

CALSPAN REPORT NUMBER: 8118-4

33 MPH VEHICLE TO VEHICLE 30° ANGLED
FRONTAL IMPACT OF A
1993 CHEVROLET CORSICA AND A 1991 HONDA ACCORD DX

CALSPAN TEST NUMBER: Y49-4-1309

SEPTEMBER 16, 1993

CALSPAN CORPORATION
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FINAL REPORT

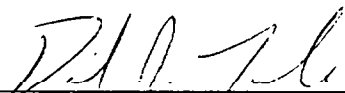
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Research and Special Programs Administration
Volpe National Transportation Systems Center
Kendall Square
Cambridge, MA 02142

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16. Abstract A 33 mph vehicle to vehicle 30° angled impact test of a 1993 Chevrolet Corsica 4-door sedan and a 1991 Honda Accord DX 4-door sedan was performed at the Calspan Advanced Technology Center crash facility in Buffalo, New York on 16 September 1993. The measured impact velocities of both vehicles were 33.0 mph and the ambient temperature at the time of test was 57°F. Both vehicles had 50th percentile male Hybrid III dummy occupants in the driver positions only. The driver of the Chevrolet Corsica (Vehicle 1) was restrained with an active 3-point continuous loop belt system and a supplemental airbag. The driver of the Honda Accord DX (Vehicle 2) was restrained with a passive torso belt and active lap belt system. The left femur force on the driver dummy of the Chevrolet Corsica was -2569.3 pounds. The Head Injury Criteria (HIC), chest resultant acceleration and all other femur load measurements for the occupant dummies of both vehicles were below the injury criteria requirements of FMVSS 208 "Occupant Crash Protection."					
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Section 1

PURPOSE AND TEST PROCEDURE

This 33 mph vehicle-to-vehicle 30° angled frontal impact test is part of the Crashworthiness Testing and Analysis Program sponsored by the Research and Special Programs Administration under Contract No. DTRS57-90-C-00104. The purpose of this Technical Task Directive (TTD 7) is to obtain responses from vehicles and restrained Hybrid III dummies during different types of frontal crashes.

This test was performed using a 1993 Chevrolet Corsica 4-door sedan (Vehicle 1) and a 1991 Honda Accord DX 4-door sedan (Vehicle 2). The vehicles were traveling forward at 33 mph and impacted at a 30° angle (measured counterclockwise from the centerline of Vehicle 1 looking down at the crash event). Vehicle 2 was positioned at impact with its left side tangent to a line at a 15° angle (measured counterclockwise from the centerline of Vehicle 1 looking down on the crash event) passing through the centerline of Vehicle 1 at the forward most point (Figure 1).

This test of a 1993 Chevrolet Corsica 4-door sedan and a 1991 Honda Accord DX 4-door sedan was performed with 50th percentile male dummies in the driver positions of both vehicles. The driver dummy occupant in the Chevrolet Corsica was restrained with an active continuous loop 3-point belt system and a supplemental airbag. The driver dummy occupant in the Honda Accord DX was restrained with a passive torso belt and an active lap belt system.

Section 2
SUMMARY OF THE TEST

Two vehicles, both moving forward at 33 mph, were impacted at a 30° angle. Vehicle 1 was a 1993 Chevrolet Corsica 4-door sedan and Vehicle 2 was a 1991 Honda Accord DX 4-door sedan. The test was performed at the Calspan Corporation Advanced Technology Center Crash Test Facility on 16 September 1993.

Pre- and post-test still photographs of the vehicle and dummies can be found in Appendix A. The impact event was documented with one real time movie camera and twelve high speed movie cameras. Vehicle photographic target locations can be found in Figure 5 and movie camera locations can be found in Figure 12.

The nominal vehicle impact points were determined as outlined in the previous section and shown in Figure 1. The actual impact points were offset approximately four inches to the right of the nominal impact points. This small offset caused the tangent angle for Vehicle 2 to be slightly smaller than 15° (see Figure 1).

One Hybrid III 50th percentile anthropomorphic test device (ATD) was placed in the driver seating position of each vehicle. The dummies were positioned according to the dummy placement instructions from the FMVSS 208 "Occupant Crash Protection" Test Procedure. The driver dummy in Vehicle 1 (Chevrolet Corsica) was restrained with an active continuous loop 3-point belt system and a supplementary airbag. The driver in Vehicle 2 (Honda Accord DX) was restrained with a passive torso belt and an active lap belt system.

The 50th percentile male dummies in the driver positions of both vehicles were instrumented with head, chest and pelvic triaxial accelerometer packages; chest displacement potentiometers; upper neck force and moment transducers; femur axial force load cells; upper and lower tibia force and moment transducer packages and knee displacement transducers. The driver dummy of the Chevrolet Corsica (Vehicle 1) also contained the chest compression displacement potentiometer array. The driver shoulder belt tensile forces were also recorded.

The 78 channels of vehicle and dummy transducer data were recorded on a PC based data acquisition system. The data was reduced, filtered and processed as

required by the appropriate test procedures using PC based software. Appendix B contains the vehicle and the dummy response data in plotted format.

The Chevrolet Corsica (Vehicle 1) driver HIC was 362.3 and the only head contact was the driver side airbag. The maximum chest acceleration over a three millisecond period was 36.6 g's. The left femur maximum axial compressive force was -2569.3 pounds and the right femur maximum axial compressive force was -575.3 pounds.

The Honda Accord (Vehicle 2) driver HIC was 513.1 with head contact on the steering wheel rim at approximately the 11 o'clock position. The maximum chest acceleration over a three millisecond period was 52.5 g's. The left femur maximum axial compressive force was -1455.3 pounds and the right femur maximum axial compressive force was -1563.6 pounds.

Problems occurred with the following data channels:

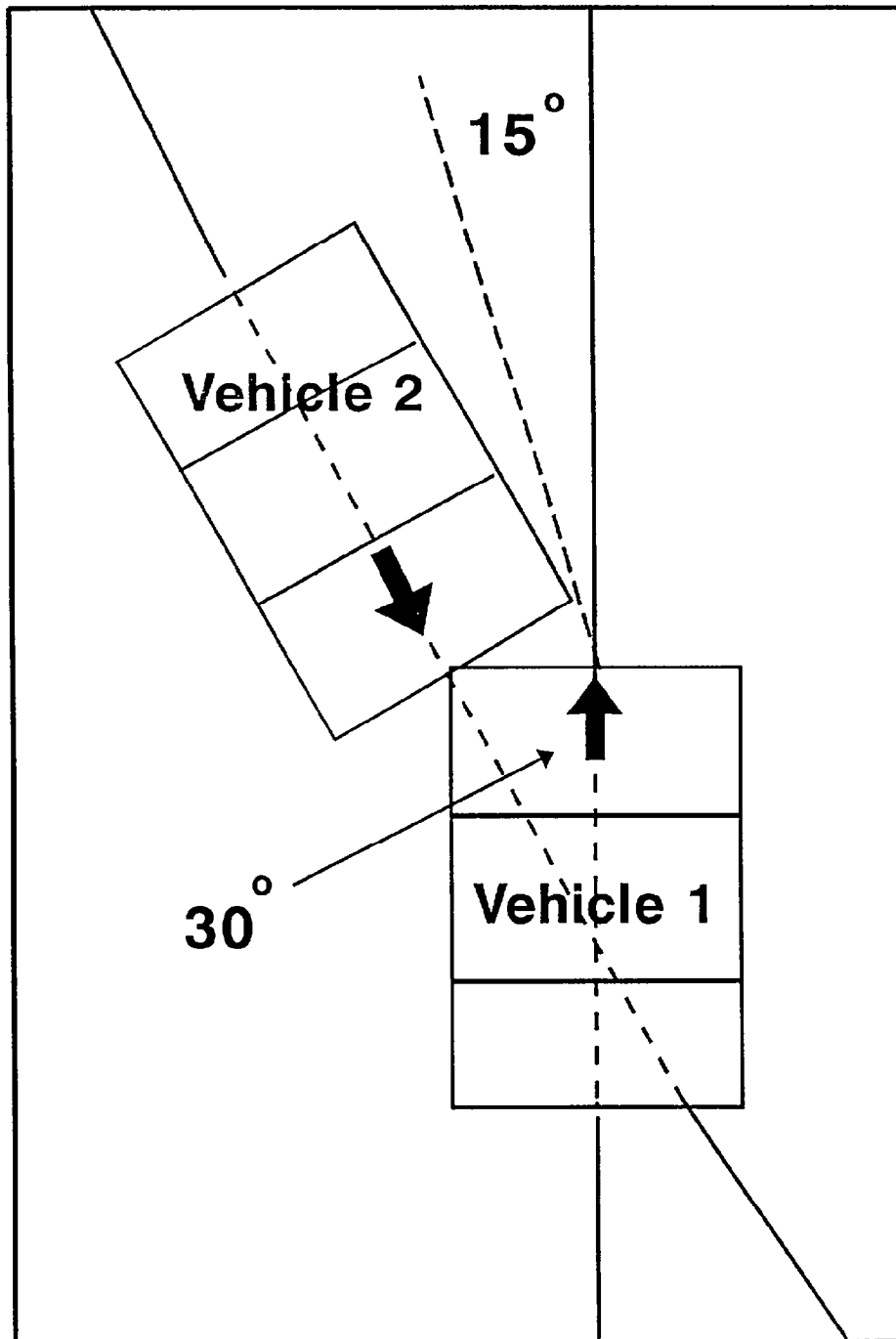
- The string of the left toeboard displacement potentiometer was trapped between the driver seat and the left sill at approximately 90 milliseconds and the data after that time is incorrect.

Section 3

VEHICLE AND OCCUPANT INFORMATION

Figure 1

VEHICLE TO VEHICLE ANGLED FRONTAL IMPACT LAYOUT



VEHICLE 1 DATA

Table 1

VEHICLE 1 - GENERAL TEST AND VEHICLE DATA

Vehicle Year/Make/Model/Body Style: 1993 Chevrolet Corsica 4-Door SedanNHTSA Test No.: _____ VIN.: 1G1LT5343PY141407Body Color: Light Grey Metallic Date of Manufacture: 11/92Engine: 4 Cylinders; - C.I.D.; 2.2 Liters; - CCX Gas; - Diesel; - Turbocharged- Longitudinal; X TransverseTransmission: 3 Speed; - Manual; X Automatic; - OverdriveFinal Drive: X Front Wheel; - Rear Wheel; - Four WheelX A/C; X P/S; X P/B; - P/wdo;X Tilt Wheel - P/seats; - Cruise ControlType of Occupant Restraint: 3 Point Belt and Driver AirbagDATA RECORDED FROM VEHICLE'S TIRE PLACARD:Tire Pressure (at capacity): Front 30 psi, Rear 30 psiRecommended Tire Size: P185/75R14Recommended Cold Tire Pressure: Front 30 psi, Rear 30 psiTires on Vehicle: P185/75R14; Manufacturer: GoodyearNumber of Occupants: 2 Front; 3 Rear; - 3rd Seat; 5 TOTALType of Front Seats: X Bucket; - Bench; - Split BenchType of Front Seat Back: - Fixed; X Adj. With X Lever - Rot. KnobVehicle Capacity Weight (VCW) = 891 lbs. (A)No. of Occupants x 150 lbs. = 750 lbs. (B)

Rated Cargo and Luggage

Weight (RCLW) A-B = 1641 lbs.GVWR 3682 lbs. GAWR: Front 1935 lbs. Rear 1729 lbs.

Table 1

VEHICLE 1 - GENERAL TEST AND VEHICLE DATA (Cont'd)

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

Right Front = 850 lbs. Right Rear = 530 lbs.
 Left Front = 890 lbs. Left Rear = 530 lbs.
 TOTAL FRONT WEIGHT = 1740 lbs. (62.1% of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1060 lbs. (37.9% of Total Vehicle Weight)
 TOTAL DELIVERED WEIGHT = 2800 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMY:

Right Front = 850 lbs. Right Rear = 570 lbs.
 Left Front = 890 lbs. Left Rear = 590 lbs.
 TOTAL FRONT WEIGHT = 1740 lbs. (60.0% of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 1160 lbs. (40.0% of Total Vehicle Weight)
 TOTAL DELIVERED WEIGHT = 2900 lbs.
 Weight of Ballast Secured in Vehicle Trunk Area = 0 lbs.

TEST VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 27.312; LF 27.250; RR 27.500; LR 27.375
 Test Attitude: RF 27.5; LF 26.8; RR 26.4; LR 25.6
 Vehicle's Wheel Base = 103.7 in.
 Location of Vehicle's C.G. = 41.5 inches rearward of front wheel center

SEAT AND STEERING COLUMN POSITIONS:

Seat Detent Position: 10th Detent of 19 Total Detents
 Seat Back Angle or Position: 26° (With Respect to Full Upright Position)
 Steering Column Position: Mid

FUEL IN TANK DURING TEST:

14.1 Gallons

Table 1

VEHICLE 1 - GENERAL TEST AND VEHICLE DATA (Cont'd)

POST-IMPACT DATA:

Type of Test: 30° Angled V-T-V Frontal Impact Angle: 30°
 Date of Test: 9/16/93 Time of Test: 4:09 PM
 Ambient Temperature: 57°F at impact area
 Temperature in Occupant Compartment: 70°F
 Windshield Molding Temperature: -°F
 Impact Velocity: primary = 33.0 mph, secondary = 33.0 mph
 Distance From Front Bumper to Barrier Face When
 Entering Speed Trap: 52
 Exiting Speed Trap: 12

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Face with Airbag</u>	<u>N/A</u>
Chest	<u>With Airbag</u>	<u>N/A</u>
Abdomen	<u>With Airbag</u>	<u>N/A</u>
Left Knee	<u>Lower dash</u>	<u>N/A</u>
Right Knee	<u>Lower dash</u>	<u>N/A</u>

Comments: Floor and toe pan severely deformed, left roof rail severely deformed, windshield cracked, left front tire flat

	<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>Closed</u>	<u>Closed</u>

	<u>Front</u>		<u>Rear</u>	
<u>Seat Movement</u>	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Seat Back Failure	<u>None</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Seat Shift (in.)	<u>0.0</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>

Table 2
VEHICLE 1 - DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DUMMY (1)	-50.5	-18.3	21.3	51.9	-36.3	22.5	12.6	36.6
DUMMY (2)	-	-	-	-	-	-	-	-
DUMMY (3)	-	-	-	-	-	-	-	-
DUMMY (4)	-	-	-	-	-	-	-	-

	MAXIMUM FORCE FEMUR LOAD (LBS.)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	-575.3	-2569.3
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)	926.4	-	-
DUMMY (2)	-	-	-
DUMMY (3)	-	-	-
DUMMY (4)	-	-	-

	HEAD INJURY CRITERIA (HIC)			
	HIC	t ₁ (msec)	t ₂ (msec)	Average Acceleration t ₁ TO t ₂
DUMMY (1)	362.3	56.880	90.360	41.09
DUMMY (2)	-	-	-	-
DUMMY (3)	-	-	-	-
DUMMY (4)	-	-	-	-

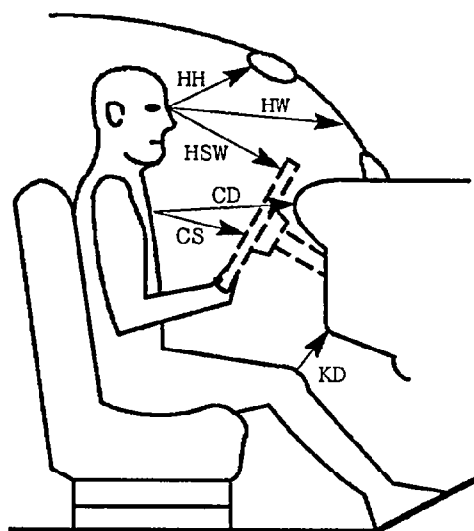
*Defined as exceeding 0.003 sec. duration

**As defined in FMVSS No. 208

Figure 2

VEHICLE 1 OCCUPANT CLEARANCE DIMENSIONS

	DRIVER
HH	11.6
NW	23.3
NSW	13.7
NIP	19.3
NH	14.5
CD	19.3
CS	11.3
KDL	4.0
KDR	5.0
1	19.5
2	2.0
SA	26°*
PA	24°
ULA	114
LLA	221



*Position as specified by manufacturer.

H-Point From Target Position	
Vertical	0.1 above
Longitudinal	0.0

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 = Nose to Steering Column Target
 2 = Distance between Steering Column Targets

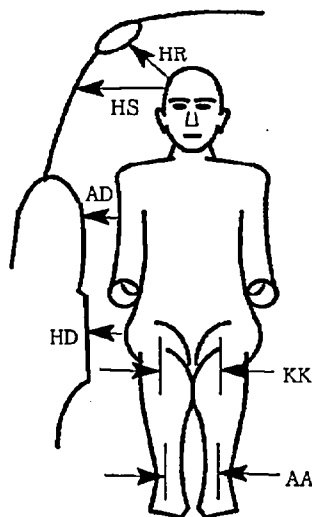
Angles taken relative to vertical

SA = Seat Back Angle

PA = Pelvic Angle

ULA = Upper Leg Angle

LLA = Lower Leg Angle



HR = Head to Side Roof

HS = Head to Side Window

AD = Arm to Door

HD = Hip to Door

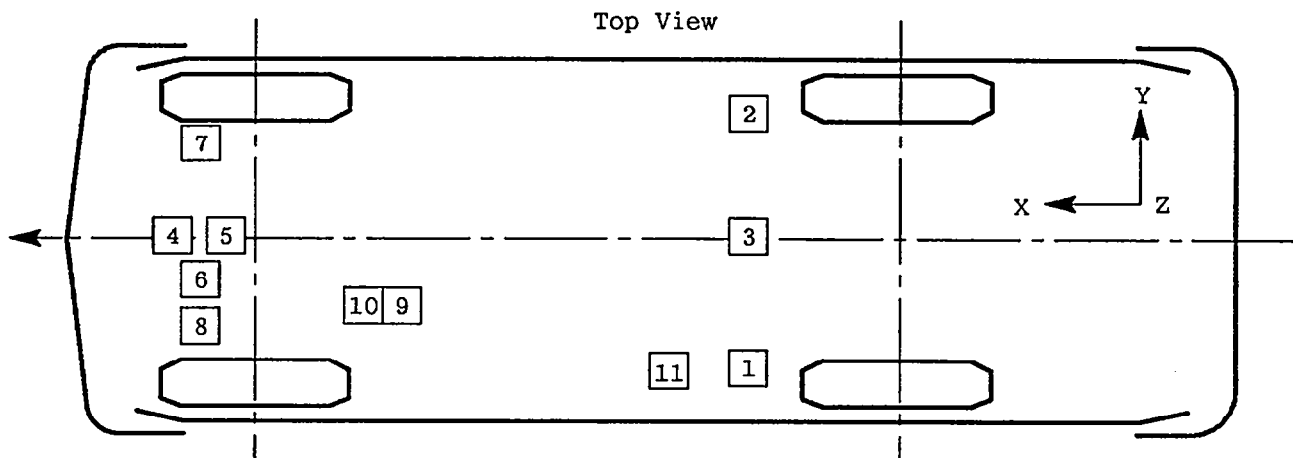
KK = Knee to Knee

AA = Ankle to Ankle

DT = Dummy Temperature °F

	DRIVER
HR	7.1
HS	10.1
AD	4.3
HD	4.7
KK	9.8
AA	12.3
DT	70

Figure 3
SUMMARY OF VEHICLE 1 INSTRUMENTATION DATA



Vehicle: 1993 Chevrolet Corsica LT 4-Door Sedan

Loc, No.	Description	Axis	Maximum Value (g's)*	
			"-"	"+"
1	Rear seat crossmember left side	x	-26.5	3.1
2	Rear seat crossmember right side	x	-36.0	3.0
3	Rear seat crossmember centerline, X	x	-40.8	5.1
3	Rear seat crossmember centerline, Y	y	-16.8	3.3
3	Rear seat crossmember centerline, Z	z	-16.3	14.2
4	Top of engine block	x	-72.0	15.1
4	Top of engine block	-	-	-
5	Bottom of engine block	x	-75.2	55.1
6	Front suspension crossmember	-	-	-
6	Front suspension crossmember	-	-	-
7	Right front brake caliper	-	-	-
8	Left front brake caliper	-	-	-
9	Brake pedal	x	-173.0	64.4
9	Brake pedal	-	-	-
10	Toe pan	x	-96.5	43.6
11	Floorboard displacement potentiometer (VI left side displacement)	-	4.42	-

*Values filtered using SAE class 60 filter.

Figure 4
VEHICLE 1 PRE- AND POST-TEST POSITION
ACCELEROMETER LOCATIONS

Test Description: 33 mph 30° Offset Frontal Vehicle to Vehicle Impact

Test Vehicle: -1993 Chevrolet Corsica LT 4-Door Sedan

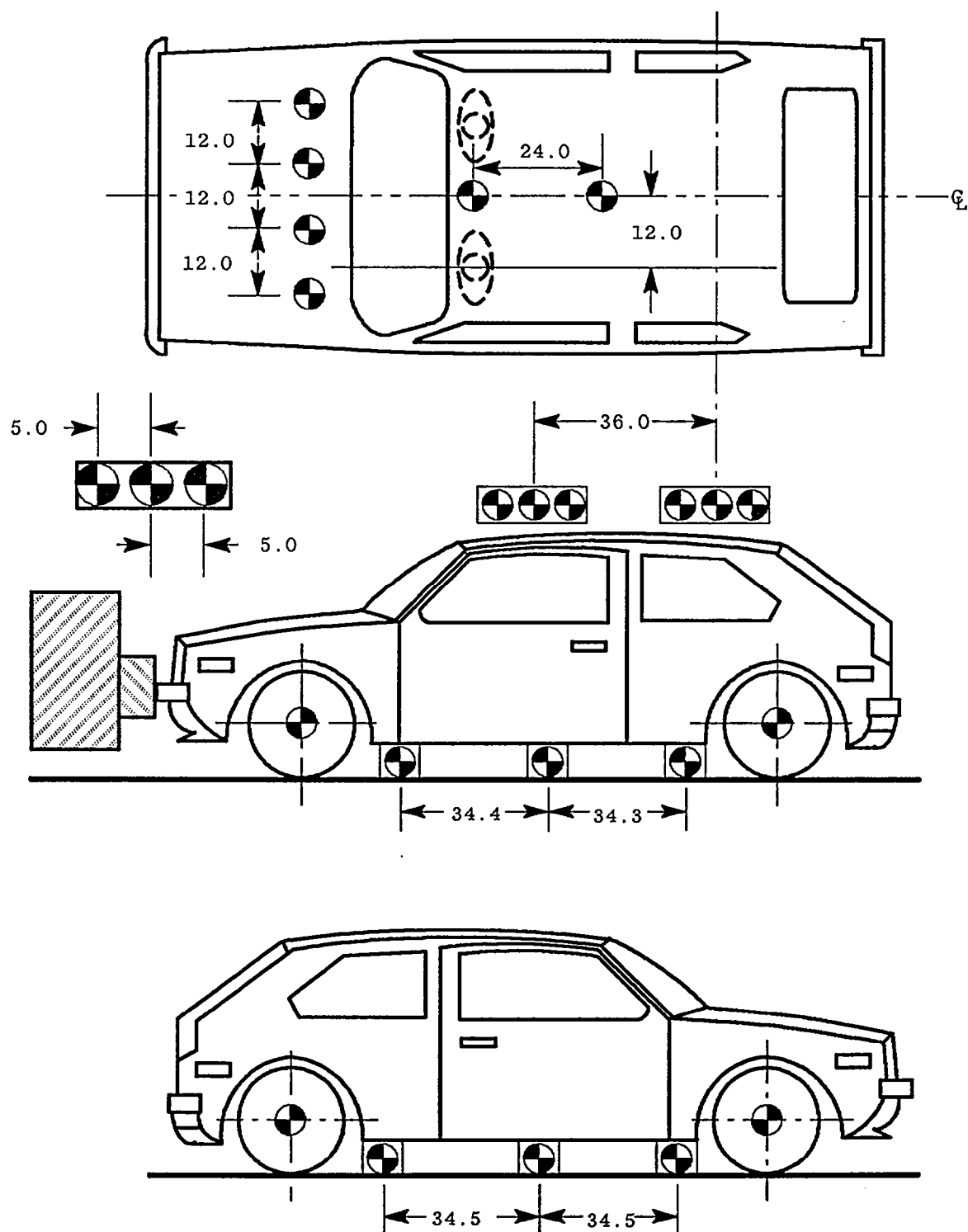
Reference Plane: Vehicle plane at rear bumper

Accelerometer Description	LONGITUDINAL LOCATION (in.)		
	Pre-Test	Post-Test	Change
Rear seat crossmember left side	70.9	70.9	0.0
Rear seat crossmember right side	70.9	70.9	0.0
Rear seat crossmember centerline	68.4	68.4	0.0
Top of engine block	151.8	146.7	5.1
Bottom of engine block	153.3	149.5	3.8
Front suspension crossmember	-	-	-
Right front brake caliper	-	-	-
Left front brake caliper	-	-	-
Toe pan	127.4	120.9	6.5
Brake pedal	125.9	124.9	1.0

Figure 5

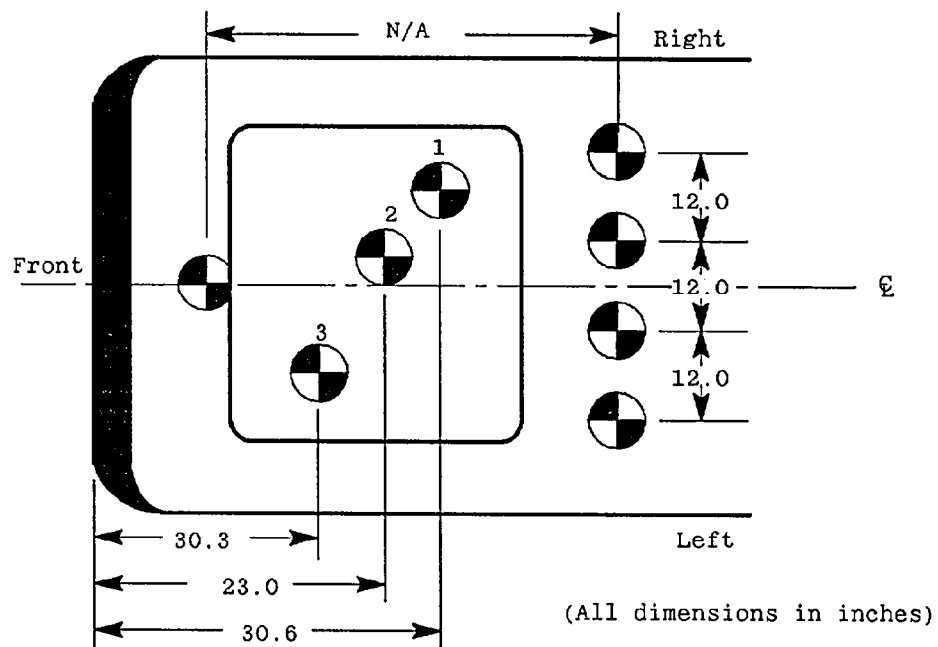
VEHICLE 1 PHOTOGRAPHIC TARGET LOCATIONS

(All dimensions in inches)



(Dimensions in inches)

Figure 5
 VEHICLE 1 TARGET LOCATIONS (continued)
 (TOP VIEW OF HOOD AND ENGINE COMPARTMENT)



Note: Drawing not to scale.

Target 1: Rocker Cover
 2: Alternator
 3: Air cleaner assembly

Figure 6
 VEHICLE 1 MEASUREMENT POINTS
 (All dimensions in inches)

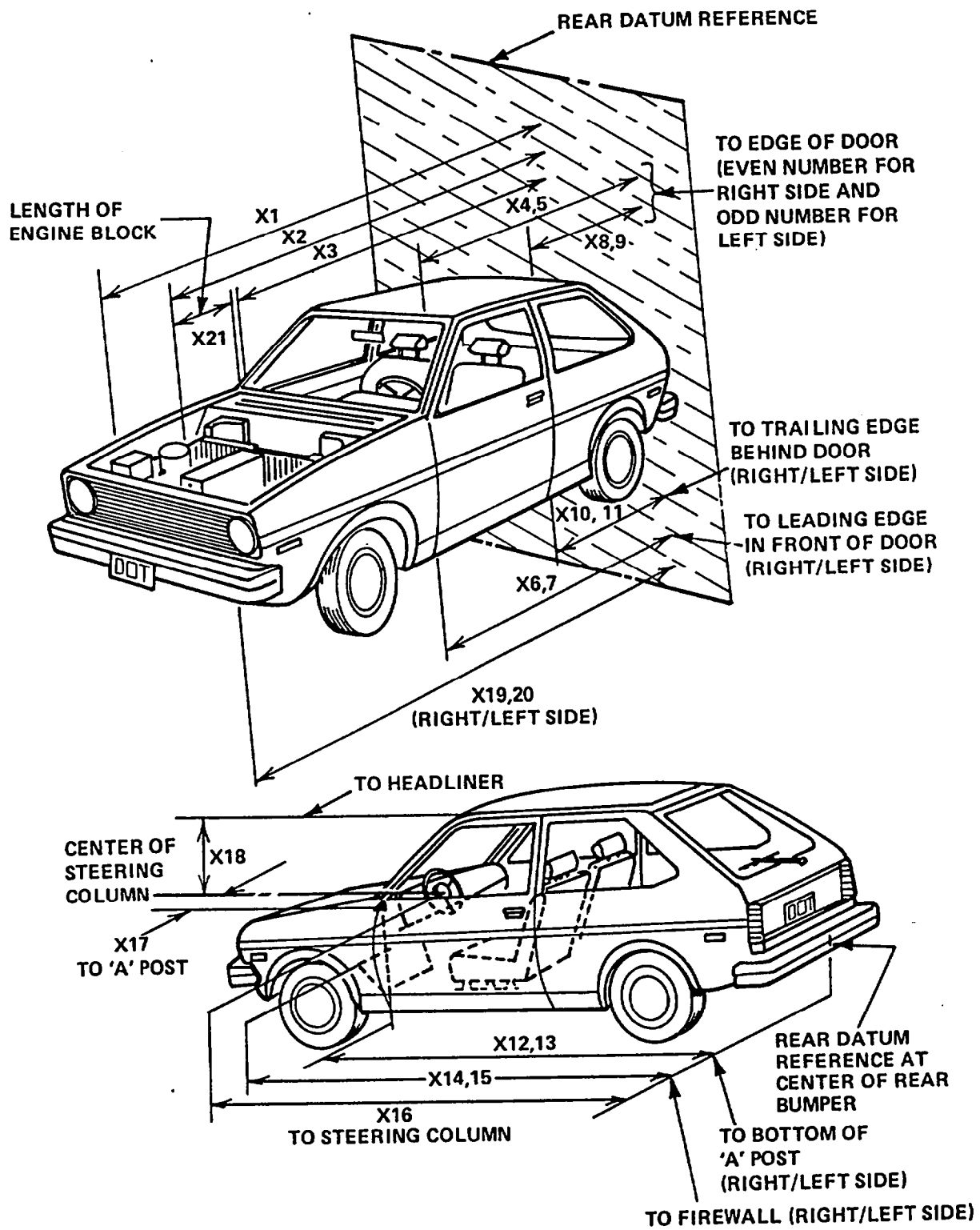


Figure 6
VEHICLE 1 MEASUREMENT POINTS (continued)

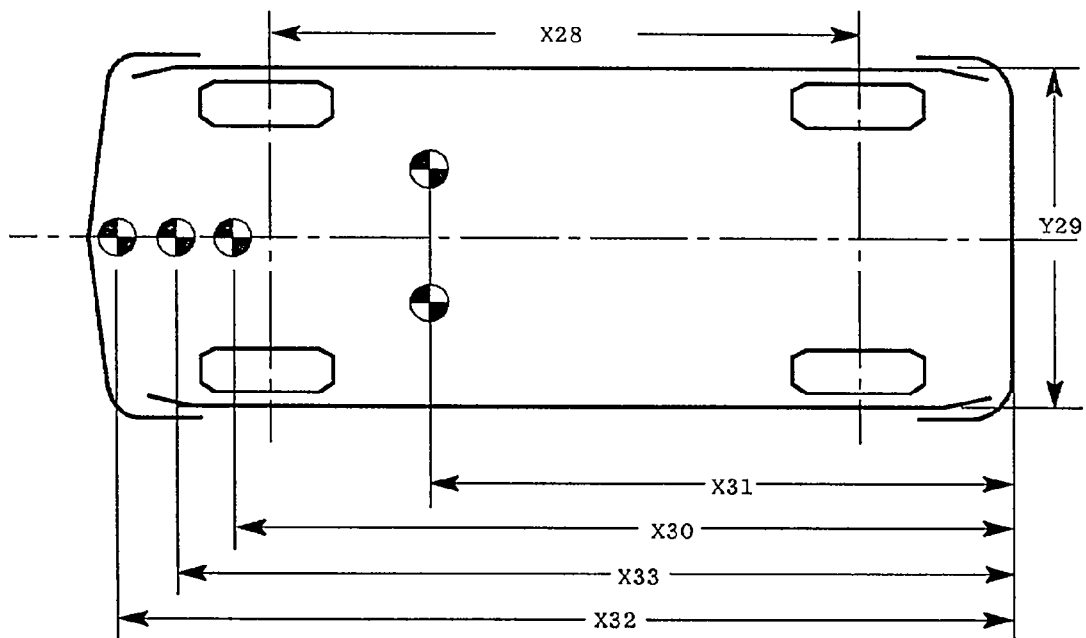
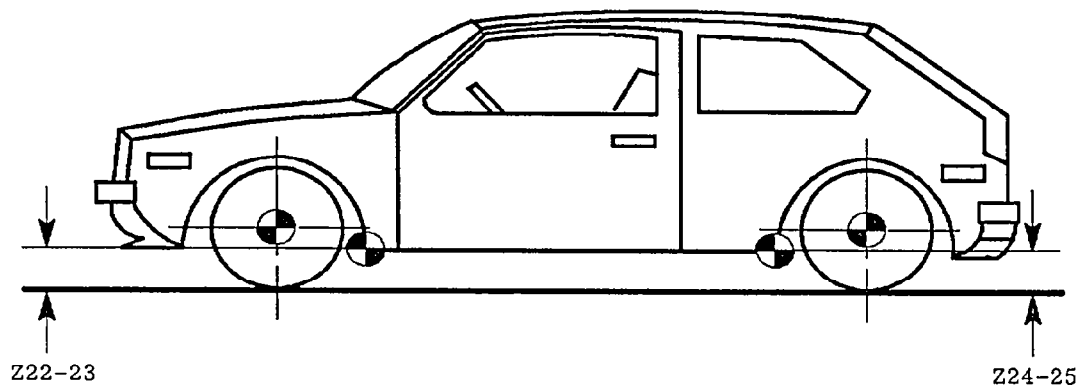


Table 3

VEHICLE 1 MEASUREMENTS

No.	TYPE OF MEASUREMENT	All Dimensions in Inches	
		Pre-Test	Post-Test
X1	Total Length of Vehicle at Centerline	183.2	167.0
X2	Rear Surface of Vehicle to Engine at Centerline	156.0	152.4
X3	Rear Surface of Vehicle to Firewall	136.0	133.9
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	123.8	124.6
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	123.9	121.8
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	123.1	123.8
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	123.3	121.3
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	84.5	84.5
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	84.5	84.0
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	85.4	85.8
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	85.4	85.4
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	124.6	125.5
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	124.8	N/A
X14	Rear Surface of Vehicle to Firewall - Right Side	136.0	135.0
X15	Rear Surface of Vehicle to Firewall - Left Side	135.7	130.5
X16	Rear Surface of Vehicle to Steering Wheel Center	105.8	104.0
Y17	Steering Column to "A" Post	17.3	16.9

Table 3

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	16.3	17.4
X19	Rear Surface of Vehicle to Right Side of Front Bumper	178.7	182.1
X20	Rear Surface of Vehicle to Left Side of Front Bumper	179.1	153.2
X21	Width of Engine Block	12.8	12.8
Z22	Right Front Sill to Ground Plane	10.5	11.4
Z23	Left Front Sill to Ground Plane	10.3	5.9
Z24	Right Rear Sill to Ground Plane	11.3	11.2
Z25	Left Rear Sill to Ground Plane	11.0	7.9
X26	Firewall to Engine or Transaxle	7.8	1.0
Z27	Vertical Dim. from Door Sill to Centerline of Steering Column	20.2	23.0
X28	Wheelbase of Vehicle	103.6	L 92, R 103.5
Y29	Width of Vehicle at Maximum Width Point	68.0	68.5
X30	Rear Surface of Vehicle to Engine Target	153.3	149.5
X31	Rear Surface of Vehicle to Compartment Target	R & L 122.3	R 122.1, L 118.5
X32	Rear Surface of Vehicle to Bumper Target	178.5	162.3
X33	Rear Surface of Vehicle to Frame Crossmember	168.7	161.1

Table 4

VEHICLE 1 - FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

FMVSS NO. 301

TEST VEHICLE NHTSA NO.:

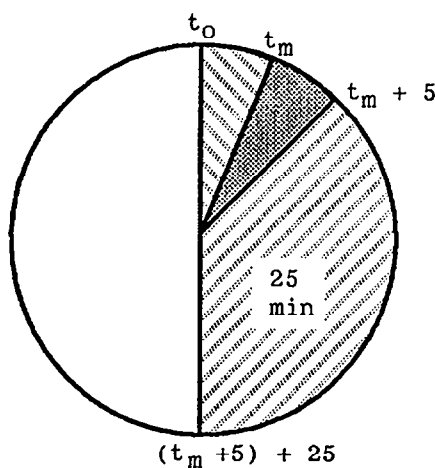
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TEST DATE: 9/17/93Vehicle Mfr./Make/Model: 1993 Chevrolet Corsica 4-Door Sedan Vehicle #1

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)
 ✓ _____ Vehicle to Vehicle 30° Angle

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.

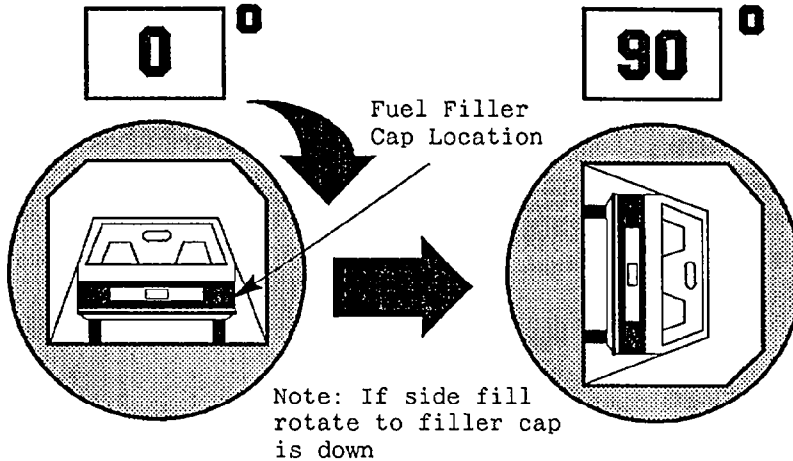
SOLVENT SPILLAGE DETAILS:

None

Table 5
VEHICLE 1 - STATIC ROLLOVER DATA SHEET

TEST PHASE:

Vehicle NHTSA ID No.: _____



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	_____ 2 _____	minutes	_____ 28 _____	seconds
	_____ 5 _____	minutes	_____ 00 _____	seconds
TOTAL	_____ 7 _____	minutes	_____ 28 _____	seconds
Next whole minute interval	_____ 8 _____	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.

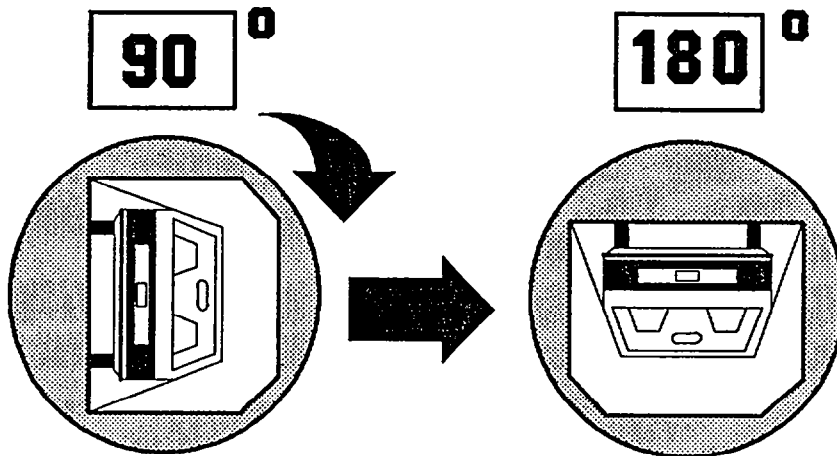
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 5
VEHICLE 1 - STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

Vehicle NHTSA ID No.: _____



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	_____ 1 _____ minutes _____ 39 _____ seconds
FMVSS 301 Position Hold Time +	_____ 5 _____ minutes _____ 00 _____ seconds
TOTAL	_____ 6 _____ minutes _____ 39 _____ seconds
Next whole minute interval	_____ 7 _____ 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	N/A
---	---	---	-----

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

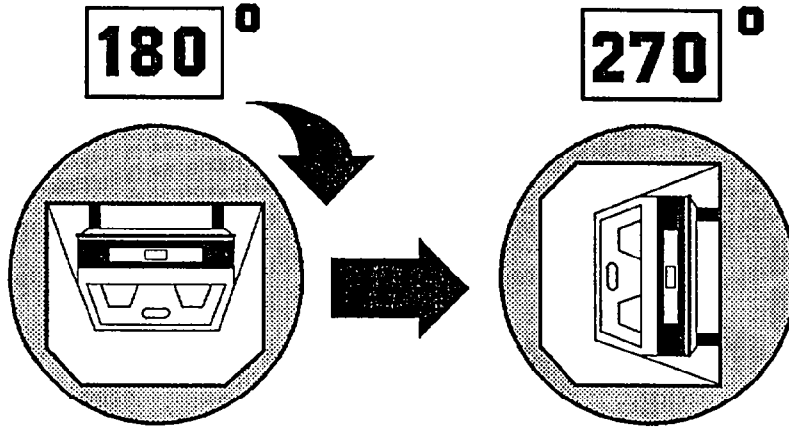
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 5
VEHICLE 1 - STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

Vehicle NHTSA ID No.: _____



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	_____ 1 _____ minutes _____ 56 _____ seconds
FMVSS 301 Position Hold Time +	_____ 5 _____ minutes _____ 00 _____ seconds
TOTAL	_____ 6 _____ minutes _____ 56 _____ seconds
Next whole minute interval	_____ 7 _____ 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	N/A
---	---	---	-----

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

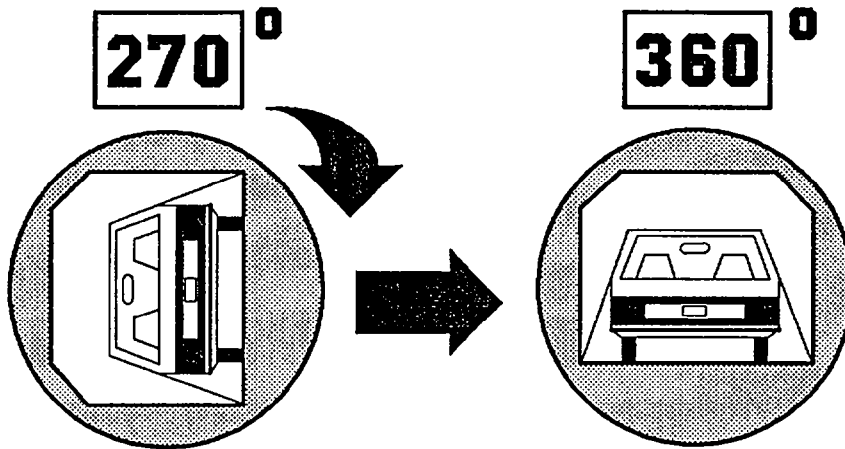
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 5
VEHICLE 1 - STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

Vehicle NHTSA ID No.: _____



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time _____ 2 _____ minutes _____ 07 _____ seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + _____ 5 _____ minutes _____ 00 _____ seconds

TOTAL _____ 7 _____ minutes _____ 07 _____ seconds

Next whole minute interval _____ 8 _____ 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	N/A
---	---	---	-----

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

IV. SOLVENT SPILLAGE LOCATION(S):

None

VEHICLE 2 DATA

Table 6

VEHICLE 2 - GENERAL TEST AND VEHICLE DATA

Vehicle Year/Make/Model/Body Style: 91 Honda Accord DX 4-Door

NHTSA Test No.: _____ VIN.: 1HGCB7541MA149837

Body Color: Brown Date of Manufacture: 5-91

Engine: 4 Cylinders; 132 C.I.D.; 2.2 Liters; - CC
X Gas; - Diesel; X Turbocharged
- Longitudinal; X Transverse

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

Final Drive: X Front Wheel; - Rear Wheel; - Four Wheel
X A/C; X P/S; X P/B; - P/wdo;
X Tilt Wheel - P/seats; - Cruise Control

Type of Occupant Restraint: Passive lap belt and automatic torso belt

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 29 psi, Rear 29 psi

Recommended Tire Size: P185/70R14 87S

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

Tires on Vehicle: P185/70R14 87S; Manufacturer: Goodyear

Number of Occupants: 2 Front; 3 Rear; - 3rd Seat; 5 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) = 850 lbs. (A)

No. of Occupants x 150 lbs. = 750 lbs. (B)

Rated Cargo and Luggage
Weight (RCLW) A-B = 100 lbs.

GVWR 3815 lbs. GAWR: Front 2050 lbs. Rear 1840 lbs.

Table 1

VEHICLE 2 - GENERAL TEST AND VEHICLE DATA (Cont'd)

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

Right Front = 840 lbs. Right Rear = 510 lbs.
Left Front = 880 lbs. Left Rear = 520 lbs.
TOTAL FRONT WEIGHT = 1720 lbs. (62.5% of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1030 lbs. (37.5% of Total Vehicle Weight)
TOTAL DELIVERED WEIGHT = 2750 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMY:

Right Front = 840 lbs. Right Rear = 580 lbs.
Left Front = 900 lbs. Left Rear = 700 lbs.
TOTAL FRONT WEIGHT = 1740 lbs. (57.6% of Total Vehicle Weight)
TOTAL REAR WEIGHT = 1280 lbs. (42.4% of Total Vehicle Weight)
TOTAL TEST WEIGHT = 3020 lbs.
Weight of Ballast Secured in Vehicle Trunk Area = 0 lbs.

TEST VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 27.6 ; LF 27.4 ; RR 27.6 ; LR 27.5
Test Attitude: RF 27.2 ; LF 26.3 ; RR 26.0 ; LR 26.0
Vehicle's Wheel Base = 107.0 in.
Location of Vehicle's C.G. = 45.4 inches rearward of front wheel center

SEAT AND STEERING COLUMN POSITIONS:

Seat Detent Position: 11th Detent of 21 Total Detents
Seat Back Angle or Position: 5th Position (With Respect to Full Upright Position)
Steering Column Position: Mid

FUEL IN TANK DURING TEST:

9.0 Gallons

Table 6

VEHICLE 2 - GENERAL TEST AND VEHICLE DATA (Cont'd)

POST-IMPACT DATA:

Type of Test: Vehicle to Vehicle Impact Angle: 30°
30° Angled Frontal

Date of Test: 9/16/93 Time of Test: 4:09 PM

Ambient Temperature: 57°F at impact area

Temperature in Occupant Compartment: 70°F

Windshield Molding Temperature: -°F

Impact Velocity: primary = 33.0 mph, secondary = 33.0 mph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 52

Exiting Speed Trap: 12

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
	Forehead with steering	
Head	<u>wheel top-left</u>	<u>N/A</u>
Chest	<u>No Contact</u>	<u>N/A</u>
Abdomen	<u>Lower Steering Wheel Rim</u>	<u>N/A</u>
Left Knee	<u>Lower dash</u>	<u>N/A</u>
Right Knee	<u>Lower dash</u>	<u>N/A</u>

Comments: Steering column dropped, windshield cracked, left side roof deformation.

	<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>Closed</u>	<u>Closed</u>

	<u>Front</u>		<u>Rear</u>	
<u>Seat Movement</u>	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Seat Back Failure	<u>None</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
Seat Shift (in.)	<u>0.0</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>

Table 7
VEHICLE 2 DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DUMMY (1)	-45.9	6.4	51.4	59.6	-57.1	-6.0	9.3	52.5
DUMMY (2)	-	-	-	-	-	-	-	-
DUMMY (3)	-	-	-	-	-	-	-	-
DUMMY (4)	-	-	-	-	-	-	-	-

	MAXIMUM FORCE FEMUR LOAD (LBS.)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	-1563.6	-1455.3
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)	2115.0	-	-
DUMMY (2)	-	-	-
DUMMY (3)	-	-	-
DUMMY (4)	-	-	-

	HEAD INJURY CRITERIA (HIC)			
	HIC	t ₁ (msec)	t ₂ (msec)	Average Acceleration t ₁ TO t ₂
DUMMY (1)	513.12	73.920	109.800	45.94
DUMMY (2)	-	-	-	-
DUMMY (3)	-	-	-	-
DUMMY (4)	-	-	-	-

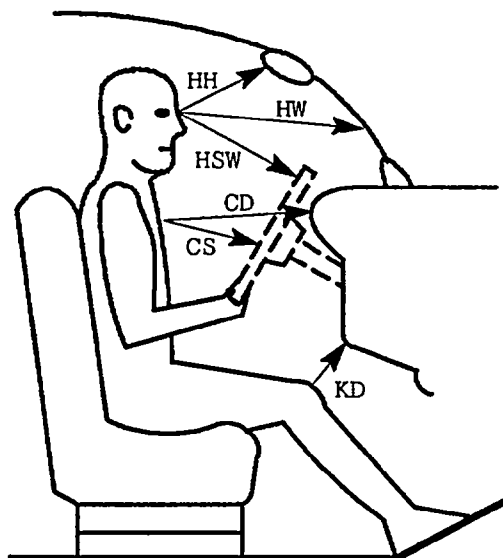
*Defined as exceeding 0.003 sec. duration

**As defined in FMVSS No. 208

Figure 7

VEHICLE 2 OCCUPANT CLEARANCE DIMENSIONS

DRIVER	
HH	14.6
NW	25.8
NSW	18.4
NIP	22.9
NH	19.0
CD	21.9
CS	14.5
KDL	5.1
KDR	5.2
1	27.4*
2	2.0
SA	*
PA	25°
ULA	109.0
LLA	228.0



H-POINT FROM TARGET POSITION	
Vertical	0.3 Above
Longitudinal	0.0

*Seat back angle placed in 5th detent from first locking position.

Angles taken relative to vertical

SA = Seat Back Angle

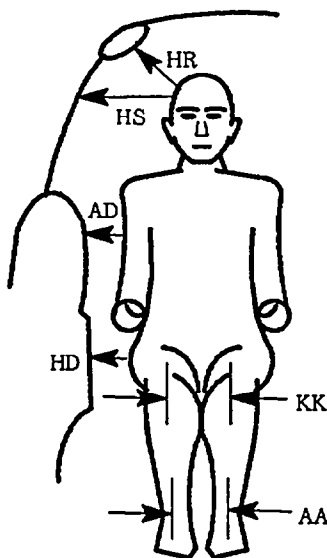
PA = Pelvic Angle

ULA = Upper Leg Angle

LLA = Lower Leg Angle

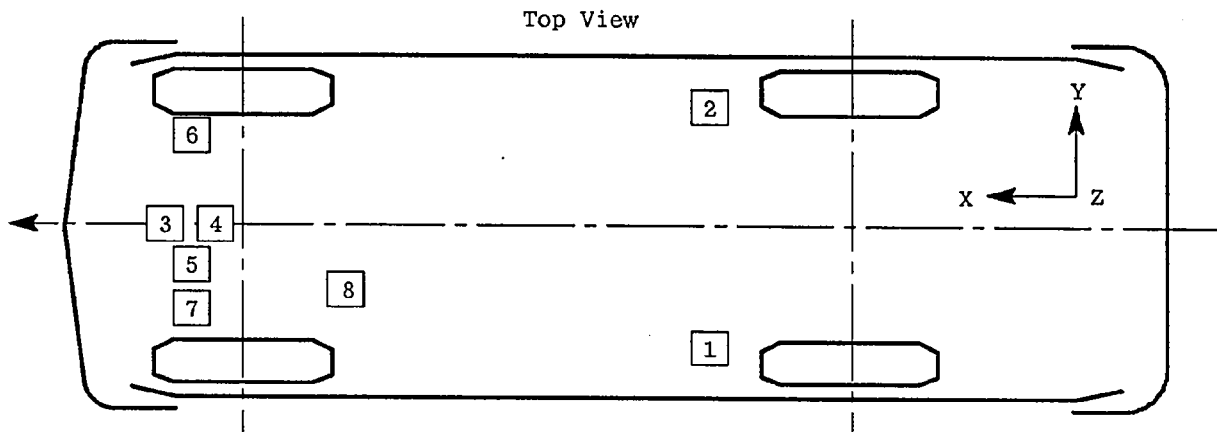
HH = Head to Windshield Header
 NW = Nose to Windshield
 NSW = Nose to Steering Wheel
 NIP = Nose to Instrument Panel
 NH = Nose to Steering Wheel Hub
 CD = Chest to Dash
 CS = Chest to Steering Wheel Hub
 KDL = Knee to Dash Left
 KDR = Knee to Dash Right
 1 = Nose to Steering Column Target
 2 = Distance 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	6.8
HS	10.2
AD	4.6
HD	6.1
KK	9.7
AA	11.1
DT	70

Figure 8
SUMMARY OF VEHICLE 2 ACCELEROMETER DATA



Vehicle: 1991 Honda Accord DX 4-Door Sedan

Loc. No.	Description	Axis	Maximum Value (g's)*	
			"-"	"+"
1	Rear seat crossmember left side	x	-27.8	3.0
2	Rear seat crossmember right side	x	-26.1	4.9
3	Top of engine block	x	-67.7	36.1
3	Top of engine block	-	-	-
4	Bottom of engine block	-	-	-
5	Front suspension crossmember	-	-	-
5	Front suspension crossmember	-	-	-
6	Right front brake caliper	-	-	-
7	Left front brake caliper	-	-	-
8	Toe pan	x	-48.0	9.0

*Values filtered using SAE class 60 filter.

Figure 9
VEHICLE 2 PRE- AND POST-TEST
ACCELEROMETER LOCATIONS

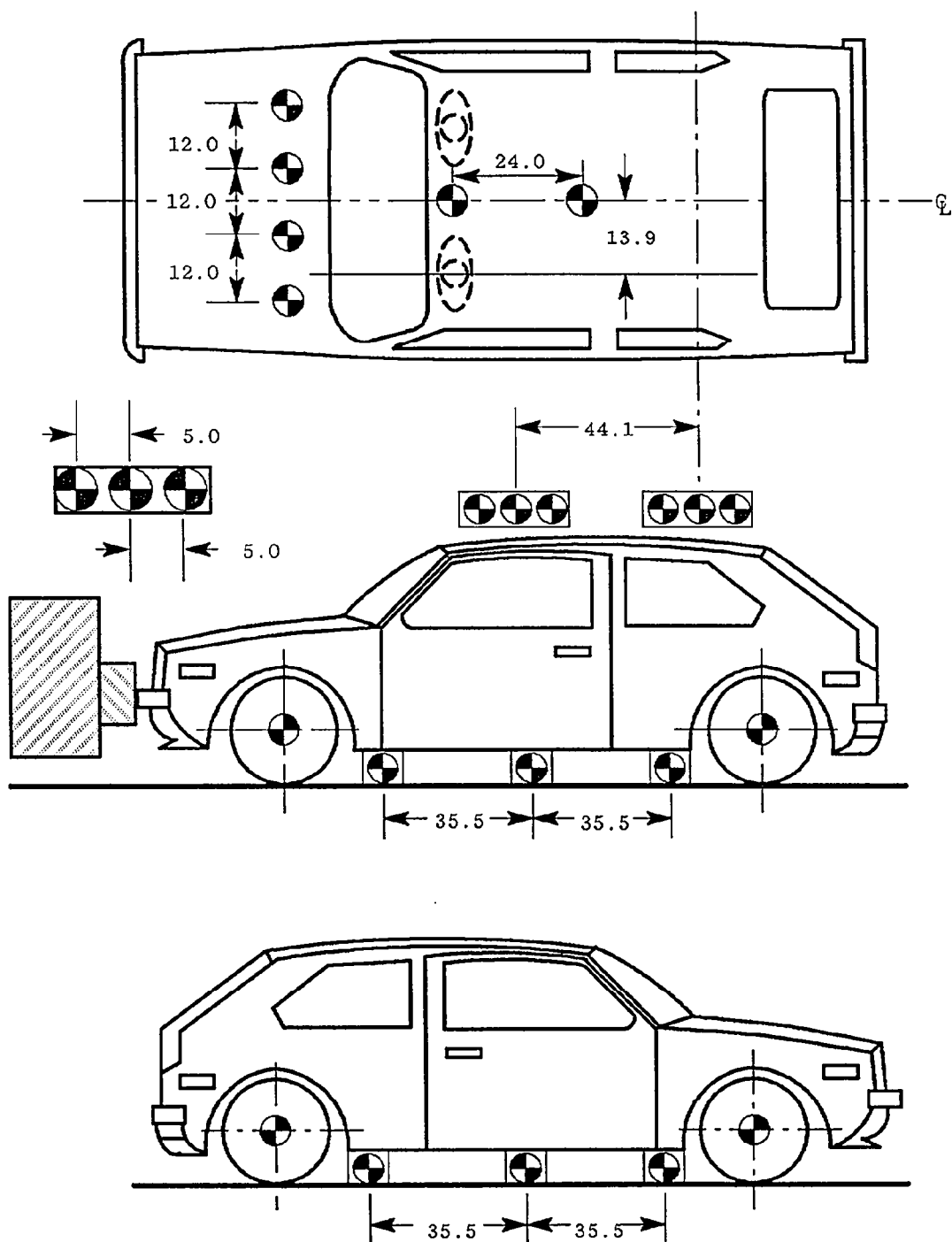
Test Description: 33 mph Vehicle to Vehicle 30° Angled Frontal Impact

Test Vehicle: 1991 Honda Accord DX 4-Door Sedan

Reference Plane: Vehicle plane at rear bumper

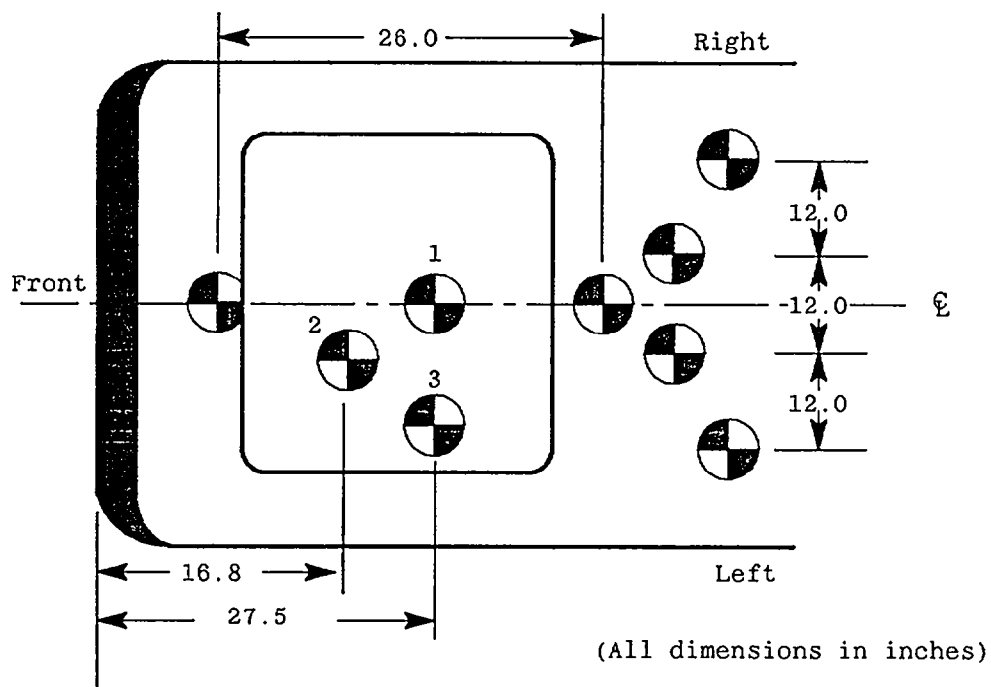
Accelerometer Description	LONGITUDINAL LOCATION (in.)		
	Pre-Test	Post-Test	Change
Rear seat crossmember left side	74.0	74.0	0.0
Rear seat crossmember right side	74.1	74.1	0.0
Top of engine block	156.9	147.9	9.0
Bottom of engine block	-	-	-
Front suspension crossmember	-	-	-
Right front brake caliper	-	-	-
Left front brake caliper	-	-	-
Toe Pan	126.4	123.7	2.7

Figure 10
 VEHICLE 2 PHOTOGRAPHIC TARGET LOCATIONS
 (All dimensions in inches)



(Dimensions in inches)

Figure 10
 VEHICLE 2 PHOTOGRAPHIC TARGET LOCATIONS (continued)
 (TOP VIEW OF HOOD AND ENGINE COMPARTMENT)



Note: Drawing not to scale.

Target 1: Air cleaner assembly
 2: Battery
 3: Engine (rocker cover)

Figure 11
VEHICLE 2 - MEASUREMENT POINTS

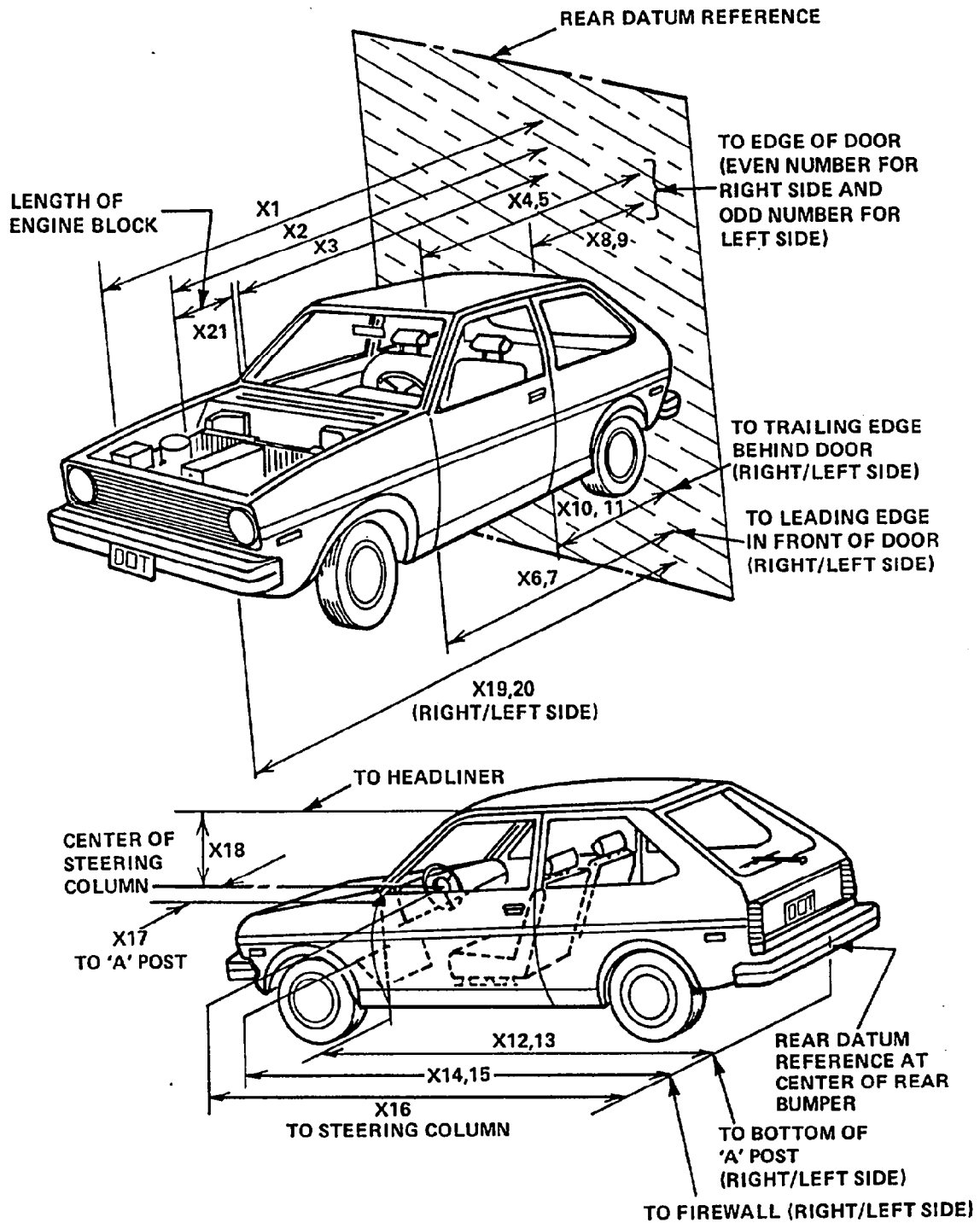


Figure 11

VEHICLE 2 - MEASUREMENT POINTS (continued)

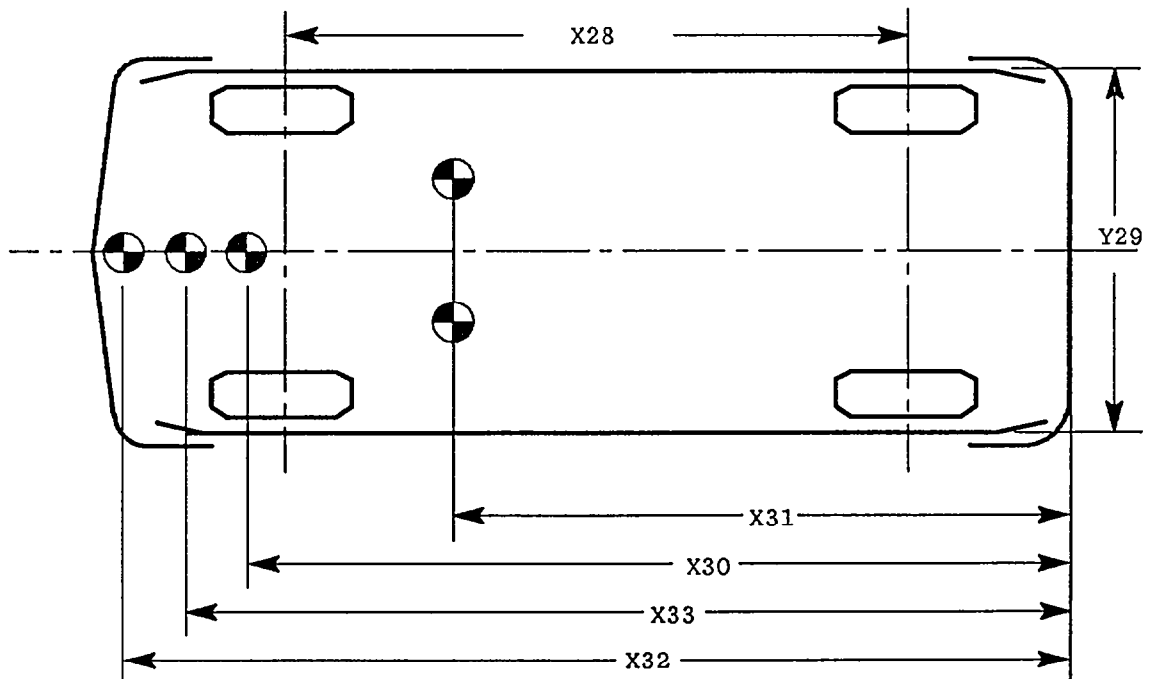
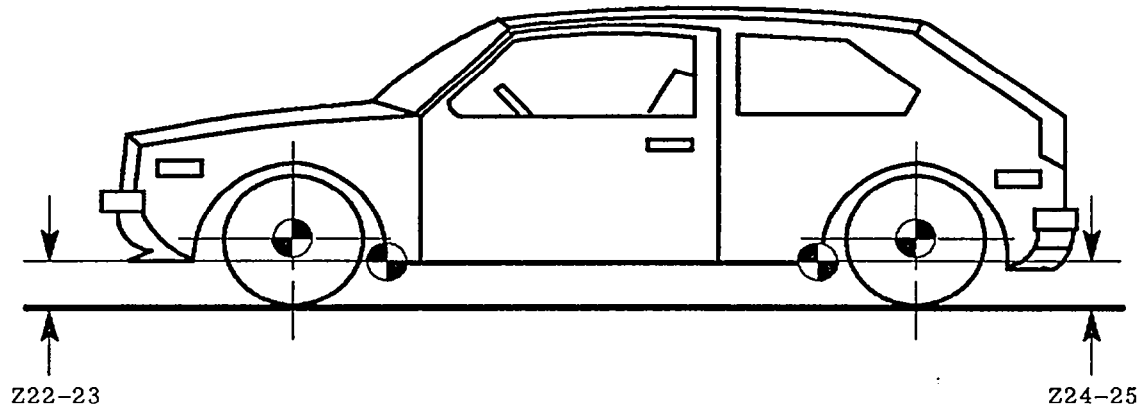


Table 8

VEHICLE 2 MEASUREMENTS

No.	TYPE OF MEASUREMENT	All Dimensions in Inches	
		Pre-Test	Post-Test
X1	Total Length of Vehicle at Centerline	184.4	167.1
X2	Rear Surface of Vehicle to Engine at Centerline	160.2	154.5
X3	Rear Surface of Vehicle to Firewall	140.4	137.8
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	127.5	127.6
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	127.5	126.6
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	128.4	128.4
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	128.5	127.9
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	86.5	85.4
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	85.4	84.8
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	85.5	86.5
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	86.6	85.9
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	127.9	127.8
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	127.6	127.4
X14	Rear Surface of Vehicle to Firewall - Right Side	139.7	138.7
X15	Rear Surface of Vehicle to Firewall - Left Side	140.2	137.6
X16	Rear Surface of Vehicle to Steering Wheel Center	109.5	107.9
X17	Steering Column to "A" Post	15.8	14.4

Table 8

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	18.3	18.8
X19	Rear Surface of Vehicle to Right Side of Front Bumper	179.7	180.0
X20	Rear Surface of Vehicle to Left Side of Front Bumper	180.0	164.5
X21	Width of Engine Block	17.8	17.8
Z22	Right Front Sill to Ground Plane	8.5	8.8
Z23	Left Front Sill to Ground Plane	8.0	4.4
Z24	Right Rear Sill to Ground Plane	8.4	8.7
Z25	Left Rear Sill to Ground Plane	8.4	7.6
X26	Firewall to Engine or Transaxle	2.1	0.0
Z27	Vertical Dim. from Door Sill to Centerline of Steering Column	19.5	20.4
X28	Wheelbase of Vehicle	107.0	L 102, R 109.8
Y29	Width of Vehicle at Maximum Width Point	67.0	67.5
X30	Rear Surface of Vehicle to Engine Target	--	--
X31	Rear Surface of Vehicle to Compartment Target	R 128.4, L 128.5	R 127.5, L 127.3
X32	Rear Surface of Vehicle to Bumper Target	182.0	165.3
X33	Rear Surface of Vehicle to Frame Crossmember	171.0	163.2

Figure 12

CAMERA POSITIONS FOR VTV OFFSET FRONTAL IMPACT

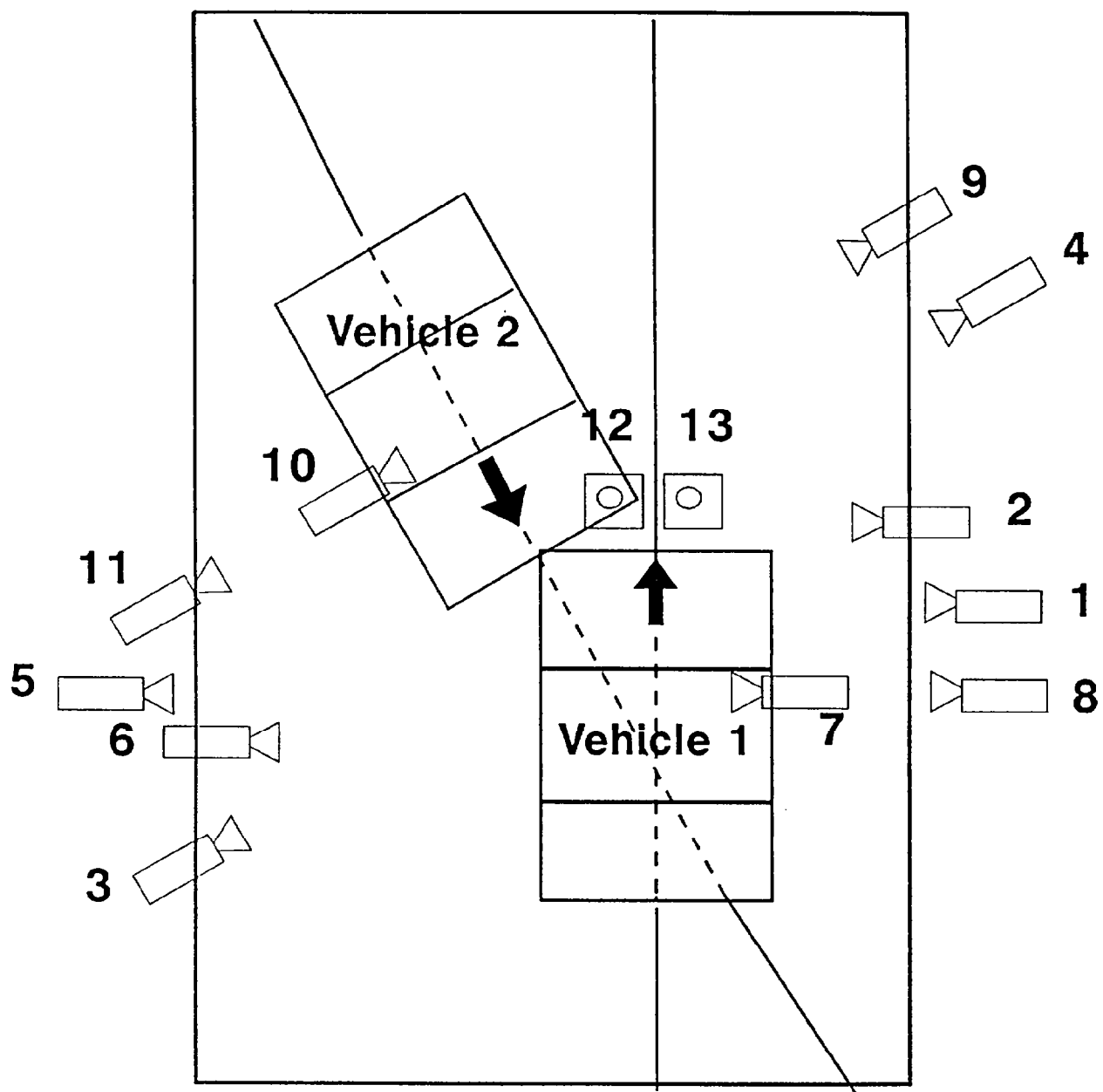


Table 9

HIGH-SPEED CAMERA LOCATIONS

Test No. V49-4-1317 Vehicle: V1 - 1993 Chevrolet Corsica, V2 - 1991 Honda Accord

CAMERA NO.	VIEW	CAMERA POSITIONS (in)*			ANGLE** (deg)	LENS (mm)	SPEED (fps)
		X	Y	Z			
1	Real-Time Camera						24
2	Overall View	-20	-359	41	-2	13	560
3	South Impact Point	-195	360	40	-2	25	550
4	North Impact Point	65	-355	41	-1	25	490
5	Vehicle 1 Left Side View	-100	472	50	0	35	545
6	Vehicle 1 Interior View	-195	360	40	-8	35	660
7	Vehicle 1 Onboard View					8	No Timing
8	Vehicle 1 Right Side View	-52	-299	51	0	25	550
9	Vehicle 2 Left Side View	-165	413	42	-3	25	500
10	Vehicle 2 Onboard View					8	140
11	Vehicle 2 Right Side View	-163	261	81	0	25	500
12	Overhead Overall View	-18	-19	386	-90	13	640
13	Overhead Closeup View	-24	-19	386	-90	25	695

*X = film plane to monorail centerline

Y = film plane to impact location

Z = film plan to ground

** = referenced to horizontal plane

FMVSS NO. 301

TEST DATE: 9/17/93

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.

FUEL SPILLAGE MEASUREMENT:

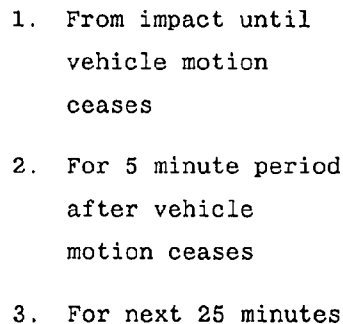
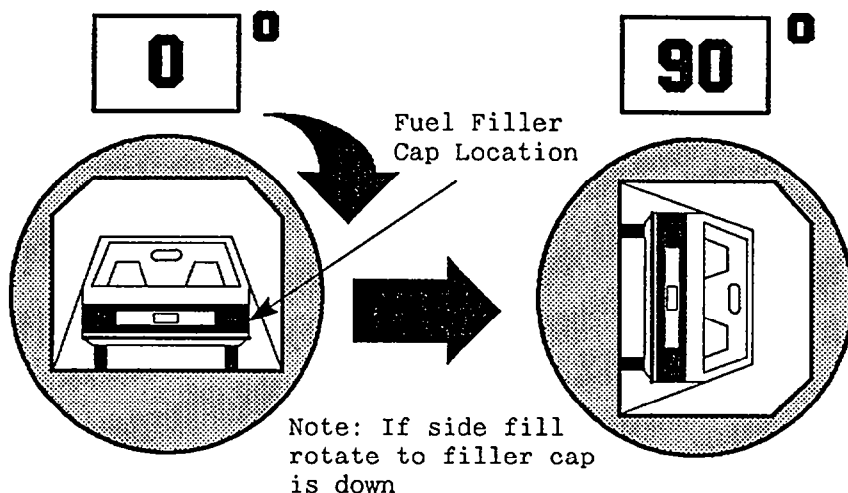
None

Table 11

VEHICLE 2 - STATIC ROLLOVER DATA SHEETTEST PHASE:

Vehicle NHTSA ID No.: _____

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90° Rotation Time
(Spec. Range = 1 to 3 minutes)

_____ 1 _____ minutes _____ 34 _____ seconds

_____ 5 _____ minutes _____ 00 _____ seconds

TOTAL

_____ 6 _____ minutes _____ 34 _____ seconds

Next whole minute interval

_____ 7 _____ 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	N/A
---	---	---	-----

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

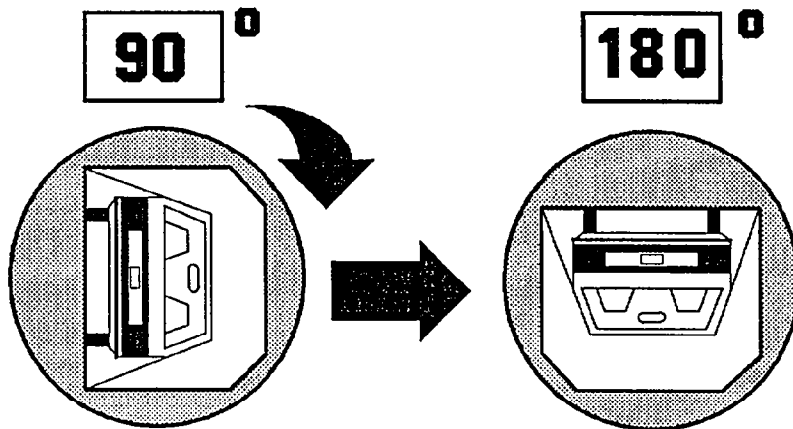
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 11
VEHICLE 2 - STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

Vehicle NHTSA ID No.: _____



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	_____	minutes	_____	seconds
FMVSS 301 Position Hold Time +	_____	minutes	_____	seconds
TOTAL				
	_____	minutes	_____	seconds
Next whole minute interval	_____	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	N/A
---	---	---	-----

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

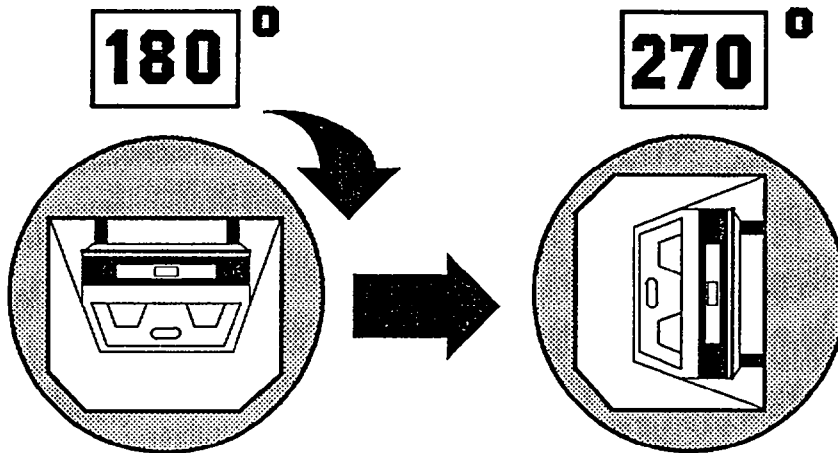
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 11
VEHICLE 2 - STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

Vehicle NHTSA ID No.: _____



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	_____ 1 _____	minutes	_____ 41 _____	seconds
FMVSS 301 Position Hold Time +	_____ 5 _____	minutes	_____ 00 _____	seconds
TOTAL				
	_____ 6 _____	minutes	_____ 41 _____	seconds
Next whole minute interval	_____ 7 _____	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	N/A
---	---	---	-----

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

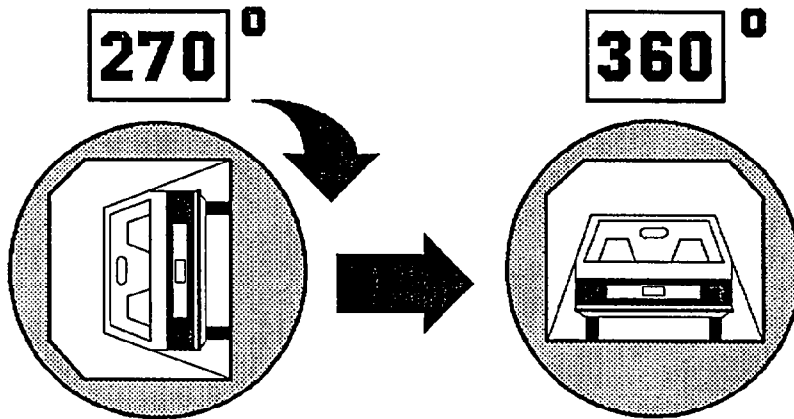
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 11
VEHICLE 2 - STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

Vehicle NHTSA ID No.: _____



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time _____ 2 _____ minutes _____ 07 _____ seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + _____ 5 _____ minutes _____ 00 _____ seconds

TOTAL _____ 7 _____ minutes _____ 07 _____ seconds

Next whole minute interval _____ 8 _____ 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

Appendix A

PHOTOGRAPHS

Appendix A

TABLE OF CONTENTS

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OVERALL TEST SETUP

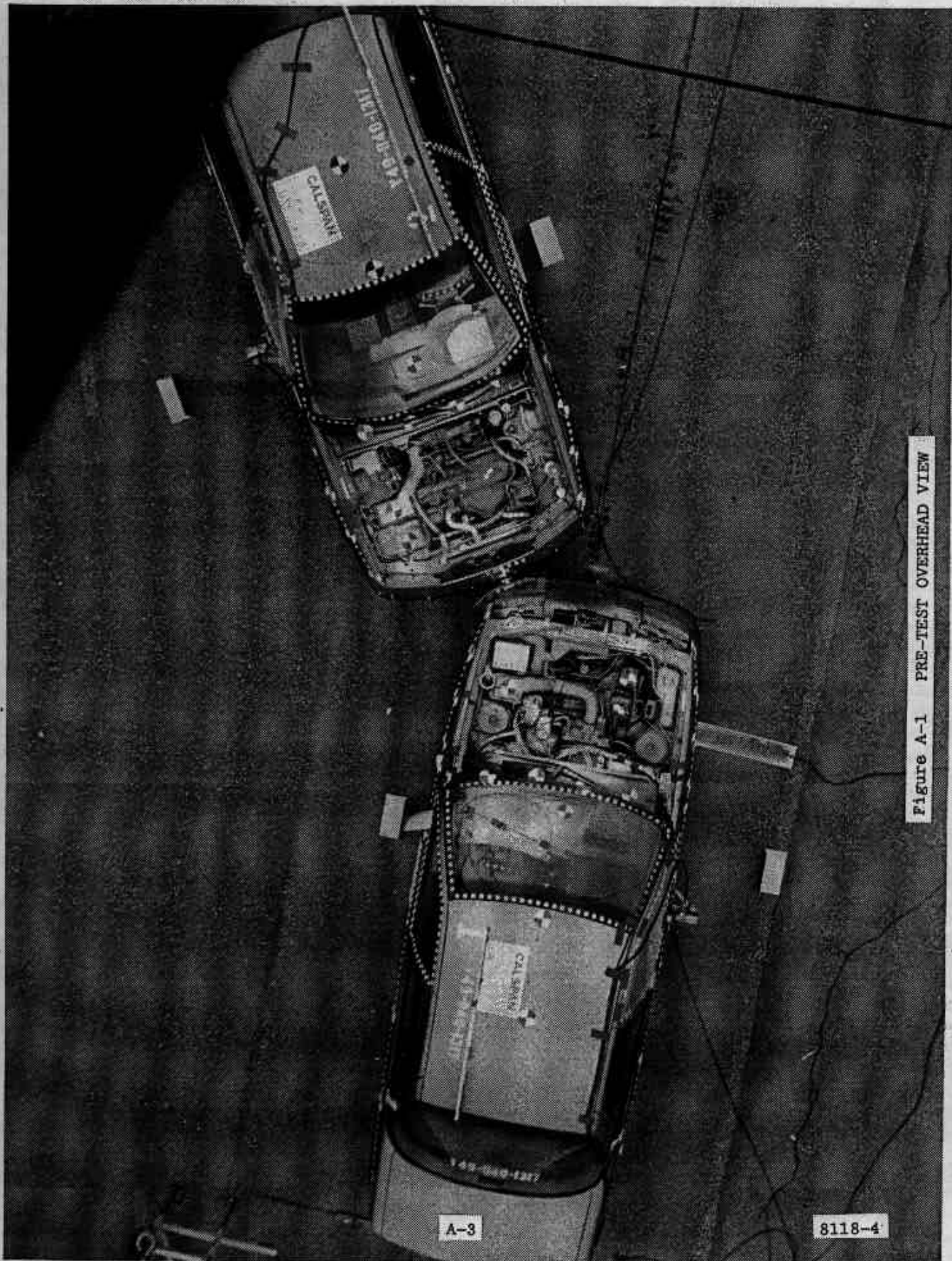


Figure A-1 PRE-TEST OVERHEAD VIEW



Figure A-2 POST-TEST OVERHEAD VIEW

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Figure A-3 PRE-TEST OVERALL SIDE VIEW

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Figure A-4 POST-TEST OVERALL SIDE VIEW

