

DOT 1382

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**VEHICLE SAFETY COMPLIANCE TESTING FOR OCCUPANT CRASH PROTECTION,
WINDSHIELD MOUNTING, WINDSHIELD ZONE INTRUSION (PARTIAL)
AND FUEL SYSTEM INTEGRITY**

**FORD MOTOR COMPANY
1990 CROWN VICTORIA
4-DOOR SEDAN**

NHTSA NUMBER: CLO202

CALSPAN TEST NUMBER: 7804-2

December 12, 1989

CALSPAN CORPORATION
ADVANCED TECHNOLOGY CENTER
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FINAL REPORT

PREPARED FOR:

U. S. Department of Transportation
National Highway Traffic Safety Administration
Office of Vehicle Safety Compliance
400 Seventh Street, S.W.
Room No. 6115 (NEF-31)
Washington, DC 20590

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16. Abstract A 30 mph vehicle safety compliance test was conducted on a 1990 Ford Crown Victoria 4-Door Sedan. This test was performed at the Calspan Advanced Technology Center in Buffalo, New York on December 12, 1989. The purpose of this test was to determine compliance with the performance requirements of the following Federal Motor Vehicle Safety Standards: 1. FMVSS No. 208, "Occupant Crash Protection" 2. FMVSS No. 212, "Windshield Mounting" 3. FMVSS No. 219 (partial), "Windshield Zone Intrusion" 4. FMVSS No. 301, "Fuel System Integrity" The test mode was perpendicular (0°) and the impact velocity was 29.6 mph. The ambient temperature at the impact face was 31°F. The subject test vehicle appears to comply with the requirements of FMVSS Nos. 208, 212, 219 (partial) and 301. <u>Type of Restraint System:</u> The test vehicle was equipped with a driver air bag restraint system and passenger 3-point manual belt safety restraint system. The driver side 3-point manual belt was not used for this test.					
17. Key Words 30 mph Vehicle Safety Compliance Testing FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219, "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity" Frontal Impact			18. Distribution Statement <u>Copies of this report are available from:</u> Technical Reference Division National Highway Traffic Safety Admin. Nassif Building, Room 5108 400 Seventh St., S.W., Washington, DC 20590		
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TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	PURPOSE AND TEST PROCEDURE	1-1
2	SUMMARY OF FRONTAL BARRIER IMPACT TEST	2-1
3	OCCUPANT AND VEHICLE INFORMATION	3-1
4	SUMMARY OF RESULTS FOR: FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219 (Partial), "Windshield Zone Intrusion" FMVSS 301, "Fuel System Integrity"	
APPENDIX A	PHOTOGRAPHS	A-1
APPENDIX B	VEHICLE AND DUMMY RESPONSE DATA	B-1
APPENDIX C	VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS	C-1

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1	TEST VEHICLE INFORMATION	3-2
2	PART 572 DUMMY IN-VEHICLE POSITION	3-3
3	OCCUPANT CLEARANCE DIMENSIONS	3-4
4	DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSEMBLY REFERENCE DIMENSIONS	3-5
5	SEAT BELT POSITIONING DATA	3-6
6	VEHICLE ACCELEROMETER LOCATIONS	3-7
7	CAMERA POSITIONS FOR FRONTAL IMPACTS	3-10
8	VEHICLE TARGET LOCATIONS	3-12
9	TEST VEHICLE MEASUREMENTS	3-13
10	FMVSS NO. 212 - "WINDSHIELD MOUNTING" DATA SHEET	4-8
11	FMVSS NO. 219 (PARTIAL) - "WINDSHIELD ZONE INTRUSION" DATA SHEET	4-9

LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
1	Crash Test Summary	2-2
2	General Test and Vehicle Parameter Data	2-3
3	Post-Impact Data	2-5
4	Vehicle Accelerometer Locations and Data Summary	3-9
5	High Speed Camera Locations	3-11
6	Vehicle Measurements	3-14
7	Dummy Injury Criteria Values	4-2
8	FMVSS No. 208 - Seat Belt Warning System check	4-3
9	FMVSS No. 208 - Labeling and Driver's Manual Information	4-4
10	FMVSS No. 208 - Readiness Indicator	4-5
11	FMVSS No. 208 - Comfort and Convenience Test Summary	4-6
12	FMVSS No. 301 - "Fuel System Integrity" Post-Impact Test Data	4-10
13	FMVSS No. 301 - Static Rollover Data Sheet	4-11
14	Test Vehicle Noncompliance Notice	4-15

Section I

PURPOSE AND TEST PROCEDURE

This 30 mph frontal barrier impact test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 208, 212, 219 (partial) and 301 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by Calspan Advanced Technology Center under Contract No.

DTNH22-88-C-01038. The purpose of this test was to determine if the subject vehicle, a 1990 Ford Crown Victoria 4-Door Sedan, meets the performance requirements of FMVSS 208, "Occupant Crash Protection"; FMVSS No. 212, "Windshield Mounting"; FMVSS No. 219 (partial), "Windshield Zone Intrusion"; and FMVSS No. 301, "Fuel System Integrity". This compliance test was conducted using the requirements found in the OVSC Laboratory Test Procedure No. TP-208-07.

Section 2

SUMMARY OF TEST NUMBER CLO202

A frontal barrier was impacted by a 1990 Ford Crown Victoria 4-Door Sedan at a velocity of 29.6 mph. The test was performed at the Calspan Corporation Advanced Technology Center on December 12, 1989. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 14 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

Two Part 572, 50th percentile male anthropomorphic test devices (ATDs), were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the OVSC Laboratory Test Procedure.

Both ATDs were fully instrumented with head and chest triaxial accelerometers and left/right femur load cells. These ATDs had been certified prior to the test.

The 27 channels of data were recorded on three 14-channel FM tape recorders. Appendix B contains the vehicle and dummy response data traces.

The driver's HIC was 268. The maximum chest deceleration over 3 milliseconds was 44.7 g's. The maximum force on the driver's left femur was 1410 pounds and 932 pounds on the right femur.

The right front passenger's HIC was 219. The maximum chest deceleration over 3 milliseconds was 33.0 g's and loads were 817 and 651 pounds on the left and right femurs respectively.

Table 1

CRASH TEST SUMMARYVehicle NHTSA-No.: CL0202 Test Mode: 30 mph Frontal BarrierTest Date.: December 12, 1989 Time: 13:05 Temperature: 31°FVehicle Make/Model/Body Style: 1990 Ford Crown Victoria 4-Door SedanVehicle Test Weight: 4460 lbs.Vehicle/Barrier Impact Angle: 0°Impact Velocity: 29.6 mphMaximum Static Crush: 23.6"Vehicle Rebound: 19.1"DUMMIES:DRIVERPASSENGER

Type:

Part 572Part 572

Restraint System:

air bag3-point manual belt
restraint systemNumber of Data Chnnels: 27Number of Cameras: 1 Real Time14 High SpeedDOOR OPENING DATA: closed operable - Left Frontclosed operable - Right Front

Front Seat(s) Data:

DRIVERPASSENGER

Seat Track Failure:

0.00.0

inches of shift

Seat Back Failure:

NoneNoneVISIBLE DUMMY CONTACT POINTS:DRIVERPASSENGER

Head:

air bag, sun visor, *windshield headerno contact

Chest

air bagno contact

Knees

dash paneldash panel

*Windshield header trim disengaged from inner molding.

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATATEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1990 Ford Crown Victoria 4-Door Sedan
 NHTSA No. CLO202 ; VIN: 2FACP73F1LX112772 ; Color: White
 Engine Data: 8 cylinders; - CID; 5.0 Litres; - cc
 Placement X Longitudinal or In-Line; - Transverse or Lateral
 Transmission Data: - speeds; - Manual; X Automatic; X Overdrive
 Final Drive: X Rear Wheel Drive; - Front Wheel Drive; - Four Wheel Drive
 Major Options: X A/C; X Pwr. Strg.; X Pwr. Brakes; X Pwr. Windows
- Power Door Locks
 Date Received: 11/16/89 ; Odometer Reading 26.4 miles
 Selling Dealer: West-Herr Ford, Inc.
 & Address S-5025 Camp Road, Hamburg, NY 14075

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: Ford Motor Company of Canada, Ltd.
 Date of Manufacture: 9-89
 GVWR: 5302 lbs.; GAWR: 2680 lbs. FRONT; 2672 lbs. REAR

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load: 31 psi FRONT
35 psi REAR
 Recommended Tire Size: P205/70R15 Load Range: Std.
 Recommended Cold Tire Pressure: 31 psi FRONT; 35 psi REAR
 Size of Tires on Test Vehicle: P215/70R15 ; Manufacturer: Michelin
 Vehicle Capacity Data:
 Type of Front Seats: - Bench; - Bucket; X Split Bench
 Number of Occupants: 3 Front; 3 Rear; 6 Total
 Vehicle Capacity Weight (VCW) = 1100 lbs.
 No. of Occupants x 150 lbs. = 900 lbs.
 Rated Cargo/Luggage Weight (RCLW) = 200 lbs. (Difference)

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (WITH MAXIMUM FLUIDS) = UDW:

Right Front =	<u>1140</u> lbs.	Right Rear =	<u>840</u> lbs.
Left Front =	<u>1110</u> lbs.	Left Rear =	<u>830</u> lbs.
TOTAL FRONT =	<u>2250</u> lbs.	TOTAL REAR =	<u>1670</u> lbs.
% of Total Vehicle Weight =	<u>57%</u>	% of Total Weight =	<u>43%</u>
TOTAL DELIVERED WEIGHT =	<u>3920</u> lbs.		

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont.)

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight	=	<u>3920</u>	lbs.
Rated Cargo/Luggage Weight (RCLW)	=	<u>200</u>	lbs.
Weight of 2 P.572 Dummies @ 164 ea.	=	<u>328</u>	lbs.
TARGET TEST WEIGHT	=	<u>4448</u>	lbs. (sum)

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 0 POUNDS OF CARGO WEIGHT:

Right Front =	<u>1190</u>	lbs.	Right Rear =	<u>1070</u>	lbs.
Left Front =	<u>1150</u>	lbs.	Left Rear =	<u>1050</u>	lbs.
TOTAL FRONT =	<u>2340</u>	lbs.	TOTAL REAR =	<u>2120</u>	lbs.
% of Total Weight =	<u>52</u>	%	% of Total Weight =	<u>48</u>	%
TOTAL TEST WEIGHT =	<u>4460</u>	lbs.			
Weight of Ballast Secured in Vehicle Trunk Area =	<u>39</u>	lbs.			
Vehicle Components Removed for Weight Reduction	<u>None</u>				

VEHICLE ATTITUDE (all dimensions in inches):

AS DELIVERED:	RF <u>28.4"</u>	LF <u>28.0"</u>	RR <u>27.9"</u>	LR <u>27.6"</u>
FULLY LOADED:	RF <u>27.2"</u>	LF <u>27.1"</u>	RR <u>23.4"</u>	LR <u>23.5"</u>
AS TESTED:	RF <u>28.1"</u>	LF <u>28.0"</u>	RR <u>25.8"</u>	LR <u>25.9"</u>
Vehicle's Wheel Base:	<u>114.2</u>	in.		
Location of Vehicle's C.G.:	<u>54.3</u>	inches from front wheel center		

FUEL SYSTEM DATA:

Fuel System Capacity From Owner's Manual =	<u>18.0</u>	gallons
Usable Capacity Figure Furnished by COTR =	<u>18.0</u>	gallons
Test Volume Range (92 to 94% of Usable Capacity) =	<u>16.6</u>	to <u>16.9</u> gallons
ACTUAL TEST VOLUME =	<u>16.7</u>	gallons (with entire fuel system filled)

Table 3

POST IMPACT DATATYPE OF TEST:

Type of Test: Frontal Barrier Impact Angle: 0°
 Test Date: December 12, 1989 Time: 13:05 Temperature: 31 °F
 Vehicle NHTSA No.: CLO202
 Required Impact Velocity Range: 28.9 to 29.9 mph

BARRIER IMPACT VELOCITY: (Speed traps within 5 feet of impact plane.)

Trap No. 1 = 29.6 mph; Trap No. 2 = 29.6 mph
 Distance from vehicle to barrier: (1) entering trap = 52 inches
 (2) exiting trap = 12 inches

VEHICLE STATIC CRUSH: (For frontal and rear impacts only.)

Vehicle Length:

Pre-Test Right = 206.5"; C/L = 210.7"; Left = 205.7"
 Post-Test Right = 185.8"; C/L = 187.1"; Left = 186.7"
 Crush Right = 20.7"; C/L = 23.6"; Left = 19.0"
 AVERAGE = 21.1 inches

VEHICLE REBOUND: (From rigid barrier only.)

Distance from front of test vehicle to impact point:

Right = 19.4"; C/L = 18.6"; Left = 19.3"
 AVERAGE = 19.10 inches

DOOR OPENING:

	Left	Right
Front	<u>operable</u>	<u>operable</u>
Rear	<u>operable</u>	<u>operable</u>

SEAT MOVEMENT:

	Seat Back Failure	Seat Shift
Front	<u>None</u>	<u>0.0</u>
Rear	<u>-</u>	<u>-</u>

Table 3

POST IMPACT DATA (cont.)

GLAZING DAMAGE: Windshield sustained cracks but remained intact.

OTHER NOTABLE IMPACT FEATURES: None

Section 3
OCCUPANT AND VEHICLE DATA

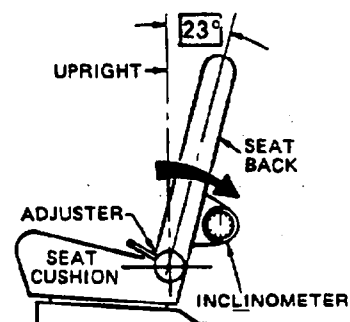
Figure 1

TEST VEHICLE INFORMATION

VEHICLE IDENTIFICATION:

Model Year: 1990 Vehicle Model: Crown Victoria Body Style: 4-Door Sedan

1. Nominal Design Riding Position for adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable



Seat back angle for driver's seat 23°

LEFT SIDE VIEW

Measurement instructions: Place seat back in front most locked position, then release the lock by reclining lever and pushing seat back one notch rearward.

Seat back angle for passenger's seat 23°

Measurement instructions: Same as driver.

2. Seat Fore and Aft Positioning

Provide instructions for positioning the driver and front outboard passenger seat(s) in the center of fore and aft travel. For example, provide information to locate the detent in which the seat track is to be locked:

Positioning of the driver's seat: Place seat in 10th detent (front position = 1) of 19 total detents.

Positioning of the passenger's seat (if applicable): Same as driver.

3. Fuel Tank Capacity Data

A. "Usable Capacity" of the standard equipment fuel tank is 18.0 gallons

B. "Usable Capacity" of the optional equipment fuel tank is gallons

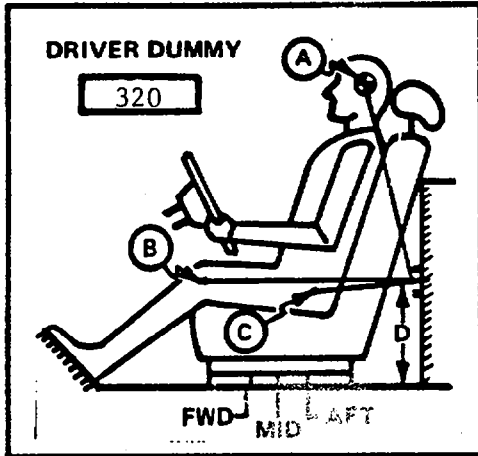
Additional Instructions: None

Figure 2

PART 572 DUMMY IN-VEHICLE POSITION

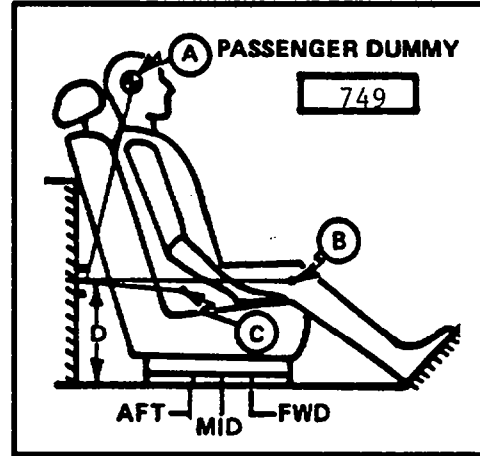
Test No.: 968-2-946 Vehicle: 1990 Ford Crown Victoria

<u>SEAT TYPE:</u>	<u>ADJUSTER TYPE:</u>	<u>BUCKET SEAT BACK TYPE:</u>
<u>-</u> Bench	<u>X</u> Manual	<u>-</u> Fixed
<u>-</u> Bucket	<u>-</u> Power	<u>X</u> Adjustable Reclining
<u>X</u> Split Bench		



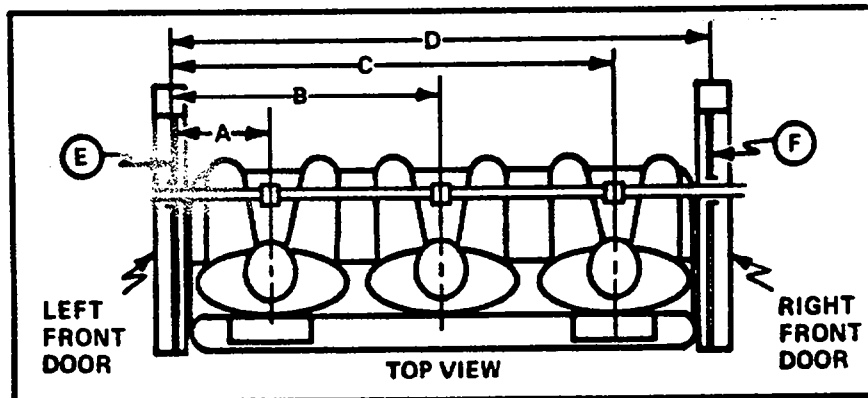
MEASUREMENT
LOCATION

- A - Head Target
- B - Knee Joint
- C - Approximate 'H' Point
- D - Sill to Reference Point



A = 21.8 in. 2 Degrees
 B = 23.8 in. 95 Degrees
 C = 8.8 in. 110 Degrees
 D = 15.1 in.

A = 21.5 in. 2 Degrees
 B = 23.6 in. 94 Degrees
 C = 9.0 in. 113 Degrees
 D = 15.1 in.



S/N 320

DUMMY ID

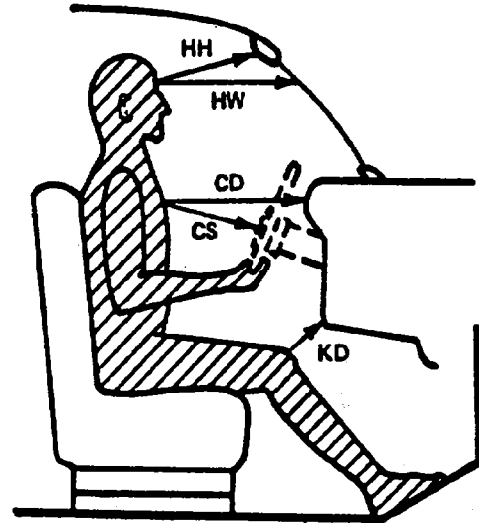
749

A = Left Door to Driver Centerline	<u>12.6</u> in.
B = Left Door to Center Passenger Centerline	<u>-</u> in.
C = Left Door to Right Passenger Centerline	<u>44.0</u> in.
D = Left Door to Right Door	<u>56.7</u> in.
E,F = Window Glass Height (Right and Left Must Be Equal)	<u>12.3</u> in.

Figure 3

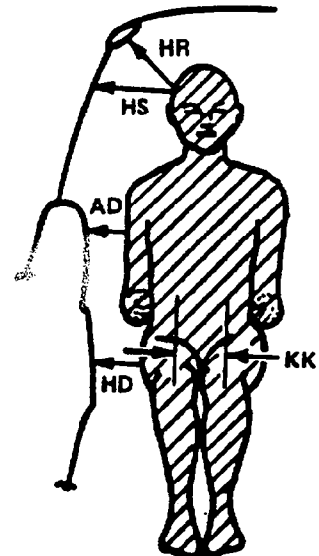
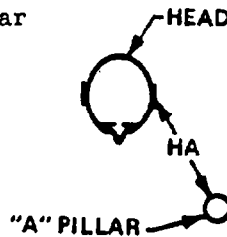
OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	14.6	14.3
HW	19.5	19.8
CD	21.8	20.3
CS	11.3	-
KDL	4.3	3.8
KDR	2.9	3.5
SA	23°	23°
TA	21°	21°



HH = Head to Windshield Header
 HW = Head to Windshield
 CD = Chest to Dash
 CS = Chest to Steering Wheel
 KD(L/R) = Knee to Dash (Left/Right)
 SA = Seat Back Angle
 TA = Torso Angle

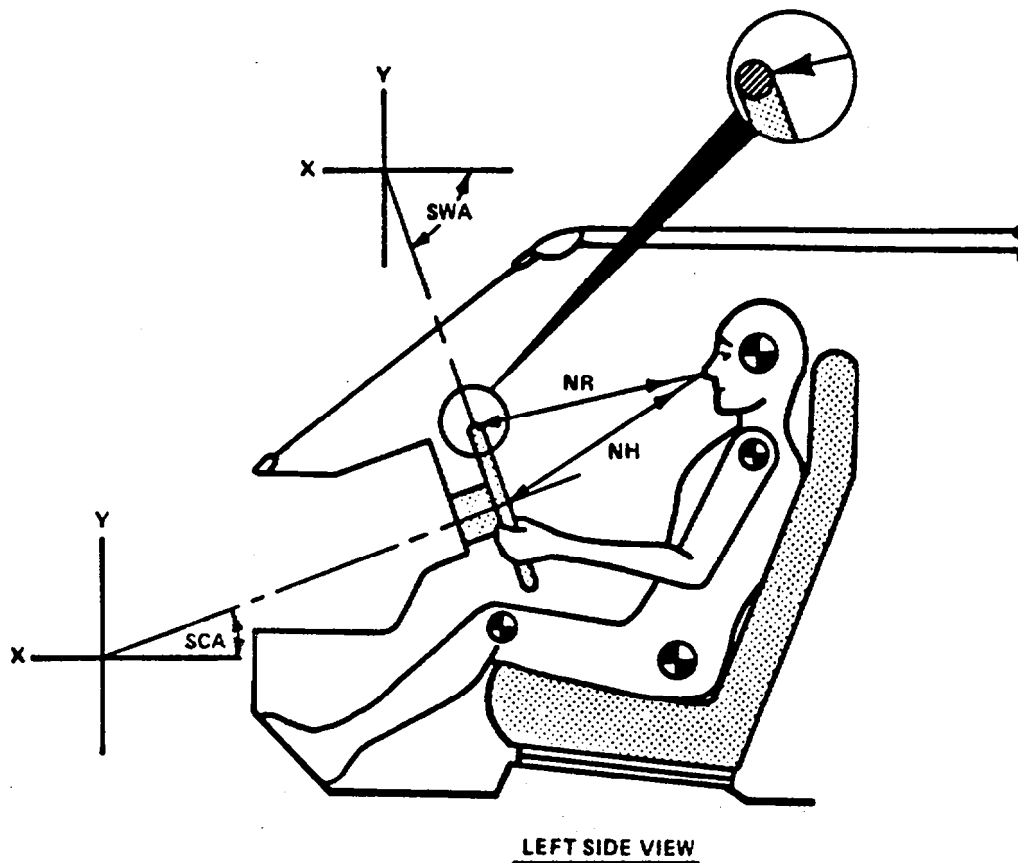
HA = Head Target to "A" Pillar
 HR = Head to Side Roof
 HS = Head to Side Window
 AD = Arm to Door
 HD = Hip to Door
 KK = Knee to Knee



	DRIVER	PASSENGER
HR	5.9	5.8
HS	9.5	9.4
AD	5.3	4.9
HD	8.5	8.4
KK	9.2	7.7
HA	18.2	17.8

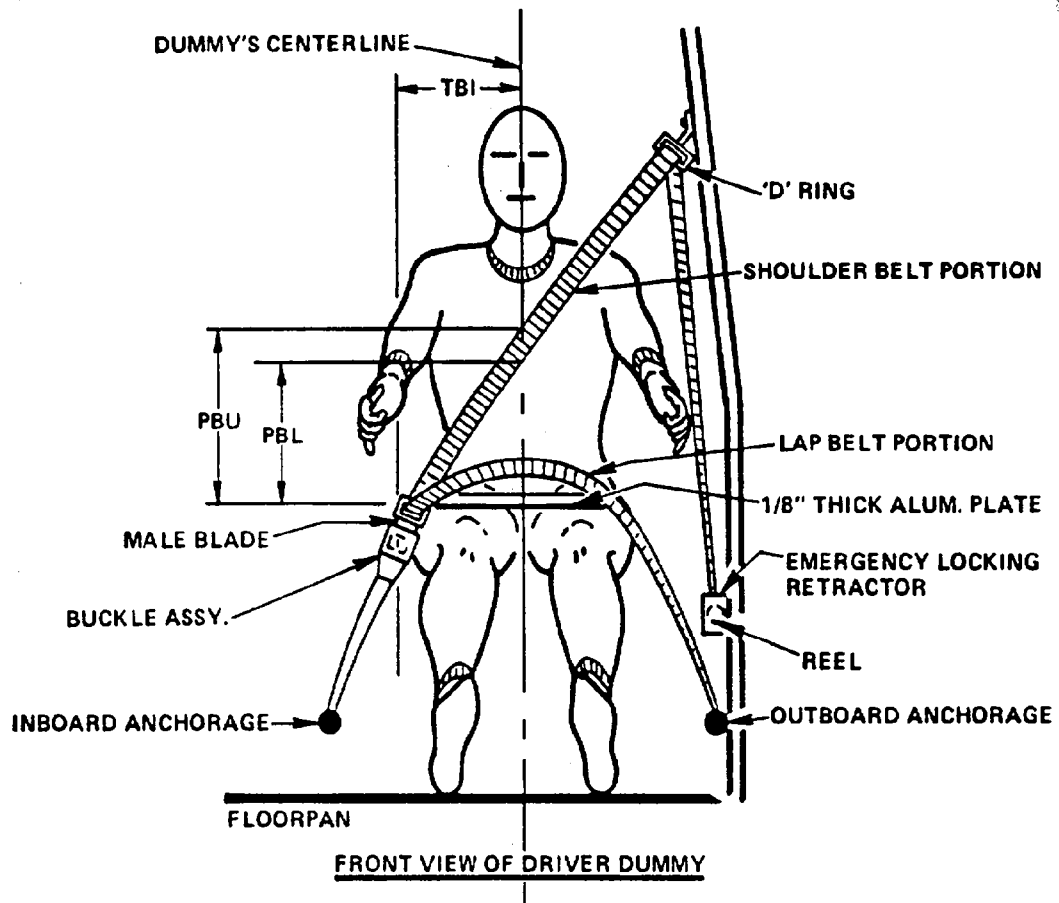
Figure 4

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



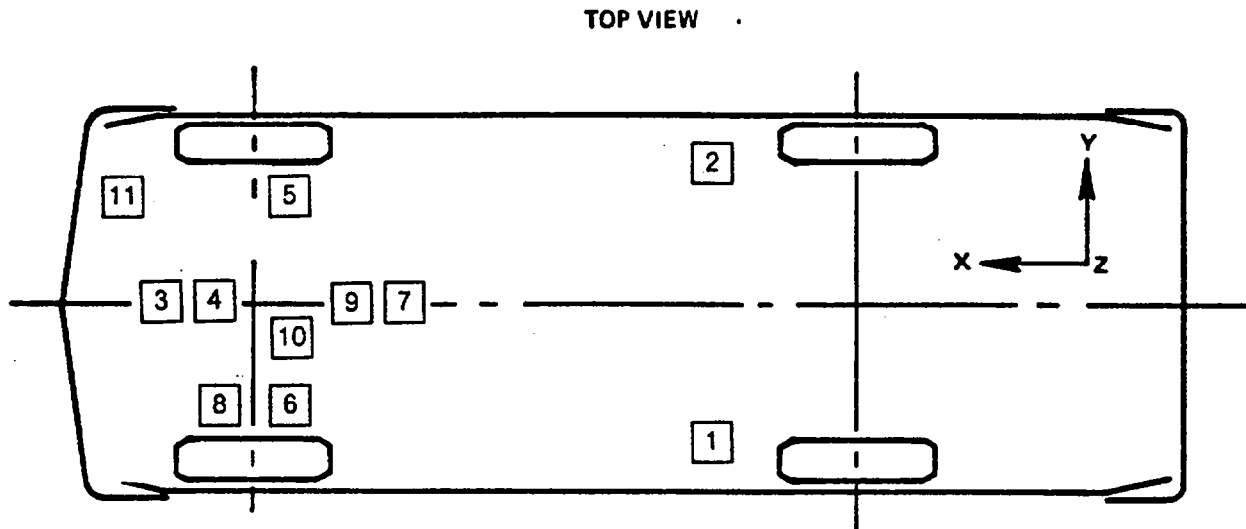
		MEASUREMENTS	
<u>NR</u>	Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	16.4	Inches
<u>NH</u>	Distance from tip of dummy's nose to center of steering column hub	17.3	Inches
<u>SCA</u>	Angle of steering column relative to the horizontal X axis	22	Degrees
<u>SWA</u>	Angle of steering wheel relative to the horizontal X axis	-68	Degrees

Figure 5
SEAT BELT POSITIONING DATA



	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
<u>PBU</u> -- Top surface of alum. plate to upper edge	-	14.7
<u>PBL</u> -- Top surface of alum. plate to belt lower edge	-	11.5
<u>TBI</u> -- Distance from torso centerline to buckle	-	9.2

Figure 6
VEHICLE ACCELEROMETER LOCATIONS



ACCELEROMETER NUMBER*	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Left Rear Seat Crossmember	X		
2	Right Rear Seat Crossmember	X		
3	Top of Engine	X		
4	Bottom of Engine	X		
5	Right Disc Brake Caliper	X		
6	Left Disc Brake Caliper	X		
7	Instrument Panel	X		
8	Front Shock Tower	X		
9	Firewall	X		
10	Cradle Frame	X		
11	Radiator Support	X		

*The accelerometer pack number can be correlated with the vehicle response data traces found in Appendix B.

Table 4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION**		NEGATIVE DIRECTION**	
					MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	REAR SEAT X-MEMBER PRE:	83.9	20.5	16.3				
	AT LEFT SIDE POST:	83.8	20.3	16.2				
	LONGITUDINAL ACCELERATION				2	145	-27	75
2	REAR SEAT X-MEMBER PRE:	85.0	-20.2	16.6				
	POST:	84.4	-19.9	16.2				
	LONGITUDINAL ACCELERATION				2	196	-26	75
3	TOP OF ENGINE BLOCK PRE:	163.6	-10.0	35.1				
	POST:	156.4	-10.2	34.8				
	LONGITUDINAL ACCELERATION				24	75	-65	59
4	BOTTOM OF ENGINE PRE:	161.2	4.9	12.5				
	POST:	159.7	4.5	12.2				
	LONGITUDINAL ACCELERATION				3	168	-37	59
5	BRAKE CALIPER AT PRE:	161.5	-21.3	9.8				
	POST:	159.9	-21.3	9.0				
	LONGITUDINAL ACCELERATION				8	43	-34	56
6	BRAKE CALIPER AT PRE:	161.5	21.2	9.7				
	POST:	158.1	21.1	9.2				
	LONGITUDINAL ACCELERATION				17	84	-52	64
7	DASH PANEL PRE:	133.4	-3.3	38.3				
	POST:	132.1	-3.1	37.9				
	LONGITUDINAL ACCELERATION				53	120	-58	66

*X + Forward from rear bumper
 Y + Left from vehicle centerline
 Z + Up from ground

**
 LONGITUDINAL:
 LATERAL:
 VERTICAL:

POSITIVE
 FORWARD
 LEFTWARD
 UPWARD

NEGATIVE
 REARWARD
 RIGHTWARD
 DOWNWARD

DISTANCE MEASUREMENTS IN INCHES

Table 4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY (cont.)

NO.	LOCATION		X*	Y*	Z*	POSITIVE DIRECTION**		NEGATIVE DIRECTION**	
						MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
8	FRONT SHOCK TOWER	PRE:	165.3	29.0	34.2				
		POST:	160.6	26.9	34.6				
	LONGITUDINAL ACCELERATION					28	40	-53	59
9	FIREWALL	PRE:	150.5	26.6	34.3				
		POST:	148.2	25.5	31.9				
	LONGITUDINAL ACCELERATION					32	111	-39	36
10	CRADLE FRAME	PRE:	178.5	18.7	21.2				
		POST:	172.4	18.3	21.7				
	LONGITUDINAL ACCELERATION					180	113	-150	21
11	RADIATOR-SUPPORT	PRE:	191.3	-19.3	32.6				
		POST:	177.0	-20.5	36.8				
	LONGITUDINAL ACCELERATION					49	47	-125	24

*X + Forward from rear bumper
 Y + Left from vehicle centerline
 Z + Up from ground

**
 LONGITUDINAL:
 LATERAL:
 VERTICAL:

POSITIVE
 FORWARD
 LEFTWARD
 UPWARD

NEGATIVE
 REARWARD
 RIGHTWARD
 DOWNWARD

DISTANCE MEASUREMENTS IN INCHES

Figure 7

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 5.

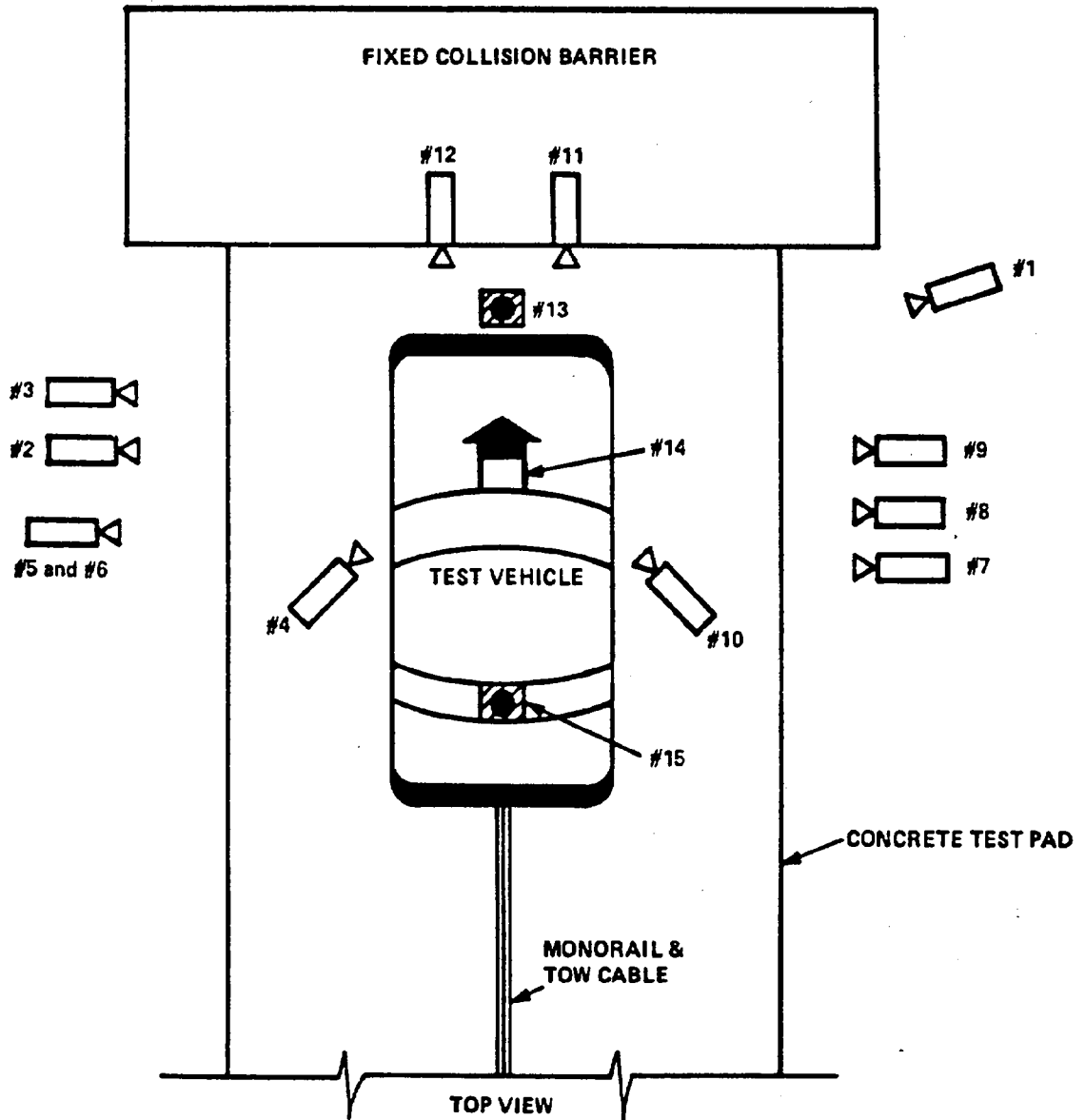


Table 5

HIGH-SPEED CAMERA LOCATIONS

CAMERA NO.	VIEW	CAMERA POSITIONS (in)*			ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Camera	-	-	-	-	-	-	24
2	Overall Left Side	252.0	68.0	41.0	-3.0	233.8	13	***
3	Left Side View	320.0	39.0	40.5	-4.0	301.8	25	***
4	Driver and Interior View	103.0	124.0	73.0	-23.0	-	13	890
5	Steering Column (Bottom)	318.0	104.0	45.5	-4.0	299.8	25	570
6	Steering Column (Top)	317.0	104.0	69.5	-9.0	298.8	25	560
7	Overall Right Side	241.0	86.0	42.0	-4.0	222.8	13	***
8	Right Side View	336.0	71.5	42.0	-1.0	317.8	25	775
9	Right Passenger View	317.0	99.0	54.0	-3.0	298.8	35	640
10	Passenger and Interior View	117.0	123.0	73.0	-16.0	-	13	590
11	Passenger Front View	24.0	17.0	77.0	-42.0	-	13	555
12	Driver Front View	24.0	17.0	77.0	-39.0	-	13	***
13	Windshield View	0.0	0.0	130.0	-47.0	-	25	540
14	Pit View of Engine	0.0	36.0	-120.0	90.0	-	13	910
15	Pit View of Fuel Tank	0.0	128.0	-120.0	90.0	-	13	800

*X = film plane to monorail centerline
 Y = film plane to impact location
 Z = film plane to ground
 ** = referenced to horizontal plane
 *** = timing marks not available

Figure 8
VEHICLE TARGET LOCATIONS

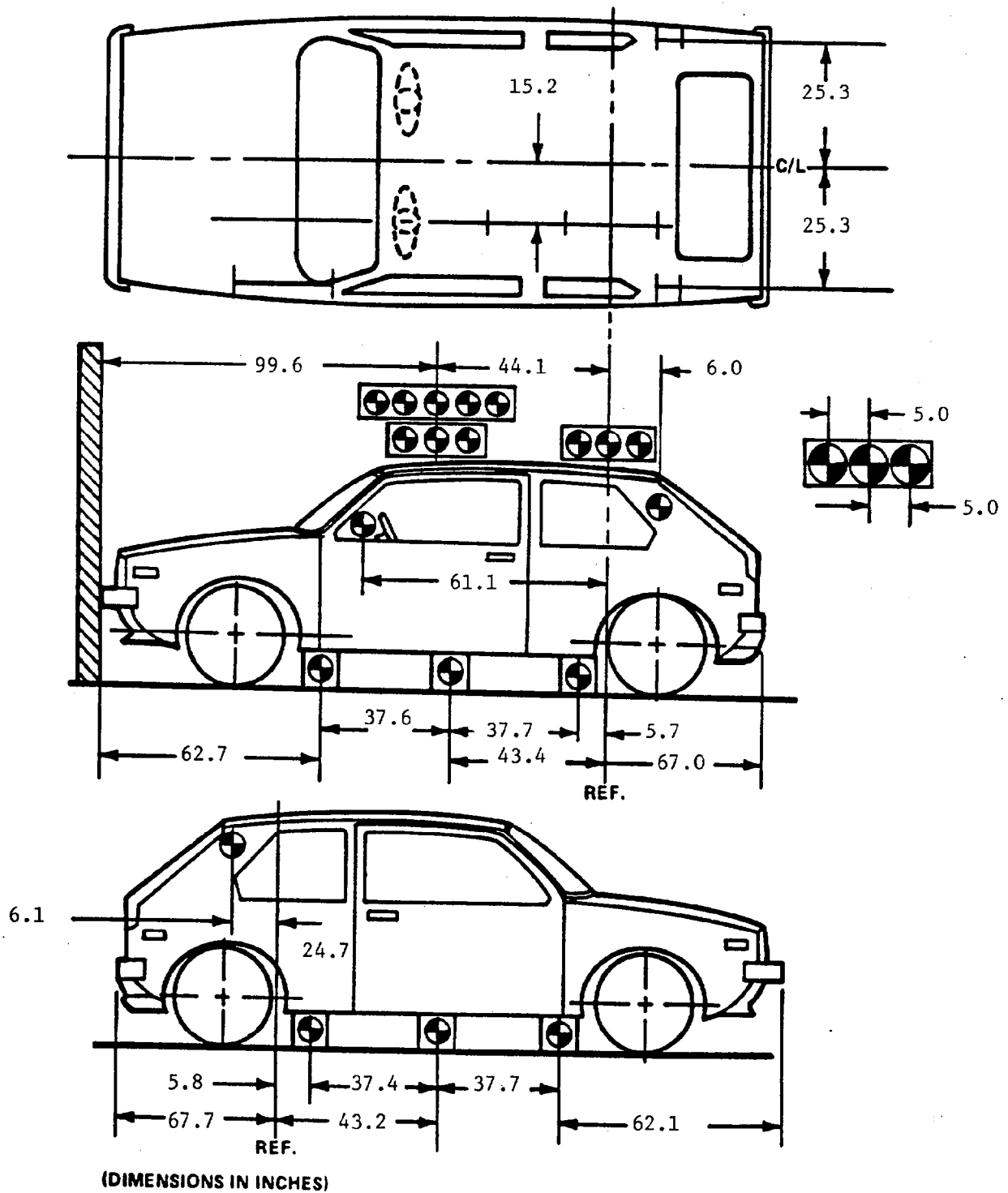


Figure 9

TEST VEHICLE MEASUREMENTS

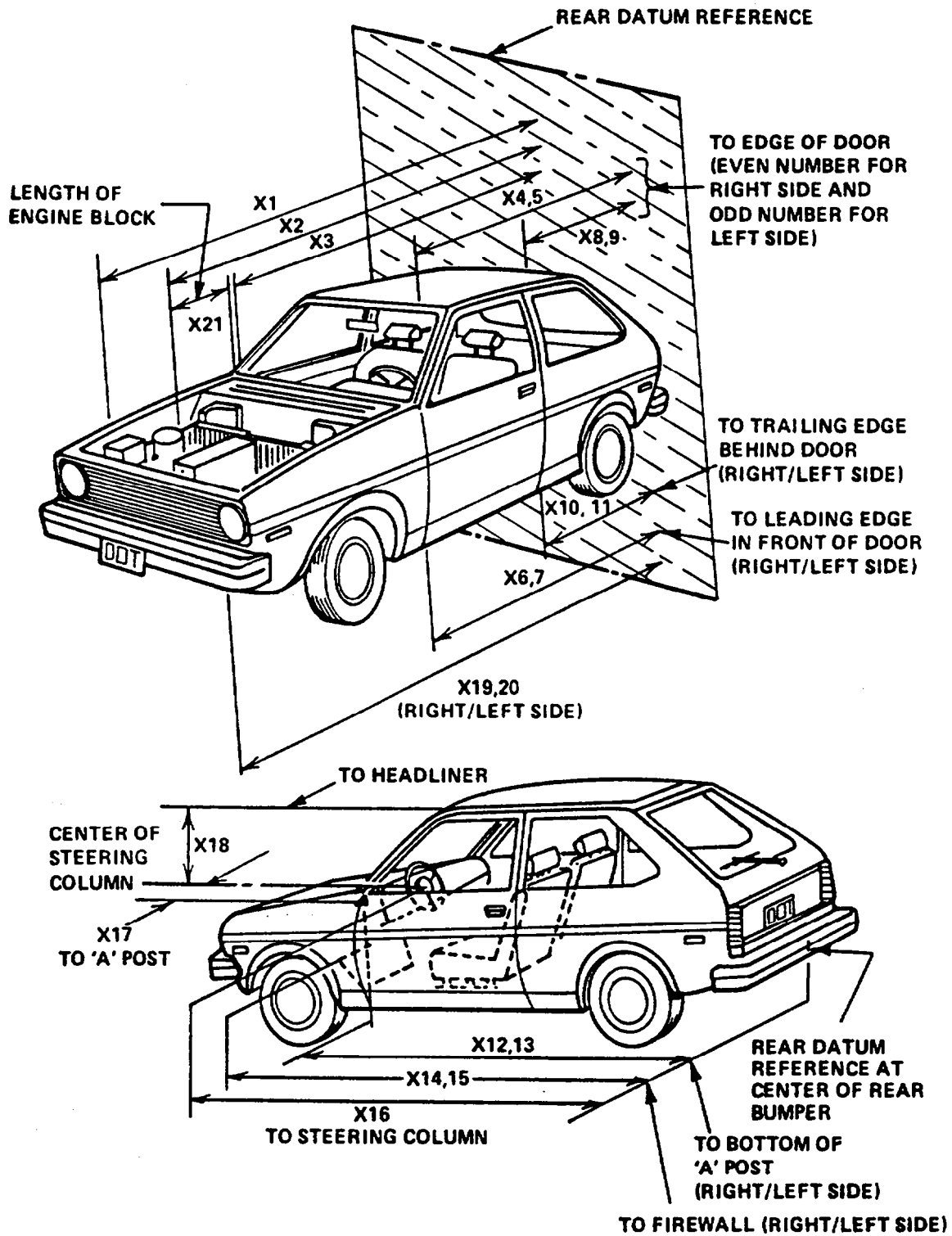


Table 6
VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	210.7	187.1	23.6
X2	Rear Surface of Vehicle to Front of Engine	180.2	174.9	5.3
X3	Rear Surface of Vehicle to Firewall	152.7	151.0	1.7
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	139.9	139.4	0.5
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	139.5	139.3	0.2
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	139.9	139.3	0.6
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	139.5	138.9	0.6
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	99.5	99.0	0.5
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	99.2	98.7	0.5
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	98.4	97.4	1.0
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	97.5	97.1	0.4
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	139.0	138.2	0.8
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	138.8	138.0	0.8
X14	Rear Surface of Vehicle to Firewall, Right Side	151.2	152.1	-0.9
X15	Rear Surface of Vehicle to Firewall, Left Side	150.1	151.6	-1.5
X16	Rear Surface of Vehicle to Steering Column	122.3	124.8	-2.5
X17	Center of Steering Column to "A" Post	17.9	17.5	0.4
X18	Center of Steering Column to Headliner	16.5	17.0	-0.5
X19	Rear Surface of Vehicle to Right Side of Front Bumper	206.5	185.8	20.7
X20	Rear Surface of Vehicle to Left Side of Front Bumper	205.7	186.7	19.0
X21	Length of Engine Block	26.0	26.0	0.0

Section 4

SUMMARY OF RESULTS OF FMVSS NOS. 208, 212, 219 AND 301-75

- "Occupant Crash Protection," FMVSS No. 208 Data
- "Windshield Mounting," FMVSS No. 212 Data
- "Windshield Zone Intrusion," FMVSS No. 219 (Partial) Data
- "Fuel System Integrity," FMVSS No. 301-75

Table 7

DUMMY INJURY CRITERIA VALUESNHTSA No.: CLO202 Vehicle: 1990 Thunderbird Std. 2-Door Coupe

	MAXIMUM HEAD ACCELERATION (g's)							
	X	Y	Z	R	X	Y	Z	R*
Dummy (1)	-57	38	35	67	-41	-7	19	44.7
Dummy (2)	-33	9	36	39	-31	33	11	33.0

	MAXIMUM FORCE - FEMUR LOAD (lbs.)	
	LEFT FEMUR	RIGHT FEMUR
Dummy (1)	1410	932
Dummy (2)	817	651

	HEAD INJURY CRITERIA**			
	HIC	36 millisecond Maximum		Avg. Acc. (g) t ₁ TO t ₂
		t ₁ (SEC)	t ₂ (SEC)	
Dummy (1)	268	.07980	.10350	41.8
Dummy (2)	219	.08070	.11670	32.6

*Defined as exceeding 0.003 sec. duration

**As defined in FMVSS No. 208

Table 8

FMVSS NO. 208 - SEAT BELT WARNING SYSTEM CHECK

With occupant in driver's position, the lap belt in stowed position, and ignition switch placed in "Start/On" position:

Log time duration of audible warning signal = 5.5 sec.

Log time duration of reminder light operation = 5.5 sec.

With occupant in driver's position, lap belt in use, and the ignition switch placed in "Start/On" position:

Log time duration of audible warning signal = 0.0 sec.

(audible warning should not operate)

Log time duration of reminder light operation = 6.4 sec.

Note wording of visual warning:

Fasten Seat Belt -

Fasten Belt -

Symbol 101-80 X

Table 9

FMVSS NO. 208 - LABELING AND DRIVER'S MANUAL INFORMATION

Locate label which describes manufacturers maintenance or replacement schedule for crash-deployed occupant protection system.

Describe location:

Inside glove box.

The manufacturers recommend no maintenance is needed unless:

- (1) "Air Bag" lamp does not light when key is turned on.
- (2) "Air Bag" lamp flashes or stays lit.
- (3) Groups of five "beeps" are heard.
- (4) An air bag has inflated.

Were appropriate instructions concerning maintenance and/or replacement of this system provided? YES X NO

Was a description of the functional operation of the system provided? YES X NO

Is there a reference to the instructions and description of the system on the label? YES X NO

Was an owner's manual provided? YES X NO

Did the owner's manual contain appropriate information concerning maintenance and/or replacement and a description of the functional operation of the systems? YES X NO

Table 10

FMVSS NO. 208 - READINESS INDICATOR

An occupant restraint system that deploys in the event of a crash shall have a monitoring system with a readiness indicator. A totally mechanical system is exempt from this requirement.

Is the system totally mechanical? YES _____ NO X _____

Describe the location of the readiness indicator:

Upper left corner of instrument cluster.

Is the readiness indicator clearly visible to the driver?

YES X _____ NO _____

Is a list of the elements in the occupant restraint system, being monitored by the readiness indicator, provided?

YES X _____ NO _____

Table 11

FMVSS NO. 208 - COMFORT AND CONVENIENCE TEST SUMMARY

Test Vehicle NHTSA No.: CLO202
 Make/Model: 1990 Ford Crown Victoria
 Date of Comfort/Convenience Check: December 8, 1989
 Technician Performing Check: V.M.P.
 GVWR: 5302 lbs.

Seat belt comfort and convenience requirements cover vehicles manufactured on or after September 1, 1986, which have a gross vehicle weight rating of 10,000 pounds or less. Exemptions to this rule are belts installed in a walk-in, van-type vehicle and manual Type 2 belt systems installed in the front outboard seating positions of passenger automobiles. On or after September 1, 1989, the exemption of the type 2 manual seat belts installed in the front outboard seating positions of passenger automobiles will change depending on the states' enactment of mandatory usage laws.

