

DOT 338

Dynamic Science Report No. 301-DYS-81-010

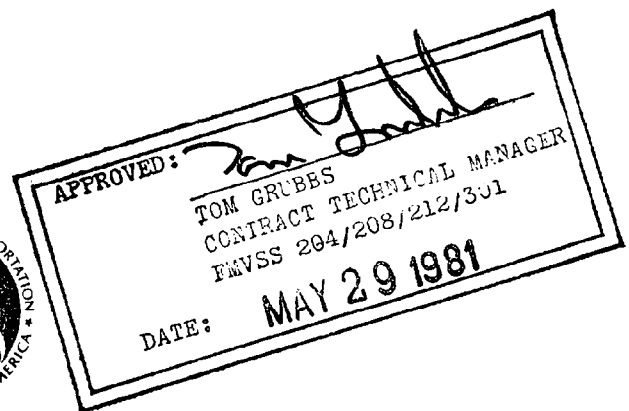
NEW VEHICLE ASSESSMENT AND
STANDARDS ENFORCEMENT INDICANT TESTING

FMVSS 301-75

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

Prepared by:

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



March 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

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Prepared by *Tony Birt*

Approved by *E. Grubbs*

Date April 16, 1981

TOM GRUBBS

NHTSA Contract Technical Manager

MAY 29 1981

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TECHNICAL REPORT STANDARD TITLE PAGE

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				6. Performing Orgn Code	
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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 30° oblique fixed barrier at a speed of 34.78 mph. The test was conducted at the Dynamic Science, Inc. Deer Valley Facility on March 13, 1981. The 1981 VW Jetta appeared to comply with the requirements of FMVSS 301-75 as specified for the vehicle manufacture date.					
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				22. Price	

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

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

TEMPERATURE (exact)			
°F	degrees Fahrenheit	5/9 (after subtracting 32)	degrees Celsius
			°C

Approximate Conversions From Metric Measures

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

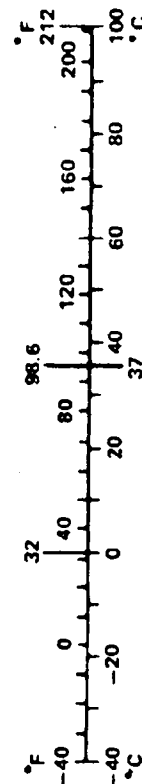


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SECTION 1
PURPOSE AND INTRODUCTION

PURPOSE

The purpose of the test was to subject a 1981 Volkswagen Jetta to the indicant test requirements of DOT Test Plan TP-212-02, April 1, 1980, Standard Enforcement Indicant Testing for FMVSS 301-75, "Fuel System Integrity." The vehicle was tested using test parameters which are in excess of the current upper limits of the subject FMVSS in order to obtain research and vehicle rating data. This test, therefore, can only be viewed as an "indicant" test by the Office of Vehicle Safety Compliance (OVSC).

INTRODUCTION

Section 2 contains General Test and Vehicle Parameter Data. Section 3 contains Compliance Related Data for FMVSS 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 calibrations.

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.: 810521 DSI No. 1144 Color: Gray

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk A.G., W. Germany
 Date of Manufacture: 10/80; VIN: WVGGA9161BW153327
 GVWR: 2887 lb; GAWR: Front = 1609 lb; Rear = 1354 lb

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL

Vehicle Capacity: FRONT REAR RECOMMENDED LOAD RANGE:
 Tire Pressure: 28 psi 34 psi Tire Size: B
175/70SR13

Designated Seating: 2 Front 2 Rear 4 Total
 Cargo load = 125 lb Is Spare Tire: Space Saver? No
 TOTAL = 725 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: 30.0
 Dealer Name & Address: Biddulph VW/Fiat 4434 W. Glendale Ave.
Glendale, Arizona 85301

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

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

Right Front = 642 lb Right Rear = 377 lb
 Left Front = 642 lb Left Rear = 412 lb
 TOTAL FRONT WEIGHT = 1284 lb (62.0 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 789 lb (38.0 % of Total Vehicle Weight)
 TOTAL DELV. WEIGHT = 2073 lb

TARGET WEIGHT = UDW + Cargo Load + 328 lbs Dummies = 2526 lb *

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 125 lb CARGO:

Right Front = 570 lb Right Rear = 548 lb
 Left Front = 696 lb Left Rear = 707 lb
 TOTAL FRONT WEIGHT = 1266 lb (50.2 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1255 lb (49.8 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 2521 lb
 Weight of ballast secured in vehicle trunk area = 7 lb

VEHICLE ATTITUDE: (inches)

Delivered Attitude: RF 32.0 LF 32.0 RR 32.0 LR 32.0
 Test Attitude: RF 31.0 LF 31.0 RR 29.8 LR 29.6

GENERAL TEST AND VEHICLE PARAMETER DATA (CONTD)

POST-TEST DATA

Type of Test: Frontal Oblique (30°) Impact on Left (Driver's) Side.
 Date of Test: 3/13/81 Time: 1445 Temperature 69 °F
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: Primary = 34.78 mph Secondary = 34.78 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	<u>168.7</u>	L	<u>169.0</u>
	Post-test = R	<u>169.7</u>	L	<u>142.3</u>
	Crush = R	<u>-1.0</u>	L	<u>26.7</u>
Distance from front of test vehicle to point of impact (in.):	R	<u>*</u>	L	<u>*</u>

VISIBLE DUMMY CONTACT POINTS

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Top left side hit</u> <u>light and side header</u> <u>above LF door, steering wheel hub</u>	<u>Upper right corner of instrument panel cowl;</u> <u>right A-pillar</u>
Chest	<u>Bottom left side of steering wheel hub</u>	<u>None</u>
Abdomen	<u>None</u>	<u>None</u>
Left Knee	<u>Knee bar and underside of dash</u>	<u>Knee bar and underside of glovebox</u>
Right Knee	<u>Knee bar</u>	<u>Knee bar and underside of glovebox</u>

DOOR OPENING

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

SEAT MOVEMENT

Seatback Failure	<u>None</u>	<u>None</u>	<u>Removed for test</u>
Seat Shift (in.)	<u>0.7 in.</u>	<u>0.3 in.</u>	
	<u>forward</u>	<u>forward</u>	

Glazing Damage

Backlight/Windshield None. Driver door window broken inside door.

*Vehicle skidded off barrier: Measurement not possible.

OTHER NOTABLE IMPACT EFFECTS: Extensive toeboard intrusion on driver side; buckle in roof over left B pillar; outward bow in driver door, door separated from doorsill. Steering column pushed to left. All four doors locked on impact; both front blinkers and a buzzer activated.

VEHICLE PROFILE DATA SHEET

PRE-IMPACT DATA

Make/Model: Volkswagen Jetta

Body Style: 4-door Sedan

Model Year: 1981

NHTSA No.: 810521

DSI No. 1144

Color: Gray

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk A.G., W. Germany

Date of Manufacture: 10/80; VIN: WVGGA9161BW153327

GVWR: 2887 lb; GAWR: Front = 1609 lb; Rear = 1354 lb

POST-IMPACT DATA

Type of Test: Frontal Oblique (30°) Impact on Left (Driver) Side

Date of Test: 3/13/81 Time: 1445 Temperature 69 °F

Required Impact Velocity Range: 34.5 to 35.5 mph

Impact Velocity: Primary = 34.78 mph Secondary = 34.78 mph

Measurements Referenced to Plane 15 Feet Forward of Rear Bumper G

Location	Height	Vehicle Left (in.)			Vehicle Right (in.)			
		29.0	17.4	5.8	<u>G</u> 5.8	17.4	29.0	
		26.5	15.9	5.3	<u>G</u> 5.3	15.9	26.5	
Pre-test Profile (in.)								
Top of Front Bumper	18.7	11.0	9.5	9.5	9.5	9.5	9.8	11.3
Front of Hood	28.7	17.2	16.4	16.0	16.0	16.0	16.6	17.5
Post-test Profile (in.)								
Top of Front Bumper	16.9	37.7	32.1	29.2	23.4	20.5	15.0	10.3
Front of Hood	27.7	39.8	37.5	31.8	28.9	26.5	21.9	17.8
Post-test Static Crush (in.)								
Top of Front Bumper	1.8	26.7	22.6	19.7	13.9	11.0	5.2	-1.0
Front of Hood	1.0	22.6	21.1	15.8	12.9	10.5	5.3	0.3

SECTION 3

COMPLIANCE-RELATED DATA
FMVSS 301-75 INDICANT TESTING

The following data sheets and photographs document compliance data.

PRE-IMPACT DATA

Make/Model: Volkswagen Jetta
 Body Style: 4-door Sedan Model Year: 1981
 NHTSA No. 810521 DSI No. 1144 Color: Gray

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk A.G., W. Germany
 Date of Manufacture: 10/80; VIN: WVGGA9161BW153327
 GVWR: 2887 lb; GAWR: Front = 1609 lb; Rear 1354 lb

POST-IMPACT DATA

Type of Test: Frontal Oblique (30°) Impact on Left (Driver) Side
 Date of Test: 3/13/81 Time: 1445 Temperature 69 °F
 Required Impact Velocity Range: 34.5 to 35.5 mph
 Impact Velocity: Primary = 34.78 mph Secondary = 34.78 mph
 Test Weight: 2521 lb Static Crush: 26.7 in.
 Rebound: N/A

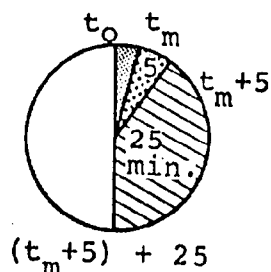
FUEL SYSTEM DATA

Test Fluid: Red Stoddard Solvent Specific Gravity: 0.764
 Temperature: 69 °F
 Kinematic Viscosity: 0.99 centistokes
 Test Volume: 10.5 U.S. gallons

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 sender lines are filled by an electric fuel pump and proceed forward to engine along right side of floorpan.

FUEL SPILLAGE MEASUREMENT

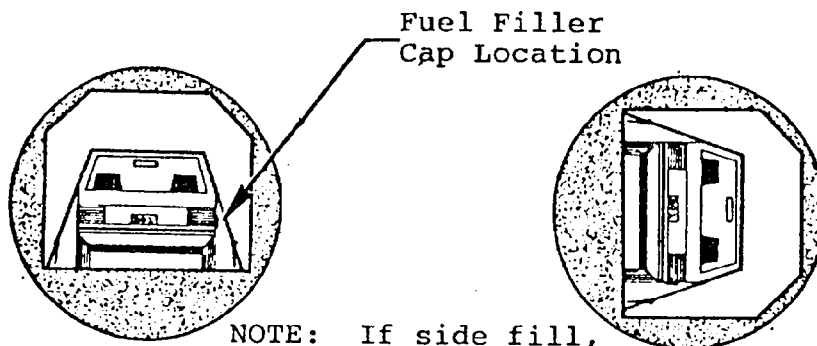


	ACTUAL	MAXIMUM ALLOWABLE
1. From impact until vehicle motion ceases	0	1 oz
2. For 5-minute period after vehicle motion ceases	0	5 oz
3. For next 25 minutes	0	1 oz/1 min

SOLVENT SPILLAGE DETAILS: None

FMVSS 301-75 INDICANT STATIC ROLLOVER DATA

TEST PHASE: 0° to 90° VEHICLE NHTSA NO. 810521



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:

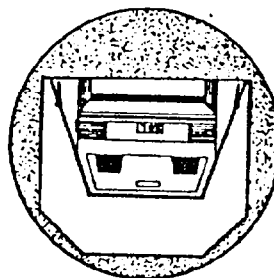
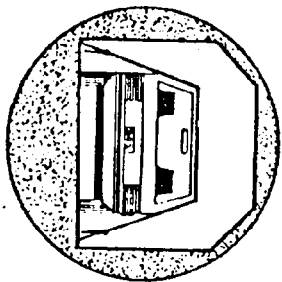
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	0	0	0	---

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

SOLVENT SPILLAGE LOCATION(S): None.

FMVSS 301-75 INDICANT, STATIC ROLLOVER DATA

TEST PHASE: 90° to 180° VEHICLE NHTSA NO. 810521



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time.... = 1 min, 38 sec +
 (Spec. Range = 1 to 3 min)
 FMVSS 301 Position Hold Time..... = 5 min, 0 sec =
 Total..... = 6 min, 38 sec
 Next Whole Minute Interval..... = 7 min

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

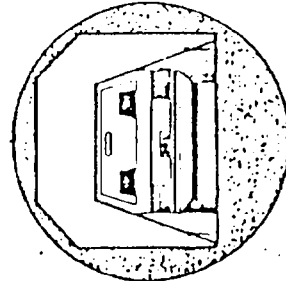
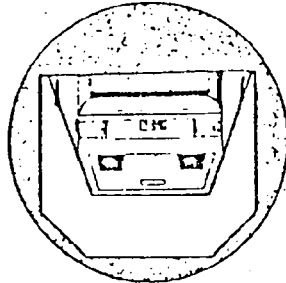
Time Period	First 5 min (from onset)	6th min	7th min	8th min (if req'd)
Maximum Spillage Allowed (oz)	5	1	1	1
Actual Spillage Recorded	0	0	0	---

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

SOLVENT SPILLAGE LOCATION(S): None.

FMVSS 301-75 INDICANT STATIC ROLLOVER DATA

TEST PHASE: 180° to 270° VEHICLE NHTSA NO. 810521



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time.... = 1 min, 35 sec +
(Spec. Range = 1 to 3 min)

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

Total..... = 6 min, 35 sec

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

FMVSS 301 REQUIREMENTS AND ACTUAL TEST RESULTS:

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

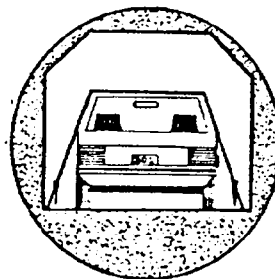
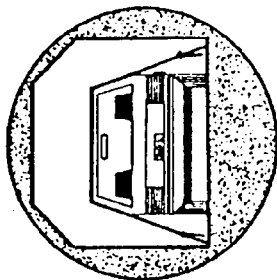
NOTE: Spillage is recorded in whole minute intervals only - as determined above.

SOLVENT SPILLAGE LOCATION(S): None.

FMVSS 301-75 INDICANT STATIC ROLLOVER DATA

TEST PHASE: 270° to 360°

VEHICLE NHTSA NO. 810521



DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

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

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

Total..... = 6 min, 36 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.

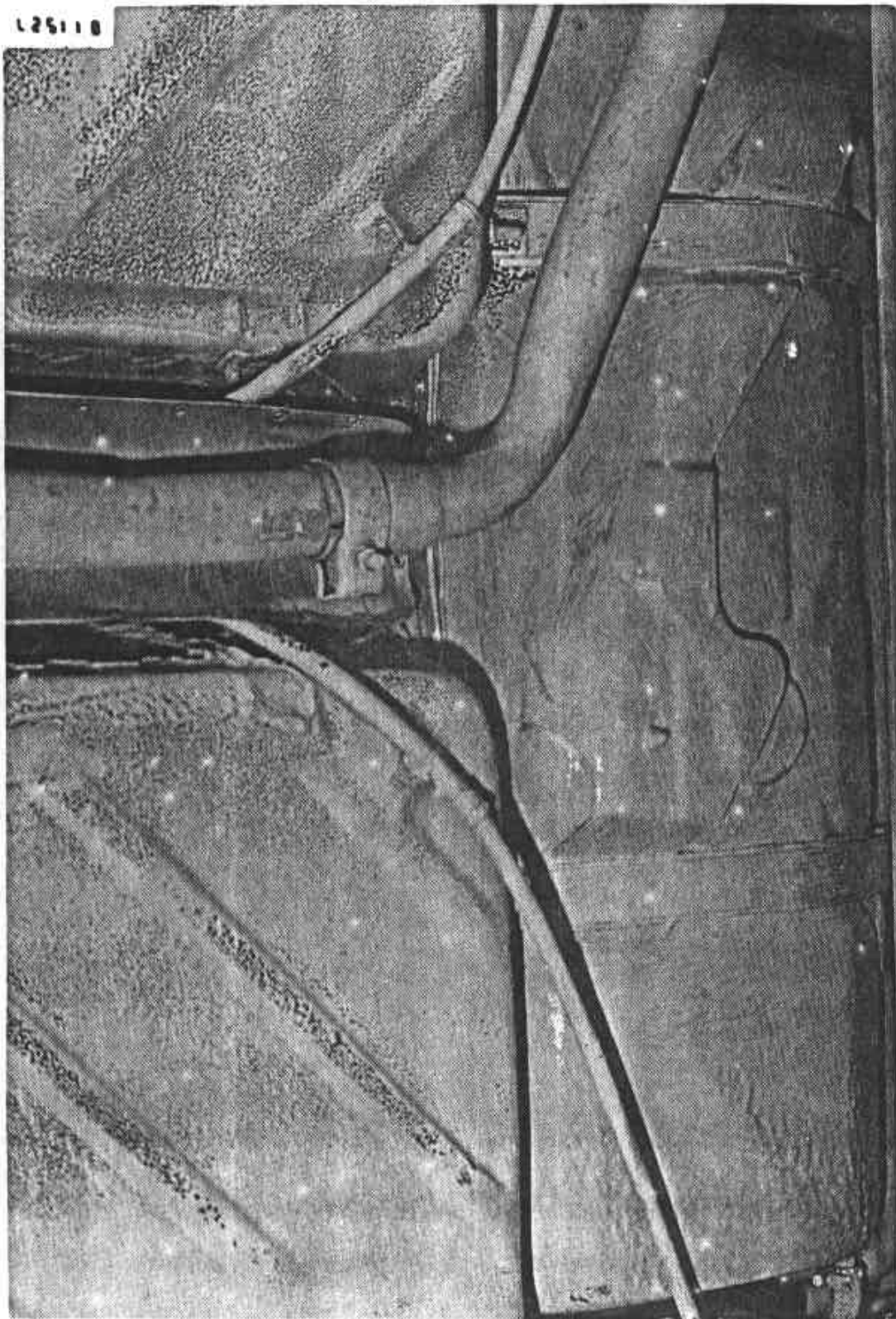


FIGURE 3-1. PRE-TEST VIEW OF FUEL TANK - 1981 VW JETTA - NHTSA 810521.

