

CALSPAN REPORT NUMBER: 7883-5

VEHICLE-TO-VEHICLE FRONTAL 60% OVERLAP
35 MPH IMPACT OF A
1991 SUZUKI SWIFT 2-DOOR HATCHBACK
AND
1991 FORD CROWN VICTORIA LTD 4-DOOR SEDAN

CALSPAN TEST NUMBER: Y42-5-1042

MARCH 6, 1991

CALSPAN CORPORATION
ADVANCED TECHNOLOGY CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225



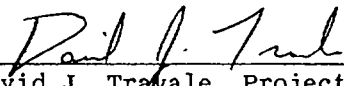
FINAL REPORT

PREPARED FOR:

U. S. Department of Transportation
Research and Special Programs Administration
Transportation Systems Center
Kendall Square
Cambridge, MA 02142

This Test Report was prepared for the U.S. Department of Transportation, Research and Special Programs Administration, under Contract No. DTRS57-87-C-00047. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

Prepared:



David J. Travale, Project Engineer

Approved:



Walter E. Levan, Program Manager

FINAL REPORT ACCEPTED BY:

Contract Technical Manager

Date of Report Acceptance

1. Report No.		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Vehicle-to-Vehicle Frontal 60% Overlap 35 mph Impact of a 1991 Suzuki Swift 2-Door Hatchback and 1991 Ford Crown Victoria LTD 4-Door Sedan				5. Report Date March 6, 1991	
				6. Performing Organization Code CAL	
7. Author(s) David J. Travale, Project Engineer Walter E. Levan, Program Manager				8. Performing Organization Report No. 7883-5	
9. Performing Organization Name and Address Calspan Advanced Technology Center P.O. Box 400 Buffalo, New York 14225				10. Work Unit No. Y42-5-1042	
				11. Contract or Grant No. DTRS57-87-C-00047	
12. Sponsoring Agency Name and Address U.S. Department of Transportation Research and Special Programs Administration Transportation Systems Center Kendall Square, Cambridge, MA 02142				13. Type of Report and Period Covered Final April 1991	
				14. Sponsoring Agency Code DOT/NHTSA/NRD	
15. Supplementary Notes					
16. Abstract A vehicle-to-vehicle frontal 35 mph test of a 60% overlapped 1991 Suzuki Swift 2-Door Hatchback into a 48% overlapped 1991 Ford Crown Victoria LTD 4-Door Sedan was performed at the Calspan Corporation Advanced Technology Center Crash Test Facility in Buffalo, New York on March 6, 1991. Actual impact speed was 36.1 mph for each vehicle and the ambient temperature at the time of impact was 50.5°F. Vehicle number one, a 1991 Suzuki Swift, 2-Door Hatchback, contained one Hybrid III dummy in the driver seating position. The dummy was restrained using the vehicles 3-point seat belt restraint system. The driver's HIC was 766 and 3 millisecond clipped chest g's were 59.8. The left femur load was 1185 lbs. and right femur load was 1145 lbs. Vehicle number two, a 1991 Ford Crown Victoria LTD 4-Door Sedan, contained one Hybrid III dummy in the driver seating position. The dummy was restrained using the vehicle's 3-point continuous belt restraint system. The driver's HIC was 338 and 3 millisecond clipped chest g's were 19.2. The maximum femur loads were 815 lbs and 739 lbs. on the left and right femur, respectively.					
17. Key Words Vehicle-to-Vehicle Crash Offset Frontal Crash			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		
19. Security Classif. (of this report) UNCLASSIFIED		20. Security Classif. (of this page) UNCLASSIFIED		21. No. of Pages 22. Price	

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
APPENDIX A	PHOTOGRAPHS	A-1
APPENDIX B	VEHICLE AND DUMMY RESPONSE DATA	B-1

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1	Vehicle-to-Vehicle Overlap layout	3-2
2	Vehicle 1 Occupant Clearance Dimensions	3-9
3	Summary of Vehicle 1 Accelerometer Data	3-10
4	Vehicle 1 Pre- and Post-Test Accelerometer Locations	3-11
5	Vehicle 1 Vehicle Target Locations	3-12
6	Vehicle 1 Measurement Points	3-13
7	Vehicle 2 Occupant Clearance Dimensions	3-23
8	Summary of Vehicle 2 Accelerometer Data	3-24
9	Vehicle 2 Pre- and Post-Test Accelerometer Locations	3-25
10	Vehicle 2 Target Locations	3-26
11	Vehicle 2 Measurement Points	3-27
12	Vehicle 1 Camera Positions for VTV Overlap Frontal Impacts	3-31

LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
1	Vehicle-to-Vehicle Overlap Measurements	3-2
2	General Test and Vehicle 1 Parameter Data	3-4
3	Vehicle 1 Dummy Injury Criteria Values	3-8
4	Vehicle 1 Measurements	3-15
5	General Test and Vehicle 2 Parameter Data	3-18
6	Vehicle 2 Dummy Injury Criteria Values	3-22
7	Vehicle 2 Measurements	3-29
8	Vehicle High-Speed Camera Locations	3-32

Section 1

PURPOSE AND TEST PROCEDURE

This 35 mph offset frontal vehicle-to-vehicle impact test is part of the Crashworthiness Testing and Analysis Program sponsored by the Research and Special Programs Administration under Contract No. DTRS57-87-C-00047. The purpose of this Technical Task Directive (TTD 10) is to obtain responses from vehicles and restrained Hybrid III dummies during car-to-car overlapped frontal crashes.

This test was performed using a 1991 Suzuki Swift and a 1991 Ford Crown Victoria. The vehicles were traveling at 36.1 mph and the 1991 Suzuki Swift was positioned at a 60% offset relative to the 1991 Ford Crown Victoria. The offset was arranged such that 60% of the Suzuki Swift's maximum width was engaged by the Ford Crown Victoria at the time of impact. Primary frontal contact was on the driver side of each vehicle.

Vehicle number one, a 1991 Suzuki Swift, contained one Hybrid III dummy in the driver seating position. The dummy was restrained using the vehicle's automatic 3-point seat belt restraint system.

Vehicle number two, a 1991 Ford Crown Victoria, contained one Hybrid III dummy in the driver seating position. The dummy was restrained using the vehicle's manual 3-point seat belt restraint system. The airbag automatic restraint system was not used for this test.

Section 2

SUMMARY OF TEST

A 1991 Suzuki Swift 2-Door Hatchback and a 1991 Ford Crown Victoria LTD 4-Door Sedan were impacted into each other with each vehicle traveling 36.1 mph. The 1991 Suzuki Swift was offset such that 60% of its maximum width was engaged to the 1991 Ford Crown Victoria. High-speed film analysis indicated the vehicles struck 2 inches off target creating slightly more overlap. Figure 1 of this report contains a sketch of the test layout. The test was performed at the Calspan Corporation Advanced Technology Center on March 6, 1991. Pre- and post-test photographs of both vehicles and dummies can be found in Appendix A of this report.

The vehicle-to-vehicle test was documented by one real-time camera and 15 high-speed cameras. Camera locations and other pertinent camera information can be found in Table 8 and Figure 12 of this report.

Vehicle 1 (1991 Suzuki Swift) contained one Hybrid III 50th percentile male anthropomorphic test device (ATD) in the driver seat position. Vehicle 2 (1991 Ford Crown Victoria LTD) contained one Hybrid III 50th percentile male ATD in the driver seat position. The ATDs were restrained using the vehicle's own restraint systems after being placed in the vehicle following the dummy placement instructions specified in the Laboratory Indicant Test Procedure. The airbag supplemental restraint system in Vehicle 2 was not used for this test.

Both ATDs were instrumented with head and chest triaxial accelerometers, chest potentiometer, left/right femur load cells, neck transducers, and upper and lower tibia transducers.

The 77 channels of data were recorded on seven 14-channel FM tape recorders. Appendix B contains the vehicle and dummy response data traces.

The driver's head in Vehicle 1 had a HIC value of 766. The maximum chest deceleration over 3 milliseconds was 64.3 g's. The femur loads were 1185 lbs. on the left and 1145 lbs. on the right. The Vehicle 1 torso belt load was 1053 lbs.

In Vehicle 2, the driver's HIC was 338. The maximum chest deceleration over 3 milliseconds was 19.6 g's. The left femur load was 815 lbs. and 739 lbs. on the right femur load. The Vehicle 2 torso belt load was 936 lbs.

TEST ANOMALIES

Vehicle 1, left rear seat (X) accelerometer data questionable between 81 and 132 msec. Channel opened.

Vehicle 1, left brake caliper (X), contains questionable data after 100 msec.

Vehicle 1, break pedal (Z), contains questionable data after 54 msec. Data wire was cut.

Vehicle 2, engine bottom (X) accelerometer did not record.

Vehicle 2, front crossmember (X), contains questionable data after 100 msec.

Vehicle 2, right brake caliper (X) accelerometer did not record.

Vehicle 2, position 1 chest displacement pot did not record.

Vehicle 2, right lower tibia force y did not calibrate correctly.

Section 3
VEHICLE AND OCCUPANT INFORMATION

Figure 1
VEHICLE-TO-VEHICLE OVERLAP LAYOUT

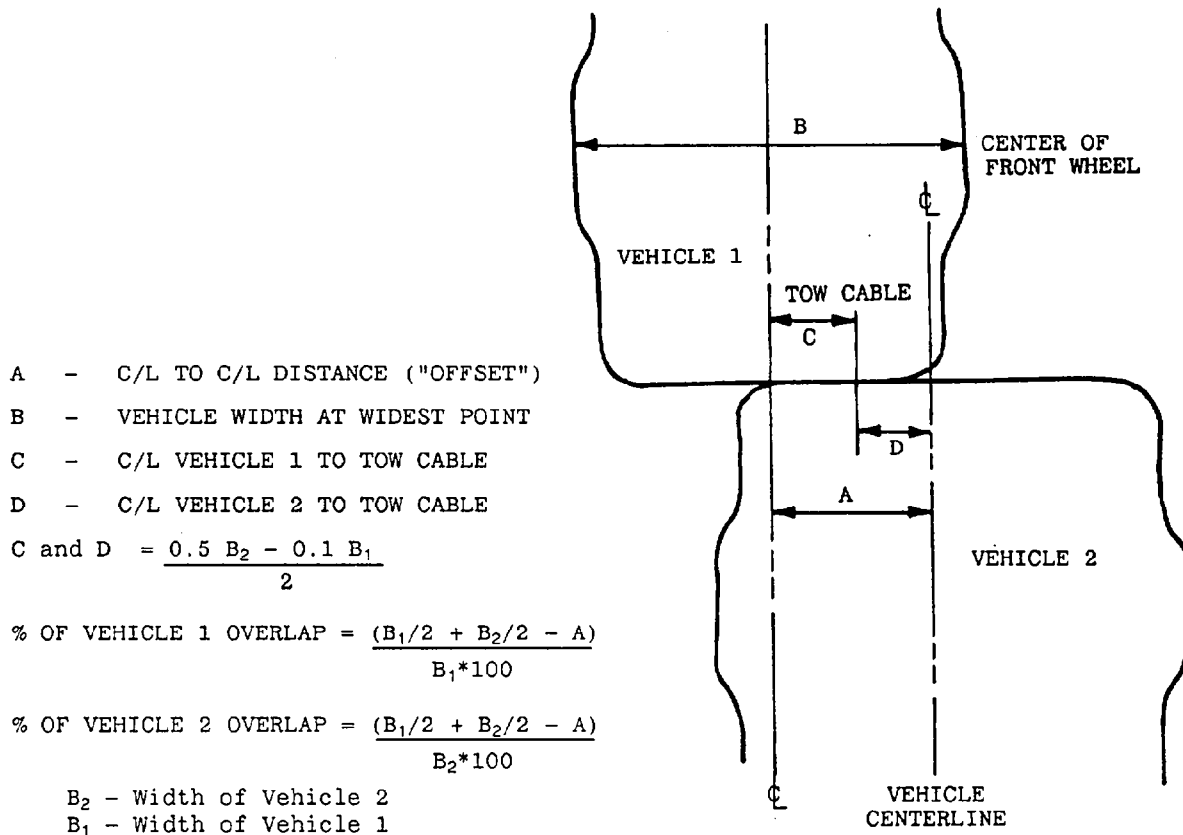


Table 1
Vehicle-to-Vehicle Overlap Measurements (in.)

Measurement Code	Vehicle 1	Vehicle 2
A	-	32.55
B	62.0	77.5
C	16.28	-
D	-	16.28
% Vehicle Overlap	60.0%	48.0%

VEHICLE ONE DATA

Table 2

GENERAL TEST AND VEHICLE 1 PARAMETER DATA

Vehicle Year/Make/Model/Body Style: 1991 Suzuki Swift 2-Door Hatchback

Test No.: Y42-5-1042 VIN.: JS2AC35S2M5100140

Body Color: White Date of Manufacture: 10/90

Engine: 4 Cylinders; - C.I.D.; 1.3 Liters; - CC

X Gas; - Diesel; - Turbocharged

- Longitudinal; X Transverse

Transmission: 5 Speed; X Manual; - Automatic; - Overdrive

Final Drive: X Front Wheel; - Rear Wheel; - Four Wheel

- A/C; - P/S; X P/B; - P/wdo;

- Tilt Wheel - P/seats; - Cruise Control

Type of Occupant Restraint: Passive 3-Point Belt Restraint System

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 35 psi, Rear 35 psi

Recommended Tire Size: P155/70R13

Recommended Cold Tire Pressure: Front 29 psi, Rear 29 psi

Tires on Vehicle: P155/70R13; Manufacturer: Bridgestone

Number of Occupants: 2 Front; 2 Rear; - 3rd Seat; 4 TOTAL

Type of Front Seats: X Bucket; - Bench; - Split Bench

Type of Front Seat Back: - Fixed; X Adj. With X Lever - Rot. Knob

Vehicle Capacity Weight (VCW) = - lbs. (A)

No. of Occupants x 150 lbs. = - lbs. (B)

Rated Cargo and Luggage

Weight (RCLW) A-B = - lbs.

GVWR: 2515 lbs. GAWR: Front 1280 lbs. Rear 1235 lbs.

Table 2

GENERAL TEST AND VEHICLE 1 PARAMETER DATA (cont'd)

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

Right Front = 500 lbs. Right Rear = 330 lbs.
 Left Front = 520 lbs. Left Rear = 340 lbs.
 TOTAL FRONT WEIGHT = 1020 lbs. (60.4 % of Total Vehicle Weight)
 TOTAL FRONT WEIGHT = 670 lbs. (39.6 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 1690 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMY:

Right Front = 530 lbs. Right Rear = 380 lbs.
 Left Front = 580 lbs. Left Rear = 470 lbs.
 TOTAL FRONT WEIGHT = 1110 lbs. (56.6 % of Total Vehicle Weight)
 TOTAL FRONT WEIGHT = 850 lbs. (43.4 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 1960 lbs.
 Weight of Ballast Secured in Vehicle Trunk Area = 0 lbs.

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 24.3"; LF 24.1"; RR 25"; LR 24.3"
 Test Attitude: RF 24.4"; LF 23.9"; RR 2.4"; LR 23.6"
 Vehicle's Wheel Base = 89.5 in.
 Location of Vehicle's C.G. = 38.8 inches rearward of front wheel center

Table 2

GENERAL TEST AND VEHICLE 1 PARAMETER DATA (cont'd)

POST-IMPACT DATA:

Type of Test: V T V Frontal Impact Angle: 0 °
 Date of Test: March 6, 1991 Time of Test: 12:30
 Ambient Temperature: 50.5 °F at impact area
 Temperature in Occupant Compartment: 69 °F
 Windshield Molding Temperature: 70 °F
 Required Impact Velocity Range: 34.5 to 36.5 mph
 Impact Velocity: primary = 36.1 mph, secondary = - mph
 Distance From Front Bumper to Vehicle 2 When
 Entering Speed Trap: 52 inches
 Exiting Speed Trap: 12 inches

VISIBLE DUMMY CONTACT POINTS:

Driver

Head *
 Chest Lower steering wheel rim
 Abdomen No contact
 Left Knee Lower dash panel
 Right Knee Lower dash panel

*Front of head with steering wheel rim and hub, and instrument cluster shroud.
 Left rear of head contacted A pillar.

Table 2
GENERAL TEST AND VEHICLE 1 PARAMETER DATA (cont'd)

	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Door Opening	<u>Closed</u>	<u>Closed</u>	<u>N/A</u>	<u>N/A</u>
	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
<u>Seat Movement</u>				
Seat Back Failure	<u>None</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Seat Shift (in.)	<u>None</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>

Table 3
VEHICLE 1 DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DUMMY (1)	-72.2	84.0	37.6	110.0	-63.6	18.1	23.7	64.3
DUMMY (2)	-	-	-	-	-	-	-	-
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE FEMUR LOAD (LBS.)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	1145.4	1184.8
DUMMY (2)	-	-
DUMMY (3)		
DUMMY (4)		

	MAXIMUM FORCE SEAT BELT LOADS (LBS.)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
DUMMY (1)	1052.6	N/M	N/M
DUMMY (2)	-	-	-
DUMMY (3)			
DUMMY (4)			

	HEAD INJURY CRITERIA (HIC)			
	HIC	t ₁ (SEC)	t ₂ (SEC)	Average Acceleration t ₁ TO t ₂
DUMMY (1)	765.9	0.05568	0.09156	53.9
DUMMY (2)	-	-	-	-
DUMMY (3)				
DUMMY (4)				

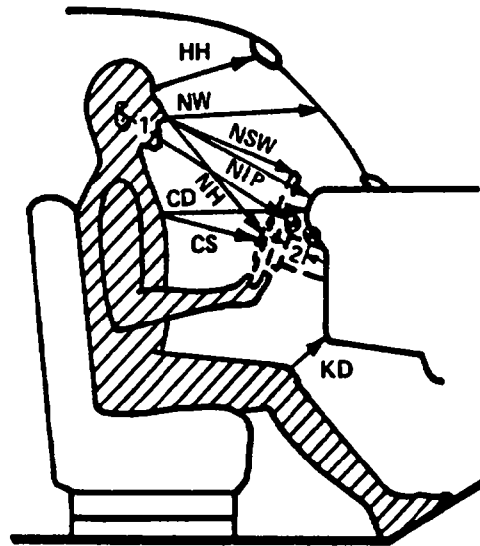
*Defined as exceeding 0.003 sec. duration

**As defined in FMVSS No. 208

Figure 2

VEHICLE 1 OCCUPANT CLEARANCE DIMENSIONS

	DRIVER
HH	13.1
NW	23.1
NSW	16.8
NIP	20.6
NH	17.1
CD	19.6
CS	13.3
KDL	4.3
KDR	5.2
1	26.6
2	1.9
SA	24.0
TA	27.0
ULA	19.0°
LLA	289.0°



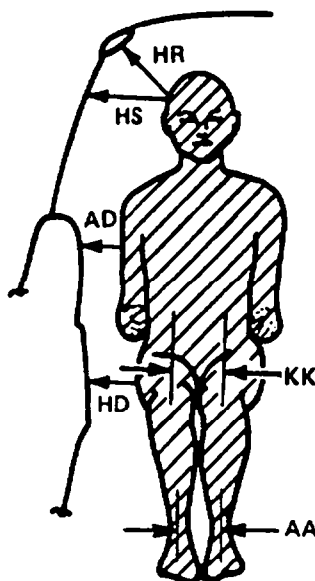
H-point from Target Position:
 Longitudinal 0.2" forward of target
 Vertical 0.1 below target

Angles taken relative to vertical

SA = Seat Back Angle
 TA = Torso Angle
 ULA = Upper Leg Angle
 LLA = Lower Leg Angle

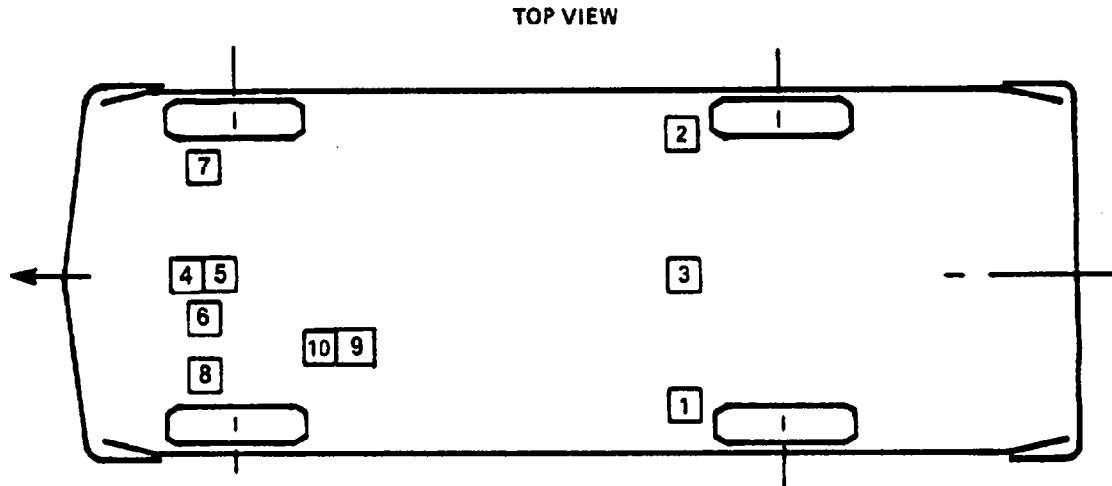
HH = Head to Windshield Header
 NW = Nose to Windshield
 NSW = Nose to Steering Wheel
 NIP = Nose to Instrument Panel
 NH = Nose to Steering Wheel Hub
 CD = Chest to Dash
 CS = Chest to Steering Wheel Hub
 KDL = Knee to Dash Left
 KDR = Knee to Dash Right
 1 = Head Target to Steering Column Target
 2 = Distance between Steering Column Targets

HR = Head to Side Roof
 HS = Head to Side Window
 AD = Arm to Door
 HD = Hip to Door
 KK = Knee to Knee
 AA = Ankle to Ankle
 DT = Dummy Temperature °F



	DRIVER
HR	6.3
HS	8.2
AD	1.8
HD	5.7
KK	9.3
AA	12.2
DT	70°F

Figure 3
SUMMARY OF VEHICLE 1 ACCELEROMETER DATA



Vehicle: 1991 Suzuki Swift 2-Door Hatchback

Loc. No.	Description	Axis	Maximum Value (g's)*	
			"-"	"+"
1	Rear seat crossmember left side	x	**	**
2	Rear seat crossmember right side	x	-31.2	3.1
3	Rear seat crossmember centerline	x	-28.1	6.0
3	Rear seat crossmember centerline, Y	y	-2.3	17.0
3	Rear seat crossmember centerline, Z	z	-67.7	92.7
4	Top of engine block	x	-171.7	39.8
4	Top of engine block	z	-32.2	19.9
5	Bottom of engine block	x	-51.3	31.9
6	Front suspension crossmember	x	-34.2	4.1
6	Front suspension crossmember	z	-50.6	21.4
7	Right front brake caliper	x	-38.3	5.9
8	Left front brake caliper	x	**	**
9	Brake pedal	x	**	**
9	Brake pedal	z	**	**
10	Toe Pan	x	-105.4	24.8

*Values filtered using SAE class 60 filter.

**These channels contain questionable data; therefore, a maximum and minimum value would have been suspect. Data anomalies can be found on page 2-2.

Figure 4

VEHICLE 1 PRE- AND POST-TEST POSITION OF TEST VEHICLE
ACCELEROMETER MOUNTING LOCATIONS

Test Description: 35 mph Offset Frontal Vehicle-to-Vehicle Impact

Test Vehicle: 1991 Suzuki Swift 2-Door Hatchback

Reference Plane: Vehicle plane at rear bumper

Accelerometer Description	LONGITUDINAL LOCATION (in.)		
	Pre-Test	Post-Test	Change
Rear seat crossmember left side	50.2	50.0	0.2
Rear seat crossmember right side	50.2	50.2	0.0
Rear seat crossmember centerline, primary	46.7	46.6	0.1
Top of engine block	126.8	112.3	14.5
Bottom of engine block	123.1	123.0	0.1
Front suspension crossmember	105.1	101.9	3.2
Right front brake caliper	113.5	114.1	-0.6
Left front brake caliper	113.6	99.4	14.2
Toe Pan	105.1	94.1	11.0
Brake Pedal	102.5	89.6	12.9

Figure 5
VEHICLE 1 TARGET LOCATIONS

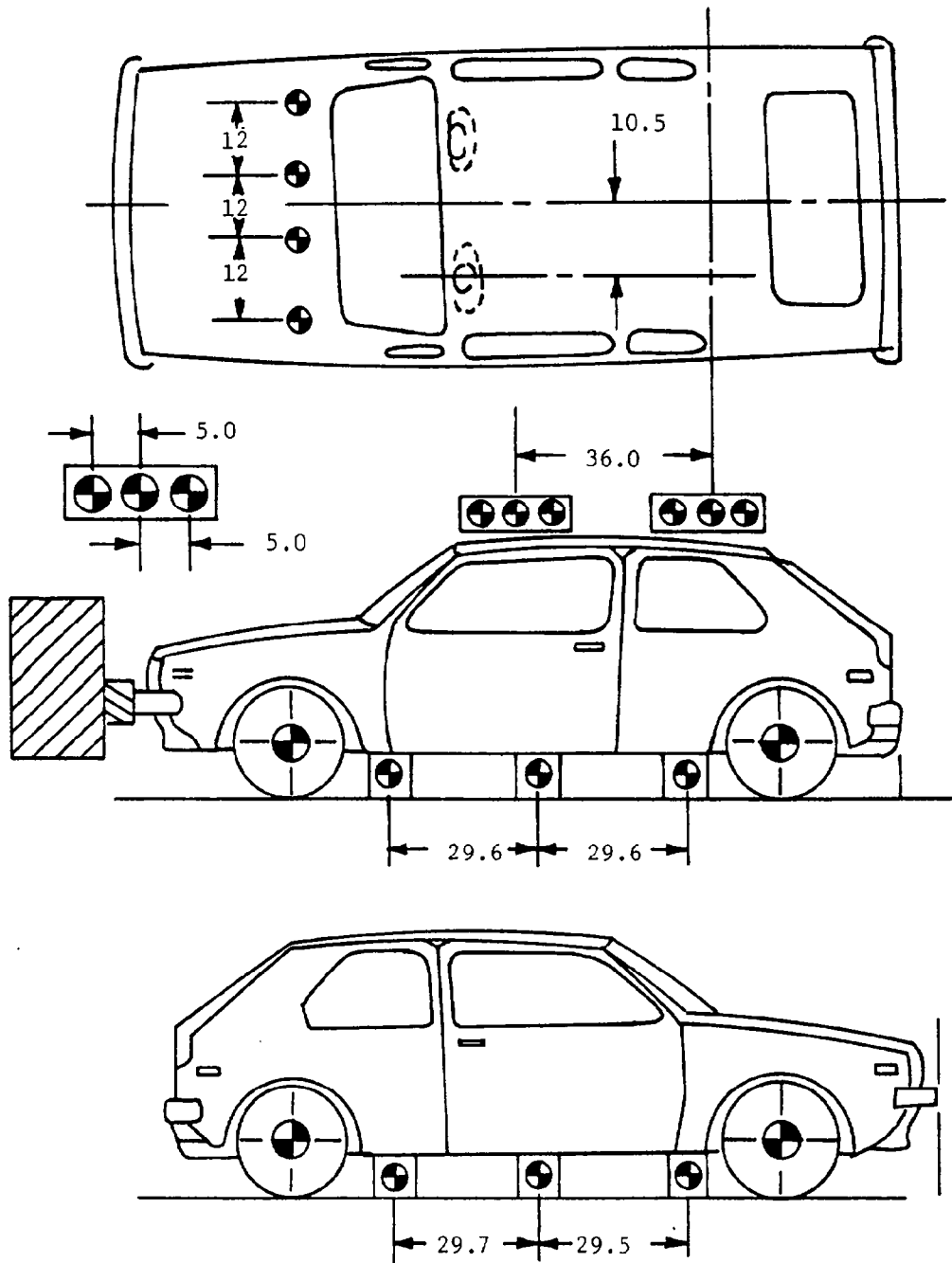


Figure 6

VEHICLE 1 MEASUREMENT POINTS

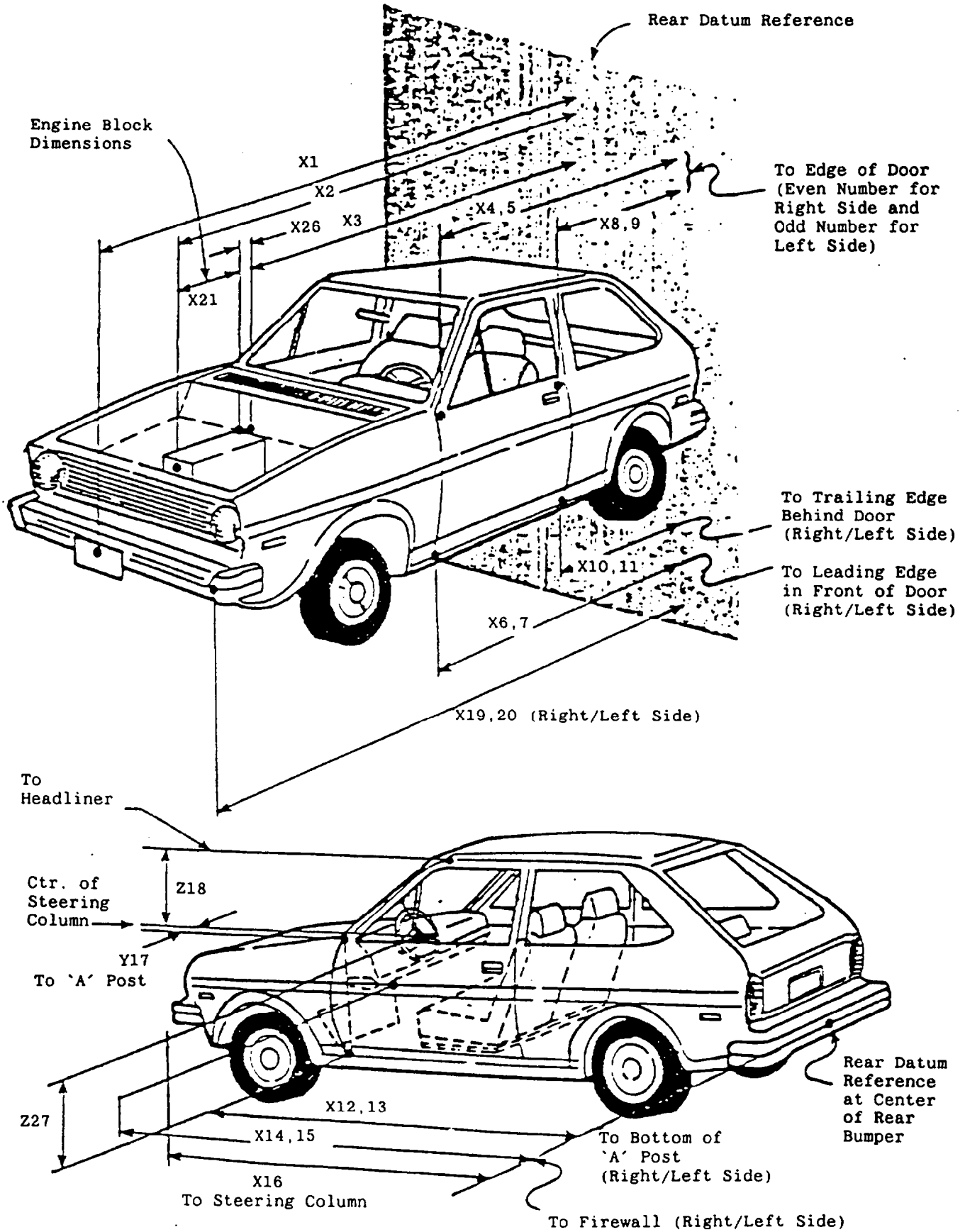


Figure 6

VEHICLE 1 MEASUREMENT POINTS (continued)

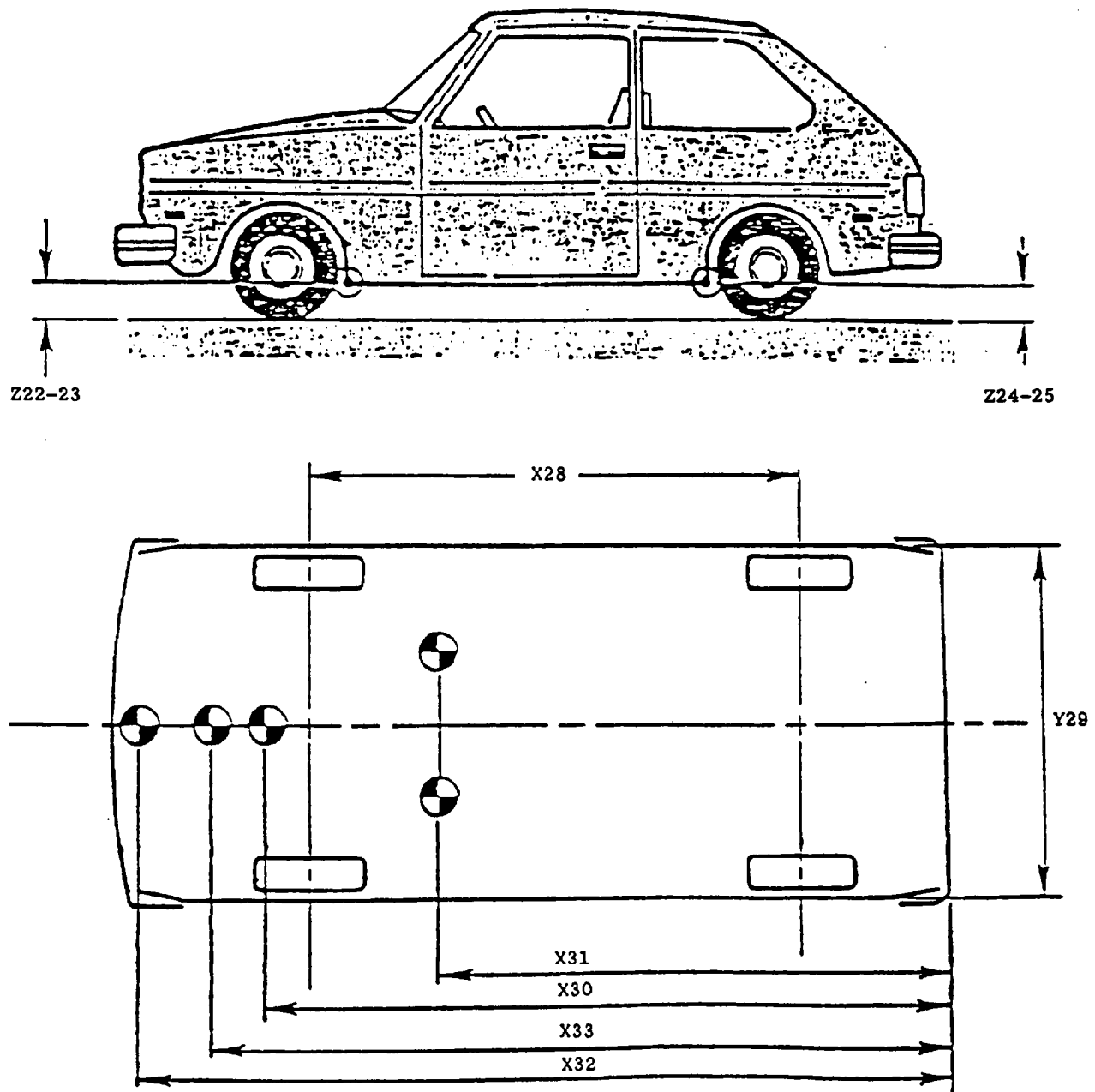


Table 4

VEHICLE 1 MEASUREMENTS

No.	TYPE OF MEASUREMENT	All Dimensions in Inches	
		Pre-Test	Post-Test
X1	Total Length of Vehicle at Centerline	146.2	118.4
X2	Rear Surface of Vehicle to Front of Engine	129.7	116.8
X3	Rear Surface of Vehicle to Firewall	111.6	101.5
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	99.3	99.4
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	99.4	90.4
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	98.6	98.2
X7	Rear Surface of vehicle to Lower Leading Edge of Left Door	98.4	94.8
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	50.4	50.8
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	50.4	47.5
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	50.9	50.8
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	51.2	50.4
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	98.3	98.3
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	98.5	94.8
X14	Rear Surface of Vehicle to Firewall - Right Side	110.5	106.2
X15	Rear Surface of Vehicle to Firewall - Left Side	110.5	91.1
X16	Rear Surface of Vehicle to Steering Wheel Center	82.4	73.6
Y17	Steering Column to "A" Post	14.8	17.4

Table 4

VEHICLE 1 MEASUREMENTS (continued)

No.	TYPE OF MEASUREMENT	All Dimensions in Inches	
		Pre-Test	Post-Test
Z18	Rear of Windshield Header to Steering Wheel Column	17.0	20.0
X19	Rear Surface of Vehicle to Right Side of Front Bumper	143.2	134.7
X20	Rear Surface of Vehicle to Left Side of Front Bumper	143.1	101.2
X21	Width of Engine Block	13.9	13.9
Z22	Right Front Sill to Ground Plane	8.1	6.3
Z23	Left Front Sill to Ground Plane	7.5	2.6
Z24	Right Rear Sill to Ground Plane	9.6	9.1
Z25	Left Rear Sill to Ground Plane	8.7	7.2
X26	Firewall to Engine or Transaxle	4.4	0
Z27	Vertical Dim. from Door Sill to Centerline of Steering Column	21.0	29.3
X28	Wheelbase of Vehicle	90.0	72.8
Y29	Width of Vehicle at Maximum Width Point	62.0	61.6
X30	Rear Surface of Vehicle to Engine Target	124.4	113.2
X31	Rear Surface of Vehicle to Compartment Target	103.1	target not available
X32	Rear Surface of Vehicle to Bumper Target	139.9	122.8
X33	Rear Surface of Vehicle to Frame Crossmember	106.7	target not available
	Rear Surface of Vehicle to Instrument Panel Targets	Left 89.6 Right 89.6	Left 82.4* Right 83.9*

*Targets displaced into dash panel due to dummy knee contact.

VEHICLE TWO DATA

Table 5

GENERAL TEST AND VEHICLE 2 PARAMETER DATA

Vehicle Year/Make/Model/Body Style: 1991 Ford Crown Victoria LTD 4-Door SedanTest No.: Y42-5-1042 VIN.: 2FACP73F9MX139803Body Color: White Date of Manufacture: 8/90Engine: 8 Cylinders; 302 C.I.D.; 5.0 Liters; - CCX Gas; - Diesel; - TurbochargedX Longitudinal; - TransverseTransmission: - Speed; - Manual; X Automatic; X OverdriveFinal Drive: - Front Wheel; X Rear Wheel; - Four WheelX A/C; X P/S; X P/B; X P/wdo;X Tilt Wheel - P/seats; - Cruise ControlType of Occupant Restraint: 3-point continuous belt restraint systemDATA RECORDED FROM VEHICLE'S TIRE PLACARD:Tire Pressure (at capacity): Front 35 psi, Rear 35 psiRecommended Tire Size: P215/70R15Recommended Cold Tire Pressure: Front 31 psi, Rear 35 psiTires on Vehicle: P215/70R15; Manufacturer: FirestoneNumber of Occupants: 3 Front; 3 Rear; - 3rd Seat; 6 TOTALType of Front Seats: - Bucket; - Bench; X Split BenchType of Front Seat Back: - Fixed; X Adj. With X Lever - Rot. KnobVehicle Capacity Weight (VCW) = 1100 lbs. (A)No. of Occupants x 150 lbs. = 900 lbs. (B)

Rated Cargo and Luggage

Weight (RCLW) A-B = 200 lbs.GVWR 5320 lbs. GAWR: Front 2680 lbs. Rear 2672 lbs.

Table 5

GENERAL TEST AND VEHICLE 2 PARAMETER DATA (cont'd)

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

Right Front = 1090 lbs. Right Rear = 860 lbs.
 Left Front = 1110 lbs. Left Rear = 830 lbs.
 TOTAL FRONT WEIGHT = 2200 lbs. (56.6 % of Total Vehicle Weight)
 TOTAL FRONT WEIGHT = 1690 lbs. (43.4 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 3890 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMY:

Right Front = 1020 lbs. Right Rear = 900 lbs.
 Left Front = 1180 lbs. Left Rear = 890 lbs.
 TOTAL FRONT WEIGHT = 2200 lbs. (55.1 % of Total Vehicle Weight)
 TOTAL FRONT WEIGHT = 1790 lbs. (44.9 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 3990 lbs.
 Weight of Ballast Secured in Vehicle Trunk Area = 0 lbs.

VEHICLE ATTITUDE (all dimensions in inches):

AS DELIVERED: RF 28.8 ; LF 28.7 ; RR 28.0 ; LR 28.0
 AS TESTED: RF 28.9 ; LF 28.5 ; RR 28.3 ; LR 27.7
 Vehicle's Wheel Base = 113.8 in.
 Location of Vehicle's C.G. = 51.1 inches rearward of front wheel center.

Table 5

GENERAL TEST AND VEHICLE 2 PARAMETER DATA (cont'd)

POST-IMPACT DATA:

Type of Test: VTV Frontal Impact Angle: 0 °
 Date of Test: March 6, 1991 Time of Test: 12:30
 Ambient Temperature: 50.5 °F at impact area
 Temperature in Occupant Compartment: 70 °F
 Windshield Molding Temperature: 71 °F
 Required Impact Velocity Range: 34.5 to 36.5 mph
 Impact Velocity: primary = 36.1 mph, secondary = - mph
 Distance From Front Bumper to Impact Point When
 Entering Speed Trap: - inches
 Exiting Speed Trap: - inches

VISIBLE DUMMY CONTACT POINTS:

Driver

Head *
 Chest No Contact
 Abdomen Lower steering rim
 Left Knee Dash panel
 Right Knee Dash panel

*Upper steering wheel rim, rear of head contacted B pillar.

Table 5
GENERAL TEST AND VEHICLE 2 PARAMETER DATA (cont'd)

	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Door Opening	<u>Operable</u>	<u>Operable</u>	<u>Operable</u>	<u>Operable</u>
<u>Seat Movement</u>	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Seat Back Failure	<u>None</u>	<u>-</u>	<u>-</u>	<u>-</u>
Seat Shift (in.)	<u>0.0</u>	<u>-</u>	<u>-</u>	<u>-</u>

Table 6
VEHICLE 2 DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DUMMY (1)	-88.0	-21.3	17.7	88.3	-18.2	6.7	9.1	19.6
DUMMY (2)	-	-	-	-	-	-	-	-
DUMMY (3)								
DUMMY (4)								

	MAXIMUM FORCE FEMUR LOAD (LBS.)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	738.6	814.7
DUMMY (2)	-	-
DUMMY (3)		
DUMMY (4)		

	MAXIMUM FORCE SEAT BELT LOADS (LBS.)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
DUMMY (1)	936.0	N/M	N/M
DUMMY (2)	-	-	-
DUMMY (3)			
DUMMY (4)			

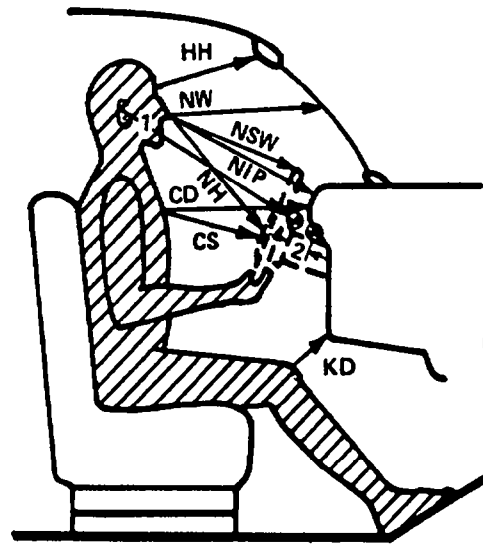
	HEAD INJURY CRITERIA (HIC)			
	HIC	t ₁ (SEC)	t ₂ (SEC)	Average Acceleration t ₁ TO t ₂
DUMMY (1)	337.8	.10980	.12012	64.0
DUMMY (2)	-	-	-	-
DUMMY (3)				
DUMMY (4)				

*Defined as exceeding 0.003 sec. duration
 **As defined in FMVSS No. 208

Figure 7

VEHICLE 2 OCCUPANT CLEARANCE DIMENSIONS

	DRIVER
HH	14.1
NW	21.8
NSW	15.8
NIP	23.6
NH	16.6
CD	21.5
CS	10.7
KDL	3.7
KDR	3.8
1	27.2
2	2.0
SA	See Note
TA	25
ULA	16°
LLA	306°



H-Point from Target Position:

Longitudinal 0.0" from target
Vertical 0.2" below target

Angles taken relative to vertical

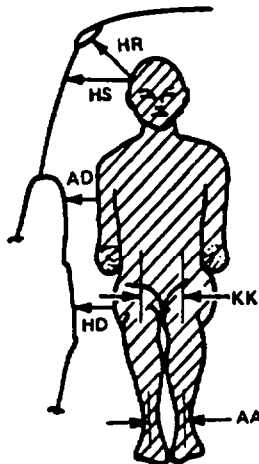
SA = Seat Back Angle

TA = Torso Angle

ULA = Upper Leg Angle

LLA = Lower Leg Angle

HH = Head to Windshield Header
NW = Nose to Windshield
NSW = Nose to Steering Wheel
NIP = Nose to Instrument Panel
NH = Nose to Steering Wheel Hub
CD = Chest to Dash
CS = Chest to Steering Wheel Hub
KDL = Knee to Dash Left
KDR = Knee to Dash Right
1 = Head Target to Steering Column Target
2 = Distance between Steering Column Targets



HR = Head to Side Roof

HS = Head to Side Window

AD = Arm to Door

HD = Hip to Door

KK = Knee to Knee

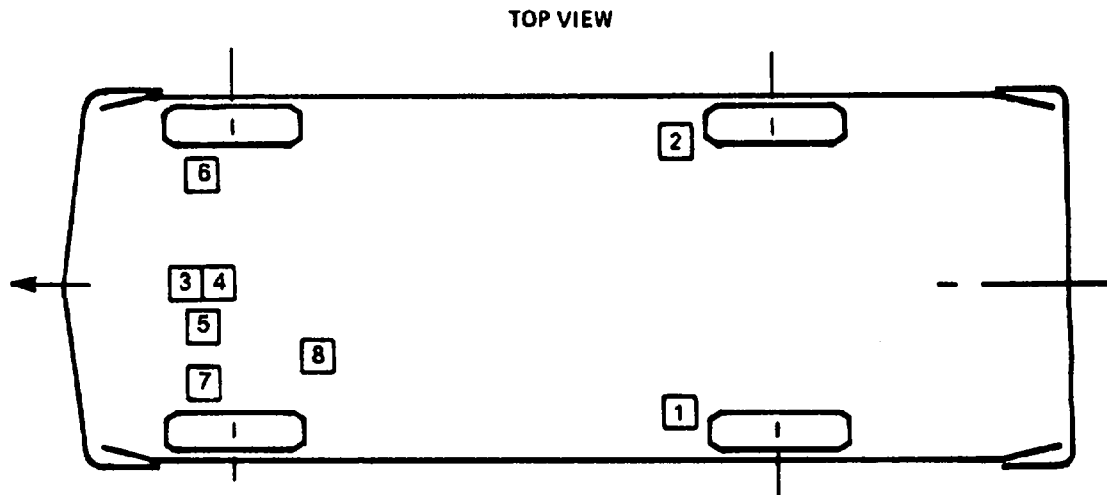
AA = Ankle to Ankle

DT = Dummy Temperature °F

	DRIVER
HR	5.7
HS	9.1
AD	5.5
HD	7.9
KK	9.6
AA	10.5
DT	70°

Note: Seat was positioned according to manufacturer specifications

Figure 8
SUMMARY OF VEHICLE 2 ACCELEROMETER DATA



Vehicle: 1991 Ford Crown Victoria LTD 4-Door Sedan

Loc. No.	Description	Axis	Maximum Value (g's)*	
			"-"	"+"
1	Rear seat crossmember left side	x	-37.9	1.2
2	Rear seat crossmember right side	x	-2.1	0.4
3	Top of engine block	x	-61.0	1.7
3	Top of engine block	z	-20.1	4.9
4	Bottom of engine block	x	**	**
5	Front suspension crossmember	x	**	**
5	Front suspension crossmember	z	-25.3	27.8
6	Right front brake caliper	x	**	**
7	Left front brake caliper	x	-40.3	18.1
8	Toe pan	x	-68.6	28.9

*Values filtered using SAE class 60 filter.

**These channels contain questionable data. Data anomalies can be found on page 2-2.

Figure 9

VEHICLE 2 PRE- AND POST-TEST POSITION OF TEST VEHICLE
ACCELEROMETER MOUNTING LOCATIONS

Test Description: 35 mph Offset Frontal Vehicle-to-Vehicle Impact

Test Vehicle: 1991 Ford Crown Victoria LTD 4-Door Sedan

Reference Plane: Vehicle plane at rear bumper

Accelerometer Description	LONGITUDINAL LOCATION (in.)		
	Pre-Test	Post-Test	Change
Rear seat crossmember left side	88.5	88.4	0.1
Rear seat crossmember right side	88.5	88.4	0.1
Top of engine block	166.8	165.1	1.7
Bottom of engine block	174.4	174.2	0.2
Front suspension crossmember	166.0	165.9	0.1
Right front brake caliper	161.6	162.1	-0.5
Left front brake caliper	161.6	157.8	3.8
Toe Pan	146.1	144.1	2.0

Figure 10
 VEHICLE 2 TARGET LOCATIONS
 (all dimensions in inches)

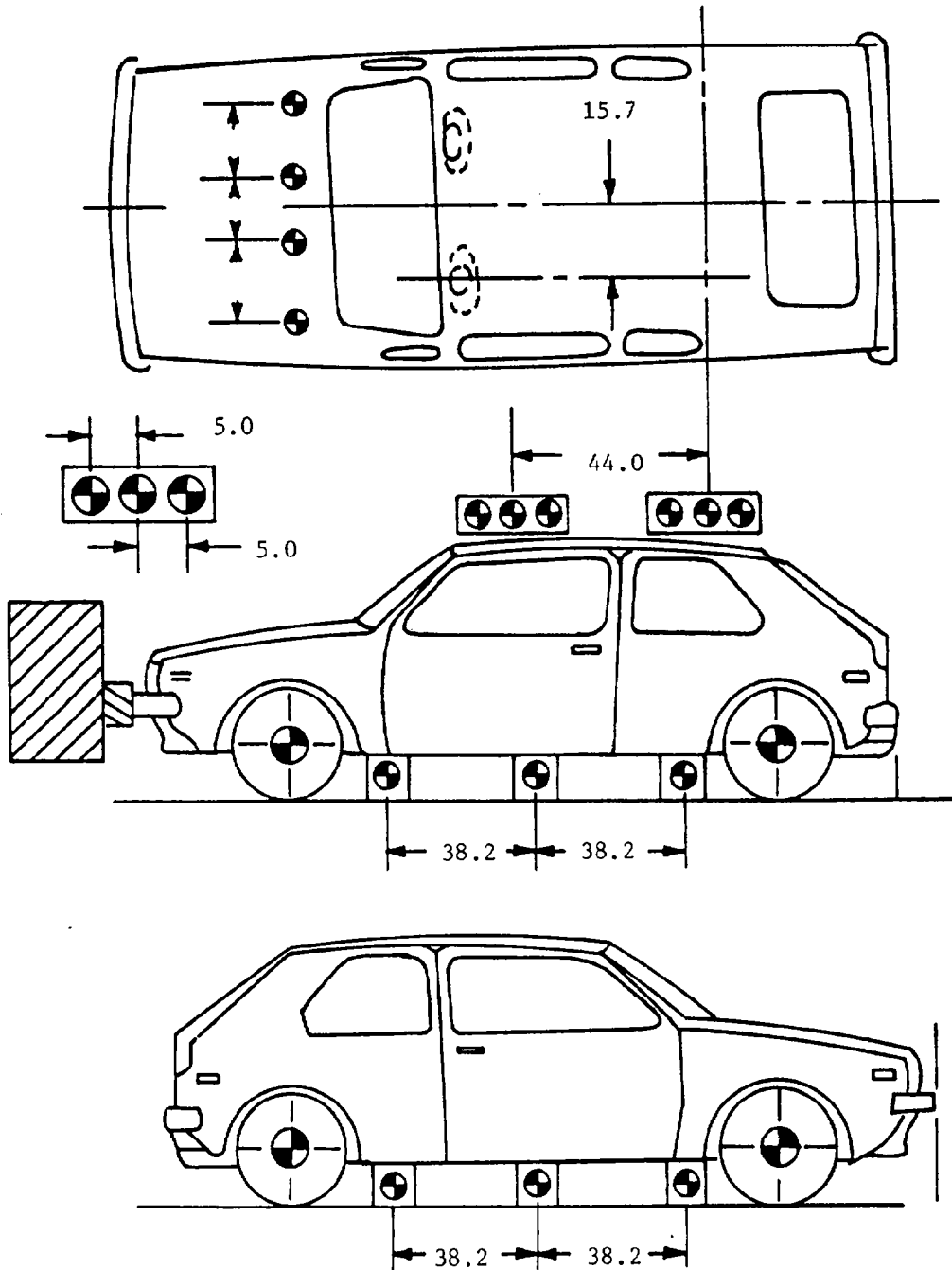


Figure 11

VEHICLE 2 MEASUREMENT POINTS

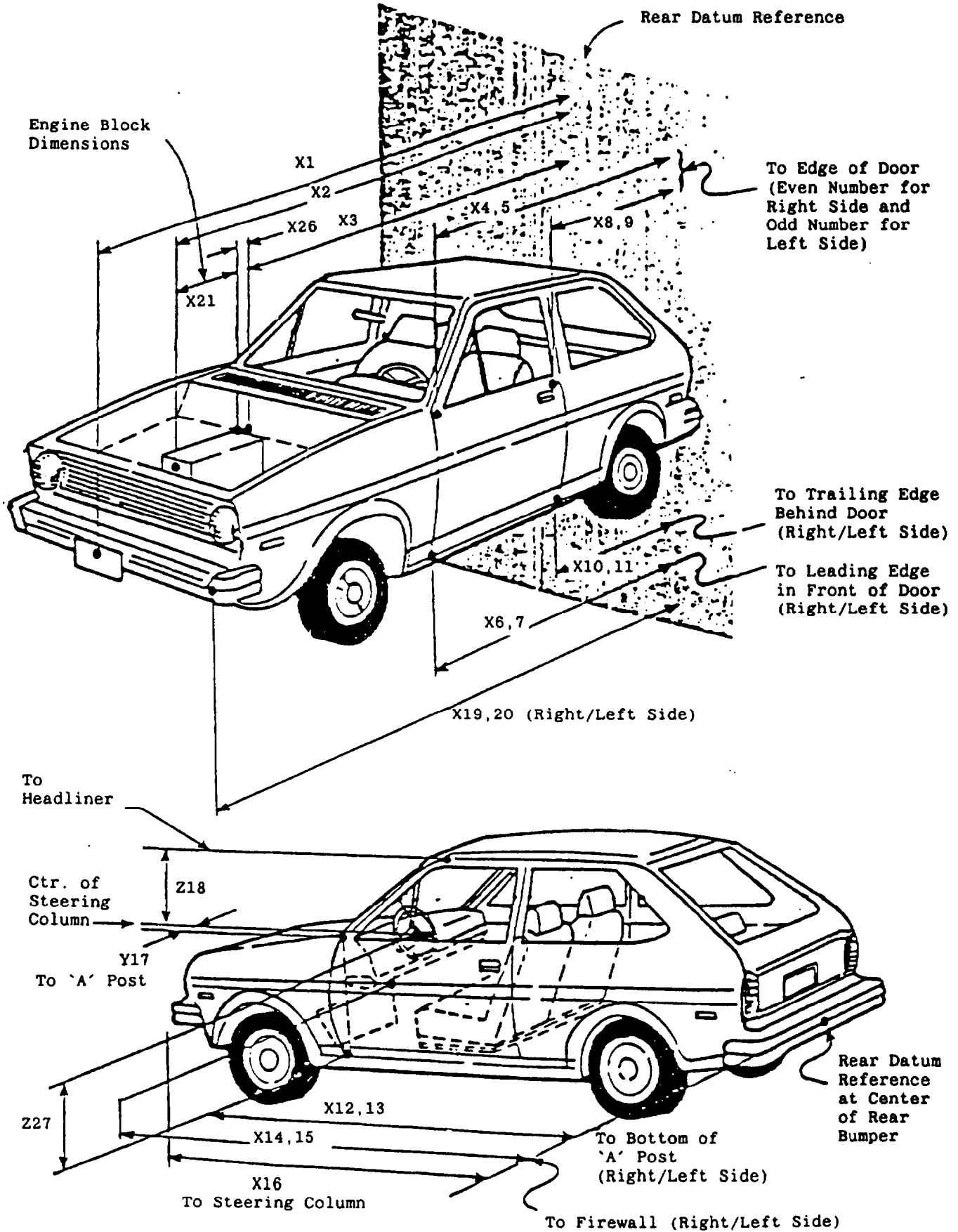


Figure 11

VEHICLE 2 MEASUREMENT POINTS (continued)

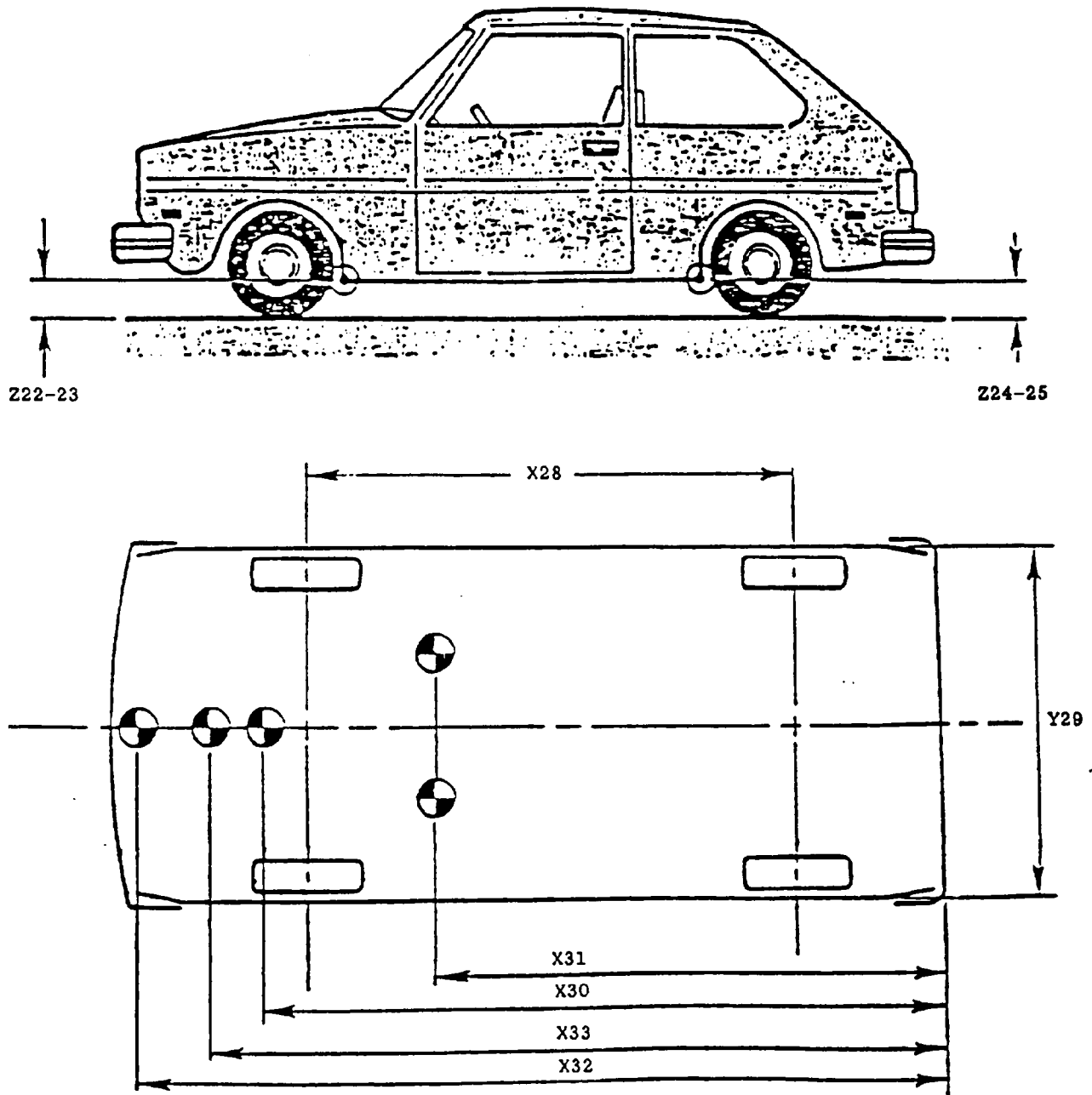


Table 7
VEHICLE 2 MEASUREMENTS

No.	TYPE OF MEASUREMENT	All Dimensions in Inches	
		Pre-Test	Post-Test
X1	Total Length of Vehicle at Centerline	210.7	197.8
X2	Rear Surface of Vehicle to Front of Engine	180.2	178.4
X3	Rear Surface of Vehicle to Firewall	150.7	151.5
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	140.0	140.1
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	139.4	139.5
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	139.8	139.2
X7	Rear Surface of vehicle to Lower Leading Edge of Left Door	139.1	138.7
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	99.4	99.4
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	98.8	99.3
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	98.3	97.4
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	97.3	96.8
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	148.8	148.2
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	148.8	148.4
X14	Rear Surface of Vehicle to Firewall - Right Side	151.5	150.7
X15	Rear Surface of Vehicle to Firewall - Left Side	150.5	149.6
X16	Rear Surface of Vehicle to Steering Wheel Center	121.7	121.5
Y17	Steering Column to "A" Post	17.2	17.4

Table 7

VEHICLE 2 MEASUREMENTS (continued)

No.	TYPE OF MEASUREMENT	All Dimensions in Inches	
		Pre-Test	Post-Test
Z18	Rear of Windshield Header to Steering Wheel Center	16.3	17.3
X19	Rear Surface of Vehicle to Right Side of Front Bumper	205.6	209.9
X20	Rear Surface of Vehicle to Left Side of Front Bumper	205.7	181.3
X21	Width of Engine Block	24.0	24.0
Z22	Right Front Sill to Ground Plane	8.2	9.3
Z23	Left Front Sill to Ground Plane	8.2	1.0
Z24	Right Rear Sill to Ground Plane	9.9	4.3
Z25	Left Rear Sill to Ground Plane	9.8	13.8
X26	Firewall to Engine or Transaxle	6.0	3.6
Z27	Vertical Dim. from Door Sill to Centerline of Steering Column	23.6	24.0
X28	Wheelbase of Vehicle	113.9	108.1
Y29	Width of Vehicle at Maximum Width Point (Rear edge of rear handle)	77.3	77.1
X30	Rear Surface of Vehicle to Engine Target	174.4	174.2
X31	Rear Surface of Vehicle to Compartment Target	139.5	139.5
X32	Rear Surface of Vehicle to Bumper Target	190.8	182.0
X33	Rear Surface of Vehicle to Frame Crossmember	170.6	170.2
	Rear Surface of Vehicle to Instrument Panel Targets	Left 129.5 Right 129.5	Left 129.2 Right 129.4

Figure 12

CAMERA POSITIONS FOR VTV OFFSET FRONTAL IMPACT

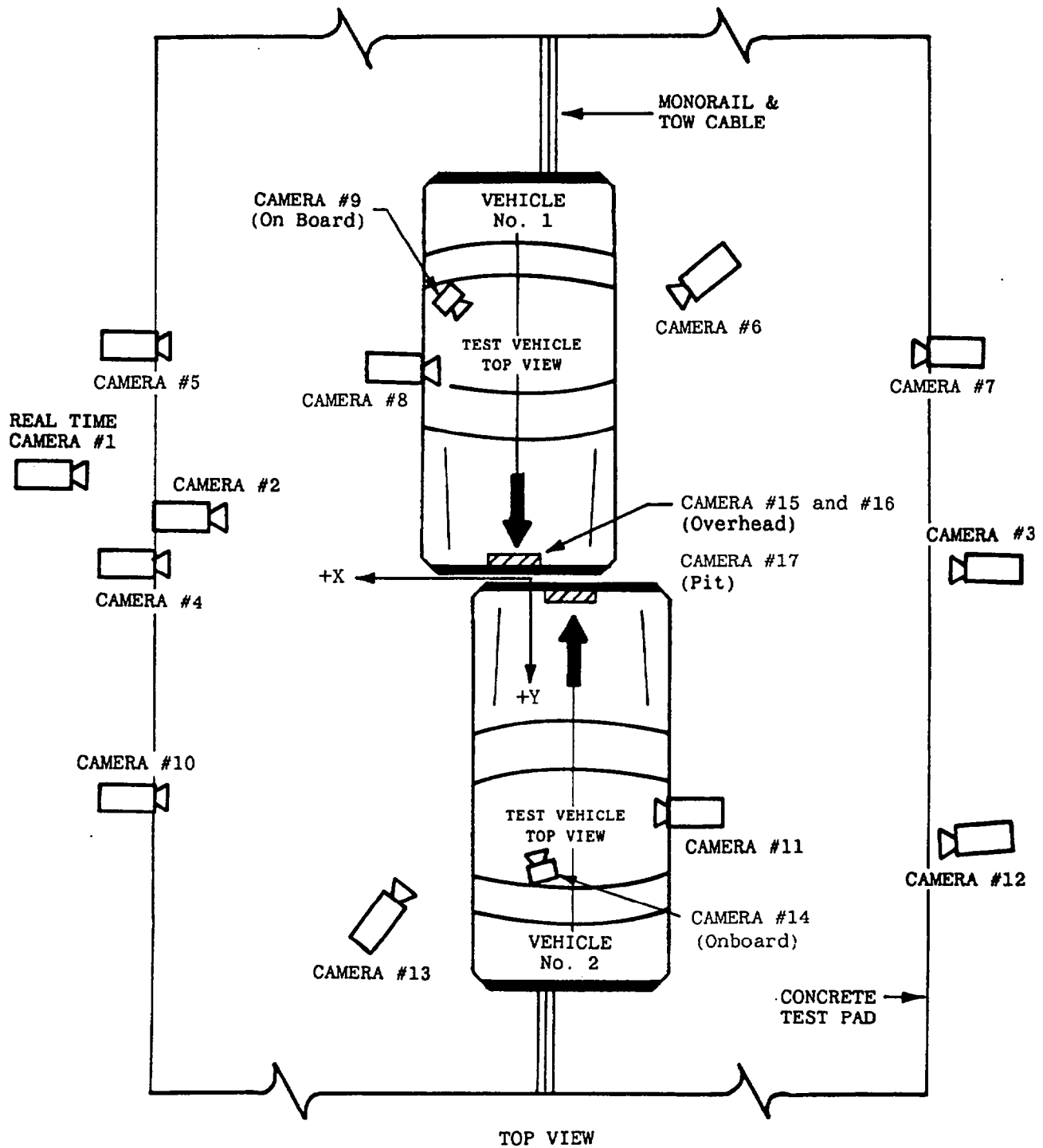


Table 8

HIGH-SPEED CAMERA LOCATIONS

Test No. Y42-5-1042 Vehicle: 1991 Ford Crown Victoria LTD 4-Door Sedan, 1991 Suzuki Swift 2-Door Hatchback

CAMERA NO.	VIEW	CAMERA POSITIONS (in)*			ANGLE** (deg)	LENS (mm)	SPEED (fps)
		X	Y	Z			
1	Real-Time Camera	-	-	-	-	-	24
2	Overall View	382	-24	70	-8	13	540
3	Impact Point Right Side View	-264	0	41	-2	25	540
4	Impact Point Left Side View	287	-5	40	-2	25	560
5	Vehicle 1 Left Side Overall View	-342	-61	42		35	NT
6	Vehicle 1 Driver and Steering Column View	-142	-146	69	-12	13	660
7	Vehicle 1 Right Side Overall View	478	-83	50	0	25	560
8	Vehicle 1 Onboard Driver View	-	-	-	-	8	650
9	Vehicle 1 Onboard Seat Belt View	-	-	-	-	8	825
10	Vehicle 2 Left Side Overall View	513	23	42	-1	35	540
11	Vehicle 2 Onboard Driver View	-	-	-	-	8	760
12	Vehicle 2 Right Side Overall View	-392	92	41	0	25	690
13	Vehicle 2 Driver and Interior View	89	116	71	-19	13	610
14	Vehicle 2 Onboard Seat Belt View	-	-	-	-	8	620
15	Overhead Overall View	0	9		-90	13	540
16	Overhead Impact Point Closeup View	0	0		-90	25	550
17	Underbody View	0	-5	-80	90	132	NT

*X = film plane to monorail centerline
 Y = film plane to impact location
 Z = film plane to ground
 ** = referenced to horizontal plane

Appendix A

PHOTOGRAPHS

Appendix A
TABLE OF CONTENTS

<u>Figure No.</u>	<u>Photograph Title</u>	<u>Page No.</u>
OVERALL TEST SETUP		
Figure A-1	PRE-TEST OVERHEAD VIEW	A-3
Figure A-2	POST-TEST OVERHEAD VIEW	A-4
Figure A-3	PRE-TEST OVERALL SIDE VIEW	A-5
Figure A-4	POST-TEST OVERALL SIDE VIEW	A-6
Figure A-5	IMPACT PHOTO	A-7
VEHICLE 1 PHOTOGRAPHS		
Figure A-6	VEHICLE 1 PRE-TEST FRONT VIEW	A-9
Figure A-7	VEHICLE 1 POST-TEST FRONT VIEW	A-10
Figure A-8	VEHICLE 1 PRE-TEST FRONT RIGHT THREE QUARTER VIEW	A-11
Figure A-9	VEHICLE 1 POST-TEST FRONT RIGHT THREE QUARTER VIEW	A-12
Figure A-10	VEHICLE 1 PRE-TEST RIGHT SIDE VIEW	A-13
Figure A-11	VEHICLE 1 POST-TEST RIGHT SIDE VIEW	A-14
Figure A-12	VEHICLE 1 PRE-TEST REAR RIGHT THREE QUARTER VIEW	A-15
Figure A-13	VEHICLE 1 POST-TEST REAR RIGHT THREE QUARTER VIEW	A-16
Figure A-14	VEHICLE 1 PRE-TEST REAR VIEW	A-17
Figure A-15	VEHICLE 1 POST-TEST REAR VIEW	A-18
Figure A-16	VEHICLE 1 PRE-TEST REAR LEFT THREE QUARTER VIEW	A-19
Figure A-17	VEHICLE 1 POST-TEST REAR LEFT THREE QUARTER VIEW	A-20
Figure A-18	VEHICLE 1 PRE-TEST LEFT SIDE VIEW	A-21
Figure A-19	VEHICLE 1 POST-TEST LEFT SIDE VIEW	A-22
Figure A-20	VEHICLE 1 PRE-TEST FRONT LEFT THREE QUARTER VIEW	A-23
Figure A-21	VEHICLE 1 POST-TEST FRONT LEFT THREE QUARTER VIEW	A-24
Figure A-22	VEHICLE 1 PRE-TEST WINDSHIELD VIEW	A-25
Figure A-23	VEHICLE 1 POST-TEST WINDSHIELD VIEW	A-26
Figure A-24	VEHICLE 1 PRE-TEST OVERHEAD ENGINE COMPARTMENT VIEW	A-27
Figure A-25	VEHICLE 1 POST-TEST OVERHEAD ENGINE COMPARTMENT VIEW (N/A)	A-28

Appendix A
TABLE OF CONTENTS (cont'd)

<u>Figure No.</u>	<u>Photograph Title</u>	<u>Page No.</u>
VEHICLE 1 PHOTOGRAPHS		
Figure A-26	VEHICLE 1 PRE-TEST UNDERBODY FRONT VIEW	A-29
Figure A-27	VEHICLE 1 POST-TEST UNDERBODY FRONT VIEW	A-30
Figure A-28	VEHICLE 1 PRE-TEST UNDERBODY FRONT SIDE VIEW	A-31
Figure A-29	VEHICLE 1 POST-TEST UNDERBODY FRONT SIDE VIEW	A-32
Figure A-30	VEHICLE 1 PRE-TEST UNDERBODY REAR VIEW	A-33
Figure A-31	VEHICLE 1 POST-TEST UNDERBODY REAR VIEW	A-34
Figure A-32	VEHICLE 1 PRE-TEST DRIVER POSITION VIEW	A-35
Figure A-33	VEHICLE 1 POST-TEST DRIVER POSITION VIEW	A-36
Figure A-34	VEHICLE 1 PRE-TEST DRIVER AND OCCUPANT COMPARTMENT VIEW	A-37
Figure A-35	VEHICLE 1 POST-TEST DRIVER AND OCCUPANT COMPARTMENT VIEW	A-38
Figure A-36	VEHICLE 1 PRE-TEST DRIVER AND OCCUPANT COMPARTMENT RIGHT SIDE VIEW	A-39
Figure A-37	VEHICLE 1 POST-TEST DRIVER AND OCCUPANT COMPARTMENT RIGHT SIDE VIEW	A-40
VEHICLE 2 PHOTOGRAPHS		
Figure A-38	VEHICLE 2 PRE-TEST FRONT VIEW	A-42
Figure A-39	VEHICLE 2 POST-TEST FRONT VIEW	A-43
Figure A-40	VEHICLE 2 PRE-TEST FRONT RIGHT THREE QUARTER VIEW	A-44
Figure A-41	VEHICLE 2 POST-TEST FRONT RIGHT THREE QUARTER VIEW	A-45
Figure A-42	VEHICLE 2 PRE-TEST RIGHT SIDE VIEW	A-46
Figure A-43	VEHICLE 2 POST-TEST RIGHT SIDE VIEW	A-47
Figure A-44	VEHICLE 2 PRE-TEST REAR RIGHT THREE QUARTER VIEW	A-48
Figure A-45	VEHICLE 2 POST-TEST REAR RIGHT THREE QUARTER VIEW	A-49
Figure A-46	VEHICLE 2 PRE-TEST REAR VIEW	A-50
Figure A-47	VEHICLE 2 POST-TEST REAR VIEW	A-51

Appendix A
TABLE OF CONTENTS (cont'd)

<u>Figure No.</u>	<u>Photograph Title</u>	<u>Page No.</u>
VEHICLE 2 PHOTOGRAPHS		
Figure A-48	VEHICLE 2 PRE-TEST REAR LEFT THREE QUARTER VIEW	A-52
Figure A-49	VEHICLE 2 POST-TEST REAR LEFT THREE QUARTER VIEW	A-53
Figure A-50	VEHICLE 2 PRE-TEST LEFT SIDE VIEW	A-54
Figure A-51	VEHICLE 2 POST-TEST LEFT SIDE VIEW	A-55
Figure A-52	VEHICLE 2 PRE-TEST FRONT LEFT THREE QUARTER VIEW	A-56
Figure A-53	VEHICLE 2 POST-TEST FRONT LEFT THREE QUARTER VIEW	A-57
Figure A-54	VEHICLE 2 PRE-TEST WINDSHIELD VIEW	A-58
Figure A-55	VEHICLE 2 POST-TEST WINDSHIELD VIEW	A-59
Figure A-56	VEHICLE 2 PRE-TEST OVERHEAD ENGINE COMPARTMENT VIEW	A-60
Figure A-57	VEHICLE 2 POST-TEST OVERHEAD ENGINE COMPARTMENT VIEW (N/A)	A-61
Figure A-58	VEHICLE 2 PRE-TEST UNDERBODY FRONT VIEW	A-62
Figure A-59	VEHICLE 2 POST-TEST UNDERBODY FRONT VIEW	A-63
Figure A-60	VEHICLE 2 PRE-TEST UNDERBODY FRONT SIDE VIEW	A-64
Figure A-61	VEHICLE 2 POST-TEST UNDERBODY FRONT SIDE VIEW	A-65
Figure A-62	VEHICLE 2 PRE-TEST UNDERBODY REAR VIEW	A-66
Figure A-63	VEHICLE 2 POST-TEST UNDERBODY REAR VIEW	A-67
Figure A-64	VEHICLE 2 PRE-TEST DRIVER POSITION VIEW	A-68
Figure A-65	VEHICLE 2 POST-TEST DRIVER POSITION VIEW	A-69
Figure A-66	VEHICLE 2 PRE-TEST DRIVER AND OCCUPANT COMPARTMENT VIEW	A-70
Figure A-67	VEHICLE 2 POST-TEST DRIVER AND OCCUPANT COMPARTMENT VIEW	A-71
Figure A-68	VEHICLE 2 PRE-TEST DRIVER AND OCCUPANT COMPARTMENT RIGHT SIDE VIEW	A-72
Figure A-69	VEHICLE 2 POST-TEST DRIVER AND OCCUPANT COMPARTMENT RIGHT SIDE VIEW	A-73