Was vehicle built after or on September 1, 1986, and is it equipped with:

1. Automatic seat belts YES _____ NO X

If yes, go to requirements D1, D2 and D3

2. Manual seat belts* YES X** NO _____

a. The seat belts, other than Type 2 lap/shoulder belts, are located in the front outboard seating positions of a passenger automobile.

YES _____ NO X

(Go to requirements D3, D4, D5, and D6)

b. The seat belt system is Type 2 lap/shoulder belt in the front outboard seating positions or the seat belts are located in a walk-in van.

STOP

*If the seat belts are voluntarily installed by the manufacturer they do not have to comply.

**Manual seat belt was used only on passenger dummy. Driver position equipped with an air bag.

D1

CONVENIENCE HOOKS

A convenience hook or other device is provided to stow seat belt webbing to facilitate entering or exiting the vehicle.

YES _____ NO X

D2

WEBBING TENSION - RELIEVING DEVICE

The seat belt assembly installed in the outboard designated seating position has either manual or automatic tension relieving devices permitting the introduction of slack in the webbing of the shoulder belt ("comfort clips" or "window shade" devices).

YES _____ NO X

D3

BELT CONTACT FORCE

1. Do not measure the belt contact force if the manual or automatic seat belt assemblies in this vehicle incorporate a webbing tension relieving device. Does the vehicle incorporate a tension relieving device?

YES _____ NO X

2. Seats are adjusted according to instructions in Appendix B.

YES X NO _____

3. The test dummies are positioned according to dummy position placement instructions in Appendix B and Appendix C.

YES X NO _____

4. Close the vehicle's adjacent door, pull either 12 inches of belt webbing or the maximum available amount of belt webbing, whichever is less, from the retractor and then release it, allowing the belt webbing to return to the dummy's chest, then fasten the latch. Locate the point where the centerline of the upper torso belt webbing crosses the midsagittal line on the dummy's chest. At that point, pull the belt webbing out 3 inches from the dummy's chest and release until it is within one inch from the dummy's chest. Measure the contact force exerted by the belt webbing on the dummy's chest. The contact for is 0.5 pounds. Contact the COTR if the contact force exceeds 0.7 pounds.

Figure 10

FMVSS NO. 212 - "WINDSHIELD MOUNTING" DATA SHEET

DETAILS OF WINDSHIELD MOUNTING SUCH AS RETENTION METHOD, TRIM TYPE, ETC.:

Windshield is bonded in place. Windshield sides covered by 1.1" metal and rubber trim. Top of windshield covered by 0.9" metal trim. No trim covering on lower edge of windshield.

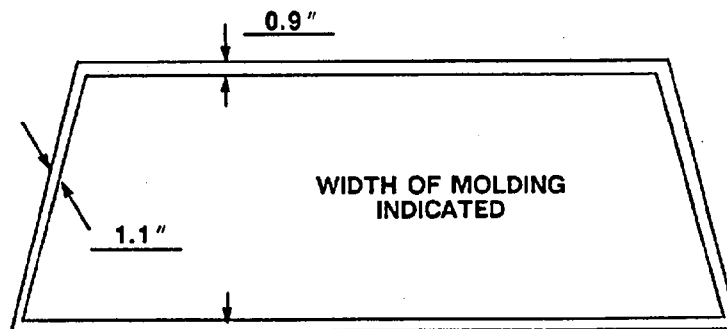
FMVSS 212 REQUIREMENTS:

The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

FMVSS 212 TEST DATA:

	WINDSHIELD PERIPHERY		PERCENT RETENTION
	PRE-TEST (in.)	POST-TEST (in.)	
RIGHT SIDE	87.7	87.7	100%
LEFT SIDE	87.7	87.7	100%
TOTAL	175.4	175.4	100%

AREA OF RETENTION FAILURE:



FRONT VIEW

FAILURE DETAILS:

None

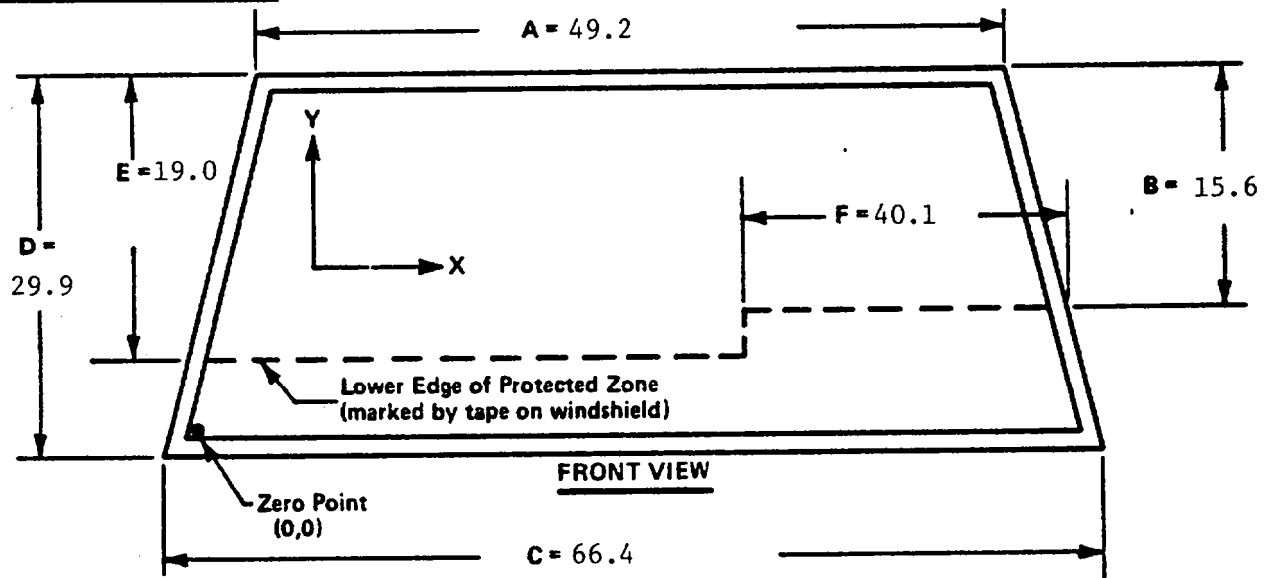
Figure 11

FMVSS NO. 219 (PARTIAL) - "WINDSHIELD ZONE INTRUSION" DATA SHEET

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5° dia. rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. The locus of points is drawn on the inner surface of the windshield contacted by the sphere across the width of the instrument panel. From the outermost contactable points, extend the locus line horizontally to the edges of the windshield, and then draw a line on the inner surface of the windshield below and 1/2" distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection of this line onto the outer surface of the windshield.

FMVSS 219 TEST DATA:



DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4°:

(Show location of penetration on above sketch)

None

COORDINATES		
	X	Y
1.		
2.		
3.		
4.		

Table 12

FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

FMVSS NO. 301

TEST VEHICLE NHTSA NO.: CL0202

TEST DATE: December 12, 1989

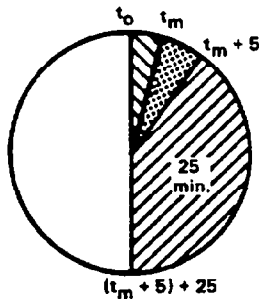
Vehicle Mfr./Make/Model: 1990 Ford Crown Victoria 4-Door Sedan

Test vehicle fuel tank filled to 92% to 94% of manufacturer's "usable" capacity and with electric fuel pump operating (if it will operate without engine operation). Part 572 test dummies located at each front designated seating position.

TEST VEHICLE IMPACT TYPE:

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

FUEL SPILLAGE MEASUREMENT:



1. From impact until vehicle motion ceases
2. For 5 minute period after vehicle motion ceases
3. For next 25 minutes

ACTUAL	MAX ALLOWED
0	1 oz.
0	5 oz.
0	1 oz./1 min.

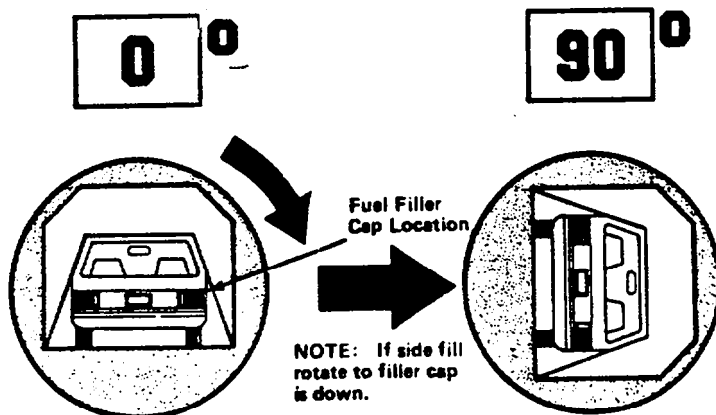
SOLVENT SPILLAGE DETAILS:

None

Table 13

FMVSS NO. 301 STATIC ROLLOVER DATA SHEETTEST PHASE:

Vehicle NHTSA ID No.:

CLQ202I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 03 minutes 00 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 05 minutes 00 seconds

TOTAL

08 minutes 00 seconds

Next whole minute interval

08 minutesII. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S):

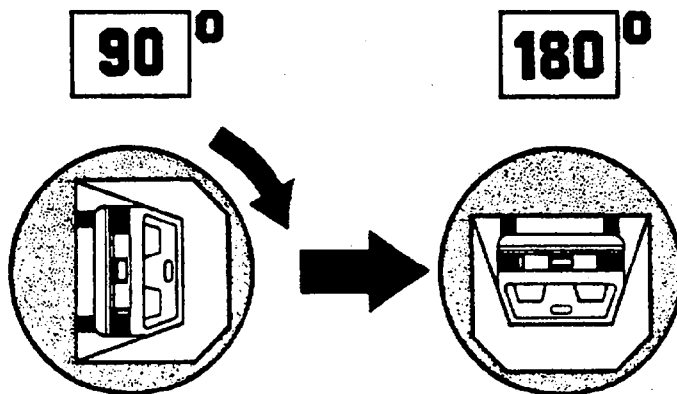
None

Table 13

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

Vehicle NHTSA ID No.:



CL0202

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes) 03 minutes 00 seconds

FMVSS 301 Position Hold Time + 05 minutes 00 seconds

TOTAL _____

08 minutes 00 seconds

Next whole minute interval 08 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

Note: Record spillage for whole minute intervals only as determined above.

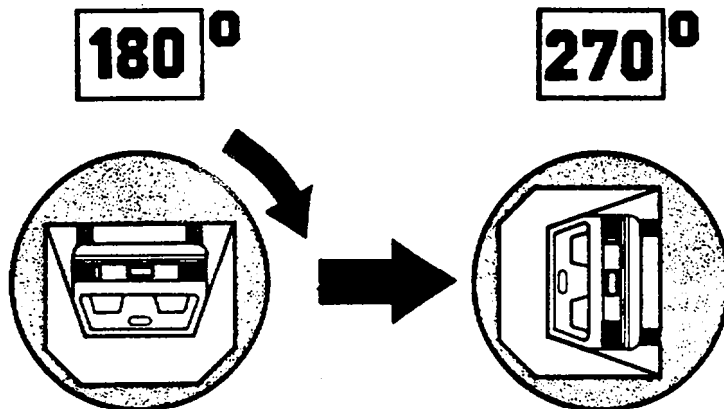
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 13

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)TEST PHASE:

Vehicle NHTSA ID No.:

CL0202I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 03 minutes 00 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 05 minutes 00 seconds

TOTAL

08 minutes 00 seconds

Next whole minute interval

08 minutesII. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S):

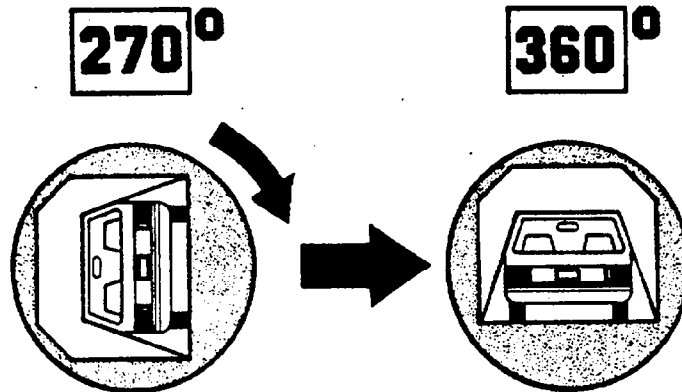
None

Table 13

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

Vehicle NHTSA ID No.:



CLO202

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes) 02 minutes 58 seconds

FMVSS 301 Position Hold Time + 05 minutes 00 seconds

TOTAL

07 minutes 58 seconds

Next whole minute interval

08 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 14

TEST VEHICLE NONCOMPLIANCE NOTICE

NHTSA Contract Lab: Calspan Advanced Technology Center

Lab Project Manager & Telephone No.: Walter E. Levan (716) 632-7500

Date of Test: December 12, 1989 Vehicle NHTSA No.: CL0202

Vehicle Manufacturer: Ford Motor Company

Model Year: 1990 VIN: 2FACP73F1LX112772

Body Style: 4-Door Sedan Build Date: September 1989

Dummy Stabilized Temperature at Time of Test: 70 °F (Spec. = 66-78°F)

Impact Velocity: 29.6 mph Time of Test: 13:05

Type of Automatic Restraint System: Driver - air bag restraint; Passenger -
3-point manual seat belt restraint.

Failure Details:

Vehicle appears to comply with the requirements of FMVSS Nos. 208, 212, 219
(partial) and 301.

Appendix A

PHOTOGRAPHS

LIST OF PHOTOGRAPHS

<u>Figure</u>	<u>Photograph Title</u>	<u>Page No.</u>
Figure A-1	PRE-TEST FRONT VIEW	A-3
Figure A-1	POST TEST FRONT VIEW	A-4
Figure A-3	PRE-TEST LEFT SIDE VIEW	A-5
Figure A-4	POST TEST LEFT SIDE VIEW	A-6
Figure A-5	PRE-TEST RIGHT SIDE VIEW	A-7
Figure A-6	POST-TEST RIGHT SIDE VIEW	A-8
Figure A-7	PRE-TEST RIGHT FRONT THREE-QUARTER VIEW	A-9
Figure A-8	POST-TEST RIGHT FRONT THREE-QUARTER VIEW	A-10
Figure A-9	PRE-TEST LEFT REAR THREE-QUARTER VIEW	A-11
Figure A-10	POST-TEST LEFT REAR THREE-QUARTER VIEW	A-12
Figure A-11	POST TEST TOP VIEW	A-13
Figure A-12	PRE-TEST WINDSHIELD VIEW	A-14
Figure A-13	POST-TEST WINDSHIELD VIEW	A-15
Figure A-14	PRE-TEST ENGINE COMPARTMENT VIEW	A-16
Figure A-15	POST-TEST ENGINE COMPARTMENT VIEW	A-17
Figure A-16	PRE-TEST FUEL FILLER CAP VIEW	A-18
Figure A-17	POST-TEST FUEL FILLER CAP VIEW	A-19
Figure A-18	PRE-TEST FRONT UNDERBODY VIEW	A-20
Figure A-19	POST-TEST FRONT UNDERBODY VIEW	A-21
Figure A-20	PRE-TEST FRONT SIDE UNDERBODY VIEW	A-22
Figure A-21	POST-TEST FRONT SIDE UNDERBODY VIEW	A-23
Figure A-22	PRE-TEST REAR UNDERBODY VIEW	A-24
Figure A-23	POST-TEST REAR UNDERBODY VIEW	A-25
Figure A-24	CERTIFICATION LABEL	A-26
Figure A-25	TIRE PLACARD	A-27
Figure A-26	PRE-TEST DRIVER DUMMY POSITION	A-28
Figure A-27	POST-TEST DRIVER DUMMY POSITION	A-29
Figure A-28	PRE-TEST PASSENGER DUMMY POSITION	A-30
Figure A-29	POST-TEST PASSENGER DUMMY POSITION	A-31
Figure A-30	PRE-TEST DRIVER DUMMY AND INTERIOR VIEW	A-32
Figure A-31	POST-TEST DRIVER DUMMY AND INTERIOR VIEW	A-33
Figure A-32	PRE-TEST PASSENGER DUMMY AND INTERIOR VIEW	A-34
Figure A-33	POST-TEST PASSENGER DUMMY AND INTERIOR VIEW	A-35
Figure A-34	POST-TEST DRIVER AIRBAG VIEW	A-36
Figure A-35	VEHICLE IMPACT	A-37
Figure A-36	BALLAST LOCATED IN RIGHT REAR TRUNK COMPARTMENT	A-38