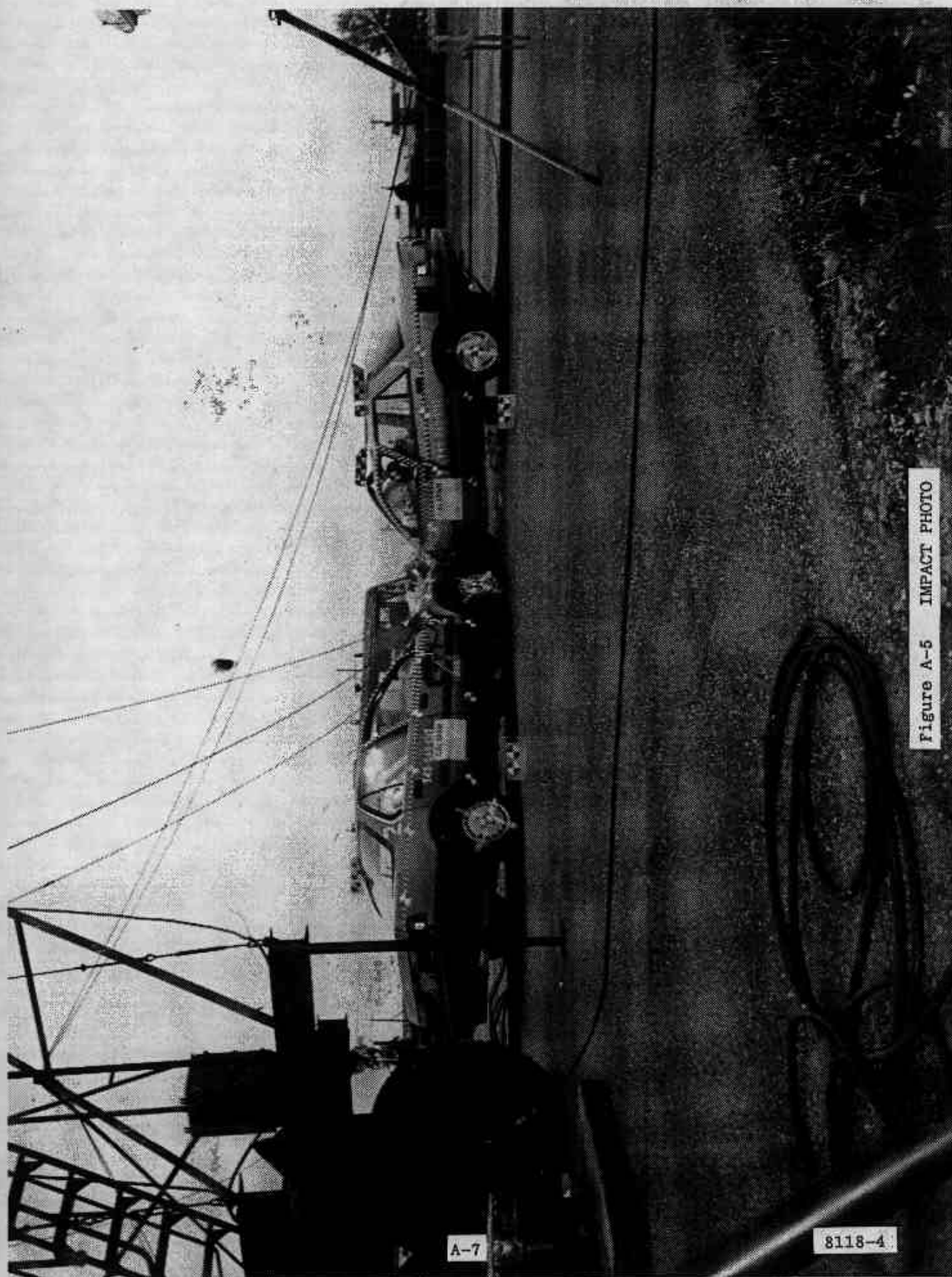


Figure A-5 IMPACT PHOTO

VEHICLE 1 PHOTOGRAPHS

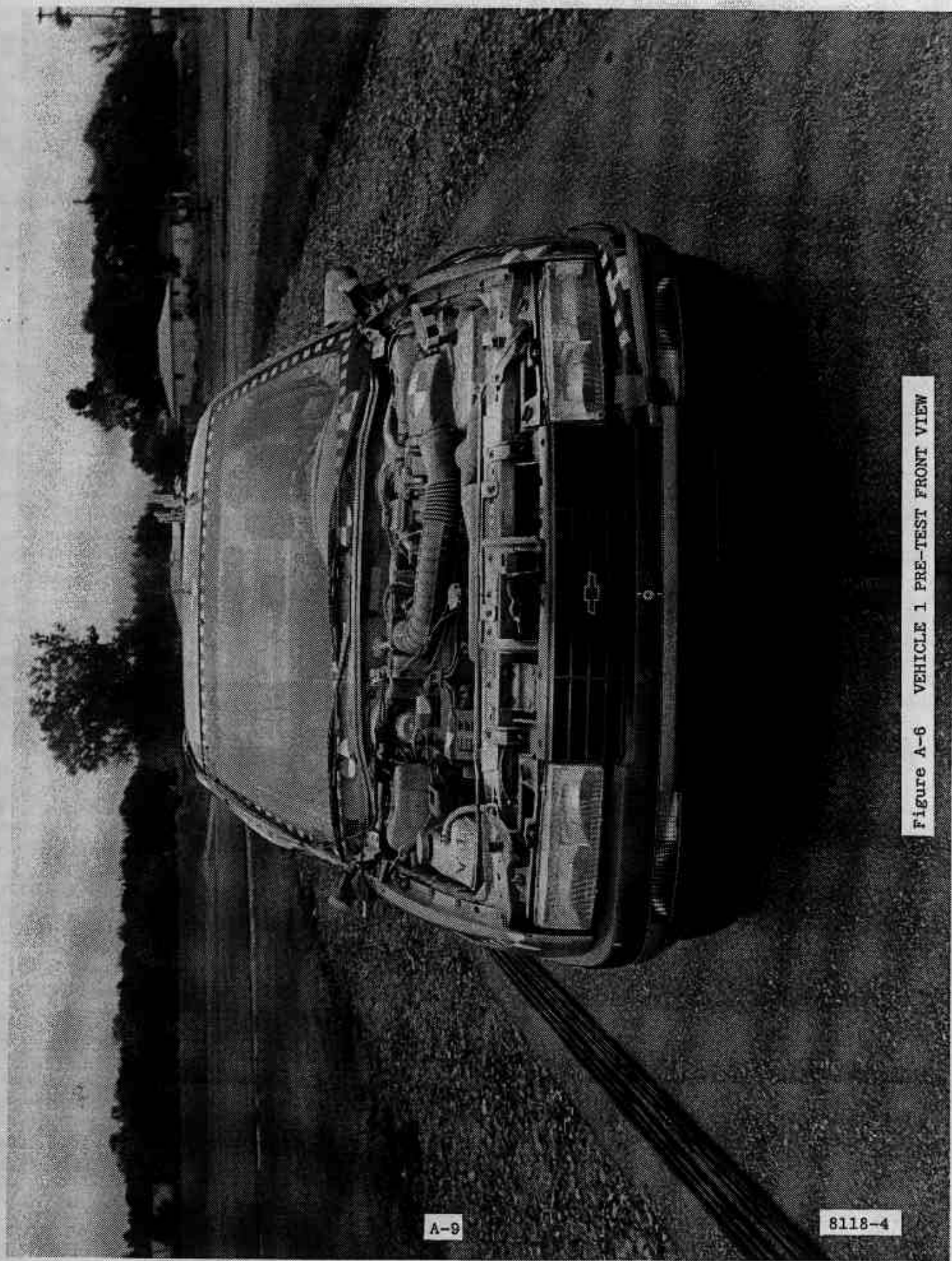


Figure A-6 VEHICLE 1 PRE-TEST FRONT VIEW

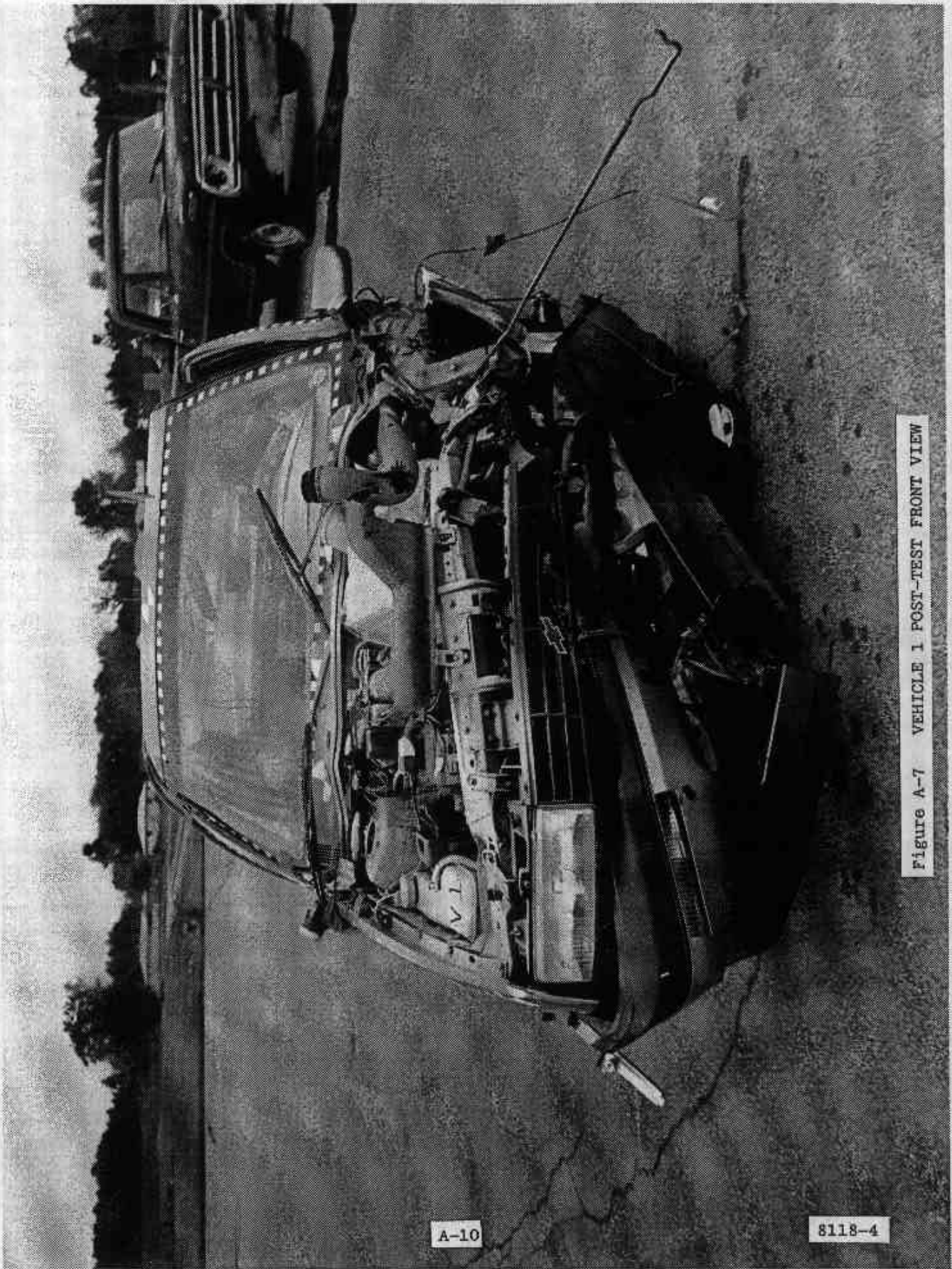


Figure A-7 VEHICLE 1 POST-TEST FRONT VIEW

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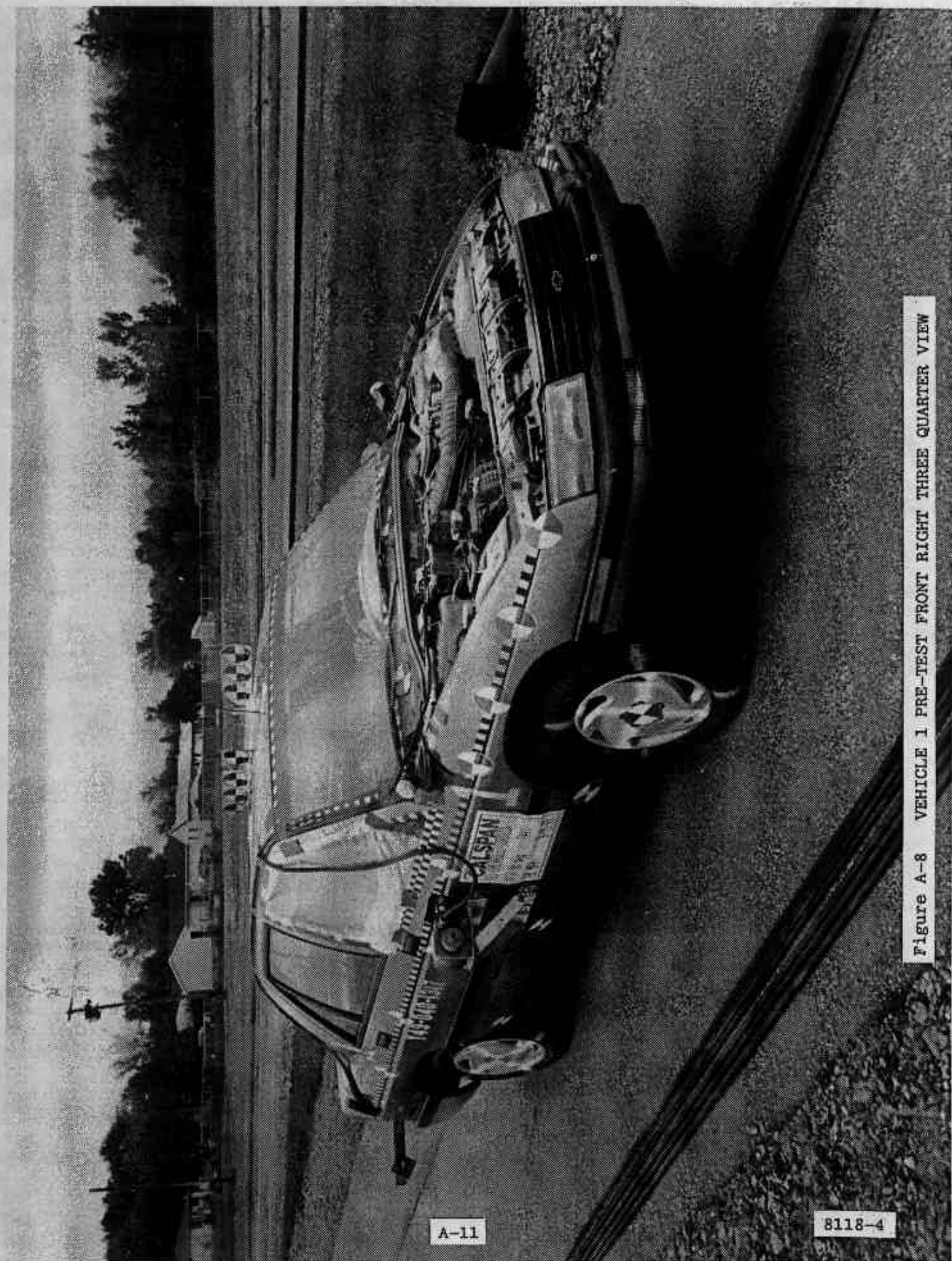


Figure A-8 VEHICLE 1 PRE-TEST FRONT RIGHT THREE QUARTER VIEW

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Figure A-9 VEHICLE 1 POST-TEST FRONT RIGHT THREE QUARTER VIEW

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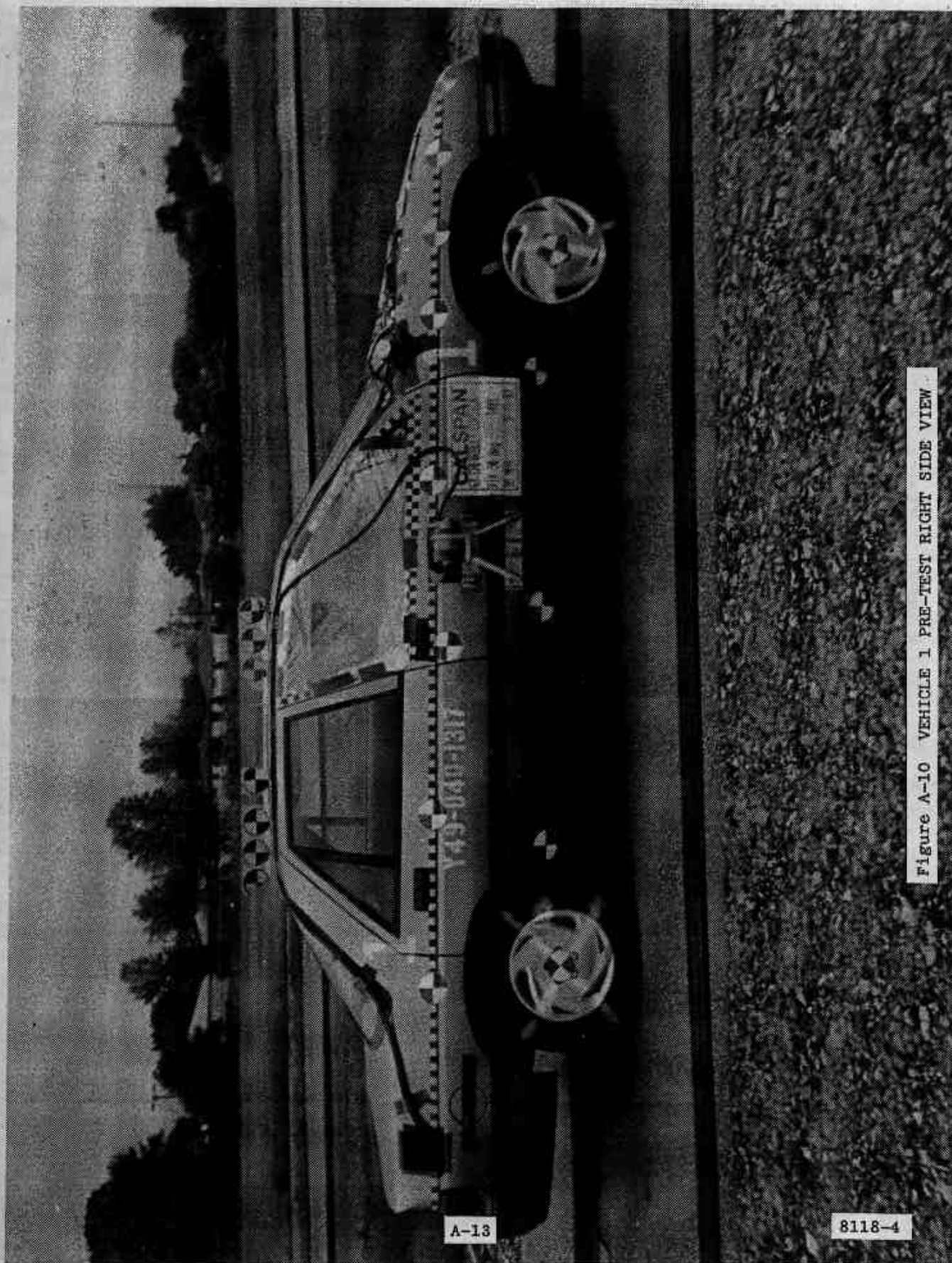


Figure A-10 VEHICLE 1 PRE-TEST RIGHT SIDE VIEW



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

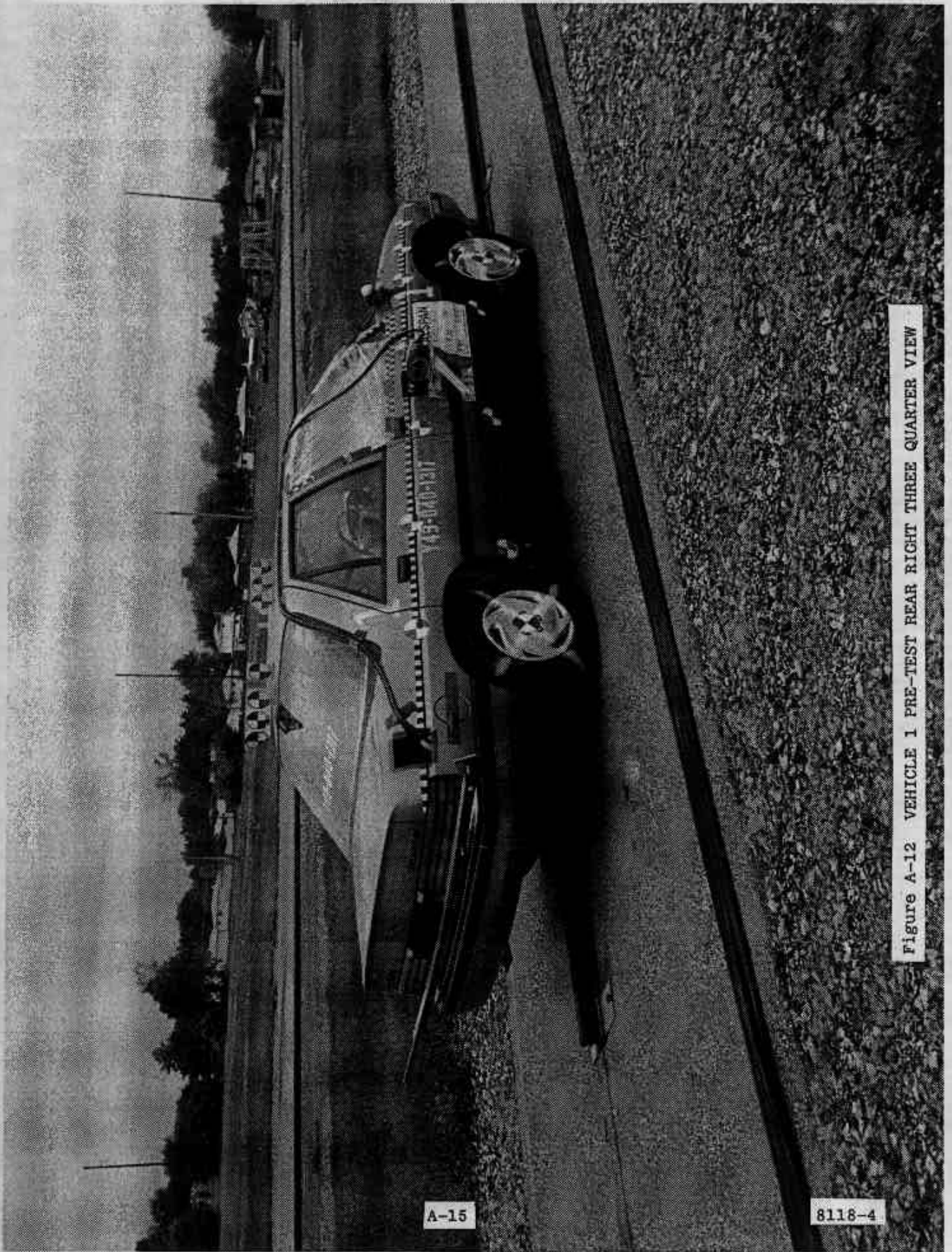


Figure A-12 VEHICLE 1 PRE-TEST REAR RIGHT THREE QUARTER VIEW

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

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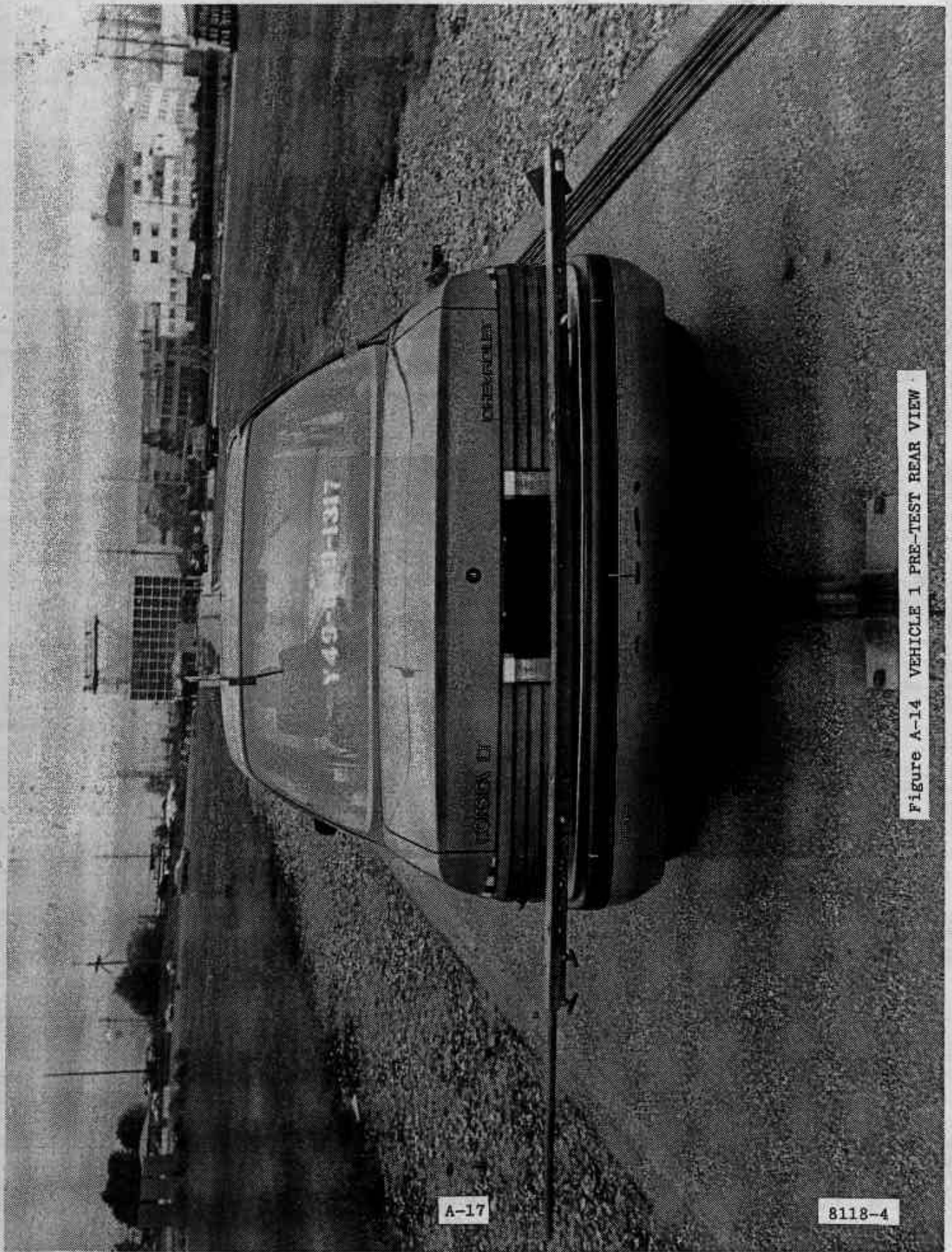


Figure A-14 VEHICLE 1 PRE-TEST REAR VIEW

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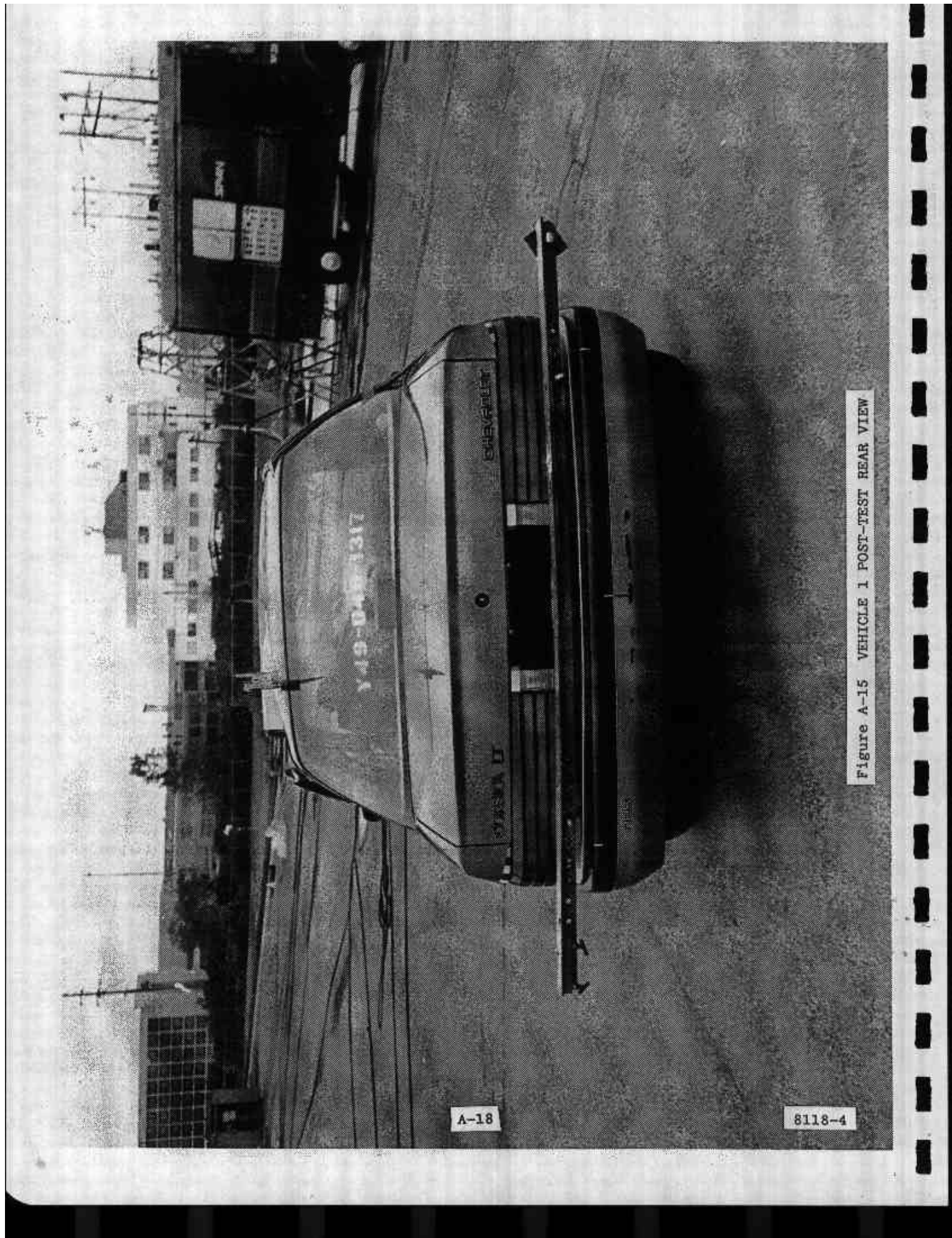


Figure A-15 VEHICLE 1 POST-TEST REAR VIEW

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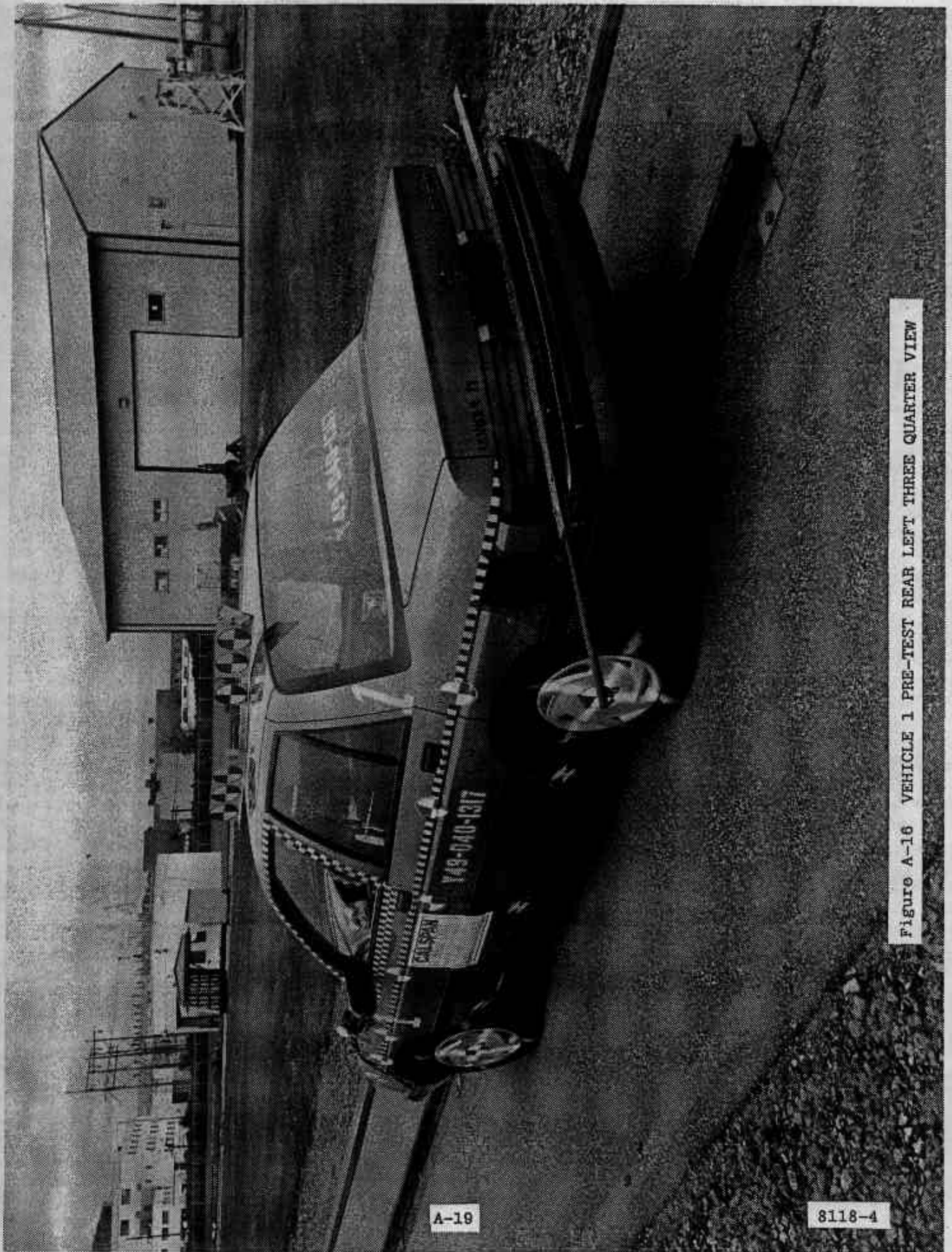


Figure A-16 VEHICLE 1 PRE-TEST REAR LEFT THREE QUARTER VIEW



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

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

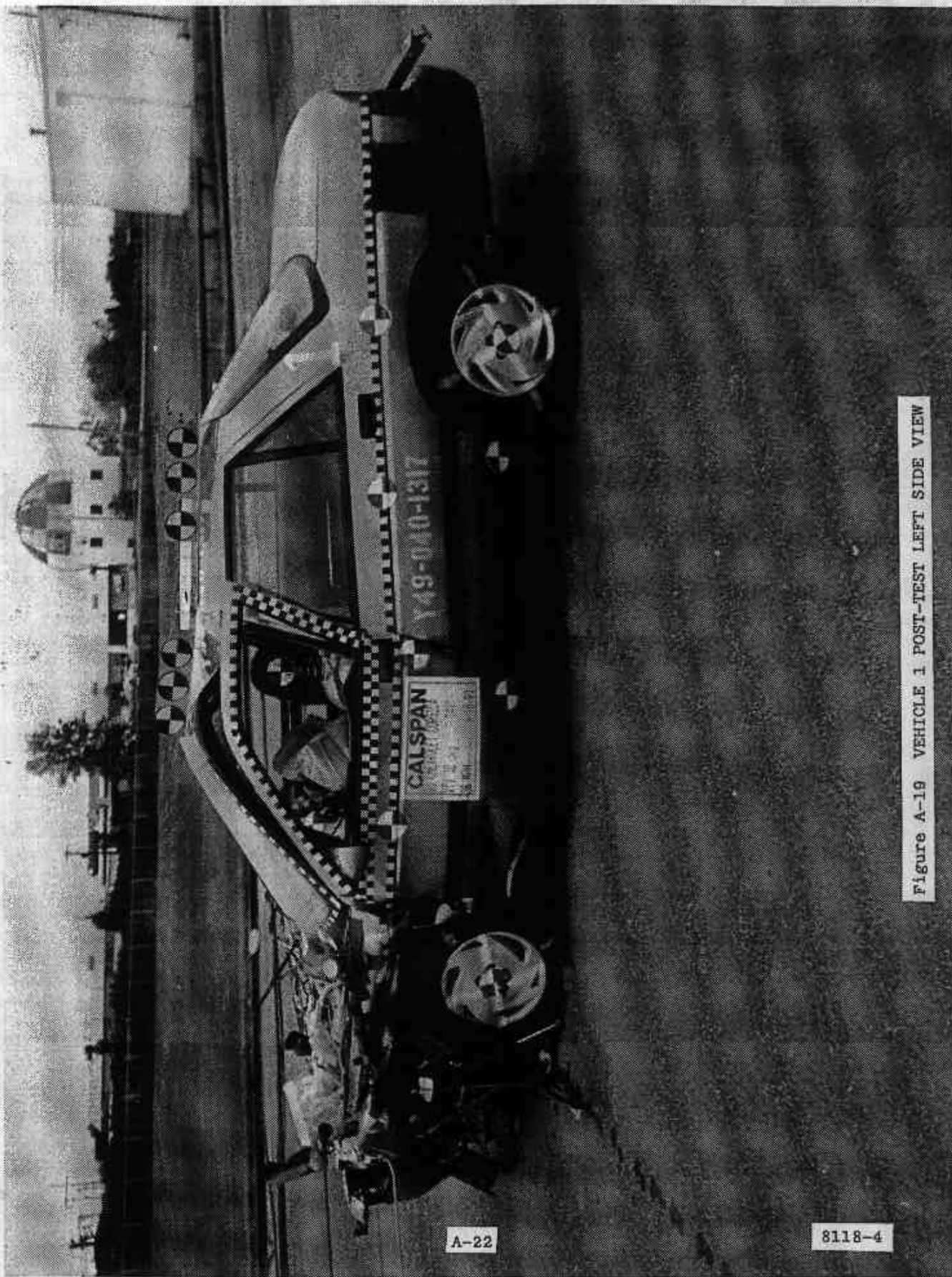


Figure A-19 VEHICLE 1 POST-TEST LEFT SIDE VIEW

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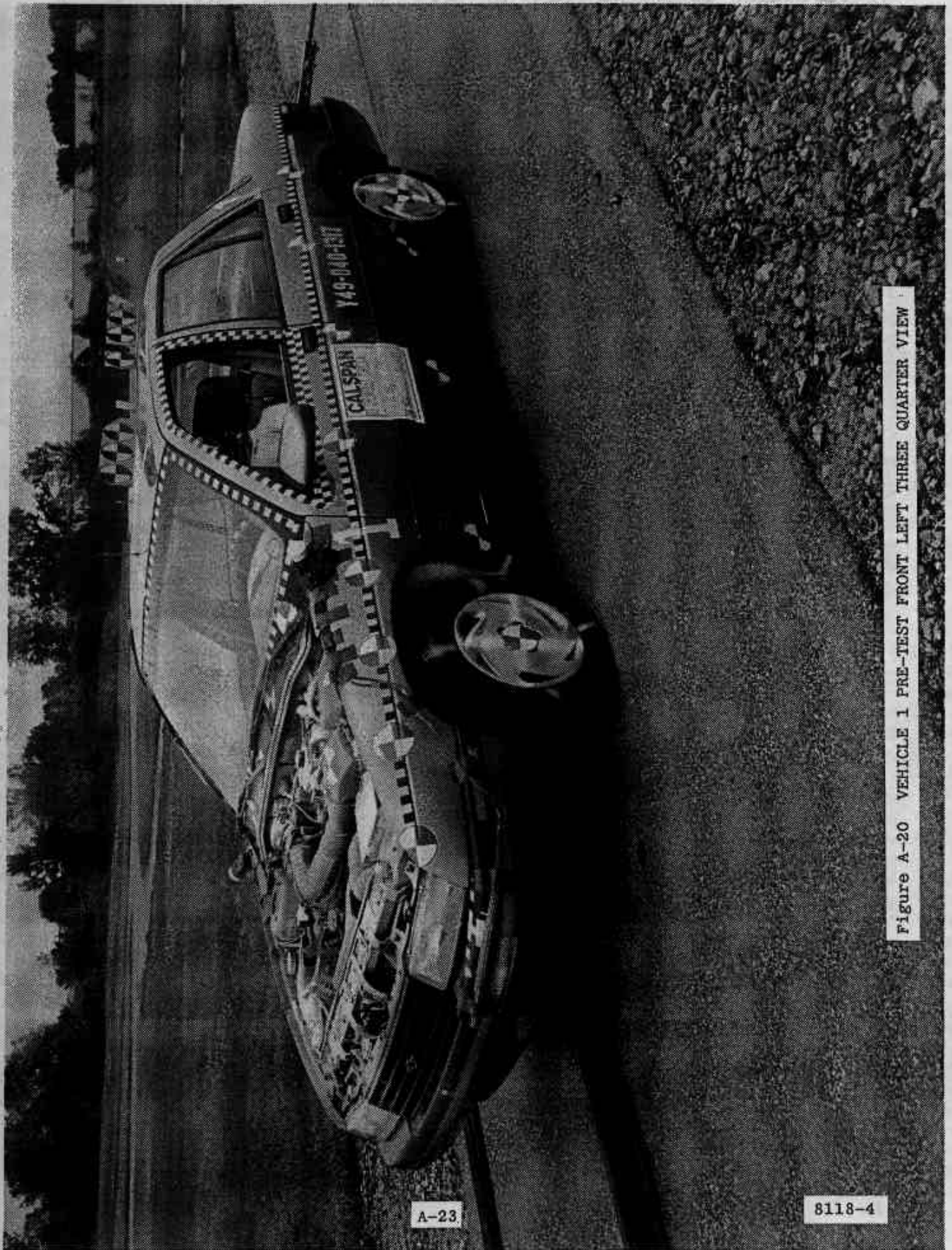


Figure A-20 VEHICLE 1 PRE-TEST FRONT LEFT THREE QUARTER VIEW

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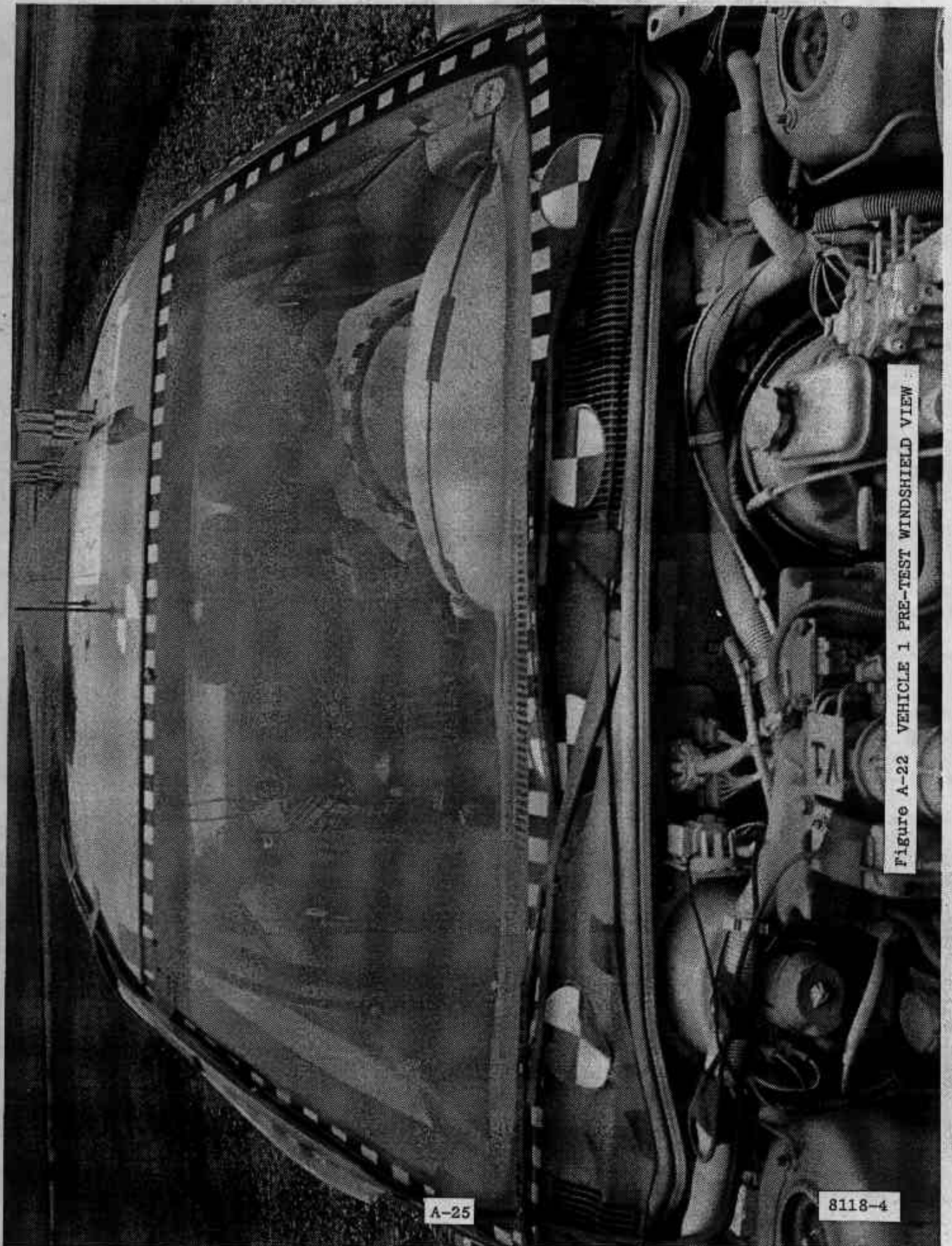
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Figure A-21 VEHICLE 1 POST-TEST FRONT LEFT THREE QUARTER VIEW

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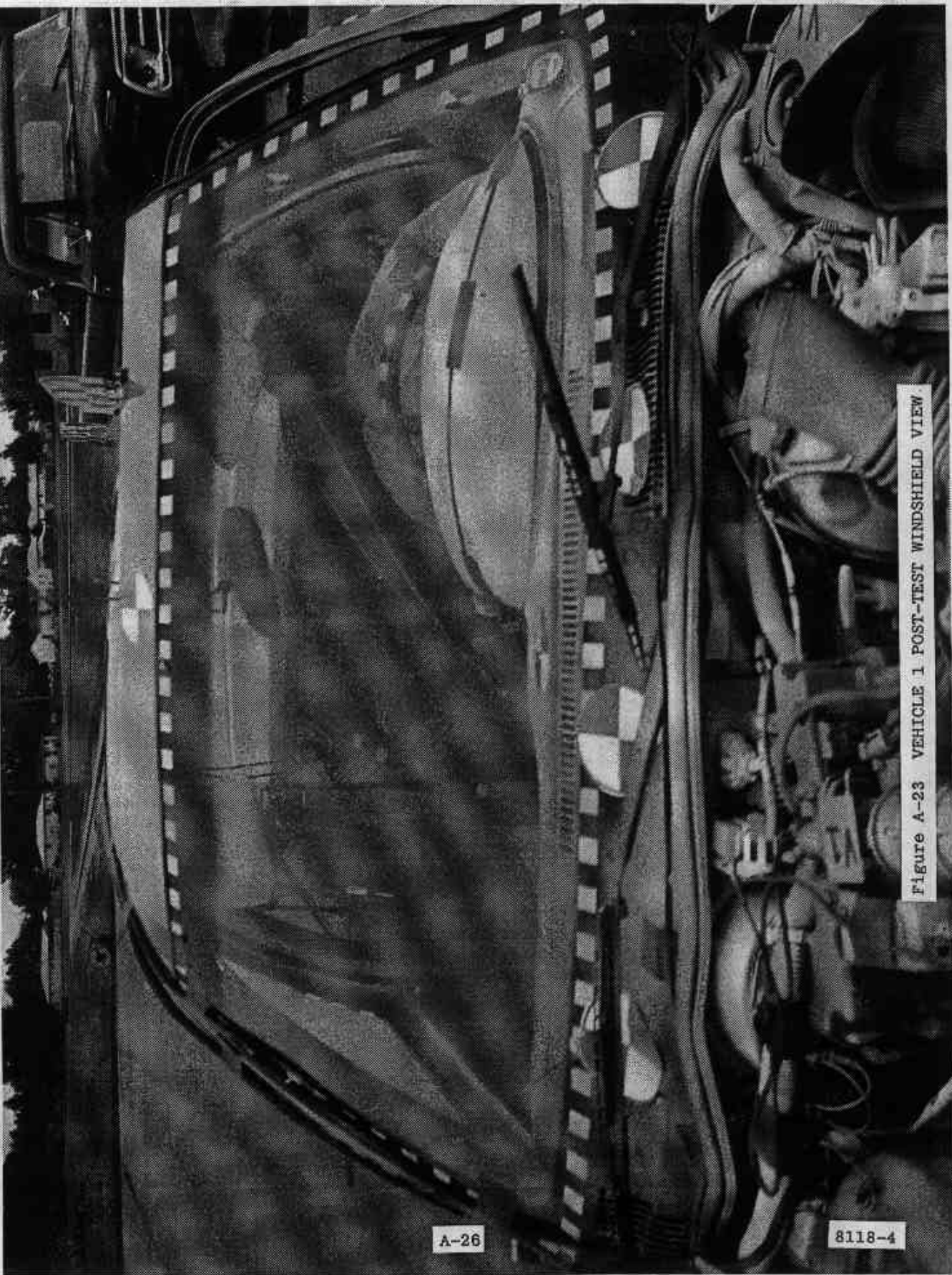
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Figure A-22 VEHICLE 1 PRE-TEST WINDSHIELD VIEW



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Figure A-23 VEHICLE 1 POST-TEST WINDSHIELD VIEW

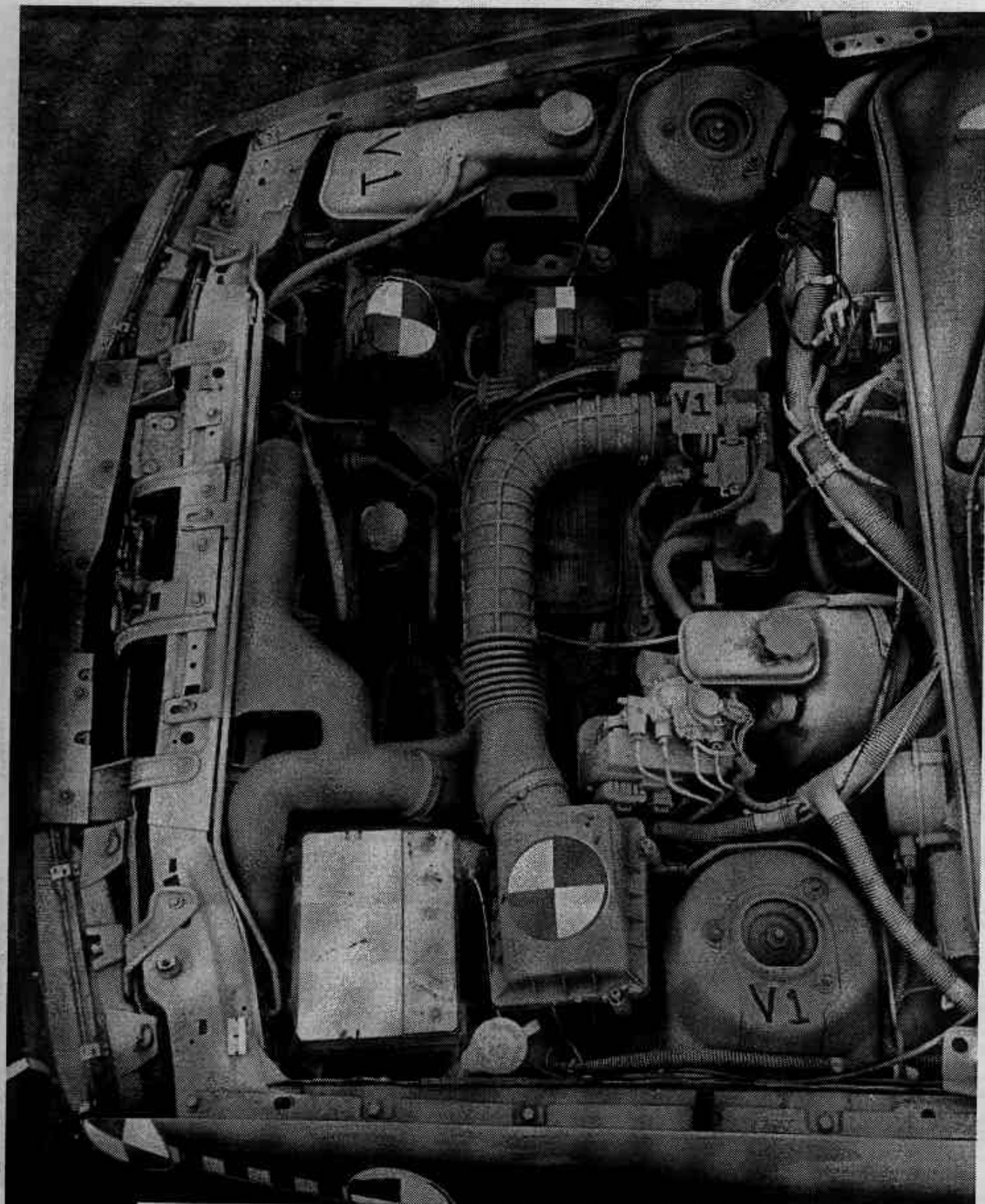


Figure A-24 VEHICLE 1 PRE-TEST OVERHEAD ENGINE COMPARTMENT VIEW



Figure A-25 VEHICLE 1 POST-TEST OVERHEAD ENGINE COMPARTMENT VIEW

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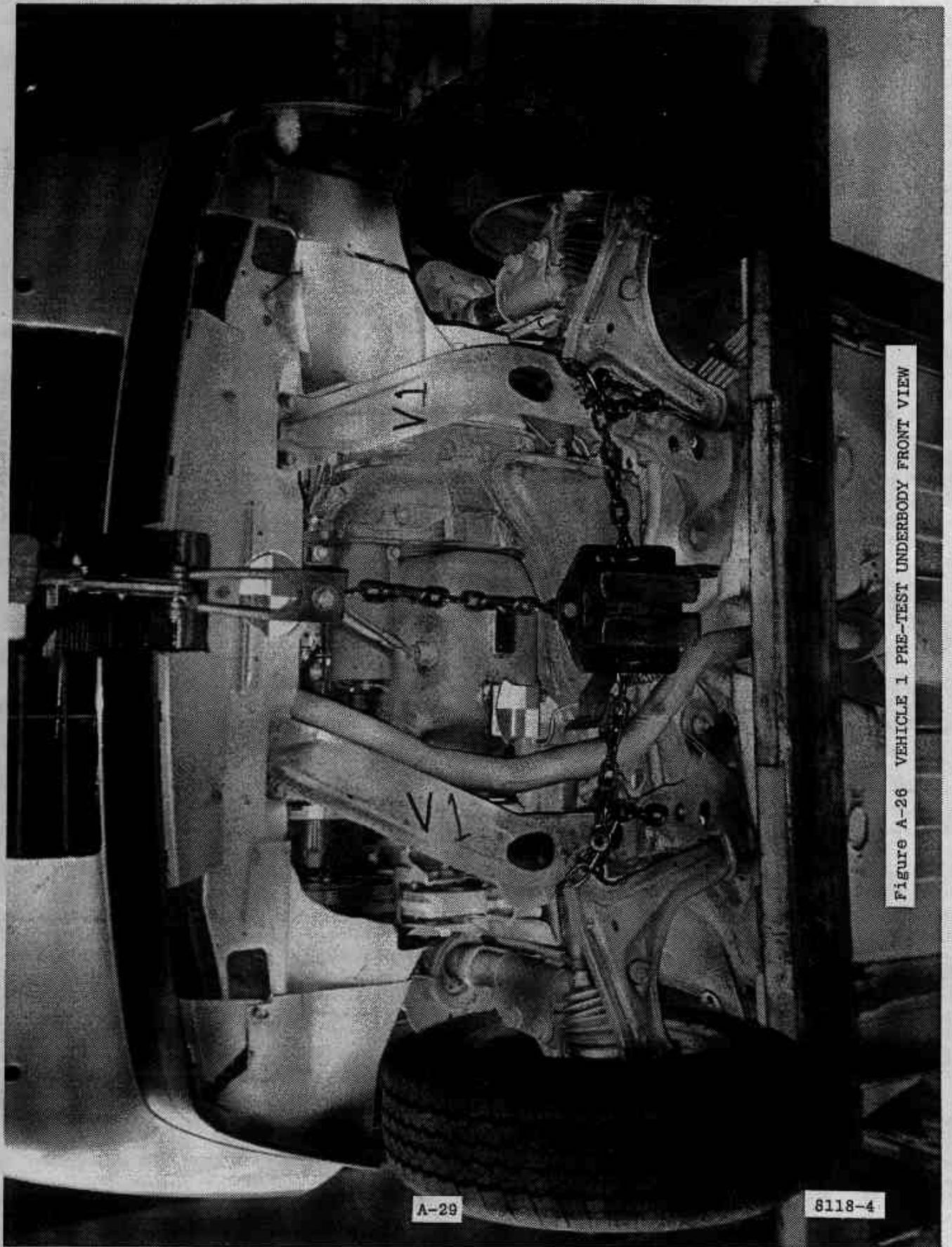


Figure A-26 VEHICLE 1 PRE-TEST UNDERBODY FRONT VIEW

A-29

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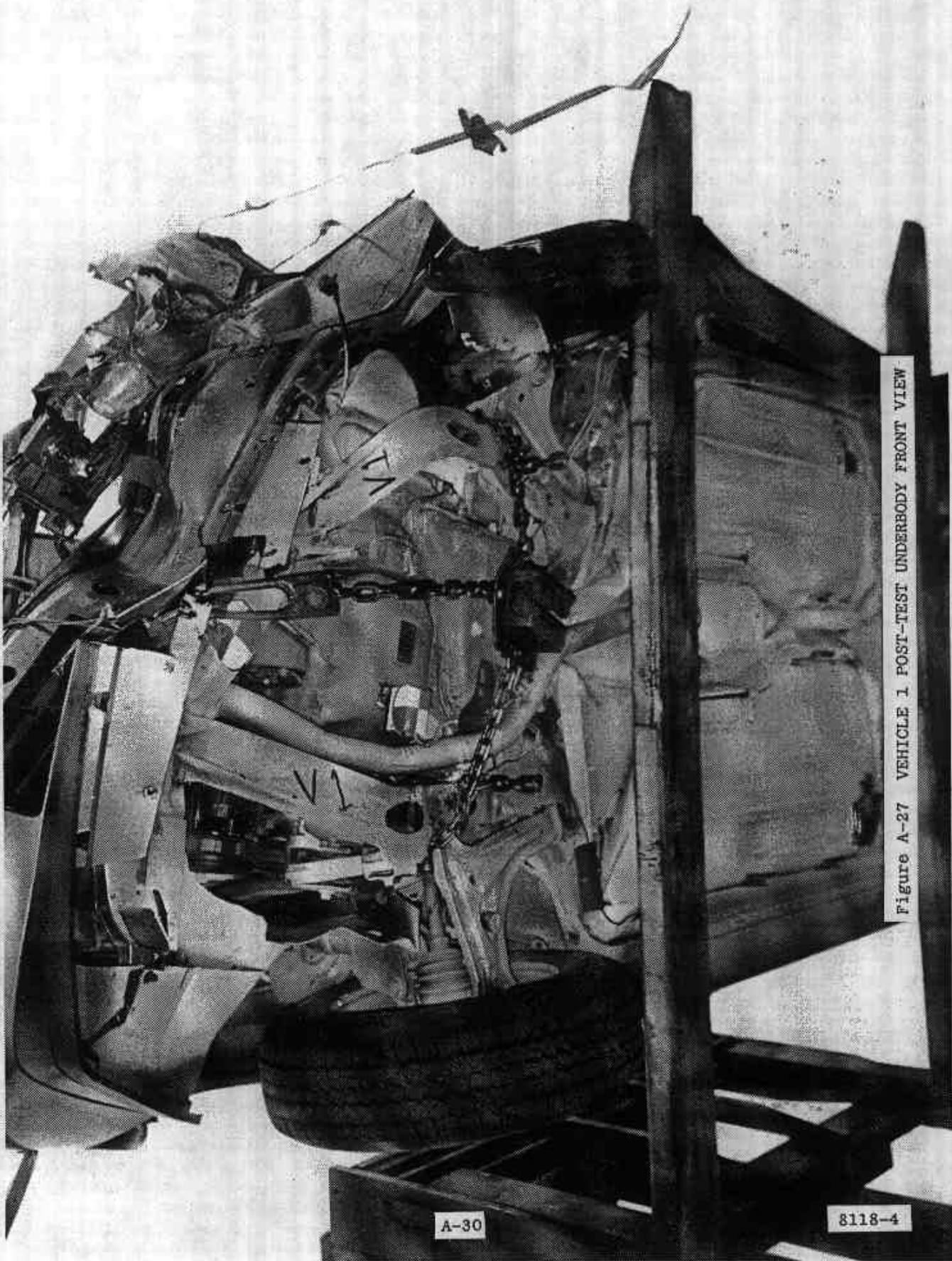


Figure A-27 VEHICLE 1 POST-TEST UNDERBODY FRONT VIEW

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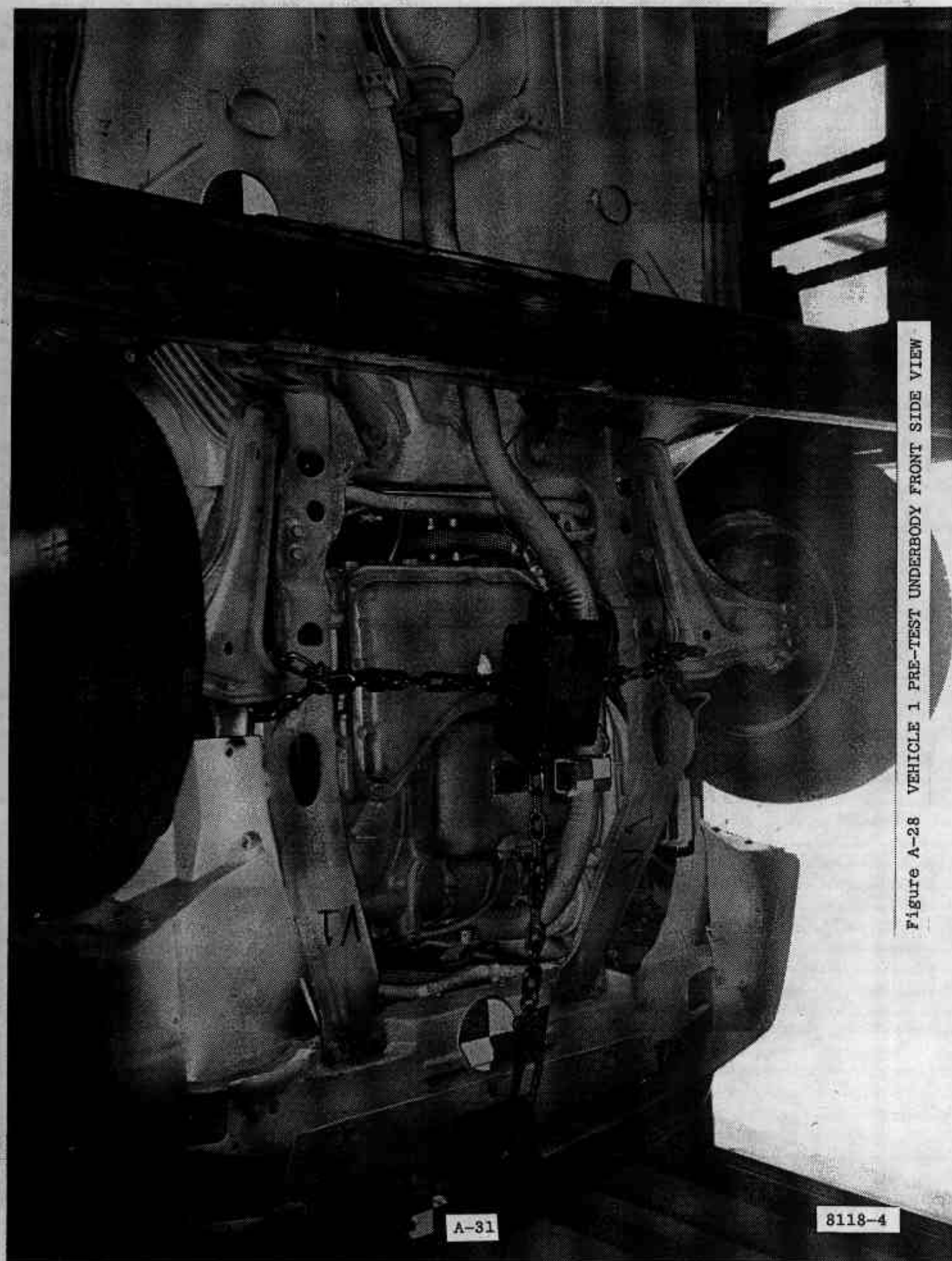


Figure A-28 VEHICLE 1 PRE-TEST UNDERBODY FRONT SIDE VIEW

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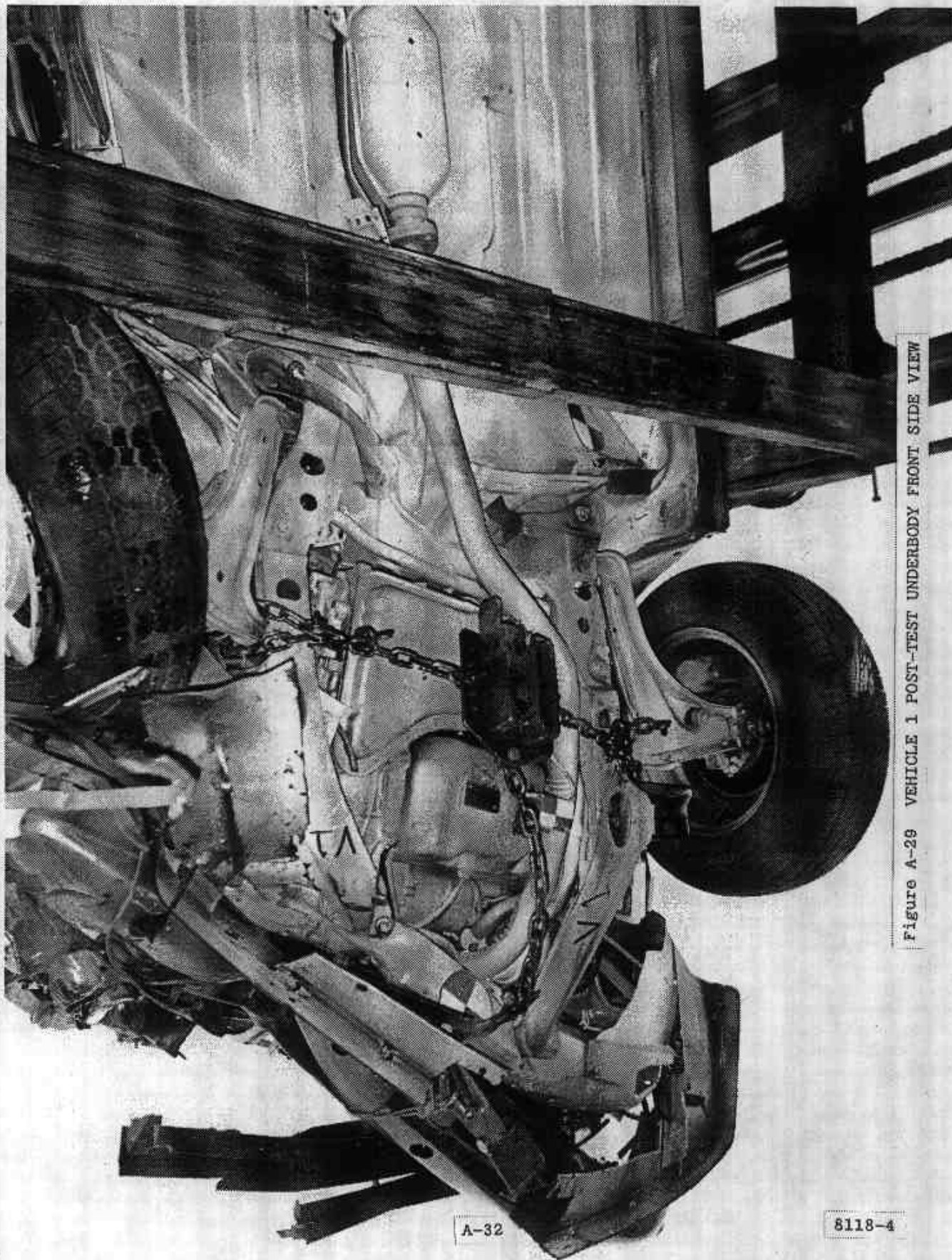


Figure A-29 VEHICLE 1 POST-TEST UNDERBODY FRONT SIDE VIEW

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8118-4

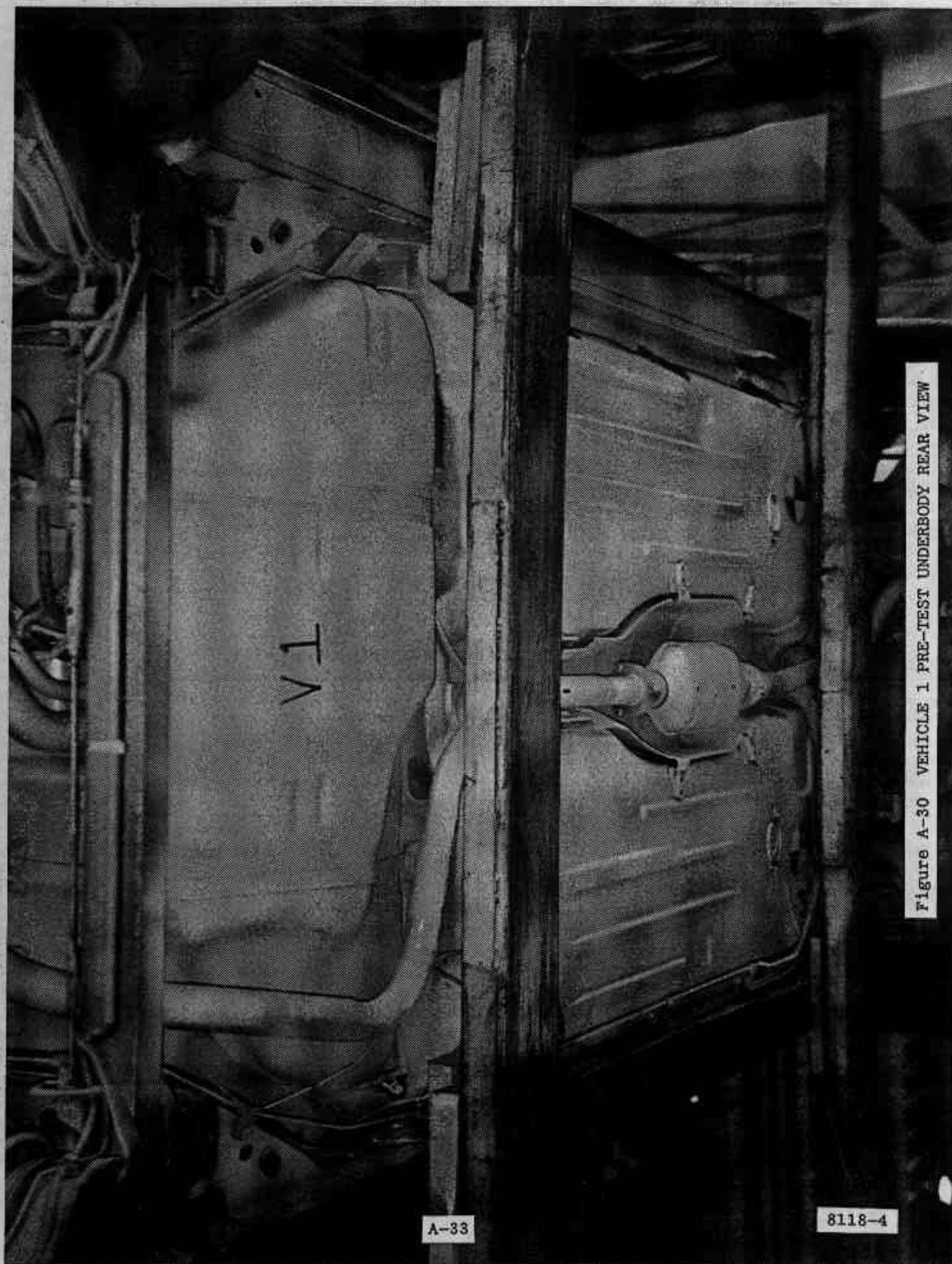


Figure A-30 VEHICLE 1 PRE-TEST UNDERBODY REAR VIEW

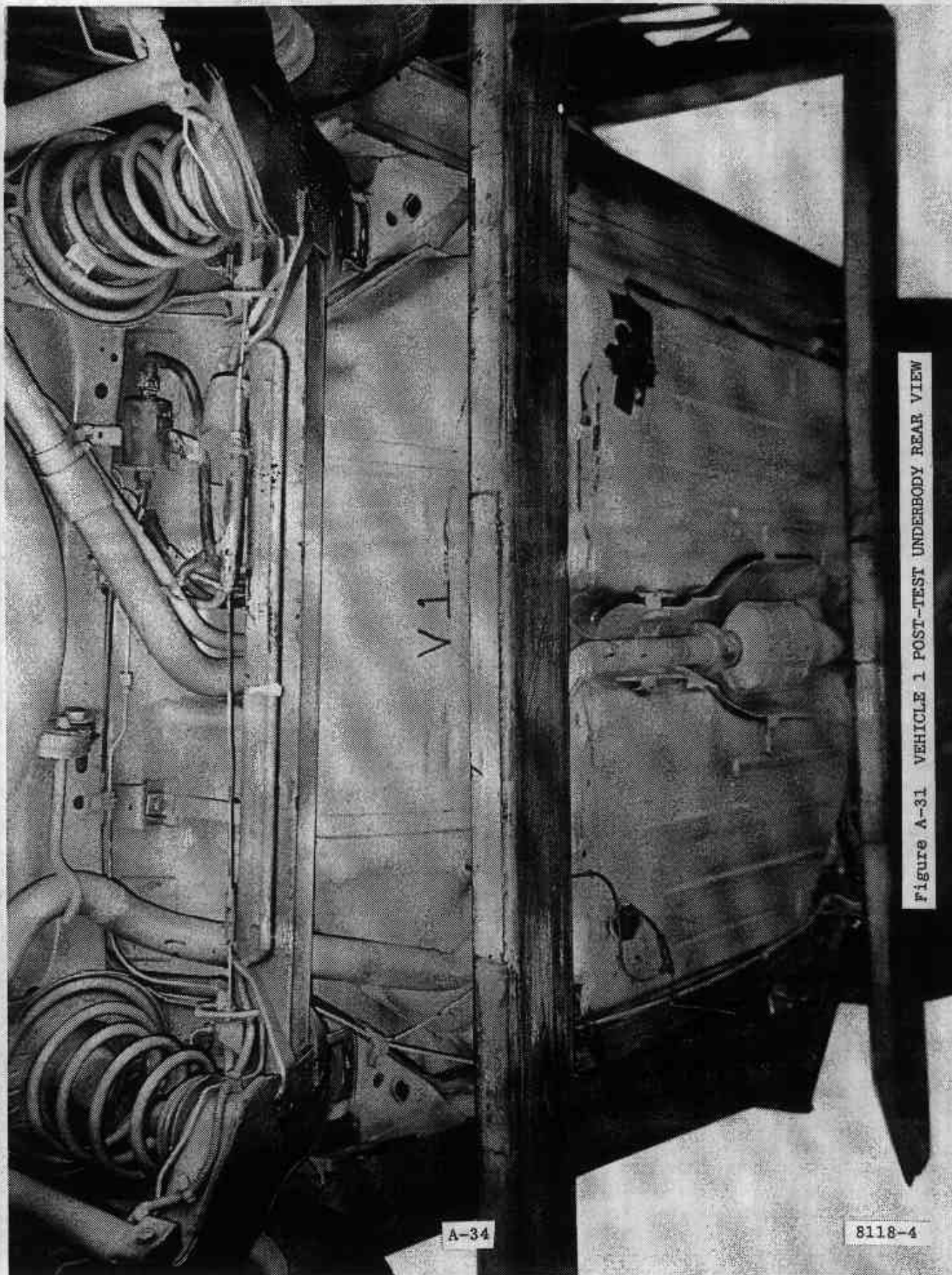


Figure A-31 VEHICLE 1 POST-TEST UNDERBODY REAR VIEW

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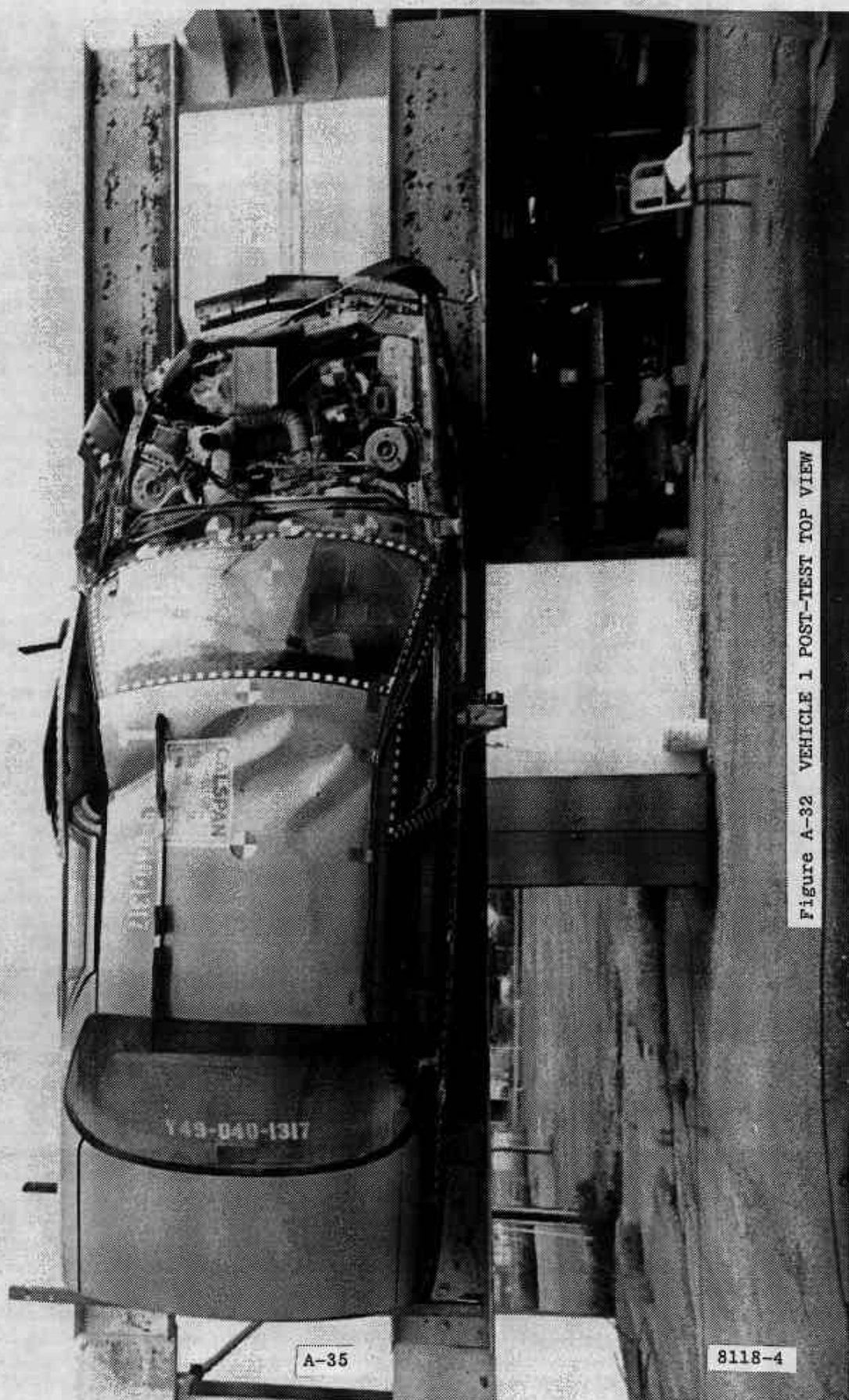


Figure A-32 VEHICLE 1 POST-TEST TOP VIEW

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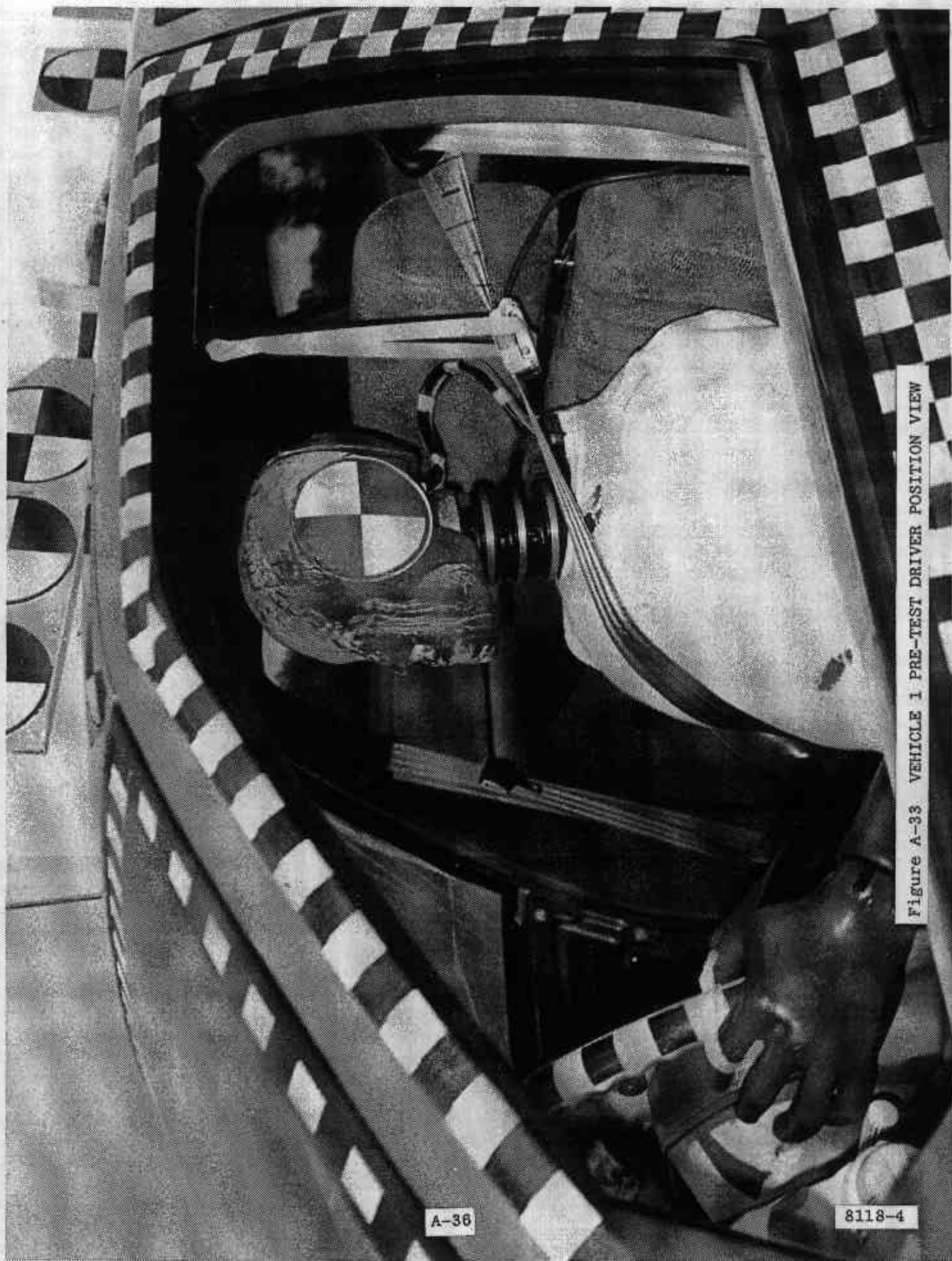


Figure A-33 VEHICLE 1 PRE-TEST DRIVER POSITION VIEW

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Figure A-34 VEHICLE 1 POST-TEST DRIVER POSITION VIEW

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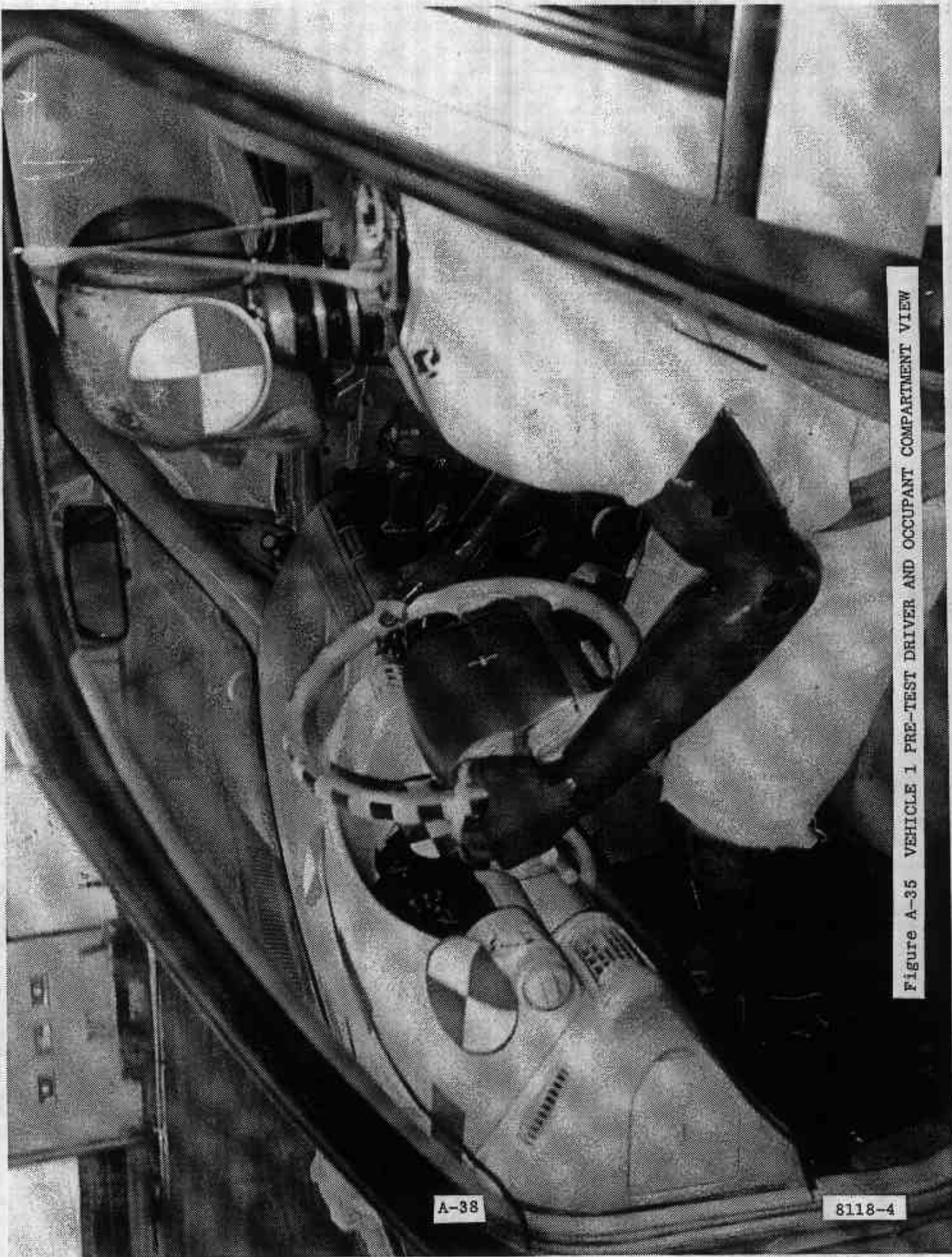


Figure A-35 VEHICLE 1 PRE-TEST DRIVER AND OCCUPANT COMPARTMENT VIEW

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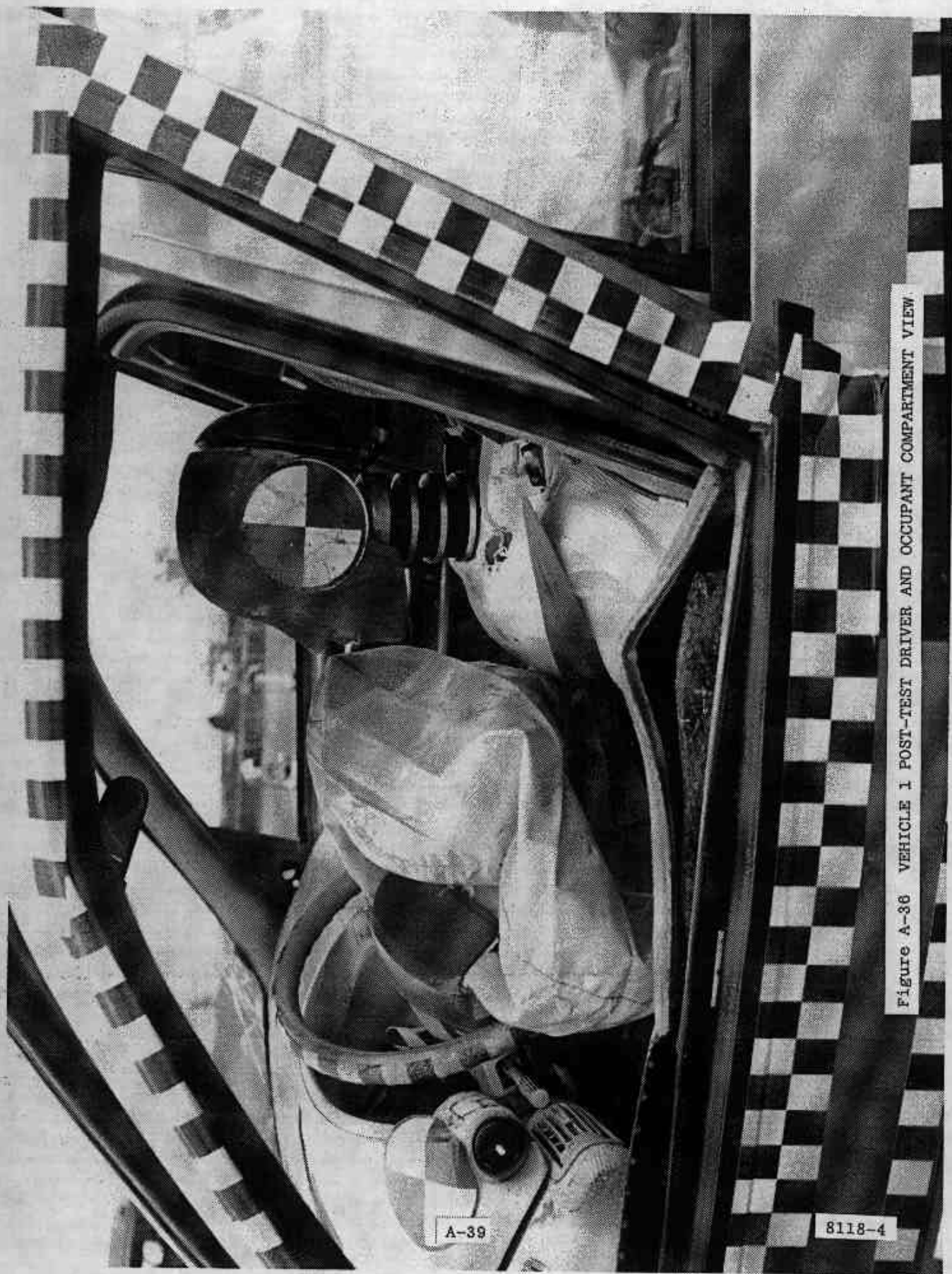


Figure A-36 VEHICLE 1 POST-TEST DRIVER AND OCCUPANT COMPARTMENT VIEW



Figure A-37 VEHICLE 1 PRE-TEST DRIVER AND OCCUPANT COMPARTMENT RIGHT SIDE VIEW

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Figure A-38 VEHICLE 1 POST-TEST DRIVER AND OCCUPANT COMPARTMENT RIGHT SIDE VIEW.