OVERALL TEST SETUP

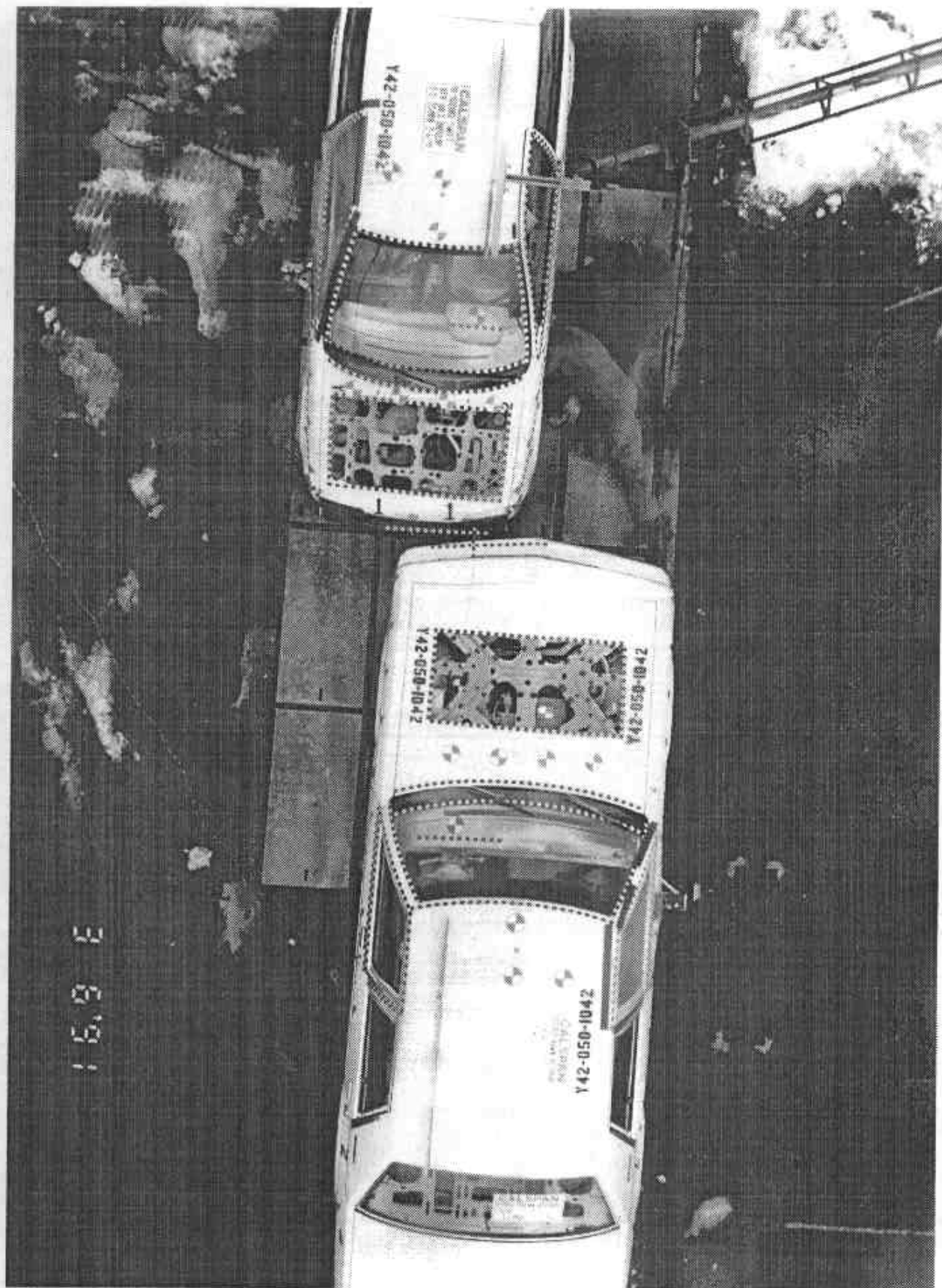


Figure A-1 PRE-TEST OVERHEAD VIEW



Figure A-2 POST-TEST OVERHEAD VIEW

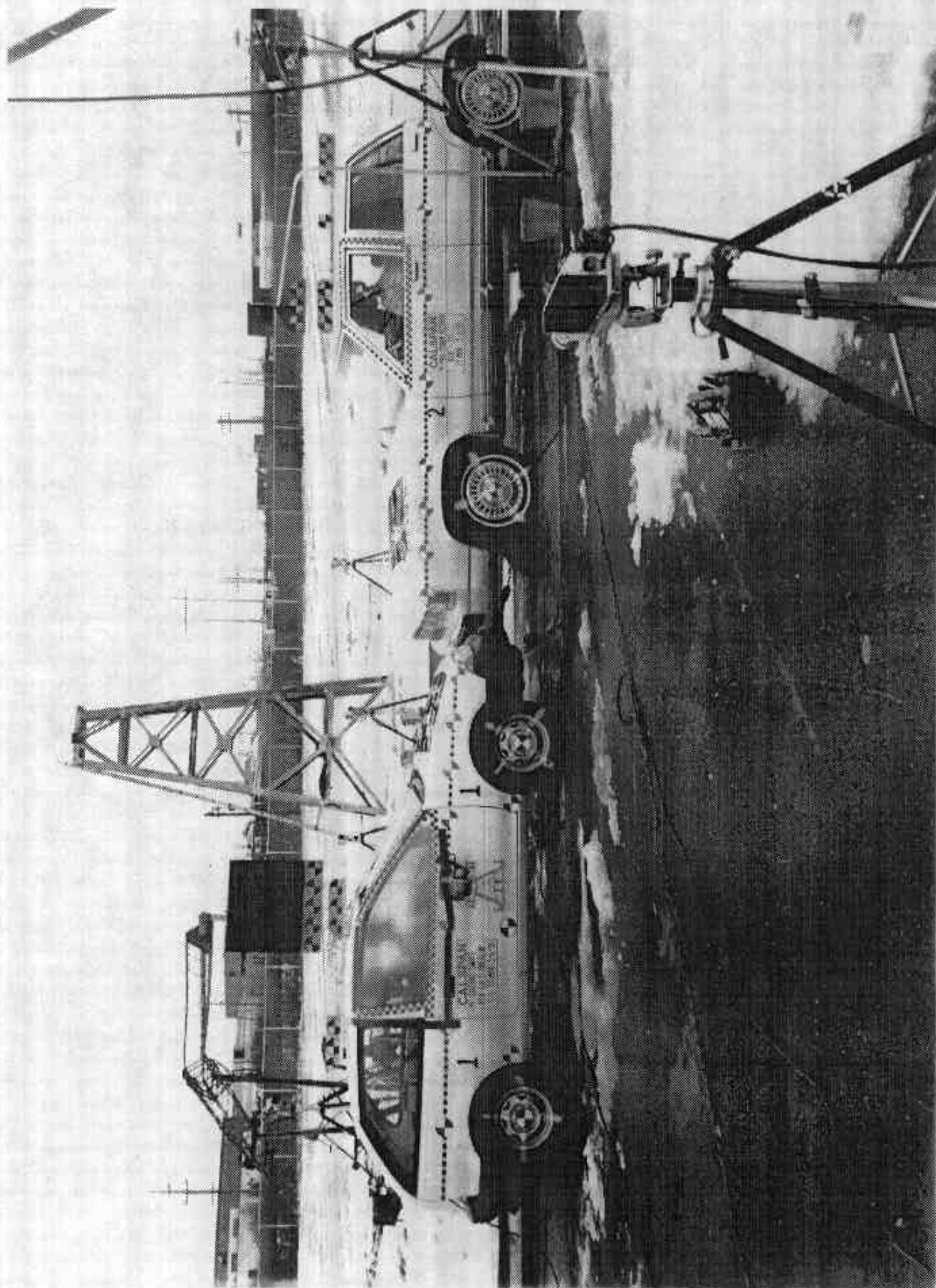


Figure A-3 PRE-TEST OVERALL SIDE VIEW

A-5

7882-5

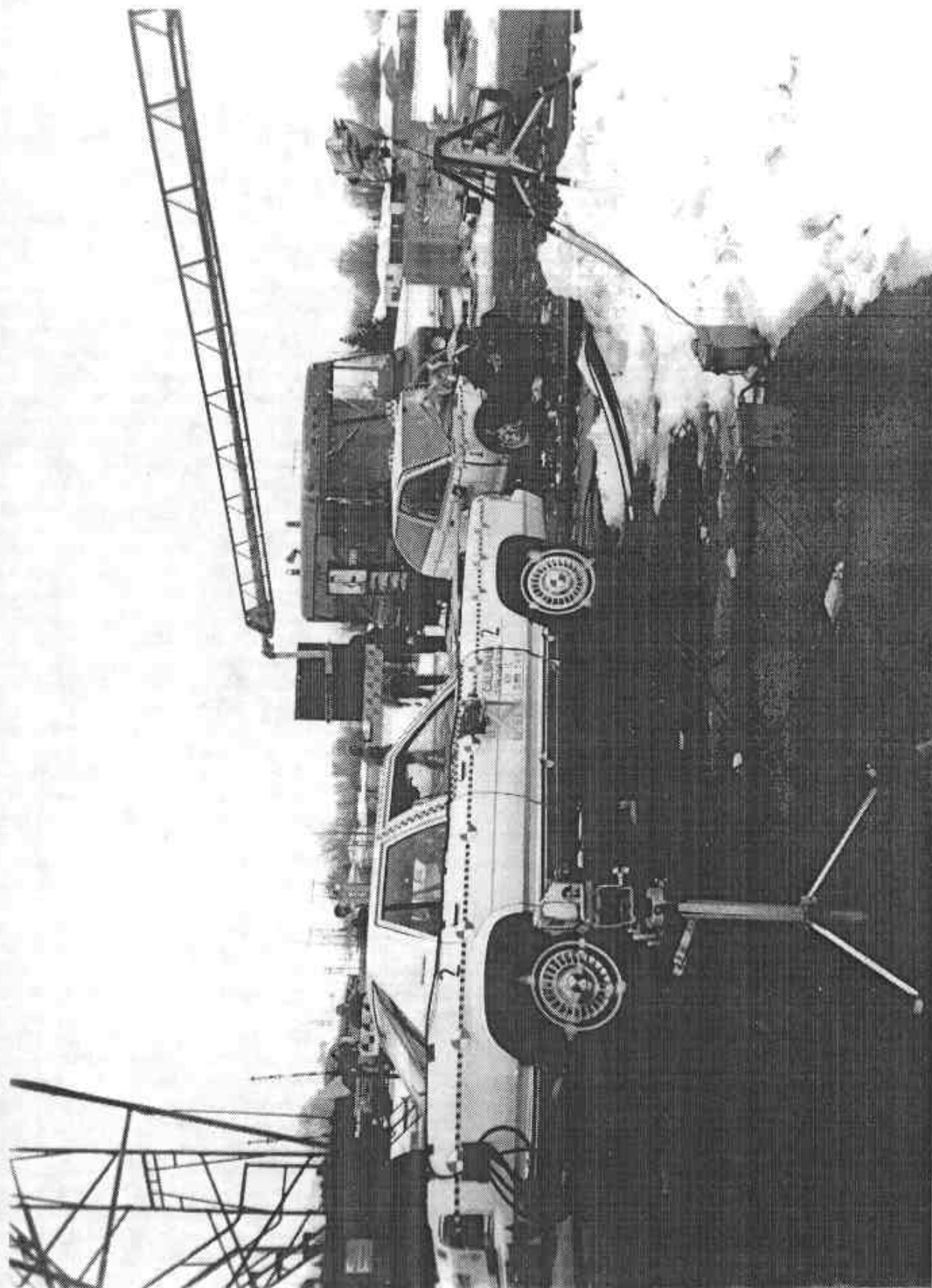


Figure A-4 POST-TEST OVERALL SIDE VIEW

A-6

7883-5

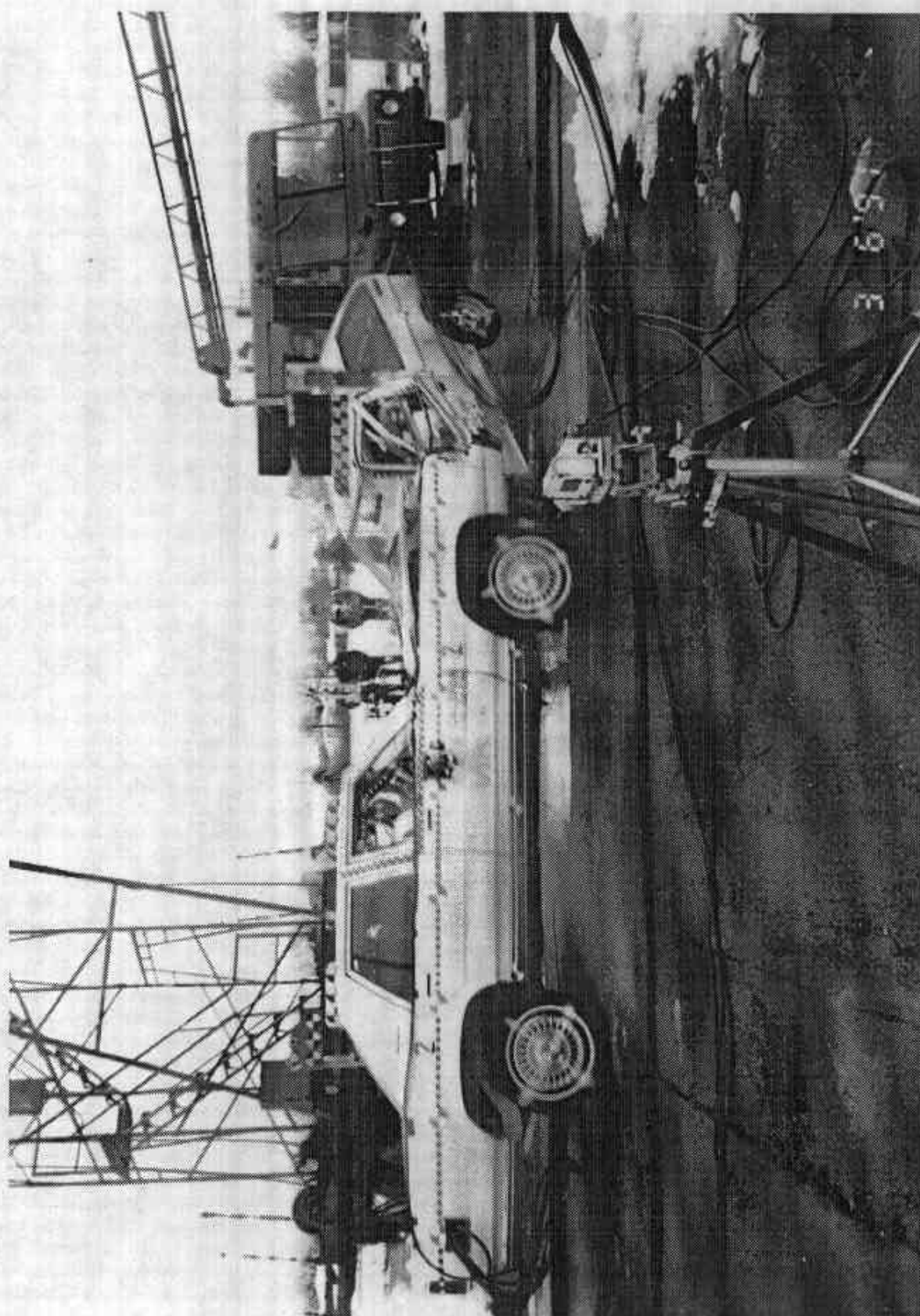


Figure A-5 IMPACT PHOTO

A-7

7883-5

VEHICLE 1 PHOTOGRAPHS

1991 SUZUKI SWIFT 2-DOOR HATCHBACK

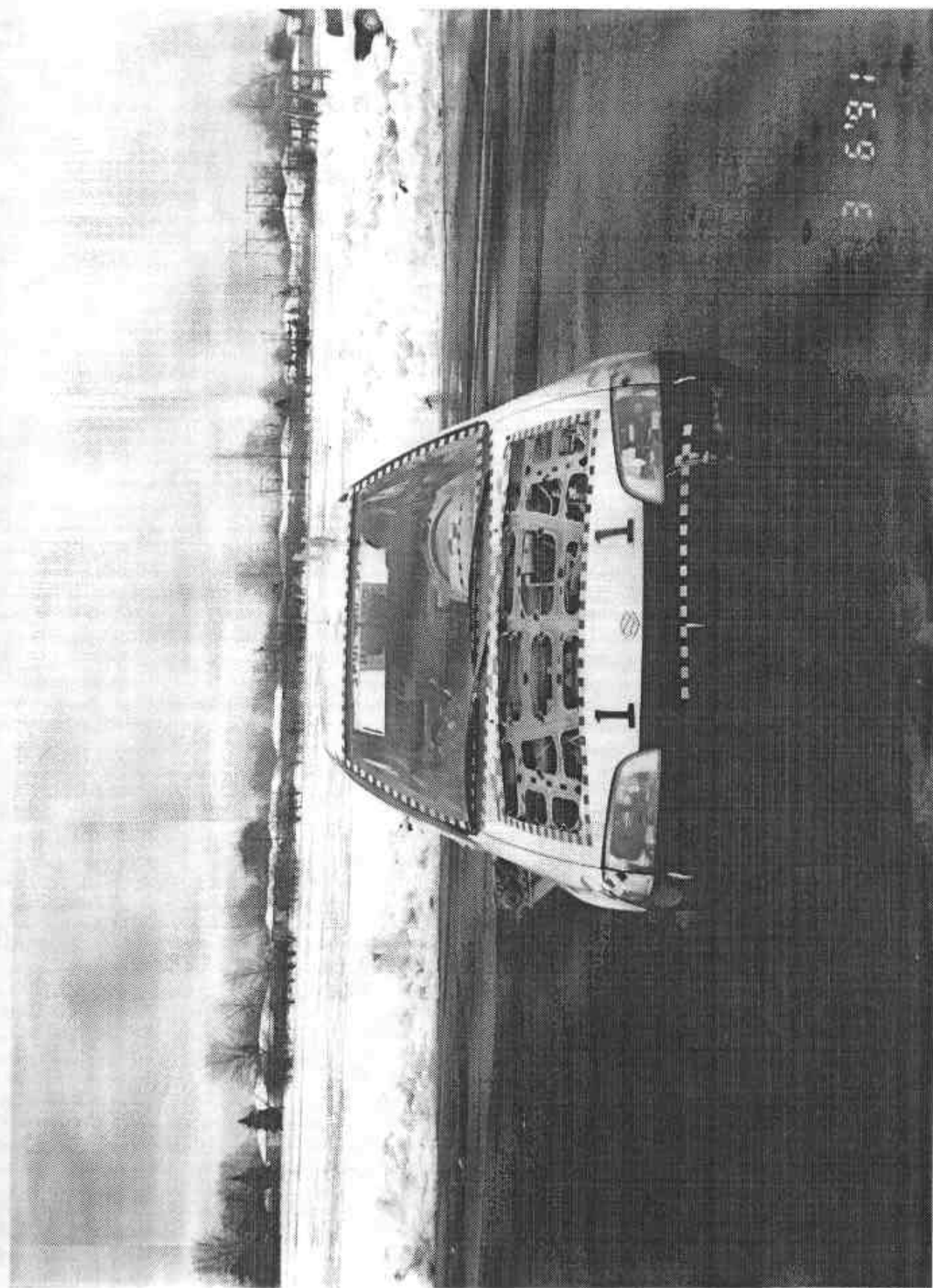


FIGURE A-6 VEHICLE 1 PRE-TEST FRONT VIEW

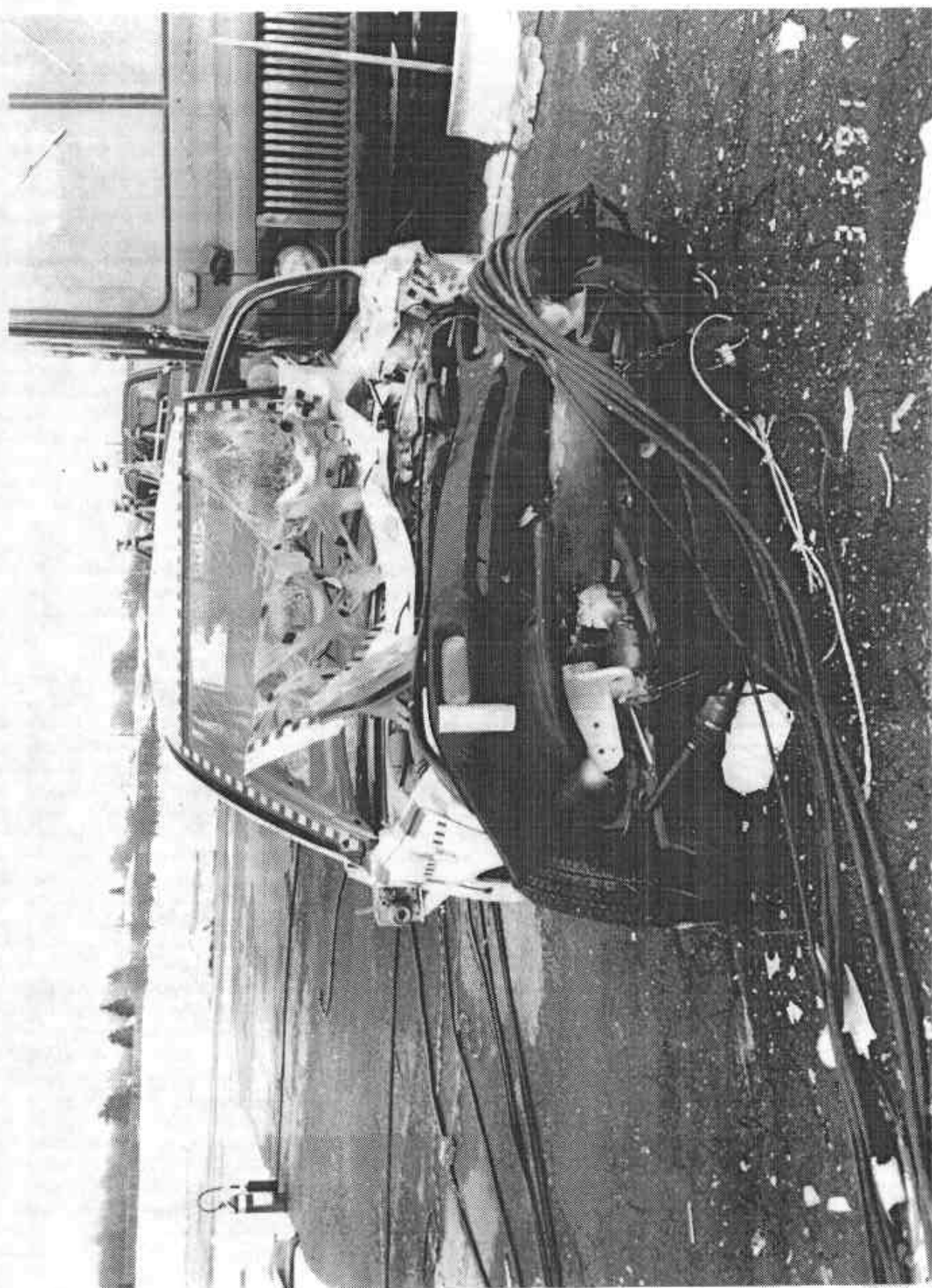


Figure A-7 VEHICLE 1 POST-TEST FRONT VIEW

A-10

7883-5



FIGURE A-8 VEHICLE 1 PRE-TEST RIGHT THREE QUARTER VIEW

A-11

7883-5

16.9 E

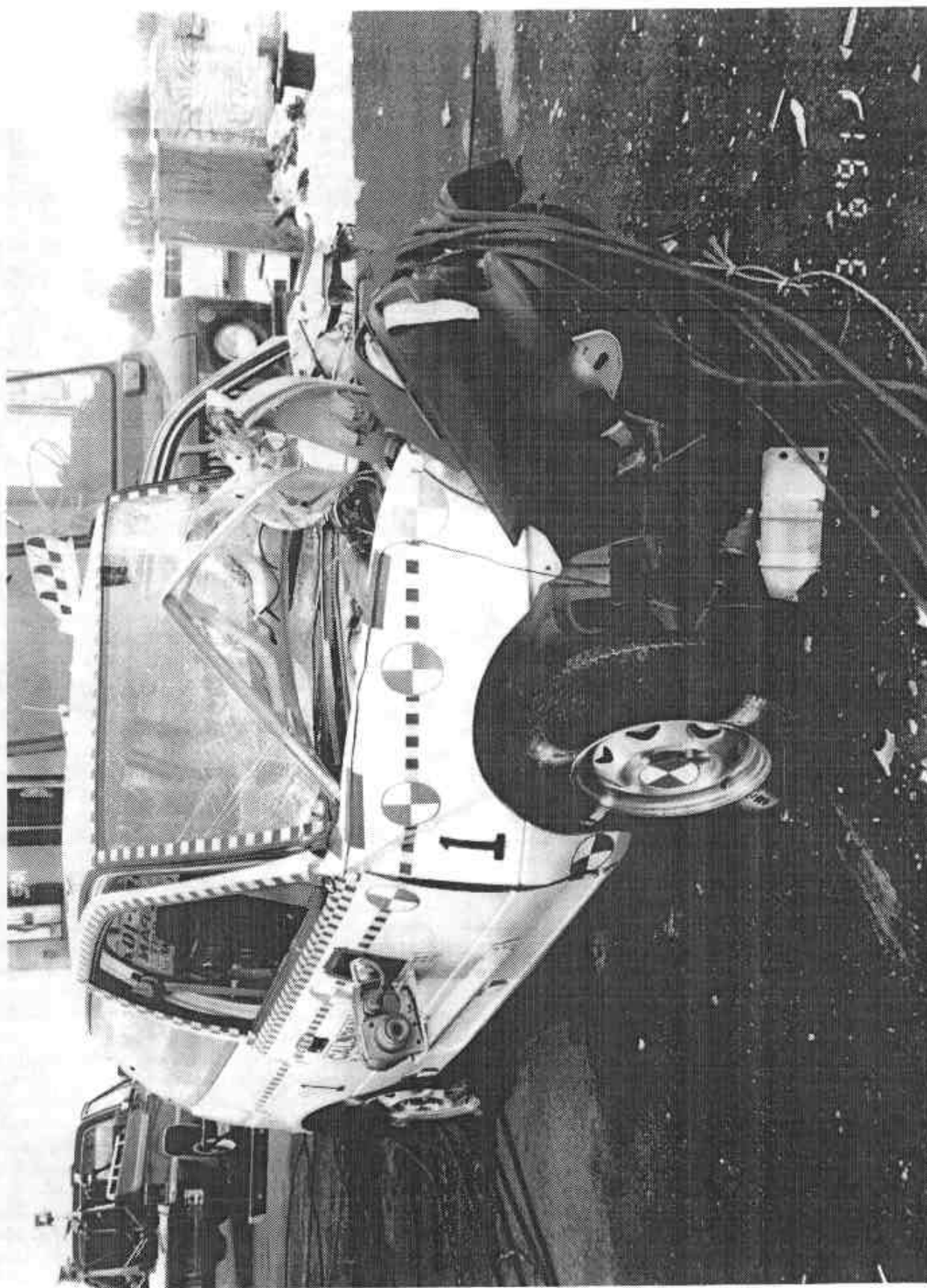


Figure A-0 VEHICLE 1 POST-TEST FRONT RIGHT THREE QUARTER VIEW

A-12

7883-5

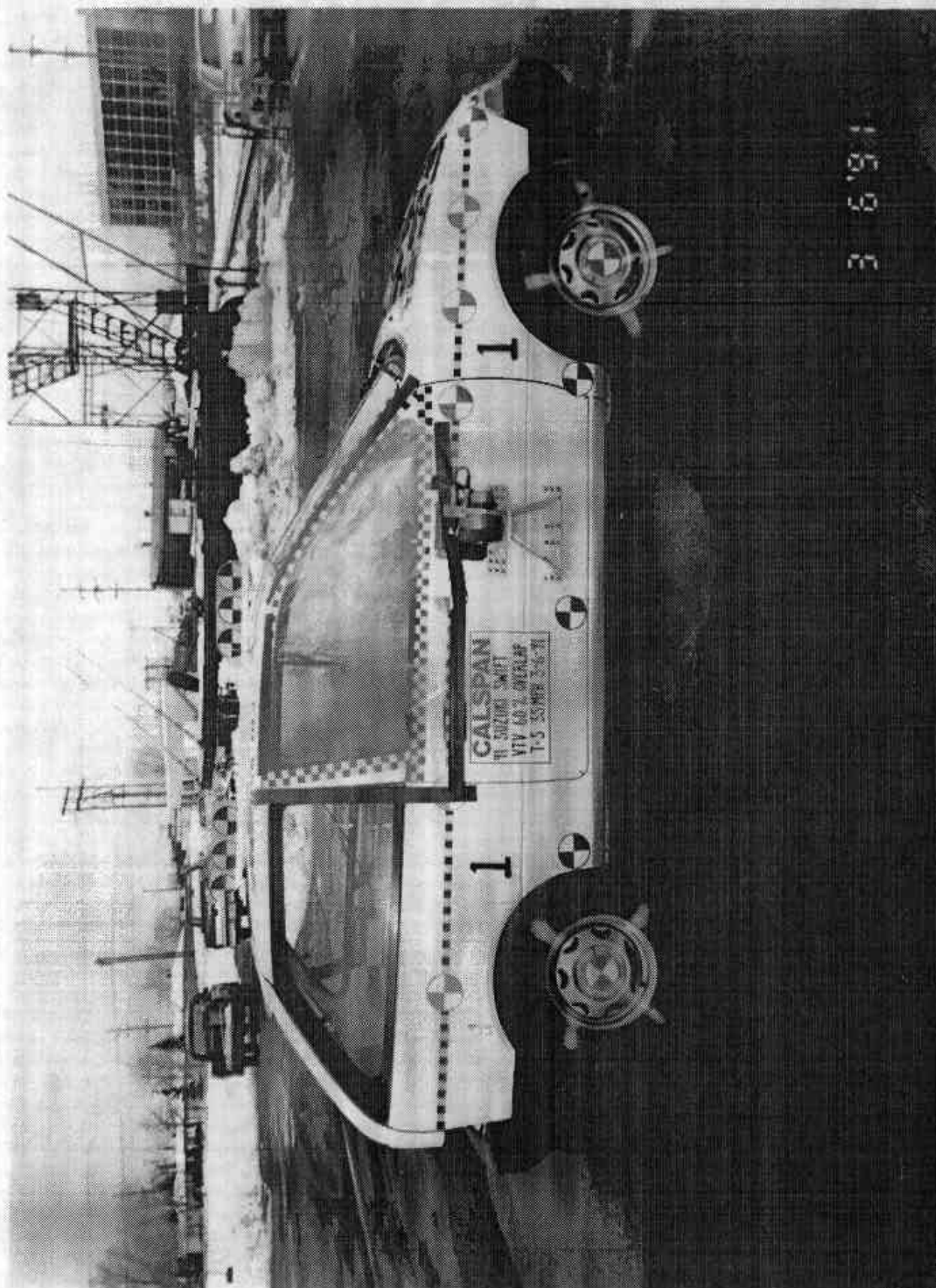


FIGURE A-10 VEHICLE 1 PRE-TEST RIGHT SIDE VIEW

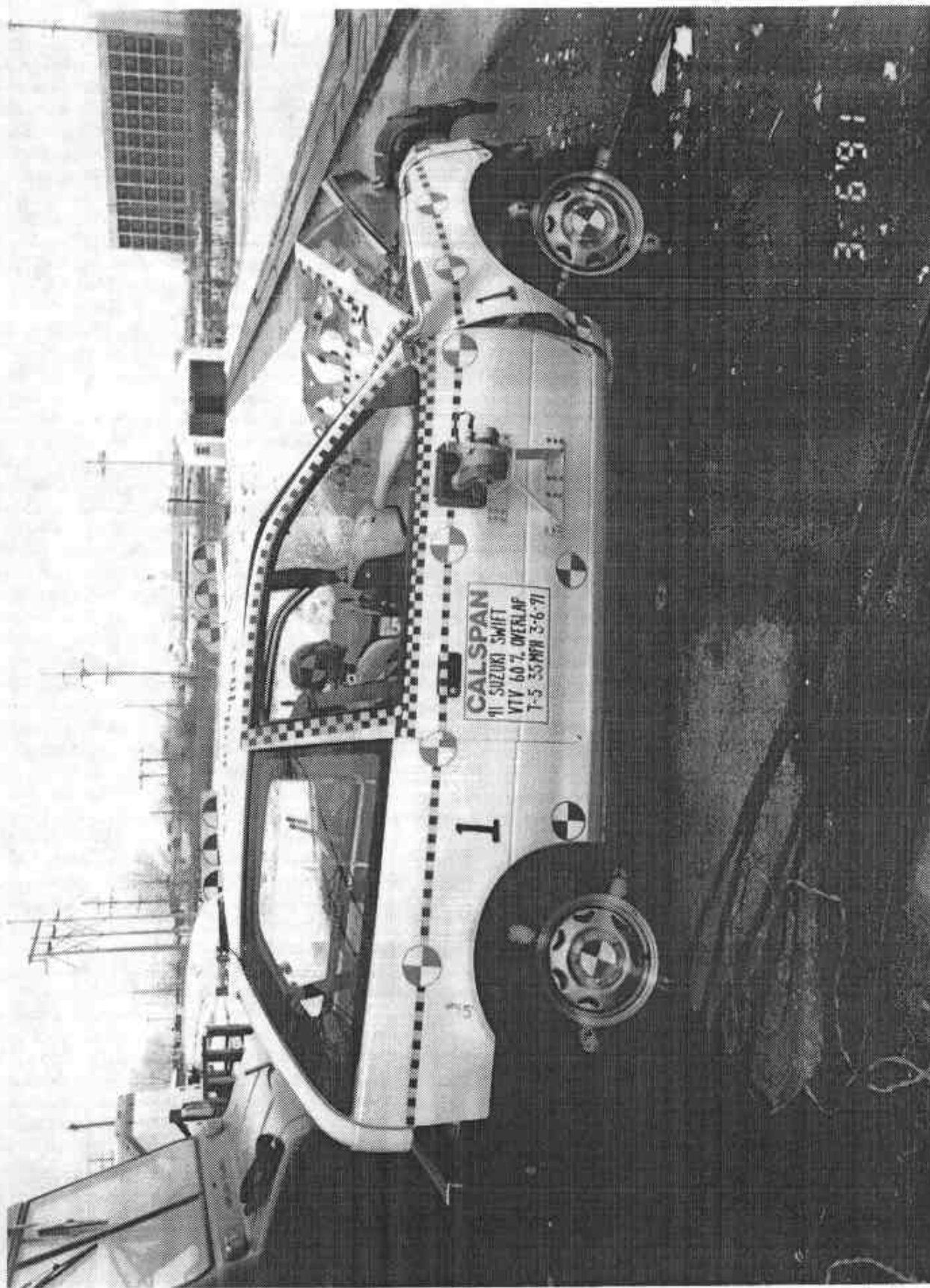


FIGURE A-11 VEHICLE 1 POST-TEST RIGHT SIDE VIEW

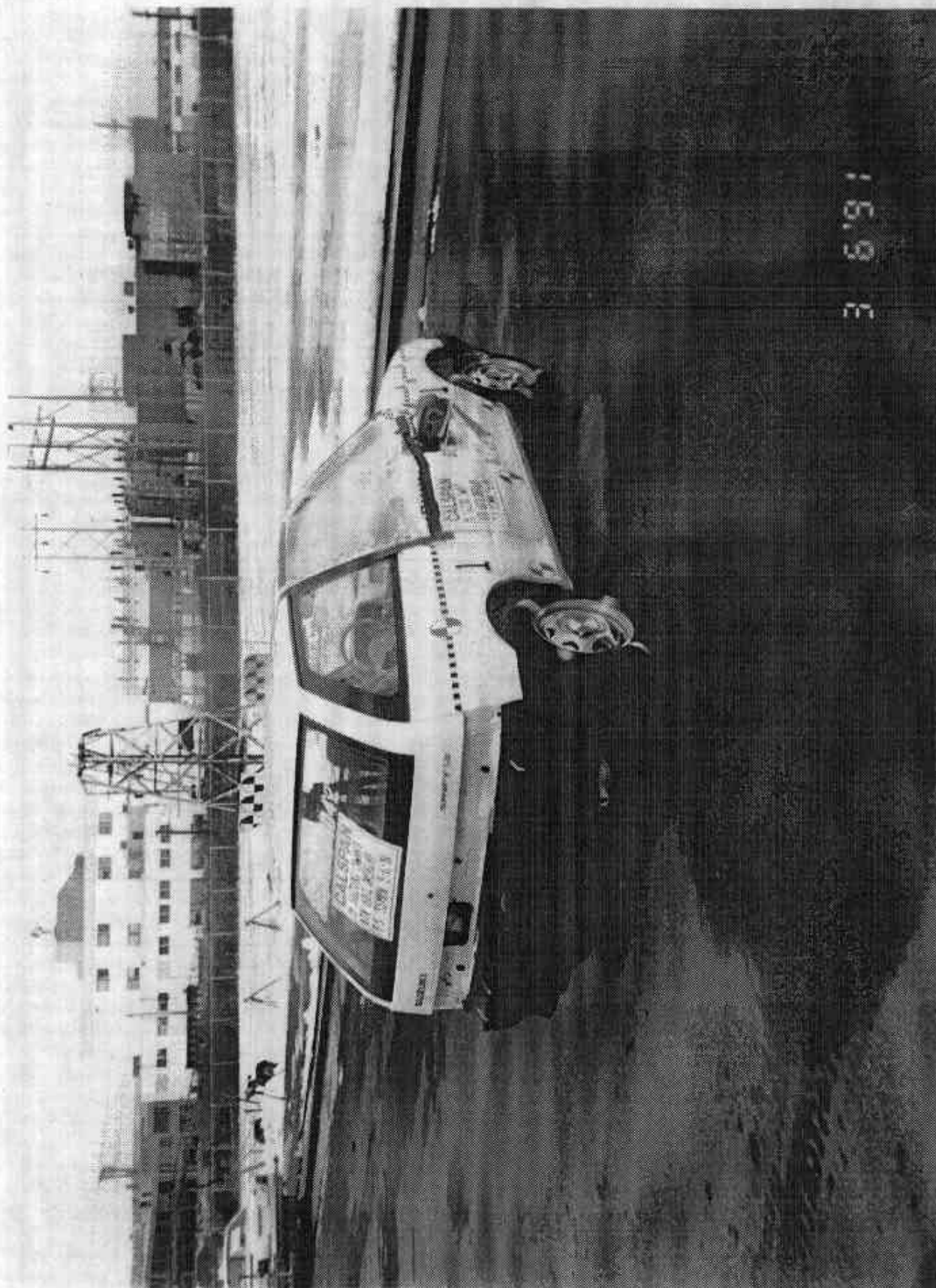


Figure A-12 VEHICLE 1 PRE-TEST REAR RIGHT THREE QUARTER VIEW



Figure A-13 VEHICLE 1 POST-TEST REAR RIGHT THREE QUARTER VIEW

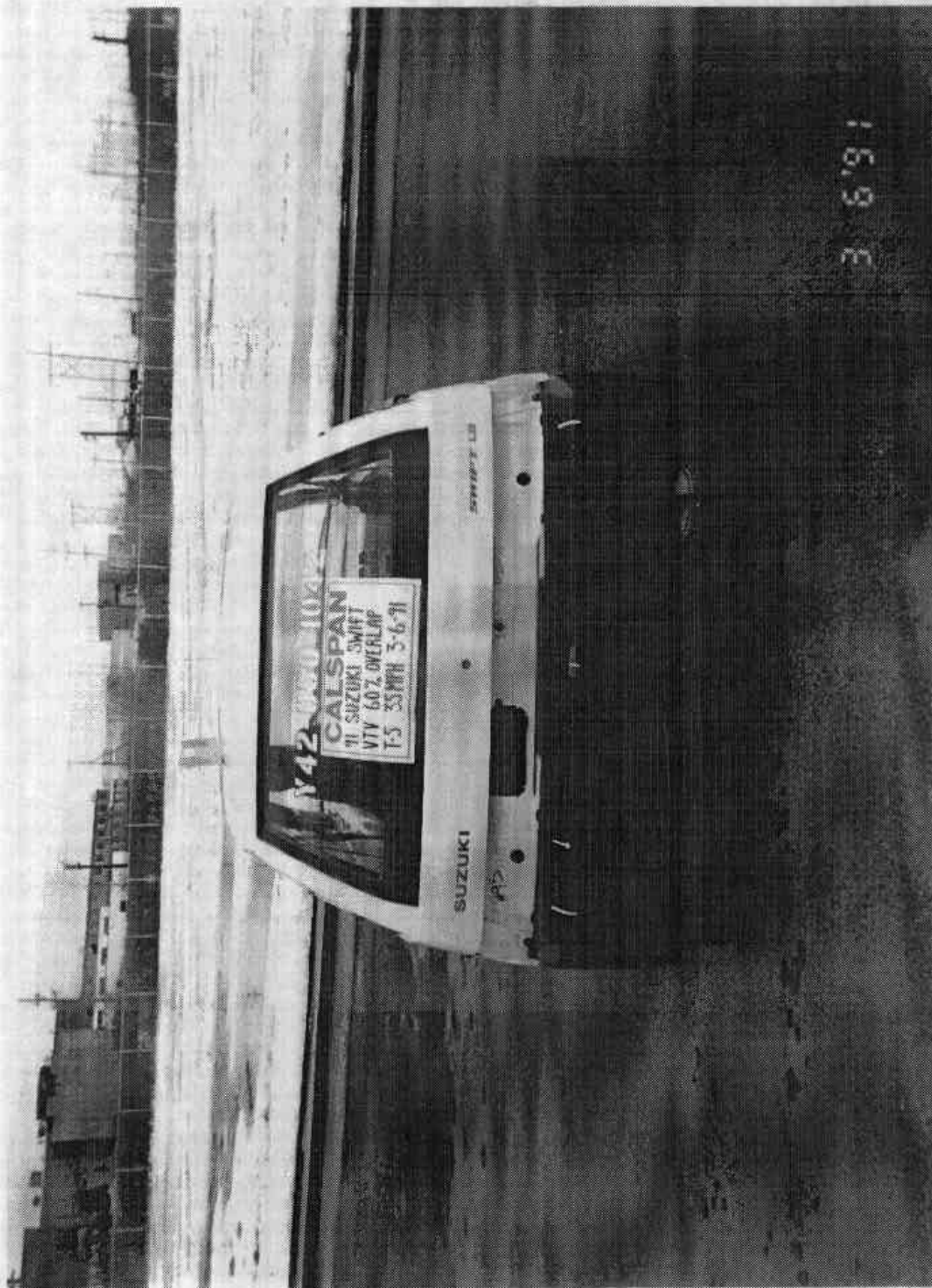


FIGURE A-14 VEHICLE 1 PRE-TEST REAR VIEW



Figure A-15 VEHICLE 1 POST-TEST REAR VIEW



16.9

FIGURE A-16 VEHICLE 1 PRE-TEST REAR LEFT THREE QUARTER VIEW

A-19

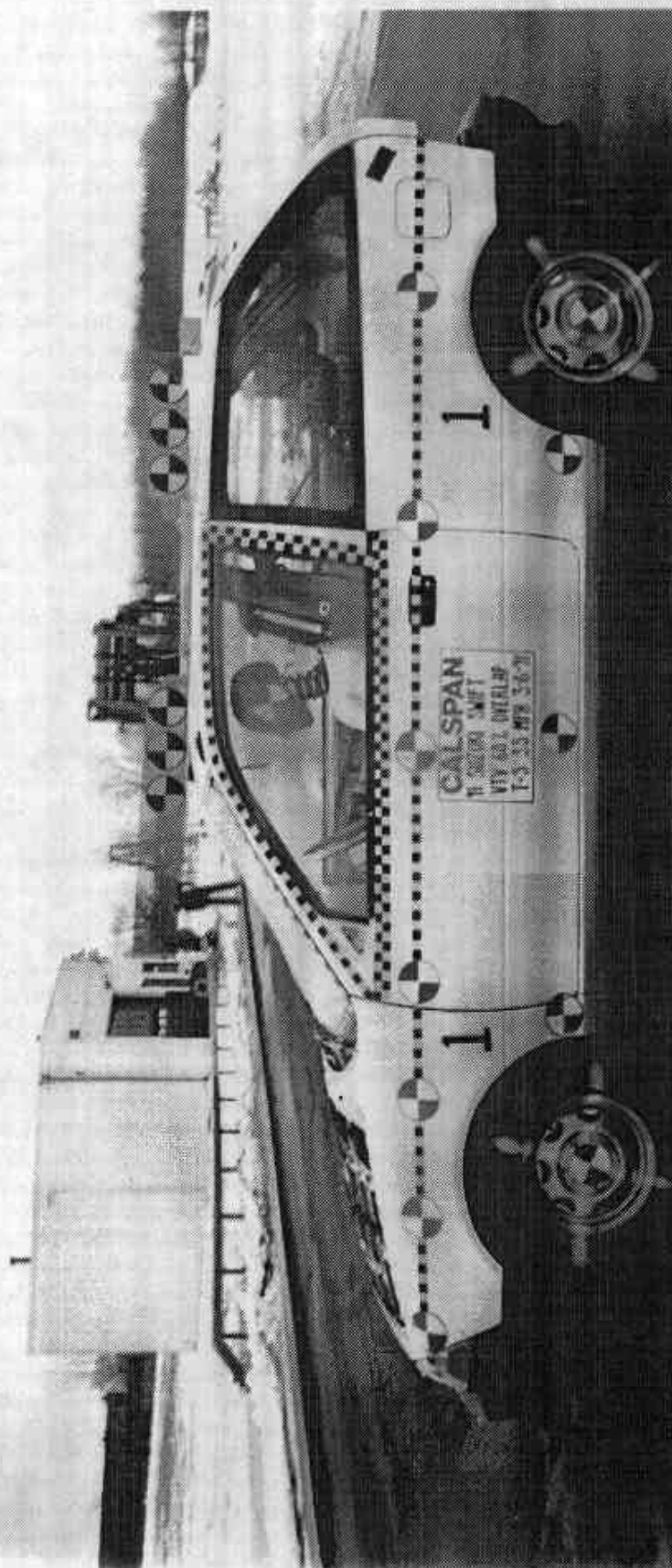
7883-5



Figure A-17 VEHICLE 1 POST-TEST REAR LEFT THREE QUARTER VIEW

A-20

7883-5



3 691

Figure A-18 VEHICLE 1 PRE-TEST LEFT SIDE VIEW

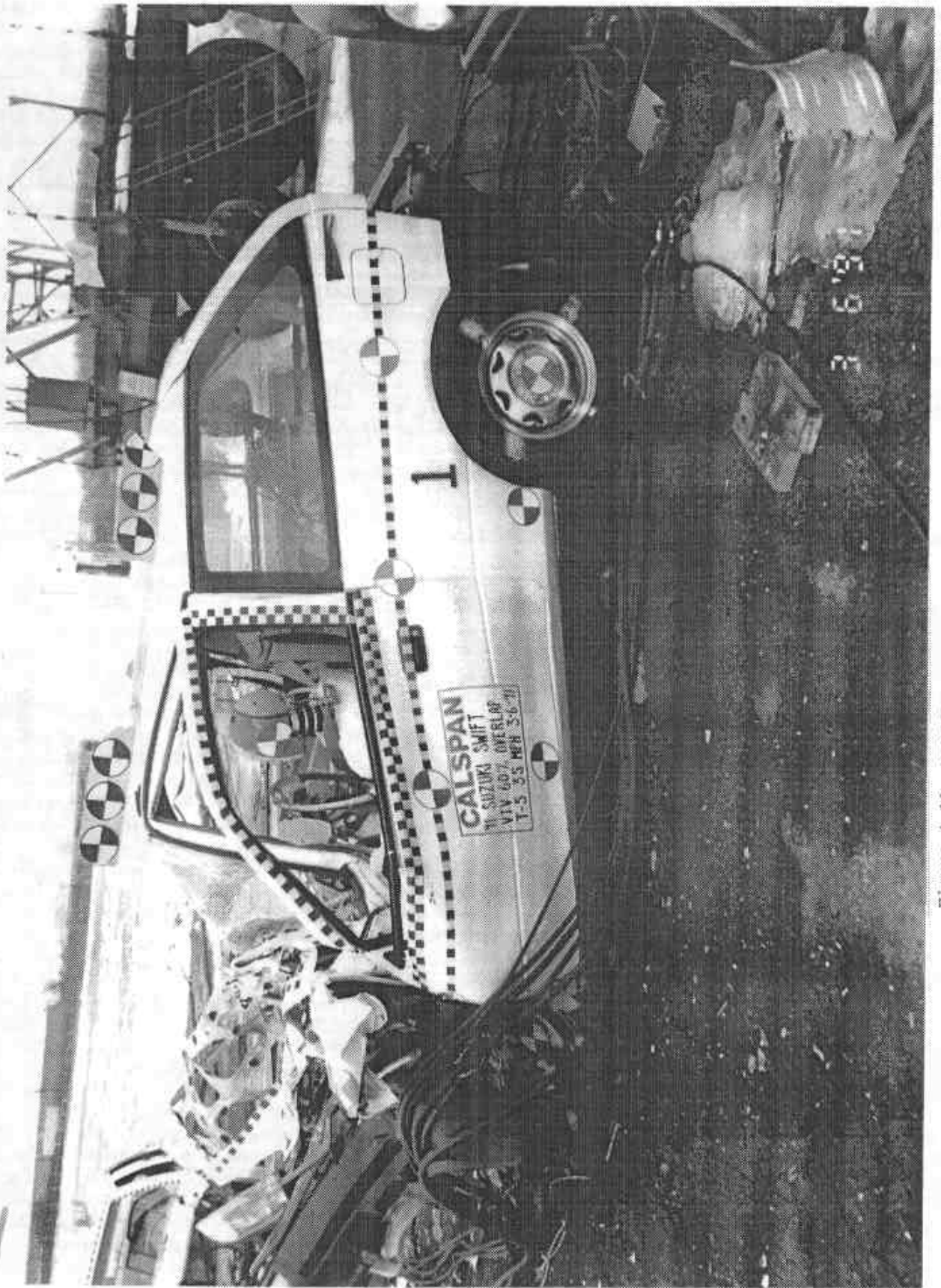


Figure A-19 VEHICLE 1 POST-TEST LEFT SIDE VIEW



3 6'9"