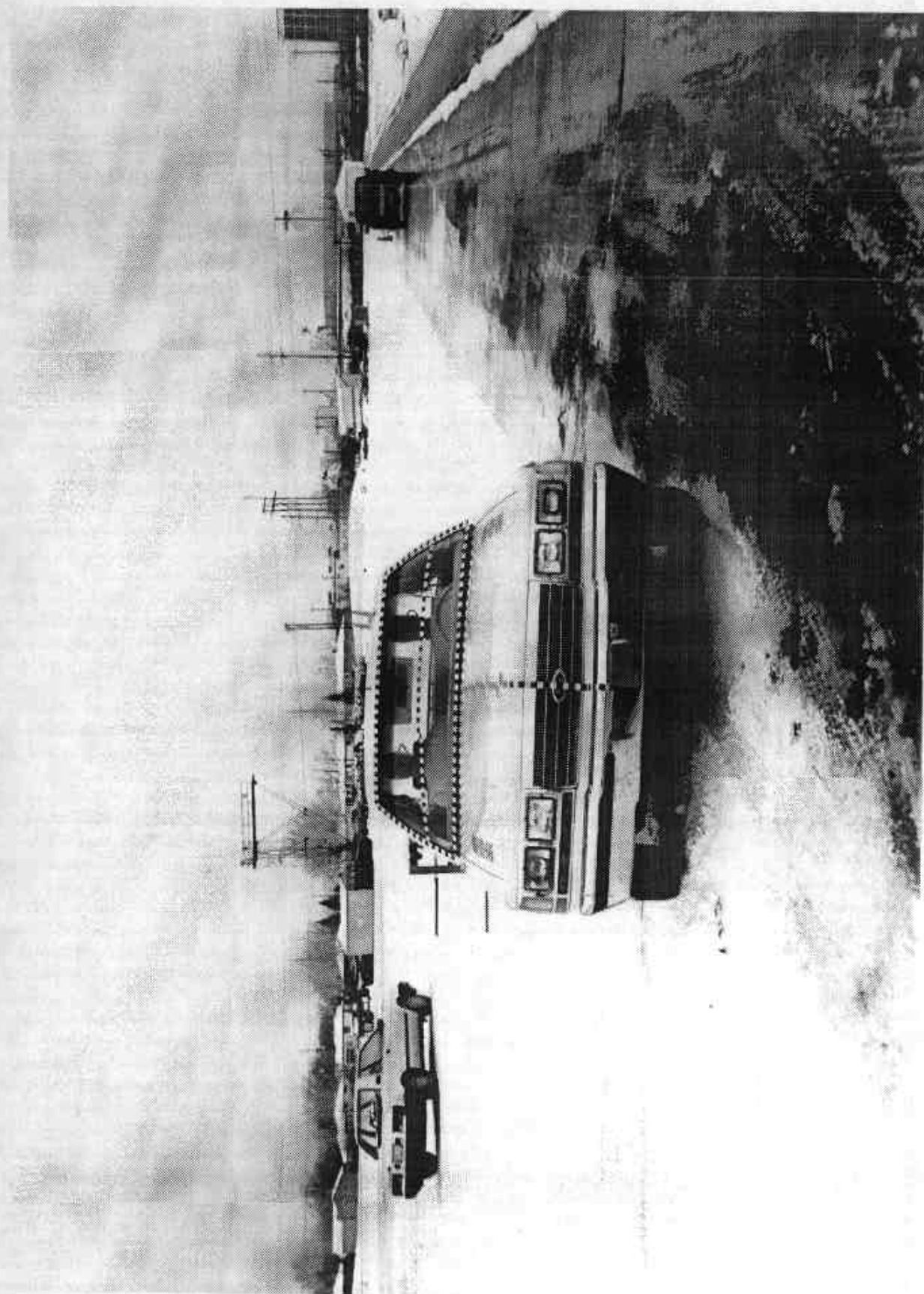


Figure A-1 PRE-TEST FRONT VIEW

A-3

7804-2

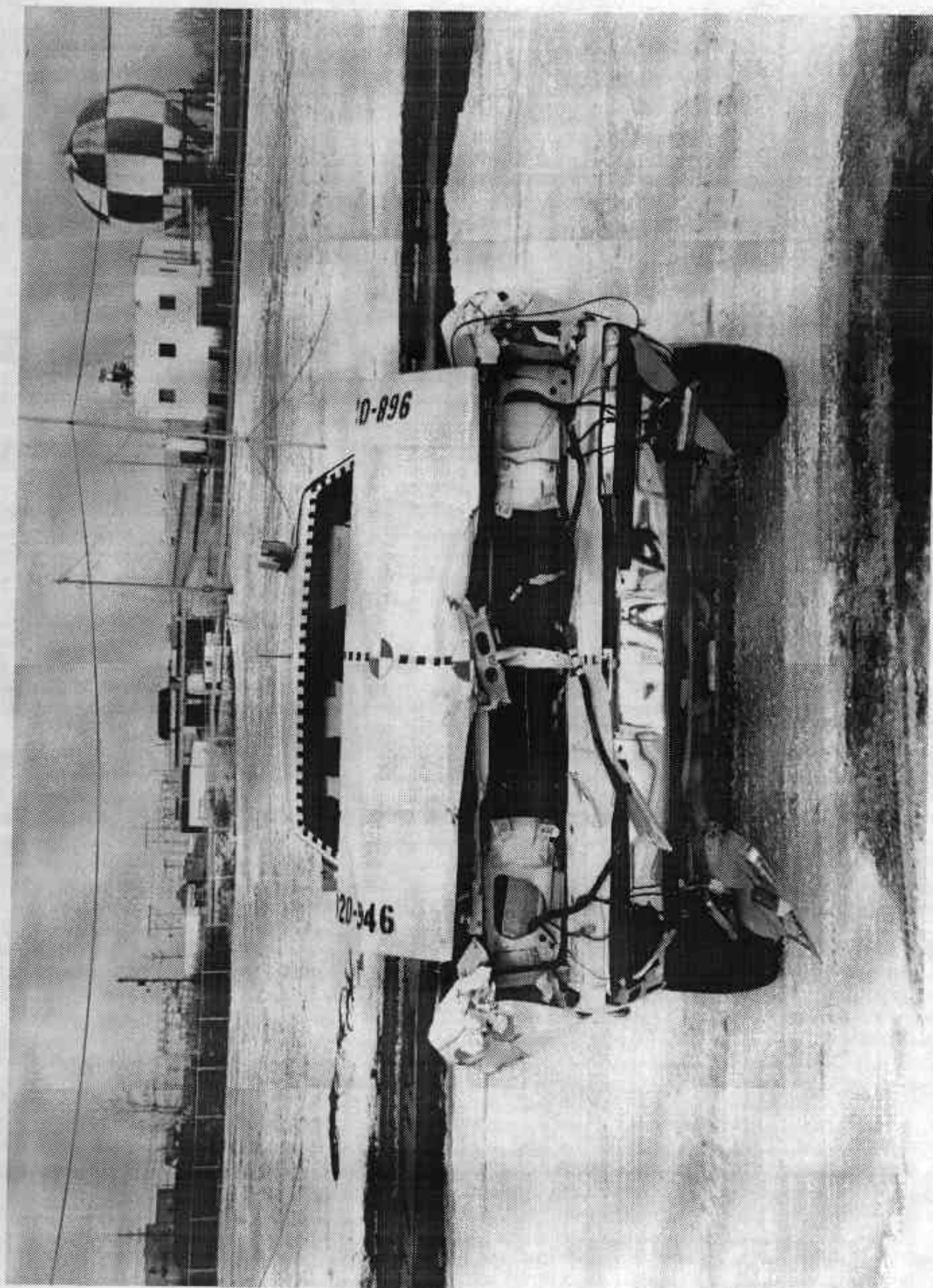


Figure A-2 POST TEST FRONT VIEW

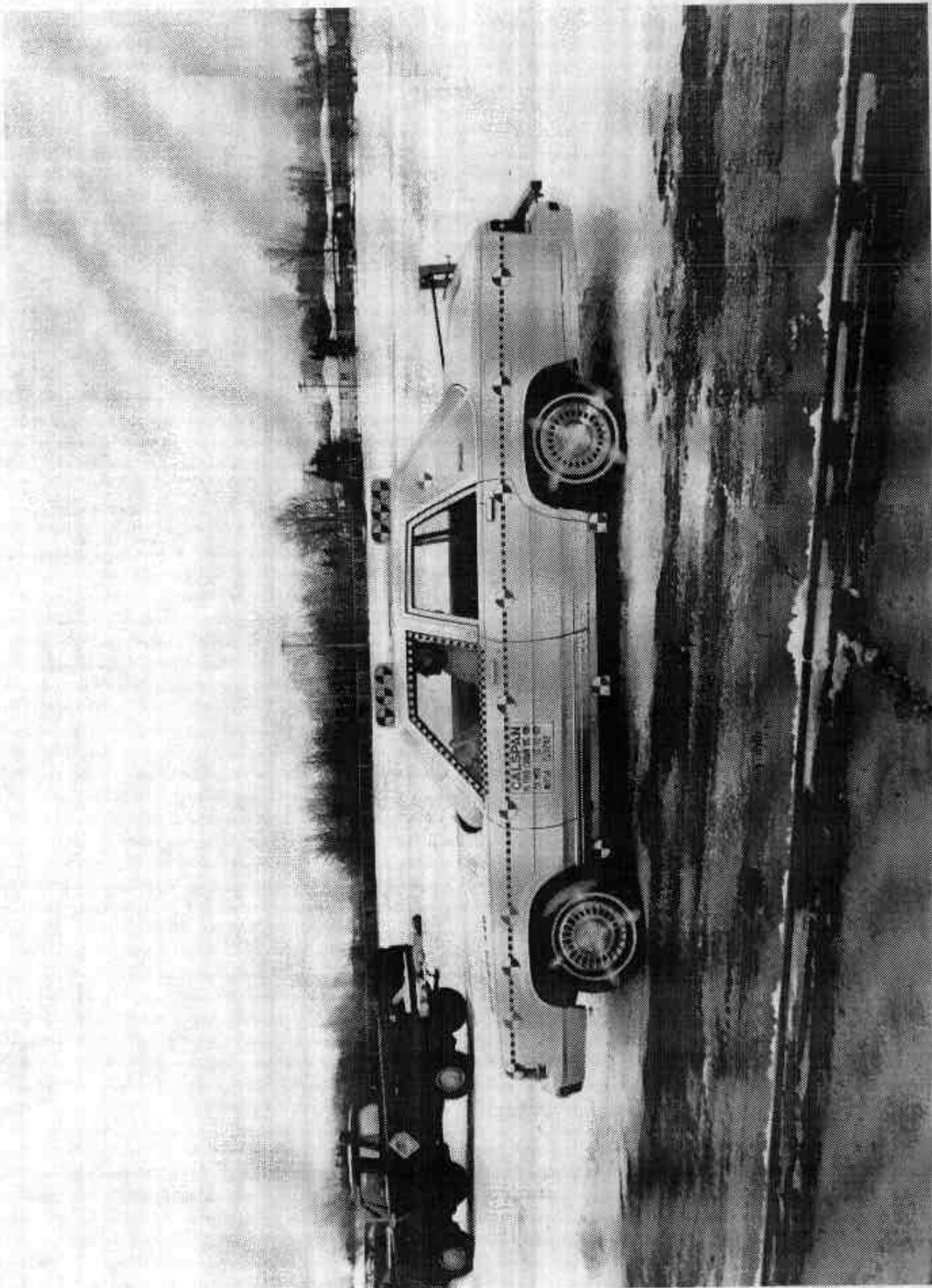


Figure A-3 PRE-TEST LEFT SIDE VIEW

A-5

7804-2

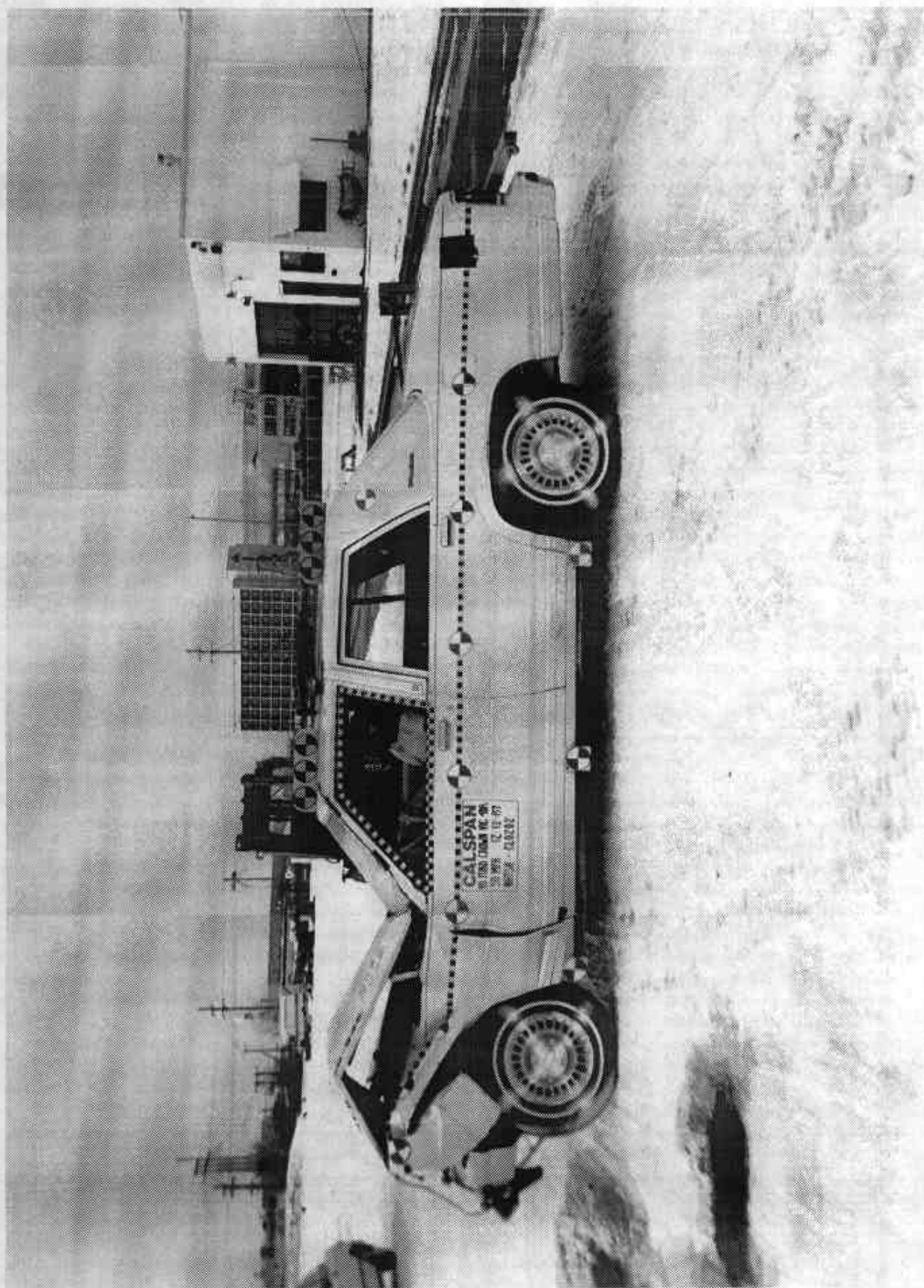


Figure A-4 POST TEST LEFT SIDE VIEW

A-6

7804-2

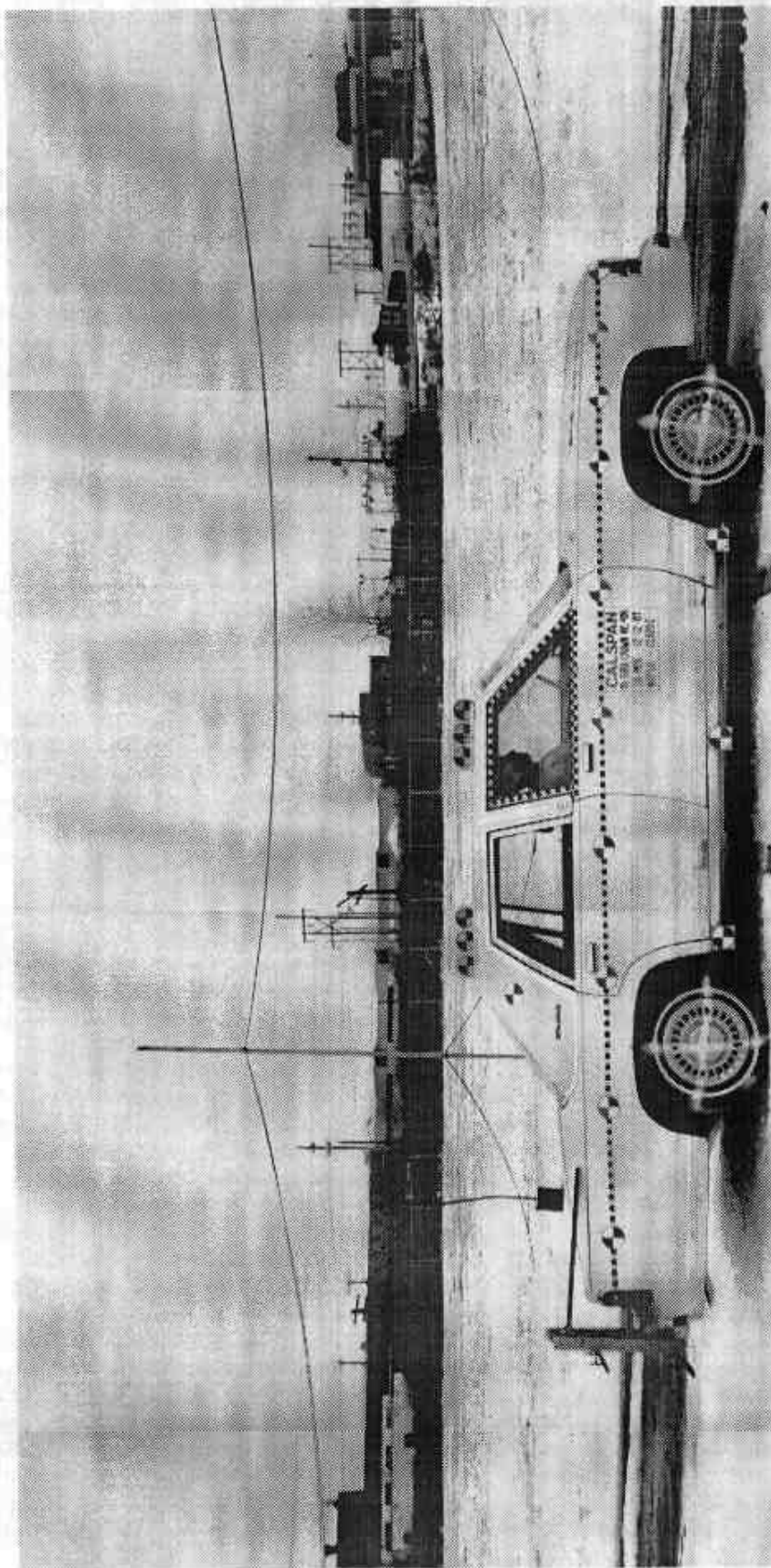


Figure A-8 PRE-TEST RIGHT SIDE VIEW

A-7

7804-2

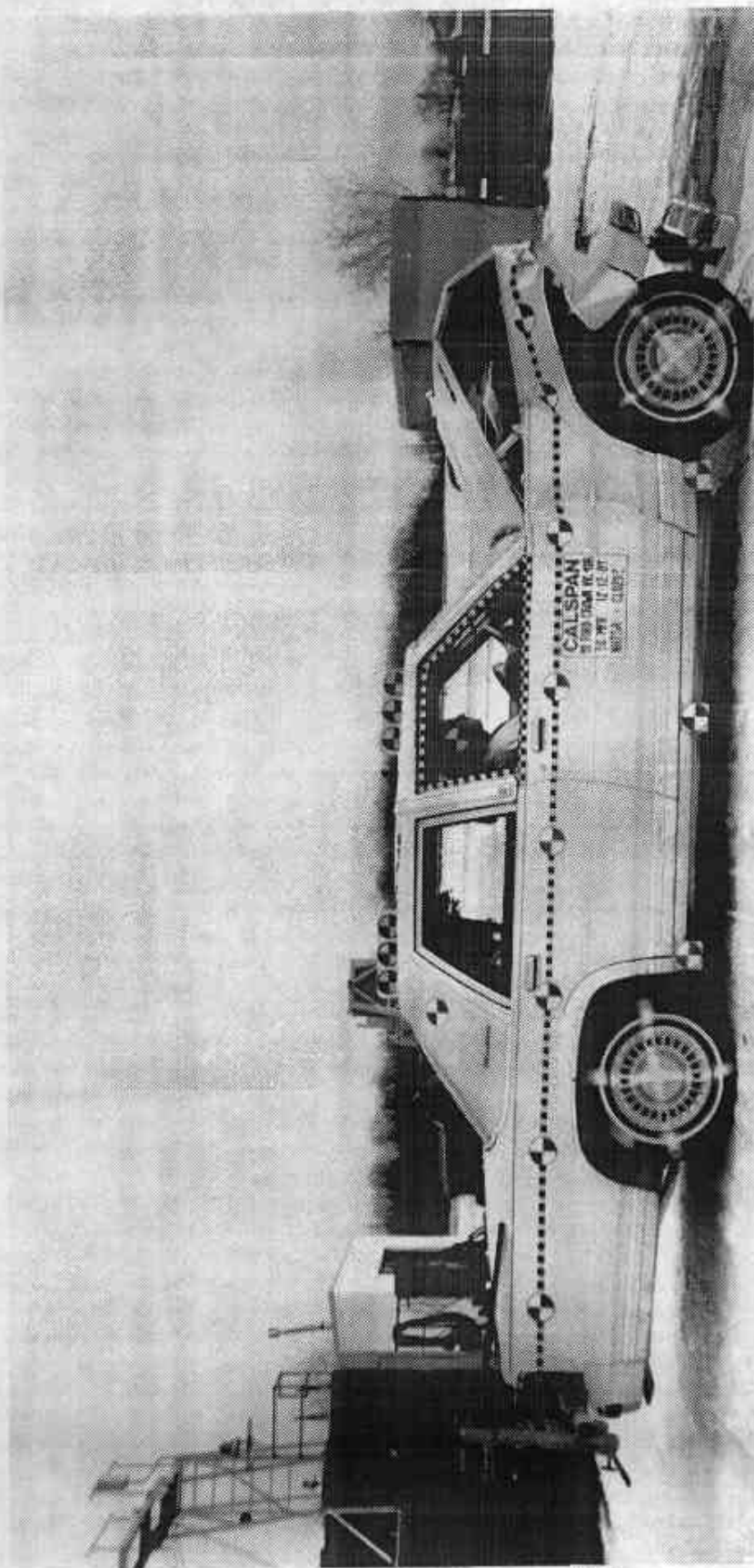


Figure A-6 POST-TEST RIGHT SIDE VIEW

A-8

7804-2

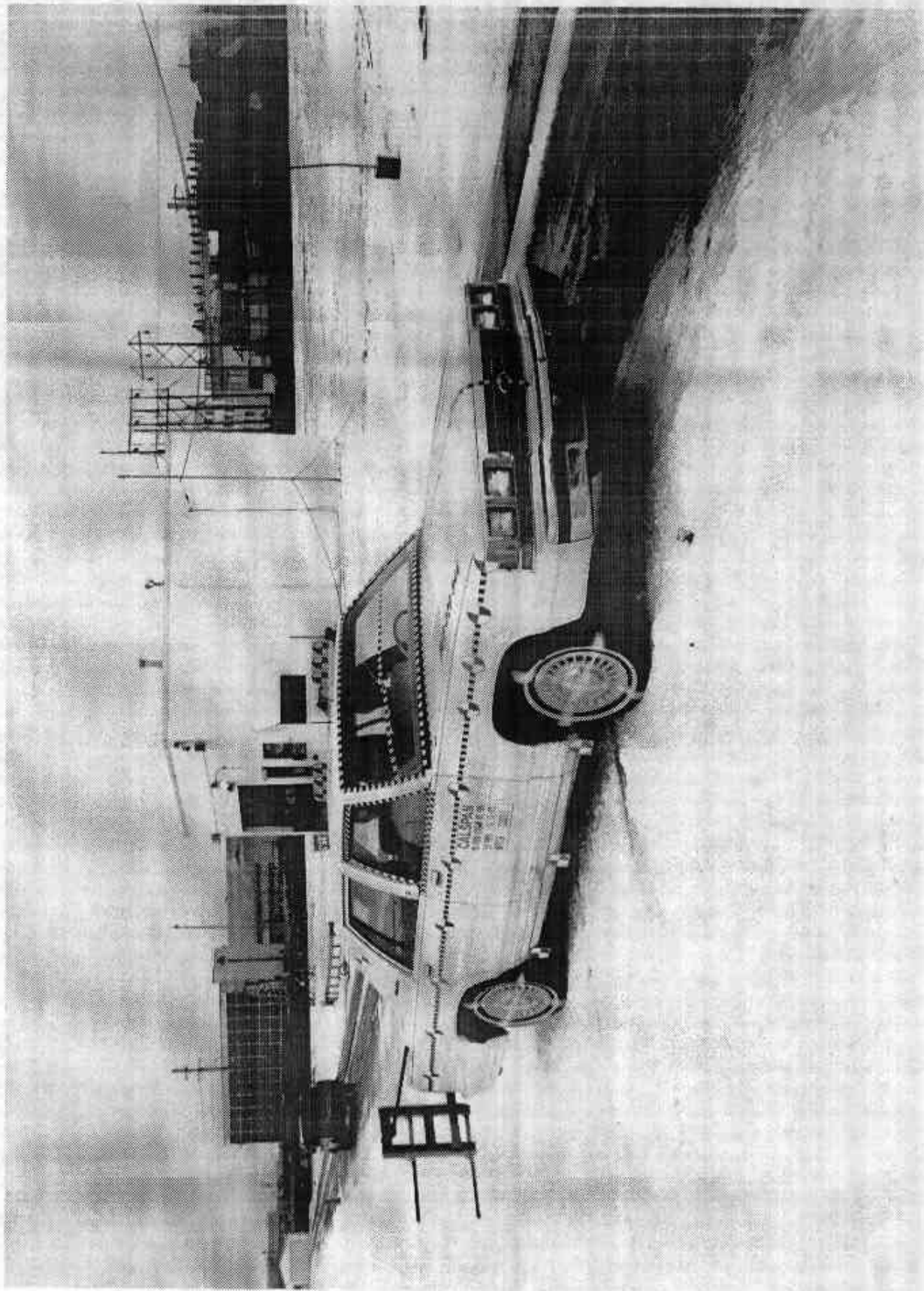


Figure A-7 PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

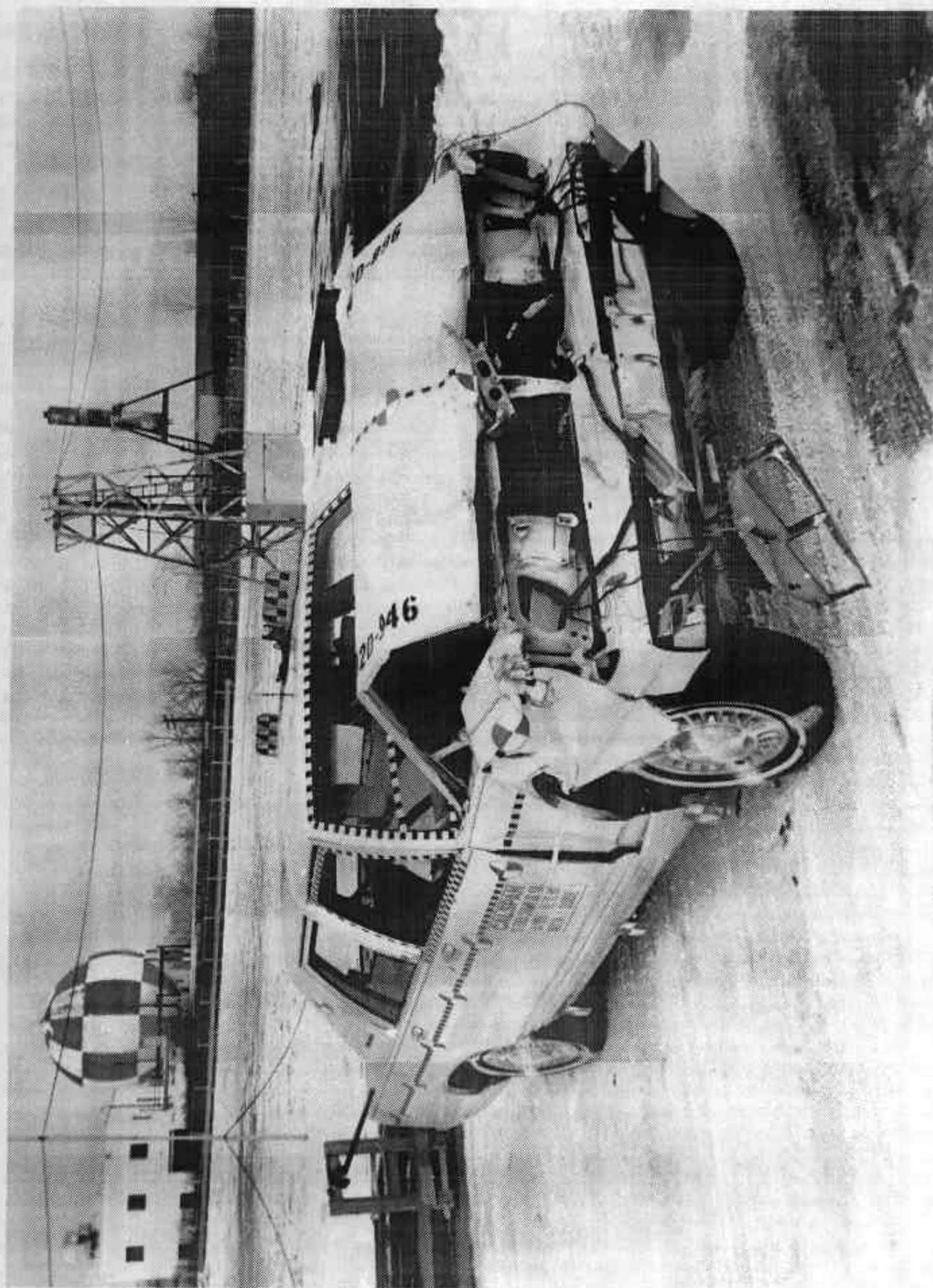


Figure A-8 POST-TEST RIGHT FRONT THREE-QUARTER VIEW



Figure A-9 PRE-TEST LEFT NEAR THREE-QUARTER VIEW

A-11

7804-2

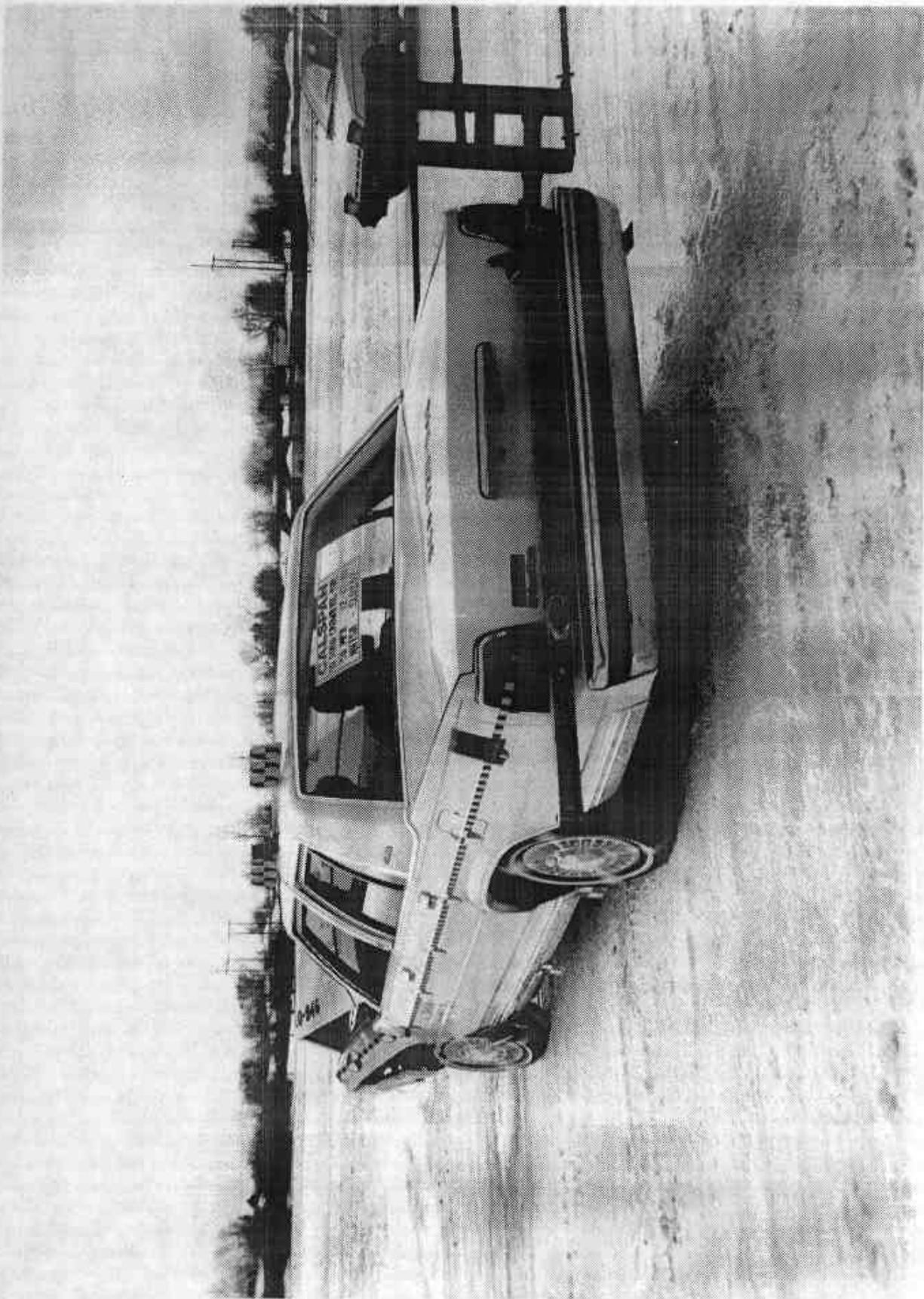


Figure A-10 POST-TEST LEFT REAR THREE-QUARTER VIEW

A-12

7804-2

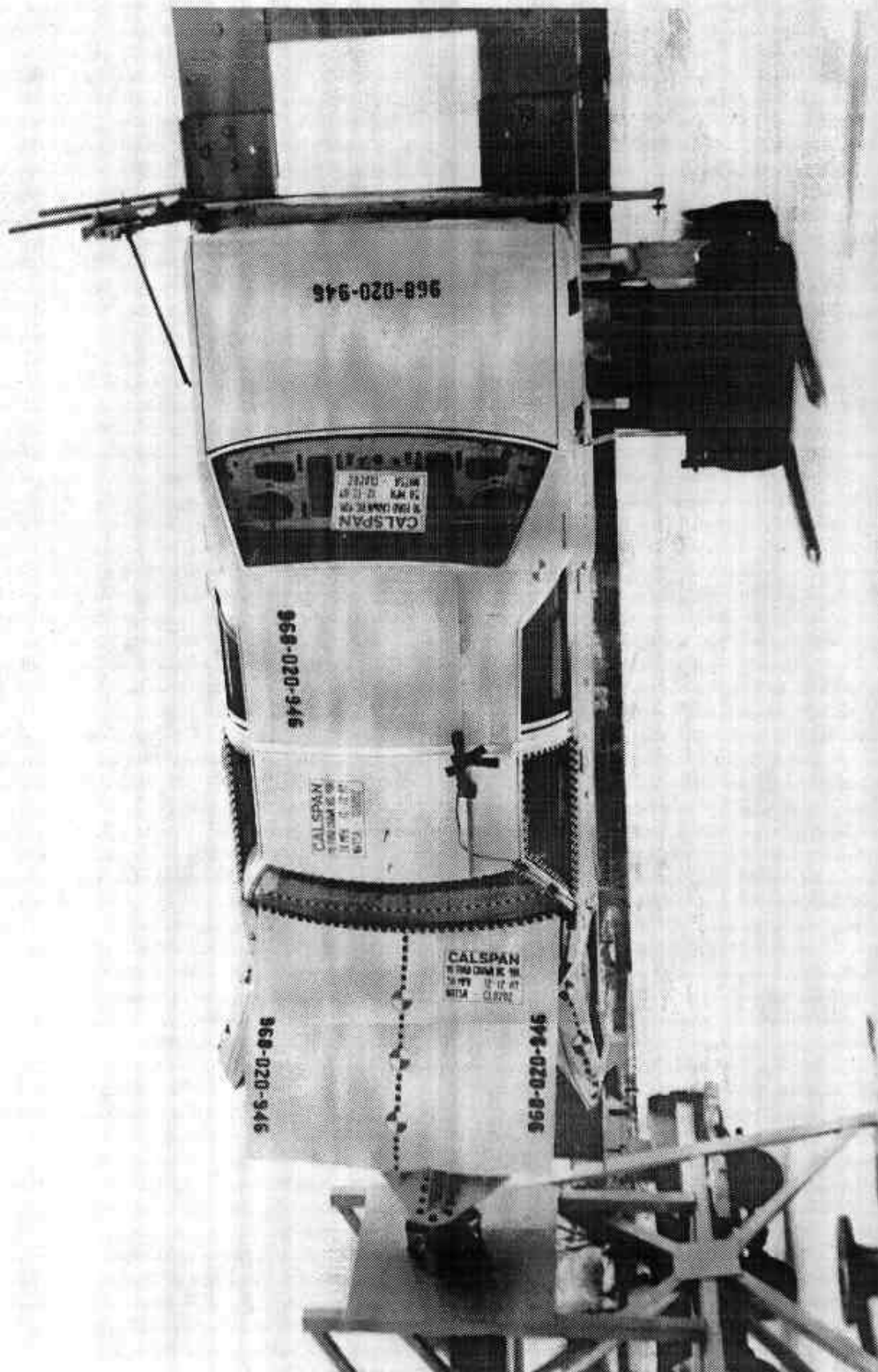


Figure A-11 POST TEST TOP VIEW

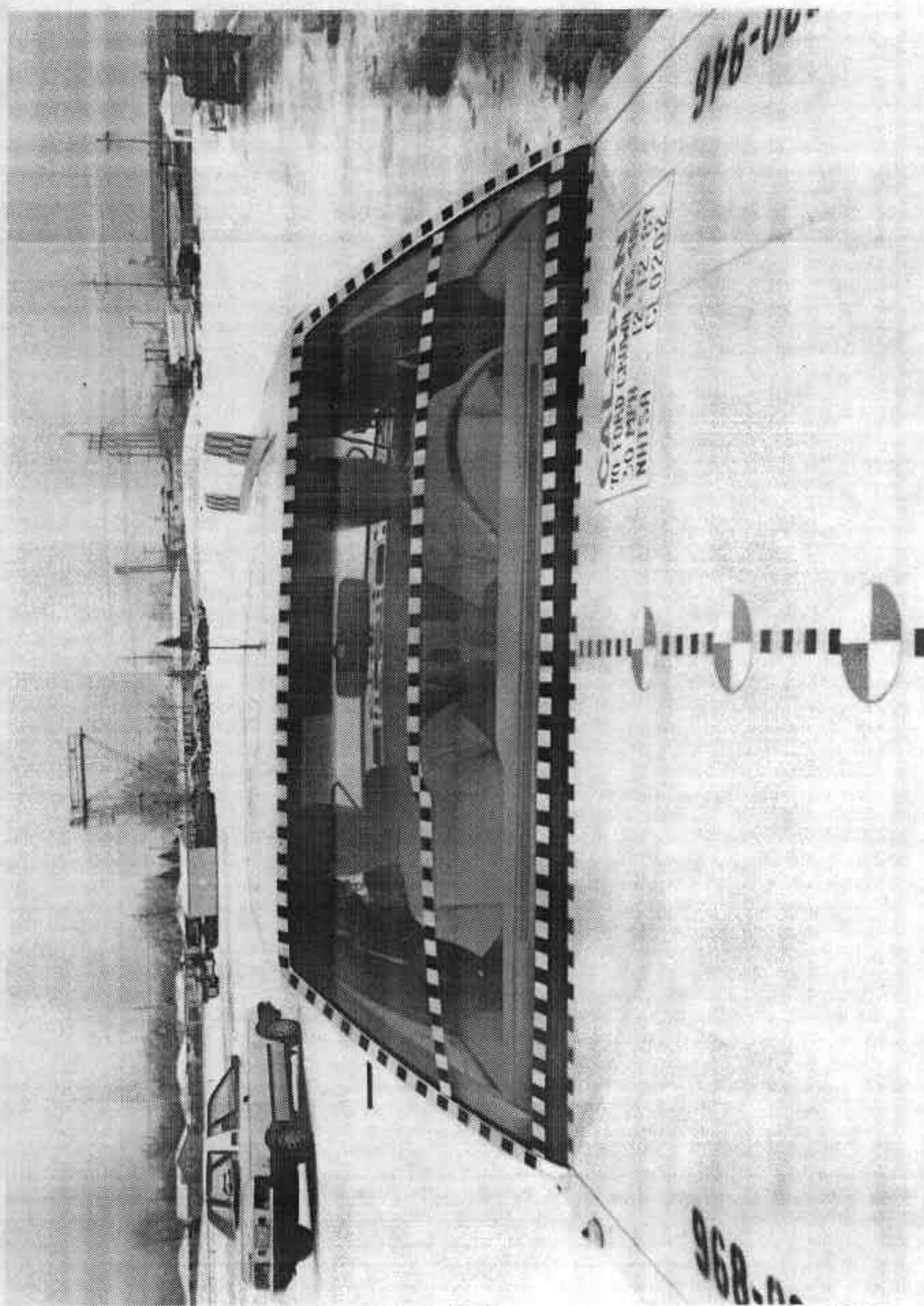


Figure A-12 PRE-TEST WINDSHIELD VIEW

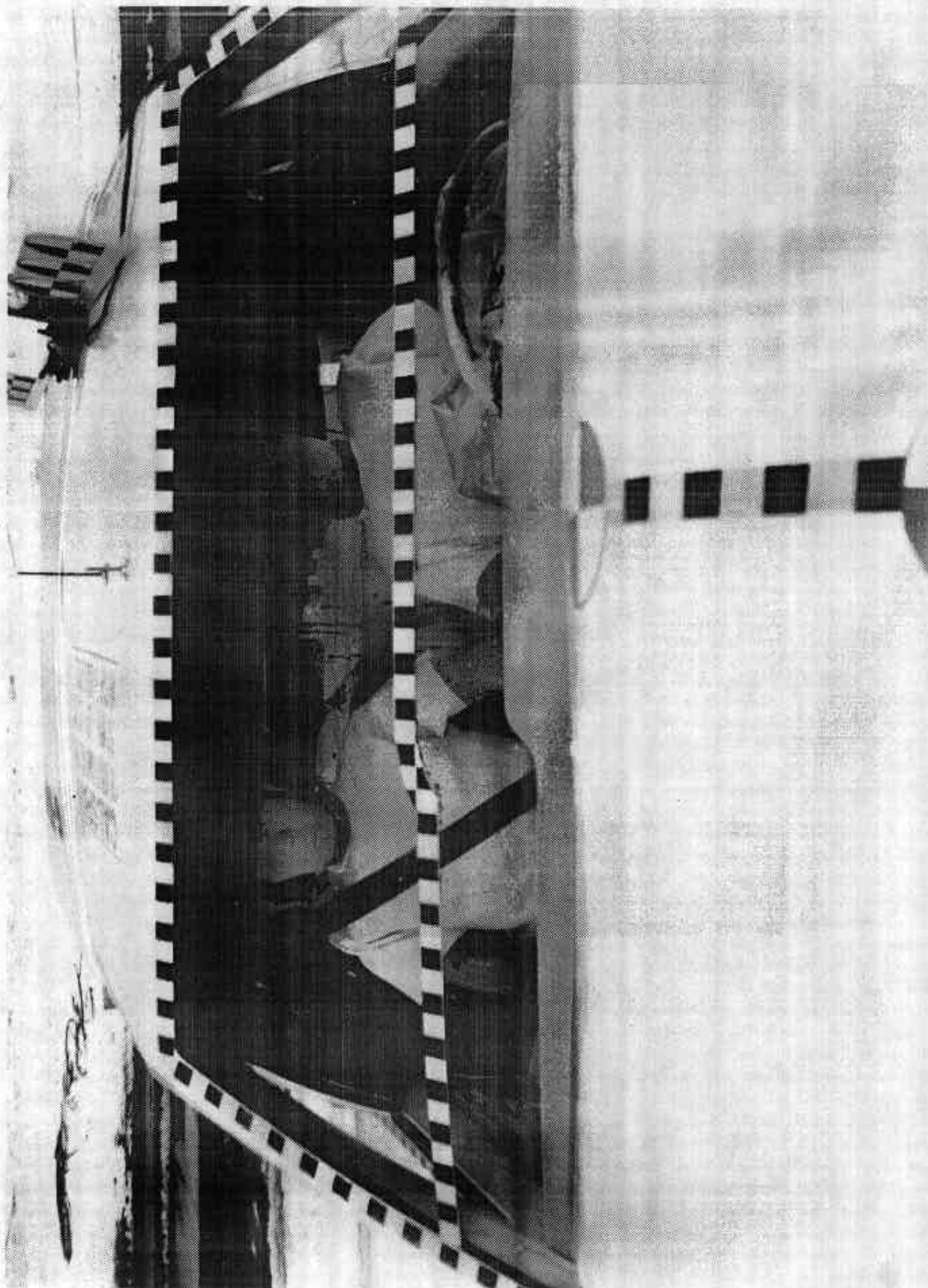
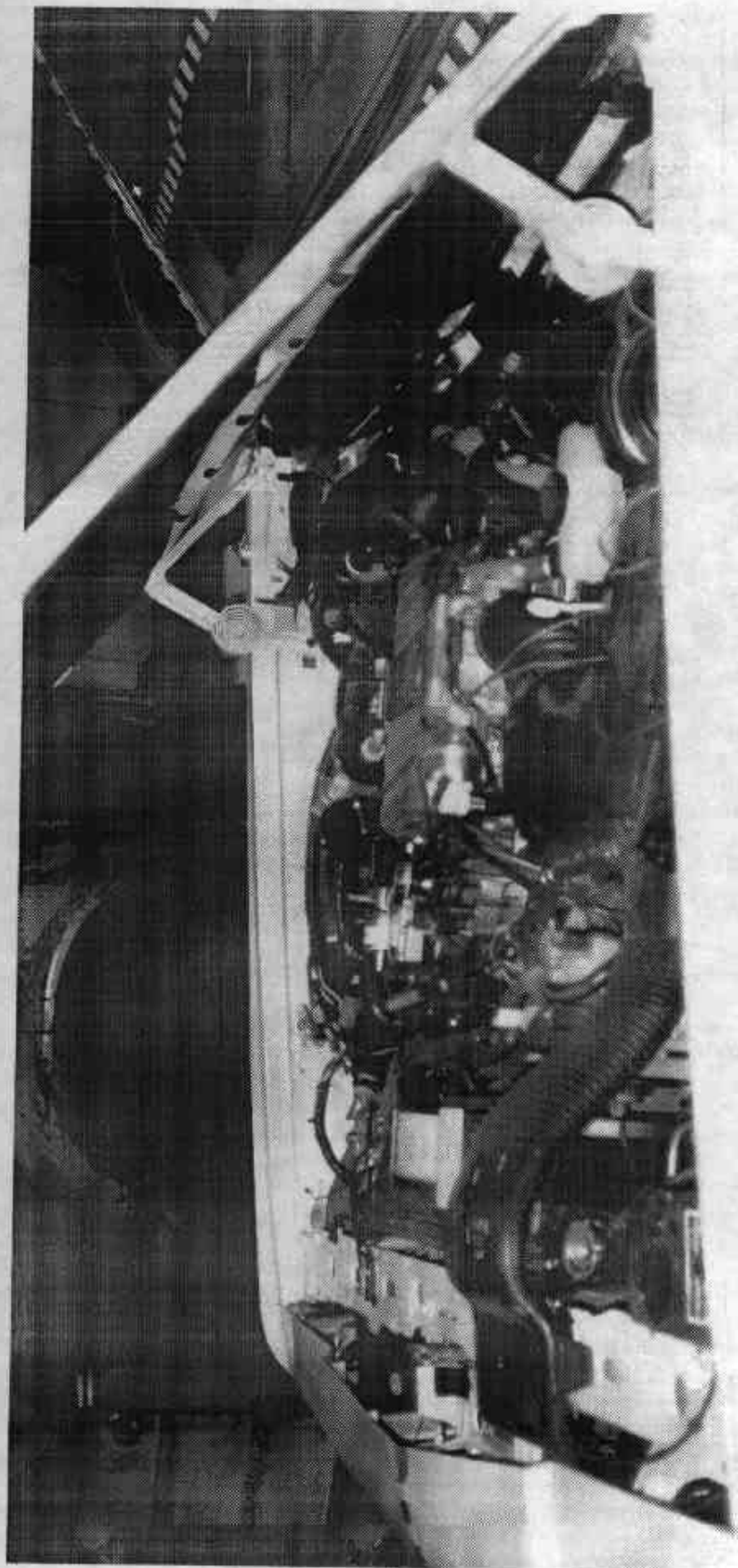


