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Dynamic Science Report No. 212-DYS-82-011
Dynamic Science Report No. 219-DYS-82-011
Dynamic Science Report No. 301-DYS-82-024

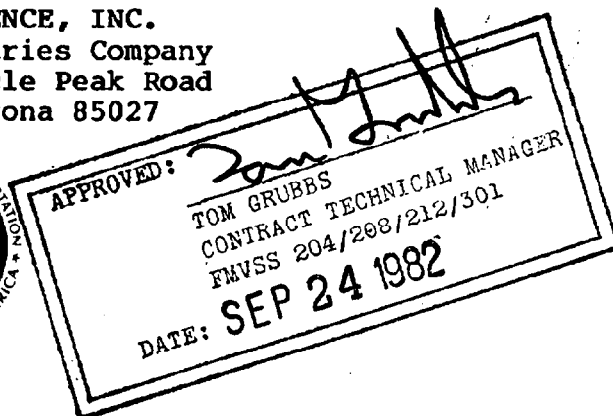
NEW VEHICLE ASSESSMENT AND
STANDARDS ENFORCEMENT INDICANT
TESTING

FMVSS 212, 219, AND 301-75

VOLKSWAGENWERK A.G.
1982 VOLKSWAGEN QUANTUM
4-DOOR SEDAN
NHTSA 820511

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September 1982

FINAL REPORT

Prepared for:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
----ENFORCEMENT----
OFFICE OF VEHICLE SAFETY COMPLIANCE
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Date 9-16-82

Report Accepted by:

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Contract Technical Manager
Office of Vehicle Safety Compliance

SEP 24 1982

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 fixed load-measuring barrier at a speed of 34.59 mph. The test was conducted at the Dynamic Science, Inc. Phoenix facility on August 4, 1982, with the following results: (a) FMVSS 212 - Loss of windshield periphery was within allowable range. (b) FMVSS 219 - No intrusion into windshield protected zone. (c) FMVSS 301 - Fuel leakage was within the allowable range. Both the driver and passenger dummies experienced a HIC value in excess of the limit specified in FMVSS 208 criteria. The driver value was 1353; the passenger value was 1194. All other values from both adult dummies satisfy FMVSS 208.					
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 Copies available from the Technical Reference Division, National Highway Traffic Safety Administration, Room 5108, 400 Seventh Street, S.W., Washington, D.C. 20590	
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. Pages 122	
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

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

Approximate Conversions From Metric Measures

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

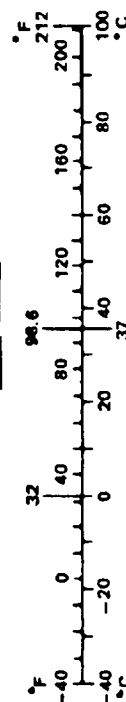


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1.0 PURPOSE AND TEST INTRODUCTION

1.1 PURPOSE

The purpose of the test was to subject a 1982 Volkswagen Quantum 4-Door Sedan to the indicant test requirements of DOT Test Plan TP-212-02, April 4, 1980, Standard Enforcement Indicant Testing for FMVSS 212, "Windshield Mounting," FMVSS No. 219, "Windshield Zone Intrusion," and FMVSS No. 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).

1.2 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. Section 4 contains occupant and vehicle response data. Appendix A contains pre-test and post-test vehicle and dummy photographs. Appendix B contains Calcomp plots. Appendix C contains dummy certification data.

2.0 GENERAL TEST AND VEHICLE PARAMETER DATA

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

GENERAL TEST AND VEHICLE PARAMETER DATA

PRE-IMPACT DATA

Make/Model: Volkswagen Quantum
Body Style: 4-Door Sedan Model Year 1982
NHTSA No. 820511 DSI No. 1250 Color: Black

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk A.G.
Date of Manufacture: 2/82; VIN: WVWFA0323CE177508
GVWR: 3395 lb; GAWR: Front = 1808 lb; Rear = 1720 lb

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL

Vehicle Capacity: FRONT REAR RECOMMENDED LOAD RANGE:
Tire Pressure: 27 psi 27 psi TIRE SIZE: Standard
185/70SR13
Designated Seating: 2 Front 3 Rear 5 Total
Cargo load = 44 lb Is Spare Tire: Space Saver? No
TOTAL = 794 lb Standard Equipment? Yes
Engine: CVW1.7V6FBC7, 4 Cylinder Inline 105 cu. in.
Transmission: Automatic Front Wheel Drive
Date Vehicle Received by Laboratory: 7/9/82; Odometer 494
Dealer Name & Address: NTW Via Autodriveaway

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

Right Front = 767 lb Right Rear = 487 lb
Left Front = 734 lb Left Rear = 485 lb
TOTAL FRONT WEIGHT = 1501 lb (61 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 972 lb (39 % of Total Vehicle Weight)
TOTAL DELV. WEIGHT = 2473 lb

TARGET WEIGHT = UDW + Cargo Load + 328 lbs Dummies = 2845 lb

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 44 LB CARGO:

Right Front = 829 lb Right Rear = 691 lb
Left Front = 773 lb Left Rear = 661 lb
TOTAL FRONT WEIGHT = 1602 lb (54 % of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1352 lb (46 % of Total Vehicle Weight)
TOTAL TEST WEIGHT = 2954 lb†

Weight of ballast secured in vehicle trunk area = 0 lb

VEHICLE ATTITUDE: (inches)

Delivered Attitude: RF 30 LF 30 RR 30 LR 30
Test Attitude: RF 29-1/4 LF 29-1/2 RR 29-1/2 LR 28-1/2

REMARKS: Vehicle contains air conditioning.

†Weight exceeds tolerance band called for in TP-212-02. The weight requirement was waived for this test by Vince Quarles (CTM).

GENERAL TEST AND VEHICLE PARAMETER DATA (CONT)

POST-IMPACT DATA

Type of Test: Frontal (0°) Impact
 Date of Test: 8/4/82 Time: 1344 Temperature 100°F
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: Primary = 34.59 mph Secondary = 34.61 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 176.0 C 179.1 L 176.4
 Post-test = R 157.0 C 156.0 L 153.8
 Crush = R 19.0 C 23.1 L 22.6
 Distance from front of test vehicle to point of impact:
 R 13.5 C 14.2 L 15.7

VISIBLE DUMMY CONTACT POINTS

	Driver	Passenger
Head	<u>Steering wheel rim and hub</u>	<u>Dash panel</u>
Chest	<u>Steering wheel rim</u>	<u>None</u>
Abdomen	<u>None</u>	<u>None</u>
Left Knee	<u>Instrument panel</u>	<u>Dash panel</u>
Right Knee	<u>Instrument panel</u>	<u>Dash panel</u>

DOOR OPENING

Front		Rear	
Left	Right	Left	Right
<u>Difficult</u>	<u>Difficult</u>	<u>Easily</u>	<u>Difficult</u>
<u>No Tools</u>	<u>No Tools</u>		<u>No Tools</u>
<u>Required</u>	<u>Required</u>		<u>Required</u>

SEAT MOVEMENT

Seat Back Failure	<u>None</u>	<u>None</u>
Seat Shift (in.)	<u>0.0</u>	<u>0.0</u>

GLAZING DAMAGE

Backlight/Windshield Slight retention loss on left side of windshield. Windshield cracked.

OTHER NOTABLE IMPACT EFFECTS: Left front tire flat. Front tires pinned by crushed sheet metal.

3.0 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 Quantum
Body Style: 4-Door Sedan Model Year: 1982
NHTSA No. 820511 DSI No. 1250 Color: Black

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk A.G.
Date of Manufacture: 2/82; VIN WVWFA0323CE177508
GVWR: 3395 lb; GAWR: Front = 1808 lb; Rear 1720 lb

POST-IMPACT DATA

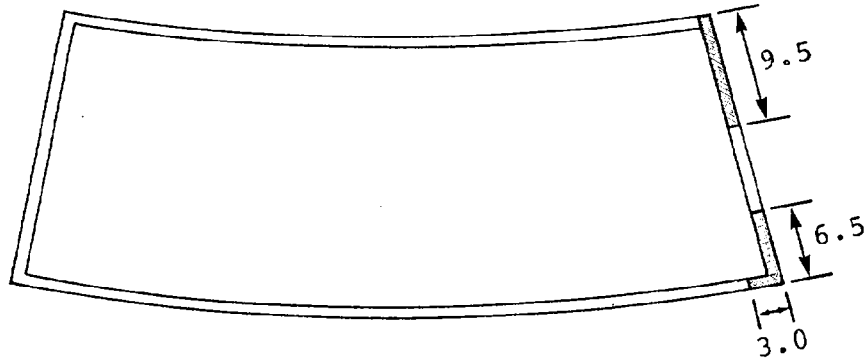
Type of Test: Frontal (0°) Impact
Date of Test: 8/4/82 Time: 1344 Temperature 100 °F
Required Impact Velocity Range: 34.5 to 35.5 mph
Impact Velocity: Primary = 34.59 mph Secondary = 34.61 mph
Test Weight: 2954 lb Static Crush: 23.1 in.
Rebound Distance: 14.2 in.

DETAILS OF WINDSHIELD MOUNTING: Windshield was bonded in one
bend of an "S" shaped rubber grommet. The other bend was
pressed over the pinch weld flange.

	WINDSHIELD PERIPHERY		
	Pre-test	Post-test	Retention
RIGHT SIDE	74-1/2	74-1/2	100%
LEFT SIDE	74	55	74%
TOTAL	148-1/2	129-1/2	87%

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 (Continued)



FRONT VIEW

AREA OF RETENTION FAILURE: Retention loss was noted along the left side of the windshield periphery. The upper 9.5 inches was lost, the next 9.3 inches was retained, the remaining 6.5 inches was lost. Also retention loss was noted for 3.0 inches along the bottom in the left hand corner.

SUMMARY OF FMVSS 219 DATA

PRE-IMPACT DATA

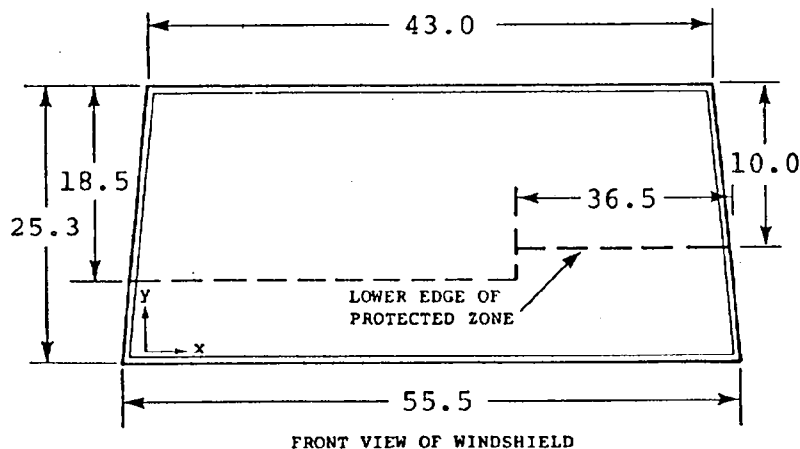
Make/Model: Volkswagen Quantum
Body Style: 4-Door Sedan Model Year: 1982
NHTSA No.: 820511 DSI No. 1250 Color: Black

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk A.G.
Date of Manufacture: 2/82; VIN: WVWFA0323CE177508
GVWR: 3395 lb; GAWR: Front = 1808 lb; Rear = 1720 lb

POST-IMPACT DATA

Type of Test: Frontal (0°) Impact
Date of Test: 8/4/82 Time: 1344 Temperature 100 °F
Required Impact Velocity Range: 34.5 to 35.5 mph
Impact Velocity: Primary = 34.59 mph Secondary = 34.61 mph
Test weight 2954 lb Static Crush 23.1 in. Rebound 14.2 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

X

Y

None

None

NOTE: No intrusion into the windshield "protected zone" was noted.

SUMMARY OF FMVSS 301 DATA

PRE-IMPACT DATA

Make/Model: Volkswagen Quantum
Body Style: 4-Door Sedan Model Year: 1982
NHTSA No.: 820511 DSI No. 1250 Color: Black

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagen A.G.
Date of Manufacture: 2/82 ; VIN: WVWFA0323CE177508
GVWR: 3395 lb; GAWR: Front = 1808 lb; Rear = 1720 lb

POST-IMPACT DATA

Type of Test: Frontal (0°) Impact
Date of Test: 8/4/82 Time: 1344 Temperature 100 °F
Required Impact Velocity Range: 34.5 to 35.5 mph
Impact Velocity: Primary = 34.59 mph Secondary = 34.61 mph
Test Weight 2954 lb Static Crush 23.1 in. Rebound 14.2 in.

FUEL SYSTEM DATA

Test fluid: Stoddard Solvent Specific Gravity: 0.764
Temperature: 100 °F
Kinematic Viscosity: 0.99 Centistokes Test Volume: 15.5 U.S. gal

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

Details of fuel system: Nearly cylindrical fuel tank (28 inches long, 19 inch diameter) fastened forward of the spare tire well by two 1.25-inch wide straps. The straps are hooked on the rear seat pan 14 inches apart and bolted to the undercarriage forward of the spare tire well.

The filler neck opening is located on the right quarter panel and is capped by a quarter turn locking cap. The neck traverses downward as a 1.5 inch OD metal tube until it reaches the top of the tire height where it is linked to the tank by a 4 inch long rubber hose (approximately 1 inch inboard from inside of tire). A 0.65-inch OD vent hose exits the neck just inside the wall next to the wheel hurst and enters top of tank on right side.

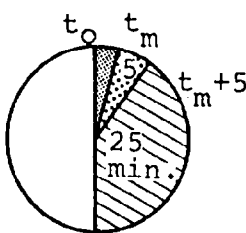
Three metal lines exit the forward right side top of the tank and traverse forward. Inwardmost line enters a floor mounting bracket, and is then linked to a metal tube in the fuel pump by a rubber line. A line exiting the pump is connected to a filter

SUMMARY OF FMVSS 301 DATA (Continued)

mounted aft of the floorpan. The line exiting the filter traverses along the right side of the vehicle in a "tunnel" to the firewall. The other two lines (one metal, one rubber) traverse through two mounting clips, bend downward around the filter and traverse along the previously described line to the firewall.

The fuel lines traverse up the firewall, over the right front axle fender housing and hook up to the injector unit.

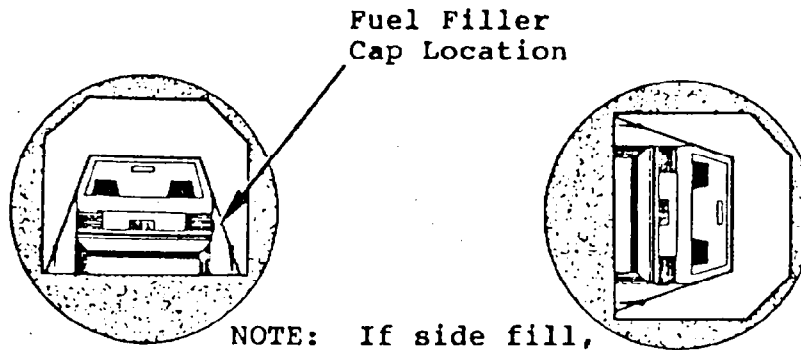
FUEL SPILLAGE MEASUREMENT

	ACTUAL	MAXIMUM ALLOWABLE
	1. From impact until vehicle motion ceases. . . . 0.0	1 oz
	2. For 5-minute period after vehicle motion ceases 0.0	5 oz
	3. For next 25 minutes. . . 0.0	1 oz/min

SOLVENT SPILLAGE DETAILS: None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 0° to 90° VEHICLE NHTSA NO. 820511



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

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:

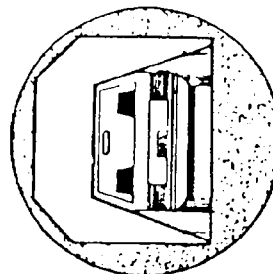
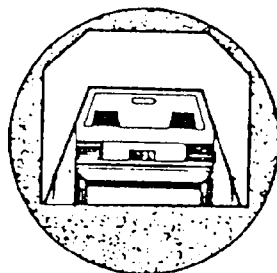
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	0	0	0	---

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

SOLVENT SPILLAGE LOCATION(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 90° to 180° VEHICLE NHTSA NO. 820511



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:

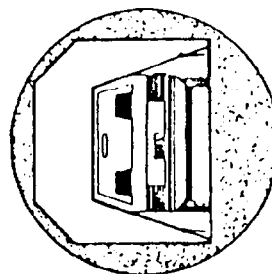
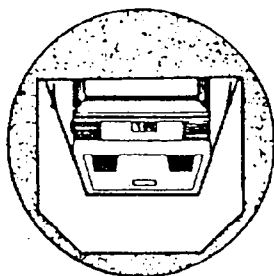
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	0	0	0	---

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

SOLVENT SPILLAGE LOCATION(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 180° to 270° VEHICLE NHTSA NO. 820511



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:

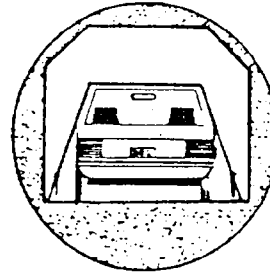
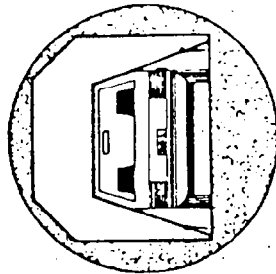
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	0	0	0	---

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

SOLVENT SPILLAGE LOCATION(S): None

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: 270° to 360° VEHICLE NHTSA NO. 820511



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

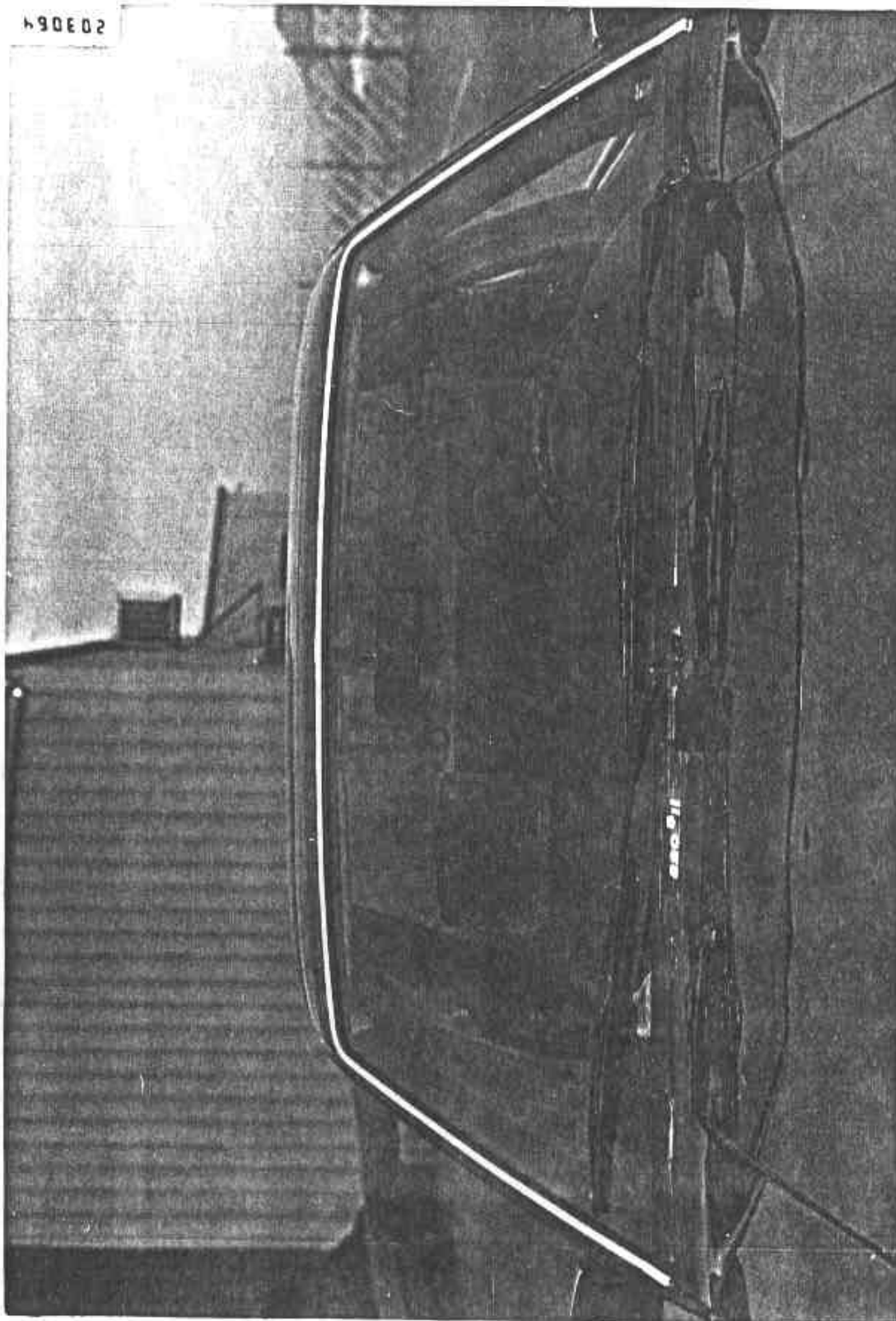


FIGURE 3-1. PRE-TEST WINDSHIELD - 1982 VOLKSWAGEN QUANTUM - NHTSA 820511.

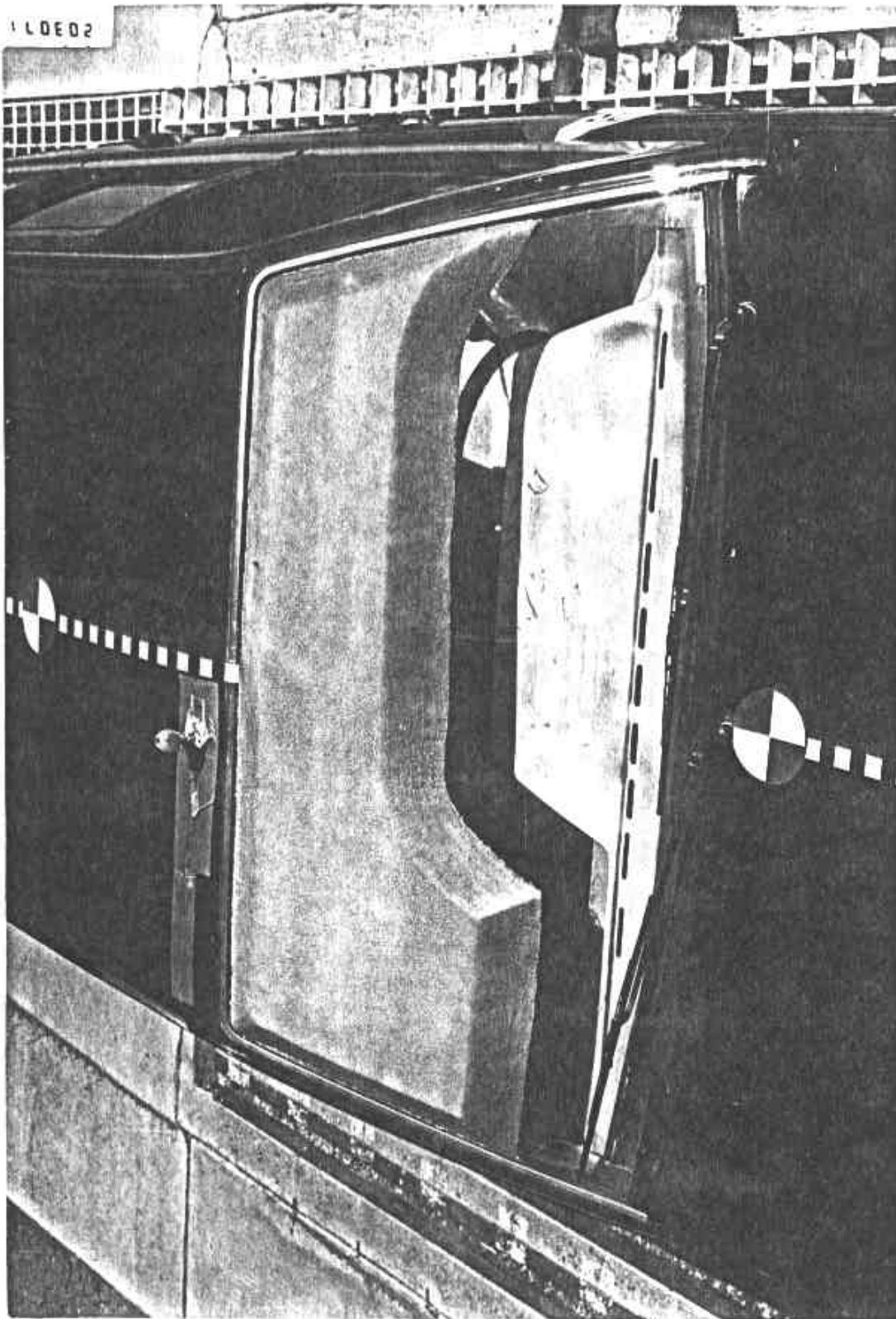


FIGURE 3-2. PRE-TEST WINDSHIELD WITH STYROFOAM TEMPLATE IN PLACE -
1982 VOLKSWAGEN QUANTUM - NHTSA 820511.

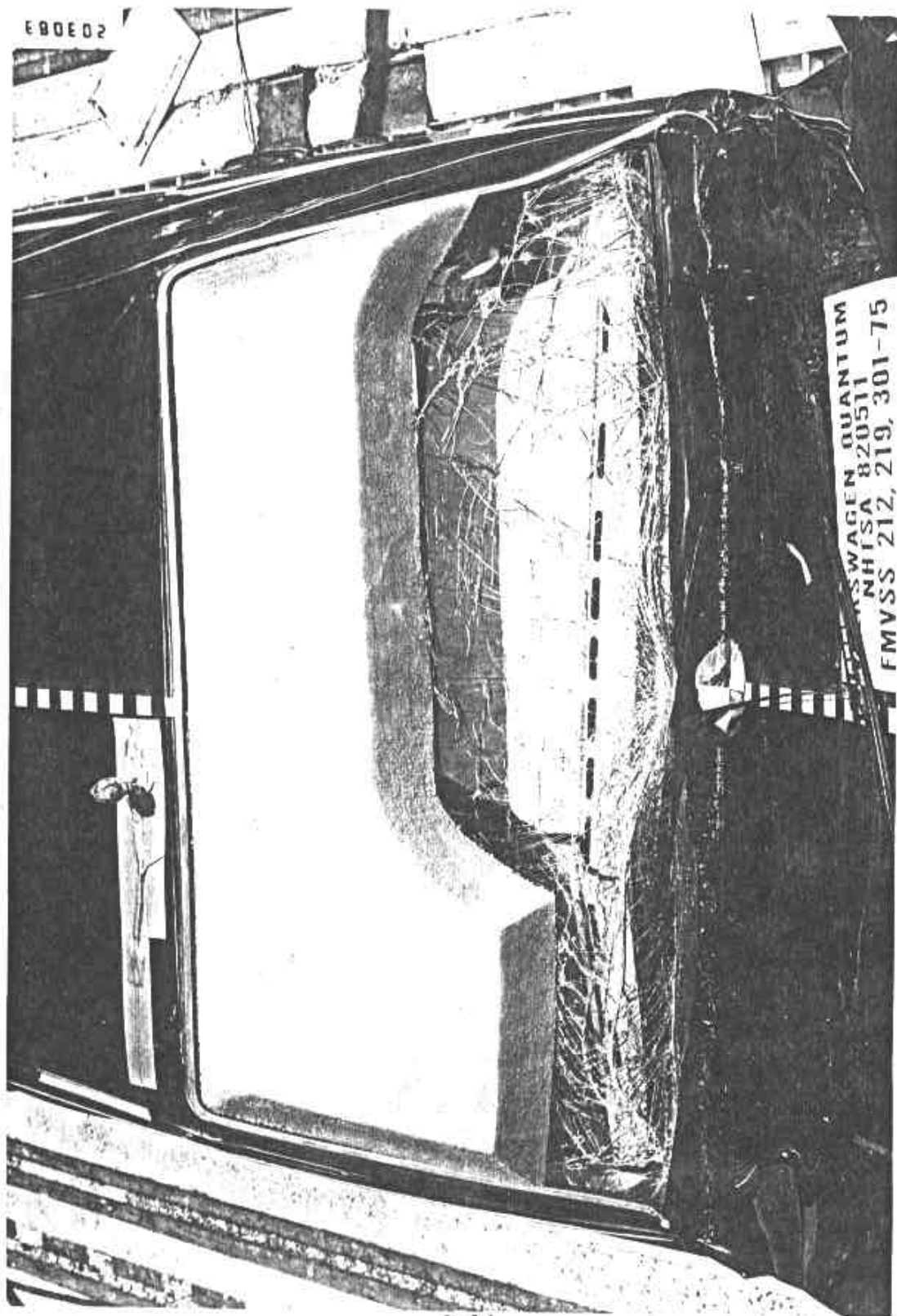


FIGURE 3-3. POST-TEST WINDSHIELD - 1982 VOLKSWAGEN QUANTUM - NHTSA 820511.

