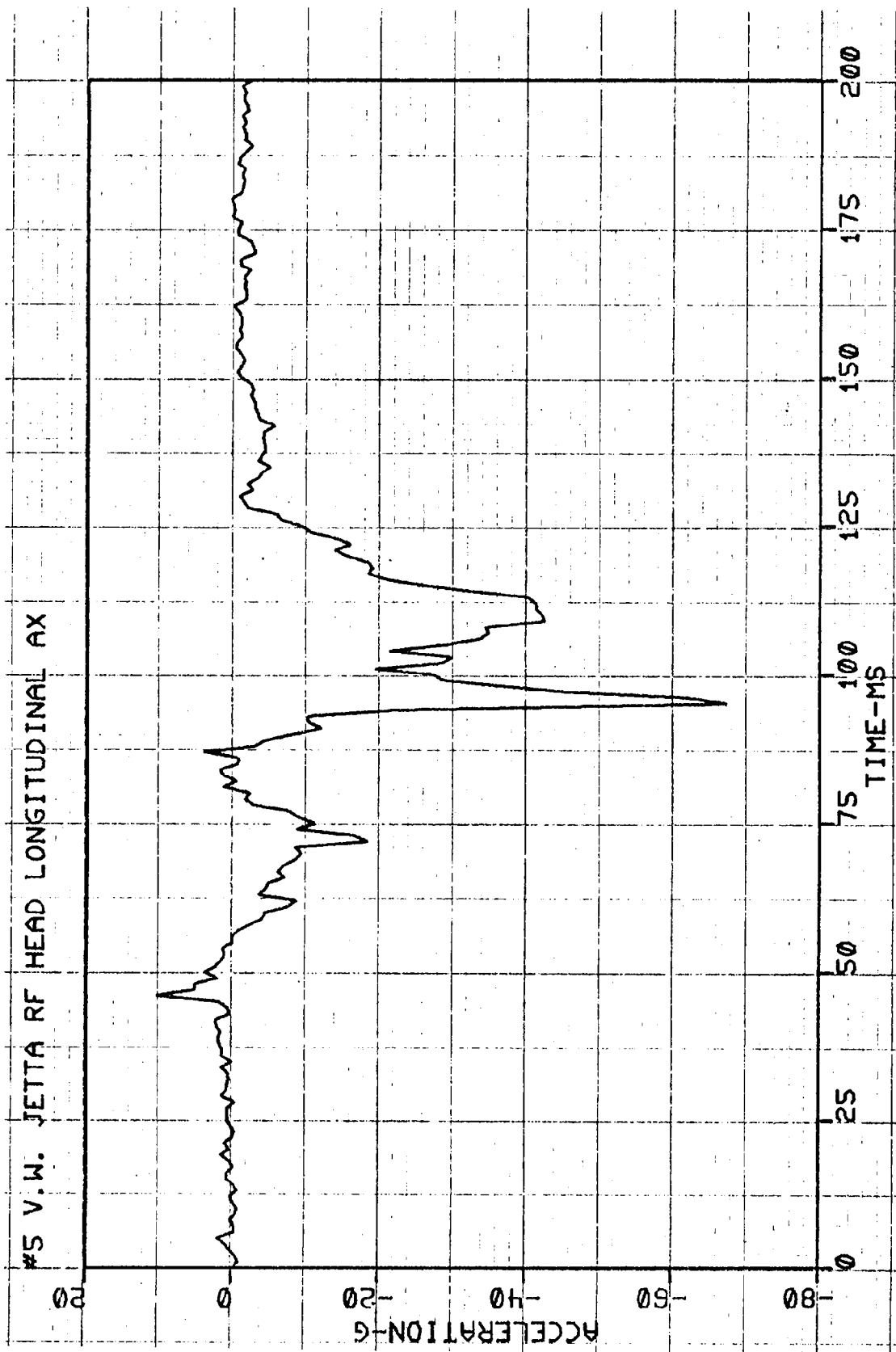
#5 V.W. JETTA LF CHEST RESULTANT AR





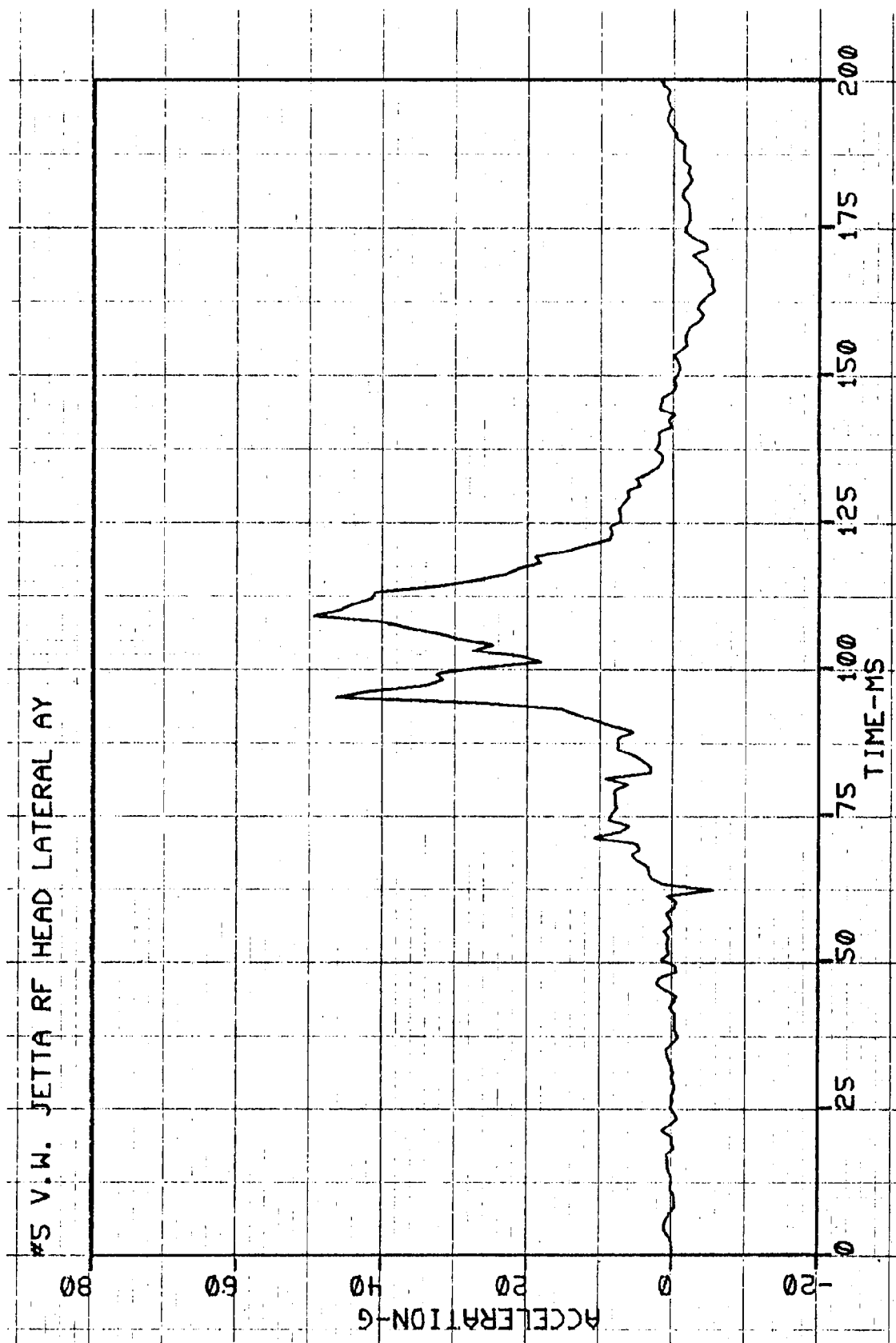
#5 V.W. JETTA LF DRIVER TORSO BELT

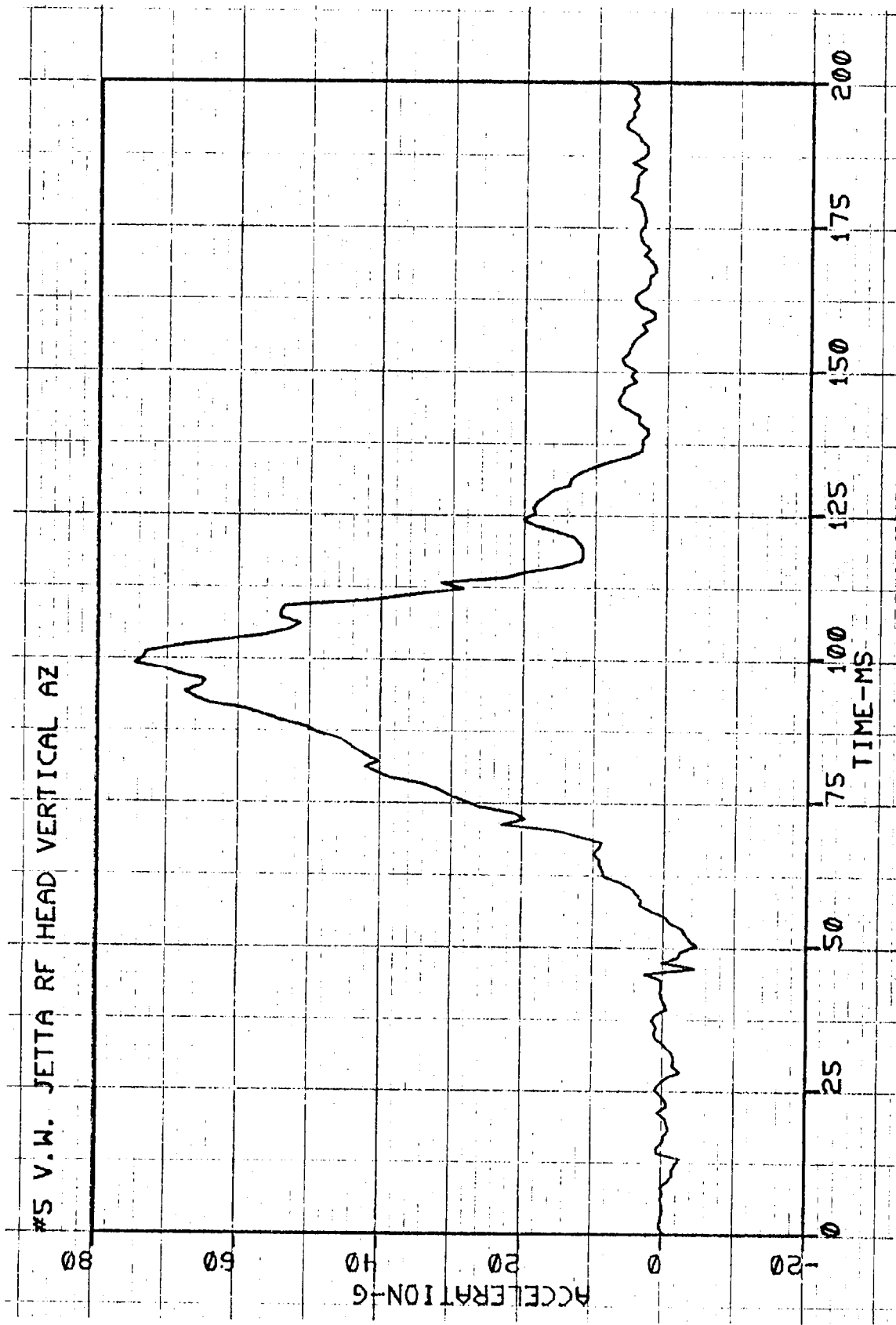




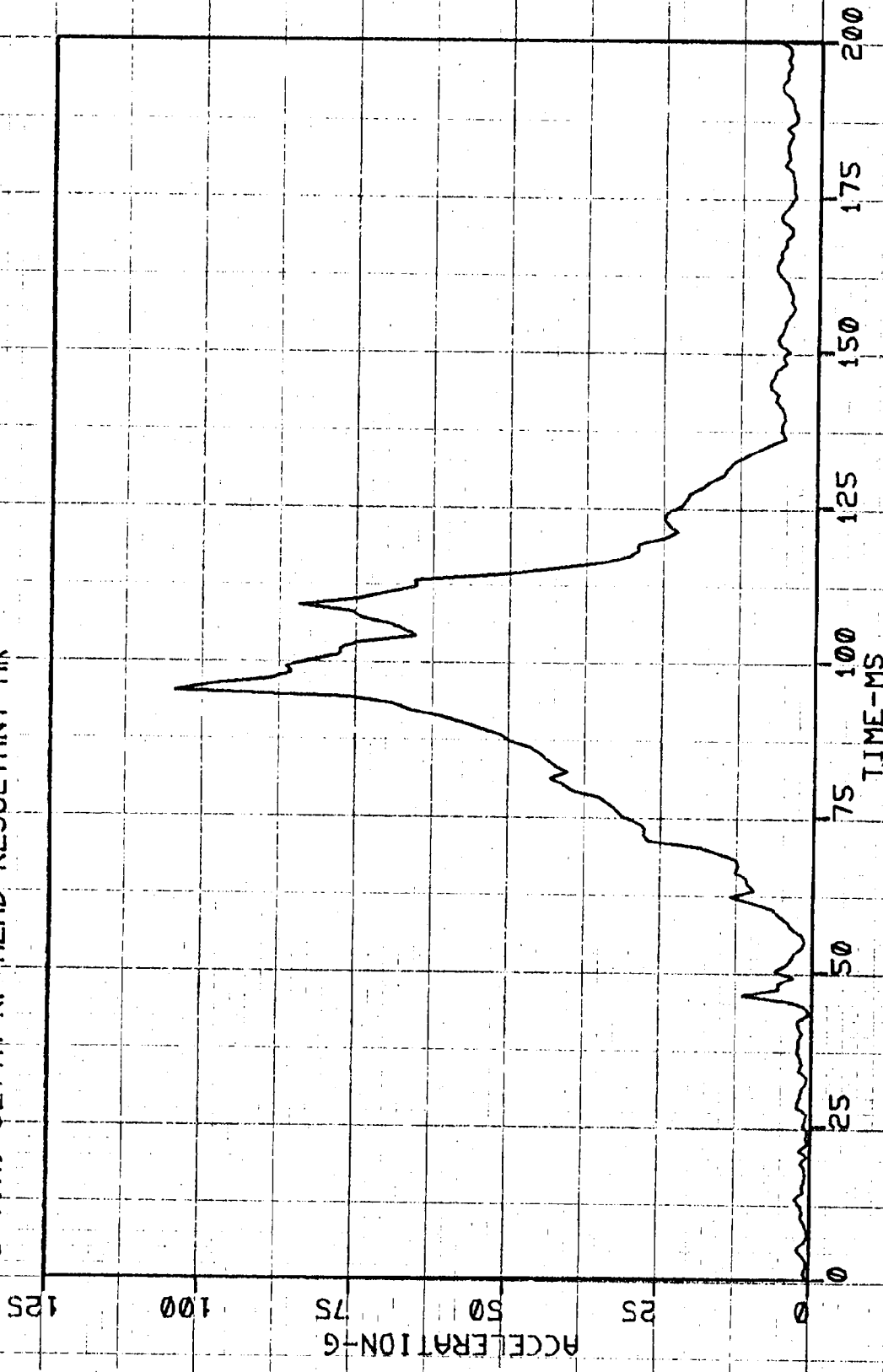
B-12

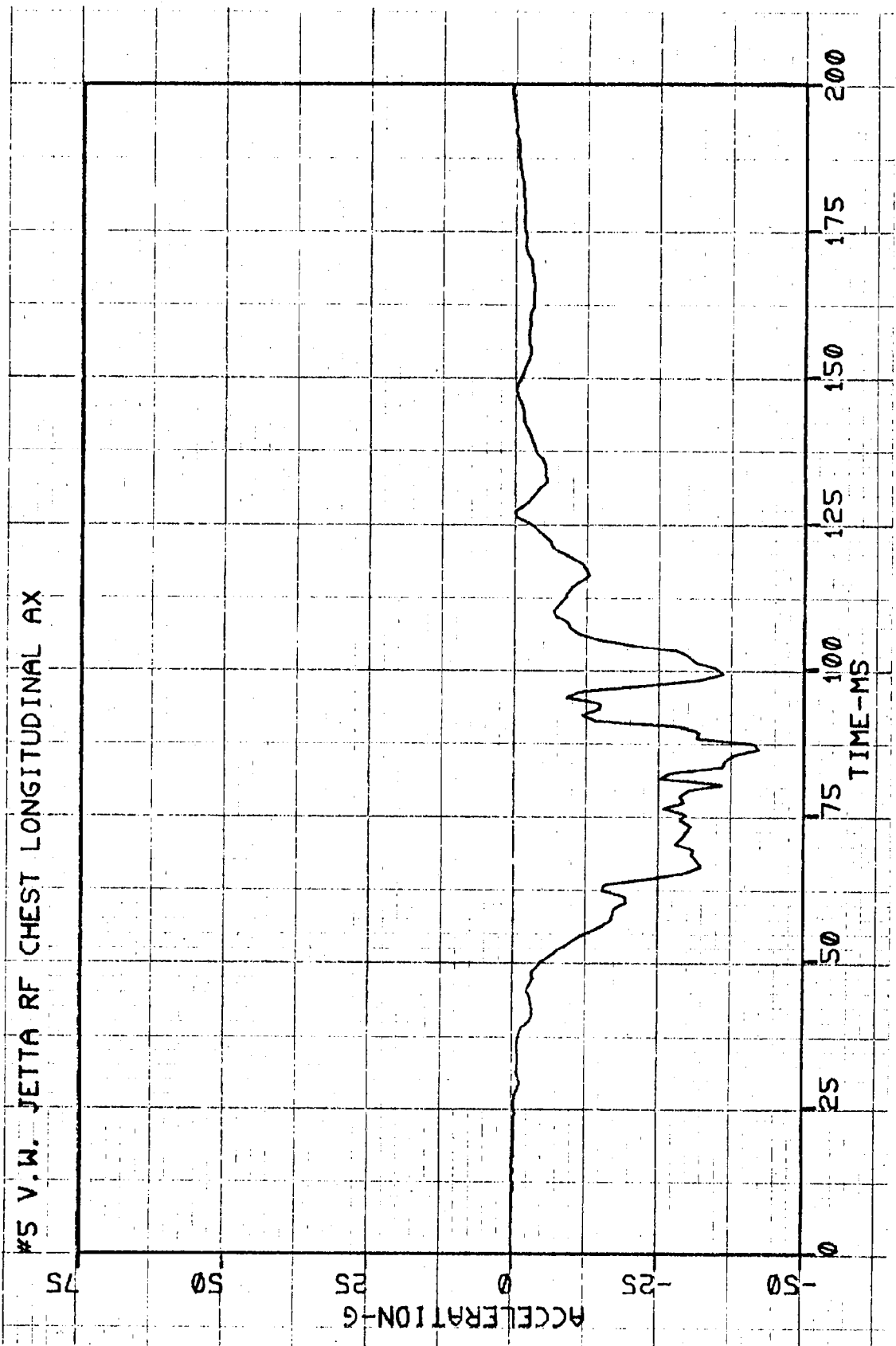
#5 V.W. JETTA RF HEAD LATERAL AY

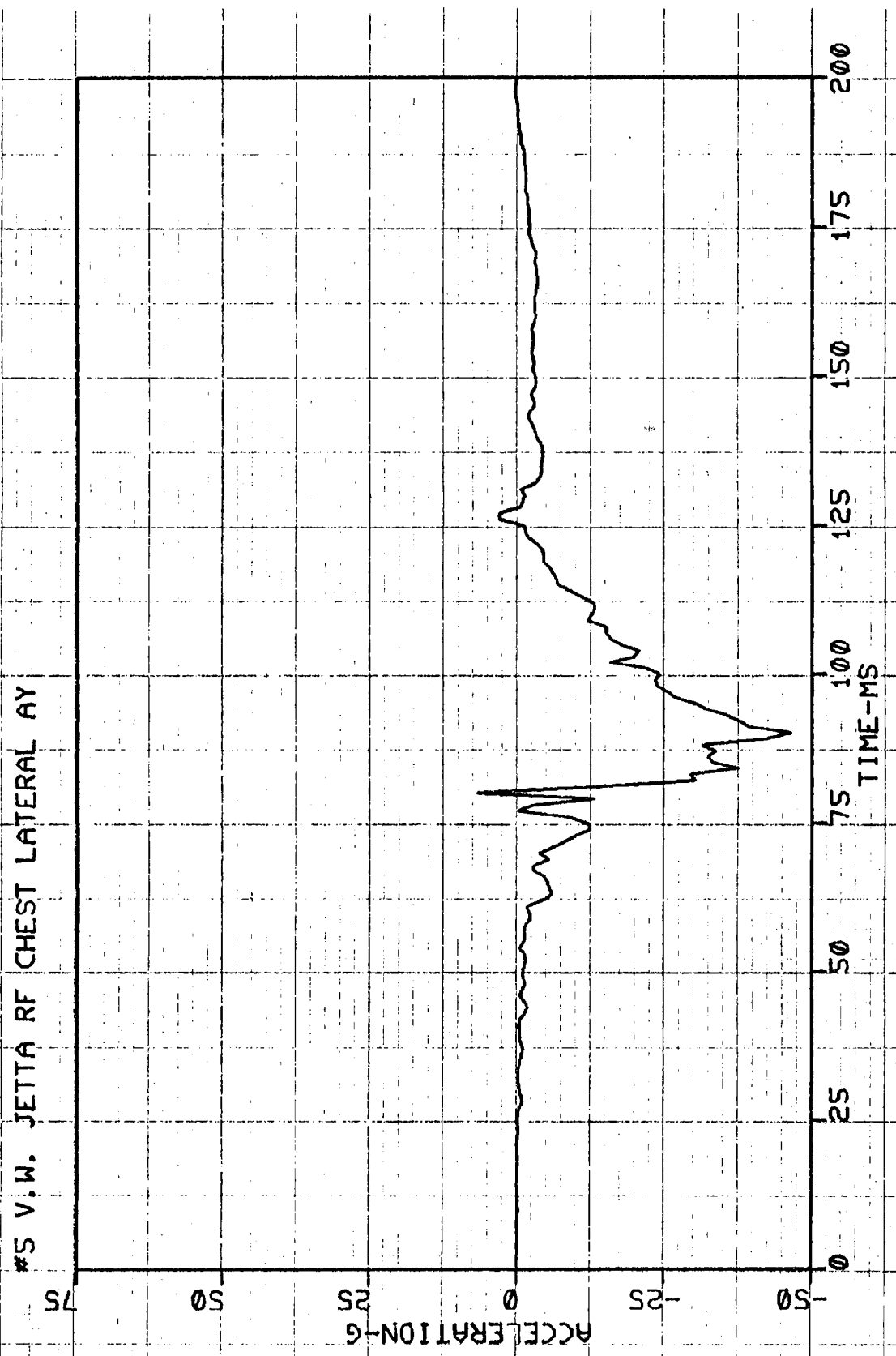