Figure A-13 POST-TEST WINDSHIELD VIEW

A-15

7804-2



A-16



Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

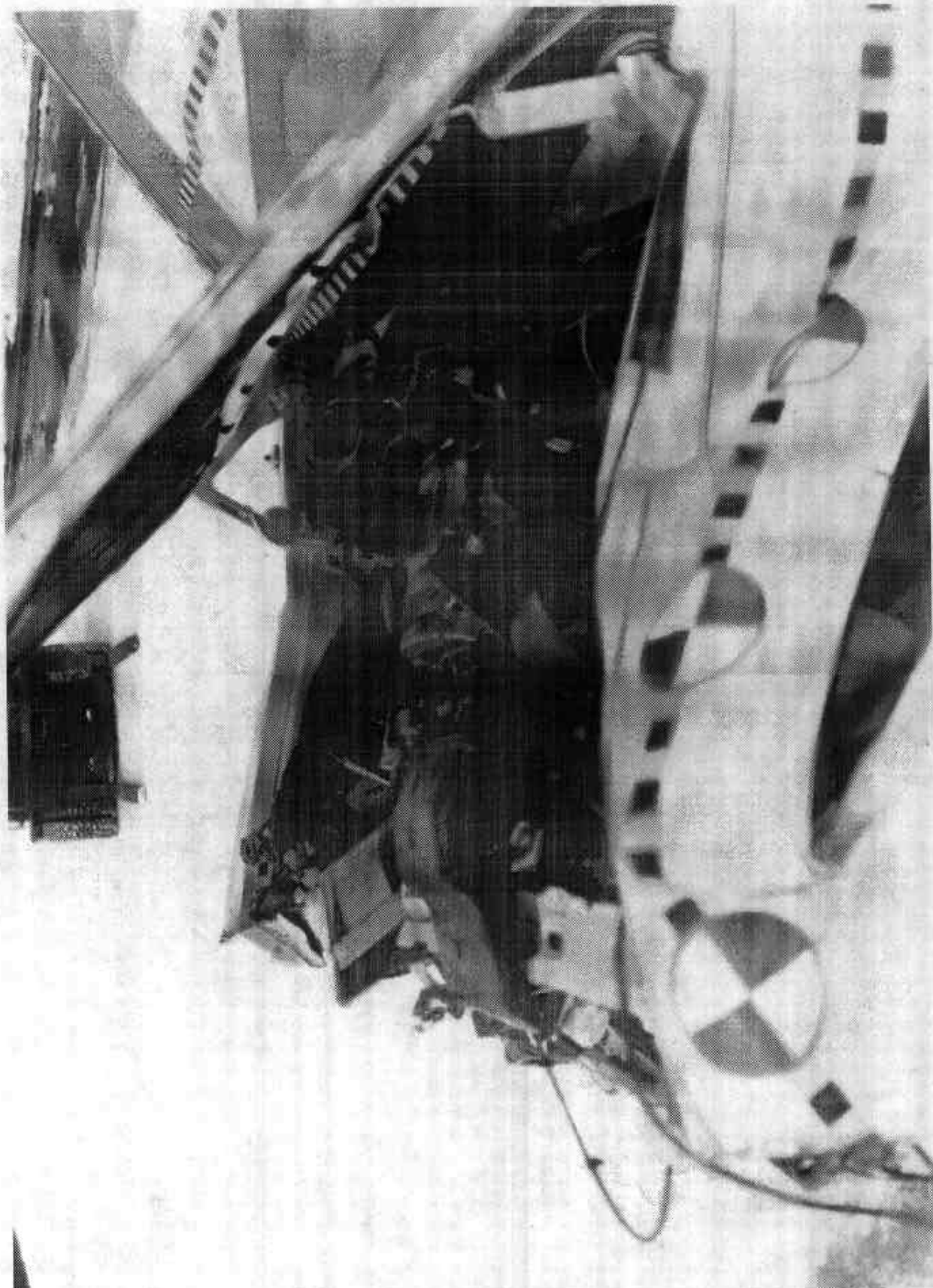


Figure A-15 POST-TEST ENGINE COMPARTMENT VIEW

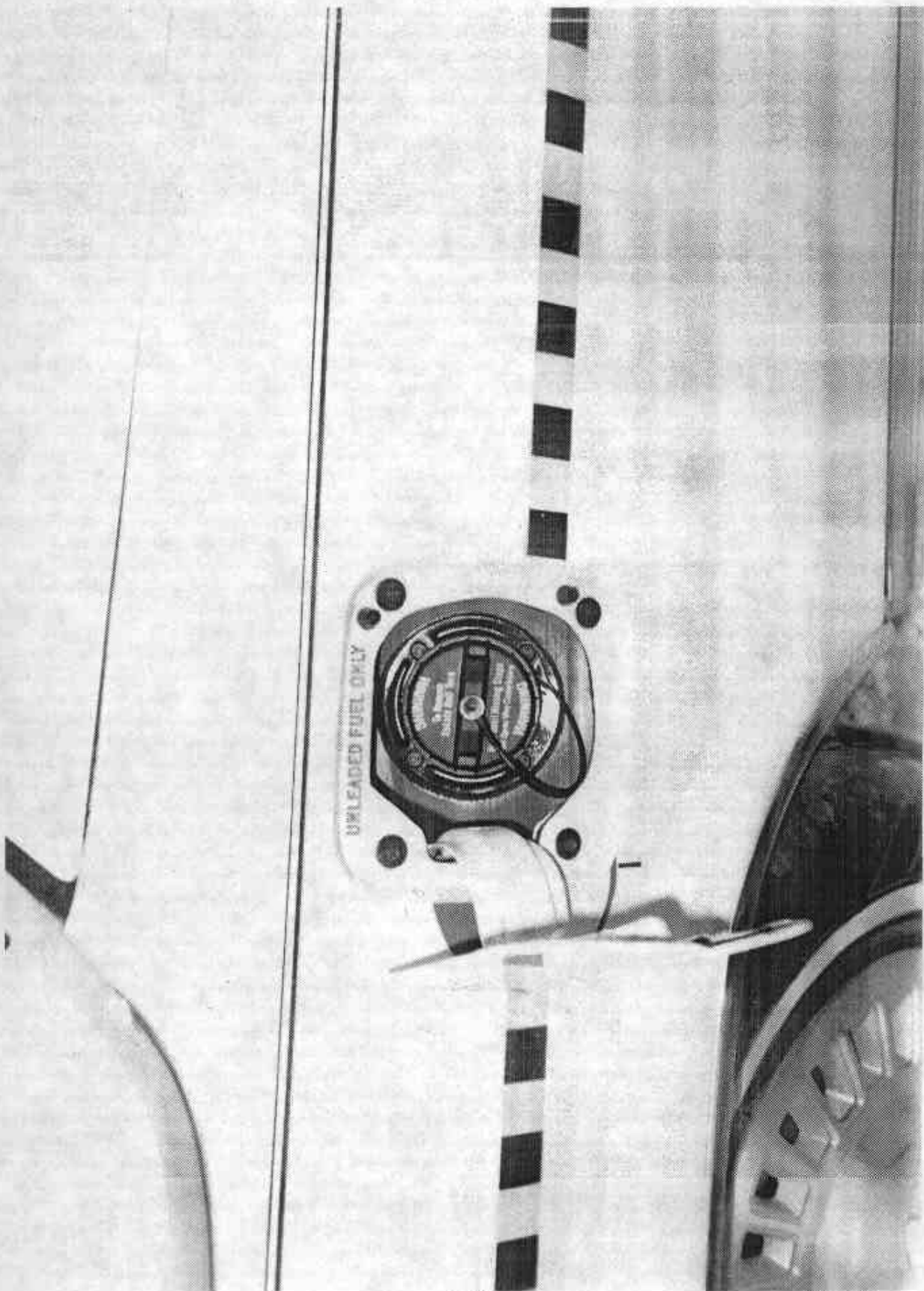


Figure A-16 PRE-TEST FUEL FILLER CAP VIEW

A-18

7804-2

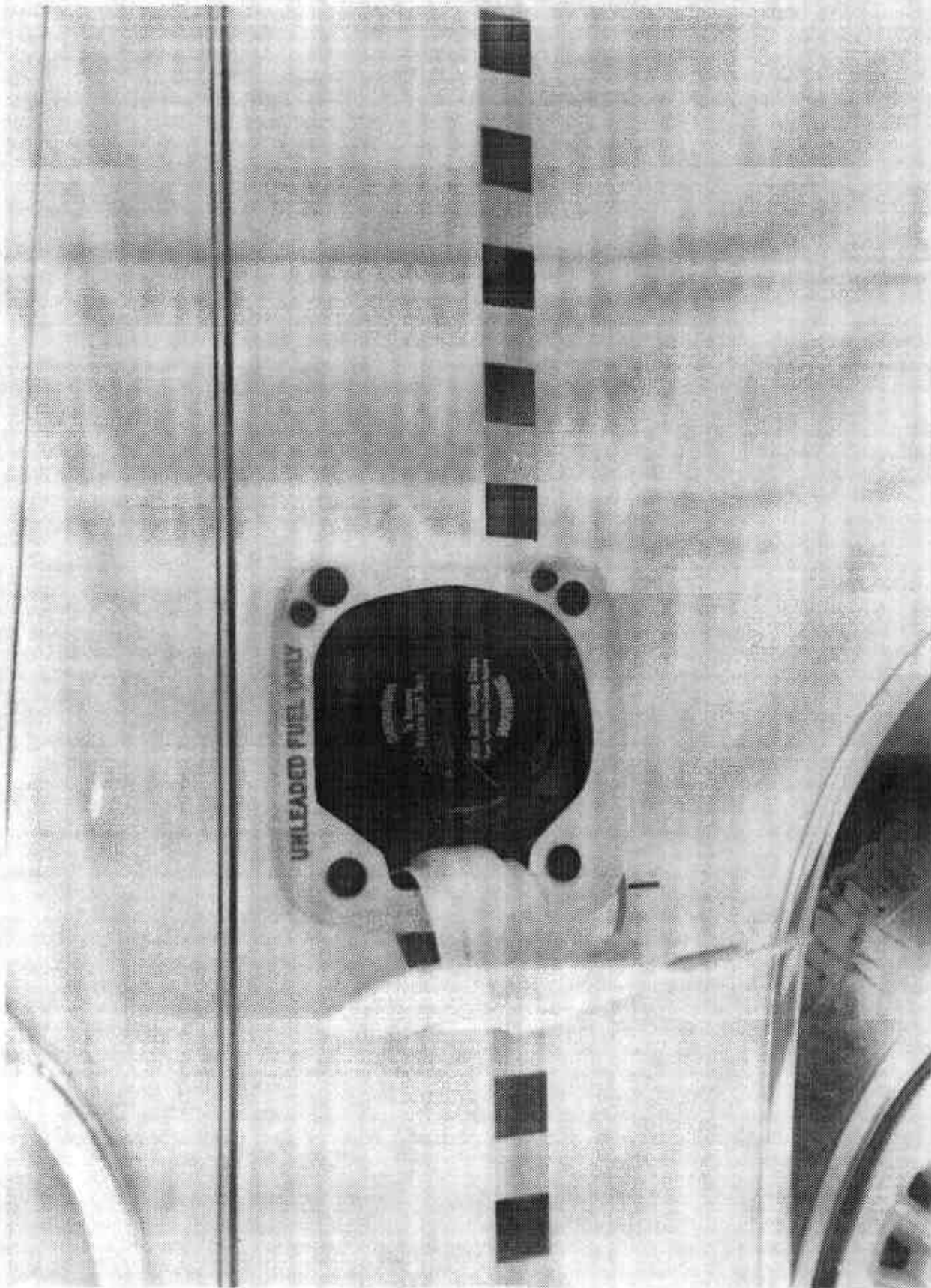


Figure A-17 POST-TEST FUEL FILLER CAP VIEW

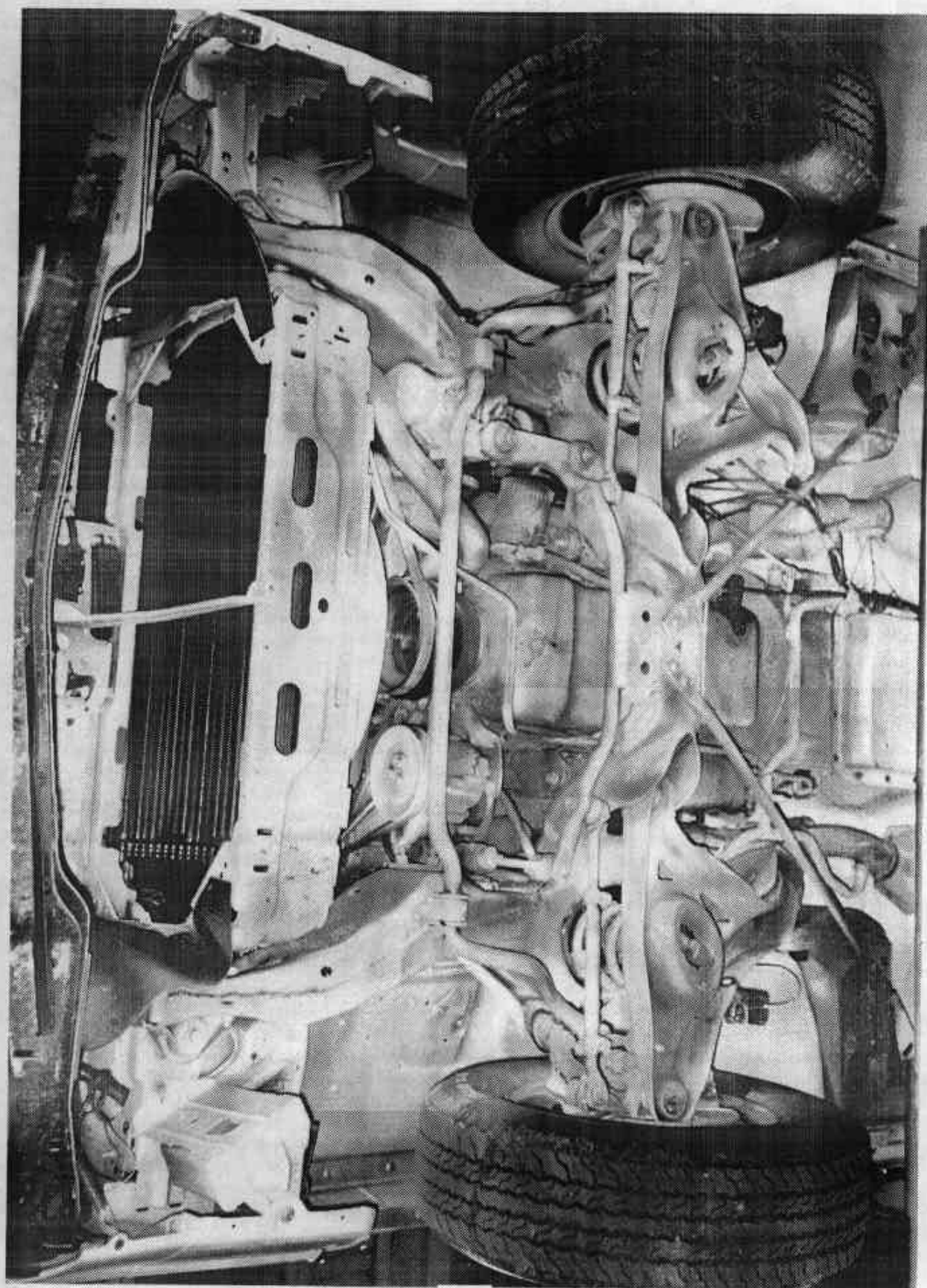


Figure A-18 PRE-TEST FRONT UNDERBODY VIEW

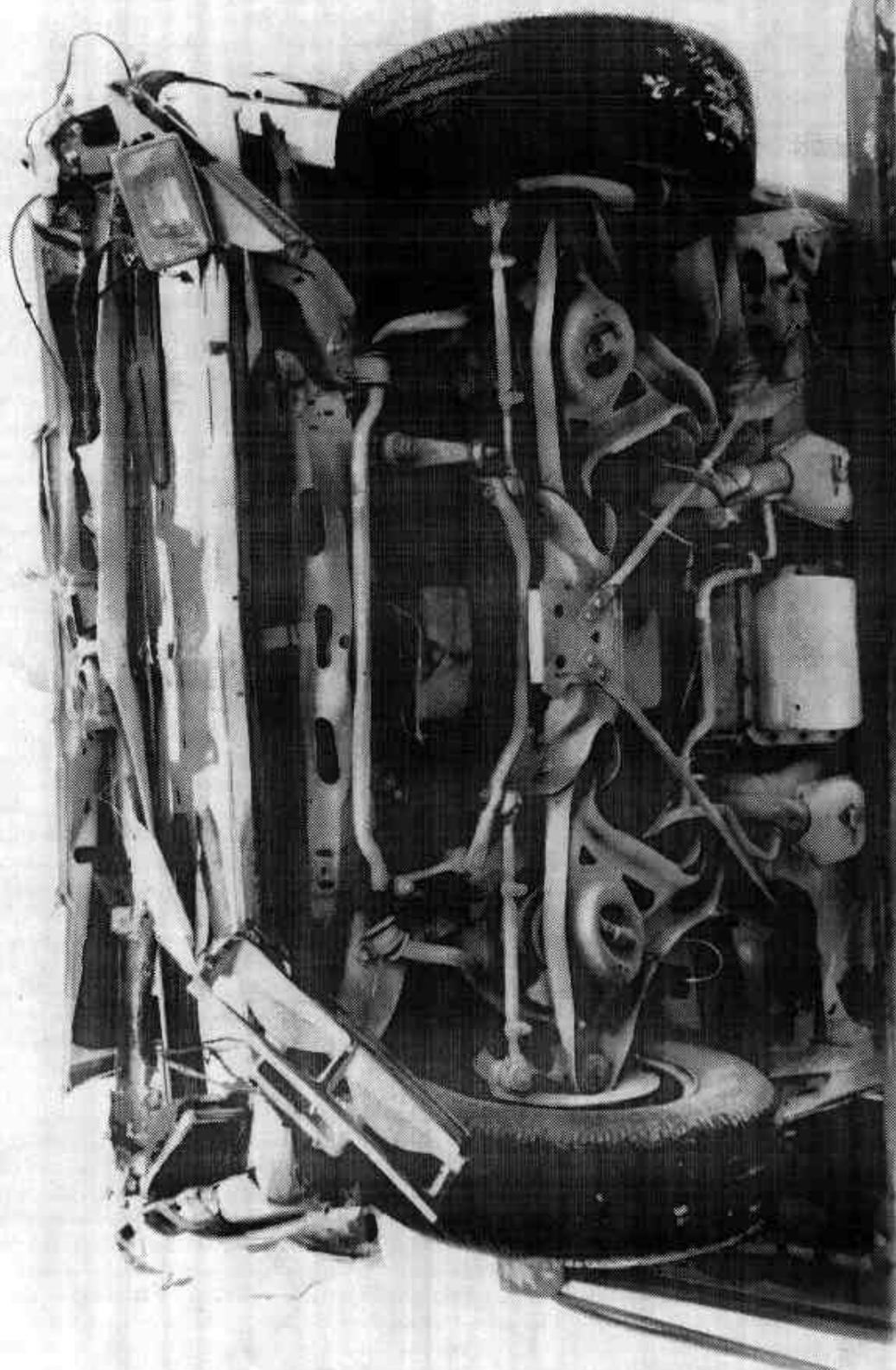


Figure A-19 POST-TEST FRONT UNDERBODY VIEW

A-21

7804-2

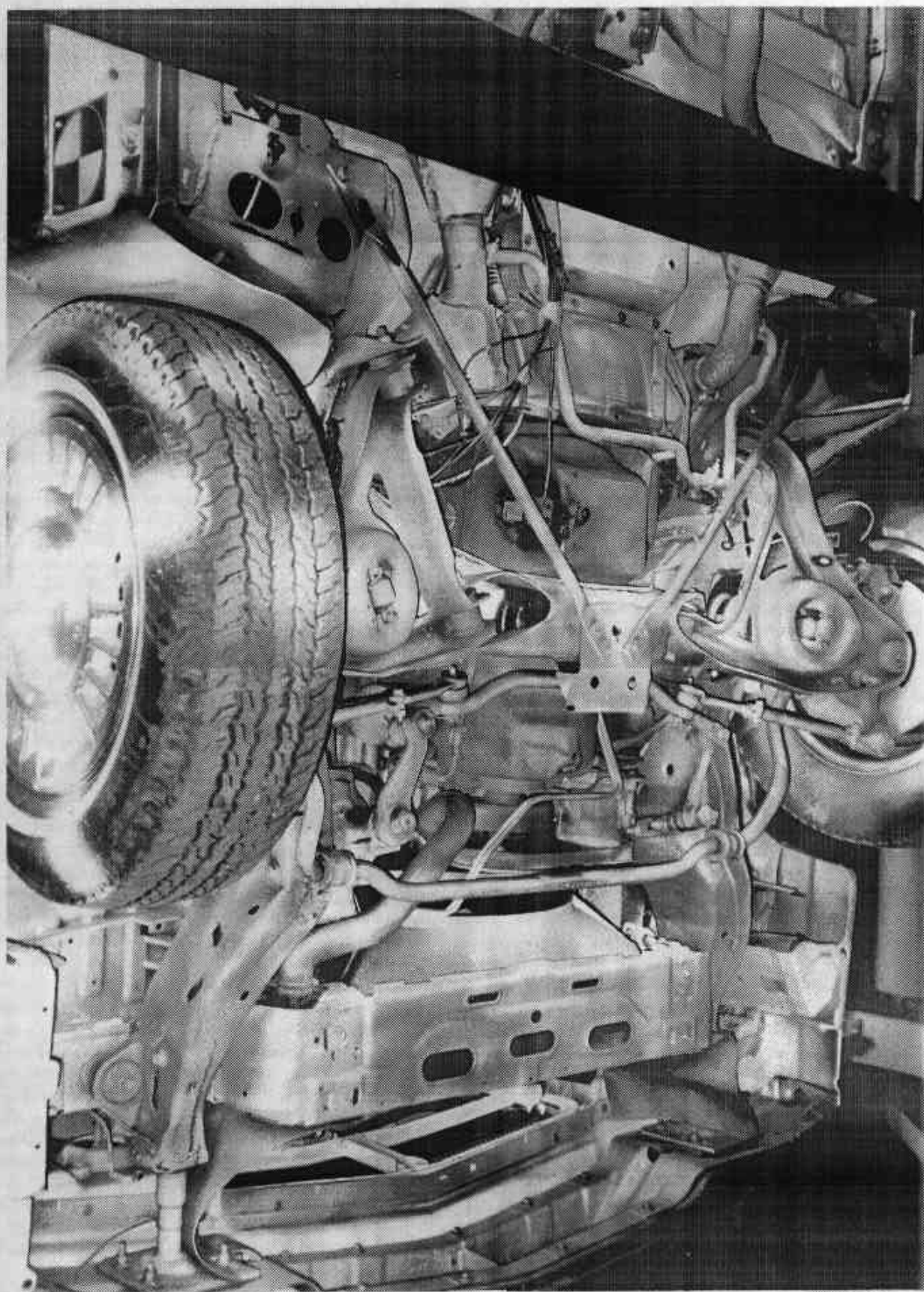


Figure A-20 PRE-TEST FRONT SIDE UNDERBODY VIEW

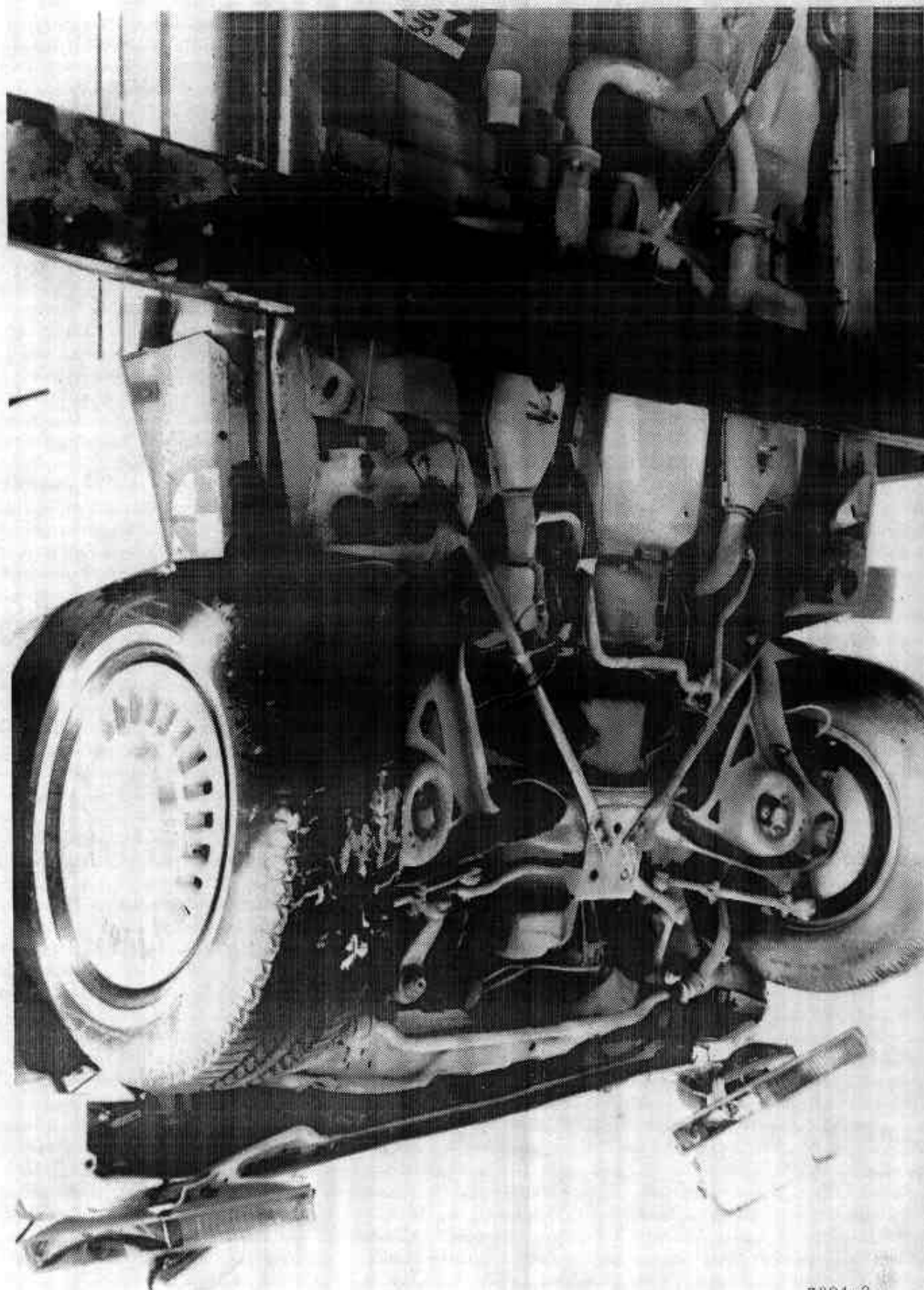


FIGURE A-21 POST-TEST FRONT SIDE UNDERBODY VIEW

A-23

7804-2

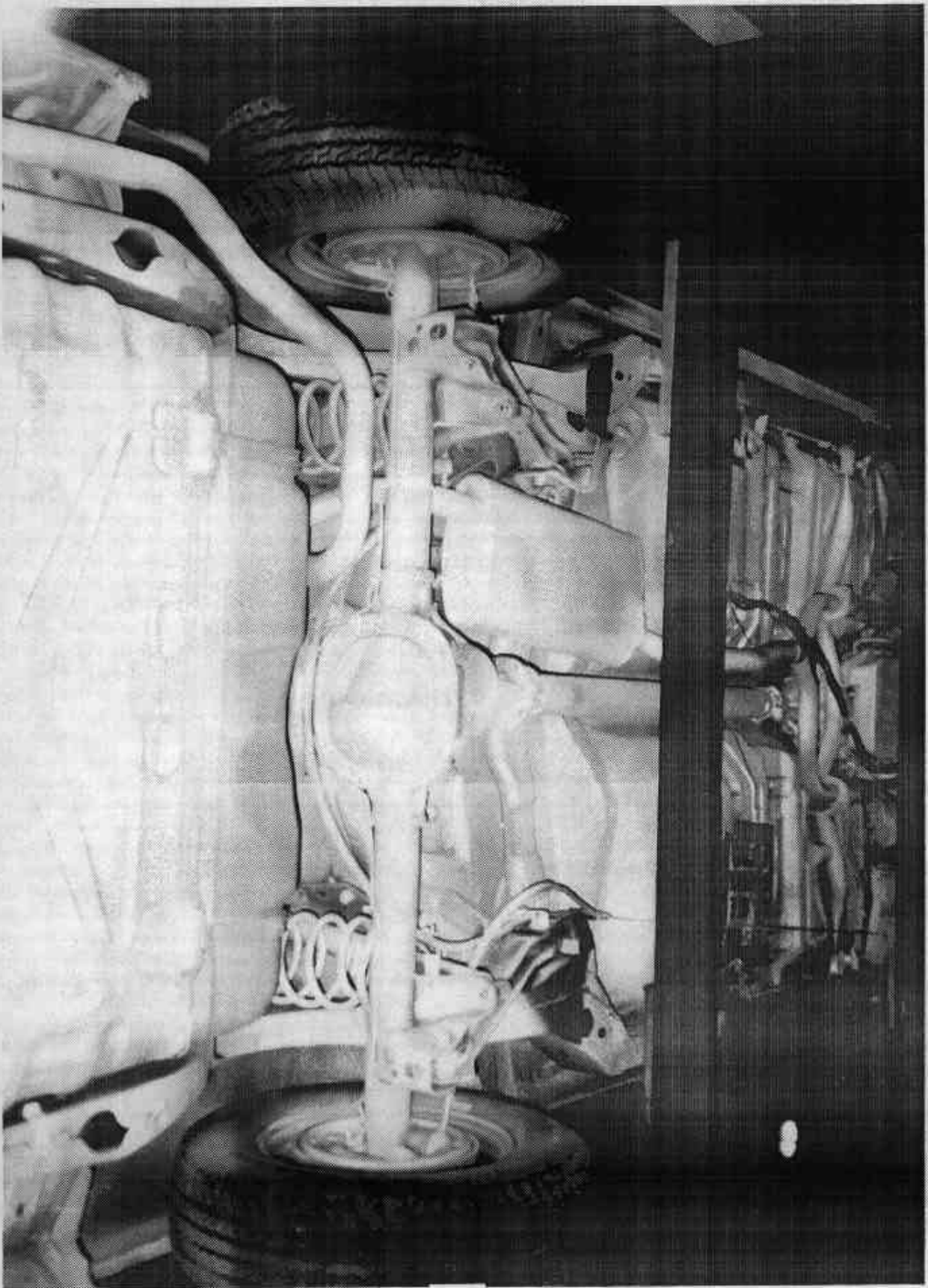


Figure A-22 PRE-TEST REAR UNDERBODY VIEW

A-24

7804-2

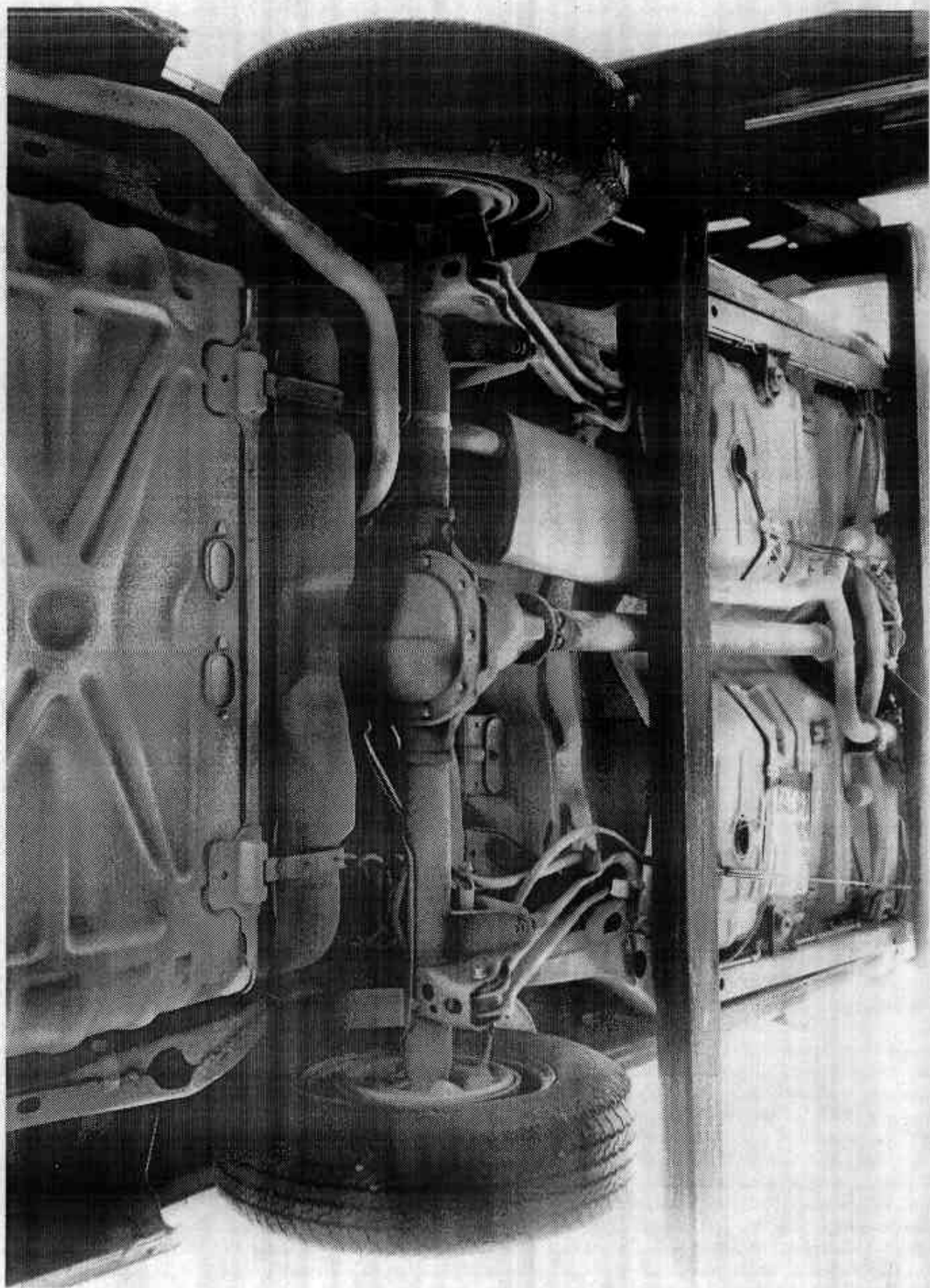


Figure A-23 POST-TEST REAR UNDERBODY VIEW

A-25

7804-2

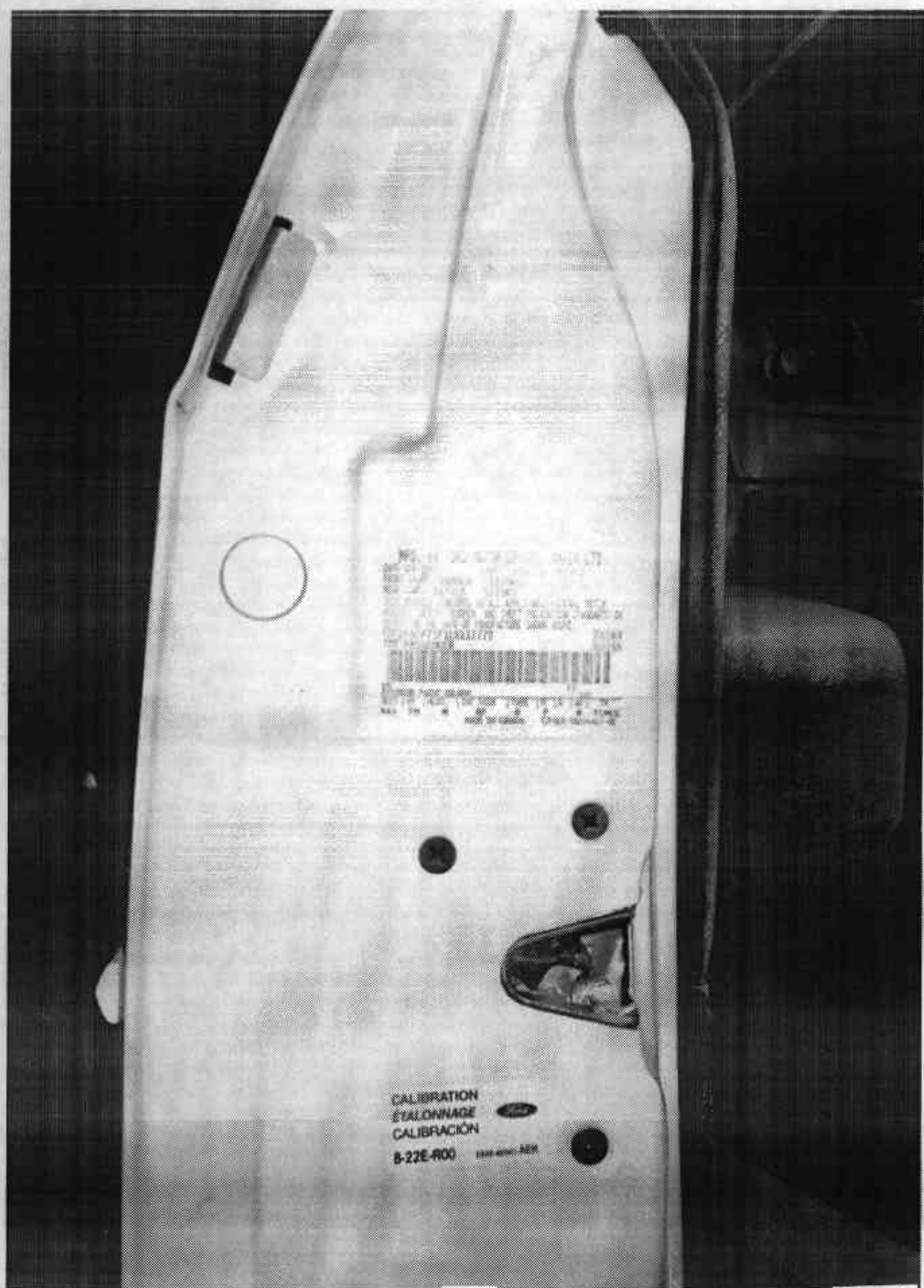


Figure A-24 CERTIFICATION LABEL

CALIBRATION
ÉTALONNAGE
CALIBRACIÓN
8-22E-R00 1000-4000-200

A-26

7804-2



Figure A-25 TIRE PLACARD

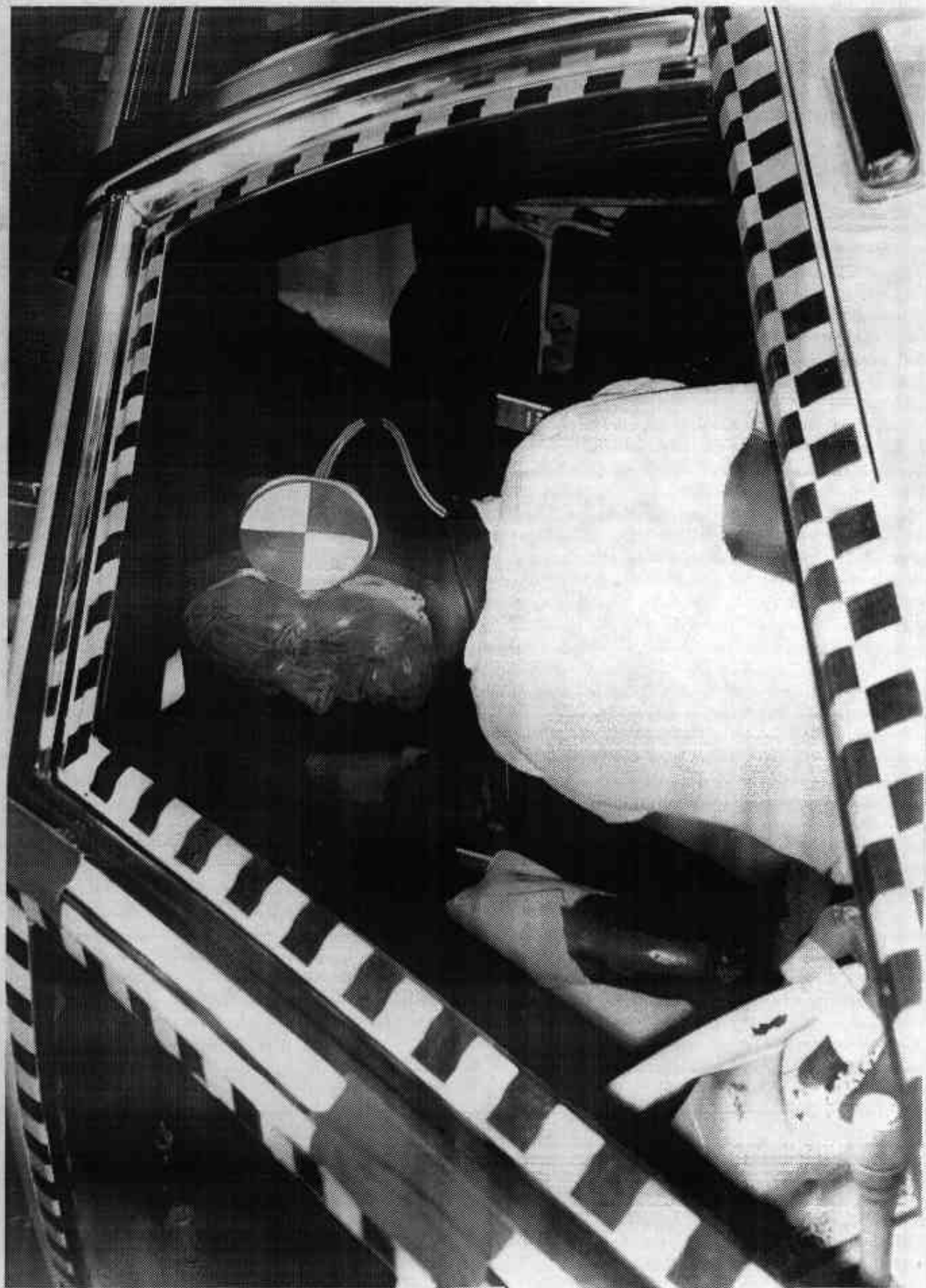


Figure A-26 PRE-TEST DRIVER DUMMY POSITION



Figure A-27 POST-TEST DRIVER DUMMY POSITION

A-29

7804-2

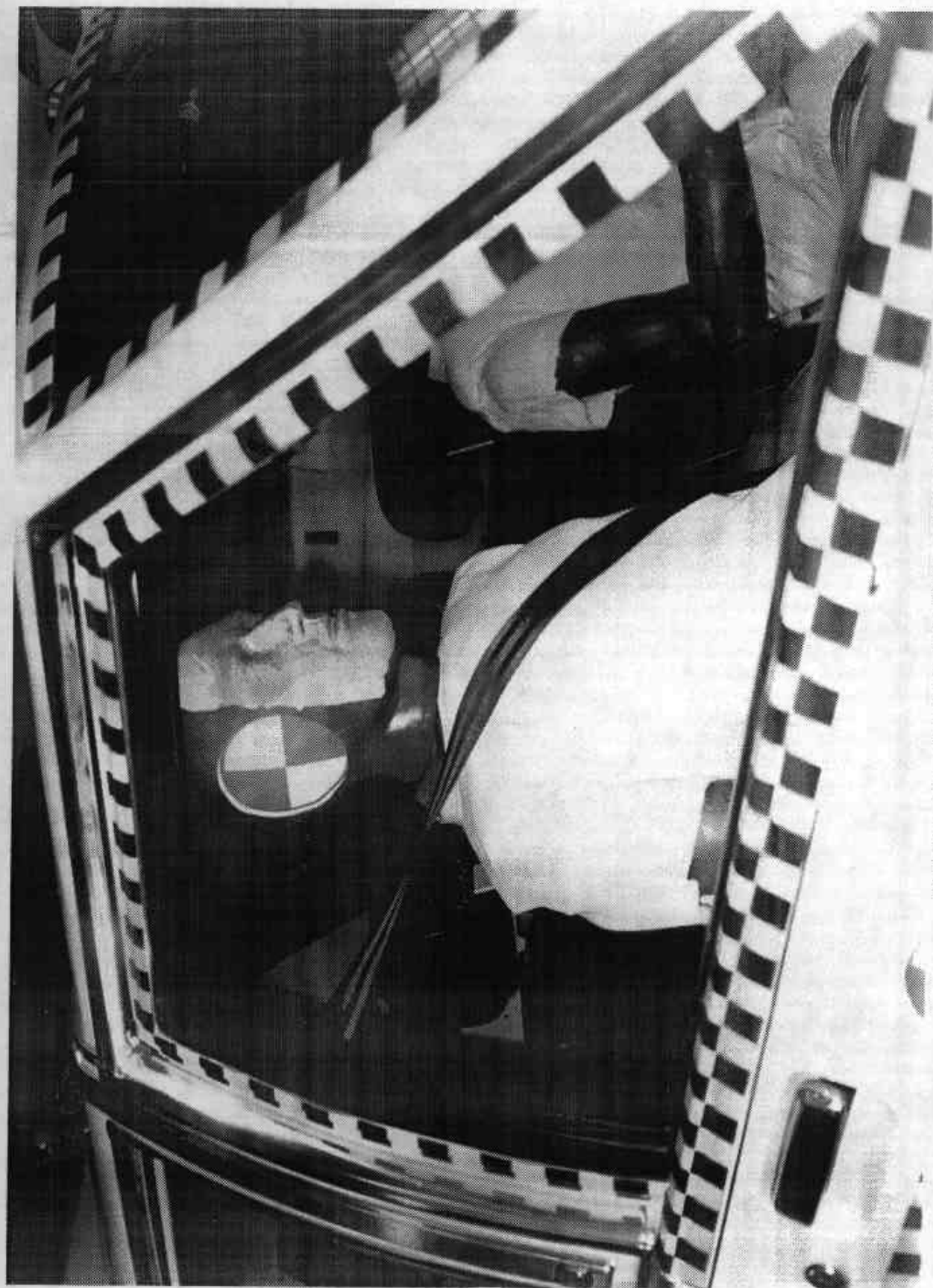


Figure A-28 PRE-TEST PASSENGER DUMMY POSITION

A-30

7804-2

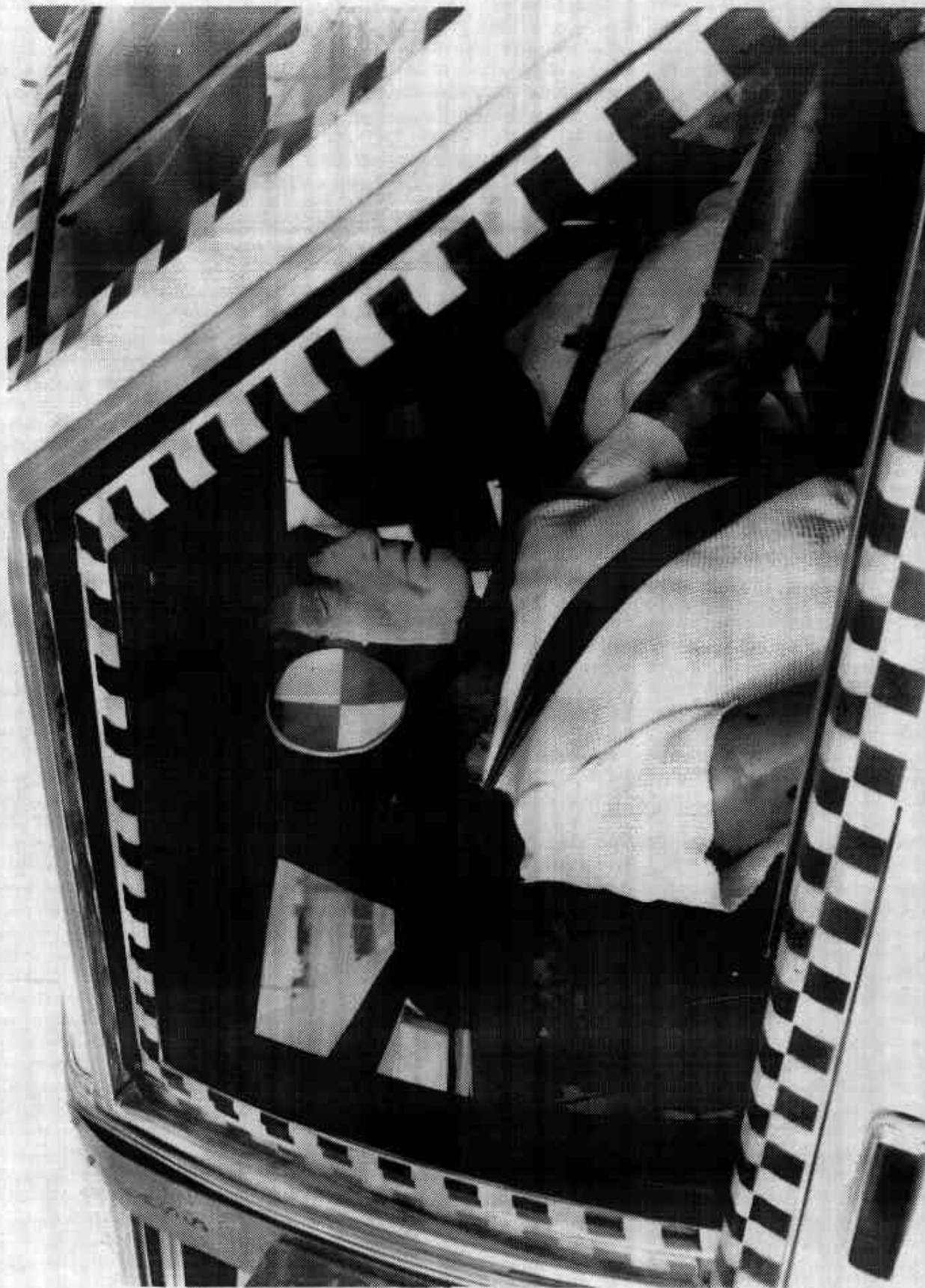


Figure A-29 POST-TEST PASSENGER DUMMY POSITION

A-31

7804-2

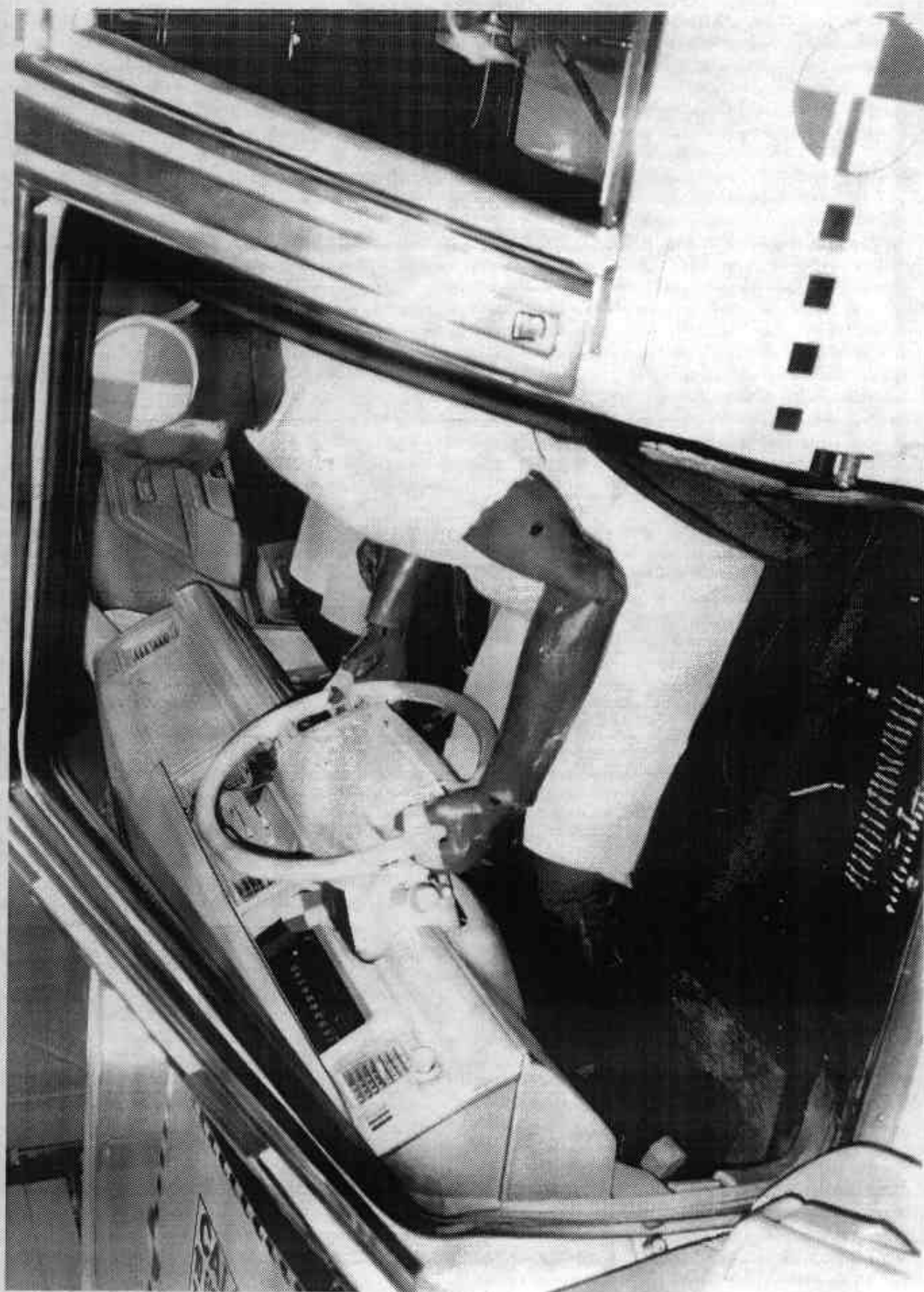


Figure A-30 PRE-TEST DRIVER DUMMY AND INTERIOR VIEW

A-32

7804-2



Figure A-31 POST-TEST DRIVER DUMMY AND INTERIOR VIEW

A-33

7804-2



Figure A-32 PRE-TEST PASSENGER DUMMY AND INTERIOR VIEW



Figure A-34 POST-TEST DRIVER AIRBAG VIEW

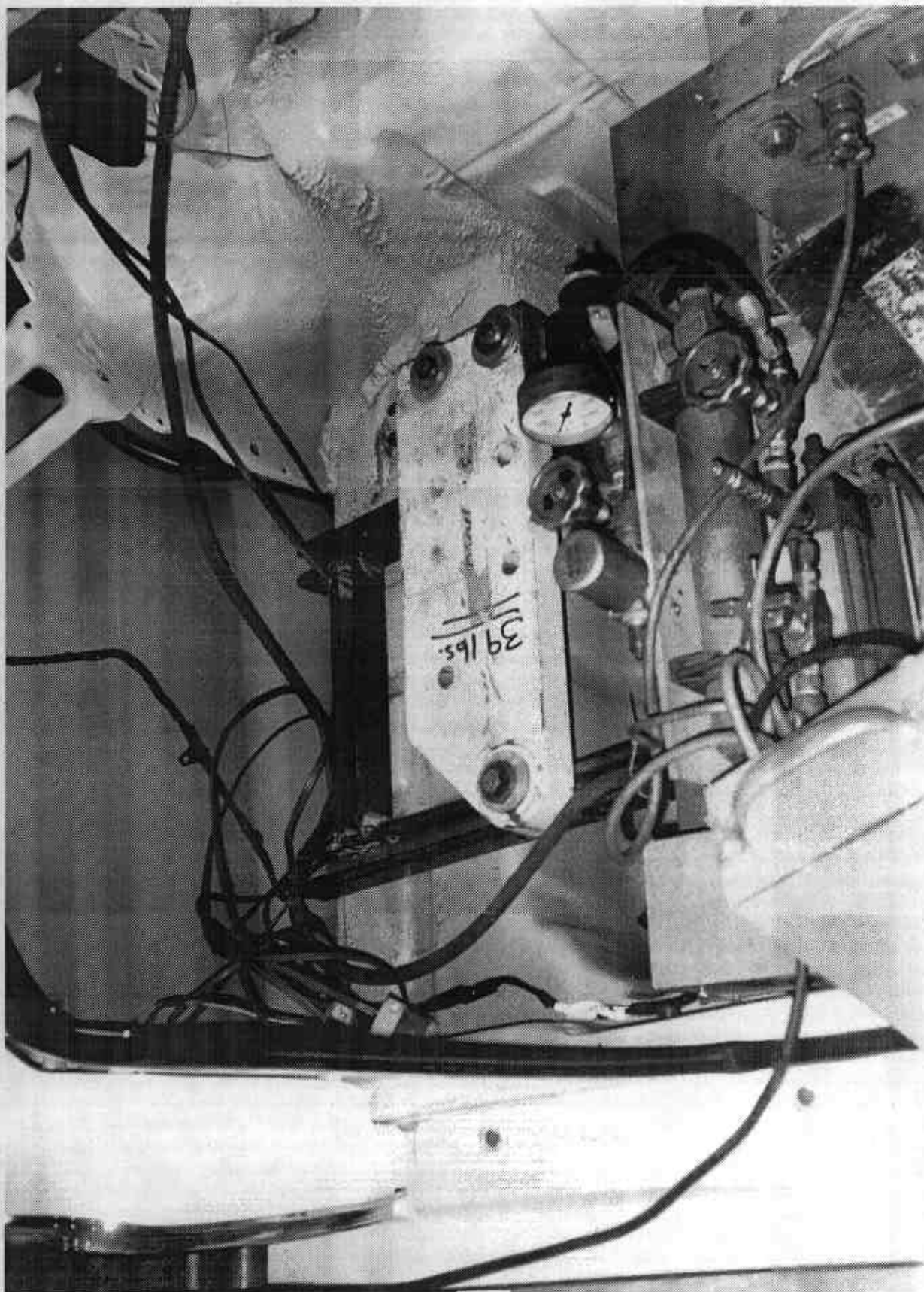


Figure A-36 BALLAST LOCATED IN RIGHT REAR TRUNK COMPARTMENT

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

TEST NO. CL0202

VEHICLE DATA

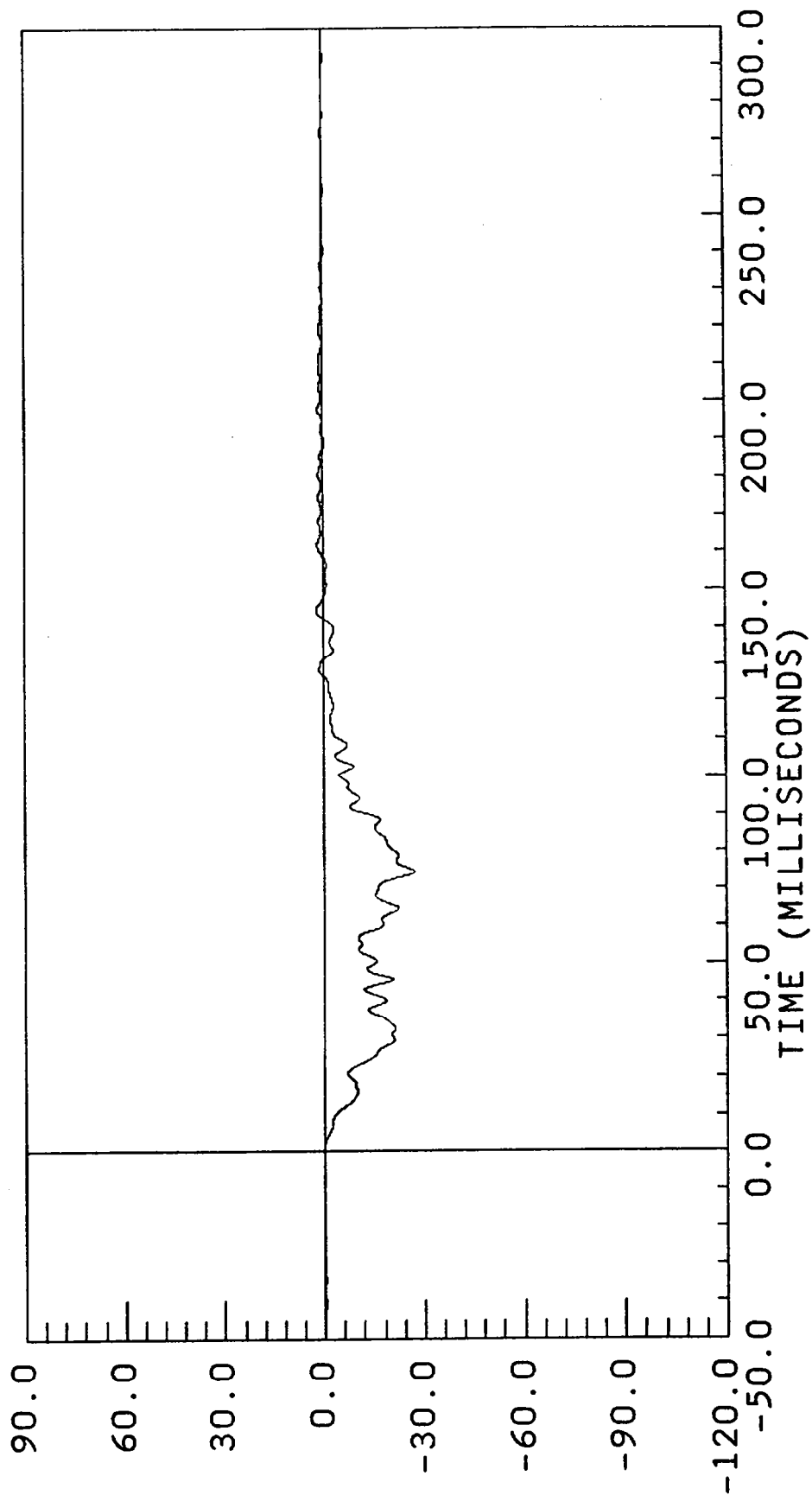
FILTER CHANNEL CLASS

60

29.60 mph

ACC PACK #1(X)
 FILTERED
 FILTER CUTOFF: 100Hz

XL AXIS
 YMIN = -27.31542 at 74.62500
 YMAX = 2.263252 at 144.6000



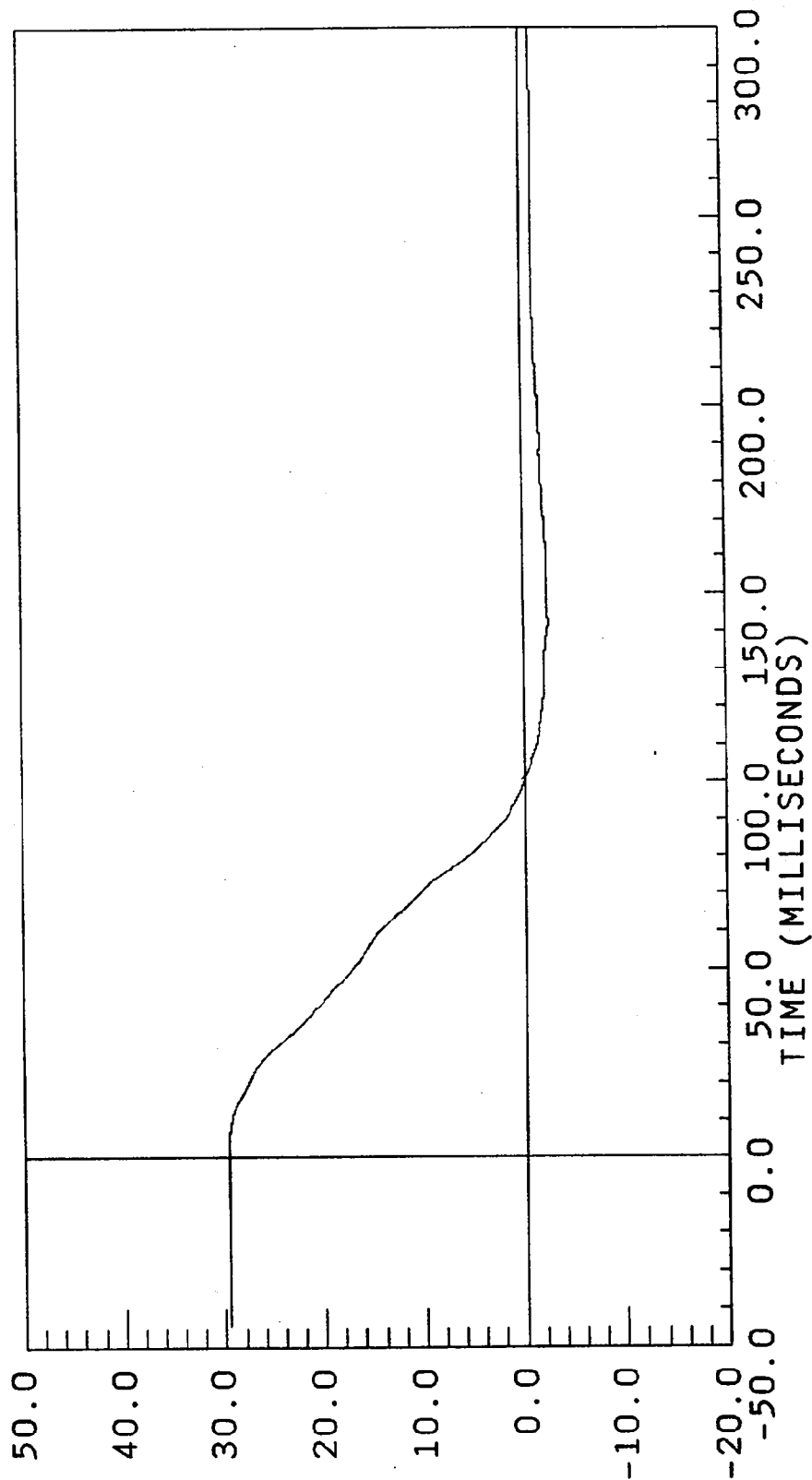
ACCELERATION * G * S *

V946-17.DAT

29.60 mph

ACC PACK #1(X)
COMPUTED
FILTER CUTOFF: 100HZ

XL AXIS
YMIN = -2.486707 at 142.3500
YMAX = 29.60227 at -42.75000

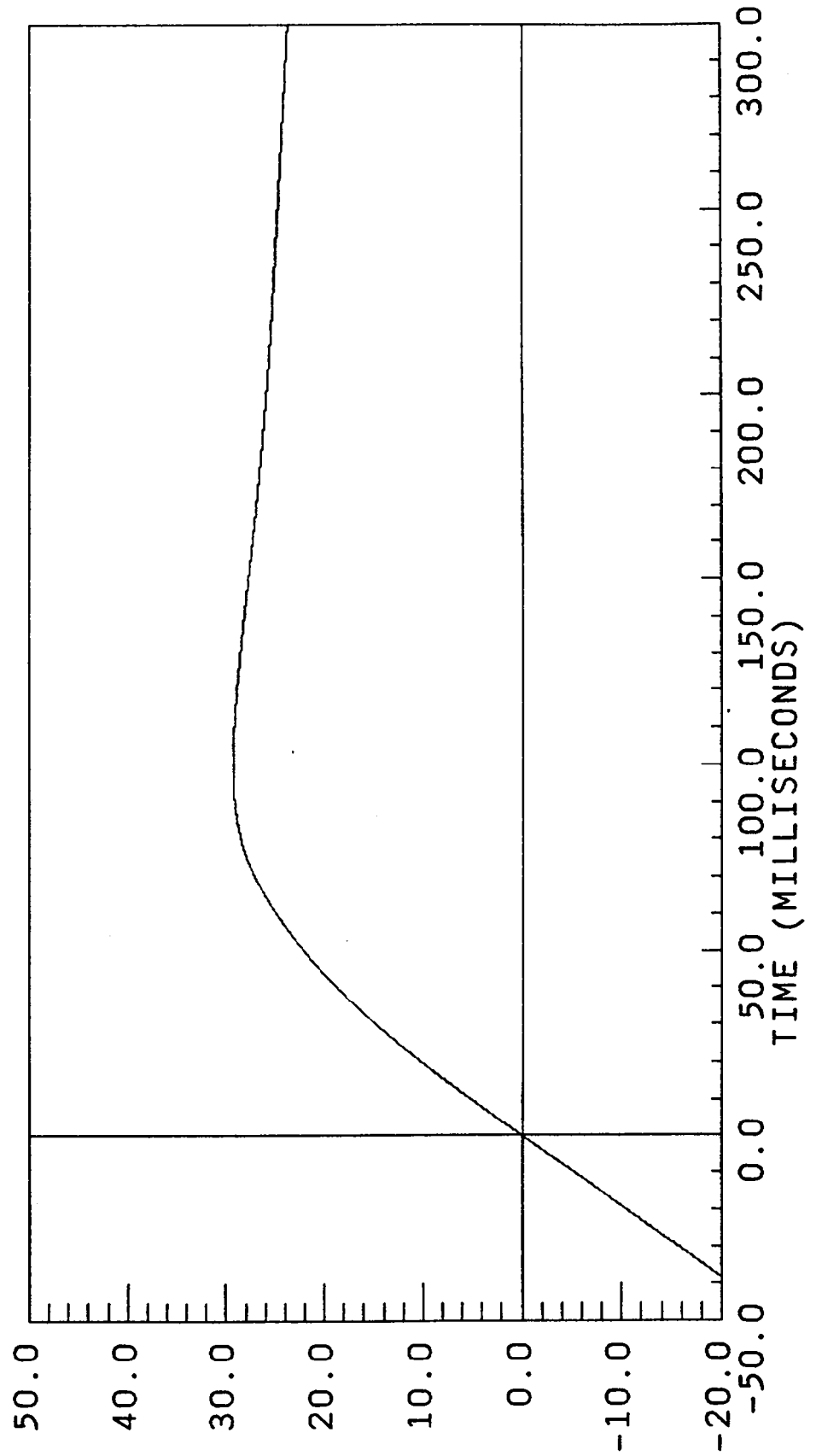


VELOCITY * MILES / HOUR

29.60 mph

ACC PACK #1(X)
COMPUTED
FILTER CUTOFF: 100Hz

XL AXIS
YMIN = -23.39935 at 142.3500
YMAX = 29.28222 at 99.67500



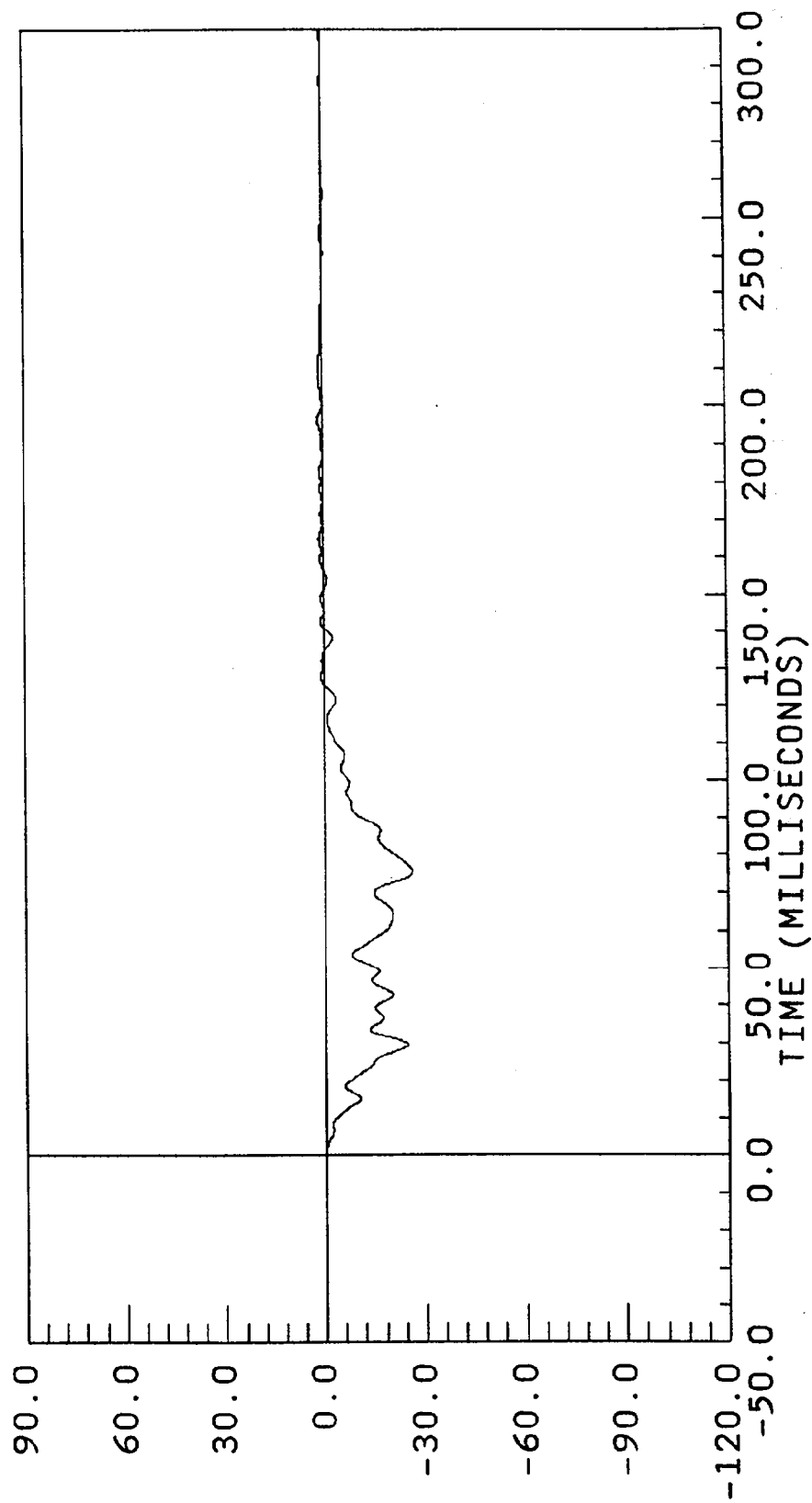
DISPLACEMENT * INCHES

BW946-18.DAT

29.60 mph

ACC PACK #2(X)
FILTERED
FILTER CUTOFF: 100Hz

XL AXIS
YMIN = -26.17211 at 75.37500
YMAX = 1.528145 at 196.4250

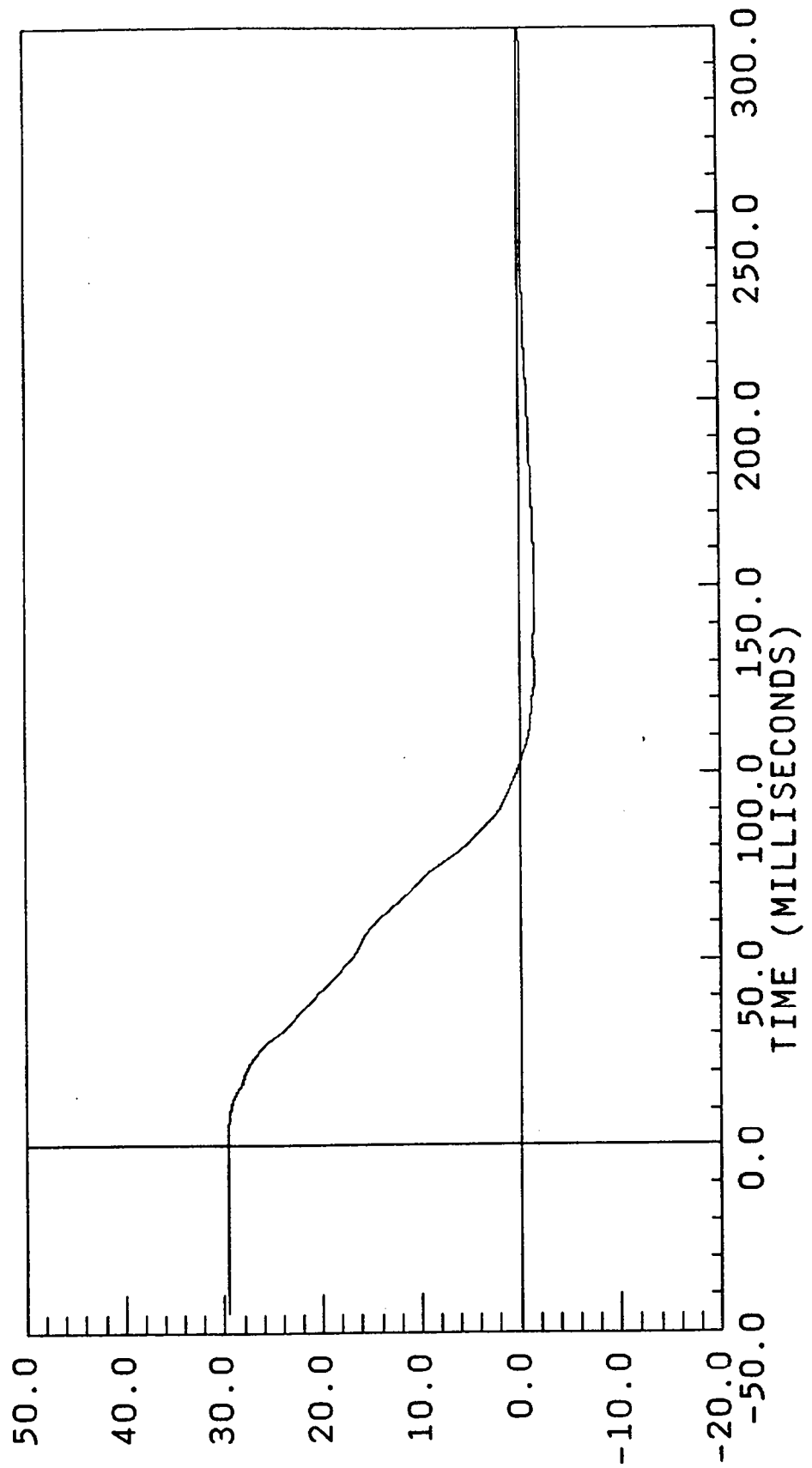


ACCELERATION * G * S *

29.60 mph

ACC PACK #2(X)
COMPUTED
FILTER CUTOFF: 100HZ

XL AXIS
YMIN = -1.617175 at 140.8500
YMAX = 29.60391 at 1.650000

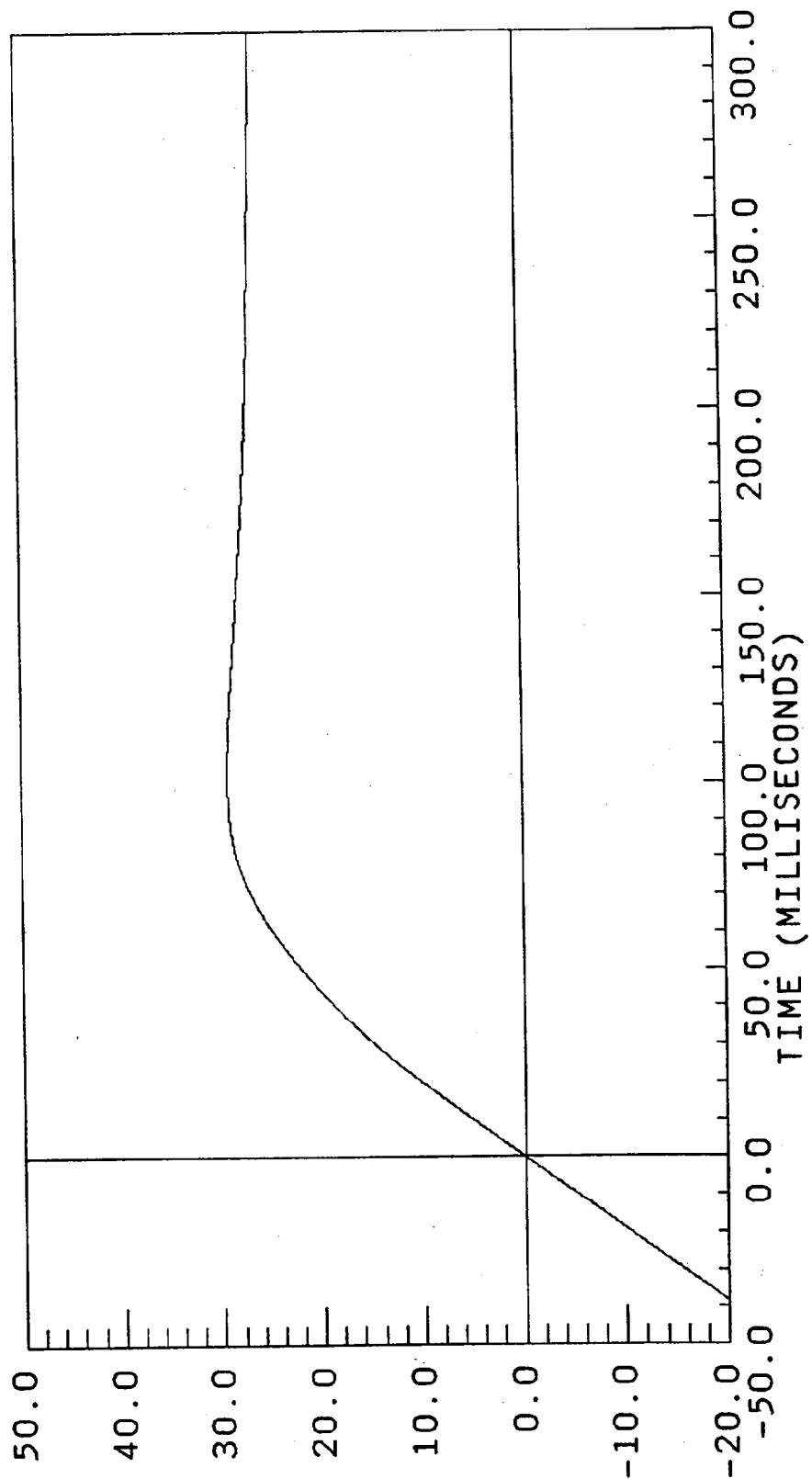


VELOCITY * MILES / HOUR

D946-18.DAT

29.60 mph

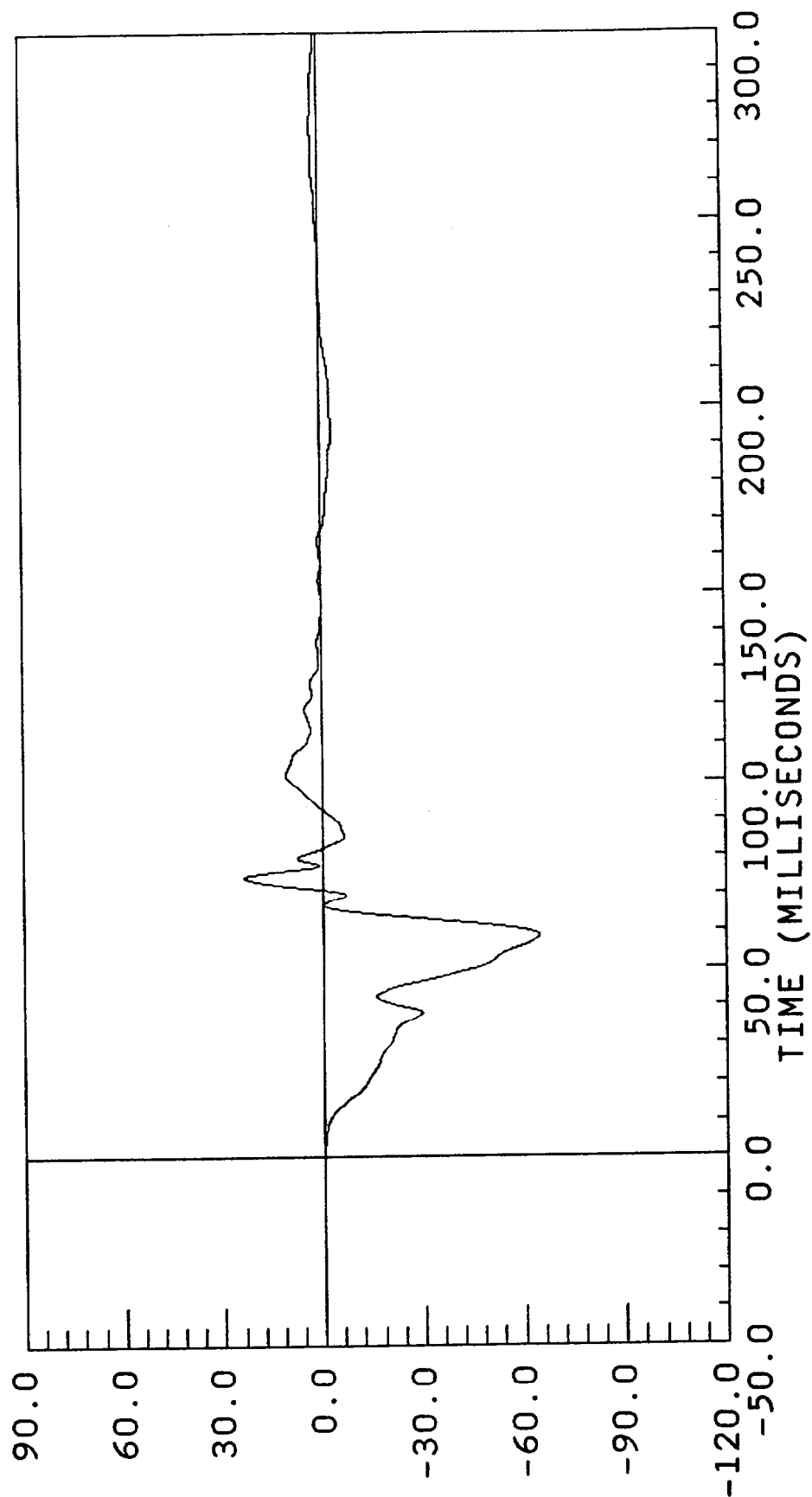
ACC PACK #2(X)
COMPUTED
FILTER CUTOFF: 100Hz
XL AXIS
YMIN = -23.37585 at 140.8500
YMAX = 29.36702 at 102.1500