Figure A-39 VEHICLE 1 POST-TEST DRIVER CHEST CONTACT (NOT AVAILABLE)

VEHICLE 2 PHOTOGRAPHS

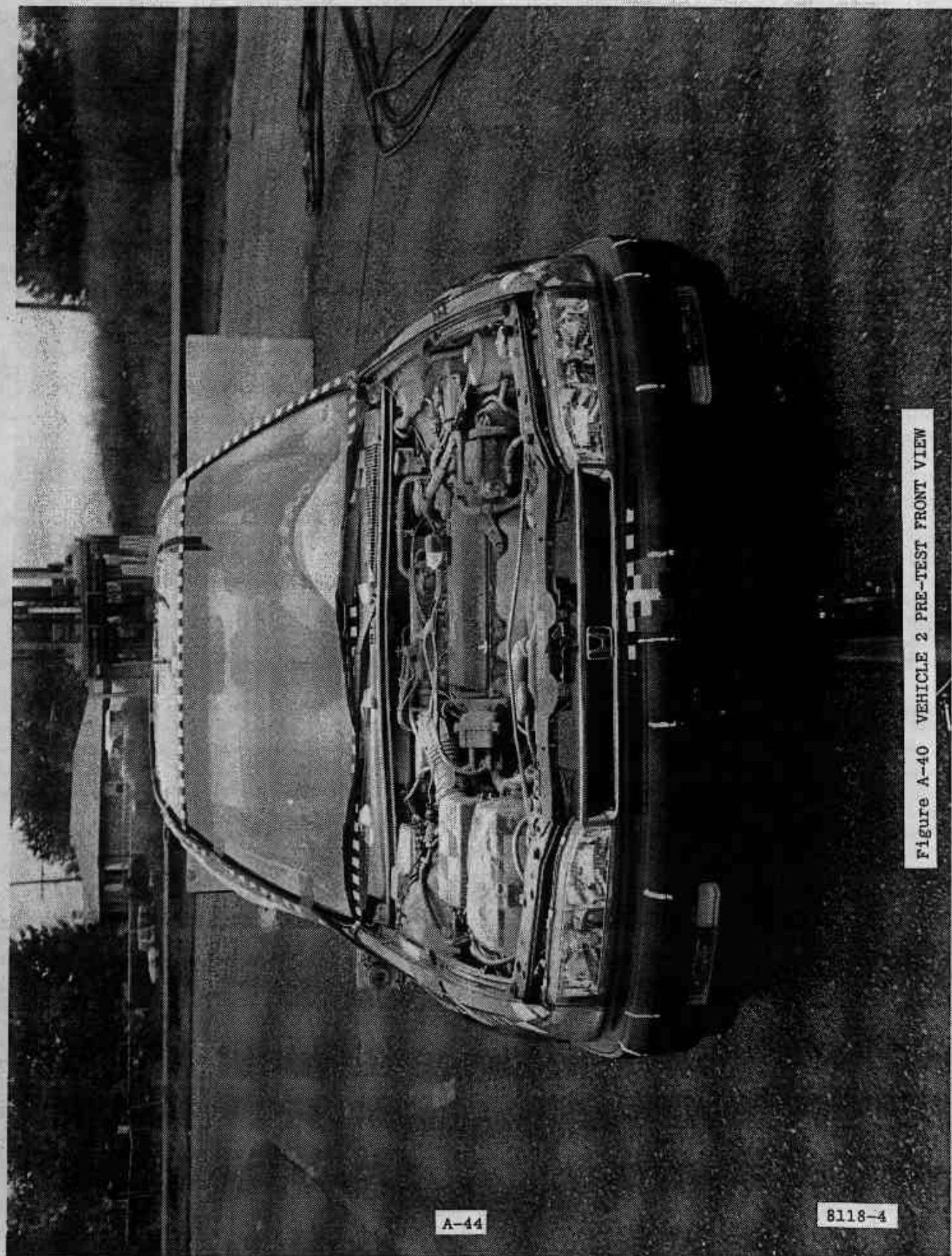


Figure A-40 VEHICLE 2 PRE-TEST FRONT VIEW



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Figure A-41 VEHICLE 2 POST-TEST FRONT VIEW



Figure A-42 VEHICLE 2 PRE-TEST FRONT RIGHT THREE QUARTER VIEW

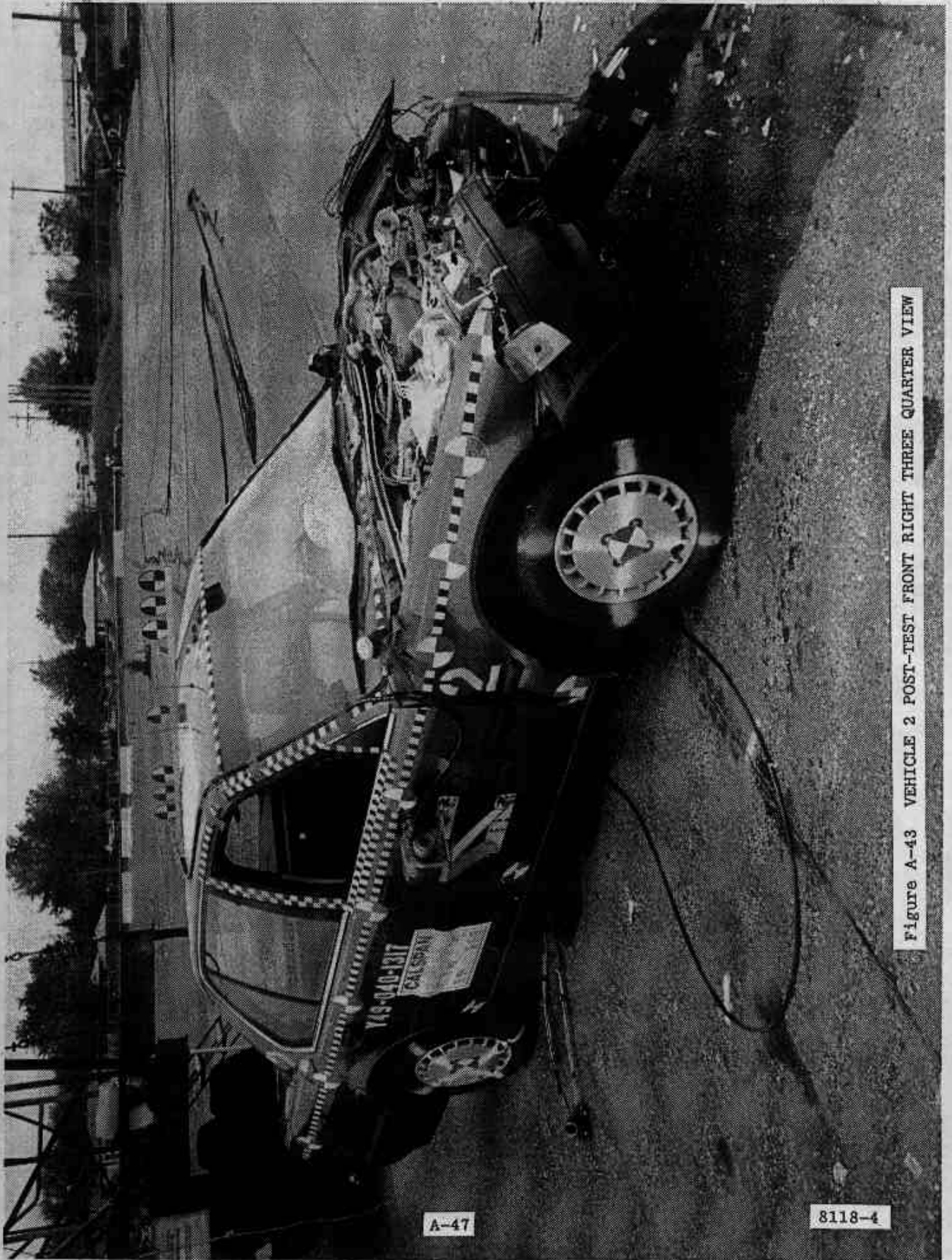


Figure A-43 VEHICLE 2 POST-TEST FRONT RIGHT THREE QUARTER VIEW

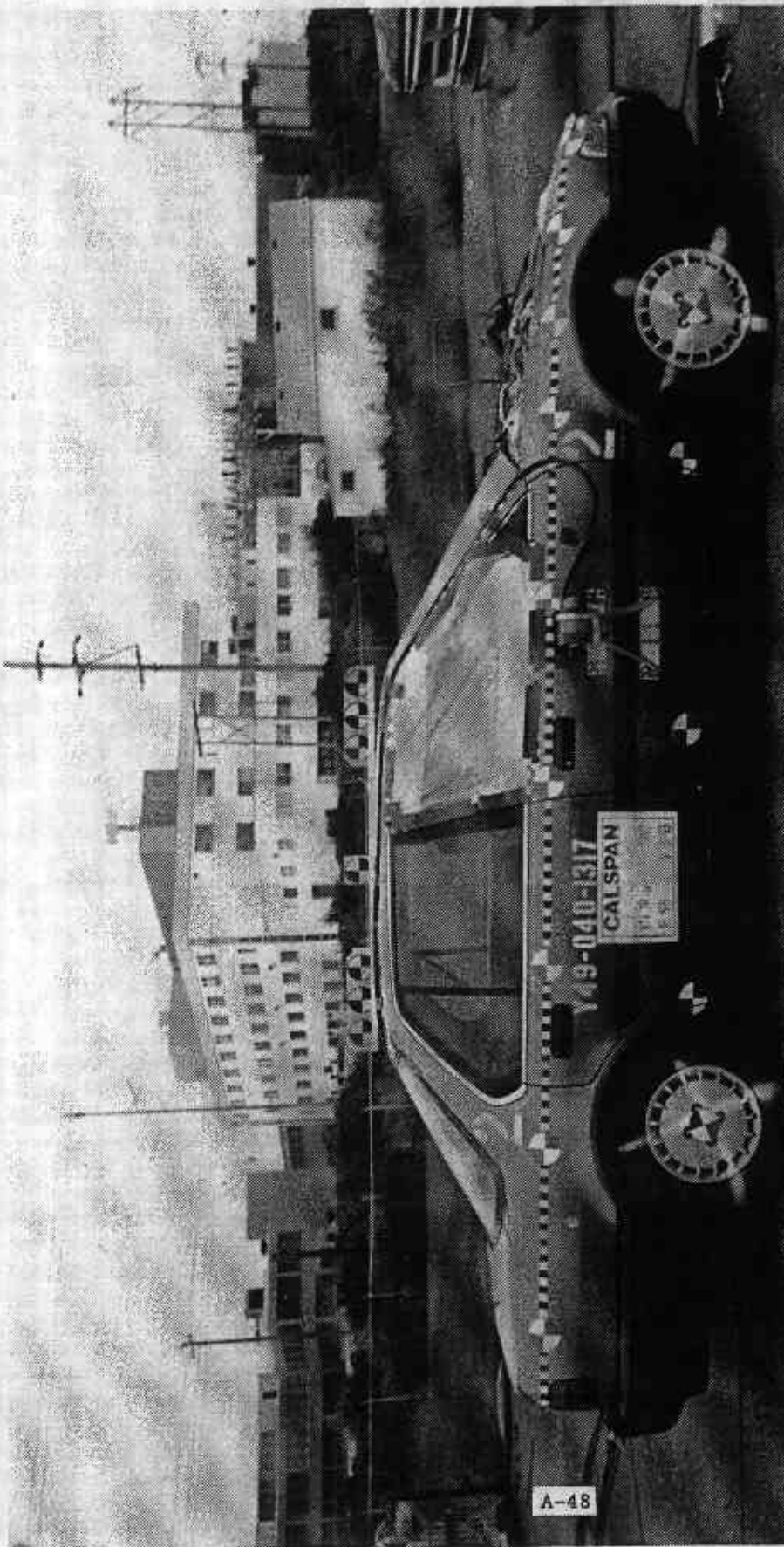


FIGURE A-44 VEHICLE 2 PRE-TEST RIGHT SIDE VIEW

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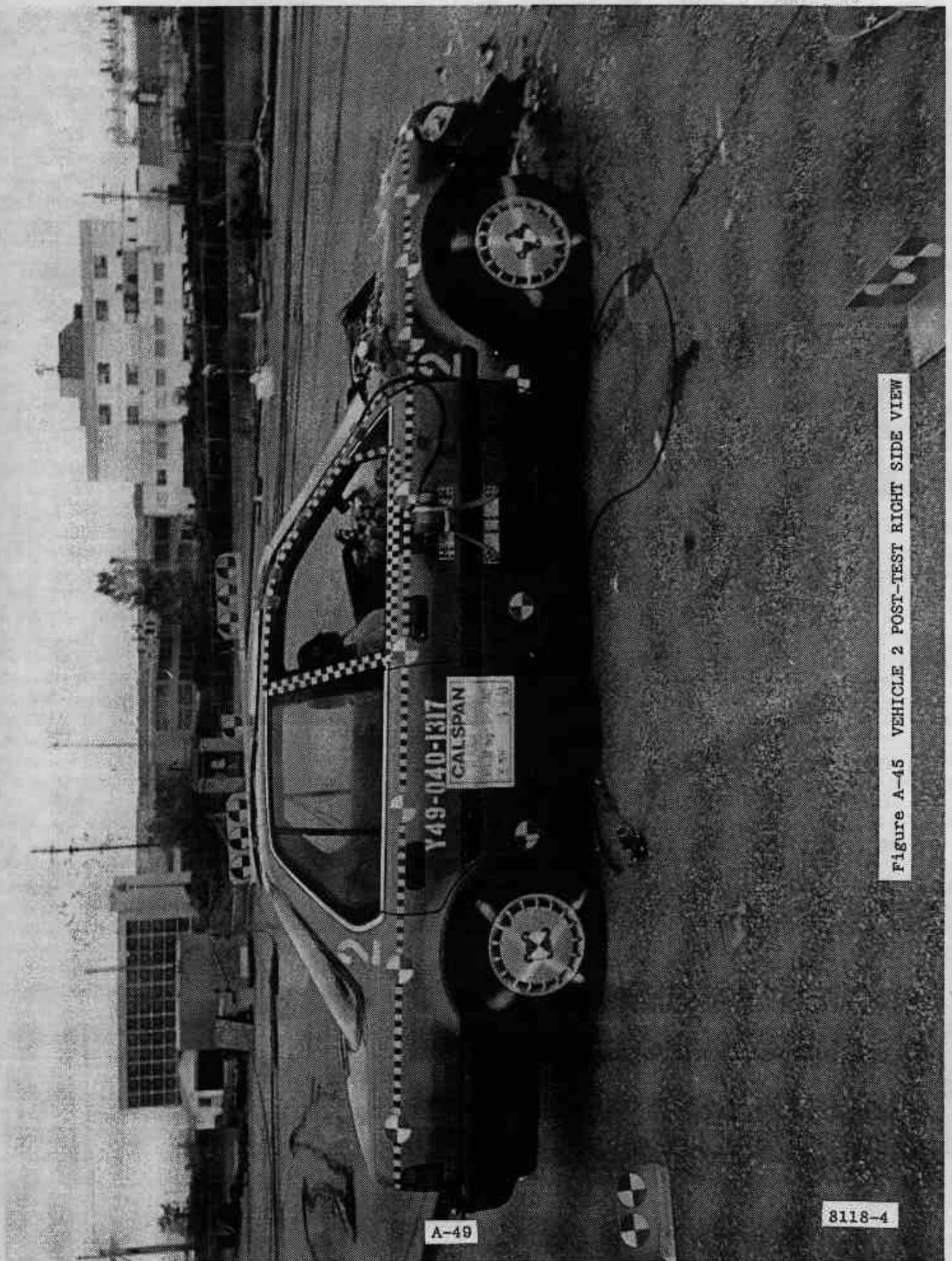


Figure A-45 VEHICLE 2 POST-TEST RIGHT SIDE VIEW

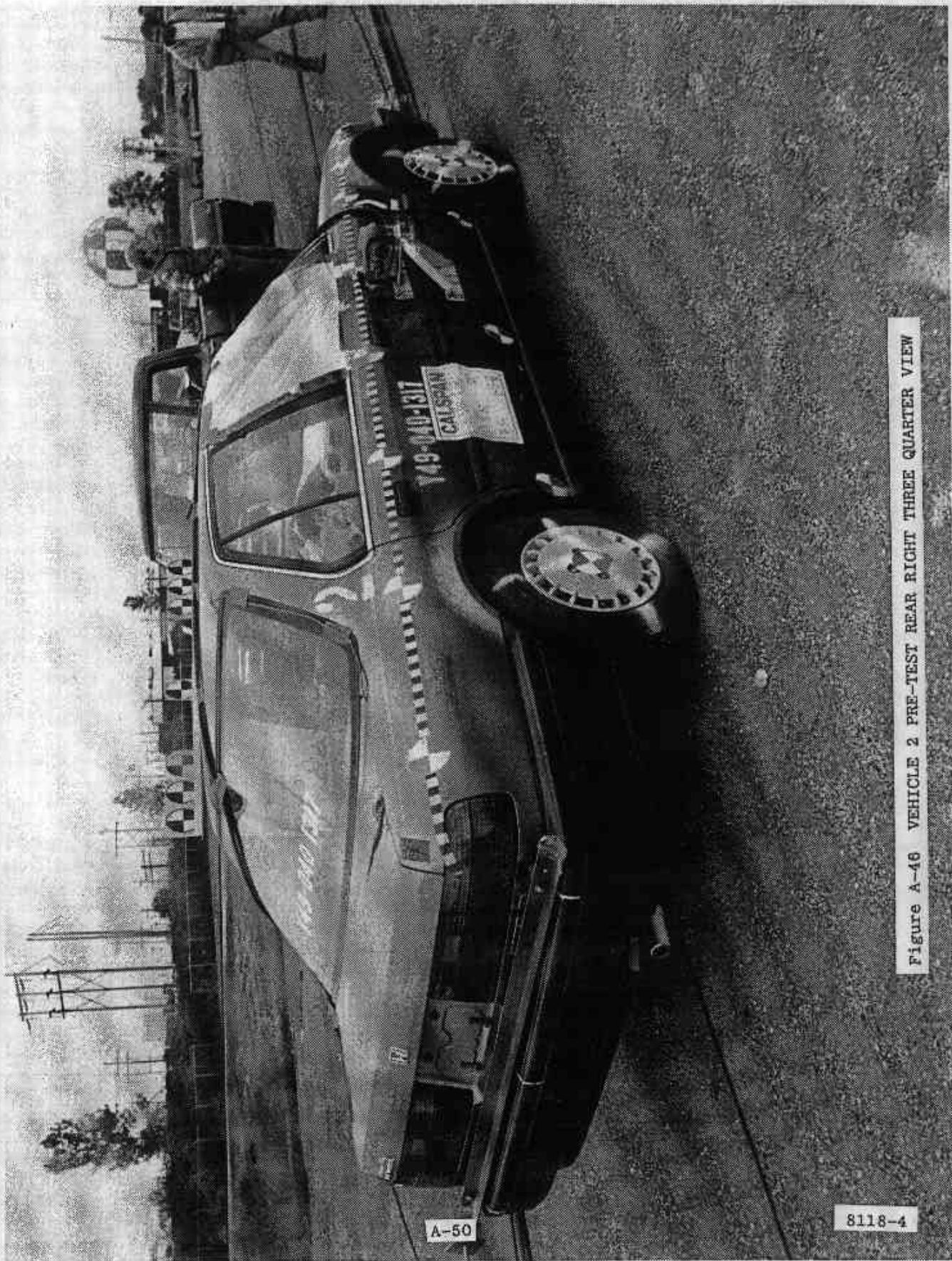


Figure A-46 VEHICLE 2 PRE-TEST REAR RIGHT THREE QUARTER VIEW

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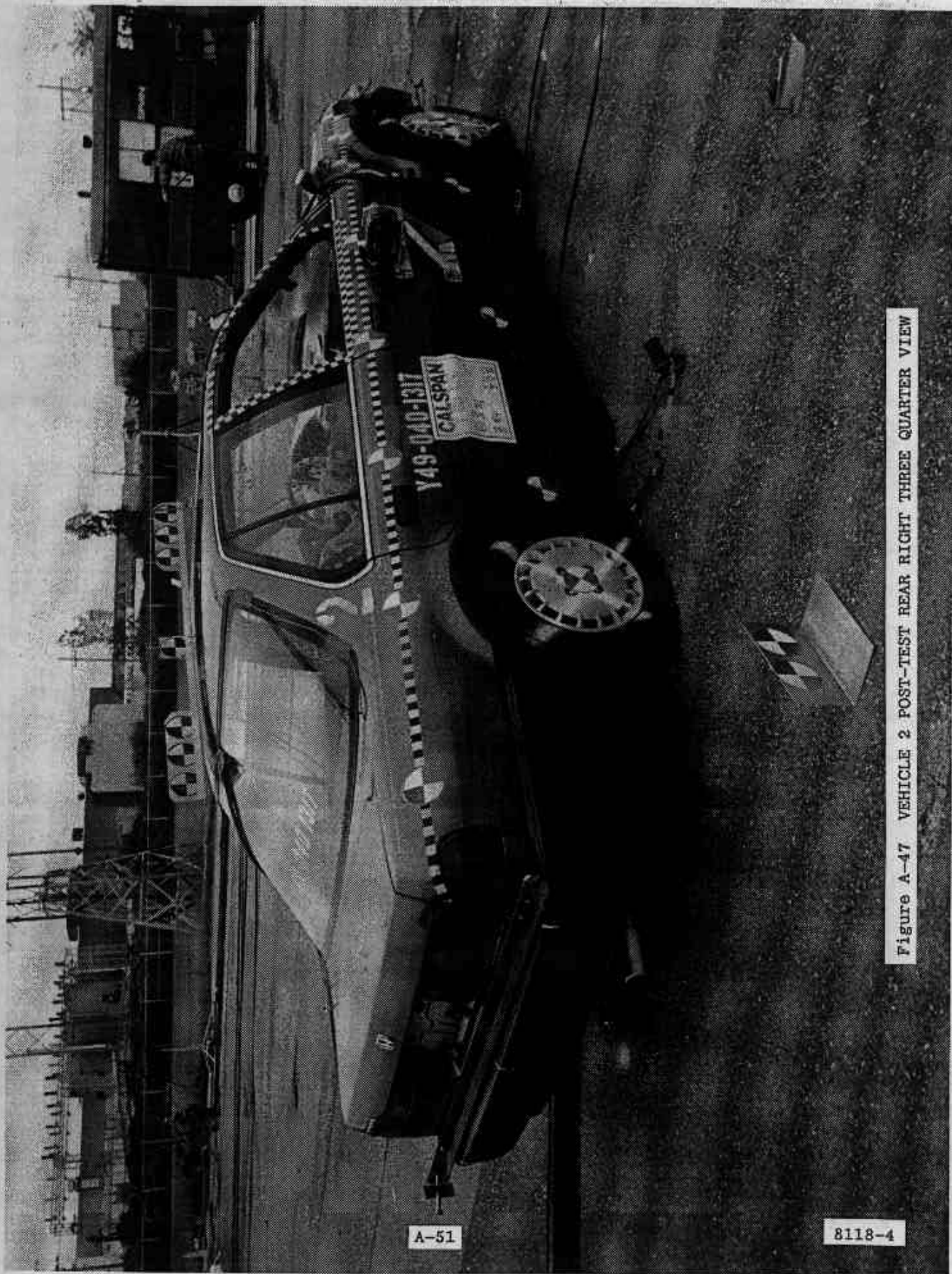


Figure A-47 VEHICLE 2 POST-TEST REAR RIGHT THREE QUARTER VIEW

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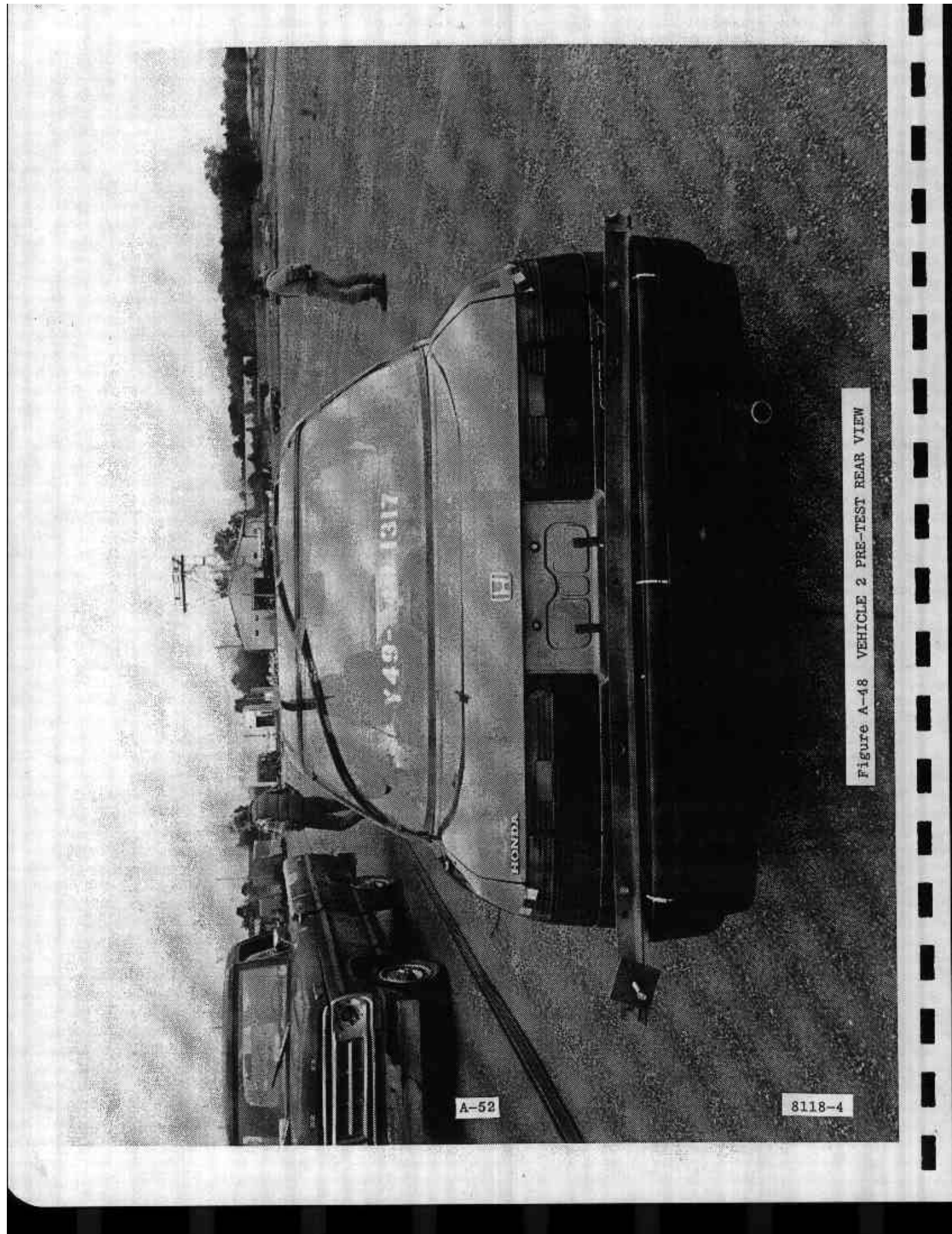


Figure A-48 VEHICLE 2 PRE-TEST REAR VIEW

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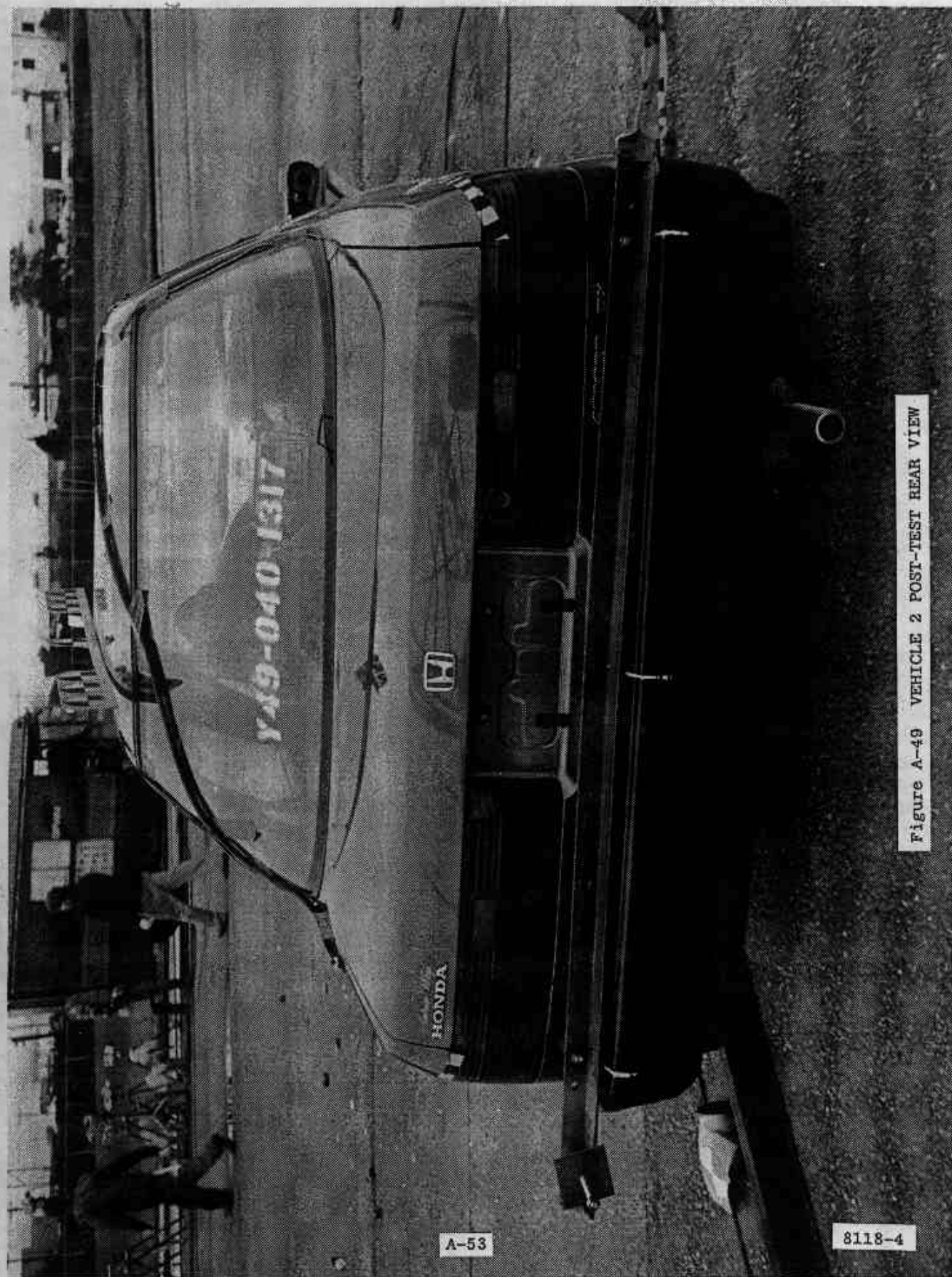


Figure A-49 VEHICLE 2 POST-TEST REAR VIEW

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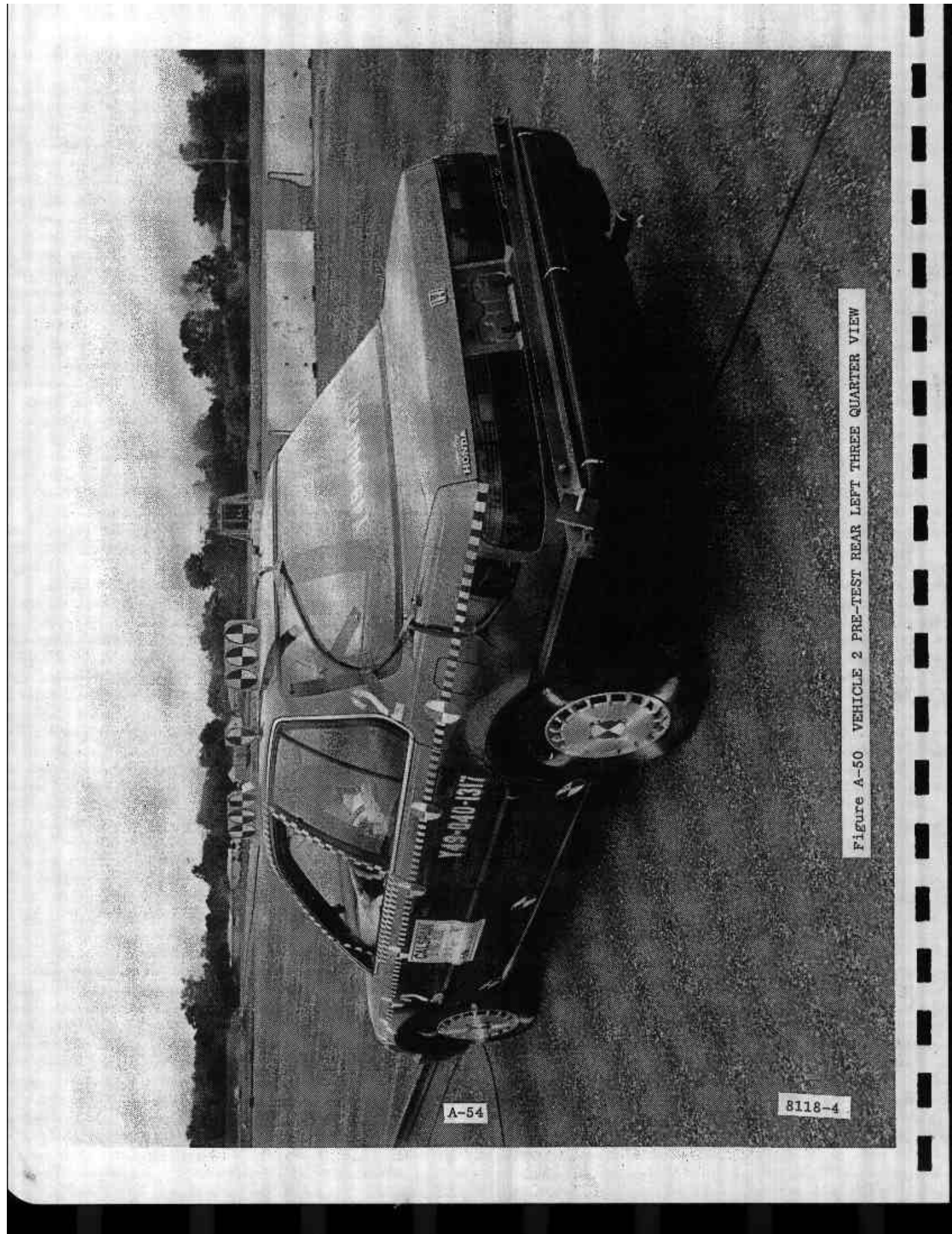


Figure A-50 VEHICLE 2 PRE-TEST REAR LEFT THREE QUARTER VIEW

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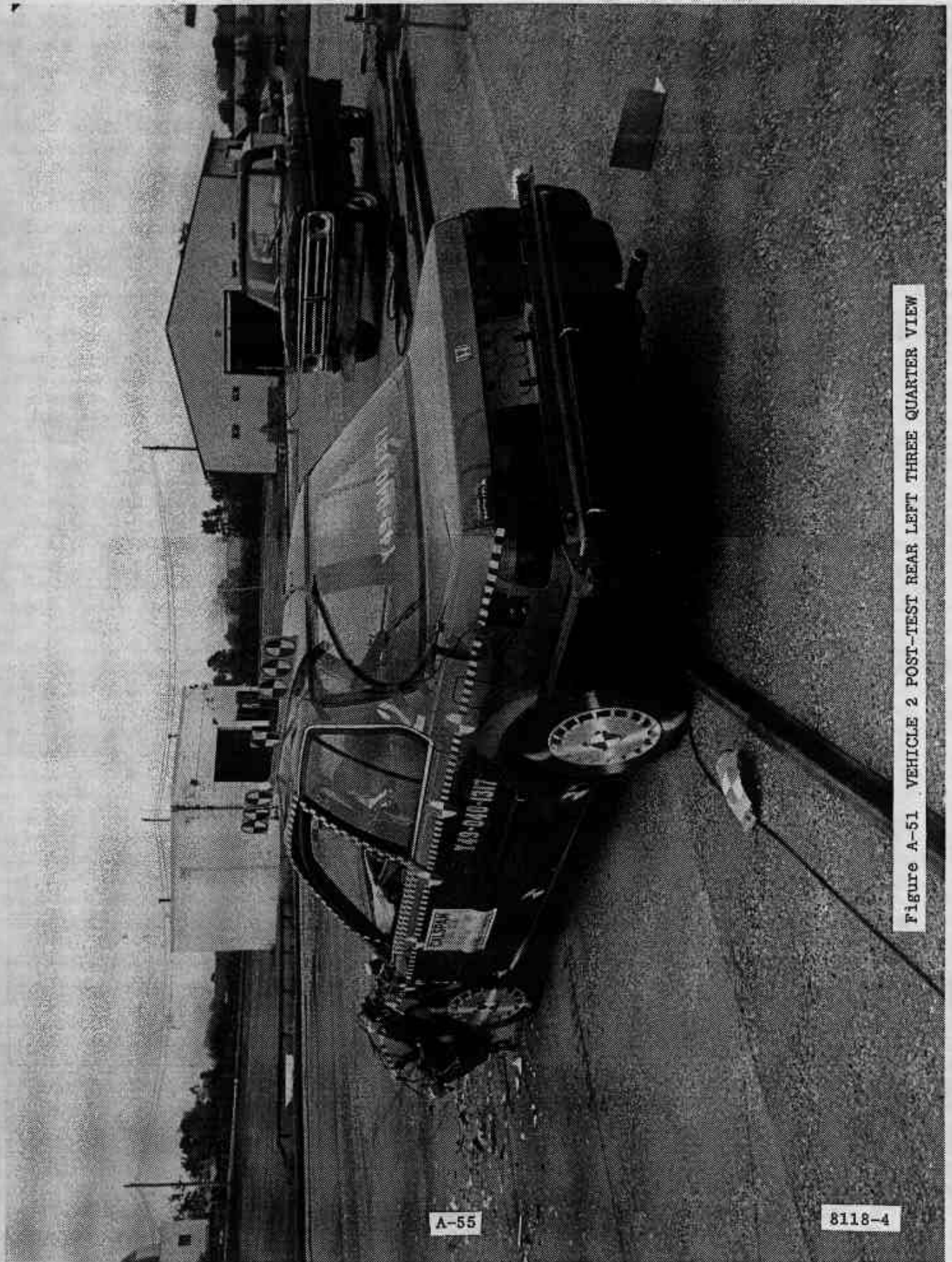


Figure A-51 VEHICLE 2 POST-TEST REAR LEFT THREE QUARTER VIEW

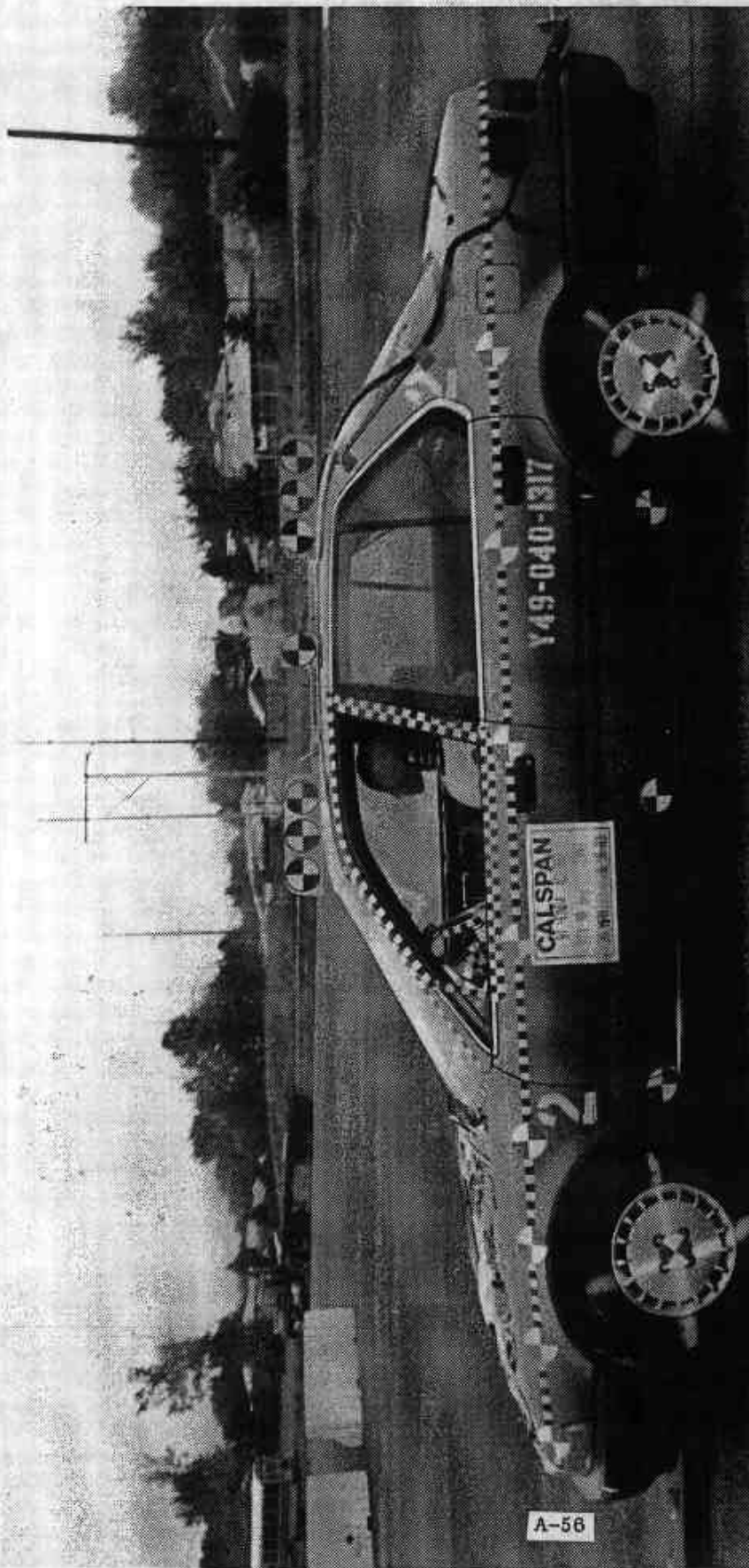


Figure A-52 VEHICLE 2 PRE-TEST LEFT SIDE VIEW

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Figure A-53 VEHICLE 2 POST-TEST LEFT SIDE VIEW

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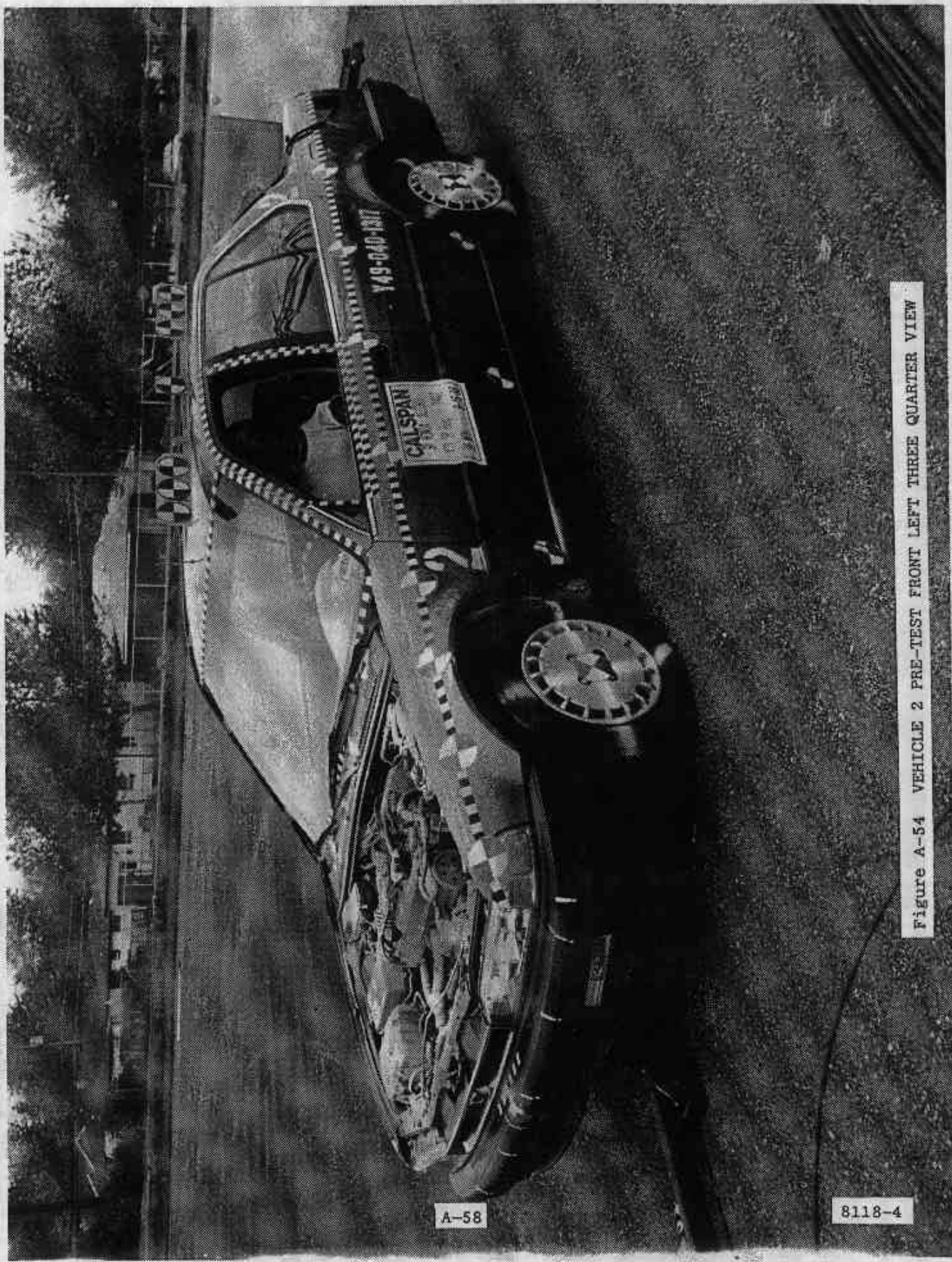


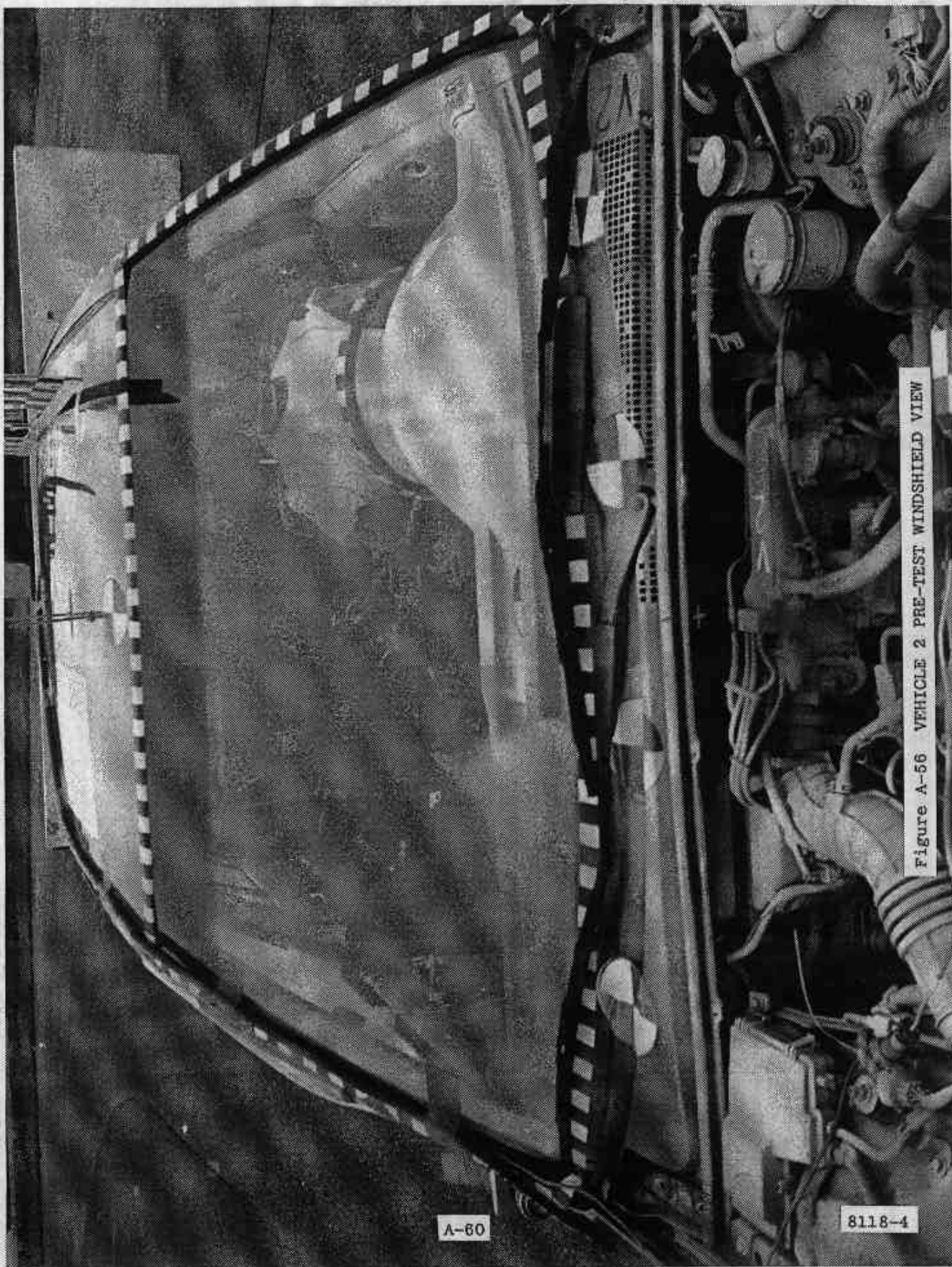
Figure A-54 VEHICLE 2 PRE-TEST FRONT LEFT THREE QUARTER VIEW

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Figure A-55 VEHICLE 2 POST-TEST FRONT LEFT THREE QUARTER VIEW



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Figure A-56 VEHICLE 2. PRE-TEST WINDSHIELD VIEW

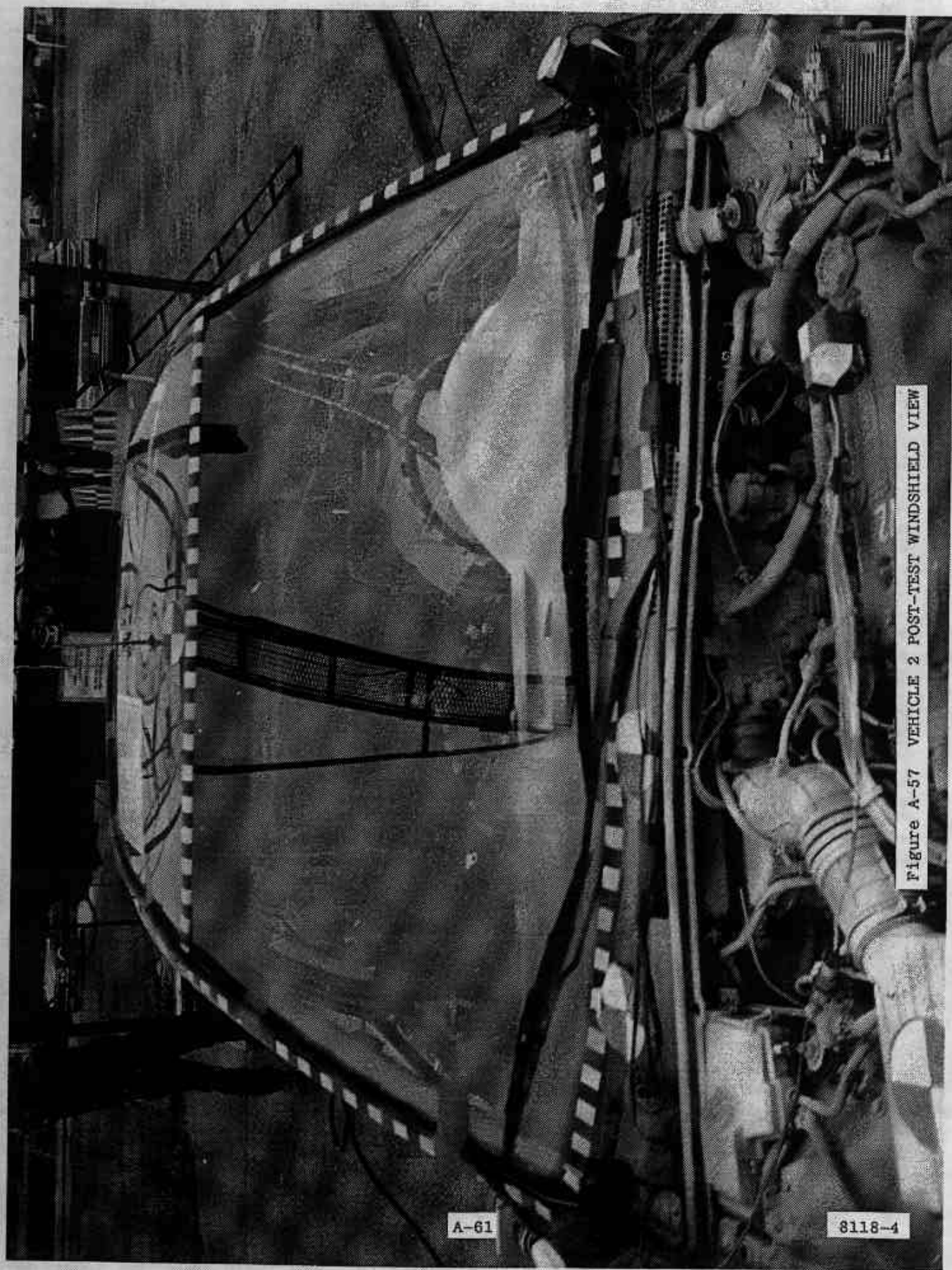


Figure A-57 VEHICLE 2 POST-TEST WINDSHIELD VIEW

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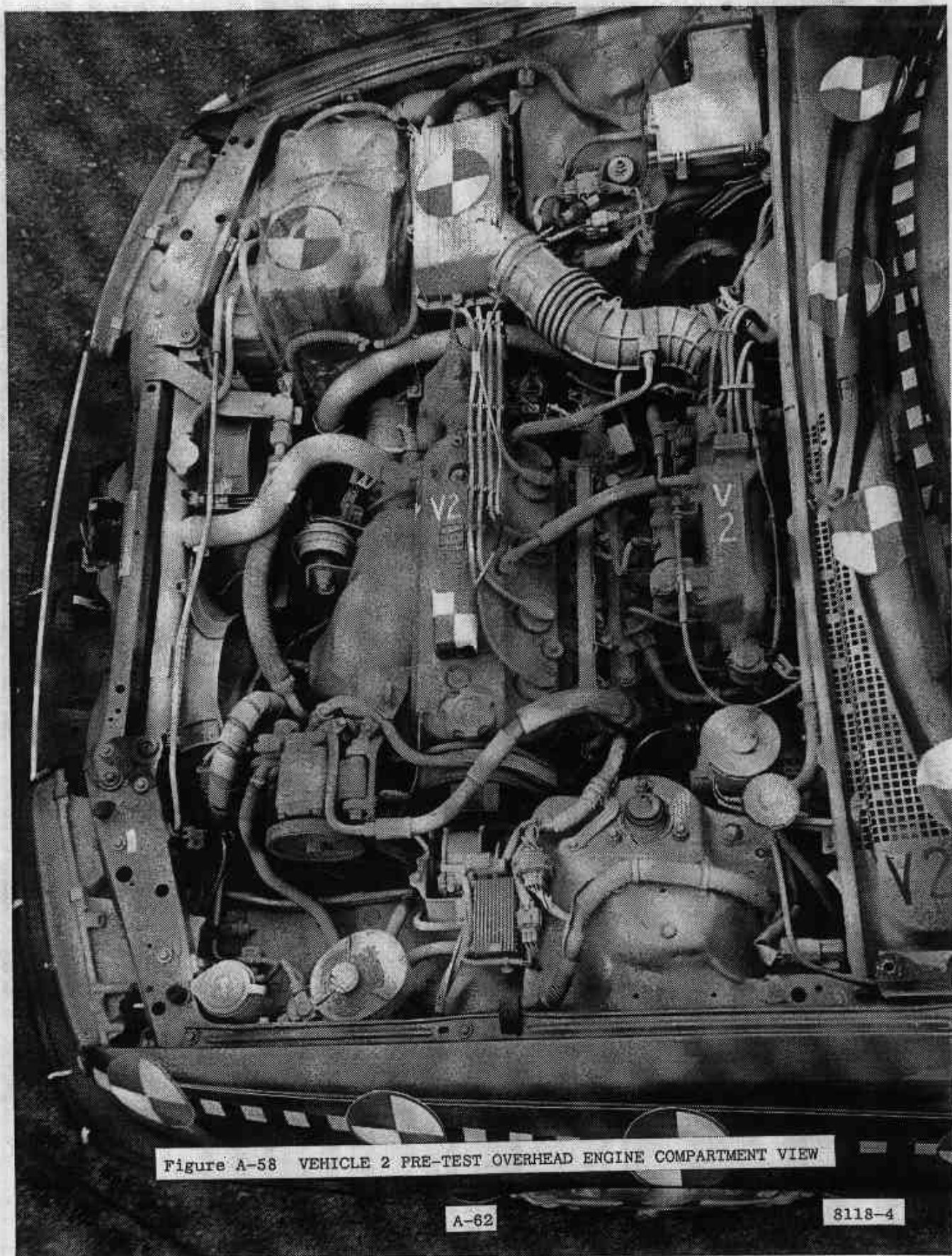


Figure A-58 VEHICLE 2 PRE-TEST OVERHEAD ENGINE COMPARTMENT VIEW

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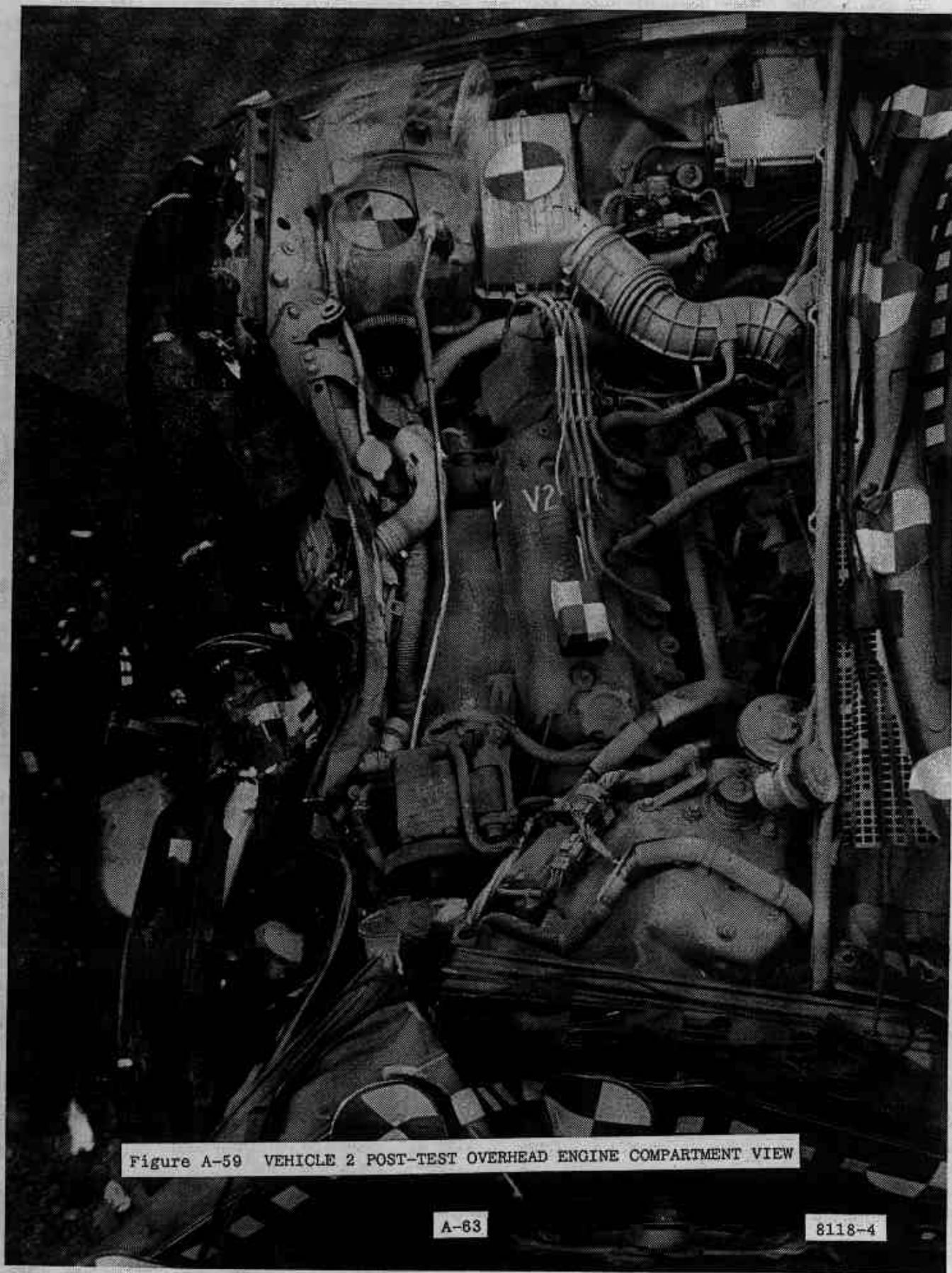


Figure A-59 VEHICLE 2 POST-TEST OVERHEAD ENGINE COMPARTMENT VIEW

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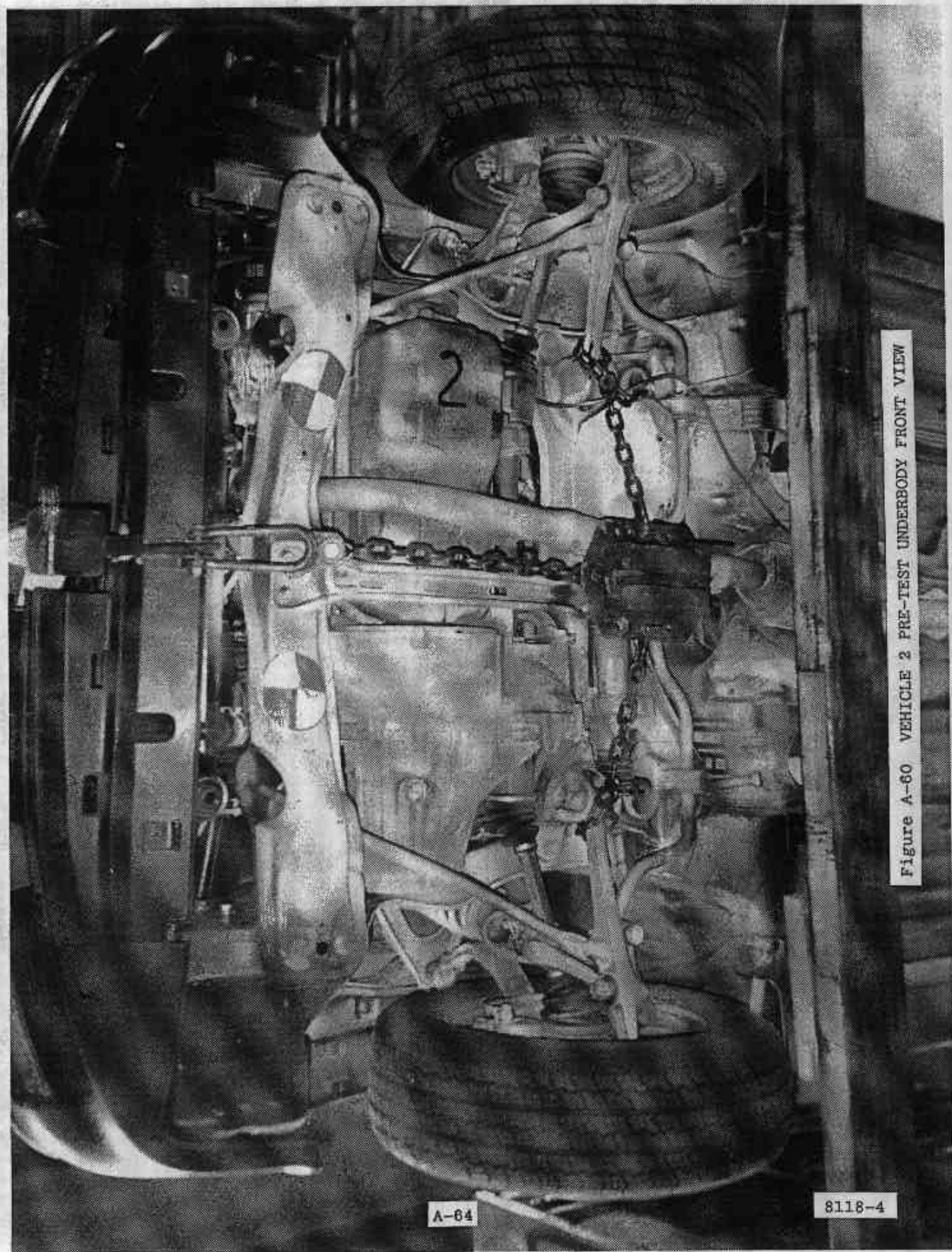


Figure A-60 VEHICLE 2 PRE-TEST UNDERBODY FRONT VIEW

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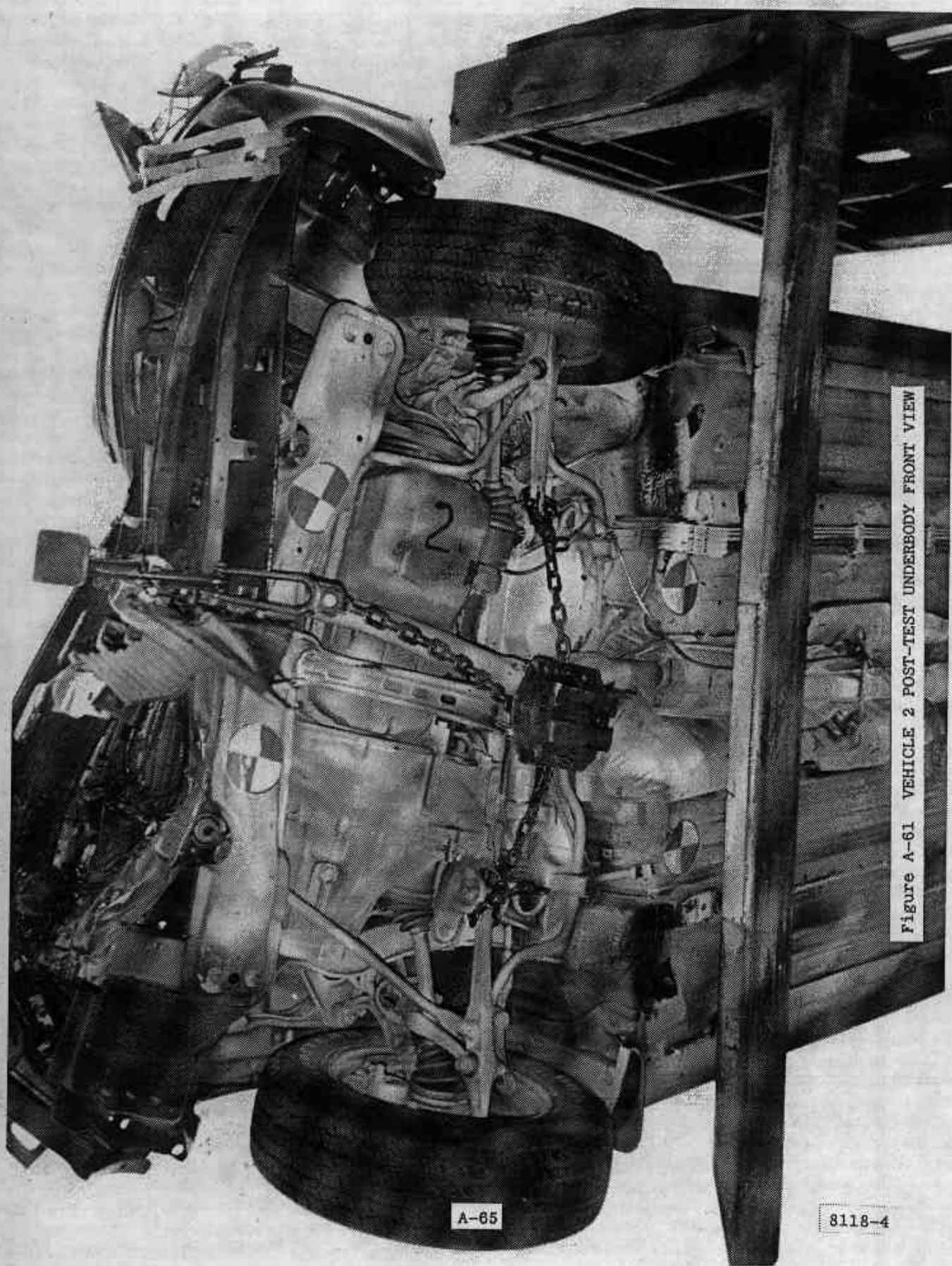


Figure A-61 VEHICLE 2 POST-TEST UNDERBODY FRONT VIEW

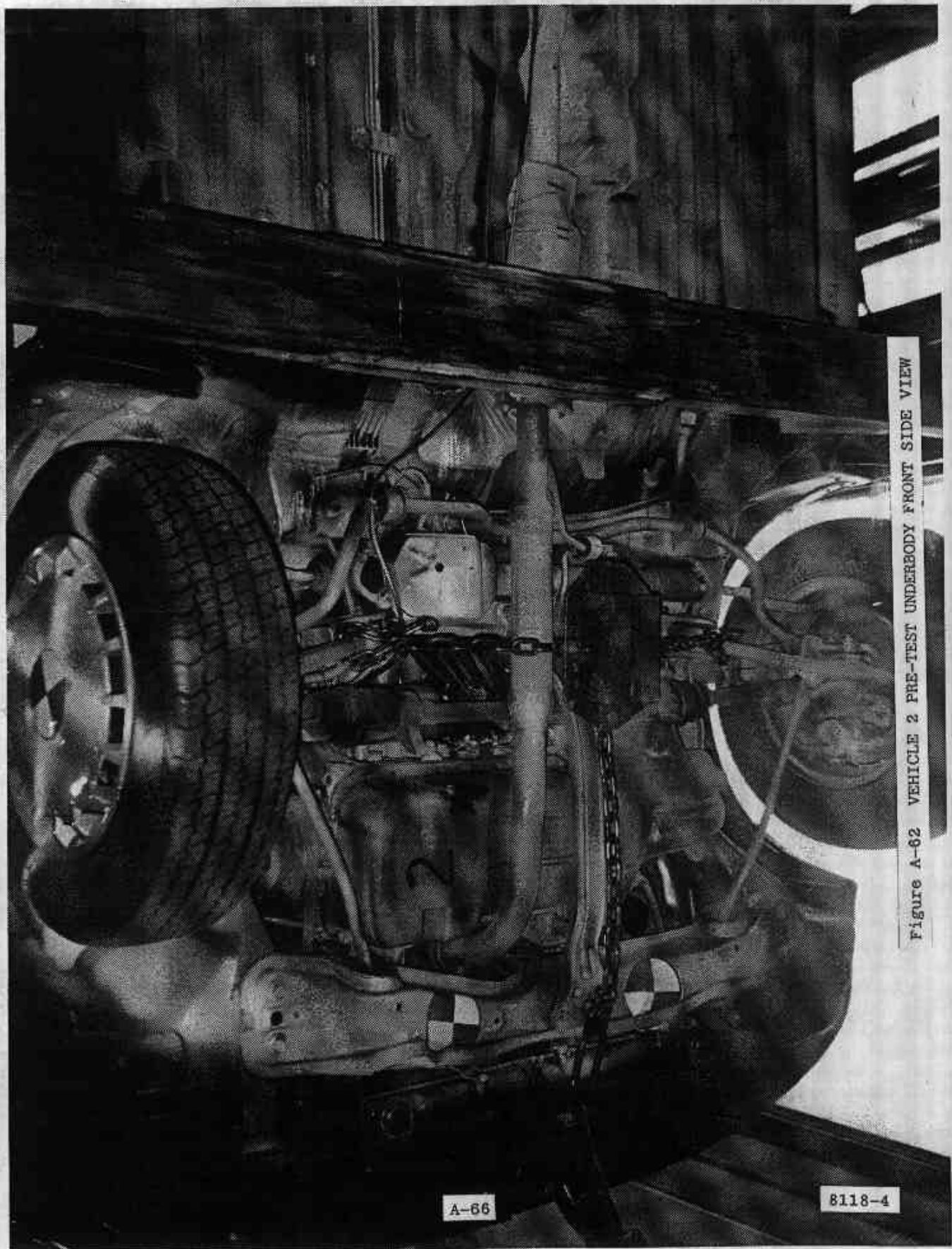


Figure A-62 VEHICLE 2 PRE-TEST UNDERBODY FRONT SIDE VIEW

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8118-4

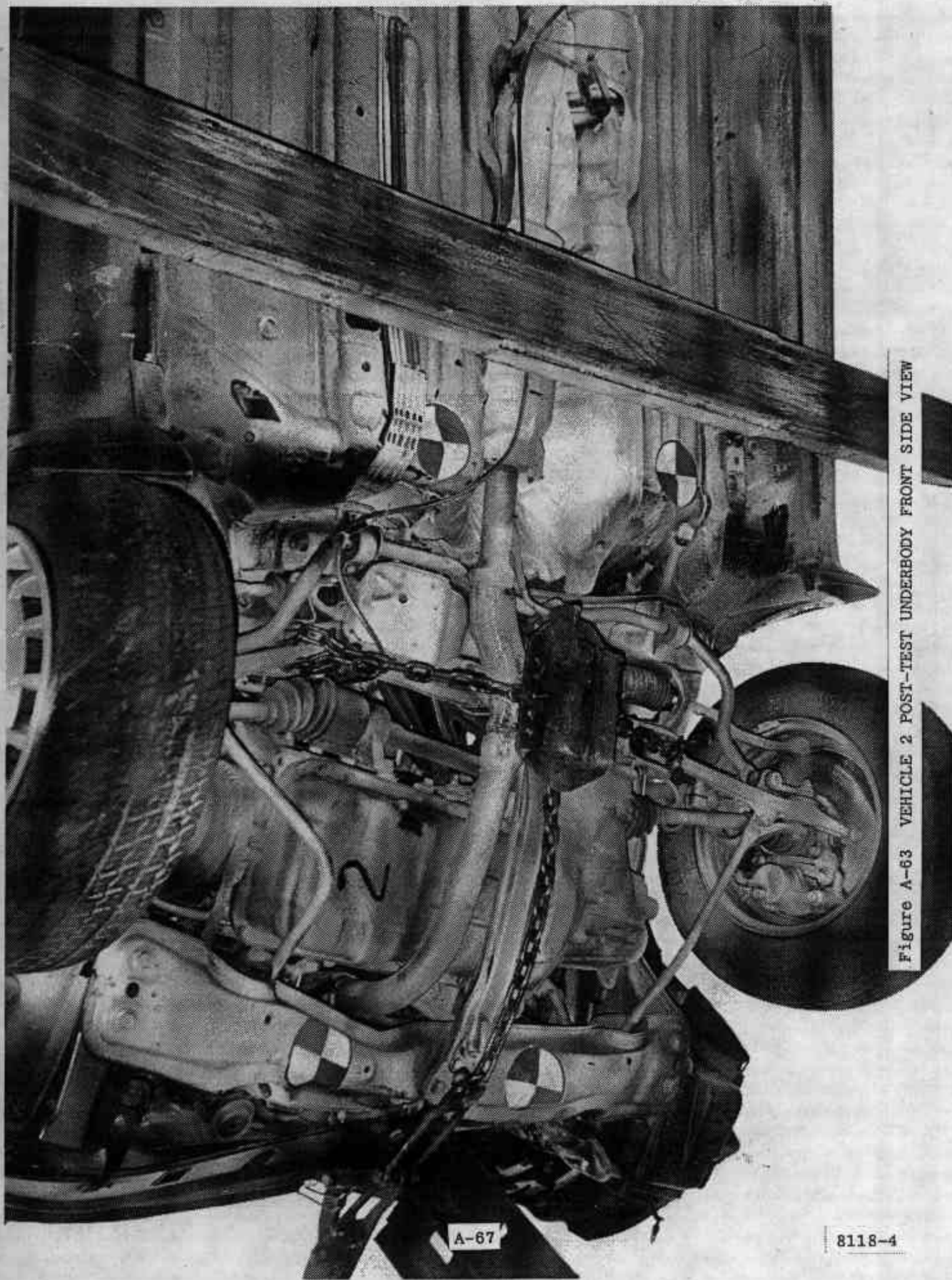


Figure A-63 VEHICLE 2 POST-TEST UNDERBODY FRONT SIDE VIEW

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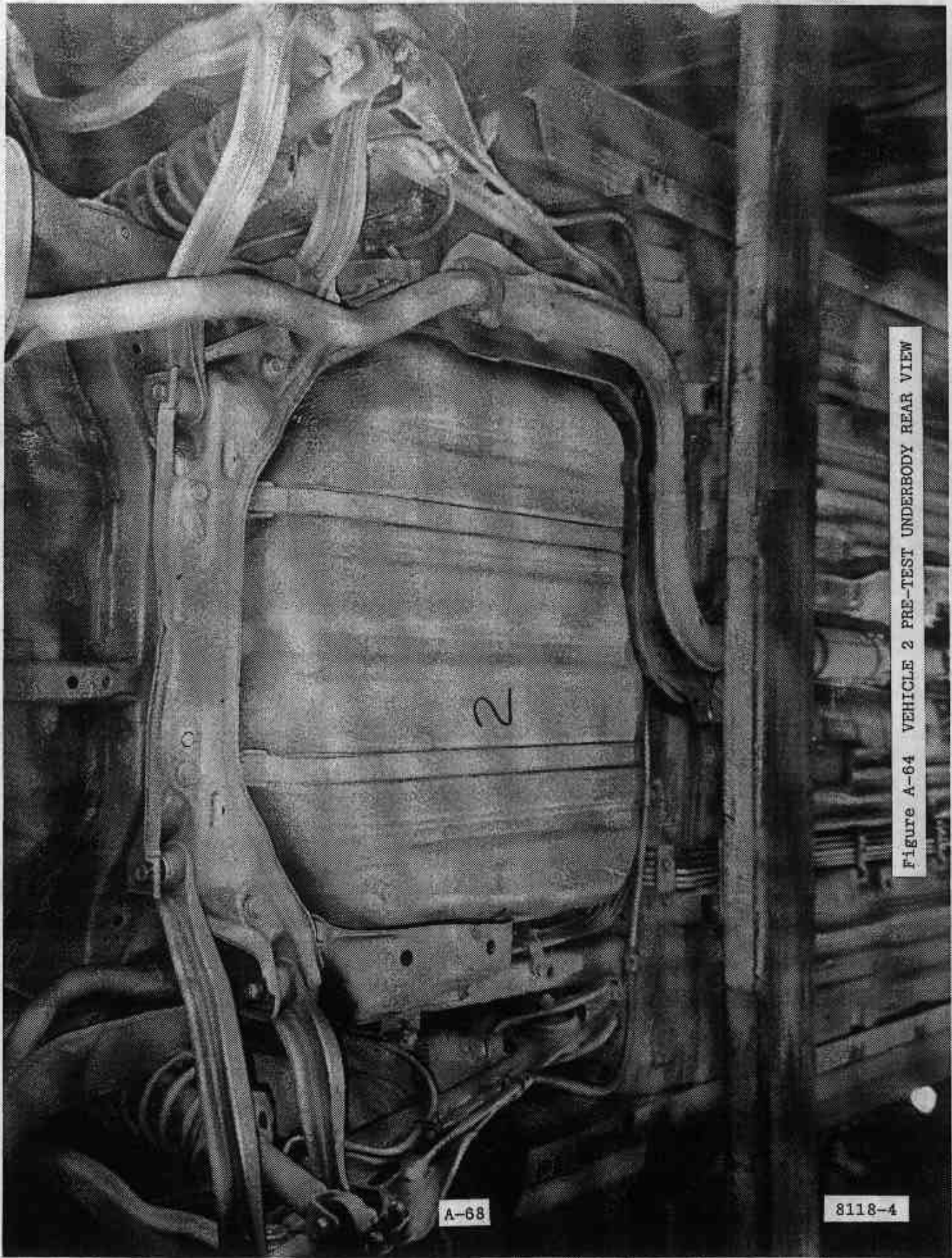
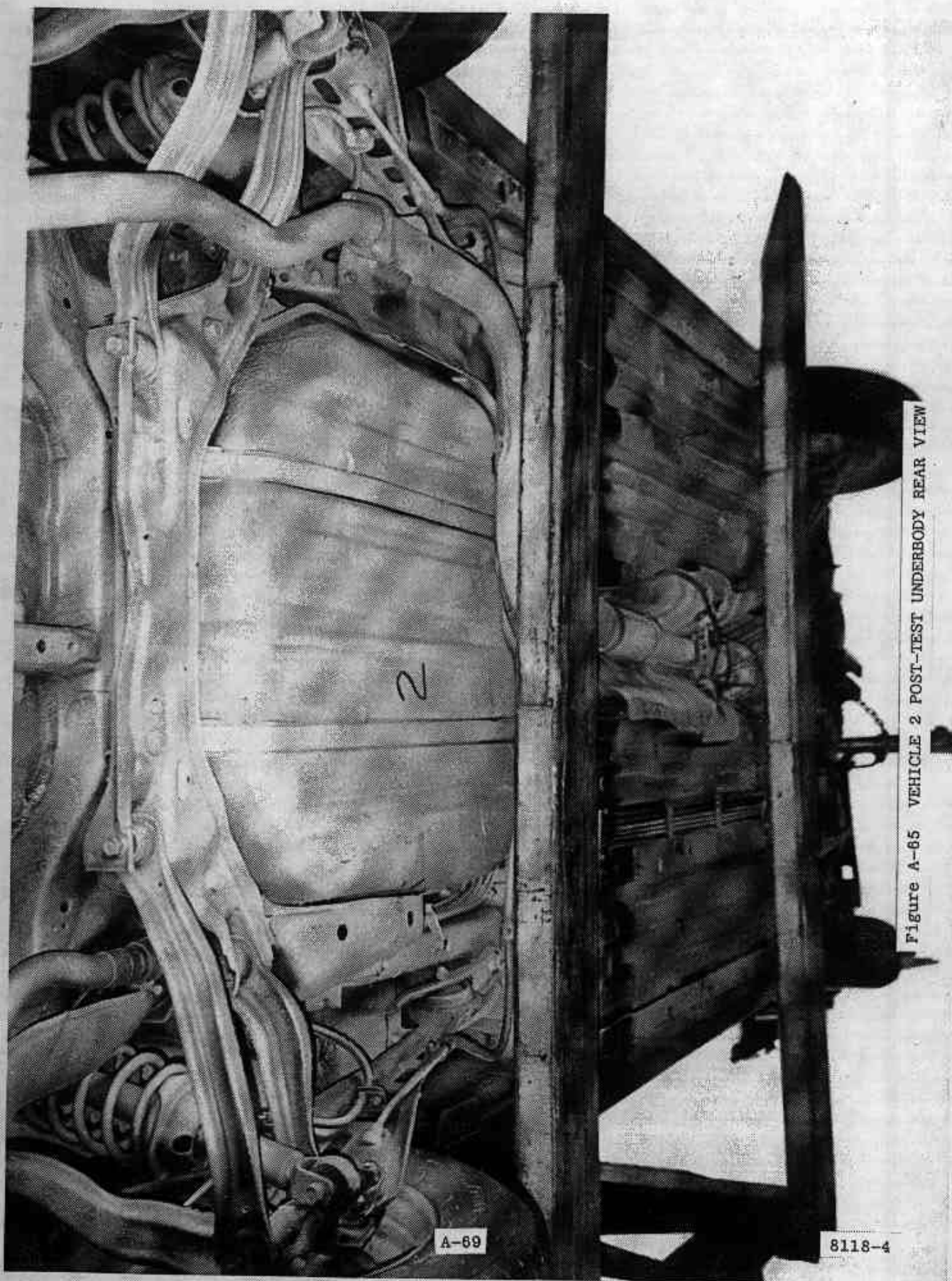


Figure A-64 VEHICLE 2 PRE-TEST UNDERBODY REAR VIEW

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Figure A-65 VEHICLE 2 POST-TEST UNDERBODY REAR VIEW

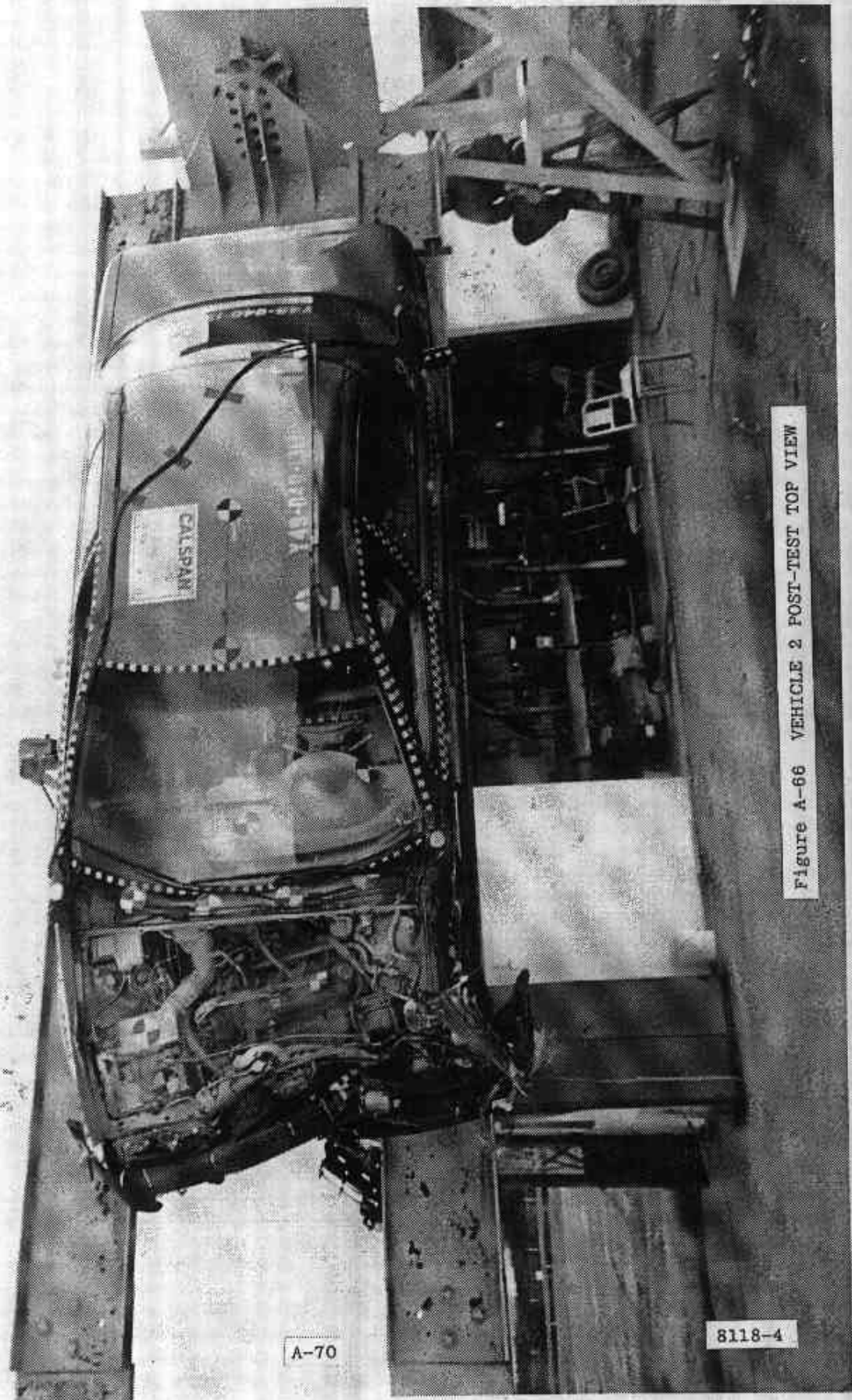


Figure A-66 VEHICLE 2 POST-TEST TOP VIEW

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Figure A-67 VEHICLE 2 PRE-TEST DRIVER POSITION VIEW

Figure A-68 VEHICLE 2 POST-TEST DRIVER POSITION VIEW

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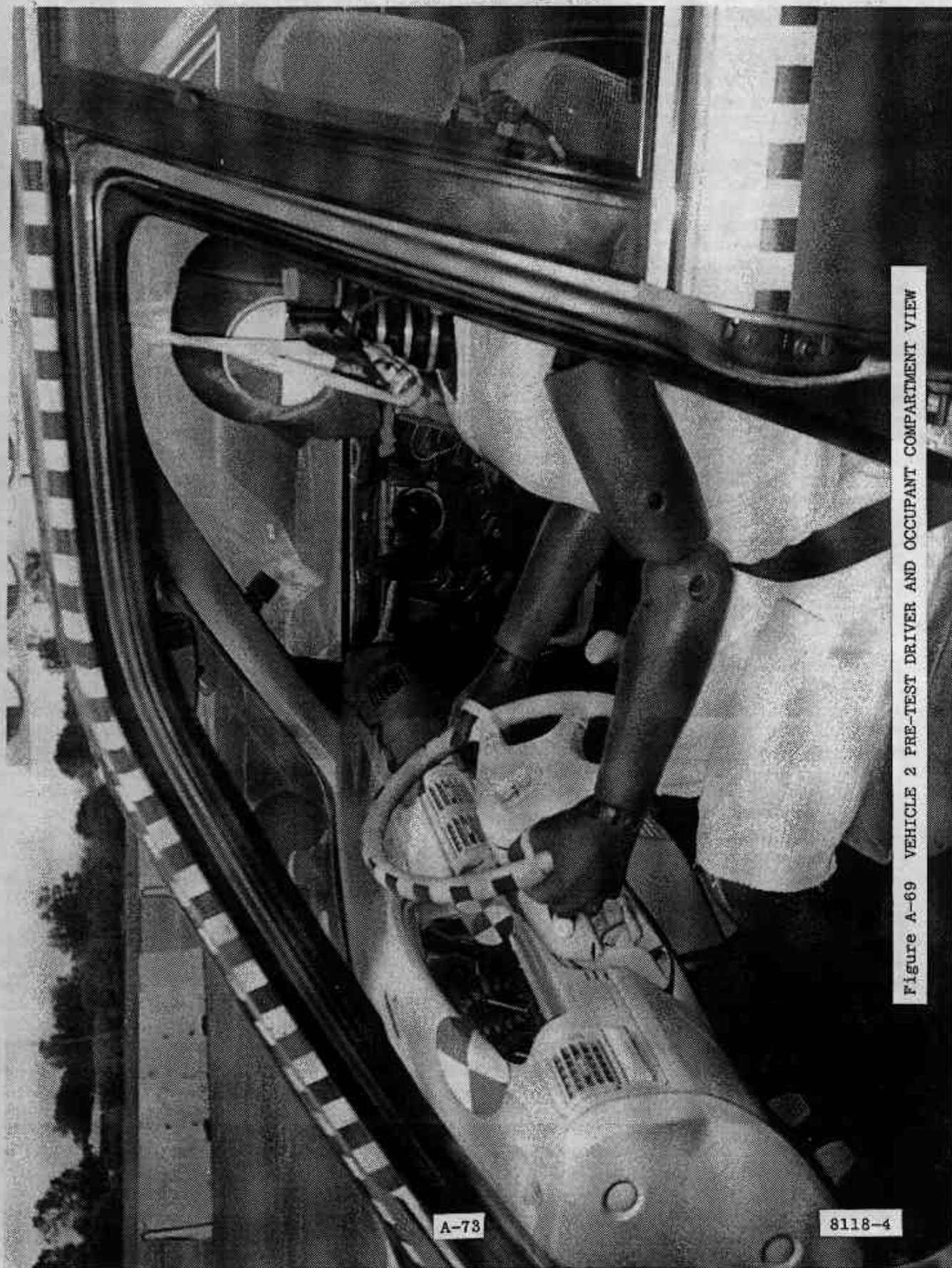