FIGURE A-20 VEHICLE 1 PRE-TEST FRONT LEFT THREE QUARTER VIEW



FIGURE A-21 VEHICLE 1 POST-TEST FRONT LEFT THREE QUARTER VIEW

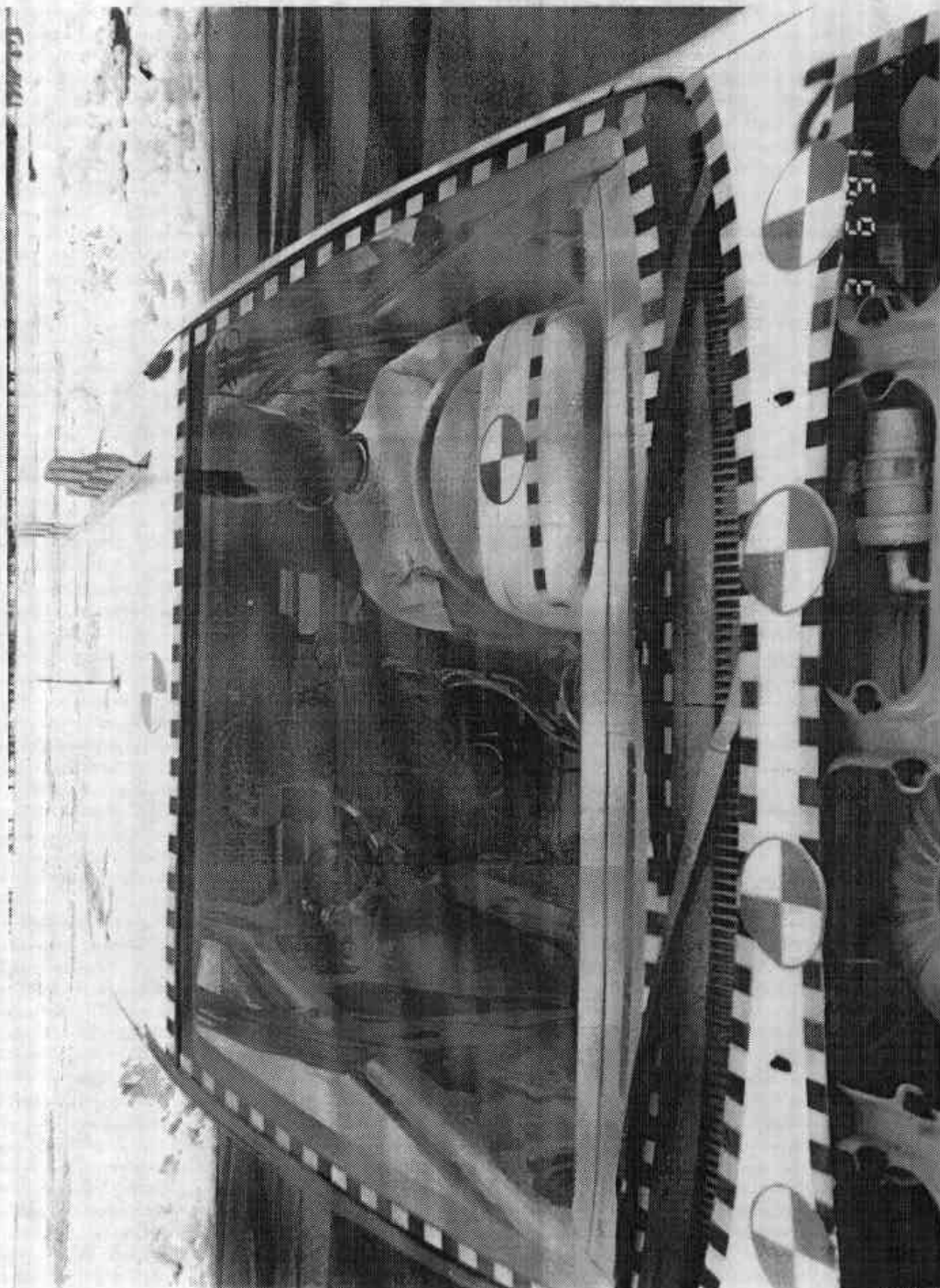


FIGURE A-22 VEHICLE 1 PRE-TEST WINDSHIELD VIEW

A-25

7883-5

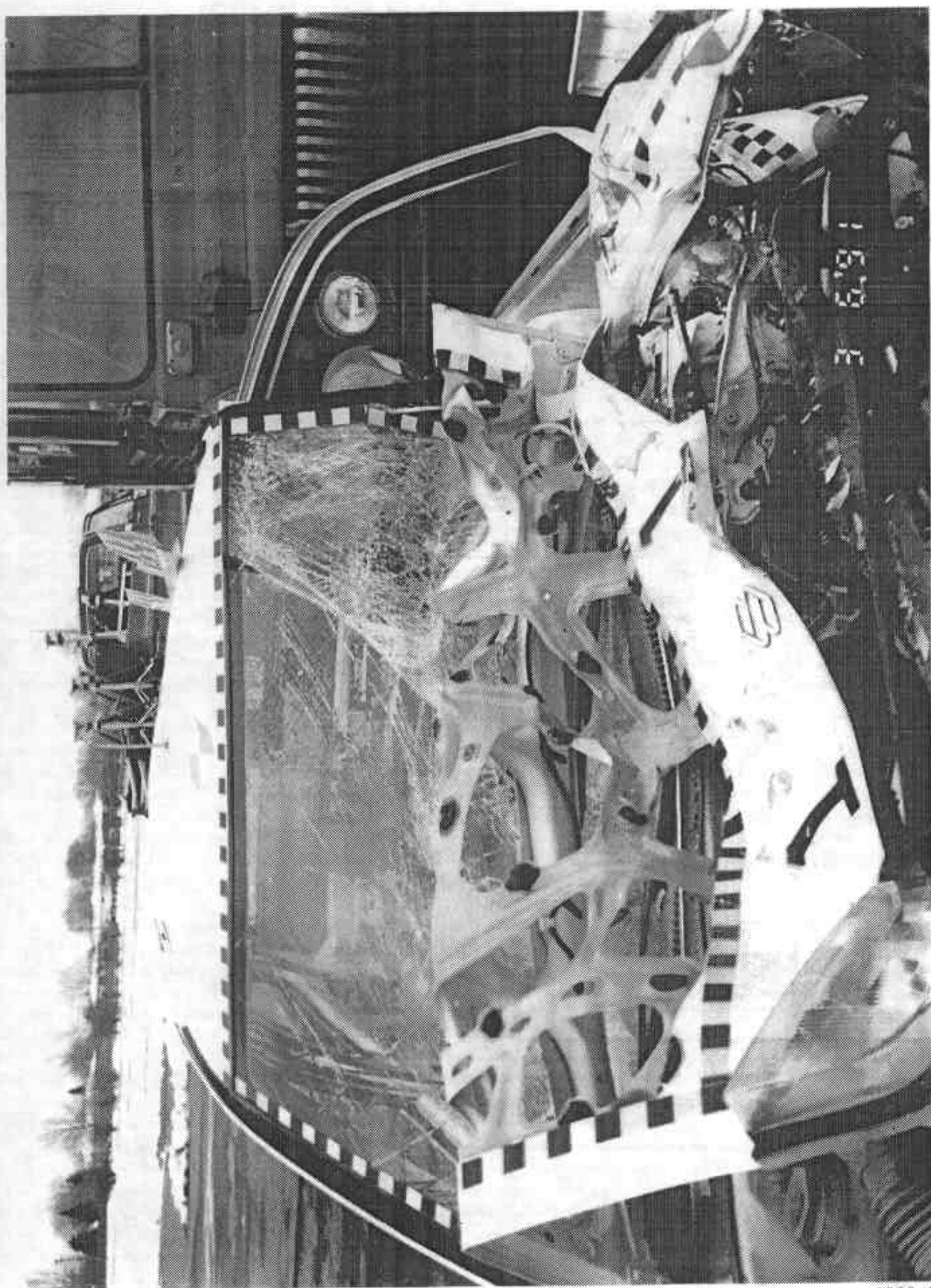


Figure A-23 VEHICLE 1 POST-TEST WINDSHIELD VIEW

A-26

7883-5

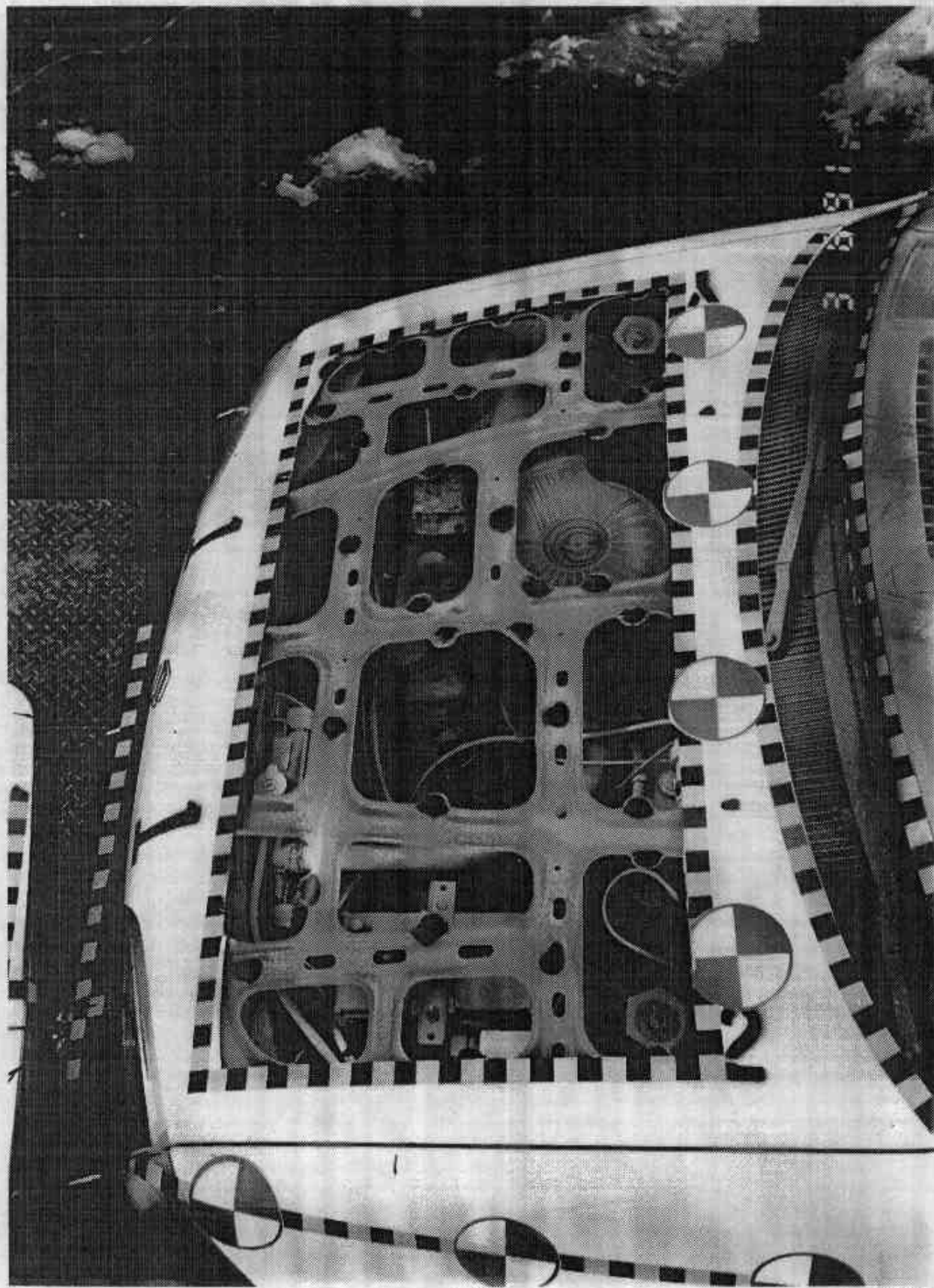


Figure A-24 VEHICLE 1 PRE-TEST OVERHEAD ENGINE COMPARTMENT VIEW

FIGURE A-25

VEHICLE 1 POST-TEST OVERHEAD ENGINE COMPARTMENT VIEW PHOTO

IS NOT AVAILABLE

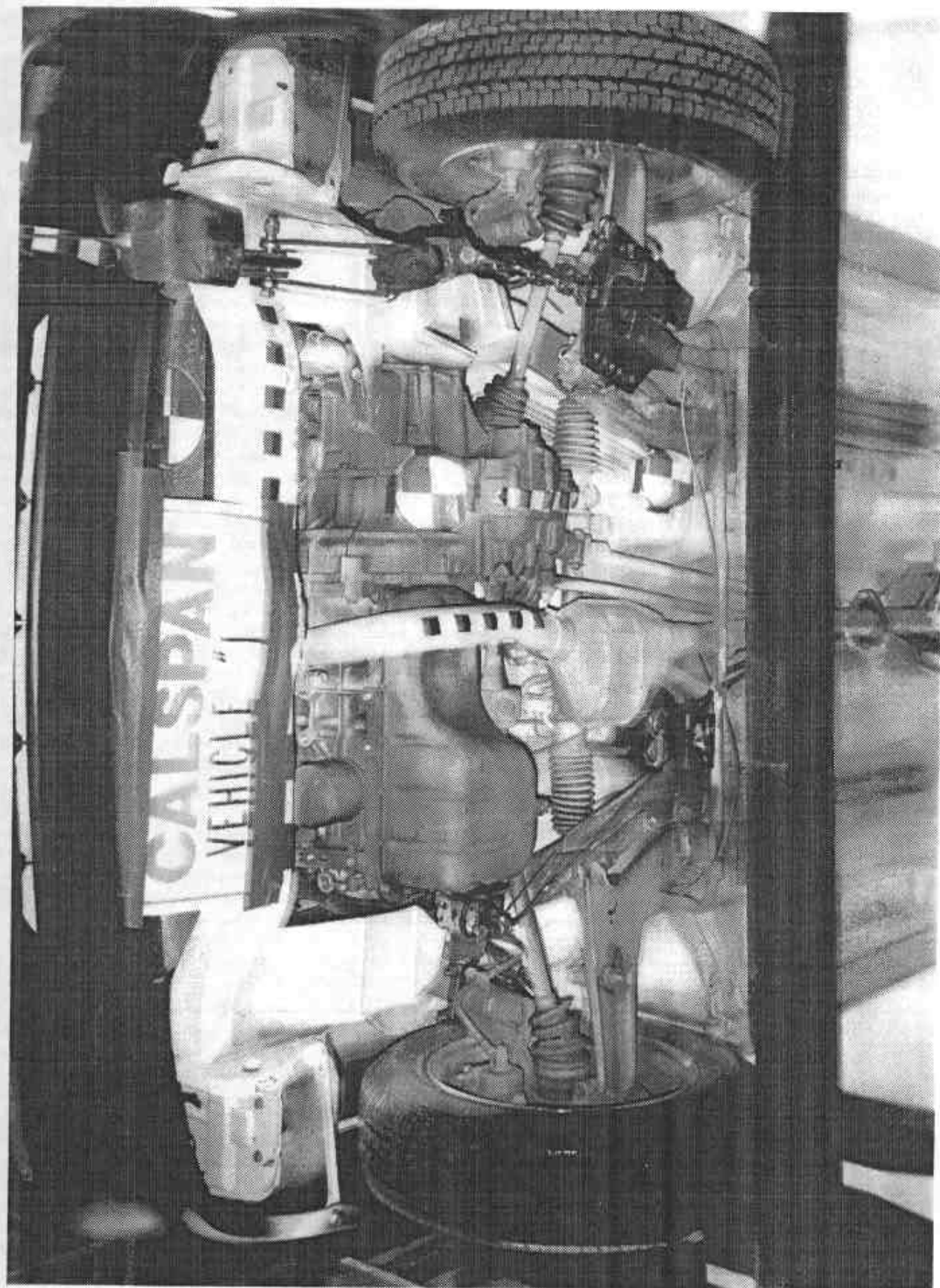


Figure A-26 VEHICLE 1 PRE-TEST UNDERBODY FRONT VIEW

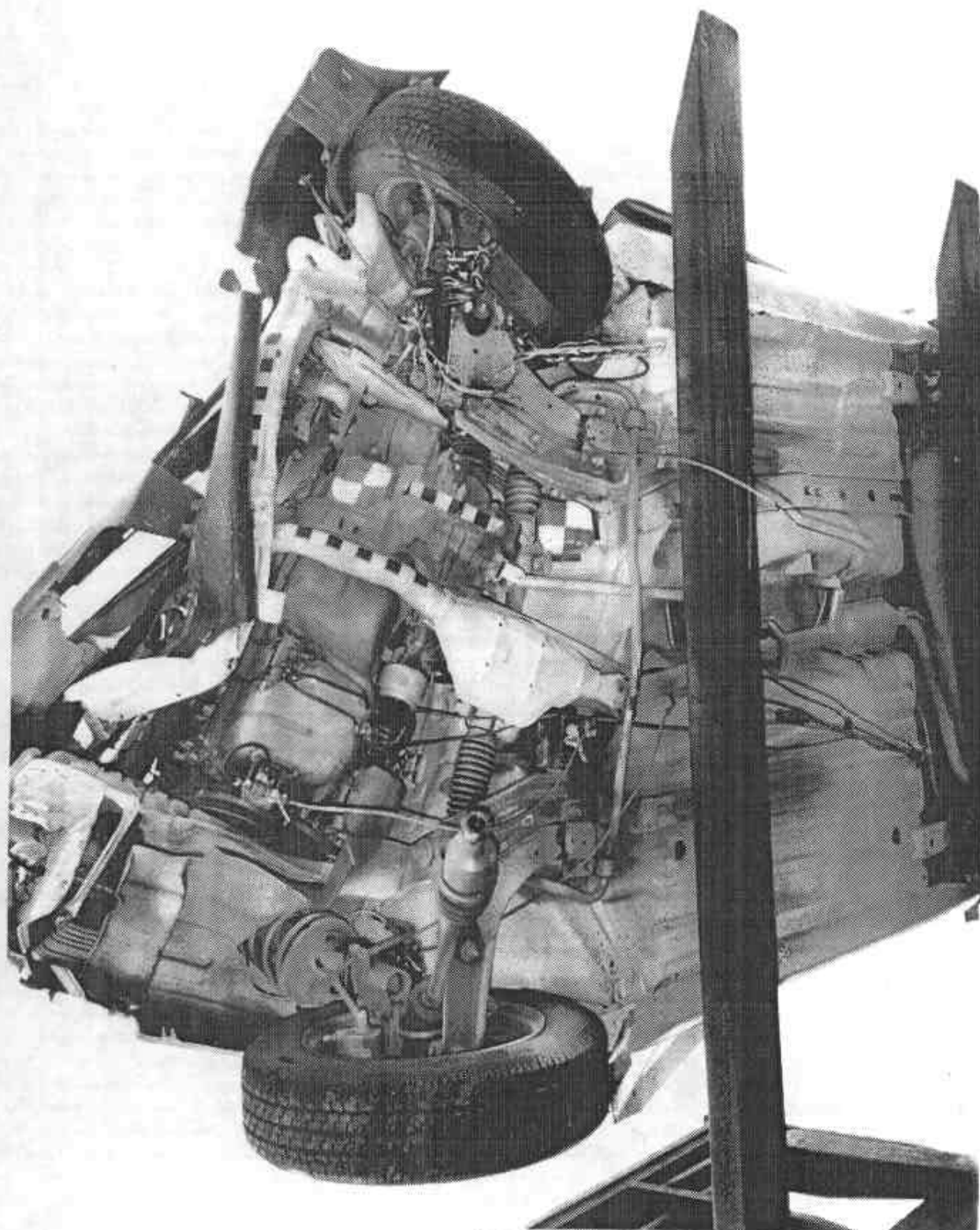


FIGURE A-27 VEHICLE 1 POST-TEST UNDERBODY FRONT VIEW

A-30

7883-5

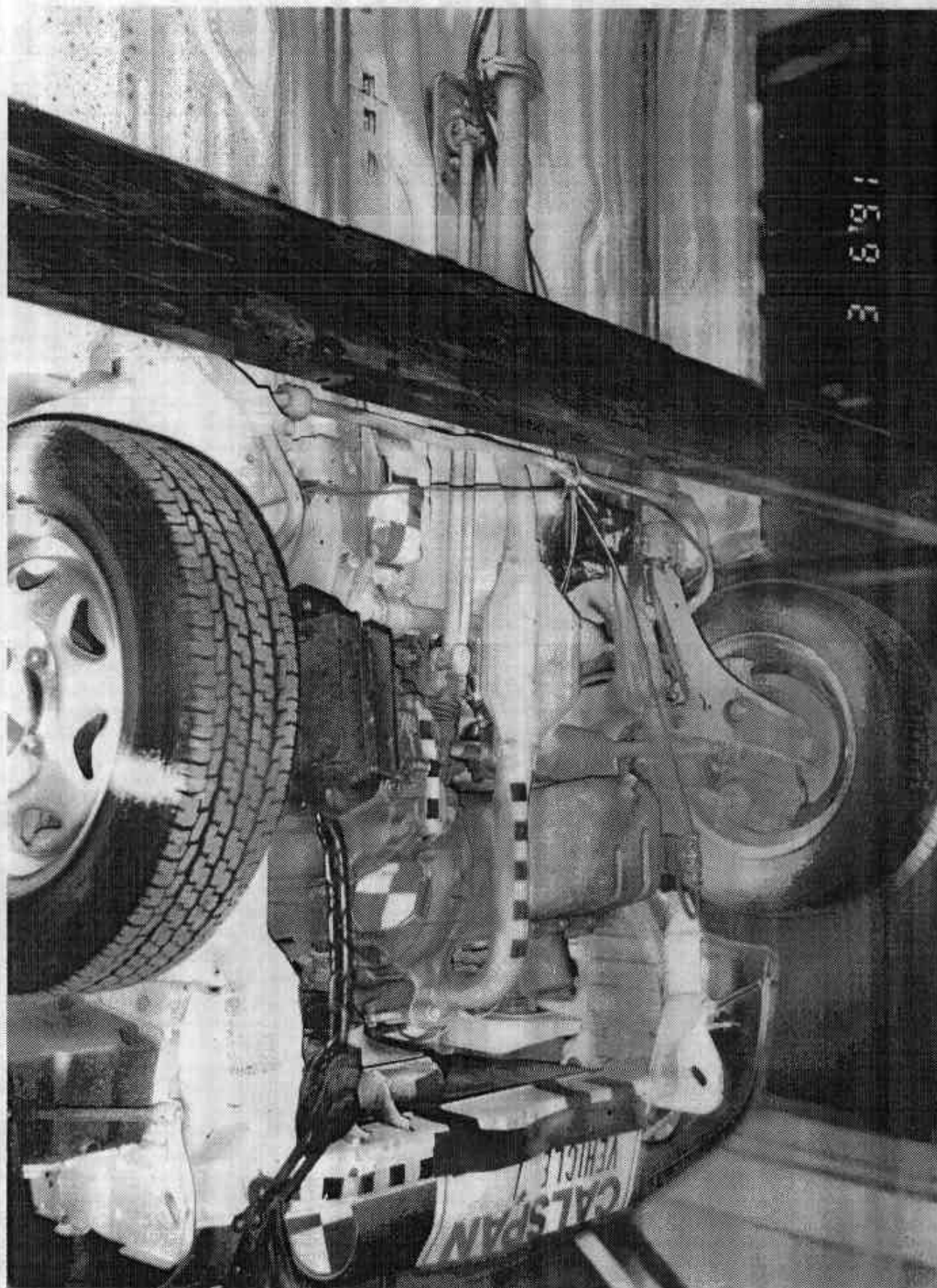


FIGURE A-28 VEHICLE 1 PRE-TEST UNDERBODY FRONT SIDE VIEW

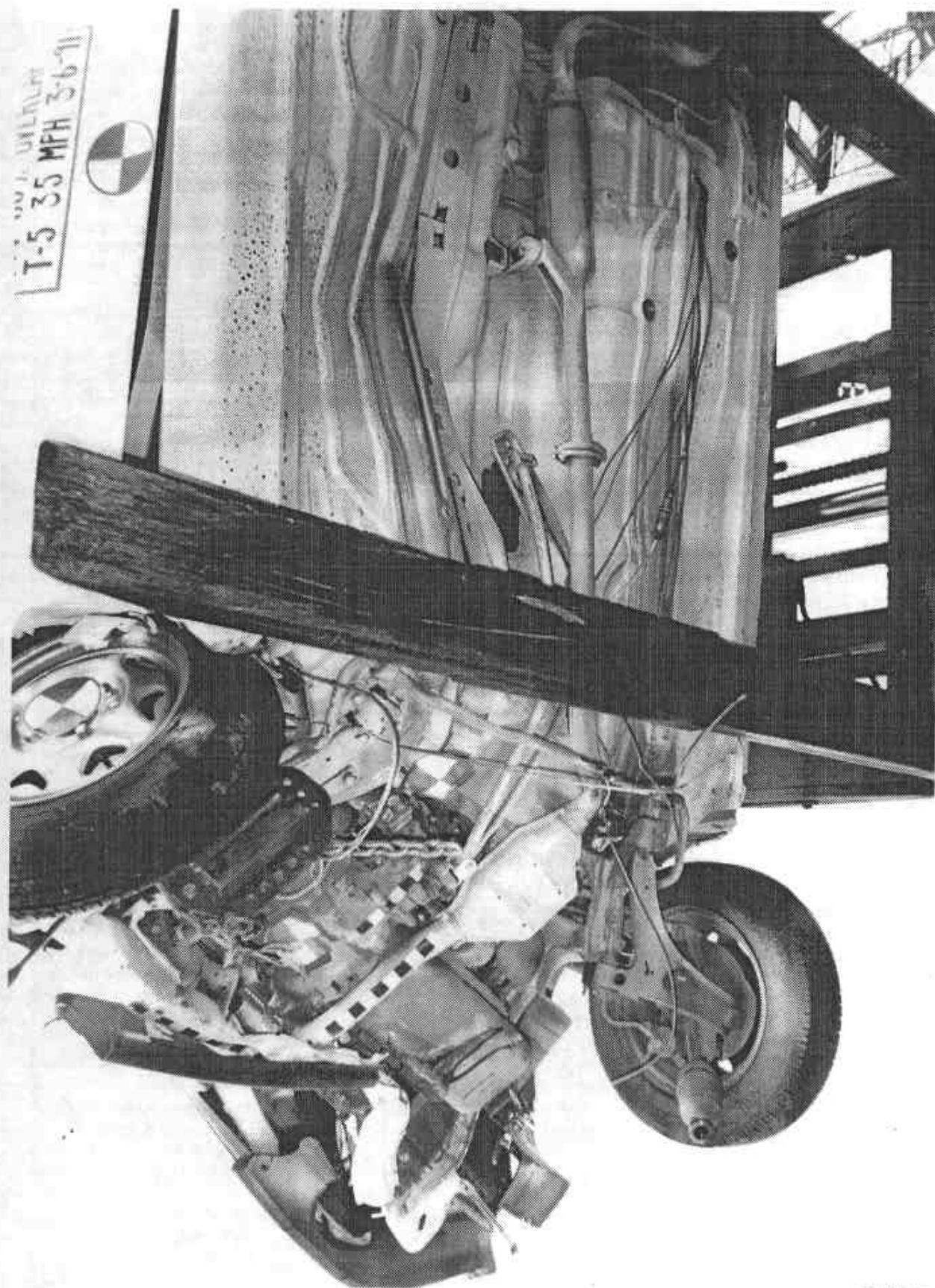


Figure A-28 VEHICLE 1 POST-TEST UNDERBODY FRONT SIDE VIEW

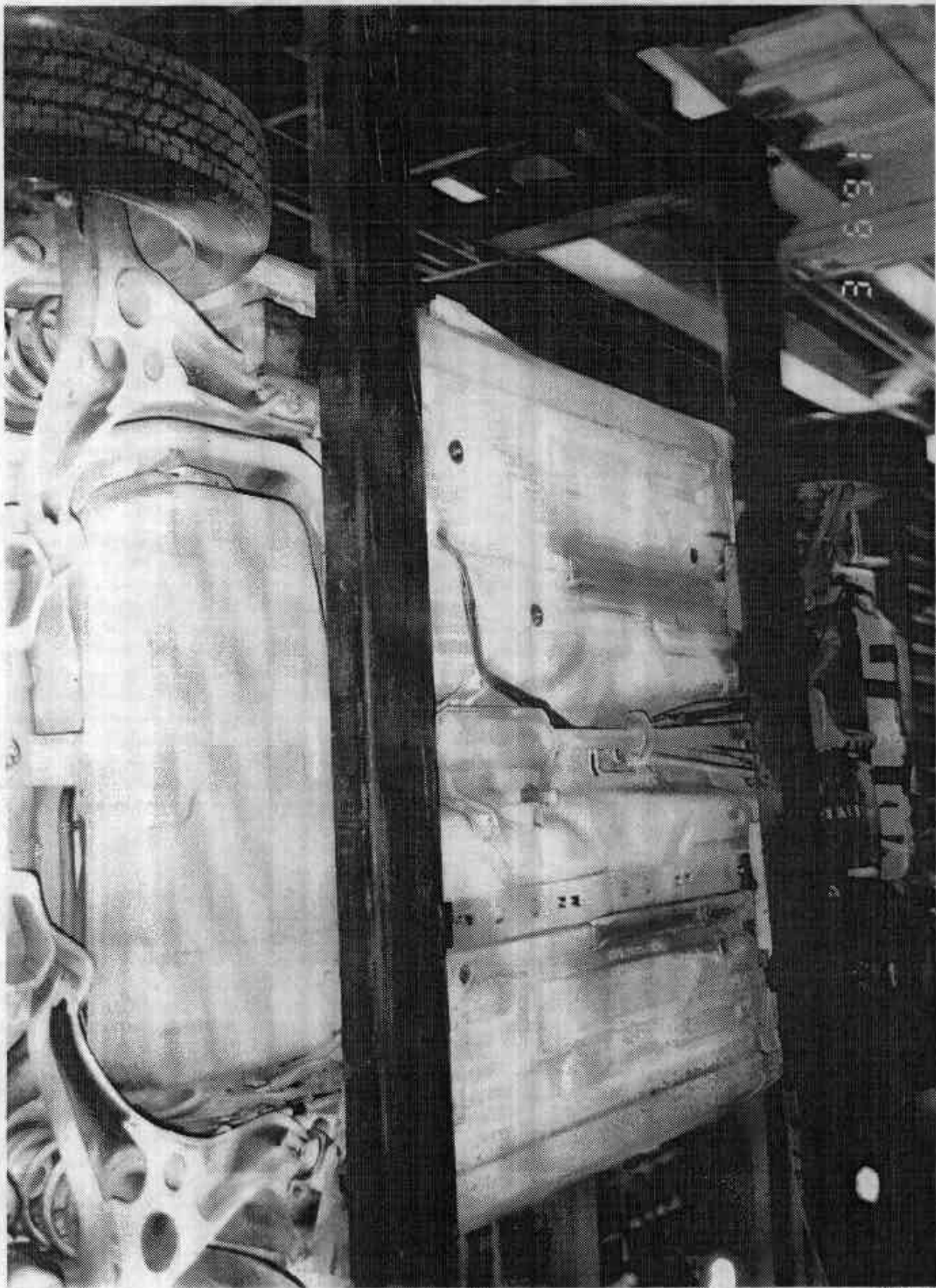


FIGURE A-30 VEHICLE 1 PRE-TEST UNDERBODY REAR VIEW

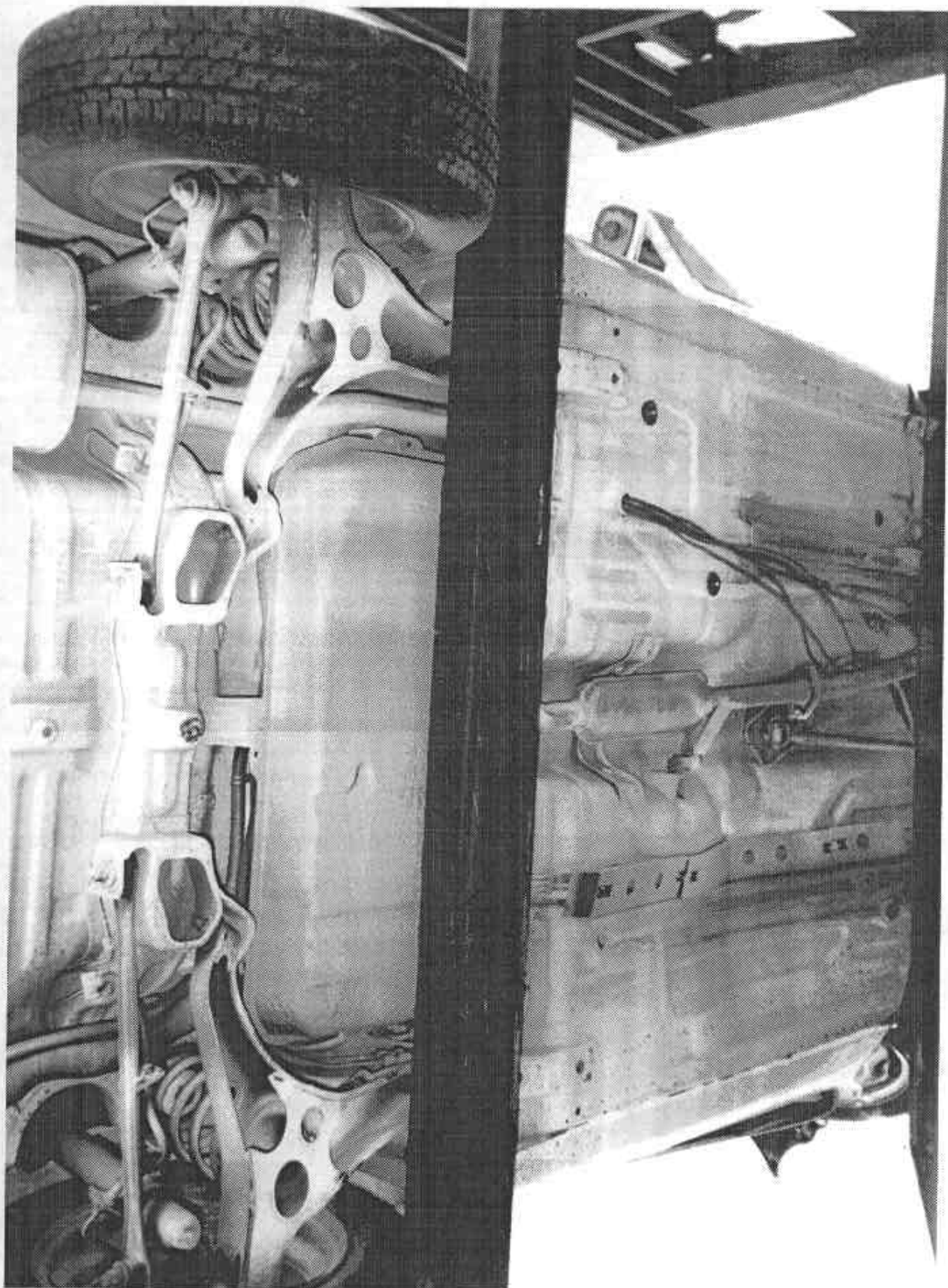


FIGURE A-31 VEHICLE 1 POST-TEST UNDERBODY-REAR VIEW

A-34

7583-5

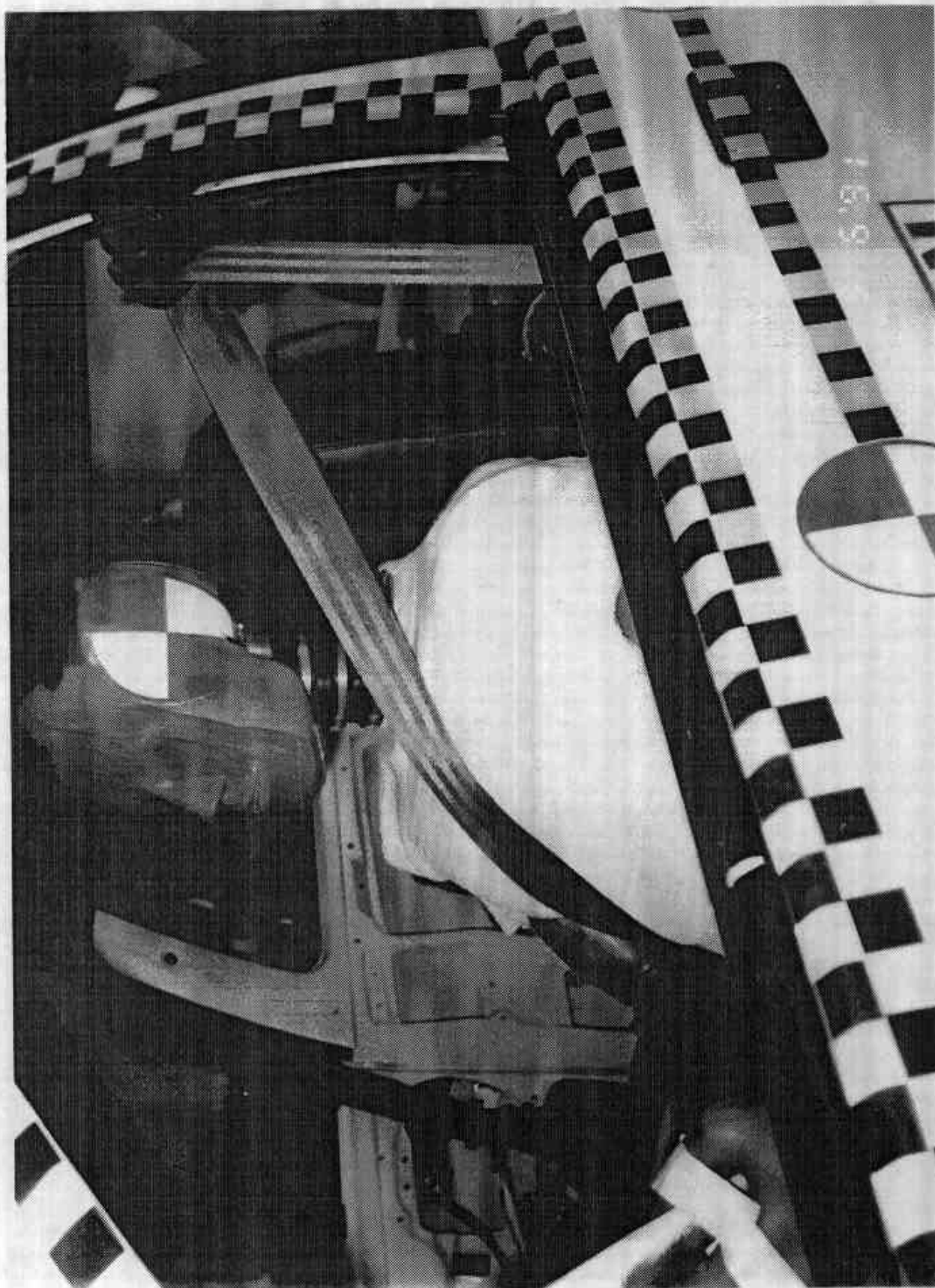


FIGURE A-32 VEHICLE 1 PRE-TEST DRIVER POSITION VIEW

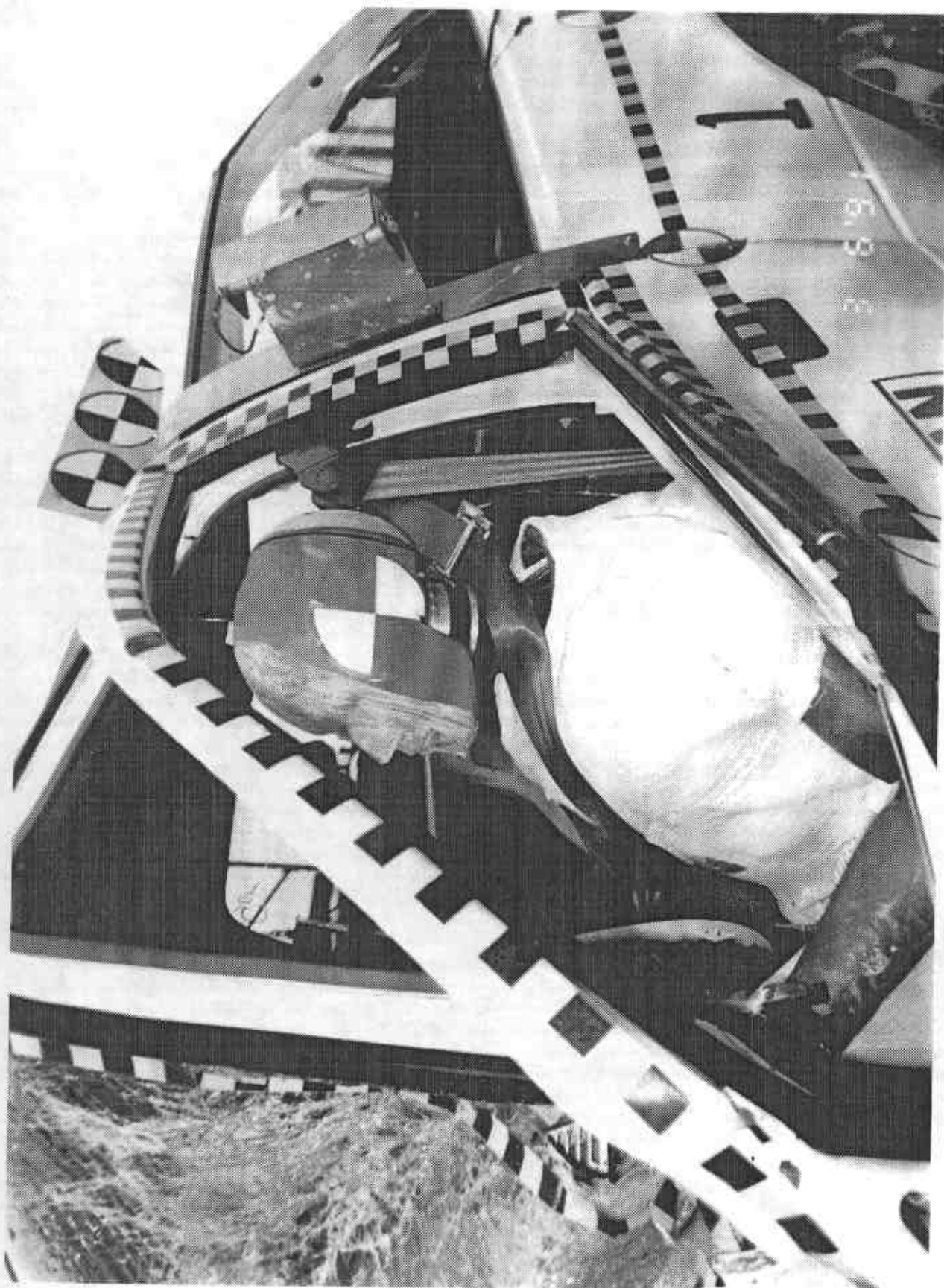


FIGURE A-33 VEHICLE 1 POST-TEST DRIVER POSITION VIEW

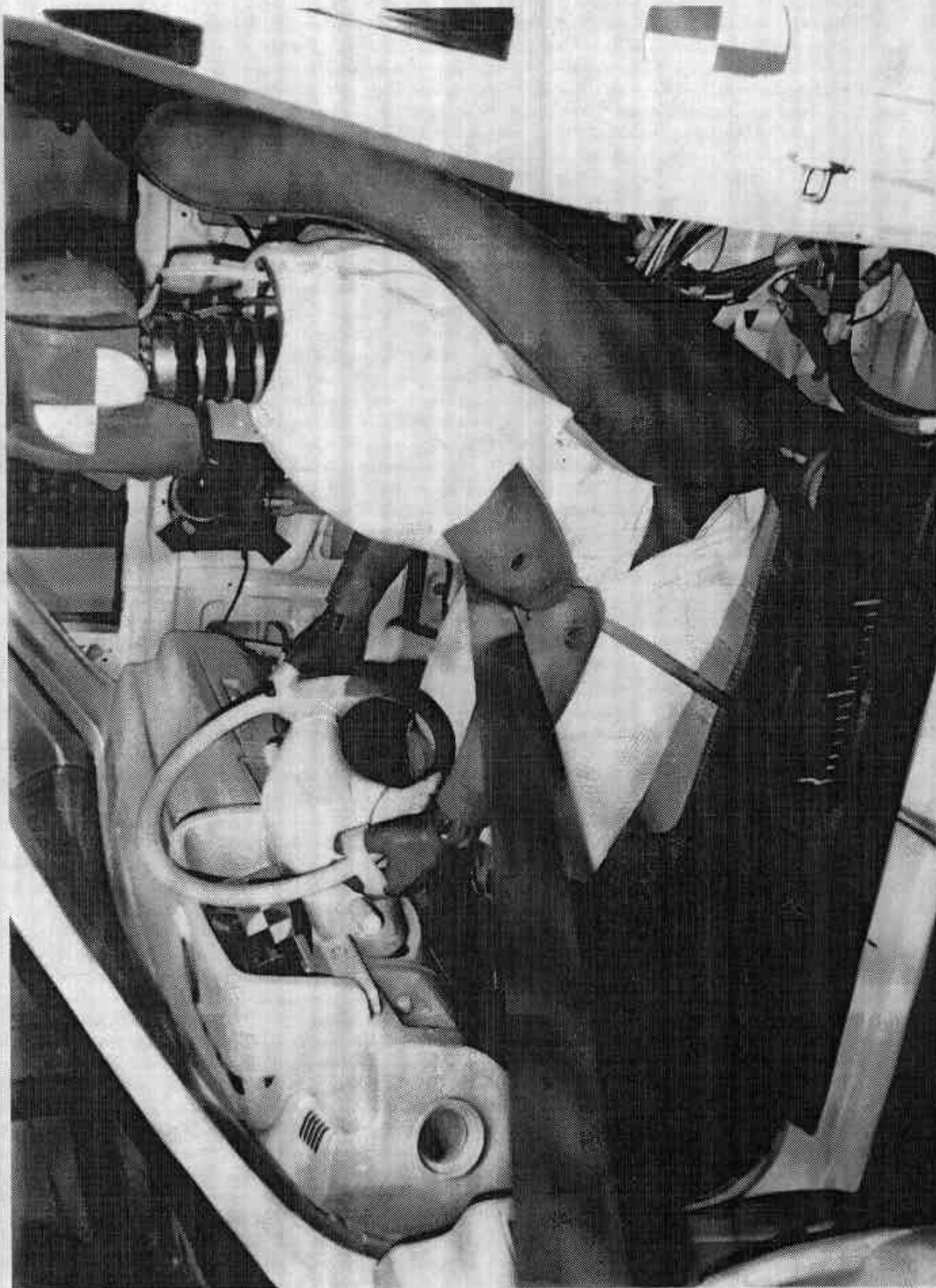


FIGURE A-34 VEHICLE 1 PRE-TEST DRIVER AND OCCUPANT COMPARTMENT VIEW

A-37

7883-5



Figure A-35 VEHICLE 1 POST-TEST DRIVER AND OCCUPANT COMPARTMENT VIEW

A-38

7883-5

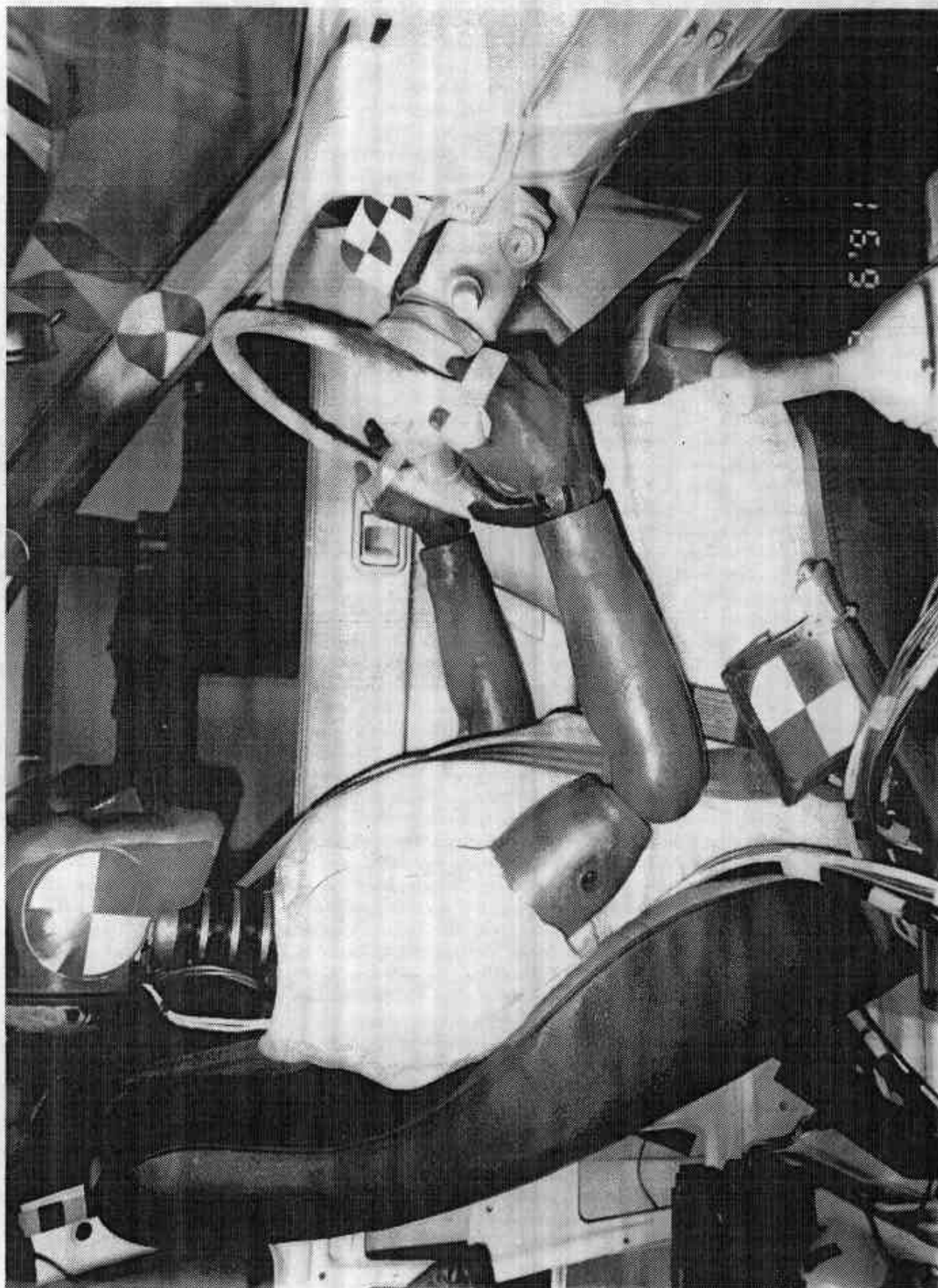


Figure A-36 VEHICLE 1 PRE-TEST DRIVER AND OCCUPANT COMPARTMENT
RIGHT SIDE VIEW



Figure A-37 VEHICLE 1 POST-TEST DRIVER AND OCCUPANT COMPARTMENT

RIGHT SIDE VIEW

A-40

7883-5

VEHICLE 2 PHOTOGRAPHS

1991 FORD CROWN VICTORIA 4-DOOR SEDAN

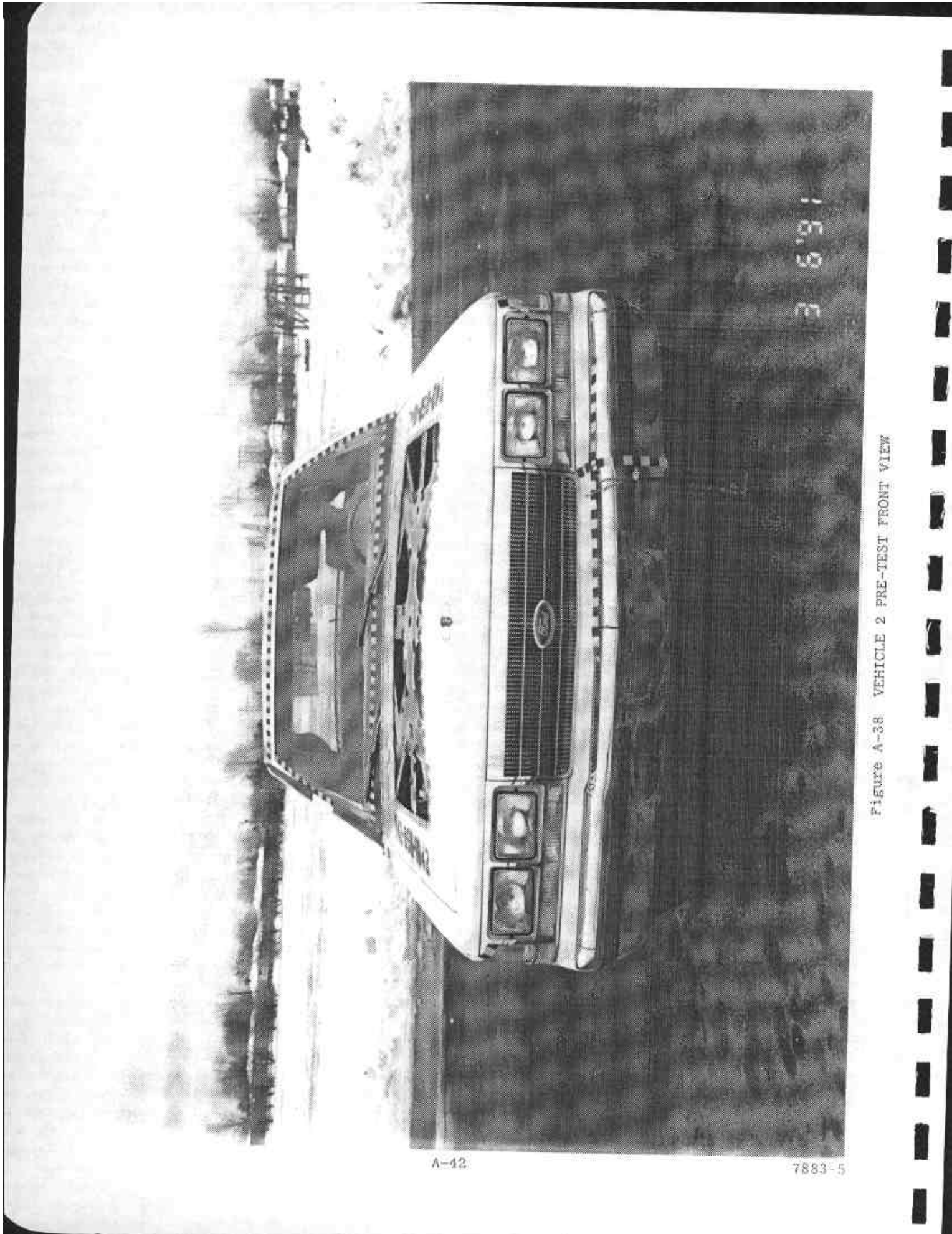


Figure A-38. VEHICLE 2 PRE-TEST FRONT VIEW

A-42

7883-5



FIGURE A-39 VEHICLE 2 POST-TEST FRONT VIEW

A-43

7883-5



168 3 891

Figure A-40 VEHICLE 2 PRE-TEST FRONT RIGHT THREE QUARTER VIEW

A-44

7883-5



FIGURE A-41 VEHICLE 2 POST-TEST FRONT RIGHT THREE QUARTER VIEW

A-45

7883-5



Figure A-42 VEHICLE 2 PRE-TEST RIGHT SIDE VIEW

A-40

7883-5

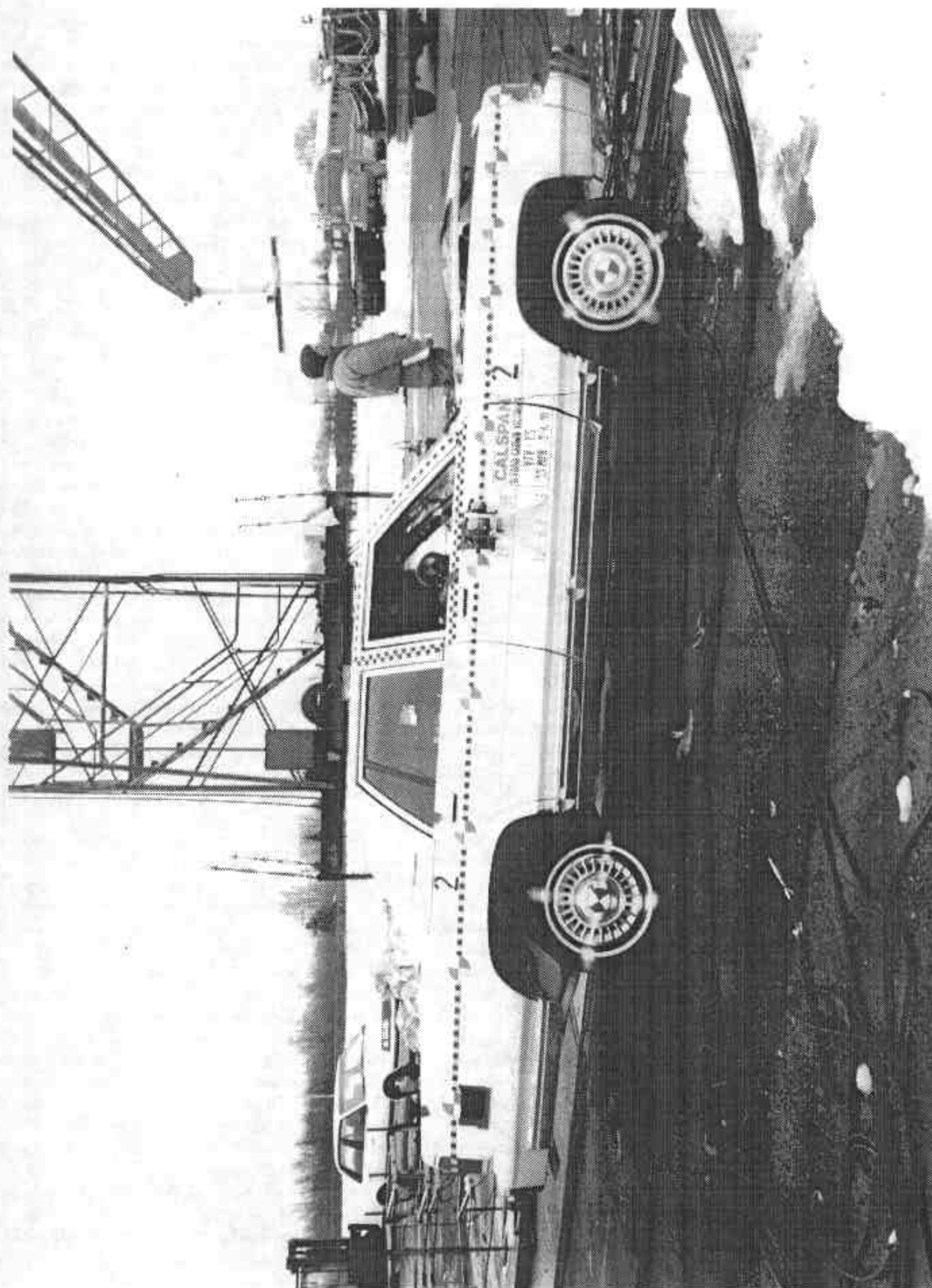


Figure A-43 VEHICLE 2 POST-TEST RIGHT SIDE VIEW



A-48

7883-5

Figure A-44 VEHICLE 2 PRE-TEST REAR RIGHT THREE QUARTER VIEW

3 891



FIGURE A-45 VEHICLE 2 POST-TEST REAR RIGHT THREE QUARTER VIEW

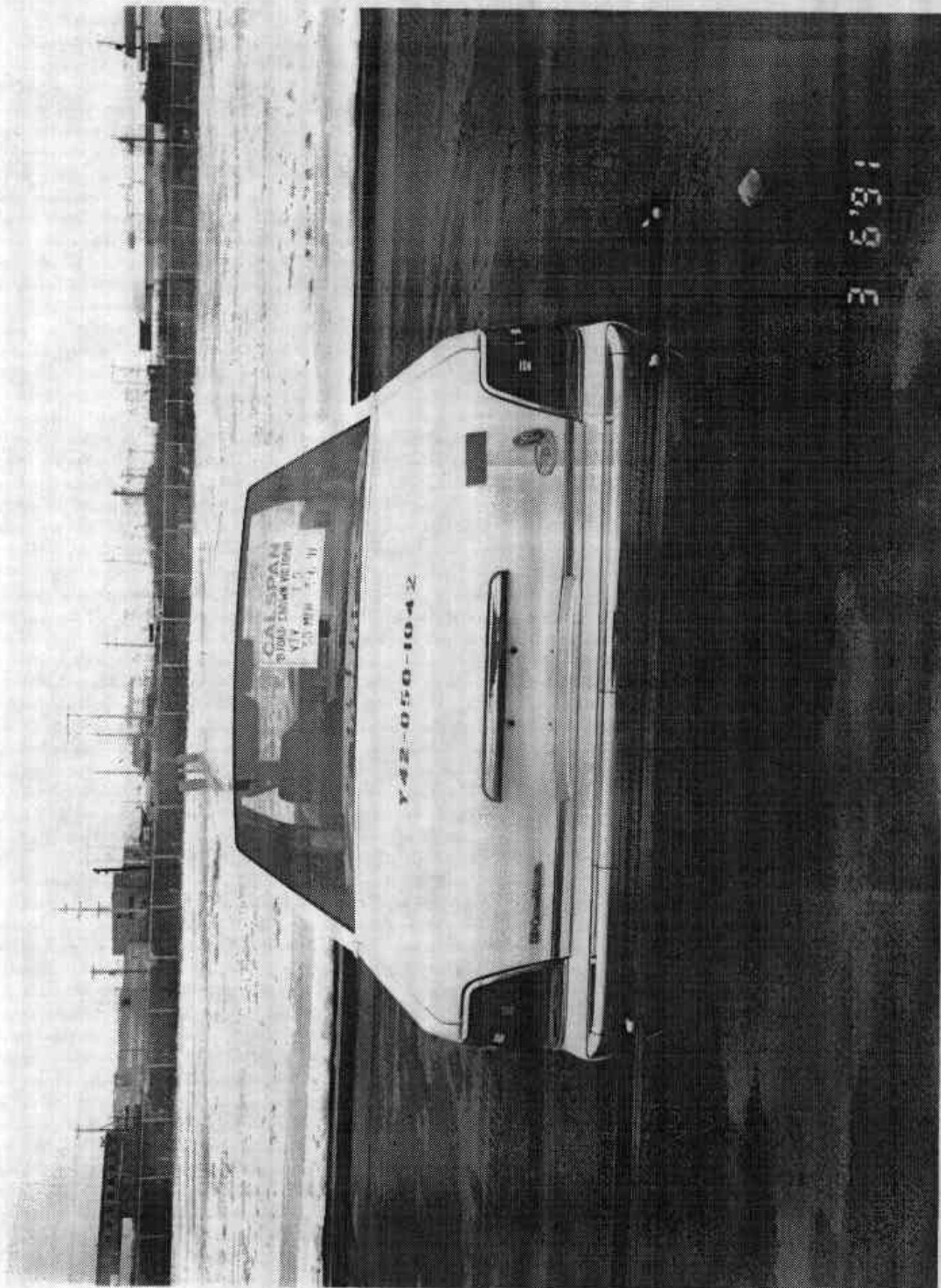


FIGURE A-50 VEHICLE 2 PRE-TEST REAR VIEW



Figure A-47 VEHICLE 2 POST-TEST REAR VIEW



1691

Figure A-49 VEHICLE 2 POST-TEST REAR LEFT THREE QUARTER VIEW

A-53

7883-5

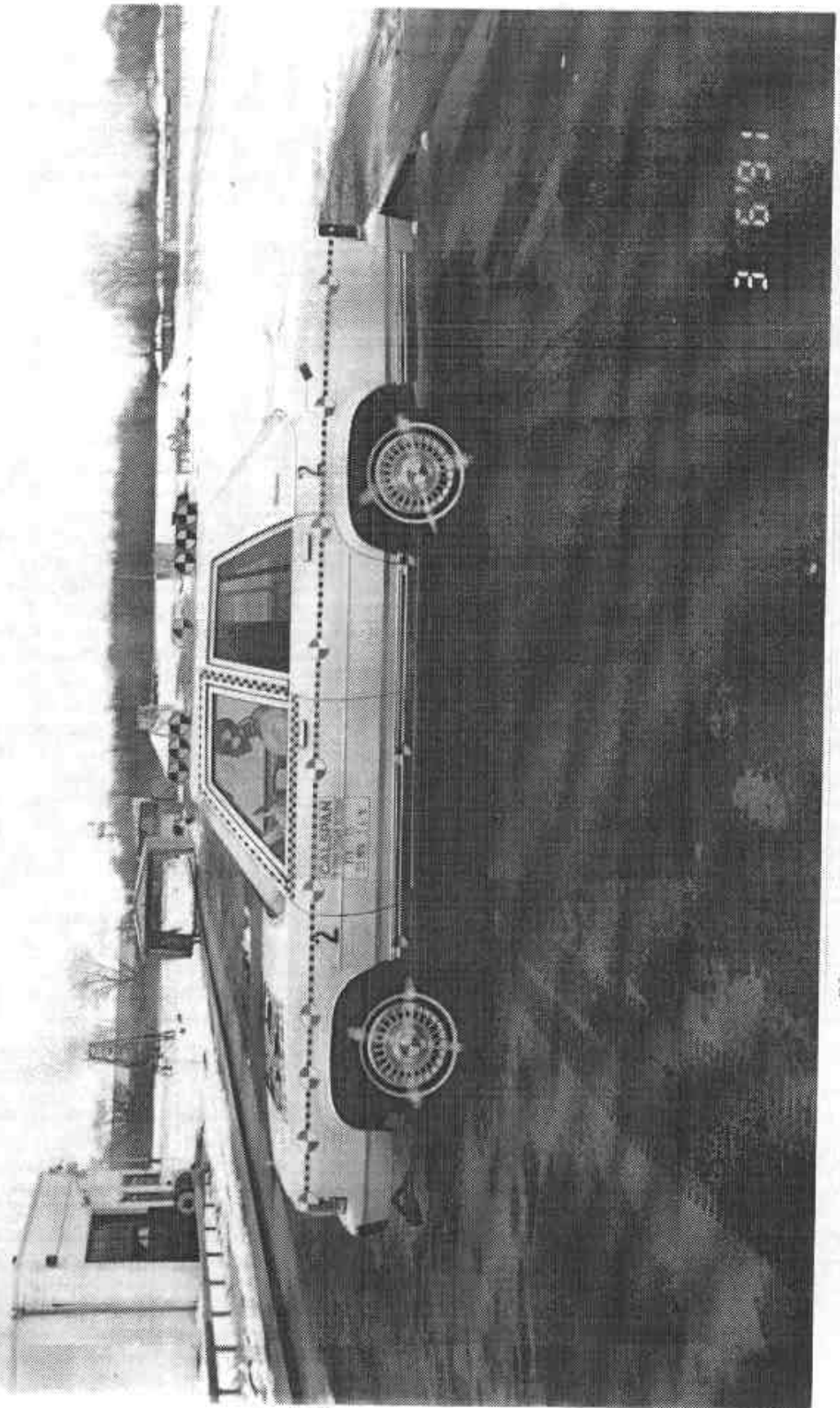


FIGURE A-50 VEHICLE 2 PRE-TEST LEFT SIDE VIEW

A-54

7883-5

3 6'91

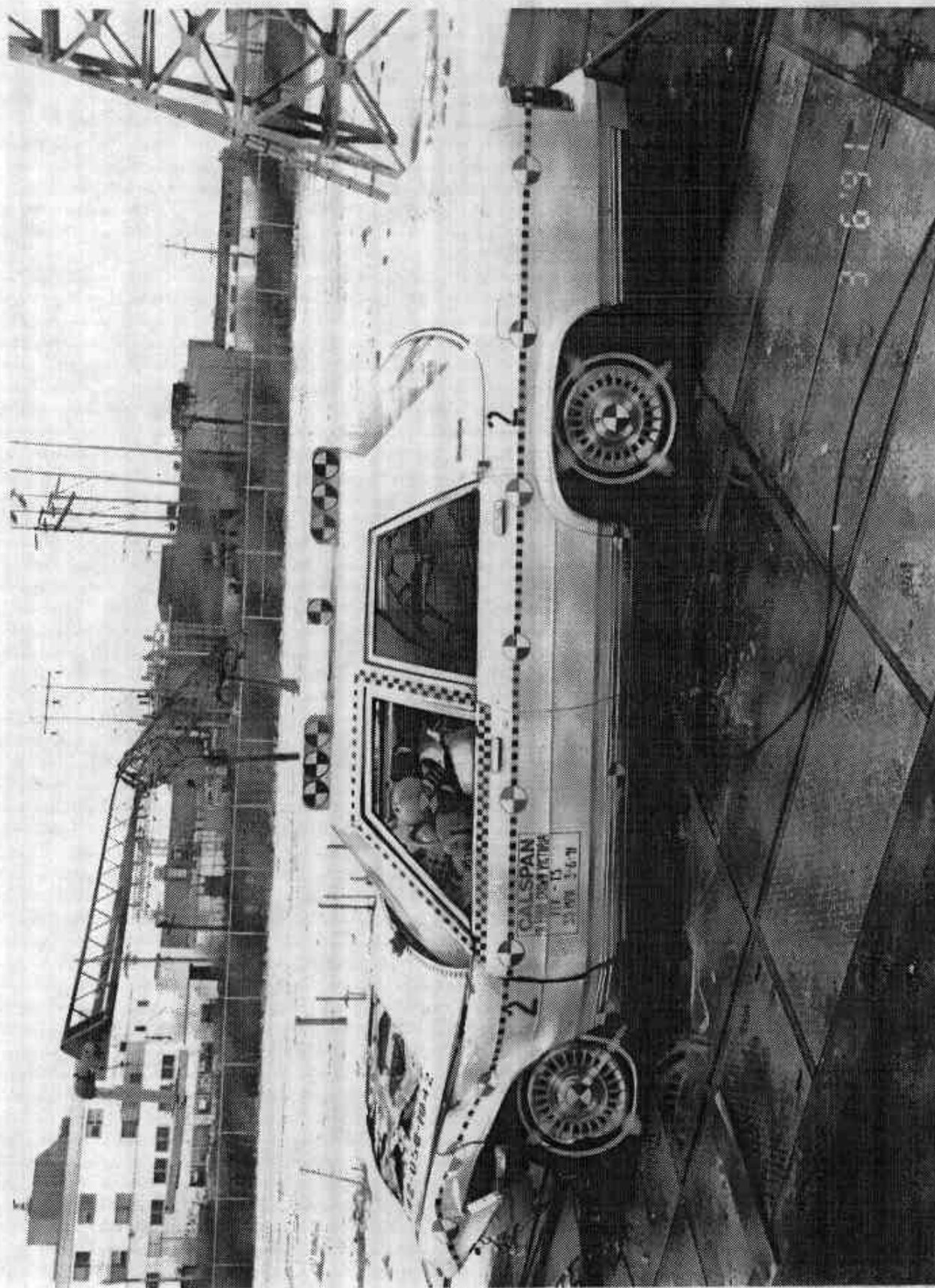


Figure A-51 VEHICLE 2 POST-TEST LEFT SIDE VIEW

A-55

7883-5



Figure A-52 VEHICLE 2 PRE-TEST FRONT LEFT THREE QUARTER VIEW

A-56

7883-5

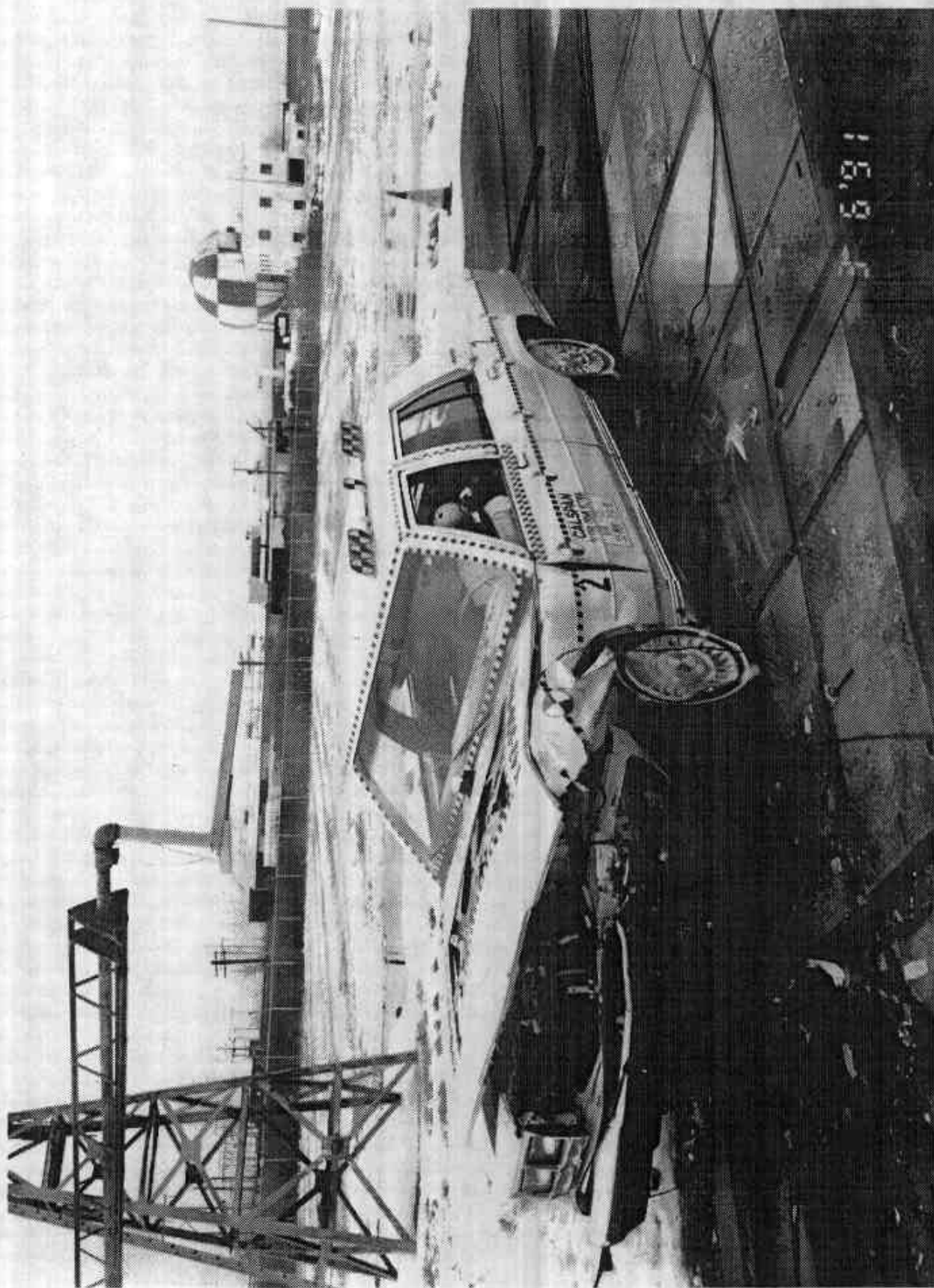


FIGURE A-53 VEHICLE 2 POST-TEST FRONT LEFT THREE QUARTER VIEW

A-57

7883-5

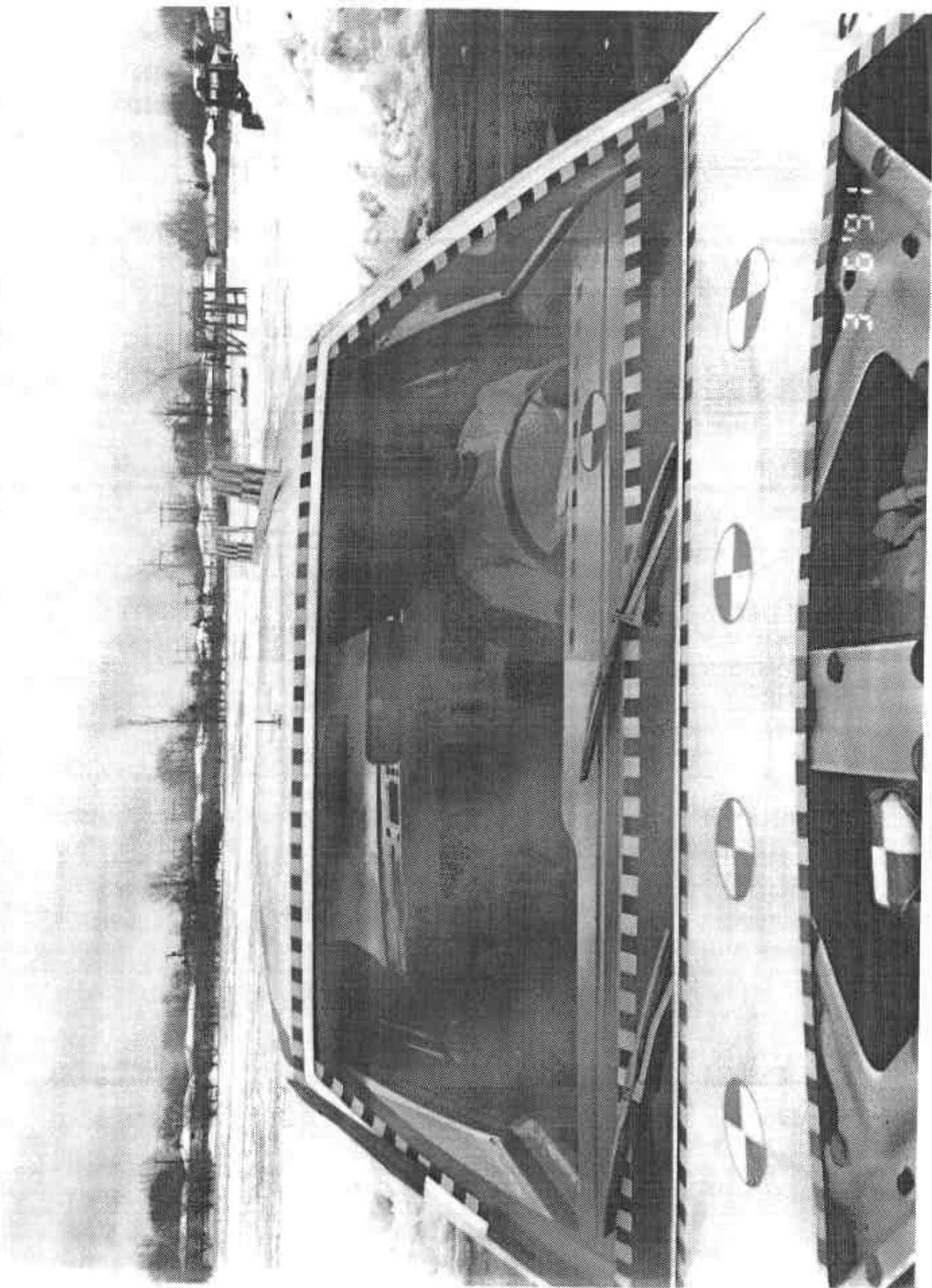


Figure A-54 VEHICLE 2 PRE-TEST WINDSHIELD VIEW

A-58

7883-6

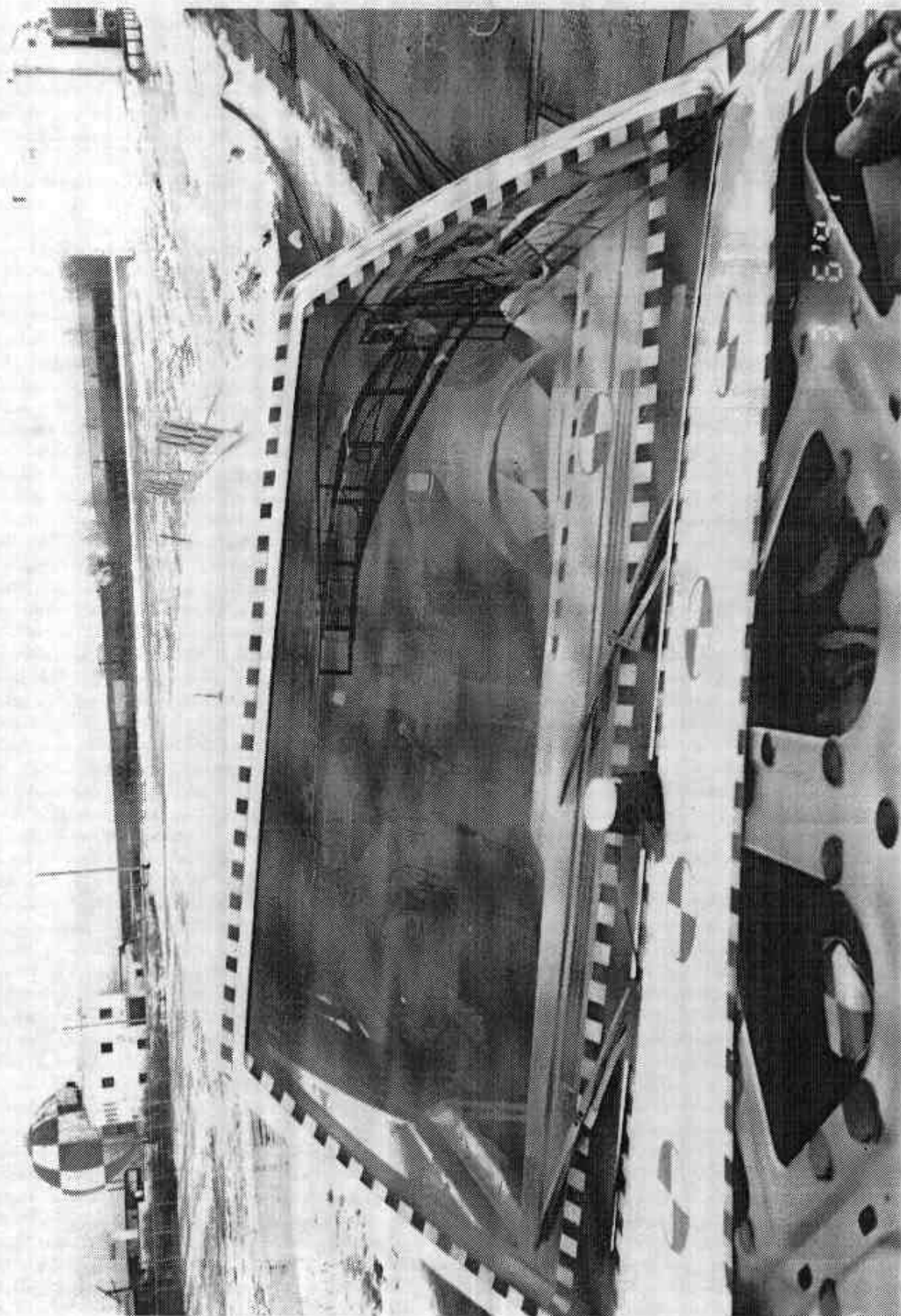


Figure A-55 VEHICLE 2 POST-TEST WINDSHIELD VIEW

A-50

7883-5

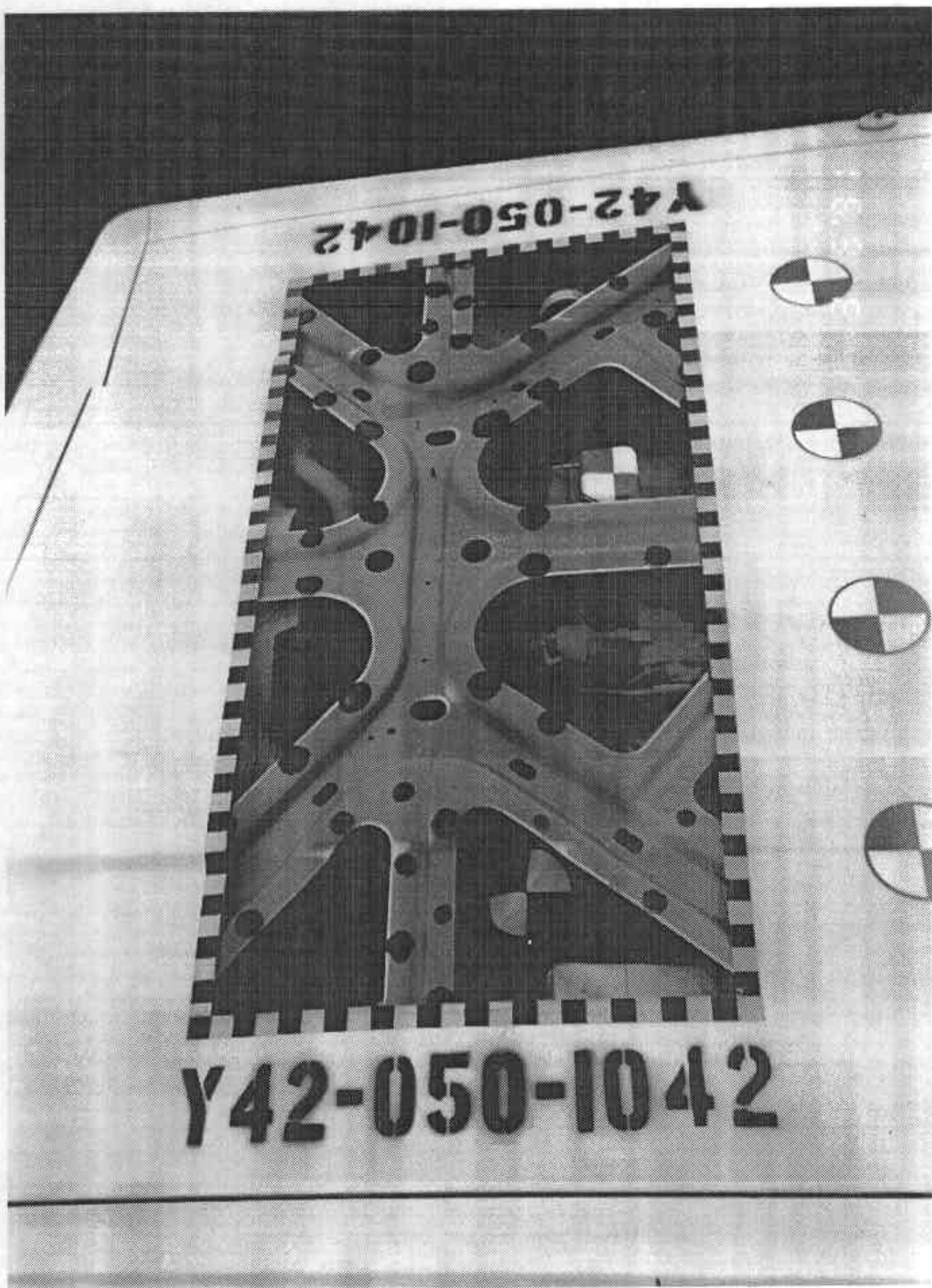


Figure A-56 VEHICLE 2 PRE-TEST OVERHEAD ENGINE COMPARTMENT VIEW

FIGURE A-57

VEHICLE 2 POST-TEST OVERHEAD ENGINE COMPARTMENT VIEW PHOTO

IS NOT AVAILABLE

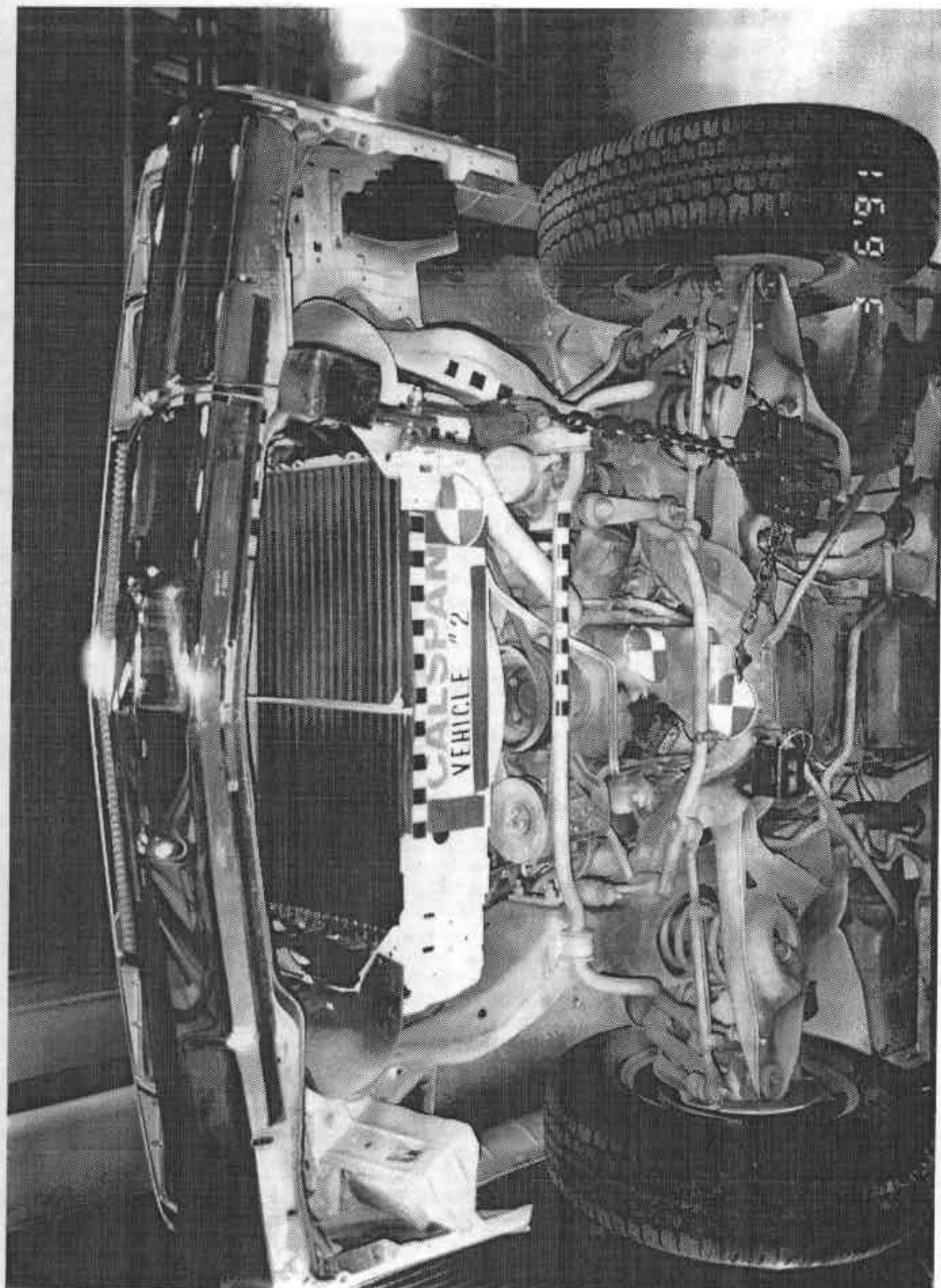


Figure A-58 VEHICLE 2 PRE-TEST UNDERBODY FRONT VIEW

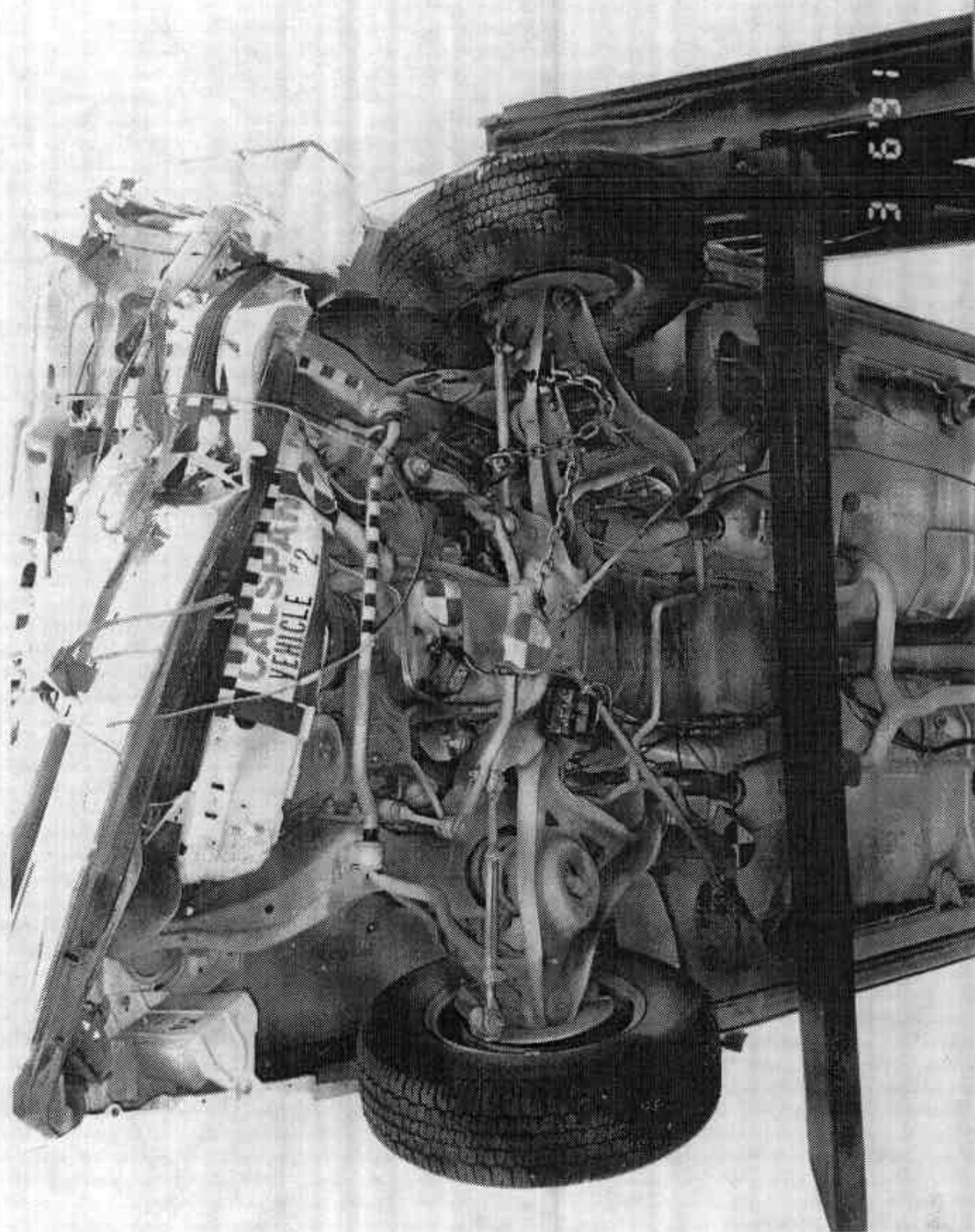


Figure A-59 VEHICLE 2 POST-TEST UNDERBODY FRONT VIEW

A-63

7883-5

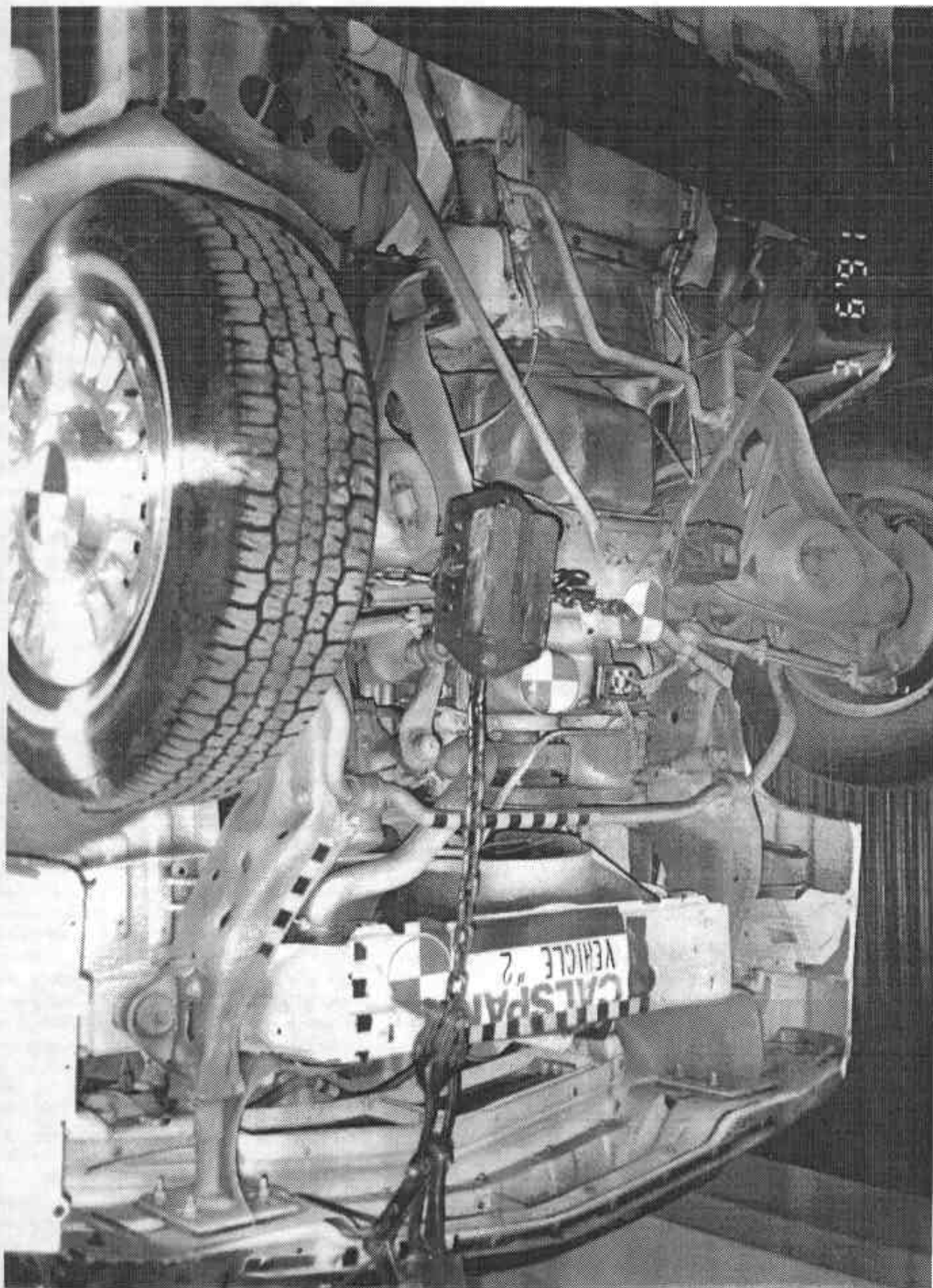


Figure A-60 VEHICLE 2 PRE-TEST UNDERBODY FRONT SIDE VIEW

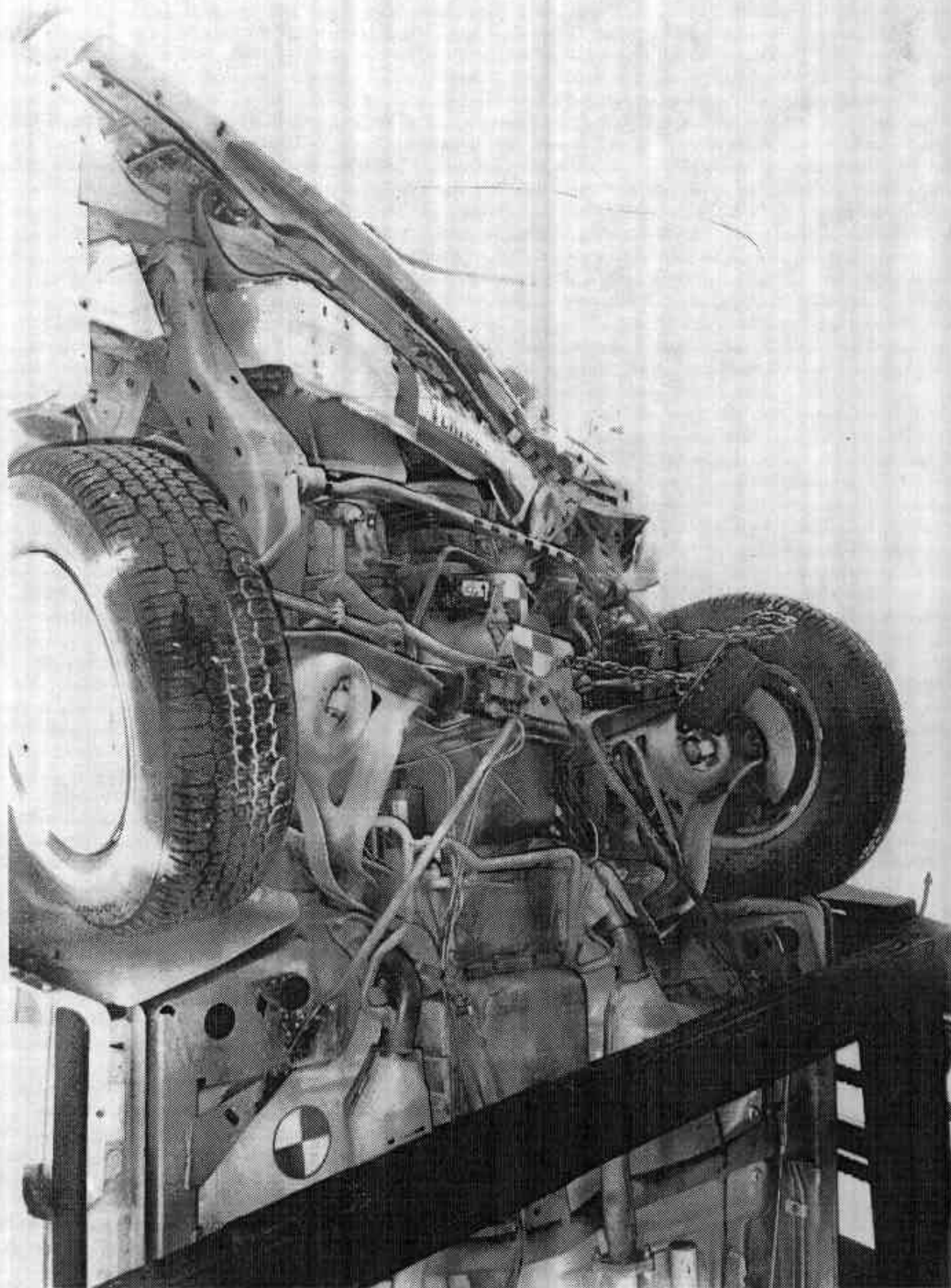


Figure A-61 VEHICLE 2 POST-TEST UNDERBODY FRONT SIDE VIEW

A-65

7883-5

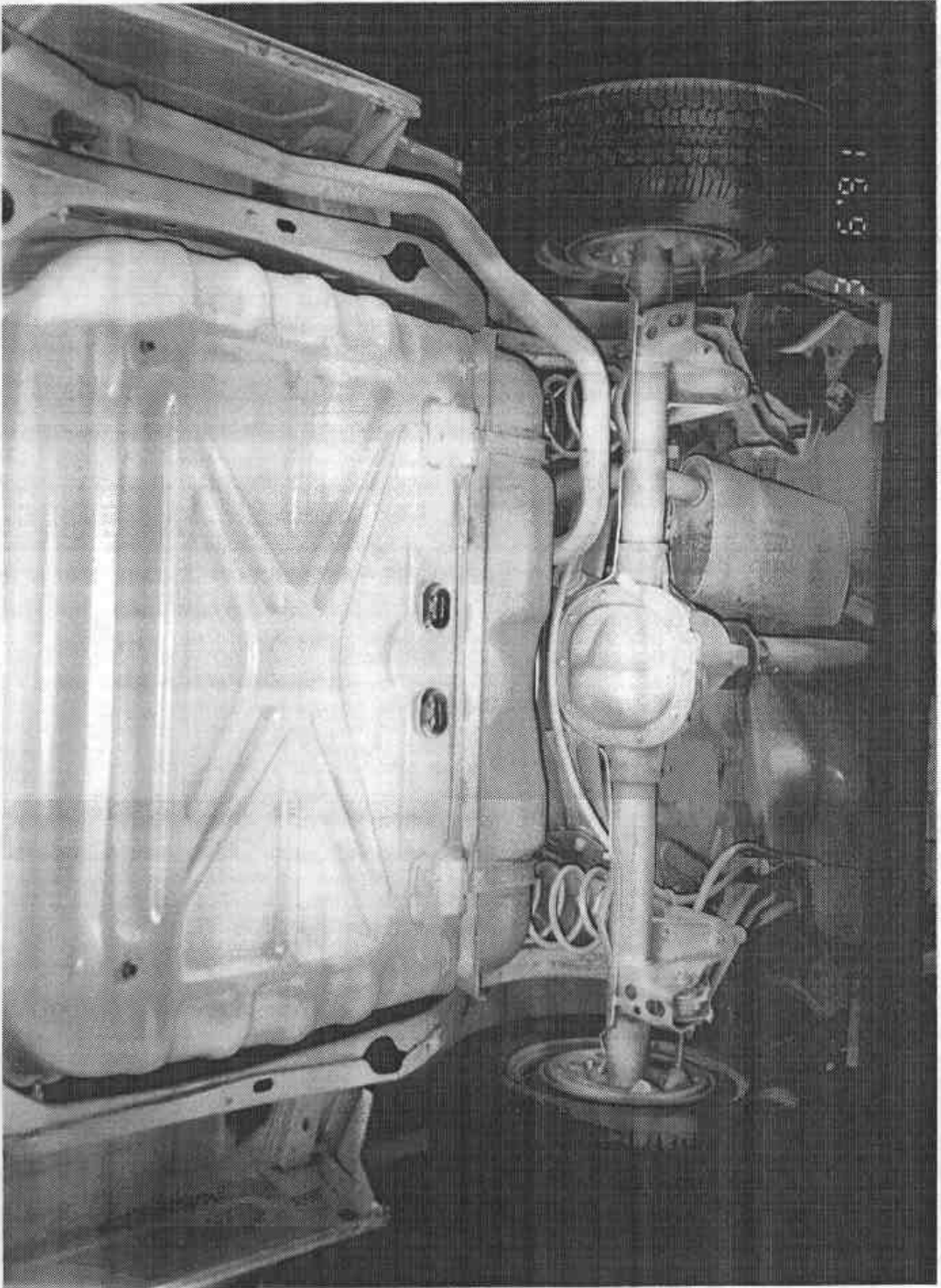


Figure A-62 VEHICLE 2 PRE-TEST UNDERBODY REAR VIEW

A-66

7883-5

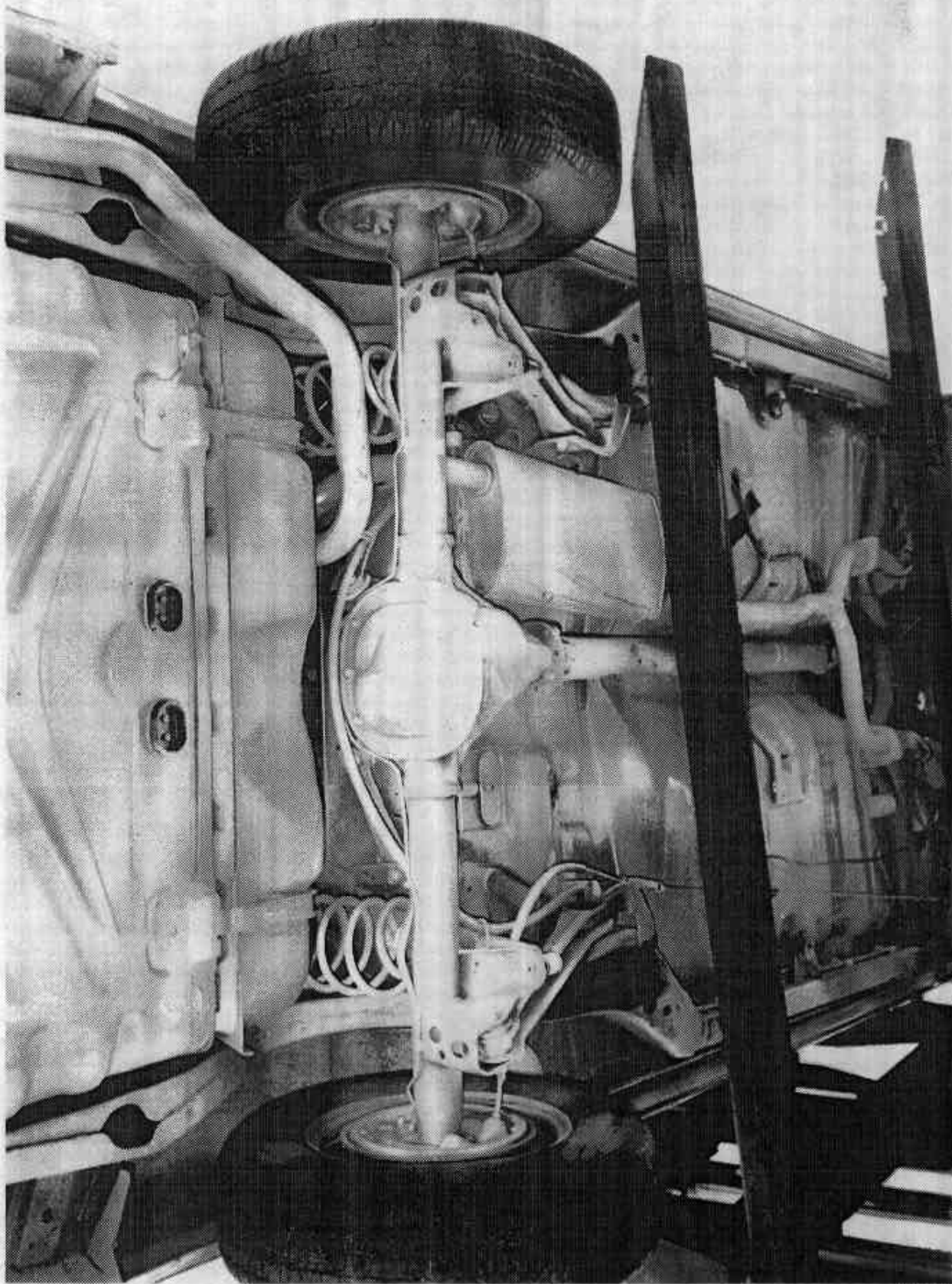


Figure A-63 VEHICLE 2 POST-TEST UNDERBODY REAR VIEW

A-67

7883-5

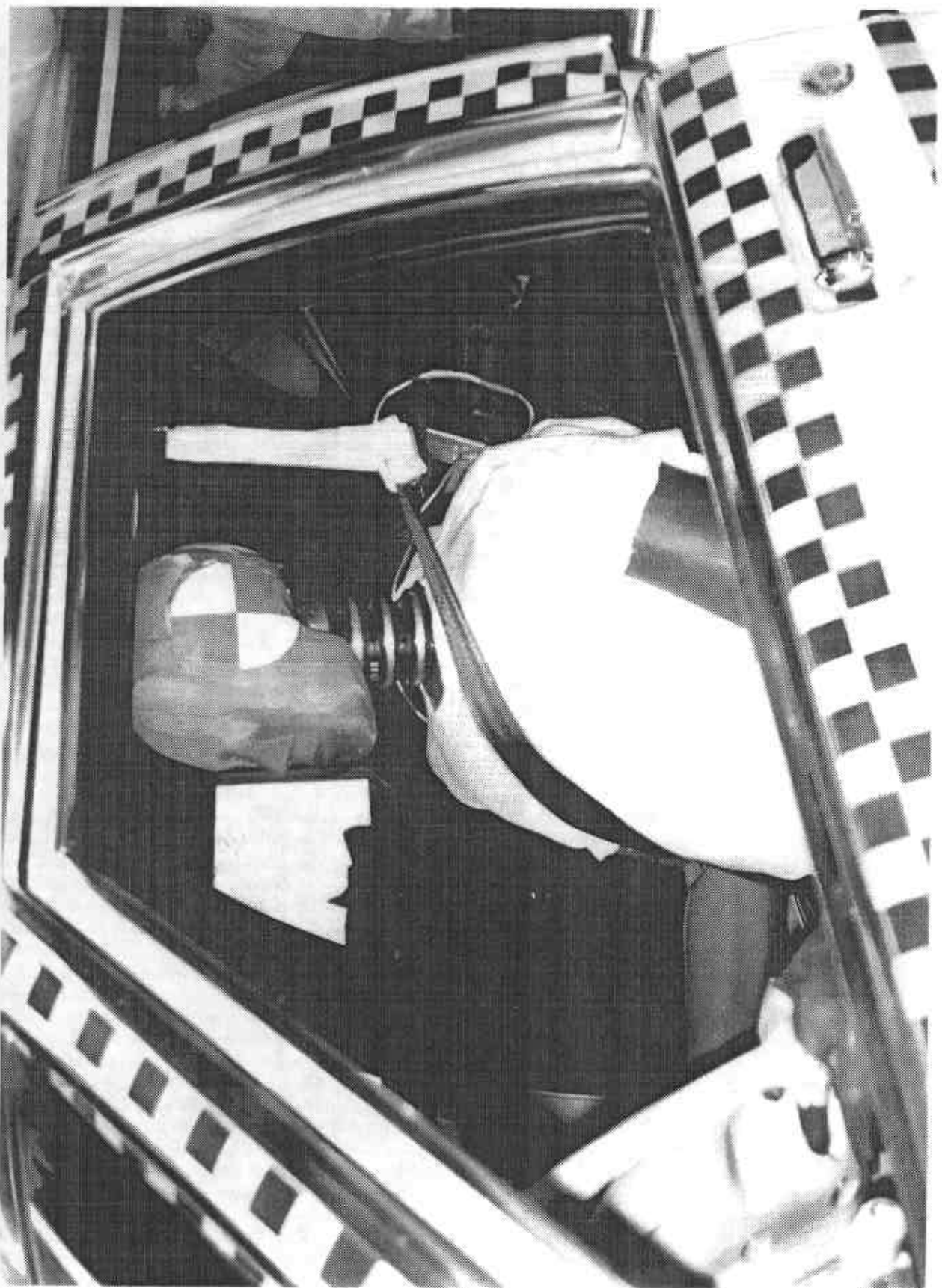


Figure A-64 VEHICLE 2 PRE-TEST DRIVER POSITION VIEW

A-68

7883-5

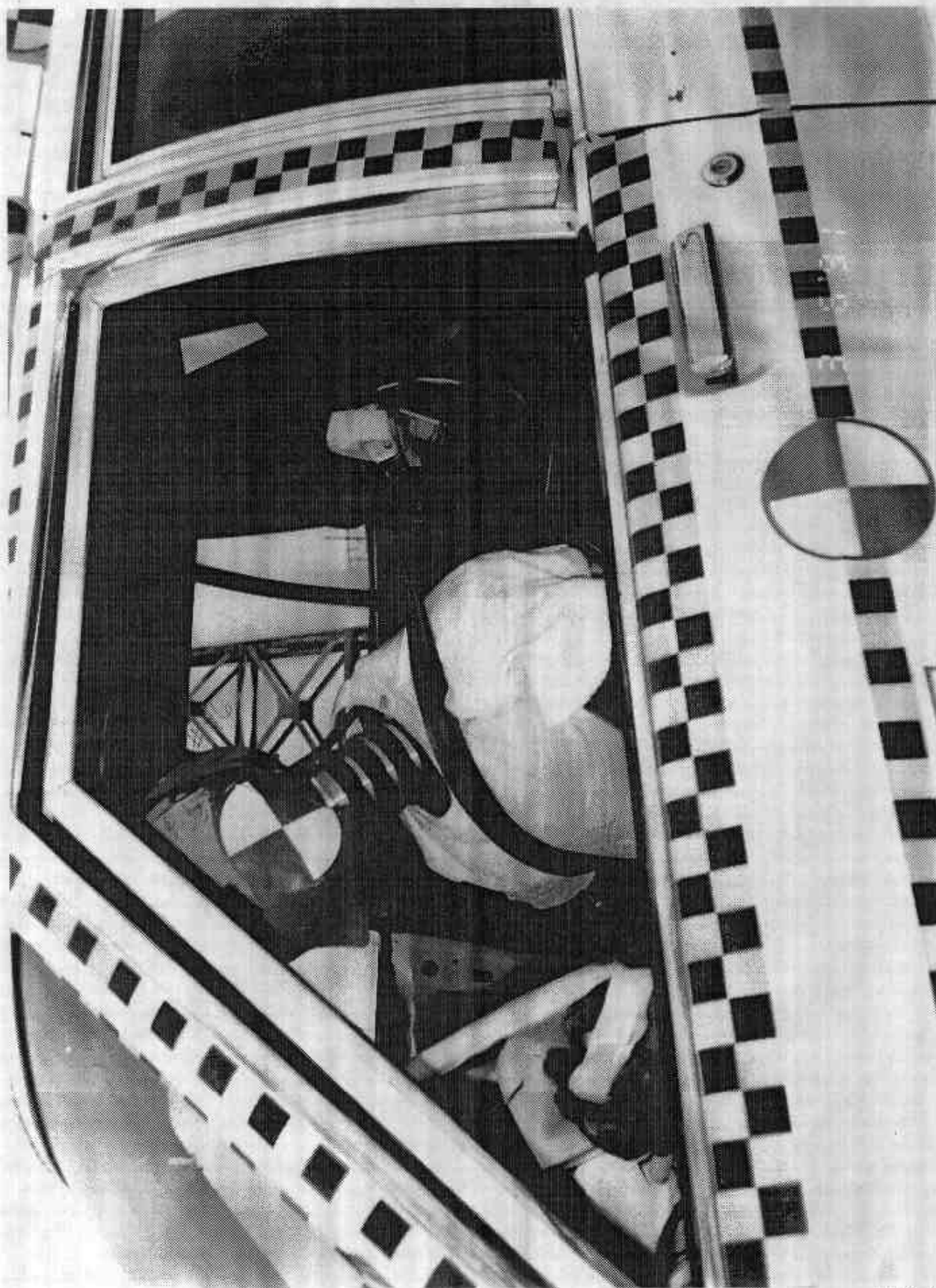


Figure A-65 VEHICLE 2 POST-TEST DRIVER POSITION VIEW

A-69

7883-5

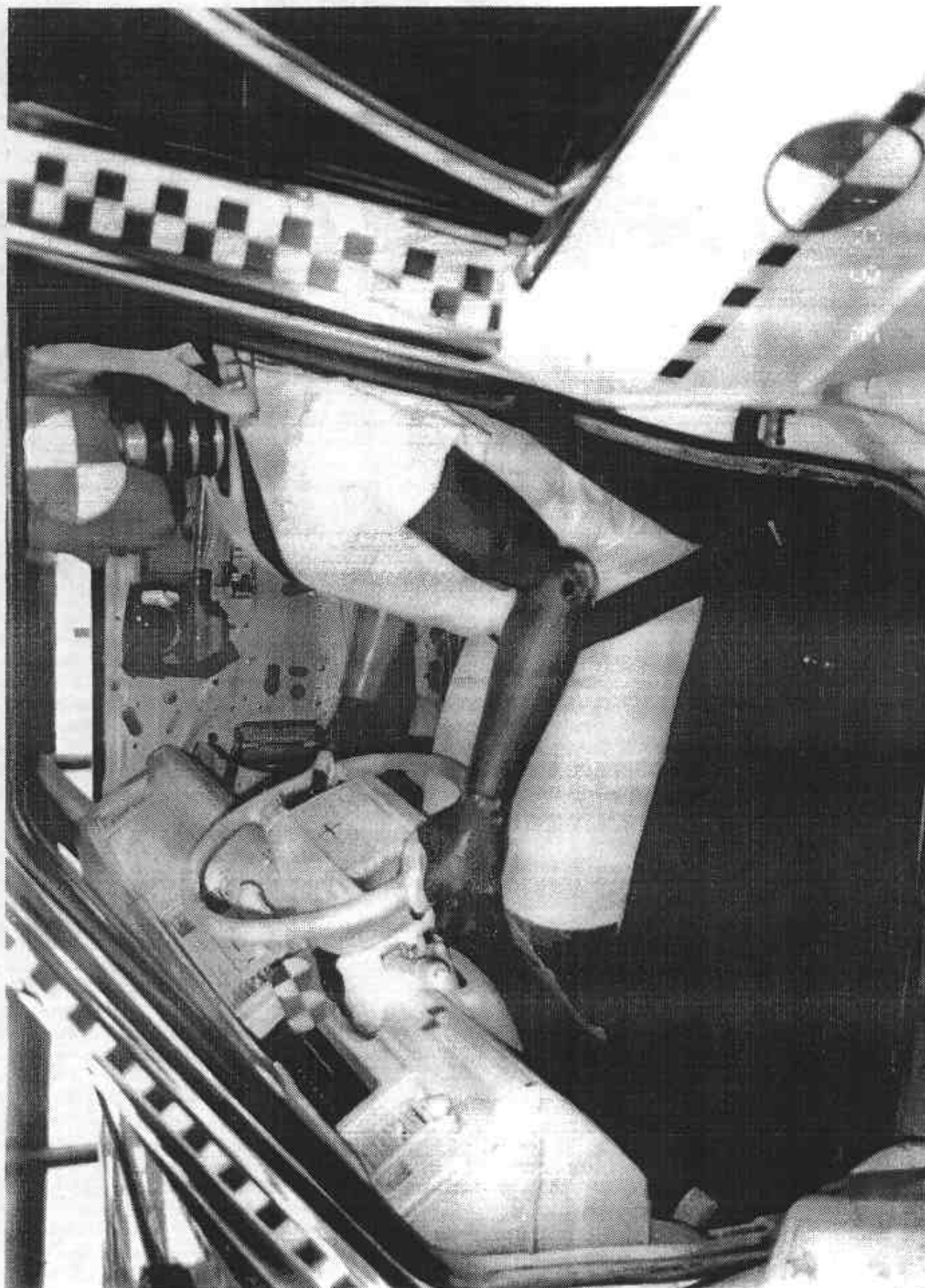


Figure A-66 VEHICLE 2 PRE-TEST DRIVER AND OCCUPANT COMPARTMENT VIEW

A-70

7883-5

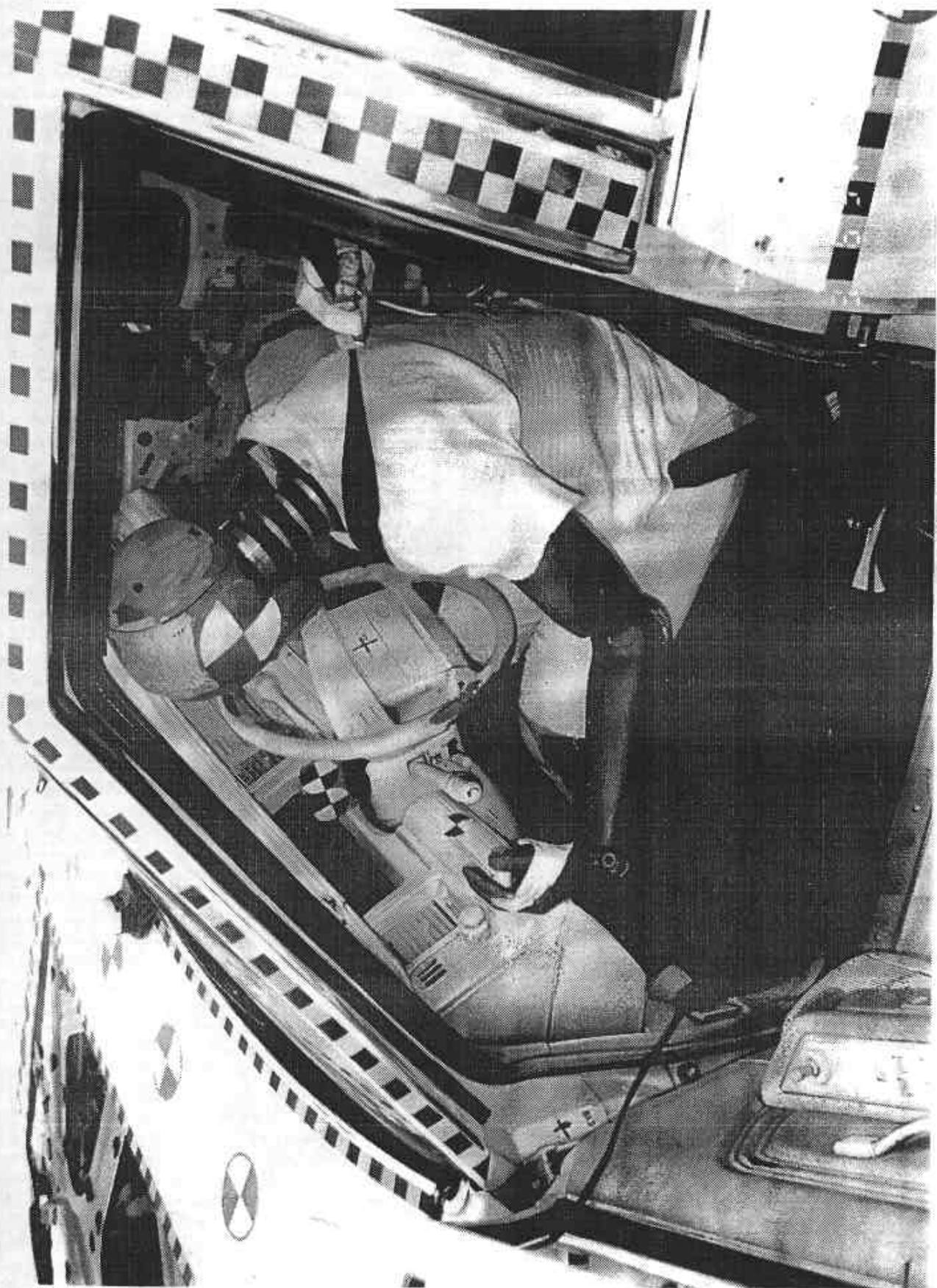


Figure A-67 VEHICLE 2 POST-TEST DRIVER AND OCCUPANT COMPARTMENT VIEW

A-71

7883-5

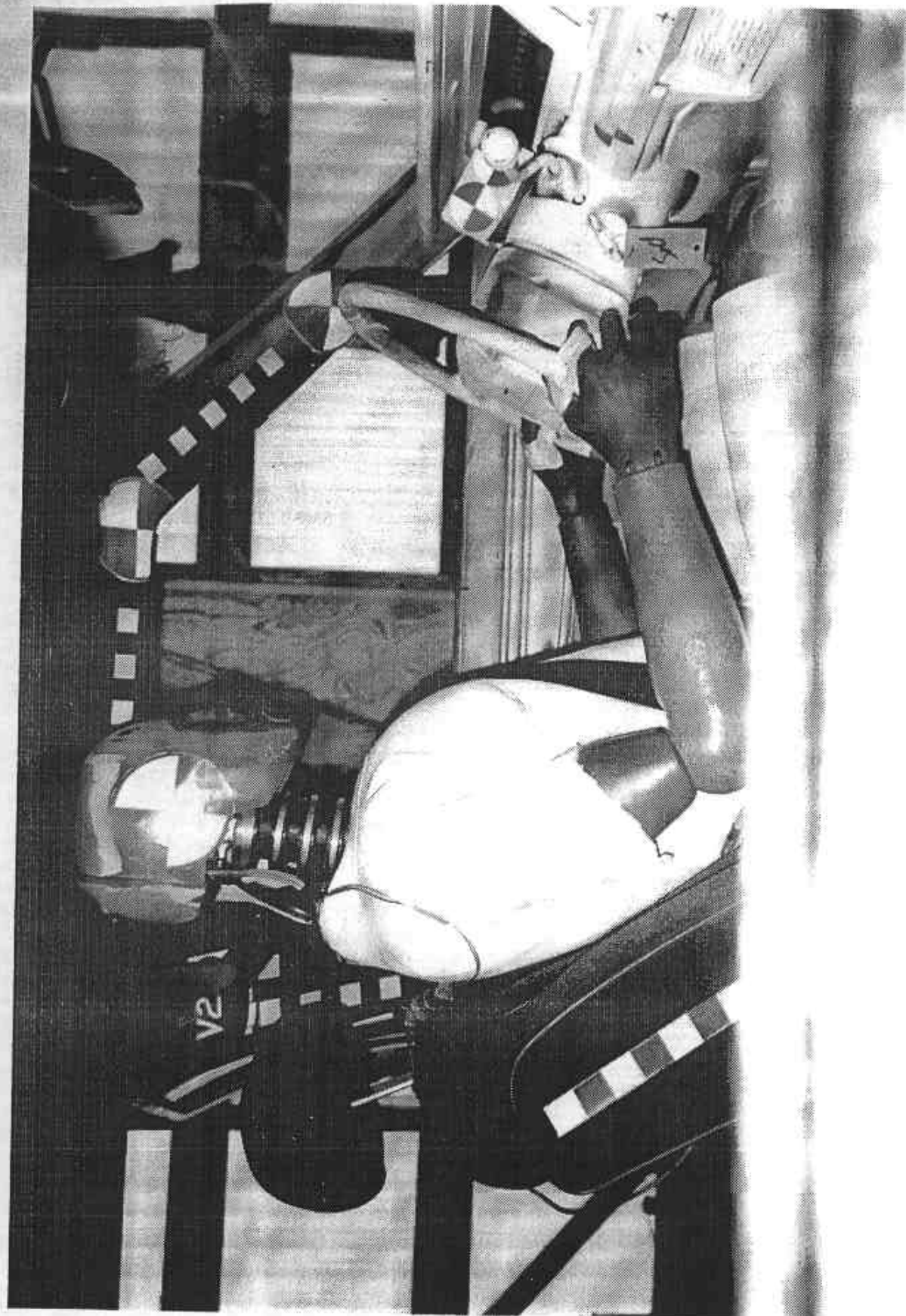


Figure A-68 VEHICLE 2 PRE-TEST DRIVER AND OCCUPANT COMPARTMENT
RIGHT SIDE VIEW

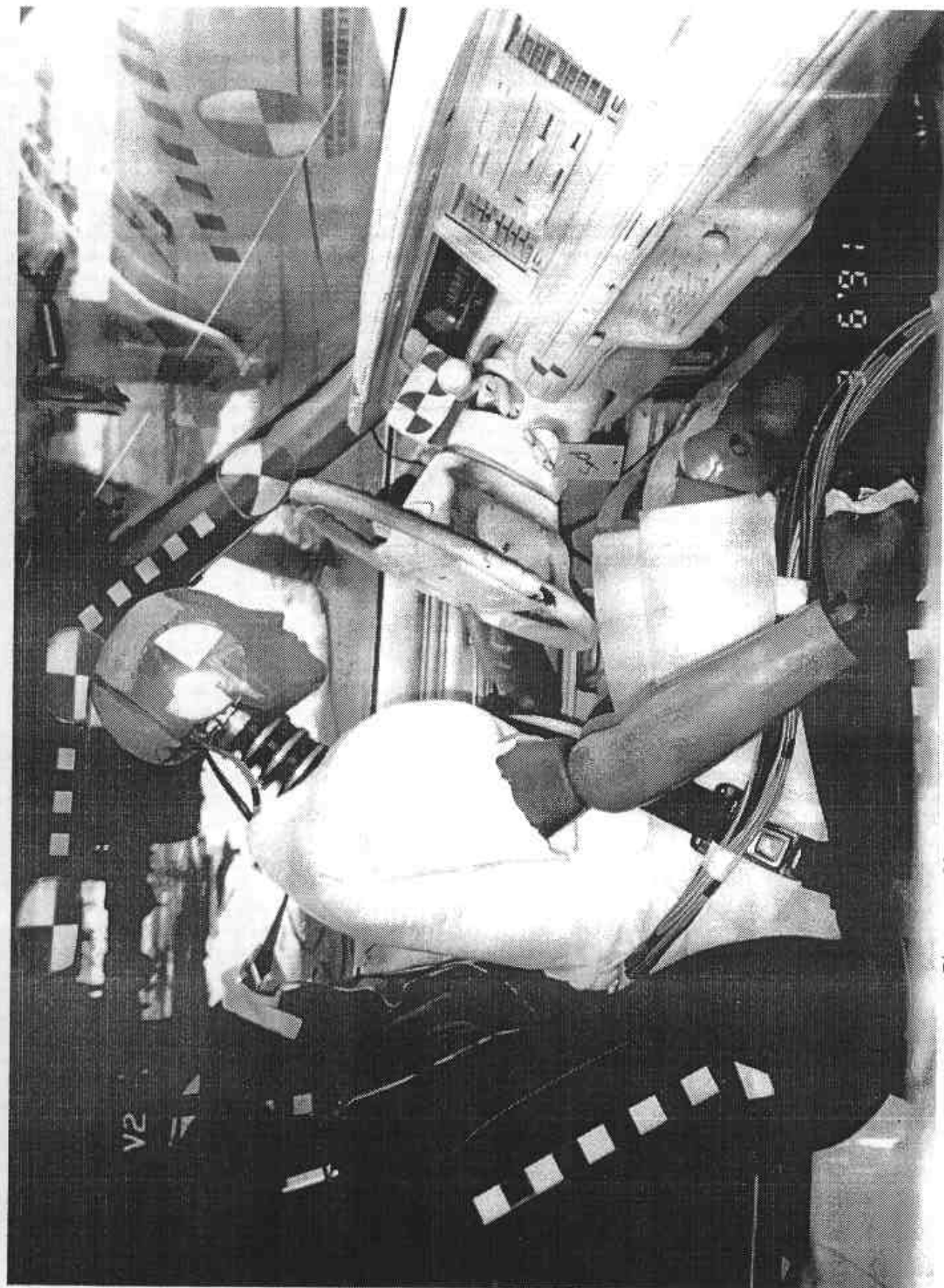


Figure A-69 VEHICLE 2 POST-TEST DRIVER AND OCCUPANT COMPARTMENT
RIGHT SIDE VIEW

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

Key: V1 - Vehicle 1
V2 - Vehicle 2

VEHICLE ONE DATA

1991 SUZUKI SWIFT 2-DOOR HATCHBACK

TEST NO. Y42-5-1042

VEHICLE DATA

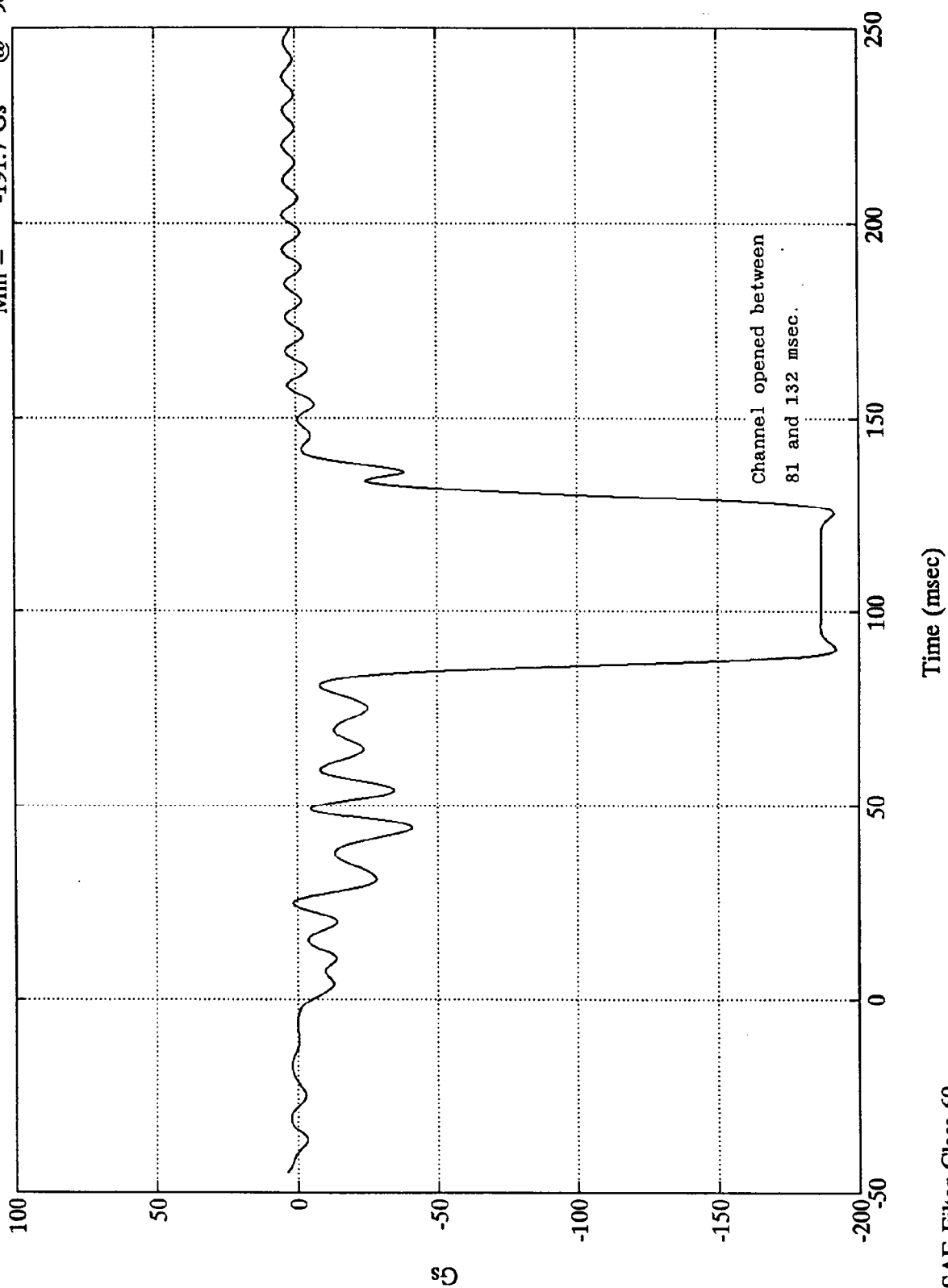
FILTER CHANNEL CLASS

60

V-to-V Test #5

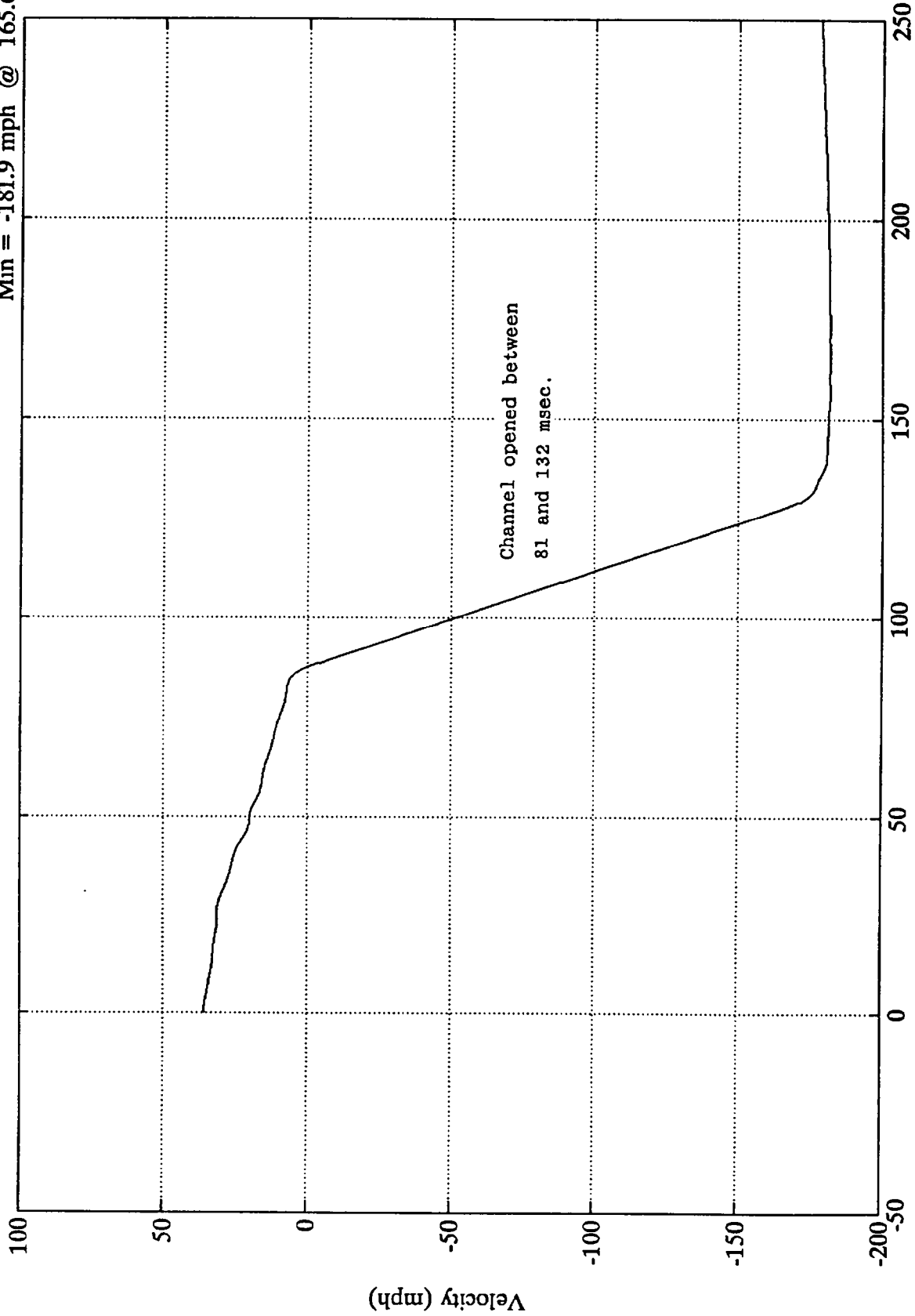
Veh. 1 L R Seat (X)

Max = 4.9 Gs @ 202.08 msec
Min = -191.7 Gs @ 90.59 msec



Veh. 1 L R Seat (X)

Max = 36.1 mph @ -0.0 msec
Min = -181.9 mph @ 165.6 msec



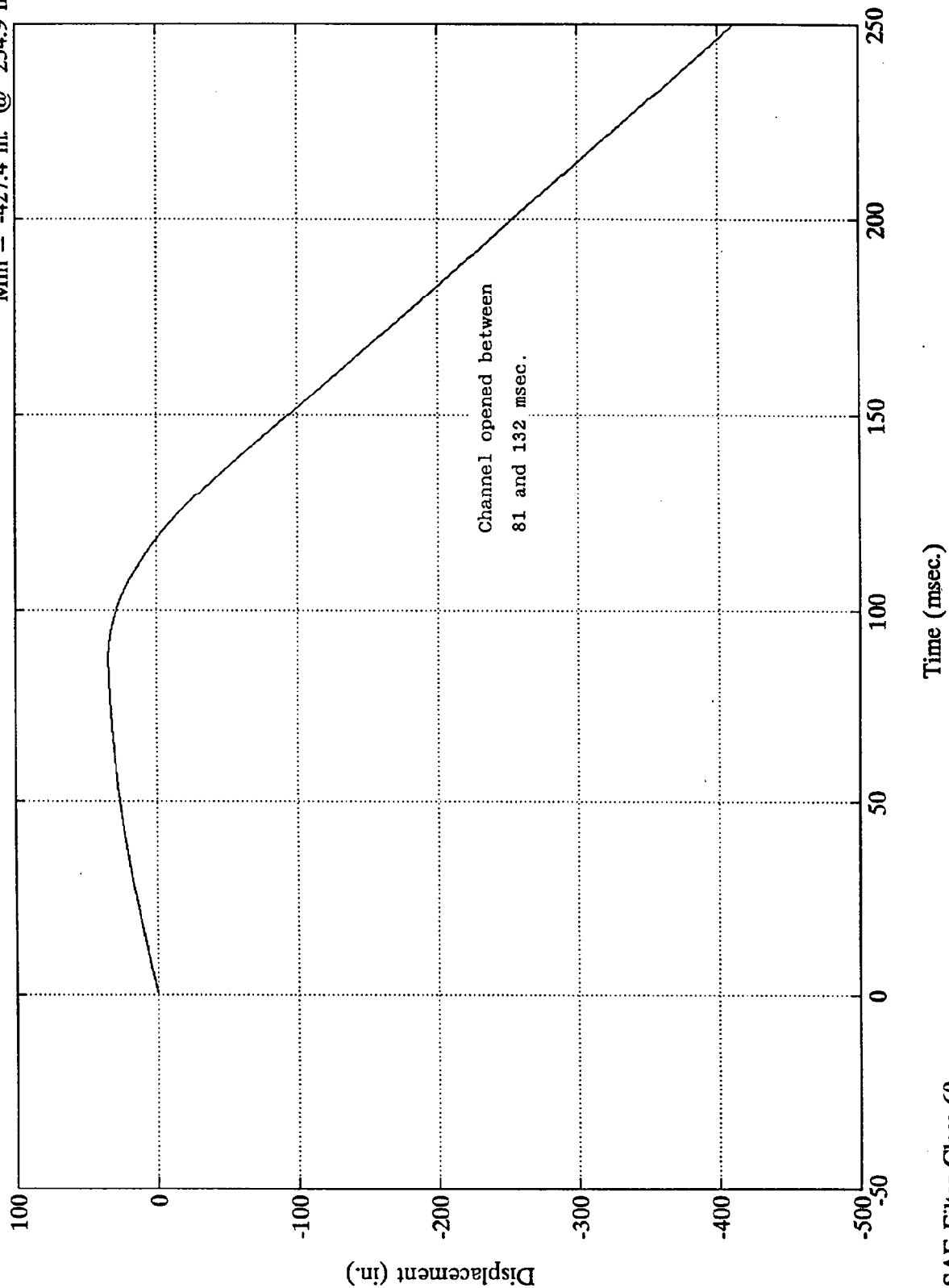
Time (msec.)

