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CALSPAN REPORT NUMBER: 8118-11

**VEHICLE-TO-VEHICLE FRONTAL 45° OBLIQUE ANGLE
65% OVERLAP 108.6 kph IMPACT OF A
STATIONARY 1994 FORD TAURUS 4-DOOR SEDAN AND
A MOVING DEFORMABLE BARRIER**

CALSPAN TEST NUMBER: Y49-11-1456

September 23, 1994

CALSPAN CORPORATION
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FINAL REPORT

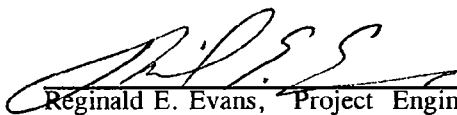
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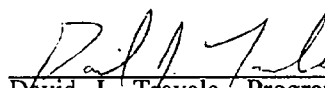
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16. Abstract A 108.6 kph vehicle to vehicle 45° oblique angle 65% overlapped frontal impact test of a 1994 Ford Taurus 4-Door Sedan (vehicle 1) and a Moving Deformable Honeycomb Barrier (MDB) was performed at the Calspan Advanced Technology Center crash facility in Buffalo, New York on September 23, 1994. The impact velocity of the moving deformable honeycomb barrier, was measured at 108.6 kph. The ambient temperature at the time of test was 21° C. The stationary 1994 Ford Taurus 4-door sedan contained a 50th percentile male Anthropomorphic Test Devices (ATD) in the driver and right front passenger seating positions. The ATD's were restrained using the vehicles' driver and passenger air bags and 3 point belt restraint systems. The driver and passenger occupant Head Injury Criteria (HIC), 3 millisecond clipped chest resultants and femur loads were all below the injury requirements of FMVSS 208 "Occupant Crash Protection".			
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Section 1

PURPOSE AND TEST PROCEDURE

This 108.6 kph 45° angle 65% overlapped frontal vehicle-to-vehicle impact test is part of the Crashworthiness Testing and Analysis Program sponsored by the Research and Special Programs Administration under Contract No. DTRS-57-90-C-00104. The purpose of this Technical Task Directive (TTD 7) is to obtain responses from vehicles and restrained Hybrid III dummies during car-to-car overlapped frontal crashes.

This test was performed using a 1994 Ford Taurus 4-Door Sedan (vehicle 1) and a Moving Deformable Honeycomb Barrier (MDB). The MDB (vehicle 2) was traveling at 108.6 kph and impacted the stationary Ford Taurus.

The MDB (vehicle 2) was positioned at a crabbed 20.5° angle measured counter clockwise from the vehicle's centerline. Vehicle 1 was positioned at a 24.5° angle measured clockwise from its centerline. Together the angles provided a 45 degree oblique impact angle.

The impact point was designated using an offset measurement to the right of vehicle 1 centerline which was 65% of the vehicle 1 maximum width dimension. From this 65% width point (parallel with the vehicle 1 centerline), a 15 degree counterclockwise line tangent to the vehicle 2 left-most point of the bumper was determined. These angles and tangent line determined the impact point.

The 1994 Ford Taurus 4-Door Sedan, contained two Hybrid III 50th percentile male Anthropomorphic Test Devices (ATDs), in the front, driver and passenger seating positions. The ATDs were restrained using the vehicle's Driver and passenger air bags and 3 point manual seat belt restraint systems.

Section 2

SUMMARY OF TEST

A moving deformable honeycomb barrier (vehicle 2) moving forward at 108.6 kph impacted a stationary 1994 Ford Taurus 4-Door Sedan (vehicle 1). Both vehicles were positioned to impact at a 30° angle with a 65% offset from vehicle 1 centerline. The test was performed at the Calspan Corporation Advanced Technology Center Crash Test Facility on September 23, 1994.

Pre- and Post-test still photographs of the vehicles and dummies can be found in Appendix A. The impact event was documented with one real time movie camera and eight high speed movie cameras. Vehicle photographic target locations can be found in Figure 5 and movie camera locations can be found in Figure 8.

The nominal vehicle impact points were determined as outlined in the previous section and shown in Figure 1. From film analysis, it was determined the vehicles struck 0.5 inches off target so as to create slightly less overlap.

Two Hybrid III 50th percentile Anthropomorphic Test Devices (ATDs) were placed in the driver and passenger seating positions of vehicle 1. The ATD's were positioned according to the ATD placement instructions from the FMVSS 208 "Occupant Crash Protection" Test Procedure. Both ATDs were restrained using the vehicle's driver and passenger air bags and 3 point manual seat belt restraint systems.

The 50th percentile male ATDs in the driver and passenger positions were instrumented with head and chest three axis accelerometer packages; chest displacement potentiometers; upper neck force and moment transducers; femur axial force load cells and upper and lower tibia force and moment transducer packages. The driver ATD contained additional chest compression displacement potentiometer arrays. The driver shoulder belt tensile forces were also recorded.

The 110 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.

Section 2
SUMMARY OF TEST (continued)

The 1994 Ford Taurus (Vehicle 1) driver HIC was 362.65 and the head contacted the test vehicle air bag and "B" pillar. The maximum chest acceleration over a three millisecond period was 44.932 gs. The left femur maximum axial compressive force was -7190.9 newtons and the right femur maximum axial compressive force was -7222.5 newtons.

The passenger HIC was 393.69 and the head contacted the passenger air bag and sunvisor. The maximum chest acceleration over a three millisecond period was 53.870 gs. The left femur maximum axial compressive force was -6254.7 newtons and the right femur maximum force was 7426.4 newtons.

Structural damage to the 1994 Ford Taurus (Vehicle 1) consisted of severe deformation to the right front quarter of the vehicle, roof rail deformation, driver side floor pan intrusion and the steering column stroked. The vehicle windshield cracked throughout with a 51 millimeter tear to the bottom right side of the windshield.

The honeycomb barrier used on vehicle 2 was the DSL-1285 barrier used for FMVSS 214D side impact testing. The rear of the barrier face was instrumented with load cells.

TEST ANOMALIES

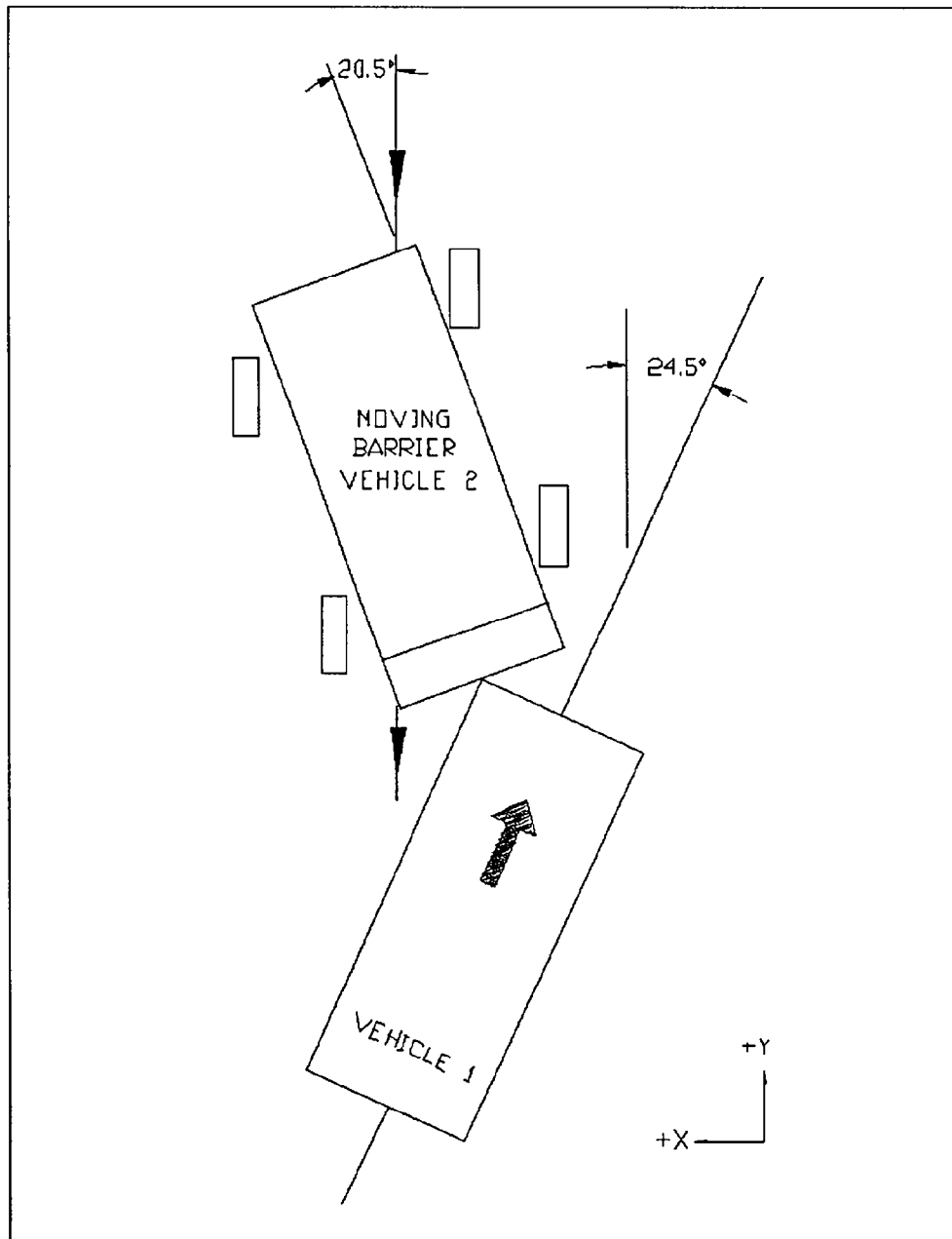
Appendix B contains lists of all data channels. Where an anomaly occurred, the channel is identified by an asterix and commented below.

Section 3

VEHICLE AND OCCUPANT INFORMATION

Figure 1

VEHICLE-TO-VEHICLE ANGLED FRONTAL IMPACT LAYOUT



VEHICLE ONE DATA

Table 1

GENERAL TEST AND VEHICLE 1 PARAMETER DATATEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1994 Ford Taurus 4-Door Sedan

NHTSA Test No.: - VIN.: 1FALP52U7RG132088

Body Color: White Date of Manufacture: 10/93

Engine: 6 Cylinders; - C.I.D.; 3.0 Liters; - CC
X Gas; - Diesel; - Turbocharged
- Longitudinal; X Transverse

Transmission: 3 Speed; - Manual; X Automatic; X 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: Driver and passenger air bags and 3 point belt systems.

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 241 kpa, Rear 241 kpa

Recommended Tire Size: P205/65 R15

Recommended Cold Tire Pressure: Front 241 kpa, Rear 241 kpa

Tires on Vehicle: P205/65 R15 ; Manufacturer: General

Number of Occupants: 3 Front; 3 Rear; - 3rd Seat; 6 TOTAL

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

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

Vehicle Capacity Weight (VCW) = 1100 kgs. (A)

No. of Occupants x 68.03 kgs. = 900 kgs. (B)

Rated Cargo and Luggage

Weight (RCLW) A - B = 200 kgs.

GVWR 4653 kgs. GAWR: Front 2510 kgs. Rear 2173 kgs.

Table 1

GENERAL TEST AND VEHICLE 1 PARAMETER DATA (continued)

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

Right Front	=	<u>454</u>	kgs.	Right Rear	=	<u>266</u>	kgs.
Left Front	=	<u>473</u>	kgs.	Left Rear	=	<u>255</u>	kgs.
TOTAL FRONT WEIGHT	=	<u>927.0</u>	kgs.	(<u>64.0</u> % of Total Vehicle Weight)			
TOTAL REAR WEIGHT	=	<u>521.0</u>	kgs.	(<u>36.0</u> % of Total Vehicle Weight)			
TOTAL DELIVERED WEIGHT	=	<u>1,448.0</u>	kgs.				

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMY:

Right Front	=	<u>468</u>	kgs.	Right Rear	=	<u>317.5</u>	kgs.
Left Front	=	<u>482</u>	kgs.	Left Rear	=	<u>312.5</u>	kgs.
TOTAL FRONT WEIGHT	=	<u>950.0</u>	kgs.	(<u>60.1</u> % of Total Vehicle Weight)			
TOTAL REAR WEIGHT	=	<u>630.0</u>	kgs.	(<u>39.9</u> % of Total Vehicle Weight)			
TOTAL TEST WEIGHT	=	<u>1,580.0</u>	kgs.				

TEST VEHICLE ATTITUDE (all dimensions in millimeters):

Delivered Attitude:	RF	<u>719</u>	;	LF	<u>711</u>	;	RR	<u>699</u>	;	LR	<u>699</u>
Test Attitude:	RF	<u>724</u>	;	LF	<u>716</u>	;	RR	<u>668</u>	;	LR	<u>668</u>
Vehicle's Wheel Base =		<u>2675</u>	mm.								
Location of Vehicle's C.G. =		<u>1067 millimeters rearward of front wheel center.</u>									

Table 1

GENERAL TEST AND VEHICLE 1 PARAMETER DATA (continued)POST-IMPACT DATA:

Type of Test:	Frontal ⁴⁵ 30° Angle	Impact Angle:	⁴⁵ 30 deg.
Date of Test:	September 23, 1994	Time of Test:	15:55
Ambient Temperature:	21	°C at impact area	
Temperature in Occupant Compartment:	21	°C	
Windshield Molding Temperature:	-	°C	
Required Impact Velocity Range:	-	to	- kph
Impact Velocity:	primary = 108.6 kph, secondary =	-	kph
Distance From Front Bumper to Barrier Face When			
Entering Speed Trap:	132	cm.	
Exiting Speed Trap:	30.5	cm.	

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	Face with air bag, top of head with "B" pillar.	Face with air bag, top of head with sunvisor.
Chest	Air bag	No contact
Abdomen	No contact	No contact
Left Knee	Lower dash panel	Glove box door
Right Knee	Lower dash panel	Glove box door

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

	<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	none	none	N/A	N/A
Seat Shift (mm.)	0.0	0.0	N/A	N/A

Table 2

VEHICLE 1 DUMMY INJURY CRITERIA VALUES

	MAXIMUM ACCELERATION ("G")							
	HEAD				CHEST			
	X	Y	Z	R	X	Y	Z	R*
DUMMY (1)	-53.1	80.3	-24.9	82.1	-45.7	26.6	-23.2	44.932
DUMMY (2)	-63.5	-30.9	16.0	66.4	-55.9	24.3	13.2	53.870
DUMMY (3)	-	-	-	-	-	-	-	-
DUMMY (4)	-	-	-	-	-	-	-	-

	MAXIMUM FORCE FEMUR LOAD (NEWTONS)	
	RIGHT FEMUR	LEFT FEMUR
DUMMY (1)	-7222.5	-7190.9
DUMMY (2)	7426.4	-6254.7
DUMMY (3)	-	-
DUMMY (4)	-	-

	MAXIMUM LOAD (NEWTONS)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
DUMMY (1)	4200.3	-	-
DUMMY (2)	-	-	-
DUMMY (3)	-	-	-
DUMMY (4)	-	-	-

	MAXIMUM ACCELERATION ("G")			
	HIC	t ₁ (SEC)	t ₂ (SEC)	Average Acceleration t ₁ TO t ₂
DUMMY (1)	362.65	53.280	88.200	40.42
DUMMY (2)	393.69	56.760	87.960	43.69
DUMMY (3)	-	-	-	-
DUMMY (4)	-	-	-	-

*Defined as exceeding 0.003 sec. duration

**As defined in FMVSS No. 208

Figure 2

VEHICLE 1 OCCUPANT CLEARANCE DIMENSIONS (mm)

	DRIVER (mm)	PASSENGER
HH	294	300
HW	475	495
NSW	344	-
NIP	499	-
NH	352	-
CD	510	476
CS	284	-
KDL	54	95
KDR	75	100
1	480	-
2	51	-
SA	20°	20°
PA	23°	24°
ULA	108°	108°
LLA	228°	229°

DISTANCE OF H-POINT FROM TARGET POSITION (mm)		
	Driver	Passenger
Longitudinal	6 forward	0
Vertical	3 above	0

Angles taken relative to vertical

SA = Seat Back Angle

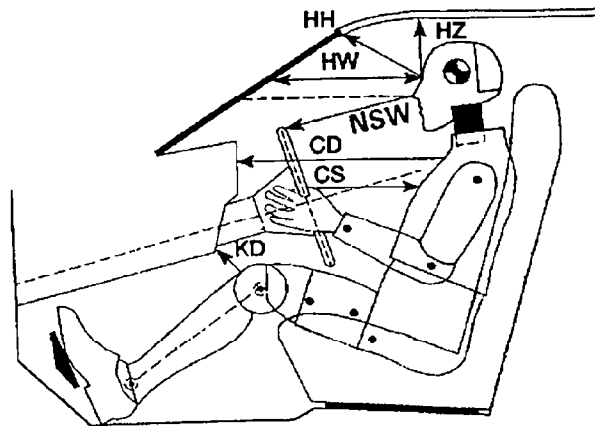
PA = Pelvic Angle

ULA= Upper Leg Angle

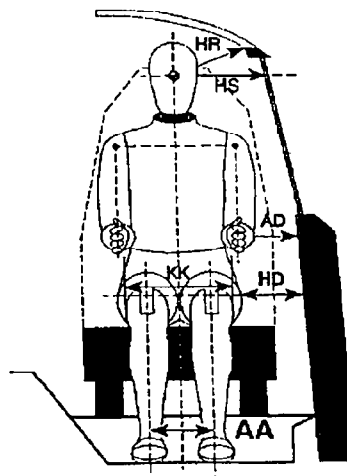
LLA= Lower Leg Angle

	DRIVER (mm)	PASSENGER
HR	164	153
HS	252	245
AD	100	109
HD	160*	149
KK	280	273
AA	202	218
DT	21	21

*to pocket



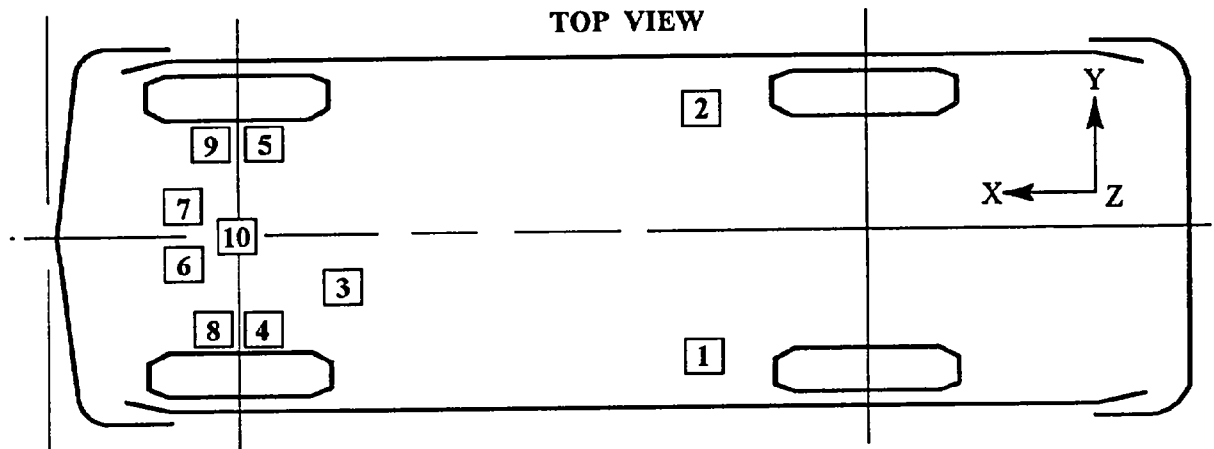
- HH - Head to Windshield Header
- HW - Head to Windshield
- NSW - Nose to Steering Wheel
- NIP - Nose to Instrument Panel
- NH - Nose to Steering Wheel Hub
- CD - Chest to Dash
- CS - Chest to Steering Wheel Hub
- KDL - Knee to Dash Left
- KDR - Knee to Dash Right
- 1 - Nose to Steering Column Target
- 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

Figure 3

SUMMARY OF VEHICLE 1 ACCELEROMETER DATA



Vehicle: 1994 Ford Taurus 4-Door Sedan

ACCELEROMETER NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	V1 L.R. Comp (X)	Gs	8.3	80.6	-39.5	46.3	60.0
1	V1 L.R. Comp (Y)	Gs	17.1	58.3	-5.1	115.7	60.0
2	V1 R.R. Comp (X)	Gs	2.1	127.1	-46.2	47.3	60.0
2	V1 R.R. Comp (Y)	Gs	27.0	52.4	-4.6	159.7	60.0
3	V1 Brake Pedal (X)	Gs	72.4	48.4	-148.4	54.5	60.0
3	V1 Brake Pedal (Y)	Gs	172.4	53.6	-62.4	47.6	60.0
3	V1 Brake Pedal (Z)	Gs	92.7	60.1	-111.8	45.1	60.0
3	V1 Brake Pedal (res)	Gs	229.9	54.0	.0	-20.0	60.0
4	V1 Left Shock Tower (X)	Gs	76.6	28.3	-27.4	58.9	60.0
4	V1 Left Shock Tower (Z)	Gs	40.5	51.8	-49.9	42.6	60.0
5	V1 Right Shock Tower (X)	Gs	2.2	109.0	-62.9	51.8	60.0
5	V1 Right Shock Tower (Y)	Gs	118.2	51.7	-8.2	28.9	60.0
6	V1 Left Engine (X)	Gs	51.1	59.5	-125.2	42.5	60.0
7	V1 Right Engine (X)	Gs	40.0	61.0	-111.0	42.1	60.0
8	V1 L.F Frame Rail (X)	Gs	39.3	55.7	-112.9	38.0	60.0
8	V1 L.F Frame Rail (Y)	Gs	70.9	37.4	-28.7	50.8	60.0
8	V1 L.F Frame Rail (Z)	Gs	79.9	36.8	-130.4	43.0	60.0
8	V1 L.F Frame Rail Res.	Gs	152.0	37.6	.1	-9.7	60.0
9	V1 R.F Frame Rail (X)	Gs	25.9	17.2	-93.9	39.1	60.0
9	V1 R.F Frame Rail (Y)	Gs	4.2	385.7	-59.4	49.9	60.0
9	V1 R.F Frame Rail (Z)	Gs	53.3	51.8	-35.5	55.9	60.0
9	V1 R.F Frame Rail Res.	Gs	98.0	39.1	.1	-9.0	60.0
10	V1 Engine Bottom (X)	Gs	21.4	56.3	-69.1	27.5	60.0
10	V1 Engine Bottom (Y)	Gs	40.2	58.0	-56.7	37.0	60.0

Figure 4

VEHICLE 1 PRE- AND POST-TEST POSITION OF TEST VEHICLE

ACCELEROMETER MOUNTING LOCATIONS

Test Description: 108.6 kph Frontal Vehicle to Vehicle Impact

Test Vehicle: 1994 Ford Taurus 4-Door Sedan

Reference Plane: Vehicle plane at rear bumper

VEHICLE No. 1		PRE-TEST AXIS (mm)			POST-TEST AXIS (mm)		
Loc. No.	DESCRIPTION	X	Y	Z	X	Y	Z
1	RIGHT FRONT FRAME RAIL	3973	438	171	3949	355	119
2	LEFT FRONT FRAME RAIL	3973	438	163	3915	490	178
3	RIGHT ENGINE TOP	4036	216	874	3937	368	848
4	LEFT ENGINE TOP	3970	76	875	3867	-97	932
5	ENGINE BOTTOM	3942	114	205	3901	40	183
6	RIGHT SHOCK TOWER	3821	657	923	3823	660	930
7	LEFT SHOCK TOWER	3821	657	917	3576	508	1056
8	BRAKE PEDAL	3373	318	445	3310	292	449
9	LEFT REAR COMP.	1907	406	454	1907	406	455
10	RIGHT REAR COMP.	1907	406	456	1907	406	462
11	CENTER REAR COMP.	-	-	-	-	-	-
12	LOWER STEERING COL.	-	-	-	-	-	-
13	UPPER STEERING COL.	-	-	-	-	-	-
14	LEFT DRIVER TOEPAN	3455	544	406	3337	533	422
15	RIGHT DRIVER TOEPAN	3518	279	325	3393	256	393

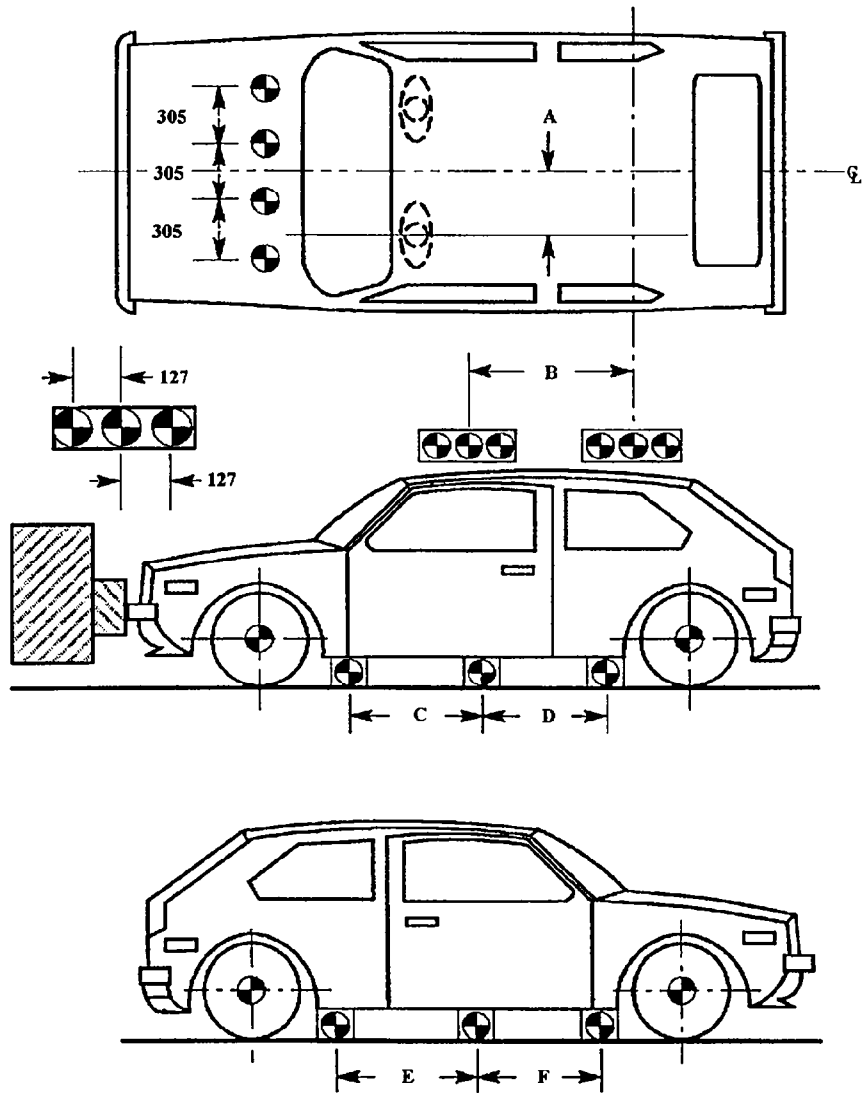
NOTE: Vehicle leveled to pre-test height for post-test measurements. Carpet removed from floor-pan.

TOEPAN MEASUREMENT POSITIONS						
Loc. No.	PRE-TEST AXIS (mm)			POST-TEST AXIS (mm)		
	X	Y	Z	X	Y	Z
1	3503	546	495	3310	521	517
2	3394	556	292	3271	533	294
3	3516	432	325	3398	394	369
4	3551	106	465	3437	119	397
5	3437	150	254	3368	177	224

Figure 5

VEHICLE 1 TARGET LOCATIONS

(All dimensions in millimeters)



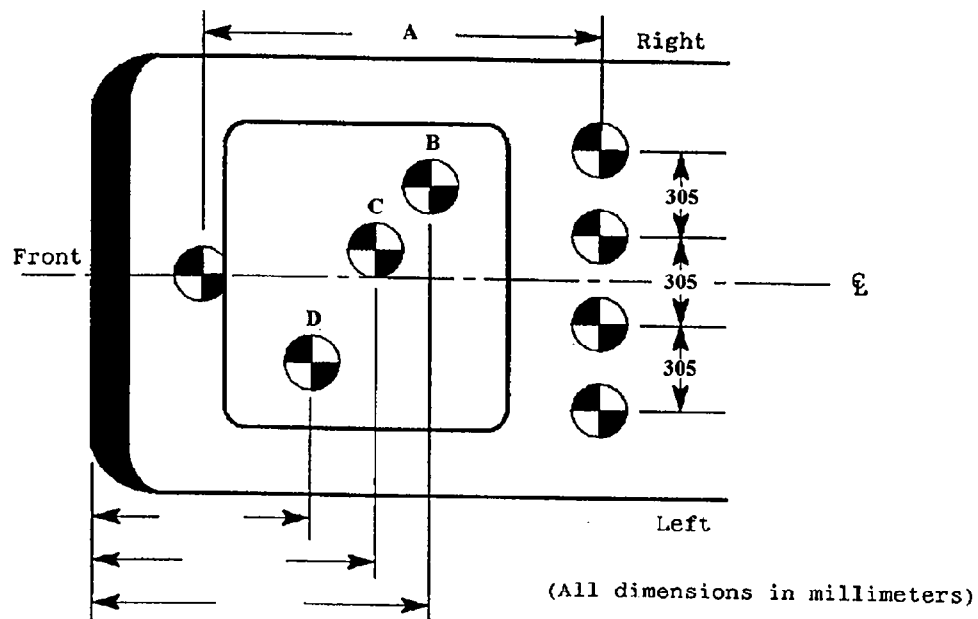
(Dimensions in millimeters)

Targets	A: 330	D: 874
	B: 1219	E: 869
	C: 912	F: 917

Figure 5

VEHICLE 1 TARGET LOCATIONS (continued)

(TOP VIEW OF HOOD AND ENGINE COMPARTMENT)



Note: Drawing not to scale.

- Target A: 960
B: Air Cleaner Assembly - 673
C: Valve Cover - 620
D: Alternator - 686

Figure 6

VEHICLE 1 MEASUREMENT POINTS

(All dimensions in millimeters)

REAR DATUM REFERENCE

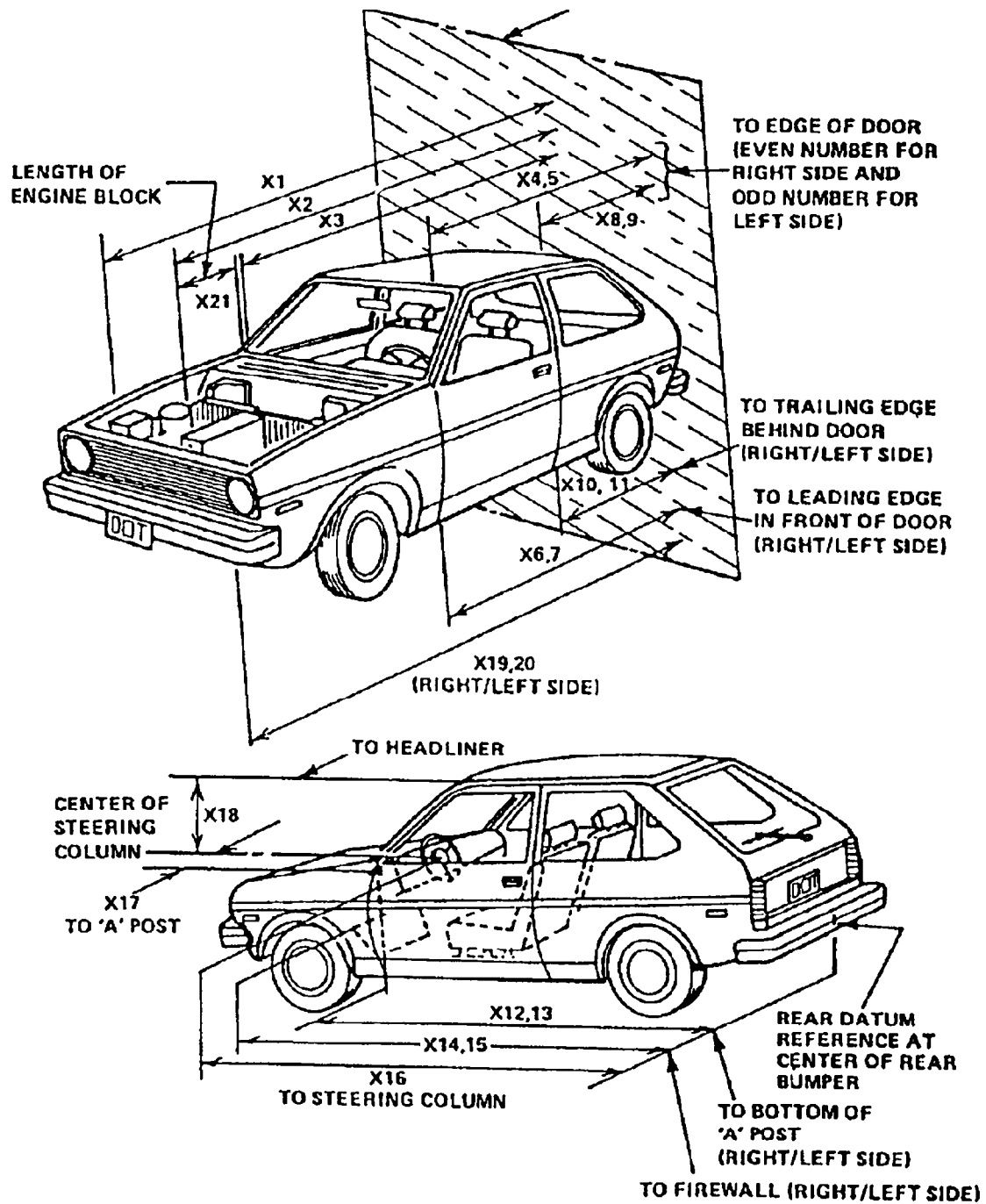


Figure 6

VEHICLE 1 MEASUREMENT POINTS (continued)

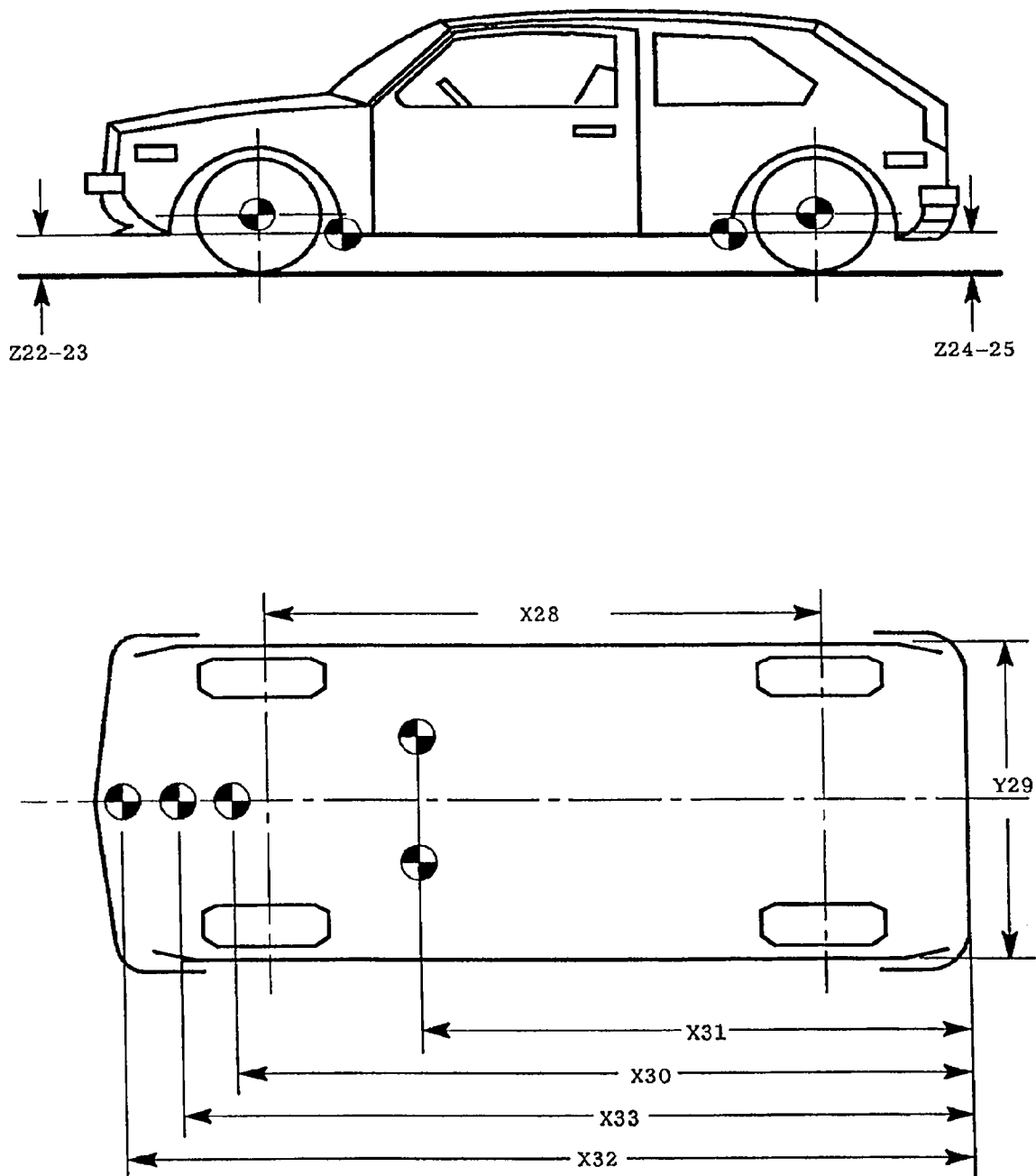


Table 3

VEHICLE 1 MEASUREMENTS

No.	TYPE OF MEASUREMENT	All Dimensions in millimeters	
		Pre-Test	Post-Test
X1	Total Length of Vehicle at Centerline	4895	4555
X2	Rear Surface of Vehicle to Engine at Centerline	4905	4215
X3	Rear Surface of Vehicle to Firewall	3675	3610
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	3374	3370
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	3374	3341
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	3304	3290
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	3302	3275
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	2286	2289
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	2292	2278
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	2270	2258
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	2265	2240
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	3277	3269
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	3290	3266
X14	Rear Surface of Vehicle to Firewall - Right Side	3645	3635
X15	Rear Surface of Vehicle to Firewall - Left Side	3640	3490
X16	Rear Surface of Vehicle to Steering Wheel Center	2870	2830
X17	Steering Column to "A" Post	425	N/A

Table 3

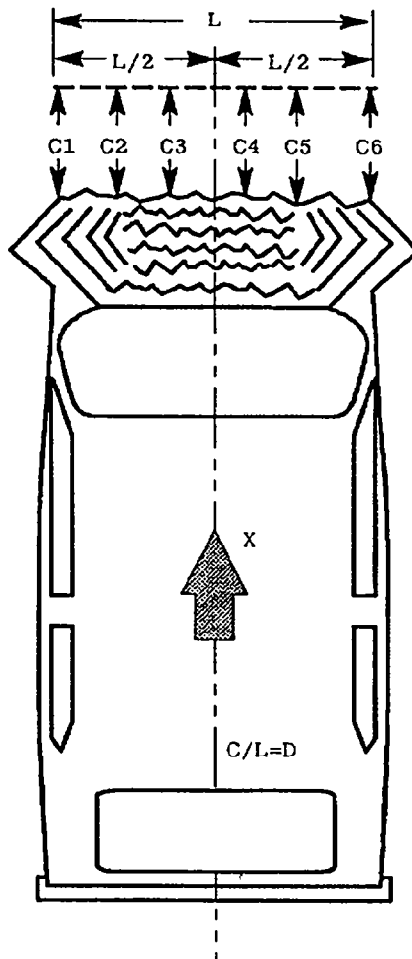
VEHICLE 1 MEASUREMENTS (continued)

No.	TYPE OF MEASUREMENT	All Dimensions in millimeters	
		Pre-Test	Post-Test
X19	Rear Surface of Vehicle to Right Side of Front Bumper	4745	4710
X20	Rear Surface of Vehicle to Left Side of Front Bumper	4765	4274
X21	Width of Engine Block	430	430
Z22	Right Front Sill to Ground Plane	233	209
X23	Left Front Sill to Ground Plane	233	83
Z24	Right Rear Sill to Ground Plane	238	273
Z25	Left Rear Sill to Ground Plane	225	143
X26	Firewall to Engine or Transaxle	195	126
Z27	Vertical Dim. from Door Sill to Centerline of Steering Column	518	561
X28	Wheelbase of Vehicle	2675	R = 2684 L = 2570
Y29	Width of Vehicle at Maximum Width Point	1800	1850
X30	Rear Surface of Vehicle to Engine Target	4034	3957
X31	Rear Surface of Vehicle to Compartment Target	3304	R = 3304 L = 3298
X32	Rear Surface of Vehicle to Bumper Target	4806	4541
X33	Rear Surface of Vehicle to Frame Crossmember	4250	4194

Table 3

VEHICLE 1 MEASUREMENT (continued)

(all dimensions in millimeters)



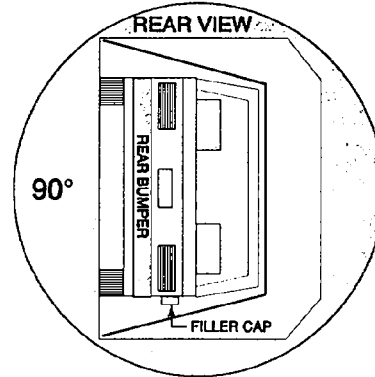
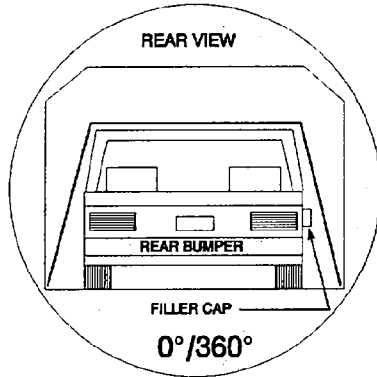
Location	Pre-Test	Post-Test	Change
C1	2705	4210	-1,505
C2	2845	4415	-1,570
C3	2880	4474	-1,594
C4	2880	4700	-1,820
C5	2837	4815	-1,978
C6	2690	4659	-1,969

$L = 1495$

Table 5
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:
0-90 Deg.

Vehicle NHTSA ID No.:



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time	1	minutes	40	seconds
(Spec. Range = 1 to 3 minutes)				
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	40	seconds
Next whole minute interval	7	minutes		

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 minutes 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):

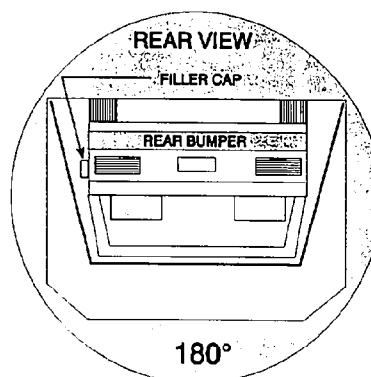
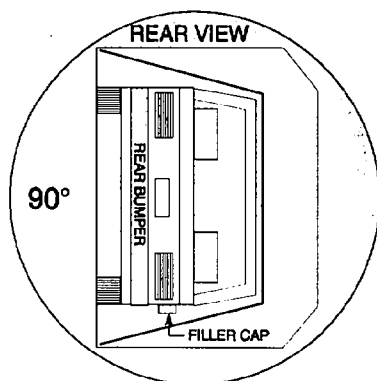
None

Table 5
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:

90-180 Deg.

Vehicle NHTSA ID No.:



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	58	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	58	seconds
Next whole minute interval	7	minutes		

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 minutes 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.

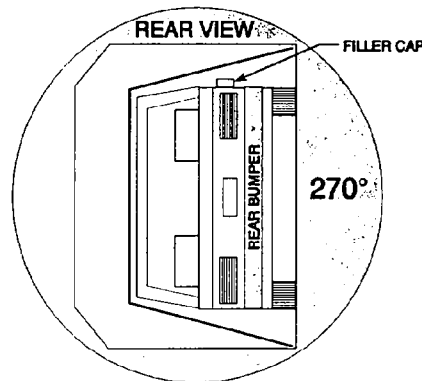
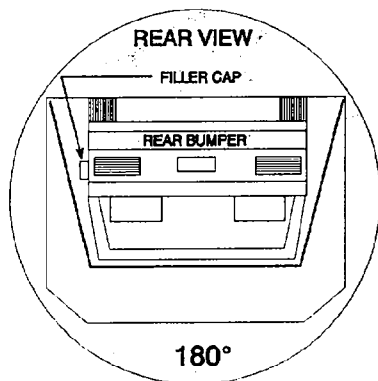
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 5
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:
180-270 Deg.

Vehicle NHTSA ID No.:



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time	1	minutes	49	seconds
(Spec. Range = 1 to 3 minutes)				
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	49	seconds
Next whole minute interval	7	minutes		

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 minutes 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.

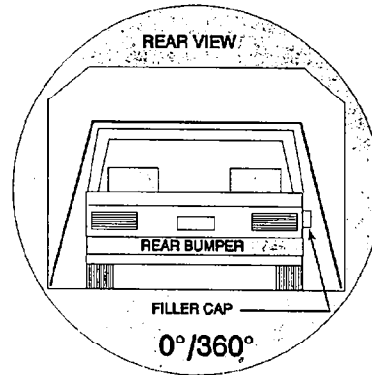
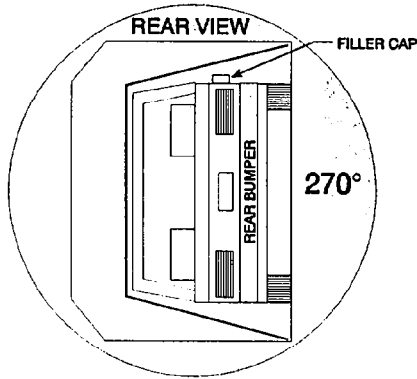
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 5
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:
270-360 Deg.

Vehicle NHTSA ID No.:



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time	2	minutes	10	seconds
(Spec. Range = 1 to 3 minutes)				
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
	7	minutes	10	seconds
TOTAL	8	minutes		
Next whole minute interval				

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 minutes 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

VEHICLE TWO DATA

Table 6

CRASH TEST SUMMARY FOR MOVING BARRIER

POSITION OF IMPACT (MDB) MONORAIL:

~~30° to right~~ 20.5° Counter-Clockwise (see Fig. 8)

MDB DETAILS:

Overall Width of Framework Carriage	=	<u>1251</u>	millimeters
Overall Length of MDB (incl. honeycomb impact face)	=	<u>4102</u>	millimeters
Wheelbase of Framework Carriage	=	<u>2598</u>	millimeters
Tread of Framework Carriage (Front & Rear)	=	<u>1880</u>	millimeters
C.G. Location Rearward of Front Axle	=	<u>1235</u>	millimeters

MDB WEIGHT:

Right Front	=	<u>266</u>	kgs.	Right Rear	=	<u>414</u>	kgs.
Left Front	=	<u>453</u>	kgs.	Left Rear	=	<u>237</u>	kgs.
TOTAL FRONT WEIGHT	=	<u>719</u>	kgs.	(52.5 % of Total Vehicle Weight)			
TOTAL REAR WEIGHT	=	<u>651</u>	kgs.	(47.5 % of Total Vehicle Weight)			
TOTAL TEST WEIGHT	=	<u>1370</u>	kgs.				

MAXIMUM STATIC CRUSH OR HONEYCOMB IMPACT FACE:

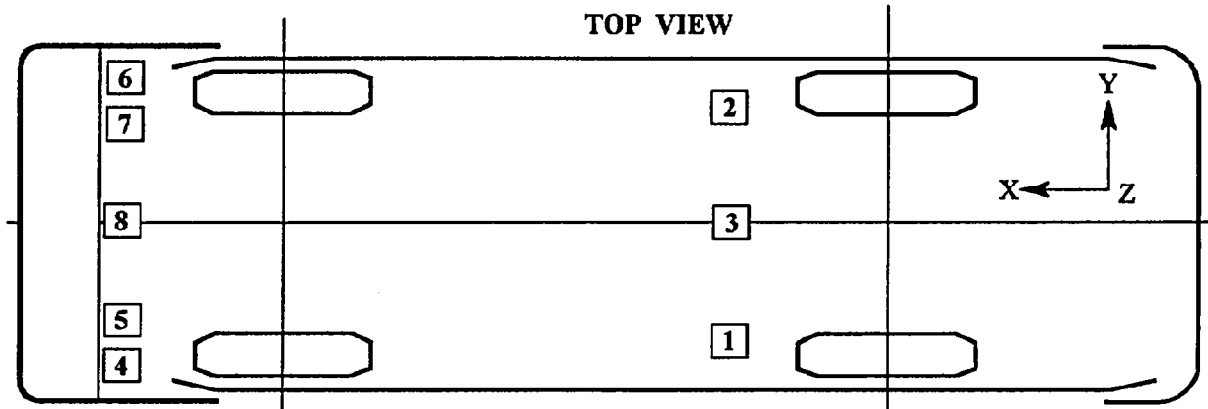
1. Row A at Bumper Level	=	<u>203</u>	millimeters
2. Row B at Mid-Stack Level	=	<u>382</u>	millimeters
3. Row C at Top of Stack Level	=	<u>403</u>	millimeters

INSTRUMENTATION:

Number of MDB Data Channels	=	<u>12</u>
-----------------------------	---	-----------

Figure 7

SUMMARY OF VEHICLE 2 ACCELEROMETER DATA



Vehicle: Moving Deformable Barrier

ACCELEROMETER NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	V2 Left Rail X	Gs	9.5	-11.5	-116.8	48.7	60.0
1	V2 Left Rail Y	Gs	14.4	54.1	-20.0	58.2	60.0
2	V2 Right Rail X	Gs	2.1	151.9	-39.7	43.6	60.0
2	V2 Right Rail Y	Gs	4.5	184.6	-22.0	48.4	60.0
3	V2 C.G. X	Gs	3.8	183.4	-51.3	41.9	60.0
3	V2 C.G. Y	Gs	4.6	110.9	-17.5	44.6	60.0
3	V2 C.G. Z	Gs	21.1	93.6	-29.9	42.2	60.0
3	V2 C.G. RES	Gs	60.3	42.2	.4	105.7	60.0
4	V2 TL Load Cell	Nwt	91766.1	34.8	-30196.0	69.4	60.0
5	V2 BL Load Cell	Nwt	8979.6	103.2	*****	44.5	60.0
6	V2 TR Load Cell	Nwt	36112.5	22.3	-7345.1	68.0	60.0
7	V2 BR Load Cell	Nwt	5136.4	143.5	*****	42.7	60.0
* 8	V2 CL Load Cell	Nwt	216819.2	64.6	*****	45.6	60.0

* Wire cut at 50 msec

Table 7

MOVING DEFORMABLE HONEYCOMB BARRIER
(Grid as looking at MDB from front)

Test Date:

September 23, 1994

Vehicle:

Moving Deformable Barrier

		Distance Right of Center										Distance Left of Center									
Location		813	711	610	508	406	305	203	102	0.0	102	203	305	406	508	610	711	813			
Top of Stack Level	Pre	382	382	382	382	382	382	382	382	382	382	382	382	382	382	382	382	382			
	Post	140	142	146	145	117	105	N/A	N/A	255	285	285	300	342	345	350	347	340			
	Crush	175	140	125	105	100	110	175	170	203	190	195	175	75	104	115	145	150			
Mid-Stack Level	Pre	379	379	379	379	379	379	379	379	380	380	380	380	380	380	380	380	380			
	Post	222	N/A	N/A	N/A	N/A	N/A	N/A	92	70	55	70	92	N/A	N/A	235	240	225			
	Crush	122	102	382	382	382	382	382	382	277	302	262	382	382	382	382	382	382			
Bumper Level	Pre	468	480	480	480	482	482	482	482	482	482	482	482	482	482	482	482	468			
	Post	138	132	158	177	172	140	67	70	62	77	140	190	225	225	270	267	255			
	Crush	277	310	320	335	297	333	330	335	353	370	403	413	377	380	375	375	397			

Figure 8

CAMERA POSITIONS FOR VEHICLE TO VEHICLE ANGLED FRONTAL IMPACT

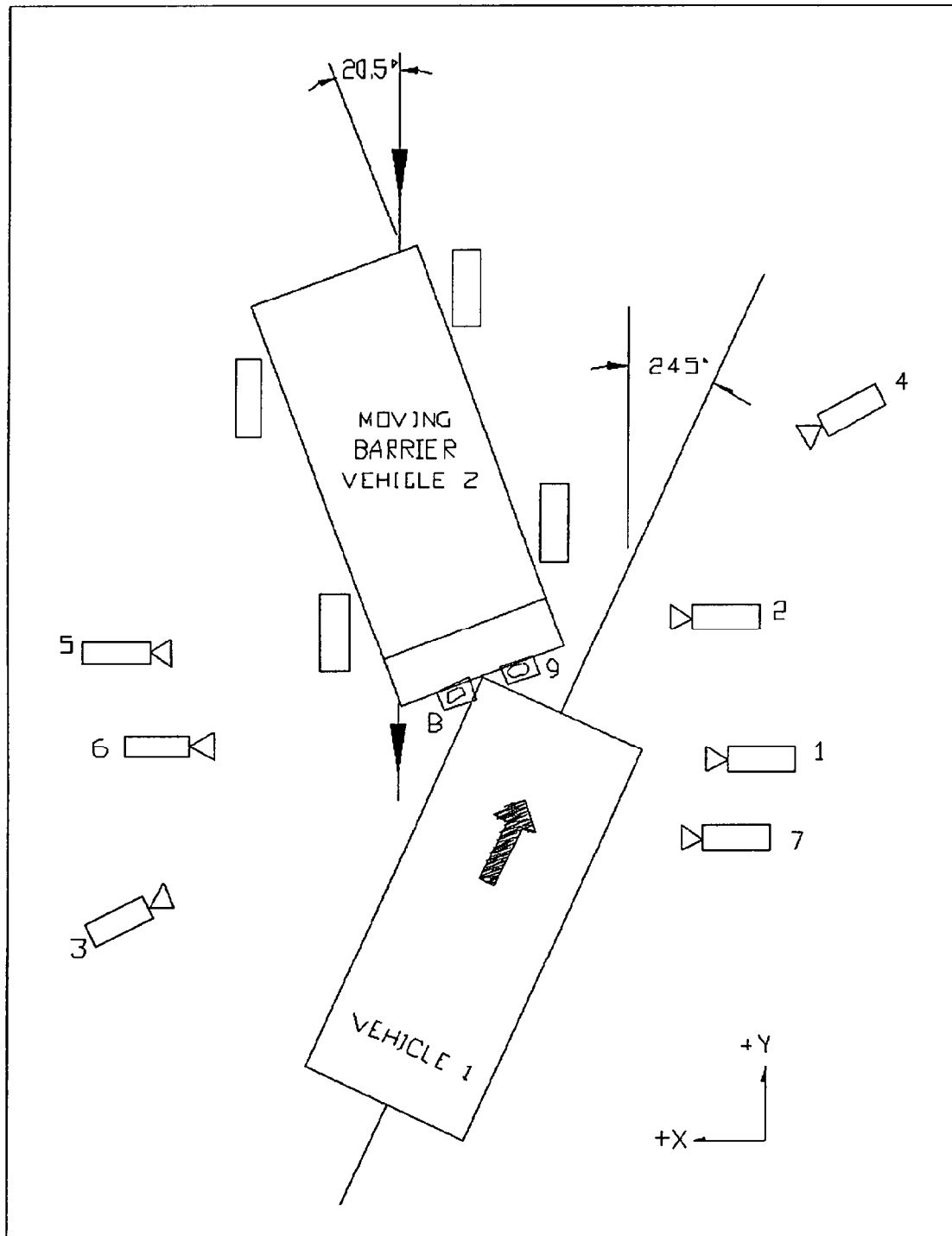


Table 8

HIGH-SPEED CAMERA LOCATIONS

Test No.	CAMERA NO.	VIEW	CAMERA POSITIONS (mm)*			ANGLE** (deg)	LENS (mm)	SPEED (fps)
			X	Y	Z			
	1	Real-Time Camera	-	-	-	-	-	24
	2	South Overall Camera	-8128.0	4495.8	1041.4	-3	13	530
	3	South Impact Point	-8204.2	4114.8	1041.4	-3	25	550
	4	Vehicle 1 Driver Side View	-9652.0	-5689.6	1143.0	0	50	550
	5	Vehicle 1 Driver and Interior View	-8051.8	736.6	1244.6	3	35	110
	6	Vehicle 1 Passenger Side View	8128.0	2108.2	1905.0	-8	25	550
	7	Vehicle 1 Passenger and Interior View	-9067.8	-6070.6	1041.4	-2	25	600
	8	Overhead Overall View	0	150.0	9804.0	-90	13	840
	9	Overhead Impact Point	0	352.0	9804.0	-90	25	600

*X = film plane to monorail centerline

Y = film plane to impact location

Z = film plane to ground

** = referenced to horizontal plane

APPENDIX A
PHOTOGRAPHS

APPENDIX A

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OVERALL TEST SETUP



FIGURE A-1 PRE-TEST OVERHEAD VIEW

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8118-11

POST-TEST OVERHEAD VIEW
(PHOTO UNAVAILABLE)