DISPLACEMENT * INCHES

29.60 mph

ACC PACK #3(X) XL AXIS
 FILTERED YMIN = -64.76546 at 58.57500
 FILTER CUTOFF: 100HZ YMAX = 23.59172 at 74.70000



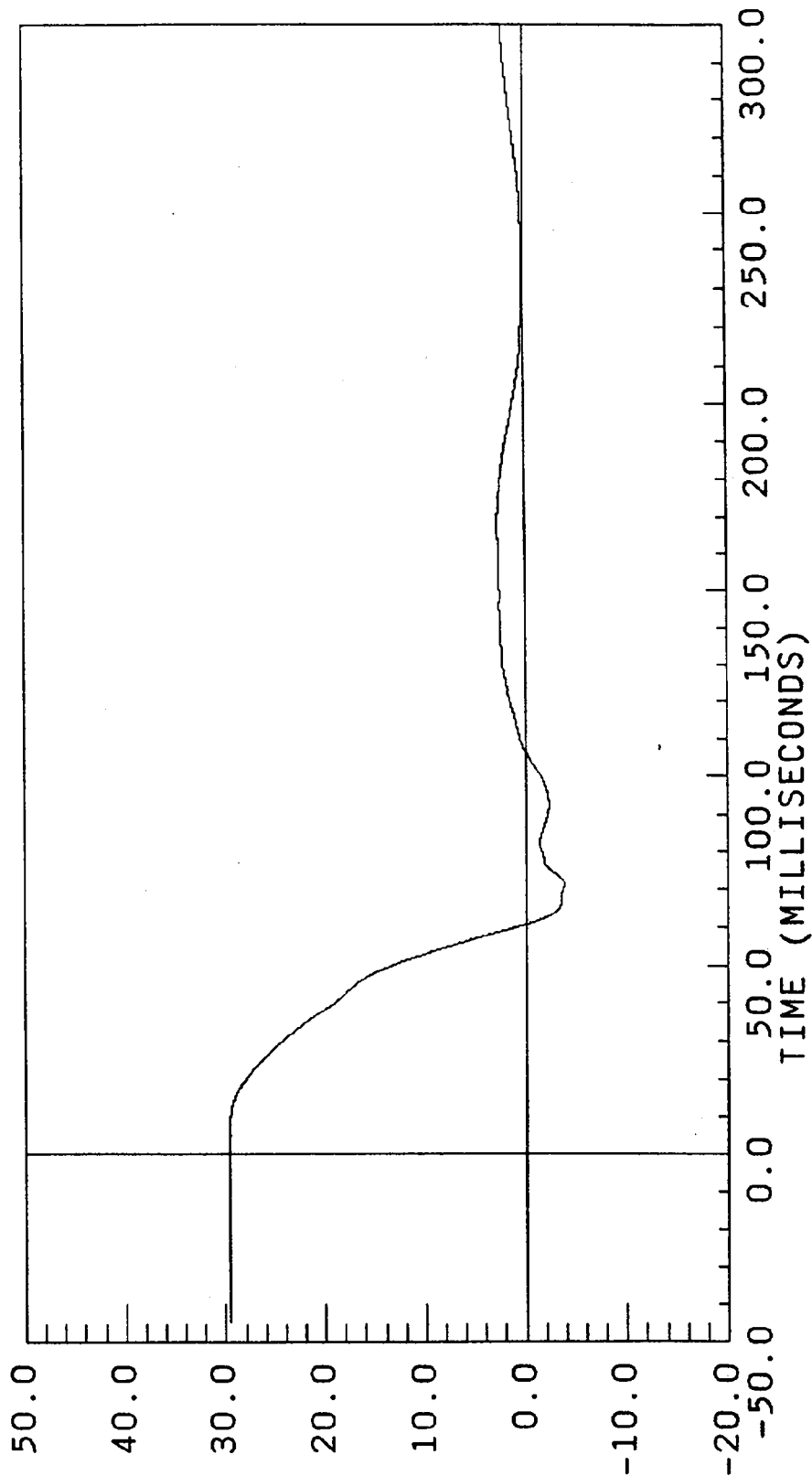
ACCELERATION * G, S *

V946-19.DAT

29.60 mph

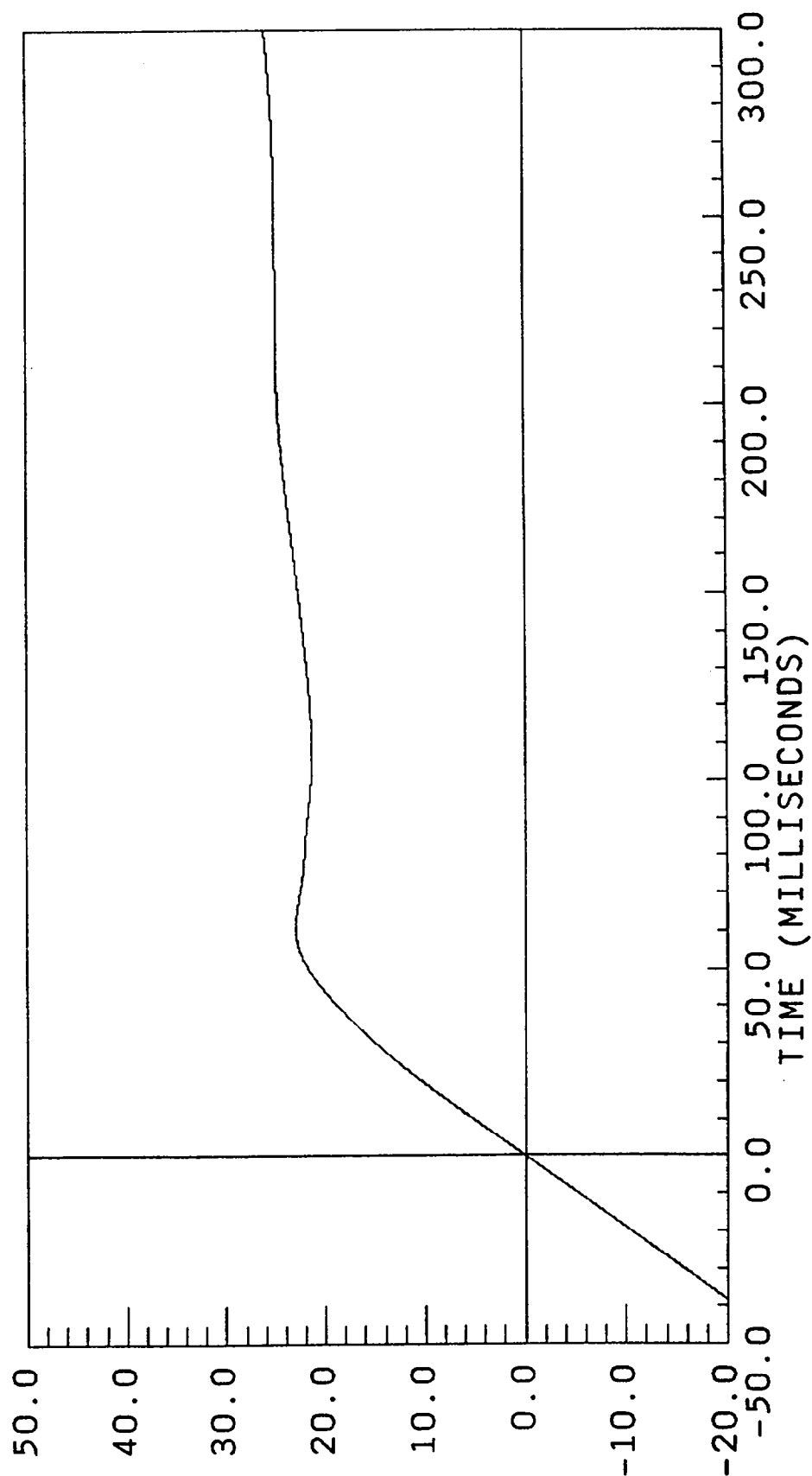
ACC PACK #3(X)
COMPUTED
FILTER CUTOFF: 100Hz

XL AXIS
YMIN = -3.846218 at 71.25000
YMAX = 29.59455 at -22.80000



29.60 mph

ACC PACK #3(X)
 COMPUTED
 FILTER CUTOFF: 100Hz
 XL AXIS
 YMIN = -23.40879 at 71.25000
 YMAX = 25.93252 at 300.00000

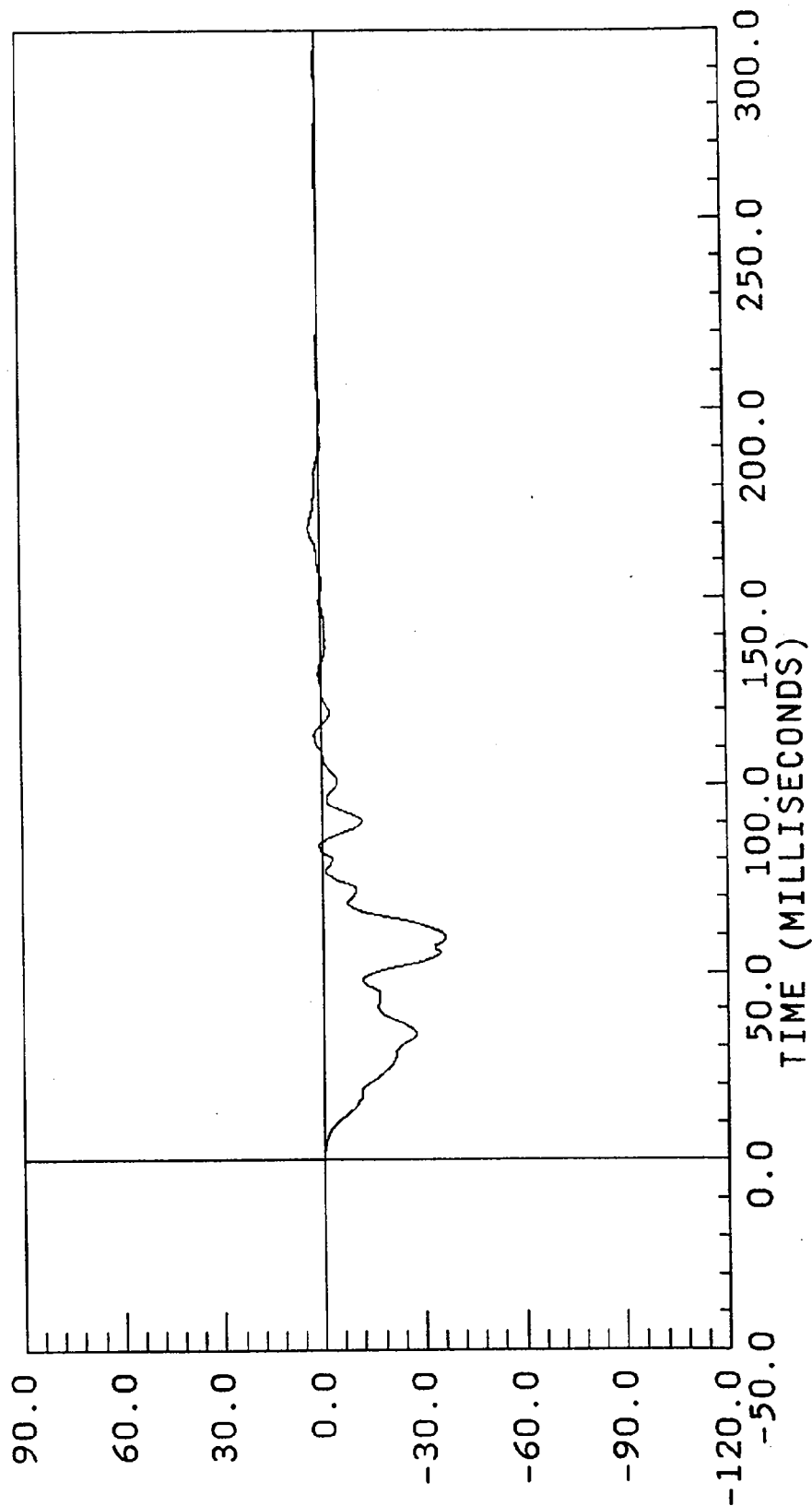


DISPLACEMENT * INCHES

BW946-20.DAT

29.60 mph

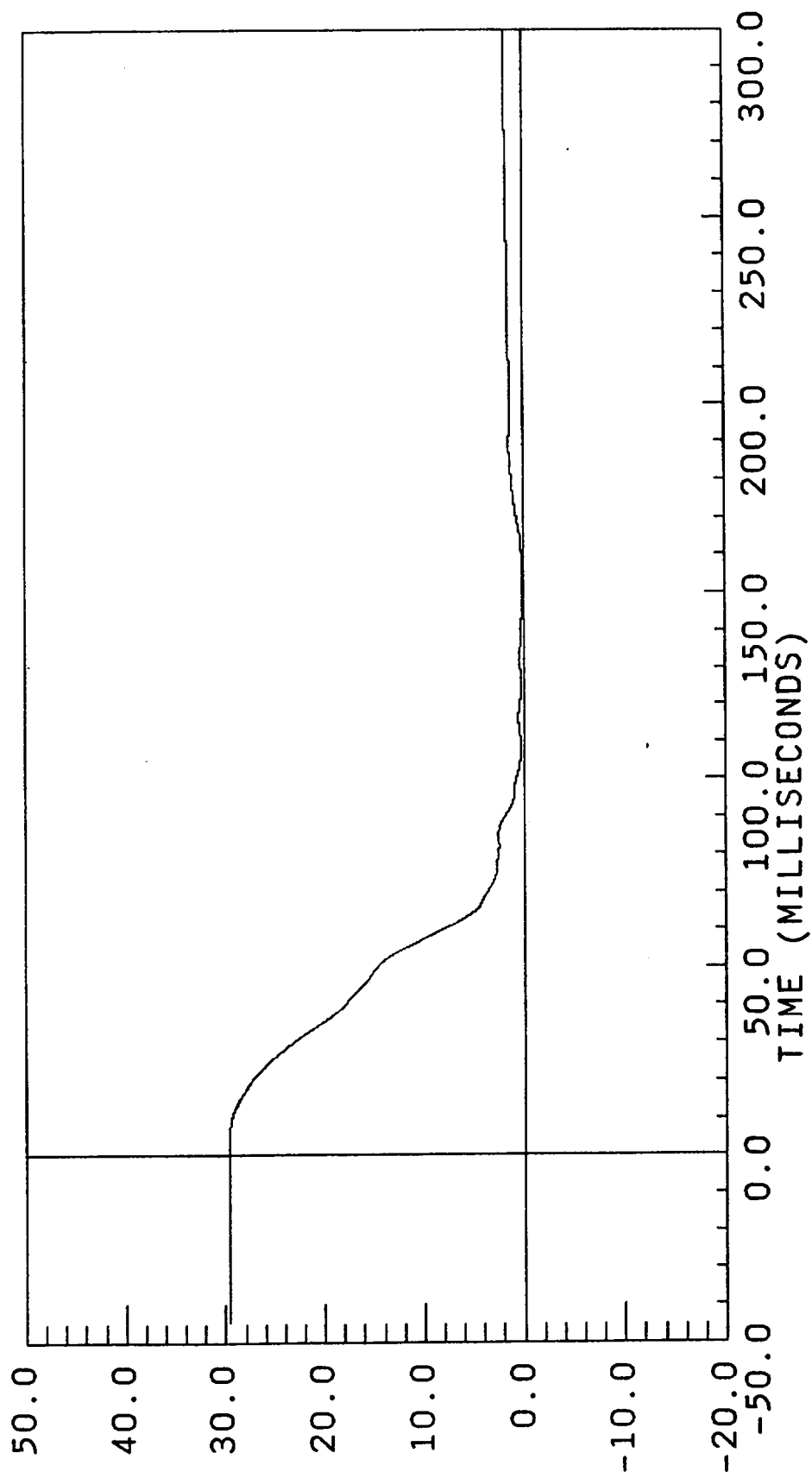
ACC PACK #4(X)
FILTERED
FILTER CUTOFF: 100HZ
XL AXIS
YMIN = -36.52948 at 59.10000
YMAX = 3.461029 at 168.5250



29.60 mph

ACC PACK #4(X)
COMPUTED
FILTER CUTOFF: 100HZ

XL AXIS
YMIN = 0.116692 at 156.0750
YMAX = 29.51726 at -7.425000



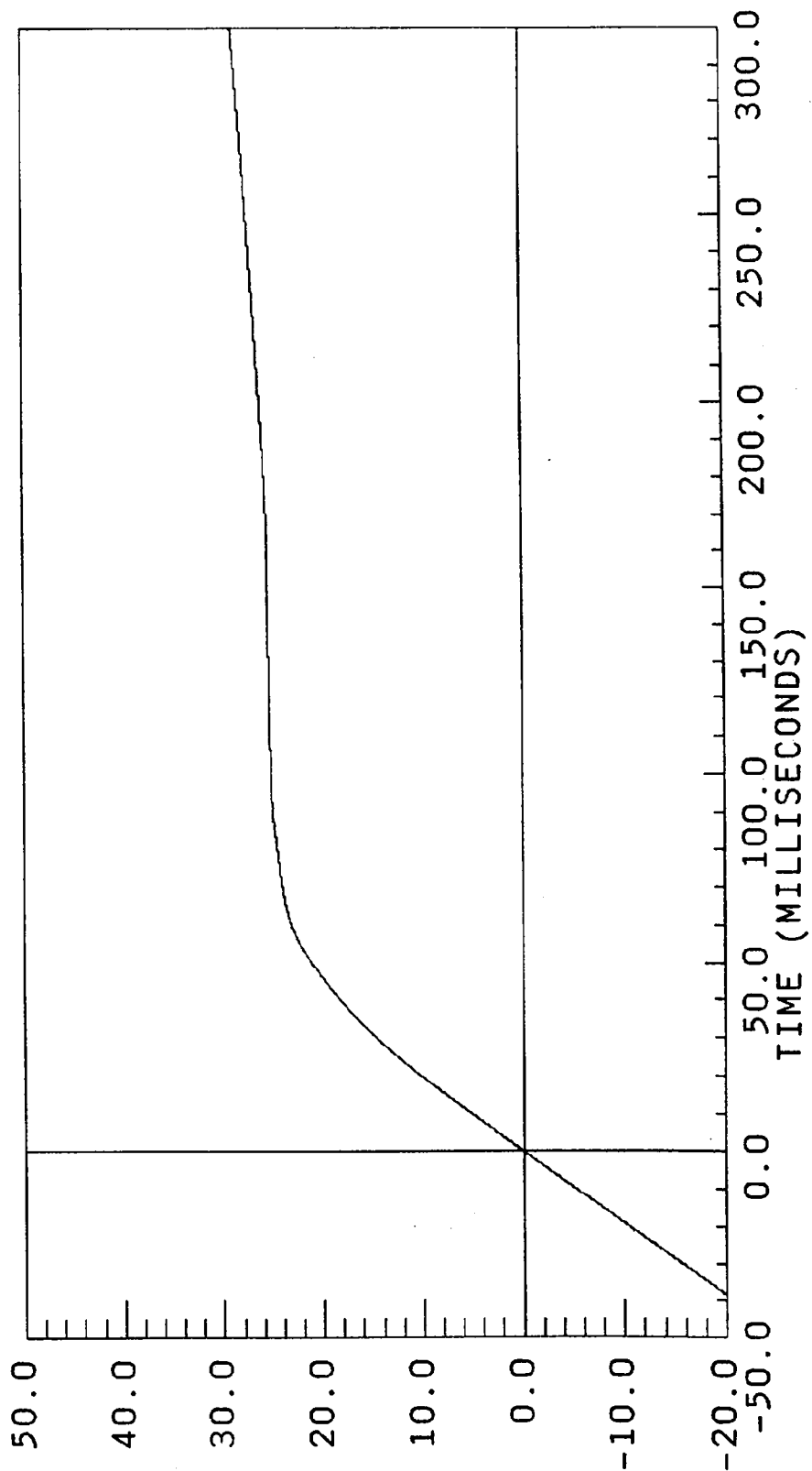
VELOCITY * MILES / HOUR

D946-20.DAT

29.60 mph

ACC PACK #4(X)
COMPUTED
FILTER CUTOFF: 100Hz

XL AXIS
YMIN = -23.37563 at 156.0750
YMAX = 28.84936 at 300.0000



29.60 mph

ACC PACK #5(X)

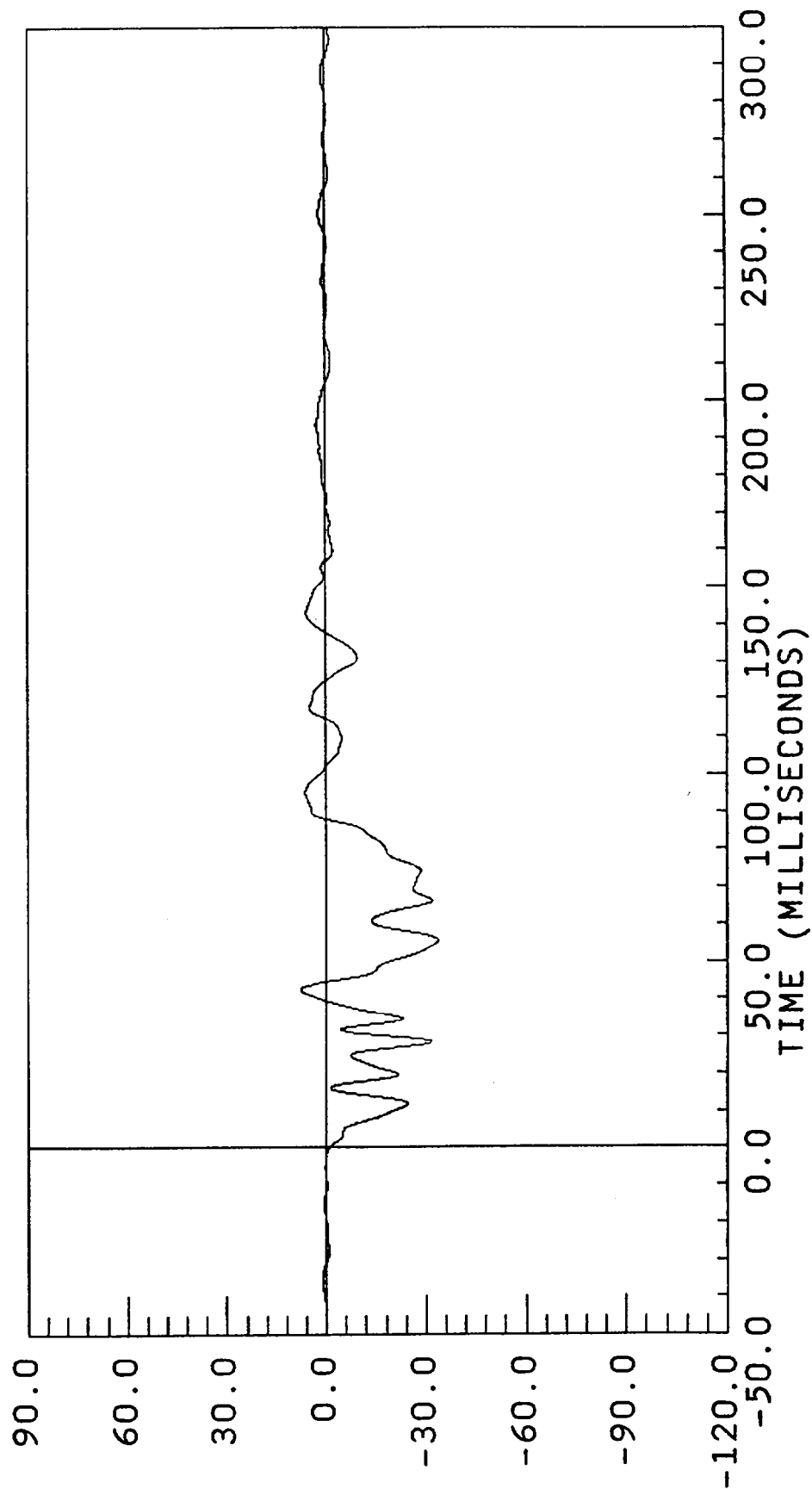
FILTERED

FILTER CUTOFF: 100HZ

XL AXIS

YMIN = -33.80309 at 55.65000

YMAX = 7.685081 at 42.60000



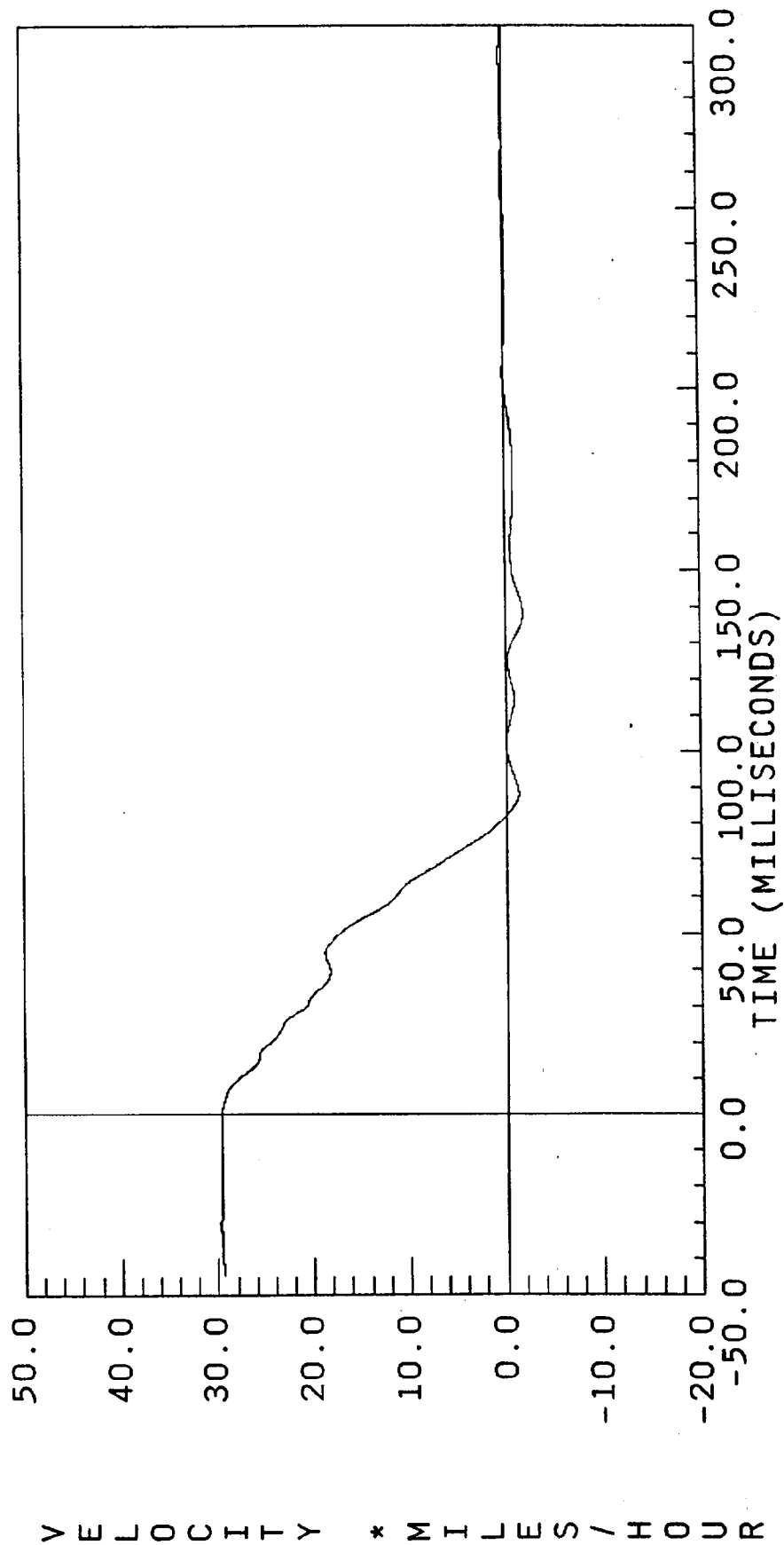
ACCELERATION * G * S *

V946-21.DAT

29.60 mph

ACC PACK #5(X)
COMPUTED
FILTER CUTOFF: 100Hz

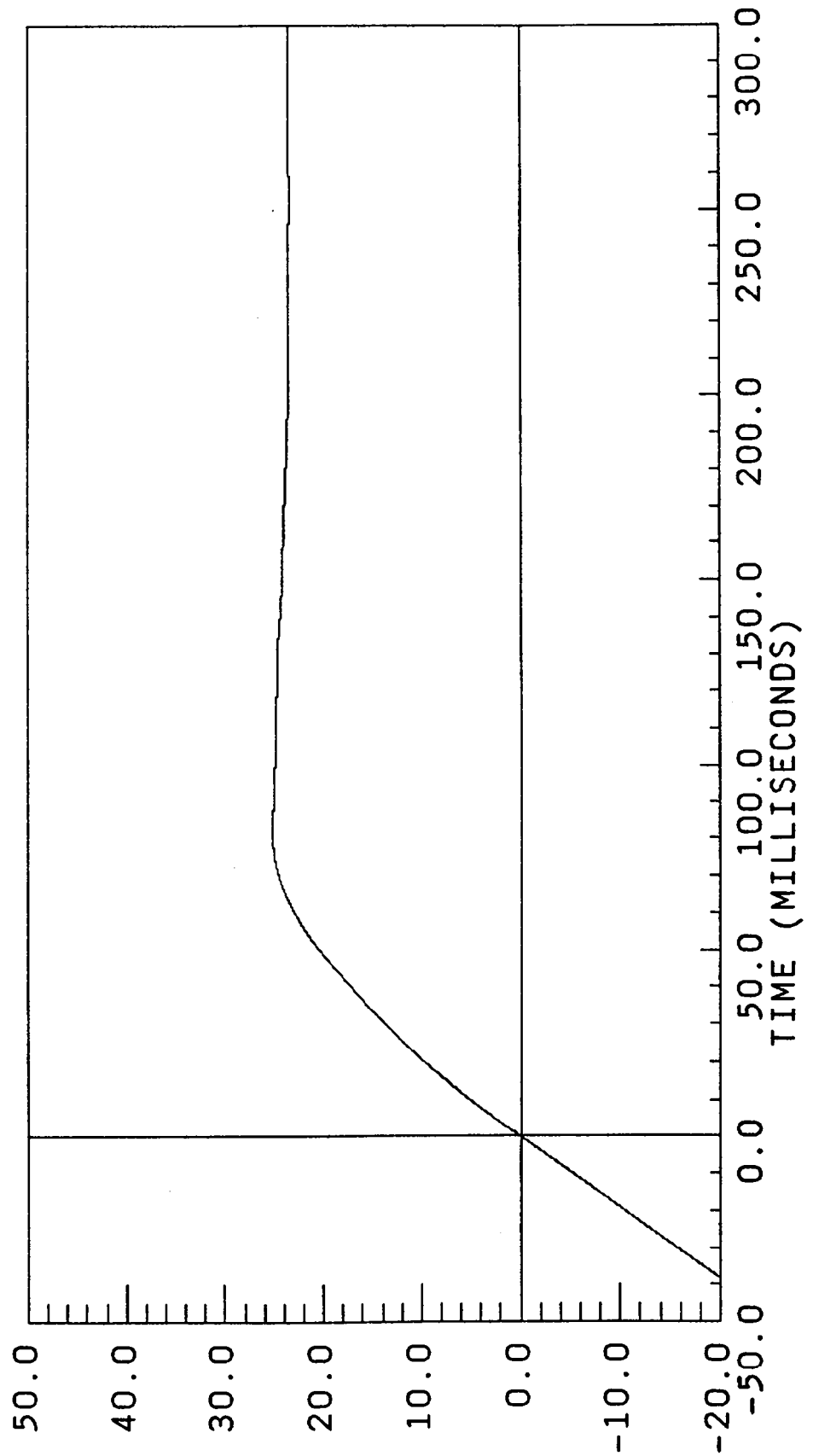
XL AXIS
YMIN = -1.853524 at 138.0750
YMAX = 29.49209 at -30.97500



29.60 mph

ACC PACK #5(X)
COMPUTED
FILTER CUTOFF: 100HZ

XL AXIS
YMIN = -23.39129 at 138.0750
YMAX = 25.12000 at 82.20000



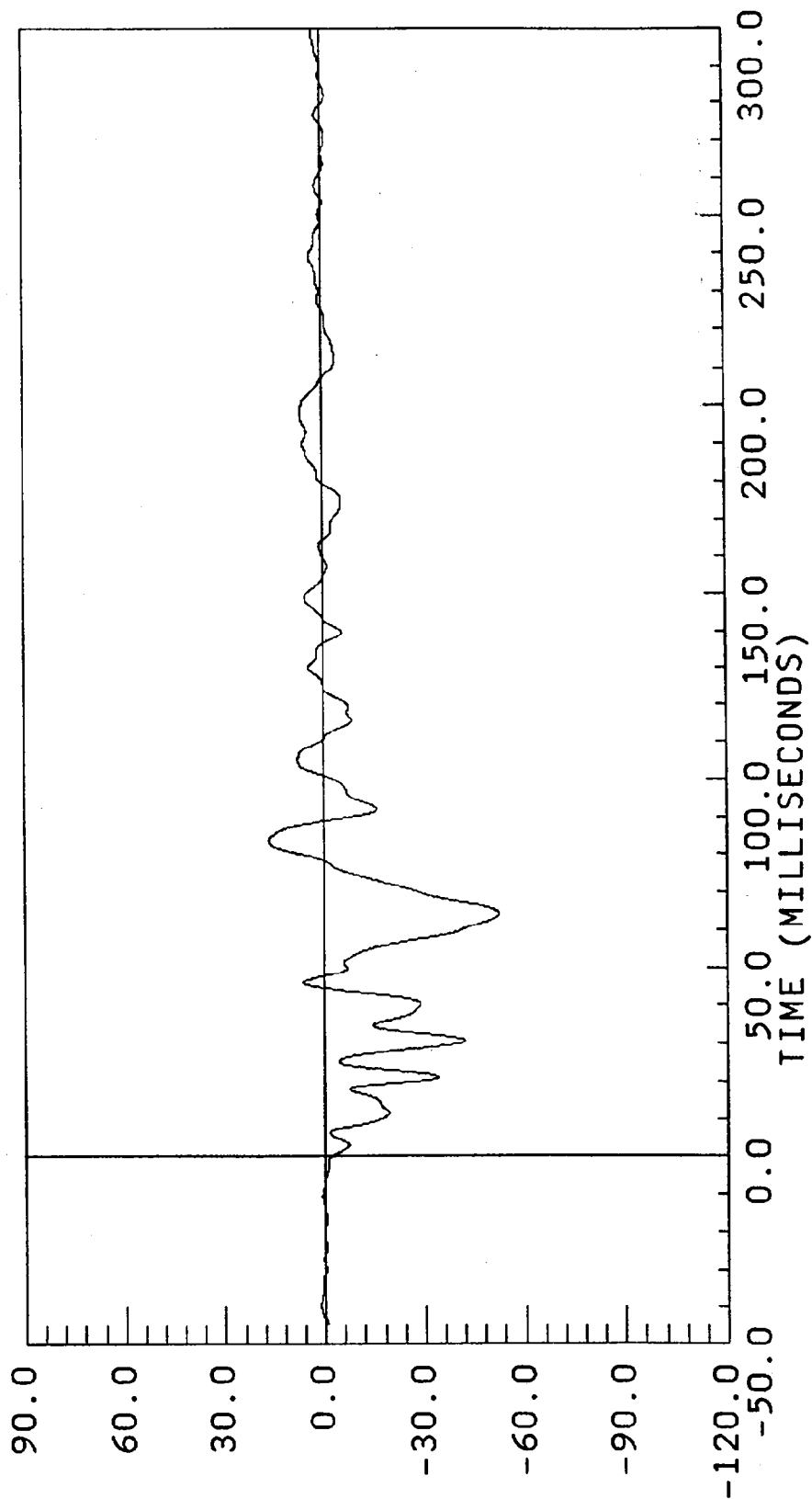
DISPLACEMENT * INCHES

BW946-22.DAT

29.60 mph

ACC PACK #6(X)
FILTERED
FILTER CUTOFF: 100HZ

XL AXIS
YMIN = -52.29633 at 64.27500
YMAX = 16.62422 at 83.62500

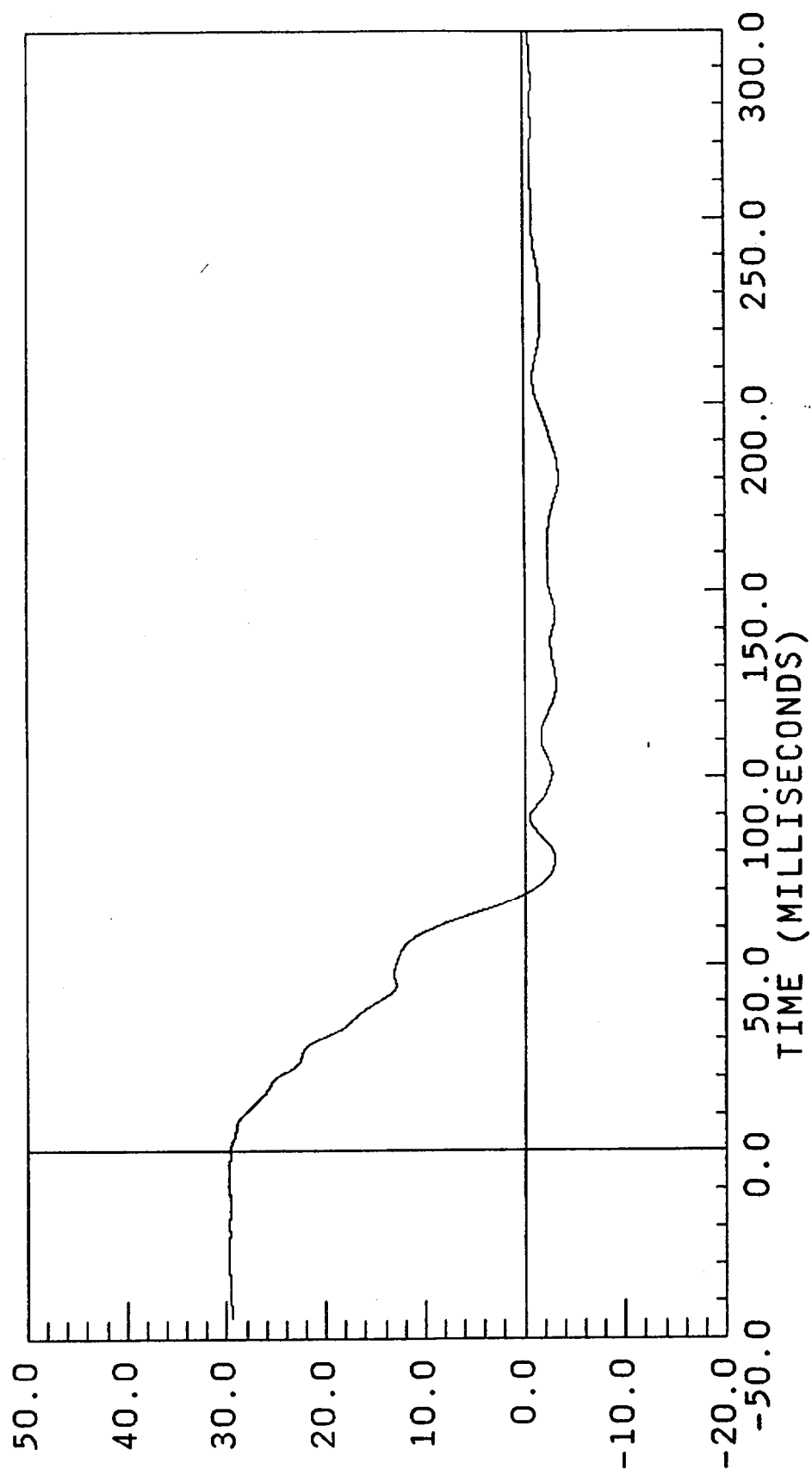


ACCELERATION * G * S *

29.60 mph

ACC PACK #6(X)
COMPUTED
FILTER CUTOFF: 100Hz

XL AXIS
YMIN = -3.511899 at 179.4000
YMAX = 29.47267 at -6.150000

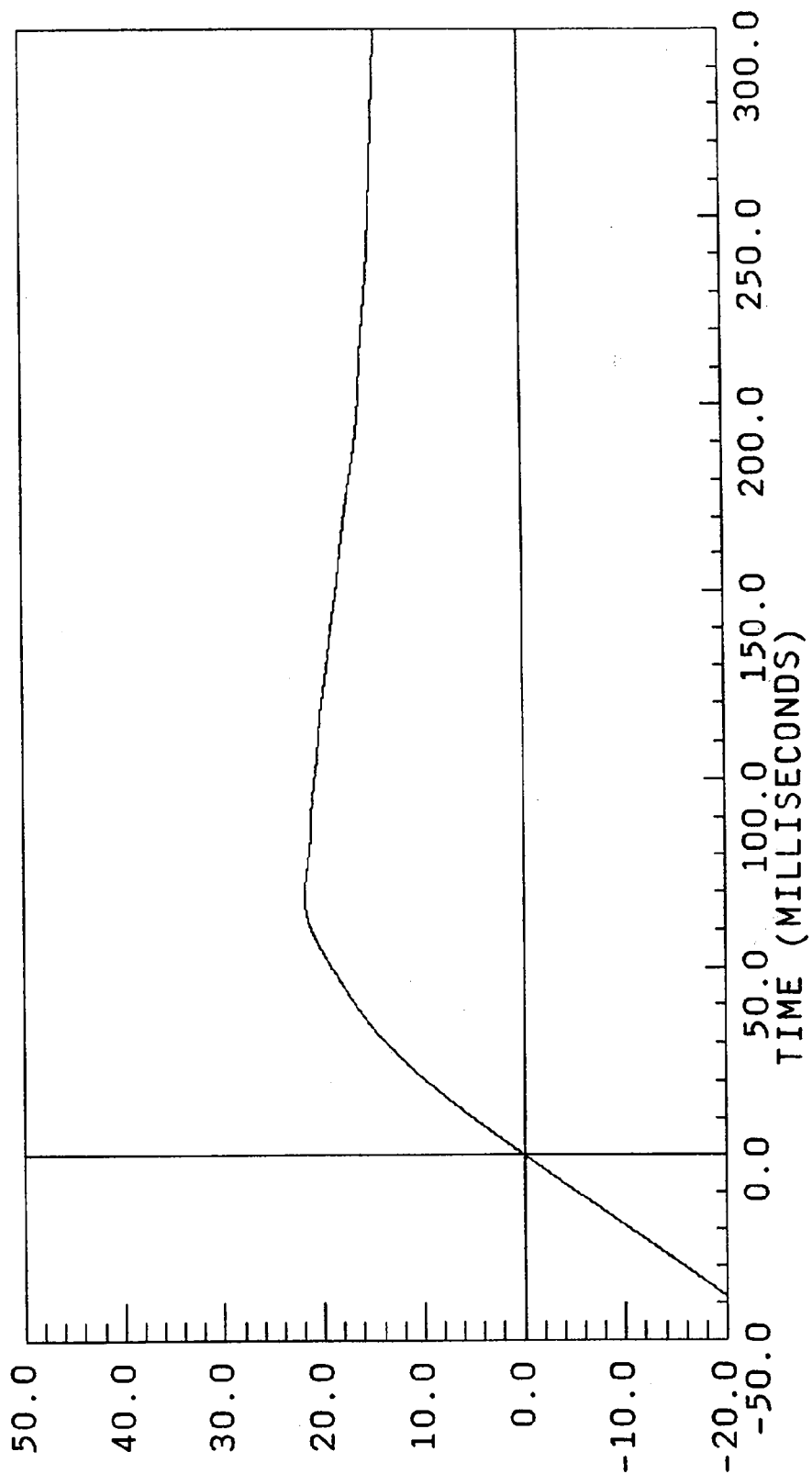


VELOCITY * MILES / HOUR

D946-22.DAT

29.60 mph

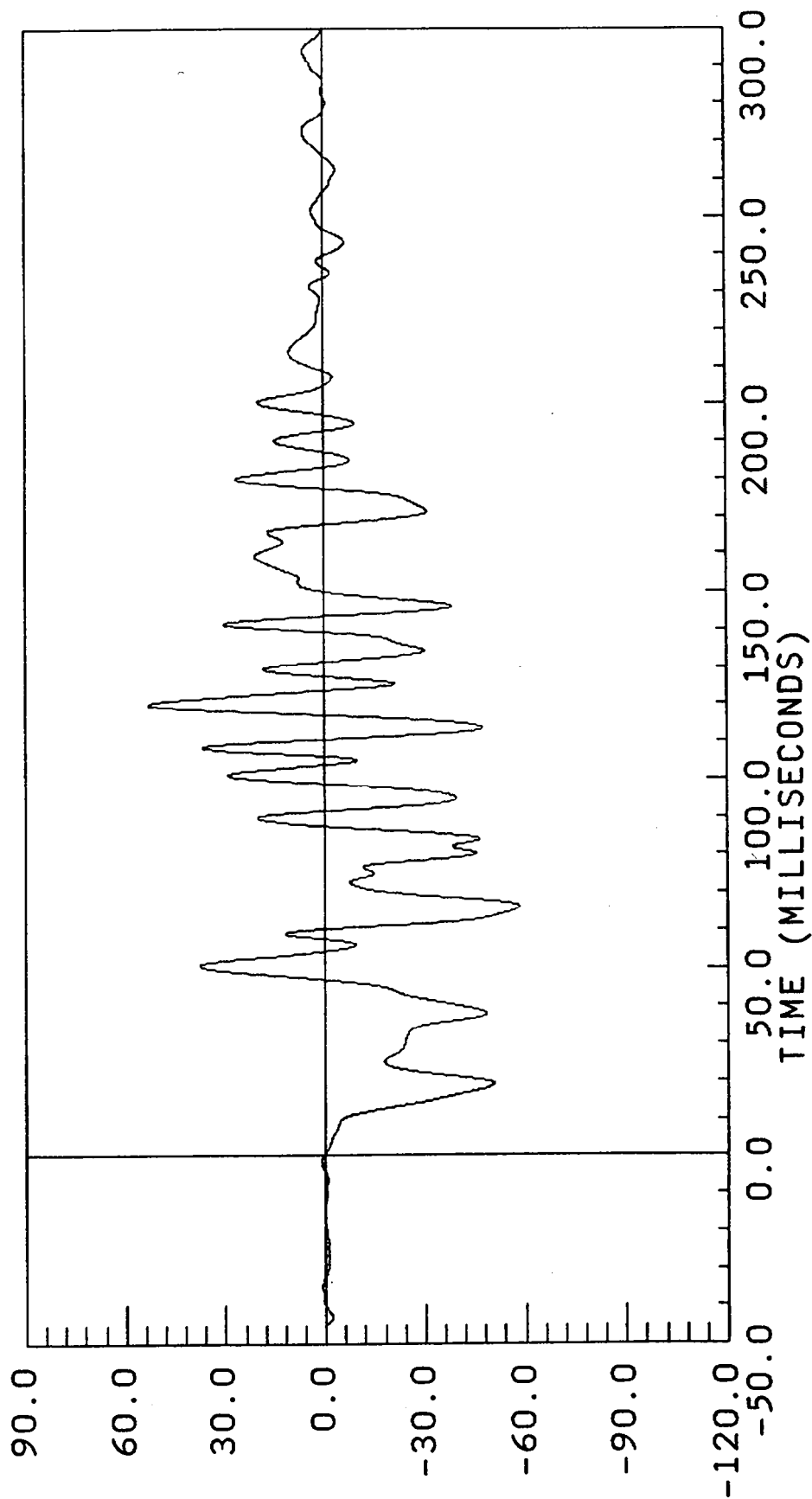
ACC PACK #6(X)
COMPUTED
FILTER CUTOFF: 100HZ
XL AXIS
YMIN = -23.43198 at 179.4000
YMAX = 21.84128 at 68.77500