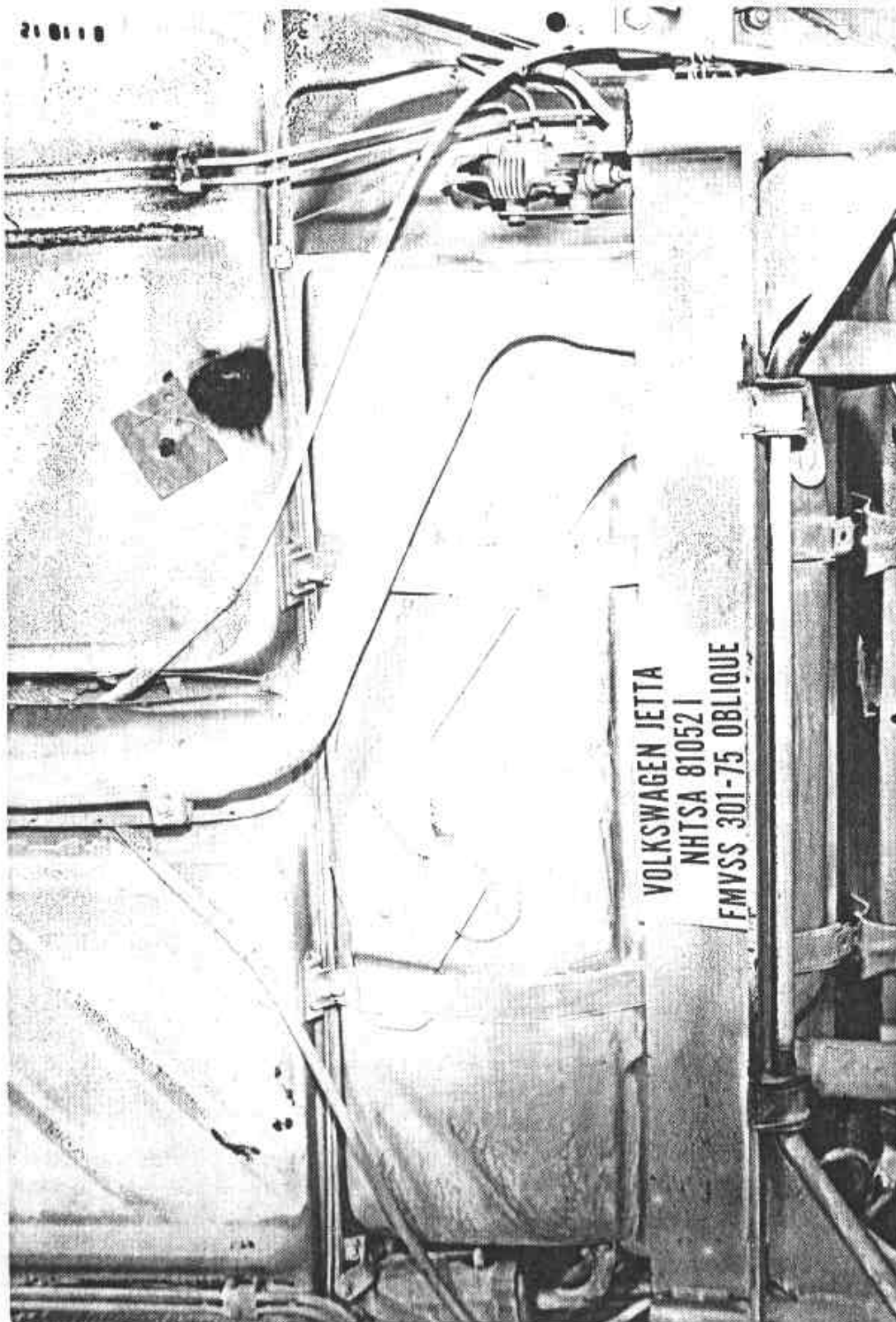


FIGURE 3-2. POST-TEST VIEW OF FUEL TANK - 1981 VW JETTA - NHTSA 810521.

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 moving camera location and specification summary.

Pertinent photographs are presented in Appendix A. Calcomp plots of dummy and vehicle accelerometer data are presented in Appendix B. Dummy calibrations are included as Appendix C.

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. 810521

DSI No. 1144

Color: Gray

DATA FROM CERTIFICATION LABEL

Vehicle Manufacturer: Volkswagenwerk A.G., W. Germany

Date of Manufacture: 10/80 ; VIN WVGGA9161BW153327

GVWR: 2887 lb; GAWR: Front = 1609 lb; Rear 1354 lb

POST-IMPACT DATA

Type of Test: Frontal Oblique (30°) Impact on Left (Driver) Side

Date of Test: 3/13/81 Time: 1445 Temperature 69 °F

Required Impact Velocity Range: 34.5 to 35.5 mph

Impact Velocity: Primary = 34.78 mph Secondary = 34.78 mph

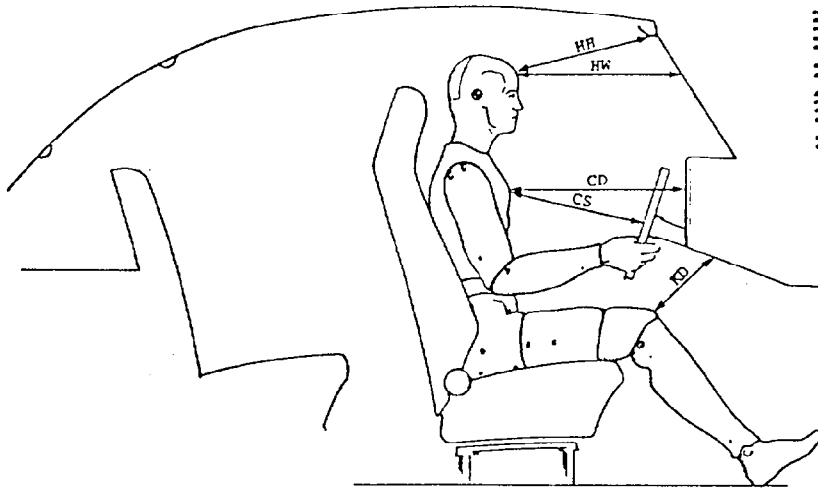
Seat Type: Bucket Adjuster Type: Manual

Bucket Seat Type Back: Adjustable

Technicians: Terry Bjork, Ben Ernyei

DRIVER DUMMY# <u>A O 3</u>		PASSENGER DUMMY # <u>A O 4</u>	
HEAD <u>17.5</u> " TARGET <u>354</u> °		HEAD <u>18.2</u> " TARGET <u>4</u> °	
KNEE JOINT <u>23.3</u> " <u>108</u>		KNEE JOINT <u>24.6</u> " <u>98</u>	
APPROX-IMATE "H" POINT <u>11.2</u> " <u>145</u>		APPROX-IMATE "H" POINT <u>12.7</u> " <u>135</u>	

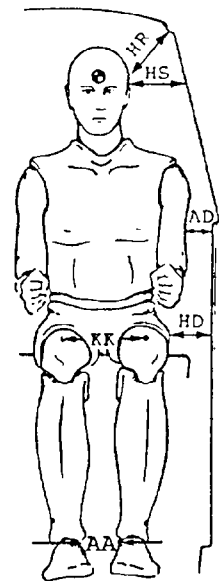
PART 572 DUMMY IN-VEHICLE POSITION RECORDING SHEET



	Driver	Passenger
HH	19.3	15.5
HW	23.0	21.5
CD	22.0	20.3
CS	14.5	N/A
KD	L4.0/R4.5	L2.0/R1.8
Torso	Torso	
Angle	25°	Angle 25°
Seat Back	Seat Back	
Angle	25°	Angle 25°

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 pro-
cedure for positioning Part 572
dummies in test vehicle.



	Driver	Passenger
HR	6.8	6.5
HS	8.0	8.0
AD	3.3	3.3
HD	6.2	6.0
KK	9.0	9.0
AA	10.5	10.5

FMVSS 208 DUMMY DATA SUMMARY

	Driver Dummy				Passenger Dummy			
	Positive Direction*		Negative Direction**		Positive Direction*		Negative Direction**	
	Peak (G)	Time (msec)	Peak (G)	Time (msec)	Peak (G)	Time (msec)	Peak (G)	Time (msec)
Head Acceleration								
Longitudinal	4.4	112	39.8	95	4.3	200	18.3	124
Lateral	43.0	93	14.3	123	54.2	118	2.9	197
Vertical	29.3	108	2.7	5	74.3	117	3.8	10
Resultant	60.6	94			91.1	117		
HIC	160.8 between 85 and 150 msec				516.8 between 85 and 135 msec			
Chest Acceleration								
Longitudinal	2.9	128	42.4	94	30.4	60	29.2	86
Lateral	14.5	98	3.5	143	0.7	11	30.3	105
Vertical	2.9	72	7.3	119	11.6	123	11.1	131
Resultant (Max.)	42.7	94			33.1	86		
Resultant (clip)	35.1	96			30.7	82		
TIME > 60 G	0 msec				0 msec			
SEVERITY INDEX	150.9 @ 200 msec				191.7 @ 200 msec			
	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)	Peak (lb)	Time (msec)
Femur Loads								
Left			758.3	68			1546.6	82
Right			1294.8	76			1162.8	74
Belt Loads								
Torso	786.5	97			3291.1	111		
Vehicle Impact Speed (mph): 34.78								
*Longitudinal:	Forward				**Longitudinal:	Rearward		
Lateral:	Rightward				Lateral:	Leftward		
Vertical:	Downward				Vertical:	Upward		

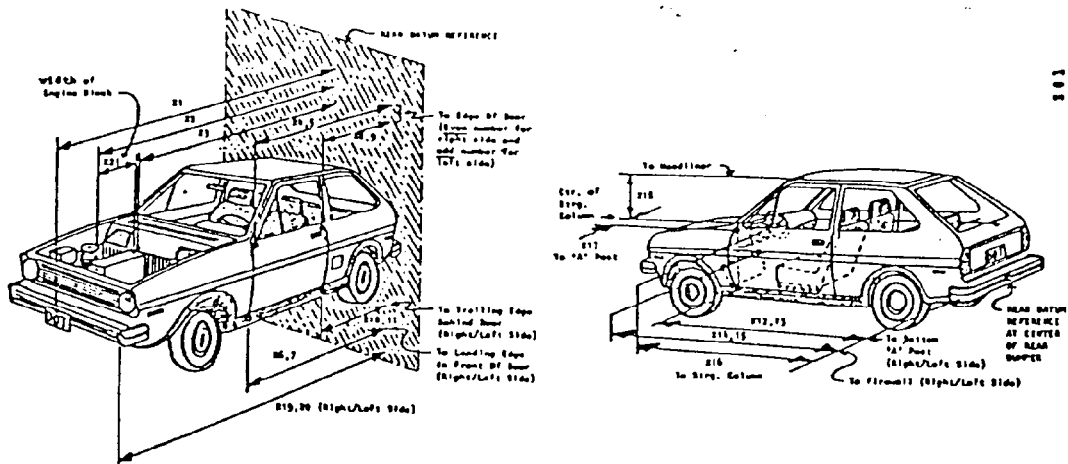
NOTE: This vehicle was equipped with a passive restraint system.

DUMMY KINEMATIC SUMMARY

DRIVER - After impact, torso began to rotate forward and lean to the left. Knees loaded into underside of dash. Left forehead grazed left side header. Torso began to rotate counterclockwise when left shoulder was arrested by torso belt. Head continued to rotate forward and counterclockwise. Dummy began to rebound somewhat and head grazed steering wheel hub while moving rearward. Dummy rebounded back toward passenger seat, still rotated slightly counterclockwise and leaning to the right. Car pitched up on right wheels and then fell down, pitching the dummy back toward the steering wheel. Dummy then rebounded back toward passenger seat and came to rest with counterclockwise rotation and rightward lean, with head nearly resting on passenger seat.

PASSENGER - After impact, dummy began to rotate forward and lean to left, and right knee loaded into dash. Left knee apparently slid under dash. Torso began clockwise rotation when right shoulder was arrested by torso belt. Top left of head struck upper right corner of instrument panel cowl. Head rebounded off dash and dummy rotated clockwise till nearly sideways in seat and leaning rearward. As car pitched up on rear wheels, dummy was thrown forward (relative to car) and head contacted right A pillar. When car fell back down, dummy was thrown back toward driver side and toward front of car. Dummy settled into seat and back toward rear of car, coming to rest with a clockwise rotation and rearward lean, resting against the driver dummy.

PRE-/POST-TEST STATIC MEASUREMENT DATA



Vehicle: 1981 VW Jetta

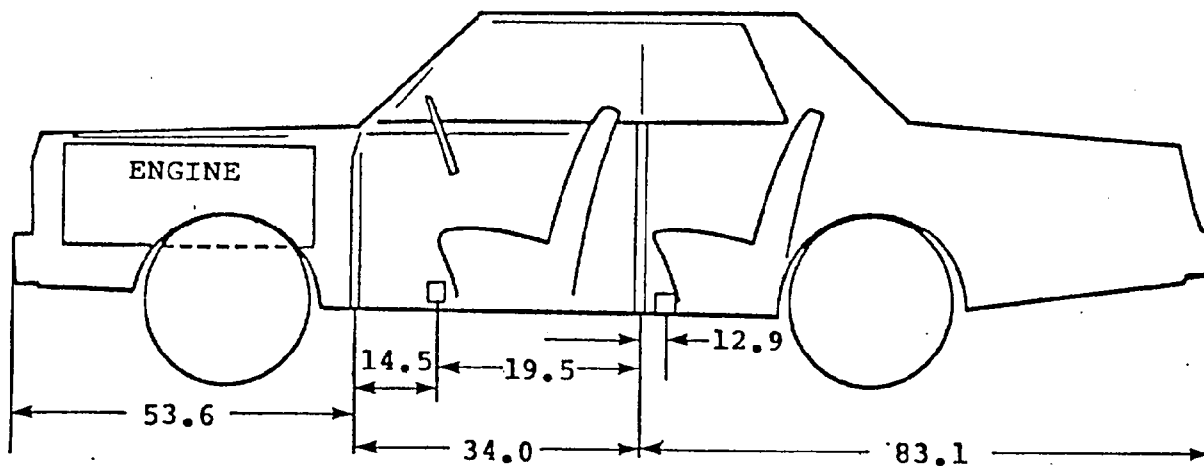
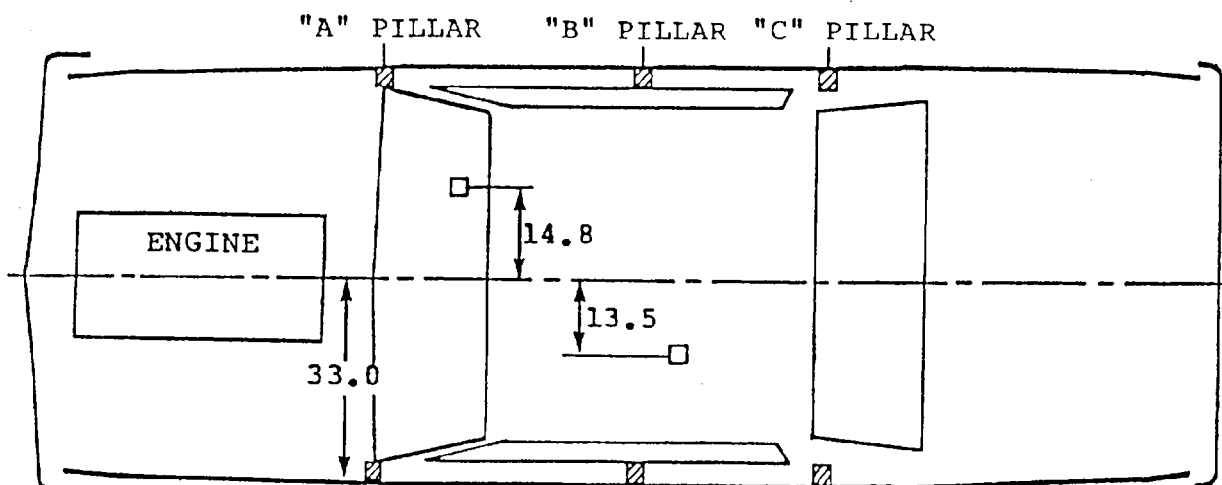
NHTSA No.: 810521