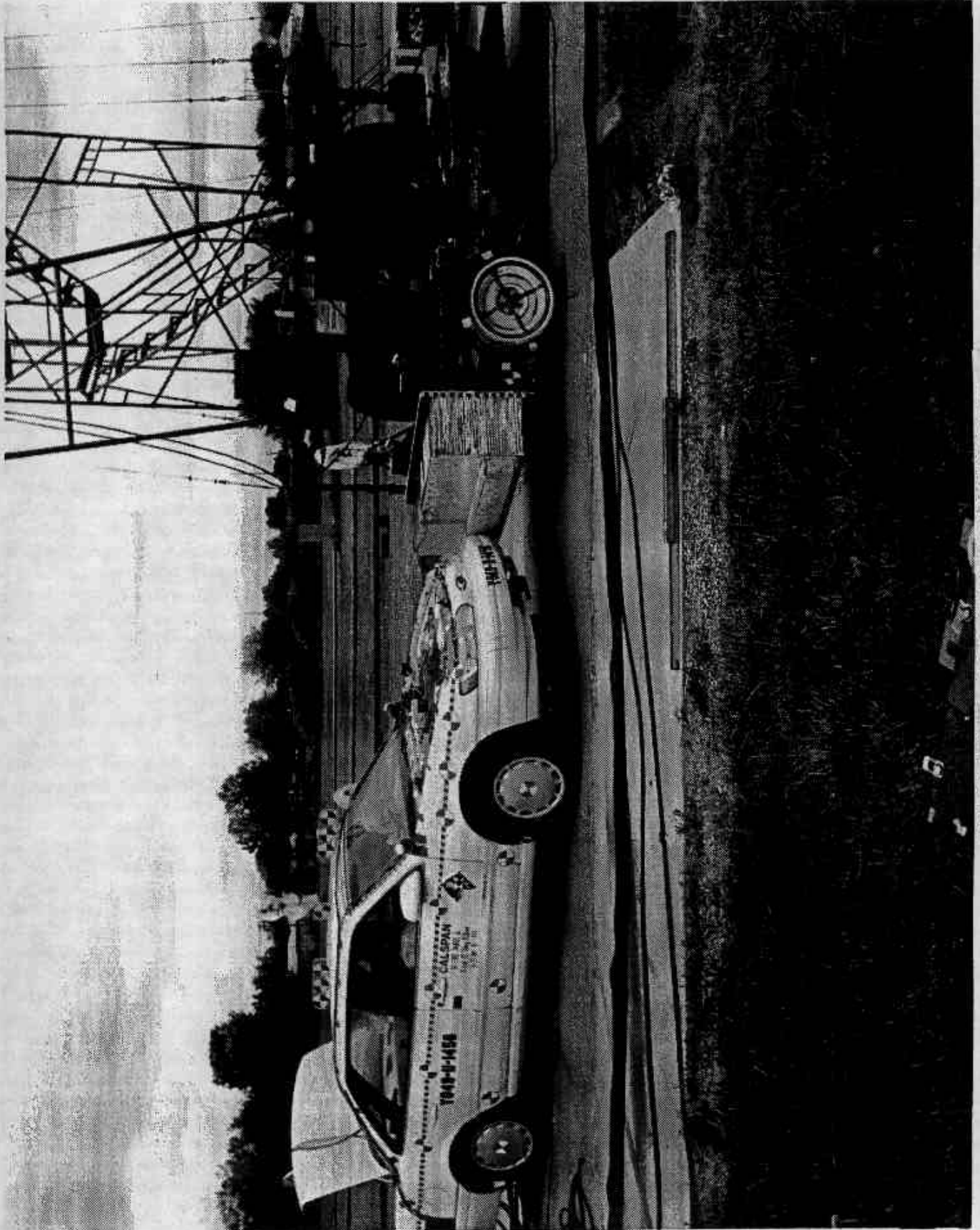


FIGURE A-3 PRE-TEST OVERALL SIDE VIEW



FIGURE A-4 POST-TEST OVERALL SIDE VIEW

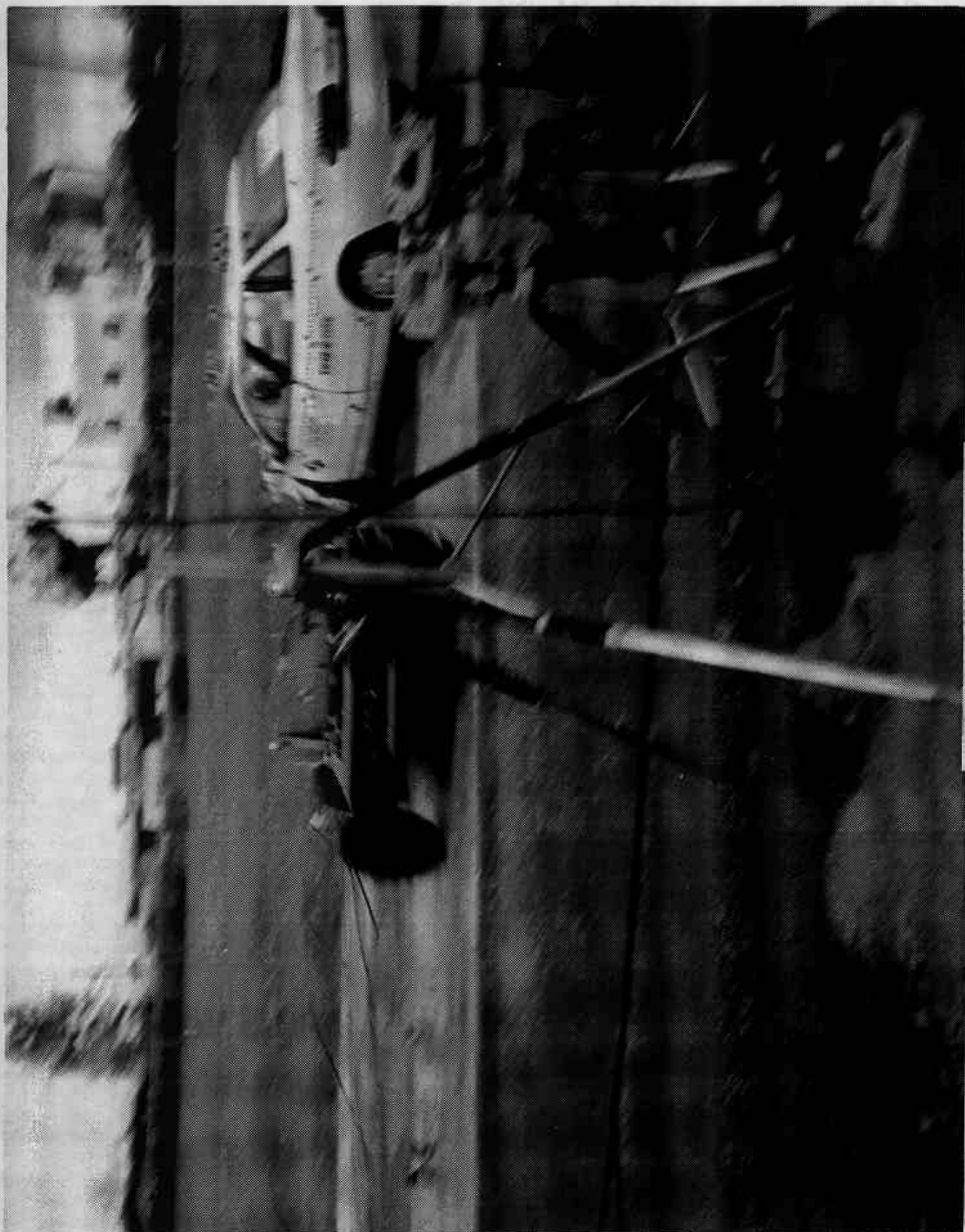


FIGURE A-5 IMPACT PHOTO

VEHICLE 1 PHOTOGRAPHS

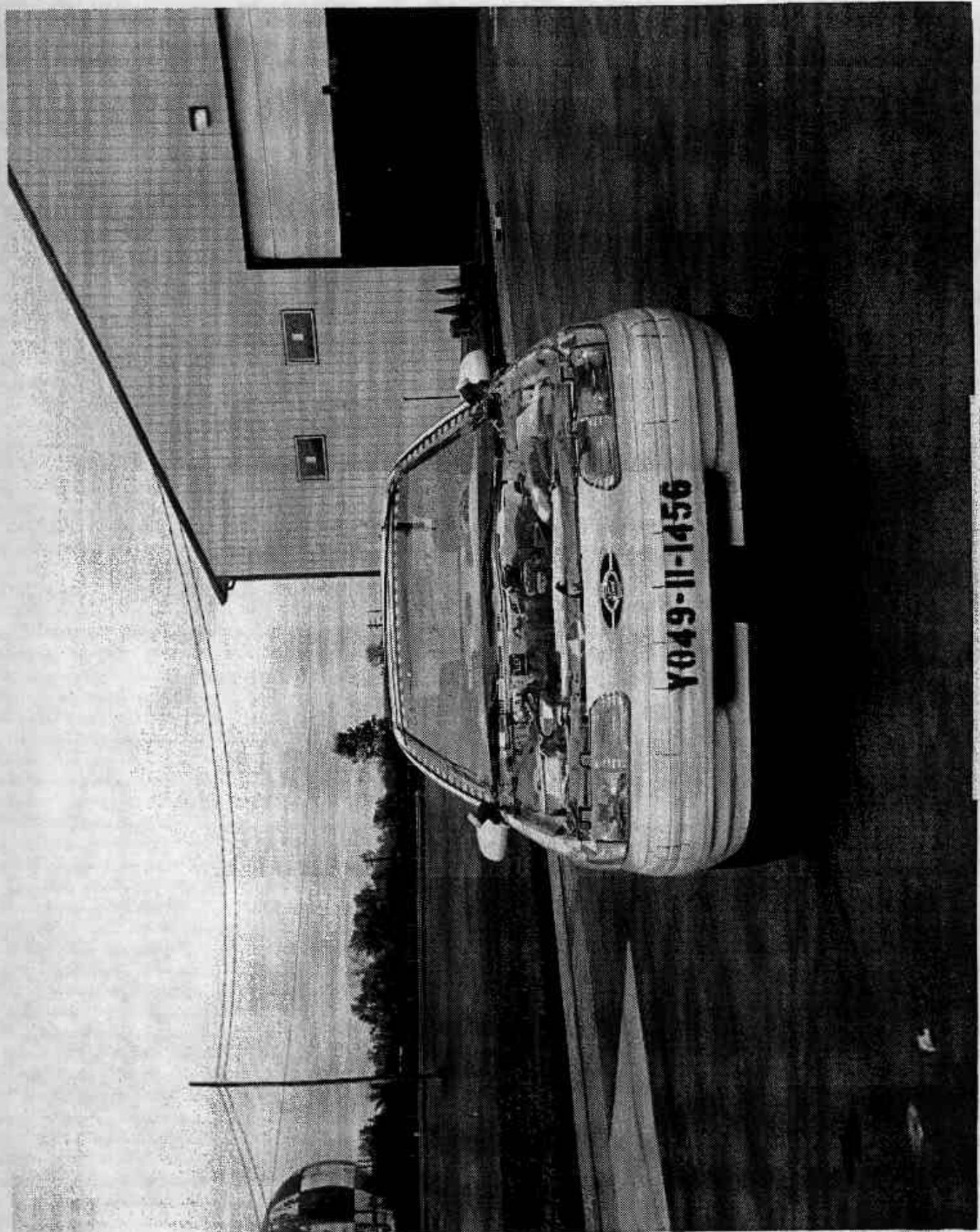


FIGURE A-6 PRE-TEST FRONT VIEW

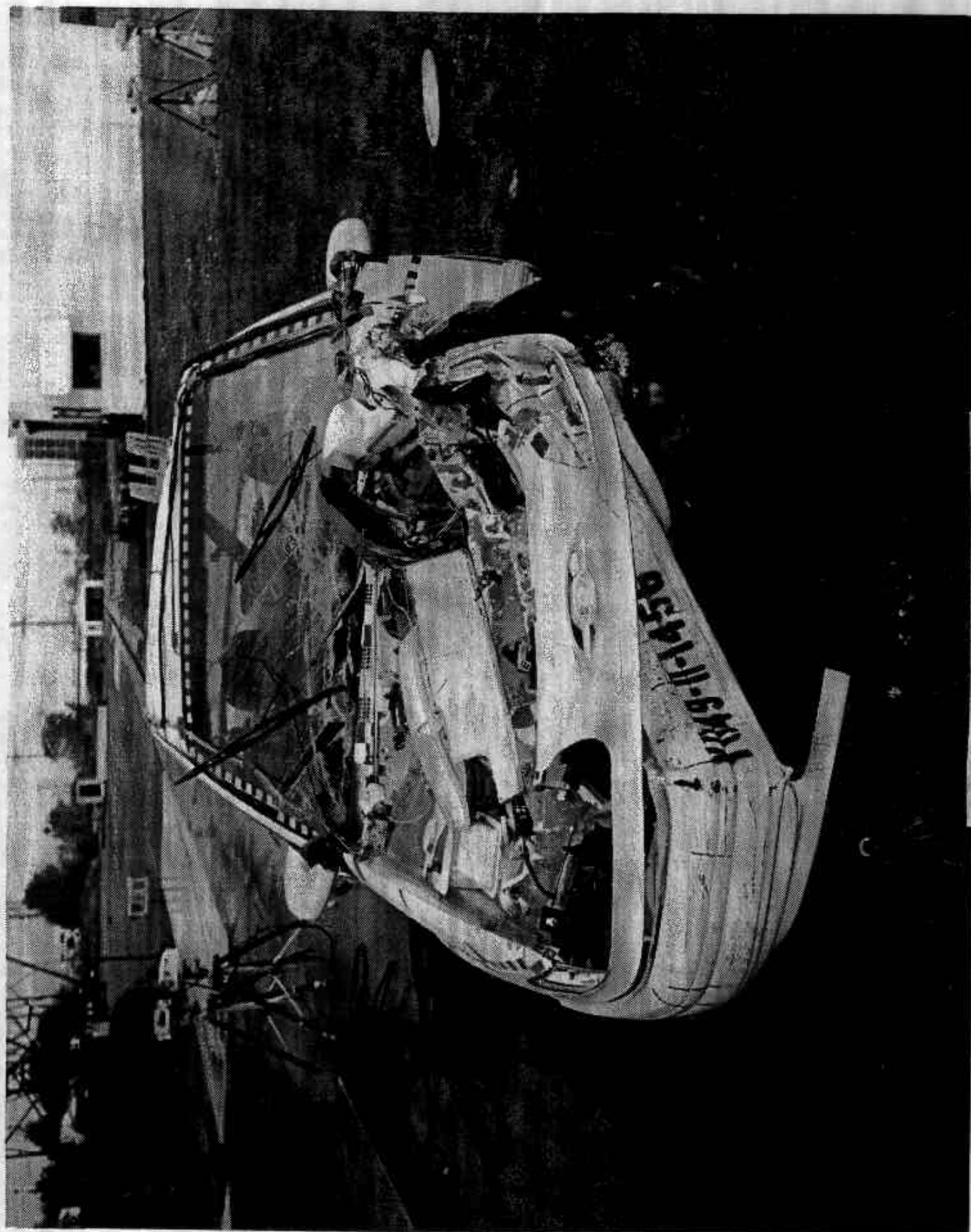


FIGURE A-7 POST-TEST FRONT VIEW



FIGURE A-8 PRE-TEST FRONT RIGHT THREE QUARTER VIEW

A-11

8118-11

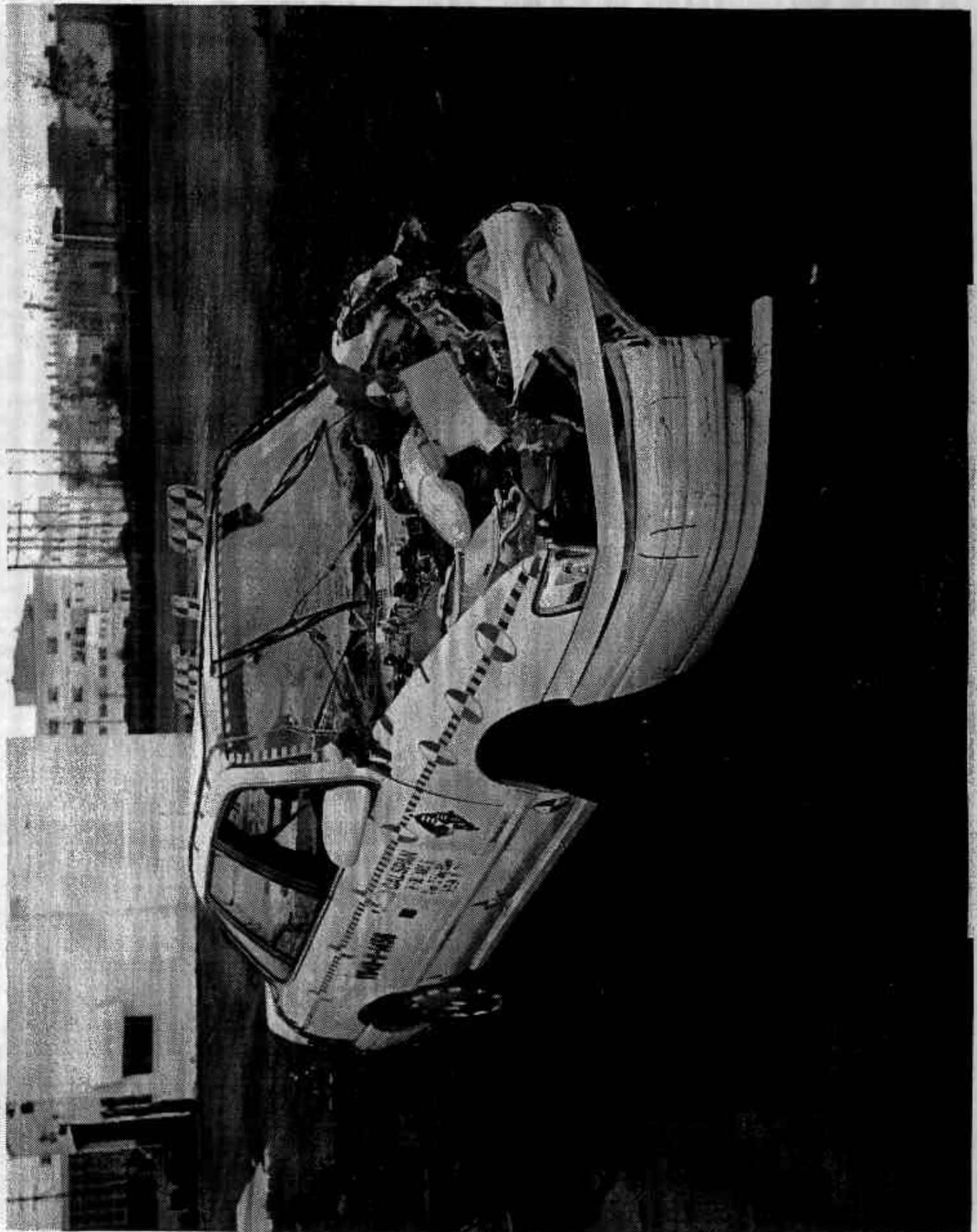


FIGURE A-9 POST-TEST FRONT RIGHT THREE QUARTER VIEW

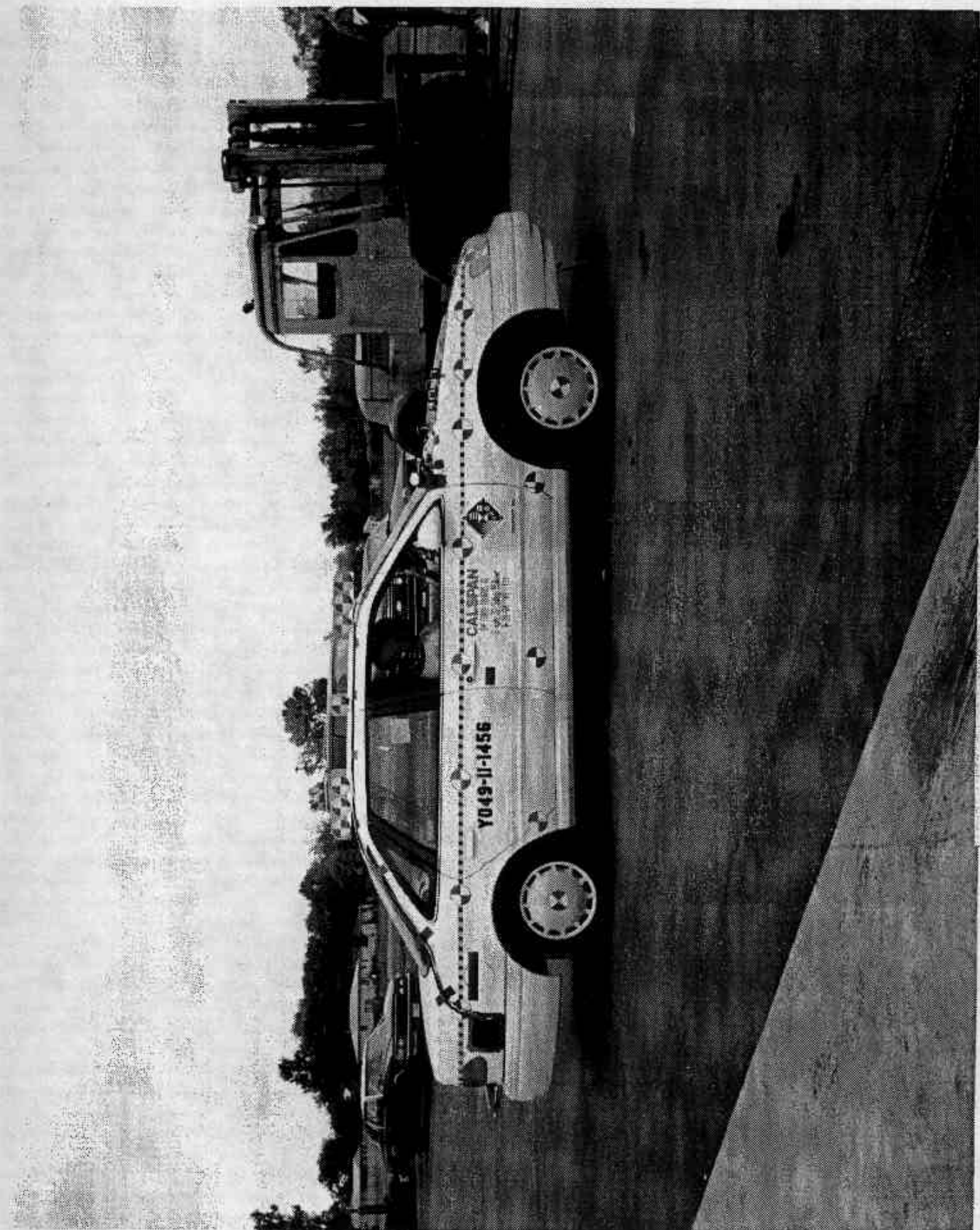


FIGURE A-10 PRE-TEST RIGHT SIDE VIEW



FIGURE A-11 POST-TEST RIGHT SIDE VIEW



FIGURE A-12 PRE-TEST REAR RIGHT THREE QUARTER VIEW



FIGURE A-13 POST-TEST REAR RIGHT THREE QUARTER VIEW



FIGURE A-14 PRE-TEST REAR VIEW



FIGURE A-15 POST-TEST REAR VIEW



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



FIGURE A-17 POST-TEST REAR LEFT THREE QUARTER VIEW

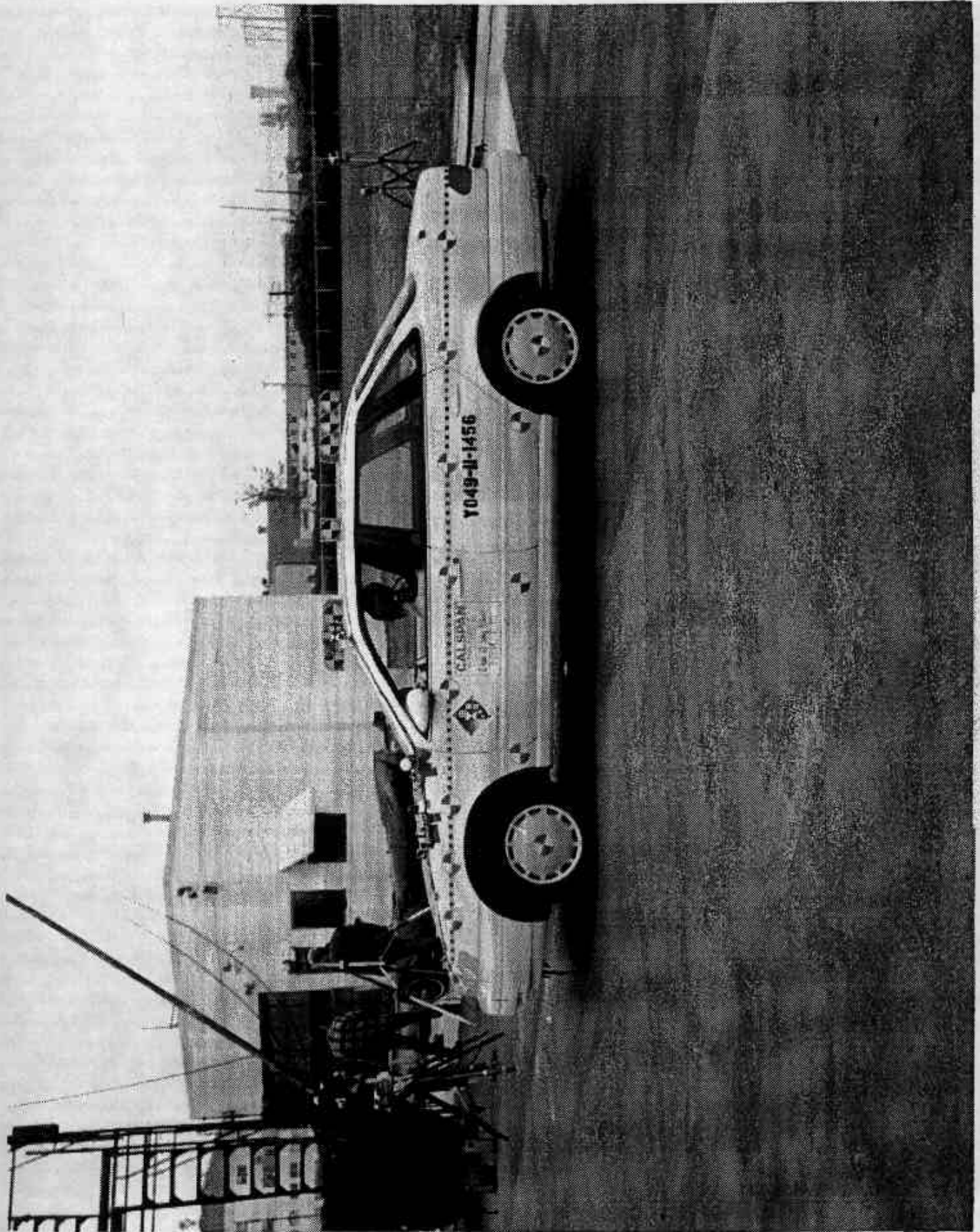


FIGURE A-18 PRE-TEST LEFT SIDE VIEW



FIGURE A-19 POST-TEST LEFT SIDE VIEW

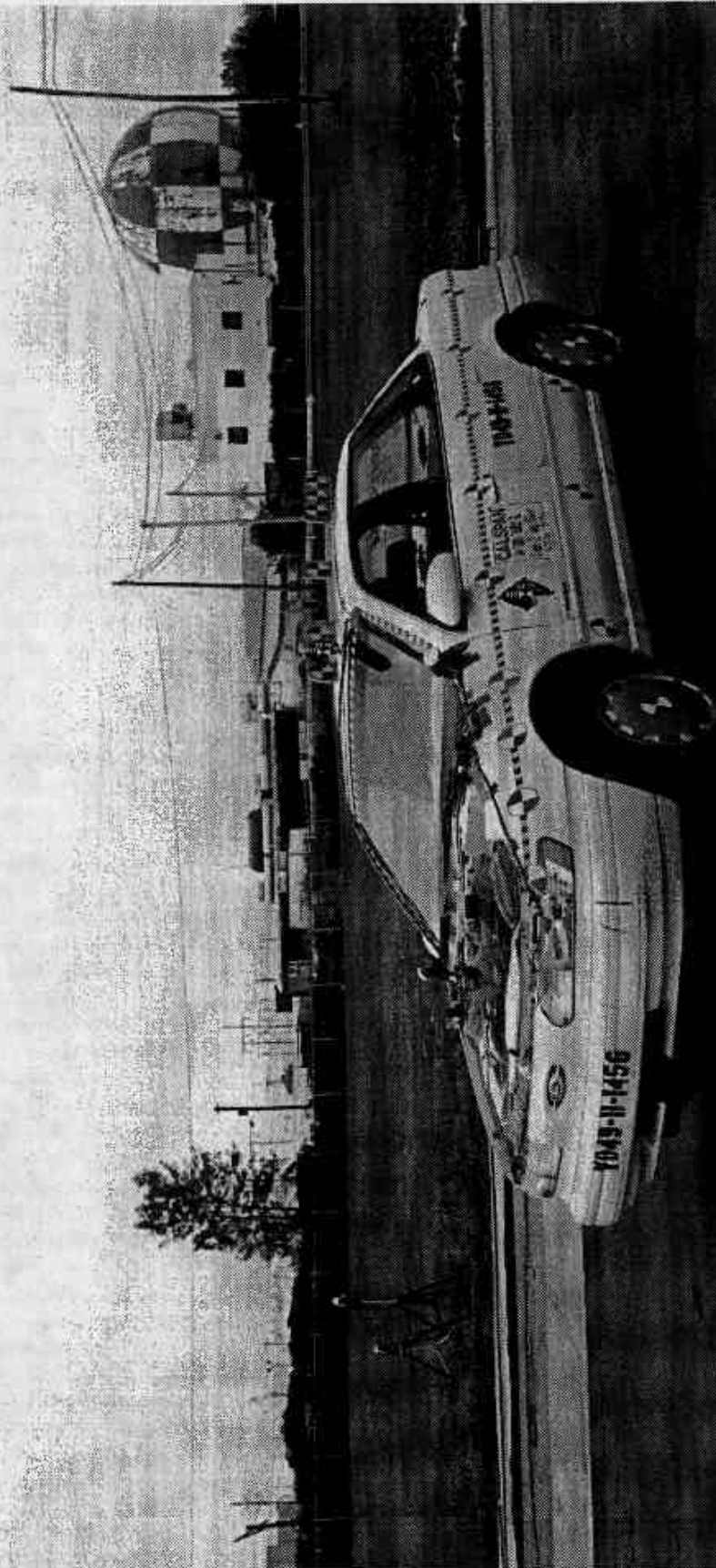


FIGURE A-20 PRE-TEST FRONT LEFT THREE QUARTER VIEW

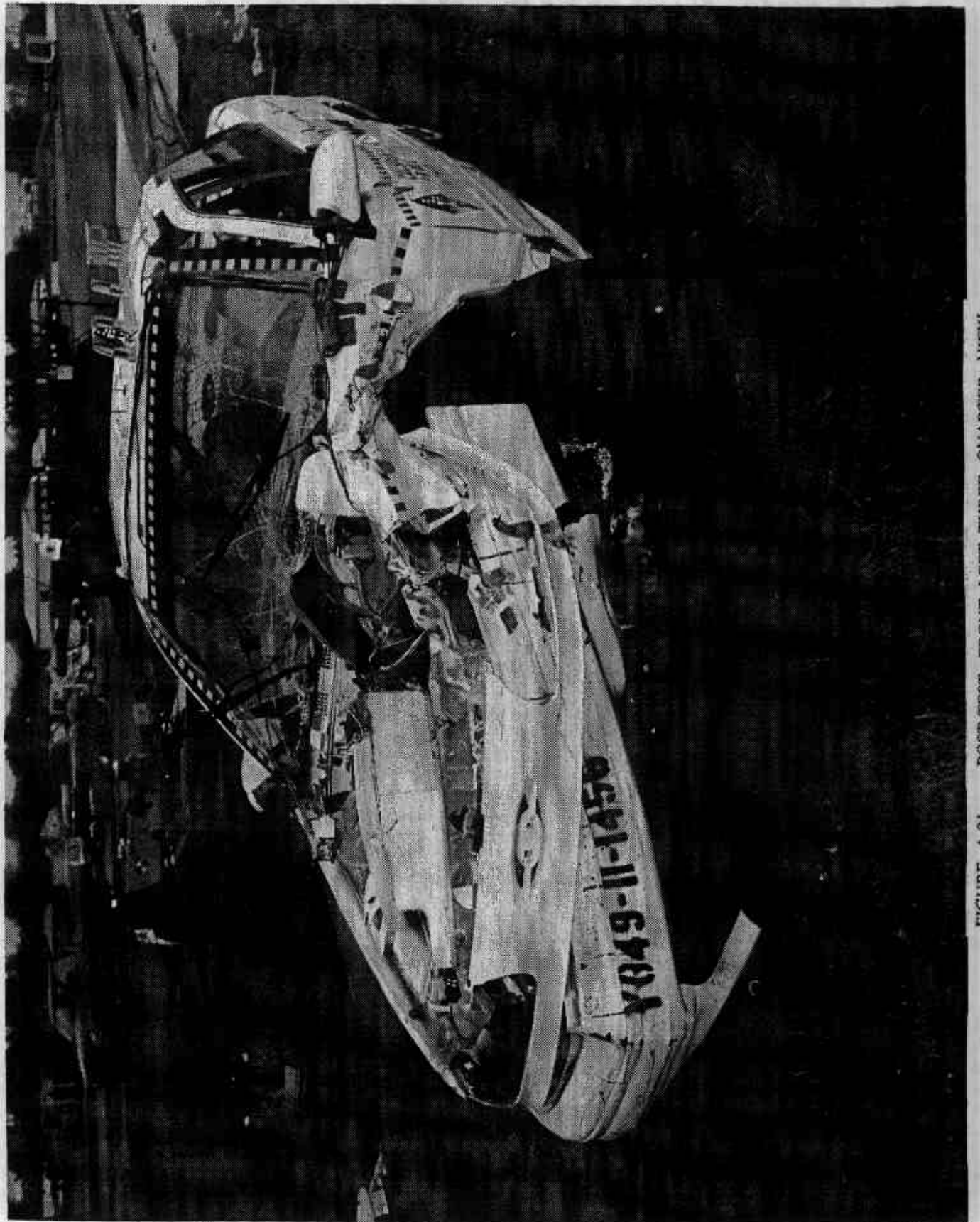


FIGURE A-21 POST-TEST FRONT-LEFT THREE-QUARTER VIEW

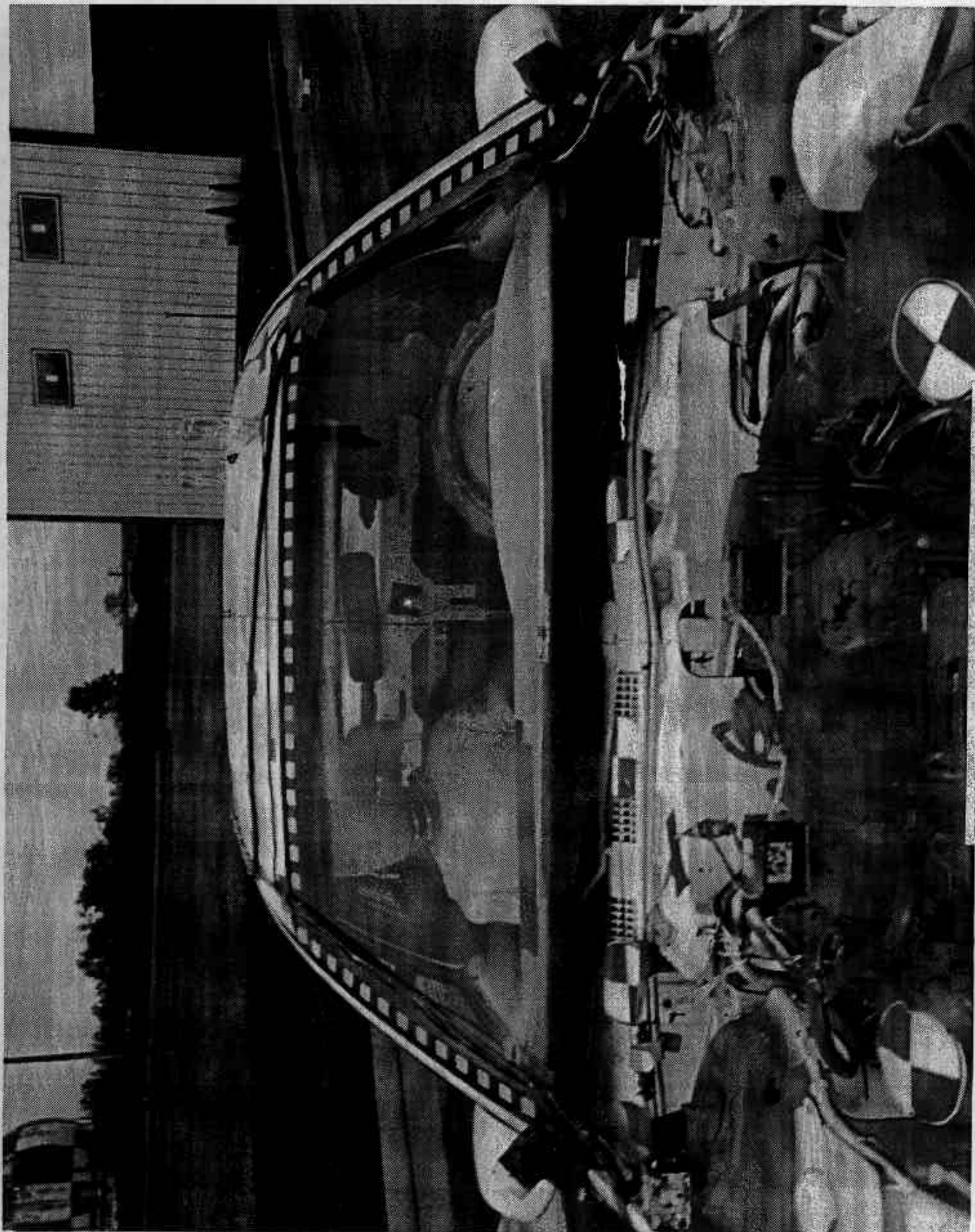


FIGURE A-22 PRE-TEST WINDSHIELD VIEW

A-25

8118-11

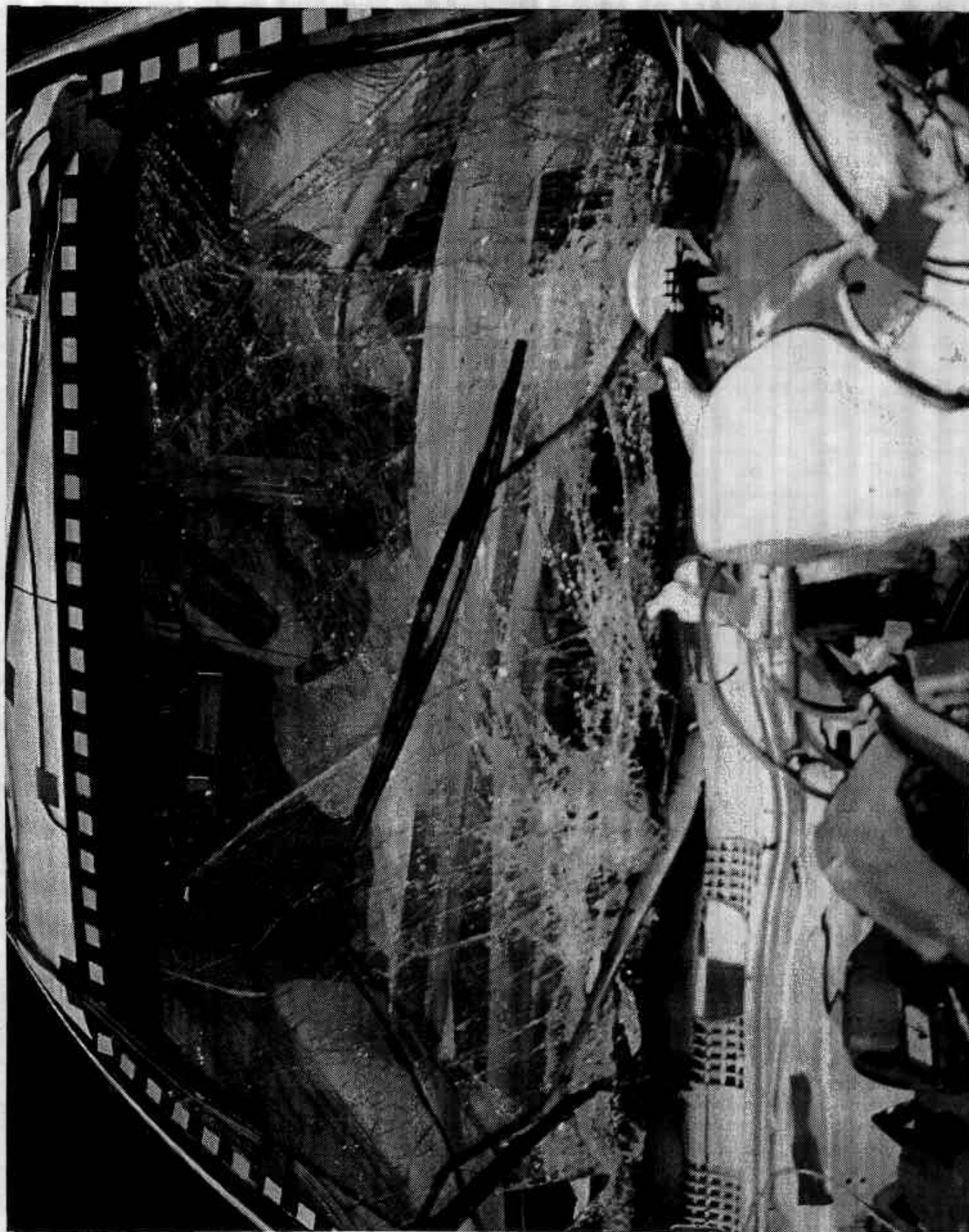


FIGURE A-23 POST-TEST WINDSHIELD VIEW

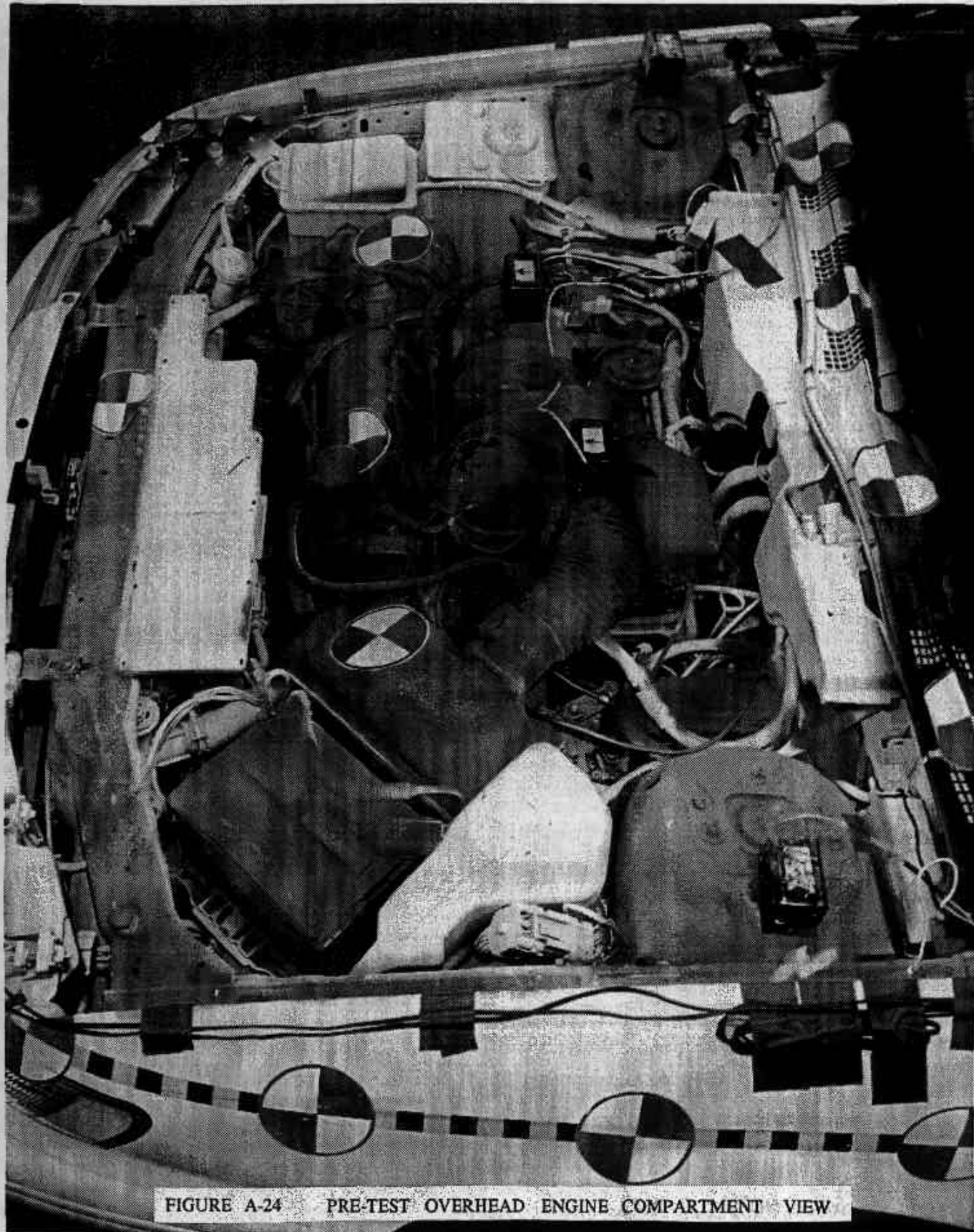


FIGURE A-24 PRE-TEST OVERHEAD ENGINE COMPARTMENT VIEW



FIGURE A-25 POST-TEST OVERHEAD ENGINE COMPARTMENT VIEW

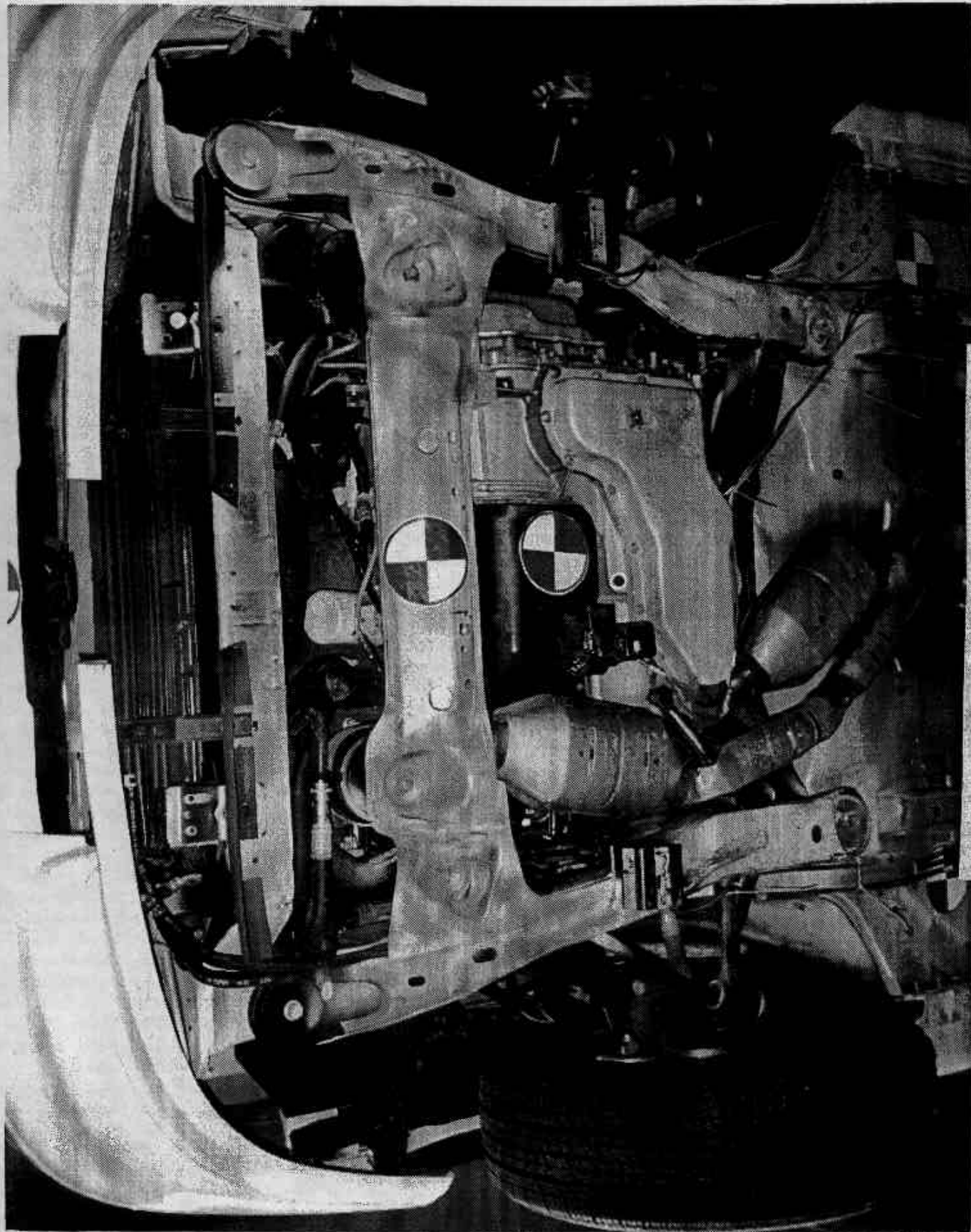


FIGURE A-26 PRE-TEST UNDERBODY FRONT VIEW



FIGURE A-27 POST-TEST UNDERBODY FRONT VIEW

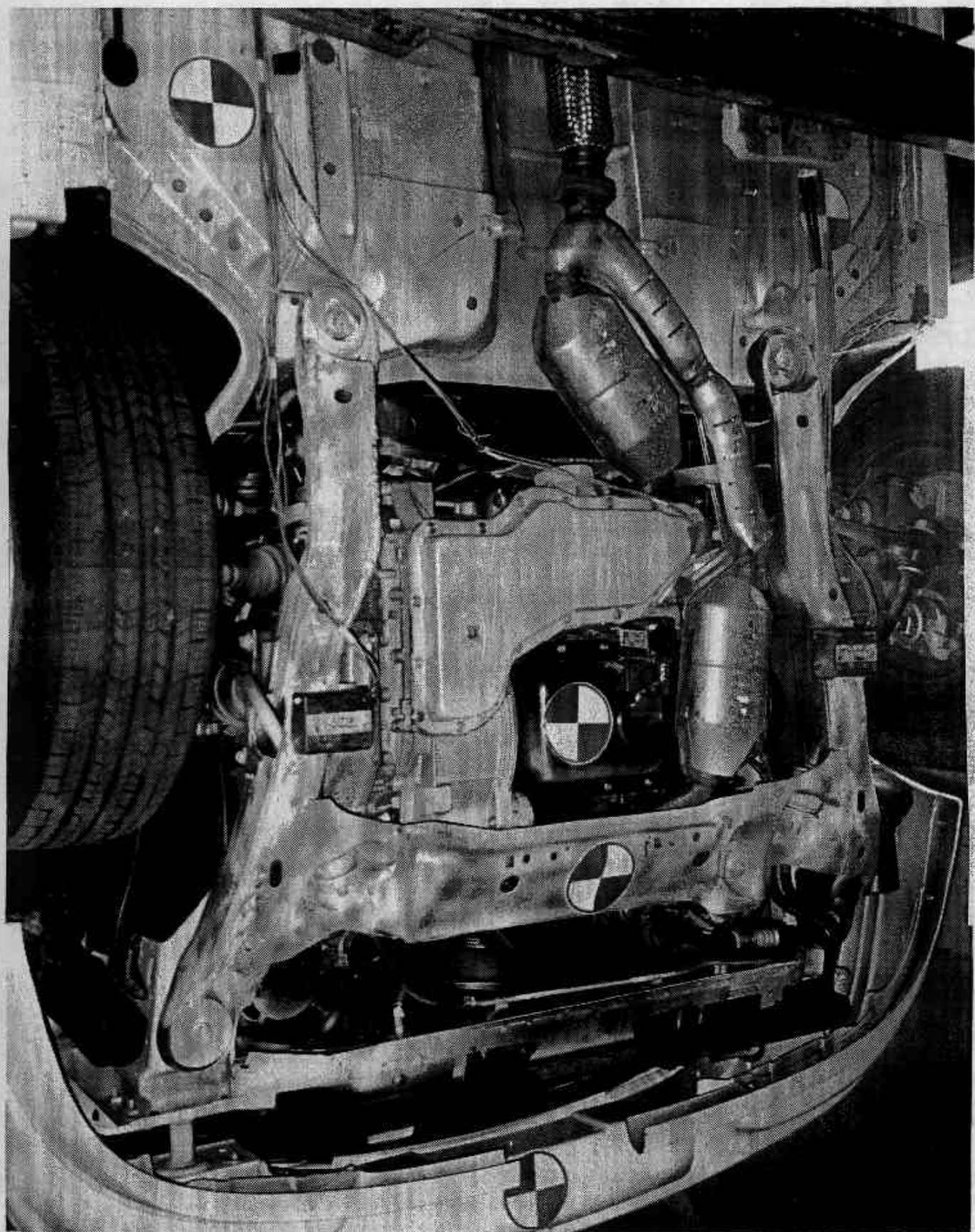


FIGURE A-28 PRE-TEST UNDERBODY FRONT SIDE VIEW

A-31

8118-11

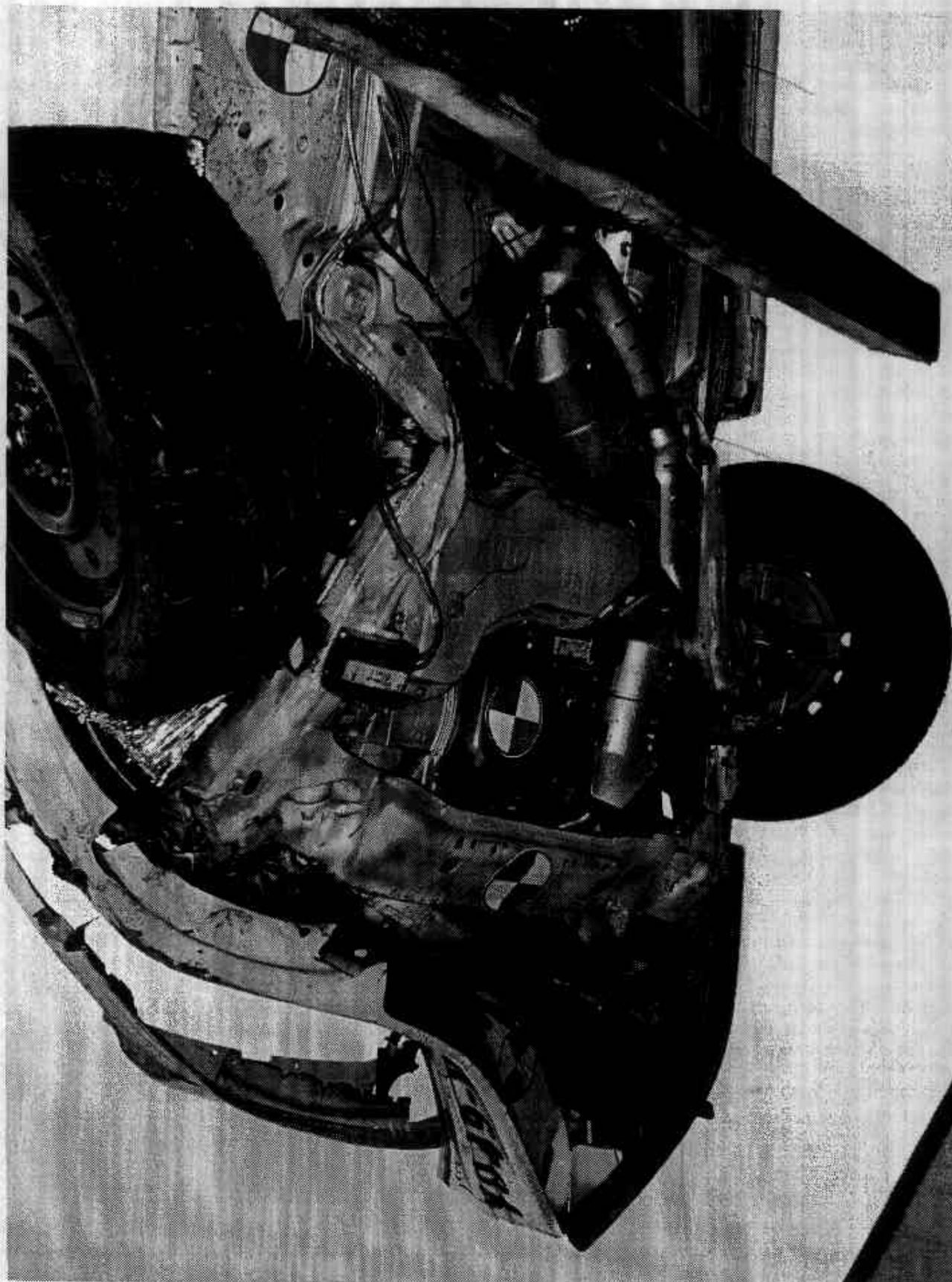


FIGURE A-29 POST-TEST UNDERBODY FRONT SIDE VIEW

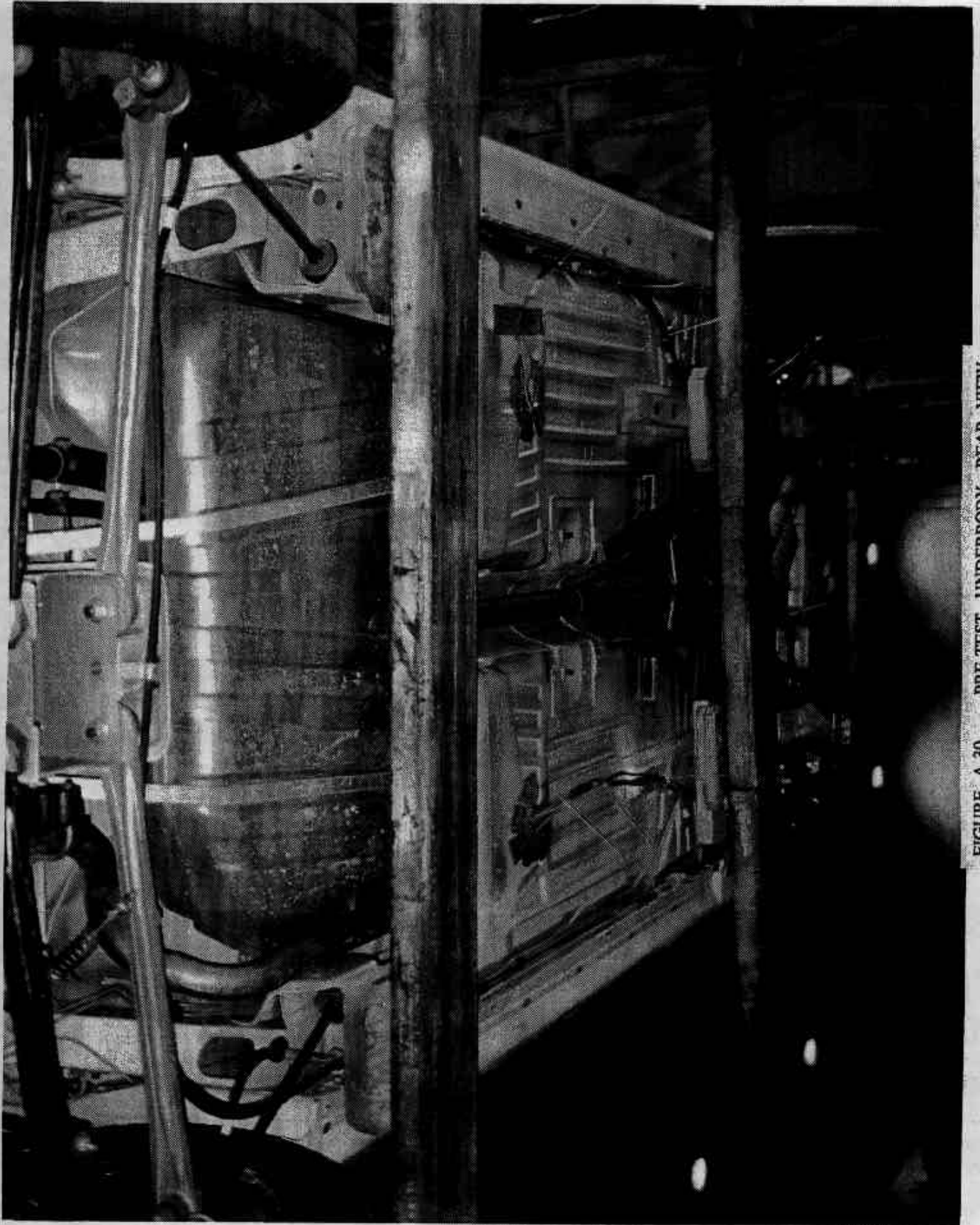


FIGURE A-30 PRE-TEST UNDERBODY REAR VIEW



FIGURE A-31 POST-TEST UNDERBODY REAR VIEW



FIGURE A-32 PRE-TEST DRIVER POSITION VIEW

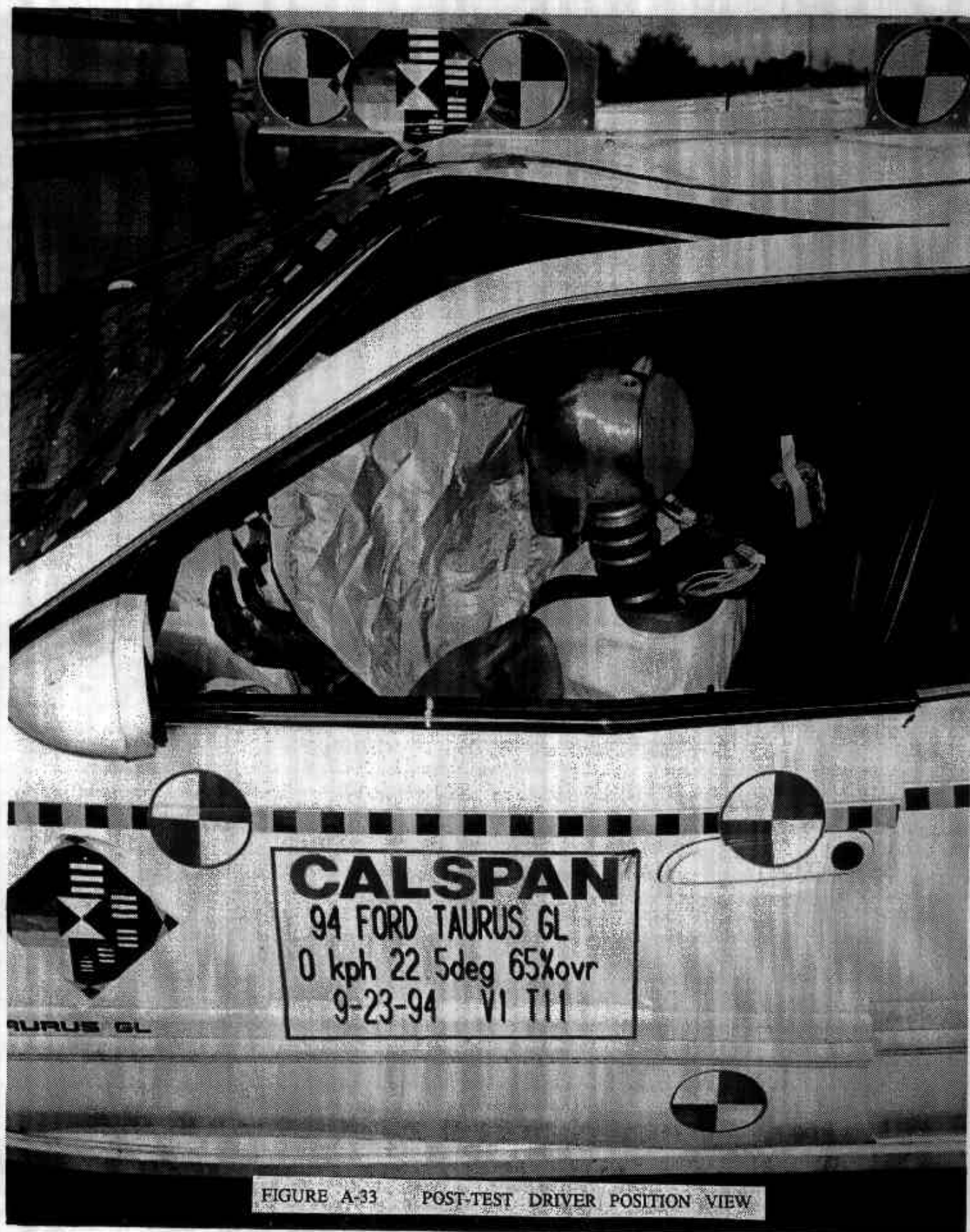


FIGURE A-33 POST-TEST DRIVER POSITION VIEW

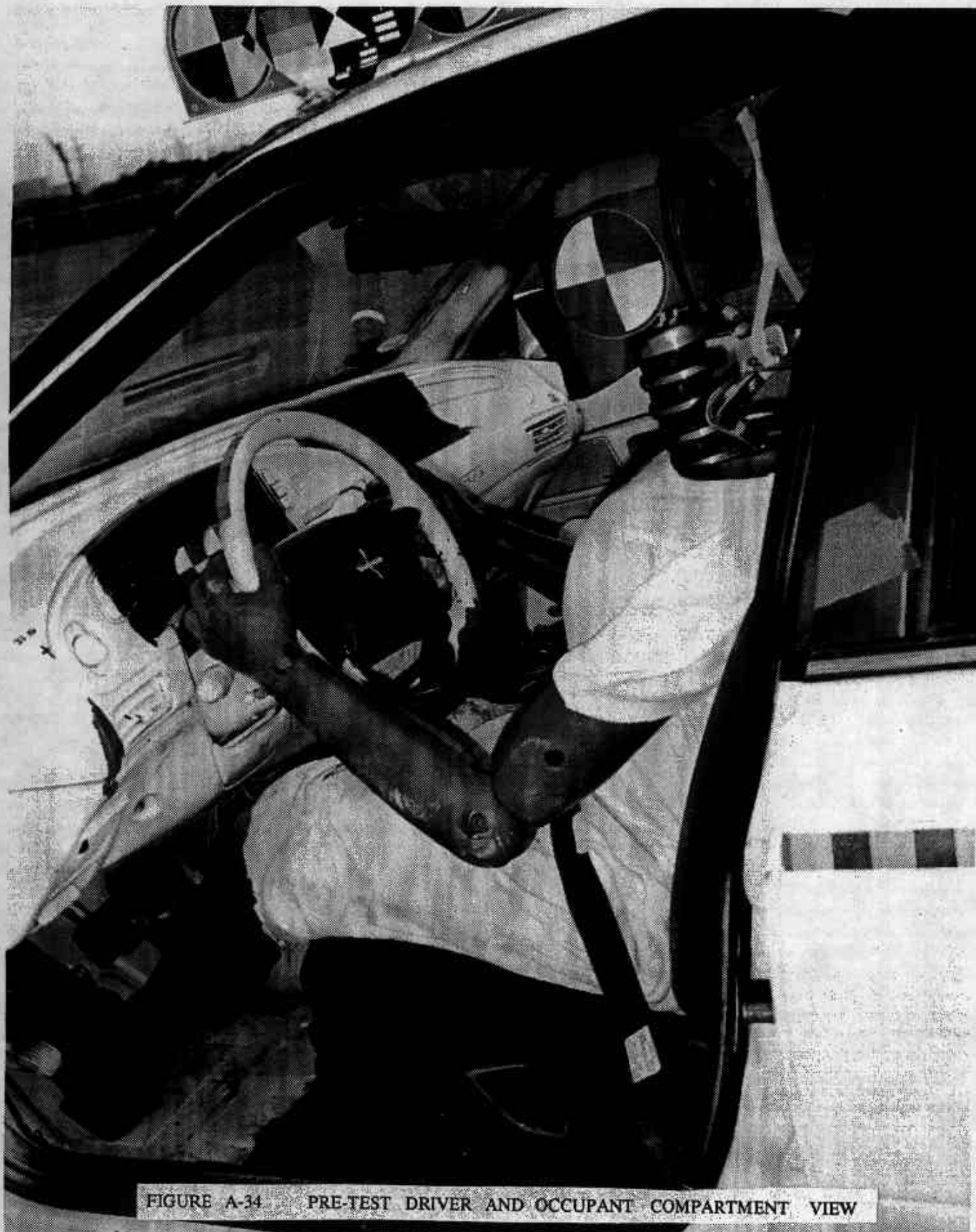


FIGURE A-34 PRE-TEST DRIVER AND OCCUPANT COMPARTMENT VIEW

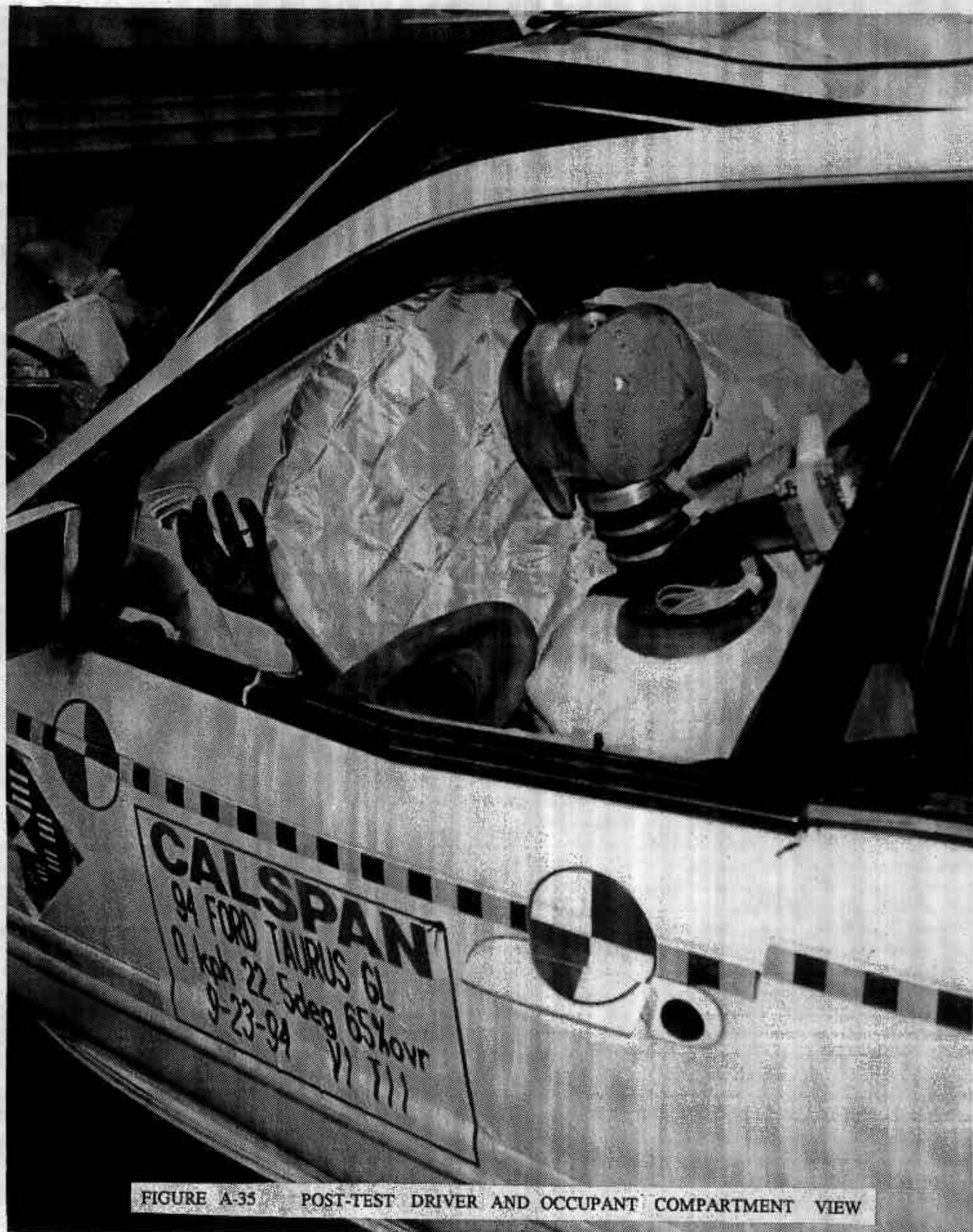


FIGURE A-35 POST-TEST DRIVER AND OCCUPANT COMPARTMENT VIEW

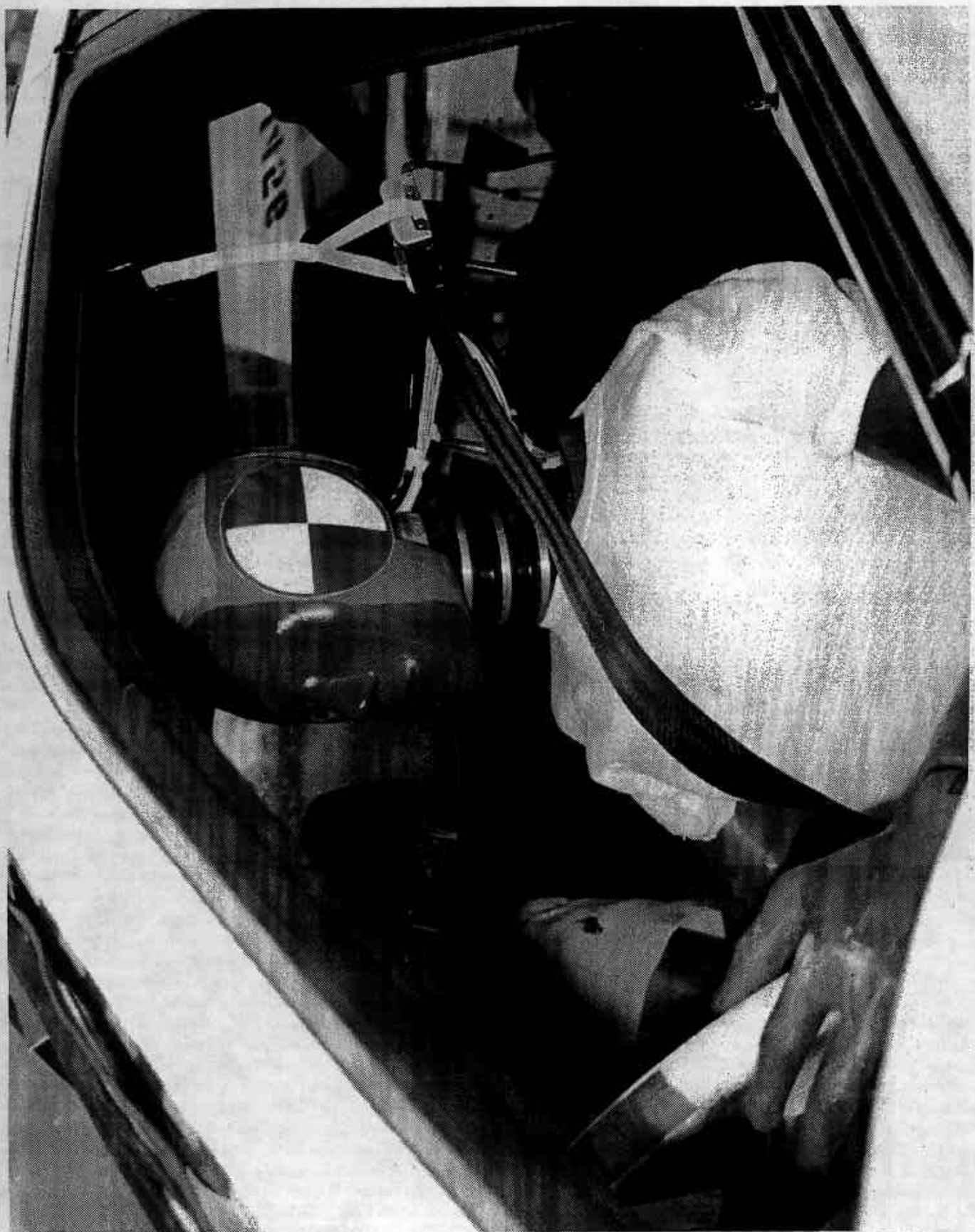


FIGURE A-36 PRE-TEST DRIVER FRONT SIDE VIEW

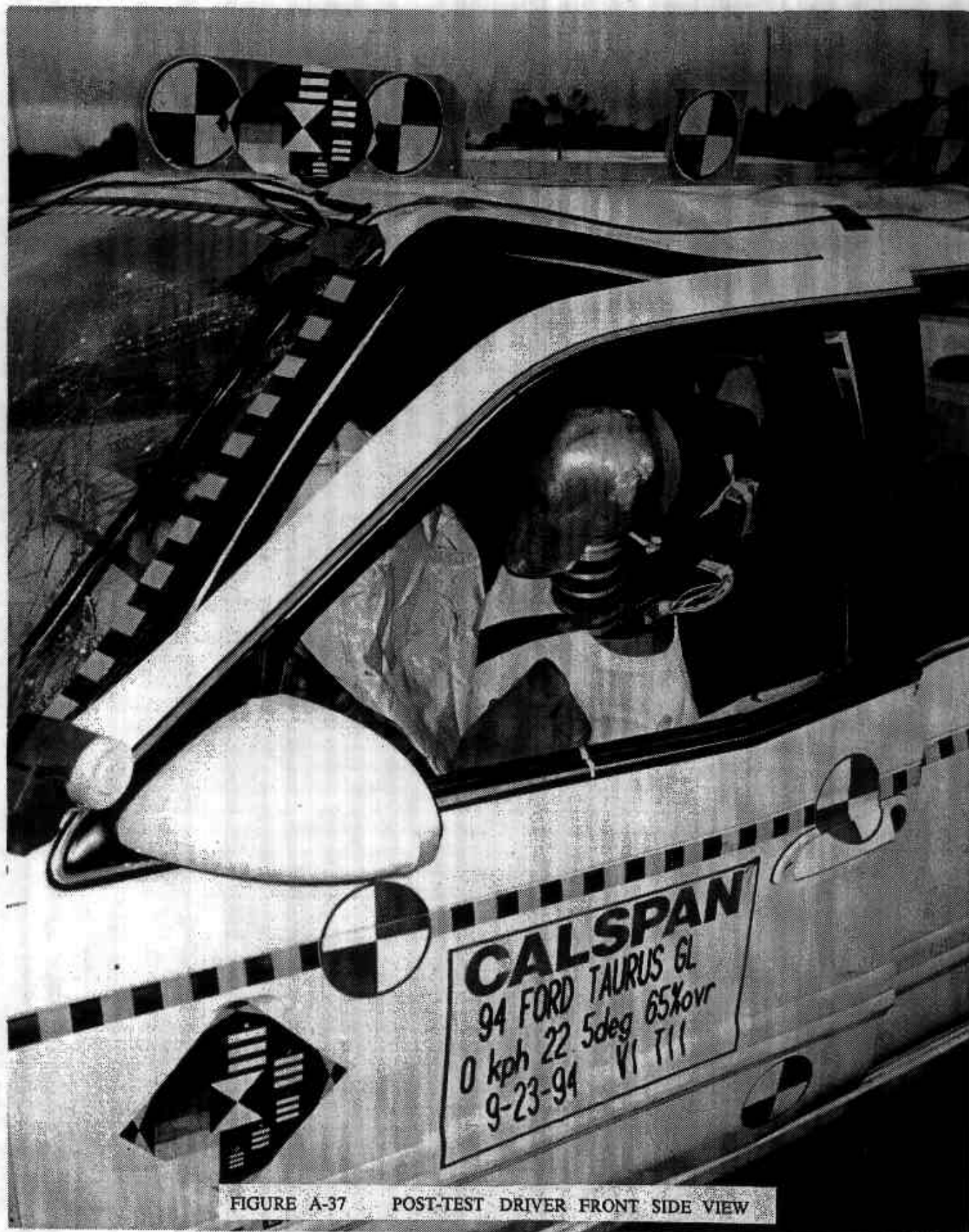


FIGURE A-37 POST-TEST DRIVER FRONT SIDE VIEW



FIGURE A-38 PRE-TEST DRIVER FRONT VIEW

A-41

8118-11



FIGURE A-39 PRE-TEST PASSENGER POSITION VIEW



FIGURE A-40 POST-TEST PASSENGER POSITION VIEW



FIGURE A-41 PRE-TEST PASSENGER AND OCCUPANT COMPARTMENT VIEW



FIGURE A-42 POST-TEST PASSENGER AND OCCUPANT COMPARTMENT VIEW



FIGURE A-43 PRE-TEST PASSENGER FRONT SIDE VIEW

A-46

8118-11



FIGURE A-44 POST-TEST PASSENGER FRONT SIDE VIEW



FIGURE A-45 PRE-TEST PASSENGER FRONT VIEW

A-48

8118-11



FIGURE A-46 POST-TEST DRIVER AIRBAG VIEW

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8118-11



FIGURE A-47 POST-TEST PASSENGER AIRBAG VIEW

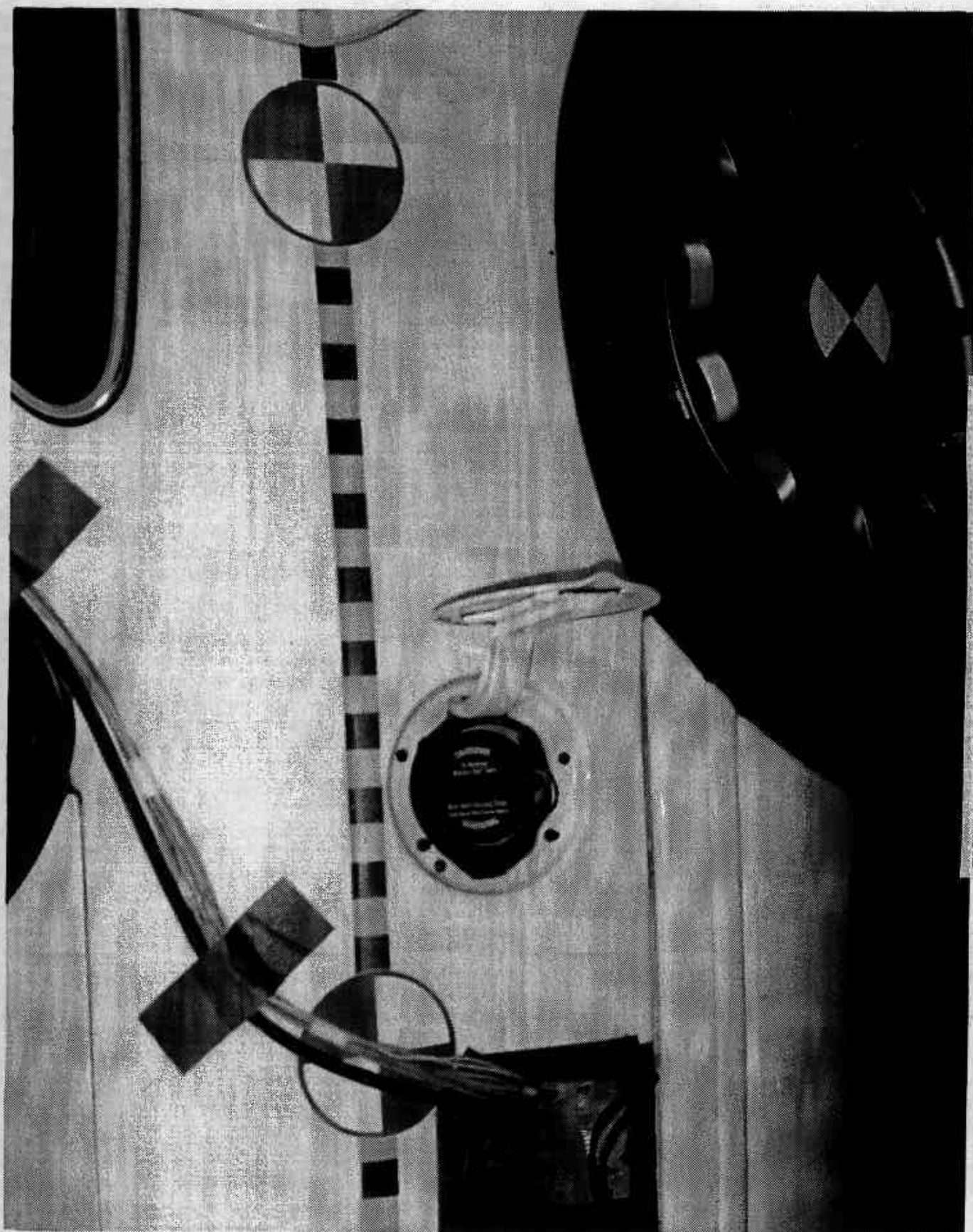


FIGURE A-48 PRE-TEST FUEL FILLER CAP VIEW

VEHICLE 2 PHOTOGRAPHS

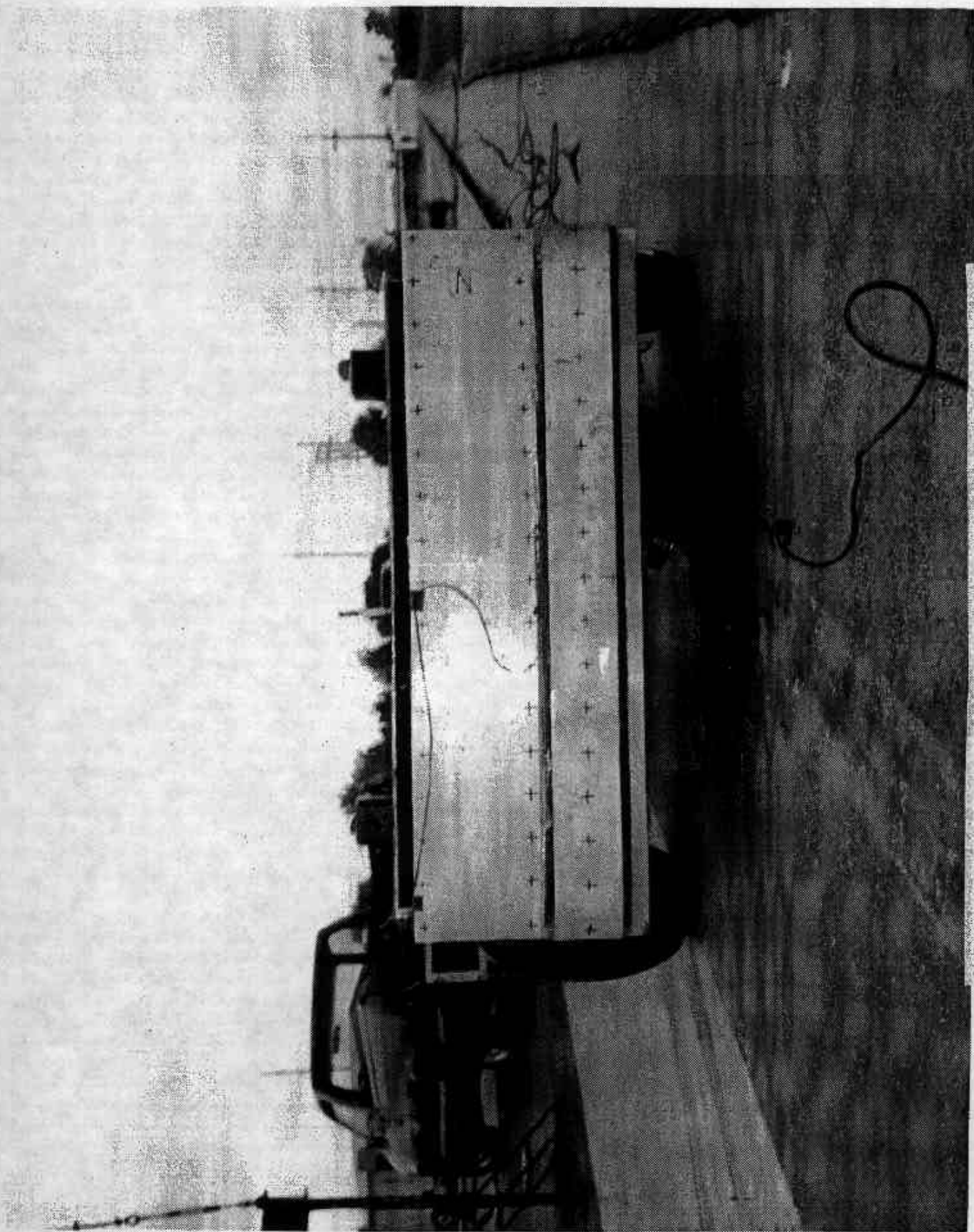


FIGURE A-49 PRE-TEST MOVING DEFORMABLE BARRIER FRONT VIEW



FIGURE A-50 POST-TEST MOVING DEFORMABLE BARRIER FRONT VIEW

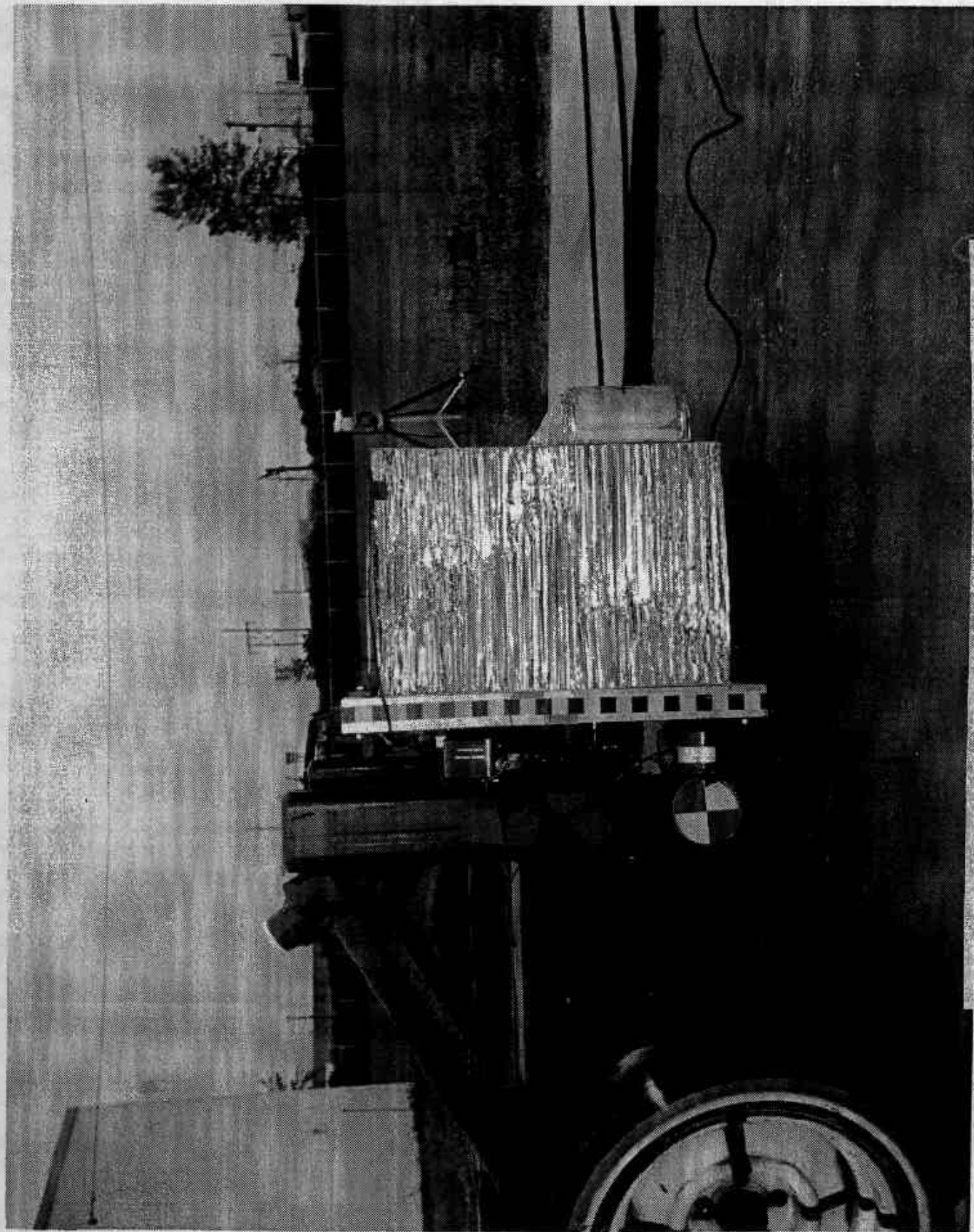


FIGURE A-51 PRE-TEST MOVING DEFORMABLE BARRIER RIGHT SIDE VIEW

A-55

8118-11

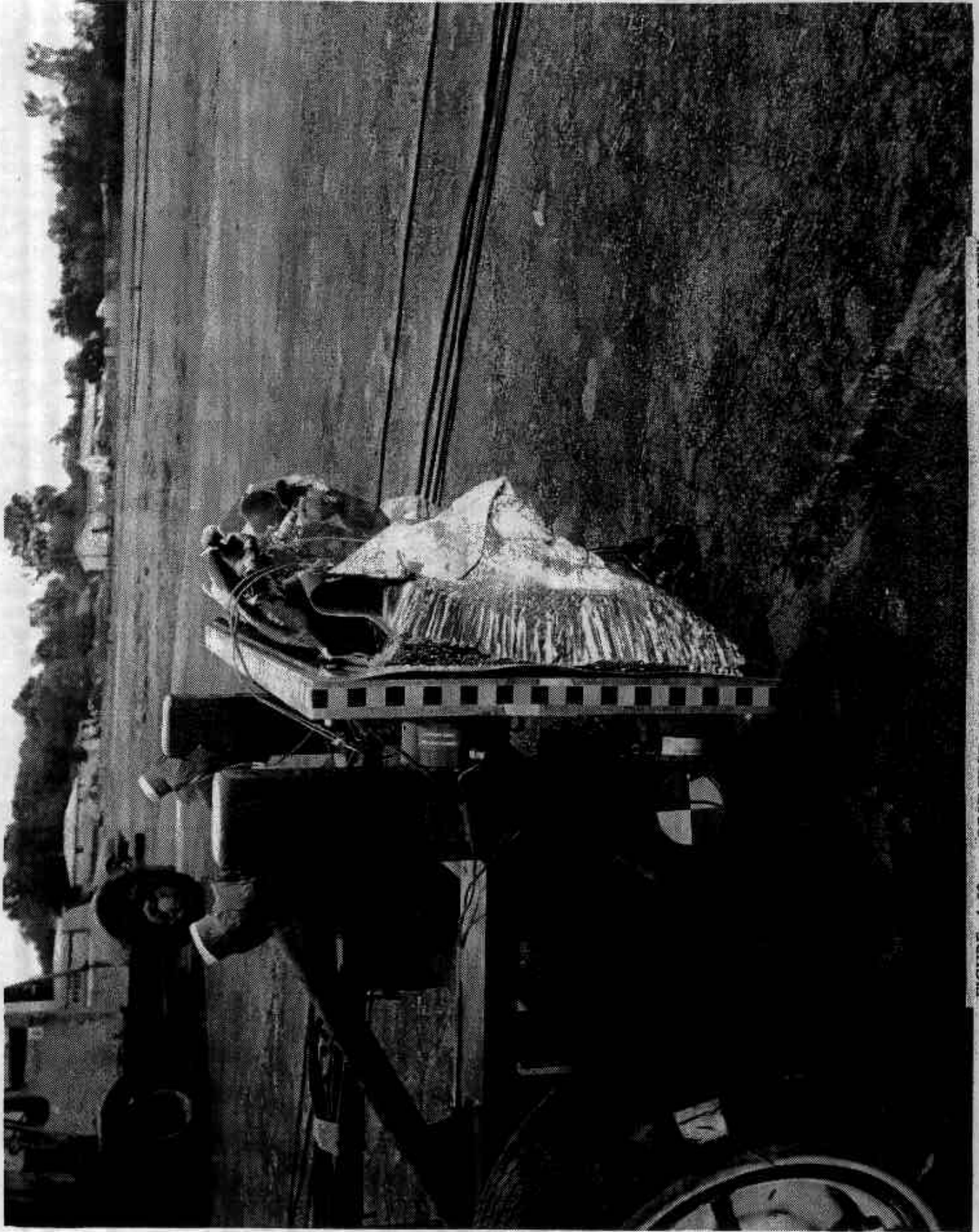


FIGURE A-52 POST-TEST MOVING DEFORMABLE BARRIER RIGHT SIDE VIEW

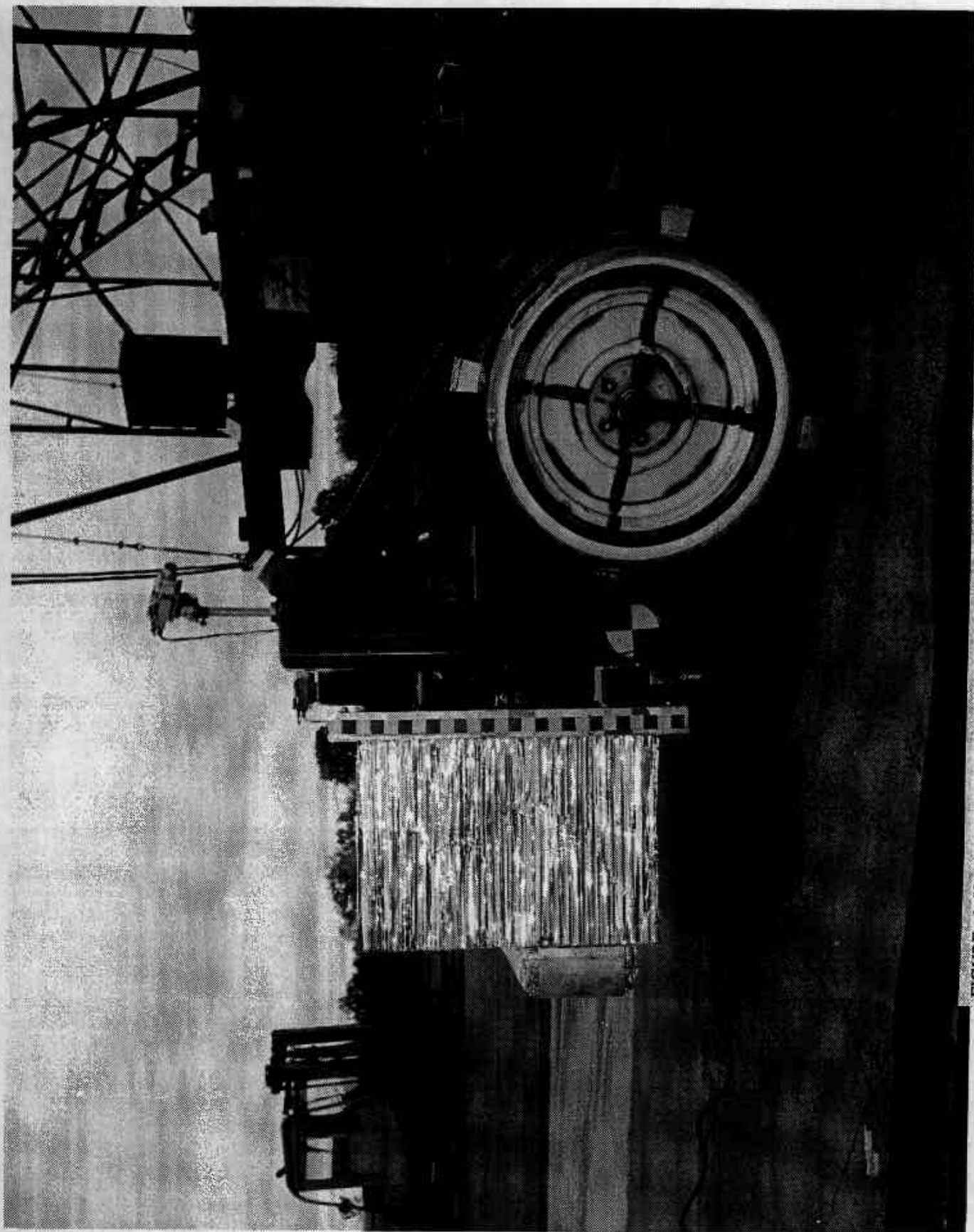


FIGURE A-53 PRE-TEST MOVING DEFORMABLE BARRIER LEFT SIDE VIEW

A-57

8118-11

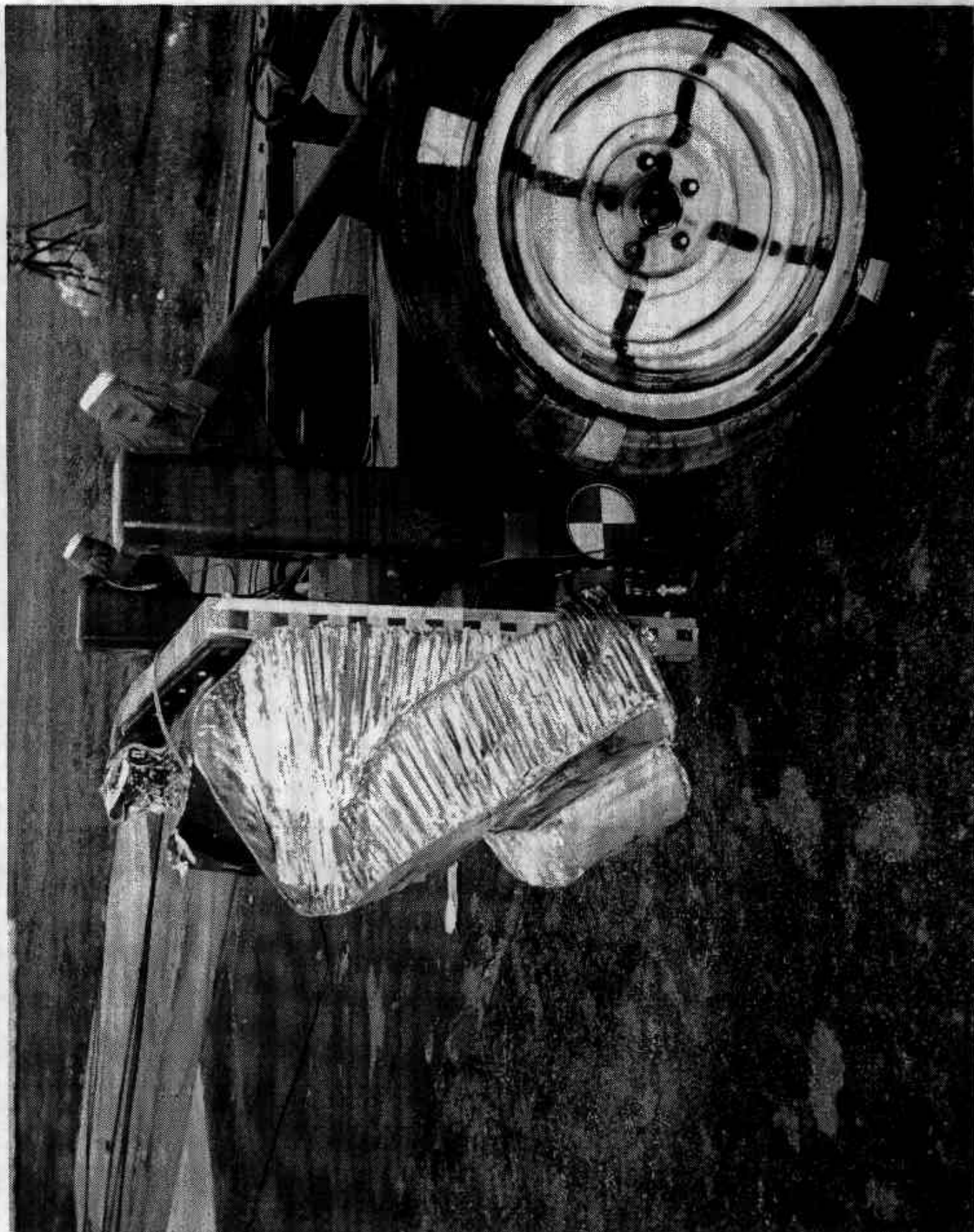


FIGURE A-54 POST-TEST MOVING DEFORMABLE BARRIER LEFT SIDE VIEW



FIGURE A-55 PRE-TEST MOVING DEFORMABLE BARRIER TOP VIEW



FIGURE A-56 POST-TEST MOVING DEFORMABLE BARRIER TOP VIEW

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA

Key: V1 - Vehicle 1
V2 - Vehicle 2

FACILITY: TRACK
RUN #: 1456
SERIES #: 1

TEST DATE: 23 Sep 1994
TEST TIME: 15:55:46
BOARD: A

TITLE: VTV TEST #11

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	V1-P1 Head X	Gs	19.4	98.4	-53.1	57.8	1000.0
2	V1-P1 Head Y	Gs	80.3	86.5	-75.1	171.0	1000.0
3	V1-P1 Head Z	Gs	17.8	86.2	-24.9	153.1	1000.0
4	V1-P1 HD9Y (X)	Gs	31.6	169.4	-56.9	57.8	1000.0
5	V1-P1 Chest X	Gs	11.6	122.2	-45.7	69.0	180.0
6	V1-P1 Chest Y	Gs	26.6	82.4	-5.0	61.6	180.0
7	V1-P1 Chest Z	Gs	13.2	70.4	-23.2	111.4	180.0
8	V1-P1 HD9Y (Z)	Gs	48.6	169.8	-35.7	153.2	1000.0
9	V1-P1 Upper Neck Fx	Nwt	765.4	114.5	-453.8	72.7	1000.0
10	V1-P1 Upper Neck Fy	Nwt	169.8	61.9	-868.8	184.1	1000.0
11	V1-P1 Upper Neck Fz	Nwt	1597.1	62.2	-499.0	100.8	1000.0
12	V1-P1 HD9X (Y)	Gs	97.7	86.8	-31.4	170.6	1000.0
13	V1-P1 Upper Neck Mx	Nwt-M	40.9	79.2	-10.5	91.3	600.0
14	V1-P1 Upper Neck My	Nwt-M	2.1	391.3	-70.7	73.1	600.0
15	V1-P1 Upper Neck Mz	Nwt-M	10.8	263.5	-31.6	179.8	600.0
16	V1-P1 HD9X (Z)	Gs	30.4	86.9	-19.8	93.8	1000.0
17	Head Resultant	Gs	82.1	86.5	.0	6.8	1000.0
18	Chest Resultant	Gs	47.5	69.1	.0	-20.5	180.0
19	Upper Neck Force Res.	Nwt	1614.6	62.2	3.8	13.0	1000.0
20	Upper Neck Moment Res.	Nwt-M	77.6	74.5	.0	-.2	600.0

36 ms Fixed Duration HIC SUMMARY: Head Resultant

hic: 362.65
t1 = 53.280 msec
t2 = 88.200 msec
Average G's Over Hic Duration = 40.42

CLIP SUMMARY: Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 44.932 G's
Tstart = 68.0400 ms
Tend = 71.1600 ms
CSI = 432.156

FACILITY: TRACK
RUN #: 1456
SERIES #: 1

TEST DATE: 23 Sep 1994
TEST TIME: 15:55:46
BOARD: B

TITLE: VTV TEST #11

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM AMP	msec	MINIMUM AMP	msec	FILTER CLASS
1	V1-P2 Head X	Gs	12.3	216.5	-63.5	74.5	1000.0
* 2	V1-P2 Head Y	Gs	26.2	82.1	-30.9	57.8	1000.0
3	V1-P2 Head Z	Gs	16.0	87.0	-4.6	155.0	1000.0
4	V1-P1 Chest Disp.	mm	.0	5.2	-14.8	71.4	60.0
5	V1-P2 Chest X	Gs	6.8	154.7	-55.9	75.5	180.0
6	V1-P2 Chest Y	Gs	24.3	72.8	-12.7	153.1	180.0
7	V1-P2 Chest Z	Gs	13.2	68.0	-10.9	96.8	180.0
8	V1-P1 Torso Belt Load	Nwt	4200.3	75.2	-727.2	154.6	600.0
9	V1-P1 Lower Neck Fx	Nwt	2625.3	57.7	-290.8	100.8	1000.0
10	V1-P1 Lower Neck Fy	Nwt	1965.3	57.7	-132.9	60.0	1000.0
11	V1-P1 Lower Neck Fz	Nwt	2148.9	62.3	-1545.7	100.7	1000.0
12	V1-P1 HD9Z (X)	Gs	31.8	153.0	-71.5	65.5	1000.0
13	V1-P1 Lower Neck Mx	Nwt-M	121.3	128.2	-40.2	98.0	600.0
14	V1-P1 Lower Neck My	Nwt-M	38.0	100.2	-190.1	66.7	600.0
15	V1-P1 Lower Neck Mz	Nwt-M	21.9	62.2	-130.7	97.9	600.0
16	V1-P1 HD9Z (Y)	Gs	140.2	86.5	-143.4	170.0	1000.0
* 17	V1-P2 Head Resultant	Gs	66.4	74.5	.0	10.8	1000.0
18	V1-P2 Chest Resultant	Gs	59.0	75.2	.0	-15.6	180.0
19	V1-P1 Lower Neck F(res)	Nwt	3409.2	57.7	5.0	4.0	1000.0
20	V1-P1 Lower Neck M(res)	Nwt-M	201.2	66.7	.0	-1.2	600.0

* Data questionable after 150 msec

36 ms Fixed Duration HIC SUMMARY: V1-P2 Head Resultant

hic: 393.69

t1 = 56.760 msec

t2 = 87.960 msec

Average G's Over Hic Duration = 43.69

CLIP SUMMARY: V1-P2 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 53.870 G's

Tstart = 73.4400 ms

Tend = 76.5600 ms

CSI = 436.995

FACILITY: TRACK
RUN #: 1456
SERIES #: 1

TEST DATE: 23 Sep 1994
TEST TIME: 15:55:46
BOARD: C

TITLE: VTV TEST #11

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	V1-P1 Lt Lower Tibia Fy	Nwt	869.2	51.6	-844.2	57.8	600.0
2	V1-P1 Lt Lower Tibia Fz	Nwt	110.4	61.9	-4820.4	51.2	600.0
3	V1-P1 Lt Lower Tibia Mx	Nwt-M	5.2	390.1	-88.3	51.4	600.0
4	V1-P1 Rt Lower Tibia Fy	Nwt	2060.4	51.4	-2493.4	48.2	600.0
5	V1-P1 Rt Lower Tibia Fz	Nwt	95.6	427.0	-5539.8	51.5	600.0
6	V1-P1 Rt Lower Tibia Mx	Nwt-M	337.9	55.2	-126.3	48.5	600.0
7	V1-P1 Left Femur	Nwt	1037.7	314.8	-7190.9	45.0	600.0
8	V1-P1 Right Femur	Nwt	1736.5	72.5	-7222.5	54.2	600.0
9	V1-P2 Left Femur	Nwt	982.1	203.6	-6254.7	60.1	600.0
10	V1-P2 Right Femur	Nwt	7426.4	57.7	-992.2	62.3	600.0
11	V1-P2 Lt Upper Tibia Mx	Nwt-M	81.4	52.8	-186.5	57.8	600.0
12	V1-P2 Lt Upper Tibia My	Nwt-M	24.3	143.2	-200.0	53.0	600.0
13	V1-P2 Lt Lower Tibia Fy	Nwt	685.4	53.3	-1843.7	52.7	600.0
14	V1-P2 Lt Lower Tibia Fz	Nwt	138.6	85.0	-8183.7	57.7	600.0
15	V1 Right Shock Tower (Y)	Gs	118.2	51.7	-8.2	28.9	60.0
16	V1 Left Shock Tower (X)	Gs	76.6	28.3	-27.4	58.9	60.0

FACILITY: TRACK
RUN #: 1456
SERIES #: 1

TEST DATE: 23 Sep 1994
TEST TIME: 15:55:46
BOARD: D

TITLE: VTV TEST #11

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	V1 R.F Frame Rail (X)	Gs	25.9	17.2	-93.9	39.1	60.0
2	V1 R.F Frame Rail (Y)	Gs	4.2	385.7	-59.4	49.9	60.0
3	V1 R.F Frame Rail (Z)	Gs	53.3	51.8	-35.5	55.9	60.0
4	V1 Engine Bottom (X)	Gs	21.4	56.3	-69.1	27.5	60.0
5	V1 L.F Frame Rail (X)	Gs	39.3	55.7	-112.9	38.0	60.0
6	V1 L.F Frame Rail (Y)	Gs	70.9	37.4	-28.7	50.8	60.0
7	V1 L.F Frame Rail (Z)	Gs	79.9	36.8	-130.4	43.0	60.0
8	V1-P2 Chest Disp.	mm	1.0	36.1	-48.7	176.2	60.0
9	V1-P1 Lt Upper Tibia Mx	Nwt-M	16.0	183.1	-148.8	51.7	600.0
10	V1-P1 Lt Upper Tibia My	Nwt-M	19.4	95.4	-209.6	48.1	600.0
11	V1-P1 Rt Upper Tibia Mx	Nwt-M	102.8	51.6	-217.6	55.6	600.0
12	V1-P1 Rt Upper Tibia My	Nwt-M	24.9	130.4	-253.7	51.6	600.0
13	V1 L.R. Comp (X)	Gs	8.3	80.6	-39.5	46.3	60.0
14	V1 L.R. Comp (Y)	Gs	17.1	58.3	-5.1	115.7	60.0
15	V1 R.R. Comp (X)	Gs	2.1	127.1	-46.2	47.3	60.0
16	V1 R.R. Comp (Y)	Gs	27.0	52.4	-4.6	159.7	60.0
17	V1 R.F Frame Rail Res.	Gs	98.0	39.1	.1	-9.0	60.0
18	V1 L.F Frame Rail Res.	Gs	152.0	37.6	.1	-9.7	60.0

FACILITY: TRACK
 RUN #: 1456
 SERIES #: 1

TEST DATE: 23 Sep 1994
 TEST TIME: 15:55:46
 BOARD: E

TITLE: VTV TEST #11

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	V1-P1 Pelvic X	Gs	23.3	100.6	-66.6	54.6	1000.0
2	V1-P1 Pelvic Y	Gs	30.3	98.2	-32.6	49.8	1000.0
3	V1-P1 Pelvic Z	Gs	7.7	83.6	-23.5	57.7	1000.0
4	V1 Right Engine (X)	Gs	40.0	61.0	-111.0	42.1	60.0
5	V1-P2 Upper Neck Fx	Nwt	635.8	57.7	-768.3	68.0	1000.0
6	V1-P2 Upper Neck Fy	Nwt	396.6	111.0	-1447.4	57.7	1000.0
7	V1-P2 Upper Neck Fz	Nwt	4238.5	75.6	-284.4	155.2	1000.0
8	V1 Engine Bottom (Y)	Gs	40.2	58.0	-56.7	37.0	60.0
9	V1-P2 Upper Neck Mx	Nwt-M	70.5	57.6	-18.0	217.2	600.0
10	V1-P2 Upper Neck My	Nwt-M	8.7	347.2	-82.1	57.7	600.0
11	V1-P2 Upper Neck Mz	Nwt-M	10.5	162.6	-39.0	97.4	600.0
12	V1 Left Engine (X)	Gs	51.1	59.5	-125.2	42.5	60.0
13	V1-P2 Pelvic X	Gs	4.7	99.1	-70.0	59.5	1000.0
* 14	V1-P2 Pelvic Y	Gs	323299.2	48.0	*****	48.4	1000.0
15	V1-P2 Pelvic Z	Gs	23.7	54.1	-22.8	77.4	1000.0
16	V1 Right Shock Tower (X)	Gs	2.2	109.0	-62.9	51.8	60.0
* 17	V1-P1 Pelvic Res.	Gs	72.4	54.6	.0	6.1	1000.0
18	V1-P2 Upper Neck F(res)	Nwt	4258.4	75.6	5.2	14.2	1000.0
19	V1-P2 Upper Neck M(res)	Nwt-M	109.1	57.6	.0	-17.8	600.0
20	V1-P2 Pelvic Res.	Gs	323299.2	48.0	70.0	.5	1000.0

* Data not accurate, channel did not calibrate properly

FACILITY: TRACK
RUN #: 1456
SERIES #: 1

TEST DATE: 23 Sep 1994
TEST TIME: 15:55:46
BOARD: F

TITLE: VTV TEST #11

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	V1 Brake Pedal (X)	Gs	72.4	48.4	-148.4	54.5	60.0
2	V1 Brake Pedal (Y)	Gs	172.4	53.6	-62.4	47.6	60.0
3	V1 Brake Pedal (Z)	Gs	92.7	60.1	-111.8	45.1	60.0
4	V1-P2 Lt Lower Tibia Mx	Nwt-M	30.0	52.1	-376.2	55.9	600.0
5	V1-P2 Rt Upper Tibia Mx	Nwt-M	54.6	179.8	-189.8	79.9	600.0
6	V1-P2 Rt Upper Tibia My	Nwt-M	64.6	63.5	-134.8	72.2	600.0
7	V1-P2 Rt Lower Tibia Fy	Nwt	1831.5	57.8	-960.0	59.8	1000.0
8	V1-P2 Rt Lower Tibia Fz	Nwt	2158.5	57.8	-5102.3	55.1	1000.0
9	V1-P2 Rt Lower Tibia Mx	Nwt-M	52.0	180.1	-184.1	65.9	600.0
10	V1 Left Shock Tower (Z)	Gs	40.5	51.8	-49.9	42.6	60.0
11	NULL	in	.0	427.3	.0	427.3	1000.0
12	NULL	in	.0	427.3	.0	427.3	1000.0
17	V1 Brake Pedal (res)	Gs	229.9	54.0	.0	-20.0	60.0

FACILITY: TAPE
RUN #: 7456
SERIES #: 1

TEST DATE: 27 Sep 1994
TEST TIME: 15:25:20
BOARD: G

TITLE: VTV TEST #11

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	Chest Displacement #132	mm	28.7	72.5	.0	-14.2	60.0
2	NULL	Gs	.0	427.3	.0	427.3	1000.0
3	NULL	Gs	.0	427.3	.0	427.3	1000.0
4	NULL	Gs	.0	427.3	.0	427.3	1000.0

FACILITY: TAPE
RUN #: 8456
SERIES #: 1

TEST DATE: 27 Sep 1994
TEST TIME: 15:30:15
BOARD: H

TITLE: VTV TEST #11

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	Chest Displacement #125	mm	5.5	63.8	-2.1	71.0	60.0
2	Chest Displacement #126	mm	8.7	77.0	-.8	143.5	60.0
* 3	Chest Displacement #127	mm	2.9	68.9	-3.9	87.1	60.0
4	Chest Displacement #128	mm	8.8	94.7	-1.3	169.3	60.0
5	Chest Displacement #129	mm	.8	44.6	-6.1	219.5	60.0
* 6	Chest Displacement #130	mm	6.8	78.8	-7.0	71.2	60.0
7	Chest Displacement #131	mm	3.1	56.5	-3.5	117.4	60.0
8	NULL		.0	427.3	.0	427.3	1000.0

* Data questionable

** Data questionable between 70 and 80 msec

FACILITY: TAPE
RUN #: 9456
SERIES #: 1

TEST DATE: 27 Sep 1994
TEST TIME: 15:35:25
BOARD: I

TITLE: VTV TEST #11

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	V2 C.G. X	Gs	3.8	183.4	-51.3	41.9	60.0
2	V2 C.G. Y	Gs	4.6	110.9	-17.5	44.6	60.0
3	V2 C.G. Z	Gs	21.1	93.6	-29.9	42.2	60.0
4	V2 Left Rail X	Gs	9.5	-11.5	-116.8	48.7	60.0
5	V2 Left Rail Y	Gs	14.4	54.1	-20.0	58.2	60.0
6	V2 Right Rail X	Gs	2.1	151.9	-39.7	43.6	60.0
7	V2 Right Rail Y	Gs	4.5	184.6	-22.0	48.4	60.0
8	V2 TR Load Cell	Nwt	36112.5	22.3	-7345.1	68.0	60.0
9	V2 BR Load Cell	Nwt	5136.4	143.5	*****	42.7	60.0
10	V2 TL Load Cell	Nwt	91766.1	34.8	-30196.0	69.4	60.0
11	V2 BL Load Cell	Nwt	8979.6	103.2	*****	44.5	60.0
* 12	V2 CL Load Cell	Nwt	216819.2	64.6	*****	45.6	60.0
17	V2 C.G.	Gs	60.3	42.2	.4	105.7	60.0

* Wire cut at 50 msec

TEST NO. Y49-11-1456

VEHICLE DATA

SAE FILTER CHANNEL CLASS

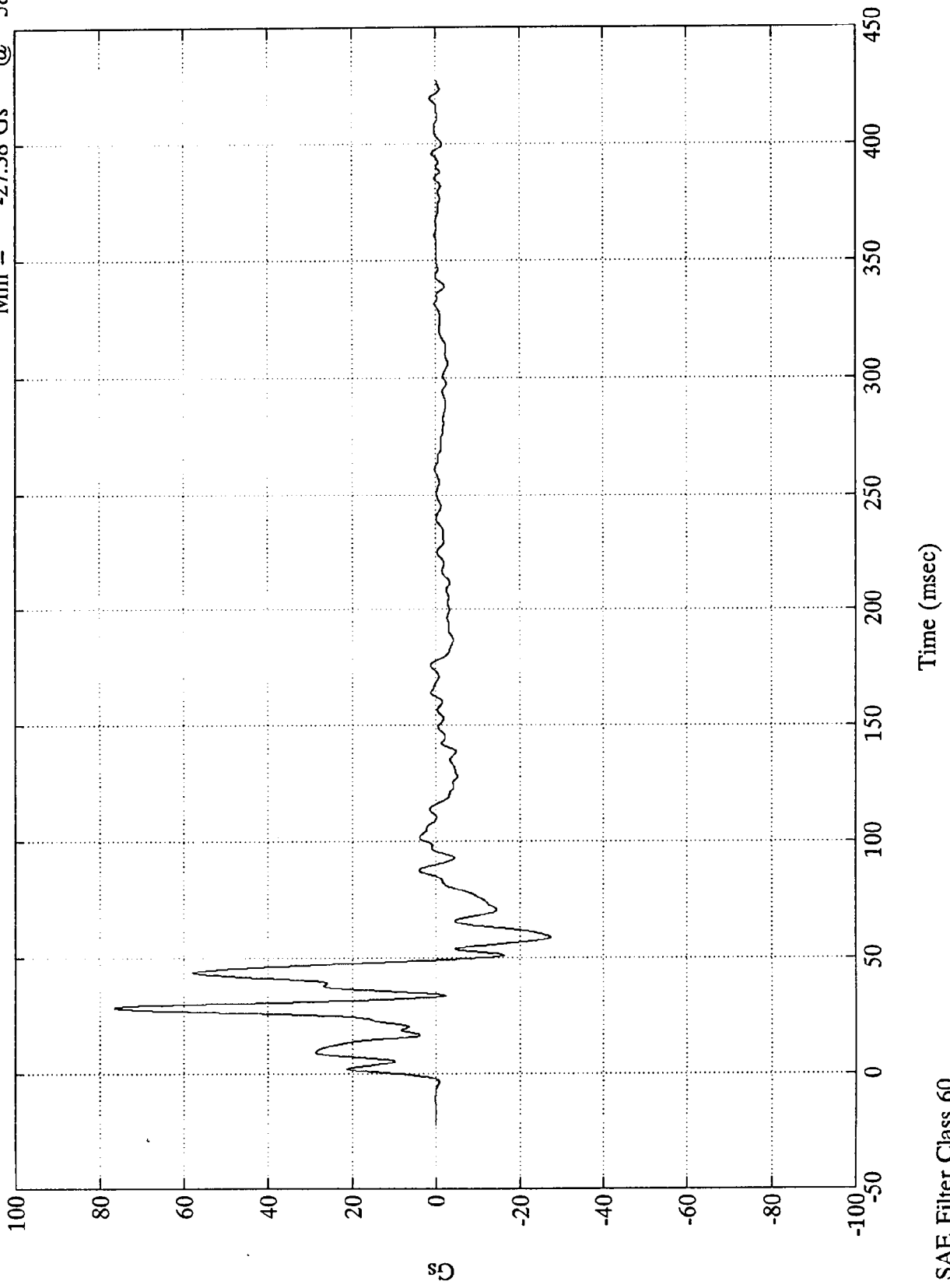
60

VEHICLE ONE DATA

VTV TEST #11

V1 Left Shock Tower (X)

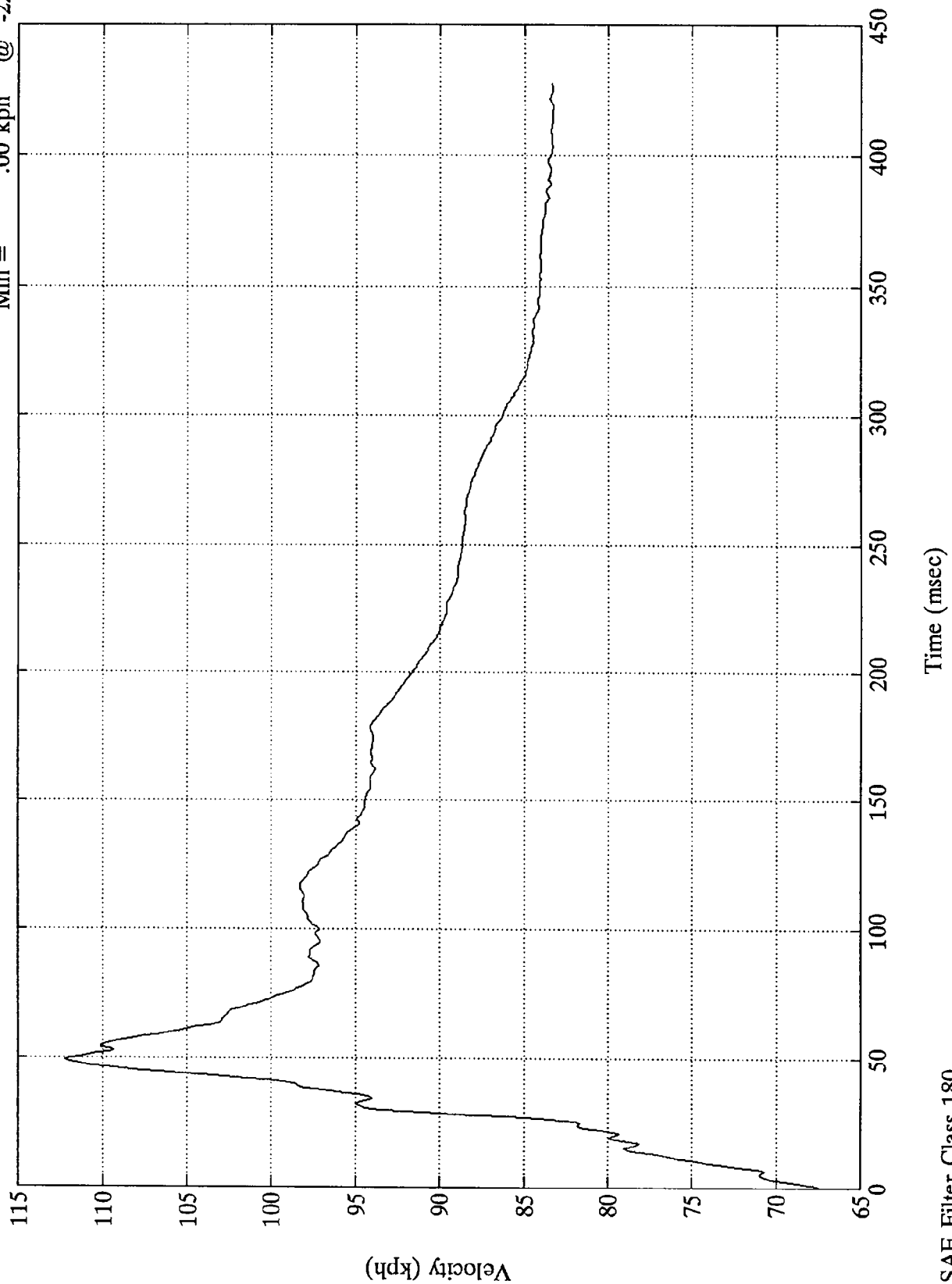
Max = 76.62 Gs @ 28.31 msec
Min = -27.38 Gs @ 58.91 msec



VTV TEST #11

V1 Left Shock Tower (X)

Max = 112.16 kph @ 49.20 msec
Min = .00 kph @ -22.44 msec

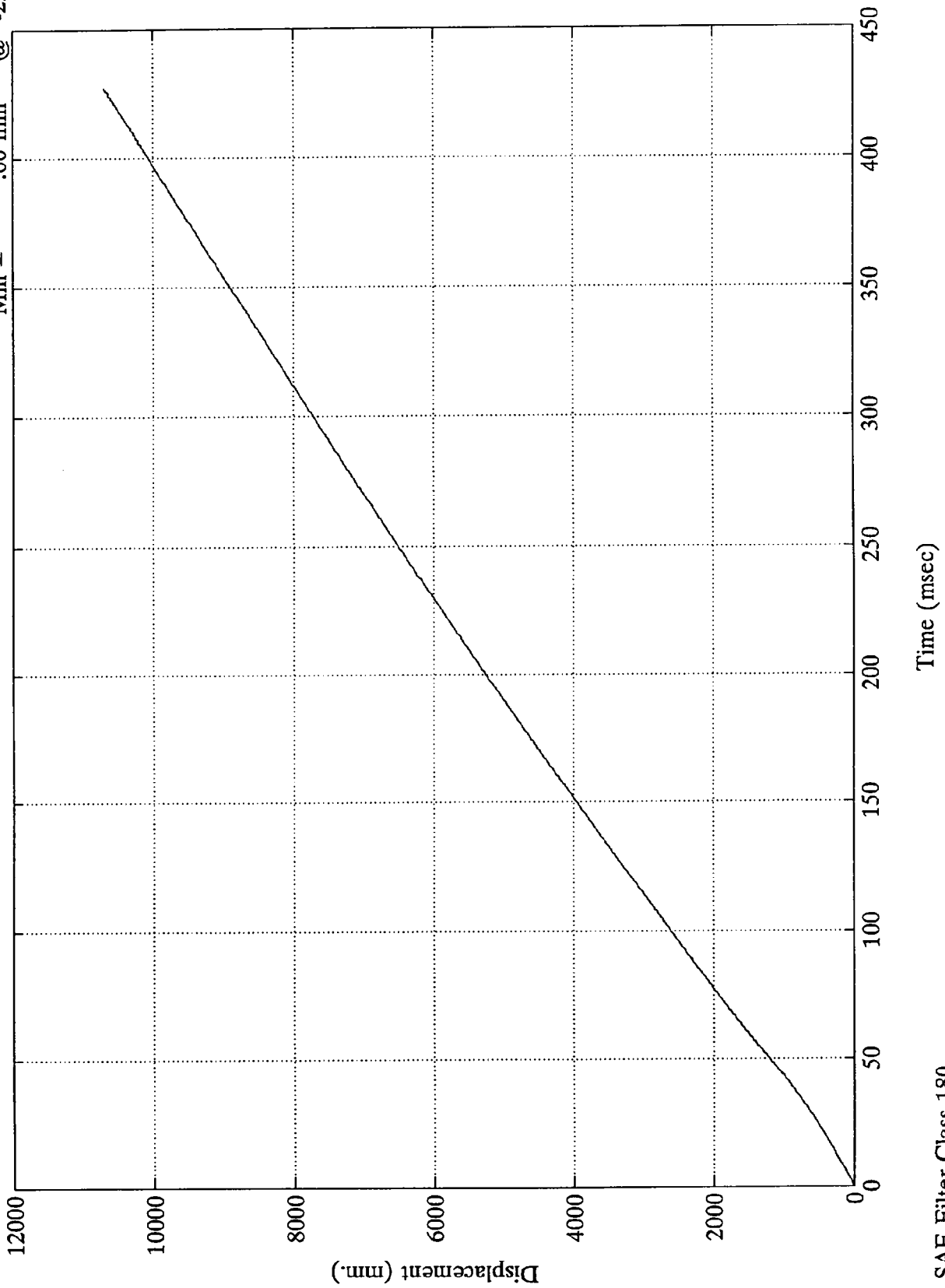


SAE Filter Class 180

VTV TEST #11

V1 Left Shock Tower (X)

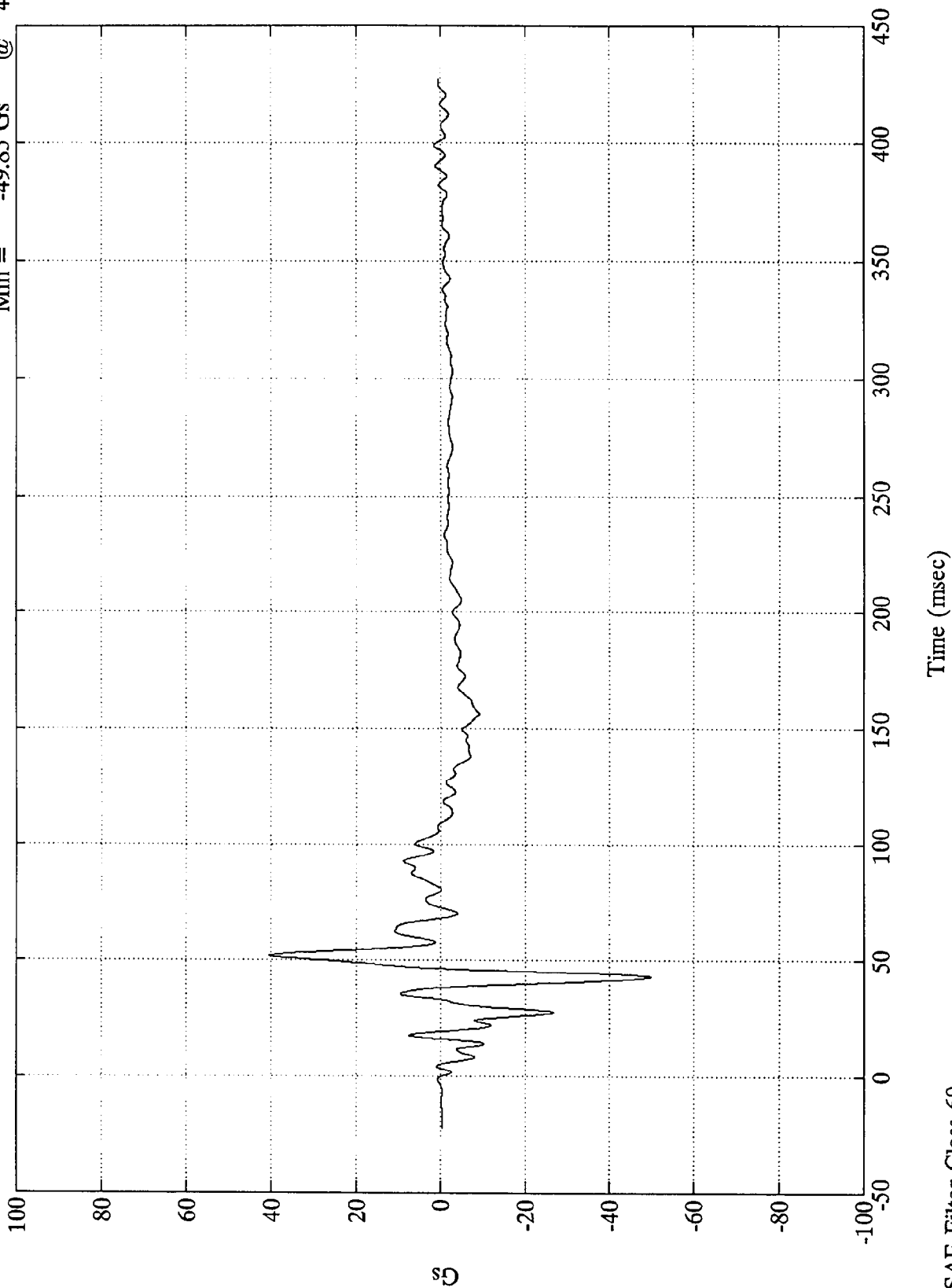
Max = 10698.04 mm @ 427.32 msec
Min = .00 mm @ -22.44 msec



VTV TEST #11

V1 Left Shock Tower (Z)

Max =	40.51 Gs	@	51.84 msec
Min =	-49.85 Gs	@	42.60 msec

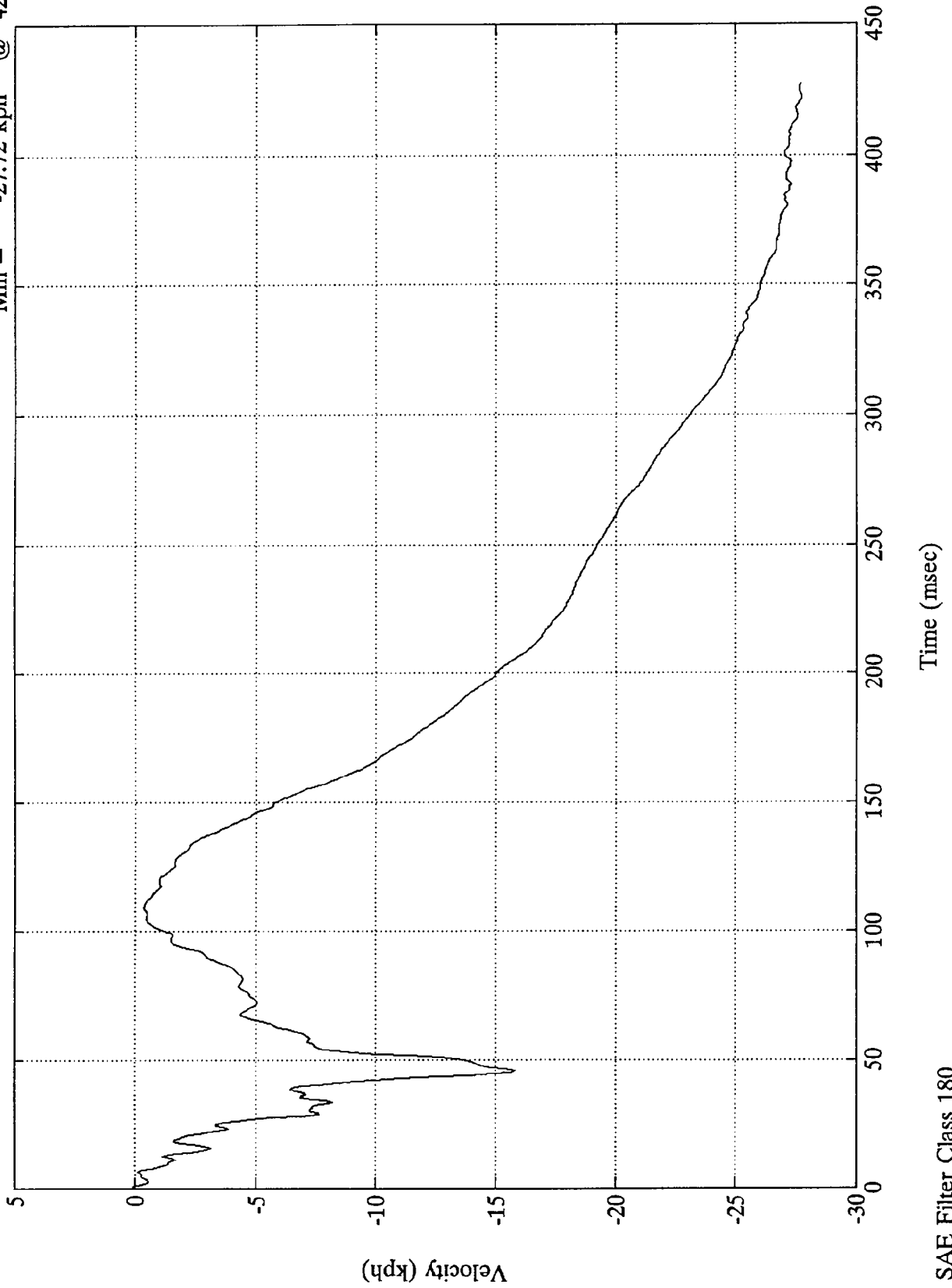


SAE Filter Class 60

VTV TEST #11

V1 Left Shock Tower (Z)

Max = .06 kph @ 0.47 msec
Min = -27.72 kph @ 422.64 msec

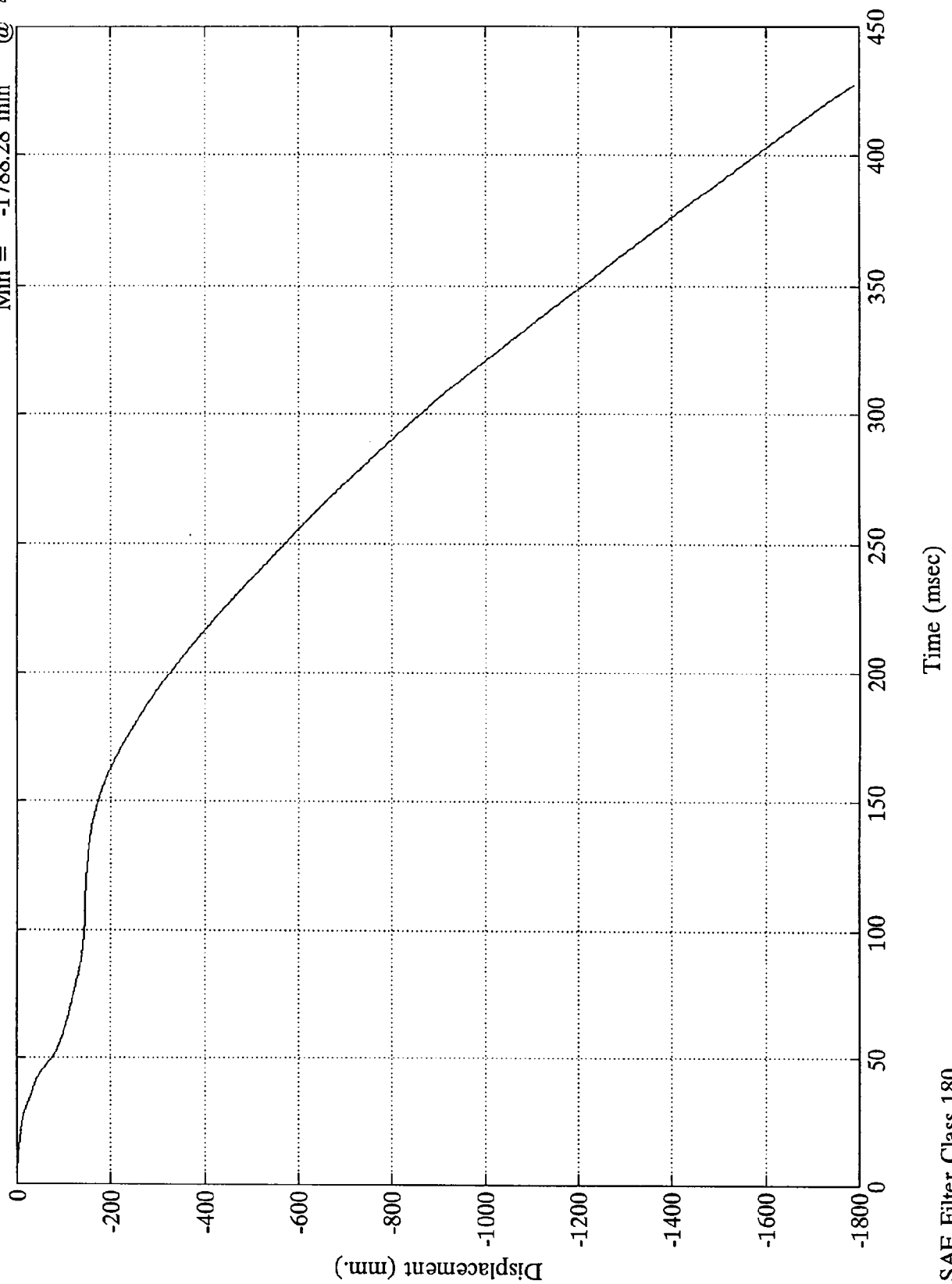


SAE Filter Class 180

VTIV TEST #11

V1 Left Shock Tower (Z)

Max = .01 mm @ 0.83 msec
Min = -1788.28 mm @ 427.32 msec

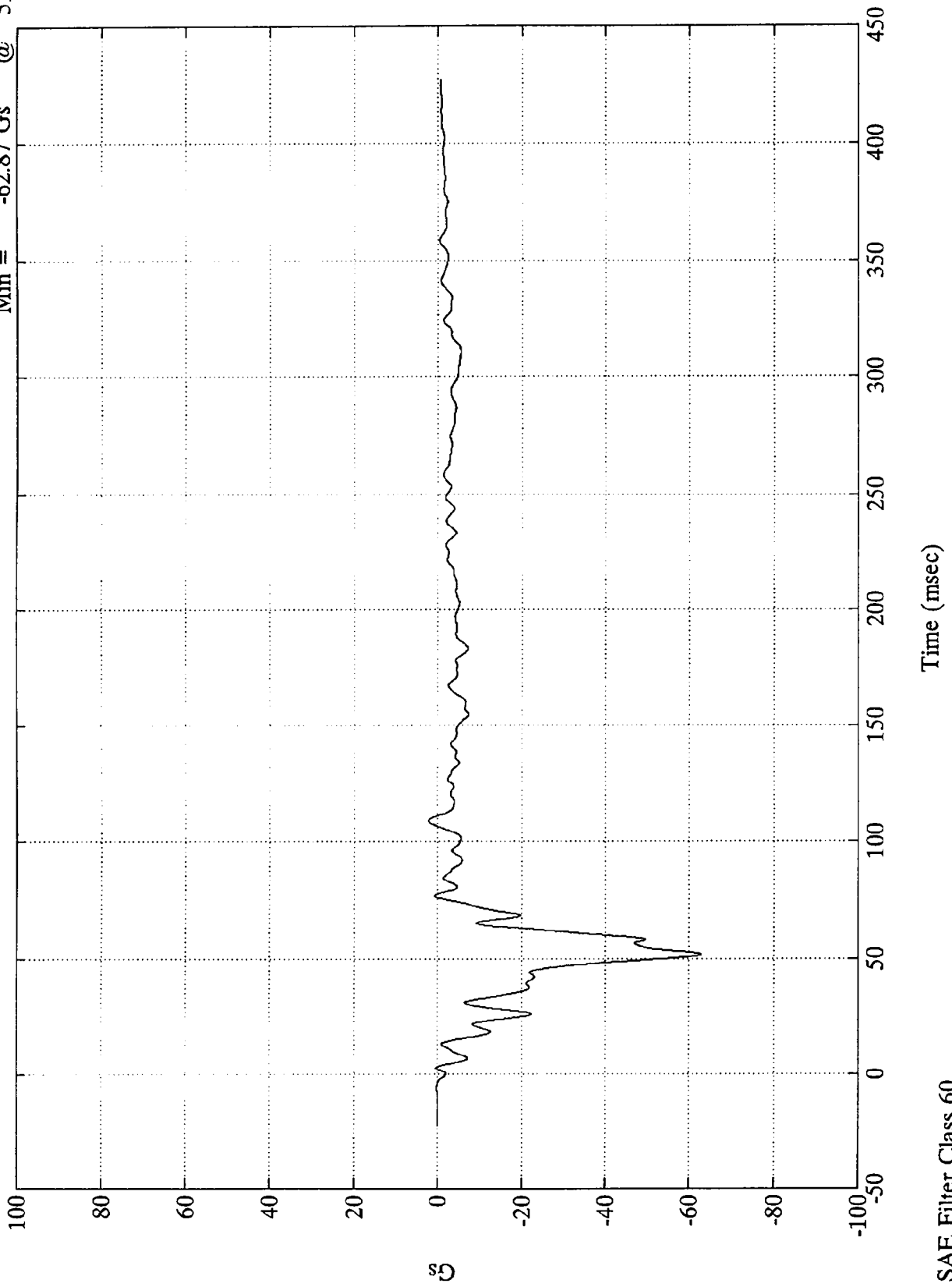


SAE Filter Class 180

VTV TEST #11

V1 Right Shock Tower (X)

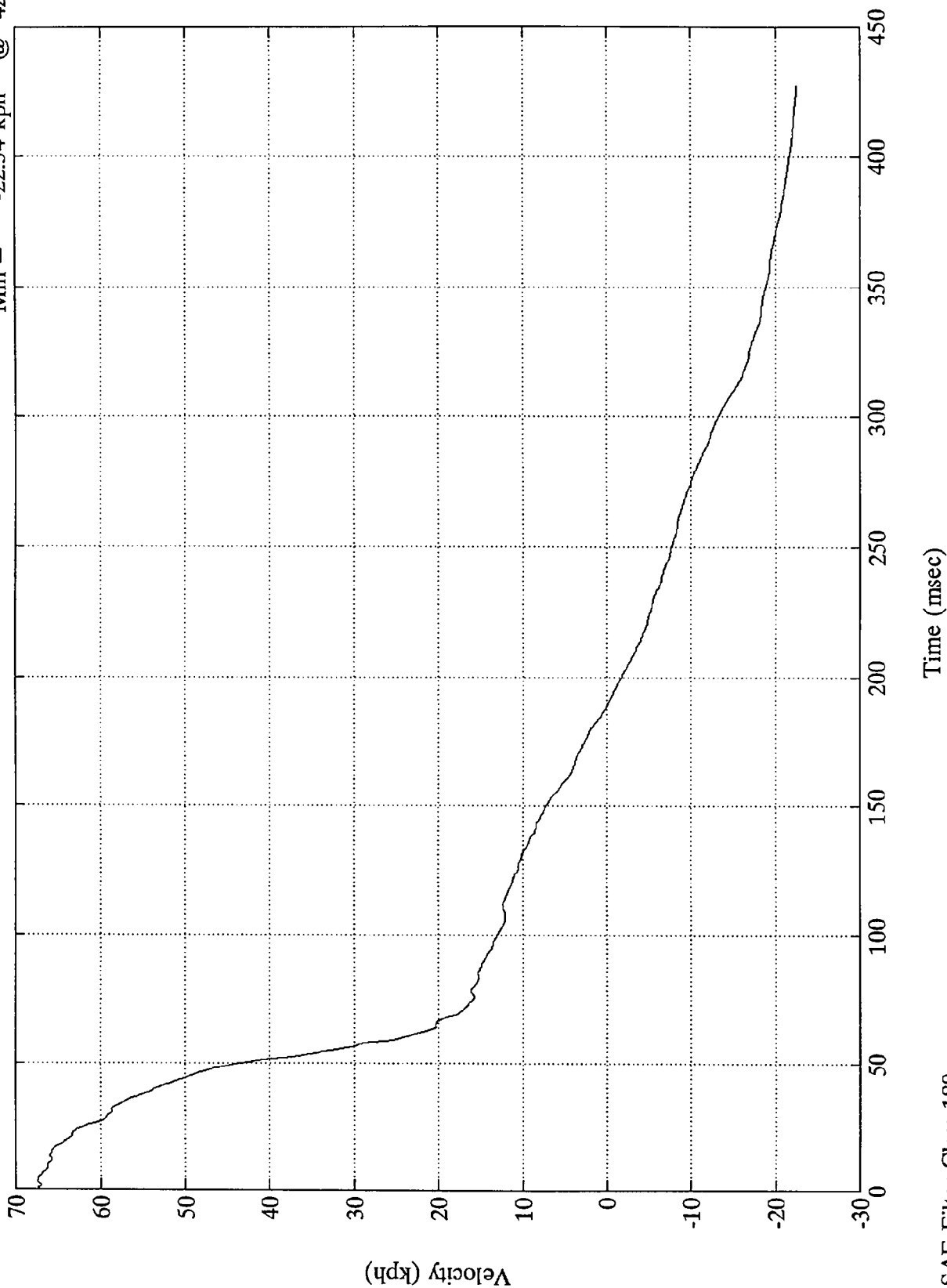
Max = 2.20 Gs @ 108.95 msec
Min = -62.87 Gs @ 51.84 msec



VTV TEST #11

V1 Right Shock Tower (X)

Max = 67.44 kph @ 3.35 msec
Min = -22.54 kph @ 427.32 msec

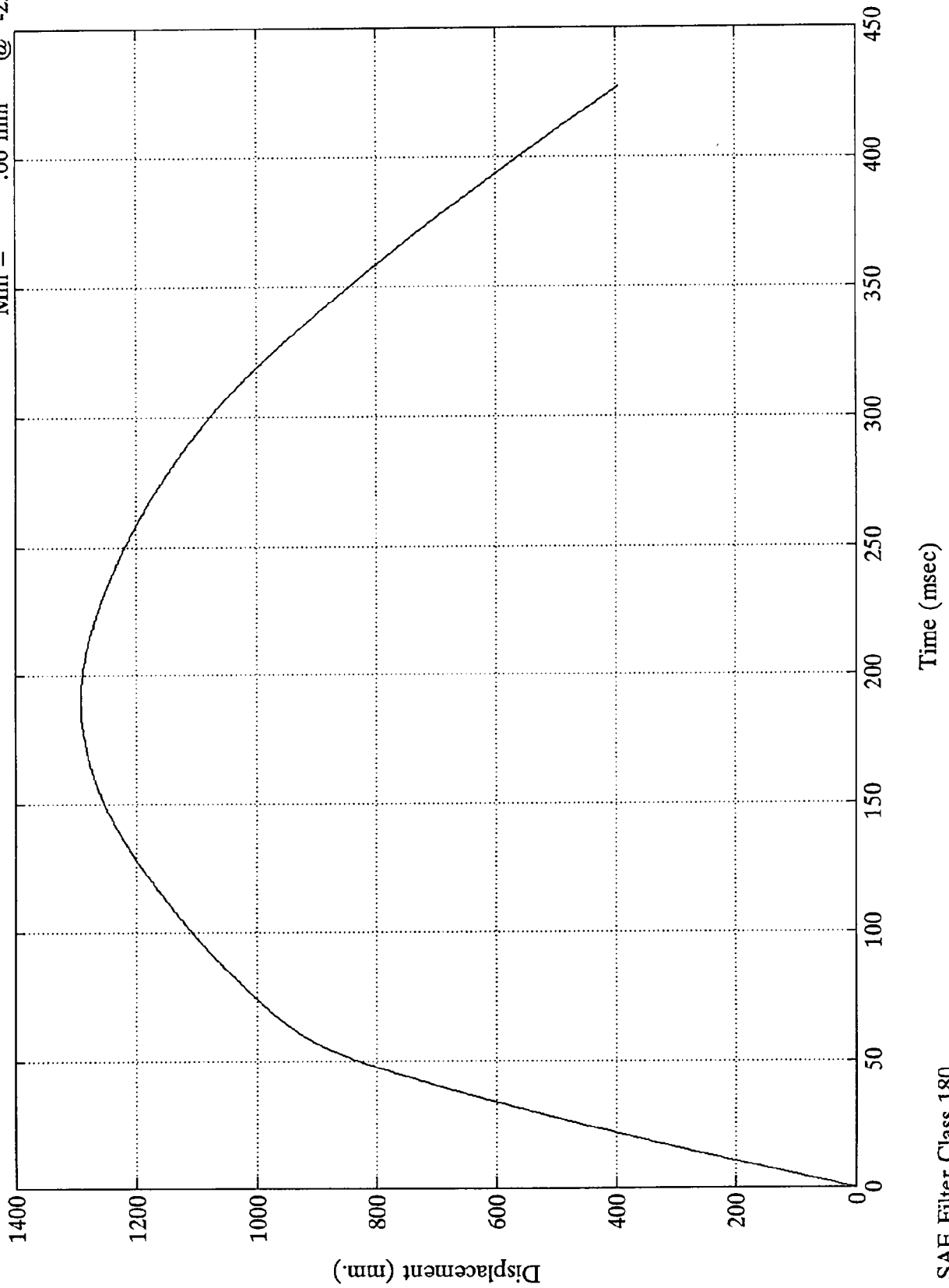


SAE Filter Class 180

VTV TEST #11

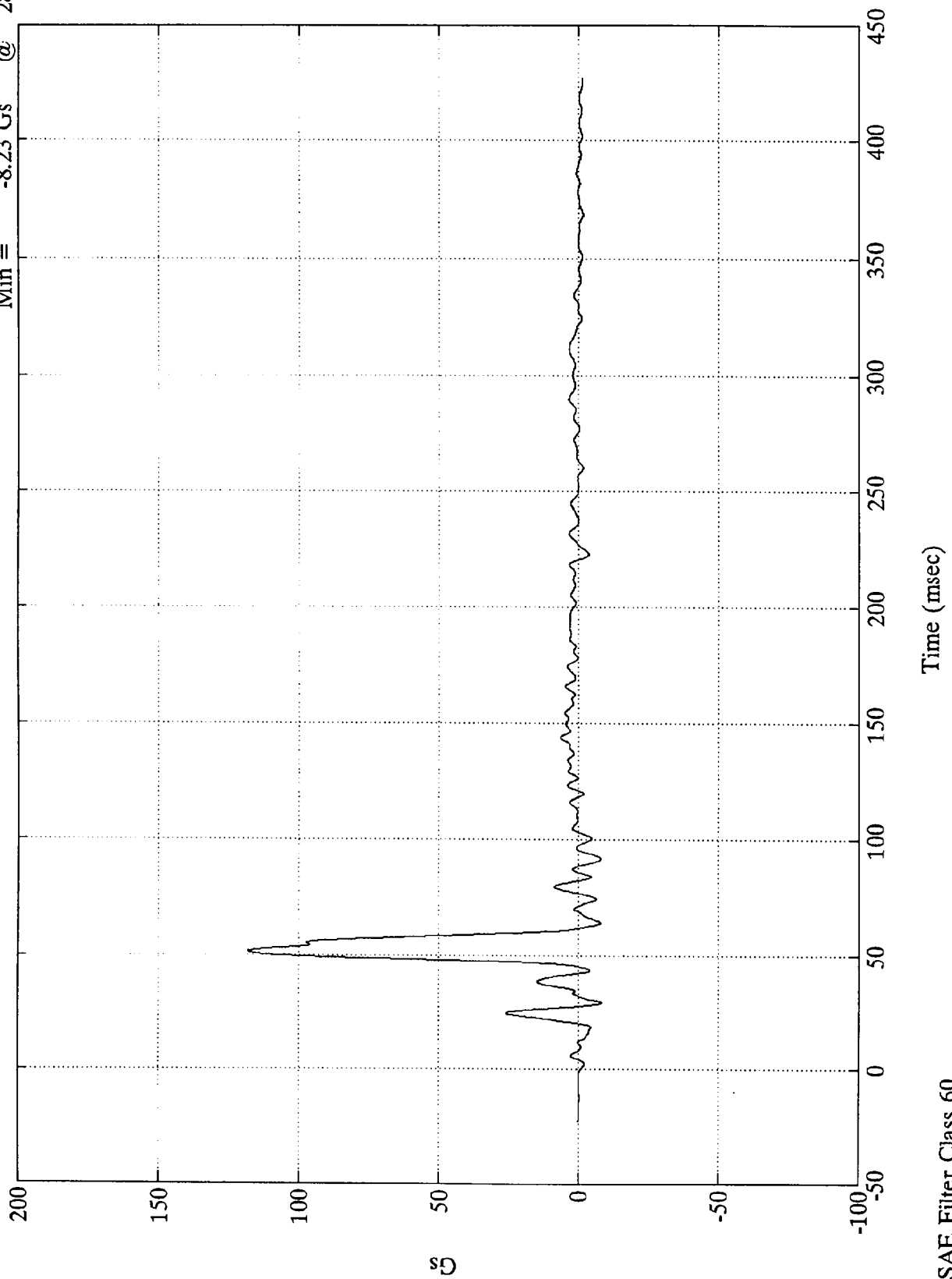
V1 Right Shock Tower (X)

Max = 1290.79 mm @ 189.12 msec
Min = .00 mm @ -22.44 msec



VTV TEST #11

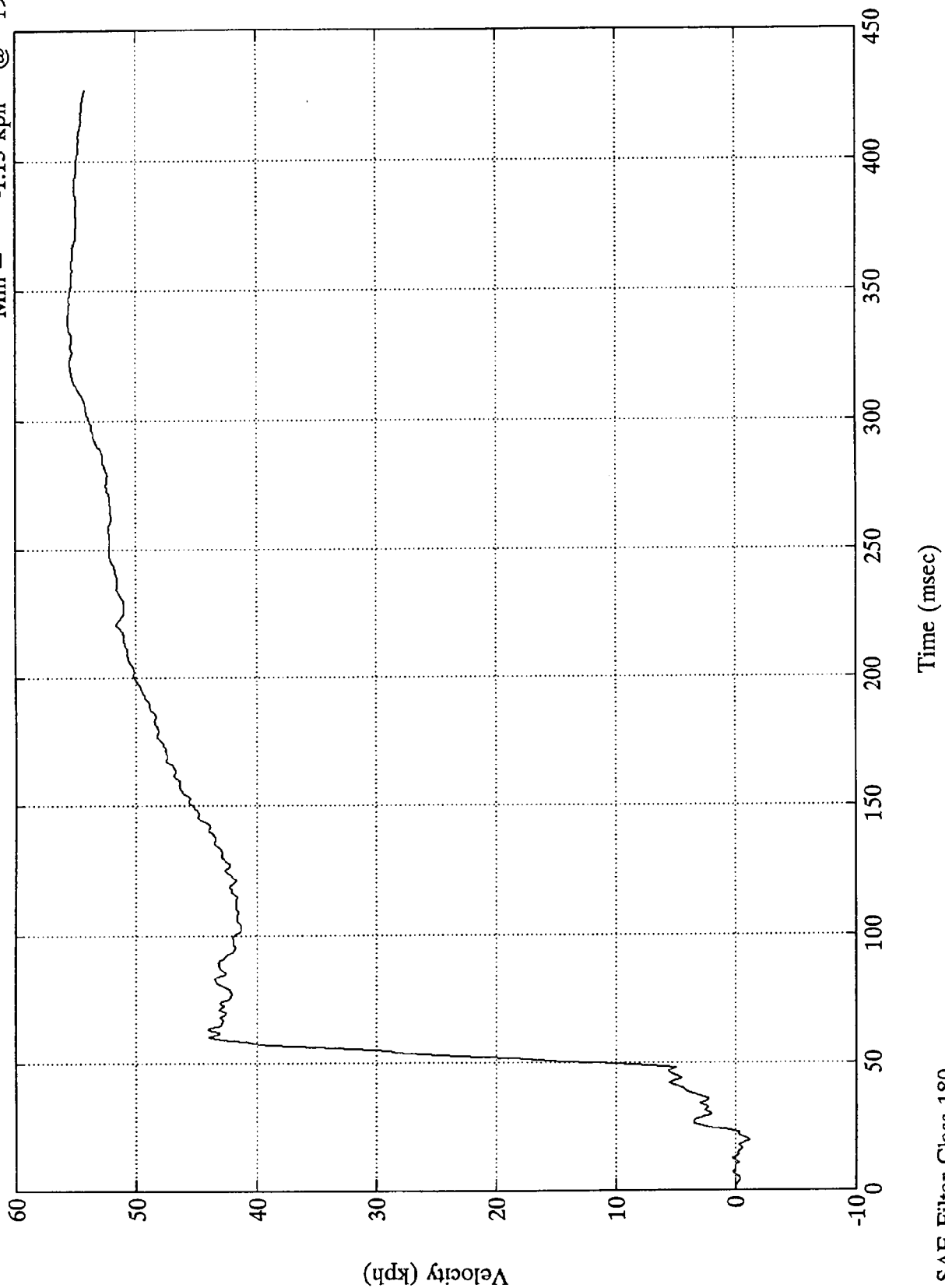
V1 Right Shock Tower (Y) Max = 118.15 Gs @ 51.72 msec
Min = -8.23 Gs @ 28.92 msec



SAE Filter Class 60

VTV TEST #11

V1 Right Shock Tower (Y)
Max = 55.64 kph @ 339.00 msec
Min = -1.13 kph @ 19.92 msec

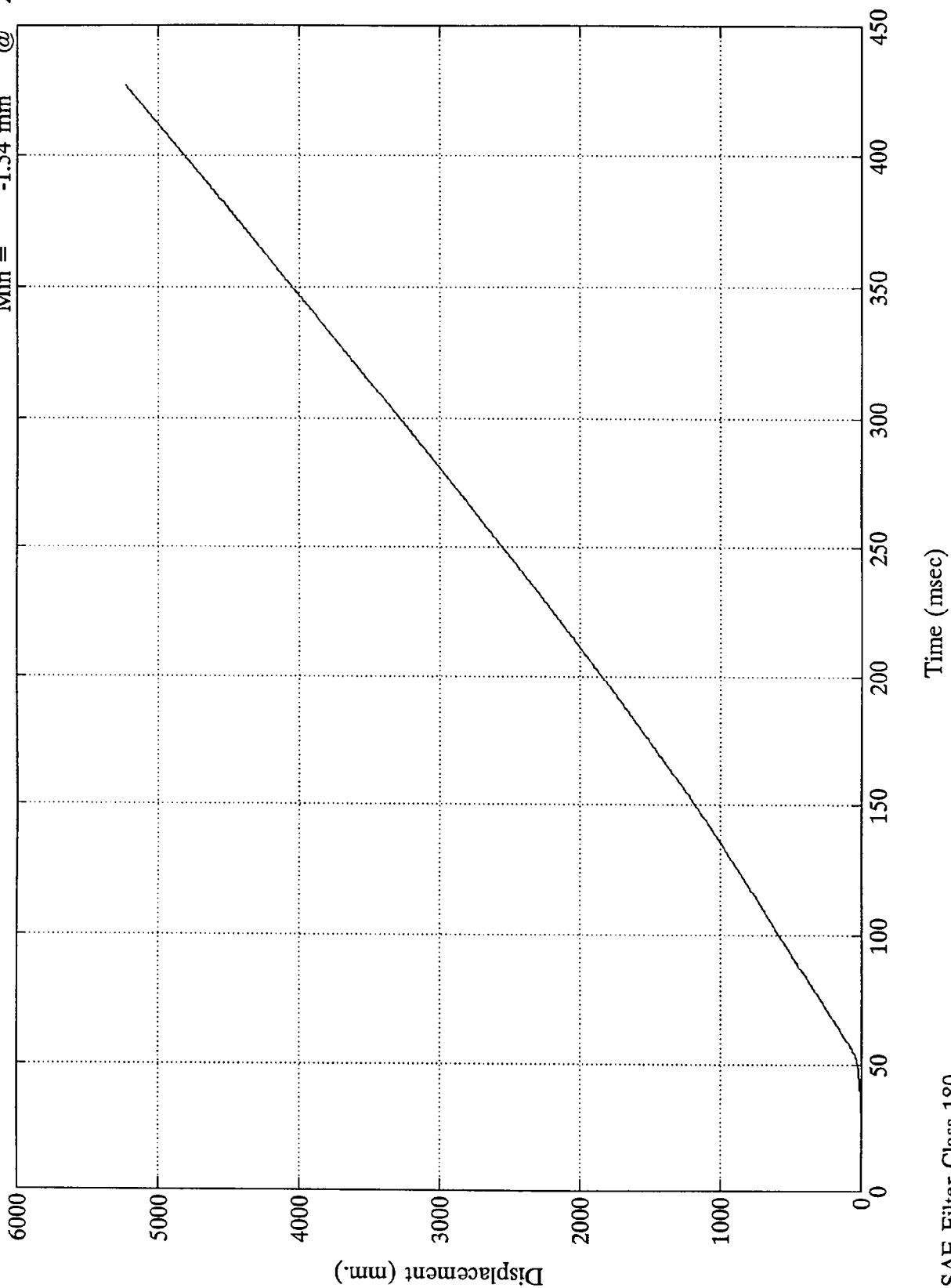


SAE Filter Class 180

VTV TEST #11

V1 Right Shock Tower (Y)

Max = 5229.94 mm @ 427.32 msec
Min = -1.54 mm @ 23.28 msec

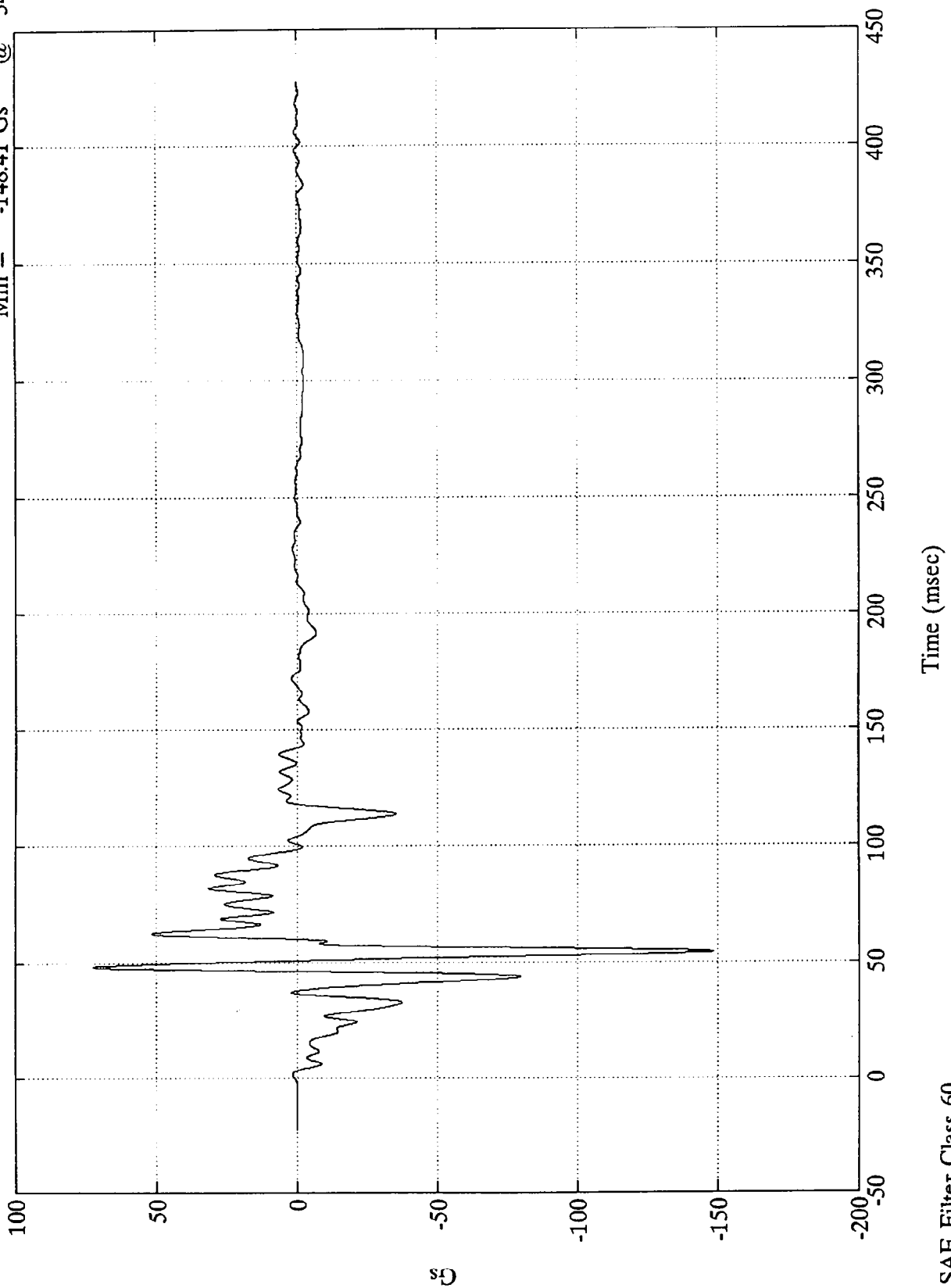


SAE Filter Class 180

VTV TEST #11

V1 Brake Pedal (X)