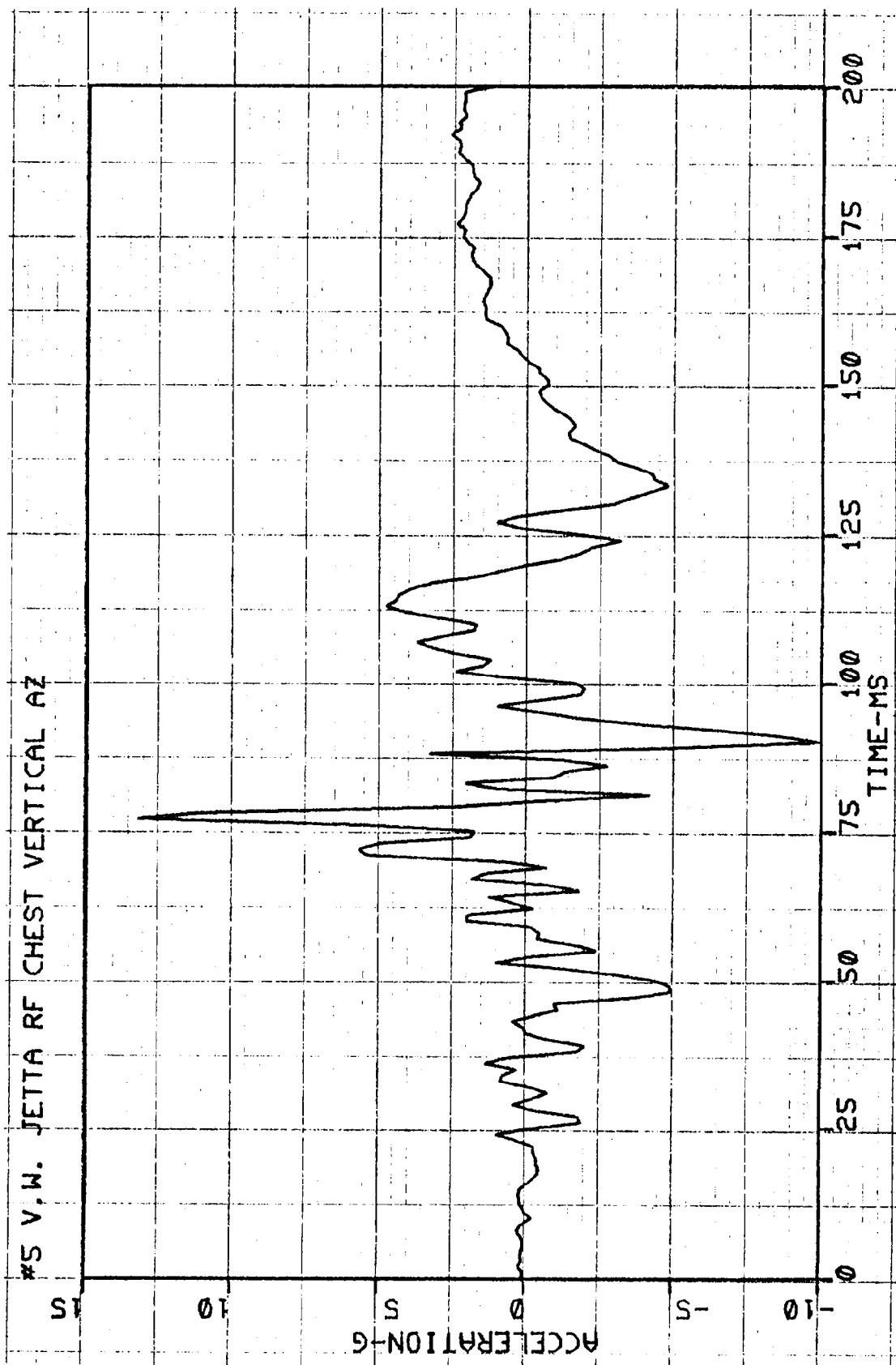


#5 V.W. JETTA RF HEAD RESULTANT AR

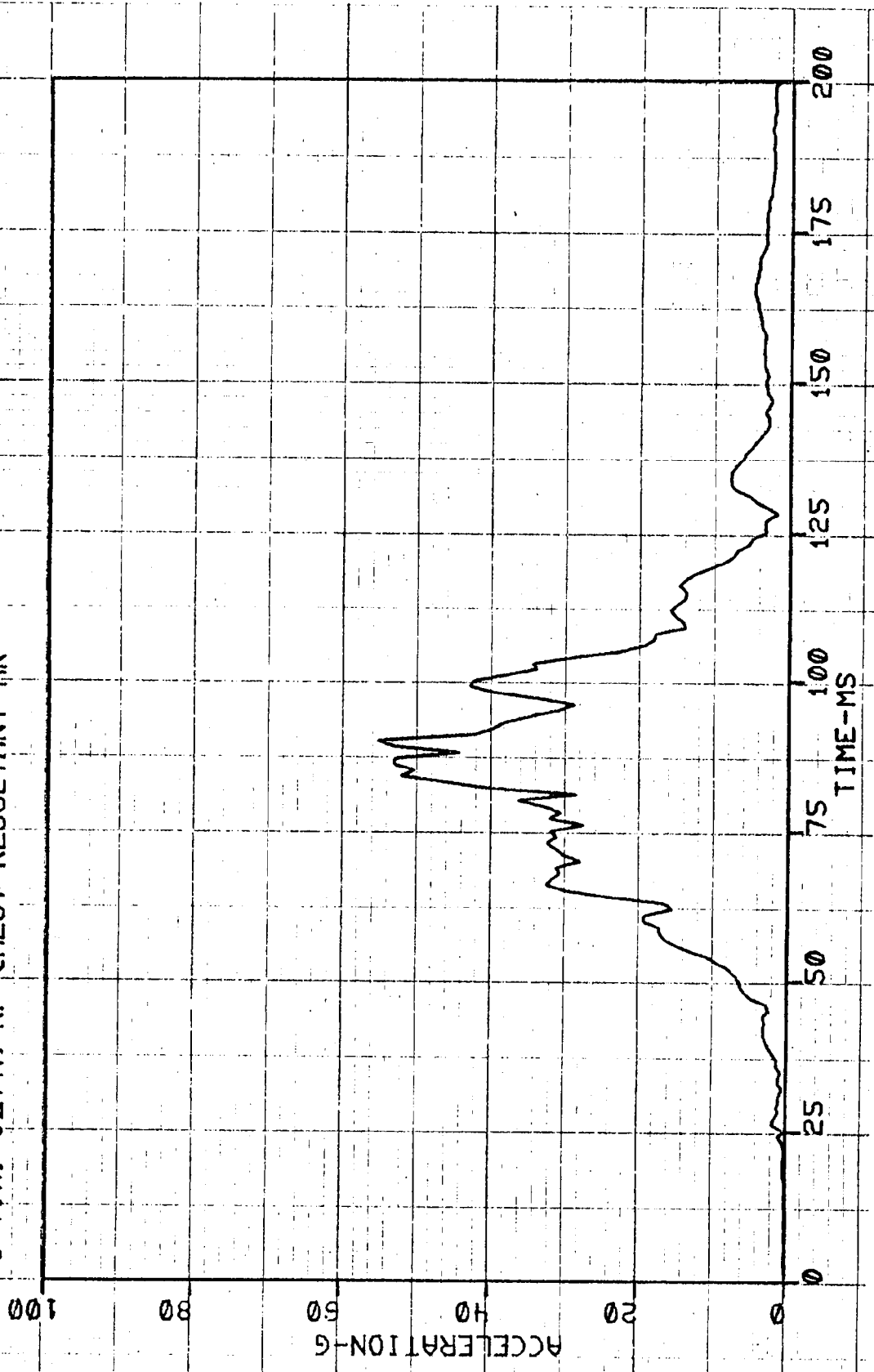


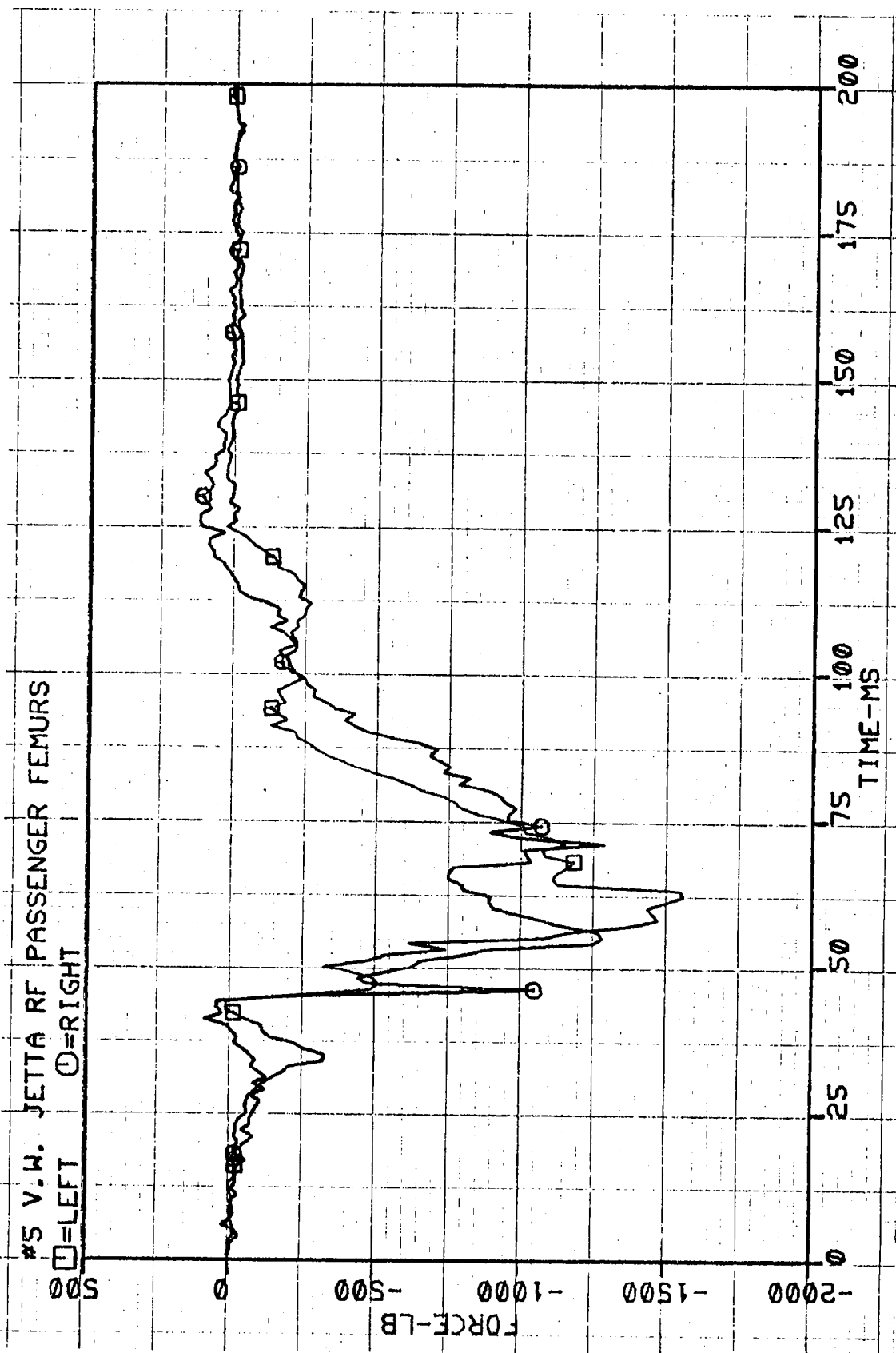




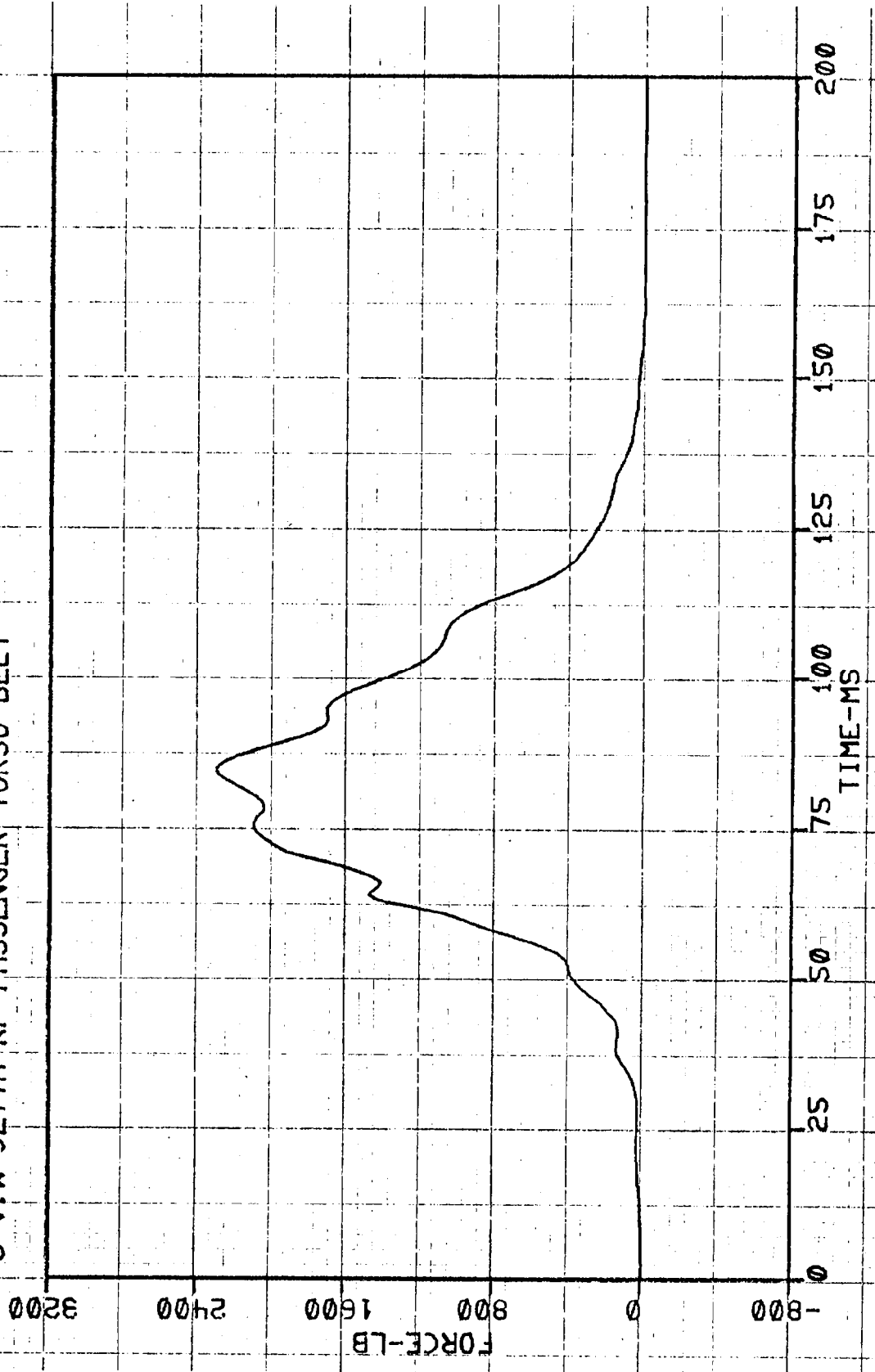


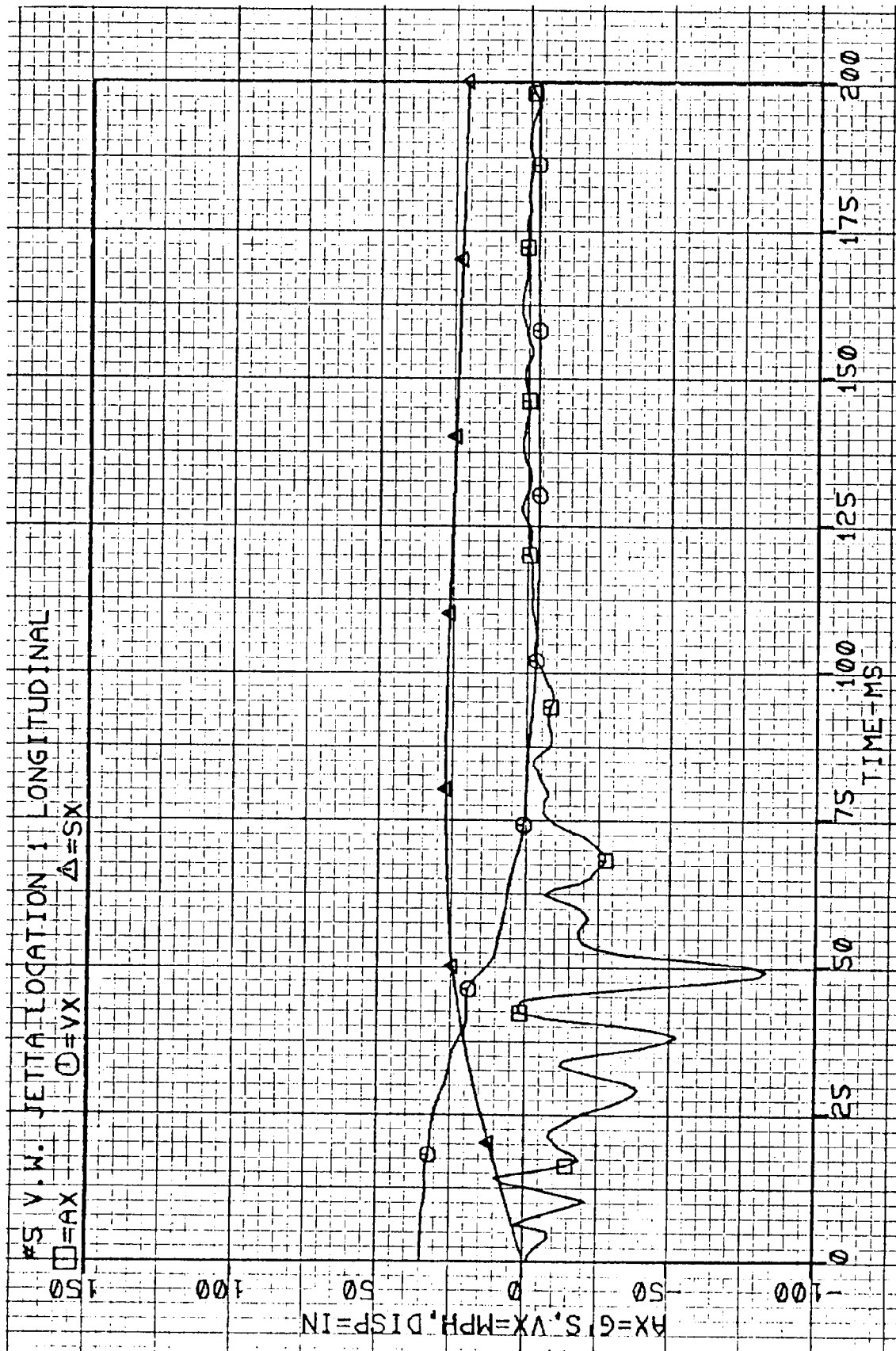
#5 V.W. JETTA RF CHEST RESULTANT AR

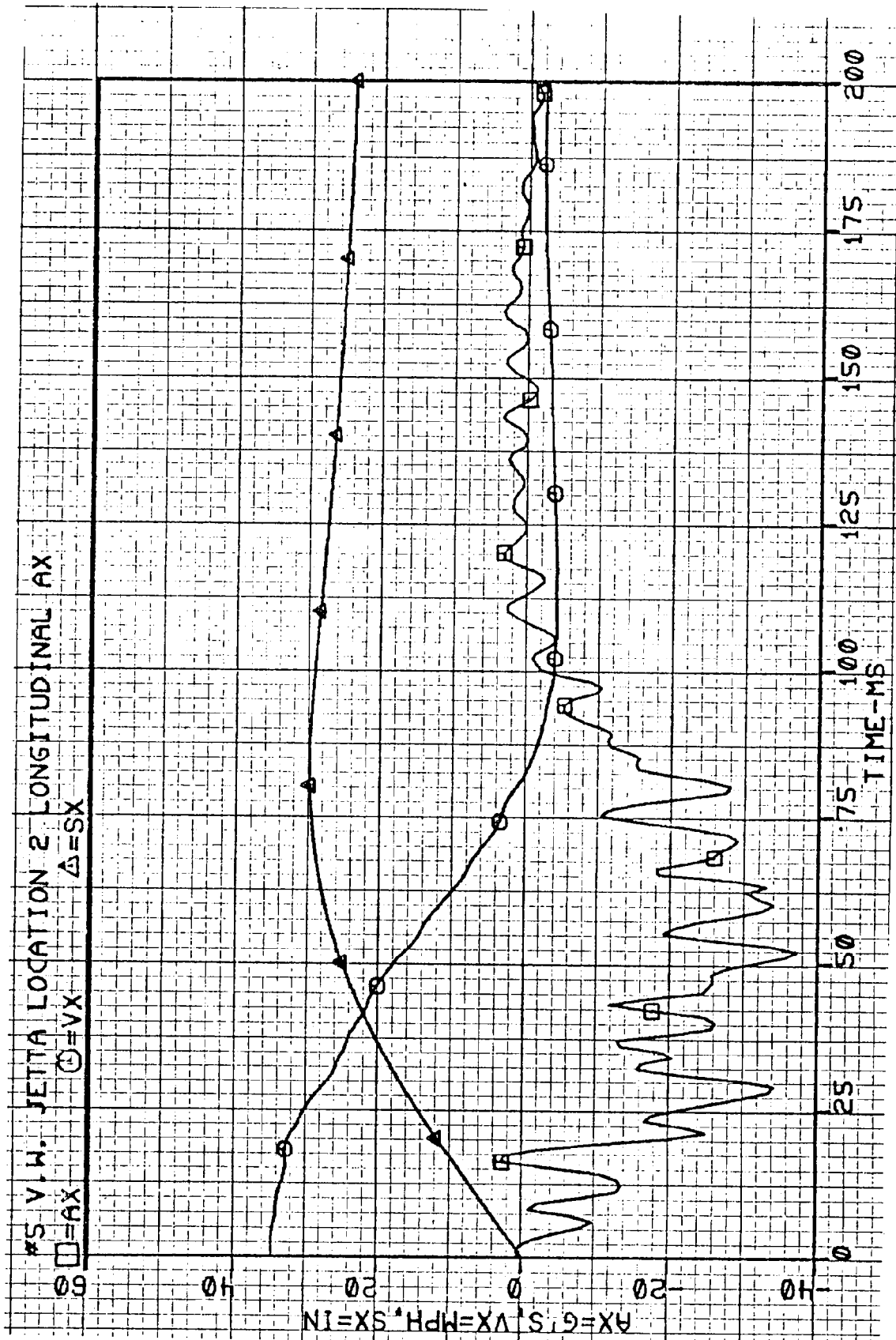




#5 V.W. JETTA RF PASSENGER TORSO BELT







APPENDIX C
DUMMY CALIBRATIONS

PART 572 DUMMY CALIBRATION TEST DATA

NHTSA Dummy I.D. No.: A08

Laboratory Technician: C. Brugaletta, L. Johnson

	Pre-test Calibration	Post-test Calibration
Date of Dummy Calibration	3/4/81	7/24/81
Calibration Sequential Number for Dummy	40	42
Temperature in Lab. (Spec. = 66 to 78 °F)	72	74
Relative Humidity in Lab. (Spec. = 10 to 70%)	54	56