880E02

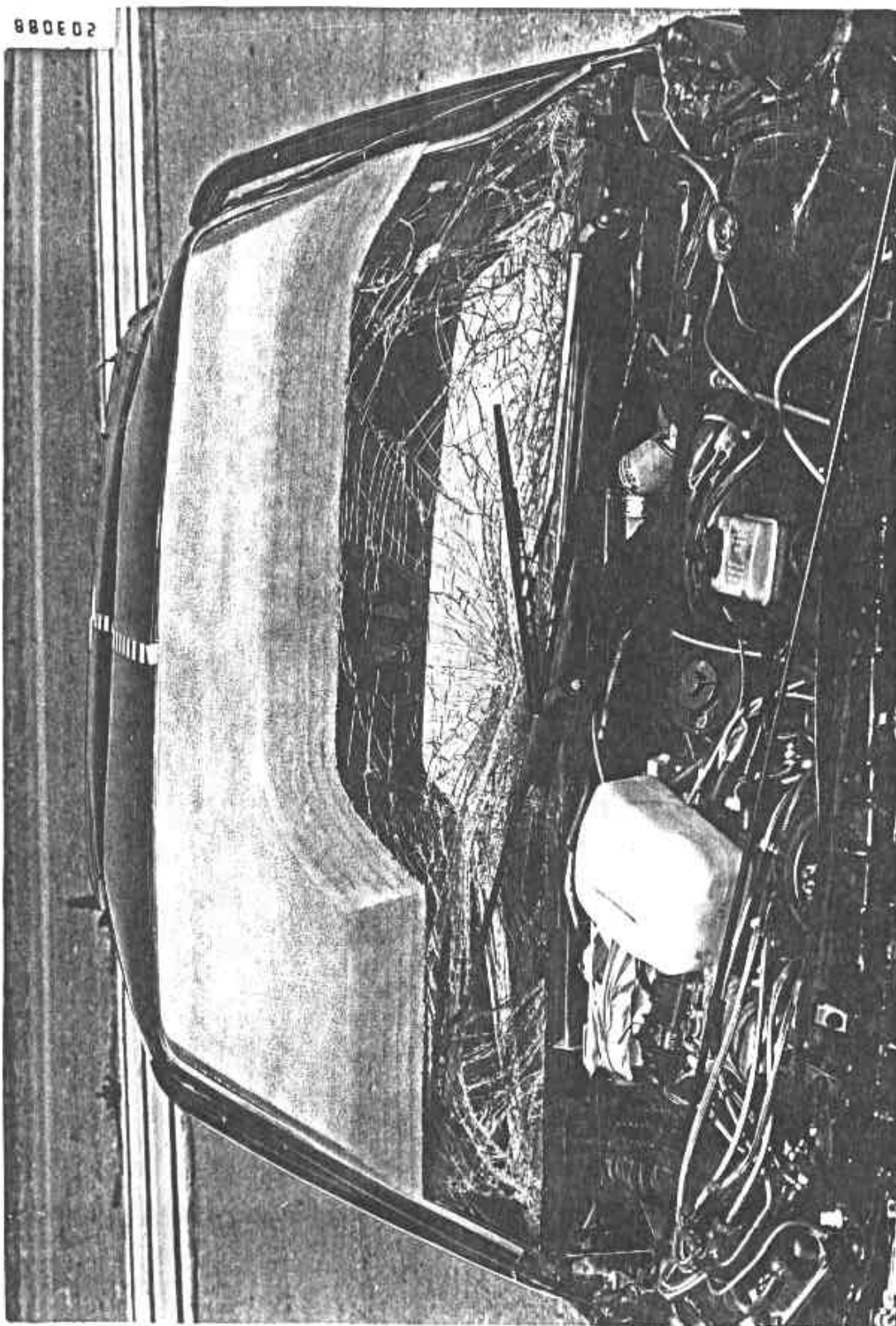


FIGURE 3-4. POST-TEST WINDSHIELD WITH HOOD REMOVED - 1982 VOLKSWAGEN QUANTUM -
NHTSA 820511.



FIGURE 3-5. PRE-TEST FUEL TANK - 1982 VOLKSWAGEN QUANTUM - NHTSA 820511.

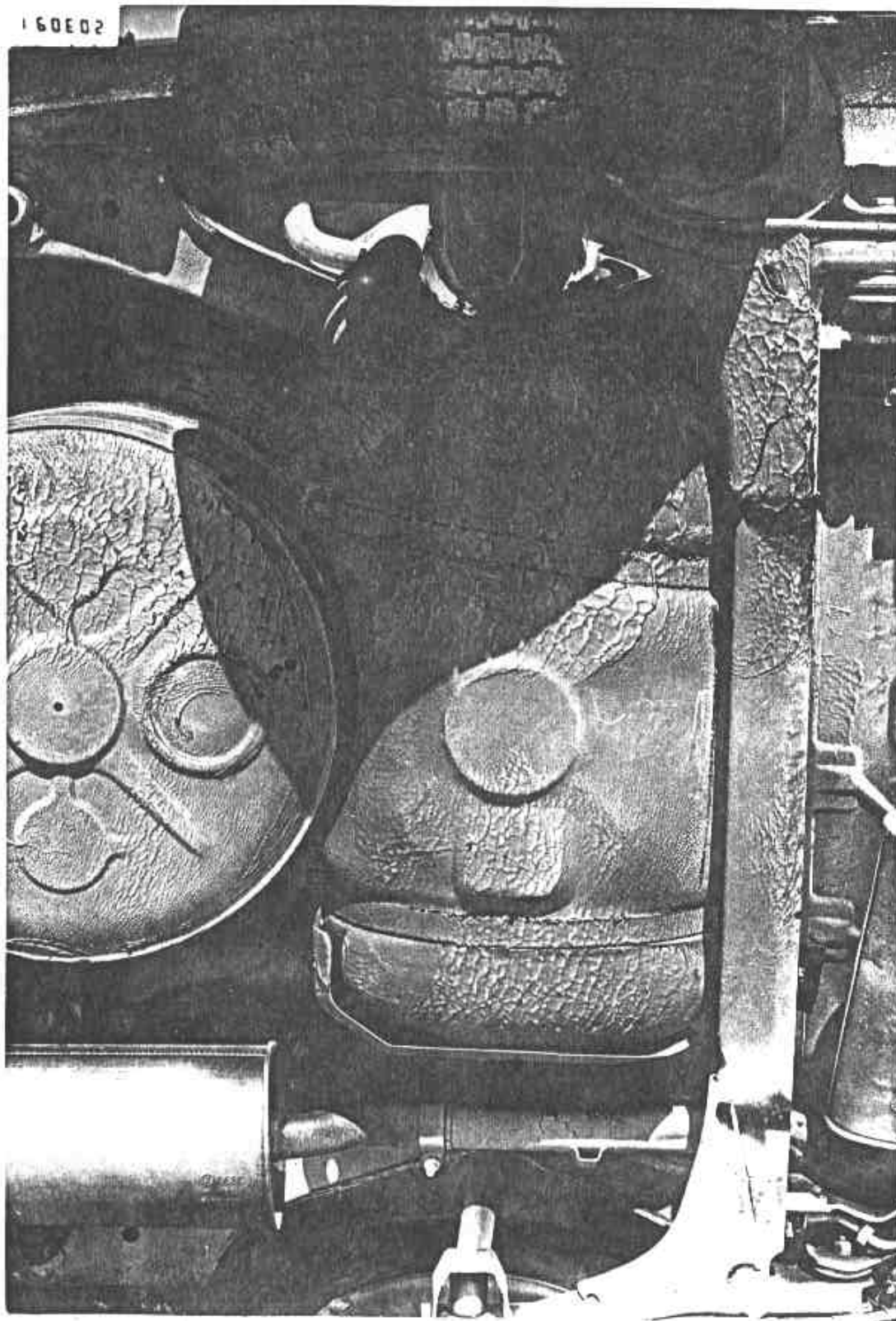


FIGURE 3-6. POST-TEST FUEL TANK - 1982 VOLKSWAGEN QUANTUM - NHTSA 820511.

4.0 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 Quantum
 Body Style: 4-Door Sedan Model Year: 1982
 NHTSA No.: 820511 DSI No. 1250 Color: Black

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk A.G.
 Date of Manufacture: 2/82; VIN: WVWFA0323CE177508
 GVWR: 3395 lb; GAWR: Front = 1808 lb; Rear = 1720 lb

POST-IMPACT DATA

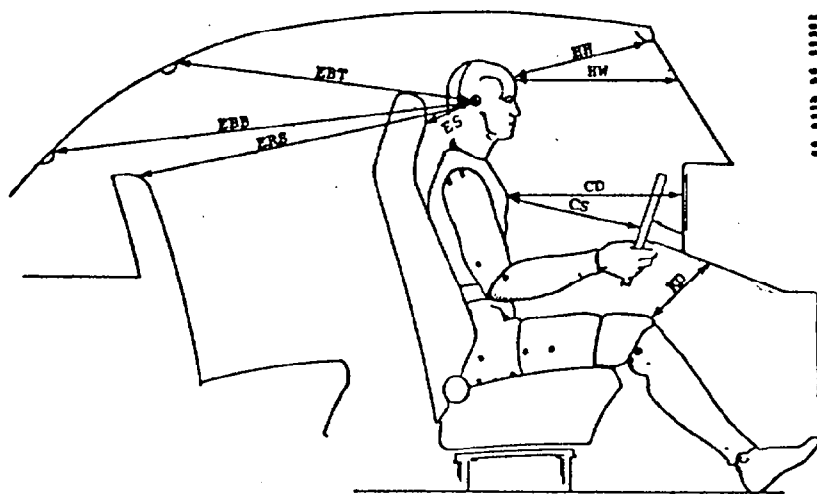
Type of Test: Frontal (0°) Impact
 Date of Test: 8/4/82 Time: 1344 Temperature 100 °F
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: Primary = 34.59 mph Secondary = 34.61 mph
 Seat Type: Bucket Adjuster Type: Manual
 Rebound Distance 14.2 in. Static Crush: 23.1 in.
 Technicians: M. Rodack, L. Johnson

DRIVER DUMMY# <u>A03</u>		PASSENGER DUMMY # <u>A04</u> (A09 HEAD)	
HEAD TARGET	<u>15.5</u> " <u>2</u> °	<u>17</u> " <u>2</u> °	HEAD TARGET
KNEE JOINT	<u>26.75</u> " <u>102</u> °	<u>26.75</u> " <u>101</u> °	KNEE JOINT
APPROXIMATE "H" POINT	<u>13.5</u> " <u>132</u> °	<u>13.5</u> " <u>132</u> °	APPROXIMATE "H" POINT

Diagram showing the seating positions of the Driver Dummy (A03) and Passenger Dummy (A04) in the vehicle. The Driver Dummy is seated on the left, and the Passenger Dummy is seated on the right. The diagram includes labels for the Fore, Aft, and Midpoint of the seat and the dummy's position relative to the vehicle's centerline.

Diagram showing the overall dimensions of the vehicle interior. The Driver Dummy (A03) is seated on the left, and the Passenger Dummy (A04) is seated on the right. The diagram includes labels for the Overall dimensions, Lateral Bar, Adjustable Pointer, Left Front Door, Driver Dummy, Passenger Dummy, Right Front Door, and Door Glass Height.

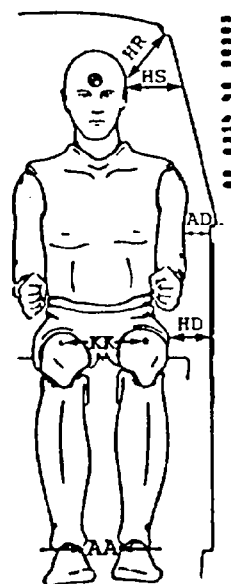
PART 572 DUMMY IN-VEHICLE POSITION RECORDING SHEET



	Driver	Passenger
HH	17.2	17.1
HW	25.0	25.0
CD	22.0	22.7
CS	17.5	N/A
KD R	5.6	6.5
KD L	5.9	6.2
Torso	Torso	
Angle 27°	Angle 27°	
Seat Back	Seat Back	
Angle 27°	Angle 27°	
HSW	21.8	N/A

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
 Torso and seat back angles
 are relative to vertical.

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



	Driver	Passenger
HR	8.0	7.0
HS	8.0	8.0
AD	4.5	4.5
HD	6.0	5.7
KK	14.5	13.5
AA	14.0	12.5

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	25.2	181	124.1	78	7.5	93	100.4	98
Lateral	22.8	77	20.0	79	63.2	97	8.1	194
Vertical	135.2	84	18.6	100	100.0	97	6.4	17
Resultant	160.9	84	-	-	153.4	97	-	-
HIC	1353 between 77 and 93 msec,				1194 between 78 and 107 msec			
Chest Acceleration								
Longitudinal	5.6	176	56.8	82	10.5	155	39.3	77
Lateral	4.2	85	6.5	60	35.9	103	14.8	80
Vertical	12.1	60	13.9	106	14.7	98	9.7	82
Resultant (Max)	56.9	82	-	-	48.9	102	-	-
Resultant (clip)	53.0	81-84	-	-	41.4	101-104	-	-
TIME > 60 G	0 msec				0 msec			
SEVERITY INDEX	466 @ 200 msec				340 @ 200 msec			
	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)
Femur Loads								
Left	351.9	65	180.1	30	102.9	26	560.6	40
Right	310.1	49	436.4	69	333.5	48	413.0	40
Belt Loads								
Lap	1817.8	64			1585.3	65		
Torso	1856.0	73			1930.8	77		
Belt Stretch/Spoolout Measurements								
	Peak (in.)		Time (msec)		Peak (in.)		Time (msec)	
String Pot	4.0 (3.7)		95 (75)		4.2 (3.5)		95 (76)	
Extensiometer @ Max Load	0.4 (8%)		75 (1856 lb)		0.5 (11%)		77 (1931 lb)	
Film Data	Data not available due to onboard camera power supply malfunction.							
Vehicle Impact Speed (mph): 34.59								
*Longitudinal:	Forward				**Longitudinal:	Rearward		
Lateral:	Rightward				Lateral:	Leftward		
Vertical:	Downward				Vertical:	Upward		

DUMMY KINEMATIC SUMMARY

1982 Volkswagen Quantum 4-Door Sedan
NHTSA 820511

DRIVER - Upon barrier contact, the driver torso rocked forward contacting the lower rim of the steering wheel at 65 ms. The head continued to pitch forward and impacted the right arm of the steering wheel near the center hub at 75 ms. Following this contact the torso rotated aft with the head contacting the upper seat back at 173 ms.

PASSENGER - Upon impact of the vehicle with the barrier, the dummy torso began to rotate forward. The vehicle dash panel also rotated upward slightly. The torso rocked forward until the head contacted the dash at 98 ms. Contact with the dash was maintained for approximately 10 ms. The head then rebounded and contacted the seat back at 212 ms.

VEHICLE PROFILE DATA SHEET

PRE-IMPACT DATA

Make/Model: Volkswagen Quantum
 Body Style: 4-Door Sedan Model Year: 1982
 NHTSA No.: 820511 DSI No. 1250 Color: Black

DATA FROM CERTIFICATION LABEL

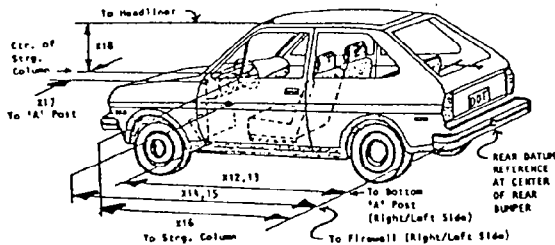
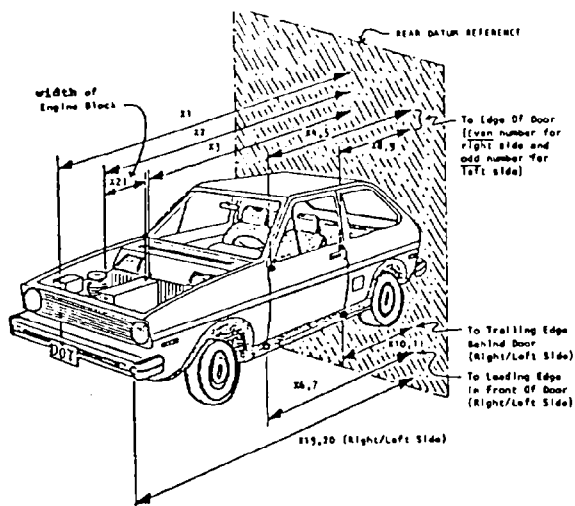
Vehicle Manufacturer: Volkswagenwerk A.G.
 Date of Manufacture: 2/82; VIN: WVWFA0323CE177508
 GVWR: 3395 lb; GAWR: Front = 1808 lb; Rear = 1720 lb

POST-IMPACT DATA

Type of Test: Frontal (0°) Impact
 Date of Test: 8/4/82 Time: 1344 Temperature 100 °F
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: Primary = 34.59 mph Secondary = 34.61 mph

Measurements Referenced to Plane 14.9 Feet Forward of Rear Bumper C

Location	Height	Vehicle Left (in.)				Vehicle Right (in.)			
		<u>30.3</u>	<u>18.2</u>	<u>6.1</u>	<u>C</u>	<u>6.1</u>	<u>18.2</u>	<u>30.3</u>	
		<u>28.7</u>	<u>17.2</u>	<u>5.7</u>	<u>C</u>	<u>5.7</u>	<u>17.2</u>	<u>28.7</u>	
Pre-test Profile (in.)									
Top of Front Bumper	20.8	2.9	0.5	0.3	0.3	0.2	0.5	3.0	
Front of Hood	30.3	7.7	5.9	5.5	5.4	5.5	6.0	8.0	
Post-test Profile (in.)									
Top of Front Bumper	26.0	25.4	23.4	23.4	23.1	22.8	21.9	22.1	
Front of Hood	39.0	26.8	23.9	23.4	23.1	22.9	23.2	24.9	
Post-test Static Crush (in.)									
Top of Front Bumper		22.5	22.9	23.1	22.8	22.6	21.4	19.1	
Front of Hood		19.1	18.0	17.9	17.4	17.4	17.2	16.9	



PRE-/POST-TEST STATIC MEASUREMENT DATA

Vehicle: Volkswagen Quantum

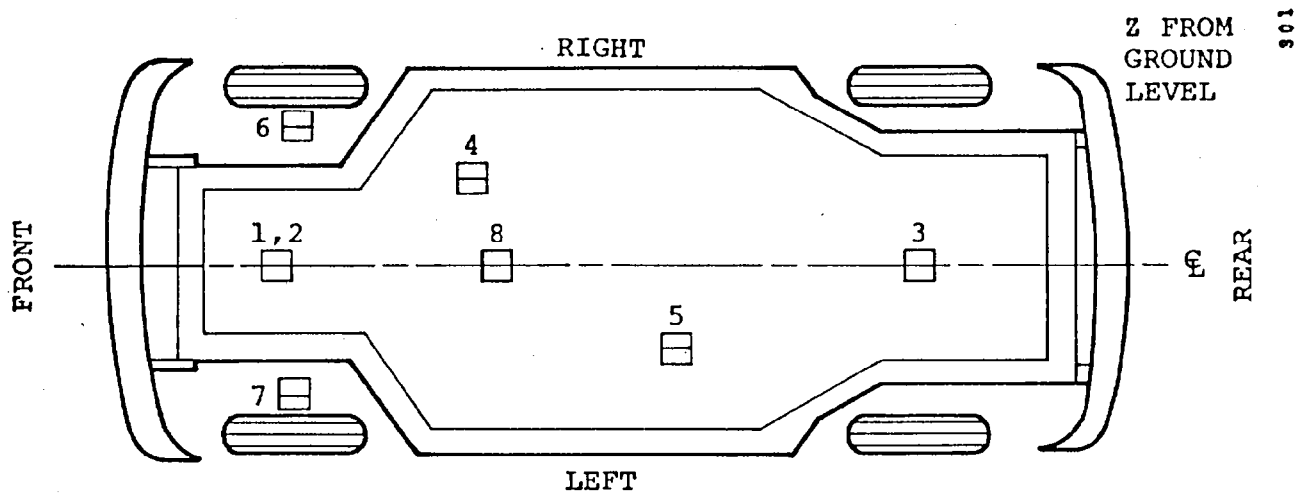
NHTSA No.: 820511

Test Date: 8/4/82

D.S. No.: 1250

Reference Dimension	Pre-test Measurement	Post-test Measurement	Change
X ₁	179.1	156.0	23.1
X ₂	162.4	149.1	13.3
X ₃	136.7	130.9	5.8
X ₄	121.3	121.2	0.1
X ₅	121.8	121.0	0.8
X ₆	121.4	121.7	-0.3
X ₇	121.9	121.8	0.1
X ₈	80.2	80.1	0.1
X ₉	80.8	80.0	0.8
X ₁₀	80.4	80.9	-0.5
X ₁₁	80.9	81.1	-0.2
X ₁₂	120.2	120.7	-0.5
X ₁₃	120.6	120.3	0.3
X ₁₄	136.7	131.4	5.3
X ₁₅	136.7	134.4	2.3
X ₁₆	107.4	105.1	2.3
X ₁₇	16.3	16.4	-0.1
X ₁₈	17.8	17.7	0.1
X ₁₉	176.4	153.8	22.6
X ₂₀	176.0	157.0	19.0
X ₂₁	16.0	16.0	0.0

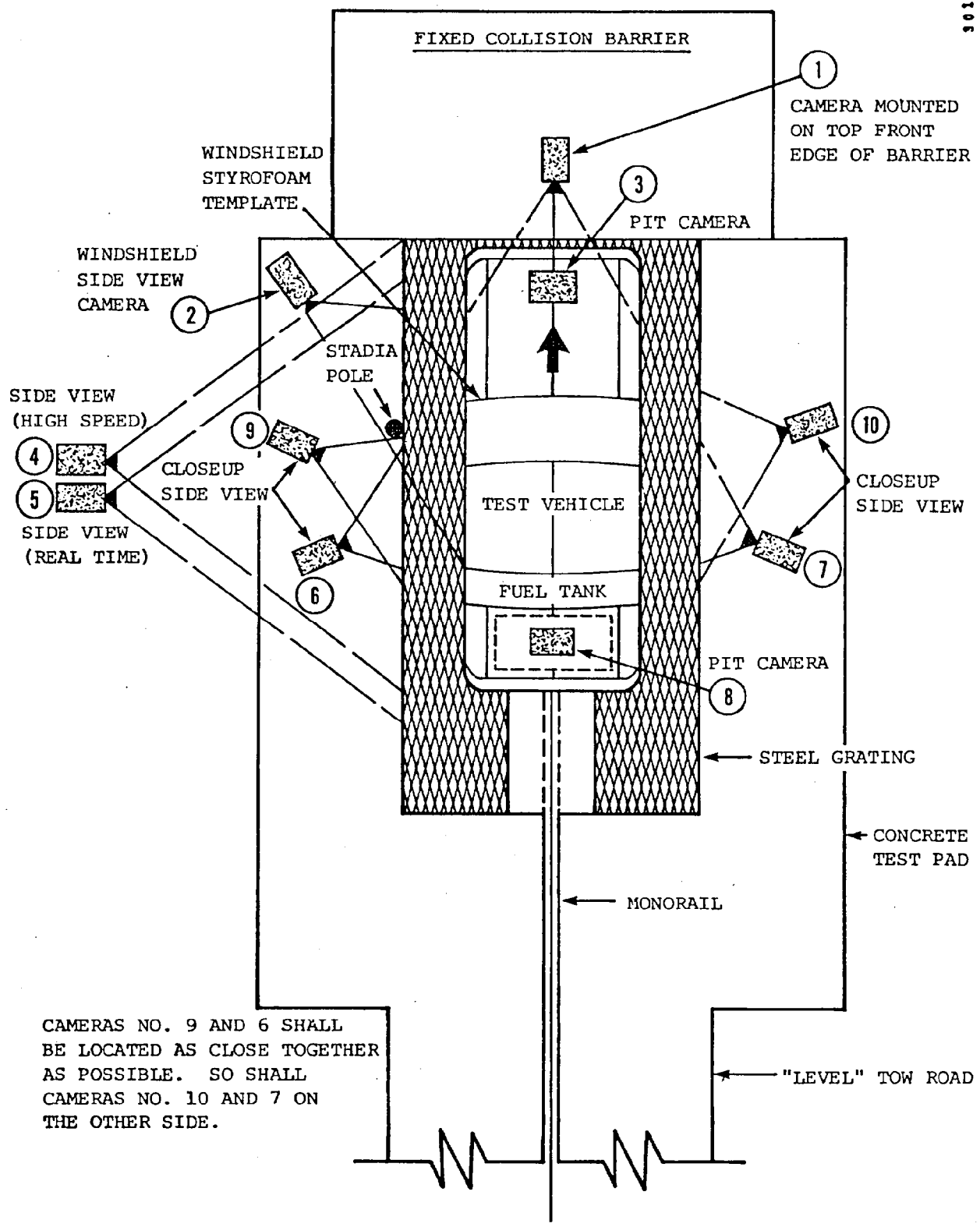
VEHICLE ACCELEROMETER LOCATIONS AND SUMMARY



LINEAR ACCELEROMETERS

□ LONGITUDINAL

Vehicle Accelerometer Locations and Coordinates					Maximum Readings			
No.	Description of Location	X	Y	Z	+G's	MS	-G's	MS
1	Top of Engine	152.2	7.0	32.0	37.0	32	156.4	25
2	Bottom of Engine	158.4	-6.0	12.2	37.3	39	122.5	23
3	Differential Housing	NA - Front Wheel Drive Vehicle						
4	Right "B" Pillar $\Delta V = 36.7$ mph	100.4	24.5	13.2	4.7	141	34.6	50
5	Left "B" Pillar $\Delta V = 36.9$ mph	99.9	-24.5	13.2	5.7	140	36.9	57
6	Right Front Brake Caliper	134.9	23.1	12.0	46.9	56	90.8	33
7	Left Front Brake Caliper	134.9	-23.1	12.0	53.5	41	161.5	30
8	Vehicle C.G. $\Delta V = 35.8$ mph	100.5	0.0	14.8	22.7	9	72.7	31