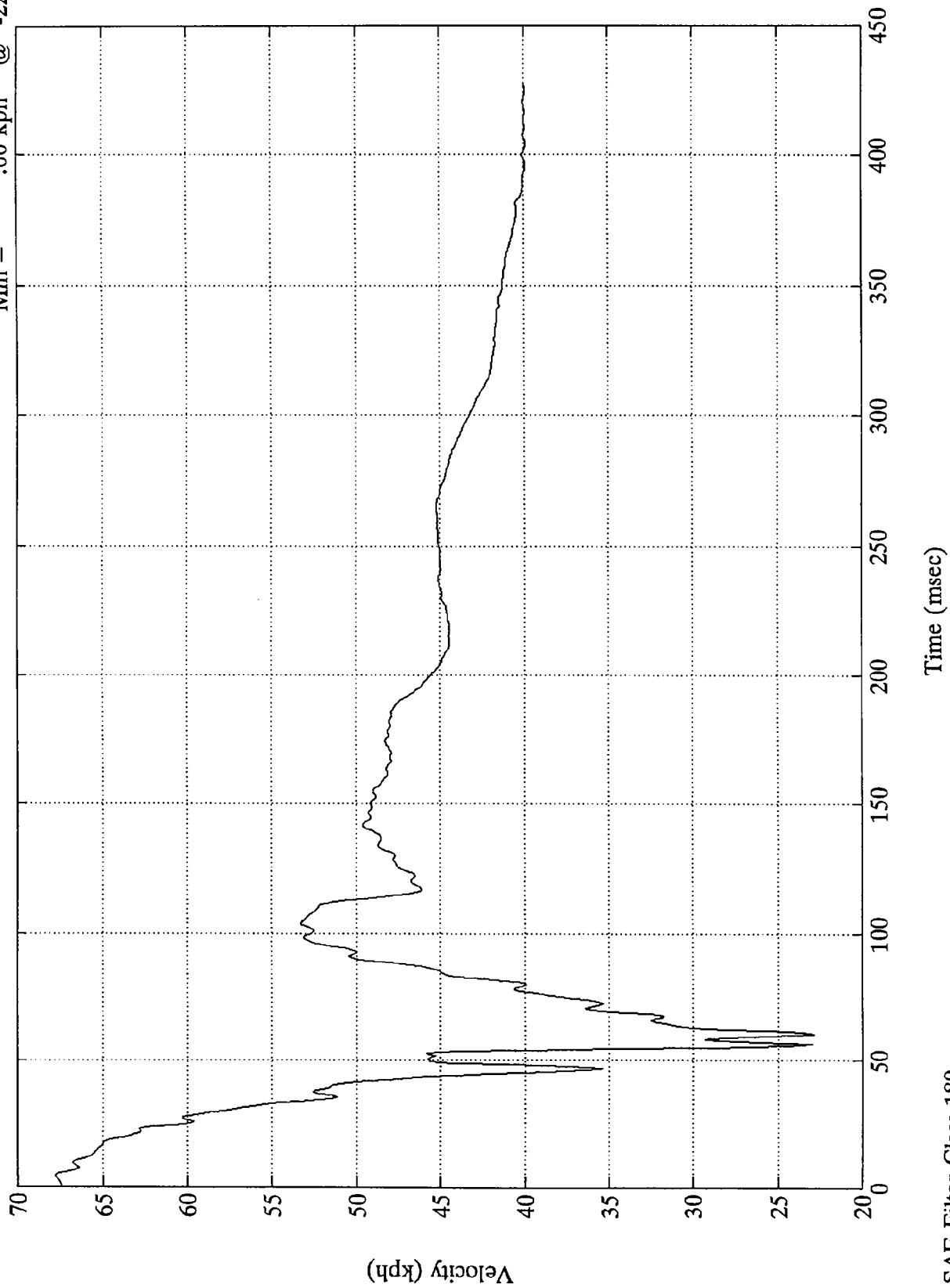
Max = 72.44 Gs @ 48.36 msec
Min = -148.41 Gs @ 54.47 msec



SAE Filter Class 60

VTV TEST #11

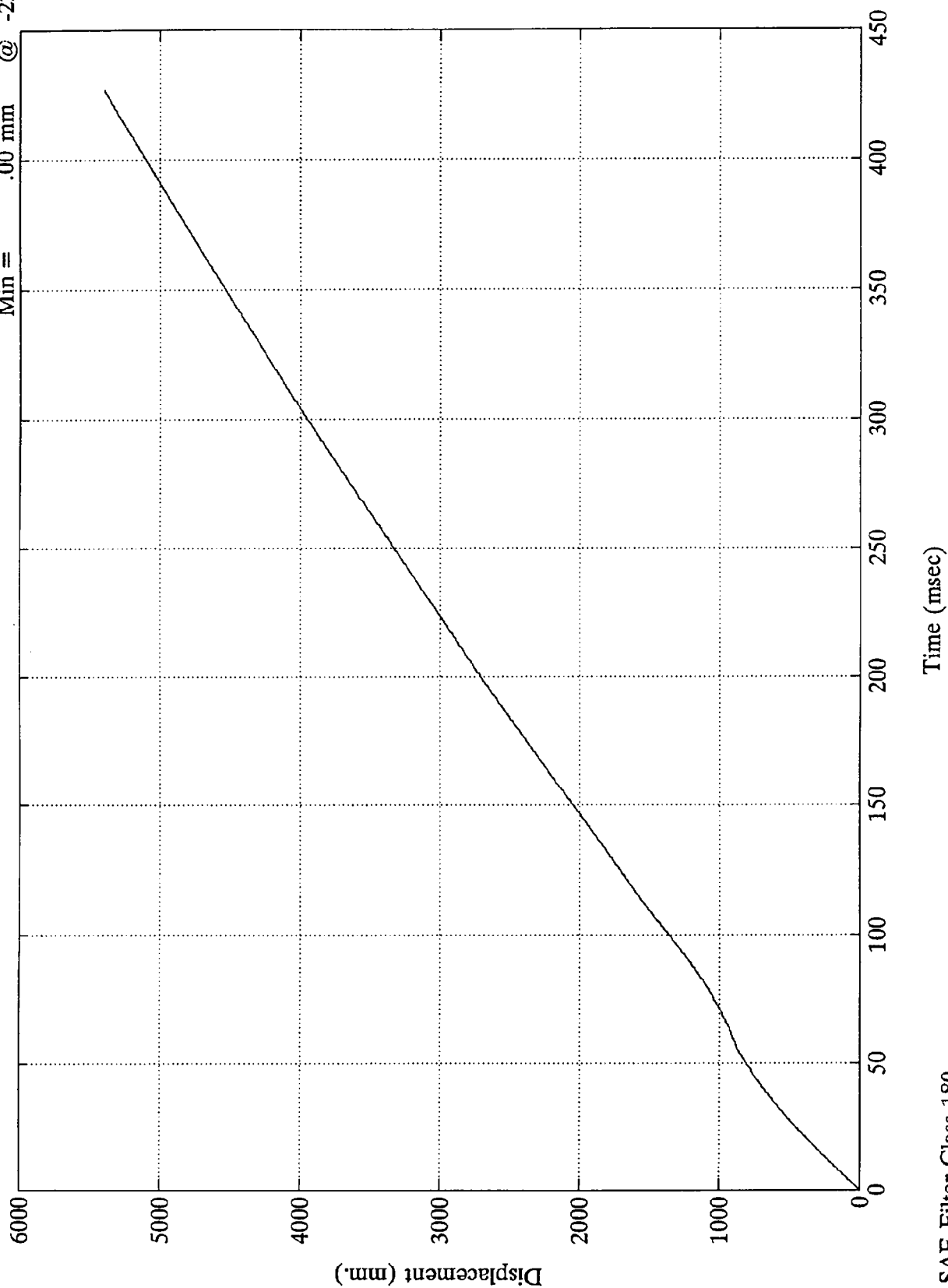
V1 Brake Pedal (X) Max = 67.81 kph @ 4.55 msec
Min = .00 kph @ -22.44 msec



SAE Filter Class 180

VTV TEST #11

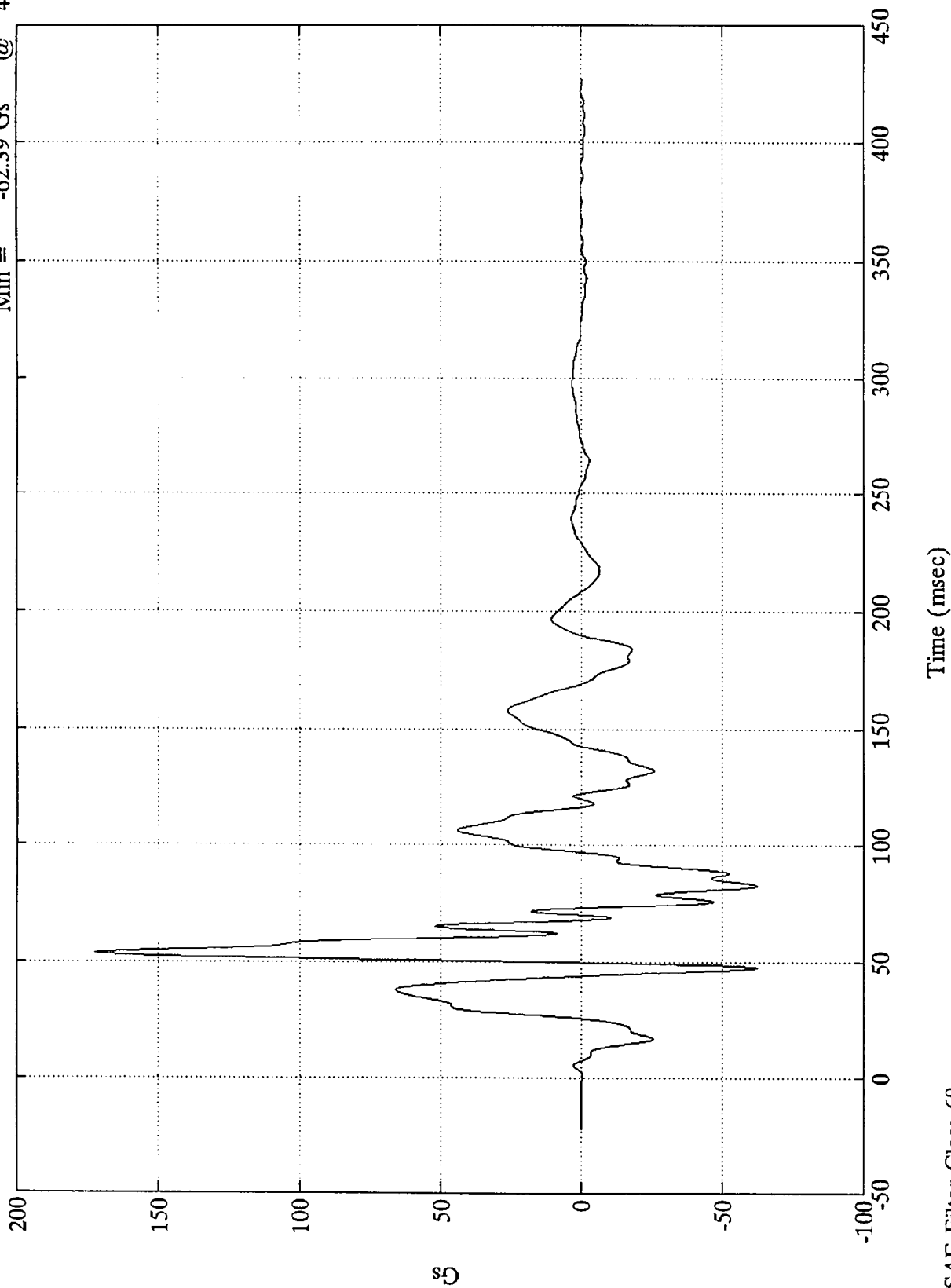
V1 Brake Pedal (X) Max = 5401.09 mm @ 427.32 msec
Min = .00 mm @ -22.44 msec



VTV TEST #11

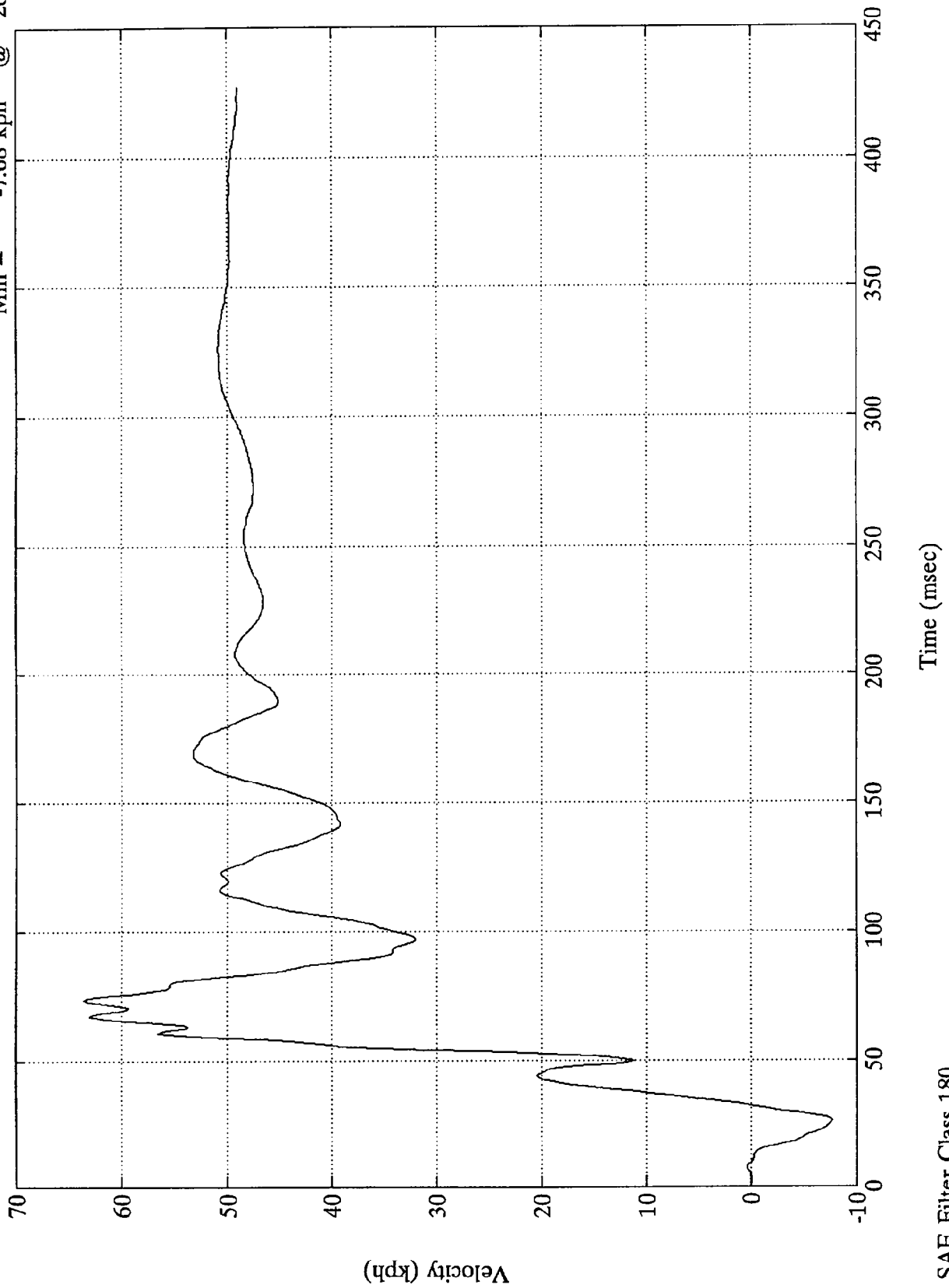
V1 Brake Pedal (Y)

Max =	172.41 Gs	@	53.63 msec
Min =	-62.39 Gs	@	47.63 msec



VTV TEST #11

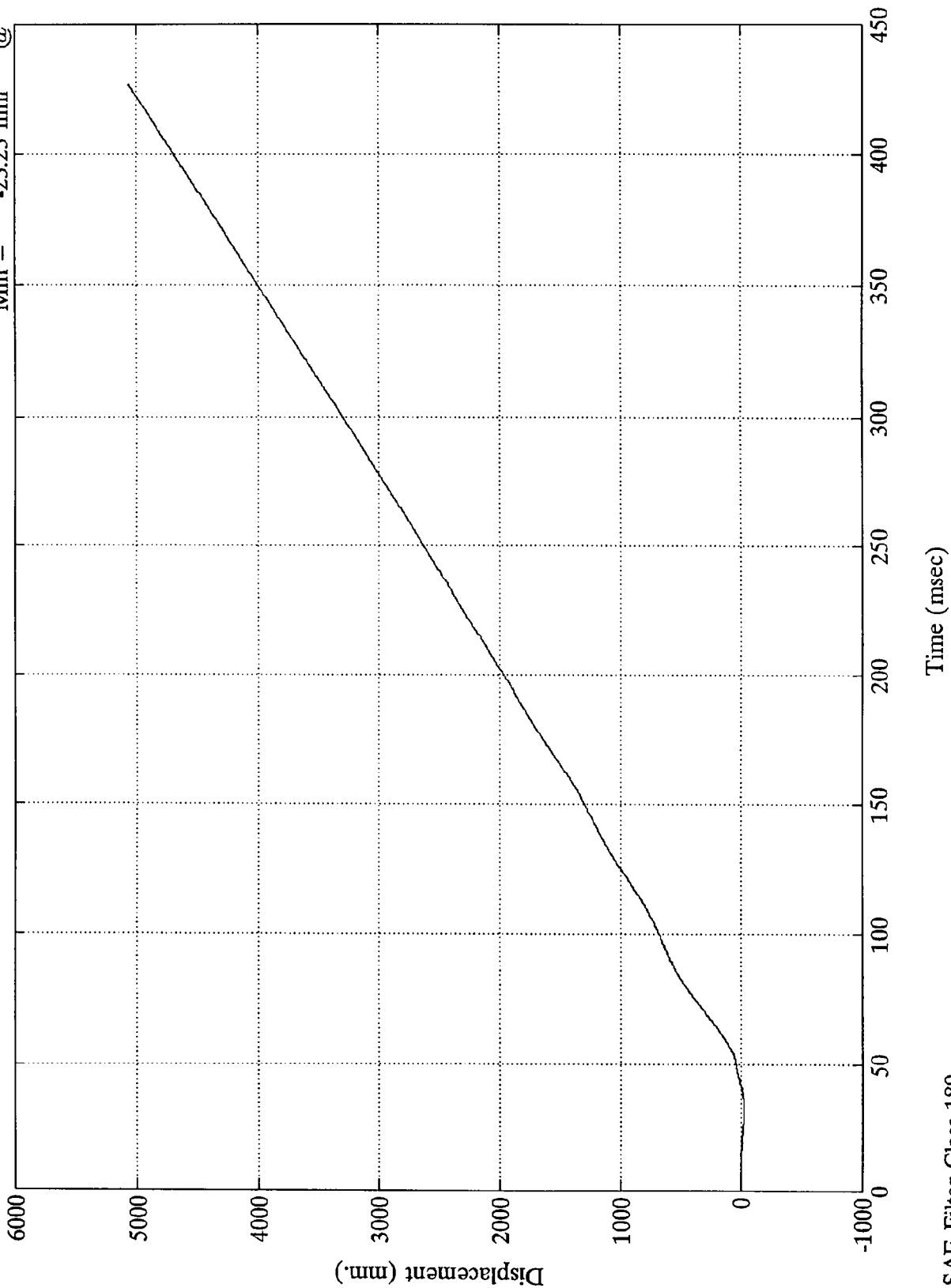
V1 Brake Pedal (Y) Max = 63.56 kph @ 73.20 msec
Min = -7.68 kph @ 26.28 msec



VTV TEST #11

V1 Brake Pedal (Y)

Max = 5064.33 mm @ 427.32 msec
Min = -23.23 mm @ 32.03 msec

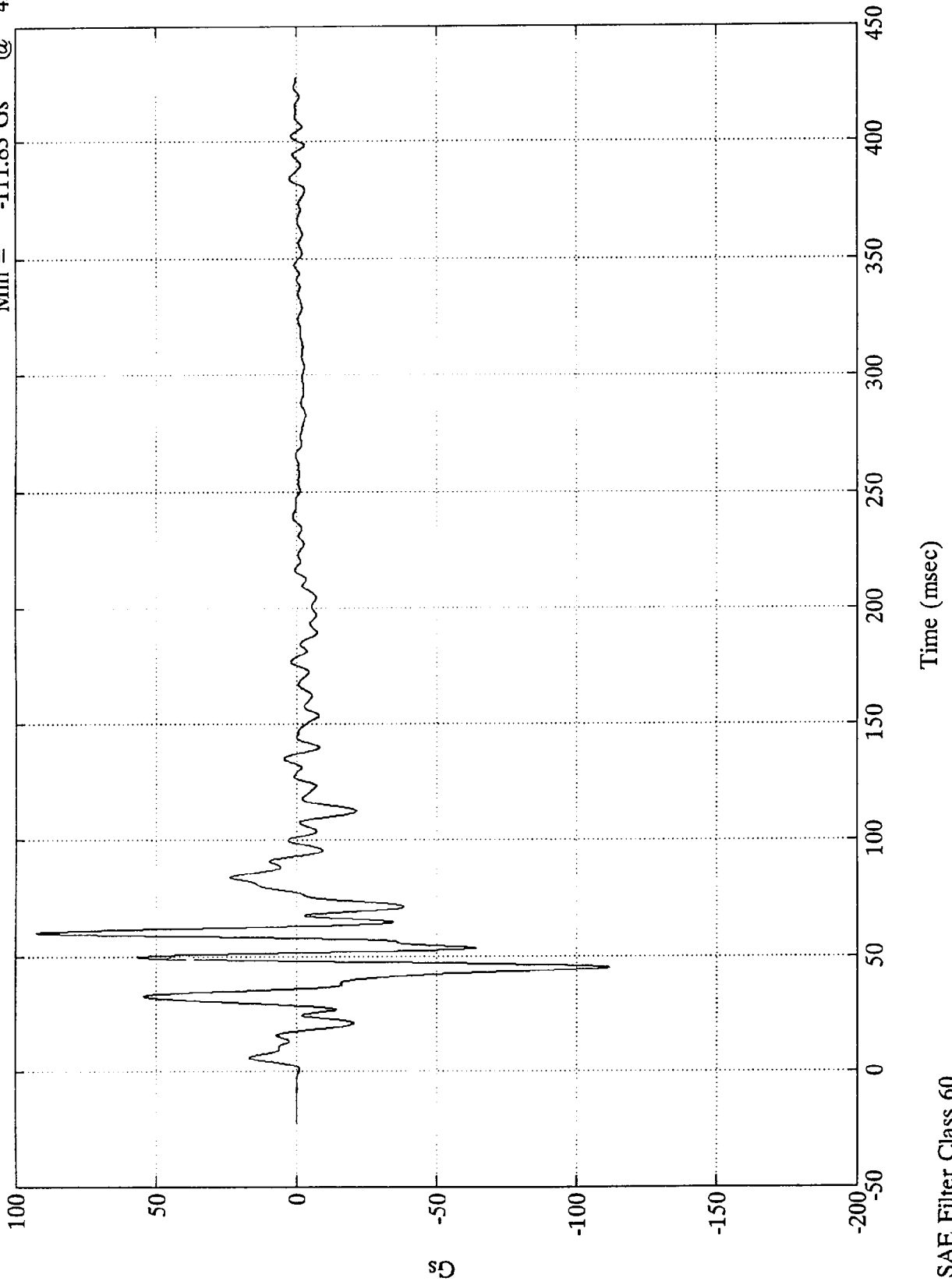


SAE Filter Class 180

VTV TEST #11

V1 Brake Pedal (Z)

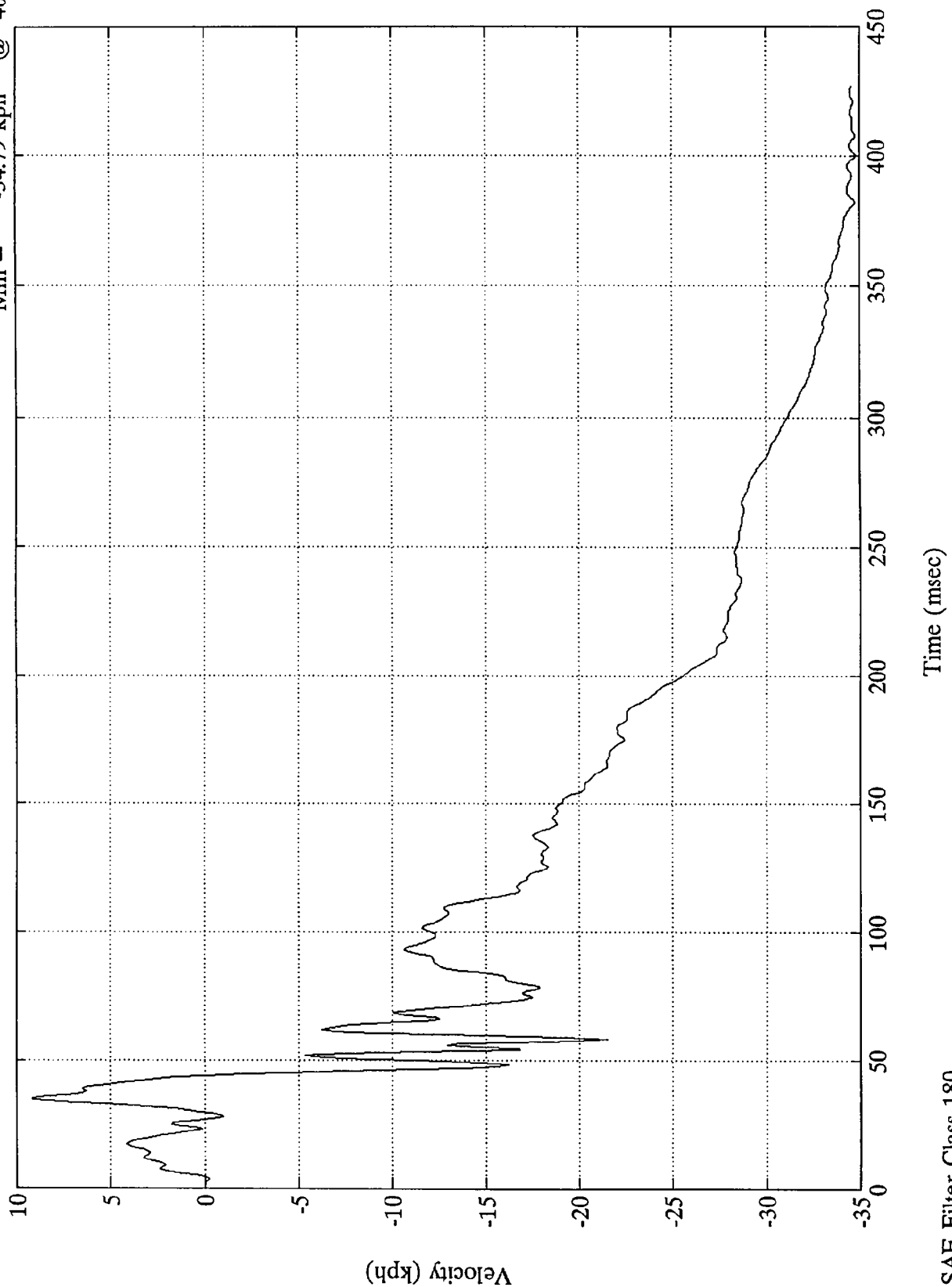
Max = 92.72 Gs @ 60.12 msec
Min = -111.83 Gs @ 45.12 msec



SAE Filter Class 60

VTV TEST #11

V1 Brake Pedal (Z) Max = 9.26 kph @ 35.04 msec
Min = -34.79 kph @ 400.08 msec

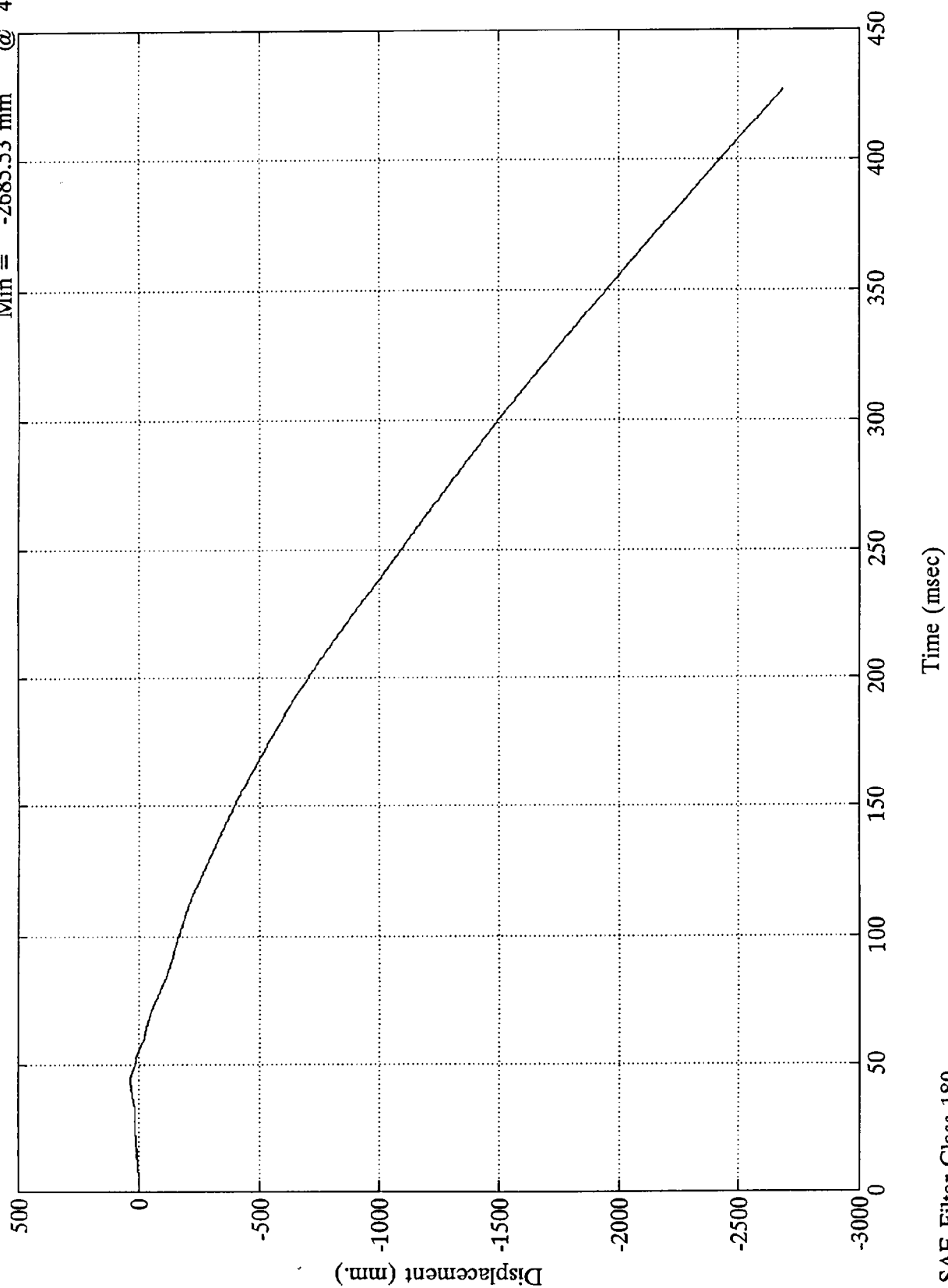


SAE Filter Class 180

VTV TEST #11

V1 Brake Pedal (Z)

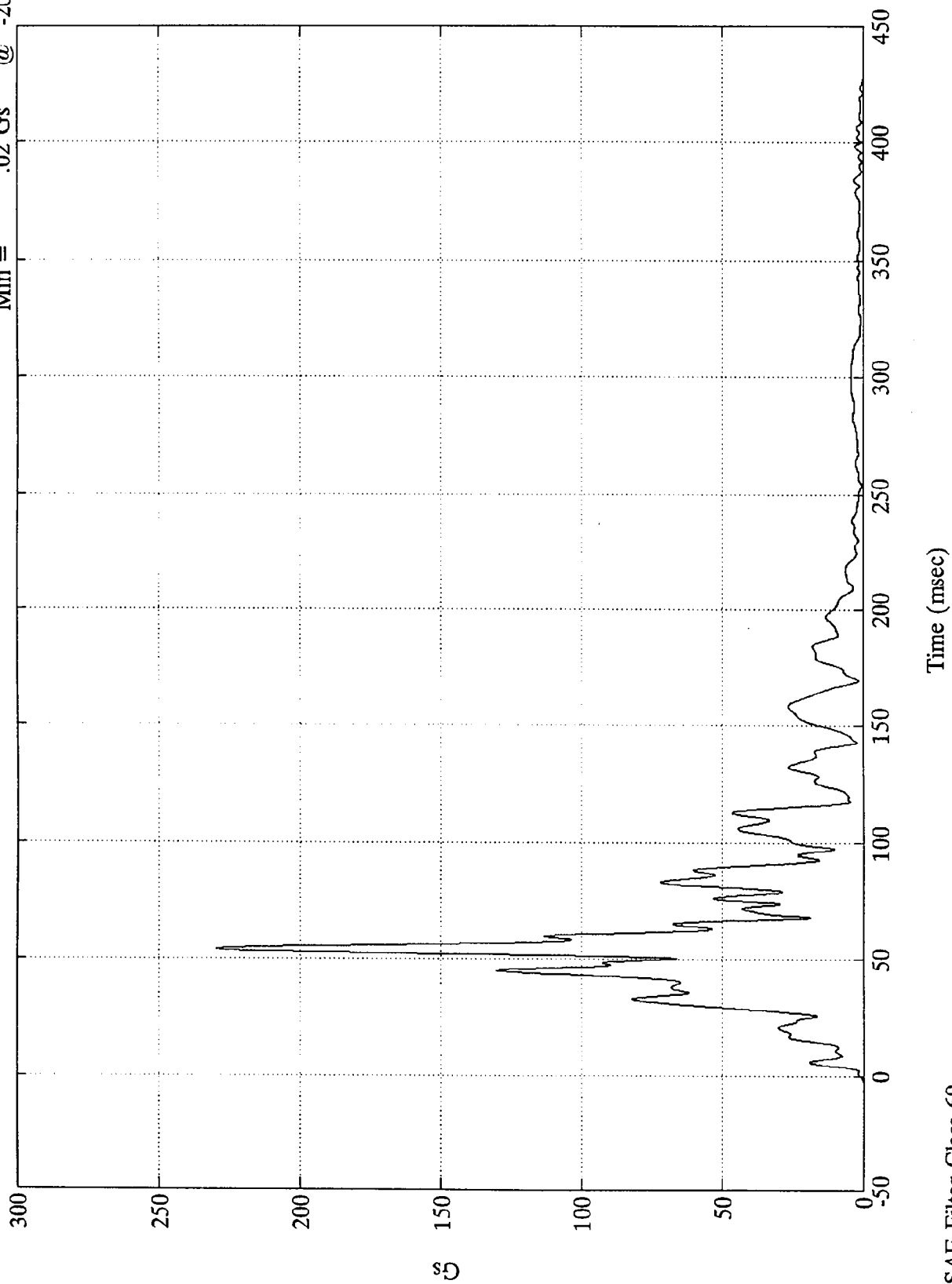
Max = 33.41 mm @ 43.80 msec
Min = -2685.53 mm @ 427.32 msec



VTV TEST #11

Max = 229.90 Gs @ 54.00 msec
Min = .02 Gs @ -20.04 msec

V1 Brake Pedal (res)

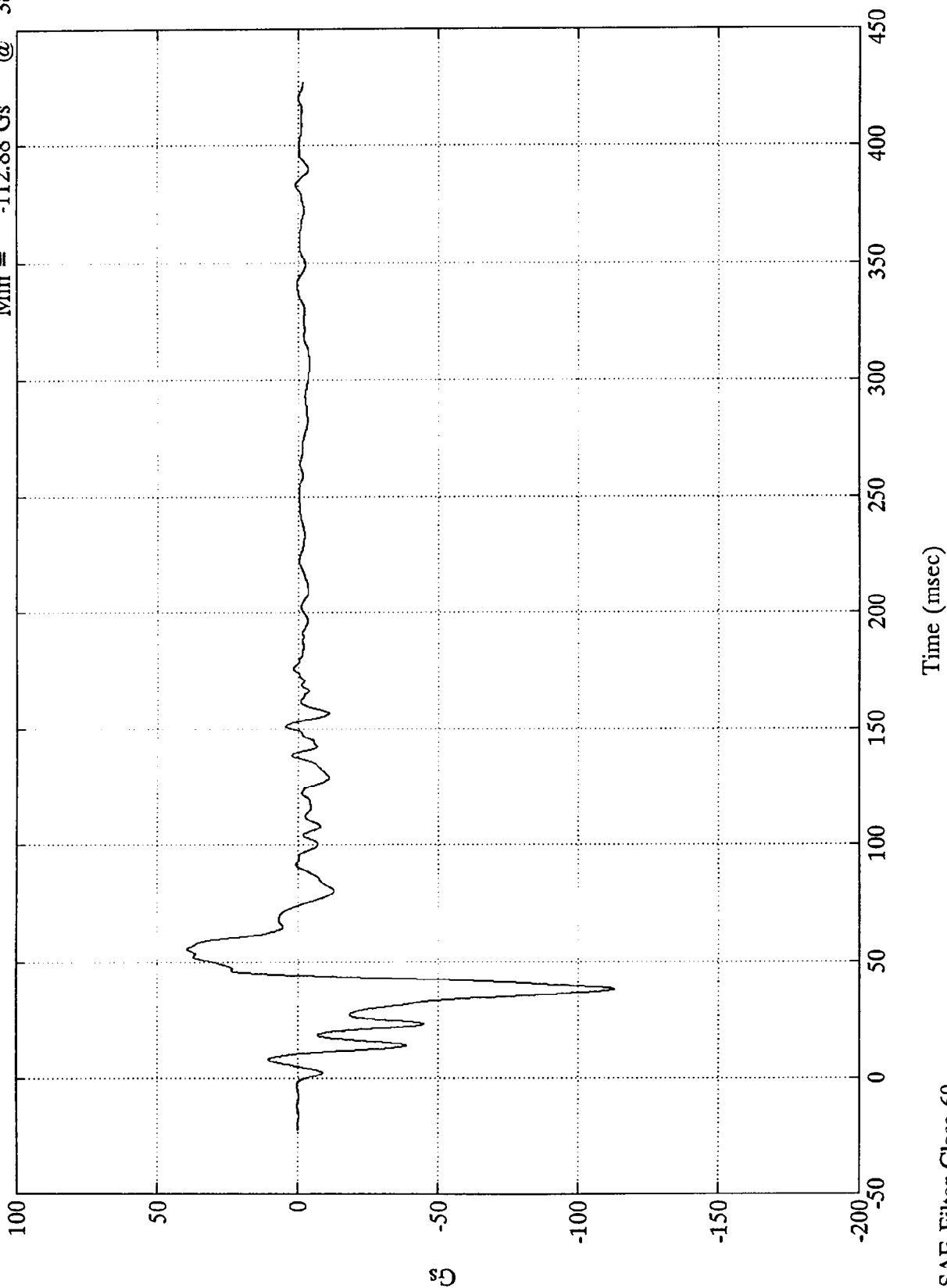


SAE Filter Class 60

VTV TEST #11

V1 LF Frame Rail (X)

Max = 39.31 Gs @ 55.68 msec
Min = -112.88 Gs @ 38.04 msec

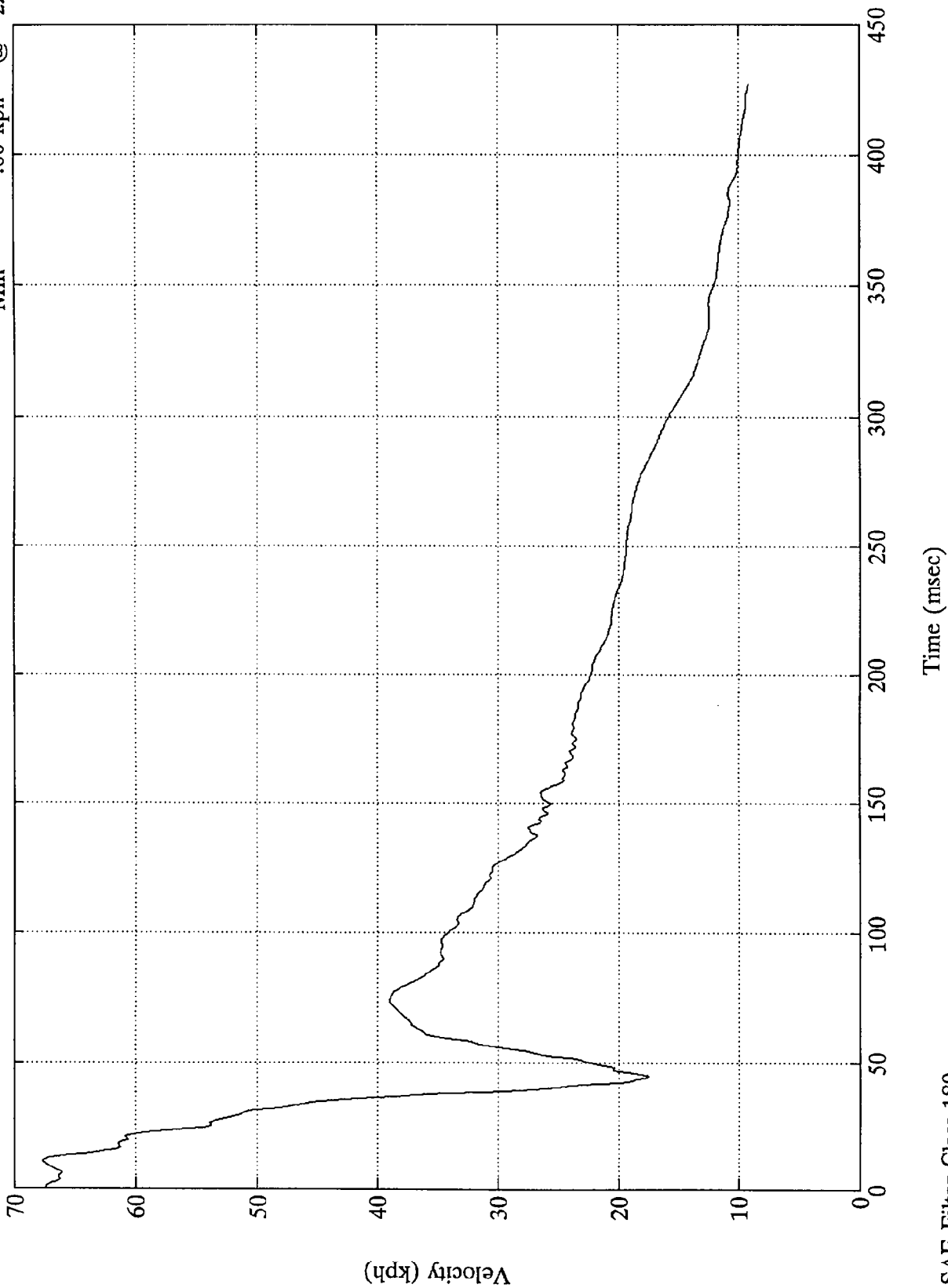


SAE Filter Class 60

VTV TEST #11

V1 L.F Frame Rail (X)

Max = 67.70 kph @ 11.16 msec
Min = .00 kph @ -22.44 msec

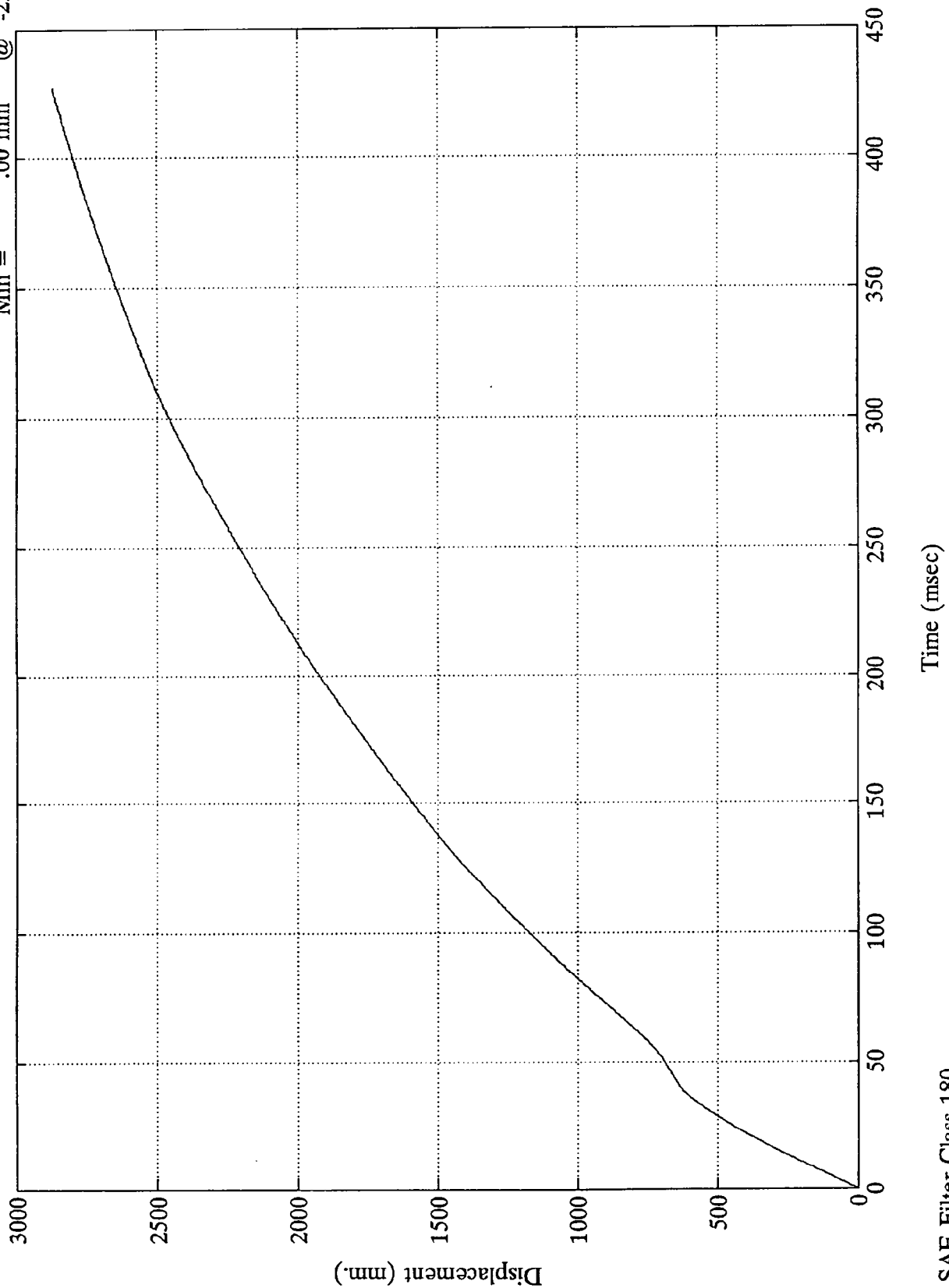


SAE Filter Class 180

VTV TEST #11

V1 LF Frame Rail (X)

Max = 2871.00 mm @ 427.32 msec
Min = .00 mm @ -22.44 msec

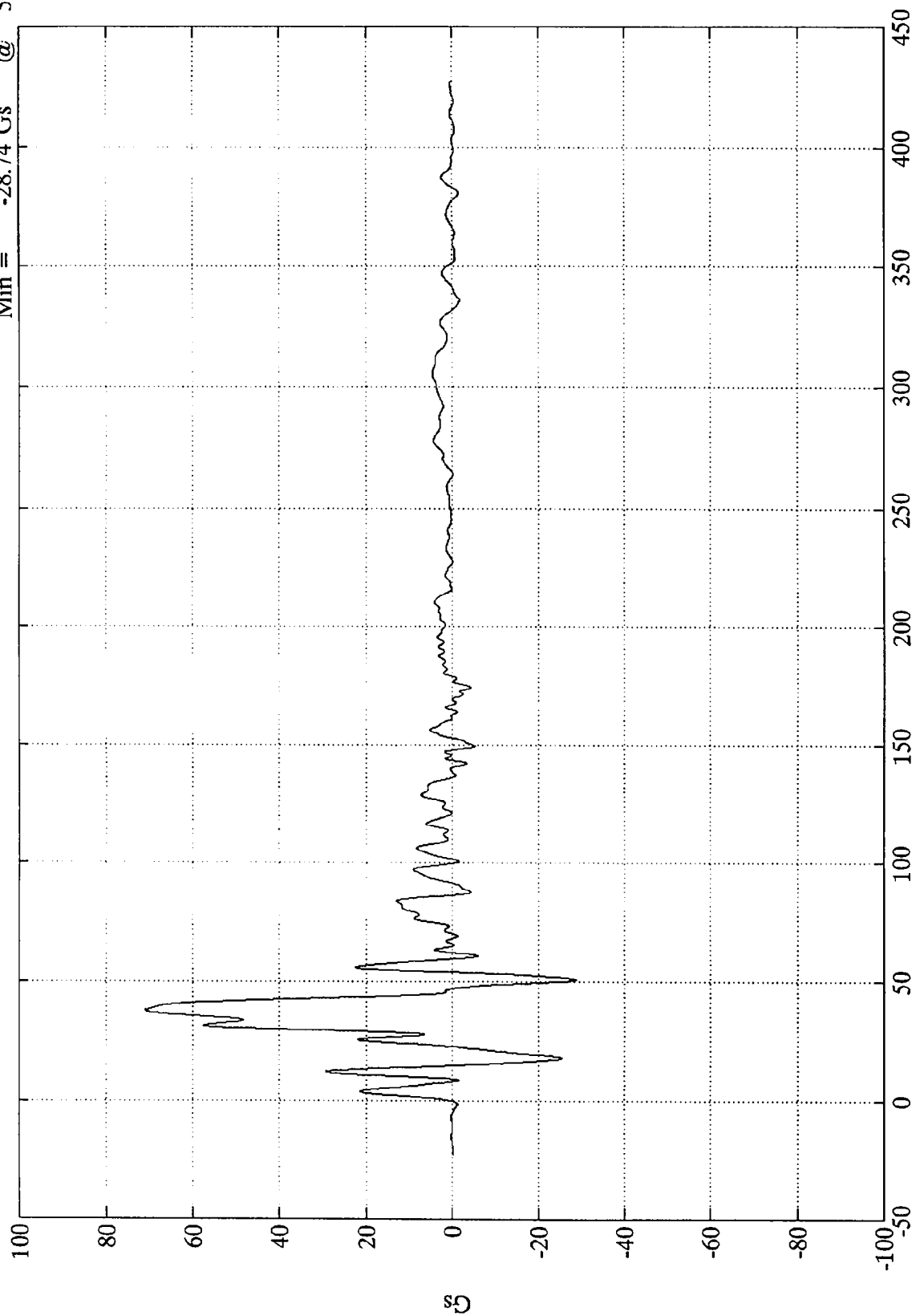


SAE Filter Class 180

VTV TEST #11

Max = 70.94 Gs @ 37.44 msec
Min = -28.74 Gs @ 50.76 msec

V1 L.F. Frame Rail (Y)



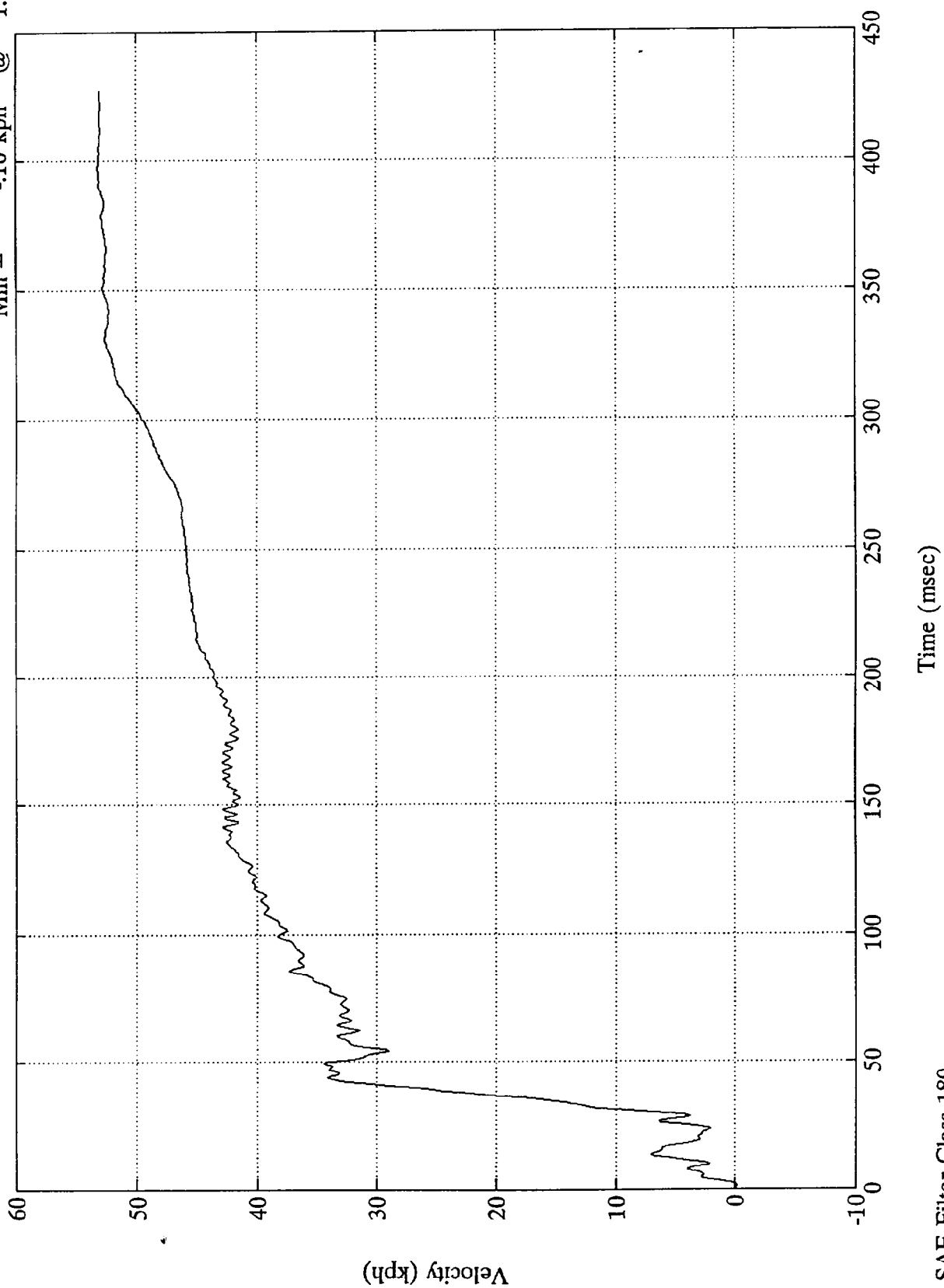
Time (msec)

SAE Filter Class 60

VTV TEST #11

V1 L.F. Frame Rail (Y)

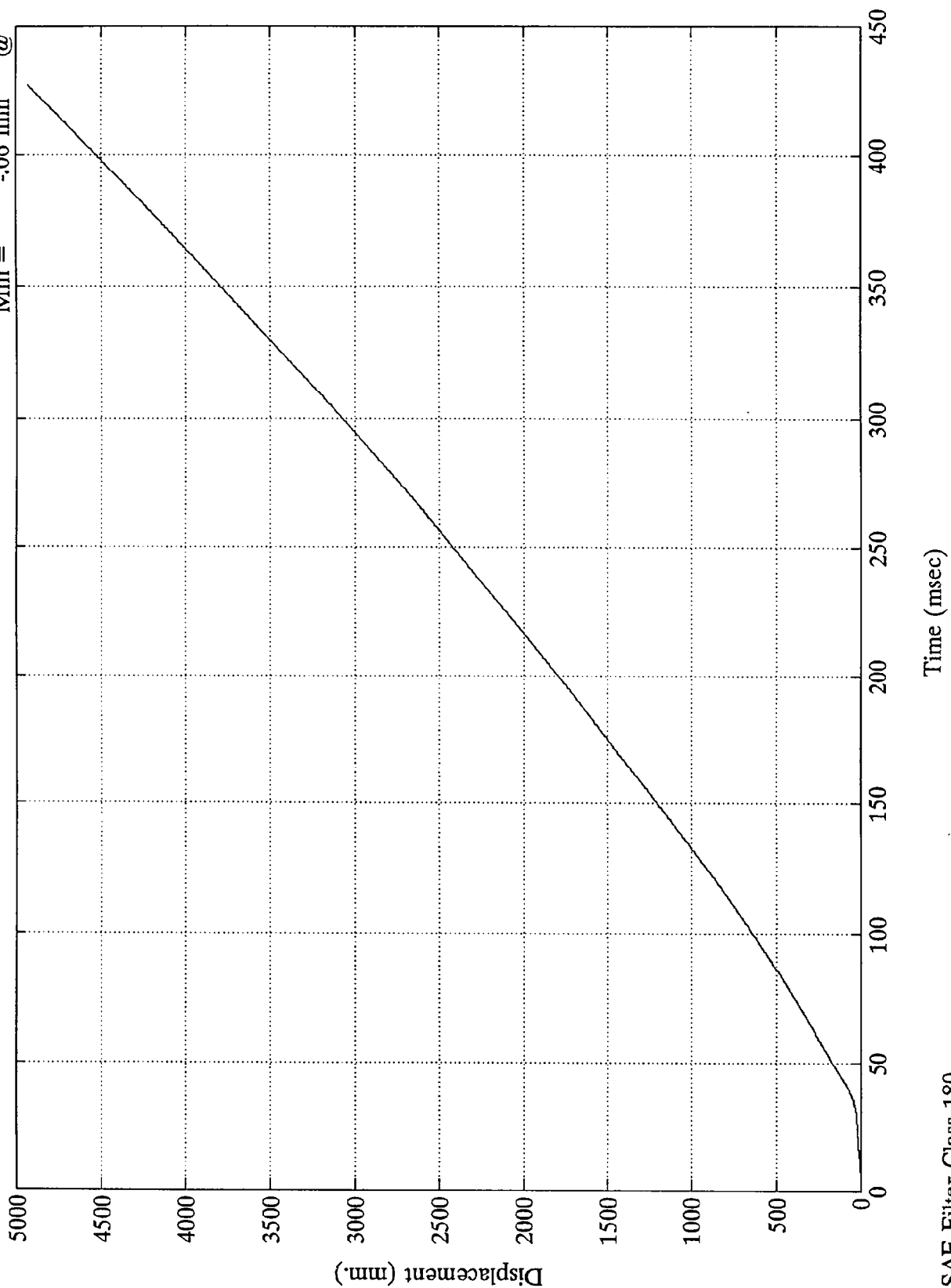
Max = 53.18 kph @ 397.32 msec
Min = -1.6 kph @ 1.67 msec



VTV TEST #11

V1 L.F Frame Rail (Y)

Max = 4929.28 mm @ 427.32 msec
Min = -.06 mm @ 2.39 msec

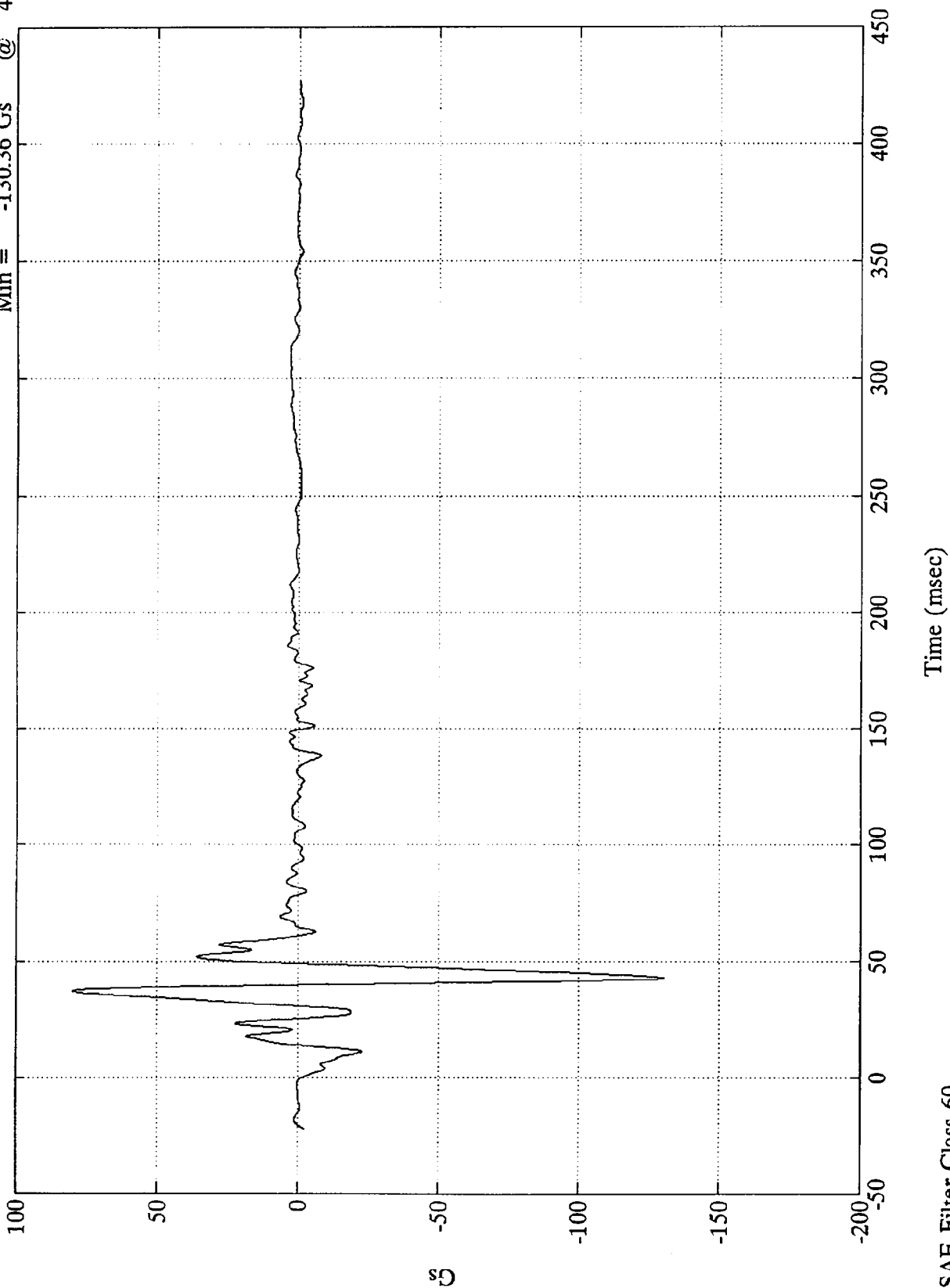


SAE Filter Class 180

VTV TEST #11

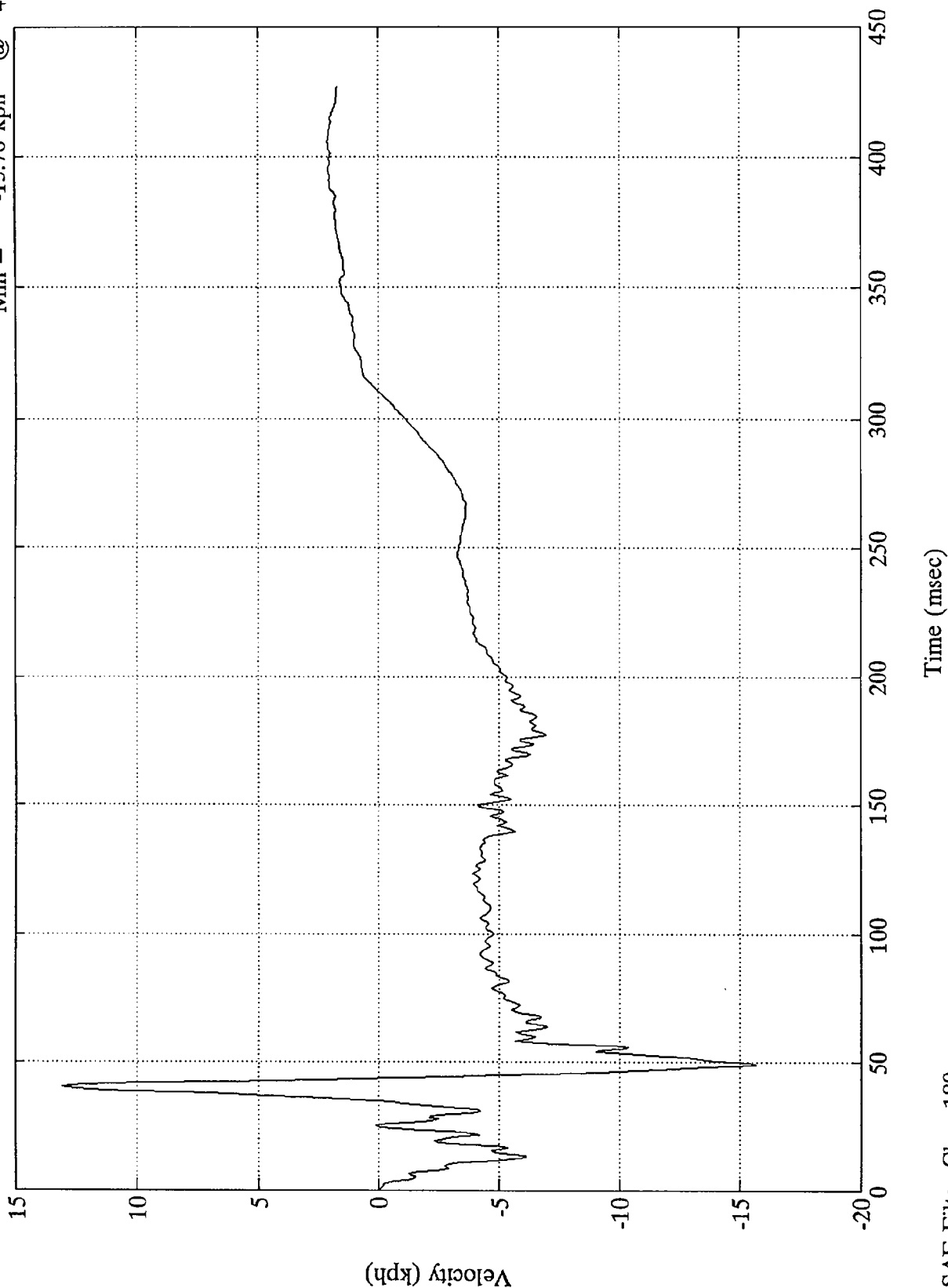
V1 LF Frame Rail (Z)

Max =	79.91 Gs	@	36.84 msec
Min =	-130.36 Gs	@	42.95 msec



VTV TEST #11

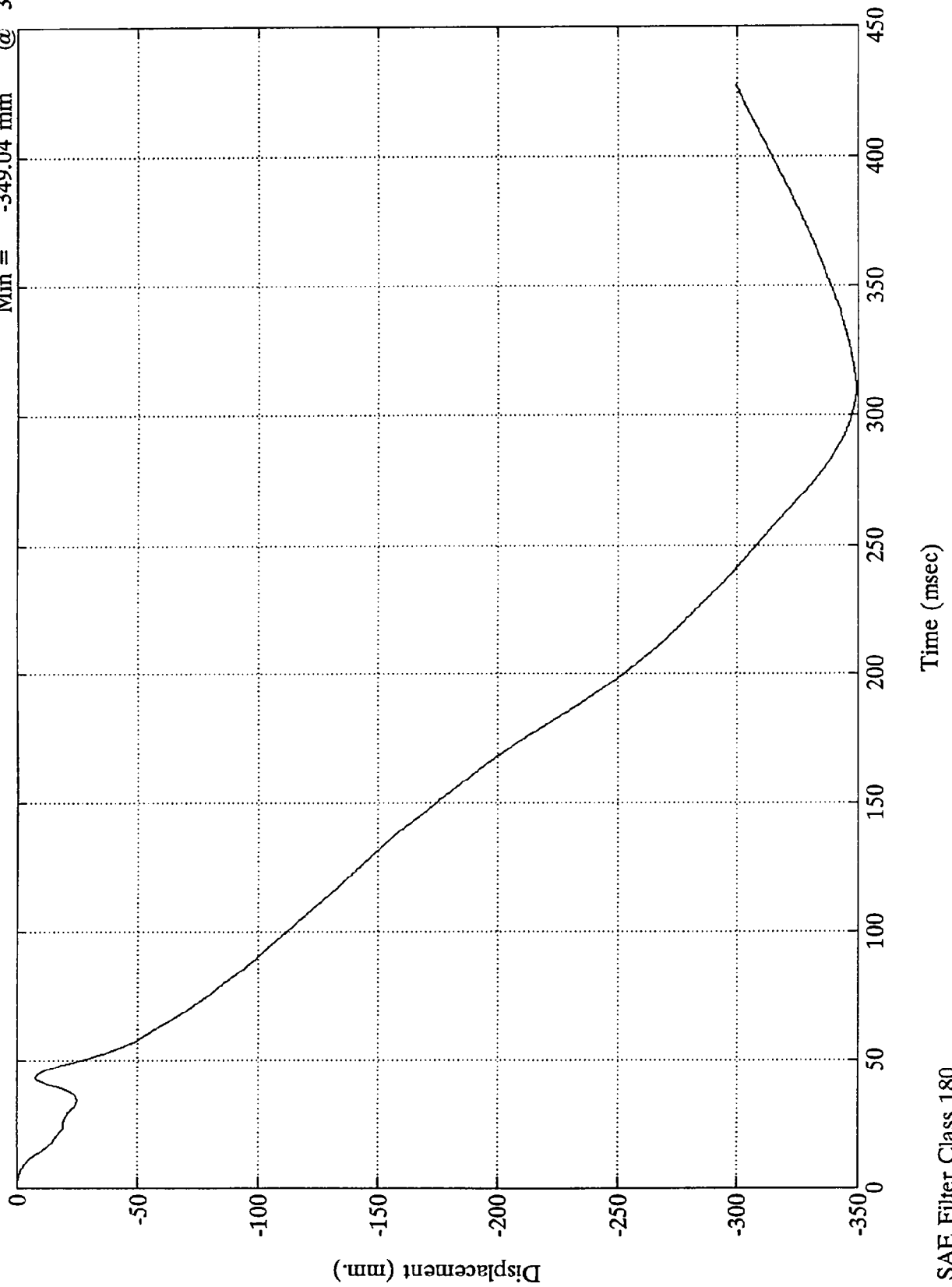
V1 LF Frame Rail (Z) Max = 13.11 kph @ 40.07 msec
Min = -15.76 kph @ 48.84 msec



VTV TEST #11

V1 L.F Frame Rail (Z)

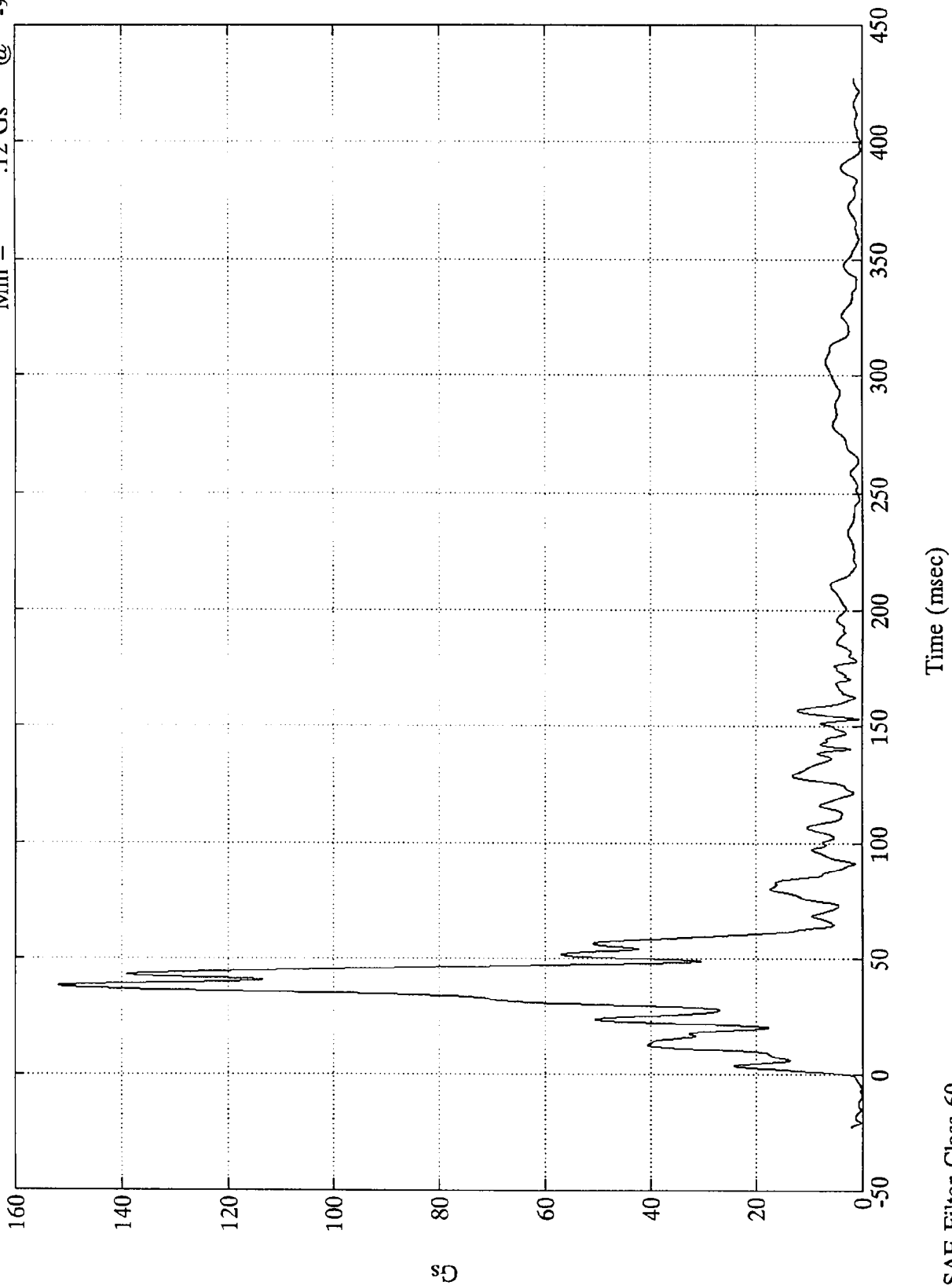
Max = .00 mm @ -0.00 msec
Min = -349.04 mm @ 310.32 msec



VTV TEST #11

Max = 152.03 Gs @ 37.56 msec
Min = .12 Gs @ -9.72 msec

V1 L.F. Frame Rail Res.

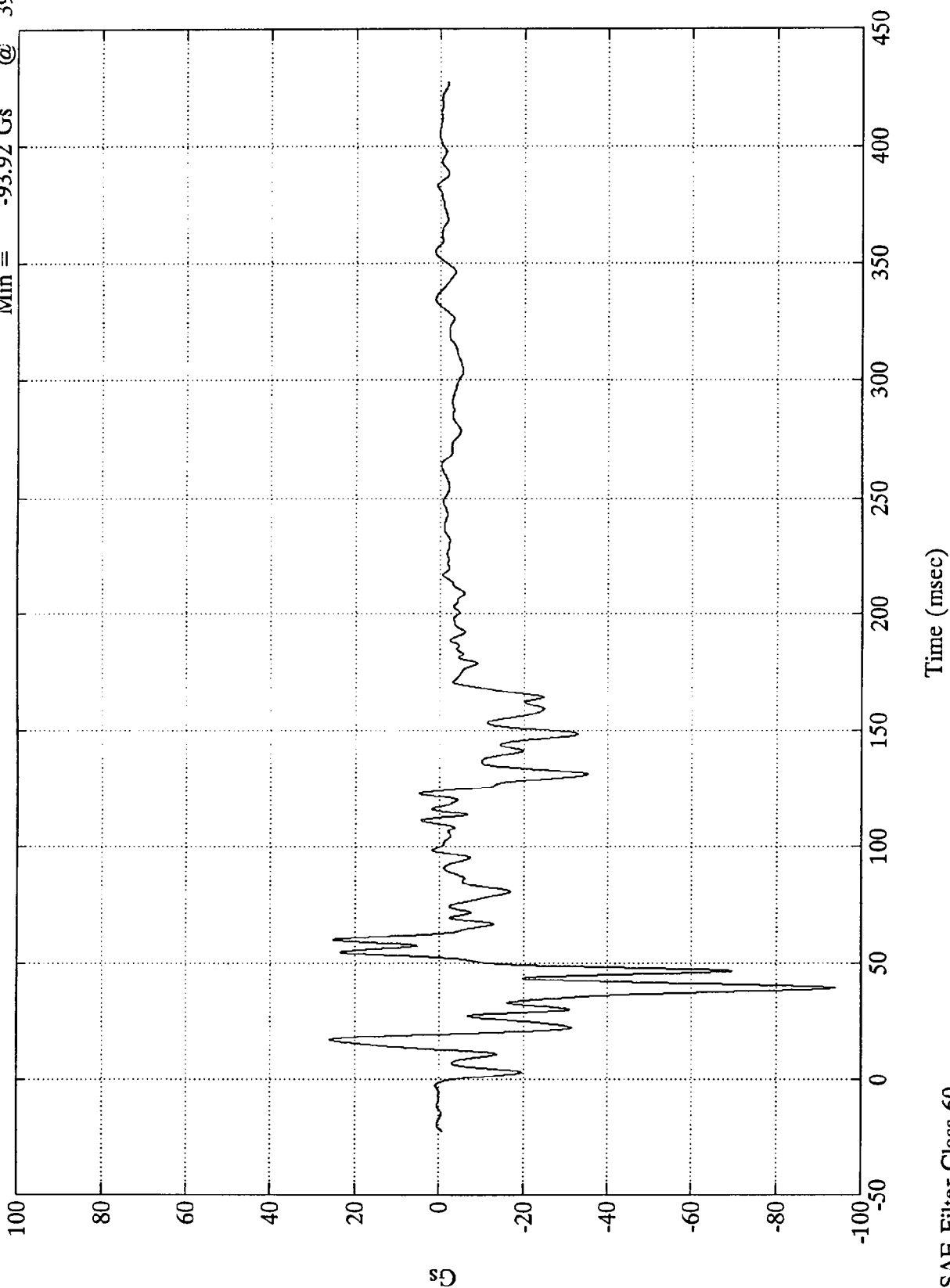


SAE Filter Class 60

VTV TEST #11

V1 R.F Frame Rail (X)

Max = 25.90 Gs @ 17.15 msec
Min = -93.92 Gs @ 39.11 msec

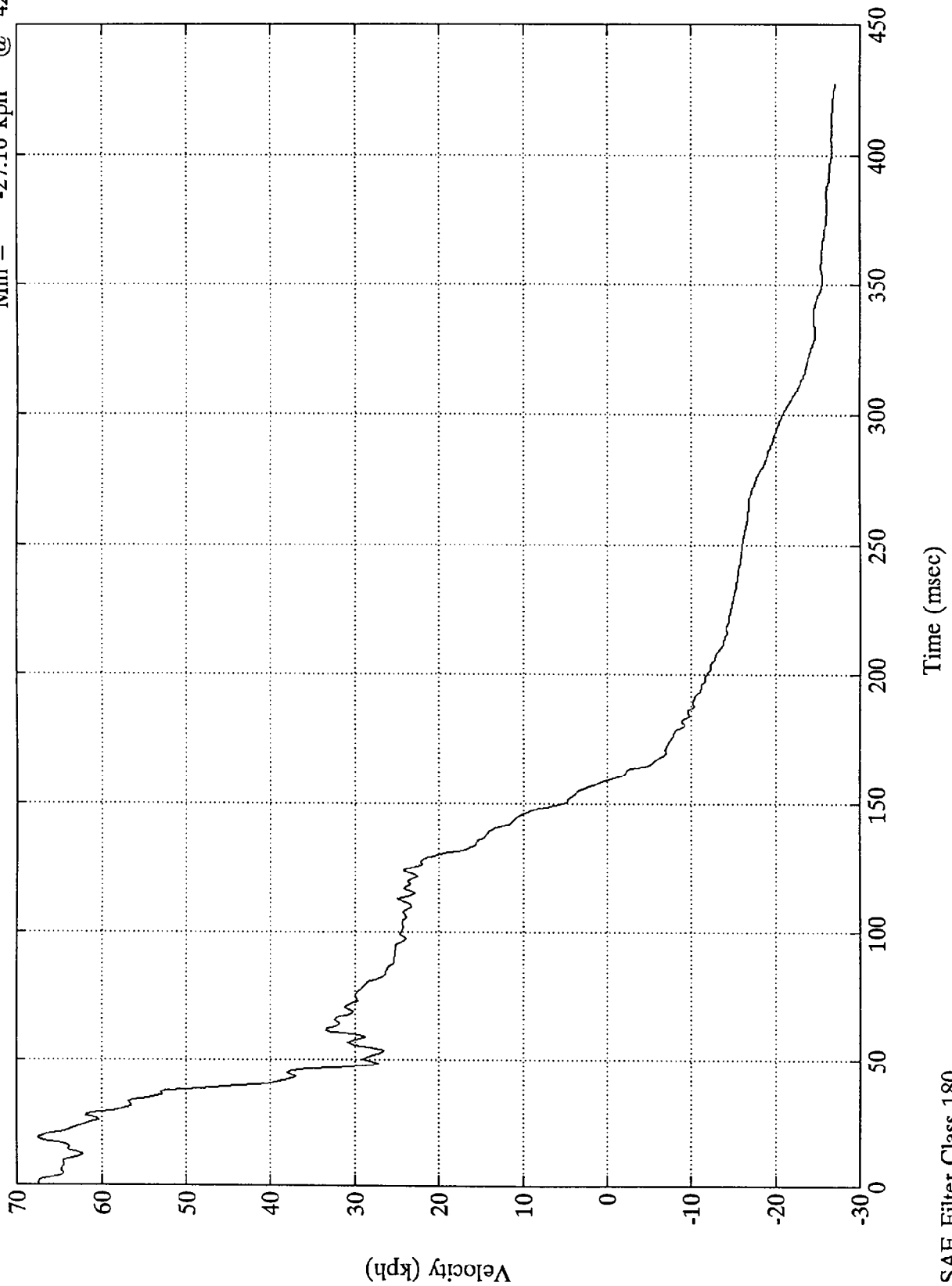


SAE Filter Class 60

VTV TEST #11

V1 R.F Frame Rail (X)

Max = 67.59 kph @ 19.07 msec
Min = -27.10 kph @ 427.32 msec

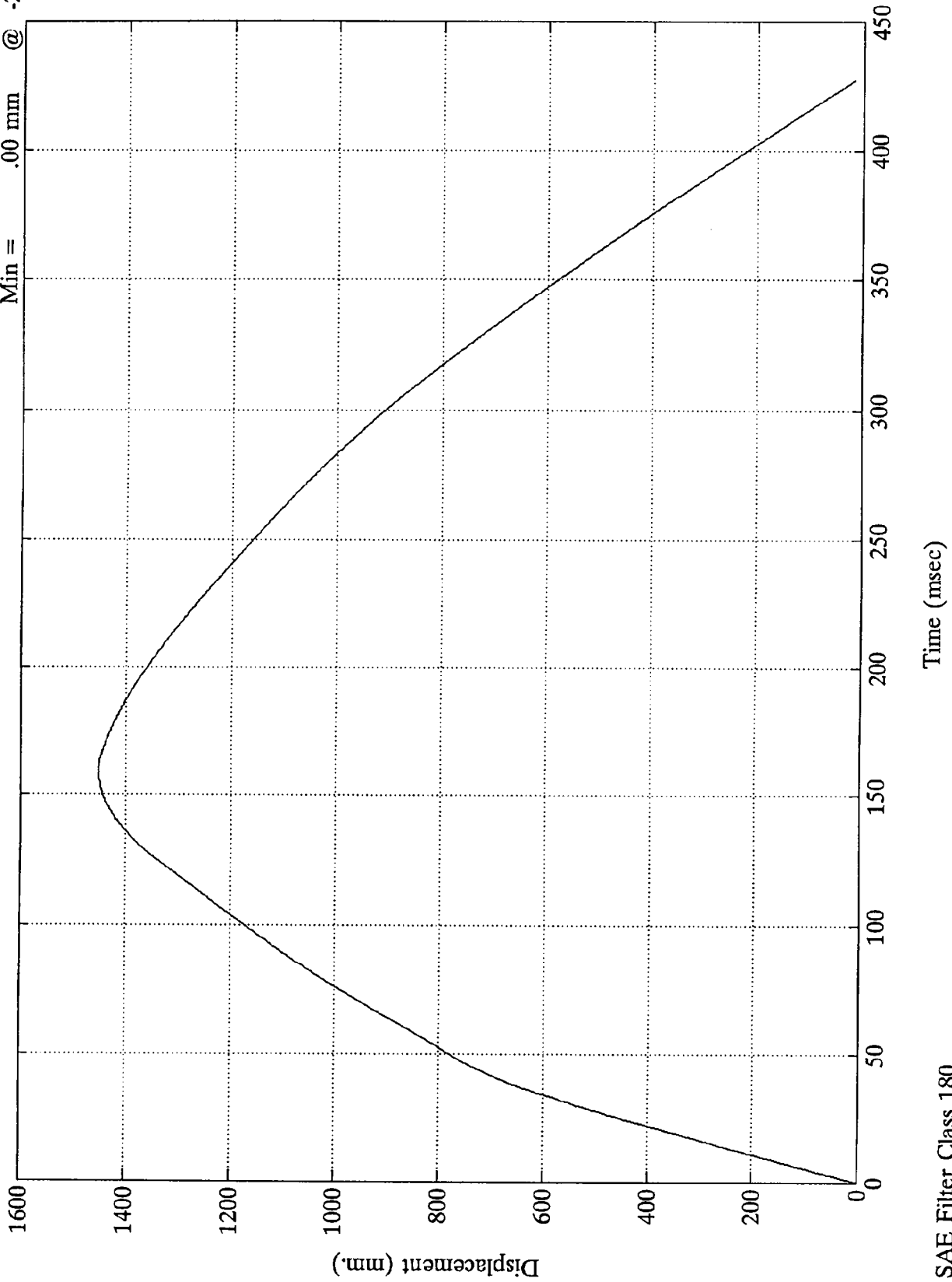


SAE Filter Class 180

VTV TEST #11

V1 R.F Frame Rail (X)

Max = 1451.78 mm @ 159.24 msec
Min = .00 mm @ -22.44 msec

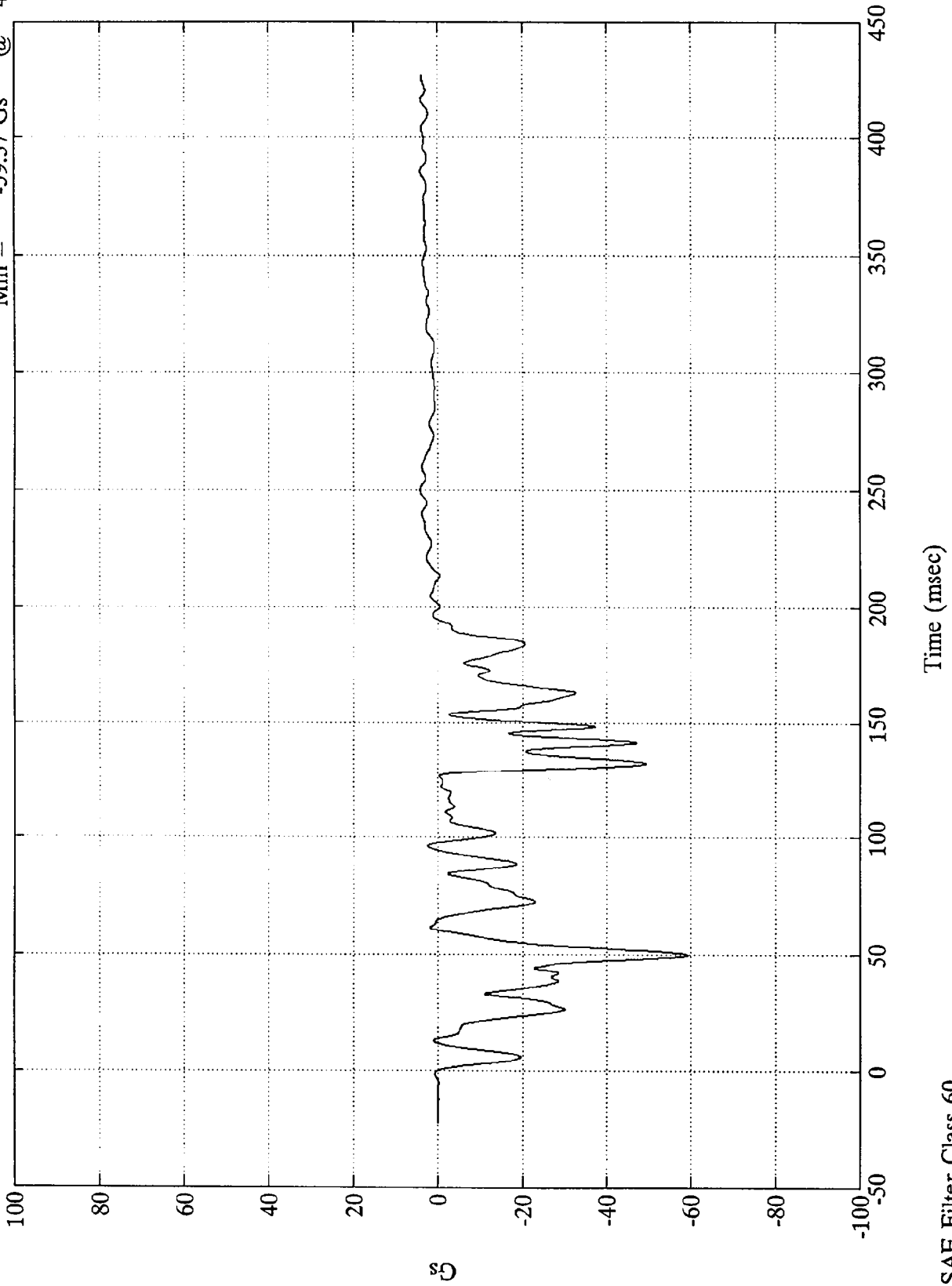


SAE Filter Class 180

VTV TEST #11

V1 R.F Frame Rail (Y)

Max = 4.19 Gs @ 385.68 msec
Min = -59.37 Gs @ 49.92 msec

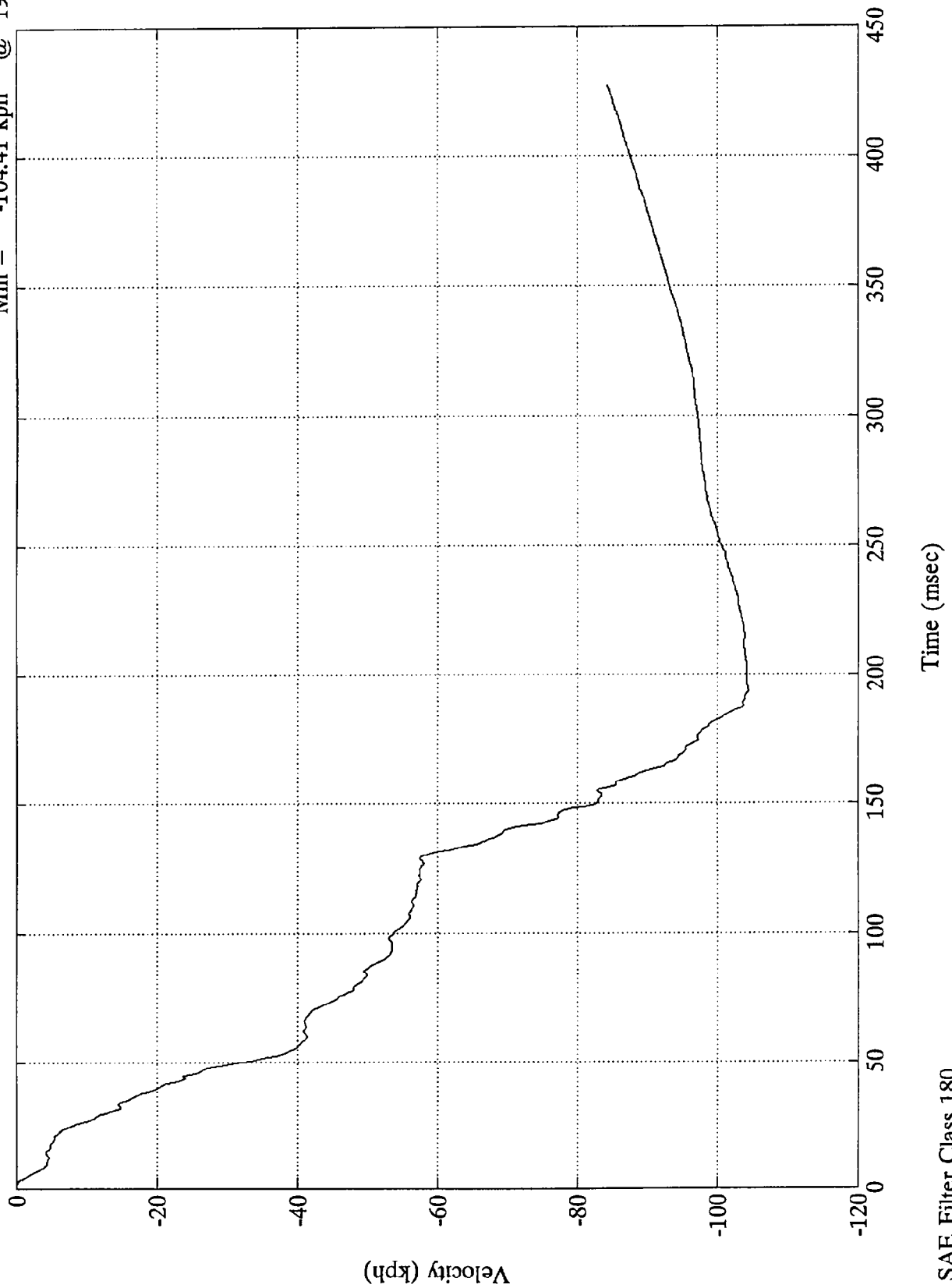


SAE Filter Class 60

VTV TEST #11

V1 R.F Frame Rail (Y)

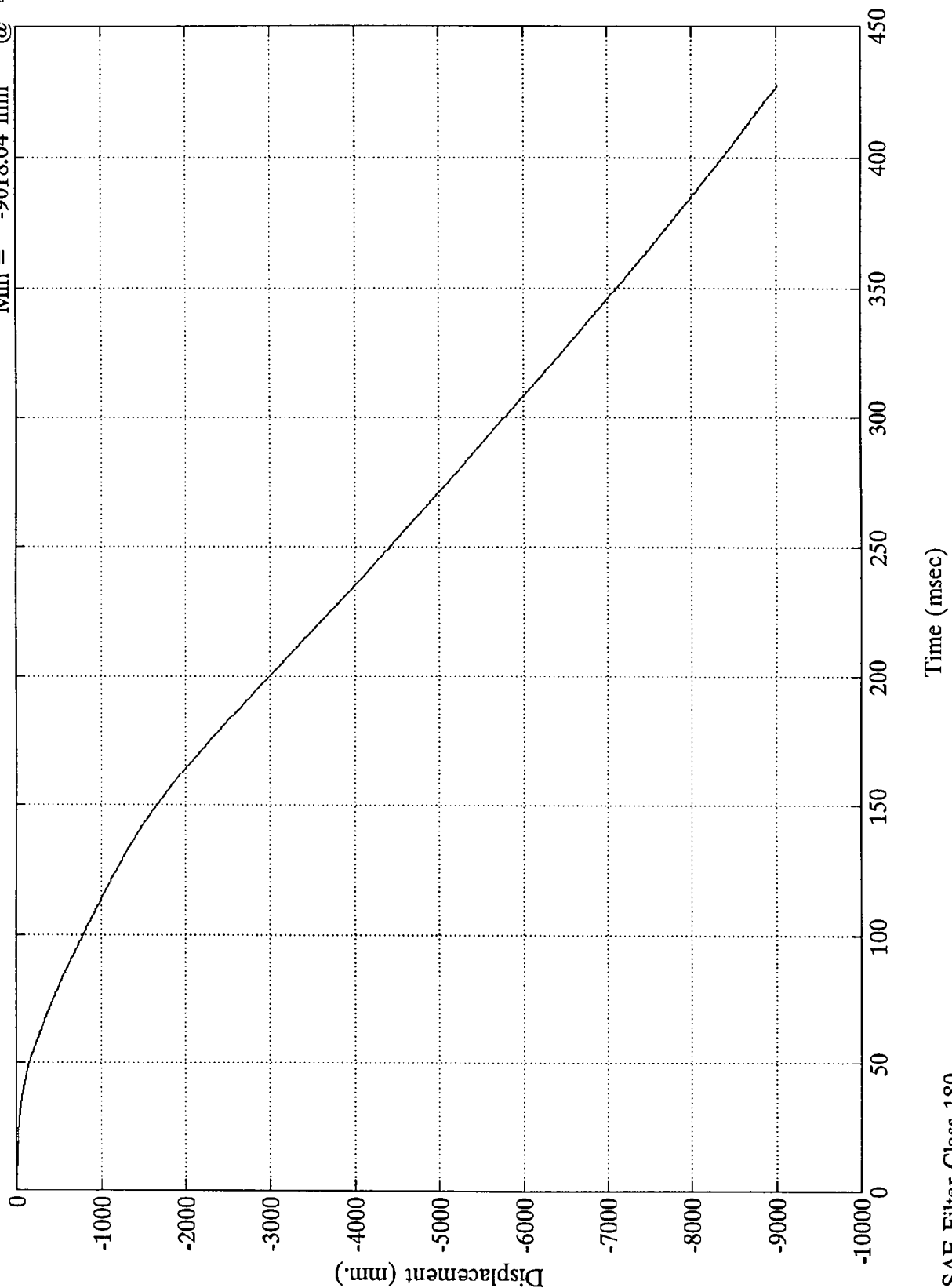
Max = .02 kph @ 1.19 msec
Min = -104.41 kph @ 193.56 msec



VTV TEST #11

V1 R.F Frame Rail (Y)

Max =	.01 mm	@	1.79 msec
Min =	-9018.04 mm	@	427.32 msec

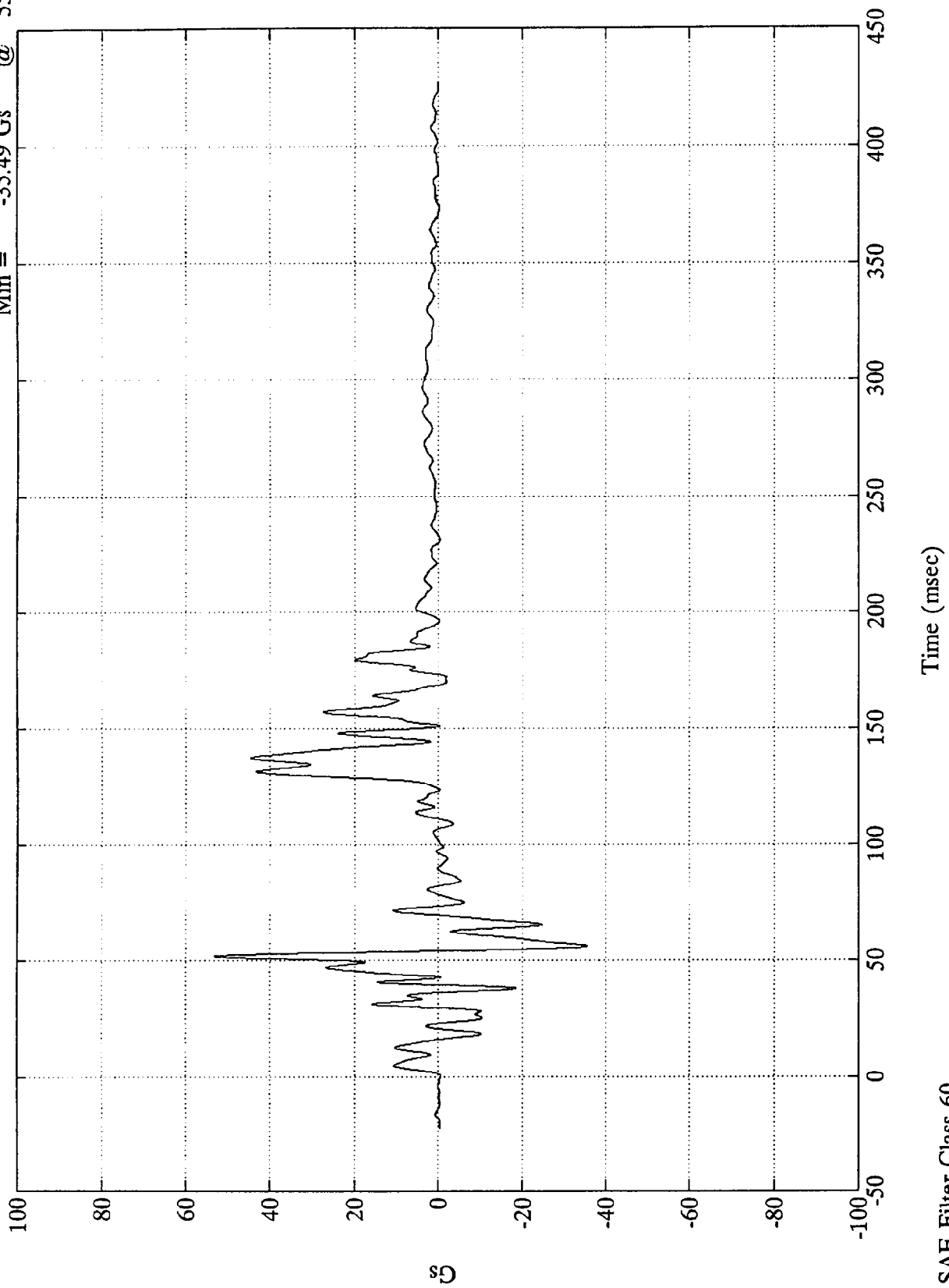


SAE Filter Class 180

VTV TEST #11

V1 R.F Frame Rail (Z)

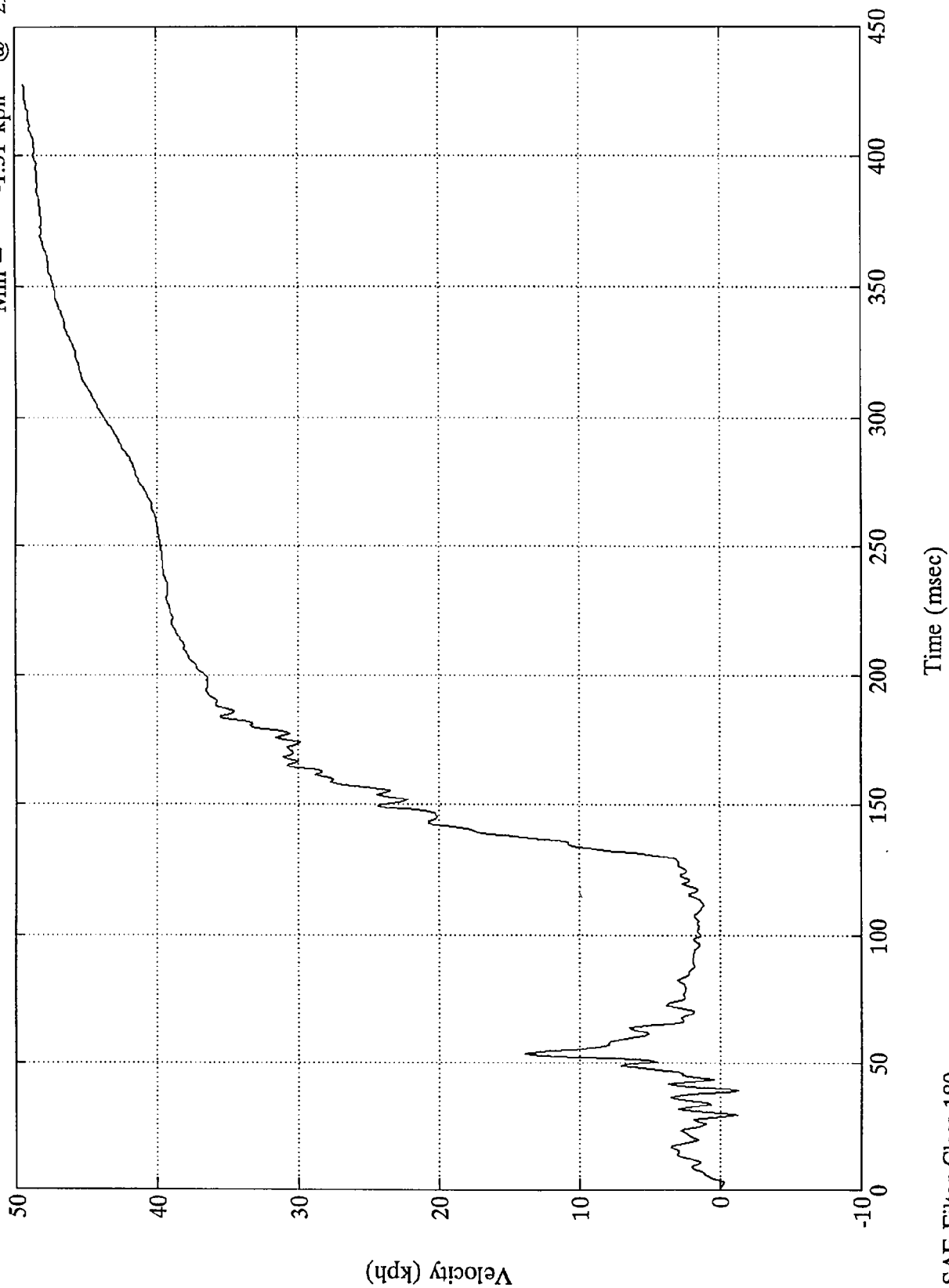
Max = 53.27 Gs @ 51.84 msec
Min = -35.49 Gs @ 55.92 msec



VTV TEST #11

V1 R.F Frame Rail (Z)

Max =	49.39 kph	@	427.32 msec
Min =	-1.31 kph	@	29.64 msec

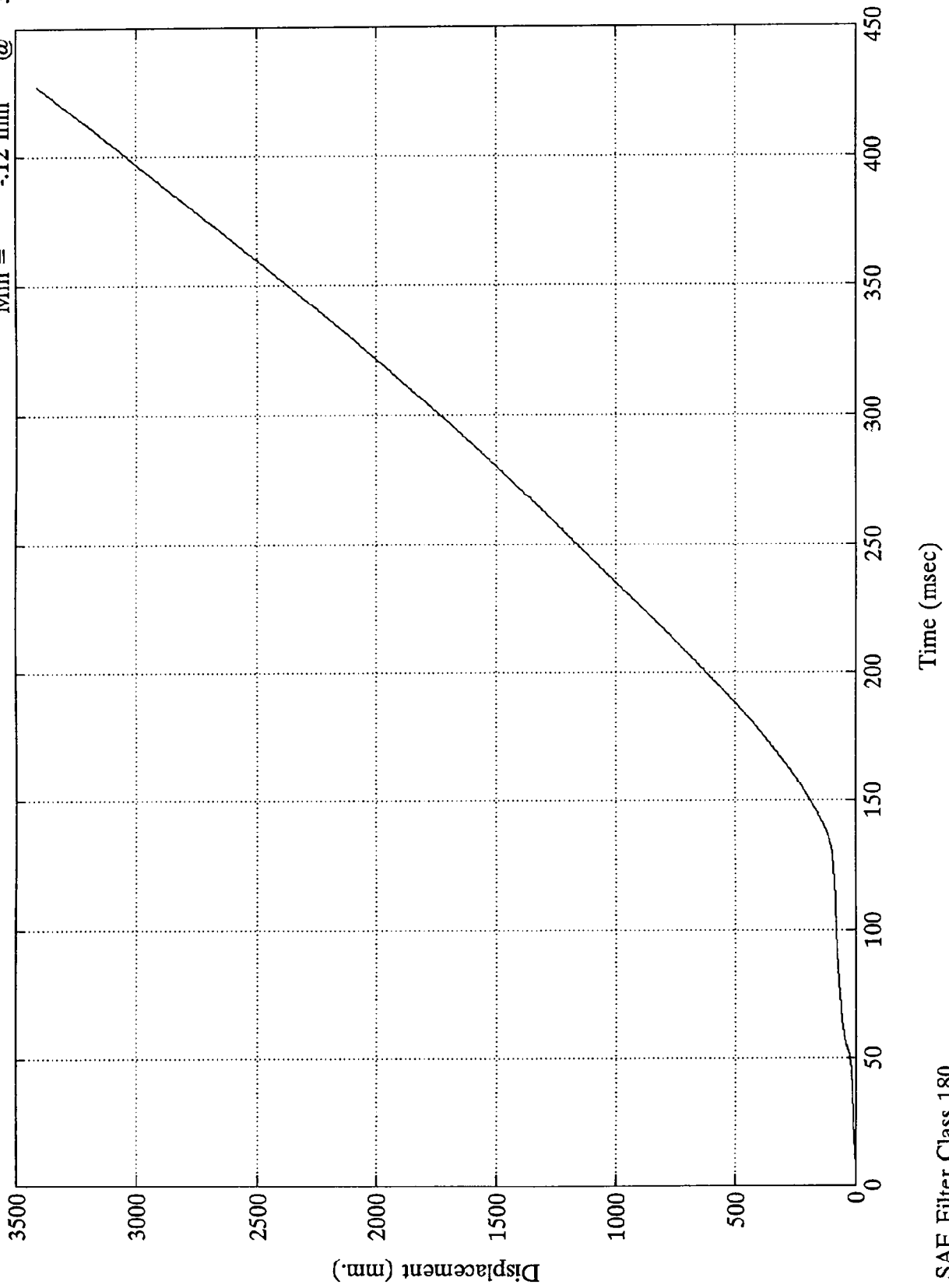


SAE Filter Class 180

VTV TEST #11

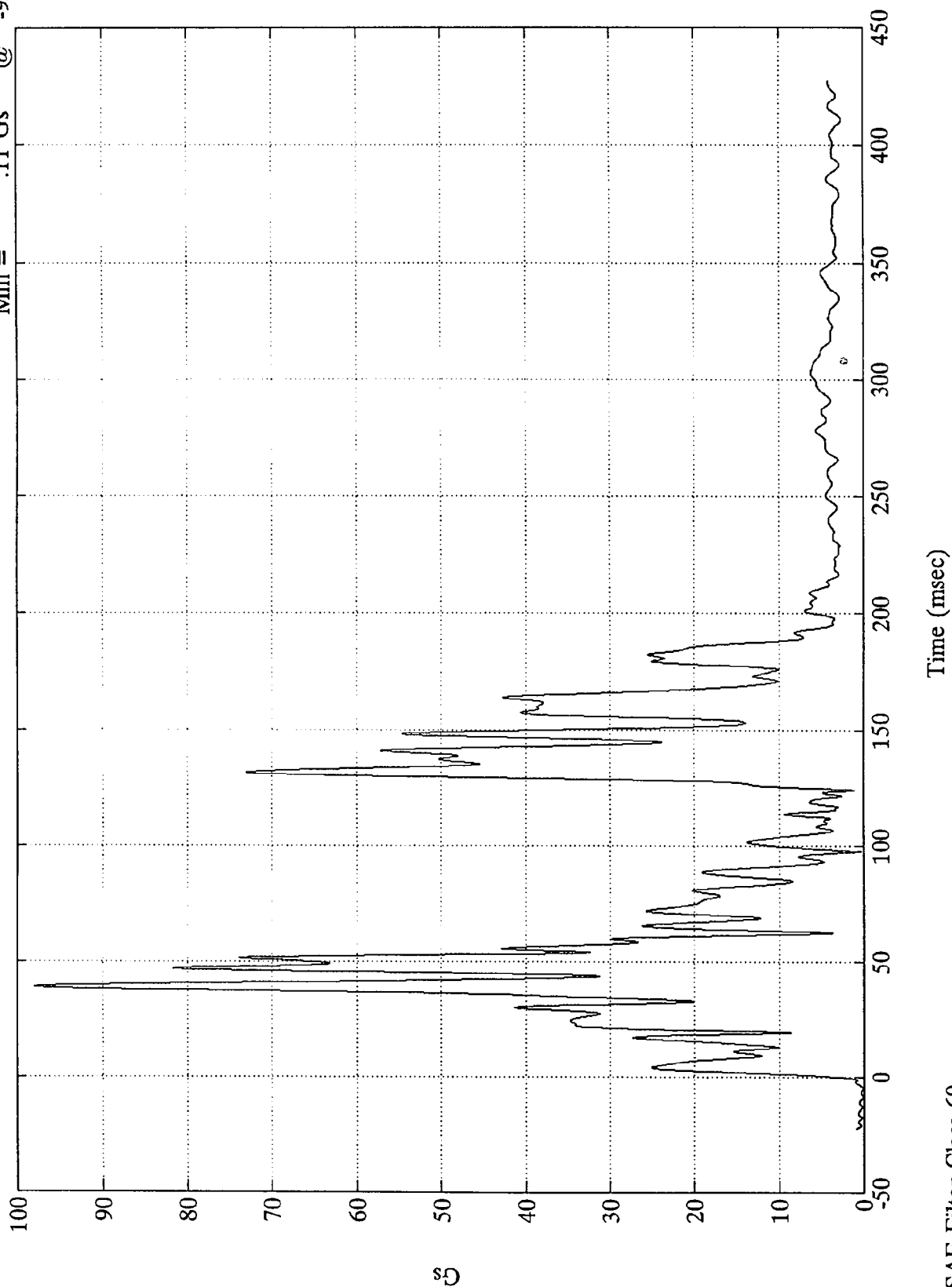
V1 R.F Frame Rail (Z)