Test Date: 3/13/81

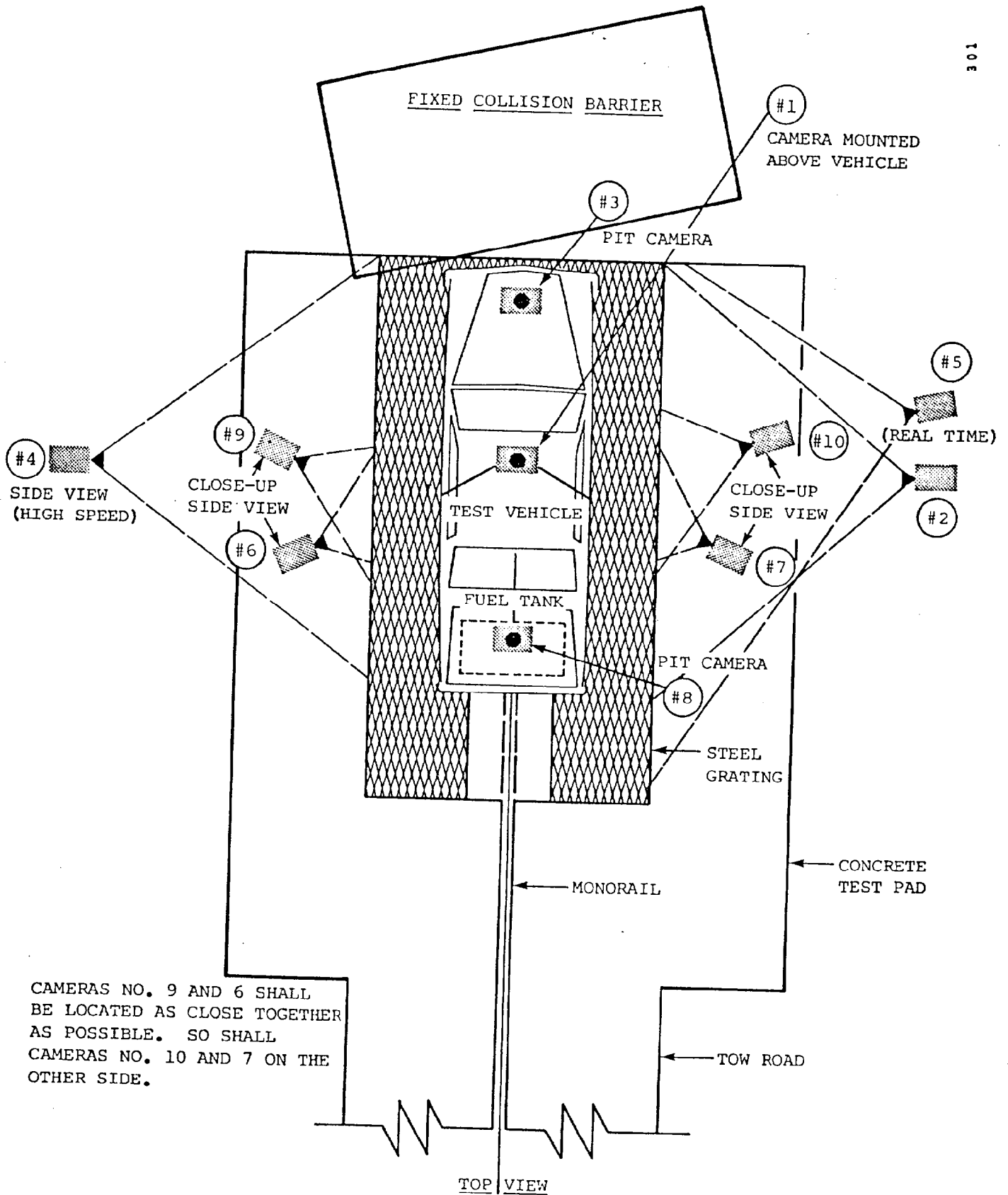
D.S. No.: 1144

Reference Dimension	Pre-test Measurement	Post-test Measurement	Change
X ₁	170.7	156.5	14.2
X ₂	144.9	141.1	3.8
X ₃	127.6	125.5	2.1
X ₄	118.5	117.7	0.8
X ₅	118.5	117.7	0.8
X ₆	118.2	117.3	0.9
X ₇	118.2	116.6	1.6
X ₈	81.5	81.0	0.5
X ₉	81.5	81.8	-0.3
X ₁₀	81.2	80.8	0.4
X ₁₁	81.2	80.4	0.8
X ₁₂	117.1	116.1	1.0
X ₁₃	117.1	114.4	2.7
X ₁₄	130.9	130.5	0.4
X ₁₅	131.7	126.2	5.5
X ₁₆	102.2	103.9	-1.7
Y ₁₇	15.8	11.9	3.9
Z ₁₈	17.8	12.7	5.1
X ₁₉	169.0	142.3	26.7
X ₂₀	168.7	169.7	-1.0
X ₂₁	6.8	6.7	0.1

VEHICLE ACCELEROMETER SUMMARY



No.	Location Description	Component Direction*	Data Summary Peak G @ msec							
			X			Y		Z		
			"+"	"-"	"+"	"-"	"+"	"-"		
1	Right front floor pan	✓	1.4 23	34.0 64						
2	Left rear floor pan	✓	1.9 23	19.7 77						
*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	Views barrier and entire vehicle	10mm	400	100 HZ	M9	62"	-4"	23'1"
2	Ground Based (Right)	Views entire right side of vehicle	16mm	400	103 HZ	M7	84"	445"	53"
3	Pit	Engine underside and fuel pump	8mm	1000	100 HZ	10	67"	0	-8'
4	Ground Based (Left)	Views entire left of vehicle	16mm	400	101 HZ	M8	54"	41'	59"
5	Ground Based (Real Time)	Documentary	Zoom	24	N/A				
6	Ground Based (Left)	Driver dummy closeup	15mm	1000	101 HZ	8	88"	111"	63"
7	Ground Based (Right)	Passenger dummy closeup	13mm	1000	100 HZ	5	75"	133"	61"
8	Pit	Fuel tank	13mm	1000	104 HZ	4	134"	0	-8'
9	Ground Based (Left)	Same view as Camera No. 6	15mm	1000	101HZ	6	99"	111"	63"
10	Ground Based (Right)	Same view as Camera No. 7	13mm	1000	100 HZ	7	90"	133"	61"

APPENDIX A
PHOTOGRAPHS

96118



FIGURE A-1. PRE-TEST FRONT VIEW - 1981 VW JETTA - NHTSA 810521.

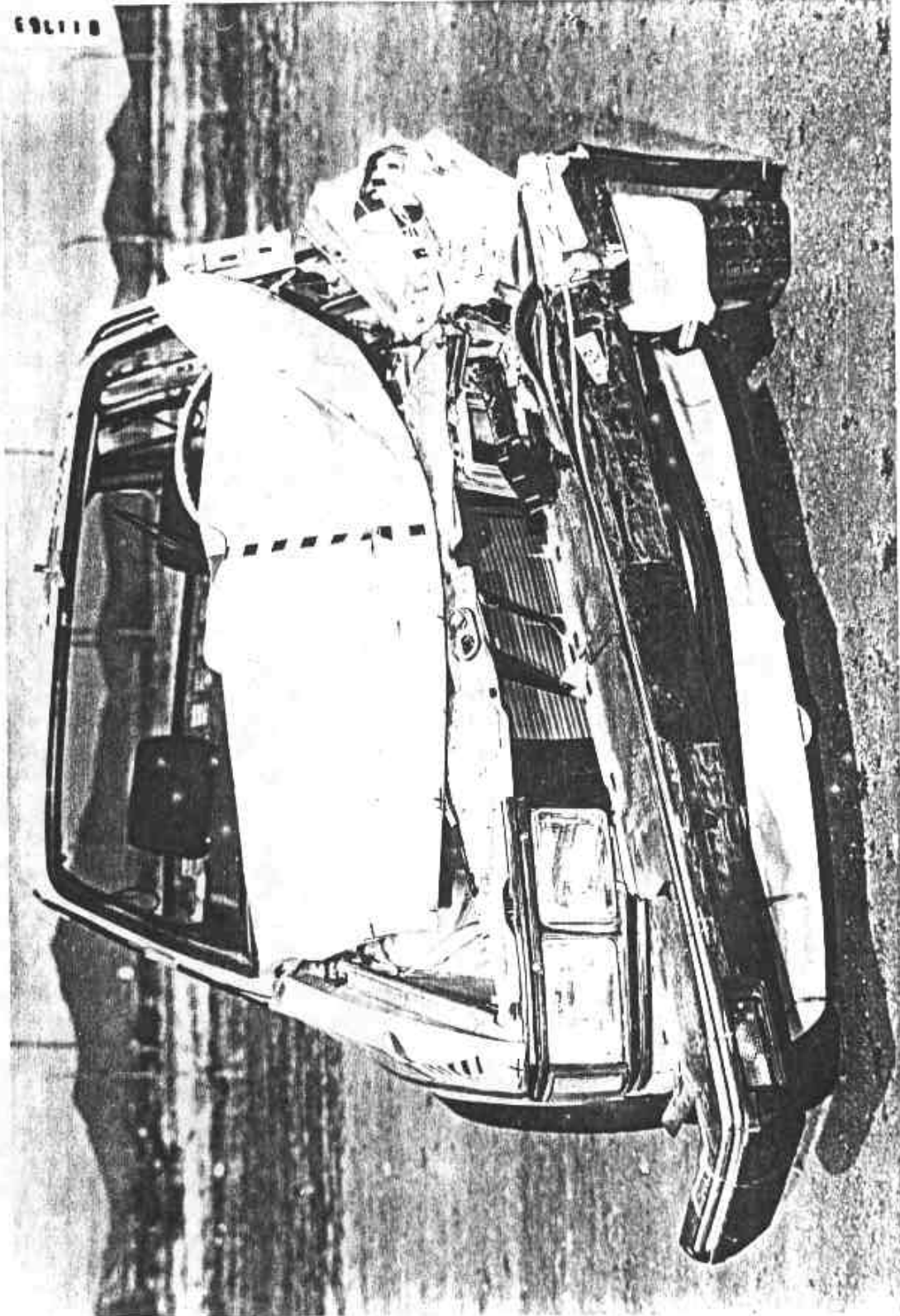


FIGURE A-2. POST-TEST FRONT VIEW - 1981 VW JETTA - NHTSA 810521.

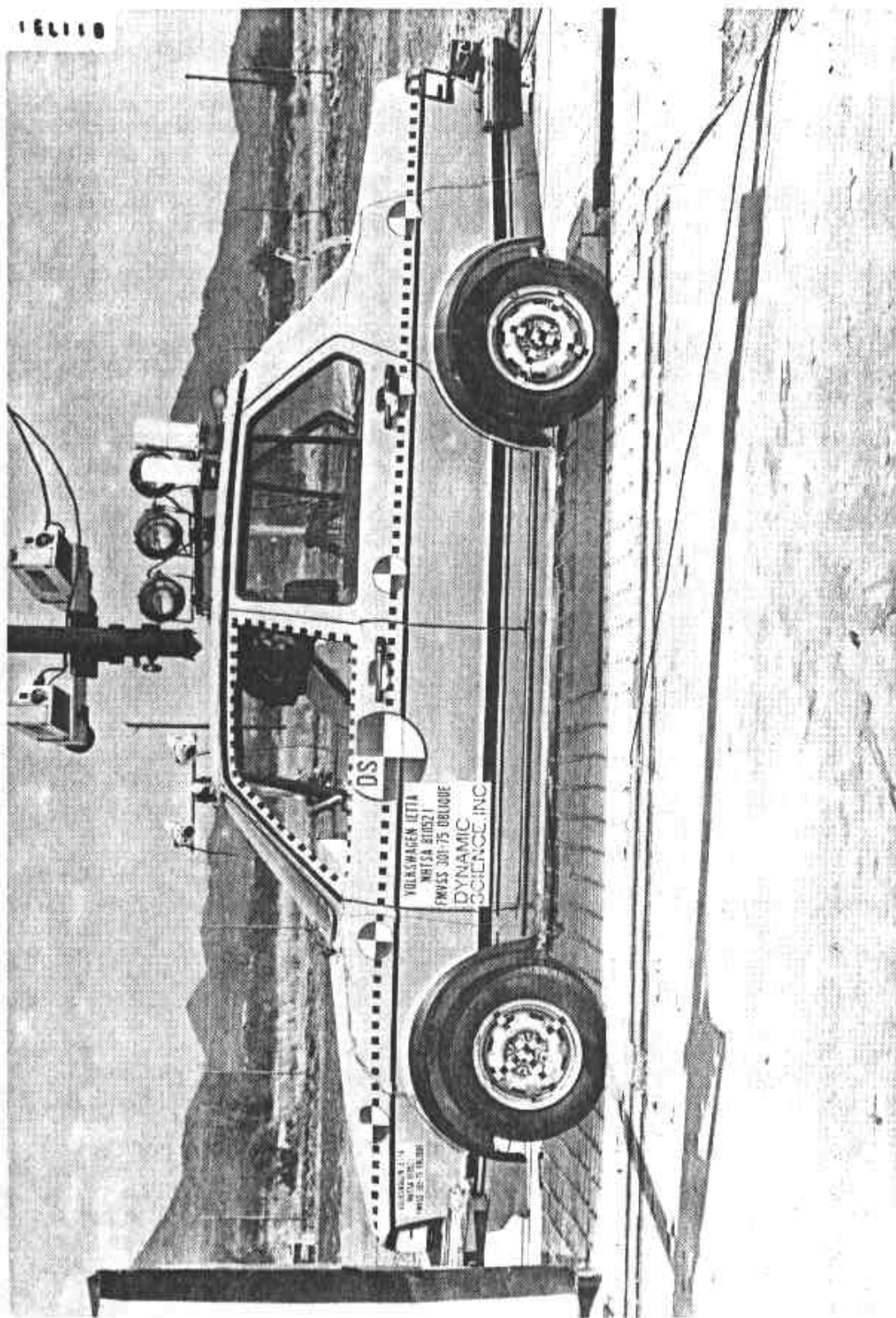


FIGURE A-3. PRE-TEST SIDE VIEW - 1981 VW JETTA - NHTSA 810521.

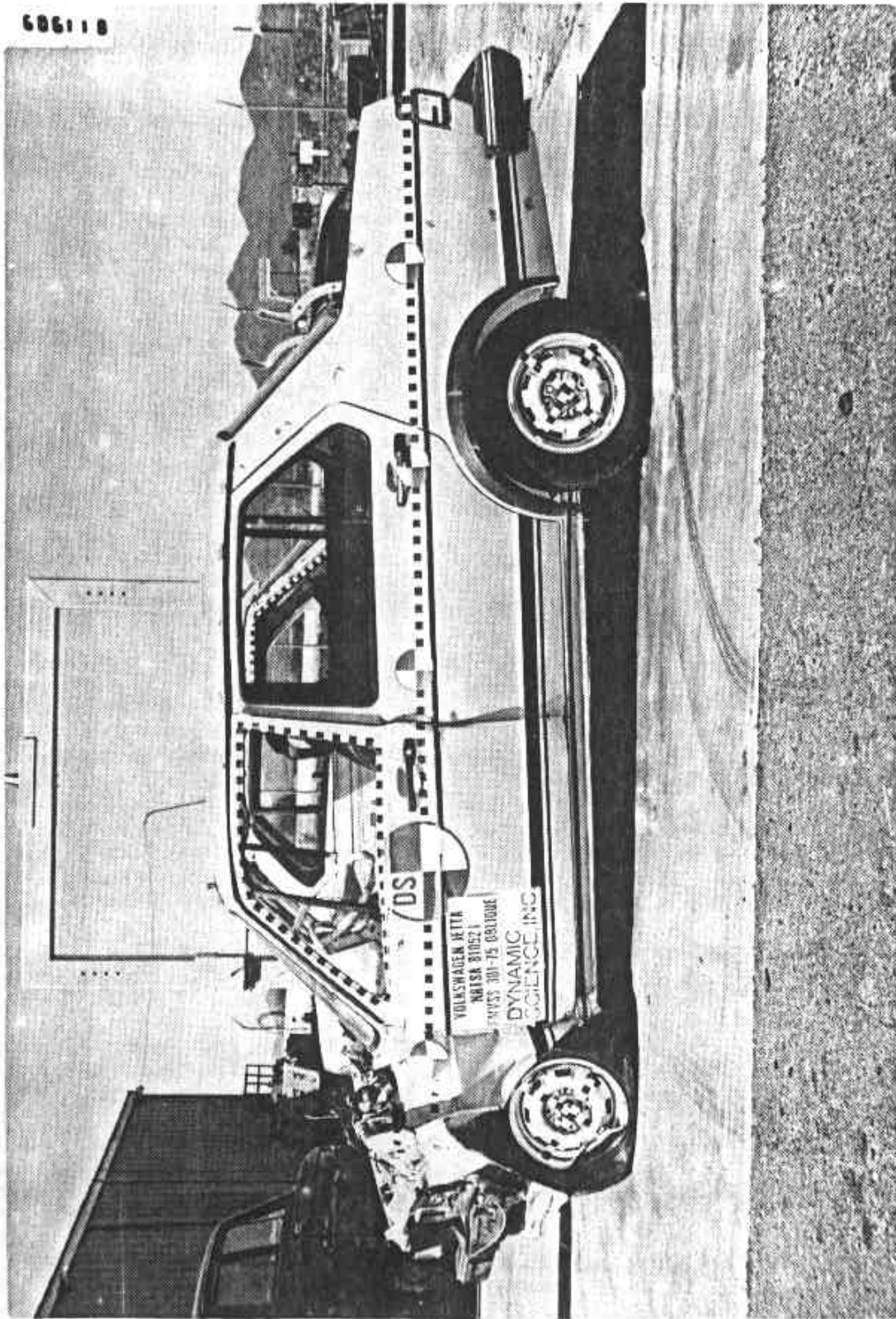


FIGURE A-4. POST-TEST LEFT SIDE VIEW - 1981 VW JETTA - NHTSA 810521.