SAE Filter Class 60

V-to-V Test #5

Veh. 1 L R Seat (X)

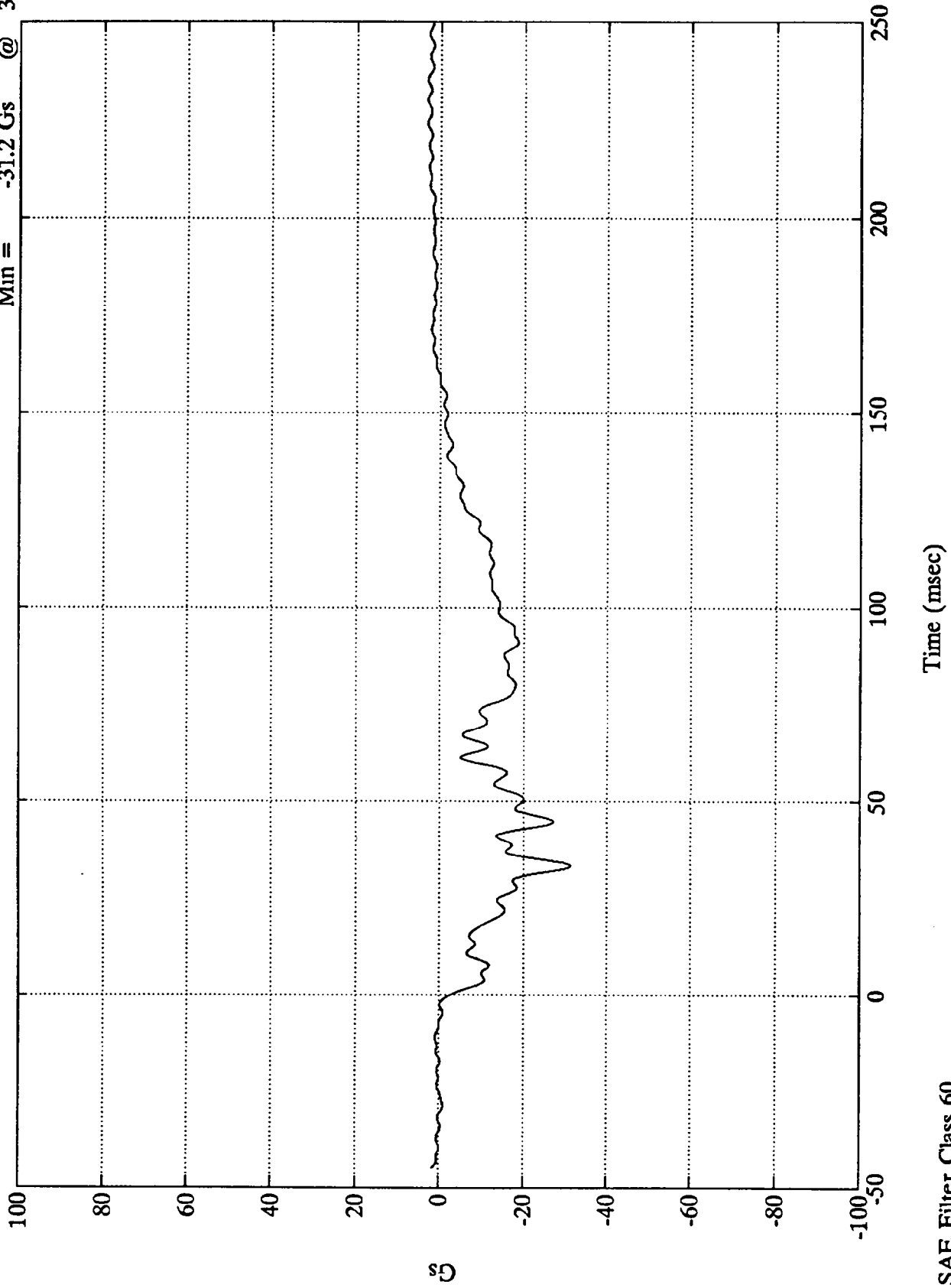
Max = 34.1 in. @ 87.6 msec
Min = -427.4 in. @ 254.9 msec



V-to-V Test #5

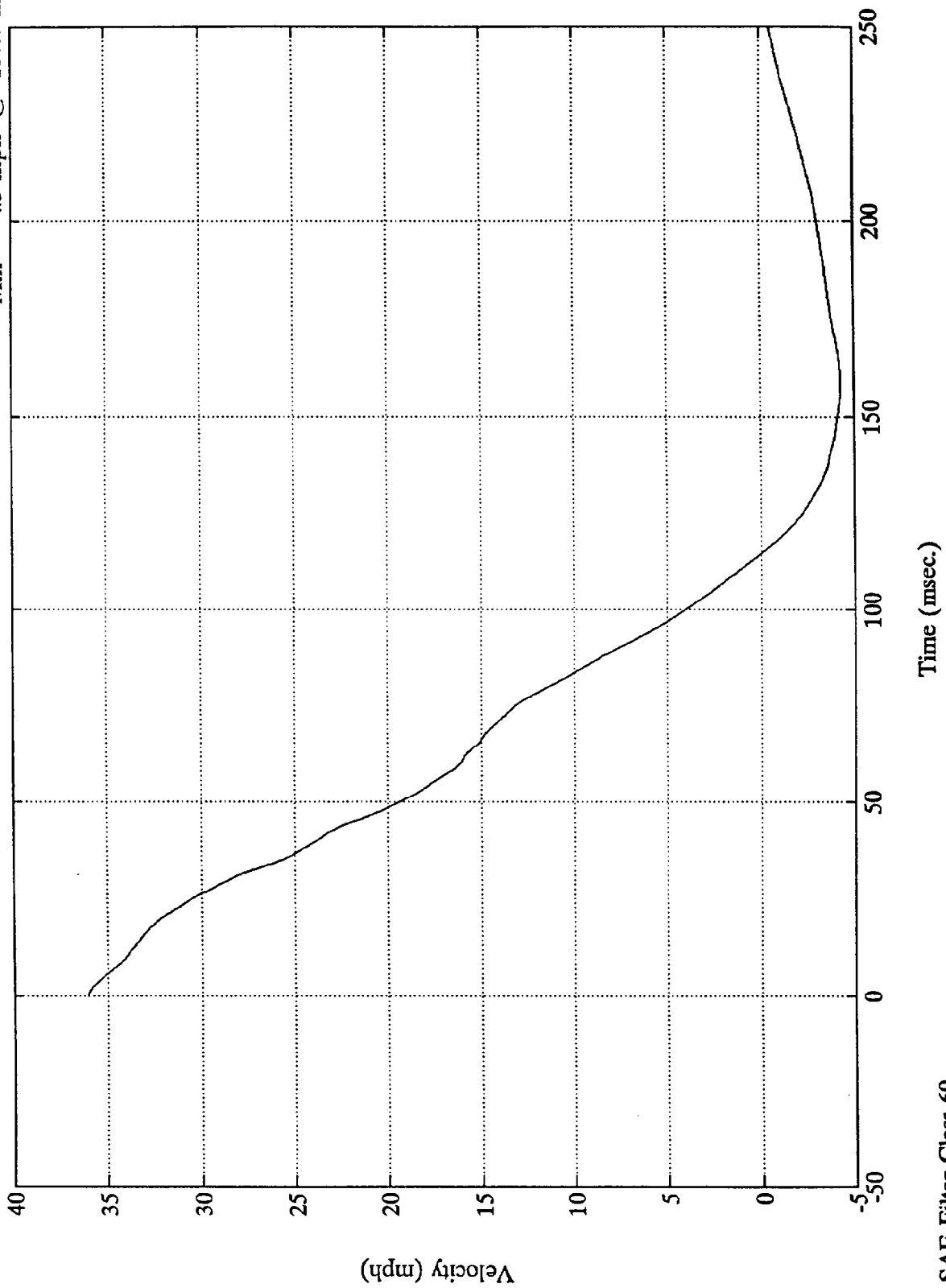
Veh. 1 R R Seat (X)

Max = 3.1 Gs @ 224.04 msec
Min = -31.2 Gs @ 33.36 msec

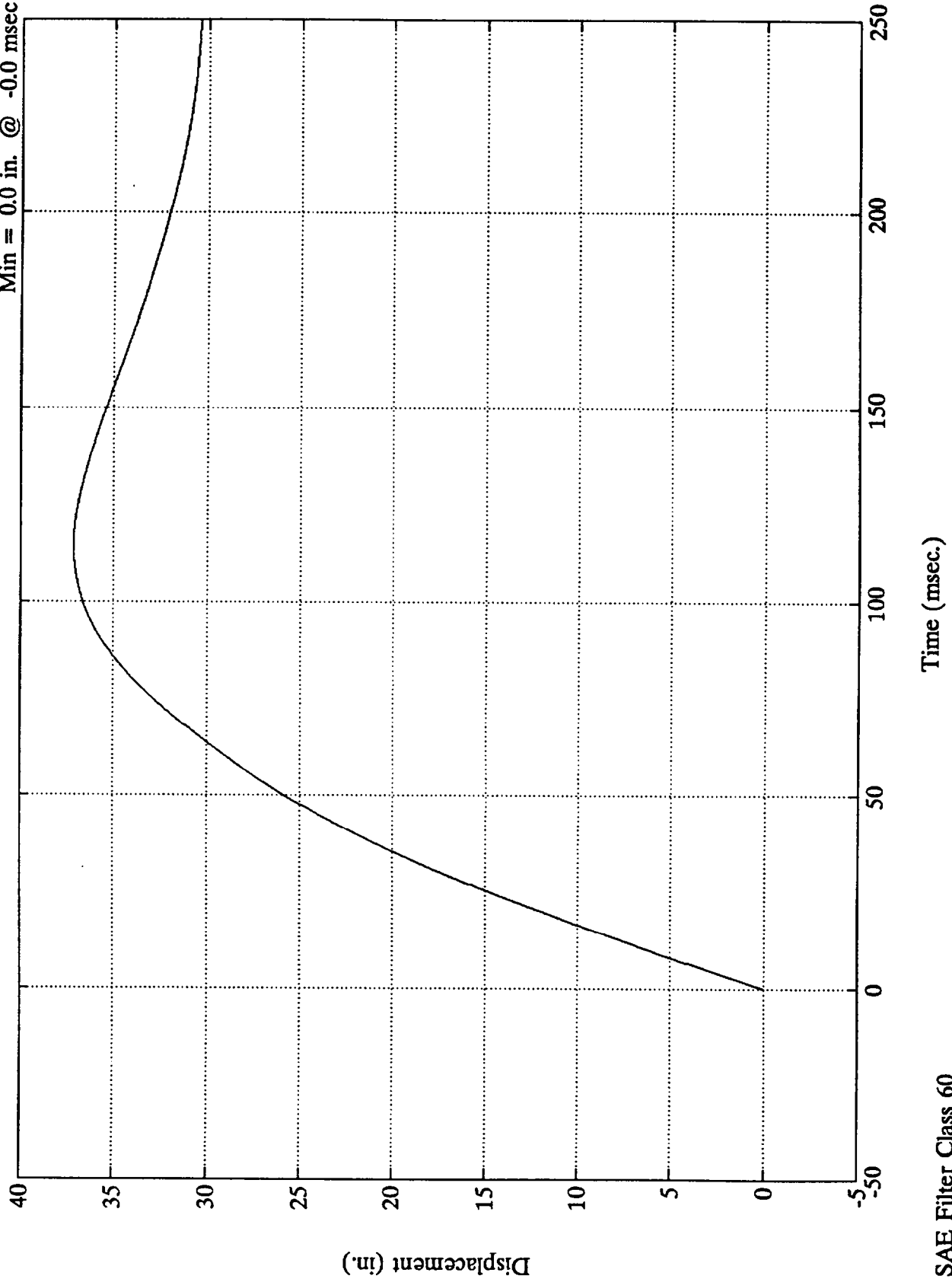


V-to-V Test #5

Veh. 1 R R Seat (X)
Max = 36.1 mph @ -0.0 msec
Min = -4.3 mph @ 157.7 msec



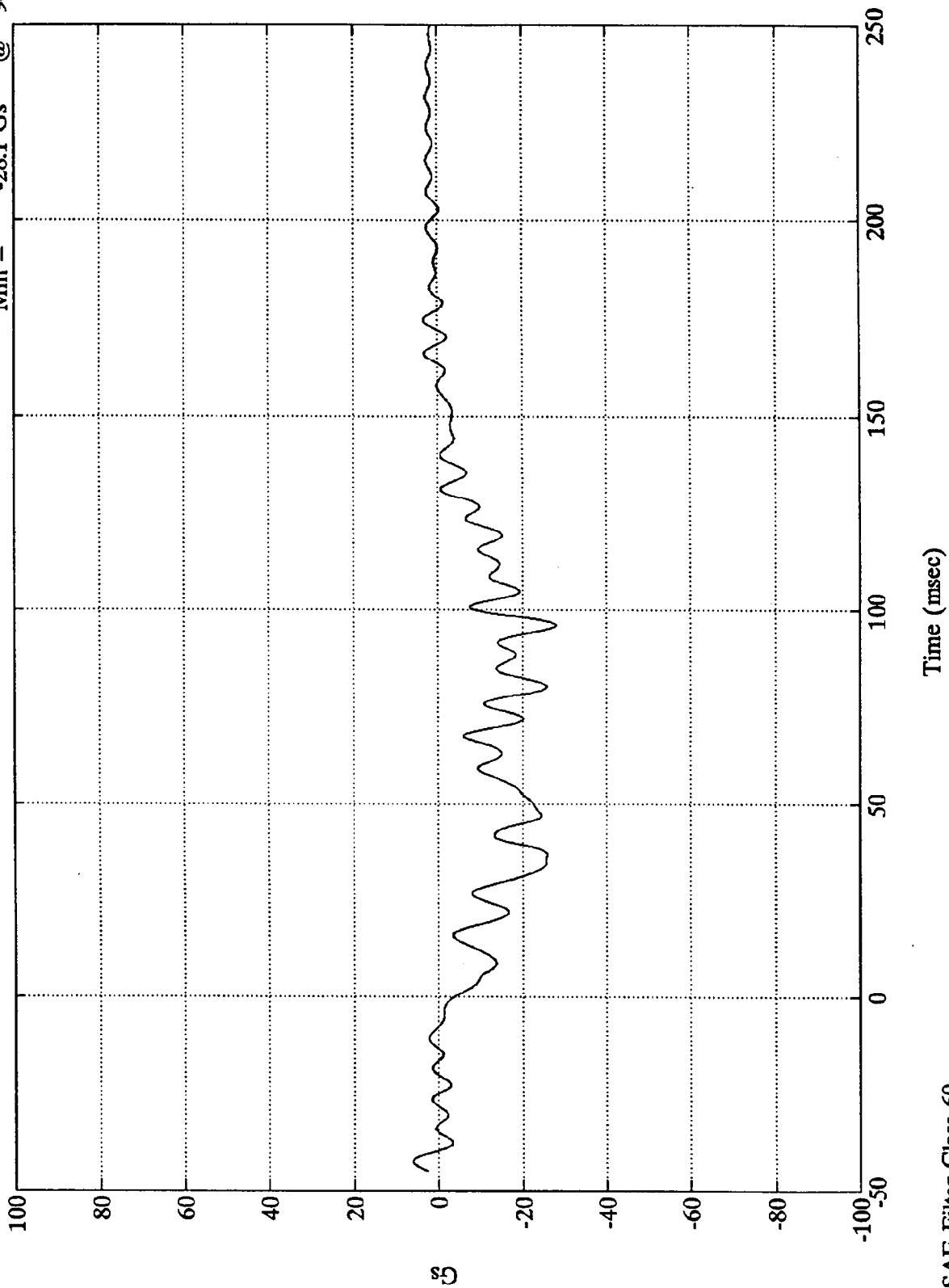
Veh. 1 R R Seat (X)
Max = 37.2 in. @ 116.2 msec
Min = 0.0 in. @ -0.0 msec



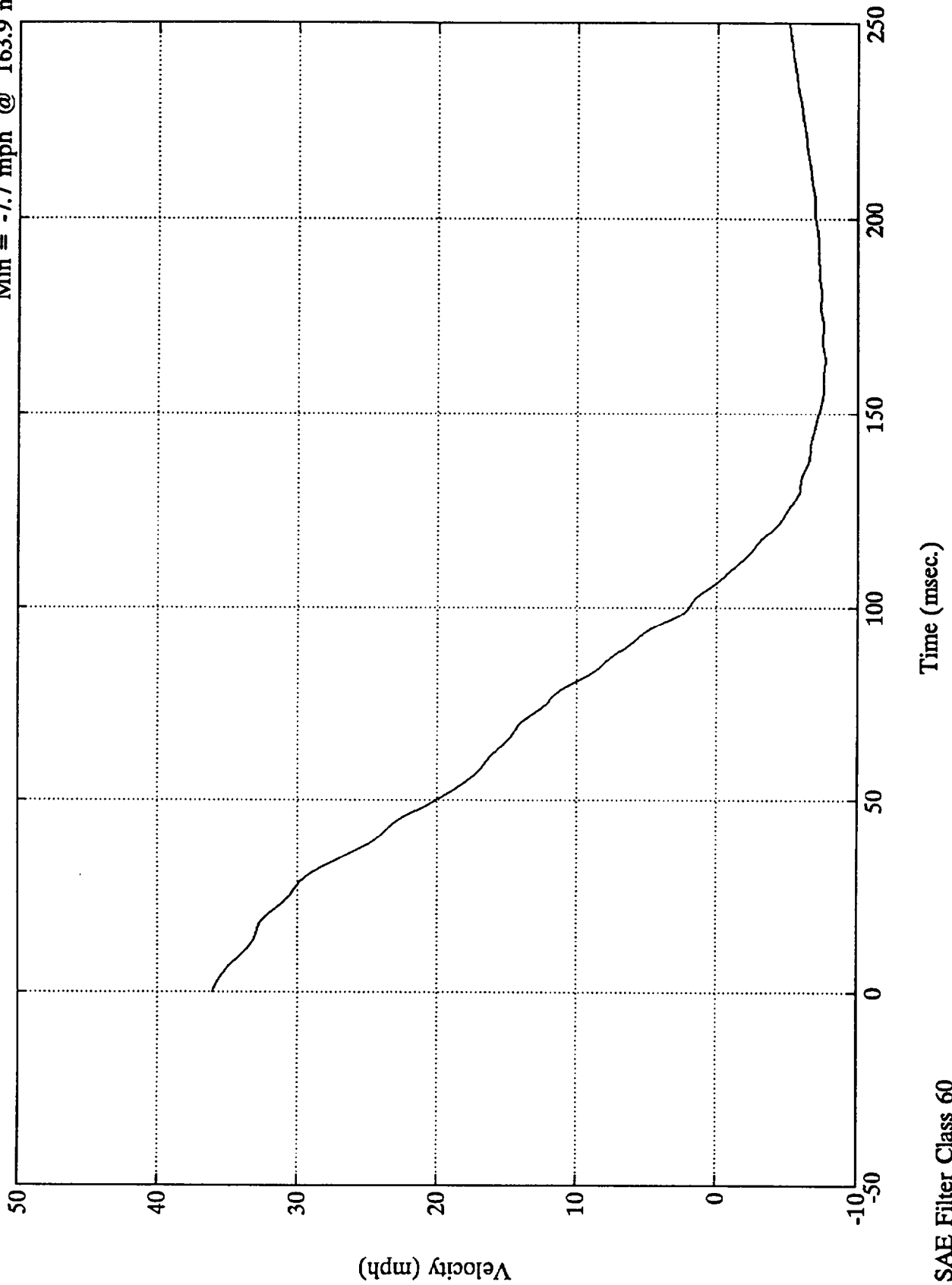
V-to-V Test #5

Veh. 1 C/L Seat (X)

Max = 6.0 Gs @ -42.48 msec
Min = -28.1 Gs @ 96.23 msec



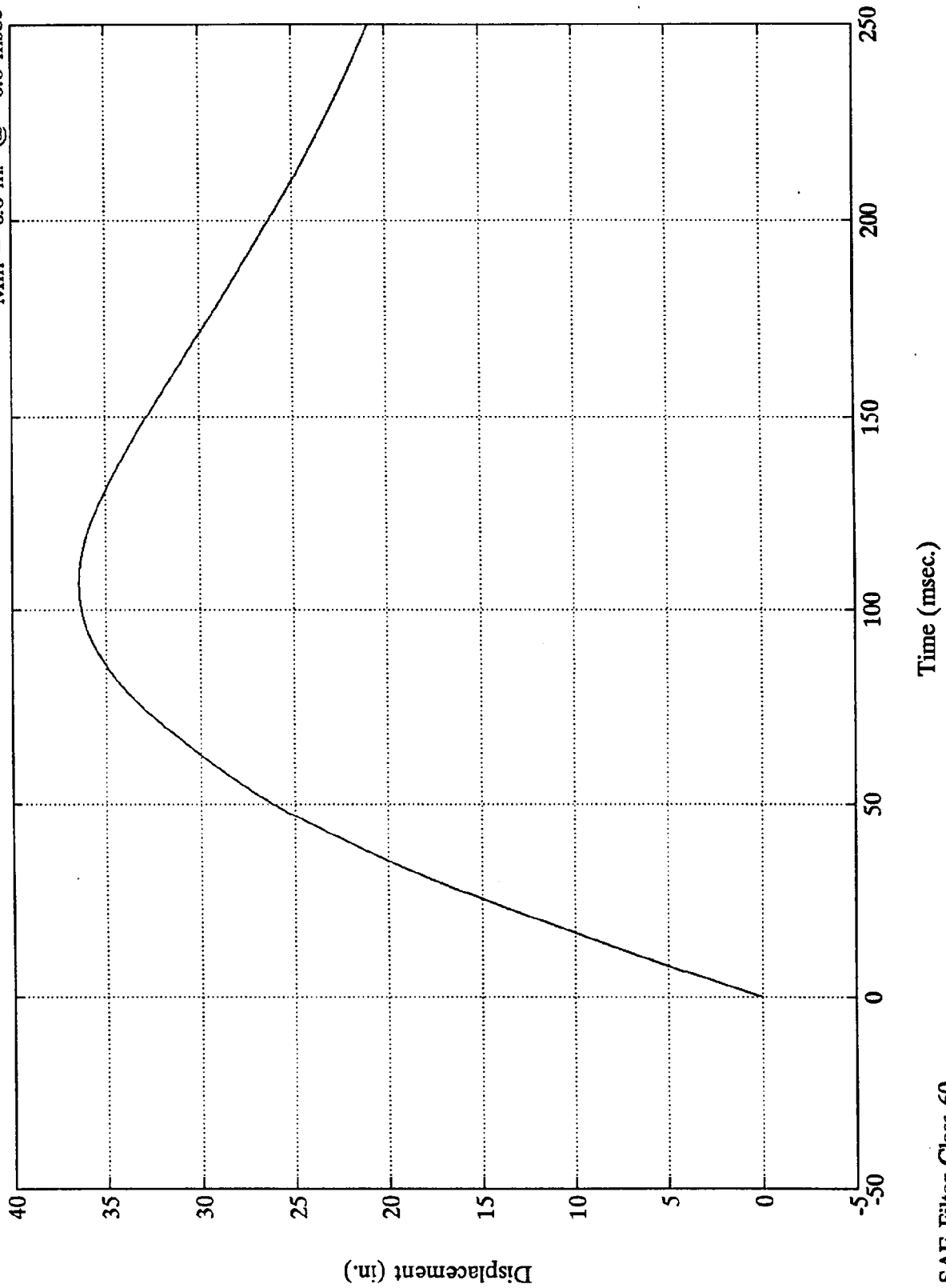
Veh. 1 C/L Seat (X)
Max = 36.1 mph @ -0.0 msec
Min = -7.7 mph @ 163.9 msec



V-10-V Test #5

Veh. 1 C/L Seat (X)

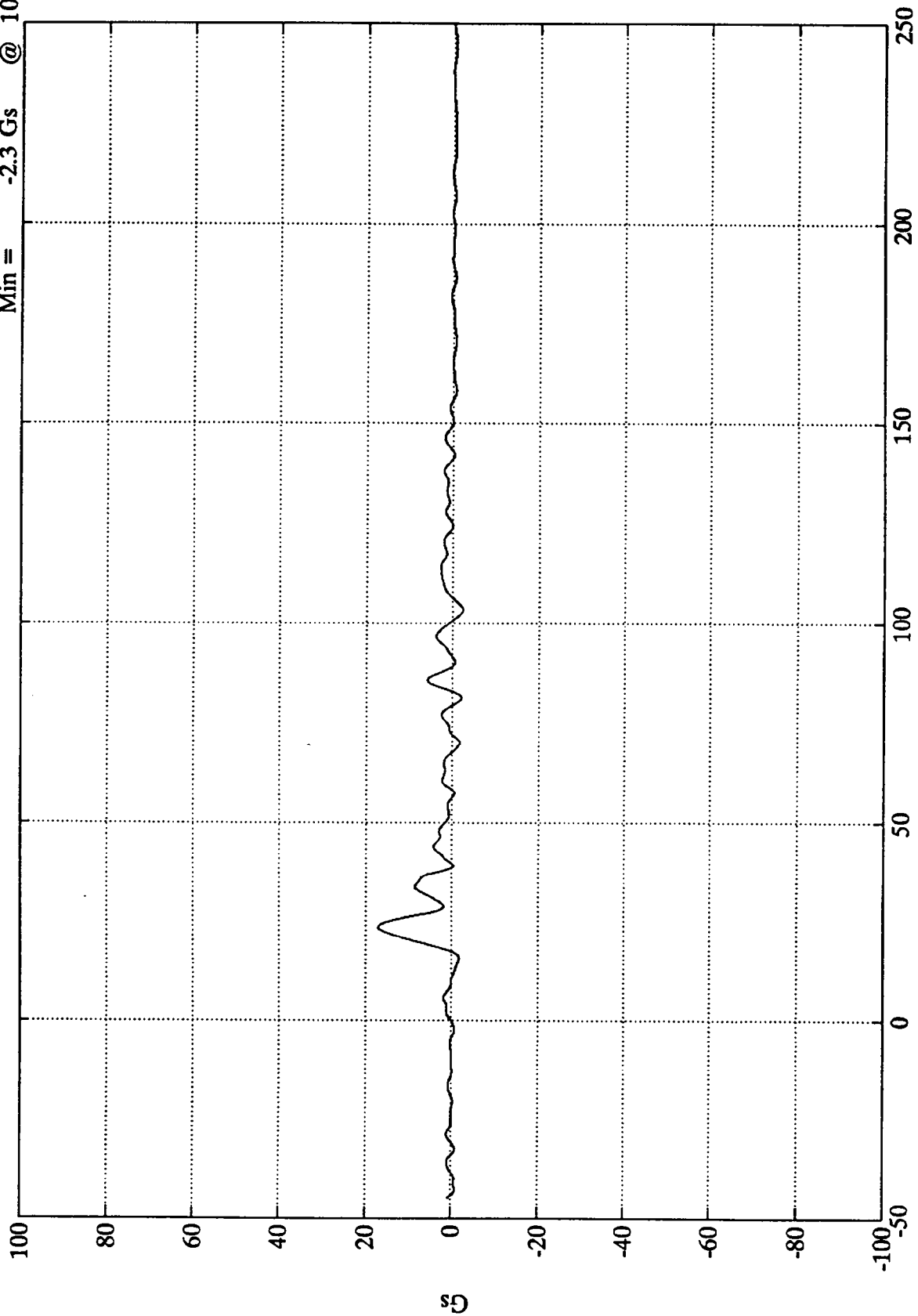
Max = 36.5 in. @ 107.0 msec
Min = 0.0 in. @ -0.0 msec



SAE Filter Class 60

Veh. 1 C/L Seat (Y)

Max = 17.0 Gs @ 23.63 msec
 Min = -2.3 Gs @ 103.44 msec



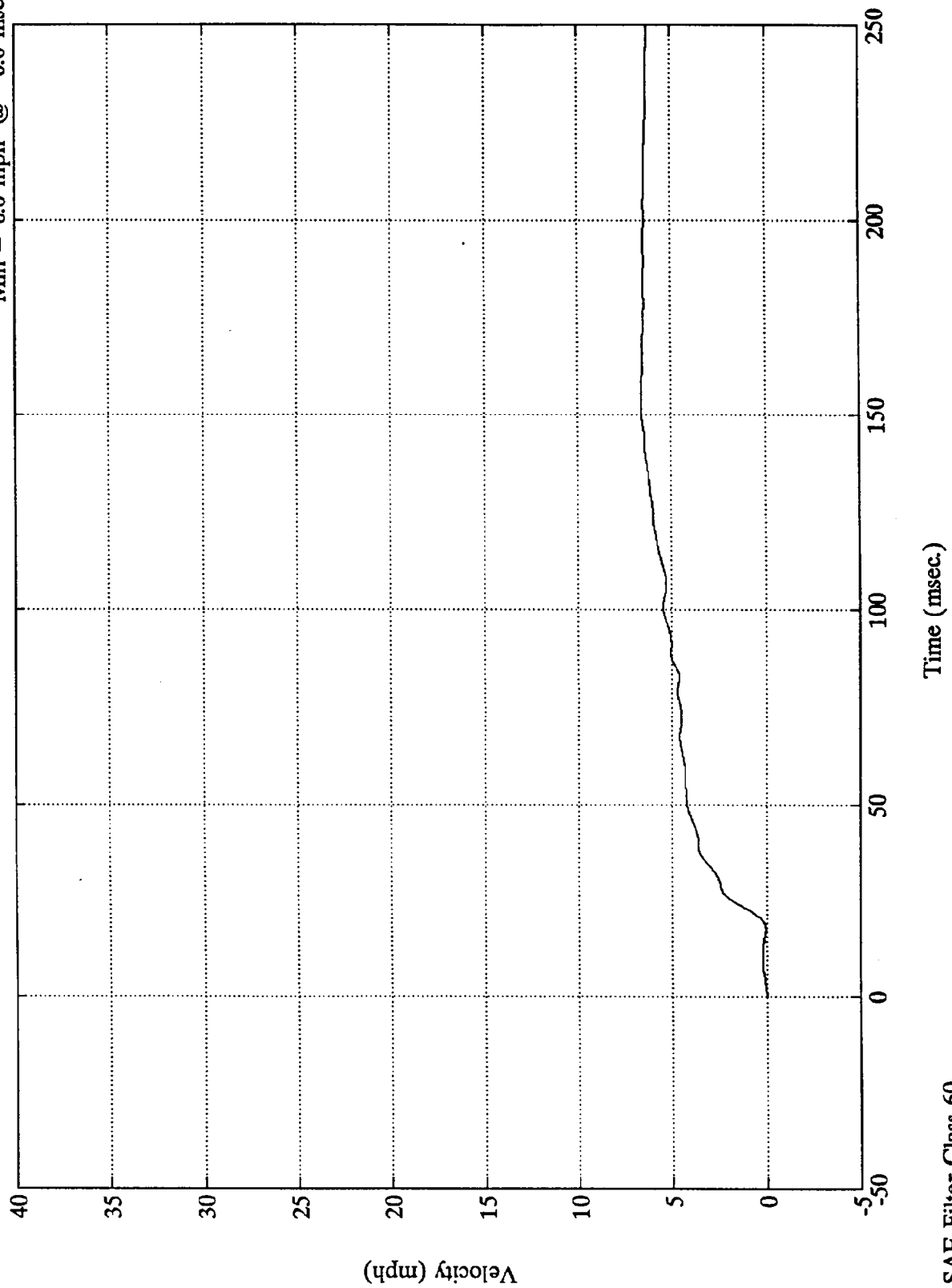
Time (msec)

SAE Filter Class 60

V-to-V Test #5

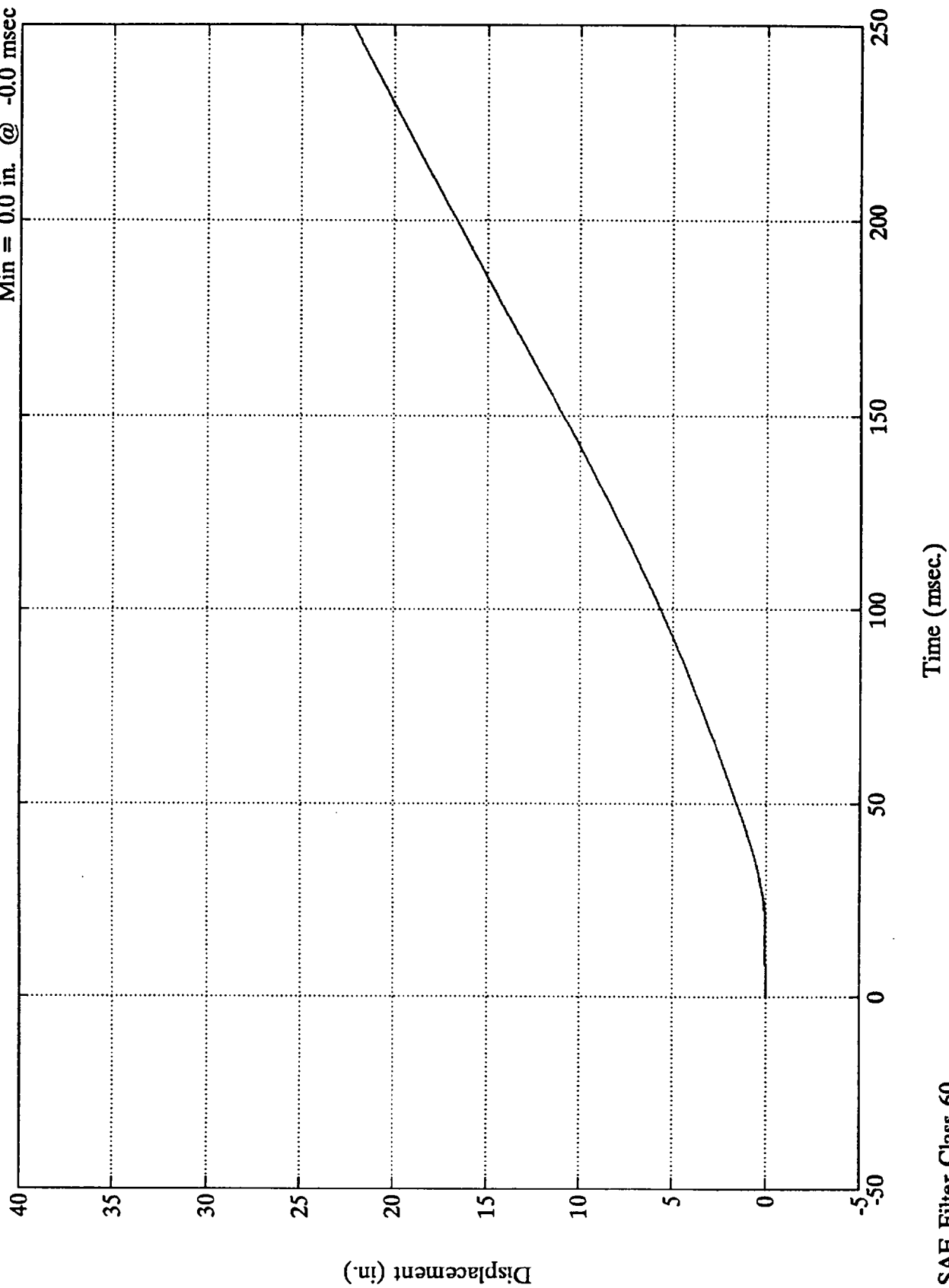
Veh. 1 C/L Seat (Y)

Max = 6.6 mph @ 155.8 msec
Min = 0.0 mph @ -0.0 msec



Veh. 1 C/L Seat (Y)

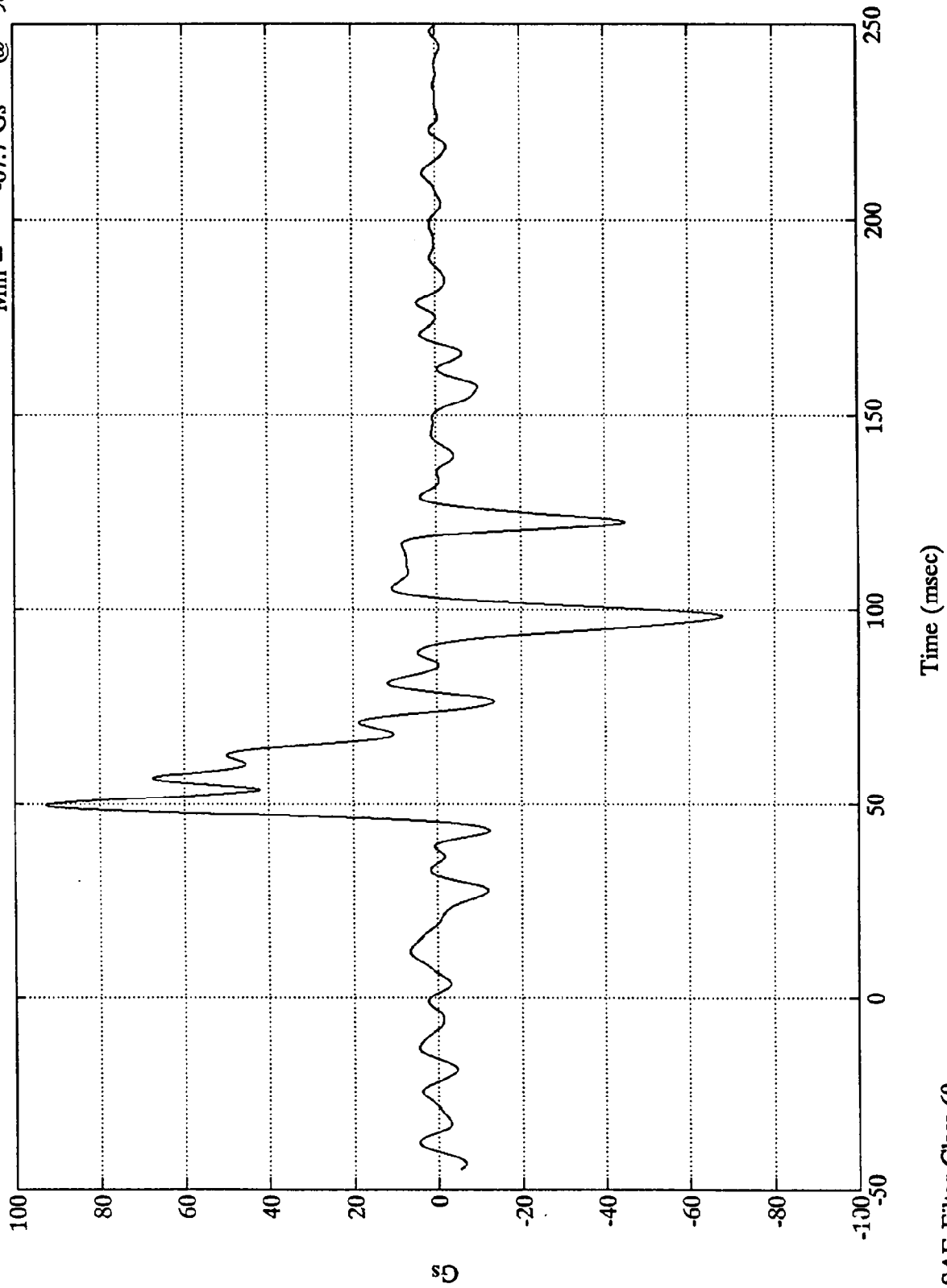
Max = 22.8 in. @ 254.9 msec
Min = 0.0 in. @ -0.0 msec



V-to-V Test #5

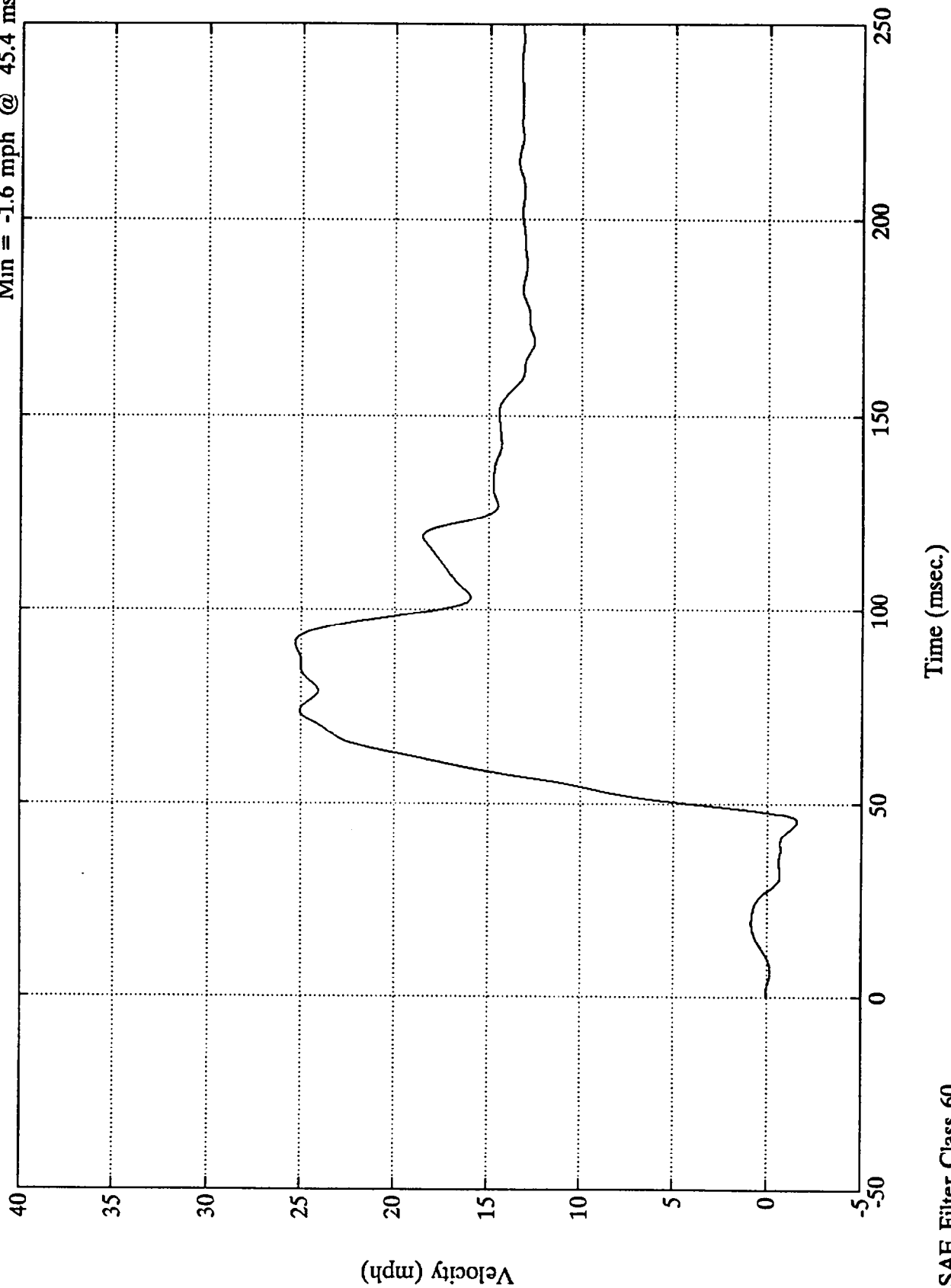
Veh. 1 C/L Seat (Z)

Max = 92.7 Gs @ 49.68 msec
Min = -67.7 Gs @ 98.40 msec



SAE Filter Class 60

Veh. 1 C/L Seat (Z)
Max = 25.3 mph @ 91.4 msec
Min = -1.6 mph @ 45.4 msec

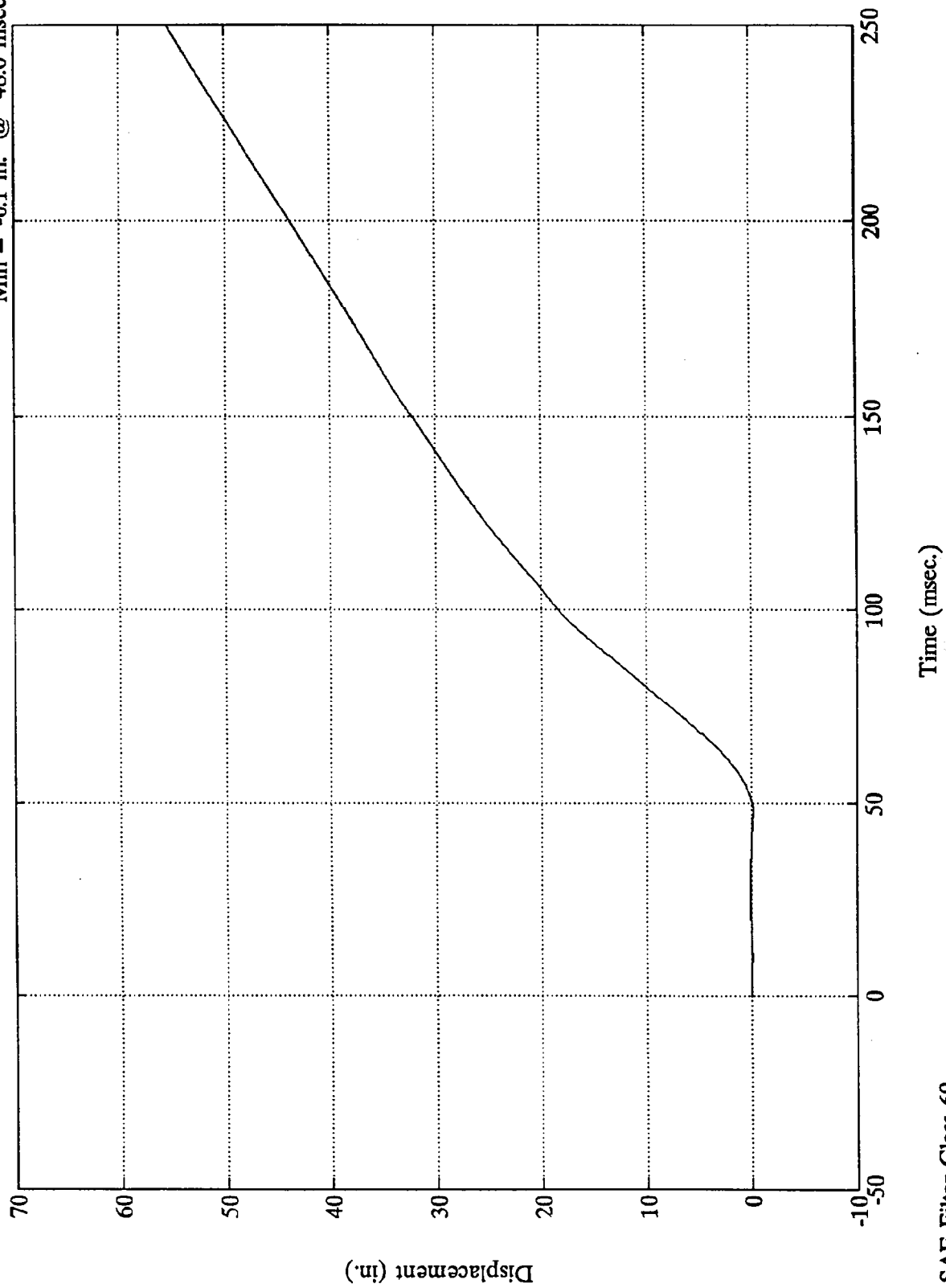


SAE Filter Class 60

V-to-V Test #5

Veh. 1 C/L Seat (Z)

Max = 56.6 in. @ 254.9 msec
Min = -0.1 in. @ 48.0 msec

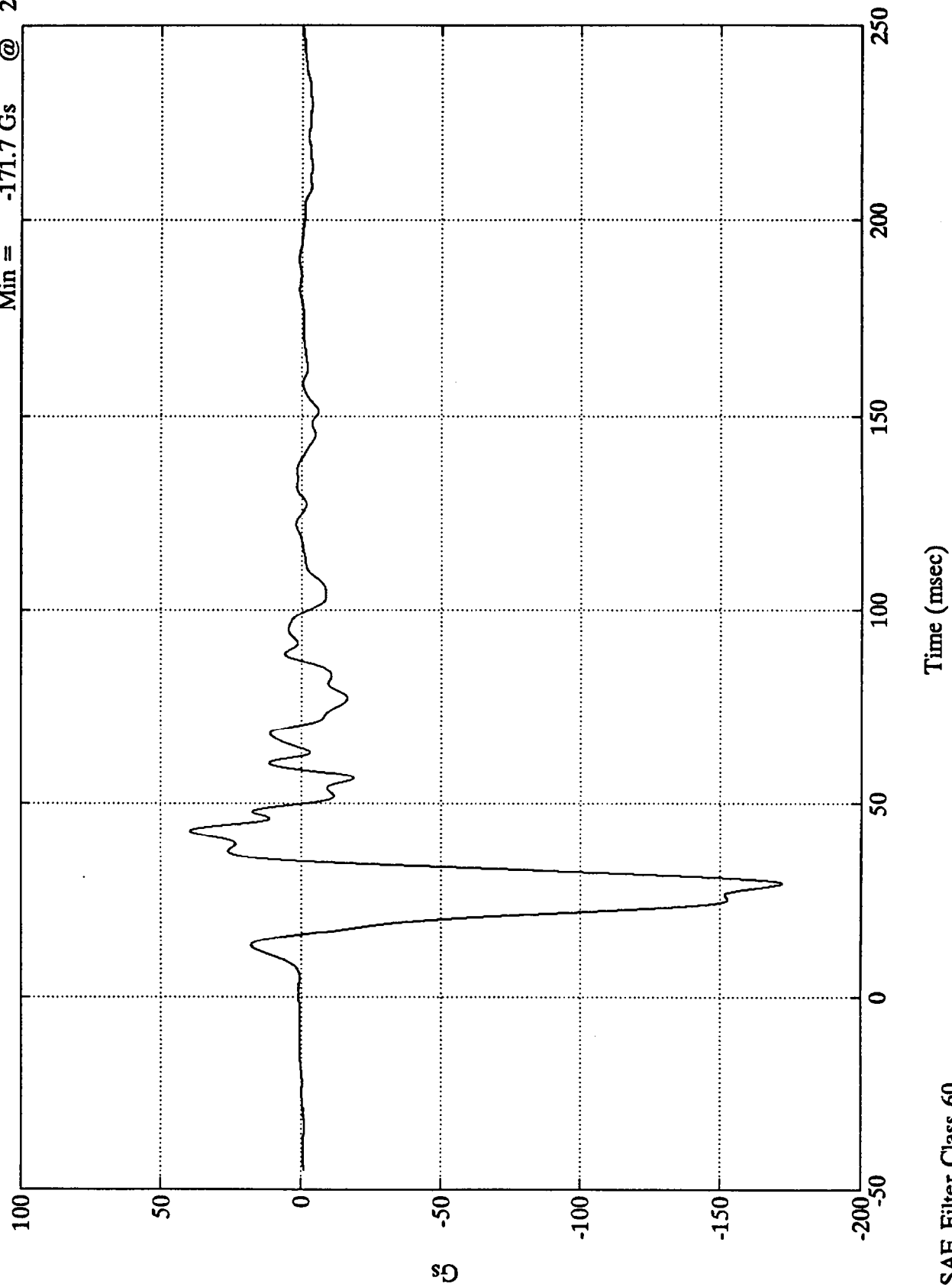


SAE Filter Class 60

Veh. 1 Engine Top (X)

Max = 39.8 Gs
Min = -171.7 Gs

@ 42.95 msec
@ 29.39 msec

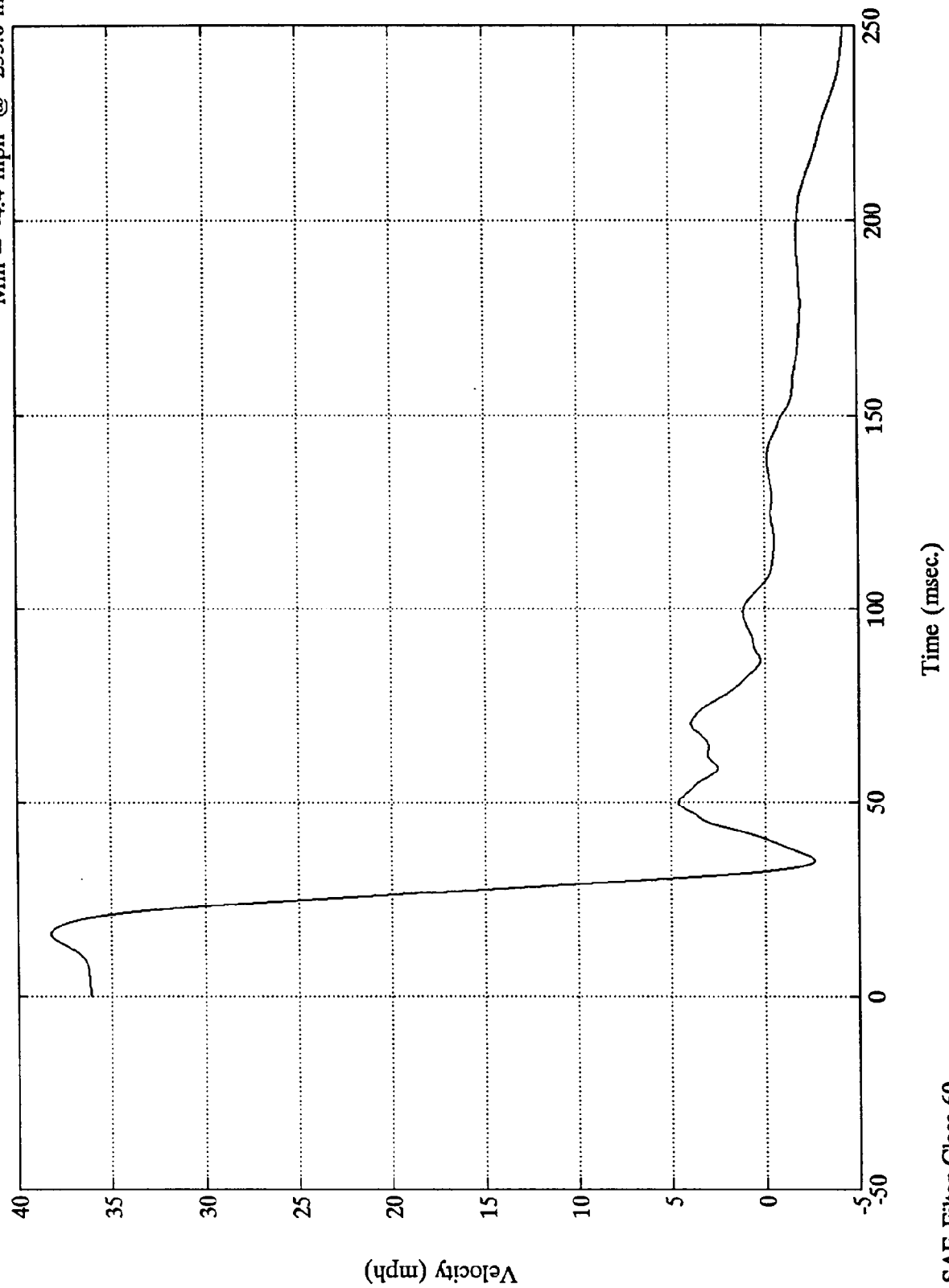


SAE Filter Class 60

V-to-V Test #5

Veh. 1 Engine Top (X)

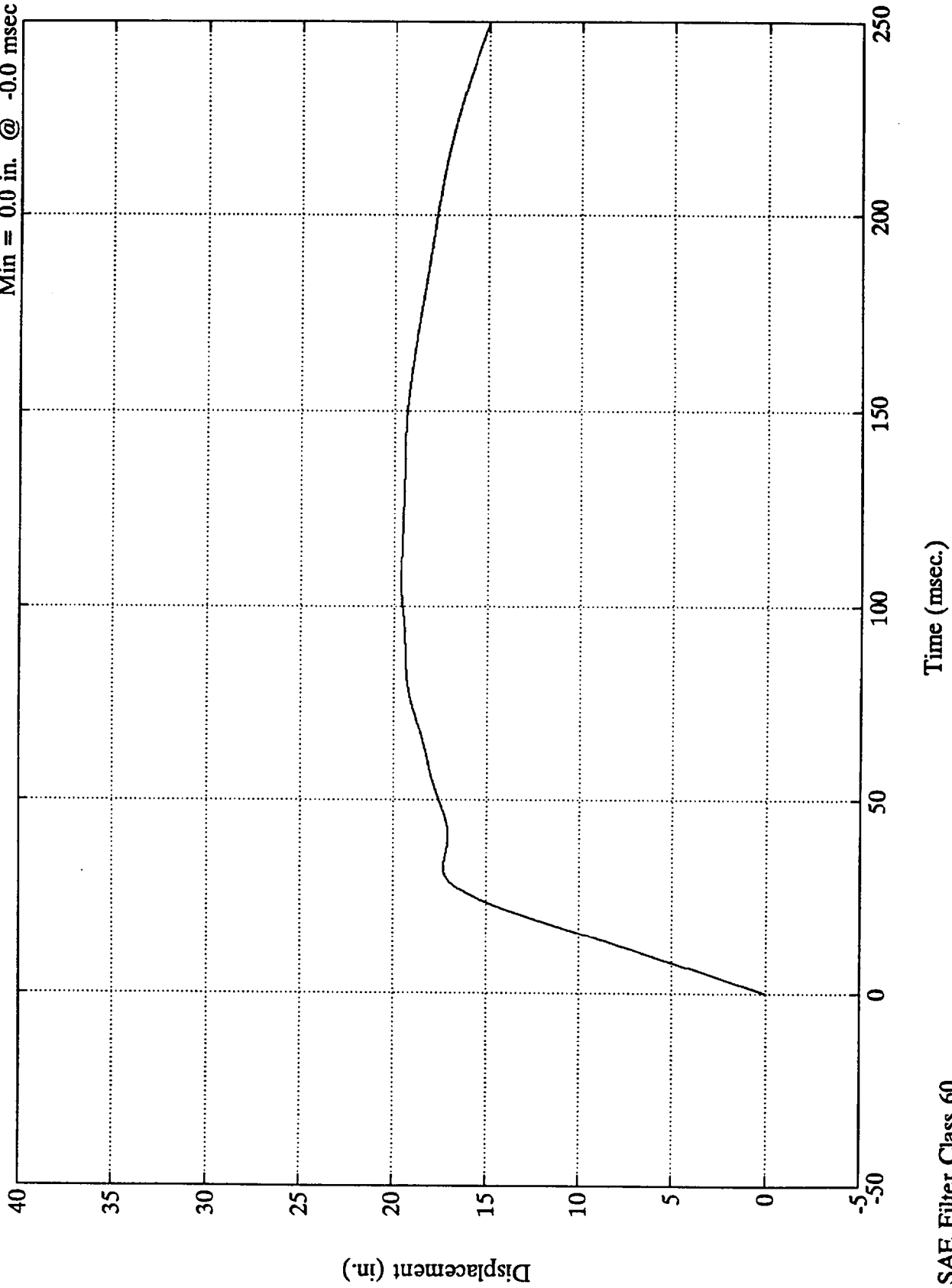
Max = 38.3 mph @ 16.3 msec
Min = -4.4 mph @ 253.0 msec



SAE Filter Class 60

Veh. 1 Engine Top (X)

Max = 19.6 in. @ 109.4 msec
Min = 0.0 in. @ -0.0 msec

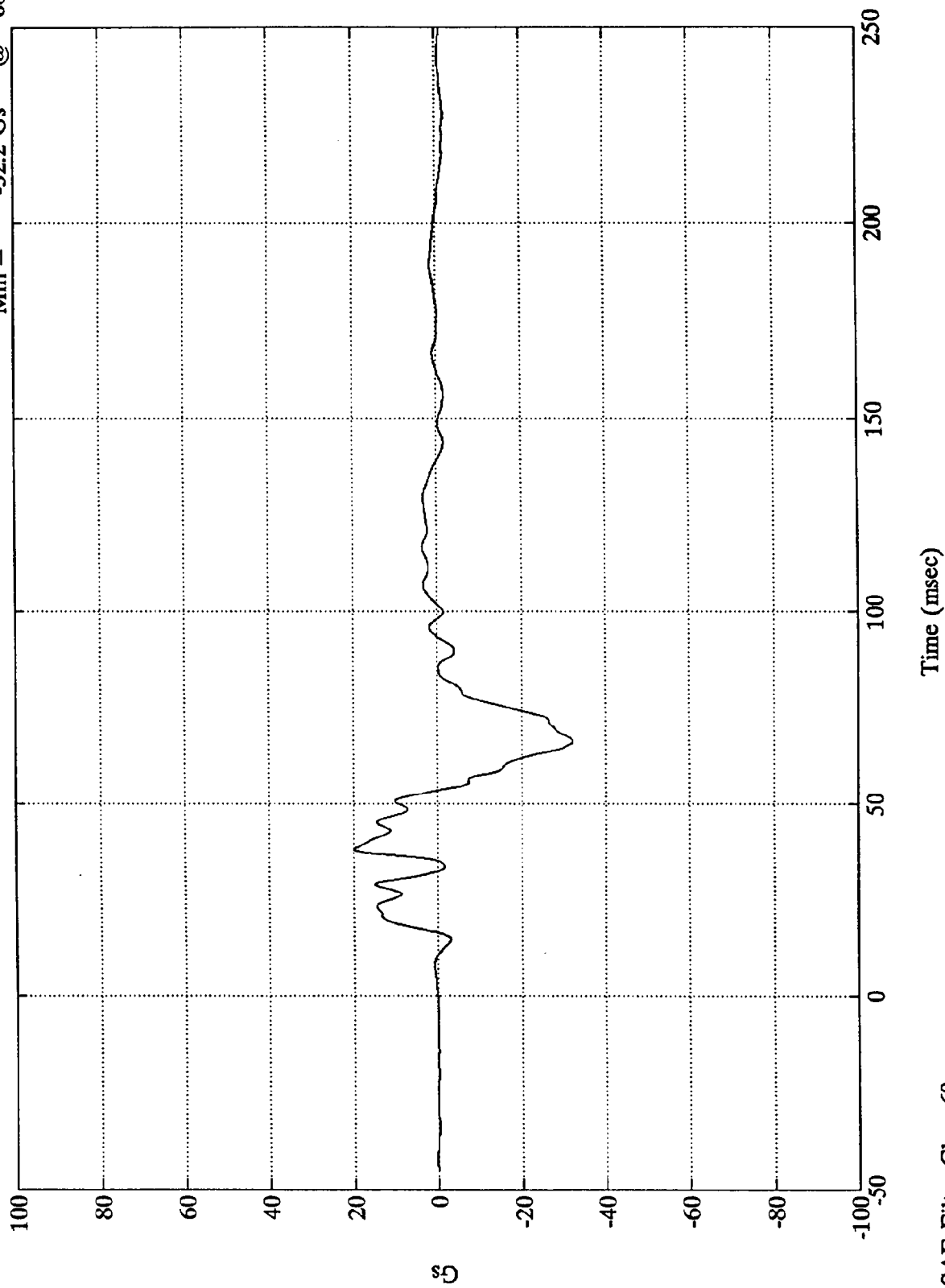


SAE Filter Class 60

V-to-V Test #5

Veh. 1 Engine Top (Z)

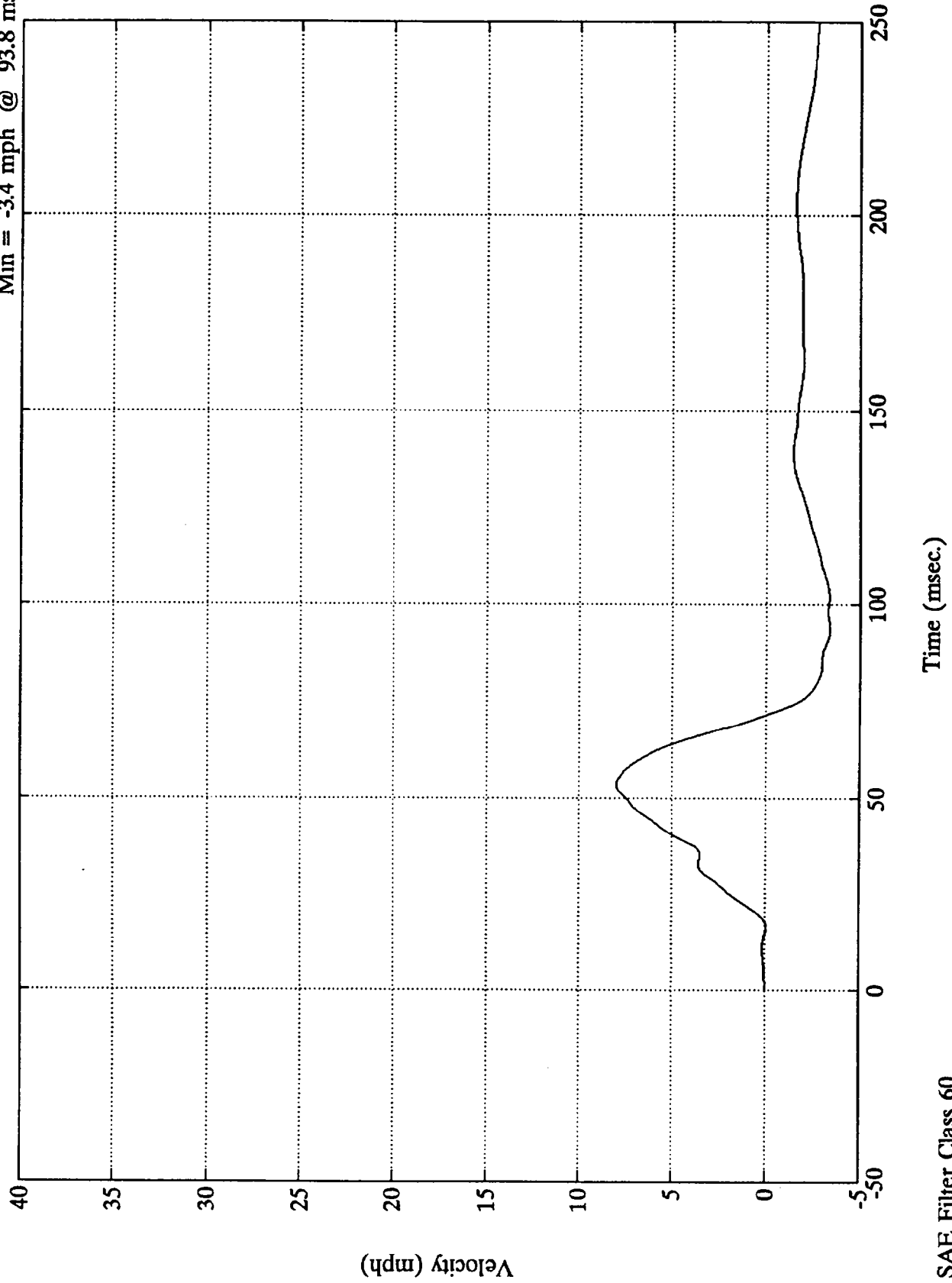
Max = 19.9 Gs @ 38.40 msec
Min = -32.2 Gs @ 66.23 msec



SAE Filter Class 60

Veh. 1 Engine Top (Z)

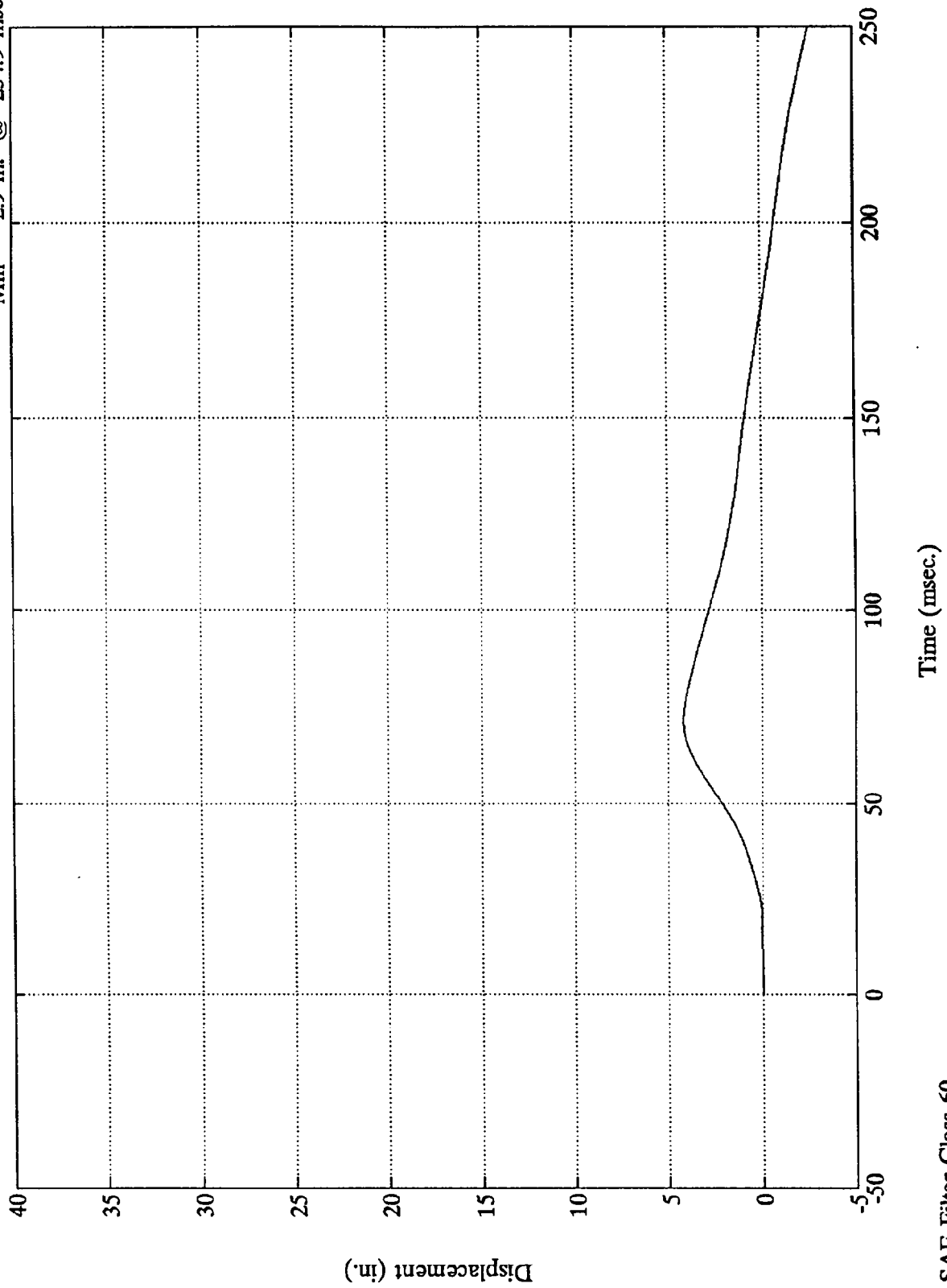
Max = 8.0 mph @ 53.8 msec
Min = -3.4 mph @ 93.8 msec



V-to-V Test #5

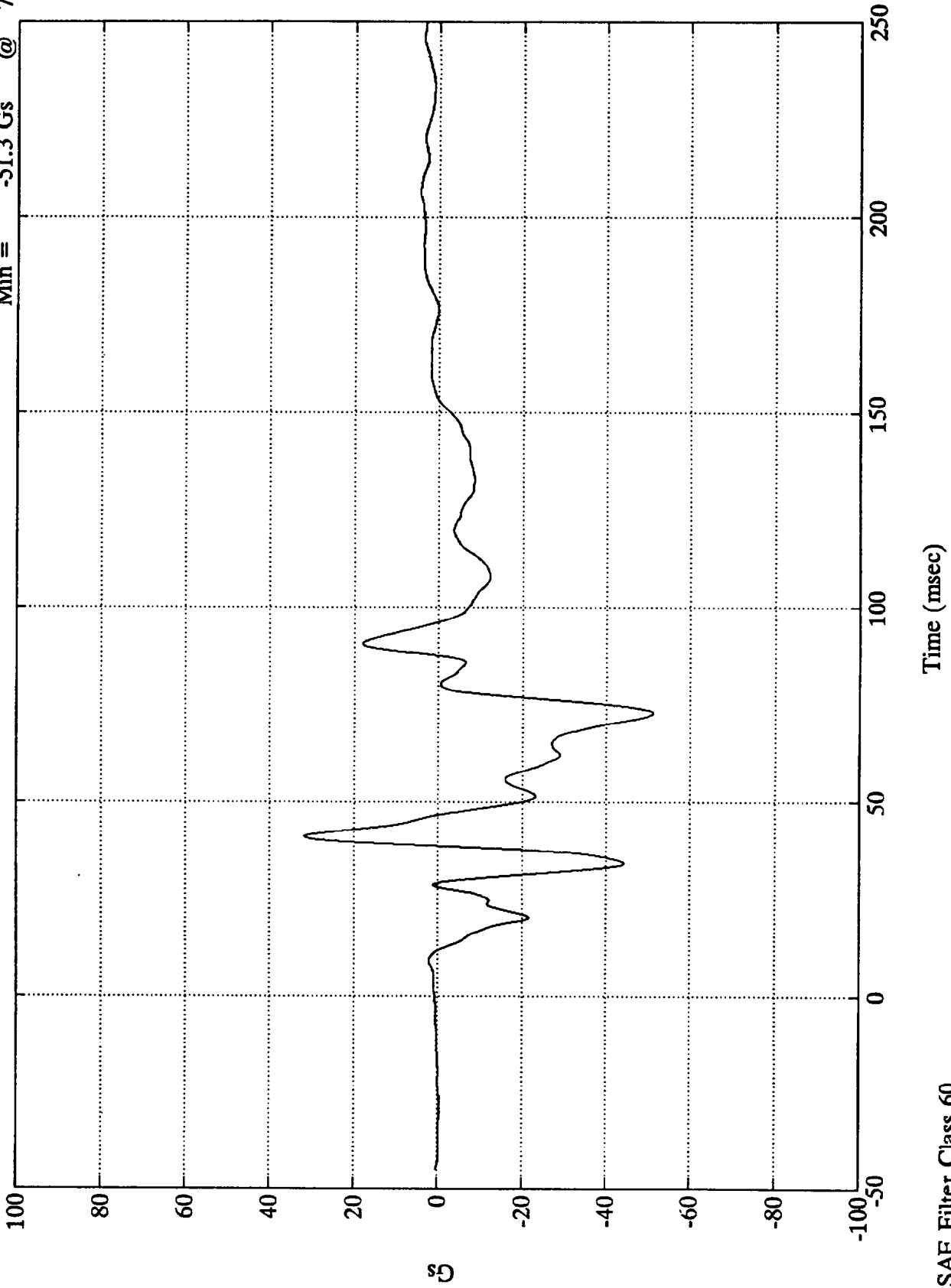
Veh. 1 Engine Top (Z)

Max = 4.2 in. @ 71.8 msec
Min = -2.9 in. @ 254.9 msec



Veh. 1 Engine Bottom (X)

Max = 31.9 Gs @ 41.15 msec
Min = -51.3 Gs @ 72.96 msec

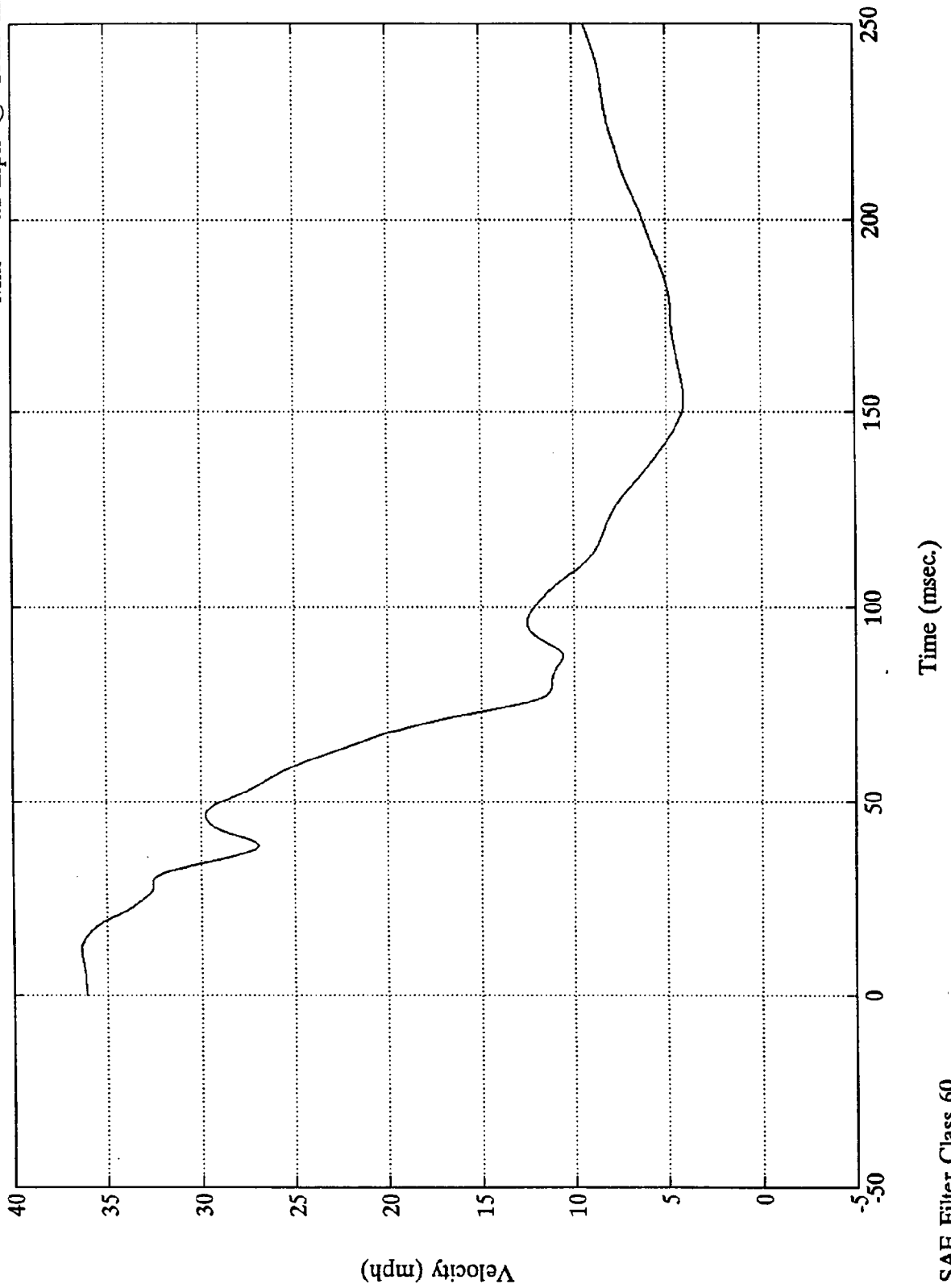


SAE Filter Class 60

V-to-V Test #5

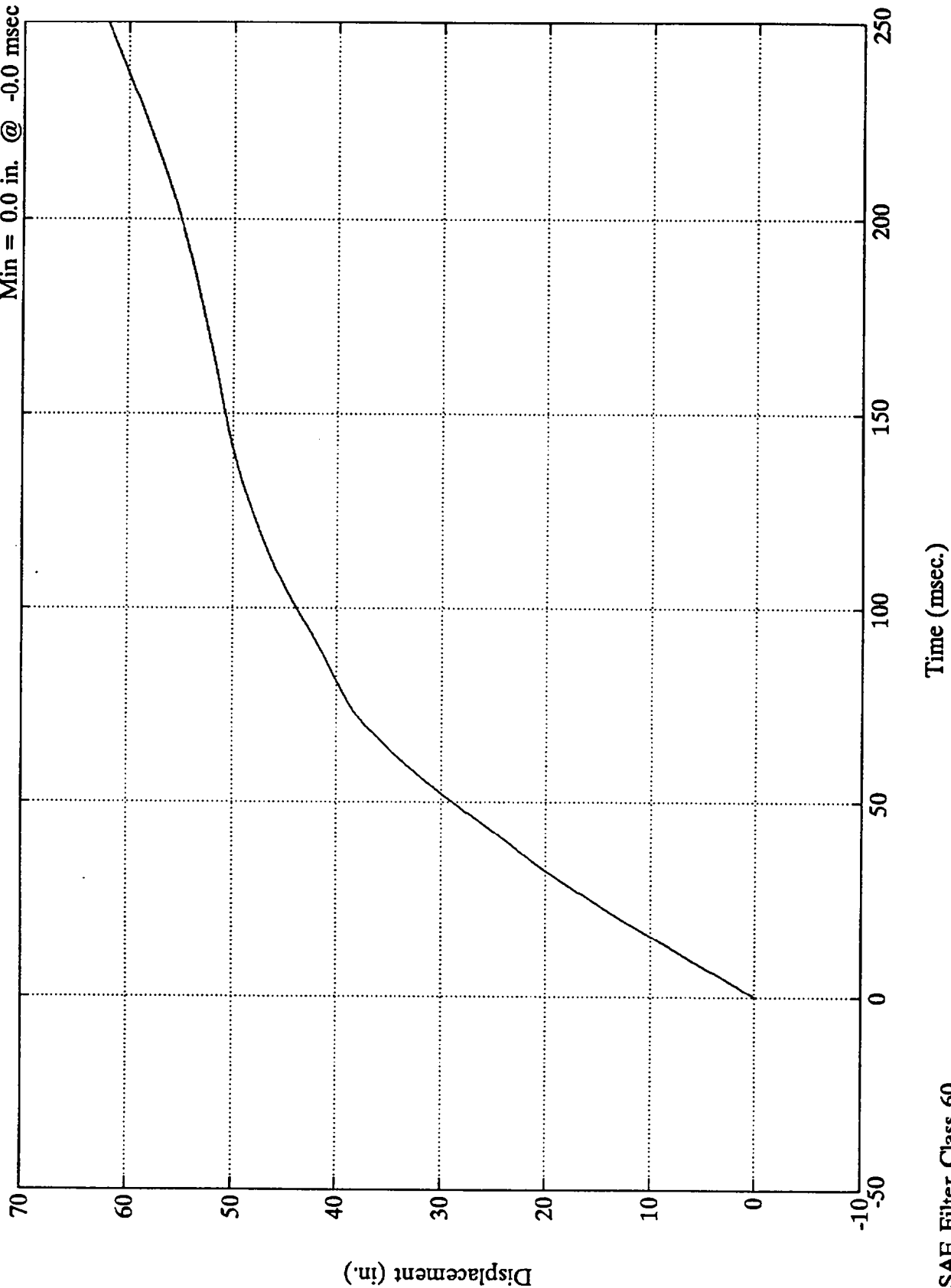
Veh. 1 Engine Bottom (X)

Max = 36.4 mph @ 12.2 msec
Min = 4.1 mph @ 152.9 msec



Veh. 1 Engine Bottom (X)

Max = 62.8 in. @ 254.9 msec
Min = 0.0 in. @ -0.0 msec

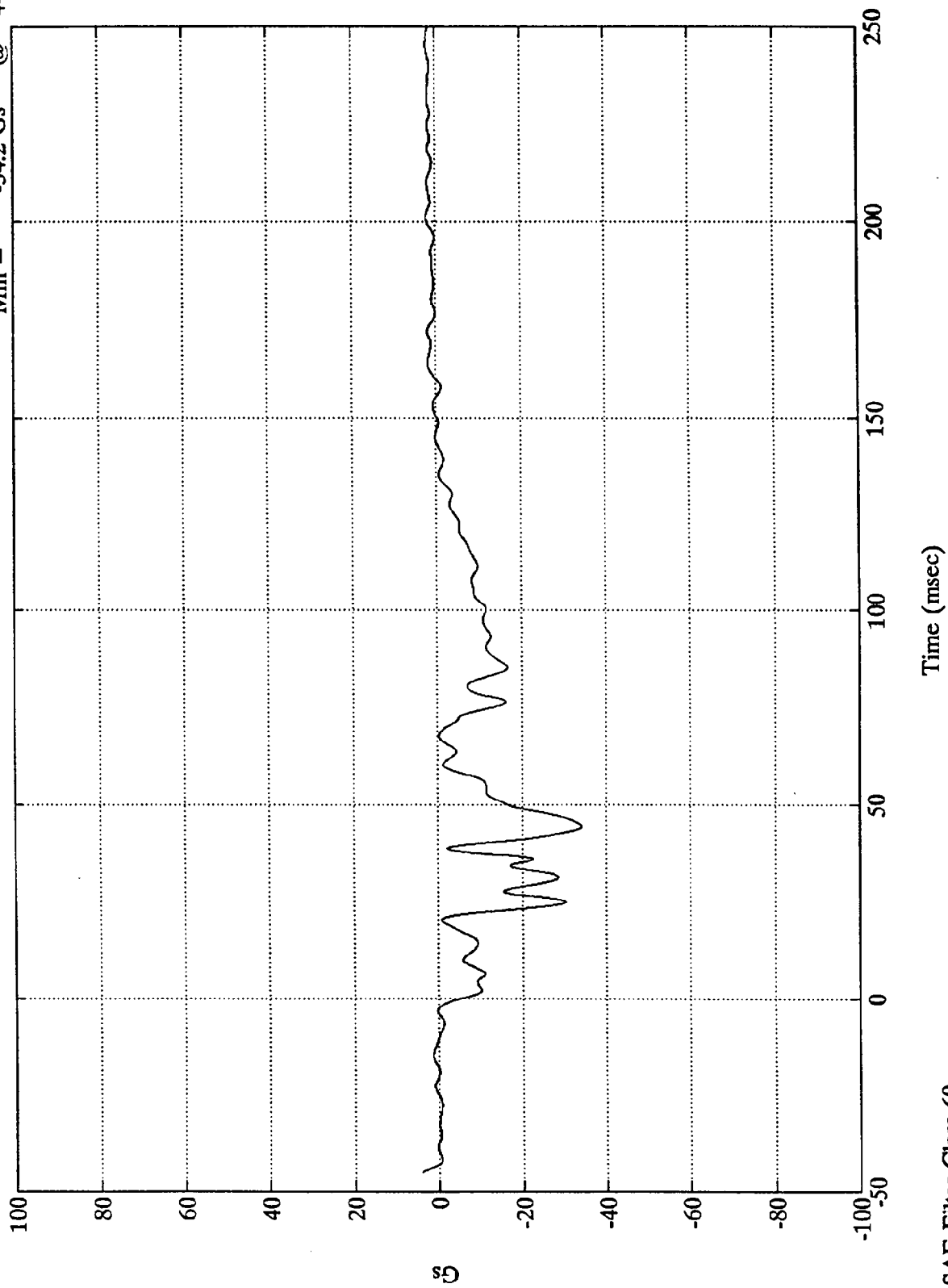


SAE Filter Class 60

V-to-V Test #5

Veh. 1 Front X Mem. (X)

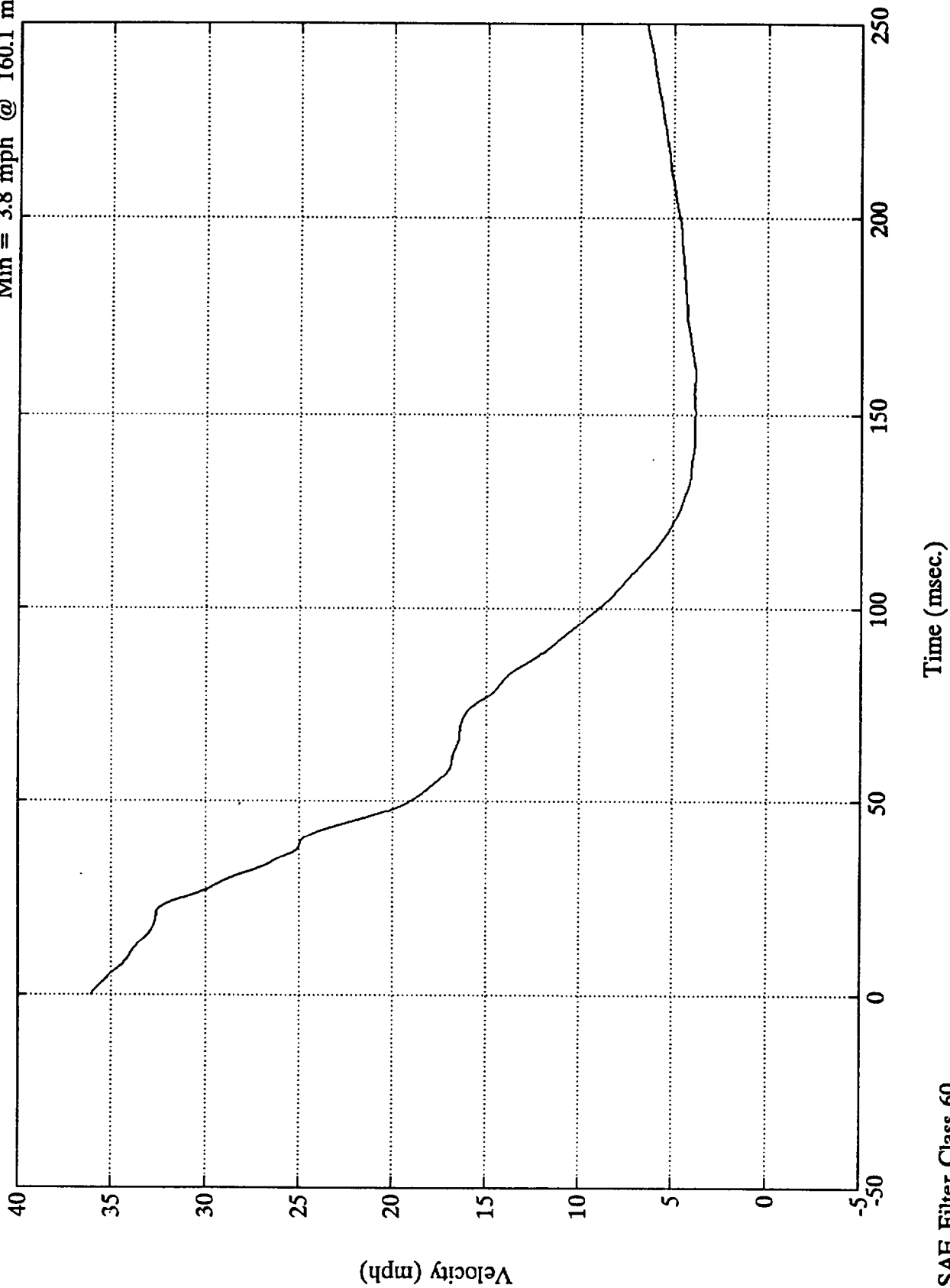
Max = 4.1 Gs @ -44.88 msec
Min = -34.2 Gs @ 44.39 msec



SAE Filter Class 60

V-to-V Test #5

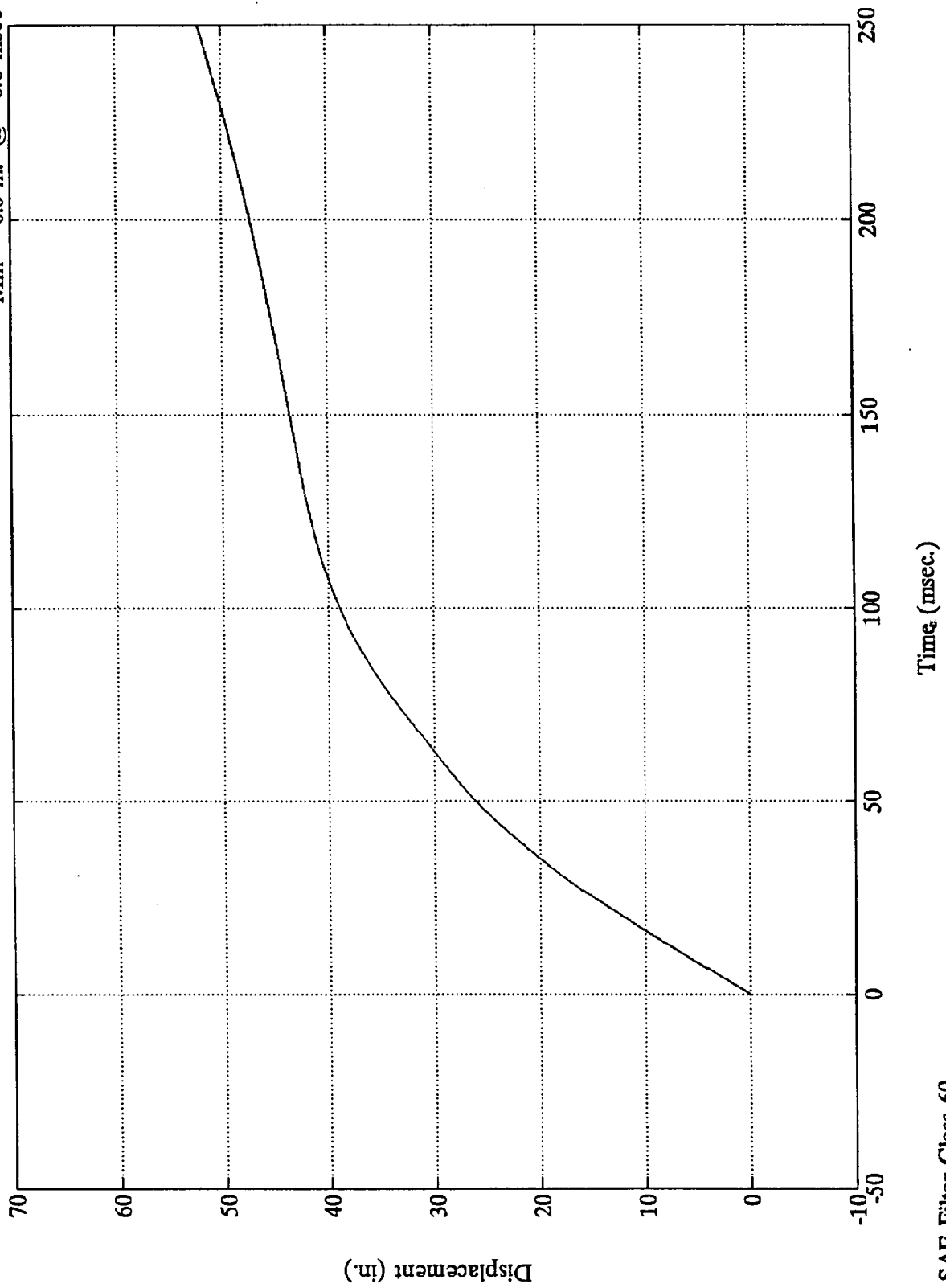
Veh. 1 Front X Mem. (X)
Max = 36.1 mph @ -0.0 msec
Min = 3.8 mph @ 160.1 msec



V-to-V Test #5

Veh. 1 Front X Mem. (X)

Max = 52.8 in. @ 254.9 msec
Min = 0.0 in. @ -0.0 msec

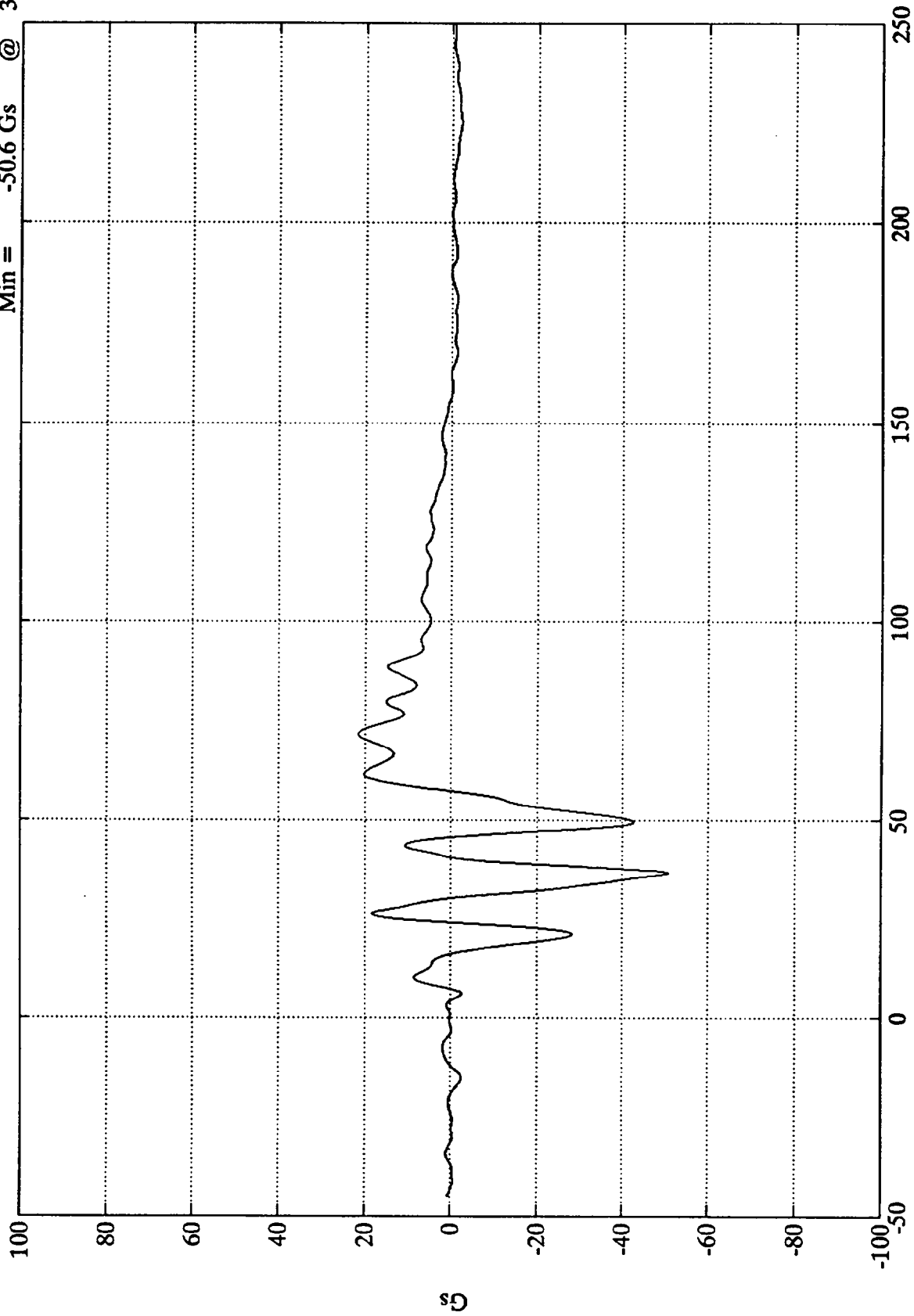


Veh. 1 Front X Mem. (Z)

Max =
Min =

21.4 Gs
-50.6 Gs

@ 71.40 msec
@ 36.47 msec



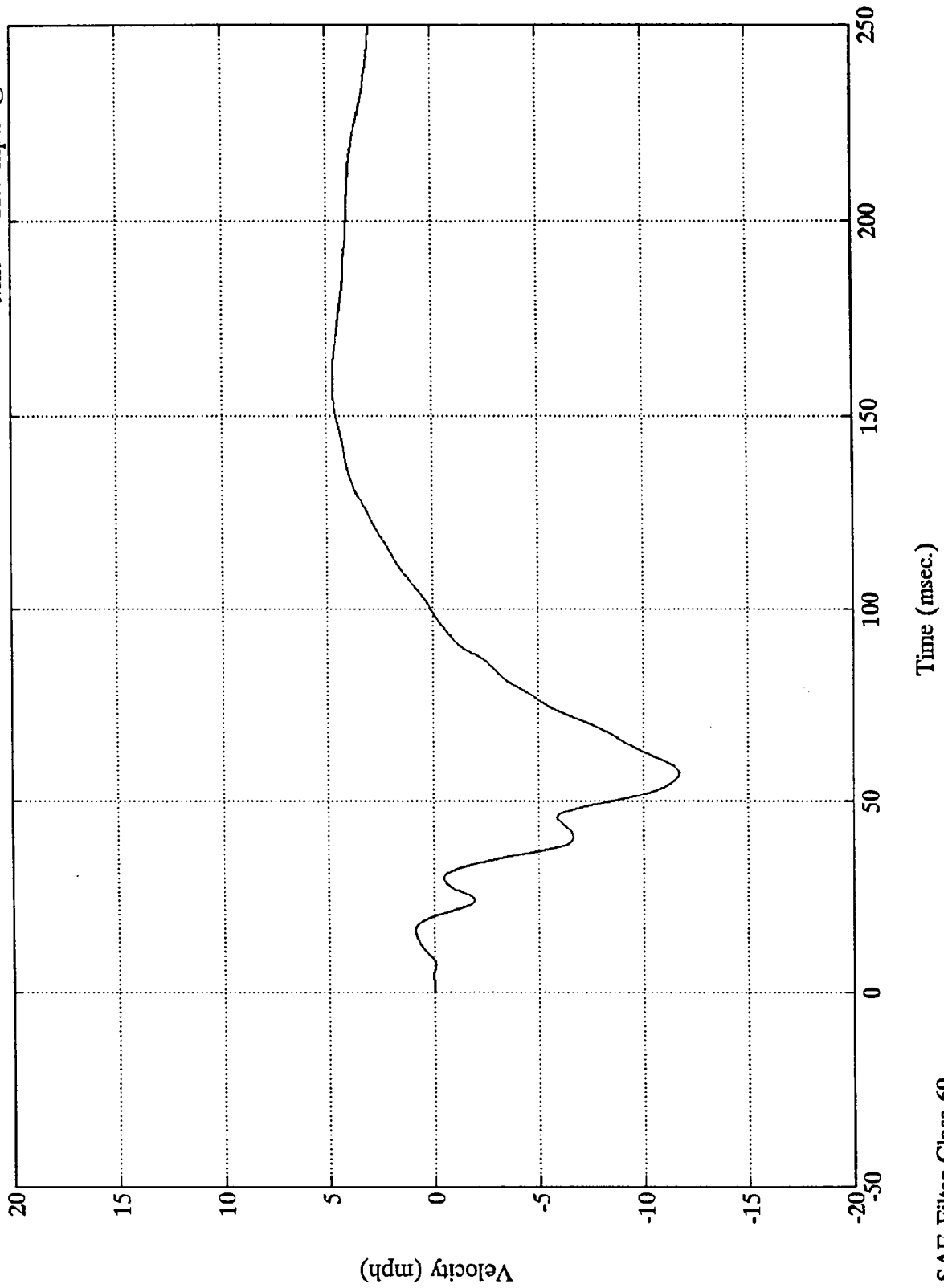
Time (msec)

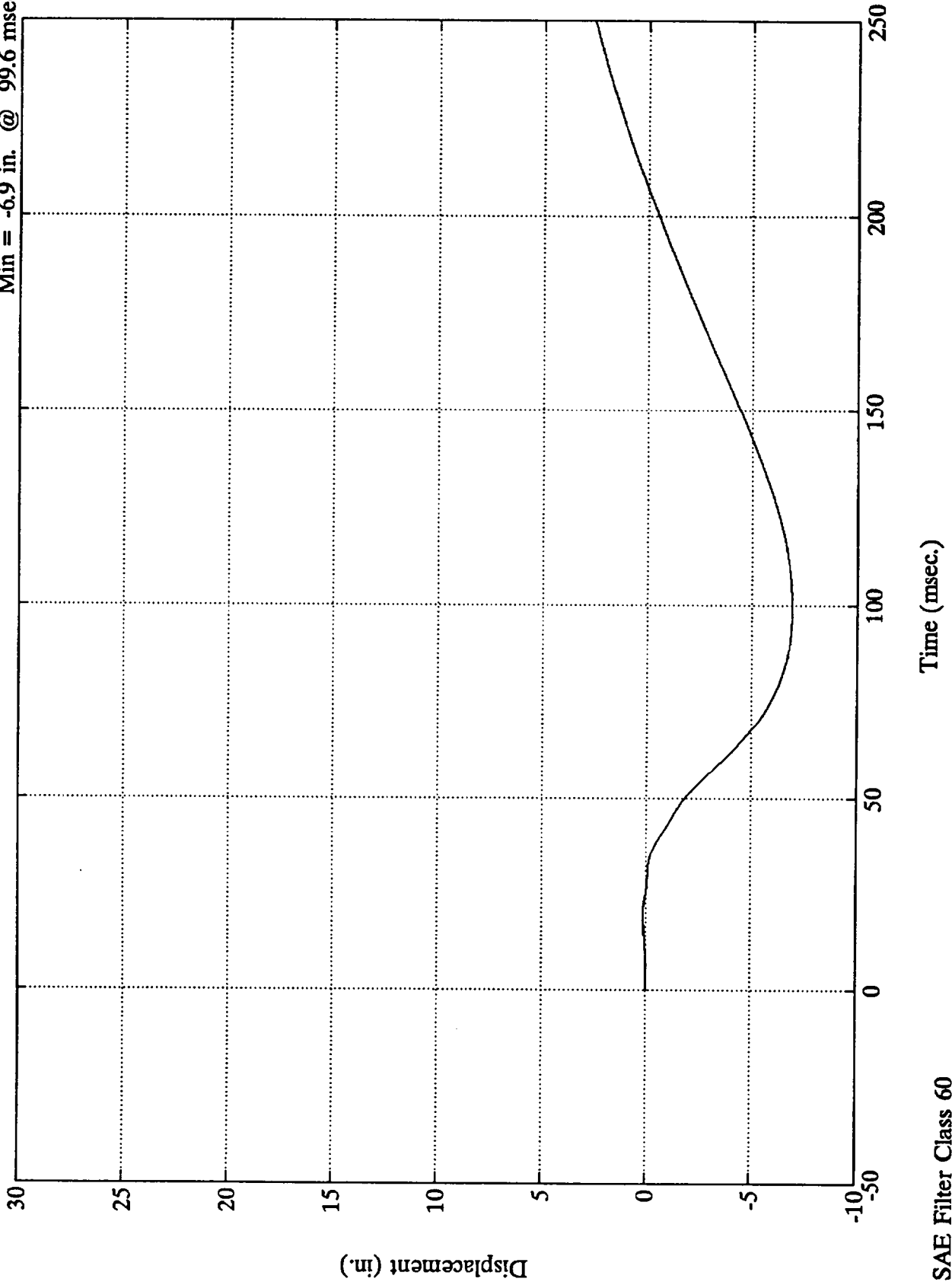
SAE Filter Class 60

V-to-V Test #5

Veh. 1 Front X Mem. (Z)

