

REPORT NUMBER: CAL-95-N09

**NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST**

**GENERAL MOTORS CORPORATION
1995 GEO METRO
4-DOOR SEDAN**

NHTSA NUMBER: MS0103

CALSPAN TEST NUMBER: 8227-9

January 24, 1995

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FINAL REPORT

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Section 1

PURPOSE AND TEST PROCEDURE

This 56.6 kph frontal barrier impact test is part of the Composite FY92 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-90-D-02121.

The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 48.3 kph requirements.

The 56.6 kph frontal barrier impact test was conducted in accordance with the Office of Market Incentives (OMI) Laboratory Indicant Test Procedure.

Section 2

SUMMARY OF TEST MS0103

A load cell barrier consisting of 36 load cells was impacted by a 1995 Geo Metro 4-Door Sedan at a velocity of 56.6 kph. The test was performed at the Calspan Corporation Advanced Technology Center on January 24, 1995. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by 1 real-time camera and 16 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

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

Both ATDs were fully instrumented with head and chest triaxial accelerometers and right/left femur load cells. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver ATD (Serial No.061) and the right-front passenger ATD (Serial No.245) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 95 channels of data were recorded on a P.C. based data acquisition system. Appendix B contains the vehicle, load cell barrier and dummy response data traces. Position 2 Head Y (redundant) and Head Z (redundant) accelerometers did not record accurately during test. Both data plots were removed from test report. Accelerometer #3 (X), located on the top of engine block, sustained a cut wire at approximately 25 milliseconds. Accelerometer #4 (X), located on the bottom of engine block, contained a zero shift of approximately 30 g's after 33 milliseconds. The integrations (velocity and displacement data) for the above vehicle accelerometers were not included in this test report. Barrier load cell D6 did not record accurately during test. This load cell was not used in the load cell sum calculation.

The driver's HIC was 466.5. The maximum chest deceleration over 3 milliseconds was 52.0 g's and maximum chest deflection was -38.6 mm. Femur loads were -3735.4 newtons on the left femur and -7743.1 newtons on the right femur.

The right front passenger's HIC was 186.4. Maximum chest deceleration over 3 milliseconds was 54.9 g's and maximum chest deflection was -37.8 mm. Femur loads were -2472.2 newtons on the left and -4776.1 newtons on the right.

Table 1

GENERAL TEST AND VEHICLE DATA

Vehicle Year/Make/Model/Body Style:				1995 Geo Metro 4-Door Sedan			
Test No.:		MS0103		VIN.:		2C1MR5298S6702557	
Body Color:		Blue		Date of Manufacturer:		9/94	
Date Received:		11/21/94		Odometer Reading:		161 miles	
Engine:		4 Cylinders;		-- C.I.D.;		1.3 Liters;	
		X Gas;		-- Diesel;		-- Turbocharged;	
		-- Longitudinal;				X Transverse;	
Transmission:		3 Speed;		-- Manual;		X Automatic;	
						-- Overdrive	
Final Drive:		X Front Wheel;		-- Rear Wheel;		-- Four Wheel;	
Accessories:		-- A/C;		-- Pwr./Strg.;		X Pwr./Brks.;	
		X Tilt Wheel;		-- Pwr./Seats;		-- Cruise Control;	
						-- Other	
Type of Occupant Restraint:				3-point restraint system with supplemental driver and passenger airbag.			

DATA RECORDED FROM VEHICLE TIRE PLACARD:

Tire Pressure (at capacity):		Front		220 kPa,		Rear		220 kPa.	
Recommended Tire Size:		P155/80R13							
Recommended Cold Tire Pressure:		Front		220 kPa,		Rear		220 kPa.	
Tires on Vehicle:		P155/80R13		Manufacturer:		Goodyear			
Number of Occupants:		2 Front;		2 Rear;		-- 3rd Seat;		4 TOTAL	
Type of Front Seats:		X Bucket;		-- Bench;		-- Split Bench			
Type of Seat Back:		-- Fixed;		X Adj. with		X Lever;		-- Rot. Knob	
Vehicle Capacity Weight (VCW)		=		312 kgs. (A)					
No. of Occupants x 68 kgs.		=		272 kgs. (B)					
Rated Cargo and Luggage Weight (RCLW)		A-B =		40 kgs.					
GVWR		1250 kgs.		GAWR:		Front		650 kgs.	
						Rear		620 kgs.	

Table 1

GENERAL TEST AND VEHICLE DATA (cont'd)WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with maximum fluids) = UDW:

Right Front	=	<u>257</u>	kgs.	Right Rear	=	<u>181</u>	kgs.
Left Front	=	<u>273</u>	kgs.	Left Rear	=	<u>190</u>	kgs.
TOTAL FRONT WEIGHT:		<u>530</u>	kgs.	<u>58.8</u>	% of Total Vehicle Weight		
TOTAL REAR WEIGHT:		<u>371</u>	kgs.	<u>41.2</u>	% of Total Vehicle Weight		
TOTAL DELIVERED WEIGHT	=	<u>901</u>	kgs.				

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight	<u>901</u>	kgs.
VCW = Vehicle Capacity Weight	<u>312</u>	kgs.
DSC = Designated Seating Capacity	<u>4</u>	kgs.
RCLW = VCW - 68 (DSC) =	<u>40</u>	kgs.
Target Test Weight = UDW + RCLW + (2 dummies x 74.0 kgs.)		
Target Test Weight =	<u>1089</u>	kgs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 76 KGS. CARGO:

Right Front	=	<u>299</u>	kgs.	Right Rear	=	<u>270</u>	kgs.
Left Front	=	<u>297</u>	kgs.	Left Rear	=	<u>259</u>	kgs.
TOTAL FRONT WEIGHT:		<u>596</u>	kgs.	<u>53.0</u>	% of Total Vehicle Weight		
TOTAL REAR WEIGHT:		<u>529</u>	kgs.	<u>47.0</u>	% of Total Vehicle Weight		
TOTAL TEST WEIGHT	=	<u>1125</u>	kgs.				
Weight of ballast in vehicle trunk area =		<u>--</u>	kgs.				

VEHICLE ATTITUDE (all dimensions in millimeters):

Delivered Attitude:	RF	<u>648</u>	LF	<u>643</u>	RR	<u>659</u>	LR	<u>662</u>
Test Attitude	RF	<u>642</u>	LF	<u>638</u>	RR	<u>610</u>	LR	<u>610</u>
Wheel Base:	<u>2375</u>	mm.; C.G.	<u>1117</u>	millimeters rearward of front wheel center.				

Remarks: Vehicle test weight was set as close^{as possible} to the manufacturer test weight of 1148 kgs. The actual test weight of 1125 kgs. was within 2 % of the manufacturer's test weight.

37 liters of stoddard solution was placed in the fuel tank.

Table 1

GENERAL TEST AND VEHICLE DATA (cont'd)POST -IMPACT DATA:

Type of Test:	Frontal Barrier	Impact Angle:	0 deg.
Date of Test:	January 24, 1995	Time of Test:	13:40
Ambient Temperature:	21	° C at impact area	
Temperature in Occupant Compartment:	21	° C	
Windshield Molding Temperature:	21	° C	
Required Impact Velocity Range:	55.5	to	57.1 kph
Impact Velocity: primary =	56.6	kph, secondary =	56.8 kph
Distance From Front Bumper to Barrier Face When			
Entering Speed Trap:	1321	mm	
Exiting Speed Trap:	305	mm	

VEHICLE REBOUND AND CRUSH (mm):

Vehicle Length:	Pre-test = R	4040	C _L	4161	L	4036
	Post-test = R	3450	C _L	3535	L	3490
	Crush = R	590	C _L	626	L	546
Distance from front of test vehicle to point of impact:						
R	536	C _L	546	L	532	

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	airbag	Airbag; Side of head with side roof rail; Back of head with B-pillar
Chest	airbag	airbag
Abdomen	airbag	airbag
Left Knee	knee bolster	glove box door
Right Knee	knee bolster	glove box door

Table 1

GENERAL TEST AND VEHICLE DATA (cont'd)

	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Door Opening	<u>yes-operable</u>	<u>yes-operable</u>	<u>yes-operable</u>	<u>yes-operable</u>
<u>Seat Movement</u>	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Seat Back Failure	<u>None</u>	<u>None</u>	<u>--</u>	<u>--</u>
Seat Shift (mm.)	<u>0</u>	<u>0</u>	<u>--</u>	<u>--</u>

Glazing Damage

Backlight/Windshield: Windshield sustained stress fractures but remained intact

Other Notable Impact Effects: Driver and passenger floor pan intrusion

Section 3

OCCUPANT AND VEHICLE INFORMATION

I. DATA

1. Dummy Injury Criteria Data Summary
2. Dummy Positioning Data
3. Seat Belt Performance Assessment Data
4. Camera Locations
5. Vehicle Target Locations
6. Load Cell Barrier Data
7. Vehicle Accelerometer Data
8. Test Vehicle Measurements

Table 2

DUMMY INJURY CRITERIA VALUES

Test No.: MS0103 Vehicle: 1995 Geo Metro 4-Door Sedan

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-43.1	6.6	38.4	56.3
Position #2 - Passenger	42.2	17.9	30.1	43.5

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R*
Position #1 - Driver	-52.7	-6.4	15.0	52.0
Position #2 - Passenger	-55.5	-8.2	-14.4	54.9

* The maximum chest resultant acceleration is defined as the maximum acceleration which exceeds 0.003 seconds in duration.

	MAXIMUM FORCE - FEMUR LOAD (nwt)	
	LEFT FEMUR	RIGHT FEMUR
Position #1 - Driver	-3735.4	-7743.1
Position #2 - Passenger	-2472.2	-4776.1

	MAXIMUM FORCE - SEAT BELT LOADS (nwt)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	4636.9	--	2588.7
Position #2 - Passenger	4464.6	3271.4	--

	HEAD INJURY CRITERIA (HIC)			
	HIC**	t ₁ (mSec)	t ₂ (mSec)	Average Acceleration t ₁ to t ₂
Position #1 - Driver	466.5	64.92	97.20	46.1
Position #2 - Passenger	186.4	51.48	87.36	30.6

** HIC is as defined in FMVSS 208. The maximum time interval from t₁ to t₂ is 36 milliseconds.

Table 3

HYBRID III NECK AND CHEST DATA SHEET

Vehicle Year/Make/Model/Body Style: 1995 Geo Metro 4-Door Sedan
 Vehicle Test No.: MS0103 Test Date: January 24, 1995

MAXIMUM VALUES	DRIVER DUMMY ID #061:	PASSENGER DUMMY ID #245:
Neck Load X (nwt)	-775.3	629.3
Neck Load Y (nwt)	437.7	162.4
Neck Load Z (nwt)	1243.6	1769.3
Neck Moment X (nwt-m)	42.6	-11.9
Neck Moment Y (nwt-m)	65.8	57.1
Neck Moment Z (nwt-m)	46.3	-6.6
Chest Deflection X (mm.)	-38.6	-37.8
Time of Max. Occurrence (msec)	84.1	69.7

Note: All values listed occur during the primary impact event.

Figure 1

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS

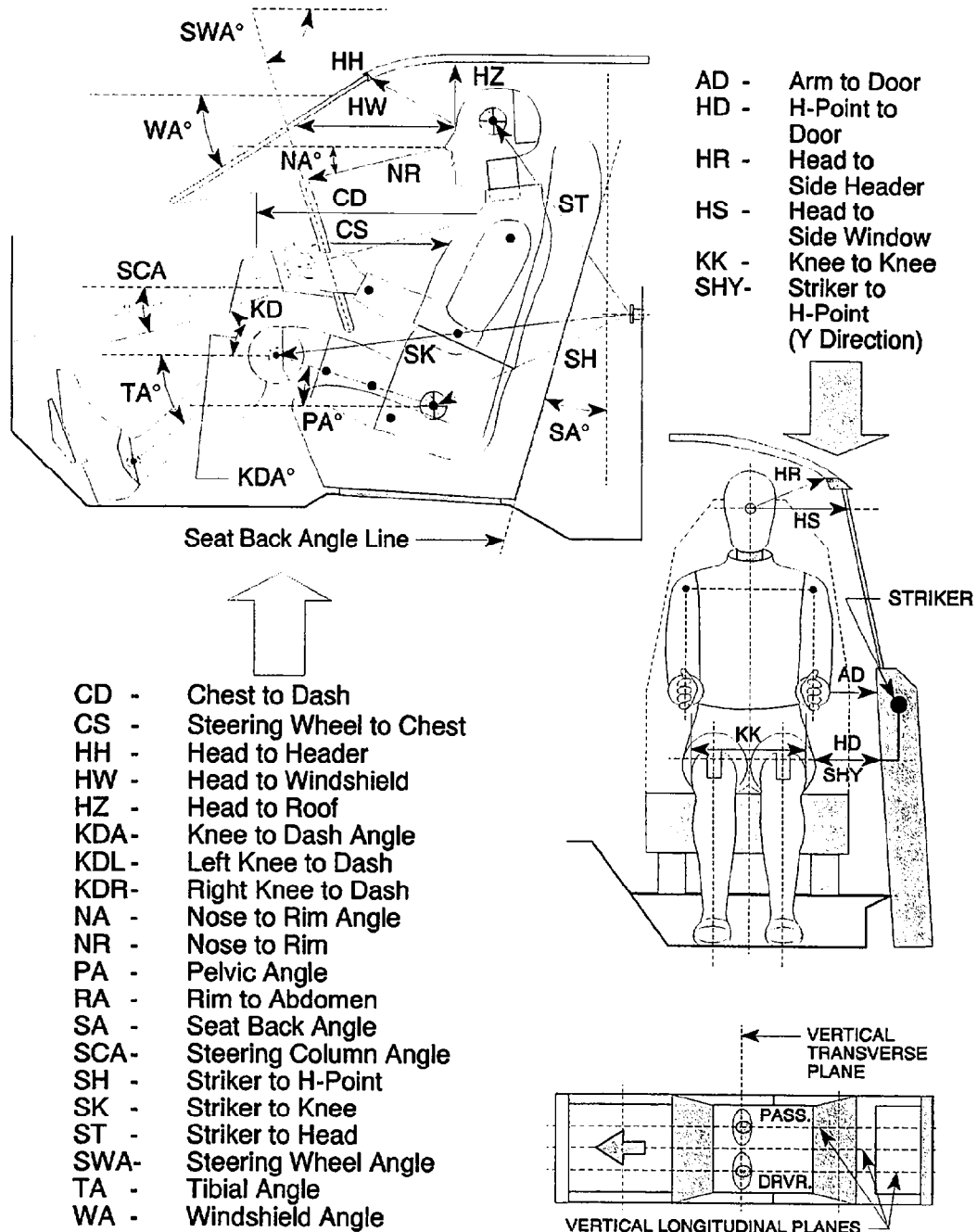


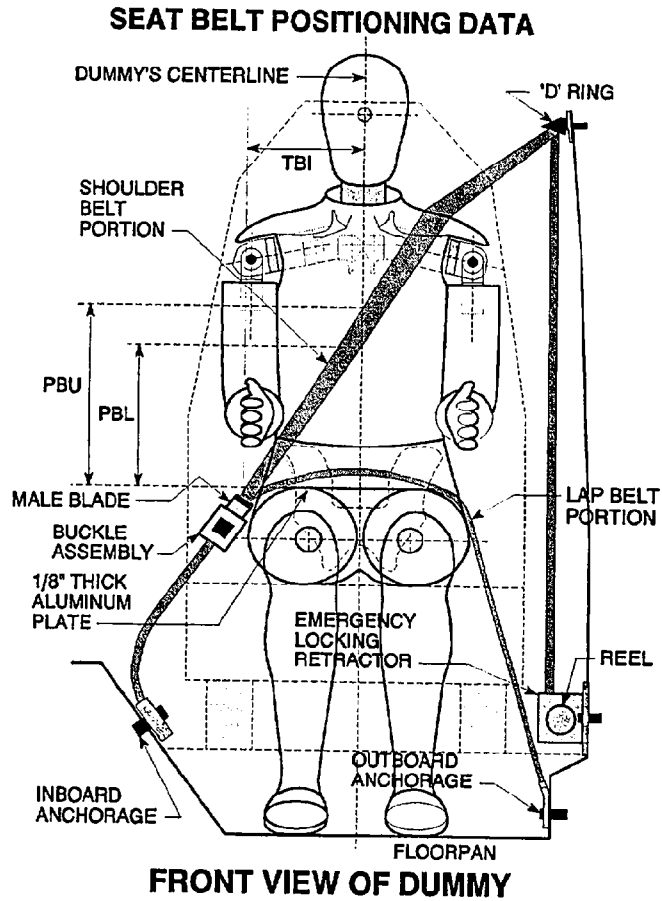
Table 4

FRONT SEAT OCCUPANT MEASUREMENTS

	DRIVER (Serial #061)			PASS. (Serial # 245)		
WA°	27 deg.			N/A		
SWA°	67 deg.			N/A		
SCA°	23 deg.			N/A		
SA°	23 deg.			23 deg.		
HZ	160 mm			185 mm		
HH	320 mm			325 mm		
HW	550 mm			590 mm		
HR	175 mm			200 mm		
NR	402 mm	Angle	15 deg.	N/A		
CD	514 mm			510 mm		
CS	290 mm			N/A		
RA	195 mm			N/A		
KDL	165 mm	Angle (KDA)	30 deg.	145 mm		
KDR	165 mm			140 mm	Angle (KDA)	33 deg.
PA°	23 deg.			23 deg.		
TA°	40 deg.			40 deg.		
KK	310 mm			270 mm		
ST	498 mm	Angle	5 deg.	508 mm	Angle	8 deg.
SK	574 mm	Angle	95 deg.	587 mm	Angle	93 deg.
SH	236 mm	Angle	130 deg.	231 mm	Angle	123 deg.
SHY	190 mm			190 mm		
HS	230 mm			235 mm		
HD	90 mm			85 mm		
AD	65 mm			70 mm		

Figure 2

SEAT BELT POSITIONING DATA



	DRIVER DUMMY (mm)	PASSENGER DUMMY (mm)
PBU -- Top surface of alum. plate to upper edge	320	337
PBL-- Top surface of alum. plate to belt lower edge	260	270
<u>LAP BELT TENSION</u>	Retractor	Retractor
<u>SHOULDER BELT TENSION</u>	Retractor	Retractor

Table 5

SEAT BELT PERFORMANCE ASSESSMENT TEST DATABELT LENGTH DATA:

Belt length from trim panel exit
to bolt hole anchor point for
continuous webbing systems.

Shoulder belt length as measured
on Part 572 Dummy.

Lap belt length as measured
on Part 572 Dummy.

SHOULDER BELT SPOOL-OFF DATA:

As determined by film analysis.

As determined mechanically.

As determined electronically.

BELT STRETCH DATA:

Measured electronically between shoulder
belt load cell and the "D" ring.

Measured mechanically.

<u>Driver</u>	<u>Passenger</u>
1860 mm	1860 mm
840 mm	840 mm
800 mm	800 mm
110 mm	120 mm
91 mm	134 mm
N/A	N/A
52 mm/m	272 mm/m
0 mm/m	0 mm/m

Figure 3

CAMERA POSITIONS FOR FRONTAL IMPACTS

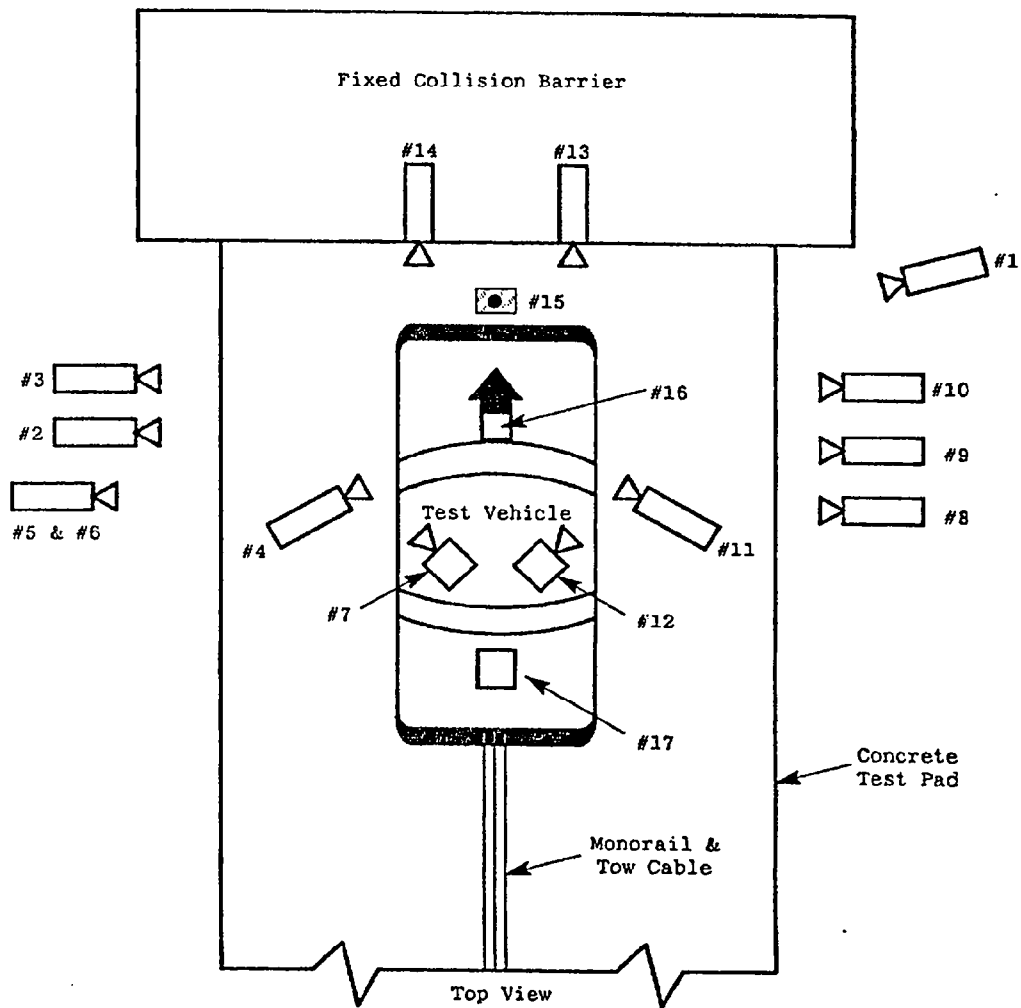


Table 6
HIGH-SPEED CAMERA LOCATIONS

Test No. MS0103 Vehicle: 1995 Geo Metro 4-Door Sedan

CAMERA NO.	VIEW	CAMERA POSITIONS (mm.)*			ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Camera	--	--	--	--	--	--	24
2	Overall Left Side	5944	1524	1041	-2	5634 mm	13	1010
3	Left Side View	7493	1092	1041	-2	7183 mm	25	1000
4	Driver and Interior View	2719	2718	1753	-22	-	13	1020
5	Steering Column (Bottom)	6883	1803	1168	-5	6573 mm	25	1075
6	Steering Column (Top)	6883	1803	1753	-11	6573 mm	25	1110
7	Left Belt View	-	-	-	-	-	8	630
8	Overall Right Side	5918	1753	1092	-3	5608 mm	13	1050
9	Right Side View	7645	1346	1041	-3	7335 mm	25	1020
10	Right Passenger View	7341	1676	1397	-5	7031 mm	35	1050
11	Passenger and Interior View	2591	2849	1778	-21	-	13	1090
12	Right Belt View	-	-	-	-	-	8	640
13	Passenger Front View	560	127	1750	-39	-	13	1000
14	Driver Front View	560	127	1750	-36	-	13	1010
15	Windshield View	0	0	3040	-50	-	13	1040
16	Pit View of Engine	0	505	-3048	90	-	13	1000
17	Pit View of Fuel Tank	0	3432	-3048	90	-	13	930

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

Figure 4

VEHICLE TARGET LOCATIONS

(All measurements in millimeters)

A	310
B	490
C	1218
D	1660
E	260
F	1385
G	791
H	791
I	90
J	1206
K	881
L	1283
M	260
N	90
O	791
P	791
Q	1283
R	881
S	1206

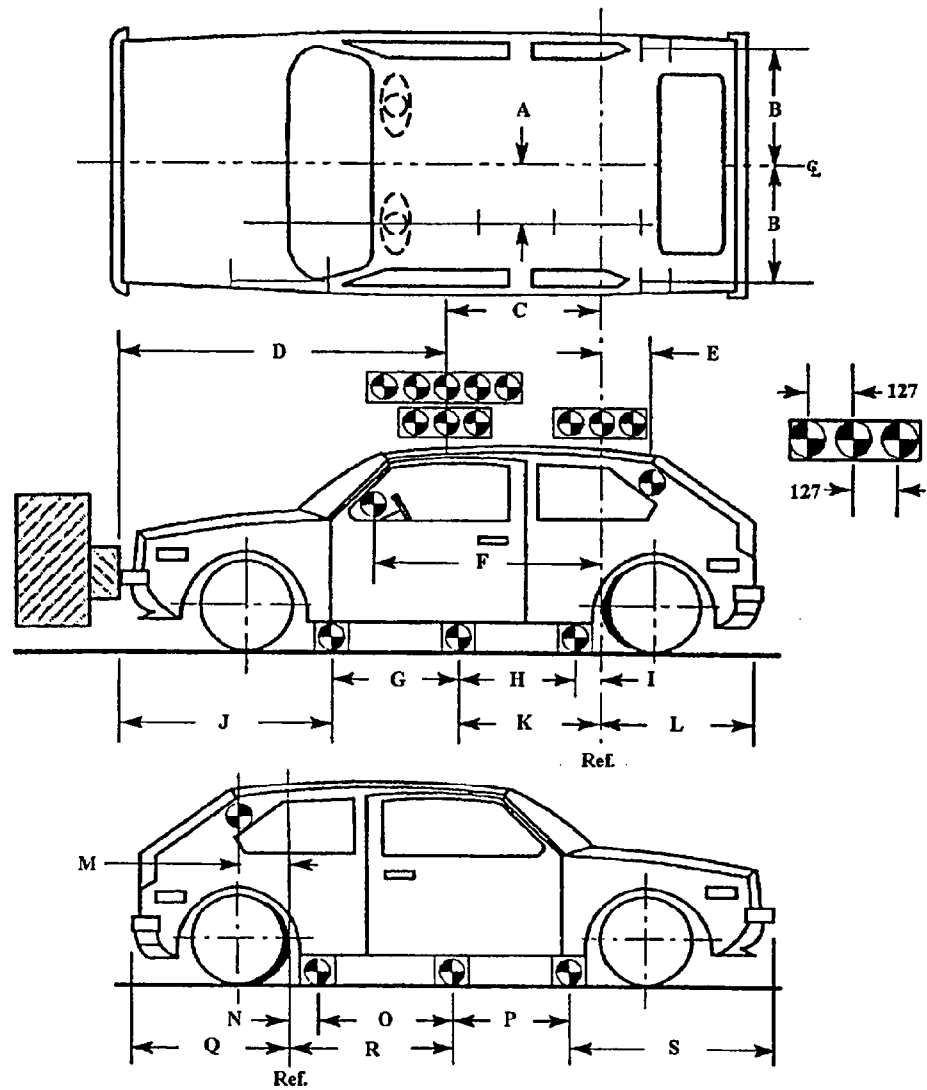
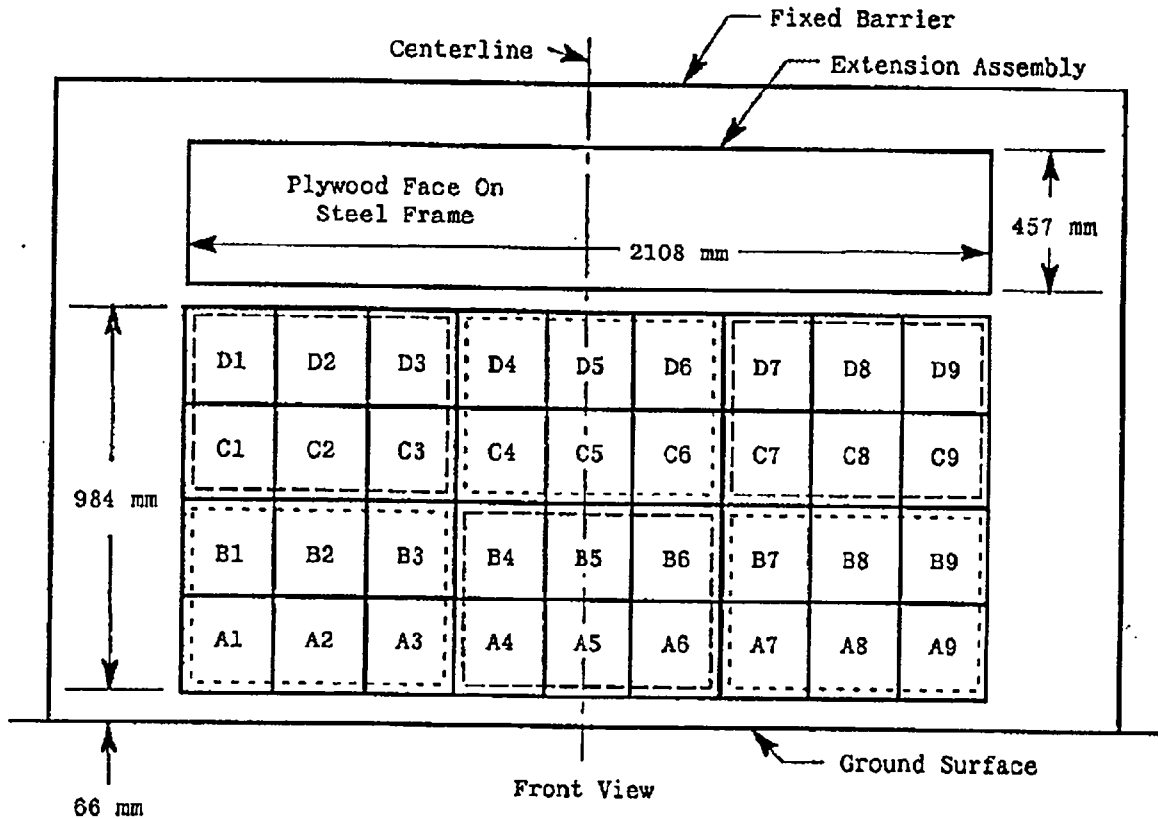


Figure 5

LOAD CELL LOCATIONS ON FIXED BARRIER

- 36 Load Cells
- 4 Rows
- 9 Columns
- 6 Groupings (6 cells/group)



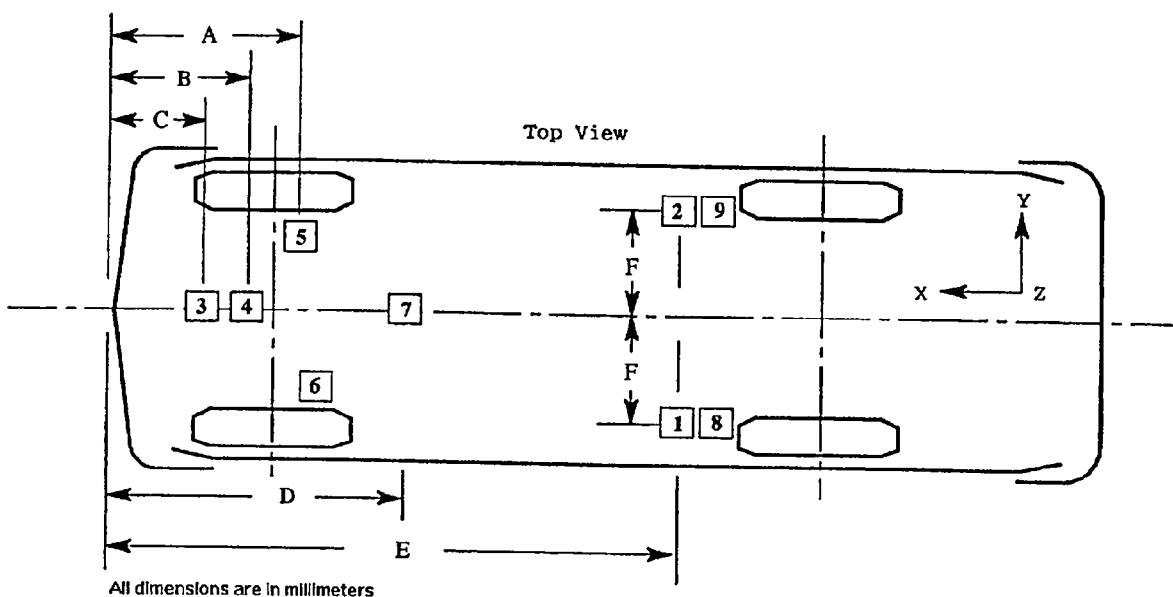
6 GROUPS OF 6 LOAD CELLS EACH

Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

The following data is presented in Appendix B:

- (1) Data from 36 individual load cells
- (2) Total or Sum of 36 individual load cells
- (3) Data from 6 Groupings shown above (6 cells/group)

Figure 6

VEHICLE ACCELEROMETER LOCATIONS

ACCELEROMETER NUMBER*	ACCELEROMETER LOCATION	Distances From Vehicle Front	
		All dimensions in millimeters	
1	Left Rear Seat Crossmember [E/F]	X= 2558	Y= 490
2	Right Rear Seat Crossmember [E/F]	X= 2558	Y= 490
3	Top of engine [C]	580	
4	Bottom of engine [B]	675	
5	Right Disc Brake Caliper [A]	885	
6	Left Disc Brake Caliper [A]	885	
7	Instrument Panel [D]	1510	
8	Left Rear Seat Crossmember [E/F]	X= 2558	Y= 490
9	Right Rear Seat Crossmember [E/F]	X= 2558	Y= 490

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

Figure 7

TEST VEHICLE MEASUREMENTS

REAR DATUM REFERENCE

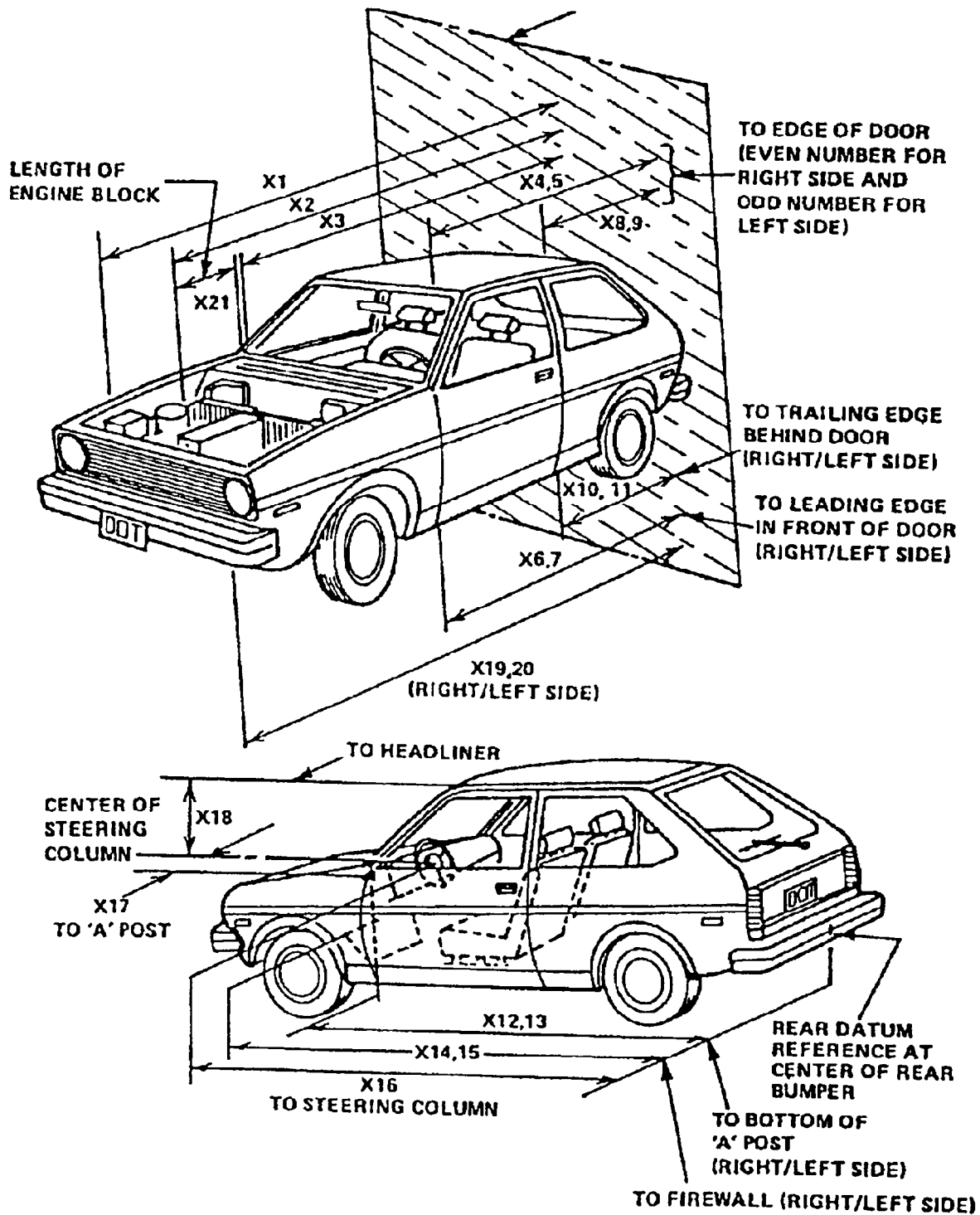


Table 7

VEHICLE MEASUREMENTS

No.		All Dimensions in mm		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	4161	3535	626
X2	Rear Surface of Vehicle to Front of Engine	3695	3400	295
X3	Rear Surface of Vehicle to Firewall	3215	3150	65
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	2870	2878	-8
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	2879	2890	-11
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	2870	2815	55
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	2876	2812	64
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	1885	1910	-25
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	1891	1908	-17
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	1871	1825	46
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	1880	1830	50
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	2869	2781	88
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	2875	2782	93
X14	Rear Surface of Vehicle to Firewall, Right Side	3196	2955	231
X15	Rear Surface of Vehicle to Firewall, Left Side	3176	3185	-9
X16	Rear Surface of Vehicle to Steering Column	2468	2430	38
X17	Center of Steering Column to "A" Post	400	410	-10
X18	Center of Steering Column to Headliner	450	400	50
X19	Rear Surface of Vehicle to Right Side of Front Bumper	4040	3450	590
X20	Rear Surface of Vehicle to Left Side of Front Bumper	4036	3490	546
X21	Length of Engine Block	380	380	0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	2640	2640	0
CD	Rear Surface of Vehicle to Center of Dash Panel	2655	2626	29
LD	Rear Surface of Vehicle to Left Side of Dash Panel	2656	2630	26

Table 8

ACCIDENT INVESTIGATION DIVISION DATA
FOR 56.3 KPH FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: Geo Metro 4-Door Sedan

Vehicle Test No.: MS0103 VIN: 2C1MR5298S6702557

Model Year: 1995 Build Date: 9/94 Test Date: January 24, 1995

Vehicle Size Category: Compact Test Weight: 1125 kgs.

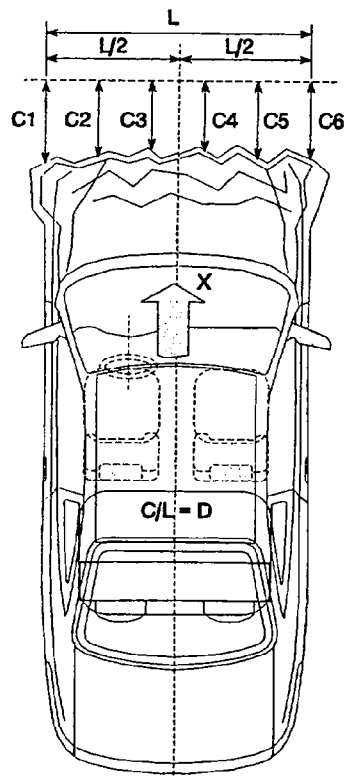
Wheel Base: 2375 mm; Front Overhang: 1206 mm;

Vehicle Overall Width: 1590 mm;

Collision Deformation Classification (CDC) Code: 12FDEW2

Crush Depth Dimensions:

C1 = 506 mm
 C2 = 600 mm
 C3 = 635 mm
 C4 = 609 mm
 C5 = 653 mm
 C6 = 525 mm



Midpoint of Damage: D = Vehicle Centerline
(Longitud.)

Longitude Length of Damaged Region: L = 1390 mm

Section 4

SUMMARY OF RESULTS OF FMVSS 212, 219 (Partial) AND 301

"Windshield Mounting" FMVSS No. 212 Data

"Windshield Zone Intrusion" FMVSS No. 219 Data

"Fuel System Integrity" FMVSS No. 301

Figure 8

FMVSS NO. 212 - "WINDSHIELD MOUNTING" DATA

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

Windshield is bonded in place and covered with 13 mm. molding.

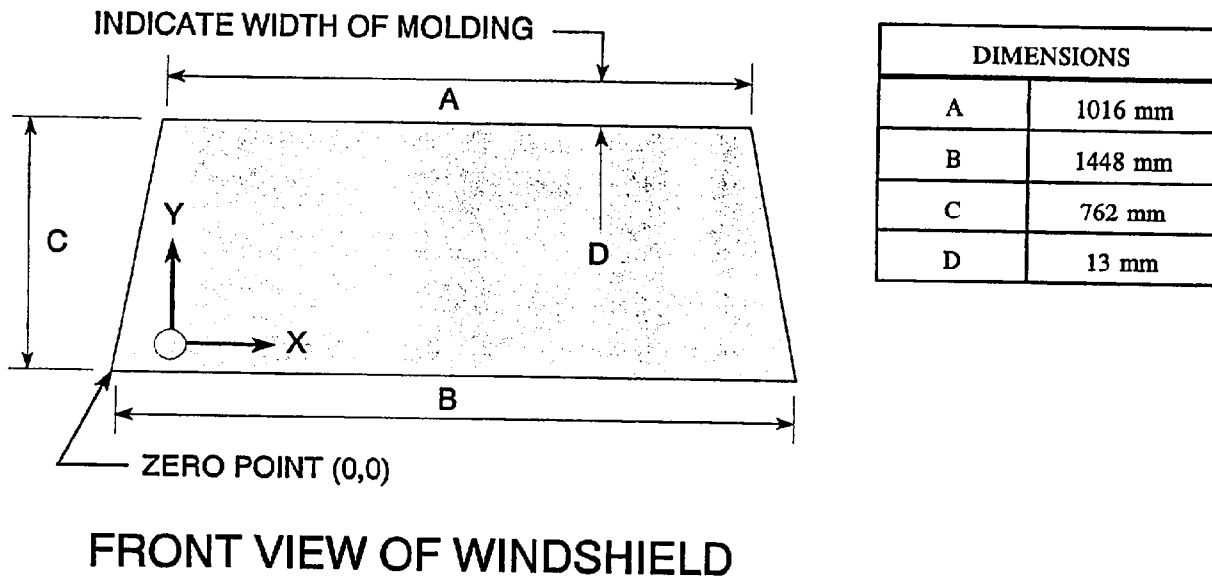
FMVSS 212 REQUIREMENTS:

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

FMVSS 212 TEST DATA

	WINDSHIELD PERIPHERY		% OF RETENTION
	PRE-TEST (mm)	POST-TEST(mm)	
RIGHT SIDE	1994	1994	100
LEFT SIDE	1994	1994	100
TOTAL	3988	3988	100

AREA OF RETENTION FAILURE:



FAILURE DETAILS: None.

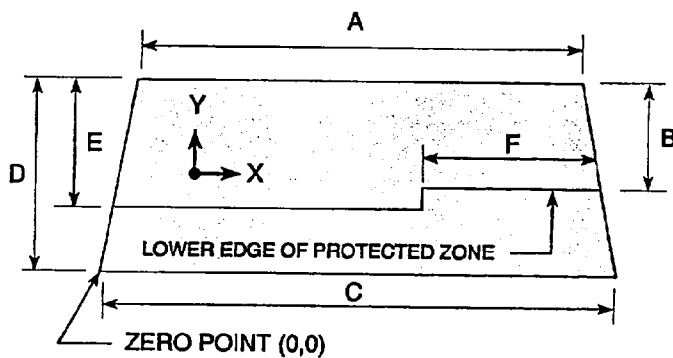
Figure 9

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

PROTECTED ZONE LOWER EDGE REQUIREMENT:

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

FMVSS 219 TEST DATA: (Dimensions in mm)



DIMENSIONS	
A	1016
B	457
C	1448
D	762
E	483
F	730

FRONT VIEW OF WINDSHIELD

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

(Show location of penetration on the above sketch)
None.

COORDINATES		
	X	Y
1.		
2.		
3.		
4.		

Table 9

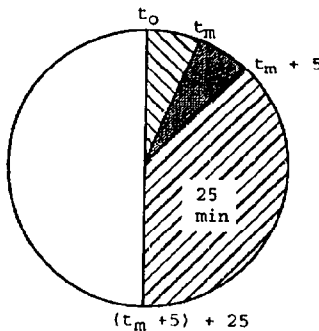
FMVSS NO. 301-75 "FUEL SYSTEM INTEGRITY" POST IMPACT TEST DATA

TEST VEHICLE NUMBER: MS0103 TEST DATE: January 24, 1995
VEHICLE MAKE/MODEL: 1995 Geo Metro

The test vehicle was filled from 92% to 94% of the manufacture's "usable" capacity. The electric fuel pump was operating if it will operate without engine operation. Two Part 572 anthropomorphic test devices were located at each of the front designated seating positions.

=====

TEST VEHICLE IMPACT TYPE: X Frontal (35 mph)
Oblique (30 mph) with _____ deg. barrier face first
(driver/passenger) side
Rear Moving Barrier (30 mph)
Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT:

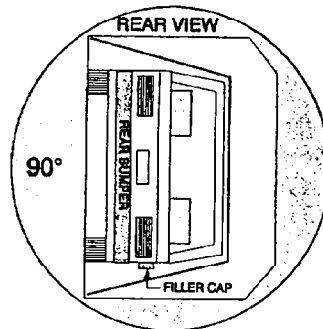
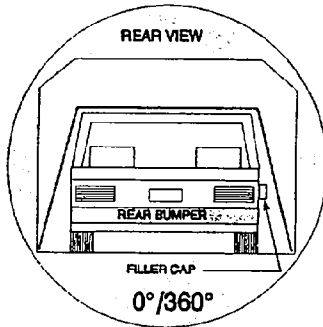
1. From impact until vehicle motion ceases
2. For 5 minute period after vehicle motion ceases
3. For next 25 minutes

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

SOLVENT SPILLAGE DETAILS:

None

Table 10

FMVSS NO. 301 STATIC ROLLOVER DATA SHEETTEST PHASE:0 - 90 deg.VEHICLE TEST No.MS0103I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90 deg. Rotation Time

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time +

TOTAL

Next whole minute interval

<u>2</u>	minutes	<u>25</u>	seconds
<u>5</u>	minutes	<u>00</u>	seconds
<u>7</u>	minutes	<u>25</u>	seconds
<u>8</u>	minutes		seconds

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

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

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0 oz.	0 oz.	0 oz.	0 oz.
-------	-------	-------	-------

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

IV. SOLVENT SPILLAGE LOCATION(S): None

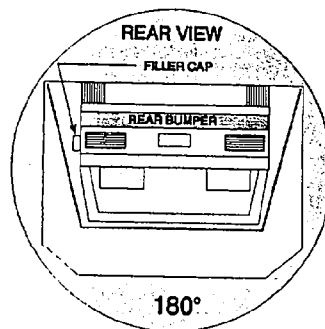
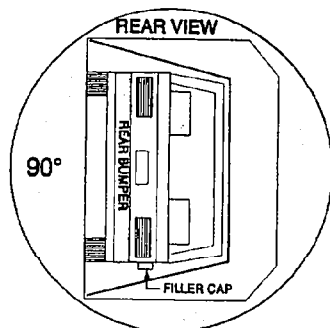
Table 10

FMVSS NO. 301 STATIC ROLLOVER DATA SHEETTEST PHASE:

90 - 180 deg.

VEHICLE TEST No.

MS0103

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90 deg. Rotation Time

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time +

TOTAL

Next whole minute interval

2	minutes	34	seconds
5	minutes	00	seconds
7	minutes	34	seconds
8	minutes		seconds

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

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

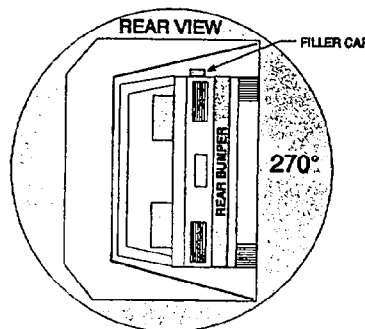
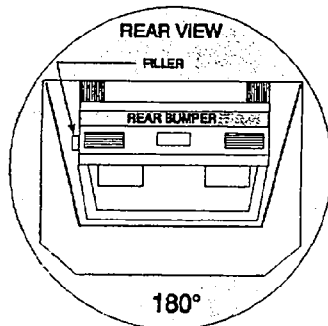
III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0 oz.	0 oz.	0 oz.	0 oz.
-------	-------	-------	-------

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

IV. SOLVENT SPILLAGE LOCATION(S): None

Table 10

FMVSS NO. 301 STATIC ROLLOVER DATA SHEETTEST PHASE:180 - 270 deg.VEHICLE TEST No.MS0103I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90 deg. Rotation Time

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time +

TOTAL

Next whole minute interval

<u>2</u>	minutes	<u>35</u>	seconds
<u>5</u>	minutes	<u>00</u>	seconds
<u>7</u>	minutes	<u>35</u>	seconds
<u>8</u>	minutes		seconds

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

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

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0 oz.	0 oz.	0 oz.	0 oz.
-------	-------	-------	-------

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

IV. SOLVENT SPILLAGE LOCATION(S): None.

Table 10

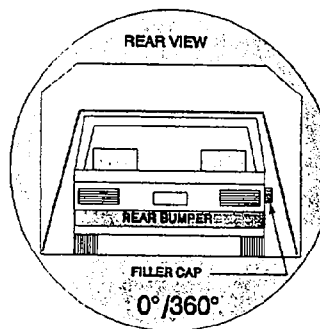
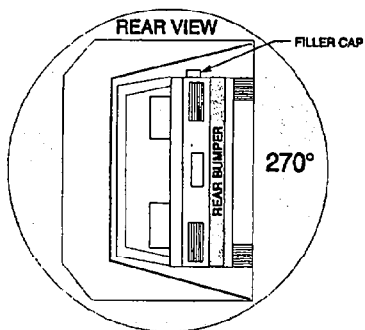
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:

270 - 360 deg.

VEHICLE TEST No.