Figure A-69 VEHICLE 2 PRE-TEST DRIVER AND OCCUPANT COMPARTMENT VIEW

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PHOTOGRAPH NOT AVAILABLE

Figure A-70 VEHICLE 2 POST-TEST DRIVER AND OCCUPANT COMPARTMENT VIEW



Figure A-71 VEHICLE 2 PRE-TEST DRIVER AND OCCUPANT COMPARTMENT RIGHT SIDE VIEW

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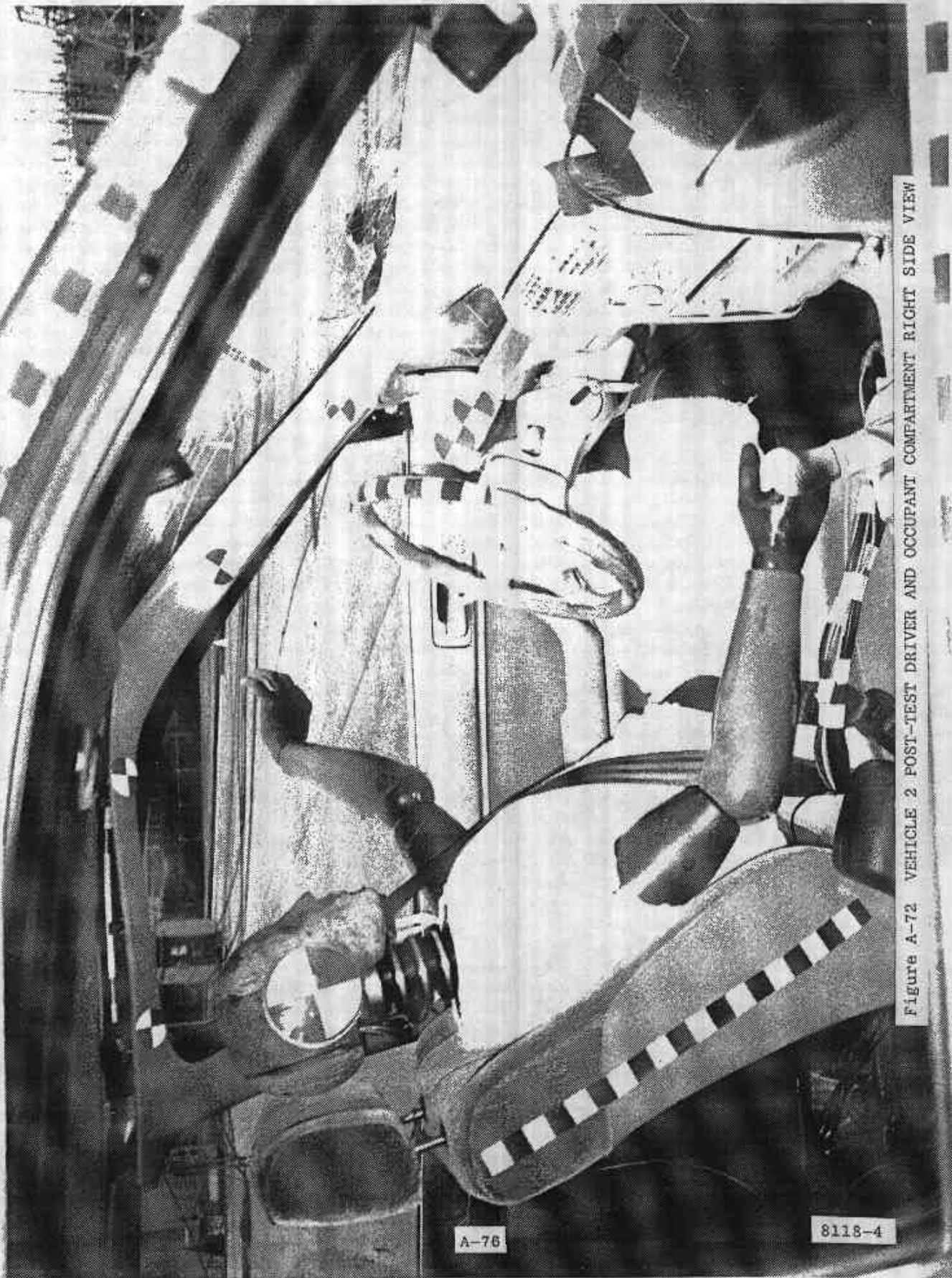


Figure A-72 VEHICLE 2 POST-TEST DRIVER AND OCCUPANT COMPARTMENT RIGHT SIDE VIEW

A-76

8118-4

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

Key: V1 - Vehicle 1
V2 - Vehicle 2

TEST NO. Y049-0040-1317

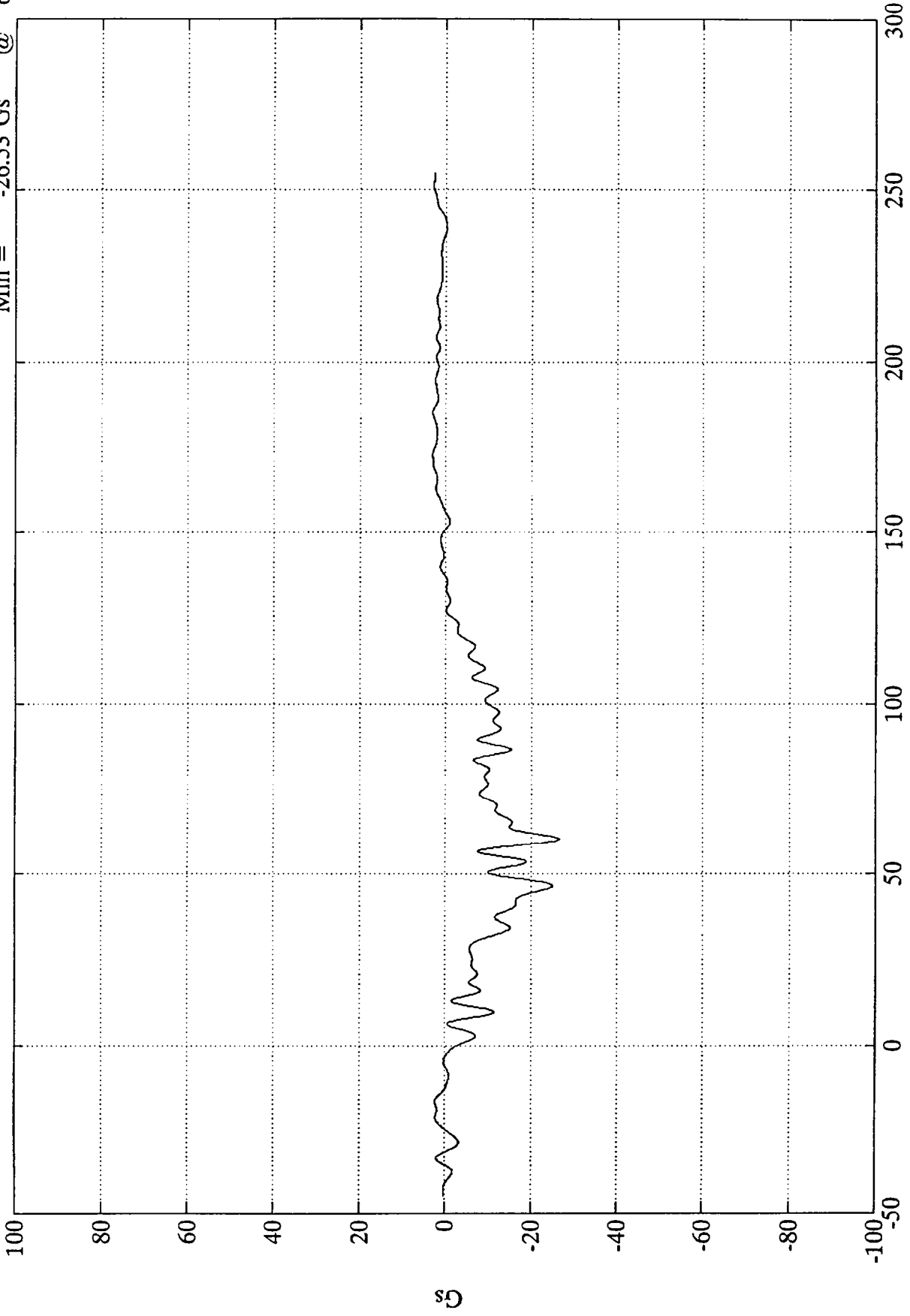
VEHICLE 1 DATA

SAE FILTER CHANNEL CLASS

60

V1 L.R. Seat X Mem. (X)

Max = 3.11 Gs @ 185.40 ms
Min = -26.53 Gs @ 60.12 ms

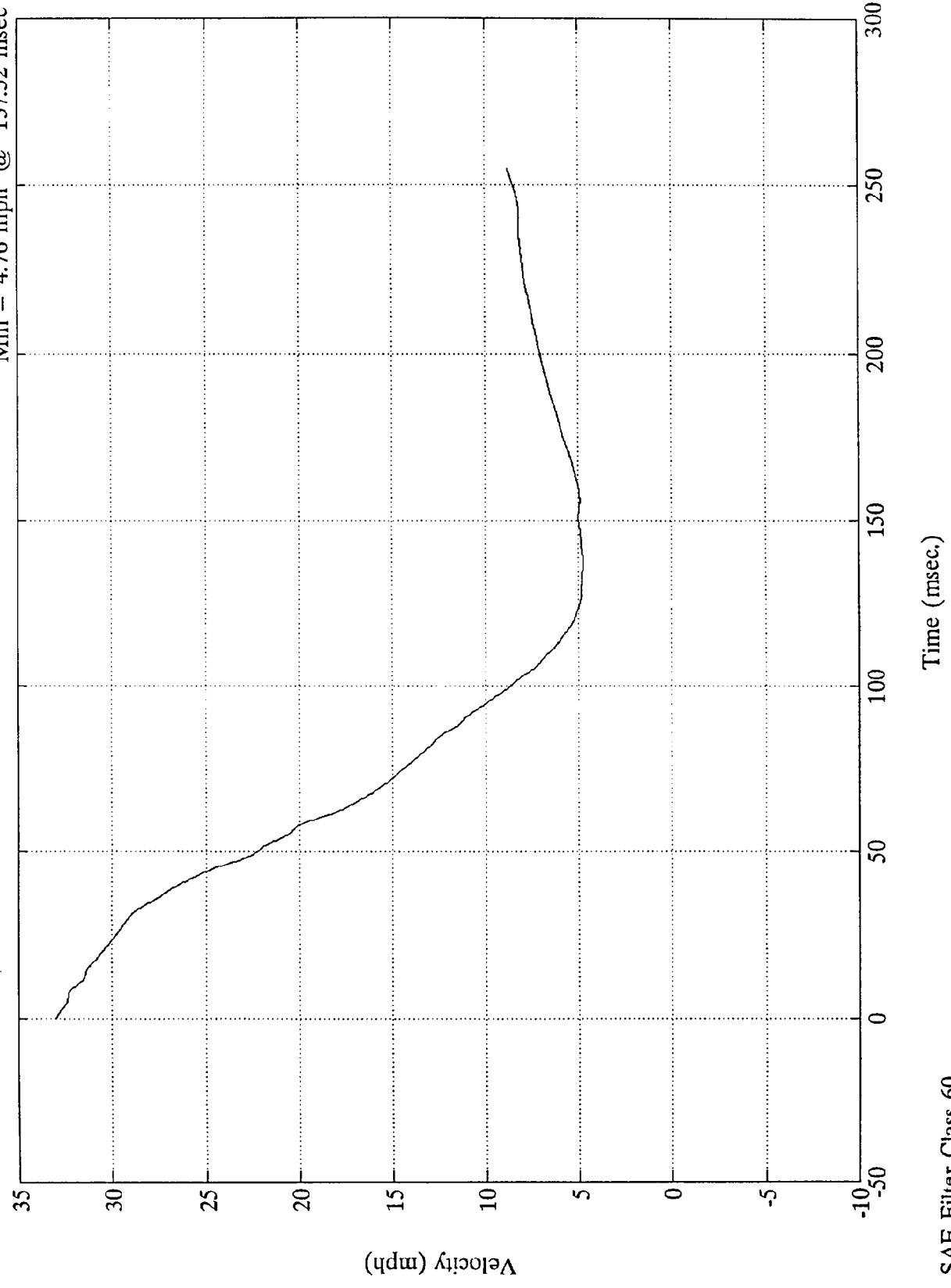


Time (msec)

SAE Filter Class 60

VTV Test 4 - V1 93 CHEVROLET CORSICA

V1 L. Rear Seat X-member X
Max = 33.00 mph @ -0.00 msec
Min = 4.76 mph @ 137.52 msec

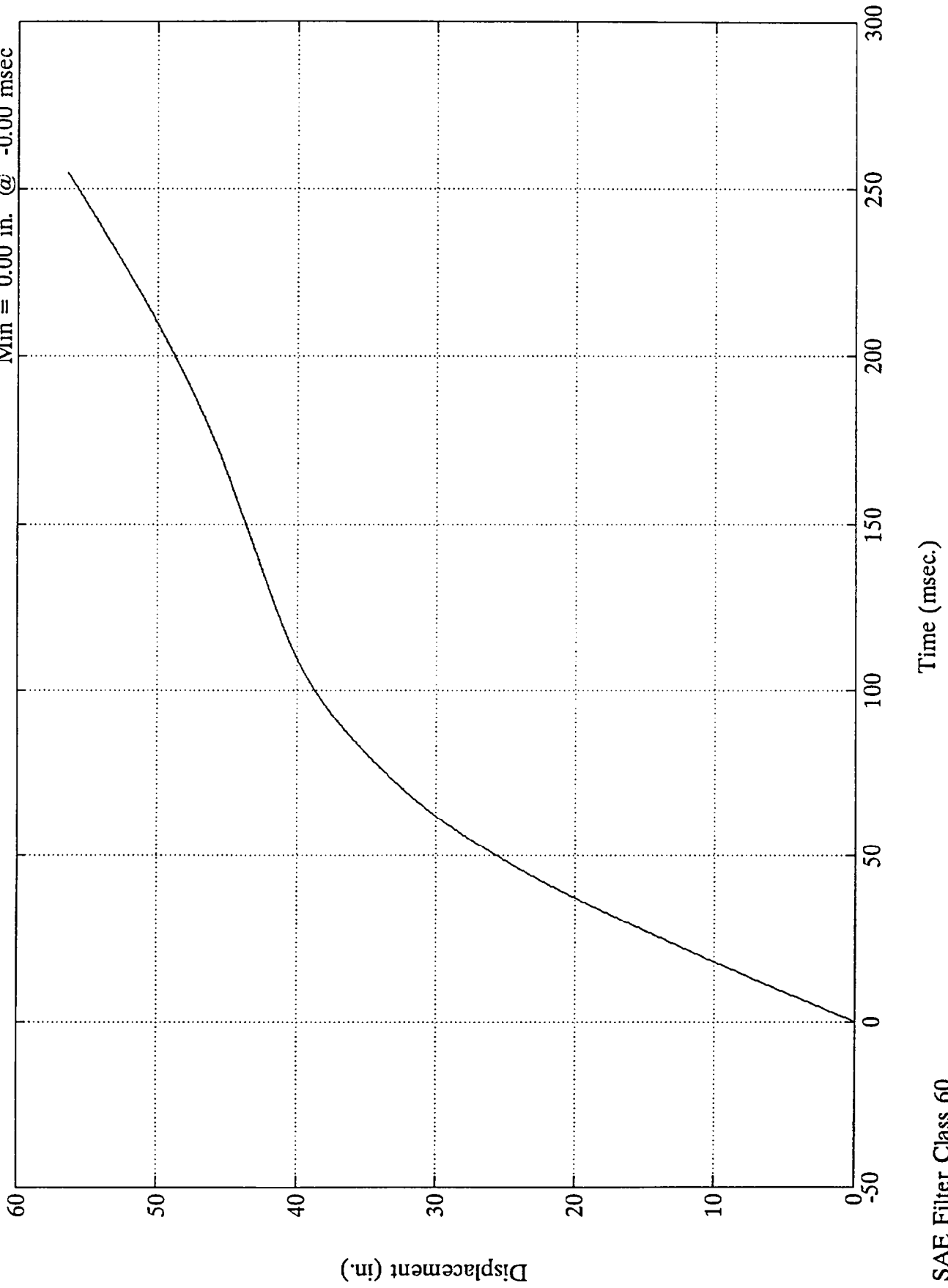


SAE Filter Class 60

VTV Test 4 - V1 93 CHEVROLET CORSICA

V1 L. Rear Seat X-member X

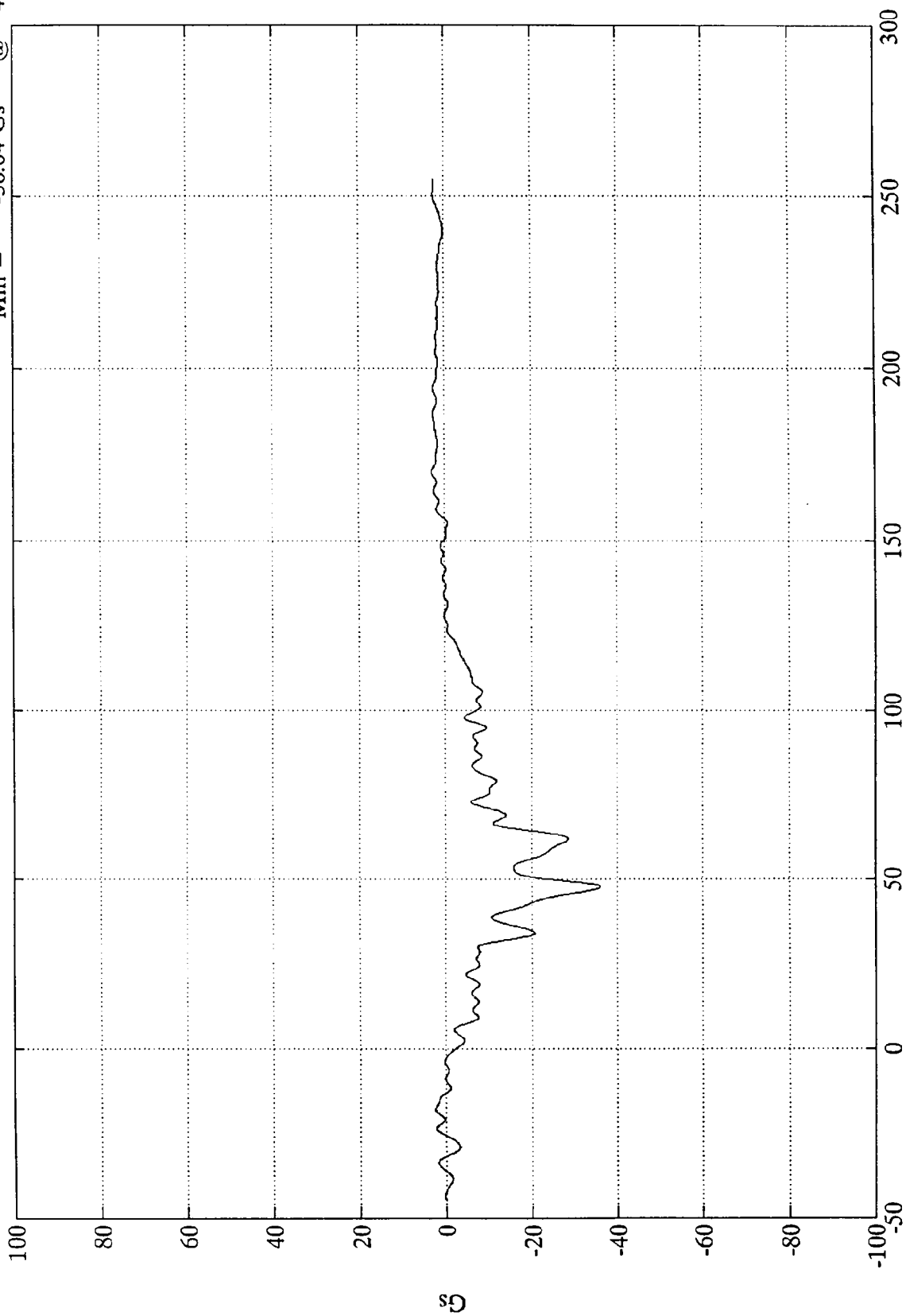
Max = 56.46 in. @ 254.88 msec
Min = 0.00 in. @ -0.00 msec



VTV TEST #4 - 30 Deg.

V1 R.R. Seat X Mem. (X)

Max = 3.01 Gs @ 170.16 msec
Min = -36.04 Gs @ 47.76 msec



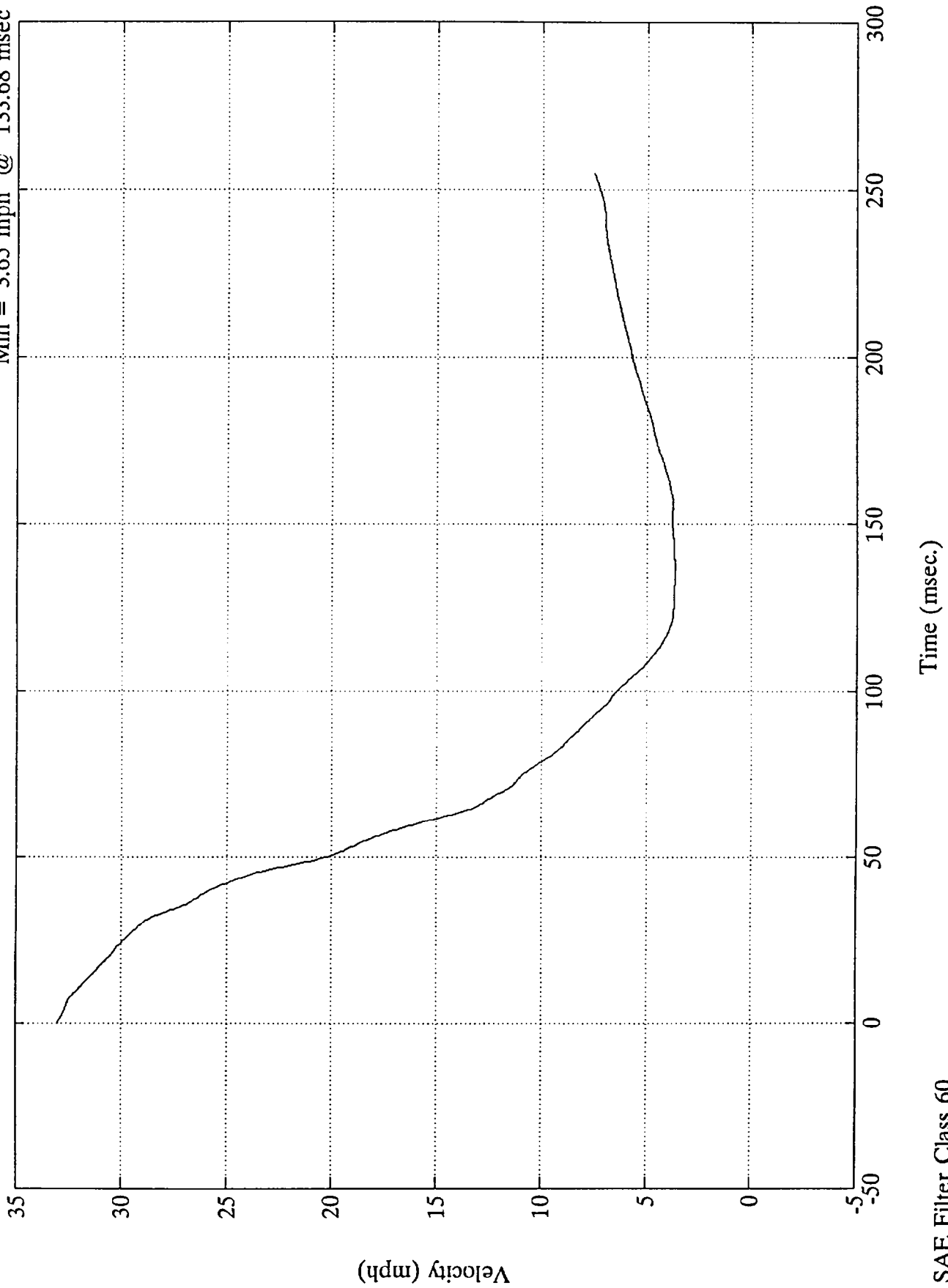
Time (msec)

SAE Filter Class 60

VTV Test 4 - V1 93 CHEVROLET CORSICA

V1 R. Rear Seat X-member X

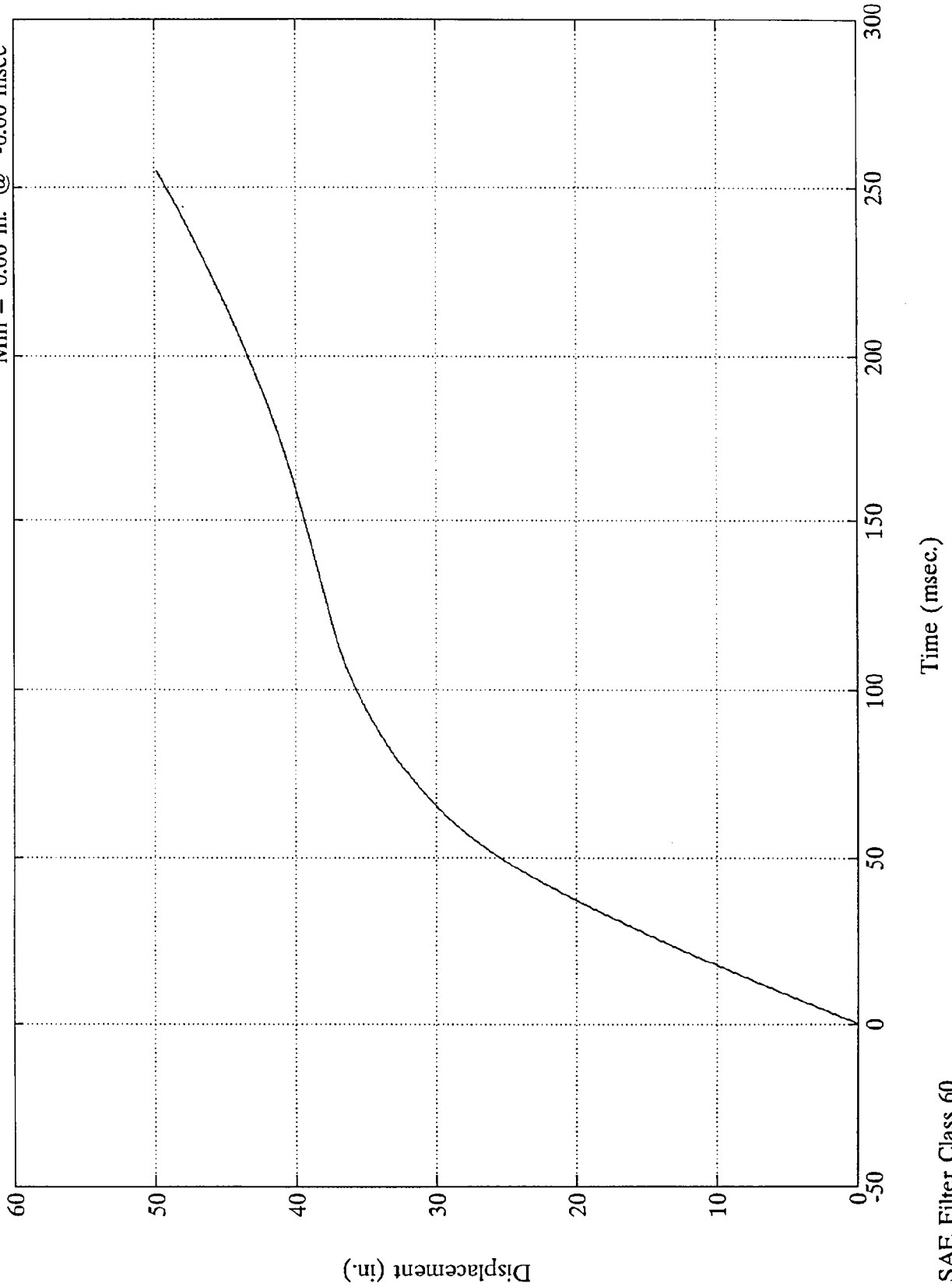
Max = 33.00 mph @ -0.00 msec
Min = 3.65 mph @ 133.68 msec



VTV Test 4 - V1 93 CHEVROLET CORSICA

V1 R. Rear Seat X-member X

Max = 49.80 in. @ 254.88 msec
Min = 0.00 in. @ -0.00 msec

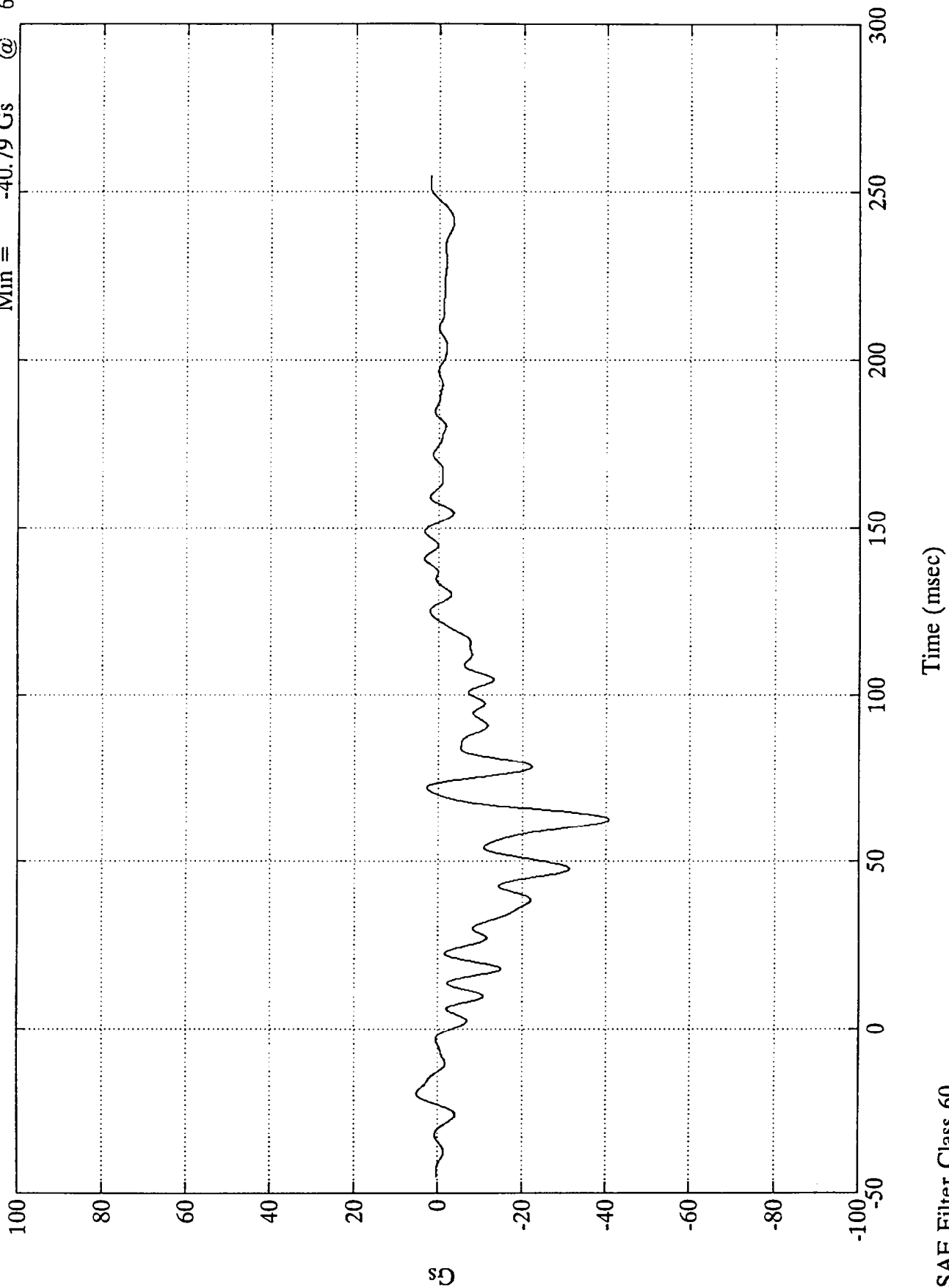


SAE Filter Class 60

V1 R.Seat C/L X Mem. (X)

Max = 5.07 Gs
Min = -40.79 Gs

@ -19.56 msec
@ 62.51 msec



B-9

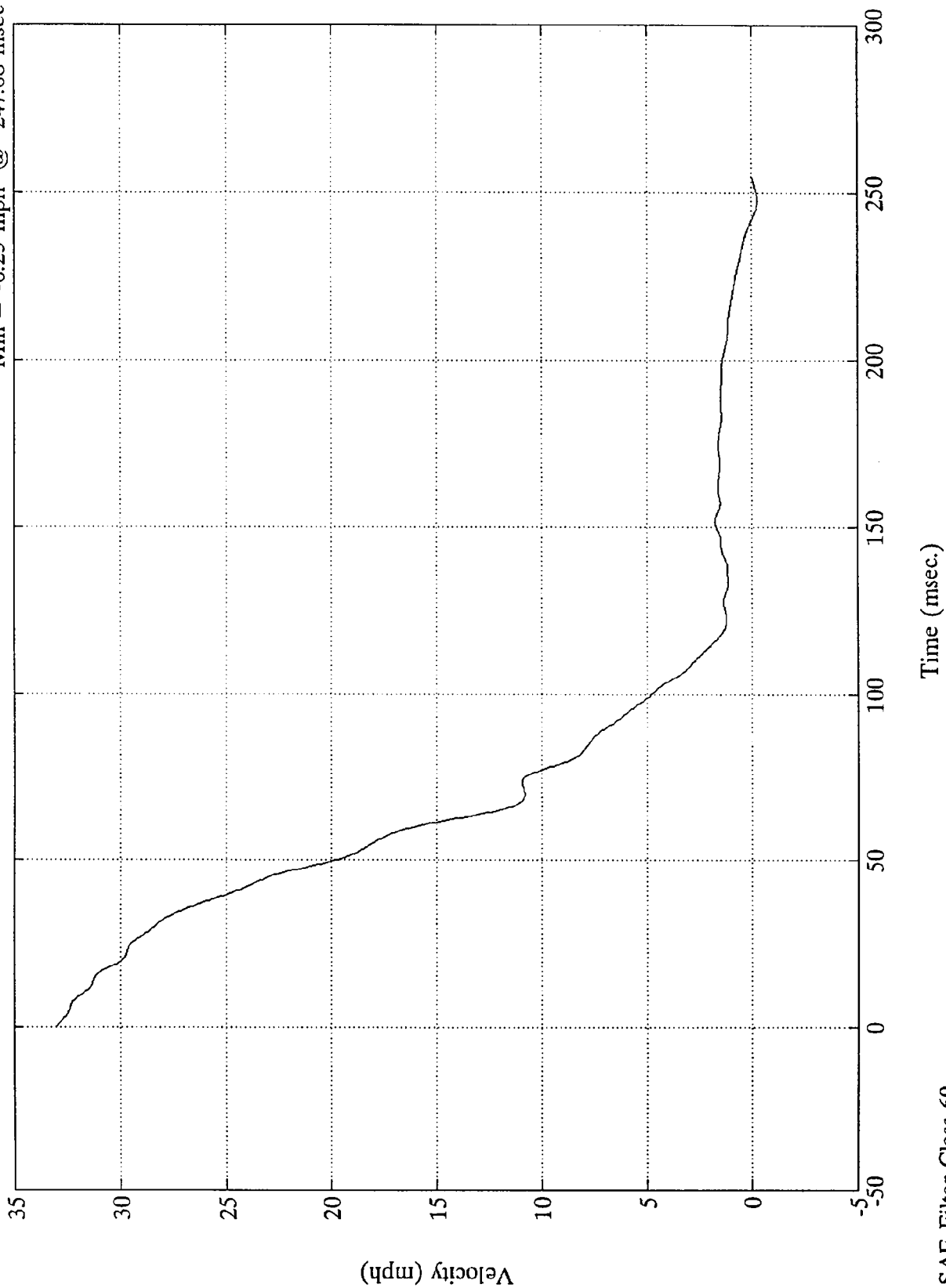
8118-4

SAE Filter Class 60

VTV Test 4 - V1 93 CHEVROLET CORSICA

V1 Rear Seat C/L X-member X

Max = 33.00 mph @ -0.00 msec
Min = -0.25 mph @ 247.68 msec

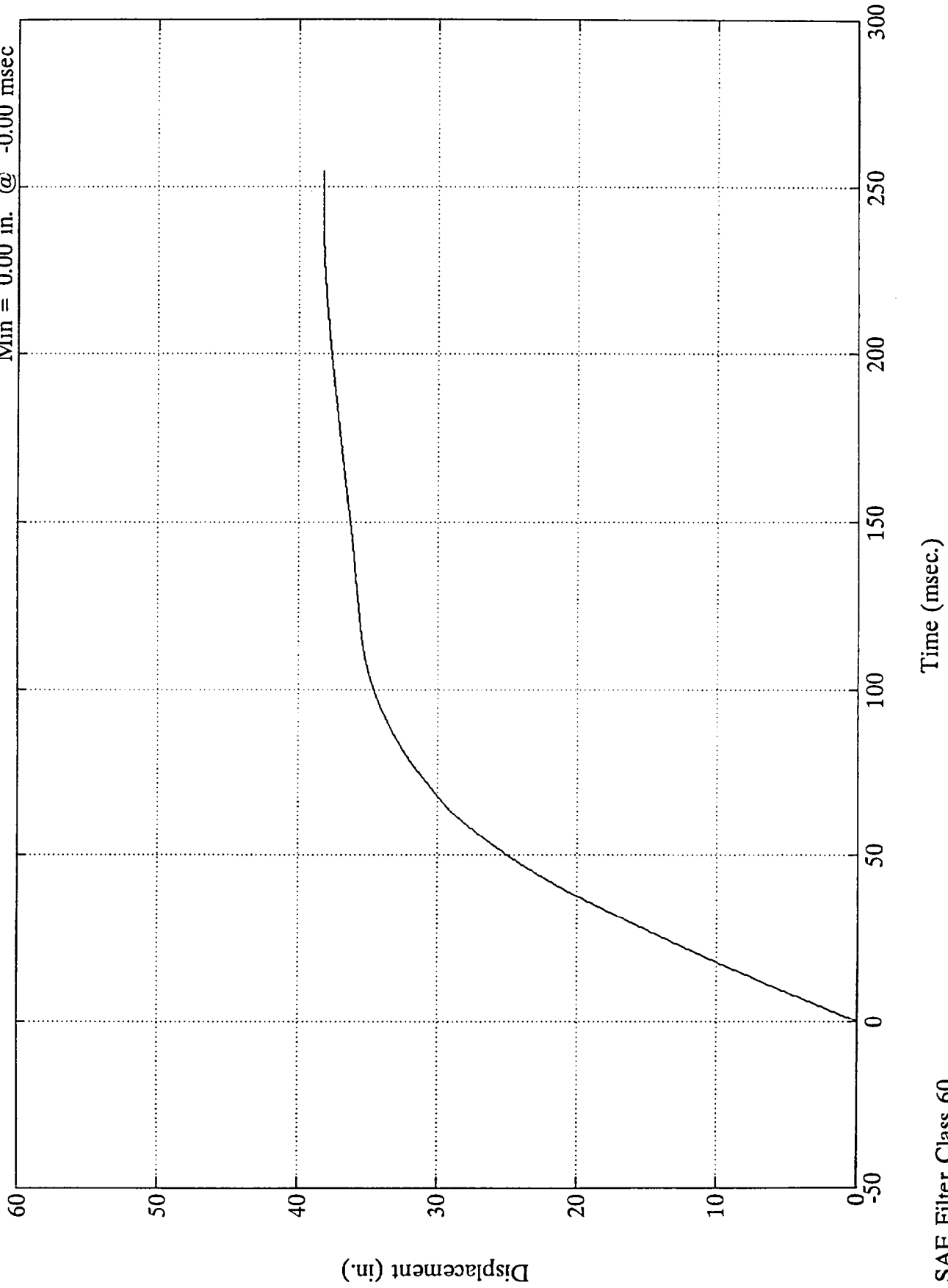


SAE Filter Class 60

VTV Test 4 - V1 93 CHEVROLET CORSICA

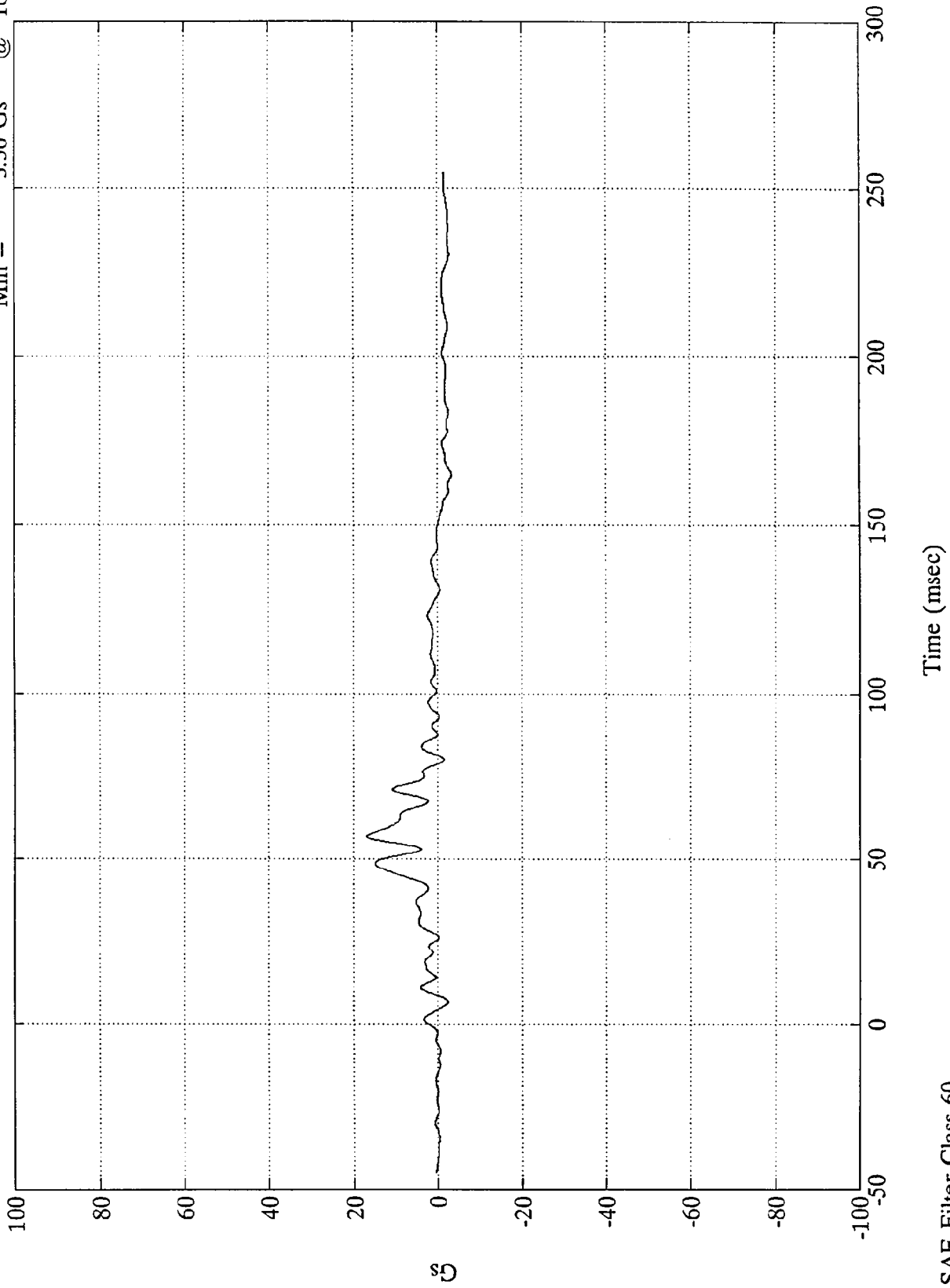
V1 Rear Seat C/L X-member X

Max = 38.29 in. @ 244.08 msec
Min = 0.00 in. @ -0.00 msec



VTV TEST #4 - 30 Deg.

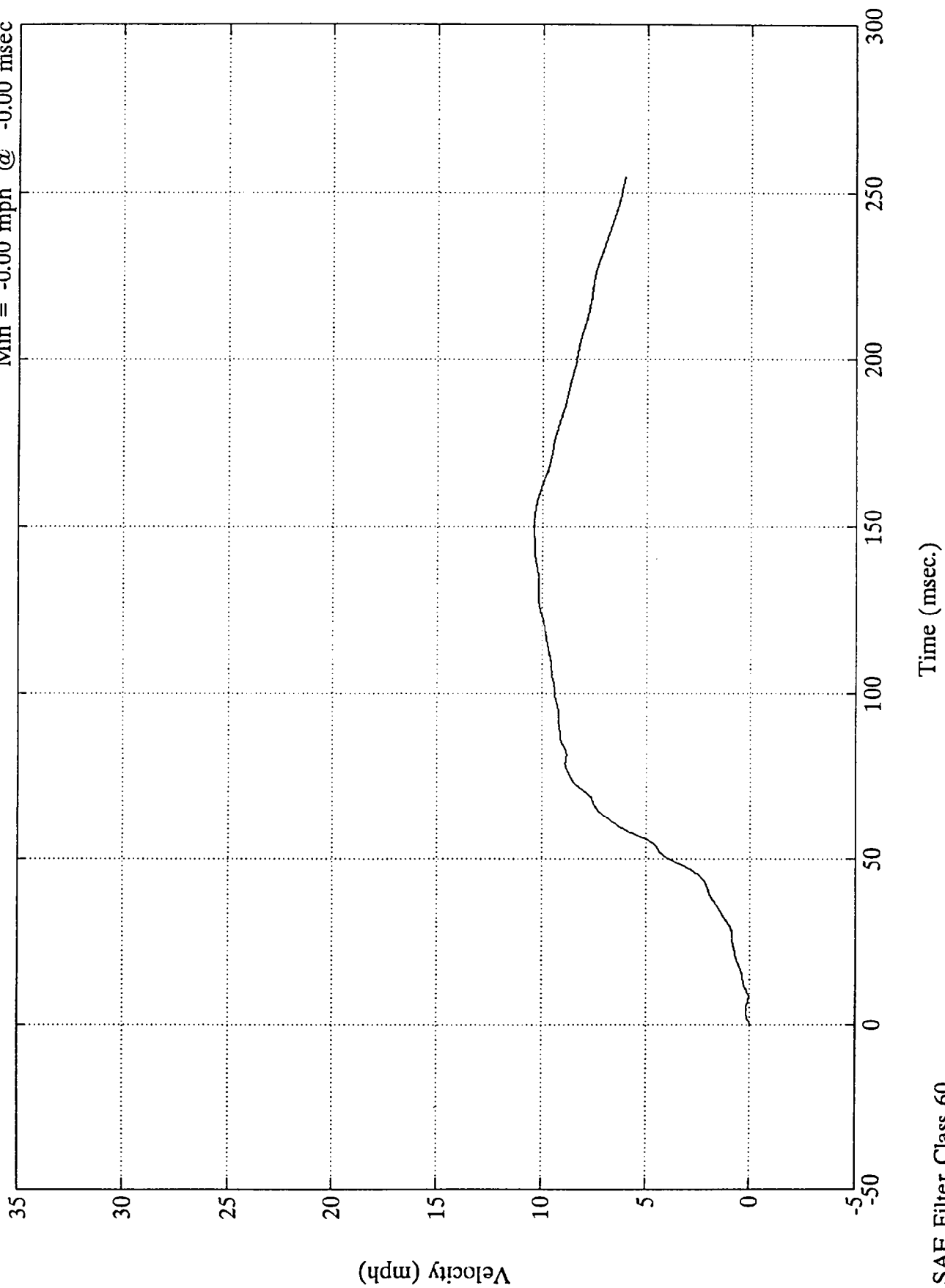
V1 R.Seat C/L X Mem. (Y) Max = -16.80 Gs @ 56.76 msec
Min = 3.30 Gs @ 165.00 msec



VTV Test 4 - V1 93 CHEVROLET CORSICA

V1 Rear Seat C/L X-member Y

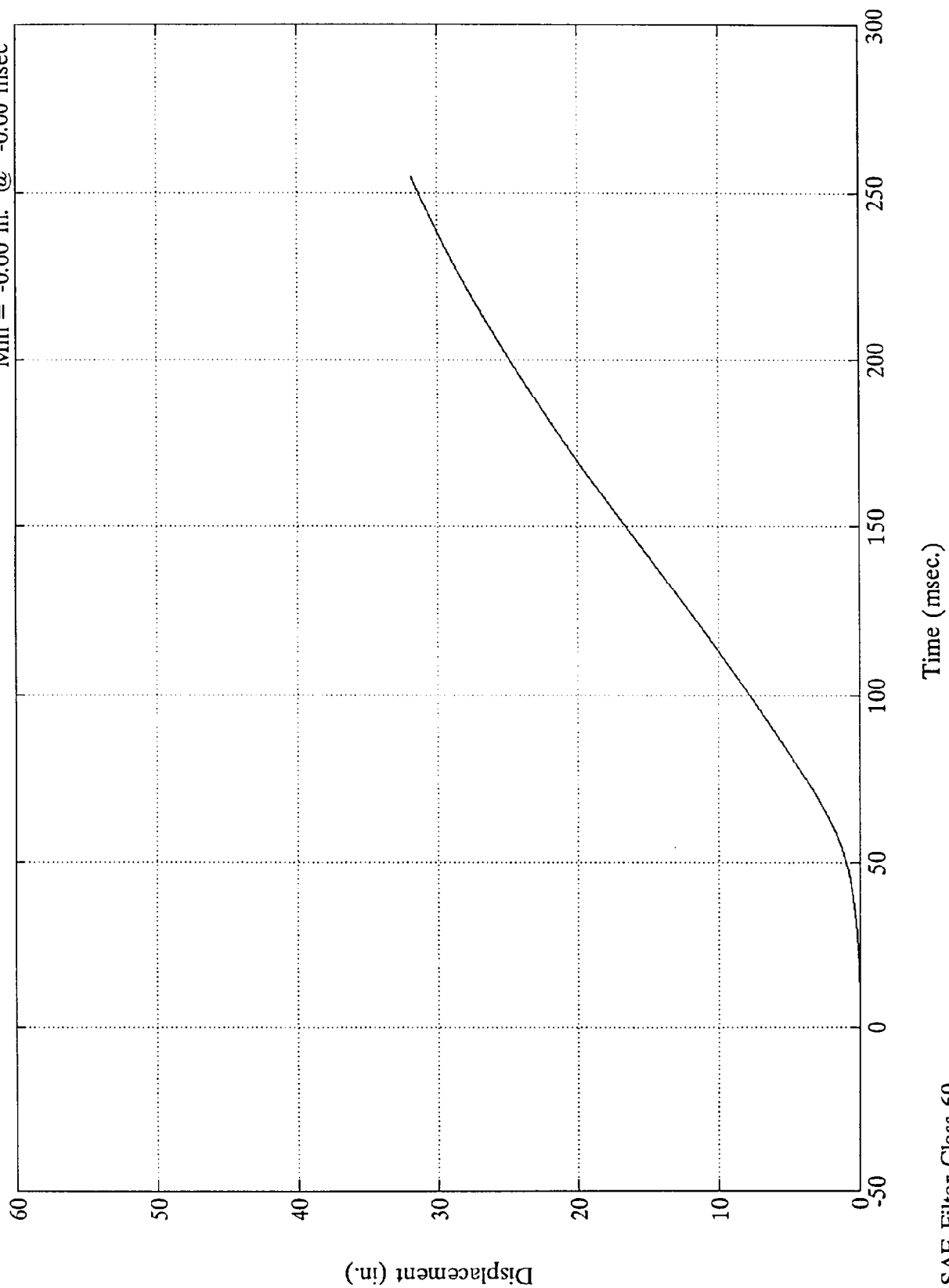
Max = 10.39 mph @ 150.96 msec
Min = -0.00 mph @ -0.00 msec



VTV Test 4 - V1 93 CHEVROLET CORSICA

V1 Rear Seat C/L X-member Y

Max = 31.87 in. @ 254.88 msec
Min = -0.00 in. @ -0.00 msec

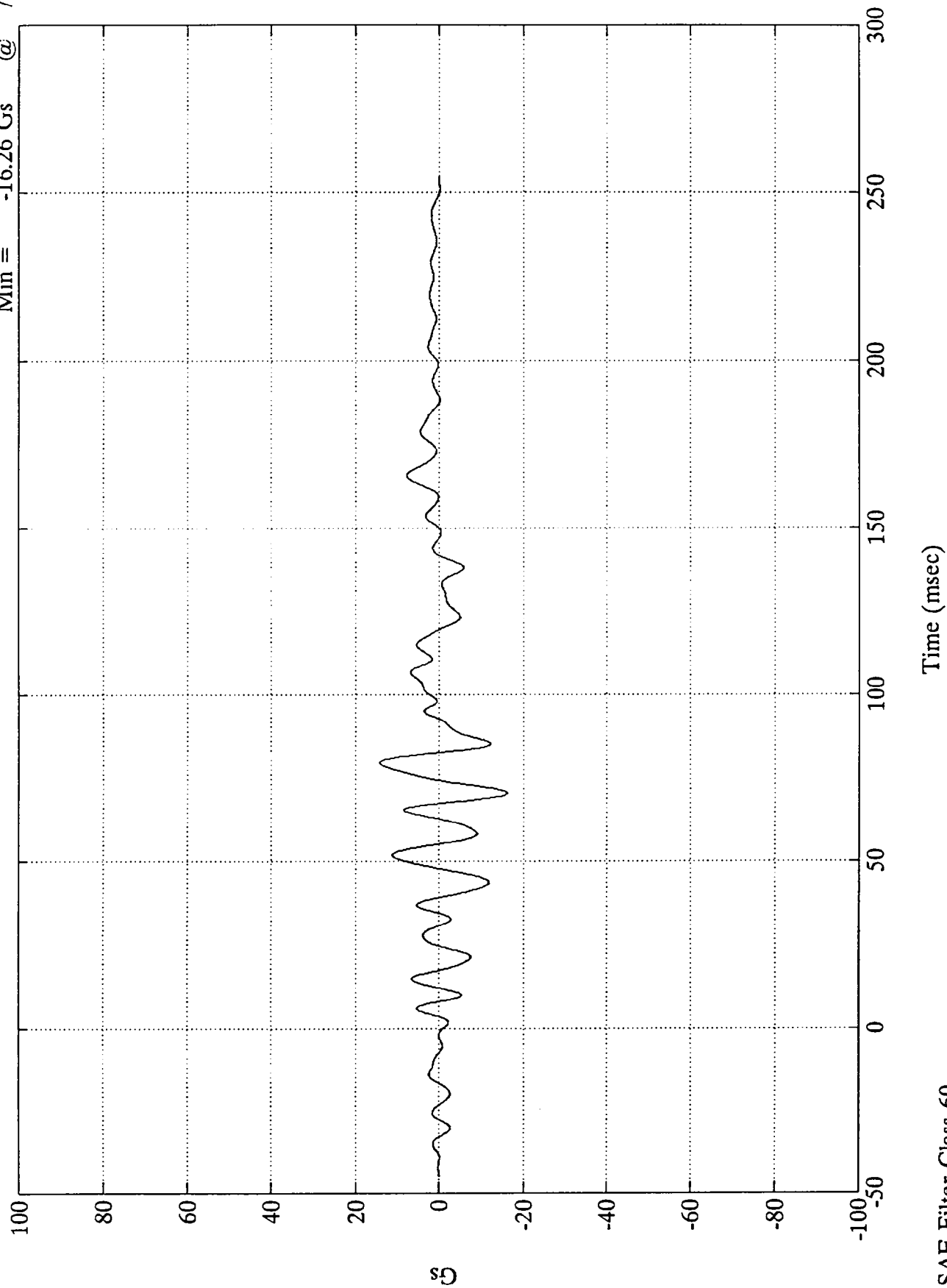


VTW TEST #4 - 30 Deg.

V1 R.Seat C/L X Mem. (Z)

Max = 14.25 Gs
Min = -16.26 Gs

@ 79.56 ms
@ 70.55 ms



B-15

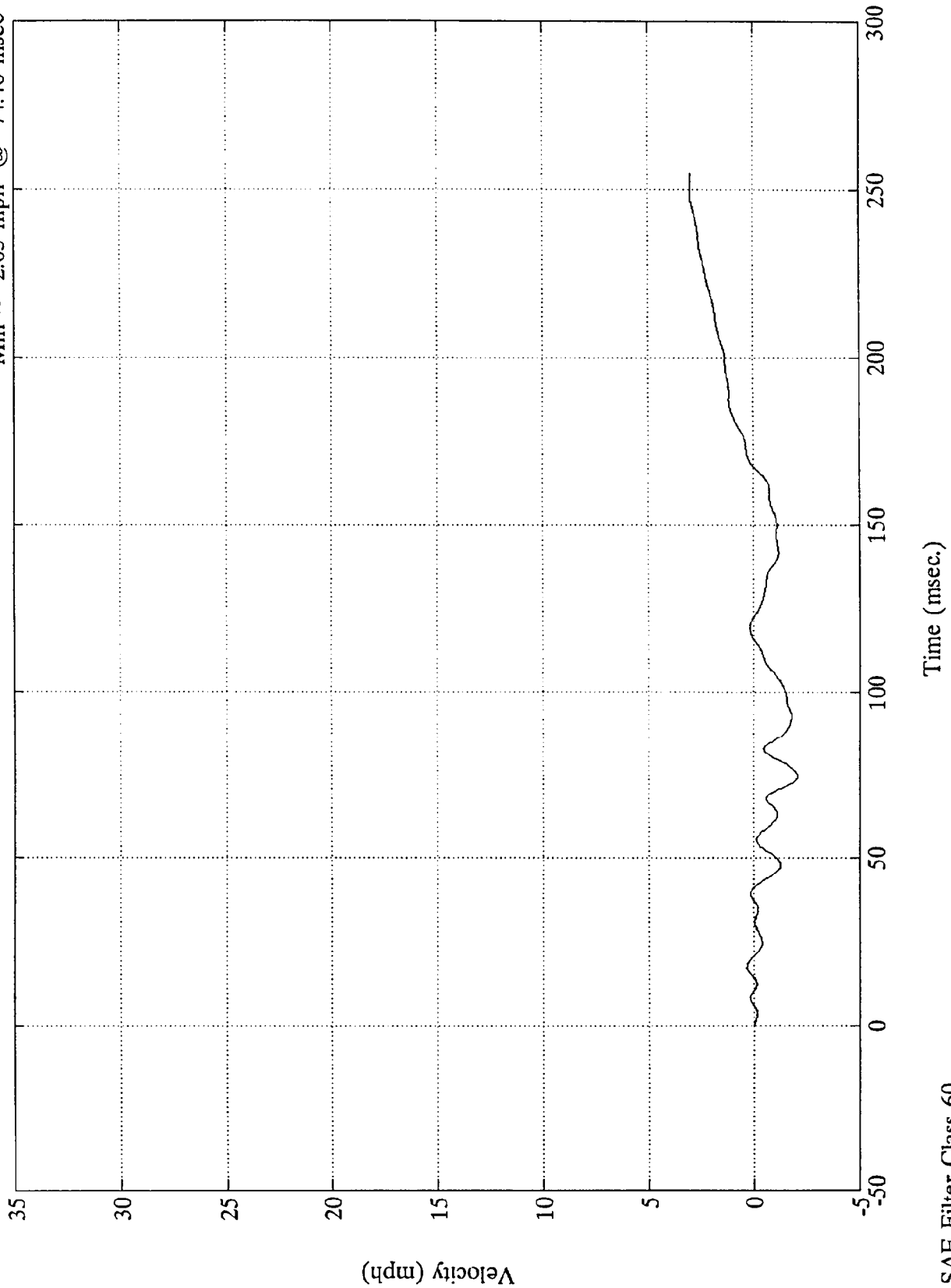
8118-4

SAE Filter Class 60

VTV Test 4 - V1 93 CHEVROLET CORSICA

V1 Rear Seat C/L X-member Z

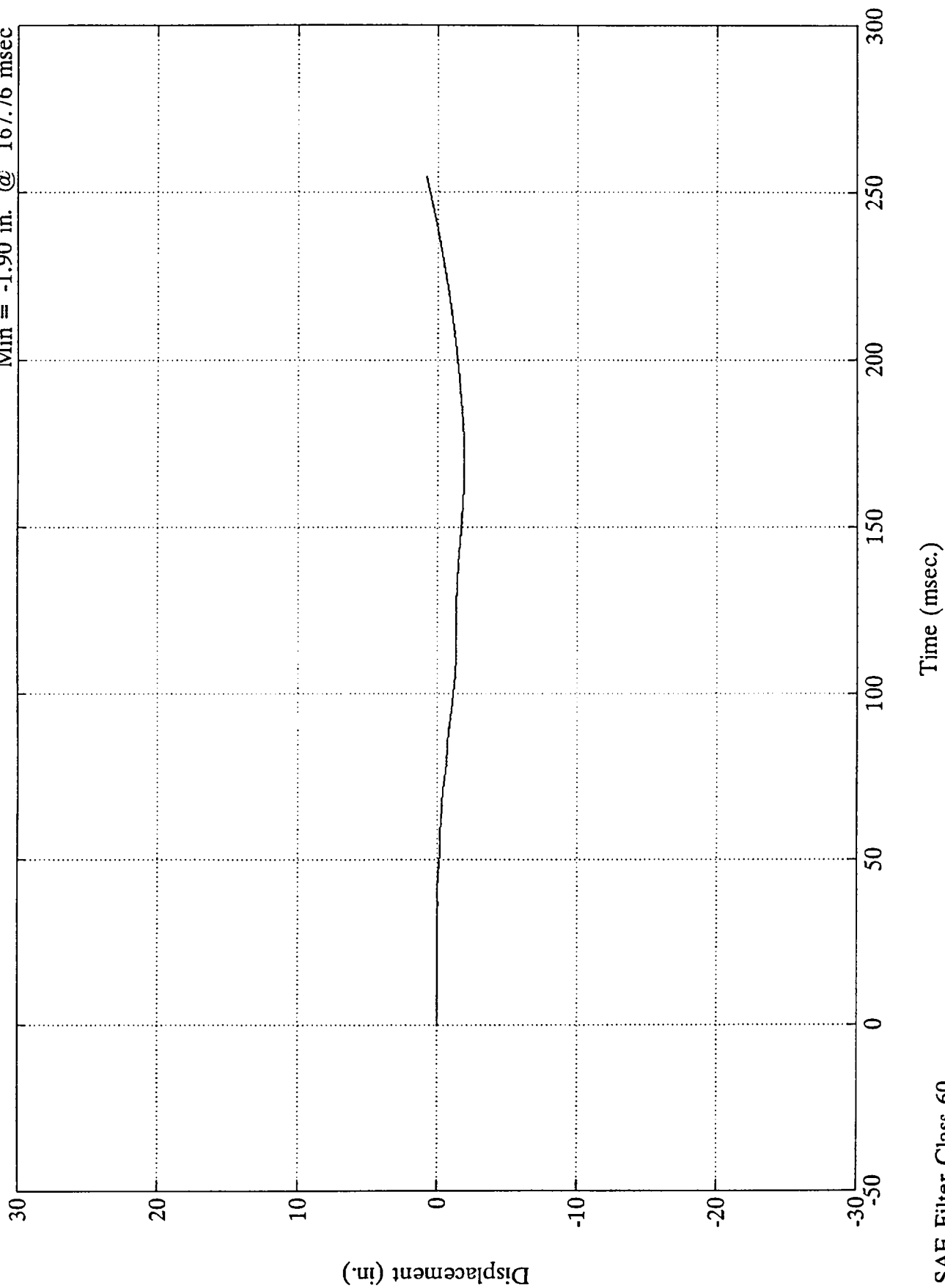
Max = 2.99 mph @ 250.32 msec
Min = -2.05 mph @ 74.40 msec



VTV Test 4 - V1 93 CHEVROLET CORSICA

V1 Rear Seat C/L X-member Z

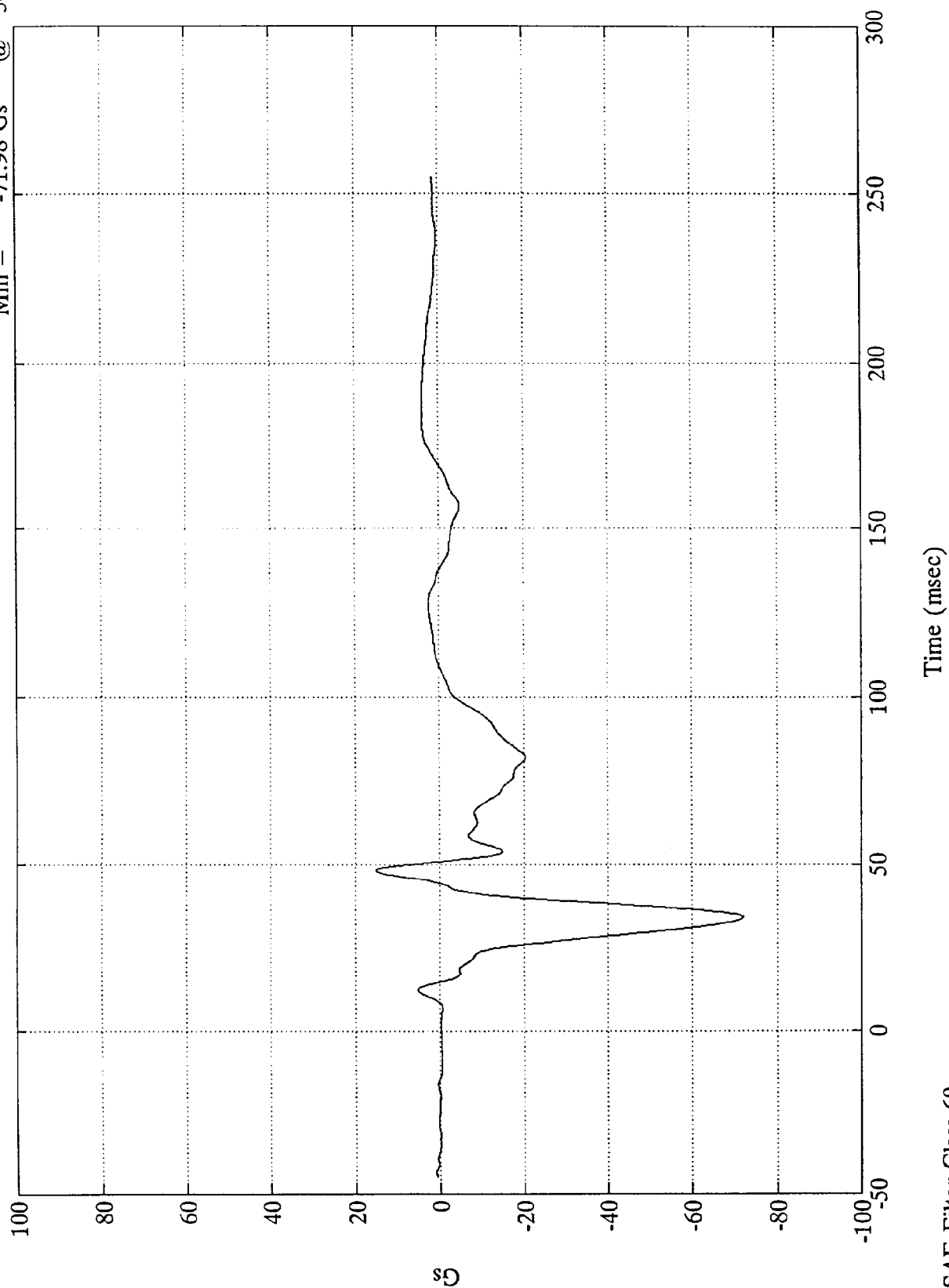
Max = 0.82 in. @ 254.88 msec
Min = -1.90 in. @ 167.76 msec



VTV TEST #4 - 30 Deg.

Max = 15.13 Gs @ 48.36 msec
Min = -71.98 Gs @ 34.20 msec

V1 Engine Top (X)



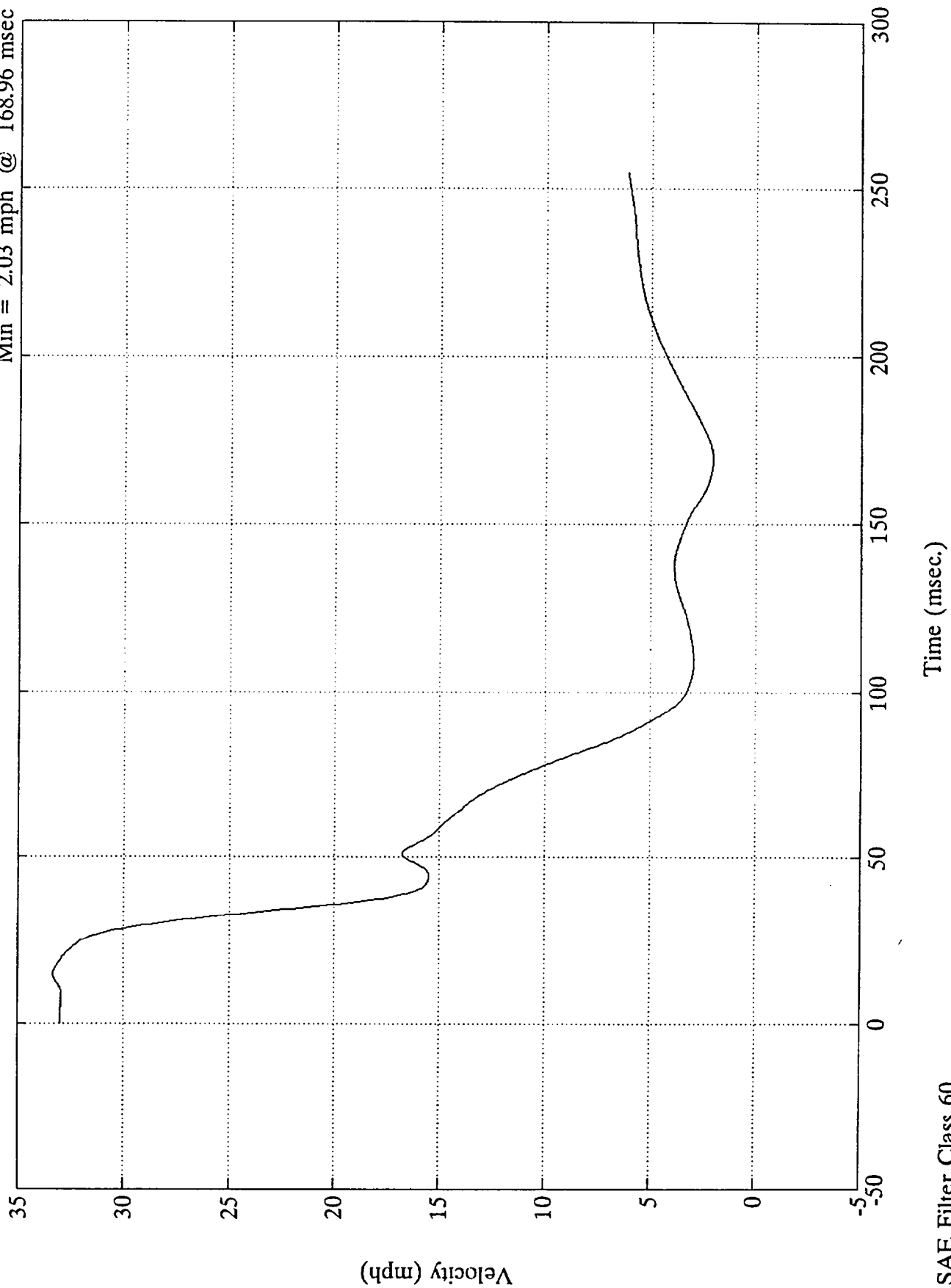
8D
B-18

8118-4

SAE Filter Class 60

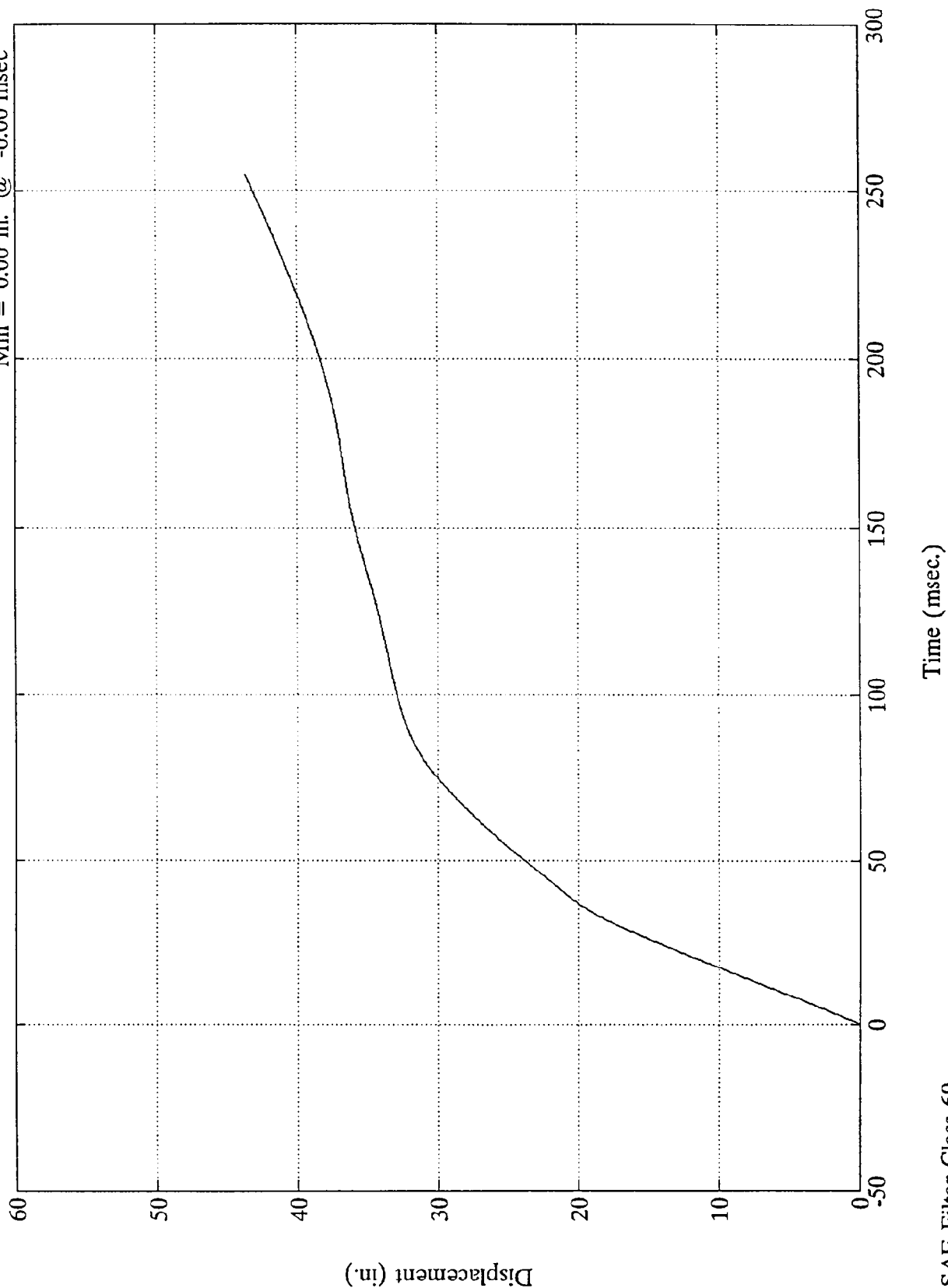
VTV Test 4 - V1 93 CHEVROLET CORSICA

Engine Top X
Max = 33.34 mph @ 14.88 msec
Min = 2.03 mph @ 168.96 msec



VTV Test 4 - V1 93 CHEVROLET CORSICA

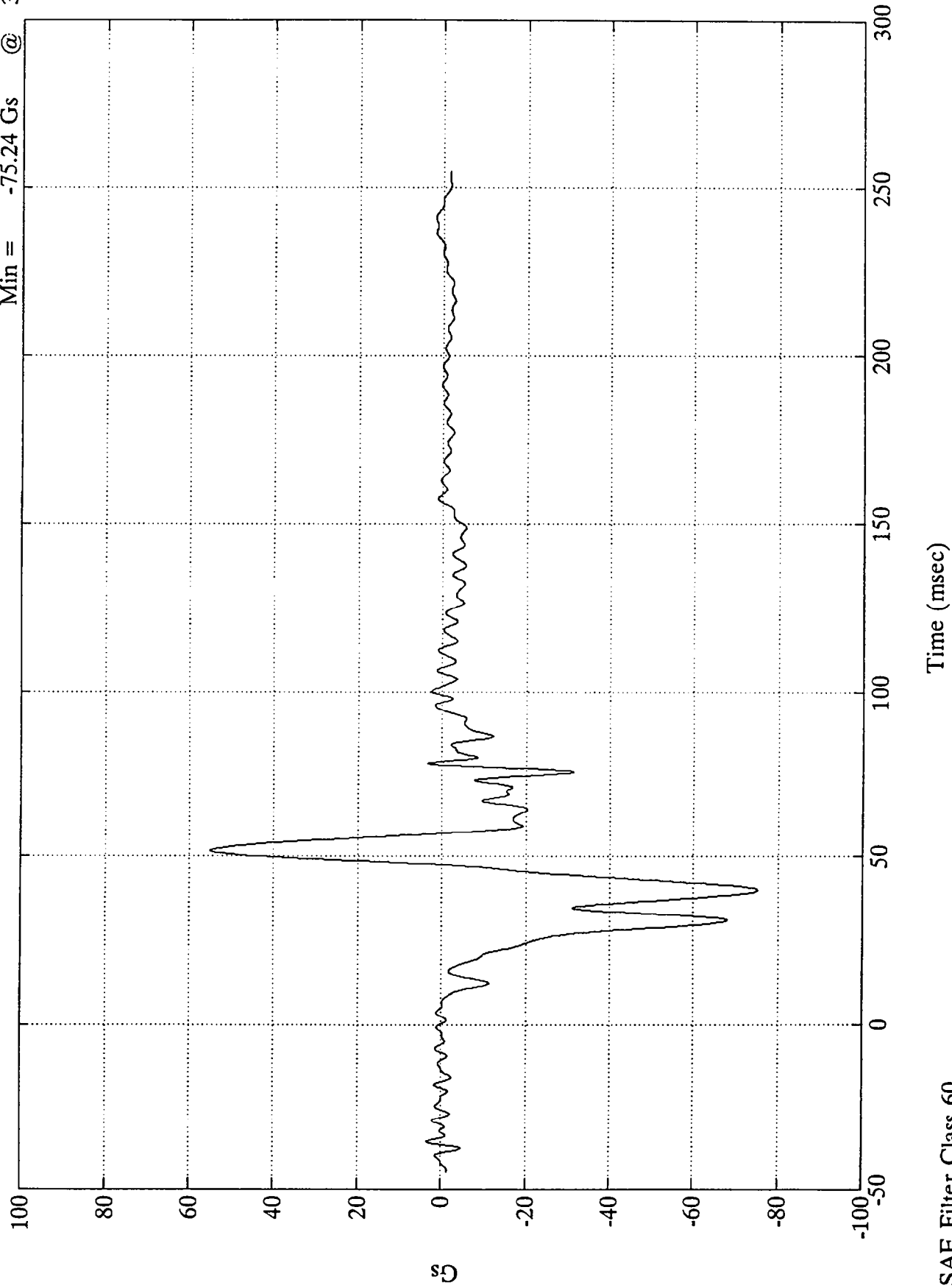
Engine Top X
Max = 43.64 in. @ 254.88 msec
Min = 0.00 in. @ -0.00 msec



SAE Filter Class 60

V1 Engine Bottom (X)

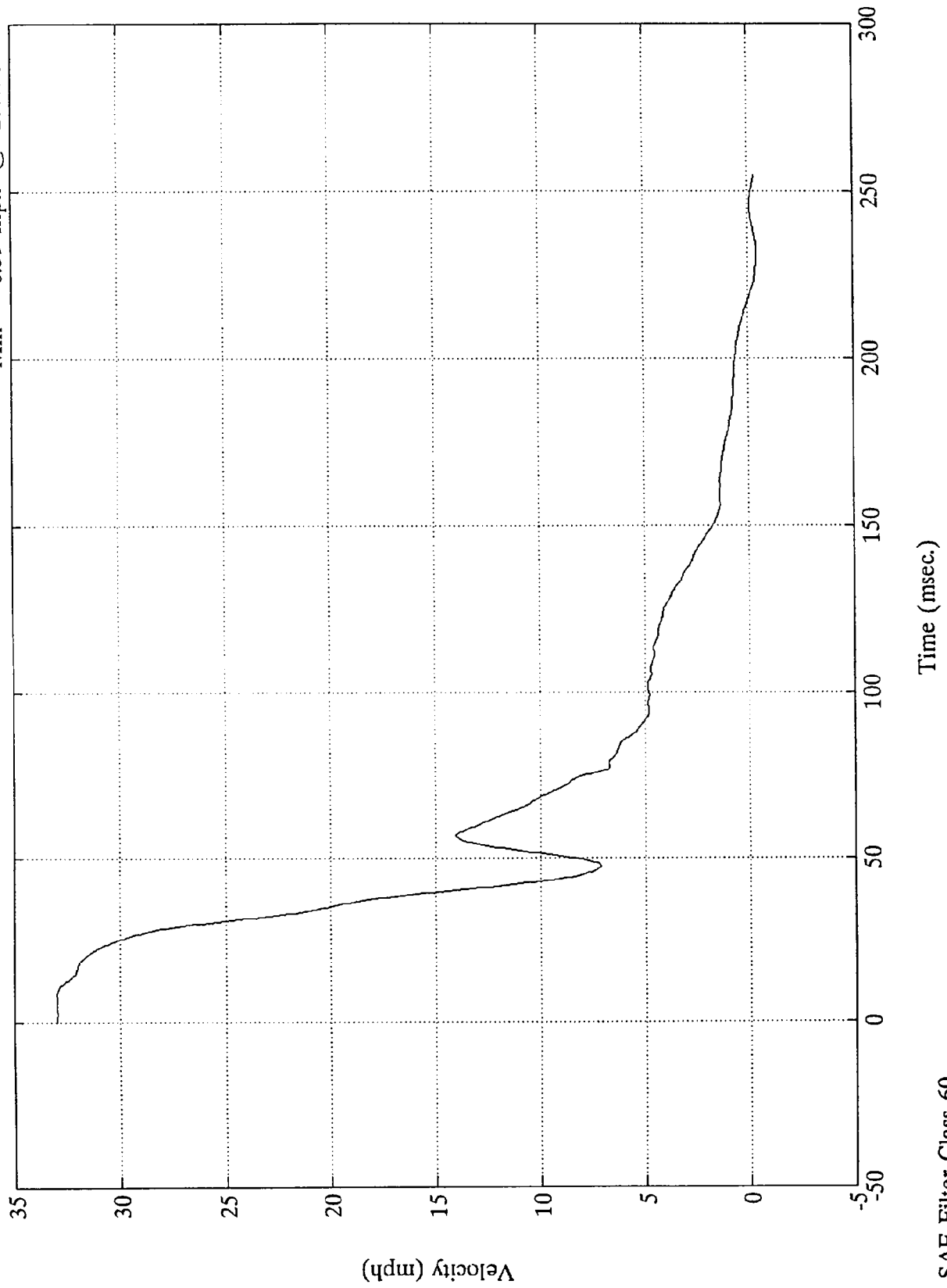
Max = 55.11 Gs @ 51.60 mse
Min = -75.24 Gs @ 39.95 mse



VTV Test 4 - V1 93 CHEVROLET CORSICA

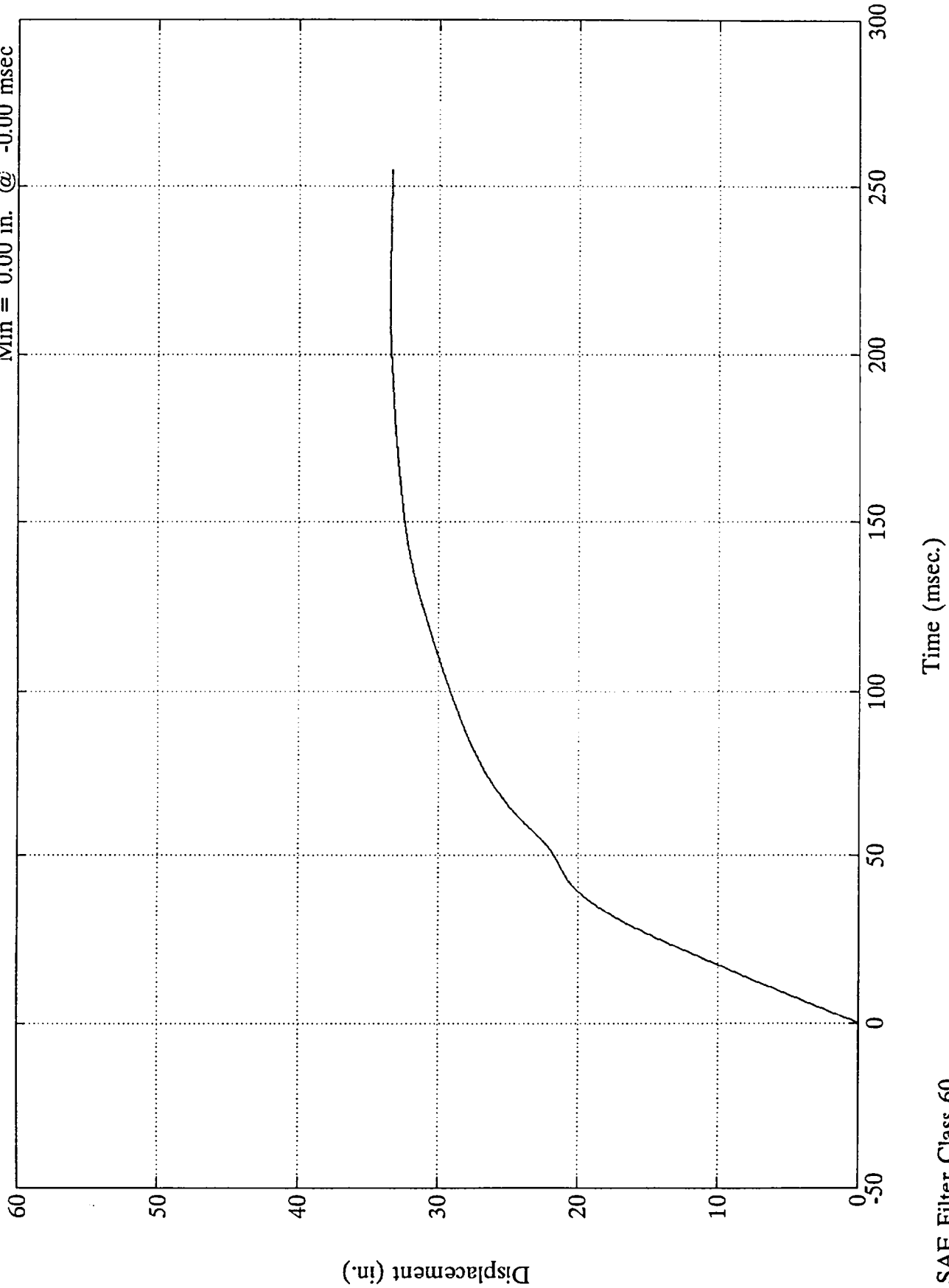
Engine Bottom X

Max = 33.01 mph @ 5.52 msec
Min = -0.39 mph @ 233.52 msec



VTV Test 4 - V1 93 CHEVROLET CORSICA

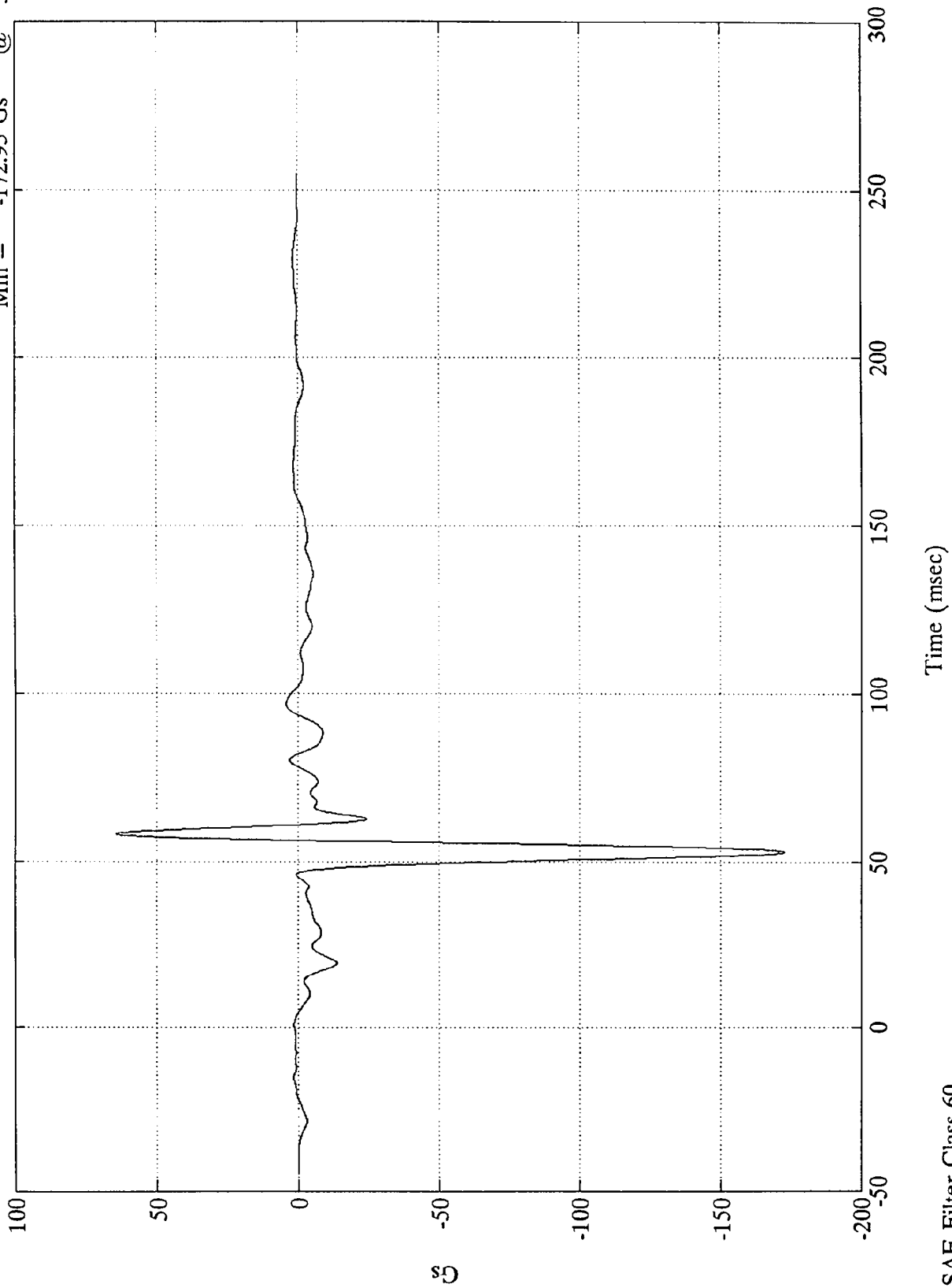
Engine Bottom X
Max = 33.52 in. @ 221.52 msec
Min = 0.00 in. @ -0.00 msec



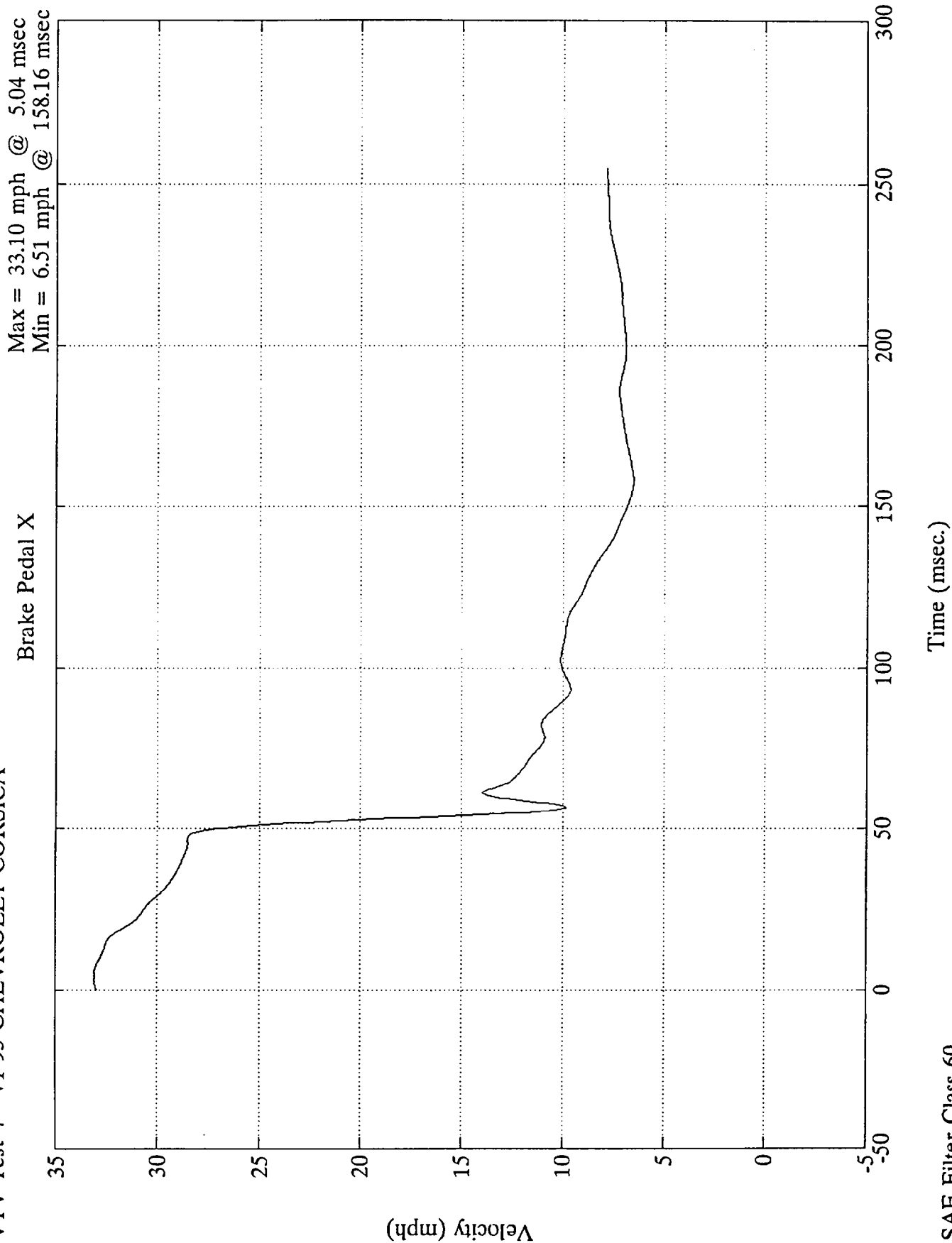
VTV TEST #4 - 30 Deg.