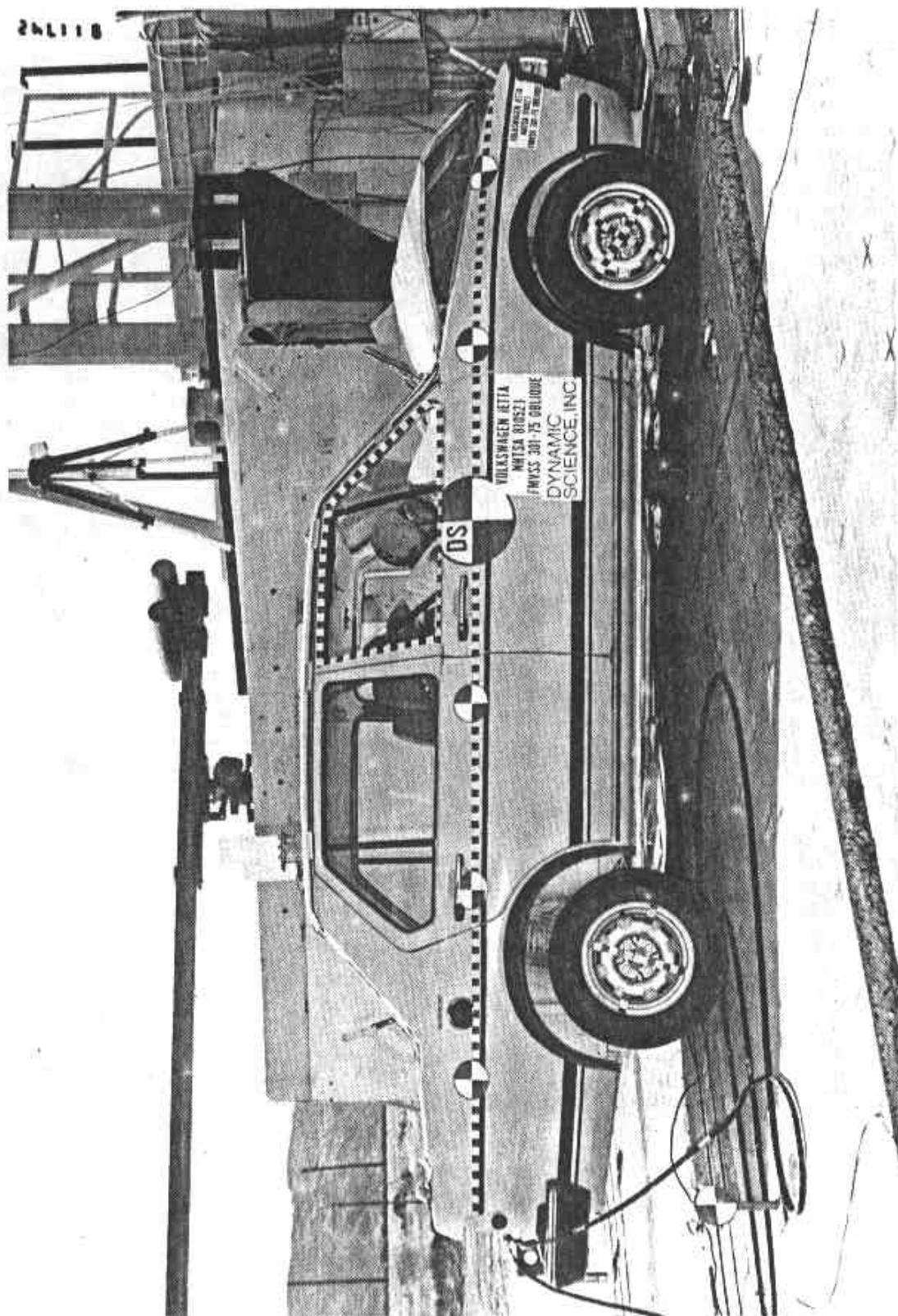


FIGURE A-5. POST-TEST RIGHT SIDE VIEW - 1981 VW JETTA - NHTSA 810521.

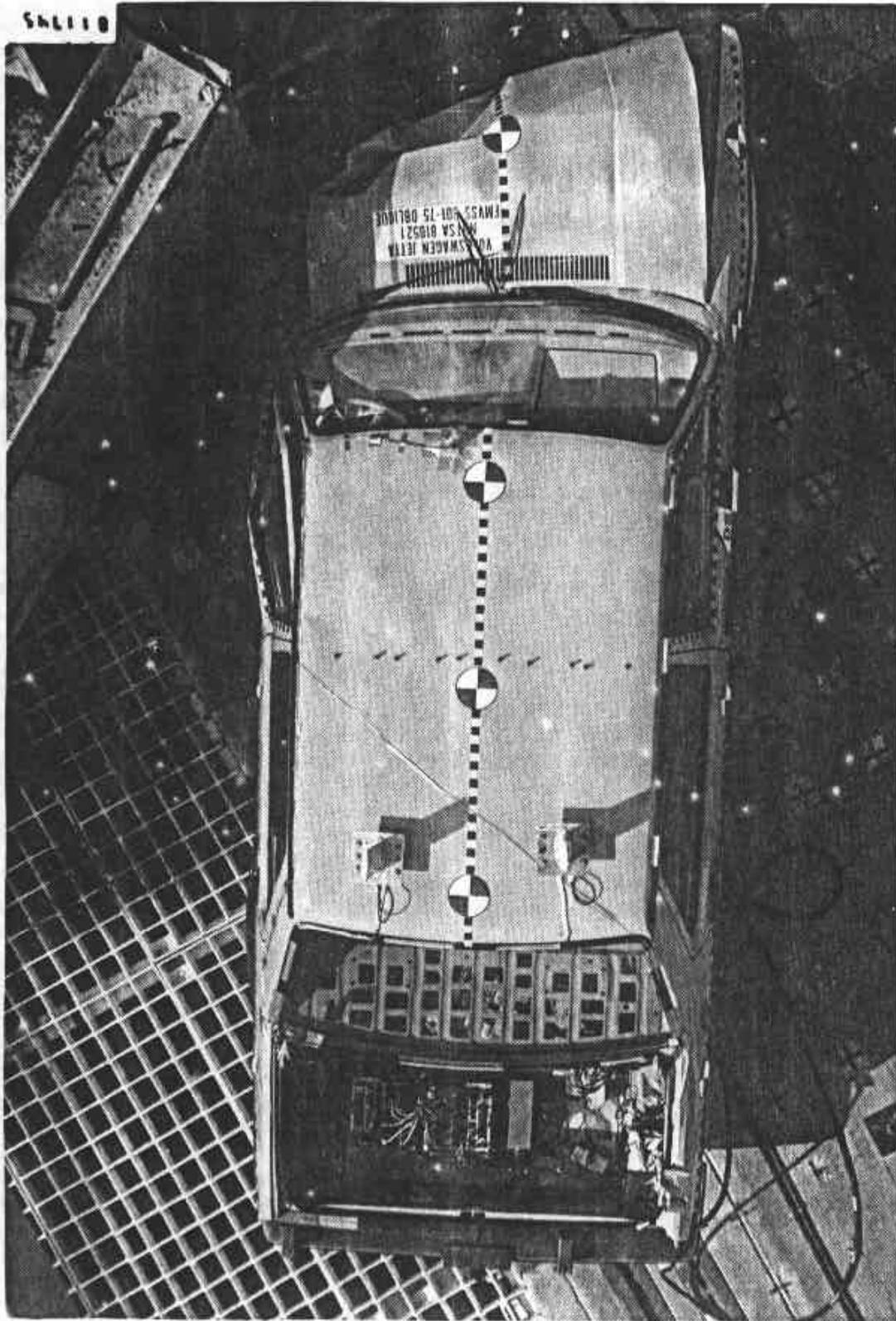


FIGURE A-6. OVERHEAD VIEW SHOWING POST-TEST POSITION OF VEHICLE WITH RESPECT TO BARRIER - 1981 VW JETTA - NHTSA 810521.

118118

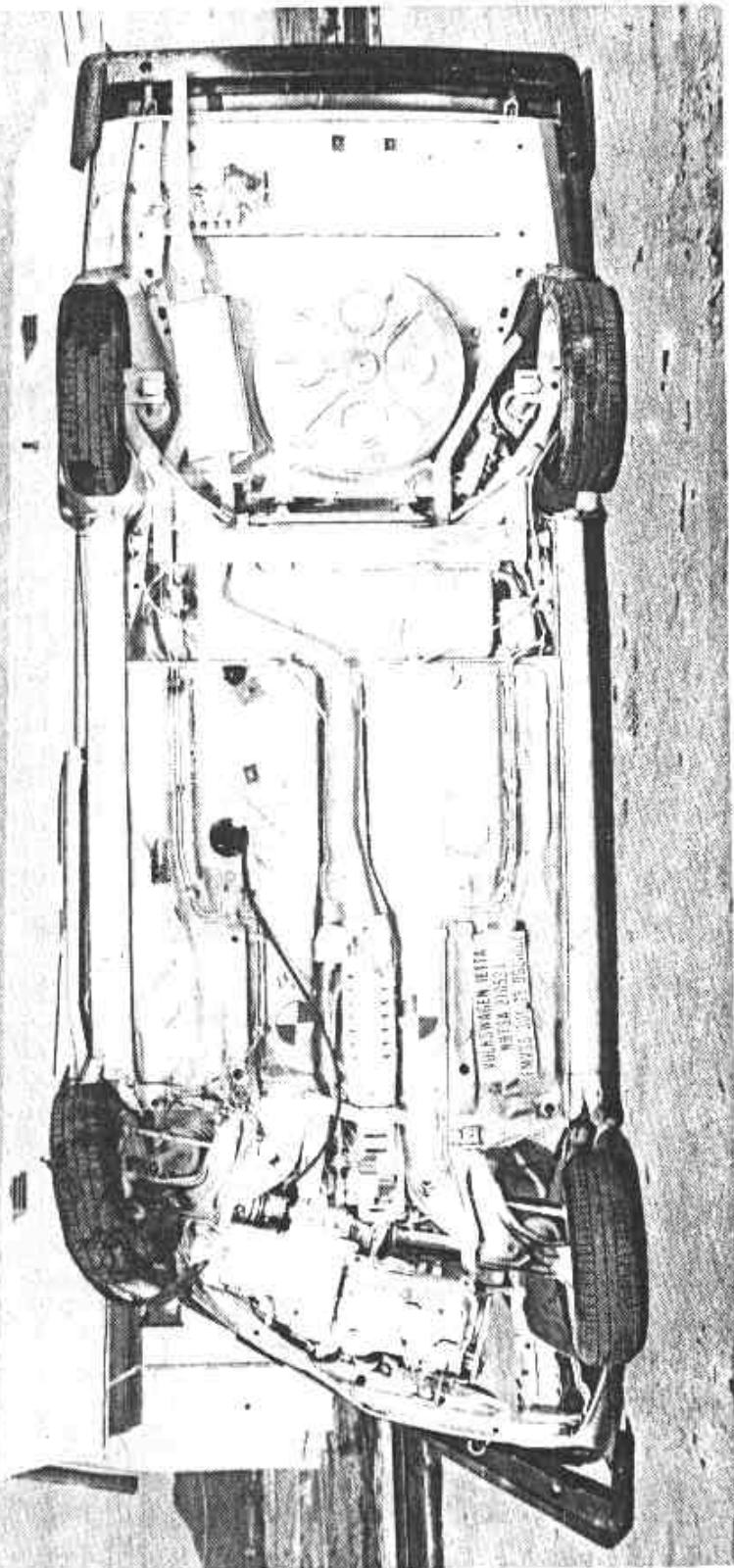


FIGURE A-7. POST-TEST OVERALL UNDERSIDE VIEW - 1981 VW JETTA - NHTSA 810521.



FIGURE A-8. PRE-TEST DRIVER DUMMY POSITION - 1981 VW JETTA - NHTSA 810521.



FIGURE A-9. POST-TEST DRIVER DUMMY POSITION - 1981 JETTA - NHTSA 810521.



FIGURE A-10. PRE-TEST PASSENGER DUMMY POSITION - 1981 VW JETTA - NHTSA 810521.



FIGURE A-11. POST-TEST PASSENGER DUMMY POSITION - 1981 VW JETTA - NHTSA 810521.

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*

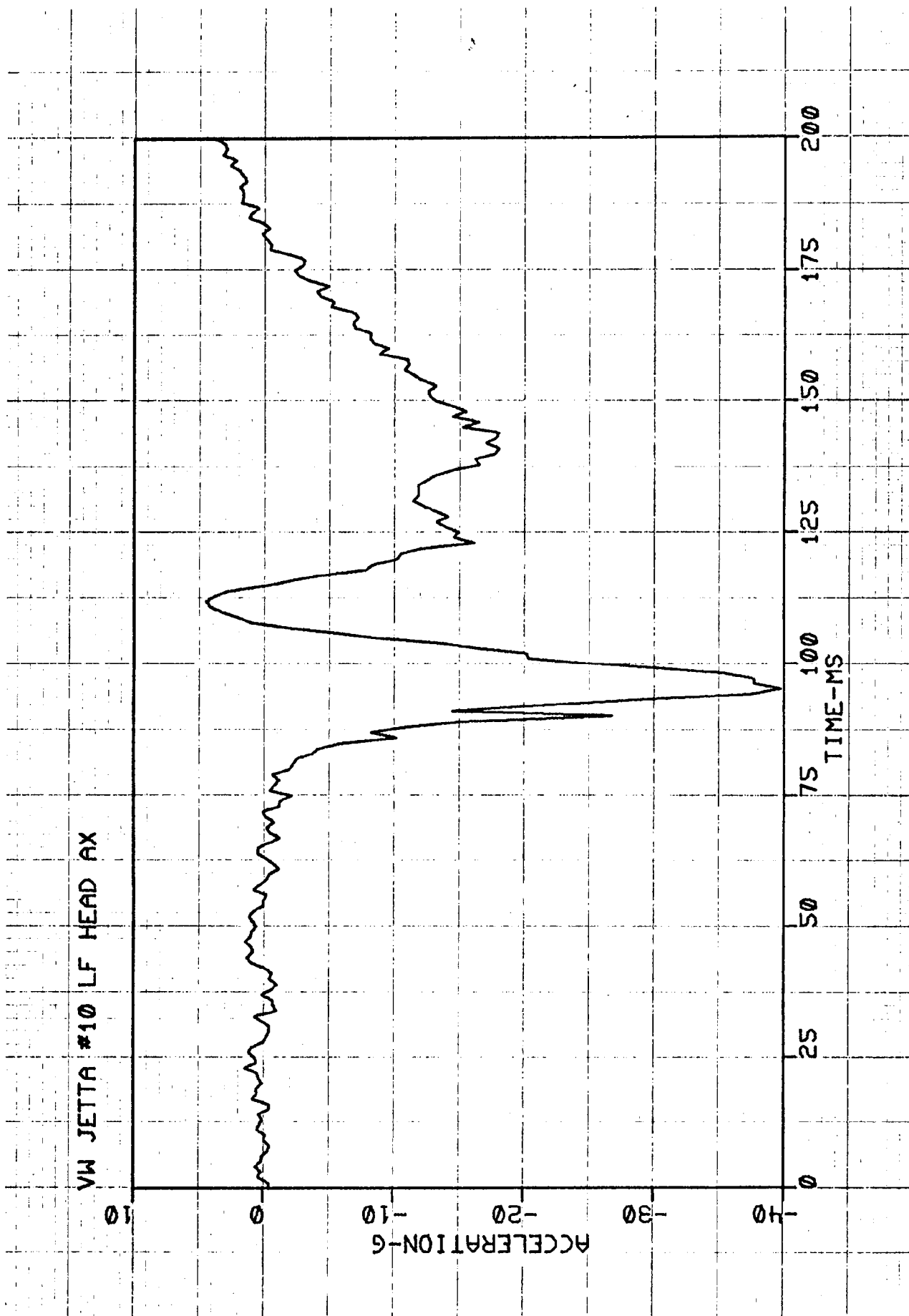
<u>Driver</u>	<u>RF Outboard Passenger</u>	<u>Data Description</u>
LF Head	RF Head	Head Acceleration (G)
LF Chest	RF Chest	Chest Acceleration (G)
LF Femurs	RF Femurs	Femur Loads (lb)
LF Belt Loads	RF Belt Loads	Torso Belt Loads (lb)