MS0103

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90 deg. Rotation Time

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time +

TOTAL

Next whole minute interval

2	minutes	20	seconds
5	minutes	00	seconds
7	minutes	20	seconds
8	minutes		seconds

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

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

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0 oz.	0 oz.	0 oz.	0 oz.
-------	-------	-------	-------

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

IV. SOLVENT SPILLAGE LOCATION(S): None.

Appendix A
PHOTOGRAPHS

PHOTOGRAPHS

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A-30	PRE-TEST DRIVER HEAD LOCATION	A-32
A-31	PRE-TEST PASSENGER HEAD LOCATION	A-33
A-32	IMPACT VIEW	A-34

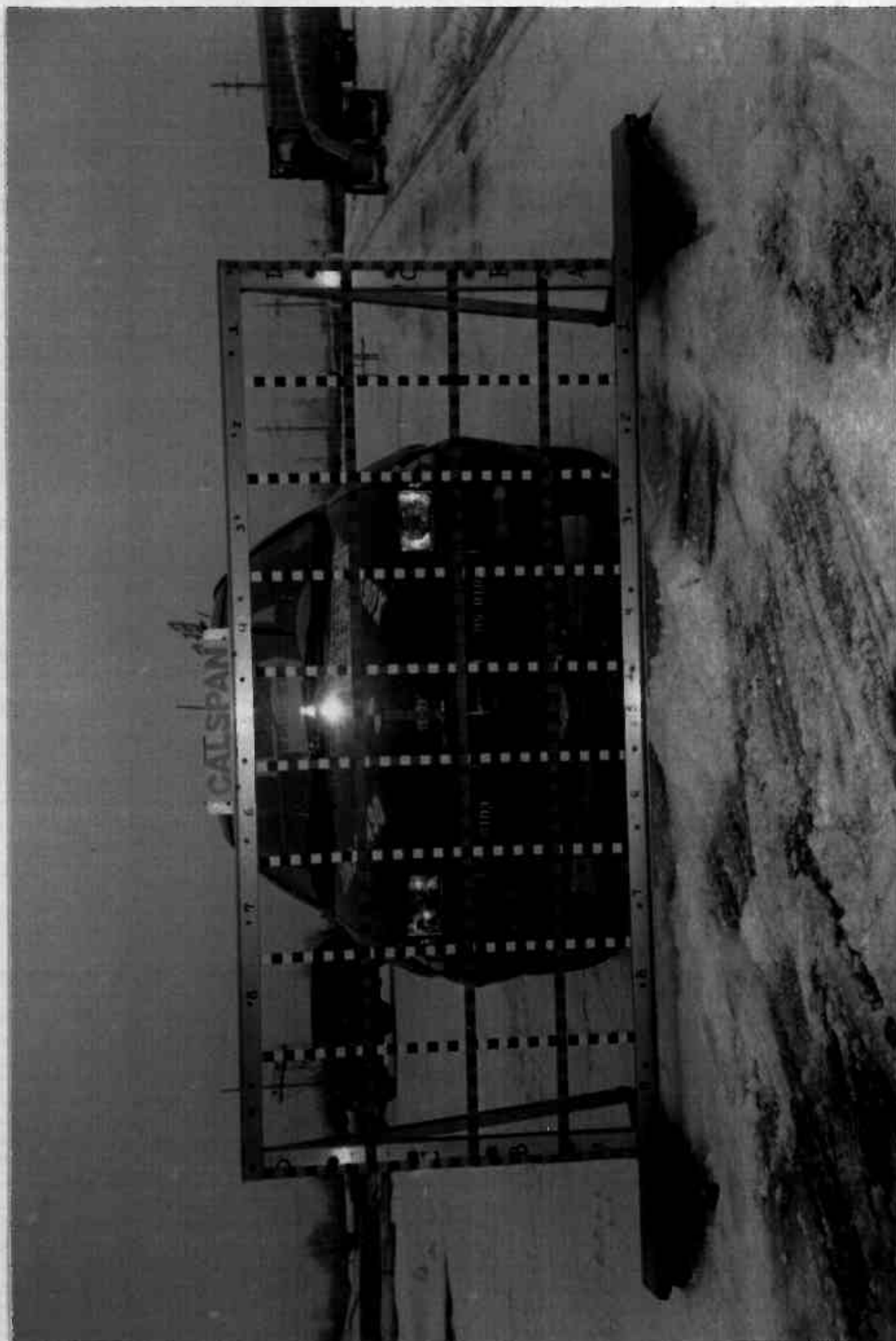


Figure A-1 LOAD CELL LOCATIONS



Figure A-2 PRE-TEST FRONT VIEW

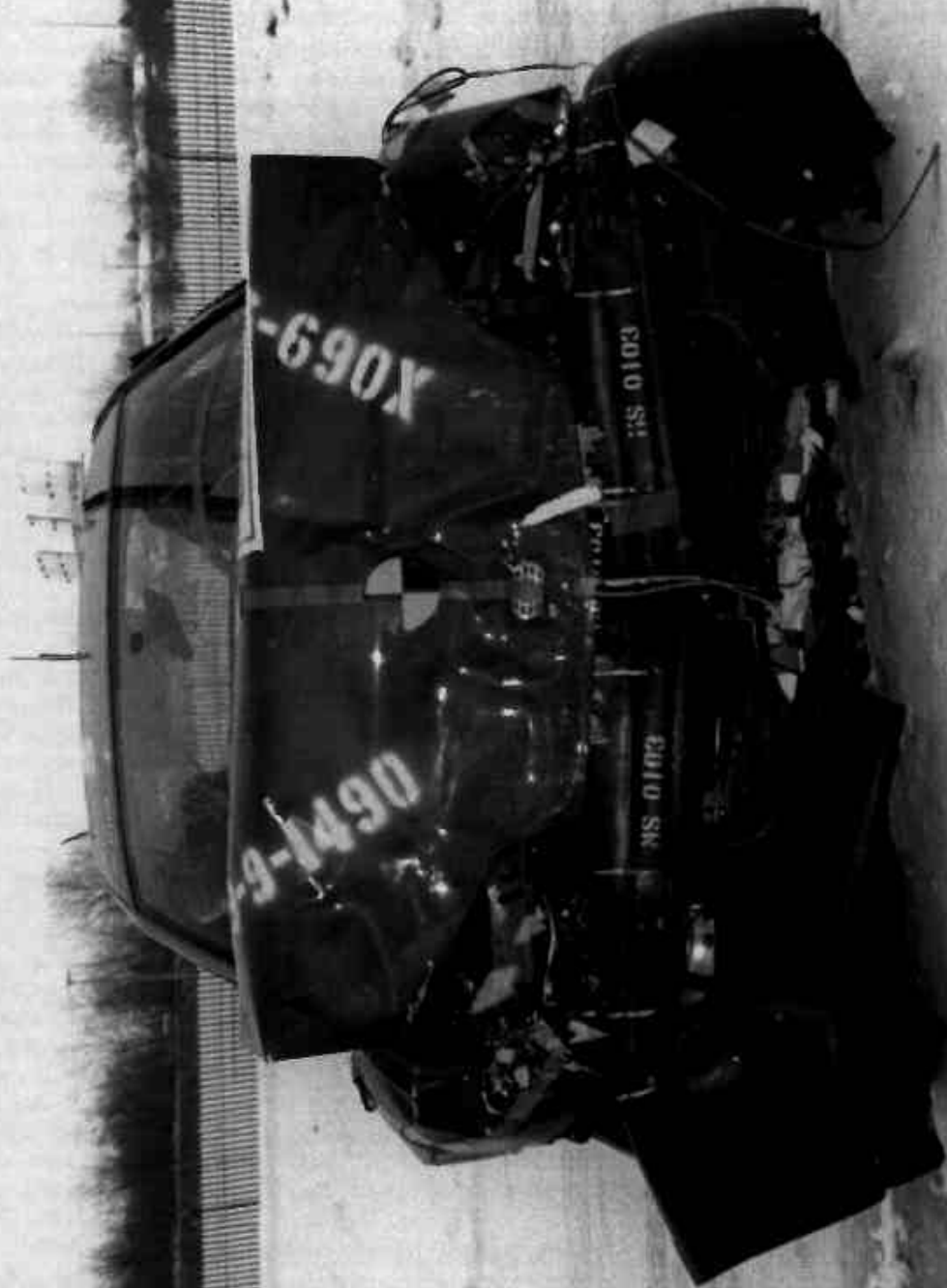


Figure A-3 POST-TEST FRONT VIEW

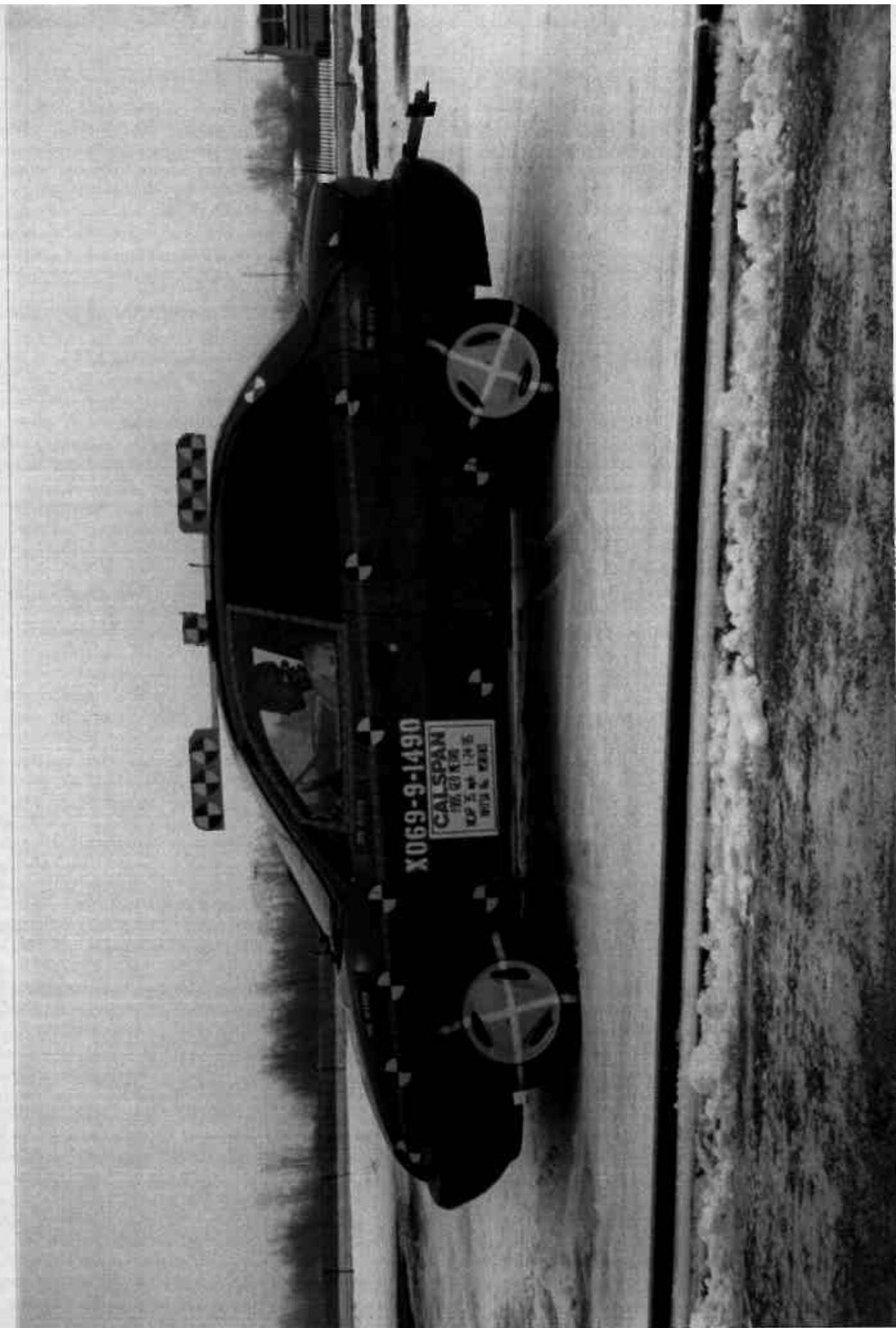


Figure A-4 PRE-TEST LEFT SIDE VIEW

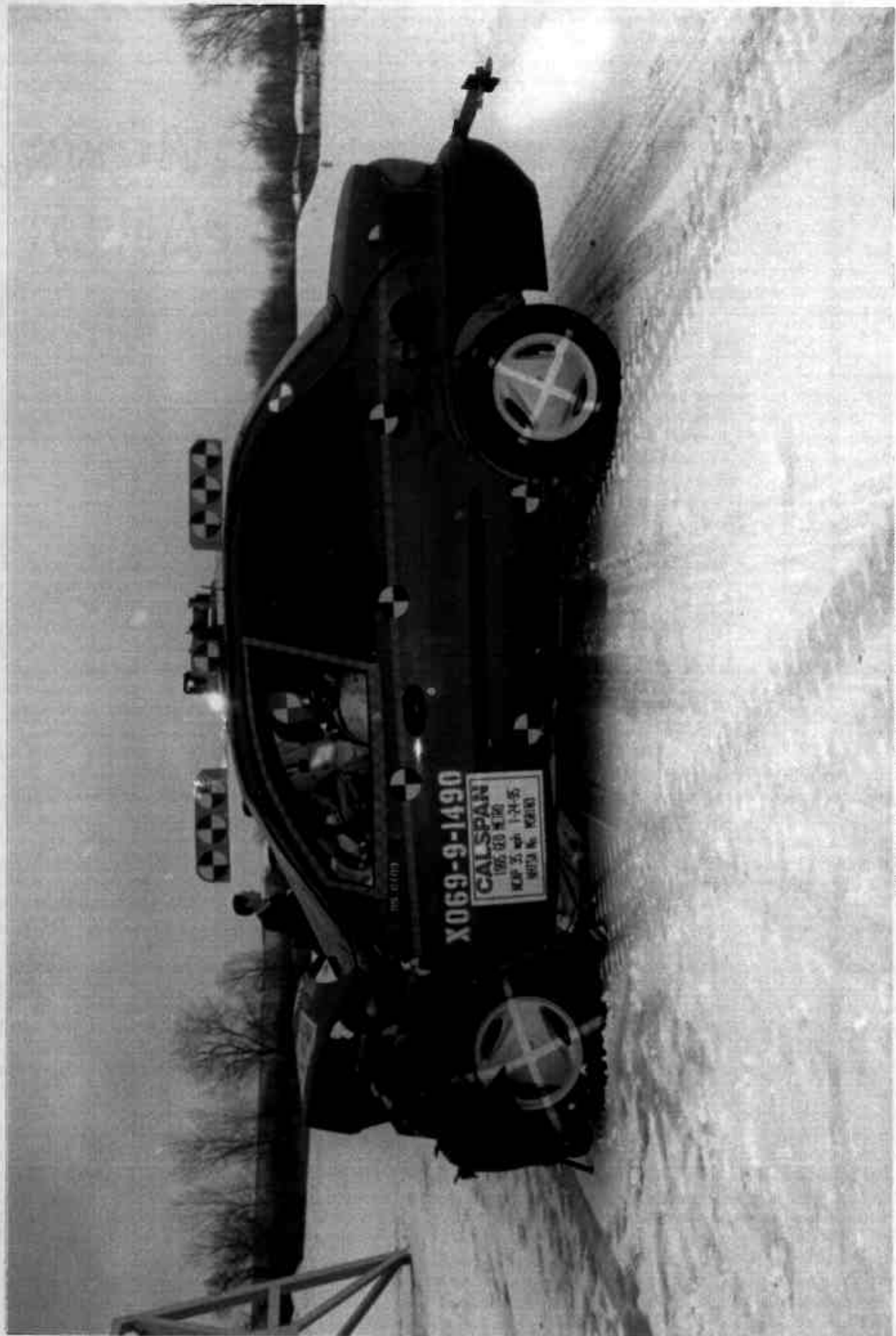


Figure A-5 POST-TEST LEFT SIDE VIEW

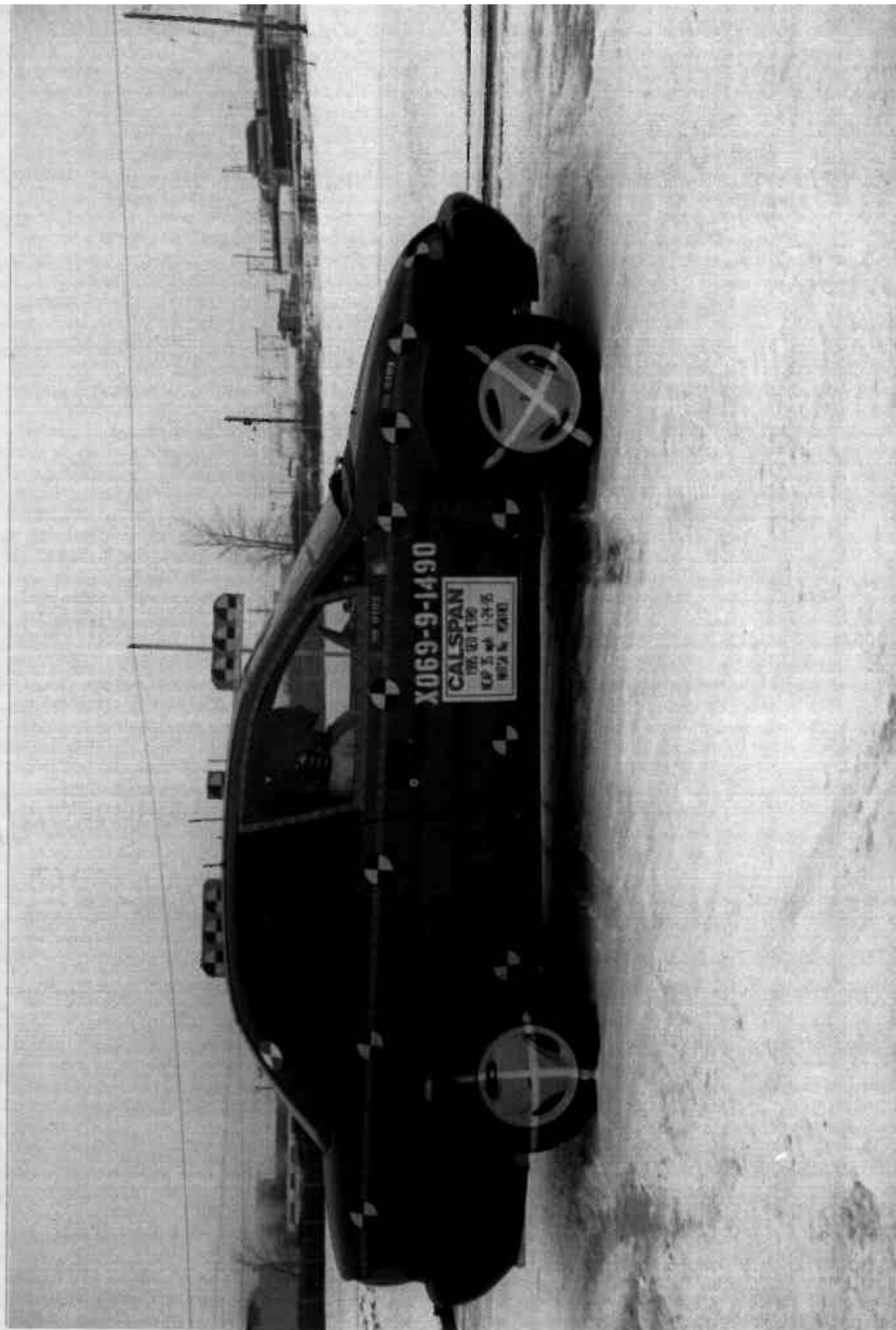


Figure A-6 PRE-TEST RIGHT SIDE VIEW

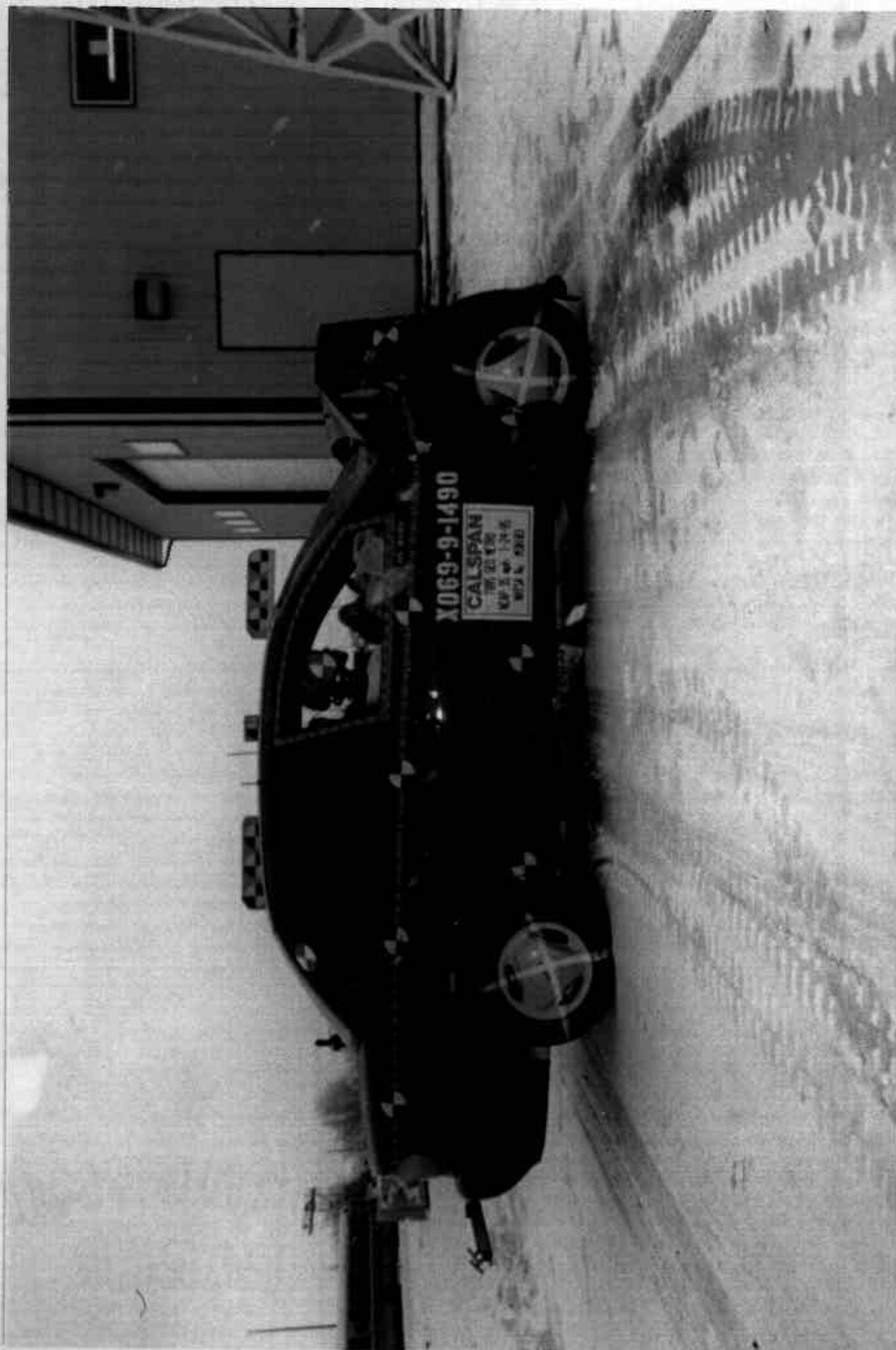


Figure A-7 POST-TEST RIGHT SIDE VIEW



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

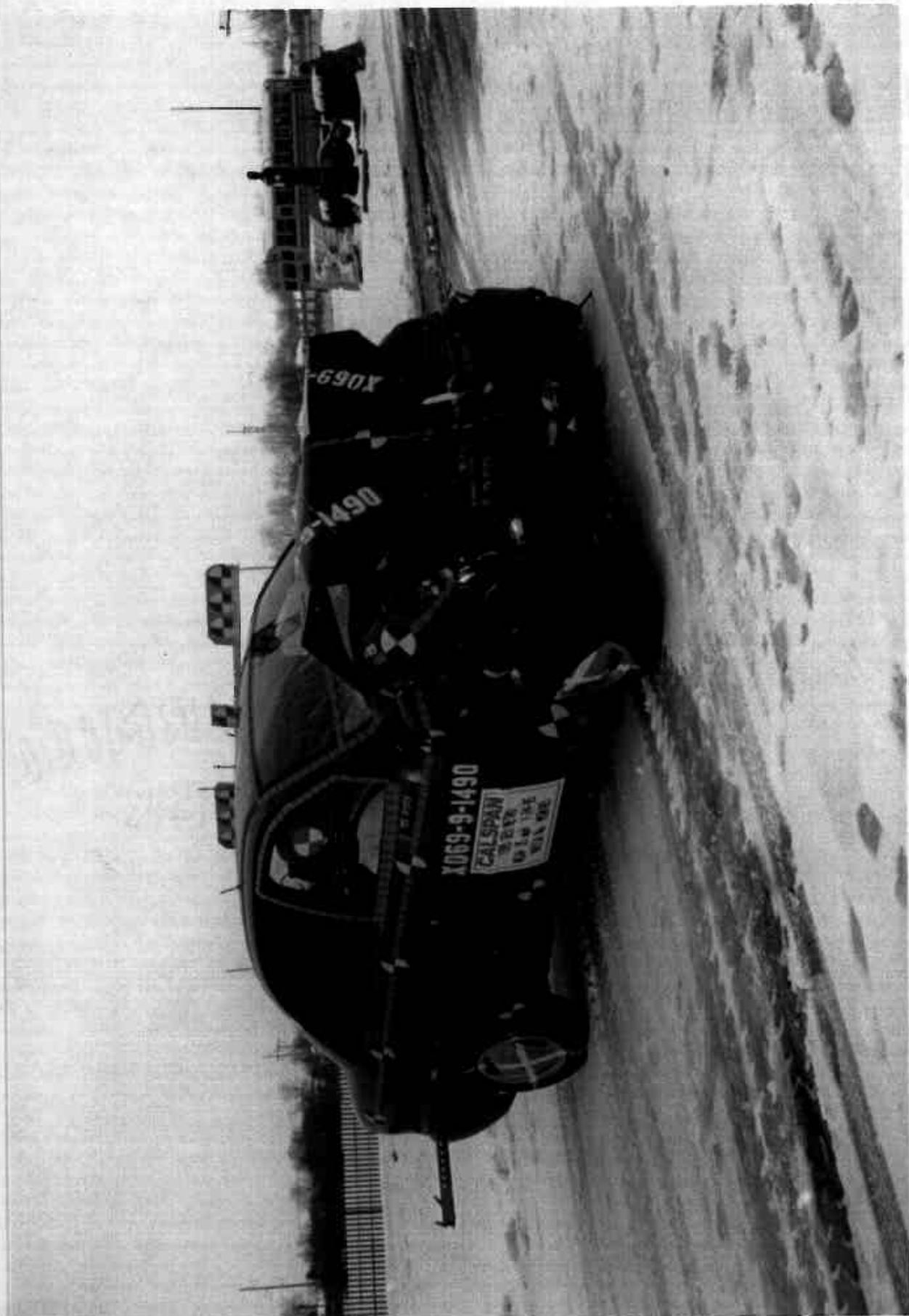


Figure A-9 POST-TEST RIGHT FRONT THREE-QUARTER VIEW



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

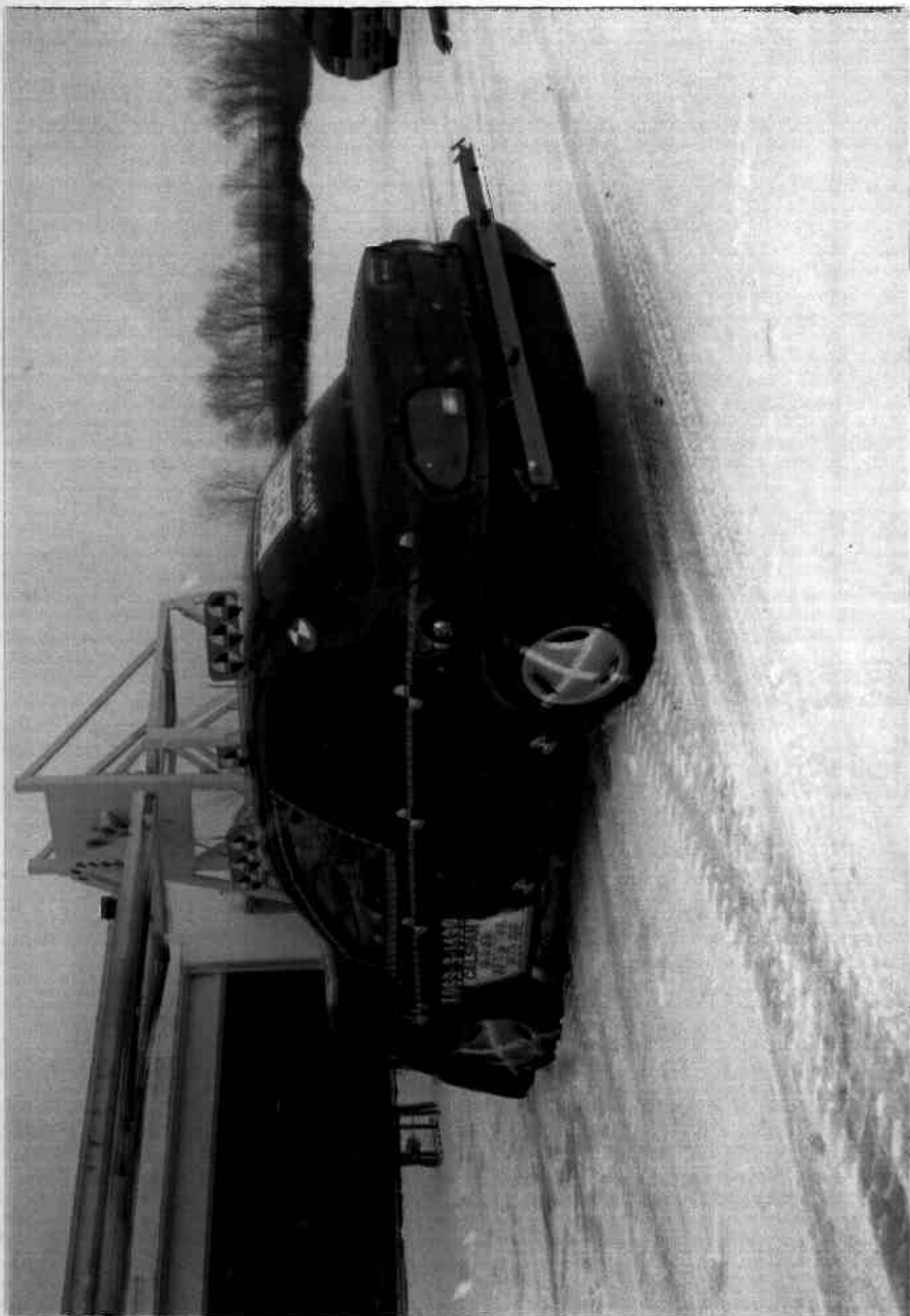


Figure A-11 POST-TEST LEFT REAR THREE-QUARTER VIEW



Figure A-12 PRE-TEST WINDSHIELD VIEW



Figure A-13 POST-TEST WINDSHIELD VIEW



Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW
A-16

8227-9



Figure A-15 FUEL CAP VIEW

PHOTOGRAPH NOT AVAILABLE



Figure A-17 POST-TEST FRONT UNDERBODY VIEW

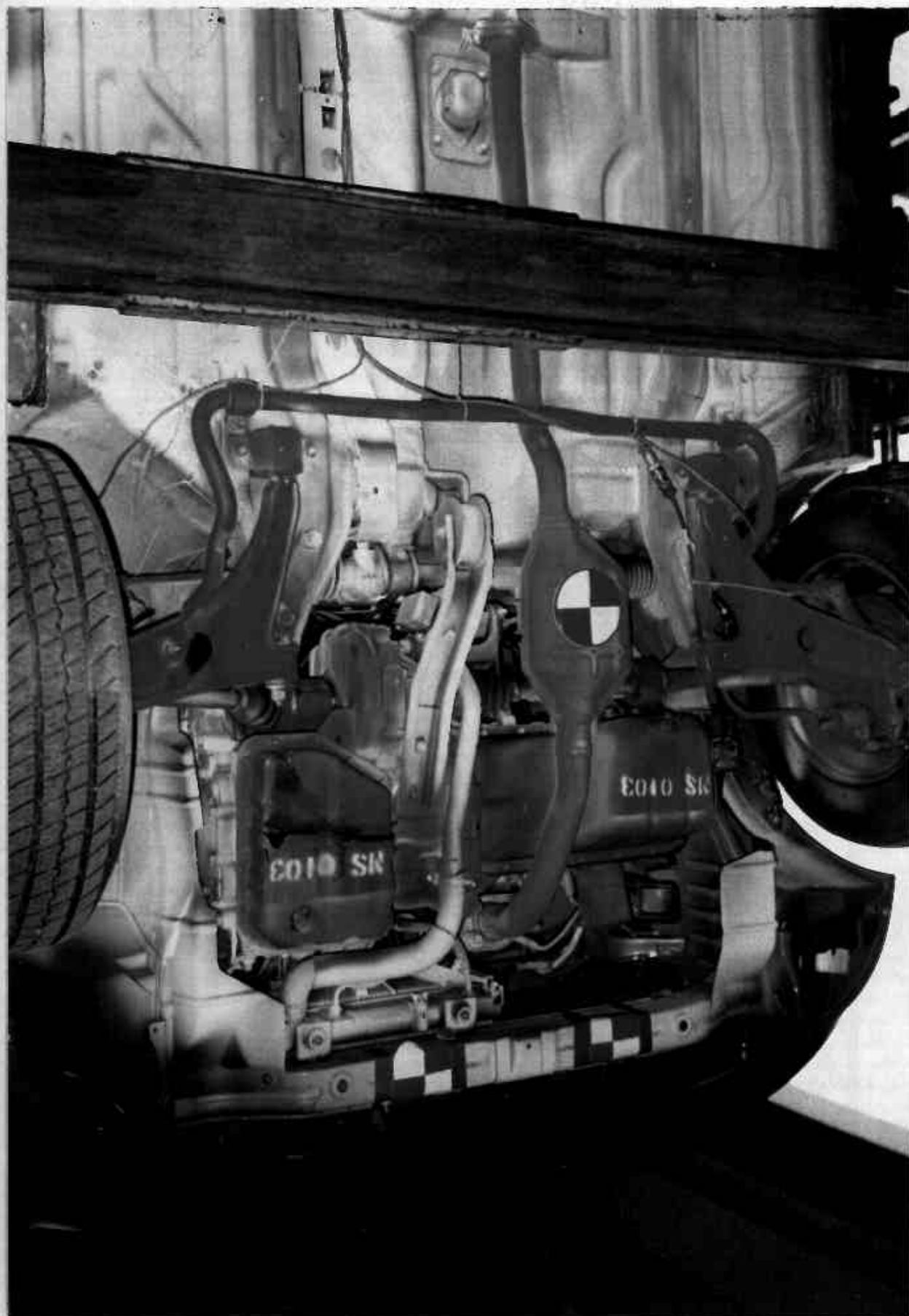


Figure A-18 PRE-TEST FRONT SIDE UNDERBODY VIEW



Figure A-19 POST-TEST FRONT SIDE UNDERBODY VIEW

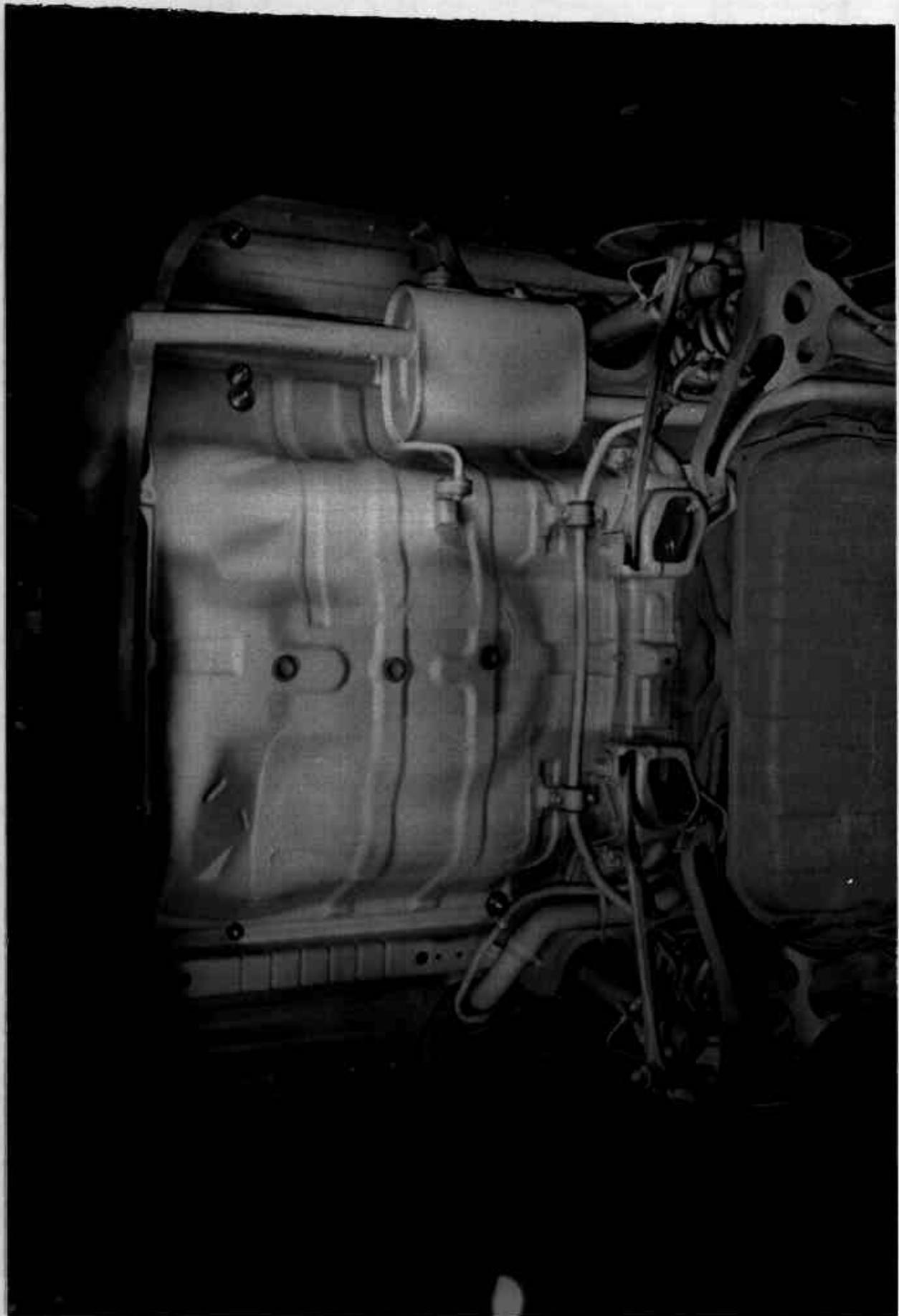


Figure A-20 PRE-TEST REAR UNDERBODY VIEW

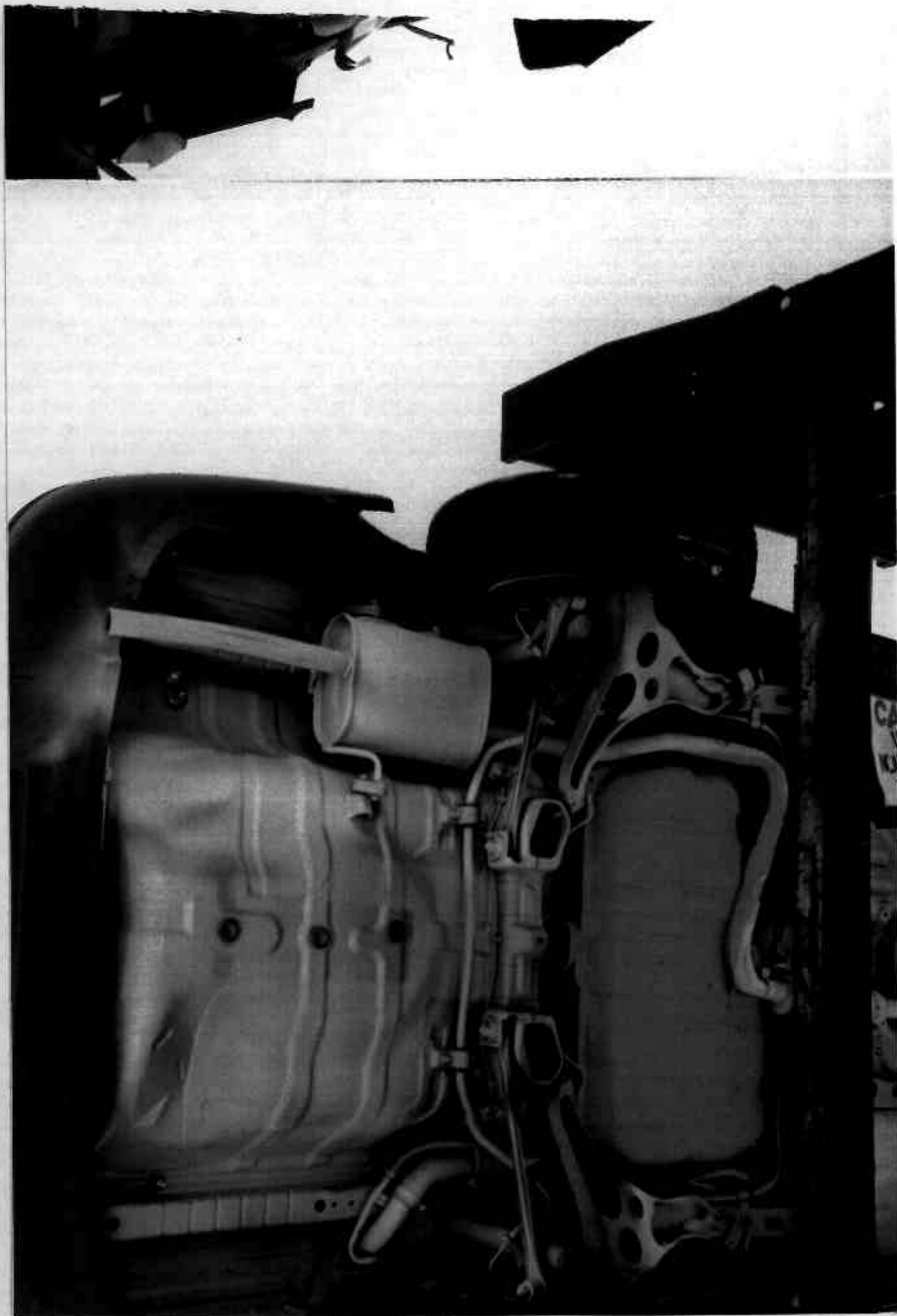


Figure A-21 POST-TEST REAR UNDERBODY VIEW



Figure A-22 PRE-TEST DRIVER POSITION VIEW



Figure A-23 POST-TEST DRIVER POSITION VIEW



Figure A-24 PRE-TEST PASSENGER POSITION VIEW



Figure A-25 POST-TEST PASSENGER POSITION VIEW



Figure A-26 PRE-TEST DRIVER AND INTERIOR VIEW
A-28

8227-9



Figure A-27 POST-TEST DRIVER AND INTERIOR VIEW
A-29

8227-9



Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW
A-30

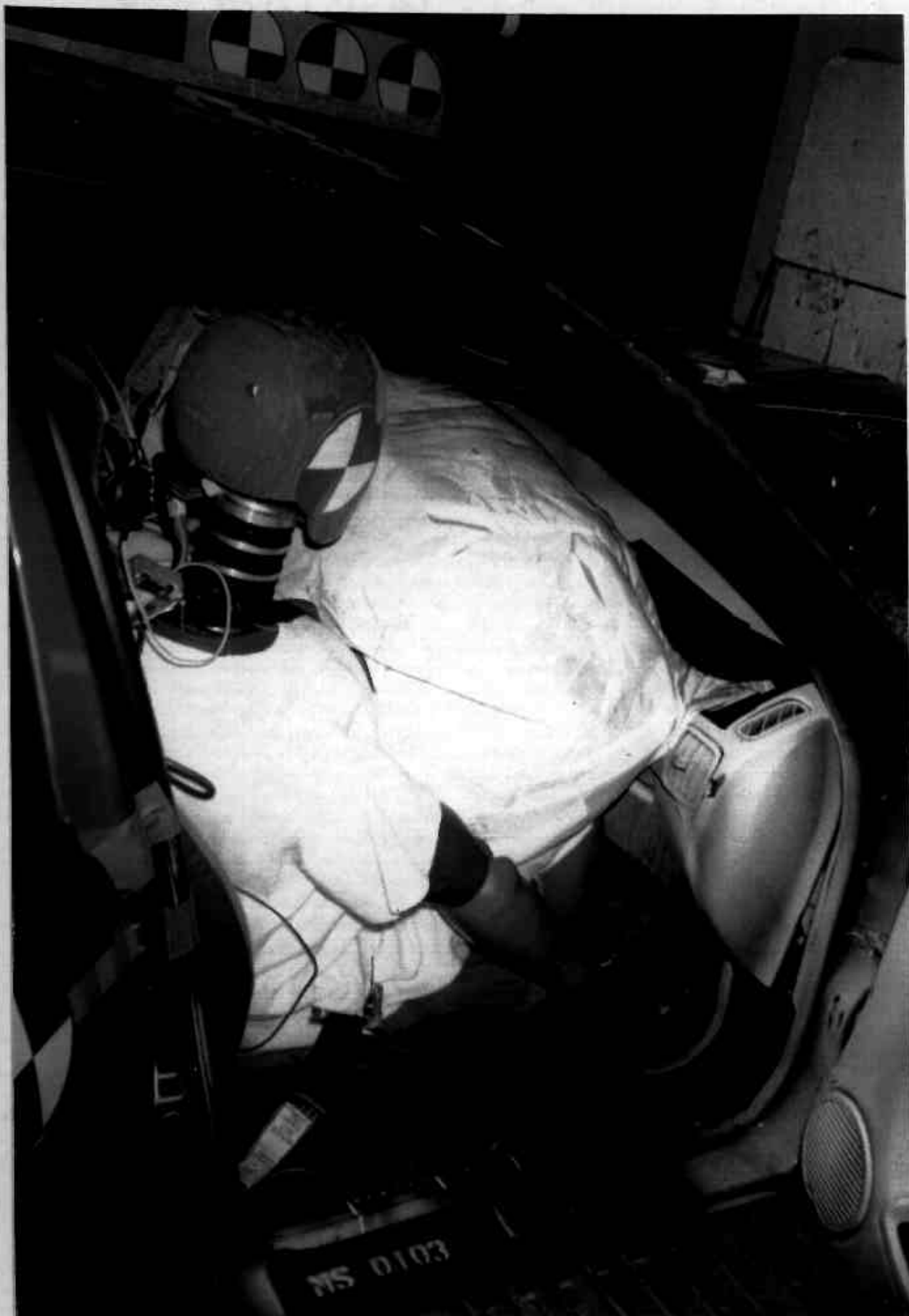


Figure A-29 POST-TEST PASSENGER AND INTERIOR VIEW
A-31

8227-9



Figure A-30 PRE-TEST DRIVER HEAD LOCATION
A-32



Figure A-31 PRE-TEST PASSENGER HEAD LOCATION
A-33



Figure A-32 IMPACT VIEW

Appendix B

VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

TEST NO. MS0103

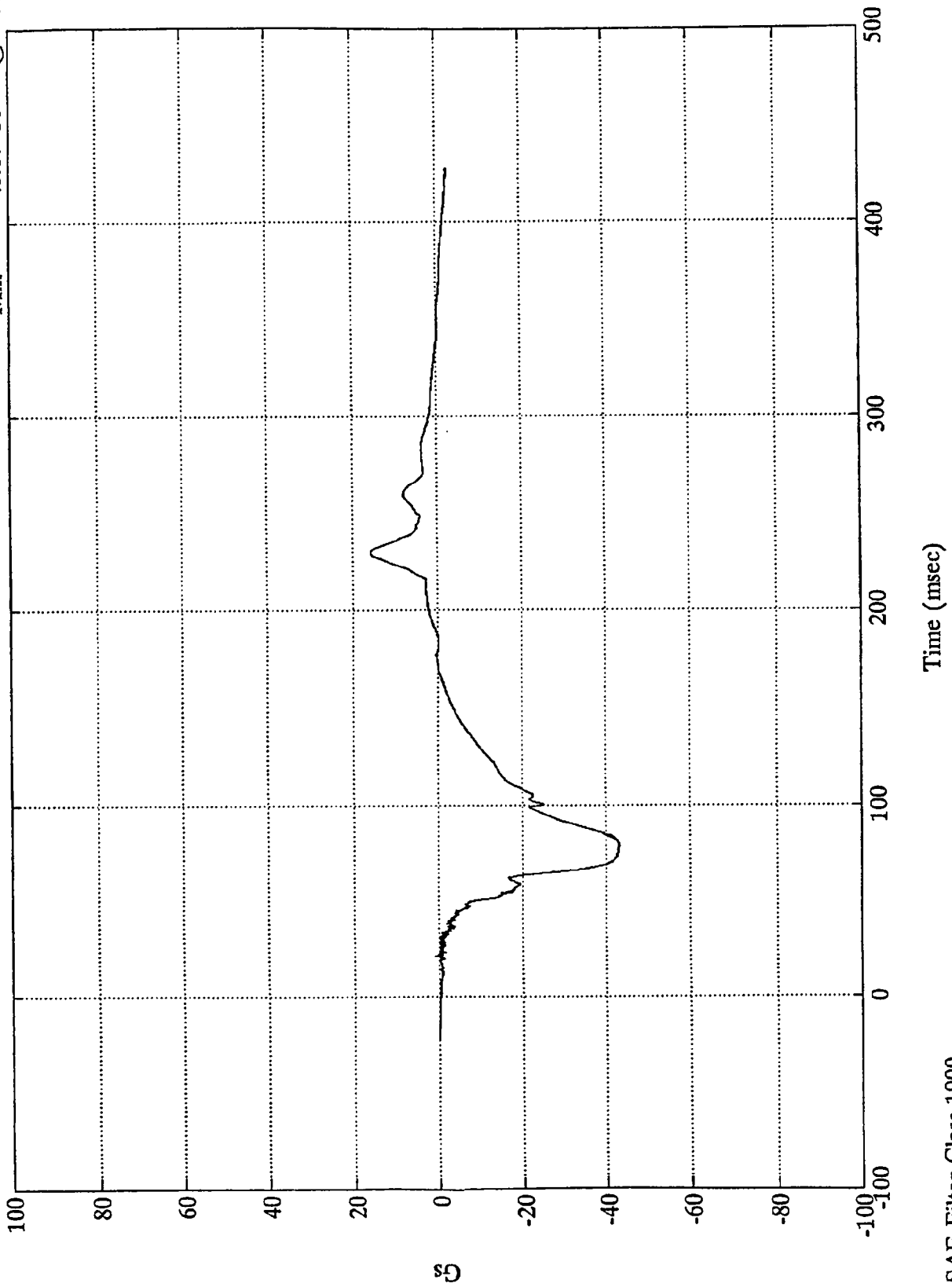
DUMMY DATA

CLASS	FILTER CHANNEL
Head Accelerations	1000
Chest Accelerations	180
Chest Displacements	60
Femur Forces	600
Belt Loads	60
Belt Displacements	180
Neck Forces	1000
Neck Moments	600

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Head X

Max = 15.75 Gs @ 230.16 msec
Min = -43.07 Gs @ 80.52 msec

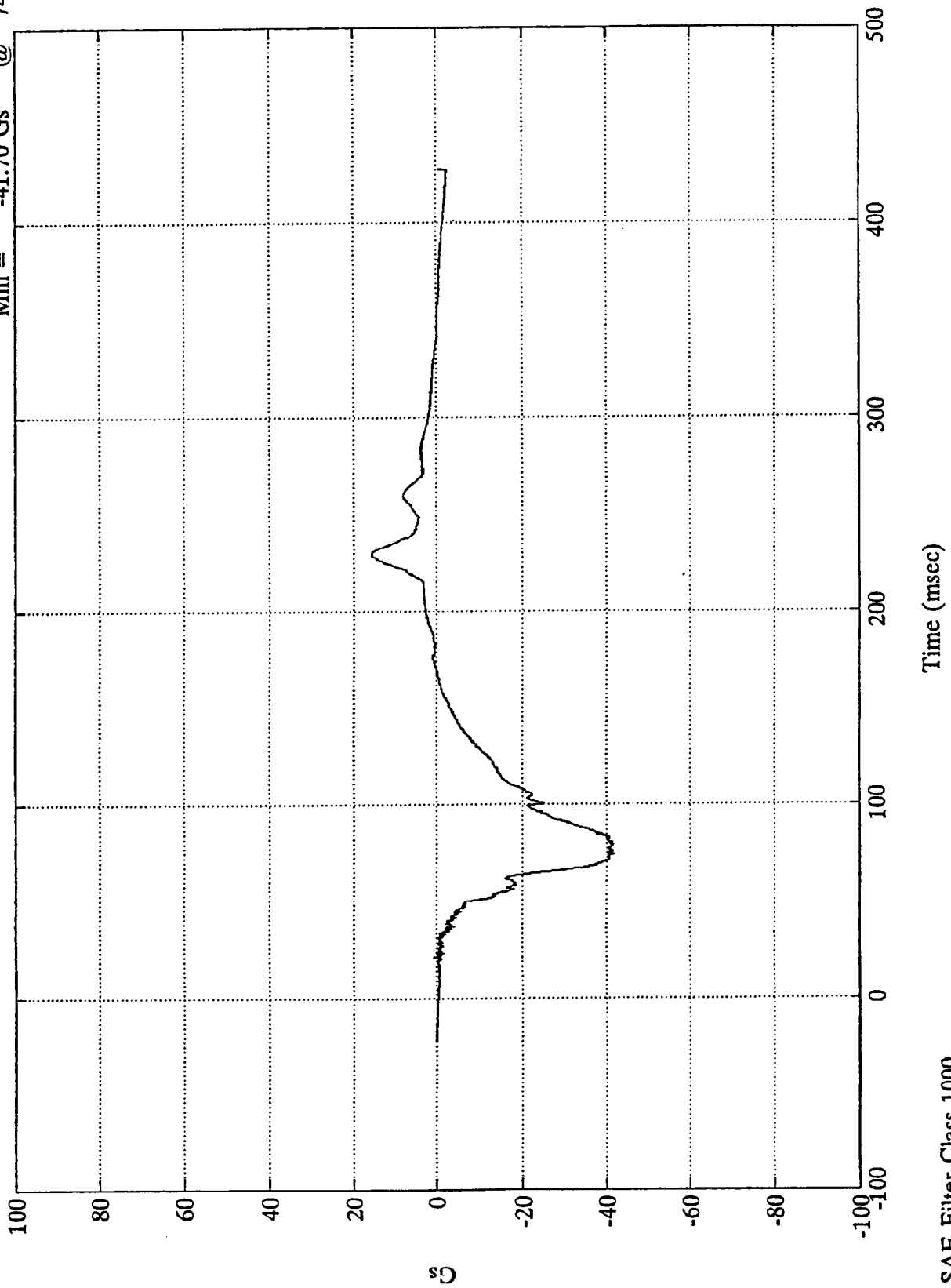


SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Head X(R)

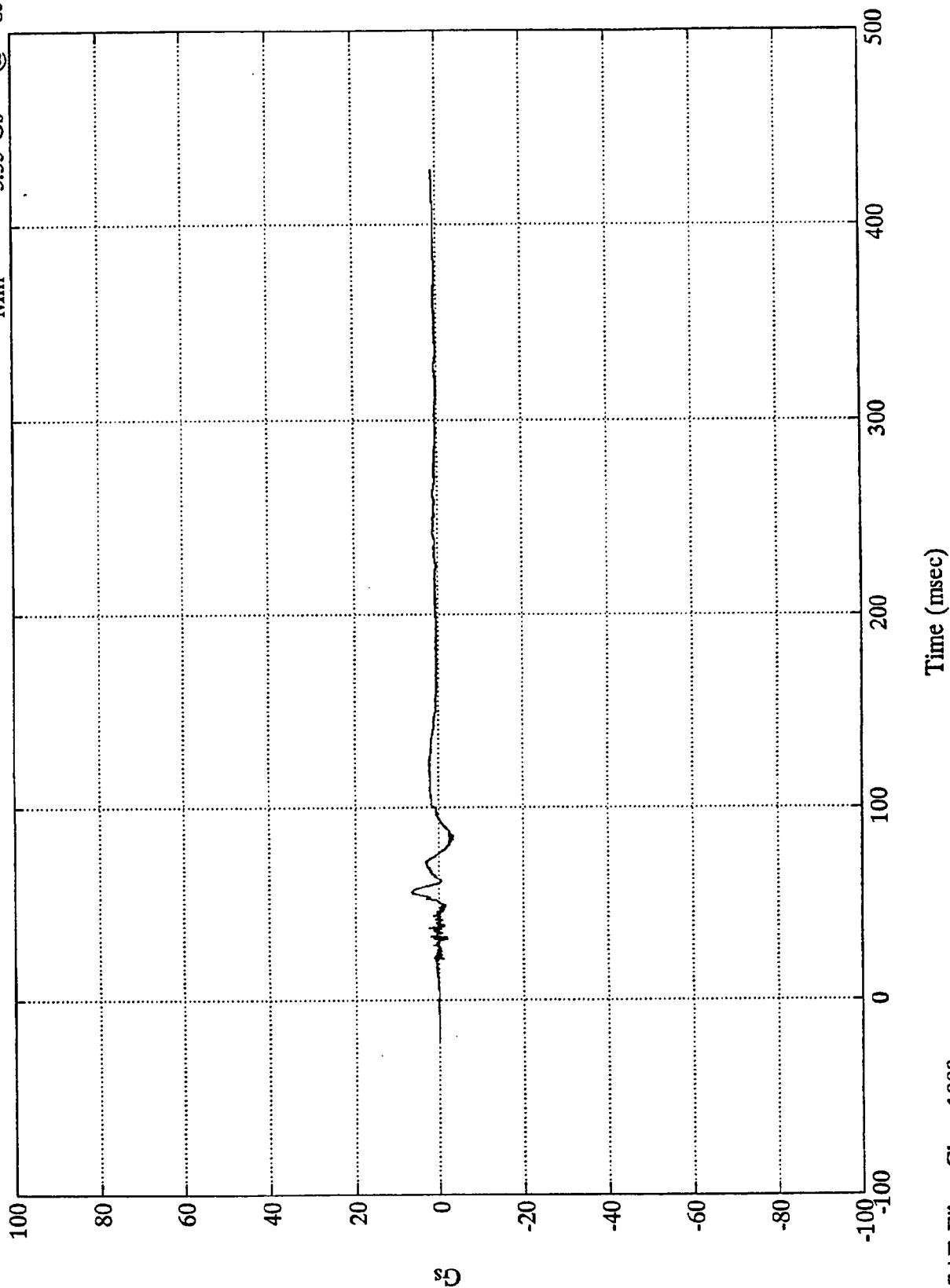
Max = 15.66 Gs @ 230.04 msec
Min = -41.70 Gs @ 74.16 msec



NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Head Y

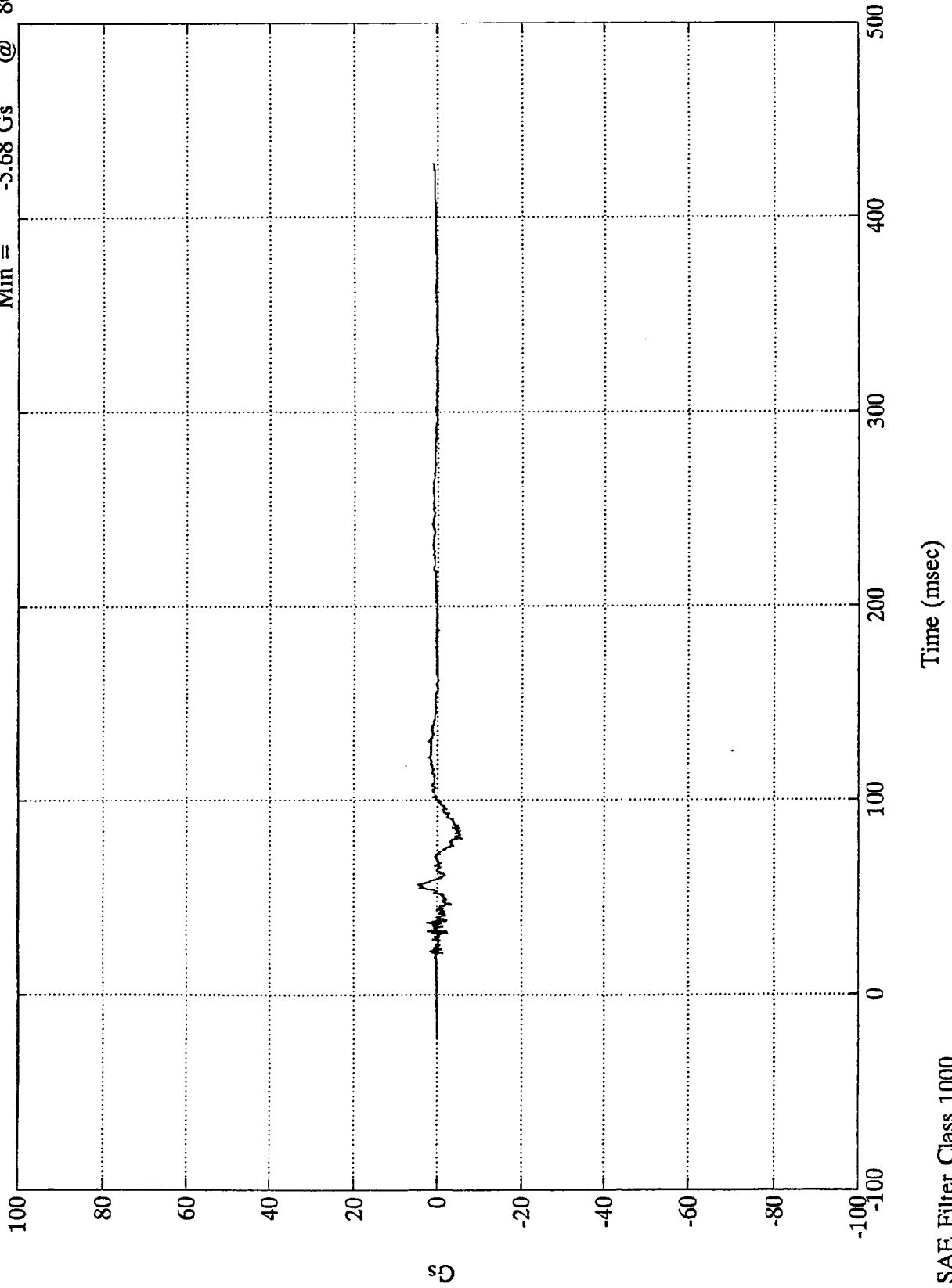
Max = 6.59 Gs @ 56.40 msec
Min = -3.35 Gs @ 85.80 msec



SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

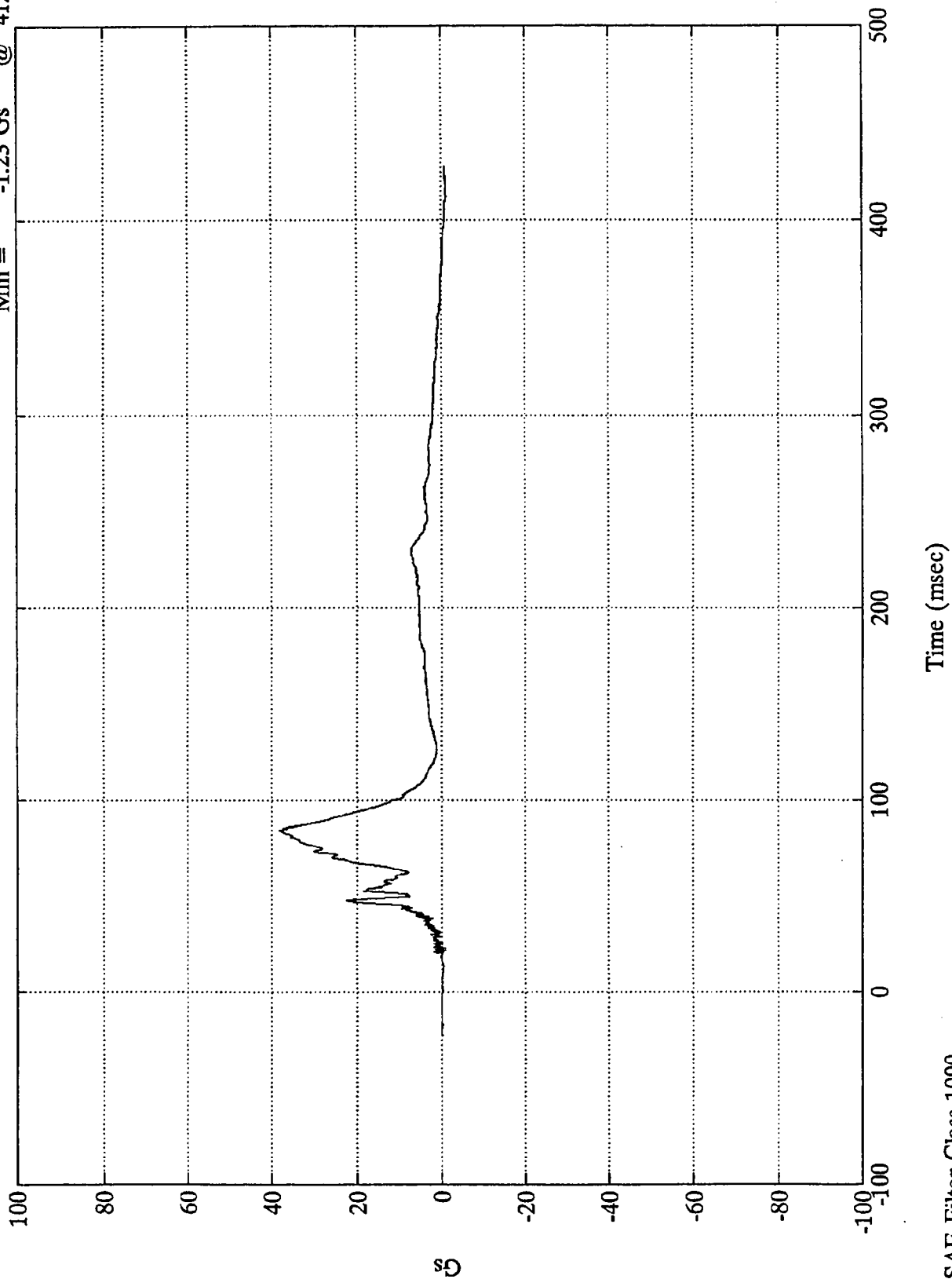
Pos. 1 Head Y(R) Max = 4.80 Gs @ 57.36 msec
Min = -5.68 Gs @ 80.88 msec



NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Head Z

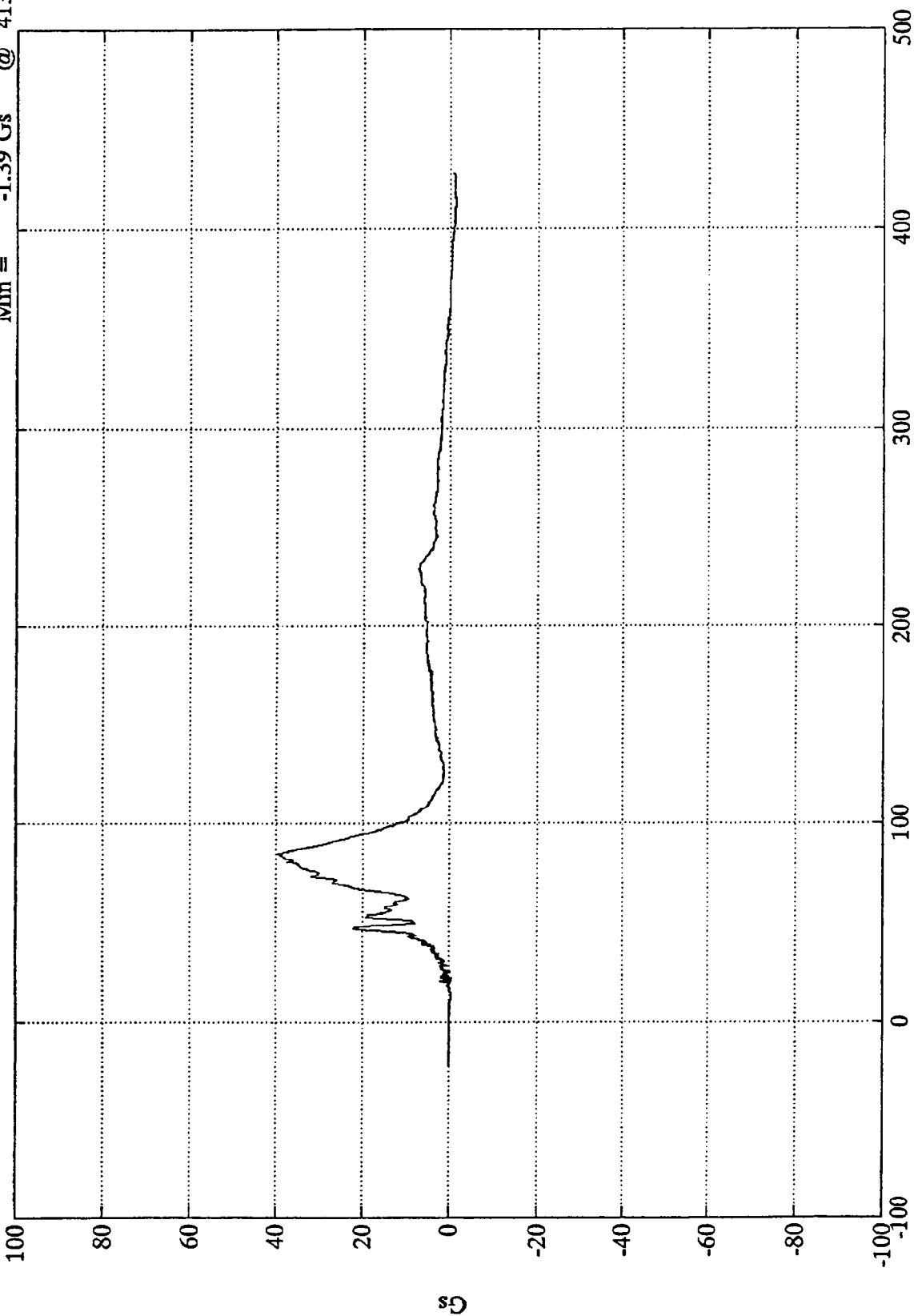
Max = 38.36 Gs @ 84.36 msec
Min = -1.23 Gs @ 412.67 msec



NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Head Z(R)

Max = 39.59 Gs @ 84.36 msec
Min = -1.39 Gs @ 413.40 msec

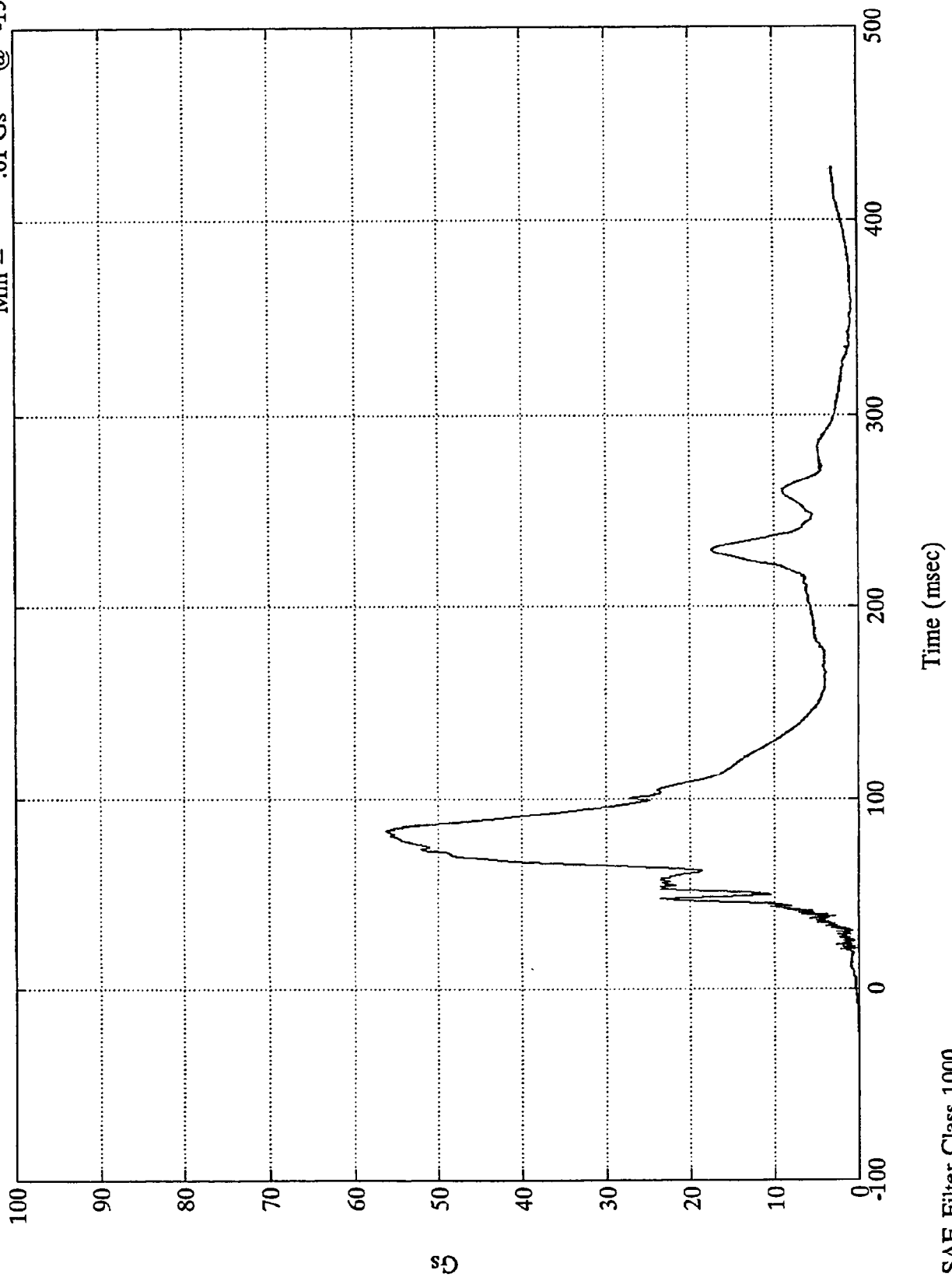


Time (msec)

SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Head Resultant
Max = 56.26 Gs @ 83.76 msec
Min = .01 Gs @ -13.80 msec

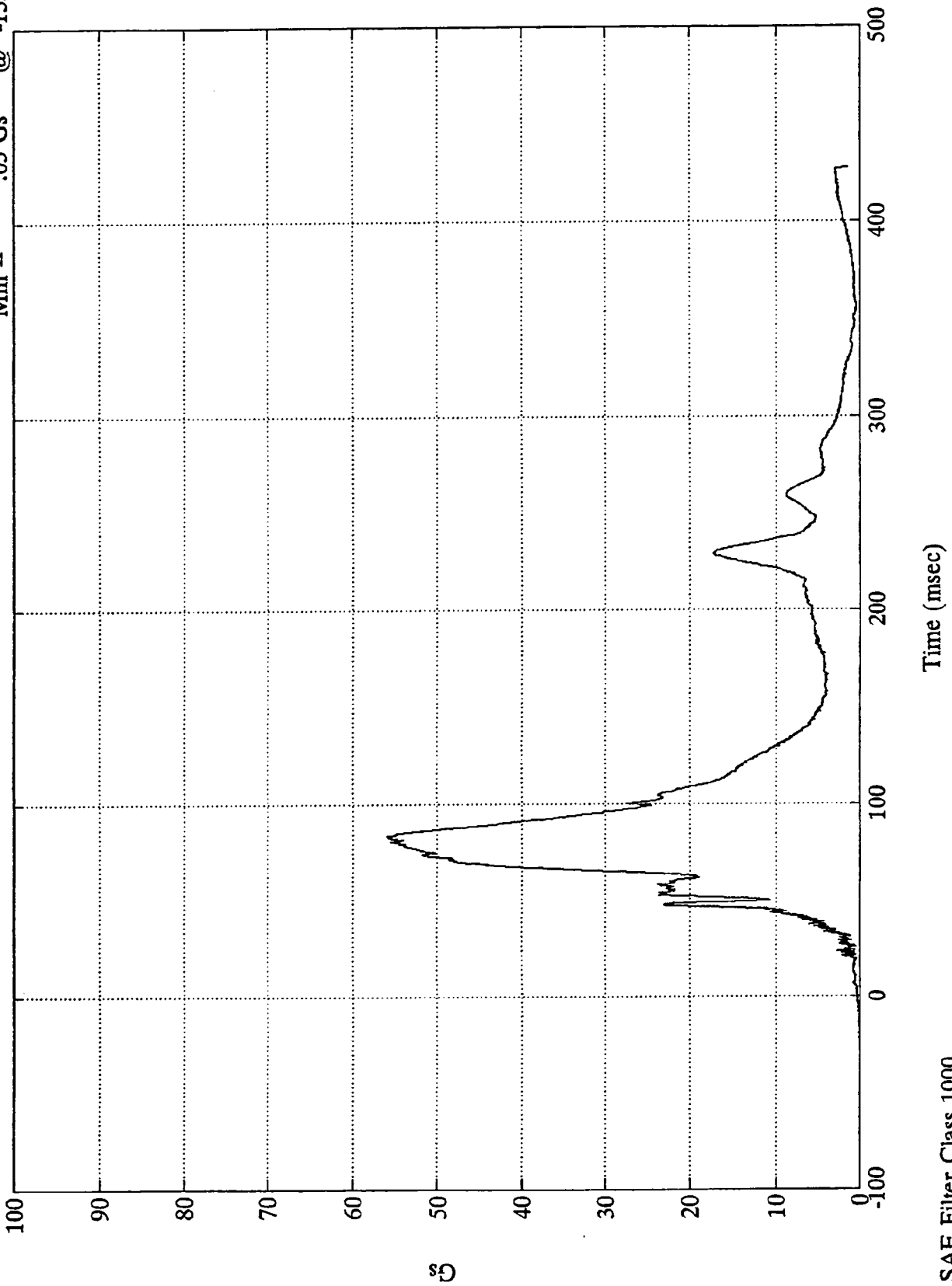


SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Head Resultant(R)

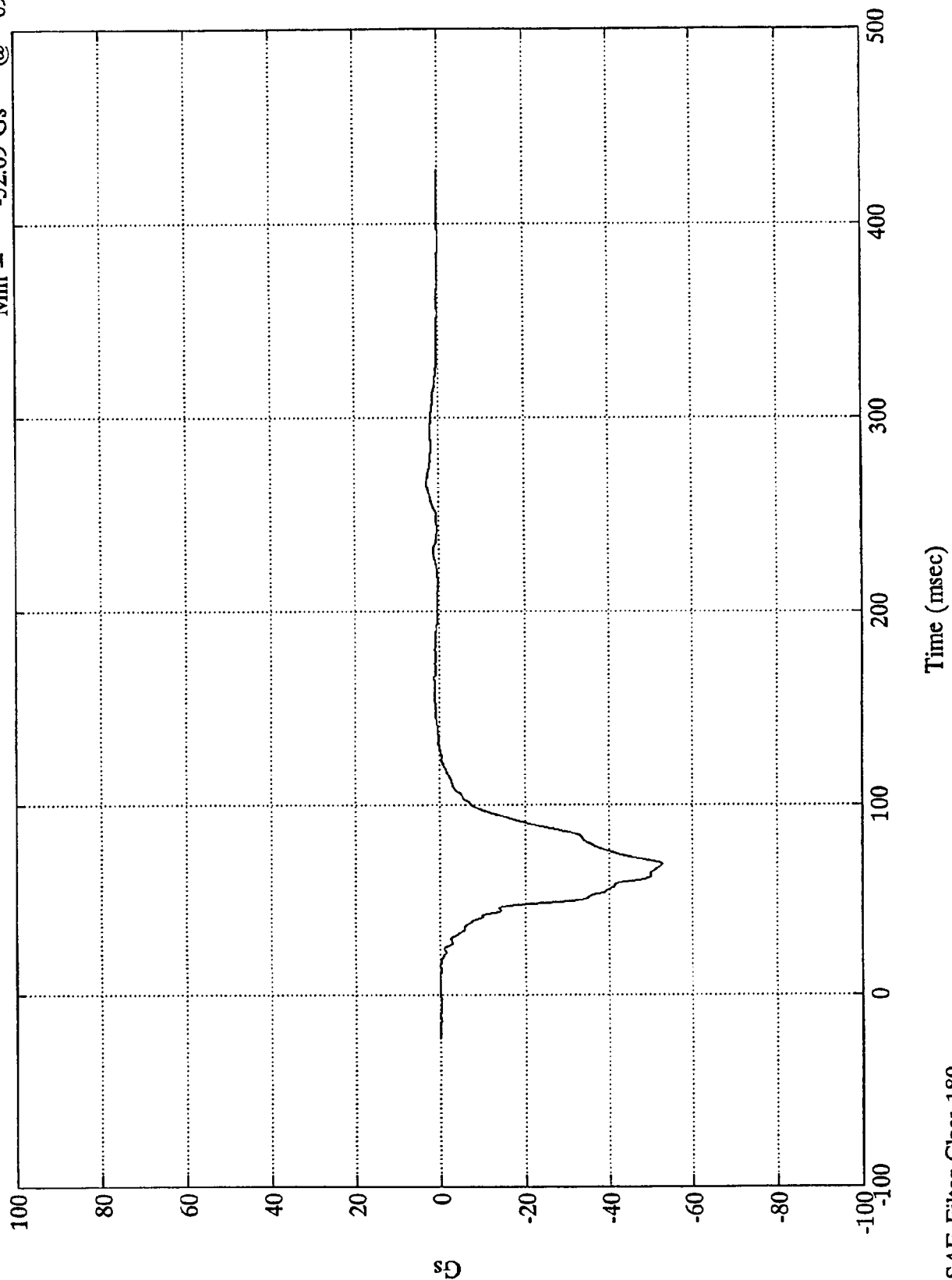
Max = 55.95 Gs @ 83.76 msec
Min = .03 Gs @ -13.08 msec



NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Chest X

Max = 2.92 Gs @ 267.36 msec
Min = -52.69 Gs @ 69.59 msec

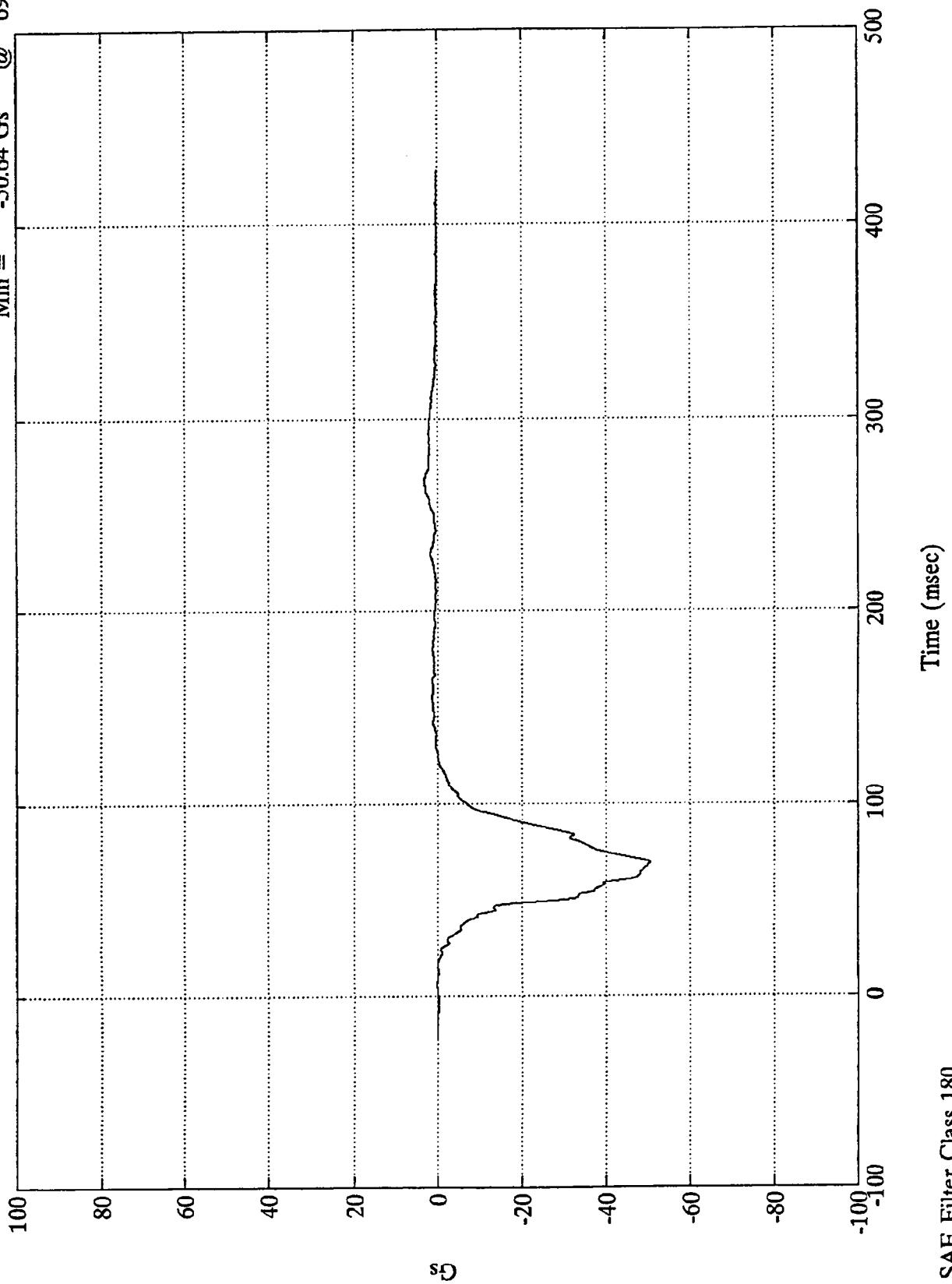


SAE Filter Class 180

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Chest X(R)

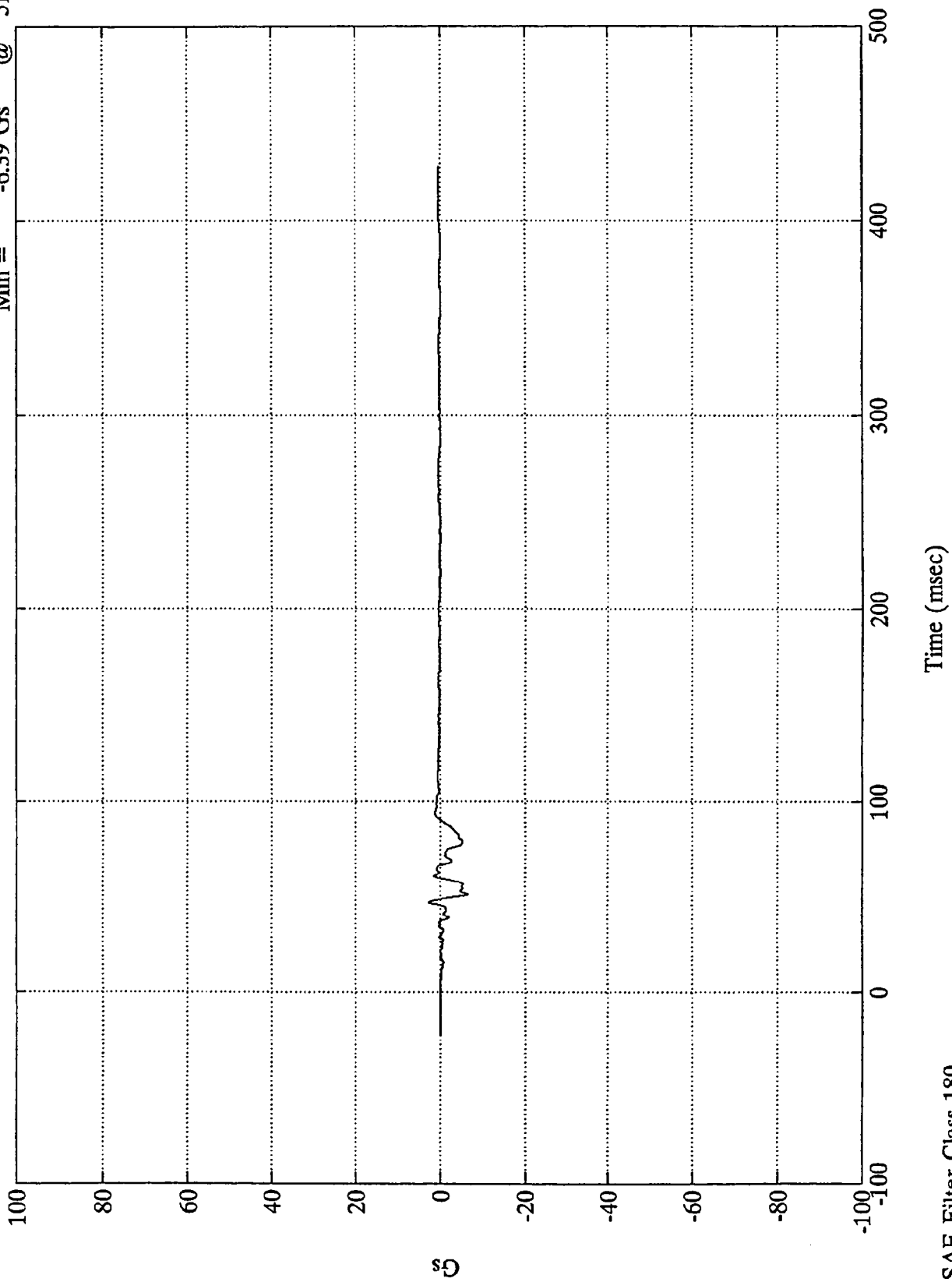
Max = 3.24 Gs @ 267.72 msec
Min = -50.64 Gs @ 69.72 msec



SAE Filter Class 180

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Chest Y
 Max = 2.72 Gs @ 47.04 msec
 Min = -6.39 Gs @ 51.36 msec

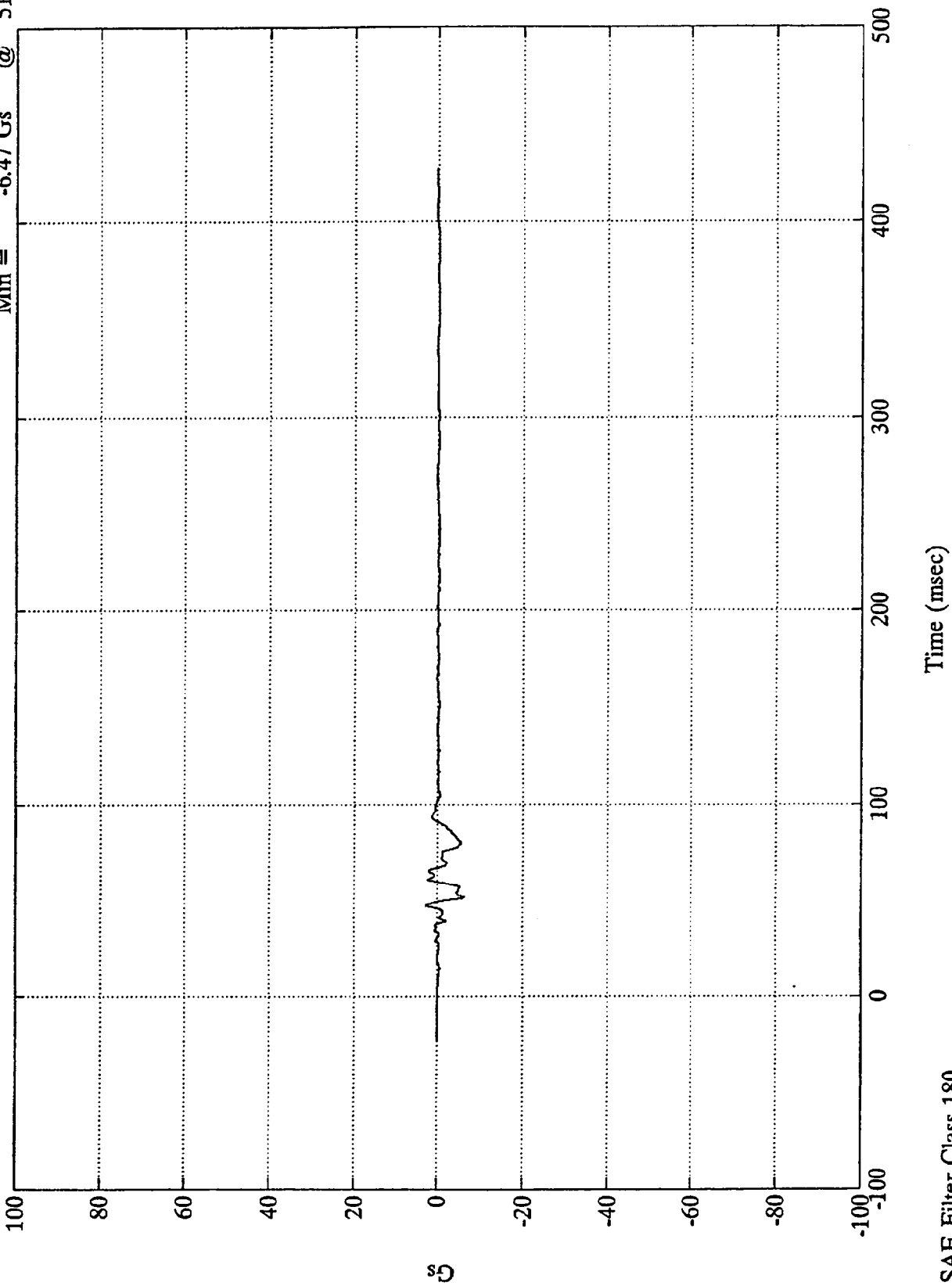


SAE Filter Class 180

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Chest Y(R)

Max = 2.71 Gs @ 46.92 msec
Min = -6.47 Gs @ 51.24 msec

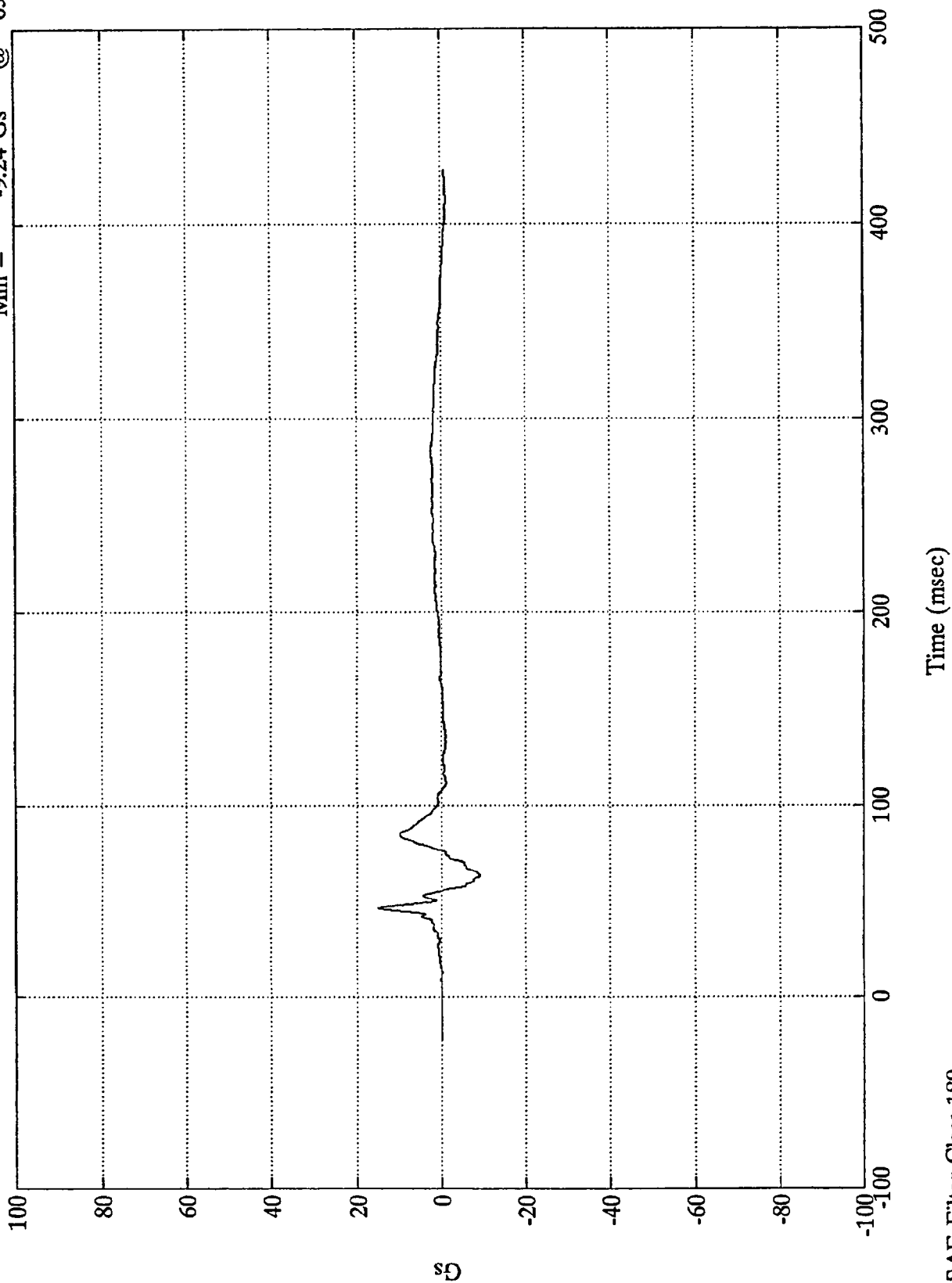


SAE Filter Class 180

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Chest Z

Max = 14.95 Gs @ 46.56 msec
Min = -9.24 Gs @ 63.48 msec

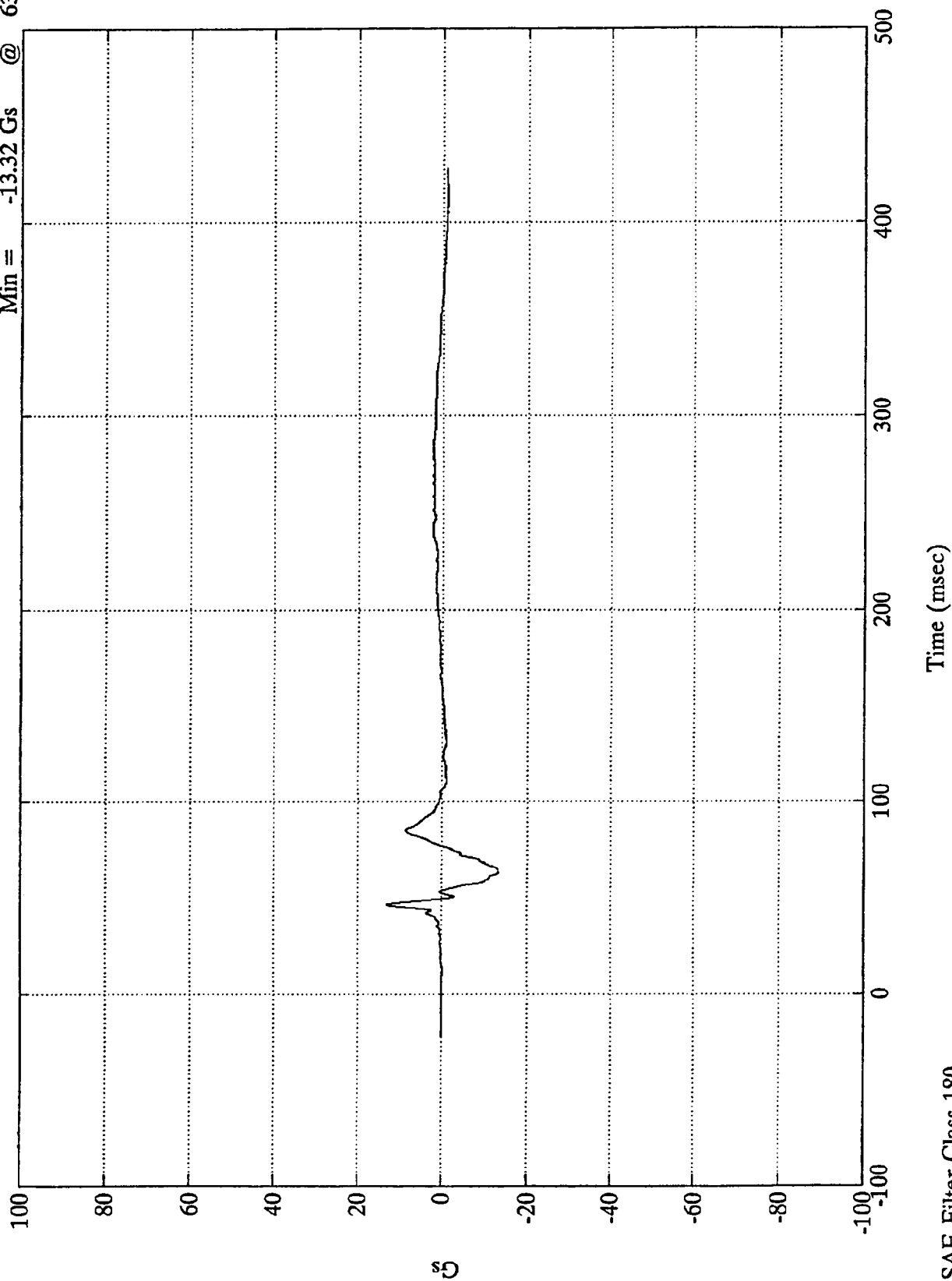


SAE Filter Class 180

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Chest Z(R)

Max = 13.07 Gs @ 46.44 msec
Min = -13.32 Gs @ 63.35 msec

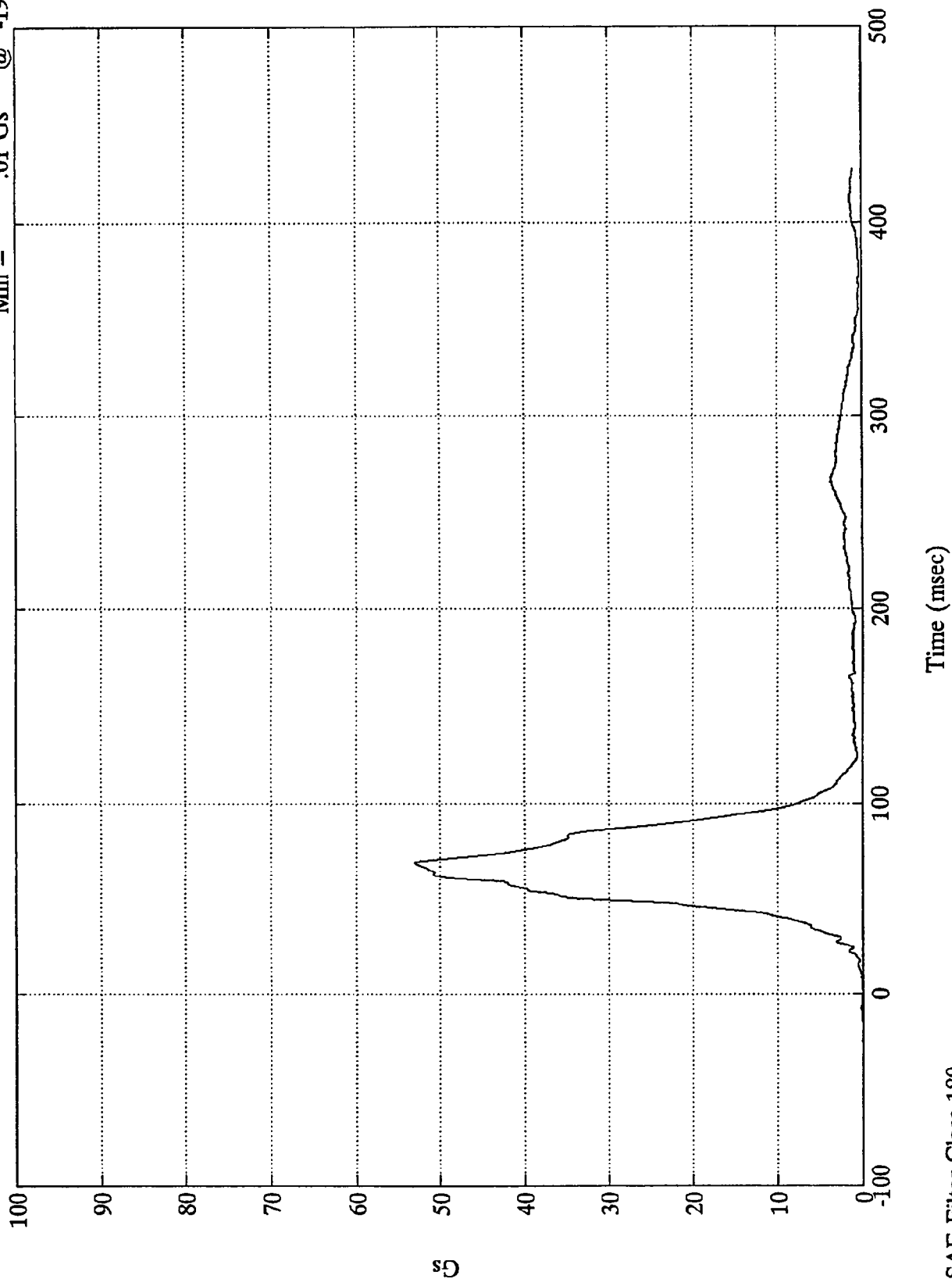


SAE Filter Class 180

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Chest Resultant

Max = 53.01 Gs @ 69.59 msec
 Min = .01 Gs @ -19.56 msec

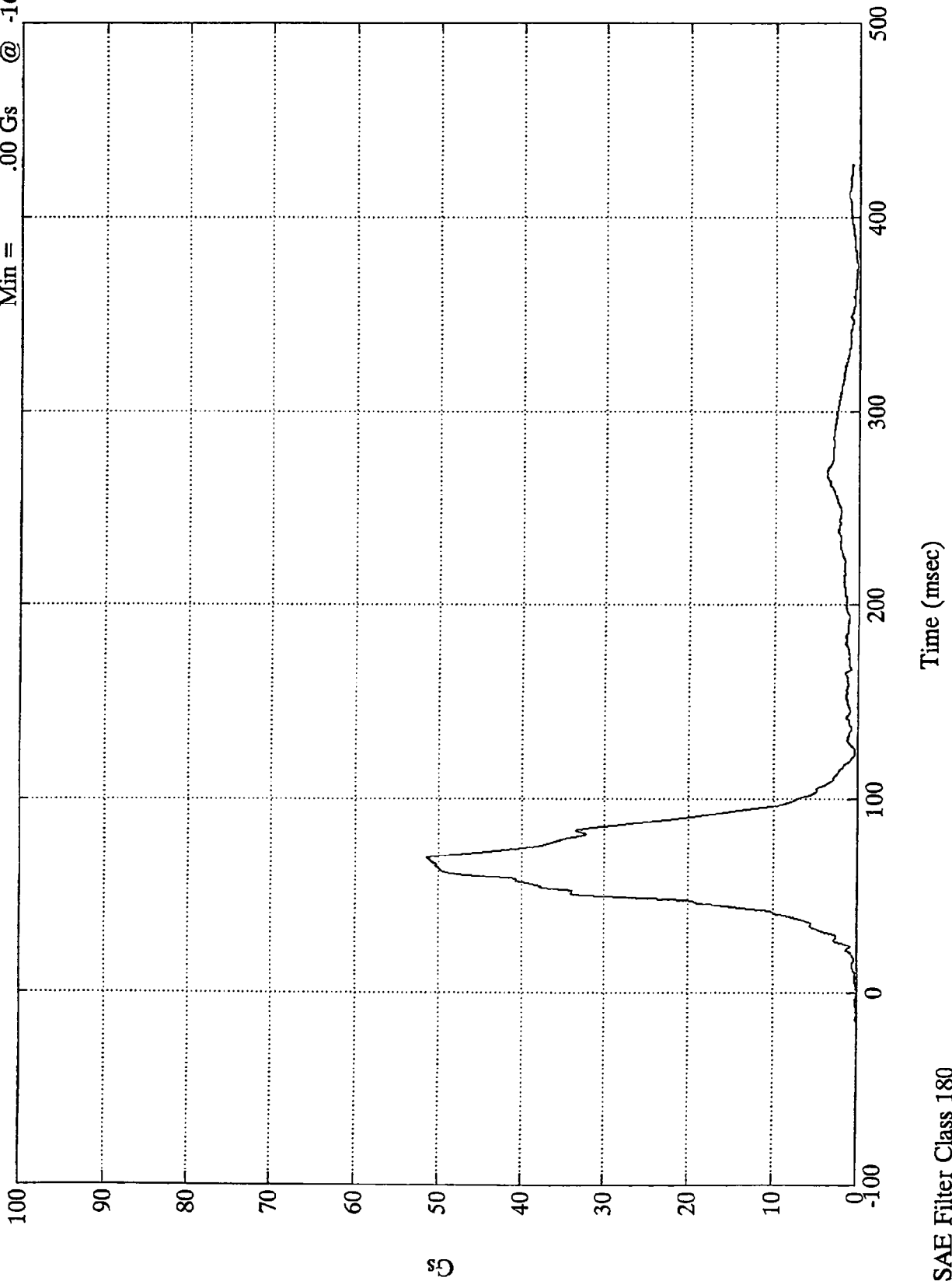


SAE Filter Class 180

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Chest Resultant(R)

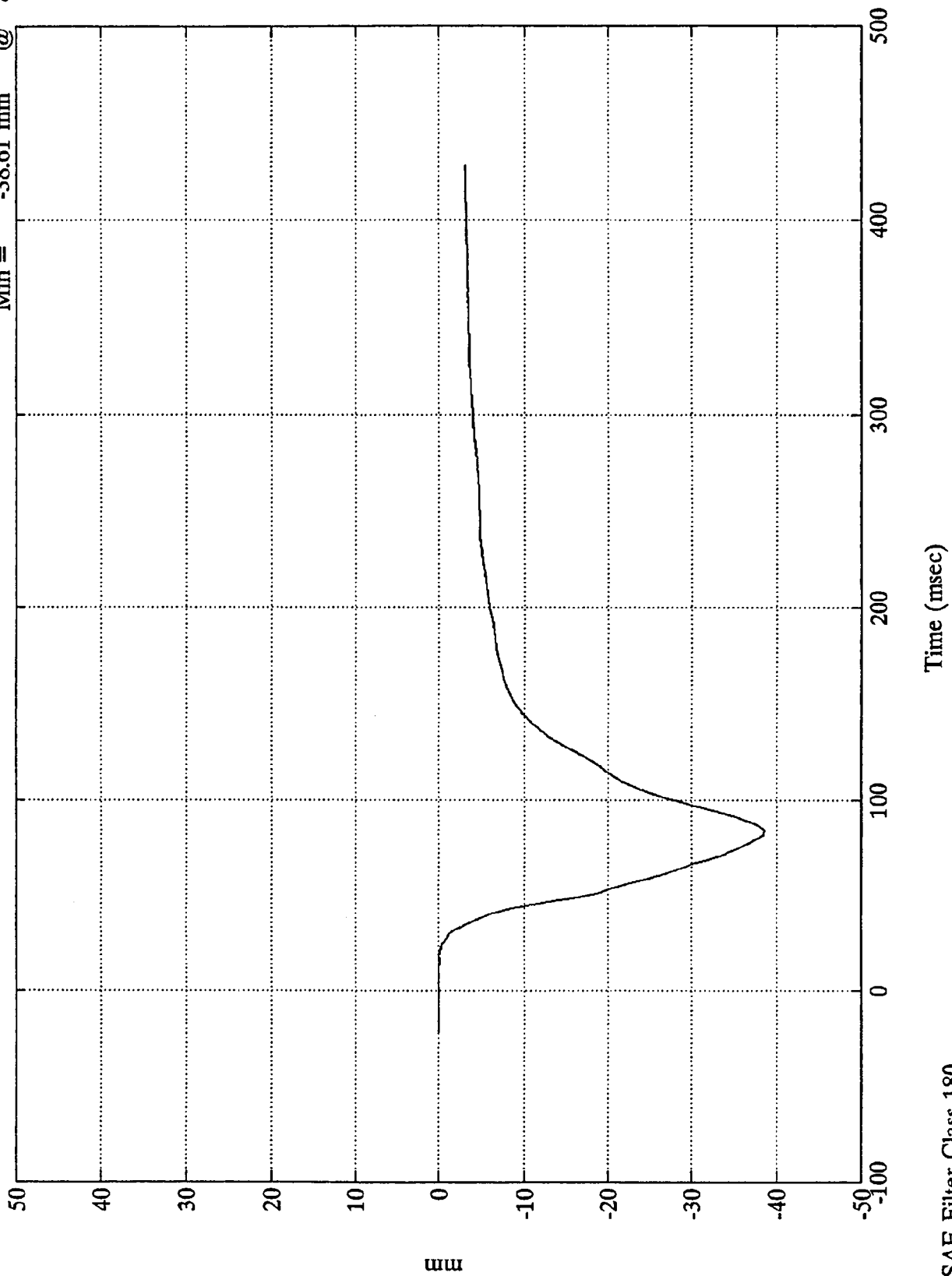
Max = 51.45 Gs @ 69.72 msec
Min = .00 Gs @ -16.20 msec



NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Chest Disp.