29.60 mph

ACC PACK #7(X)
 FILTERED
 FILTER CUTOFF: 100HZ

XL AXIS
 YMIN = -58.30935 at 66.22501
 YMAX = 52.93444 at 120.0750

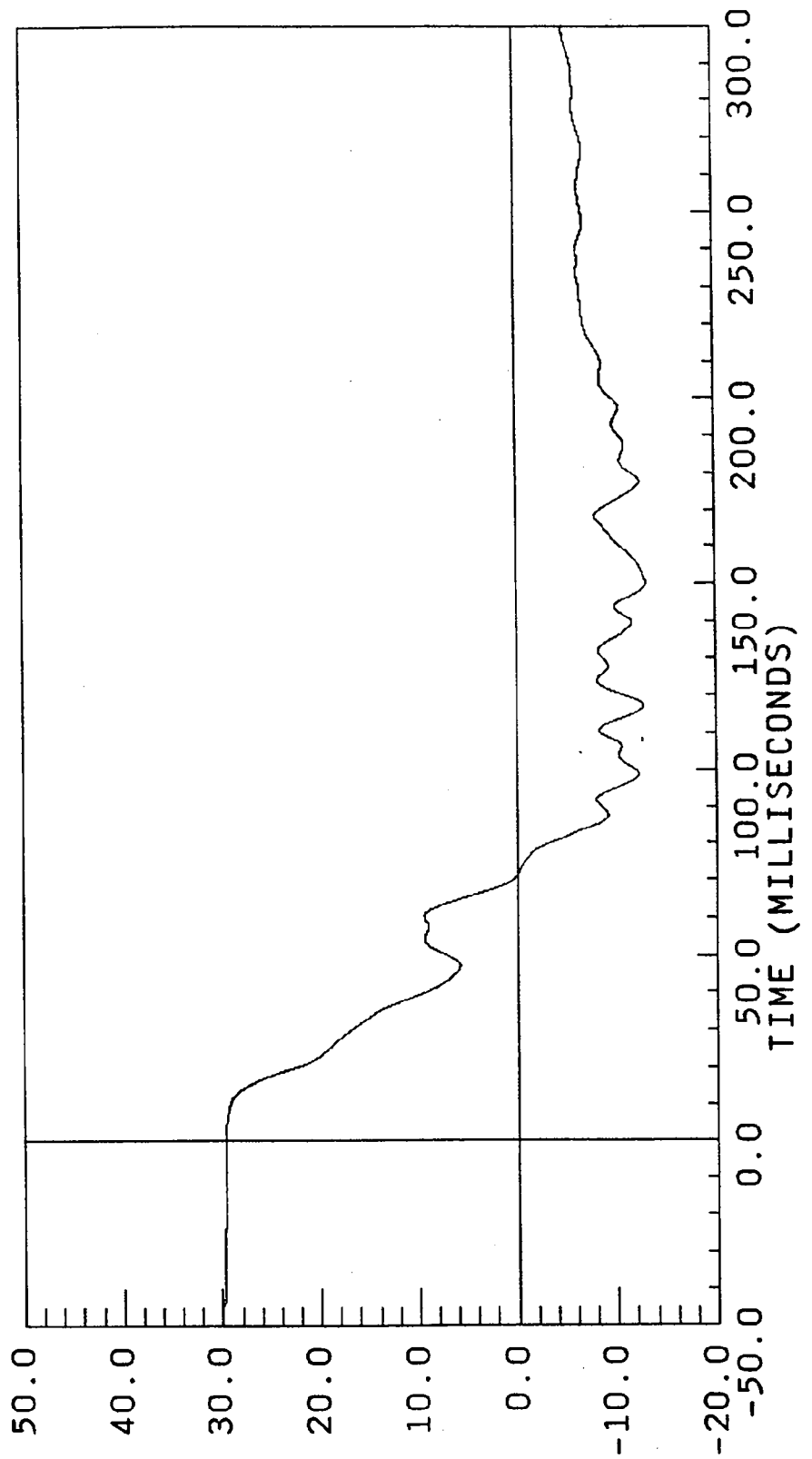


V946-23.DAT

29.60 mph

ACC PACK #7(X)
COMPUTED
FILTER CUTOFF: 100Hz

XL AXIS
YMIN = -13.03522 at 150.0750
YMAX = 29.84212 at 120.0750

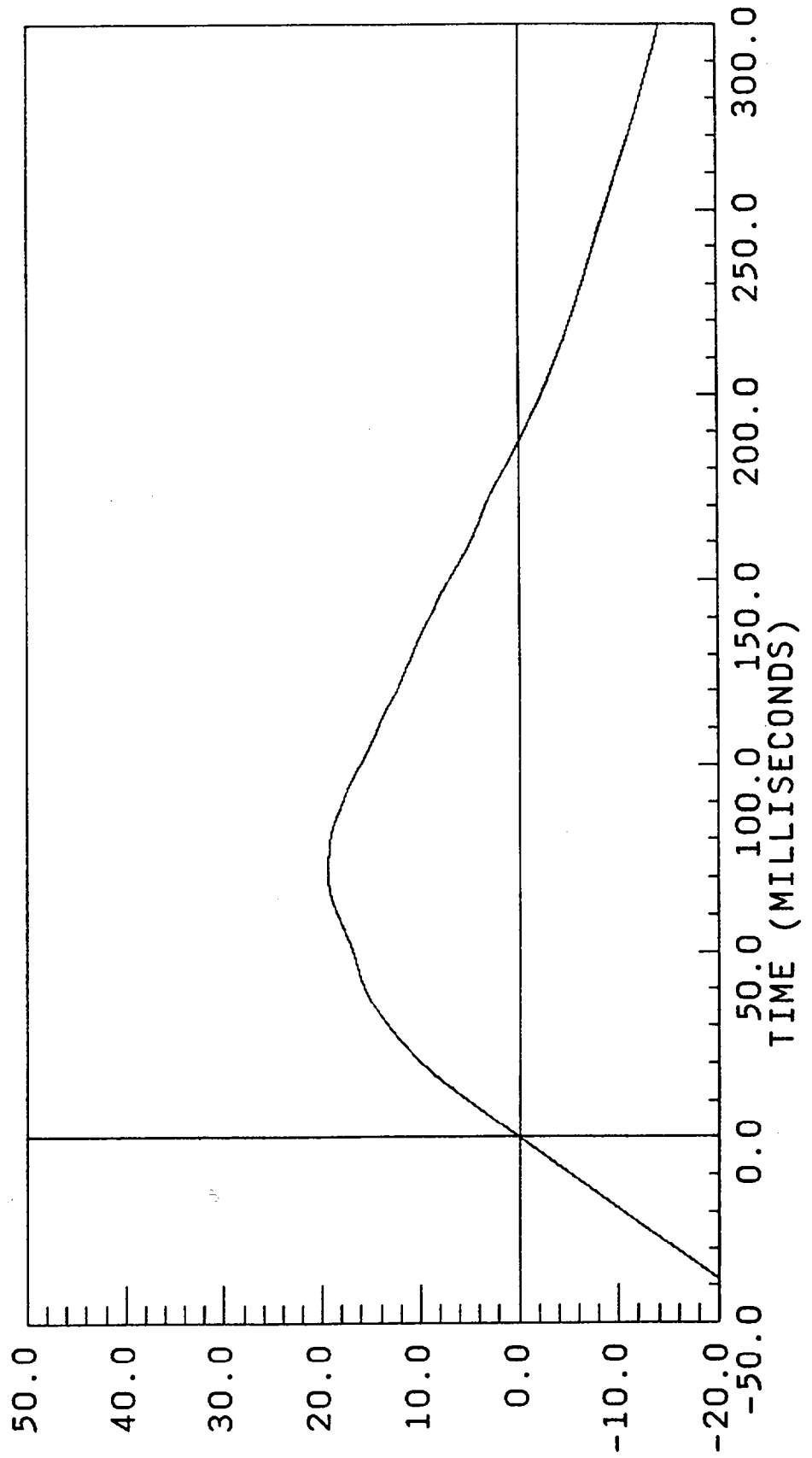


VELOCITY * MILES / HOUR

29.60 mph

ACC PACK #7(X)
COMPUTED
FILTER CUTOFF: 100Hz

XL AXIS
YMIN = -23.45731 at 150.0750
YMAX = 19.32522 at 71.10001

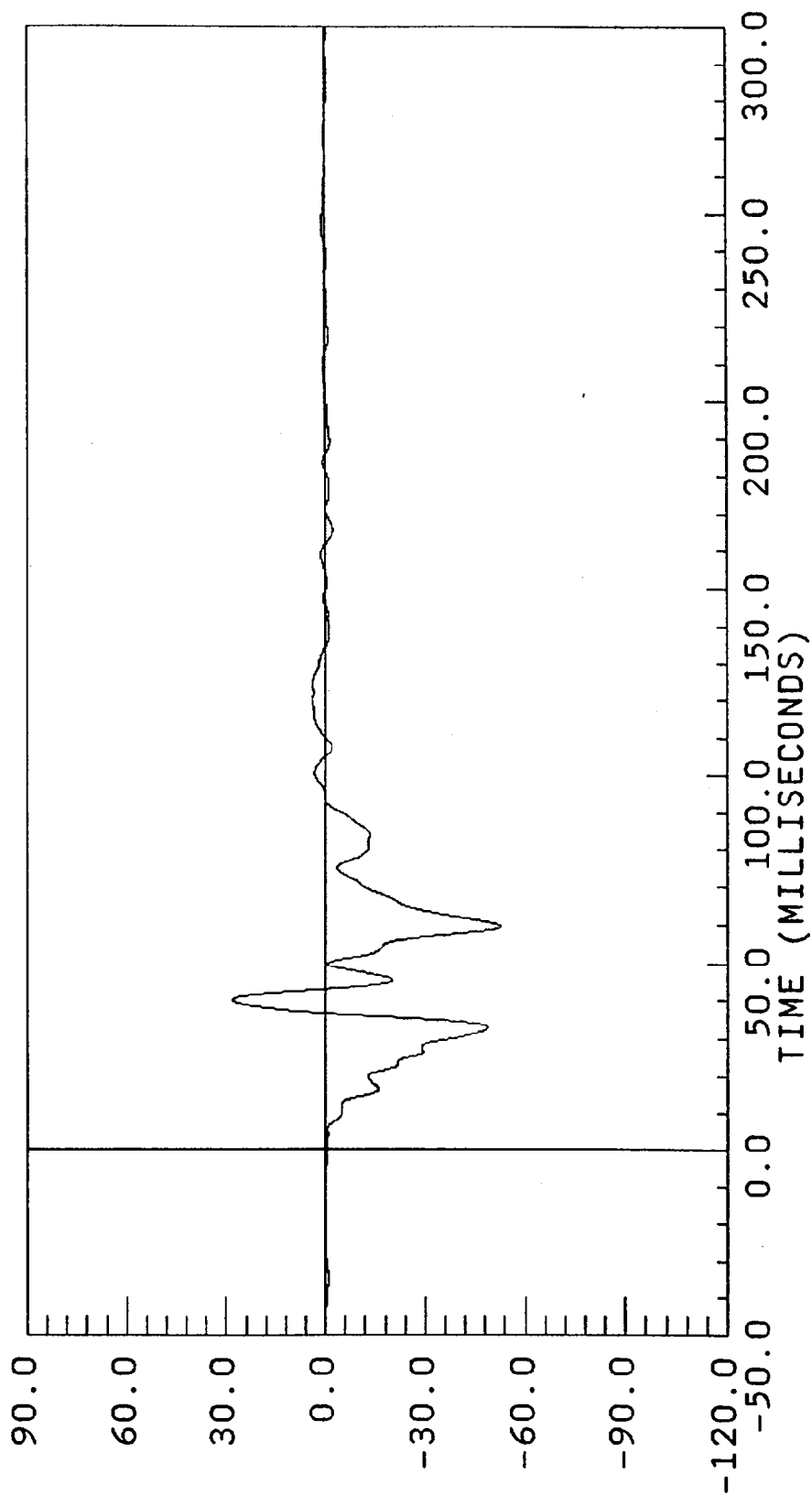


DISPLACEMENT * INCHES

BW946-24.DAT

29.60 mph

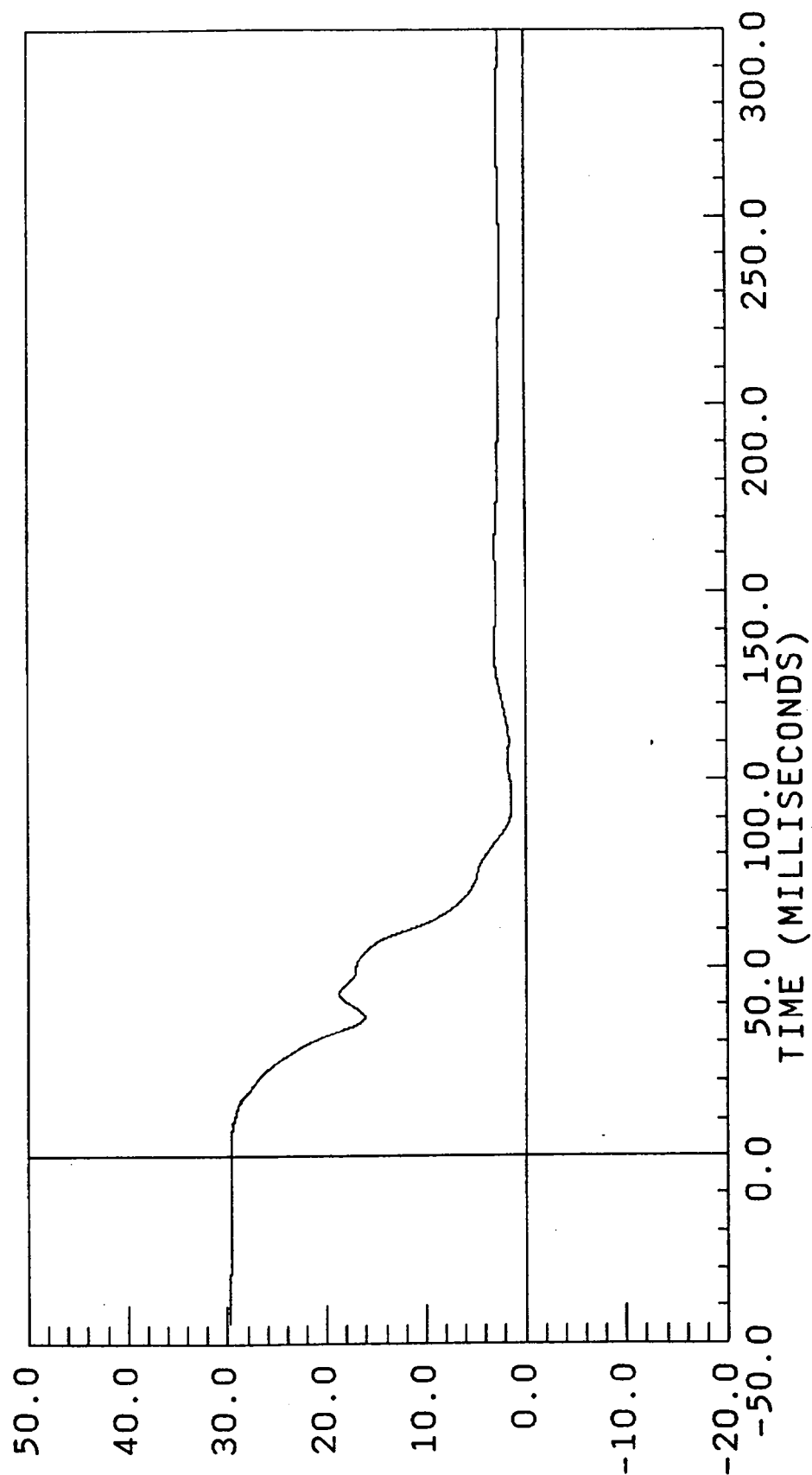
ACC PACK #8(X)
FILTERED
FILTER CUTOFF: 100HZ
XL AXIS
YMIN = -52.78777 at 59.55000
YMAX = 28.16949 at 40.05000



29.60 mph

ACC PACK #8(X)
COMPUTED
FILTER CUTOFF: 100HZ

XL AXIS
YMIN = 1.367382 at 93.07500
YMAX = 29.78903 at -44.32500

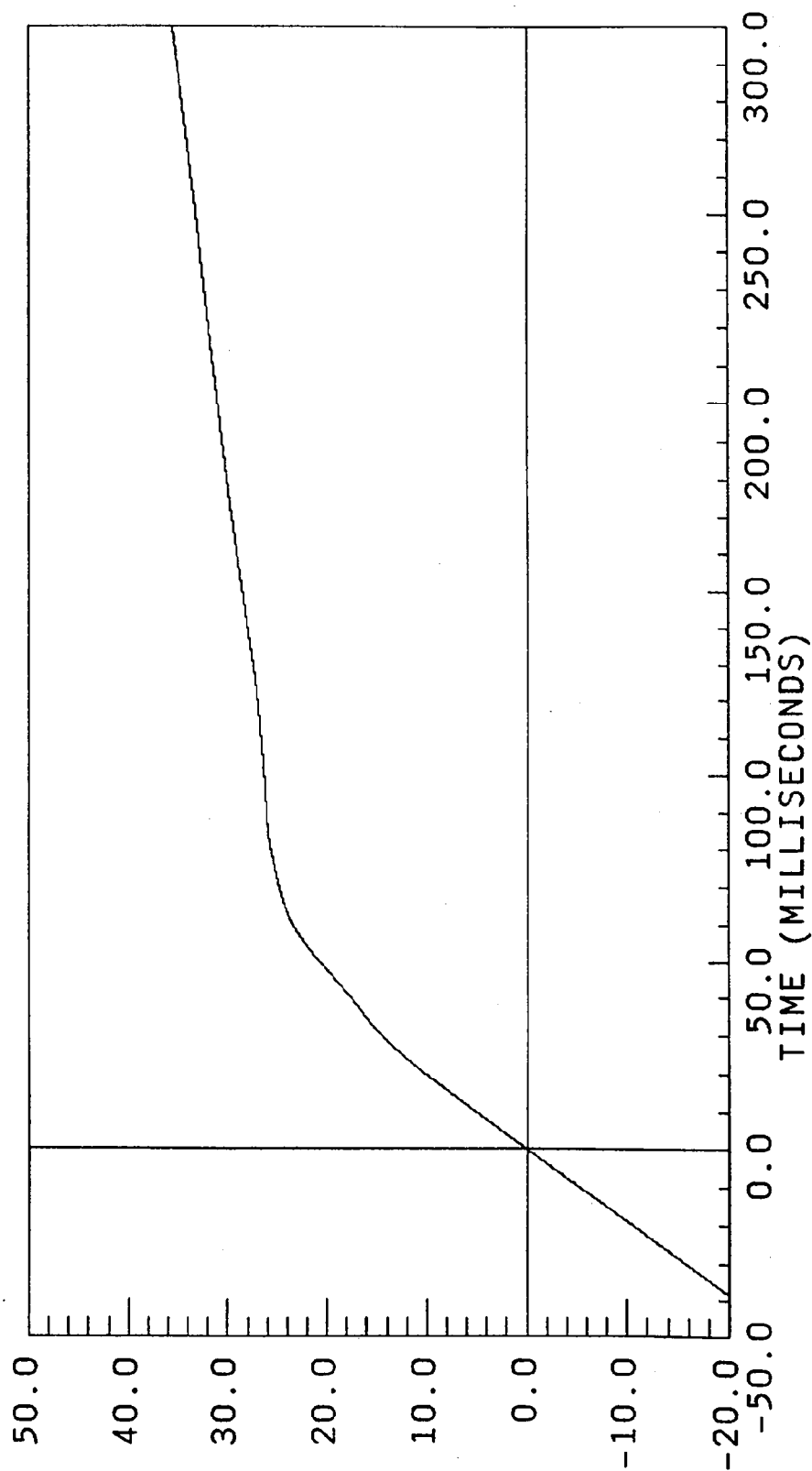


D946-24.DAT

29.60 mph

ACC PACK #8(X)
COMPUTED
FILTER CUTOFF: 100Hz

XL AXIS
YMIN = -23.45921 at 93.07500
YMAX = 35.51011 at 300.0000

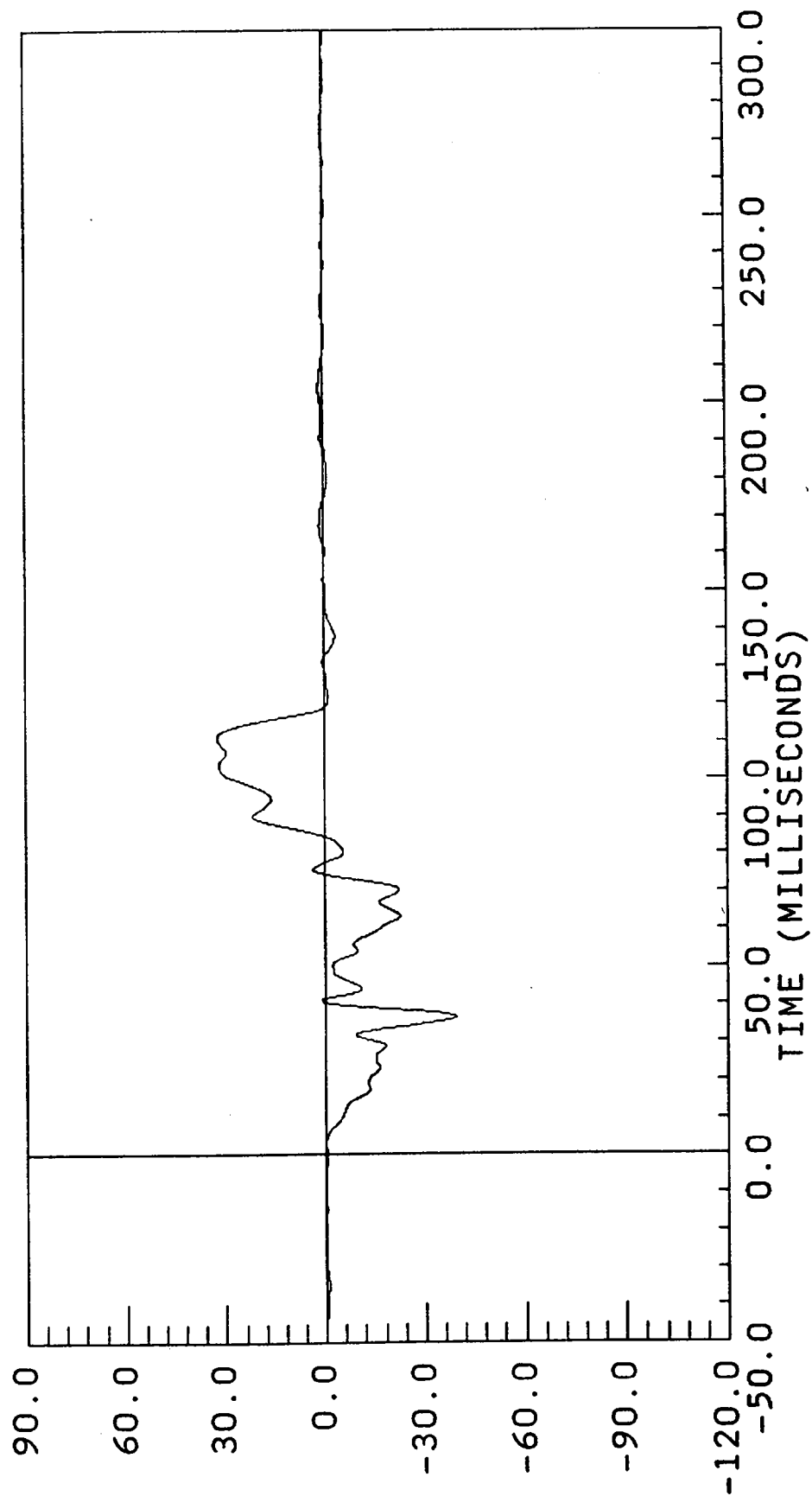


DISPLACEMENT * INCHES

29.60 mph

ACC PACK #9(X)
 FILTERED
 FILTER CUTOFF: 100HZ

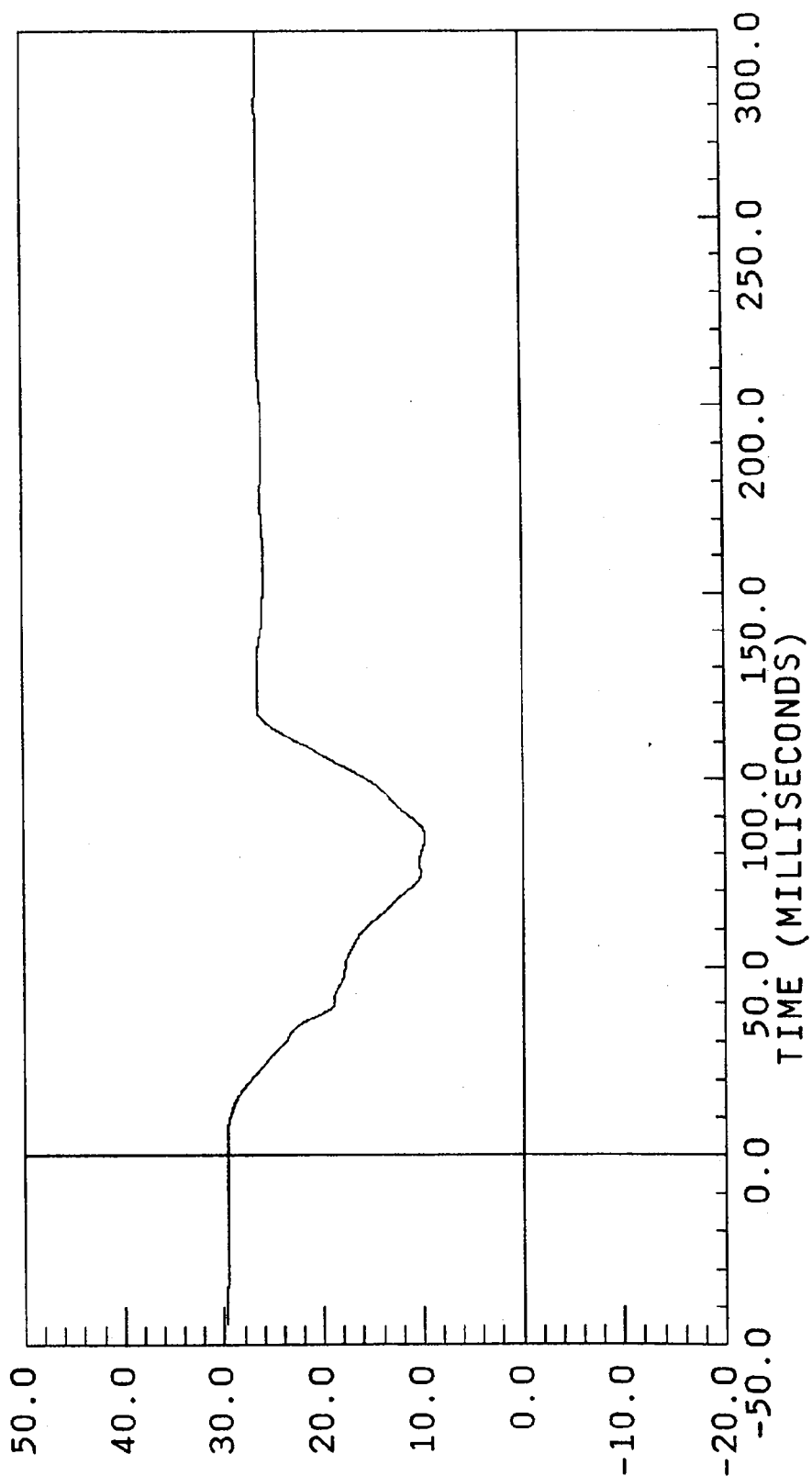
XL AXIS
 YMIN = -39.32920 at 36.52500
 YMAX = 32.23314 at 111.2250



V946-25.DAT

29.60 mph

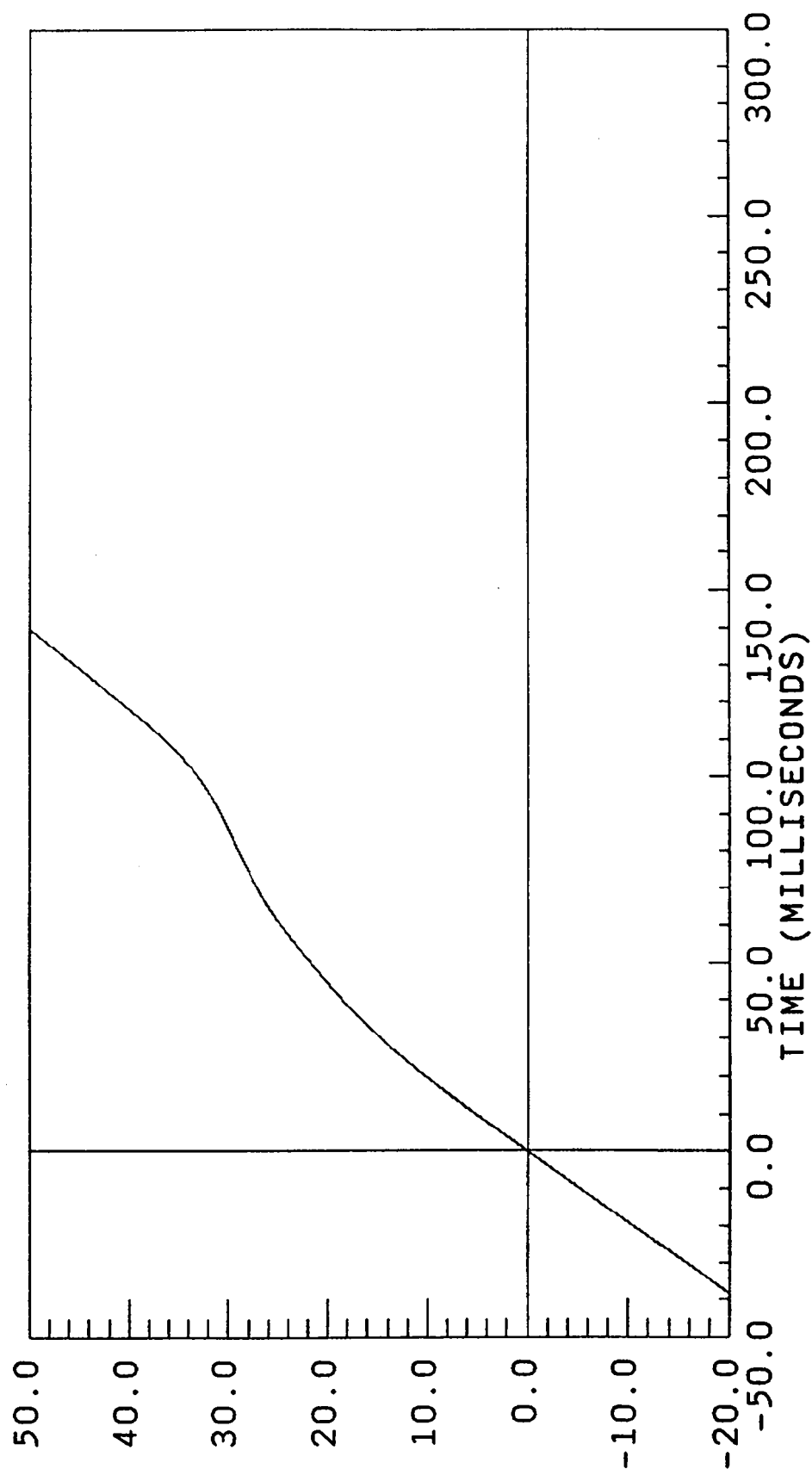
ACC PACK #9(X)
COMPUTED
FILTER CUTOFF: 100HZ
XL AXIS
YMIN = 9.777047 at 84.52500
YMAX = 29.74754 at 111.2250



29.60 mph

ACC PACK #9(X)
COMPUTED
FILTER CUTOFF: 100HZ

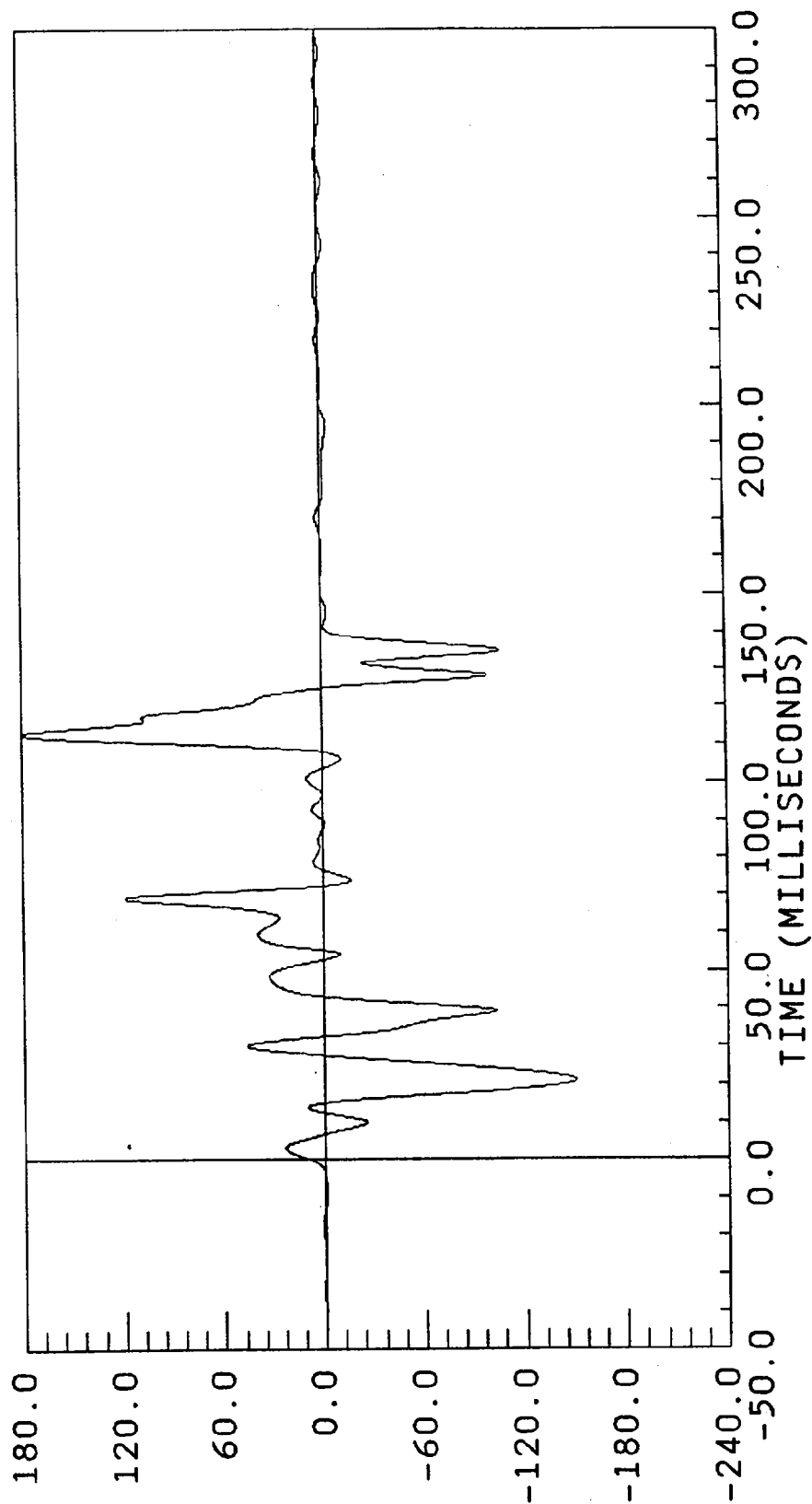
XL AXIS
YMIN = -23.43693 at 84.52500
YMAX = 123.7693 at 300.0000



BW946-26.DAT

29.60 mph

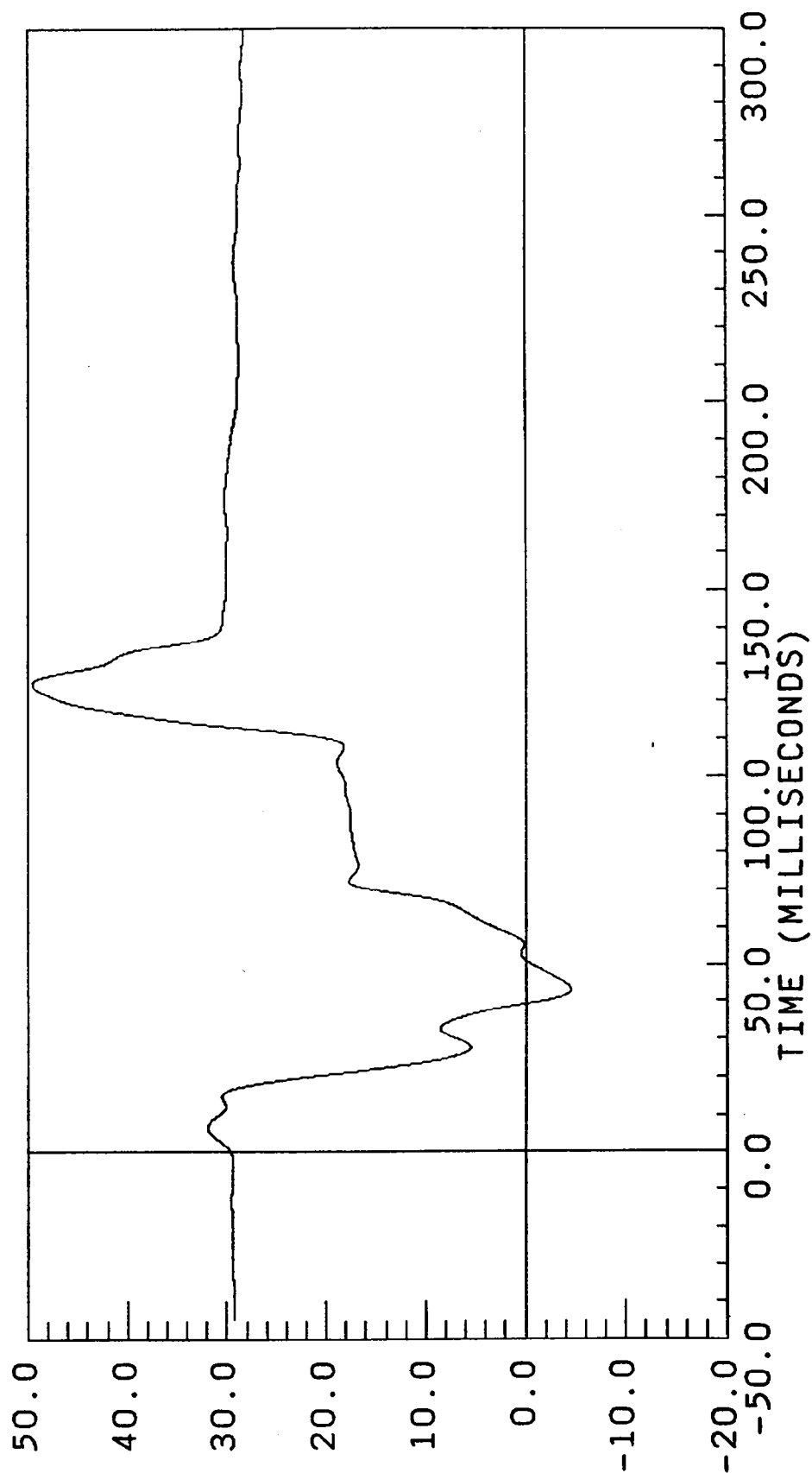
ACC PACK #10(X)
FILTERED
FILTER CUTOFF: 100Hz
XL AXIS
YMIN = -150.4797 at 21.00000
YMAX = 180.1049 at 112.8750



29.60 mph

ACC PACK #10(X)
COMPUTED
FILTER CUTOFF: 100HZ

XL AXIS
YMIN = -4.572104 at 43.05000
YMAX = 49.58230 at 124.7250



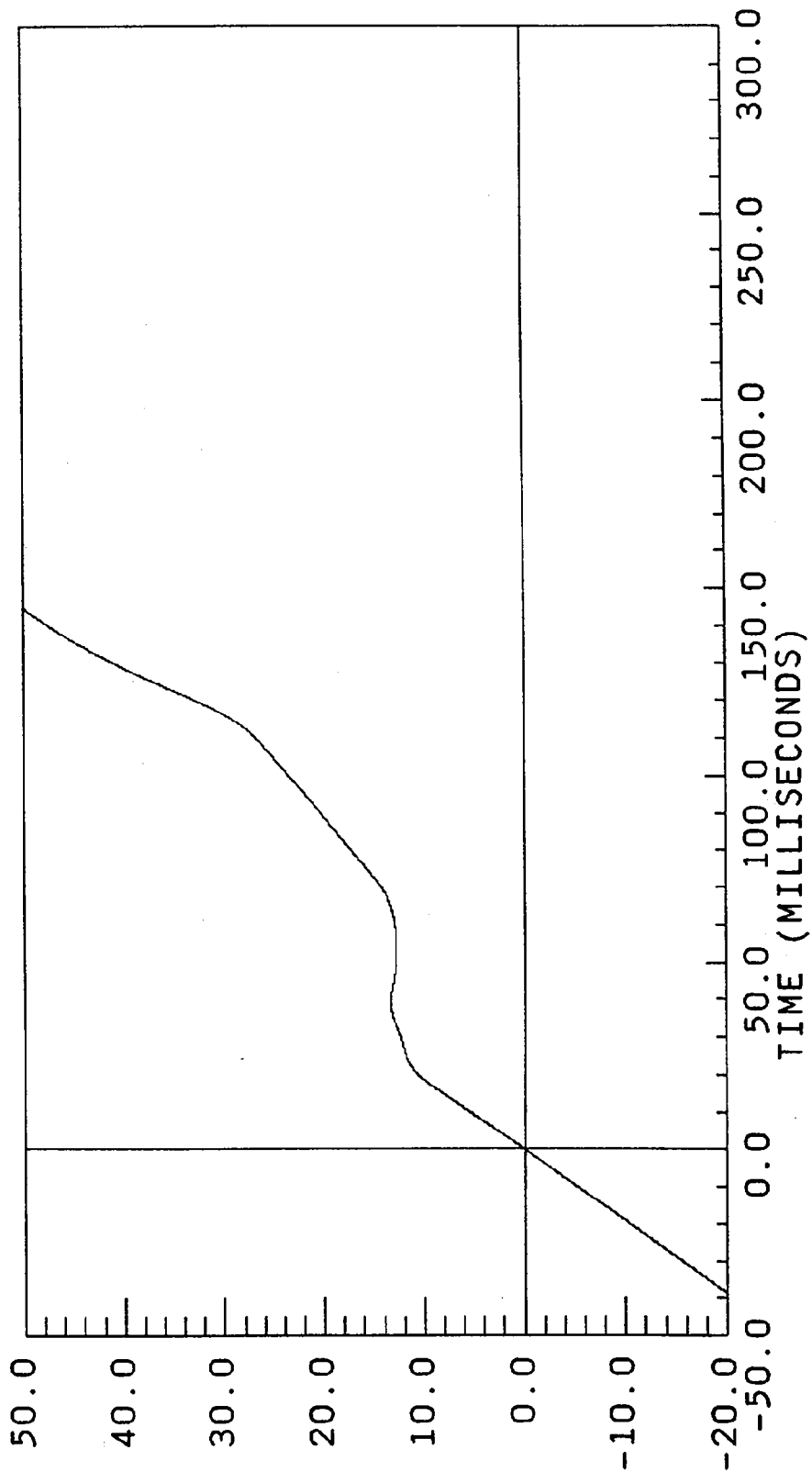
VELOCITY * MILES / HOUR
B-31 7804-2

D946-26.DAT

29.60 mph

ACC PACK #10(X)
COMPUTED
FILTER CUTOFF: 100Hz

XL AXIS
YMIN = -23.22980 at 43.05000
YMAX = 129.7702 at 300.0000



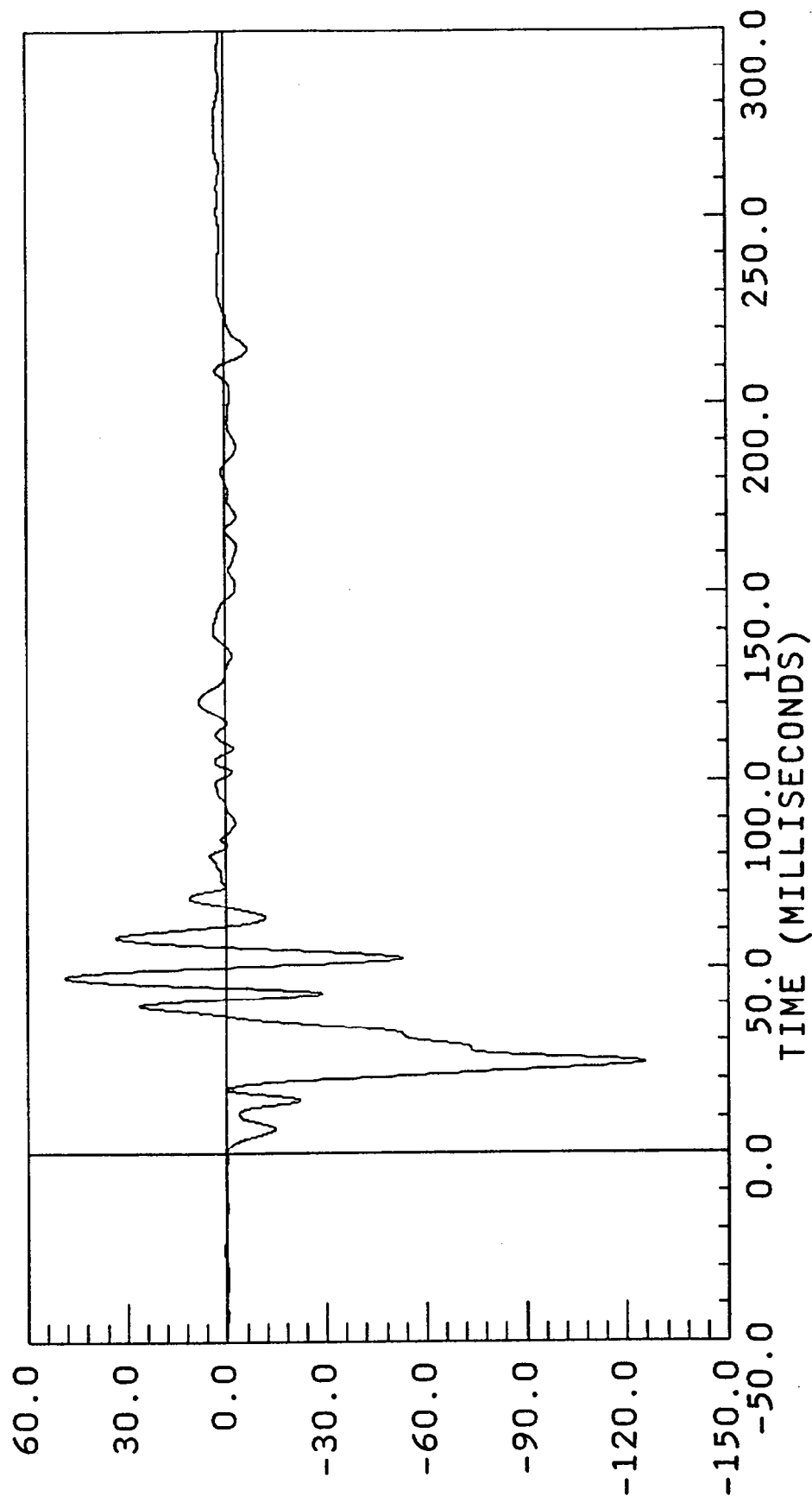
DISPLACEMENT * INCHES

29.60 mph

ACC PACK #11(X)
 FILTERED
 FILTER CUTOFF: 100HZ

XL AXIS

YMIN = -125.4016 at 24.22500
 YMAX = 48.68291 at 47.47500

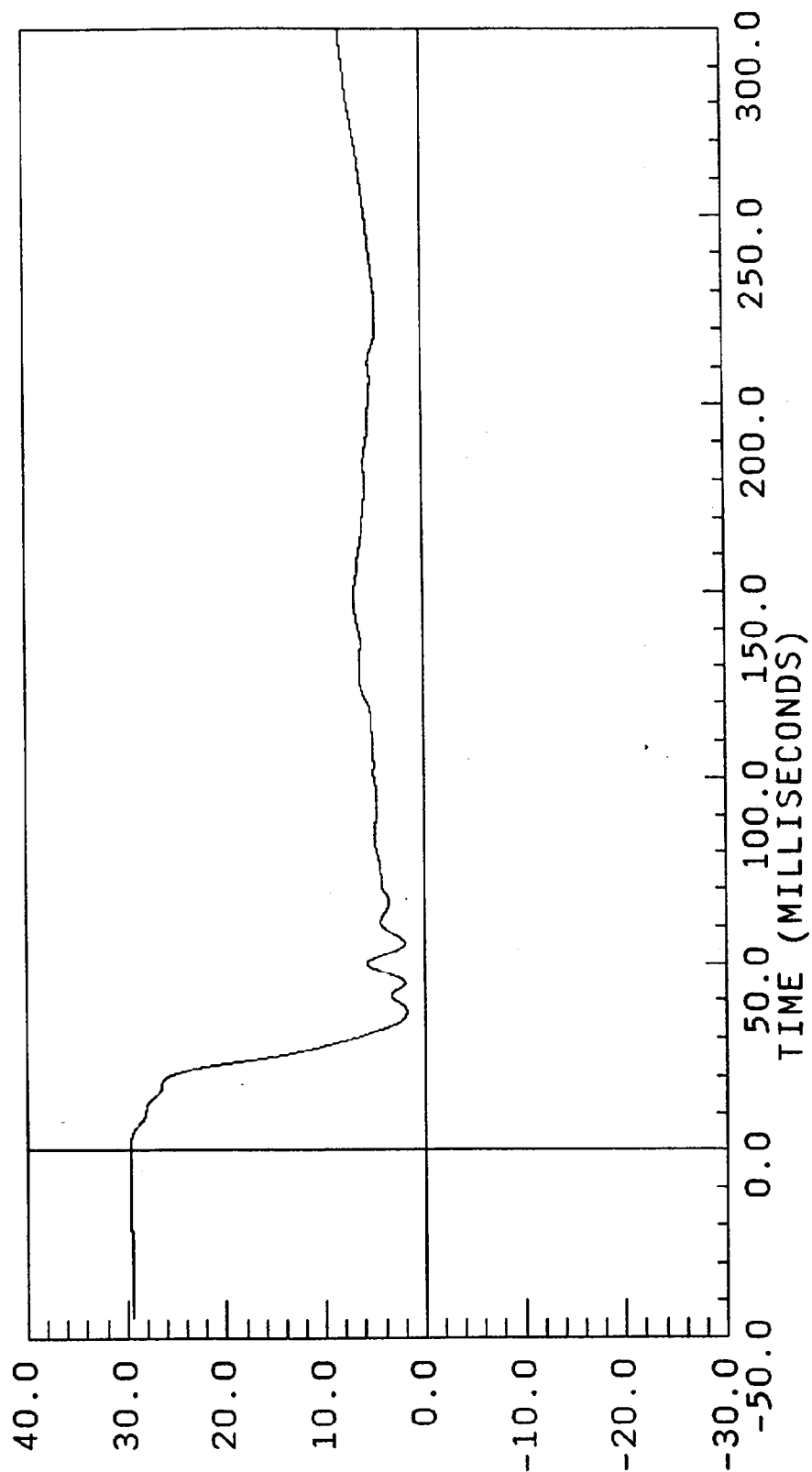


ACCELERATION * G * S *

V946-27.DAT

29.60 mph

ACC PACK #111(X) XL AXIS
COMPUTED YMIN = 1.831593 at 36.75000
FILTER CUTOFF: 100HZ YMAX = 29.51998 at -2.775000

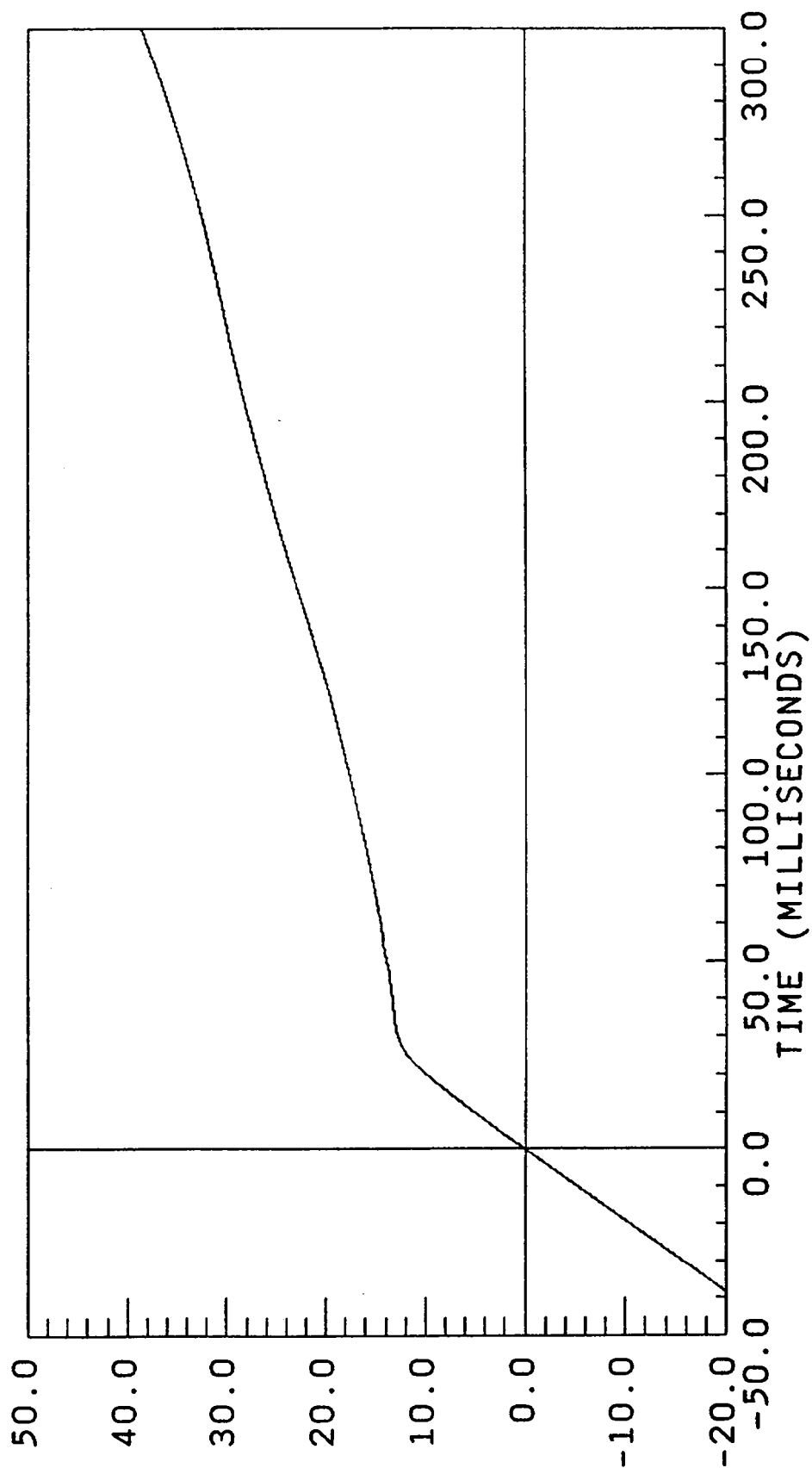


29.60 mph

ACC PACK #11(X)
COMPUTED
FILTER CUTOFF: 100HZ

XL AXIS

YMIN = -23.35419 at 36.75000
YMAX = 38.60199 at 300.0000



DISPLACEMENT * INCHES

TEST NO. CL0202

DUMMY DATA

CLASS	FILTER CHANNEL
Head Accelerations	1000
Chest Accelerations	180
Femur Forces	600

HEAD INJURY CRITERION
HEAD SEVERITY INDEX
25MS. MAXIMUM DURATION

NHTSA CRASH TEST - PROC. 208

PUN= 246

PDS#1 HEAD R

HIC= 268.4 FROM T1= .07980 TO T2= .10350
AVERAGE ACCELERATION BETWEEN T1 AND T2= 41.86'g
EVENT TIME= 300.0 MSEC
SEVERITY INDEX= 353.3