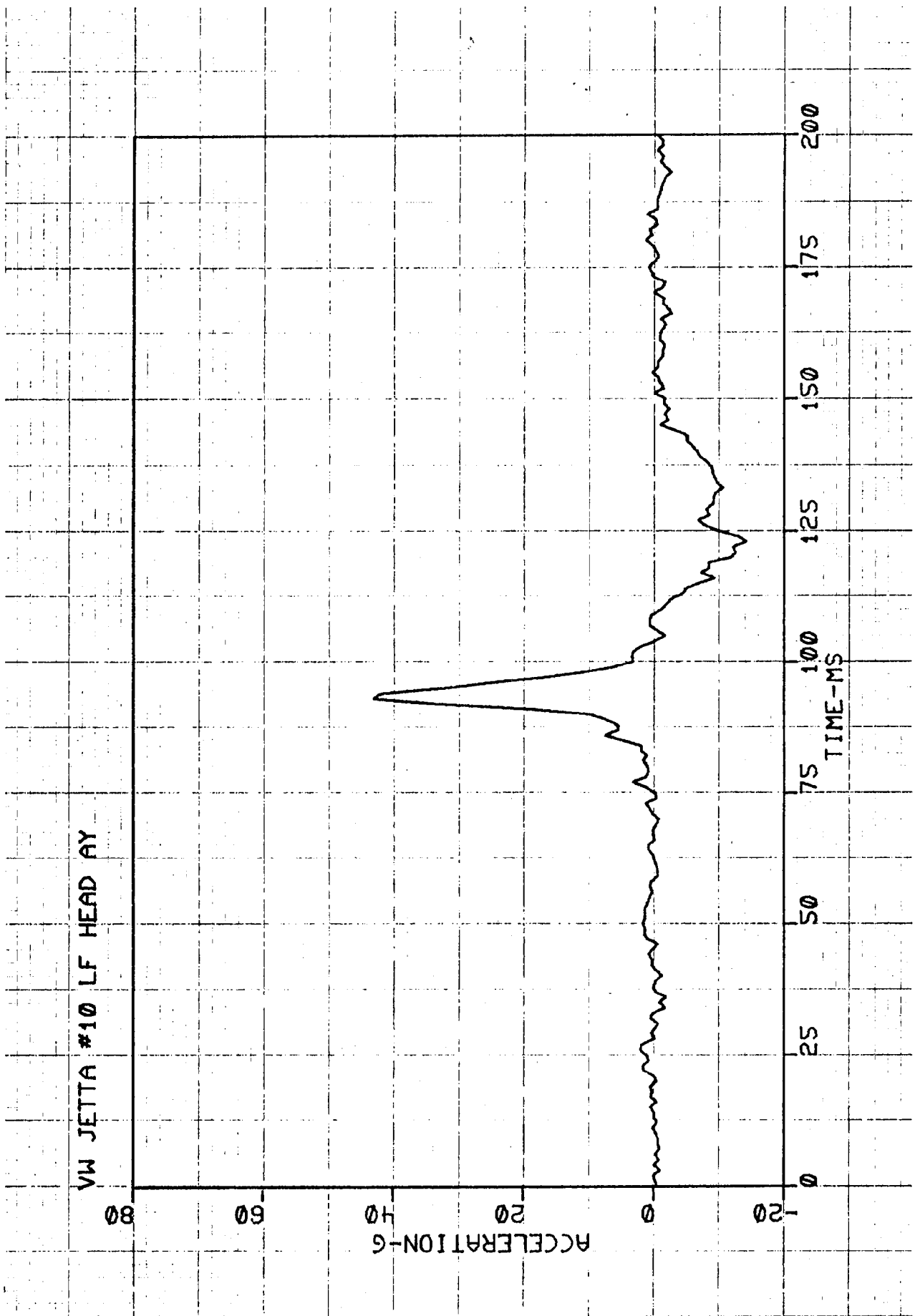
Vehicle Data**

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

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

**Vehicle accelerometer location and data summarized on page 4-7.





VW JETTA #10 LF HEAD AZ

32

24

16

8

0

0

ACCELERATION-G

100

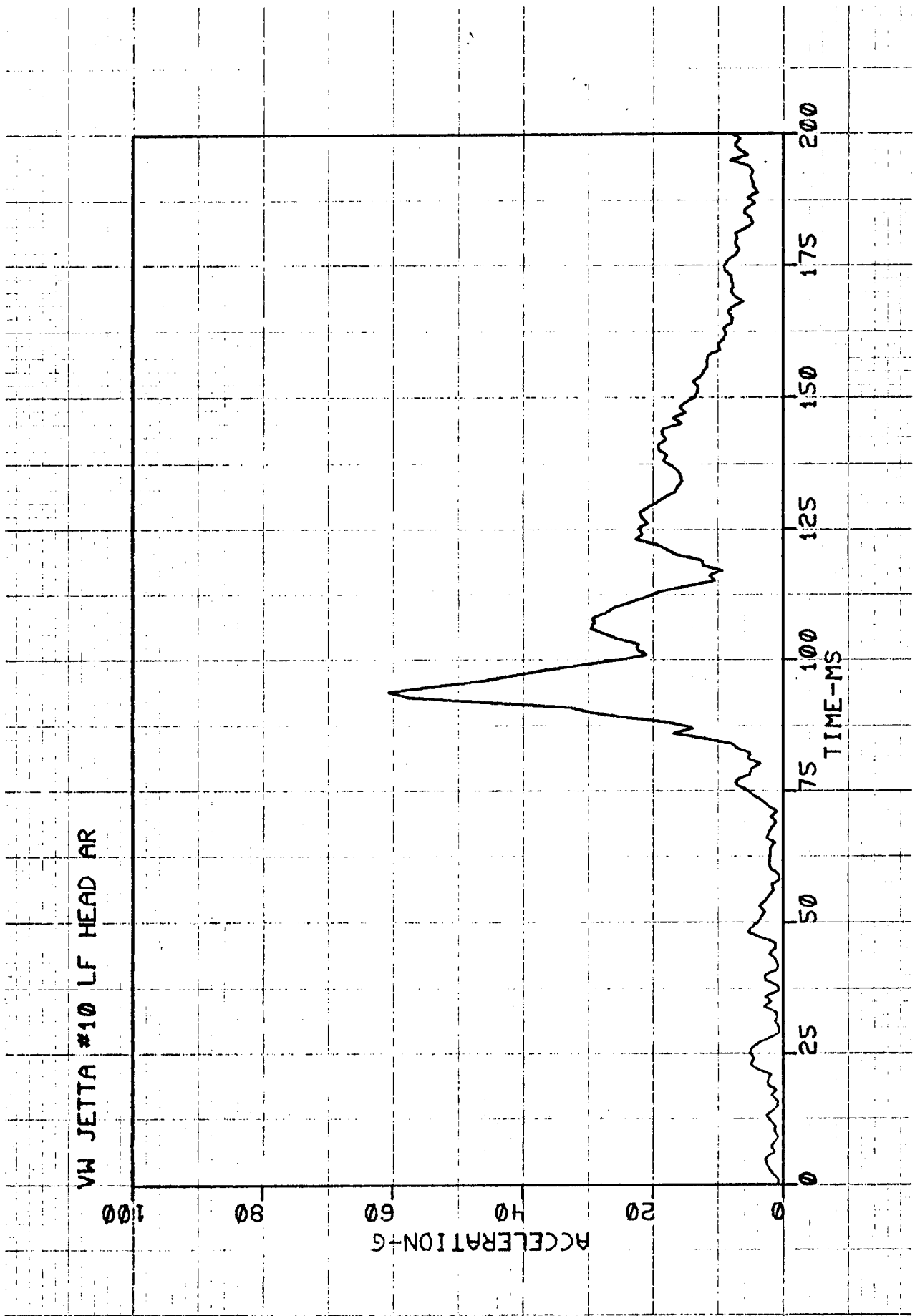
125

150

175

200

TIME-MS



VW JETTA #10 LF CHEST AX

75

50

25

0

-25

-50

ACCELERATION-G

200

175

150

125

100

75

50

25

0

TIME-MS

VW JETTA #10 LF CHEST AY

16

12

ACCELERATION-G

8

4

0

T

0

25

50

75

100

125

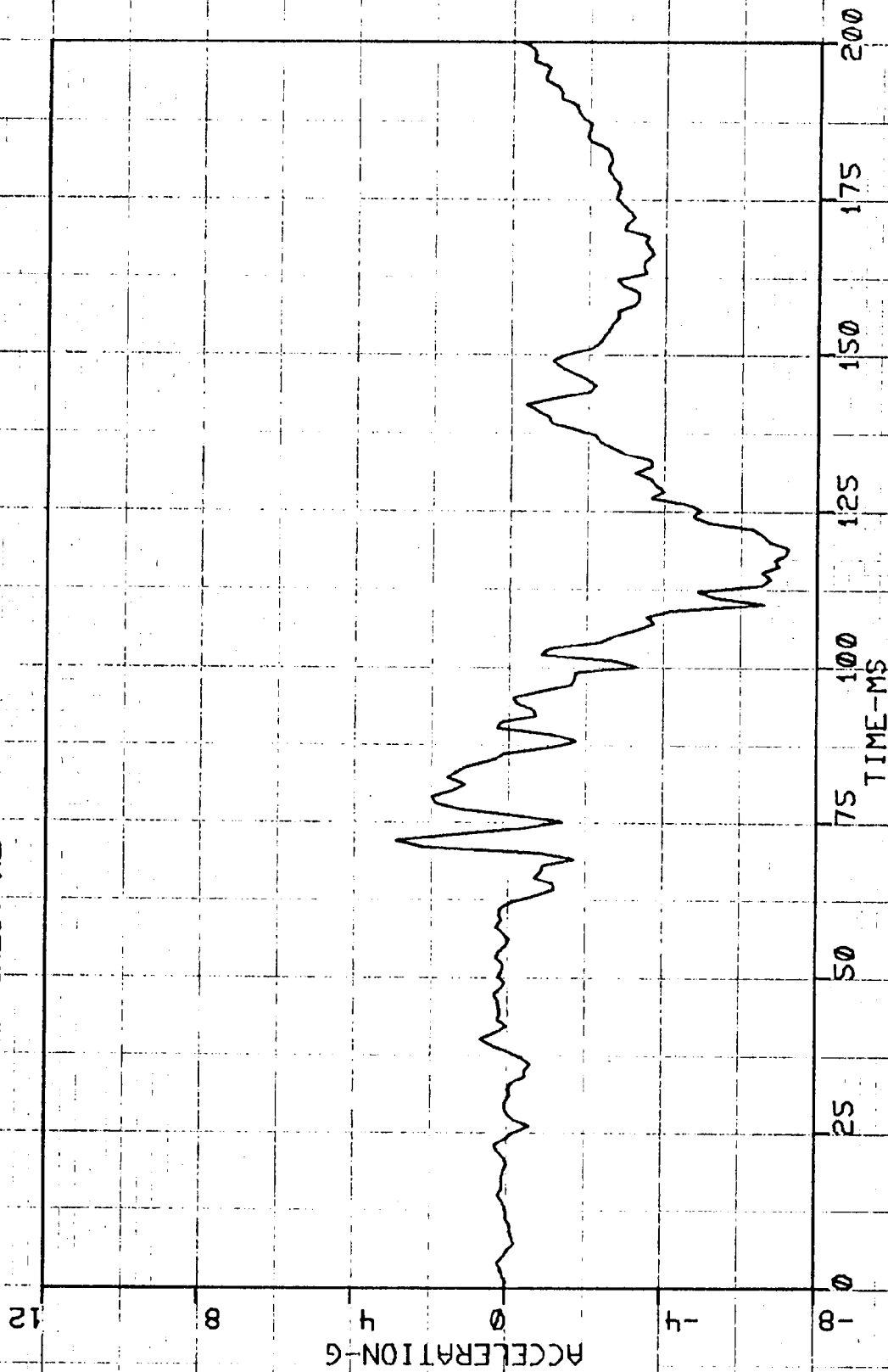
150

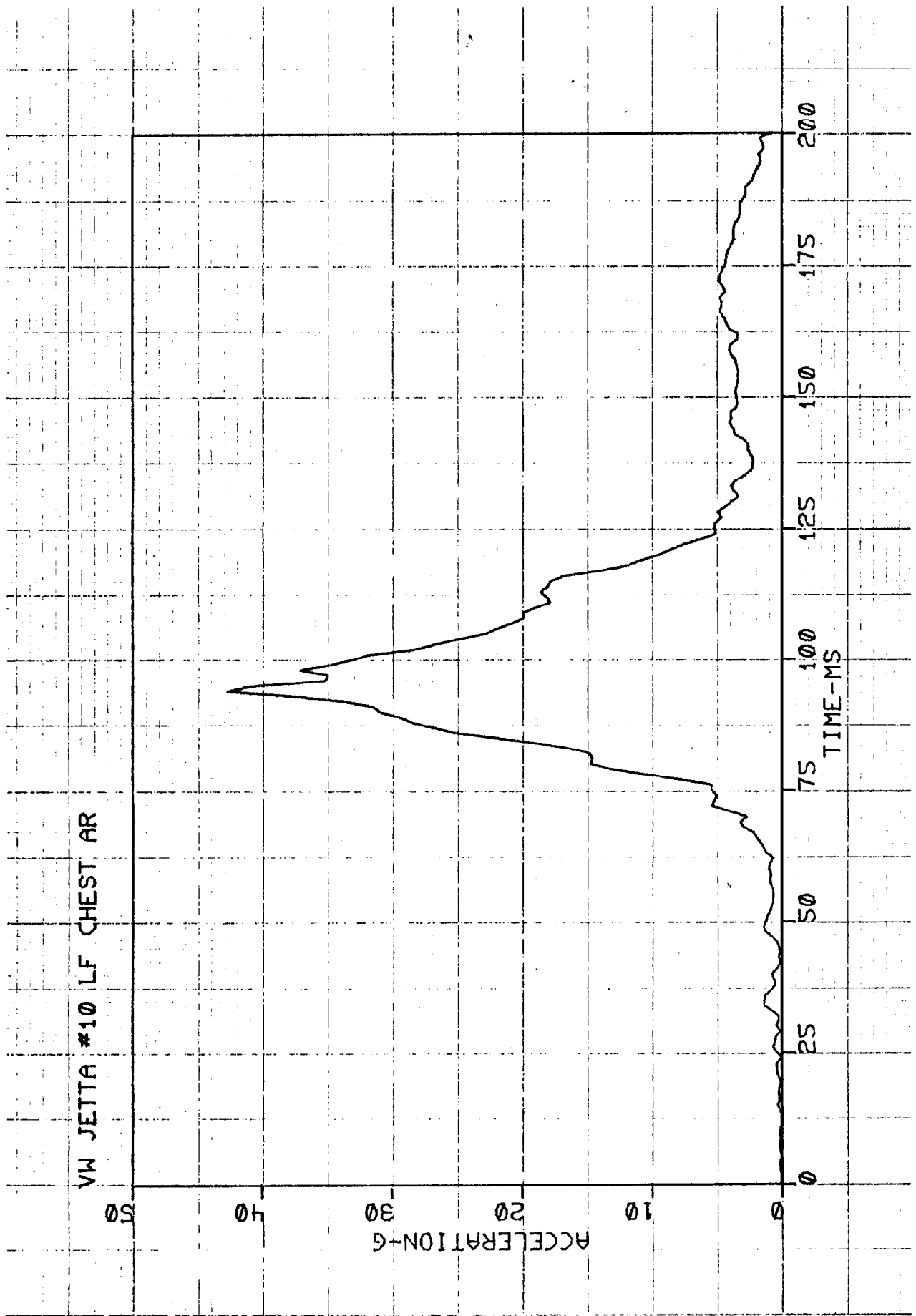
175

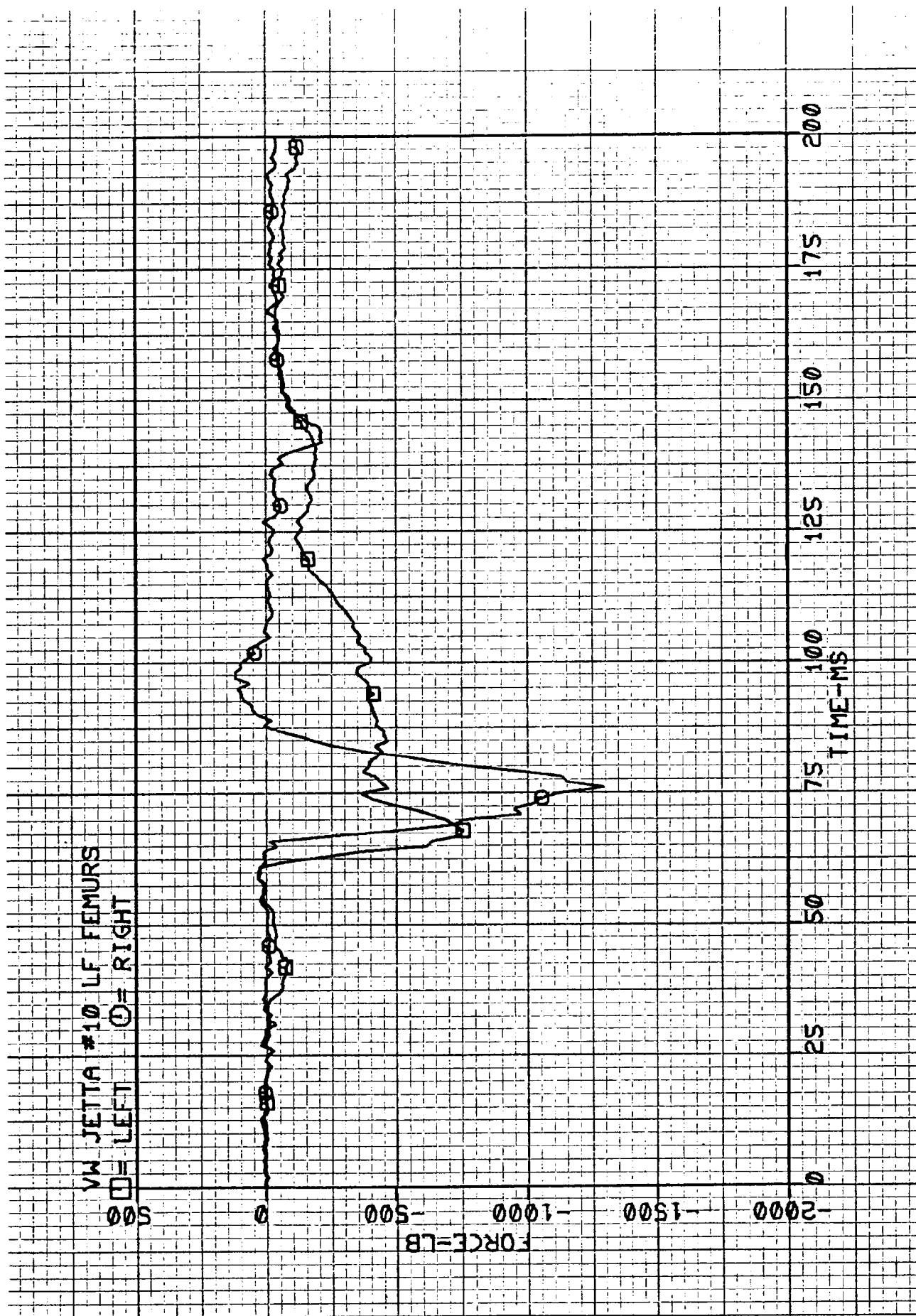
200

TIME-MS

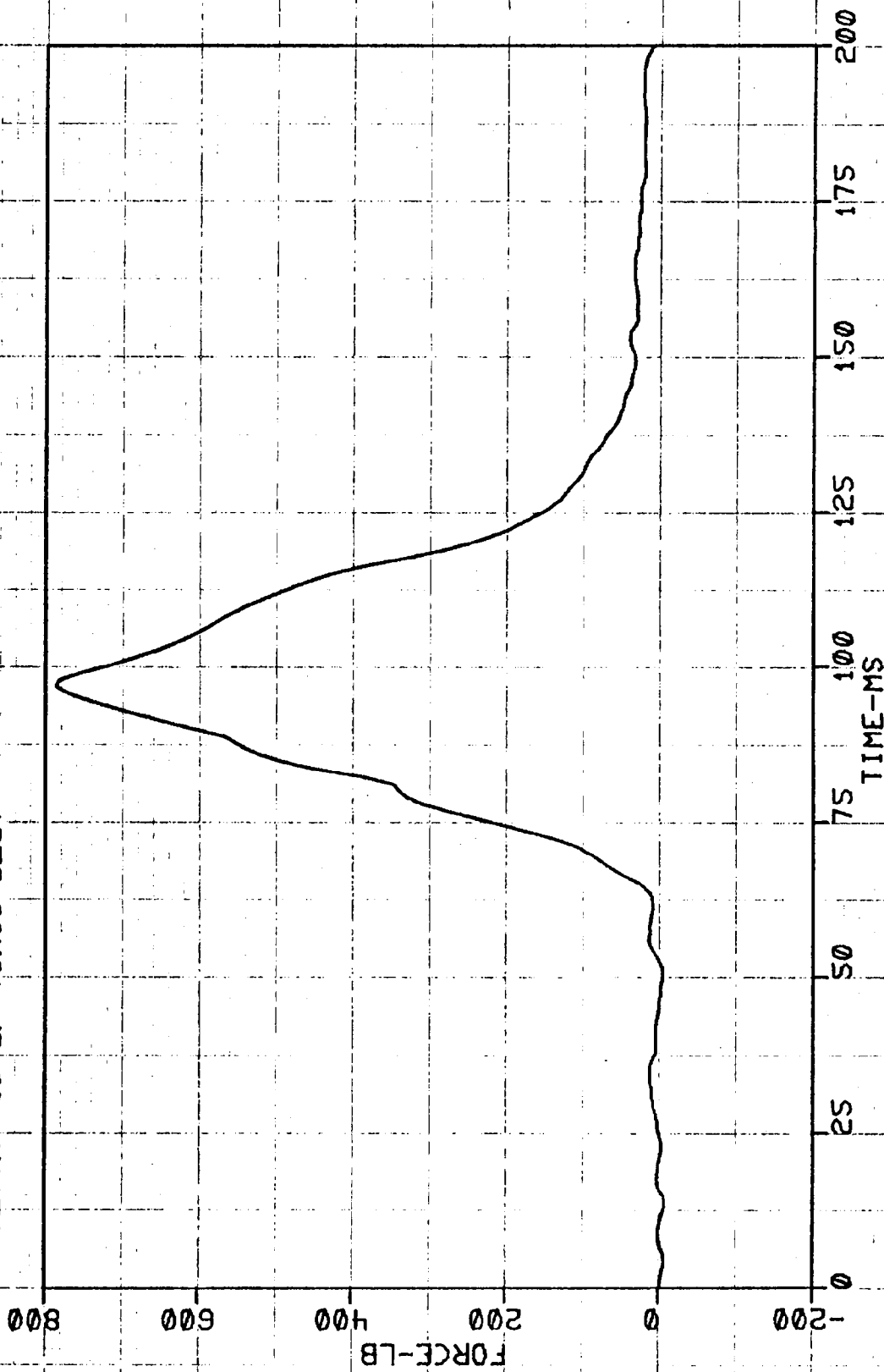
VW JETTA #10 LF CHEST AZ

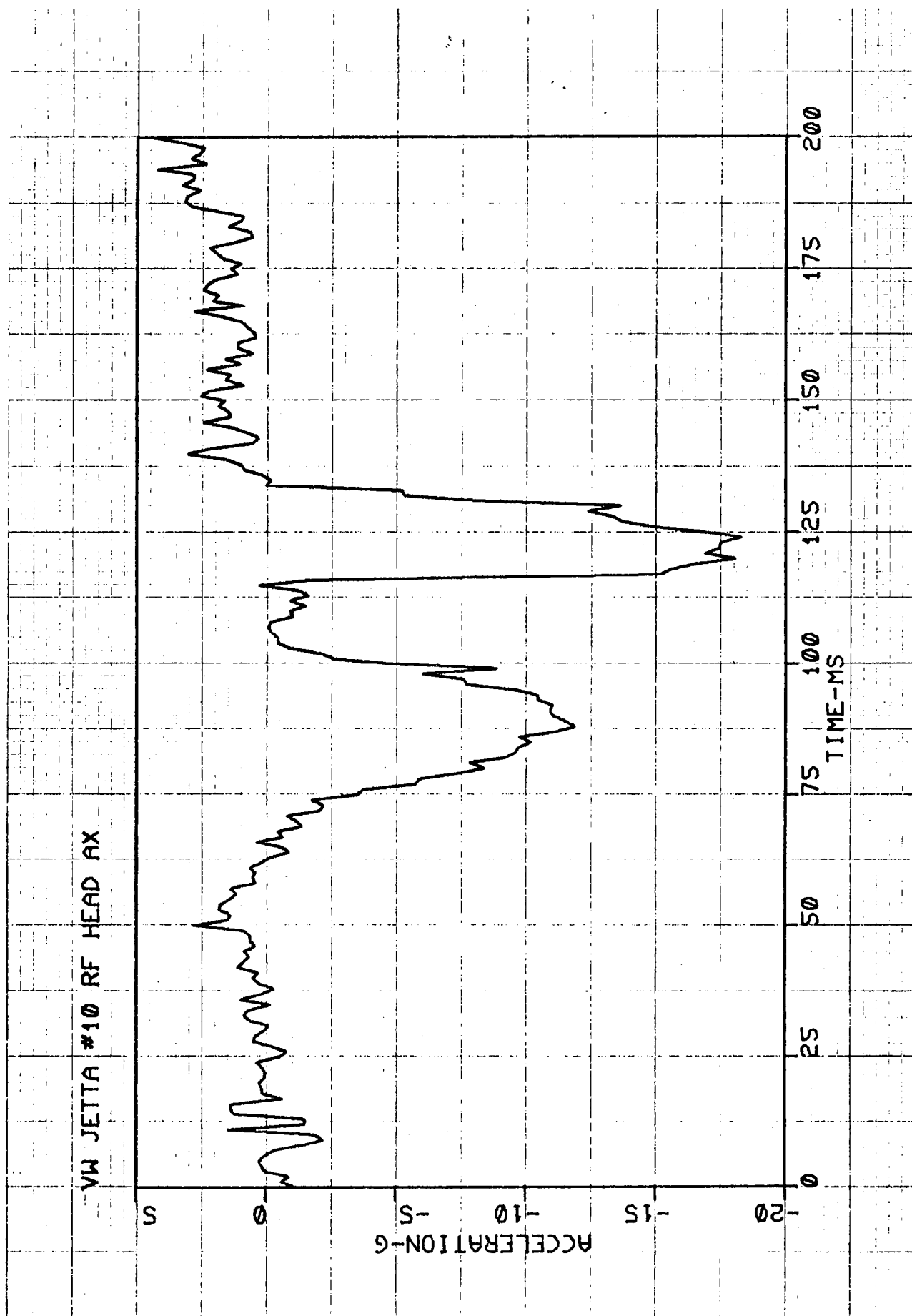




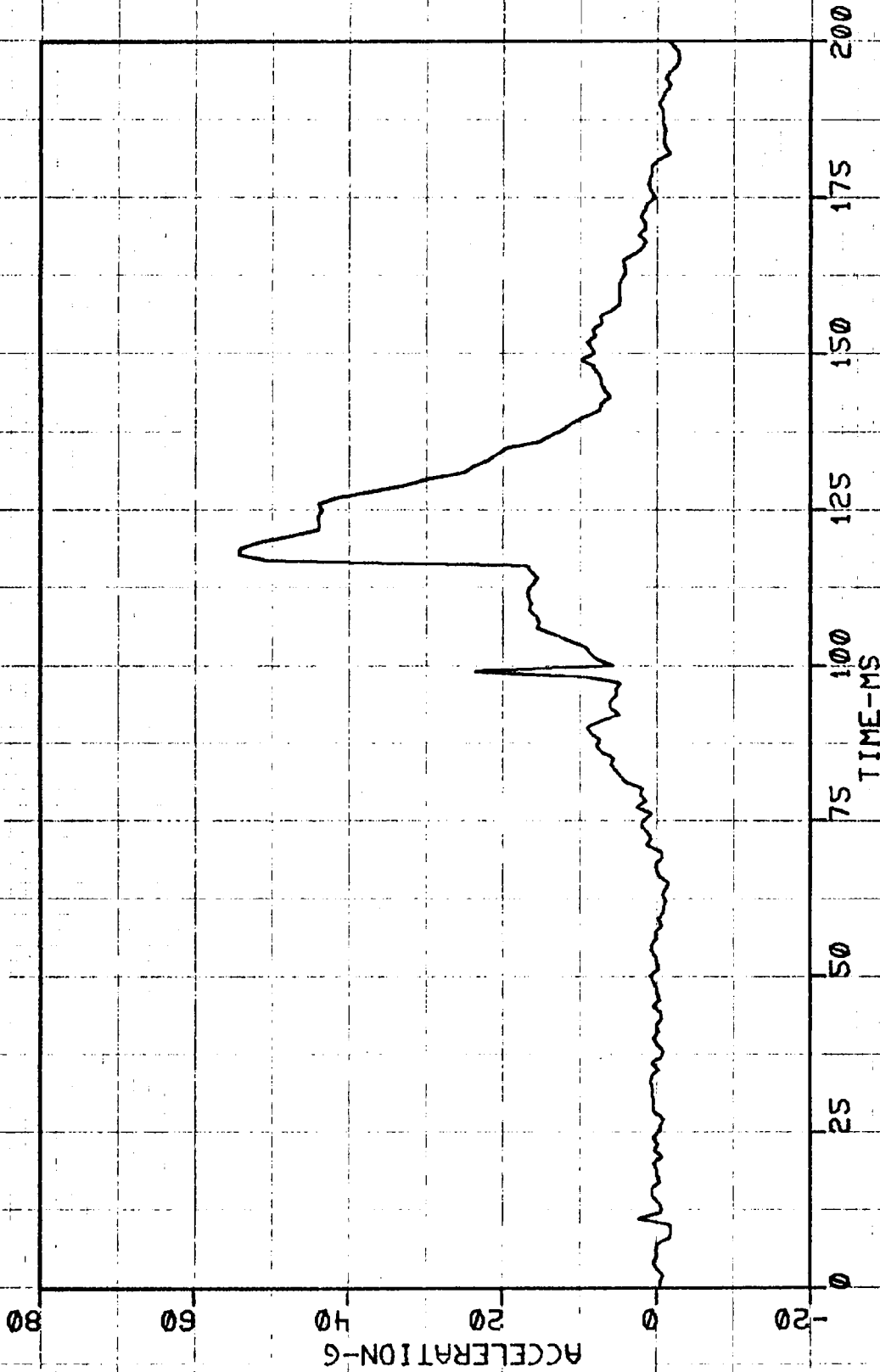


VW JETTA #10 LF TORSO BELT

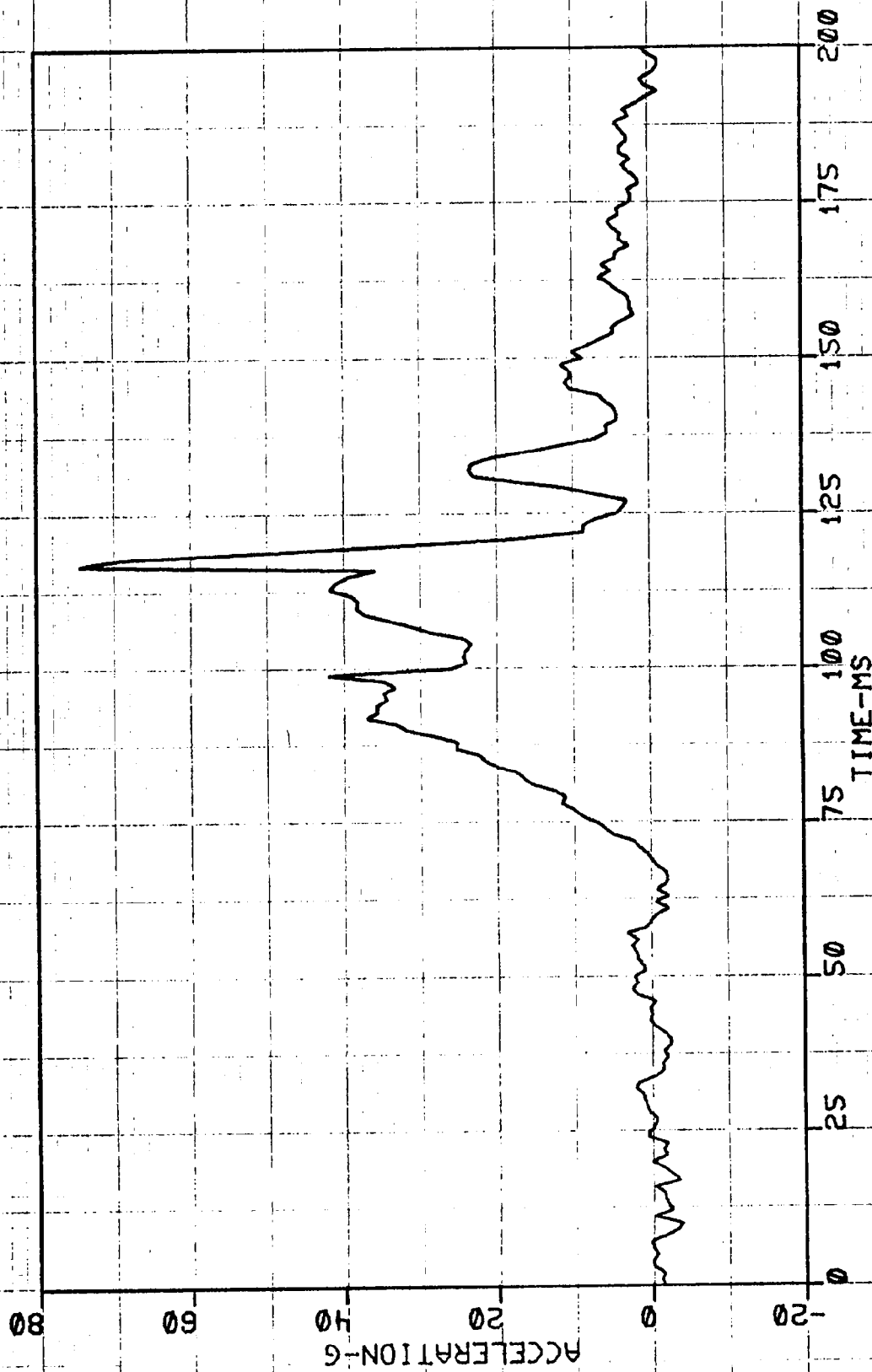


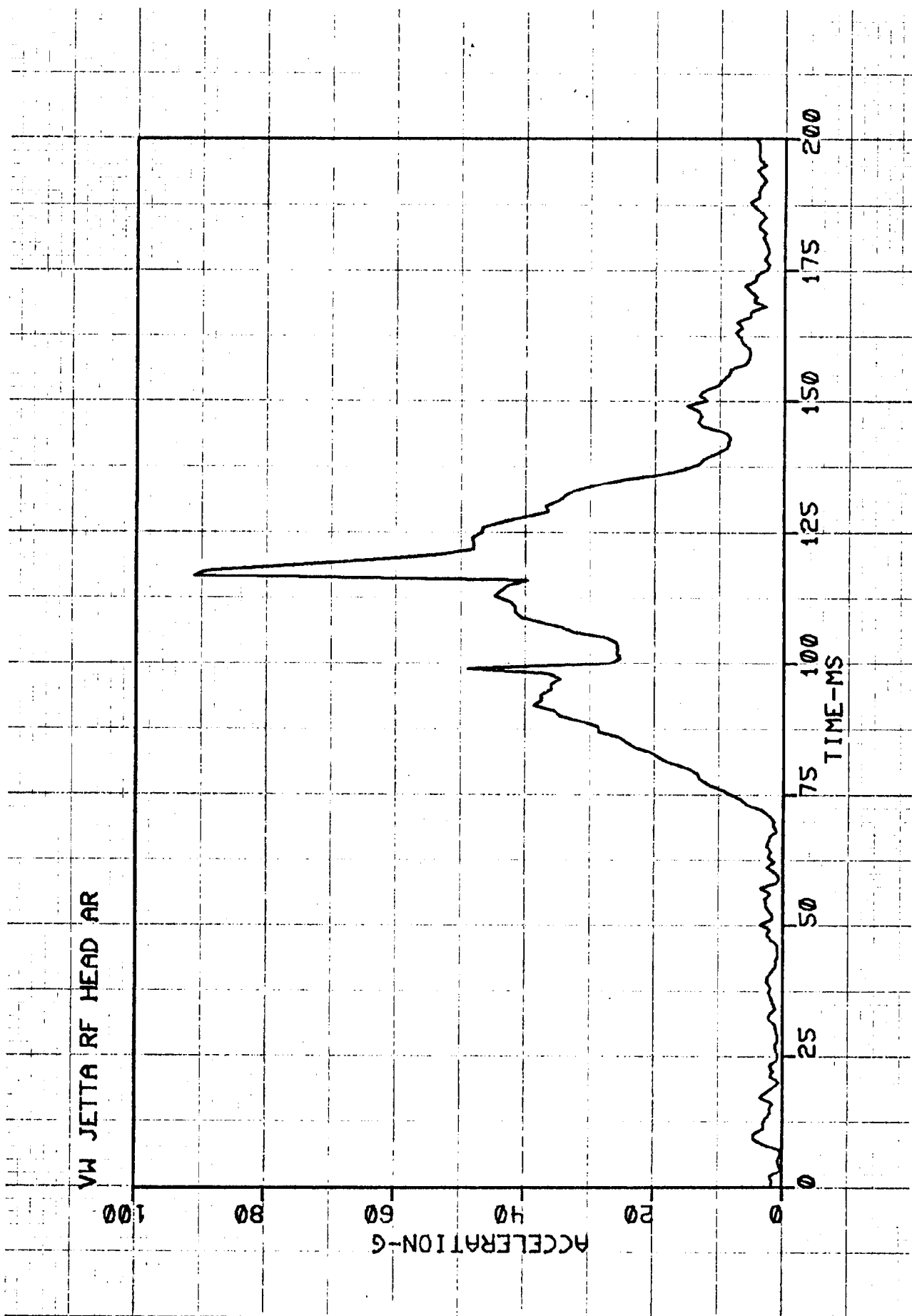


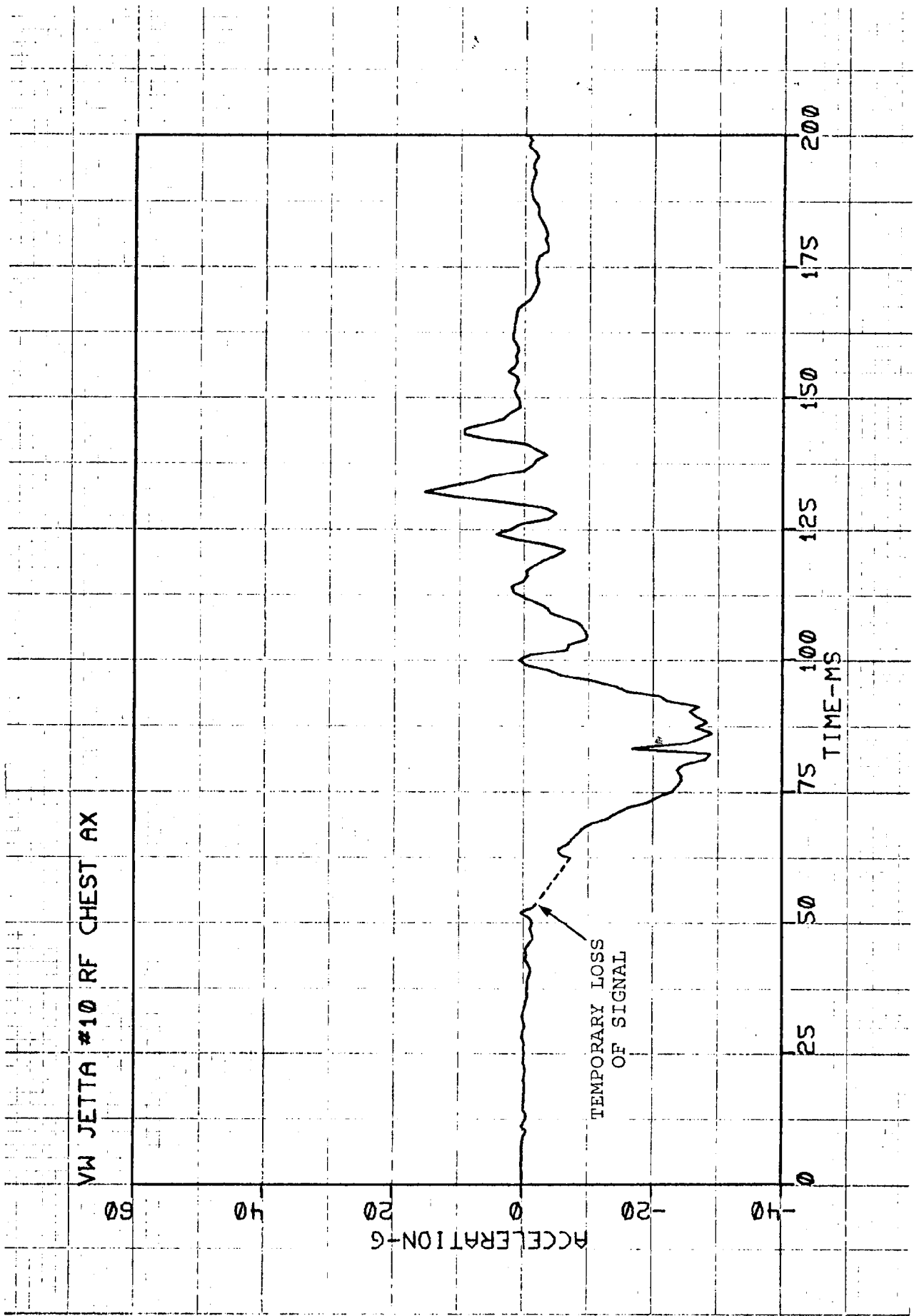
VW JETTA #10 RF HEAD AY



VW JETTA #10 RF HEAD AZ







VW JETTA #10 RF CHEST AY

10

0

-10

-20

-30

-40

ACCELERATION-G

0

25

50

75

100

125

150

175

200

TIME-MS

VW JETTA #10 RF CHEST AZ

30

20

10

ACCELERATION-G

-10

-20

0

25

50

75

100

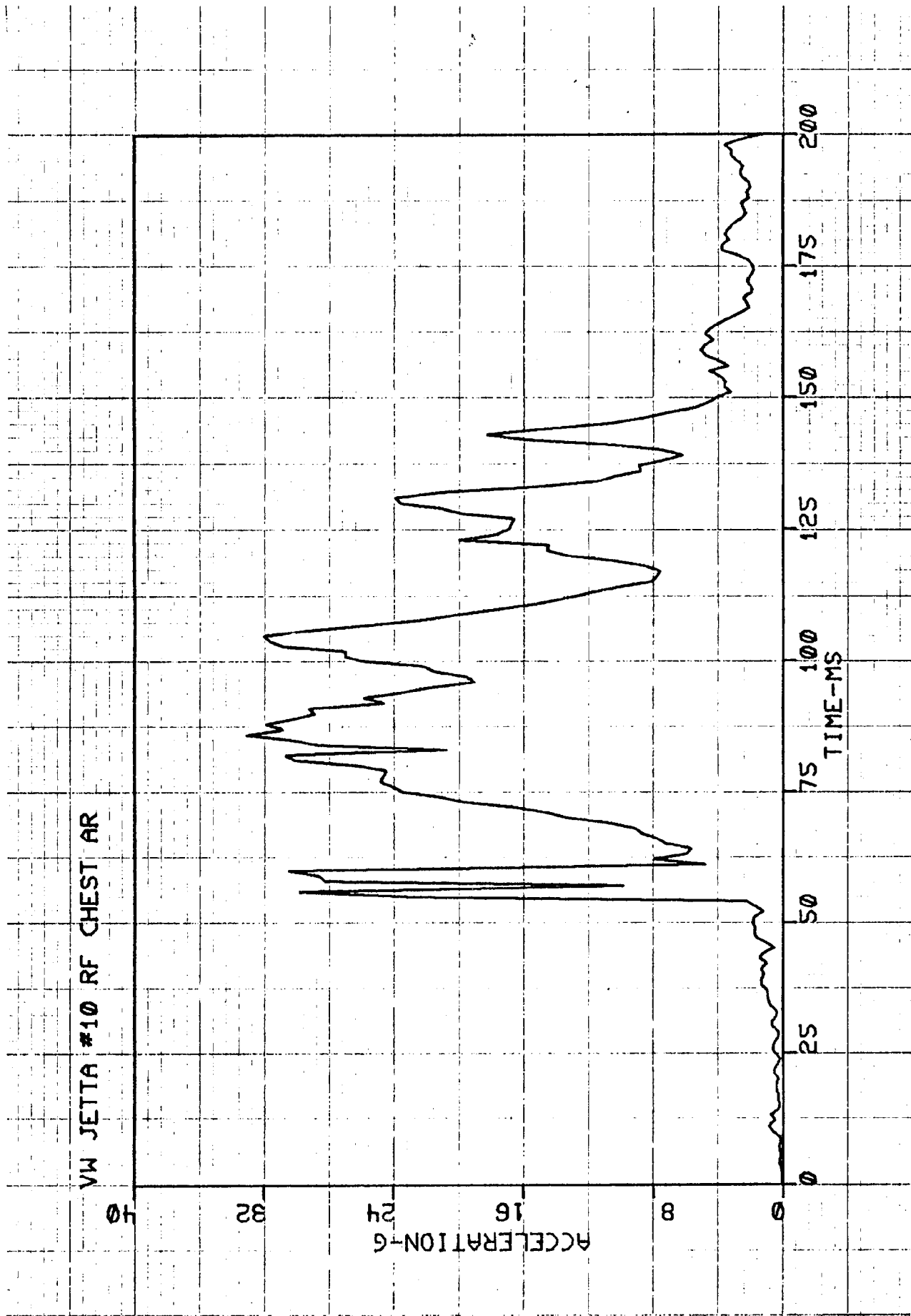
125

150

175

200

TIME-MS



VW JETTA #10 RF FEMURS

□ = LEFT

○ = RIGHT

500

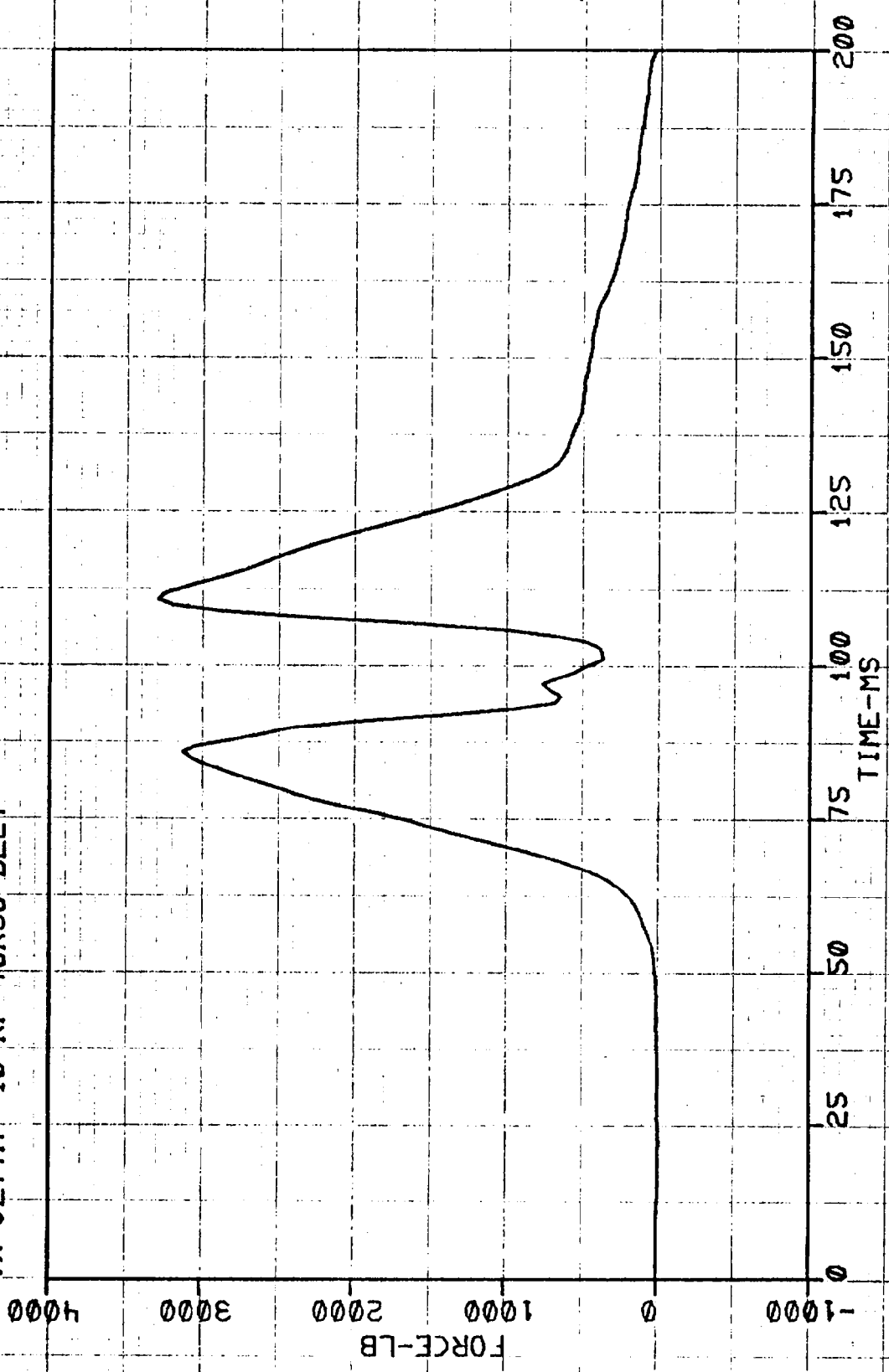
0
-500
-1000
-1500
-2000

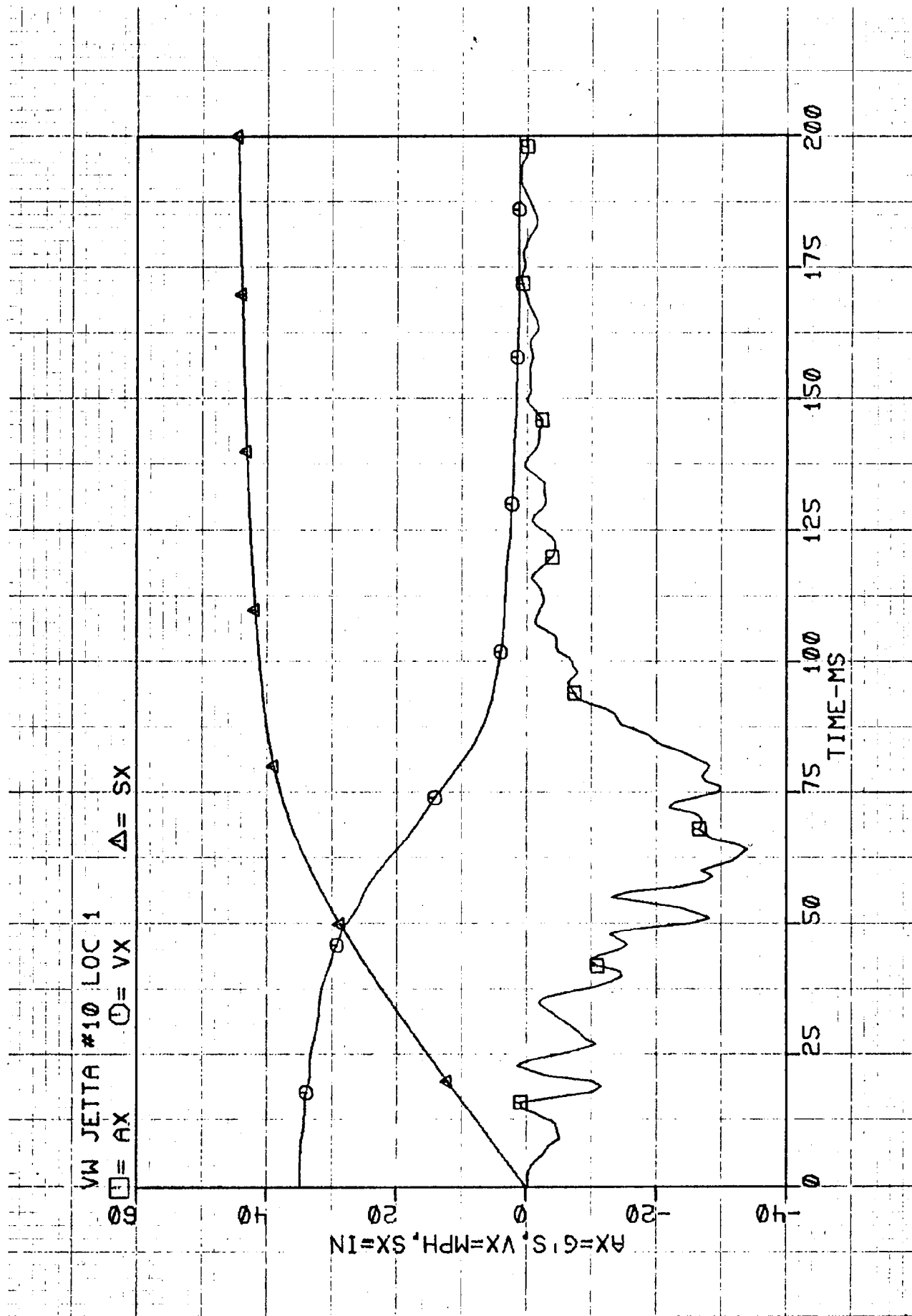
FORCE-LB

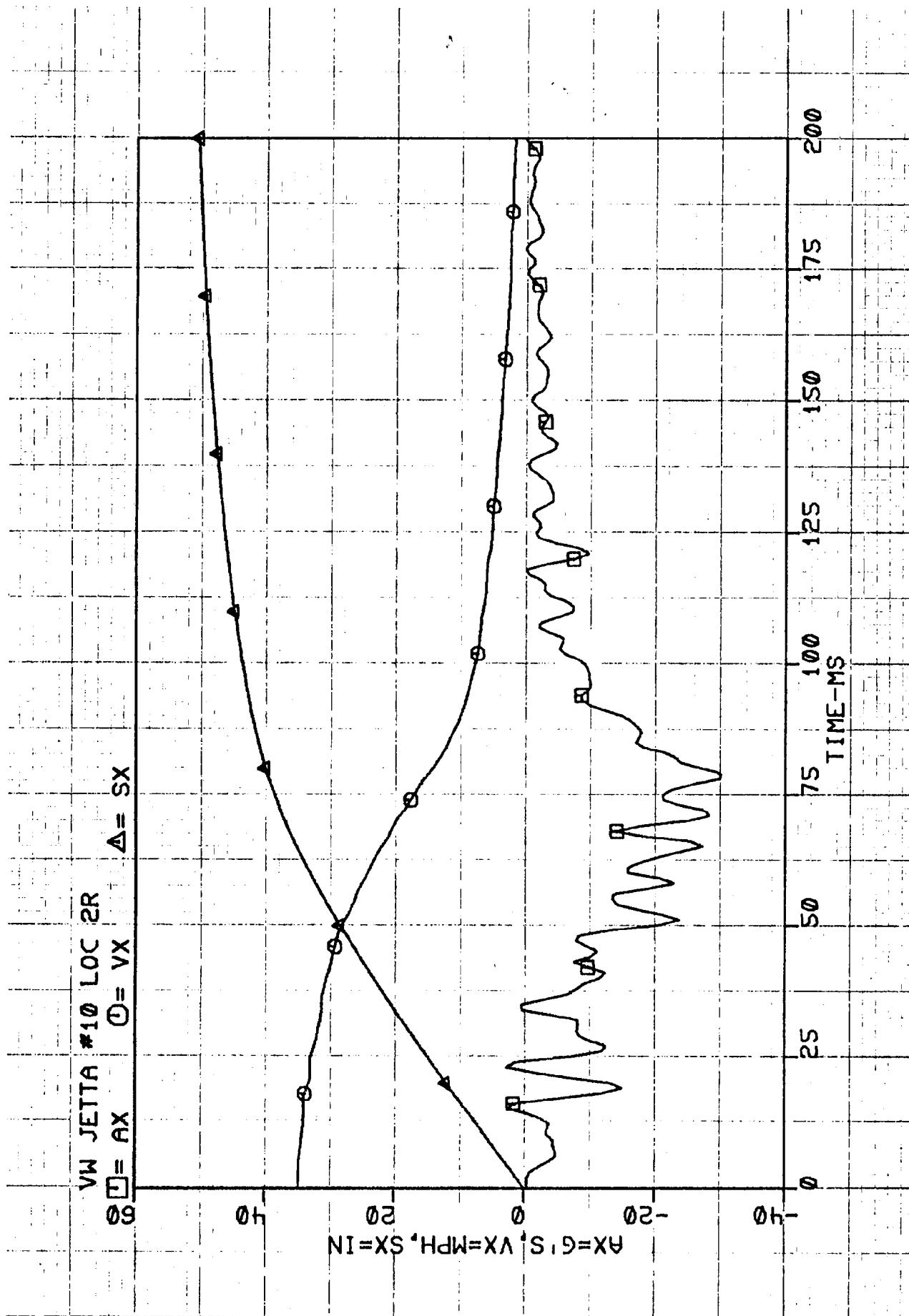
25 50 75 100 125 150 175 200

TIME-MS

VW JETTA #10 RF TORSO BELT







APPENDIX C
DUMMY CALIBRATION

PART 572 DUMMY CALIBRATION TEST DATA

NHTSA Dummy I.D. No.: A03

Laboratory Technician: C. Haymaker