Test Parameter	Specification			
1. Head Drop Test:				
a. Peak Resultant Accel	210 - 260G	221	233	
b. Peak Lateral Accel	< 10G	9	9	
c. Time above 100G	0.9 - 1.5 ms	1.3	1.0	
2. Neck Bending Test:				
a. Pendulum Speed	21.5 - 25.5 fps	22.1	22.0	
b. Pendulum Avg Decel (over t ₃ - t ₂)	20 - 24G	22	23	
c. Peak Resultant Head Acceleration	26G Maximum	17	20	
d. Pendulum Decel (t ₂ - t ₁)	≤ 3 ms	1	2	
e. Pendulum Decel (t ₃ -t ₂)	25 - 30 ms	25	27	
f. Pendulum Decel (t ₄ -t ₃)	≤ 10 ms	7	5	
g. Pendulum Direction Reversal Time	≥ 123 ms	-	-	
h. Maximum Head Rota- tion	63 to 73°	71	68	
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	27.0
	Displ	2.1 - 3.1 in.	2.3	2.4
60°	Time	40.3 - 51.7 ms	45.0	45.5
	Displ	4.3 - 5.3 in.	4.4	4.6
Maximum	Time	53.2 - 66.8 ms	56.0	56.5
(73°)	Displ	5.0 - 6.0 in.	5.0	5.1

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A08

Test Parameter	Specification	Pre-test Calibration	Post-test Calibration
2. Neck Bending Test: (Continued)			
Head Rotation Angle			
60°	Time	67.0 - 83.0 ms	68.0
	Displ	4.3 - 5.3 in.	4.4
30°	Time	85.4 - 104.6 ms	90.0
	Displ	2.1 - 3.1 in.	2.3
0°	Time	101.0 - 123.0 ms	105.0
	Displ	-0.5 - 0.5 in.	0.1
3. Abdominal Compression Test: (Preload = 10 pounds)			
a. Force at 0.5 in.	14 - 26 lb	21	22
b. Force at 0.75 in.	27 - 40 lb	33	32
c. Force at 1.0 in.	40 - 53 lb	49	51
d. Force at 1.3 in.	63 - 78 lb	74	73
4. Lumbar Flexion Test:			
a. Force at 20°	22 - 34 lb	27	24
b. Force at 30°	34 - 46 lb	39	35
c. Force at 40°	46 - 58 lb	47	49
d. Return Angle	12° Maximum	8	8
5. Chest Impact Tests:			
a. High Speed			
1) Probe Speed	21.78-22.22 fps	22.02	22.02
2) Peak Deflection	1.7 in. Maximum	1.4	1.5
3) Peak Resistive Force	2250 lb Maximum	2117	2085
4) Internal Hysteresis	50 - 70%	63	65
b. Low Speed			
1) Probe Speed	13.86-14.14 fps	13.99	14.01
2) Peak Deflection	1.1 in. Maximum	0.9	0.9
3) Peak Resistive Force	1450 lb Maximum	1319	1358
4) Internal Hysteresis	50 - 70%	65	70

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A08

Test Parameter	Specification	Pre-test Calibration	Post-test Calibration
6. Knee Impact Tests:			
a. Right Side			
1) Probe Speed	6.76 - 7.04 fps	6.80	6.96
2) Maximum Force	1850 - 2500 lb	2441	2068
3) Time >1000 lb	1.7 ms Minimum	2.0	2.0
b. Left Side			
1) Probe Speed	6.76 - 7.04 fps	7.00	6.98
2) Maximum Force	1850 - 2500 lb	2249	2499
3) Time >1000 lb	1.7 ms Minimum	2.0	1.8

PART 572 DUMMY CALIBRATION TEST DATA

NHTSA Dummy I.D. No.: A09

Laboratory Technician: C. Brugaletta, L. Johnson

	Pre-test Calibration	Post-test Calibration
Date of Dummy Calibration	3/4/81	7/24/81
Calibration Sequential Number for Dummy	37	38
Temperature in Lab. (Spec. = 66 to 78 °F)	72	72
Relative Humidity in Lab. (Spec. = 10 to 70%)	54	56

Test Parameter	Specification			
1. Head Drop Test:				
a. Peak Resultant Accel	210 - 260G	228	233	
b. Peak Lateral Accel	< 10G	6	7	
c. Time above 100G	0.9 - 1.5 ms	1.0	1.3	
2. Neck Bending Test:				
a. Pendulum Speed	21.5 - 25.5 fps	22.1	22.0	
b. Pendulum Avg Decel (over t ₃ - t ₂)	20 - 24G	22	23	
c. Peak Resultant Head Acceleration	26G Maximum	16	23	
d. Pendulum Decel (t ₂ - t ₁)	≤ 3 ms	1	2	
e. Pendulum Decel (t ₃ -t ₂)	25 - 30 ms	27	29	
f. Pendulum Decel (t ₄ -t ₃)	≤ 10 ms	8	2	
g. Pendulum Direction Reversal Time	≥ 123 ms	-	-	
h. Maximum Head Rota- tion	63 to 73°	-	71	
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	27.0	27.0
	Displ	2.1 - 3.1 in.	2.3	2.3
60°	Time	40.3 - 51.7 ms	44.0	44.0
	Displ	4.3 - 5.3 in.	4.4	4.5
Maximum (73°)	Time	53.2 - 66.8 ms	57.0	63.0
	Displ	5.0 - 6.0 in.	5.0	5.2

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A09

Test Parameter	Specification	Pre-test Calibration	Post-test Calibration
2. Neck Bending Test: (Continued)			
Head Rotation Angle			
60°	Time	67.0 - 83.0 ms	73.0
	Displ	4.3 - 5.3 in.	4.4
30°	Time	85.4 - 104.6 ms	92.0
	Displ	2.1 - 3.1 in.	2.3
0°	Time	101.0 - 123.0 ms	107.0
	Displ	-0.5 - 0.5 in.	-0.09
3. Abdominal Compression Test: (Preload = 10 pounds)			
a. Force at 0.5 in.	14 - 26 lb	24	23
b. Force at 0.75 in.	27 - 40 lb	32	33
c. Force at 1.0 in.	40 - 53 lb	46	46
d. Force at 1.3 in.	63 - 78 lb	66	71
4. Lumbar Flexion Test:			
a. Force at 20°	22 - 34 lb	31	27
b. Force at 30°	34 - 46 lb	40	41
c. Force at 40°	46 - 58 lb	53	52
d. Return Angle	12° Maximum	6	9
5. Chest Impact Tests:			
a. High Speed			
1) Probe Speed	21.78-22.22 fps	22.00	22.02
2) Peak Deflection	1.7 in. Maximum	1.4	1.4
3) Peak Resistive Force	2250 lb Maximum	2013	2109
4) Internal Hysteresis	50 - 70%	57	61
b. Low Speed			
1) Probe Speed	13.86-14.14 fps	13.98	13.99
2) Peak Deflection	1.1 in. Maximum	0.9	0.9
3) Peak Resistive Force	1450 lb Maximum	1284	1358
4) Internal Hysteresis	50 - 70%	58	65

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A09

Test Parameter	Specification	Pre-test Calibration	Post-test Calibration
6. Knee Impact Tests:			
a. Right Side			
1) Probe Speed	6.76 - 7.04 fps	6.80	6.88
2) Maximum Force	1850 - 2500 lb	1876	1986
3) Time >1000 lb	1.7 ms Minimum	2.0	1.8
b. Left Side			
1) Probe Speed	6.76 - 7.04 fps	6.80	6.8
2) Maximum Force	1850 - 2500 lb	1977	2118
3) Time >1000 lb	1.7 ms Minimum	2.0	2.0

Dynamic Science Report No. 3103-81-069A/1893

365

BARRIER IMPACT LOAD DATA
VOLKSWAGENWERK AG, WEST GERMANY
1981 VOLKSWAGEN JETTA 4-DOOR SEDAN
NHTSA 810524

August 1981



Prepared by:

Dynamic Science, Inc.
1850 West 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

DYNAMIC
SCIENCE, INC. | **Talley**[™]
Industries

1850 West Pinnacle Peak Road · Phoenix, Arizona 85027
(602) 869-9331

Prepared for the Department of Transportation, National Highway Traffic Safety Administration under Contract No. DOT-HS-9-02274. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

Prepared by *Jimmy B. E.*

Approved by *G. Evans*

Date *August 6, 1981*

Report Accepted by:

Contract Technical Manager
Office of Vehicle Safety
Compliance

Date

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 Dynamic Science Report No. 3103-81-069 and presents the barrier load measurement data acquired in testing a 1981 Volkswagen Jetta 4-Door Sedan (NHTSA No. 810524).

Barrier impact speed was 34.88 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.

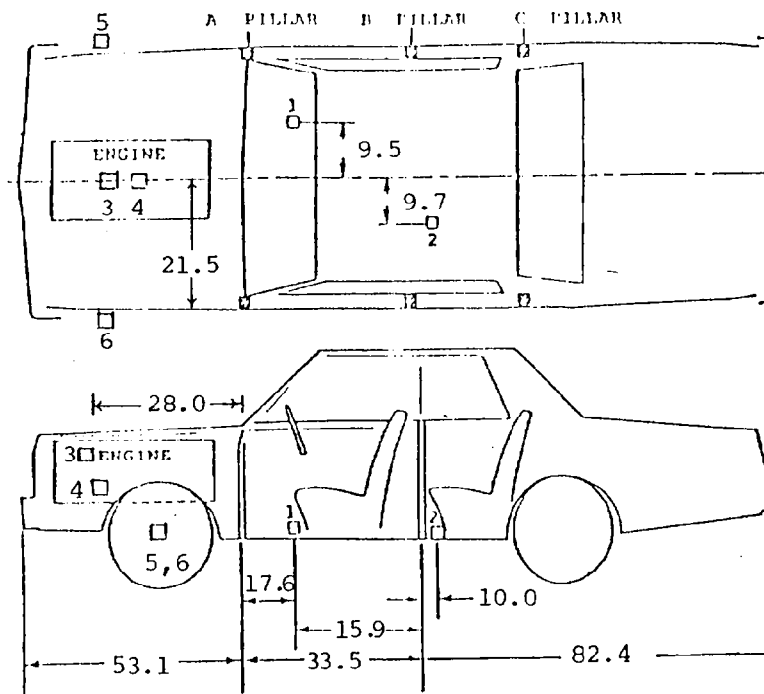
2.2 PLACEMENT OF VEHICLE ACCELEROMETERS

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

196609

D1	D2	D3	D4	D5	D6	D7	D8	D9
C1	C2	C3	C4	C5	C6	C7	C8	C9
B1	B2	B3	B4	B5	B6	B7	B8	B9
A1	A2	A3	A4	A5	A6	A7	A8	A9

FIGURE 2-1. LOAD CELL BARRIER FACE.



No.	Location Description	Component Direction*	Data Summary Peak G @ msec					
			X		Y		Z	
			"+"	"-"	"+"	"-"	"+"	"-"
1	Left front floor pan	✓	10.6 13	83.2 48				
2	Left rear floor pan	✓	3.7 143	37.2 52				
3	Top of engine	✓	48.6 43	260.3 29				
4	Bottom of engine	✓	39.2 40	181.4 24				
5	RF Brake Caliper	✓	30.9 54	173.7 41				
6	LF Brake Caliper	✓	71.2 49	146.6 41				

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

FIGURE 2-2. VEHICLE ACCELEROMETER DATA SUMMARY.

3.0 GENERAL TEST AND VEHICLE PARAMETER DATA

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

GENERAL TEST AND VEHICLE PARAMETER DATA

PRE-IMPACT DATA

Make/Model: Volkswagen Jetta
 Body Style: 4-Door Sedan Model Year: 1981
 NHTSA No.: 810524 DSI No. 1147 Color: White

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk AG, West Germany
 Date of Manufacture: 9-80 ; VIN: WVGGA9163BW152048
 GVWR: 2887 lb; GAWR: Front = 1609 lb; Rear = 1345 lb

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL

Vehicle Capacity: FRONT REAR RECOMMENDED LOAD RANGE:
 Tire Pressure: 28 psi 34 psi TIRE SIZE: B

Designated Seating: 2 Front 2 Rear 4 Total
 Cargo load = 207 lb Is Spare Tire: Space Saver? No
 TOTAL = 807 lb Standard Equipment? Yes

Engine: 4 Cylinder, transverse, 1.7 litre displacement
 Transmission: 5-Speed, manual, front-wheel drive
 Date Vehicle Received by Laboratory: 12-16-80 ; Odometer: 27.8
 Dealer Name & Address: Biddulph VW/Fiat, 4434 West Glendale Ave.
Glendale, Arizona

Remarks: Vehicle has production automatic torso belt restraint
with knee bolster.

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

Right Front = 632 lb Right Rear = 404 lb
 Left Front = 646 lb Left Rear = 424 lb
 TOTAL FRONT WEIGHT = 1278 lb (60.7 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 828 lb (39.3 % of Total Vehicle Weight)
 TOTAL DELV. WEIGHT = 2106 lb

TARGET WEIGHT = UDW + Cargo Load + 328 lbs Dummies = 2641 lb

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 207 lb CARGO:

Right Front = 707 lb Right Rear = 642 lb
 Left Front = 671 lb Left Rear = 630 lb
 TOTAL FRONT WEIGHT = 1378 lb (52.0 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1272 lb (48.0 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 2650 lb

Weight of ballast secured in vehicle trunk area = 114 lb

VEHICLE ATTITUDE: (inches)

Delivered Attitude: RF 30.0 LF 30.0 RR 30.0 LR 30.0
 Test Attitude: RF 28.8 LF 29.5 RR 28.3 LR 27.8

GENERAL TEST AND VEHICLE PARAMETER DATA (CONTD)

POST-TEST DATA

Type of Test: Frontal (0°) Impact.
 Date of Test: 7-22-81 Time: 1013 Temperature 93 °F
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: Primary = 34.88 mph Secondary = 34.93 mph

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

VEHICLE REBOUND AND CRUSH (in.)

Vehicle Length: Pre-test = R 167.4 L 167.4
 Post-test = R 146.1 L 145.8
 Crush = R 21.3 L 21.6
 Distance from front of test vehicle to point of impact:
 R 16.5 L 16.5

VISIBLE DUMMY CONTACT POINTS

	Driver	Passenger
Head	<u>Top of SW rim; top of SW hub</u>	<u>Top front edge of glove box</u>
Chest	<u>Bottom of SW hub; bottom rim</u>	<u>None</u>
Abdomen	<u>None</u>	<u>None</u>
Left Knee	<u>LS steering column, underside of dash</u>	<u>Kneebar under dash</u>
Right Knee	<u>Kneebar; underside of dash</u>	<u>Kneebar under dash</u>

DOOR OPENING

Front		Rear	
Left	Right	Left	Right
<u>Easy</u>	<u>Tools</u>	<u>Tools</u>	<u>Tools</u>

SEAT MOVEMENT

Seatback Failure	<u>None</u>	<u>None</u>
Seat Shift (in.)	<u>None</u>	<u>None</u>

GLAZING DAMAGE

Backlight/Windshield Backlight okay. Windshield cracked over most of surface, especially left side.
Retention loss on left and right sides.

OTHER NOTABLE IMPACT EFFECTS: Left side sill buckled just
ahead of rear seat riser. Right side sill buckled 3 - 4 in.
rearward of front of rear seat riser. Entire dash rotated
upward and front of dash is separated from underlying metal
structure. Left side of dash is separated from left A
Pillar. Front tires pinned front and rear against wheel
wells. Fuel injection pump and air filter assembly separated
from air cleaner cover.

VEHICLE PROFILE DATA SHEET

PRE-IMPACT DATA

Make/Model: Volkswagen Jetta
 Body Style: 4-Door Sedan Model Year: 1981
 NHTSA No.: 810524 DSI No. 1147 Color: White

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk AG, West Germany
 Date of Manufacture: 9-80; VIN: WVWGA9163BW152048
 GVWR: 2887 lb; GAWR: Front = 1609 lb; Rear = 1345 lb

POST-IMPACT DATA

Type of Test: Frontal (0°) Impact
 Date of Test: 7-22-81 Time: 1013 Temperature 93 °F
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: Primary = 34.88 mph Secondary = 34.93 mph

Measurements Referenced to Plane 14' 5.8" Forward of Rear Bumper CL

Location	Height	Vehicle Left (in.)			CL	Vehicle Right (in.)		
		27.0	16.2	5.4		5.4	16.2	27.0

Pre-test Profile (in.)