Max = 64.35 Gs @ 58.43 msec
Min = -172.95 Gs @ 53.15 msec

V1 Brake Pedal (X)



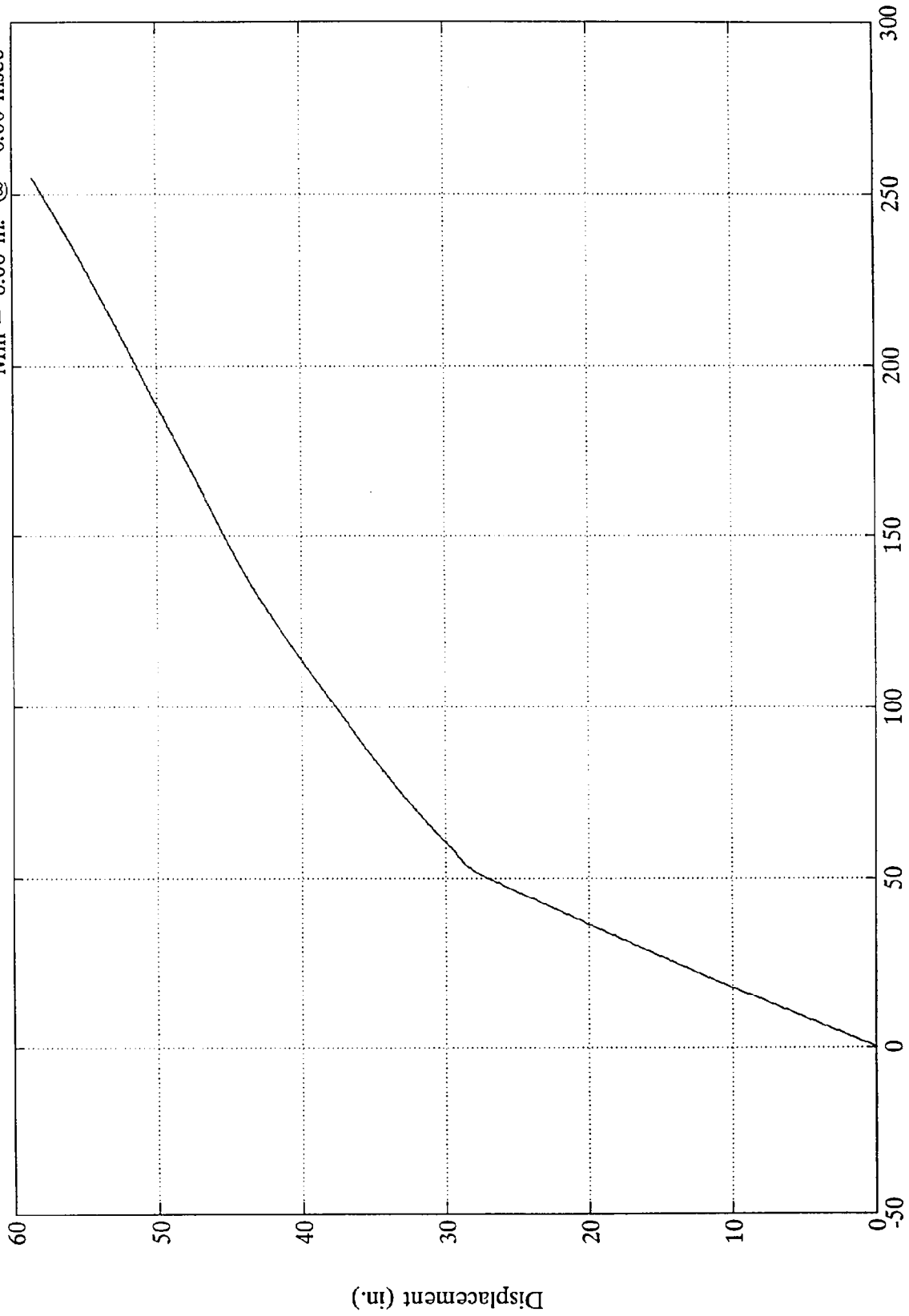
SAE Filter Class 60



VTV Test 4 - V1 93 CHEVROLET CORSICA

Max = 58.57 in. @ 254.88 msec
Min = 0.00 in. @ -0.00 msec

Brake Pedal X



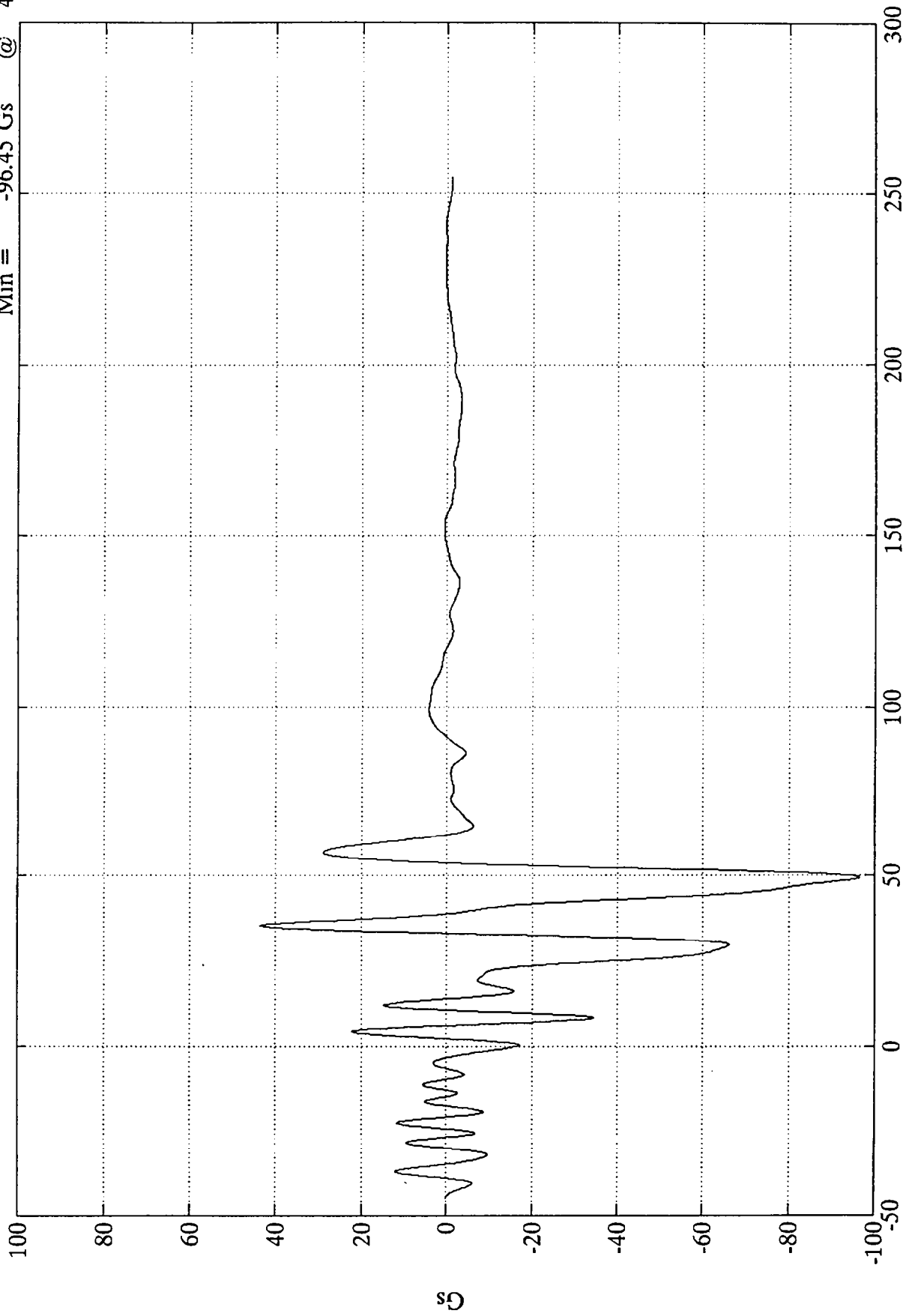
Time (msec.)

SAE Filter Class 60

VTV TEST #4 - 30 Deg.

V1 Toe Pan (X)

Max = 43.58 Gs @ 35.27 ms
Min = -96.45 Gs @ 49.43 ms



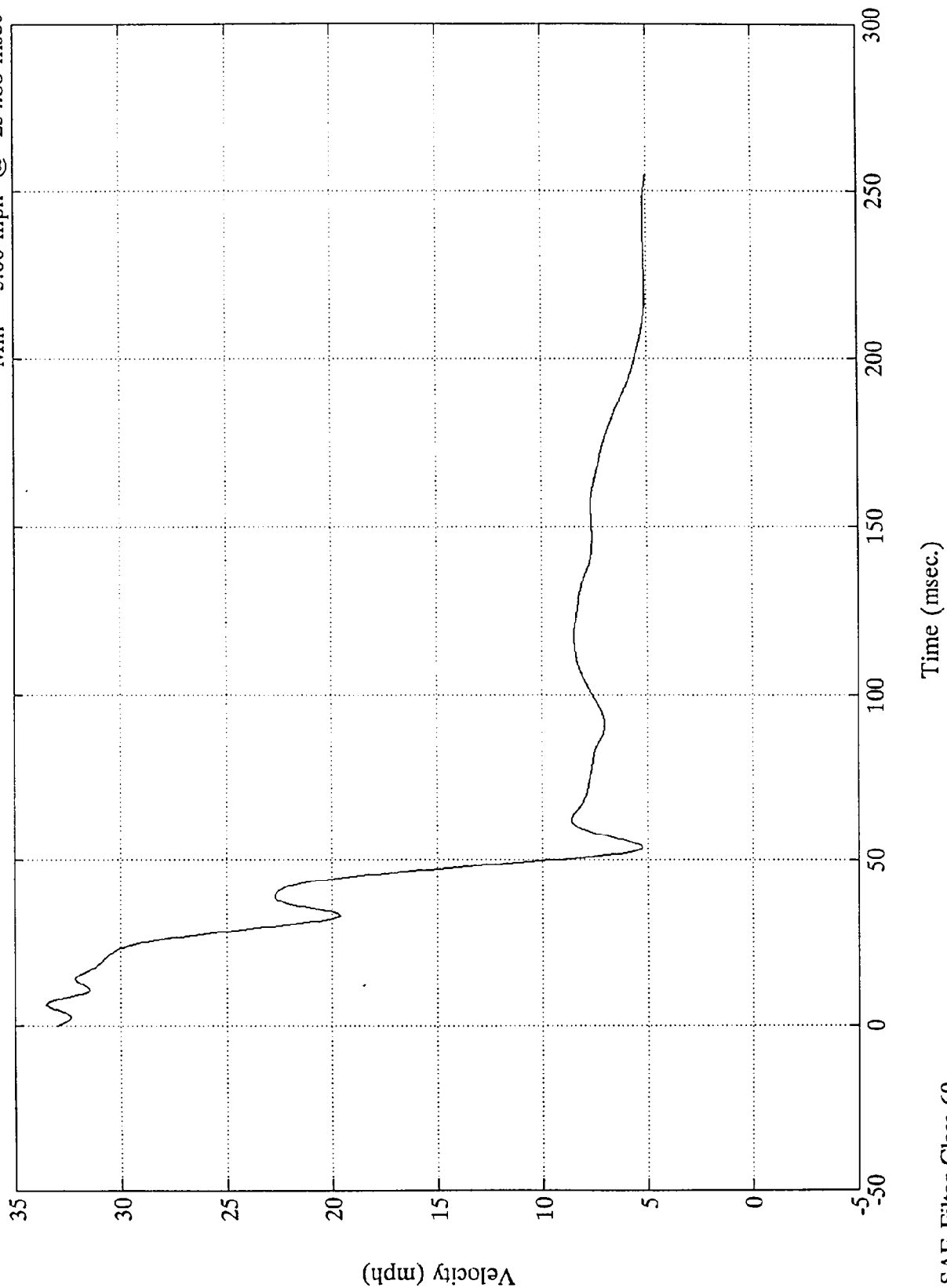
Time (msec)

SAE Filter Class 60

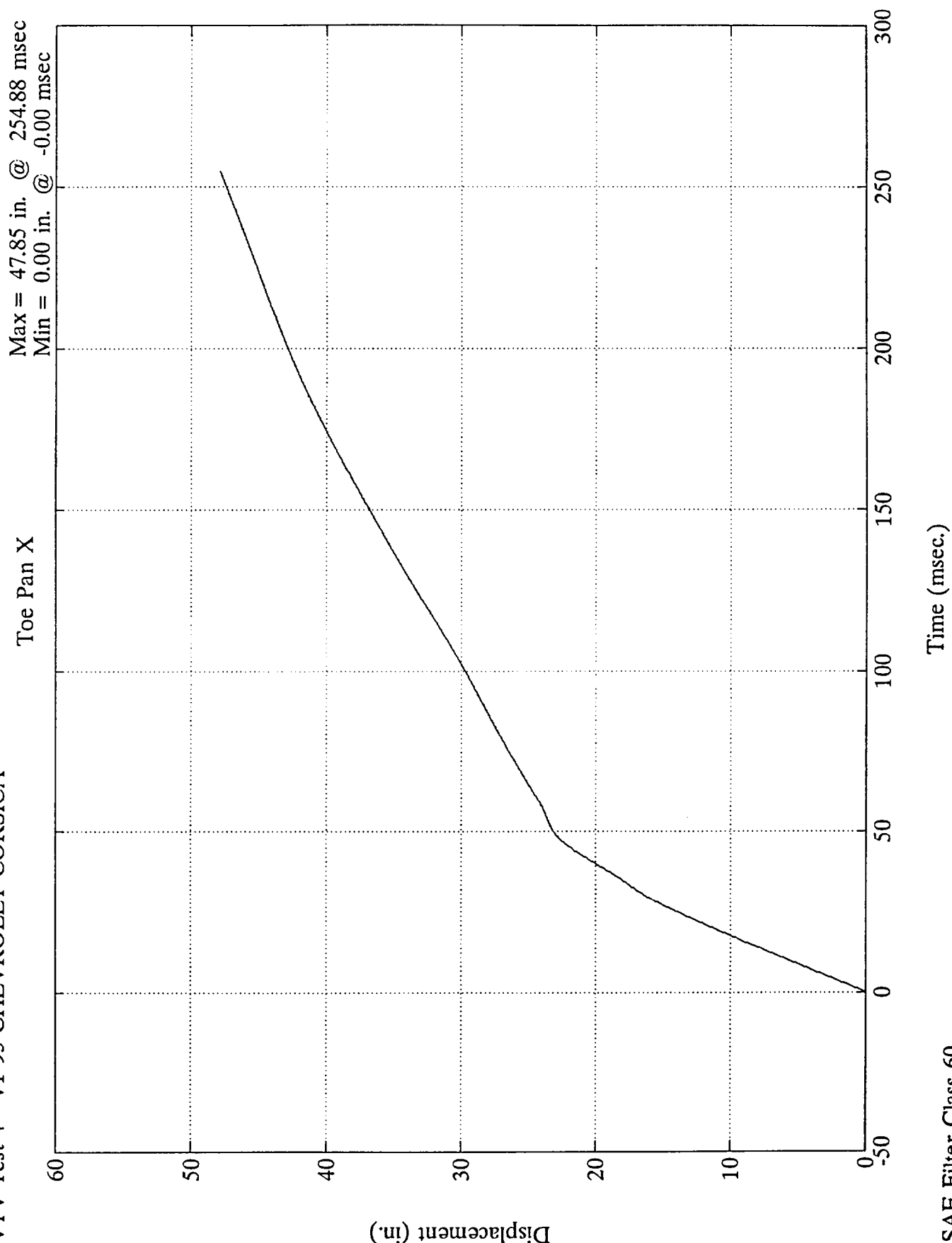
VTV Test 4 - V1 93 CHEVROLET CORSICA

Max = 33.52 mph @ 6.24 msec
Min = 5.00 mph @ 254.88 msec

Toe Pan X



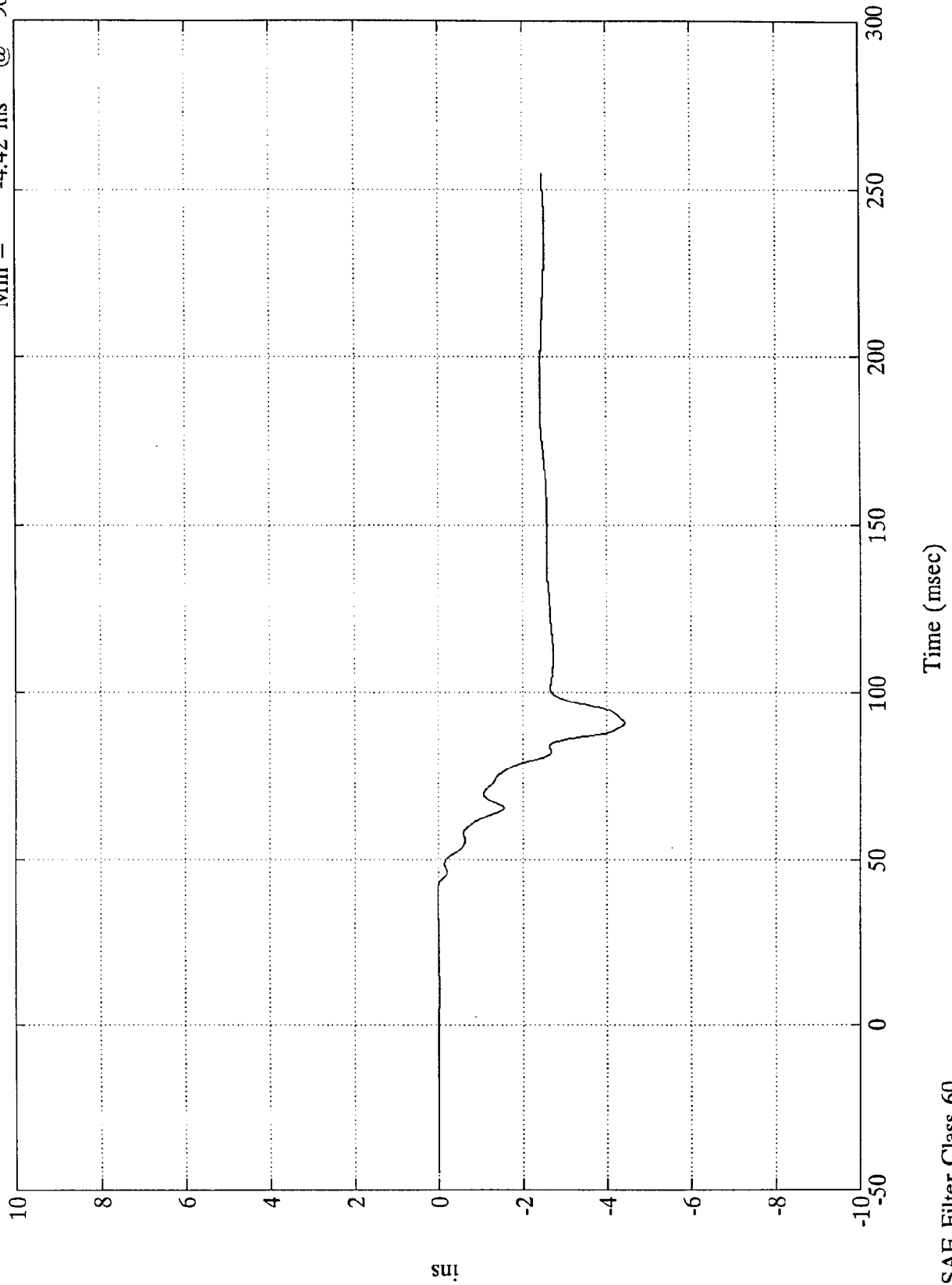
SAE Filter Class 60



VTV TEST #4 - 30 Deg.

Max = .02 ins @ 40.56 msec
Min = -4.42 ins @ 90.96 msec

V1 Left Sill Disp.



ins
B-30

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SAE Filter Class 60

TEST NO. Y049-0040-1317

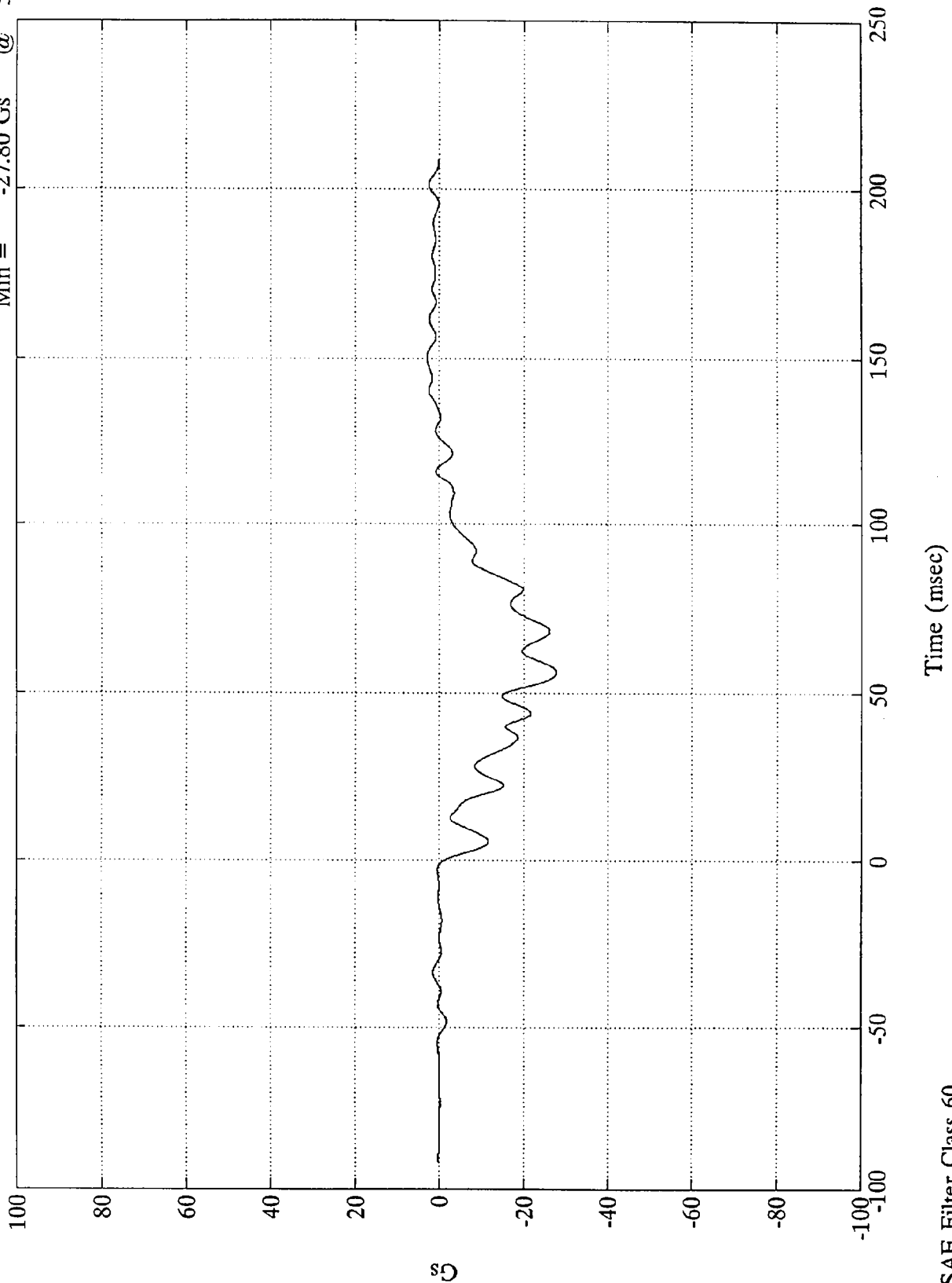
VEHICLE 2 DATA

SAE FILTER CHANNEL CLASS

60

VTV TEST #4 - 30 Deg.

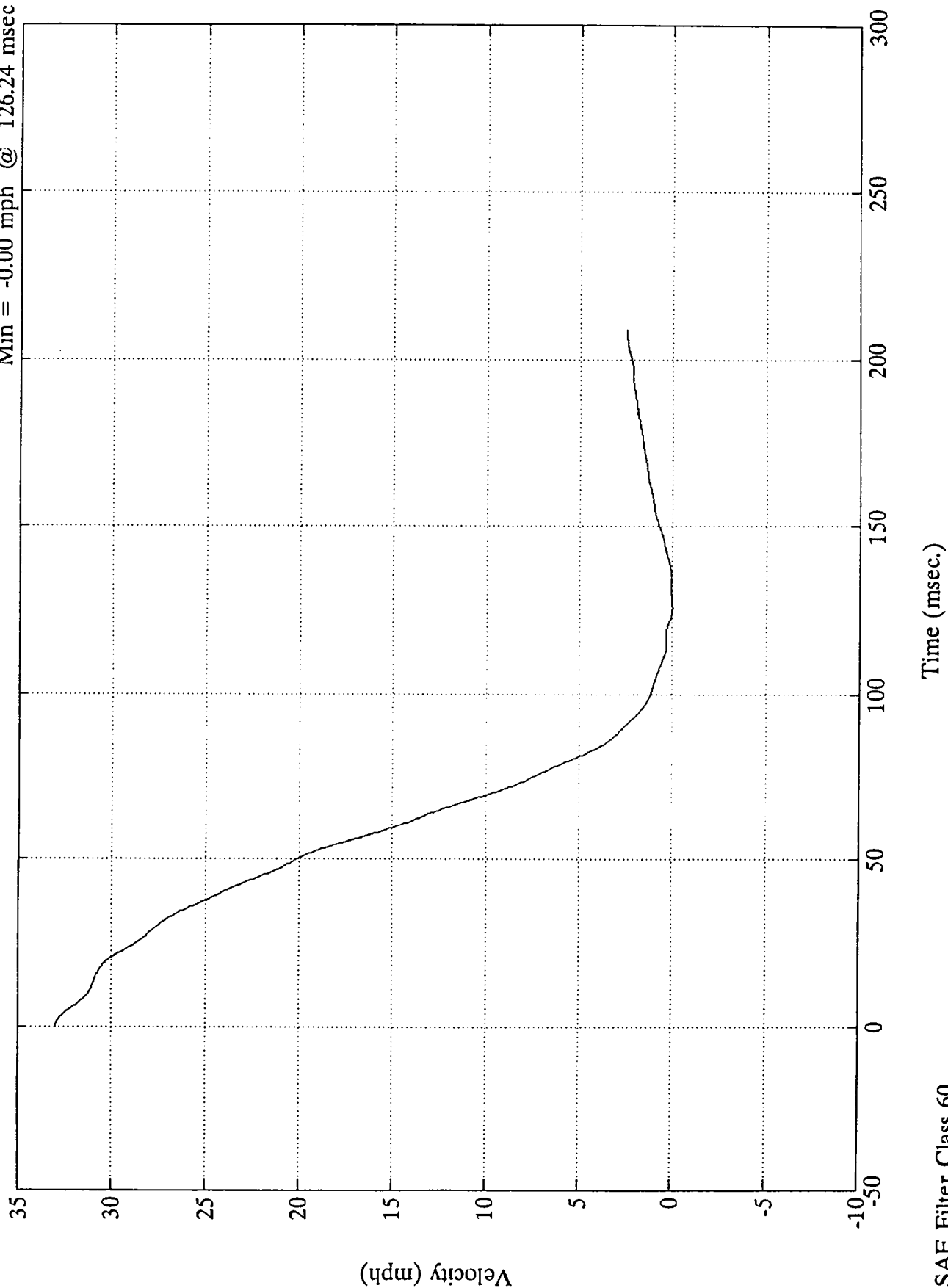
V2 L.R. X member (X) Max = 3.04 Gs @ 150.24 msec
Min = -27.80 Gs @ 56.28 msec



VTV Test 4 - V2 91 HONDA ACCORD

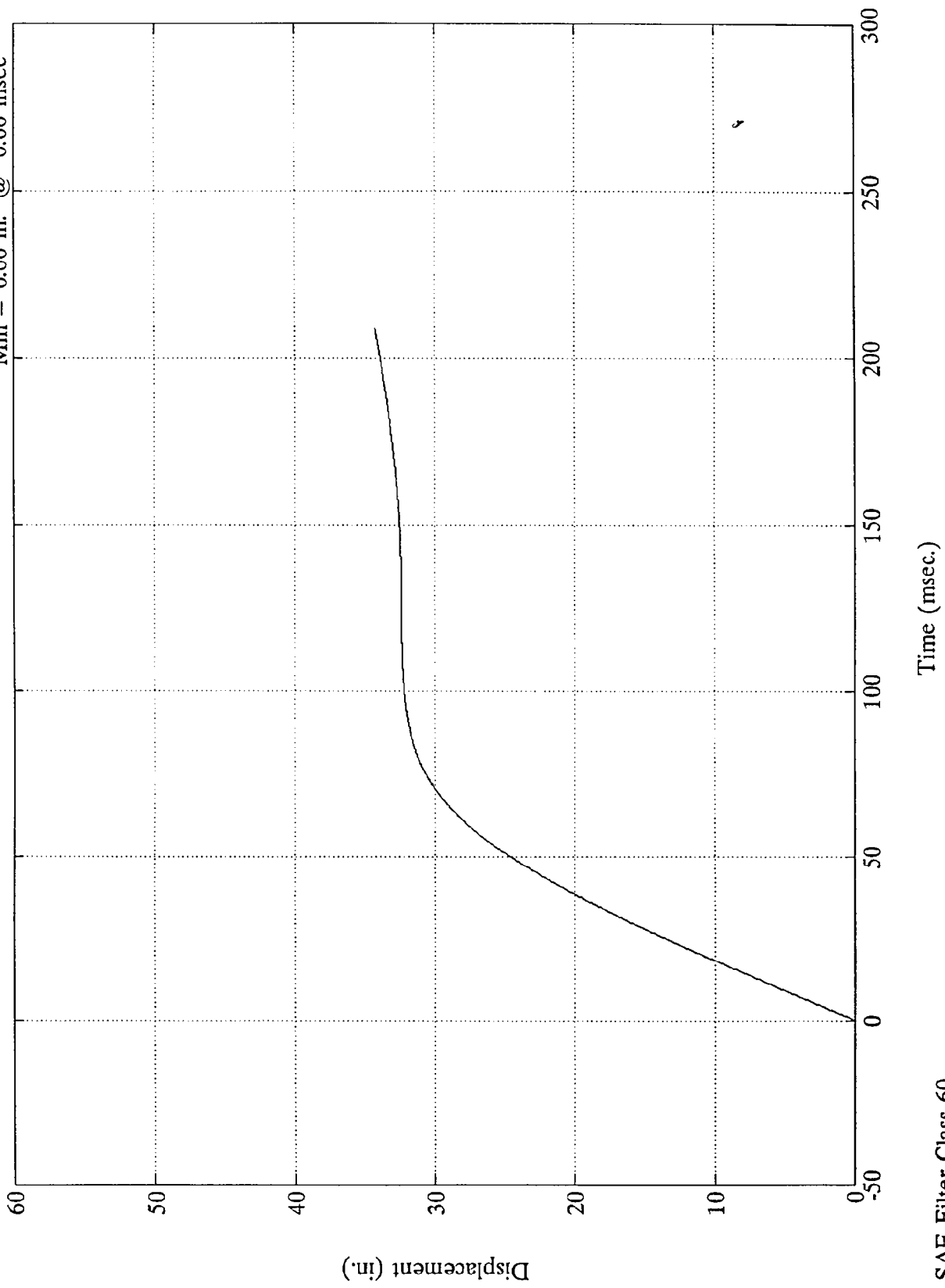
V2 L. Rear Seat X-member X

Max = 33.00 mph @ 0.00 msec
Min = -0.00 mph @ 126.24 msec



VTV Test 4 - V2 91 HONDA ACCORD

V2 L. Rear Seat X-member X
Max = 34.28 in. @ 208.56 msec
Min = 0.00 in. @ 0.00 msec



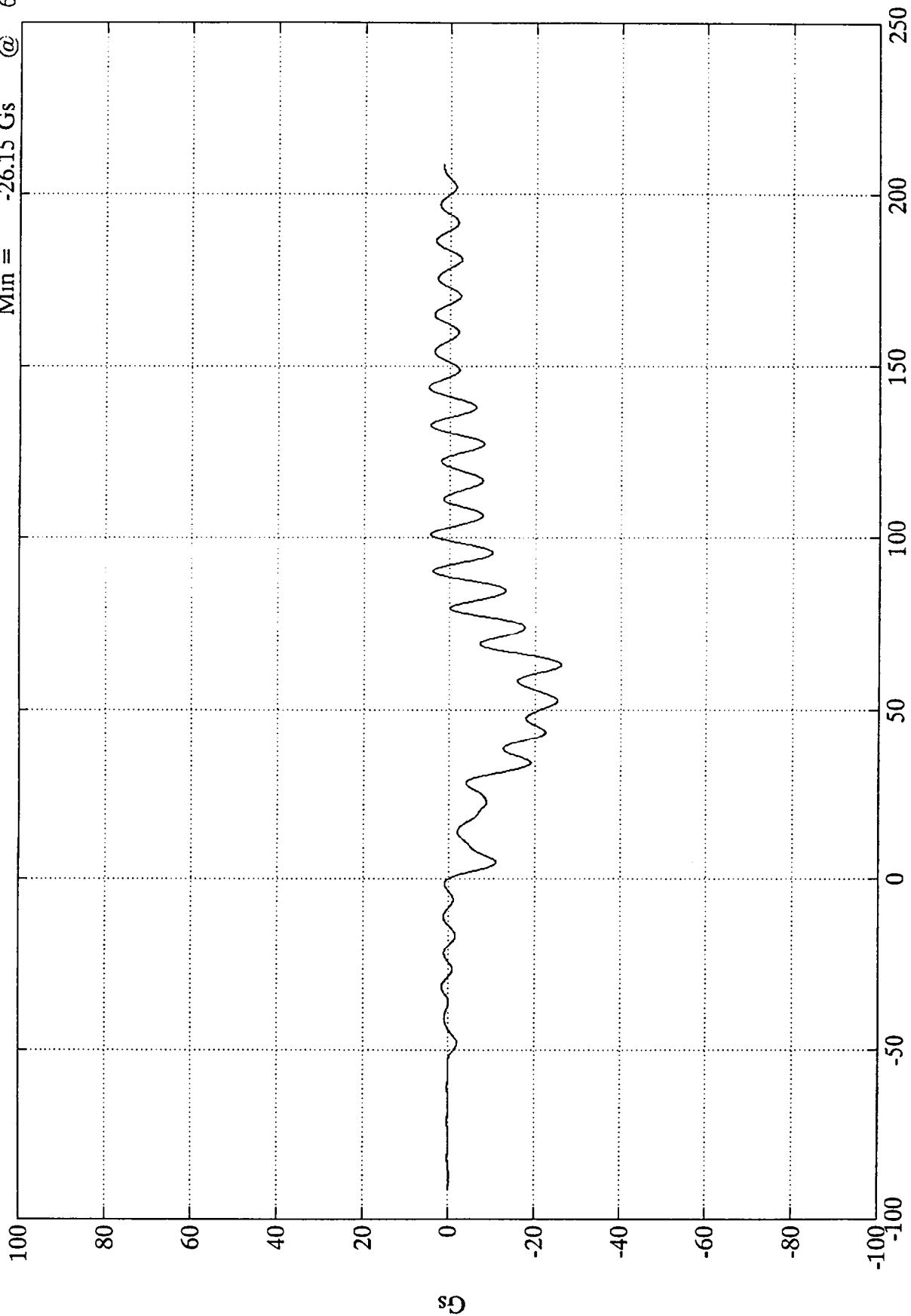
SAE Filter Class 60

VTV TEST #4 - 30 Deg.

V2 R.R. X member (X)

Max = 4.94 Gs
Min = -26.15 Gs

@ 143.76 ms
@ 63.00 ms

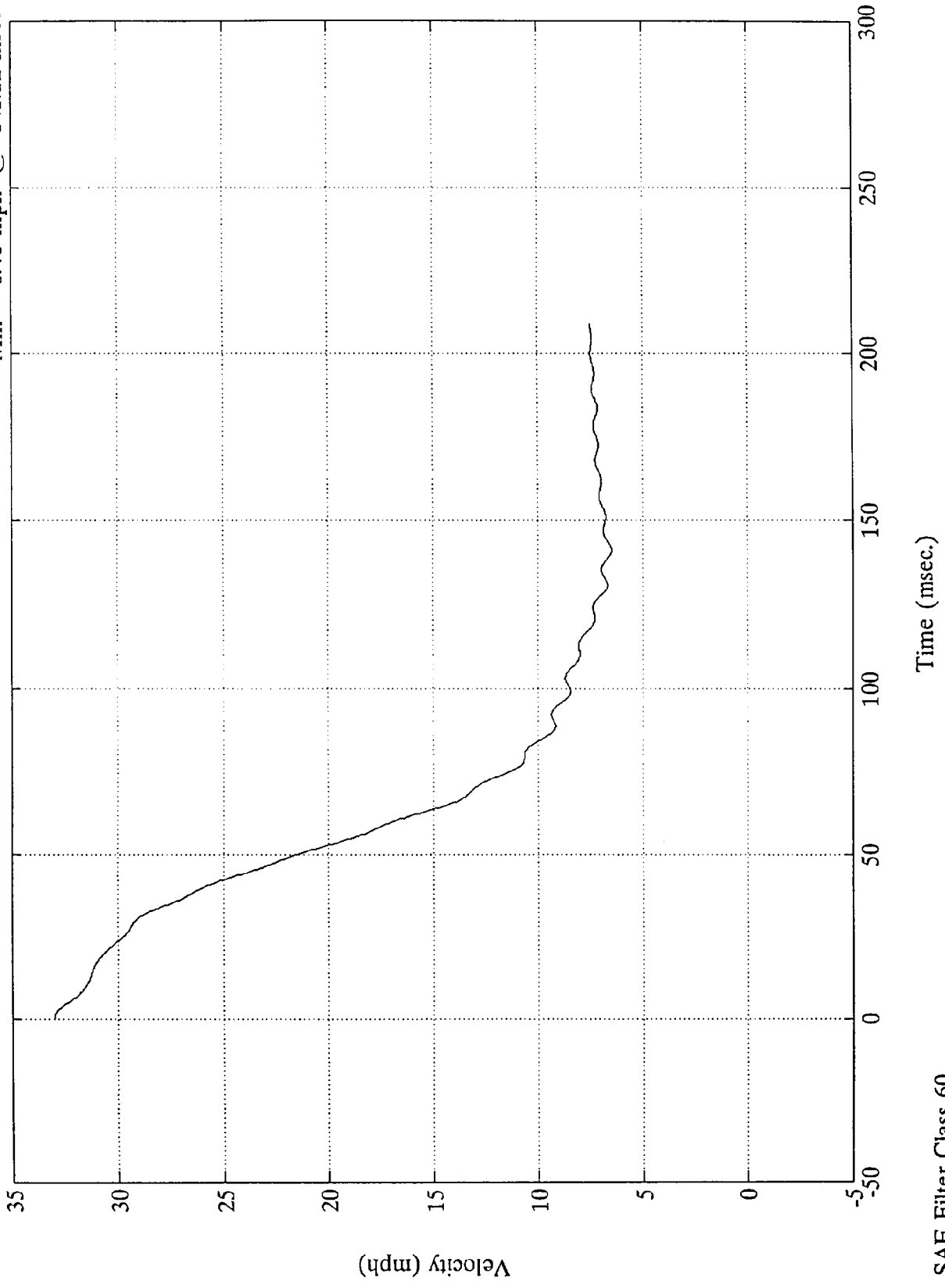


Time (msec)

SAE Filter Class 60

VTV Test 4 - V2 91 HONDA ACCORD

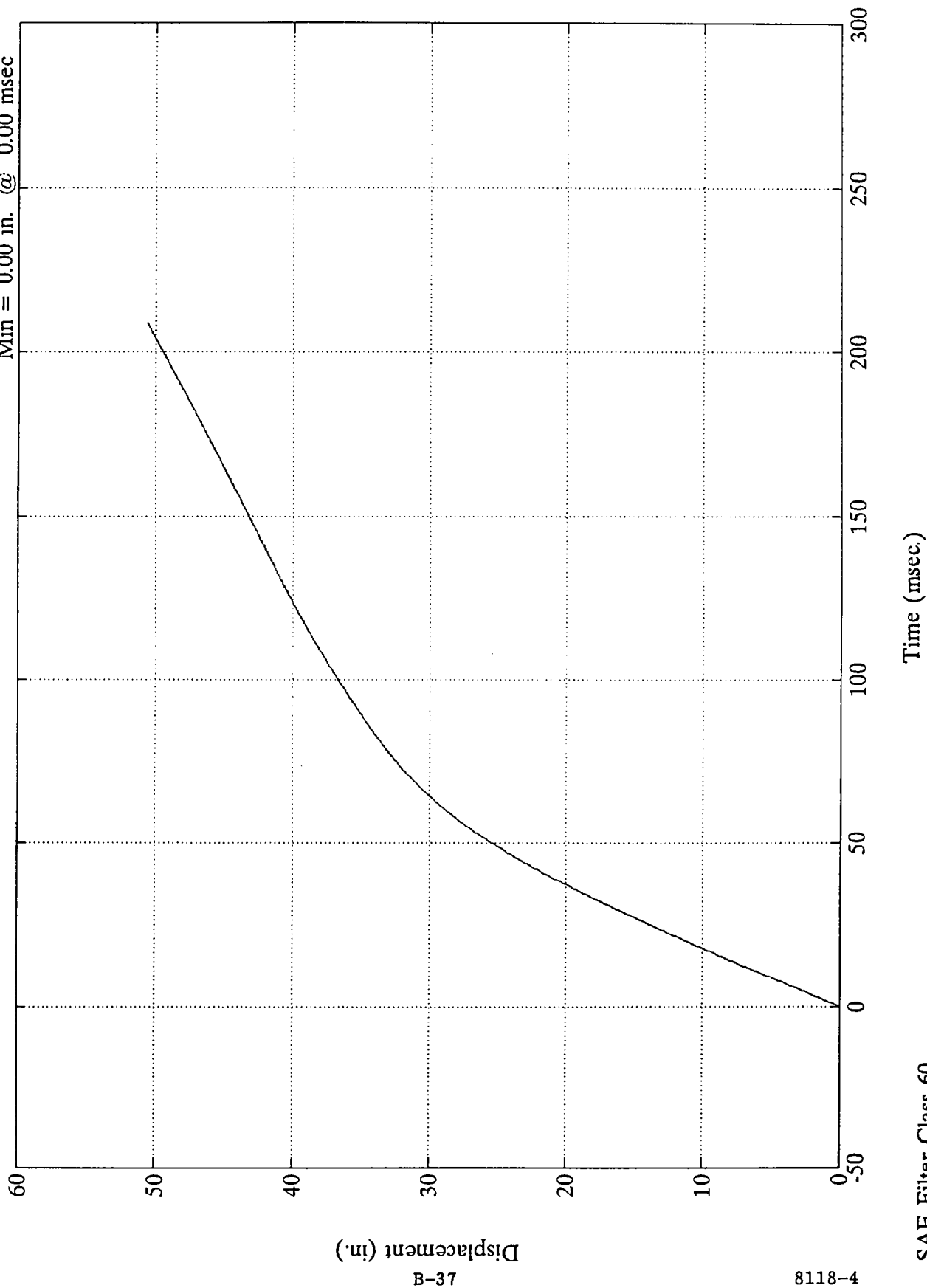
V2 R. Rear Seat X-member X
Max = 33.00 mph @ 0.24 msec
Min = 6.46 mph @ 141.12 msec



VTV Test 4 - V2 91 HONDA ACCORD

V2 R. Rear Seat X-member X

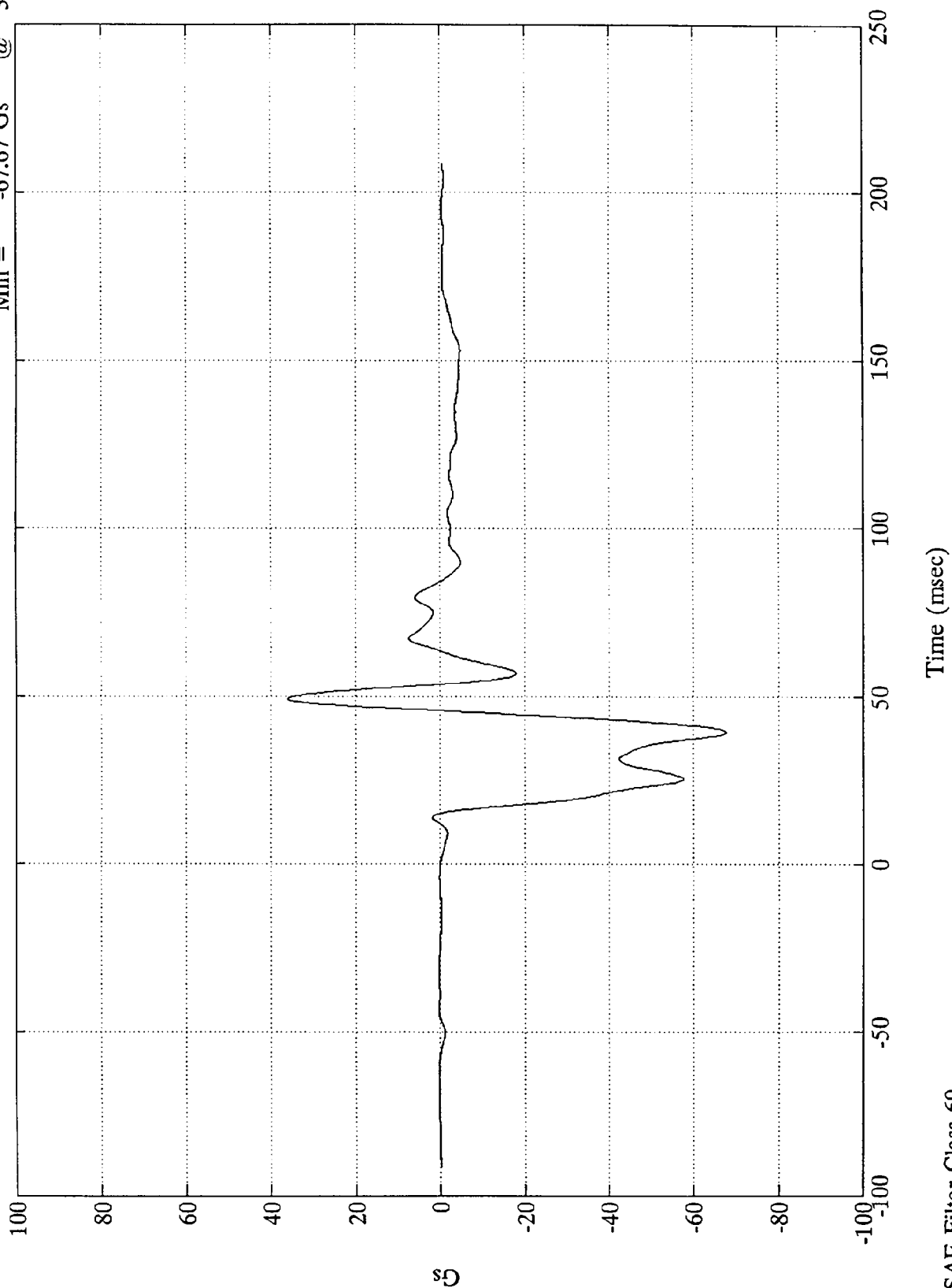
Max = 50.62 in. @ 208.56 msec
Min = 0.00 in. @ 0.00 msec



VTV TEST #4 - 30 Deg.

Max = 36.12 Gs @ 49.20 msec
Min = -67.67 Gs @ 39.47 msec

V2 Engine Top (X)



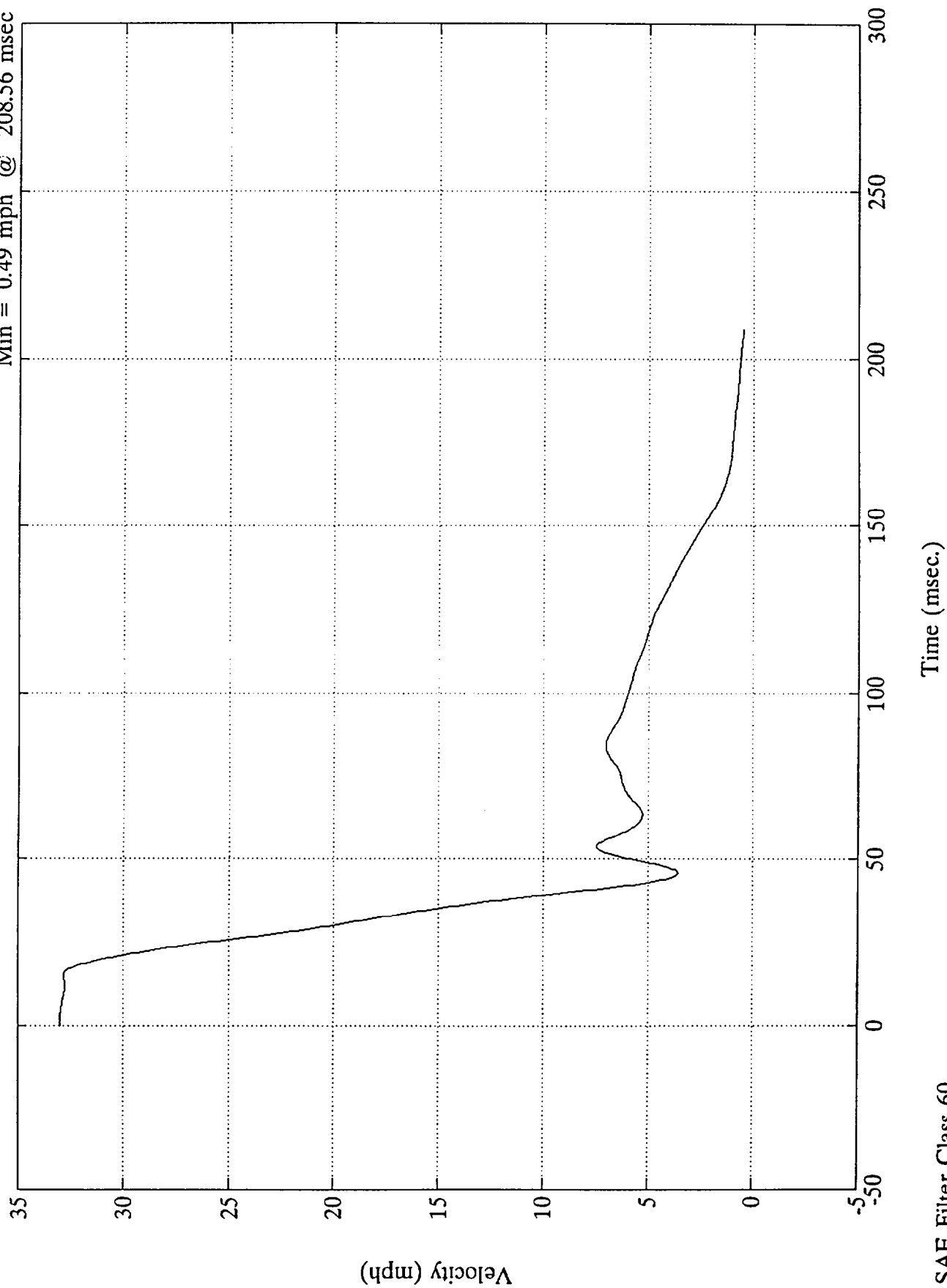
B-38

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SAE Filter Class 60

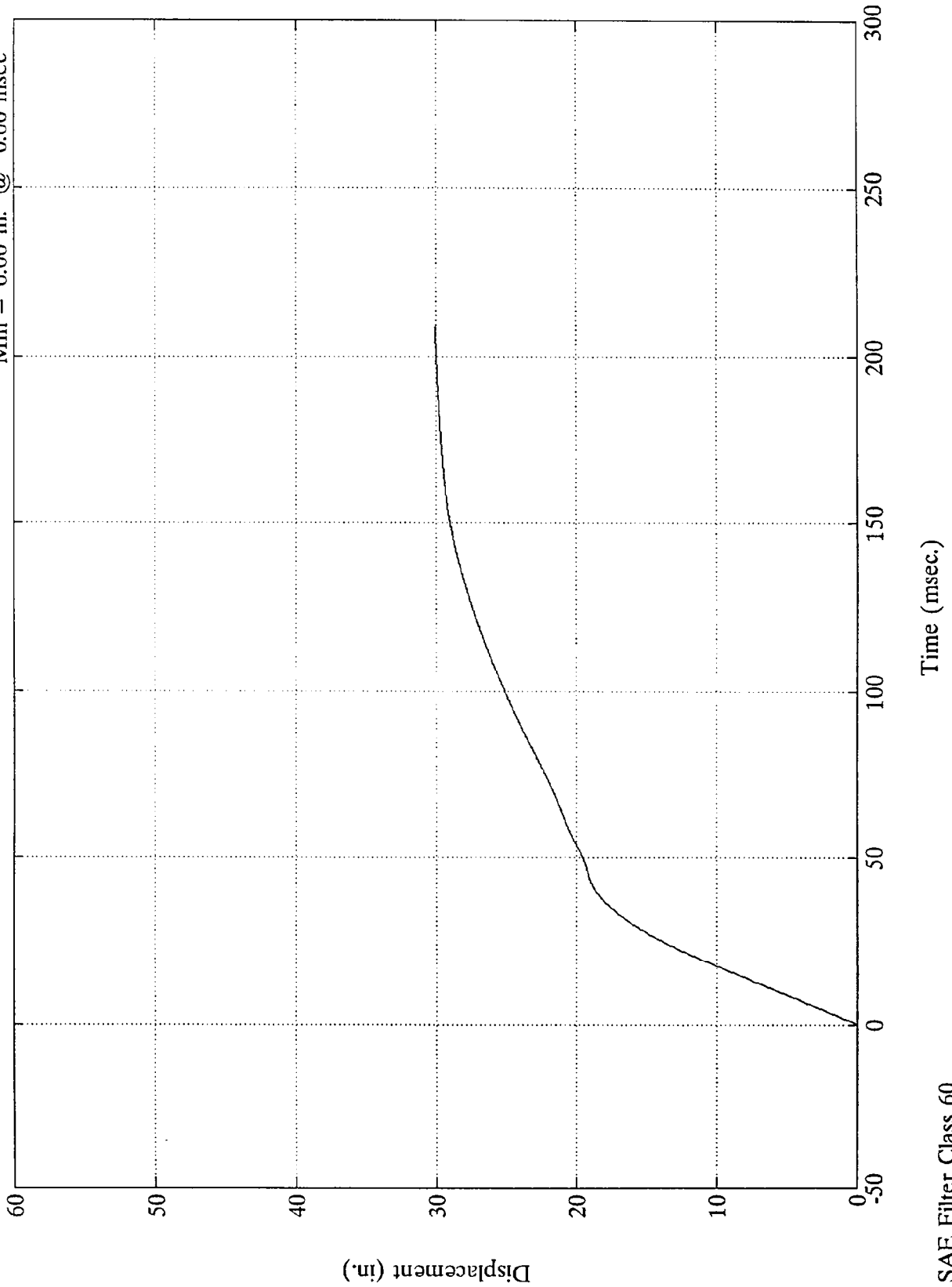
VTV Test 4 - V2 91 HONDA ACCORD

V2 Engine Top X
Max = 33.00 mph @ 1.68 msec
Min = 0.49 mph @ 208.56 msec



VTV Test 4 - V2 91 HONDA ACCORD

V2 Engine Top X
Max = 30.09 in. @ 208.56 msec
Min = 0.00 in. @ 0.00 msec

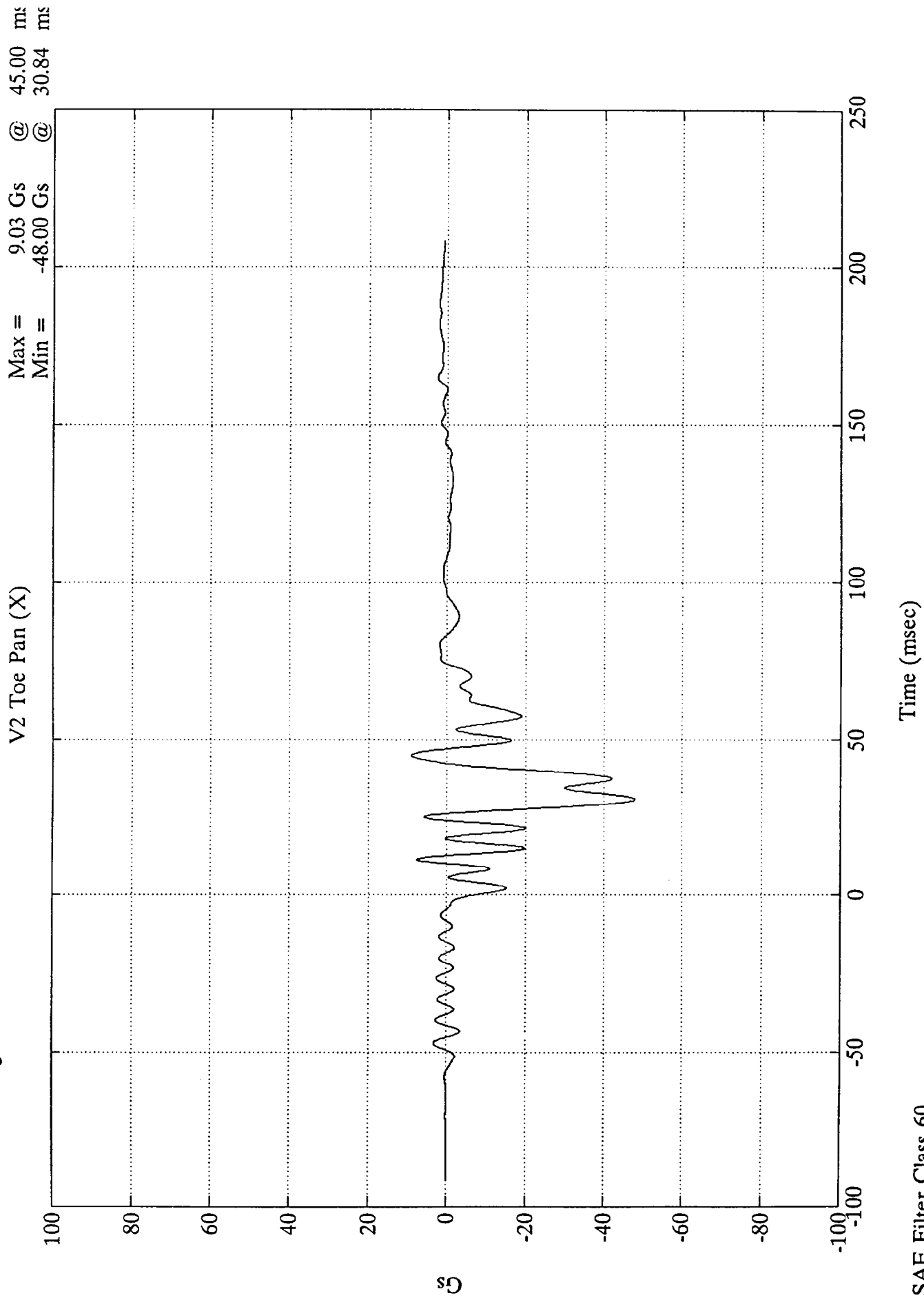


B-40

8118-4

SAE Filter Class 60

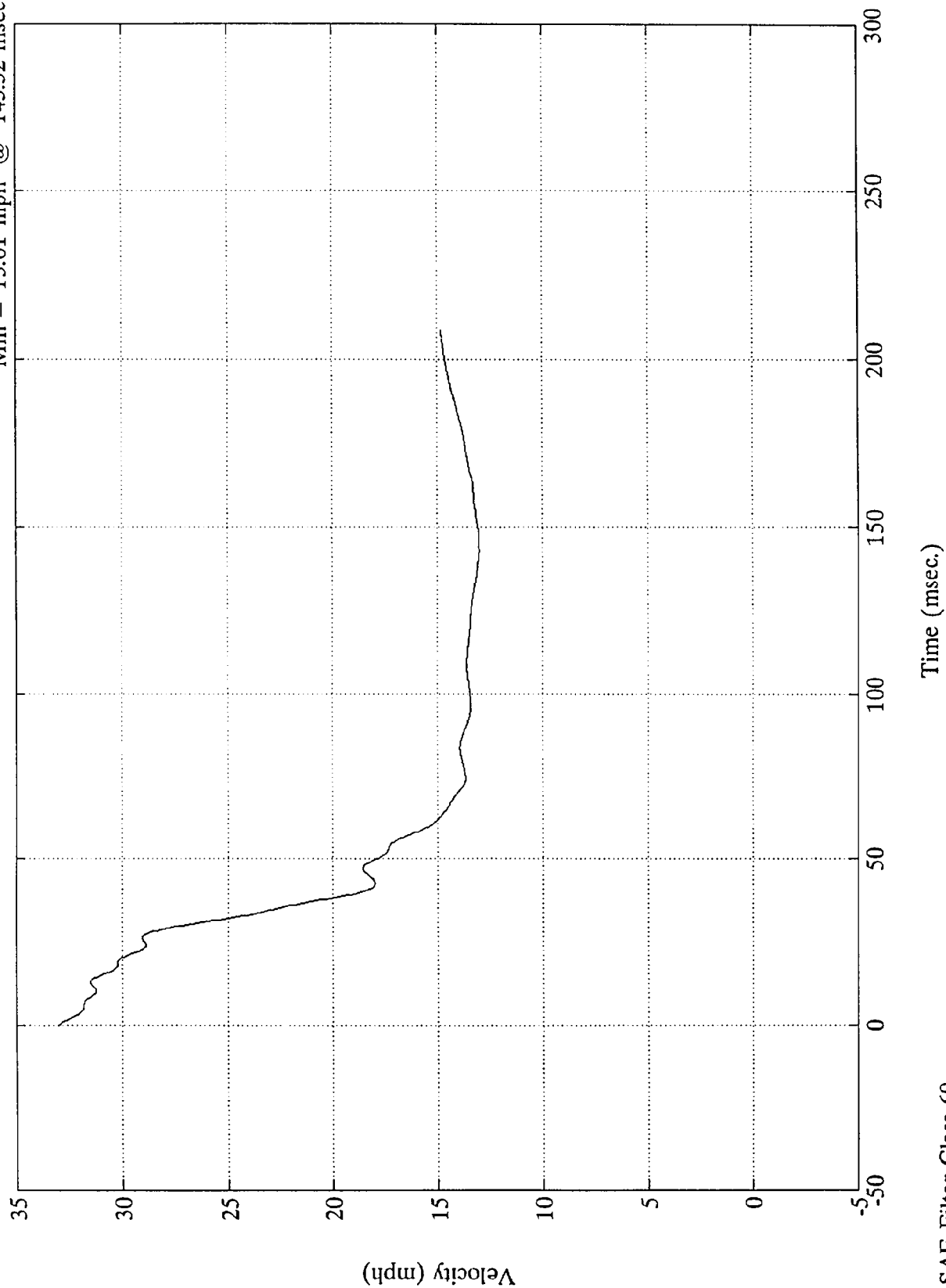
VTV TEST #4 - 30 Deg.



VTV Test 4 - V2 91 HONDA ACCORD

Max = 33.00 mph @ 0.00 msec
Min = 13.01 mph @ 143.52 msec

V2 Toe Pan X

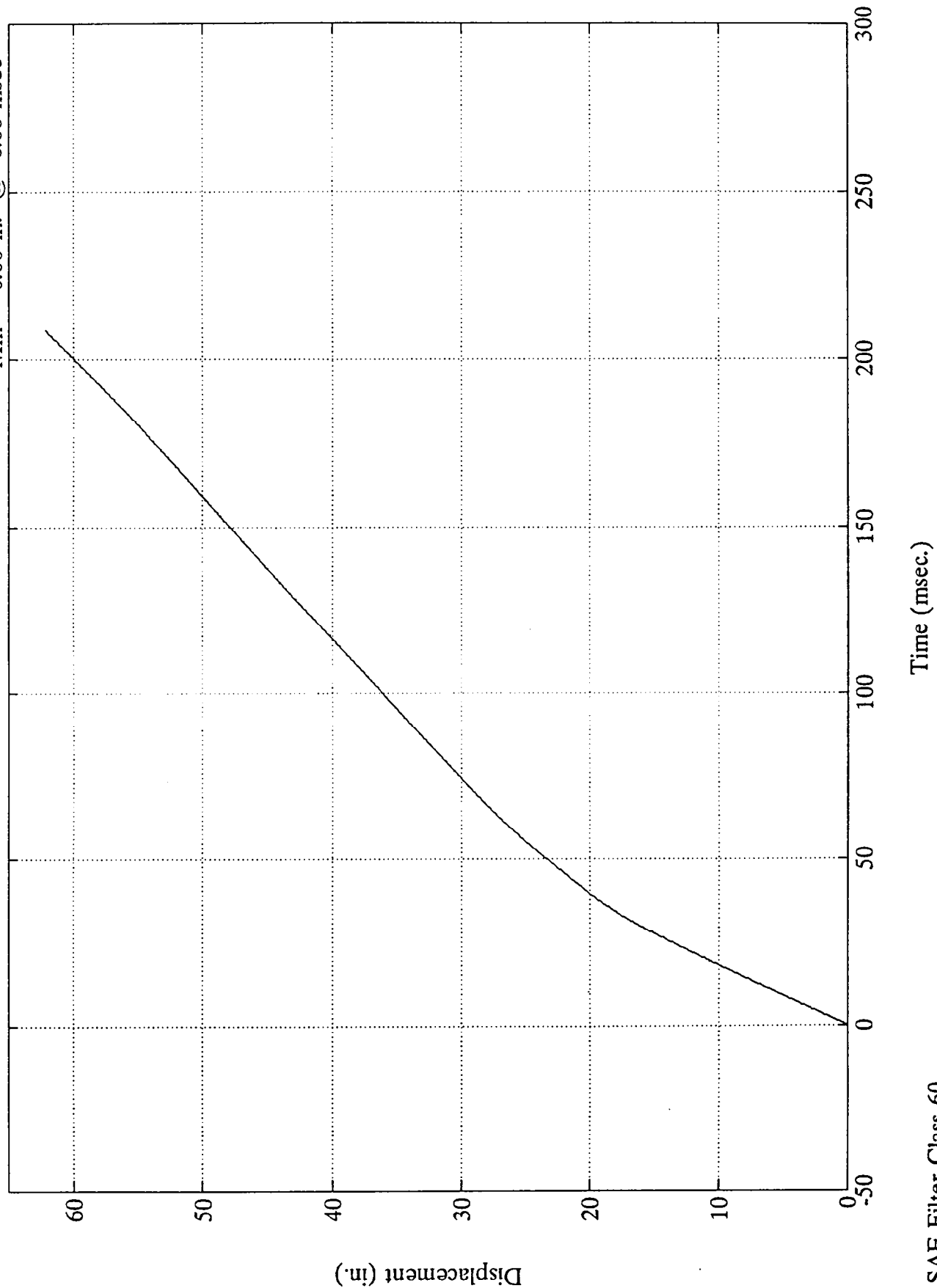


SAE Filter Class 60

VTV Test 4 - V2 91 HONDA ACCORD

Max = 62.19 in. @ 208.56 msec
Min = 0.00 in. @ 0.00 msec

Toe Pan X



TEST NO. TEST NO. Y049-0040-1317

VEHICLE 1 DUMMY DATA

CHANNEL	SAE FILTER CHANNEL CLASS
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

INCIDENT: 13000

TEST DATE: 10 Sep 1999

RUN #: 1317

TEST TIME: 16:09:22

SERIES #: 4

BOARD: a

TITLE: VTV TEST #4 - 30 Deg.

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	V1-P1 Head X	Gs	12.5	124.0	-50.5	75.5	1000.0
2	V1-P1 Head Y	Gs	11.9	112.4	-18.3	68.5	1000.0
3	V1-P1 Head Z	Gs	21.3	62.0	-19.2	57.7	1000.0
4	V1-P1 Left Femur	Lbs	95.8	52.1	-2569.3	55.6	600.0
5	V1-P1 Chest X	Gs	5.9	100.8	-36.3	70.1	180.0
6	V1-P1 Chest Y	Gs	22.5	86.9	-3.8	58.8	180.0
7	V1-P1 Chest Z	Gs	12.6	66.6	-9.6	56.5	180.0
8	V1-P1 Right Femur	Lbs	99.2	246.6	-575.3	56.4	600.0
9	V1-P1 Upper Neck Fx	lbs	37.0	64.4	-77.3	127.0	1000.0
10	V1-P1 Upper Neck Fy	lbs	99.3	134.6	-30.8	240.7	1000.0
11	V1-P1 Upper Neck Fz	lbs	465.0	72.7	-16.5	253.7	1000.0
12	V2-P1 Left Femur	Lbs	37.3	46.0	-1455.3	58.7	600.0
13	V1-P1 Upper Neck Mx	ft-lbs	18.7	77.6	-18.9	98.0	600.0
14	V1-P1 Upper Neck My	ft-lbs	9.0	70.6	-21.4	142.9	600.0
15	V1-P1 Upper Neck Mz	ft-lbs	13.3	76.7	-5.3	109.9	600.0
16	V2-P2 Right Femur	Lbs	86.2	-2.2	-1563.6	60.6	600.0
17	V1-P1 Head Resultant	Gs	51.9	68.2	.1	11.5	1000.0
18	V1-P1 Chest Resultant	Gs	38.3	70.3	.1	7.7	180.0
19	NULL	lbs	468.4	72.6	1.6	14.9	1000.0
20	NULL	ft-lbs	27.9	144.8	.0	-15.0	600.0

36 ms Fixed Duration HIC SUMMARY: V1-P1 Head Resultant

hic: 362.34

t1 = 56.880 msec

t2 = 90.360 msec

Average G's Over Hic Duration = 41.09

CLIP SUMMARY: V1-P1 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 36.614 G's

Tstart = 68.1600 ms

Tend = 71.2800 ms

CSI = 250.566

FACILITY: TRACK
RUN #: 1317
SERIES #: 4

TEST DATE: 16 Sep 1993
TEST TIME: 16:09:22
BOARD: c

TITLE: VTV TEST #4 - 30 Deg.

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	V1-P1 Lt Lower Tibia Fy	lbs	56.8	158.9	-372.4	54.0	600.0
2	V1-P1 Lt Lower Tibia Fz	lbs	870.7	48.6	-252.9	194.6	600.0
3	V1-P1 Lt Lower Tibia Mx	ft-lbs	162.5	54.7	-7.4	158.8	600.0
4	V1-P1 Rt Lower Tibia Fy	lbs	132.1	57.1	-80.1	61.9	600.0
5	V1-P1 Rt Lower Tibia Fz	lbs	104.7	66.1	-1293.8	38.5	600.0
6	V1-P1 Rt Lower Tibia Mx	ft-lbs	65.0	62.4	-13.9	92.6	600.0
7	V1-P1 Lt Knee Sheer	in	.4	56.3	-1.0	74.8	180.0
8	V1-P1 Rt Knee Sheer	in	16.2	81.5	-43.1	60.5	180.0
9	Chest Displacement #125	in	.6	76.0	.0	4.7	60.0
10	Chest Displacement #126	in	.6	84.7	.0	3.7	60.0
11	Chest Displacement #127	in	.2	68.5	.0	9.4	60.0
12	Chest Displacement #128	in	.5	85.3	.0	-41.6	60.0
13	Chest Displacement #129	in	.1	70.1	-.1	100.3	60.0
14	Chest Displacement #130	in	.6	70.4	.0	-9.5	60.0
15	Chest Displacement #131	in	.3	72.8	.0	44.4	60.0
16	Chest Displacement #132	in	.9	77.8	.0	-9.8	60.0
17	NULL	lbs	925.2	48.6	1.2	-10.0	600.0
18	NULL	lbs	1294.0	38.5	.2	22.3	600.0
19	NULL	in	.9	78.0	.0	8.4	60.0
20	NULL	in	.7	71.3	.0	-29.6	60.0

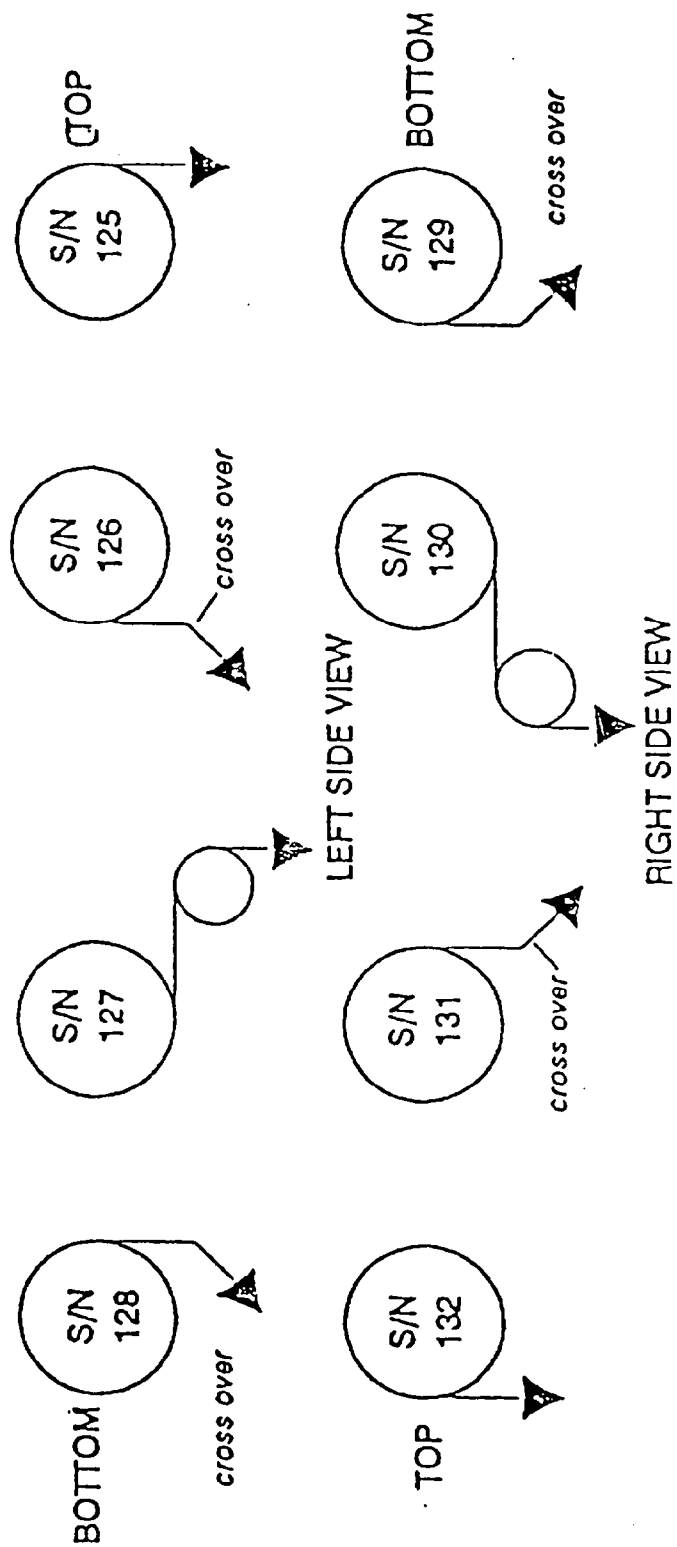
PROPERTY: ARBOR
RUN #: 1317
SERIES #: 4

TEST DATE: 18 Sep 1999
TEST TIME: 16:09:22
BOARD: d

TITLE: VTV TEST #4 - 30 Deg.

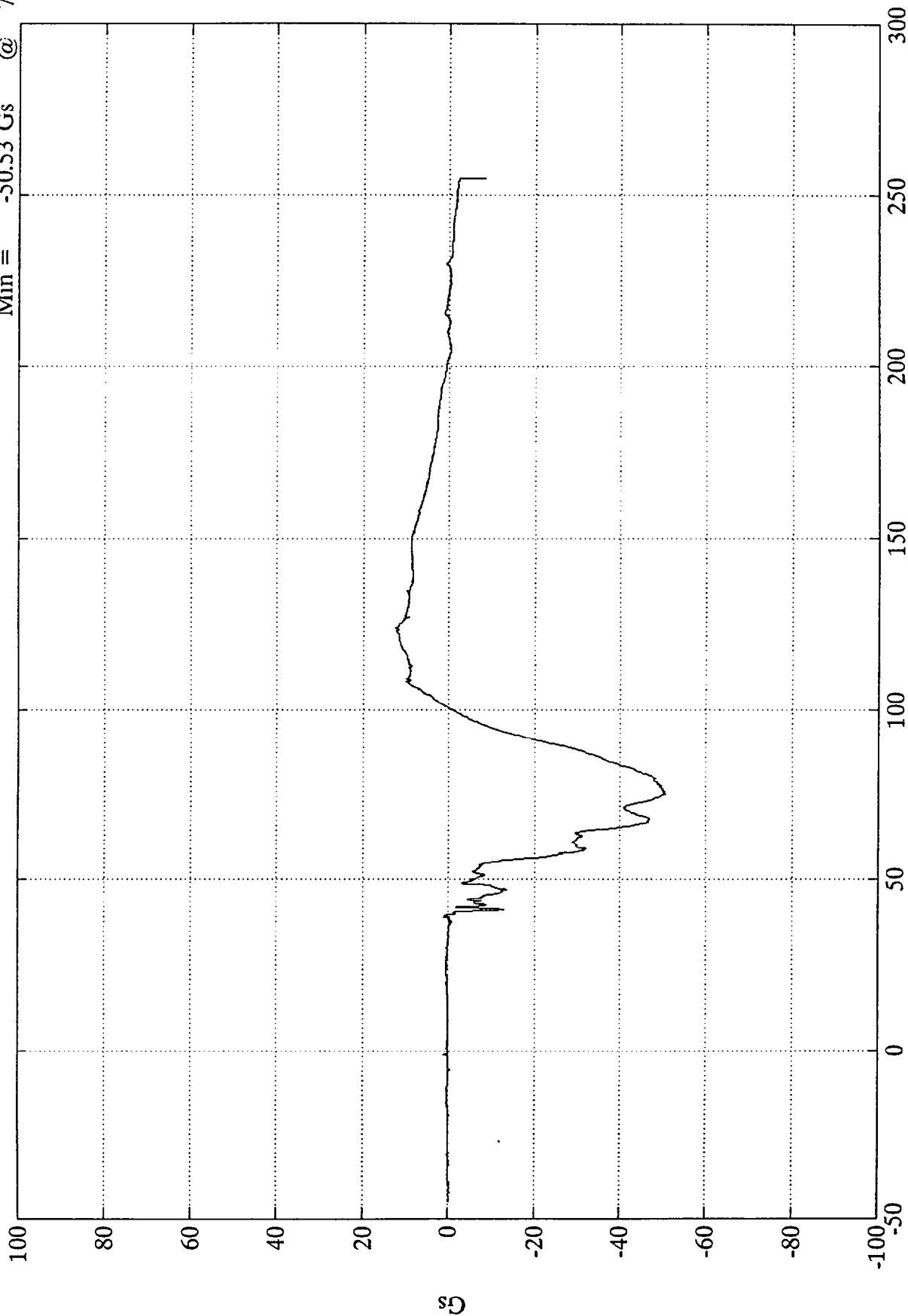
CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	V1-P1 Lt Upper Tibia Mx	ft-lbs	17.5	113.0	-87.2	53.3	600.0
2	V1-P1 Lt Upper Tibia My	ft-lbs	105.5	47.2	-16.1	213.5	600.0
3	V1-P1 Rt Upper Tibia Mx	ft-lbs	9.7	158.3	-54.1	47.0	600.0
4	V1-P1 Rt Upper Tibia My	ft-lbs	41.7	67.4	-172.4	55.9	600.0
5	V1 L.R. Seat X Mem. (X)	Gs	3.1	185.4	-26.5	60.1	60.0
6	V1 R.R. Seat X Mem. (X)	Gs	3.0	170.2	-36.0	47.8	60.0
7	V1 R.Seat C/L X Mem. (X)	Gs	5.1	-19.6	-40.8	62.5	60.0
8	V1 R.Seat C/L X Mem. (Y)	Gs	3.3	165.0	-16.8	56.8	60.0
9	V1 R.Seat C/L X Mem. (Z)	Gs	14.2	79.6	-16.3	70.6	60.0
10	V1 Engine Top (X)	Gs	15.1	48.4	-72.0	34.2	60.0
11	V1 Engine Bottom (X)	Gs	55.1	51.6	-75.2	40.0	60.0
12	V1 Brake Pedal (X)	Gs	64.4	58.4	-173.0	53.2	60.0
13	V1 Toe Pan (X)	Gs	43.6	35.3	-96.5	49.4	60.0
14	V1 Left Sill Disp.	ins	.0	40.6	-4.4	91.0	60.0
15	NULL	Gs	.0	254.9	.0	254.9	1000.0
16	NULL	Gs	.0	254.9	.0	254.9	1000.0
17	NULL	ft-lbs	124.5	47.3	.3	-27.1	600.0
18	NULL	Gs	53.1	61.9	.2	-13.1	60.0
19	NULL	Gs	91.6	31.7	.2	-22.9	60.0
20	NULL	Gs	96.5	49.4	.0	-44.4	60.0

CHEST POTENTIOMETER CONFIGURATION



Max = 12.46 Gs @ 123.96 ms
Min = -50.53 Gs @ 75.47 ms

V1-P1 Head X



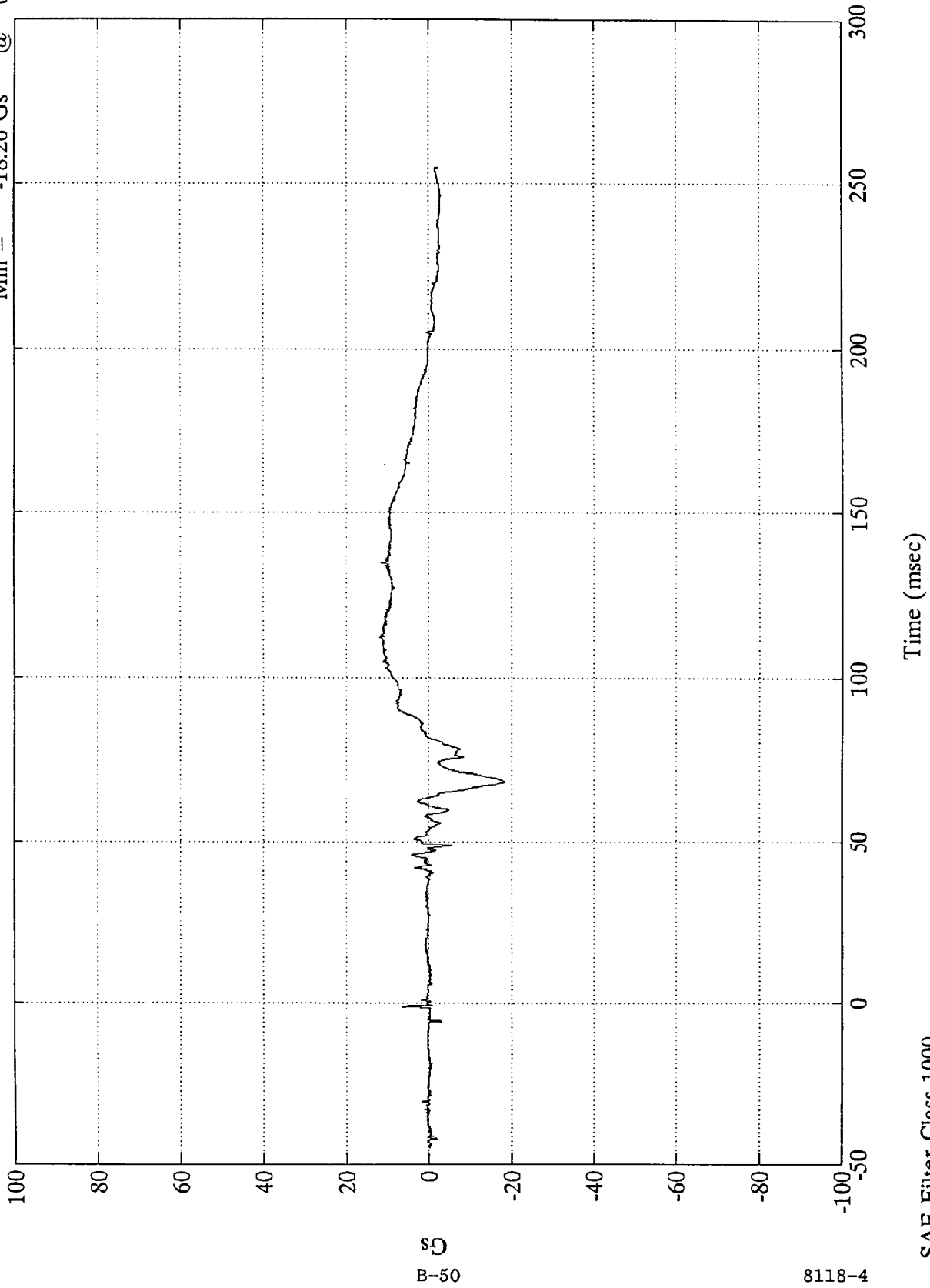
Time (msec)

SAE Filter Class 1000

VTV TEST #4 - 30 Deg.