Max = 4.7 mph @ 157.0 msec
Min = -11.7 mph @ 57.4 msec

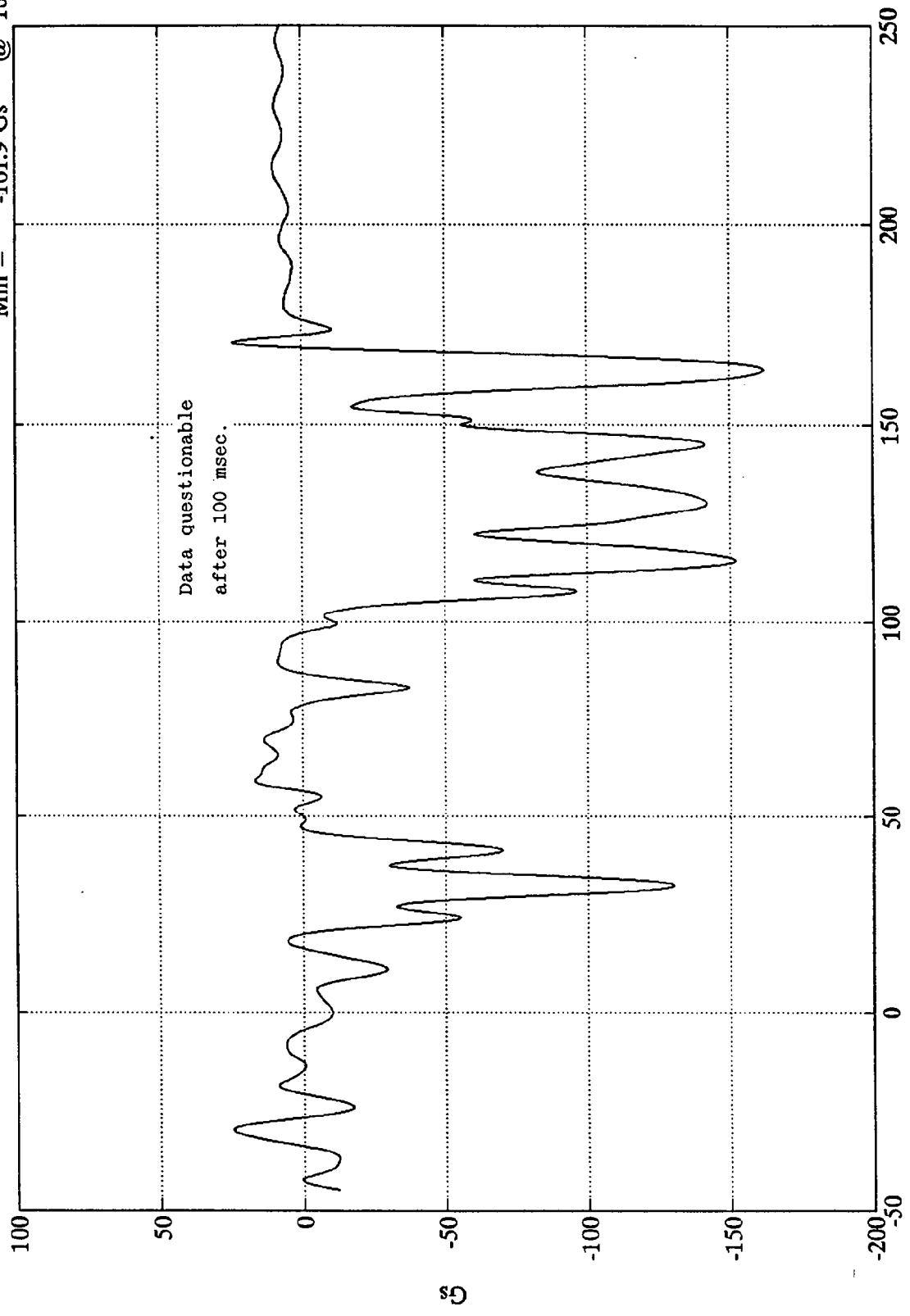




V-to-V Test #5

Veh. 1 Left Caliper (X)

Max = 24.7 Gs @ -29.88 msec
Min = -161.9 Gs @ 163.91 msec



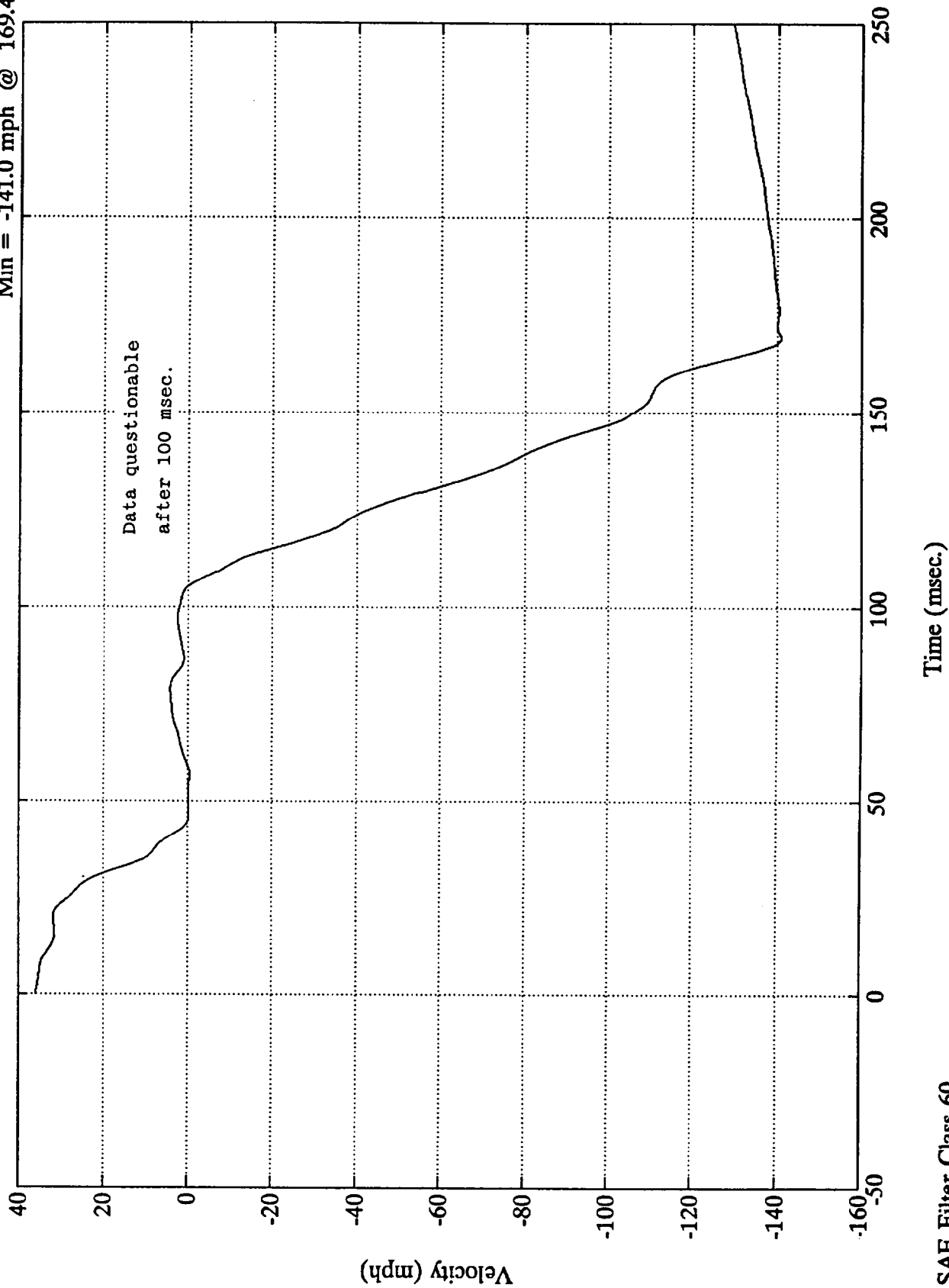
Time (msec)

SAE Filter Class 60

V-to-V Test #5

Veh. 1 Left Caliper (X)

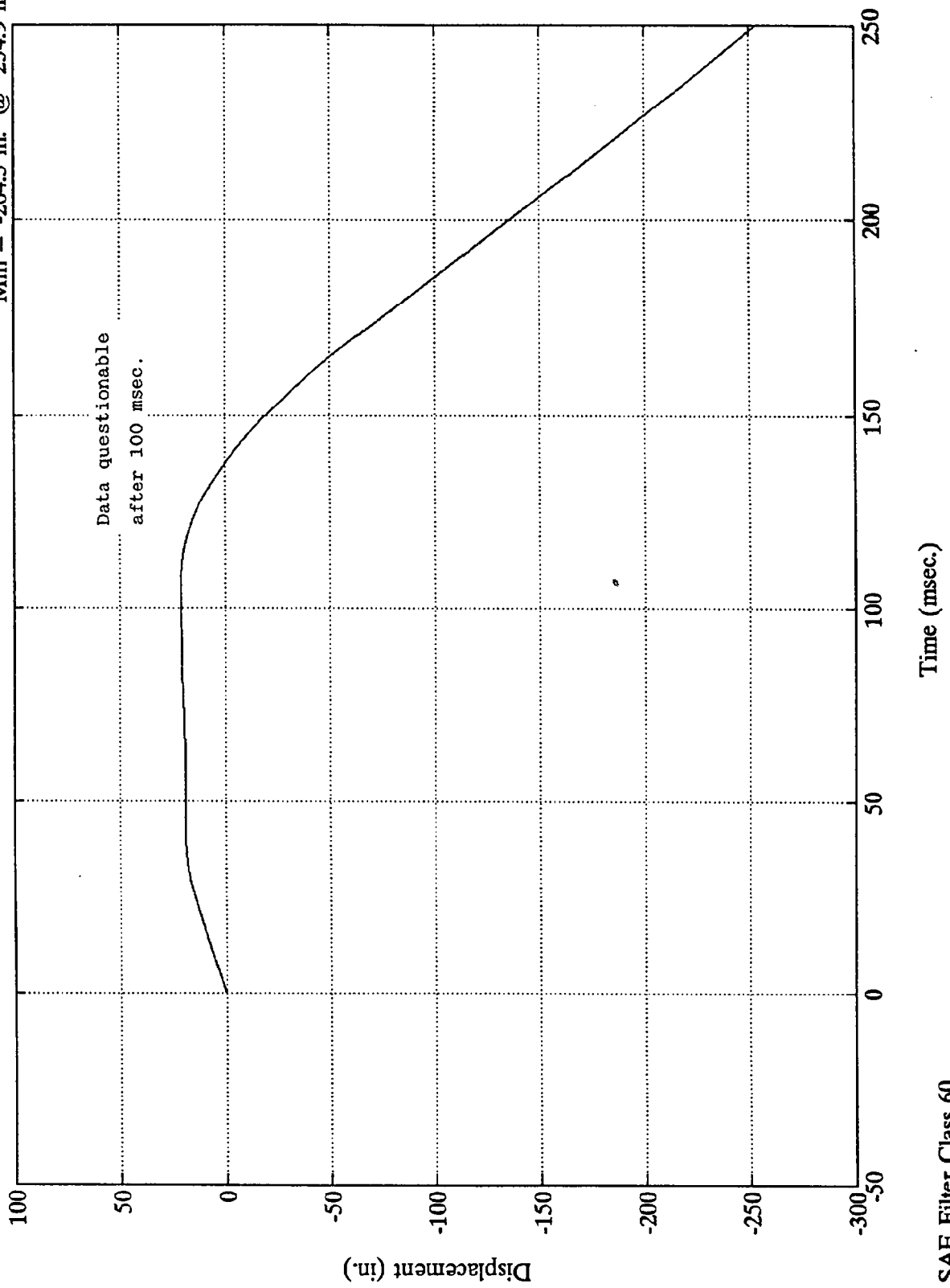
Max = 36.1 mph @ -0.0 msec
Min = -141.0 mph @ 169.4 msec



V-to-V Test #5

Veh. 1 Left Caliper (X)

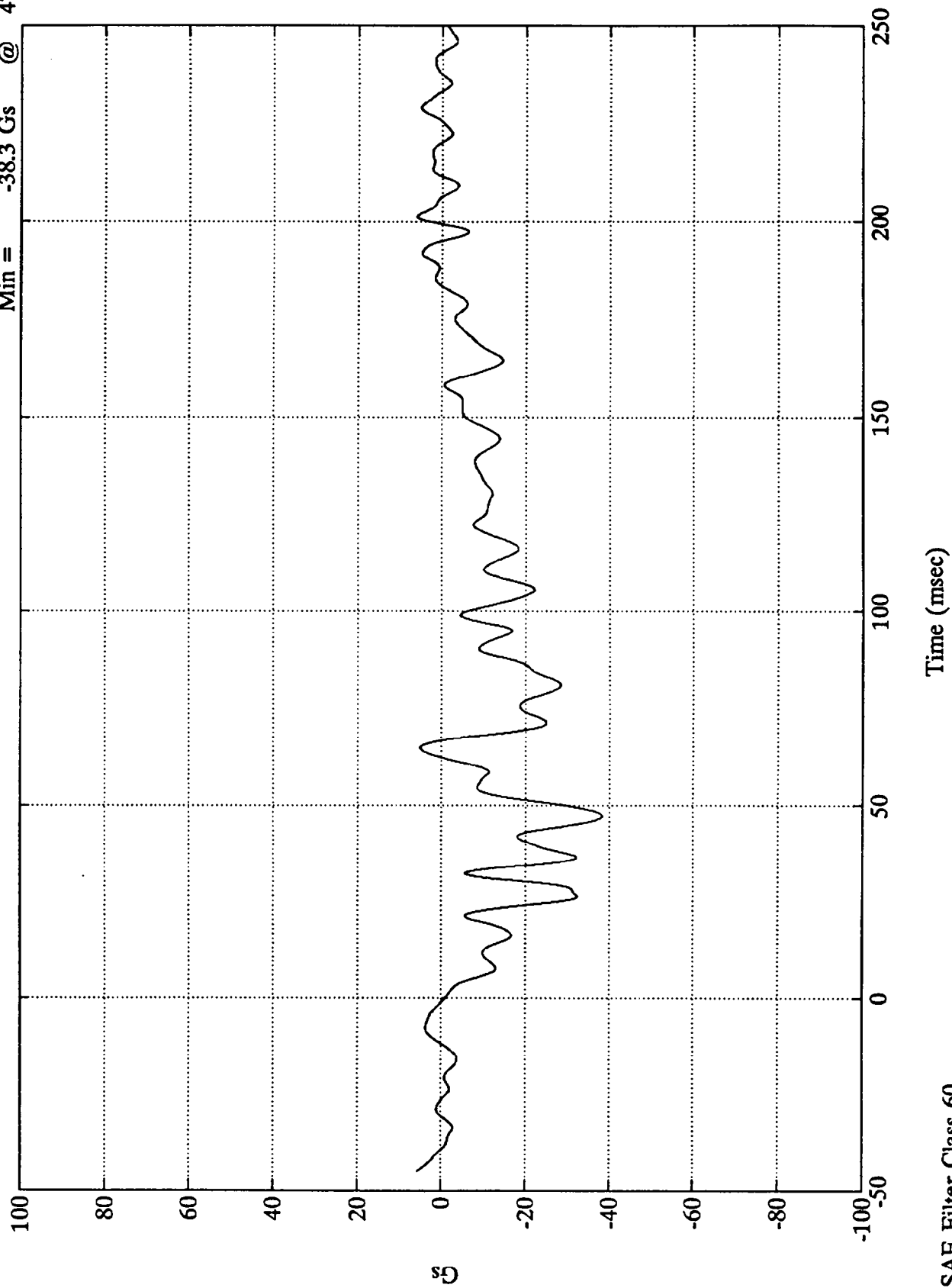
Max = 21.0 in. @ 106.1 msec
Min = -264.5 in. @ 254.9 msec



V-to-V Test #5

Veh. 1 Right Caliper (X)

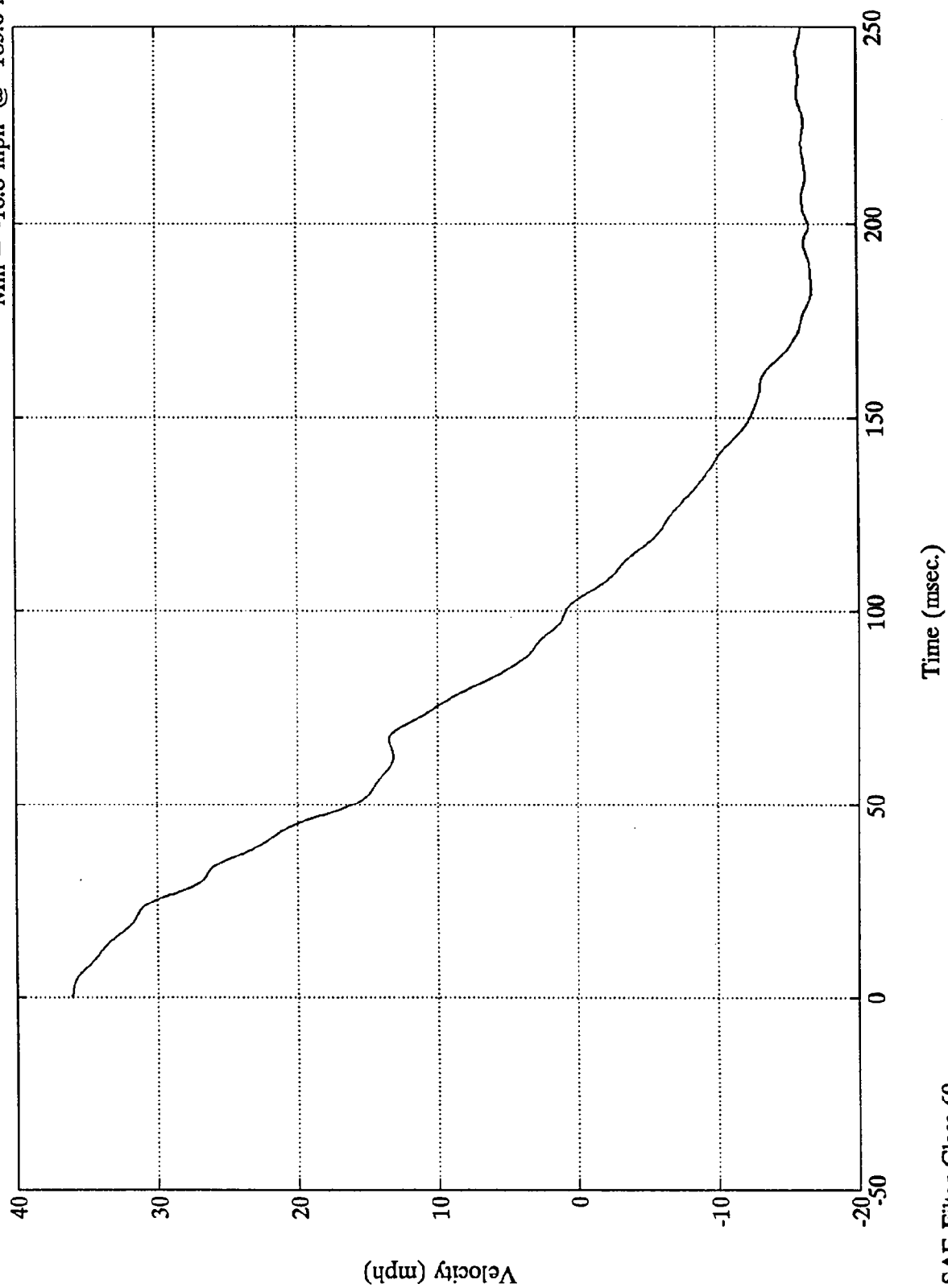
Max = 5.9 Gs @ 201.24 msec
Min = -38.3 Gs @ 47.40 msec



V-to-V Test #5

Veh. 1 Right Caliper (X)

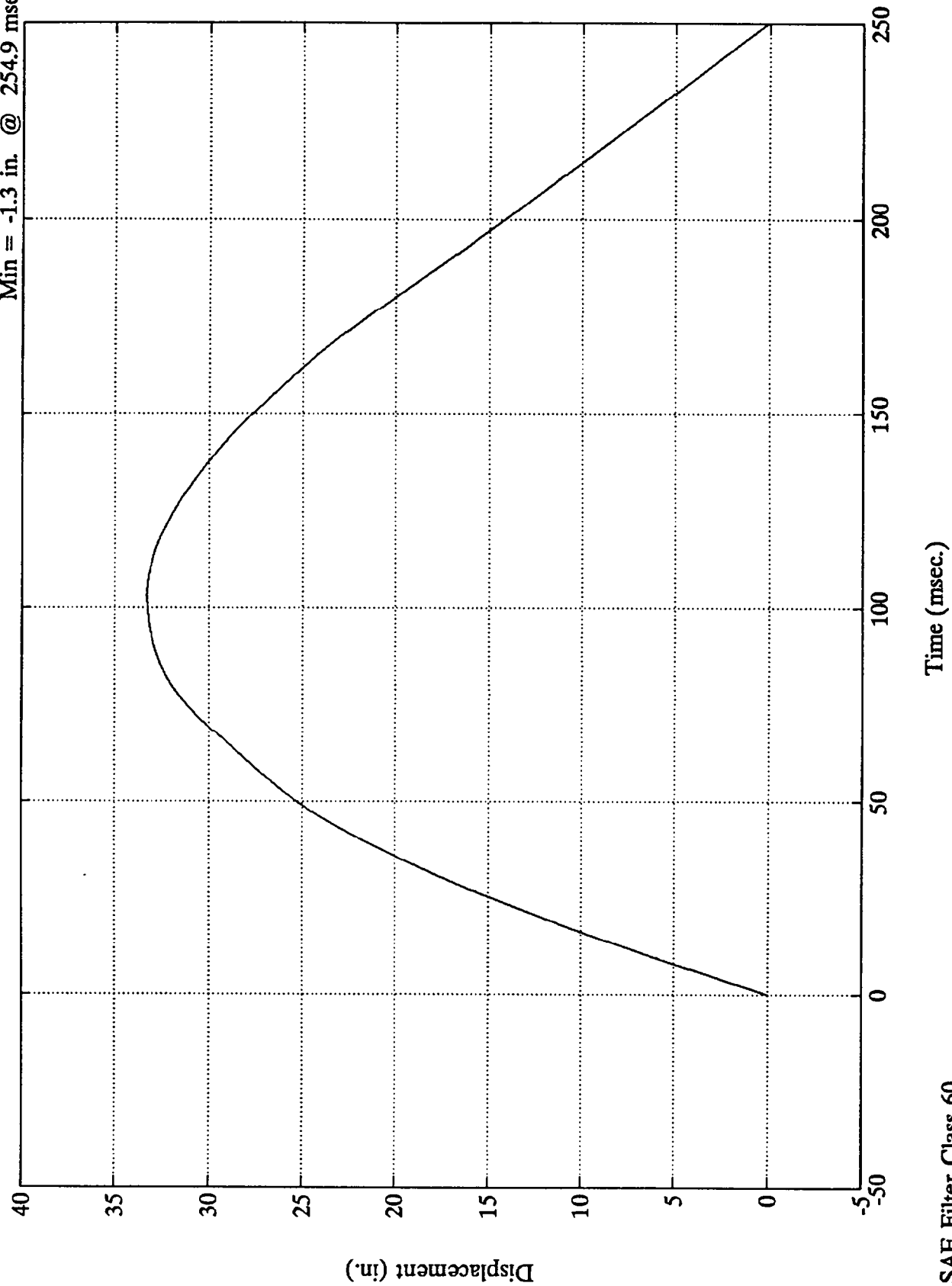
Max = 36.1 mph @ -0.0 msec
Min = -16.8 mph @ 183.6 msec



SAE Filter Class 60

Veh. 1 Right Caliper (X)

Max = 33.3 in. @ 103.4 msec
Min = -1.3 in. @ 254.9 msec

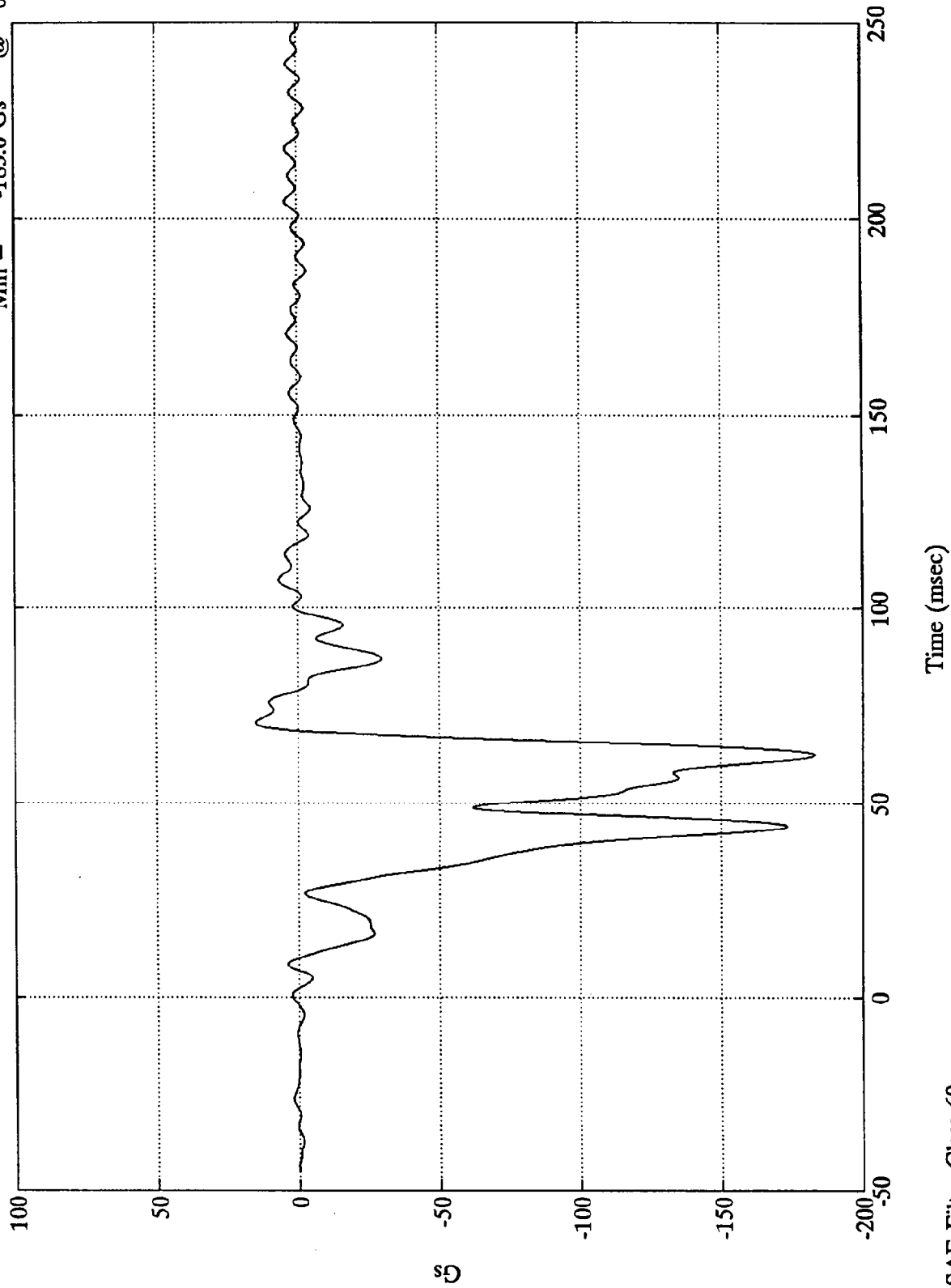


SAE Filter Class 60

V-to-V Test #5

Veh. 1 Brake Pedal (X)

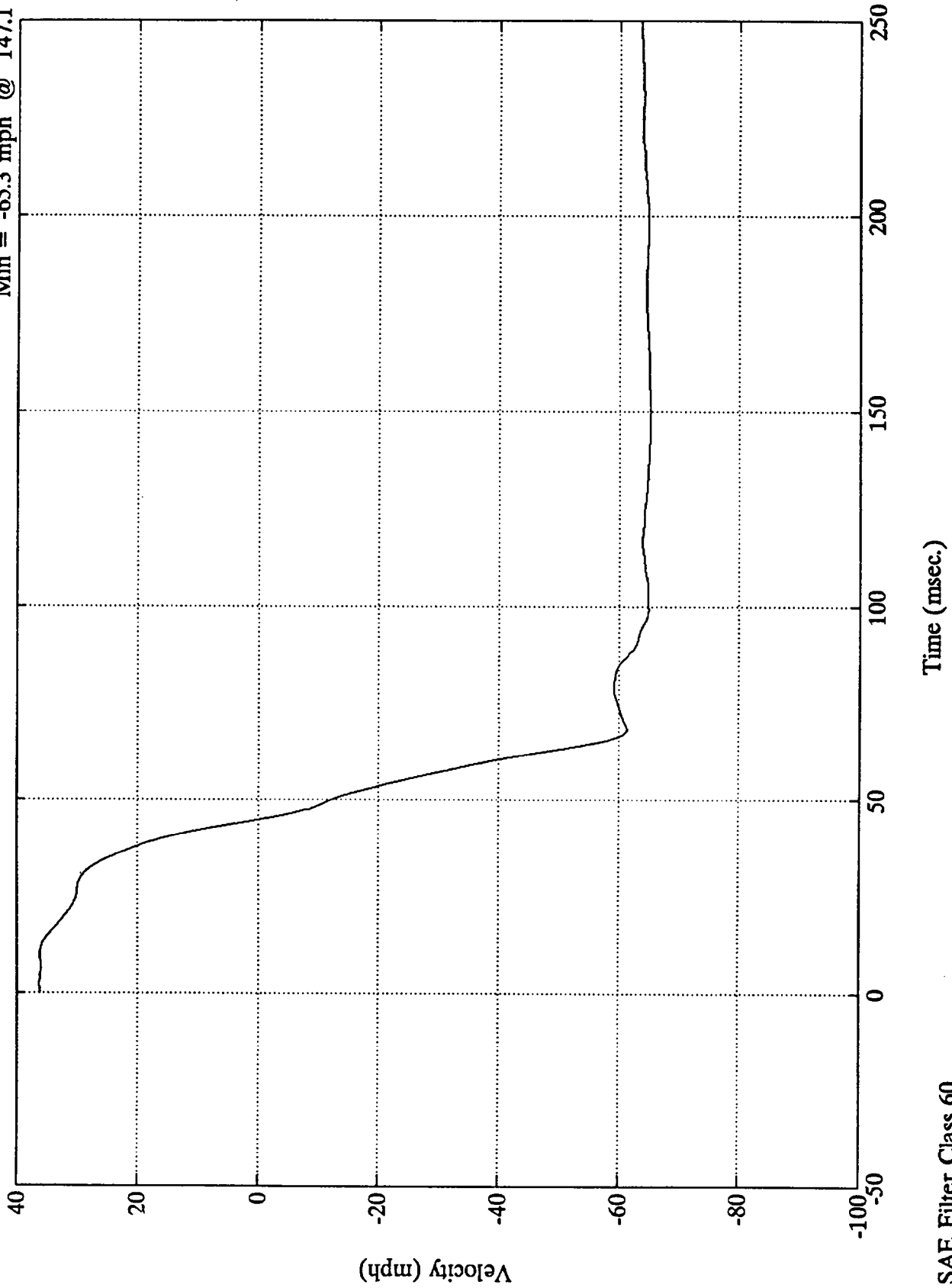
Max = 15.1 Gs @ 70.44 msec
Min = -183.0 Gs @ 62.51 msec



SAE Filter Class 60

Veh. 1 Brake Pedal (X)

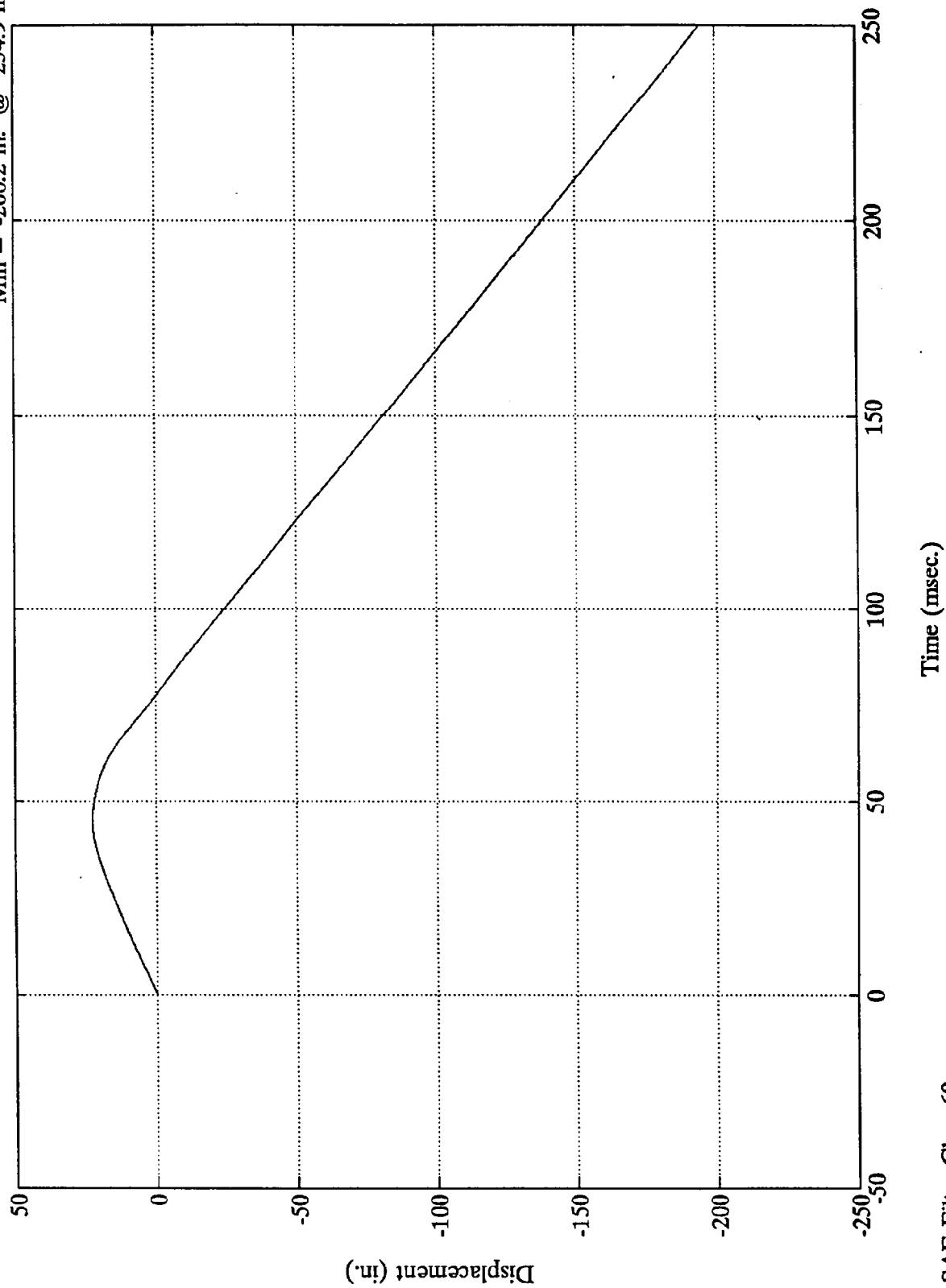
Max = 36.2 mph @ 2.6 msec
Min = -65.3 mph @ 147.1 msec



V-to-V Test #5

Veh. 1 Brake Pedal (X)

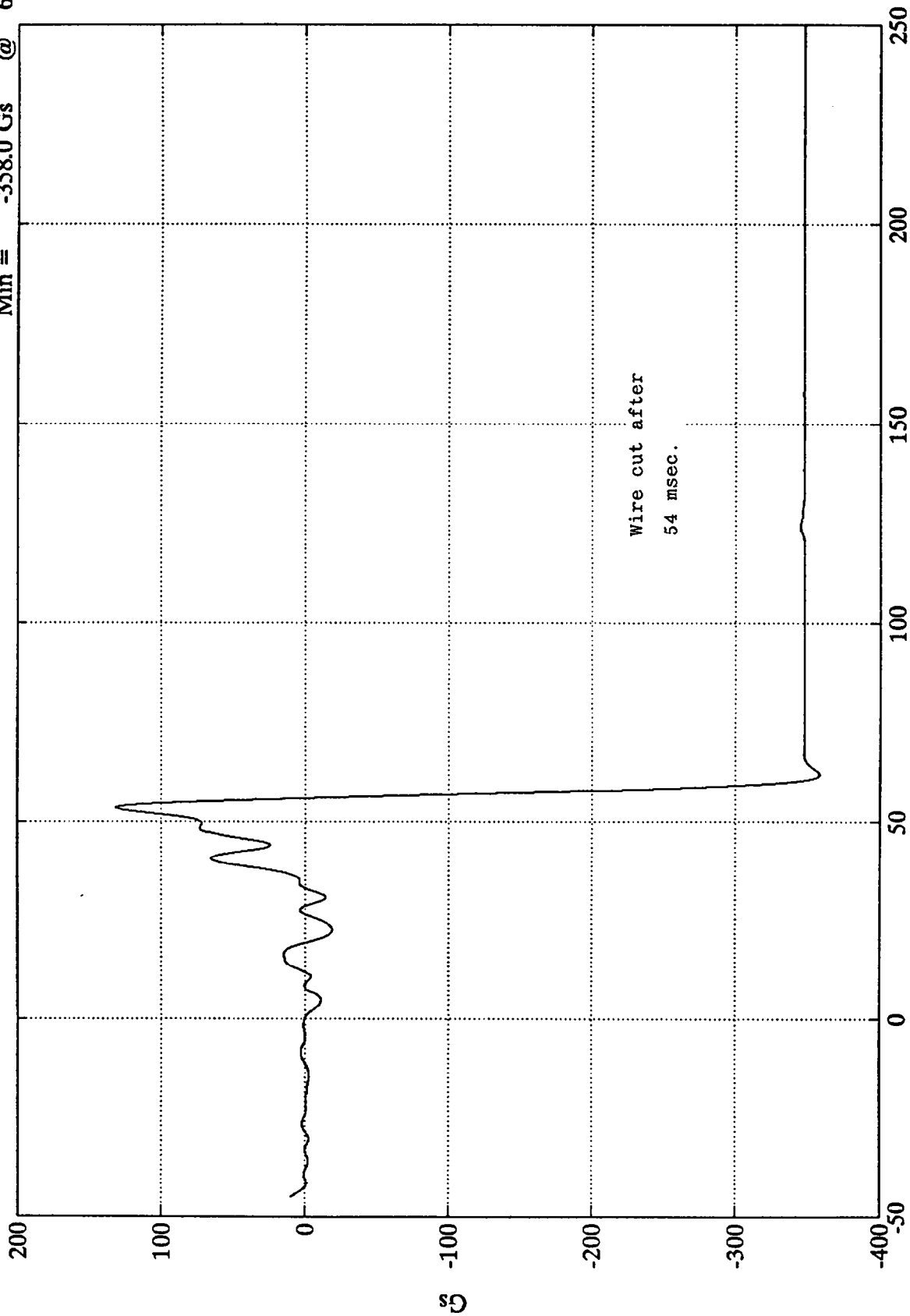
Max = 22.6 in. @ 45.1 msec
Min = -200.2 in. @ 254.9 msec



SAE Filter Class 60

Veh. 1 Brake Pedal (Z)

Max = 131.3 Gs @ 53.52 msec
 Min = -358.0 Gs @ 61.92 msec



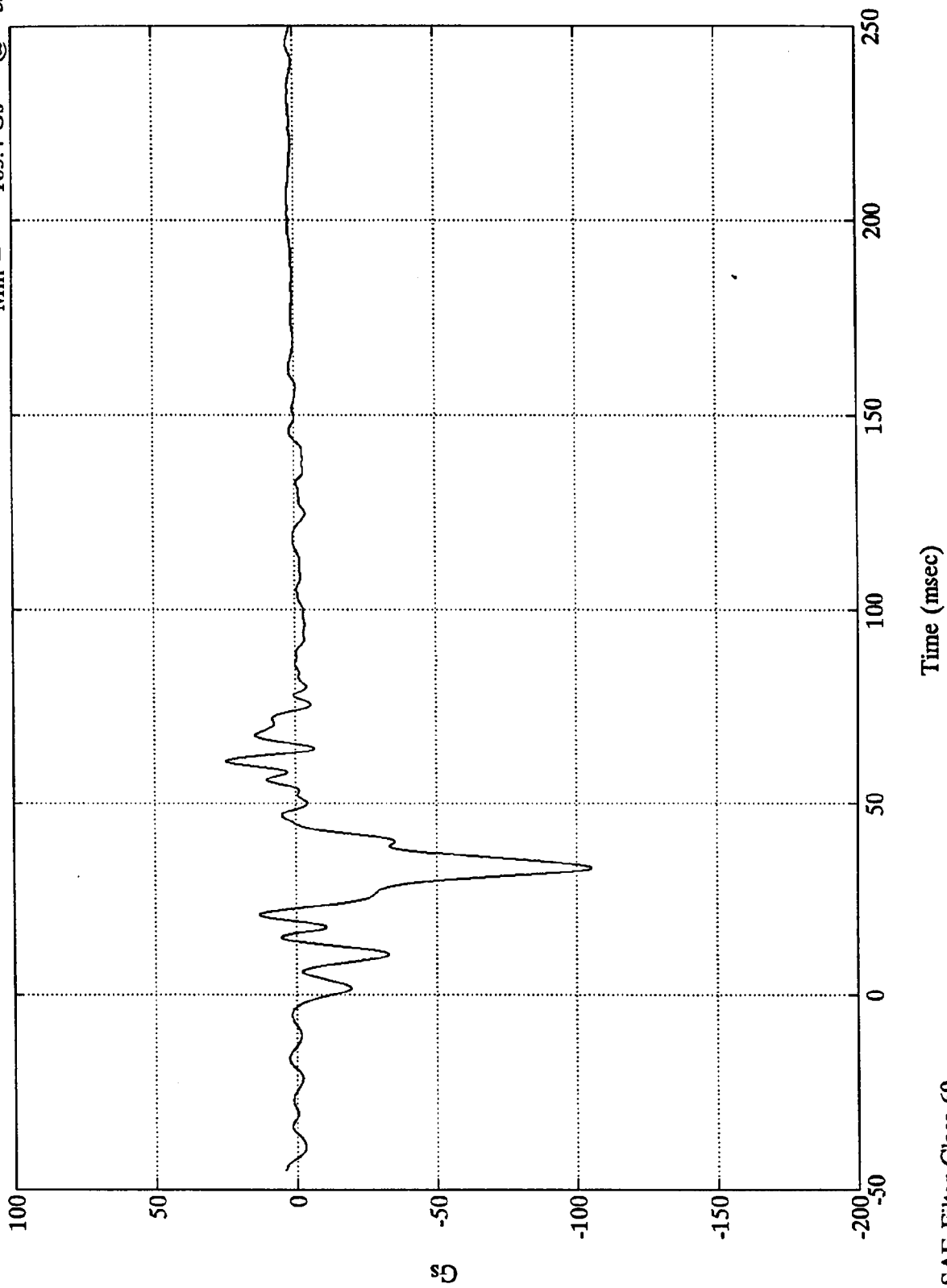
Time (msec)

SAE Filter Class 60

V-to-V Test #5

Veh. 1 Toe Pan (X)

Max = 24.8 Gs @ 61.08 msec
Min = -105.4 Gs @ 33.36 msec



V-to-V Test #5

Veh. 1 Toe Pan (X)

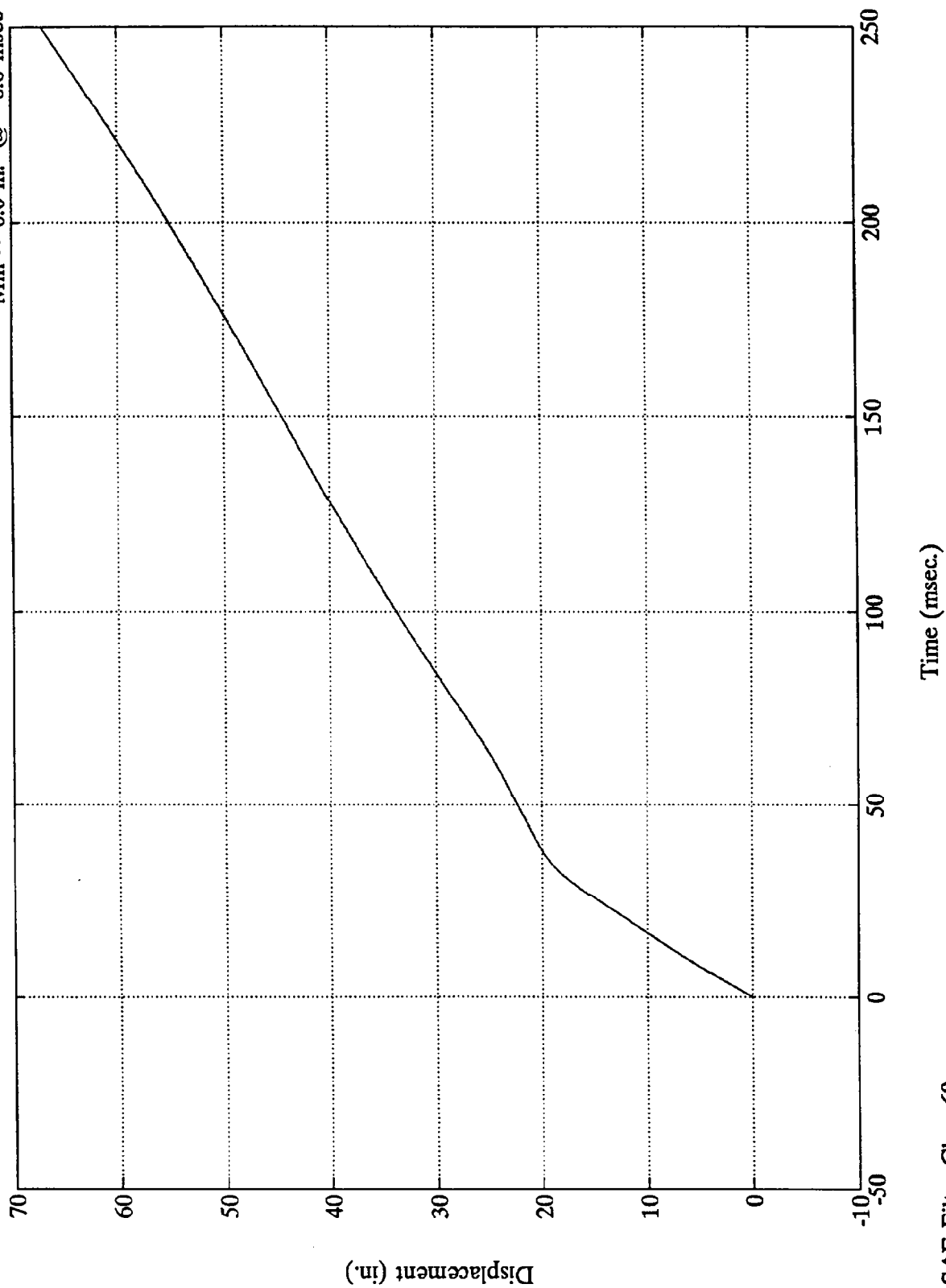
Max = 36.1 mph @ -0.0 msec
Min = 10.6 mph @ 44.9 msec



V-to-V Test #5

Veh. 1 Toe Pan (X)

Max = 68.4 in. @ 254.9 msec
Min = 0.0 in. @ -0.0 msec



SAE Filter Class 60

TEST NO. Y42-5-1042

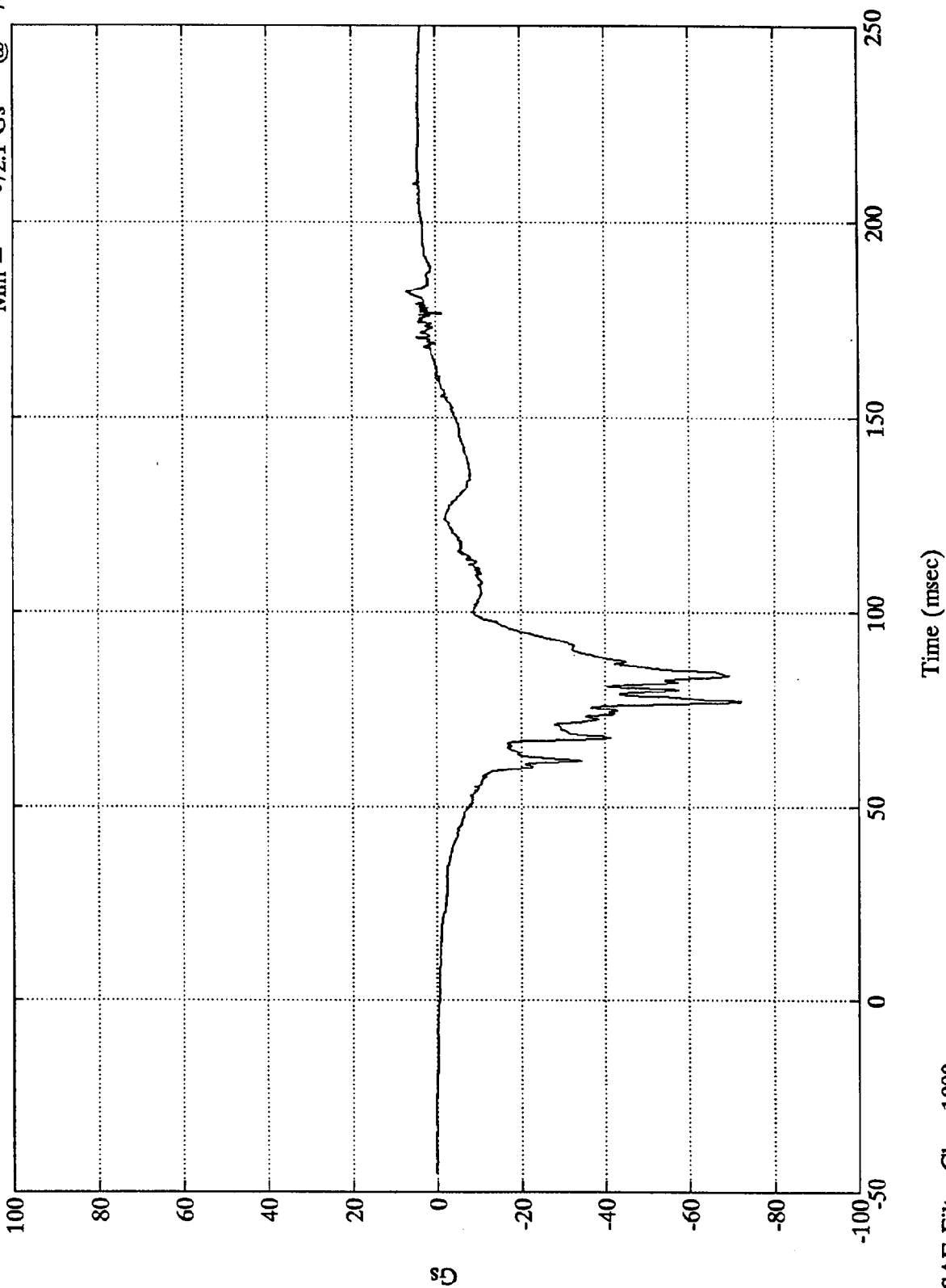
DUMMY DATA

CLASS	FILTER CHANNEL
Head Accelerations	1000
Chest Accelerations	180
Femur Forces	600
Torso Belt	60
Chest Displacement	180
Neck Forces	1000
Neck Moments	600
Tibia Forces, Moments	600

V-to-V Test #5

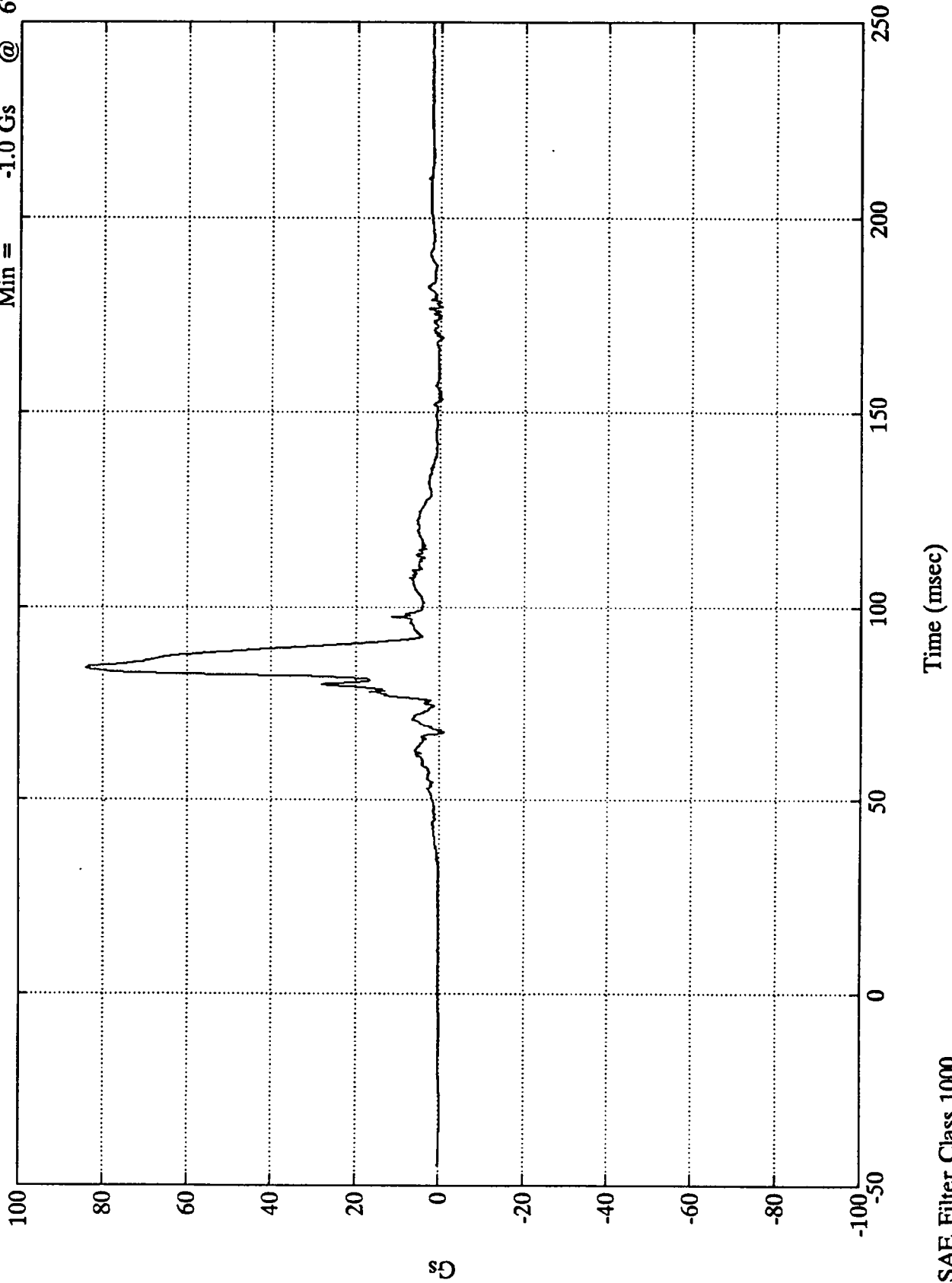
Veh. 1 Head X

Max = 6.9 Gs @ 182.16 msec
Min = -72.1 Gs @ 76.92 msec



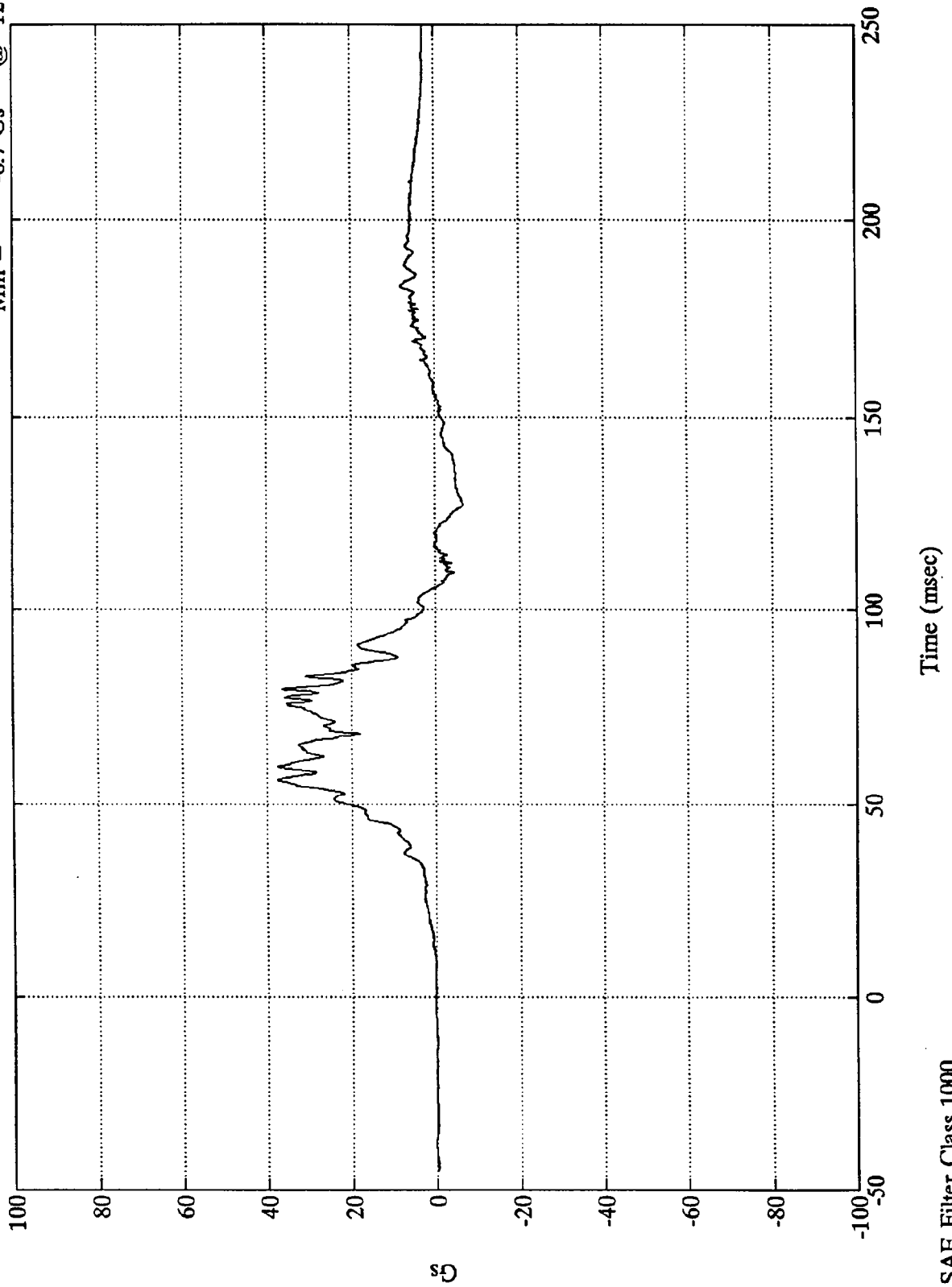
SAE Filter Class 1000

Veh. 1 Head Y
Max = 84.0 Gs @ 84.24 msec
Min = -1.0 Gs @ 67.68 msec



V-to-V Test #5

Veh. 1 Head Z
Max = 37.6 Gs @ 59.76 msec
Min = -6.7 Gs @ 127.20 msec



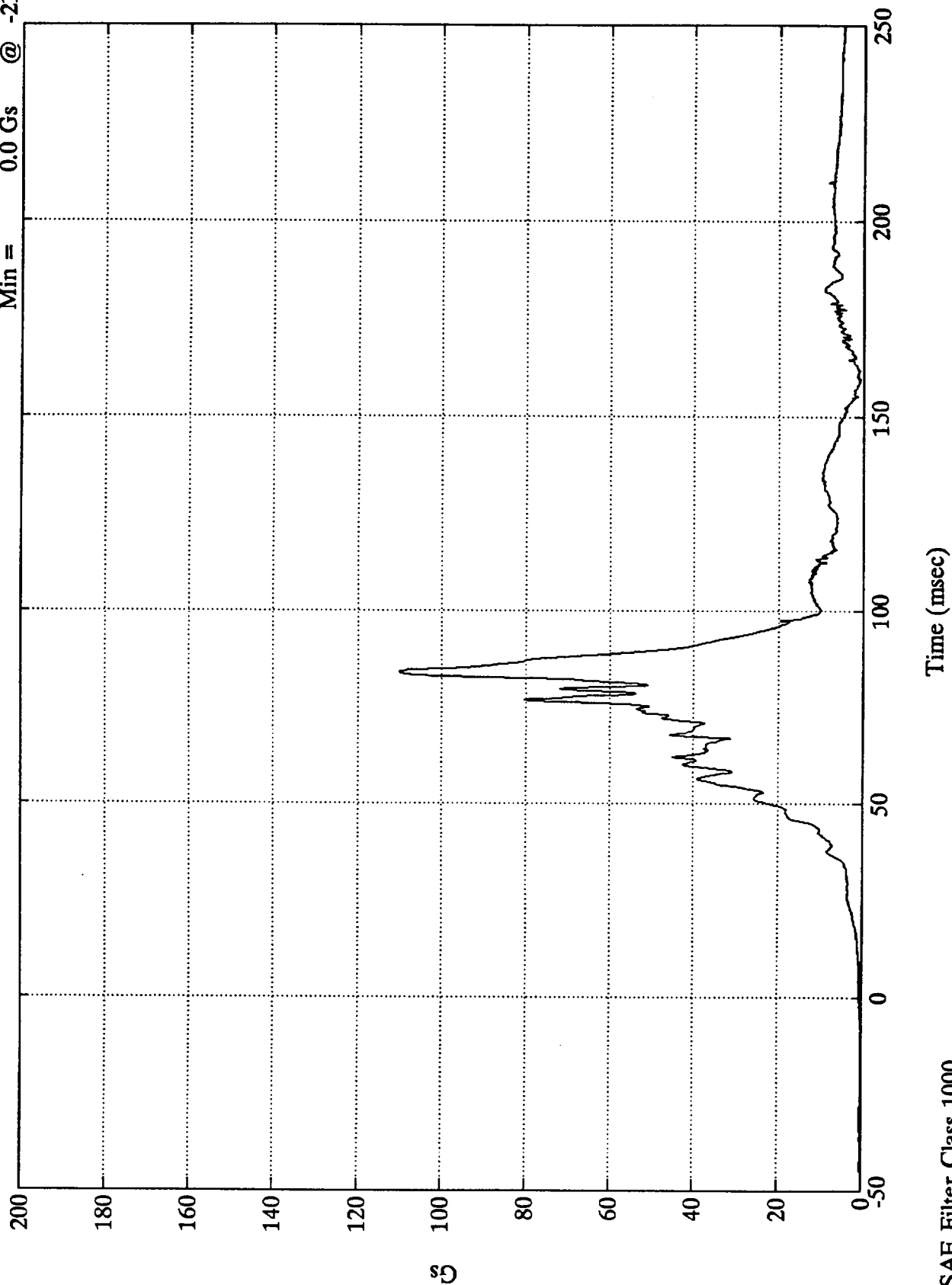
B-50

7883-5

SAE Filter Class 1000

V-to-V Test #5

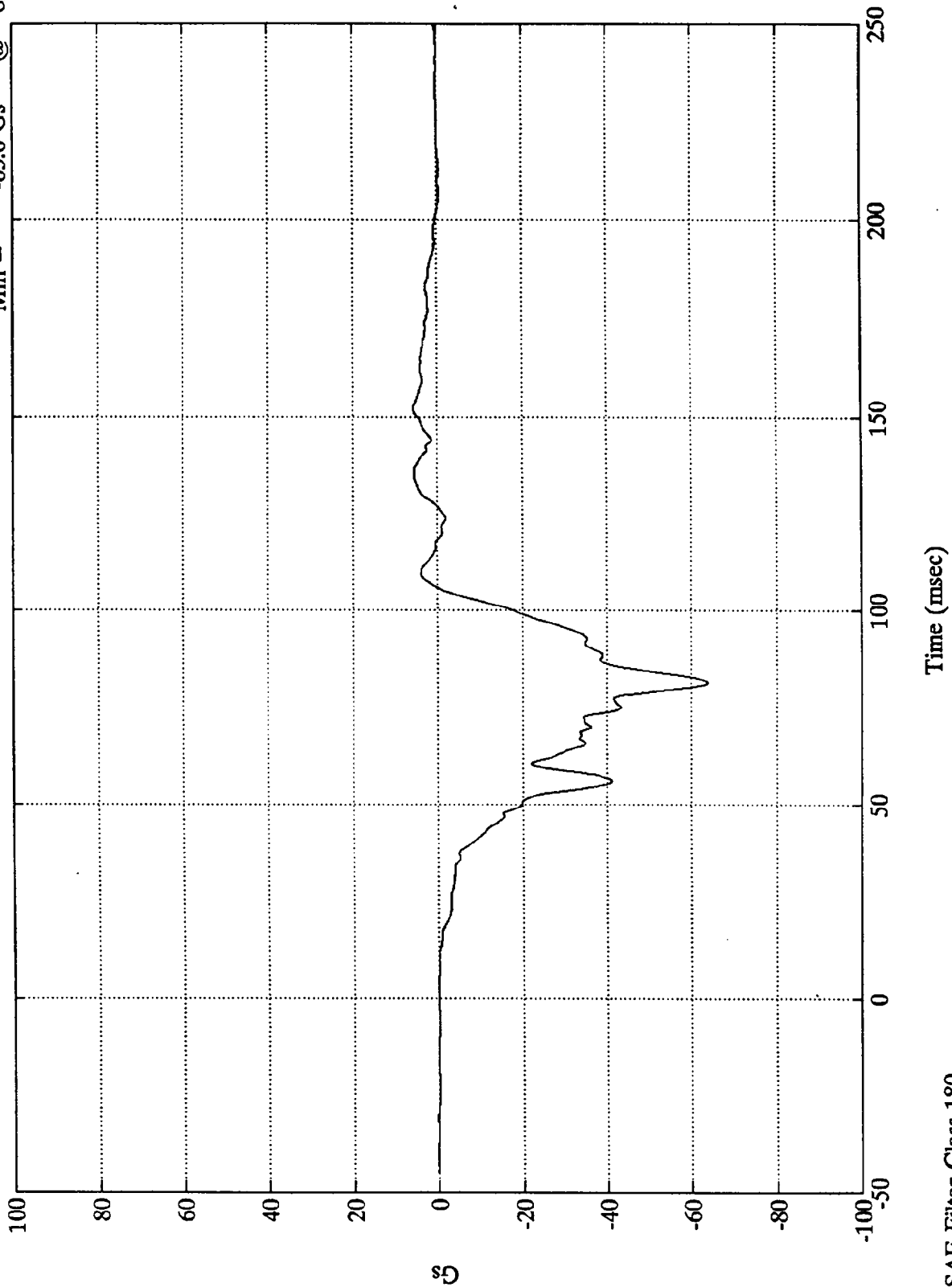
Veh. 1 Head Resultant
Max = 109.9 Gs @ 84.24 msec
Min = 0.0 Gs @ -21.72 msec



V-to-V Test #5

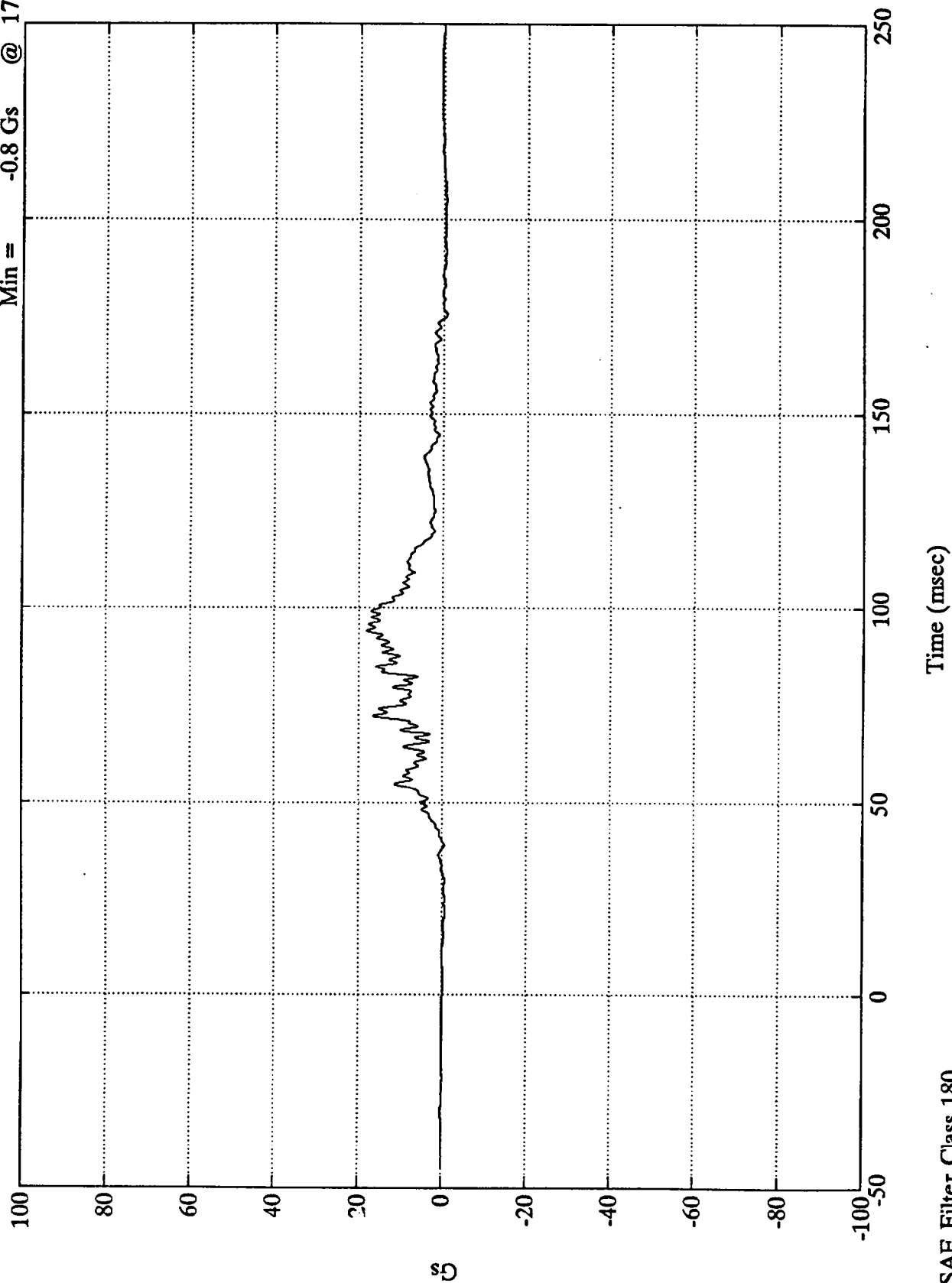
Veh. 1 Chest X

Max = 5.6 Gs @ 152.16 msec
Min = -63.6 Gs @ 81.23 msec



SAE Filter Class 180

Veh. 1 Chest Y
 Max = 18.0 Gs @ 94.08 msec
 Min = -0.8 Gs @ 175.08 msec

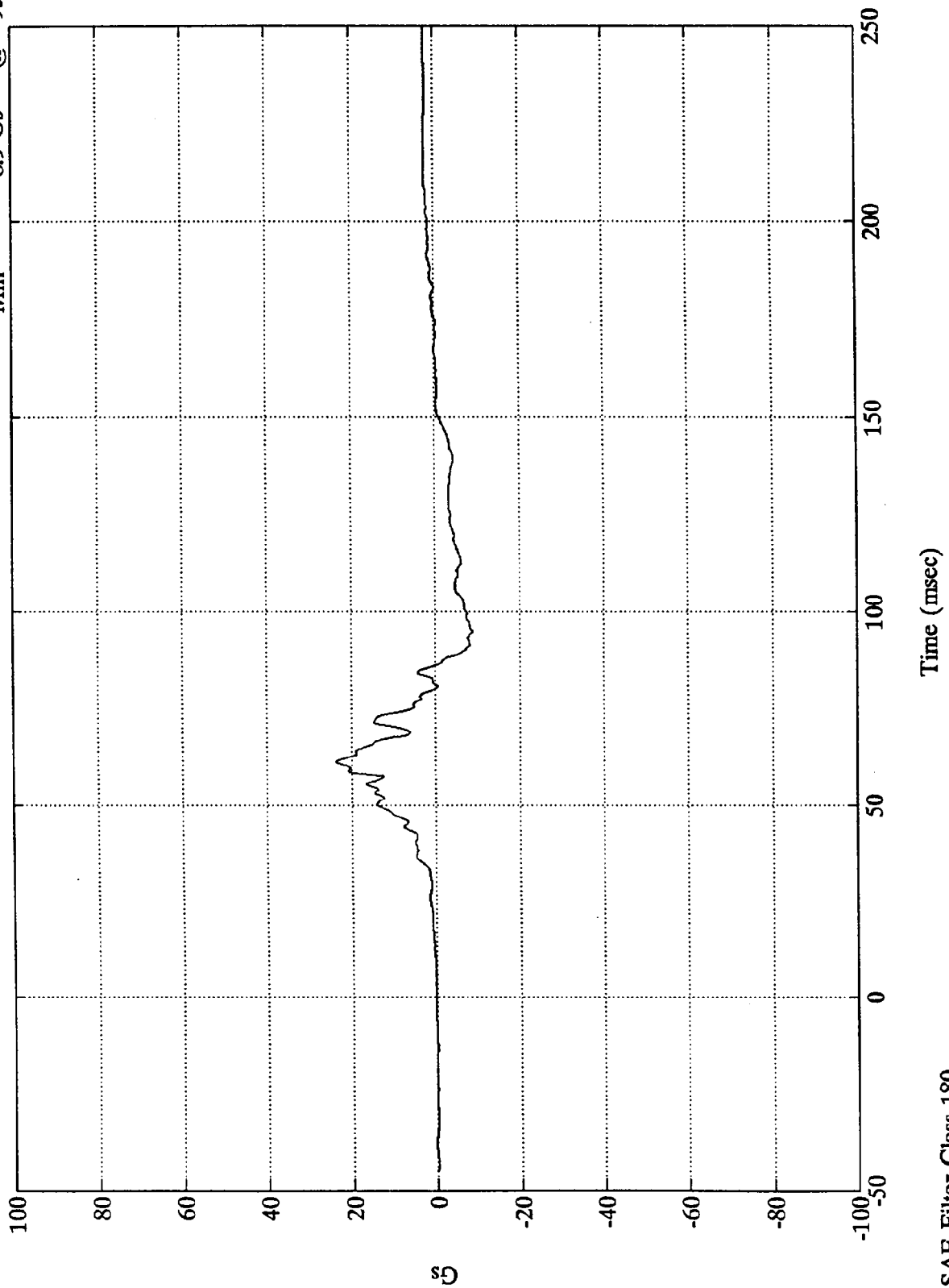


SAE Filter Class 180

V-to-V Test #5

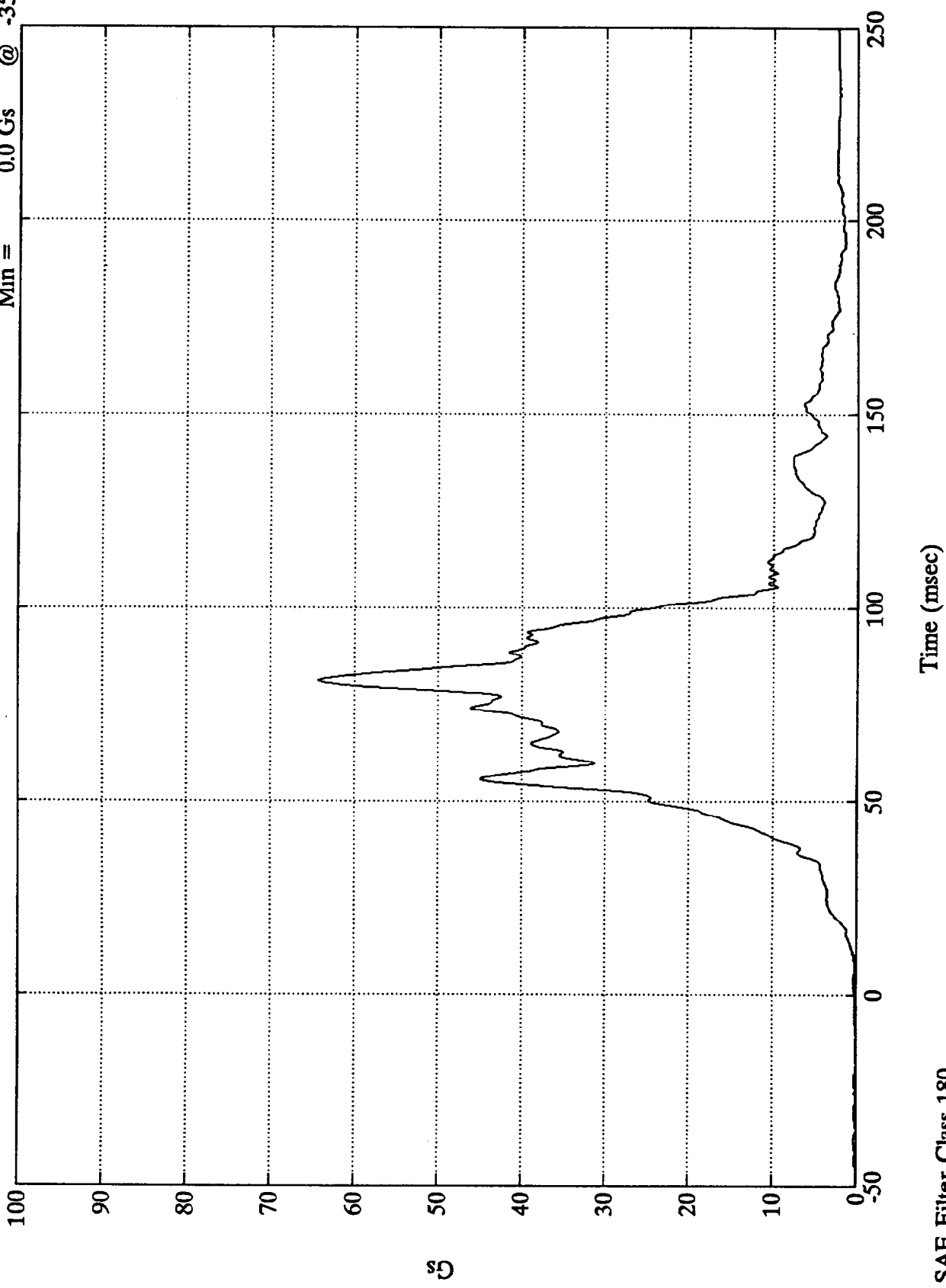
Veh. 1 Chest Z

Max = 23.7 Gs @ 61.44 msec
Min = -8.9 Gs @ 95.04 msec



SAE Filter Class 180

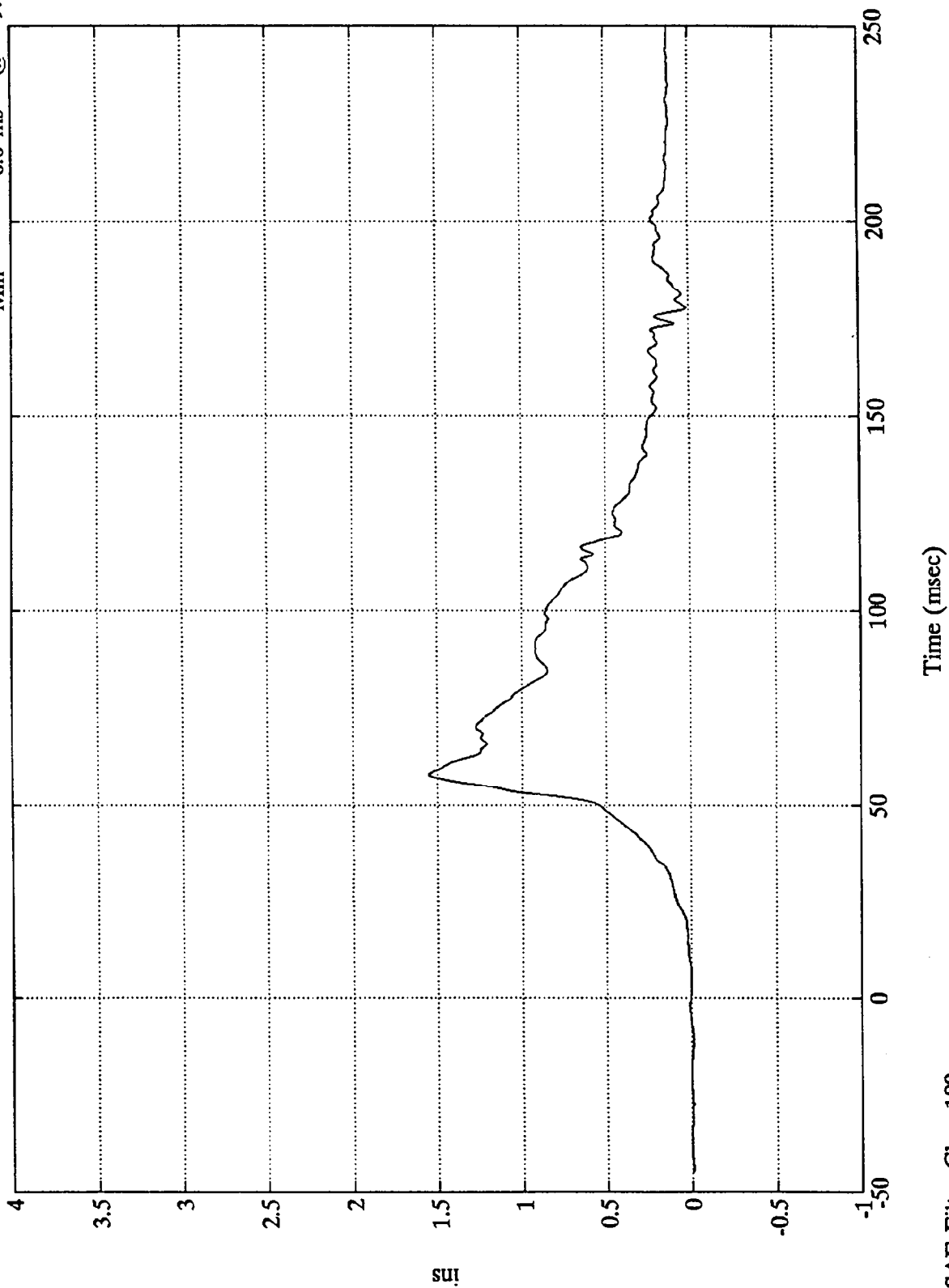
Veh. 1 Chest Resultant
Max = 64.2 Gs @ 81.36 msec
Min = 0.0 Gs @ -35.28 msec



V-to-V Test #5

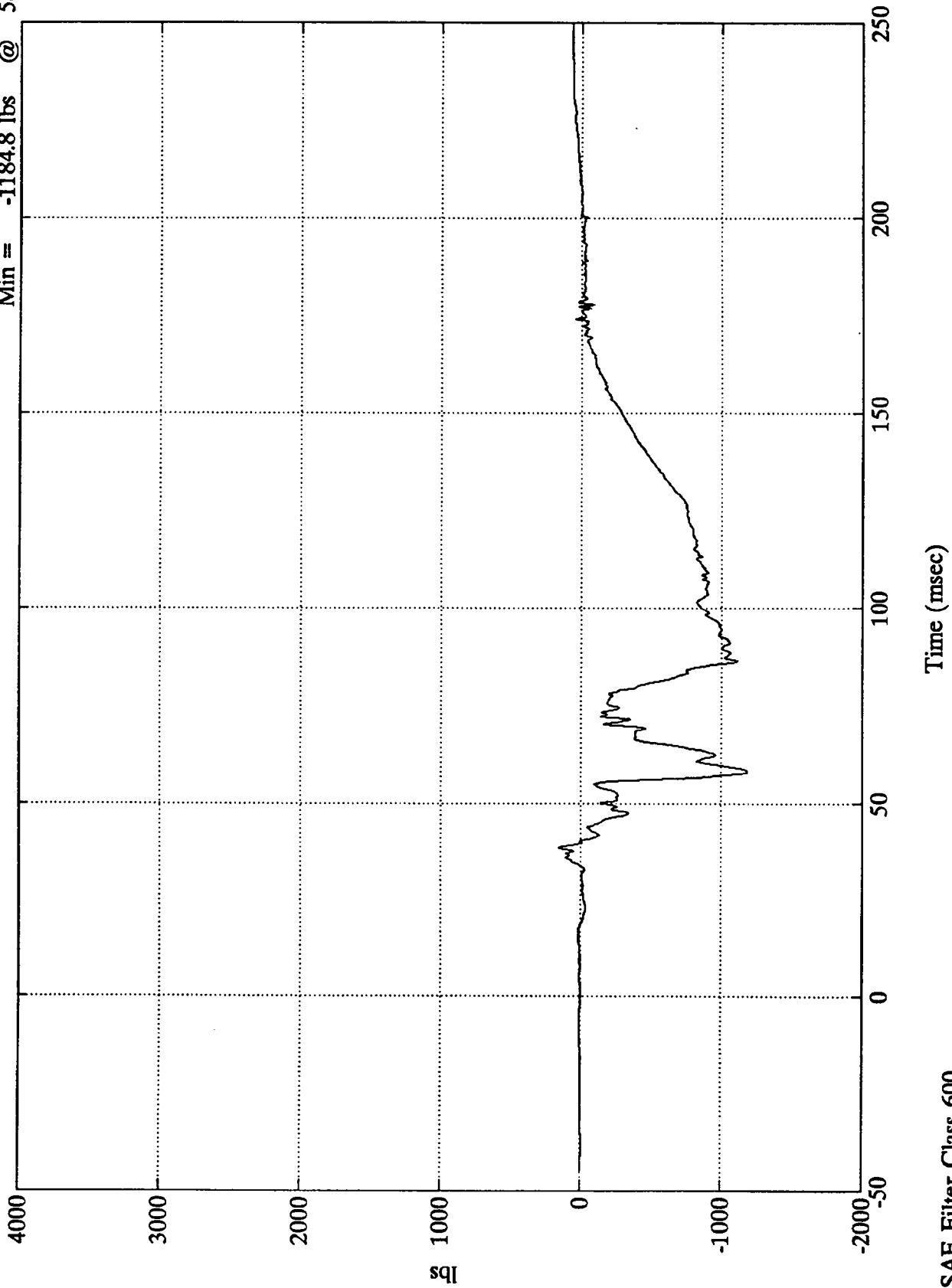
Veh. 1 Chest Displacement

Max = 1.5 ins @ 58.08 msec
Min = -0.0 ins @ -9.84 msec



SAE Filter Class 180

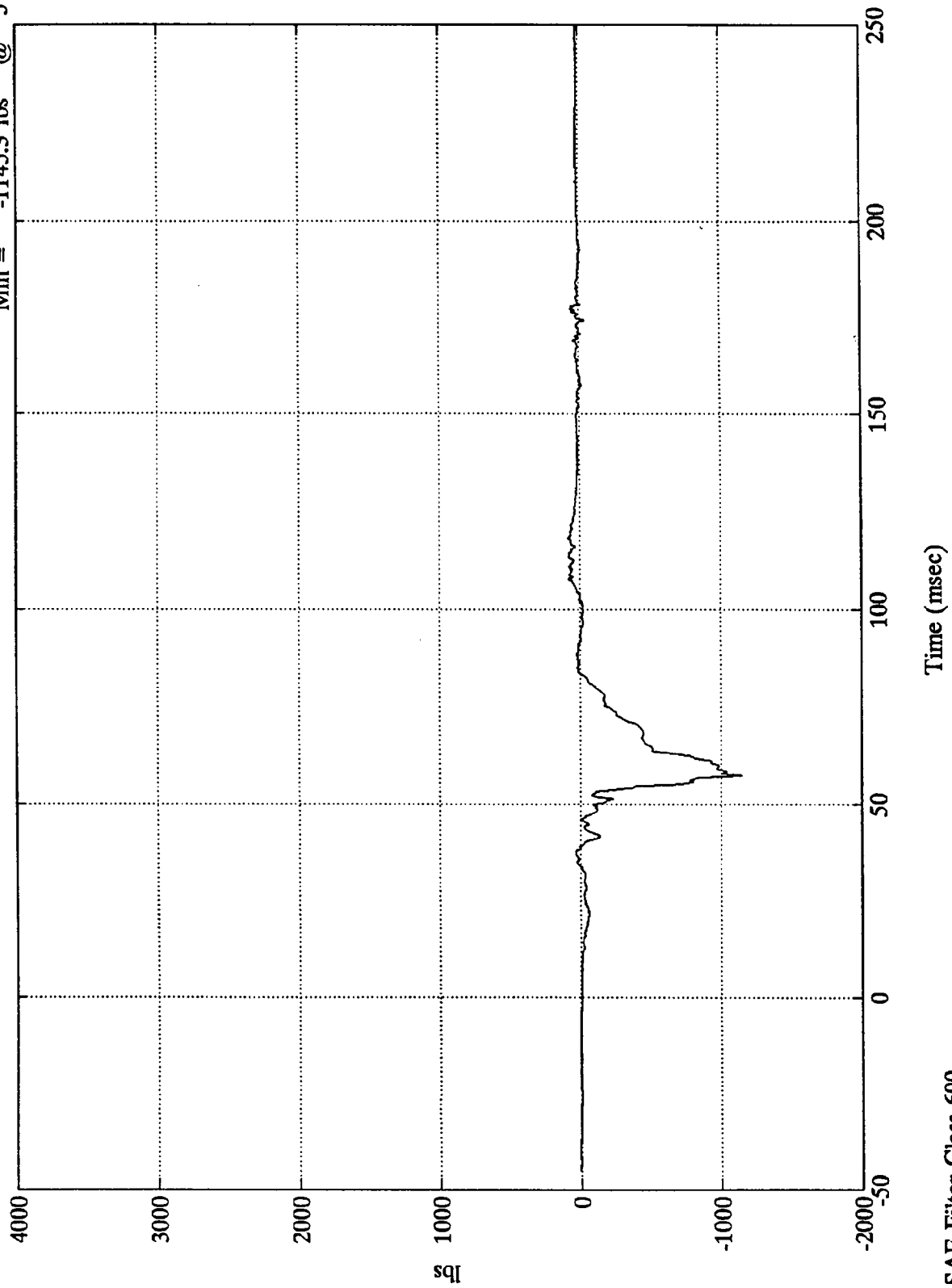
Veh. 1 Left Femur
Max = 155.4 lbs @ 38.63 msec
Min = -1184.8 lbs @ 58.31 msec



V-to-V Test #5

Veh. 1 Right Femur

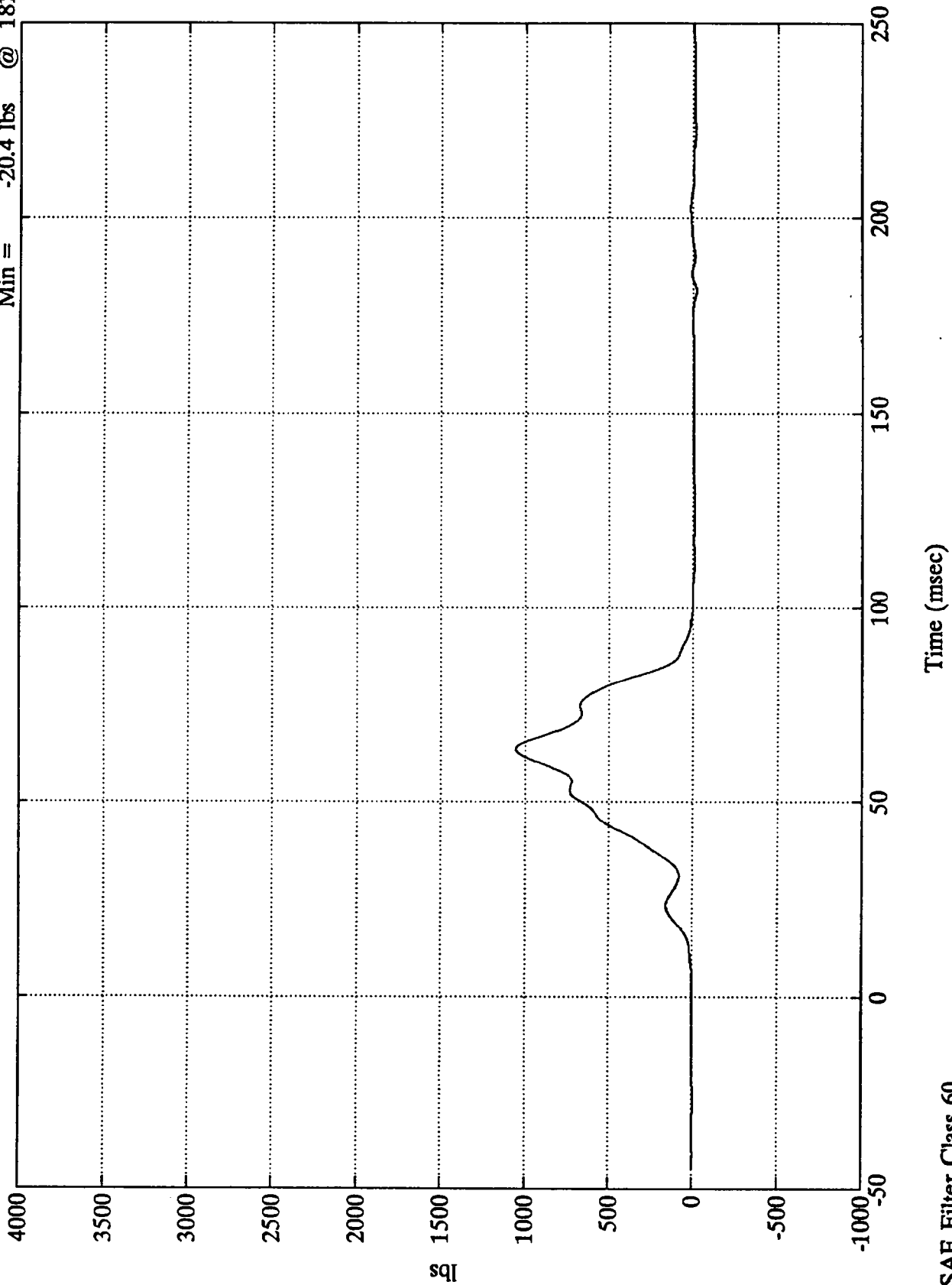
Max = 83.7 lbs @ 107.88 msec
Min = -1145.3 lbs @ 57.60 msec



SAE Filter Class 600

Veh. 1 Torso Belt L.C.