Max = 3411.84 mm @ 427.32 msec
Min = -12 mm @ 3.71 msec



VTV TEST #11

V1 R.F Frame Rail Res. Max = 97.98 Gs @ 39.11 msec
Min = .11 Gs @ -9.00 msec

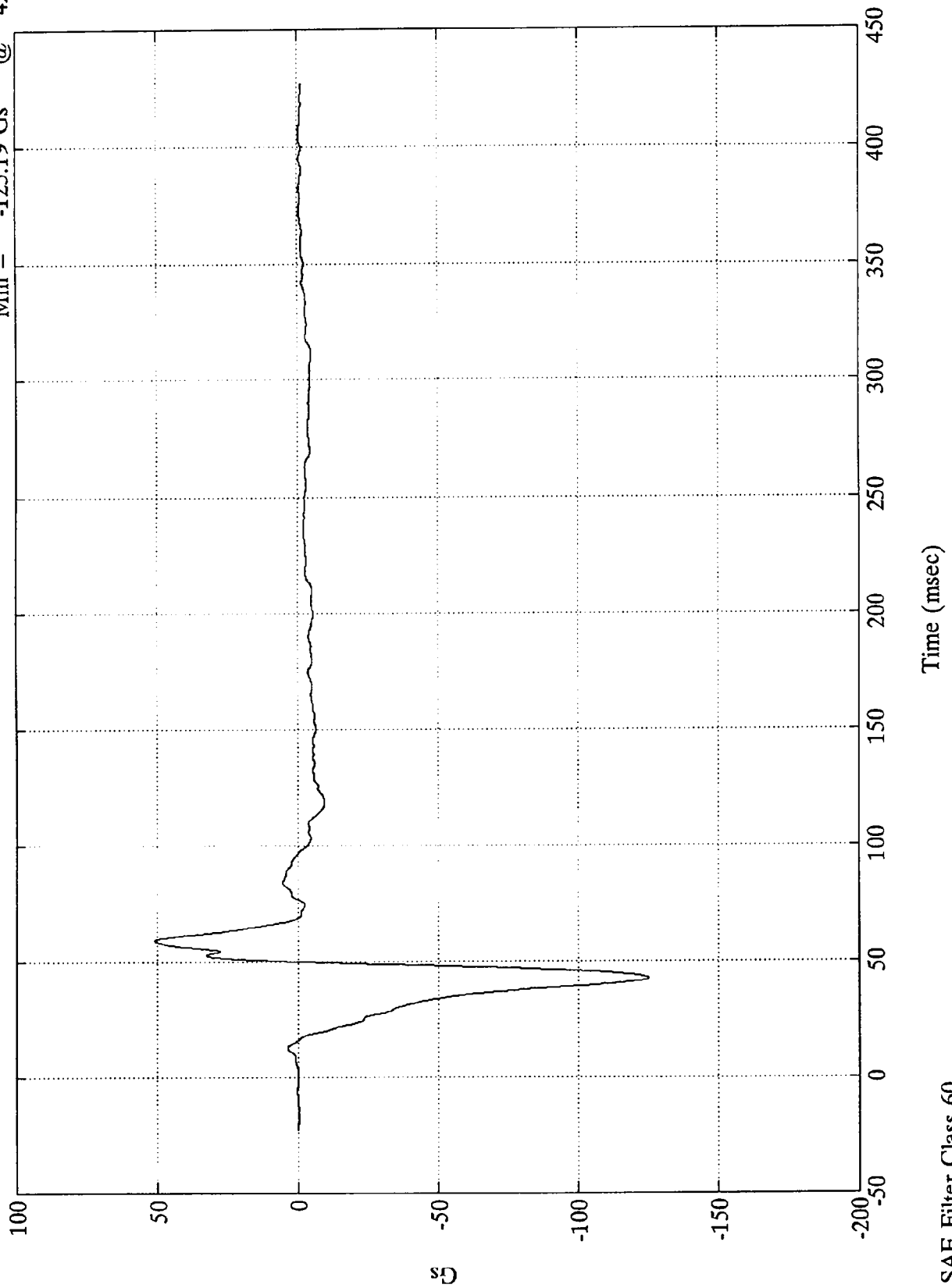


SAE Filter Class 60

VTV TEST #11

V1 Left Engine (X)

Max = 51.06 Gs @ 59.52 msec
Min = -125.19 Gs @ 42.47 msec

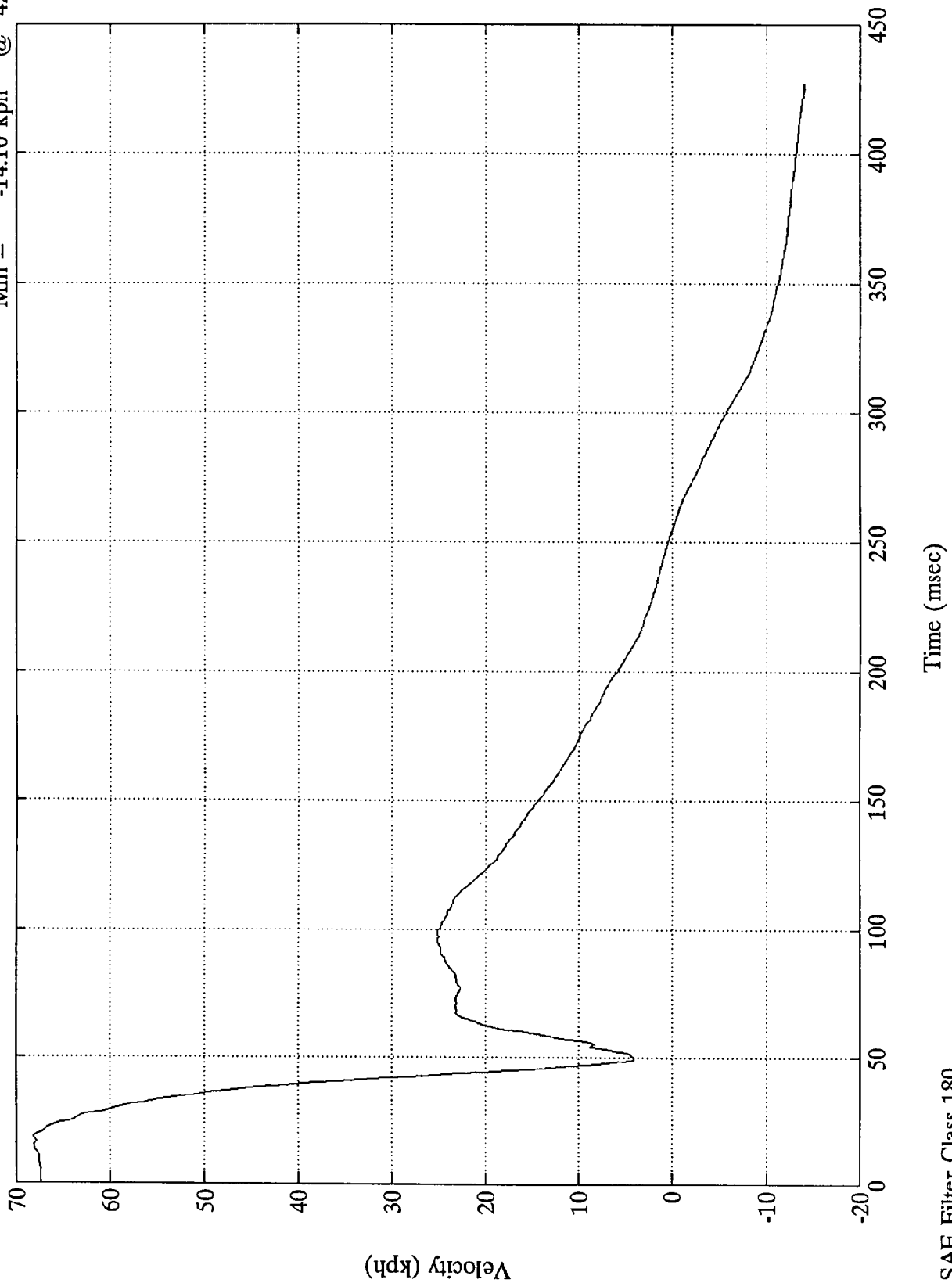


SAE Filter Class 60

VTV TEST #11

V1 Left Engine (X)

Max = 68.18 kph @ 18.60 msec
Min = -14.10 kph @ 427.32 msec

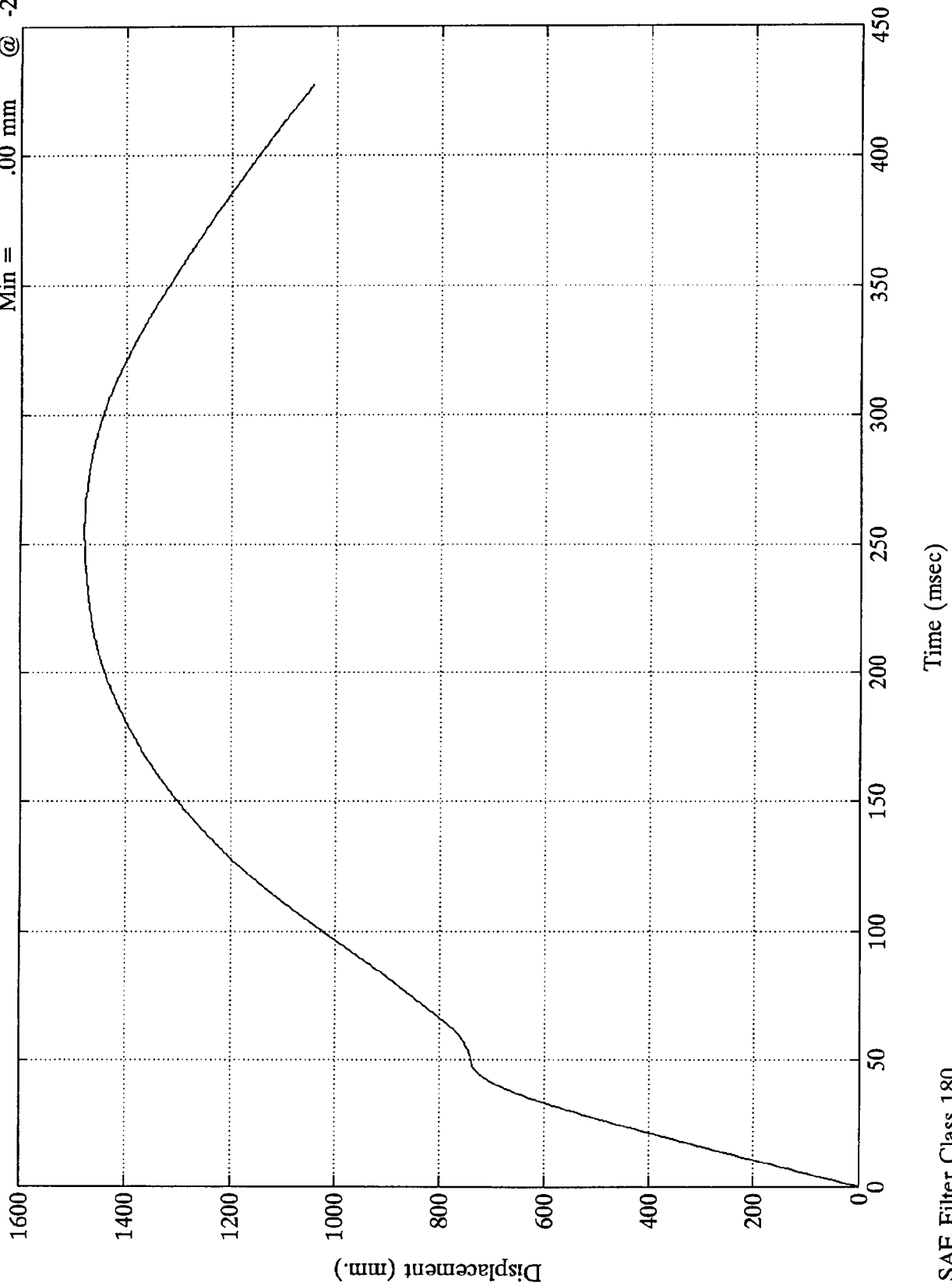


SAE Filter Class 180

VTV TEST #11

V1 Left Engine (X)

Max = 1477.63 mm @ 255.12 msec
Min = .00 mm @ -22.44 msec

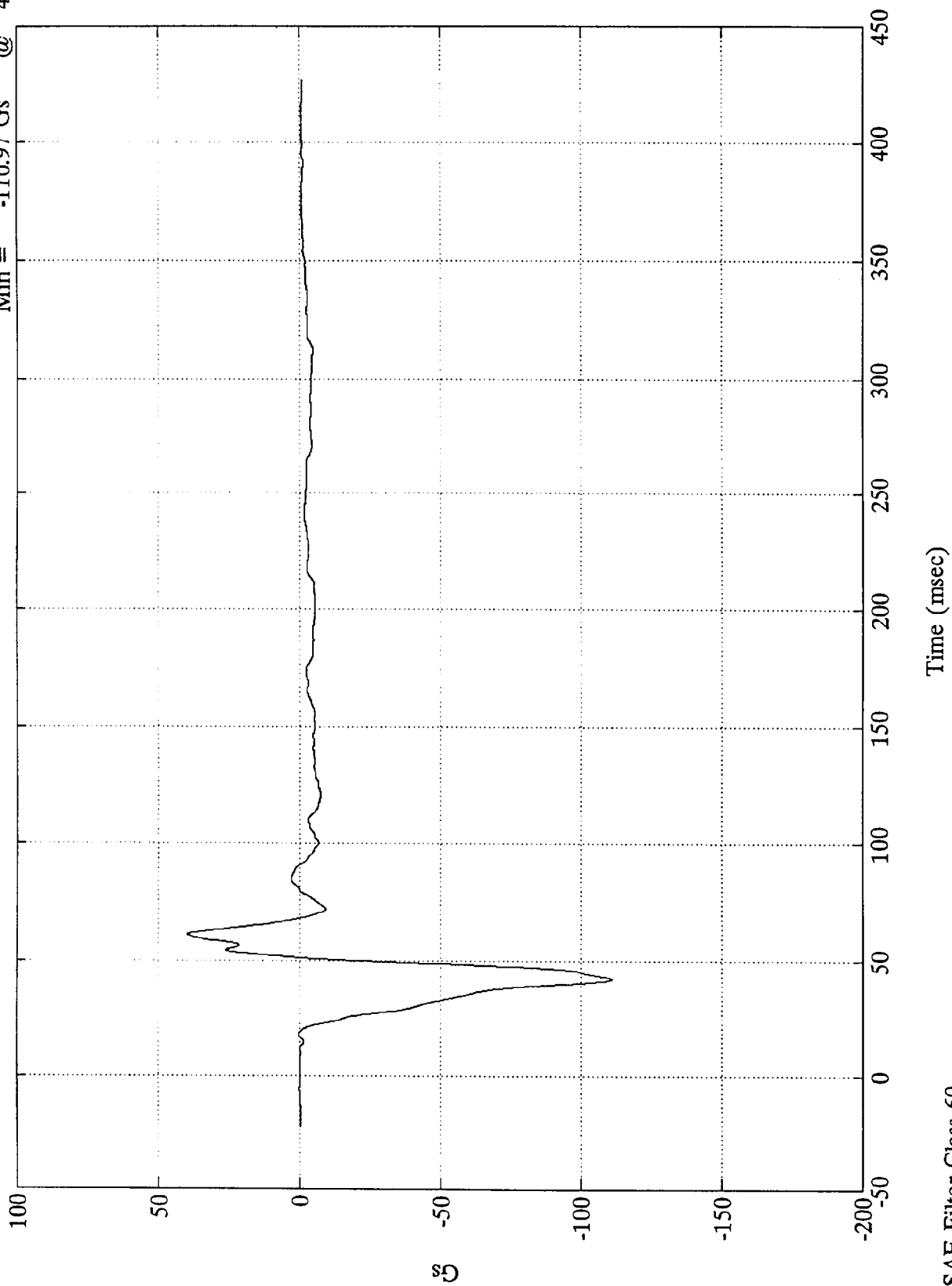


SAE Filter Class 180

VTV TEST #11

V1 Right Engine (X)

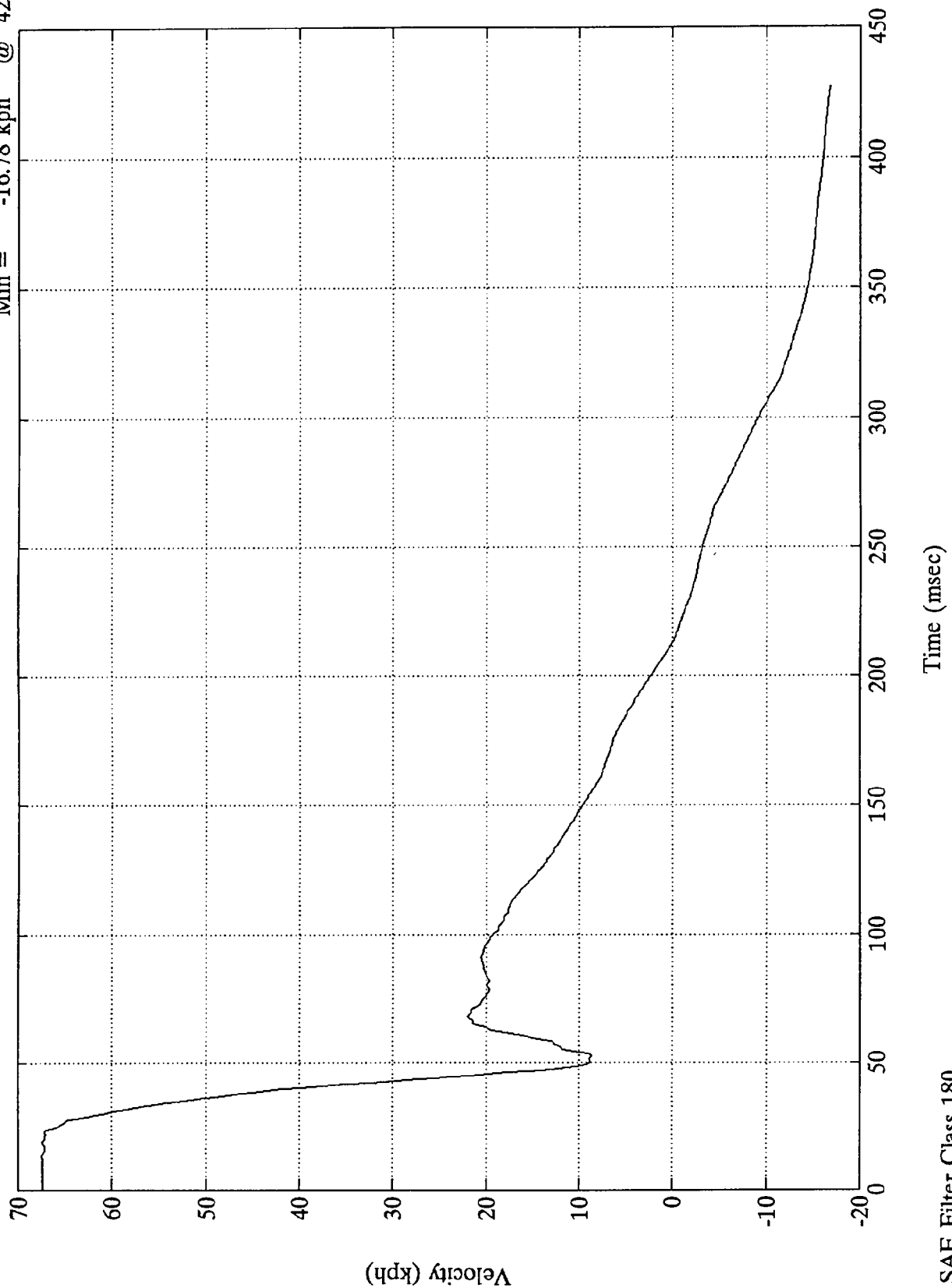
Max = 39.98 Gs @ 60.96 msec
Min = -110.97 Gs @ 42.12 msec



VTV TEST #11

V1 Right Engine (X)

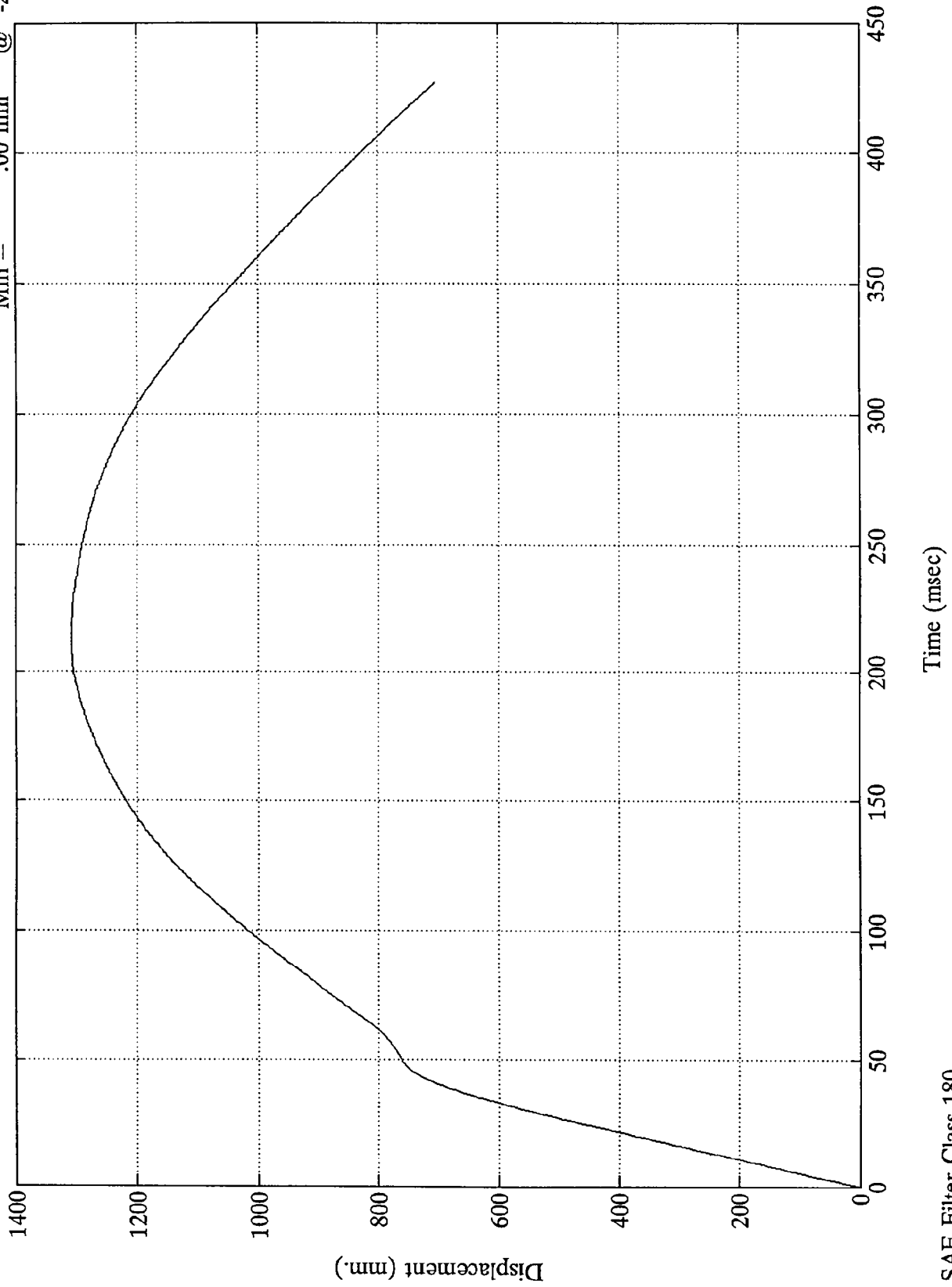
Max = 67.46 kph @ 12.95 msec
Min = -16.78 kph @ 427.32 msec



VTV TEST #11

V1 Right Engine (X)

Max = 1308.43 mm @ 213.00 msec
Min = .00 mm @ -22.44 msec

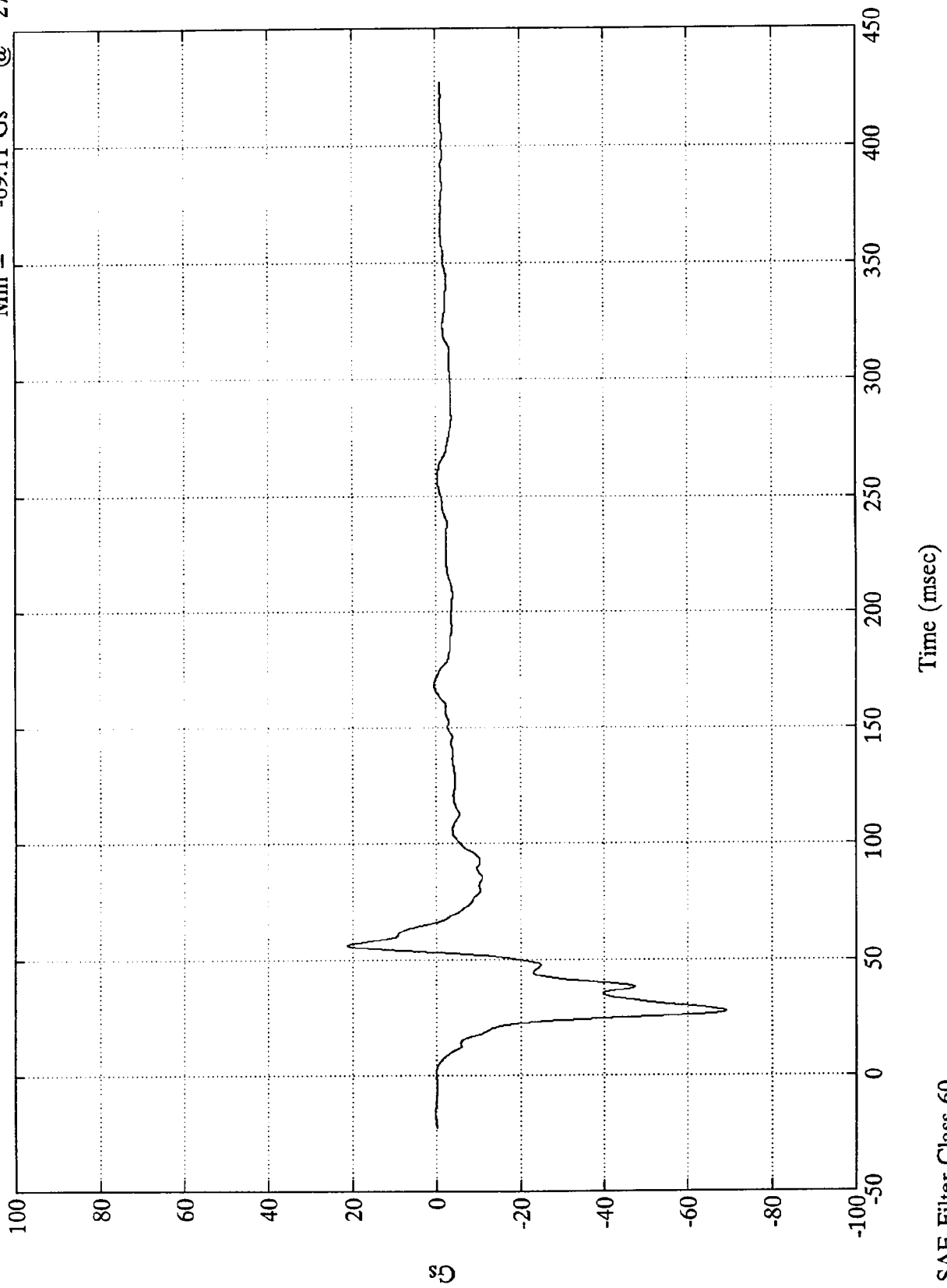


SAE Filter Class 180

VTV TEST #11

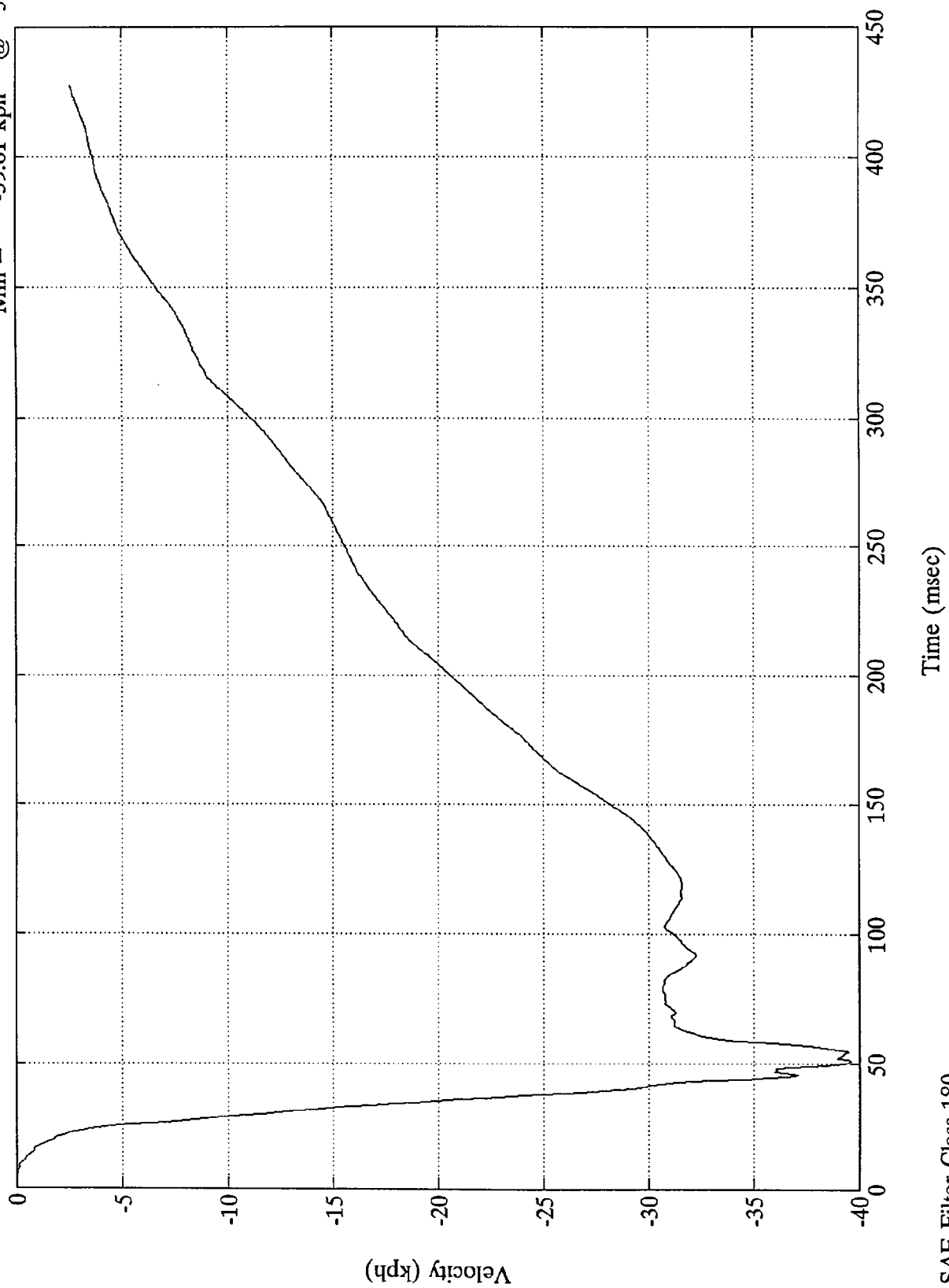
V1 Engine Bottom (X)

Max = 21.36 Gs @ 56.28 msec
Min = -69.11 Gs @ 27.48 msec



VTV TEST #11

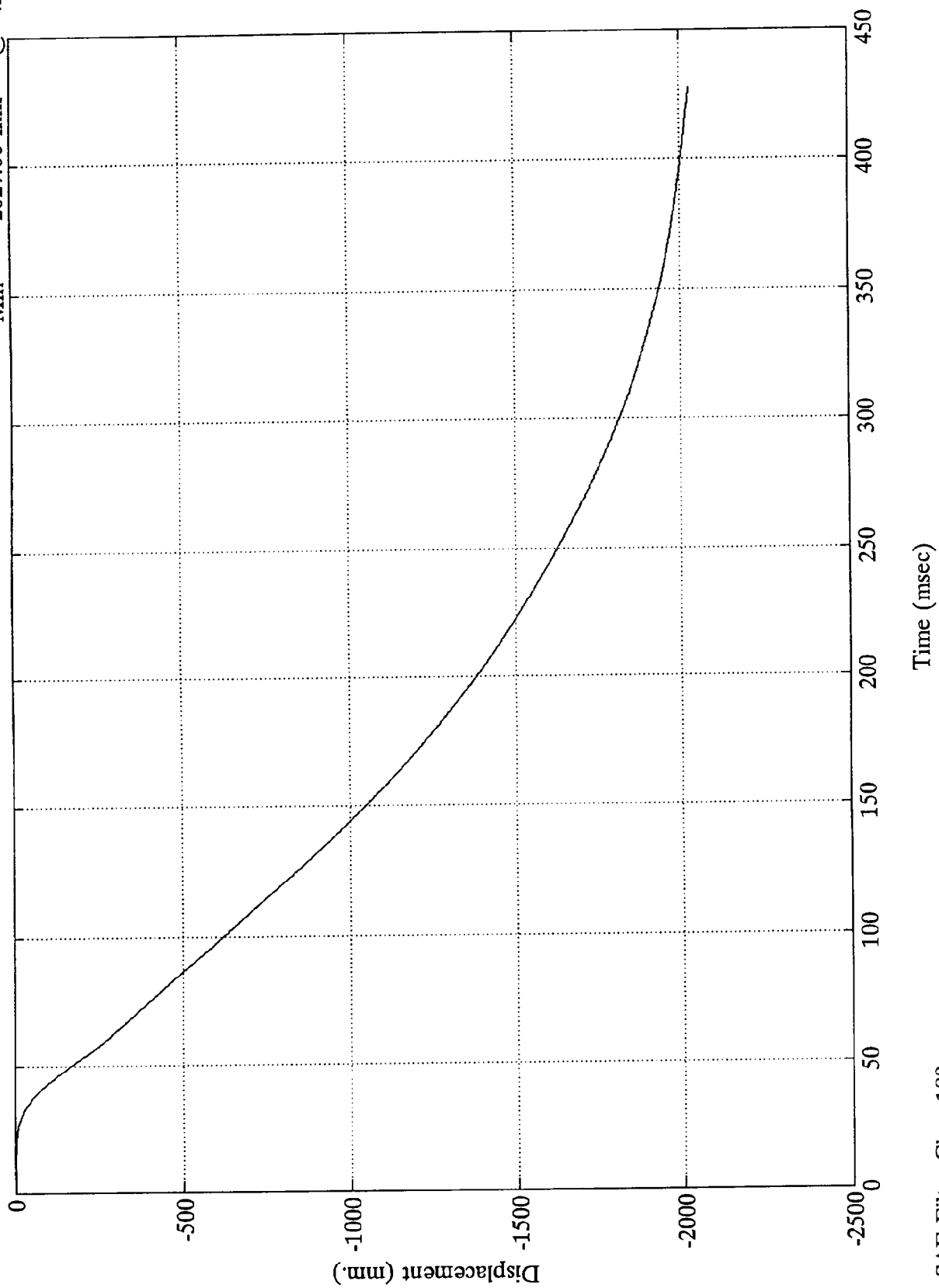
V1 Engine Bottom (Y) Max = .01 kph @ 0.71 msec
Min = -39.61 kph @ 51.12 msec



VTV TEST #11

V1 Engine Bottom (Y)

Max = .00 mm @ 2.03 msec
Min = -2027.00 mm @ 427.32 msec

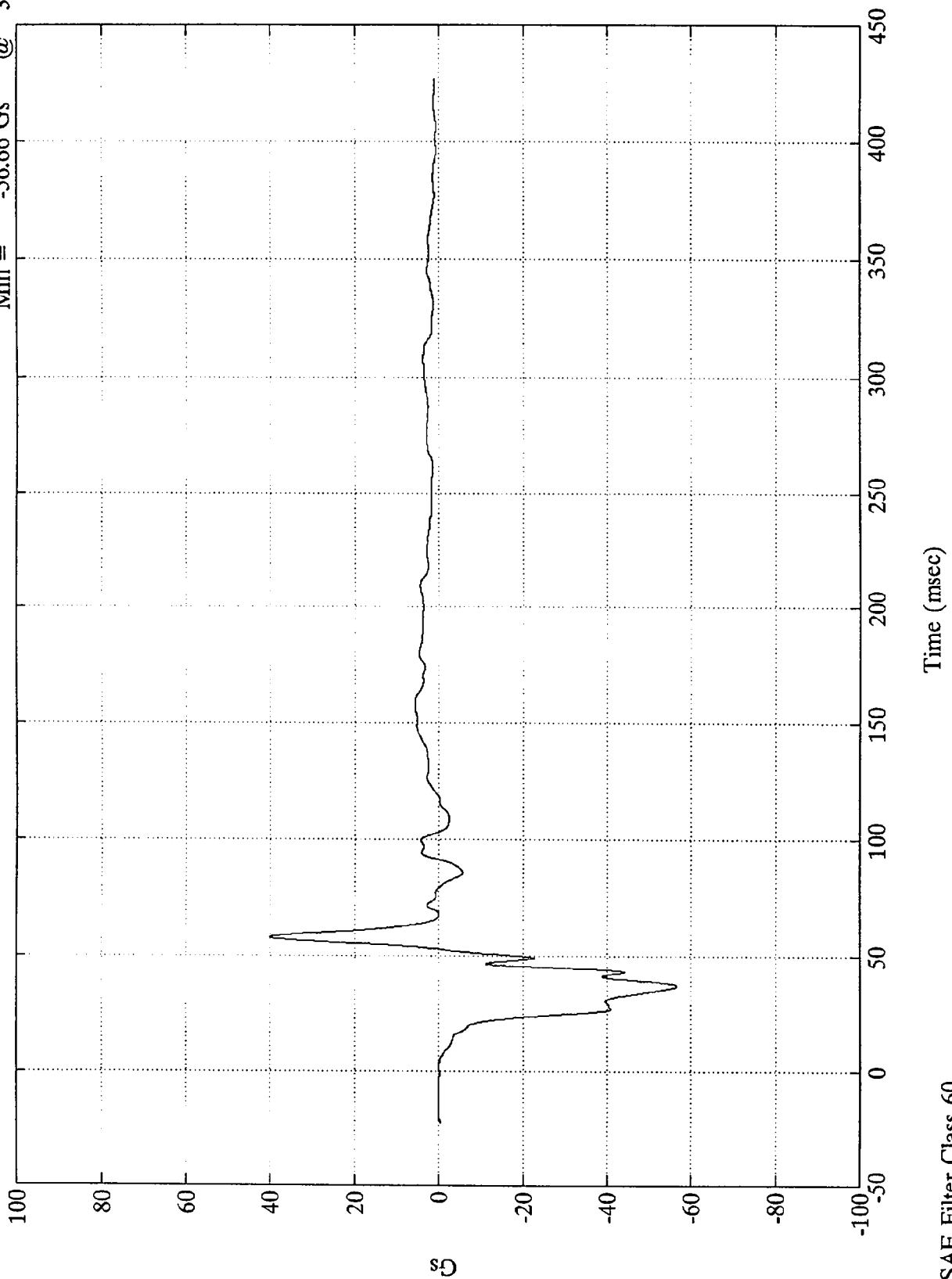


SAE Filter Class 180

VTV TEST #11

V1 Engine Bottom (Y)

Max =	40.19 Gs	@	57.95 msec
Min =	-56.66 Gs	@	36.96 msec

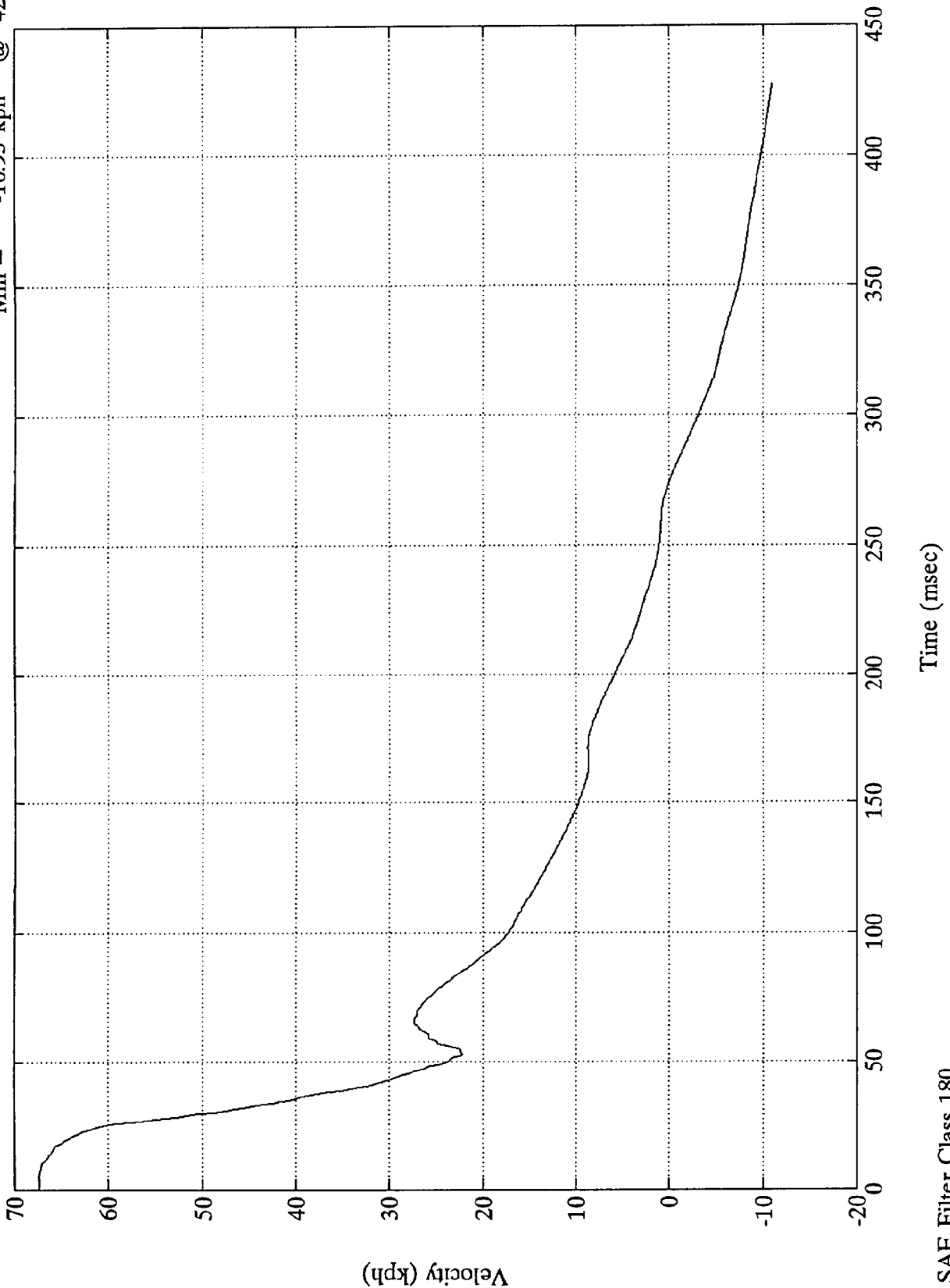


VTV TEST #11

V1 Engine Bottom (X)

Max = 67.43 kph @ 0.35 msec

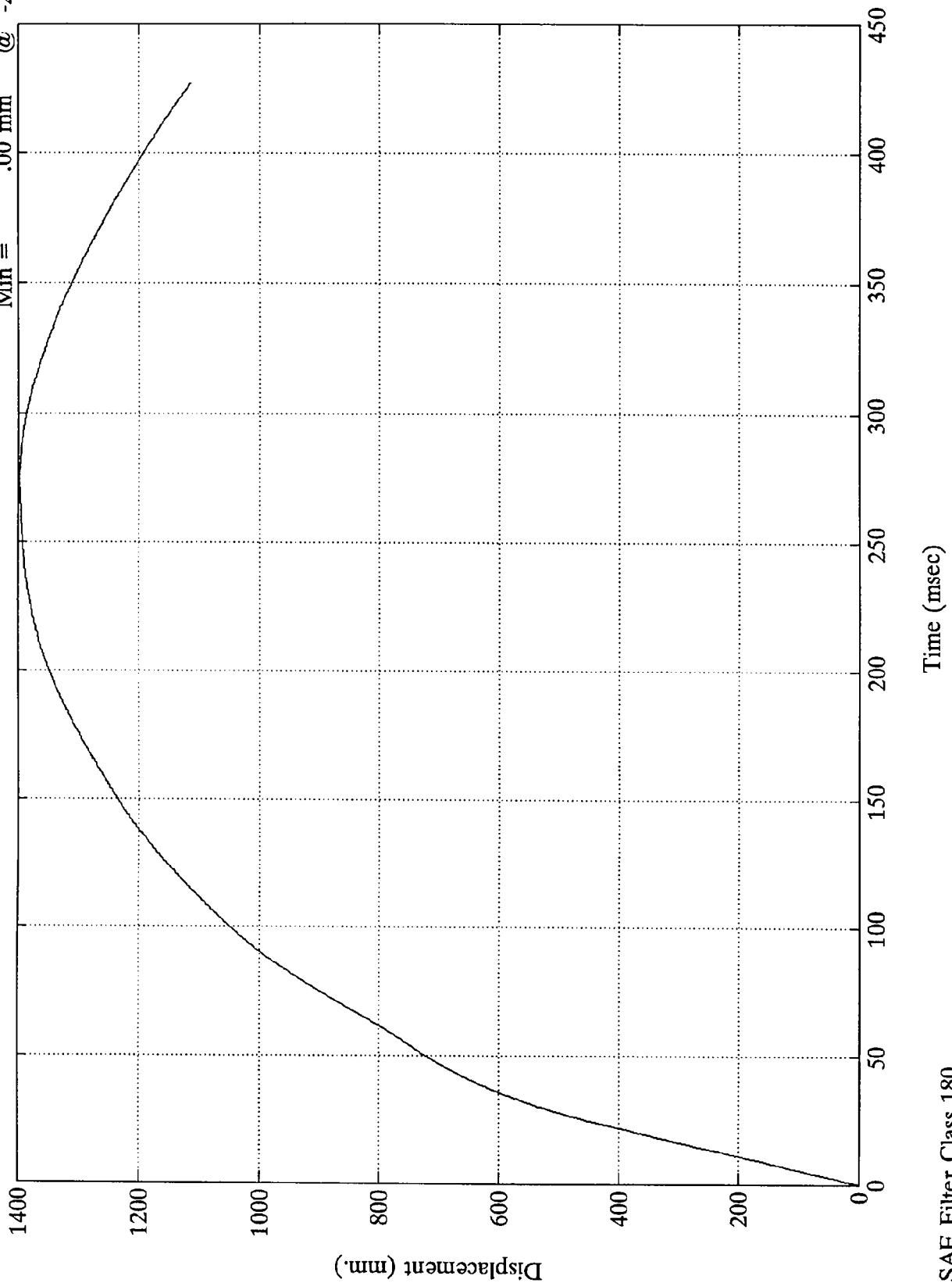
Min = -10.93 kph @ 427.32 msec



VTV TEST #11

V1 Engine Bottom (X)

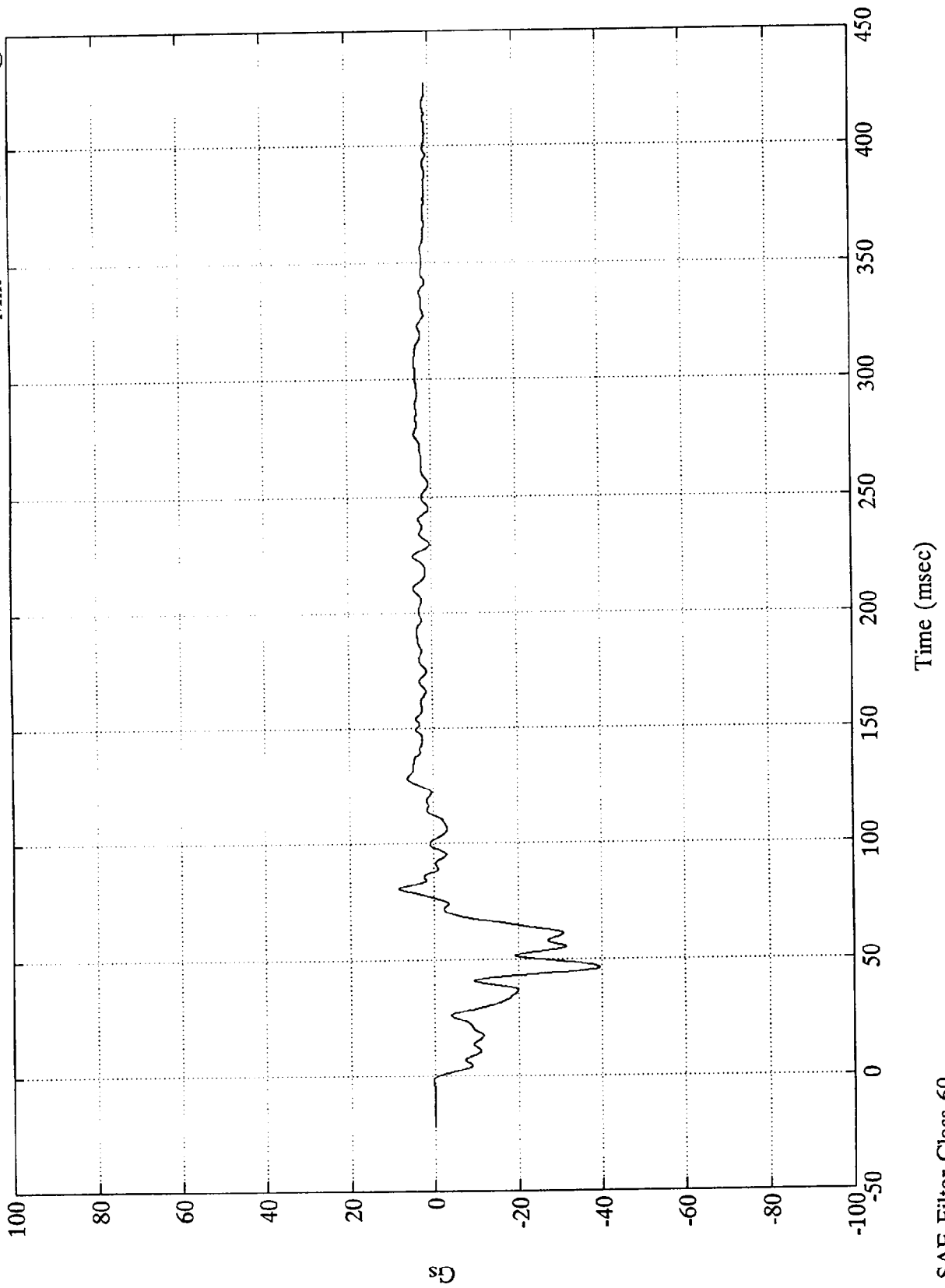
Max = 1397.66 mm @ 274.68 msec
Min = .00 mm @ -22.44 msec



SAE Filter Class 180

VTV TEST #11

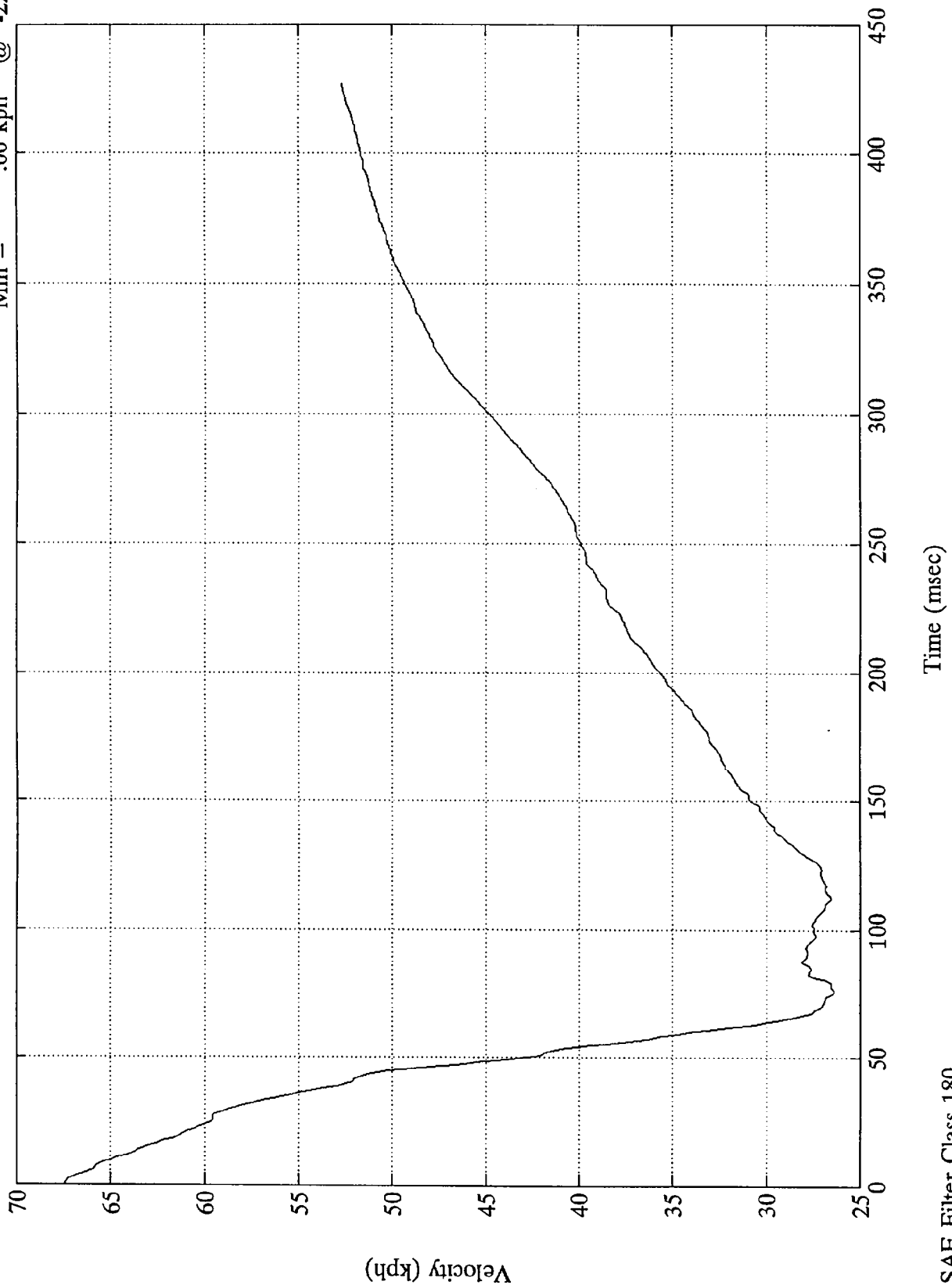
V1 L.R. Comp (X) Max = 8.30 Gs @ 80.63 msec
Min = -39.50 Gs @ 46.32 msec



SAE Filter Class 60

VTV TEST #11

V1 L.R. Comp (X) Max = 67.43 kph @ -0.00 msec
Min = .00 kph @ -22.44 msec

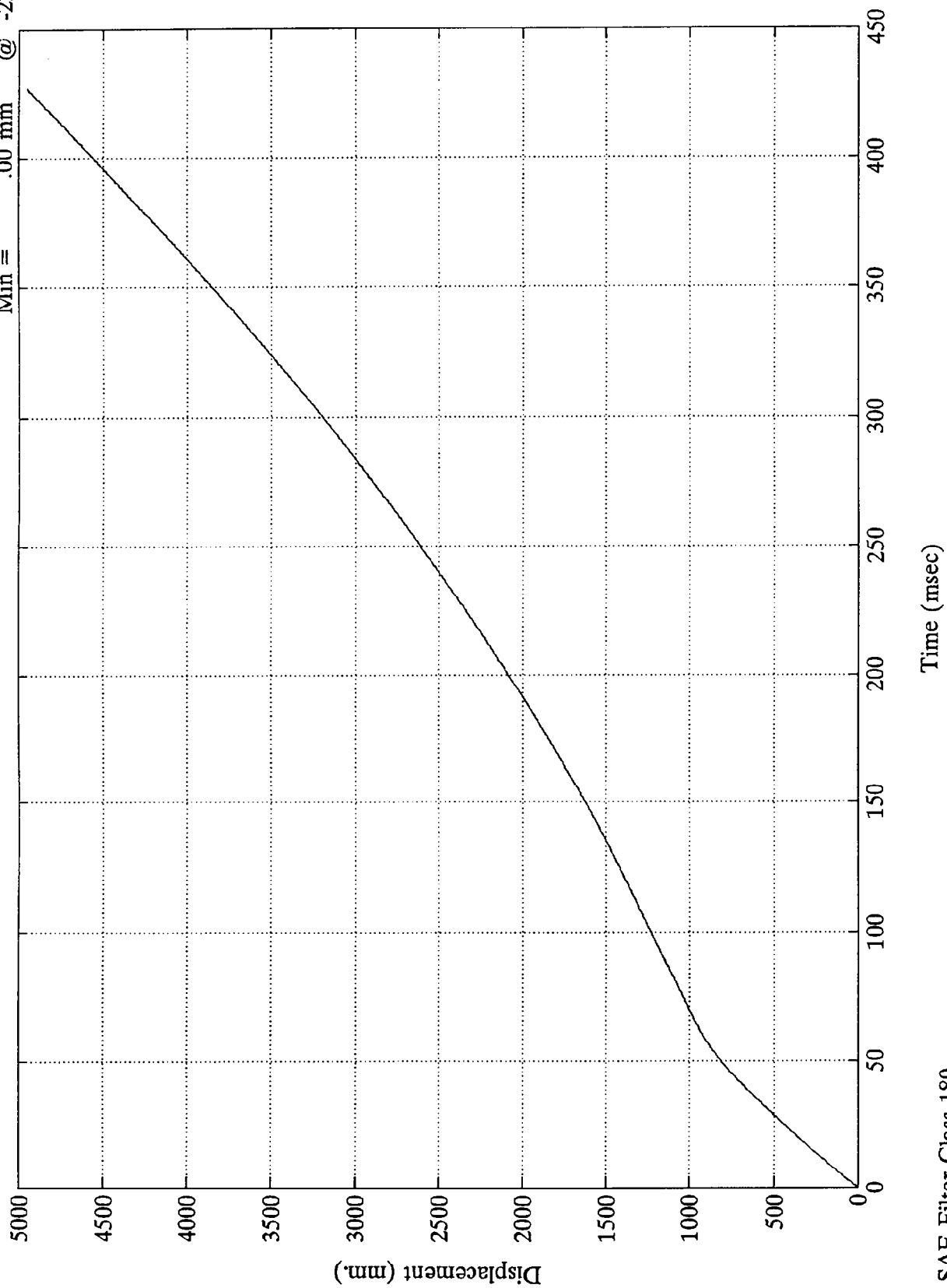


SAE Filter Class 180

VTV TEST #11

V1 L.R. Comp (X)

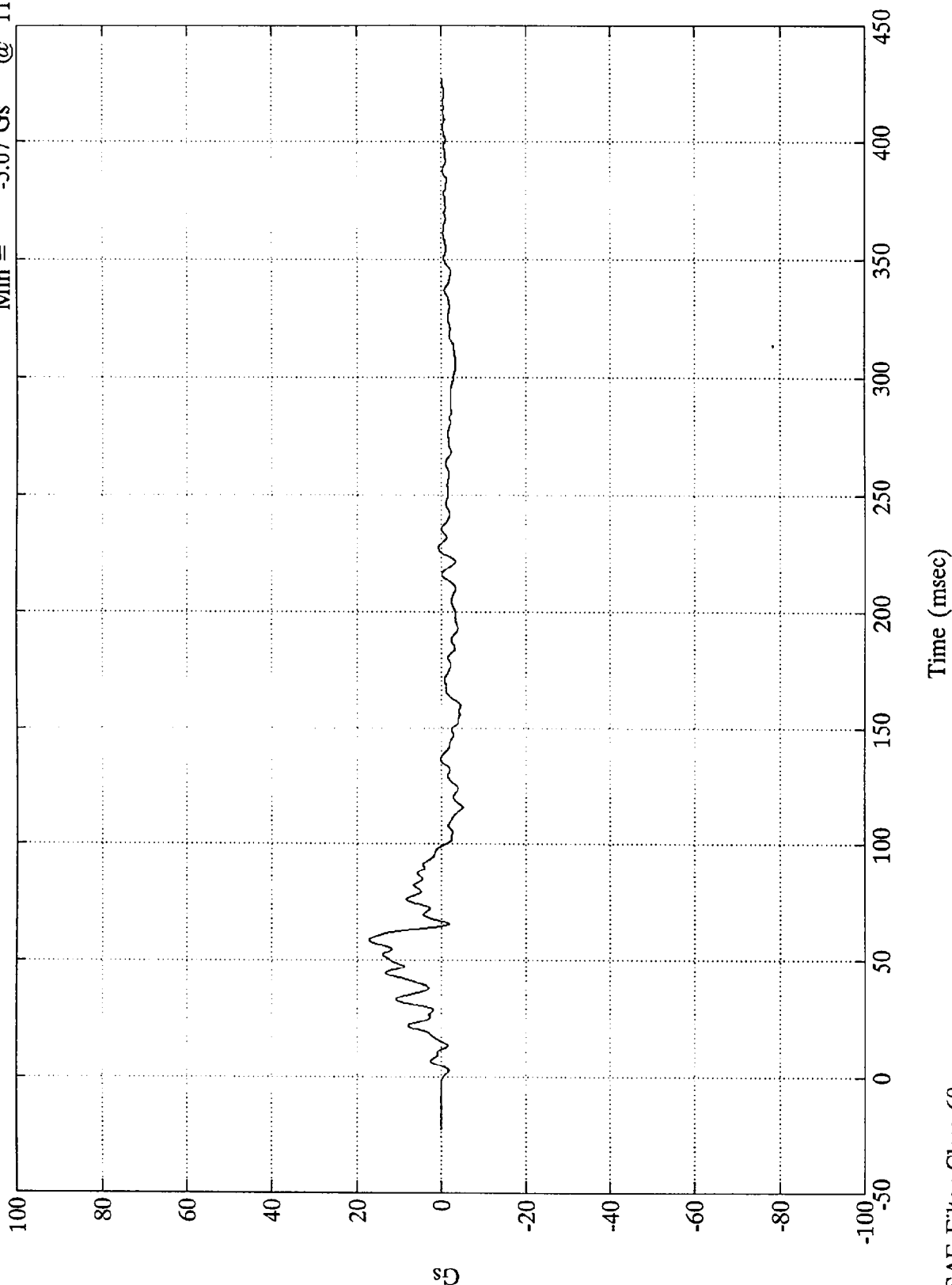
Max = 4952.32 mm @ 427.32 msec
Min = .00 mm @ -22.44 msec



VTV TEST #11

V1 L.R. Comp (Y)

Max = 17.13 Gs @ 58.31 msec
Min = -5.07 Gs @ 115.68 msec

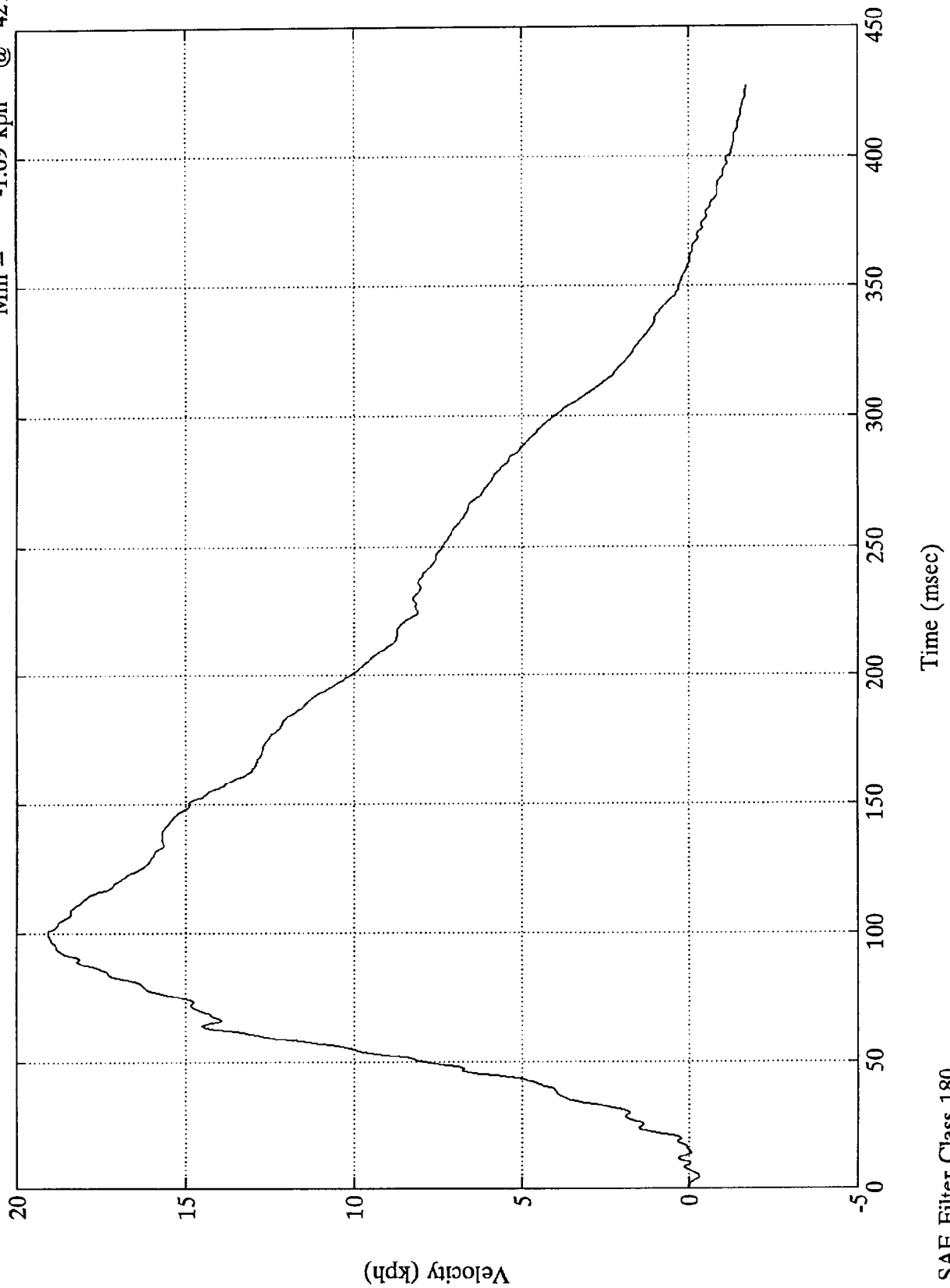


SAE Filter Class 60

VTV TEST #11

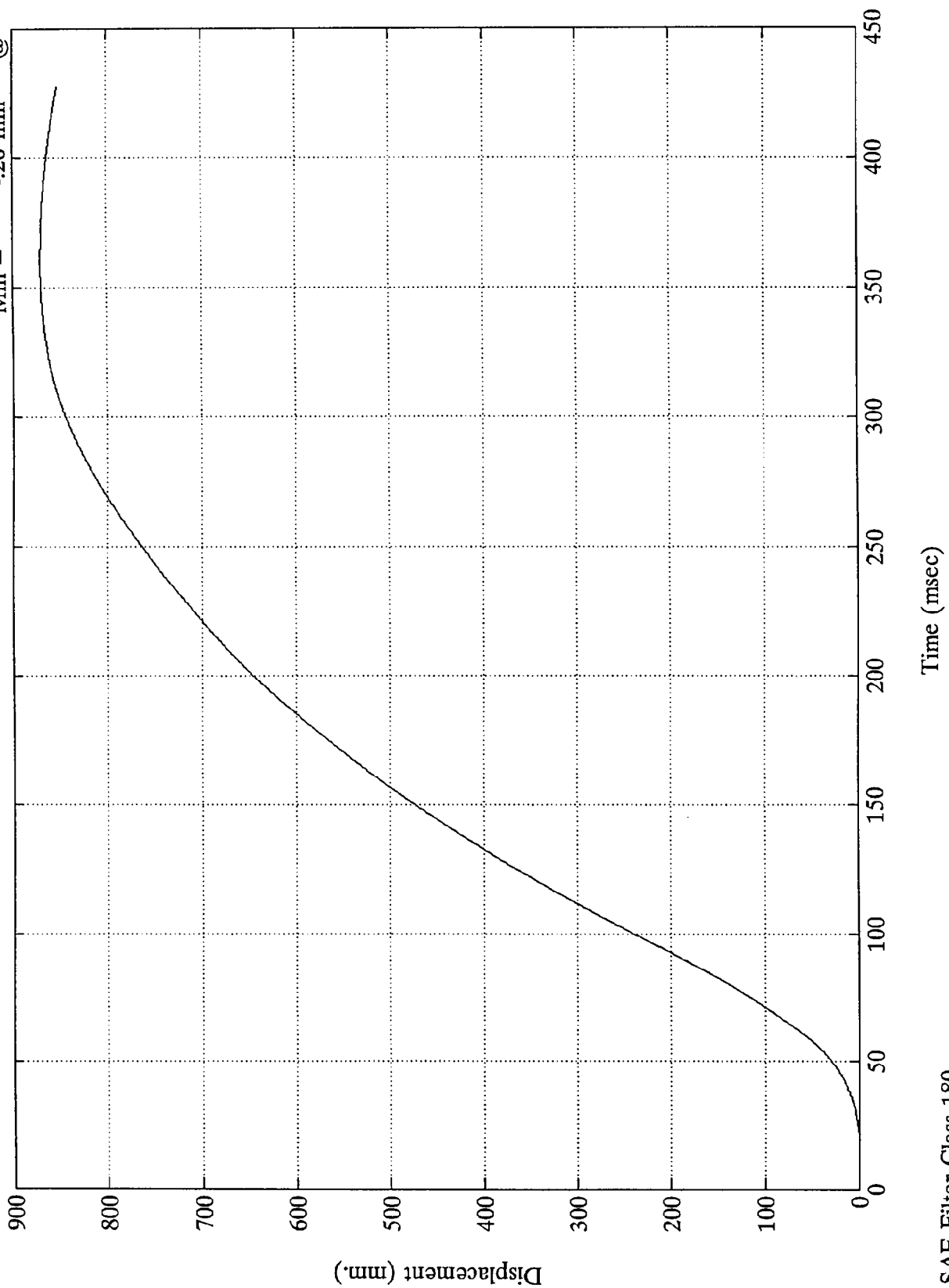
V1 L.R. Comp (Y)

Max = 19.09 kph @ 100.08 msec
Min = -1.69 kph @ 427.32 msec



VTV TEST #11

V1 L.R. Comp (Y) Max = 870.54 mm @ 358.92 msec
Min = -26 mm @ 7.07 msec

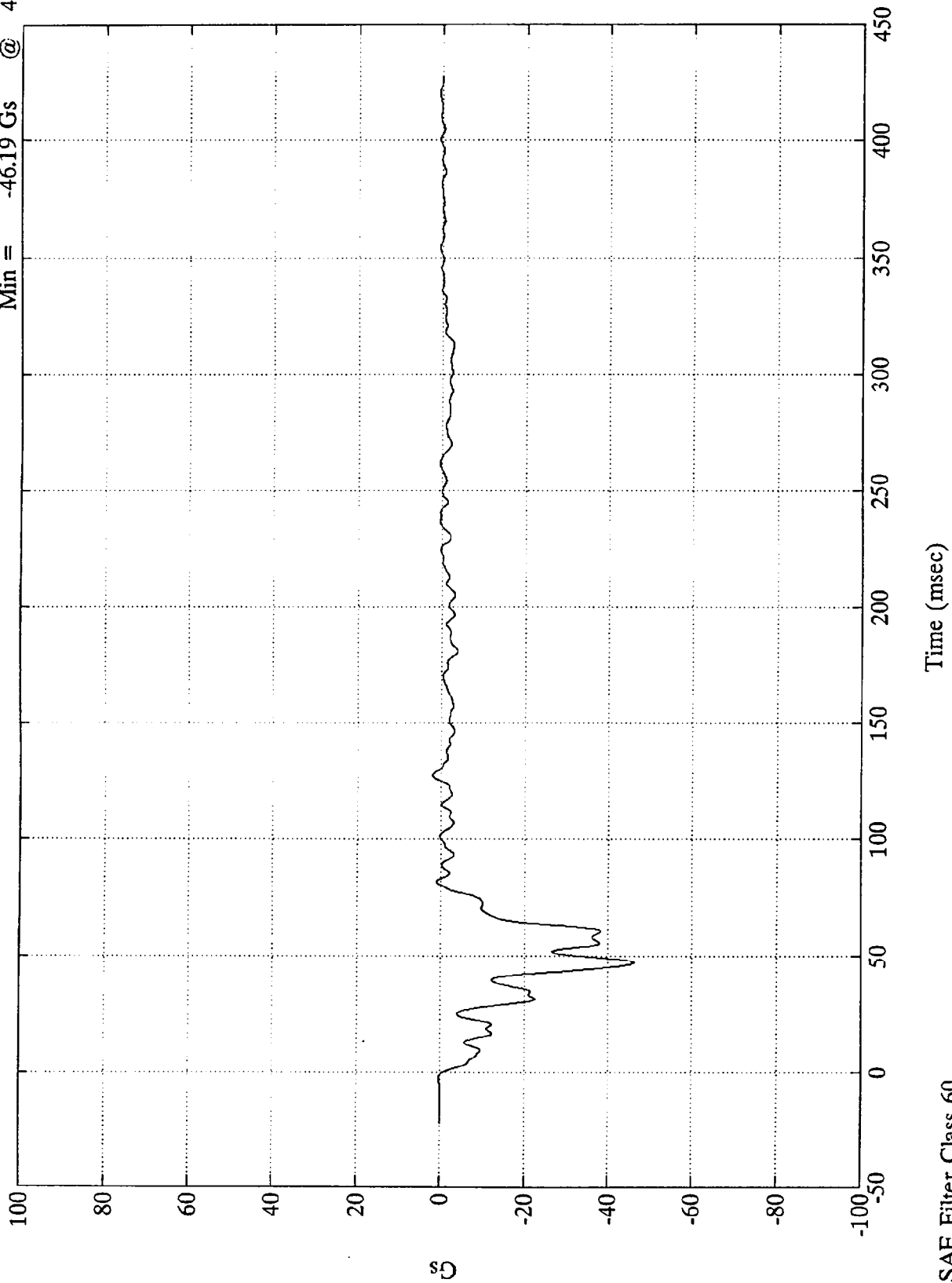


SAE Filter Class 180

VTV TEST #11

V1 R.R. Comp (X)

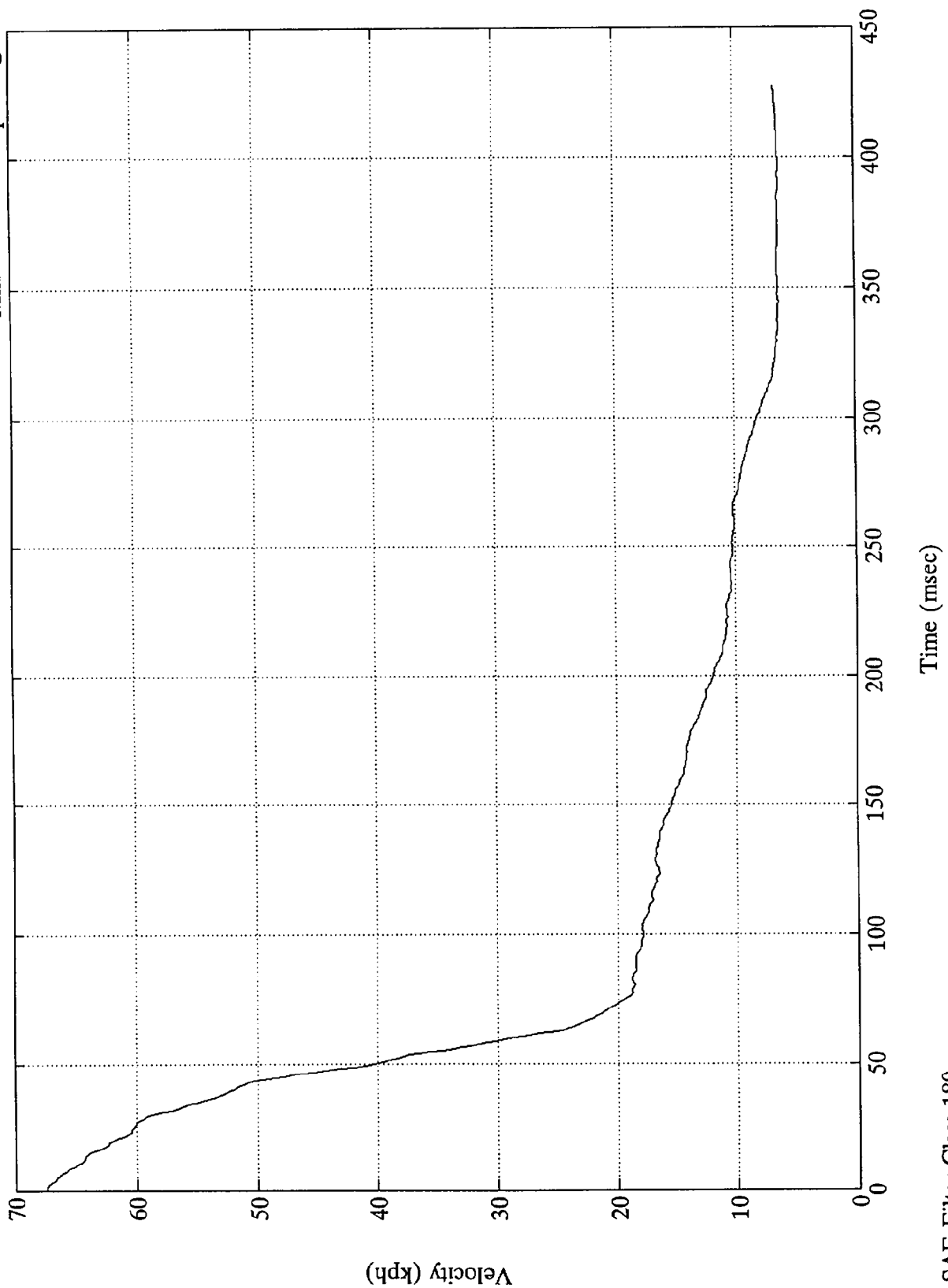
Max = 2.06 Gs @ 127.08 msec
Min = -46.19 Gs @ 47.28 msec



VTV TEST #11

Max = 67.43 kph @ 0.35 msec
Min = .00 kph @ -22.44 msec

V1 R.R. Comp (X)

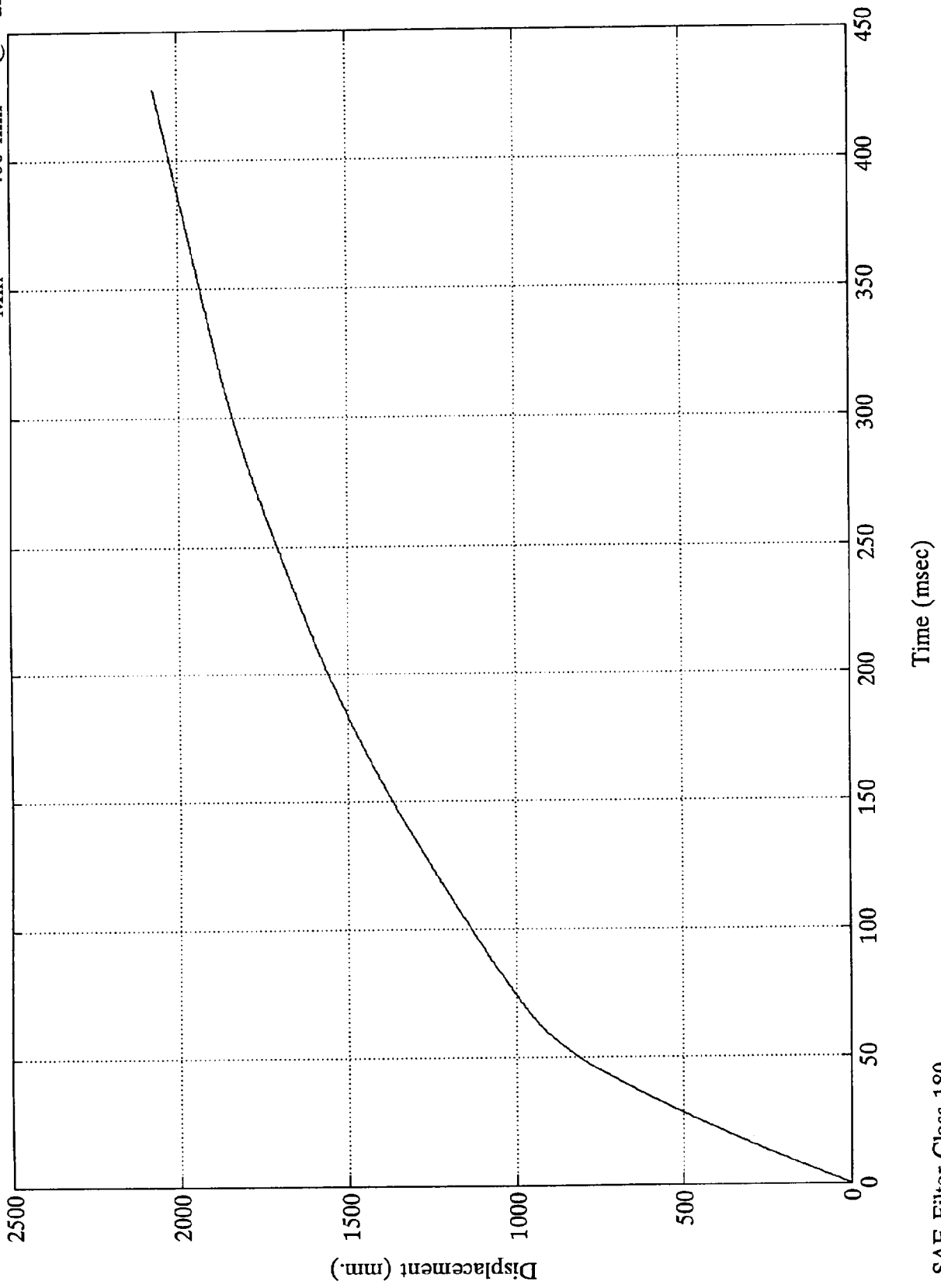


SAE Filter Class 180

VTV TEST #11

V1 R.R. Comp (X)

Max = 2072.01 mm @ 427.32 msec
Min = .00 mm @ -22.44 msec

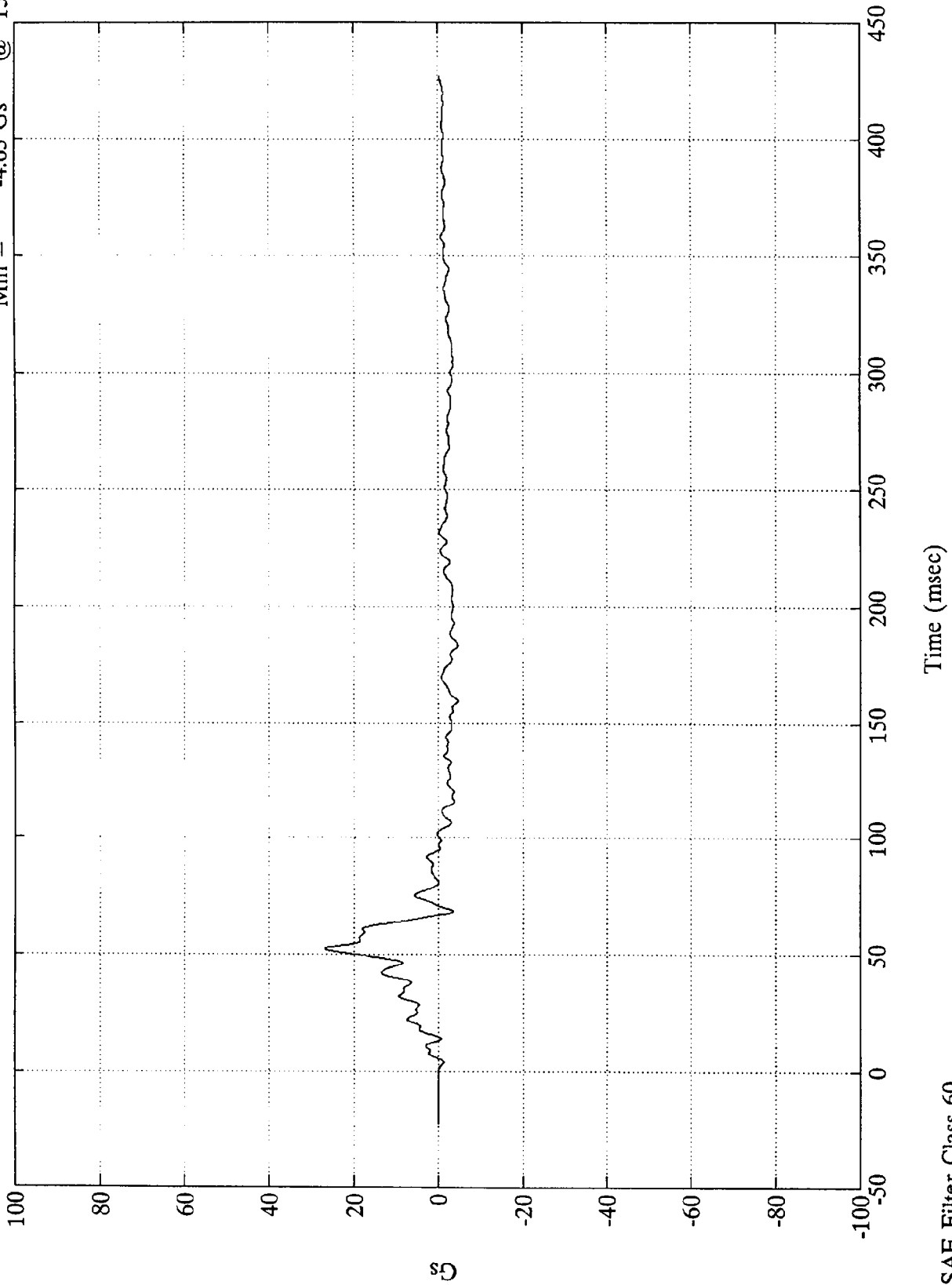


SAE Filter Class 180

VTV TEST #11

V1 R.R. Comp (Y)

Max = 26.98 Gs @ 52.44 msec
Min = -4.63 Gs @ 159.72 msec

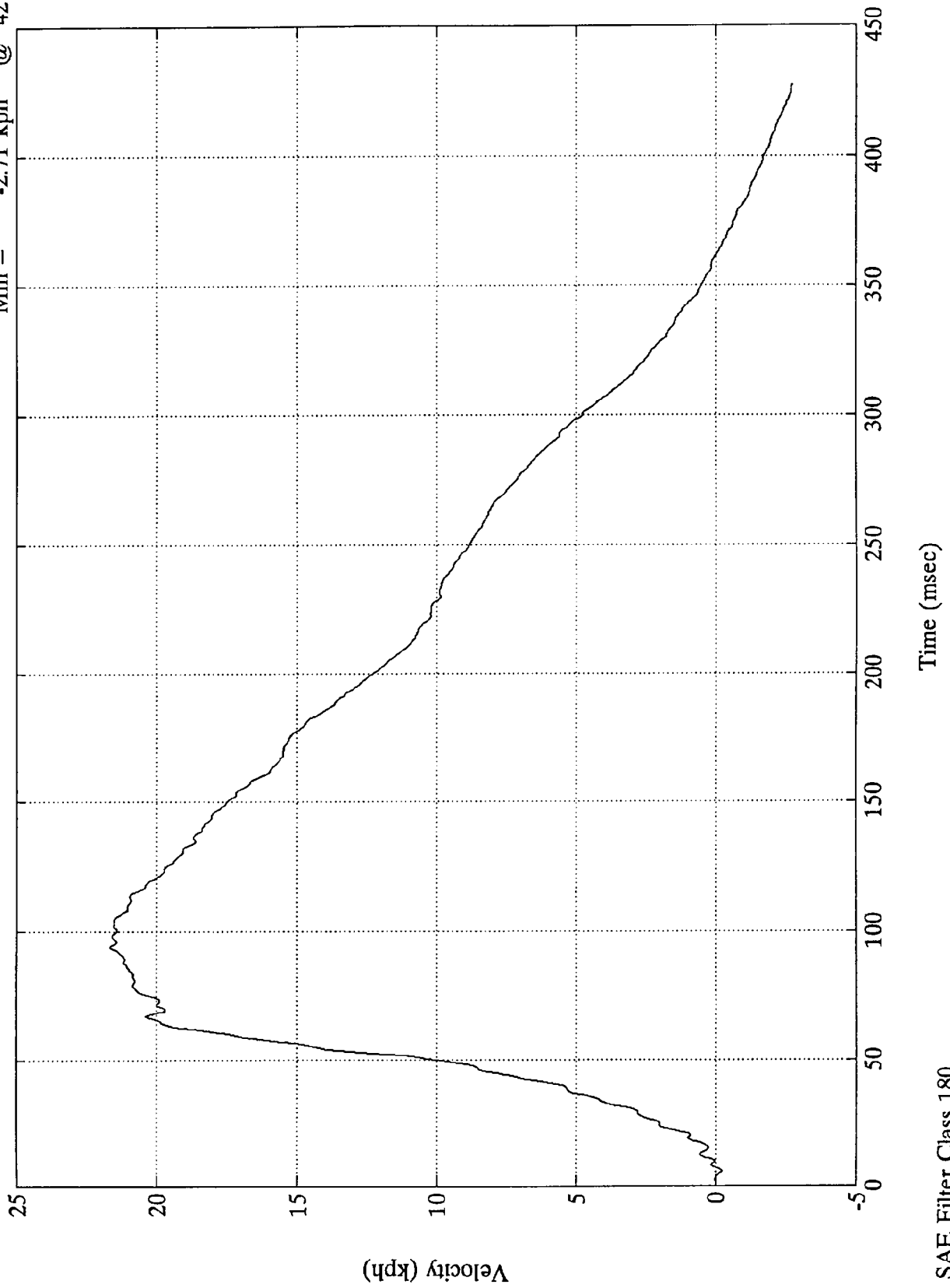


SAE Filter Class 60

VTV TEST #11

V1 R.R. Comp (Y)

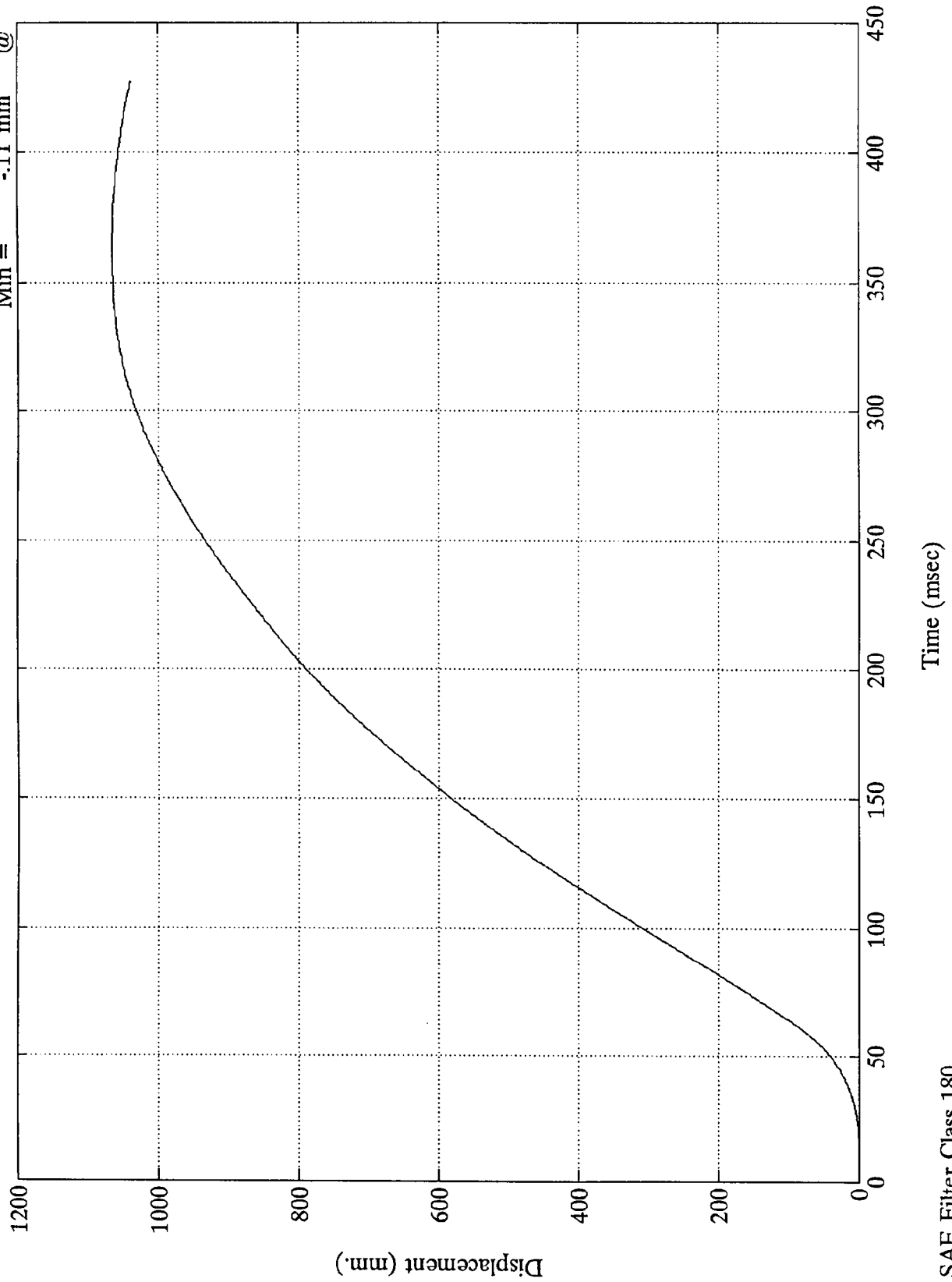
Max = 21.66 kph @ 93.84 msec
Min = -2.71 kph @ 427.32 msec



VTV TEST #11

V1 R.R. Comp (Y)

Max = 1065.94 mm @ 361.80 msec
Min = -.11 mm @ 7.43 msec



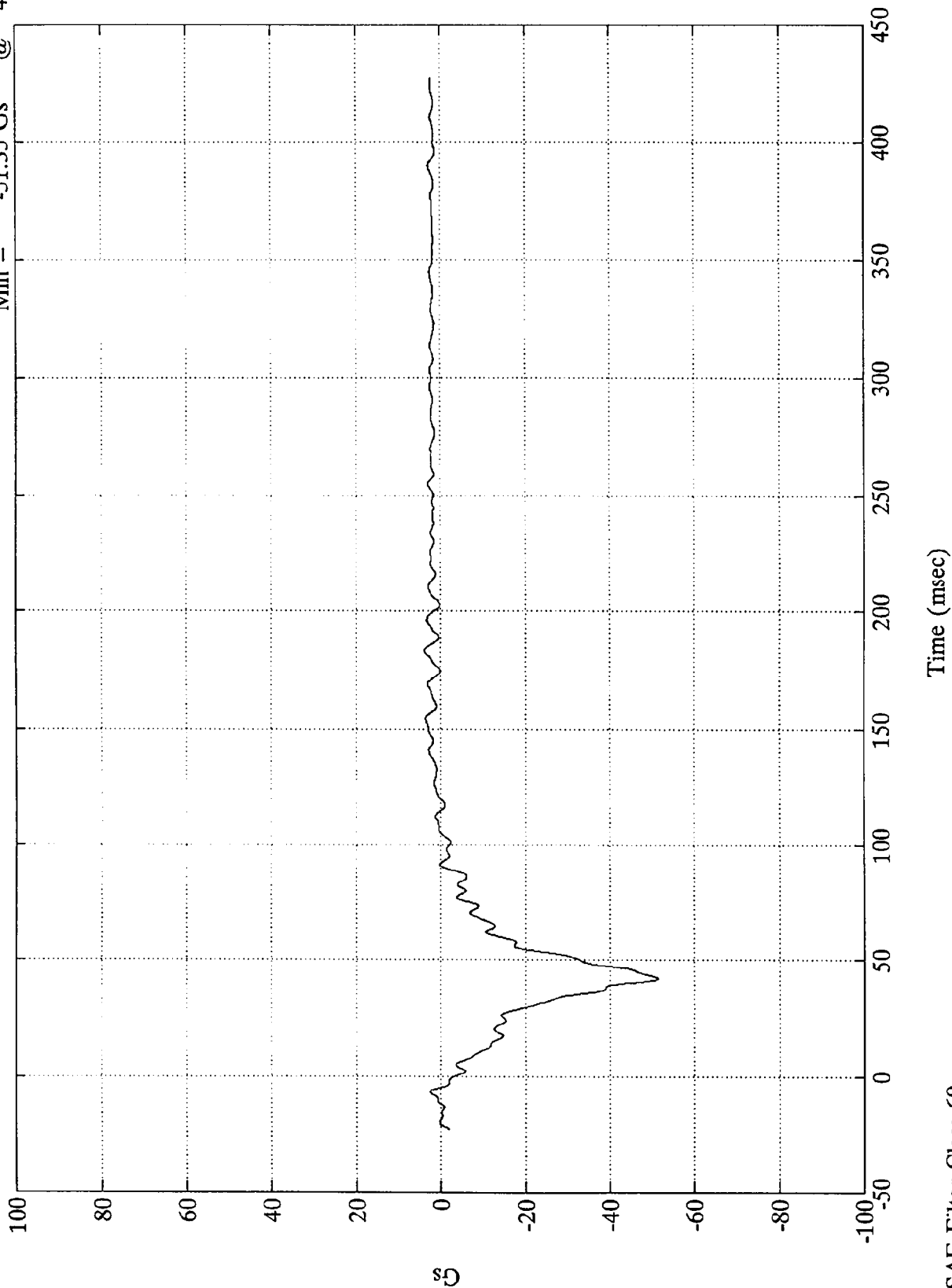
SAE Filter Class 180

VEHICLE TWO DATA

VTV TEST #11

V2 C.G. X

Max = 3.80 Gs @ 183.36 msec
Min = -51.35 Gs @ 41.88 msec

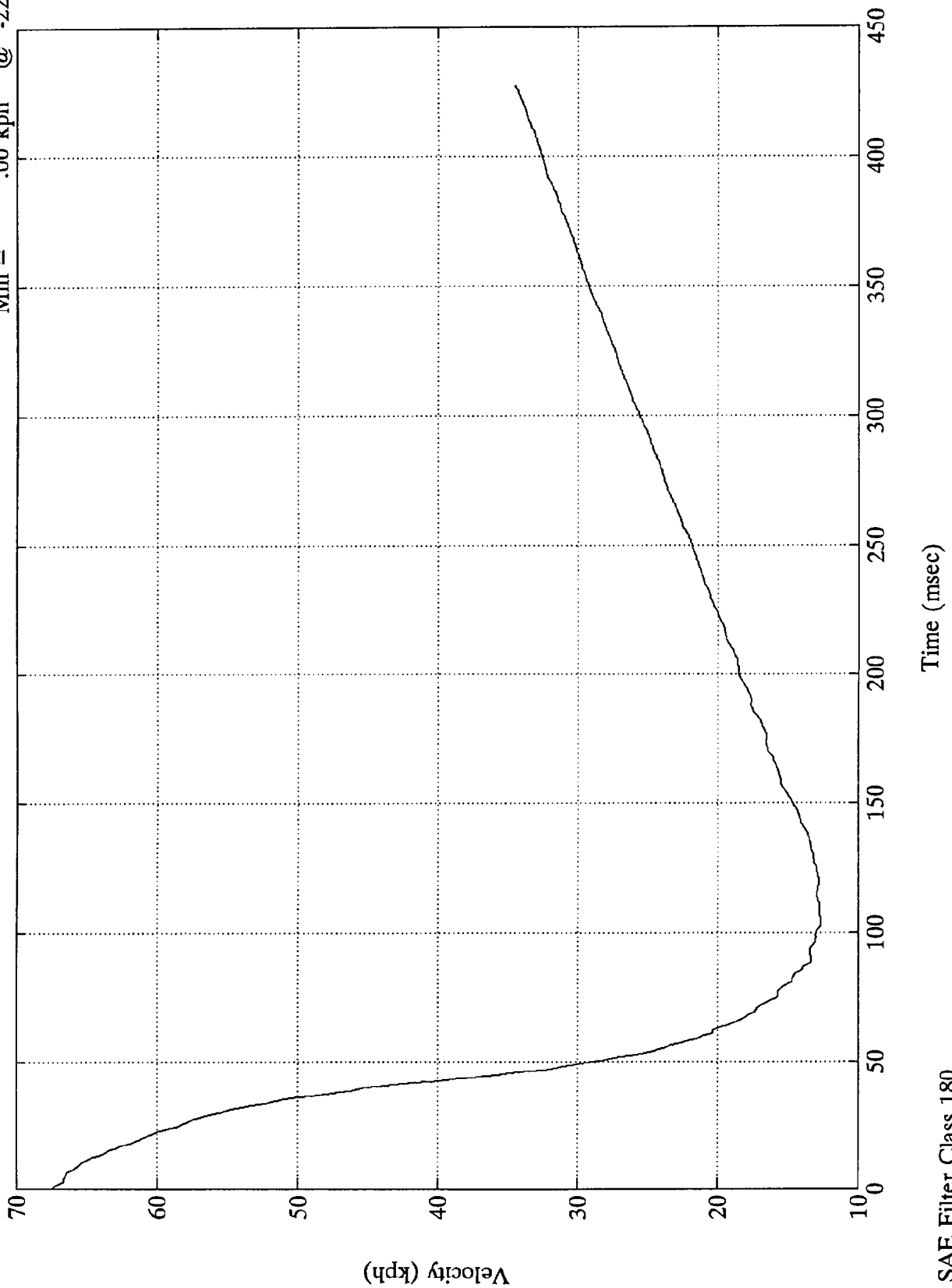


SAE Filter Class 60

VTV TEST #11

V2 C.G. X

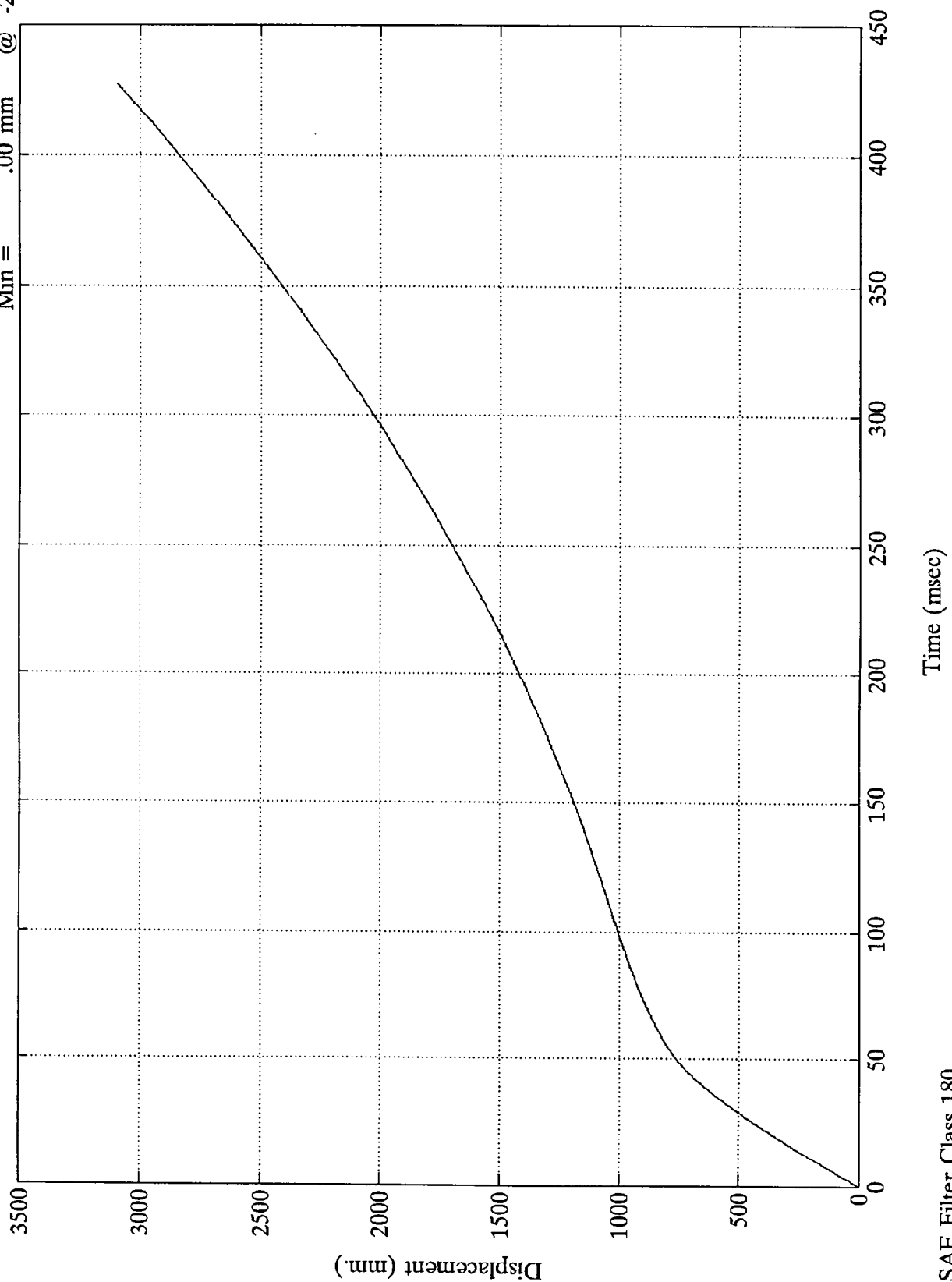
Max = 67.43 kph @ 0.23 msec
Min = .00 kph @ -22.44 msec