Top of Front Bumper	18.8	6.2	5.2	4.8	4.8	4.8	5.2	6.2
Front of Hood	28.7	12.6	11.2	10.7	10.6	10.7	11.2	12.6

Post-test Profile (in.)

Top of Front Bumper	20.5	28.3	28.9	29.6	29.8	29.5	28.9	28.8
Front of Hood	28.8	31.1	31.2	31.6	31.8	32.3	31.6	32.7

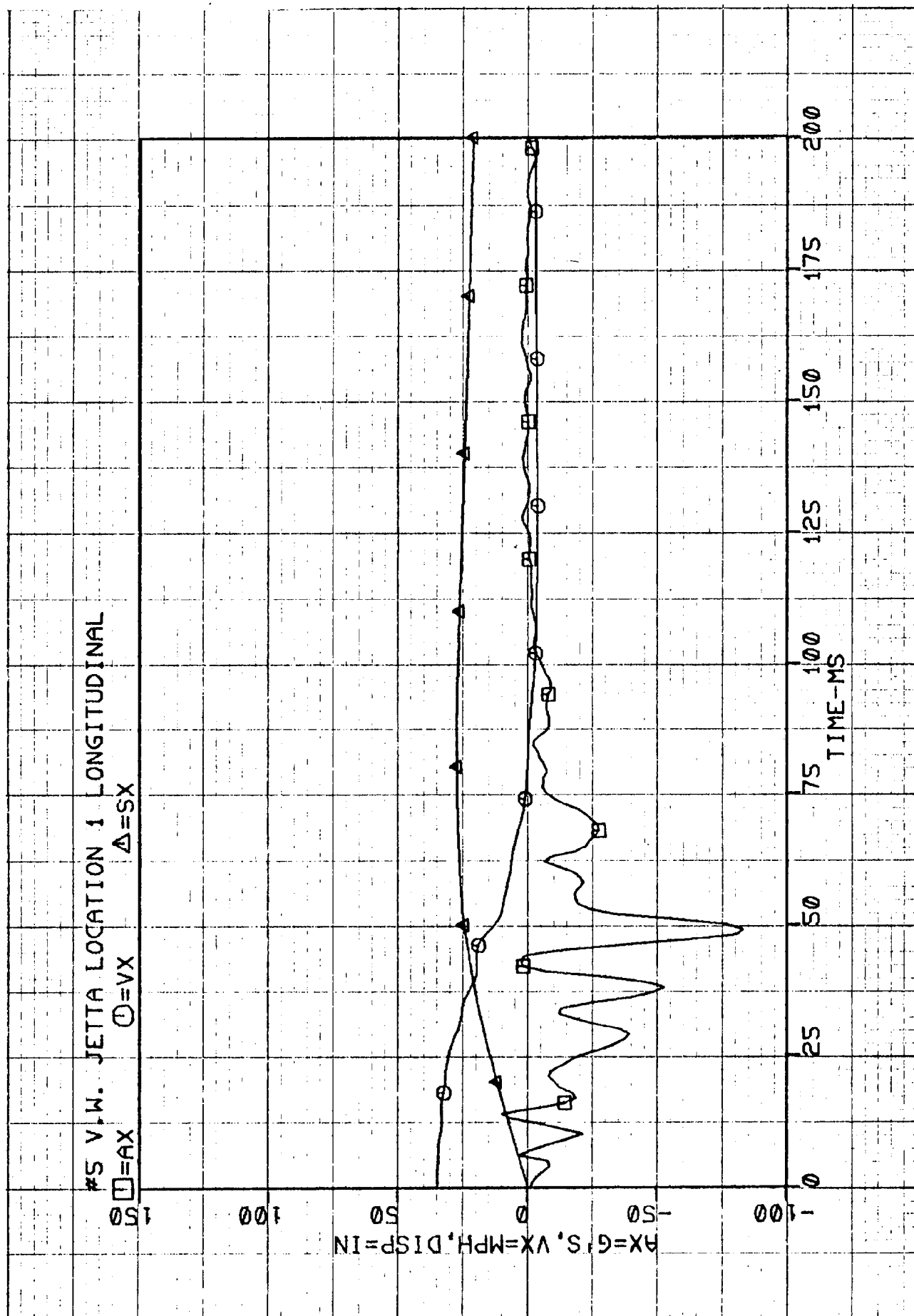
Post-test Static Crush (in.)

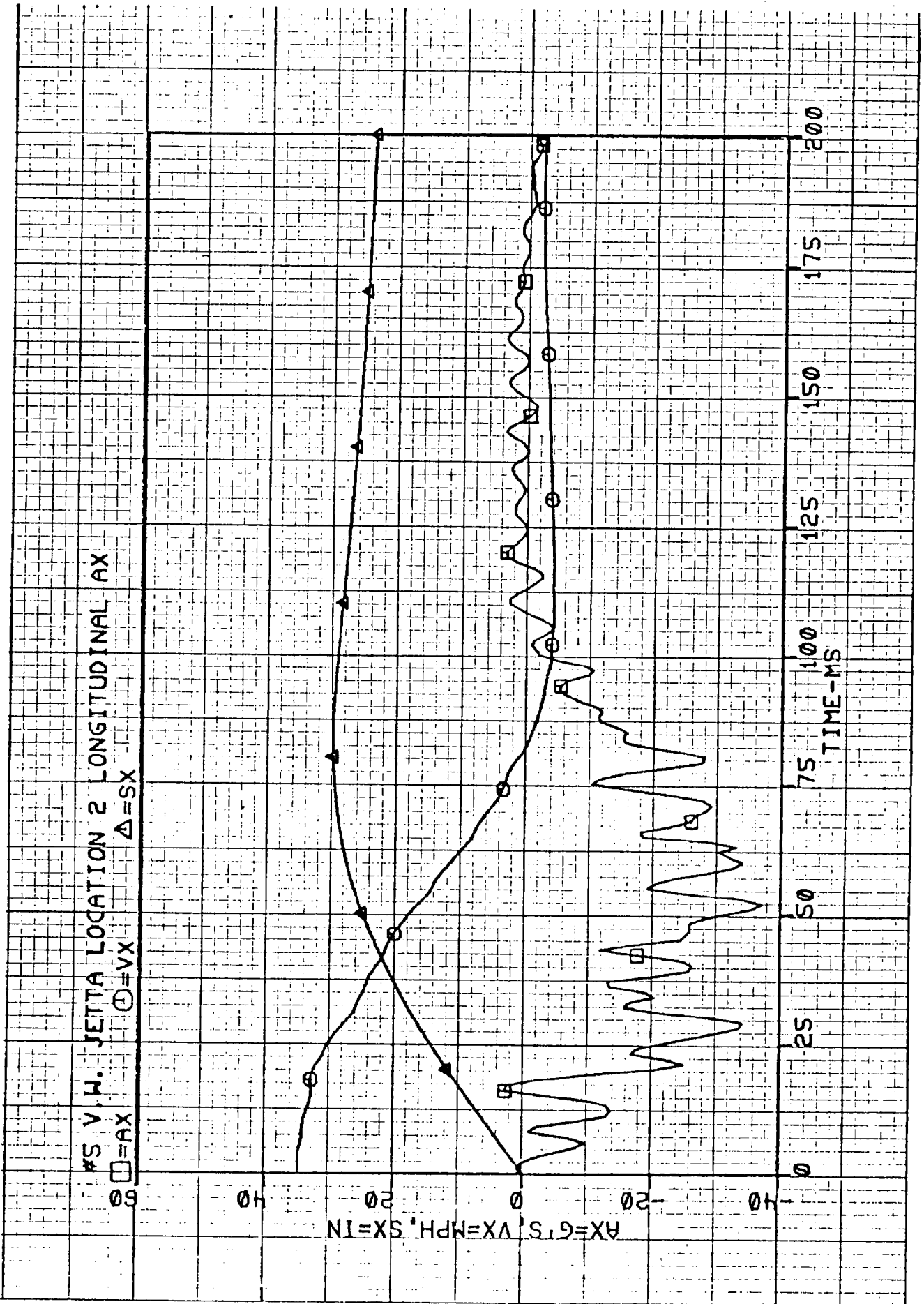
Top of Front Bumper	1.7	22.1	23.7	24.8	25.0	24.7	23.7	22.6
Front of Hood	0.1	18.5	20.0	20.9	21.2	21.6	20.4	20.1

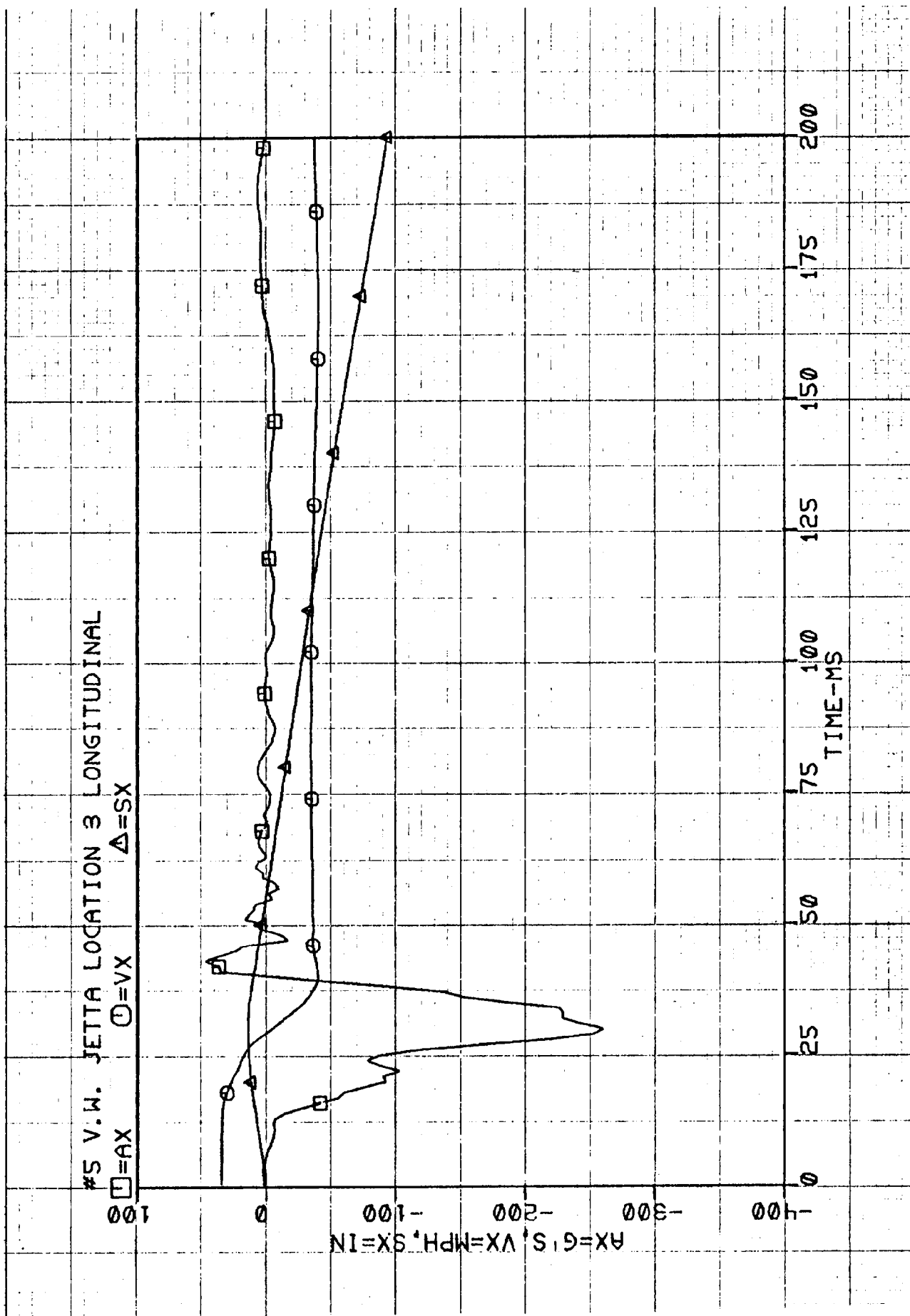
4.0 DATA PRESENTATION

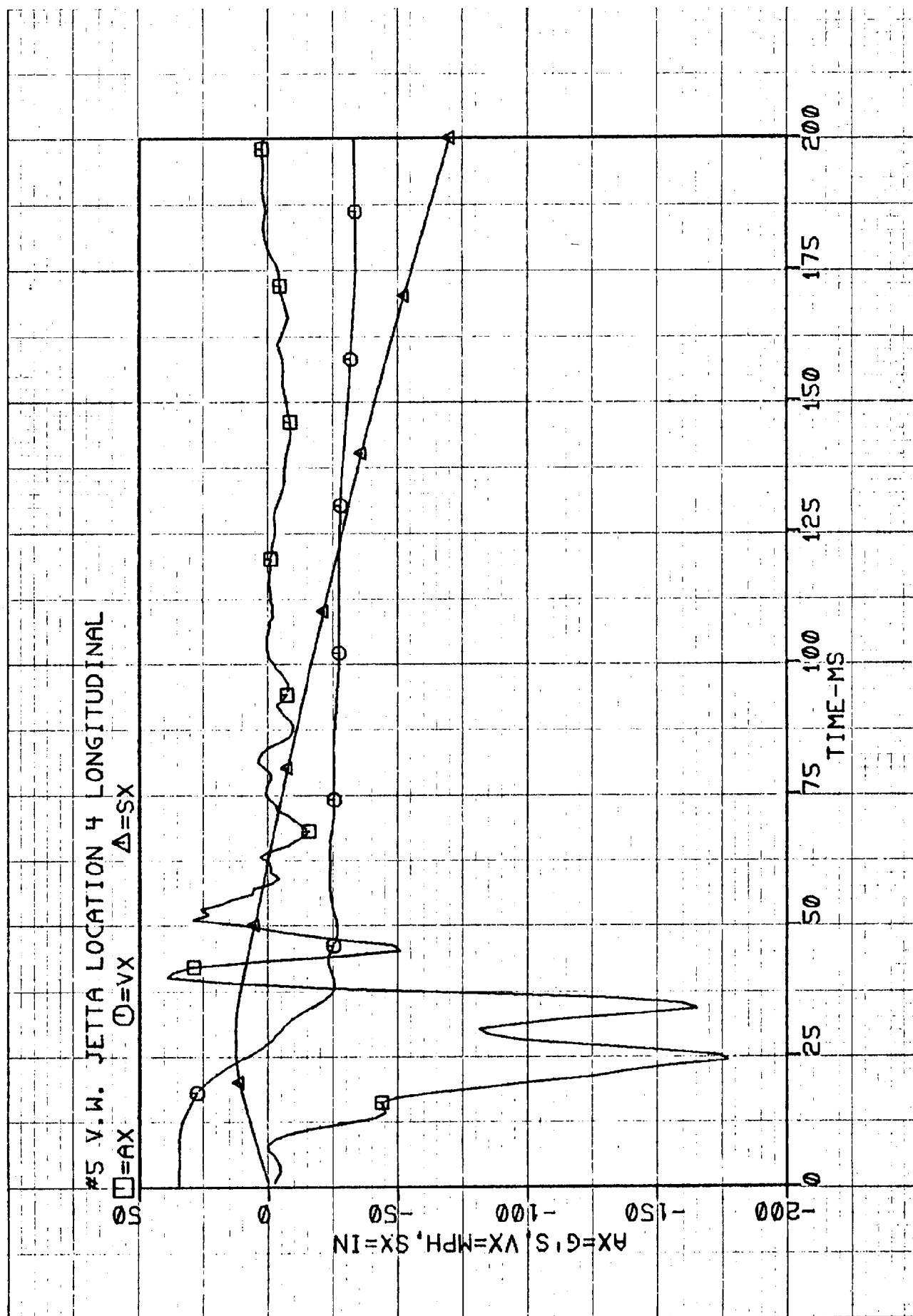
Data plots are presented for each accelerometer and consist of the accelerometer data plus the first integral versus time (velocity) and the second integral versus time (displacement) of the acceleration data.-