Max = 1052.5 lbs @ 63.35 msec
Min = -20.4 lbs @ 181.32 msec

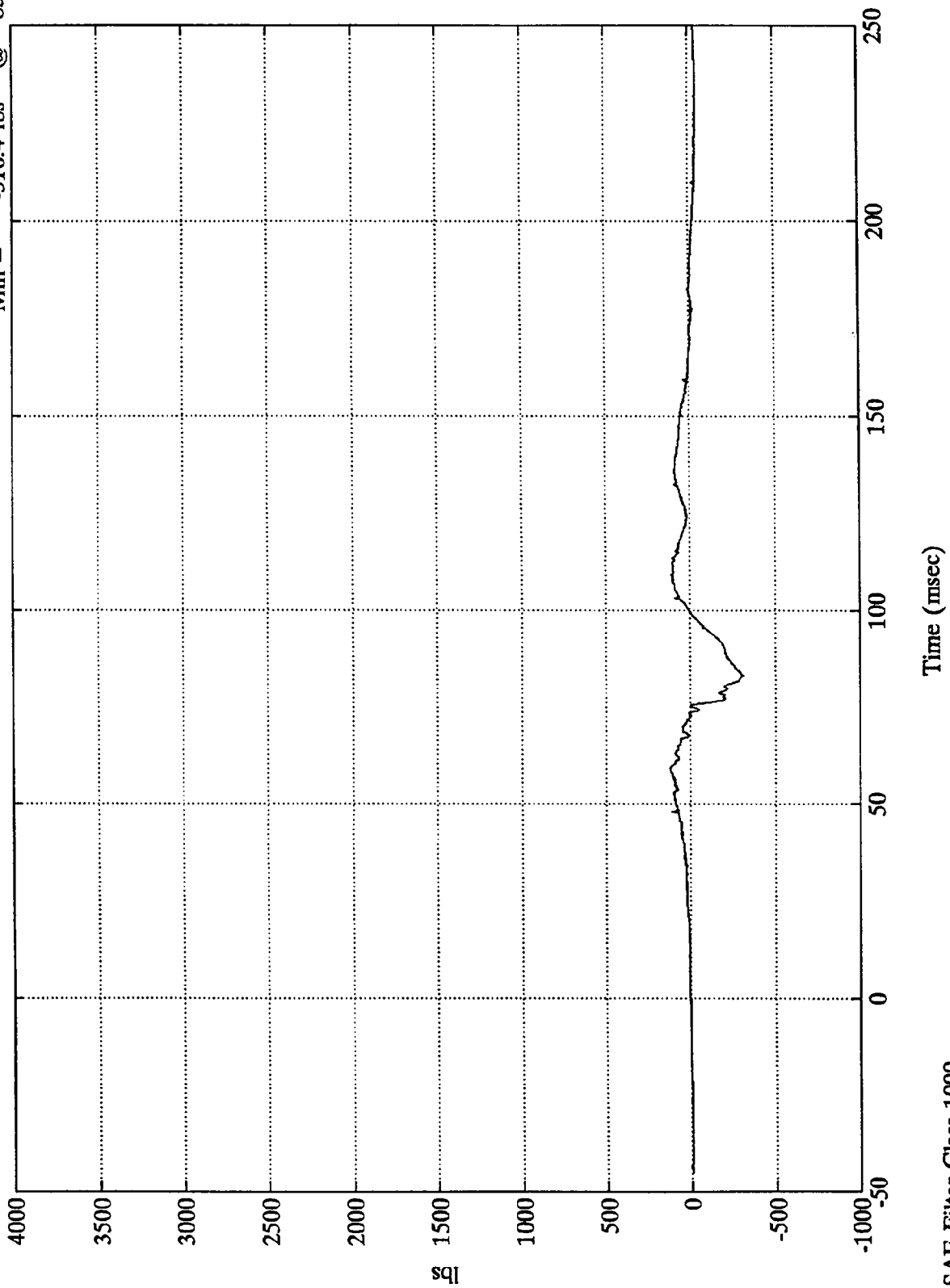


SAE Filter Class 60

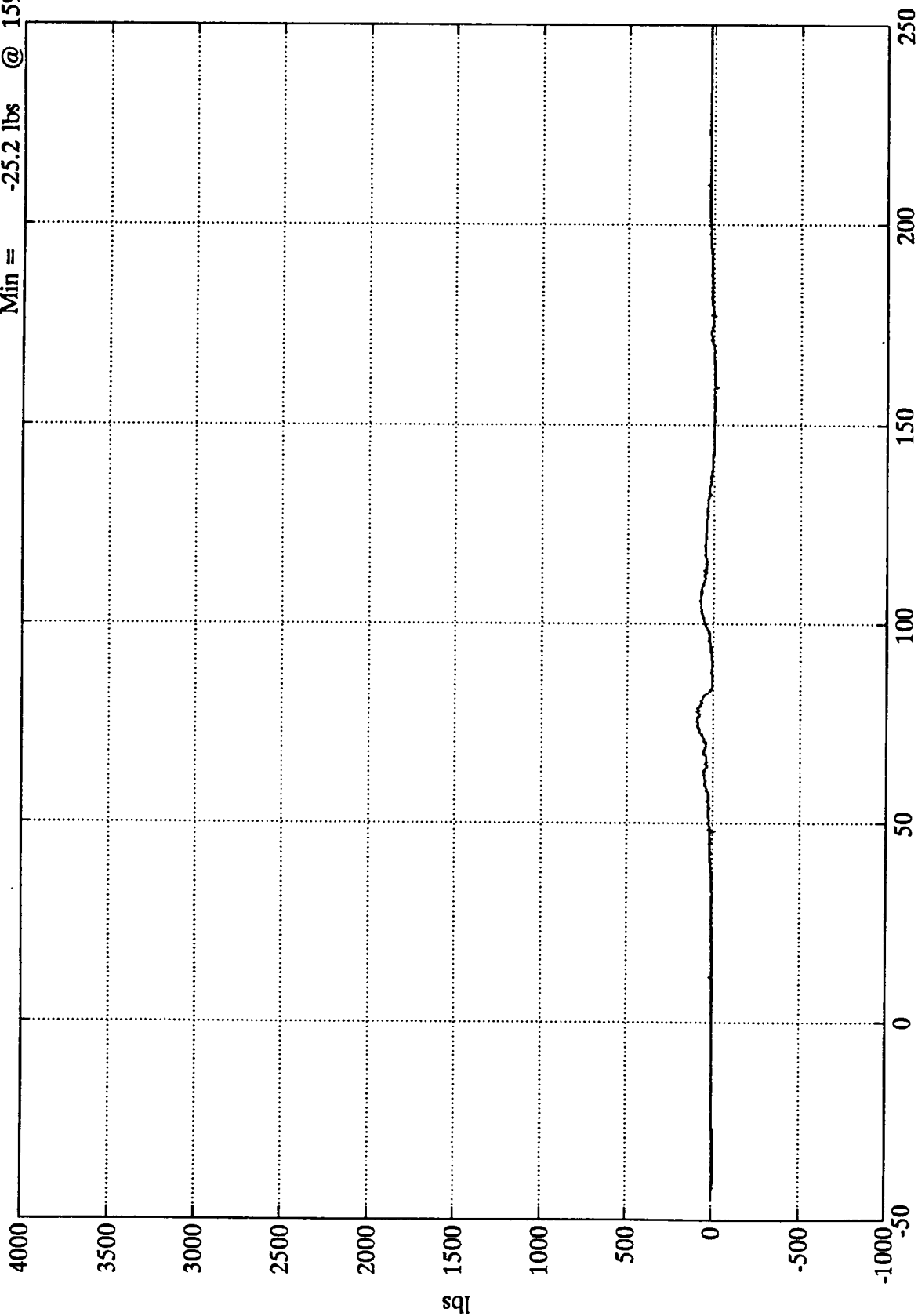
V-to-V Test #5

Veh. 1 Upper Neck Fx

Max = 122.0 lbs @ 59.52 msec
Min = -310.4 lbs @ 83.52 msec



SAE Filter Class 1000



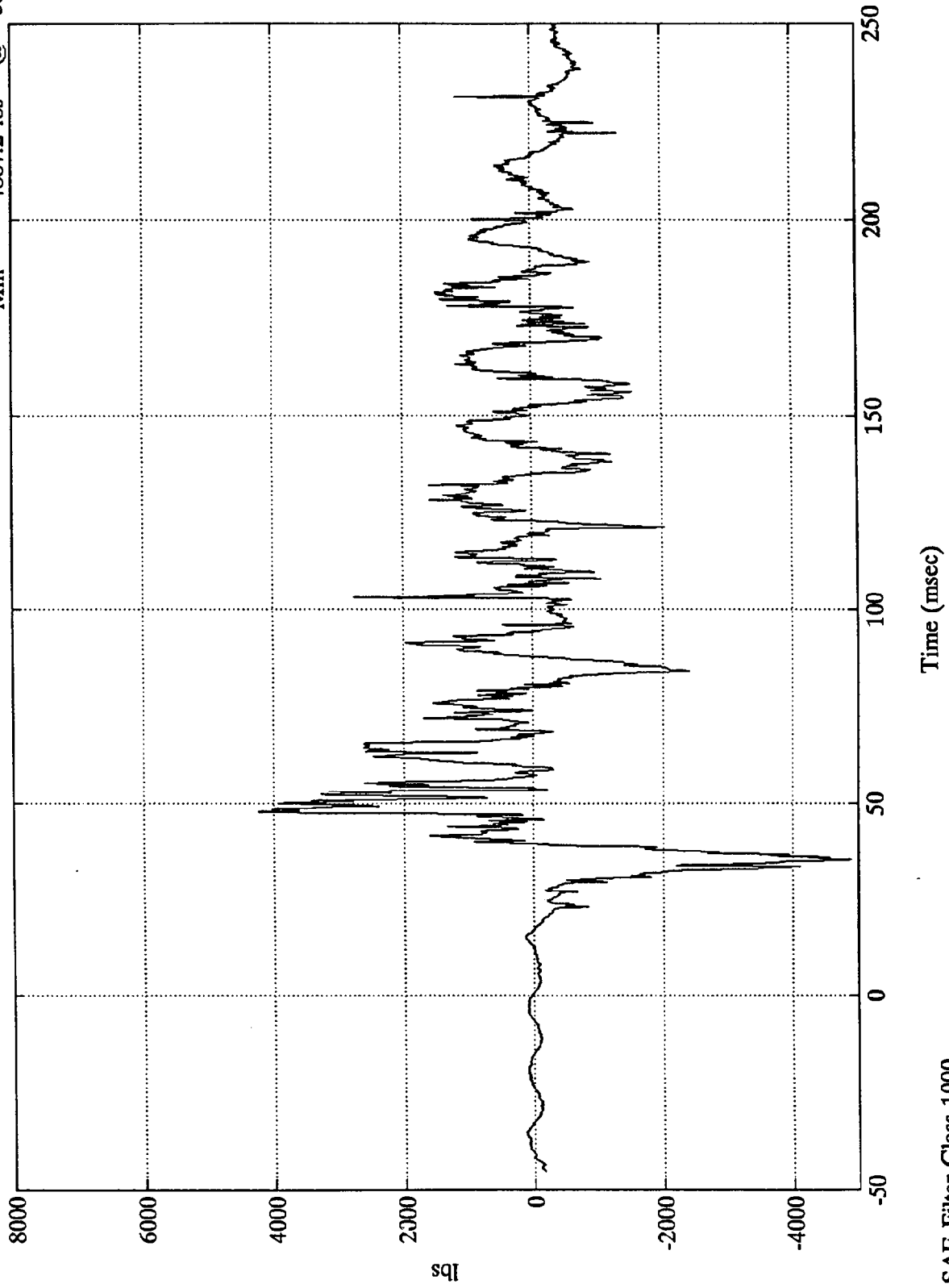
Time (msec)

SAE Filter Class 1000

V-to-V Test #5

Veh. 1 Upper Neck Fz

Max = 4236.2 lbs @ 48.00 msec
Min = -4887.2 lbs @ 35.63 msec

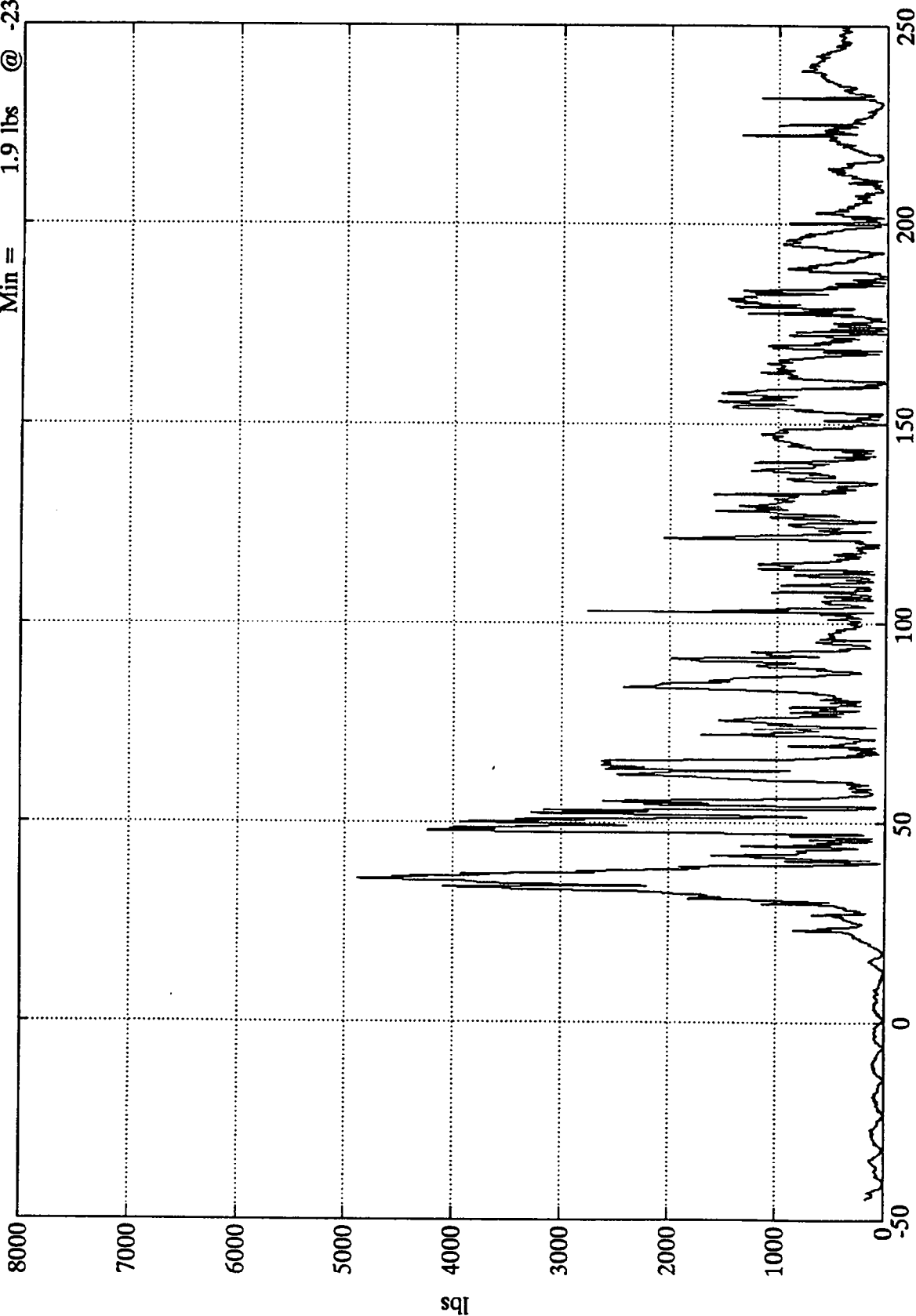


SAE Filter Class 1000

V-to-V Test #5

Veh. 1 Neck Force Res.

Max = 4887.3 lbs @ 35.63 msec
Min = 1.9 lbs @ -23.76 msec



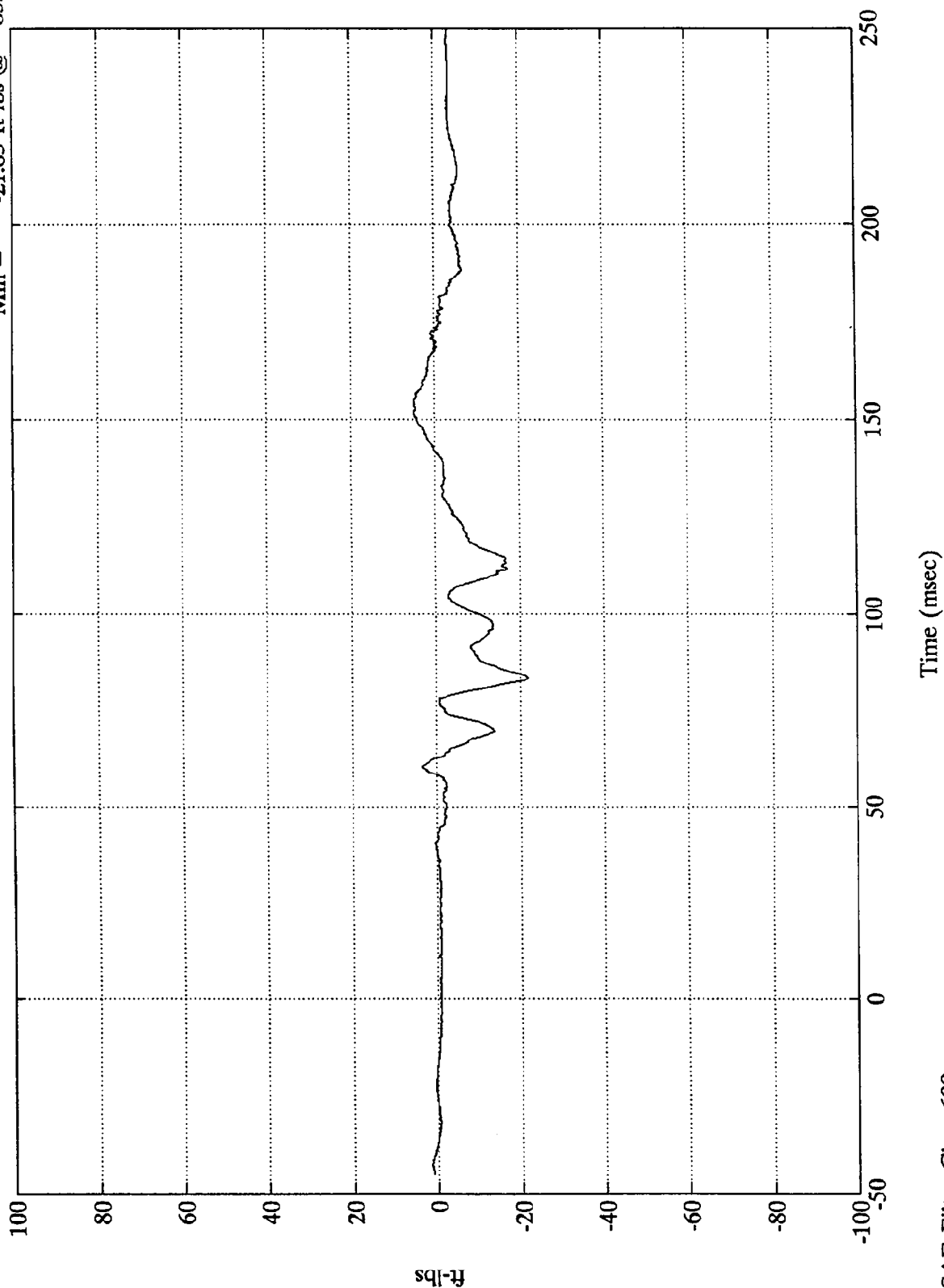
Time (msec)

SAE Filter Class 1000

V-to-V Test #5

Veh. 1 Upper Neck Mx

Max = 5.01 ft-lbs @ 151.80 msec
Min = -21.83 ft-lbs @ 83.52 msec

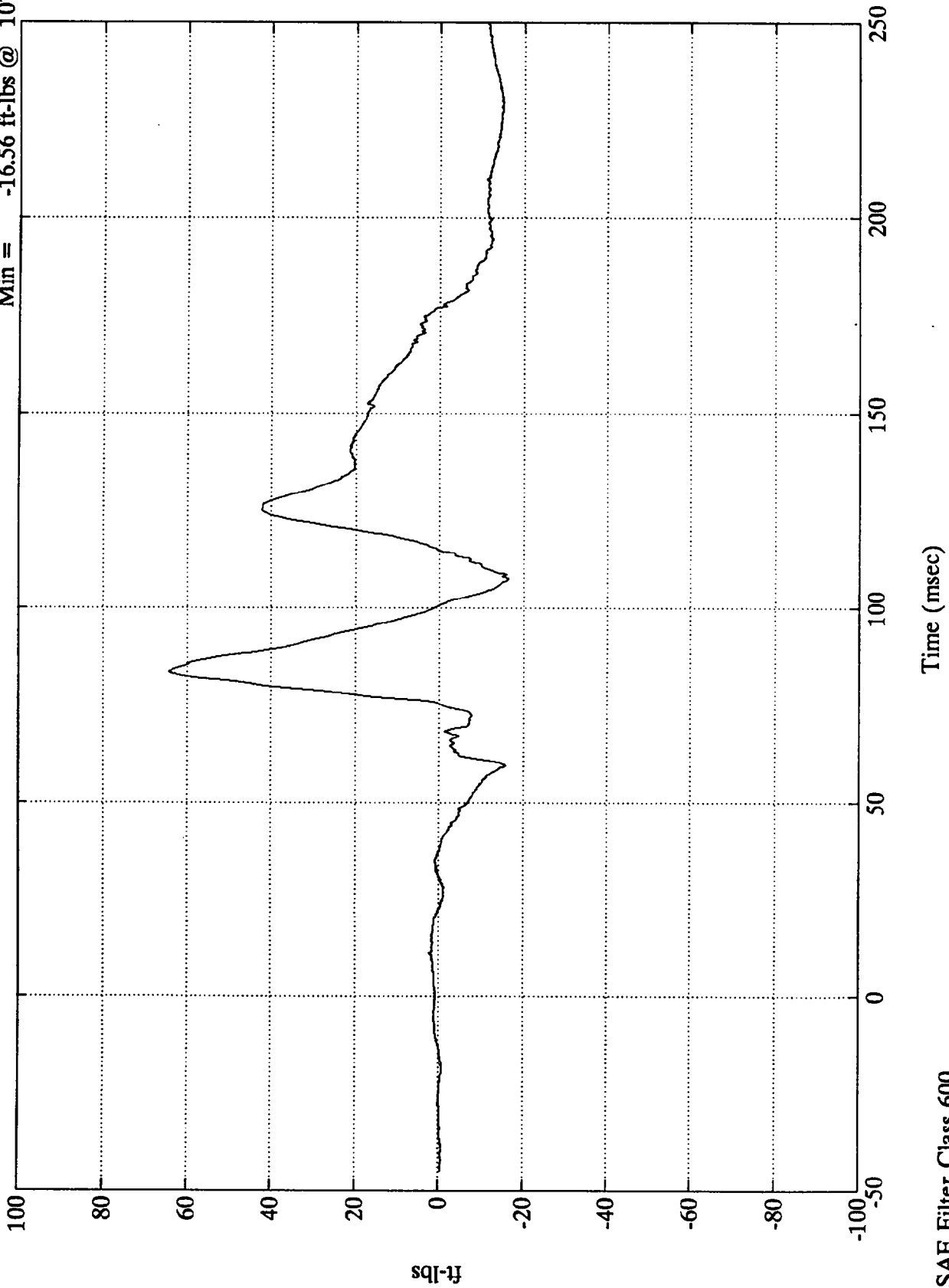


SAE Filter Class 600

V-to-V Test #5

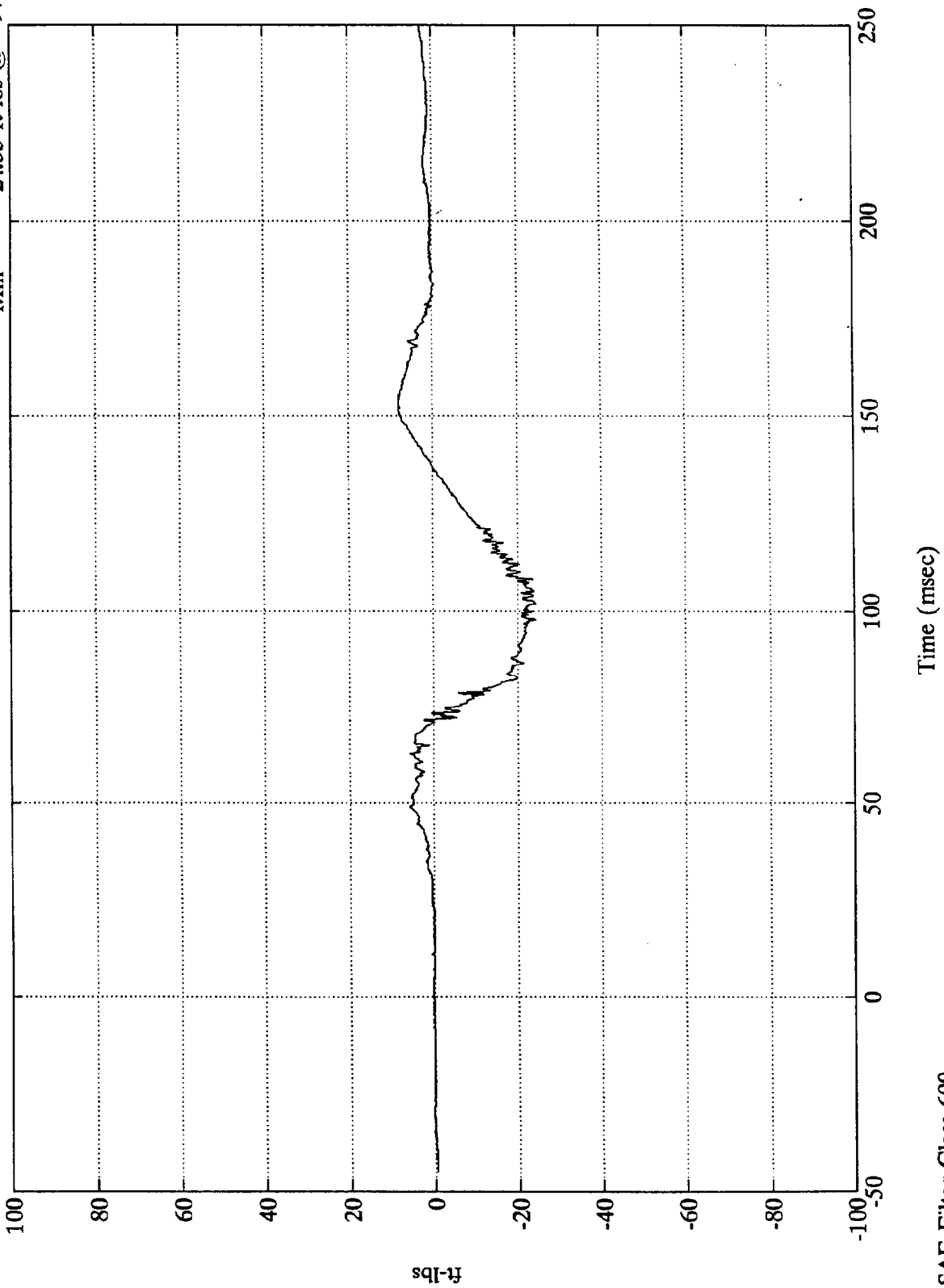
Veh. 1 Upper Neck My

Max = 64.19 ft-lbs @ 83.63 msec
Min = -16.56 ft-lbs @ 107.64 msec

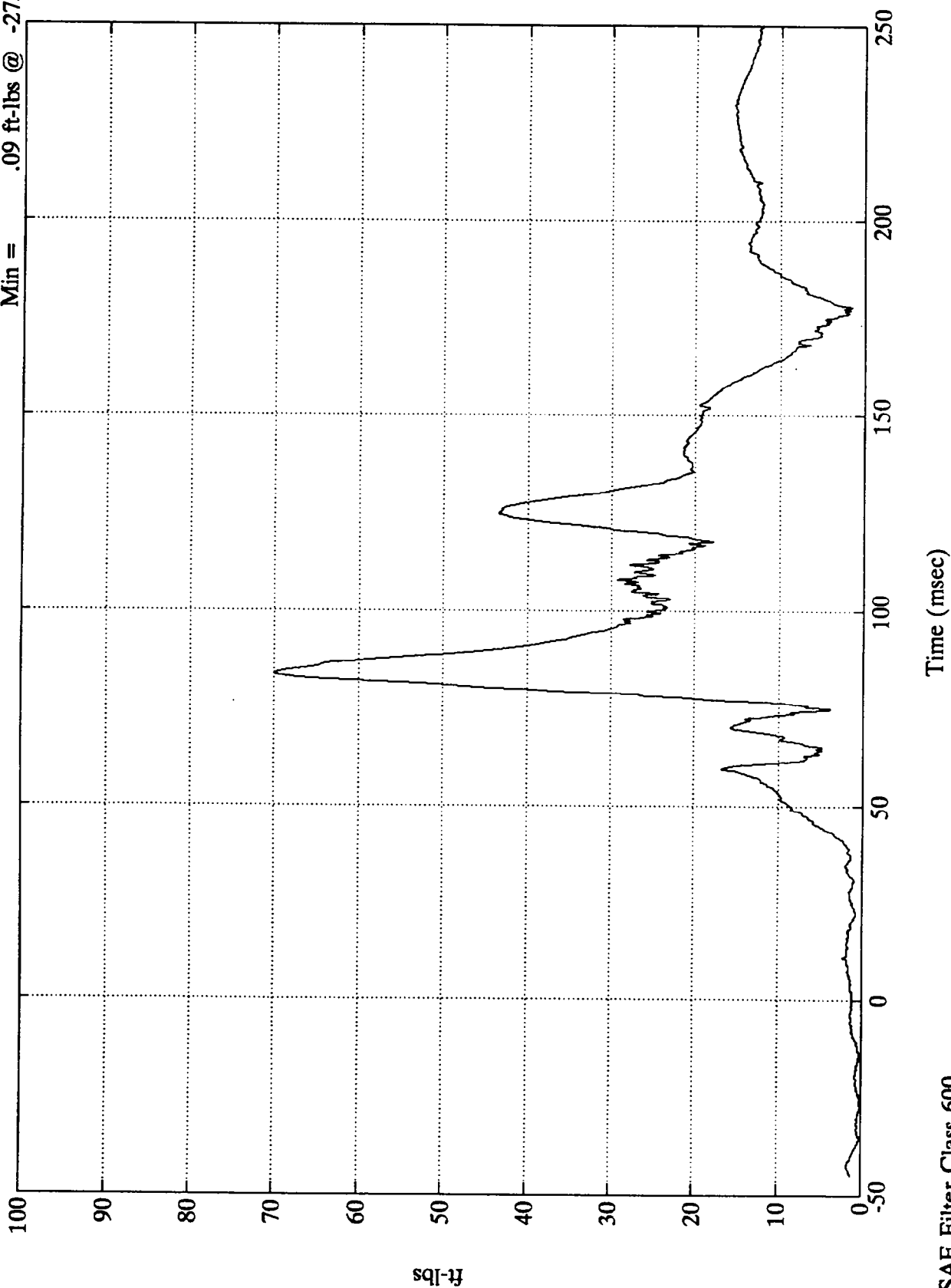


V-to-V Test #5

Veh. 1 Upper Neck Mz
Max = 8.06 ft-lbs @ 151.32 msec
Min = -24.33 ft-lbs @ 97.91 msec



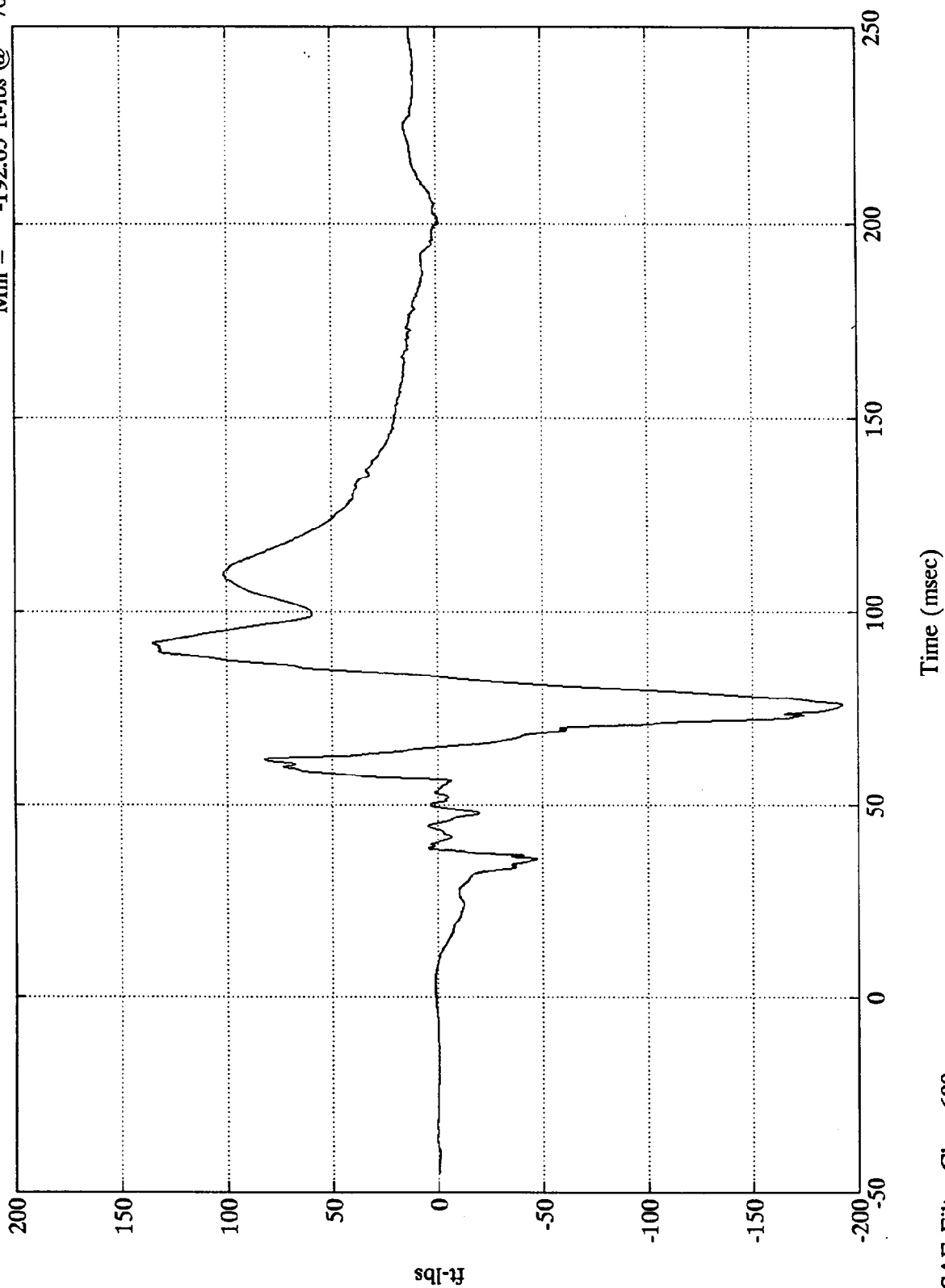
Veh. 1 Neck Moment Res. Max = 70.02 ft-lbs @ 83.52 msec
Min = .09 ft-lbs @ -27.00 msec



V-to-V Test #5

Max = 134.95 ft-lbs @ 92.04 msec
Min = -192.65 ft-lbs @ 76.08 msec

Veh. 1 Lt U Tibia Mx

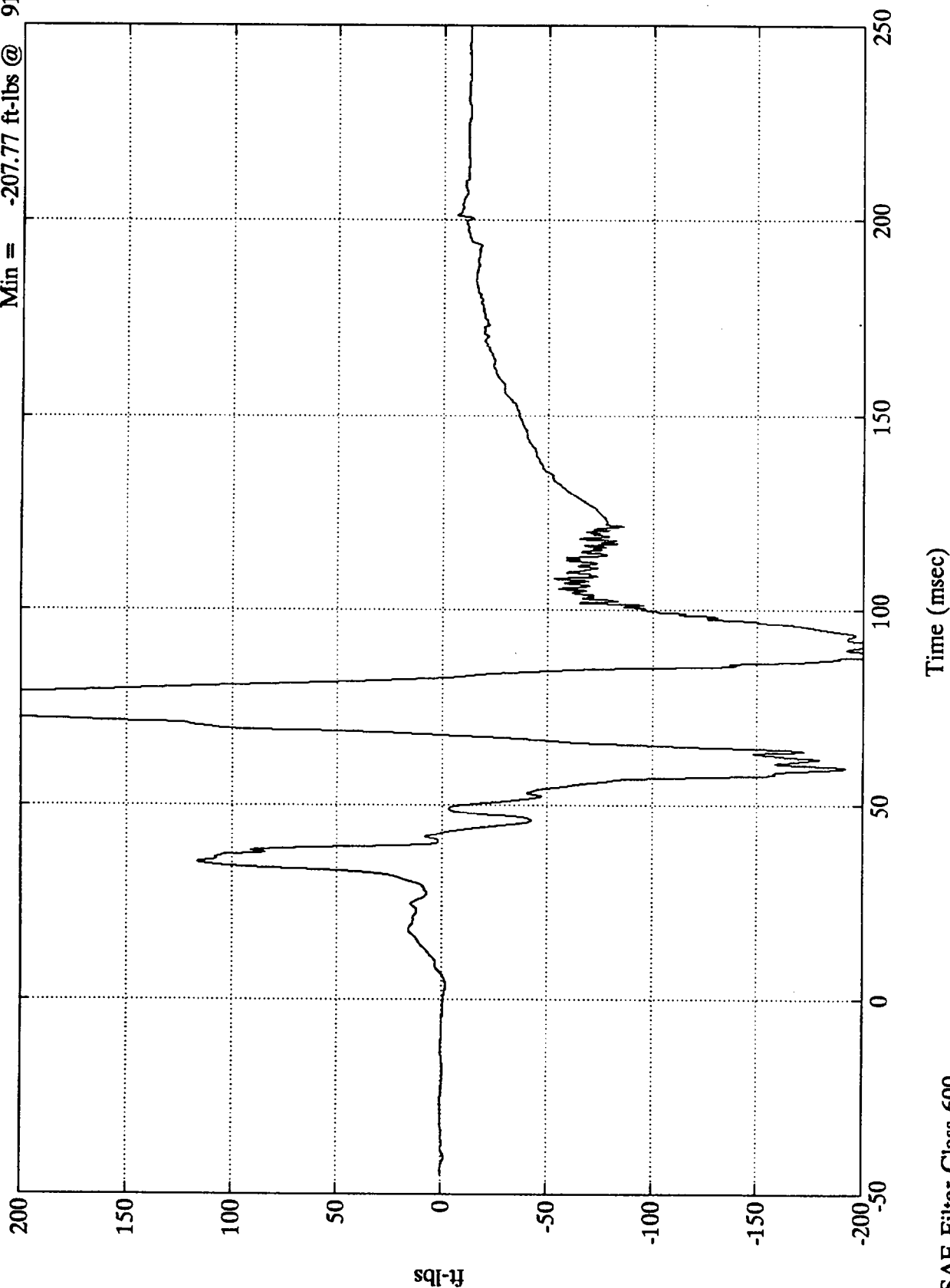


SAE Filter Class 600

V-to-V Test #5

Veh. 1 Lt U Tibia My

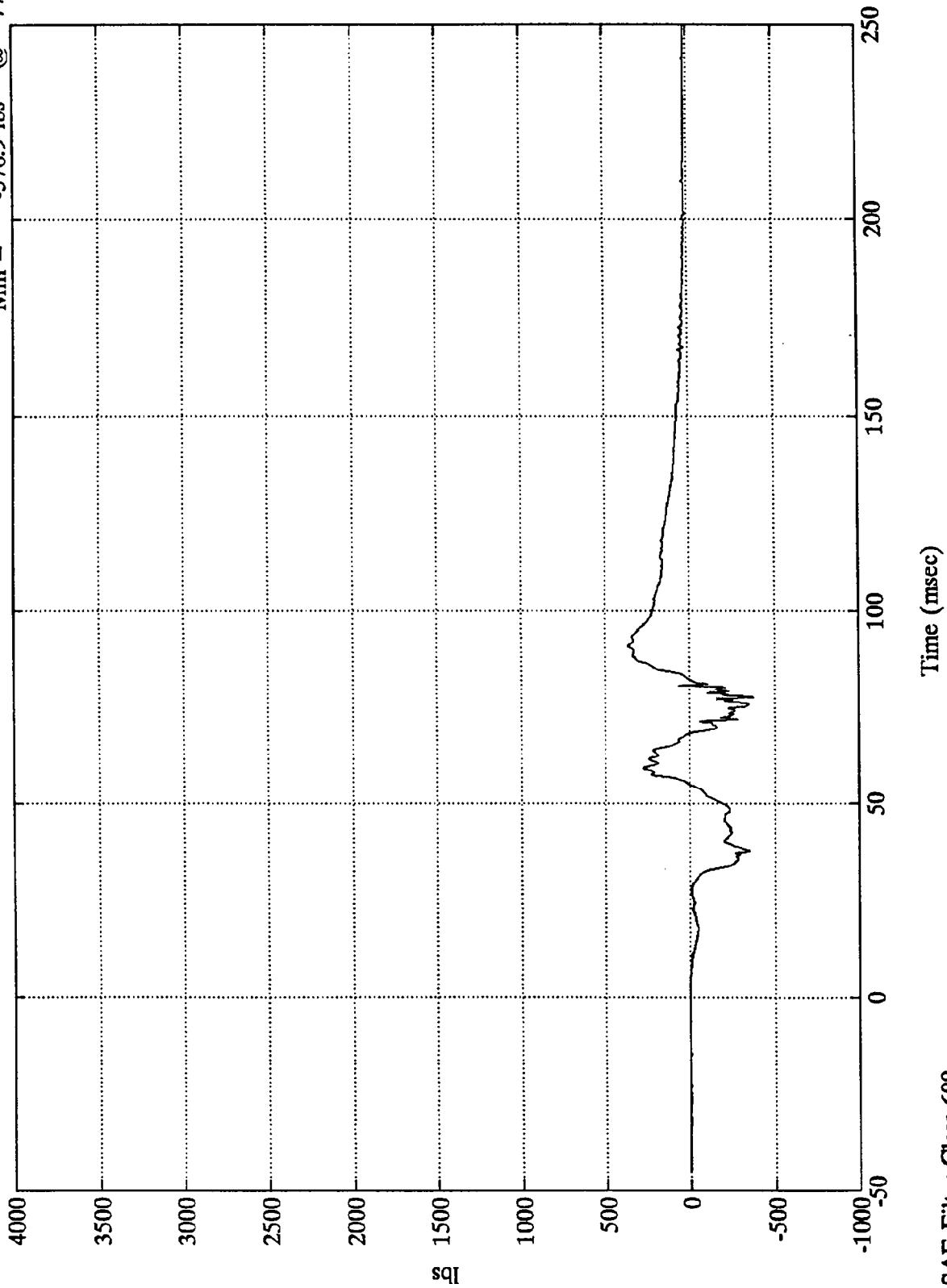
Max = 262.59 ft-lbs @ 77.27 msec
Min = -207.77 ft-lbs @ 91.31 msec



V-to-V Test #5

Veh. 1 Lt L Tibia Fy

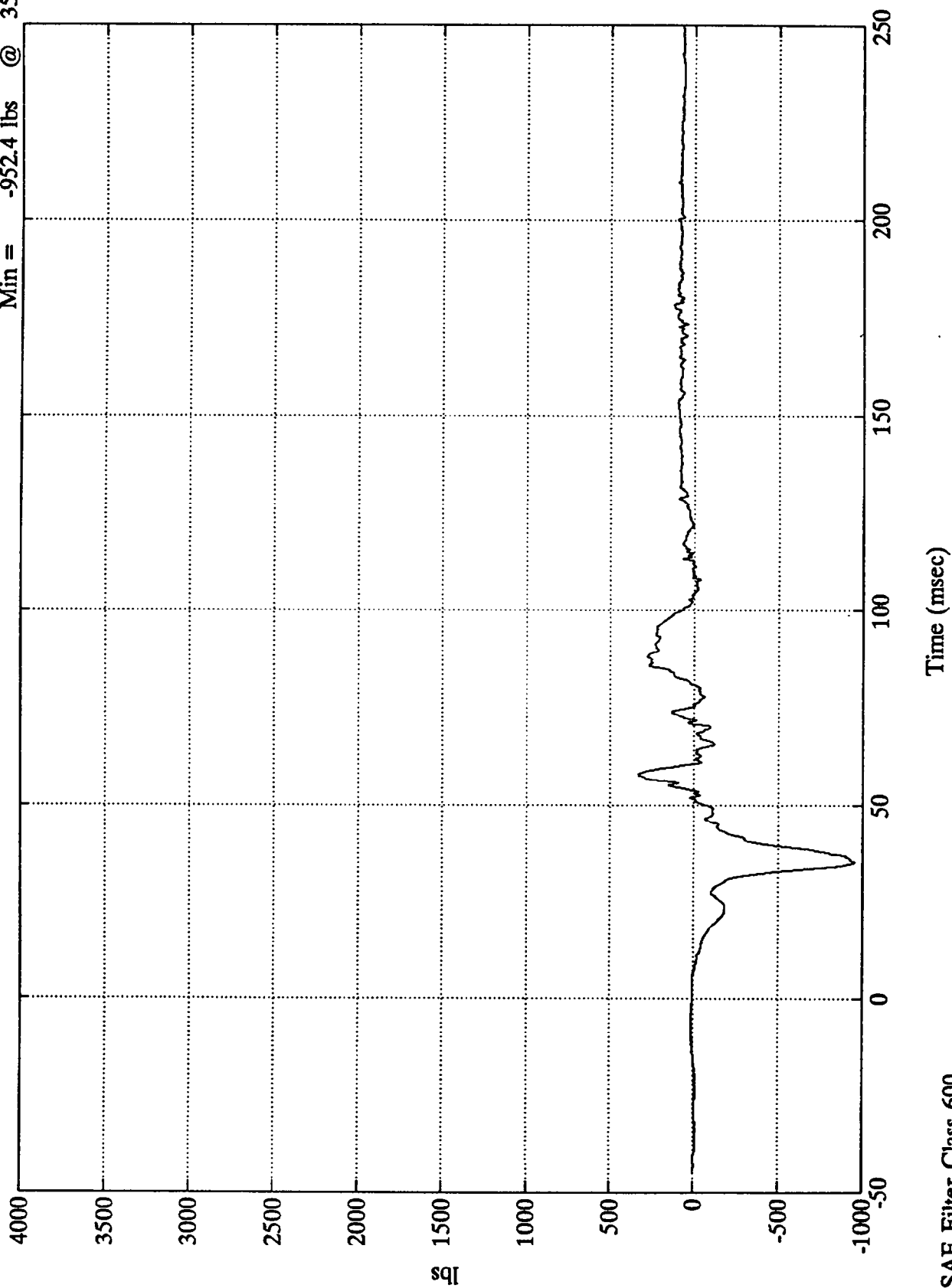
Max = 363.2 lbs @ 91.31 msec
Min = -376.9 lbs @ 77.76 msec



SAE Filter Class 600

V-to-V Test #5

Veh. 1 Lt L Tibia Fz
Max = 331.7 lbs @ 57.95 msec
Min = -952.4 lbs @ 35.15 msec

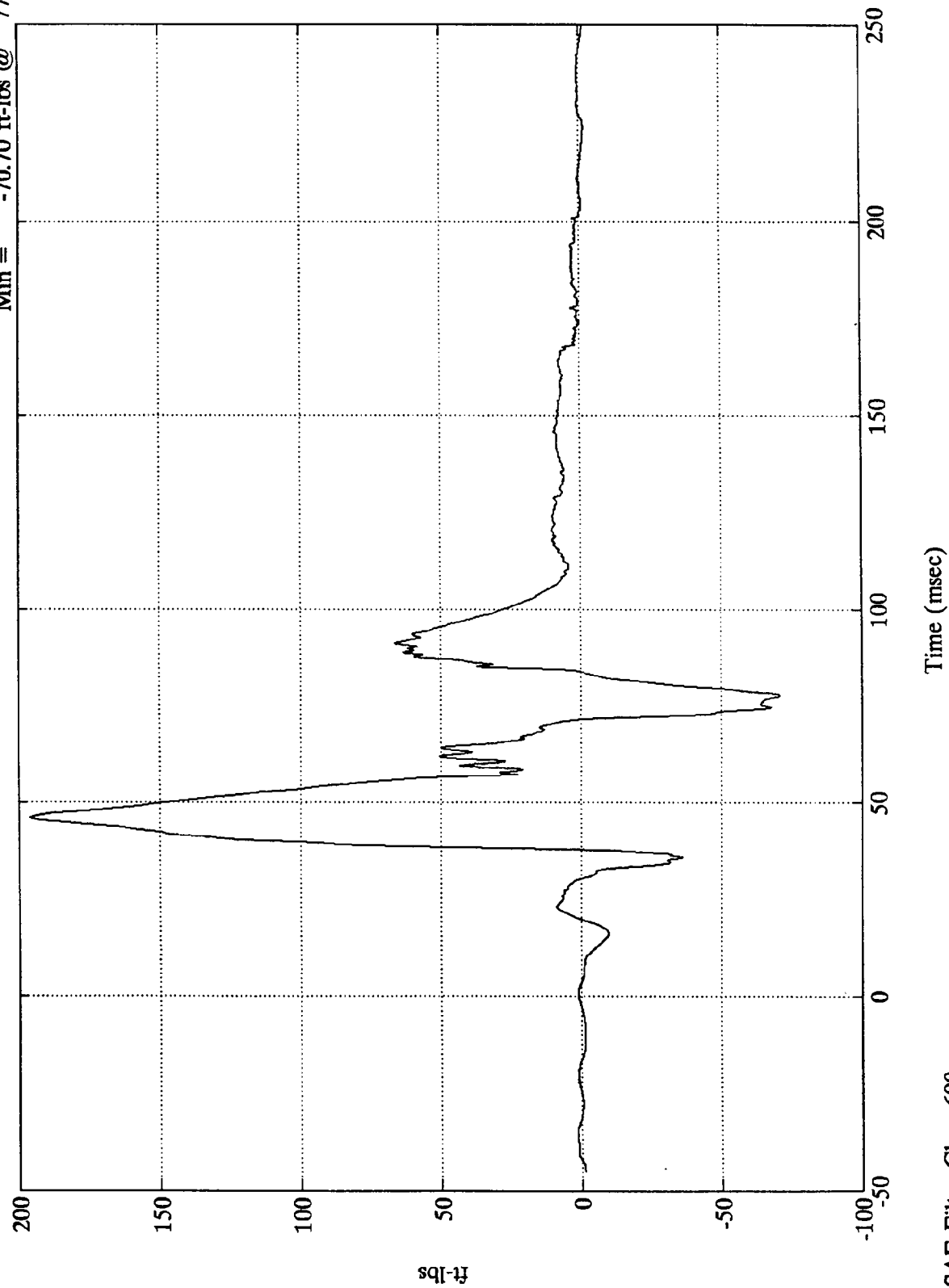


SAE Filter Class 600

V-to-V Test #5

Max = 195.92 ft-lbs @ 46.08 msec
Min = -70.70 ft-lbs @ 77.51 msec

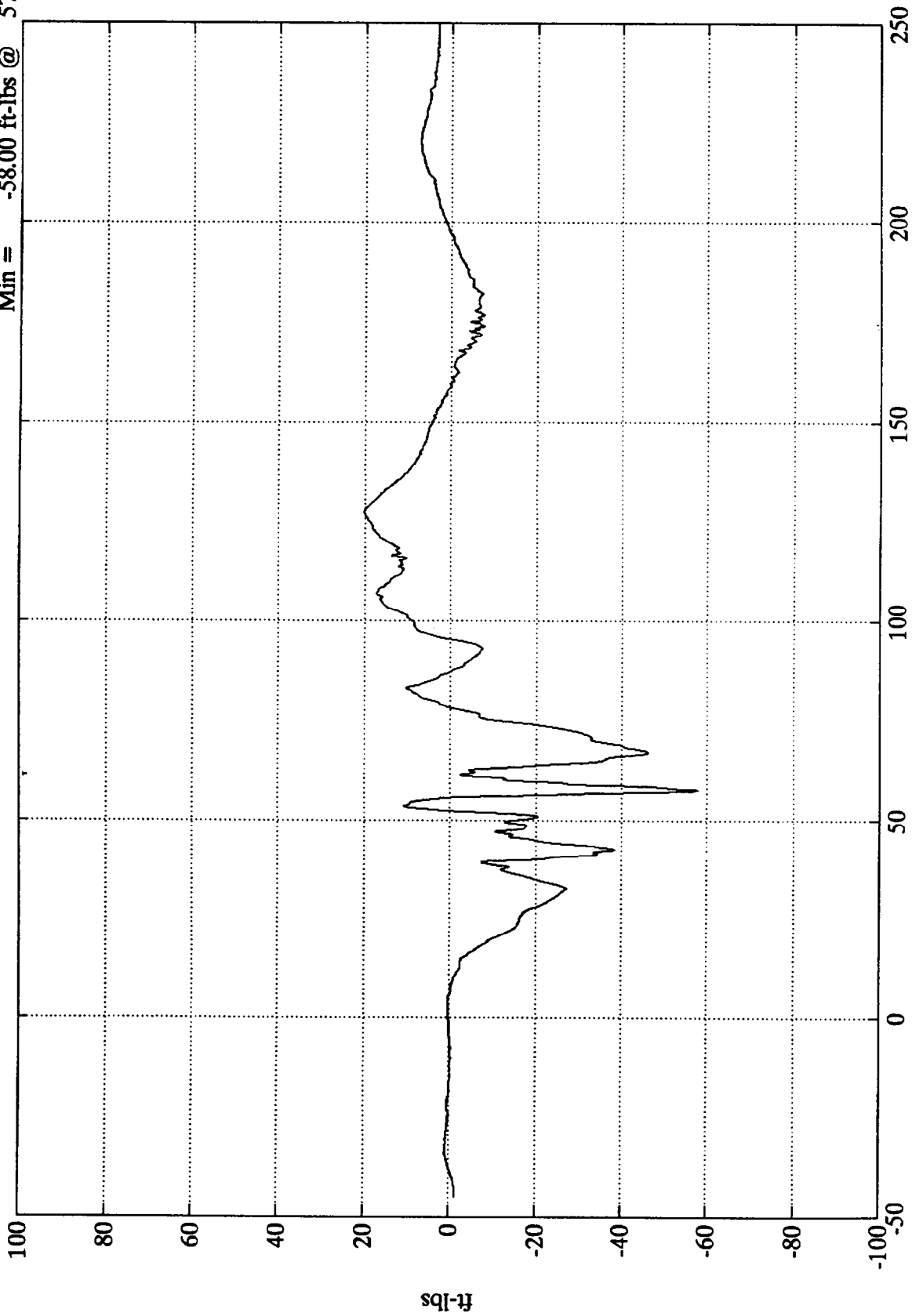
Veh. 1 Lt L Tibia Mx



SAE Filter Class 600

Veh. 1 Rt U Tibia Mx

Max = 20.11 ft-lbs @ 127.68 msec
Min = -58.00 ft-lbs @ 57.60 msec



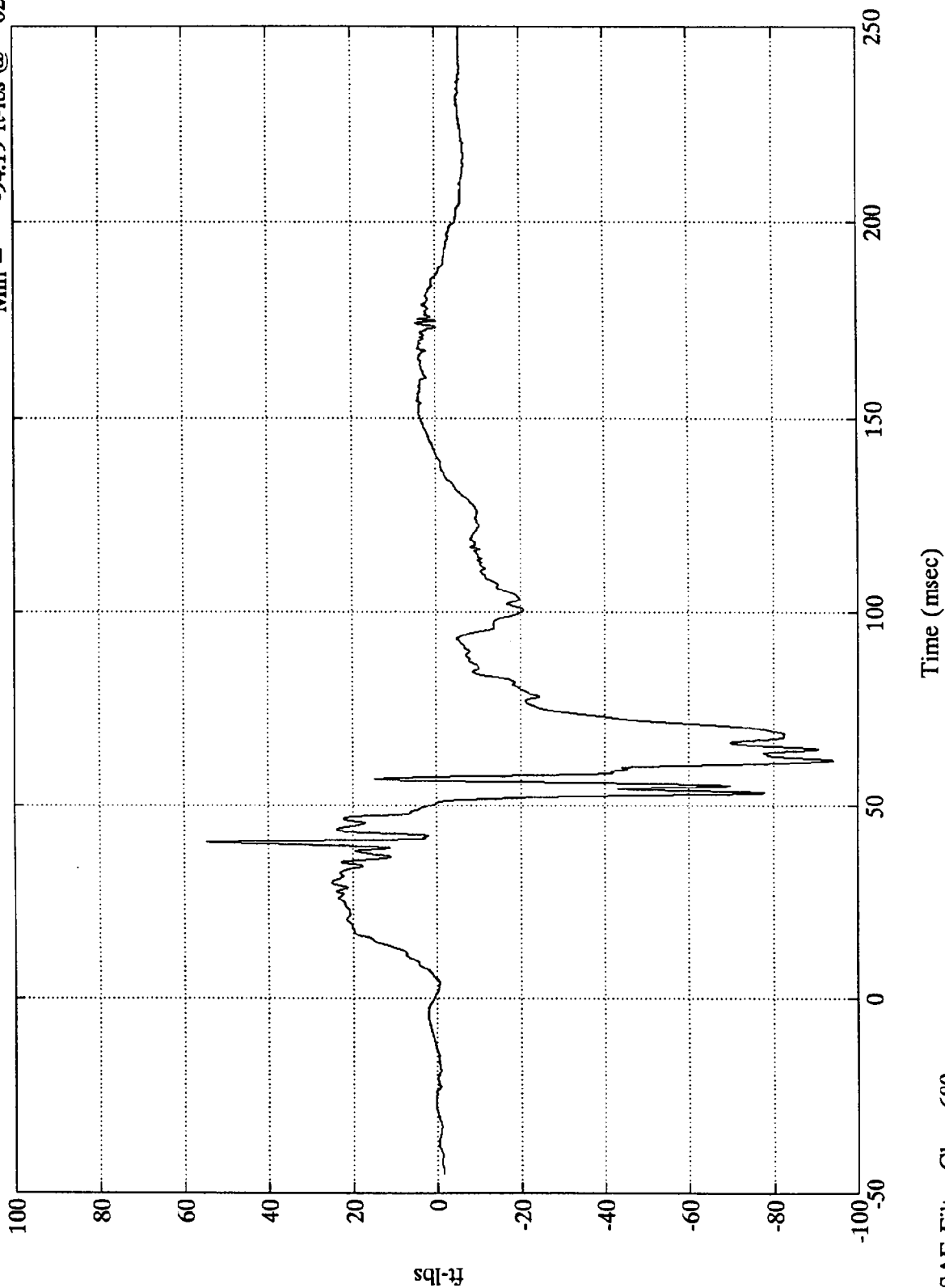
Time (msec)

SAE Filter Class 600

V-to-V Test #5

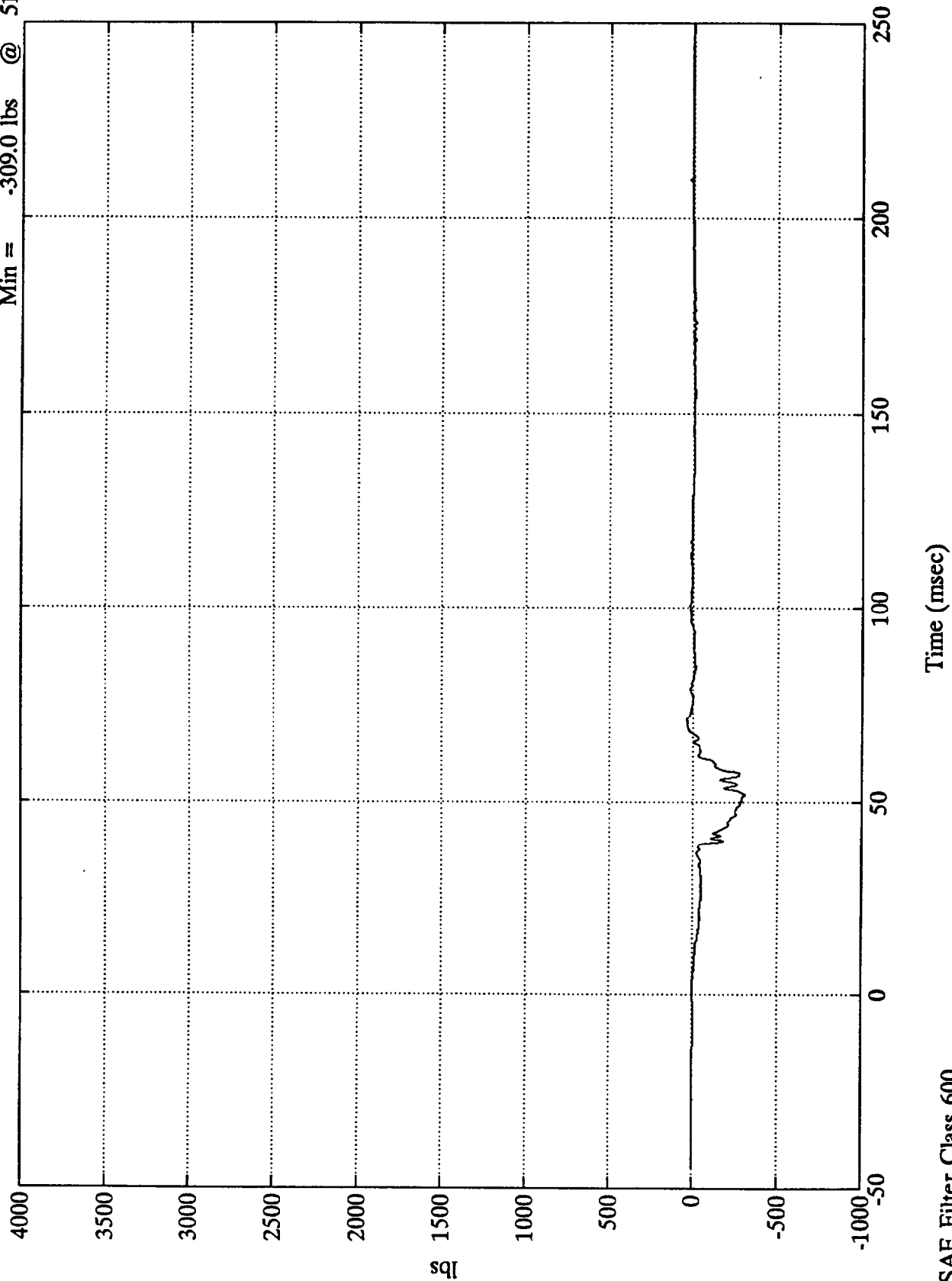
Veh. 1 Rt U Tibia My

Max = 54.61 ft-lbs @ 40.56 msec
Min = -94.19 ft-lbs @ 62.04 msec



V-to-V Test #5

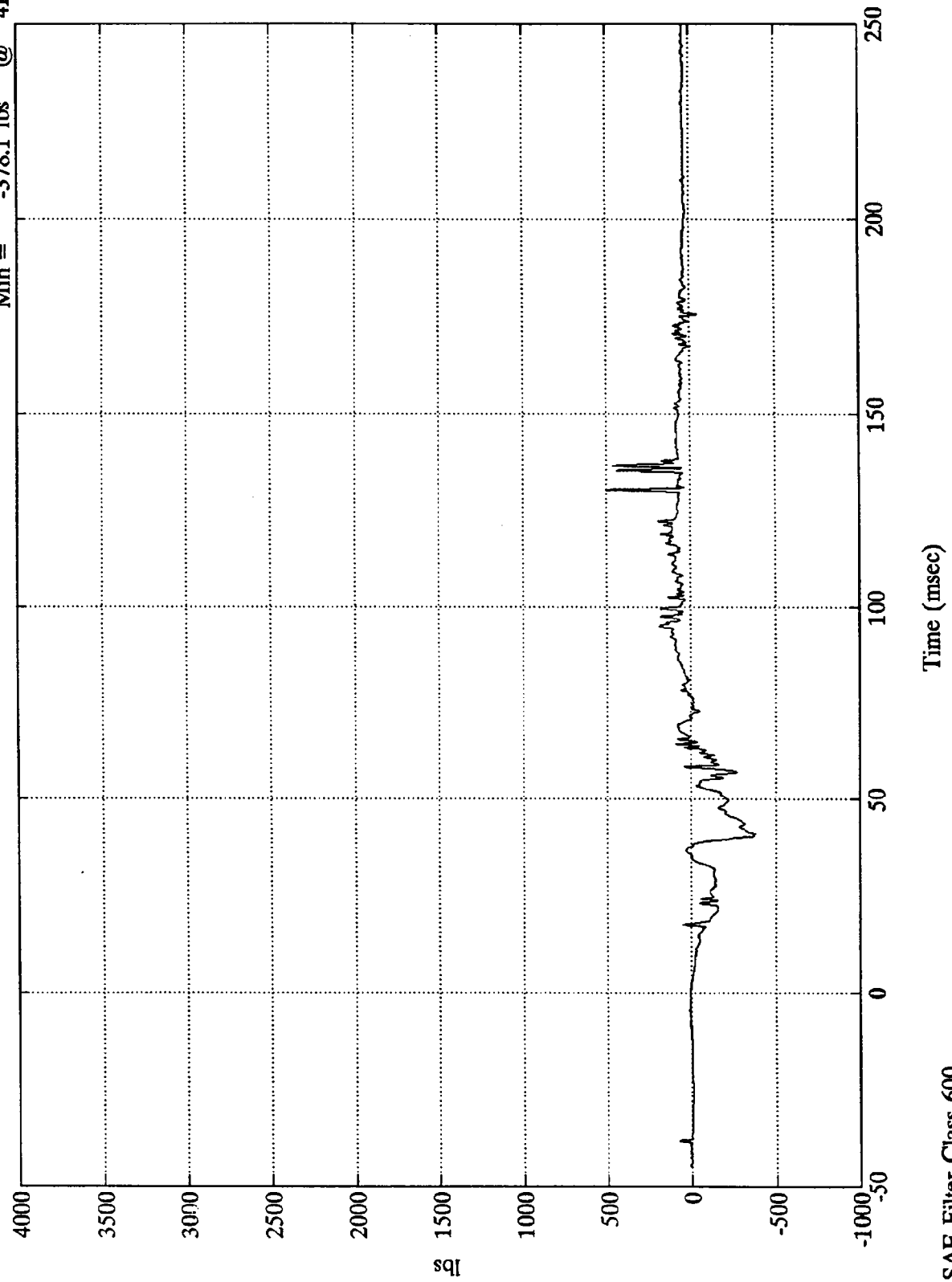
Veh. 1 Rt L Tibia Fy Max = 39.8 lbs @ 71.16 msec
Min = -309.0 lbs @ 51.95 msec



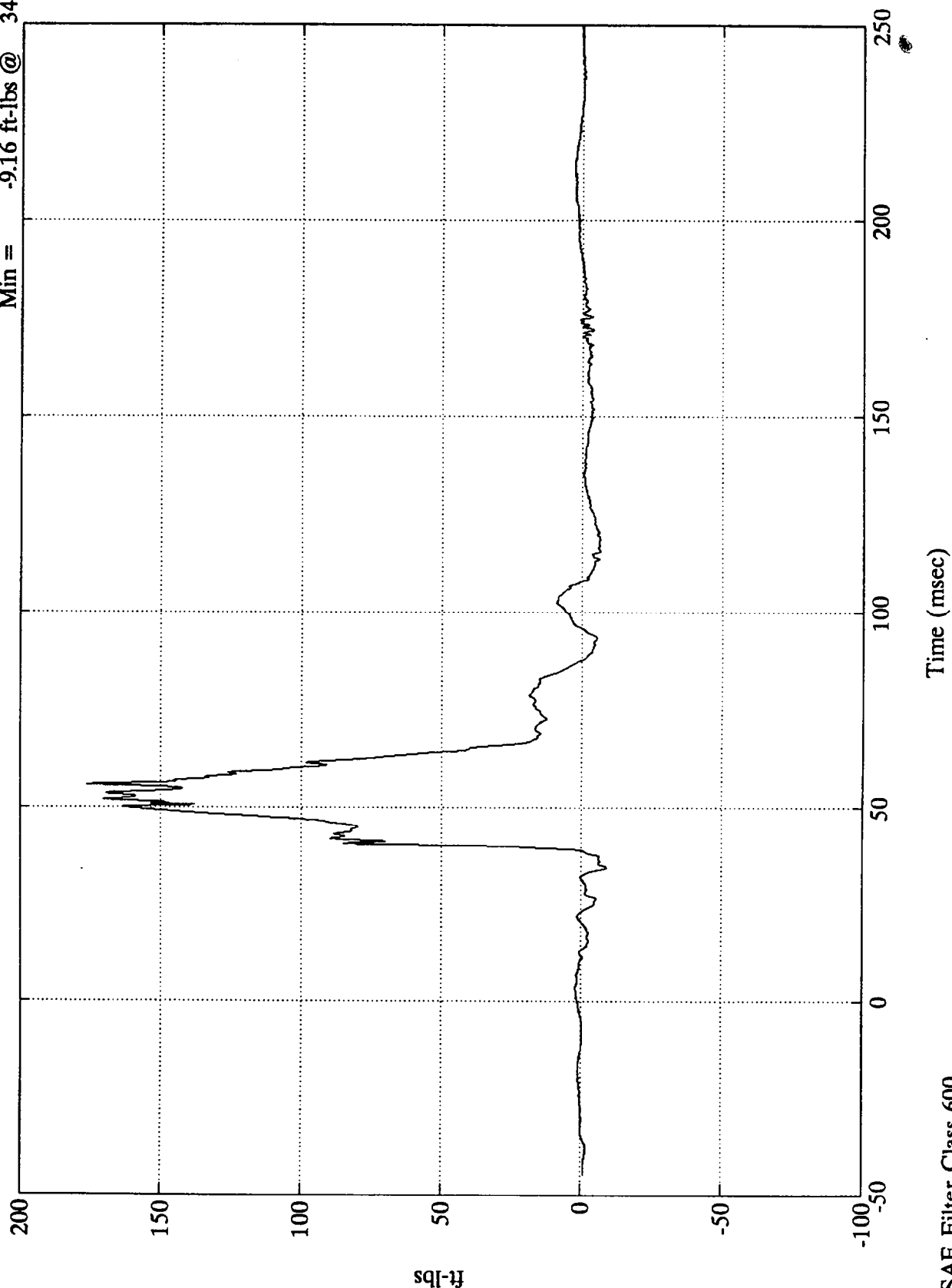
SAE Filter Class 600

V-to-V Test #5

Veh. 1 Rt L Tibia Fz
Max = 499.2 lbs @ 130.80 msec
Min = -378.1 lbs @ 41.04 msec



SAE Filter Class 600



VEHICLE TWO DATA

1991 FORD CROWN VICTORIA LTD 4-DOOR SEDAN

TEST NO. Y42-5-1042

VEHICLE DATA

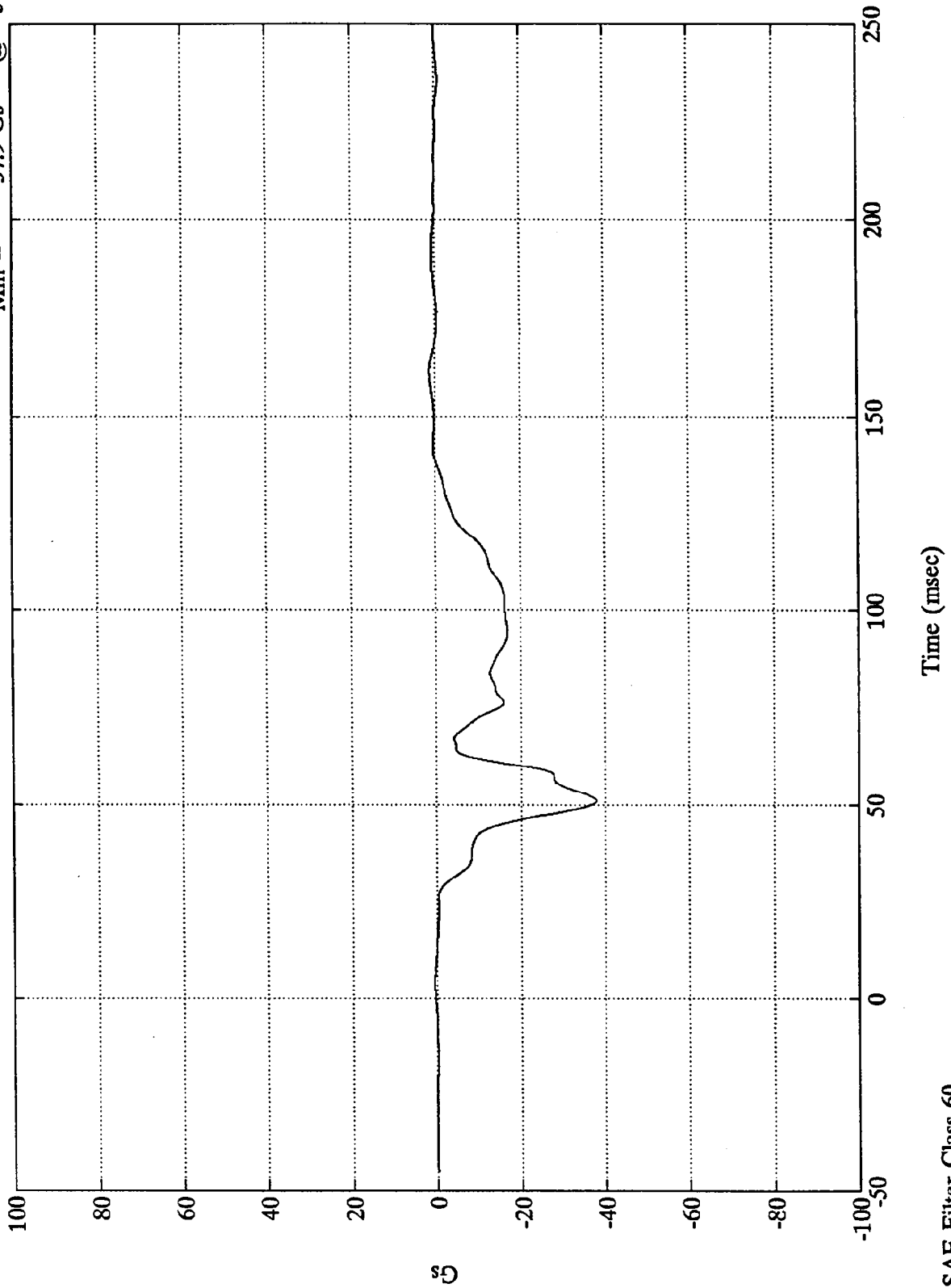
FILTER CHANNEL CLASS

60

V-to-V Test #5

Veh. 2 L R Seat (X)

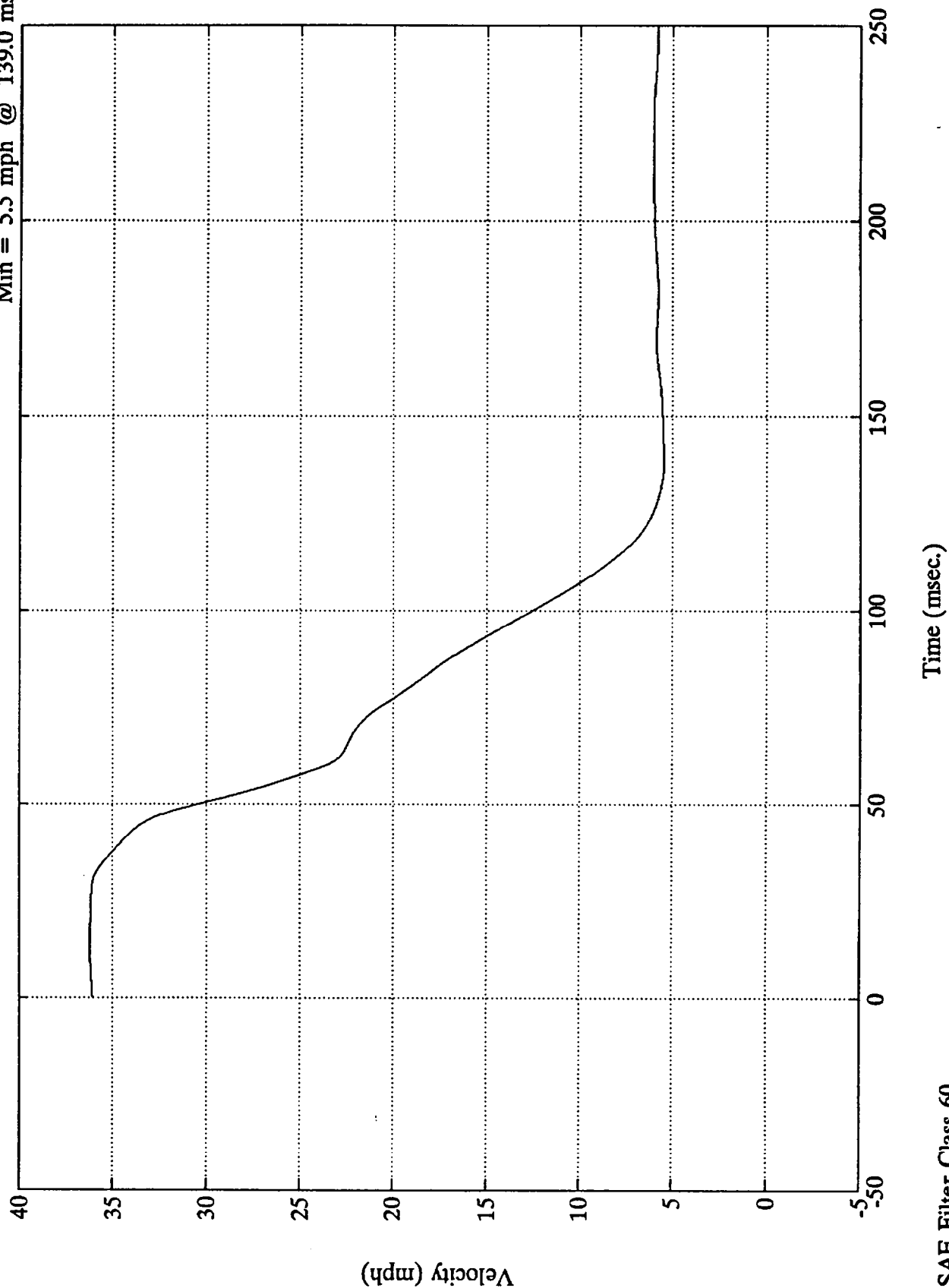
Max = 1.2 Gs @ 161.76 msec
Min = -37.9 Gs @ 51.24 msec



V-to-V Test #5

Veh. 2 L R Seat (X)

Max = 36.2 mph @ 14.6 msec
Min = 5.5 mph @ 139.0 msec



V-to-V Test #5

Veh. 2 L R Seat (X)

Max = 36.2 mph @ 14.6 msec
Min = 5.5 mph @ 139.0 msec

Velocity (mph)

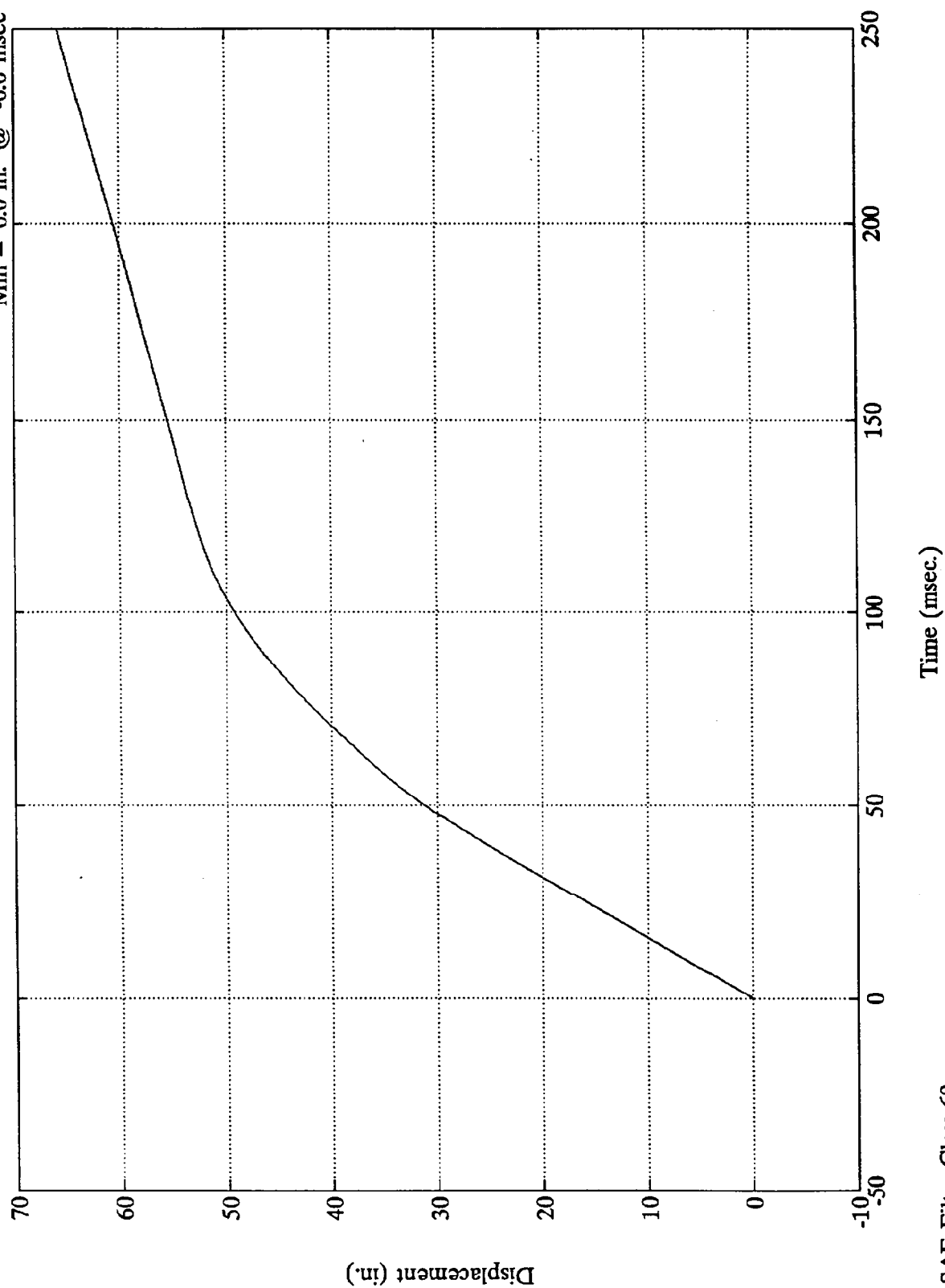
Time (msec.)