Max = 11.91 Gs @ 112.44 msec
Min = -18.26 Gs @ 68.52 msec

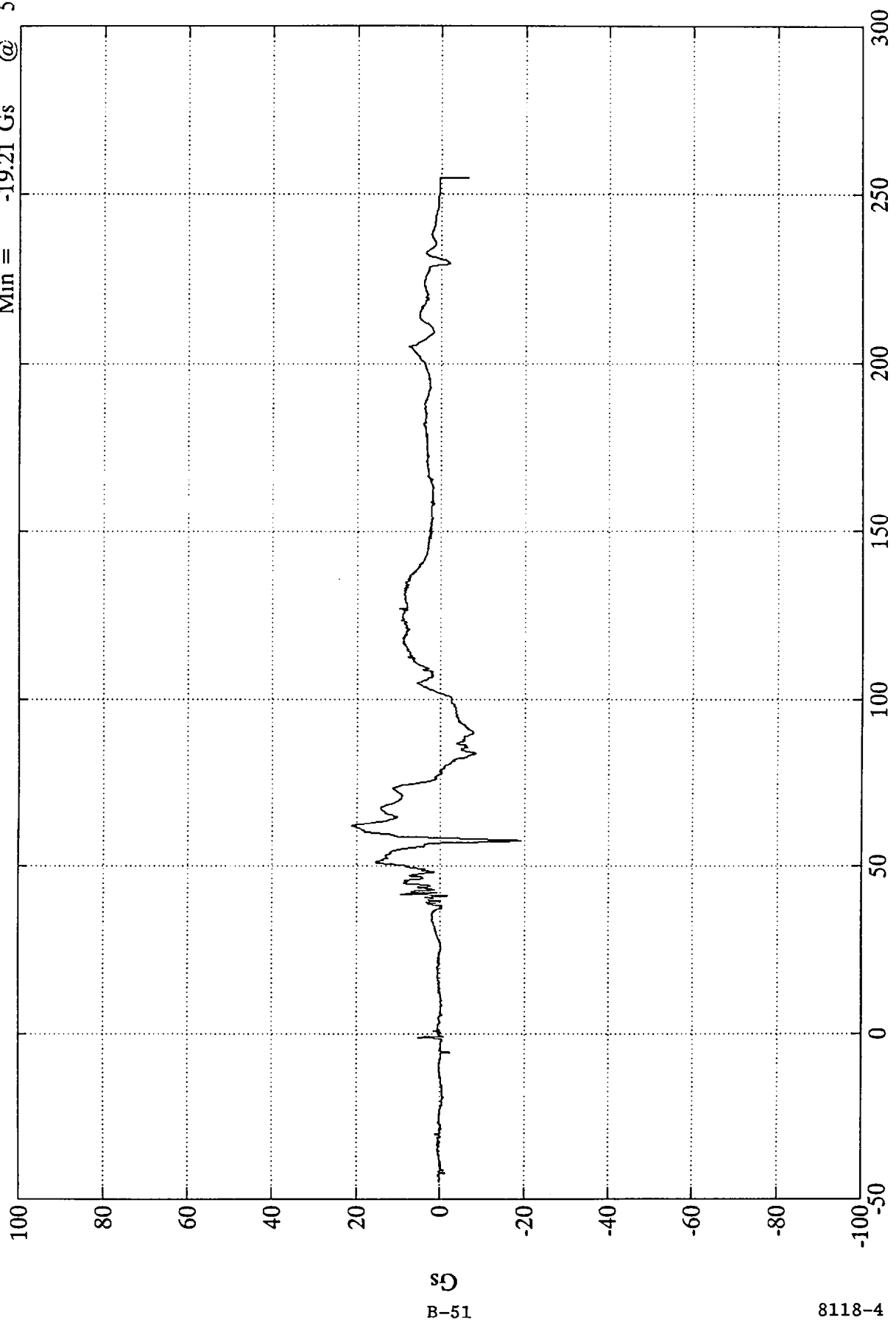
V1-P1 Head Y



SAE Filter Class 1000

Max = 21.25 Gs @ 62.04 msec
Min = -19.21 Gs @ 57.72 msec

V1-P1 Head Z

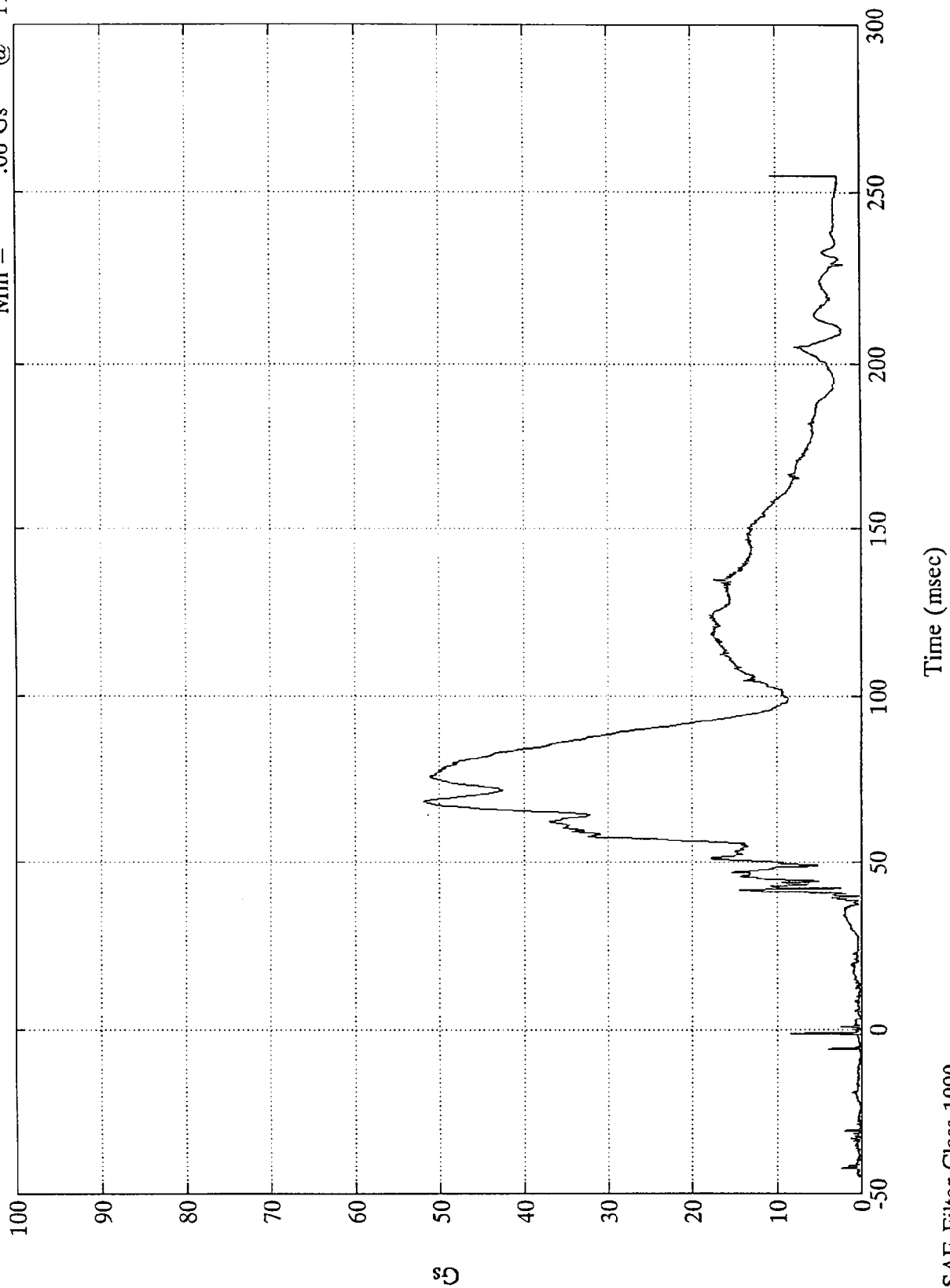


Time (msec)

SAE Filter Class 1000

VTV TEST #4 - 30 Deg.

V1-P1 Head Resultant
Max = 51.90 Gs @ 68.16 msec
Min = .06 Gs @ 11.51 msec

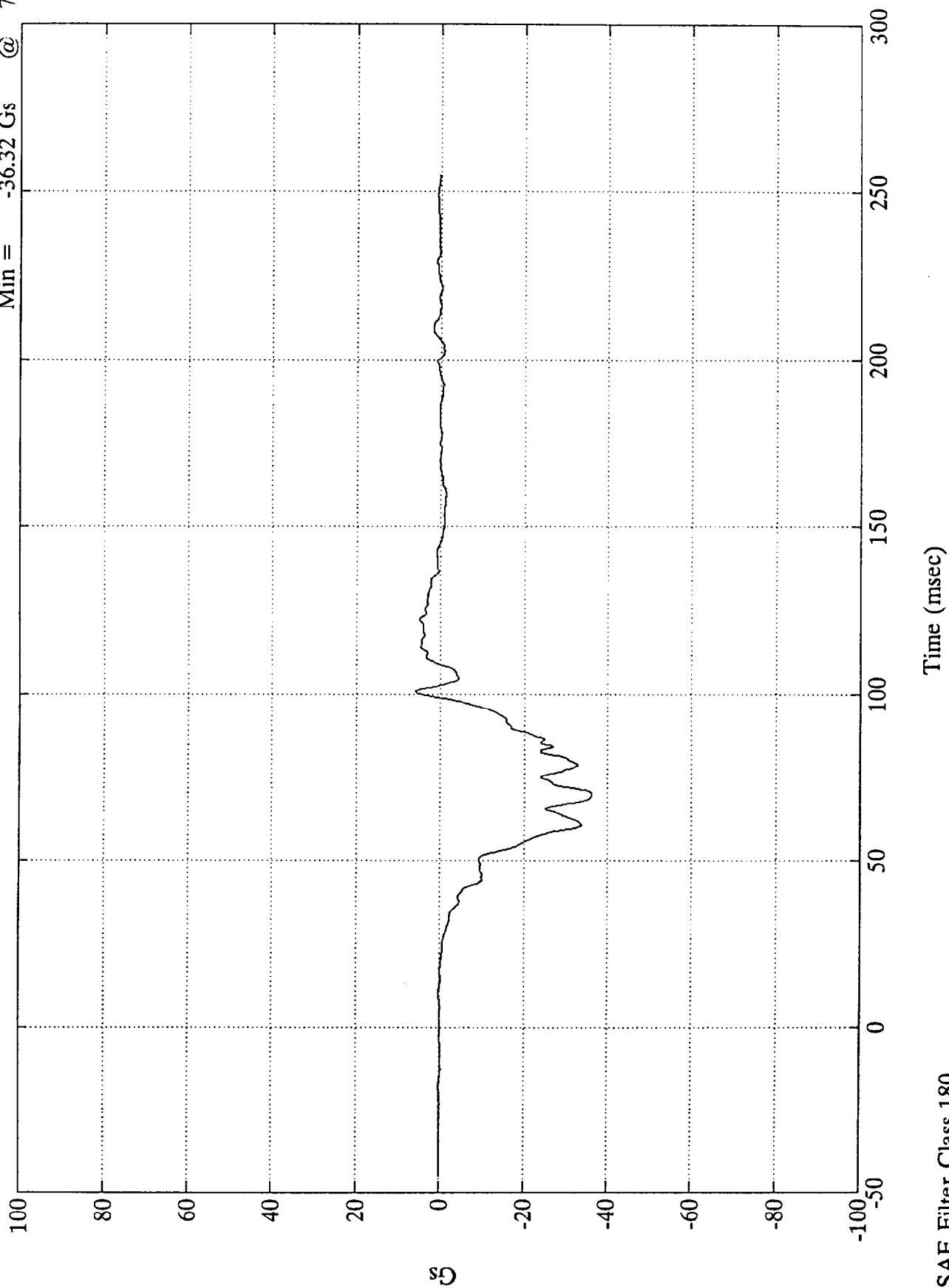


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8118-4

SAE Filter Class 1000

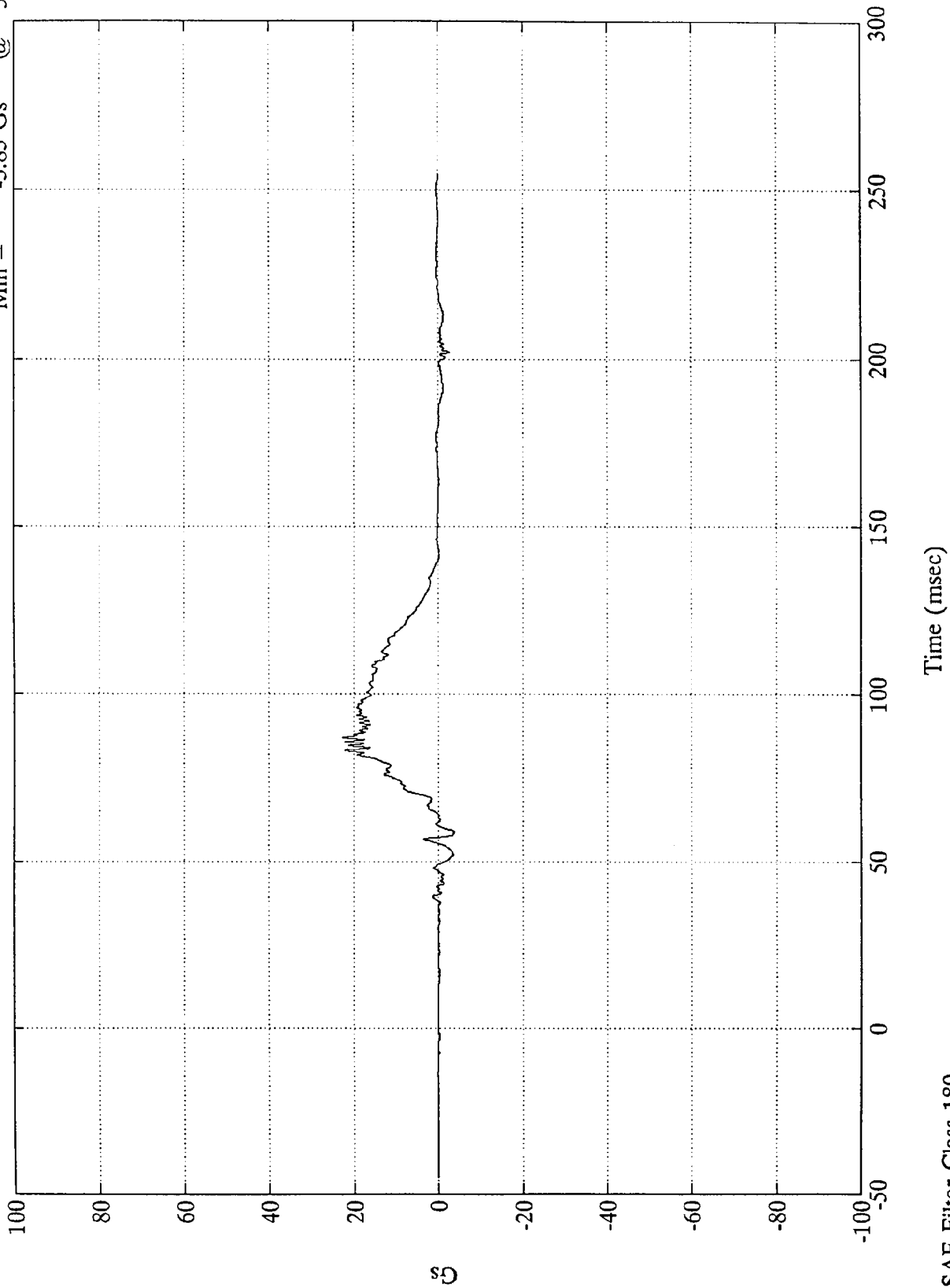
V1-P1 Chest X
Max = 5.88 Gs @ 100.80 ms
Min = -36.32 Gs @ 70.08 ms



VTV TEST #4 - 30 Deg.

Max = 22.52 Gs @ 86.87 msec
Min = -3.83 Gs @ 58.79 msec

V1-P1 Chest Y

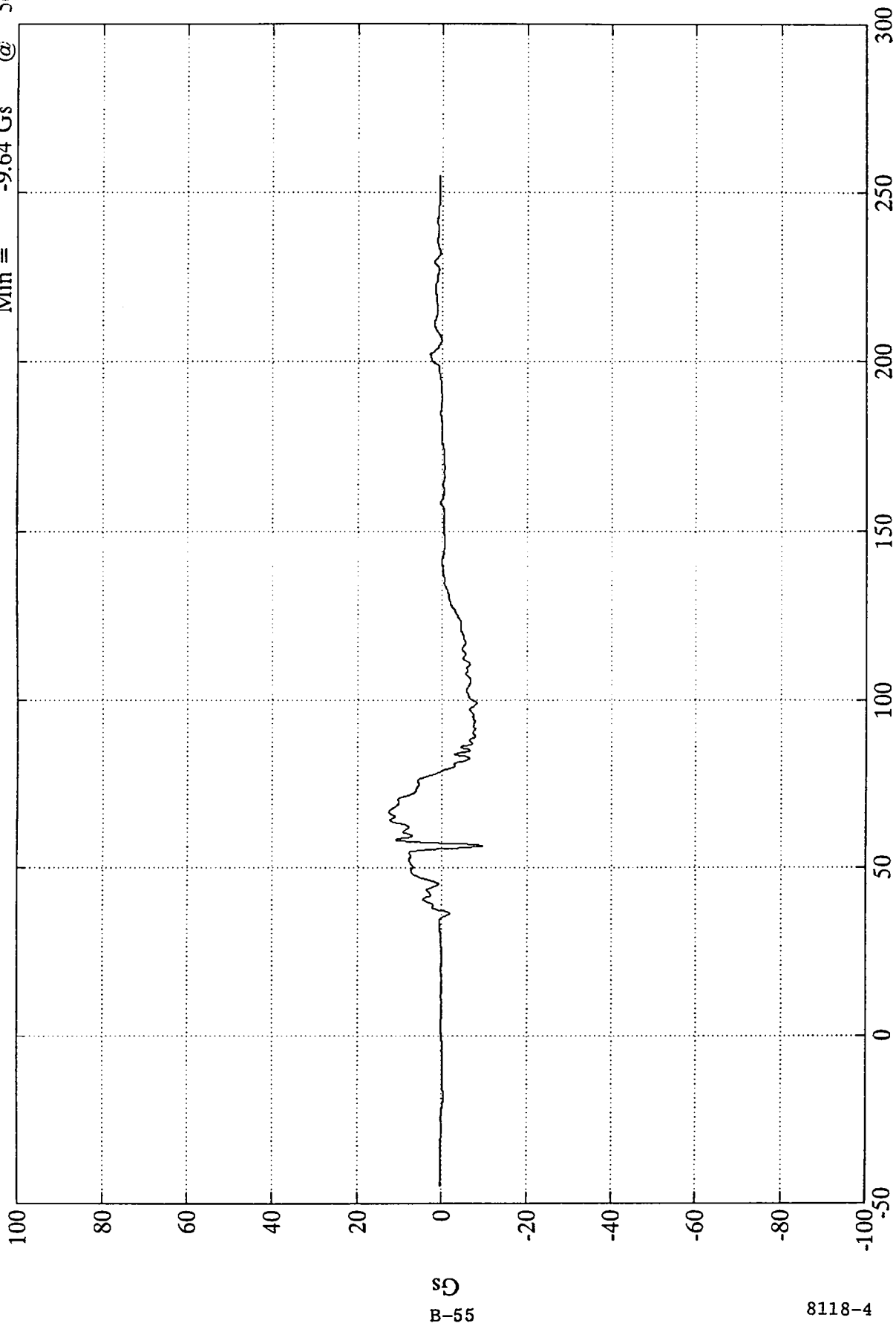


SAE Filter Class 180

VTV TEST #4 - 30 Deg.

Max = 12.57 Gs @ 66.60 ms
Min = -9.64 Gs @ 56.52 ms

V1-P1 Chest Z



B-55

8118-4

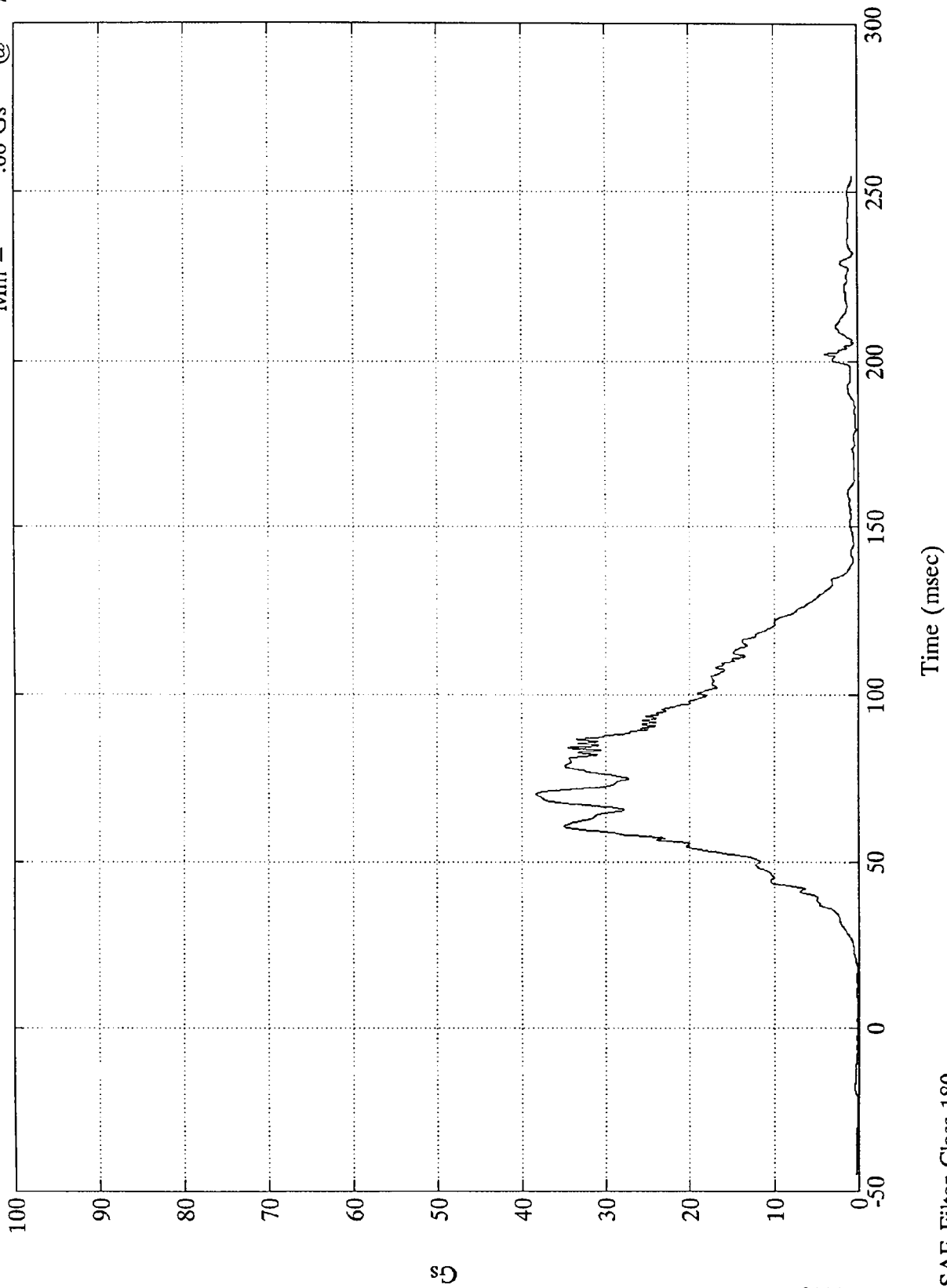
Time (msec)

SAE Filter Class 180

VTV TEST #4 - 30 Deg.

V1-P1 Chest Resultant

Max = 38.28 Gs @ 70.31 msec
Min = .06 Gs @ 7.67 msec



B-56

8118-4

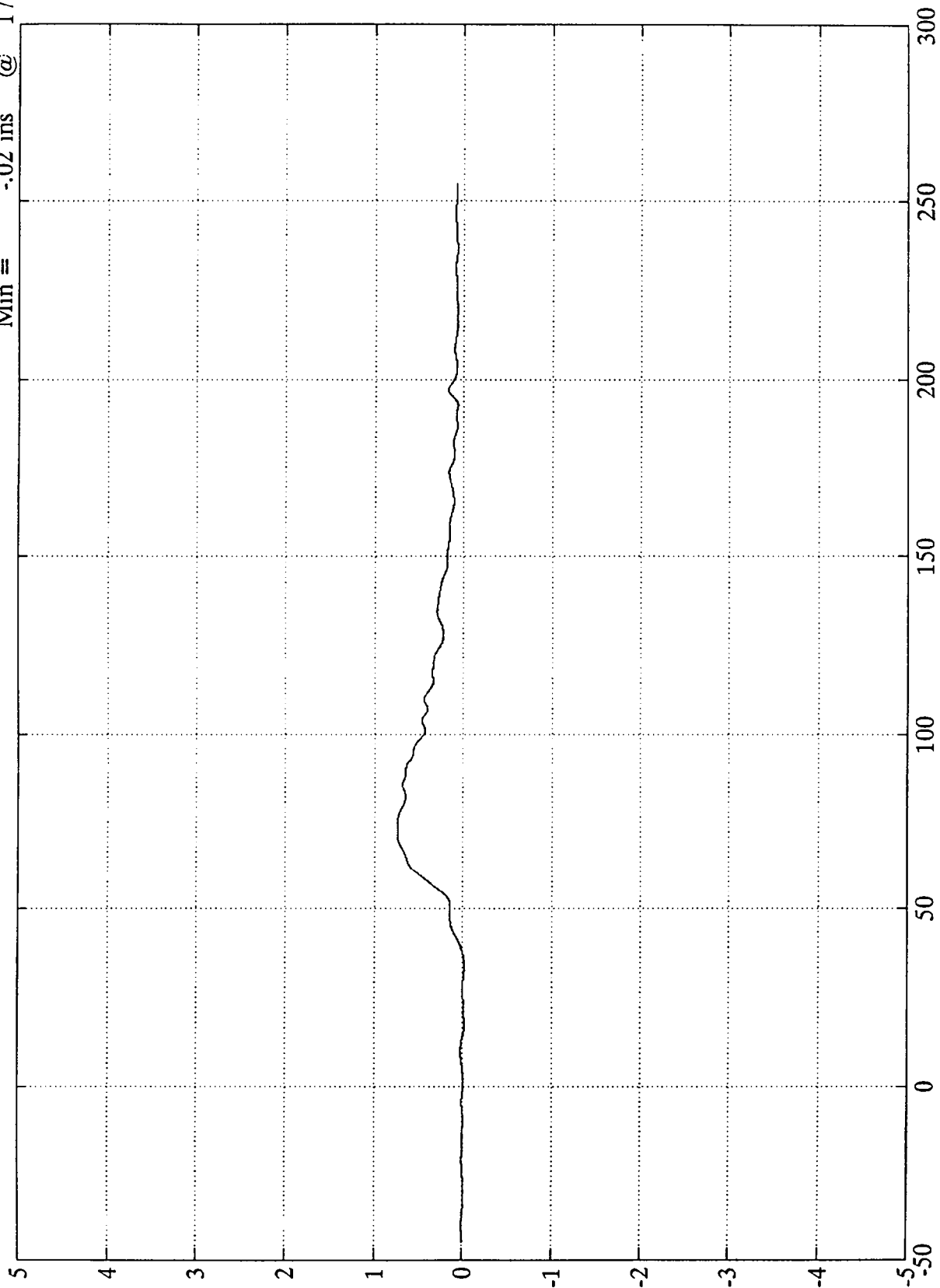
SAE Filter Class 180

VTV TEST #4 - 30 Deg.

18.8 mm

Max = .74 ins @ 72.24 msec
Min = -.02 ins @ 17.27 msec

V1-P1 Chest Disp.



su
B-57

8118-4

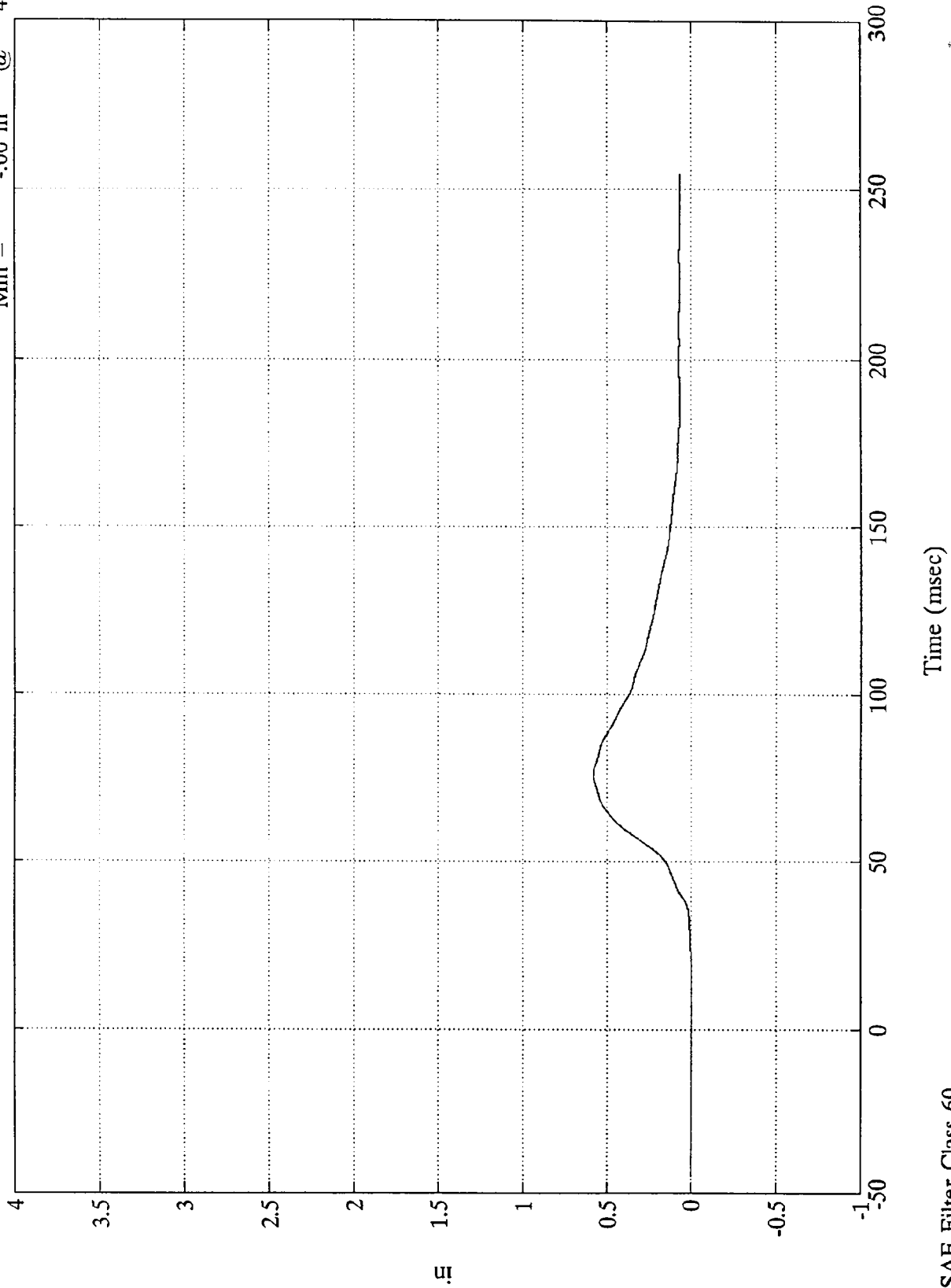
Time (msec)

SAE Filter Class 60

VTV TEST #4 - 30 Deg.

Chest Displacement #125

Max = .58 in @ 75.95 msec
Min = -.00 in @ 4.67 msec



B-58

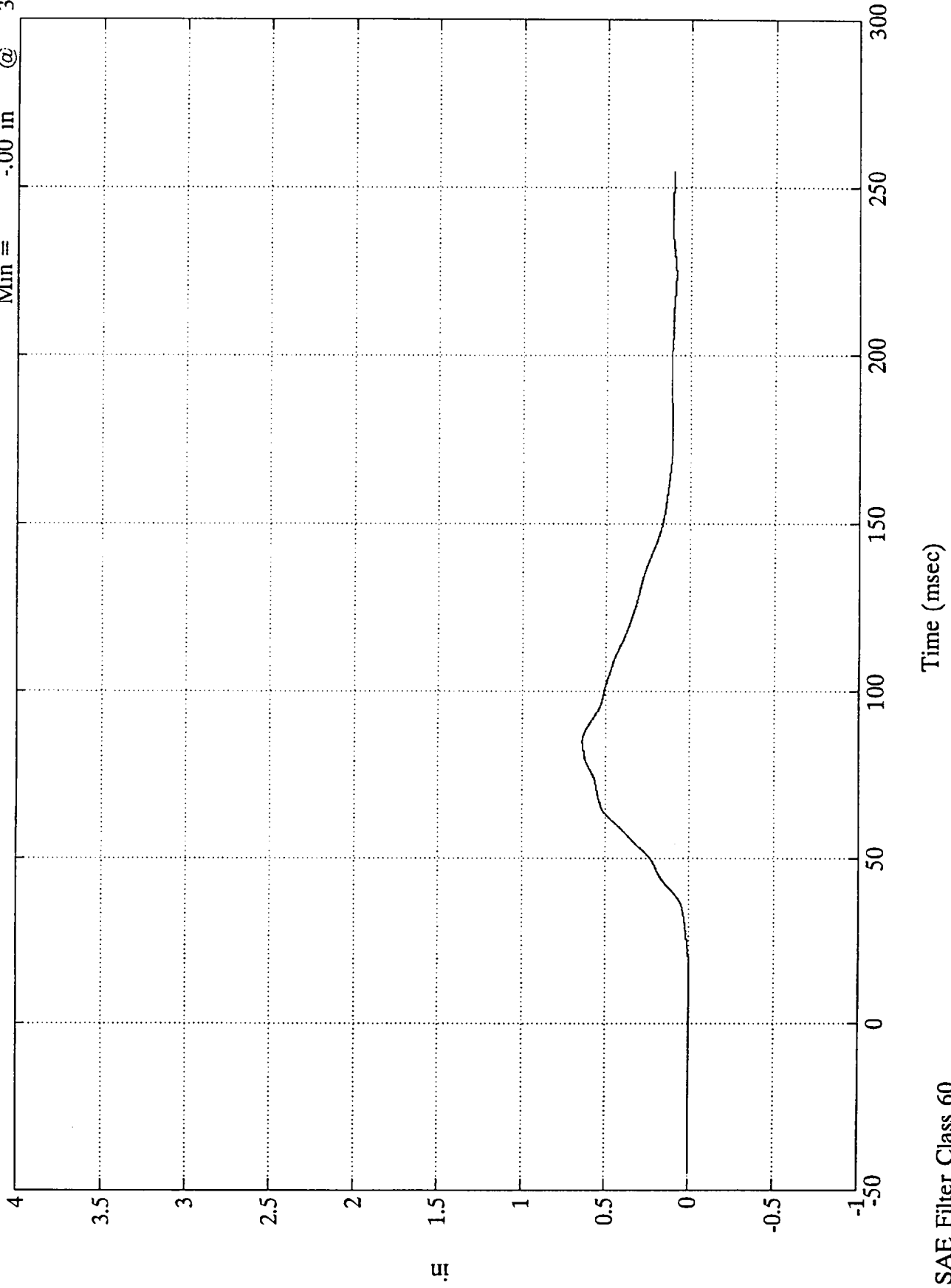
8118-4

SAE Filter Class 60

Time (msec)

2.8 4.67

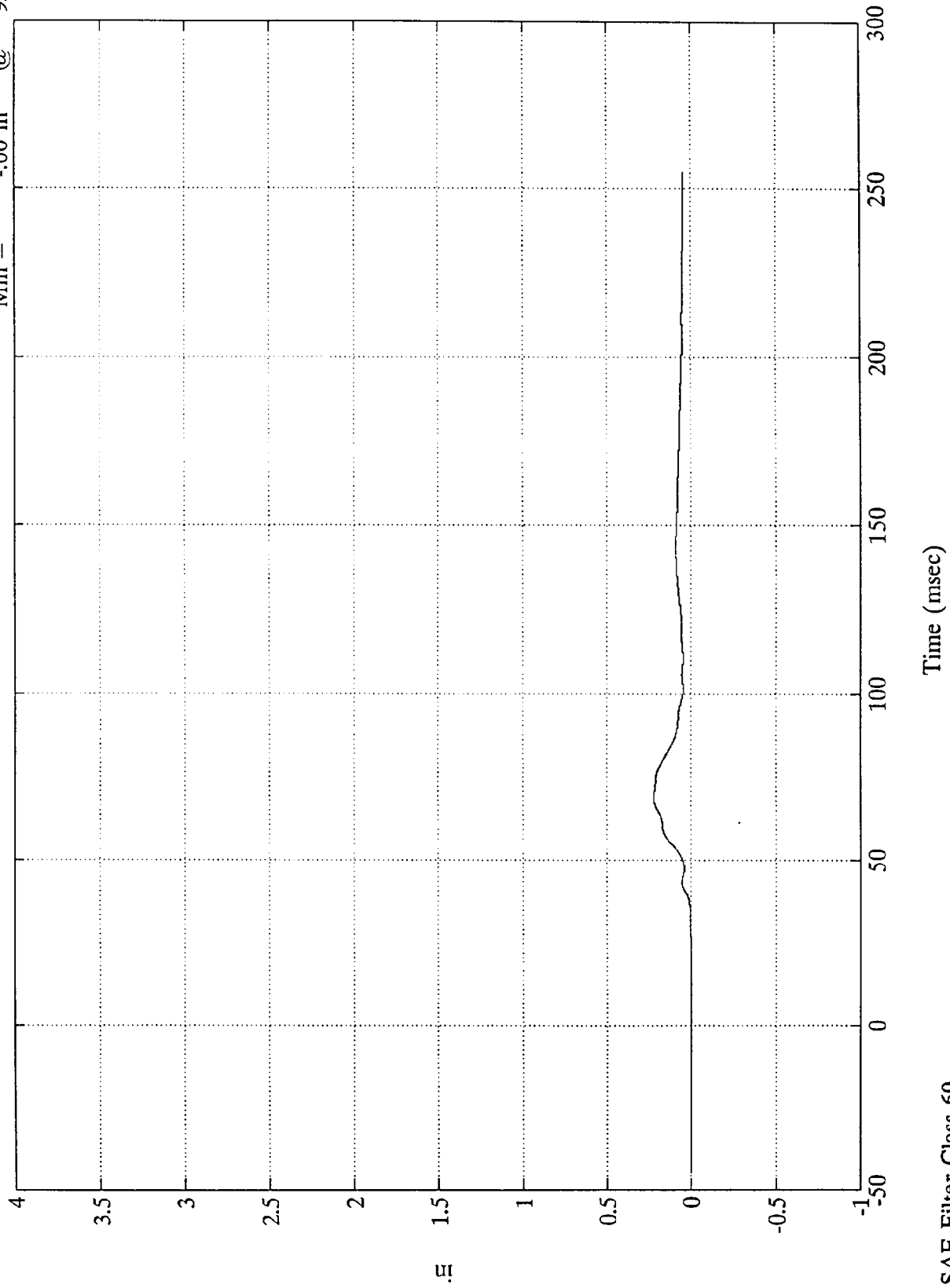
Chest Displacement #126
Max = .64 in @ 84.72 msec
Min = -.00 in @ 3.71 msec



VTV TEST #4 - 30 Deg.

Chest Displacement #127

Max = .22 in @ 68.52 msec
Min = -.00 in @ 9.35 msec

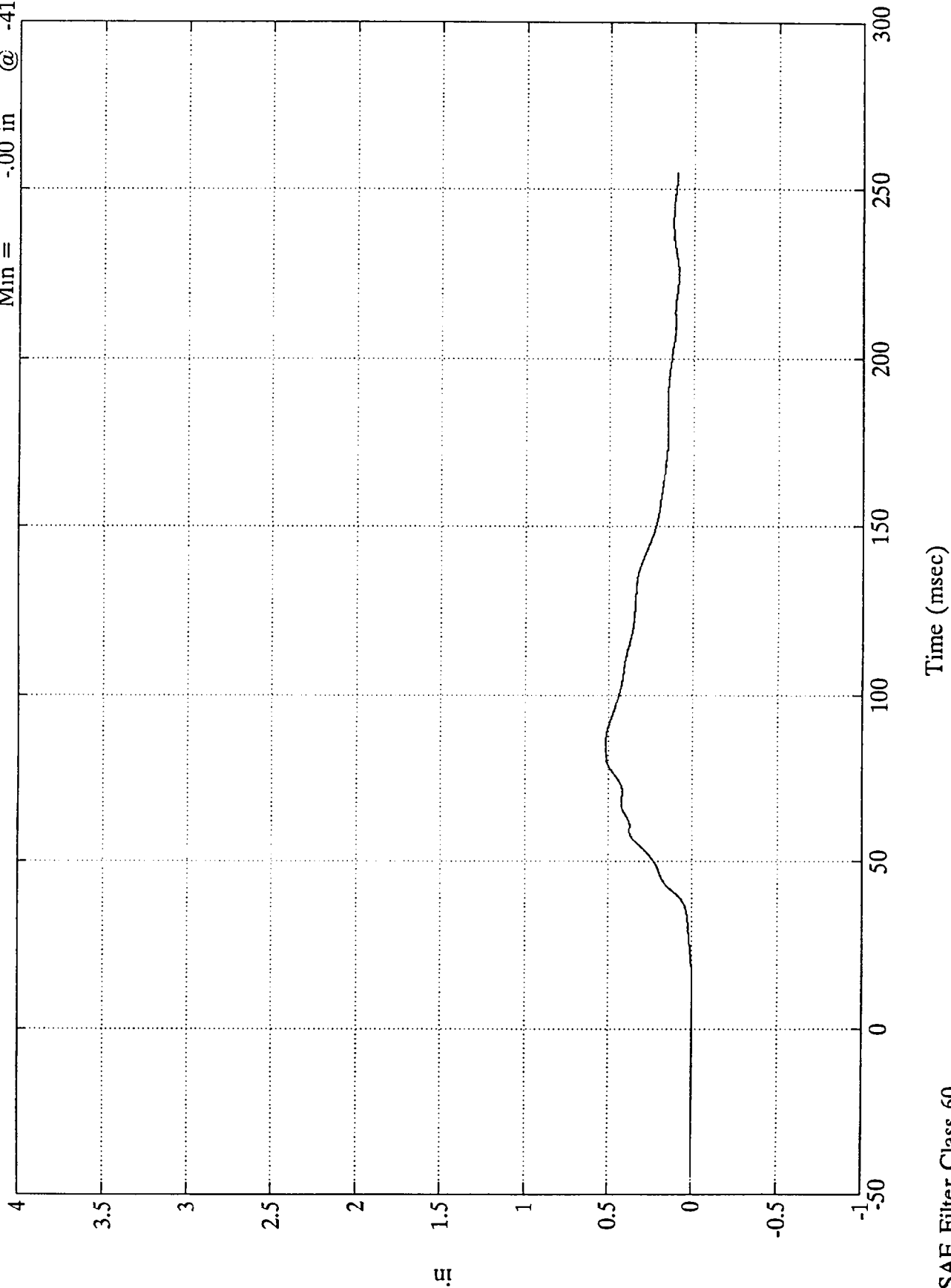


B-60

8118-4

SAE Filter Class 60

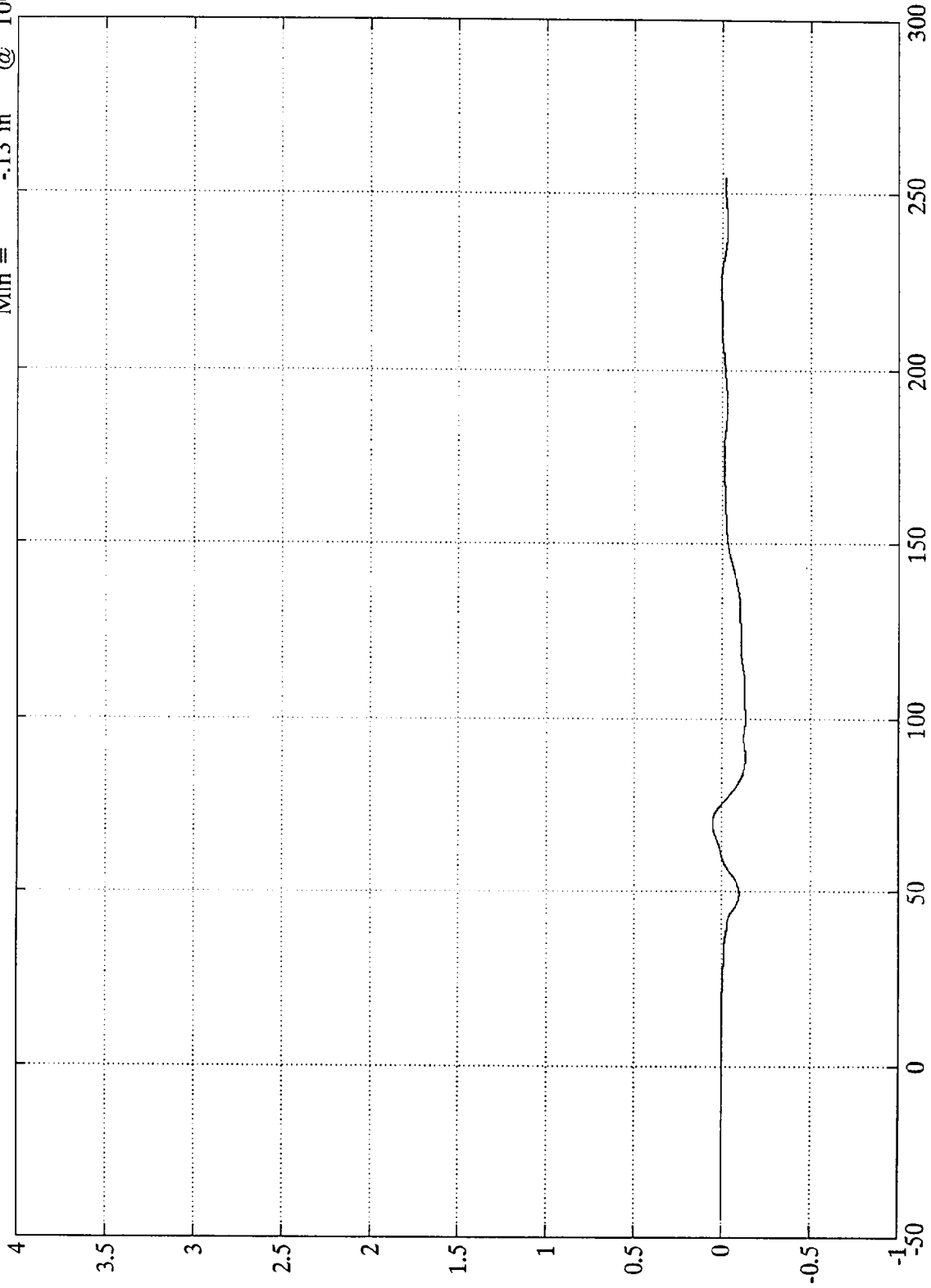
Chest Displacement #128
Max = .52 in @ 85.31 msec
Min = -.00 in @ -41.64 msec



VTV TEST #4 - 30 Deg.

Max = .05 in @ 70.08 msec
Min = -.13 in @ 100.32 msec

Chest Displacement #129

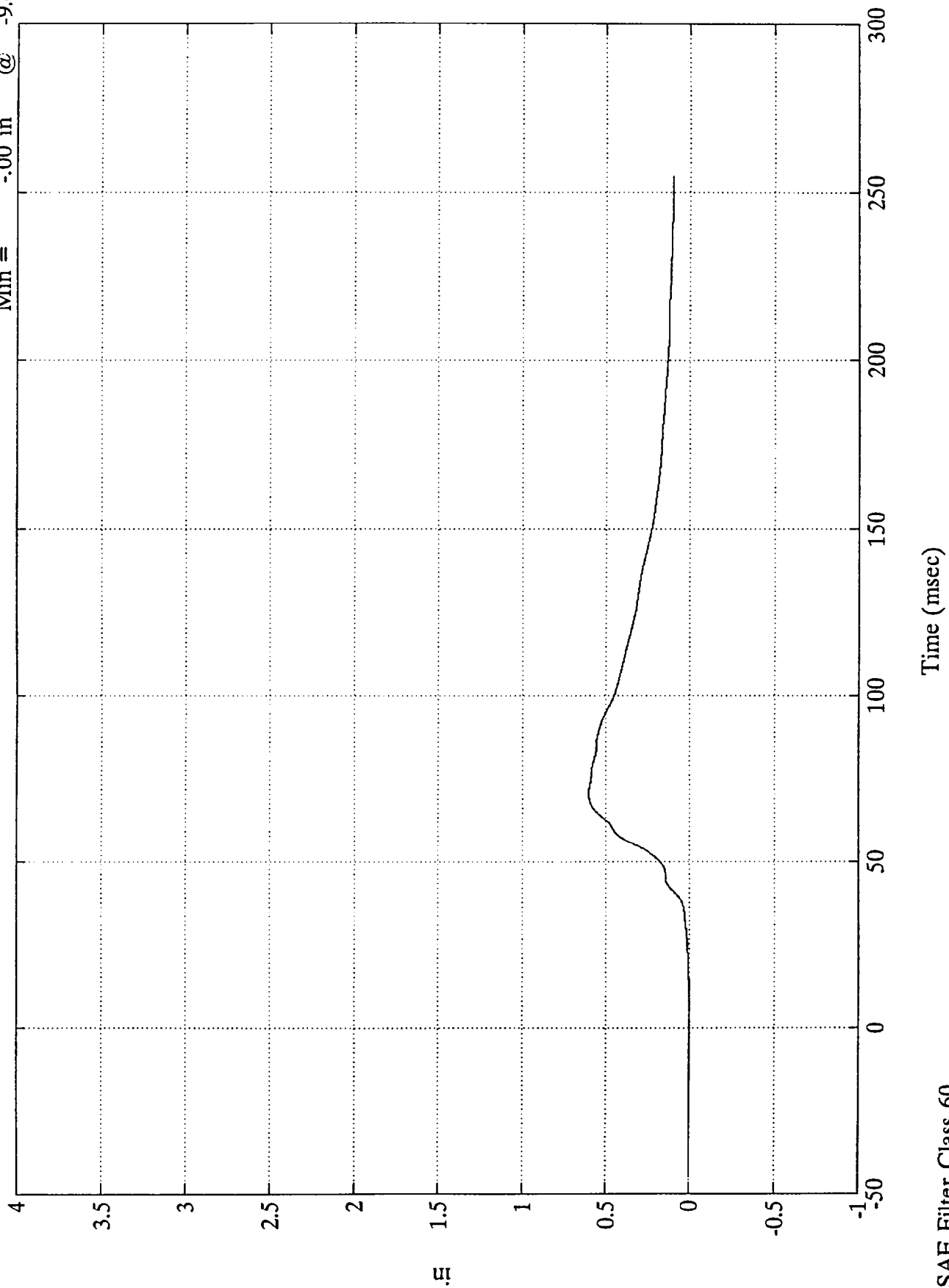


Time (msec)

SAE Filter Class 60

VTV TEST #4 - 30 Deg.

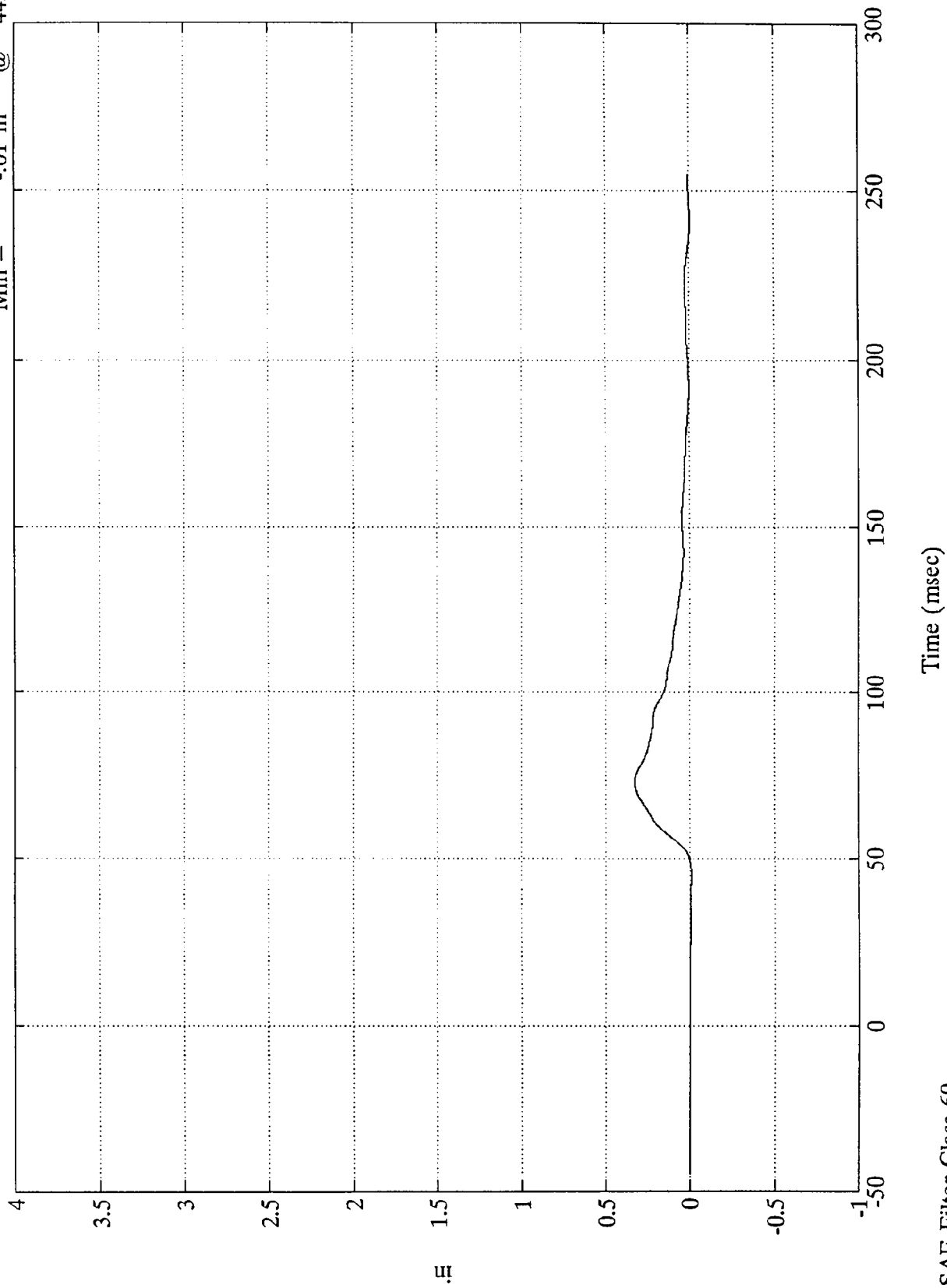
Chest Displacement #130
Max = .60 in @ 70.44 msec
Min = -.00 in @ -9.48 msec



VTV TEST #4 - 30 Deg.

Chest Displacement #131

Max = .33 in @ 72.83 msec
Min = -.01 in @ 44.39 msec



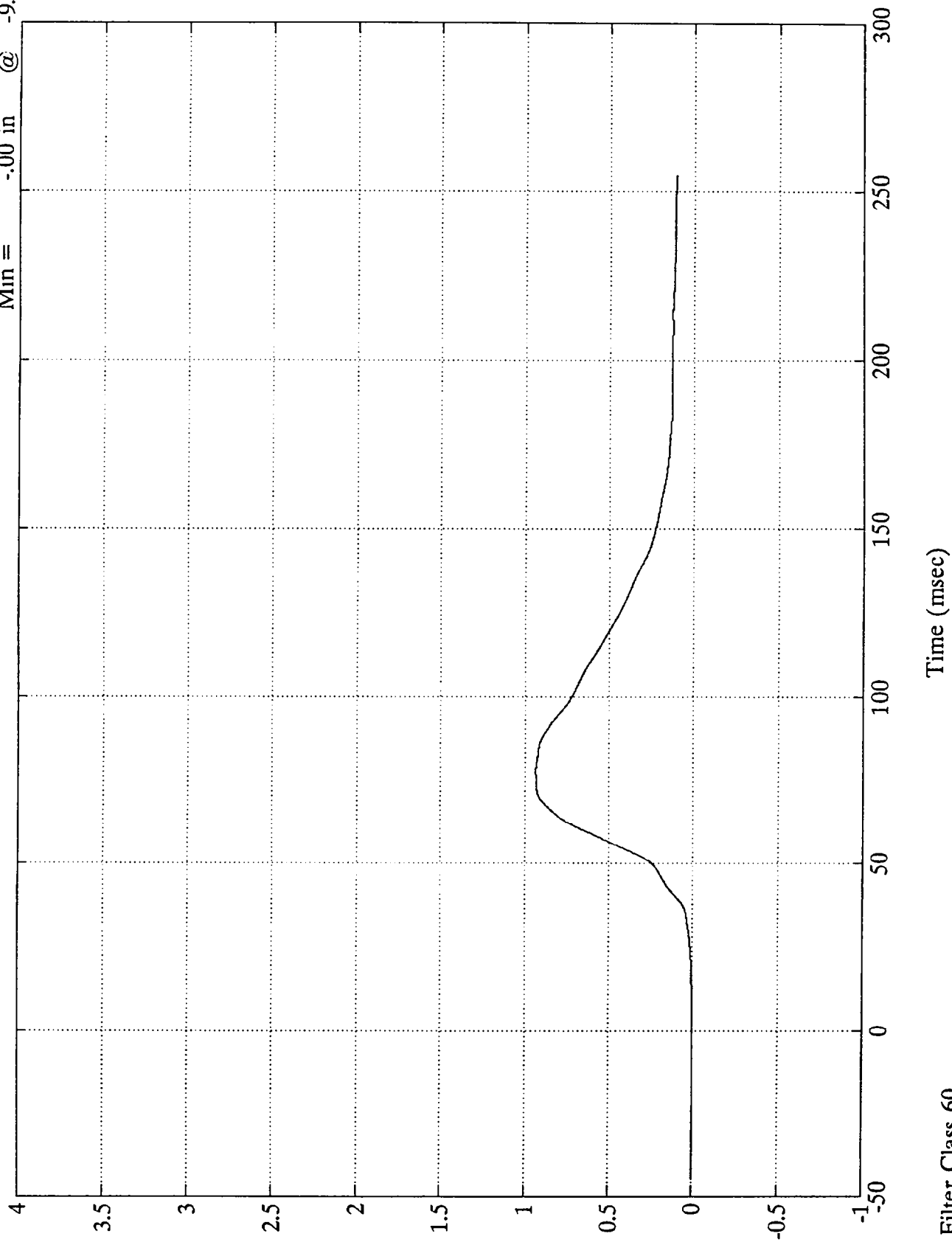
VTV TEST #4 - 30 Deg.

Chest Displacement #132

Max =
Min =

.93 in
-.00 in

@ 77.76 msec
@ -9.84 msec



B-65

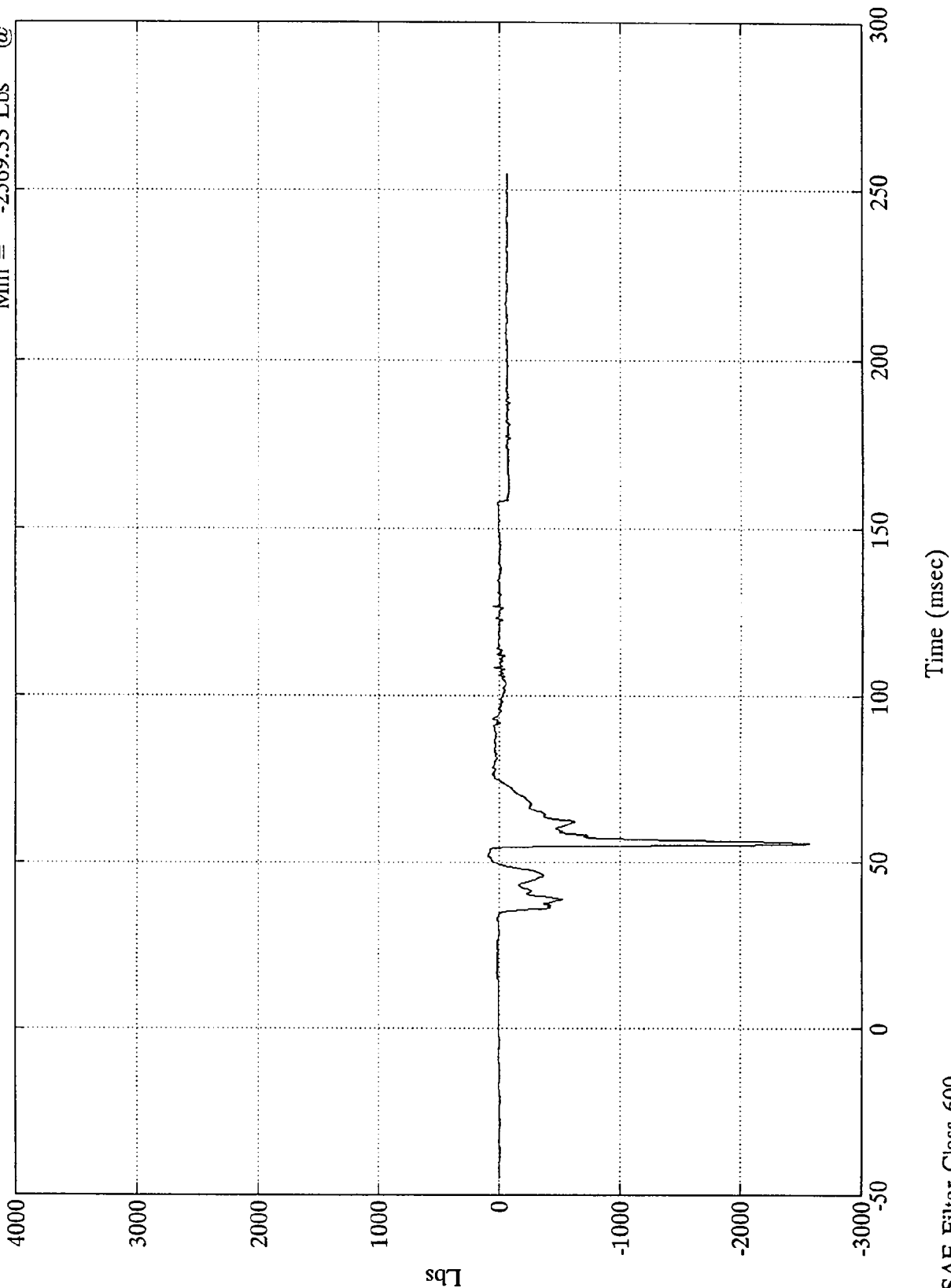
8118-4

SAE Filter Class 60

VTV TEST #4 - 30 Deg.

Max = 95.83 Lbs @ 52.08 msec
Min = -2569.33 Lbs @ 55.56 msec

VI-P1 Left Femur

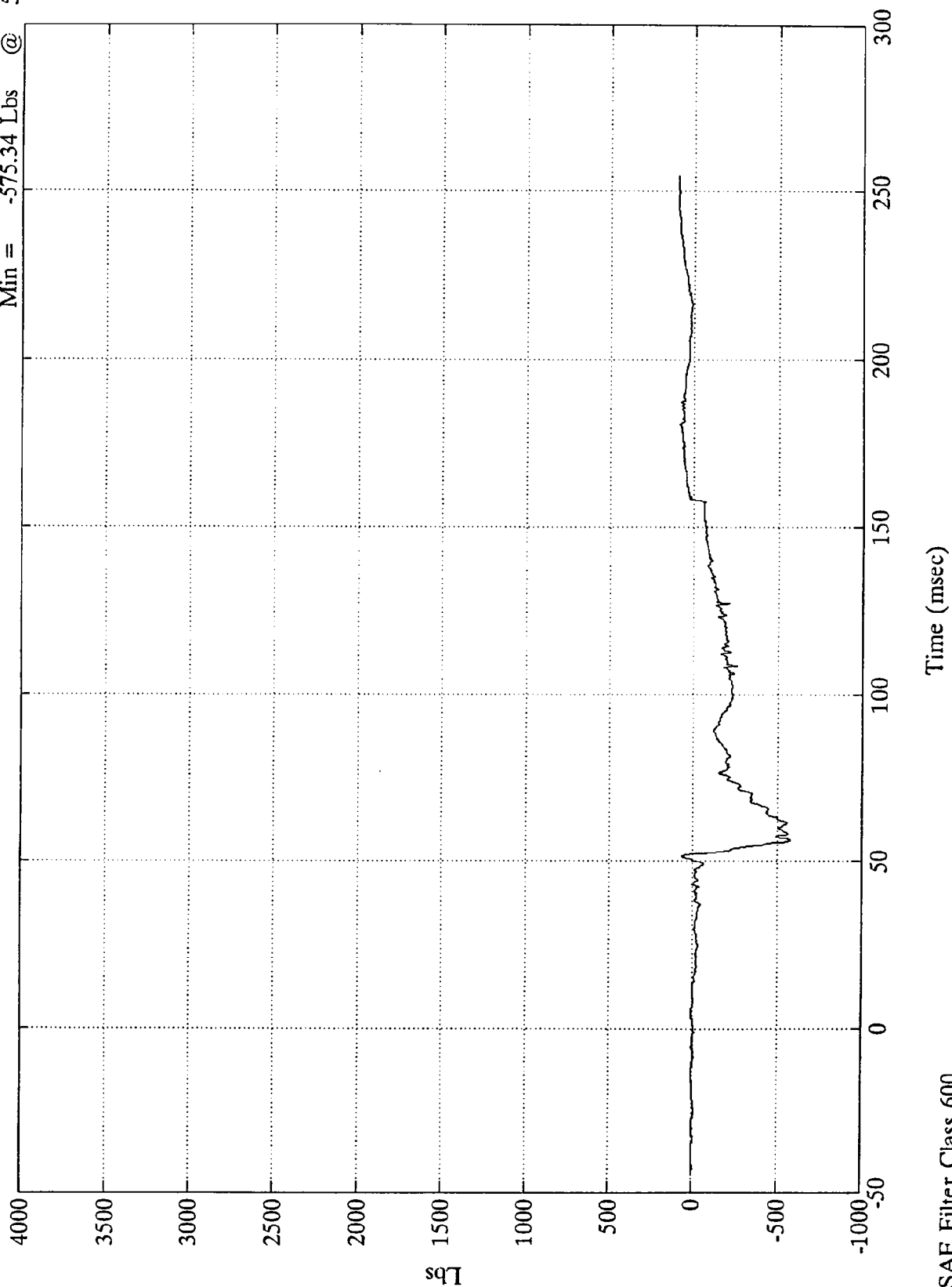


SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V1-P1 Right Femur

Max = 99.22 Lbs @ 246.60 ms
Min = -575.34 Lbs @ 56.40 ms



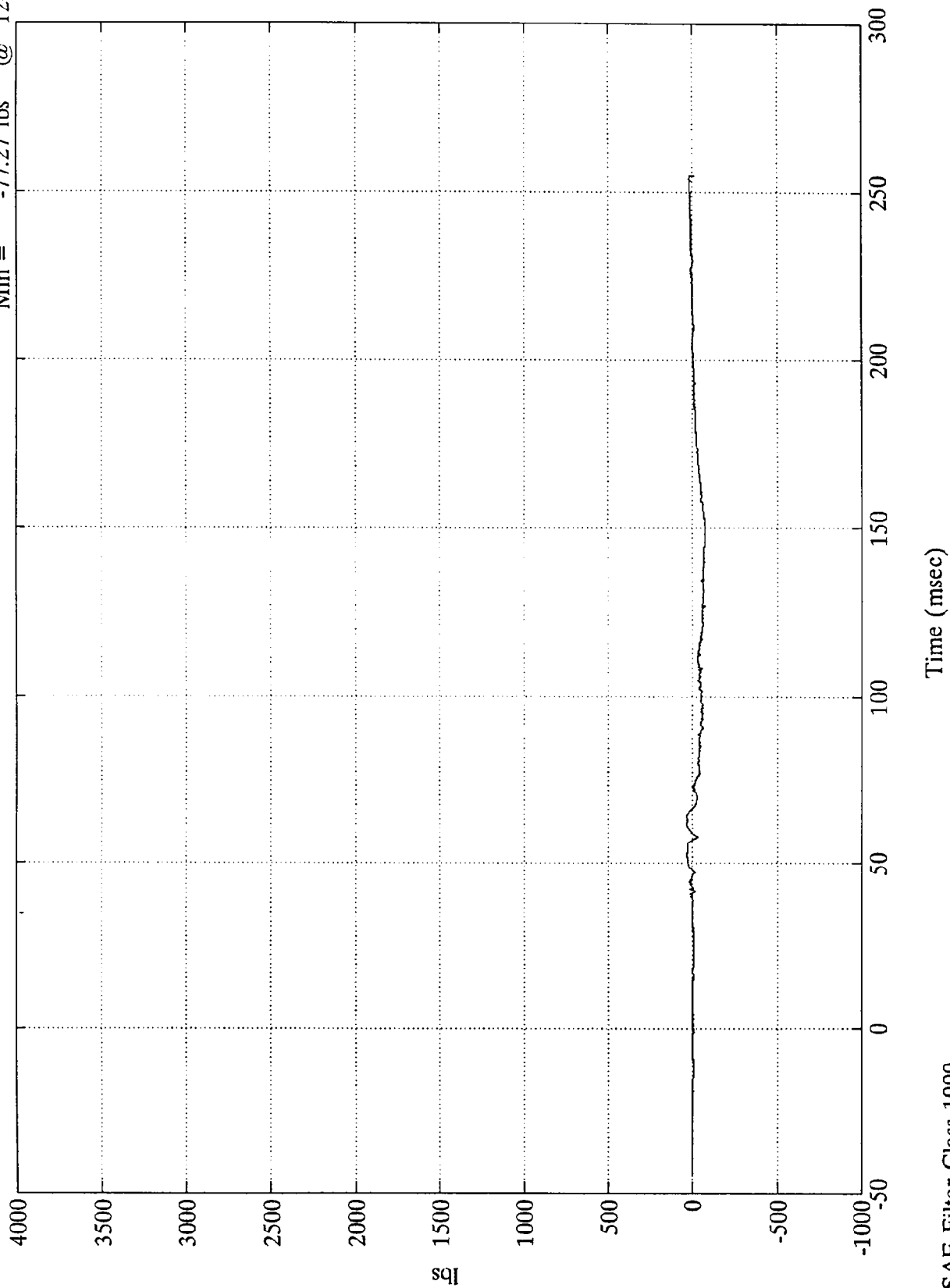
B-67

8118-4

SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V1-P1 Upper Neck Fx
Max = 37.04 lbs @ 64.44 msec
Min = -77.27 lbs @ 126.96 msec



B-68

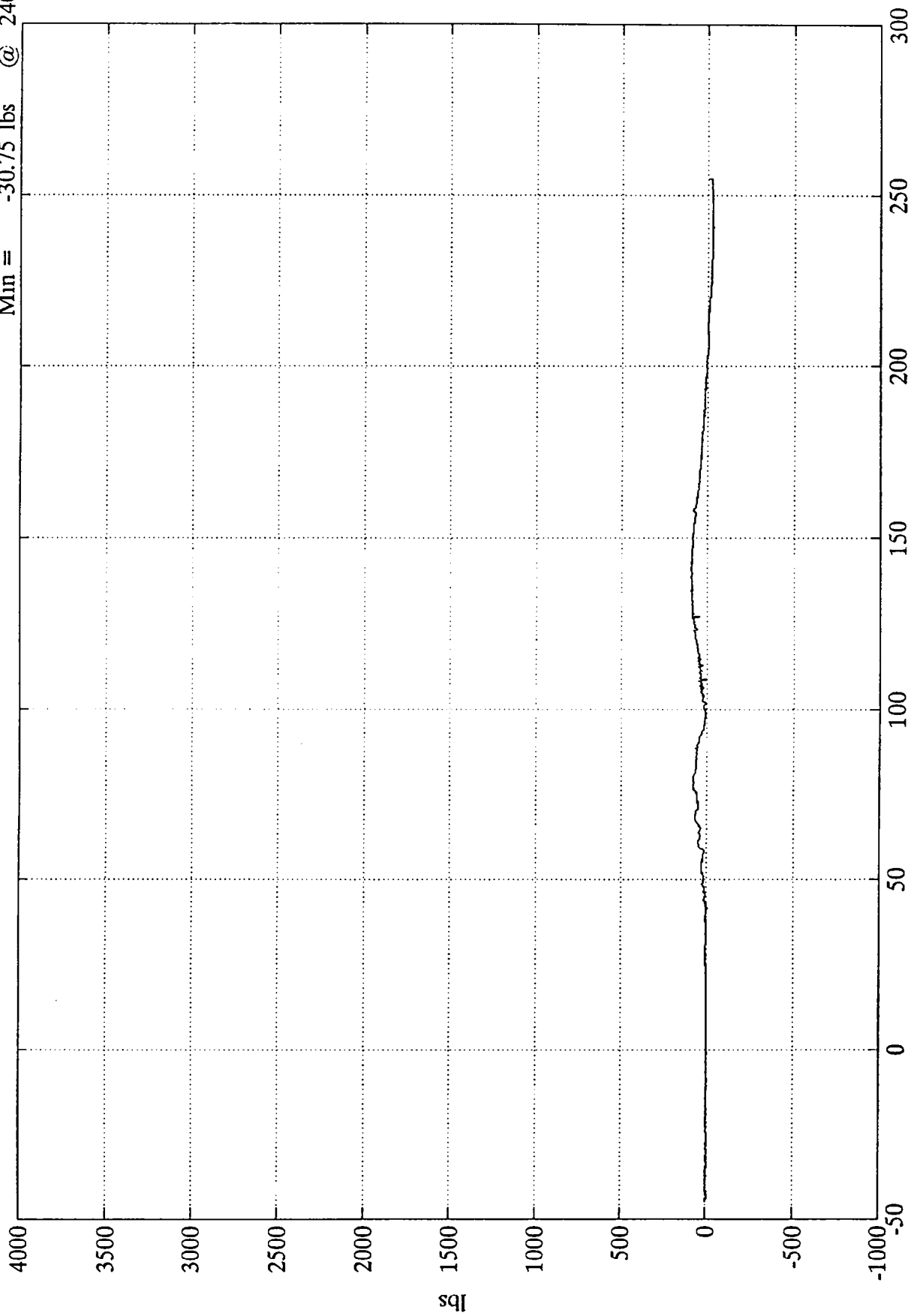
8118-4

SAE Filter Class 1000

VTV TEST #4 - 30 Deg.

V1-P1 Upper Neck Fy

Max = 99.30 lbs @ 134.64 msec
Min = -30.75 lbs @ 240.72 msec

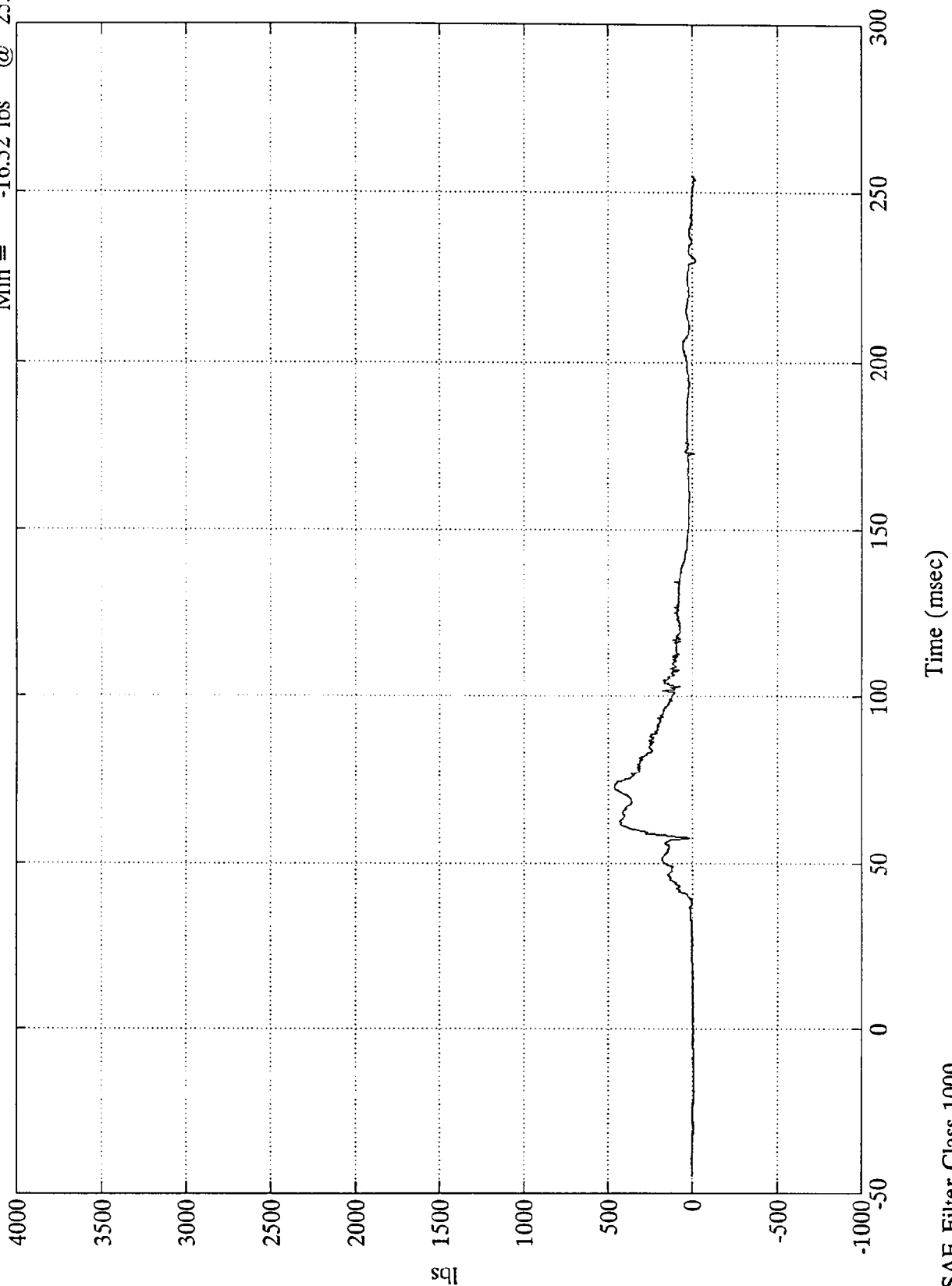


Time (msec)

SAE Filter Class 1000

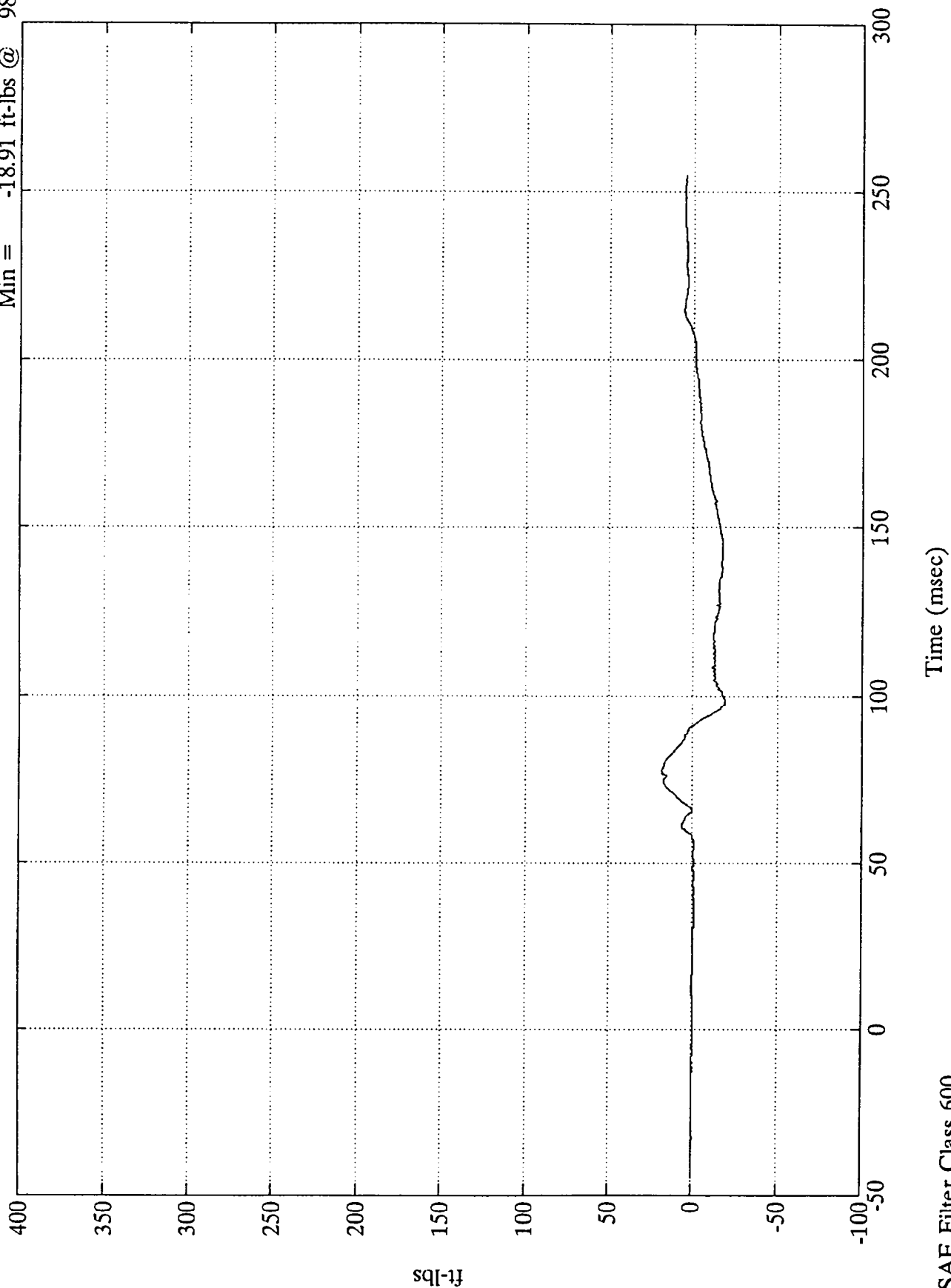
VTV TEST #4 - 30 Deg.

V1-P1 Upper Neck Fz
Max = 465.00 lbs @ 72.72 msec
Min = -16.52 lbs @ 253.68 msec



VTV TEST #4 - 30 Deg.

V1-P1 Upper Neck Mx
Max = 18.68 ft-lbs @ 77.64 msec
Min = -18.91 ft-lbs @ 98.04 msec



B-71

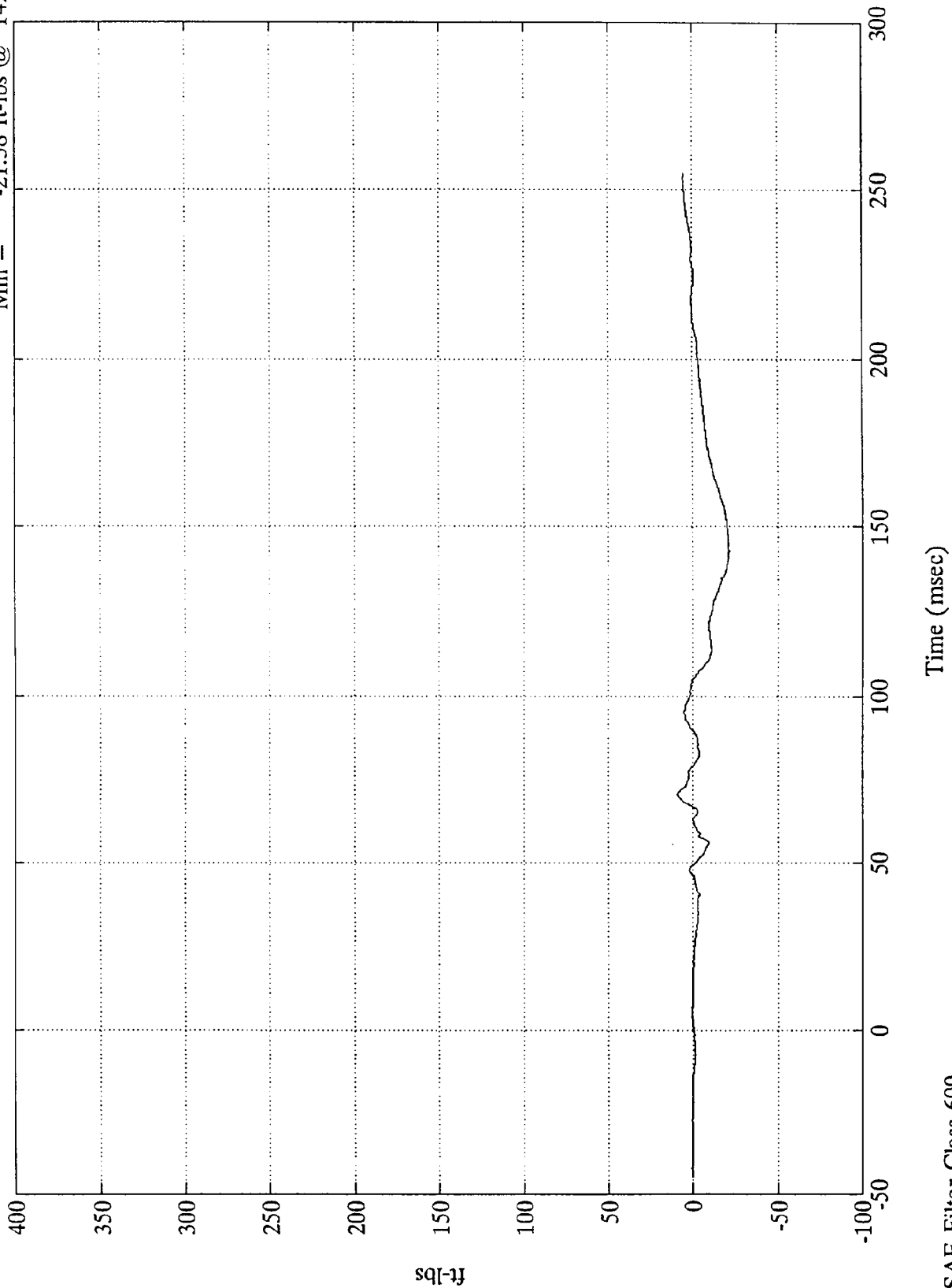
8118-4

SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V1-P1 Upper Neck My

Max = 9.04 ft-lbs @ 70.55 msec
Min = -21.38 ft-lbs @ 142.91 msec



B-72

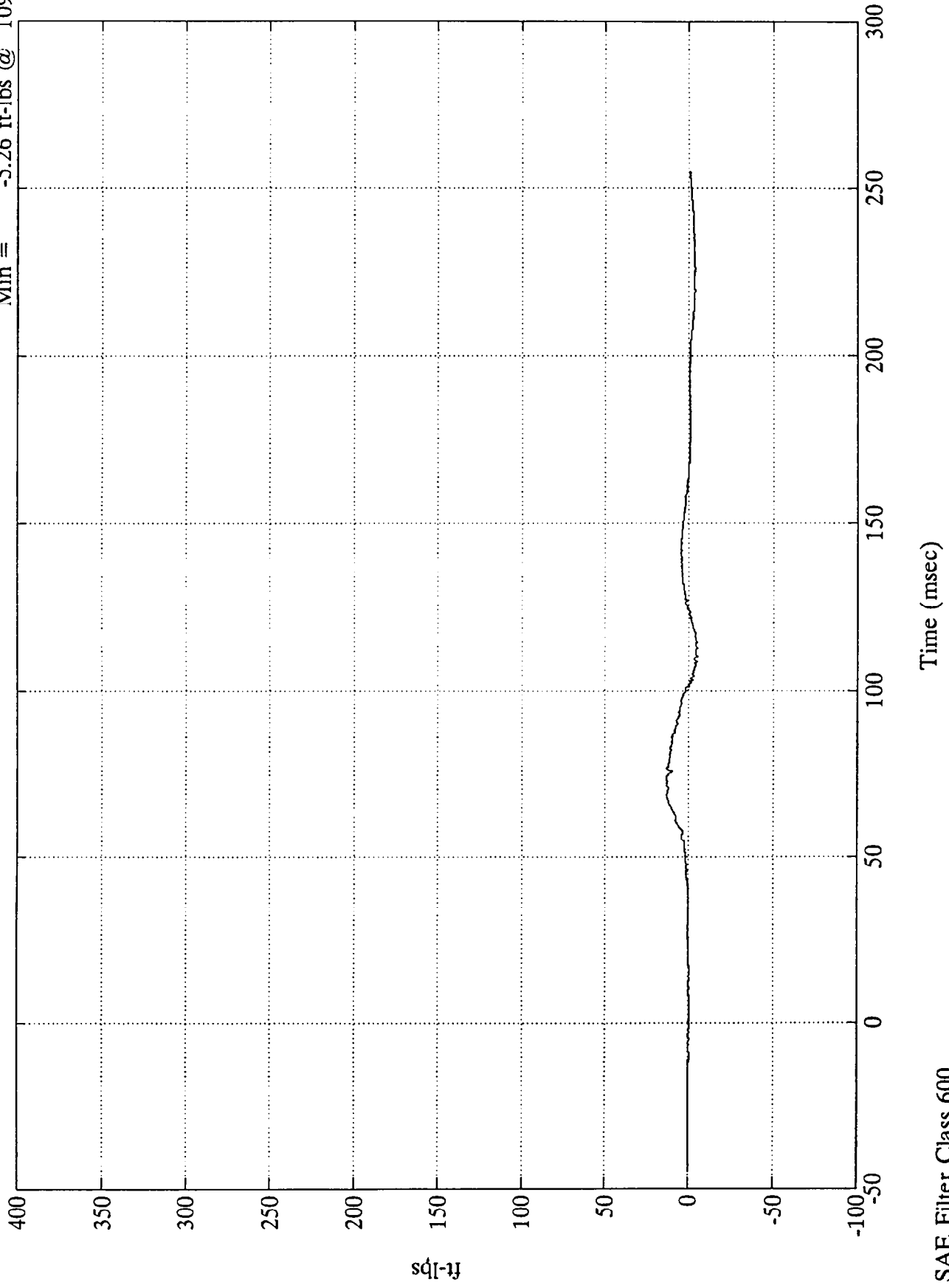
8118-4

SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V1-P1 Upper Neck Mz

Max = 13.30 ft-lbs @ 76.68 msec
Min = -5.26 ft-lbs @ 109.92 msec



sq[-1]
B-73

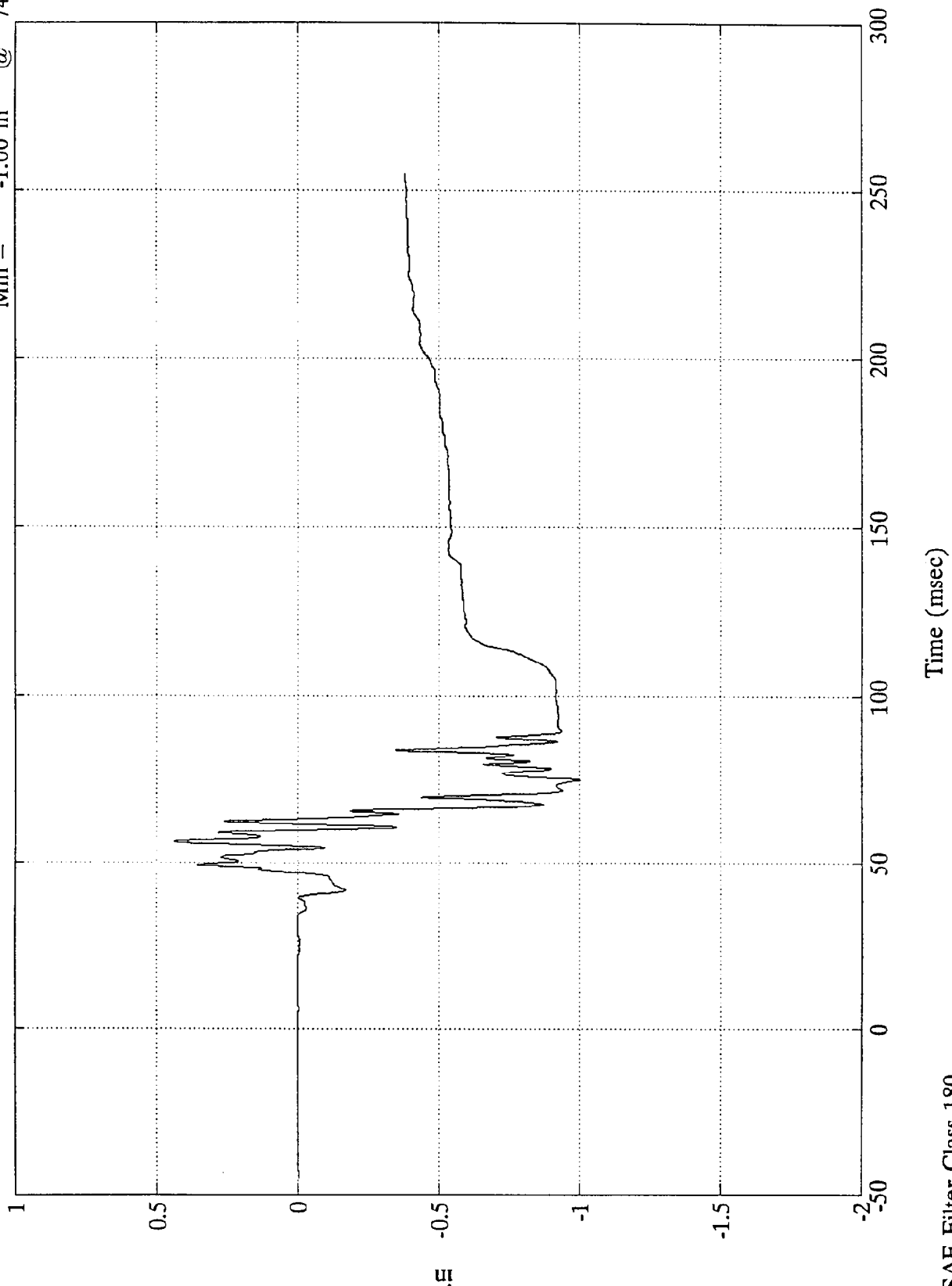
8118-4

SAE Filter Class 600

VTV TEST #4 - 30 Deg.