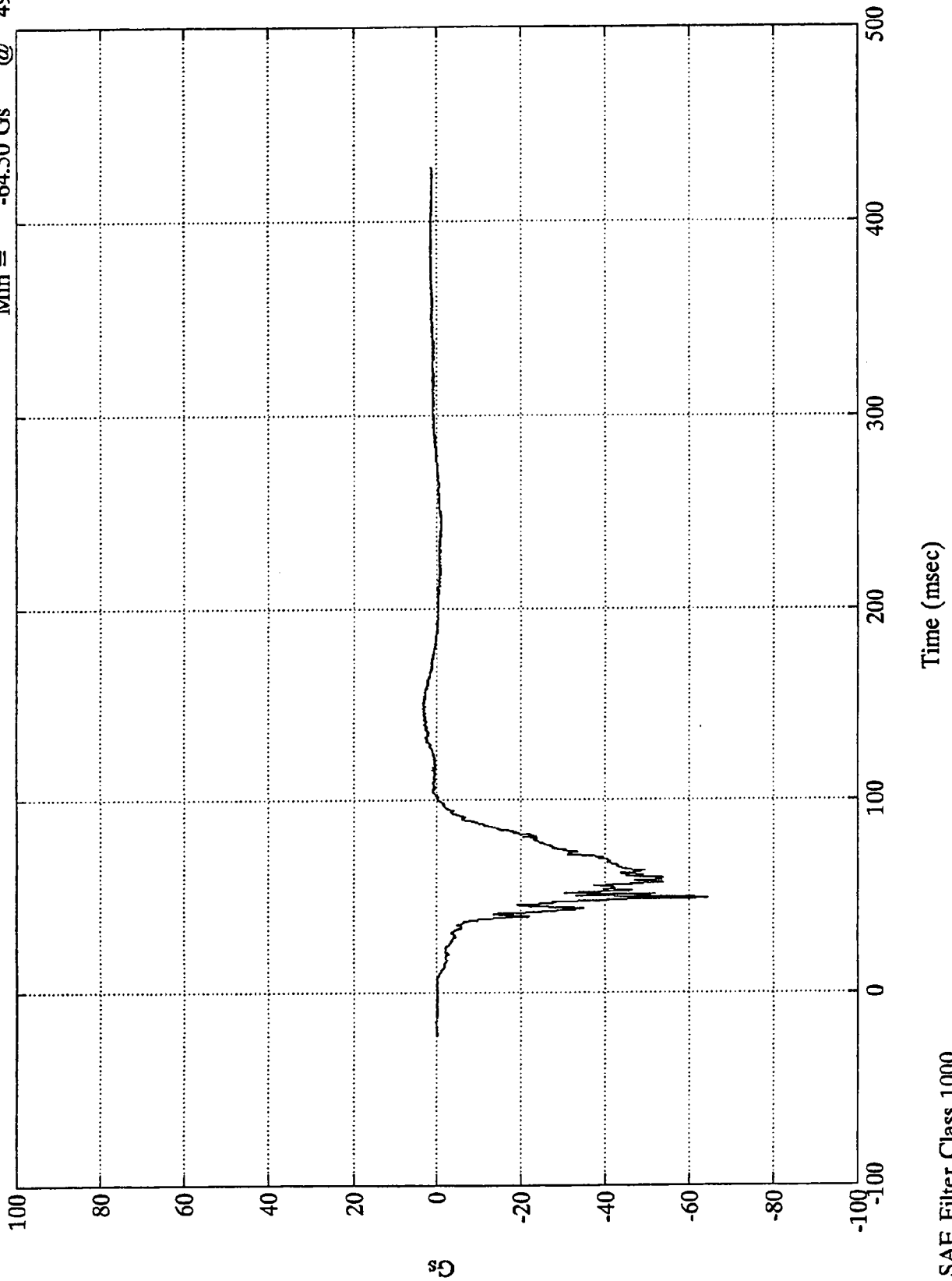
Max = .01 mm @ -6.84 msec
 Min = -38.61 mm @ 84.12 msec



SAE Filter Class 180

NCAP TEST #9 - 1995 GEO METRO

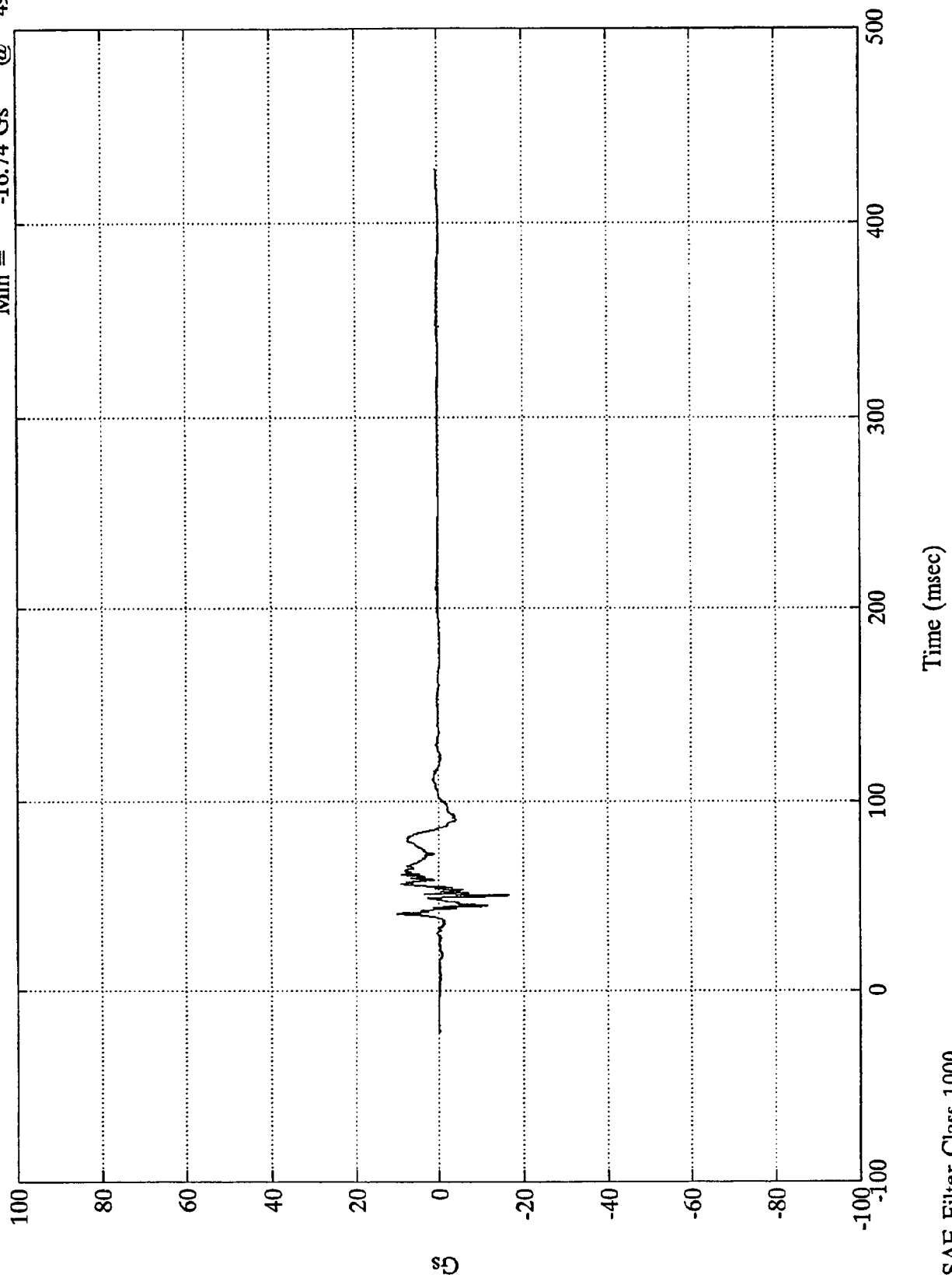
Pos. 1 Pelvic (X) Max = 3.23 Gs @ 147.72 msec
Min = -64.50 Gs @ 49.56 msec



NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Pelvic (Y)

Max = 10.02 Gs @ 40.31 msec
Min = -16.74 Gs @ 49.92 msec

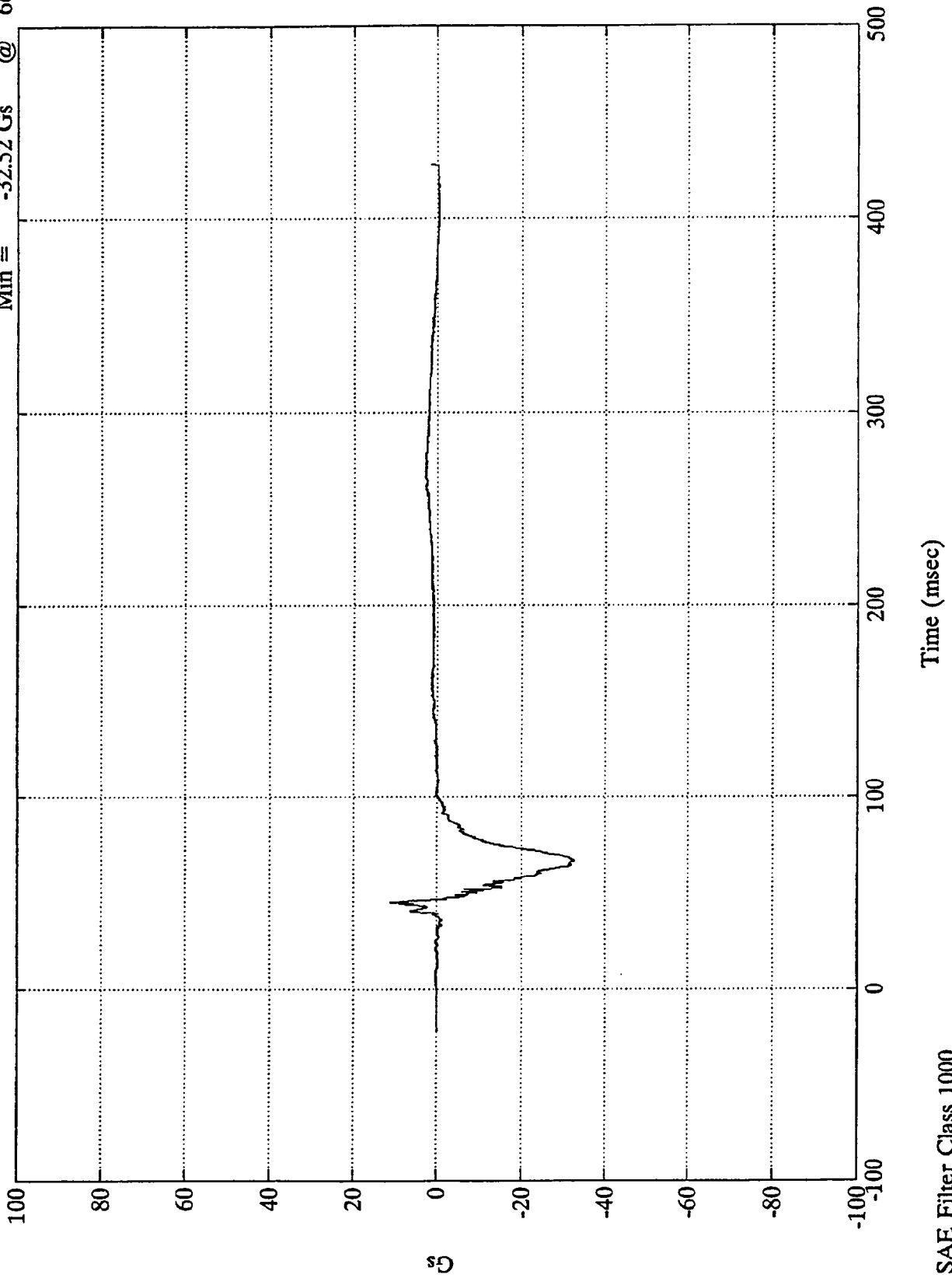


SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

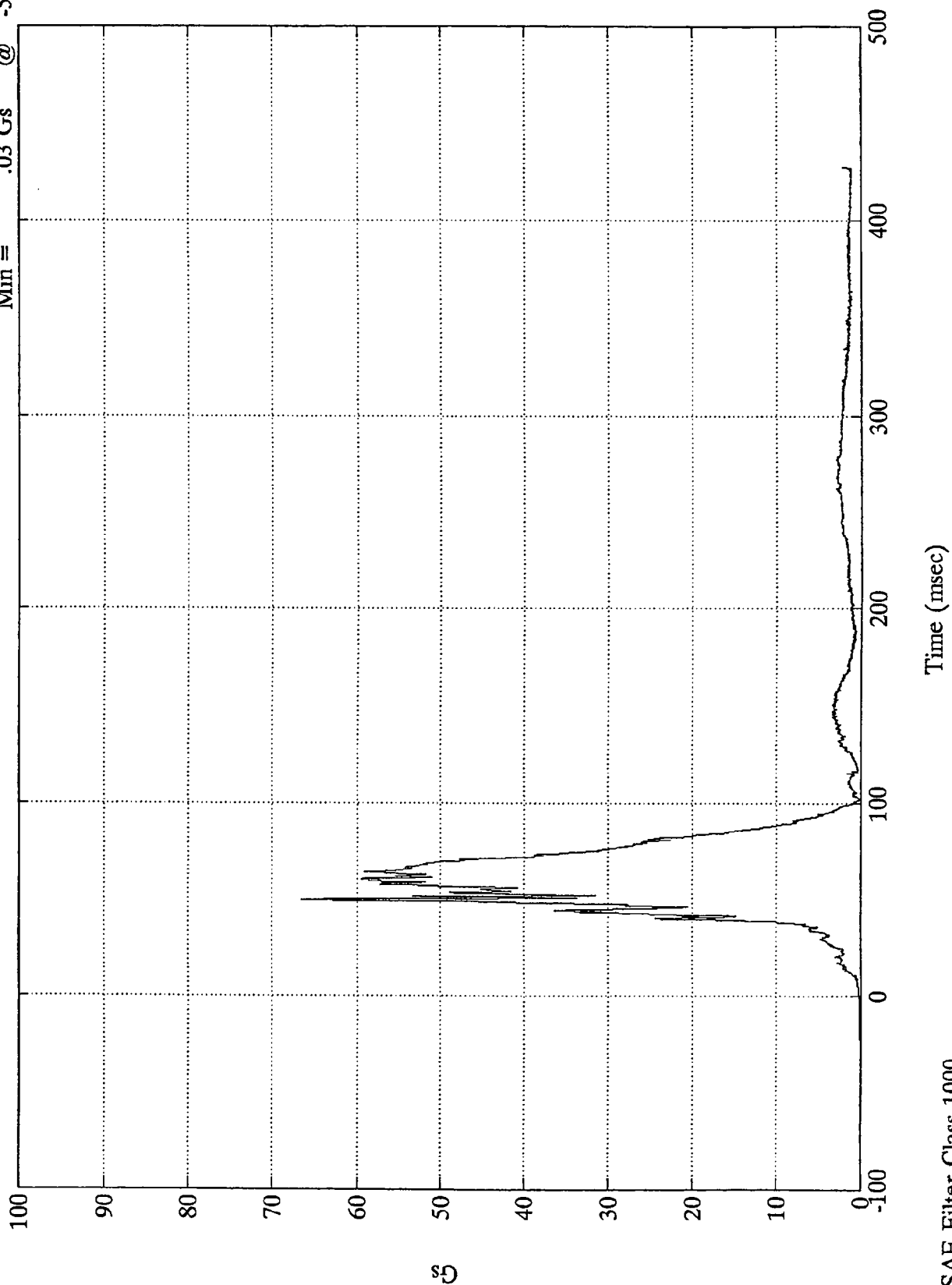
Pos. 1 Pelvic (Z)

Max = 10.88 Gs @ 45.24 msec
Min = -32.52 Gs @ 66.95 msec



NCAP TEST #9 - 1995 GEO METRO

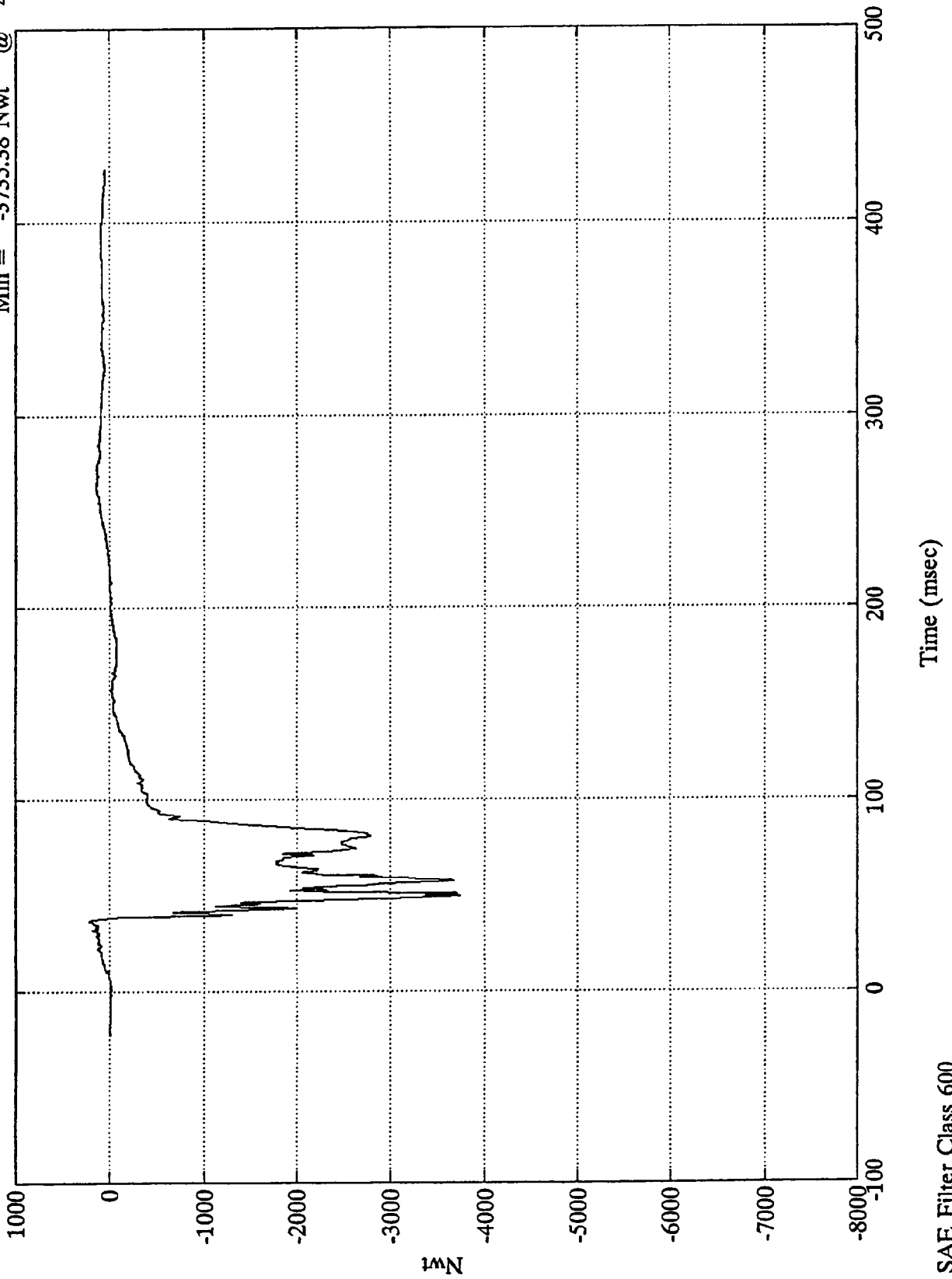
Pos. 1 Pelvic Resultant
 Max = 66.51 Gs @ 49.68 msec
 Min = .03 Gs @ -5.16 msec



SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

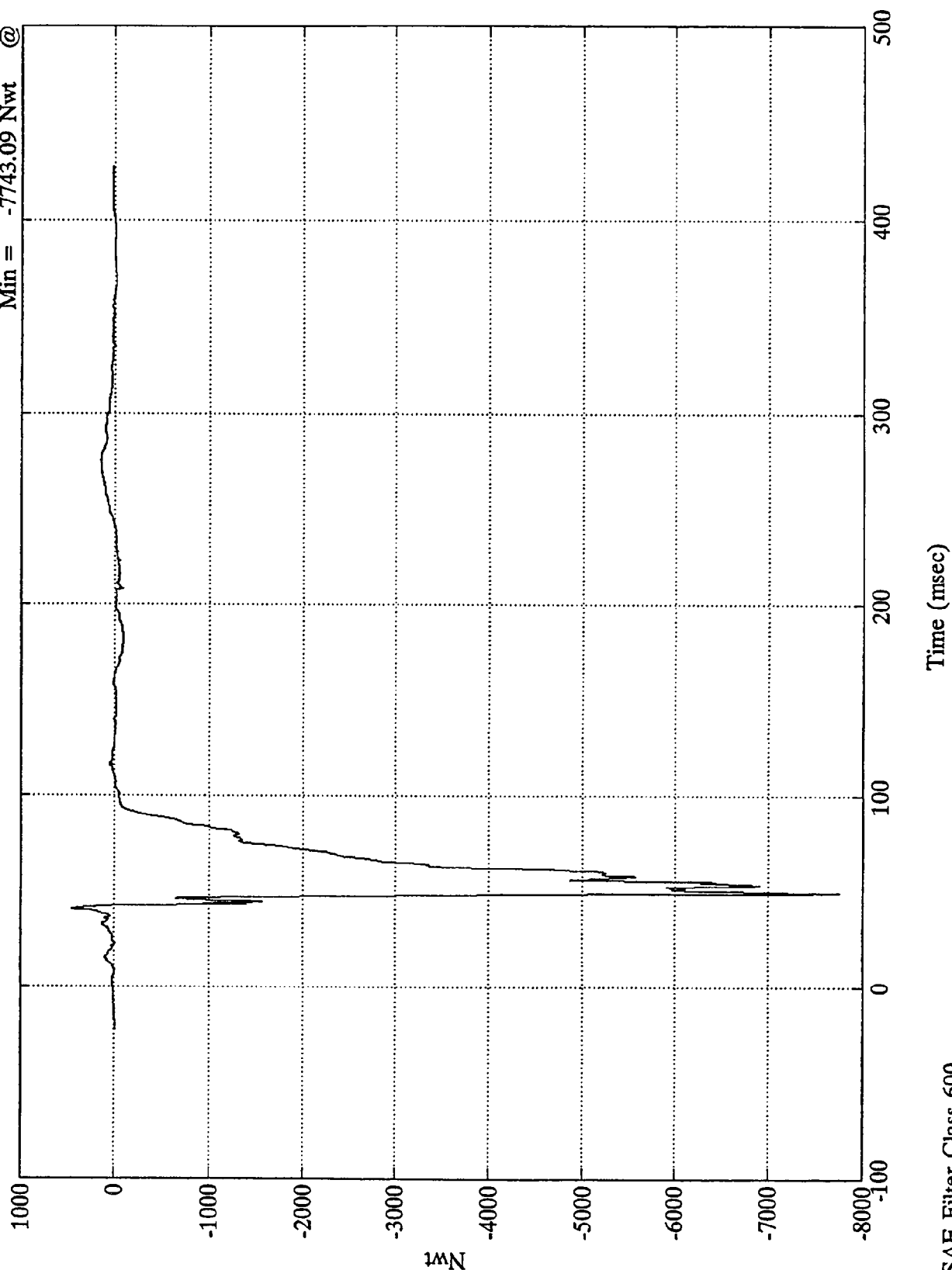
Pos. 1 Left Femur
Max = 217.75 Nwt @ 36.96 msec
Min = -3735.38 Nwt @ 49.56 msec



NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Right Femur

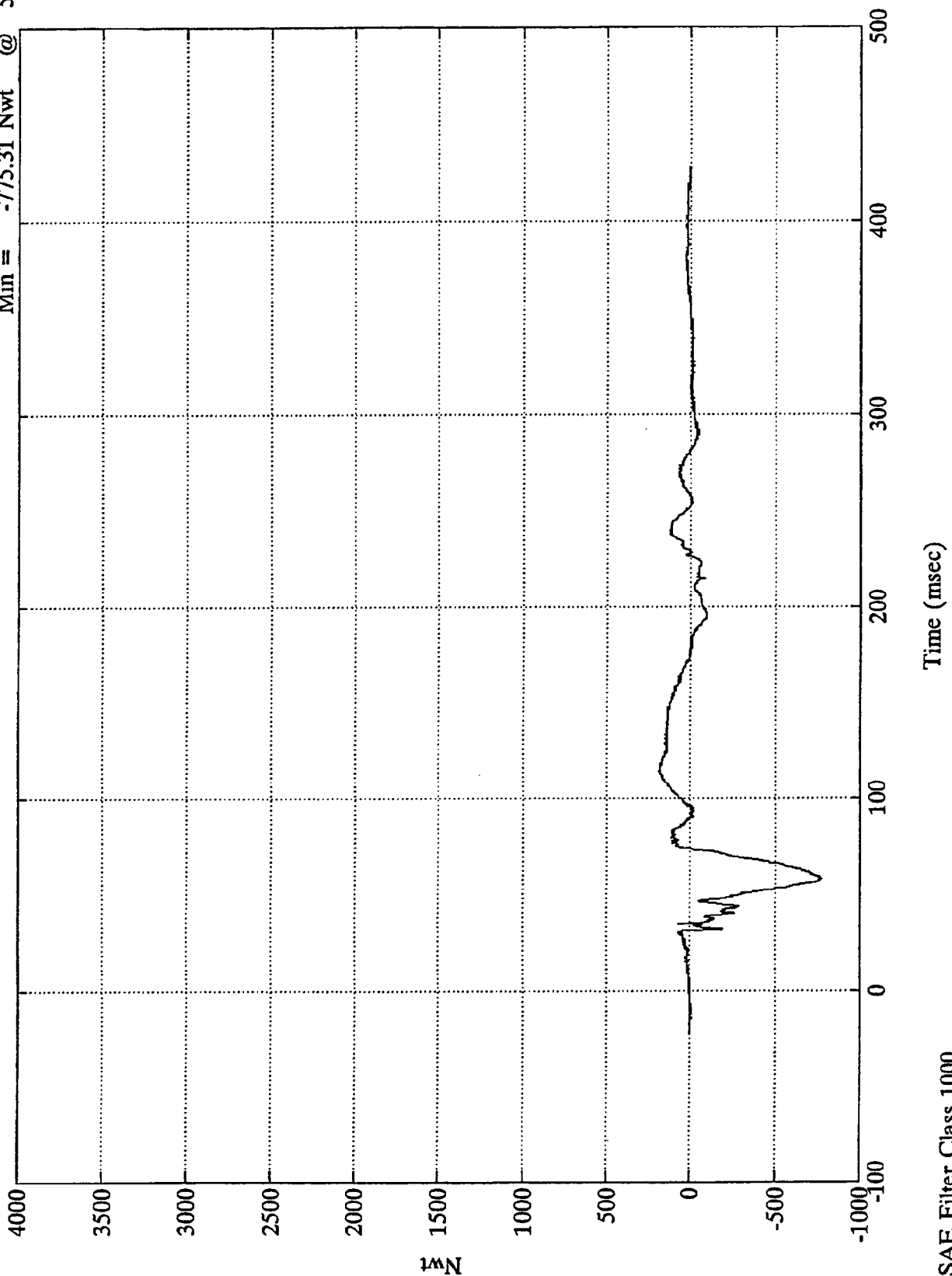
Max = 454.75 Nwt @ 40.80 msec
Min = -7743.09 Nwt @ 49.56 msec



NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Upper Neck Fx

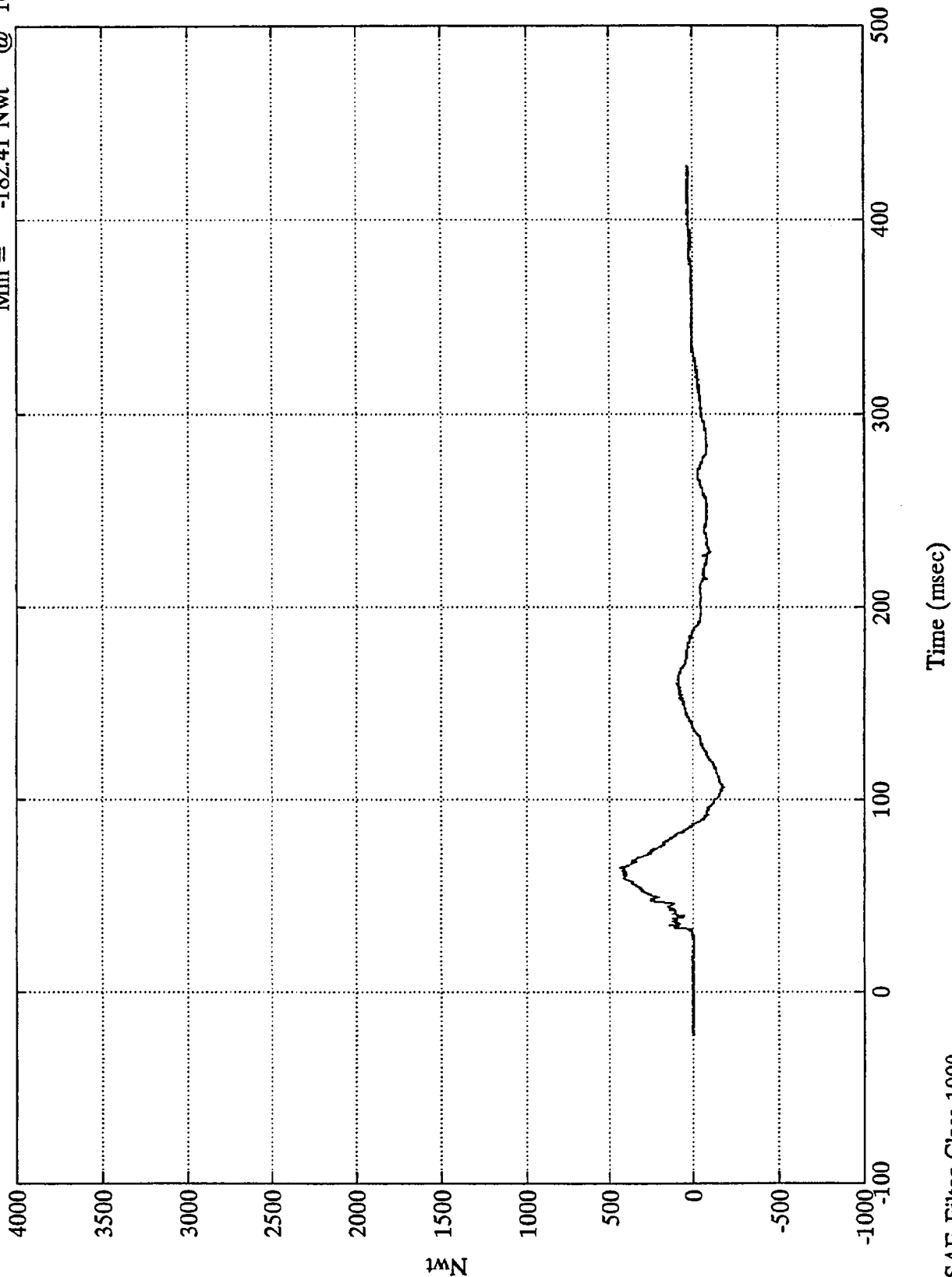
Max = 191.43 Nwt @ 114.12 msec
Min = -775.31 Nwt @ 58.31 msec



SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

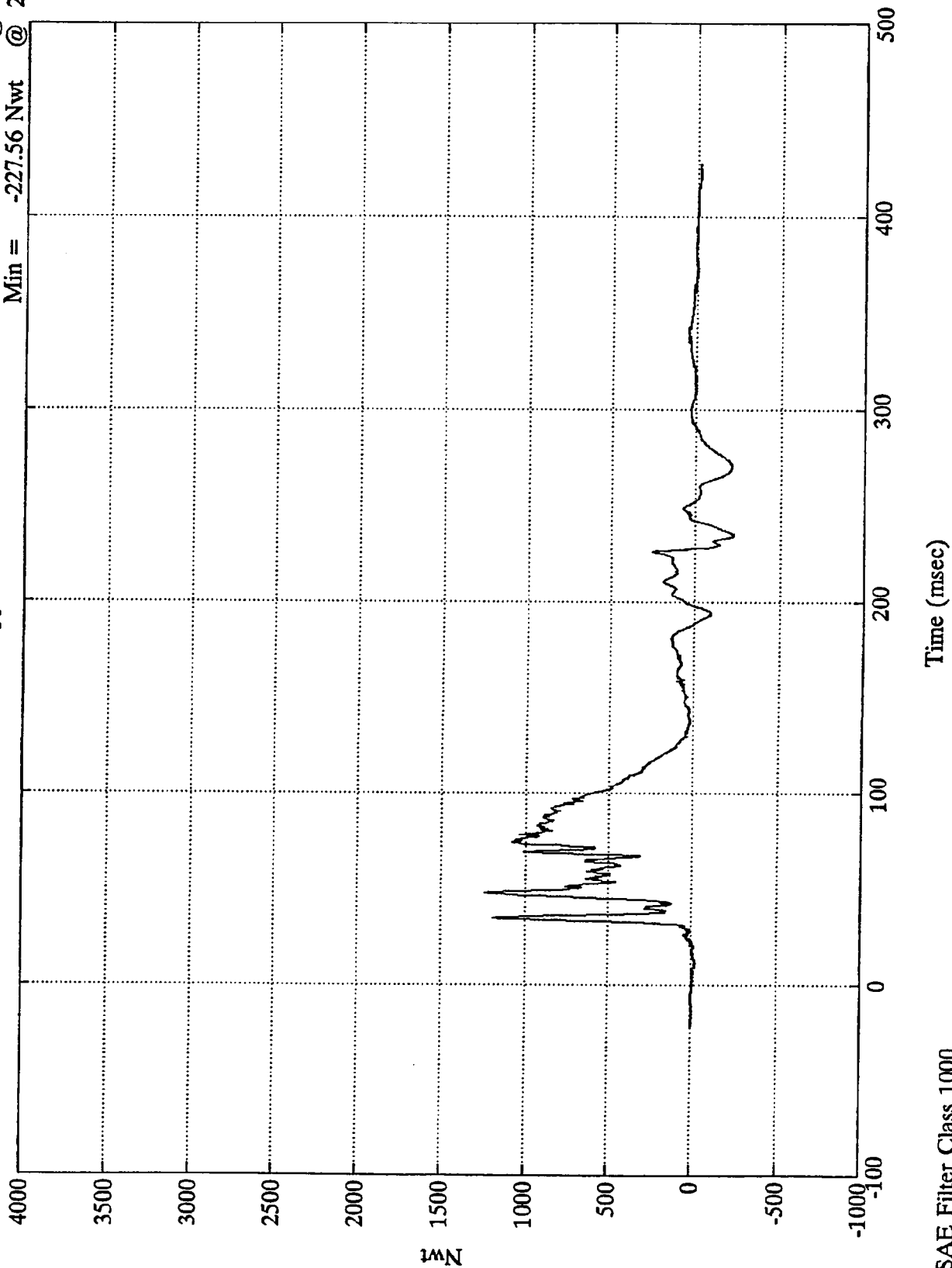
Pos. 1 Upper Neck Fy Max = 437.71 Nwt @ 65.40 msec
 Min = -182.41 Nwt @ 106.44 msec



NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Upper Neck Fz

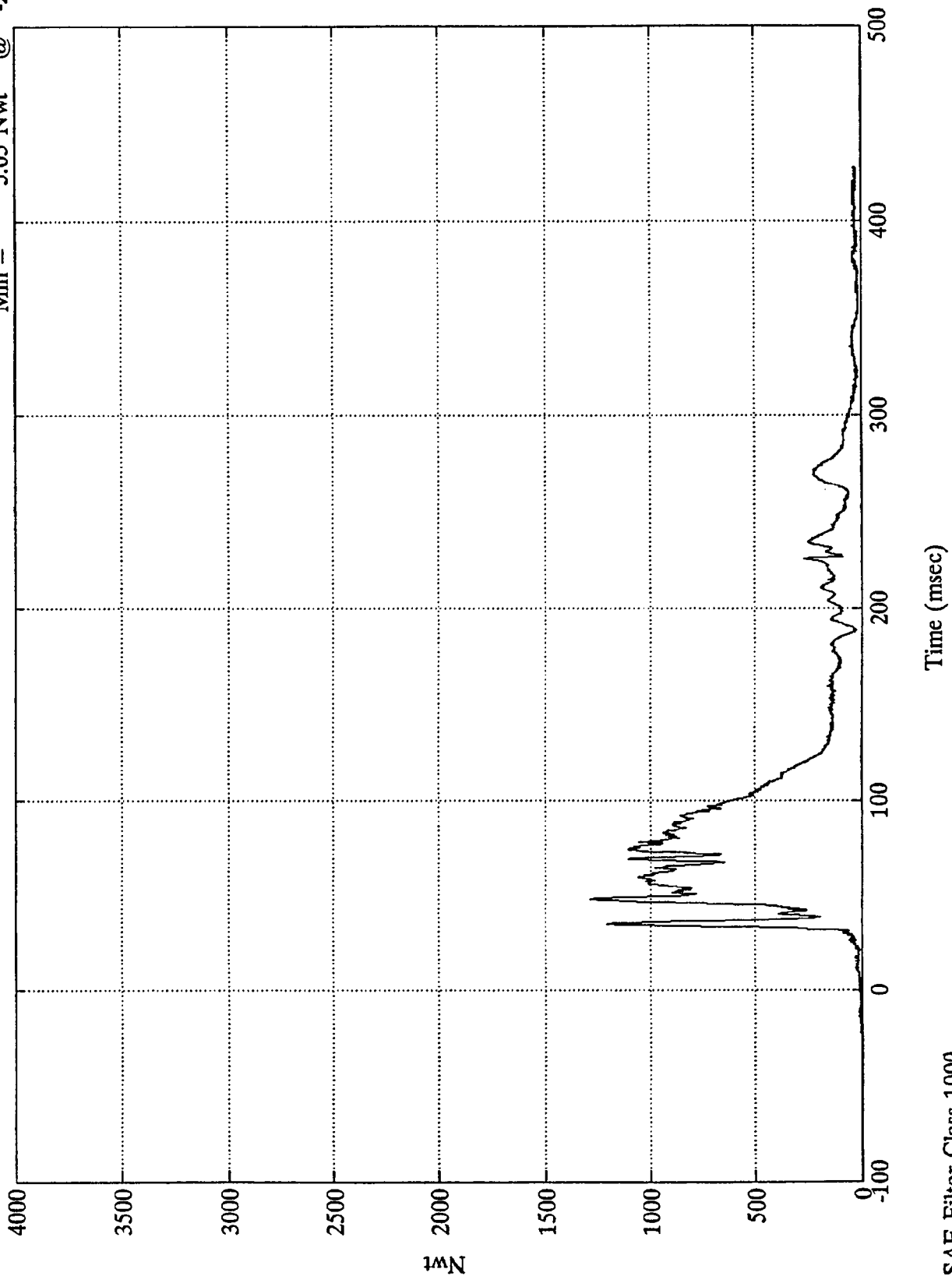
Max = 1243.63 Nwt @ 48.36 msec
Min = -227.56 Nwt @ 235.44 msec



SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Neck Force Res. Max = 1286.00 Nwt @ 48.36 msec
 Min = 5.05 Nwt @ -2.88 msec

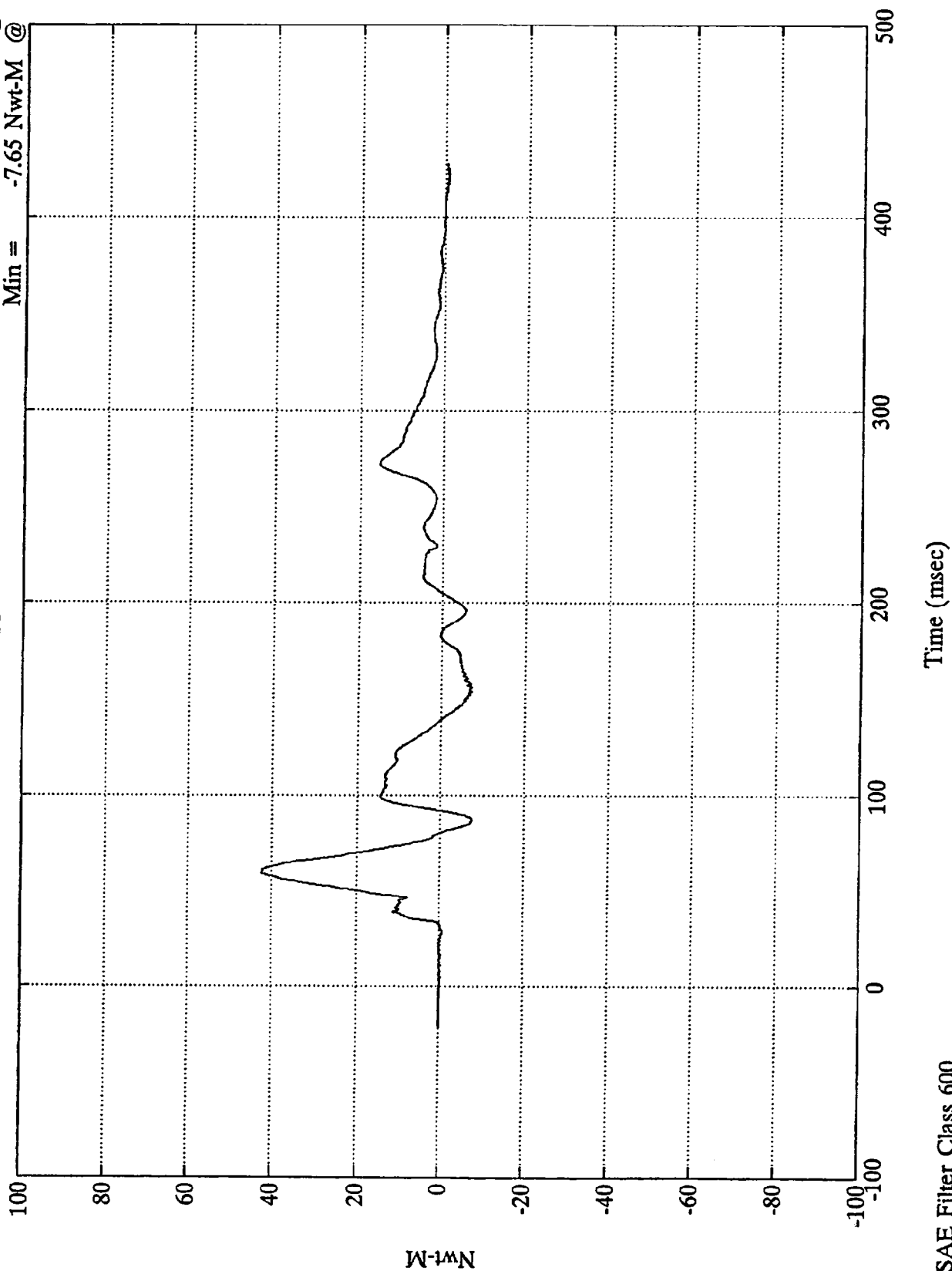


SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Upper Neck Mx

Max = 42.56 Nwt-M @ 59.27 msec
Min = -7.65 Nwt-M @ 87.00 msec

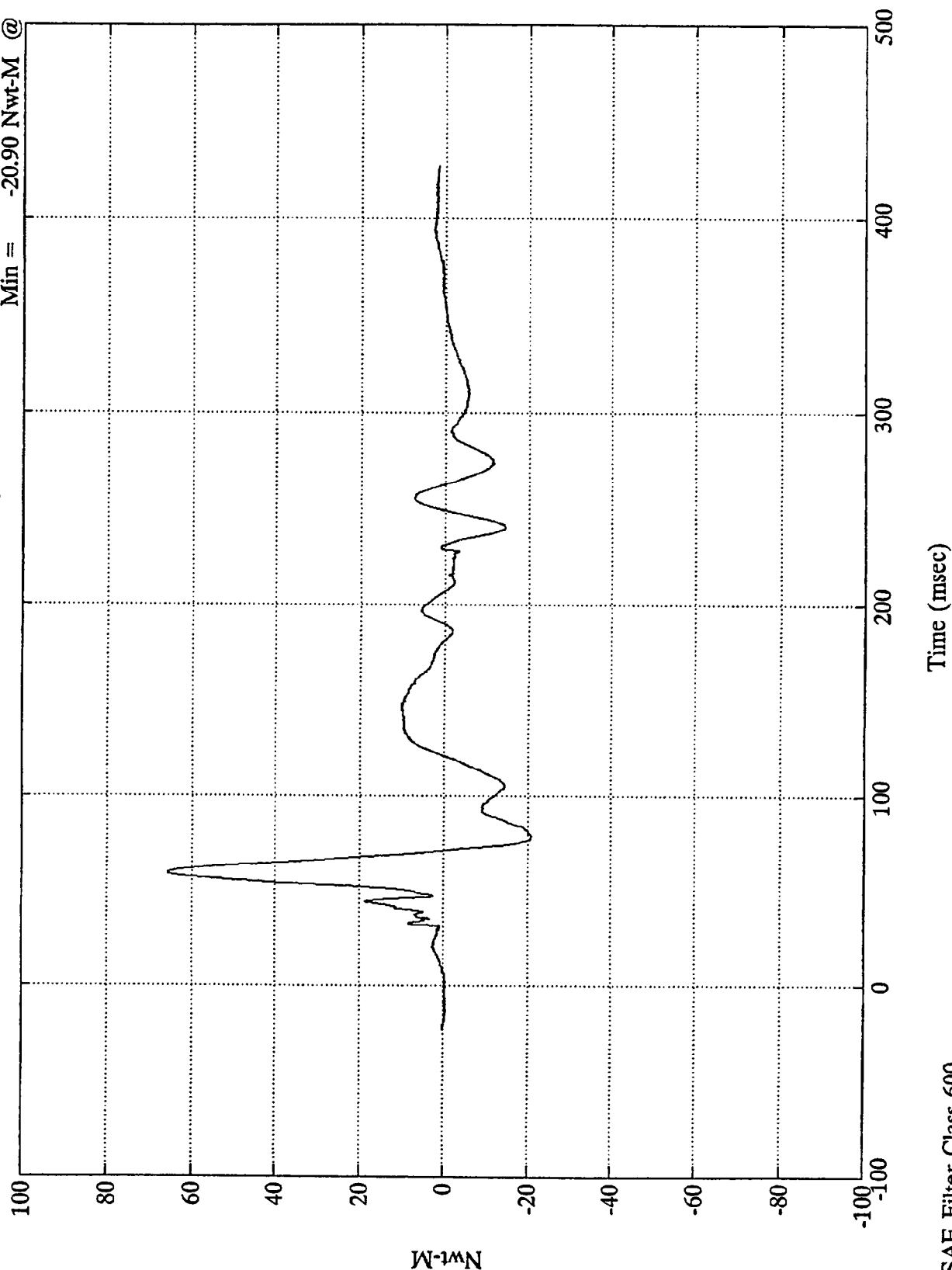


SAE Filter Class 600

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Upper Neck My

Max = 65.78 Nwt-M @ 59.04 msec
 Min = -20.90 Nwt-M @ 79.19 msec

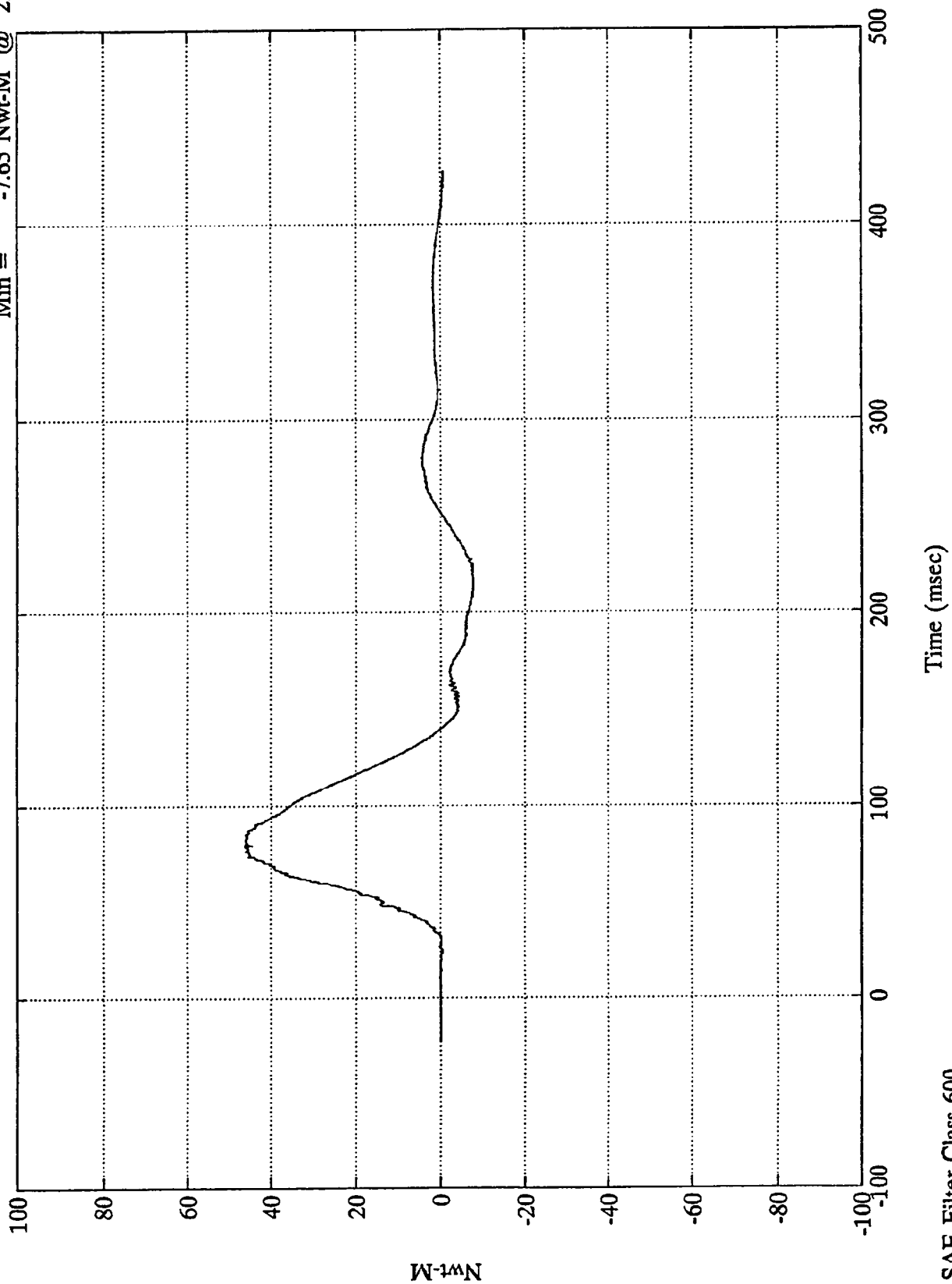


SAE Filter Class 600

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Upper Neck Mz

Max = 46.31 Nwt-M @ 79.91 msec
Min = -7.65 Nwt-M @ 217.56 msec

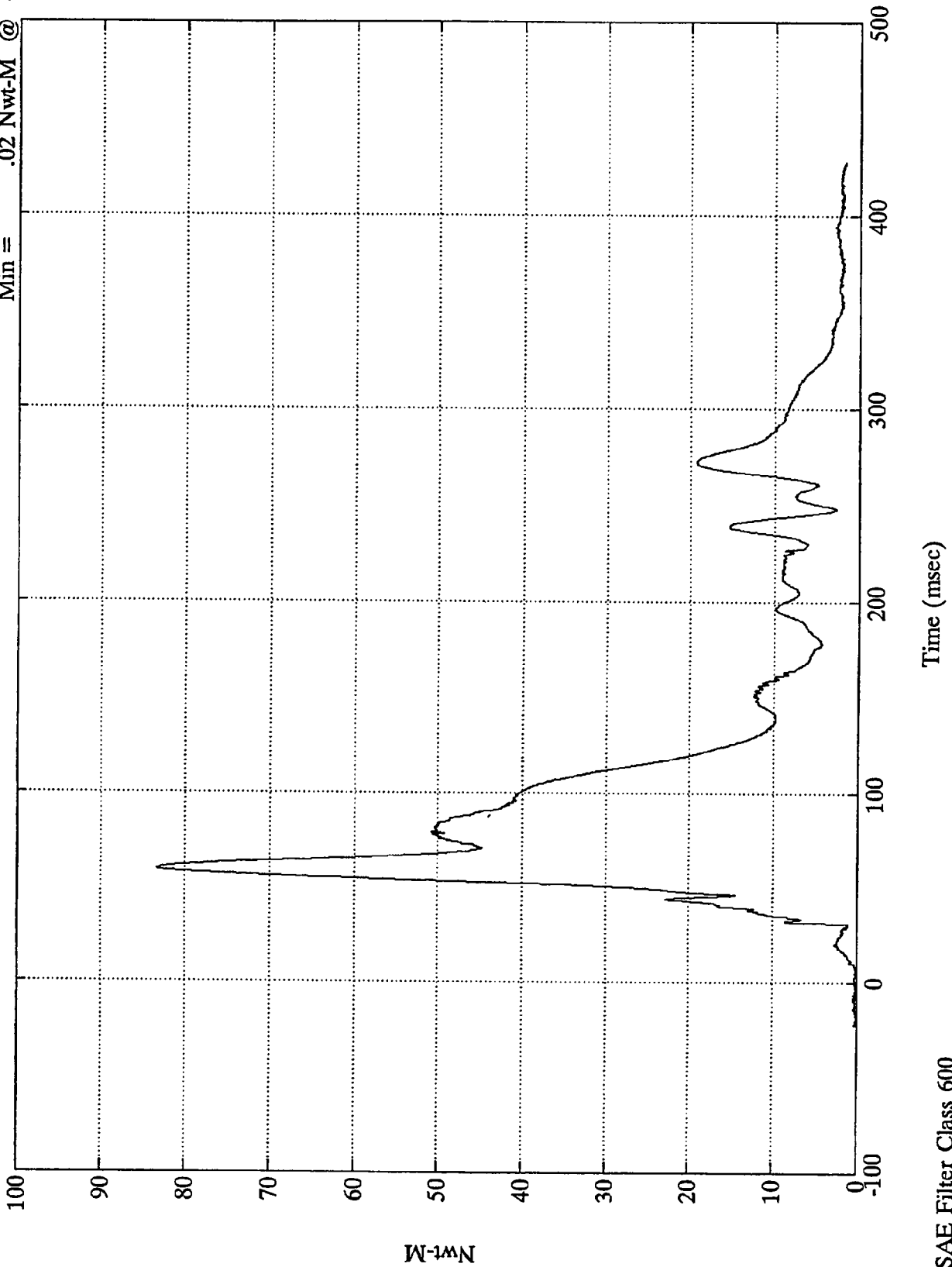


SAE Filter Class 600

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Neck Moment Res.