SAE Filter Class 60

Max = 66.3 in. @ 254.9 msec
Min = 0.0 in. @ -0.0 msec

Veh. 2 L R Seat (X)

V-to-V Test #5

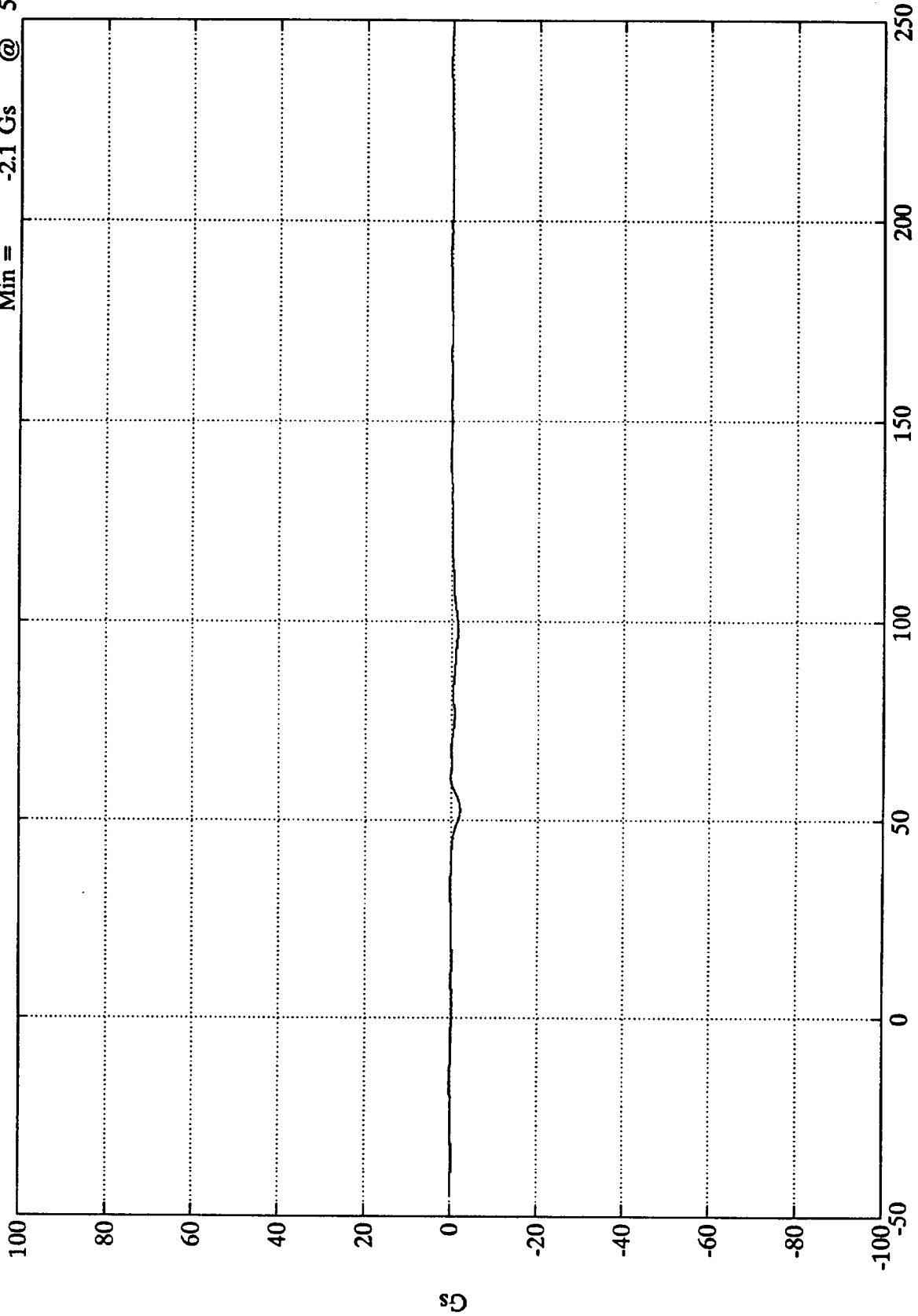


SAE Filter Class 60

V-to-V Test #5

Veh. 2 R R Seat (X)

Max = 0.4 Gs @ 190.92 msec
Min = -2.1 Gs @ 52.56 msec



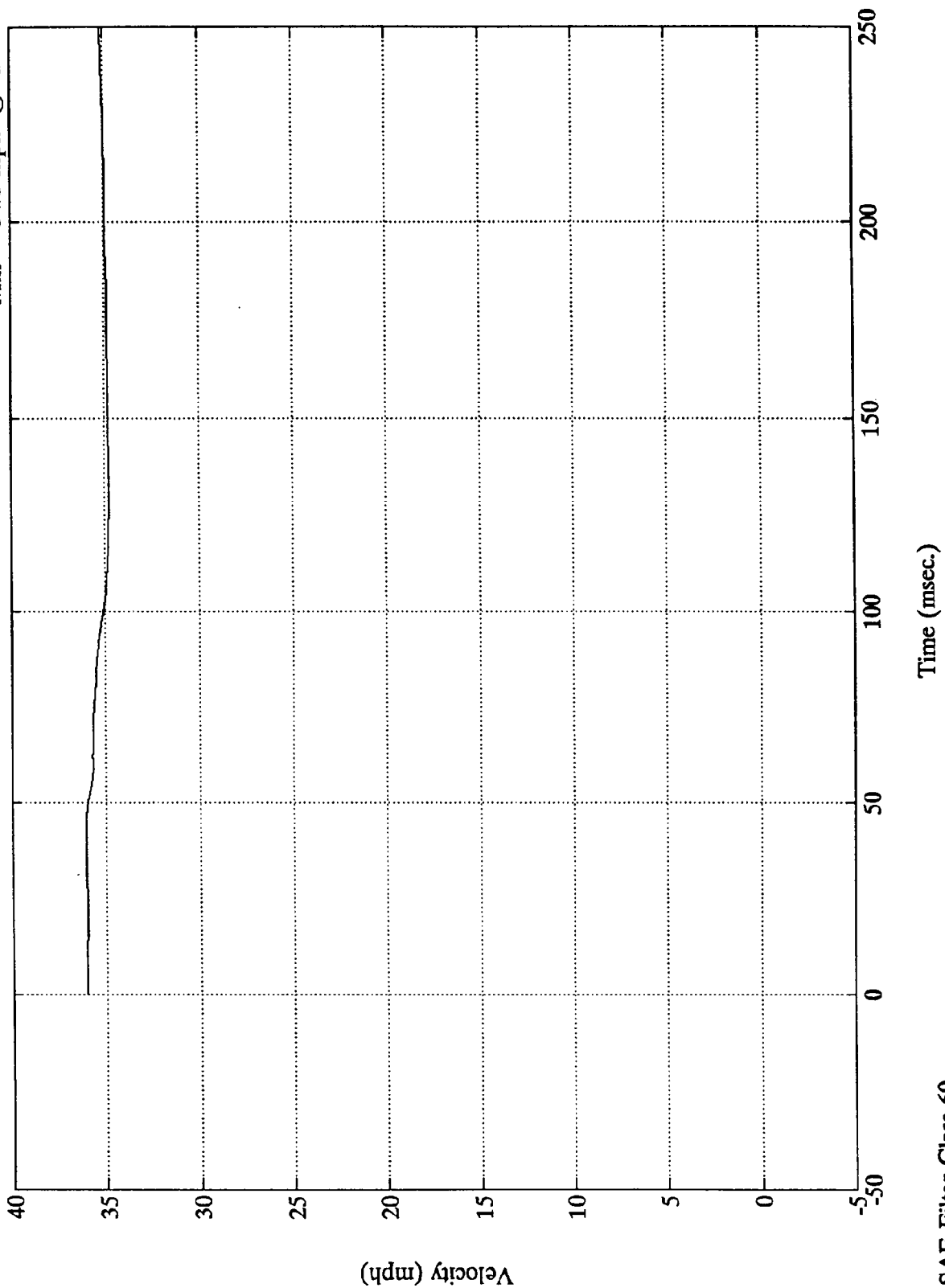
Time (msec)

SAE Filter Class 60

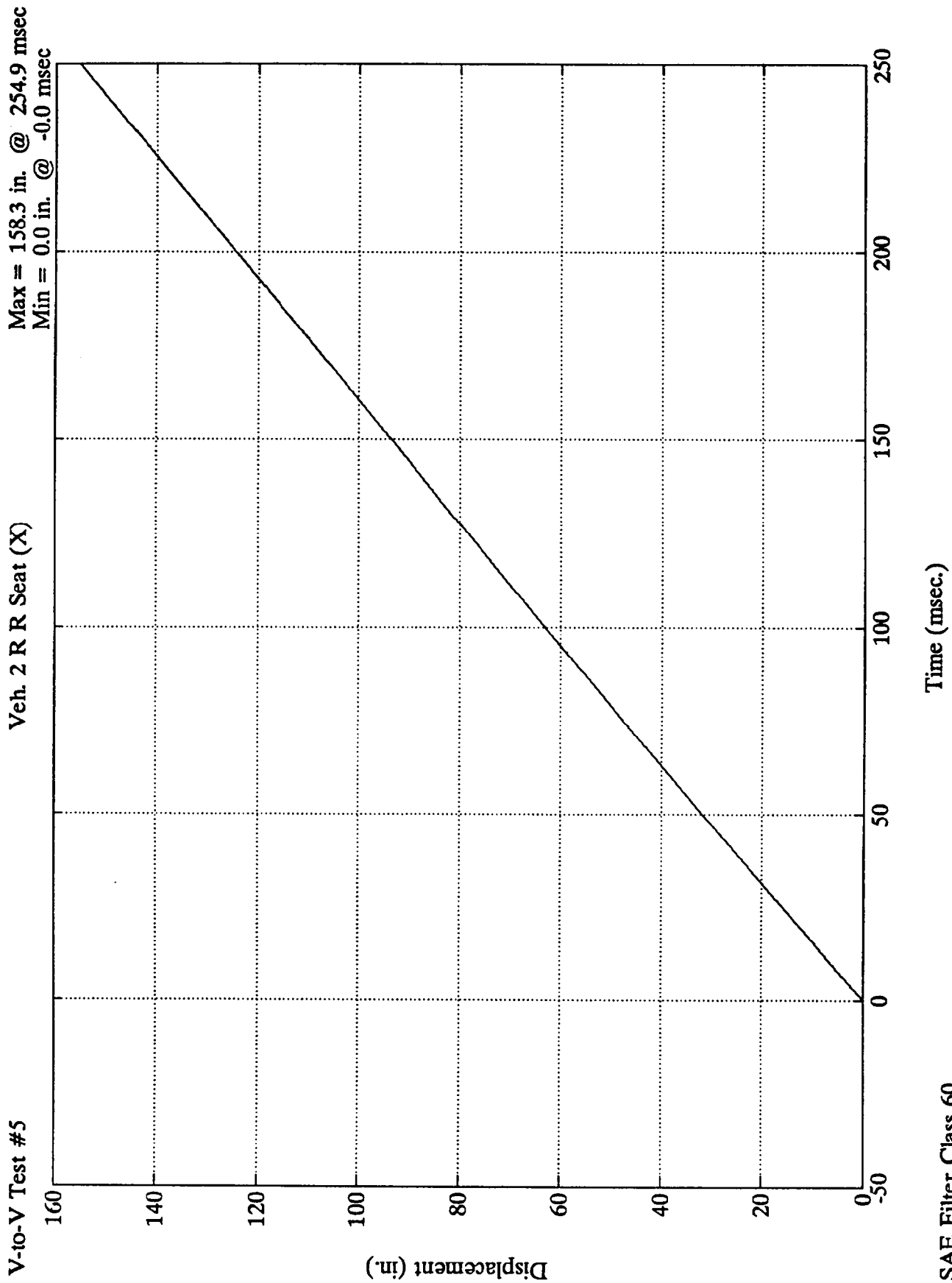
V-to-V Test #5

Veh. 2 R R Seat (X)

Max = 36.1 mph @ 0.7 msec
Min = 34.8 mph @ 137.3 msec



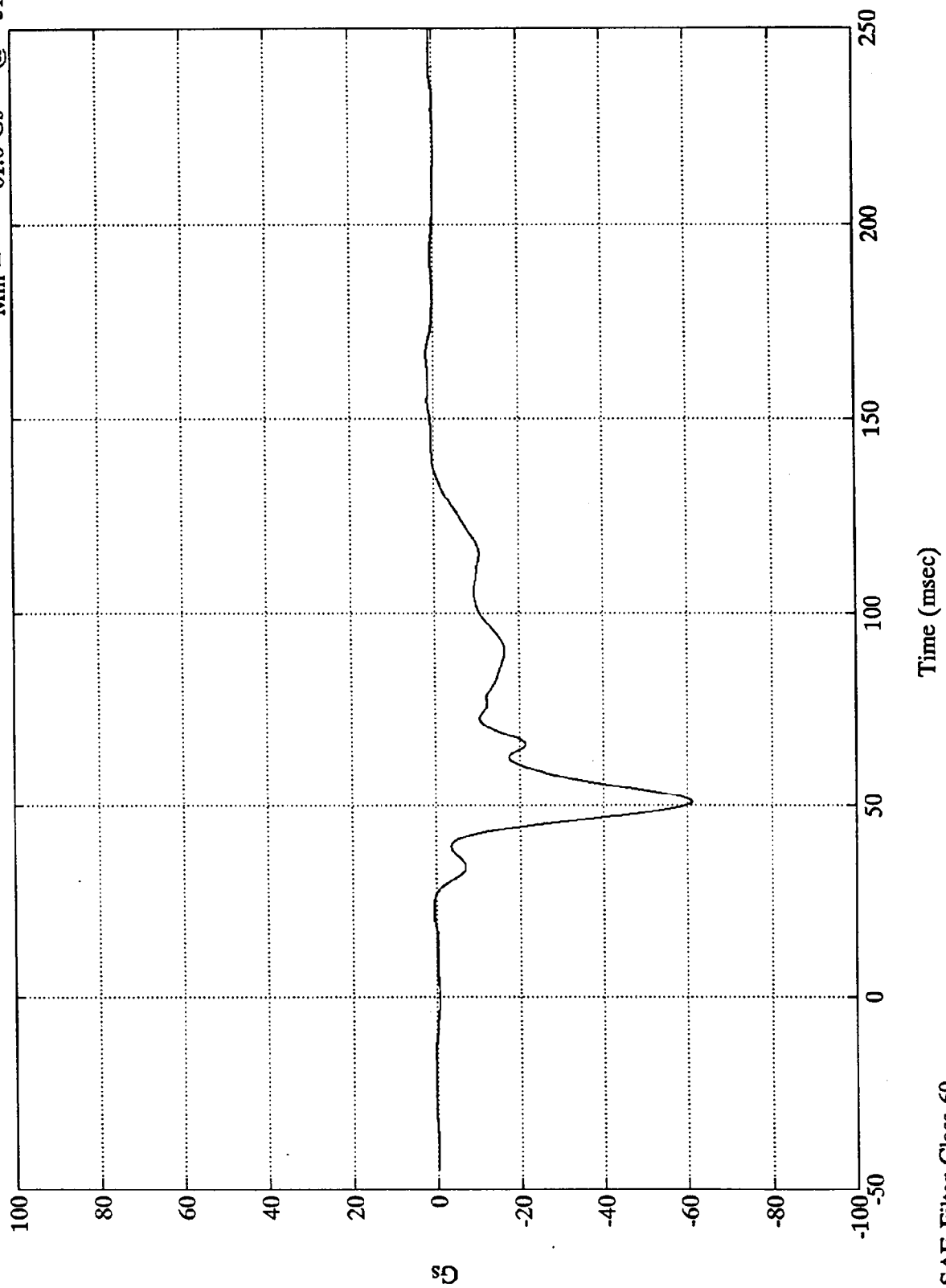
SAE Filter Class 60



V-to-V Test #5

Veh. 2 Engine Top (X)

Max = 1.7 Gs @ 166.68 msec
Min = -61.0 Gs @ 51.00 msec

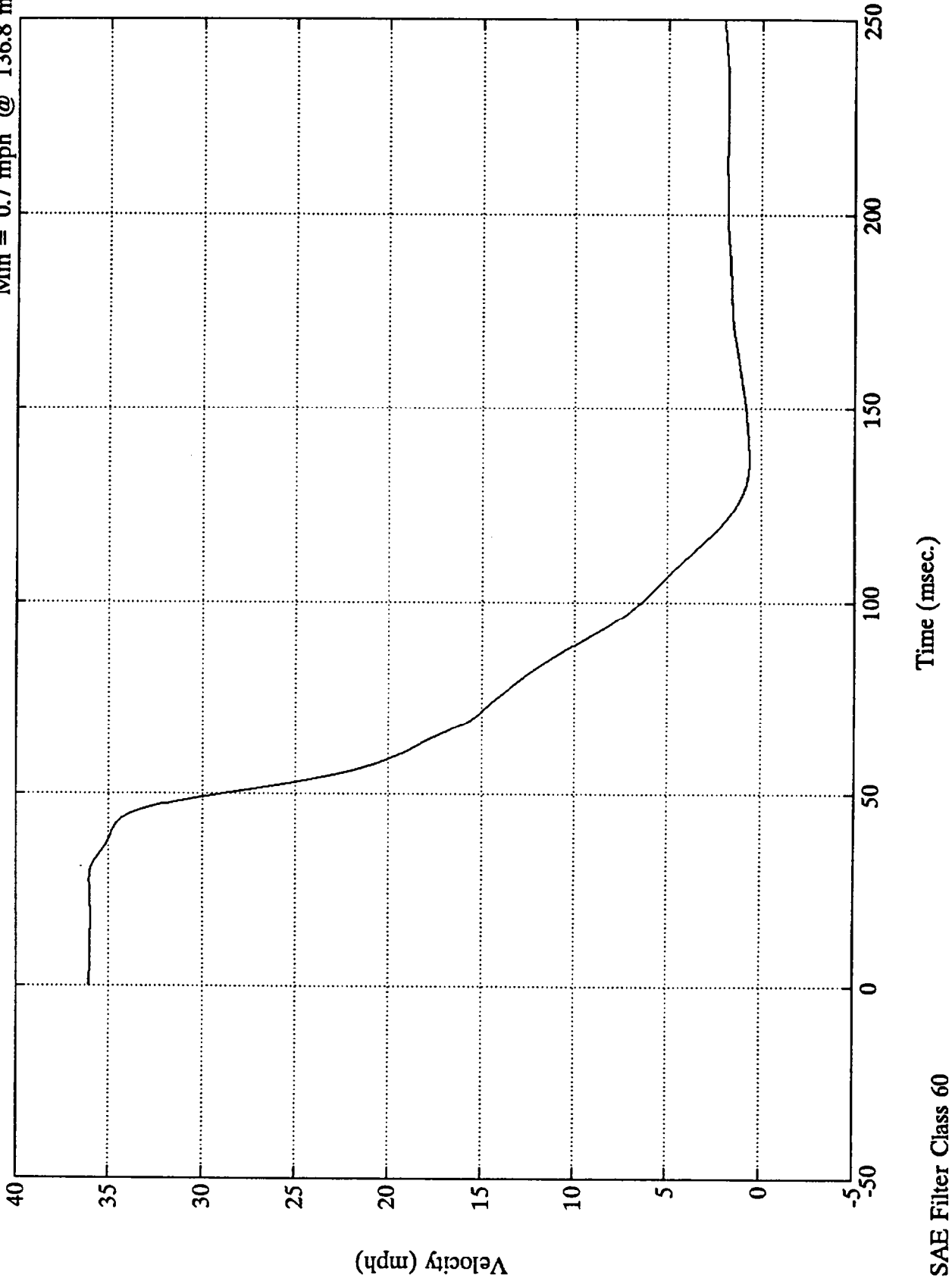


SAE Filter Class 60

V-to-V Test #5

Veh. 2 Engine Top (X)

Max = 36.1 mph @ -0.0 msec
Min = 0.7 mph @ 136.8 msec

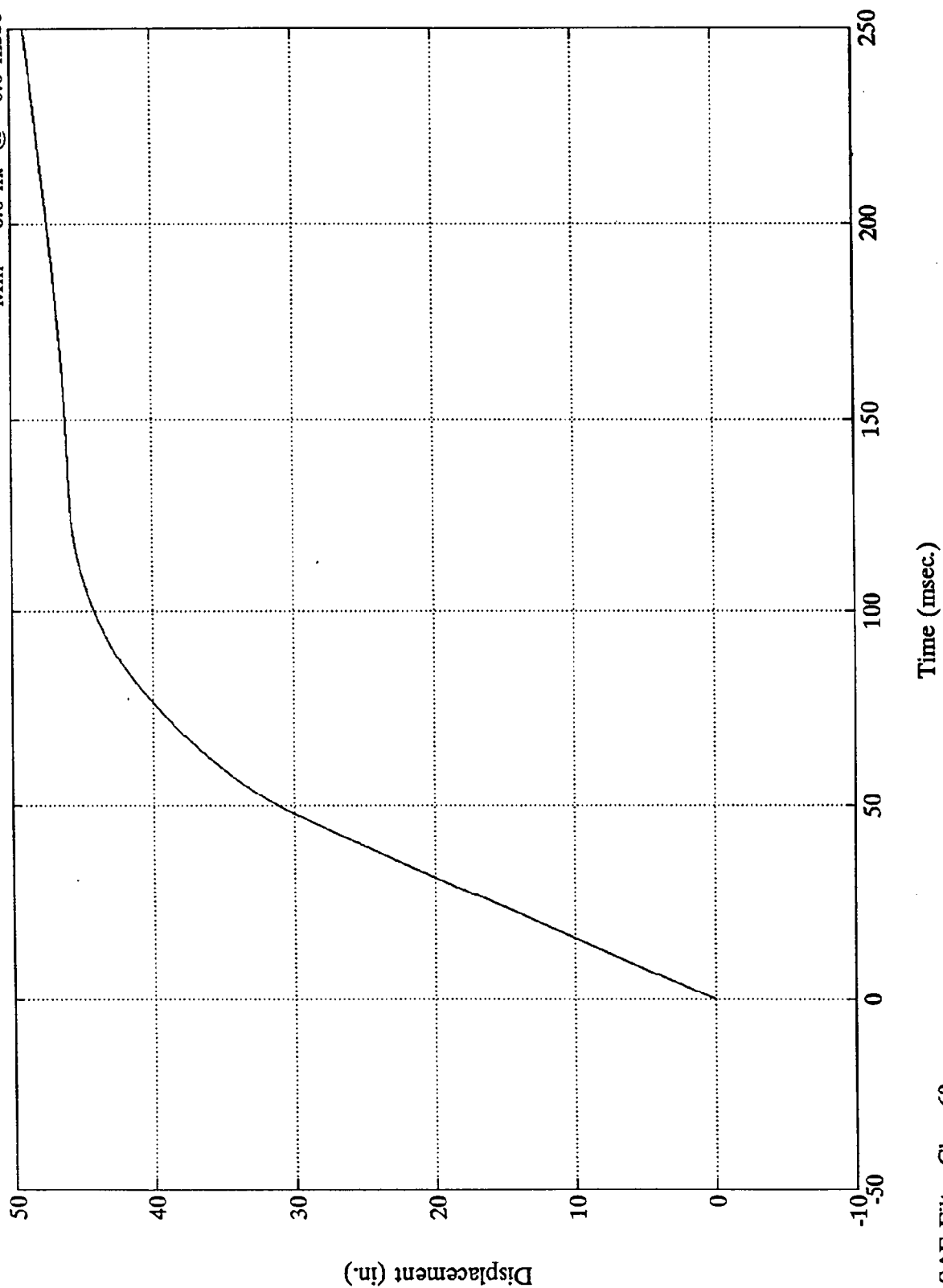


SAE Filter Class 60

Max = 49.2 in. @ 254.9 msec
Min = 0.0 in. @ -0.0 msec

Veh. 2 Engine Top (X)

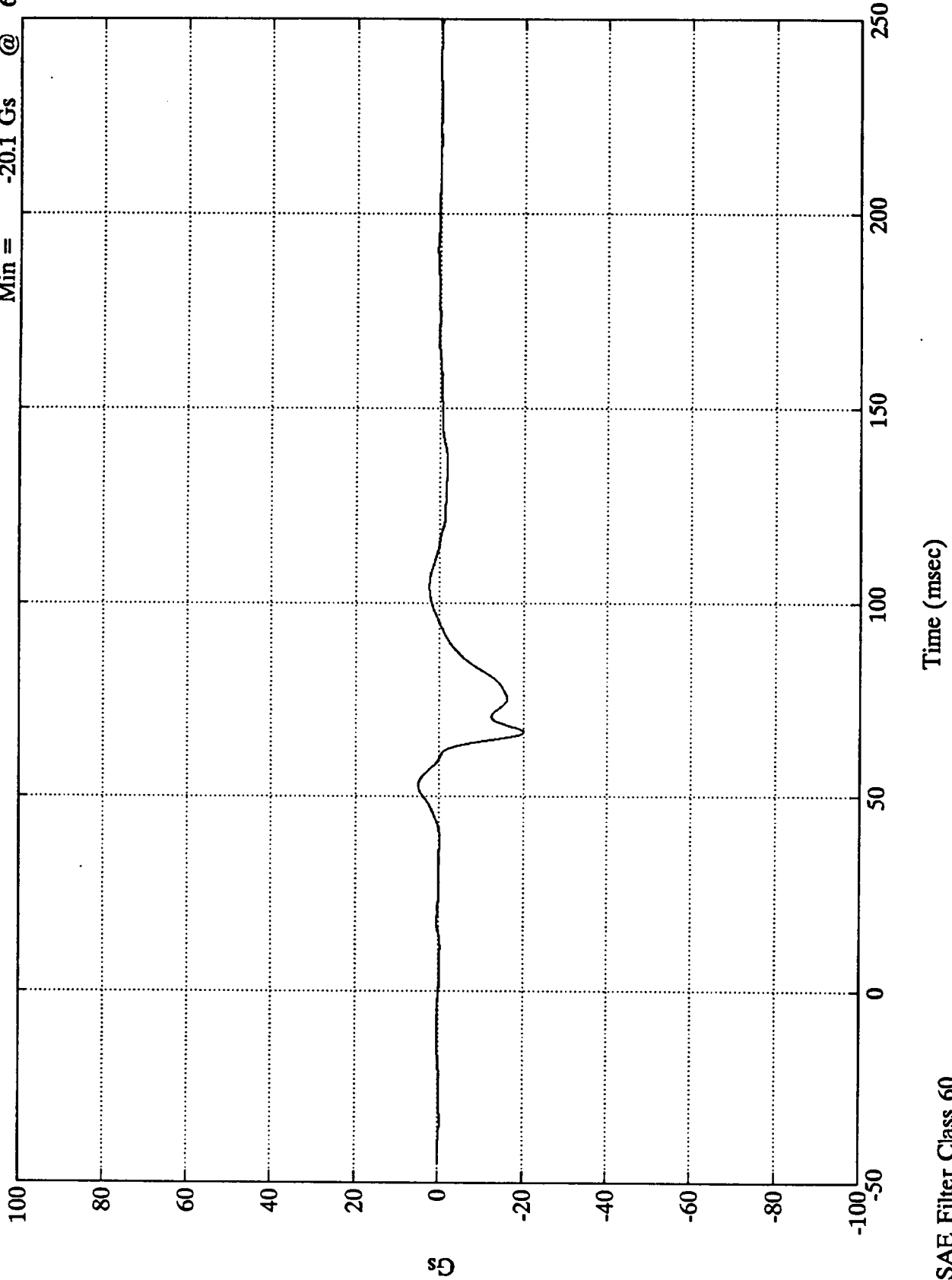
V-to-V Test #5



SAE Filter Class 60

Veh. 2 Engine Top (Z)

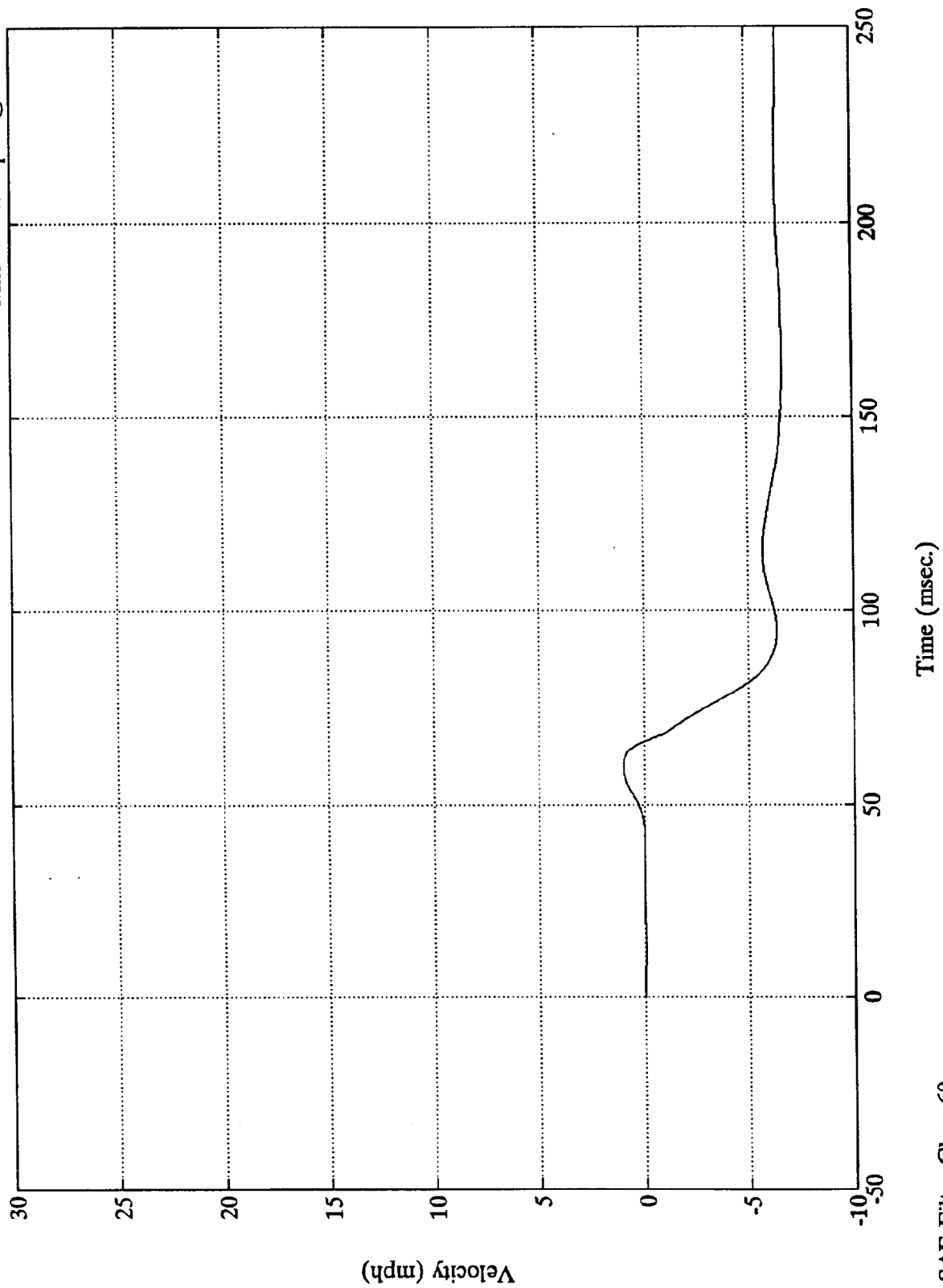
Max = 4.9 Gs @ 52.79 msec
Min = -20.1 Gs @ 66.72 msec



Max = 1.0 mph @ 60.0 msec
Min = -6.7 mph @ 164.2 msec

Veh. 2 Engine Top (Z)

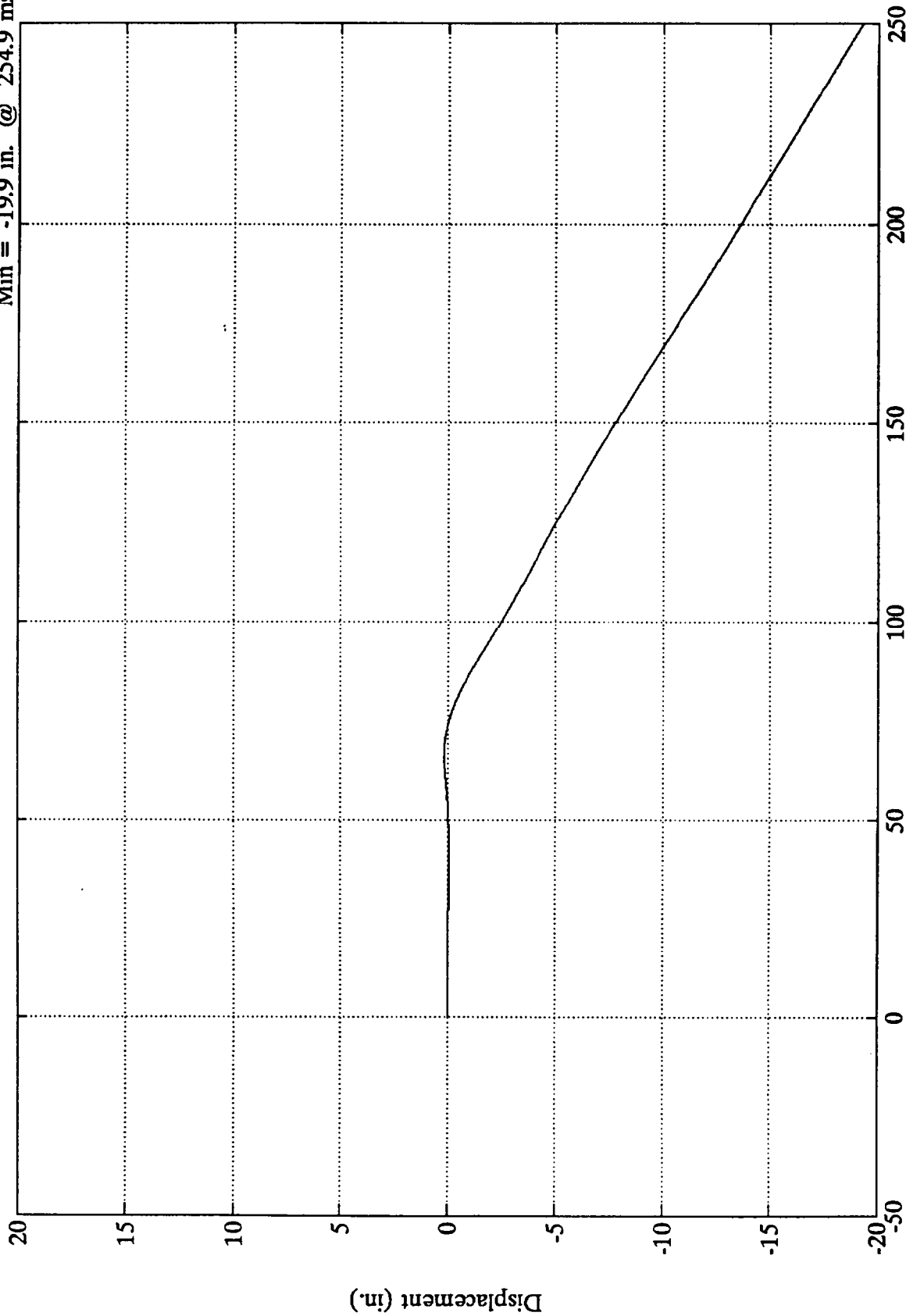
V-to-V Test #5



SAE Filter Class 60

V-to-V Test #5
Max = 0.2 in. @ 66.2 msec
Min = -19.9 in. @ 254.9 msec

Veh. 2 Engine Top (Z)



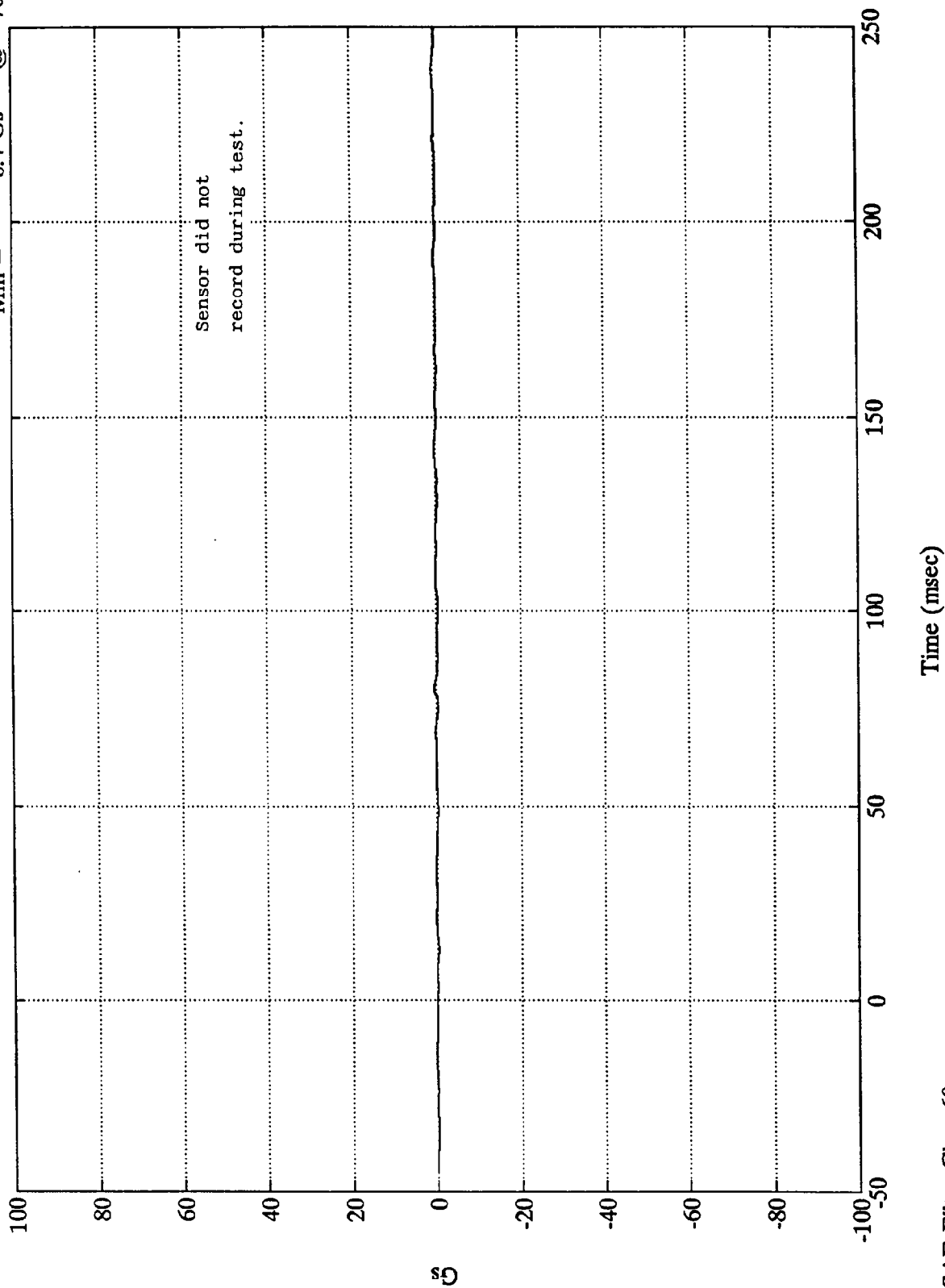
Time (msec.)

SAE Filter Class 60

V-to-V Test #5

Veh. 2 Engine Bottom (X)

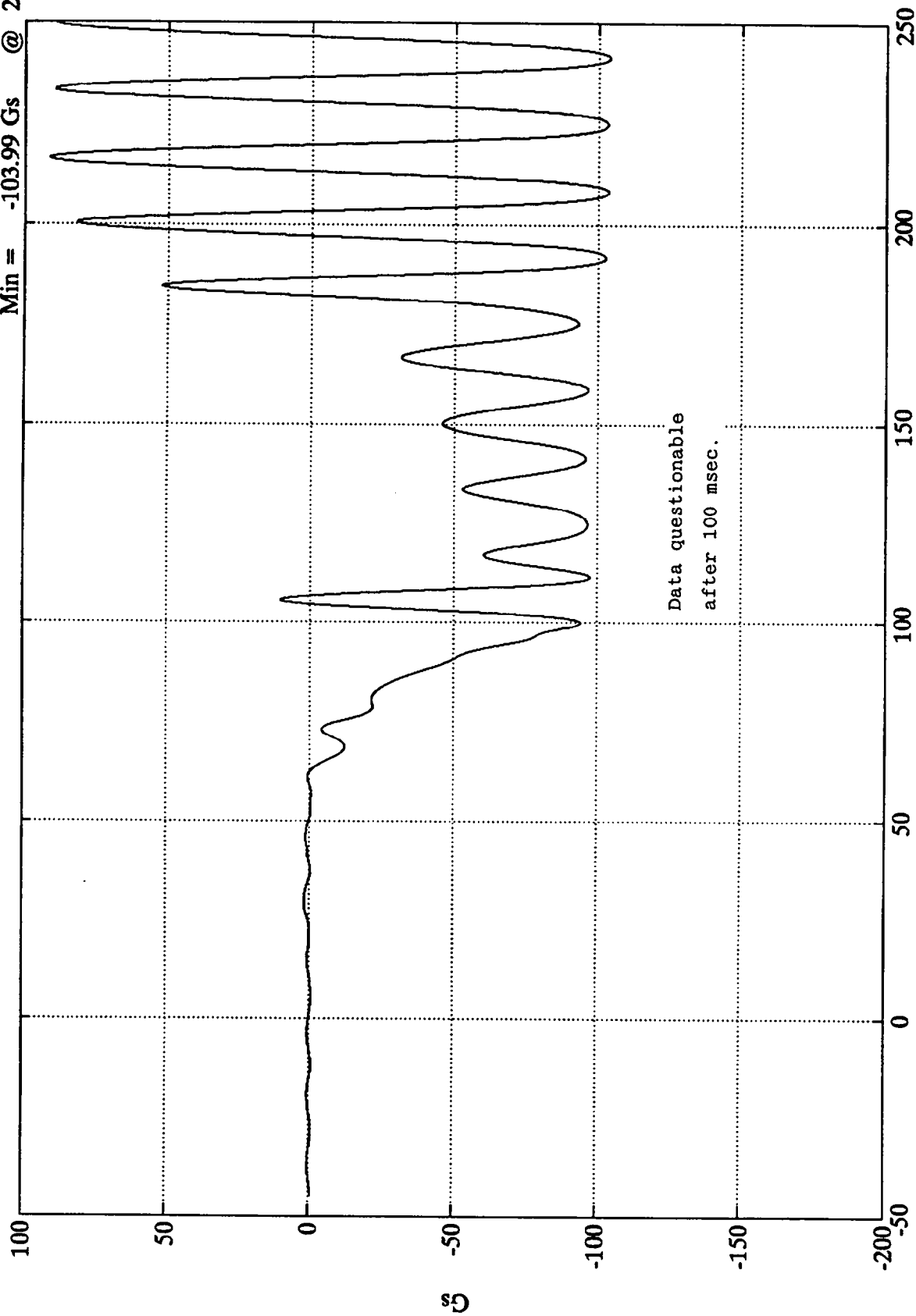
Max = 0.5 Gs @ 80.04 msec
Min = -0.4 Gs @ 76.55 msec



SAE Filter Class 60

Veh. 2 Front X Mem. (X)

Max = 91.42 Gs @ 216.47 msec
Min = -103.99 Gs @ 241.44 msec



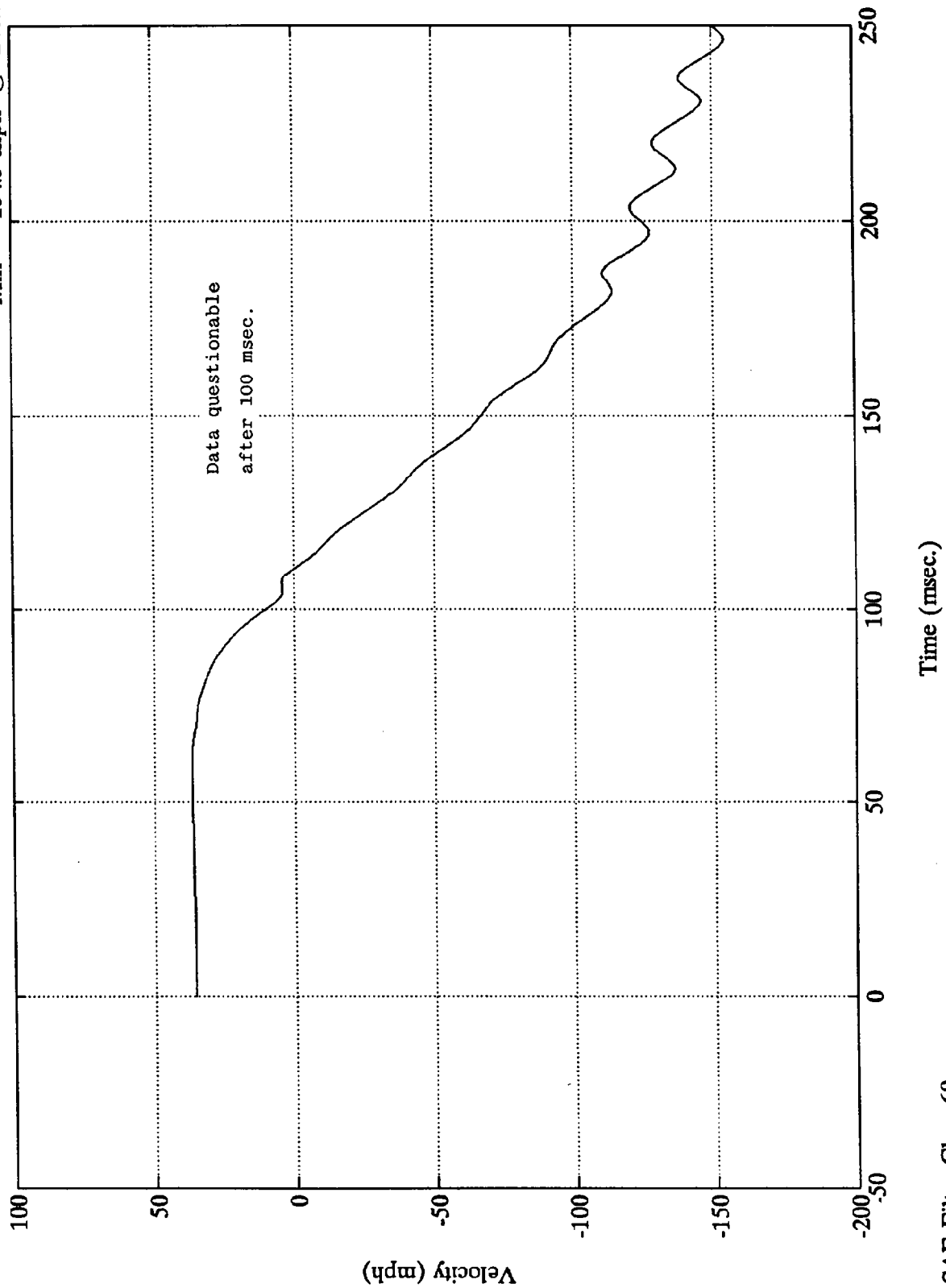
Time (msec)

SAE Filter Class 60

V-to-V Test #5

Veh.2 Front X Mem. (X)

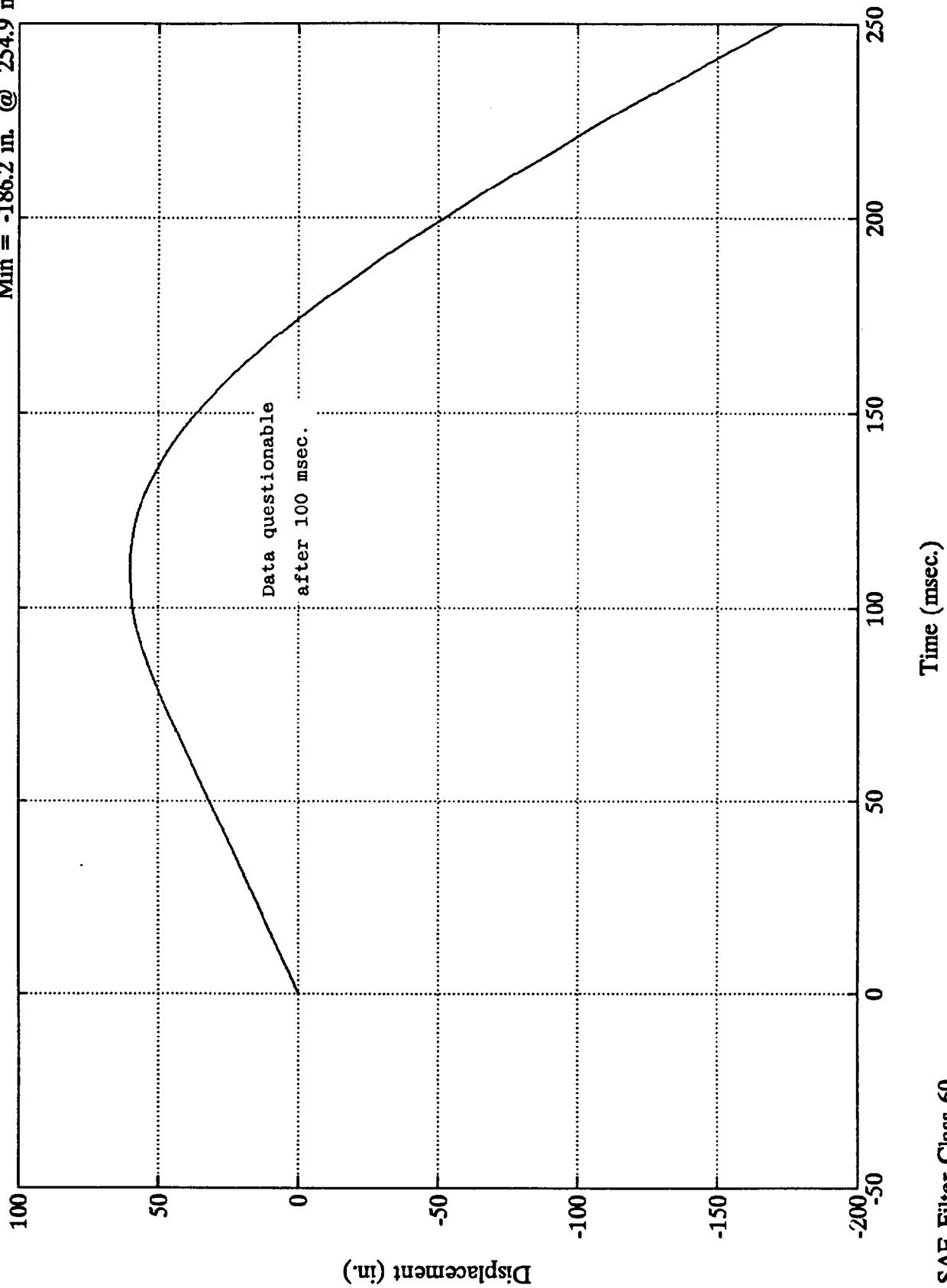
Max = 36.6 mph @ 52.1 msec
Min = -154.5 mph @ 246.5 msec



V-to-V Test #5

Veh.2 Front X Mem. (X)

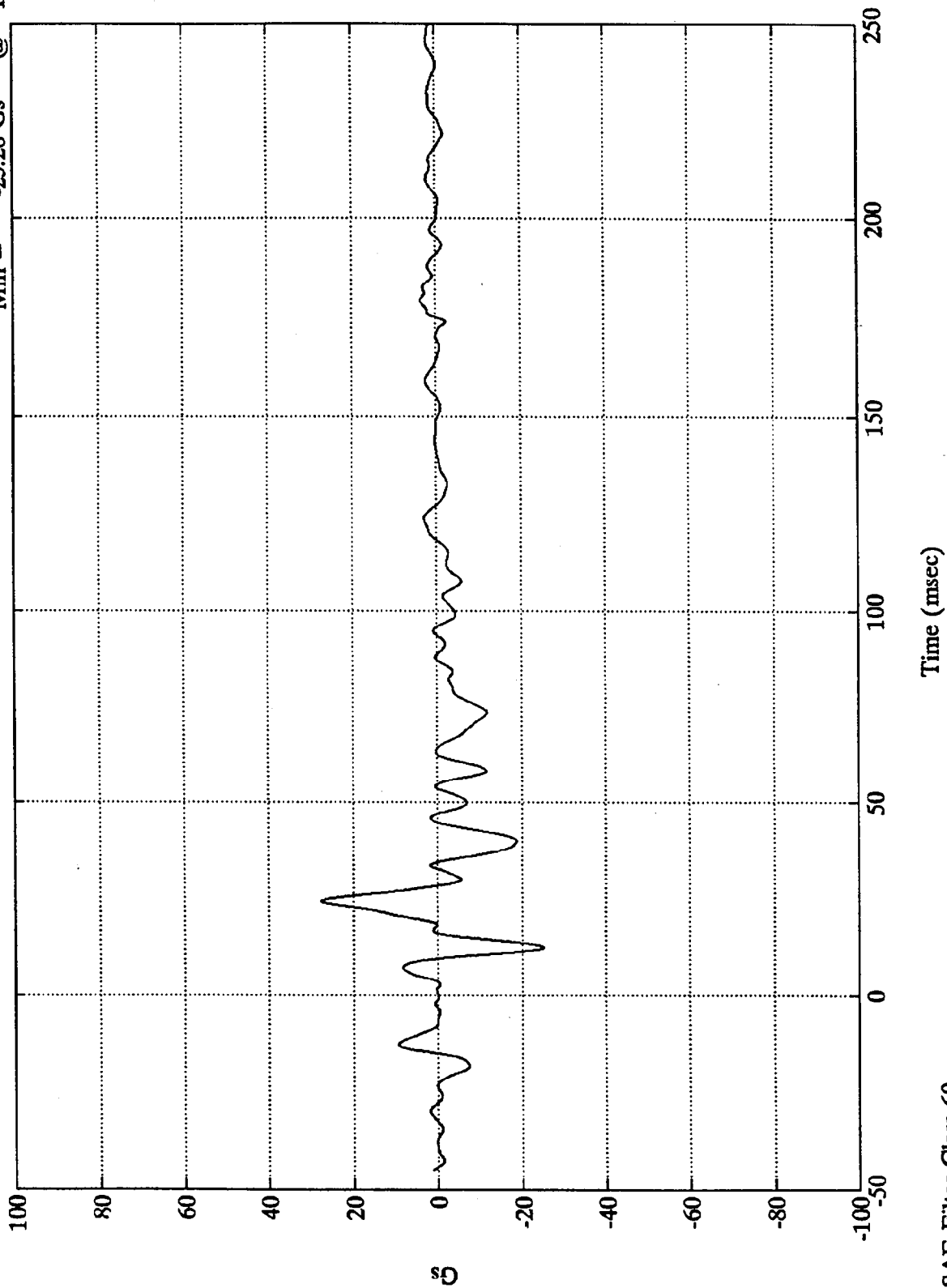
Max = 60.2 in. @ 111.1 msec
Min = -186.2 in. @ 254.9 msec



V-to-V Test #5

Veh. 2 Front X Mem. (Z)

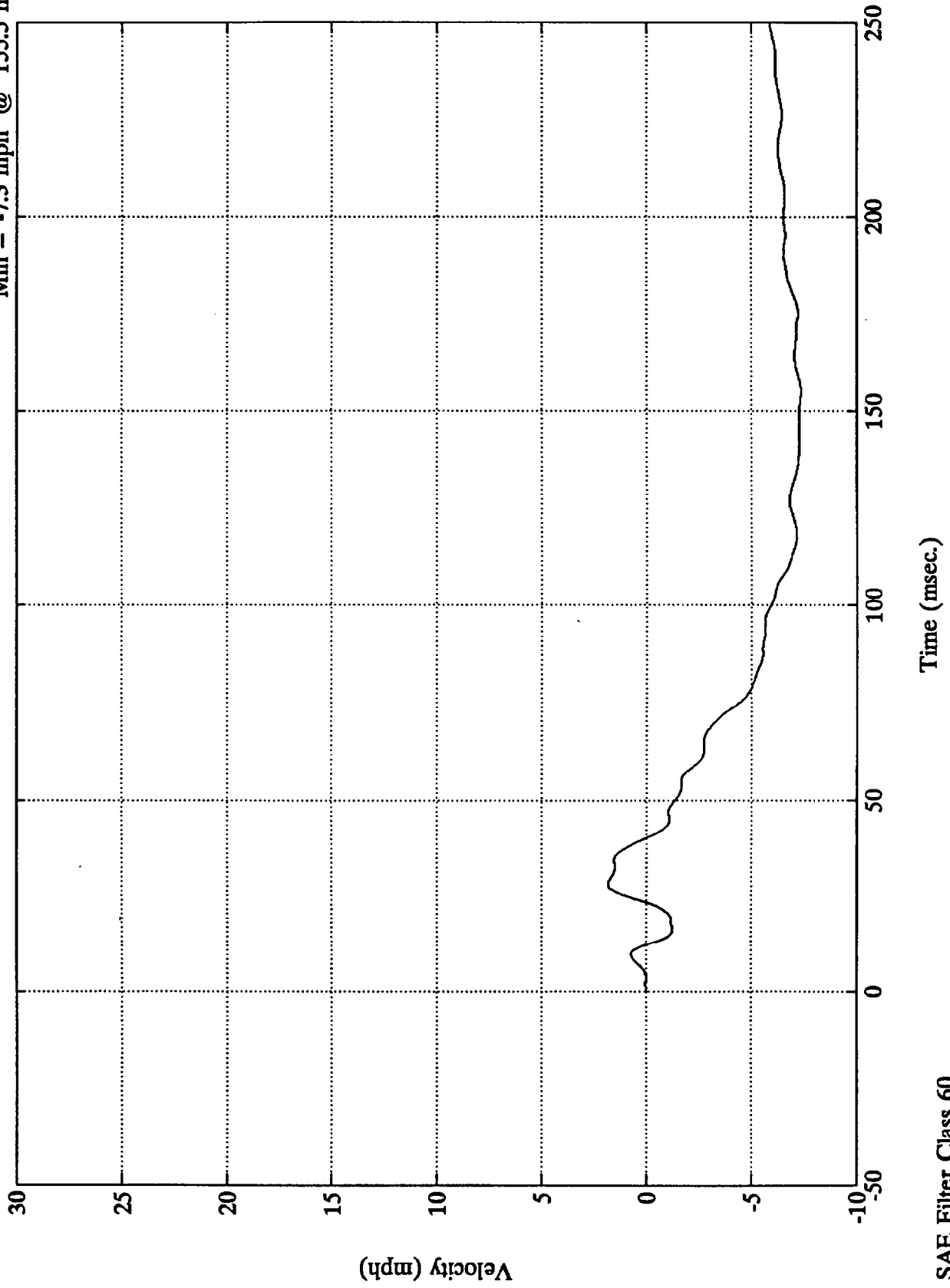
Max = 27.81 Gs @ 24.23 msec
Min = -25.28 Gs @ 12.47 msec



SAE Filter Class 60

V-to-V Test #5

Veh.2 Front X Mem. (Z)
Max = 1.8 mph @ 28.3 msec
Min = -7.3 mph @ 155.5 msec

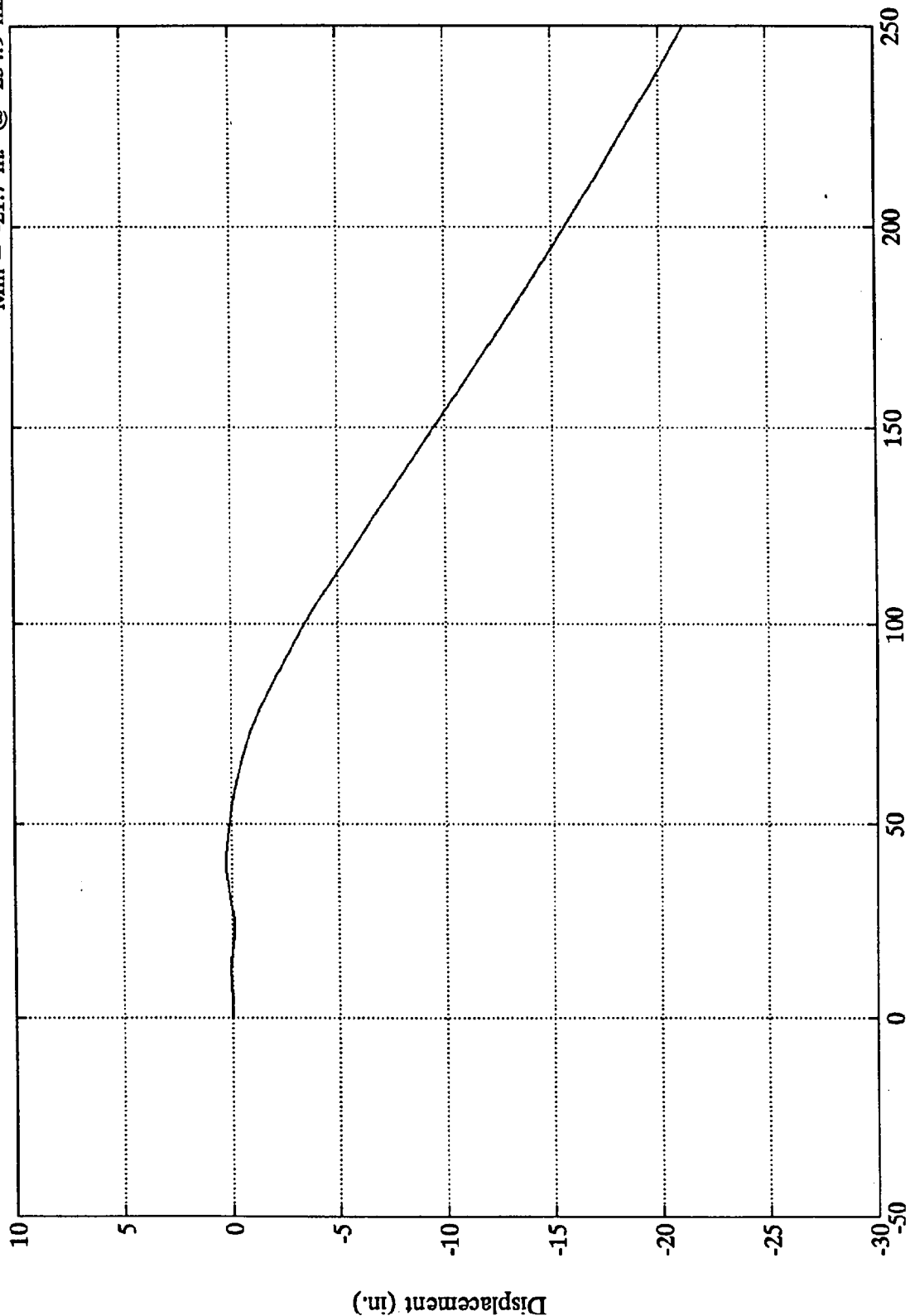


SAE Filter Class 60

V-to-V Test #5

Veh.2 Front X Mem. (Z)

Max = 0.3 in. @ 40.3 msec
Min = -21.7 in. @ 254.9 msec

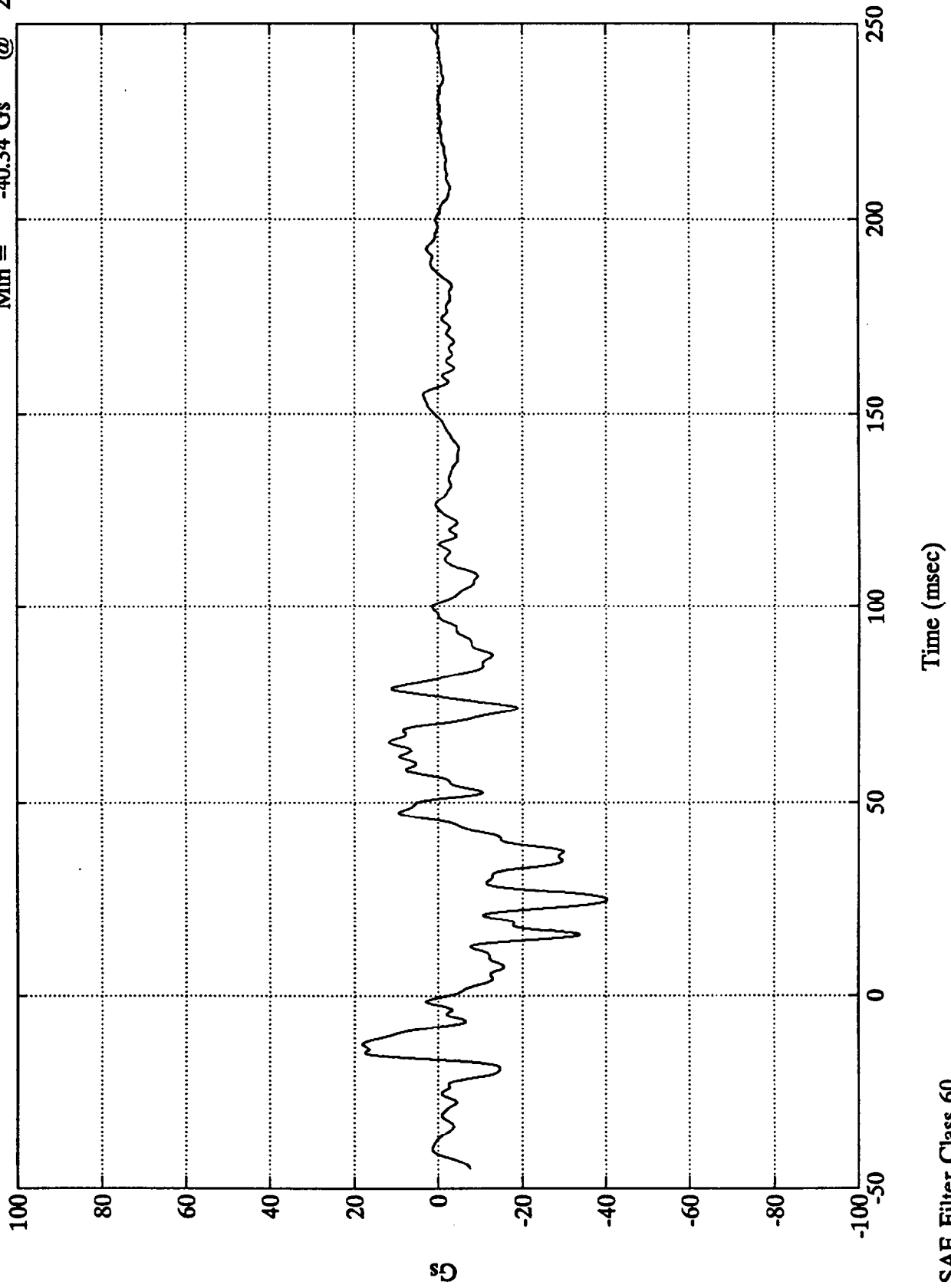


Time (msec.)

SAE Filter Class 60

Veh. 2 Left Caliper (X)

Max =	18.06 Gs	@	-12.60 msec
Min =	-40.34 Gs	@	24.96 msec

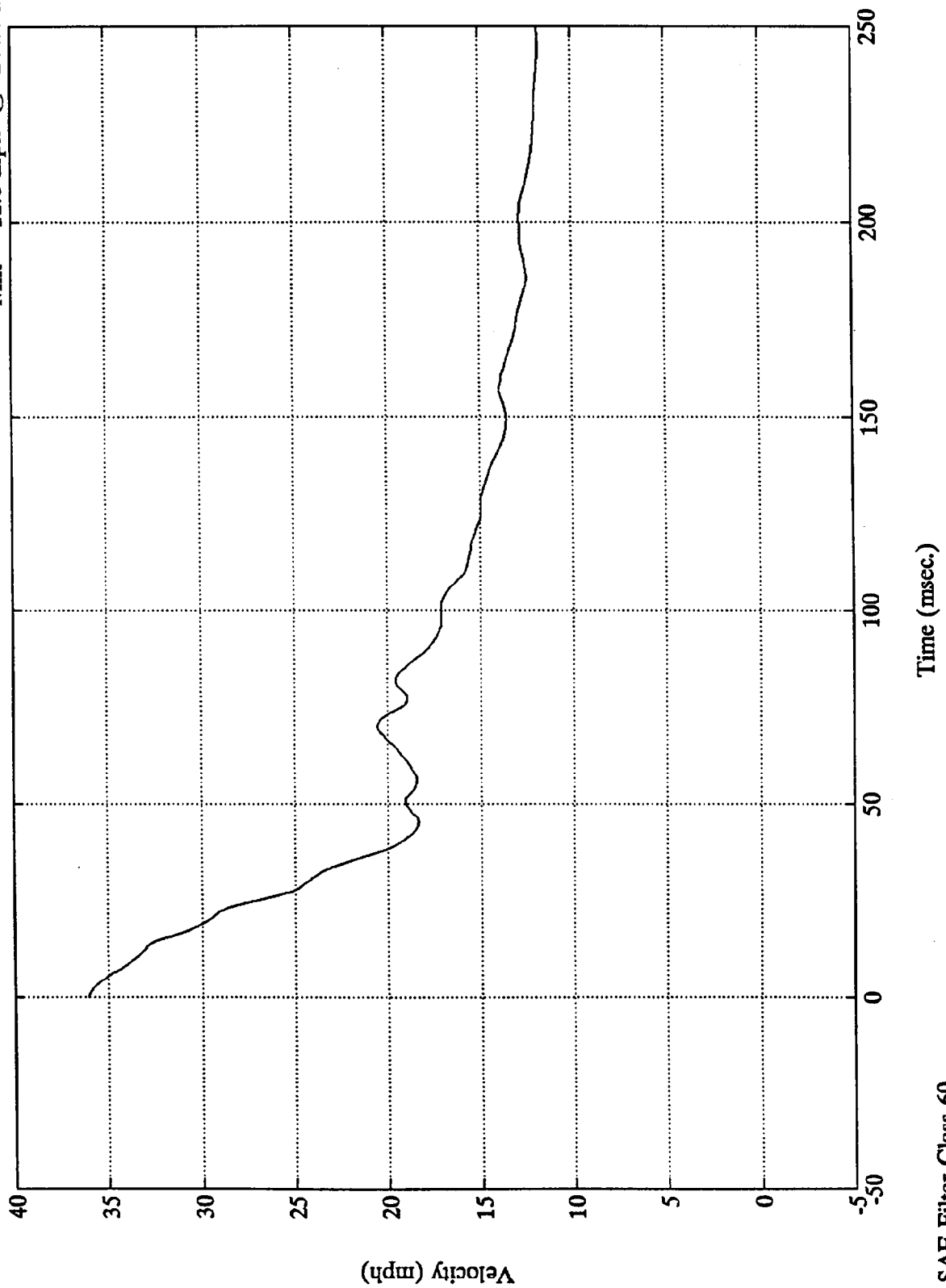


SAE Filter Class 60

V-to-V Test #5

Veh.2 Left Caliper (X)

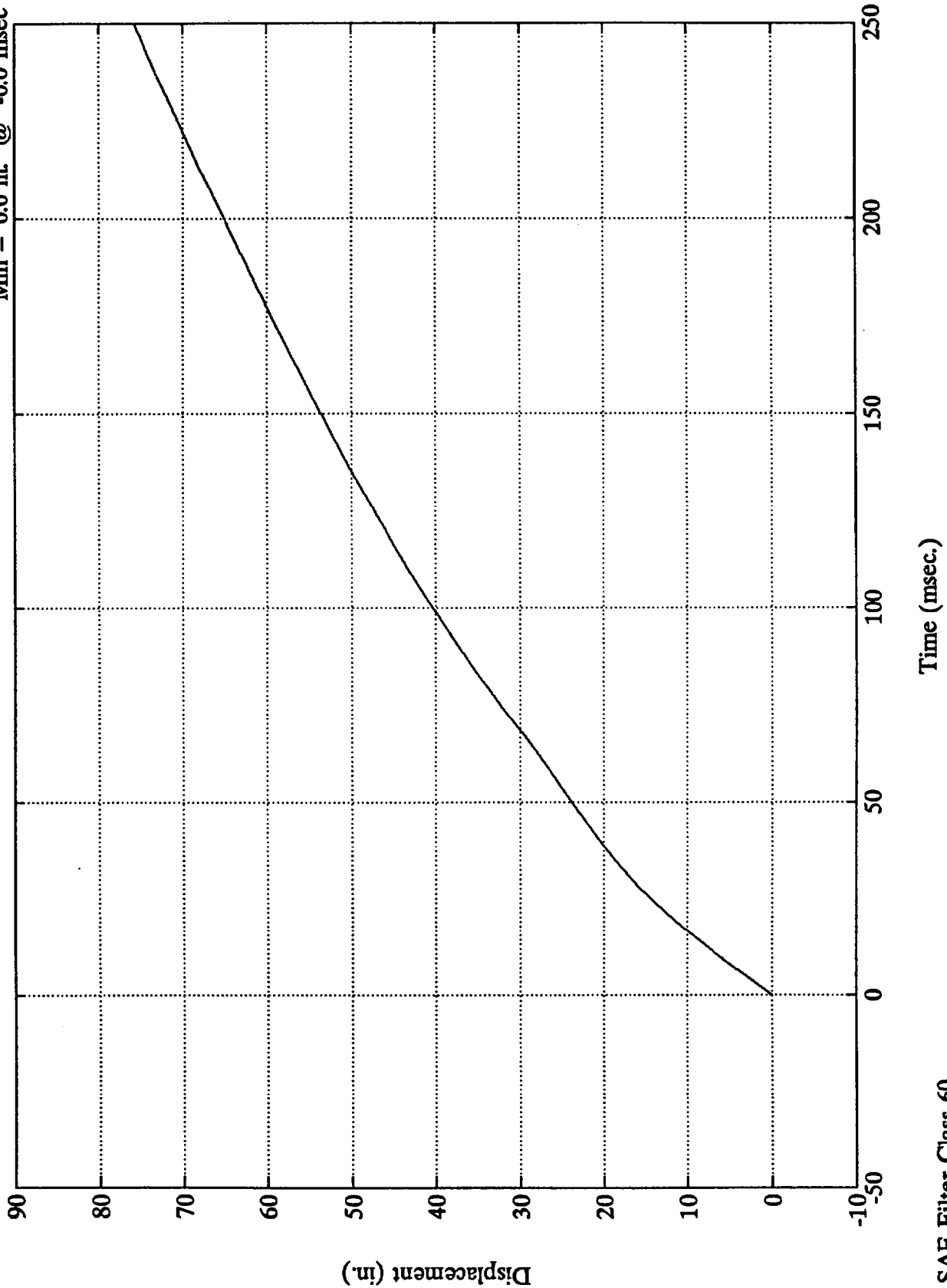
Max = 36.1 mph @ -0.0 msec
Min = 11.8 mph @ 244.6 msec



V-to-V Test #5

Veh.2 Left Caliper (X)

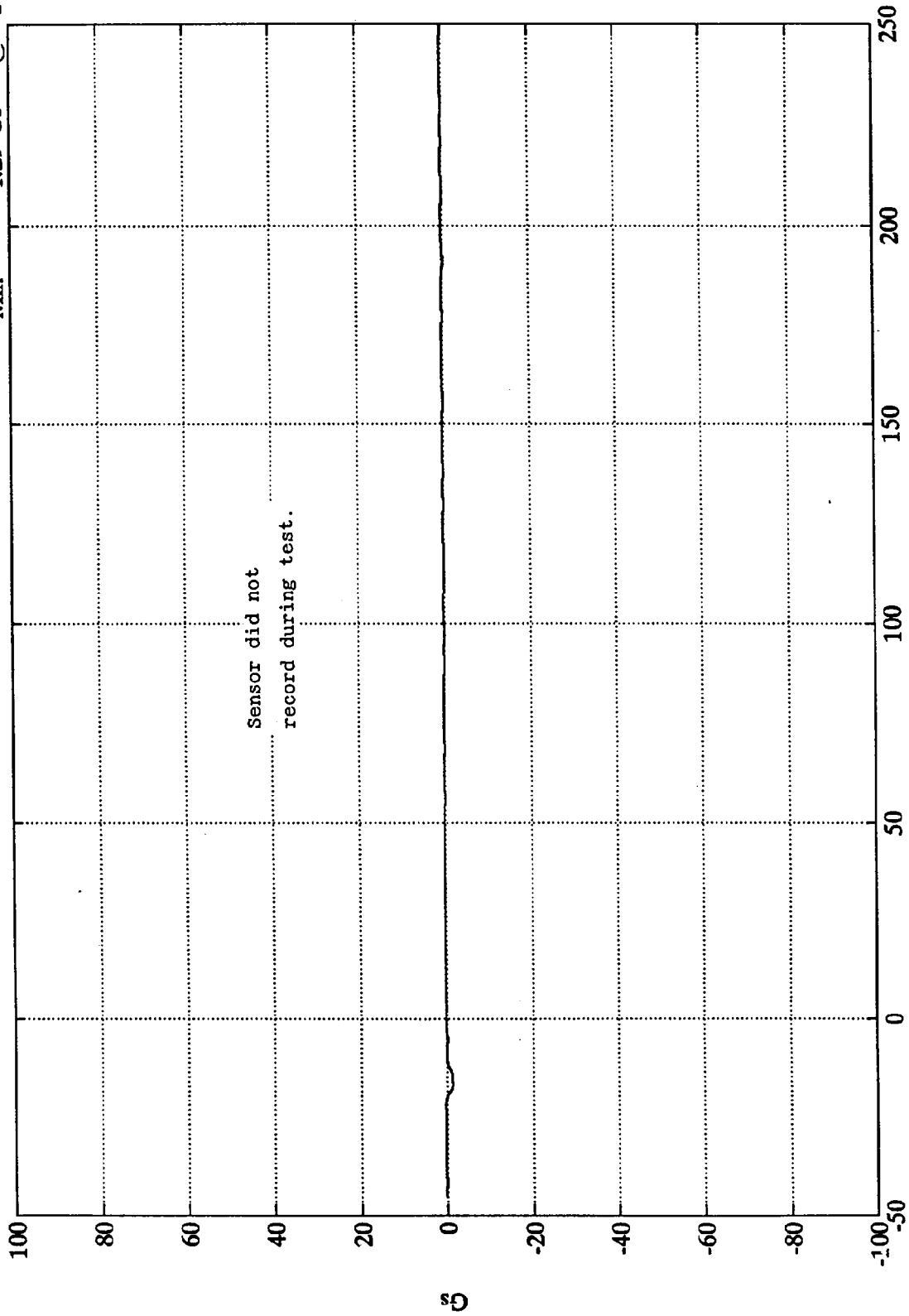
Max = 76.8 in. @ 254.9 msec
Min = 0.0 in. @ -0.0 msec



V-to-V Test #5

Veh. 2 Right Caliper (X)

Max = .38 Gs @ -22.20 msec
Min = -1.29 Gs @ -16.80 msec



Time (msec)

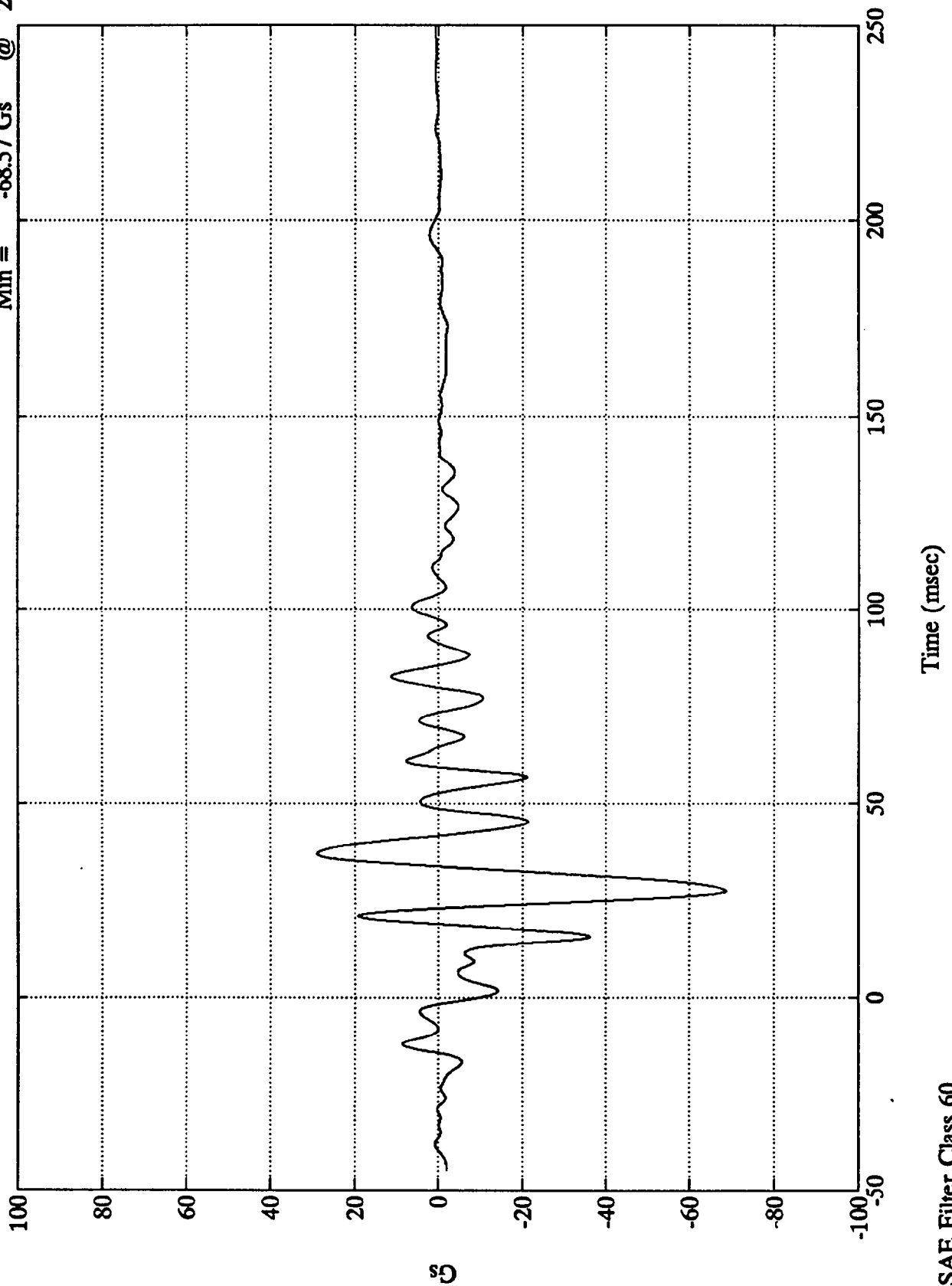
SAE Filter Class 60

Gs

V-to-V Test #5

Veh. 2 Toe Pan (X)

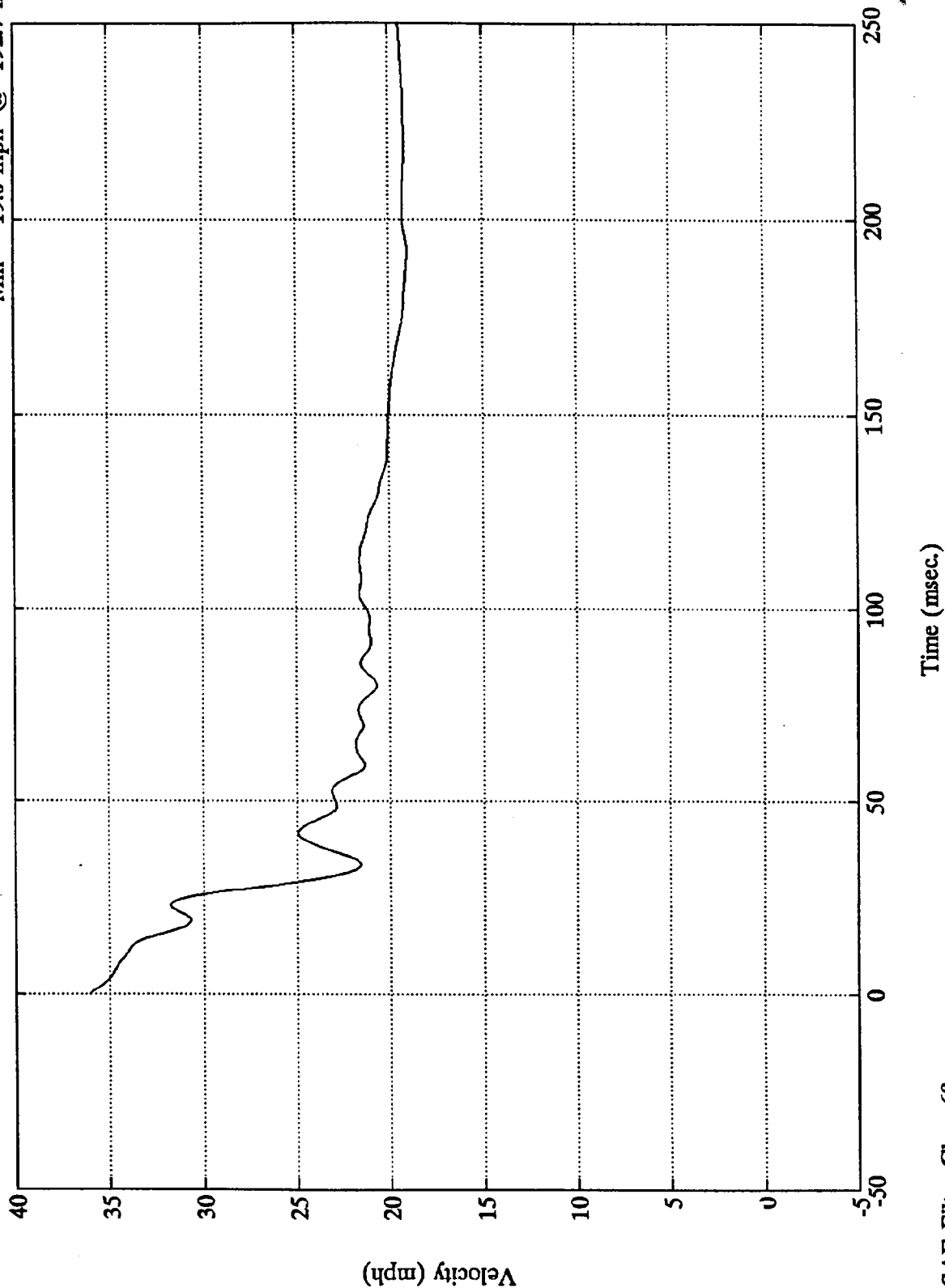
Max = 28.93 Gs @ 36.95 msec
Min = -68.57 Gs @ 27.36 msec



V-to-V Test #5

Veh.2 Toe Pan (X)

Max = 36.1 mph @ -0.0 msec
Min = 19.0 mph @ 192.7 msec

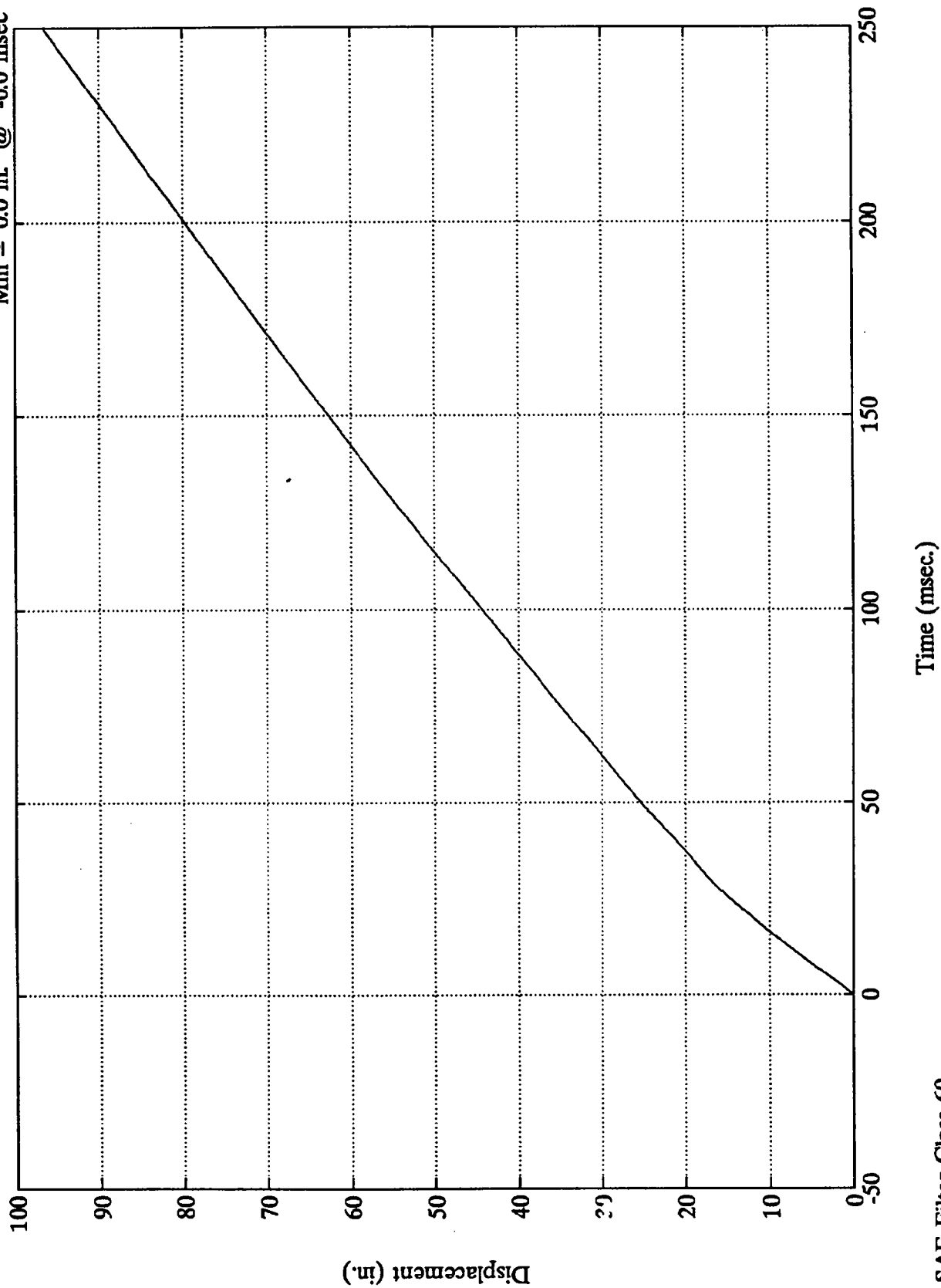


SAE Filter Class 60

V-to-V Test #5

Veh.2 Toe Pan (X)

Max = 98.4 in. @ 254.9 msec
Min = 0.0 in. @ -0.0 msec



TEST NO. Y42-5-1042

DUMMY DATA

CLASS	FILTER CHANNEL
Head Accelerations	1000
Chest Accelerations	180
Femur Forces	600
Torso Belt	60
Chest Displacement	180
Neck Forces	1000
Neck Moments	600
Tibia Forces, Moments	600

V-to-V Test #5

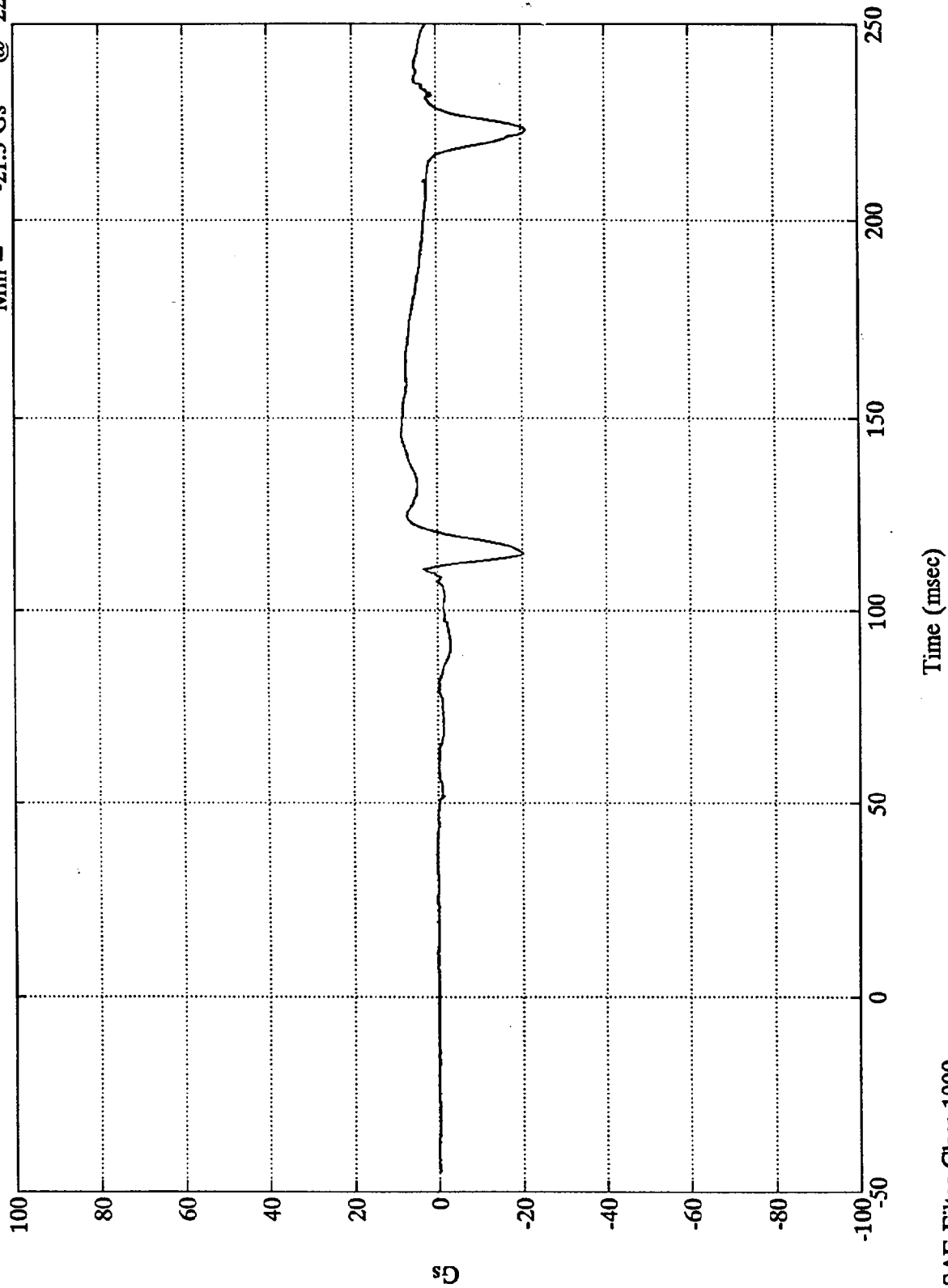
Veh. 2 Head X
Max = 42.1 Gs @ 223.08 msec
Min = -88.0 Gs @ 112.68 msec



V-to-V Test #5

Veh. 2 Head Y

Max = 8.4 Gs @ 147.36 msec
Min = -21.3 Gs @ 222.96 msec

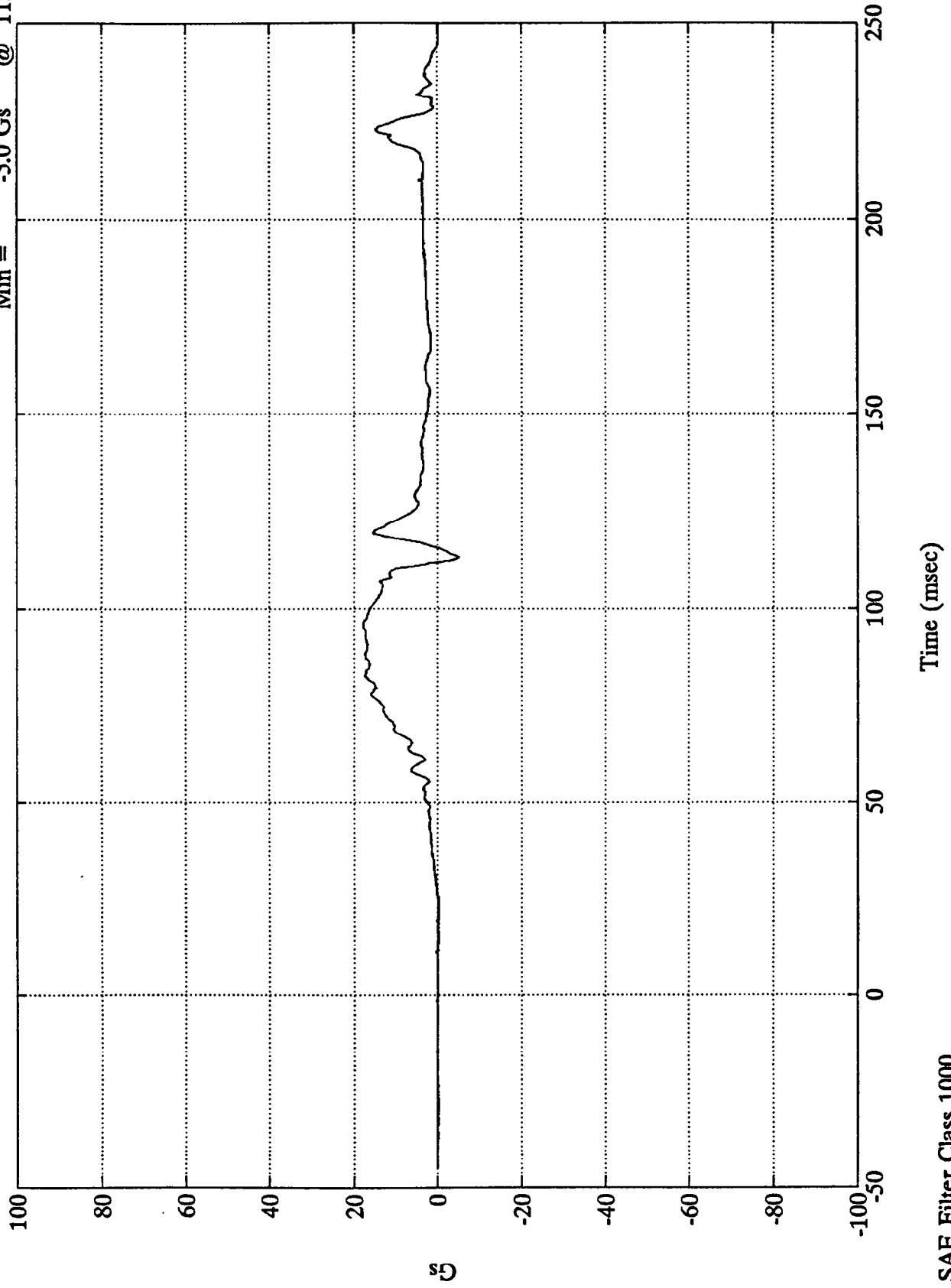


SAE Filter Class 1000

V-to-V Test #5

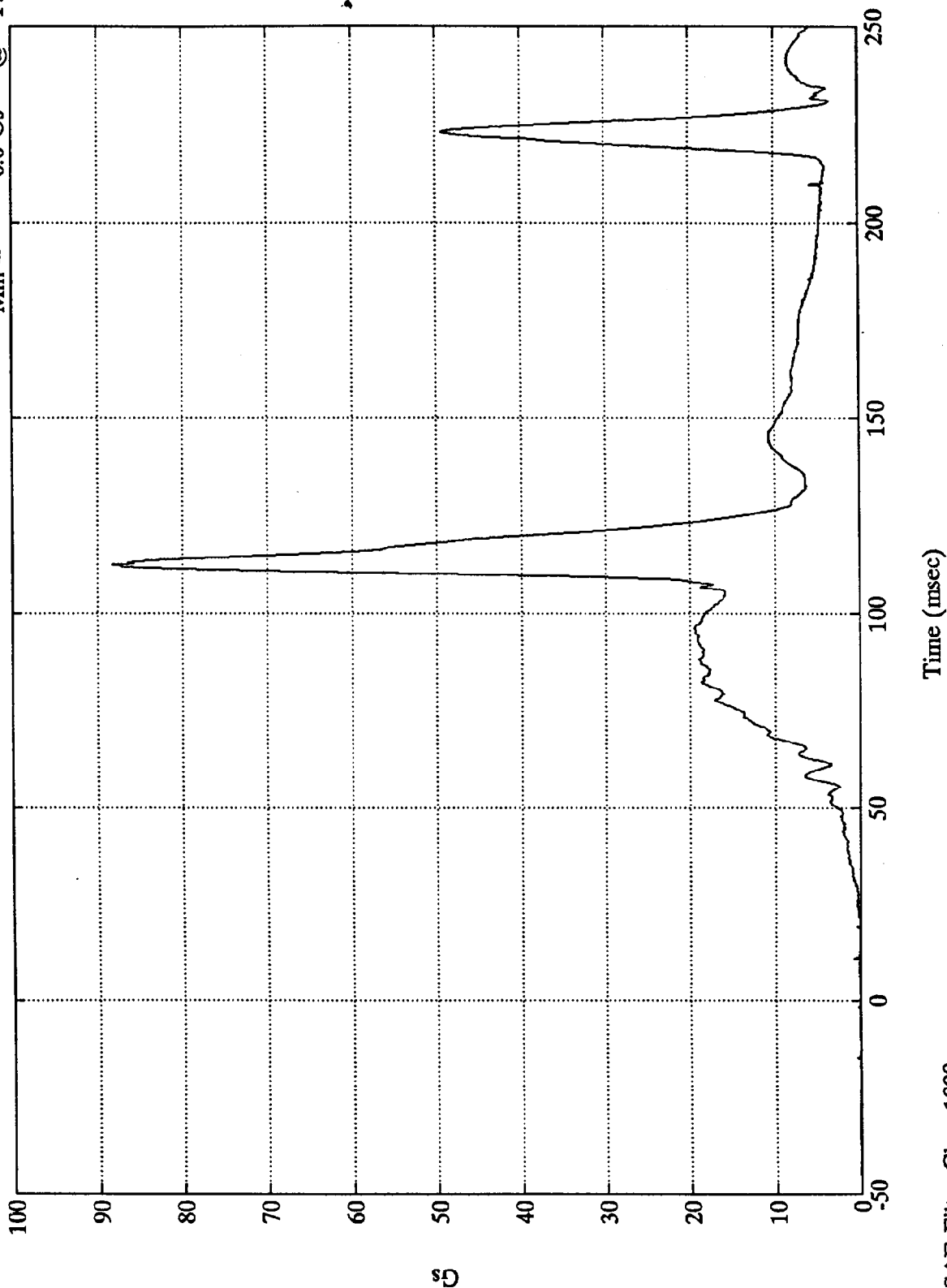
Veh. 2 Head Z

Max = 17.6 Gs @ 96.23 msec
Min = -5.0 Gs @ 113.15 msec



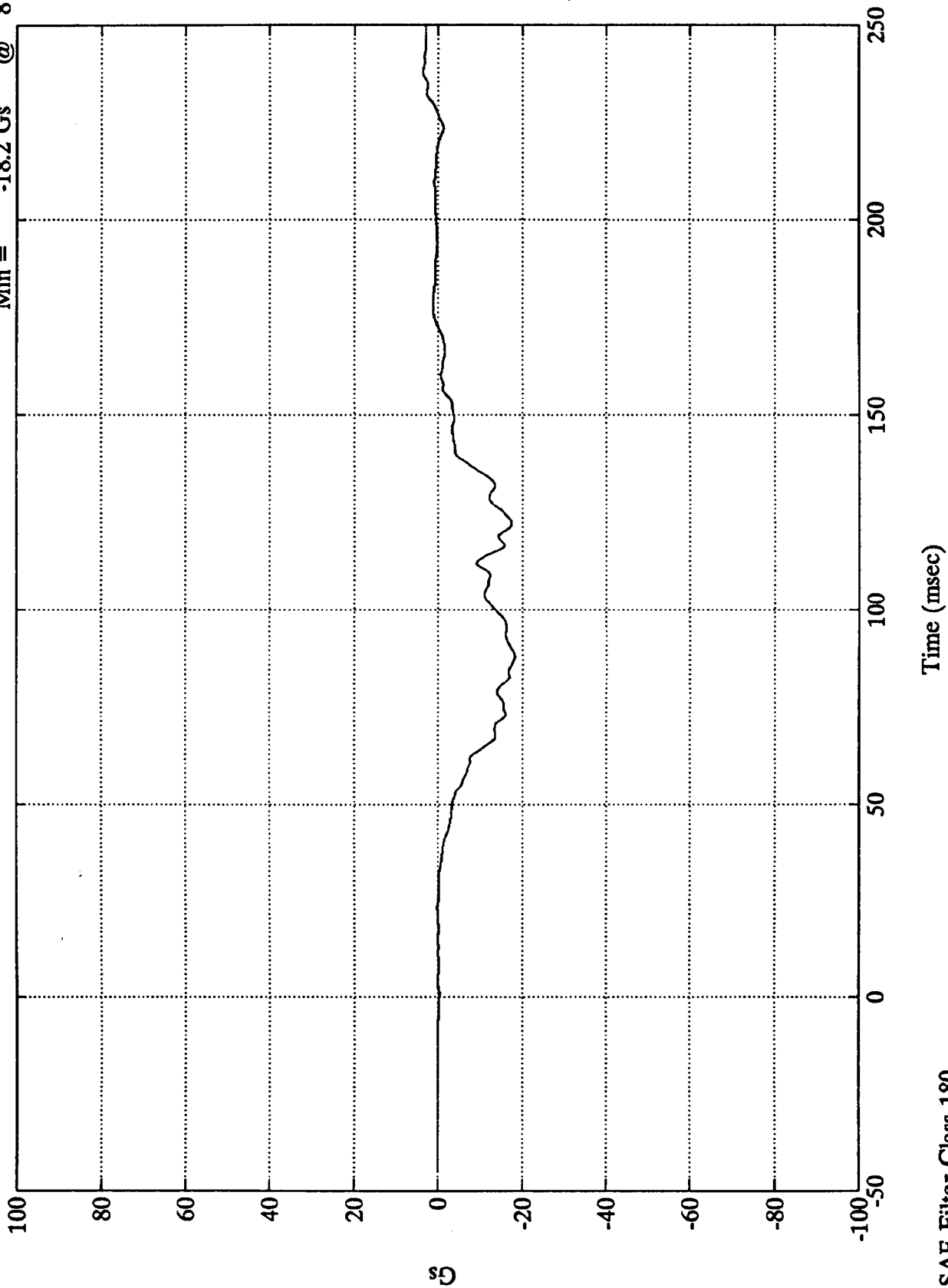
V-to-V Test #5

Veh. 2 Head Resultant
Max = 88.2 Gs @ 112.68 msec
Min = 0.0 Gs @ 17.88 msec



SAE Filter Class 1000

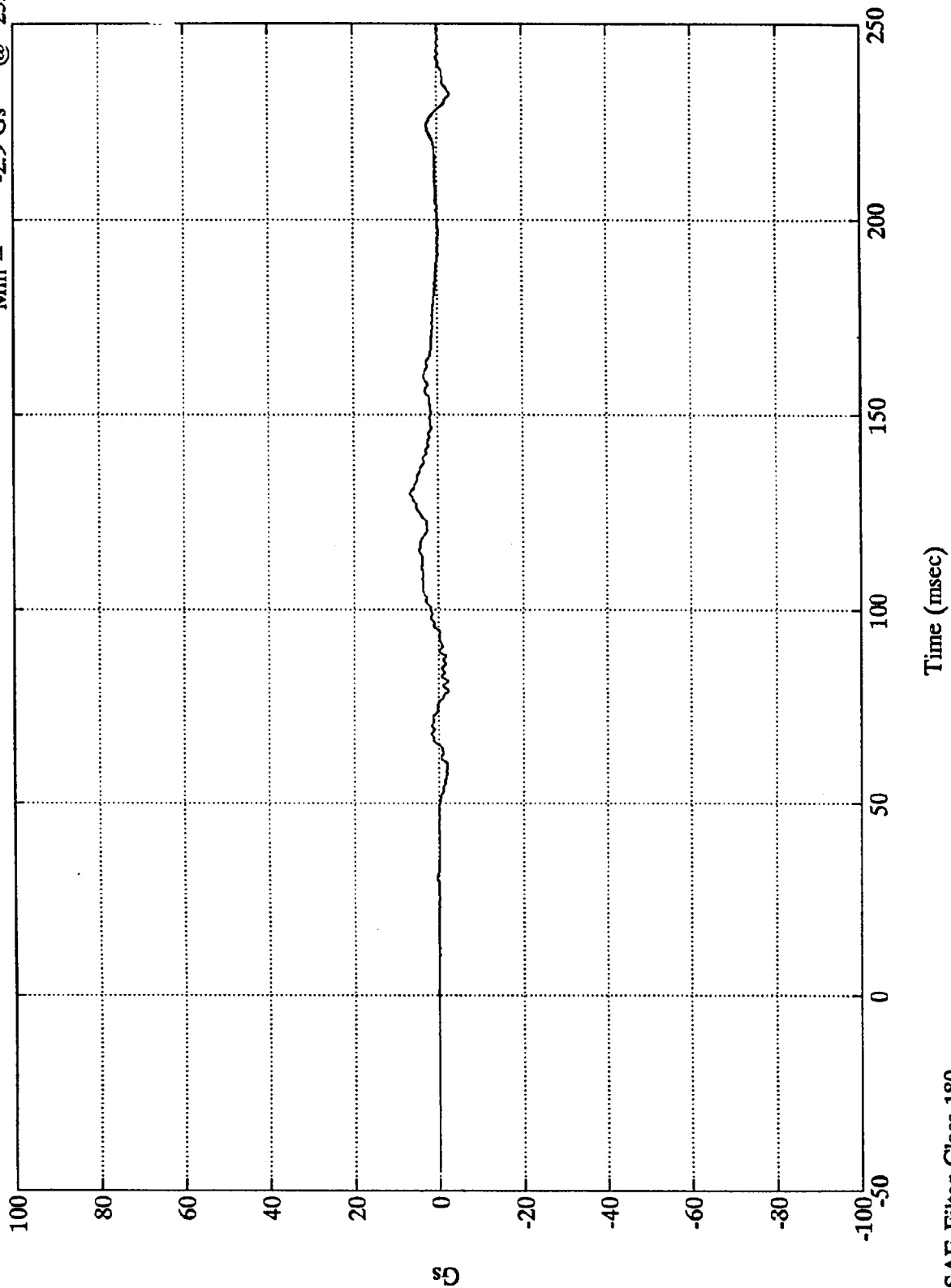
Veh. 2 Chest X
Max = 3.6 Gs @ 237.84 msec
Min = -18.2 Gs @ 87.96 msec