VTV TEST #11

V2 C.G. X

Max = 3092.90 mm @ 427.32 msec
Min = .00 mm @ -22.44 msec

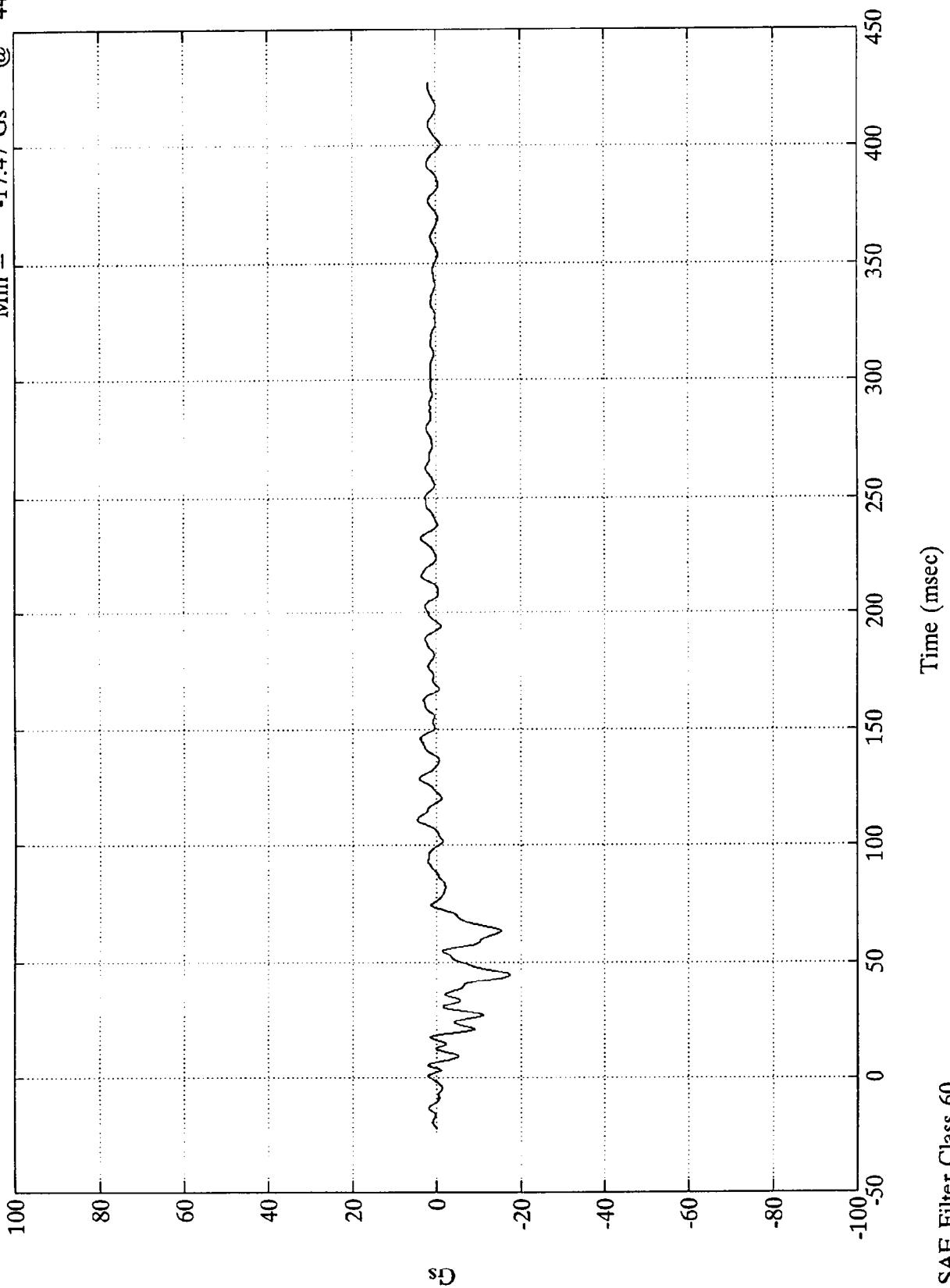


SAE Filter Class 180

VTV TEST #11

Max = 4.63 Gs @ 110.88 msec
Min = -17.47 Gs @ 44.63 msec

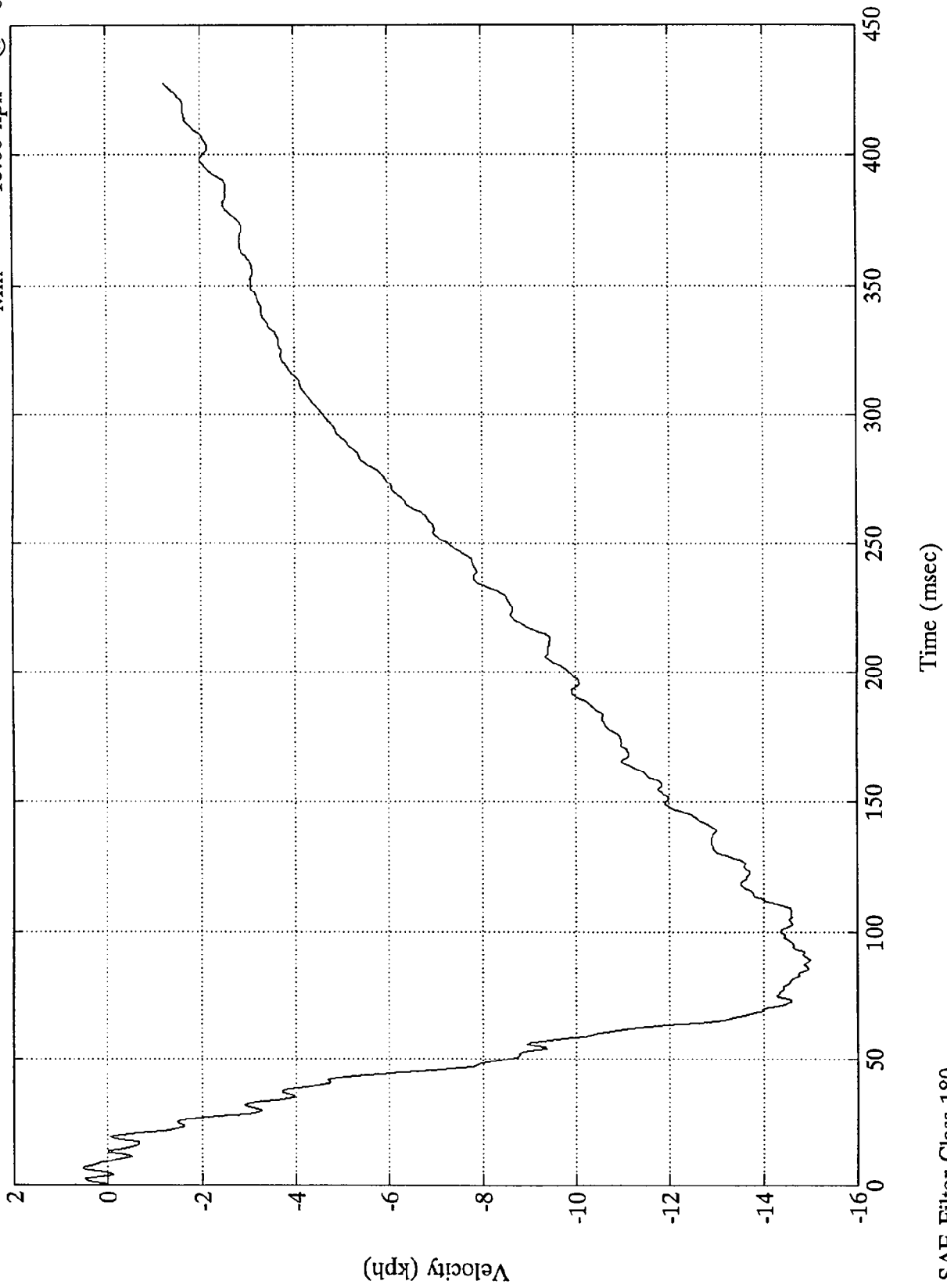
V2 C.G. Y



VTV TEST #11

V2 C.G. Y

Max = .55 kph @ 6.83 msec
Min = -15.00 kph @ 89.28 msec

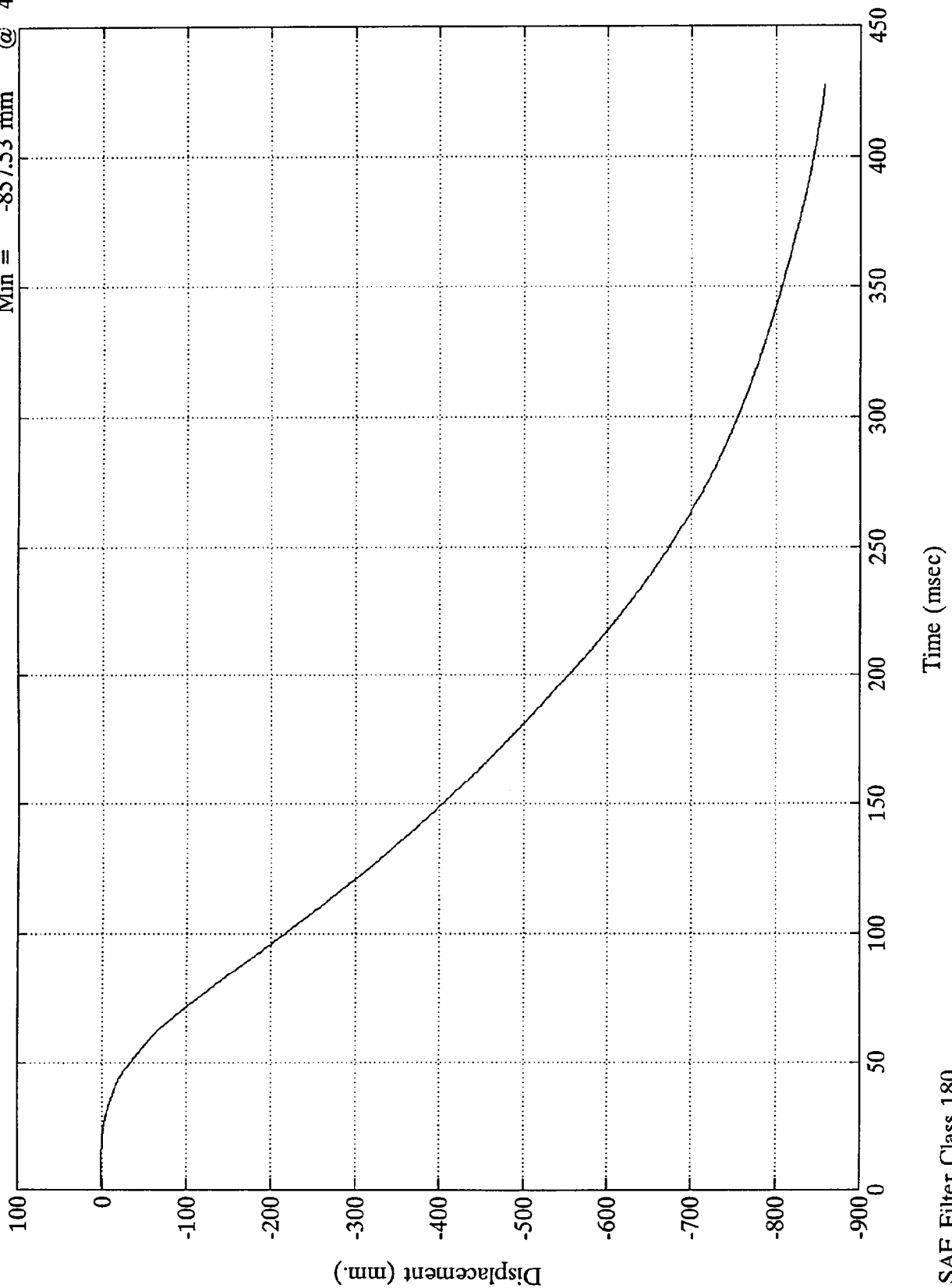


SAE Filter Class 180

VTV TEST #11

Max = .65 mm @ 9.47 msec
Min = -857.53 mm @ 427.32 msec

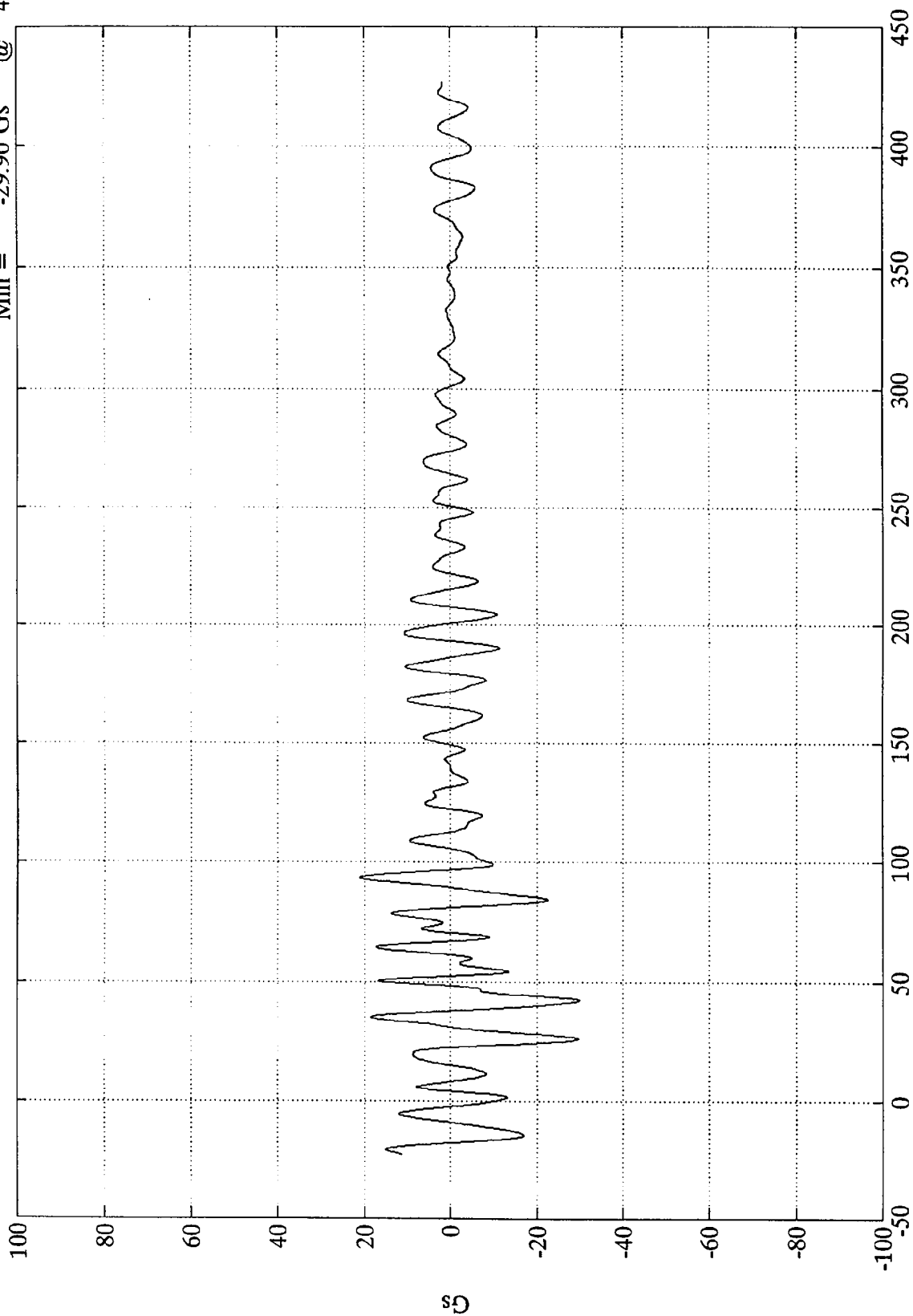
V2 C.G. Y



VTV TEST #11

Max = 21.10 Gs @ 93.60 msec
Min = -29.90 Gs @ 42.24 msec

V2 C.G. Z



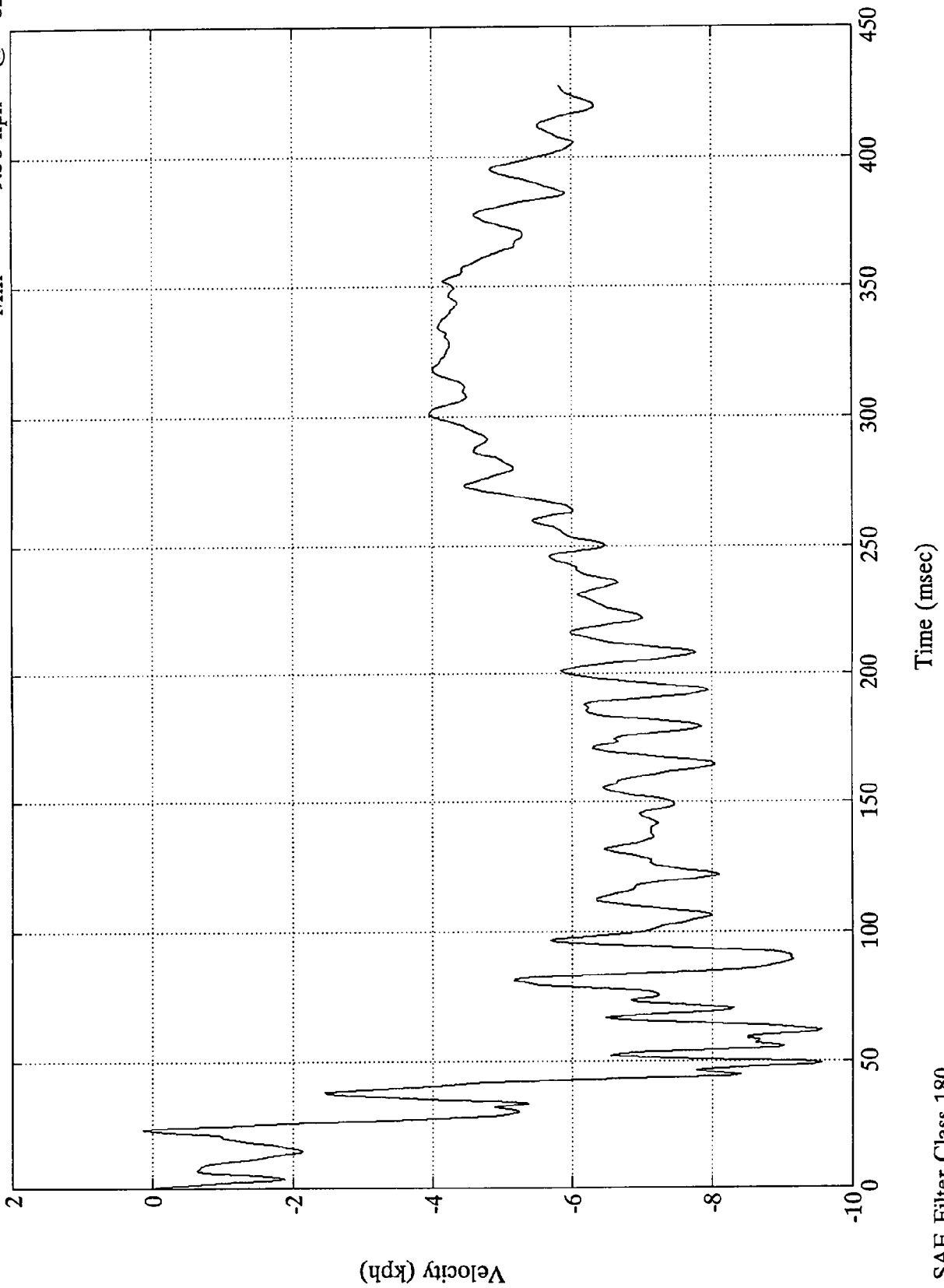
Time (msec)

SAE Filter Class 60

VTV TEST #11

V2 C.G. Z

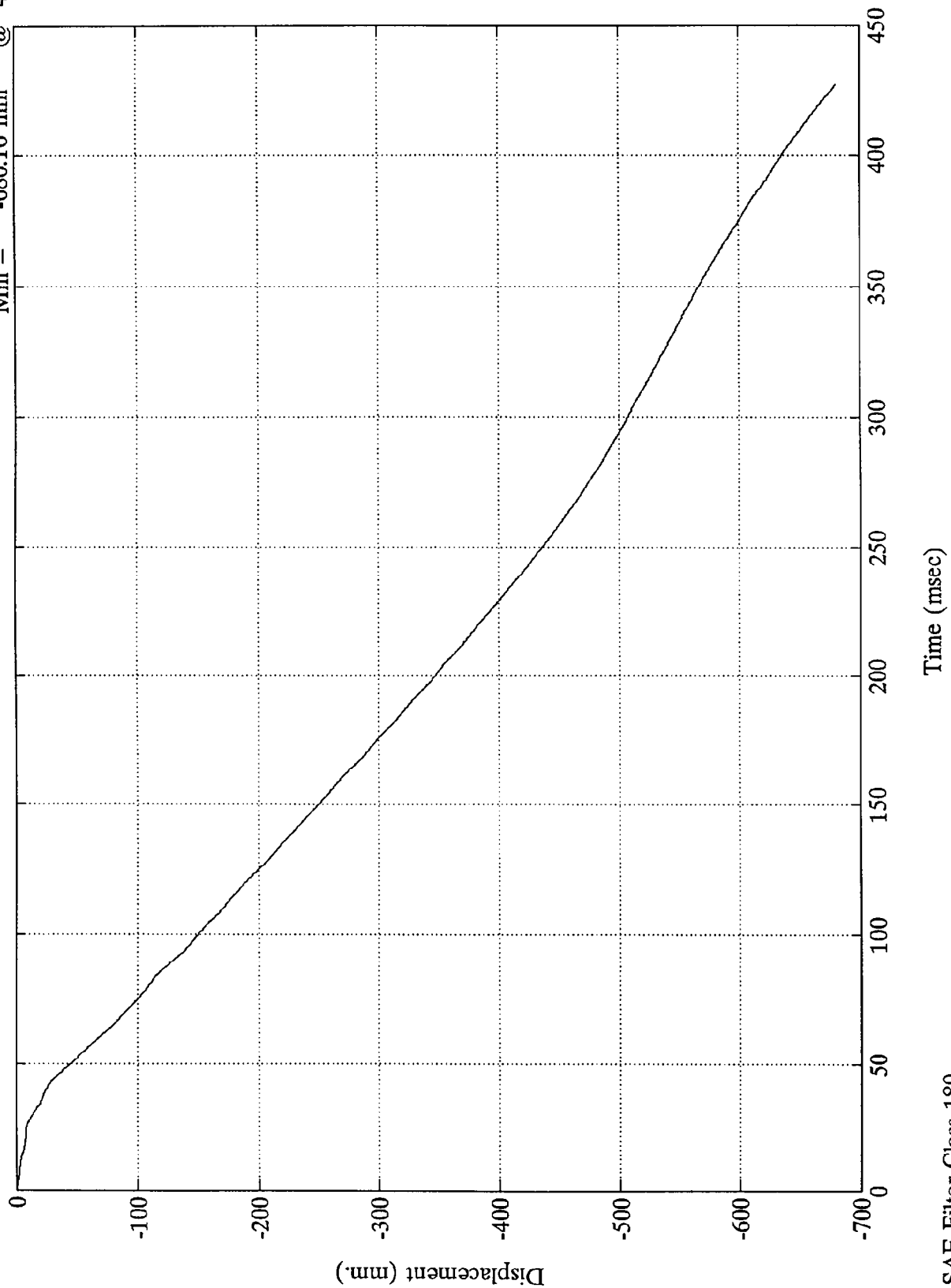
Max = .18 kph @ 23.16 msec
Min = -9.56 kph @ 61.68 msec



VTV TEST #11

Max = .00 mm @ -0.00 msec
Min = -680.16 mm @ 427.32 msec

V2 C.G. Z

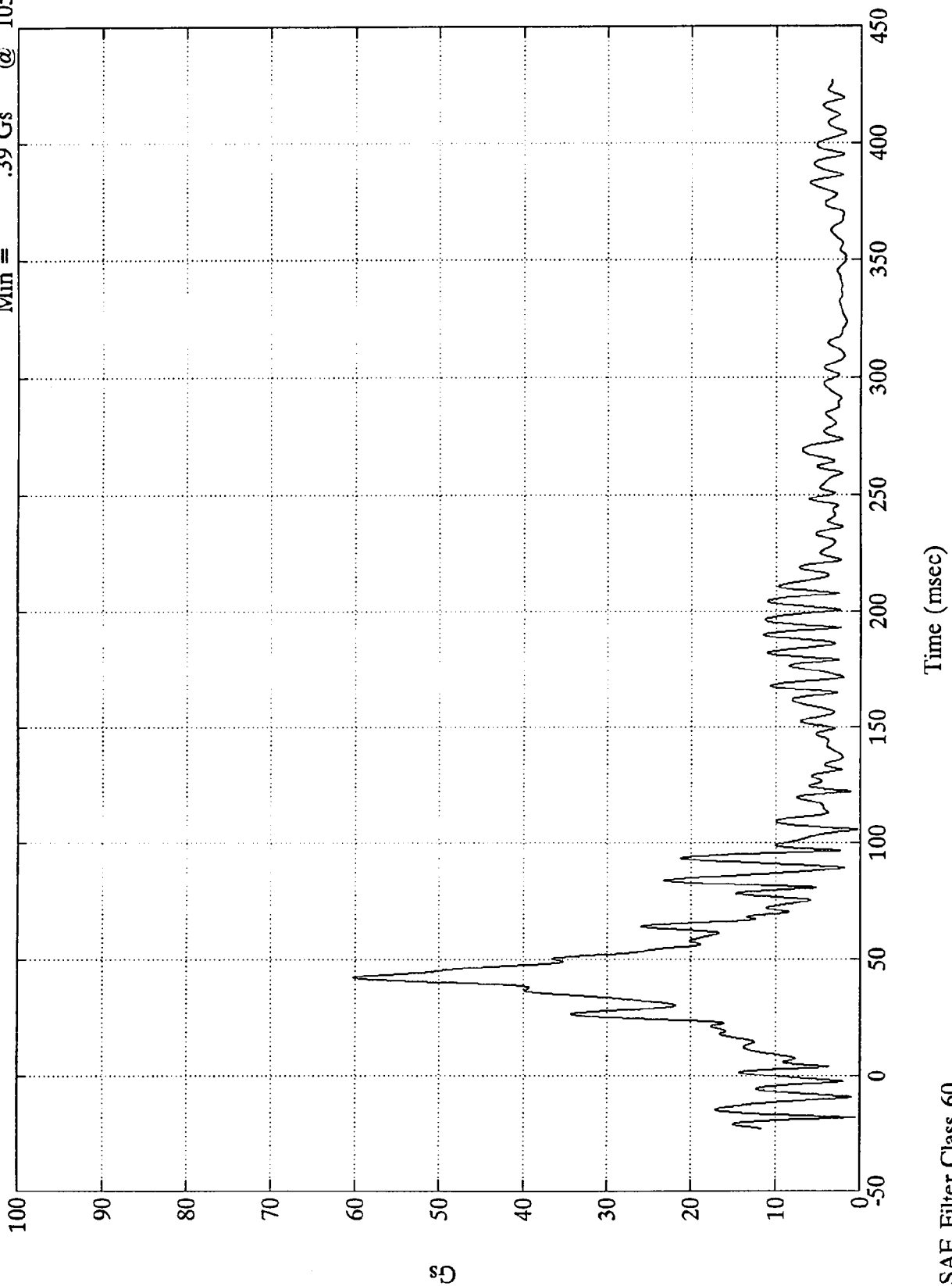


SAE Filter Class 180

VTV TEST #11

V2 C.G.

Max = 60.31 Gs @ 42.24 msec
Min = .39 Gs @ 105.72 msec

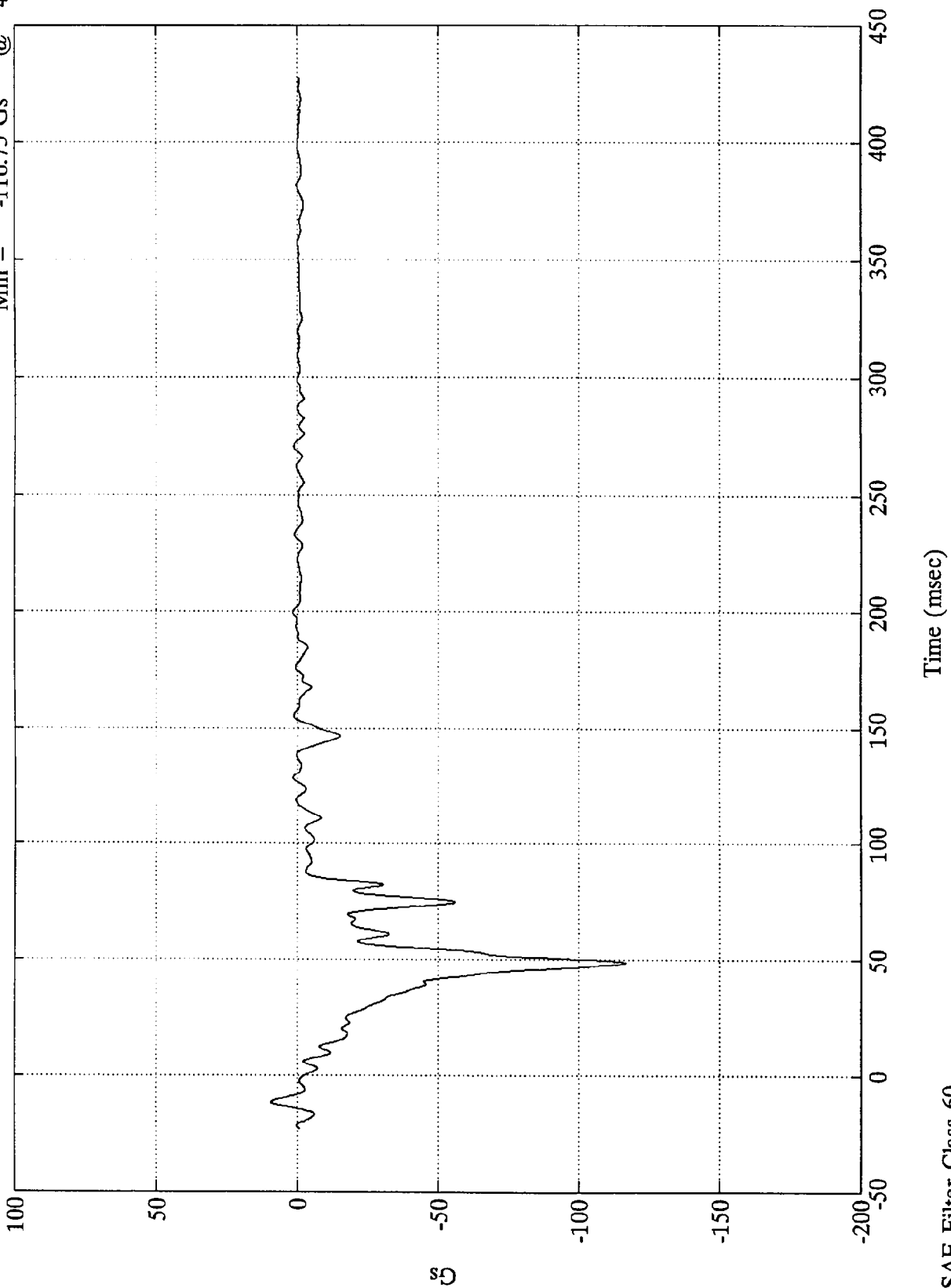


8

VTV TEST #11

Max = 9.53 Gs @ -11.52 msec
Min = -116.75 Gs @ 48.72 msec

V2 Left Rail X

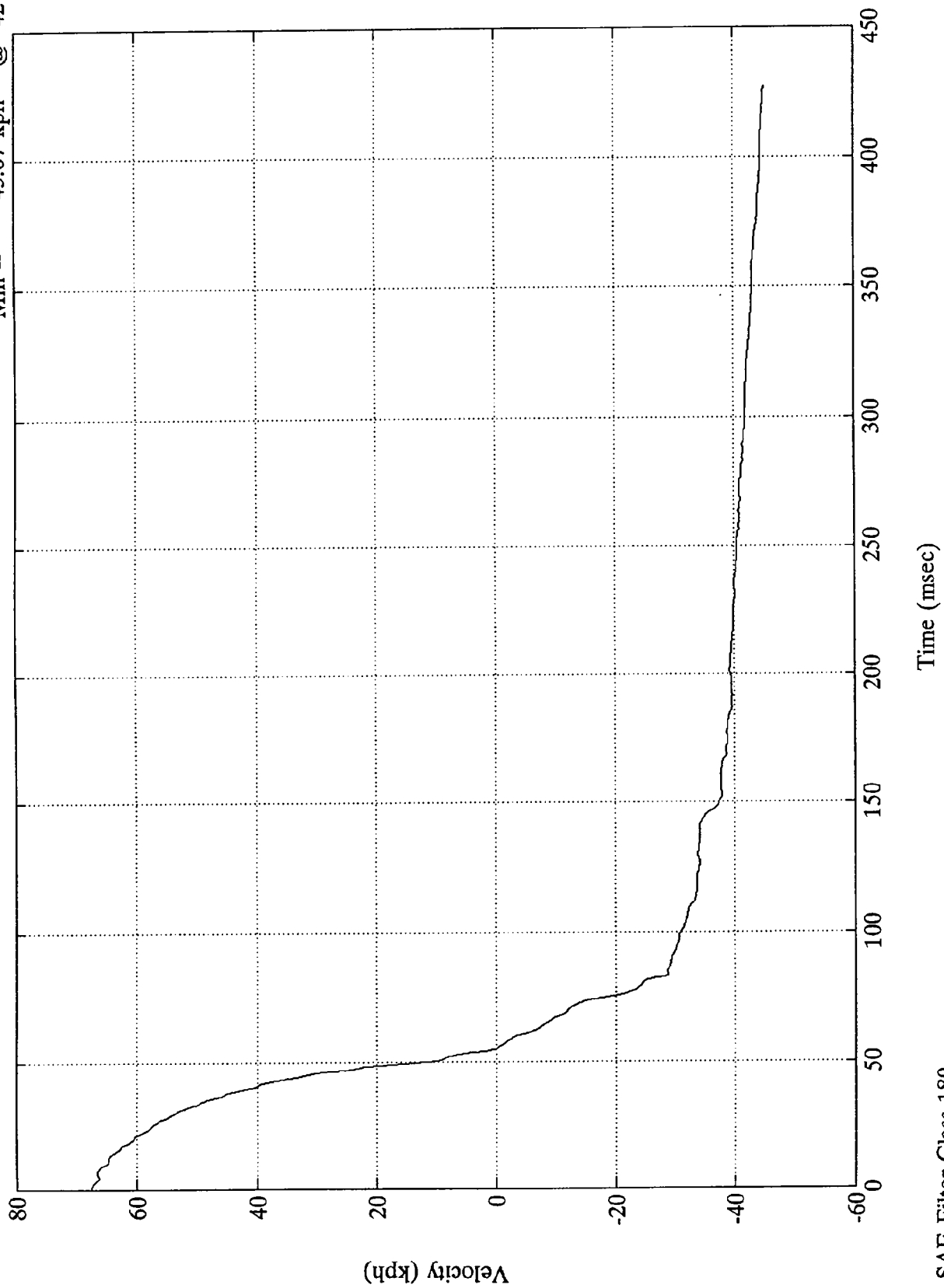


SAE Filter Class 60

VTV TEST #11

V2 Left Rail X

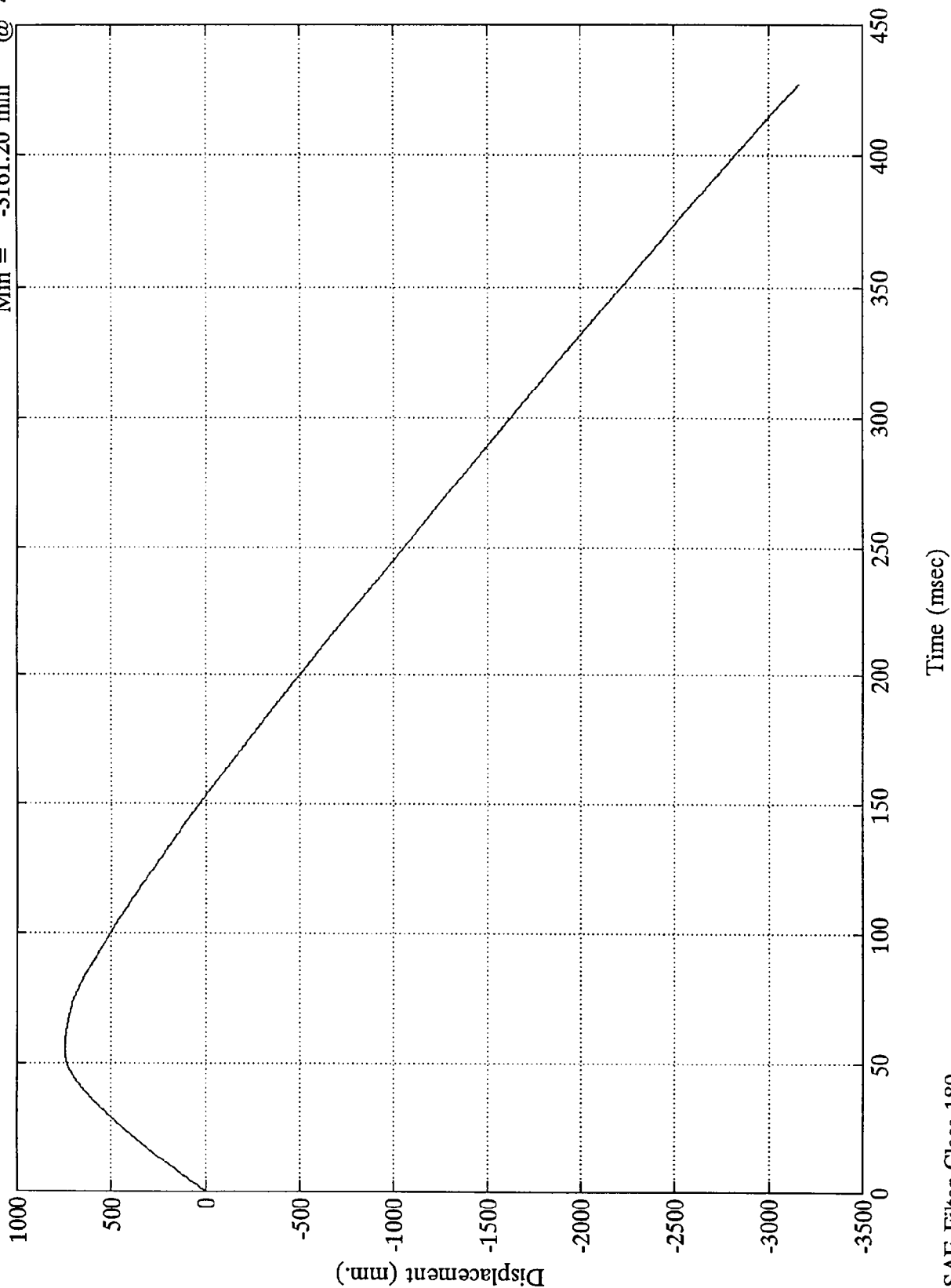
Max = 67.46 kph @ 1.19 msec
Min = -45.07 kph @ 427.32 msec



VTV TEST #11

Max = 744.22 mm @ 54.96 msec
Min = -3161.20 mm @ 427.32 msec

V2 Left Rail X

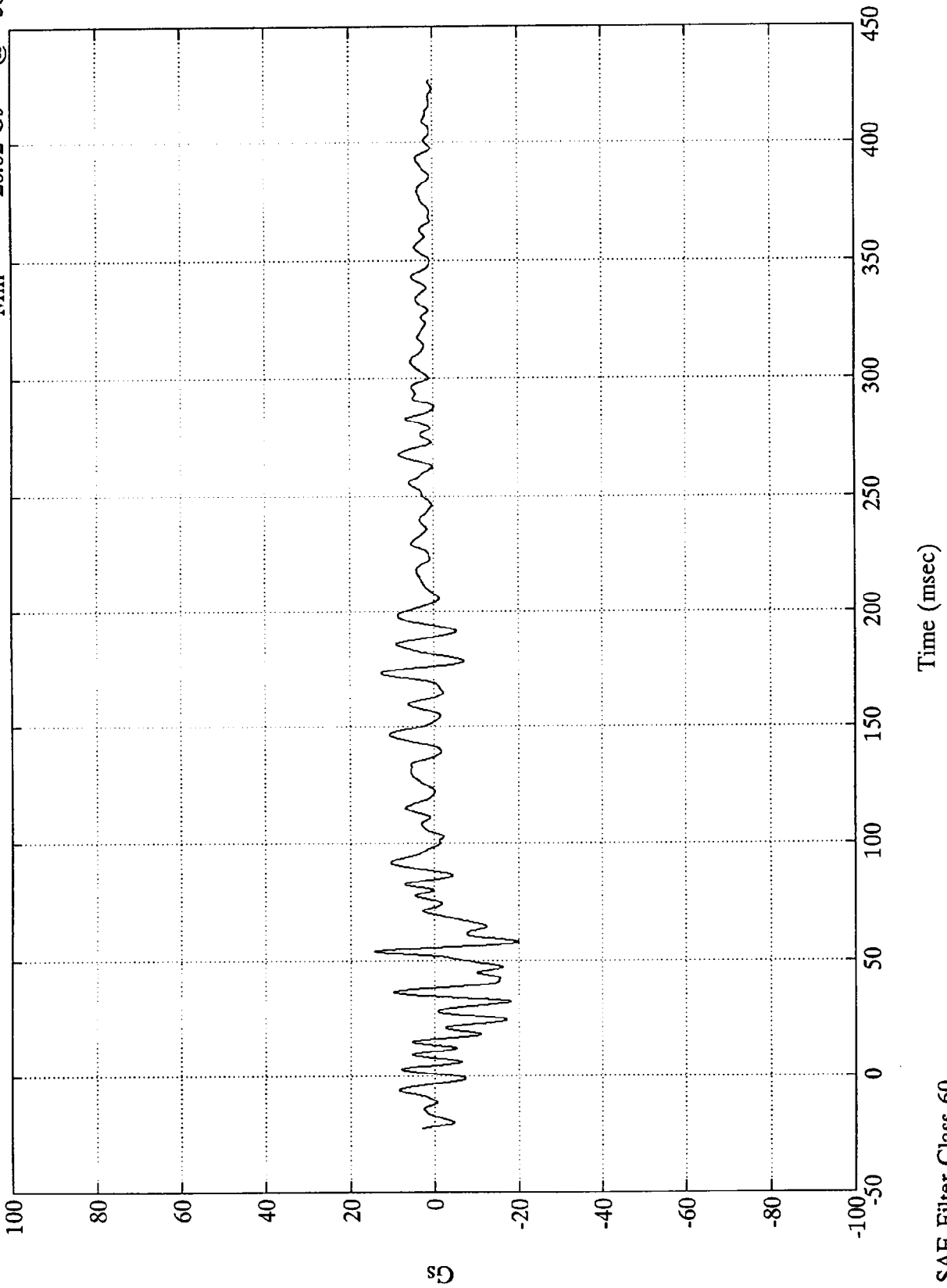


SAE Filter Class 180

VTV TEST #11

Max = 14.43 Gs @ 54.11 msec
Min = -20.02 Gs @ 58.20 msec

V2 Left Rail Y

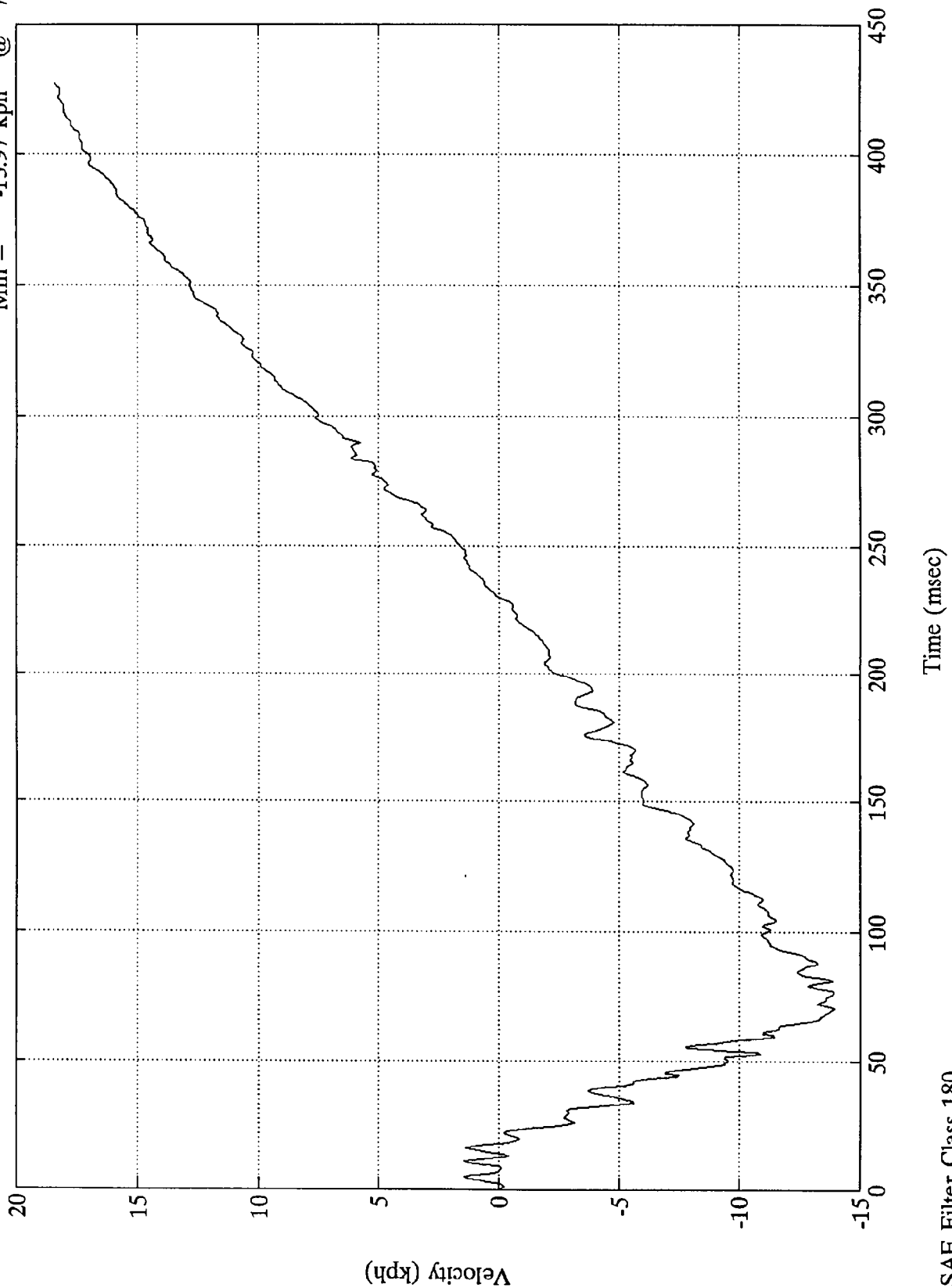


SAE Filter Class 60

VTV TEST #11

V2 Left Rail Y

Max = 18.42 kph @ 427.32 msec
Min = -13.97 kph @ 70.44 msec

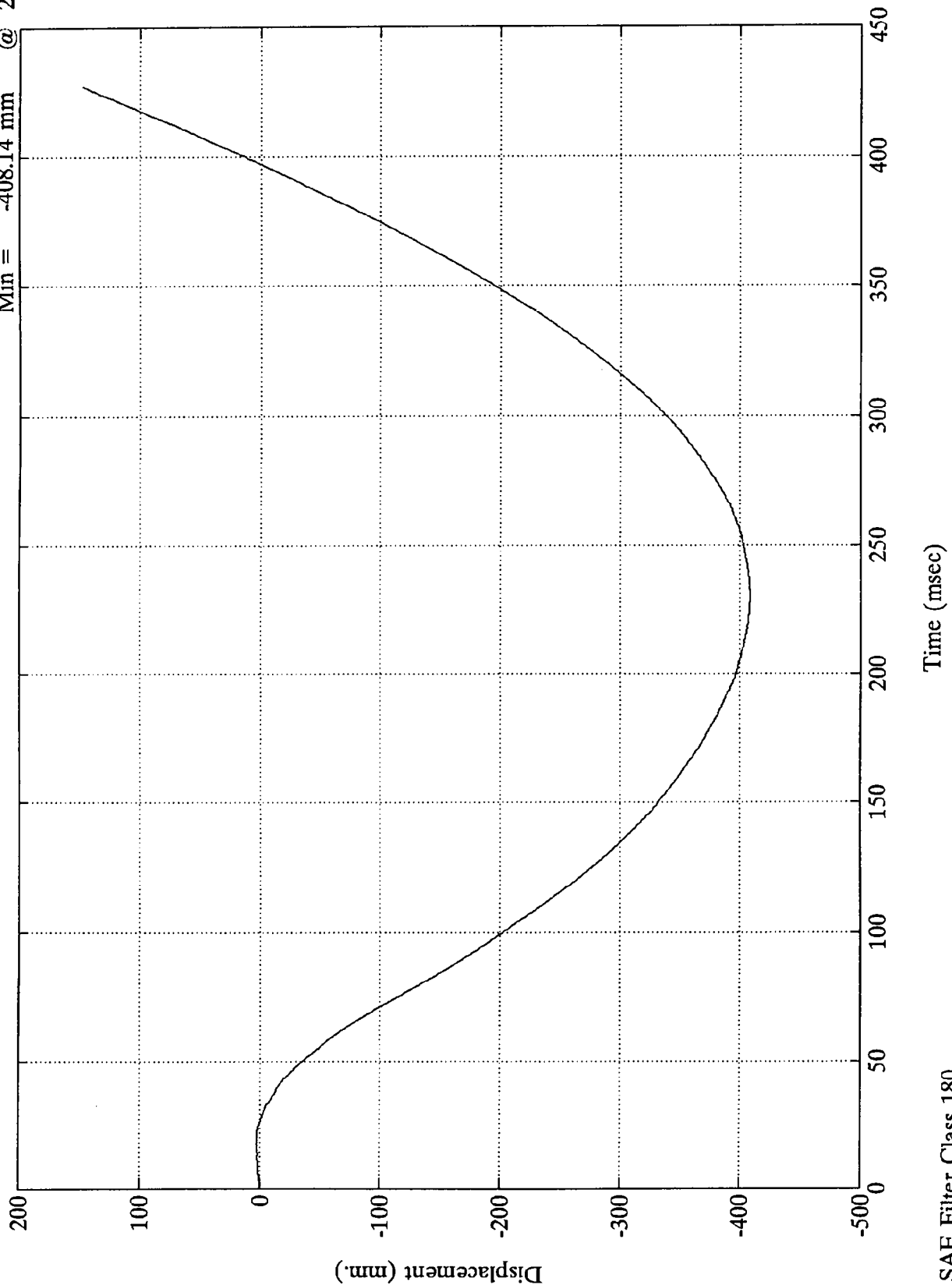


SAE Filter Class 180

VTV TEST #11

V2 Left Rail Y

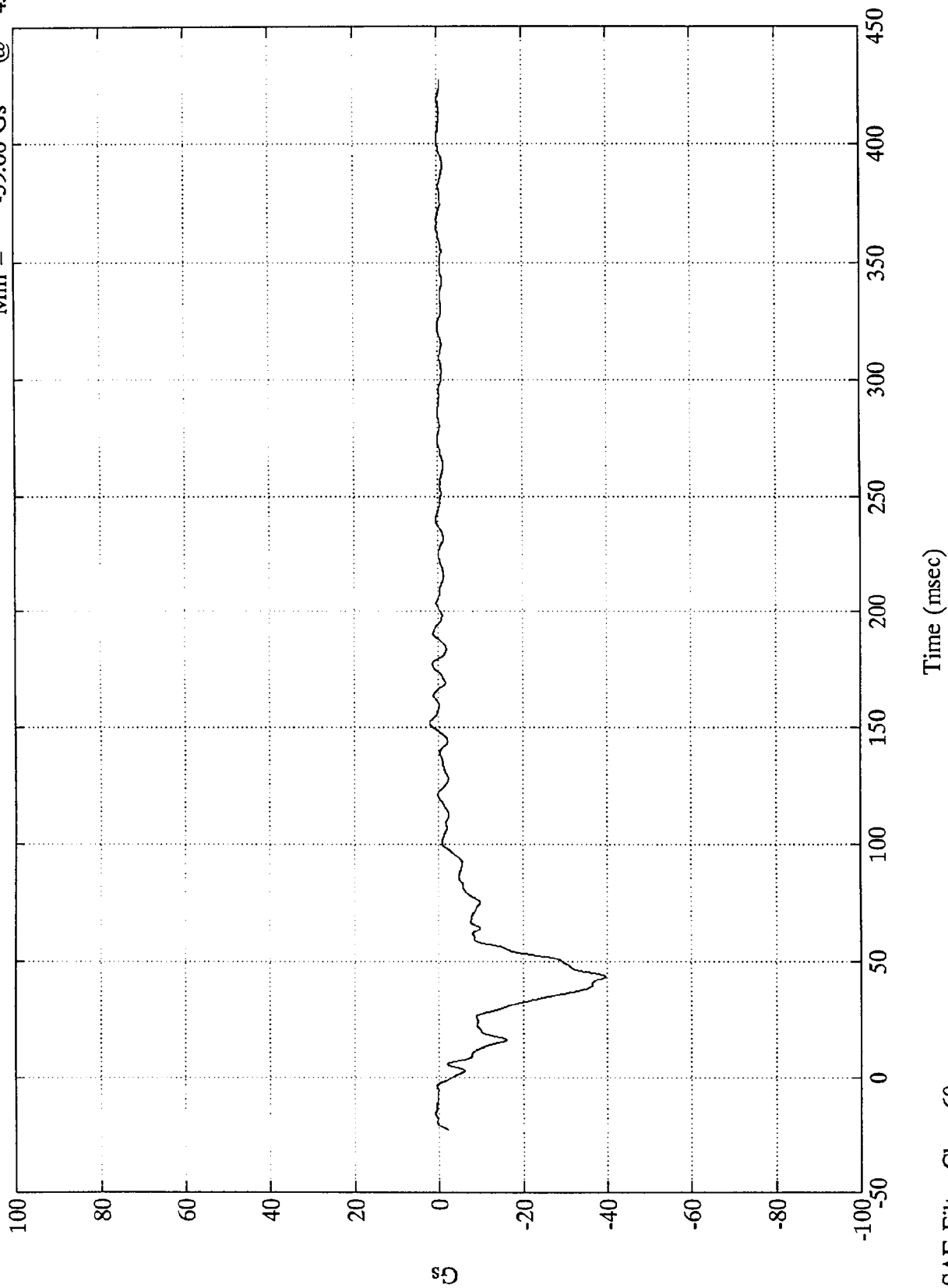
Max = 148.44 mm @ 427.32 msec
Min = -408.14 mm @ 229.68 msec



VTV TEST #11

V2 Right Rail X

Max = 2.07 Gs @ 151.91 msec
Min = -39.66 Gs @ 43.56 msec

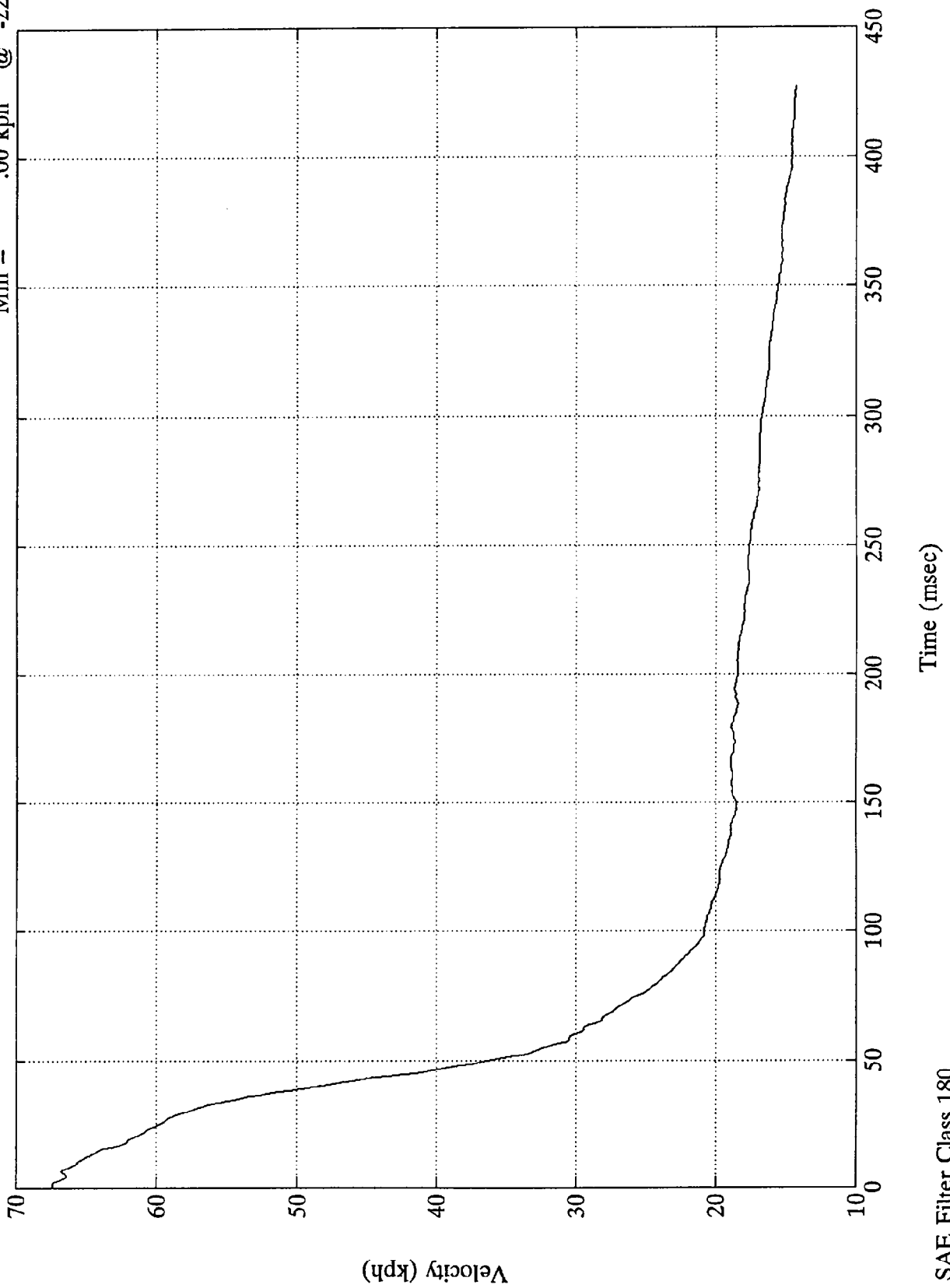


SAE Filter Class 60

VTV TEST #11

V2 Right Rail X

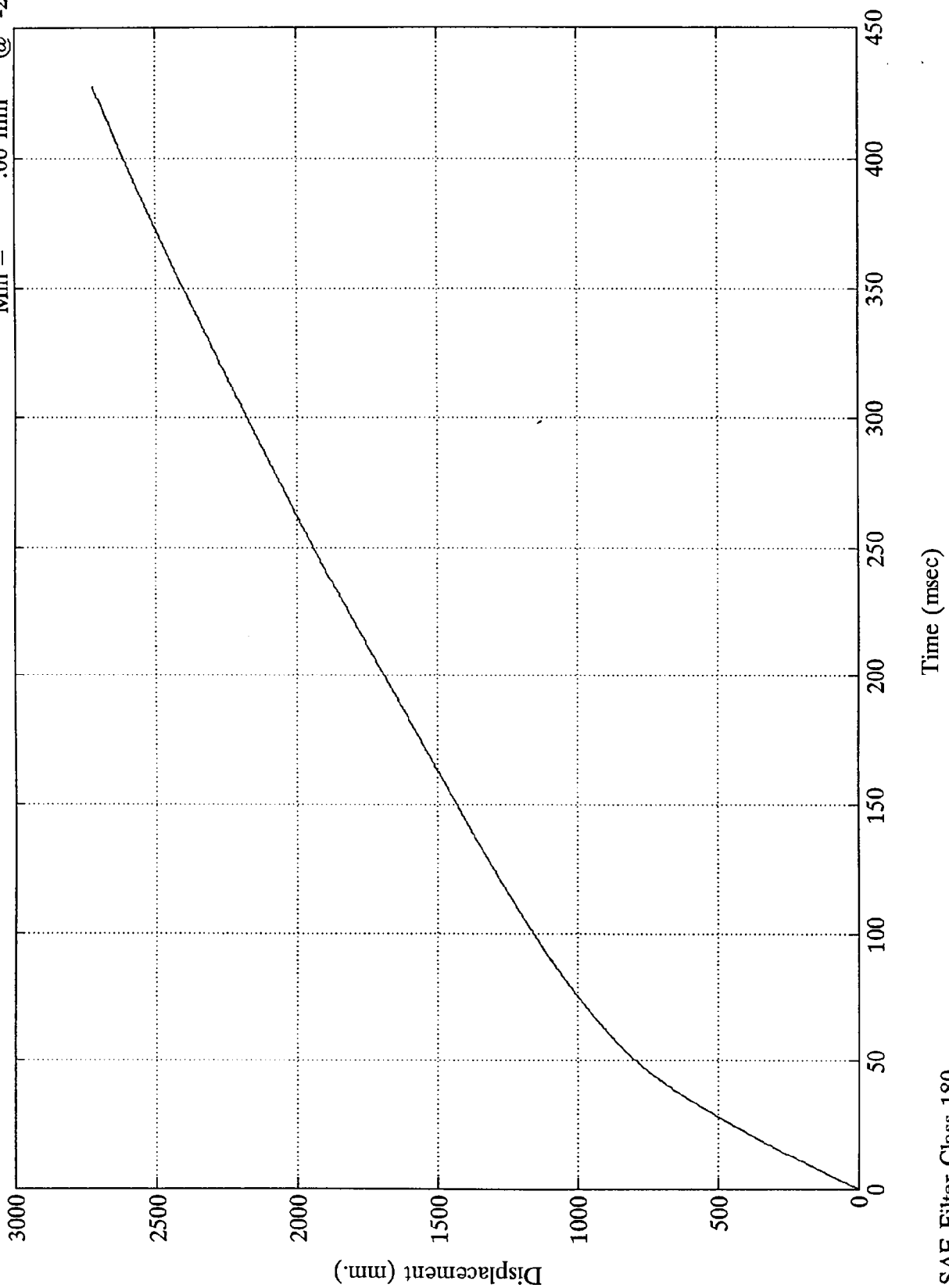
Max = 67.43 kph @ -0.00 msec
Min = .00 kph @ -22.44 msec



VTV TEST #11

V2 Right Rail X

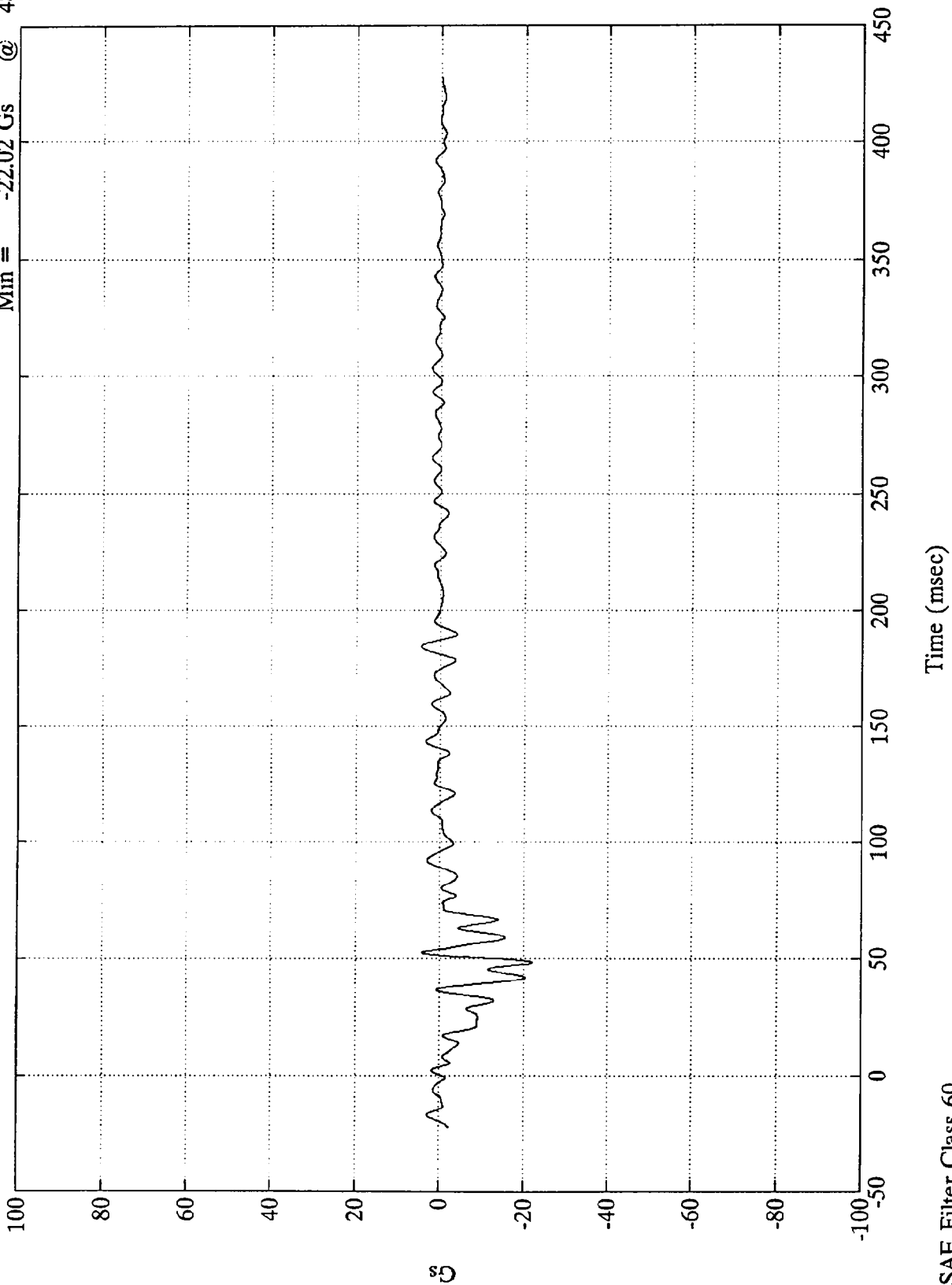
Max = 2722.04 mm @ 427.32 msec
Min = .00 mm @ -22.44 msec



VTV TEST #11

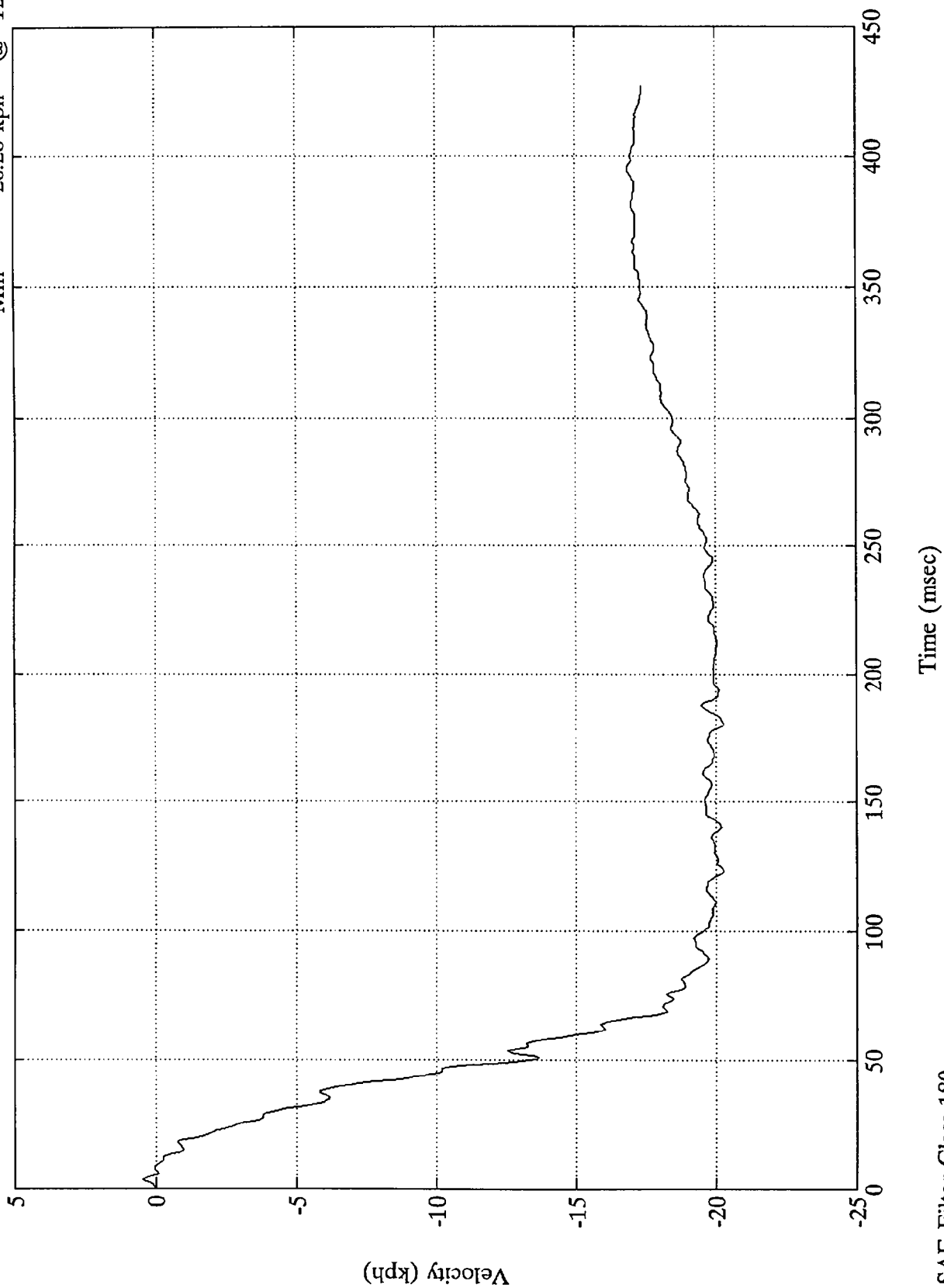
V2 Right Rail Y

Max = 4.49 Gs @ 184.55 msec
Min = -22.02 Gs @ 48.36 msec



VTV TEST #11

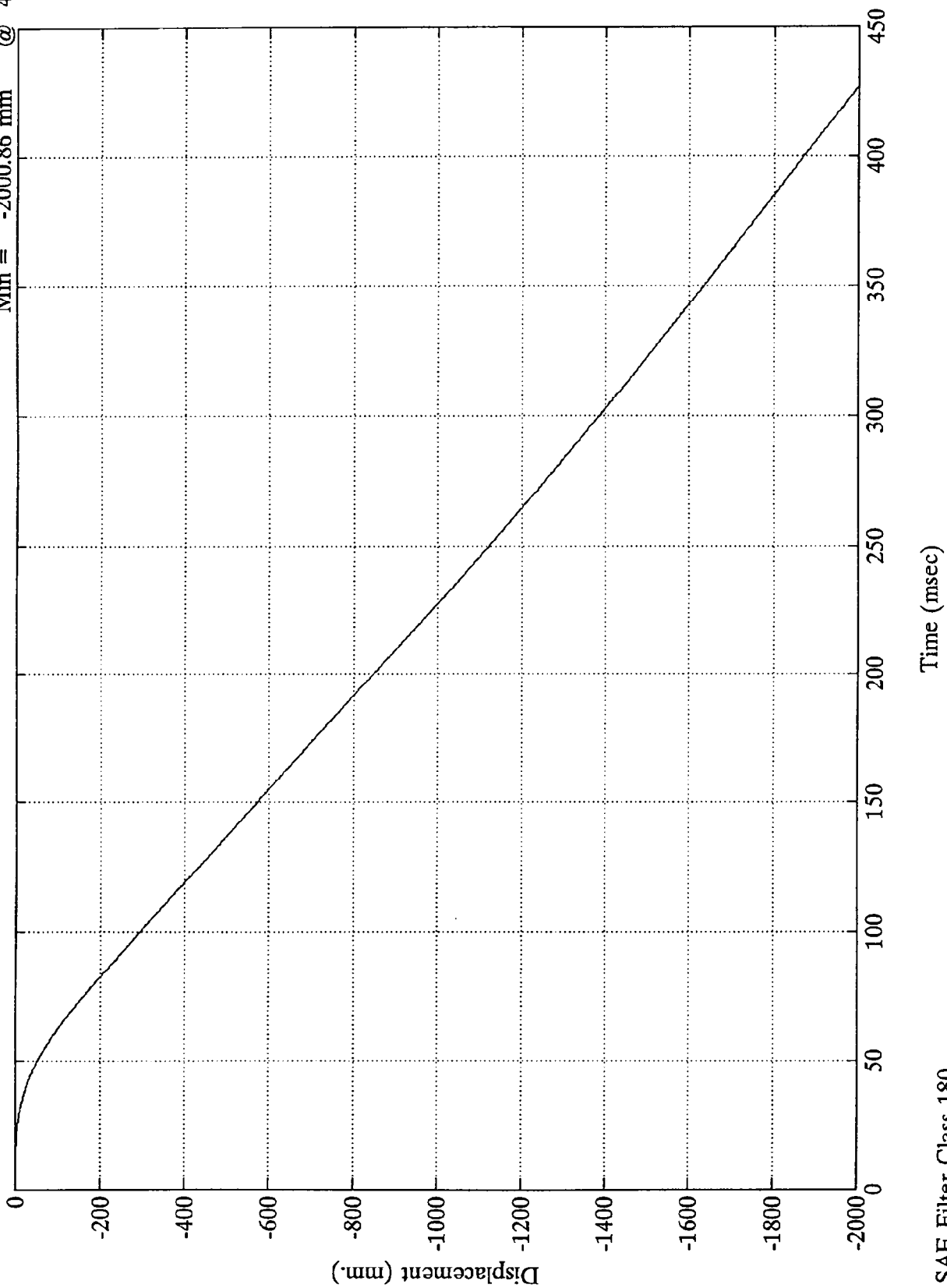
V2 Right Rail Y
Max = .47 kph @ 3.71 msec
Min = -20.26 kph @ 123.36 msec



VTV TEST #11

V2 Right Rail Y

Max = .33 mm @ 9.47 msec
Min = -2000.86 mm @ 427.32 msec

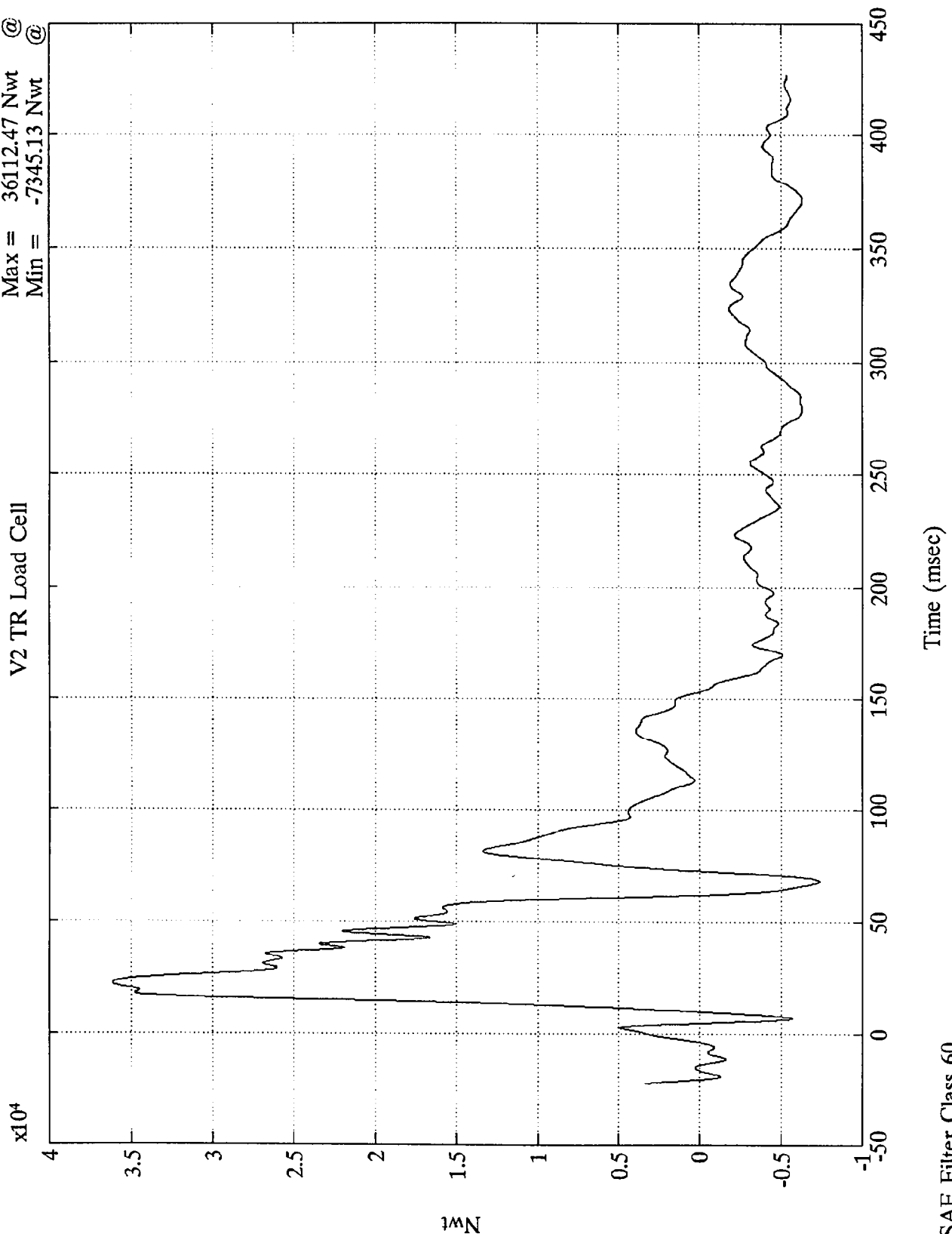


SAE Filter Class 180

VTV TEST #11

V2 TR Load Cell

Max = 36112.47 Nwt @ 22.31 msec
Min = -7345.13 Nwt @ 68.04 msec

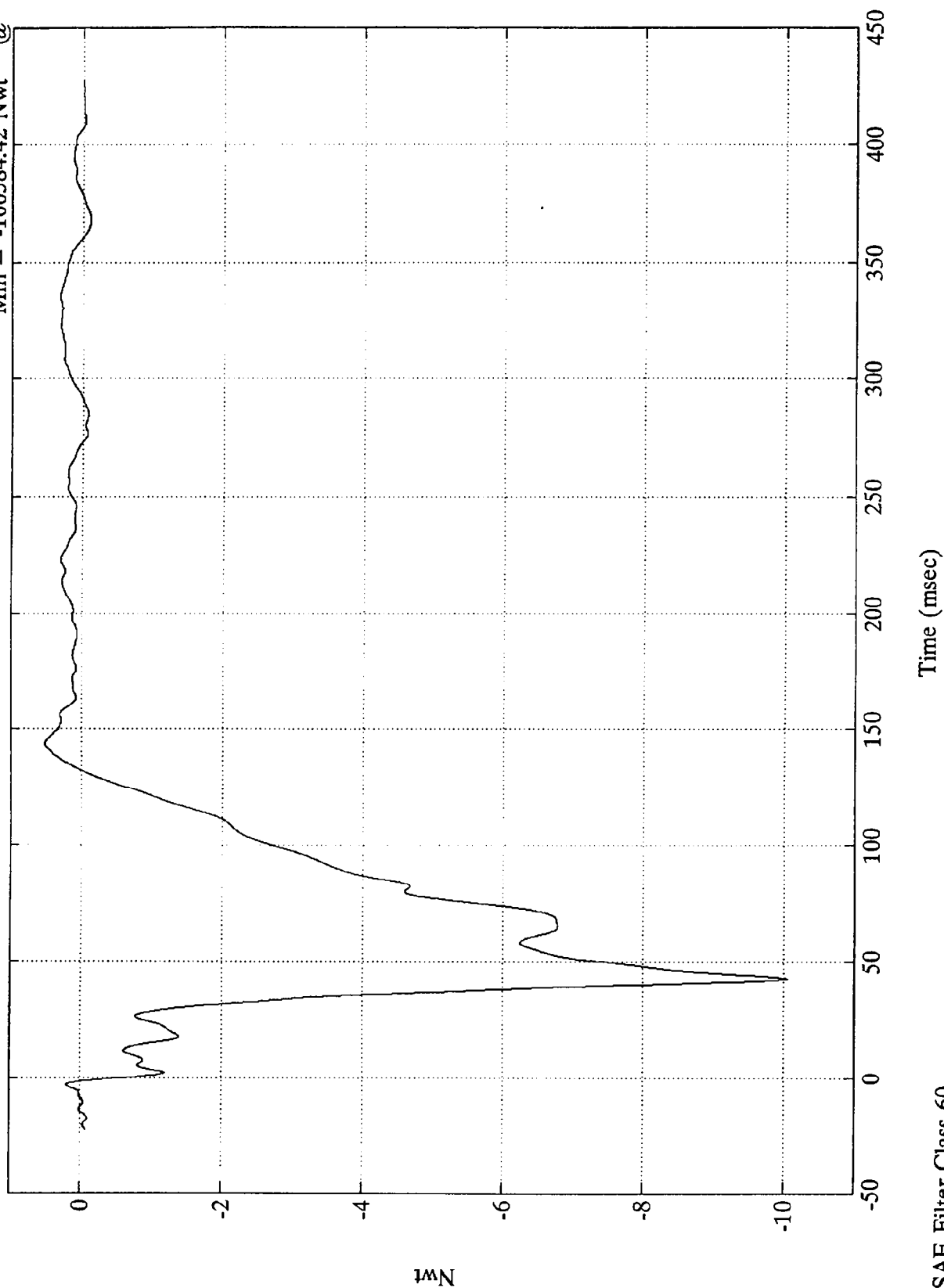


SAE Filter Class 60

VTV TEST #11
x10⁴

Max = 5136.37 Nwt @ 143.52 msec
Min = -100584.42 Nwt @ 42.72 msec

V2 BR Load Cell



Nwt

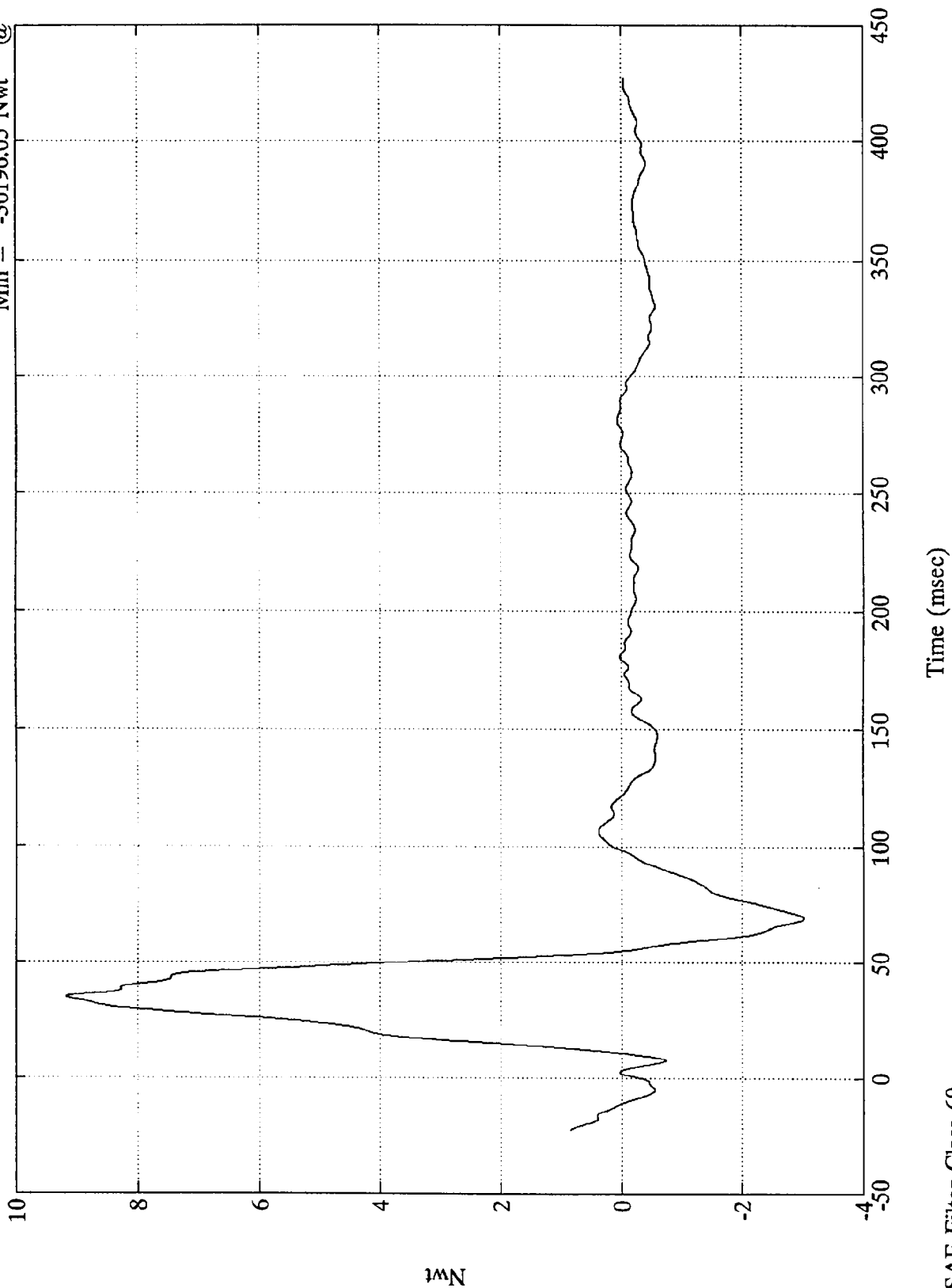
SAE Filter Class 60

VTV TEST #11

$\times 10^4$

V2 TL Load Cell

Max = 91766.05 Nwt @ 34.79 msec
Min = -30196.05 Nwt @ 69.36 msec



SAE Filter Class 60

VTV TEST #11

$\times 10^4$

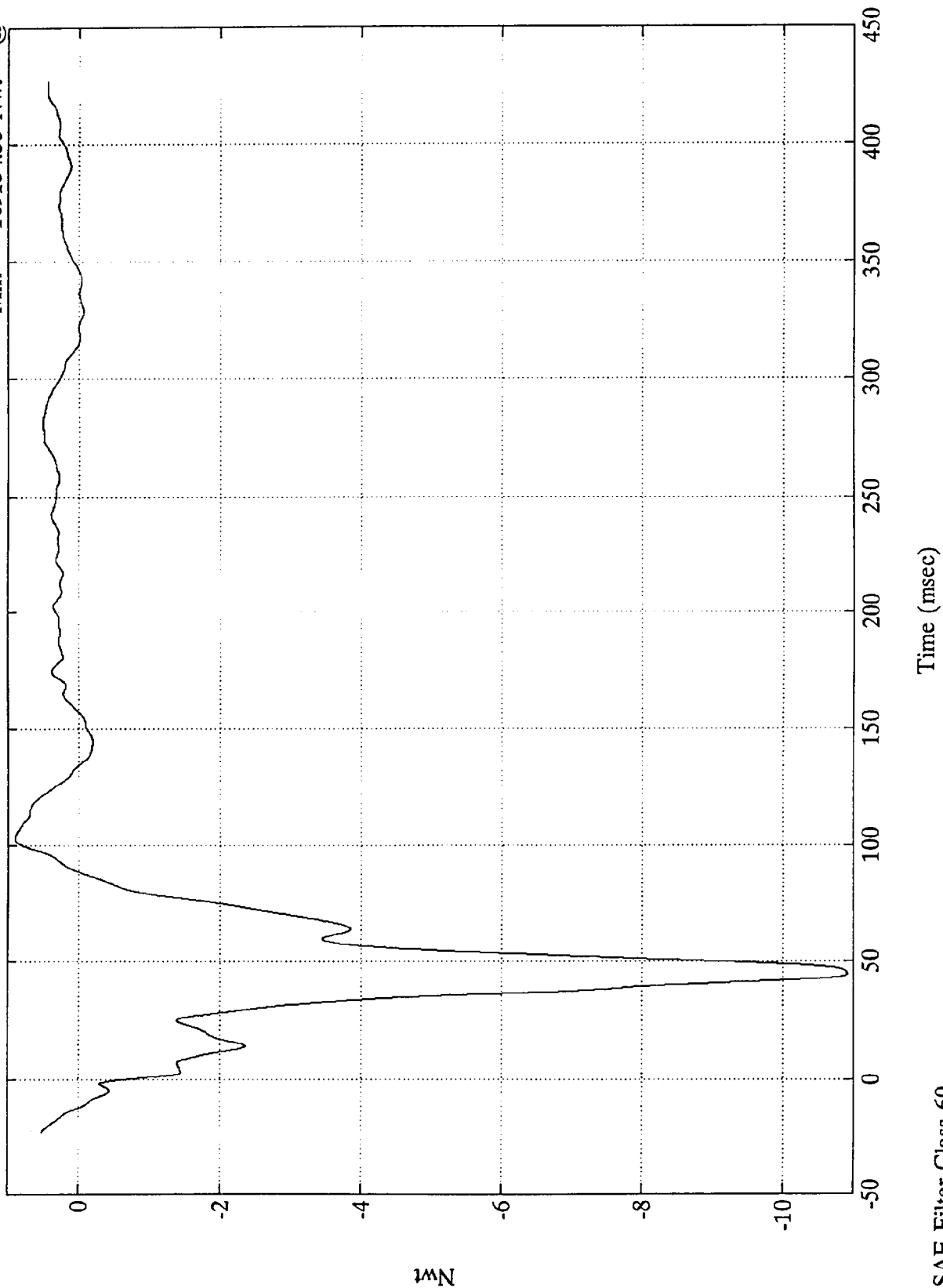
V2 BL Load Cell

Max = 8979.59 Nwt

@ 103.20 msec

Min = -109134.55 Nwt

@ 44.52 msec



SAE Filter Class 60

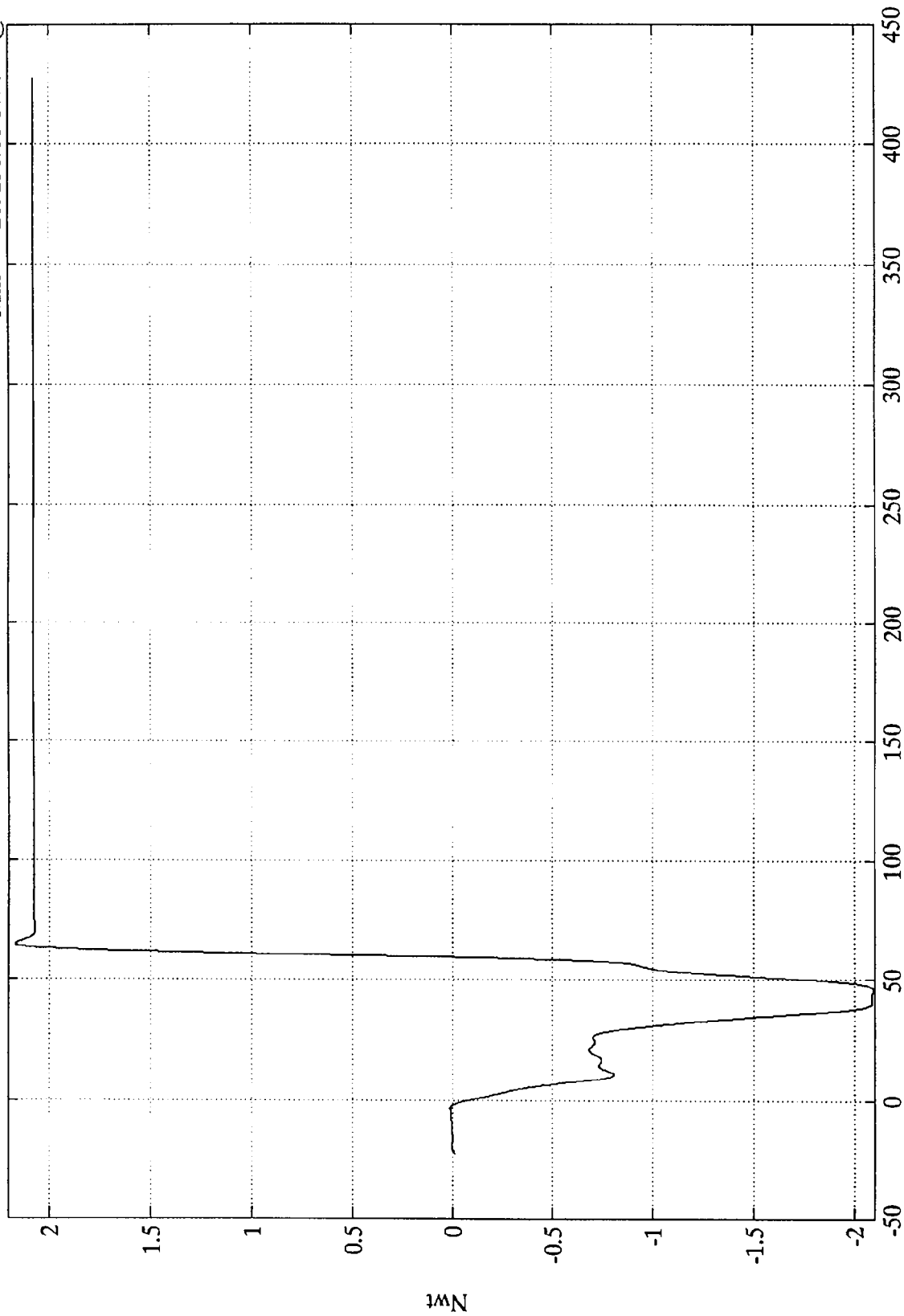
Nwt

VTV TEST #11

$\times 10^5$

V2 CL Load Cell

Max = 216819.22 Nwt @ 64.56 msec
Min = -209236.66 Nwt @ 45.60 msec



Wire cut at 50 msec

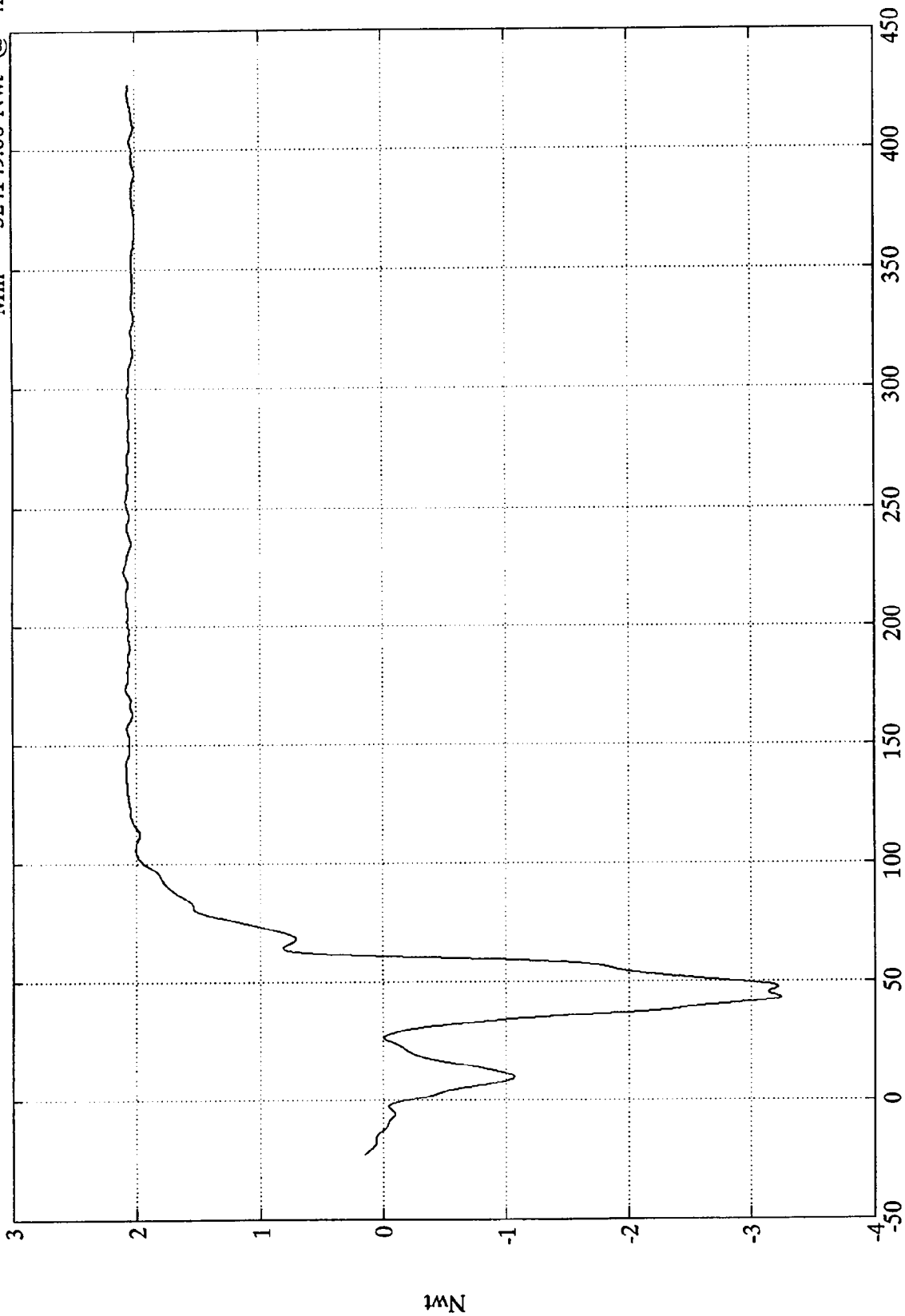
SAE Filter Class 60

VTV TEST #11

$\times 10^5$

Max = 209774.30 Nwt @ 223.56 msec
Min = -324149.00 Nwt @ 42.96 msec

V2 Load Cell Barrier Sum



Time (msec) Data questionable after 50msec, wire cut

SAE Filter Class 60

TEST NO. Y49-11-1456

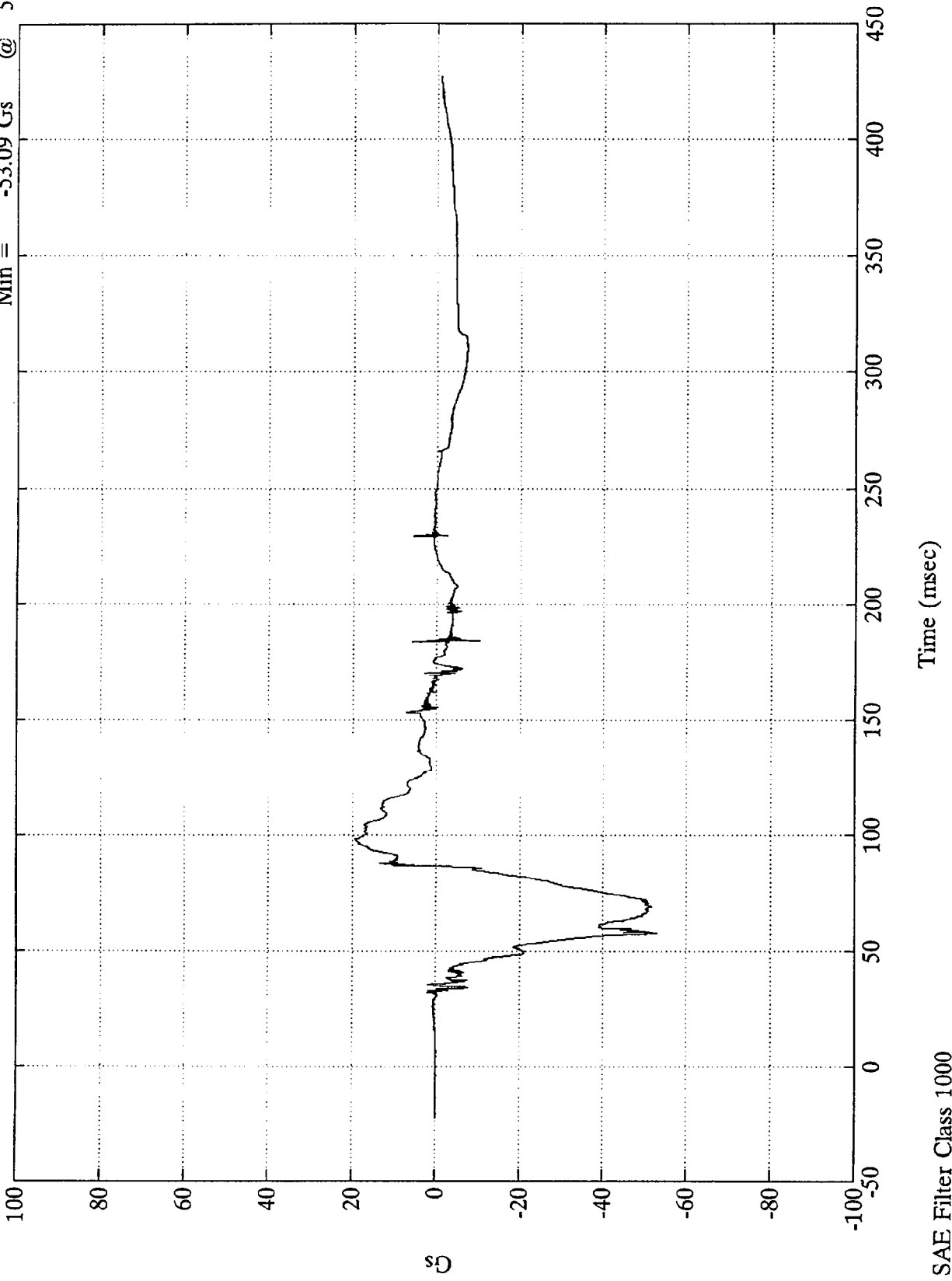
VEHICLE 1 - DUMMY DATA

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

VTV TEST #11

V1-P1 Head X

Max = 19.40 Gs @ 98.40 msec
Min = -53.09 Gs @ 57.84 msec

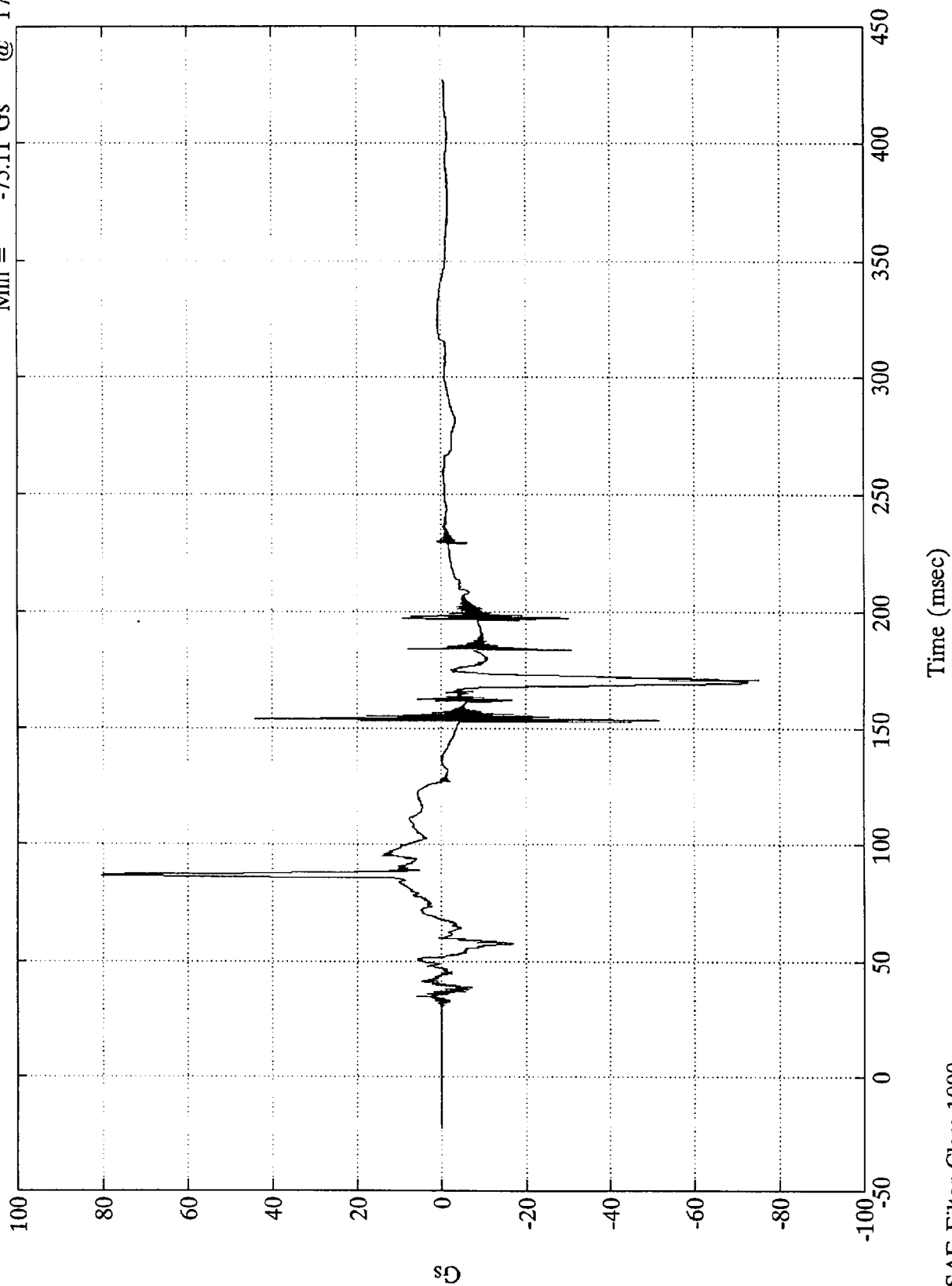


SAE Filter Class 1000

VTV TEST #11

Max = 80.32 Gs @ 86.52 msec
Min = -75.11 Gs @ 171.00 msec

V1-P1 Head Y

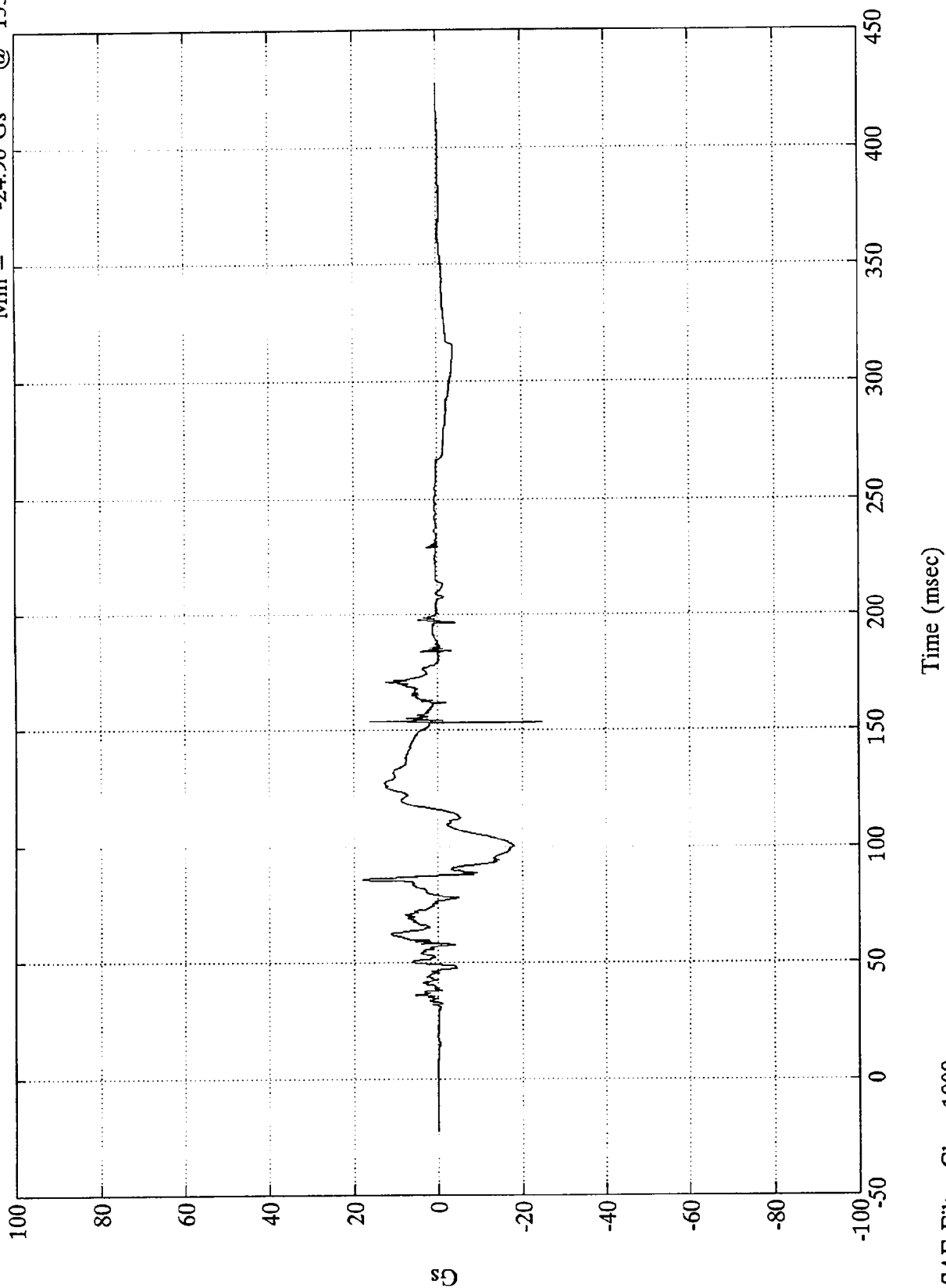


SAE Filter Class 1000

VTV TEST #11

Max = 17.82 Gs @ 86.16 msec
Min = -24.90 Gs @ 153.12 msec

V1-P1 Head Z

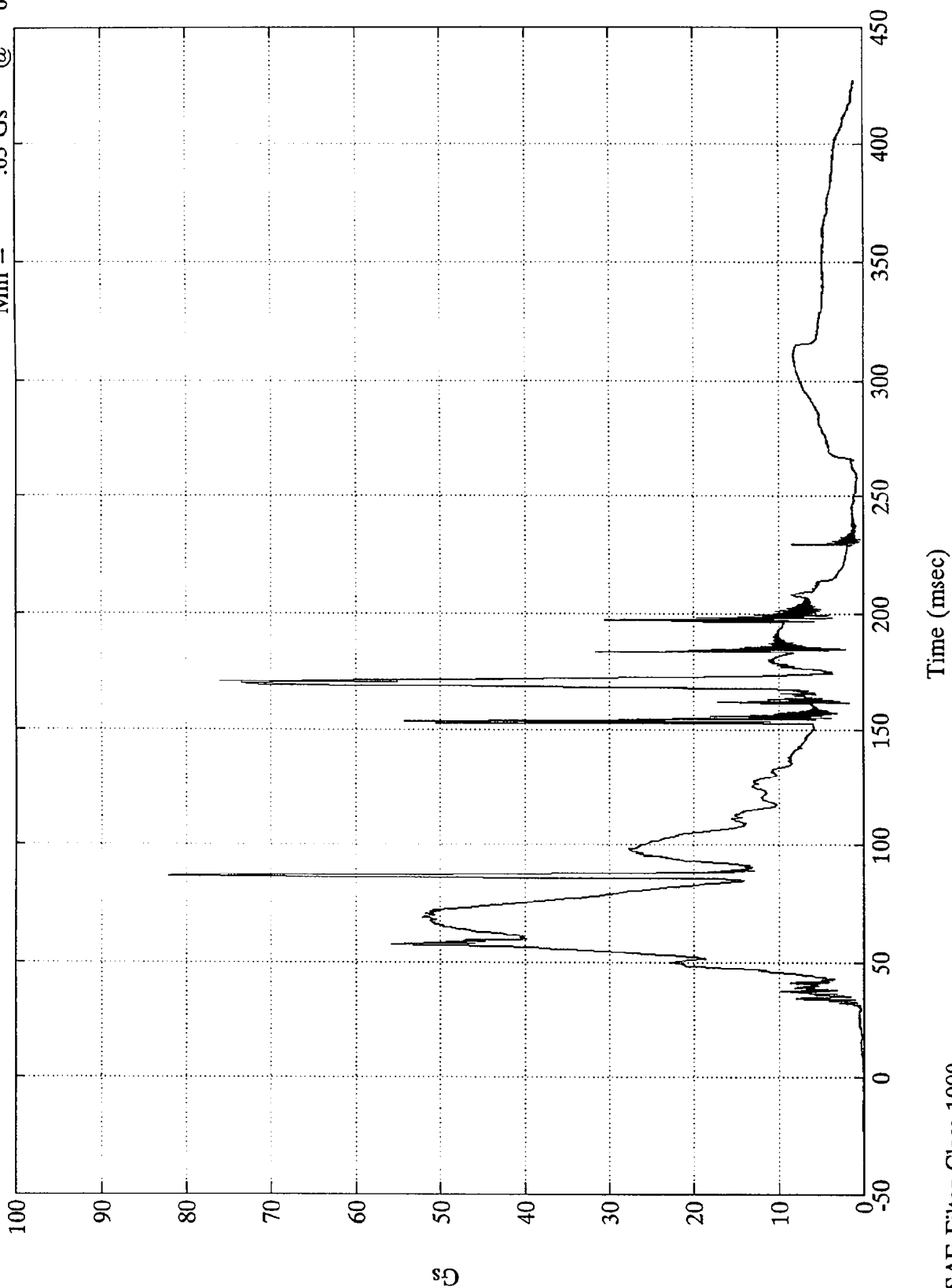


SAE Filter Class 1000

VTV TEST #11

Max = 82.13 Gs @ 86.52 msec
Min = .03 Gs @ 6.83 msec

Head Resultant

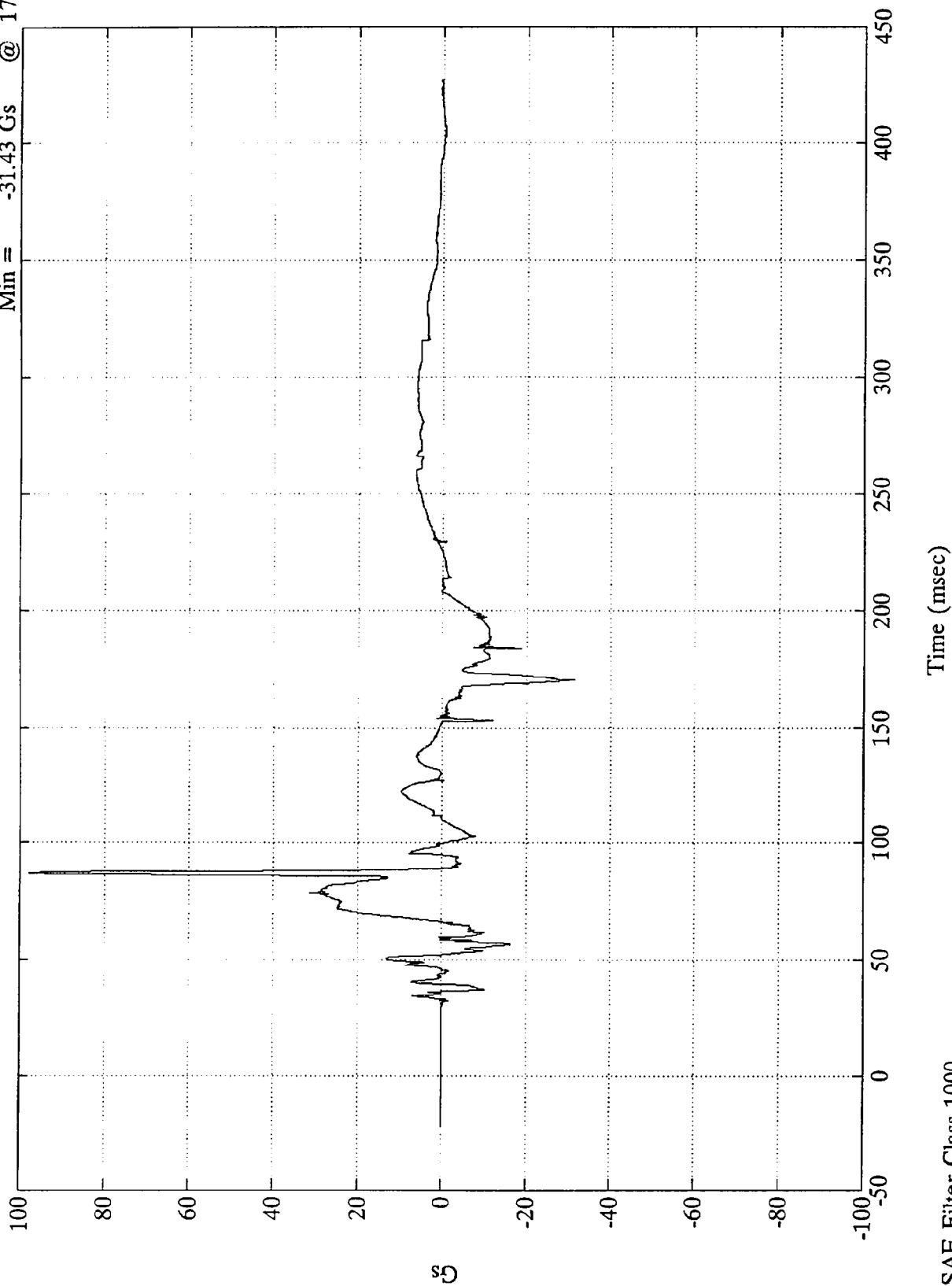


SAE Filter Class 1000

VTV TEST #11

V1-P1 HD9X (Y)

Max = 97.70 Gs @ 86.76 msec
Min = -31.43 Gs @ 170.63 msec

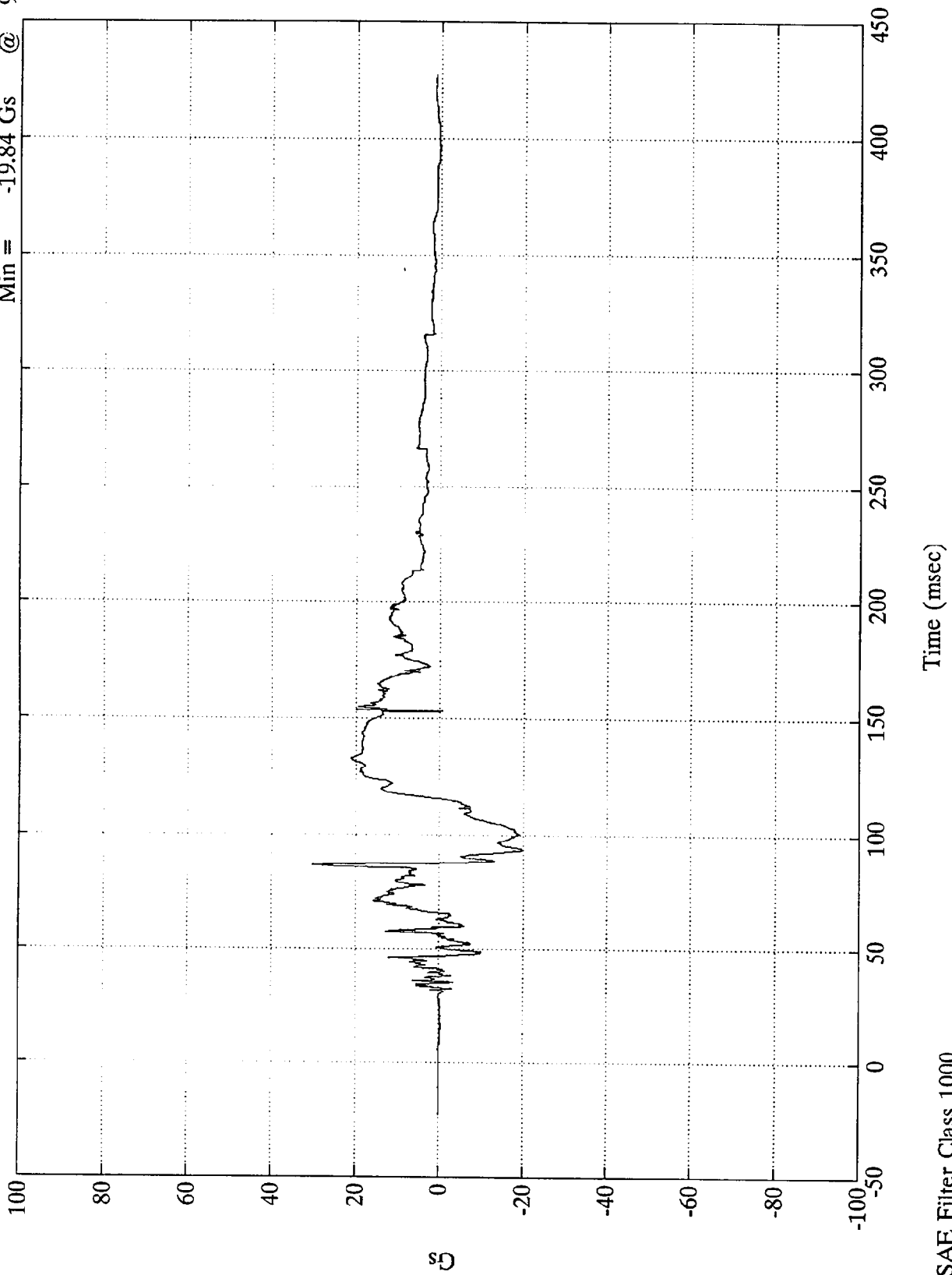


SAE Filter Class 1000

VTV TEST #11

V1-P1 HD9X (Z)