TOP VIEW

SUMMARY OF CAMERA LOCATIONS AND DESCRIPTIONS

Loc. No.	Location	Field of View	Lens Size	Frame Rate	Timing Speed	Serial Number	Impact Dist-X	Center-line Dist-Y	Camera Height
1	Overhead (Barrier)	Windshield styrofoam up to barrier-vehicle contact if possible	10 mm	414 fps	100 Hz	M3	-1'	0	9'
2	Ground Based (Left)	Windshield	25 mm	400 fps	100 Hz	M9	-1'	11'	66"
3	Pit	Engine underside and fuel pump	13 mm	990 fps	95 Hz	6	4'	0	-8'
4	Ground Based (left)	Views entire left of vehicle	25 mm	393 fps	100 Hz	M7	8'	34'	52"
5	Ground Based (Real Time)	Documentary	Vari-able	24 fps	-	Scoopic	-	-	-
6	Ground Based (Left)	Driver dummy closeup	16 mm	500 fps	100 Hz	LC 327	9'	16'	52"
7	Ground Based (Right)	Passenger dummy closeup	15 mm	419 fps	99 Hz	10	8'	-12'	52"
8	Pit	Fuel tank	13 mm	-	101 Hz	7	Camera jam during spin up.		
9	Ground Based (Left)	Same view as Camera No. 6	13 mm	1081 fps	99 Hz	8	8'	16'	52"
10	Ground Based (Right)	Same view as Camera No. 7	15 mm	459 fps	100 Hz	LC 326	9'	-12'	54"
11	On-board (Right)	Passenger retractor	8 mm	460 fps	100 Hz	12	-	-	-
12	On-board (Left)	Driver retractor	8 mm	400 fps	100 Hz	11	-	-	-

APPENDIX A
PHOTOGRAPHS

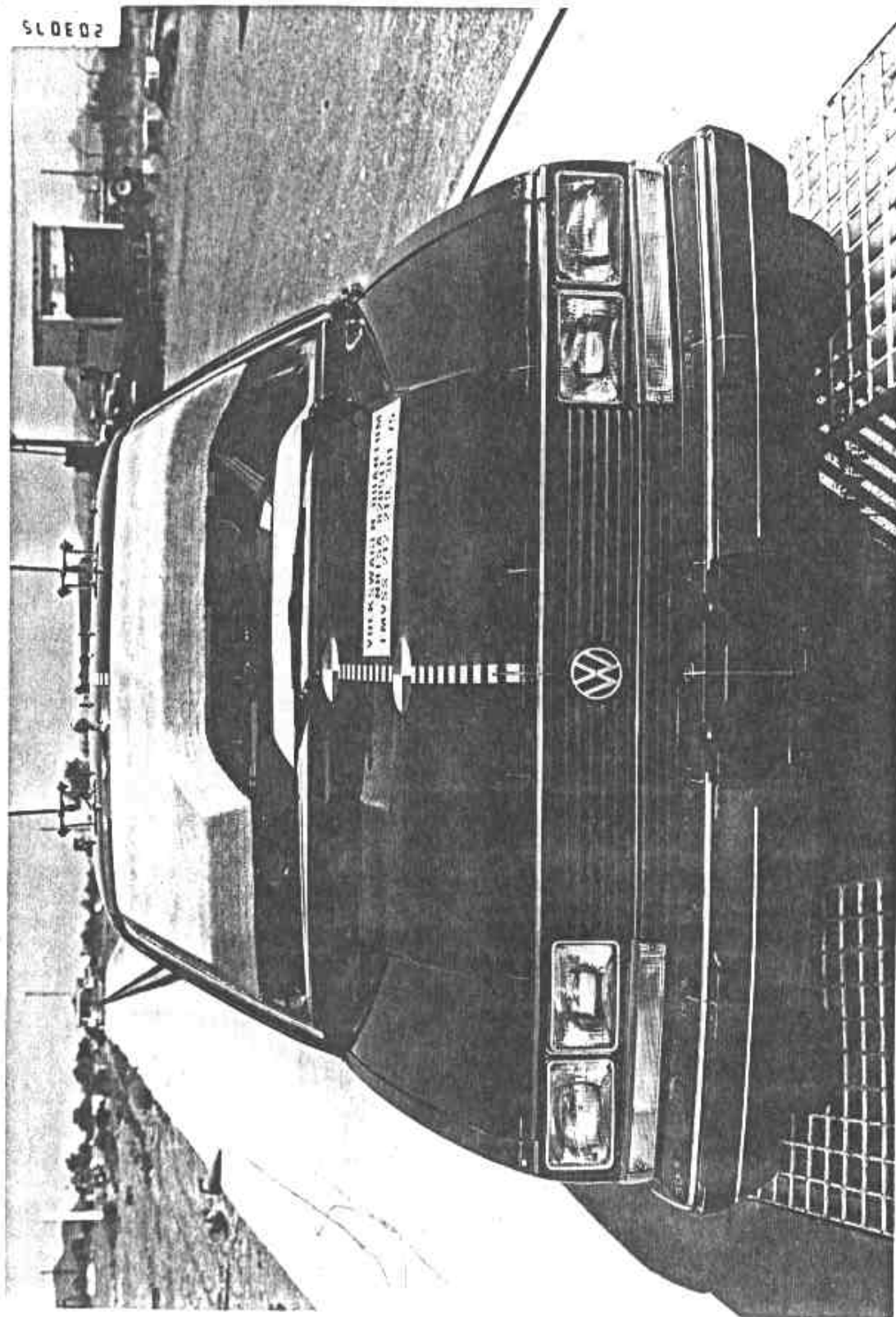
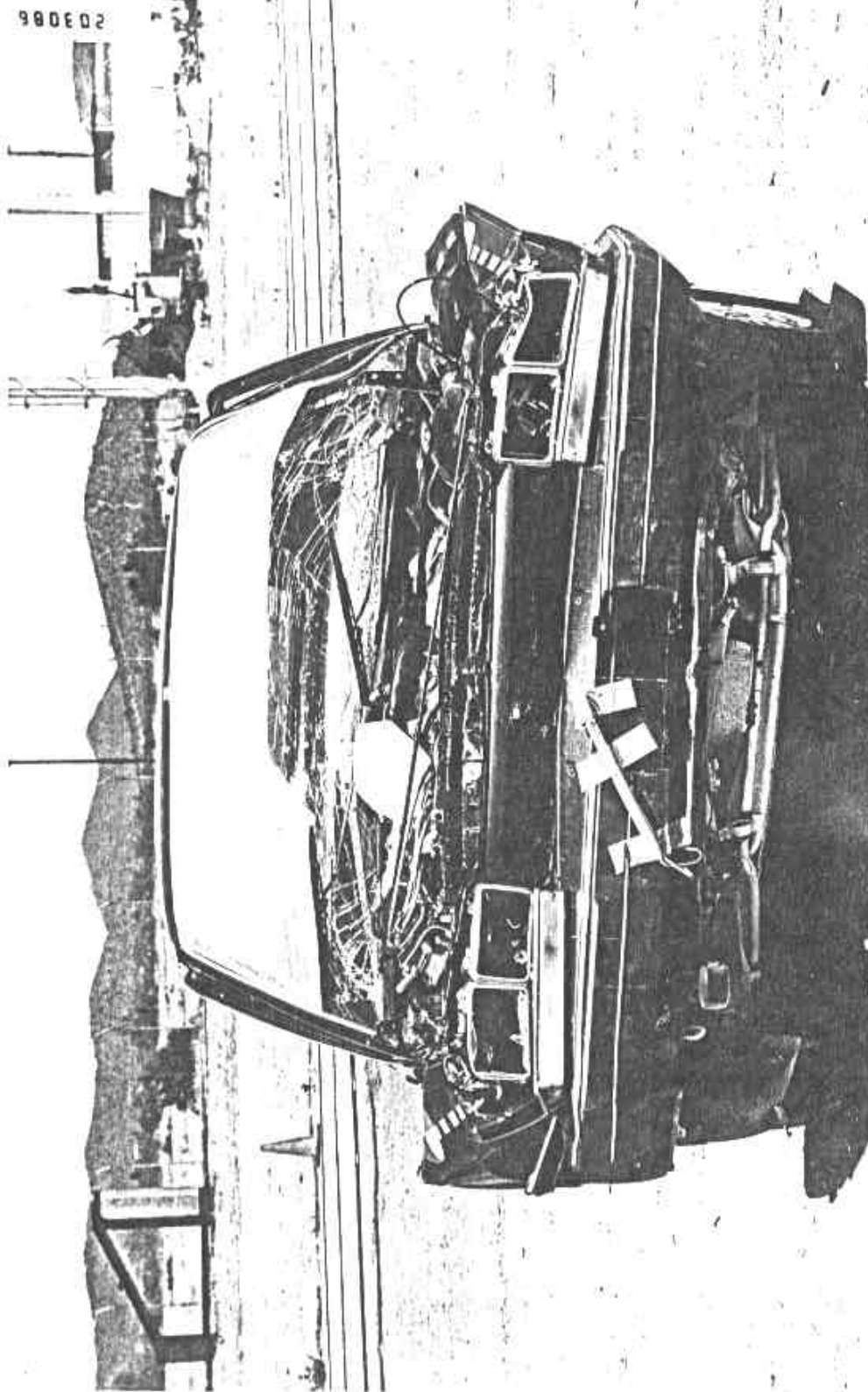


FIGURE A-1. PRE-TEST FRONT VIEW - 1982 VOLKSWAGEN QUANTUM - NHTSA 820511.



980802

FIGURE A-2. POST-TEST FRONT VIEW - 1982 VOLKSWAGEN QUANTUM - NHTSA 820511.

990E02

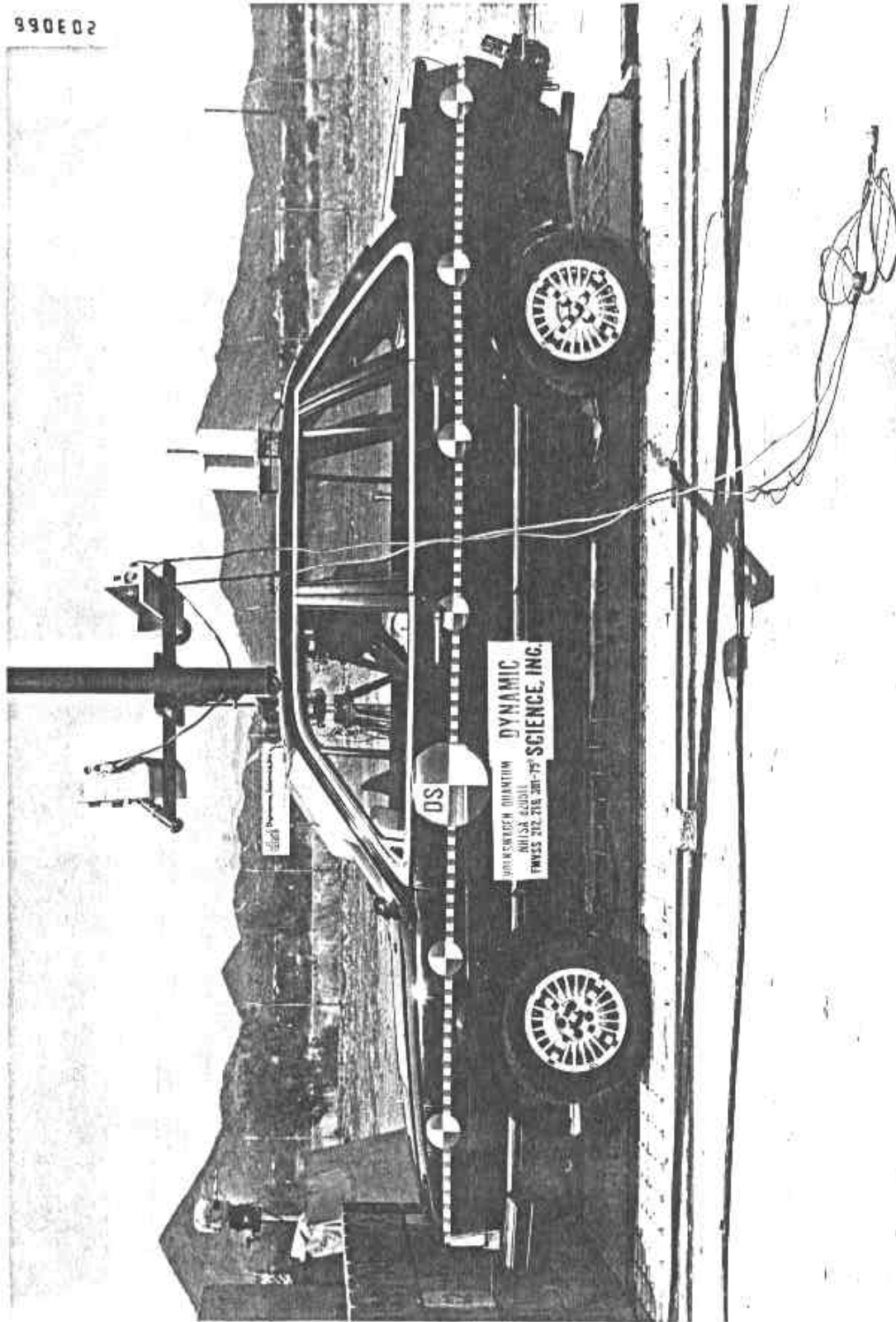


FIGURE A-3. PRE-TEST SIDE VIEW - 1982 VOLKSWAGEN QUANTUM - NIHTSA 820511.

8L0E02

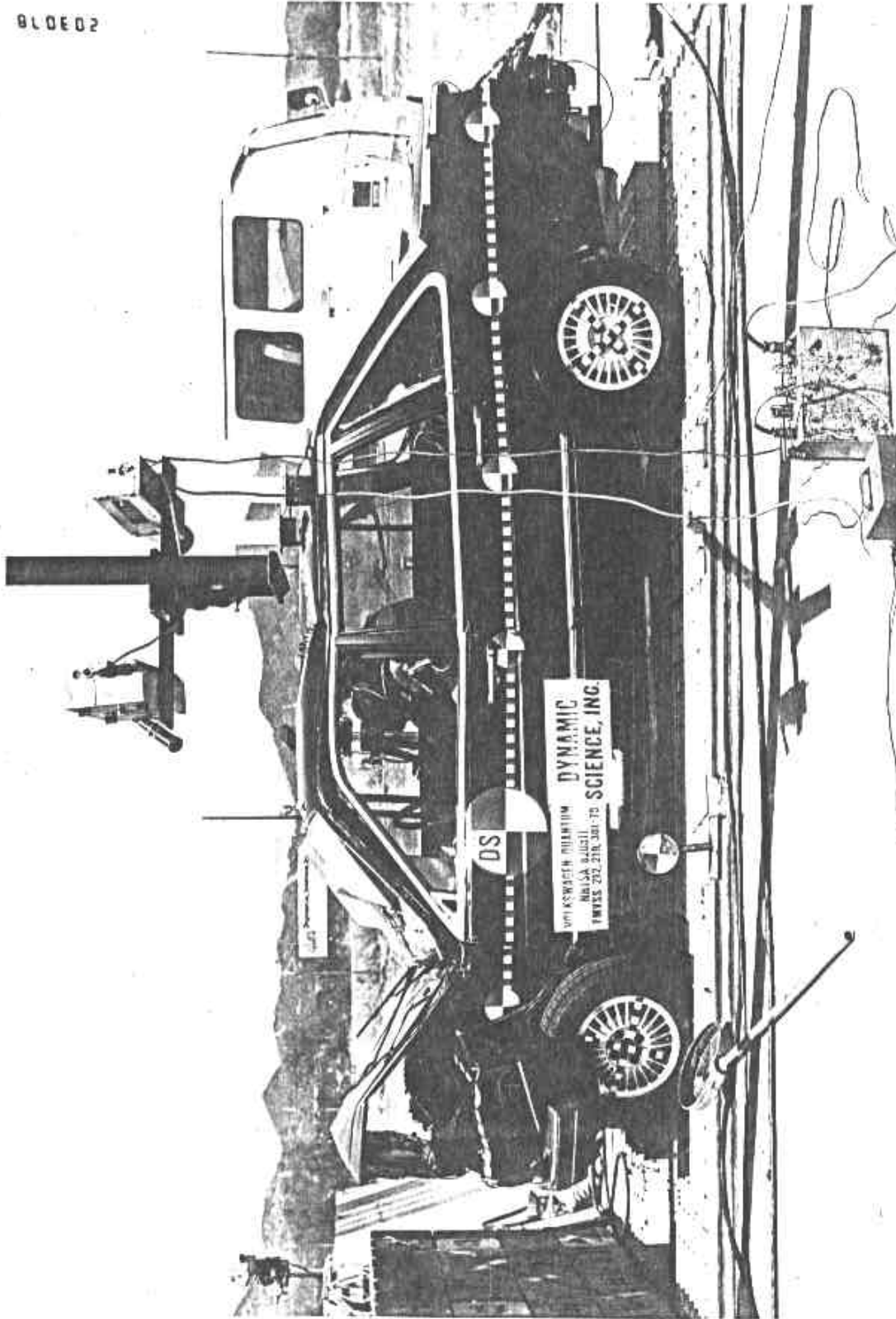


FIGURE A-4. POST-TEST SIDE VIEW - 1982 VOLKSWAGEN QUANTUM - NHTSA 820511.



FIGURE A-5. PRE-TEST VIEW OF DRIVER DUMMY - 1982 VOLKSWAGEN QUANTUM - NHTSA 820511.

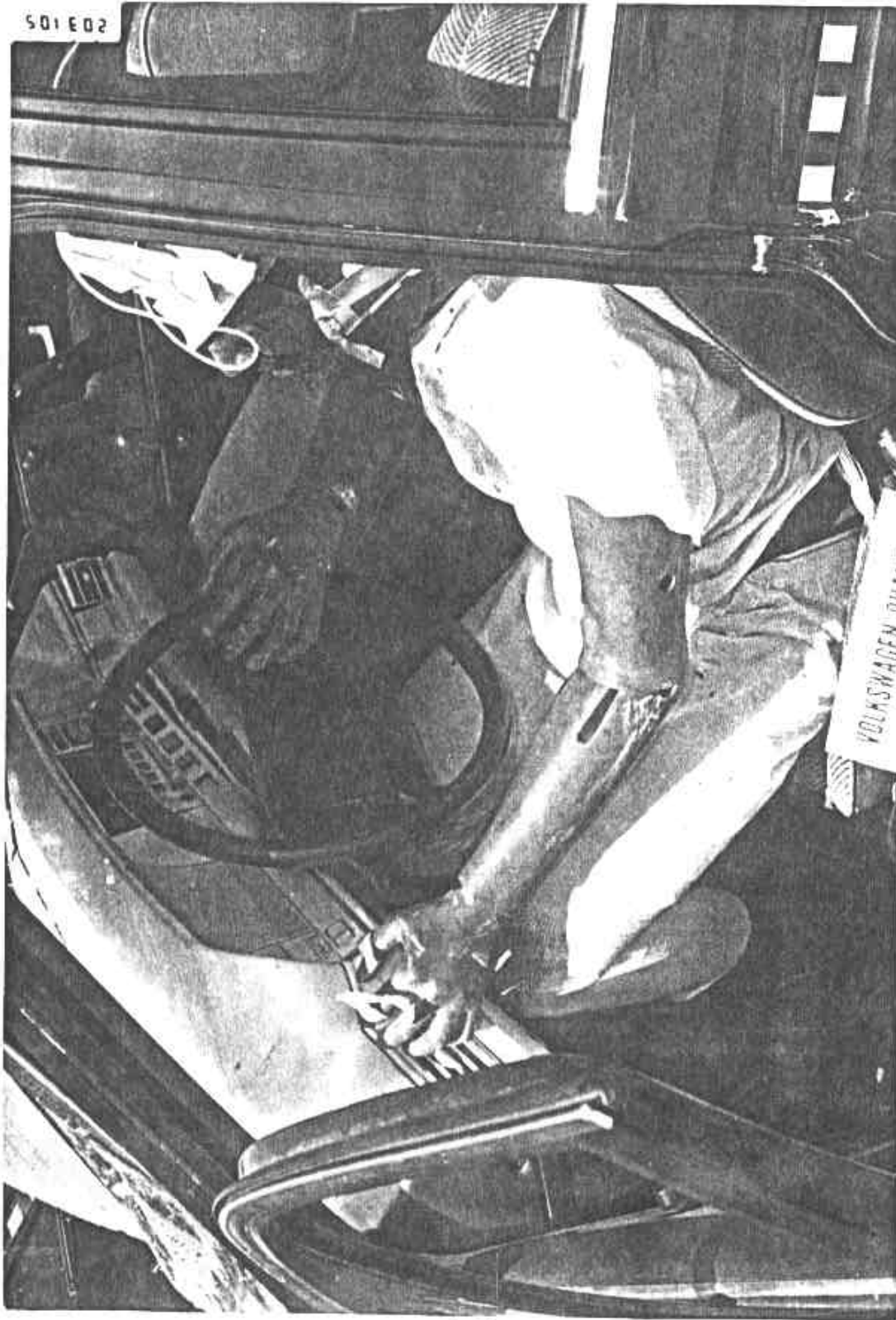


FIGURE A-6. POST-TEST VIEW OF DRIVER DUMMY - 1982 VOLKSWAGEN QUANTUM - NHTSA 820511.

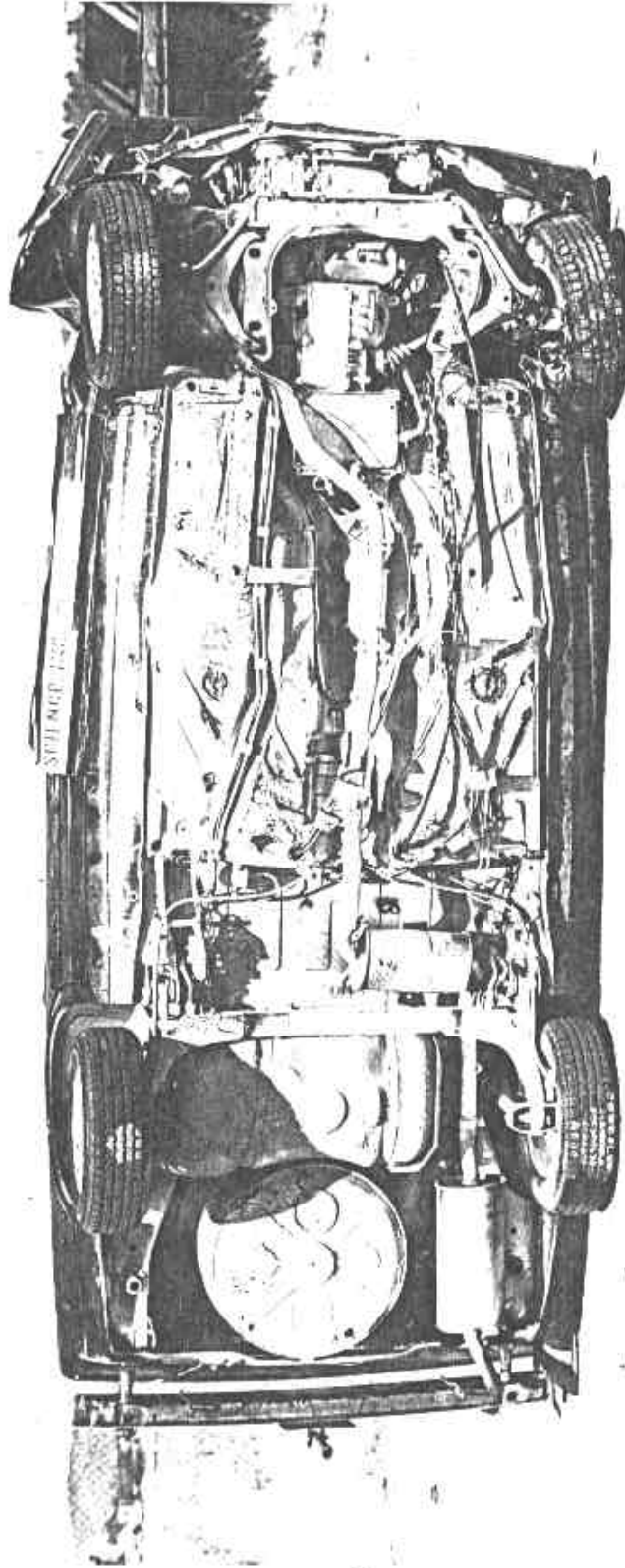


FIGURE A-7. PRE-TEST VIEW OF PASSENGER DUMMY - 1982 VOLKSWAGEN QUANTUM - NHTSA 820511.



FIGURE A-8. POST-TEST VIEW OF PASSENGER DUMMY - 1982 VOLKSWAGEN QUANTUM - NHTSA 820511.

860602



A-10

FIGURE A-9. POST-TEST VIEW OF VEHICLE UNDERSIDE - 1982 VOLKSWAGEN QUANTUM - NHTSA 820511.