V-to-V Test #5

Veh. 2 Chest Y

Max =	6.6 Gs	@	129.96 msec
Min =	-2.9 Gs	@	232.08 msec

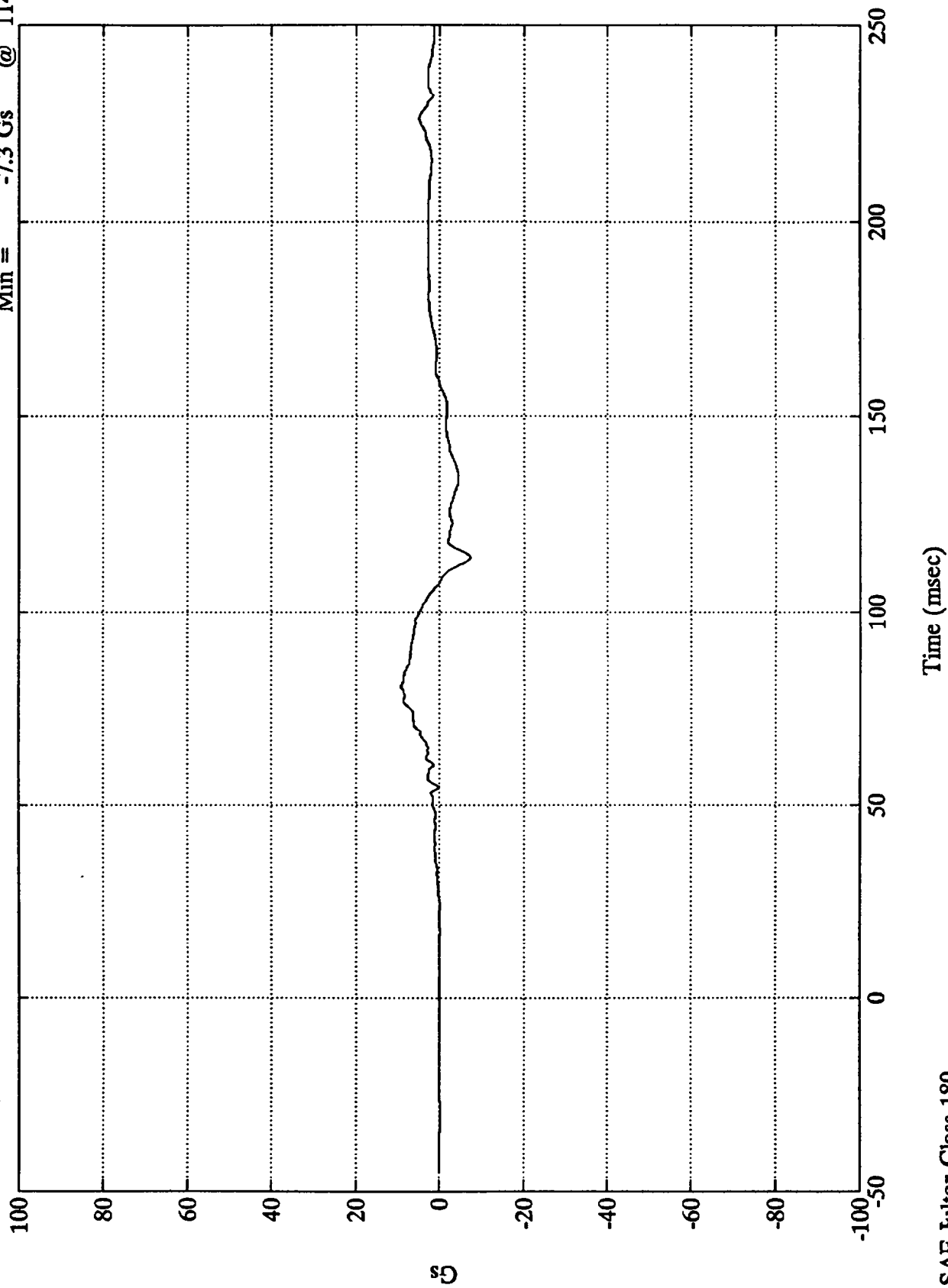


Gs

SAE Filter Class 180

Veh. 2 Chest Z

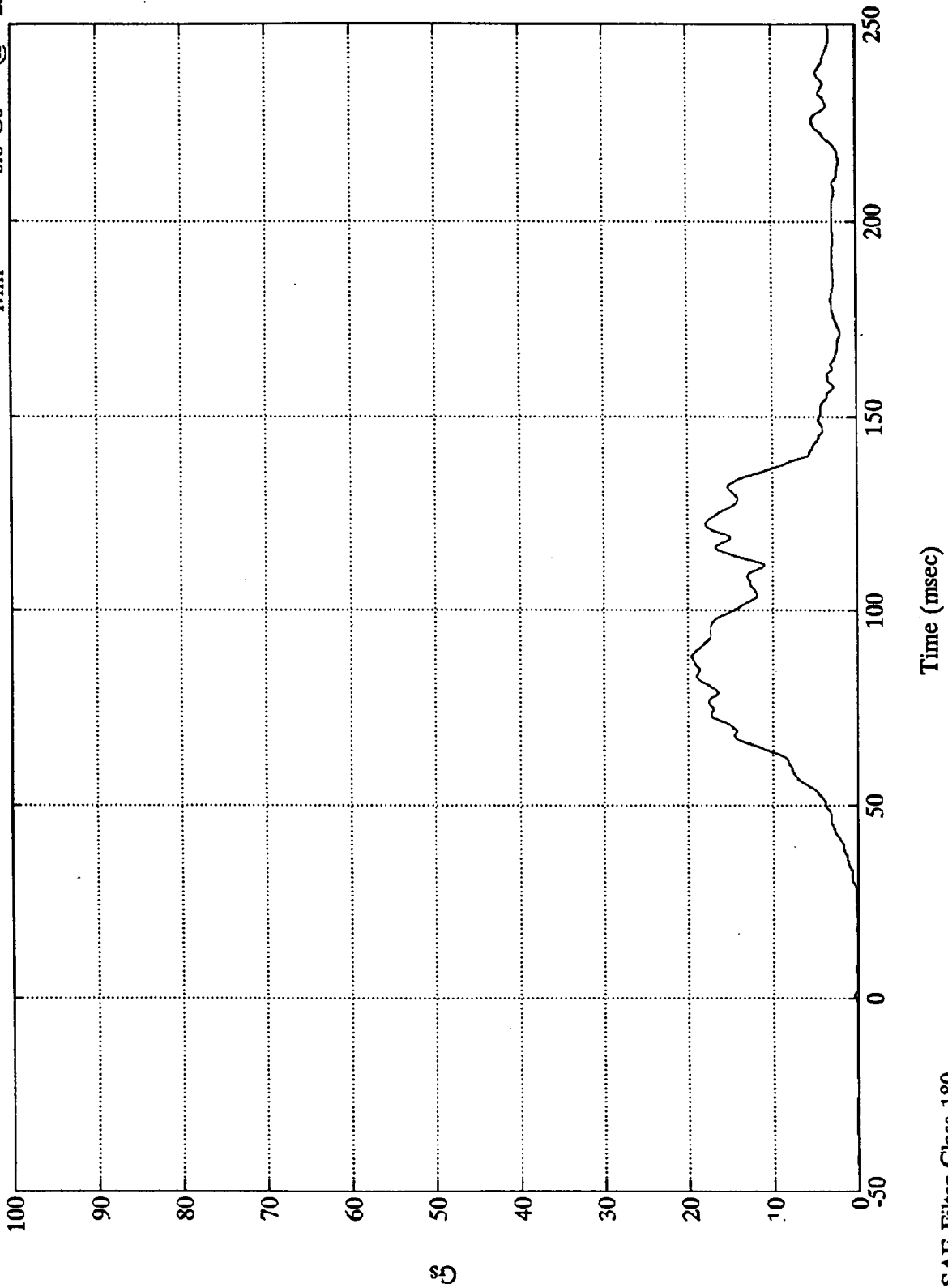
Max = 9.1 Gs @ 80.63 msec
 Min = -7.3 Gs @ 114.00 msec



V-to-V Test #5

Veh. 2 Chest Resultant

Max = 19.5 Gs @ 17.96 msec
Min = 0.0 Gs @ -23.16 msec

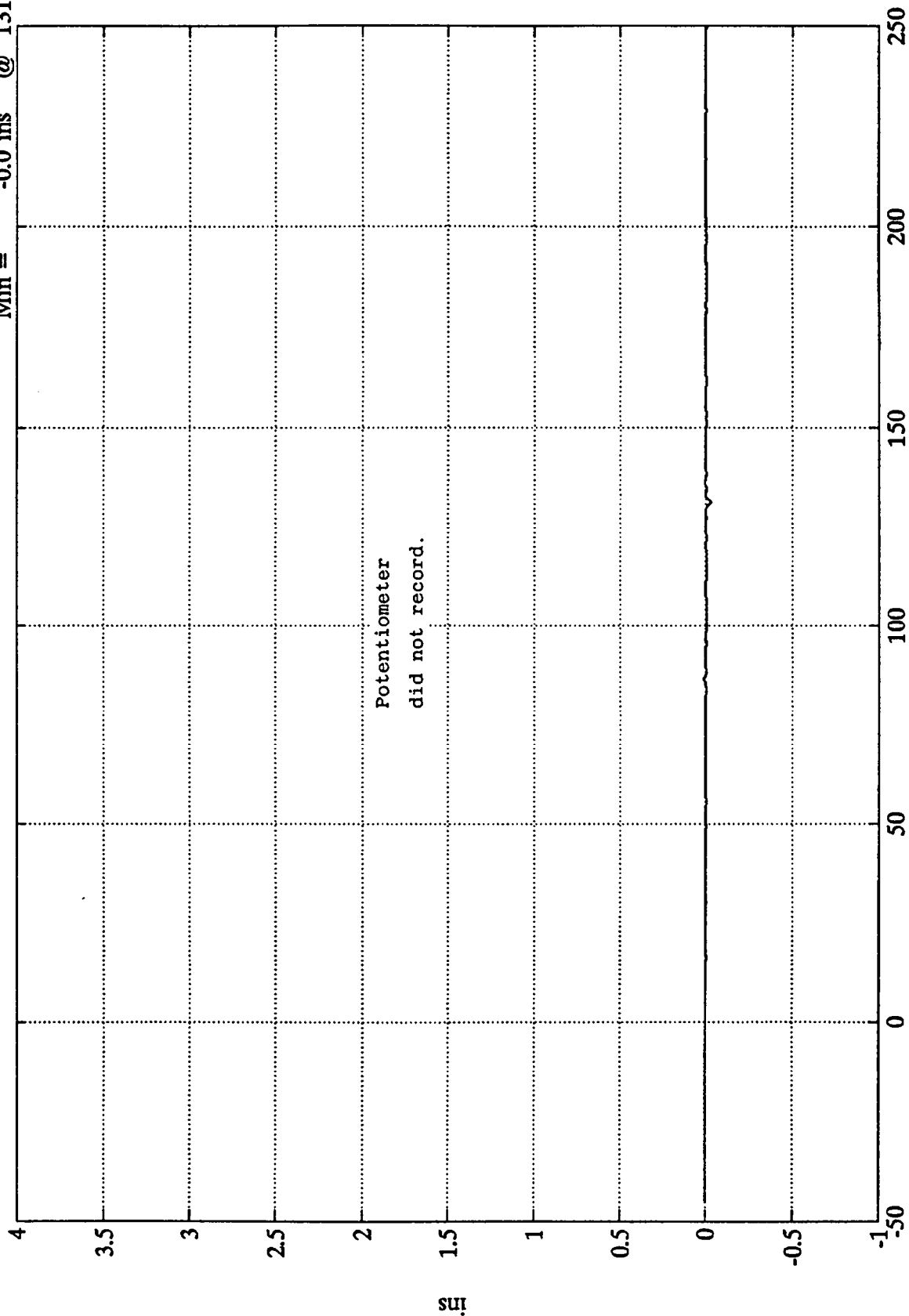


SAE Filter Class 180

V-to-V Test #5

Veh. 2 Chest Displacement

Max = 0.0 ins @ 86.63 msec
Min = -0.0 ins @ 131.52 msec



Potentiometer
did not record.

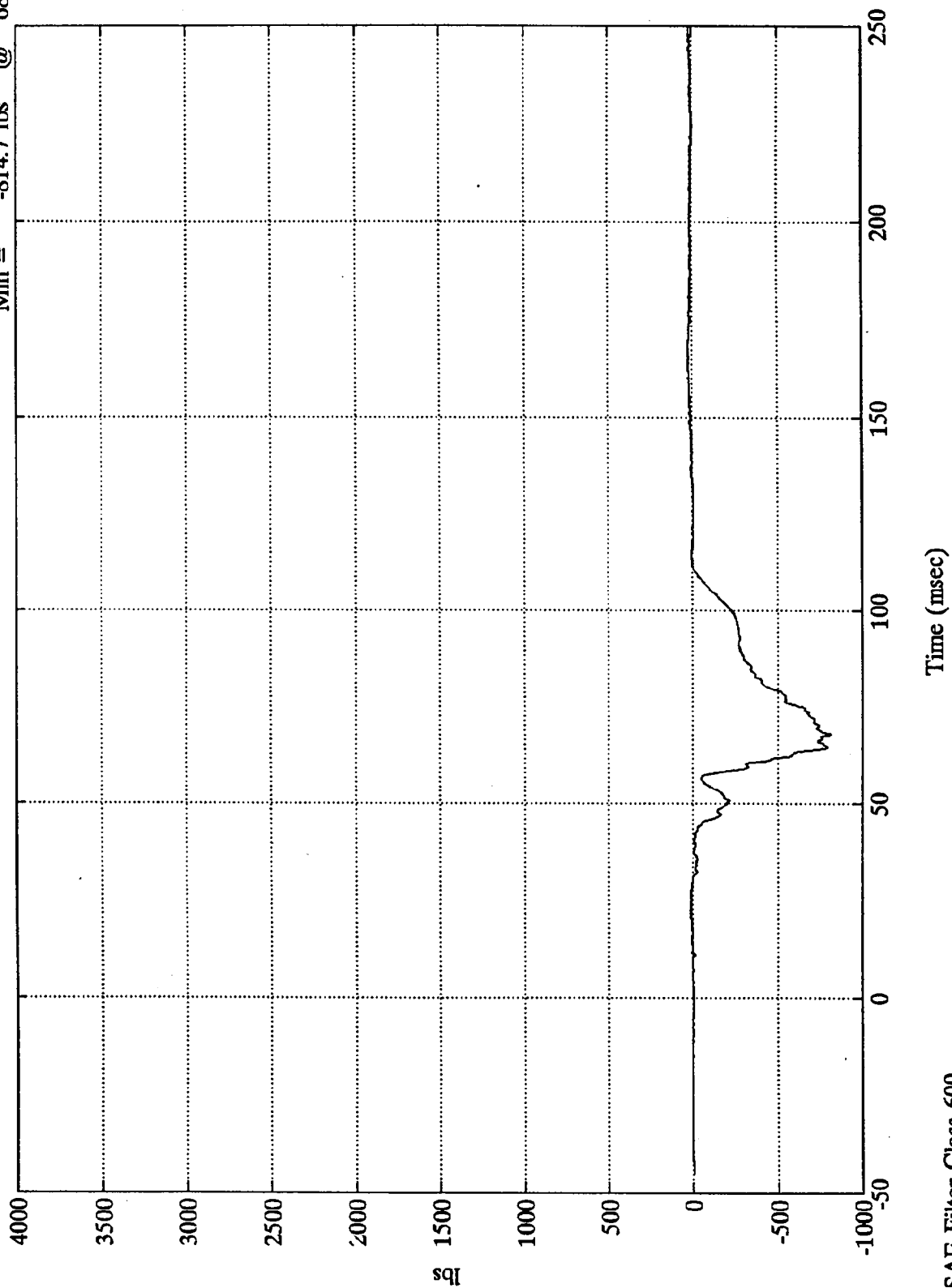
Time (msec)

SAE Filter Class 180

V-to-V Test #5

Veh. 2 Left Femur

Max = 25.5 lbs @ 167.52 msec
Min = -814.7 lbs @ 63.04 msec

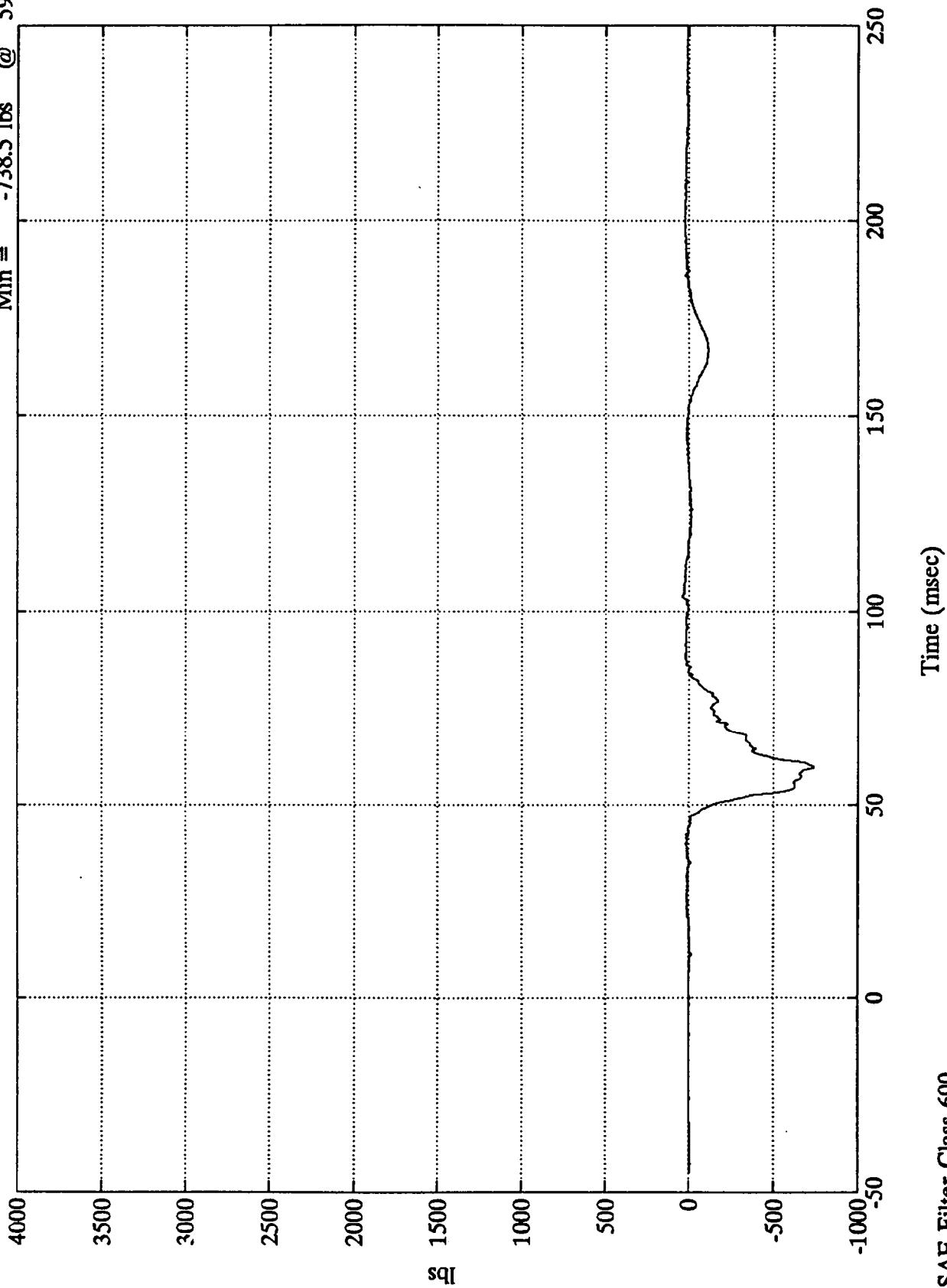


SAE Filter Class 600

V-to-V Test #5

Veh. 2 Right Femur

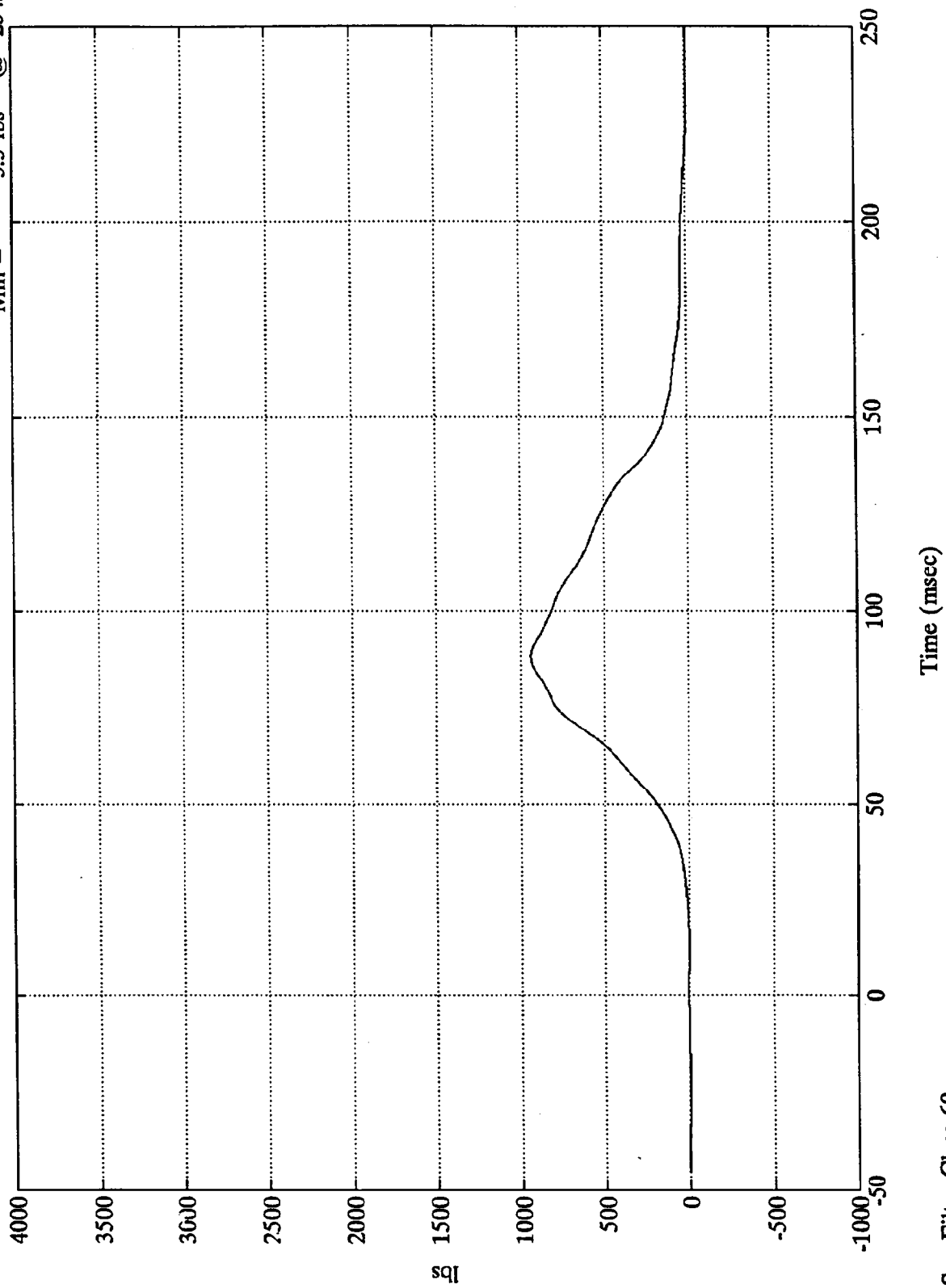
Max = 39.5 lbs @ 105.92 msec
Min = -738.5 lbs @ 59.76 msec



V-to-V Test #5

Veh. 2 Torso Belt L.C.

Max = 938.8 lbs @ 88.44 msec
Min = -5.5 lbs @ 254.04 msec

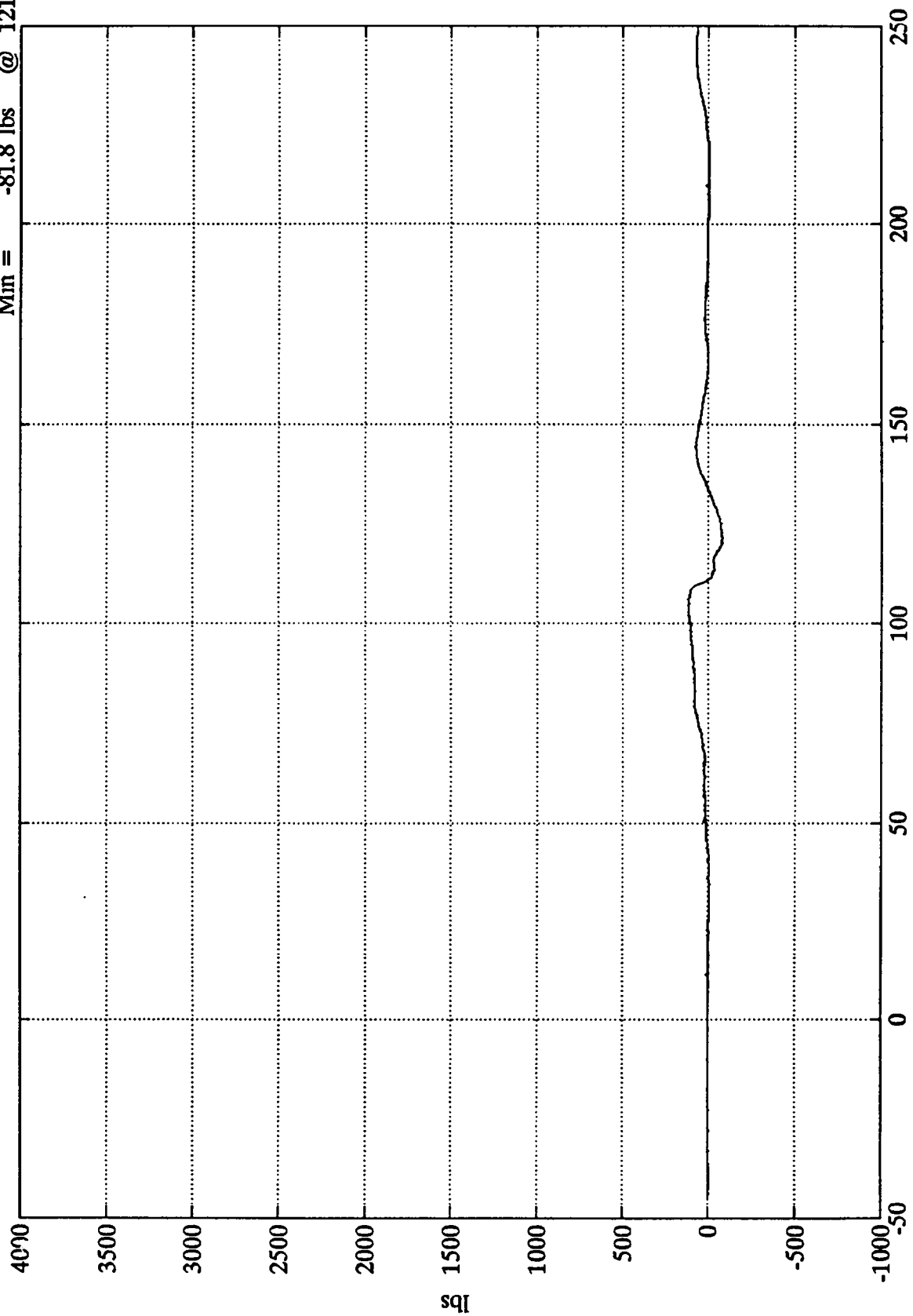


Sae Filter Class 60

V-to-V Test #5

Veh. 2 Upper Neck Fx

Max = 116.6 lbs @ 106.20 msec
Min = -81.8 lbs @ 121.44 msec



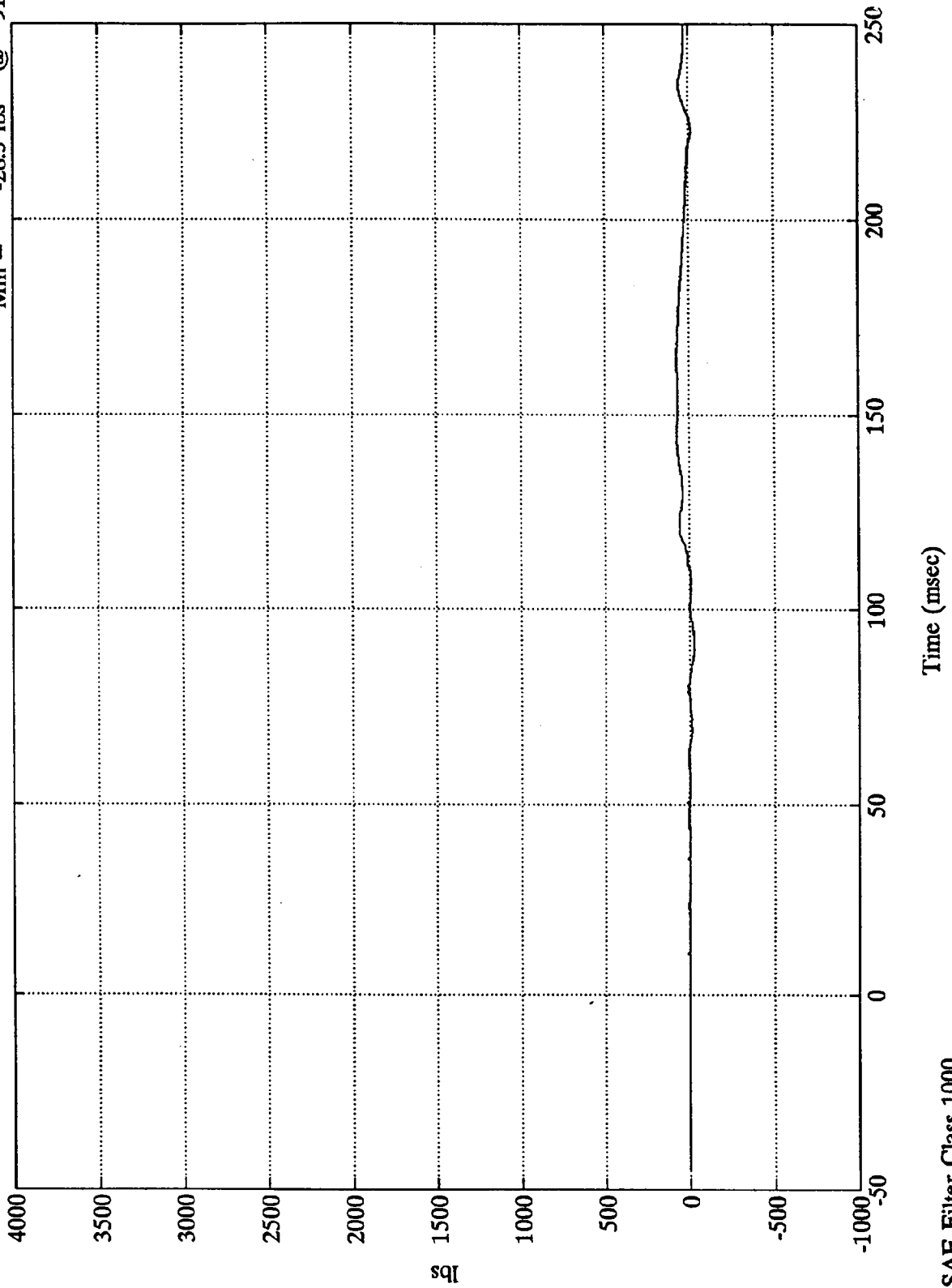
Time (msec)

SAE Filter Class 1000

V-to-V Test #5

Veh. 2 Upper Neck Fy

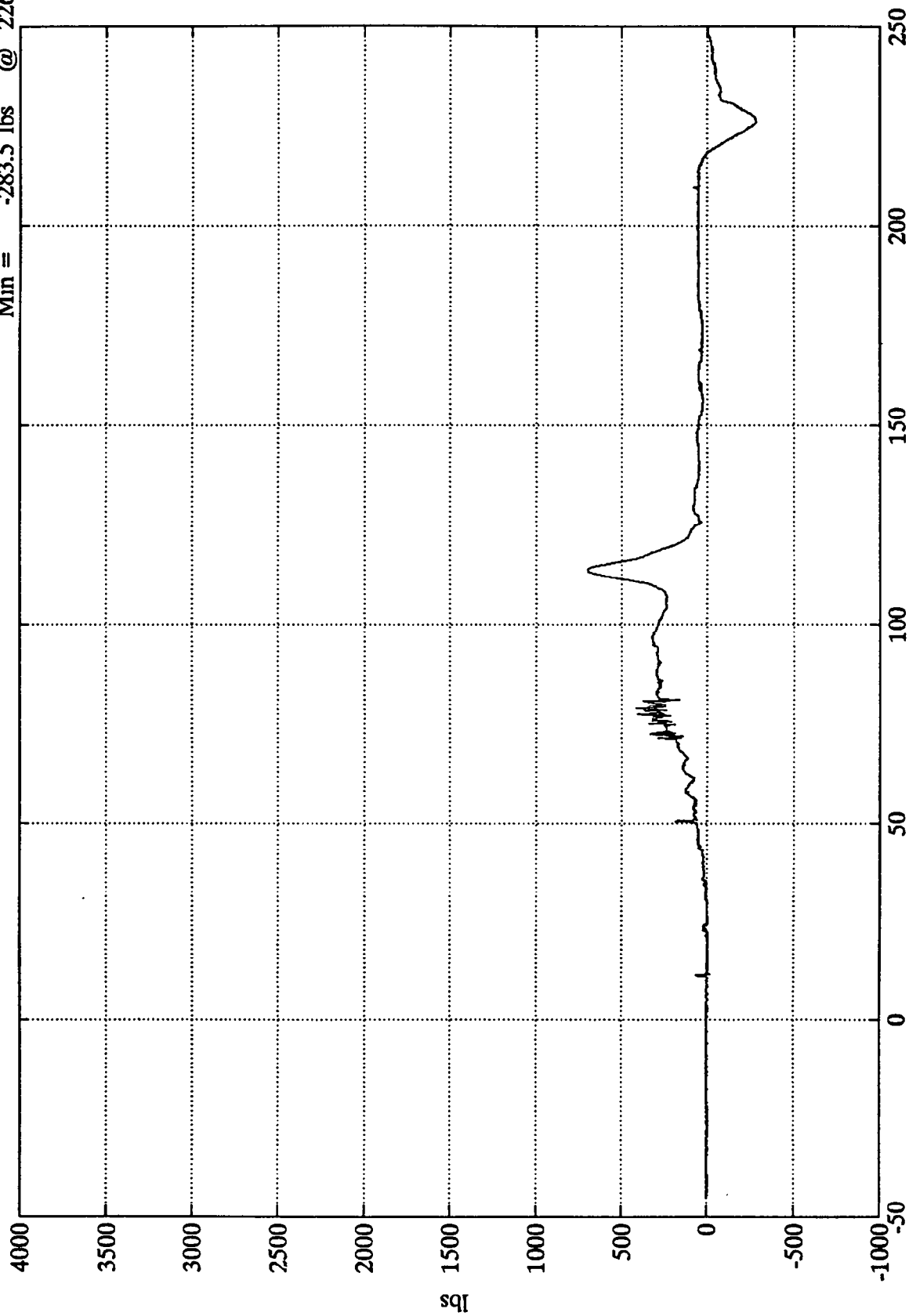
Max = 73.8 lbs @ 164.03 msec
Min = -28.5 lbs @ 91.20 msec



V-to-V Test #5

Veh. 2 Upper Neck Fz

Max = 692.7 lbs @ 114.24 msec
Min = -283.5 lbs @ 226.92 msec



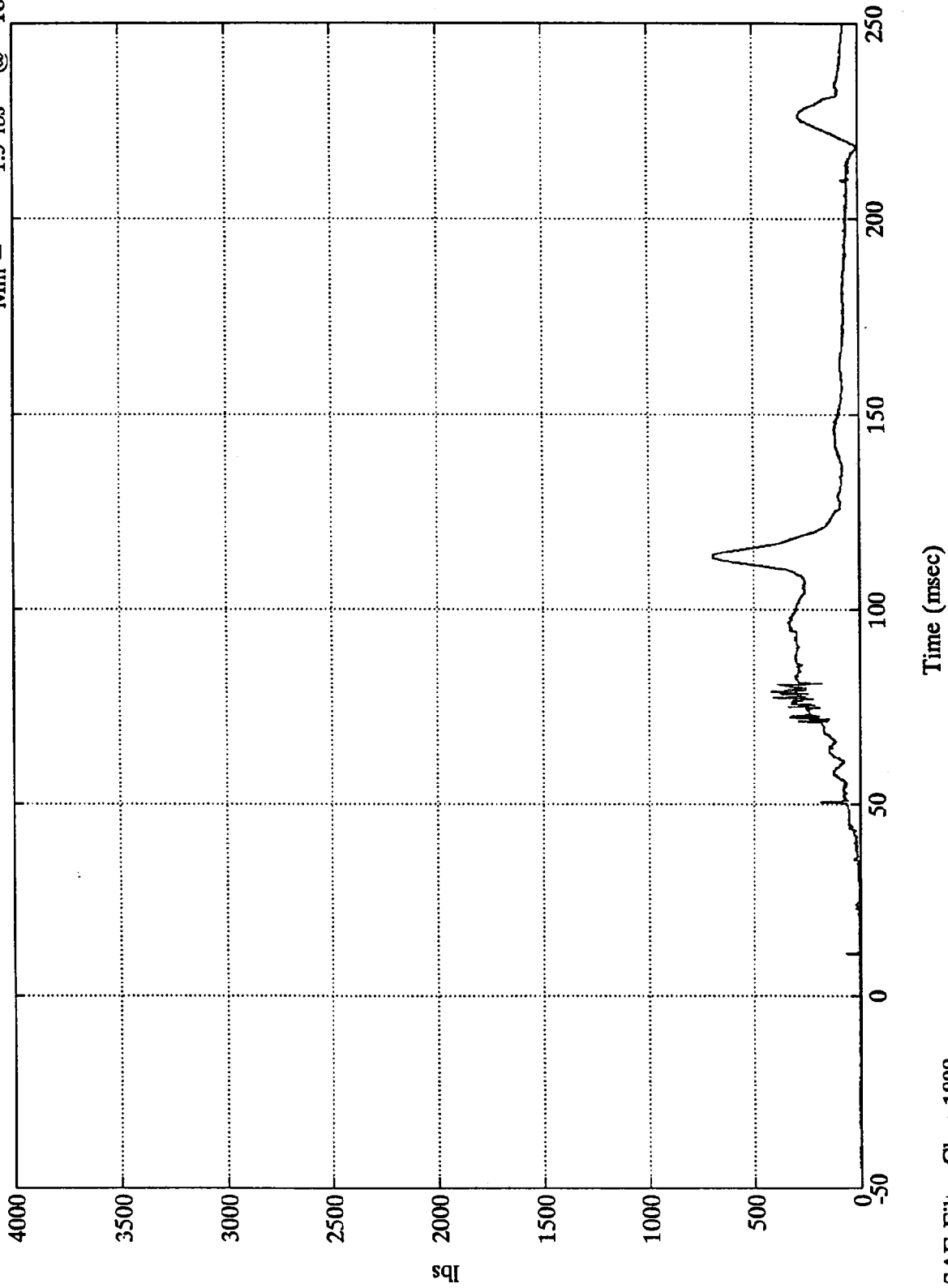
Time (msec)

SAE Filter Class 1000

V-to-V Test #5

Veh. 2 Neck Force Res.

Max = 693.7 lbs @ 113.63 msec
Min = 1.5 lbs @ 18.95 msec

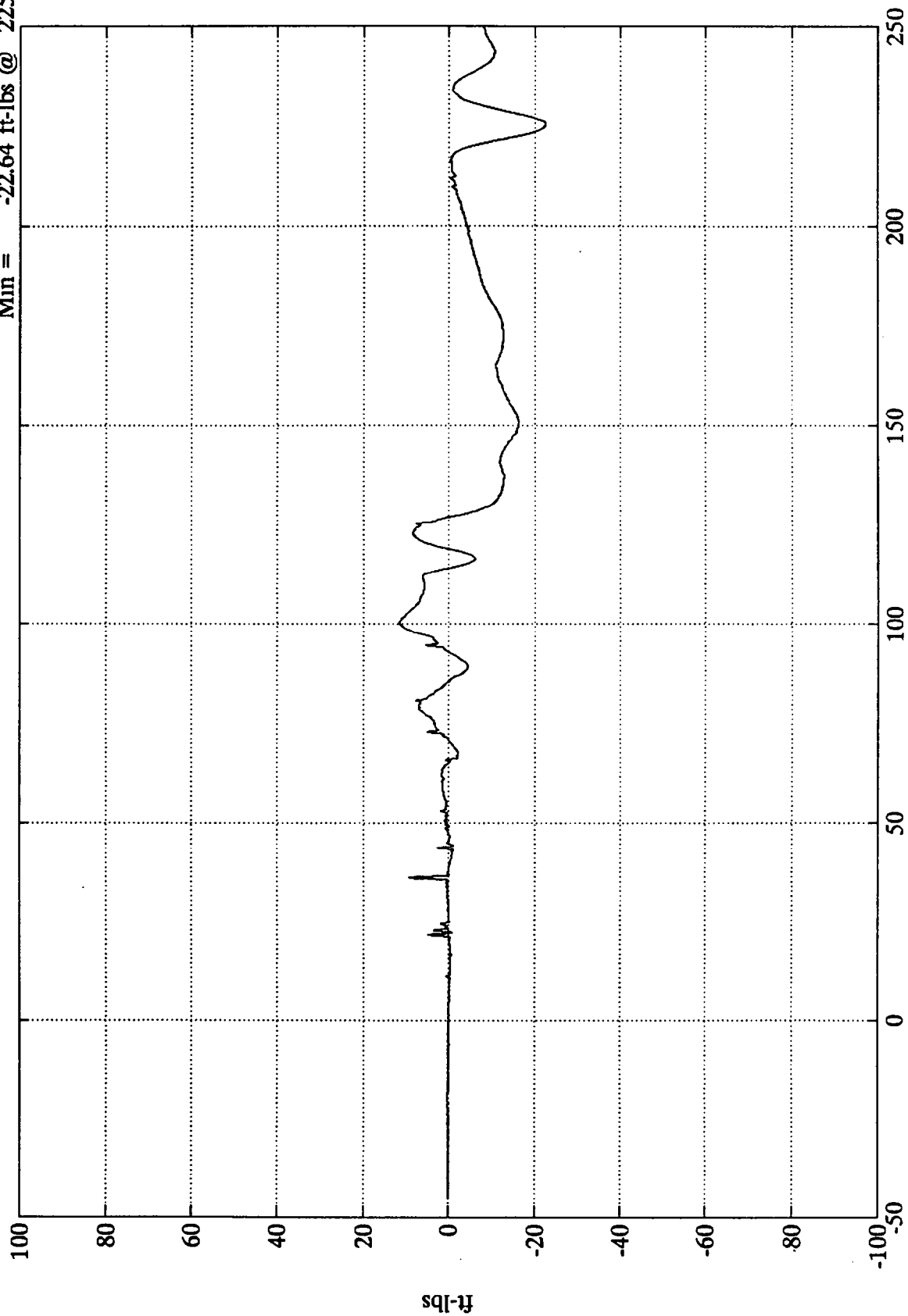


SAE Filter Class 1000

V-to-V Test #5

Veh. 2 Upper Neck Mx

Max = 11.54 ft-lbs @ 100.44 msec
Min = -22.64 ft-lbs @ 225.48 msec



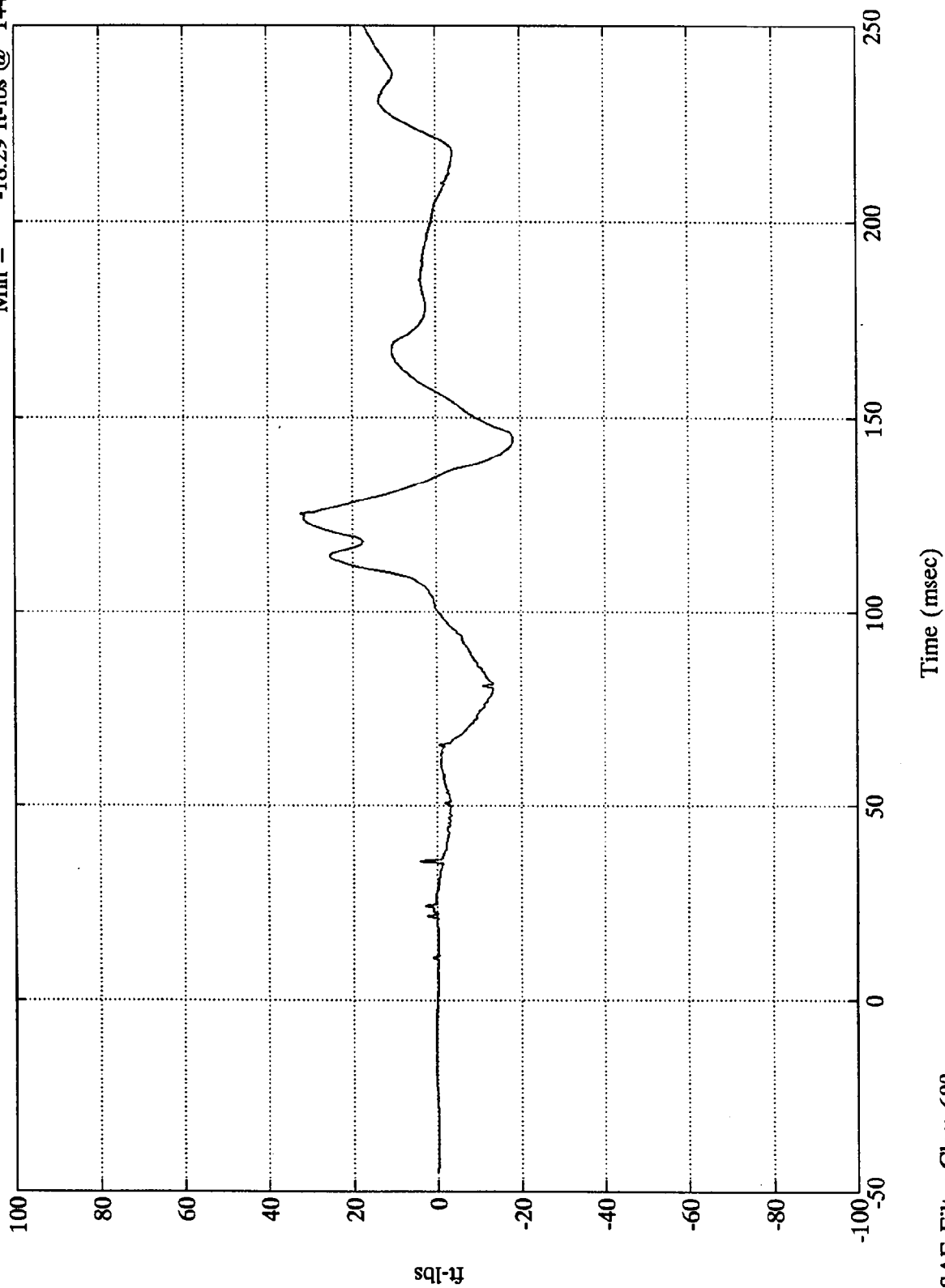
Time (msec)

SAE Filter Class 600

V-to-V Test #5

Veh. 2 Upper Neck My

Max = 32.26 ft-lbs @ 125.28 msec
Min = -18.29 ft-lbs @ 144.00 msec

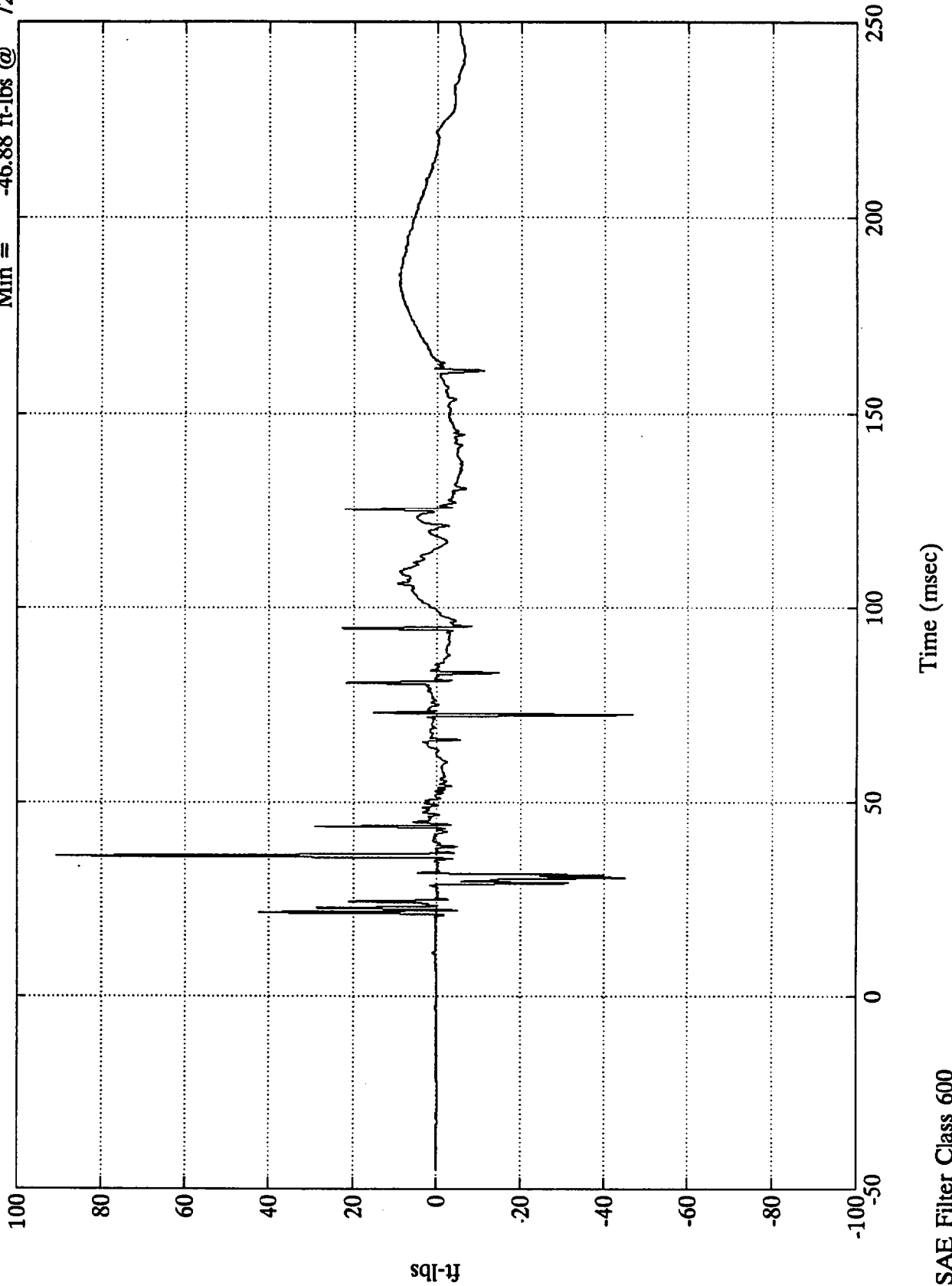


SAE Filter Class 600

V-to-V Test #5

Veh. 2 Upper Neck Mz

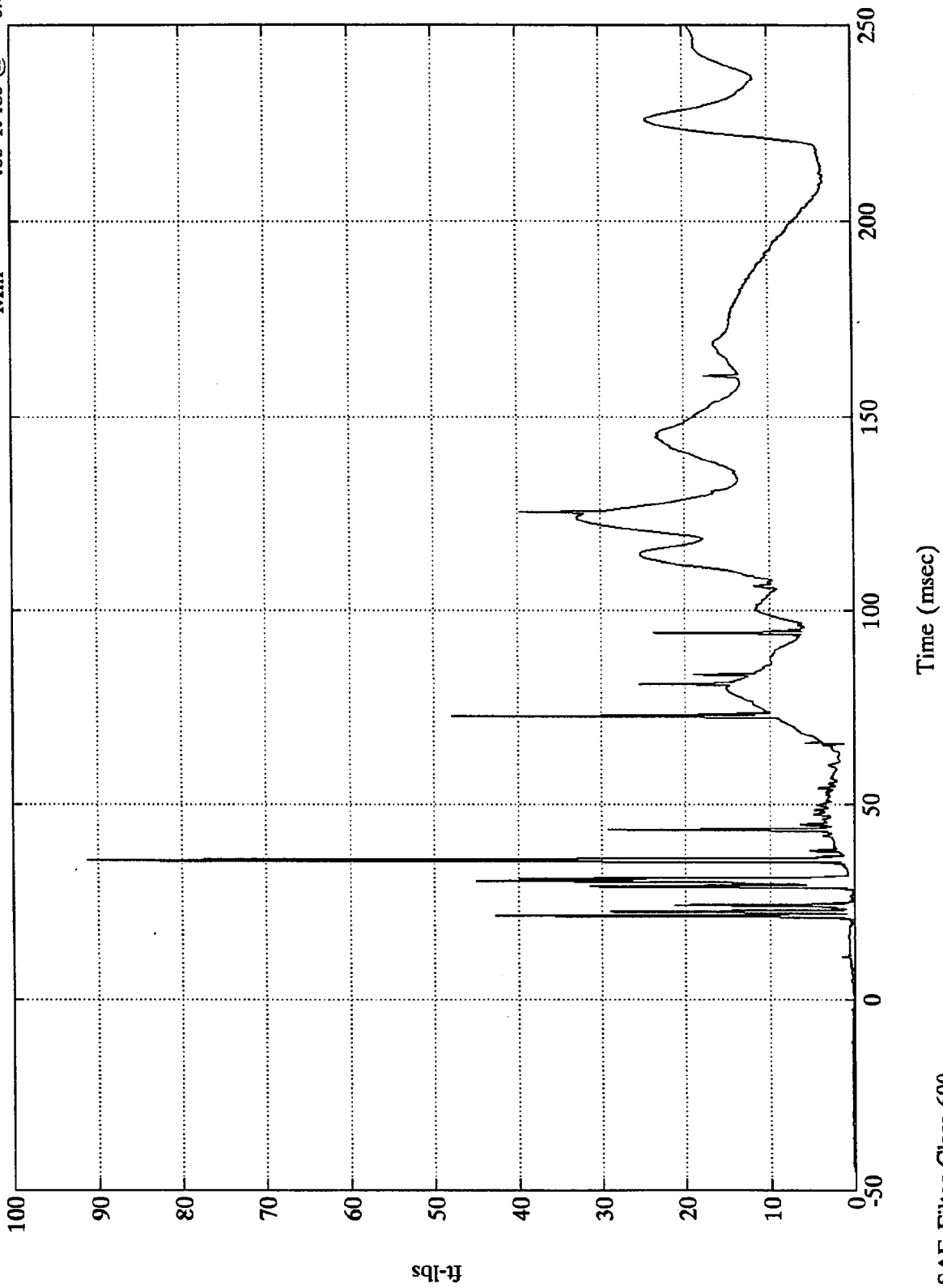
Max = 90.57 ft-lbs @ 35.88 msec
Min = -46.88 ft-lbs @ 72.83 msec



V-to-V Test #5

Veh. 2 Neck Moment Res.

Max = 91.12 ft-lbs @ 35.88 msec
Min = .05 ft-lbs @ 0.83 msec

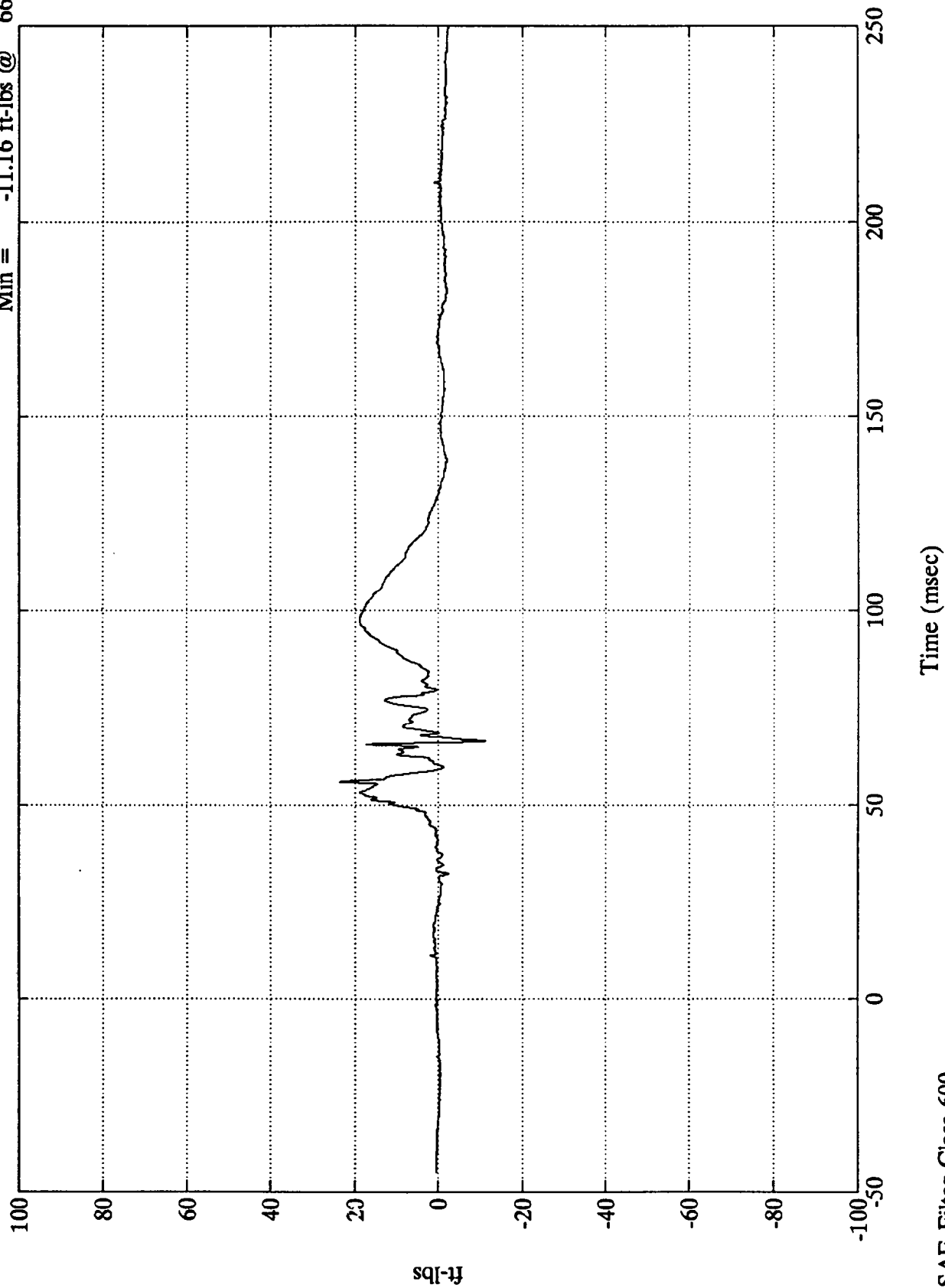


ft-lbs

SAE Filter Class 600

V-to-V Test #5

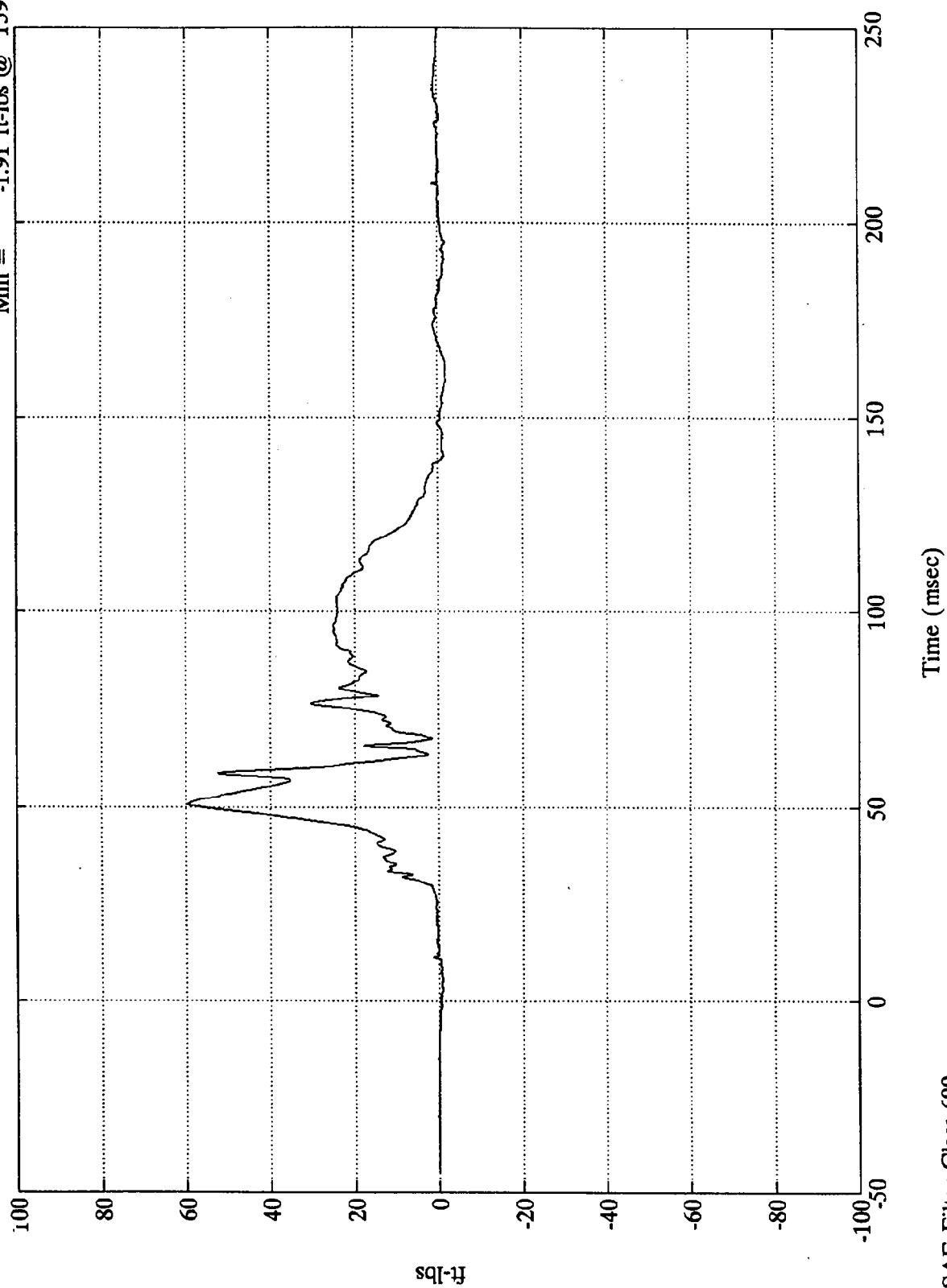
Veh. 2 Lt U Tibia Mx
Max = 23.41 ft-lbs @ 55.92 msec
Min = -11.16 ft-lbs @ 66.48 msec



V-to-V Test #5

Veh. 2 Lt U Tibia My

Max = 59.74 ft-lbs @ 50.88 msec
Min = -1.91 ft-lbs @ 159.60 msec

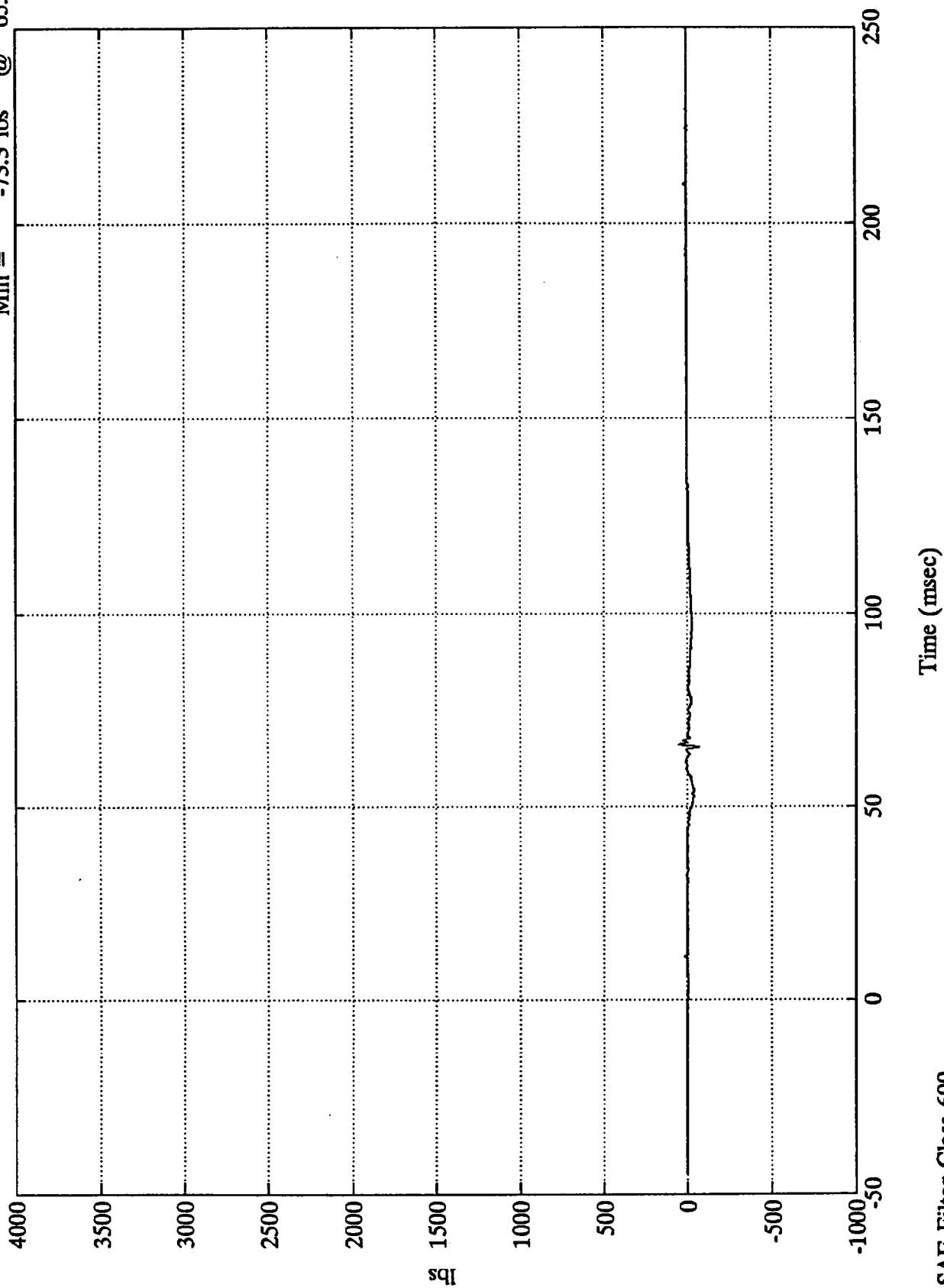


SAE Filter Class 600

V-to-V Test #5

Veh. 2 Lt L Tibia Fy

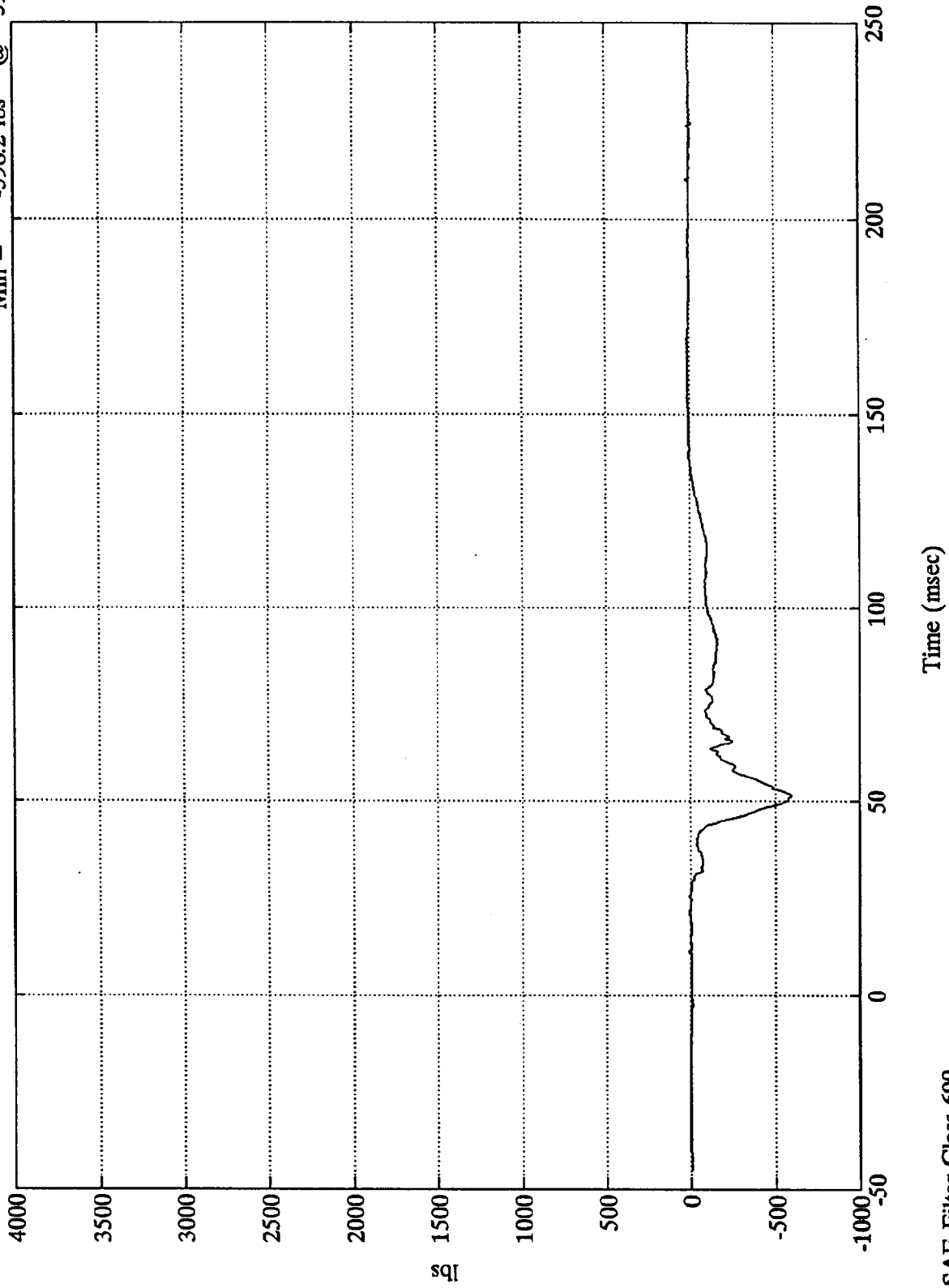
Max = 54.1 lbs @ 65.87 msec
Min = -73.3 lbs @ 65.27 msec



V-to-V Test #5

Veh. 2 Lt L Tibia Fz

Max = 20.0 lbs @ 203.38 msec
Min = -598.2 lbs @ 51.60 msec

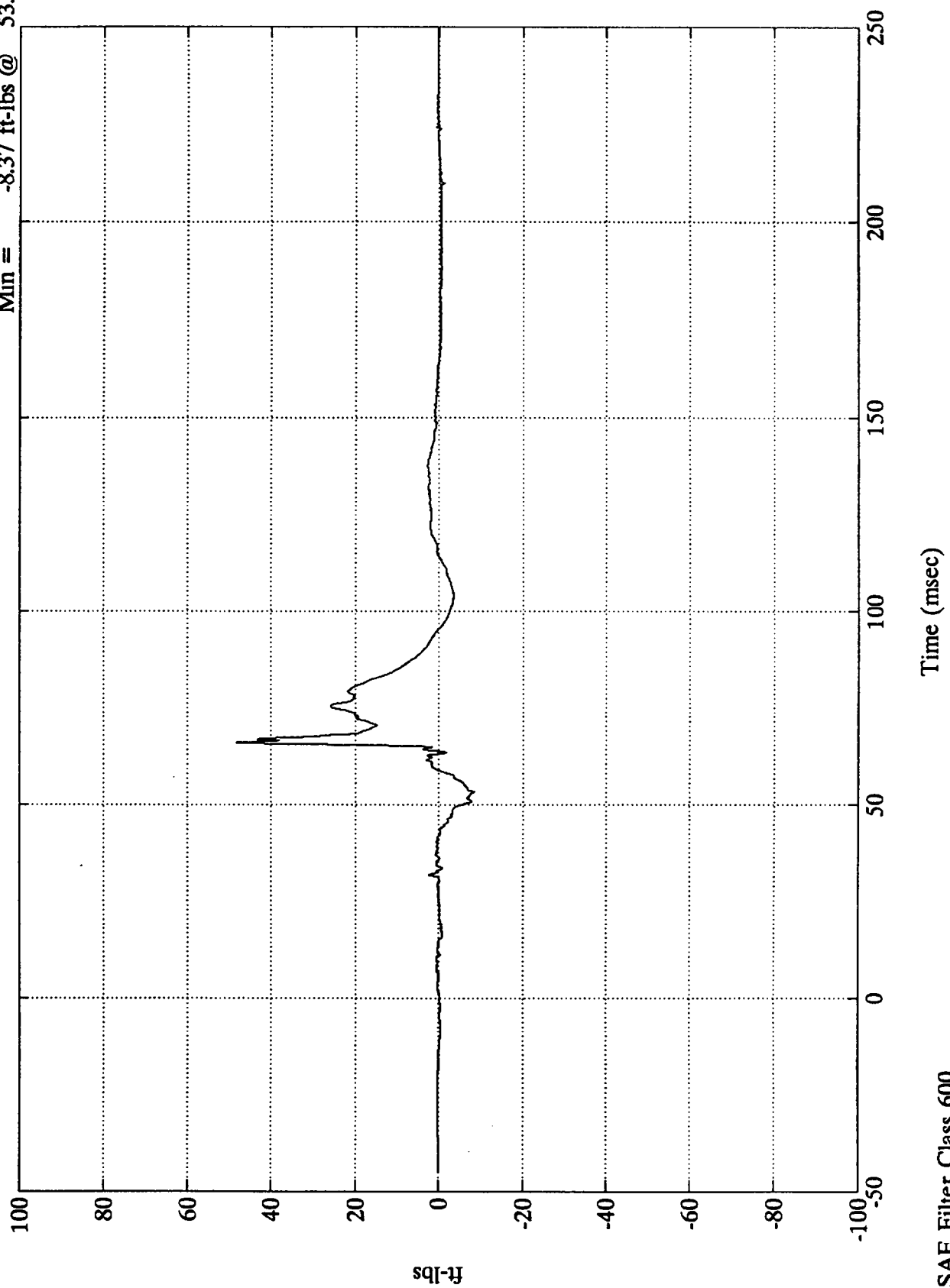


SAE Filter Class 600

V-to-V Test #5

Veh. 2 Lt L Tibia Mx

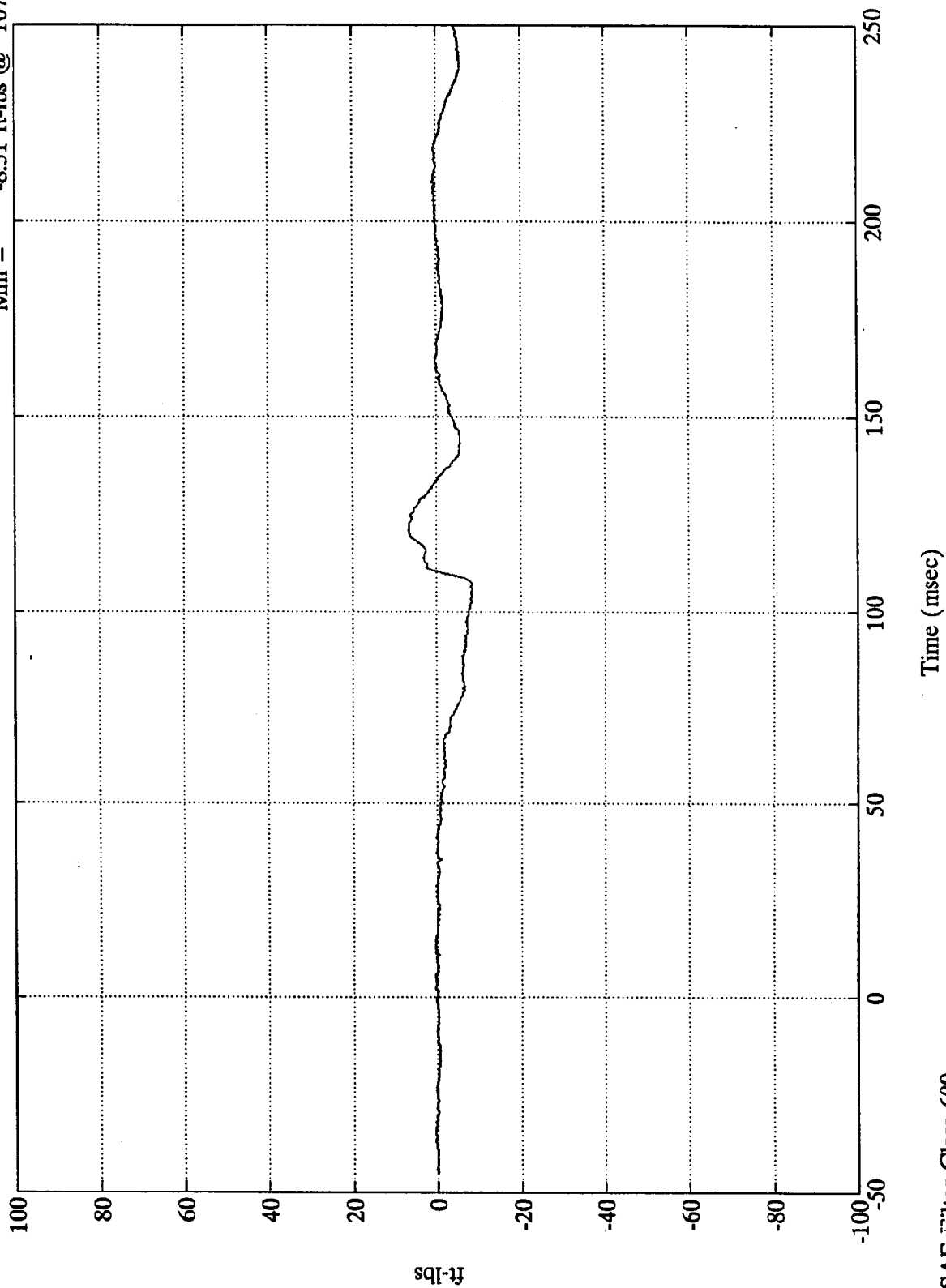
Max = 48.18 ft-lbs @ 65.87 msec
Min = -8.37 ft-lbs @ 53.40 msec



sq[[-t]

V-to-V Test #5

Veh. 2 Rt U Tibia Mx
Max = 6.67 ft-lbs @ 121.08 msec
Min = -8.51 ft-lbs @ 107.51 msec



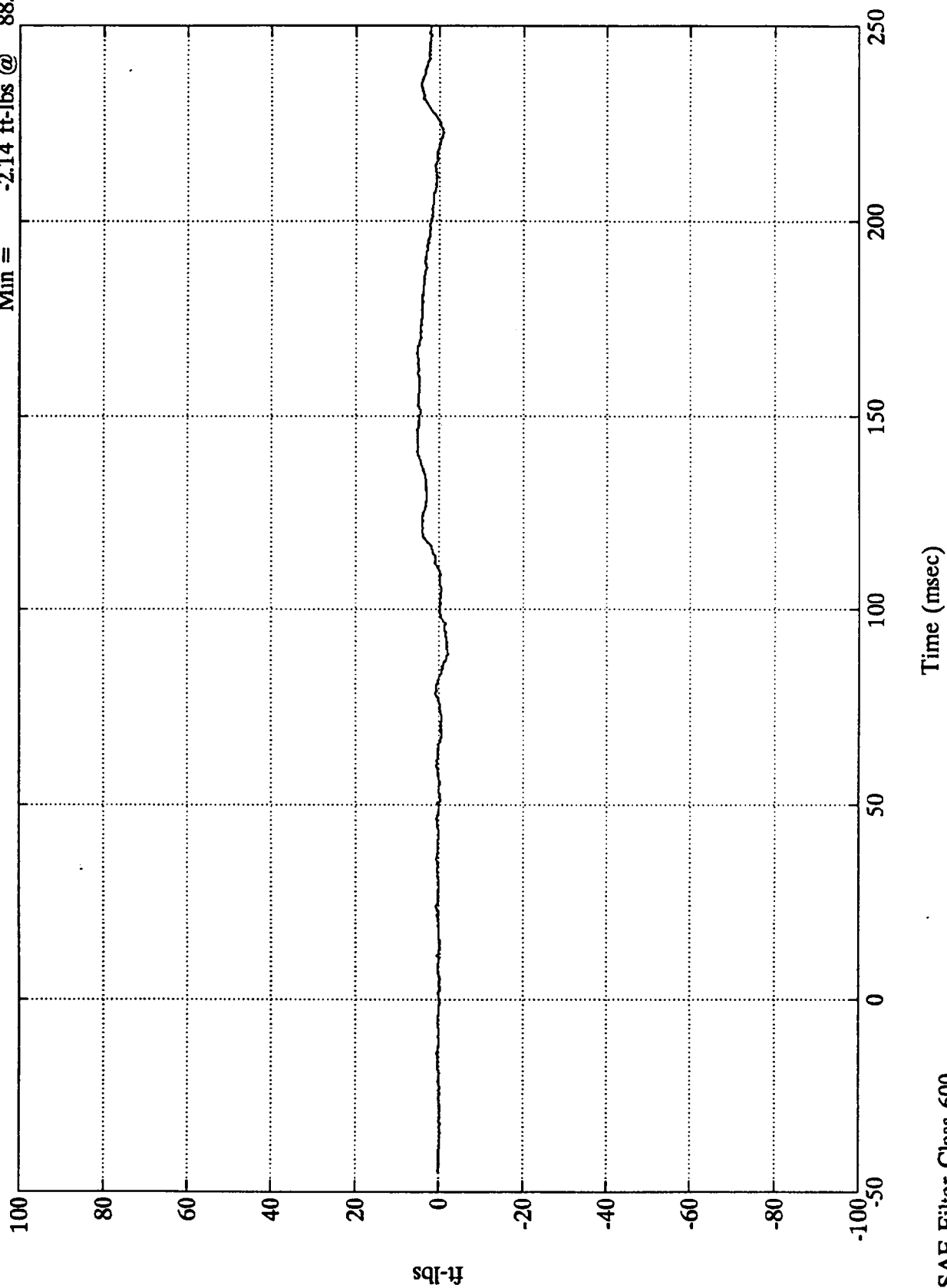
ft-lbs

SAE Filter Class 600

V-to-V Test #5

Veh. 2 Rt U Tibia My

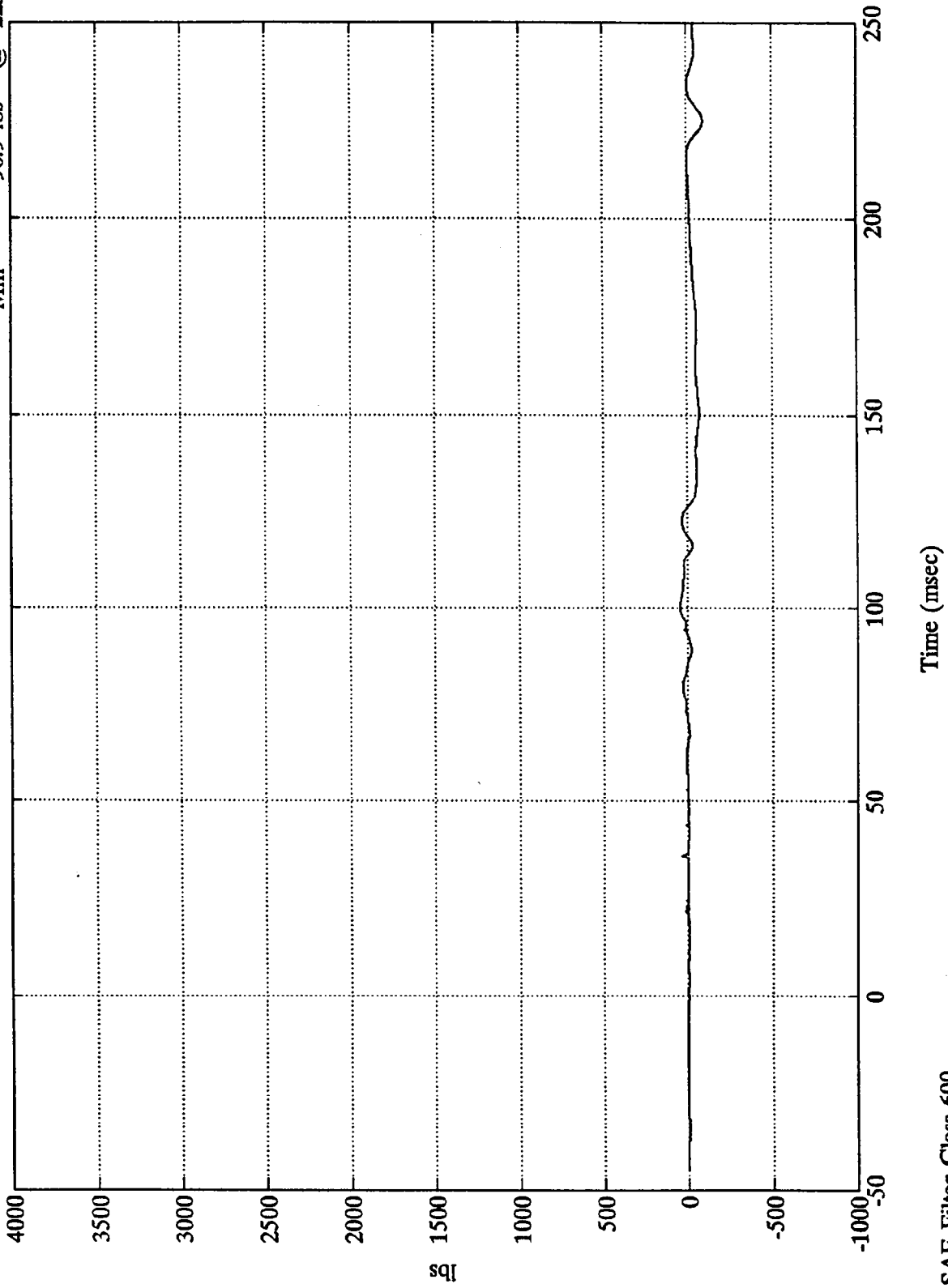
Max = 5.36 ft-lbs @ 166.08 msec
Min = -2.14 ft-lbs @ 88.80 msec



V-to-V Test #5

Veh. 2 Rt L Tibia Fz

Max = 48.8 lbs @ 100.20 msec
Min = -96.9 lbs @ 225.00 msec



V-to-V Test #5

Veh. 2 Rt L Tibia Mx

Max = 13.18 ft-lbs @ 144.36 msec
Min = -23.05 ft-lbs @ 125.04 msec