Max = 30.41 Gs @ 86.88 msec
Min = -19.84 Gs @ 93.84 msec

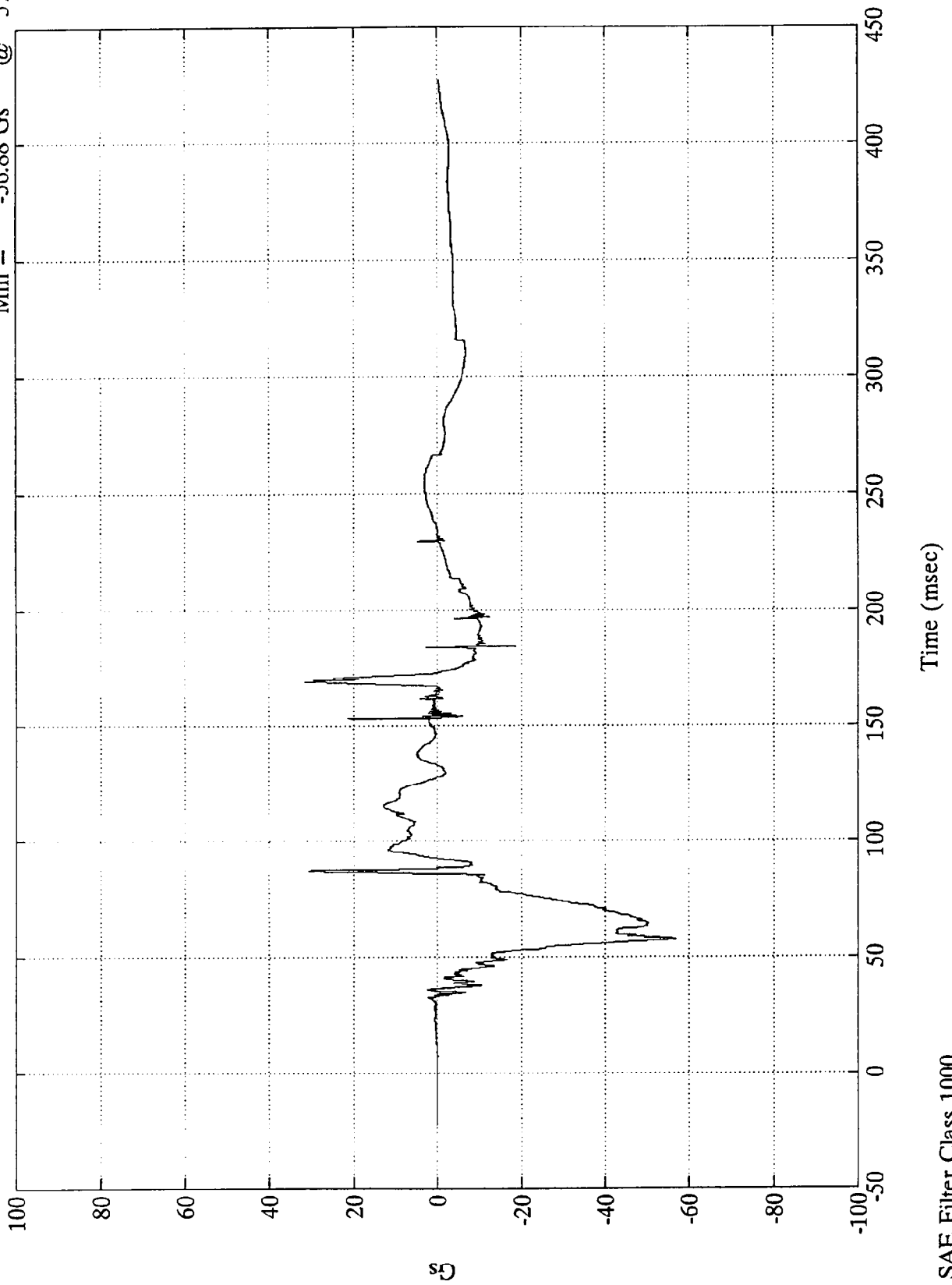


SAE Filter Class 1000

VTV TEST #11

V1-P1 HD9Y (X)

Max = 31.57 Gs @ 169.44 msec
Min = -56.88 Gs @ 57.84 msec

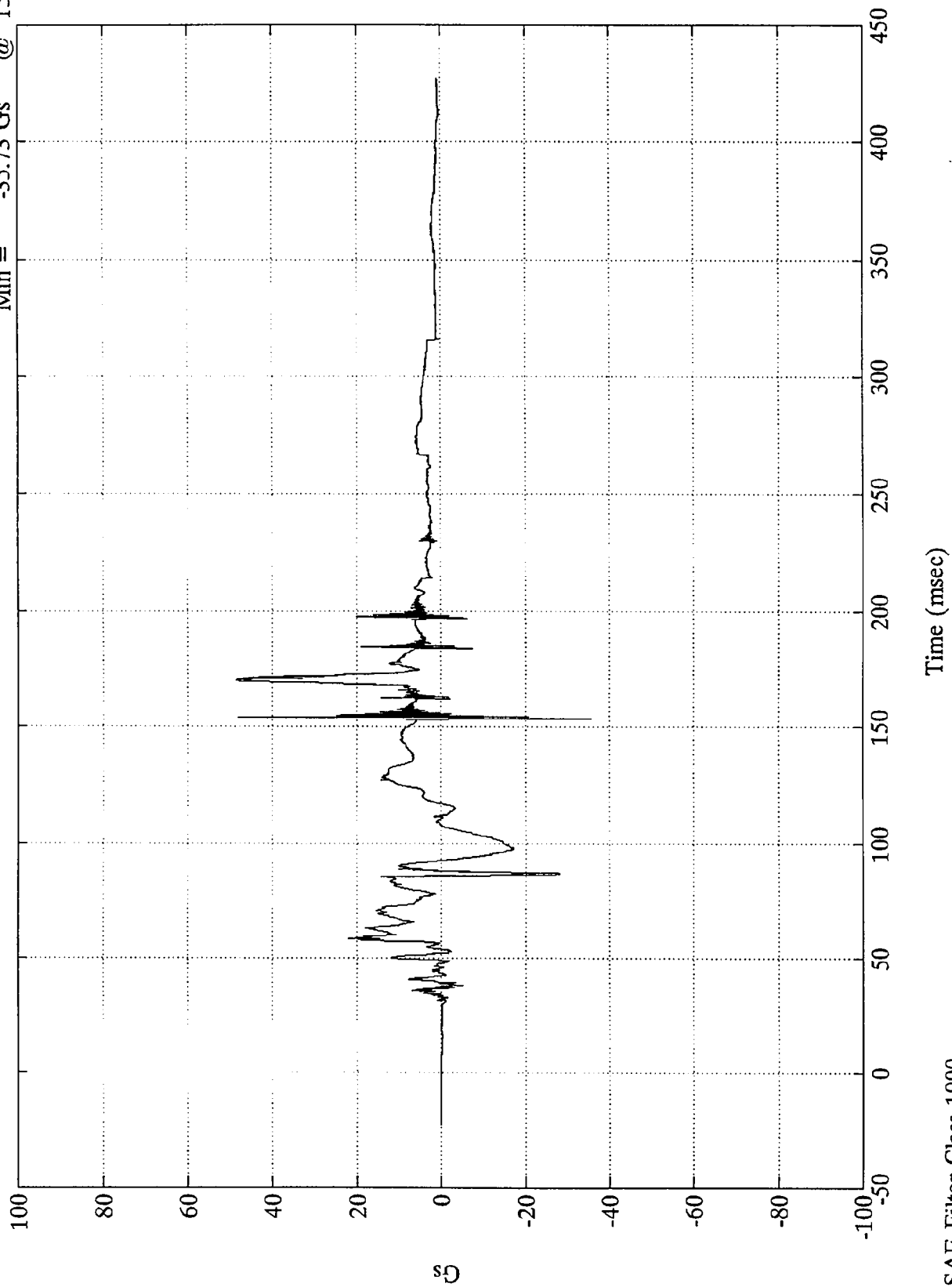


SAE Filter Class 1000

VTV TEST #11

V1-P1 HD9Y (Z)

Max = 48.59 Gs @ 169.80 msec
Min = -35.73 Gs @ 153.24 msec

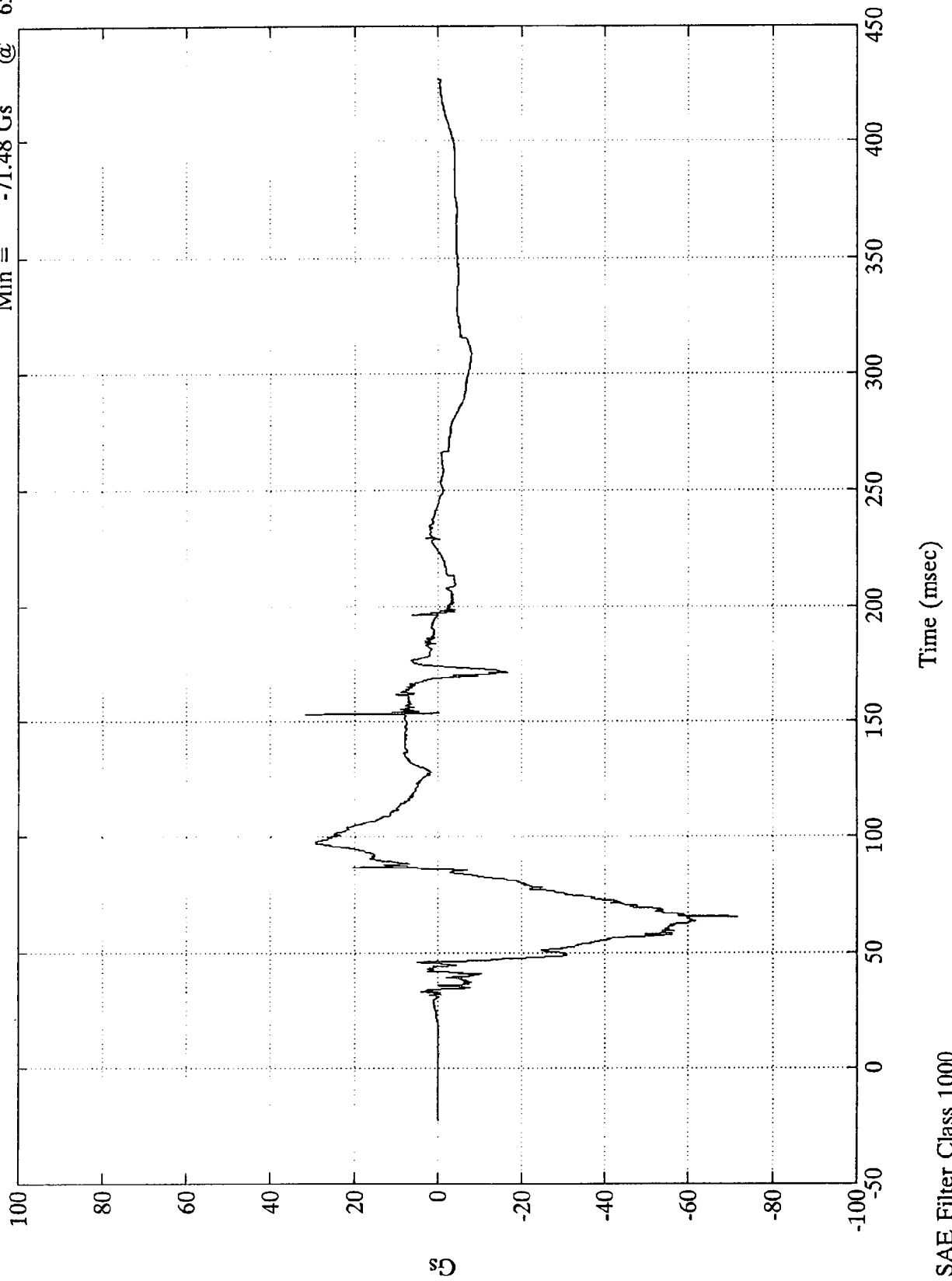


SAE Filter Class 1000

VTV TEST #11

V1-P1 HD9Z (X)

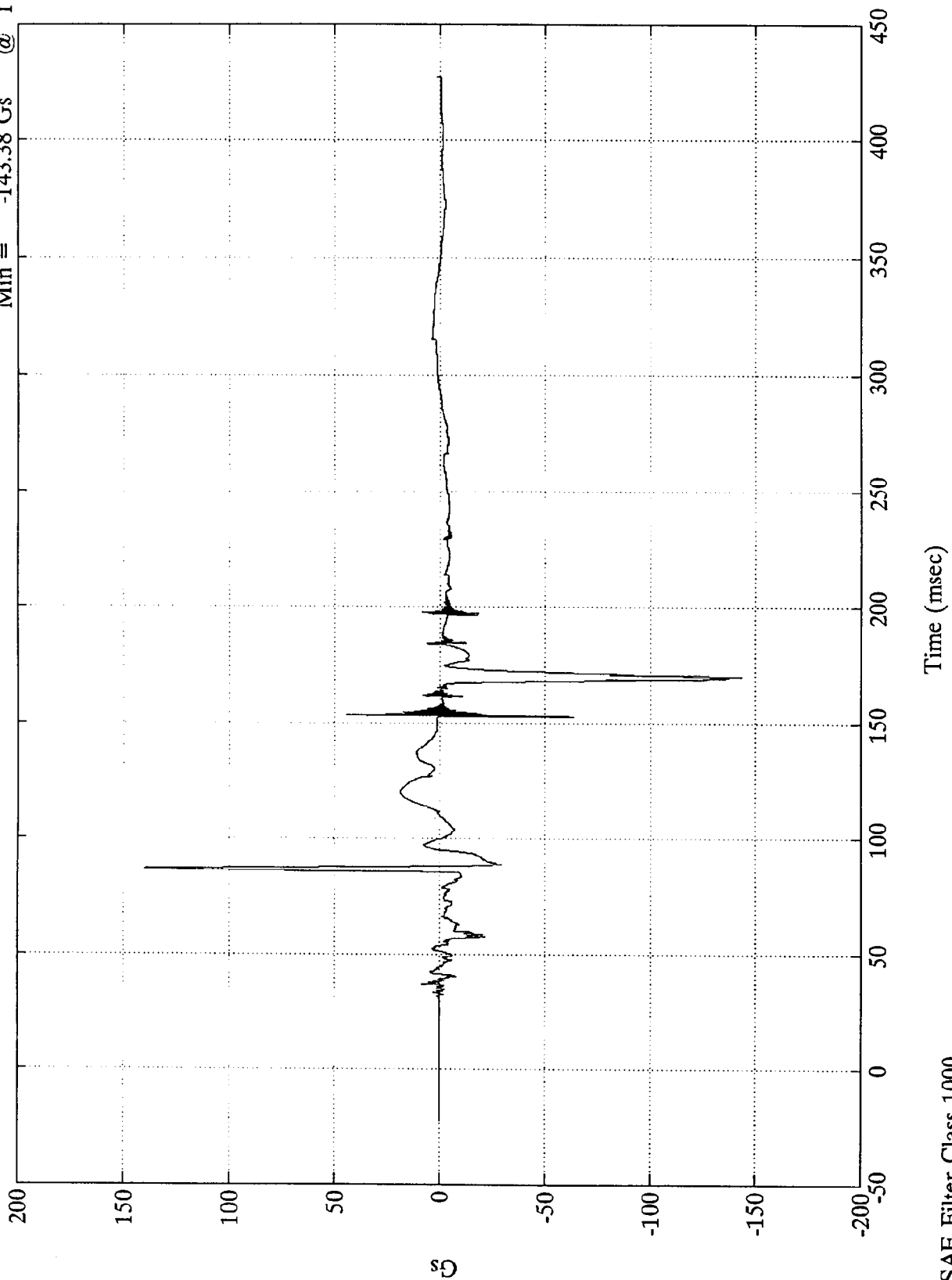
Max = 31.76 Gs @ 153.00 msec
Min = -71.48 Gs @ 65.52 msec



VTV TEST #11

V1-P1 HD9Z (Y)

Max = 140.21 Gs @ 86.52 msec
Min = -143.38 Gs @ 170.04 msec

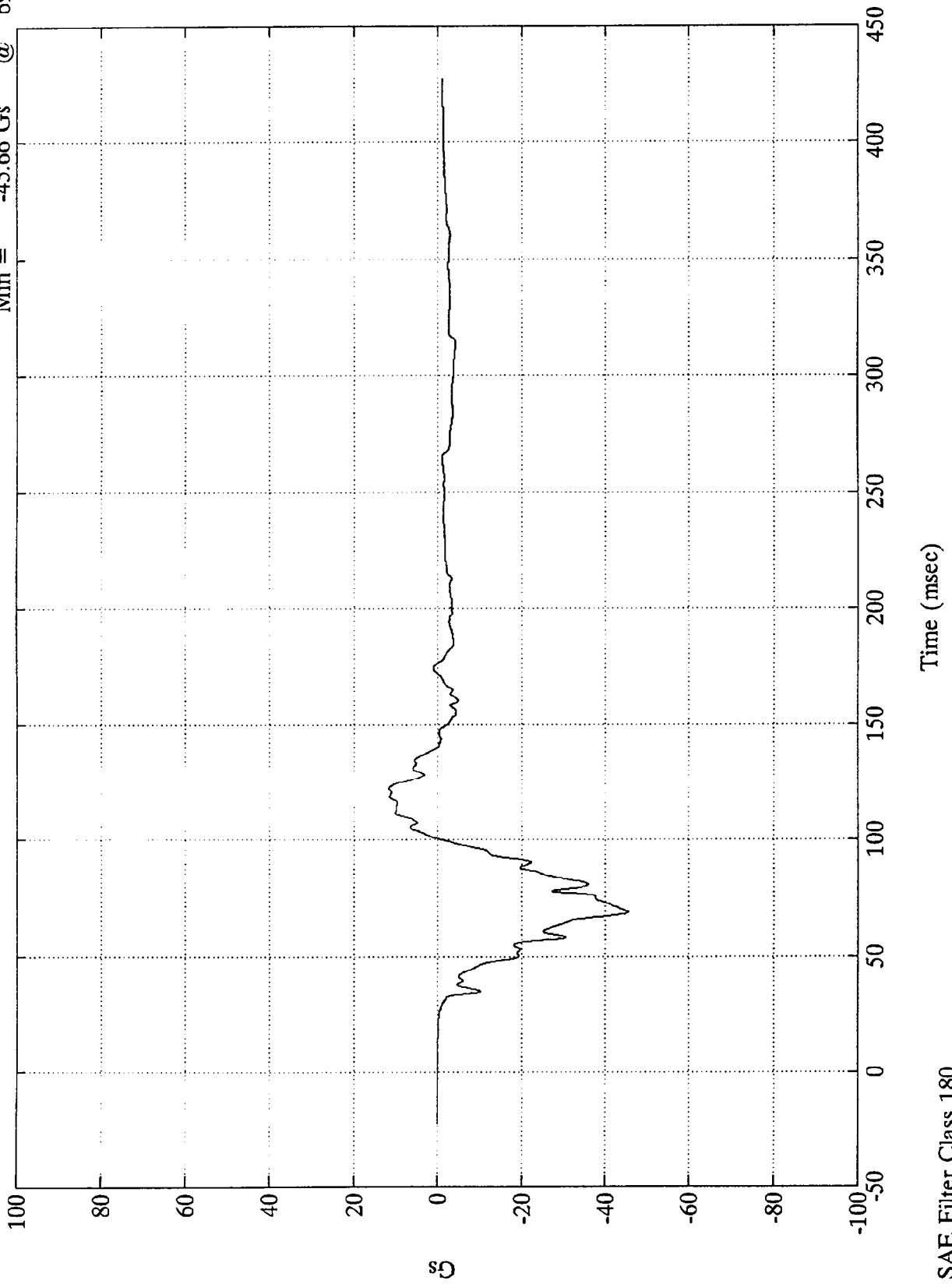


SAE Filter Class 1000

VTV TEST #11

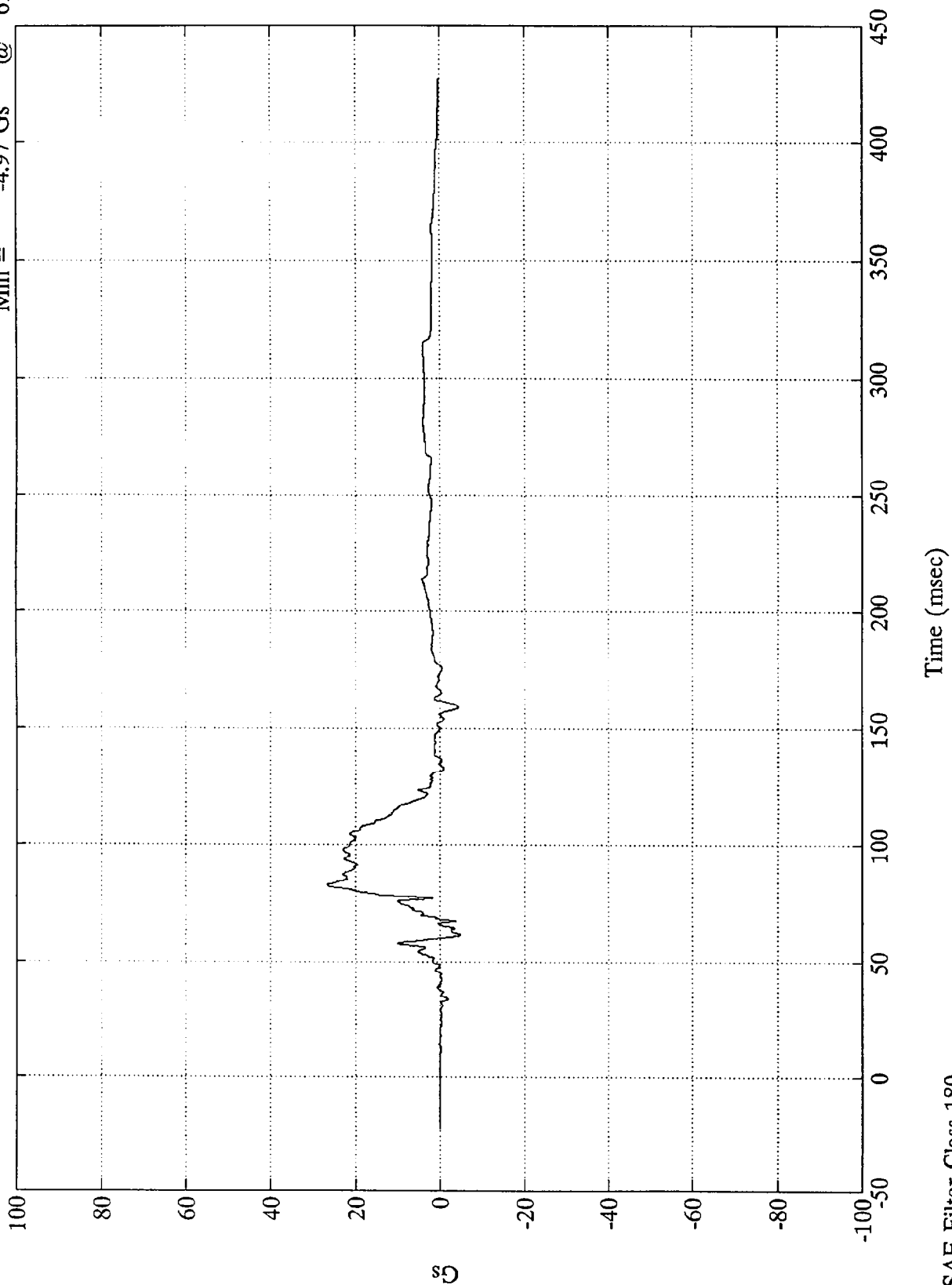
V1-P1 Chest X

Max = 11.64 Gs @ 122.16 msec
Min = -45.66 Gs @ 69.00 msec



VTV TEST #11

V1-P1 Chest Y
Max = 26.58 Gs @ 82.44 msec
Min = -4.97 Gs @ 61.56 msec

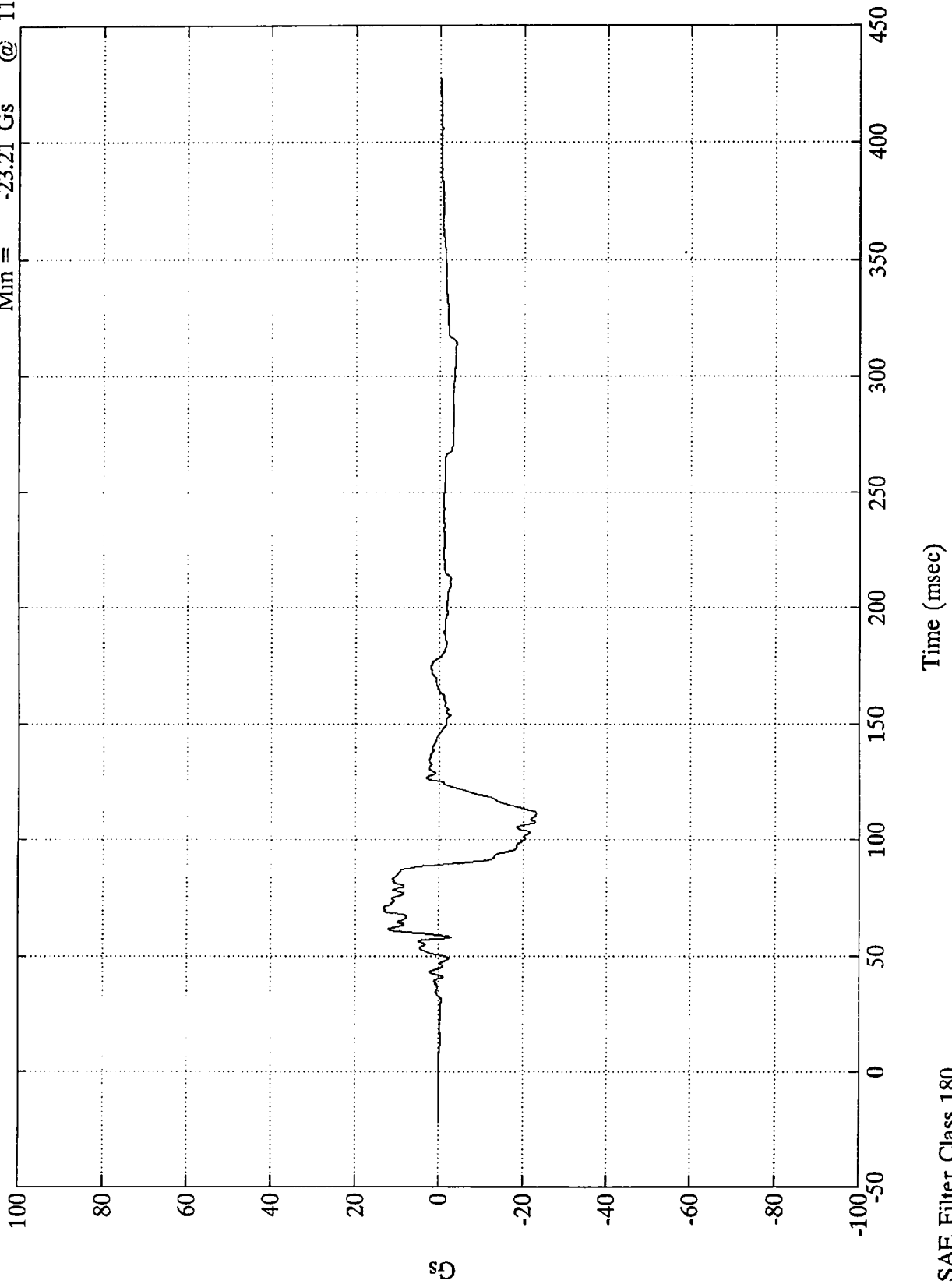


SAE Filter Class 180

VTV TEST #11

V1-P1 Chest Z

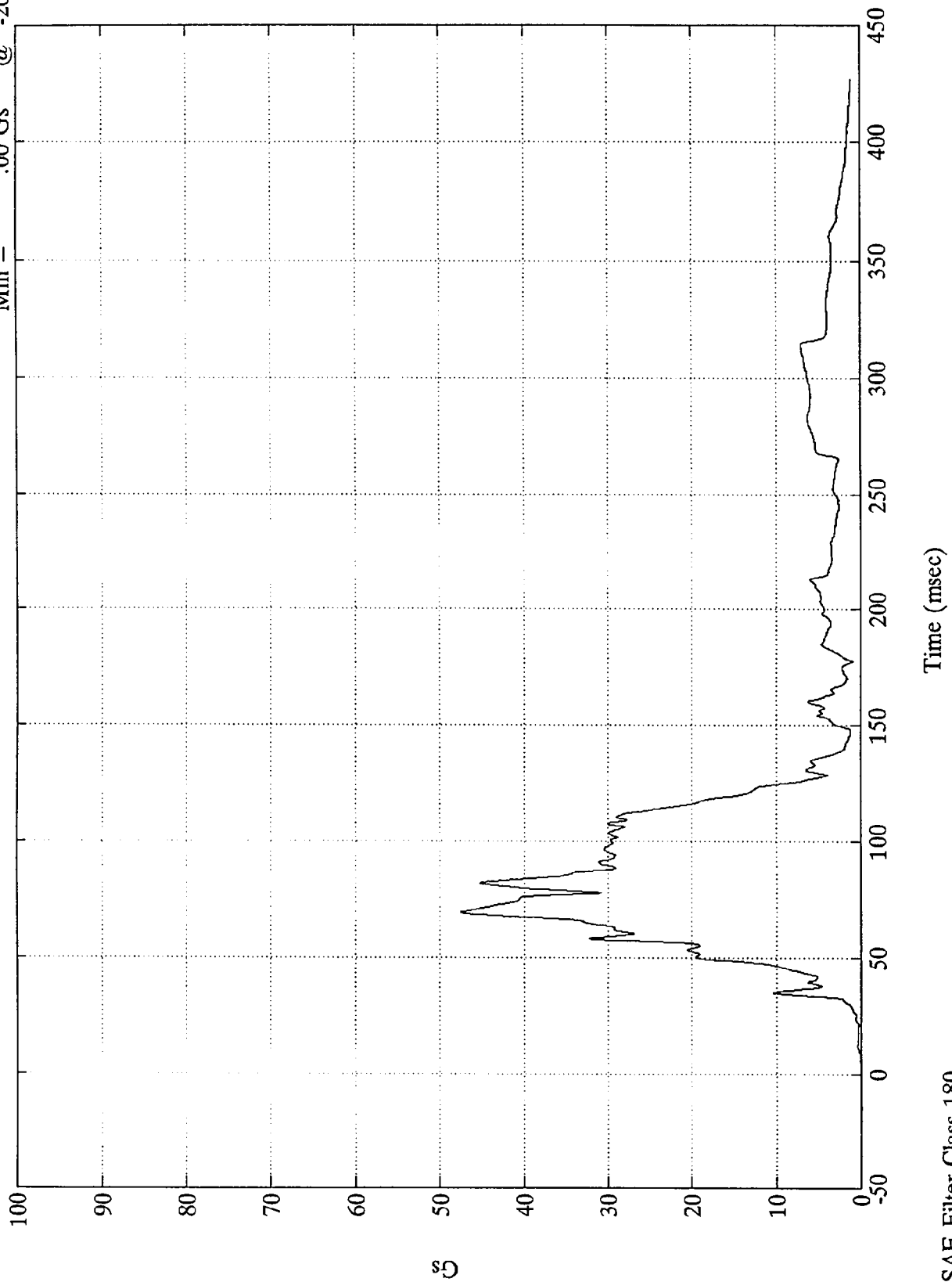
Max = 13.25 Gs @ 70.44 msec
Min = -23.21 Gs @ 111.36 msec



VTV TEST #11

Max = 47.50 Gs @ 69.12 msec
Min = .00 Gs @ -20.52 msec

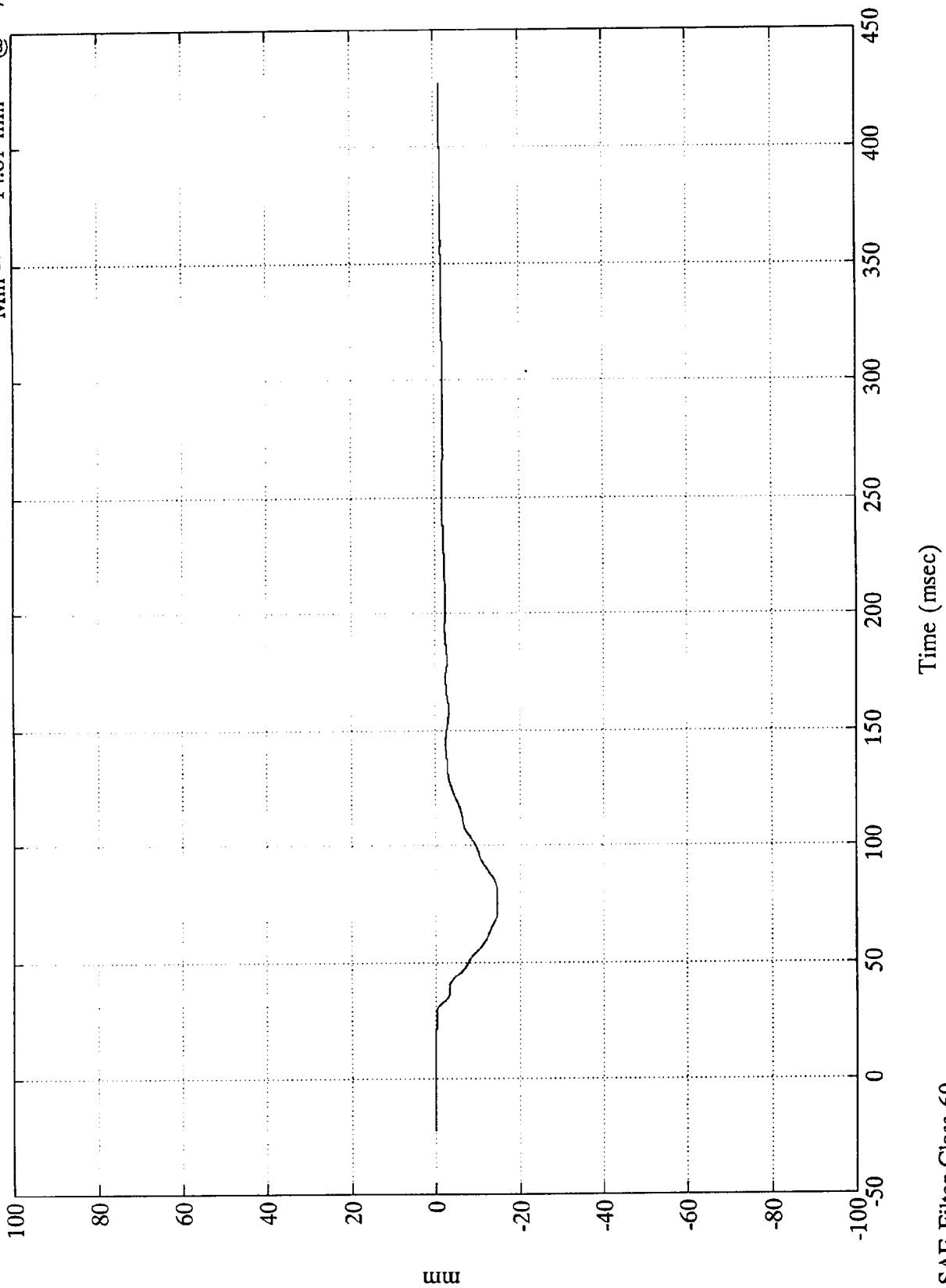
Chest Resultant



SAE Filter Class 180

VTV TEST #11

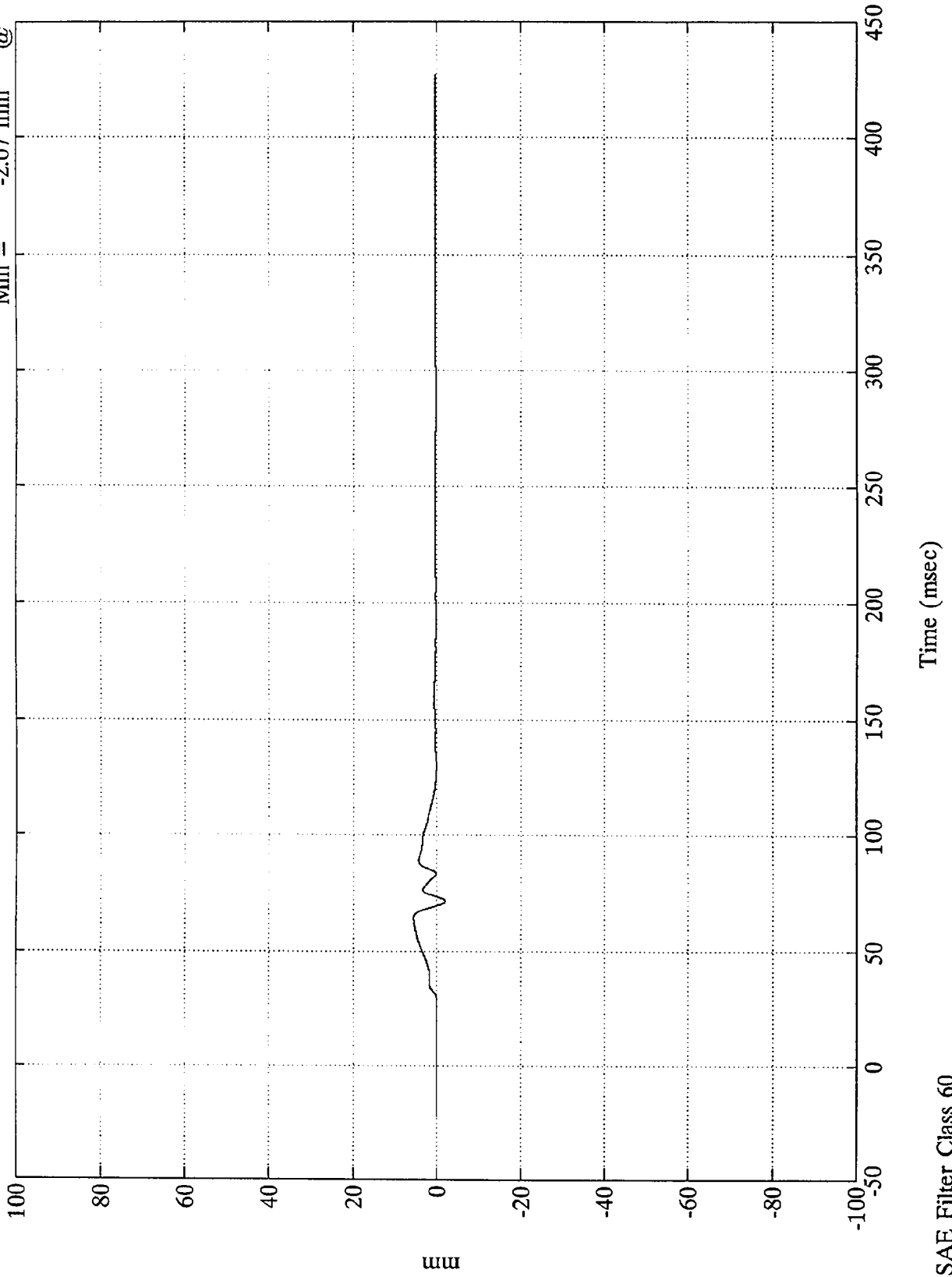
V1-P1 Chest Disp. Max = .00 mm @ 5.15 msec
Min = -14.81 mm @ 71.40 msec



VTV TEST #11

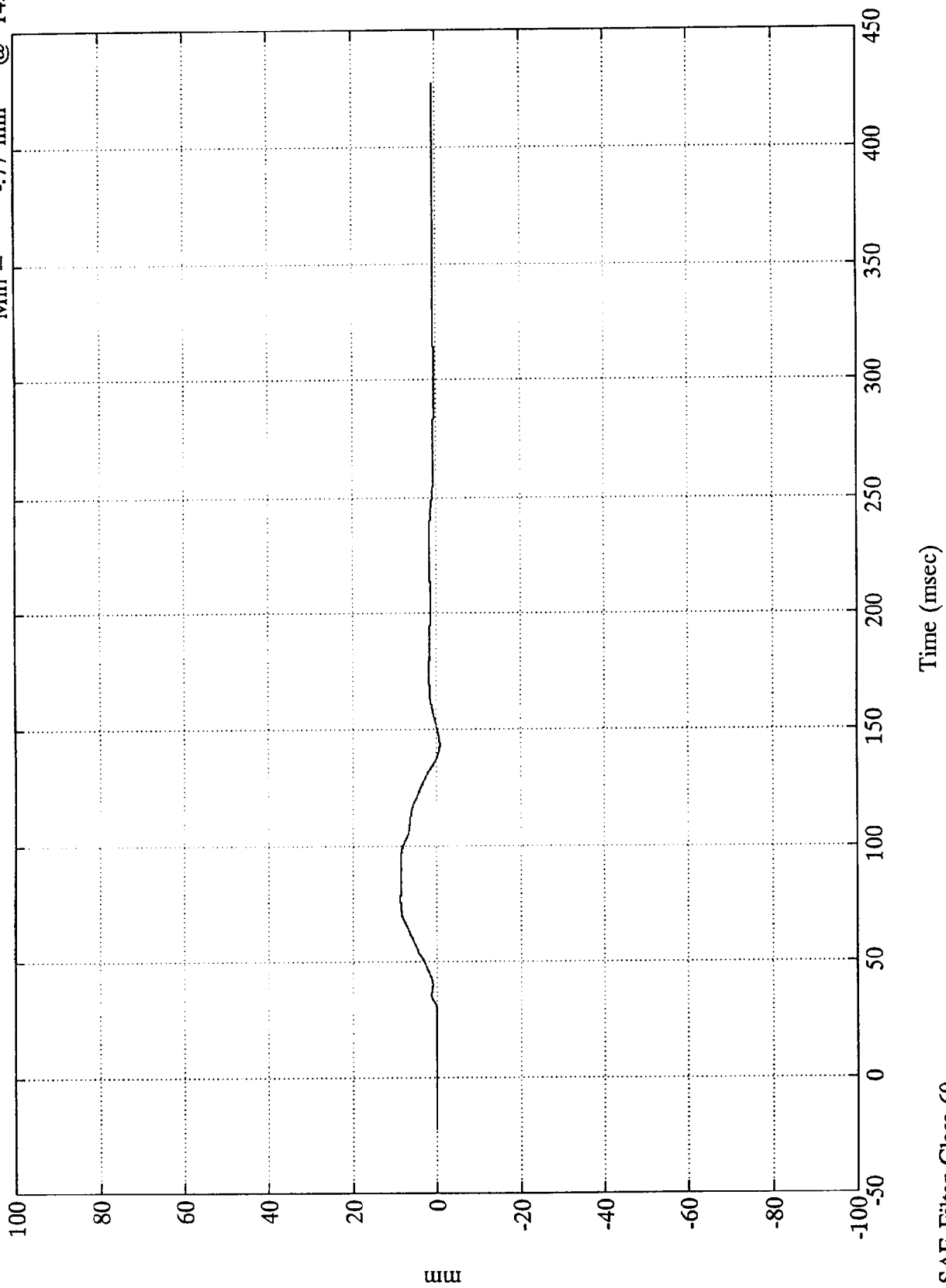
Chest Displacement #125

Max =	5.53 mm	@	63.84 msec
Min =	-2.07 mm	@	71.04 msec



VTV TEST #11

Chest Displacement #126
Max = 8.68 mm @ 77.04 msec
Min = -.77 mm @ 143.52 msec



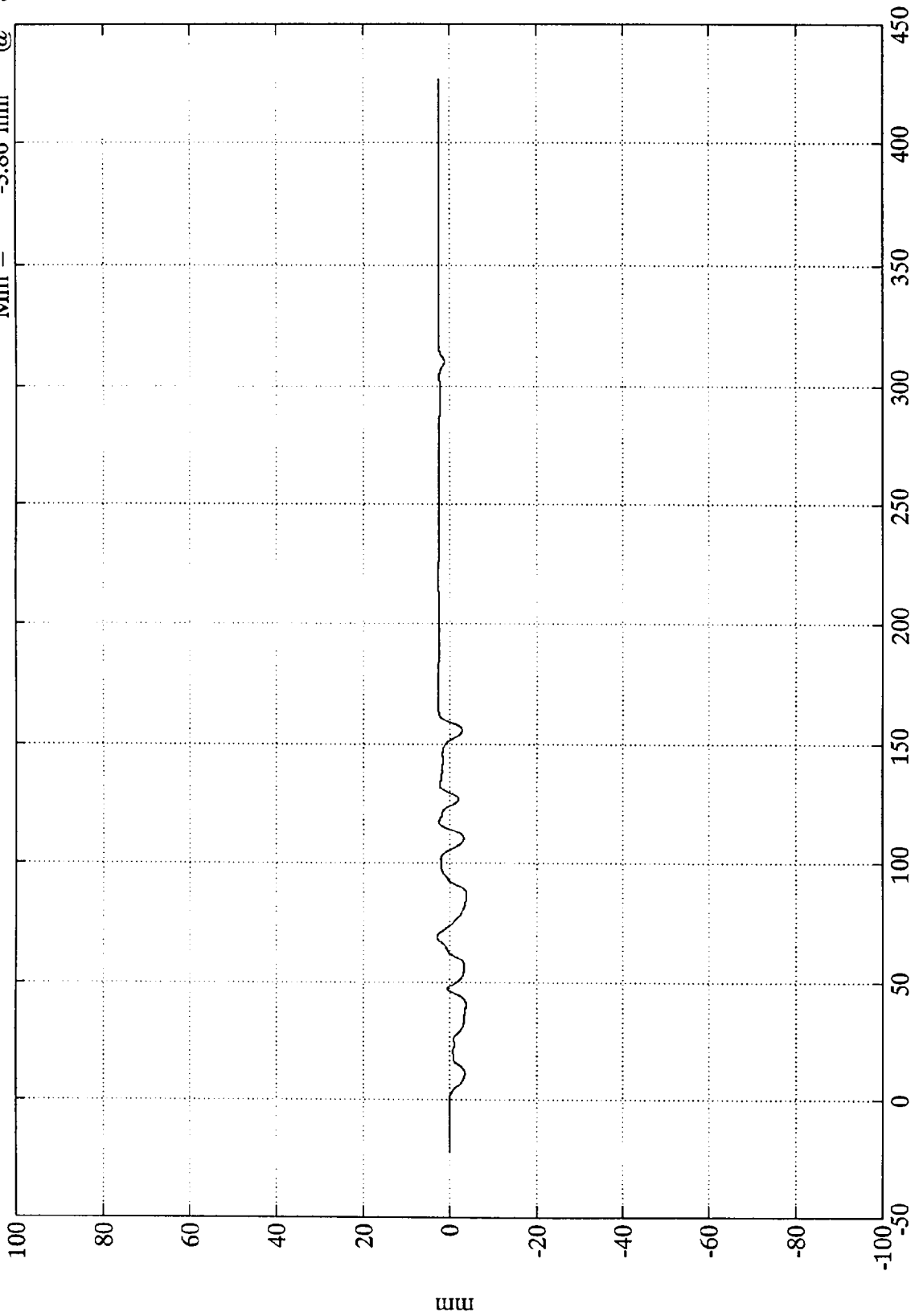
mm

SAE Filter Class 60

VTV TEST #11

Chest Displacement #127

Max = 2.90 mm @ 68.87 msec
Min = -3.86 mm @ 87.12 msec



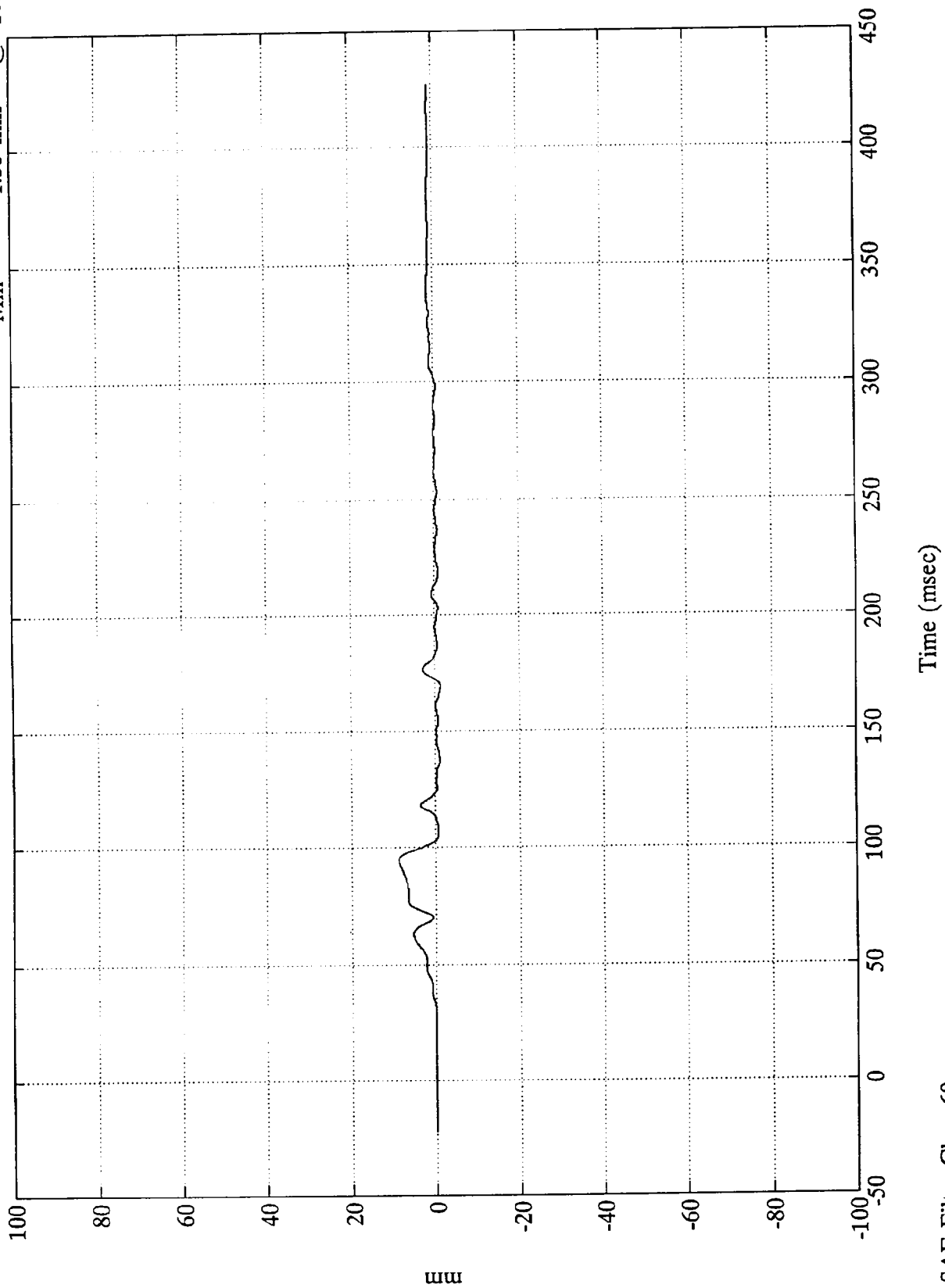
Time (msec) Data questionable

SAE Filter Class 60

VTV TEST #11

Chest Displacement #128

Max = 8.81 mm @ 94.68 msec
Min = -1.33 mm @ 169.32 msec

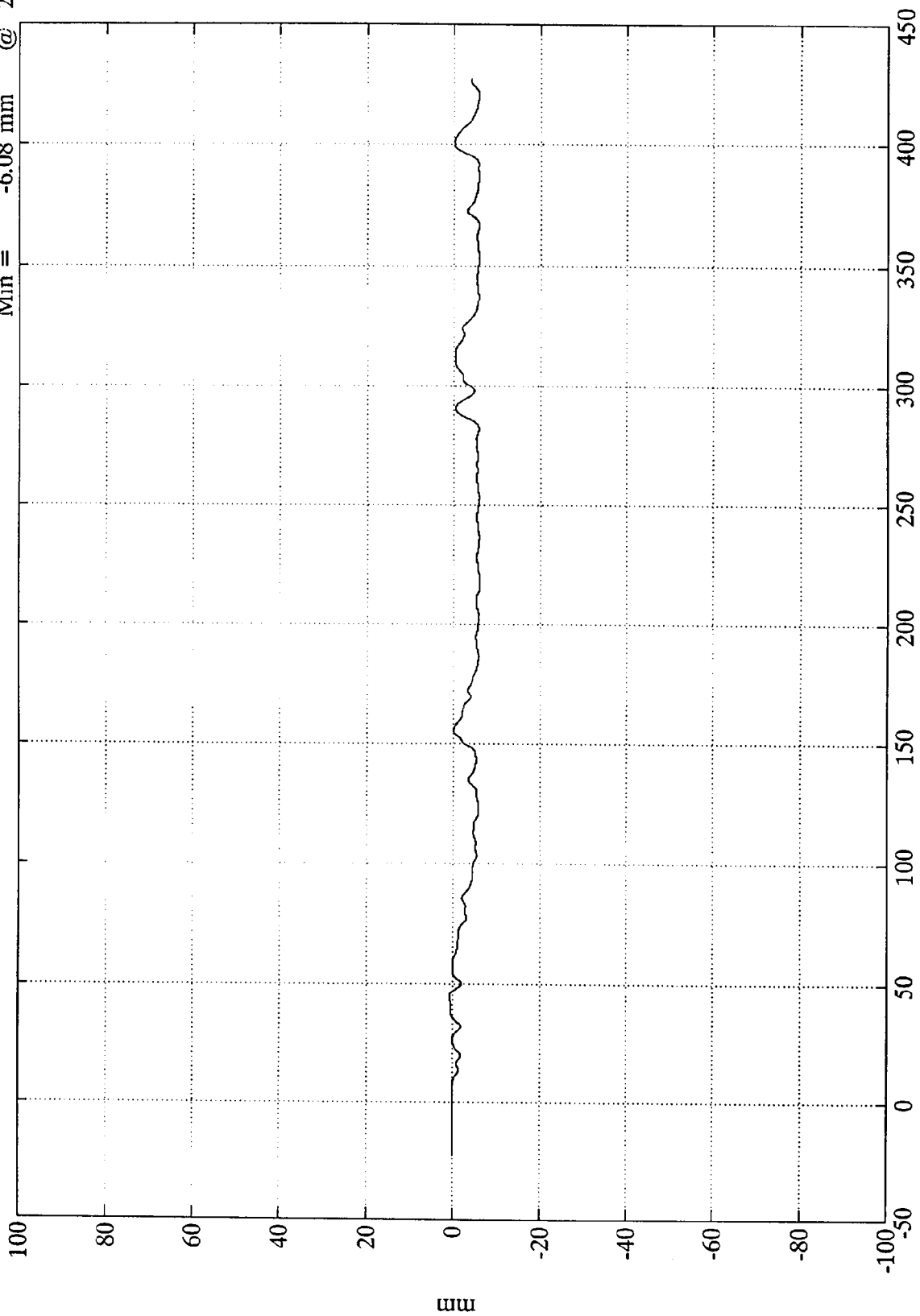


SAE Filter Class 60

VTV TEST #11

Max = .75 mm @ 44.63 msec
Min = -6.08 mm @ 219.48 msec

Chest Displacement #129



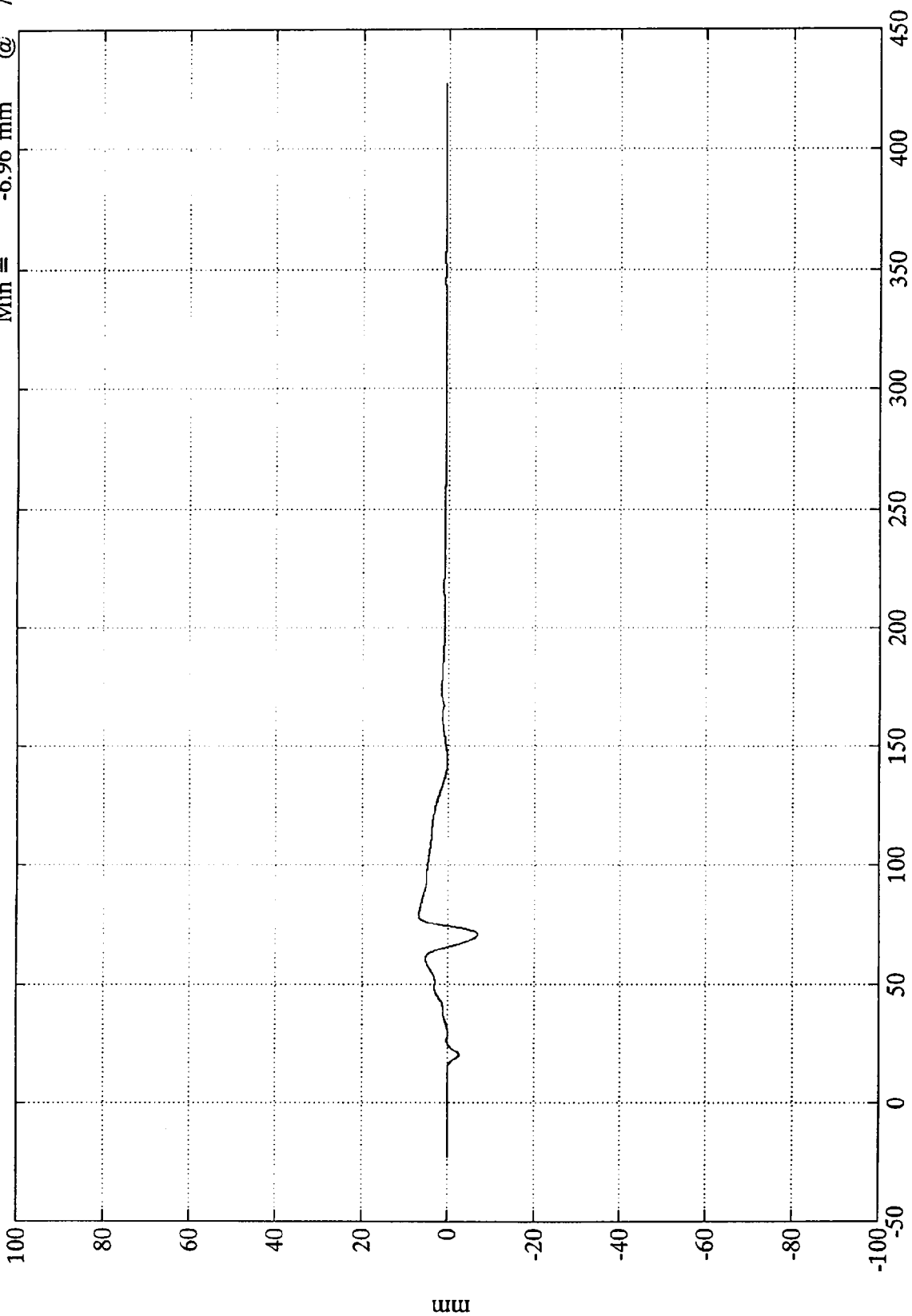
Time (msec)

SAE Filter Class 60

VTV TEST #11

Max = 6.83 mm @ 78.84 msec
Min = -6.96 mm @ 71.16 msec

Chest Displacement #130

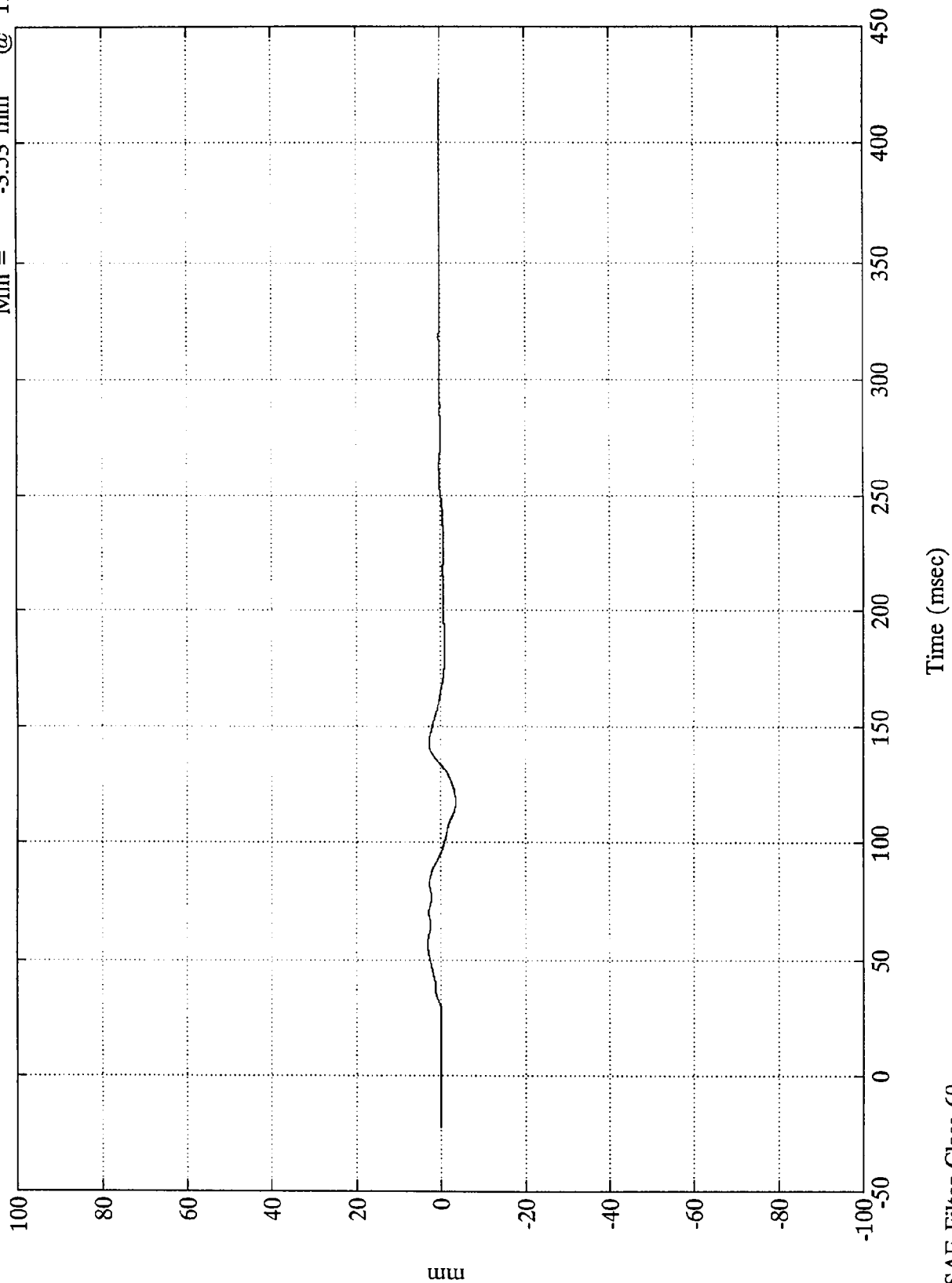


Time (msec) Data questionable between 70 and 80 msec

SAE Filter Class 60

VTV TEST #11

Chest Displacement #131
Max = 3.14 mm @ 56.52 msec
Min = -3.53 mm @ 117.36 msec

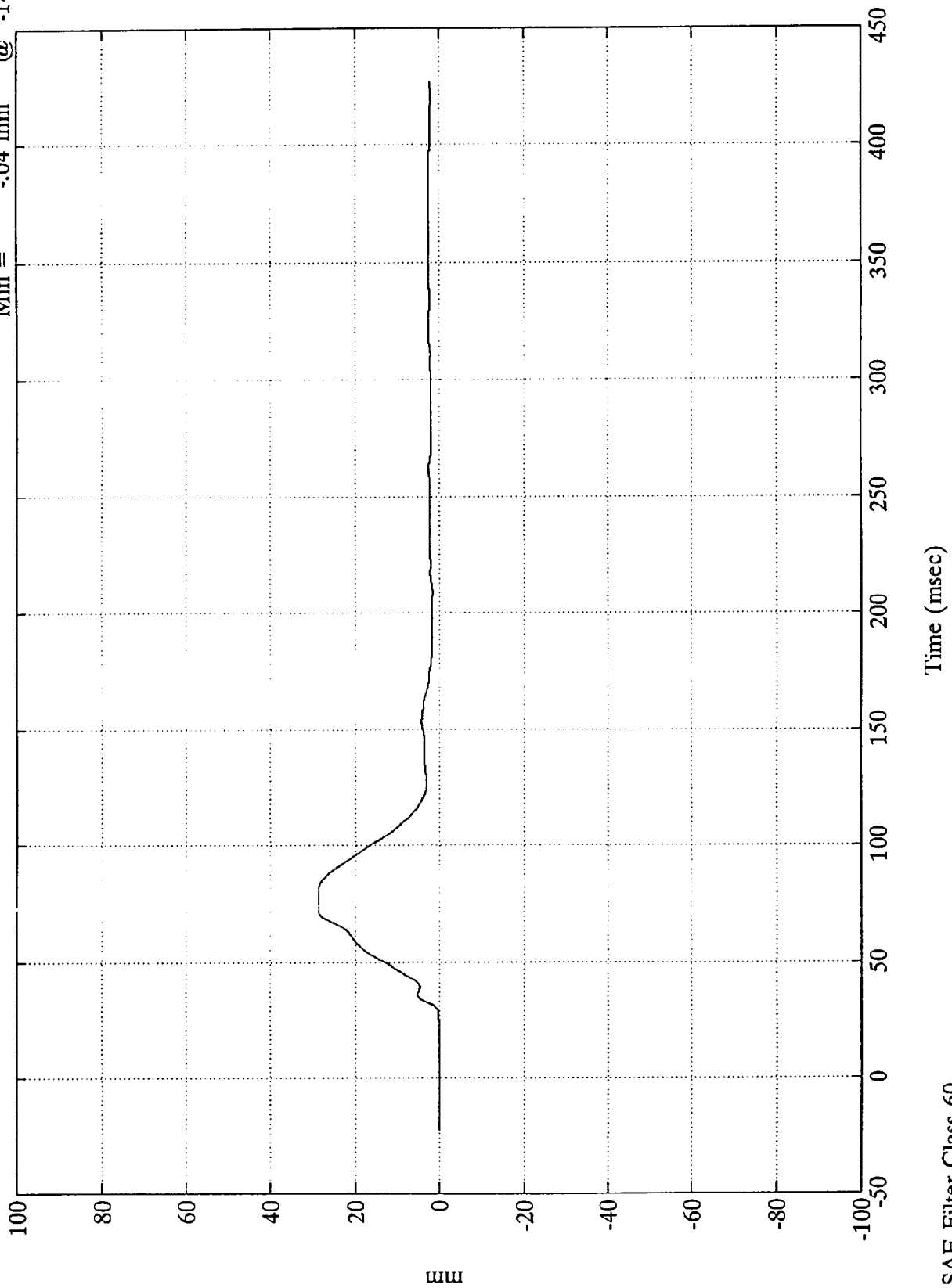


SAE Filter Class 60

VTV TEST #11

Chest Displacement #132

Max = 28.71 mm @ 72.48 msec
Min = -0.04 mm @ -14.16 msec



mm

Time (msec)

SAE Filter Class 60

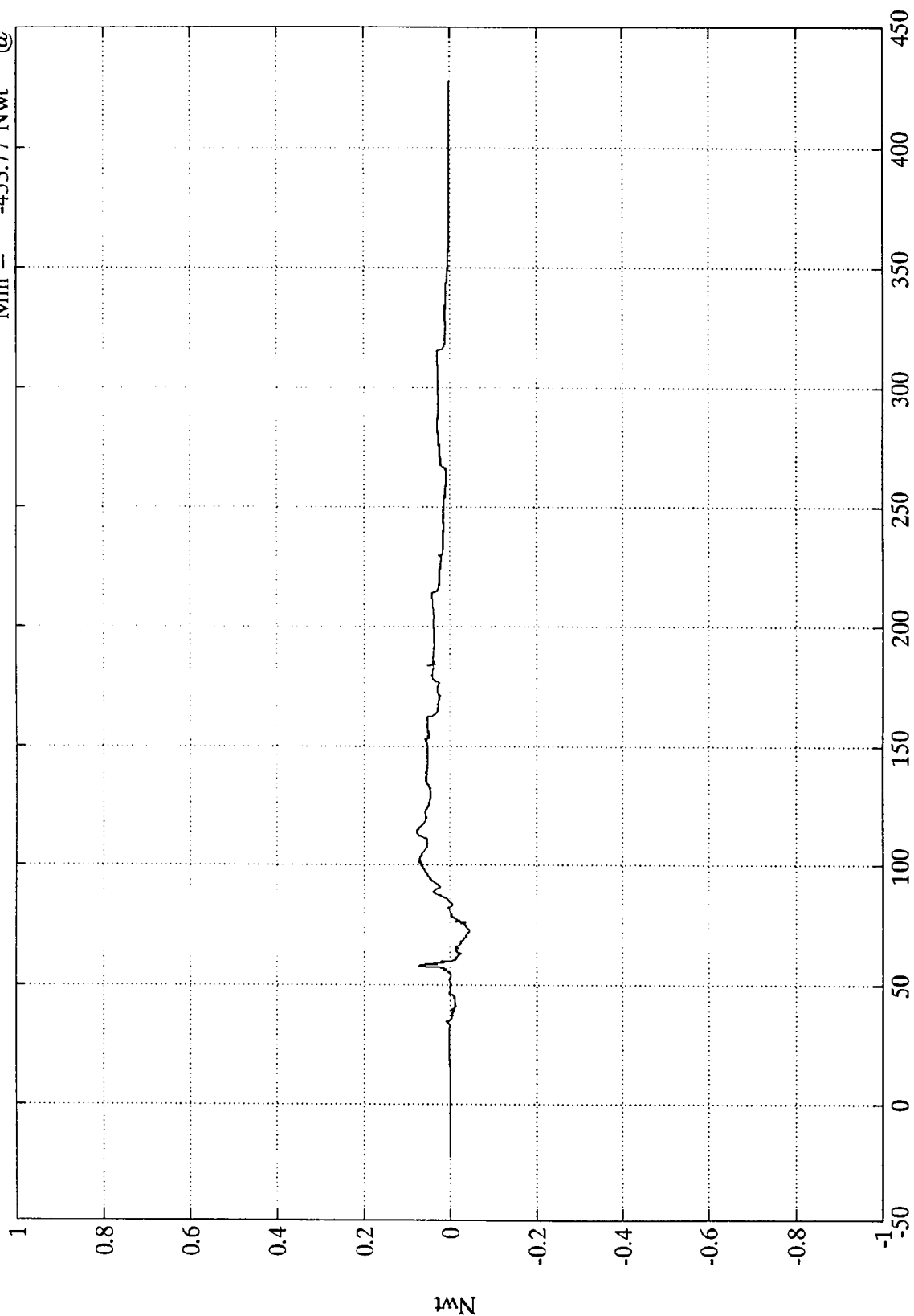
VTV TEST #11

$\times 10^4$

V1-P1 Upper Neck Fx

Max = 765.45 Nwt
Min = -453.77 Nwt

@ 114.48 msec
@ 72.72 msec



Time (msec)

SAE Filter Class 1000

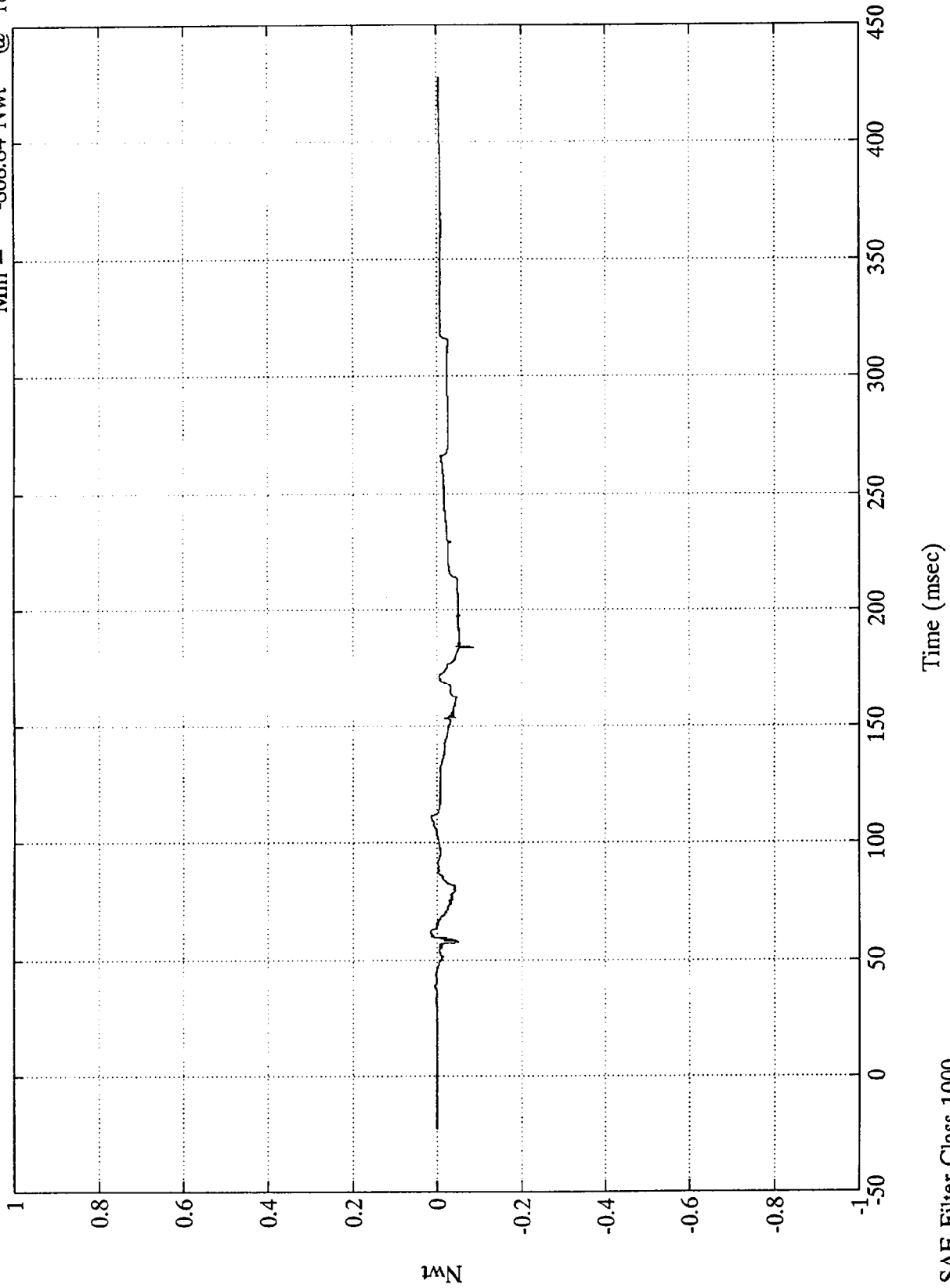
VTV TEST #11

$\times 10^4$

V1-P1 Upper Neck Fy

Max = 169.80 Nwt
Min = -868.84 Nwt

@ 61.92 msec
@ 184.08 msec

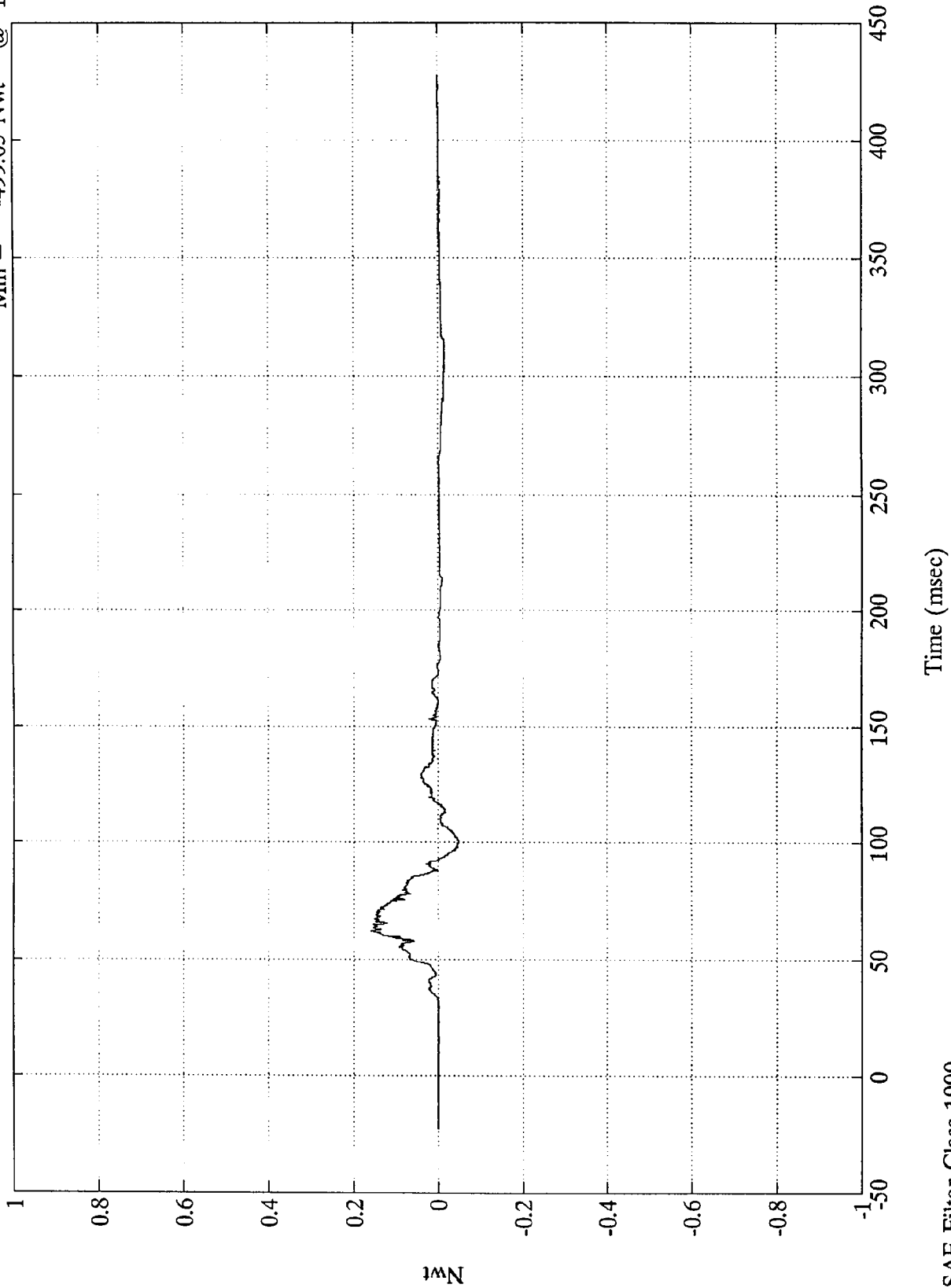


VTV TEST #11

$\times 10^4$

V1-P1 Upper Neck Fz

Max = 1597.07 Nwt @ 62.15 msec
Min = -499.05 Nwt @ 100.80 msec

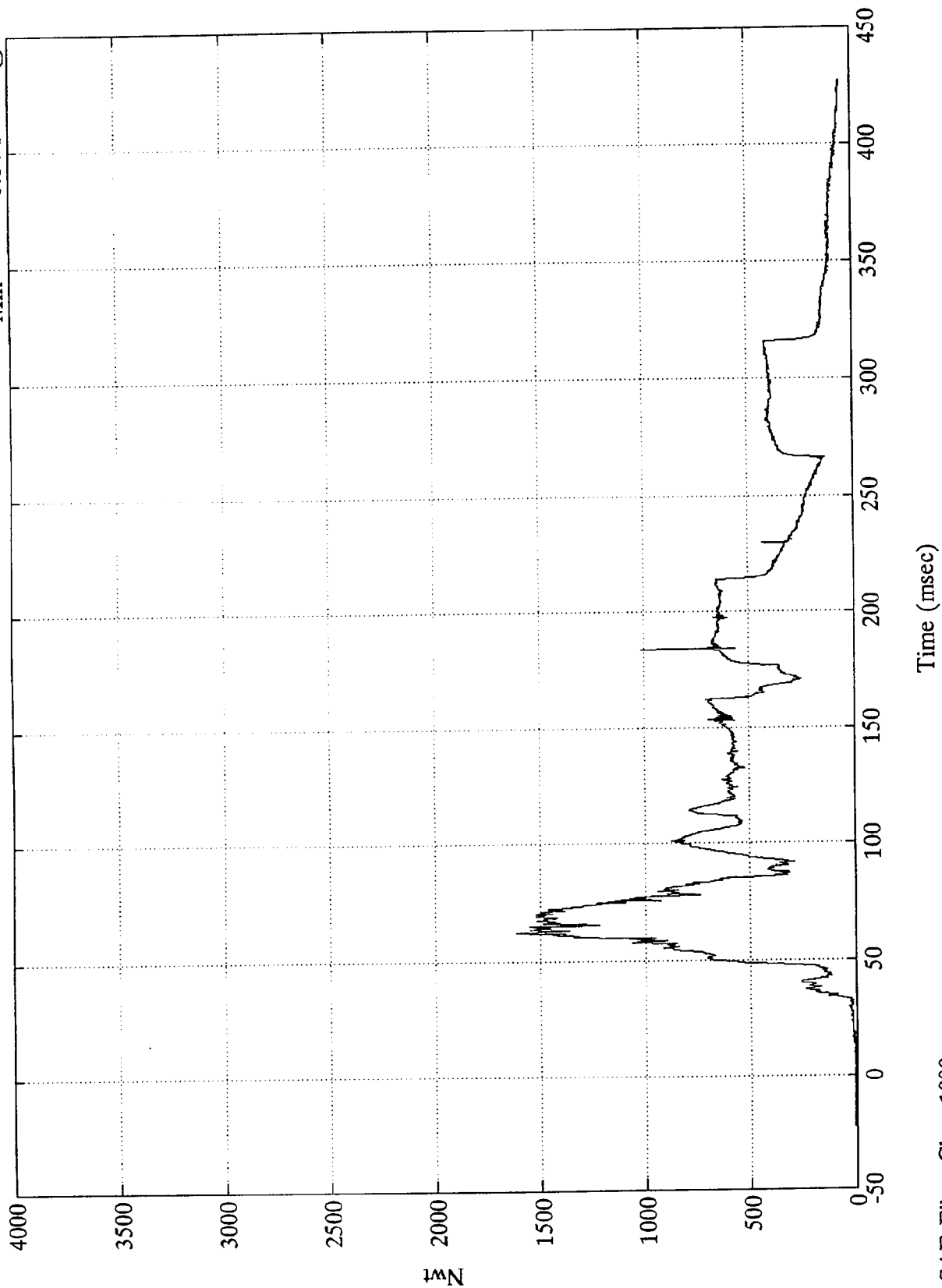


SAE Filter Class 1000

VTV TEST #11

Upper Neck Force Res.

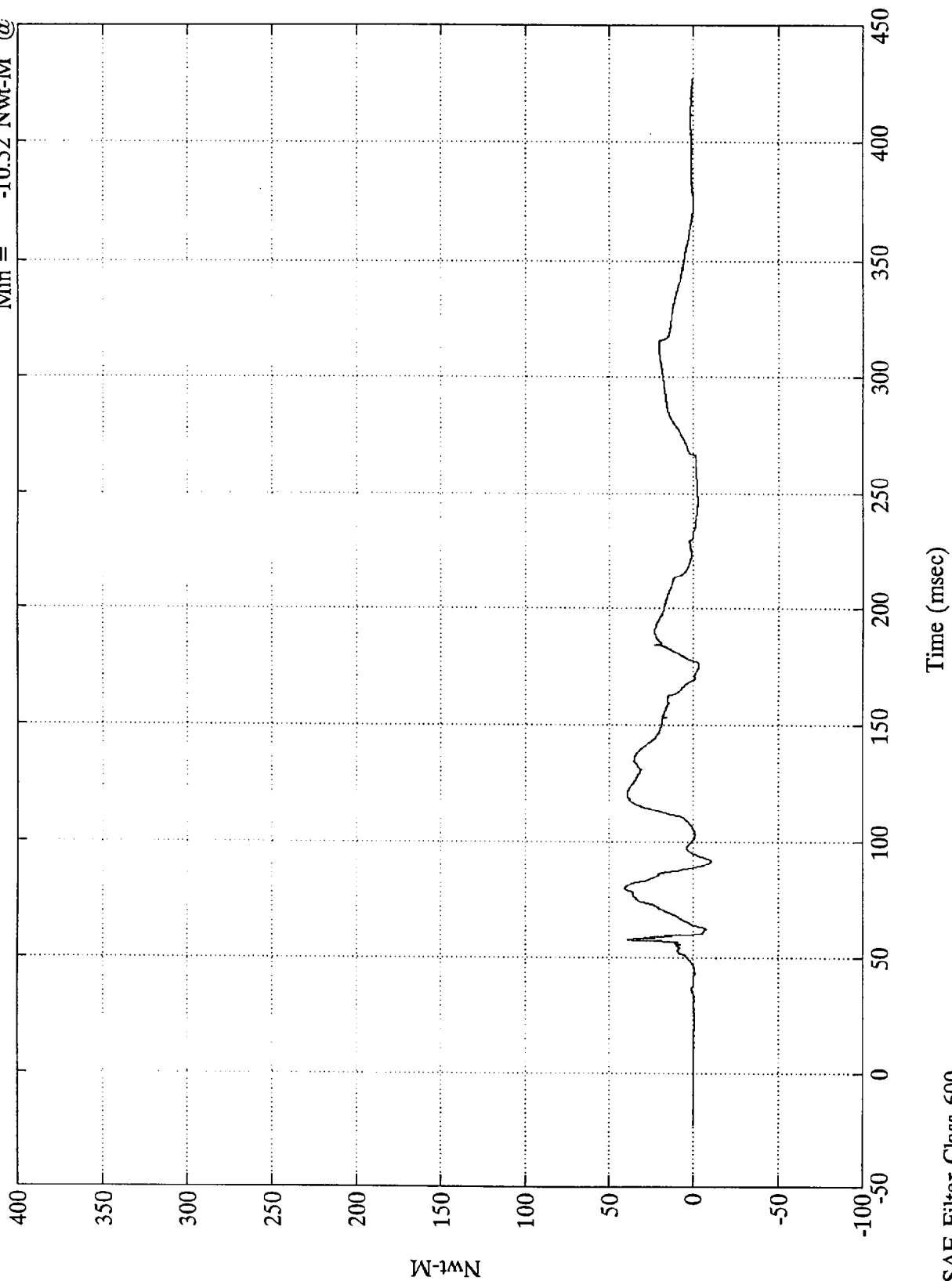
Max = 1614.61 Nwt @ 62.15 msec
Min = 3.84 Nwt @ 12.96 msec



SAE Filter Class 1000

VTV TEST #11

V1-P1 Upper Neck Mx
Max = 40.91 Nwt-M @ 79.19 msec
Min = -10.52 Nwt-M @ 91.31 msec



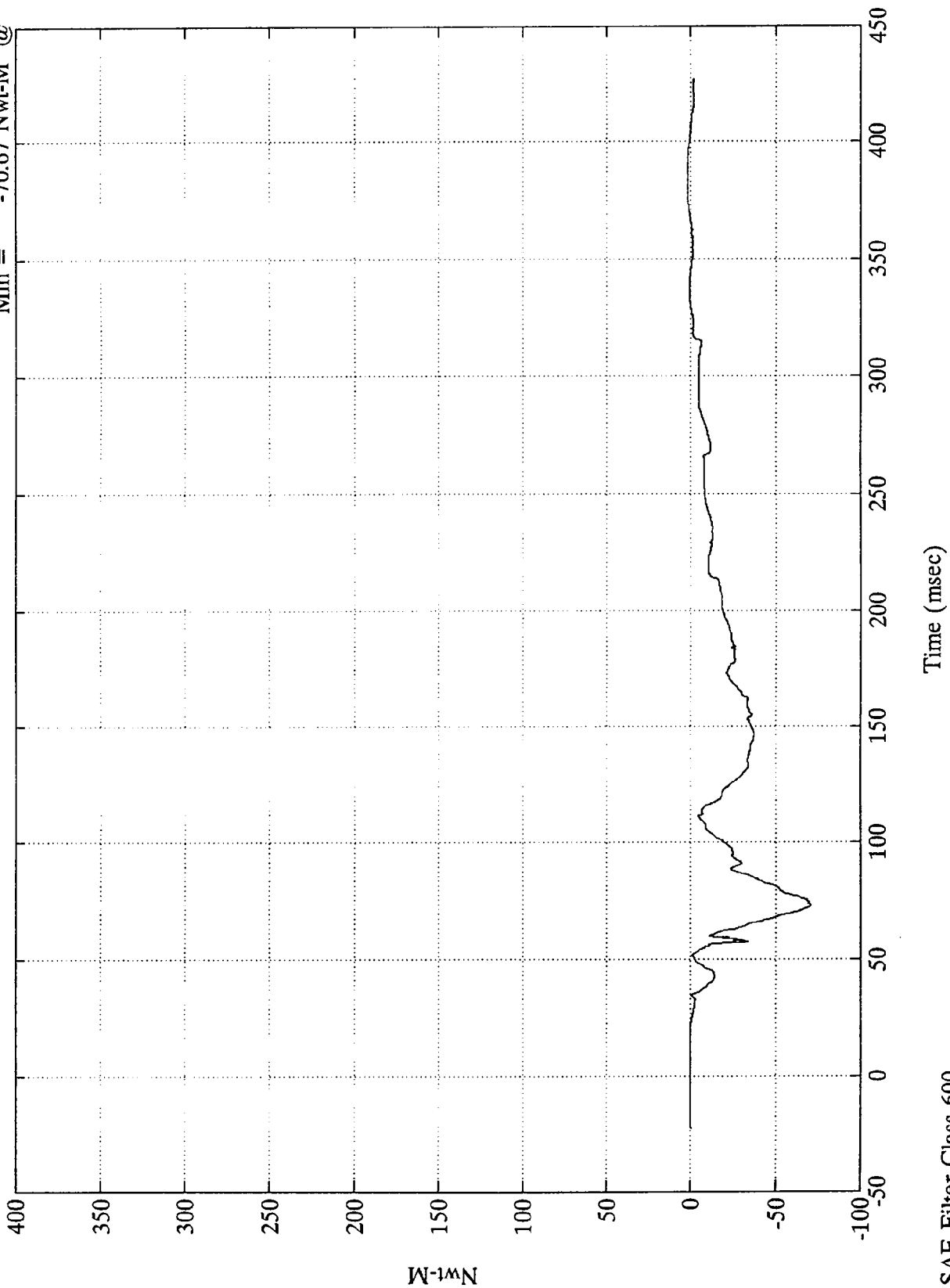
SAE Filter Class 600

VTV TEST #11

V1-P1 Upper Neck My

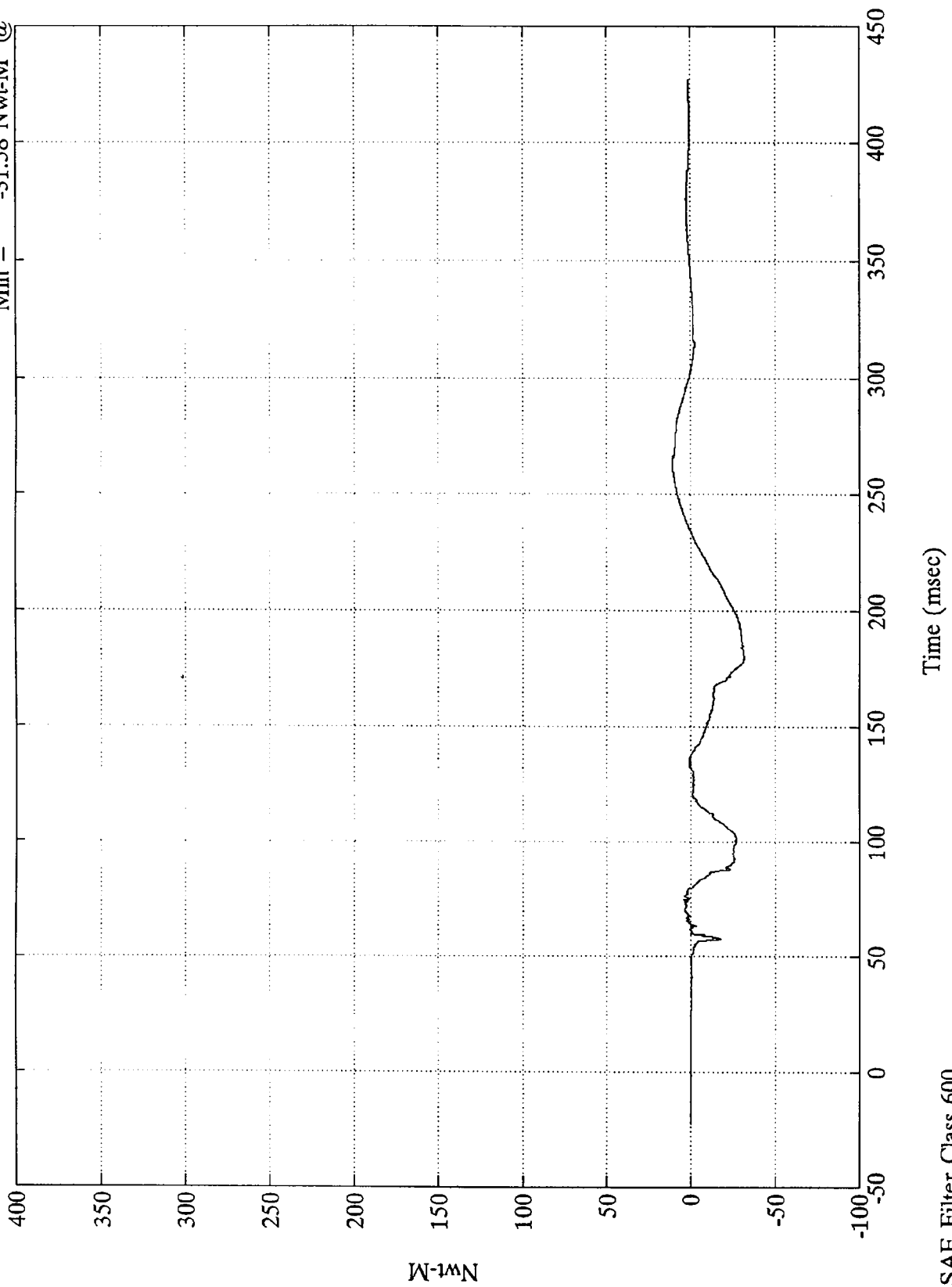
Max =
Min =

2.11 Nwt-M @ 391.32 msec
-70.67 Nwt-M @ 73.08 msec



VTV TEST #11

V1-P1 Upper Neck Mz
Max = 10.76 Nwt-M @ 263.51 msec
Min = -31.58 Nwt-M @ 179.76 msec



Nwt-M

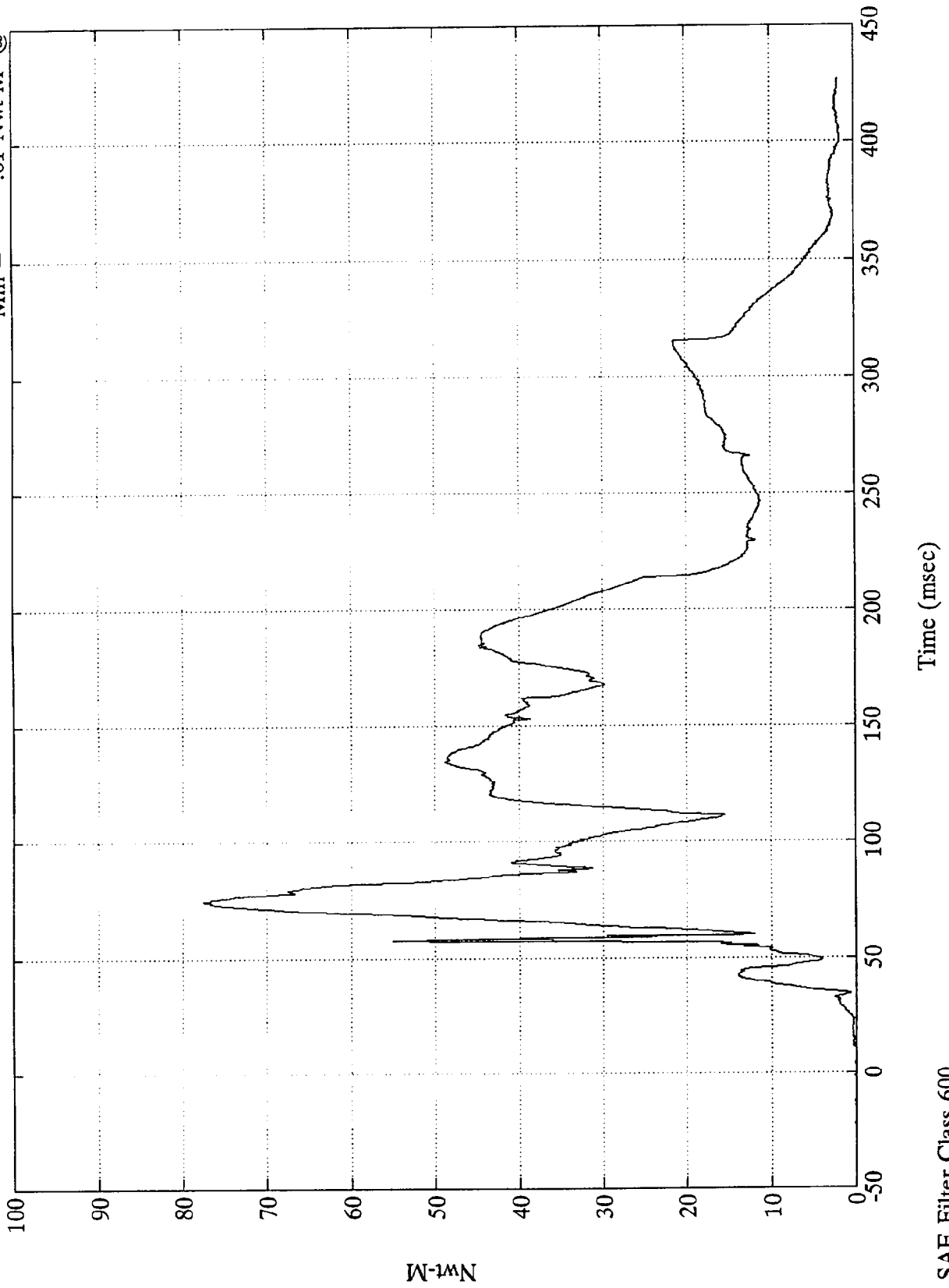
Time (msec)

SAE Filter Class 600

VTV TEST #11

Upper Neck Moment Res.