APPENDIX B CALCOMP PLOT PRESENTATION

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

PLOT LEGEND

Dummy Data*

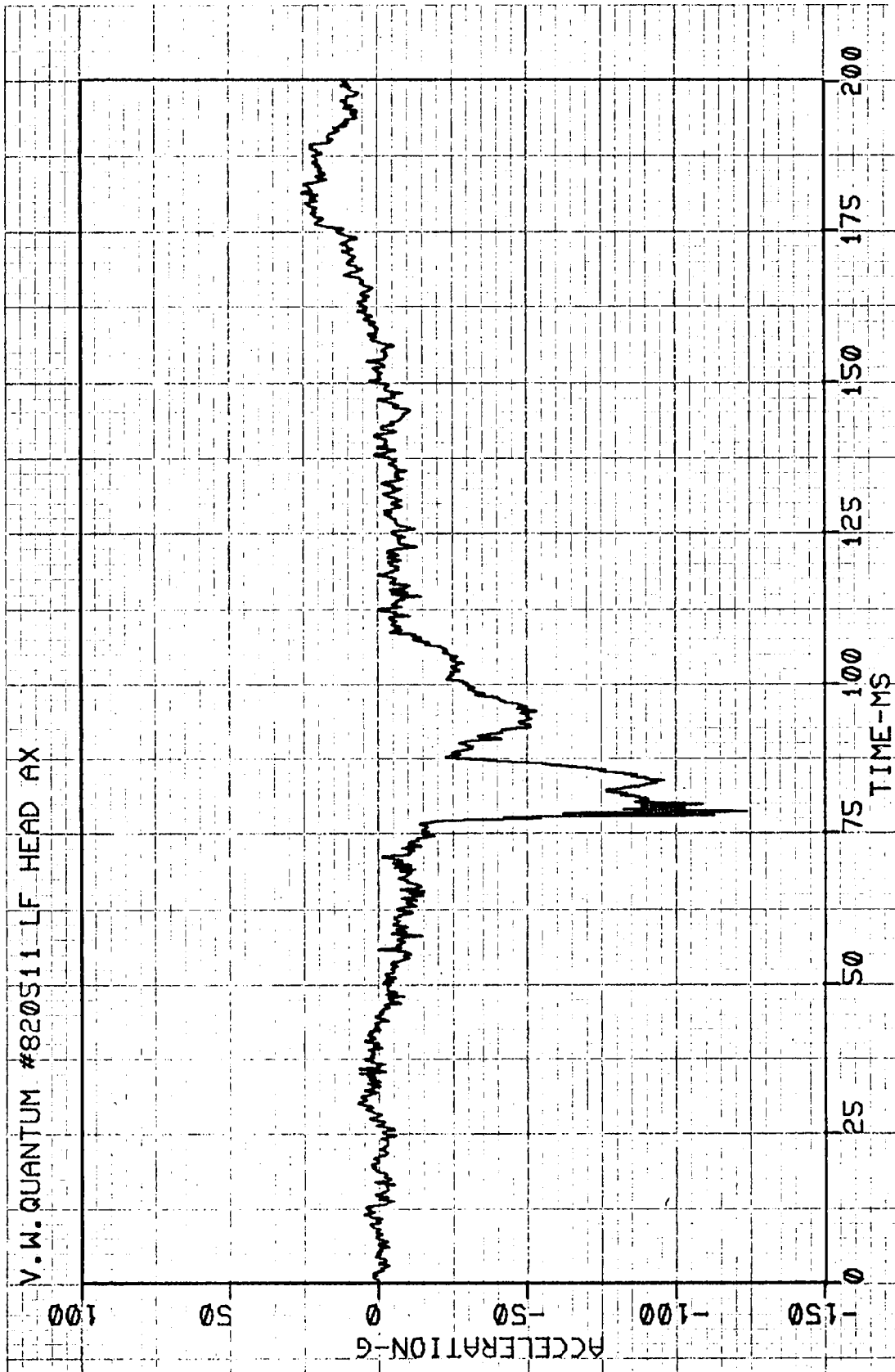
Driver	RF Outboard Passenger	Data Description
LF Head	RF Head	Head Acceleration (g)
LF Chest	RF Chest	Chest Acceleration (g)
LF Femurs	RF Femurs	Femur Loads (lb)
LF Belt Loads	RF Belt Loads	Lap and Torso Belt Loads (lb)
LF Belt Dis- placement	RF Belt Dis- placement	Belt Displacement (in.)
LF Extensio- meter	RF Extensio- meter	Belt Stretch

Vehicle Data**

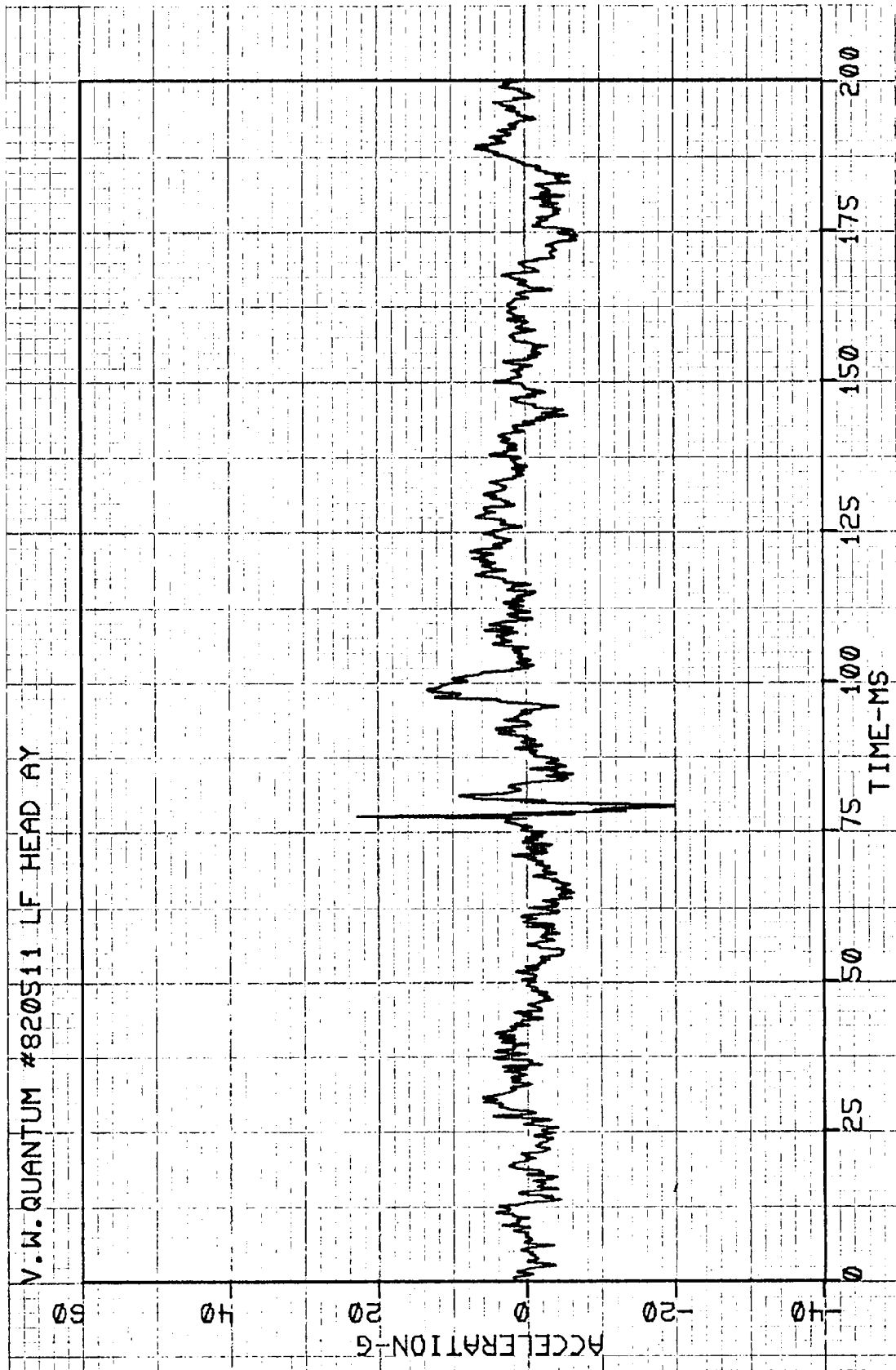
Location	Acceleration (g)
Loc 1	Top of Engine
Loc 2	Bottom of Engine
Loc 4	Right "B" Pillar
Loc 5	Left "B" Pillar
Loc 6	Right Front Brake Caliper
Loc 7	Left Front Brake Caliper
Loc 8	Vehicle C.G.

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

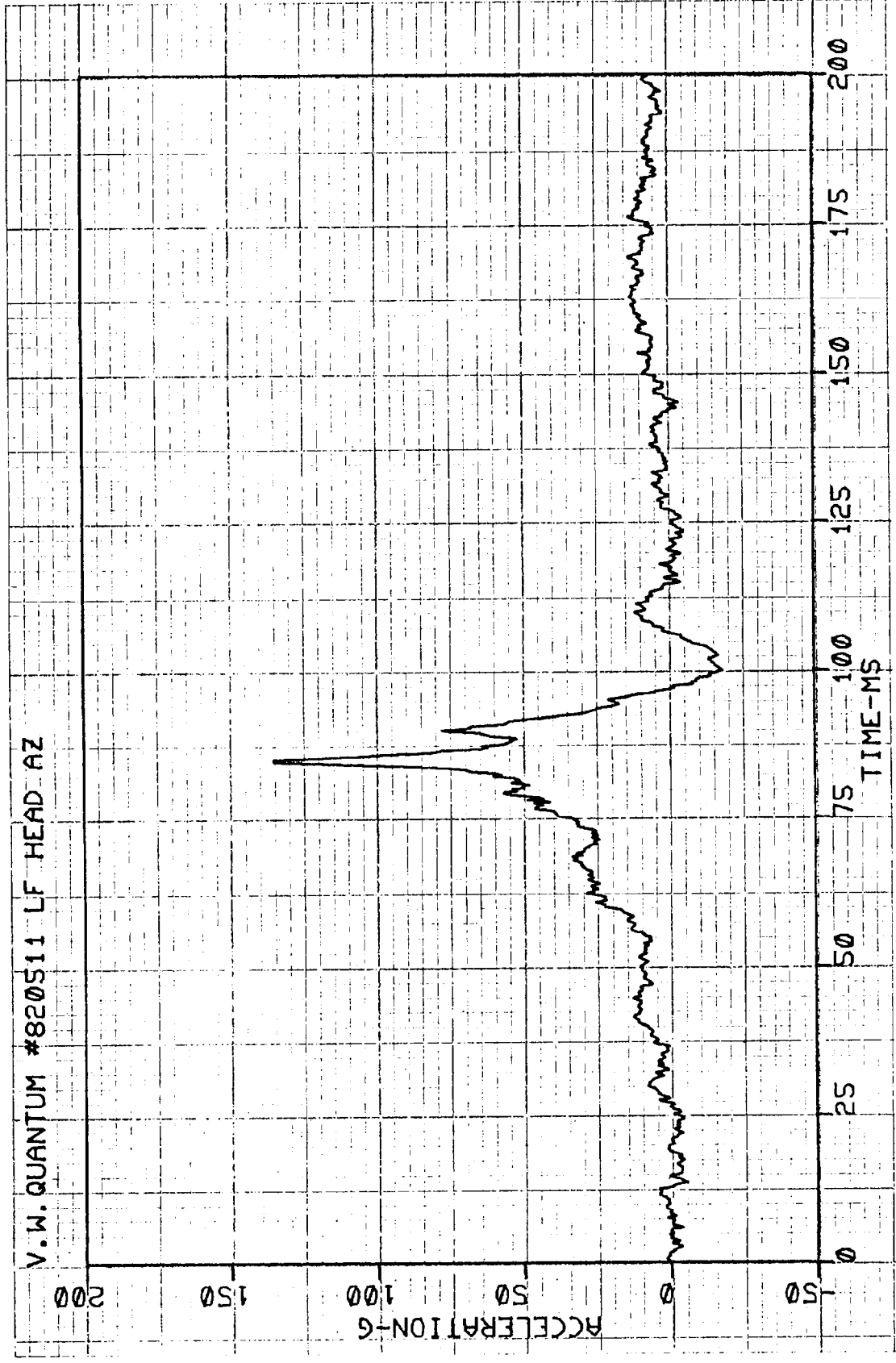
**Vehicle accelerometer locations and data summarized on page 4-8.