	Pre-test Calibration	Post-test Calibration
Date of Dummy Calibration	3/9/81	
Calibration Sequential Number for Dummy	24	
Temperature in Lab. (Spec. = 66 to 78 °F)	74	
Relative Humidity in Lab. (Spec. = 10 to 70%)	46	

Test Parameter		Specification	
1. Head Drop Test:			
a. Peak Resultant Accel	210 - 260G		221
b. Peak Lateral Accel	< 10G		3
c. Time above 100G	0.9 - 1.5 ms		1
2. Neck Bending Test:			
a. Pendulum Speed	21.5 - 25.5 fps		22.1
b. Pendulum Avg Decel (over t ₃ - t ₂)	20 - 24G		22
c. Peak Resultant Head Acceleration	26G Maximum		21
d. Pendulum Decel (t ₂ - t ₁)	≤ 3 ms		2
e. Pendulum Decel (t ₃ -t ₂)	25 - 30 ms		28
f. Pendulum Decel (t ₄ -t ₃)	≤ 10 ms		8
g. Pendulum Direction Reversal Time	≥ 123 ms		
h. Maximum Head Rota- tion	63 to 73°		70
i. Chordal Displacement:			
Head Rotation Angle			
0°	Time	-2 - 2 ms	0
	Displ	-0.5 - 0.5 in.	0
30°	Time	25.6 - 34.4 ms	28.0
	Displ	2.1 - 3.1 in.	2.3
60°	Time	40.3 - 51.7 ms	43.0
	Displ	4.3 - 5.3 in.	4.4
Maximum (73°)	Time	53.2 - 66.8 ms	59.0
	Displ	5.0 - 6.0 in.	5.1

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

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A03

Test Parameter	Specification	Pre-test Calibration	Post-test Calibration
2. Neck Bending Test: (Continued)			
Head Rotation Angle			
60°	Time	67.0 - 83.0 ms	72.0
	Displ	4.3 - 5.3 in.	4.4
30°	Time	85.4 - 104.6 ms	91.0
	Displ	2.1 - 3.1 in.	2.3
0°	Time	101.0 - 123.0 ms	107
	Displ	-0.5 - 0.5 in.	0.1
3. Abdominal Compression Test: (Preload = 10 pounds)			
a. Force at 0.5 in.	14 - 26 lb		24
b. Force at 0.75 in.	27 - 40 lb		39
c. Force at 1.0 in.	40 - 53 lb		45
d. Force at 1.3 in.	63 - 78 lb		68
4. Lumbar Flexion Test:			
a. Force at 20°	22 - 34 lb		26
b. Force at 30°	34 - 46 lb		41
c. Force at 40°	46 - 58 lb		47