Max = 83.40 Nwt-M @ 59.64 msec
 Min = .02 Nwt-M @ -18.72 msec

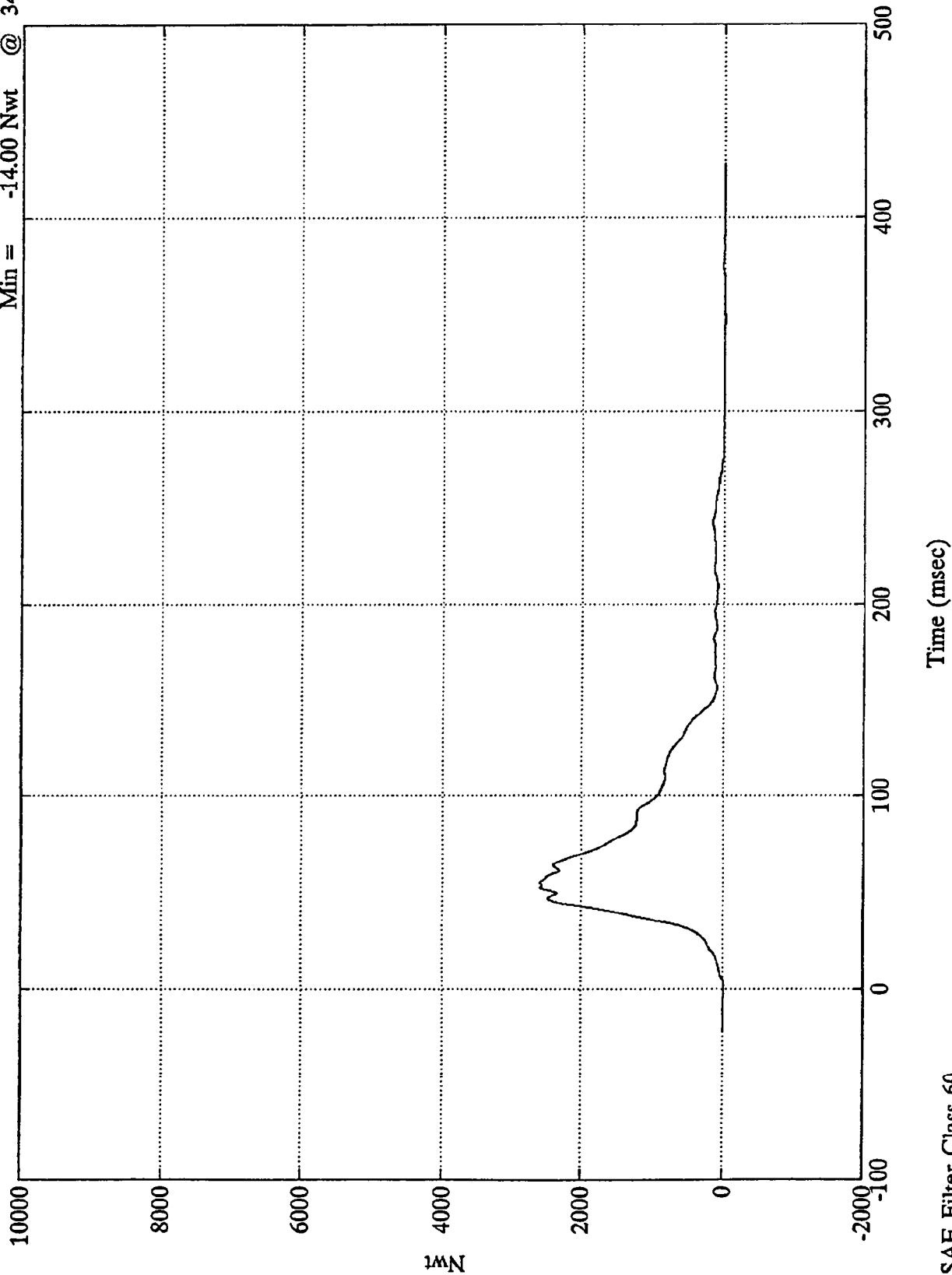


SAE Filter Class 600

NCAP TEST #9 - 1995 GEO METRO

Pos. 1 Left Belt Load

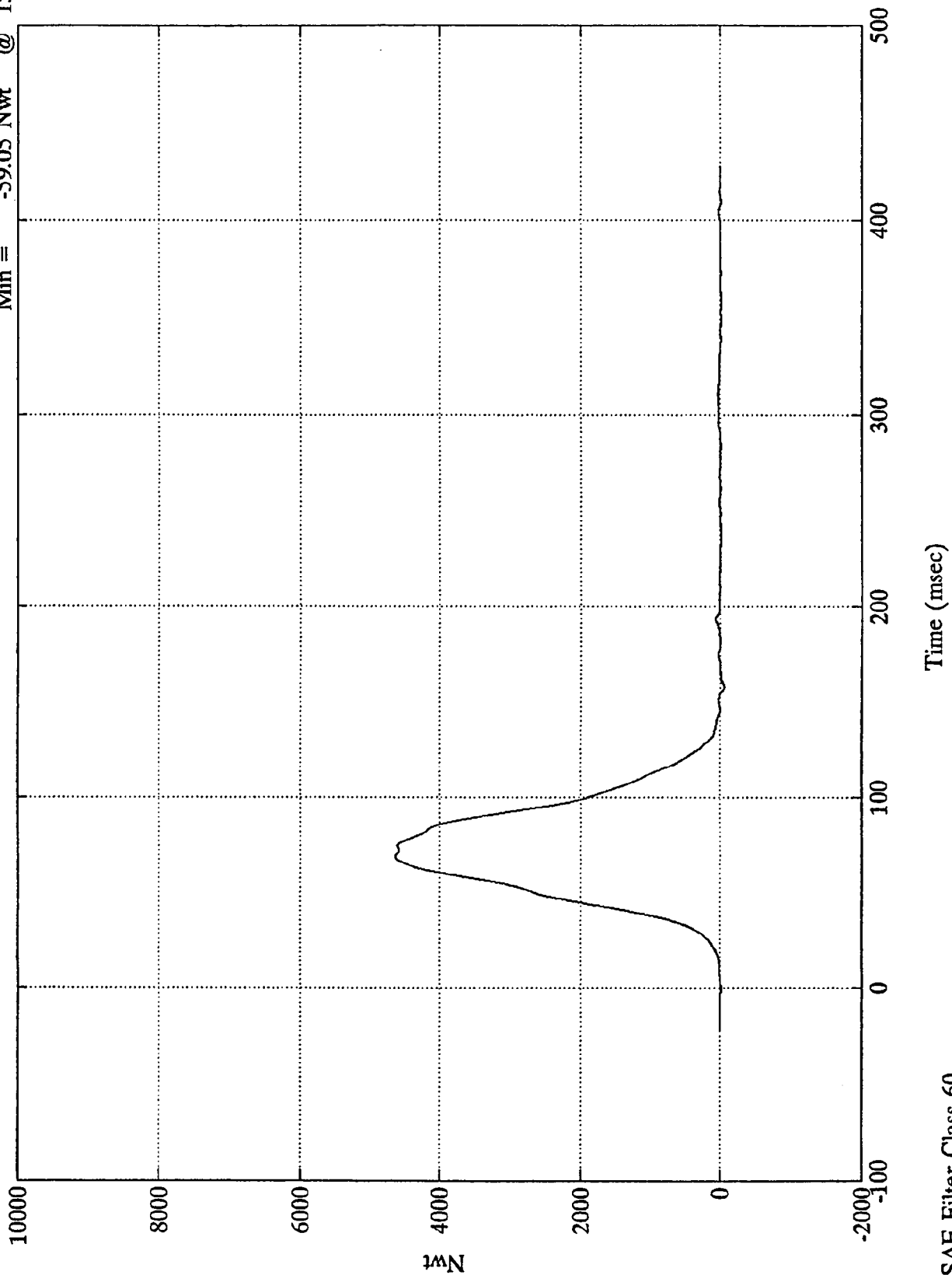
Max = 2588.71 Nwt @ 55.56 msec
Min = -14.00 Nwt @ 347.40 msec



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

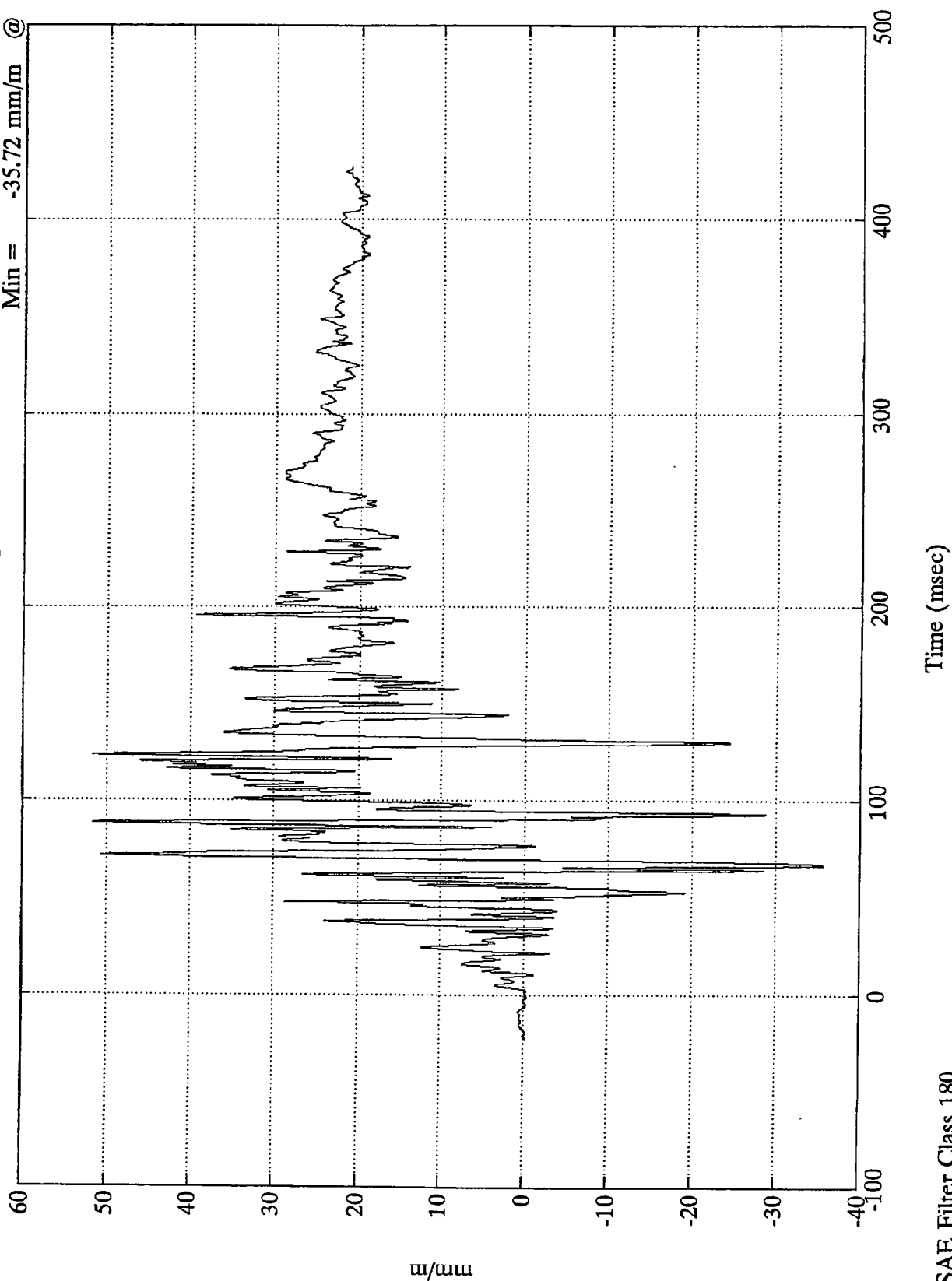
Pos. 1 Torso Belt Load
Max = 4636.88 Nwt @ 69.00 msec
Min = -59.05 Nwt @ 158.16 msec



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

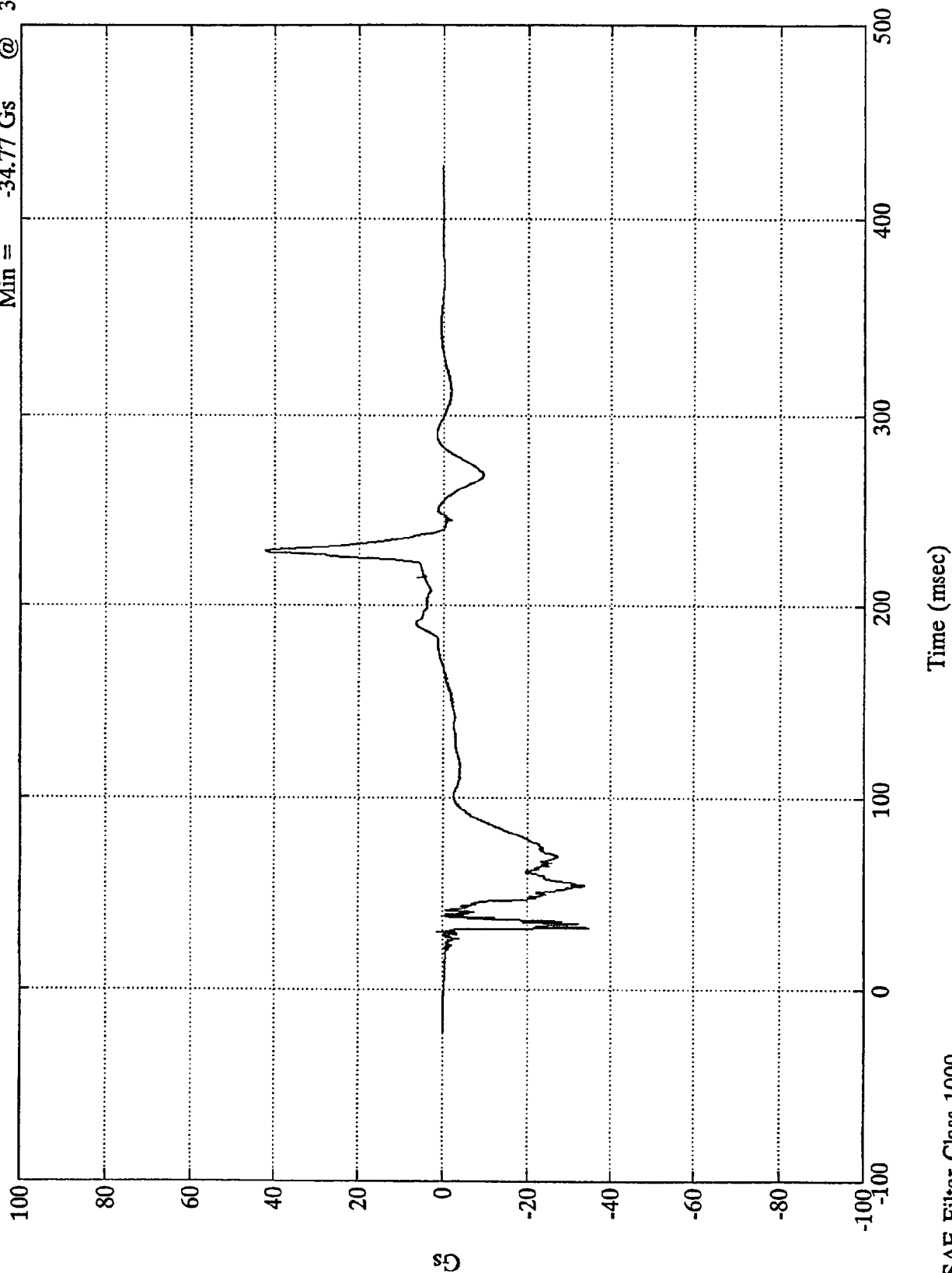
Pos. 1 Belt Elongation
Max = 51.59 mm/m @ 123.84 msec
Min = -35.72 mm/m @ 67.32 msec



SAE Filter Class 180

NCAP TEST #9 - 1995 GEO METRO

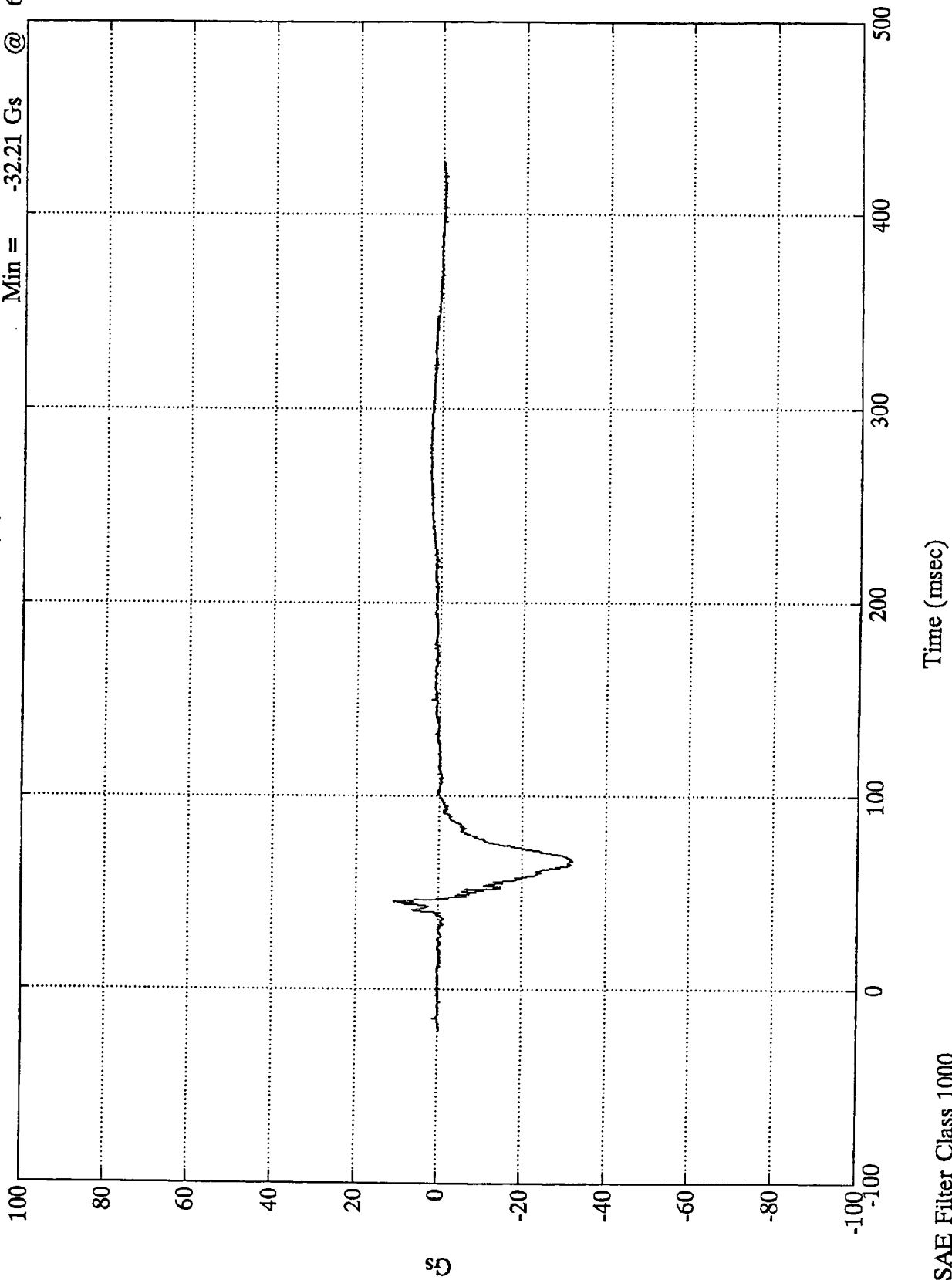
Pos. 2 Head X
 Max = 42.20 Gs @ 229.32 msec
 Min = -34.77 Gs @ 32.28 msec



NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Head X(R)

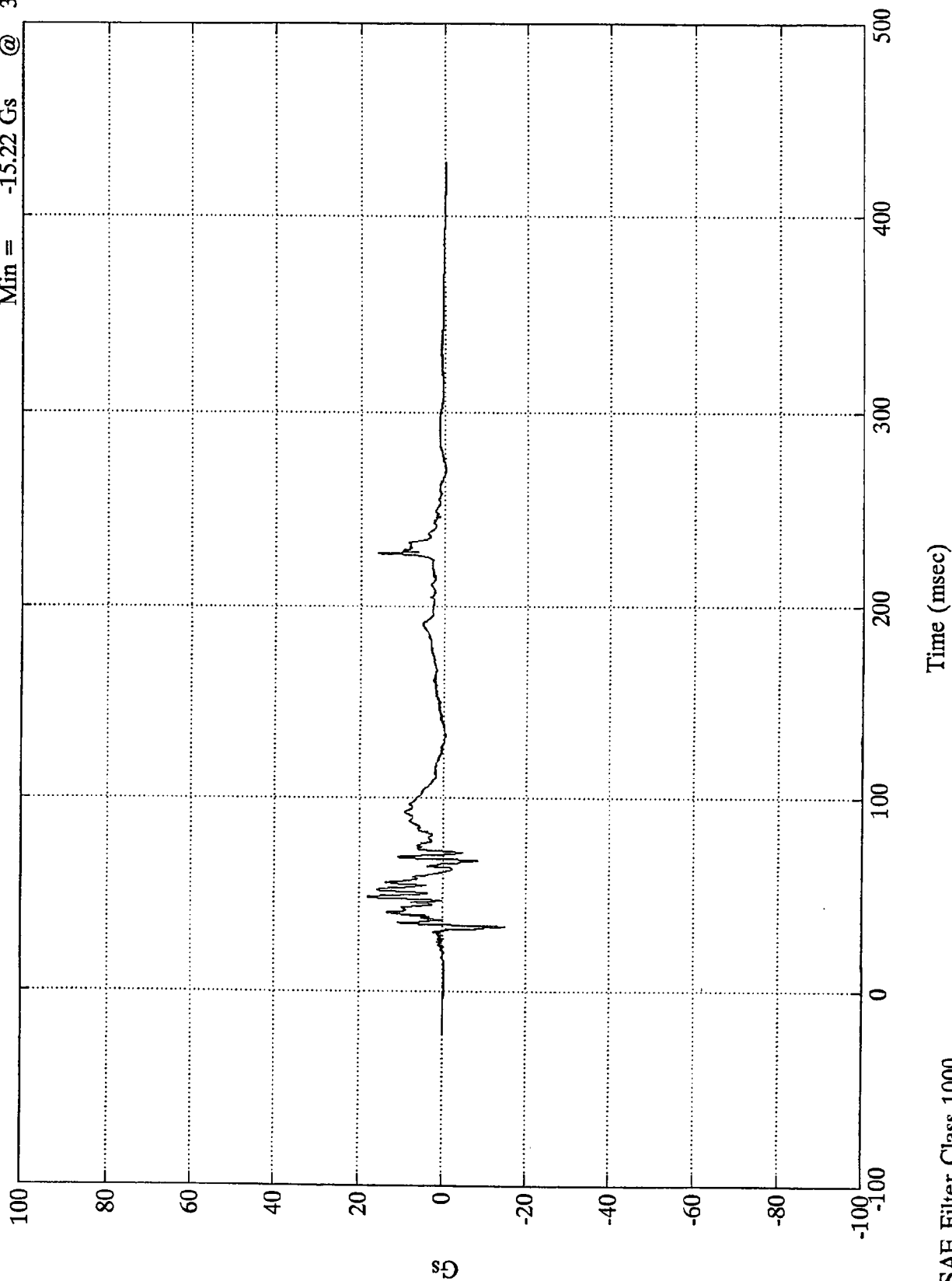
Max = 10.73 Gs @ 45.12 msec
Min = -32.21 Gs @ 66.72 msec



SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Head Y
 Max = 17.92 Gs @ 48.47 msec
 Min = -15.22 Gs @ 33.72 msec

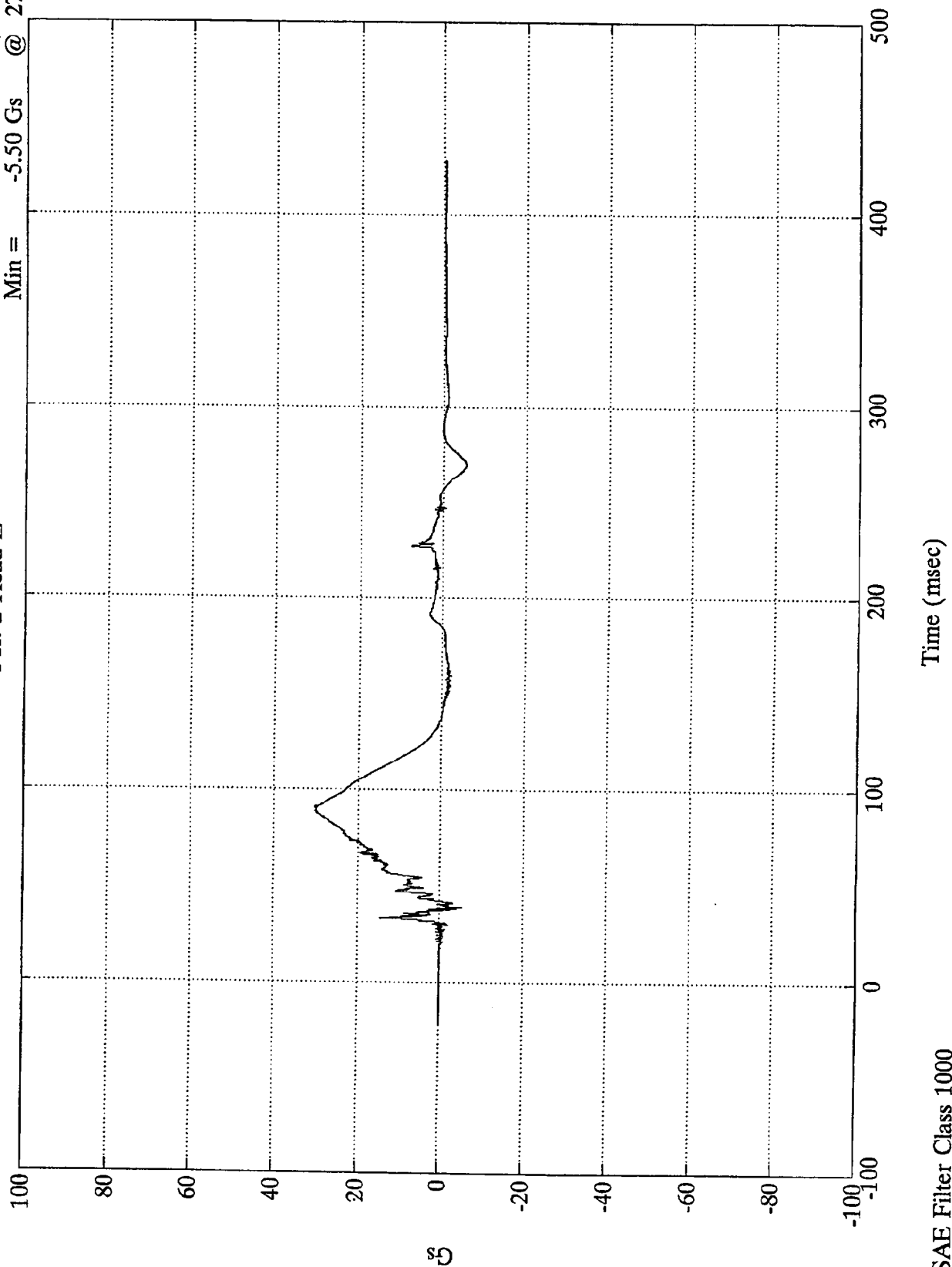


Pos. 2 Head Y (Redundant)

Transducer did not record accurately during test.
Data trace was removed from test report.

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Head Z
 Max = 30.14 Gs @ 91.20 msec
 Min = -5.50 Gs @ 270.60 msec

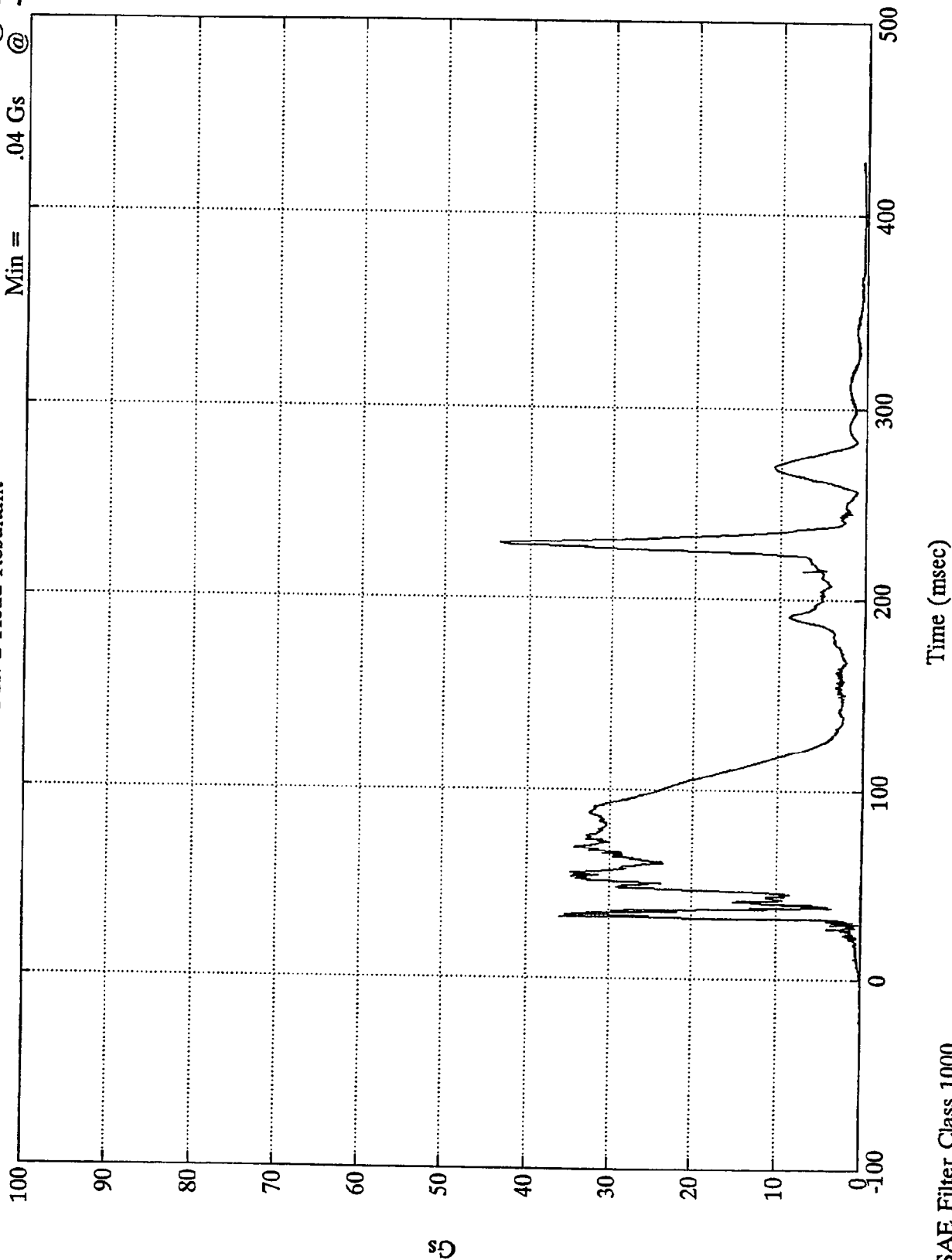


Pos. 2 Head Z (Redundant)

Transducer did not record accurately during test.
Data trace was removed from test report.

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Head Resultant
 Max = 43.54 Gs @ 229.32 msec
 Min = .04 Gs @ -2.28 msec



SAE Filter Class 1000

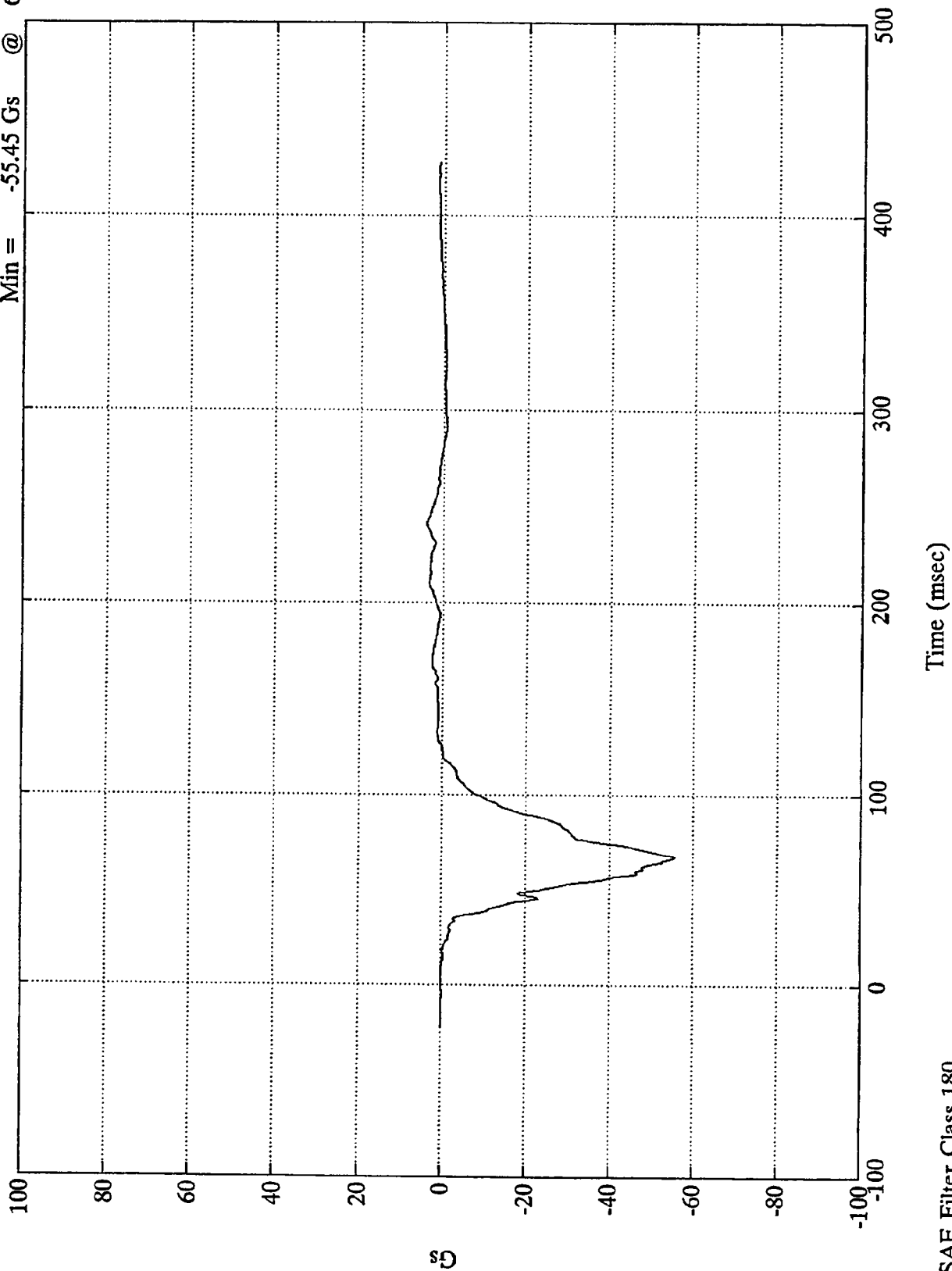
Pos. 2 Head Resultant (Redundant)

Due to Head Y (redundant) and Head Z (redundant) accelerometers not recording accurately during test, the Resultant of the head triaxial accelerometers was not calculated.

NCAP TEST #9 - 1995 GEO METRO

Max = 4.02 Gs @ 240.96 msec
Min = -55.45 Gs @ 67.44 msec

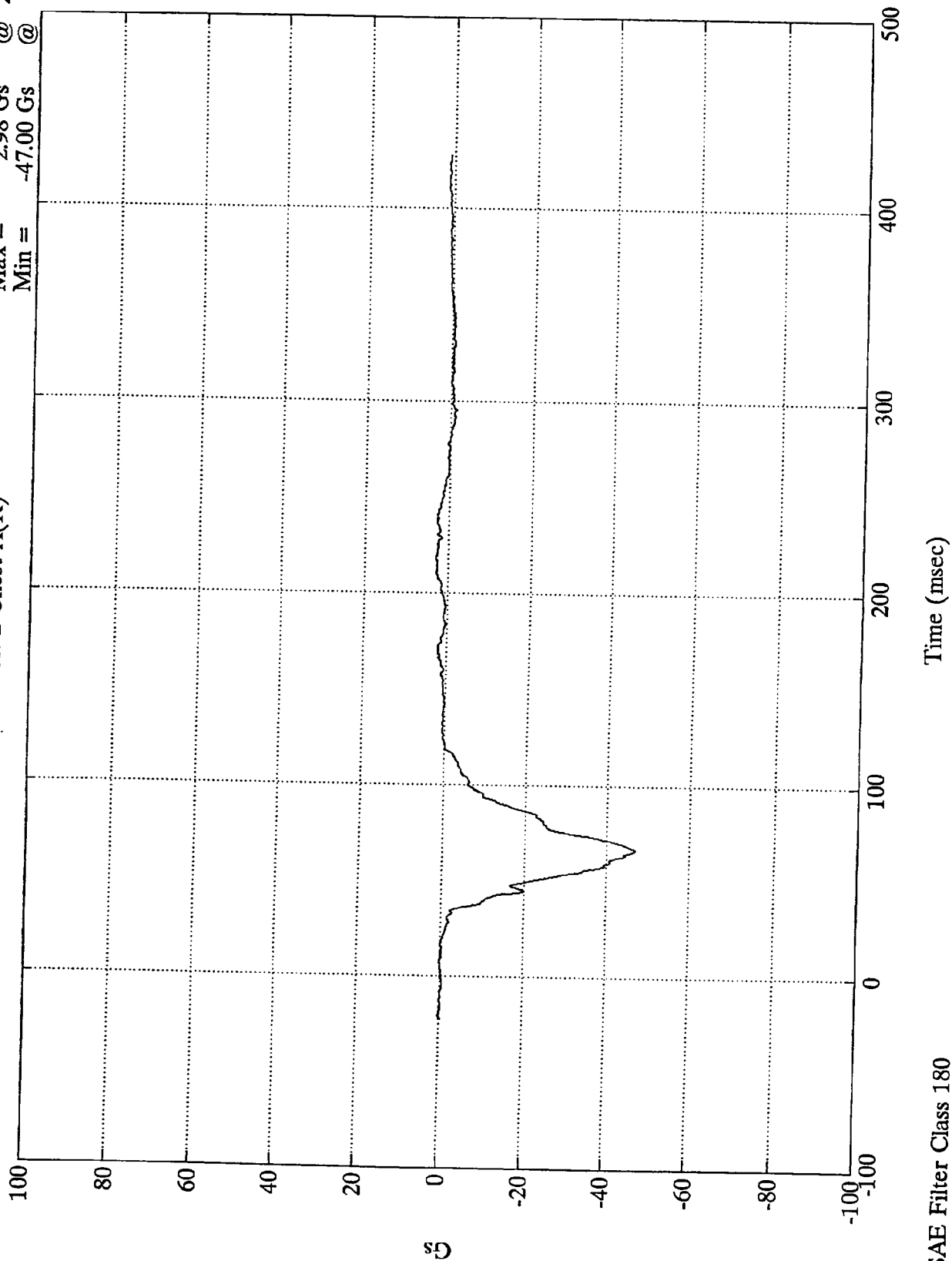
Pos. 2 Chest X



SAE Filter Class 180

Pos. 2 Chest X(R)

Max = 2.98 Gs @ 218.76 msec
Min = -47.00 Gs @ 67.20 msec

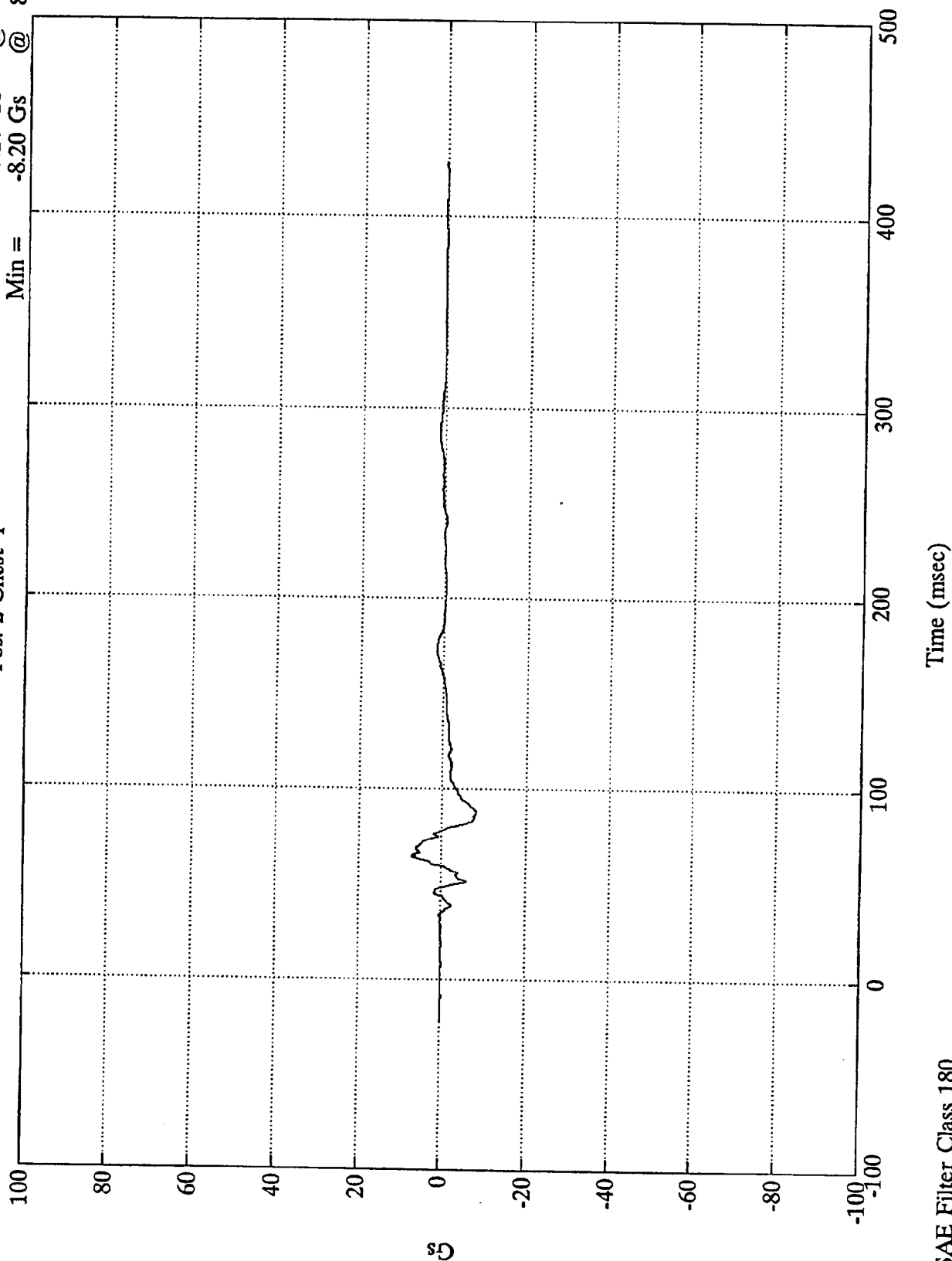


SAE Filter Class 180

NCAP TEST #9 - 1995 GEO METRO

Max = 7.17 Gs @ 63.72 msec
Min = -8.20 Gs @ 87.72 msec

Pos. 2 Chest Y

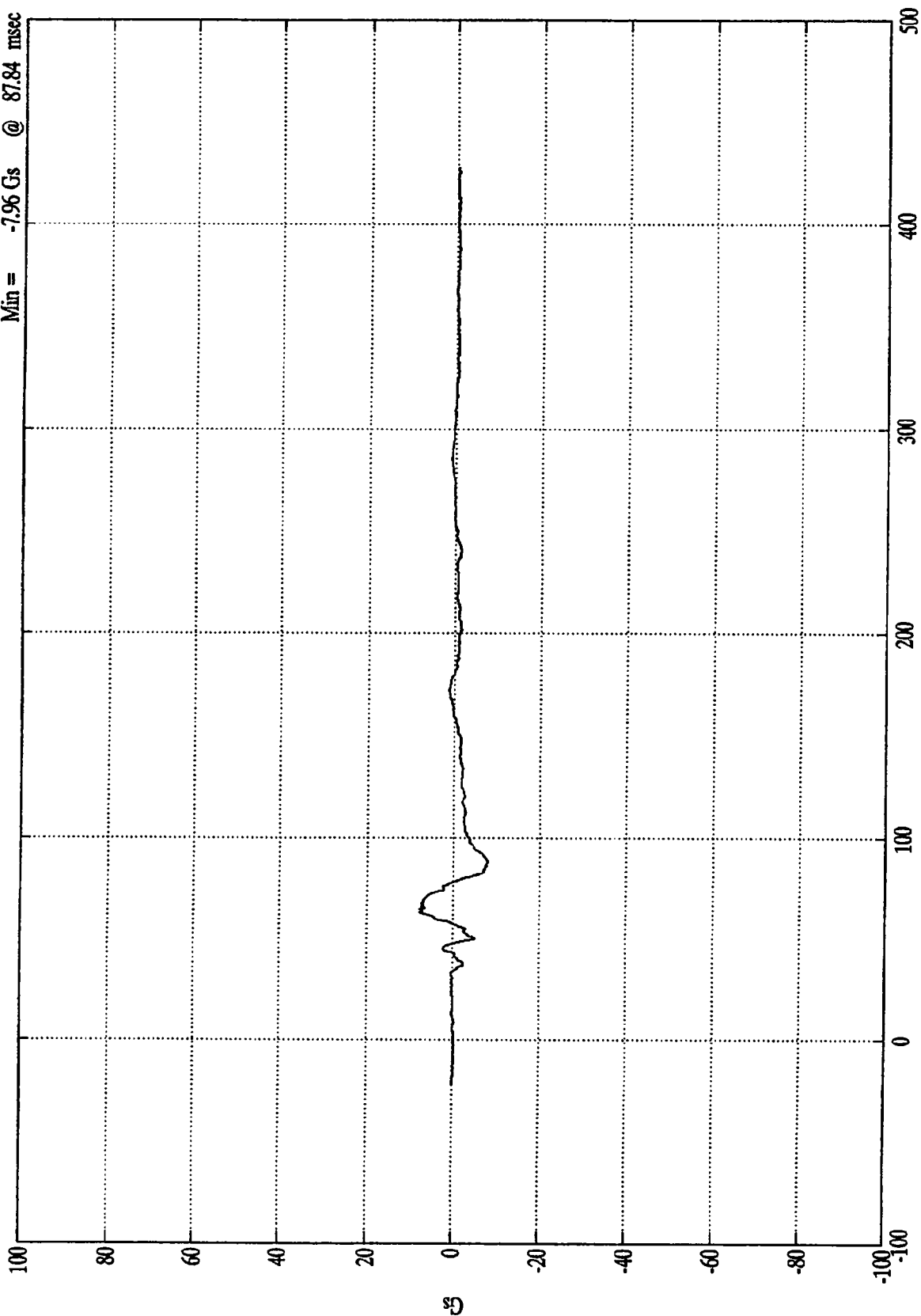


SAE Filter Class 180

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Chest Y(R)

Max = 7.82 Gs @ 65.04 msec
Min = -7.96 Gs @ 87.84 msec

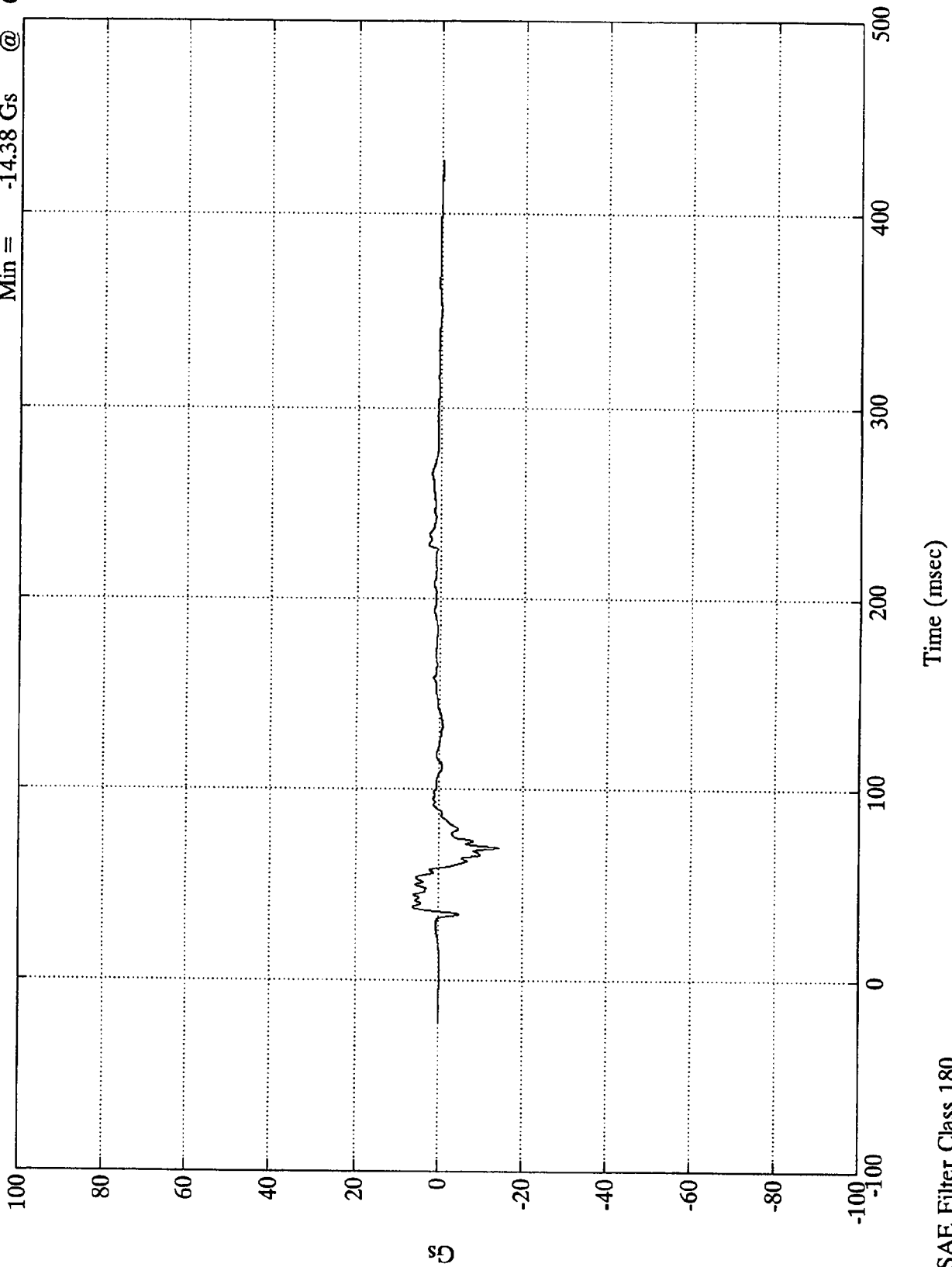


SAE Filter Class 180

Time (msec)

NCAP TEST #9 - 1995 GEO METRO

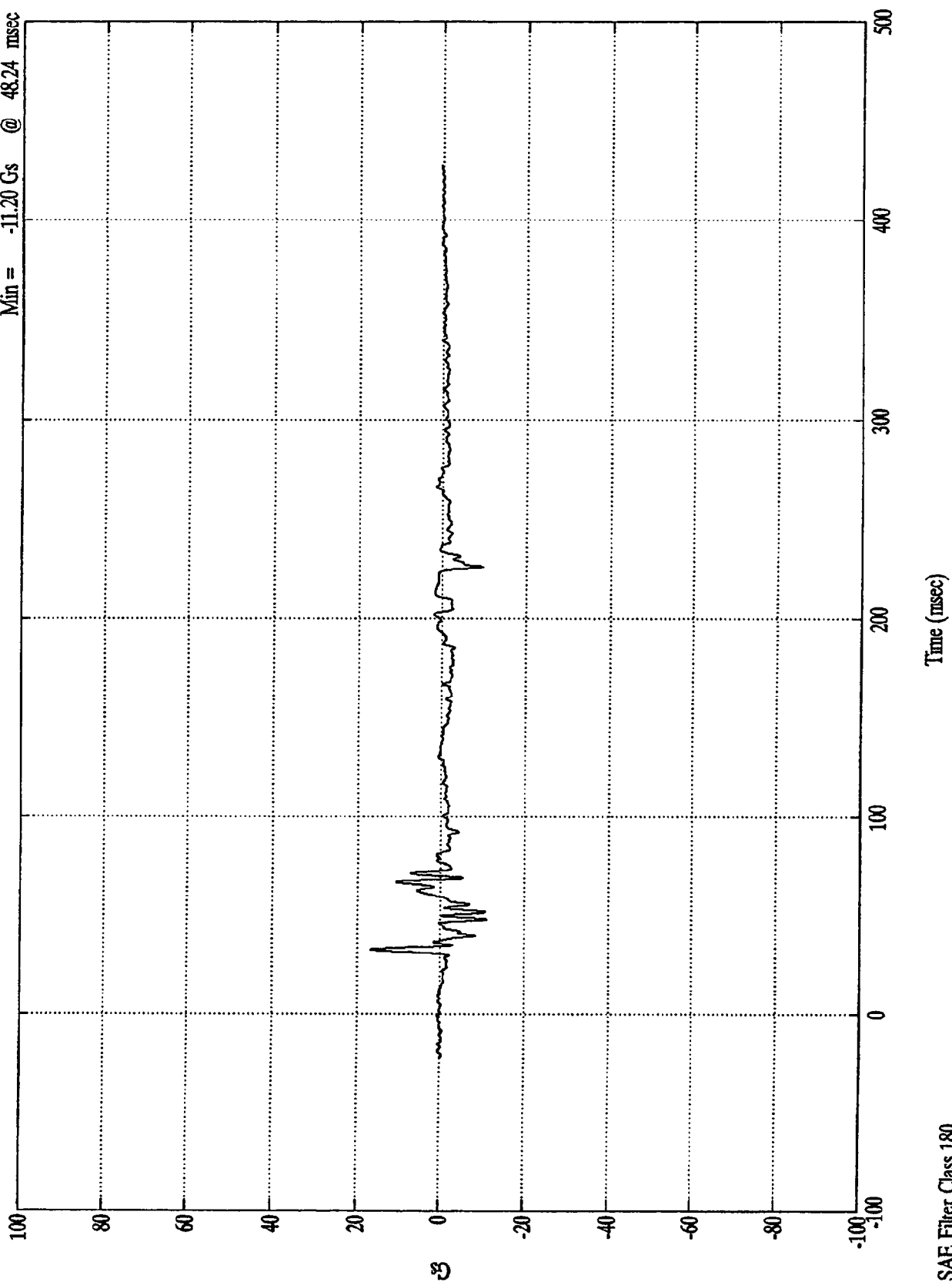
Pos. 2 Chest Z
Max = 6.34 Gs @ 38.27 msec
Min = -14.38 Gs @ 69.36 msec



NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Chest Z(R)

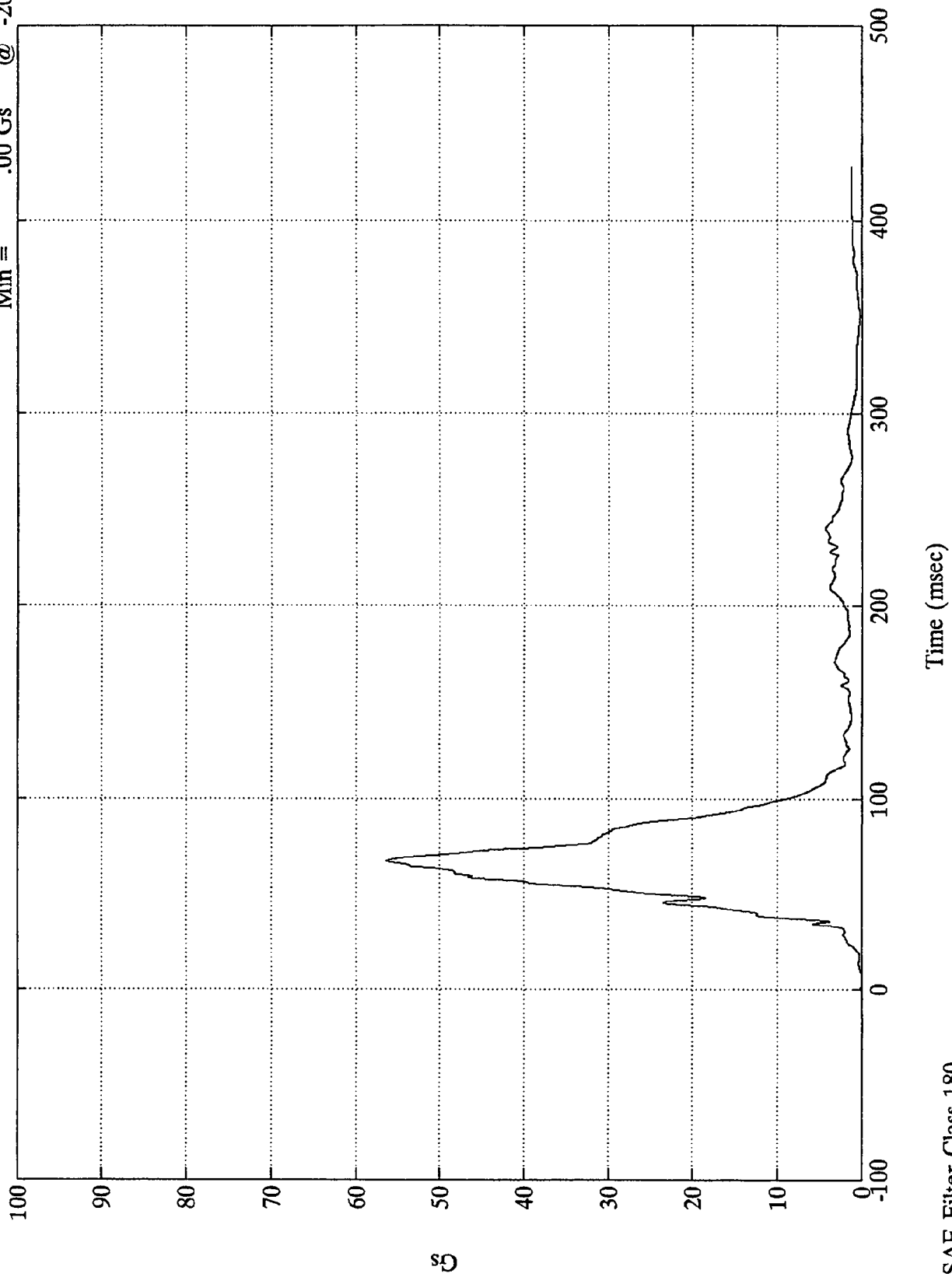
Max = 16.58 Gs @ 33.36 msec
Min = -11.20 Gs @ 48.24 msec