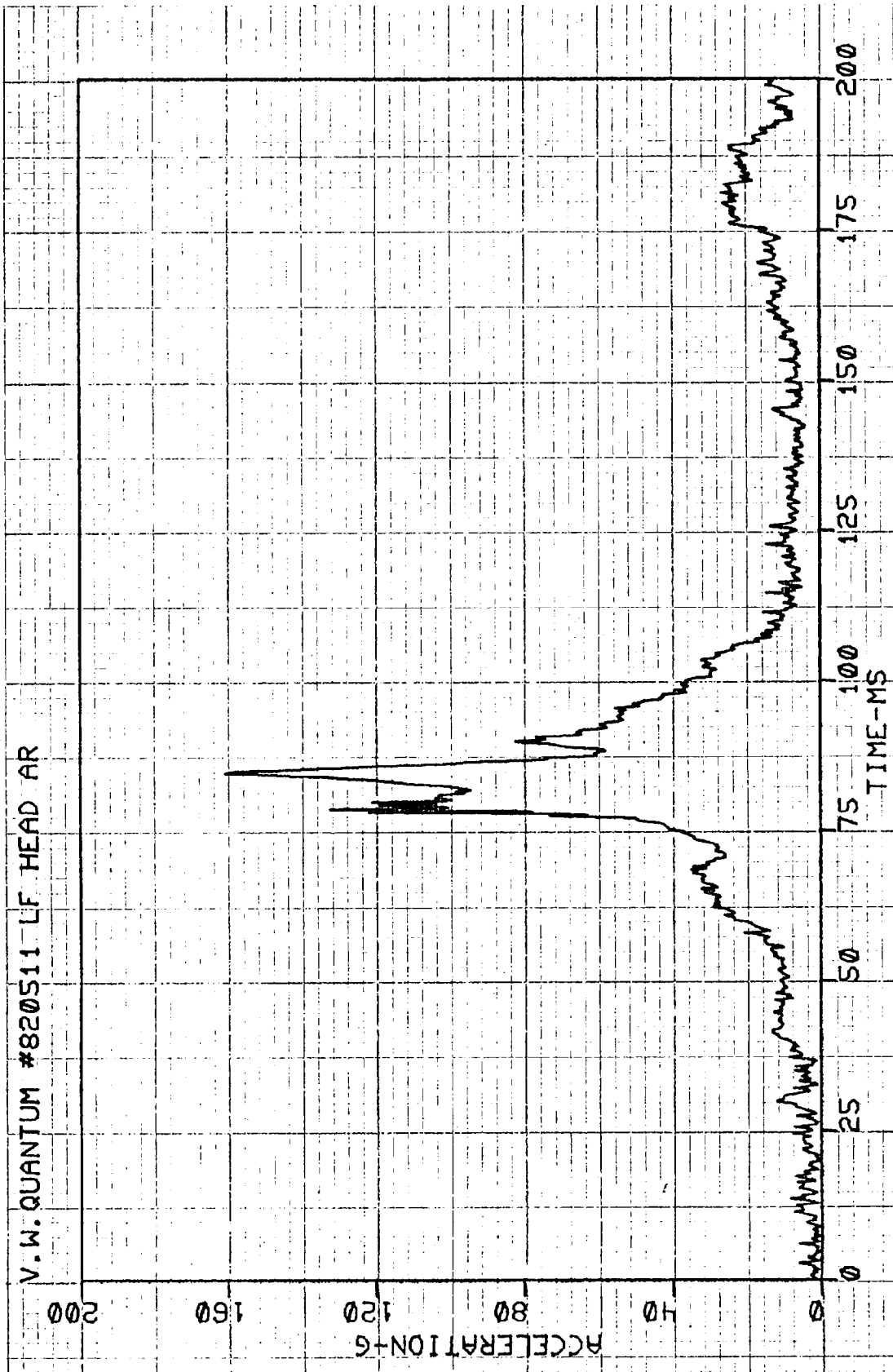


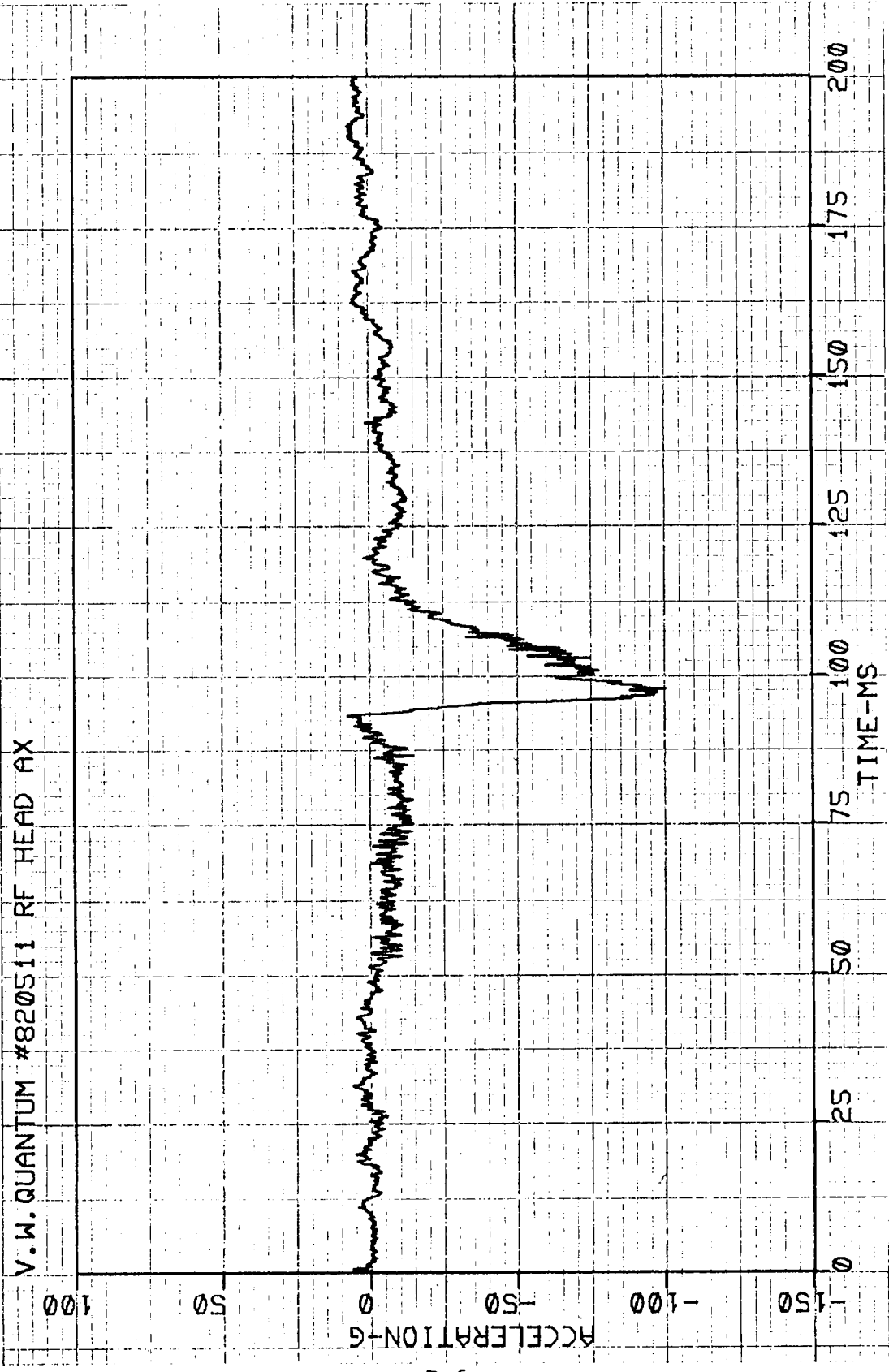
V.W. QUANTUM #820511 LF HEAD AY

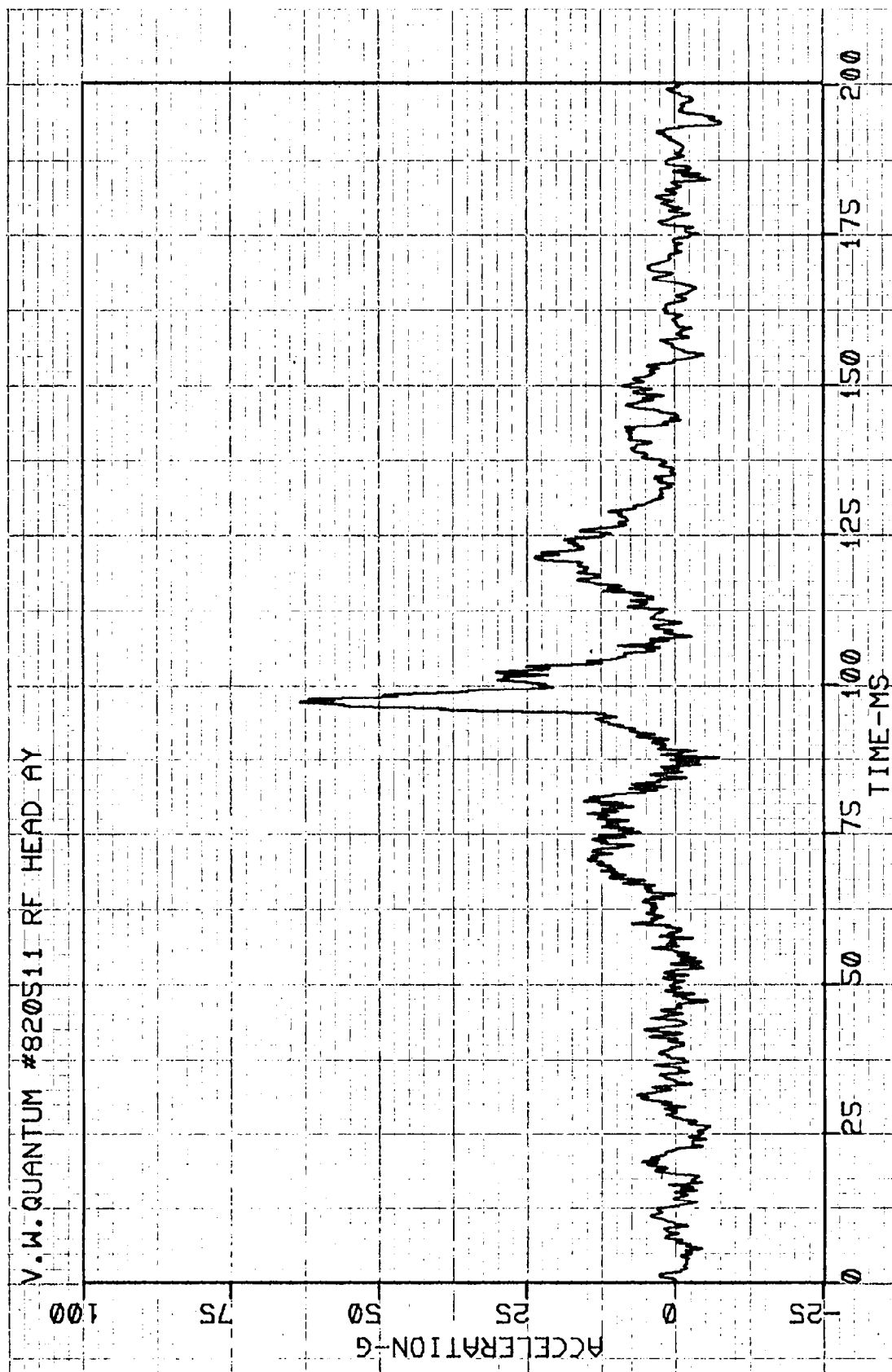


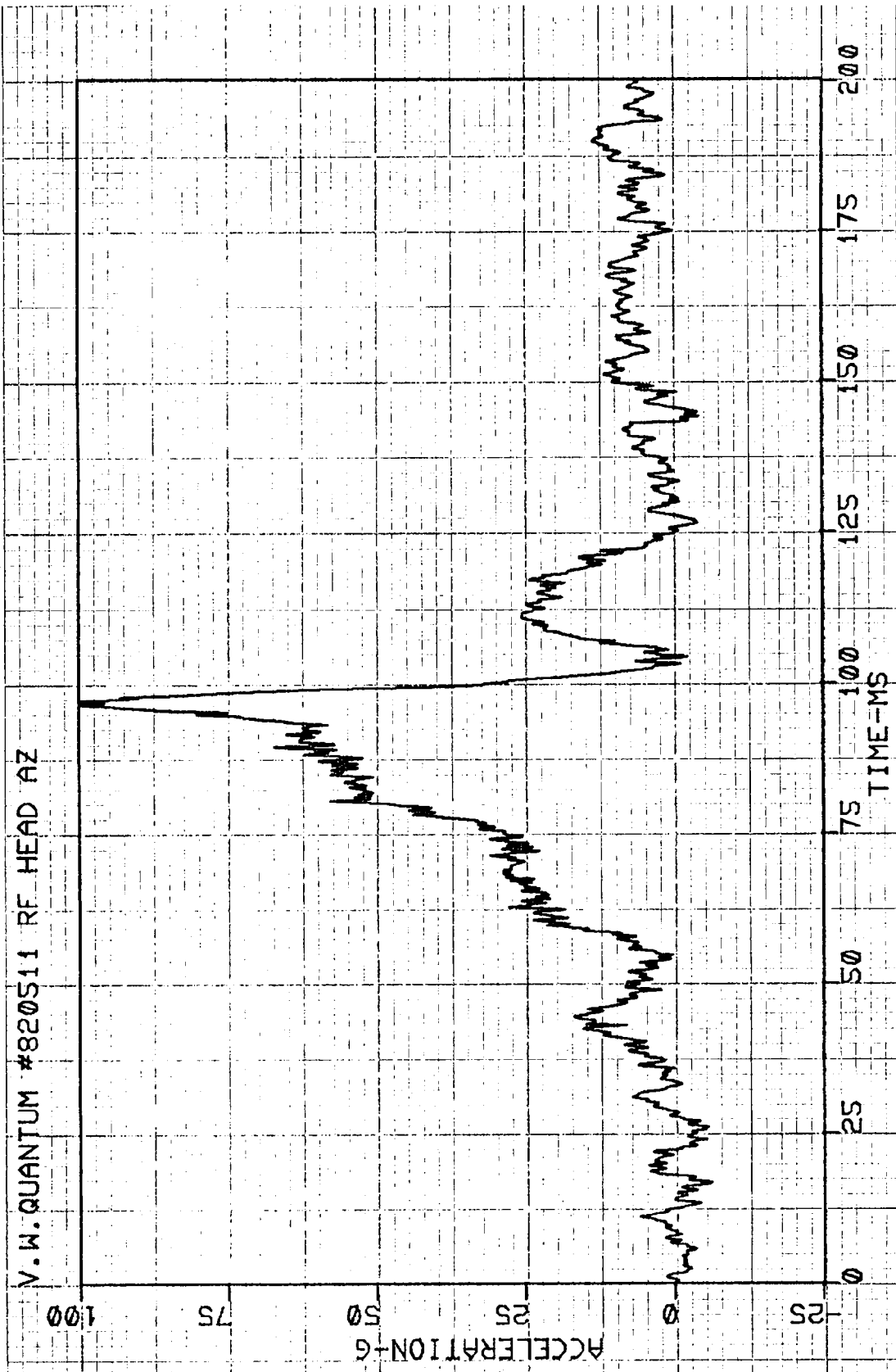
V.W. QUANTUM #820511 LF HEAD AZ

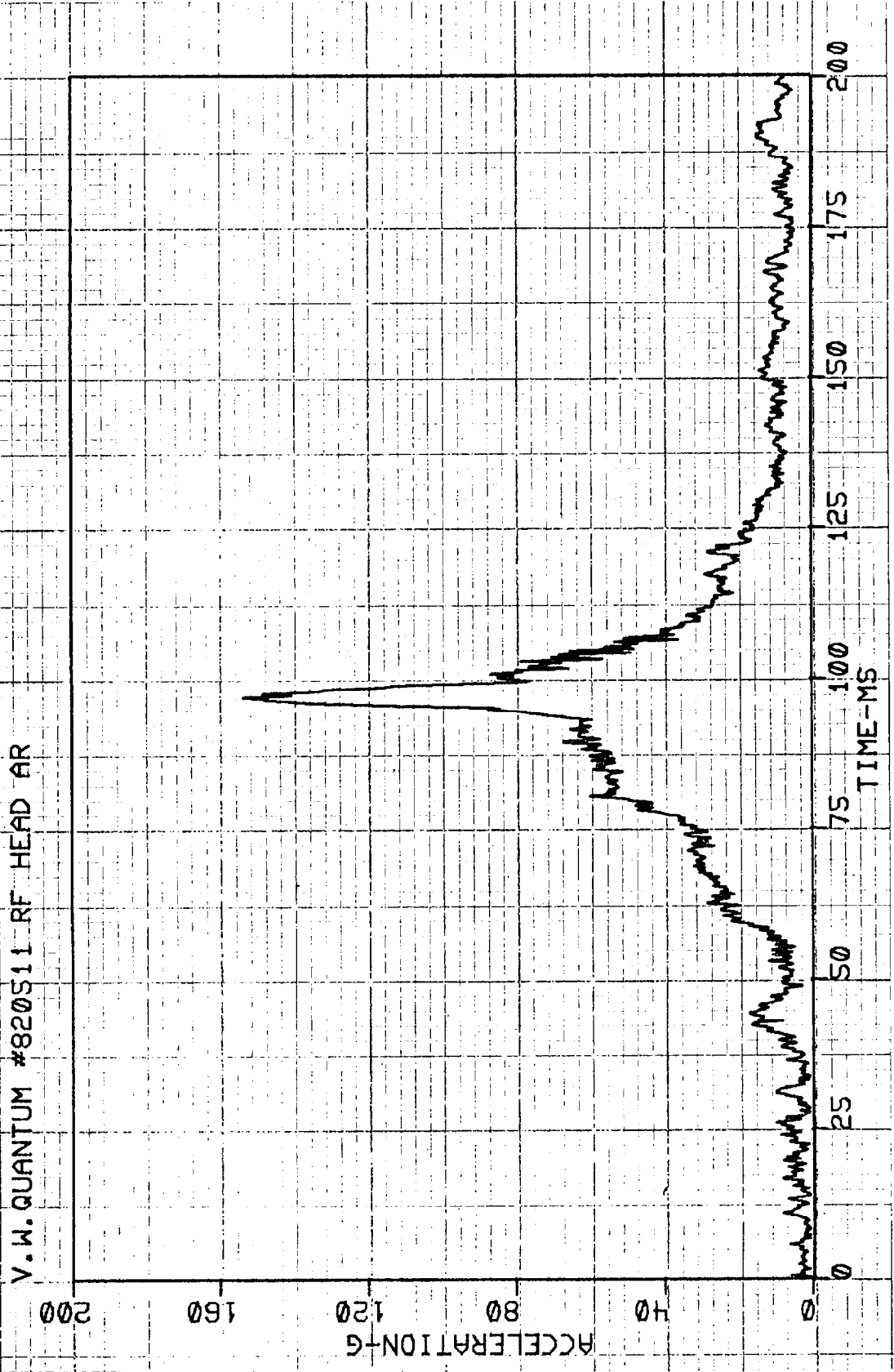


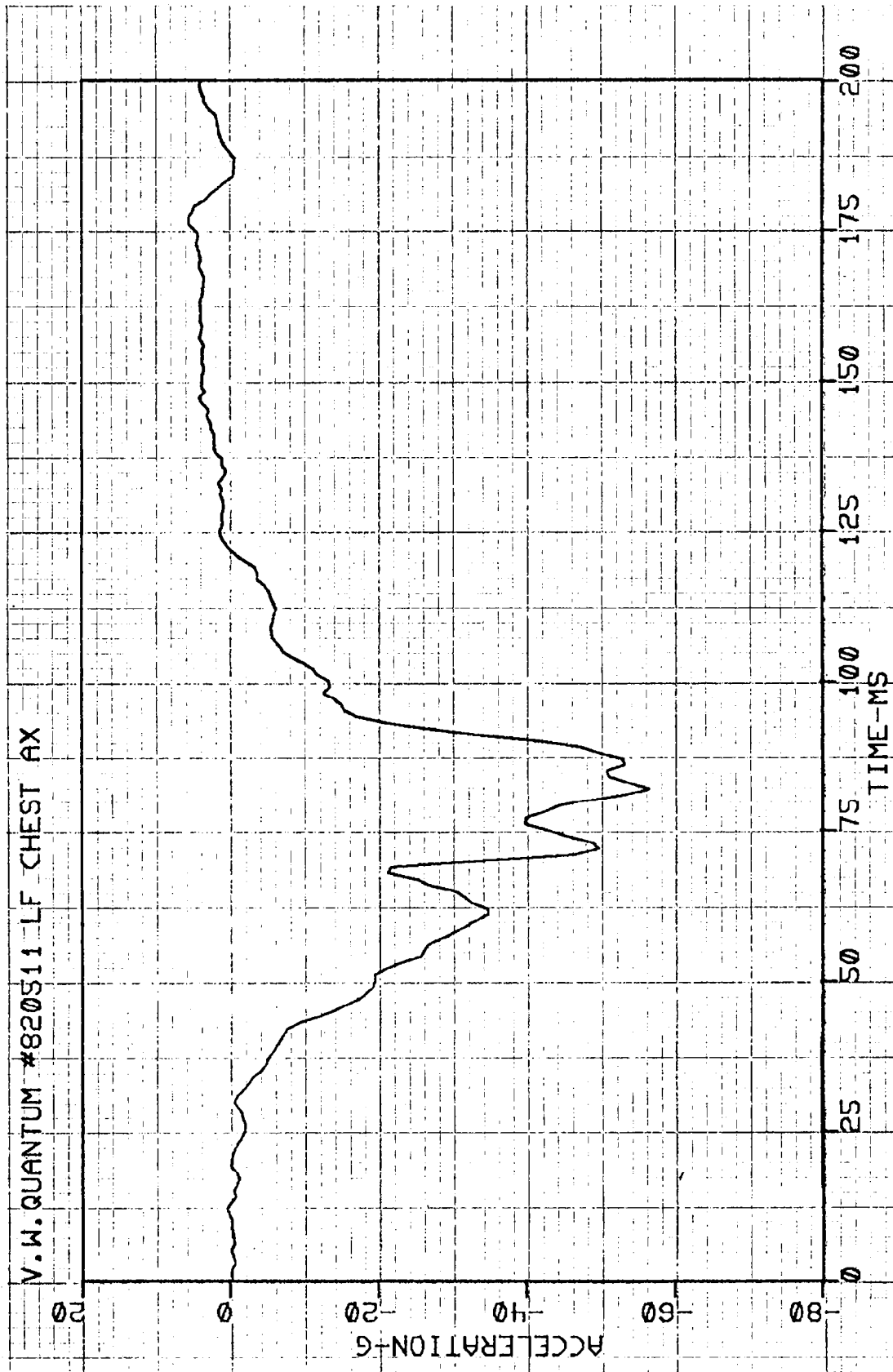


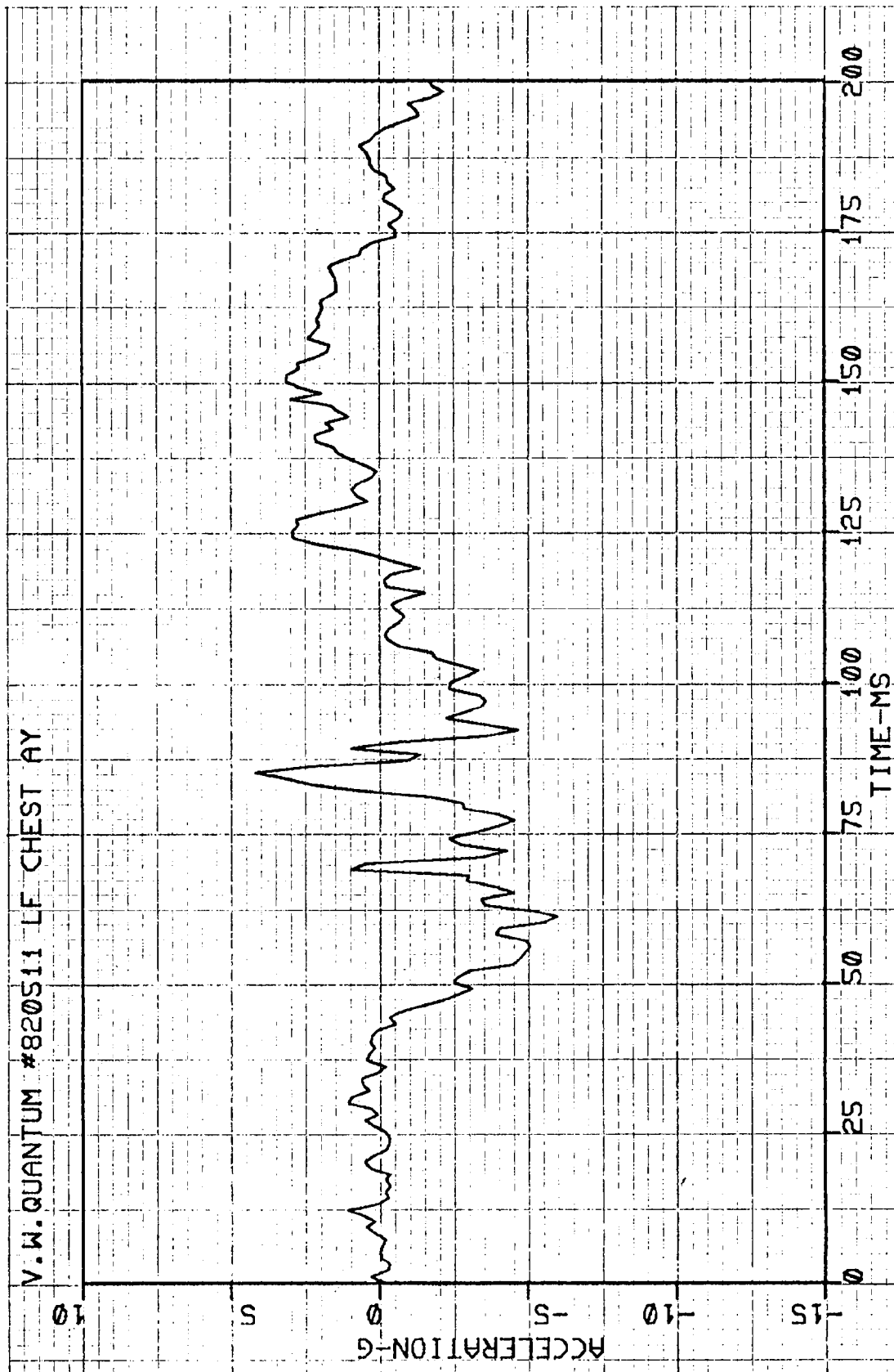


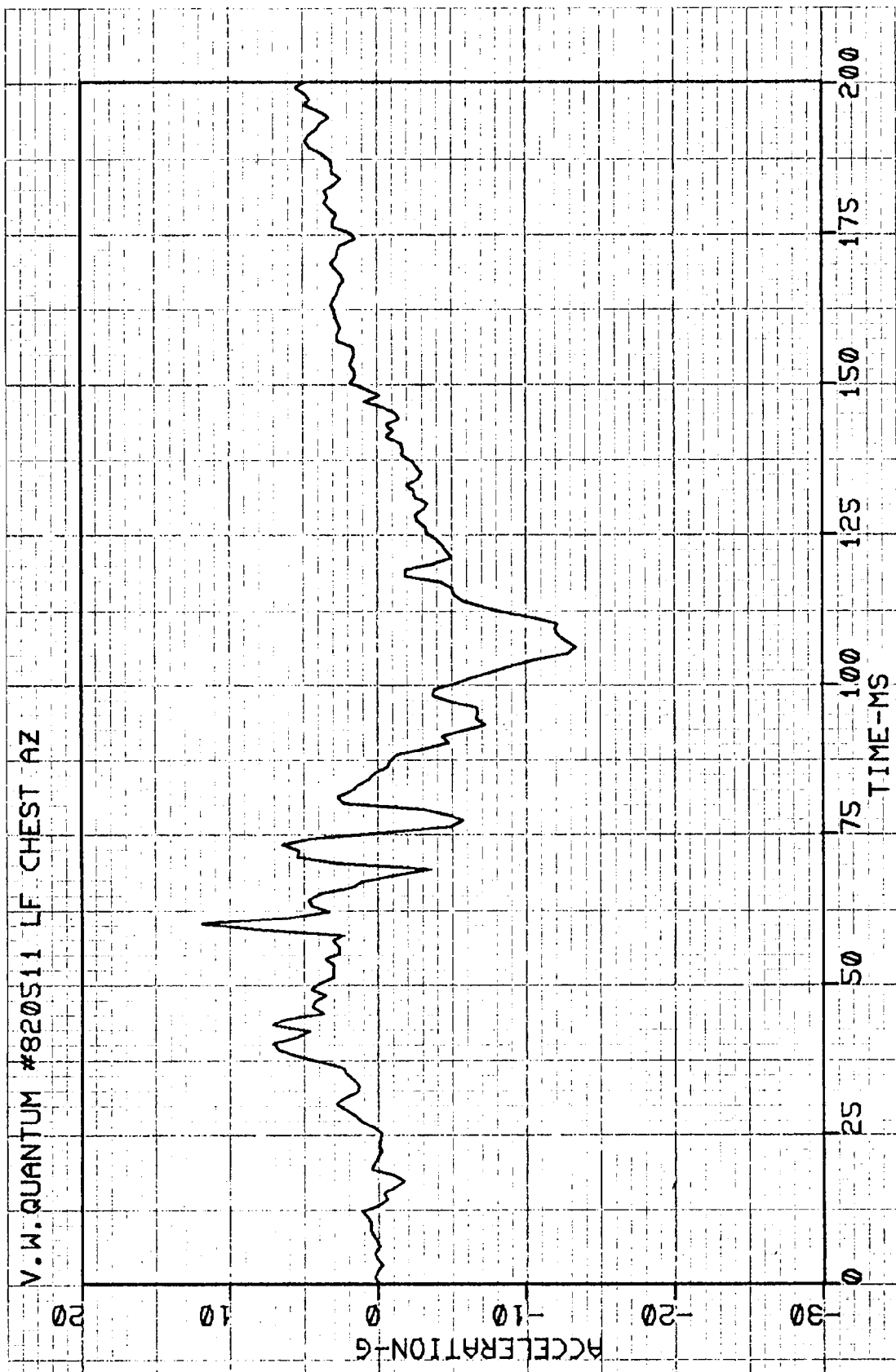




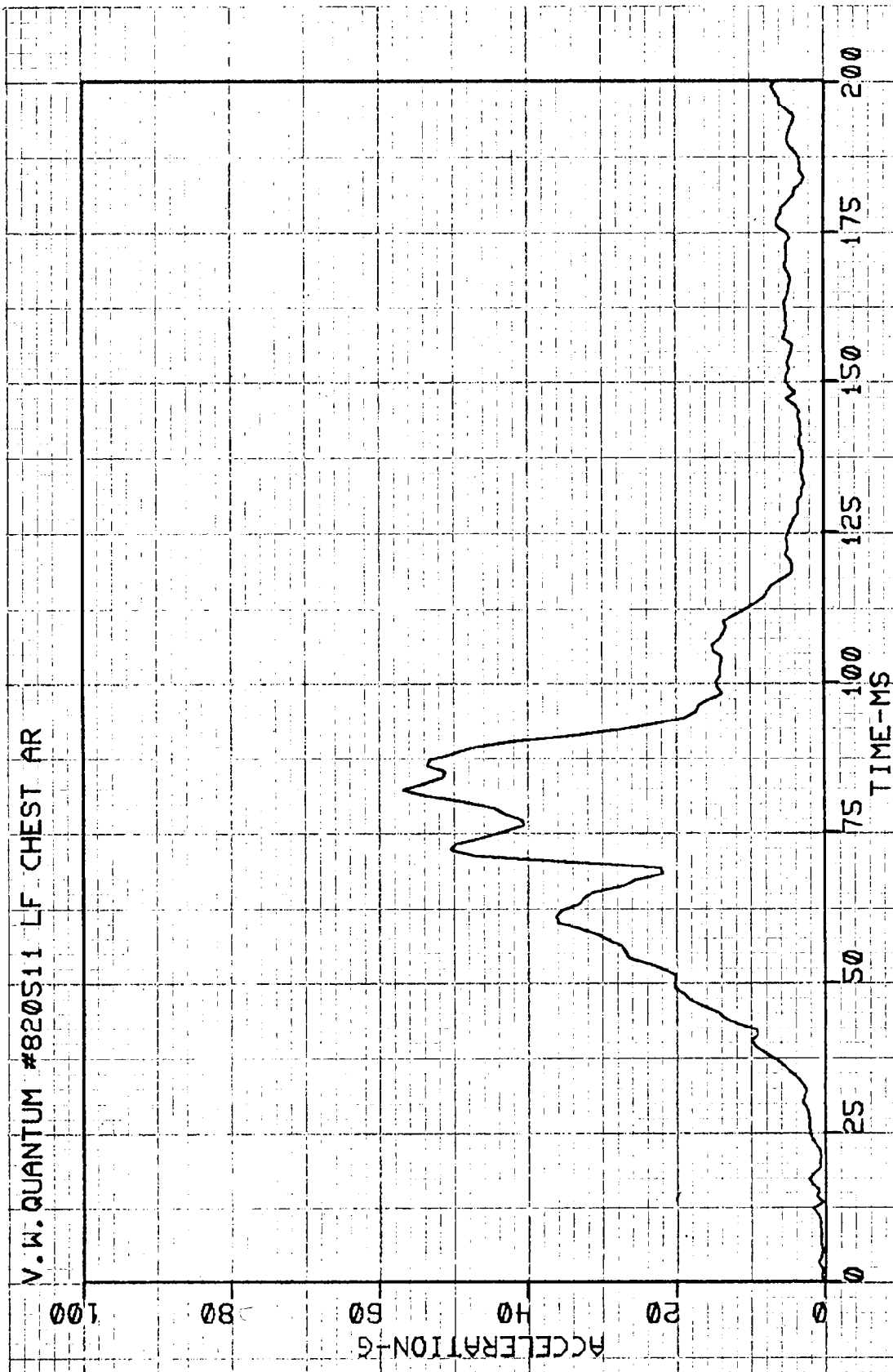


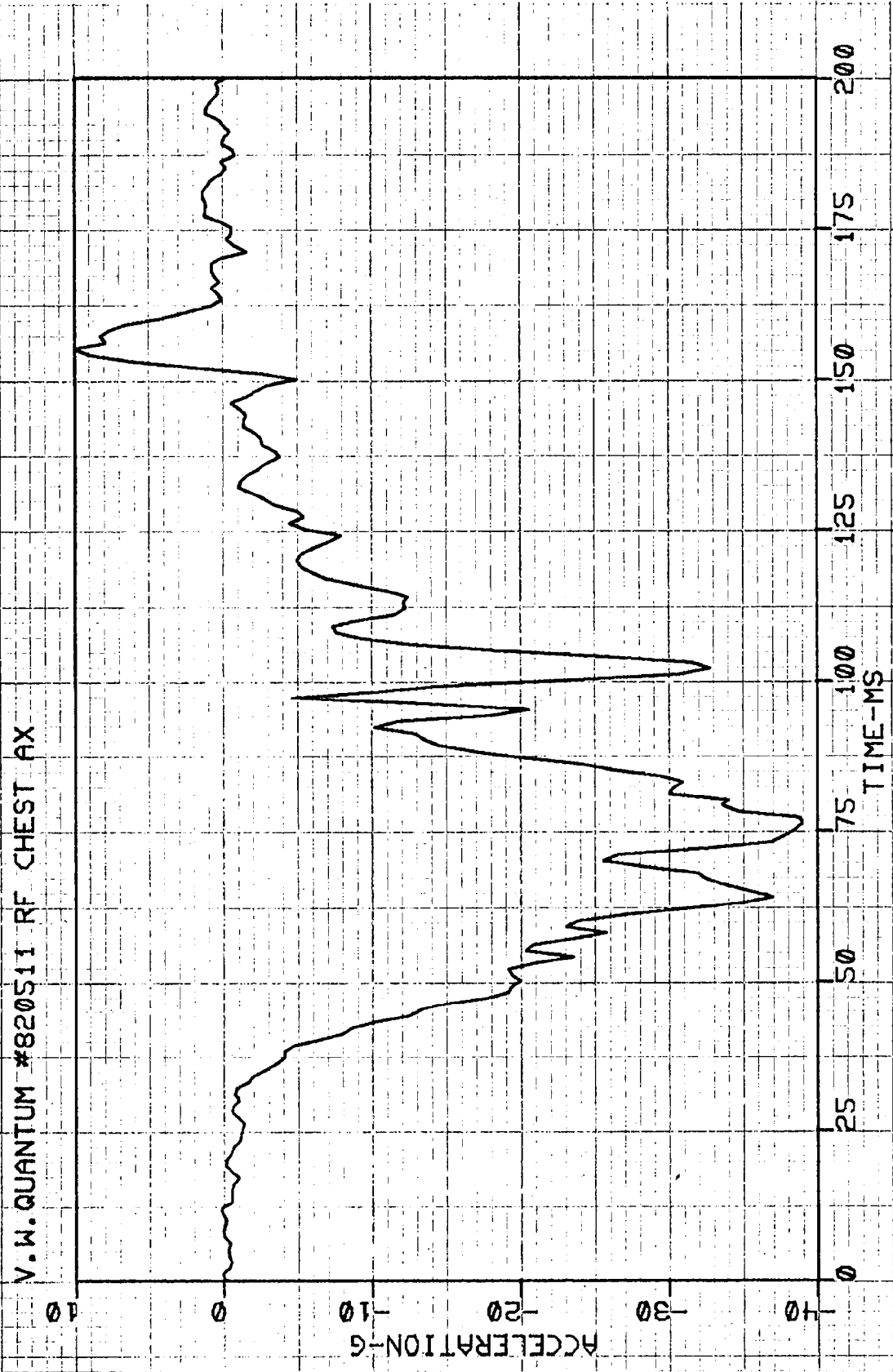


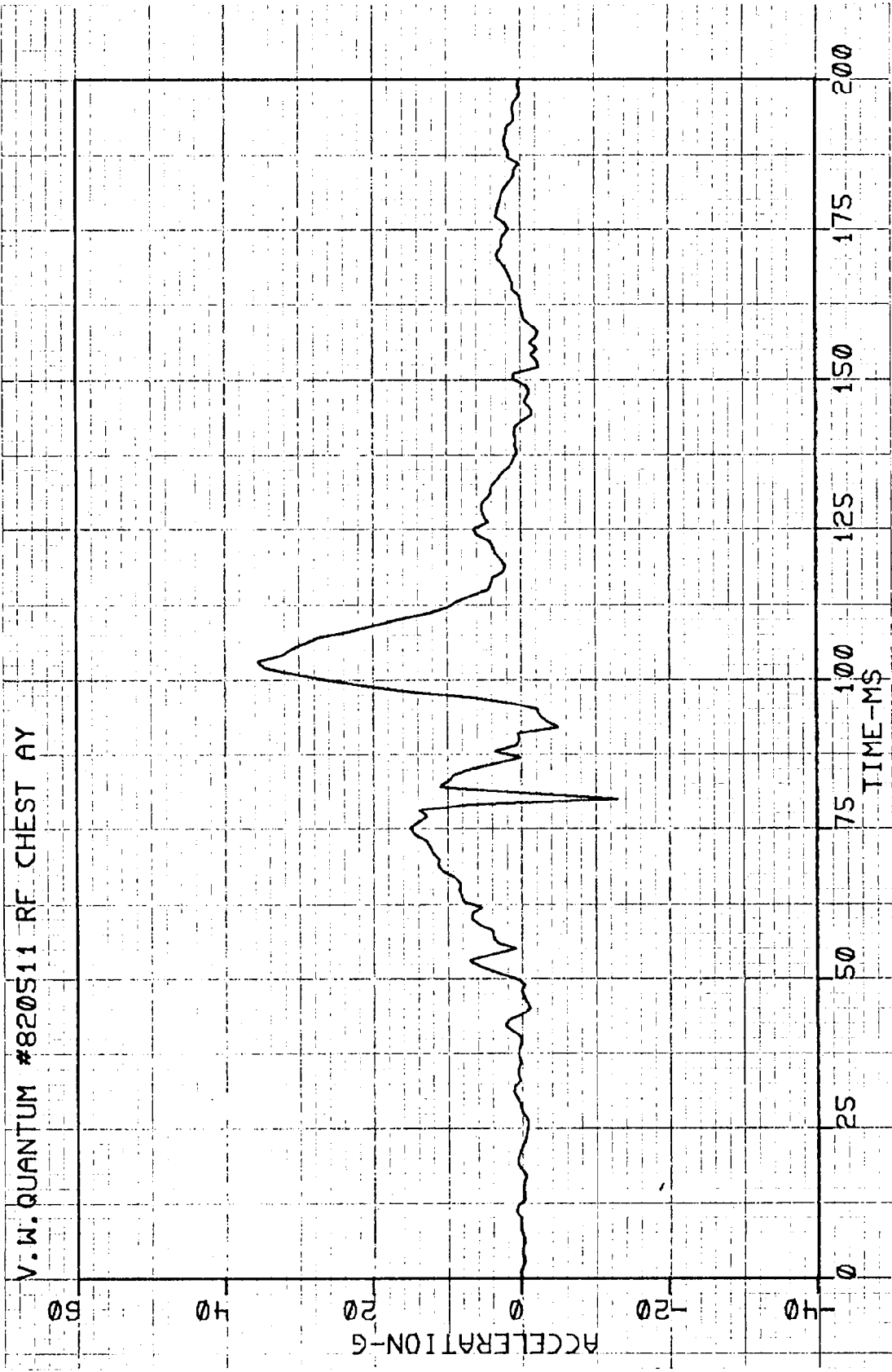




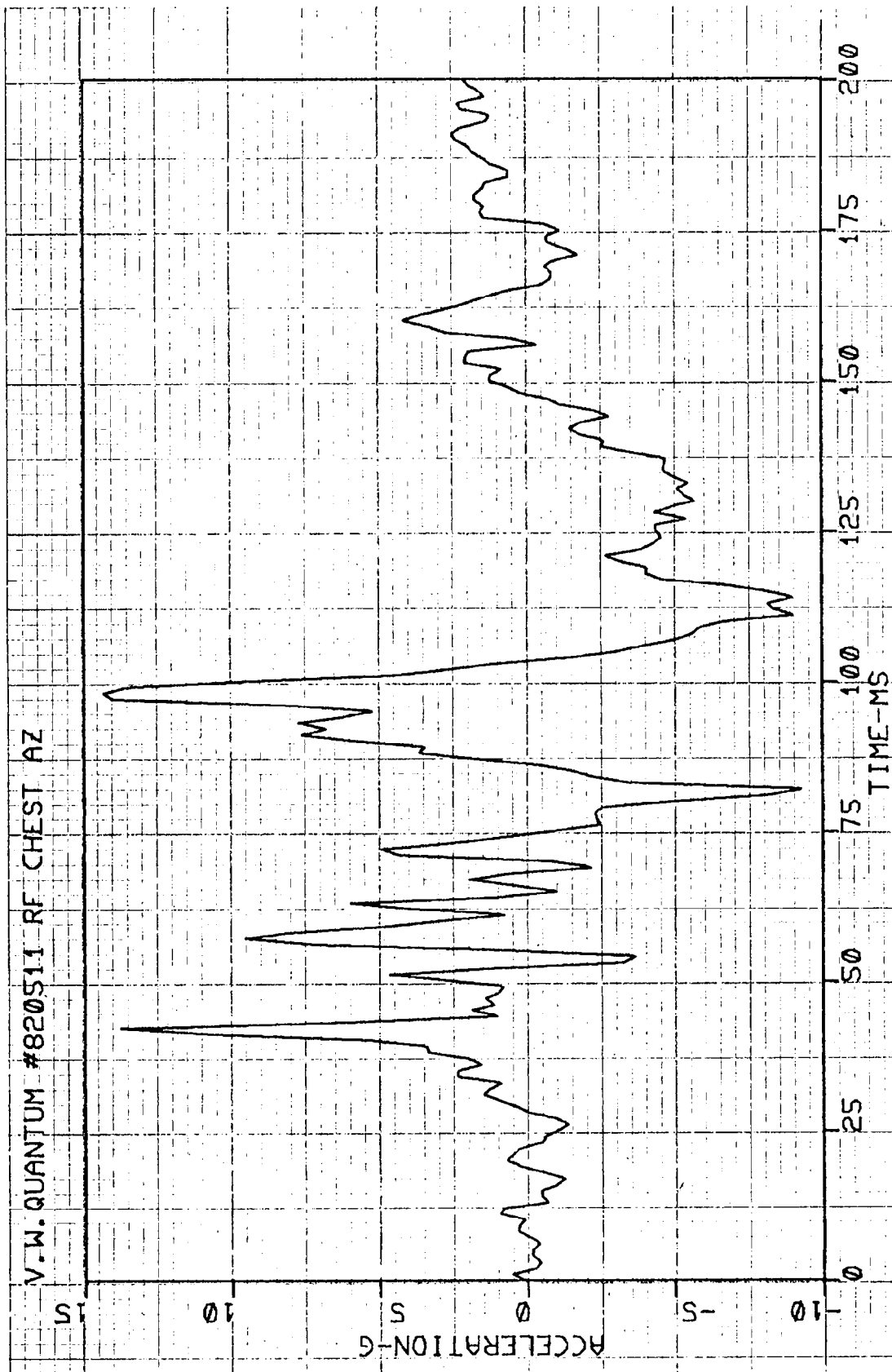
B-12



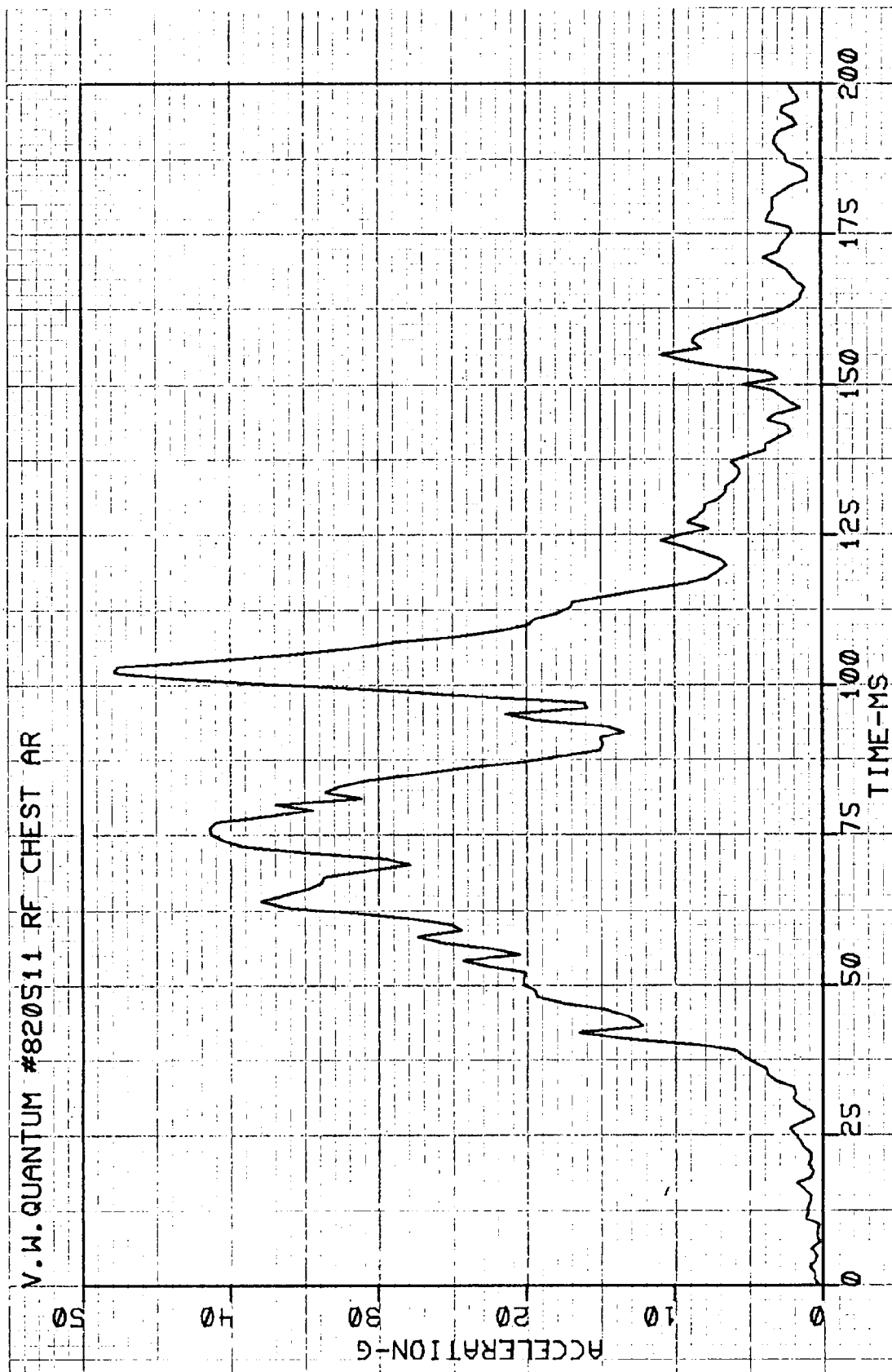