Max = 77.63 Nwt-M @ 74.51 msec
Min = .01 Nwt-M @ -0.24 msec



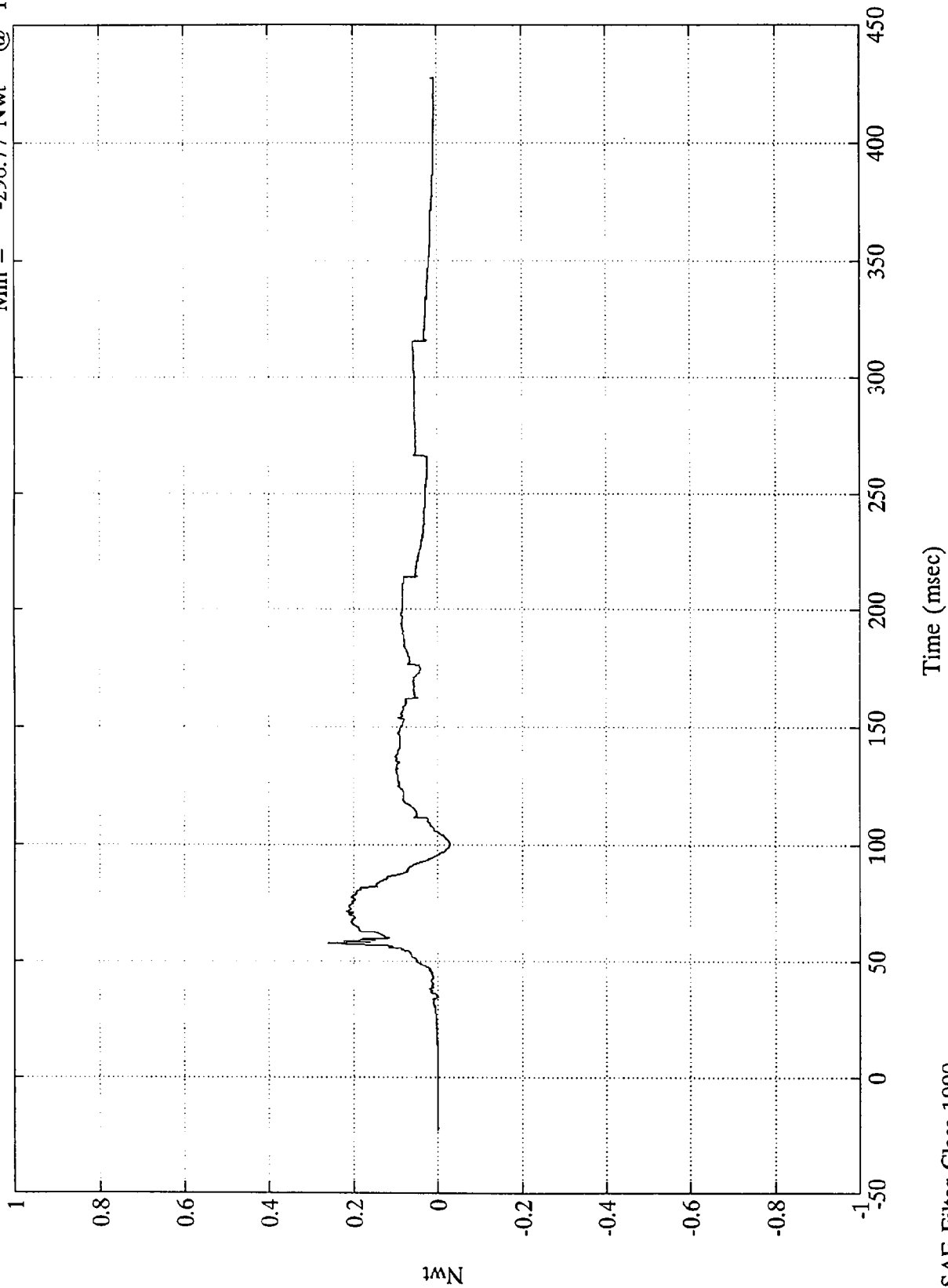
SAE Filter Class 600

VTV TEST #11

$\times 10^4$

V1-P1 Lower Neck Fx

Max = 2625.33 Nwt @ 57.72 msec
Min = -290.77 Nwt @ 100.80 msec

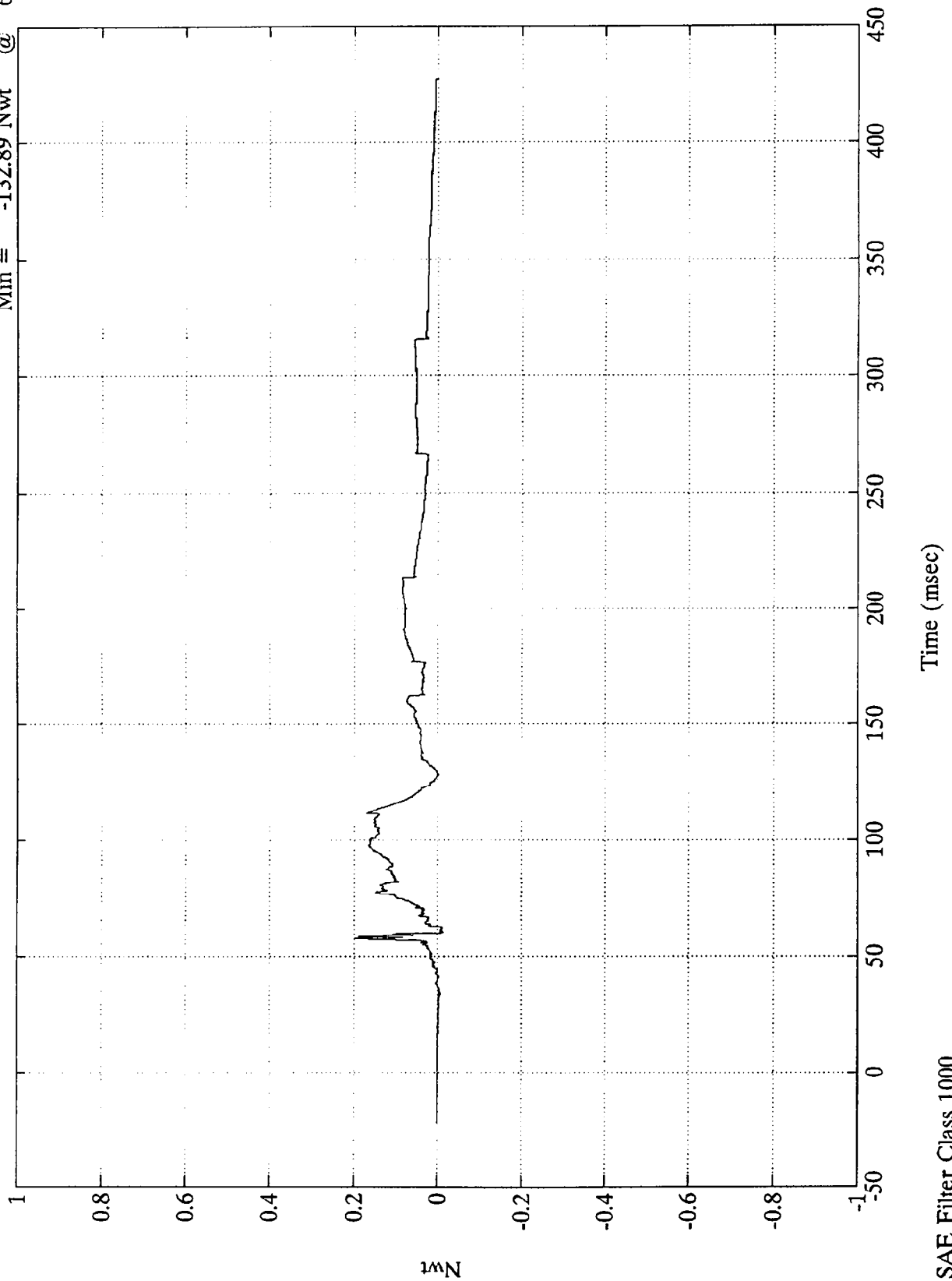


SAE Filter Class 1000

VTV TEST #11

V1-P1 Lower Neck Fy

Max = 1965.29 Nwt @ 57.72 msec
Min = -132.89 Nwt @ 60.00 msec

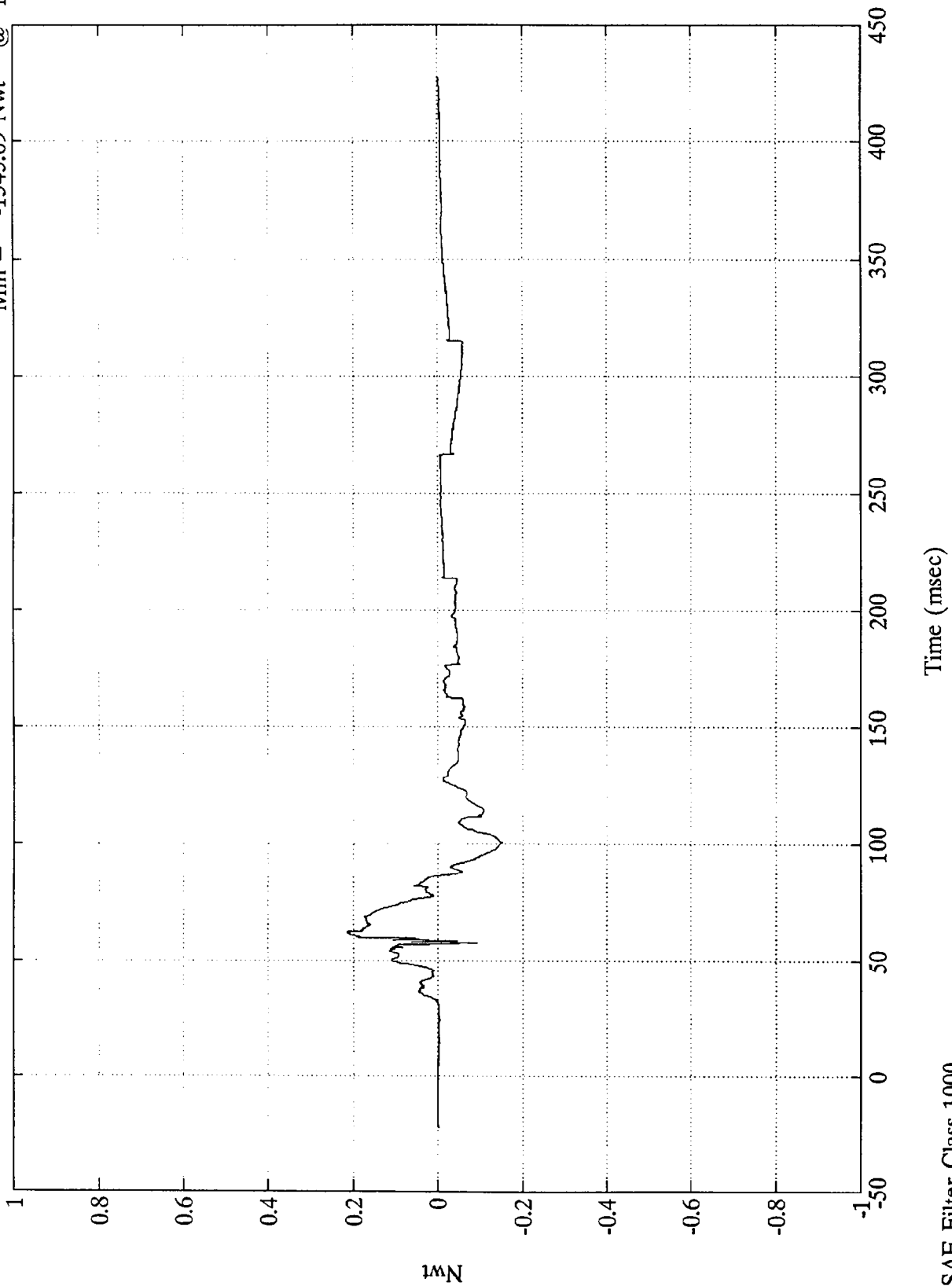


VTV TEST #11

$\times 10^4$

V1-P1 Lower Neck Fz

Max = 2148.90 Nwt @ 62.28 msec
Min = -1545.69 Nwt @ 100.68 msec

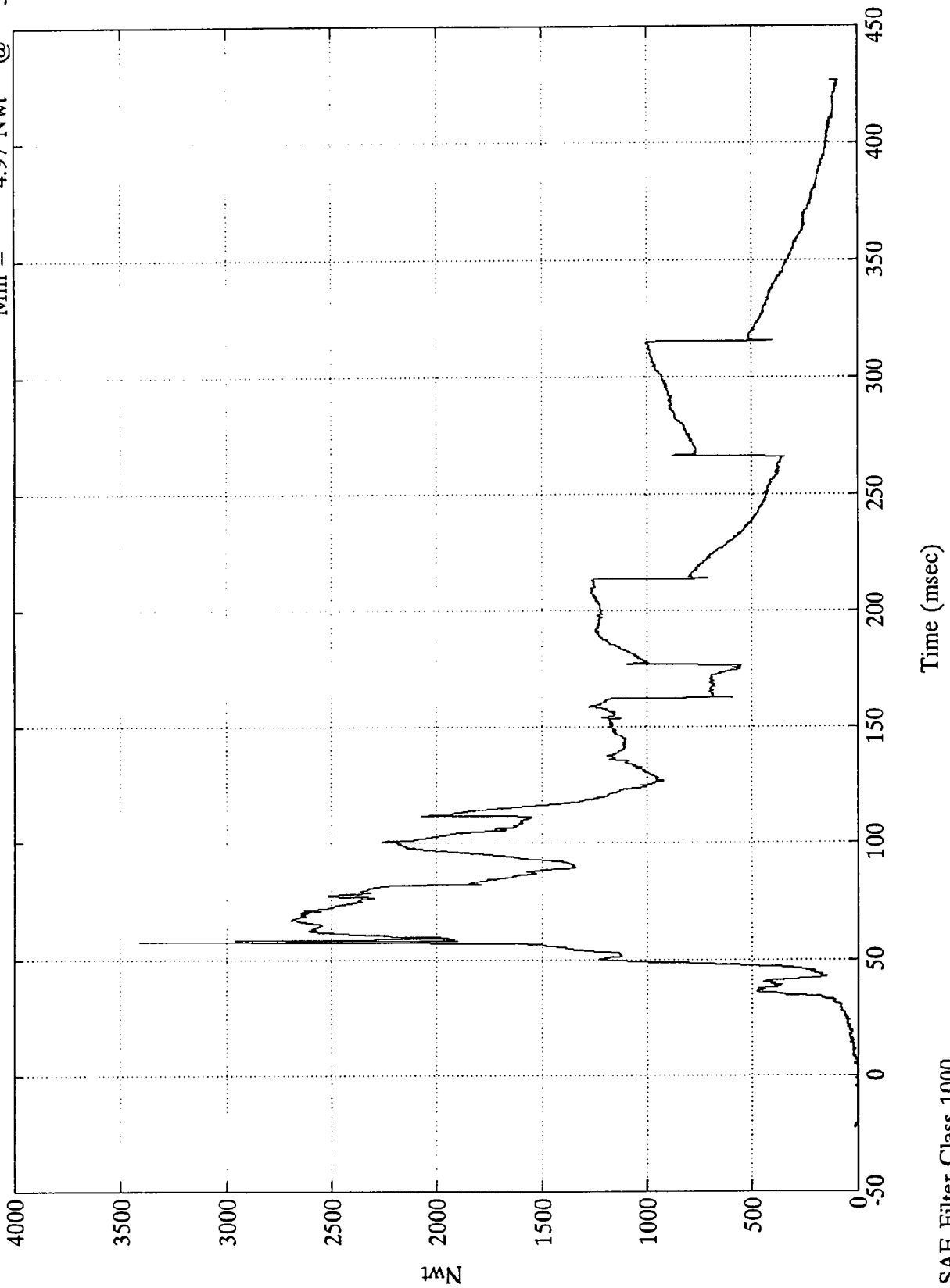


SAE Filter Class 1000

VTV TEST #11

V1-P1 Lower Neck F(res)

Max = 3409.24 Nwt @ 57.72 msec
Min = 4.97 Nwt @ 3.95 msec

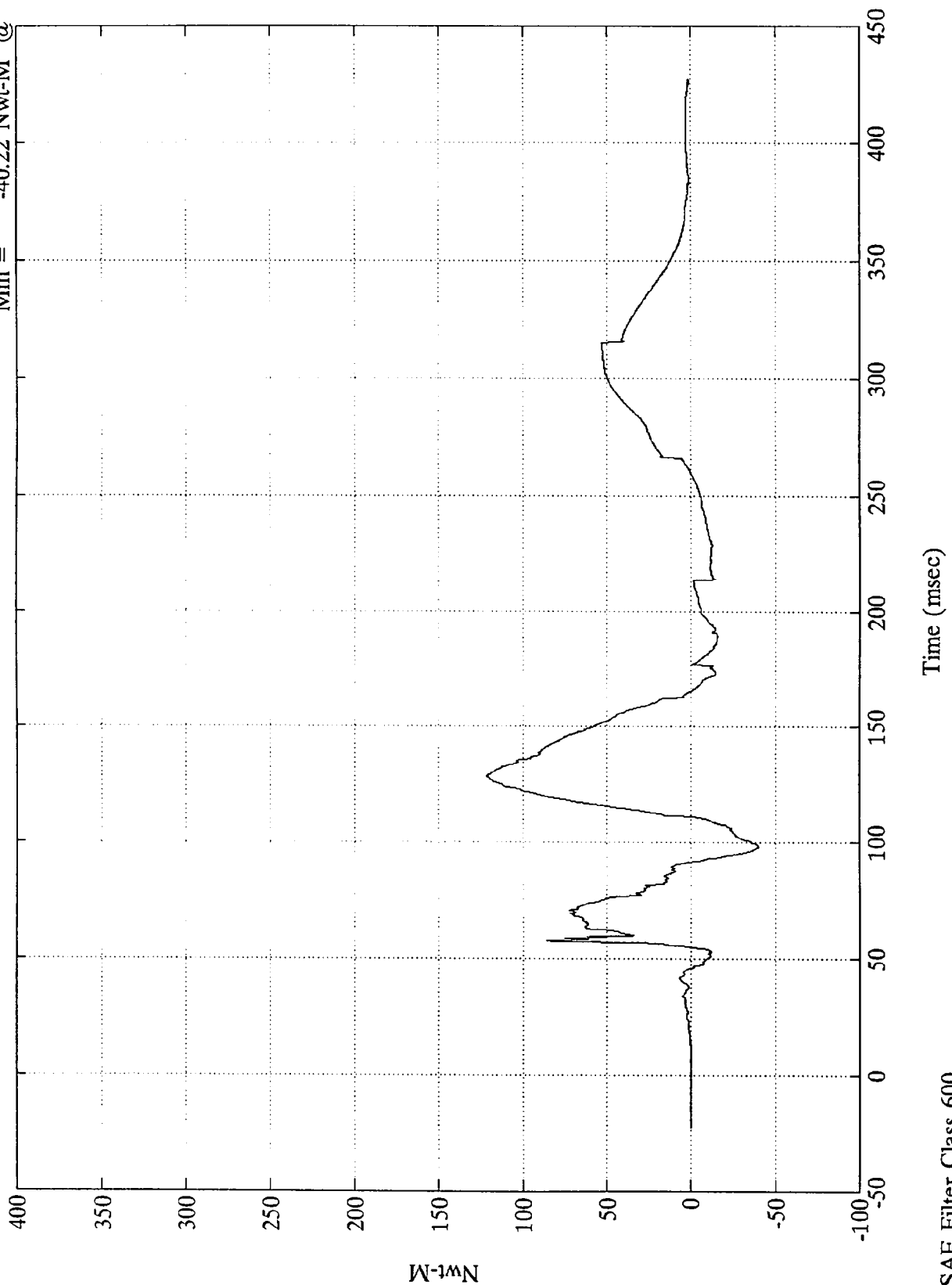


SAE Filter Class 1000

VTV TEST #11

V1-P1 Lower Neck Mx

Max = 121.31 Nwt-M @ 128.16 msec
Min = -40.22 Nwt-M @ 98.04 msec

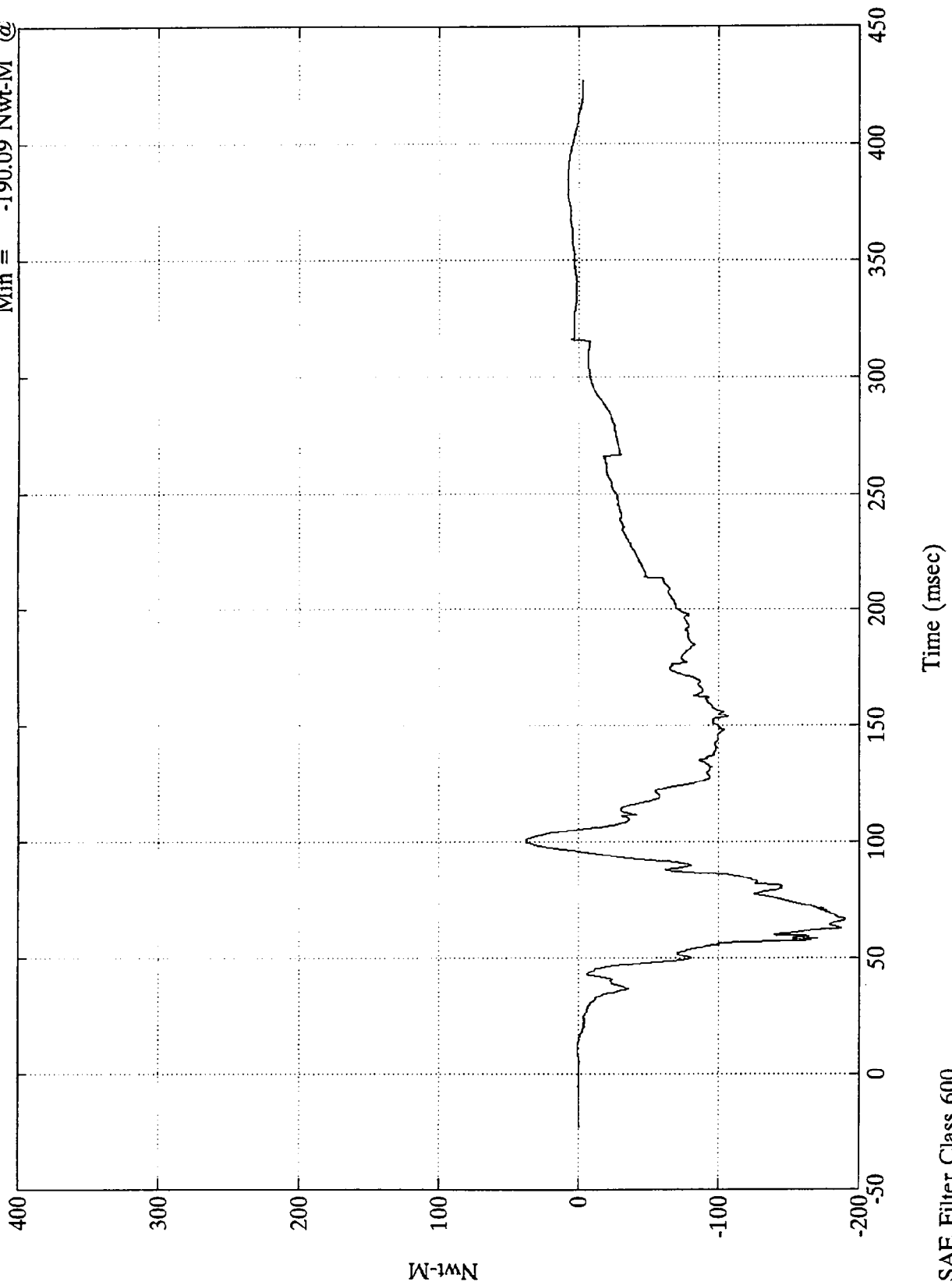


SAE Filter Class 600

VTV TEST #11

V1-P1 Lower Neck My

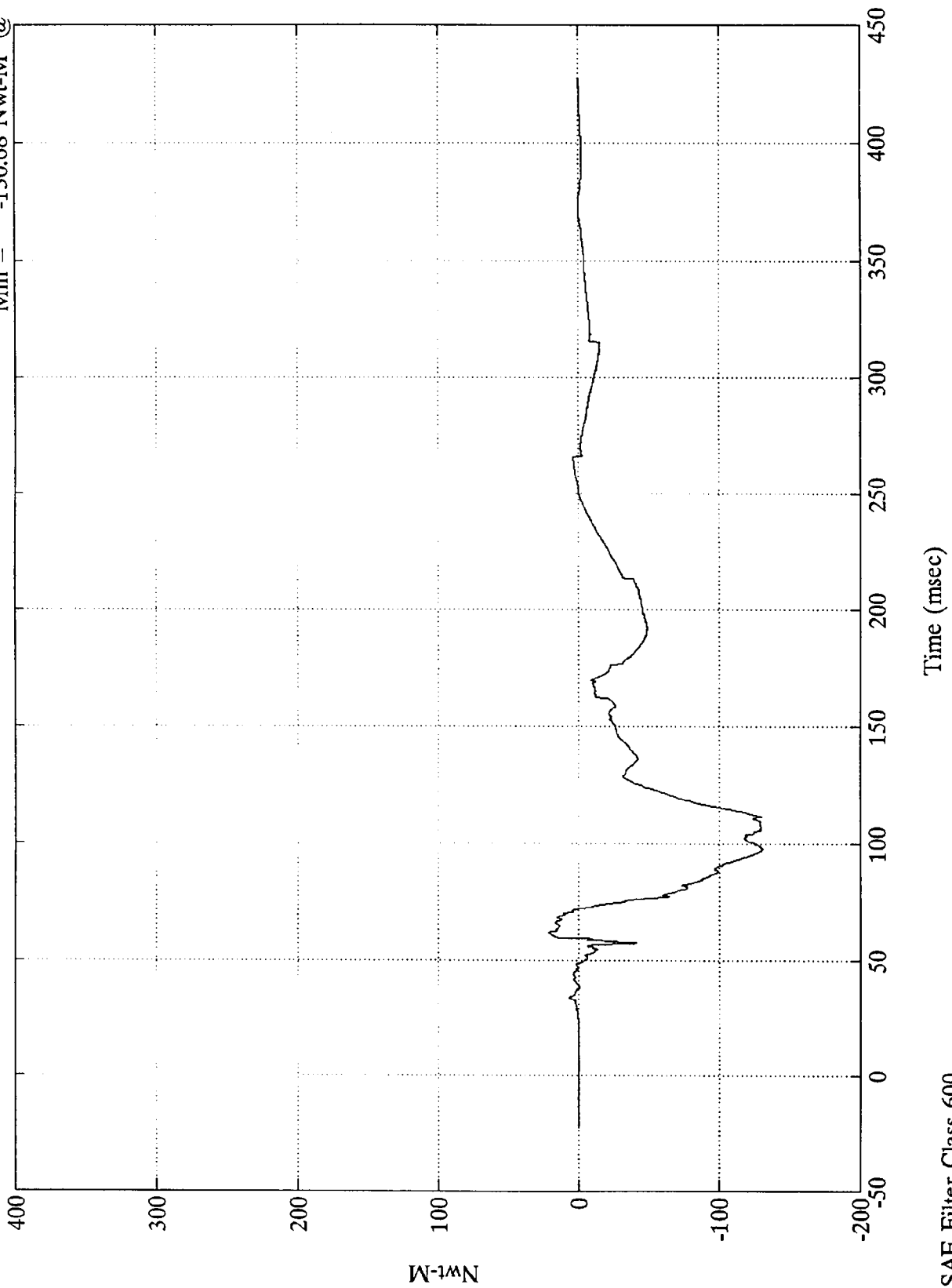
Max = 38.04 Nwt-M @ 100.20 msec
Min = -190.09 Nwt-M @ 66.72 msec



VTV TEST #11

Max = 21.85 Nwt-M @ 62.15 msec
Min = -130.68 Nwt-M @ 97.91 msec

V1-P1 Lower Neck Mz

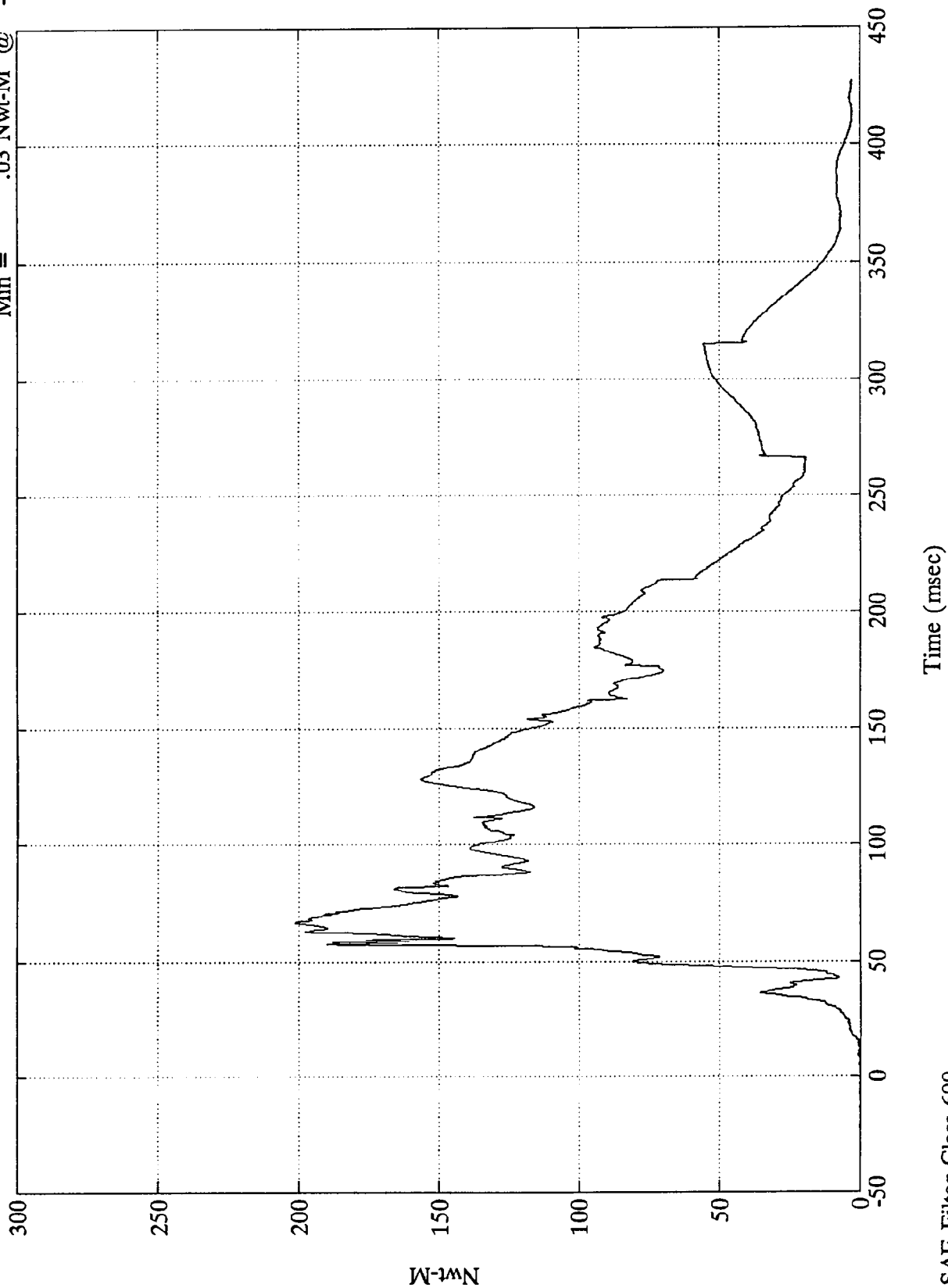


SAE Filter Class 600

VTV TEST #11

V1-P1 Lower Neck M(res)

Max = 201.25 Nwt-M @ 66.72 msec
Min = .03 Nwt-M @ -1.20 msec

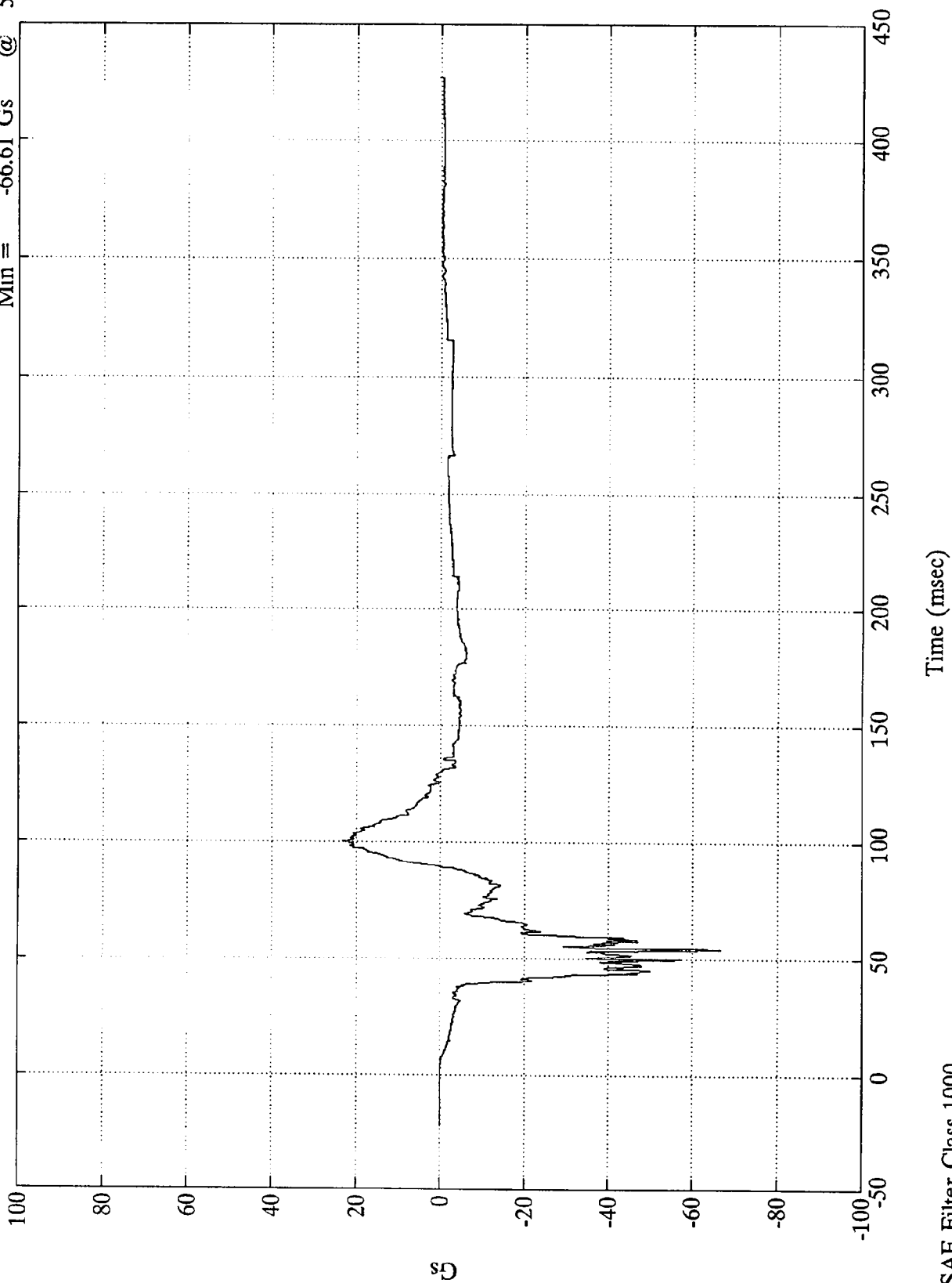


SAE Filter Class 600

VTV TEST #11

Max = 23.30 Gs @ 100.56 msec
Min = -66.61 Gs @ 54.59 msec

V1-P1 Pelvic X

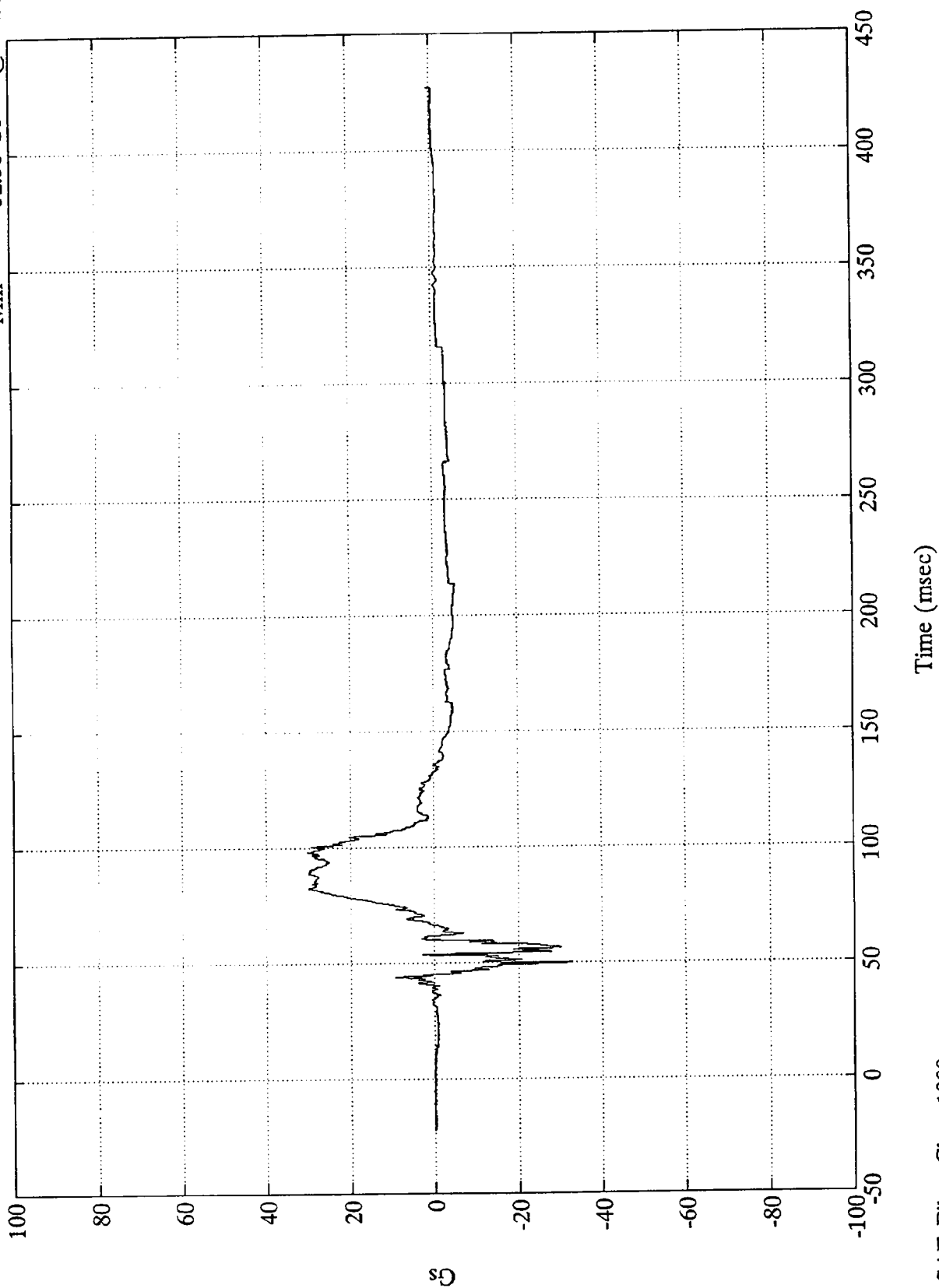


SAE Filter Class 1000

VTV TEST #11

Max = 30.31 Gs @ 98.16 msec
Min = -32.56 Gs @ 49.79 msec

V1-P1 Pelvic Y

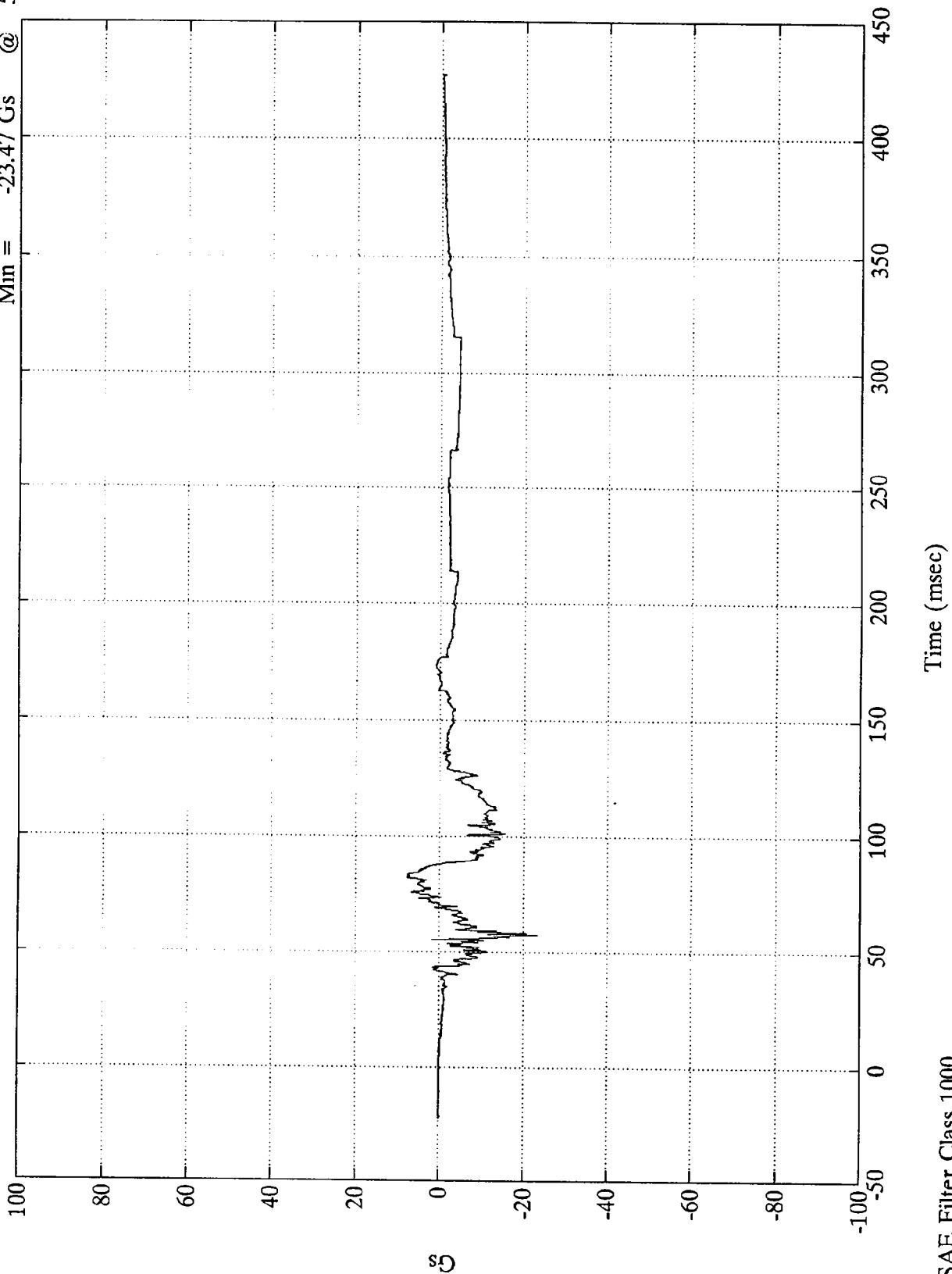


SAE Filter Class 1000

VTV TEST #11

Max = 7.73 Gs @ 83.63 msec
 Min = -23.47 Gs @ 57.72 msec

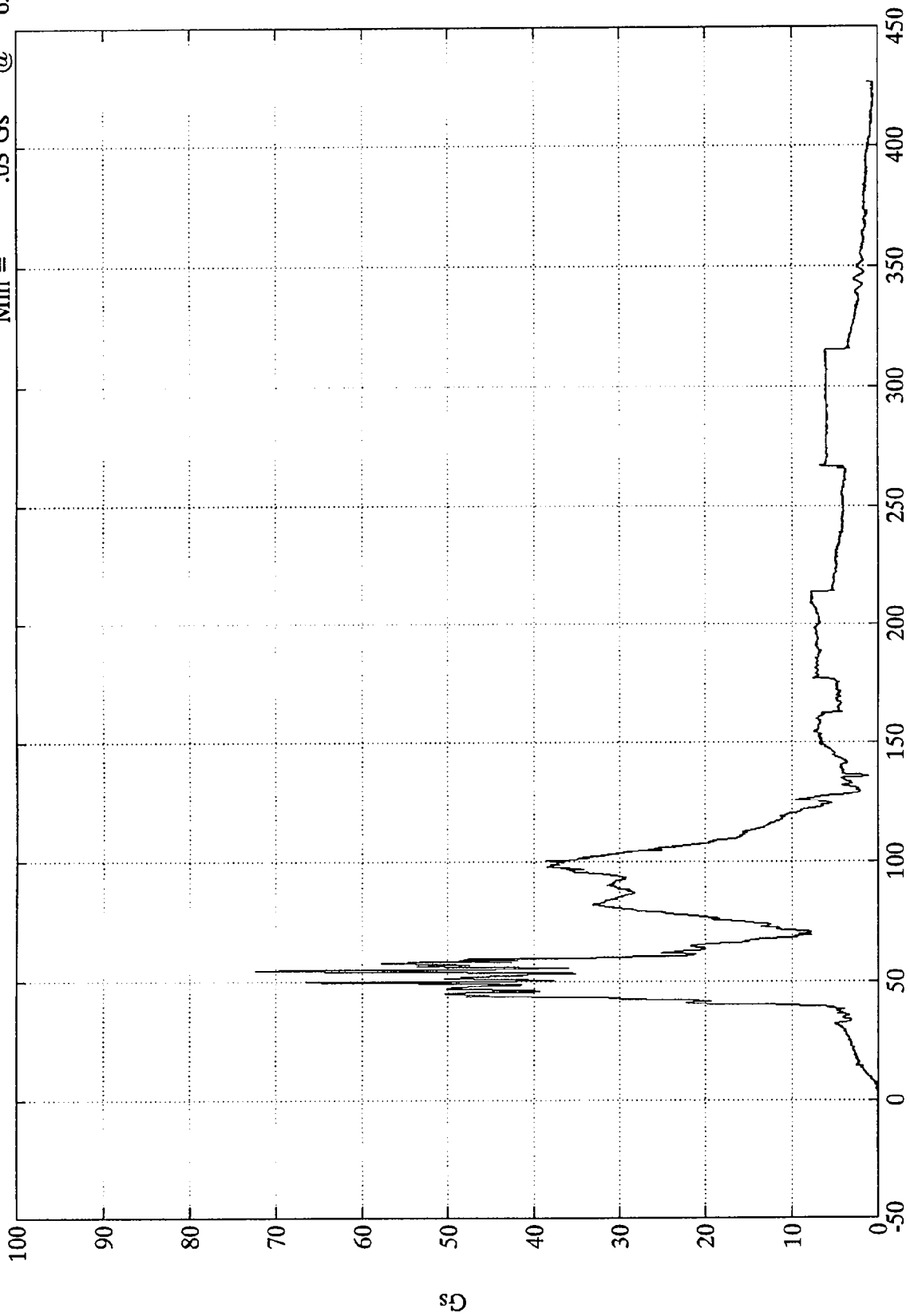
V1-P1 Pelvic Z



SAE Filter Class 1000

VTV TEST #11

V1-P1 Pelvic Res. Max = 72.43 Gs @ 54.59 msec
Min = .03 Gs @ 6.11 msec



Time (msec) Data not accurate, channel did not calibrate properly

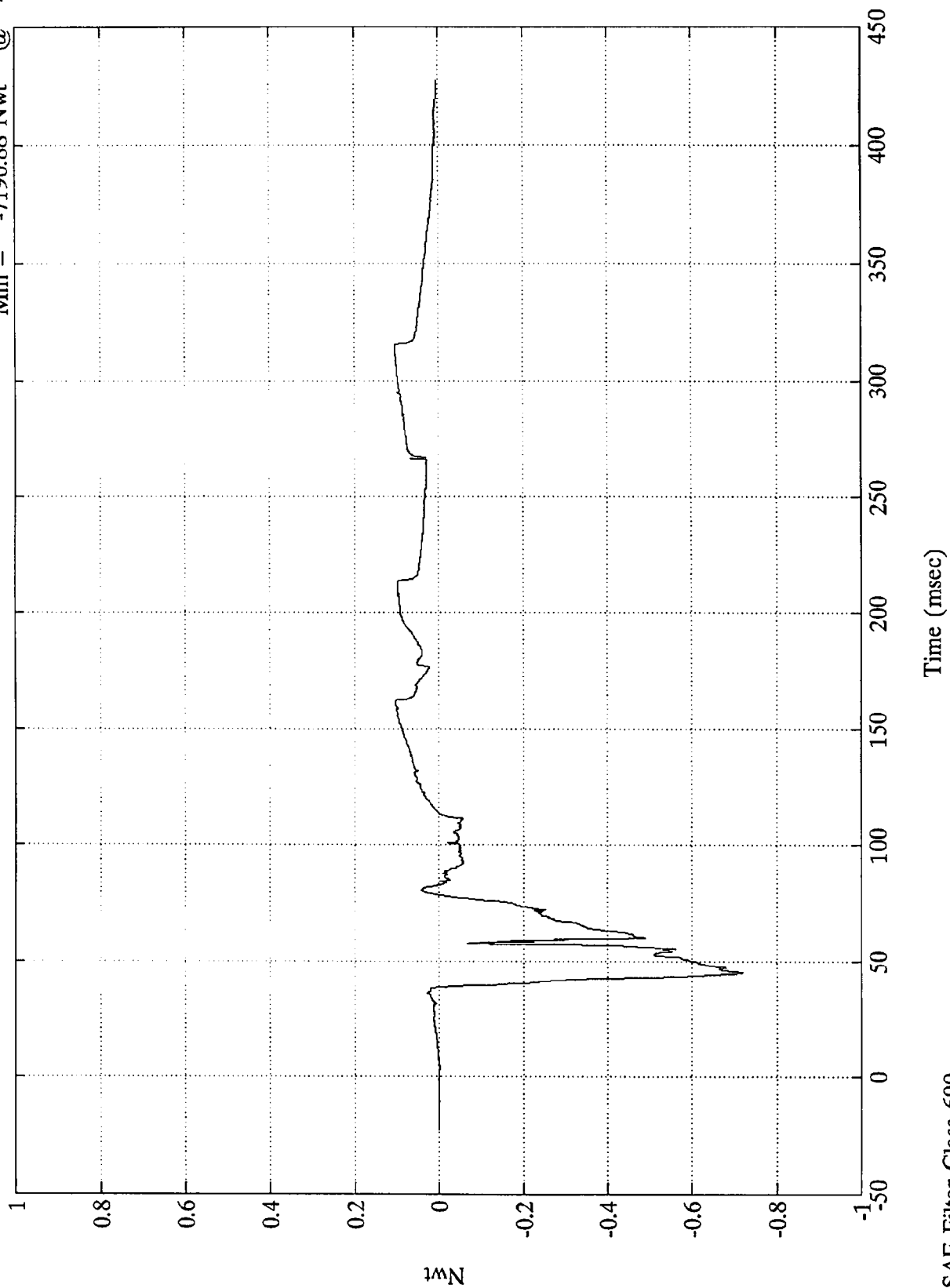
SAE Filter Class 1000

VTV TEST #11

$\times 10^4$

V1-P1 Left Femur

Max = 1037.71 Nwt @ 314.76 msec
Min = -7190.88 Nwt @ 45.00 msec



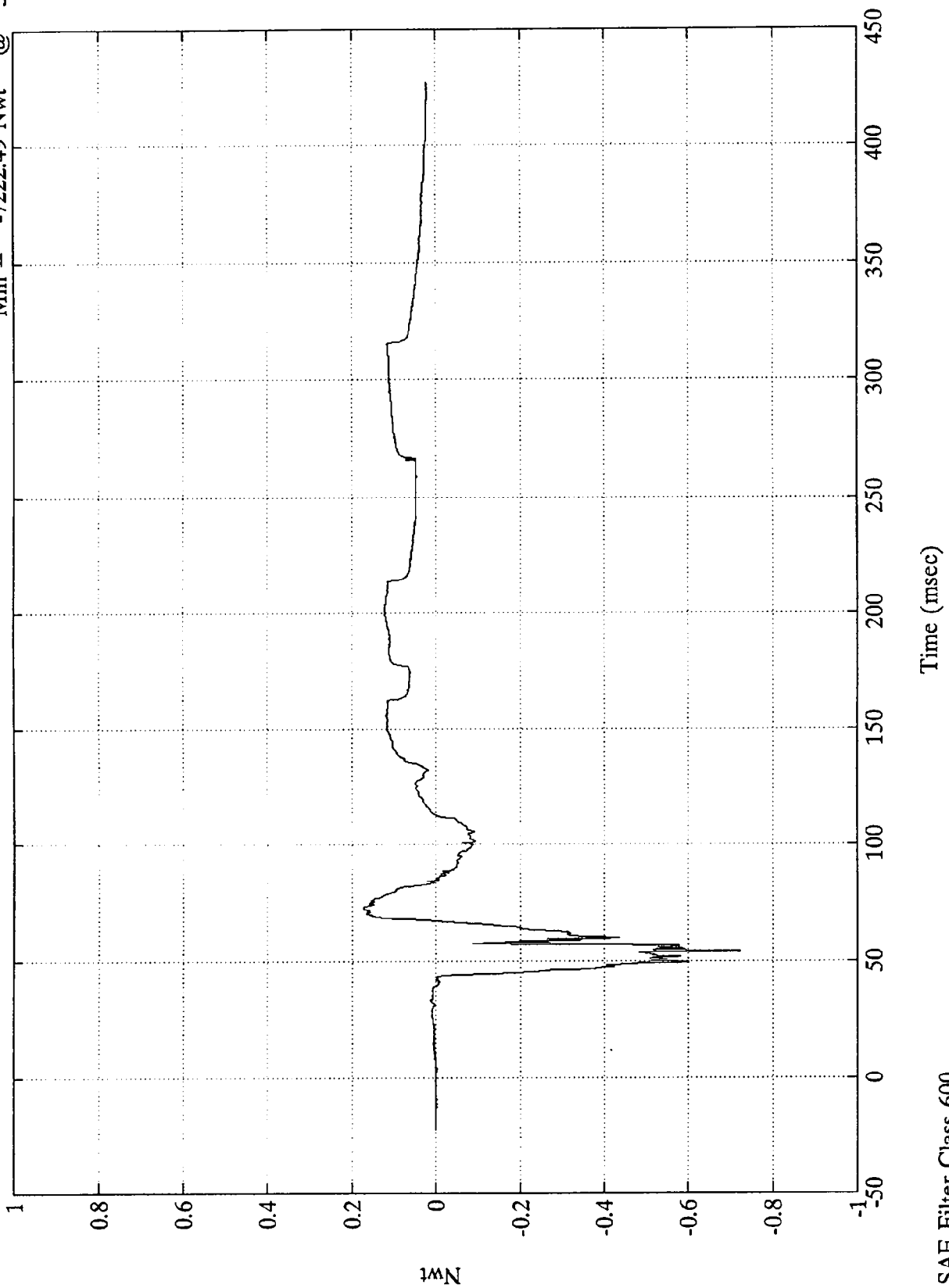
SAE Filter Class 600

VTV TEST #11

$\times 10^4$

V1-P1 Right Femur

Max = 1736.47 Nwt @ 72.48 msec
Min = -7222.49 Nwt @ 54.23 msec

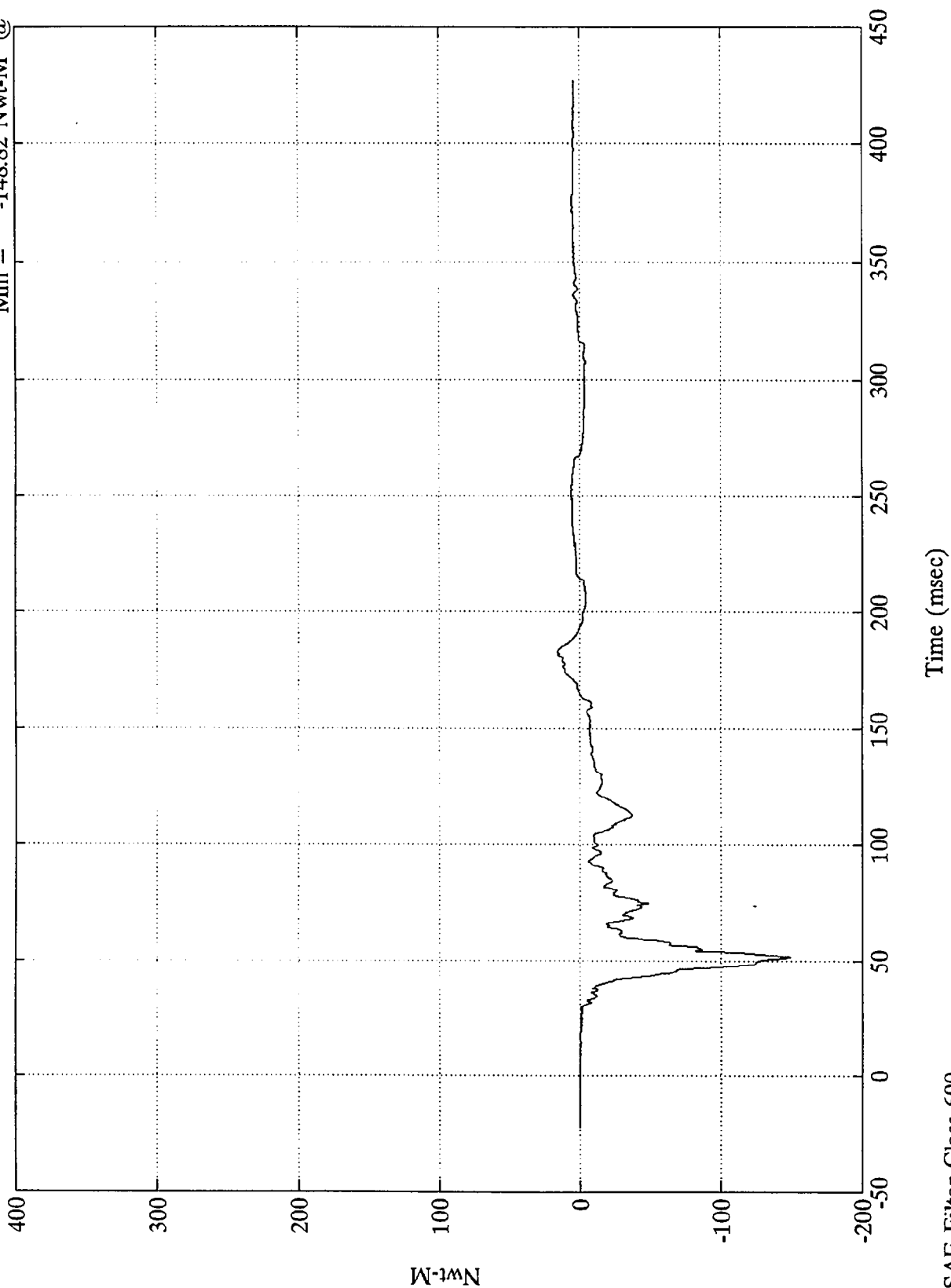


SAE Filter Class 600

VTV TEST #11

V1-P1 Lt Upper Tibia Mx

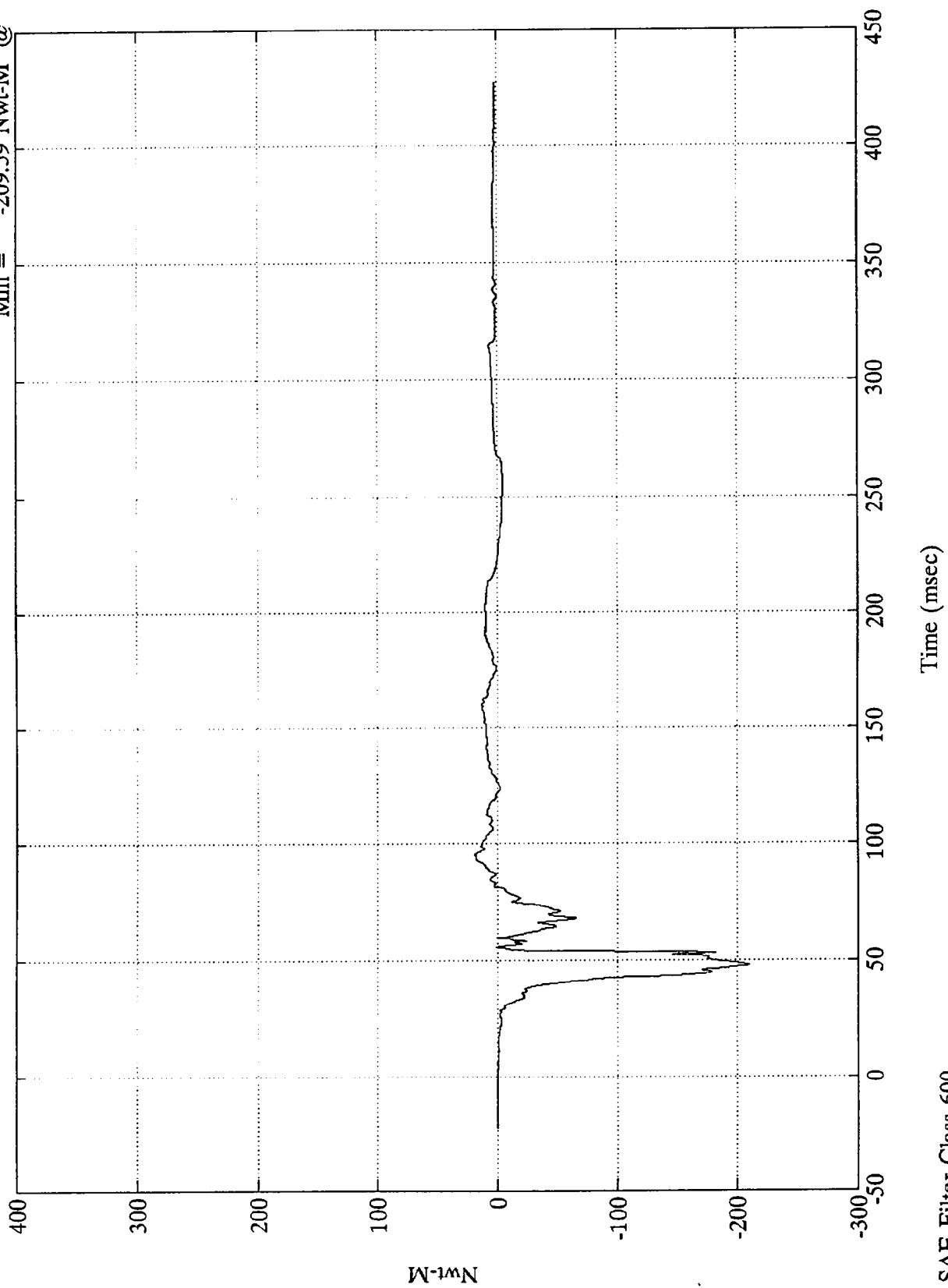
Max = 16.01 Nwt-M @ 183.12 msec
Min = -148.82 Nwt-M @ 51.72 msec



VTV TEST #11

V1-P1 Lt Upper Tibia My

Max = 19.39 Nwt-M @ 95.40 msec
Min = -209.59 Nwt-M @ 48.11 msec

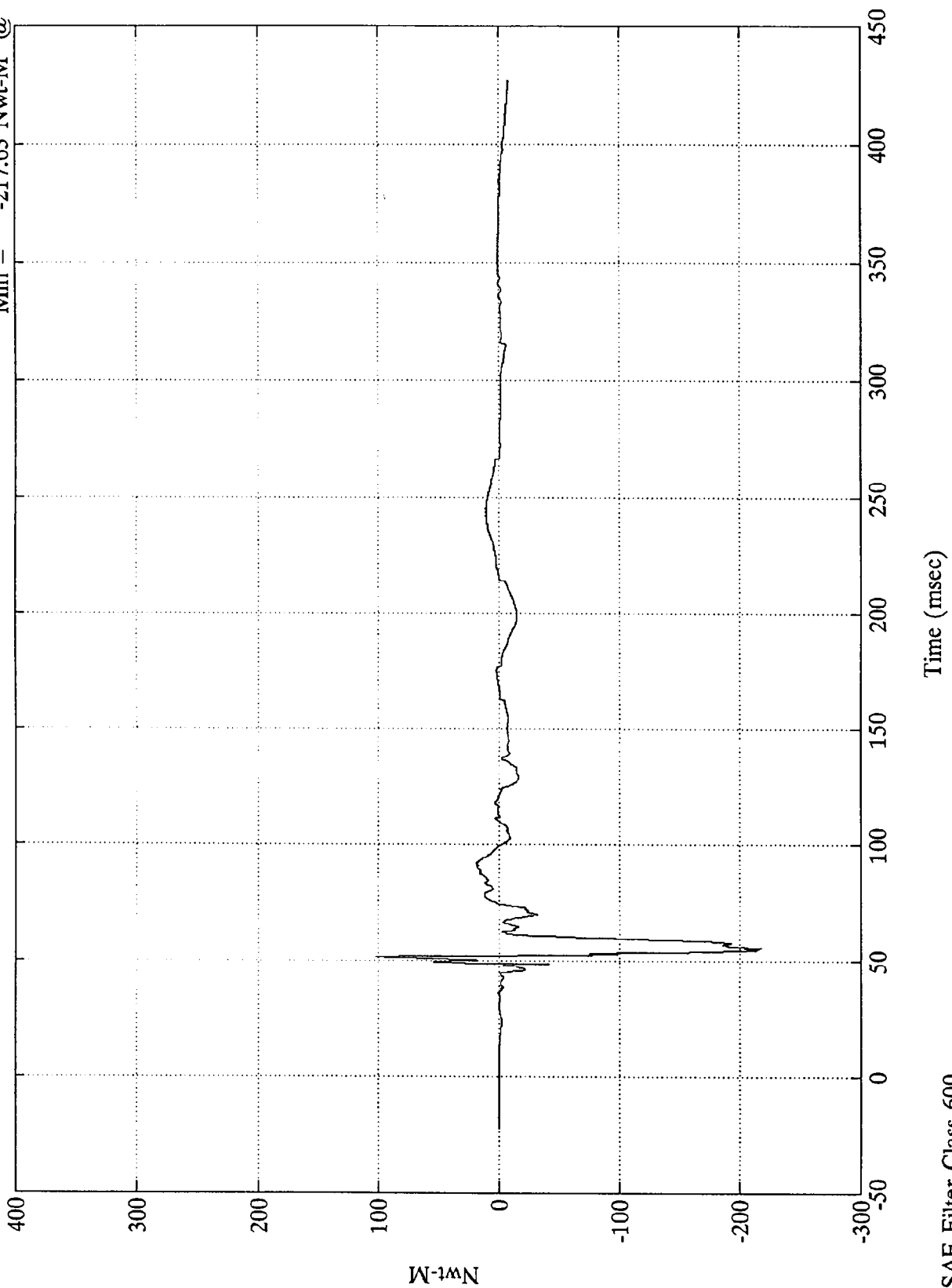


SAE Filter Class 600

VTV TEST #11

V1-P1 Rt Upper Tibia Mx

Max = 102.82 Nwt-M @ 51.60 msec
Min = -217.63 Nwt-M @ 55.56 msec

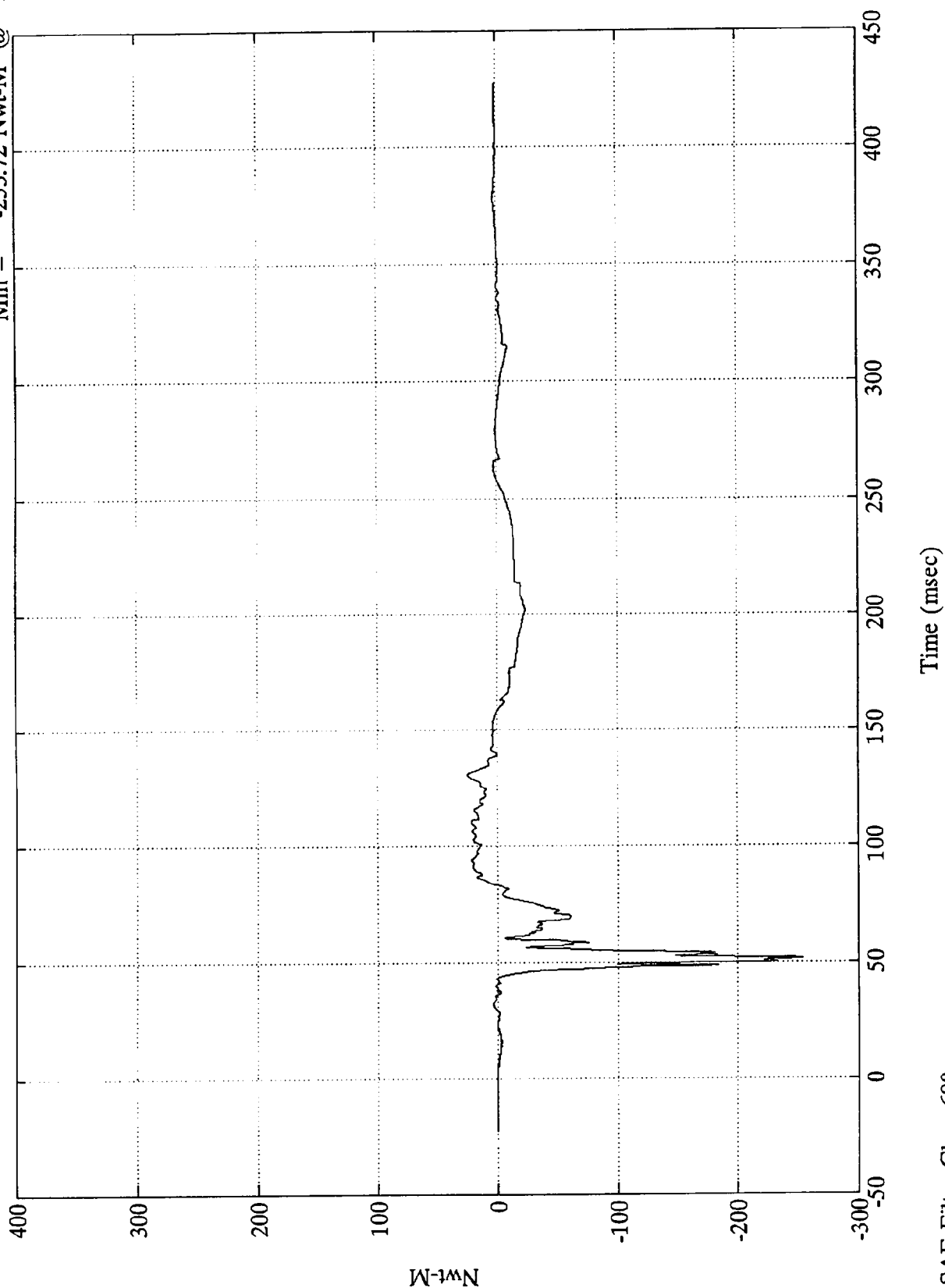


SAE Filter Class 600

VTV TEST #11

V1-P1 Rt Upper Tibia My

Max = 24.93 Nwt-M @ 130.44 msec
Min = -253.72 Nwt-M @ 51.60 msec

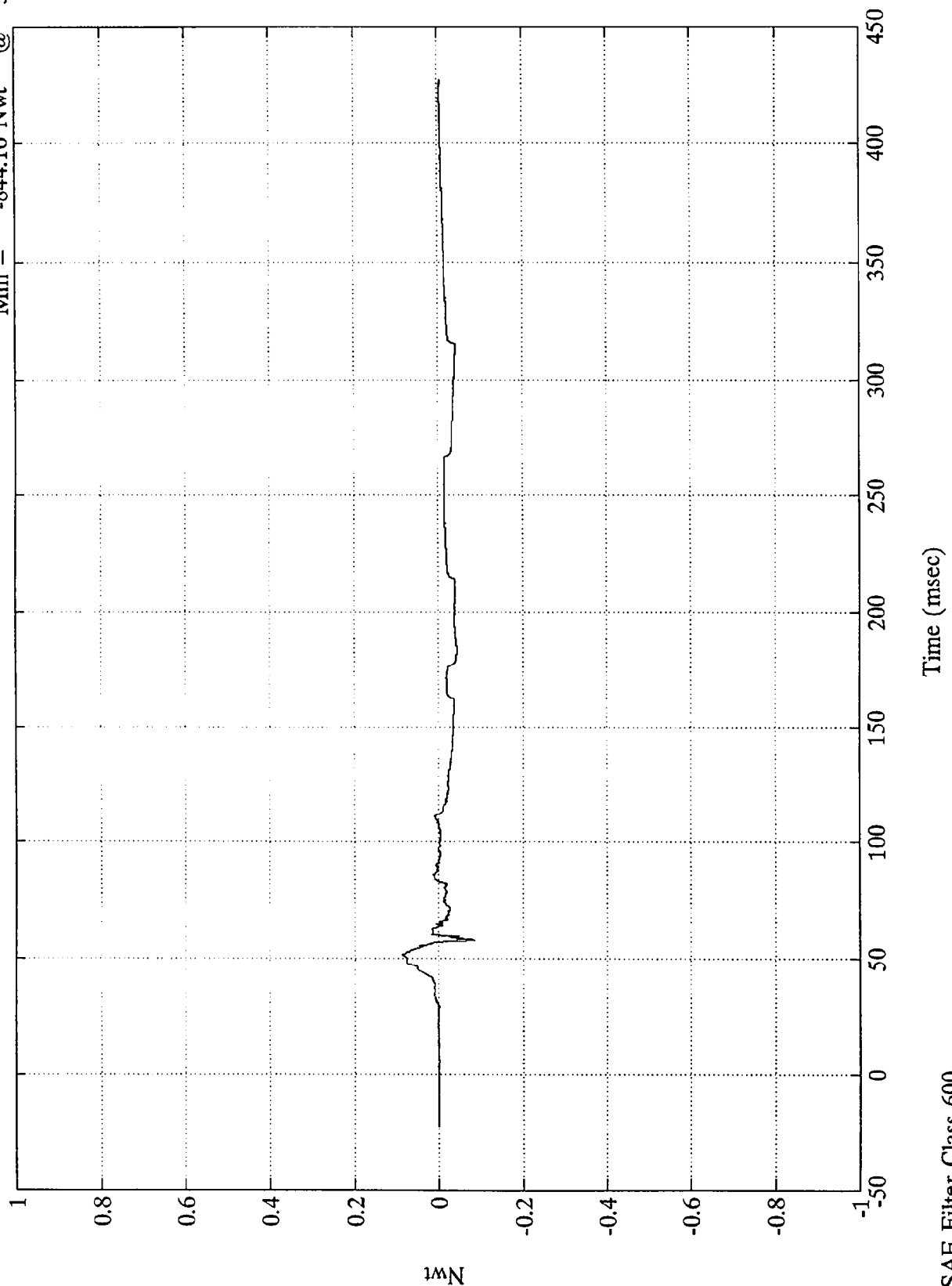


SAE Filter Class 600

VTV TEST #11

$\times 10^4$

V1-P1 Lt Lower Tibia Fy Max = 869.18 Nwt @ 51.60 msec
Min = -844.16 Nwt @ 57.84 msec



SAE Filter Class 600

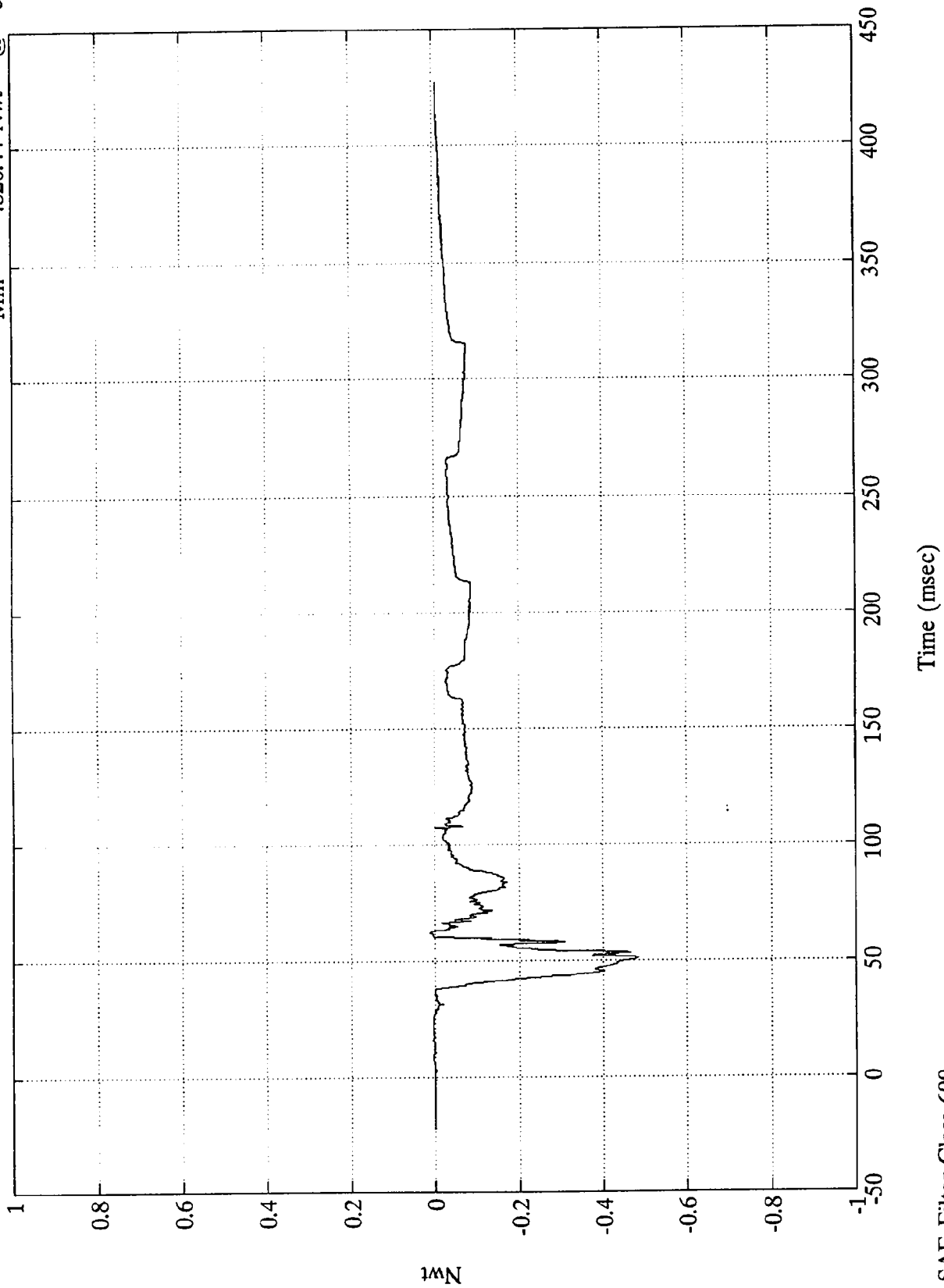
VTV TEST #11

$\times 10^4$

V1-P1 Lt Lower Tibia Fz

Max = 110.36 Nwt @
Min = -4820.44 Nwt @

61.92 msec
51.24 msec

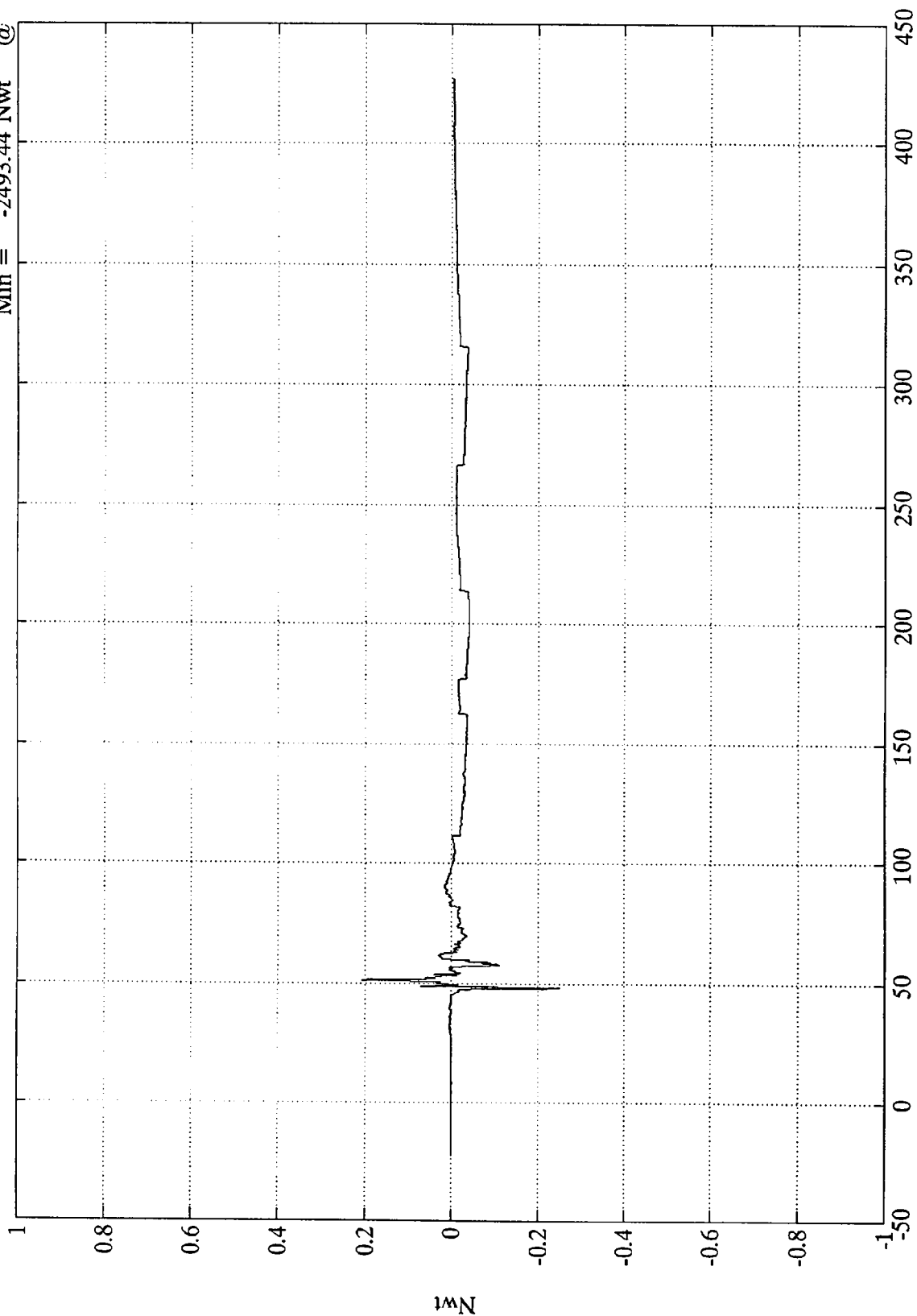


VTV TEST #11

Max = 2060.35 Nwt @ 51.36 msec
Min = -2493.44 Nwt @ 48.24 msec

V1-P1 Rt Lower Tibia Fy

$\times 10^4$



Time (msec)

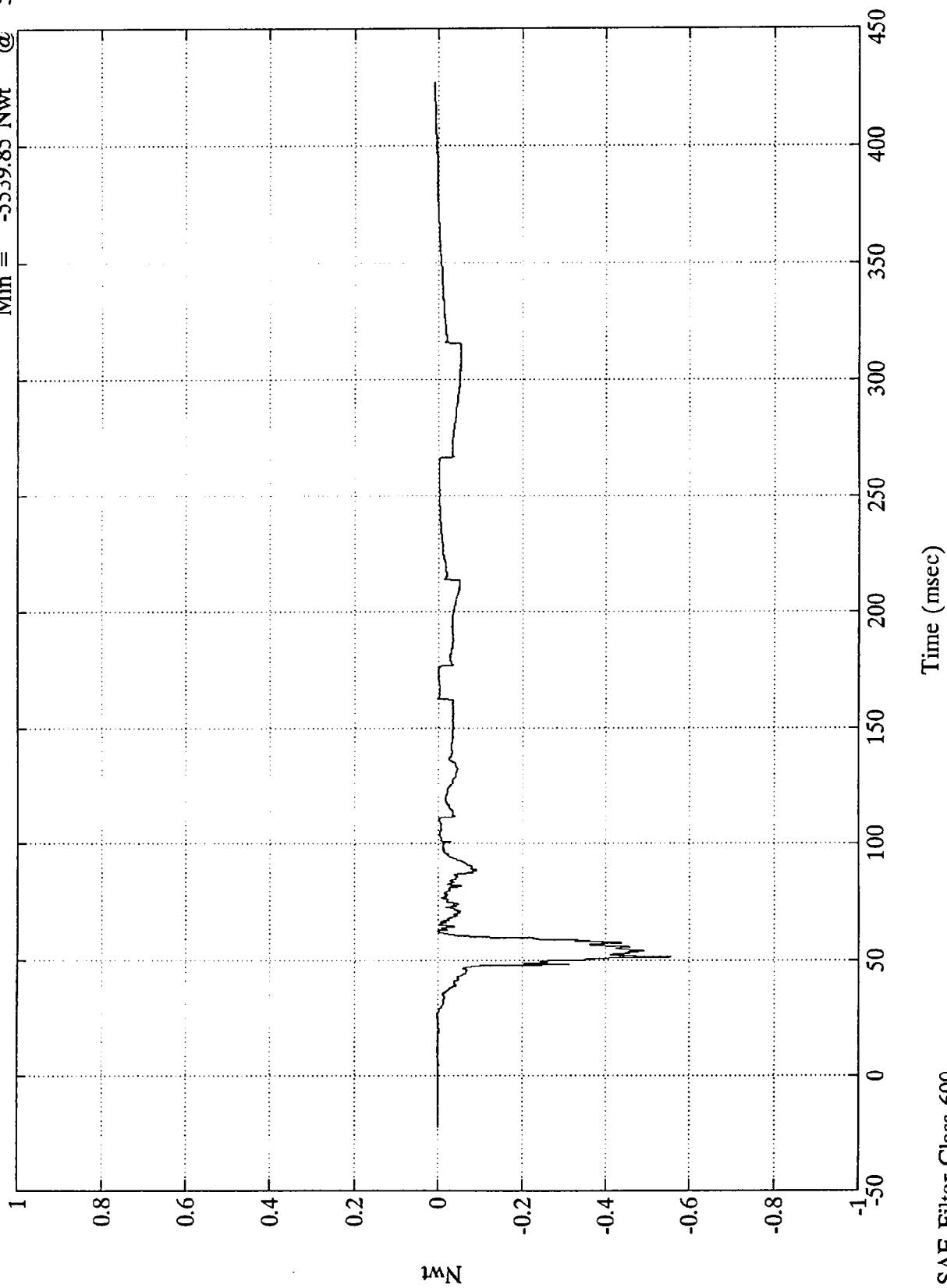
SAE Filter Class 600

VTV TEST #11

Max = 95.63 Nwt @ 426.96 msec
Min = -5539.85 Nwt @ 51.48 msec

V1-P1 Rt Lower Tibia Fz

$\times 10^4$



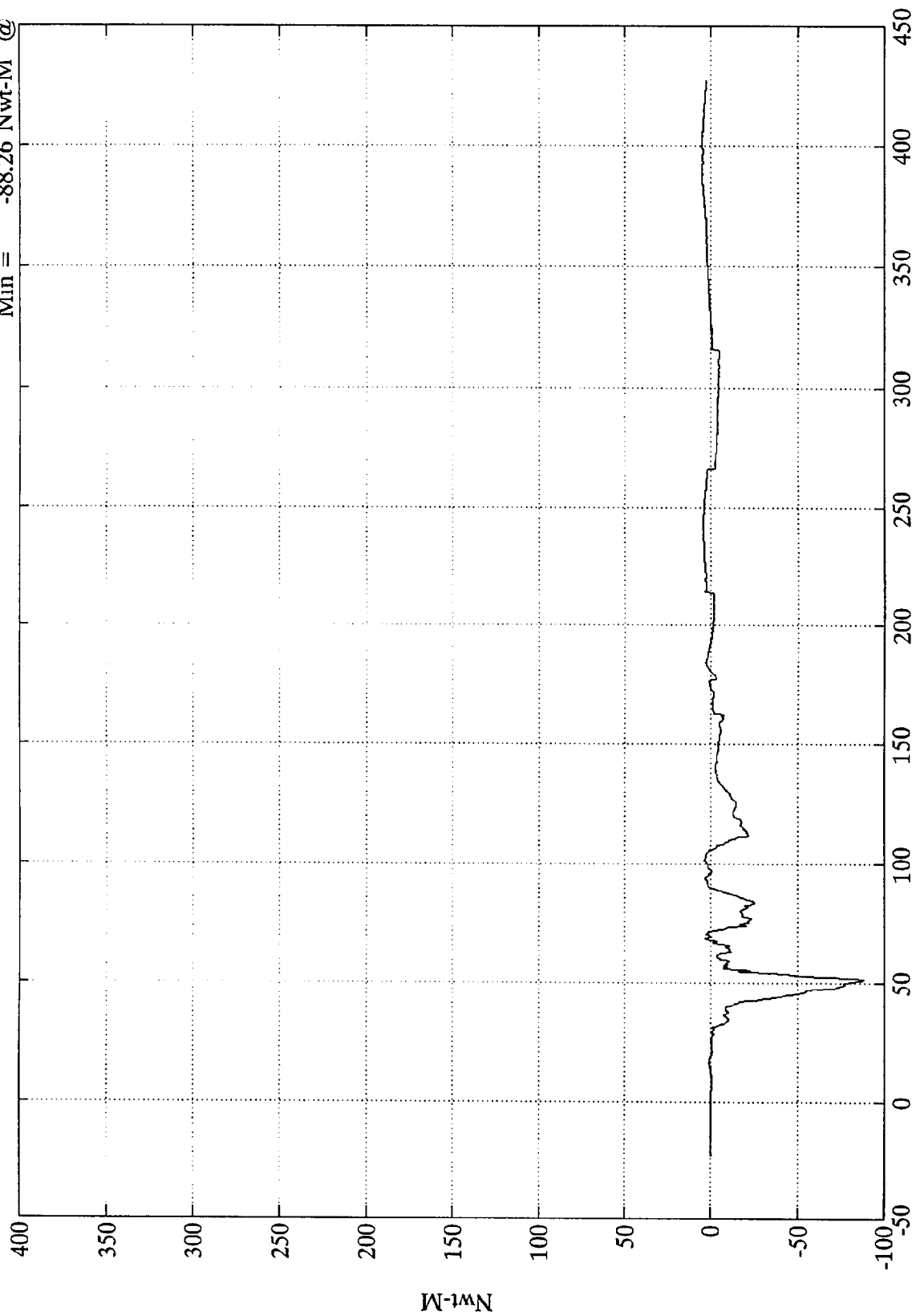
Nwt

SAE Filter Class 600

VTV TEST #11

Max = 5.19 Nwt-M @ 390.11 msec
Min = -88.26 Nwt-M @ 51.36 msec

V1-P1 Lt Lower Tibia Mx



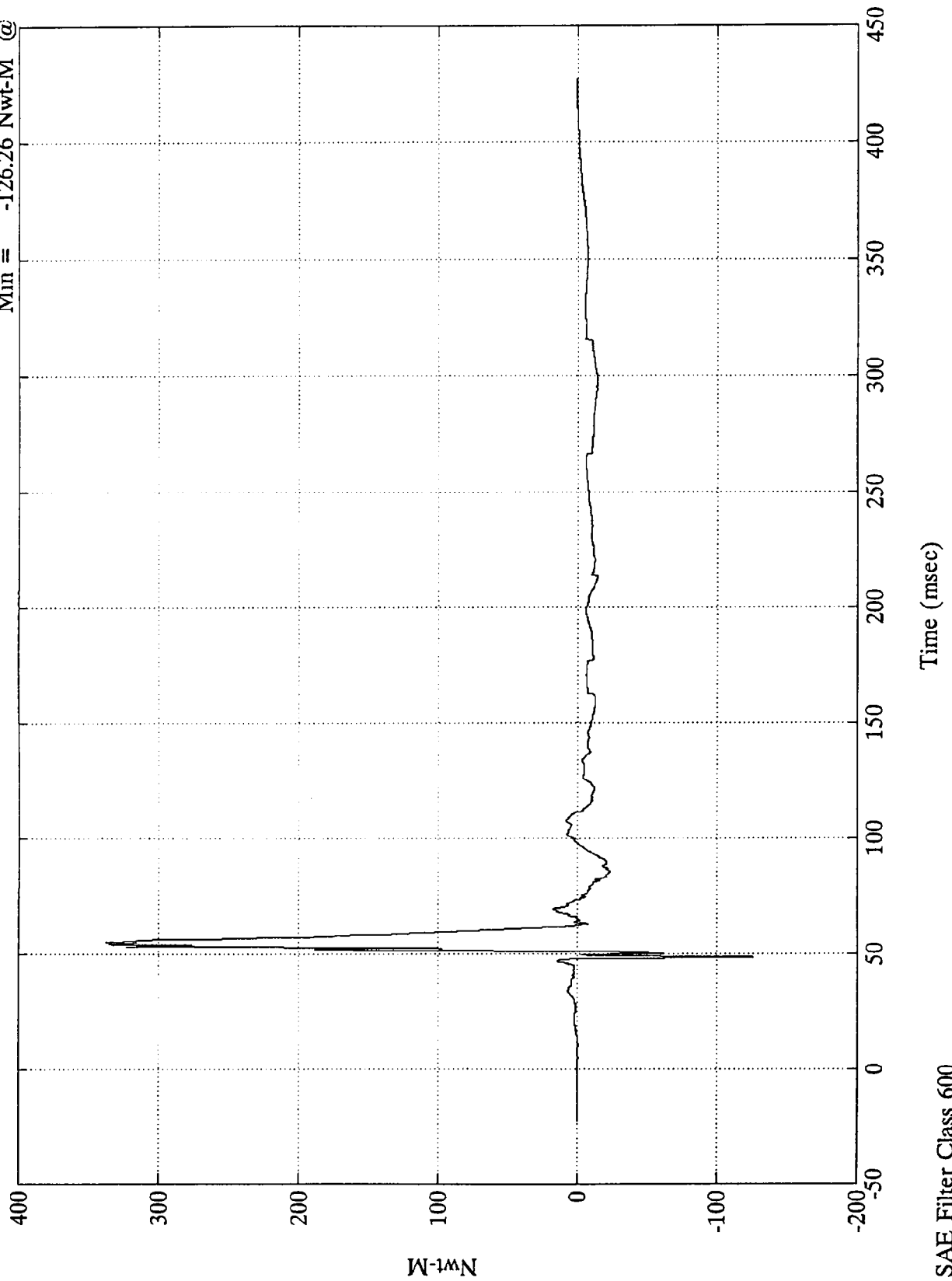
Time (msec)

SAE Filter Class 600

VTV TEST #11

V1-P1 Rt Lower Tibia Mx

Max = 337.86 Nwt-M @ 55.20 msec
Min = -126.26 Nwt-M @ 48.47 msec

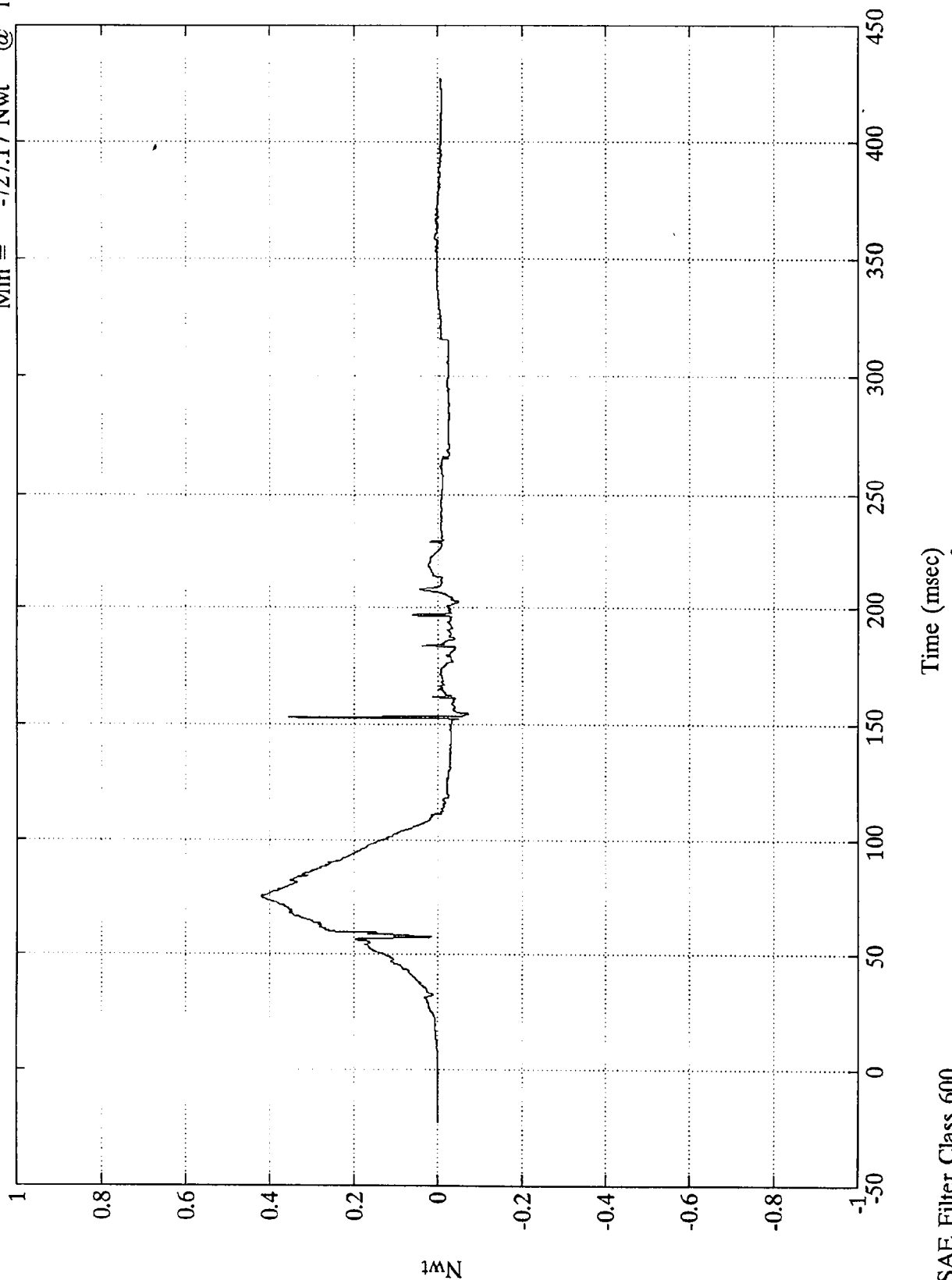


VTV TEST #11

$\times 10^4$

V1-P1 Torso Belt Load

Max = 4200.33 Nwt @ 75.23 msec
Min = -727.17 Nwt @ 154.55 msec

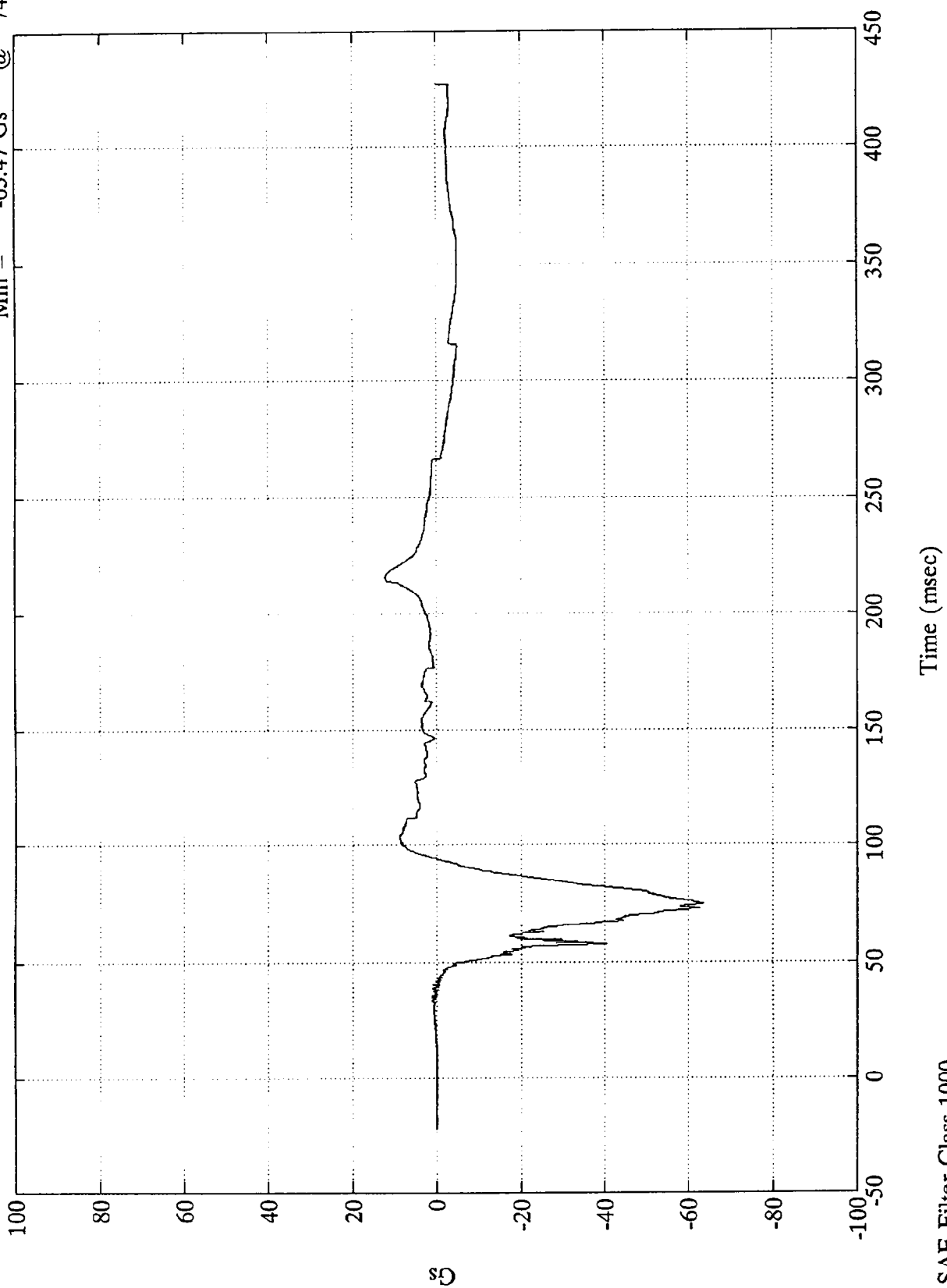


SAE Filter Class 600

VTV TEST #11

V1-P2 Head X

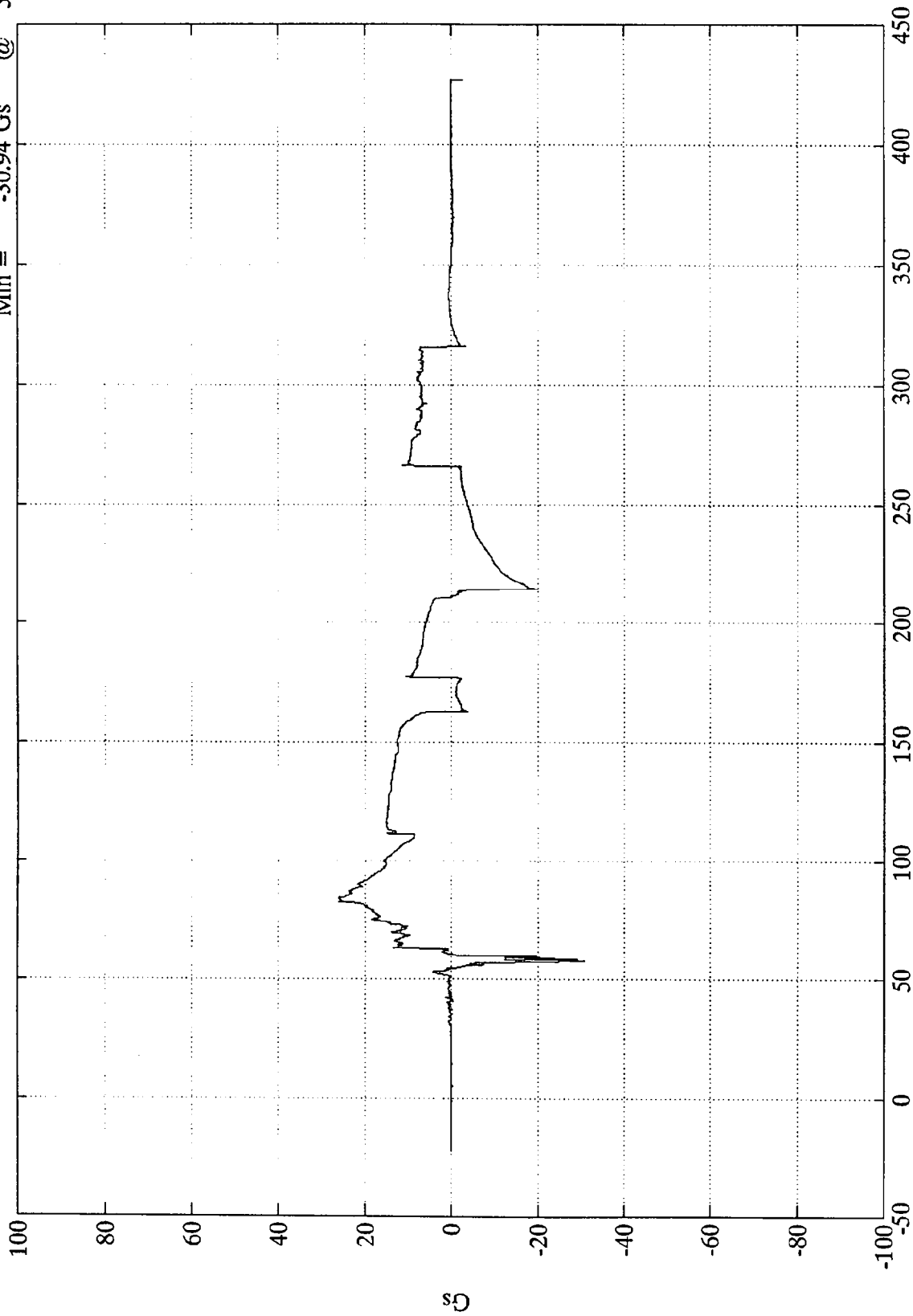
Max = 12.31 Gs @ 216.47 msec
Min = -63.47 Gs @ 74.51 msec



VTV TEST #11

Max = 26.25 Gs @ 82.08 msec
Min = -30.94 Gs @ 57.84 msec

V1-P2 Head Y



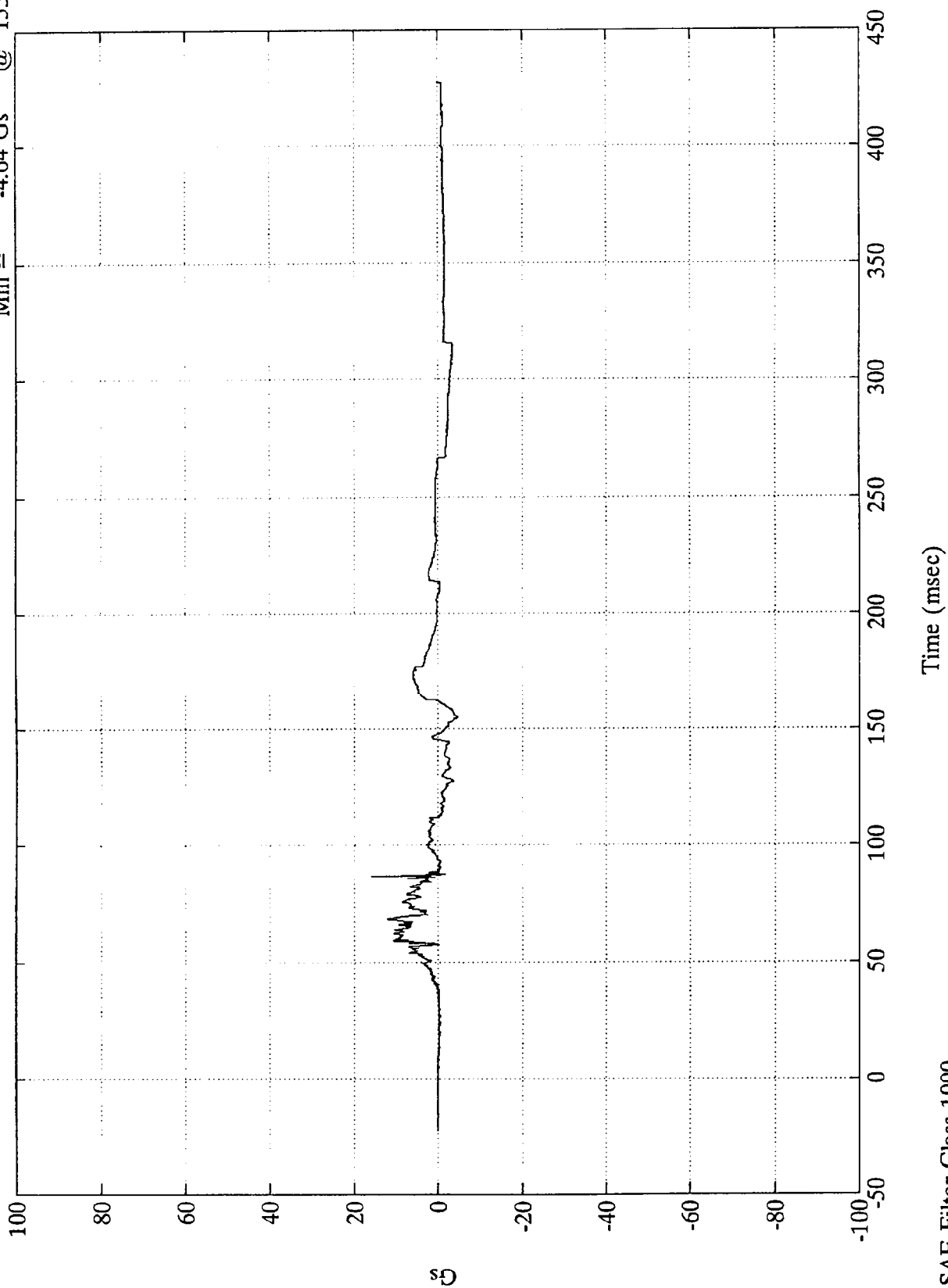
Time (msec) Data questionable after 150 msec

SAE Filter Class 1000

VTV TEST #11

Max = 15.97 Gs @ 87.00 msec
Min = -4.64 Gs @ 155.04 msec

V1-P2 Head Z

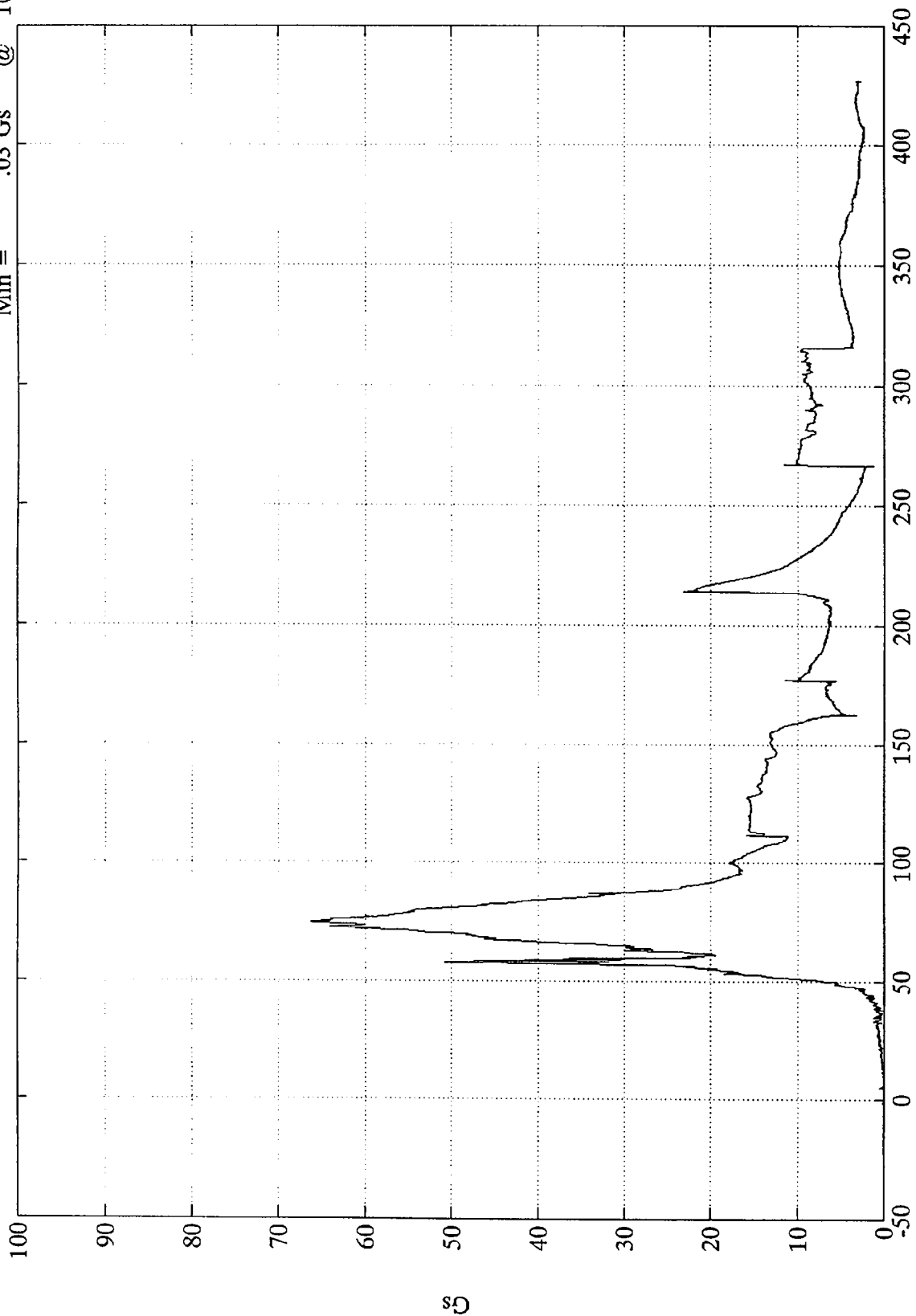


SAE Filter Class 1000

VTV TEST #11

Max = 66.36 Gs @ 74.51 msec
 Min = .03 Gs @ 10.79 msec

V1-P2 Head Resultant



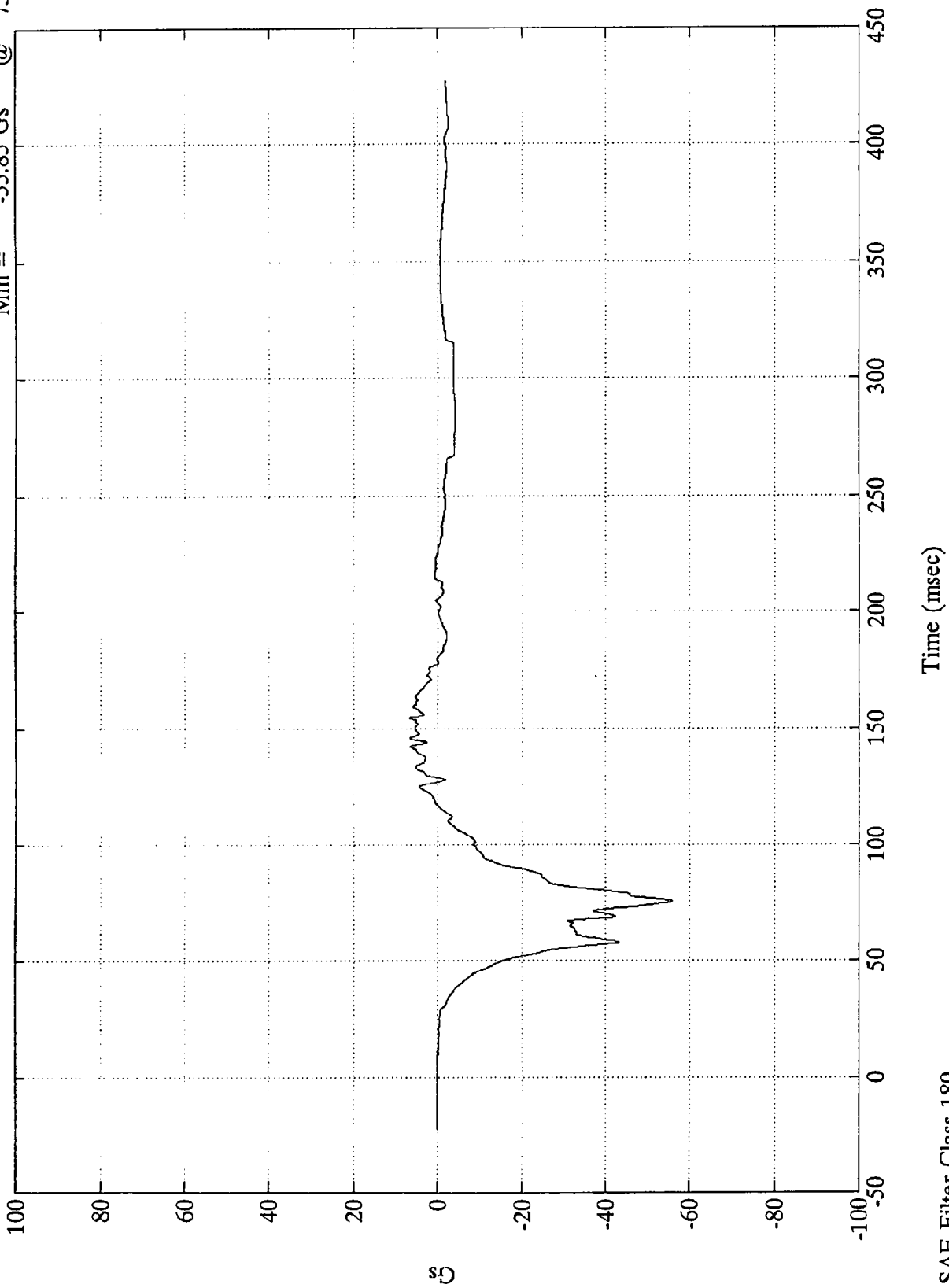
Time (msec) Data questionable after 150 msec

SAE Filter Class 1000

VTV TEST #11

Max = 6.75 Gs @ 154.67 msec
Min = -55.85 Gs @ 75.47 msec

V1-P2 Chest X

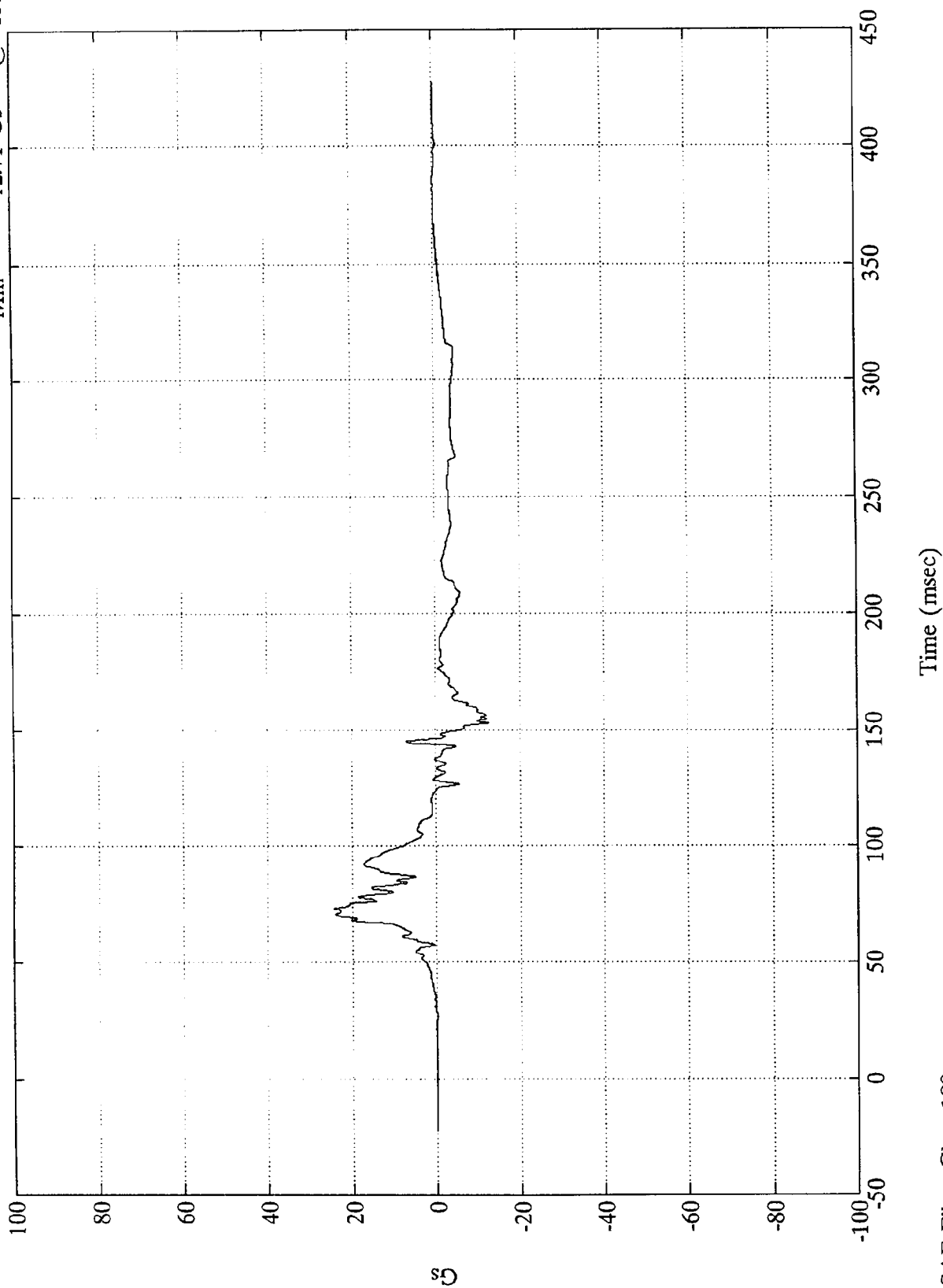


SAE Filter Class 180

VTV TEST #11

Max = 24.34 Gs @ 72.84 msec
Min = -12.71 Gs @ 153.12 msec

V1-P2 Chest Y

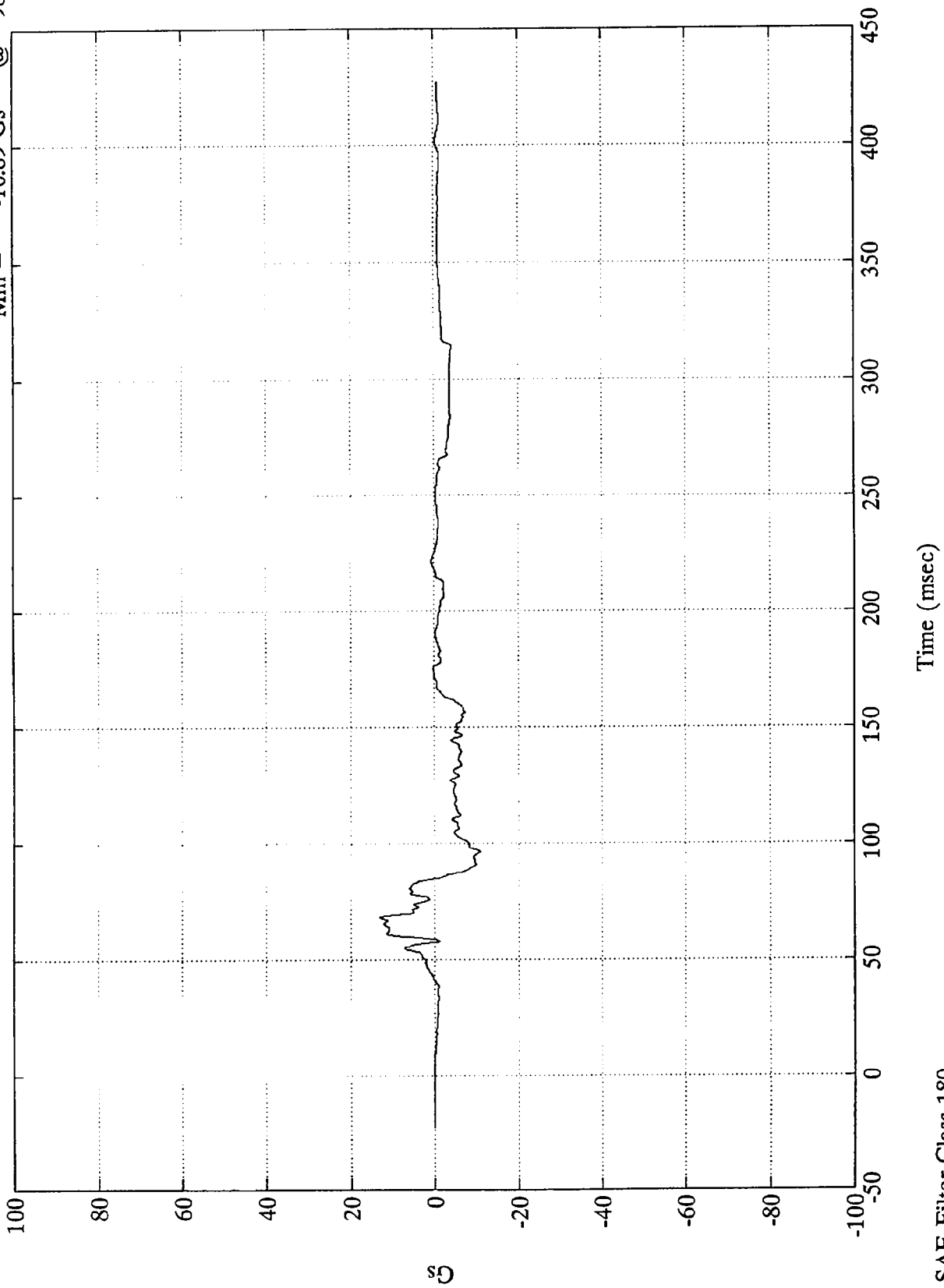


SAE Filter Class 180

VTV TEST #11

Max = 13.15 Gs @ 68.04 msec
Min = -10.89 Gs @ 96.84 msec

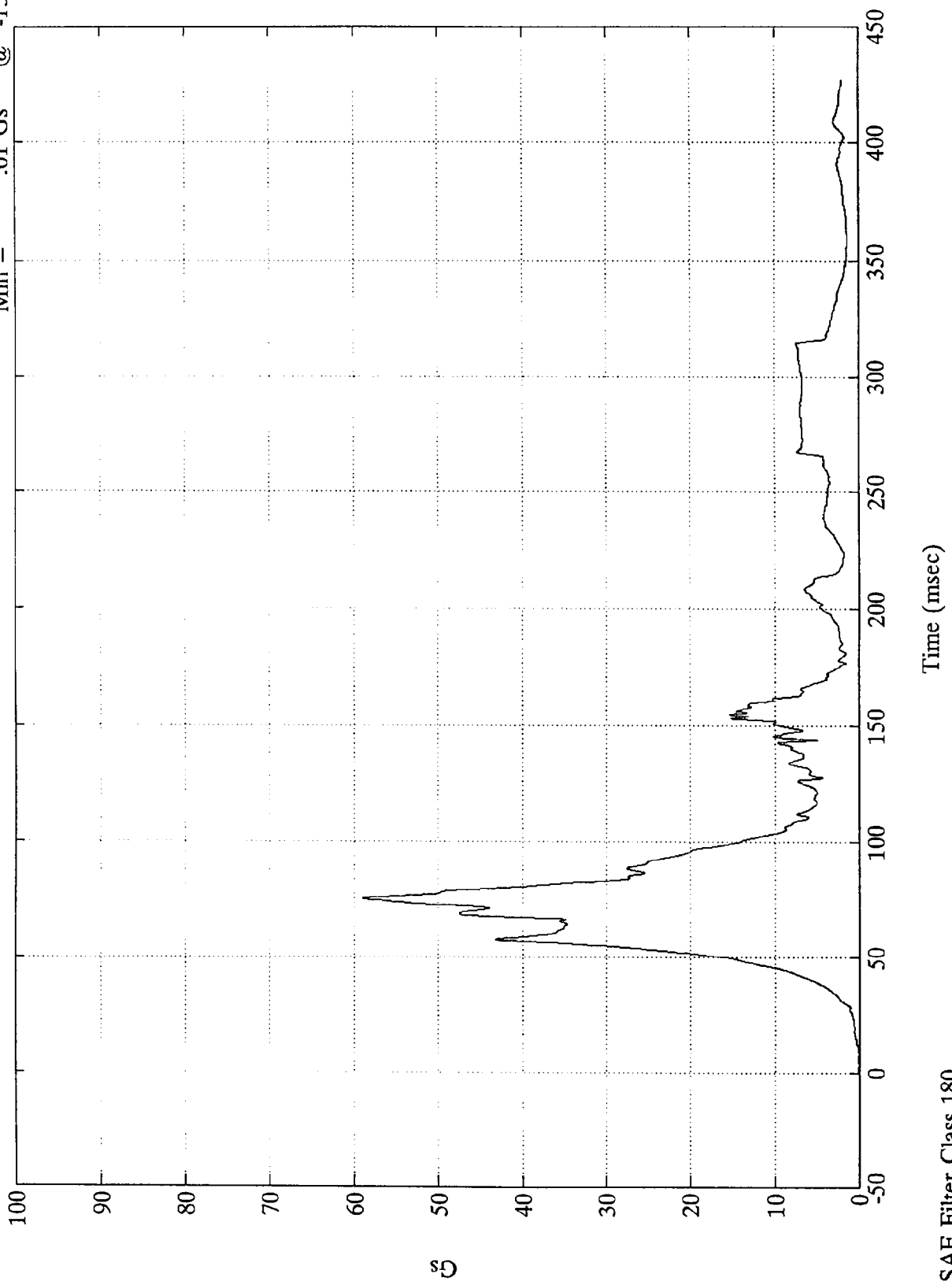
V1-P2 Chest Z



VTV TEST #11

Max = 59.01 Gs @ 75.23 msec
Min = .01 Gs @ -15.60 msec

V1-P2 Chest Resultant

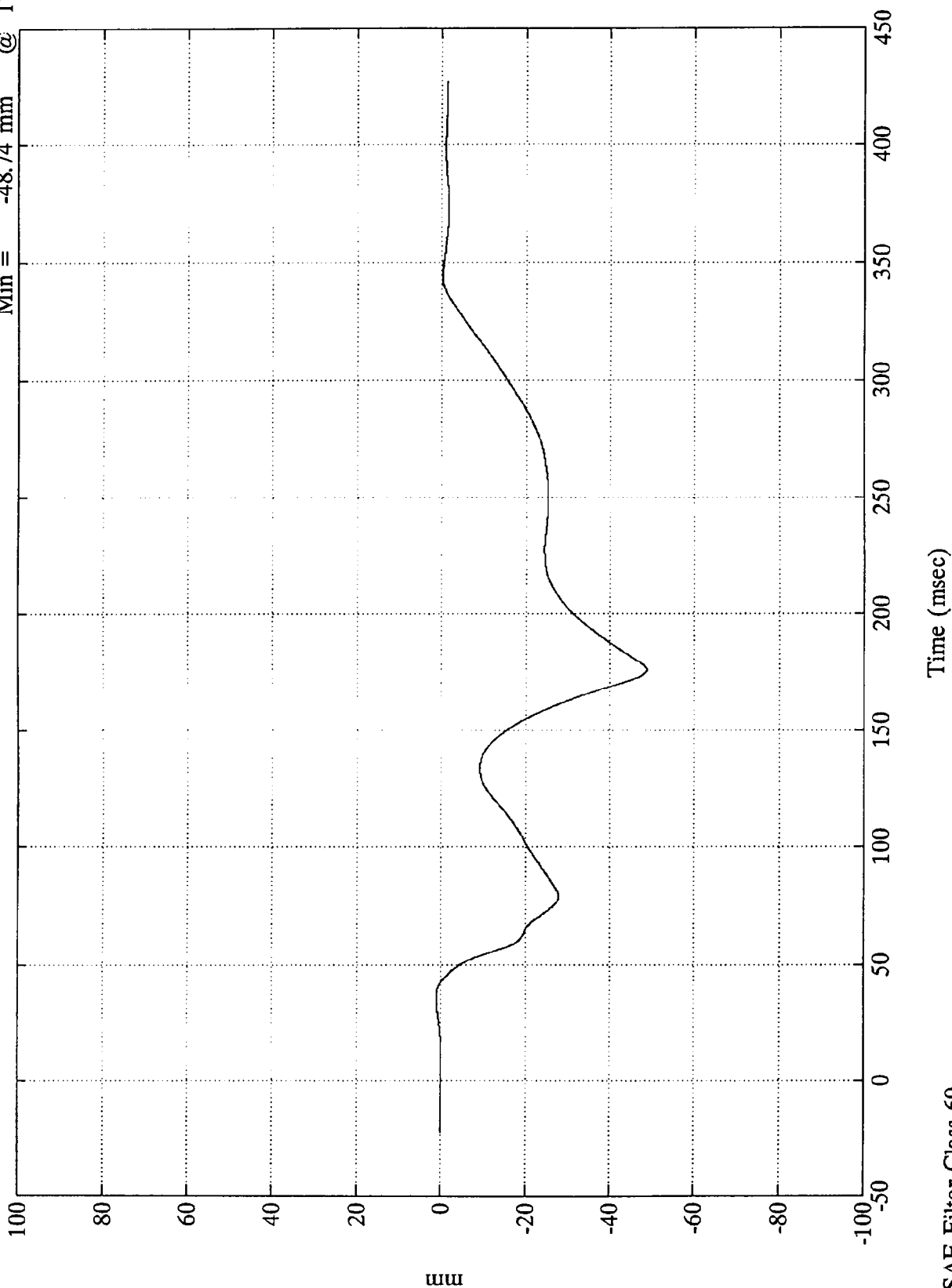


SAE Filter Class 180

VTV TEST #11

V1-P2 Chest Disp.