SAE Filter Class 180

NCAP TEST #9 - 1995 GEO METRO

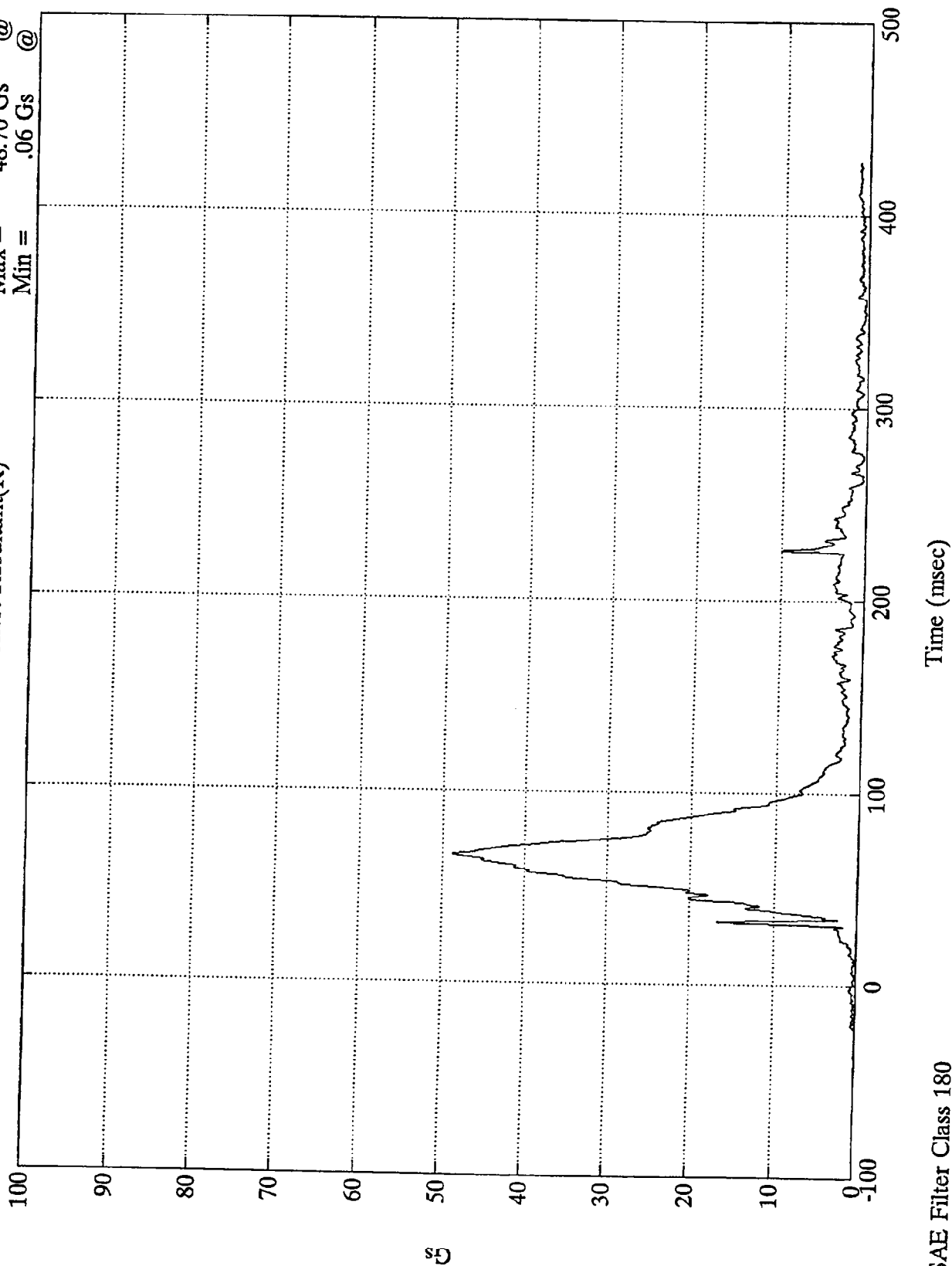
Pos. 2 Chest Resultant
 Max = 56.35 Gs @ 67.44 msec
 Min = .00 Gs @ -20.52 msec



SAE Filter Class 180

Pos. 2 Chest Resultant(R)

Max = 48.70 Gs @ 67.32 msec
Min = .06 Gs @ 5.51 msec

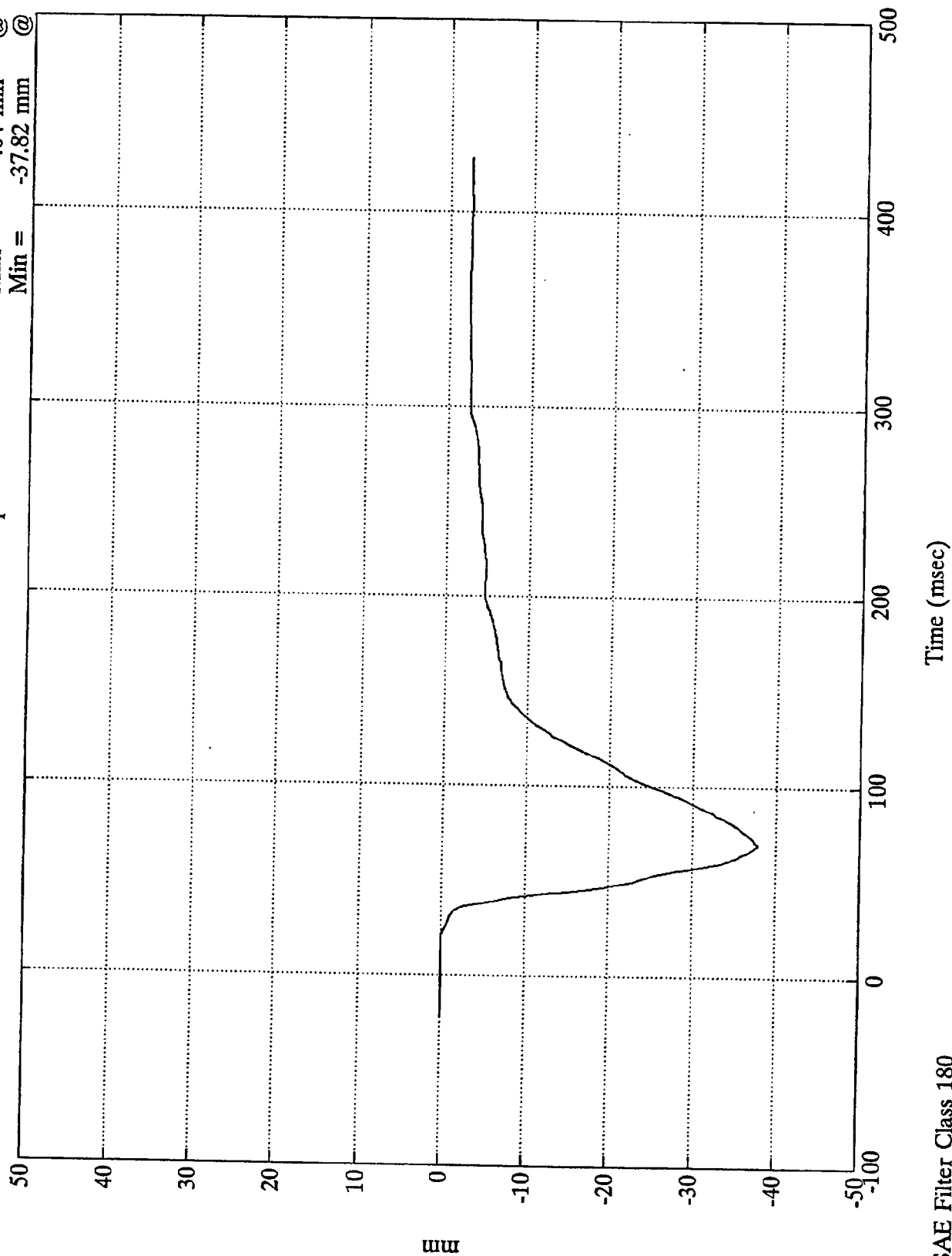


SAE Filter Class 180

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Chest Disp.

Max = .04 mm @ 11.76 msec
 Min = -37.82 mm @ 69.72 msec

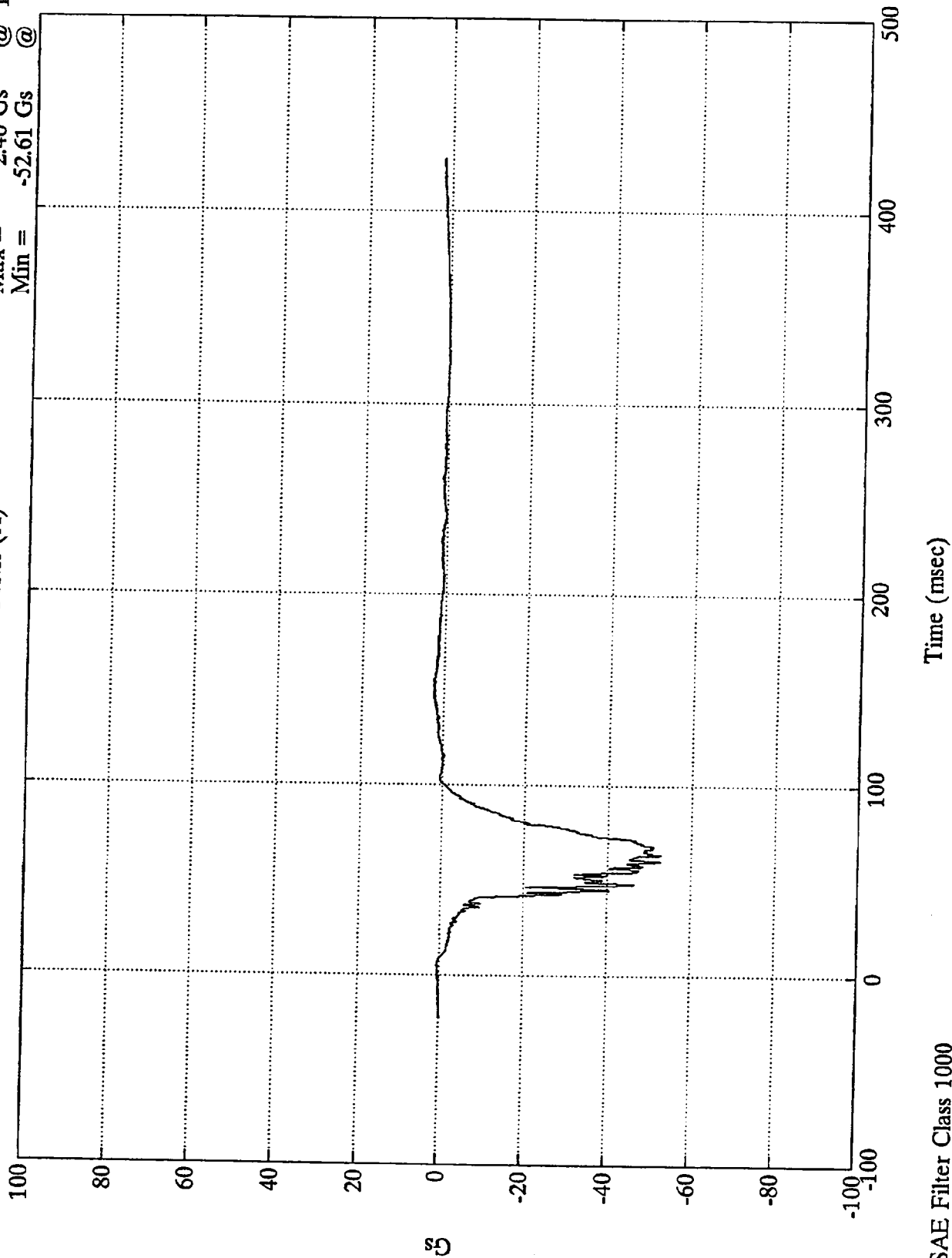


SAE Filter Class 180

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Pelvic (X)

Max = 2.40 Gs @ 154.92 msec
Min = -52.61 Gs @ 63.60 msec

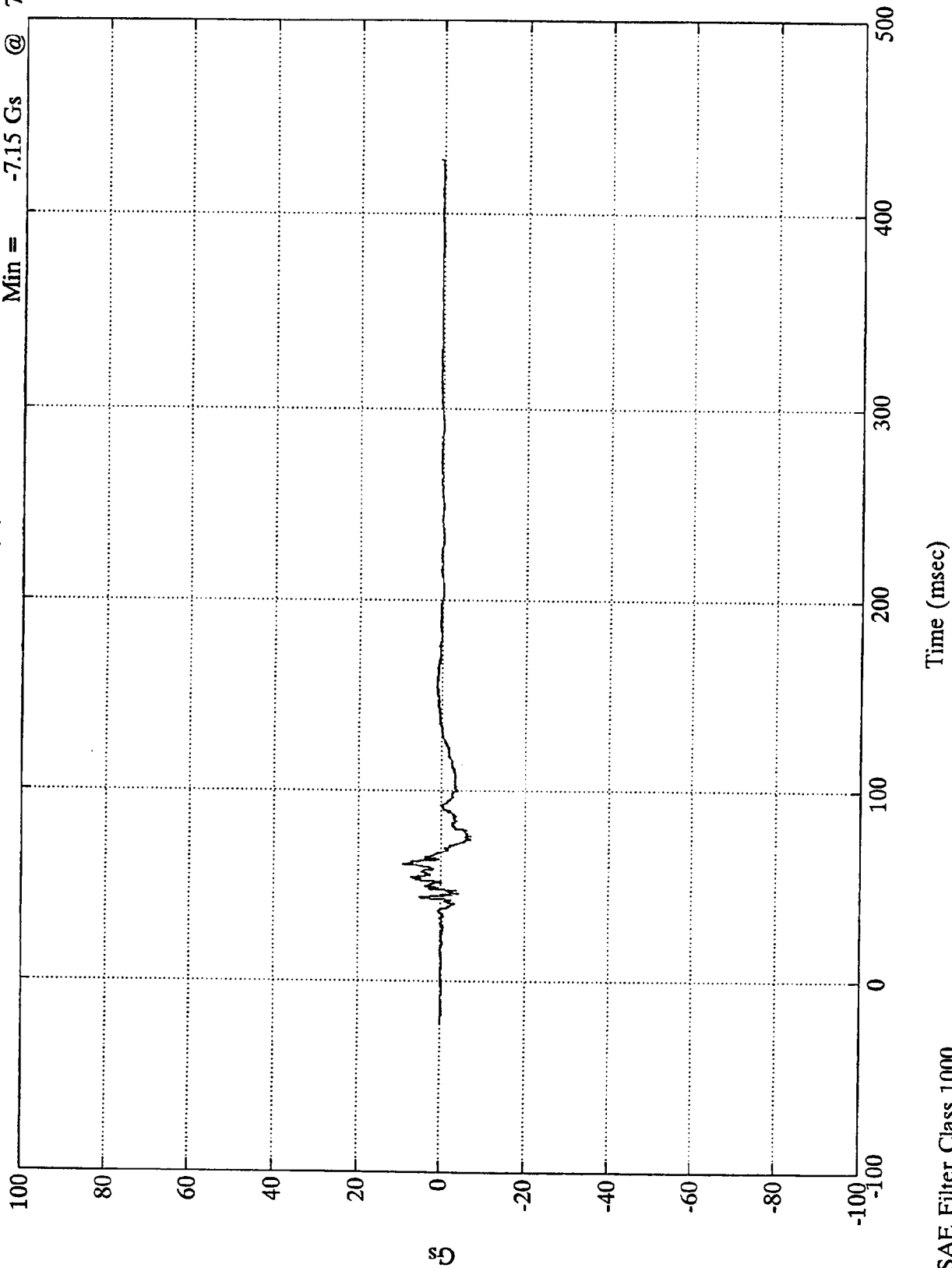


SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Pelvic (Y)

Max =	9.16 Gs	@	61.08 msec
Min =	-7.15 Gs	@	74.63 msec

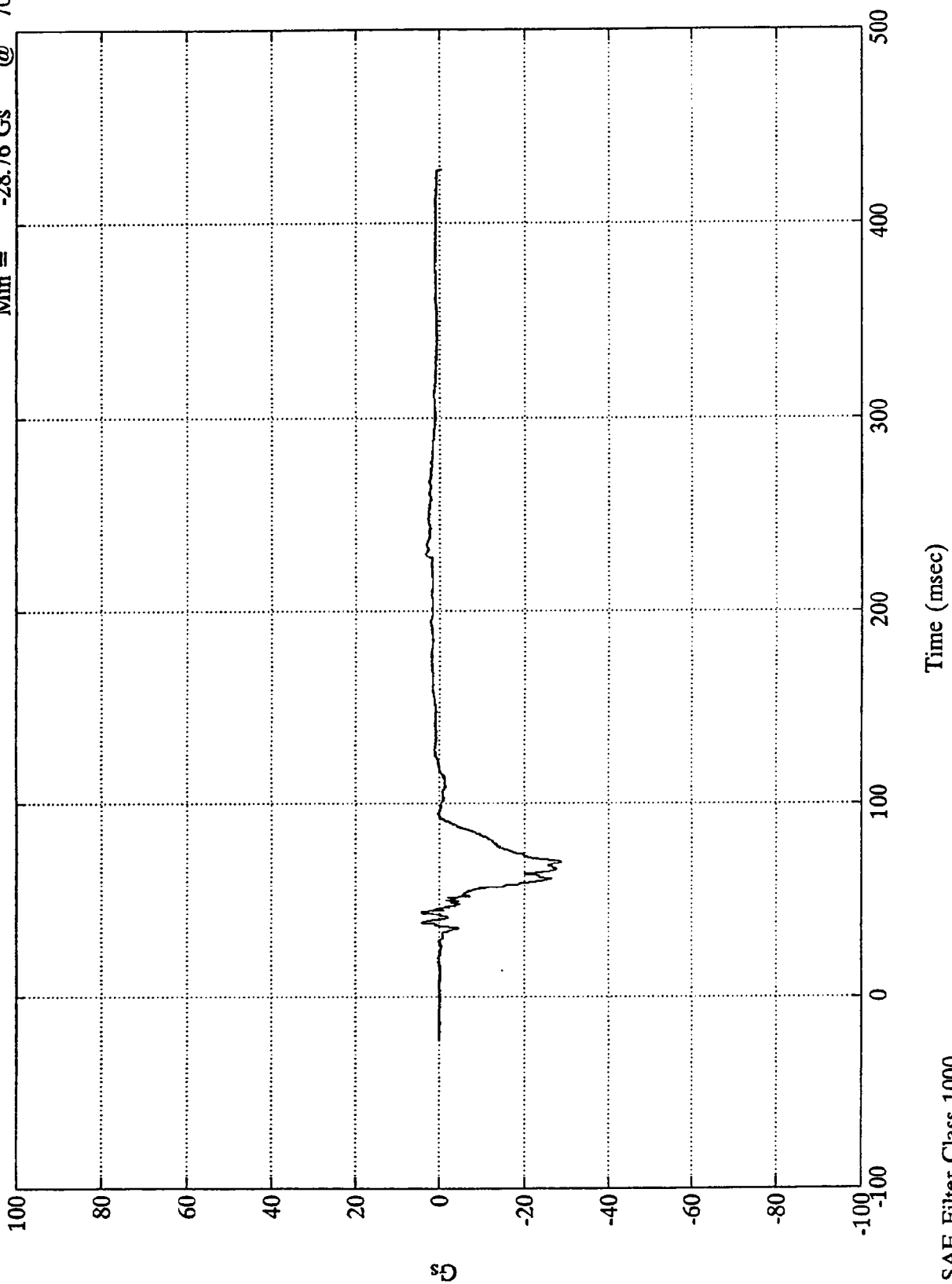


SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Pelvic (Z)

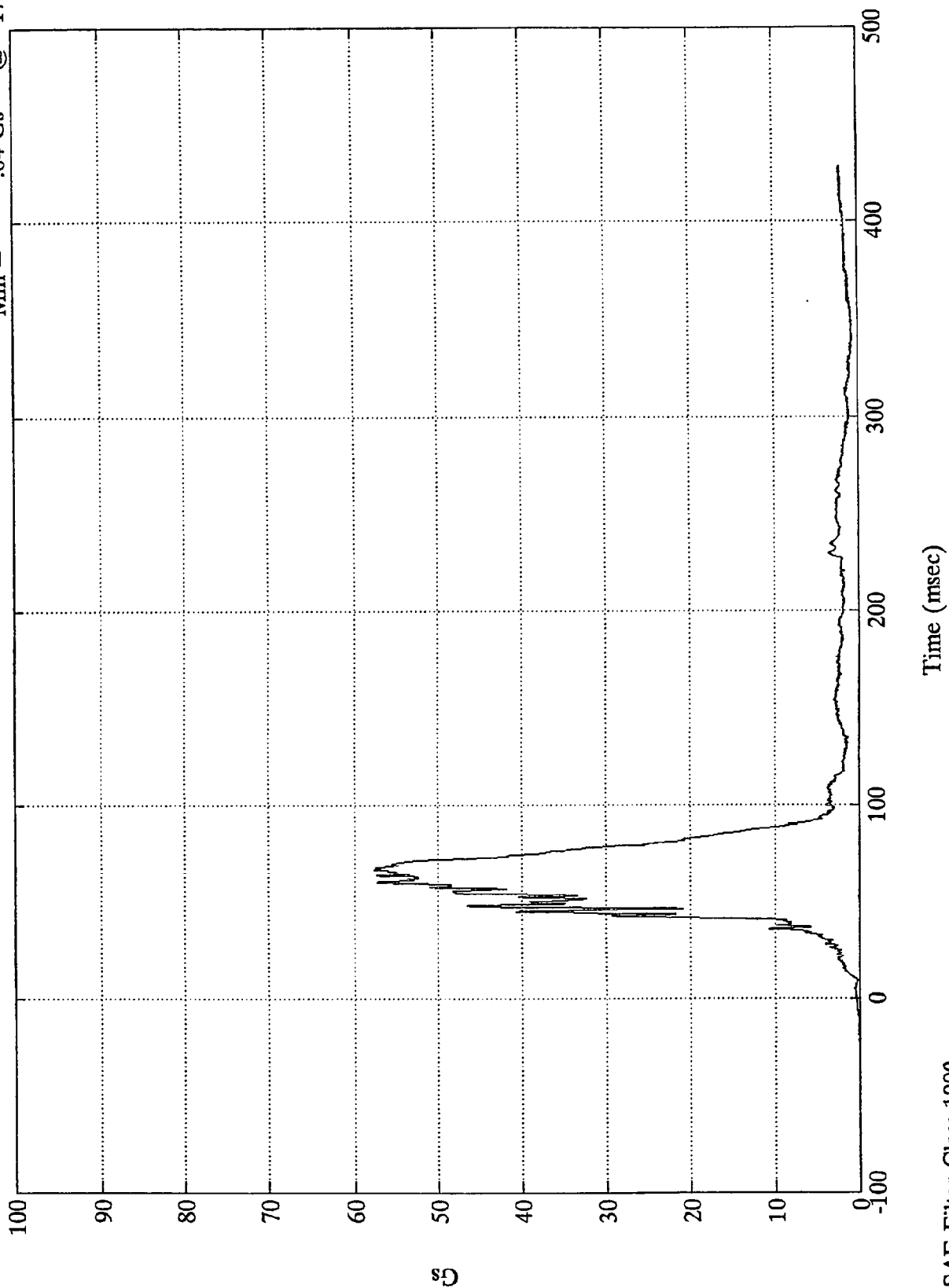
Max = 4.12 Gs @ 43.56 msec
Min = -28.76 Gs @ 70.20 msec



SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

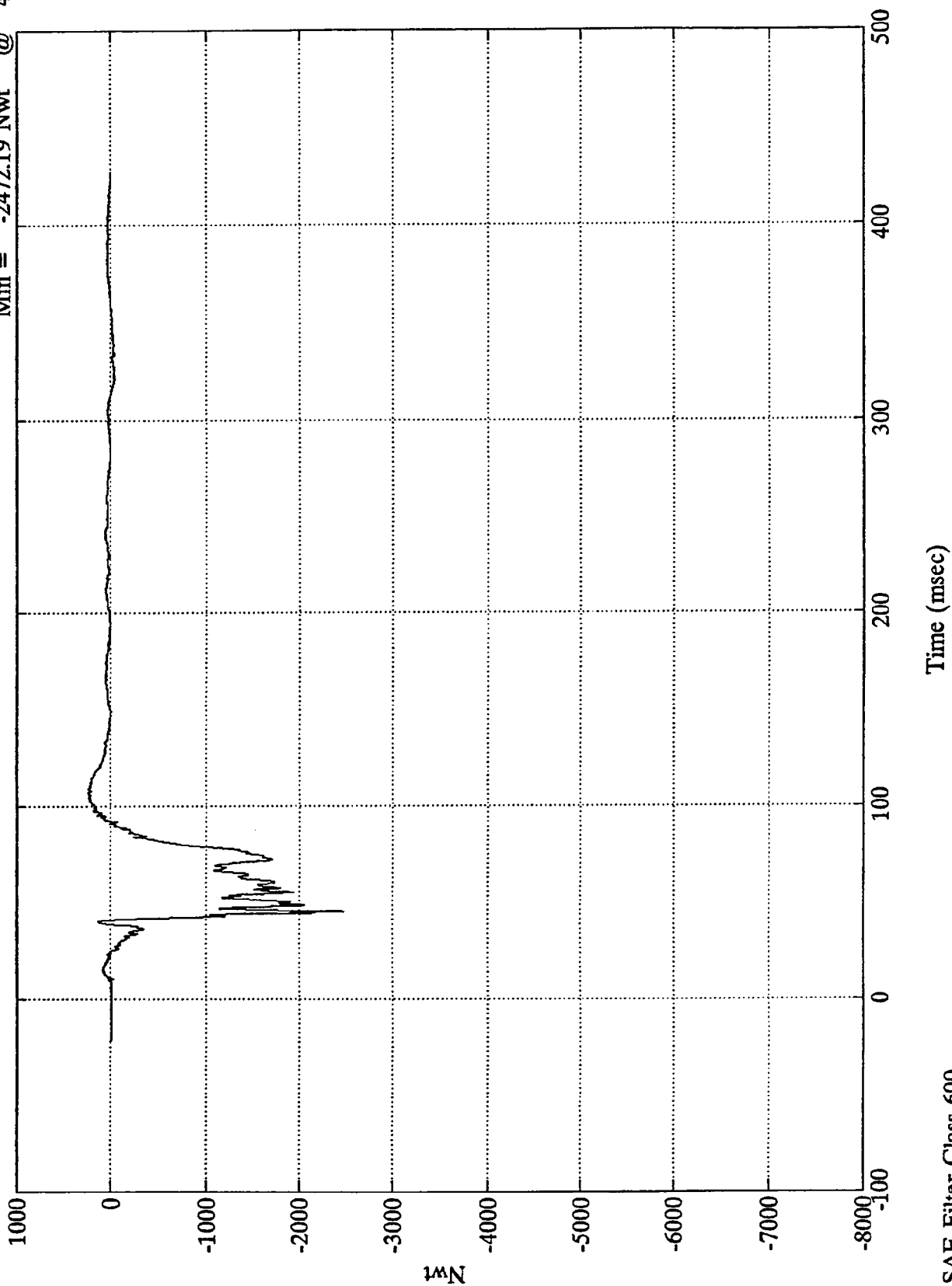
Pos. 2 Pelvic Resultant
Max = 57.69 Gs @ 66.84 msec
Min = .04 Gs @ -17.88 msec



SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

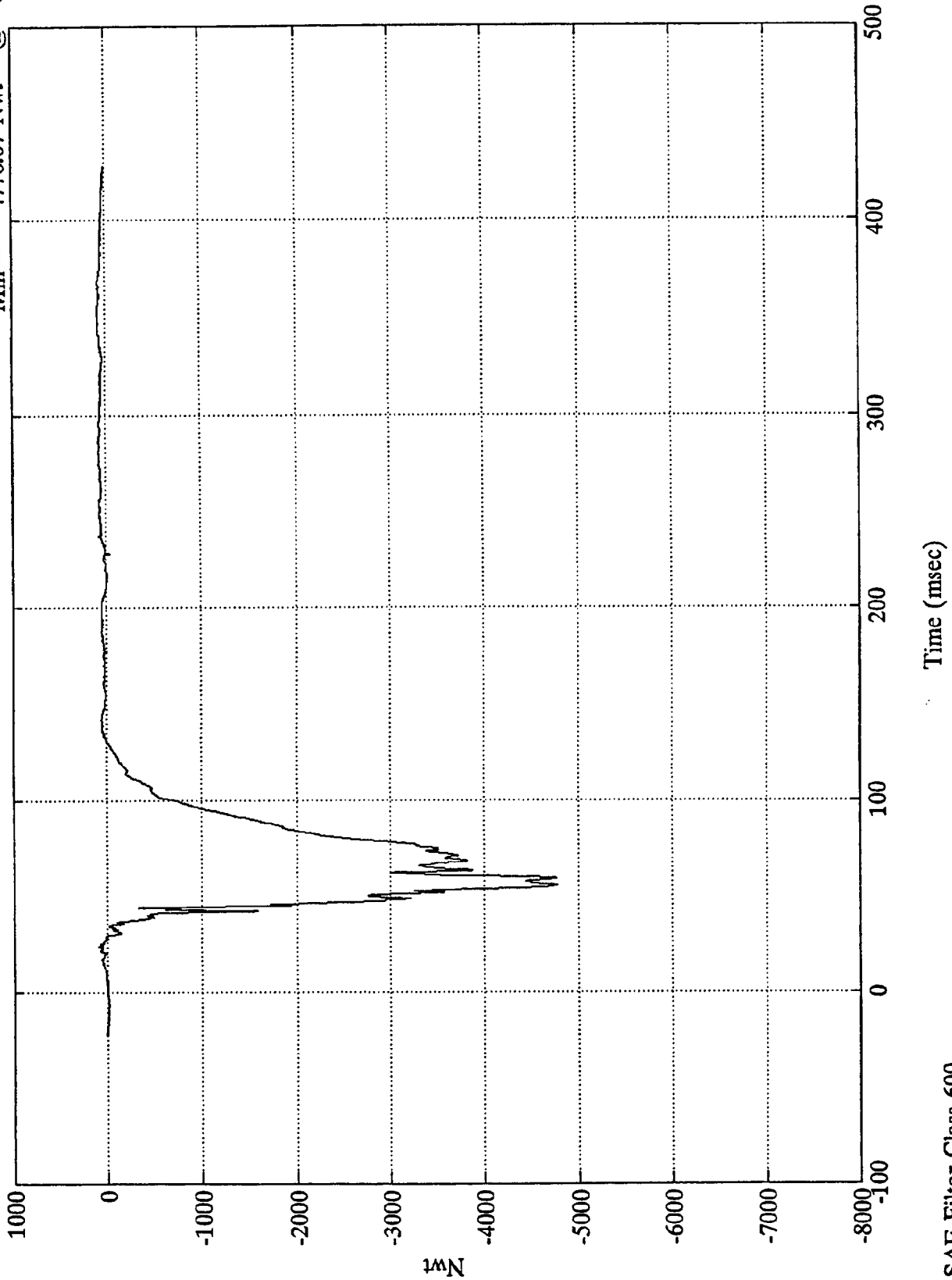
Pos. 2 Left Femur
Max = 238.86 Nwt @ 107.04 msec
Min = -2472.19 Nwt @ 45.00 msec



SAE Filter Class 600

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Right Femur
Max = 96.34 Nwt @ 24.47 msec
Min = -4776.07 Nwt @ 56.04 msec

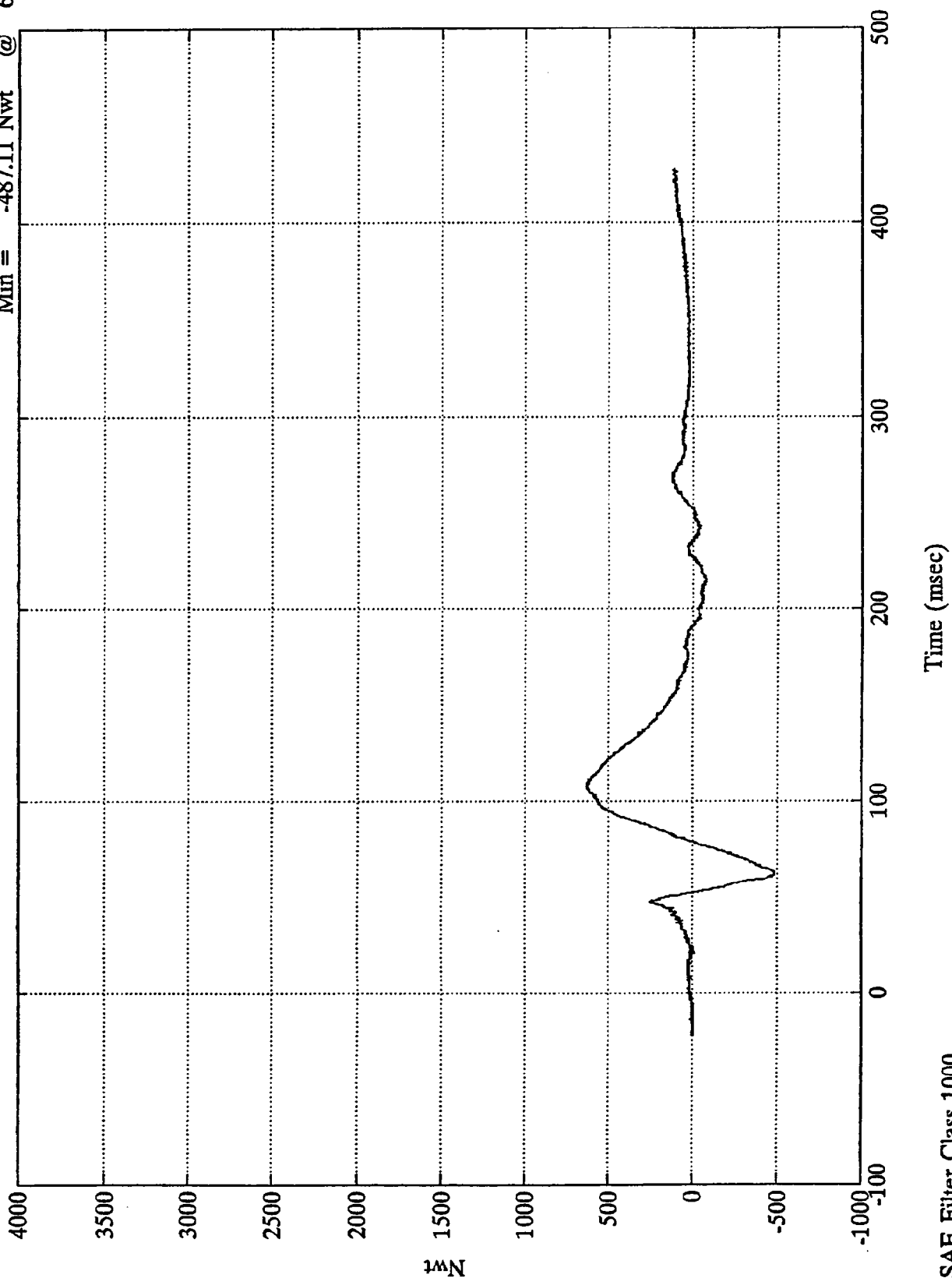


SAE Filter Class 600

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Upper Neck Fx

Max = 629.29 Nwt @ 109.68 msec
Min = -487.11 Nwt @ 63.72 msec

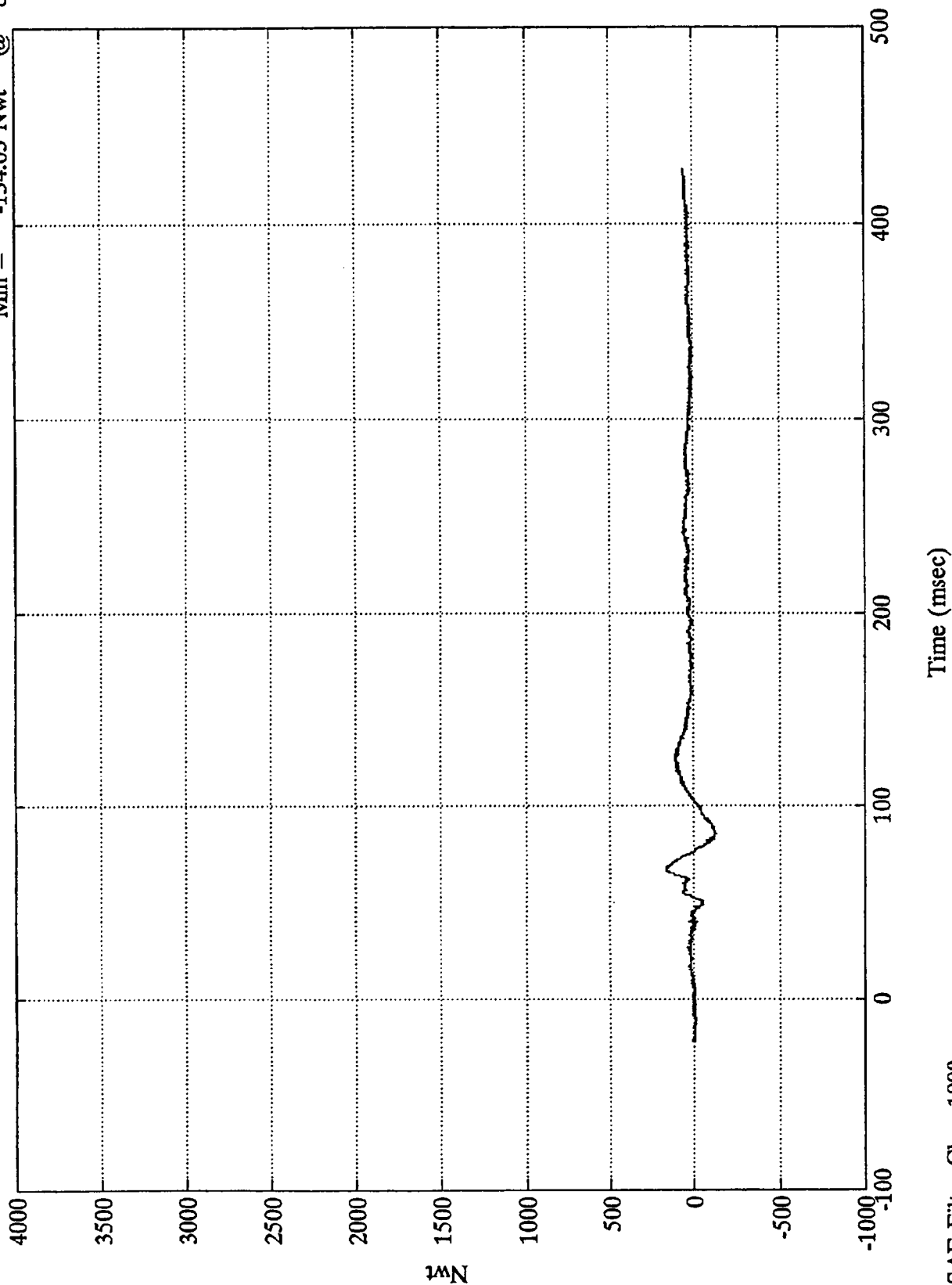


SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Upper Neck Fy

Max = 162.39 Nwt @ 68.87 msec
 Min = -134.03 Nwt @ 86.16 msec

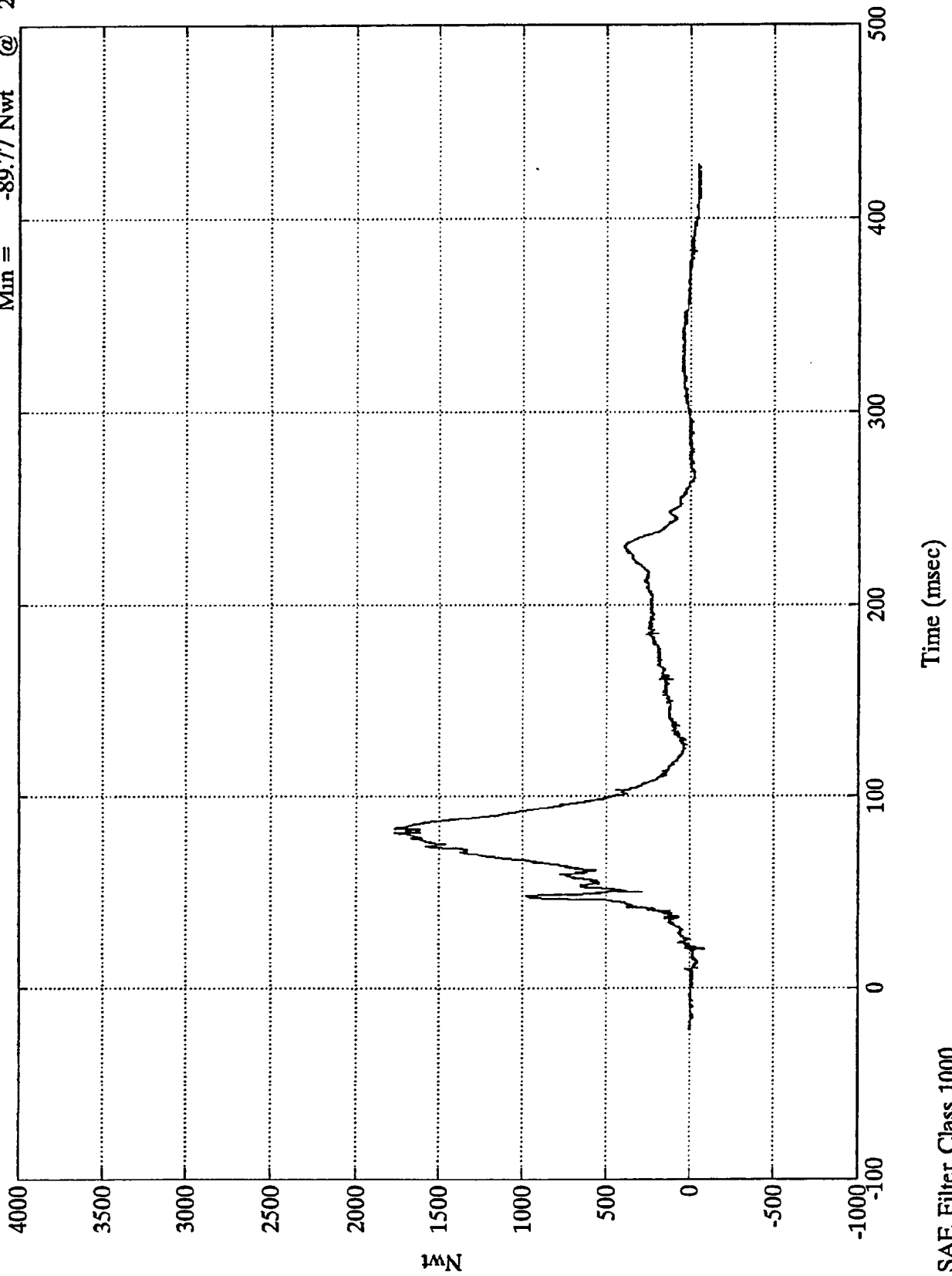


SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Upper Neck Fz

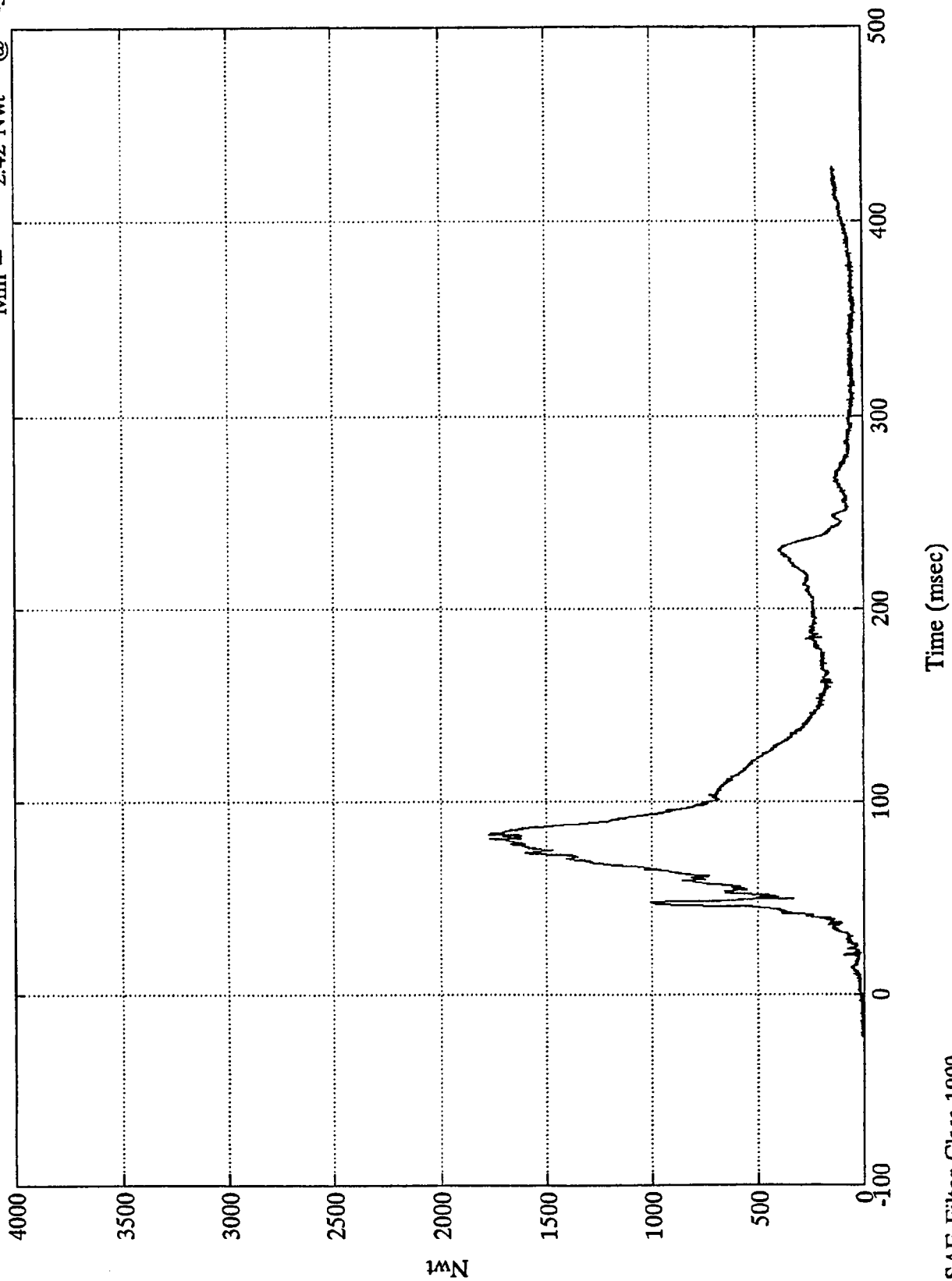
Max = 1769.29 Nwt @ 83.28 msec
Min = -89.77 Nwt @ 21.12 msec



SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Neck Force Res. Max = 1777.33 Nwt @ 83.28 msec
Min = 2.42 Nwt @ -5.88 msec

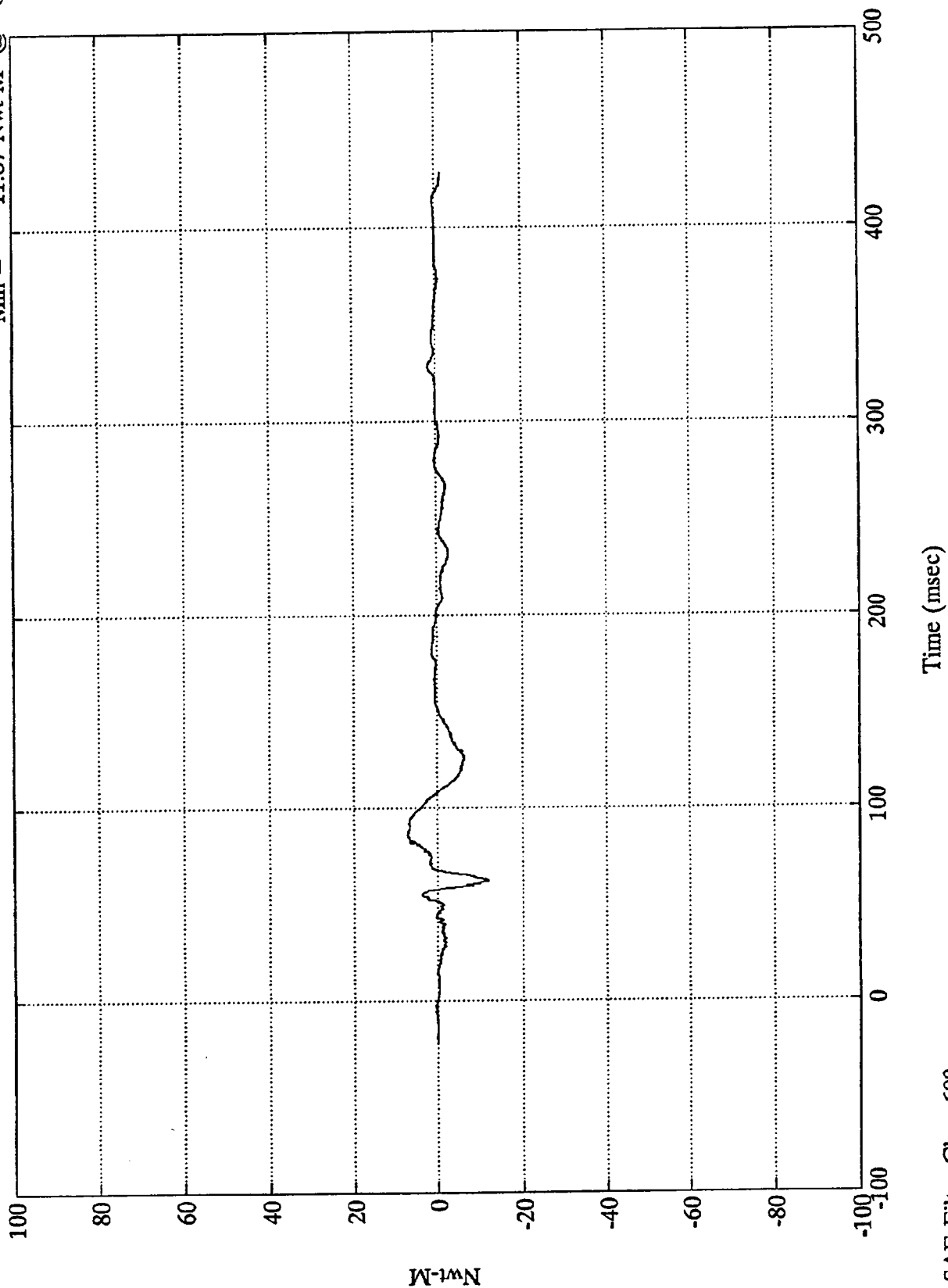


SAE Filter Class 1000

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Upper Neck Mx

Max = 7.17 Nwt-M @ 86.52 msec
Min = -11.87 Nwt-M @ 63.00 msec

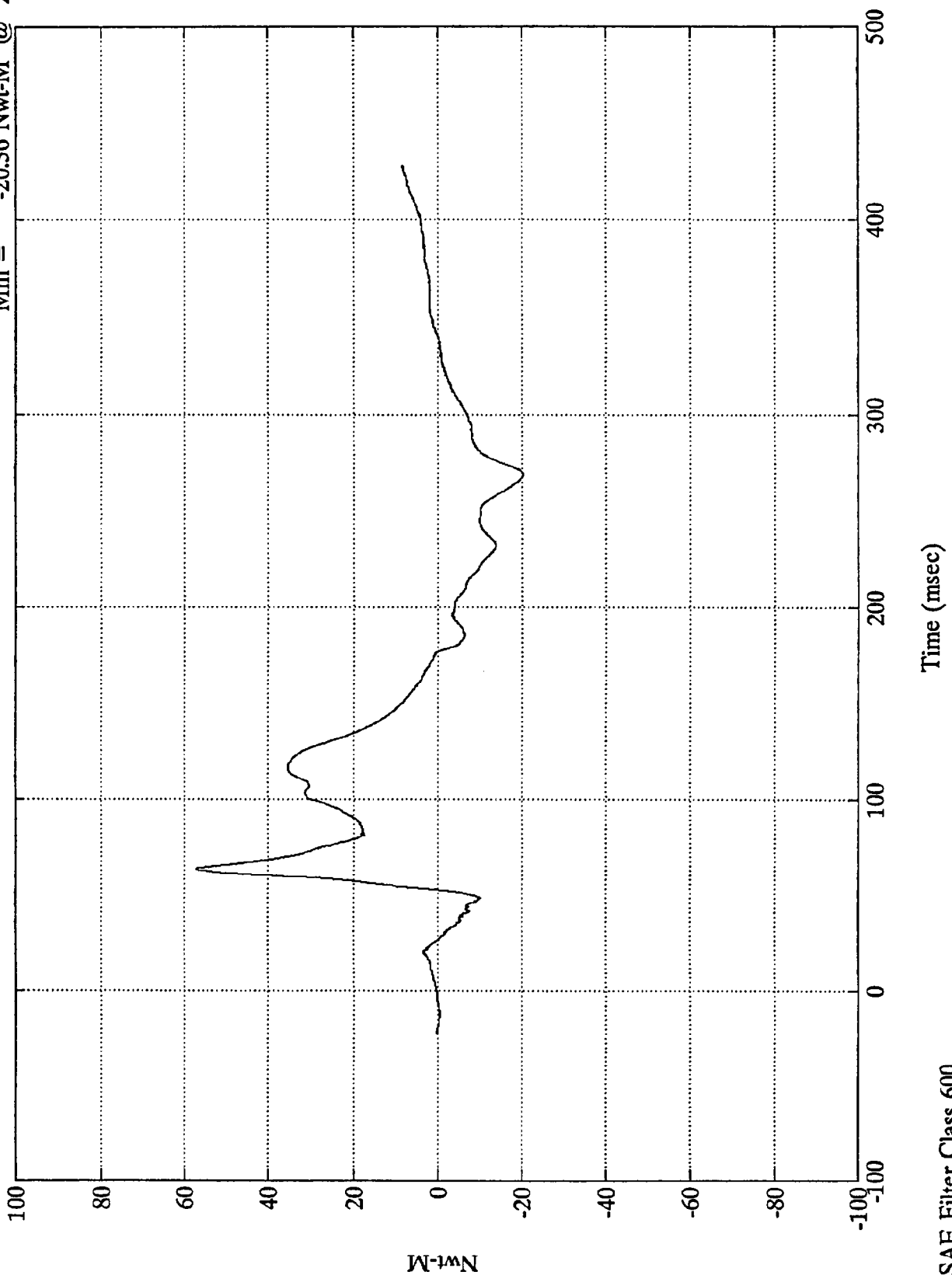


SAE Filter Class 600

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Upper Neck My

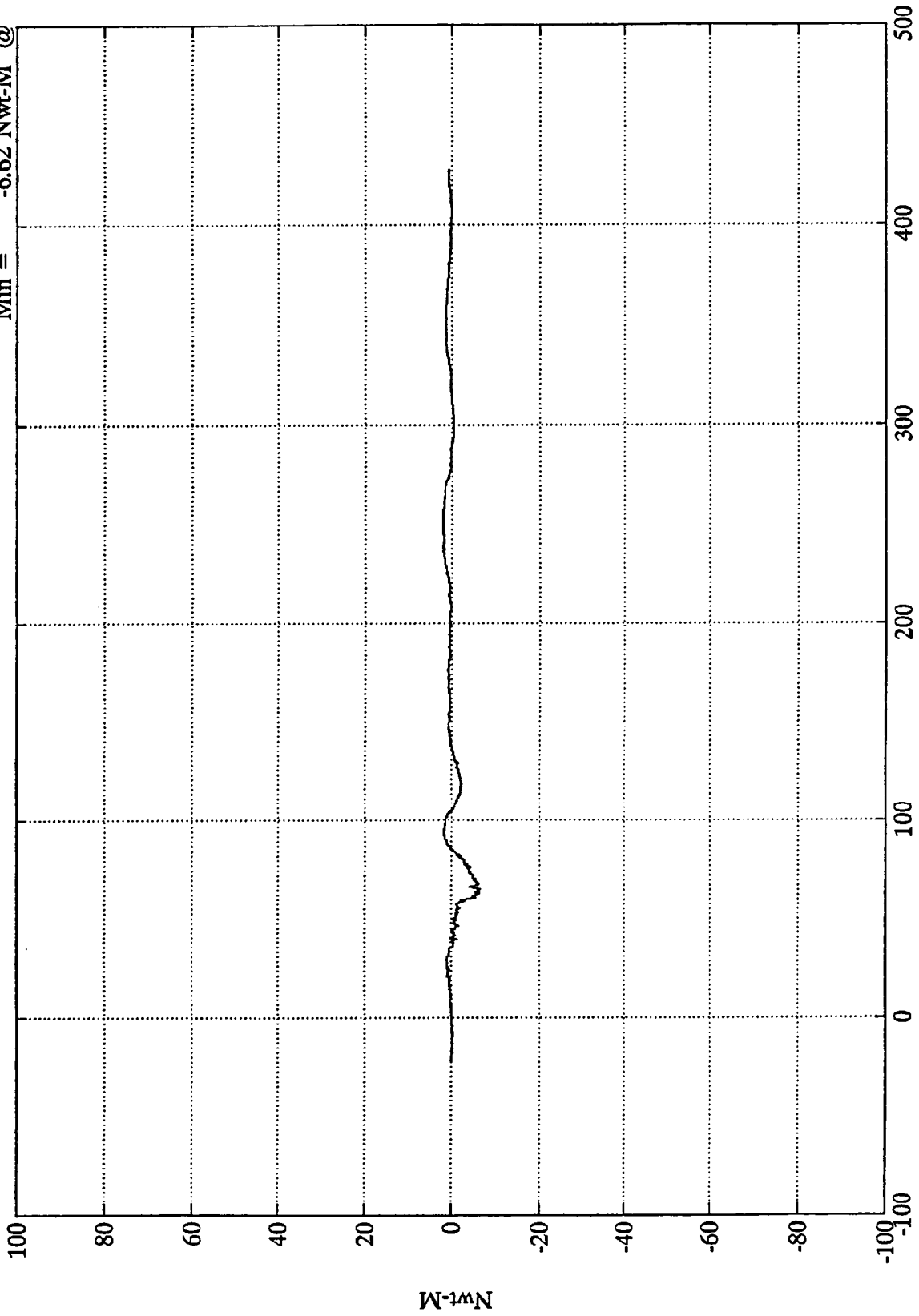
Max = 57.13 Nwt-M @ 63.48 msec
Min = -20.36 Nwt-M @ 268.80 msec



NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Upper Neck Mz

Max = 2.14 Nwt-M @ 253.08 msec
Min = -6.62 Nwt-M @ 65.76 msec



SAE Filter Class 600

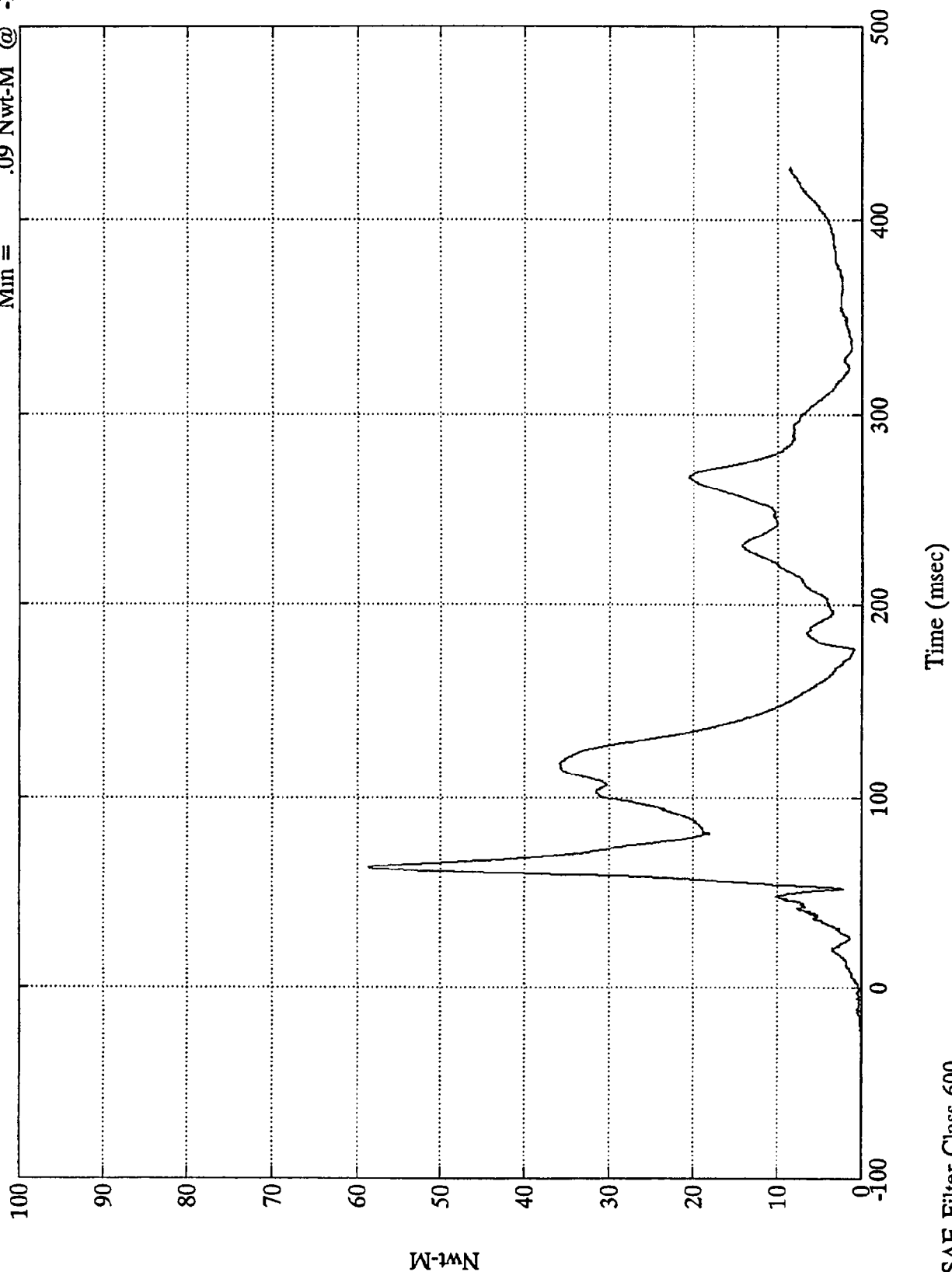
Time (msec)

Nwt-M

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Neck Moment Res.

Max = 58.62 Nwt-M @ 63.48 msec
 Min = .09 Nwt-M @ -18.12 msec

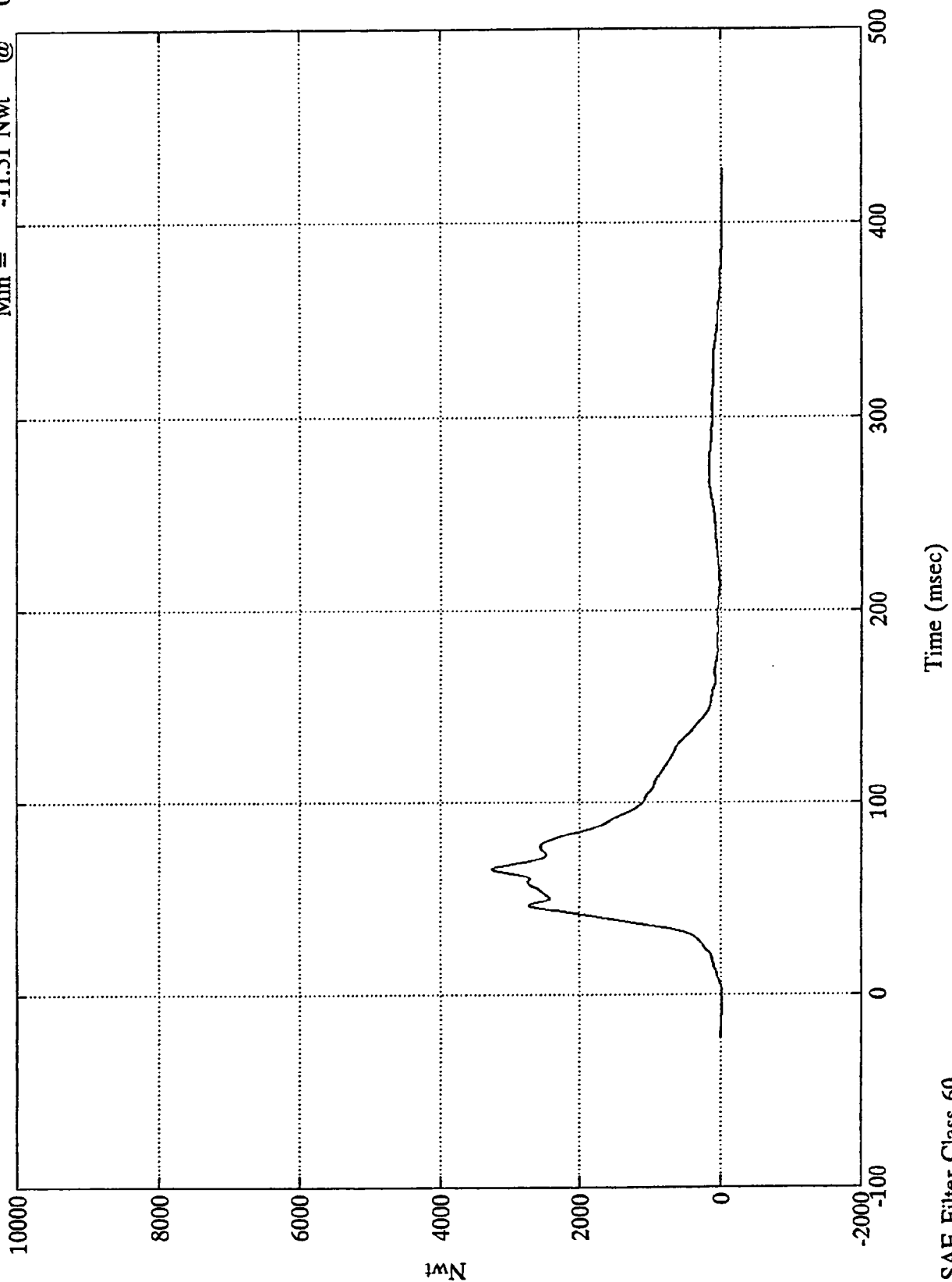


SAE Filter Class 600

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Right Belt Load

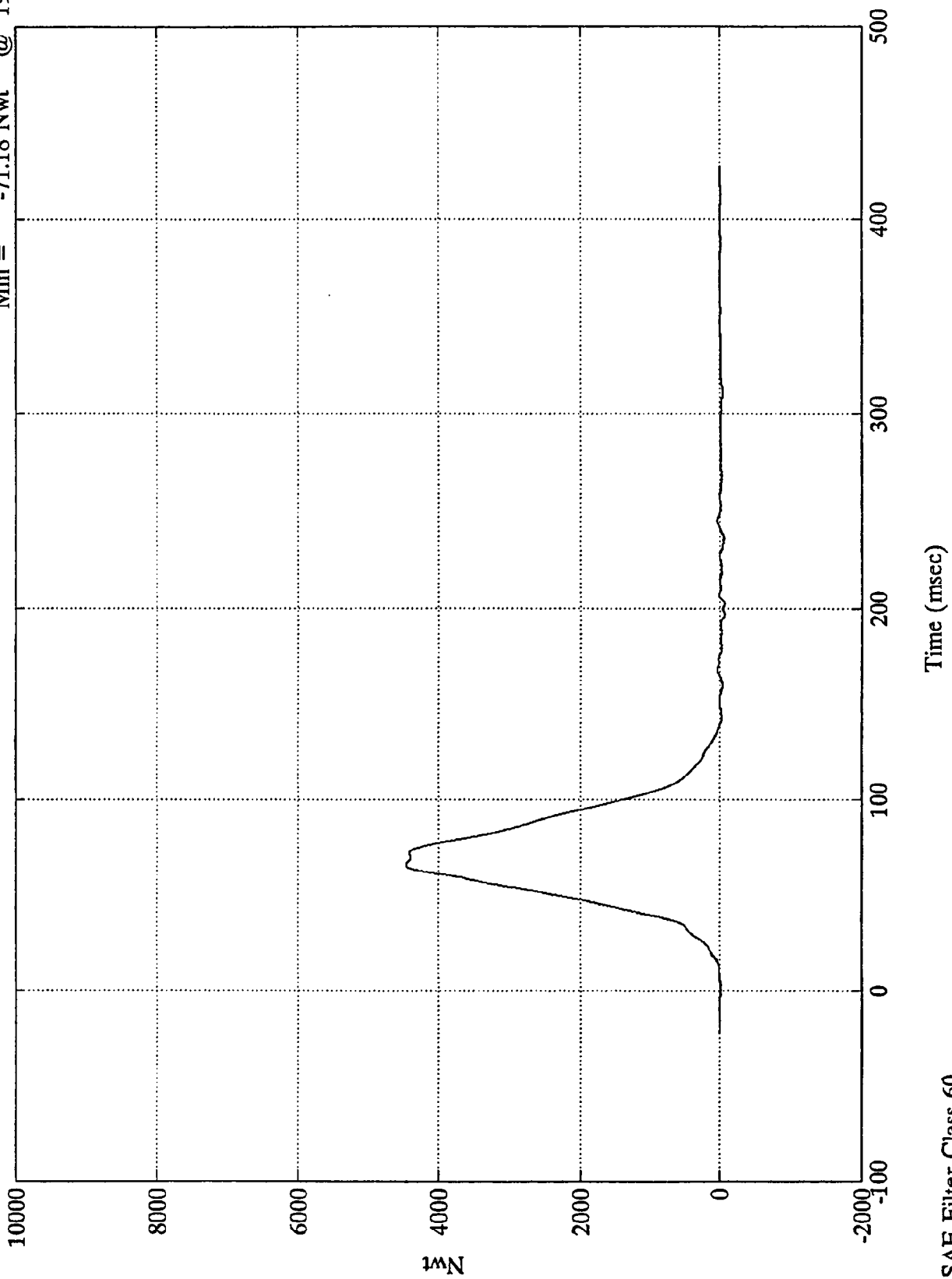
Max = 3271.36 Nwt @ 65.63 msec
Min = -11.51 Nwt @ 0.35 msec



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Torso Belt Load Max = 4464.64 Nwt @ 66.00 msec
Min = -71.18 Nwt @ 196.80 msec

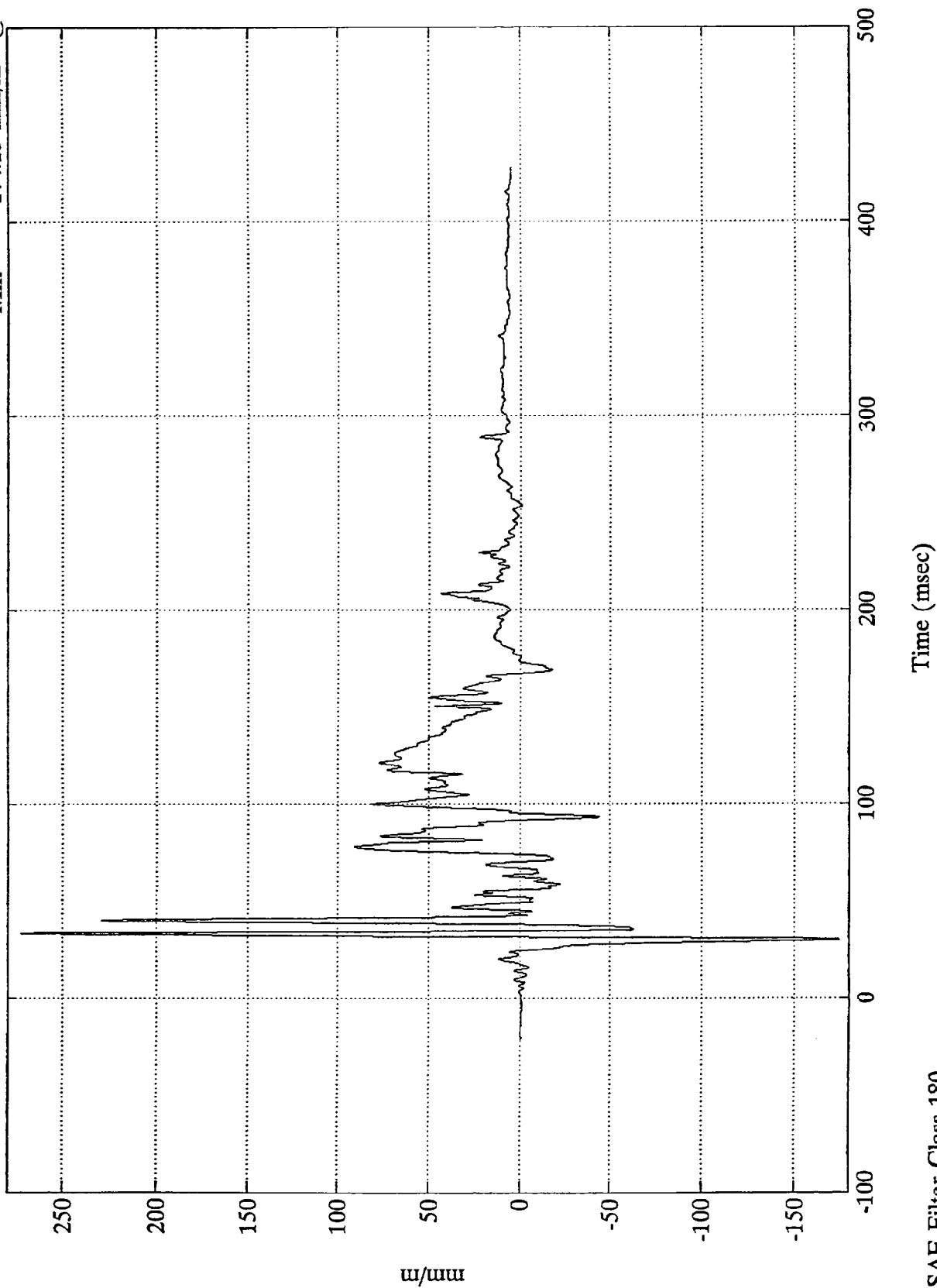


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Pos. 2 Belt Elongation

Max = 272.24 mm/m @ 33.11 msec
Min = -174.13 mm/m @ 29.88 msec



SAE Filter Class 180

TEST NO. MS0103

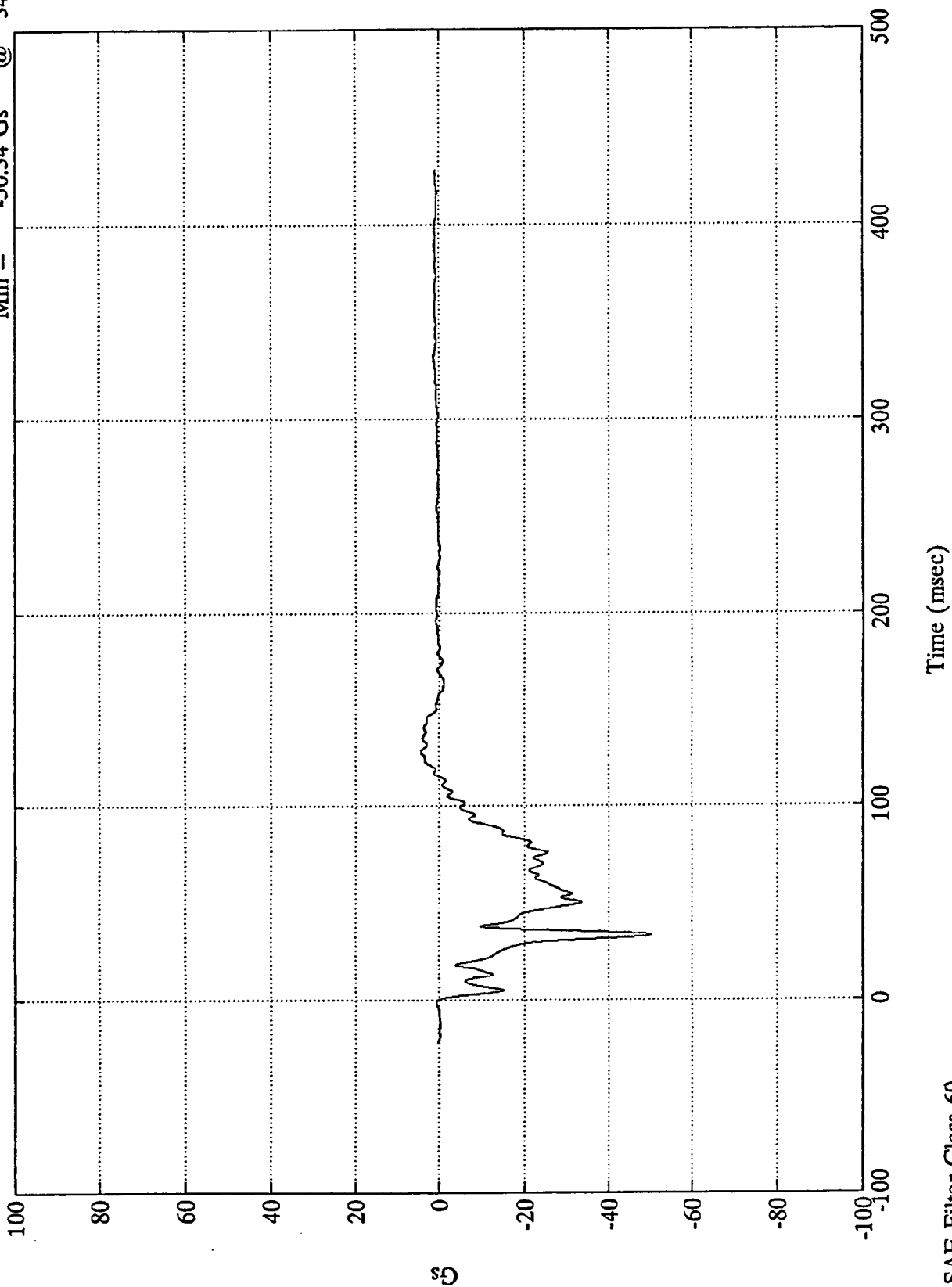
VEHICLE DATA

FILTER CHANNEL CLASS

60

NCAP TEST #9 - 1995 GEO METRO

Acc. #1(x) Max = 4.24 Gs @ 128.16 msec
Min = -50.34 Gs @ 34.31 msec

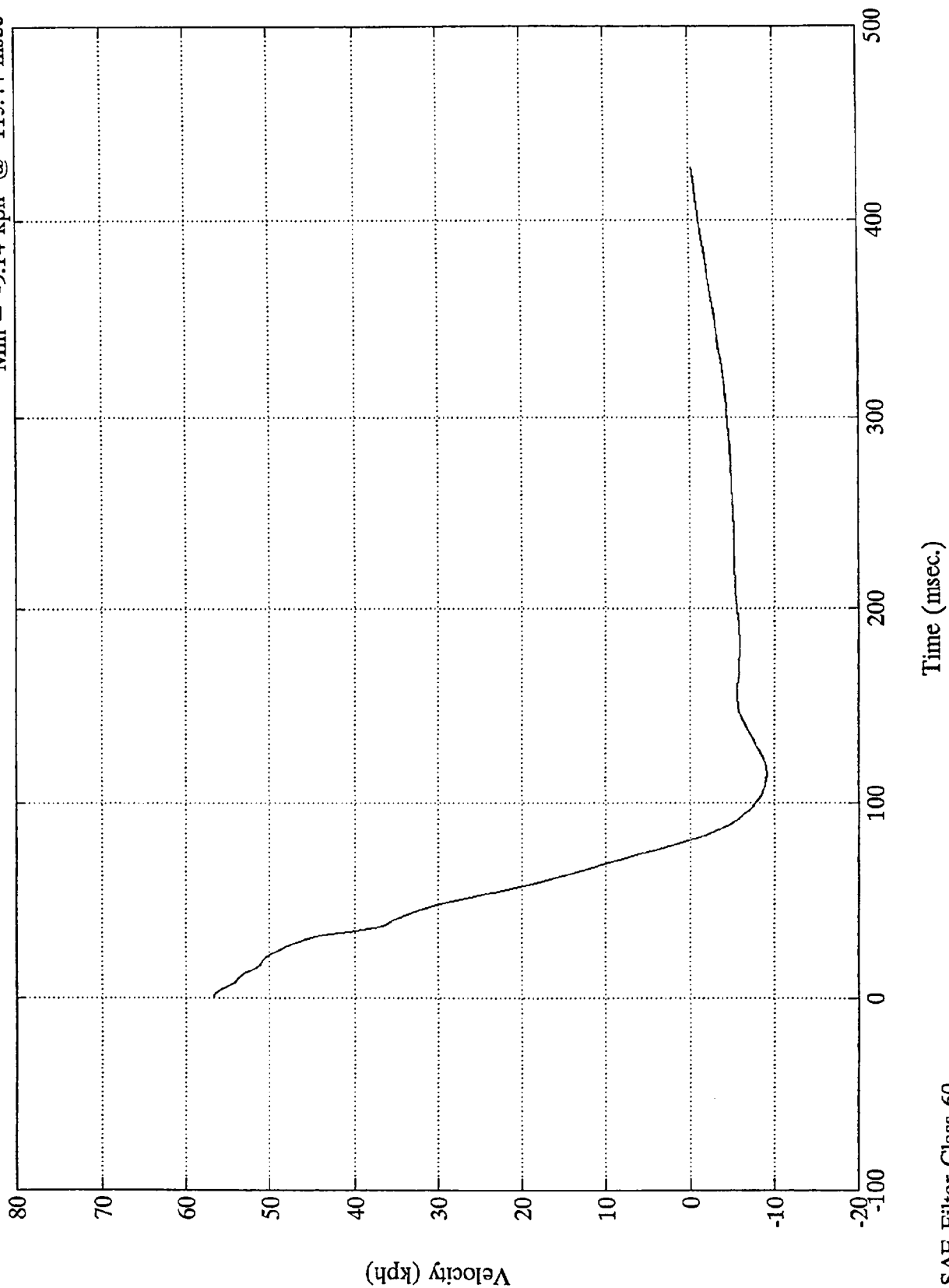


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Max = 56.65 kph @ 0.72 msec
Min = -9.14 kph @ 115.44 msec

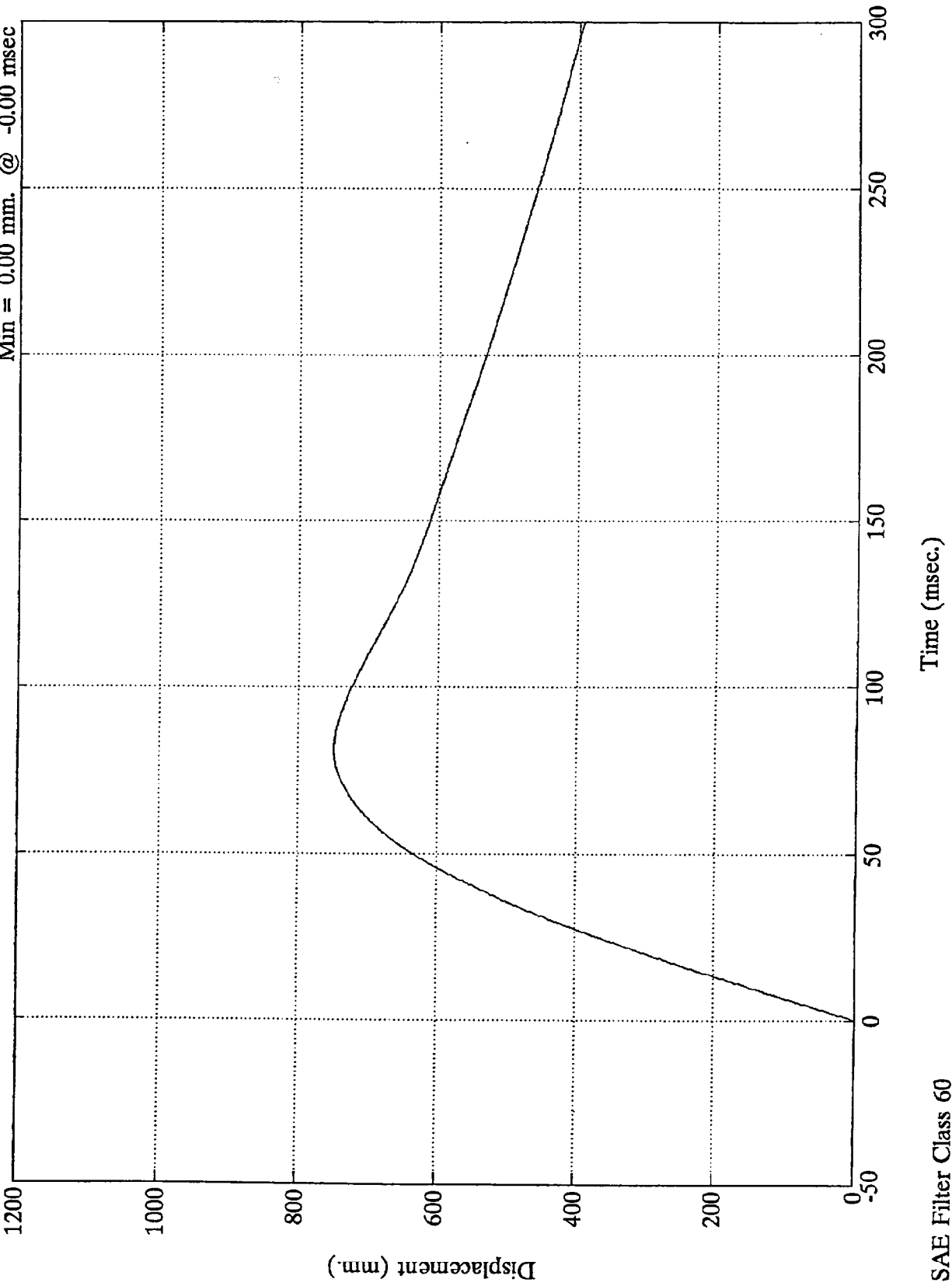
Acc. #1(x)



SAE Filter Class 60

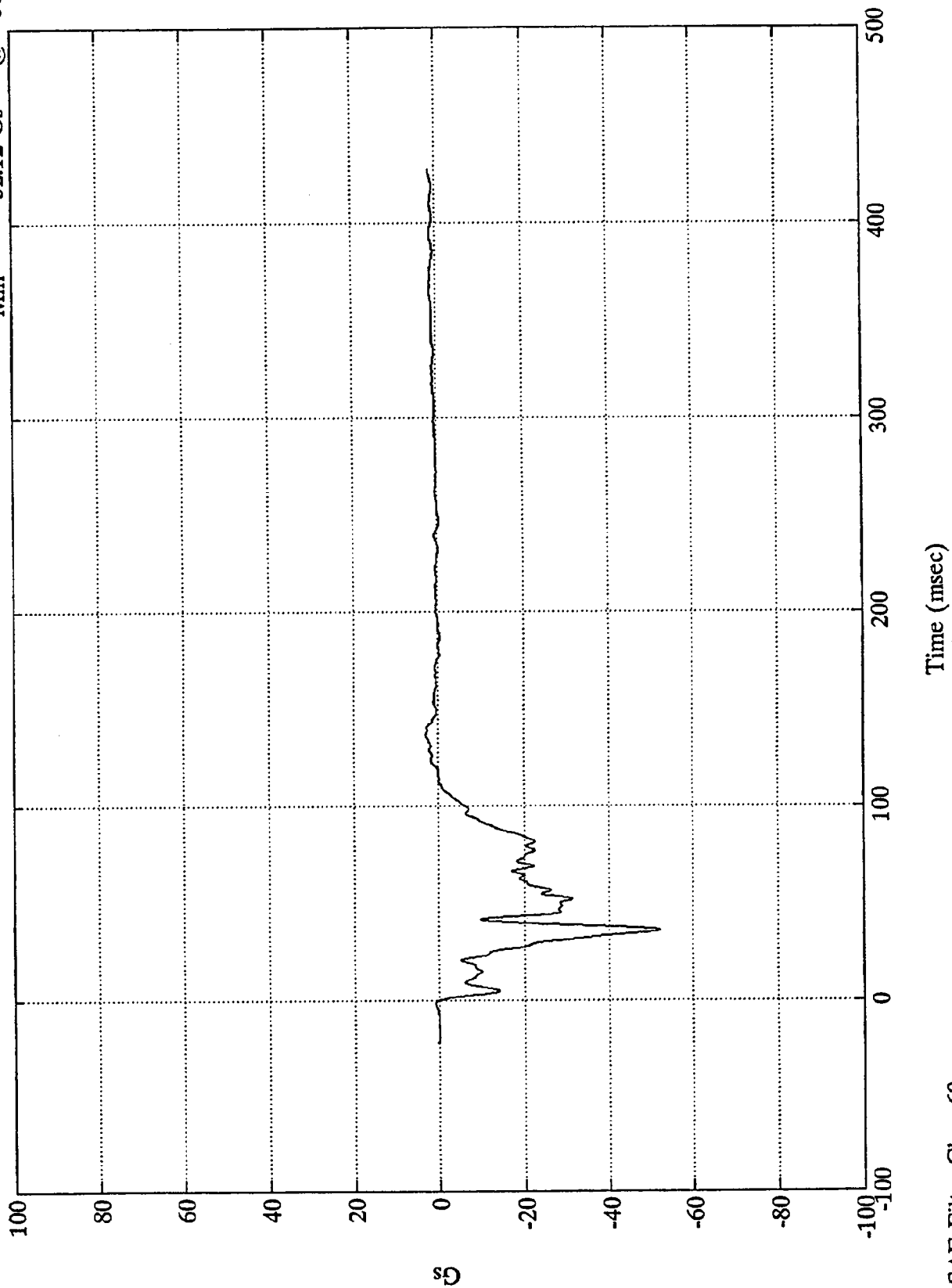
NCAP TEST #9 - 1995 GEO METRO

Acc. #1(x)
Max = 747.27 mm. @ 82.56 msec
Min = 0.00 mm. @ -0.00 msec



NCAP TEST #9 - 1995 GEO METRO

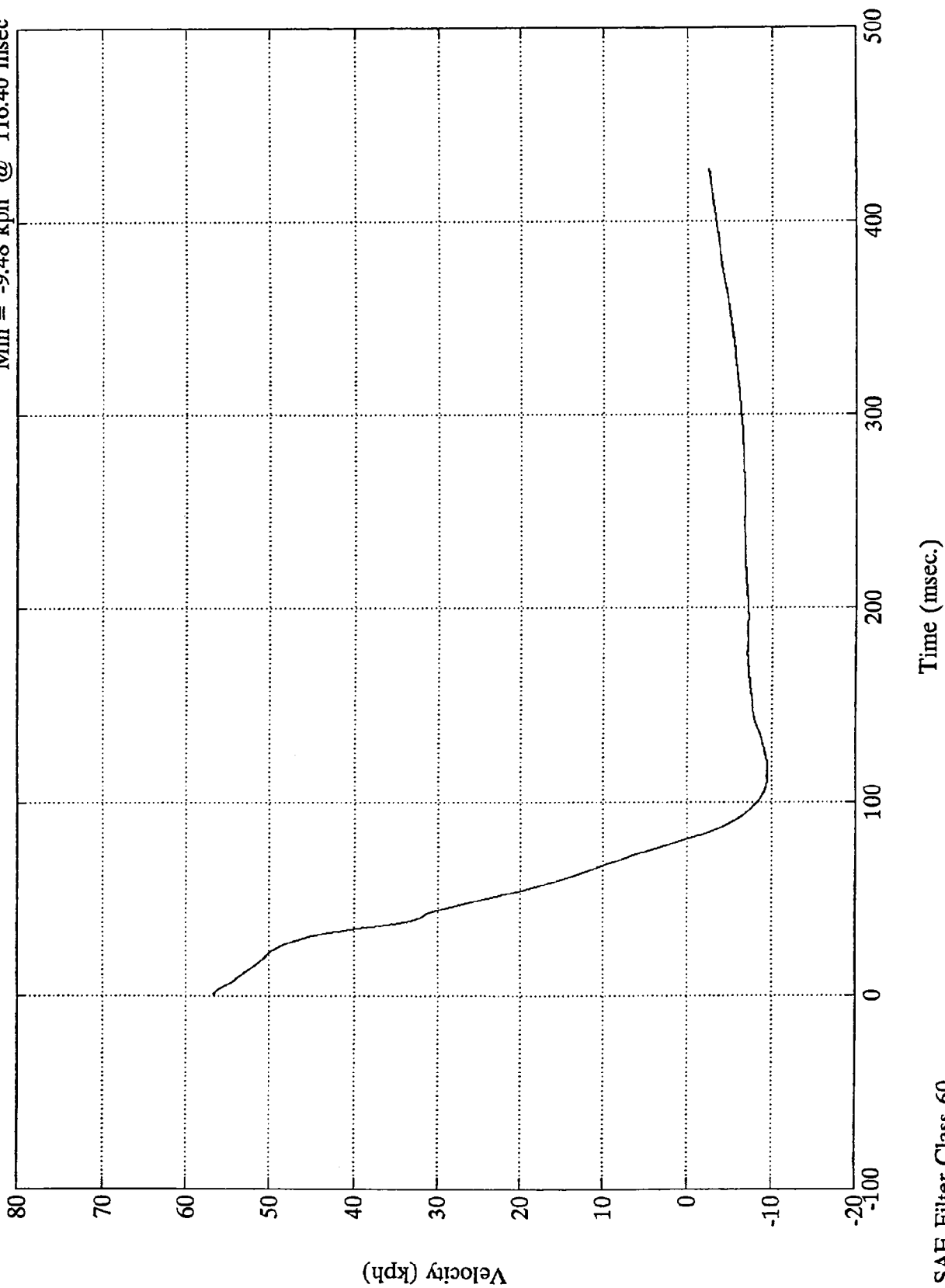
Acc. #2(x) Max = 2.93 Gs @ 137.39 msec
Min = -52.12 Gs @ 36.24 msec



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Acc. #2(x)
Max = 56.65 kph @ 0.24 msec
Min = -9.48 kph @ 116.40 msec

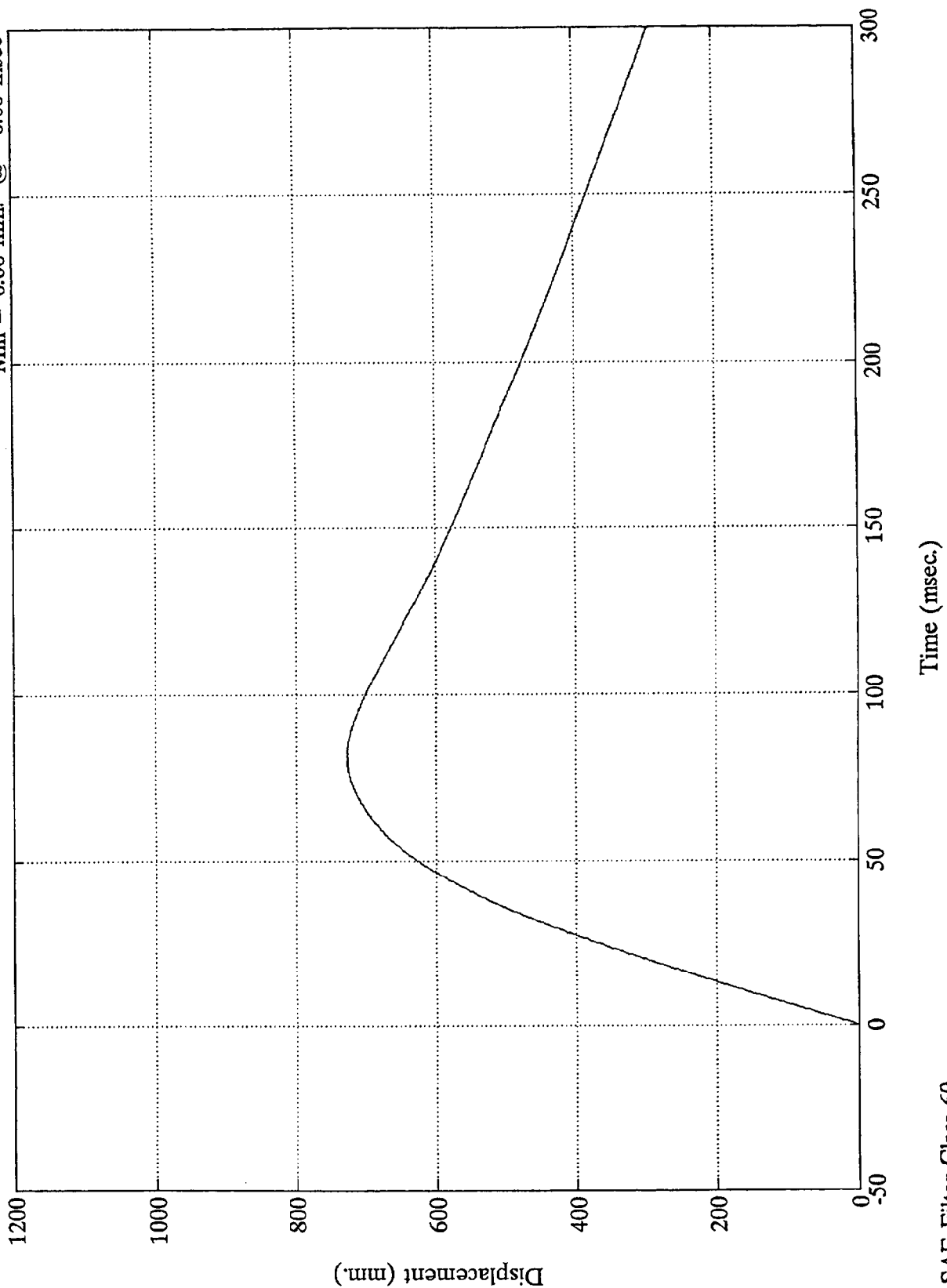


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Max = 726.44 mm. @ 82.32 msec
Min = 0.00 mm. @ -0.00 msec

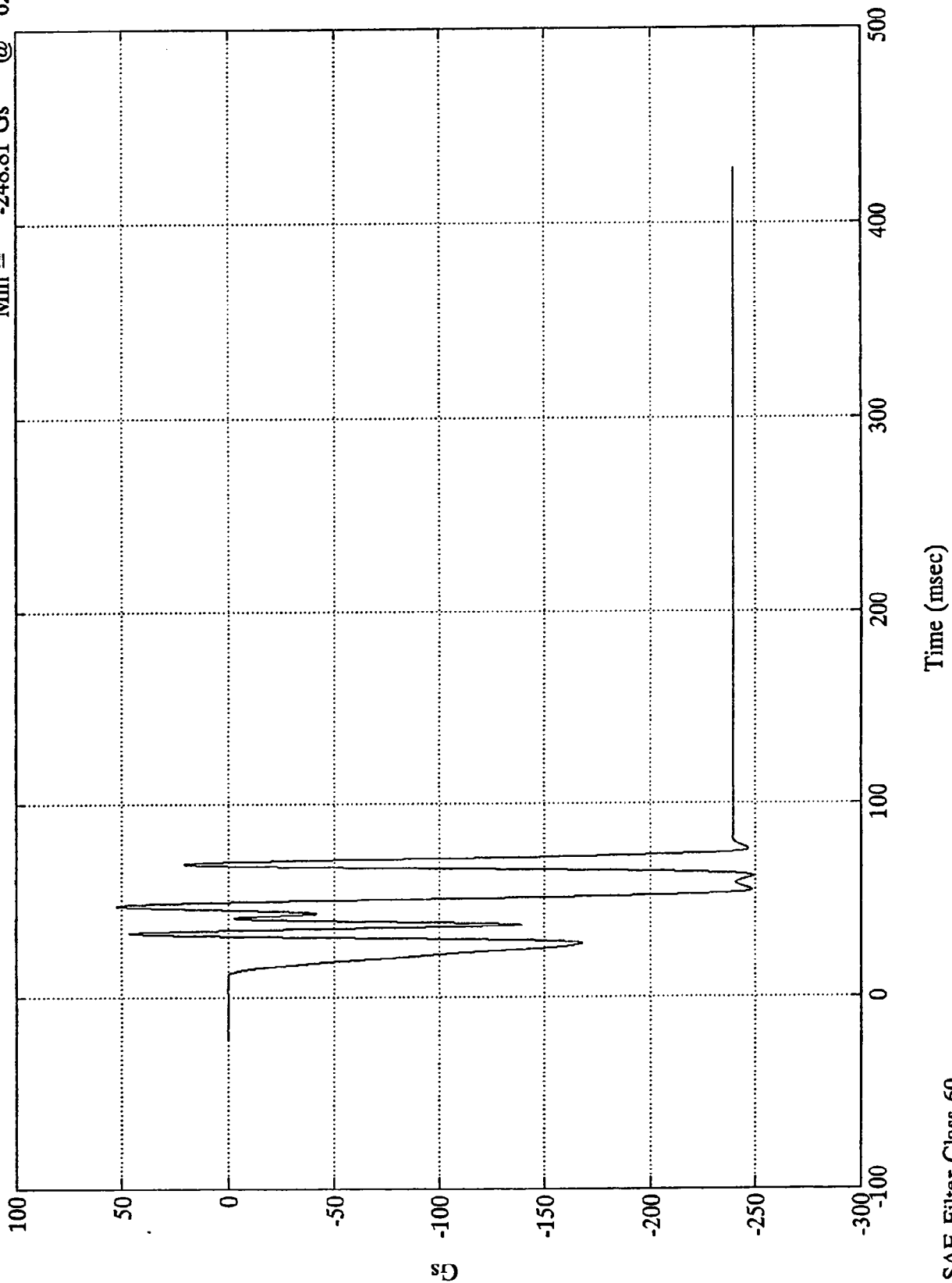
Acc. #2(x)



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Acc. #3(x) Max = 52.14 Gs @ 47.52 msec
Min = -248.81 Gs @ 62.52 msec

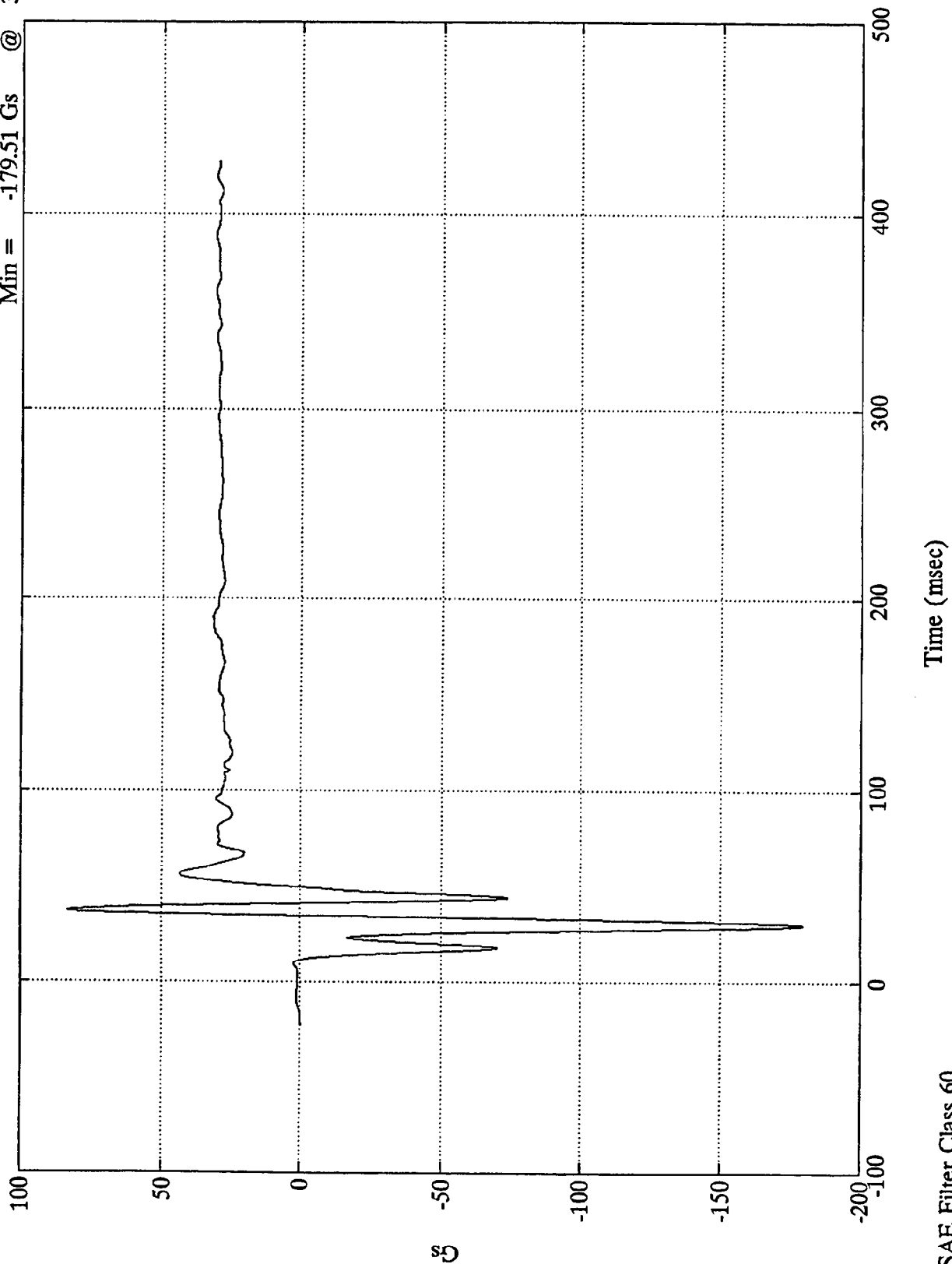


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Max = 83.34 Gs @ 37.44 msec
 Min = -179.51 Gs @ 30.24 msec

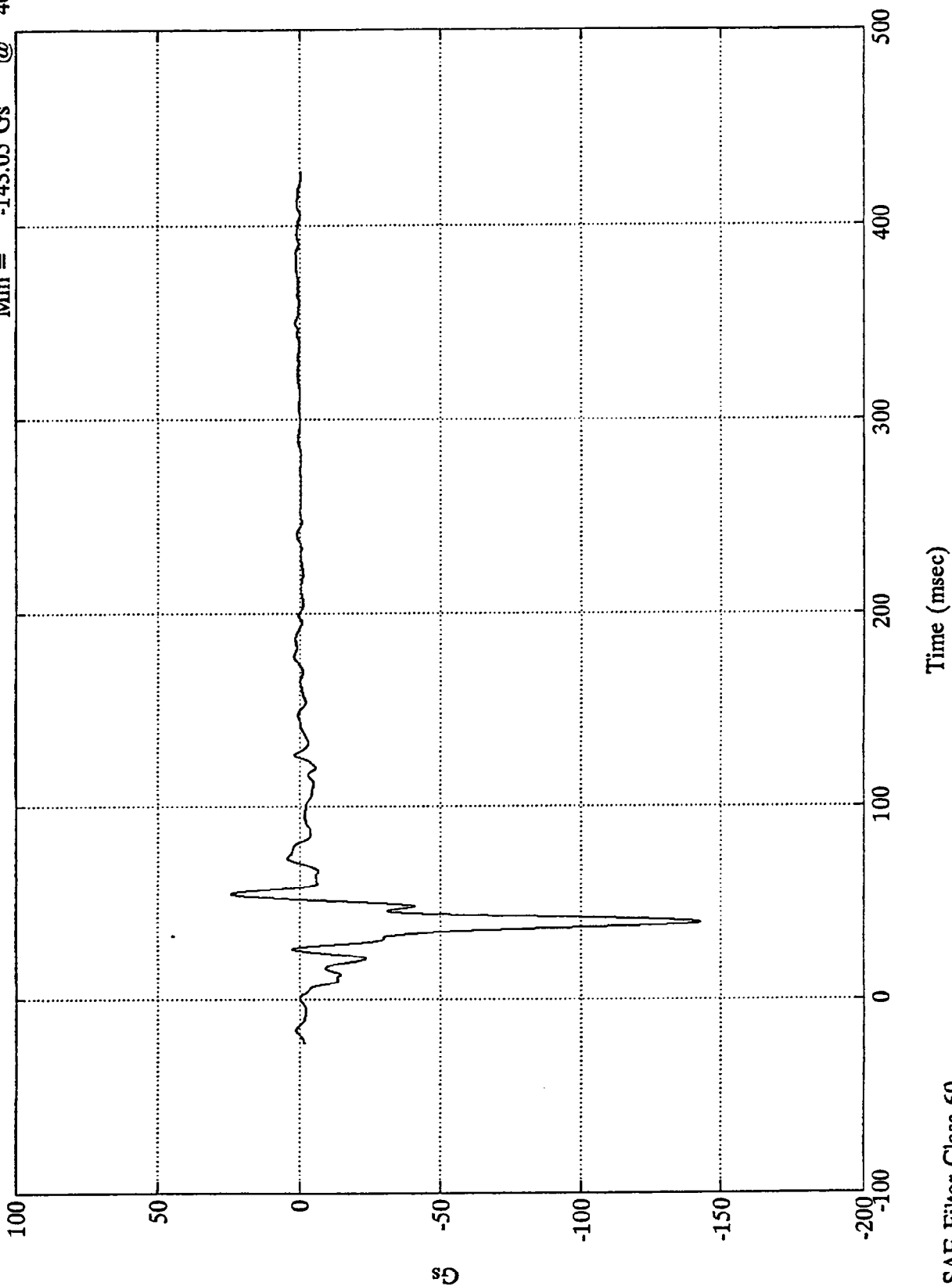
Acc. #4(x)