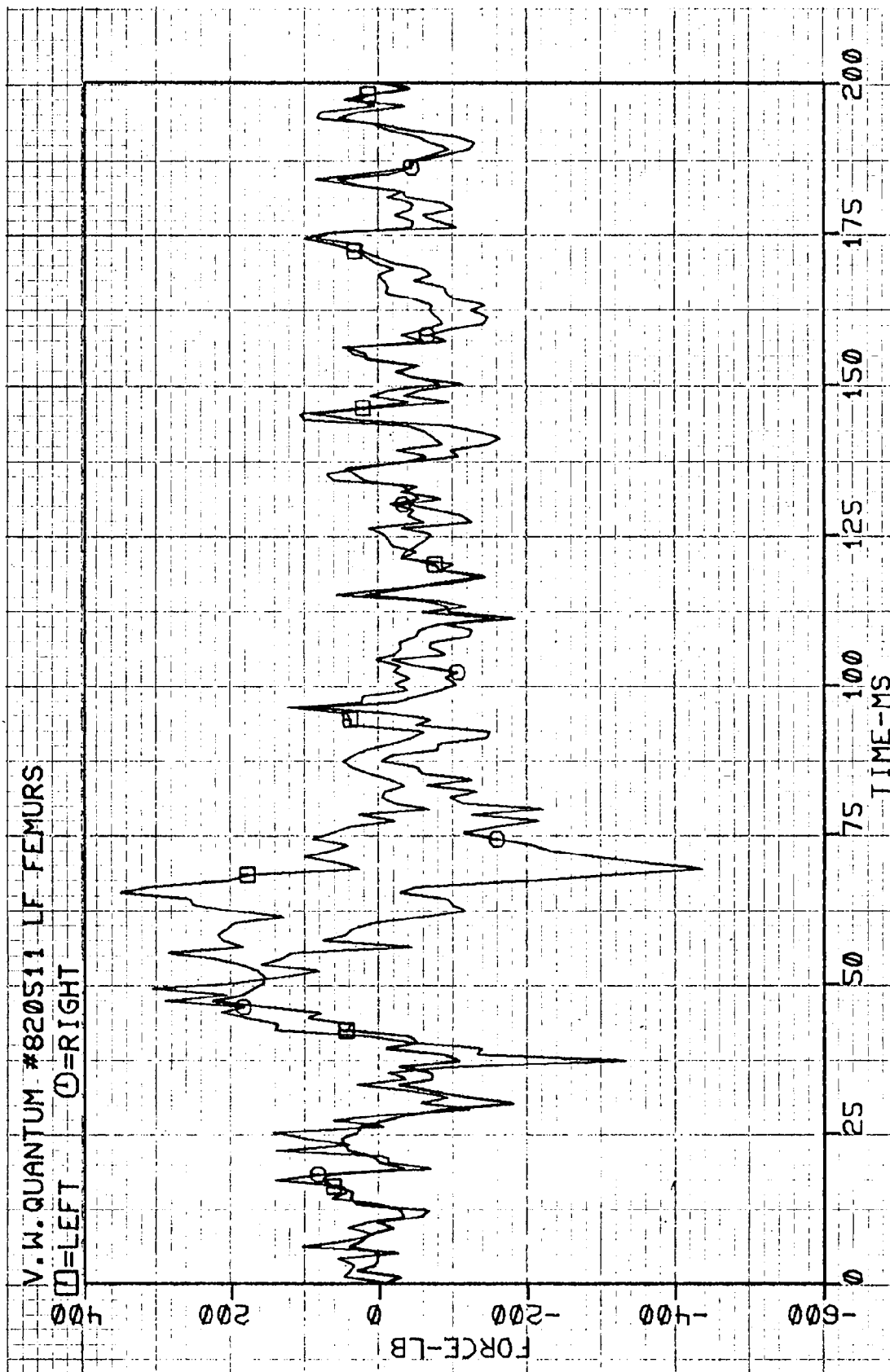


B-15



B-16





V.W. QUANTUM #820511 RF FEMURS

□=LEFT

○=RIGHT

400

200

0
-200
-400
-600

FORCE-LB

25

50

75

100

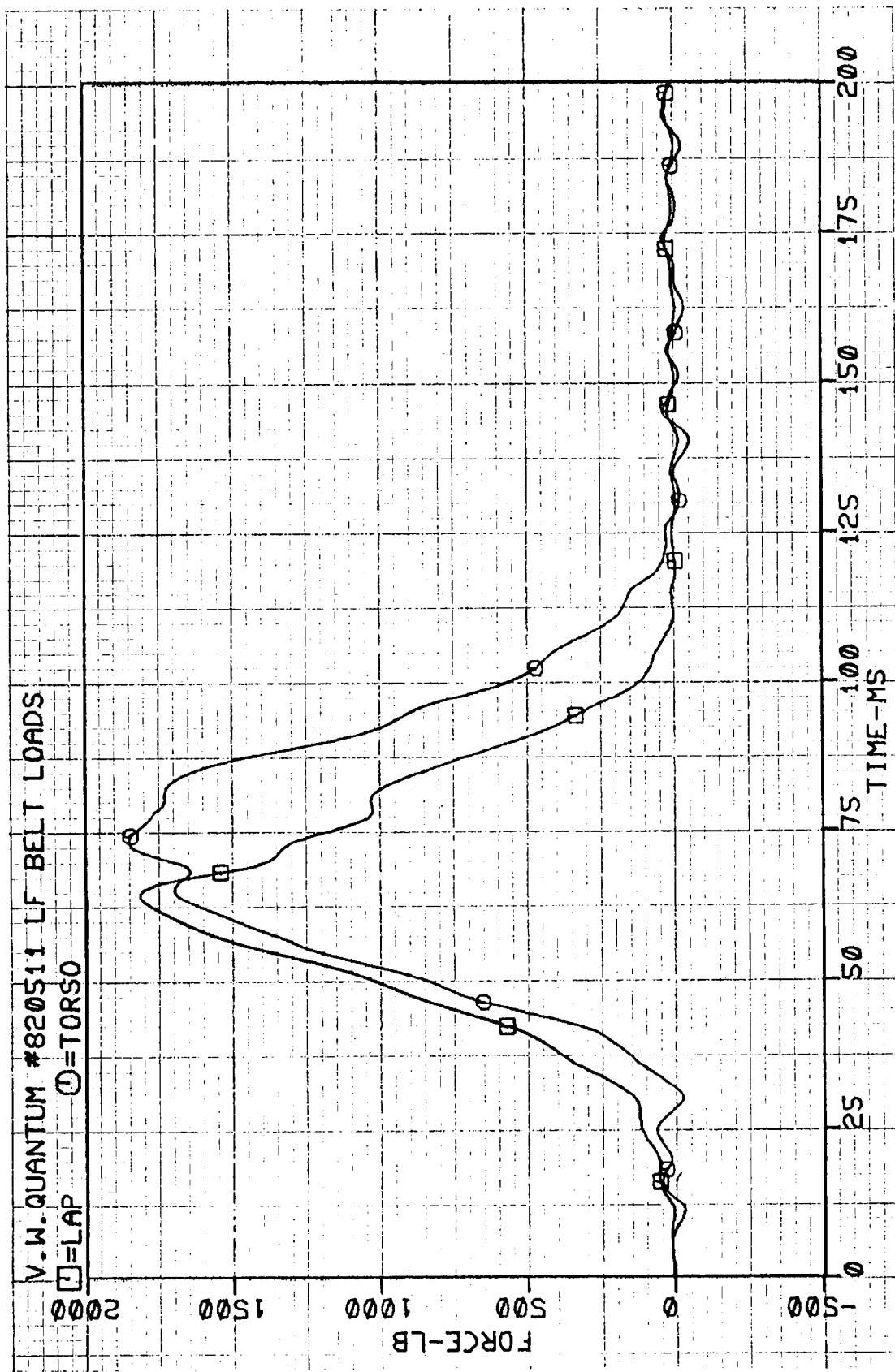
125

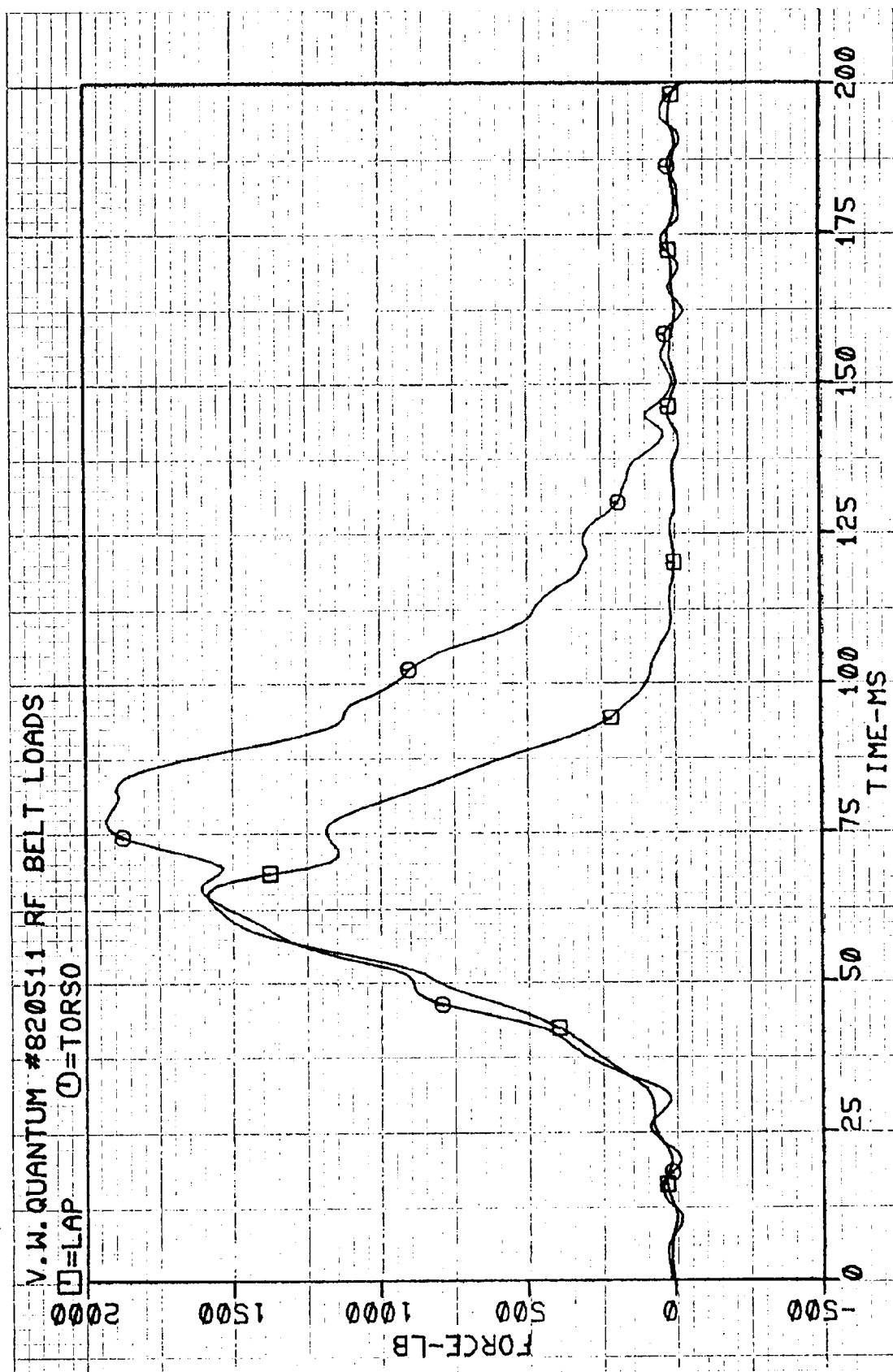
150

175

200

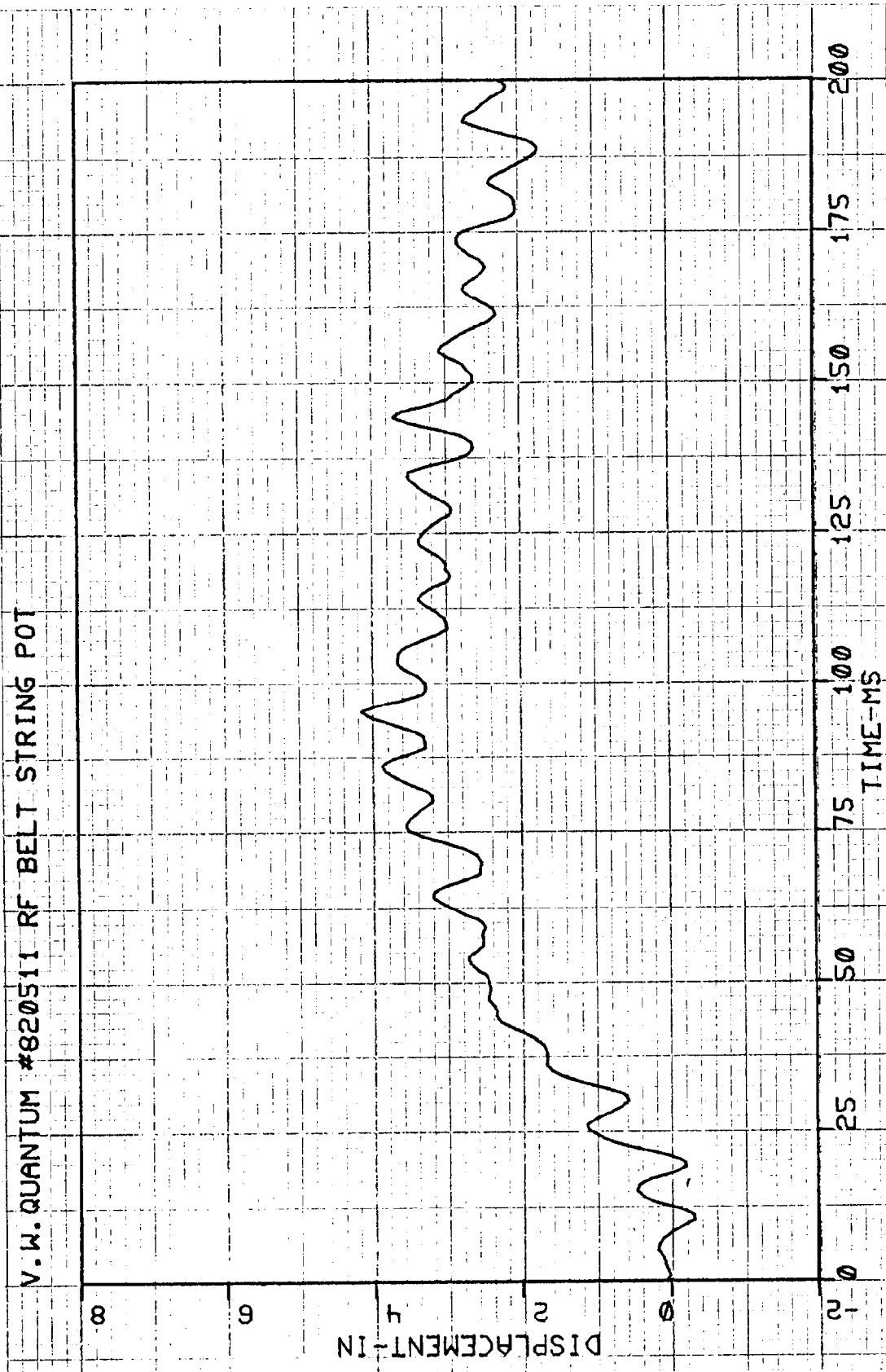
TIME-MS

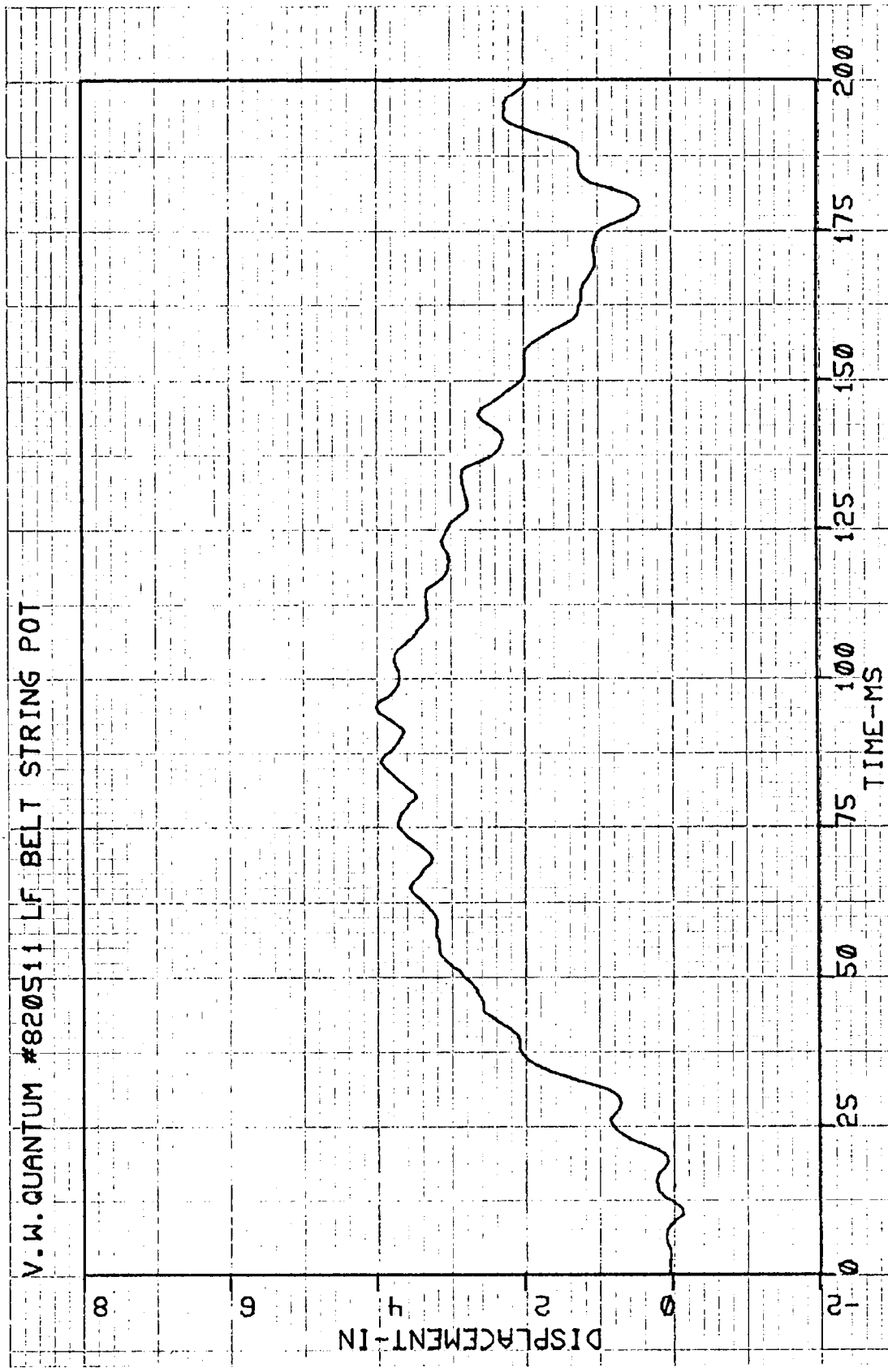


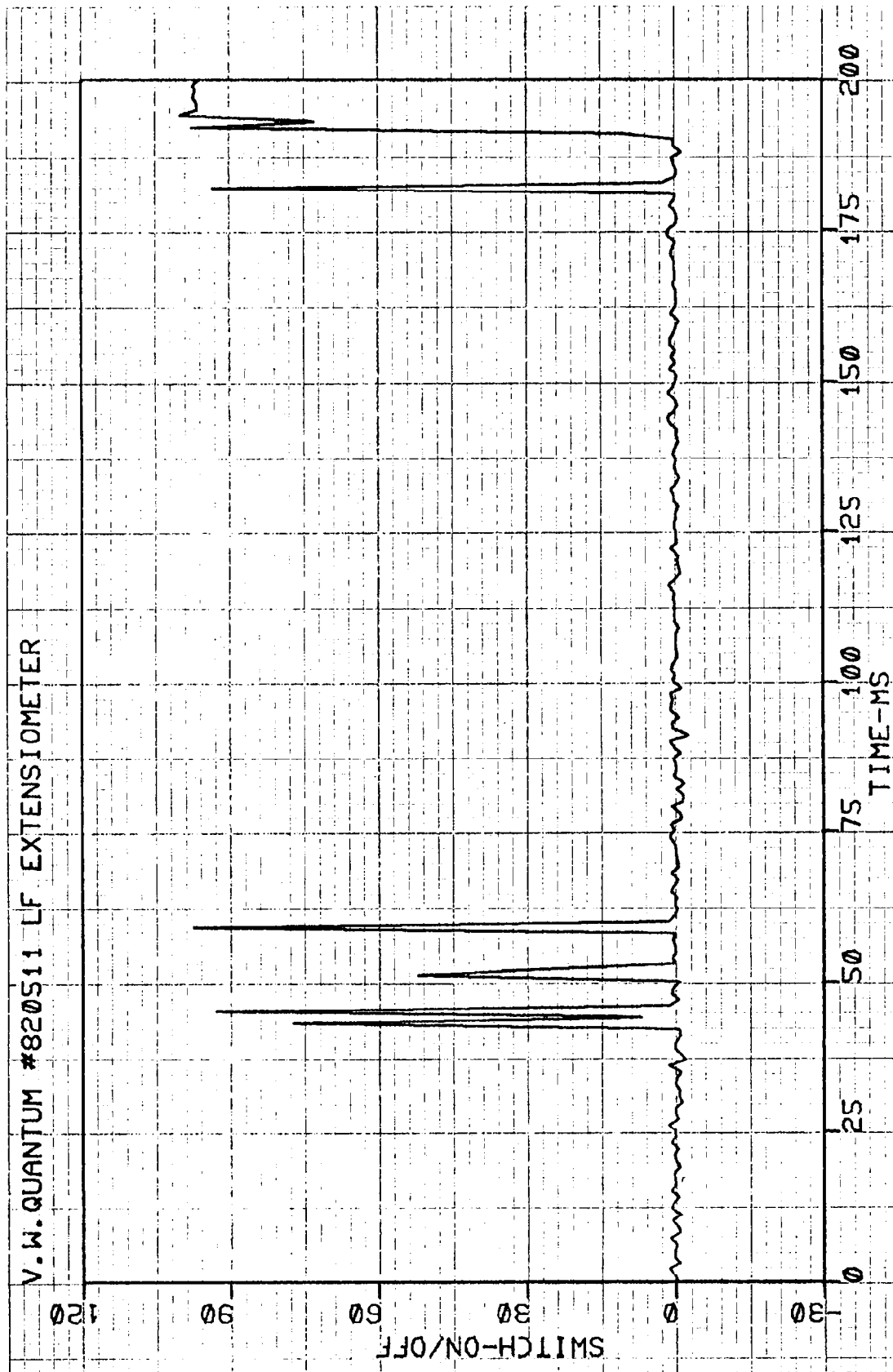


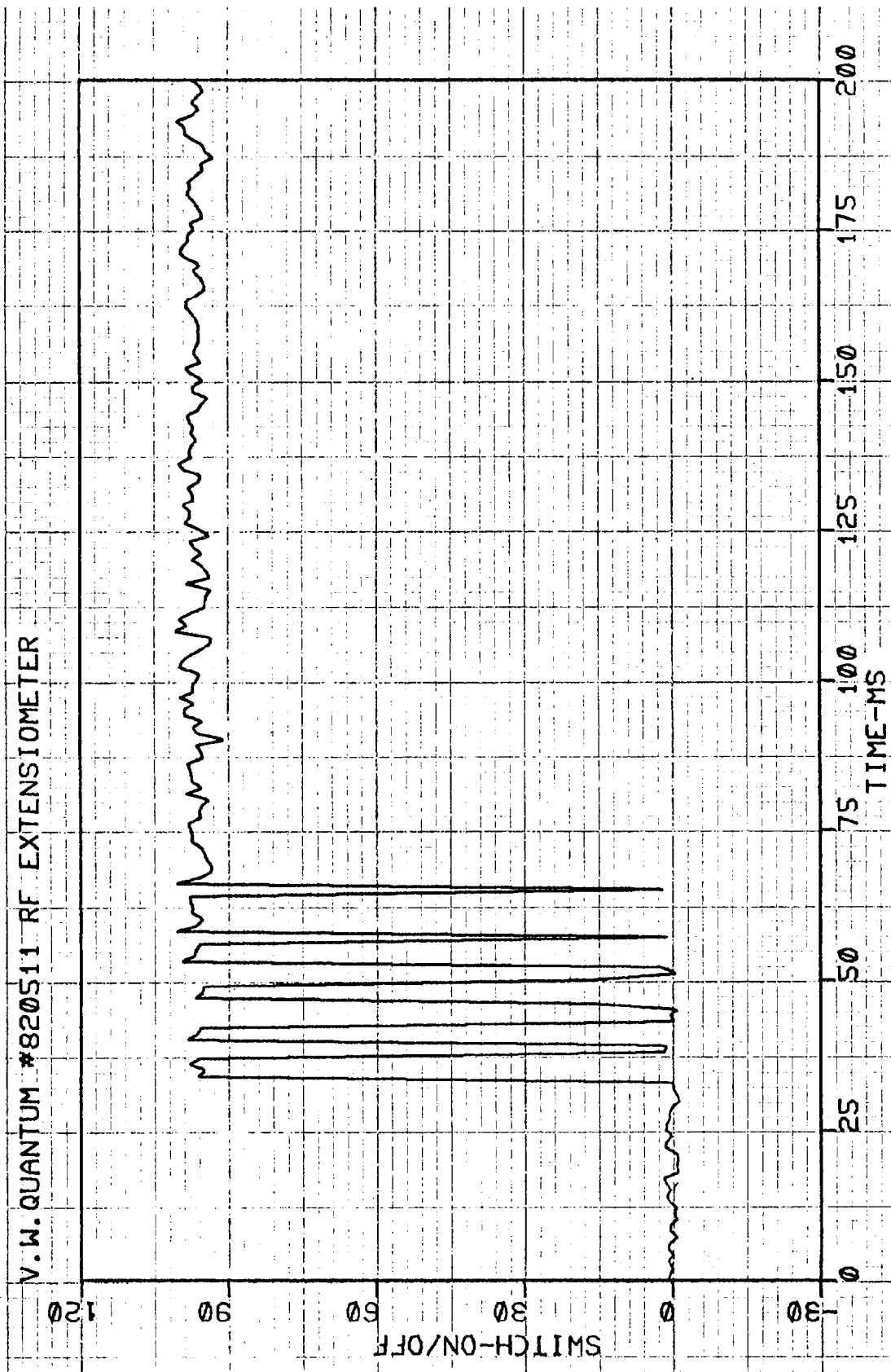
B-21

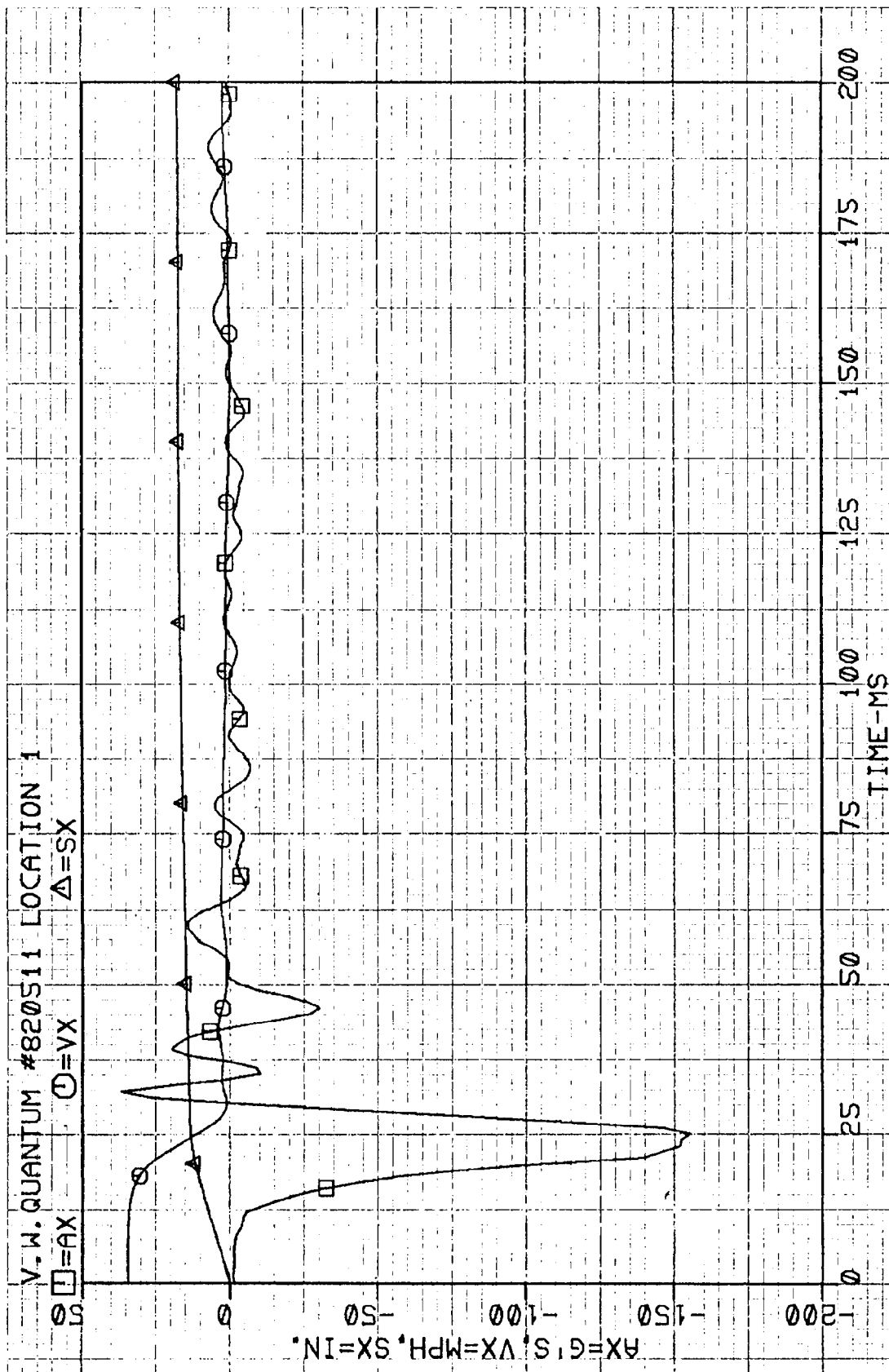
V.W. QUANTUM #820511 RF BELT STRING POT

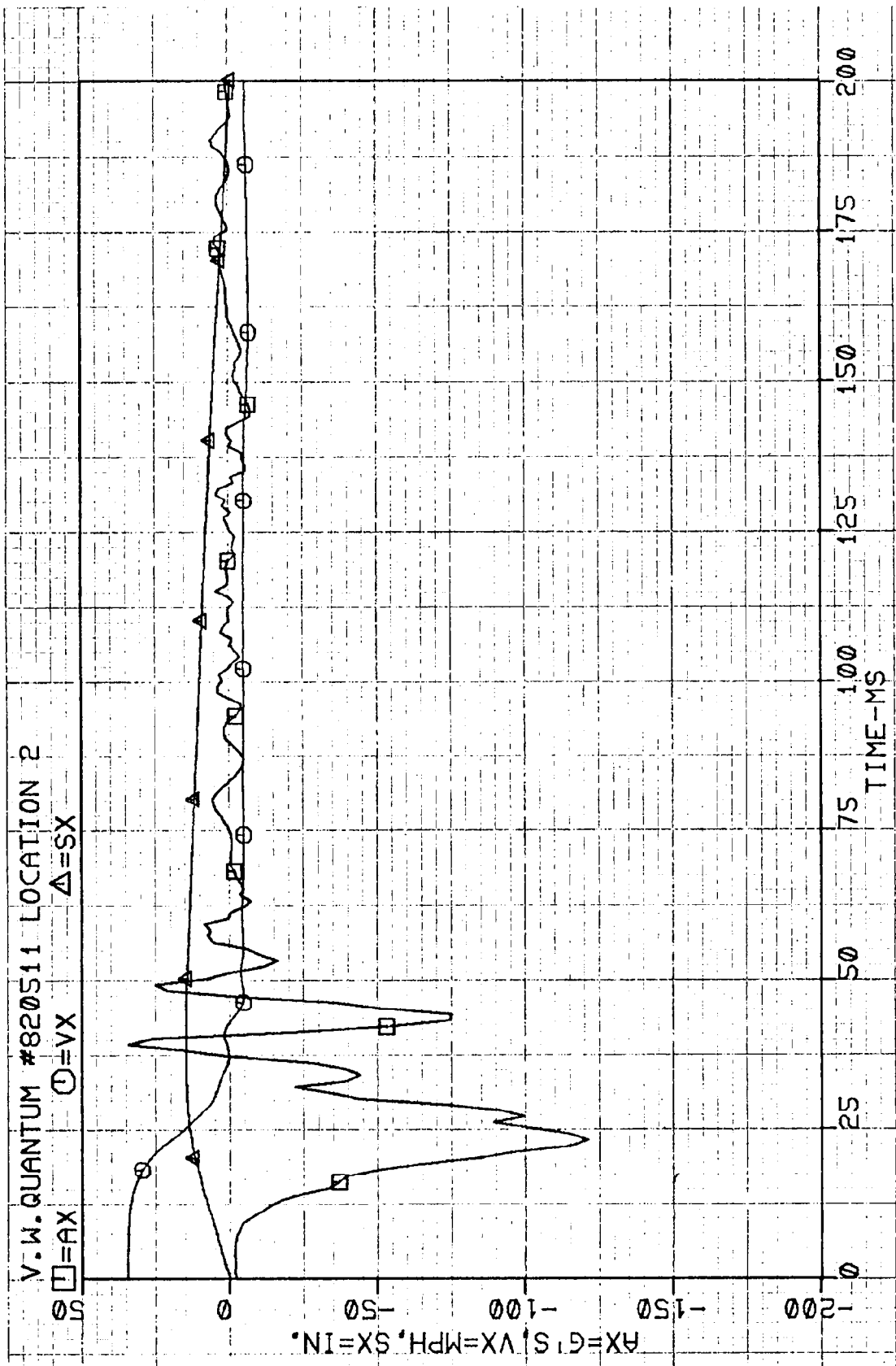


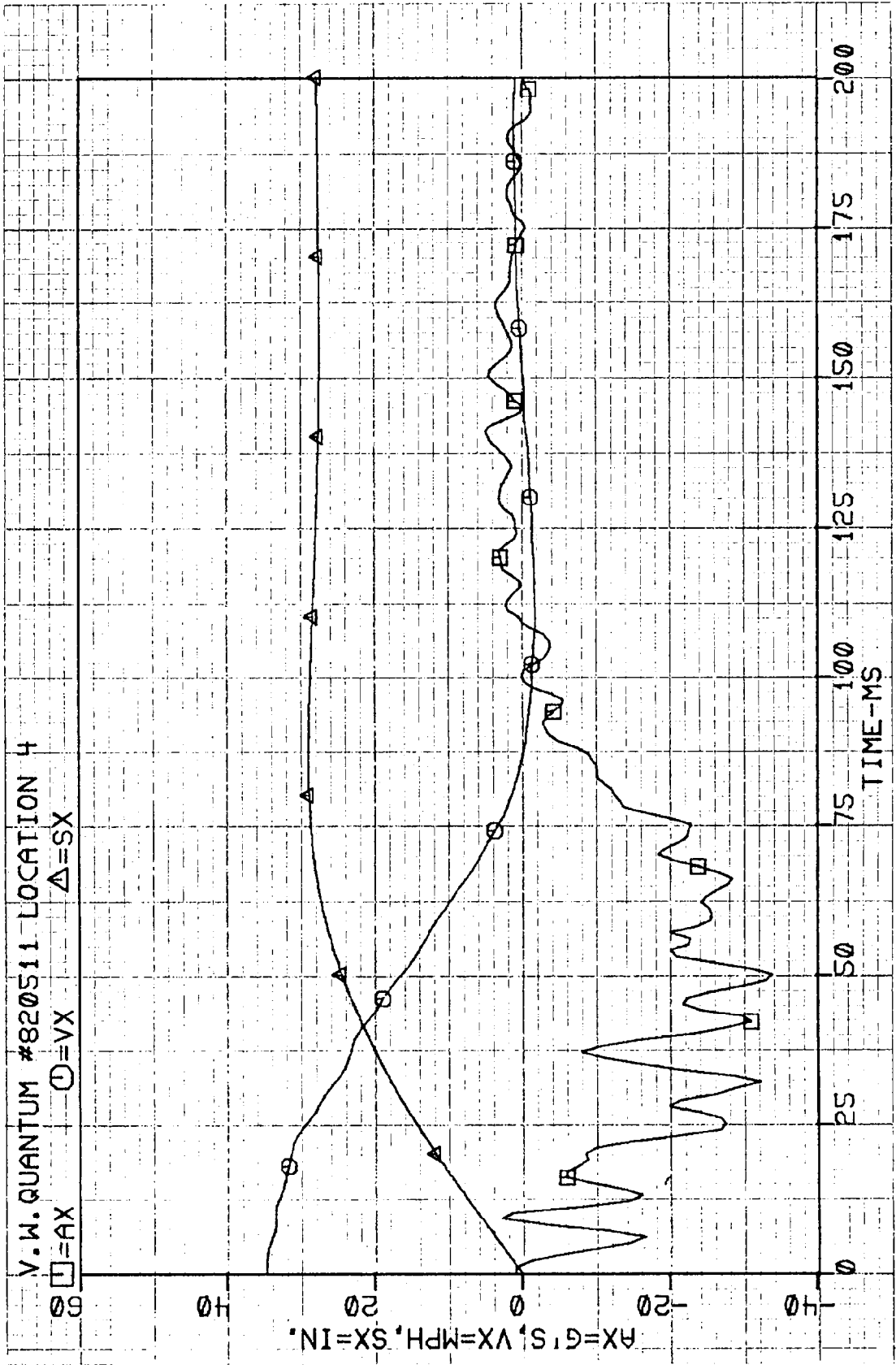