UDS\$946-1.DAT

29.60 mph

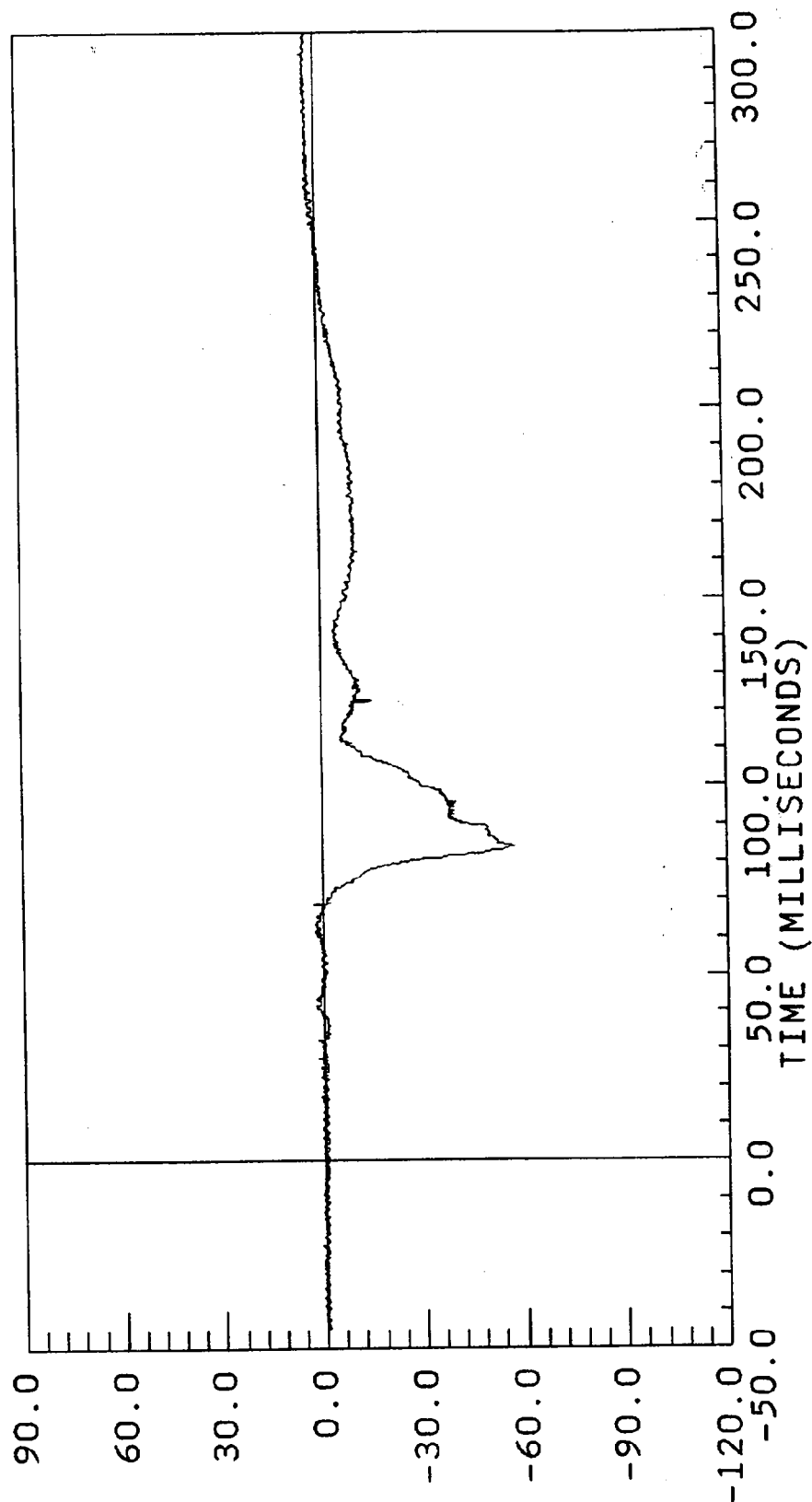
POS#1 HEAD X

XL AXIS

YMIN = -57.33100 at 84.15000

YMAX = 4.745800 at 294.3000

FILTER CUTOFF: 0Hz



ACCELERATION * G * S *

0.00 mph

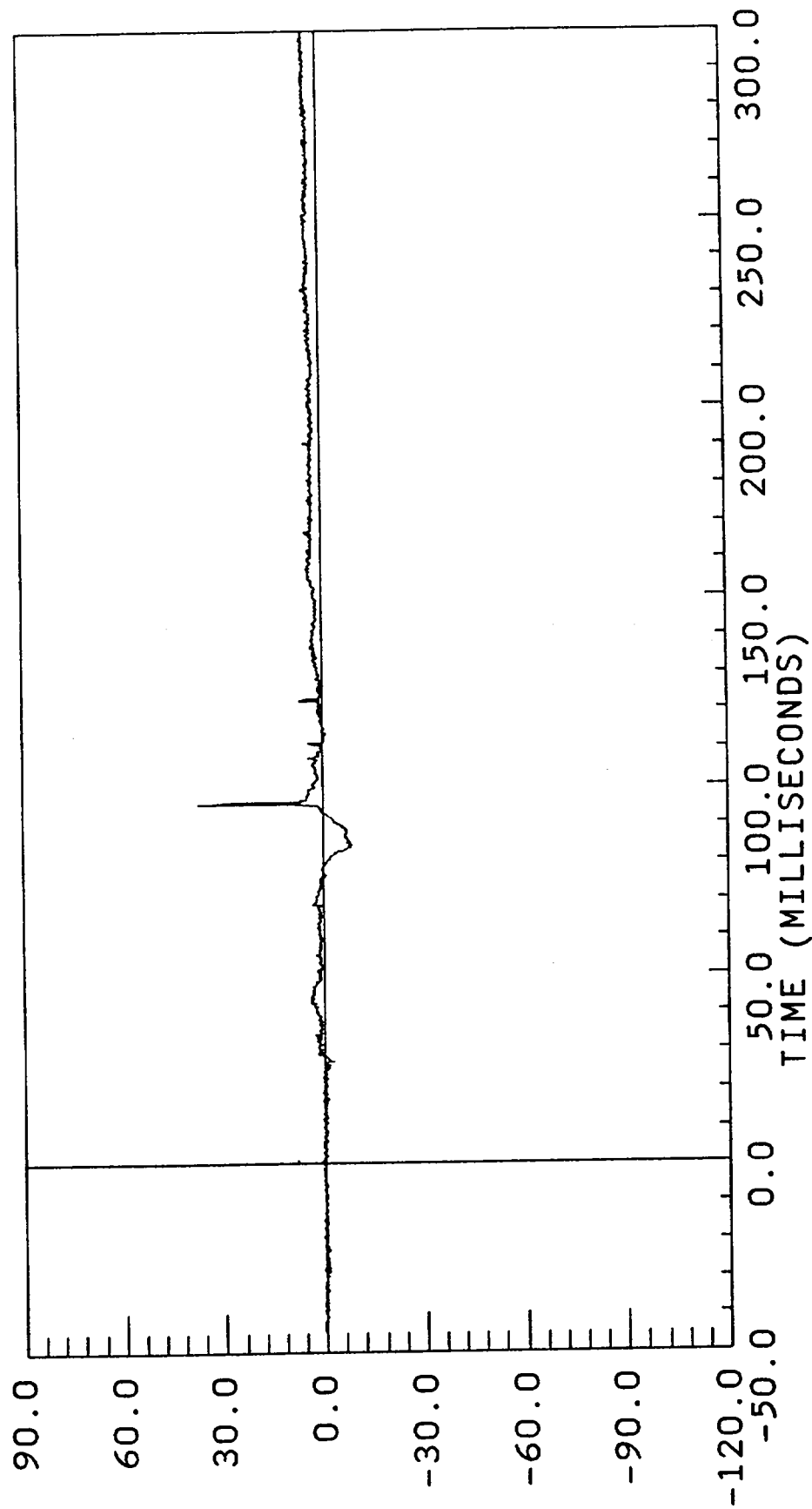
POS#1 HEAD Y

YL AXIS

YMIN = -8.163500 at 83.77500

YMAX = 37.59700 at 95.17500

FILTER CUTOFF: OHZ

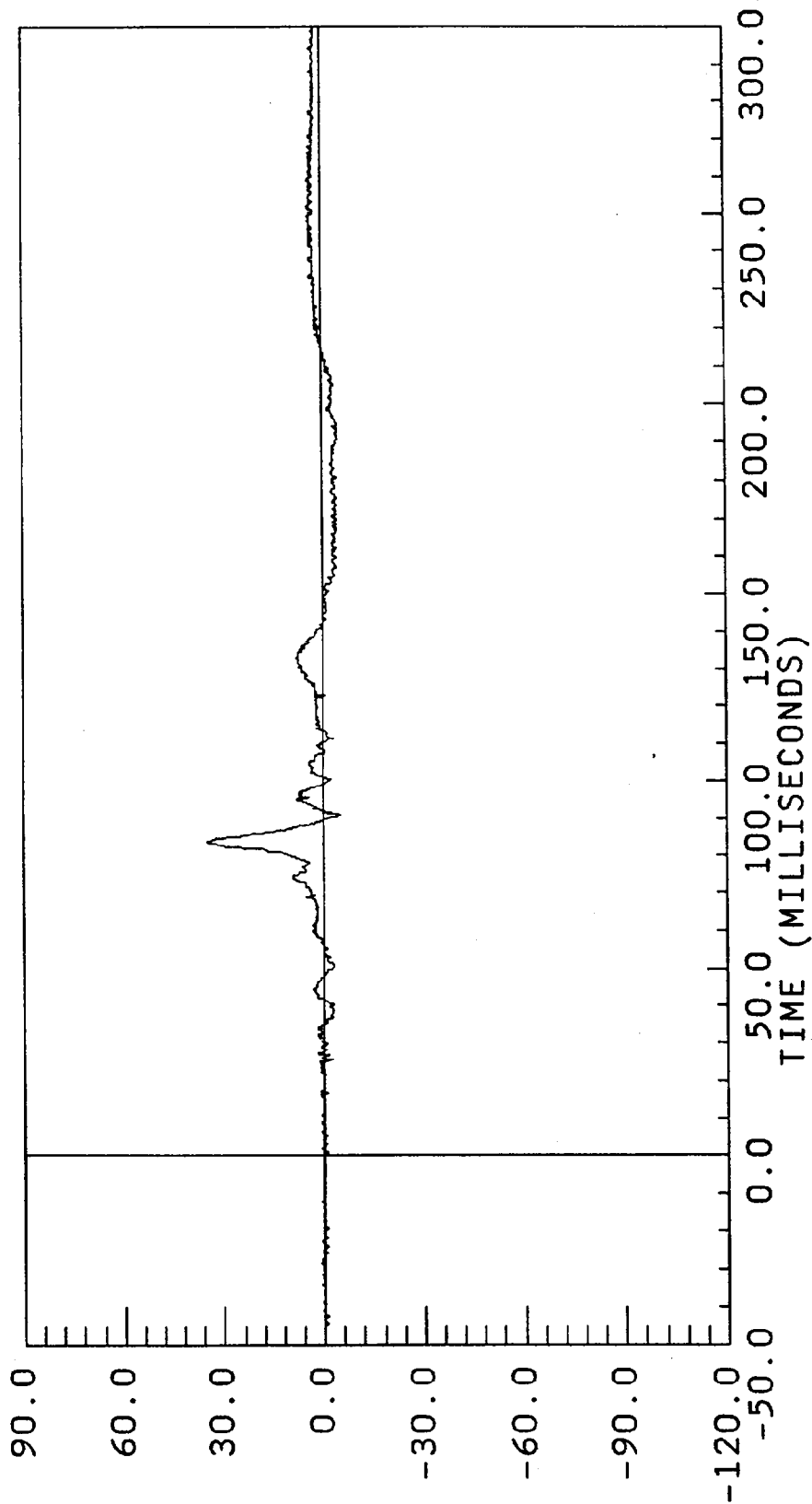


ACCELERATION * G, S *

UDS\$946-3.DAT

0.00 mph

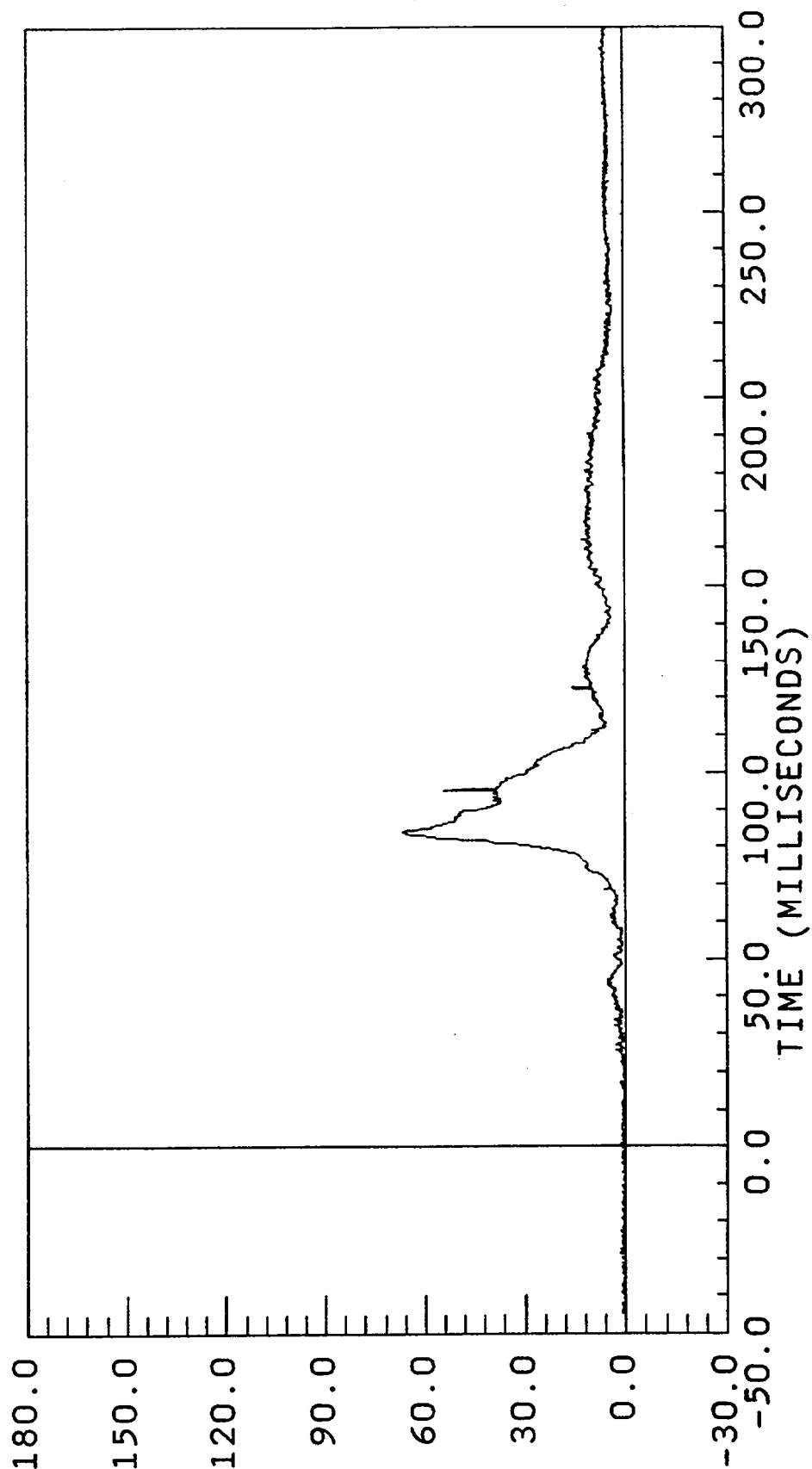
POS#1 HEAD Z ZL AXIS
YMIN = -5.151000 at 90.82500
YMAX = 35.22100 at 83.47501
FILTER CUTOFF: 0HZ



0.00 mph

POS#1 HEAD
NONSTANDARD
FILTER CUTOFF: 0Hz

RS AXIS
YMIN = 0.593131 at -43.50000
YMAX = 67.01213 at 84.15000

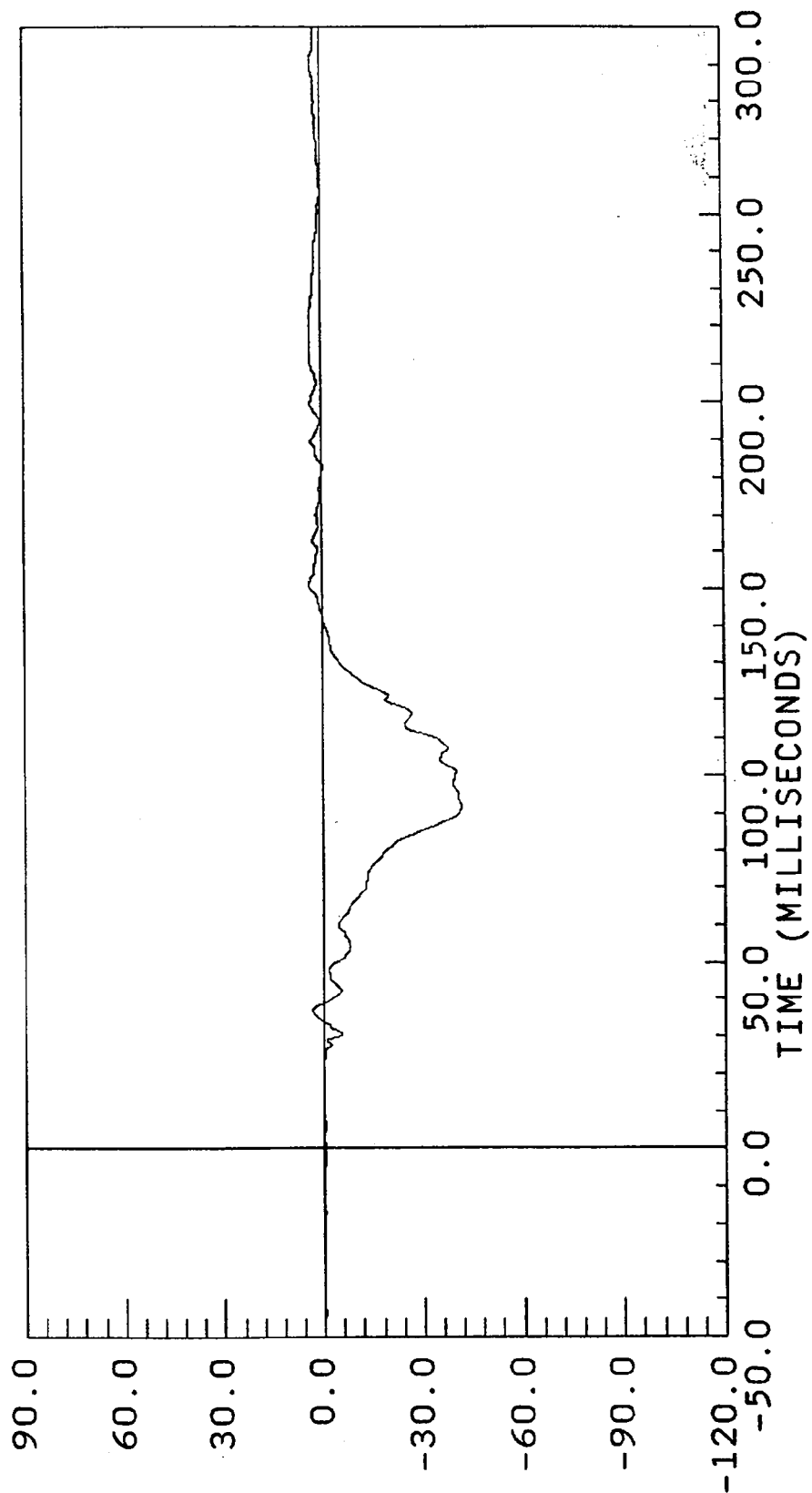


BW946-4.DAT

29.60 mph

POS#1 CHEST X
FILTERED
FILTER CUTOFF: 300Hz

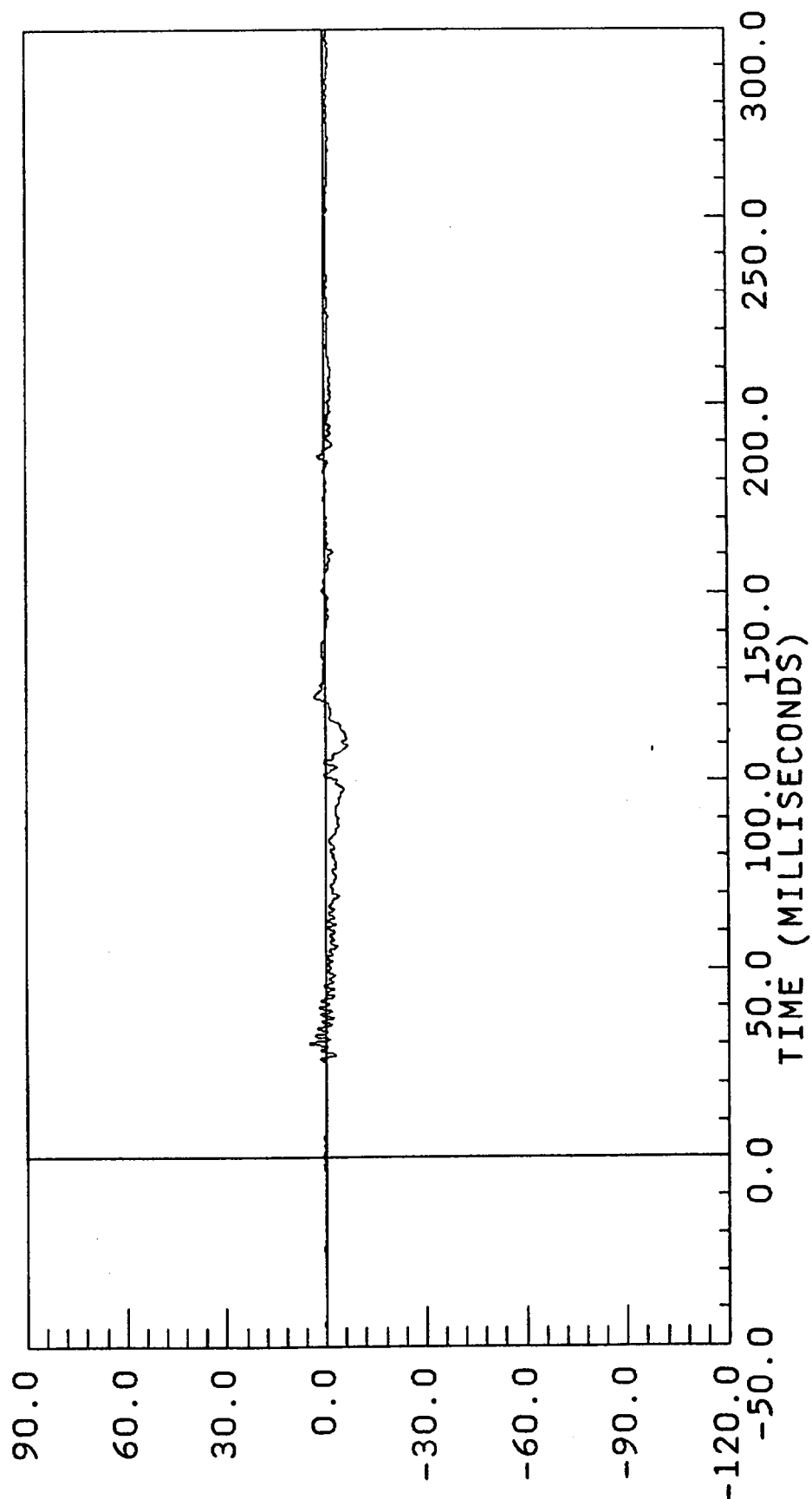
XL AXIS
YMIN = -41.41635 at 91.87500
YMAX = 3.918653 at 150.9750



ACCELERATION * G * S *
B-42 7804-2

0.00 mph

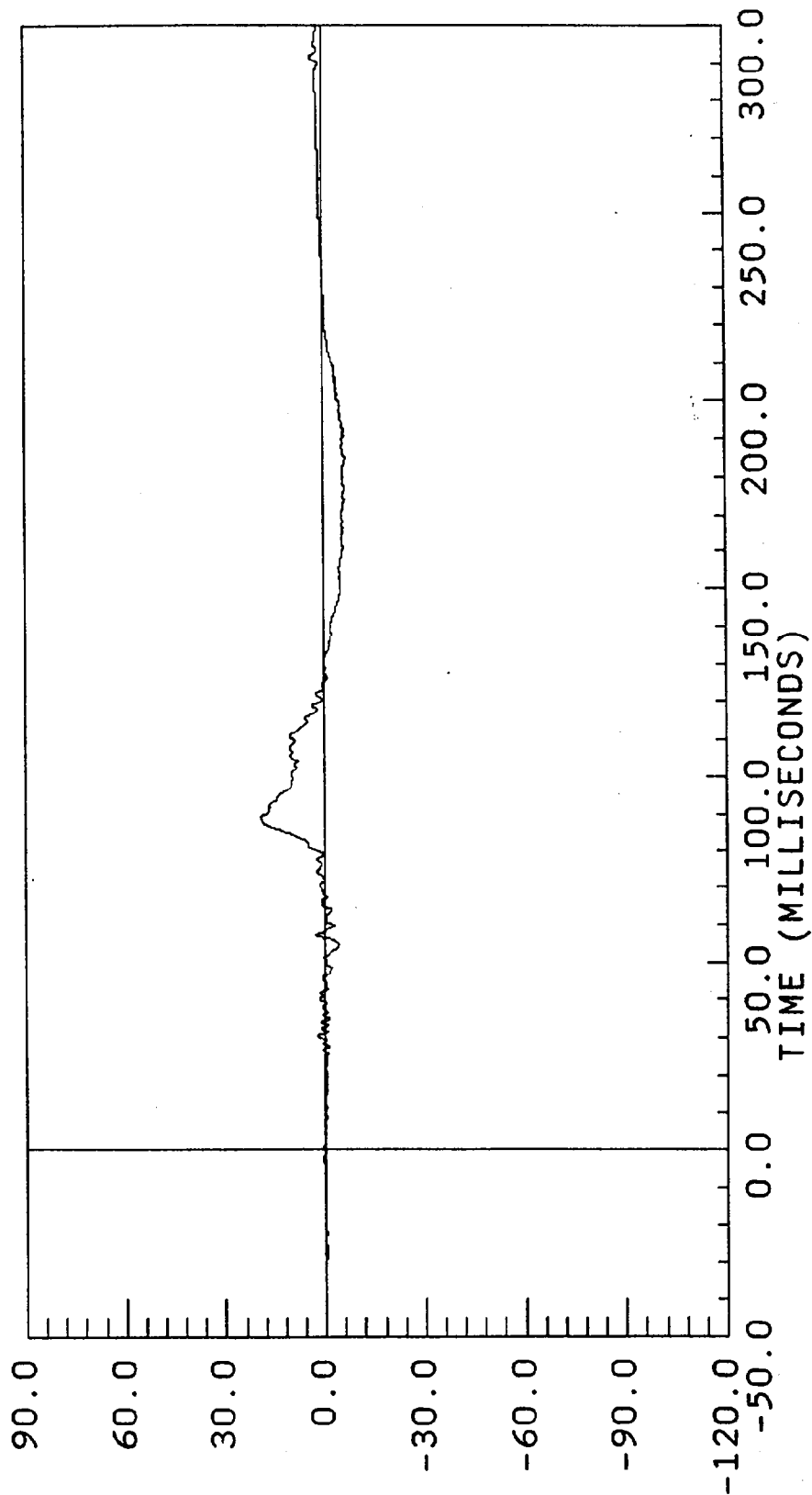
POS#1 CHEST Y
 FILTERED
 FILTER CUTOFF: 300HZ
 YL AXIS
 YMIN = -6.603786 at 109.5000
 YMAX = 4.975459 at 30.30000



BW946-6.DAT

0.00 mph

POS#1 CHEST Z
FILTERED
FILTER CUTOFF: 300Hz
ZL AXIS
YMIN = -6.670566 at 184.9500
YMAX = 19.48868 at 89.02500



0.00 mph

POS#1 CHEST

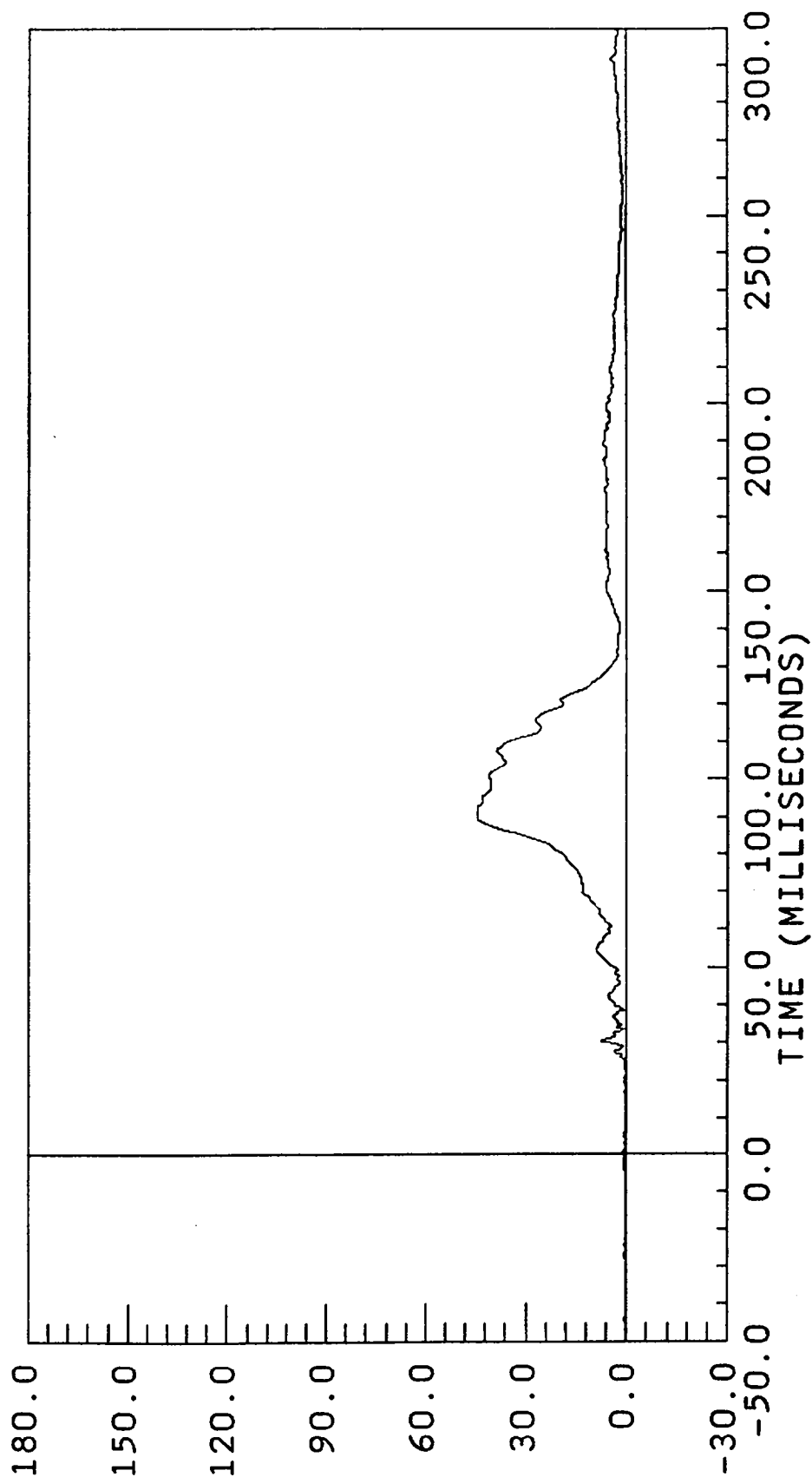
COMPUTED

FILTER CUTOFF: 300HZ

RS AXIS

YMIN = 0.0464871 at -8.850000

YMAX = 44.72087 at 92.10001



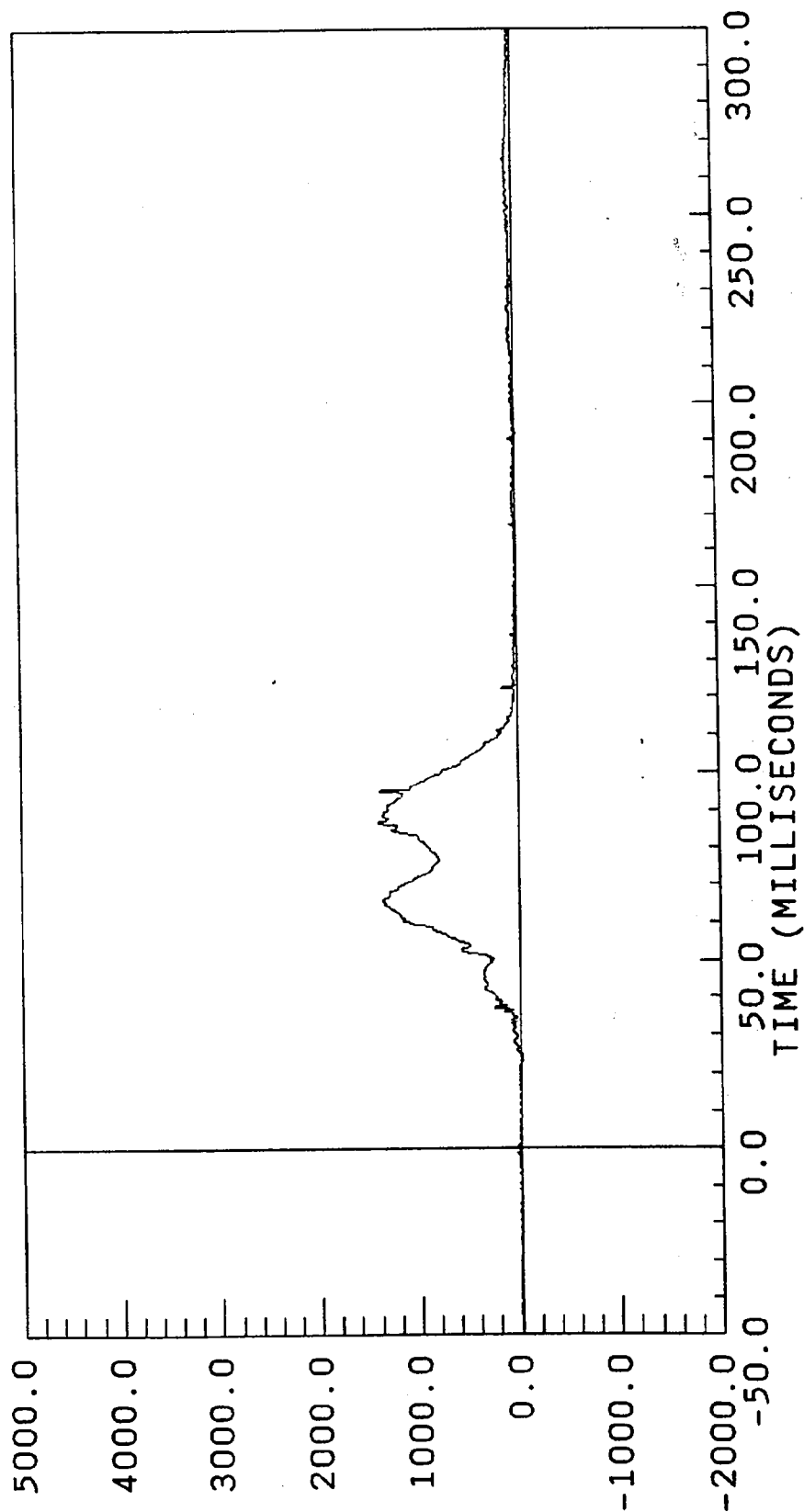
ACCELERATION * G * S *

BW946-7.DAT

0.00 mph

POS#1 LEFT FEMUR
FILTERED
FILTER CUTOFF: 1000HZ

NA AXIS
YMIN = -25.53152 at 24.75000
YMAX = 1409.817 at 86.77500

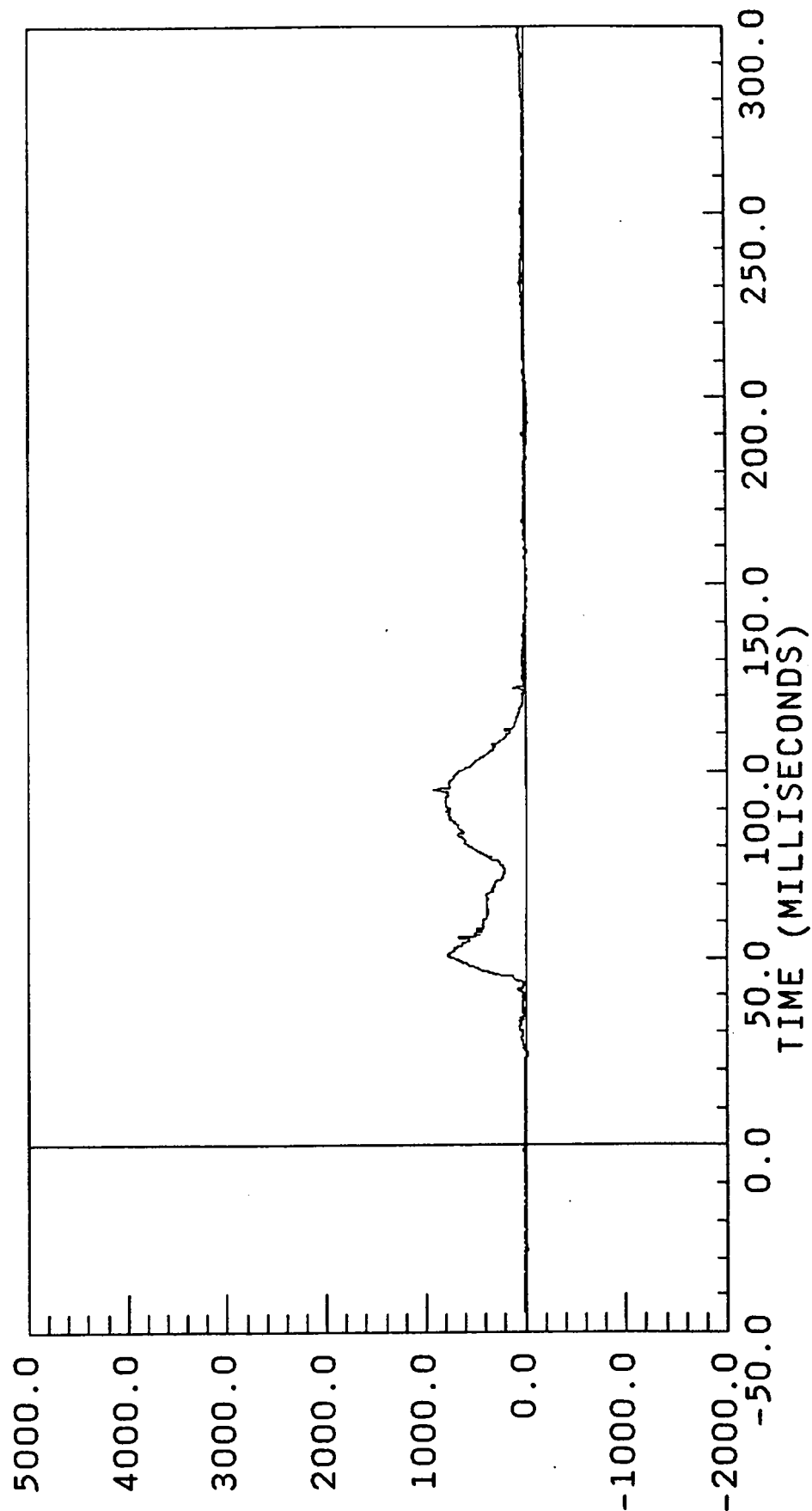


F O R C E * L B S *

0.00 mph

POS#1 RIGHT FEMUR
 FILTERED
 FILTER CUTOFF: 1000HZ

NA AXIS
 YMIN = -39.40574 at 193.5000
 YMAX = 931.5480 at 95.10001



HEAD INJURY CRITERION
HEAD SEVERITY INDEX
36MS. MAXIMUM DURATION

NHTSA CRASH TEST - PROC. 208

RUN= 946

POS#2 HEAD R

HIC= 218.9 FROM T1= .00070 TO T2= .11670
AVERAGE ACCELERATION BETWEEN T1 AND T2= 32.6G'S
EVENT TIME= 300.0 MSEC
SEVERITY INDEX= 366.2

29.60 mph

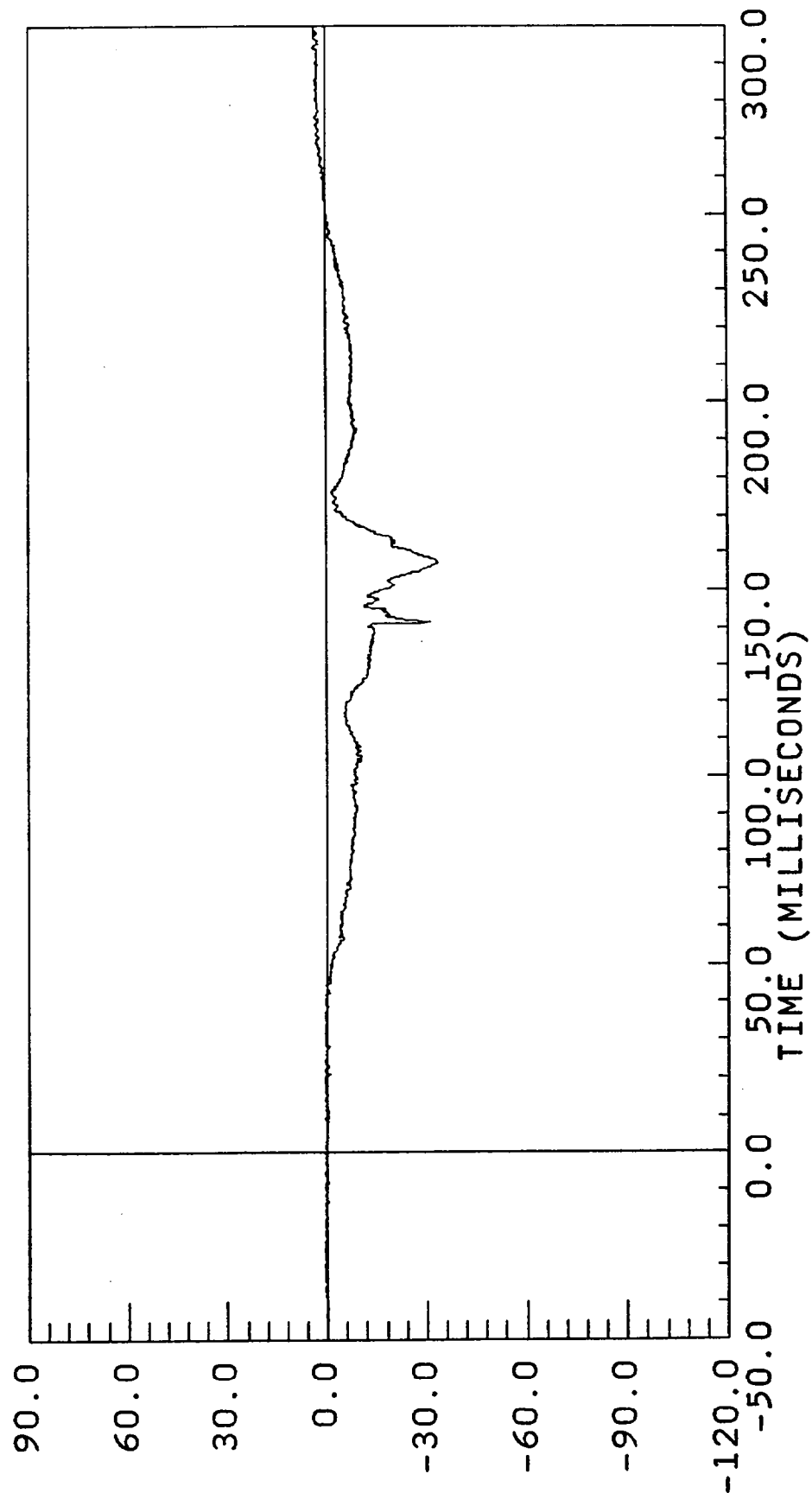
POS#2 HEAD X

XL AXIS

YMIN = -33.32600 at 157.0500

YMAX = 4.082300 at 294.1500

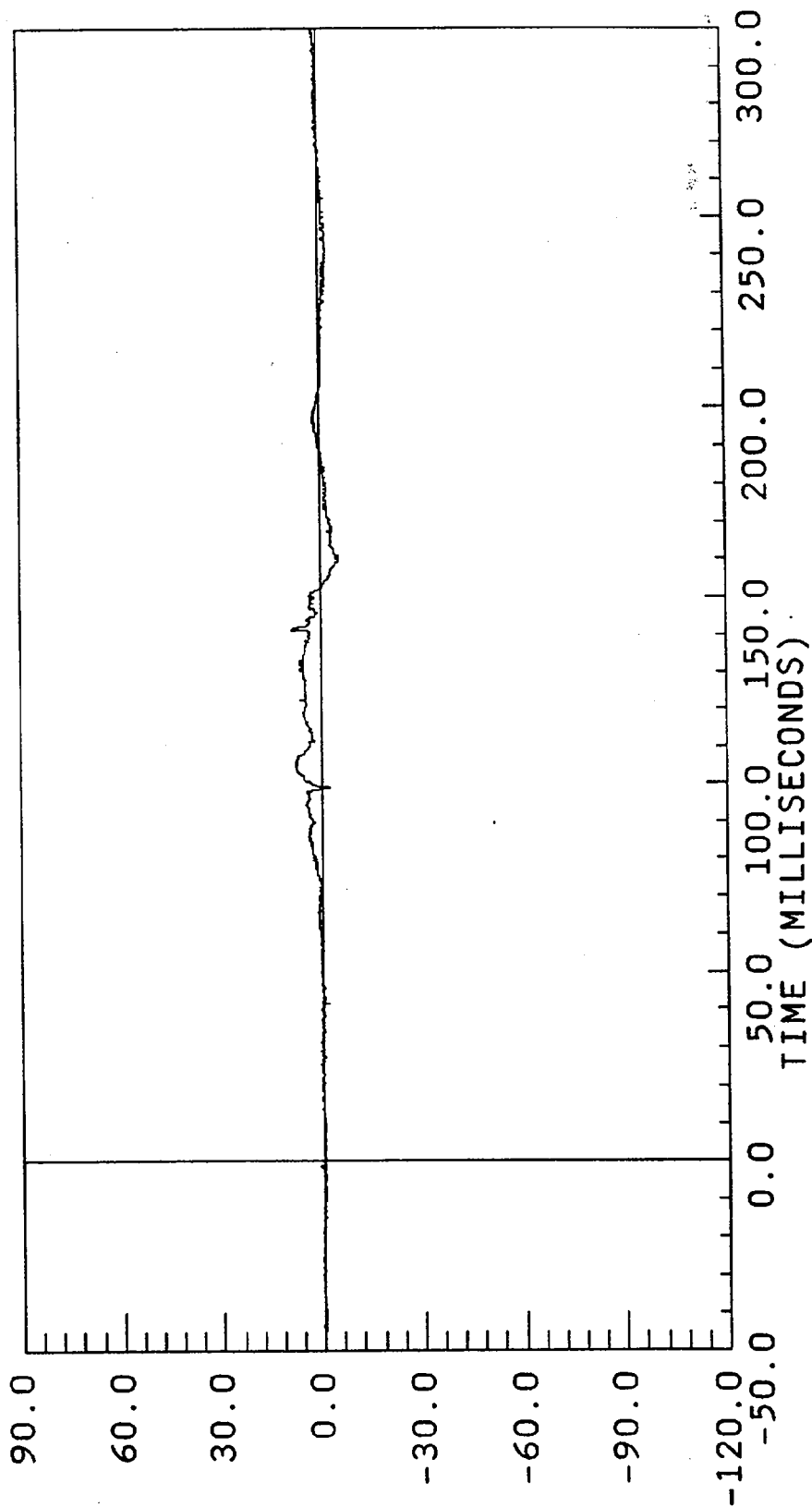
FILTER CUTOFF: OHZ



UDS\$946-12.DA

0.00 mph

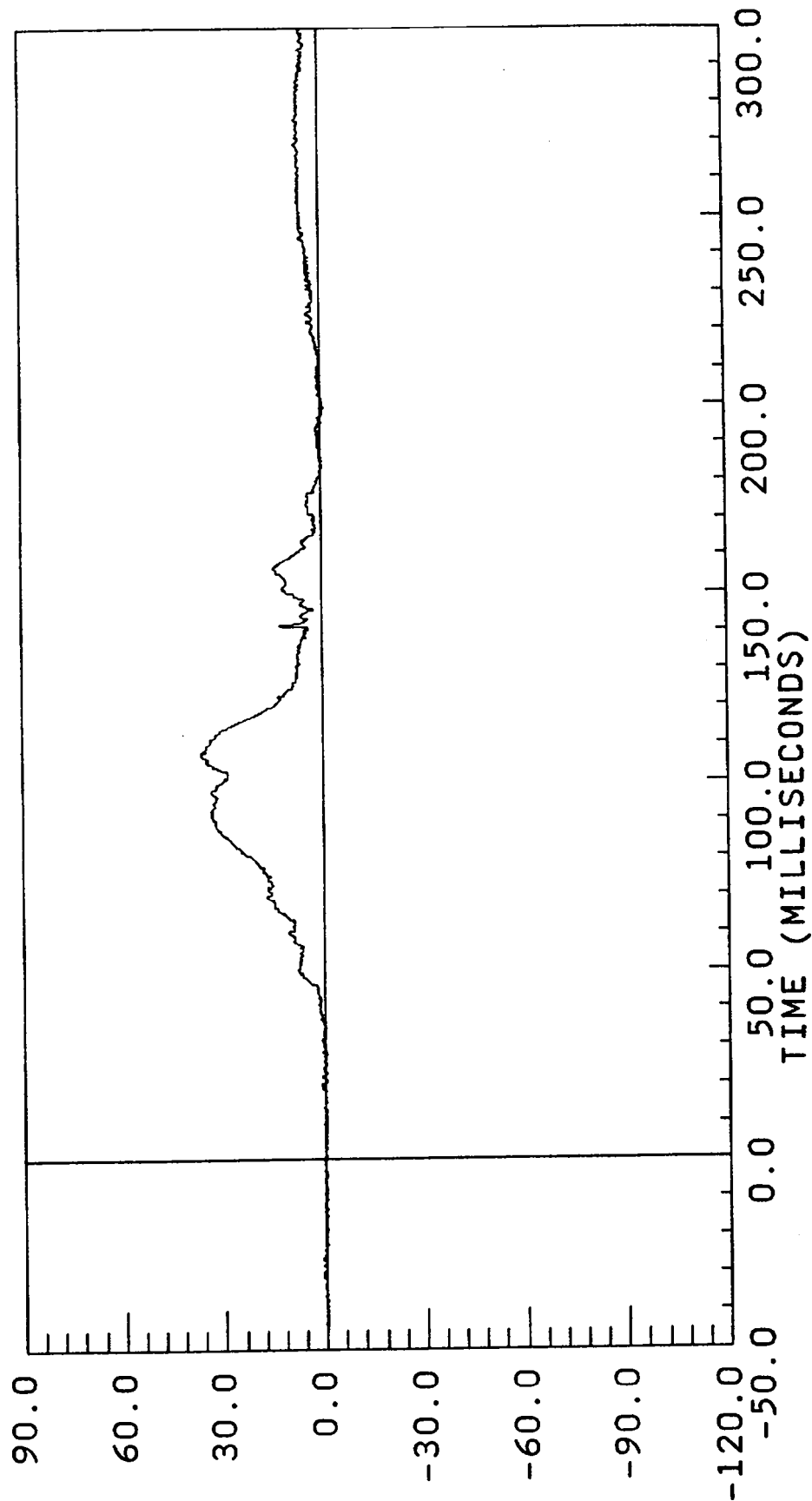
POS#2 HEAD Y YL AXIS
YMIN = -5.143500 at 159.3000
YMAX = 9.096900 at 141.3750
FILTER CUTOFF: OHZ