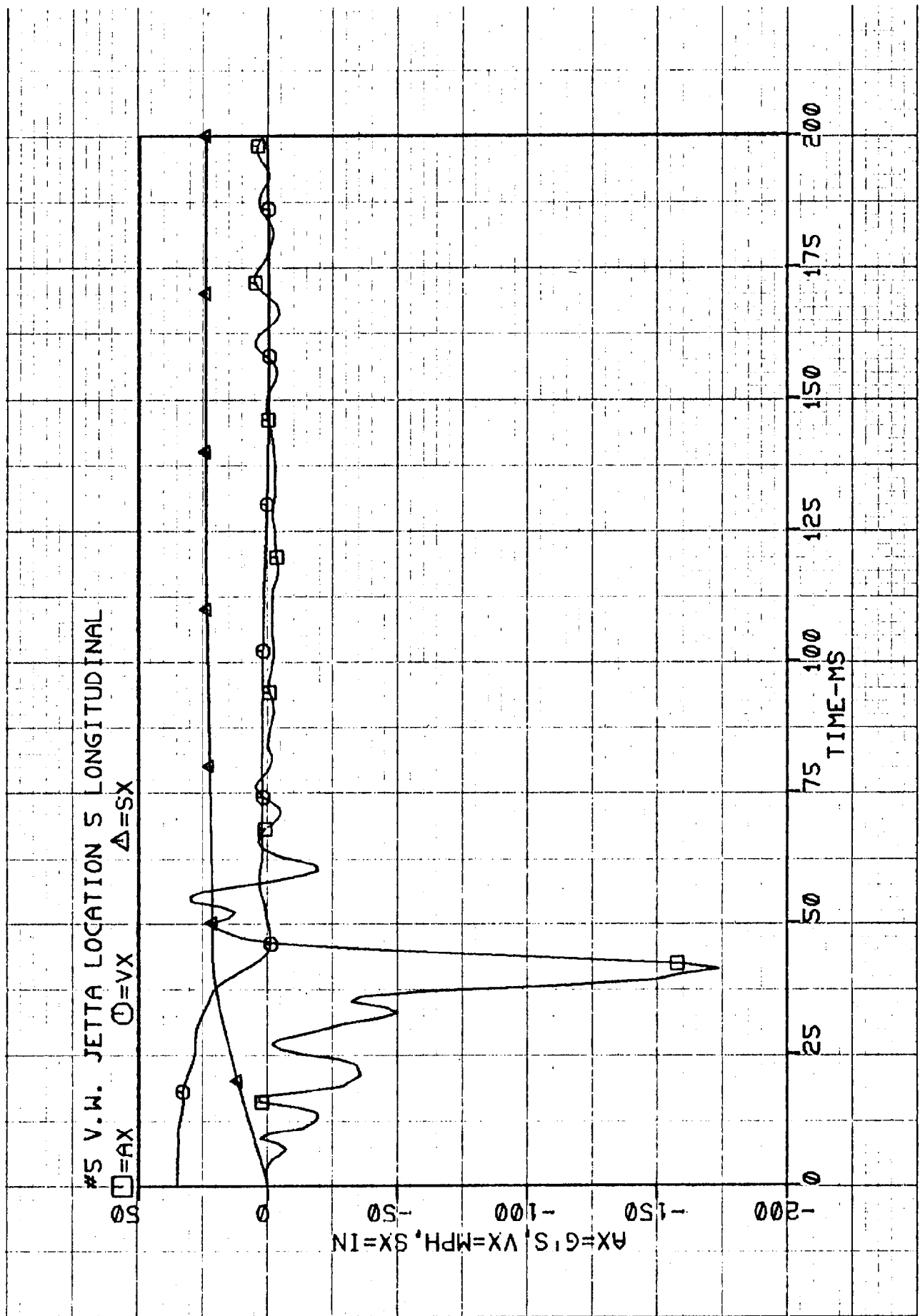
For the load cells, all data are summed and presented as total load versus time, upper two rows (C and D) summed versus time and lower two rows (A and B) summed versus time. Additional plots are presented for each cell multi-plotted by column. Individual loads may be difficult to discern on some of these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