V.W. QUANTUM #820511 LOCATION 5

□=AX

○=VX

△=SX

5

40

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

-20

-40

200

175

150

125

100

75

50

25

0

TIME-MS

V.W. QUANTUM #820511 LOCATION 6

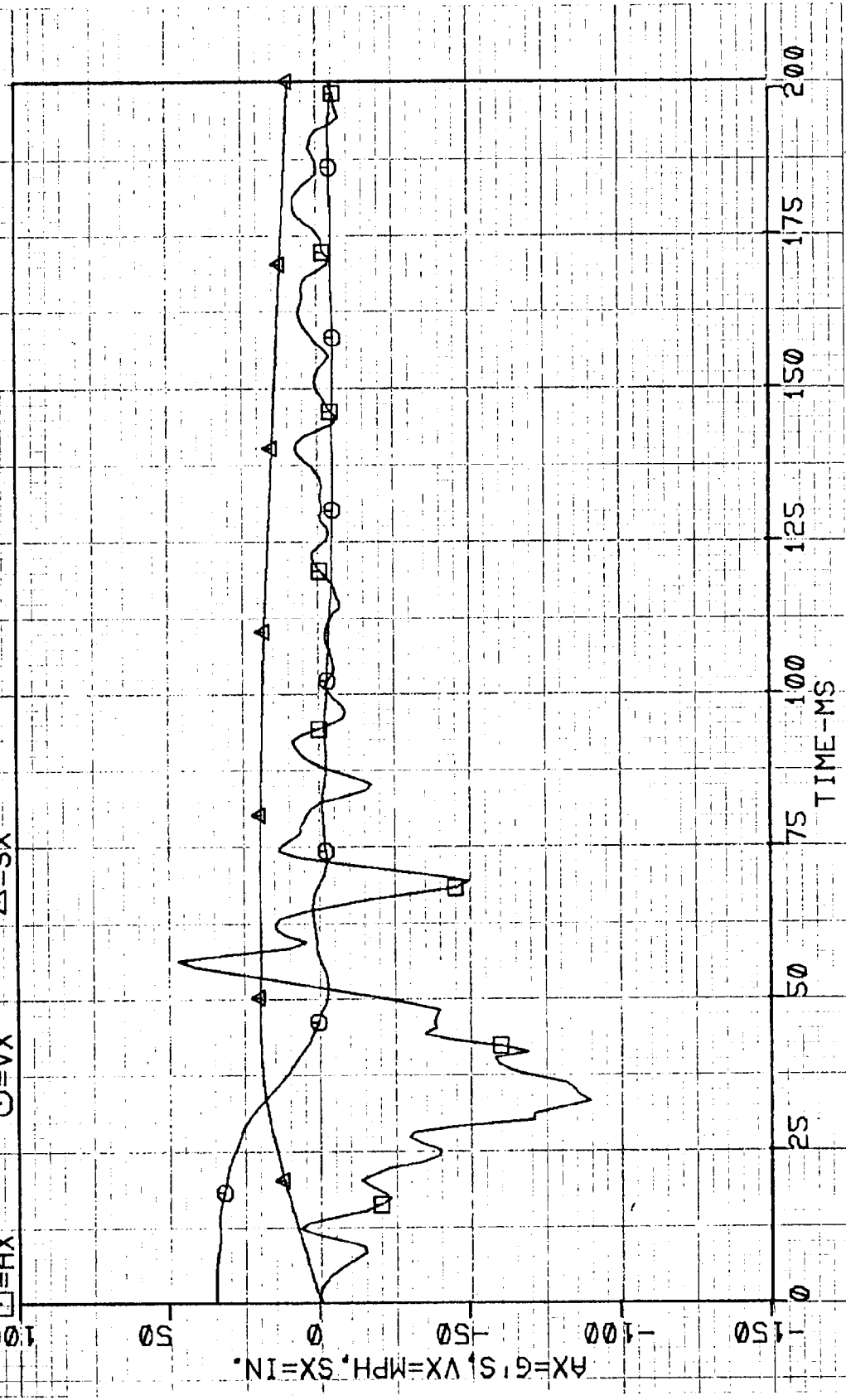
□=AX

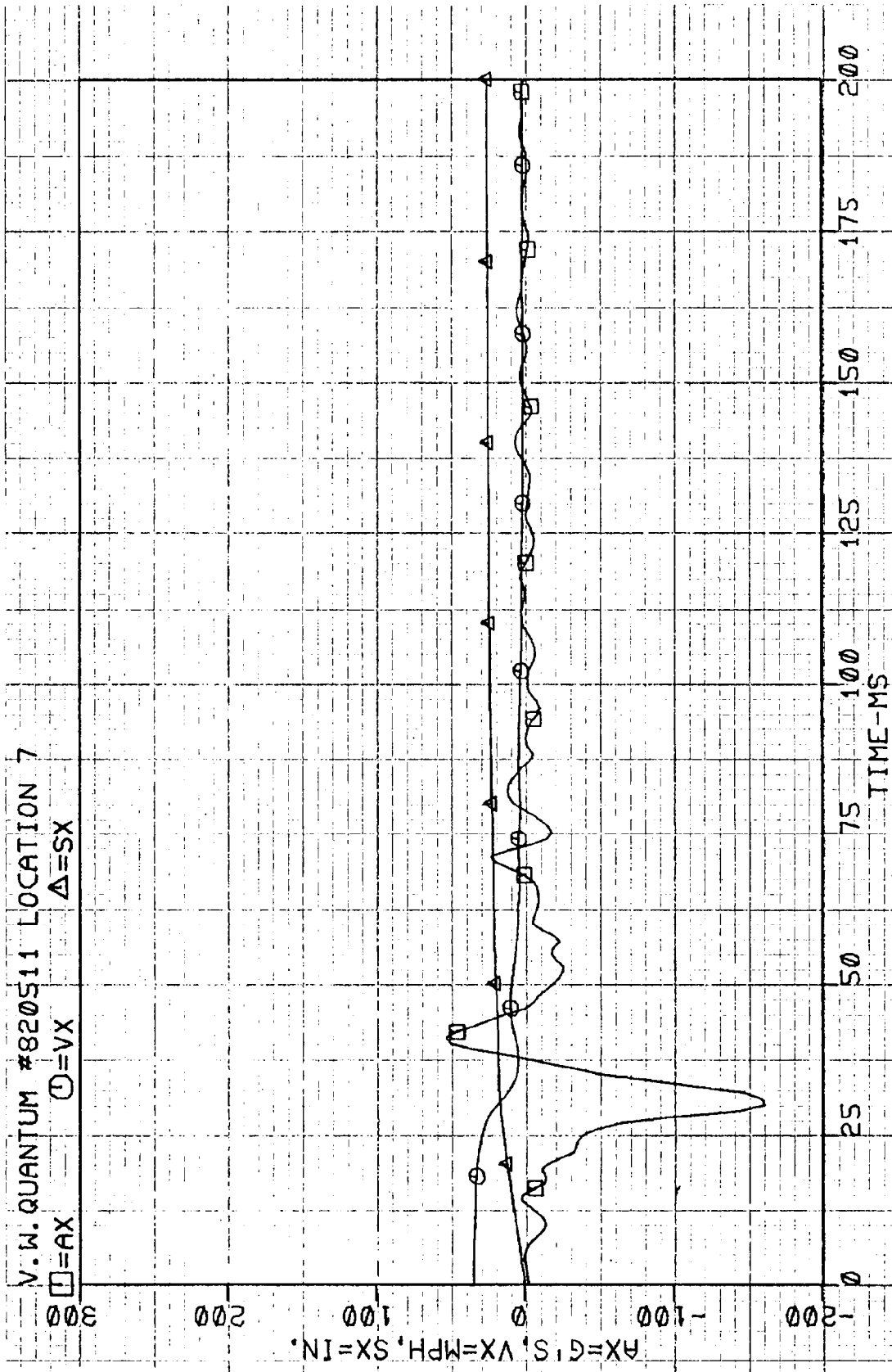
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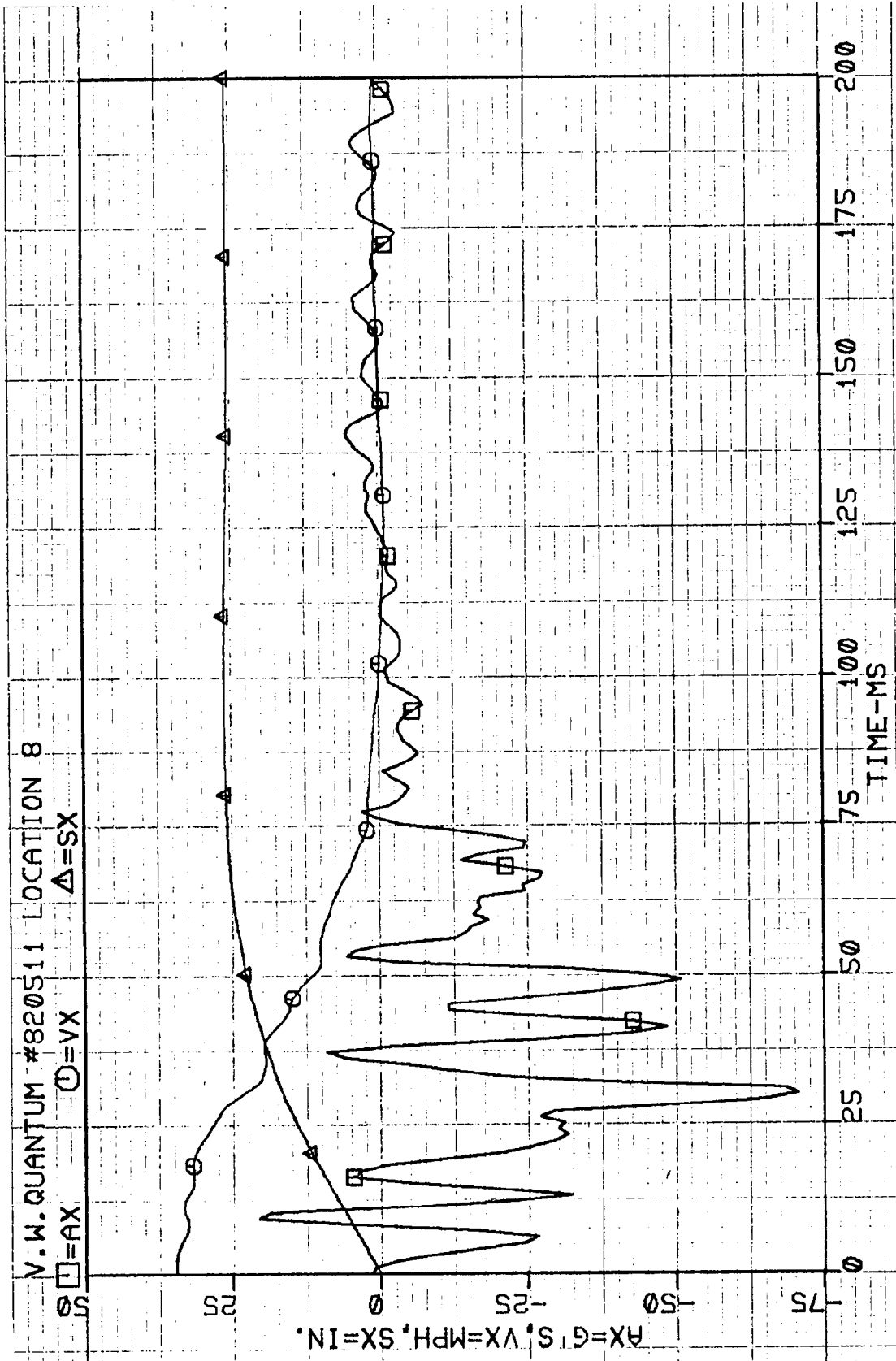
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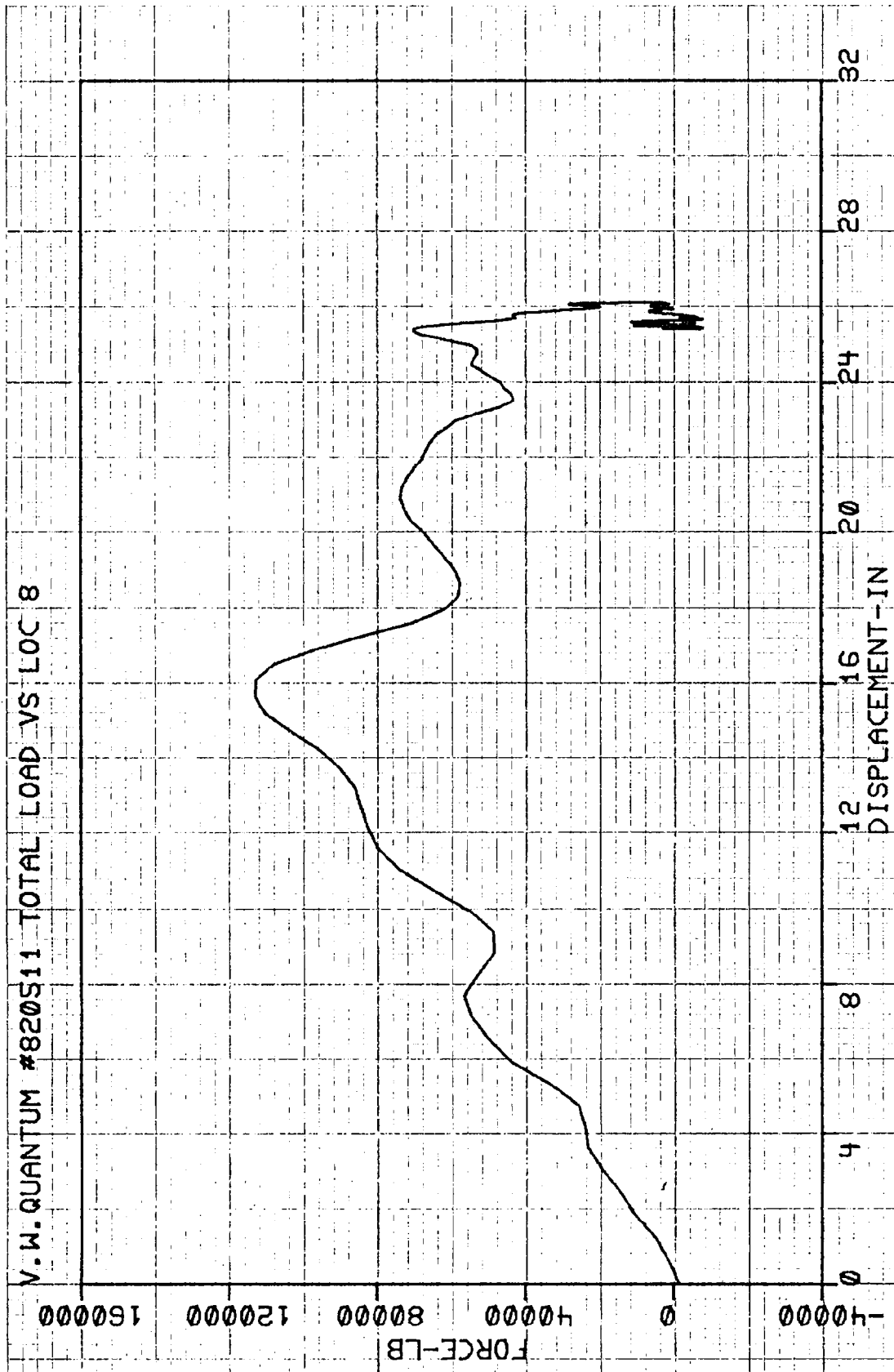
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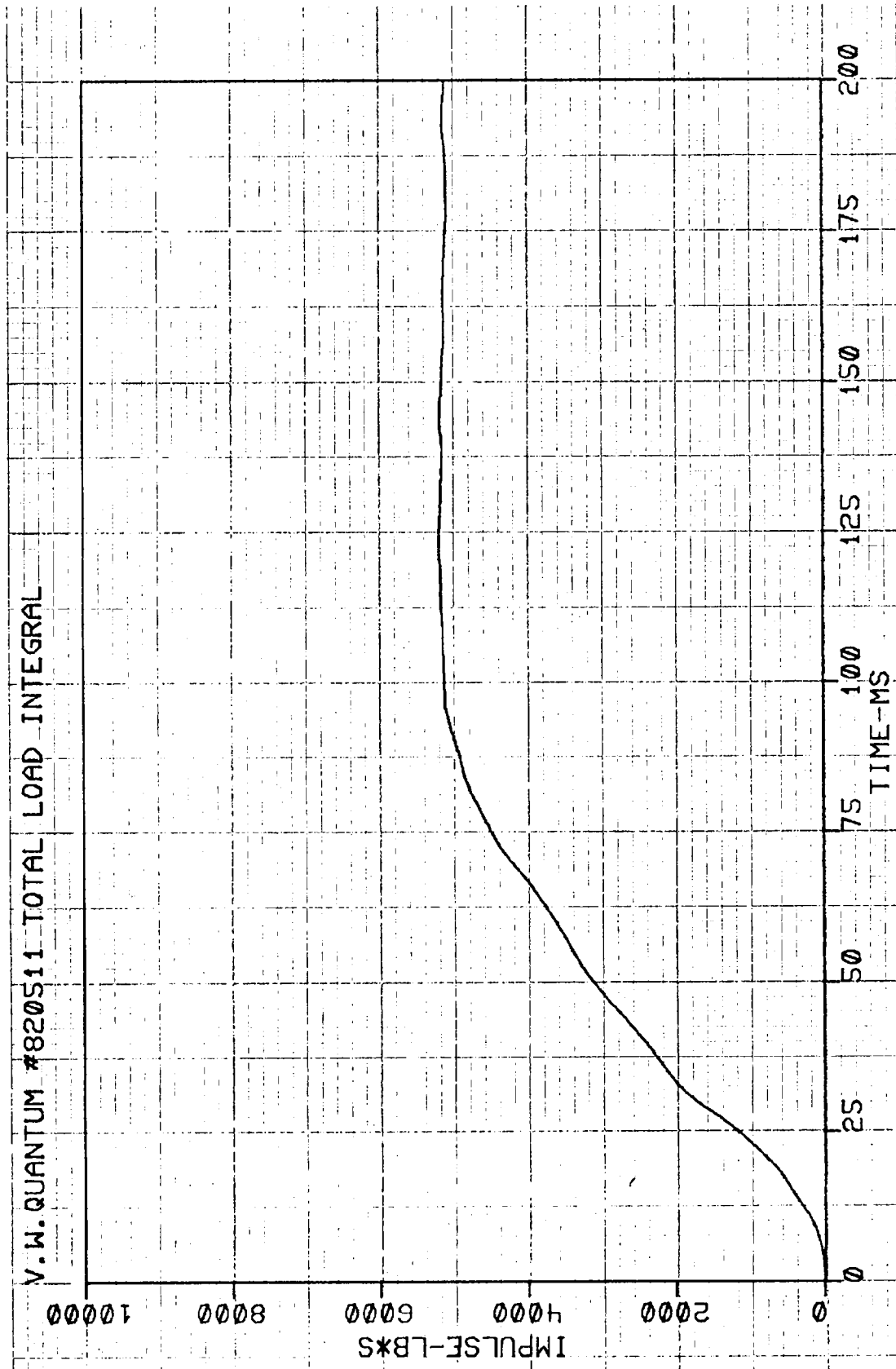
TIME-MS