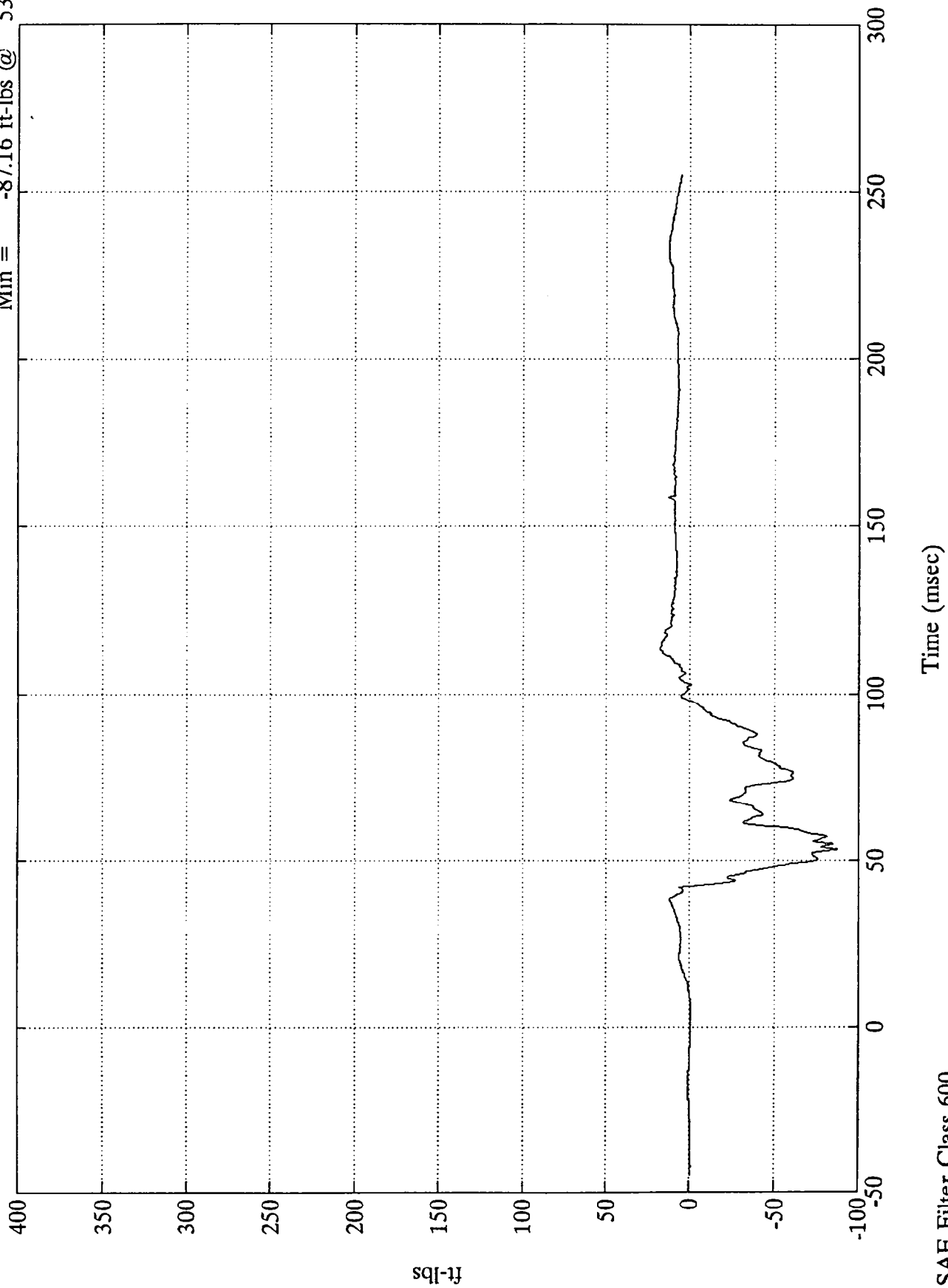
V1-P1 Lt Knee Shear

Max =	.44 in	@	56.28 msec
Min =	-1.00 in	@	74.76 msec



V1-P1 Lt Upper Tibia Mx

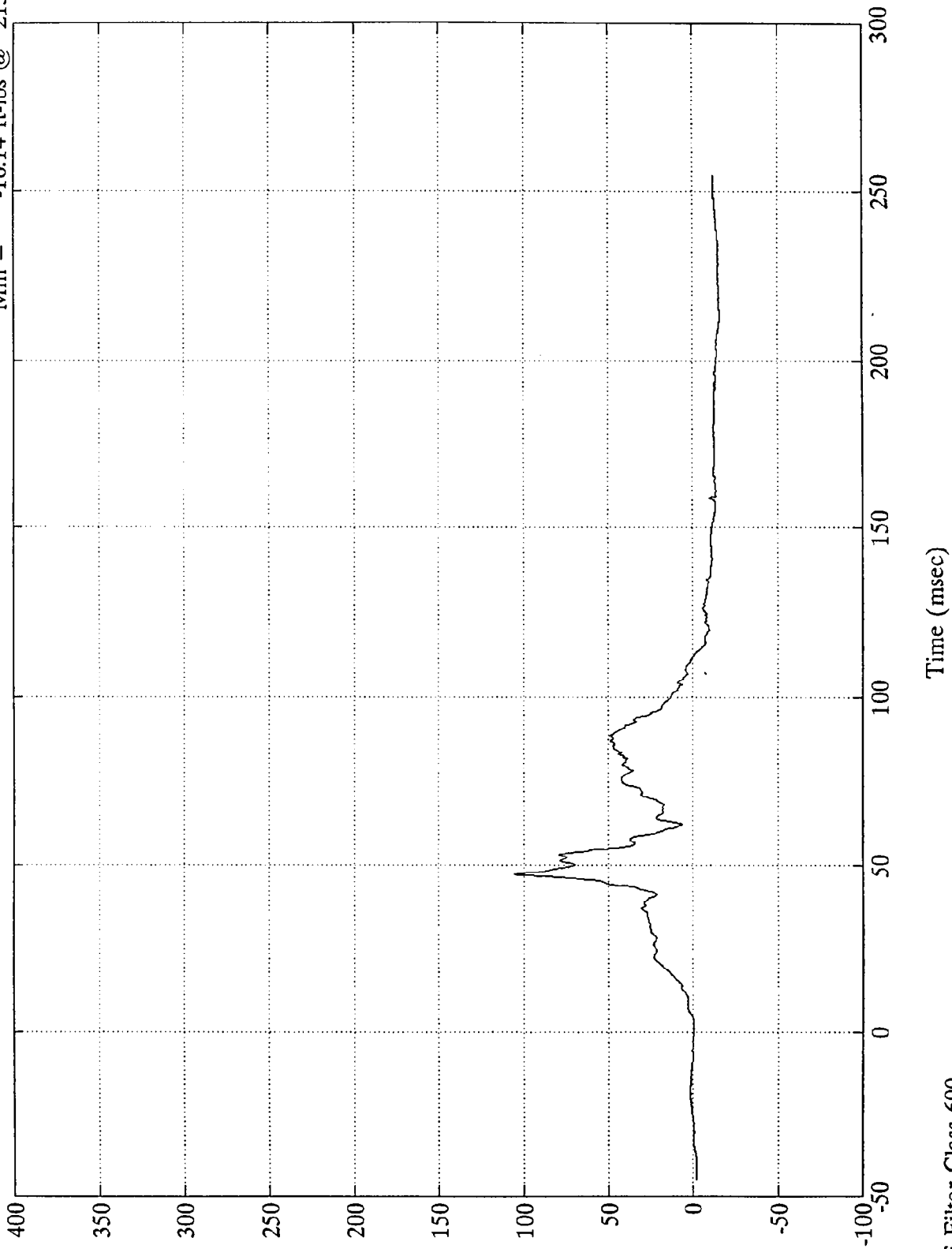
Max = 17.53 ft-lbs @ 113.04 msec
Min = -87.16 ft-lbs @ 53.27 msec



VTV TEST #4 - 30 Deg.

V1-P1 Lt Upper Tibia My

Max = 105.46 ft-lbs @ 47.15 msec
Min = -16.14 ft-lbs @ 213.48 msec

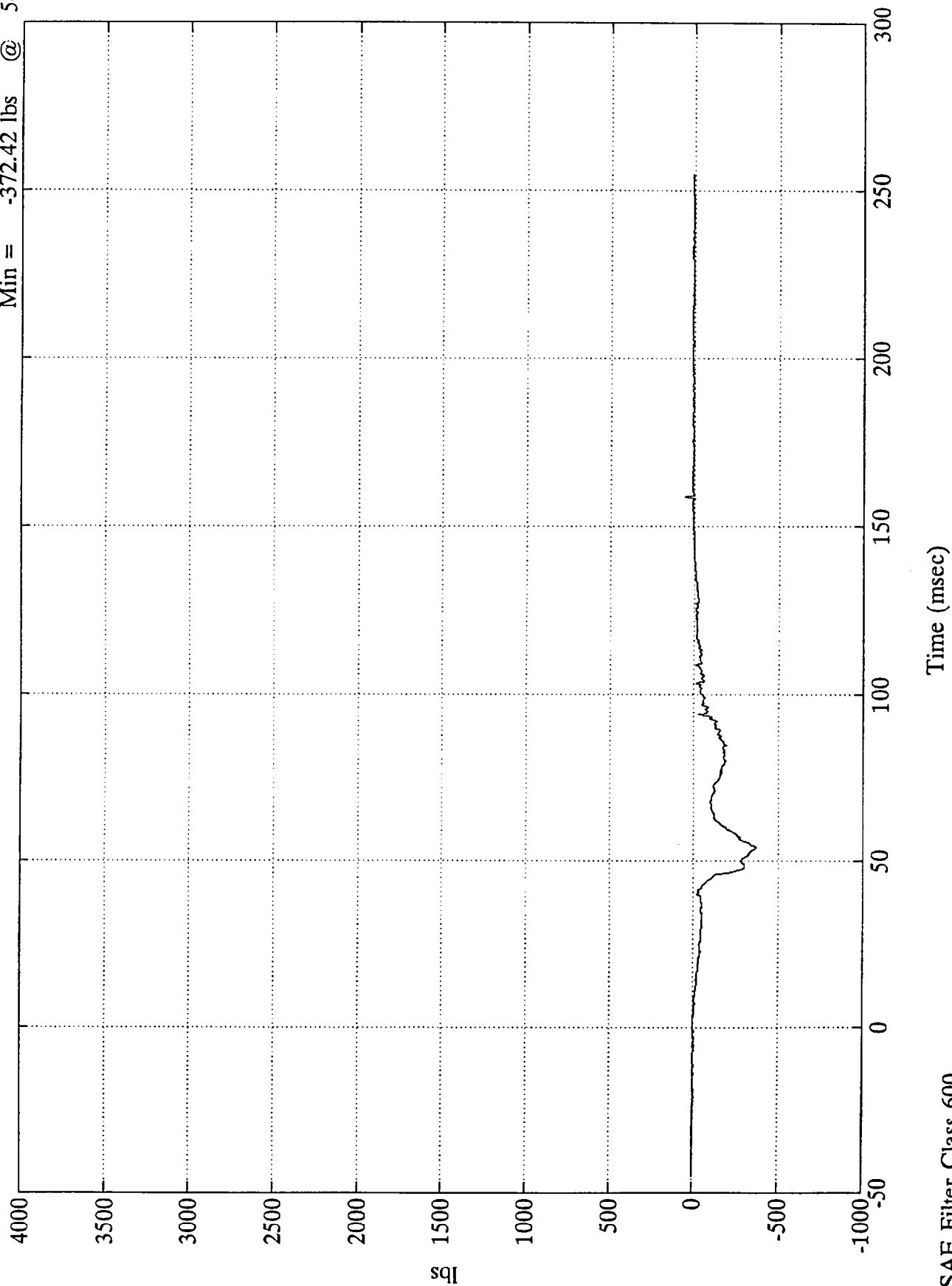


SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V1-P1 Lt Lower Tibia Fy

Max = 56.77 lbs @ 158.88 msec
Min = -372.42 lbs @ 54.00 msec



B-77

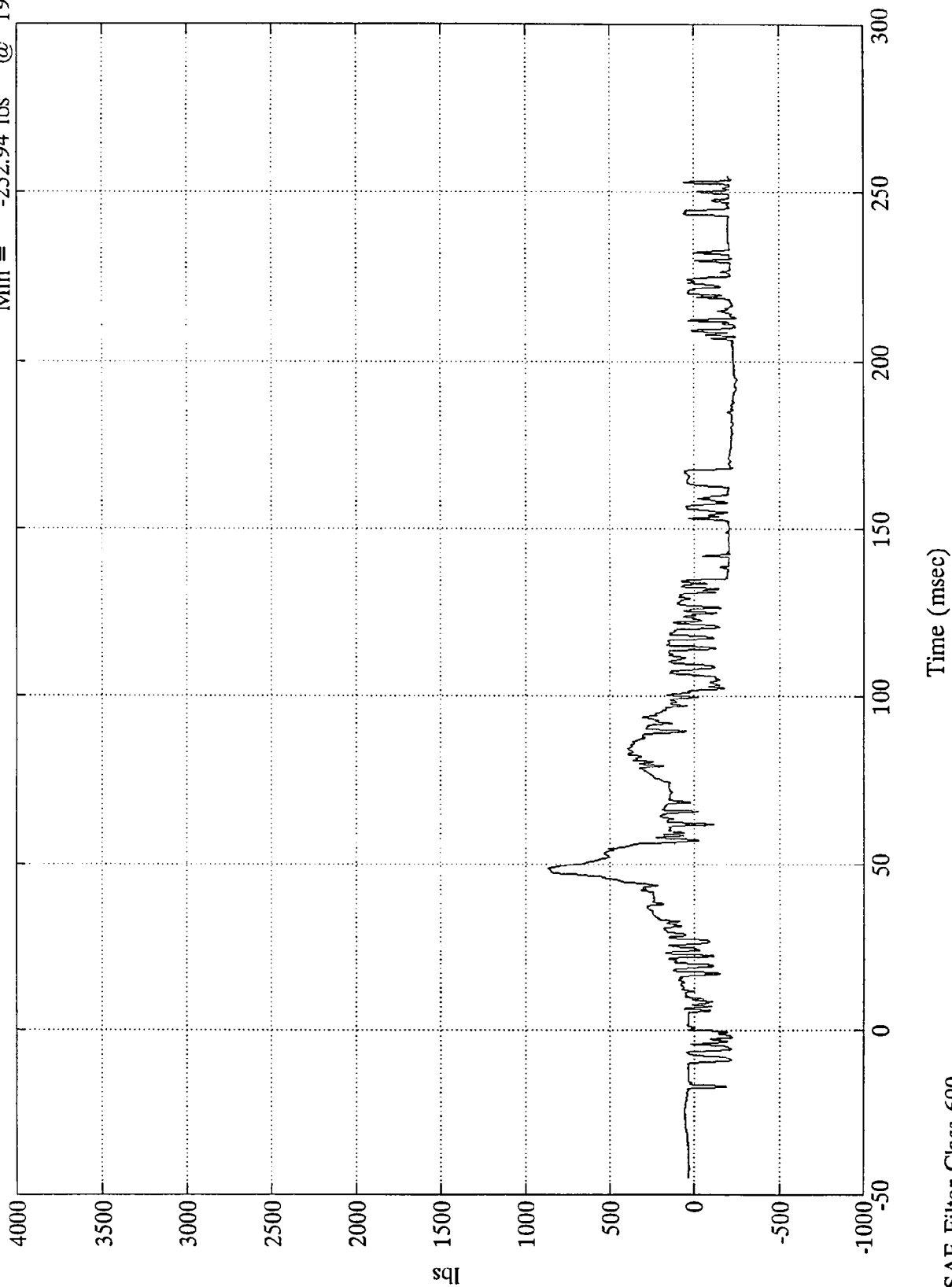
8118-4

SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V1-P1 L1 Lower Tibia Fz

Max = 870.73 lbs @ 48.59 msec
Min = -252.94 lbs @ 194.64 msec

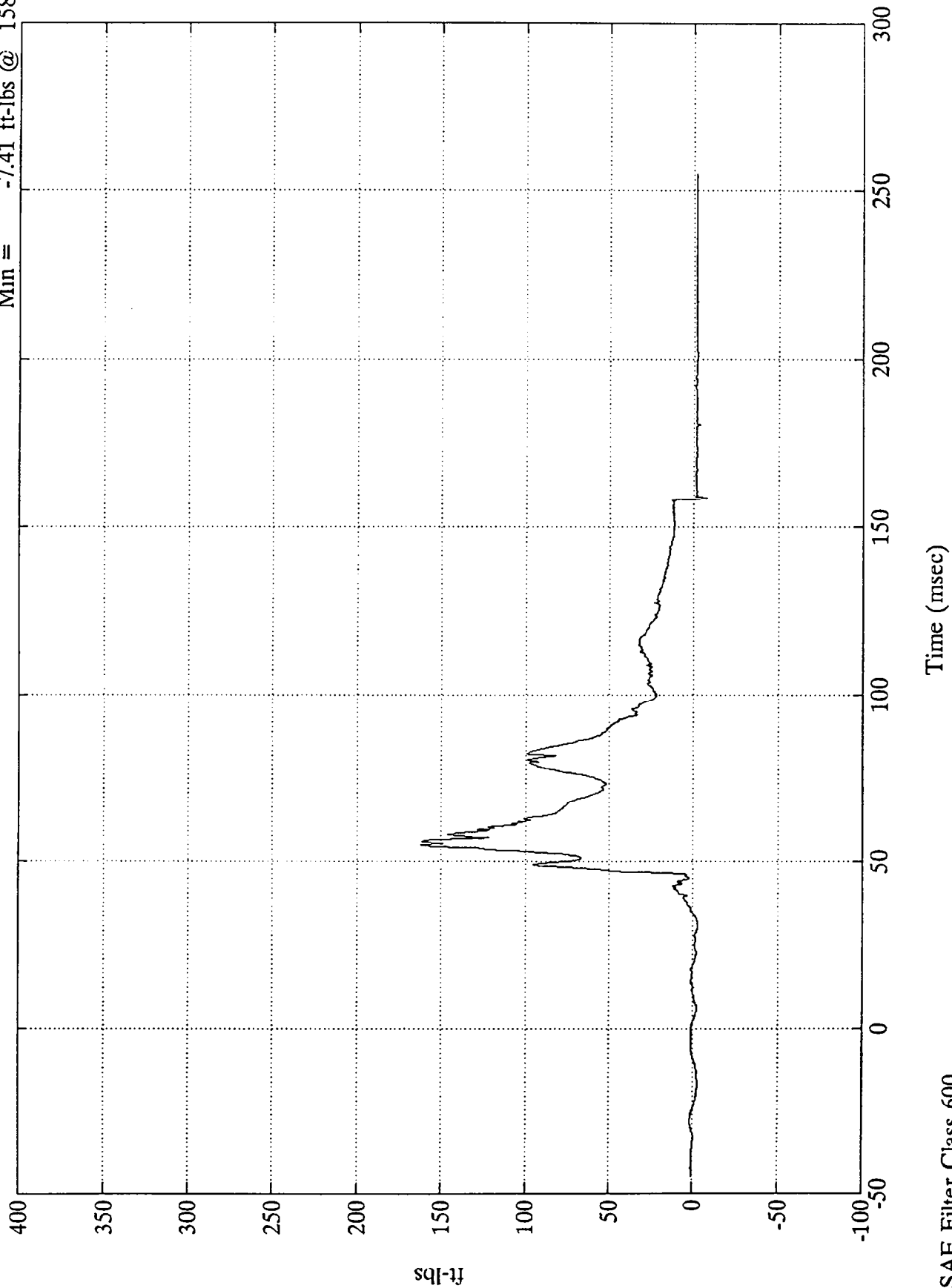


sqi
B-78

8118-4

SAE Filter Class 600

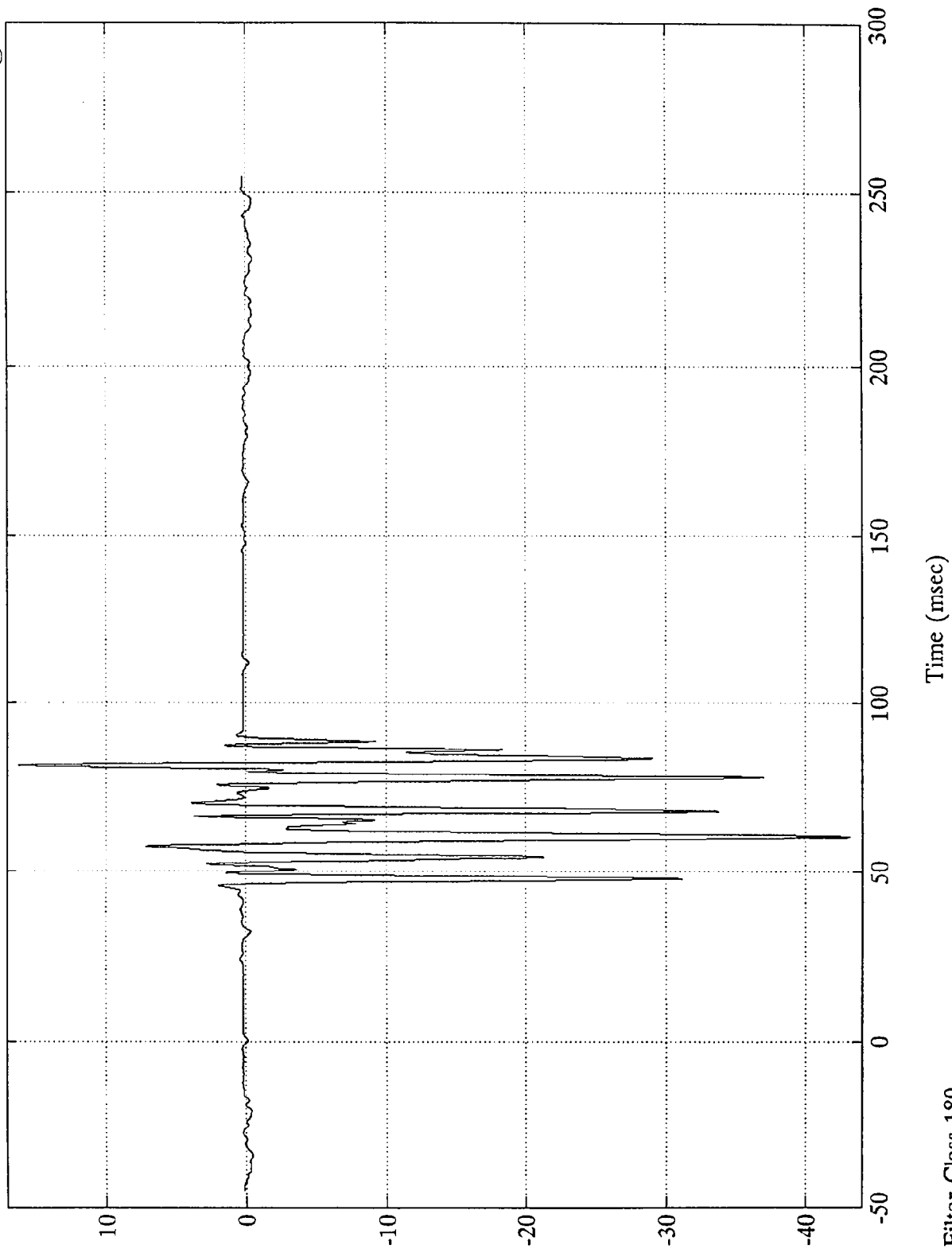
V1-P1 Lt Lower Tibia Mx
Max = 162.52 ft-lbs @ 54.72 msec
Min = -7.41 ft-lbs @ 158.76 msec



VTV TEST #4 - 30 Deg.

V1-P1 Rt Knee Sheer

Max =	16.19 in	@	81.48 msec
Min =	-43.08 in	@	60.48 msec



in
B-80

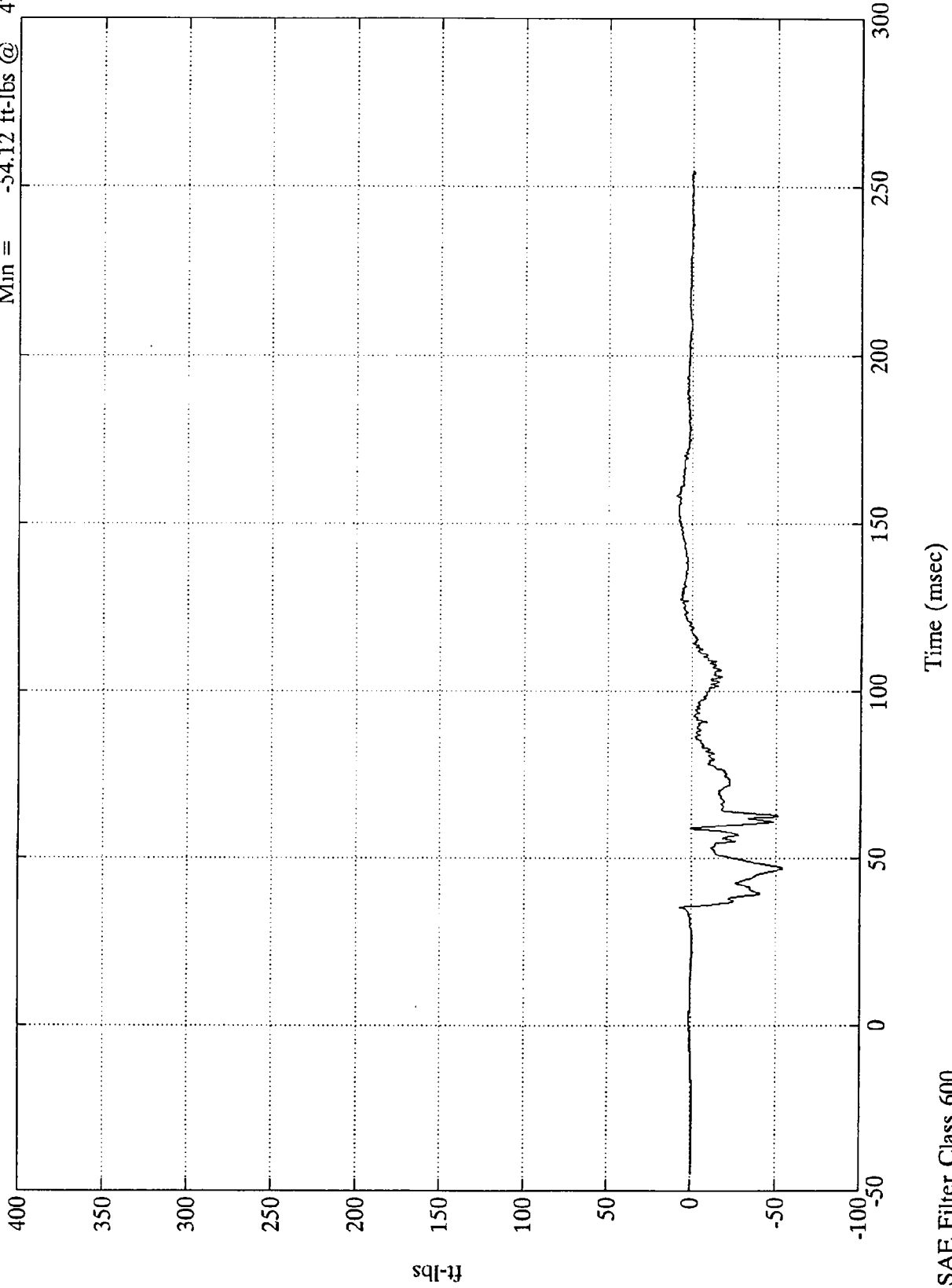
8118-4

SAE Filter Class 180

Time (msec)

V1-P1 Rt Upper Tibia Mx

Max = 9.70 ft-lbs @ 158.27 msec
Min = -54.12 ft-lbs @ 47.04 msec



B-81

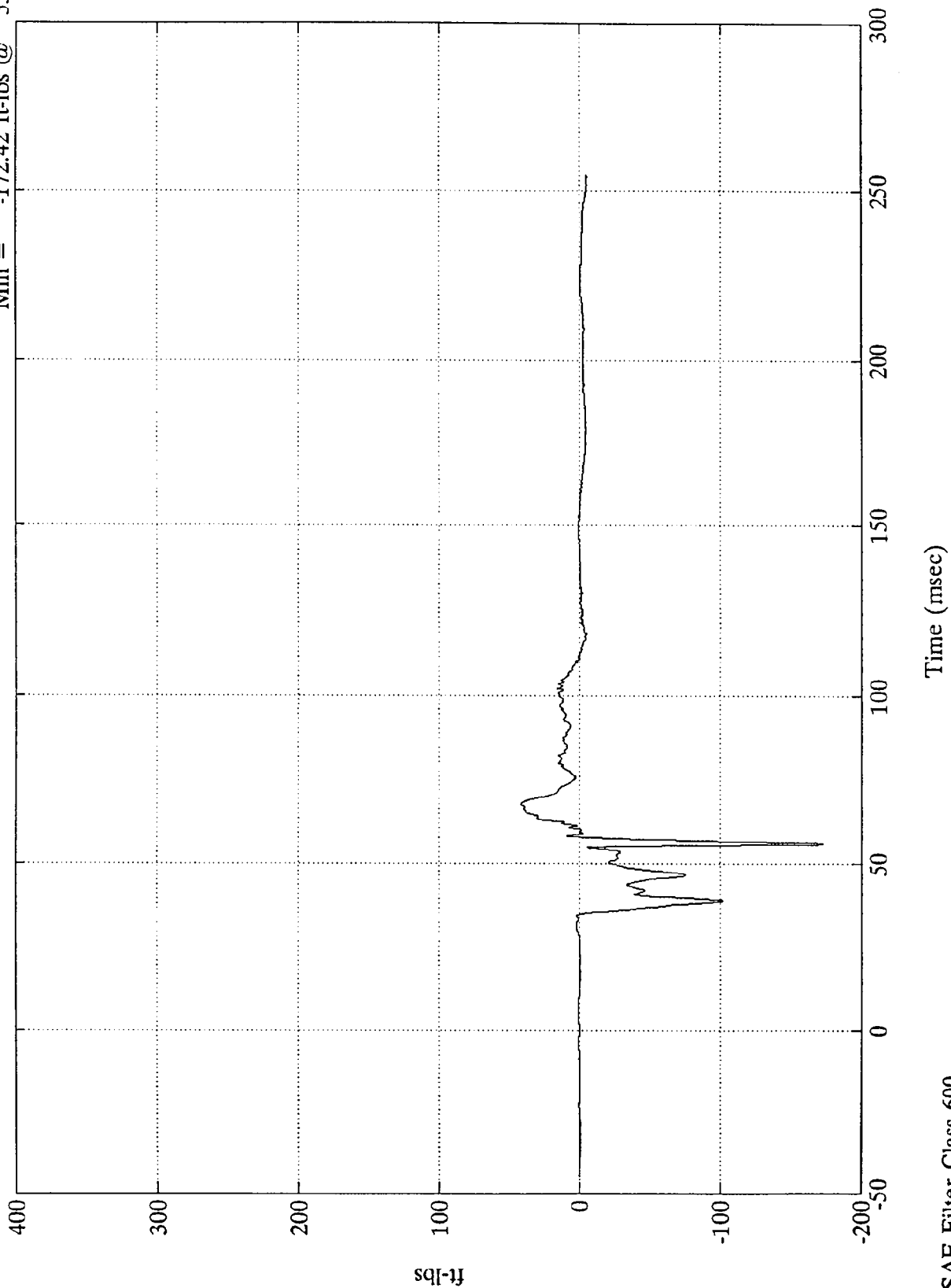
8118-4

SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V1-P1 Rt Upper Tibia My

Max = 41.74 ft-lbs @ 67.44 msec
Min = -172.42 ft-lbs @ 55.92 msec



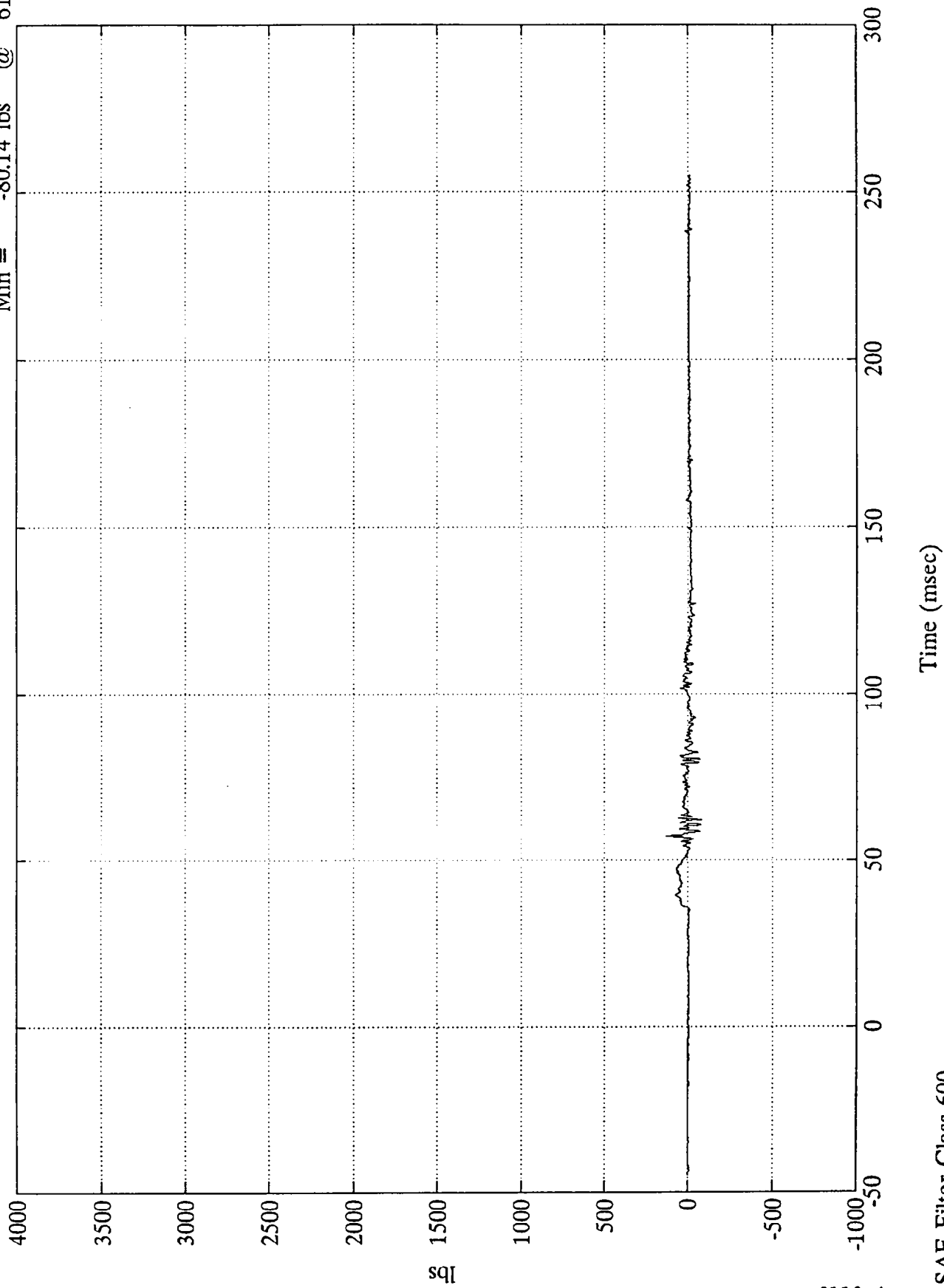
B-82

8118-4

SAE Filter Class 600

V1-P1 Rt Lower Tibia Fy

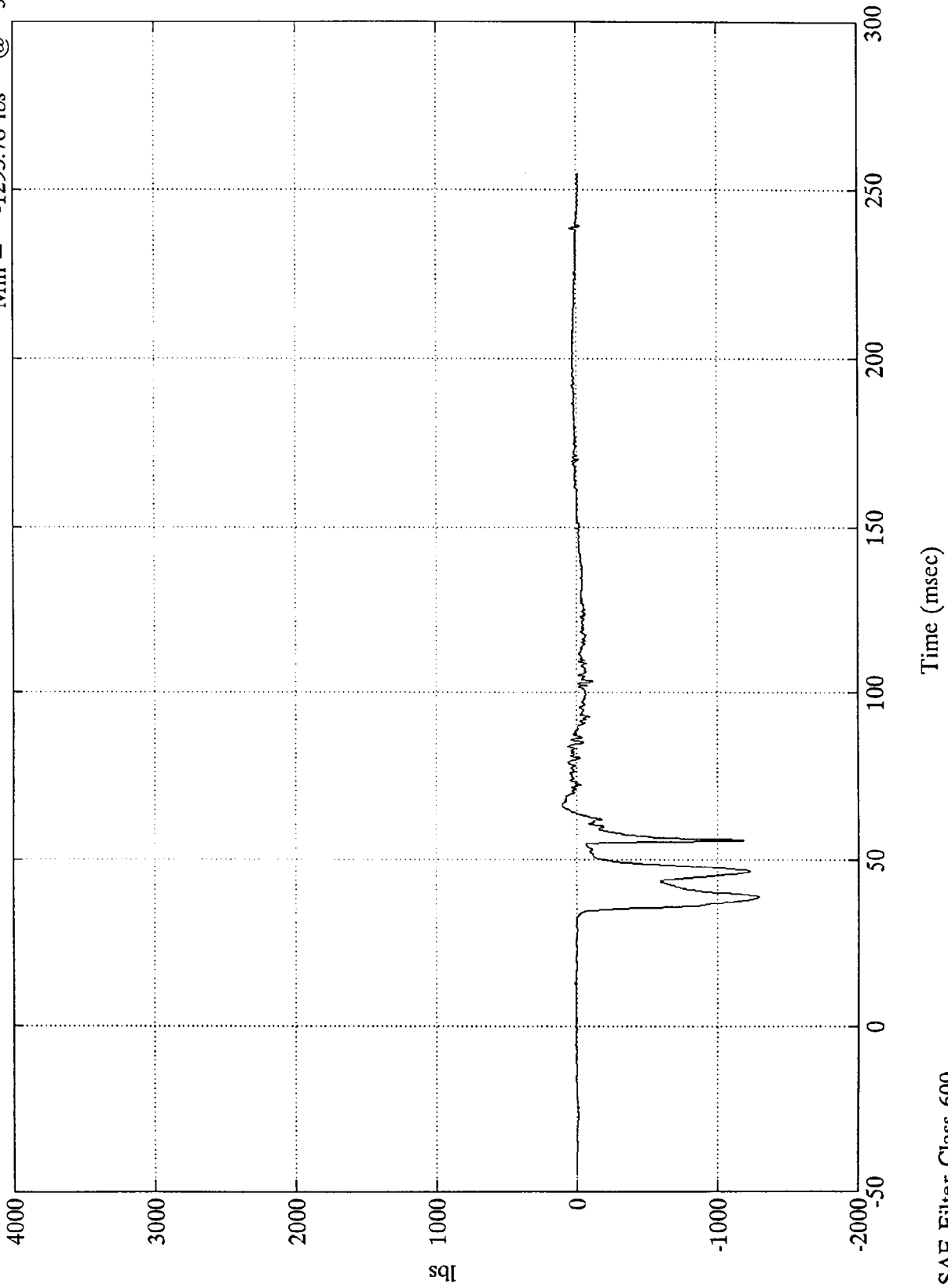
Max = 132.09 lbs @ 57.11 msec
Min = -80.14 lbs @ 61.92 msec



VTV TEST #4 - 30 Deg.

V1-P1 Rt Lower Tibia Fz

Max = 104.73 lbs @ 66.11 msec
Min = -1293.78 lbs @ 38.52 msec



B-84

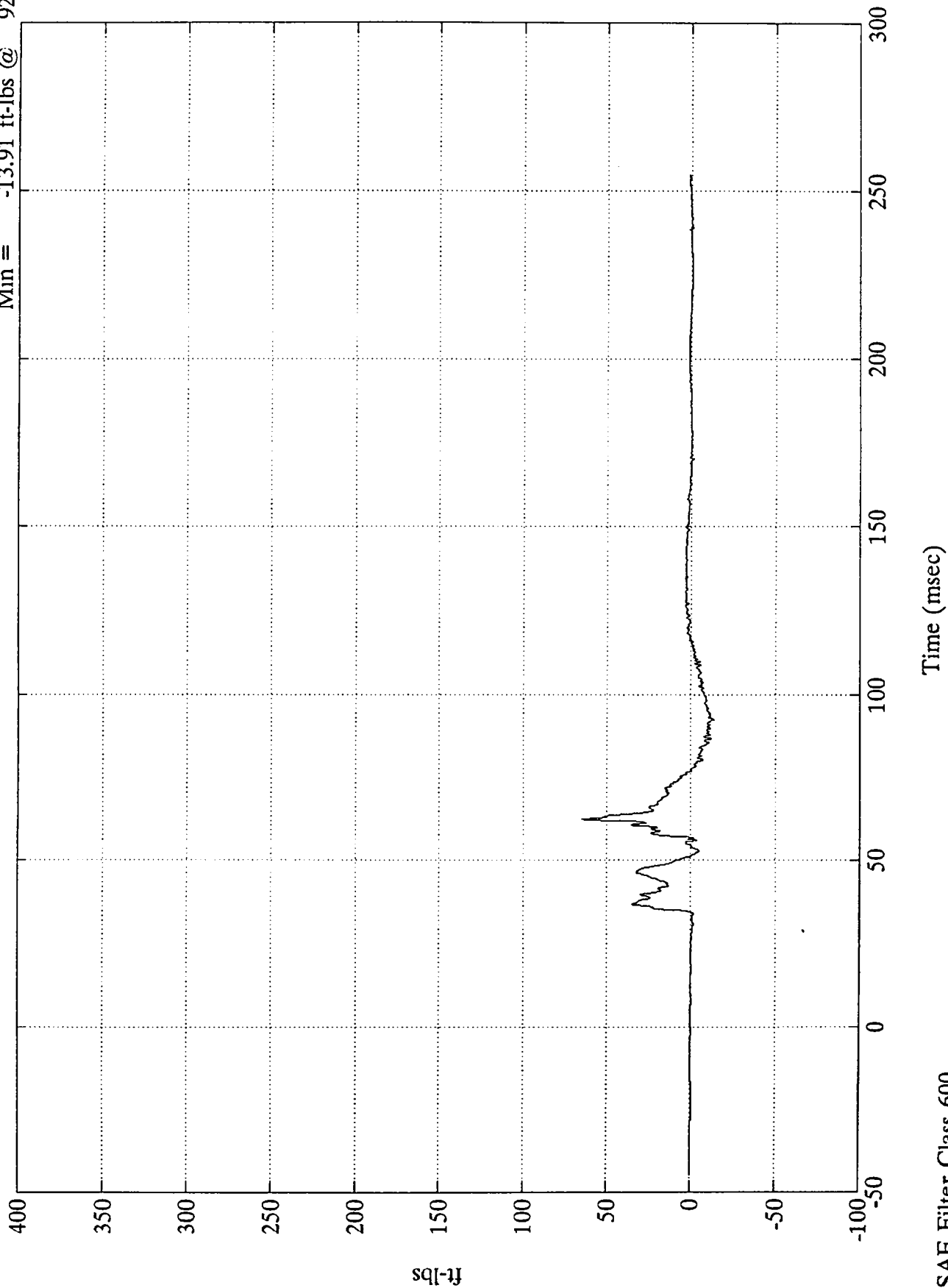
8118-4

SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V1-P1 Rt Lower Tibia Mx

Max = 65.00 ft-lbs @ 62.40 msec
Min = -13.91 ft-lbs @ 92.64 msec



B-85

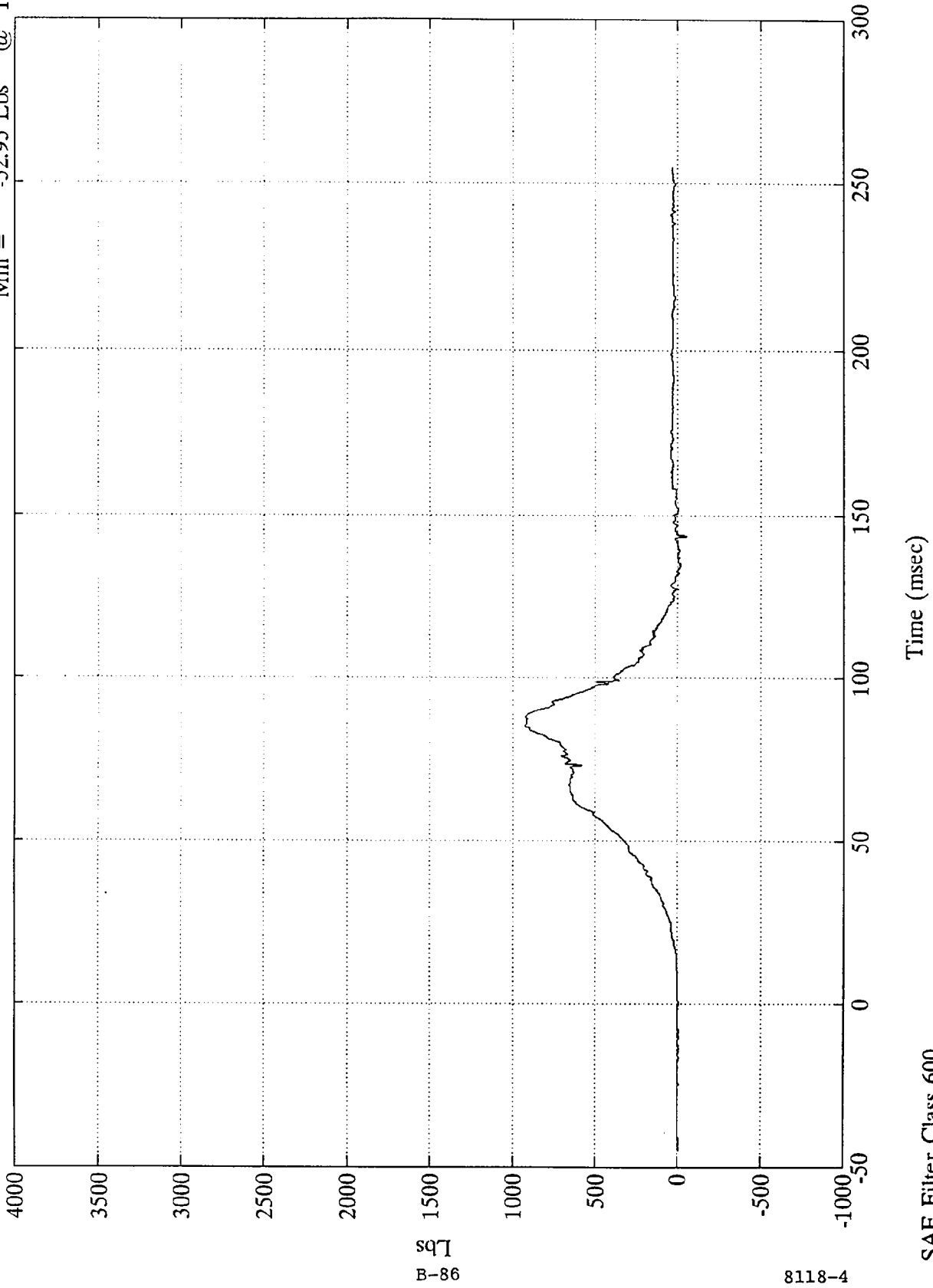
8118-4

SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V1-P1 Torso Belt Load

Max =	926.35 Lbs	@	85.44 msec
Min =	-52.95 Lbs	@	143.76 msec



B-86

8118-4

SAE Filter Class 600

TEST NO. Y049-0040-1317

VEHICLE 2 DUMMY DATA

CHANNEL	SAE FILTER CHANNEL CLASS
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

FACILITY: TRACK
RUN #: 1317
SERIES #: 4

TEST DATE: 16 Sep 1993
TEST TIME: 16:09:22
BOARD: b

TITLE: VTV TEST #4 - 30 Deg.

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM AMP	msec	MINIMUM AMP	msec	FILTER CLASS
1	V2-P1 Head X	Gs	14.3	223.8	-45.9	104.4	1000.0
2	V2-P1 Head Y	Gs	6.4	224.9	-3.8	110.2	1000.0
3	V2-P1 Head Z	Gs	51.4	85.1	-.8	17.8	1000.0
4	V1-P1 Chest Disp.	ins	.7	72.2	.0	17.3	60.0
5	V2-P1 Chest X	Gs	57.1	77.6	-2.9	253.8	180.0
6	V2-P1 Chest Y	Gs	3.7	89.9	-6.0	76.7	180.0
7	V2-P1 Chest Z	Gs	9.3	65.4	-5.0	111.5	180.0
8	V1-P1 Torso Belt Load	Lbs	926.3	85.4	-53.0	143.8	600.0
9	V2-P1 Upper Neck Fx	lbs	340.3	104.5	-36.8	222.4	1000.0
10	V2-P1 Upper Neck Fy	lbs	26.0	92.2	-26.8	254.9	1000.0
11	V2-P1 Upper Neck Fz	lbs	509.4	85.7	-15.6	33.6	1000.0
12	V2-P1 Chest Disp.	ins	1.9	81.0	-.1	37.8	600.0
13	V2-P1 Upper Neck Mx	ft-lbs	7.3	93.1	-8.3	78.2	600.0
14	V2-P1 Upper Neck My	ft-lbs	73.3	98.6	-25.1	82.7	600.0
15	V2-P1 Upper Neck Mz	ft-lbs	11.1	254.6	-3.2	132.5	600.0
16	V2-P1 Torso Belt Load	Lbs	2115.0	80.6	-11.8	-1.4	600.0
17	V2-P1 Head Resultant	Gs	59.6	85.1	.1	22.8	1000.0
18	V2-P1 Chest Resultant	Gs	57.3	77.6	.0	-7.9	180.0

36 ms Fixed Duration HIC SUMMARY: V2-P1 Head Resultant

hic: 513.12
t1 = 73.920 msec
t2 = 109.800 msec
Average G's Over Hic Duration = 45.94

CLIP SUMMARY: V2-P1 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 52.523 G's
Tstart = 76.6800 ms
Tend = 79.8000 ms
CSI = 356.948

FACILITY: TAPE
RUN #: 5317
SERIES #: 4

TEST DATE: 17 Sep 1993
TEST TIME: 13:28:06
BOARD: e

TITLE: VTV TEST #4 - 30 Deg.

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	V2-P1 Lt Upper Tibia Mx	ft-lbs	70.2	63.2	-29.3	49.1	600.0
2	V2-P1 Lt Upper Tibia My	ft-lbs	48.7	73.9	-41.2	61.4	600.0
3	V2-P1 Lt Lower Tibia Fy	lbs	121.2	48.6	-52.6	77.6	600.0
4	V2-P1 Lt Lower Tibia Fz	lbs	52.0	-2.2	-811.4	58.4	600.0
17	NULL	ft-lbs	125.3	48.6	.1	-32.2	600.0
18	NULL		53.1	61.9	.2	-13.1	1000.0
19	NULL		91.6	31.7	.2	-22.9	1000.0
20	NULL		96.5	49.4	.0	-44.4	1000.0

FACILITY: TAPE
RUN #: 6317
SERIES #: 4

TEST DATE: 17 Sep 1993
TEST TIME: 13:34:57
BOARD: f

TITLE: VTV TEST #4 - 30 Deg.

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	V2-P1 Lt Lower Tibia Mx	ft-lbs	3.9	218.4	-32.0	103.7	600.0
2	V2-P1 Rt Upper Tibia Mx	ft-lbs	5.5	253.2	-2.3	232.9	600.0
3	V2-P1 Rt Upper Tibia My	ft-lbs	3.1	-38.9	-43.4	85.1	600.0
4	V2-P1 Rt Lower Tibia Fy	lbs	170.4	92.6	-20.3	-3.6	600.0
5	V2-P1 Rt Lower Tibia Fz	lbs	280.0	82.0	-829.1	98.3	600.0
6	V2-P1 Rt Lower Tibia Mx	ft-lbs	56.8	123.2	-19.5	107.2	600.0
7	NULL	lbs	.0	254.9	.0	254.9	1000.0
8	NULL	lbs	.0	254.9	.0	254.9	1000.0
17	NULL	ft-lbs	52.1	85.1	.1	-33.6	600.0
18	NULL	lbs	829.1	98.3	.1	-42.5	600.0
19	NULL	ft-lbs	91.6	31.7	.2	-22.9	1000.0
20	NULL	ft-lbs	96.5	49.4	.0	-44.4	1000.0

FACILITY: TAPE TEST DATE: 17 Sep 1993
 RUN #: 7317 TEST TIME: 13:51:02
 SERIES #: 4 BOARD: g

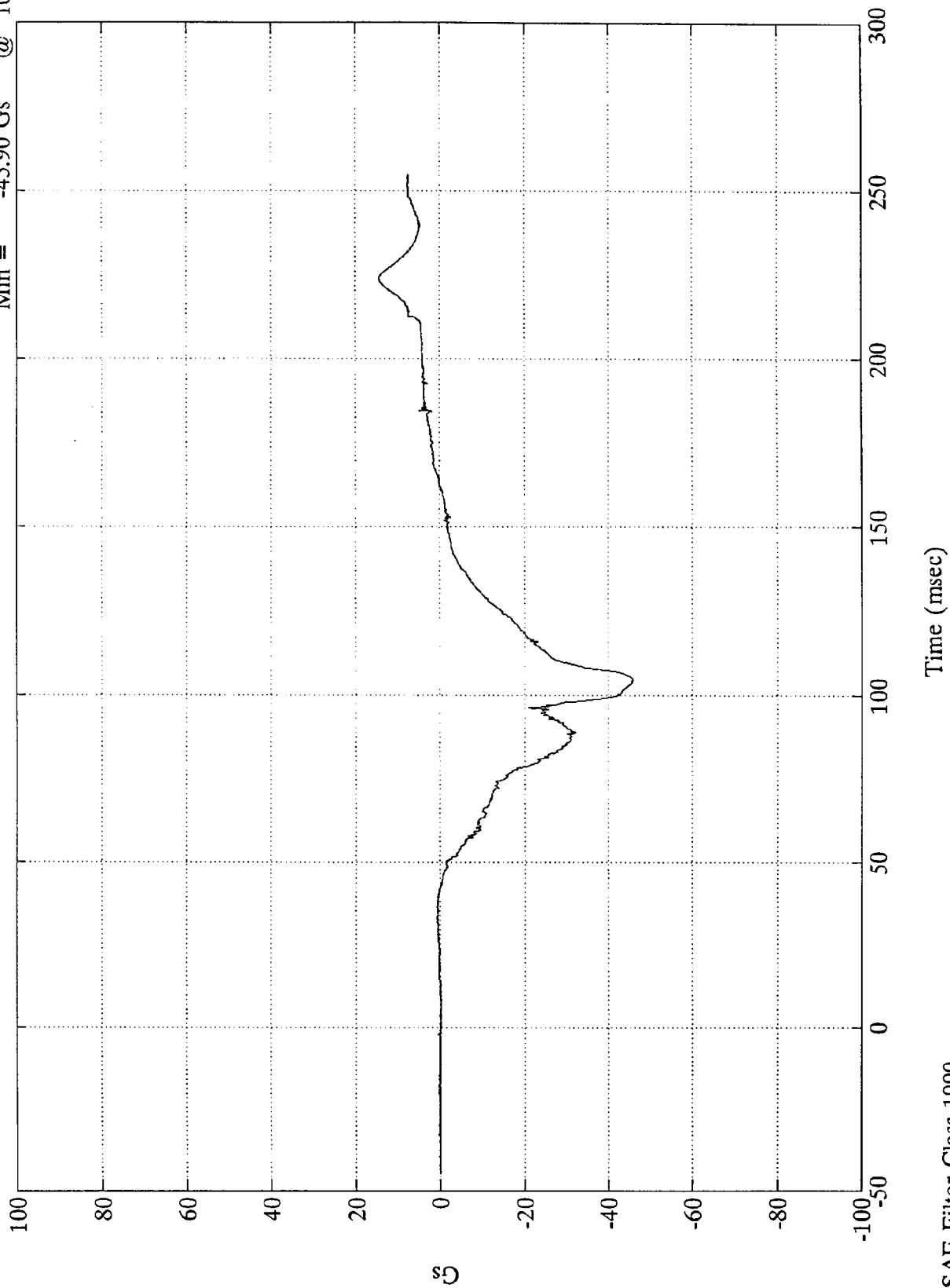
TITLE: VTV TEST #4 - 30 Deg.

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	V2-P1 Chest Displacemnt	ins	1.8	85.3	-.1	35.9	180.0
2	V2-P1 Torso Belt L.C.	lbs	2079.4	81.2	-3.8	-91.1	60.0
3	V2 L.R. X member (X)	Gs	3.0	150.2	-27.8	56.3	60.0
4	V2 R.R. X member (X)	Gs	4.9	143.8	-26.1	63.0	60.0
5	V2 Engine Top (X)	Gs	36.1	49.2	-67.7	39.5	60.0
6	V2 Toe Pan (X)	Gs	9.0	45.0	-48.0	30.8	60.0
7	NULL	Gs	.0	208.7	.0	208.7	1000.0
8	NULL	Gs	.0	208.7	.0	208.7	1000.0
17	NULL	ins	2079.5	81.1	.0	-37.7	180.0
18	NULL	Gs	76.3	38.6	.0	-8.3	60.0
19	NULL	Gs	91.6	31.7	.2	-22.9	1000.0
20	NULL	Gs	96.5	49.4	.0	-44.4	1000.0

VTV TEST #4 - 30 Deg.

Max = 14.35 Gs @ 223.80 msec
Min = -45.90 Gs @ 104.40 msec

V2-P1 Head X



B-92

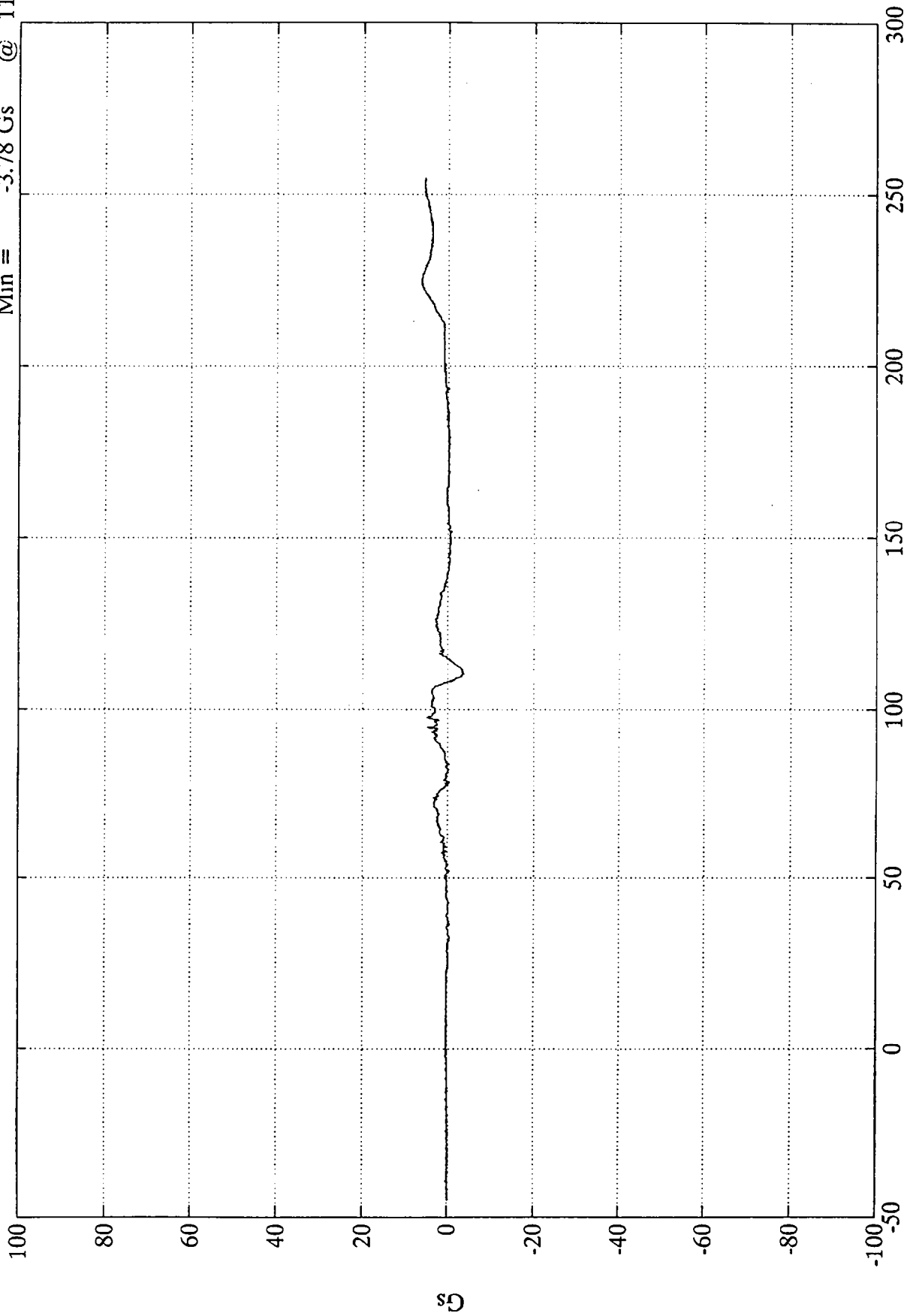
8118-4

SAE Filter Class 1000

VTV TEST #4 - 30 Deg.

Max = 6.39 Gs @ 224.88 ms
Min = -3.78 Gs @ 110.16 ms

V2-P1 Head Y



B-93

8118-4

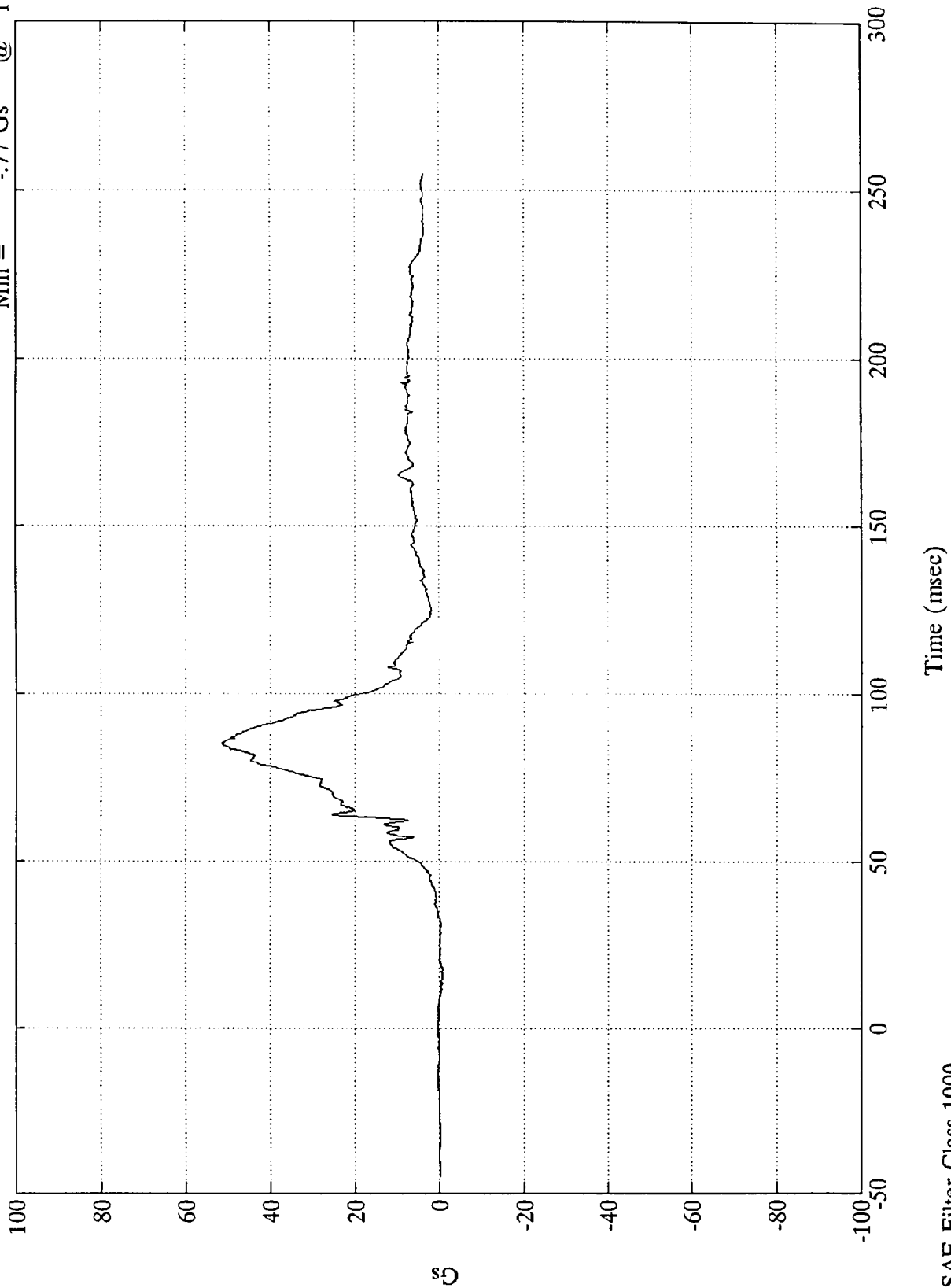
Time (msec)

SAE Filter Class 1000

VTV TEST #4 - 30 Deg.

Max = 51.45 Gs @ 85.08 msec
Min = -7.77 Gs @ 17.75 msec

V2-P1 Head Z



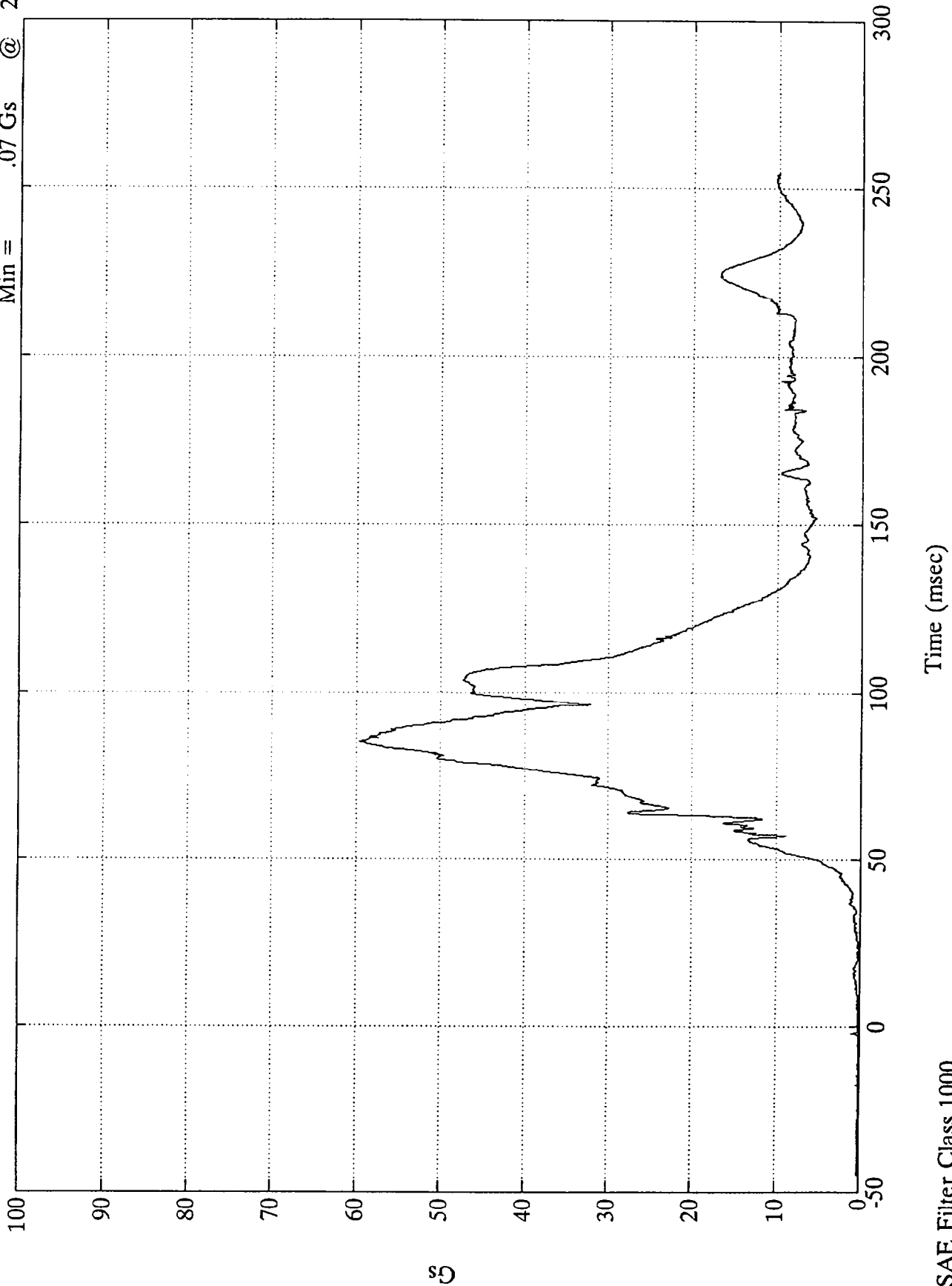
8118-4
B-94

SAE Filter Class 1000

VTV TEST #4 - 30 Deg.

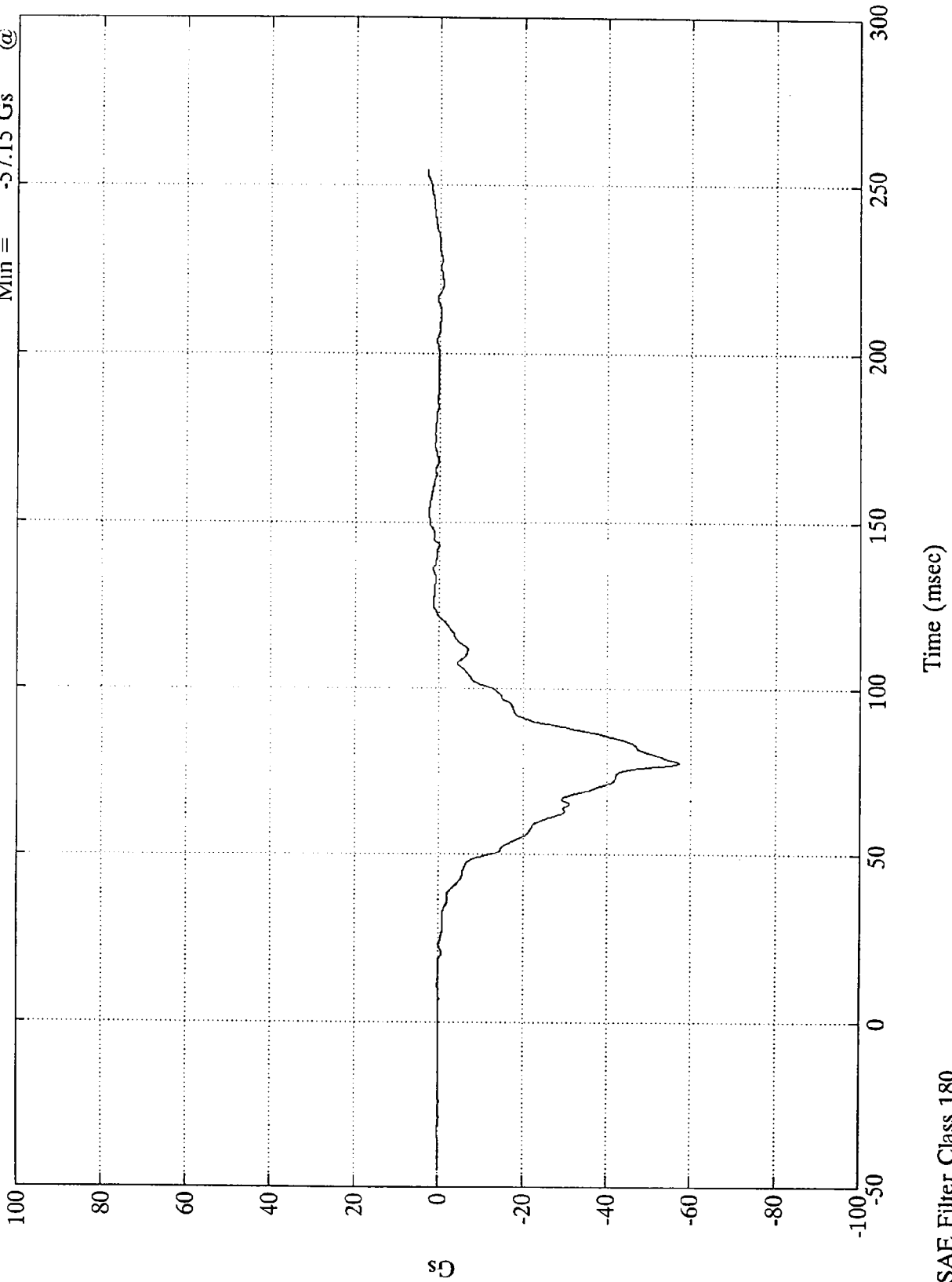
V2-P1 Head Resultant

Max = 59.62 Gs @ 85.08 ms
Min = .07 Gs @ 22.80 ms



VTV TEST #4 - 30 Deg.

V2-P1 Chest X
Max = 2.95 Gs @ 253.80 msec
Min = -57.15 Gs @ 77.64 msec



B-96

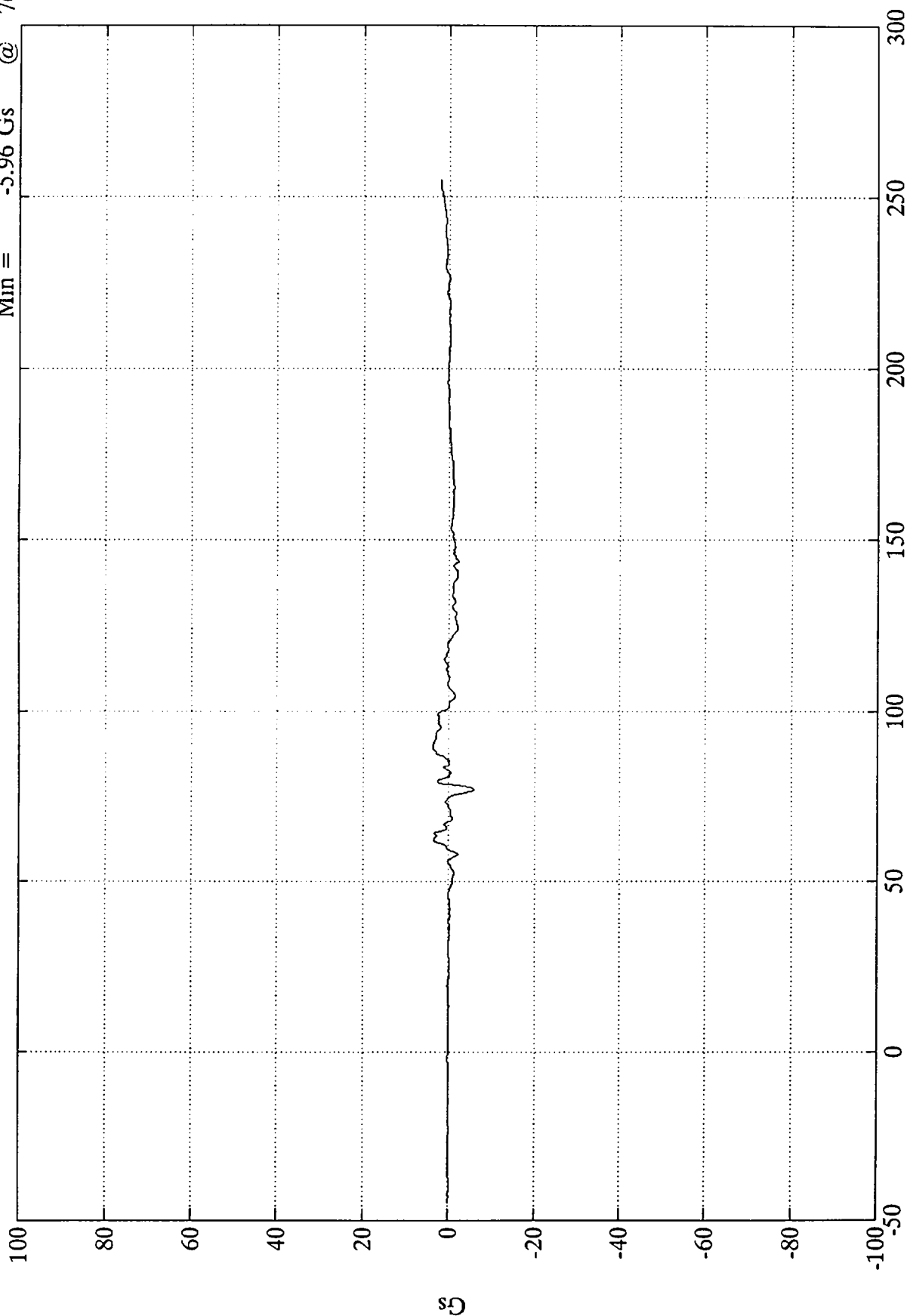
8118-4

SAE Filter Class 180

VTV TEST #4 - 30 Deg.

V2-P1 Chest Y

Max = 3.69 Gs @ 89.88 msec
Min = -5.96 Gs @ 76.68 msec



Time (msec)

SAE Filter Class 180

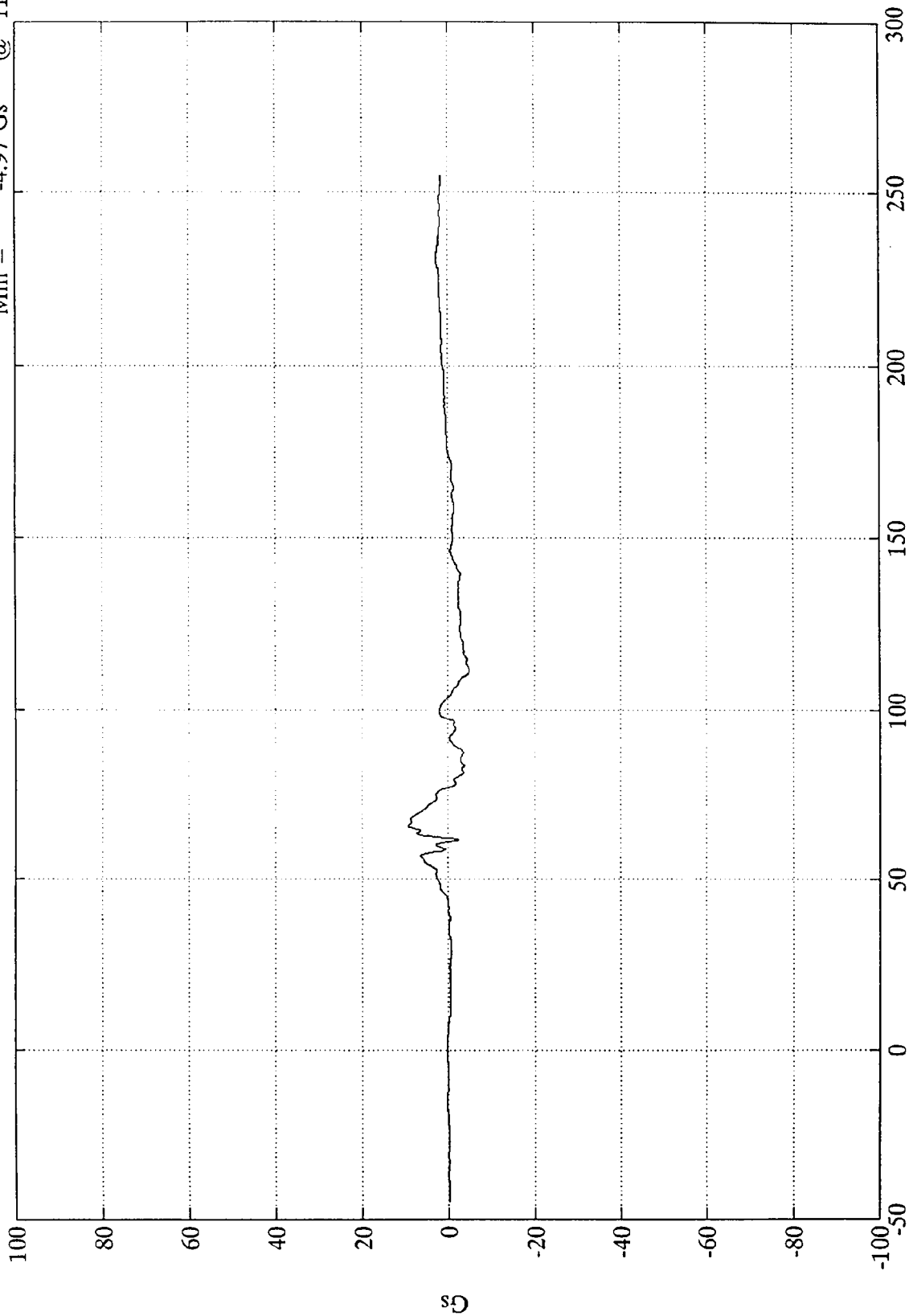
B-97

8118-4

VTV TEST #4 - 30 Deg.

Max = 9.31 Gs @ 65.40 msec
Min = -4.97 Gs @ 111.48 msec

V2-P1 Chest Z



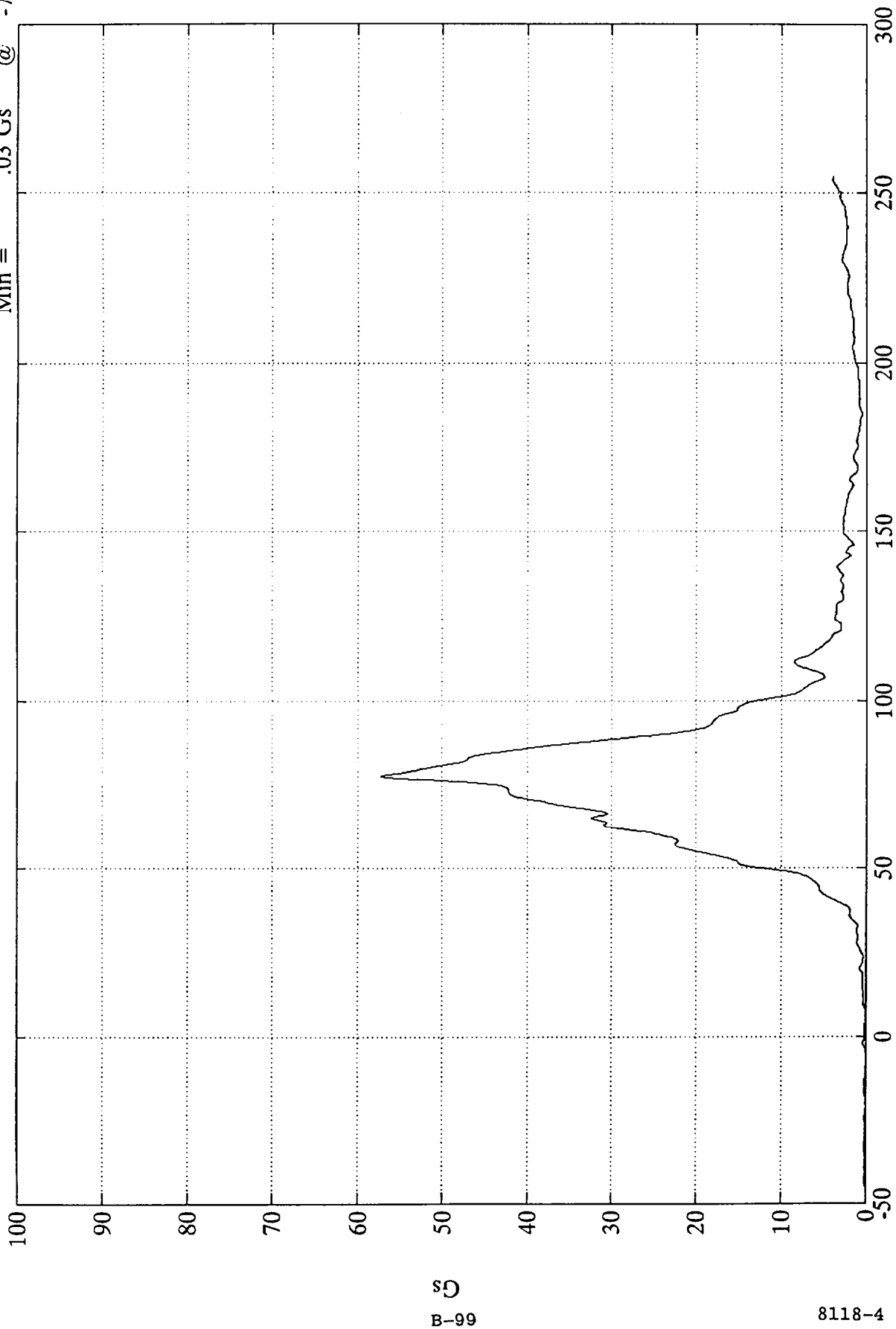
Time (msec)

SAE Filter Class 180

VTV TEST #4 - 30 Deg.