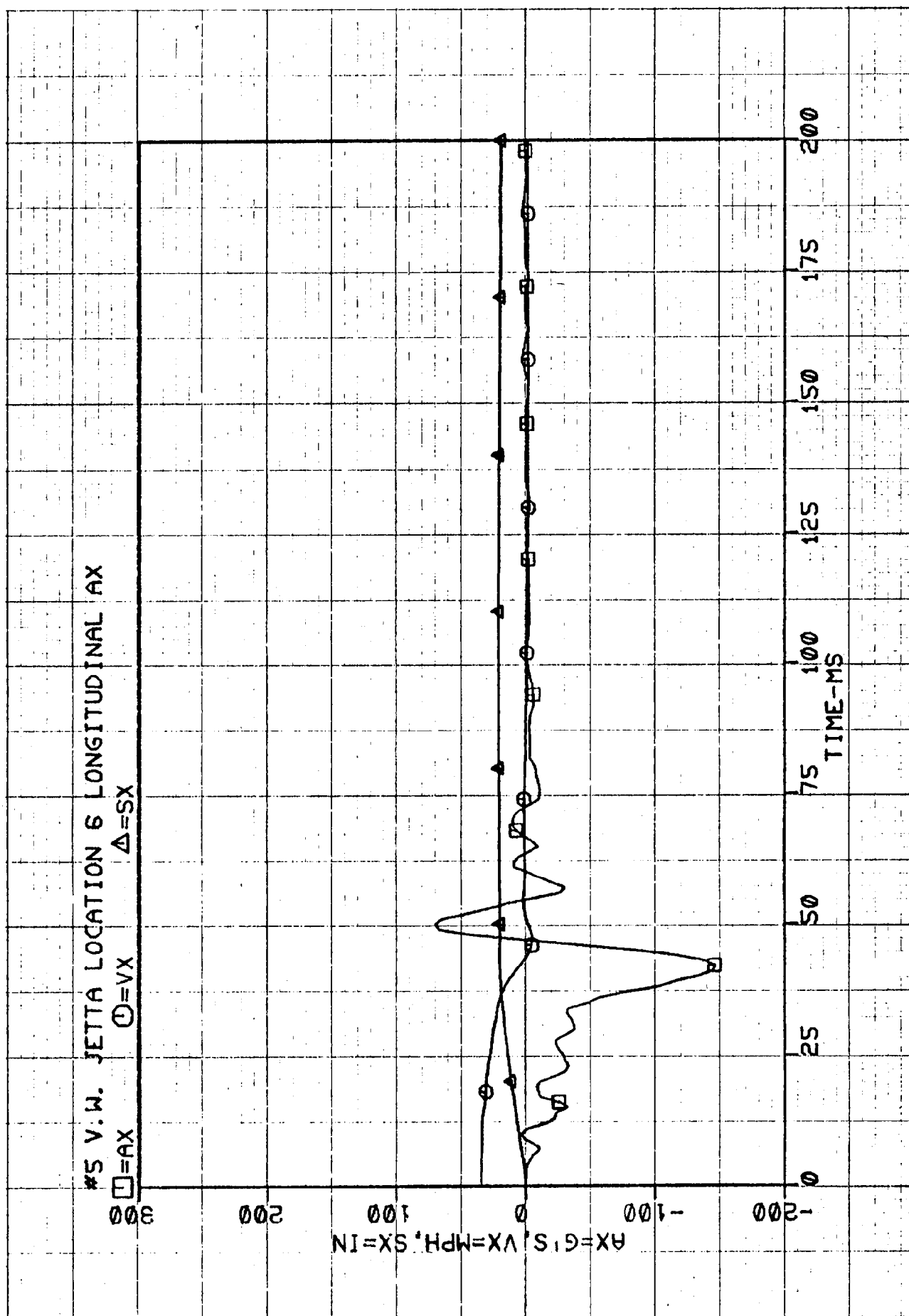


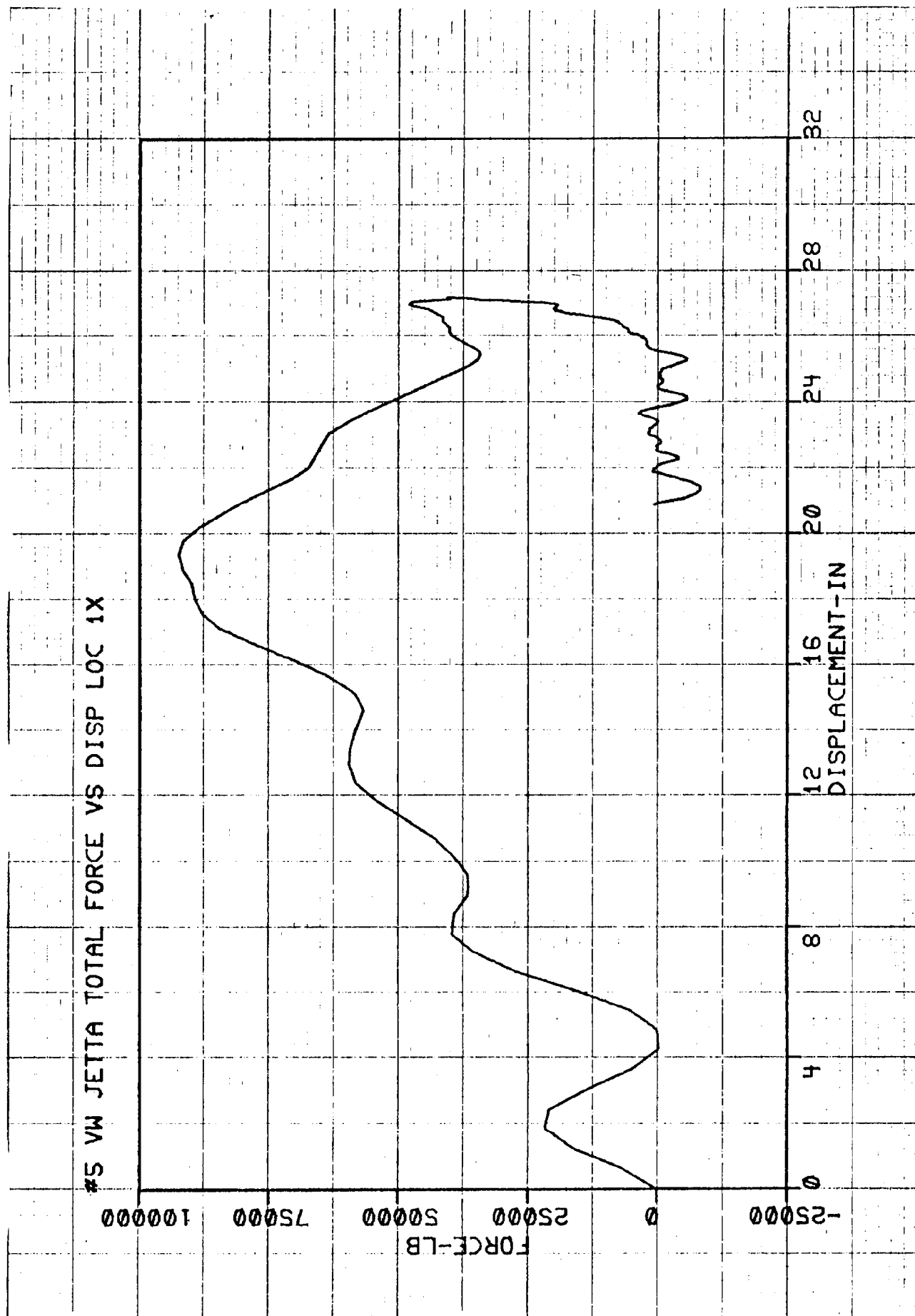


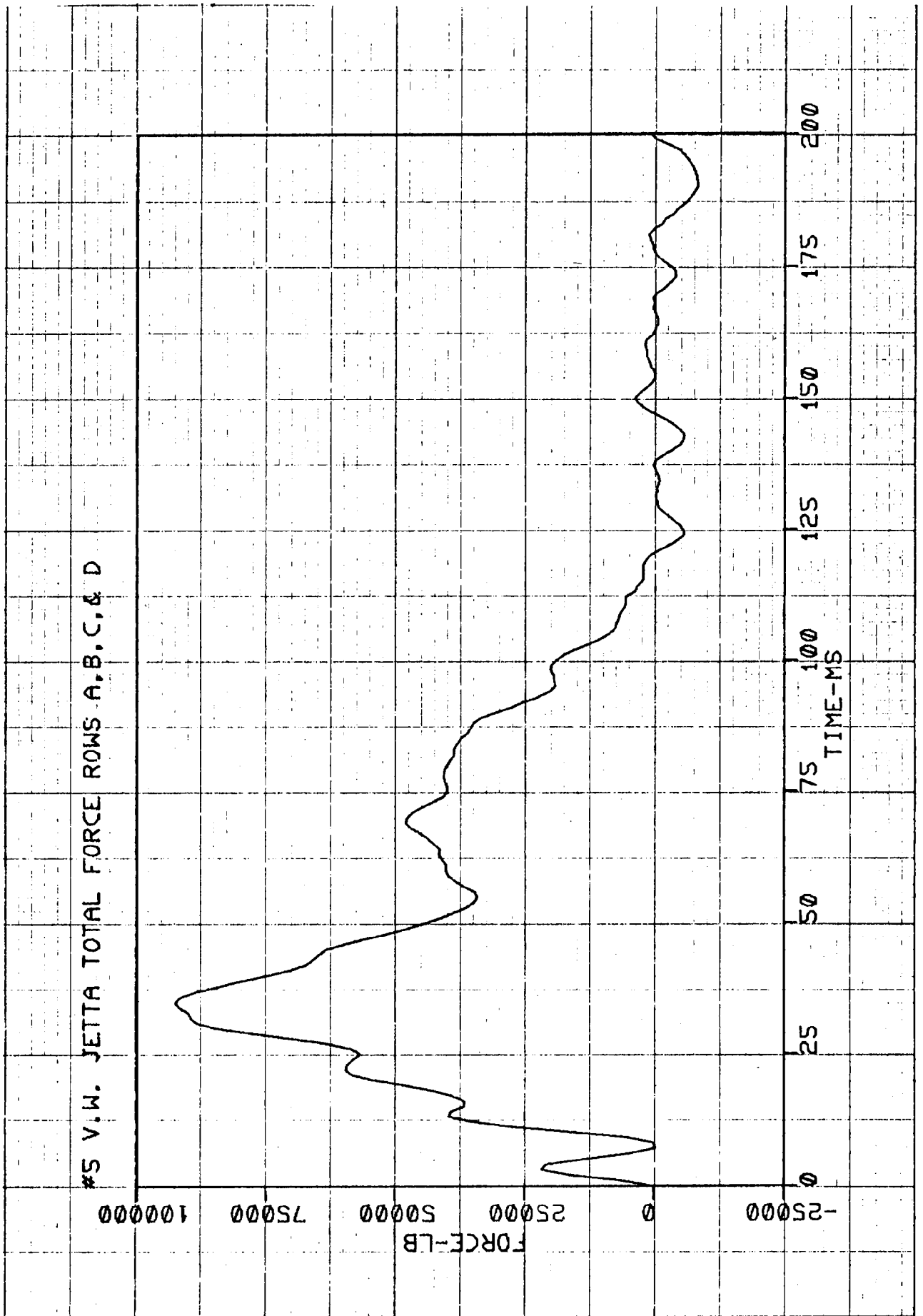


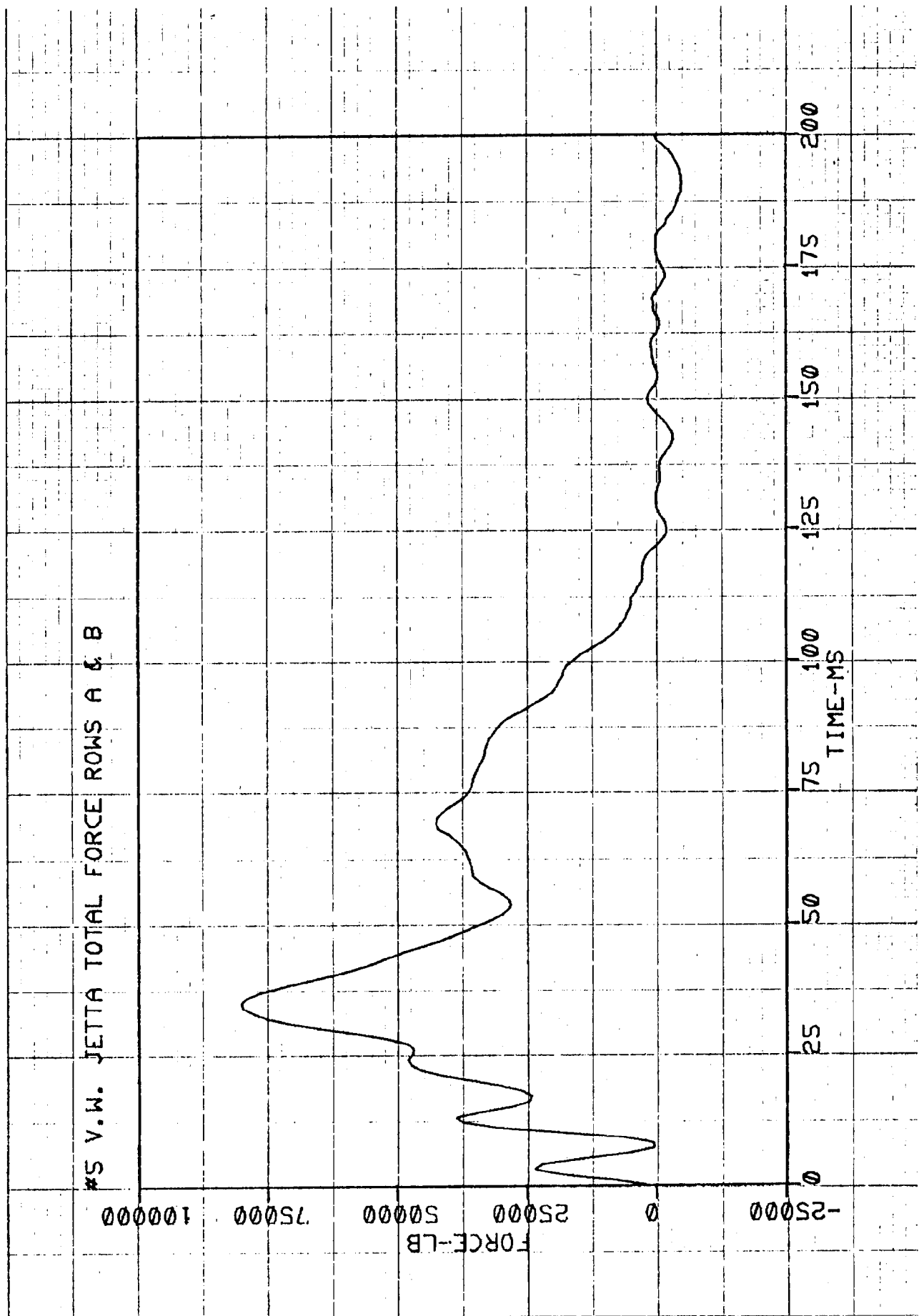




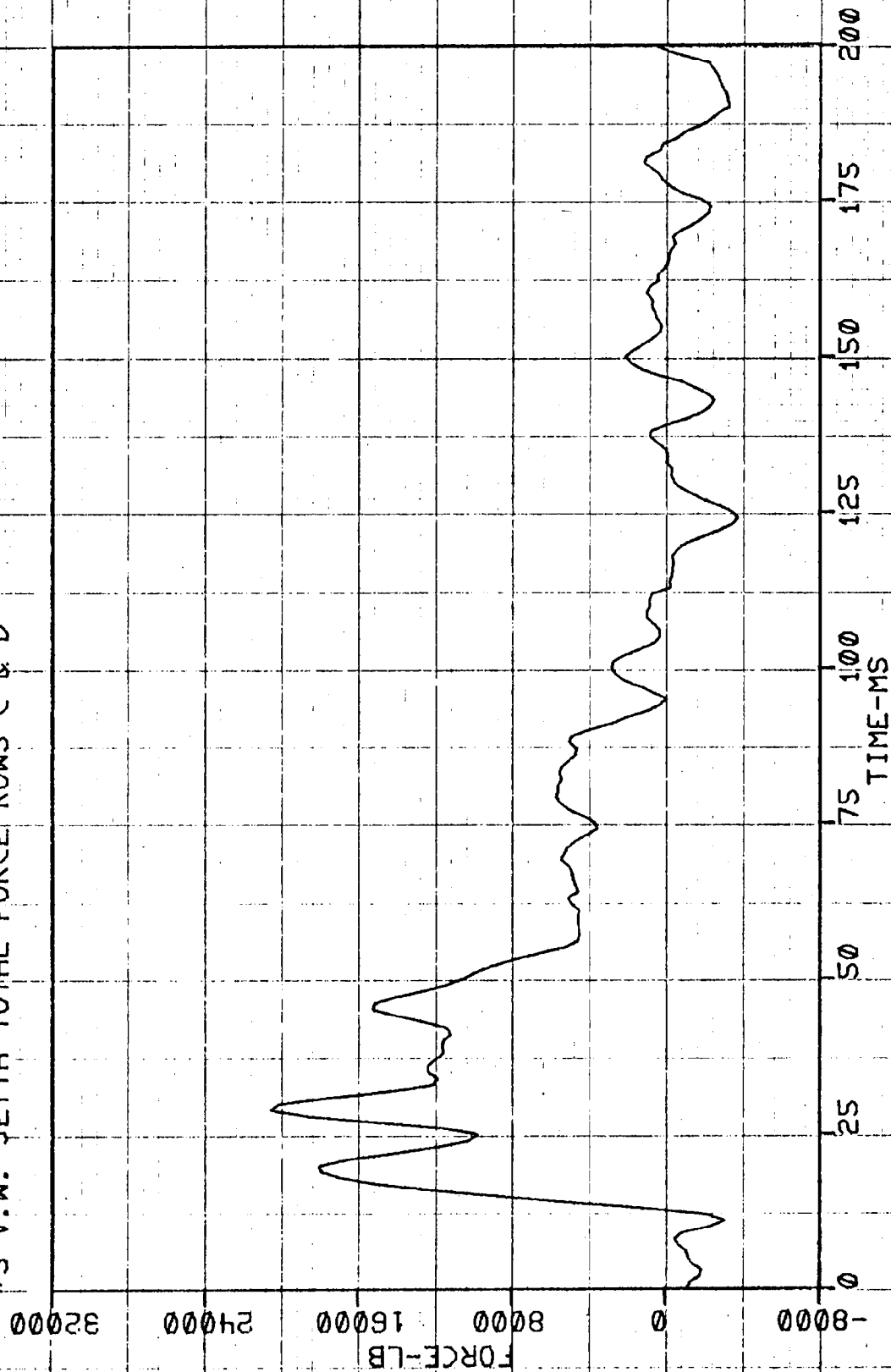


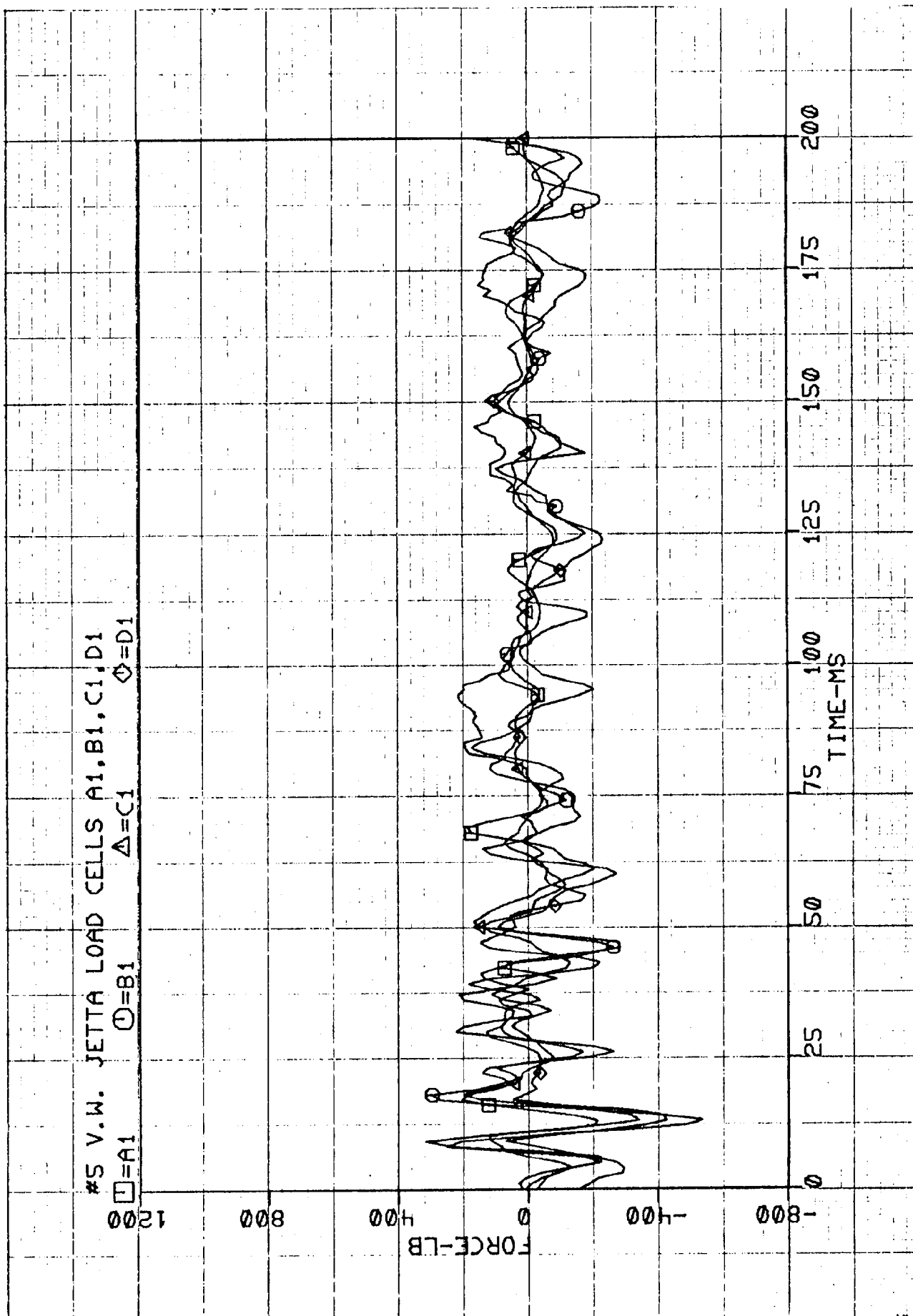


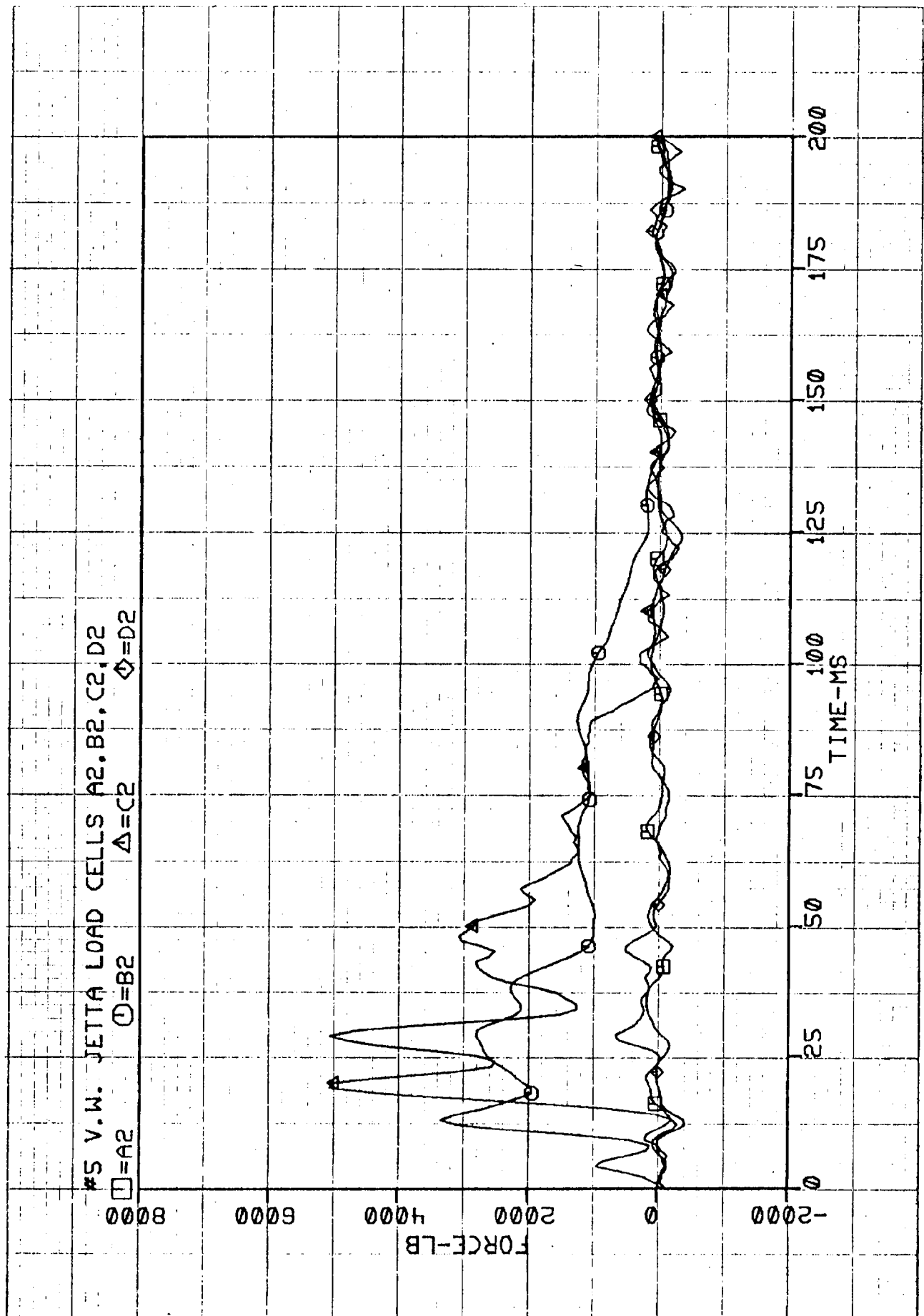


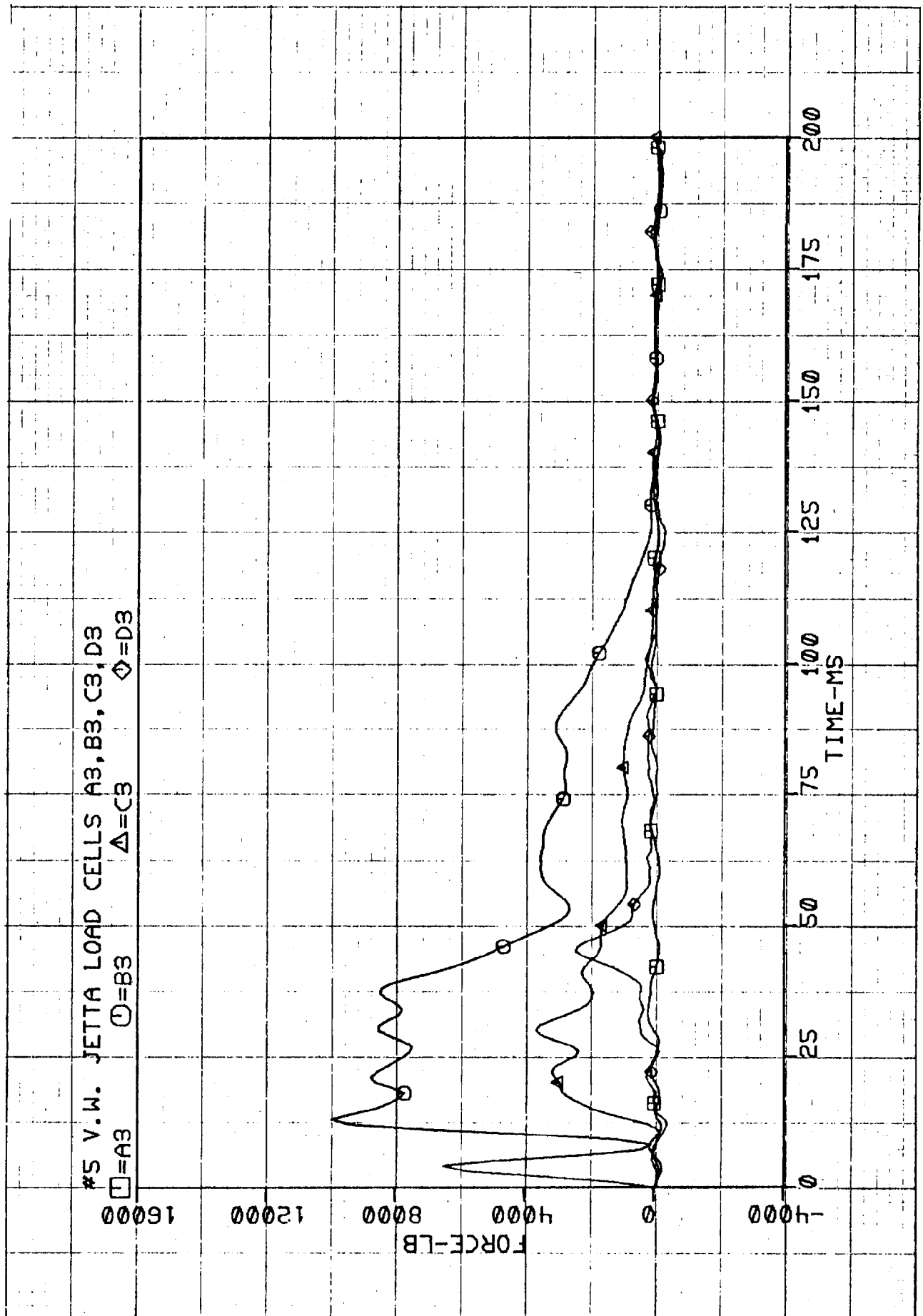


#5 V.W. JETTA TOTAL FORCE ROWS C & D