APPENDIX C
DUMMY CALIBRATIONS

PART 572 DUMMY CALIBRATION TEST DATA

NHTSA Dummy I.D. No.: A03

Laboratory Technician: C. Brugalletta

Instrumentation Engineer: V. Agnihotri

	Post-Test Calibration	Pre-test Calibration
Date of Dummy Calibration	8/12/82	8/2/82
Calibration Sequential Number for Dummy	30.0	29.0
Temperature in Lab. (Spec. = 66 to 78 °F)	70	72
Relative Humidity in Lab. (Spec. = 10 to 70%)	50	52

Test Parameter	Specification
----------------	---------------

1. Head Drop Test:

a. Peak Resultant Accel	210 - 260G	236.6	226.0
b. Peak Lateral Accel	≤ 10G	5.3	3.6
c. Time above 100G (Resultant)	0.9 - 1.5 ms	1.1	1.1

2. Neck Bending Test:

a. Pendulum Speed	21.5 - 25.5 fps	22.17	22.18
b. Pendulum Avg Decel (over t ₃ - t ₂)	20 - 24G	24.0	24.0
c. Peak Resultant Head Acceleration	26G Maximum	19.0	21.0
d. Pendulum Decel (t ₂ - t ₁)	≤ 3 ms	1.5	2.3
e. Pendulum Decel (t ₃ -t ₂)	25 - 30 ms	28.0	27.0
f. Pendulum Decel (t ₄ -t ₃)	≤ 10 ms	4.0	3.0
g. Pendulum Direction Reversal Time	≥ 123 ms	N/A	N/A
h. Maximum Head Rota- tion	63 to 73°	71.0	70.9
i. Chordal Displacement:			

Head Rotation Angle

0°	Time	-2 - 2 ms	0.00	0.30
	Displ	-0.5 - 0.5 in.	0.02	0.03
30°	Time	25.6 - 34.4 ms	27.5	28.0
	Displ	2.1 - 3.1 in.	2.6	2.9
60°	Time	40.3 - 51.7 ms	42.5	44.8
	Displ	4.3 - 5.3 in.	4.7	4.8
Maximum 73°	Time	53.2 - 66.8 ms	59.5	61.0
	Displ	5.0 - 6.0 in.	5.5	5.6

PART 572 DUMMY CALIBRATION TEST DATA (Continued)

NHTSA Dummy I.D. No.: A03

Test Parameter	Specification	Post-test Calibration	Pre-test Calibration
2. Neck Bending Test: (Continued)			
Head Rotation Angle			
60°	Time	67.0 - 83.0 ms	75.0
	Displ	4.3 - 5.3 in.	4.7
30°	Time	85.4 - 104.6 ms	92.0
	Displ	2.1 - 3.1 in.	2.5
0°	Time	101.0 - 123.0 ms	104.5
	Displ	-0.5 - 0.5 in.	0.4
3. Abdominal Compression Test: (Preload = 10 pounds)			
a. Force at 0.5 in.	14 - 26 lb	26	22
b. Force at 0.75 in.	27 - 40 lb	41	34
c. Force at 1.0 in.	40 - 53 lb	56	49
d. Force at 1.3 in.	63 - 78 lb	82	73
4. Lumbar Flexion Test:			
a. Force at 20°	22 - 34 lb	33.0	26.6
b. Force at 30°	34 - 46 lb	42.0	38.8
c. Force at 40°	46 - 58 lb	51.0	46.0
d. Return Angle	12° Maximum	5.0	3.8
5. Chest Impact Tests:			
a. High Speed			
1) Probe Speed	21.78-22.22 fps	22.08	21.99
2) Peak Deflection	1.7 in. Maximum	1.4	1.5
3) Peak Resistive Force	2250 lb Maximum	1953	1974
4) Internal Hysteresis	50 - 70%	59	54
b. Low Speed			
1) Probe Speed	13.86-14.14 fps	14.02	13.96
2) Peak Deflection	1.1 in. Maximum	0.93	0.85
3) Peak Resistive Force	1450 lb Maximum	1235	1275
4) Internal Hysteresis	50 - 70%	62	62

PART 572 DUMMY CALIBRATION TEST DATA (Continued)

NHTSA Dummy I.D. No.: A03

Test Parameter	Specification	Post-test Calibration	Pre-test Calibration
6. Knee Impact Tests:			
a. Right Side			
1) Probe Speed	6.76 - 7.04 fps	6.9	6.91
2) Maximum Force	1850 - 2500 lb	1900	1930
3) Time >1000 lb	1.7 ms Minimum	2.1	2.30
b. Left Side			
1) Probe Speed	6.76 - 7.04 fps	6.9	6.92
2) Maximum Force	1850 - 2500 lb	1832	2313
3) Time >1000 lb	1.7 ms Minimum	1.9	1.5

PART 572 DUMMY CALIBRATION TEST DATA

NHTSA Dummy I.D. No.: A04

Laboratory Technician: C. Brugalletta

Instrumentation Engineer: V. Agnihotri

	Post-Test Calibration	Pre-test Calibration
Date of Dummy Calibration	8/12/82	8/3/82
Calibration Sequential Number for Dummy	32	31
Temperature in Lab. (Spec. = 66 to 78 °F)	70	72
Relative Humidity in Lab. (Spec. = 10 to 70%)	40	56

Test Parameter	Specification		
1. Head Drop Test:			
a. Peak Resultant Accel	210 - 260G	218	242
b. Peak Lateral Accel	$\leq 10G$	6	3
c. Time above 100G (Resultant)	0.9 - 1.5 ms	1.1	1.0
2. Neck Bending Test:			
a. Pendulum Speed	21.5 - 25.5 fps	22.2	22.2
b. Pendulum Avg Decel (over $t_3 - t_2$)	20 - 24G	24	22
c. Peak Resultant Head Acceleration	26G Maximum	17	18
d. Pendulum Decel ($t_2 - t_1$)	≤ 3 ms	1.5	2.0
e. Pendulum Decel ($t_3 - t_2$)	25 - 30 ms	27	28
f. Pendulum Decel ($t_4 - t_3$)	≤ 10 ms	6	4
g. Pendulum Direction Reversal Time	≥ 123 ms	N/A	N/A
h. Maximum Head Rota- tion	63 to 73°	68	70
i. Chordal Displacement:			

Head Rotation Angle

0°	Time	-2 - 2 ms	-1.0	0.0
	Displ	-0.5 - 0.5 in.	0.03	0.0
30°	Time	25.6 - 34.4 ms	26.5	26.5
	Displ	2.1 - 3.1 in.	2.5	2.4
60°	Time	40.3 - 51.7 ms	44	43
	Displ	4.3 - 5.3 in.	4.7	4.5
Maximum 73°	Time	53.2 - 66.8 ms	57.5	60.5
	Displ	5.0 - 6.0 in.	5.3	5.3

PART 572 DUMMY CALIBRATION TEST DATA (Continued)

NHTSA Dummy I.D. No.: A04

Test Parameter	Specification	Post-test Calibration	Pre-test Calibration
2. Neck Bending Test: (Continued)			
Head Rotation Angle			
60°	Time	67.0 - 83.0 ms	69.5
	Displ	4.3 - 5.3 in.	4.7
30°	Time	85.4 - 104.6 ms	88.5
	Displ	2.1 - 3.1 in.	2.4
0°	Time	101.0 - 123.0 ms	101.0
	Displ	-0.5 - 0.5 in.	0.2
3. Abdominal Compression Test: (Preload = 10 pounds)			
a. Force at 0.5 in.	14 - 26 lb	21.5	18.0
b. Force at 0.75 in.	27 - 40 lb	31.0	32.0
c. Force at 1.0 in.	40 - 53 lb	50.7	47.0
d. Force at 1.3 in.	63 - 78 lb	89.5	73.0
4. Lumbar Flexion Test:			
a. Force at 20°	22 - 34 lb	32.82	34.0
b. Force at 30°	34 - 46 lb	45.95	44.0
c. Force at 40°	46 - 58 lb	54.30	54.0
d. Return Angle	12° Maximum	7.48	8.0
5. Chest Impact Tests:			
a. High Speed			
1) Probe Speed	21.78-22.22 fps	22.07	22.01
2) Peak Deflection	1.7 in. Maximum	1.5	1.5
3) Peak Resistive Force	2250 lb Maximum	1909	1886
4) Internal Hysteresis	50 - 70%	61	56
b. Low Speed			
1) Probe Speed	13.86-14.14 fps	14.01	13.99
2) Peak Deflection	1.1 in. Maximum	0.94	1.0
3) Peak Resistive Force	1450 lb Maximum	1183	1109
4) Internal Hysteresis	50 - 70%	56	60

PART 572 DUMMY CALIBRATION TEST DATA (Continued)

NHTSA Dummy I.D. No.: A04

Test Parameter	Specification	Post-test Calibration	Pre-test Calibration
6. Knee Impact Tests:			
a. Right Side			
1) Probe Speed	6.76 - 7.04 fps	6.90	6.9
2) Maximum Force	1850 - 2500 lb	1870	1863
3) Time >1000 lb	1.7 ms Minimum	2.0	2.1
b. Left Side			
1) Probe Speed	6.76 - 7.04 fps	6.91	6.87
2) Maximum Force	1850 - 2500 lb	2019	1927
3) Time >1000 lb	1.7 ms Minimum	1.25	2.0

NOTE: A09's head was utilized for these tests. No head skins were available to calibrate A04's head.

Dynamic Science Report No. 301-DYS-82-024A

BARRIER IMPACT LOAD DATA
VOLKSWAGENWERK A.G.
1982 VOLKSWAGEN QUANTUM
4-DOOR SEDAN
NHTSA 820511

Prepared by:

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1850 West Pinnacle Peak Road
Phoenix, Arizona 85027



Prepared for:

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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
----ENFORCEMENT----
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Prepared by Michael P. Rodack

Approved by Rod Garm

Date 9-16-82

Report Accepted by:

Contract Technical Manager
Office of Vehicle Safety Compliance

Date

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1.0 INTRODUCTION

This report is an addendum to Report No. 301-DYS-82-024 and presents the barrier load measurement data acquired in testing a 1982 Volkswagen Quantum 4-Door Sedan, NHTSA 820511.

Barrier impact speed was 34.59 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

Eight longitudinal accelerometers were located on the vehicle as schematically illustrated herein. Three instruments (Locations 4, 5, and 8) represent occupant compartment accelerations. Two (Locations 1 and 2) represent engine accelerations and two (Locations 6 and 7) represent front wheel accelerations. One additional instrument is included (Location 3) for rear axle drive vehicles mounted on the differential housing.

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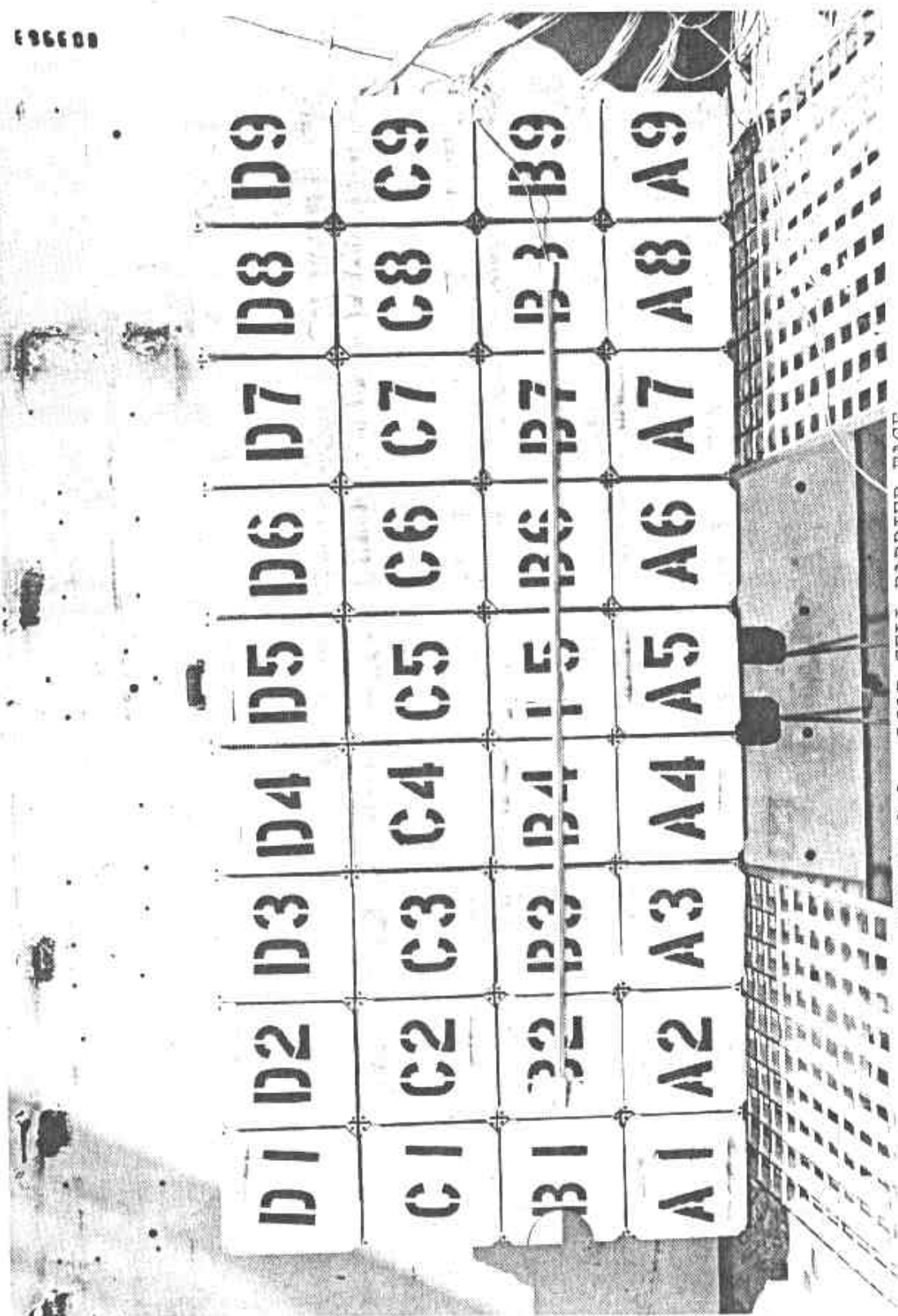
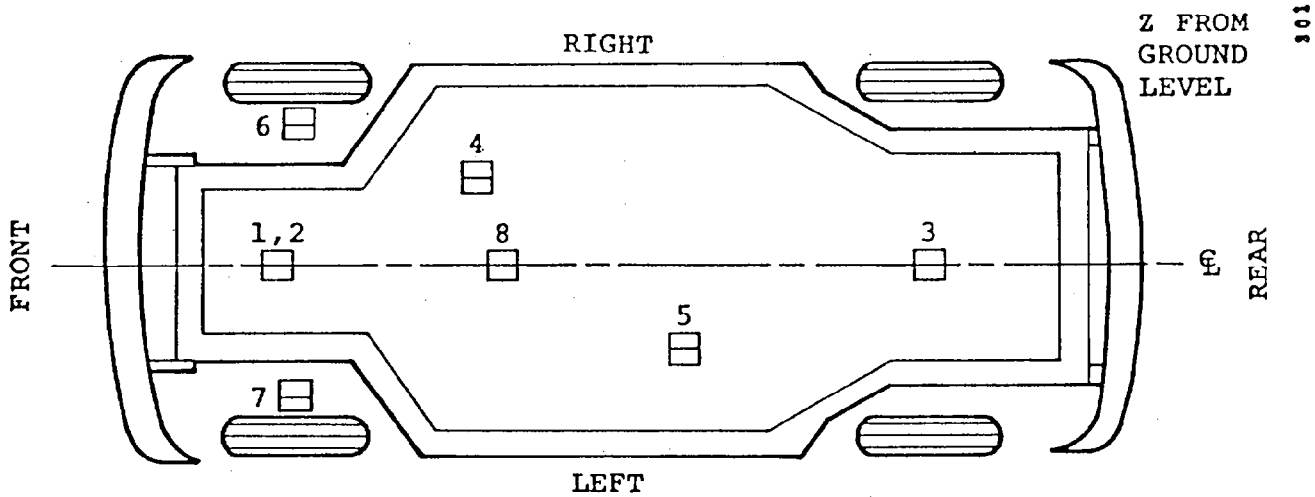


FIGURE 2-1. LOAD CELL BARRIER FACE.

VEHICLE ACCELEROMETER LOCATIONS AND SUMMARY



LINEAR ACCELEROMETERS

□ LONGITUDINAL

Vehicle Accelerometer Locations and Coordinates					Maximum Readings			
No.	Description of Location	X	Y	Z	+G's	MS	-G's	MS
1	Top of Engine	152.2	7.0	32.0	37.0	32	156.4	25
2	Bottom of Engine	158.4	-6.0	12.2	37.3	39	122.5	23
3	Differential Housing	NA - Front Wheel Drive Vehicle						
4	Right "B" Pillar $\Delta V = 36.7$ mph	100.4	24.5	13.2	4.7	141	34.6	50
5	Left "B" Pillar $\Delta V = 36.9$ mph	99.9	-24.5	13.2	5.7	140	36.9	57
6	Right Front Brake Caliper	134.9	23.1	12.0	46.9	56	90.8	33
7	Left Front Brake Caliper	134.9	-23.1	12.0	53.5	41	161.5	30
8	Vehicle C.G. $\Delta V = 35.8$ mph	100.5	0.0	14.8	22.7	9	72.7	31

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

PRE-IMPACT DATA

Make/Model: Volkswagen Quantum
 Body Style: 4-Door Sedan Model Year 1982
 NHTSA No. 820511 DSI No. 1250 Color: Black

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk A.G.
 Date of Manufacture: 2/82; VIN: WVWFA0323CE177508
 GVWR: 3395 lb; GAWR: Front = 1808 lb; Rear = 1720 lb

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL

Vehicle Capacity: FRONT REAR RECOMMENDED LOAD RANGE:
 Tire Pressure: 27 psi 27 psi TIRE SIZE: Standard
185/70SR13
 Designated Seating: 2 Front 3 Rear 5 Total
 Cargo load = 44 lb Is Spare Tire: Space Saver? No
 TOTAL = 794 lb Standard Equipment? Yes
 Engine: CVW1.7V6FBC7, 4 Cylinder Inline 105 cu. in.
 Transmission: Automatic Front Wheel Drive
 Date Vehicle Received by Laboratory: 7/9/82; Odometer 494
 Dealer Name & Address: NTW Via Autodriveaway

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

Right Front = 767 lb Right Rear = 487 lb
 Left Front = 734 lb Left Rear = 485 lb
 TOTAL FRONT WEIGHT = 1501 lb (61 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 972 lb (39 % of Total Vehicle Weight)
 TOTAL DELV. WEIGHT = 2473 lb

TARGET WEIGHT = UDW + Cargo Load + 328 lbs Dummies = 2845 lb

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 44 LB CARGO:

Right Front = 829 lb Right Rear = 691 lb
 Left Front = 773 lb Left Rear = 661 lb
 TOTAL FRONT WEIGHT = 1602 lb (54 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1352 lb (46 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 2954 lb†

Weight of ballast secured in vehicle trunk area = 0 lb

VEHICLE ATTITUDE: (inches)

Delivered Attitude: RF 30 LF 30 RR 30 LR 30
 Test Attitude: RF 29-1/4 LF 29-1/2 RR 29-1/2 LR 28-1/2

REMARKS: Vehicle contains air conditioning.

†Weight exceeds tolerance band called for in TP-212-02. The weight requirement was waived for this test by Vince Quarles (CTM).

GENERAL TEST AND VEHICLE PARAMETER DATA (CONT)

POST-IMPACT DATA

Type of Test: Frontal (0°) Impact
 Date of Test: 8/4/82 Time: 1344 Temperature 100°F
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: Primary = 34.59 mph Secondary = 34.61 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 176.0 C 179.1 L 176.4
 Post-test = R 157.0 C 156.0 L 153.8
 Crush = R 19.0 C 23.1 L 22.6
 Distance from front of test vehicle to point of impact:
 R 13.5 C 14.2 L 15.7

VISIBLE DUMMY CONTACT POINTS

	Driver	Passenger
Head	<u>Steering wheel rim and hub</u>	<u>Dash panel</u>
Chest	<u>Steering wheel rim</u>	<u>None</u>
Abdomen	<u>None</u>	<u>None</u>
Left Knee	<u>Instrument panel</u>	<u>Dash panel</u>
Right Knee	<u>Instrument panel</u>	<u>Dash panel</u>

DOOR OPENING

Front		Rear	
Left	Right	Left	Right
<u>Difficult</u>	<u>Difficult</u>	<u>Easily</u>	<u>Difficult</u>
<u>No Tools</u>	<u>No Tools</u>		<u>No Tools</u>
<u>Required</u>	<u>Required</u>		<u>Required</u>

SEAT MOVEMENT

Seat Back Failure	<u>None</u>	<u>None</u>
Seat Shift (in.)	<u>0.0</u>	<u>0.0</u>

GLAZING DAMAGE

Backlight/Windshield Slight retention loss on left side of windshield. Windshield cracked.

OTHER NOTABLE IMPACT EFFECTS: Left front tire flat. Front tires pinned by crushed sheet metal.

VEHICLE PROFILE DATA SHEET

PRE-IMPACT DATA

Make/Model: Volkswagen Quantum
Body Style: 4-Door Sedan Model Year: 1982
NHTSA No.: 820511 DSI No. 1250 Color: Black

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk A.G.
Date of Manufacture: 2/82; VIN: WVWFA0323CE177508
GVWR: 3395 lb; GAWR: Front = 1808 lb; Rear = 1720 lb

POST-IMPACT DATA

Type of Test: Frontal (0°) Impact
Date of Test: 8/4/82 Time: 1344 Temperature 100 °F
Required Impact Velocity Range: 34.5 to 35.5 mph
Impact Velocity: Primary = 34.59 mph Secondary = 34.61 mph

Measurements Referenced to Plane 14.9 Feet Forward of Rear Bumper Q

Location	Height	Vehicle Left (in.)				Vehicle Right (in.)			
		<u>30.3</u>	<u>18.2</u>	<u>6.1</u>	<u>Q</u>	<u>6.1</u>	<u>18.2</u>	<u>30.3</u>	
		<u>28.7</u>	<u>17.2</u>	<u>5.7</u>	<u>Q</u>	<u>5.7</u>	<u>17.2</u>	<u>28.7</u>	
Pre-test Profile (in.)									
Top of Front Bumper	20.8	2.9	0.5	0.3	0.3	0.2	0.5	3.0	
Front of Hood	30.3	7.7	5.9	5.5	5.4	5.5	6.0	8.0	
Post-test Profile (in.)									
Top of Front Bumper	26.0	25.4	23.4	23.4	23.1	22.8	21.9	22.1	
Front of Hood	39.0	26.8	23.9	23.4	23.1	22.9	23.2	24.9	
Post-test Static Crush (in.)									
Top of Front Bumper		22.5	22.9	23.1	22.8	22.6	21.4	19.1	
Front of Hood		19.1	18.0	17.9	17.4	17.4	17.2	16.9	

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.