Max = .98 mm @ 36.12 msec
Min = -48.74 mm @ 176.16 msec

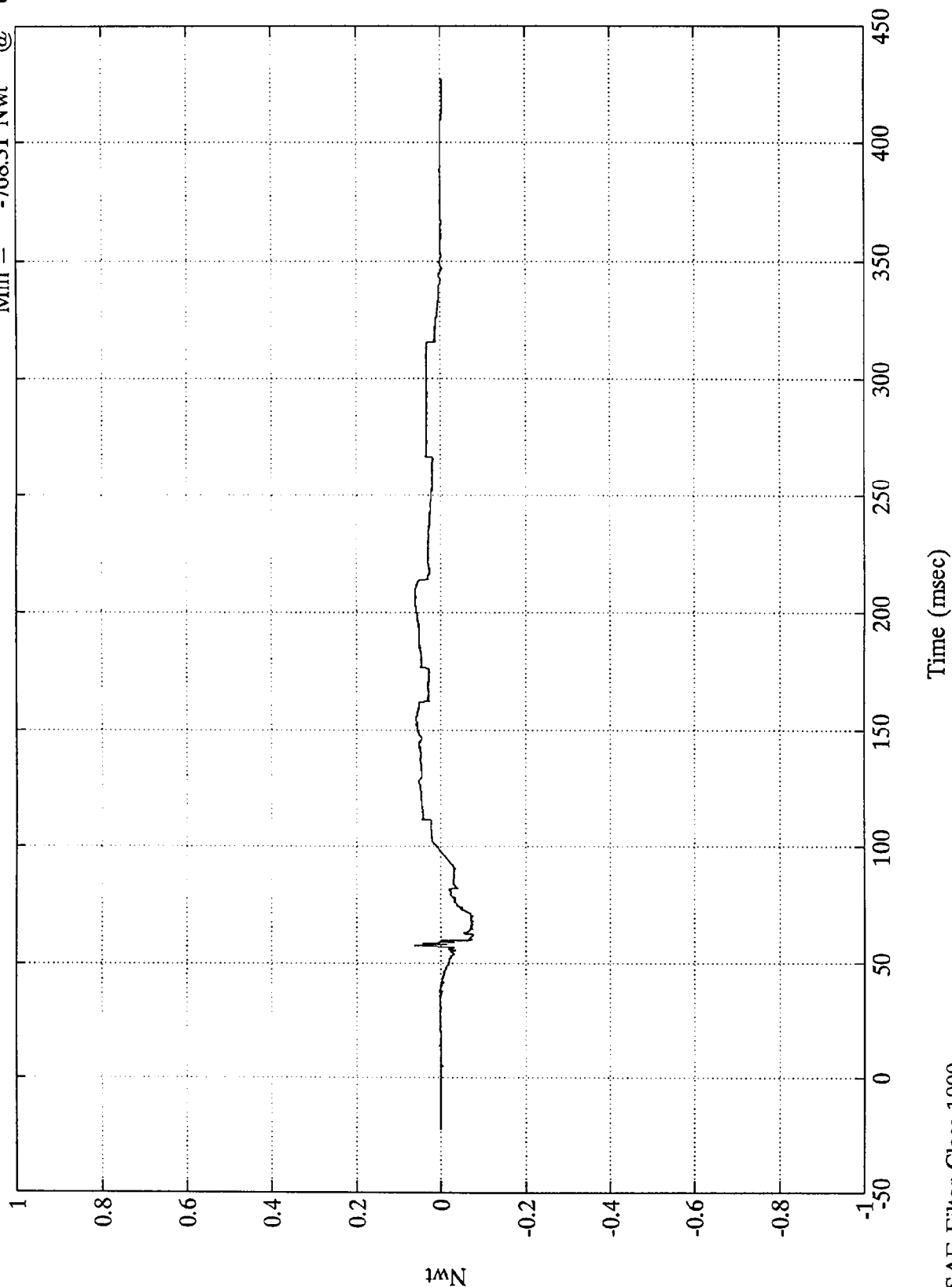


VTV TEST #11

$\times 10^4$

V1-P2 Upper Neck Fx

Max = 635.83 Nwt @ 57.72 msec
Min = -768.31 Nwt @ 68.04 msec



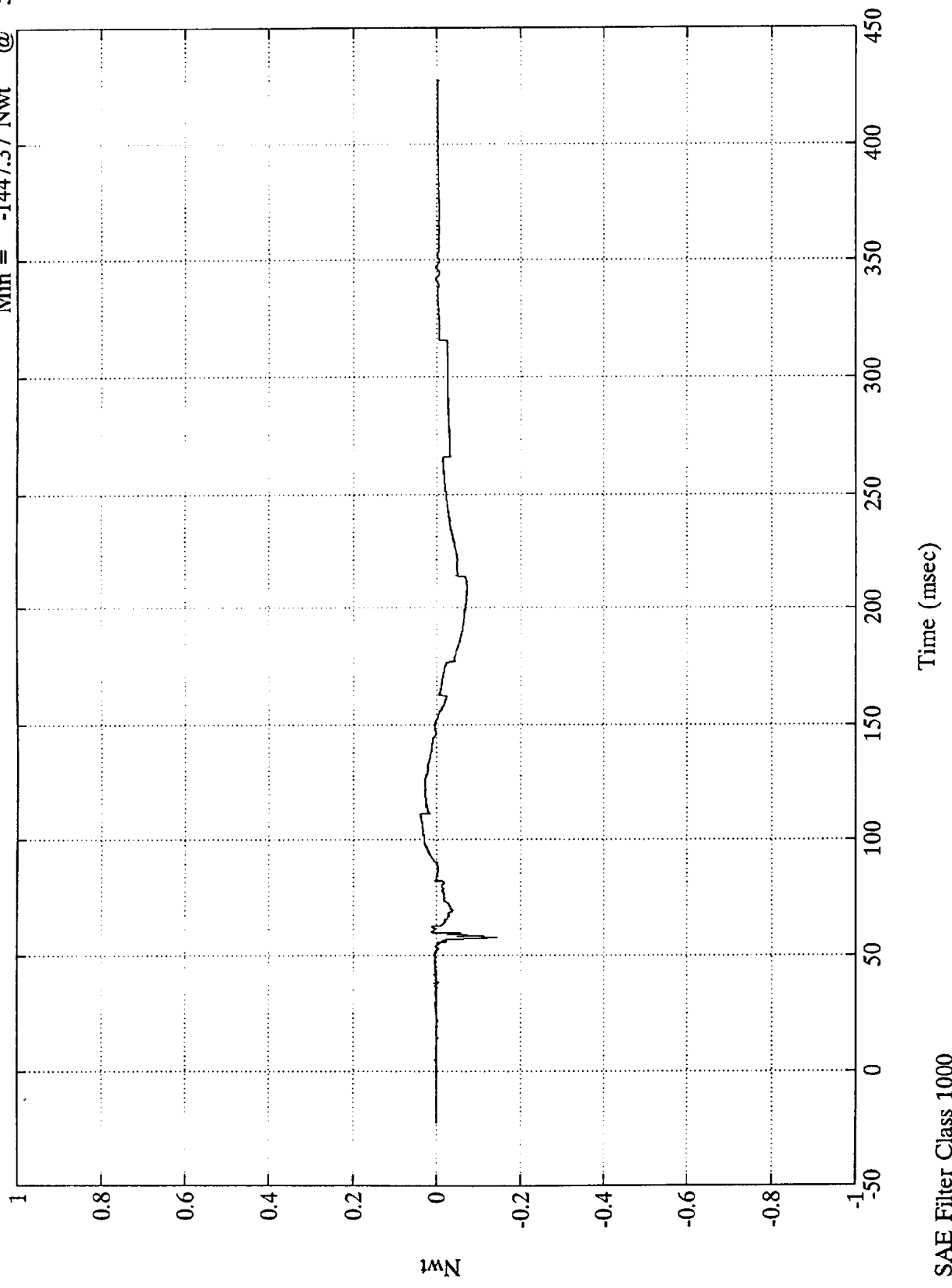
SAE Filter Class 1000

VTV TEST #11

V1-P2 Upper Neck Fy

Max = 396.63 Nwt @ 111.00 msec
Min = -1447.37 Nwt @ 57.72 msec

$\times 10^4$



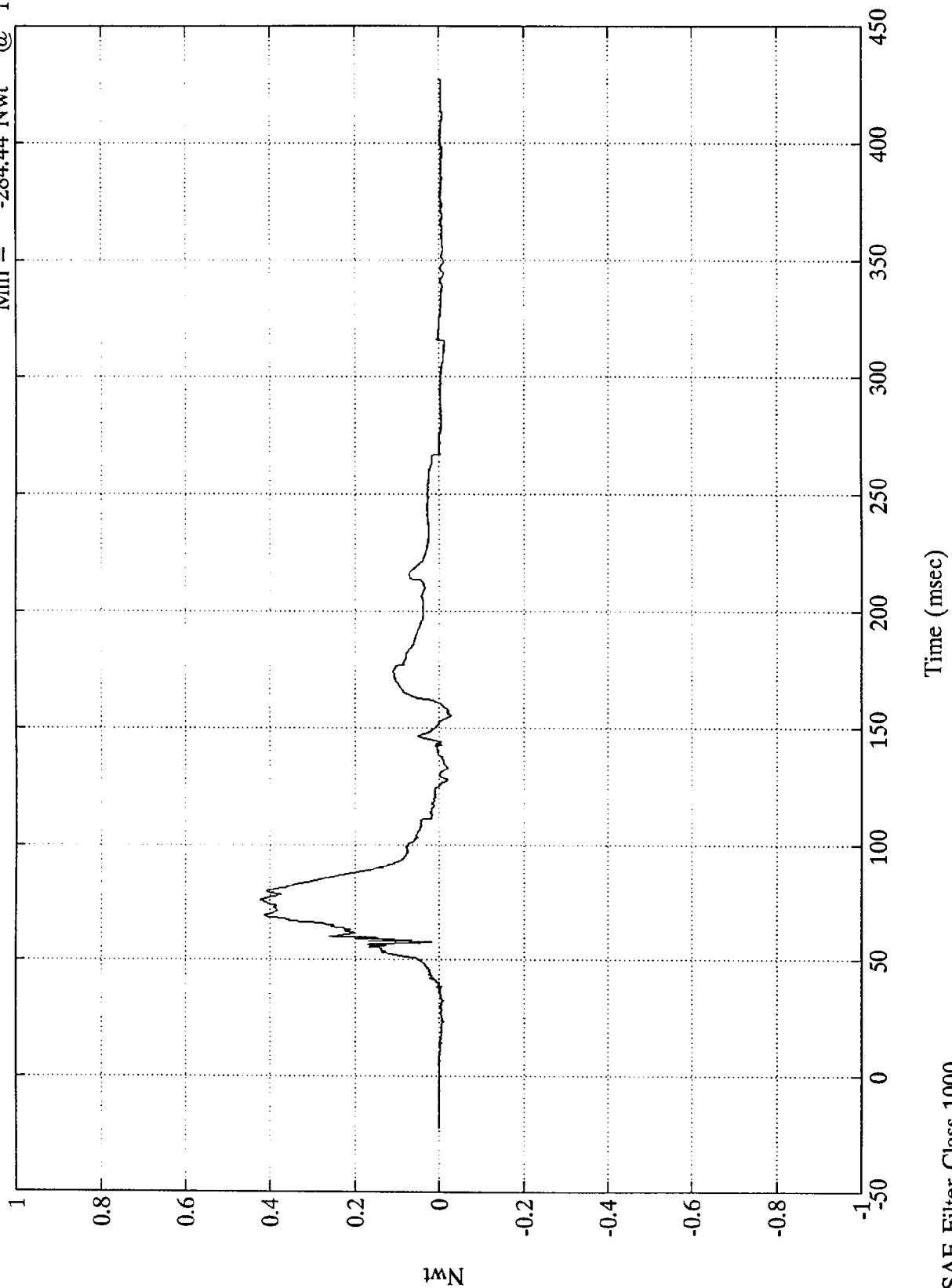
SAE Filter Class 1000

VTV TEST #11

$\times 10^4$

V1-P2 Upper Neck Fz

Max = 4238.50 Nwt @ 75.60 msec
Min = -284.44 Nwt @ 155.16 msec

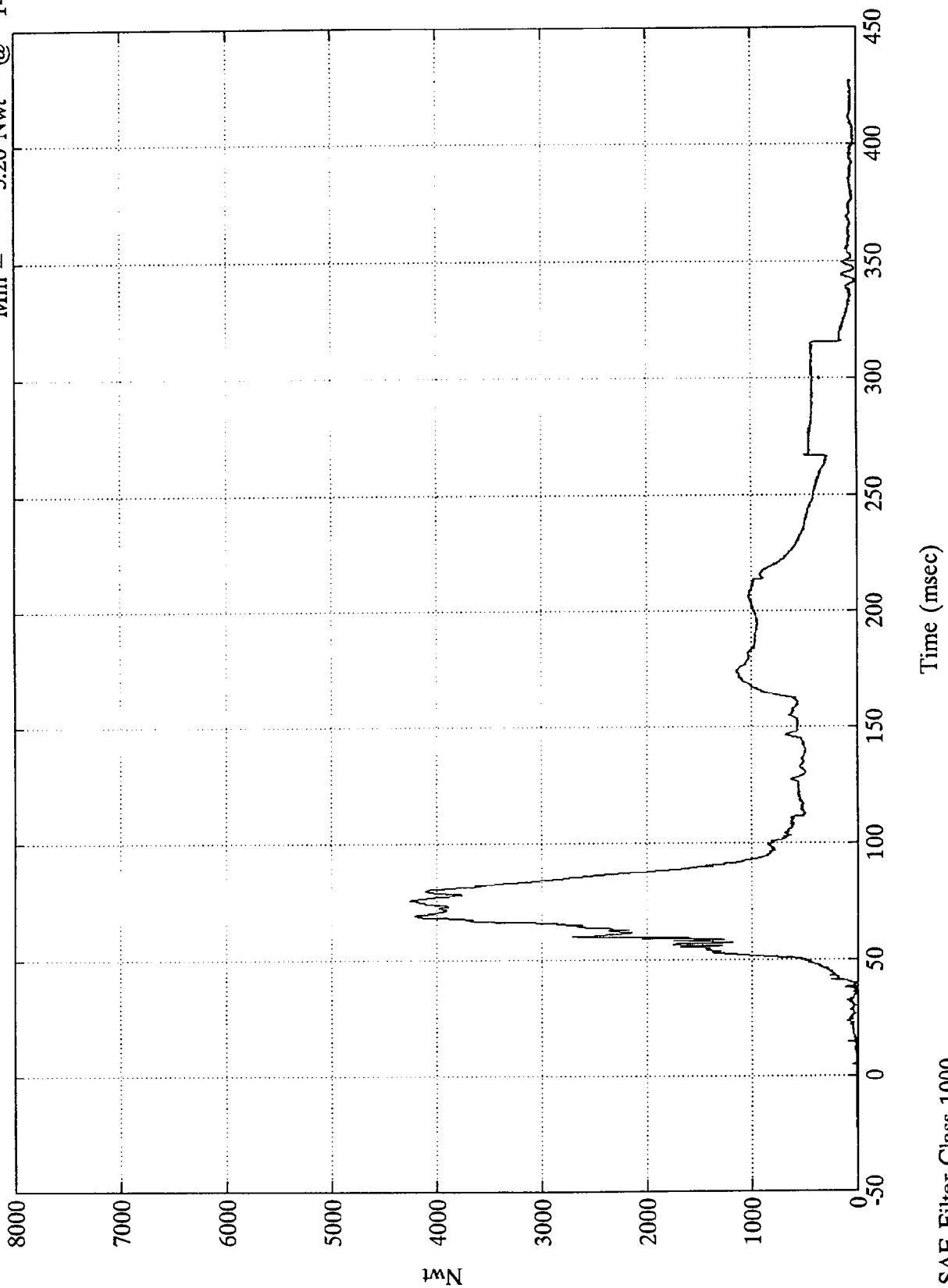


SAE Filter Class 1000

VTV TEST #11

V1-P2 Upper Neck F(res)

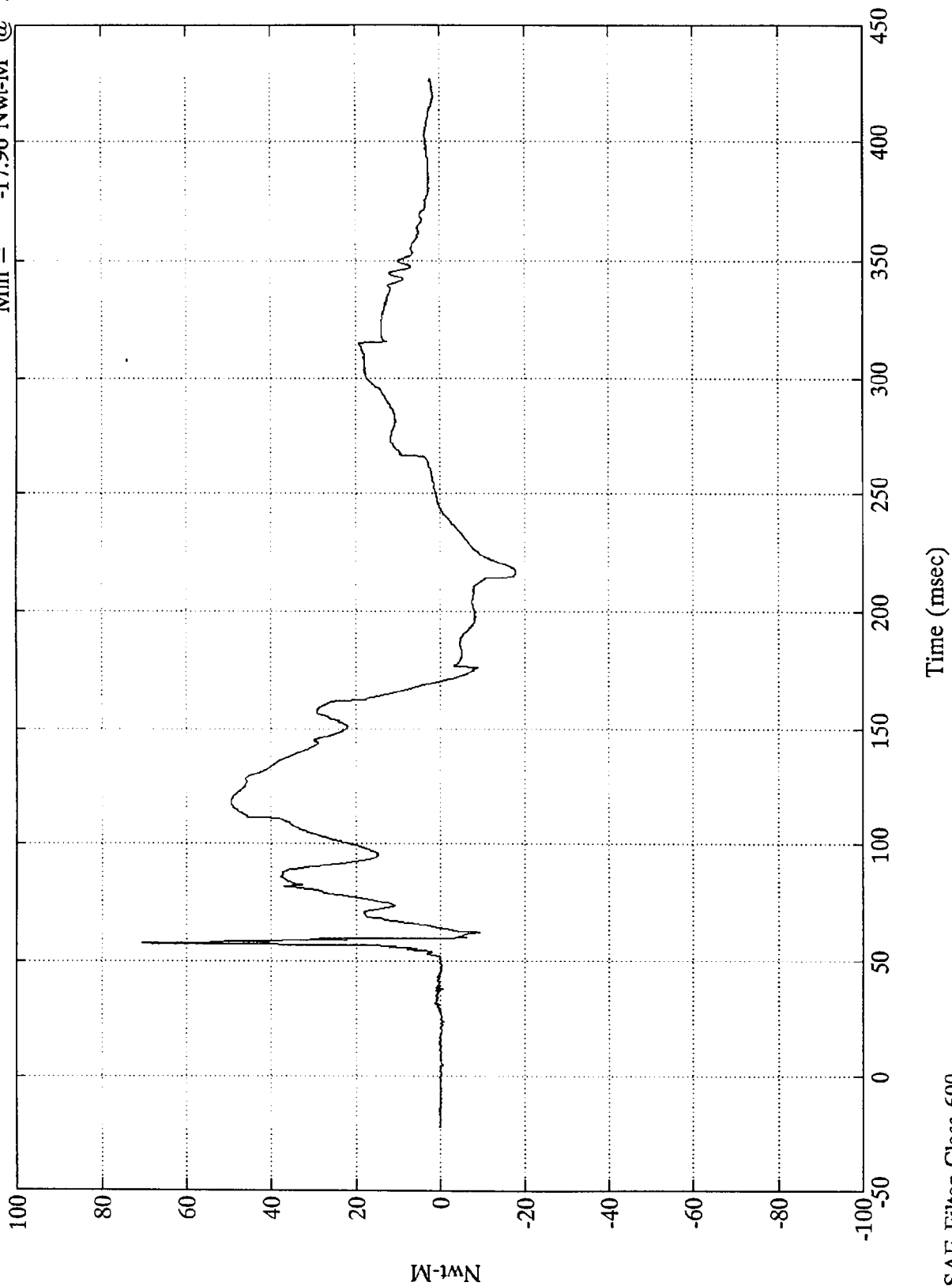
Max = 4258.37 Nwt @ 75.60 msec
Min = 5.20 Nwt @ 14.15 msec



SAE Filter Class 1000

VTV TEST #11

V1-P2 Upper Neck Mx
Max = 70.55 Nwt-M @ 57.60 msec
Min = -17.96 Nwt-M @ 217.20 msec



SAE Filter Class 600

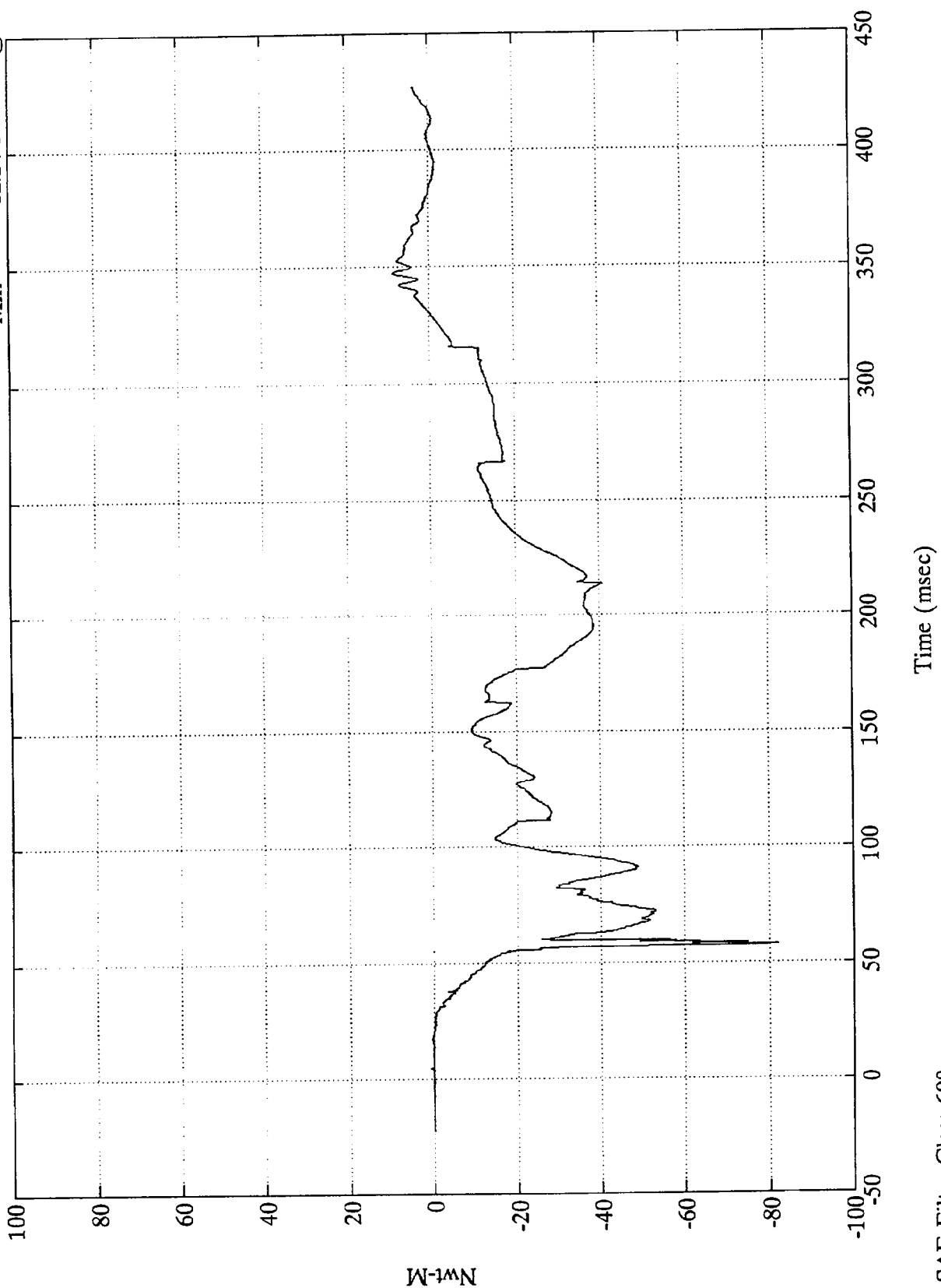
VTV TEST #11

V1-P2 Upper Neck My

Max =
Min =

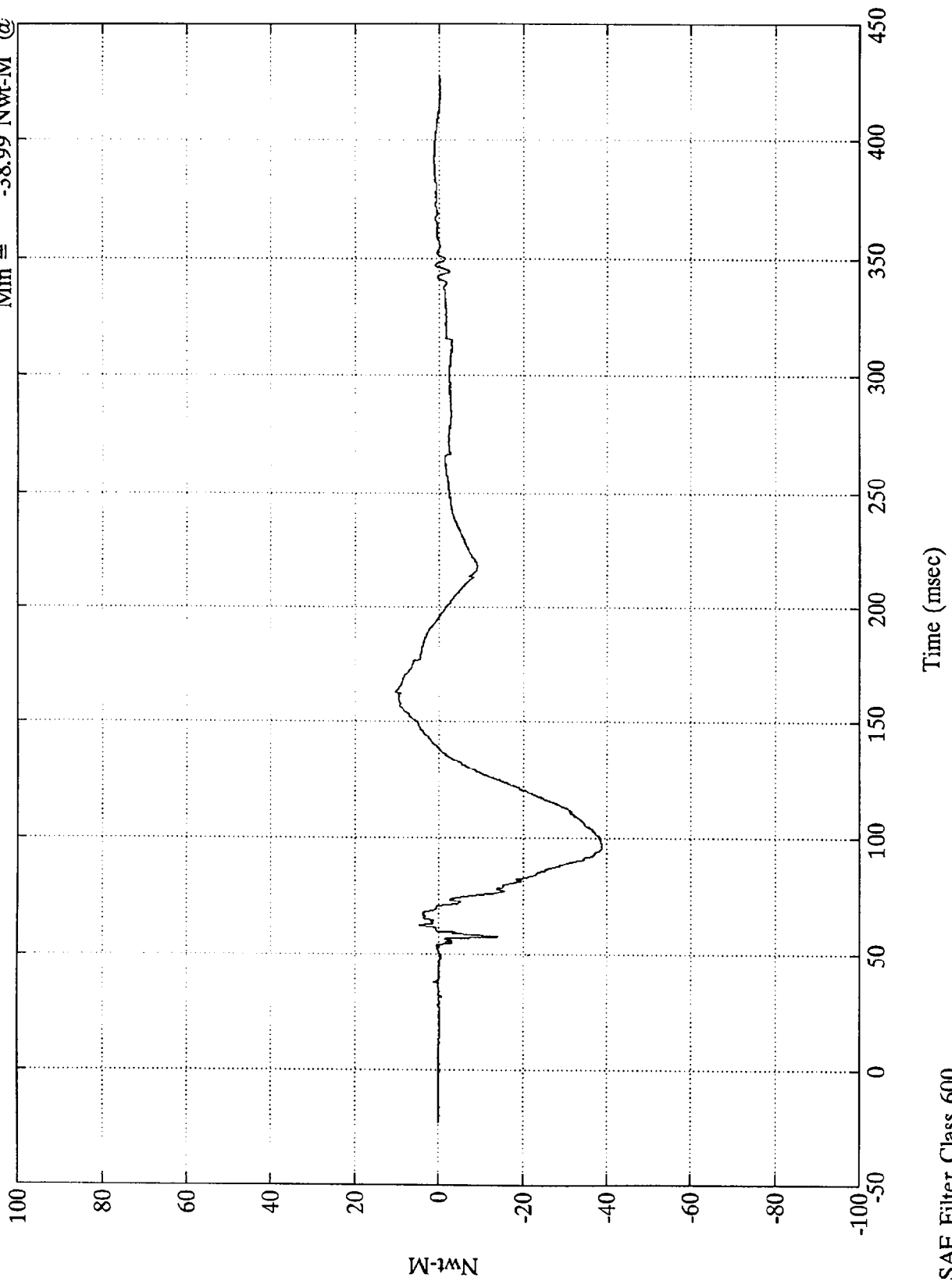
8.72 Nwt-M
-82.14 Nwt-M

@ 347.16 msec
@ 57.72 msec



VTV TEST #11

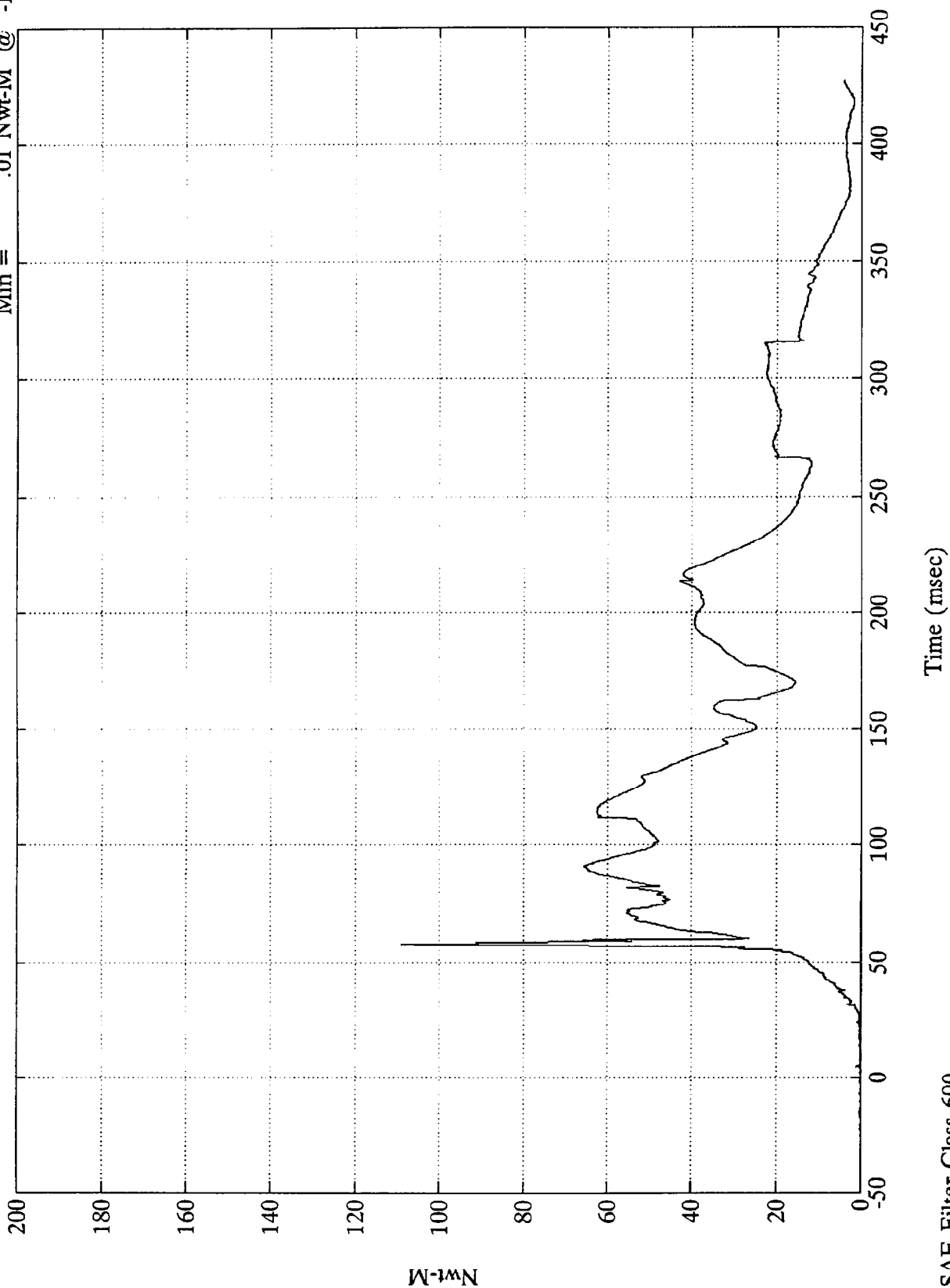
V1-P2 Upper Neck Mz
Max = 10.54 Nwt-M @ 162.60 msec
Min = -38.99 Nwt-M @ 97.44 msec



VTV TEST #11

V1-P2 Upper Neck M(res)

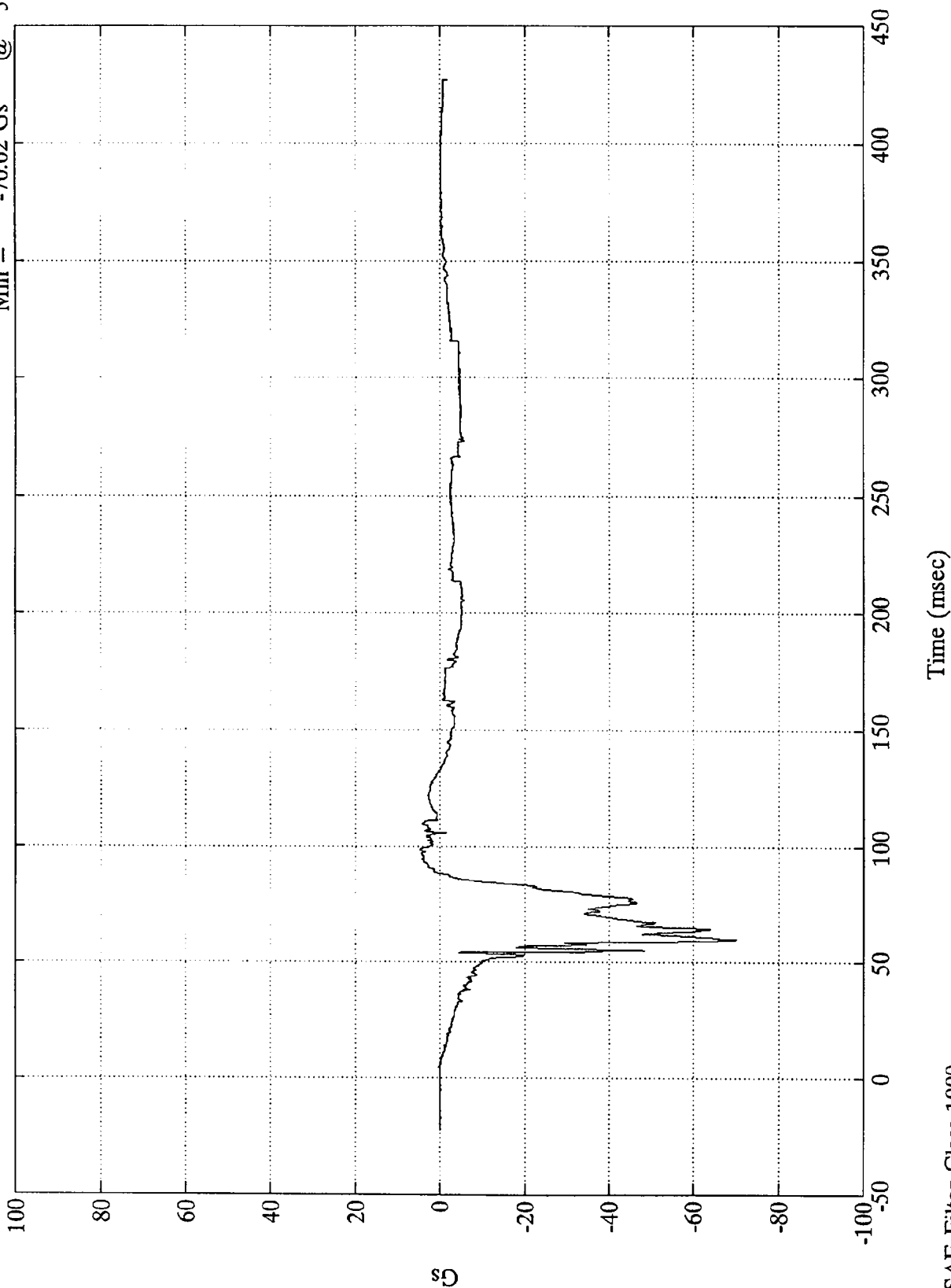
Max = 109.08 Nwt-M @ 57.60 msec
Min = .01 Nwt-M @ -17.76 msec



VTV TEST #11

V1-P2 Pelvic X

Max = 4.70 Gs @ 99.12 msec
Min = -70.02 Gs @ 59.52 msec

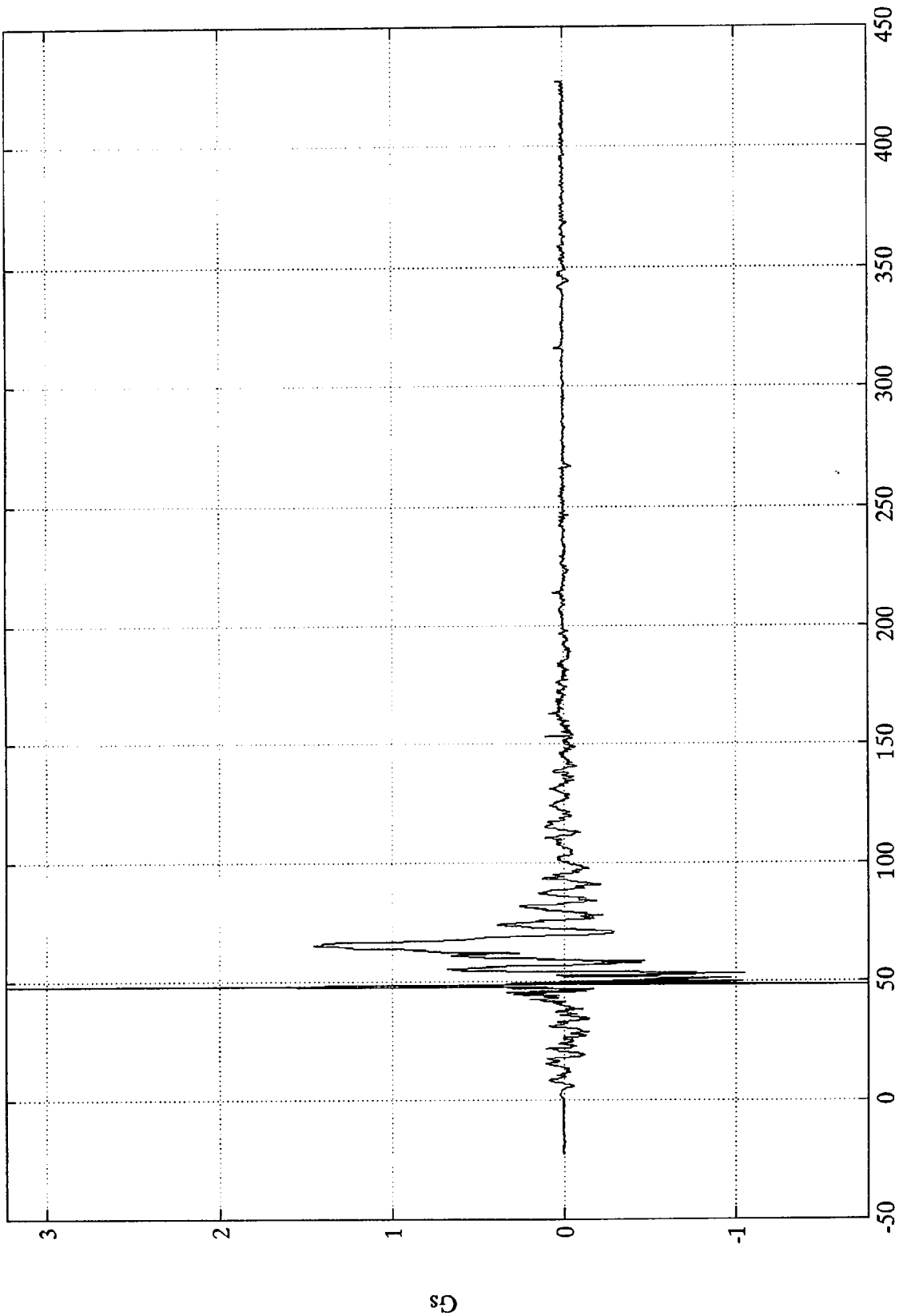


VTV TEST #11

$\times 10^5$

V1-P2 Pelvic Y

Max = 323299.16 Gs @ 48.00 msec
Min = -176376.83 Gs @ 48.36 msec



Time (msec)

Data not accurate, channel did not calibrate properly

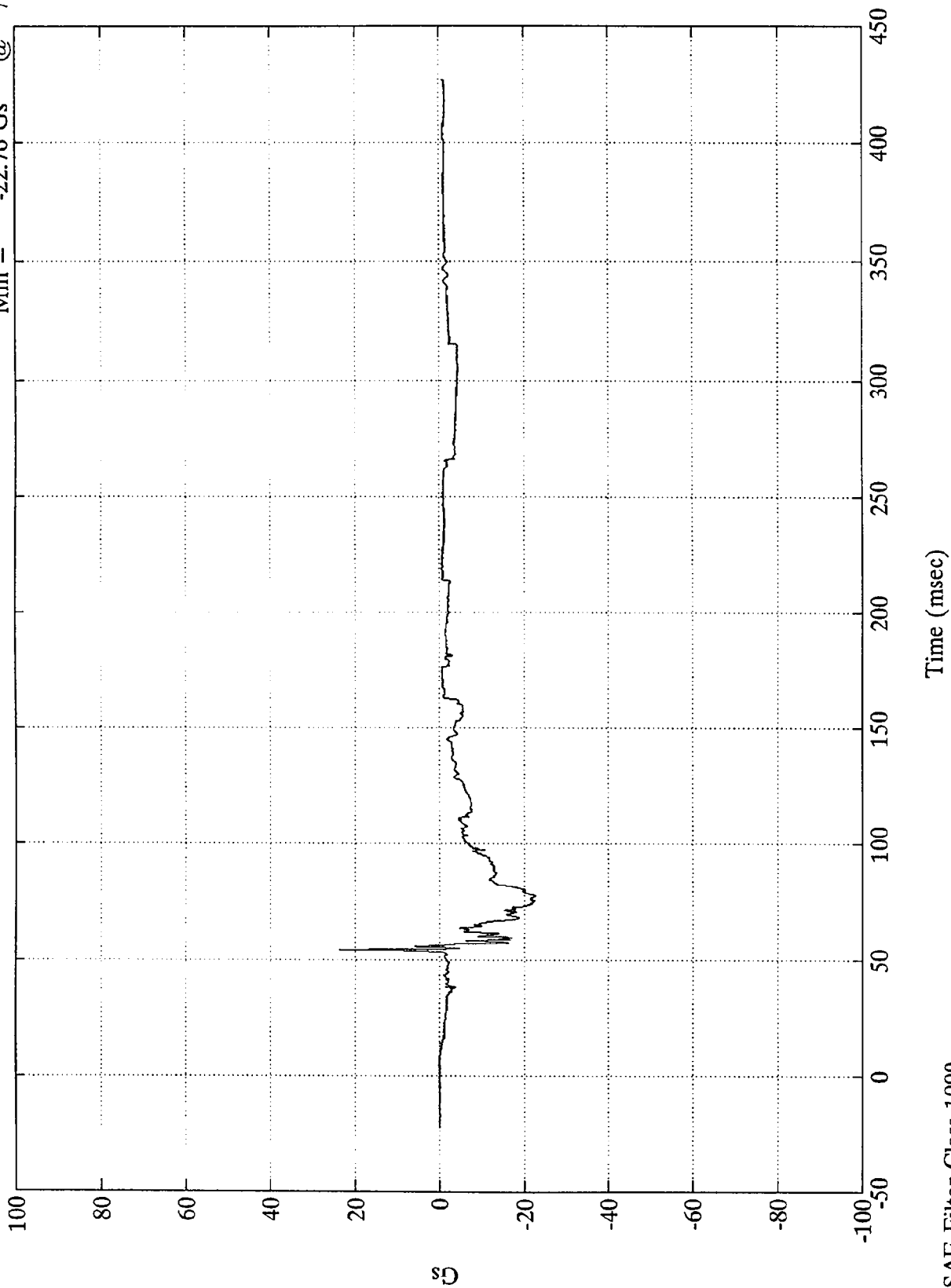
SAE Filter Class 1000

Gs

VTV TEST #11

Max = 23.68 Gs @ 54.11 msec
Min = -22.76 Gs @ 77.40 msec

V1-P2 Pelvic Z



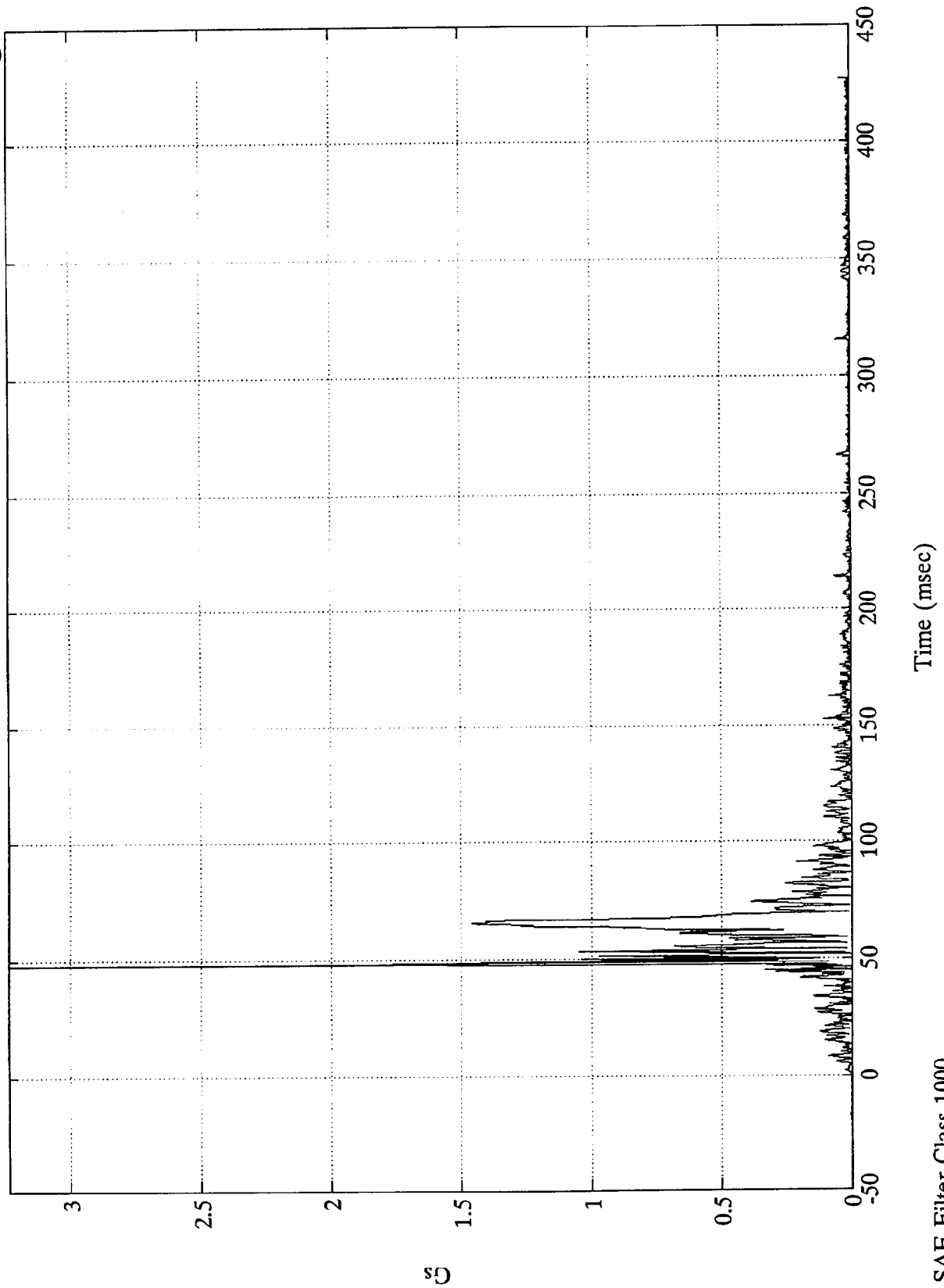
SAE Filter Class 1000

VTV TEST #11

$\times 10^5$

V1-P2 Pelvic Res.

Max = 323299.16 Gs @ 48.00 msec
Min = 70.05 Gs @ 0.47 msec



SAE Filter Class 1000

Gs

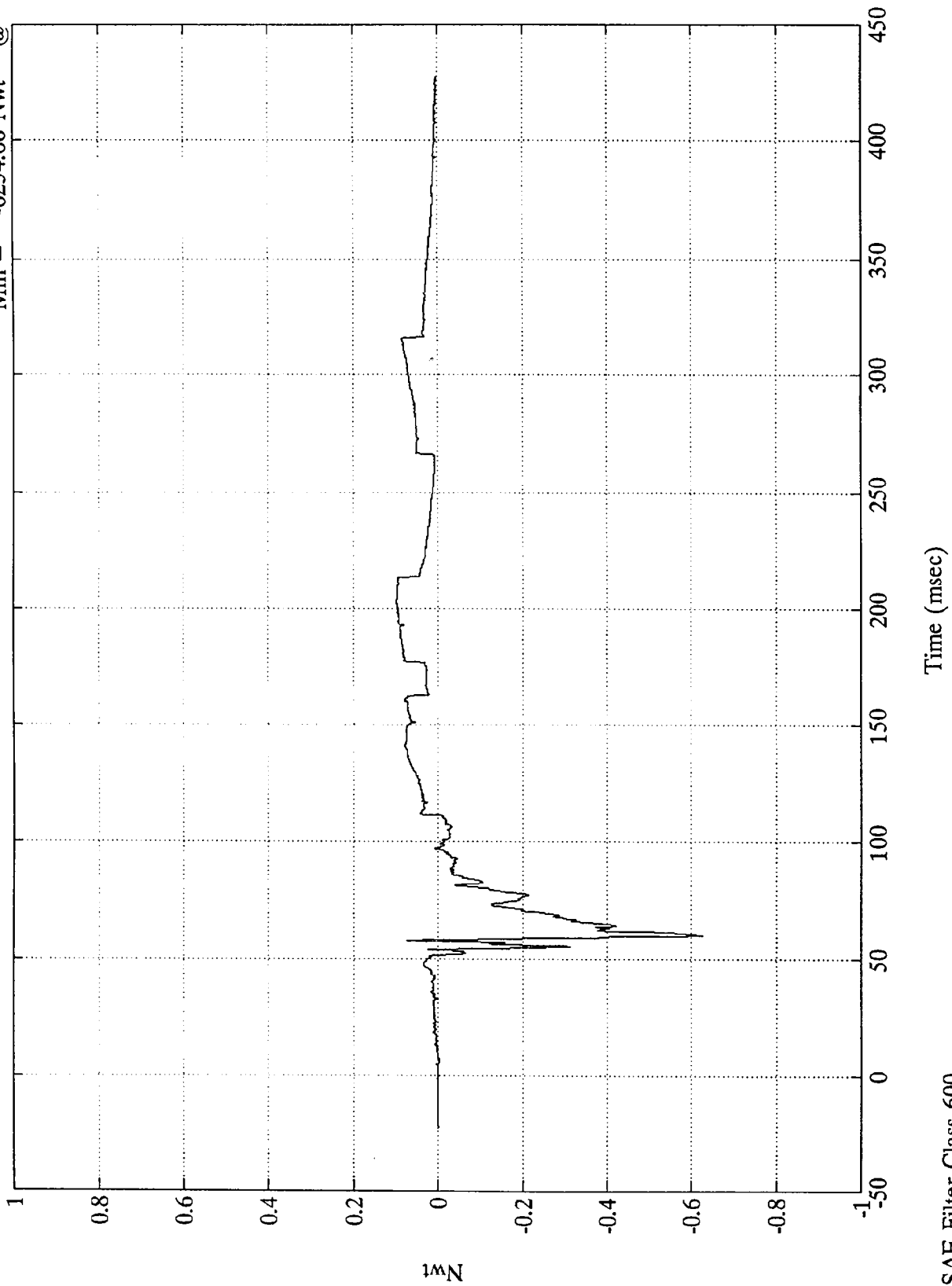
Time (msec)

VTV TEST #11

$\times 10^4$

V1-P2 Left Femur

Max = 982.08 Nwt @ 203.64 msec
Min = -6254.66 Nwt @ 60.12 msec



SAE Filter Class 600

VTV TEST #11

$\times 10^4$

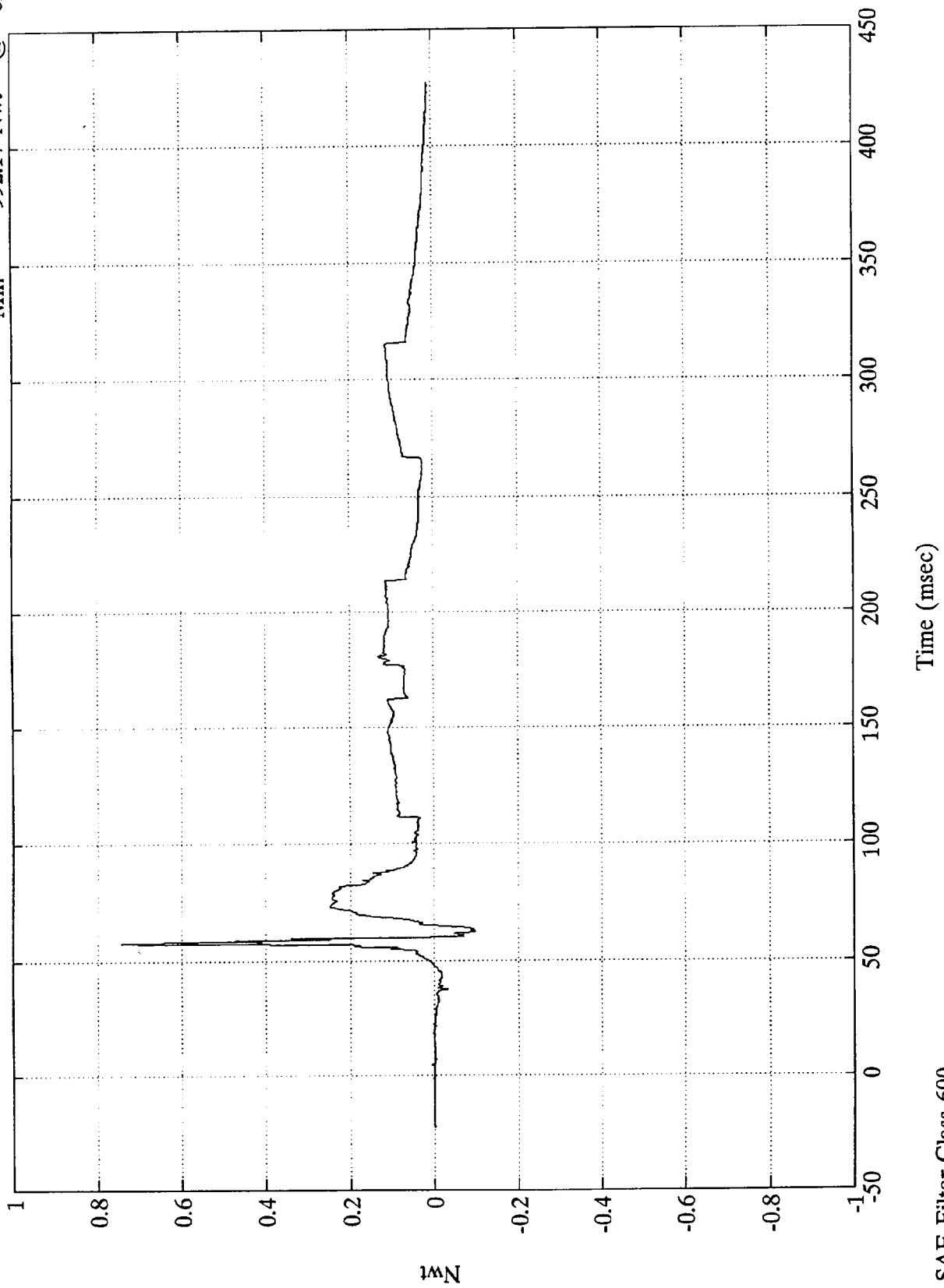
V1-P2 Right Femur

Max =
Min =

7426.35 Nwt
-992.17 Nwt

@
@

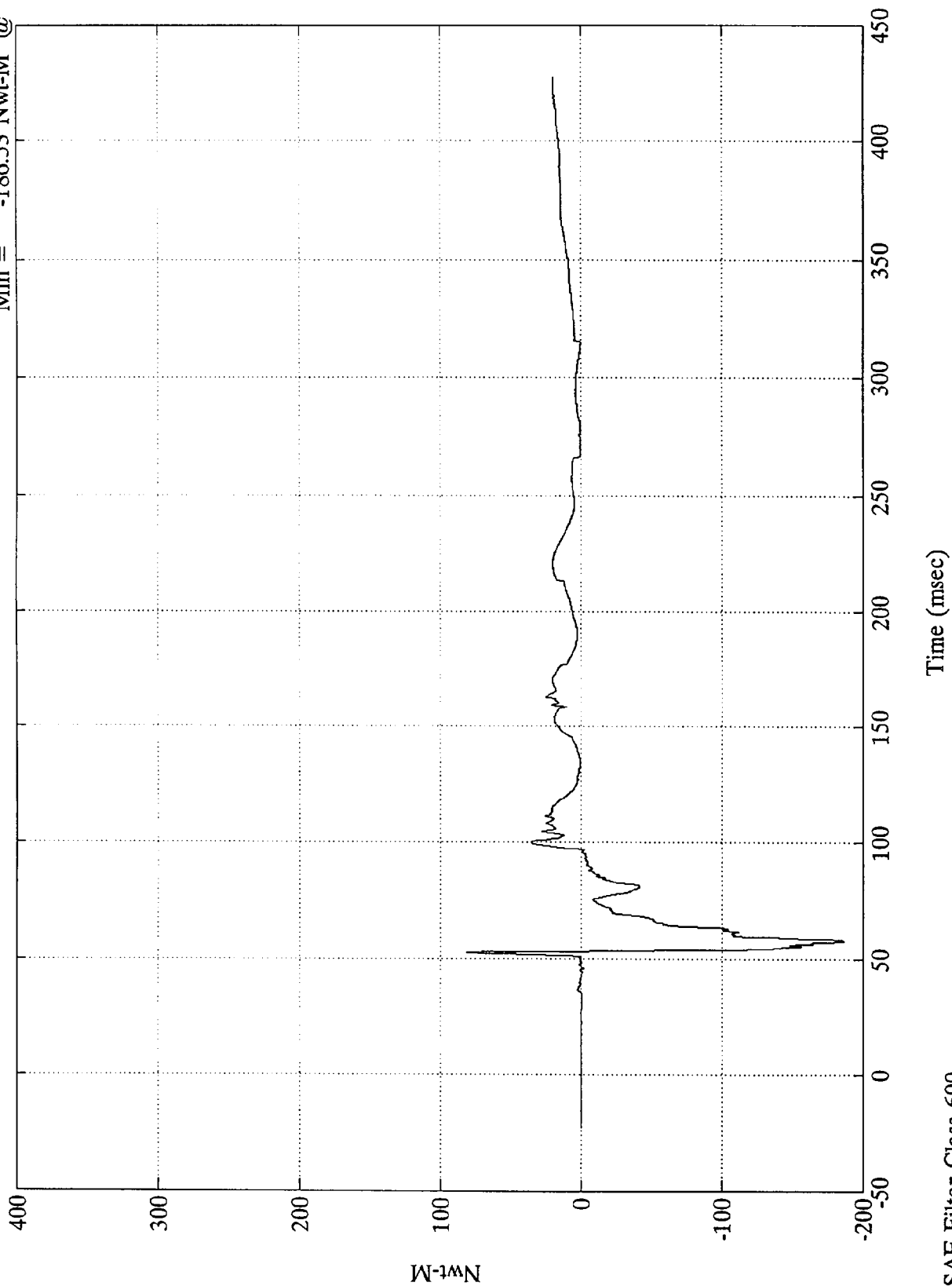
57.72 msec
62.28 msec



VTV TEST #11

V1-P2 Lt Upper Tibia Mx

Max = 81.39 Nwt-M @ 52.79 msec
Min = -186.53 Nwt-M @ 57.84 msec

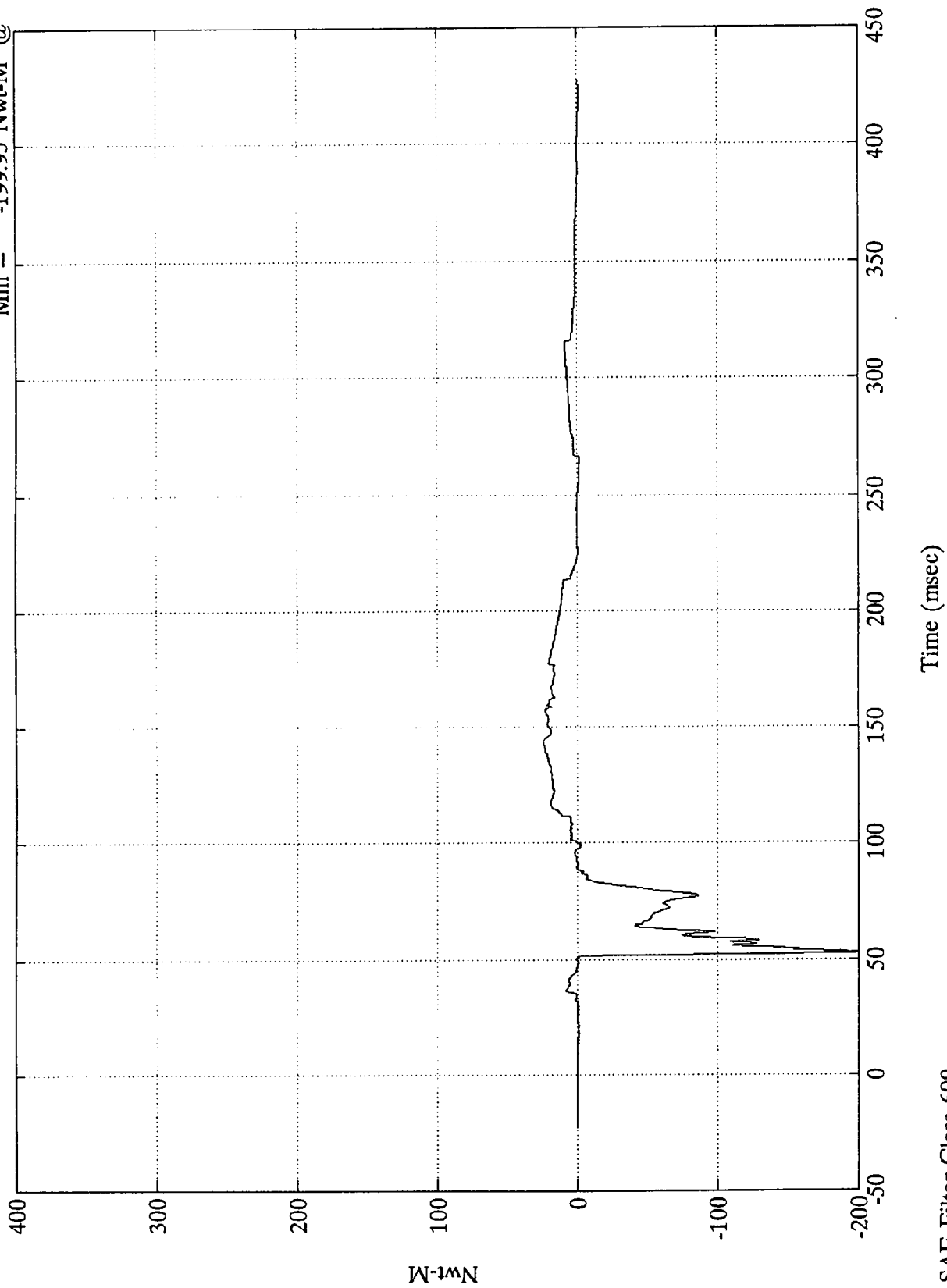


SAE Filter Class 600

VTV TEST #11

V1-P2 Lt Upper Tibia My

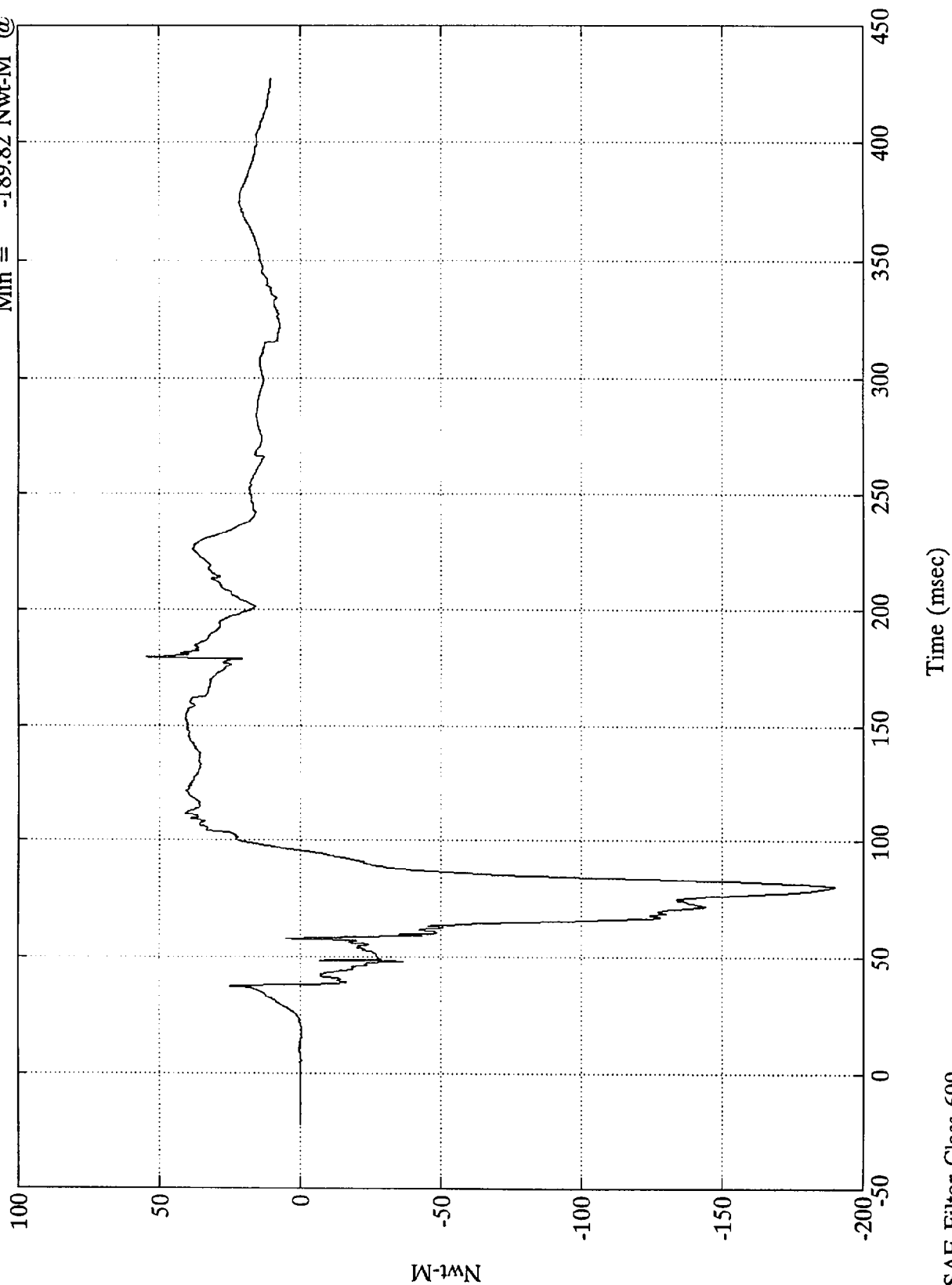
Max = 24.33 Nwt-M @ 143.16 msec
Min = -199.95 Nwt-M @ 53.04 msec



SAE Filter Class 600

VTV TEST #11

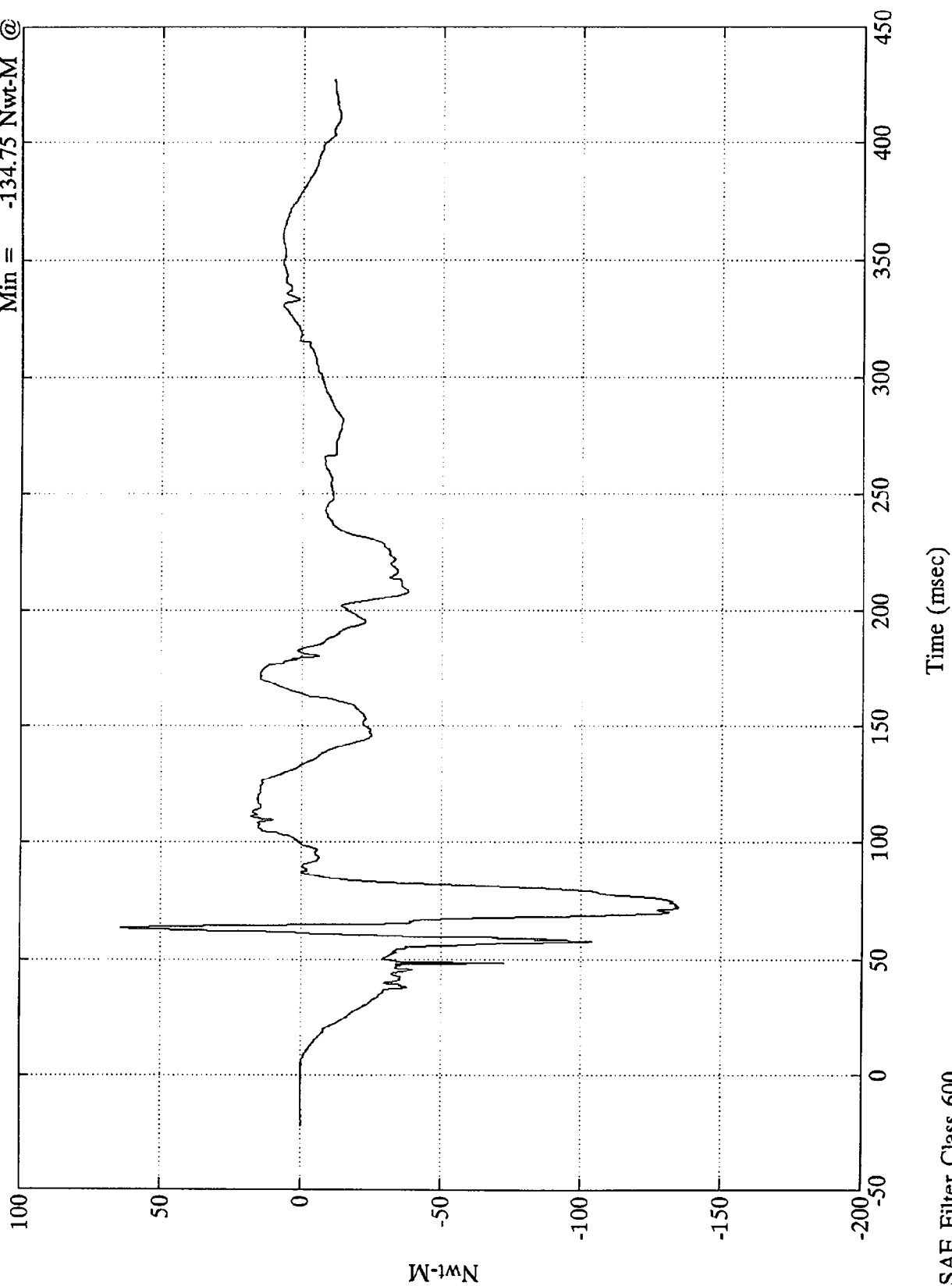
V1-P2 Rt Upper Tibia Mx
Max = 54.60 Nwt-M @ 179.76 msec
Min = -189.82 Nwt-M @ 79.91 msec



VTV TEST #11

V1-P2 Rt Upper Tibia My

Max = 64.61 Nwt-M @ 63.48 msec
Min = -134.75 Nwt-M @ 72.24 msec



SAE Filter Class 600

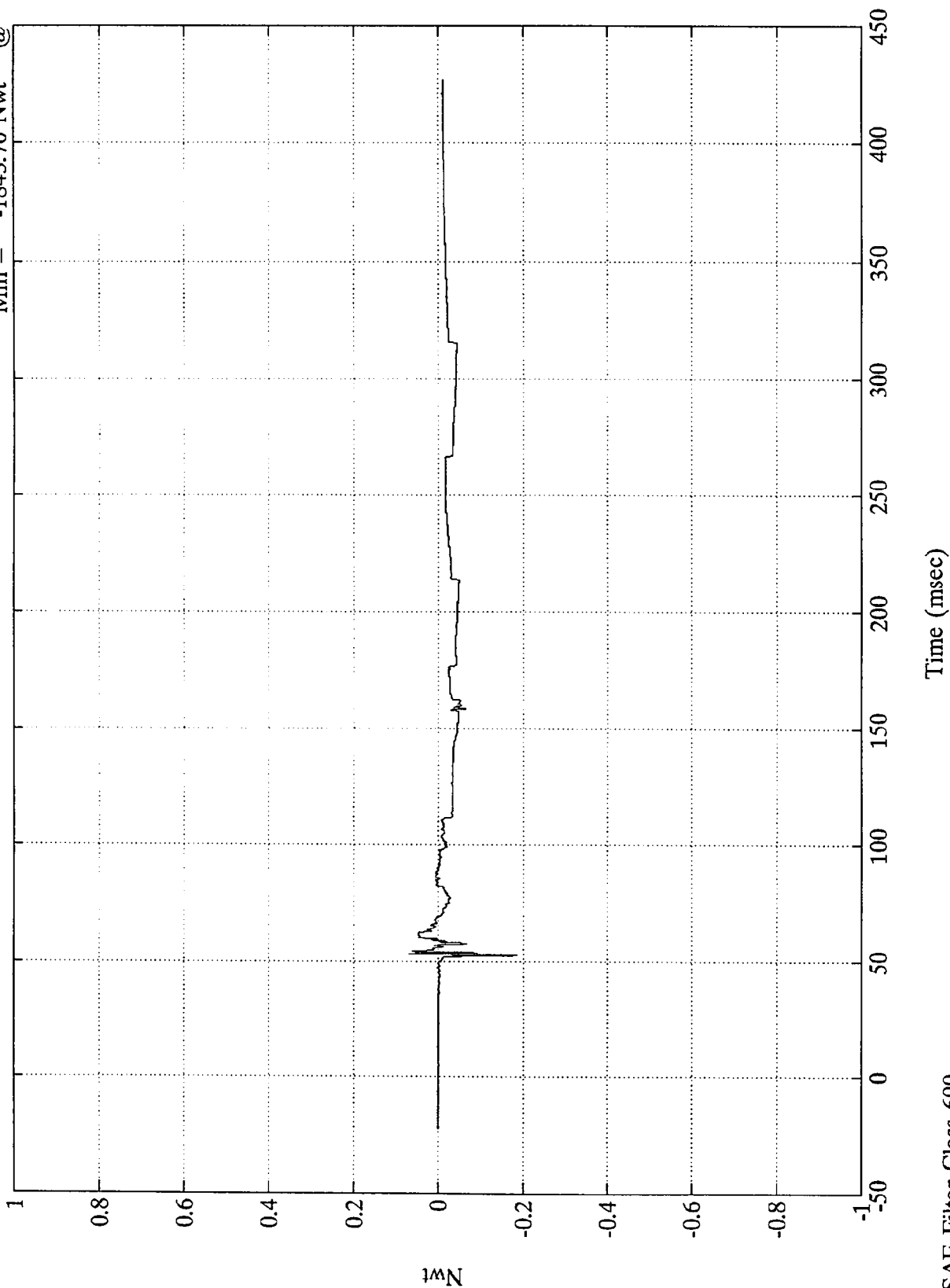
VTV TEST #11

$\times 10^4$

V1-P2 Lt Lower Tibia Fy

Max = 685.43 Nwt @
Min = -1843.70 Nwt @

53.27 msec
52.68 msec



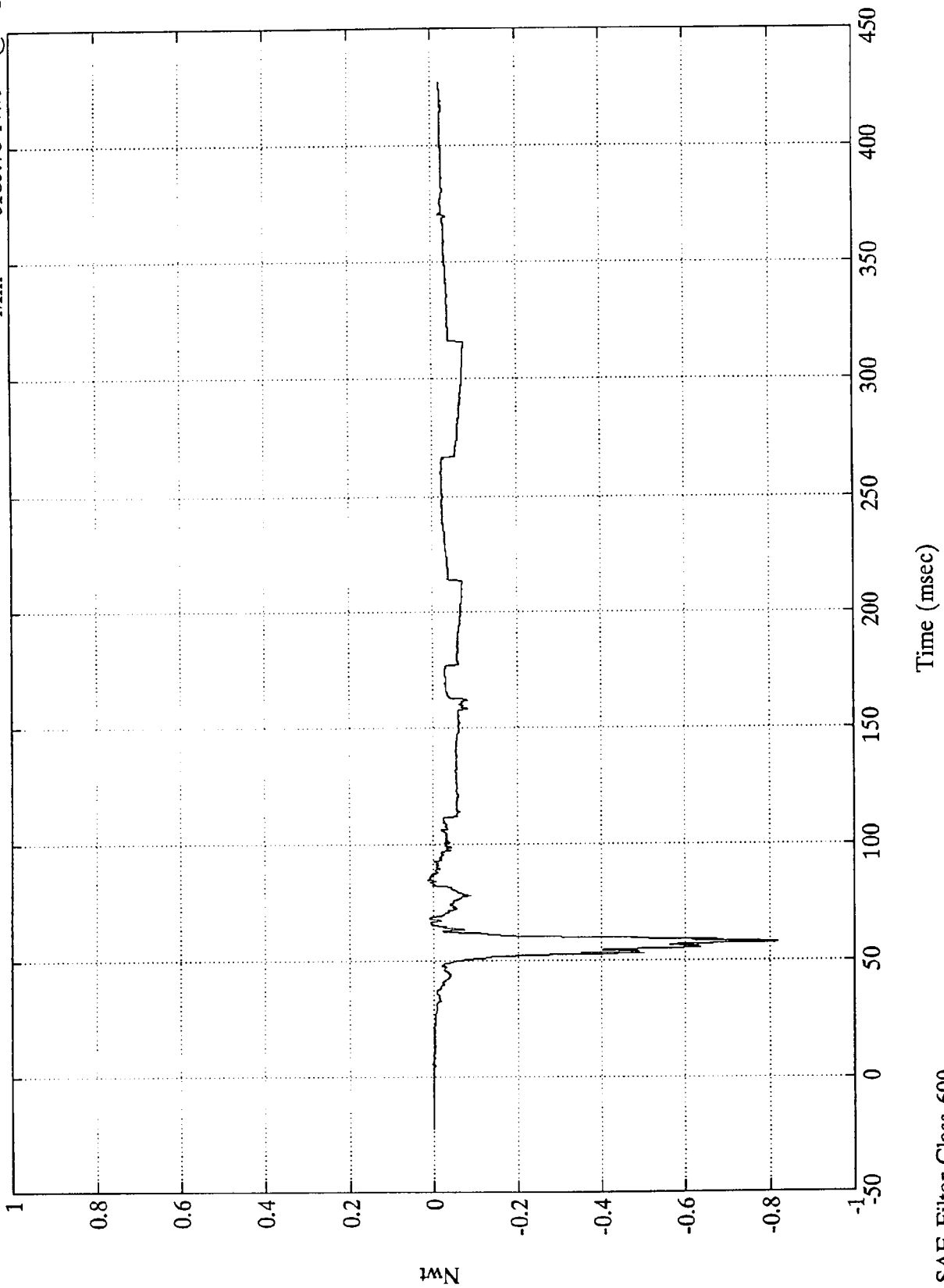
SAE Filter Class 600

VTV TEST #11

$\times 10^4$

V1-P2 Lt Lower Tibia Fz

Max = 138.58 Nwt @ 84.95 msec
Min = -8183.70 Nwt @ 57.72 msec

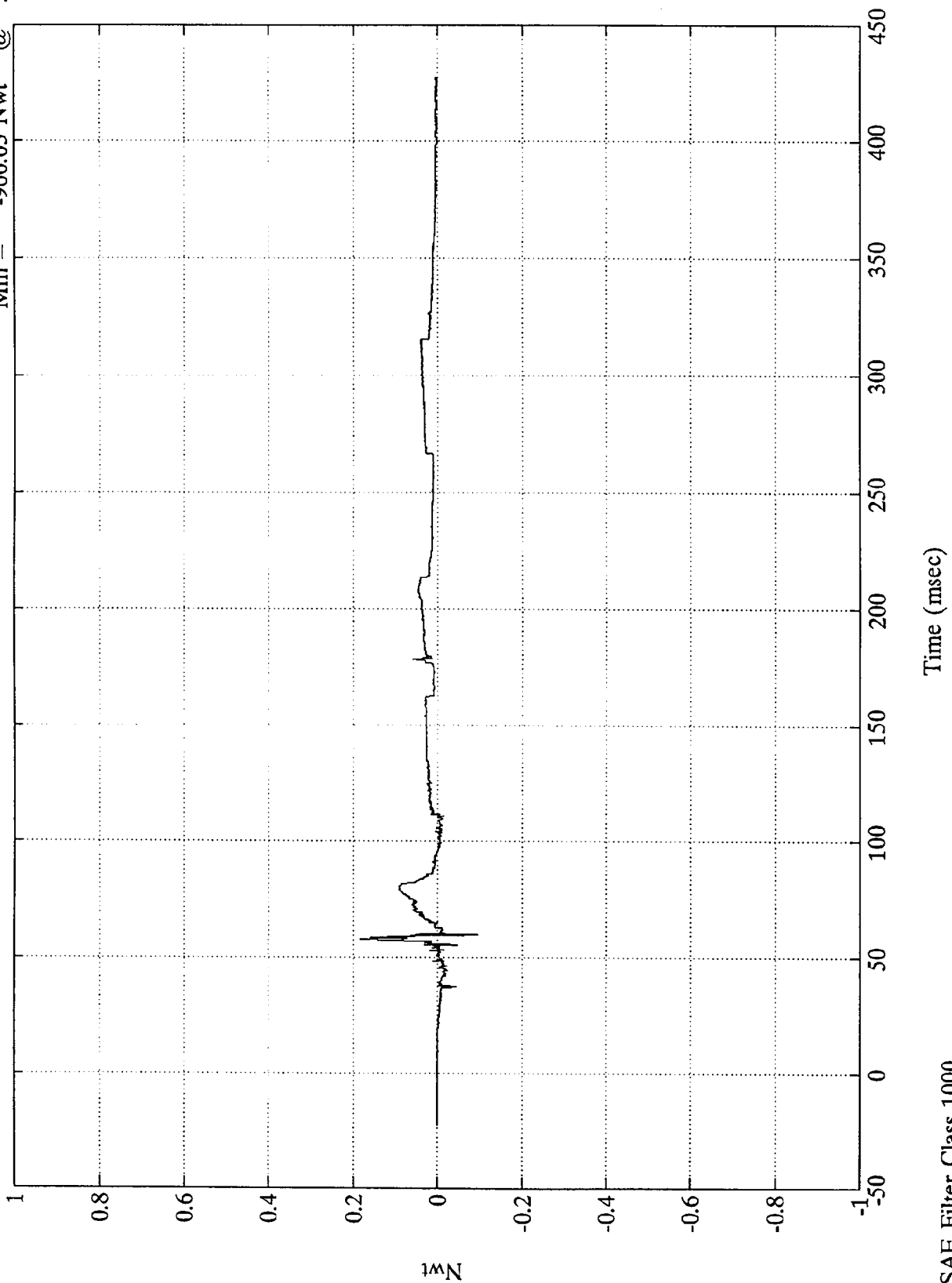


VTV TEST #11

$\times 10^4$

V1-P2 Rt Lower Tibia Fy

Max = 1831.50 Nwt @ 57.84 msec
Min = -960.03 Nwt @ 59.76 msec

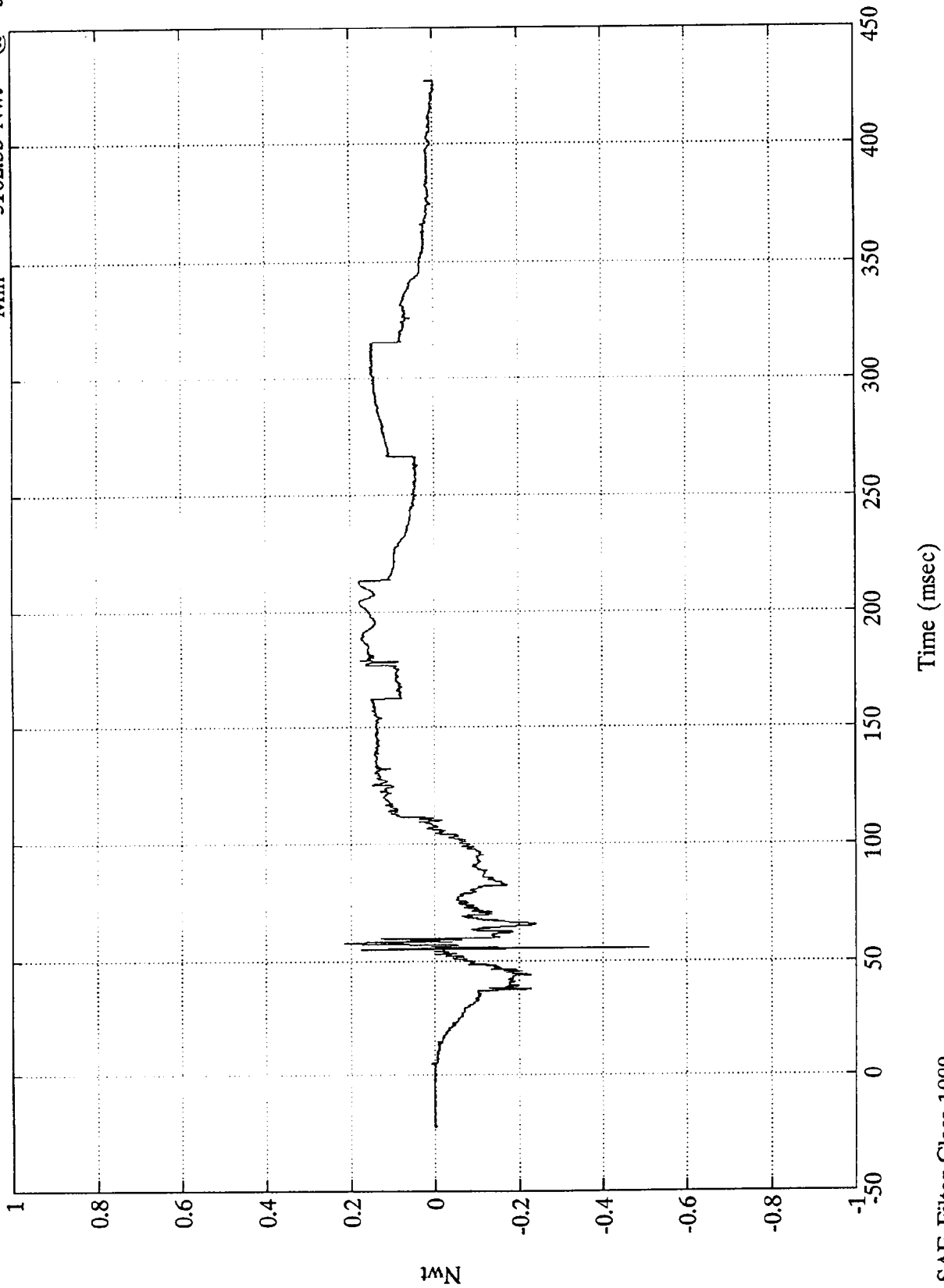


SAE Filter Class 1000

VTV TEST #11
x10⁴

V1-P2 Rt Lower Tibia Fz

Max = 2158.49 Nwt @ 57.84 msec
Min = -5102.33 Nwt @ 55.08 msec

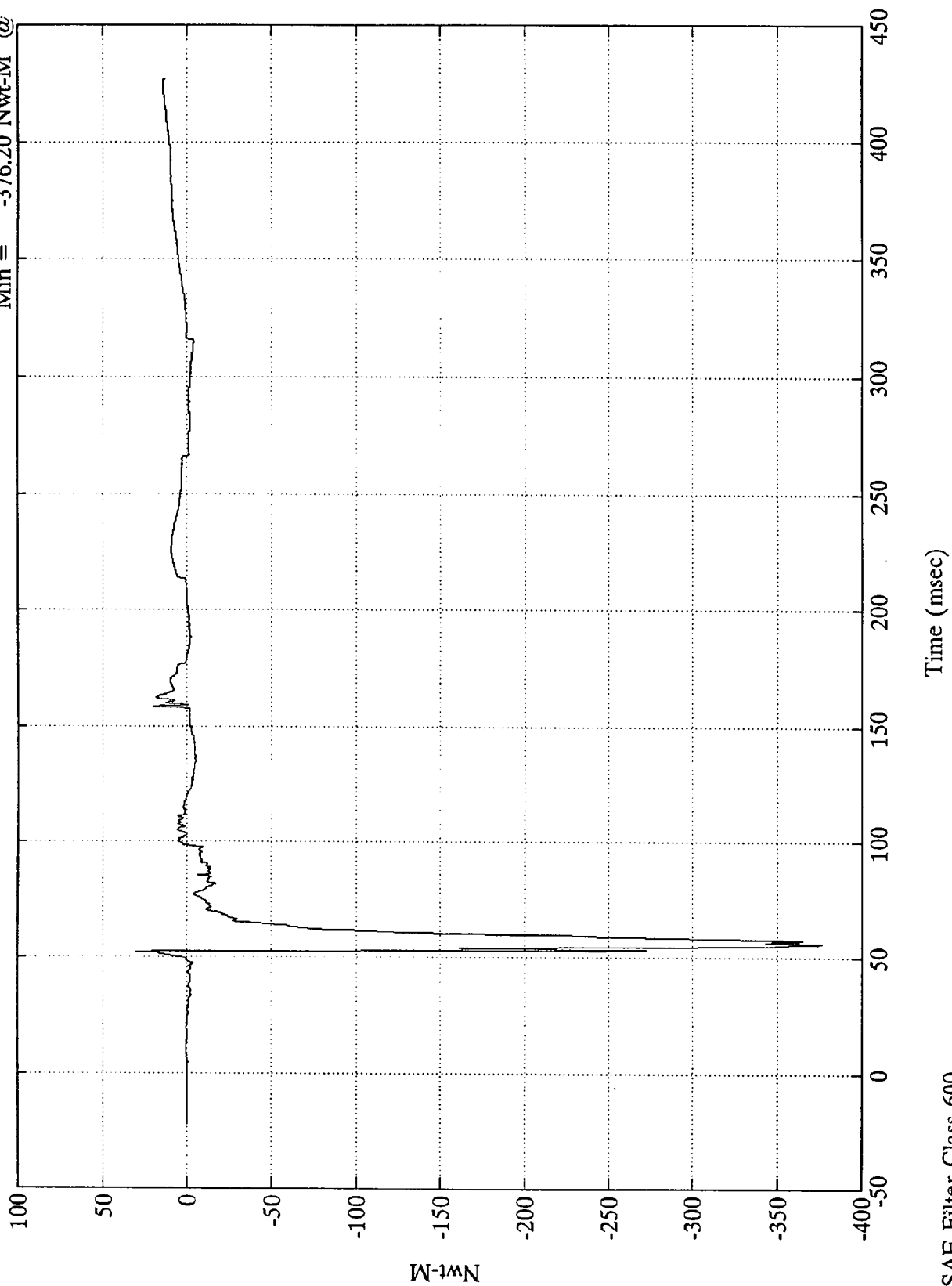


SAE Filter Class 1000

VTV TEST #11

V1-P2 Lt Lower Tibia Mx

Max = 29.98 Nwt-M @ 52.08 msec
Min = -376.20 Nwt-M @ 55.92 msec

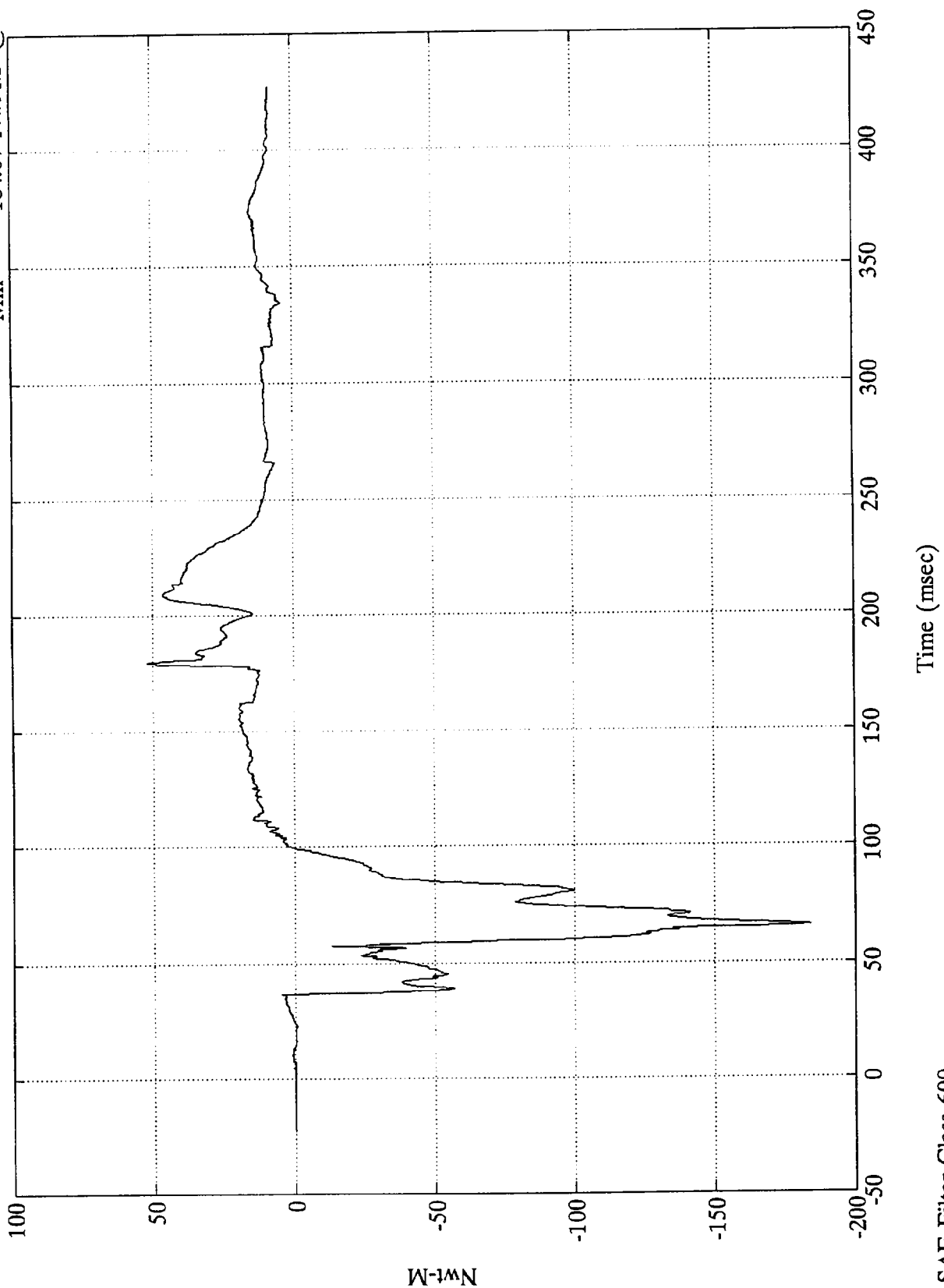


SAE Filter Class 600

VTV TEST #11

Max = 52.01 Nwt-M @ 180.12 msec
Min = -184.07 Nwt-M @ 65.87 msec

V1-P2 Rt Lower Tibia Mx



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.

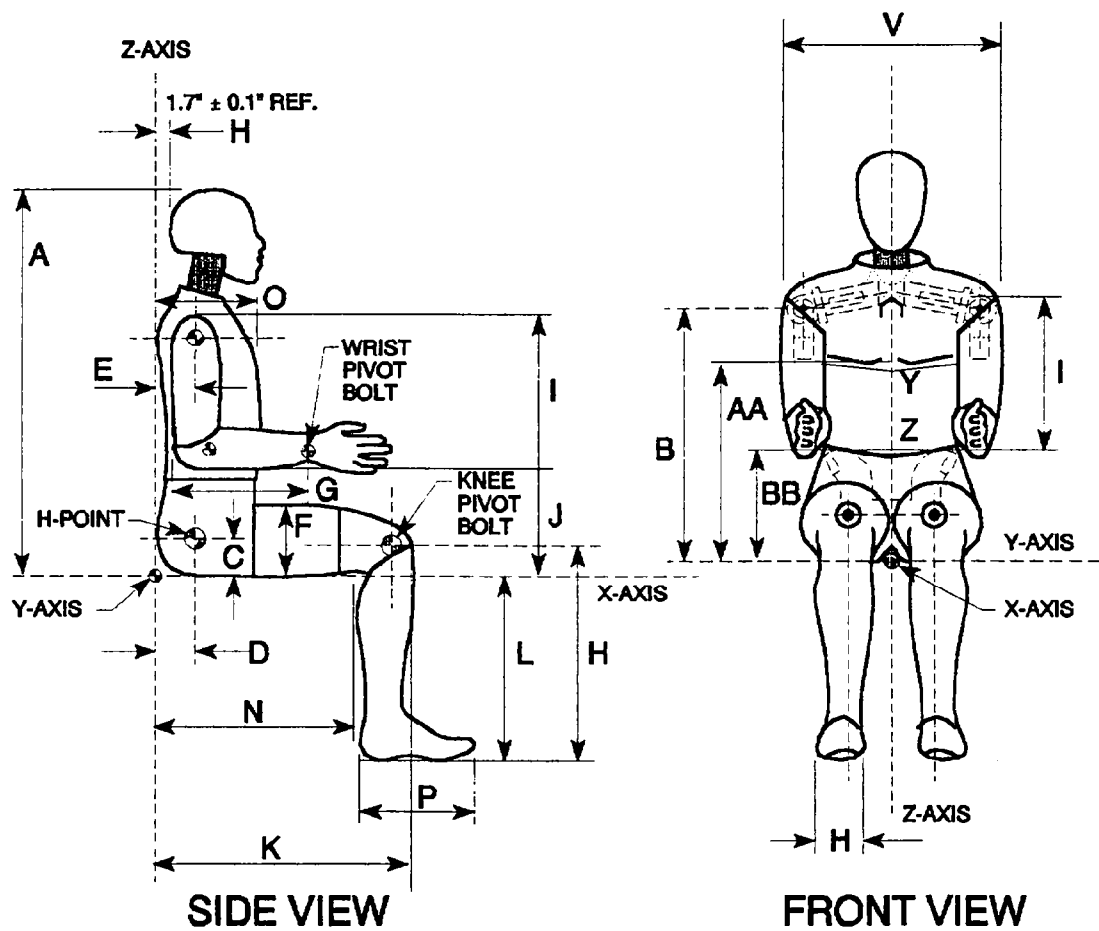
The tests were conducted at the Dummy Certification Test Facility of Calspan Corporation, Advanced Technology Center. A summary of the test results, and Part 572 specifications are included in the Appendix.

Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Date</u>
150	3-22-94
245	9-10-94

FIGURE 9

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.
(REF: S572.31(A)(6))

VEHICLE 1, POSITION 1 - DRIVER DUMMY

Manufacturer: Humanoid

Serial No.: 150

HYBRID III EXTERNAL DIMENSIONS

S/N 150 HUMANOID

DUMMY SERIAL NO. 150

DATE: 3/22/94

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)	32.1-34.1 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 : 3/3/94

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 150 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	69 DEG. F
RELATIVE HUMIDITY	10% - 70%	29 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	239.5 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	4.9 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 : 3/22/94

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%	33 %
IMPACT VELOCITY		22.60 - 23.40 FPS	23.1 FPS
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	23.98 G'S
	20 MS	17.60 - 22.60 G'S	22.24 G'S
	30 MS	12.50 - 18.50 G'S	18.43 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	18.43 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	40.38 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	73.87 DEG.
	TIME	57 - 64 MS	59.5 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	65 - 80 FT.-LBS.	77.92 FT.-LBS.
	TIME	47 - 58 MS	54.38 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	117.25 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	97.13 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

NECK FLEXION TEST

HYBRID III

DATE : 3/22/94

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%	33 %
IMPACT VELOCITY		22.60 - 23.40 FPS	20.2 FPS
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	17.6 G'S
	20 MS	17.60 - 22.60 G'S	16.79 G'S
	30 MS	12.50 - 18.50 G'S	15.51 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	15.51 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	43.75 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	88.19 DEG.
	TIME	57 - 64 MS	76.25 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	65 - 80 FT.-LBS.	-51.43 FT.-LBS.
	TIME	47 - 58 MS	71.63 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	152.88 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	131.25 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
THORAX IMPACT TEST
HYBRID III

DATE : 3/1/94

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN 150 H.S. THORAX CAL

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	69 - 72 DEG. F	69 DEG. F
RELATIVE HUMIDITY	10% - 70%	26 %
PENDULUM VELOCITY	21.6 - 22.4 FT/SEC	21.6 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 INCHES	2.53 INCHES
MAXIMUM RESISTIVE FORCE	1160 - 1325 POUNDS	1311 POUNDS
INTERNAL HYSTERESIS	69% - 85%	72.1 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 3/3/94

KNEE: LEFT

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 150 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	69 DEG. F
RELATIVE HUMIDITY	10% - 70%	29 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS.	1178 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 3/3/94

KNEE: RIGHT

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 150 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	69 DEG. F
RELATIVE HUMIDITY	10% - 70%	29 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS.	1144 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

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	AF5B3	8/94	2/95
ENDEVCO	AF5F7	8/94	2/95
ENDEVCO	AF5E1	8/94	2/95
ENDEVCO	A12C	4/94	10/94
ENDEVCO	A60C	4/94	10/94
ENDEVCO	A84G	4/94	10/94
GSE	951	7/94	1/95
GSE	952	7/94	1/95

B. CALIBRATION LABORATORY
INSTRUMENTS

1. PENDULUM ACC.

2. TEST PROBE
ACCELEROMETER

3. LUMBAR FLEXION TEST
PUSH FORCE GAUGE

4. ABDOMINAL COMPRESS.
TEST FORCE GAUGE

5. ABDOMINAL COMPRESS.
TEST FORCE GAUGE

MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
CEC	A160	6/94	12/94
CEC	A161	7/94	1/95
TRANS- DUCER INC	20051	6/94	12/94
BLH	72952	6/94	12/94
CIC	567-11	6/94	12/94

VEHICLE 1, POSITION 2 - FRONT PASSENGER DUMMY

Manufacturer: Humanoid

Serial No.: 245

HYBRID III EXTERNAL DIMENSIONS

S/N 245 HUMANOID

DUMMY SERIAL NO. 245

DATE: 9/10/94

TEMPERATURE		20.5 DEG. C
RELATIVE HUMIDITY		51 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)	429-434 mm	431 mm
LOCATION FOR WAIST CIRCUMFERENCE (BB)	226-231 mm	228 mm
CHEST CIRCUMFERENCE (Y)	970-1001 mm	998 mm
WAIST CIRCUMFERENCE (Z)	815-866 mm	863 mm
CHEST DEPTH (O)	213-229 mm	213 mm
H-POINT HEIGHT (C)	84-89 mm	89 mm
H-POINT FROM SEAT BACK (D)	135-140 mm	137 mm
SKULL CAP TO BACKLINE (H)	41-46 mm	43 mm
TOTAL SITTING HEIGHT (A)	879-889 mm	889 mm
THIGH CLEARANCE (F)	140-155 mm	152 mm
BUTTOCK KNEE LENGTH (K)	580-605 mm	596 mm
BUTTOCK POPLITAL LENGTH (N)	452-477 mm	464 mm
POPLITEAL LENGTH (L)	430-455 mm	447 mm
KNEE PIVOT HEIGHT (M)	485-501 mm	487 mm
FOOT LENGTH (P)	252-267 mm	256 mm
FOOT BREADTH (W)	91-107 mm	96 mm
SHOULDER PIVOT FROM BACKLINE (E)	84-94 mm	89 mm
SHOULDER BREADTH (V)	422-437 mm	426 mm
SHOULDER PIVOT HEIGHT (B)	505-521 mm	518 mm
ELBOW REST HEIGHT (J)	190-211 mm	205 mm
SHOULDER-ELBOW LENGTH (I)	330-345 mm	335 mm
BACK OF ELBOW TO WRIST PIVOT (G)	290-305 mm	294 mm

DUMMY MEETS SPECIFICATIONS

TECHNICIAN: IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

HEAD DROP TEST

HYBRID III

DATE : 8/30/94

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 245 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	69 DEG. F
RELATIVE HUMIDITY	10% - 70%	49 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	249.7 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	6.9 G'S
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
NECK EXTENSION TEST
HYBRID III

DATE : 9/2/94

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN:245 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	69 DEG. F
RELATIVE HUMIDITY		10% - 70%	52 %
IMPACT VELOCITY		19.50 - 20.30 FPS	20.1 FPS
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G'S	19.36 G'S
	20 MS	14.00 - 19.00 G'S	18.55 G'S
	30 MS	11.00 - 16.00 G'S	15.82 G'S
MAX PENDULUM G'S ABOVE 30 MS		22 G'S MAX	15.82 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		38 - 46 MS	45.25 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	88.82 DEG.
	TIME	72 - 82 MS	73.13 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-59.0/-39.0 FT.-LBS.	-57.71 FT.-LBS.
	TIME	65 - 79 MS	68 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	147 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	123.63 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
NECK FLEXION TEST

HYBRID III

DATE : 8/31/94

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN:245 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	23 FPS
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	26.61 G'S
	20 MS	17.60 - 22.60 G'S	22.43 G'S
	30 MS	12.50 - 18.50 G'S	16.78 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	16.78 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	41.25 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	72.41 DEG.
	TIME	57 - 64 MS	59.13 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	65 - 80 FT.-LBS.	76.18 FT.-LBS.
	TIME	47 - 58 MS	54.13 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	118.63 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	97 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
THORAX IMPACT TEST
HYBRID III

DATE : 8/29/94

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN 245

H.S. THORAX

CAL

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	69 - 72 DEG. F	69 DEG. F
RELATIVE HUMIDITY	10% - 70%	50 %
PENDULUM VELOCITY	21.6 - 22.4 FT/SEC	21.6 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 INCHES	2.55 INCHES
MAXIMUM RESISTIVE FORCE	1160 - 1325 POUNDS	1307 POUNDS
INTERNAL HYSTERESIS	69% - 85%	73.2 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 9/9/94

KNEE: LEFT

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 245 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70 DEG. F
RELATIVE HUMIDITY	10% - 70%	56 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS.	1166 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 9/9/94

KNEE: RIGHT

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 245 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70 DEG. F
RELATIVE HUMIDITY	10% - 70%	56 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS.	1086 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY I.D. NUMBER: 045

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	ADL50	8/94	2/95
ENDEVCO	A59J	8/94	2/95
ENDEVCO	A73A	8/94	2/95
ENDEVCO	ADL98	8/94	2/95
ENDEVCO	AC209	8/94	2/95
ENDEVCO	ADMB6	8/94	2/95
GSE	954	7/94	1/95
GSE	955	7/94	1/95

B. CALIBRATION LABORATORY
INSTRUMENTS

1. PENDULUM ACC.

2. TEST PROBE
ACCELEROMETER

3. LUMBAR FLEXION TEST
PUSH FORCE GAUGE

4. ABDOMINAL COMPRESS.
TEST FORCE GAUGE

5. ABDOMINAL COMPRESS.
TEST FORCE GAUGE

MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
CEC	A160	6/94	12/94
CEC	A161	7/94	1/95
TRANS- DUCER INC	20051	6/94	12/94
BLH	72952	6/94	12/94
CIC	567-11	6/94	12/94