d. Return Angle	12° Maximum		9
5. Chest Impact Tests:			
a. High Speed			
1) Probe Speed	21.78-22.22 fps		22.00
2) Peak Deflection	1.7 in. Maximum		1.5
3) Peak Resistive Force	2250 lb Maximum		2117
4) Internal Hysteresis	50 - 70%		63
b. Low Speed:			
1) Probe Speed	13.86-14.14 fps		14.00
2) Peak Deflection	1.1 in. Maximum		1.0
3) Peak Resistive Force	1450 lb Maximum		1354
4) Internal Hysteresis	50 - 70%		58

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A03

Test Parameter	Specification	Pre-test	Post-test
		Calibration	Calibration
6. Knee Impact Tests:			
a. Right Side:			
1) Probe Speed	6.76 - 7.04 fps	6.96	
2) Maximum Force	1850 - 2500 lb	1854	
3) Time >1000 lb	1.7 ms Minimum	1.8	
b. Left Side:			
1) Probe Speed	6.76 - 7.04 fps	6.86	
2) Maximum Force	1850 - 2500 lb	1857	
3) Time >1000 lb	1.7 ms Minimum	1.8	

PART 572 DUMMY CALIBRATION TEST DATA

NHTSA Dummy I.D. No.: A04

Laboratory Technician: C. Haymaker

	Pre-test Calibration	Post-test Calibration
Date of Dummy Calibration	2/20/81	
Calibration Sequential Number for Dummy	24	
Temperature in Lab. (Spec. = 66 to 78 °F)	72	
Relative Humidity in Lab. (Spec. = 10 to 70%)	44	

Test Parameter	Specification	
1. Head Drop Test:		
a. Peak Resultant Accel	210 - 260G	256
b. Peak Lateral Accel	< 10G	0
c. Time above 100G	0.9 - 1.5 ms	1.0
2. Neck Bending Test:		
a. Pendulum Speed	21.5 - 25.5 fps	22.0
b. Pendulum Avg Decel (over t ₃ - t ₂)	20 - 24G	23
c. Peak Resultant Head Acceleration	26G Maximum	21
d. Pendulum Decel (t ₂ - t ₁)	≤ 3 ms	2
e. Pendulum Decel (t ₃ -t ₂)	25 - 30 ms	28
f. Pendulum Decel (t ₄ -t ₃)	≤ 10 ms	4
g. Pendulum Direction Reversal Time	≥ 123 ms	
h. Maximum Head Rota- tion	63 to 73°	67
i. Chordal Displacement:		
Head Rotation Angle		
0°	Time -2 - 2 ms	
	Displ -0.5 - 0.5 in.	0