ACCELERATION * G * S *
B-50 7804-2

0.00 mph

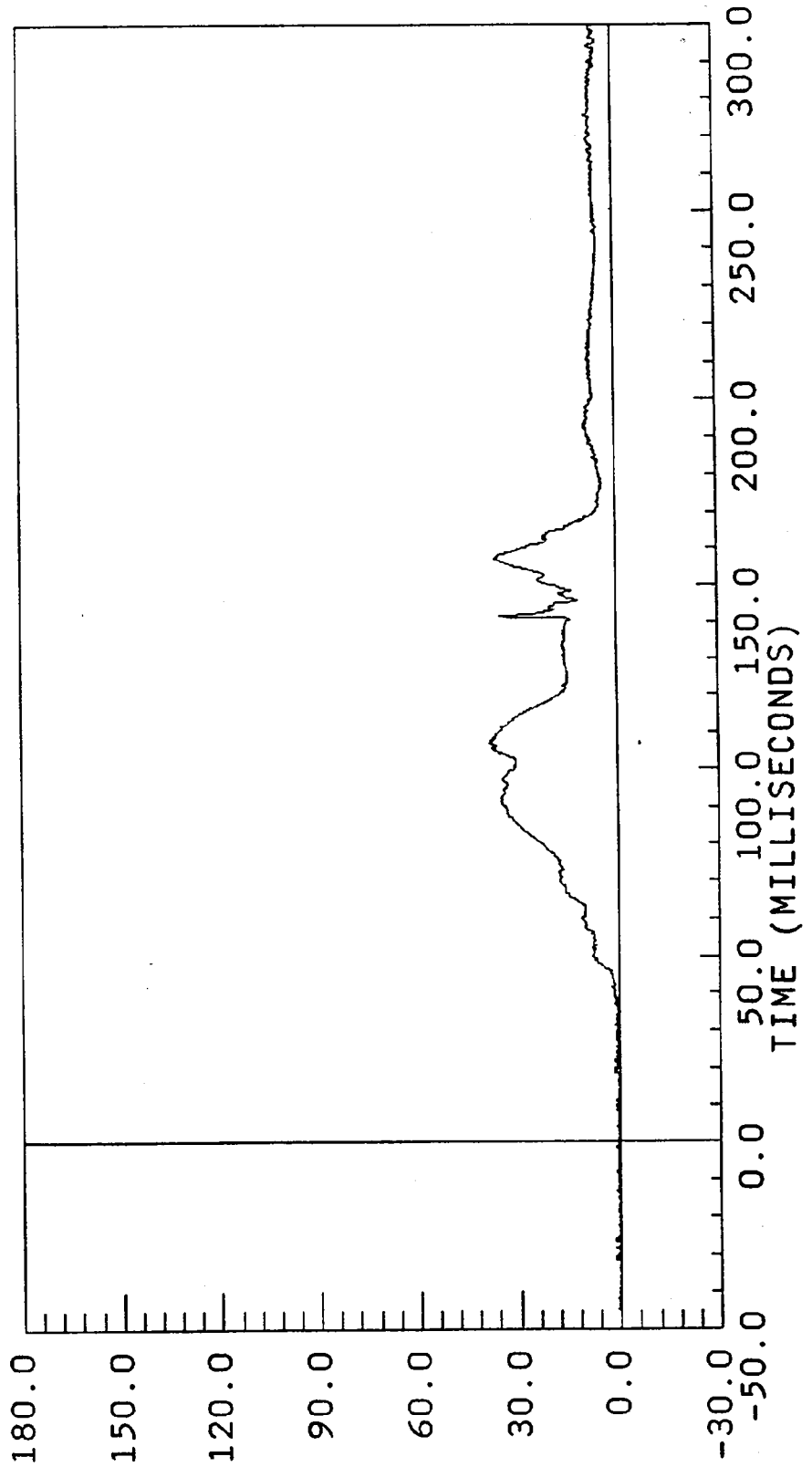
POS#2 HEAD Z
 FILTER CUTOFF: 0HZ
 ZL AXIS
 YMIN = -1.022900 at 27.90000
 YMAX = 36.46800 at 106.8000



HRES946-2.DAT

0.00 mph

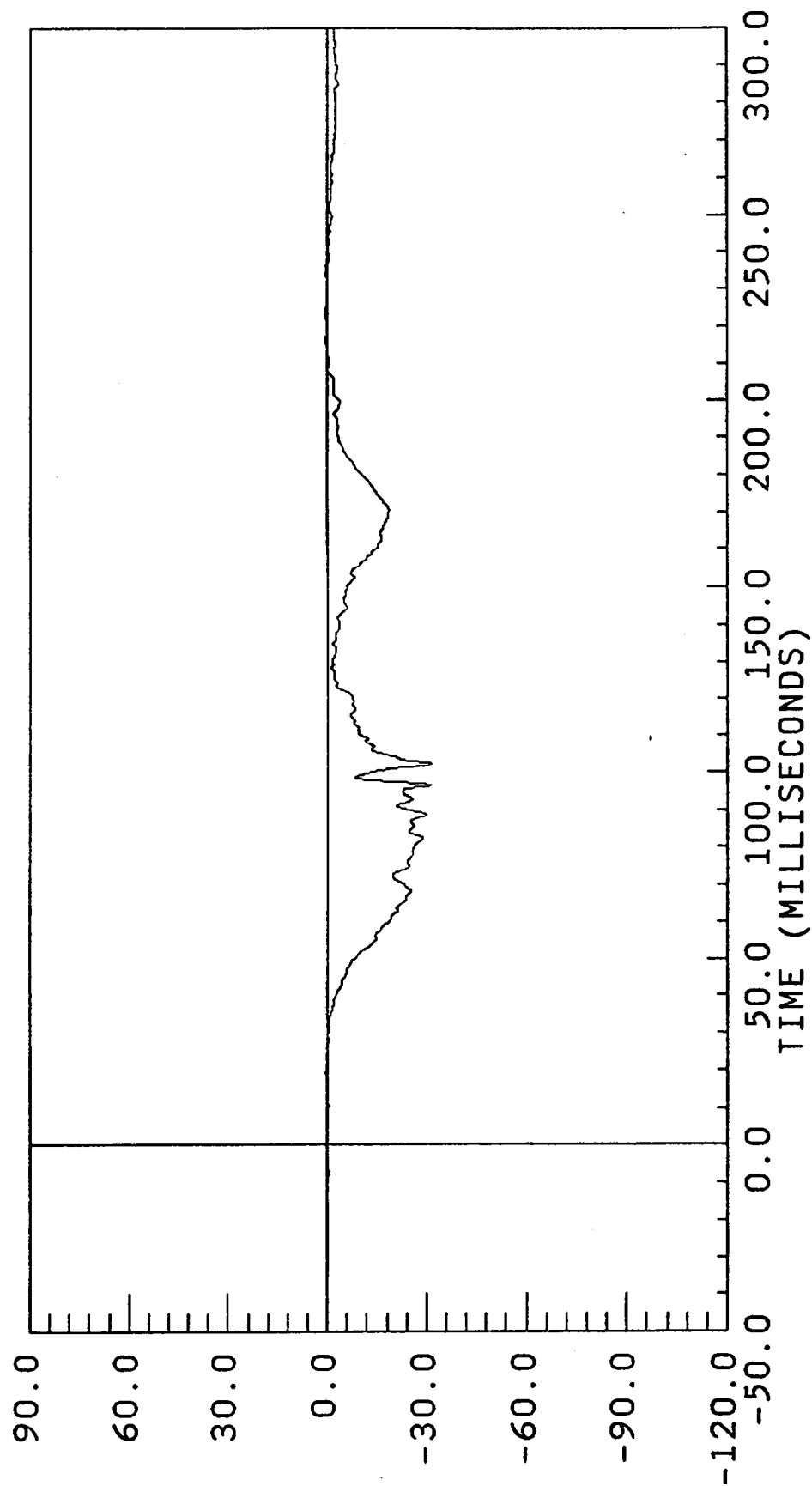
POS#2 HEAD
NONSTANDARD
FILTER CUTOFF: 0HZ
RS AXIS
YMIN = 0.772975 at -44.55000
YMAX = 38.51516 at 106.8750



29.60 mph

POS#2 CHEST X
 FILTERED
 FILTER CUTOFF: 300HZ

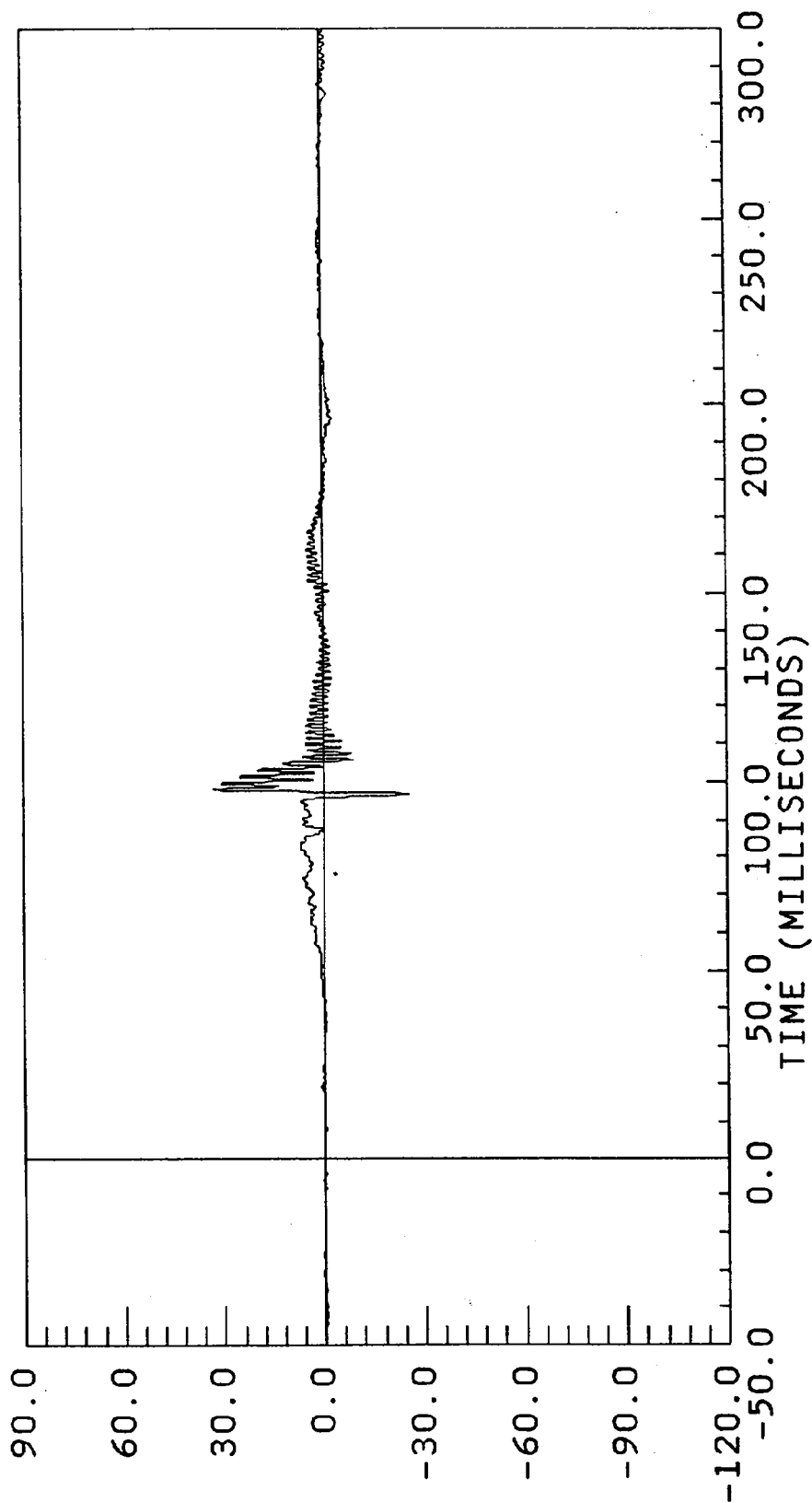
XL AXIS
 YMIN = -31.32507 at 96.37501
 YMAX = 0.756927 at 224.2500



BW946-15.DAT

0.00 mph

POS#2 CHEST Y
FILTERED
FILTER CUTOFF: 300HZ
YL AXIS
YMIN = -25.69090 at 96.90000
YMAX = 33.09801 at 98.17500



ACCELERATION * G * S *

B-54

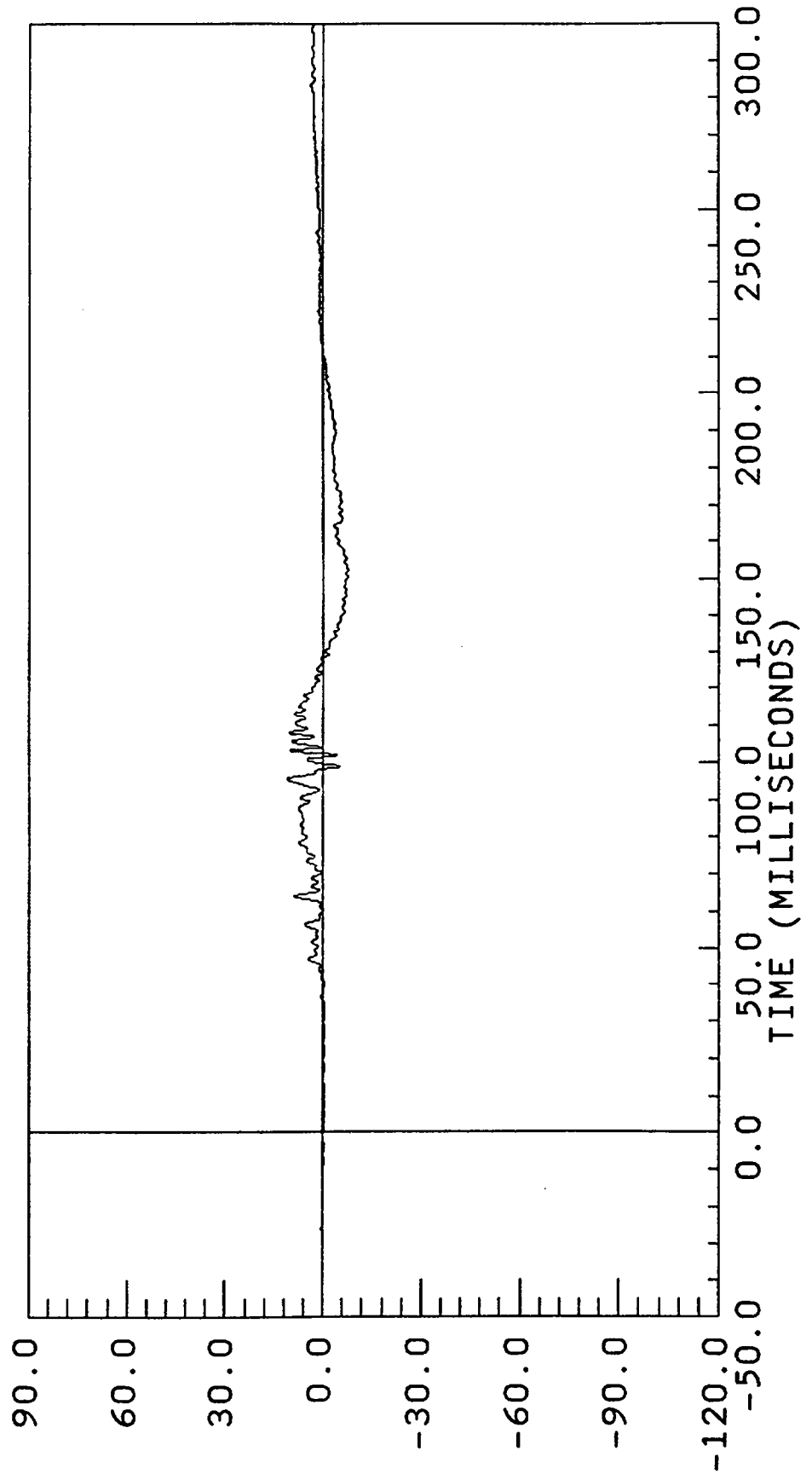
7804-2

0.00 mph

POS#2 CHEST Z
 FILTERED
 FILTER CUTOFF: 300Hz

ZL AXIS

YMIN = -7.724479 at 150.6750
 YMAX = 10.93833 at 95.62500

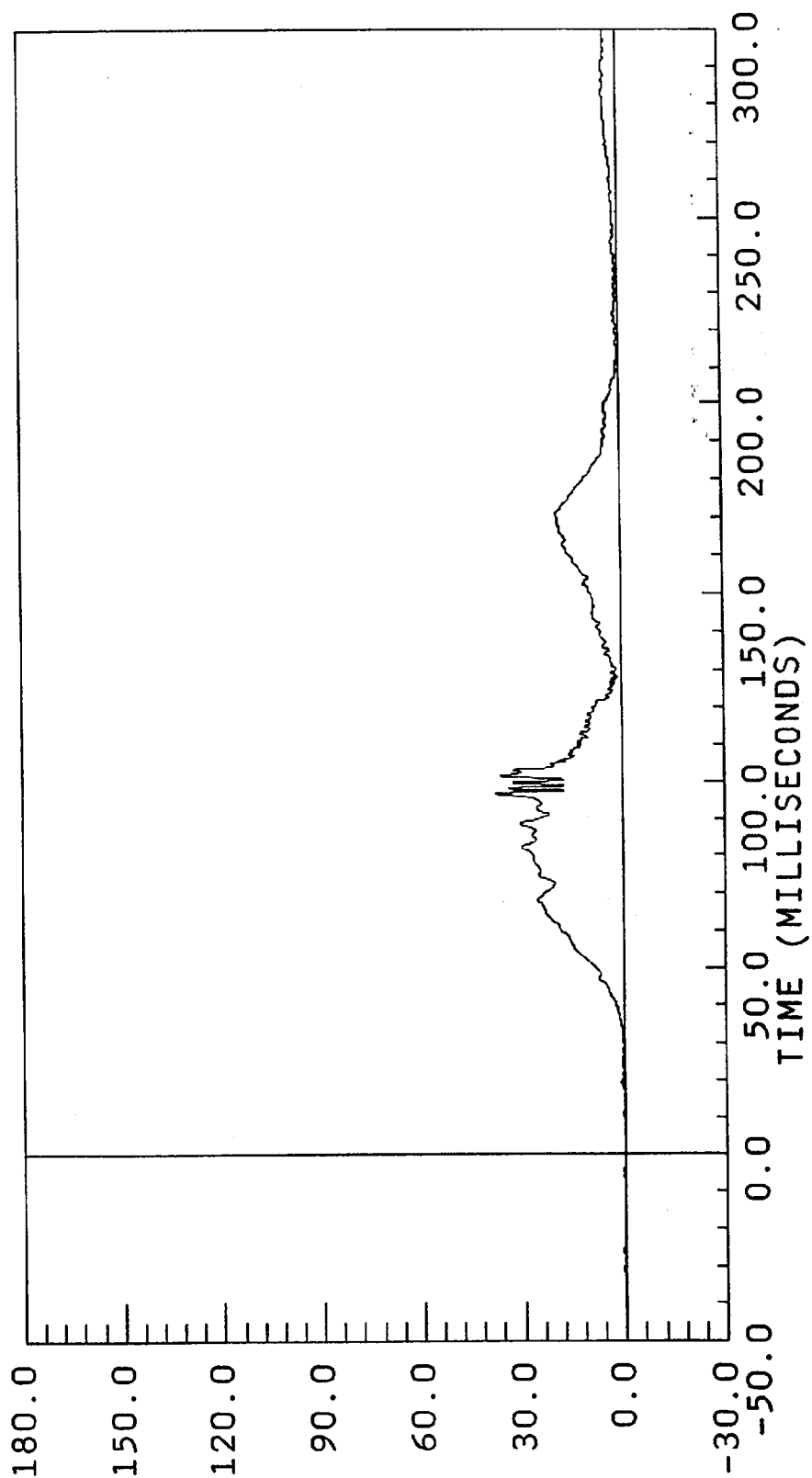


ACCELERATION * G, S *

CHST946-2.DAT

0.00 mph

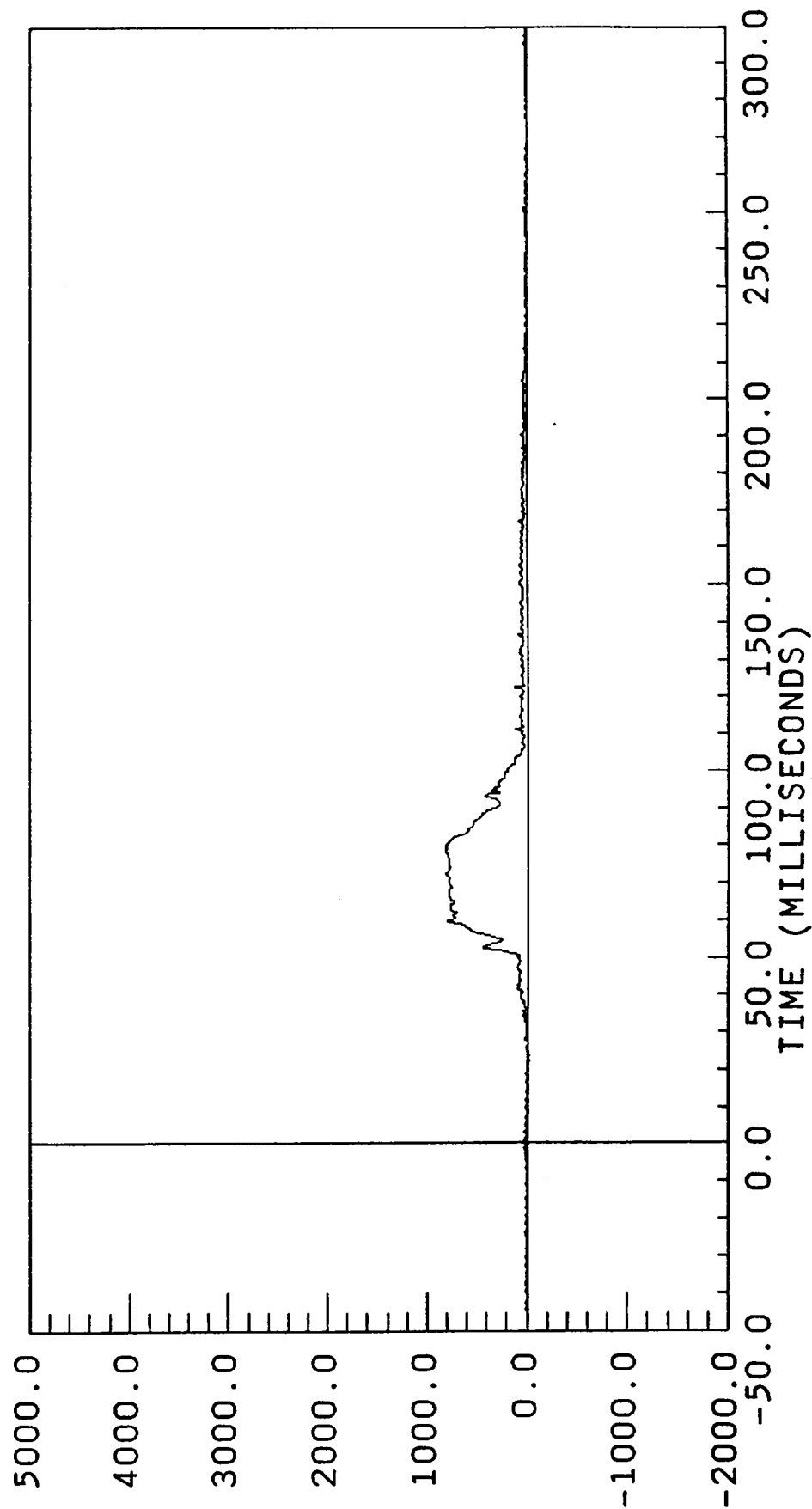
POS#2 CHEST
COMPUTED
FILTER CUTOFF: 300HZ
RS AXIS
YMIN = 0.0332299 at -37.27500
YMAX = 37.98183 at 96.75001



0.00 mph

POS#2 LEFT FEMUR
 FILTERED
 FILTER CUTOFF: 1000Hz

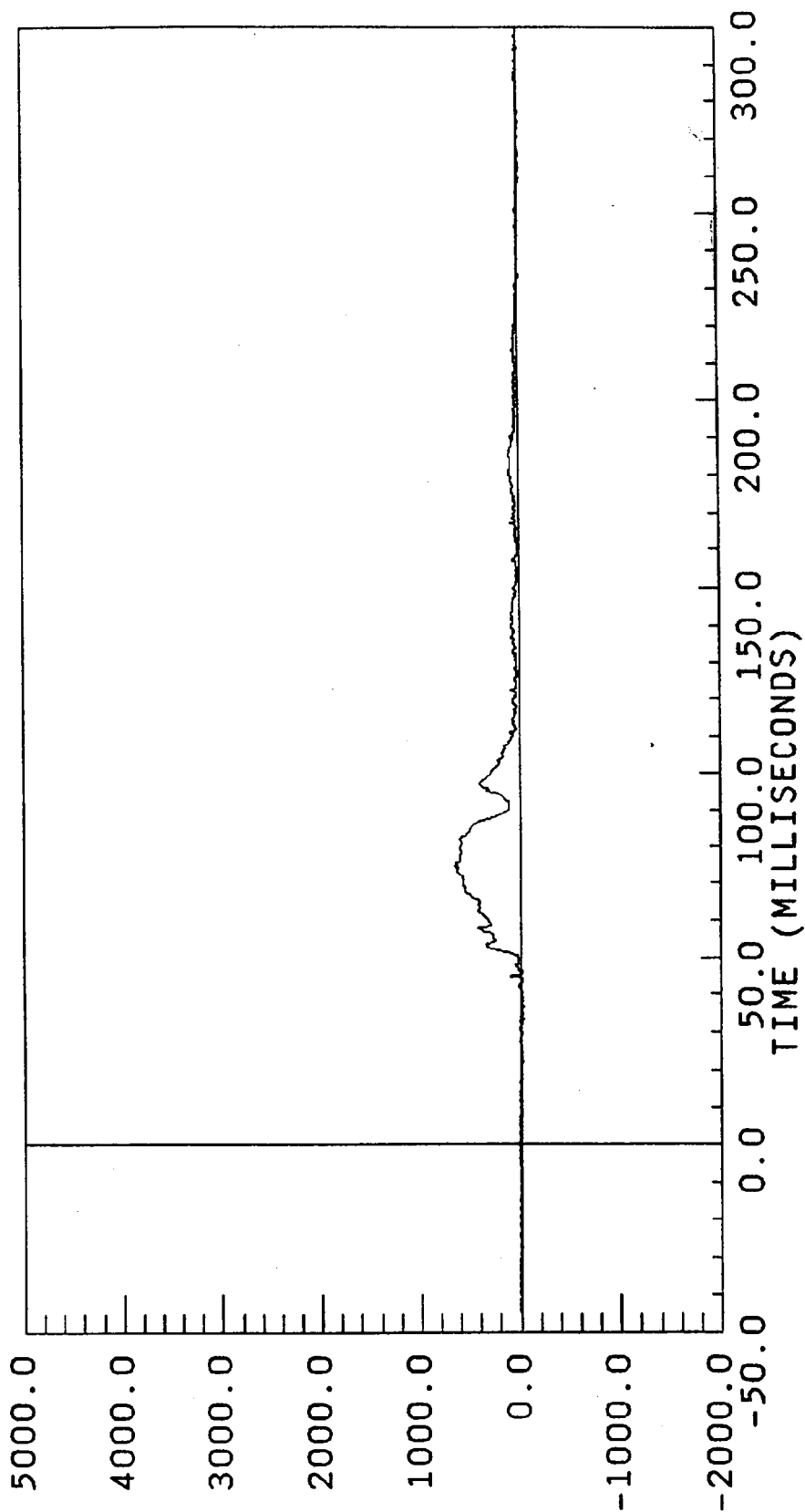
NA AXIS
 YMIN = -17.31030 at 23.62500
 YMAX = 816.7868 at 72.37500



BW946-10.DAT

0.00 mph

POS#2 RIGHT FEMUR
FILTERED
FILTER CUTOFF: 1000HZ
NA AXIS
YMIN = -33.01535 at 36.60000
YMAX = 650.9098 at 74.70000



B-58 F O R C E * L B S *

7804-2

Appendix C

VEHICLE OWNERS MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

Using Safety Restraints Properly

Safety Belts

Safety belts help protect you and your passengers in case of a collision. In most states, the law requires their use. We strongly recommend that you use them every time you travel in your vehicle.

Warning: Always drive and ride with your seat back upright and the lap belt snug across the hips to reduce the risk of serious injury to the abdomen or neck that could be caused by sliding under the safety belts in a collision.

Safety belts provide best restraint when:

- ☐ the seat back is upright
- ☐ the occupant is sitting upright (not slouched)
- ☐ the lap belt is snug and low on the hips
- ☐ the shoulder belt is snug against the chest
- ☐ the knees are straight forward

For your safety, your vehicle has different types of safety belts:

- ☐ Front and rear lap and shoulder belts — for people who sit next to the windows in either the front or rear seats
- ☐ Lap belts — for people who use the middle seat in either the front or the back seats, or for passengers who sit in the wagon model in the optional Dual Facing Rear Seats.
- ☐ Lap belts without retractors — for people who sit in the front and rear center seats.
- ☐ Manual front lap and shoulder belts (Canadian vehicles only) — for people who sit in the front seat.

See the following sections for directions on how to properly use these safety belts. Also see *Safety restraints for children* in this chapter for special instructions about using safety belts for children.

Warning: Make sure that you and your passengers, including pregnant women, wear safety belts. Be sure that lap belts fit snugly and as low as possible around the hips. Do not wear them around the waist. If safety belts are not used properly, the chances of you or your passengers being injured in a collision greatly increase.

Warning: Use the shoulder belt on the outside shoulder only. Never wear the shoulder belt under the arm. Never swing it around your neck over the inside shoulder. Never use a single belt for more than one person. Failure to follow these precautions could increase the chance and/or severity of injury in an accident.

Do not allow people to ride in the cargo area of your vehicle. People who are not riding in a seat with a fastened safety belt are much more likely to be injured if you have a collision.

Never let a passenger hold a child on his or her lap while the vehicle is moving. The passenger cannot protect the child from injury in a collision.

Never use a single belt for more than one person or across seating positions. This greatly increases the chance that one or both of the people will be injured in a collision. Each seating position in your vehicle has a specific safety belt assembly which is made up of one buckle and one tongue. Each assembly is designed to be used as a pair.

Warning: Be sure to lock all doors before you drive away. This will lessen the risk of your being thrown from the vehicle in a collision.

Safety Belt Maintenance

Also, check the safety belt systems periodically to make sure that they work properly and are not damaged.

Warning: All safety belt assemblies including retractors and attaching hardware should be inspected after any collision. Ford recommends that all safety belt assemblies used during a collision be replaced unless the collision was minor and a qualified technician finds that the belts do not show damage and continue to operate properly. Safety belt assemblies not in use during a collision should also be inspected and replaced if either damage or improper operation is noted.

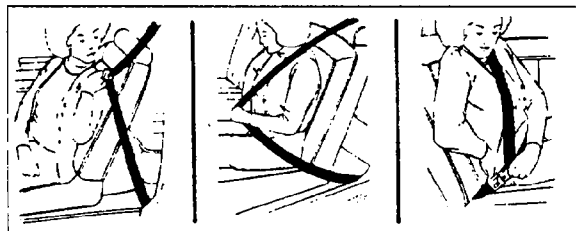
Combination Lap and Shoulder Belts

While your vehicle is in motion, the front and rear combination lap and shoulder belts adjust

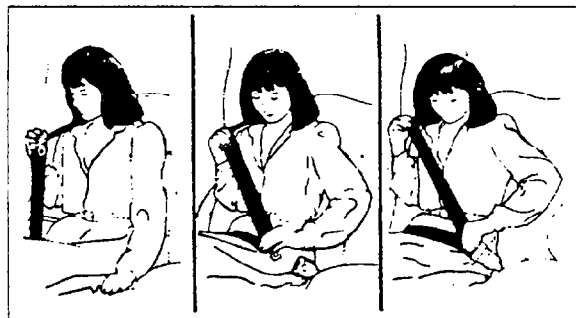
to your movement. However, if you brake hard, corner hard or if your vehicle receives an impact of 5 mph (8 km/h) or more, the lap and shoulder belt locks and prevents you from moving.

After you get into your vehicle, close the door and lock it. Then adjust the seat to the position that suits you best.

To fasten the belt, find the long strap of the belt near the door, pull it across your shoulder and chest, and insert the tongue into the proper buckle on your seat until you hear a snap and feel it lock. Be sure to use the correct buckle and check to make sure the buckle is securely fastened.



Fastening the front seat lap and shoulder belt



Fastening the rear seat lap and shoulder belt

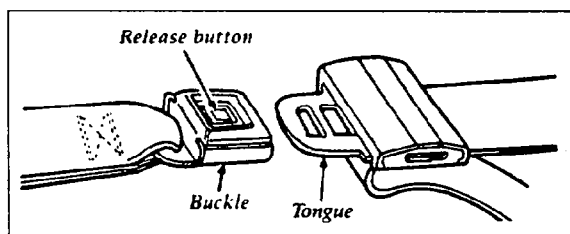
26 Combination Lap and Shoulder Belts

Warning: Use the shoulder belt only on the shoulder that is closest to the vehicle door. Never wear the belt under your arm. If you do not use the shoulder belt properly, the chances of your being injured in a collision greatly increase.

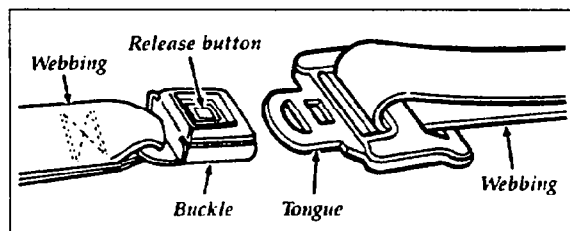
To adjust the lap part of the belt, pull up on the shoulder belt until the lap belt fits snugly low on your hips.

To unfasten the belt:

1. Push the release button in the center of the buckle. This allows the tongue to unlatch from the buckle.



Unfastening center lap safety belts



Unfastening the outboard lap/shoulder belts

Combination Lap and Shoulder Belts 27

2. While the belt retracts, guide the tongue to its original position. If you do not guide the tongue, it may strike you or part of the vehicle.

To Untangle the Belt:

If you should jam the lap belt retractor by allowing the belt to retract when it is twisted, you can free the webbing with this procedure:

1. Pull on the belt with both hands to tighten it on the retractor spool.
2. Feed the belt back into the retractor until it is completely retracted. Repeat previous step if necessary.
3. Pull the belt out of its holder as far as it will go and untwist the belt or remove the object that is jamming the belt. Let the belt retract.
4. Then, pull the belt out and let it retract several times to be sure that the belt works properly.

Lap belts — center seating positions

The lap belts in the center of the front and rear seats do not adjust automatically. You must adjust them to fit snugly around your hips. Do not wear them around your waist.

Before you fasten your center position lap belts in the front or rear seats, you may need to lengthen them.

To lengthen the belt, tip the belt tongue at a right angle to the belt. Pull the belt tongue over your lap until it reaches the buckle.

To fasten the belt, pull the belt across your hips and insert the tongue into the correct buckle on your seat until you hear a snap and feel it lock. Make sure the buckle is securely fastened.

Adjust the belt so that it fits snugly around your hips:

- If you need to shorten the belt, pull on the loose end of the webbing.

To unfasten the belt, push the release button on the buckle. This allows the tongue to unlatch from the buckle.

Lap belts with retractors — wagon model with the optional Dual Facing Rear Seat only

For the lap belt portion of the safety belts next to the windows in the front and rear seat position, pull up on the shoulder portion of the belt to adjust to a snug fit.

To fasten the belt, pull the belt across your hips and insert the tongue into the correct buckle on your seat until you hear a snap and feel it lock. Make sure the buckle is securely fastened.

Center Rear Lap Belts

Because the center lap belts do not have retractors, they should be shortened and fastened when not in use. To lengthen the belt, tip the tongue at a right angle to the belt, and pull the belt over your lap until the tongue reaches the buckle.

To fasten the belt, insert the tongue into the open end of the proper buckle until you hear a snap and feel the latch engage. Then pull on the loose end of the webbing to snug up the belt. The belt should be snug and as low as possible around the hips, never around the waist.

Rear Seat Lap-Shoulder Belts

Pull the lap-shoulder belt from the retractor so the shoulder portion of the belt crosses your

shoulder and chest and insert the belt tongue into the proper buckle until you hear a snap and feel it latch. Pull up on the shoulder portion of the belt to tighten the lap portion to a snug fit. Be sure the belt is as low on your hips as possible.

Warning: Front and rear seat occupants (including pregnant women) should wear both lap and shoulder belts, for optimum protection in an accident.

Safety Lap Belt Extension Assembly

A safety belt that is too short even when fully extended can be lengthened. Available from your dealer is a safety belt extension assembly (54611C22). This assembly will add approximately eight inches (20 cm) to the length of the belt.

Warning: To ensure that the safety belt extension assembly will hold in the event of a collision, only safety belt extensions manufactured by the same supplier as the safety belt should be used. Manufacturer identification is located at the end of the webbing on a label.

Supplemental Air Bag Restraint System (SRS)

Driver Side Only

Your car is equipped with an air bag for the driver. This air bag is a supplemental restraint system. It is designed to be used in addition to safety belts to help protect against head and chest injuries in certain moderate to severe frontal collisions.

30 Rear Seat Lap-Shoulder Belts

Warning: Safety belts must be worn by all vehicle occupants to help reduce the risk of injury in an accident.

The Importance of Wearing Safety Belts

There are four very important reasons to use safety belts even with an air bag system. Use your safety belts to:

- ☐ help keep you in the proper position when the air bag inflates
- ☐ reduce the risk of harm in rollover, side or rear impact accidents, since an air bag is not designed to inflate in such situations
- ☐ reduce the risk of harm in frontal collisions that are not severe enough to activate the air bag
- ☐ reduce the risk of being thrown from your car

The Importance of Proper Seated Position

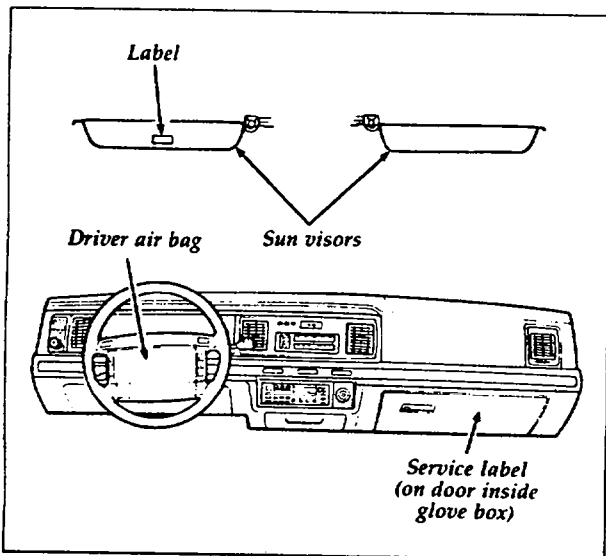
In an accident, air bags must inflate extremely fast to help provide additional protection for you. In order to do this, the air bags must inflate with considerable force. If you are not seated in a normal riding position with your back against the seat back, the air bag may not protect you properly and could possibly hurt you as it inflates.

Warning: Do not put objects in front of the air bag system storage area that might restrict inflation or that might increase personal injury.

Supplemental Air Bag Restraint System (SRS) 31

How the Supplemental Air Bag System Operates

The supplemental air bag system has two main parts. One part is the air bag system with the driver air bag and inflator. The second part is the electrical system, which has impact sensors, a diagnostic module, and backup power supply. The diagnostic module monitors the supplemental air bag electrical system readiness, including the five crash sensors and wiring connecting them to the module, readiness light, air bag power, and supplemental air bag. The driver air bag is in the center of the steering wheel.



The location of the air bag and warning labels

The air bag system uses a readiness light and a tone to indicate the condition of the system. The readiness light is in the instrument cluster. When you turn the ignition key to ON, this

light will light up for six seconds and then turn off. This indicates that the system is operating normally. **NOTE:** Regularly scheduled maintenance of the air bag system is not required.

If there is a problem with the system, two things may happen: the readiness light will either flash or stay lit up, or you will hear a beeping sound. If either of these things happen, have the air bag system serviced at your Ford or Lincoln-Mercury dealer immediately.

Tone Generator

The air bag readiness light indicates the air bag system condition. However, a series of five sets of five beeps will be heard only if the readiness light doesn't work and there is a problem with the air bag system. This also means that the Air Bag Restraint System (SRS) is in need of service. The tone pattern will repeat (five sets of five beeps) periodically until the problem and light are repaired. Unless serviced, the Air Bag Restraint System may not function properly in the event of an accident.

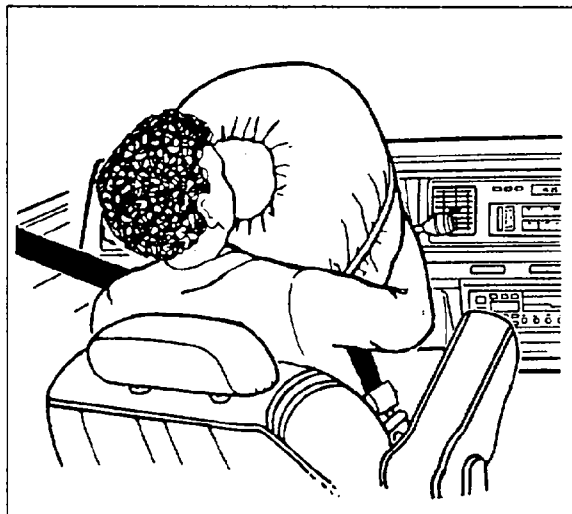
Warning: Do not attempt to service, repair, or modify the Supplemental Air Bag Restraint System; tampering could cause activation of the system and increase the risk of personal injury. For servicing of the Supplemental Air Bag Restraint System, see your Ford or Lincoln-Mercury dealer.

The air bag system is designed to stay out of sight until it is activated. The air bag system only operates in frontal accidents more severe than hitting a parked car of similar size and weight head-on at about 28 mph. In such a collision, you would be thrown forward against

the safety belts. After receiving a signal from the crash sensors, the air bag inflates in about 45 milliseconds.

The air bag system is designed to inflate in moderate to severe head-on and front angle collisions, and then deflate almost immediately. The air bag and safety belt help restrain forward motion and can help reduce injuries to the head and chest. **NOTE:** Several air bag system components get hot after inflation. Do not try to touch them after inflation.

Air bags will not inflate in minor frontal collisions, even though the vehicle may be badly damaged. The fact that your air bag did not inflate in such a collision does not mean that something is wrong with the air bag system.



The driver side supplemental air bag inflated

Report Air Bag Inflation

If an air bag inflates during a collision or for any other reason, Ford Motor Company wants to know. Please report the inflation to the Accident Investigation Team by calling "collect" (313) 337-8040.

The Accident Investigation Team reviews the information you provide. An investigator may contact you for more information. In some cases, the investigator may want to examine your car, and if an accident occurred, to get an accident report.

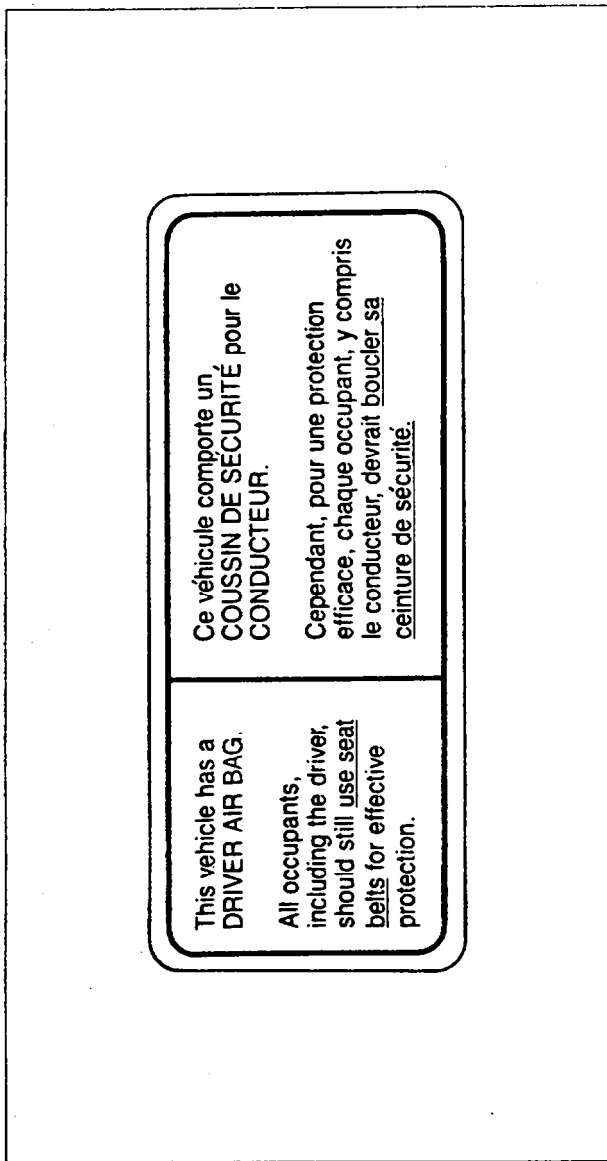
Warning: The air bag will inflate only once. The system is designed to function on a one-time-only basis. If the air bag is inflated, **THE AIR BAG WILL NOT FUNCTION AGAIN AND MUST BE REPLACED IMMEDIATELY.** If the air bag is not replaced, the unrepaired area will increase the risk of injury in a collision.

Disposal of Air Bag Equipped Vehicles

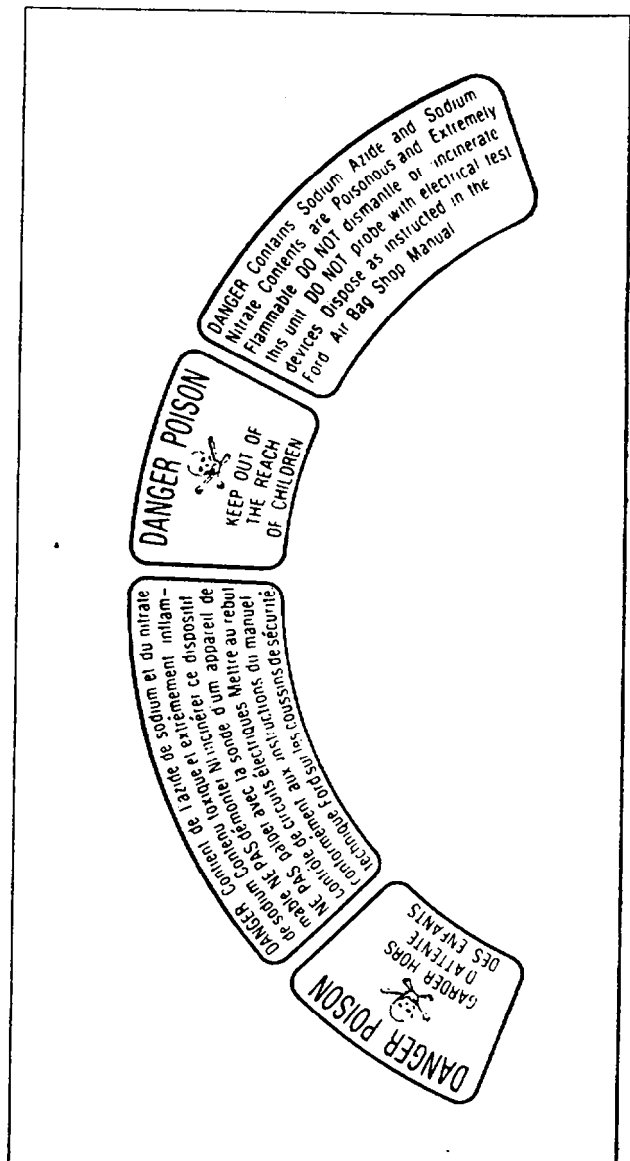
For disposal of air bags or air bag equipped vehicles, refer to the procedures in the 1990 Ford Shop Manual. Information on how to order a shop manual is available at an authorized Ford or Lincoln-Mercury Dealer. You can also order a shop manual using the order form in the back of your Owner's Guide.

Service Information Labels

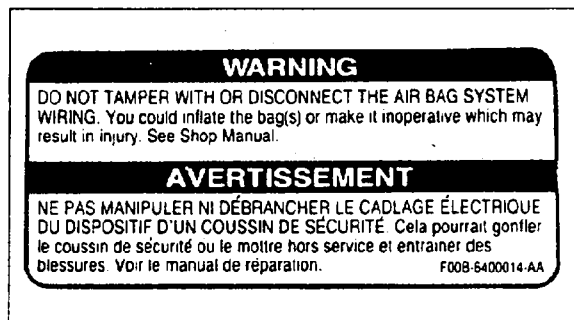
Service and information labels are attached inside the glove compartment, on the sun visor, and on the radiator support in the engine compartment.



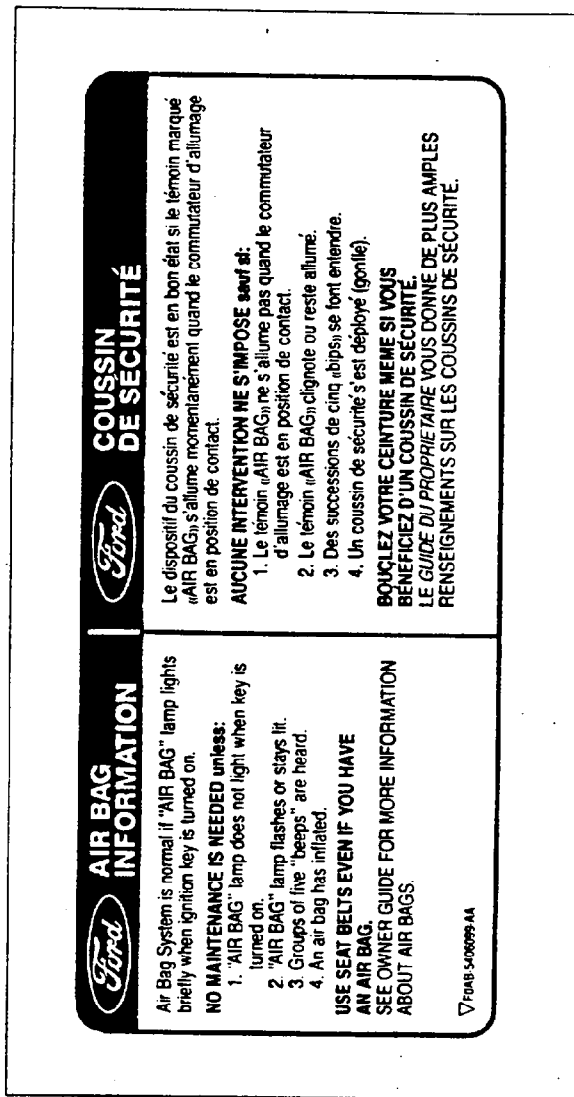
Label on the driver sun visor in the down position



Rear of air bag module



Label on radiator support in the engine compartment



Label located in the glove compartment