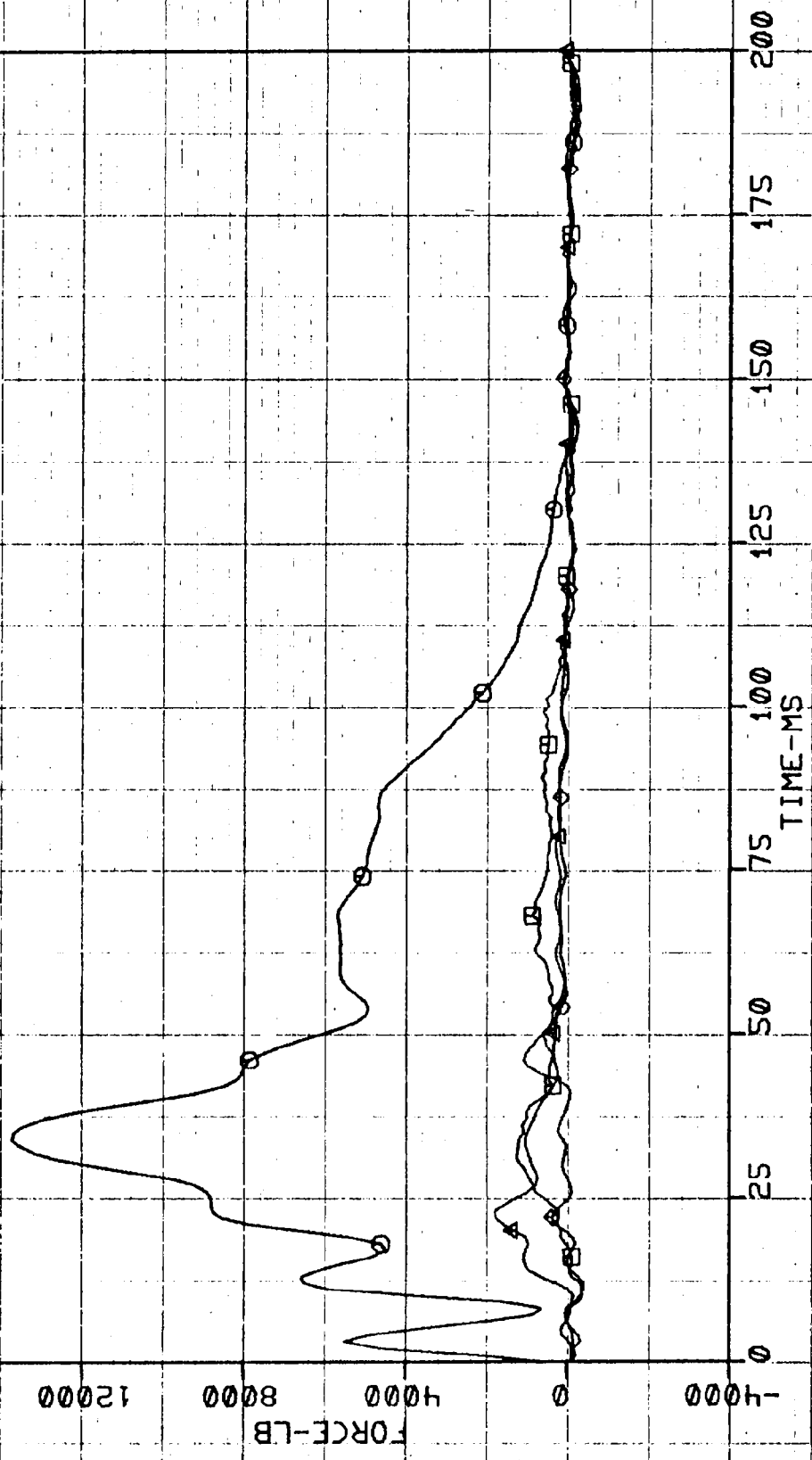


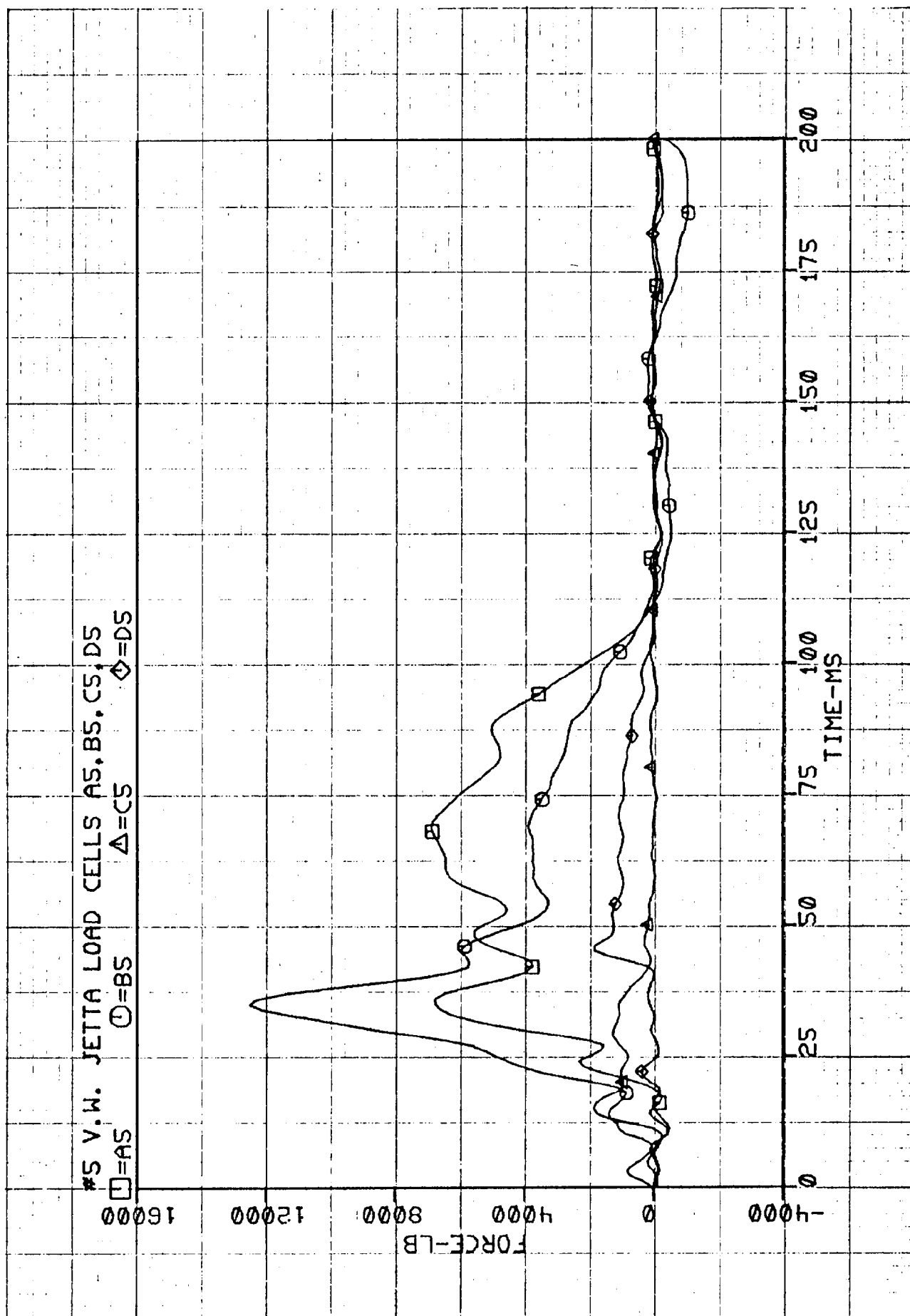






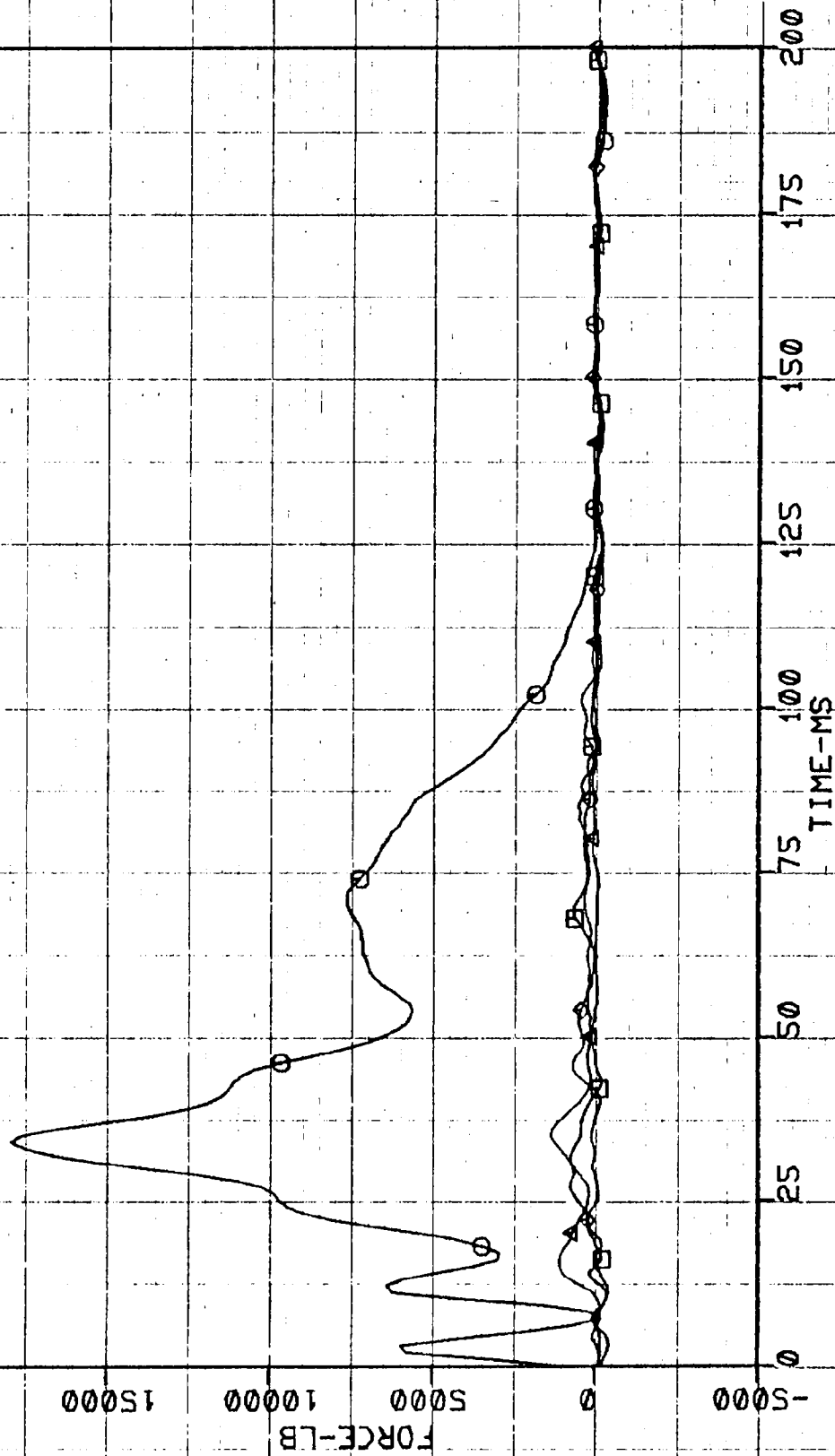
#5 V.W. JETTA LOAD CELLS A4, B4, C4, D4
 □=A4 ○=B4 △=C4 ◇=D4





#5 V.W. JETTA LOAD CELLS A6, B6, C6, D6

□=A6 ○=B6 △=C6 ◇=D6



#5 V.W. JETTA LOAD CELLS A7,B7,C7,D7

□=A7

○=B7

△=C7

◇=D7

20000

15000

10000

5000

0

-5000

FORCE-LB

200

175

150

125

100

75

50

25

0

TIME-MS