V2-P1 Chest Resultant

Max = 57.33 Gs @ 77.64 msec
Min = .03 Gs @ -7.92 msec



Time (msec)

SAE Filter Class 180

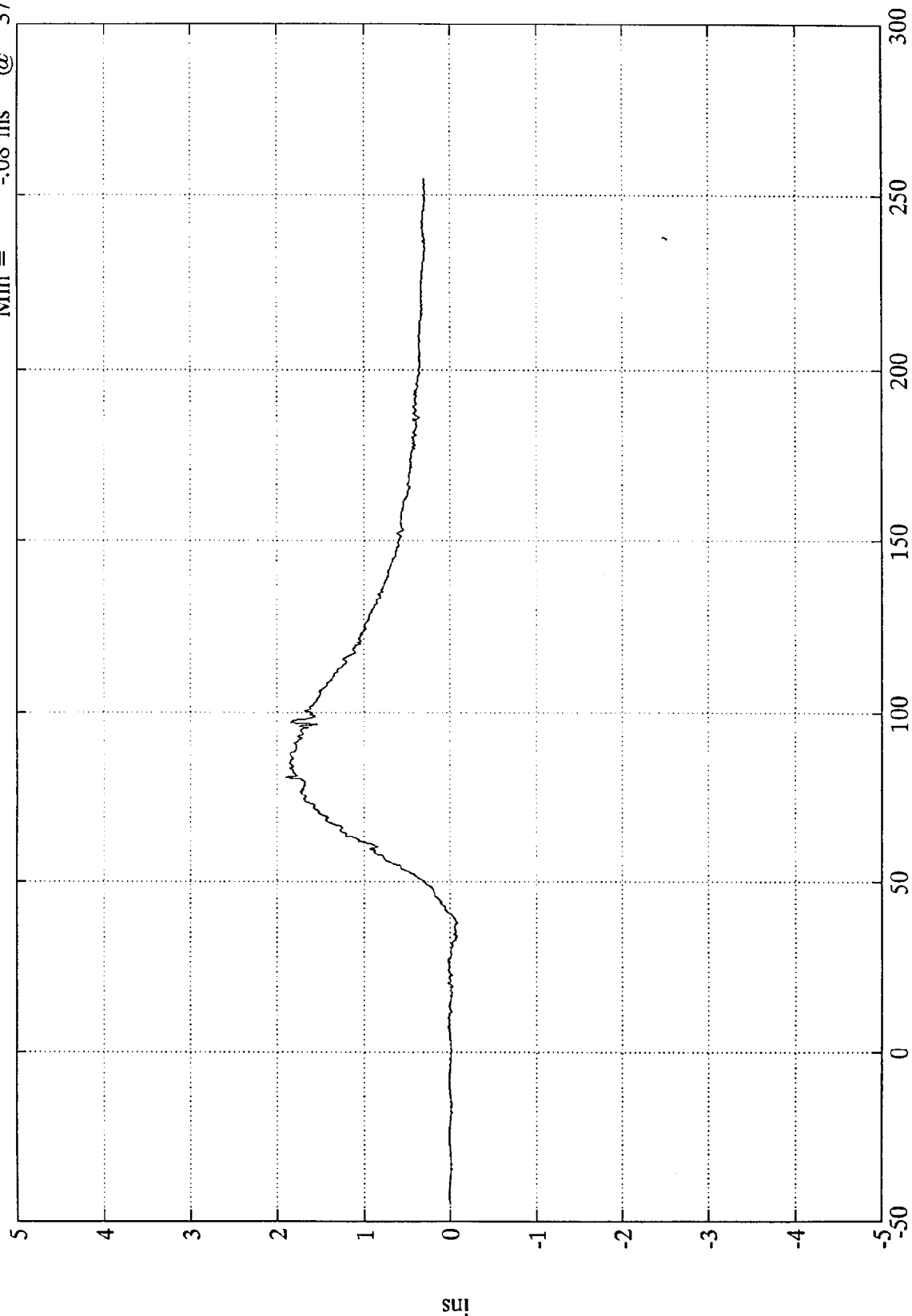
8118-4

VTV TEST #4 - 30 Deg.

48.5 mm

Max = 1.91 ins @ 81.00 msec
Min = -0.08 ins @ 37.79 msec

V2-P1 Chest Disp.



B-100

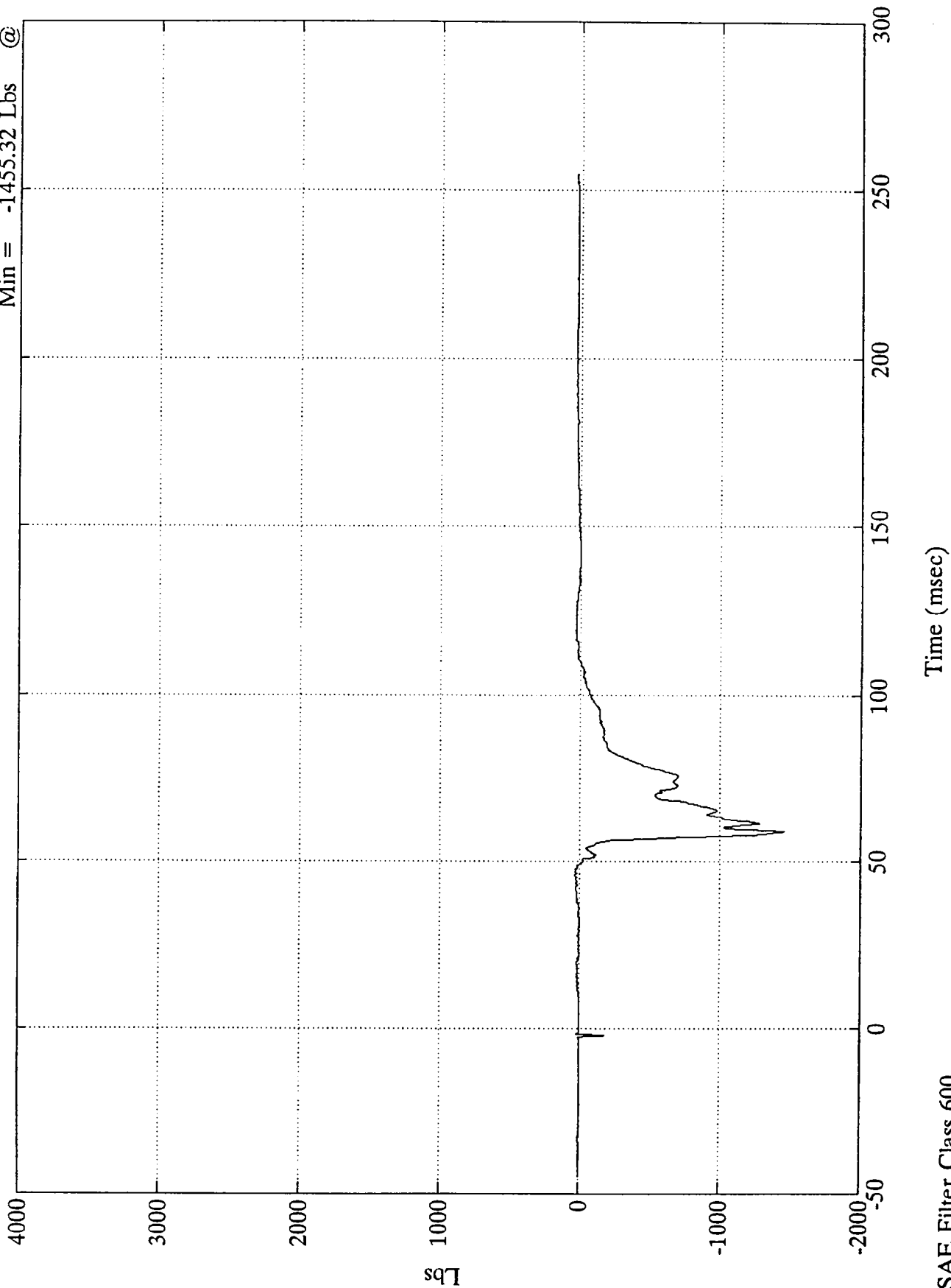
8118-4

Time (msec)

SAE Filter Class 600

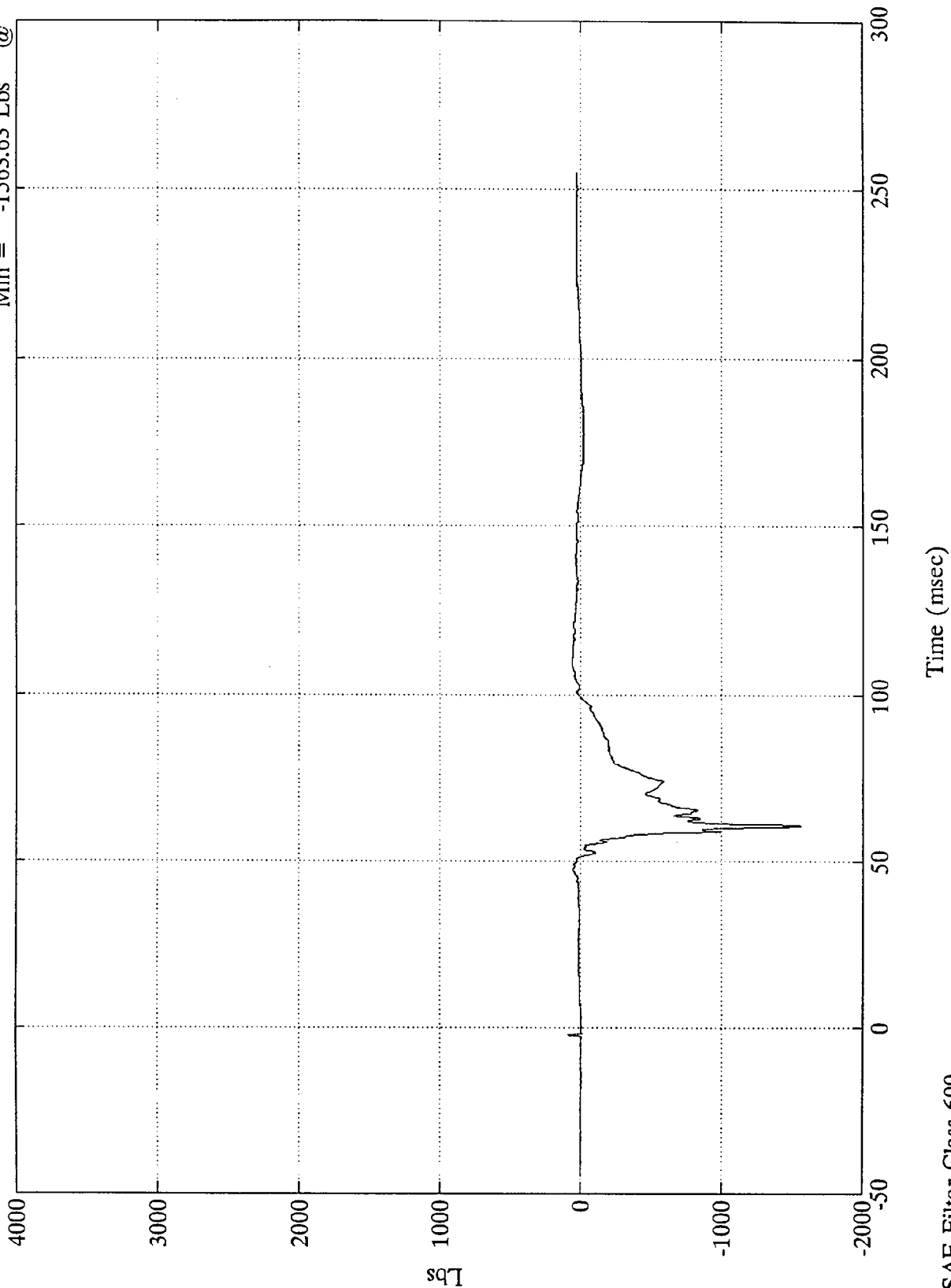
Max = 37.29 Lbs @ 45.96 msec
Min = -1455.32 Lbs @ 58.68 msec

V2-P1 Left Femur



VTV TEST #4 - 30 Deg.

V2-P2 Right Femur
Max = 86.17 Lbs @ -2.16 msec
Min = -1563.63 Lbs @ 60.60 msec

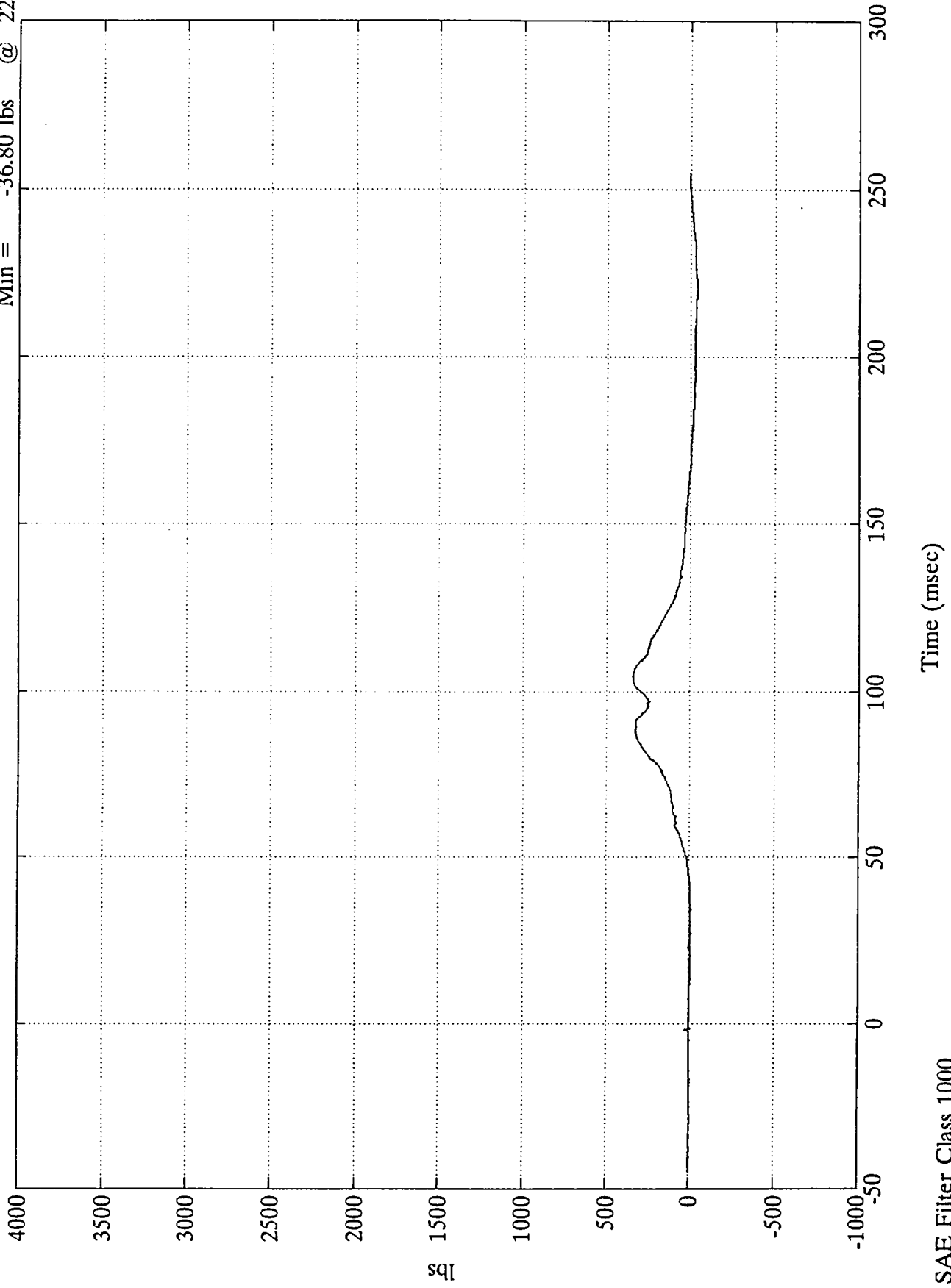


SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V2-P1 Upper Neck Fx

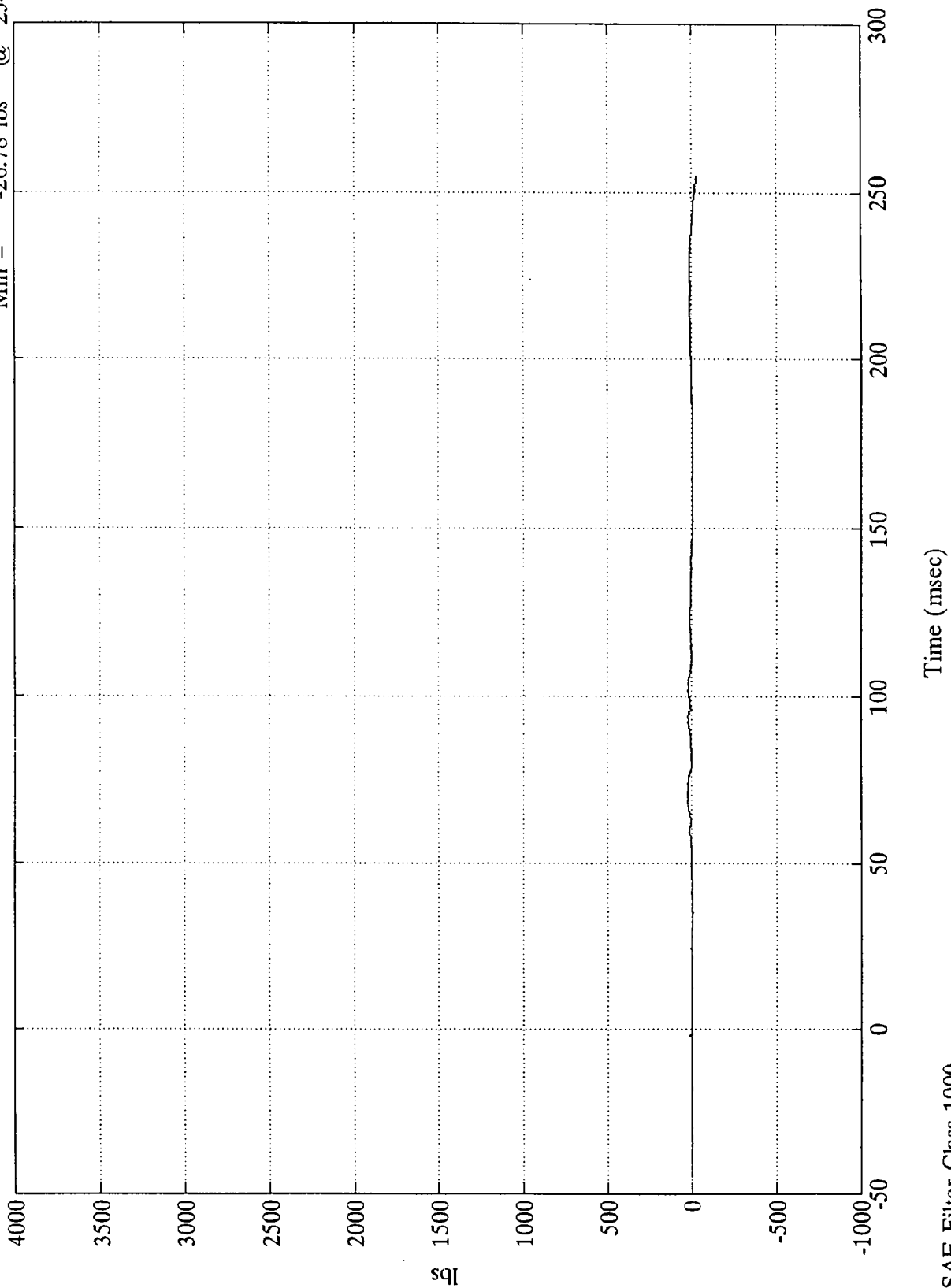
Max = 340.27 lbs @ 104.52 mst
Min = -36.80 lbs @ 222.36 mse



VTV TEST #4 - 30 Deg.

V2-P1 Upper Neck Fy

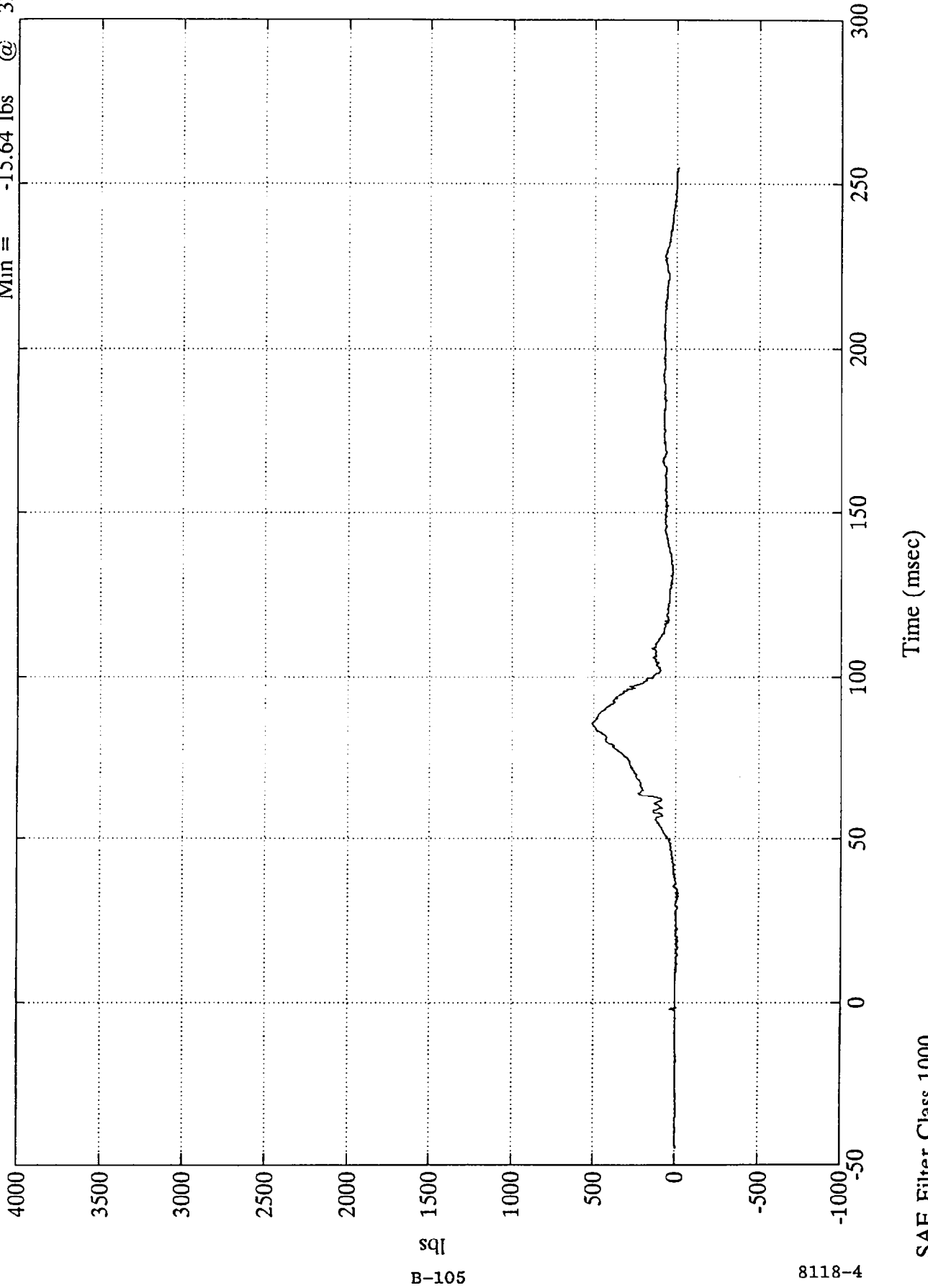
Max = 25.97 lbs @ 92.16 msec
Min = -26.78 lbs @ 254.88 msec



VTV TEST #4 - 30 Deg.

V2-P1 Upper Neck Fz

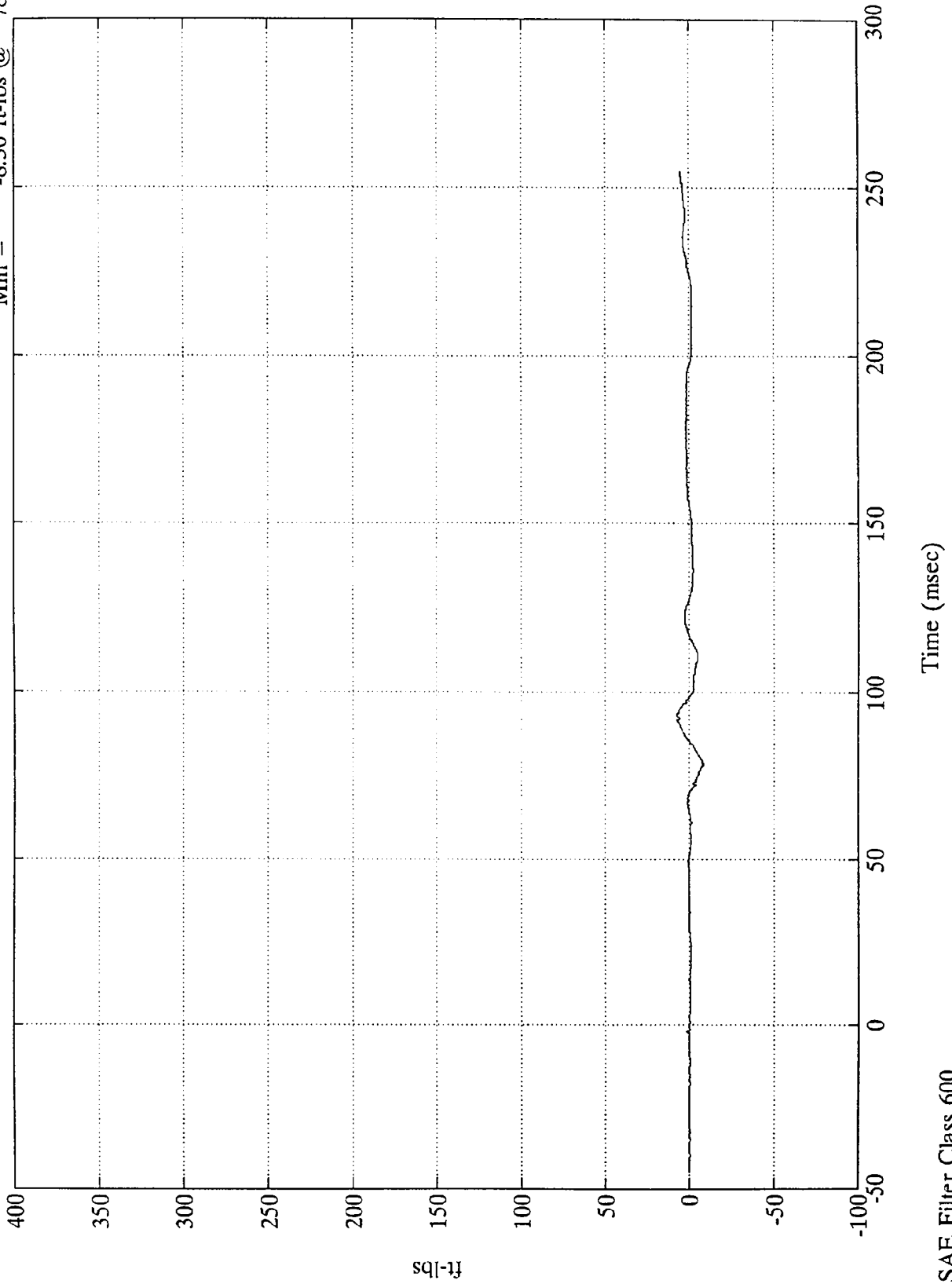
Max = 509.39 lbs @ 85.68 msec
Min = -15.64 lbs @ 33.59 msec



VTV TEST #4 - 30 Deg.

V2-P1 Upper Neck Mx

Max = 7.29 ft-lbs @ 93.12 msec
Min = -8.30 ft-lbs @ 78.23 msec



sq|-lf
B-106

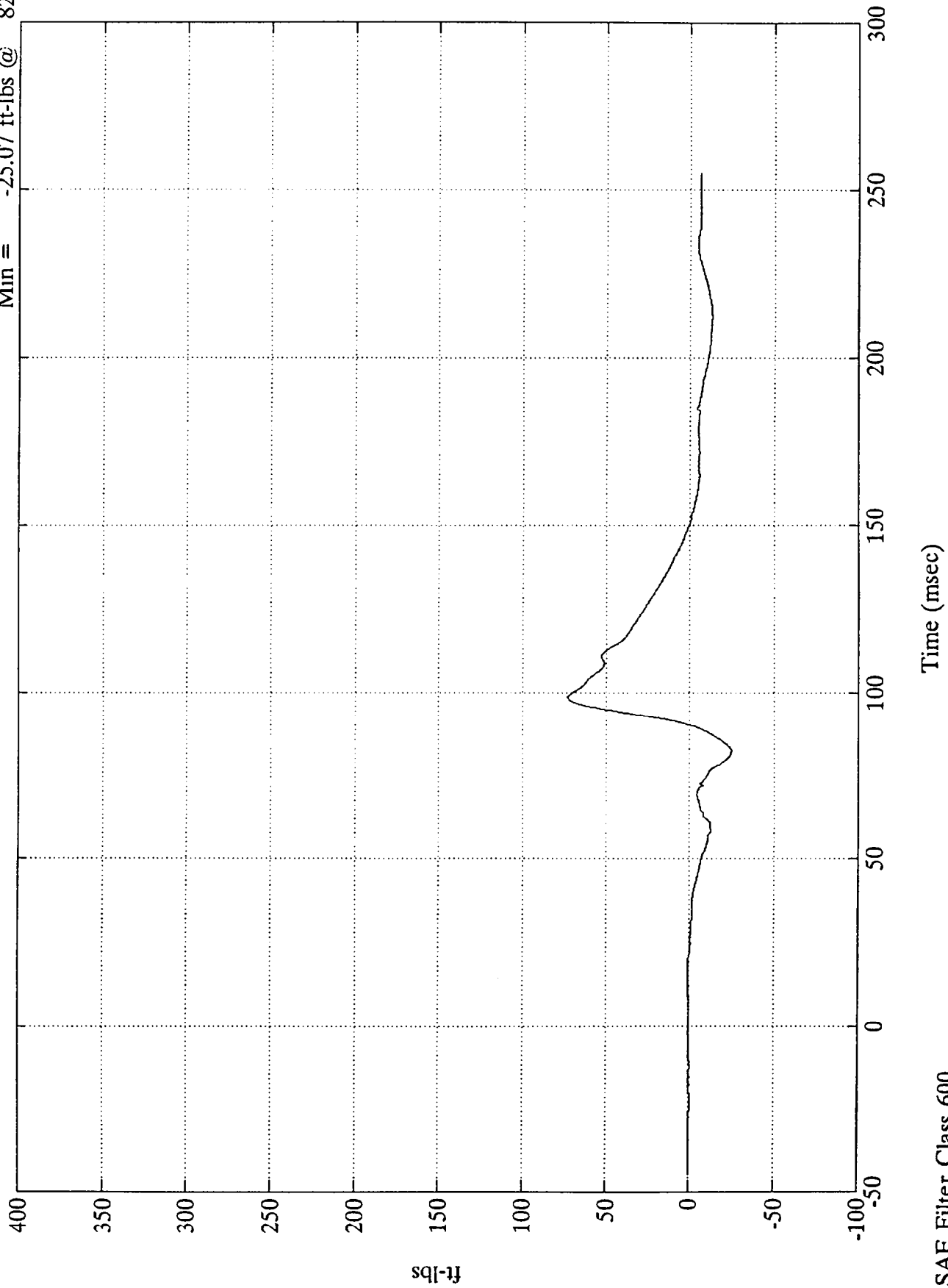
8118-4

SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V2-P1 Upper Neck My

Max = 73.29 ft-lbs @ 98.63 msec
Min = -25.07 ft-lbs @ 82.68 msec



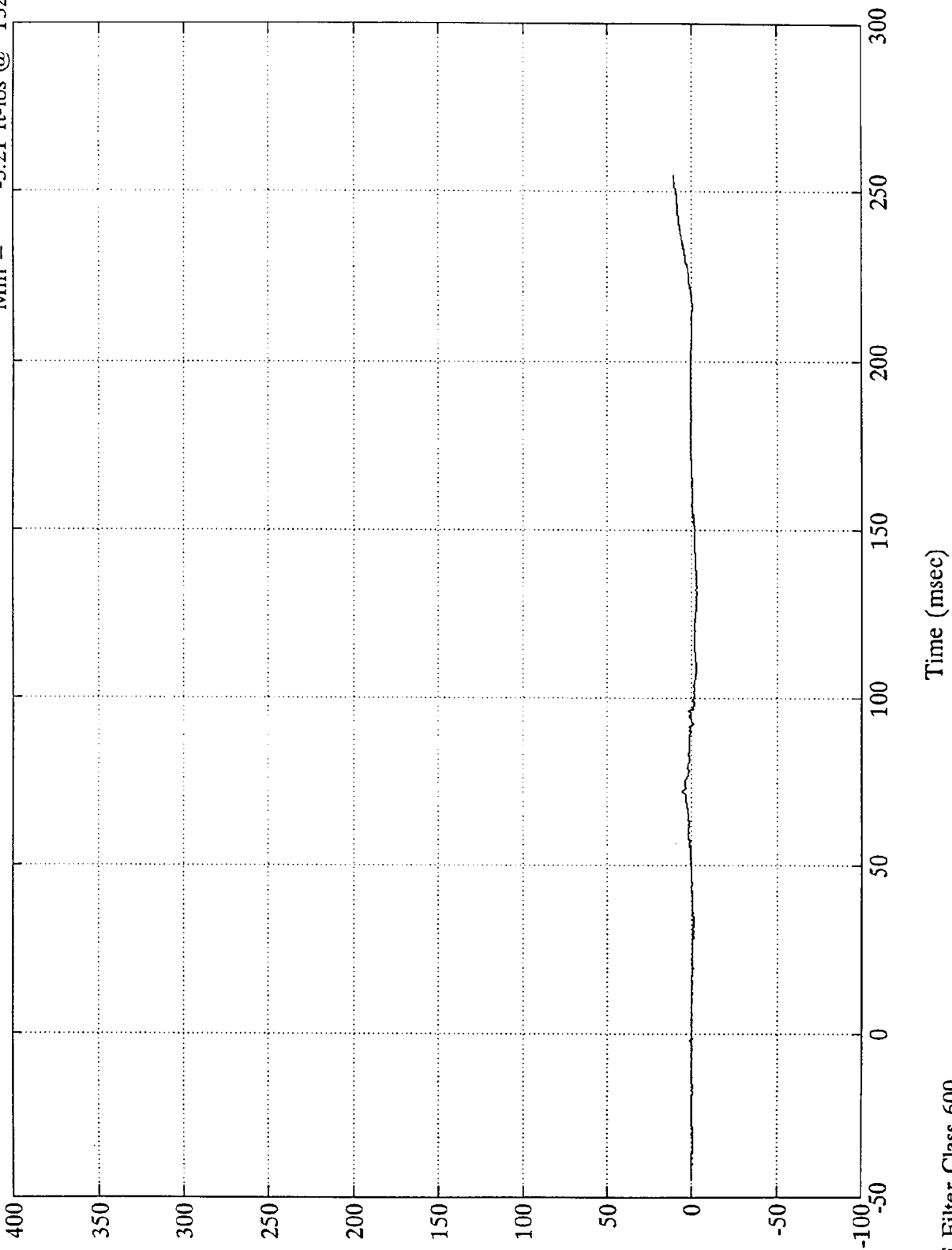
B-107

8118-4

SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V2-P1 Upper Neck Mz
Max = 11.07 ft-lbs @ 254.64 msec
Min = -3.21 ft-lbs @ 132.48 msec



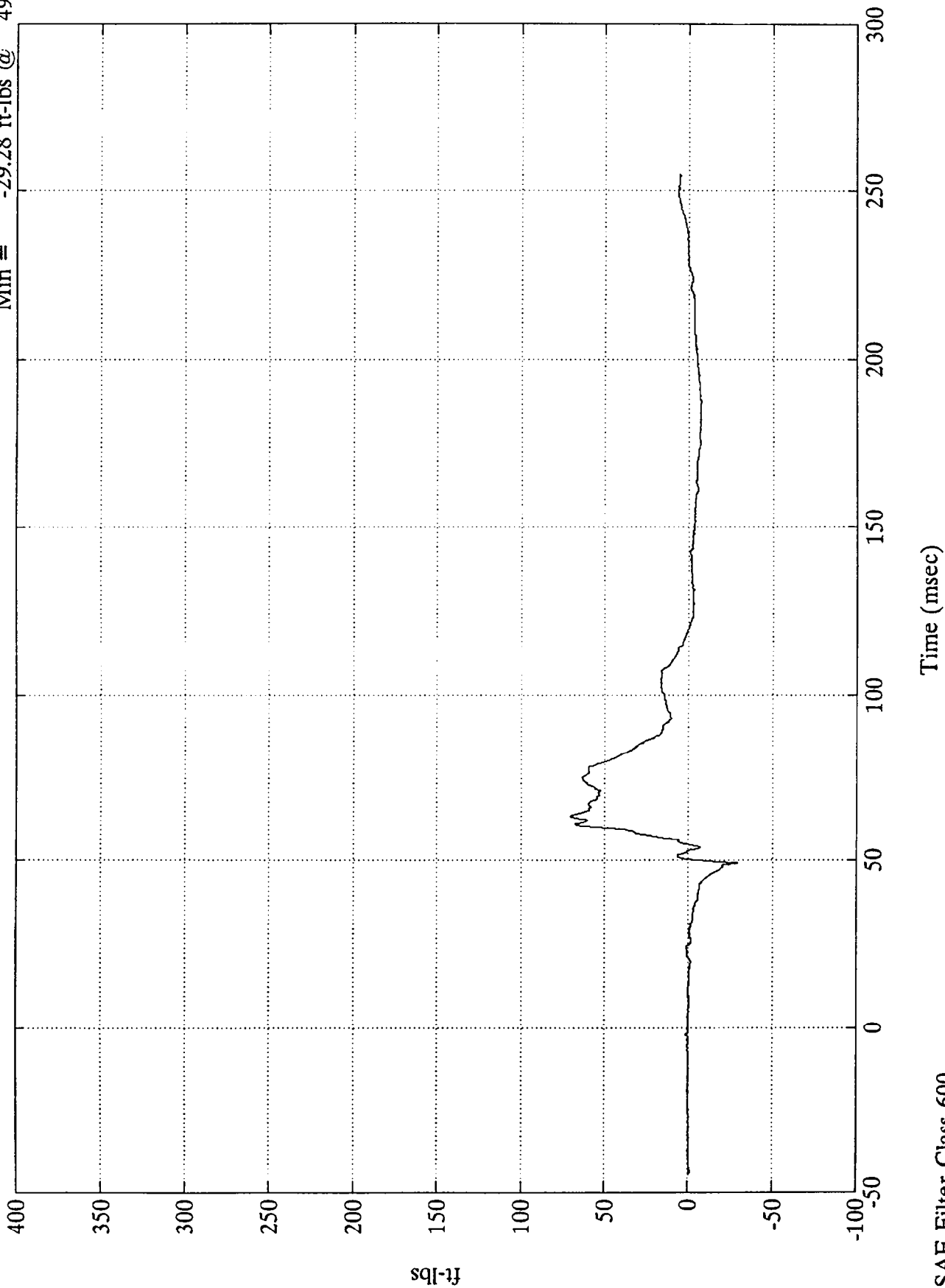
sq[1-t]
B-108

8118-4

SAE Filter Class 600

V2-P1 Lt Upper Tibia Mx

Max = 70.16 ft-lbs @ 63.23 msec
Min = -29.28 ft-lbs @ 49.07 msec



sq[-1]

B-109

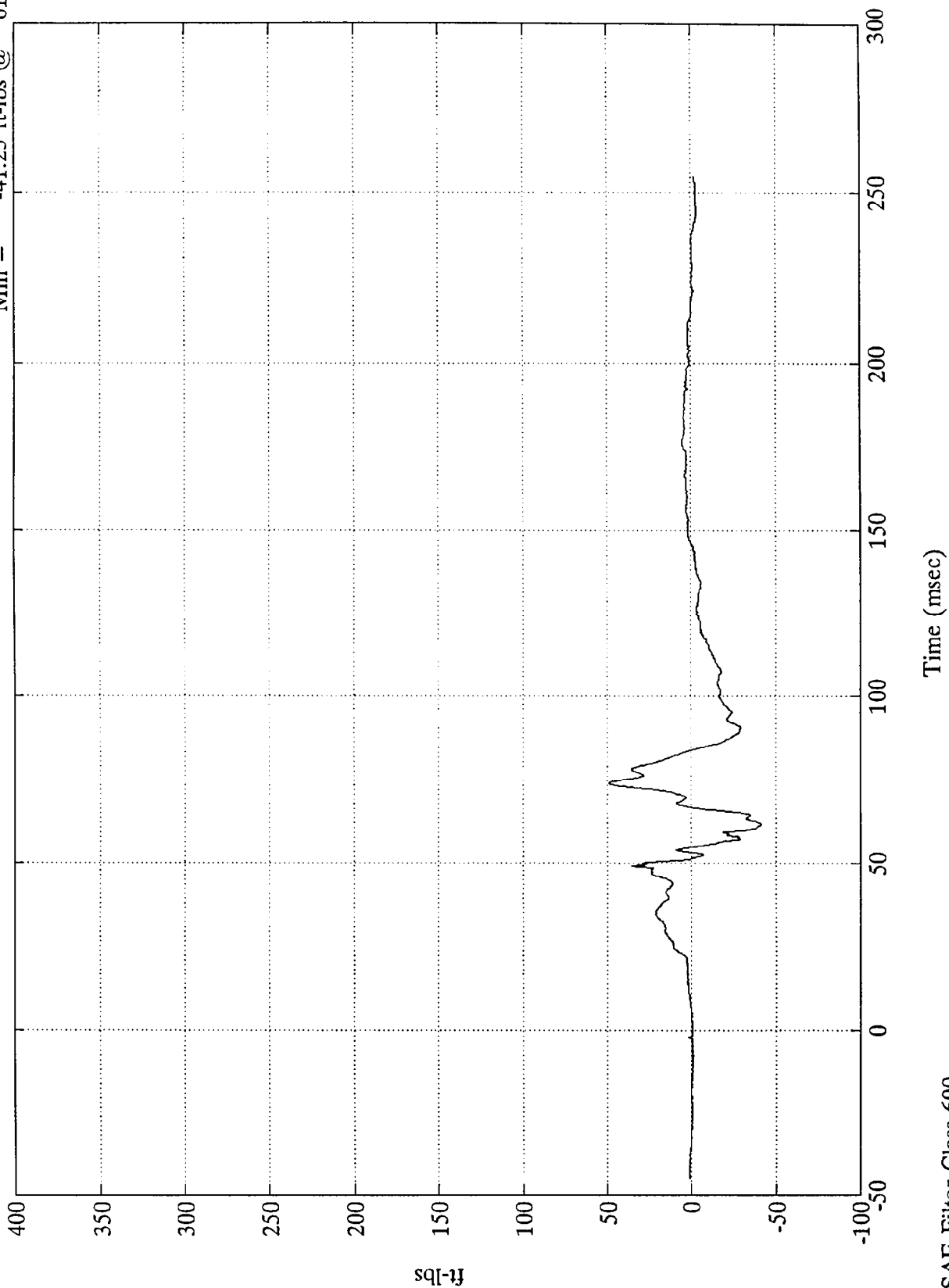
8118-4

SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V2-P1 Lt Upper Tibia My

Max = 48.75 ft-lbs @ 73.92 msec
Min = -41.25 ft-lbs @ 61.44 msec



ft-lbs

B-110

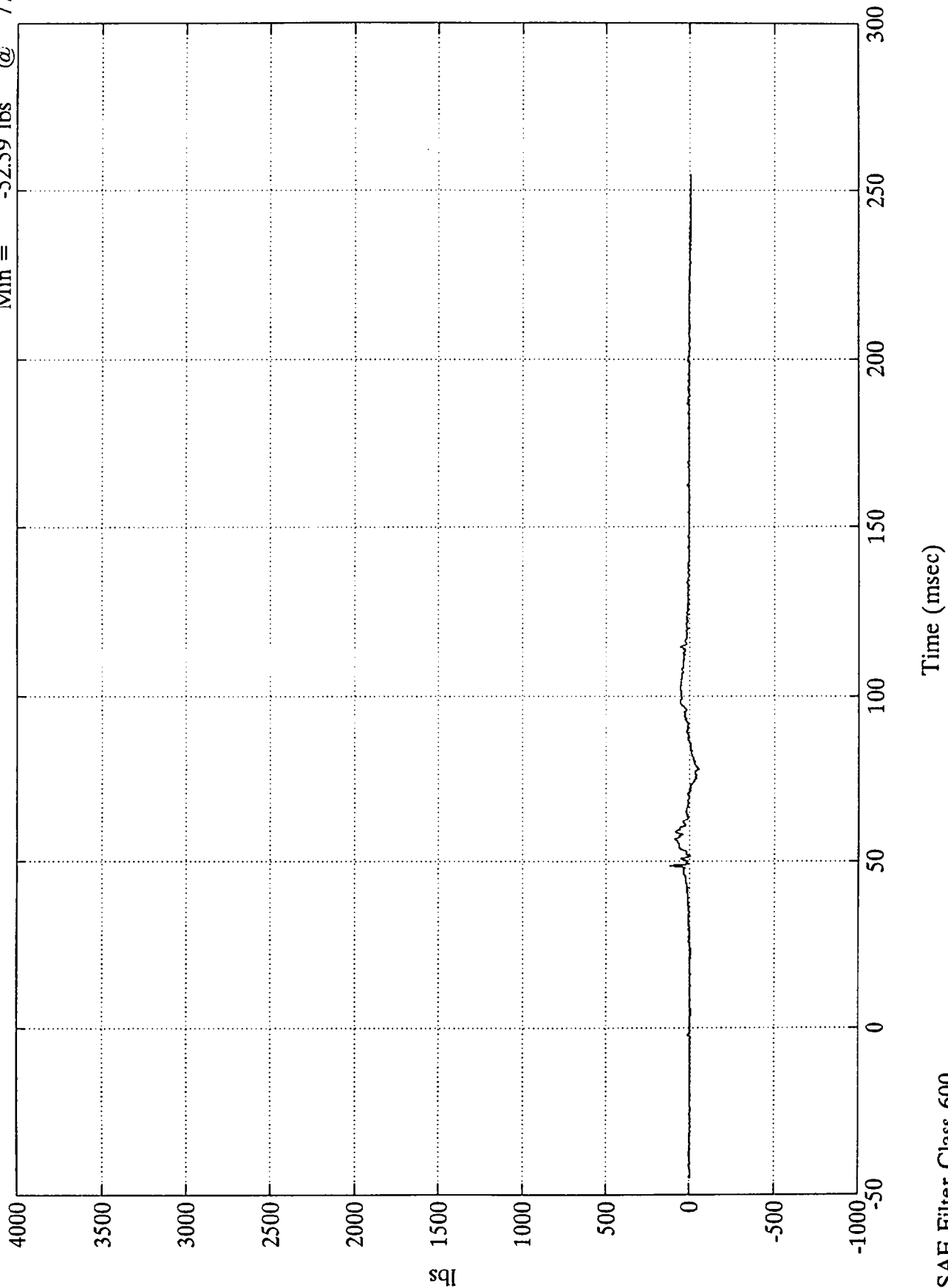
8118-4

SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V2-P1 Lt Lower Tibia Fy

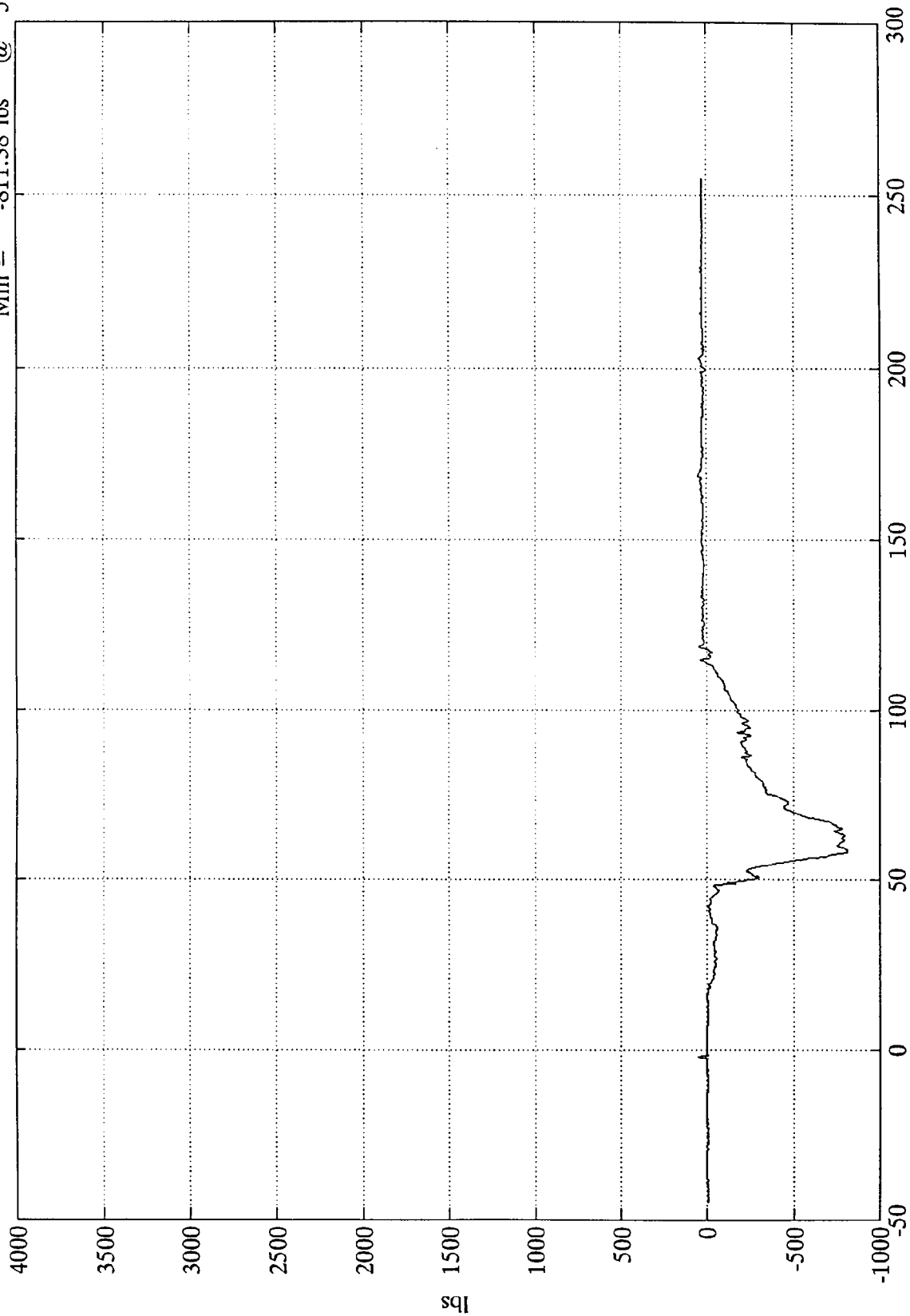
Max = 121.16 lbs @ 48.59 msec
Min = -52.59 lbs @ 77.64 msec



VTV TEST #4 - 30 Deg.

Max = 52.02 lbs @ -2.16 msec
Min = -811.38 lbs @ 58.43 msec

V2-P1 Lt Lower Tibia Fz



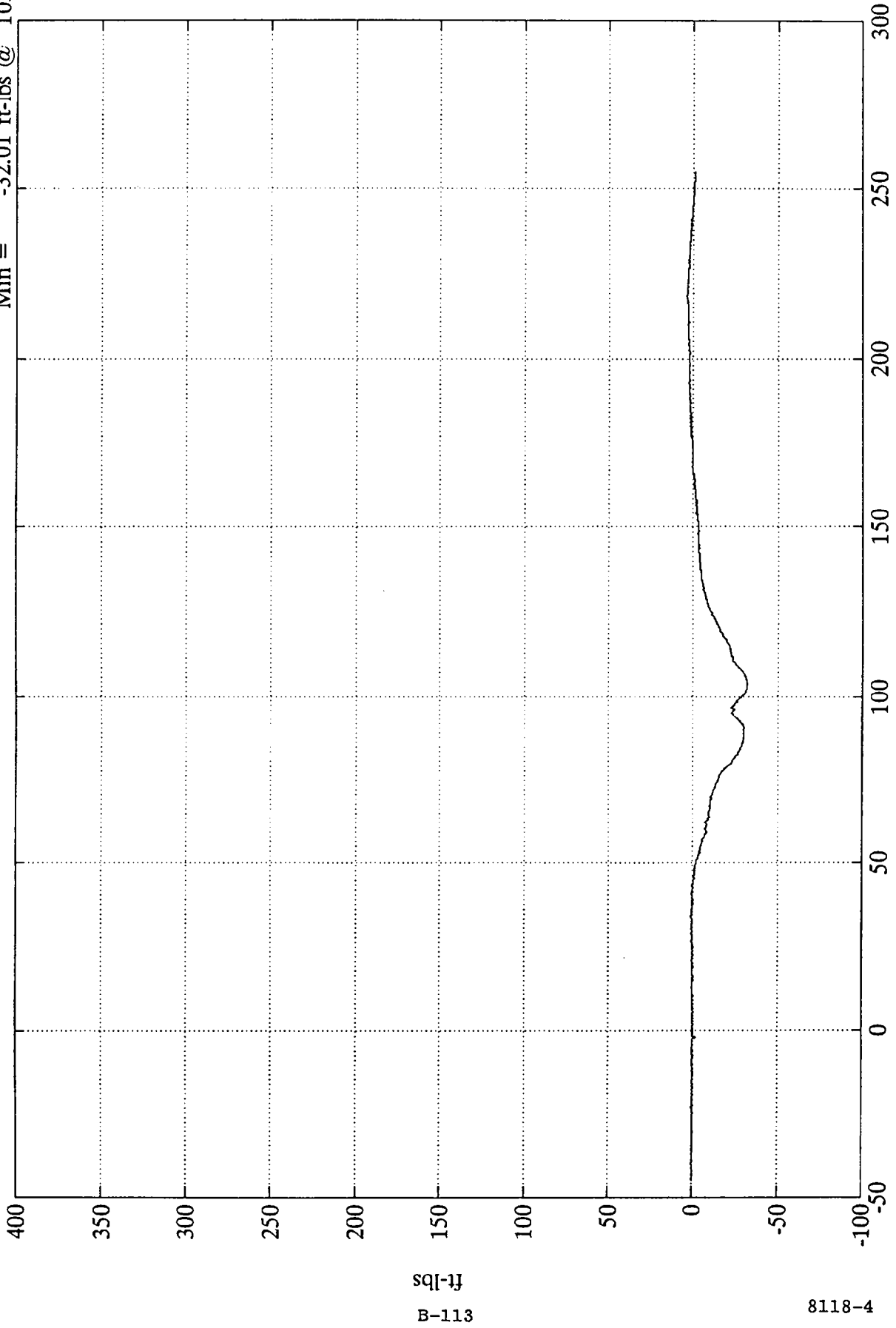
Time (msec)

SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V2-P1 Lt Lower Tibia Mx

Max = 3.87 ft-lbs @ 218.39 msec
Min = -32.01 ft-lbs @ 103.68 msec



B-113

8118-4

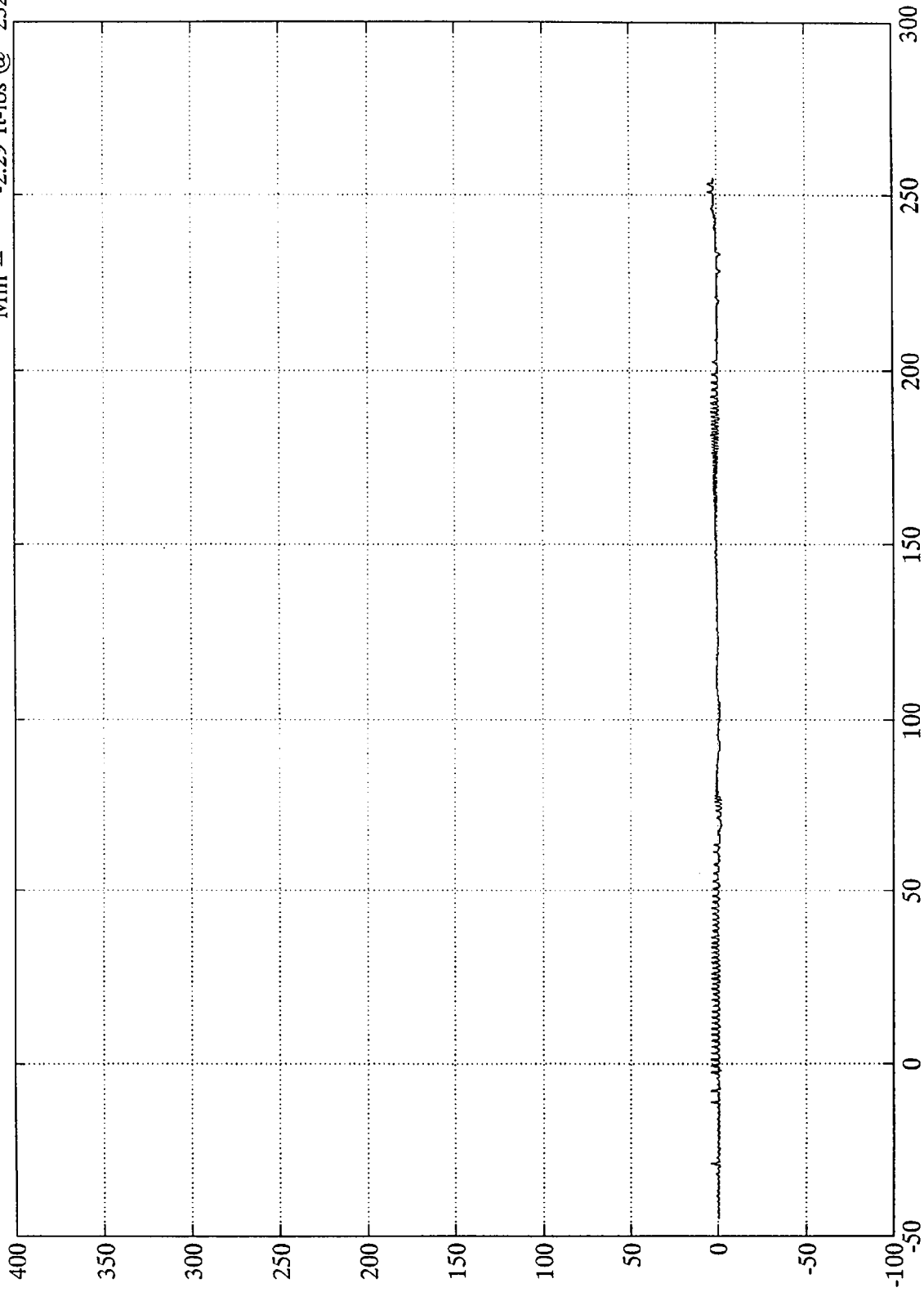
SAE Filter Class 600

Time (msec)

VTV TEST #4 - 30 Deg.

Max = 5.47 ft-lbs @ 253.19 msec
Min = -2.29 ft-lbs @ 232.92 msec

V2-P1 Rt Upper Tibia Mx



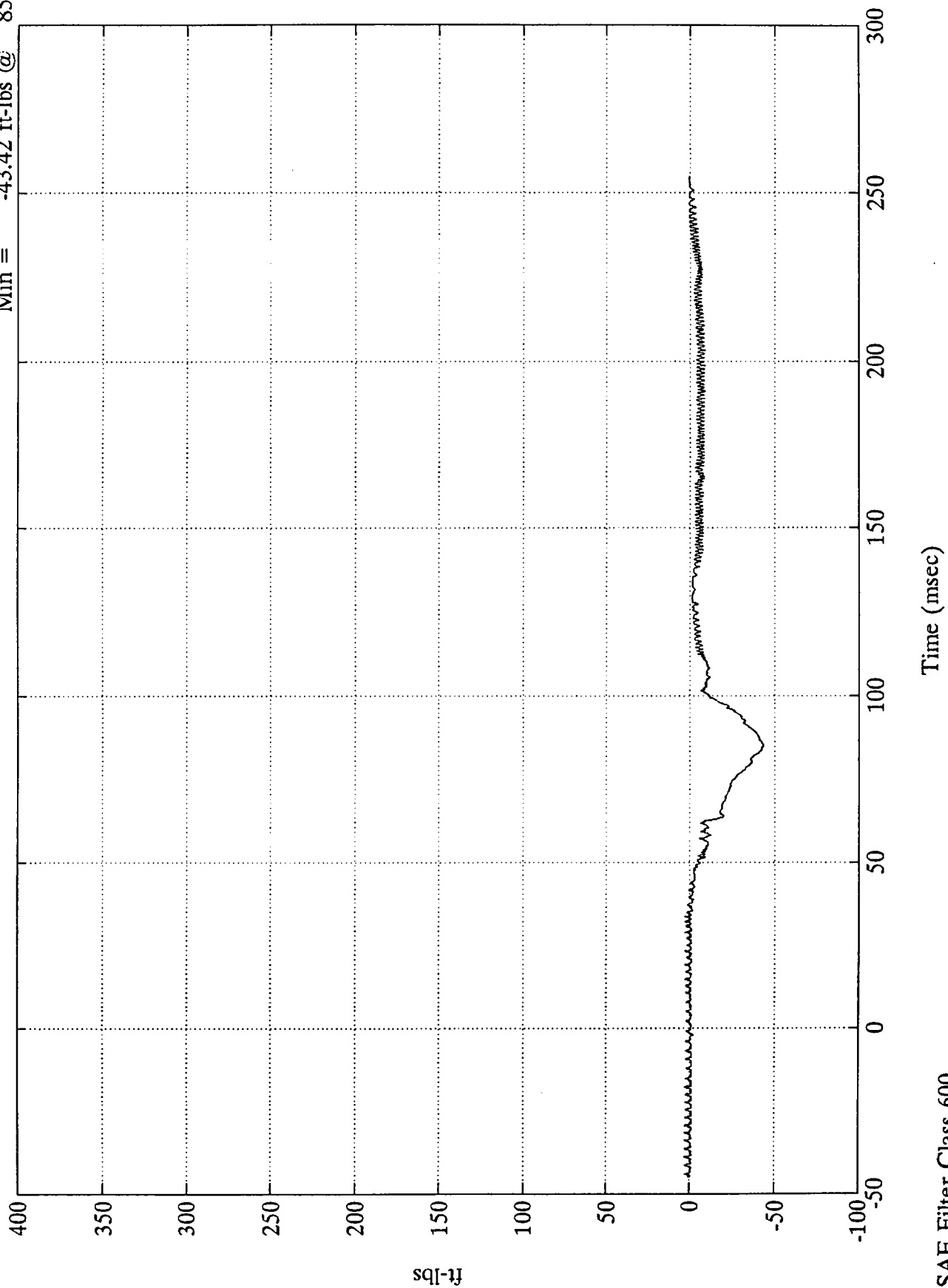
Time (msec)

SAE Filter Class 600

VTV TEST #4 - 30 Deg.

V2-P1 Rt Upper Tibia My

Max = 3.09 ft-lbs @ -38.88 msec
Min = -43.42 ft-lbs @ 85.08 msec



sq[-1]
B-115

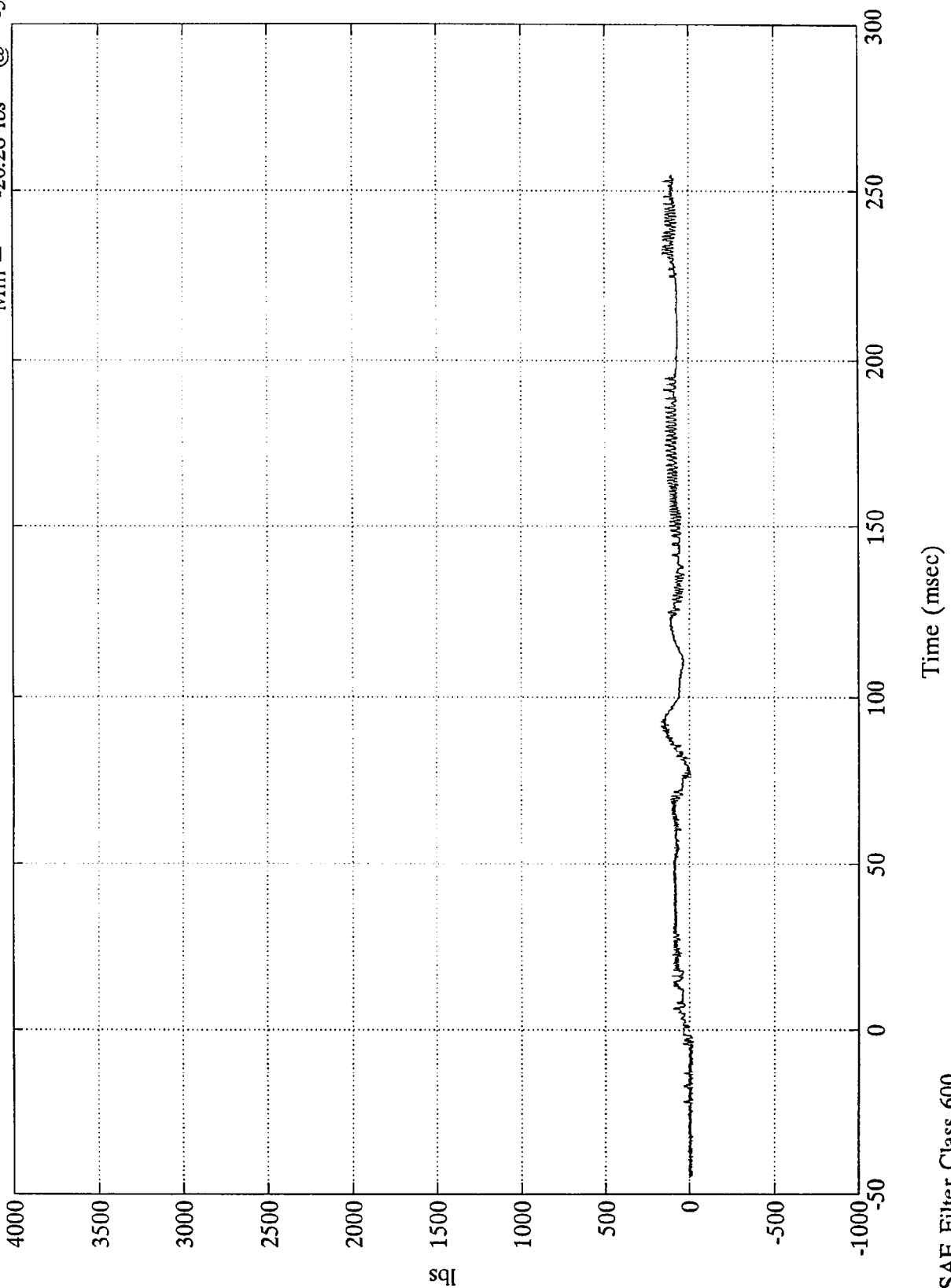
8118-4

SAE Filter Class 600

VTV TEST #4 - 30 Deg.

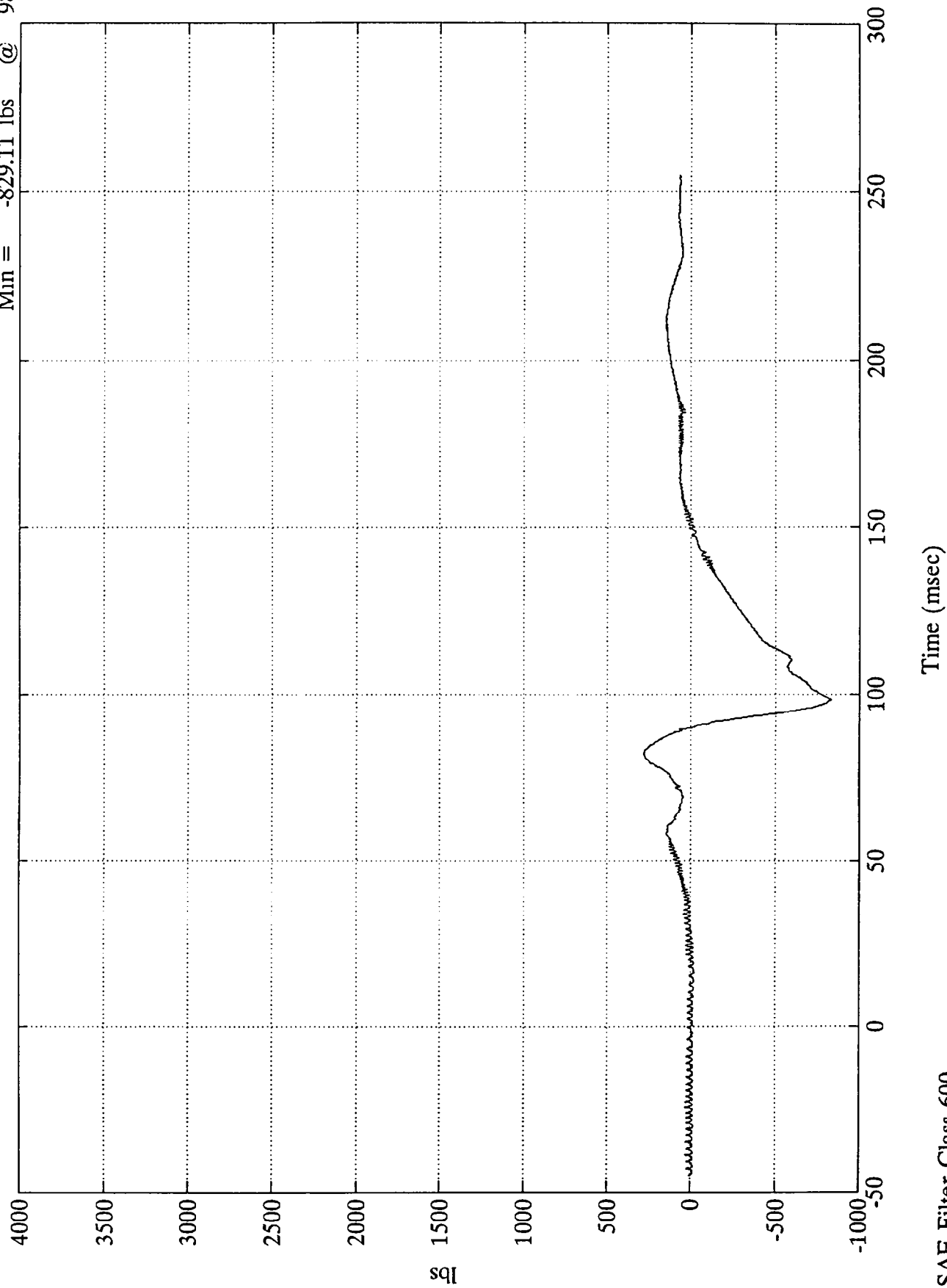
V2-P1 Rt Lower Tibia Fy

Max = 170.40 lbs @ 92.64 msec
Min = -20.28 lbs @ -3.60 msec



SAE Filter Class 600

V2-P1 Rt Lower Tibia Fz
Max = 280.02 lbs @ 81.95 msec
Min = -829.11 lbs @ 98.28 msec



VTV TEST #4 - 30 Deg.

V2-P1 Rt Lower Tibia Mx

Max = 56.85 ft-lbs @ 123.23 msec
Min = -19.50 ft-lbs @ 107.16 msec



Time (msec)

SAE Filter Class 600

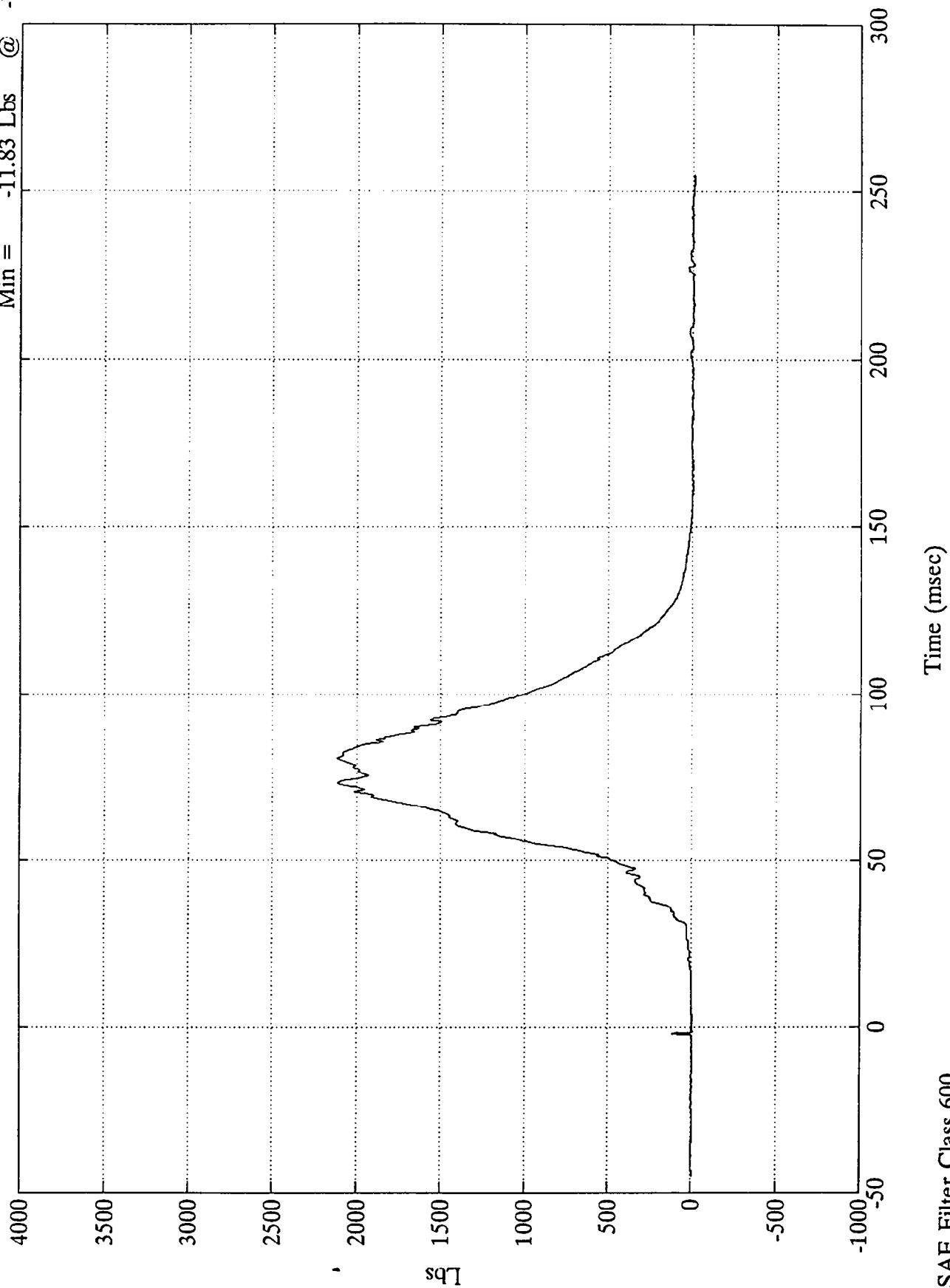
sq|-l|f

B-118

8118-4

Max = 2114.97 Lbs @ 80.63 ms
Min = -11.83 Lbs @ -1.44 ms

V2-P2 Torso Belt Load



Appendix C

PART 572E DUMMY CONFIGURATION

AND PERFORMANCE VERIFICATION DATA SHEETS

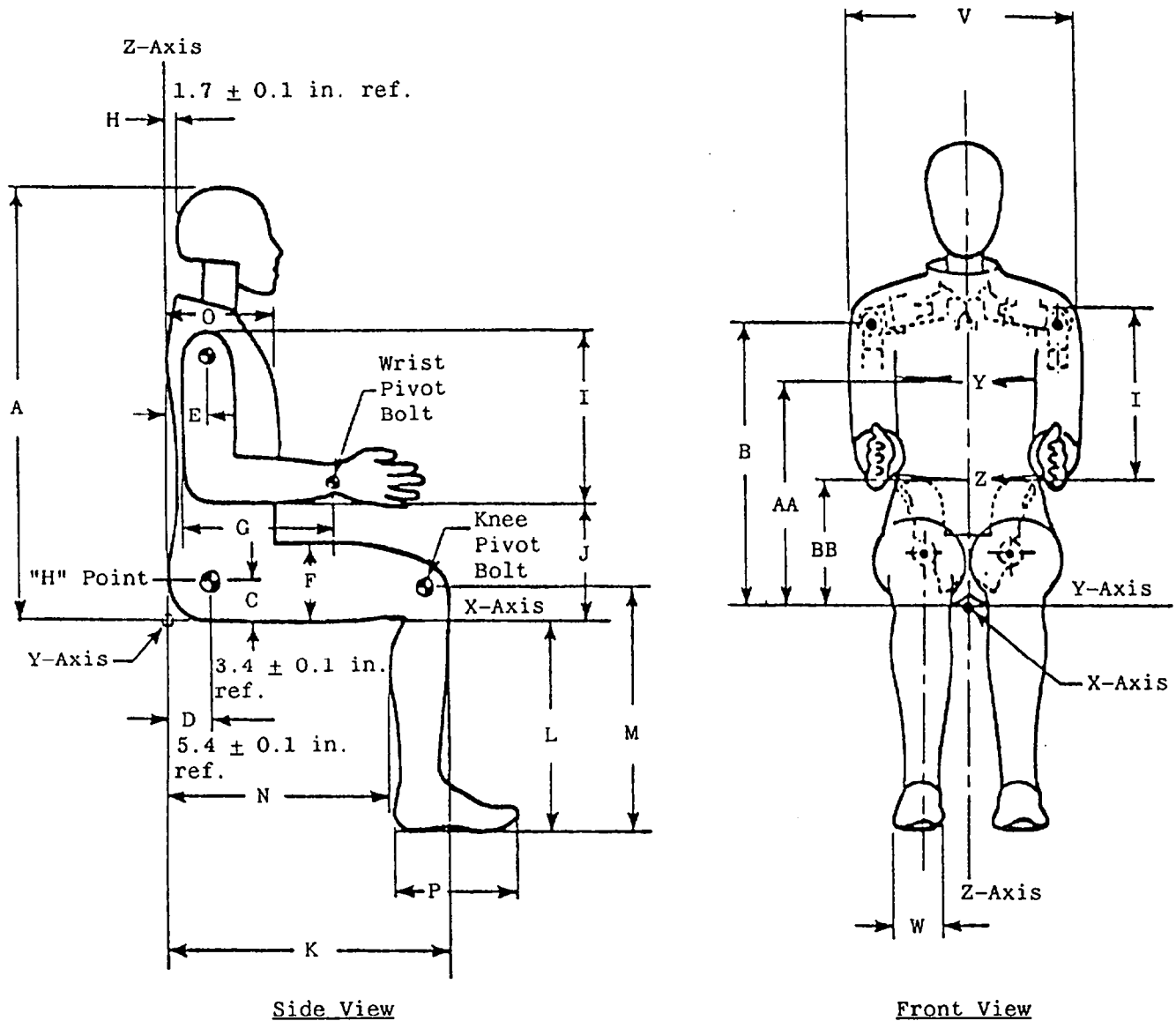
Appendix C contains the results from certification tests performed on the 50th percentile male anthropomorphic test devices utilized for this crash test. The results indicate that the dummies meet all of the performance requirements of the six standard tests as specified in 49 CFR Part 572, Federal Register, Volume 42, No. 25, dated February 7, 1977.

The tests were conducted at the Dummy Certification Test Facility of Calspan Corporation, Advanced Technology Center. A summary of the test results, and Part 572 specifications are included in this Appendix.

Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Date</u>
150	7-29-93
245	5-5-93

Figure 12
EXTERNAL DIMENSIONS SETUP SPECIFICATIONS



Note: Figure is referenced to the erect seated position. The curved lumbar does not allow the Hybrid III to be positioned in a perfect erect attitude.

VEHICLE 1, POSITION 1 - DRIVER DUMMY

Manufacturer: Humanoid

Serial No.: 45

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY I.D. NUMBER: 150

A. DUMMY INSTRUMENTS

1. HEAD ACCELEROMETER

HX LONGITUDINAL

HY LATERAL

HZ VERTICAL

2. CHEST ACCELEROMETER

CX LONGITUDINAL

CY LATERAL

CZ VERTICAL

3. FEMUR LOAD CELLS

LEFT SIDE

RIGHT SIDE

MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
ENDEVCO	ADMB8	3/93	9/93
ENDEVCO	ADL44	3/93	9/93
ENDEVCO	AC2J3	3/93	9/93
ENDEVCO	ADMB6	3/93	9/93
ENDEVCO	AC209	3/93	9/93
ENDEVCO	ADL98	3/93	9/93
GSE	951	5/93	11/93
GSE	952	5/93	11/93

B. CALIBRATION LABORATORY
INSTRUMENTS

1. PENDULUM ACC.

2. TEST PROBE
ACCELEROMETER

MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
CEC	A160	6/93	12/93
CEC	A161	6/93	12/93

HYBRID III EXTERNAL DIMENSIONS

S/N 150 HUMANOID

DUMMY SERIAL NO. 150

DATE: 7/30/93

TEMPERATURE		69 DEG. F
RELATIVE HUMIDITY		31 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)	16.9-17.1 IN	17.0 IN
LOCATION FOR WAIST CIRCUMFERENCE (BB)	8.9-9.1 IN	9.0 IN
CHEST CIRCUMFERENCE (Y)	38.2-39.4 IN	39.3 IN
WAIST CIRCUMFERENCE (Z)	32.9-34.1 IN	34.0 IN
CHEST DEPTH (O)	8.4-9.0 IN	8.4 IN
H-POINT HEIGHT (C)	3.3-3.5 IN	3.5 IN
H-POINT FROM SEAT BACK (D)	5.3-5.5 IN	5.4 IN
SKULL CAP TO BACKLINE (H)	1.6-1.8 IN	1.7 IN
TOTAL SITTING HEIGHT (A)	34.6-35.0 IN	34.7 IN
THIGH CLEARANCE (F)	5.5-6.1 IN	5.6 IN
BUTTOCK KNEE LENGTH (K)	22.8-23.8 IN	23.3 IN
BUTTOCK POPLITAL LENGTH (N)	17.8-18.8 IN	18.5 IN
POPLITEAL LENGTH (L)	16.9-17.9 IN	17.8 IN
KNEE PIVOT HEIGHT (M)	19.1-19.7 IN	19.7 IN
FOOT LENGTH (P)	9.9-10.5 IN	10.2 IN
FOOT BREADTH (W)	3.6-4.2 IN	3.8 IN
SHOULDER PIVOT FROM BACKLINE (E)	3.3-3.7 IN	3.7 IN
SHOULDER BREADTH (V)	16.6-17.2 IN	16.9 IN
SHOULDER PIVOT HEIGHT (B)	19.9-20.5 IN	20.2 IN
ELBOW REST HEIGHT (J)	7.5-8.3 IN	8.2 IN
SHOULDER-ELBOW LENGTH (I)	13.0-13.6 IN	13.3 IN
BACK OF ELBOW TO WRIST PIVOT (G)	11.4-12.0 IN	11.5 IN

DUMMY MEETS SPECIFICATIONS

TECHNICIAN: IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
HEAD DROP TEST
HYBRID III

DATE : 7/27/93

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 150 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	71 DEG. F
RELATIVE HUMIDITY	10% - 70%	51 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	242.2 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	11.8 G'S
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

NECK FLEXION TEST

HYBRID III

DATE : 7/28/93

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN:150 CAL NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	70 DEG. F
RELATIVE HUMIDITY		10% - 70%	53 %
IMPACT VELOCITY		22.60 - 23.40 FPS	22.7 FPS
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	25.89 G'S
	20 MS	17.60 - 22.60 G'S	21.36 G'S
	30 MS	12.50 - 18.50 G'S	17.36 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	17.36 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	39.38 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	70.76 DEG.
	TIME	57 - 64 MS	59.13 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	65 - 80 FT.-LBS.	74.16 FT.-LBS.
	TIME	47 - 58 MS	52.88 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	113.25 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	99 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
NECK EXTENSION TEST
HYBRID III

DATE : 7/28/93

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN:150 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	69 DEG. F
RELATIVE HUMIDITY		10% - 70%	53 %
IMPACT VELOCITY		19.50 - 20.30 FPS	20.0 FPS
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G'S	17.43 G'S
	20 MS	14.00 - 19.00 G'S	17.19 G'S
	30 MS	11.00 - 16.00 G'S	14.09 G'S
MAX PENDULUM G'S ABOVE 30 MS		22 G'S MAX	17.29 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		38 - 46 MS	45.25 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	87 DEG.
	TIME	72 - 82 MS	74.5 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-59.0/-39.0 FT.-LBS.	-57.43 FT.-LBS.
	TIME	65 - 79 MS	69.63 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	153.13 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	128.38 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
THORAX IMPACT TEST
HYBRID III

DATE : 7/28/93

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN 150 H.S. THORAX CAL

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	69 - 72 DEG. F	71 DEG. F
RELATIVE HUMIDITY	10% - 70%	52 %
PENDULUM VELOCITY	21.6 - 22.4 FT/SEC	21.6 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 INCHES	2.69 INCHES
MAXIMUM RESISTIVE FORCE	1160 - 1325 POUNDS	1234 POUNDS
INTERNAL HYSTERESIS	69% - 85%	71.1 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
KNEE IMPACT TEST
HYBRID III

DATE : 7/29/93

KNEE: LEFT

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 150 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	71 DEG. F
RELATIVE HUMIDITY	10% - 70%	49 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS.	1135 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 7/29/93

KNEE: RIGHT

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 150 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	71 DEG. F
RELATIVE HUMIDITY	10% - 70%	49 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS.	1067 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

VEHICLE 2, POSITION 1 - DRIVER DUMMY

Manufacturer: Humanoid

Serial No.: 245

HYBRID III EXTERNAL DIMENSIONS

S/N 245 HUMANOID

DUMMY SERIAL NO. 245

DATE: 5/5/93

TEMPERATURE		71 DEG. F
RELATIVE HUMIDITY		35 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)	16.9-17.1 IN	16.9 IN
LOCATION FOR WAIST CIRCUMFERENCE (BB)	8.9-9.1 IN	8.9 IN
CHEST CIRCUMFERENCE (Y)	38.2-39.4 IN	39.3 IN
WAIST CIRCUMFERENCE (Z)	32.9-34.1 IN	34 IN
CHEST DEPTH (O)	8.4-9.0 IN	8.4 IN
H-POINT HEIGHT (C)	3.3-3.5 IN	3.5 IN
H-POINT FROM SEAT BACK (D)	5.3-5.5 IN	5.4 IN
SKULL CAP TO BACKLINE (H)	1.6-1.8 IN	1.7 IN
TOTAL SITTING HEIGHT (A)	34.6-35.0 IN	35 IN
THIGH CLEARANCE (F)	5.5-6.1 IN	6.0 IN
BUTTOCK KNEE LENGTH (K)	22.8-23.8 IN	23.5 IN
BUTTOCK POPLITAL LENGTH (N)	17.8-18.8 IN	18.3 IN
POPLITEAL LENGTH (L)	16.9-17.9 IN	17.6 IN
KNEE PIVOT HEIGHT (M)	19.1-19.7 IN	19.2 IN
FOOT LENGTH (P)	9.9-10.5 IN	10 IN
FOOT BREADTH (W)	3.6-4.2 IN	3.8 IN
SHOULDER PIVOT FROM BACKLINE (E)	3.3-3.7 IN	3.5 IN
SHOULDER BREADTH (V)	16.6-17.2 IN	16.8 IN
SHOULDER PIVOT HEIGHT (B)	19.9-20.5 IN	20.4 IN
ELBOW REST HEIGHT (J)	7.5-8.3 IN	8.1 IN
SHOULDER-ELBOW LENGTH (I)	13.0-13.6 IN	13.2 IN
BACK OF ELBOW TO WRIST PIVOT (G)	11.4-12.0 IN	11.6 IN

DUMMY MEETS SPECIFICATIONS

TECHNICIAN: IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
HEAD DROP TEST
HYBRID III

DATE : 4/16/93

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 245 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70 DEG. F
RELATIVE HUMIDITY	10% - 70%	41 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	235.4 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	4.2 G'S
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

NECK FLEXION TEST

HYBRID III

DATE : 5/5/93

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN:245 CAL NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	71 DEG. F
RELATIVE HUMIDITY		10% - 70%	43 %
IMPACT VELOCITY		22.60 - 23.40 FPS	22.8 FPS
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	24.36 G'S
	20 MS	17.60 - 22.60 G'S	20.66 G'S
	30 MS	12.50 - 18.50 G'S	17.21 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	17.21 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	40.75 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	71.15 DEG.
	TIME	57 - 64 MS	57.13 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	65 - 80 FT.-LBS.	70.83 FT.-LBS.
	TIME	47 - 58 MS	53.63 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	113.88 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	99 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
NECK EXTENSION TEST

HYBRID III

DATE : 5/5/93

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN:245 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	71 DEG. F
RELATIVE HUMIDITY		10% - 70%	43 %
IMPACT VELOCITY		19.50 - 20.30 FPS	20.2 FPS
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G'S	17.41 G'S
	20 MS	14.00 - 19.00 G'S	17.05 G'S
	30 MS	11.00 - 16.00 G'S	14.36 G'S
MAX PENDULUM G'S ABOVE 30 MS		22 G'S MAX	17.27 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		38 - 46 MS	44.88 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	99.41 DEG.
	TIME	72 - 82 MS	74 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-59.0/-39.0 FT.-LBS.	-57.22 FT.-LBS.
	TIME	65 - 79 MS	69.25 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	150.75 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	125.13 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
THORAX IMPACT TEST
HYBRID III

DATE : 4/30/93

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN 245 H.S. THORAX CAL

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	69 - 72 DEG. F	70 DEG. F
RELATIVE HUMIDITY	10% - 70%	39 %
PENDULUM VELOCITY	21.6 - 22.4 FT/SEC	21.6 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 INCHES	2.52 INCHES
MAXIMUM RESISTIVE FORCE	1160 - 1325 POUNDS	1224 POUNDS
INTERNAL HYSTERESIS	69% - 85%	70.7 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
KNEE IMPACT TEST
HYBRID III

DATE : 5/4/93

KNEE: LEFT

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 245 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	71 DEG. F
RELATIVE HUMIDITY	10% - 70%	40 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS.	1125 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 5/4/93

KNEE: RIGHT

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 245 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	71 DEG. F
RELATIVE HUMIDITY	10% - 70%	40 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS.	1143 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY I.D. NUMBER: 245

A. DUMMY INSTRUMENTS

1. HEAD ACCELEROMETER

HX LONGITUDINAL

HY LATERAL

HZ VERTICAL

2. CHEST ACCELEROMETER

CX LONGITUDINAL

CY LATERAL

CZ VERTICAL

3. FEMUR LOAD CELLS

LEFT SIDE

RIGHT SIDE

MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
ENDEVCO	A39J	3/93	9/93
ENDEVCO	A33F	3/93	9/93
ENDEVCO	A27F	3/93	9/93
ENDEVCO	A12C	3/93	9/93
ENDEVCO	A60C	3/93	9/93
ENDEVCO	A84G	3/93	9/93
GSE	954	5/93	11/93
GSE	955	5/93	11/93

B. CALIBRATION LABORATORY
INSTRUMENTS

1. PENDULUM ACC.

2. TEST PROBE
ACCELEROMETER

MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
CEC	A160	6/93	12/93
CEC	A161	6/93	12/93