30°	Time 25.6 - 34.4 ms	26.0
	Displ 2.1 - 3.1 in.	2.3
60°	Time 40.3 - 51.7 ms	43.0
	Displ 4.3 - 5.3 in.	4.4
Maximum (73°)	Time 53.2 - 66.8 ms	59.0
	Displ 5.0 - 6.0 in.	5.1

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

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A04

Test Parameter	Specification	Pre-test Calibration	Post-test Calibration
2. Neck Bending Test: (Continued)			
Head Rotation Angle			
60°	Time	67.0 - 83.0 ms	72.0
	Displ	4.3 - 5.3 in.	4.4
30°	Time	85.4 - 104.6 ms	91.0
	Displ	2.1 - 3.1 in.	2.3
0°	Time	101.0 - 123.0 ms	104.0
	Displ	-0.5 - 0.5 in.	0.1
3. Abdominal Compression Test: (Preload = 10 pounds)			
a. Force at 0.5 in.	14 - 26 lb		23
b. Force at 0.75 in.	27 - 40 lb		35
c. Force at 1.0 in.	40 - 53 lb		48
d. Force at 1.3 in.	63 - 78 lb		69
4. Lumbar Flexion Test:			
a. Force at 20°	22 - 34 lb		34
b. Force at 30°	34 - 46 lb		45
c. Force at 40°	46 - 58 lb		48
d. Return Angle	12° Maximum		5
5. Chest Impact Tests:			
a. High Speed			
1) Probe Speed	21.78-22.22 fps		21.99
2) Peak Deflection	1.7 in. Maximum		1.4
3) Peak Resistive Force	2250 lb Maximum		2114
4) Internal Hysteresis	50 - 70%		68
b. Low Speed:			
1) Probe Speed	13.86-14.14 fps		13.96
2) Peak Deflection	1.1 in. Maximum		0.9
3) Peak Resistive Force	1450 lb Maximum		1333
4) Internal Hysteresis	50 - 70%		62

PART 572 DUMMY CALIBRATION TEST DATA (CONTINUED)

NHTSA Dummy I.D. No.: A04

		Pre-test	Post-test
<u>Test Parameter</u>	<u>Specification</u>	<u>Calibration</u>	<u>Calibration</u>
6. Knee Impact Tests:			
a. Right Side			
1) Probe Speed	6.76 - 7.04 fps	6.90	
2) Maximum Force	1850 - 2500 lb	1874	
3) Time >1000 lb	1.7 ms Minimum	2.0	
b. Left Side:			
1) Probe Speed	6.76 - 7.04 fps	6.80	
2) Maximum Force	1850 - 2500 lb	2152	
3) Time >1000 lb	1.7 ms Minimum	2.0	