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Acc. #5(x) Max = 24.37 Gs @ 55.44 msec
Min = -143.05 Gs @ 40.44 msec

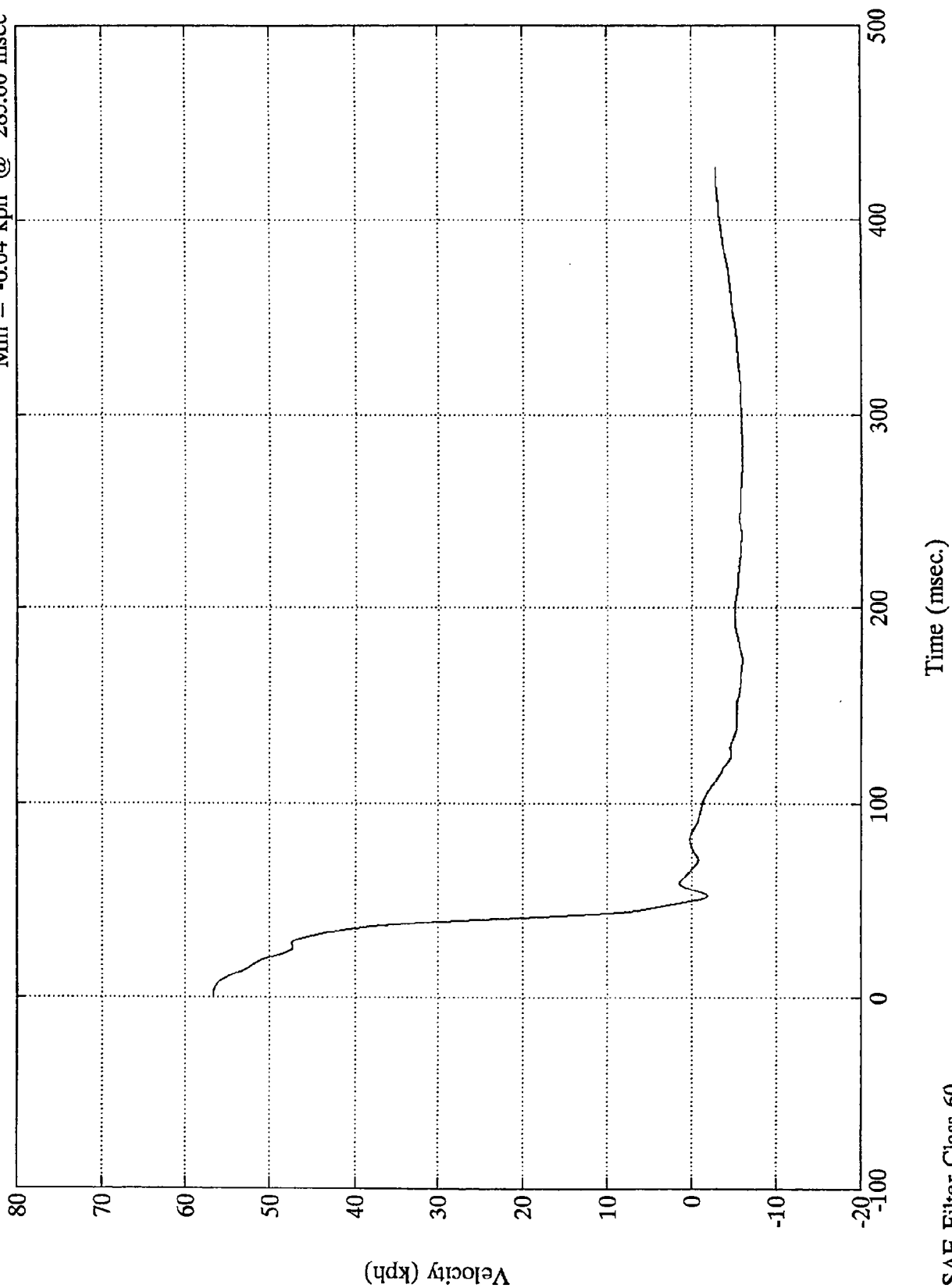


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Max = 56.65 kph @ 1.20 msec
Min = -6.04 kph @ 285.60 msec

Acc. #5(x)

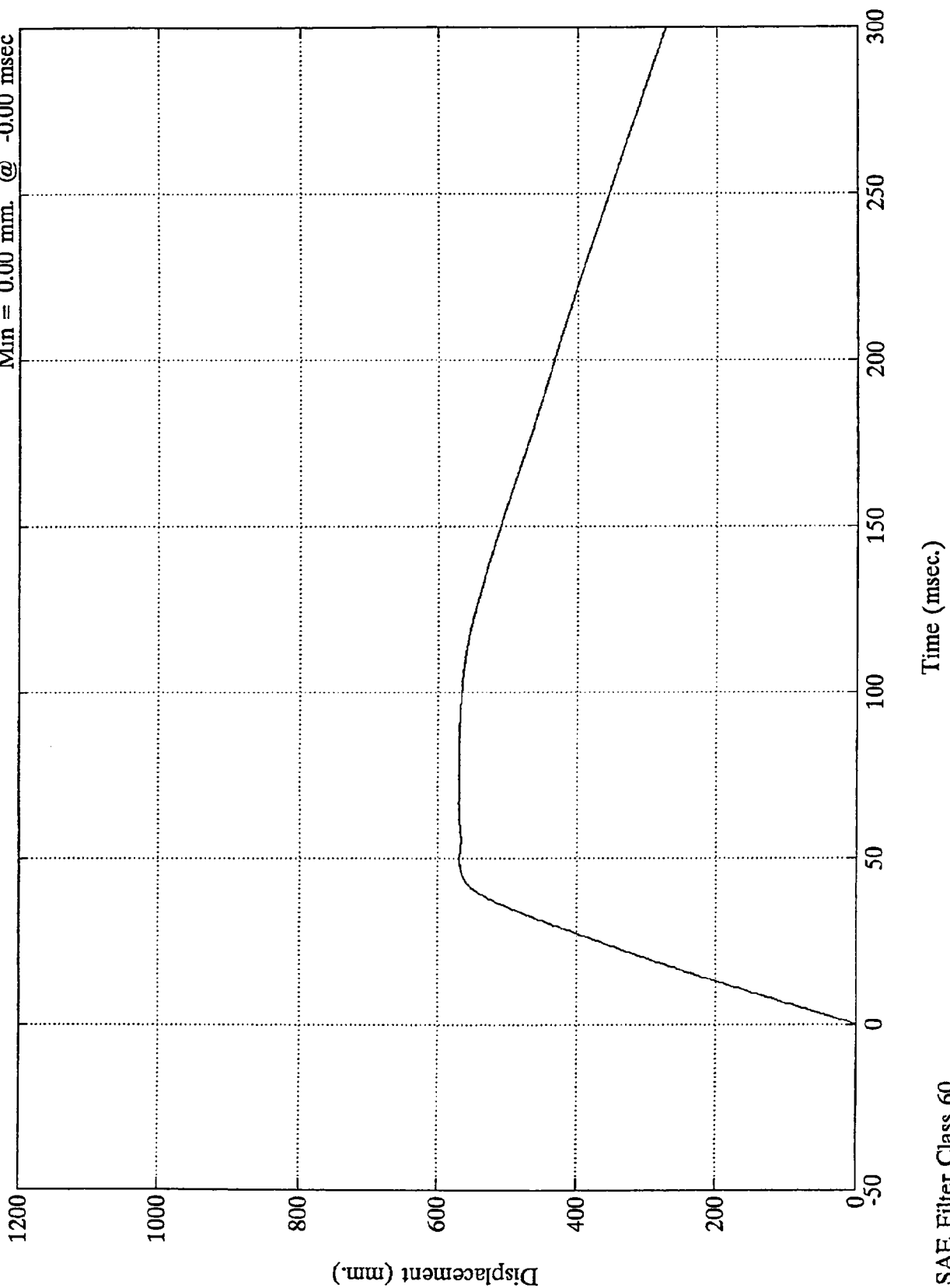


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Acc. #5(x)

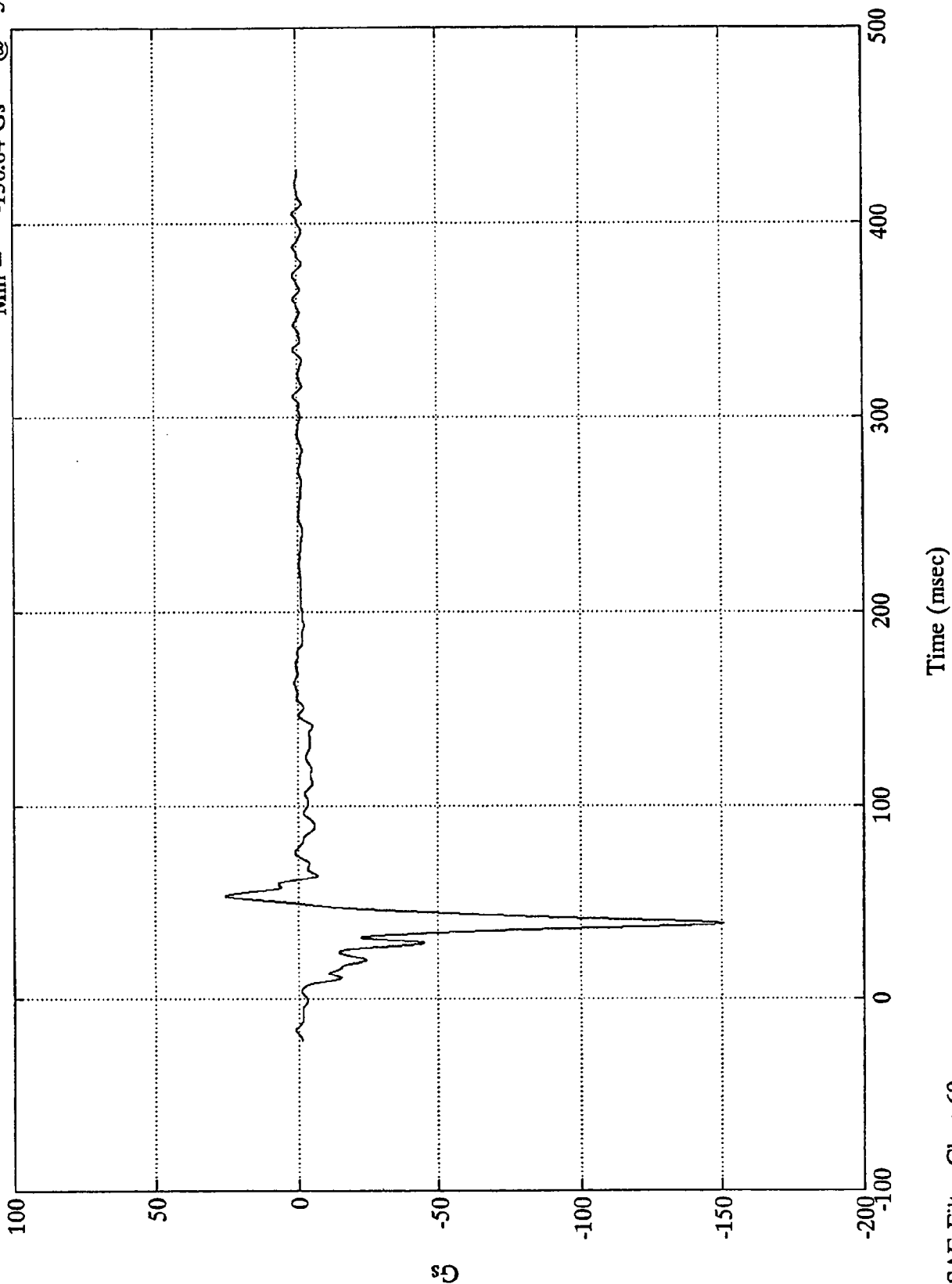
Max = 569.98 mm. @ 66.96 msec
Min = 0.00 mm. @ -0.00 msec



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Acc. #6(x) Max = 25.39 Gs @ 53.75 msec
 Min = -150.64 Gs @ 39.24 msec

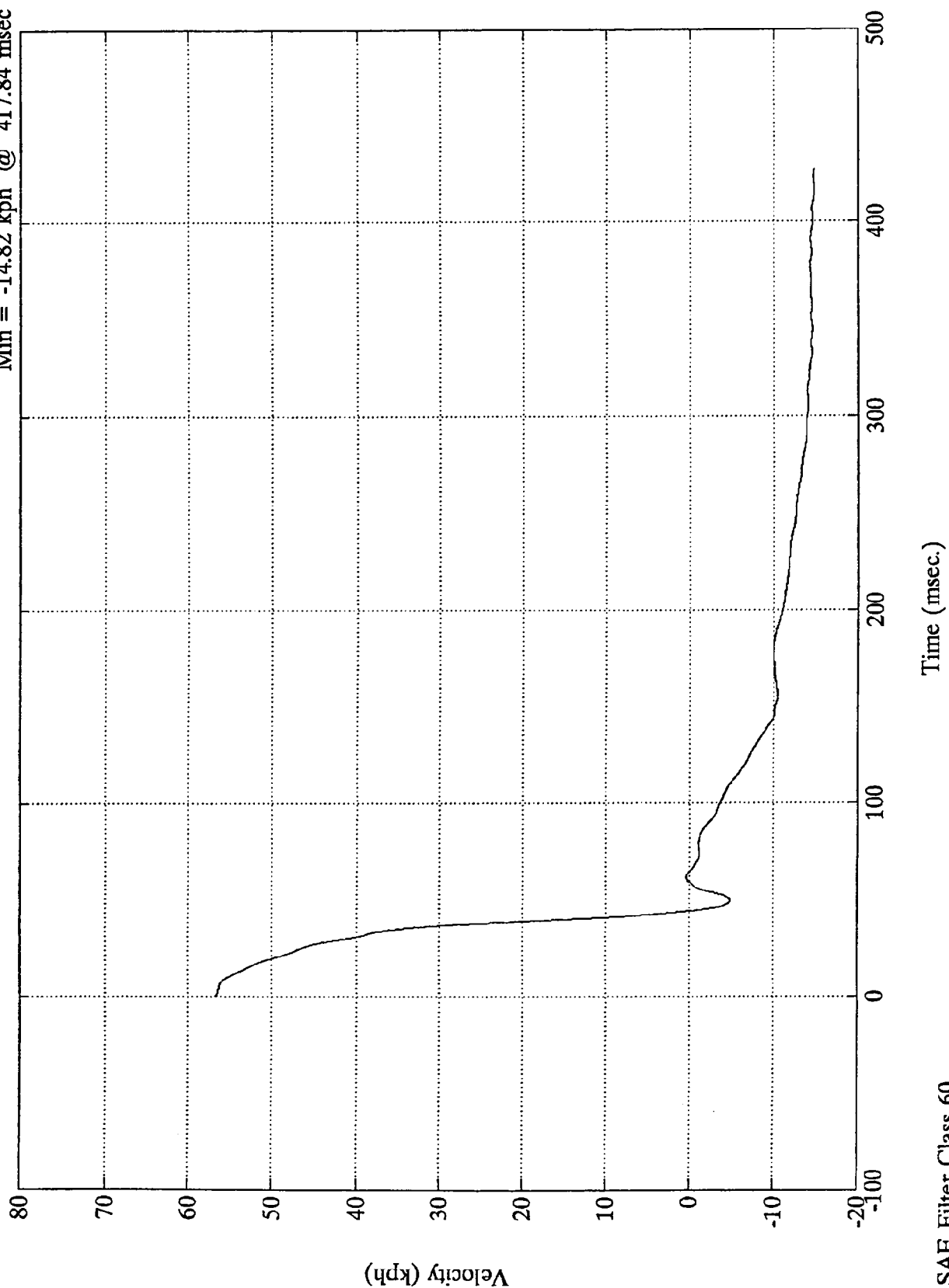


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Max = 56.65 kph @ -0.00 msec
Min = -14.82 kph @ 417.84 msec

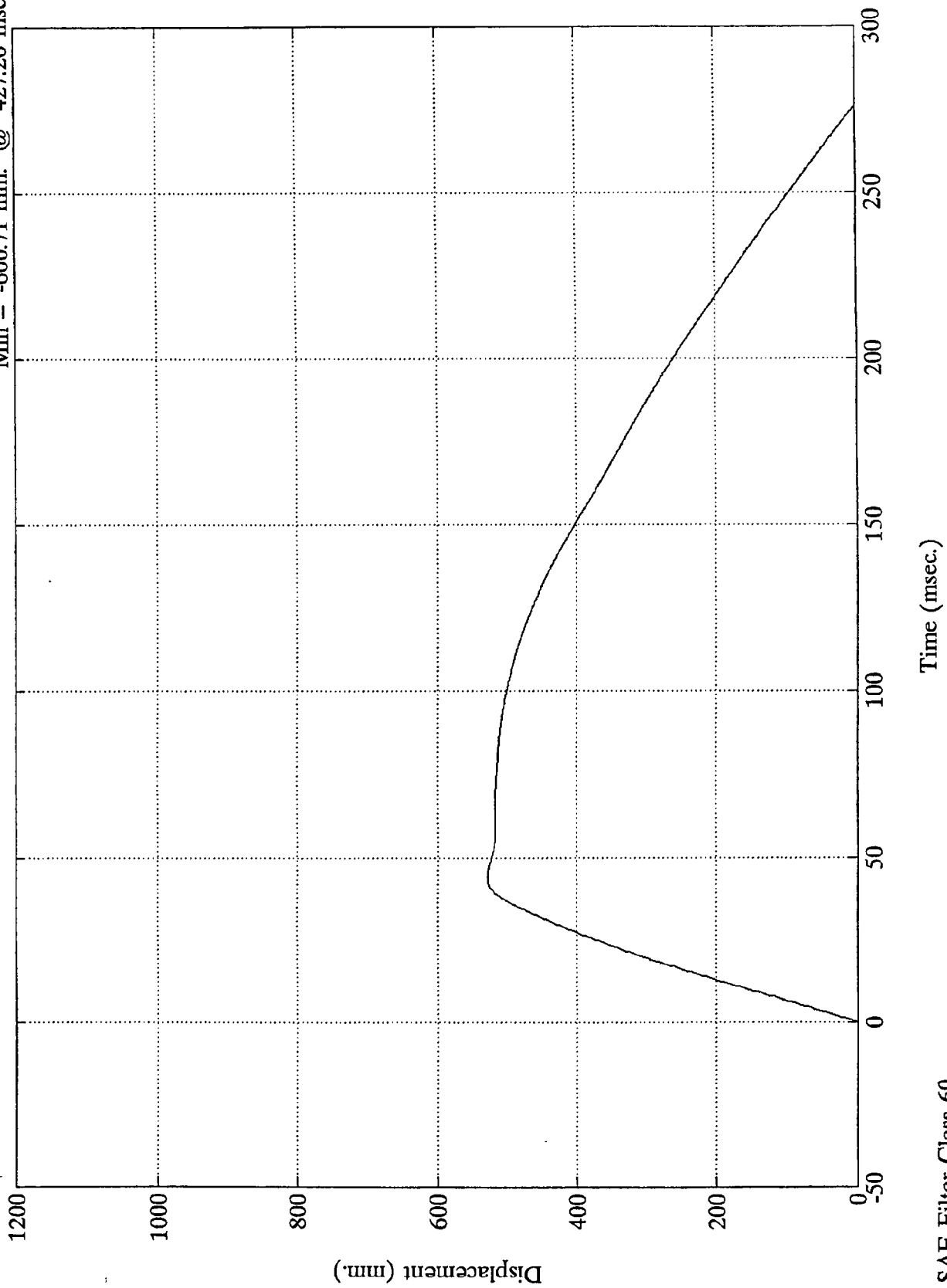
Acc. #6(x)



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

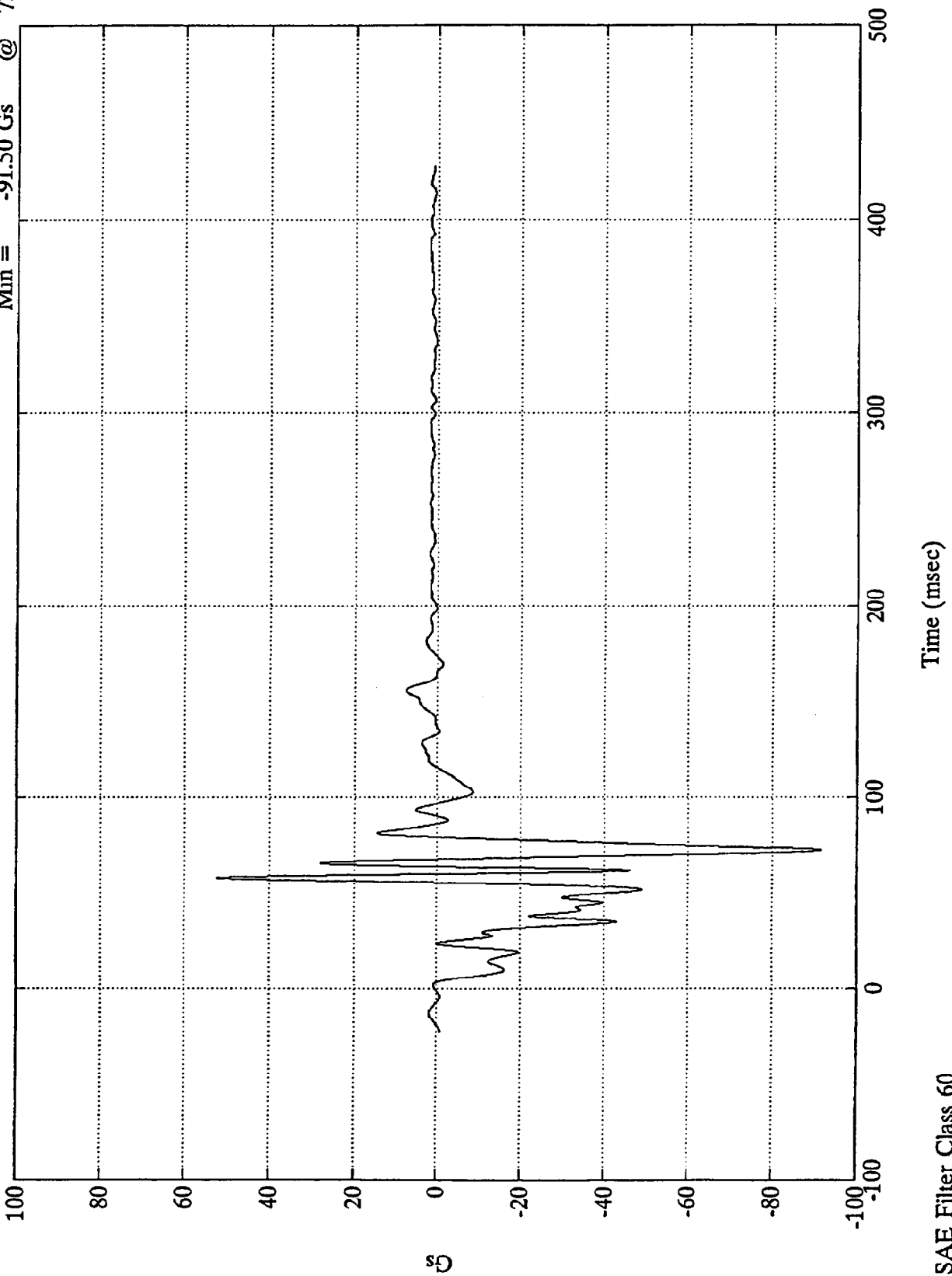
Acc. #6(x)
Max = 529.59 mm. @ 45.12 msec
Min = -600.71 mm. @ 427.20 msec



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

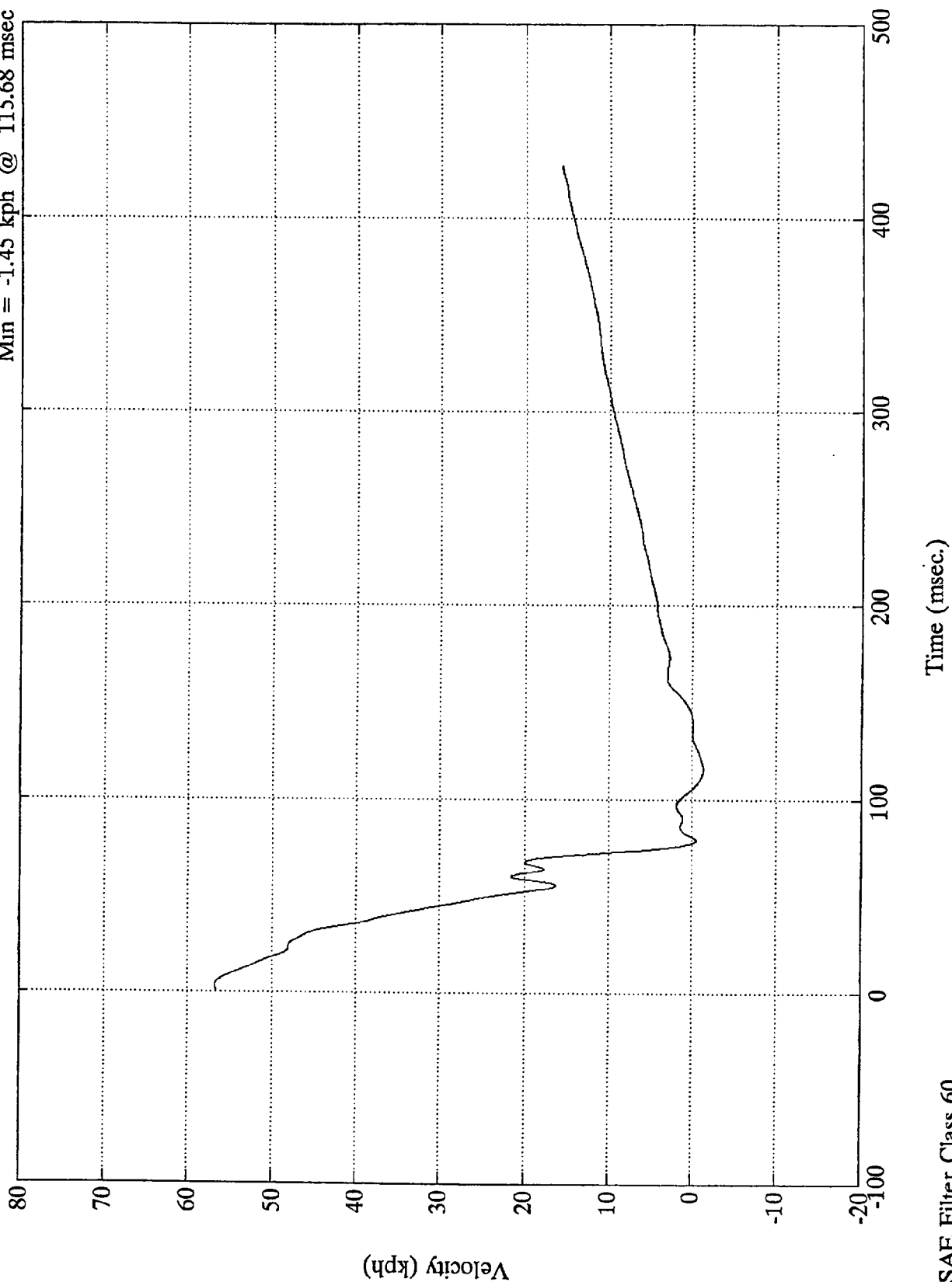
Acc. #7(x) Max = 52.36 Gs @ 58.68 msec
 Min = -91.50 Gs @ 73.08 msec



NCAP TEST #9 - 1995 GEO METRO

Max = 56.72 kph @ 4.08 msec
Min = -1.45 kph @ 115.68 msec

Acc. #7(x)

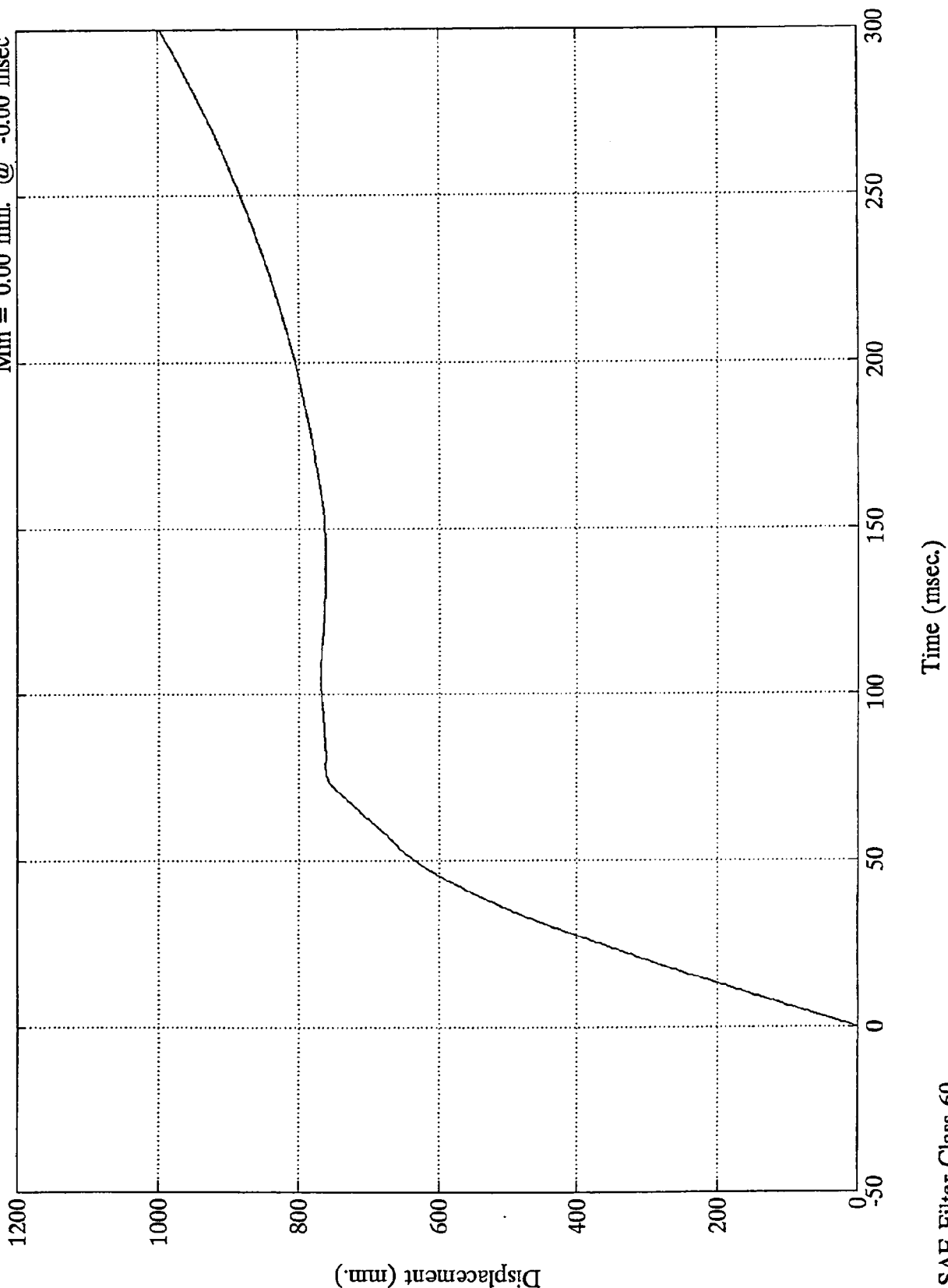


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Max = 1439.93 mm. @ 427.20 msec
Min = 0.00 mm. @ -0.00 msec

Acc. #7(x)

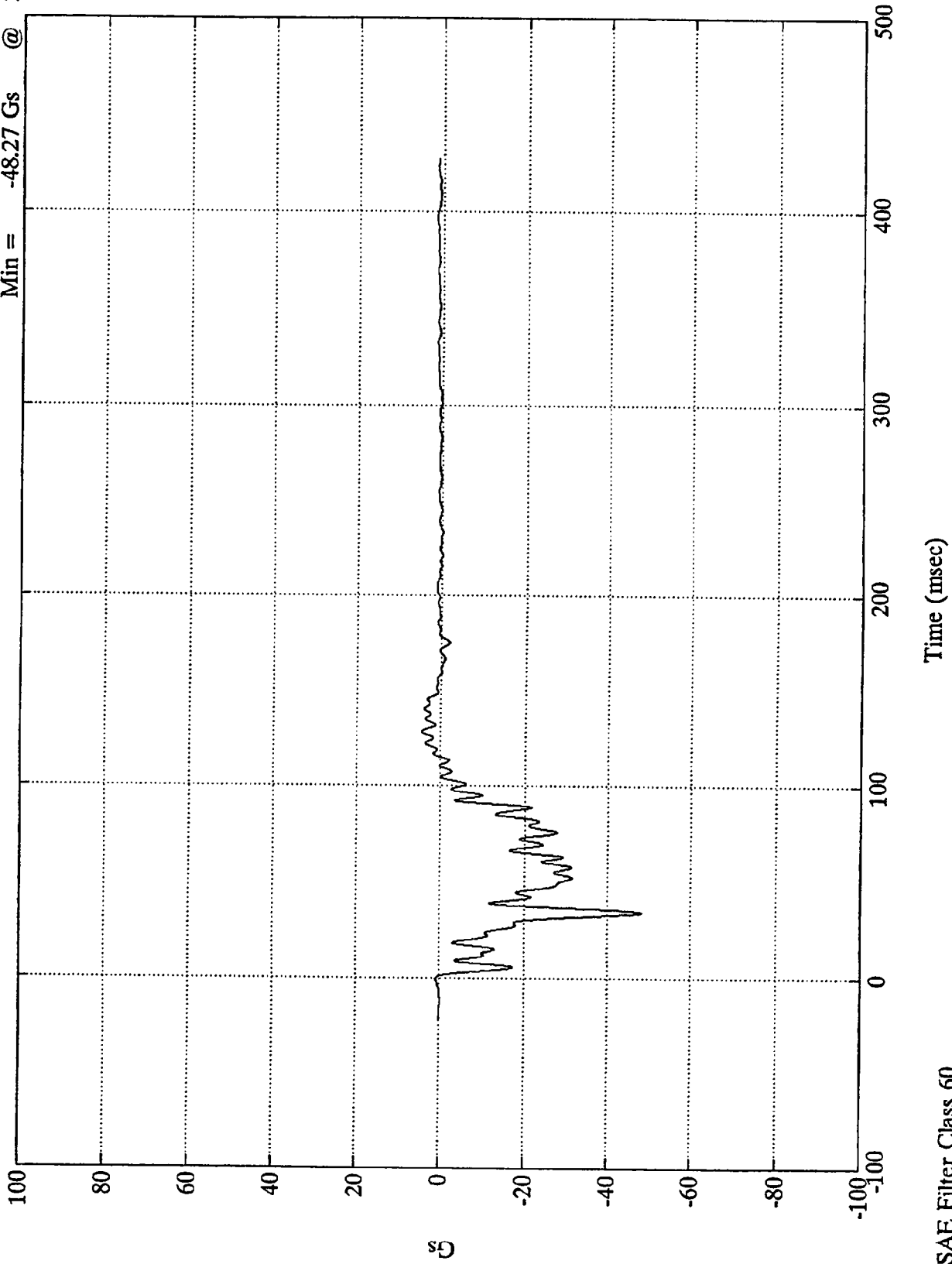


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Max = 4.49 Gs @ 128.39 msec
Min = -48.27 Gs @ 34.56 msec

Acc. #8(x)

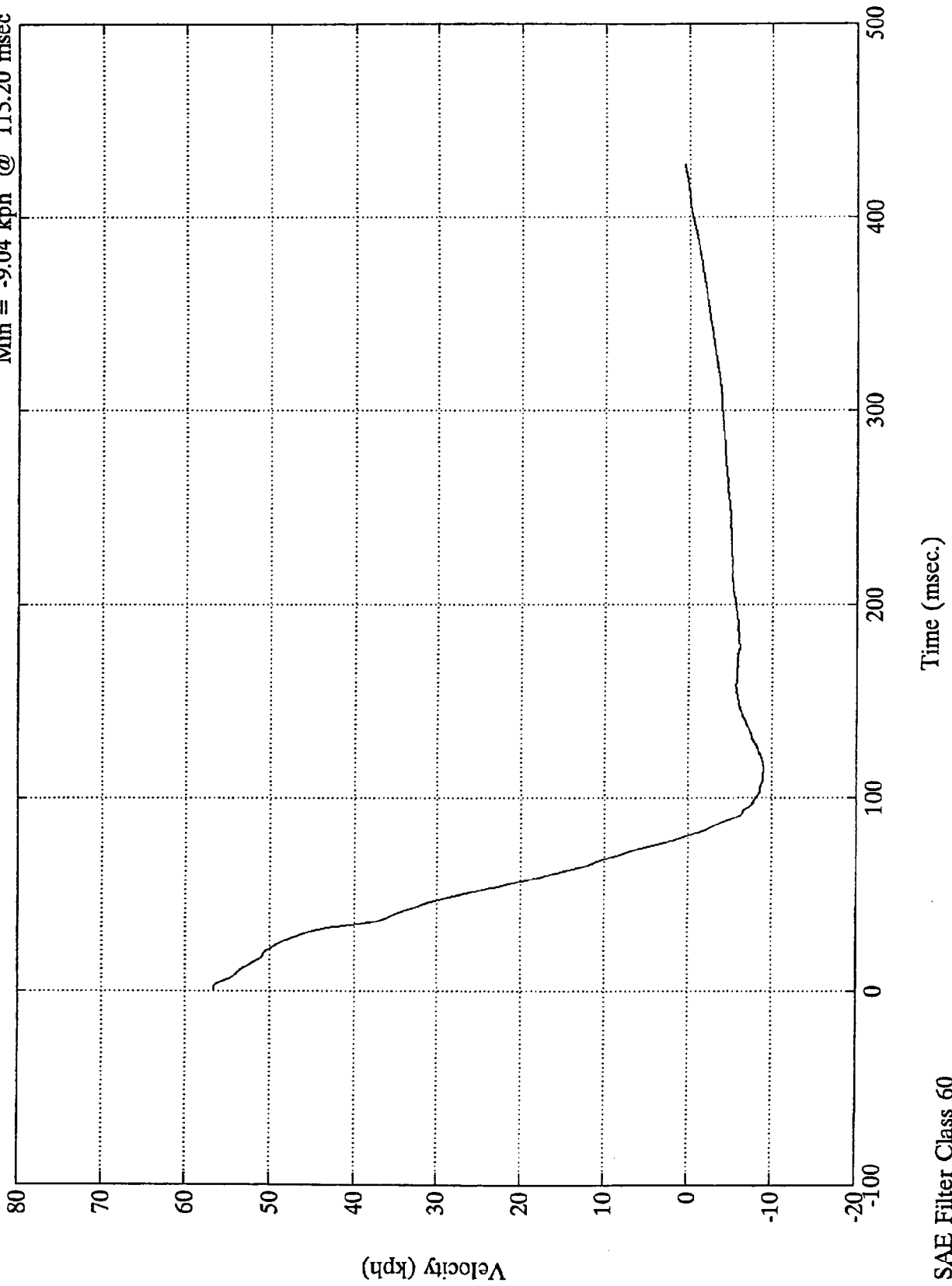


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Max = 56.67 kph @ 1.44 msec
Min = -9.04 kph @ 115.20 msec

Acc. #8(x)

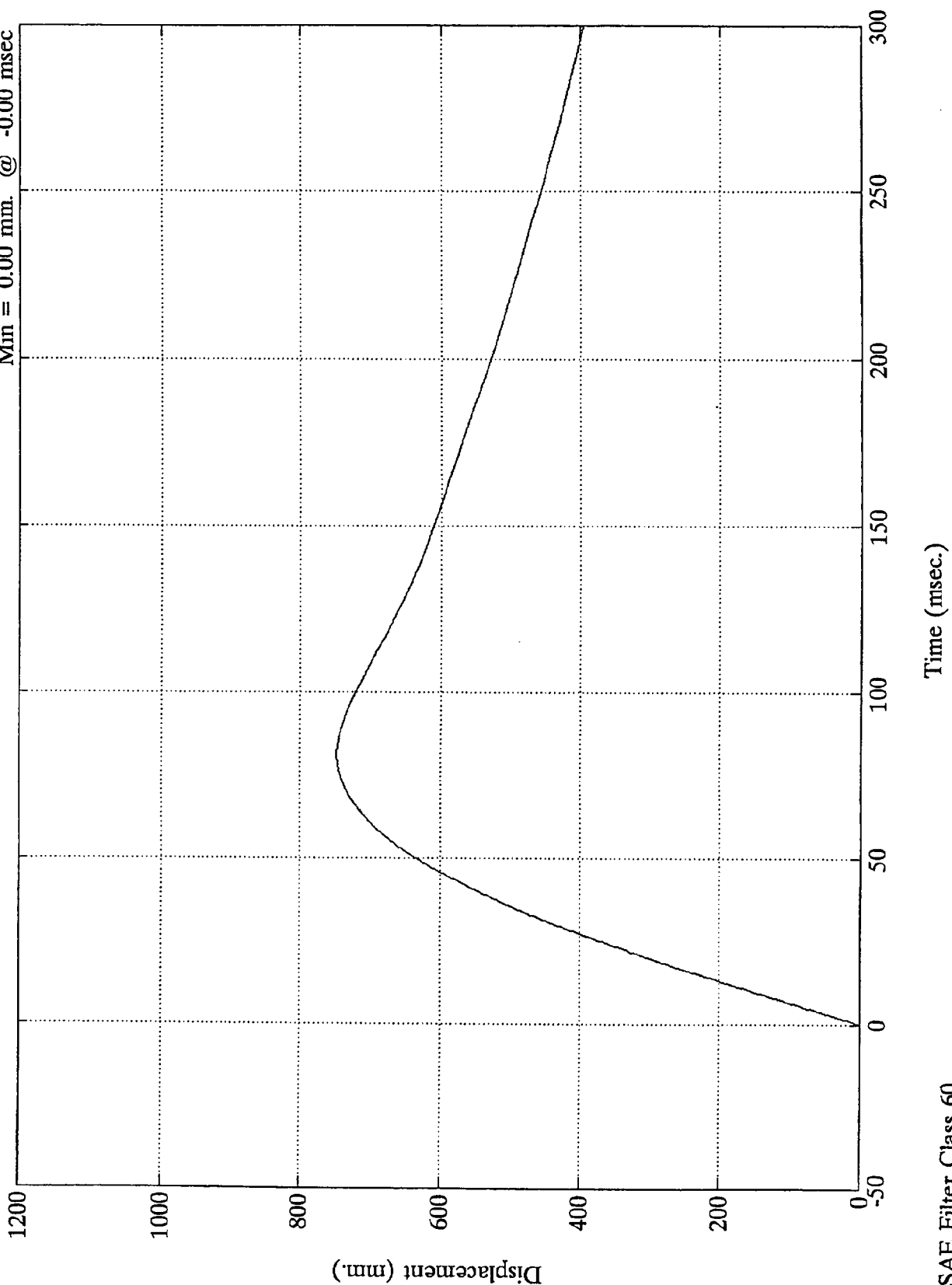


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Max = 747.52 mm. @ 81.60 msec
Min = 0.00 mm. @ -0.00 msec

Acc. #8(x)

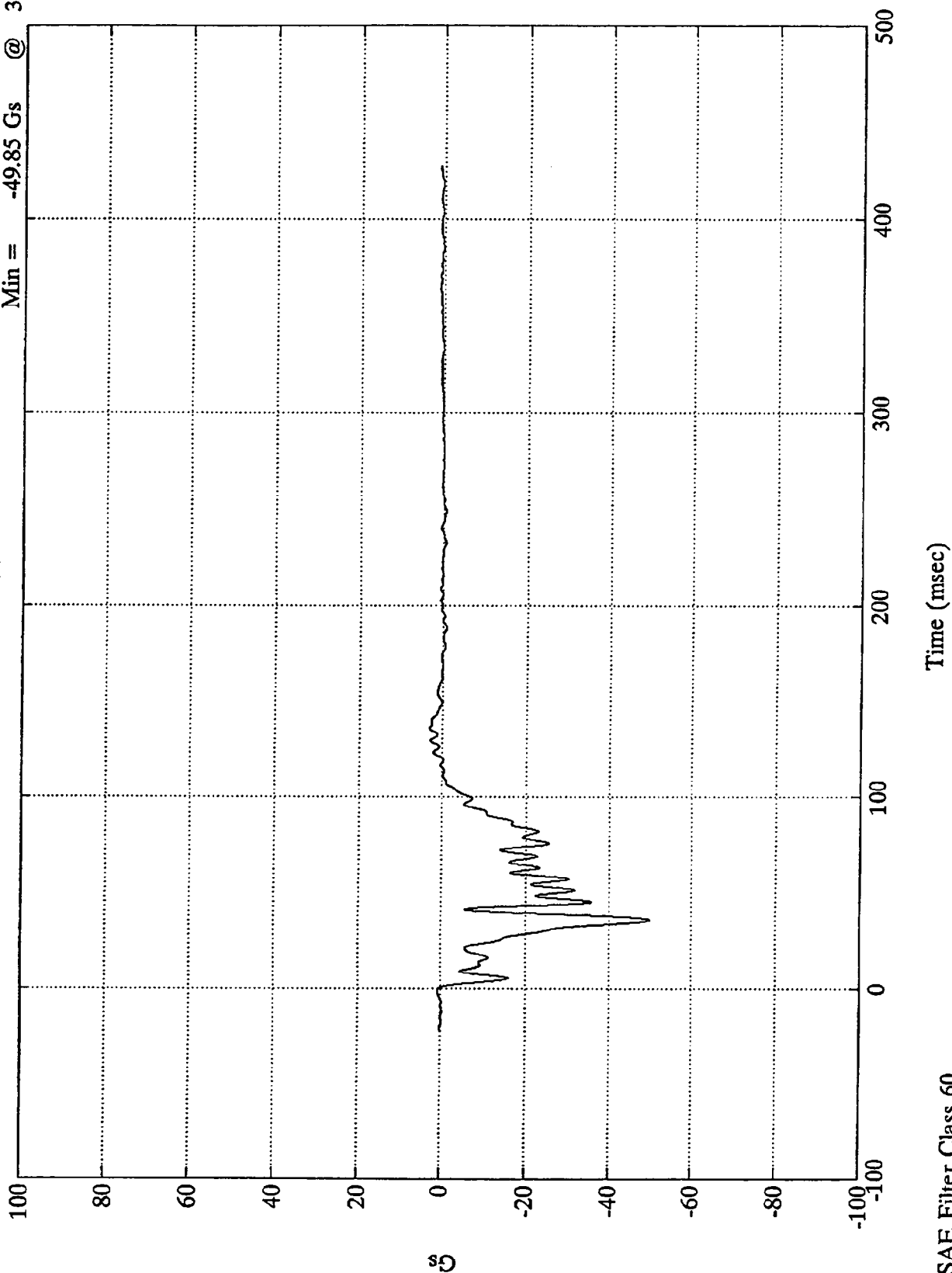


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Acc. #9(x)

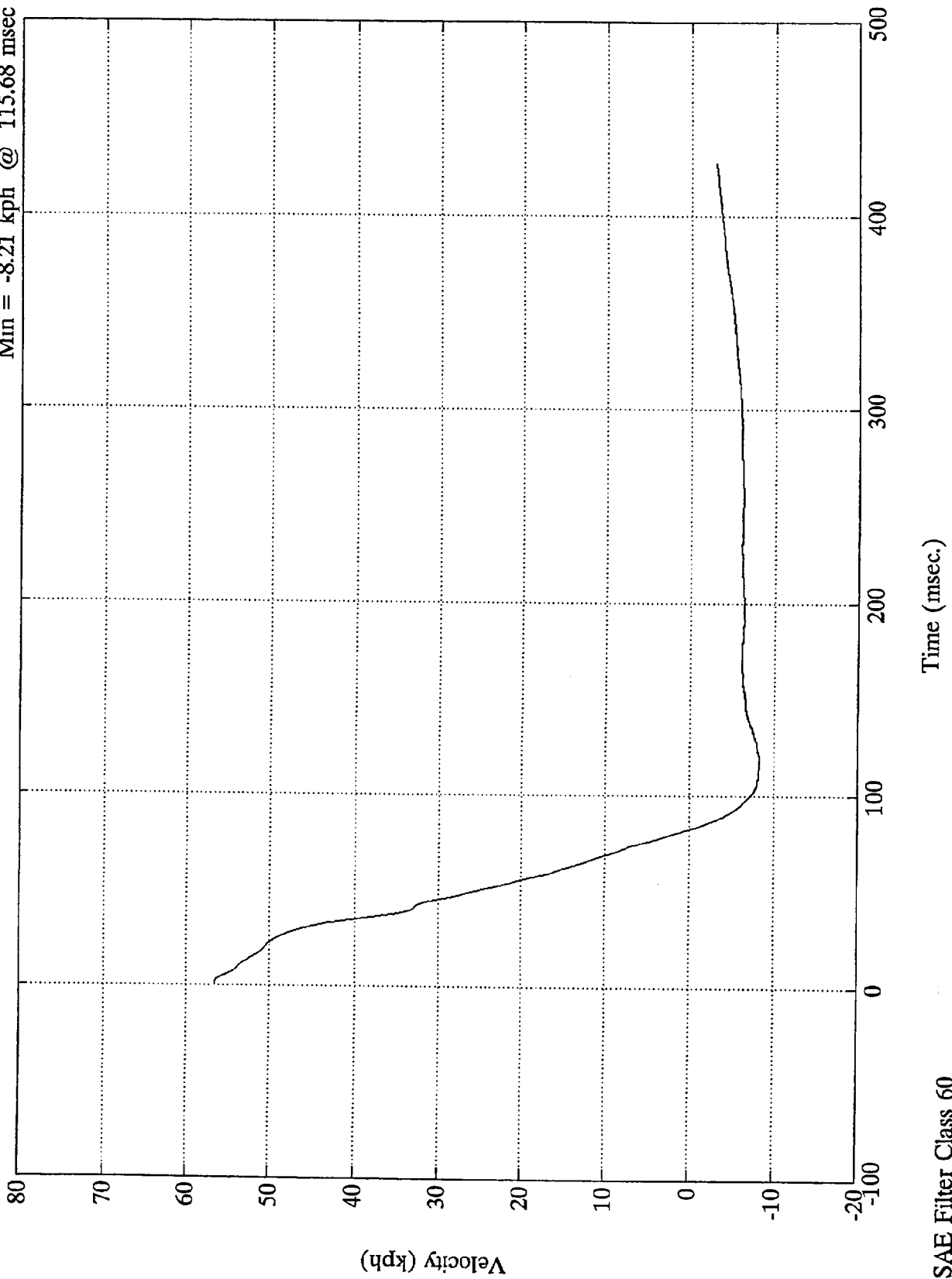
Max = 2.92 Gs @ 135.83 msec
Min = -49.85 Gs @ 36.36 msec



NCAP TEST #9 - 1995 GEO METRO

Max = 56.66 kph @ 0.96 msec
Min = -8.21 kph @ 115.68 msec

Acc. #9(x)

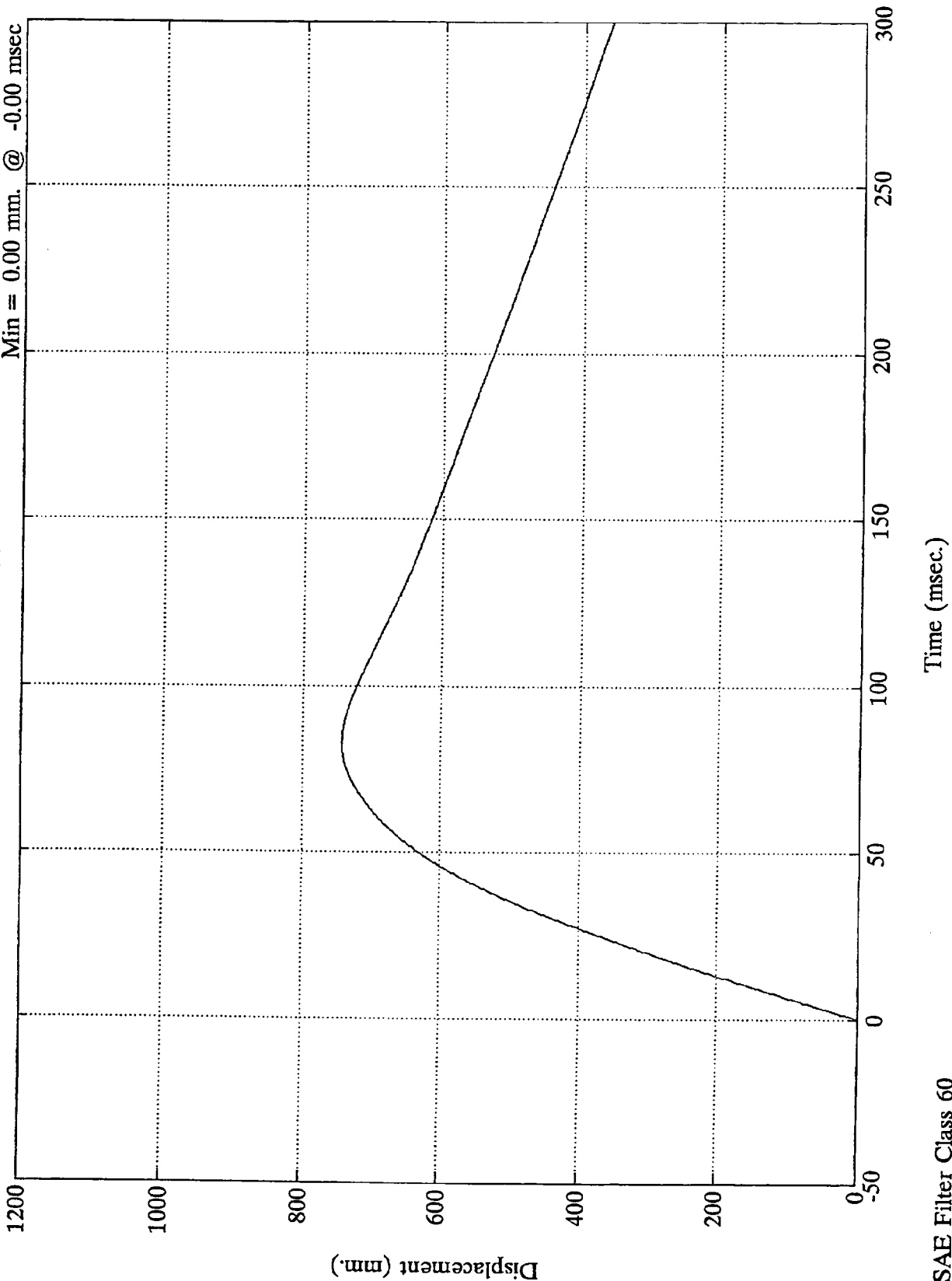


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Acc. #9(x)

Max = 743.20 mm. @ 82.80 msec
Min = 0.00 mm. @ -0.00 msec



TEST NO. MS0103

LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

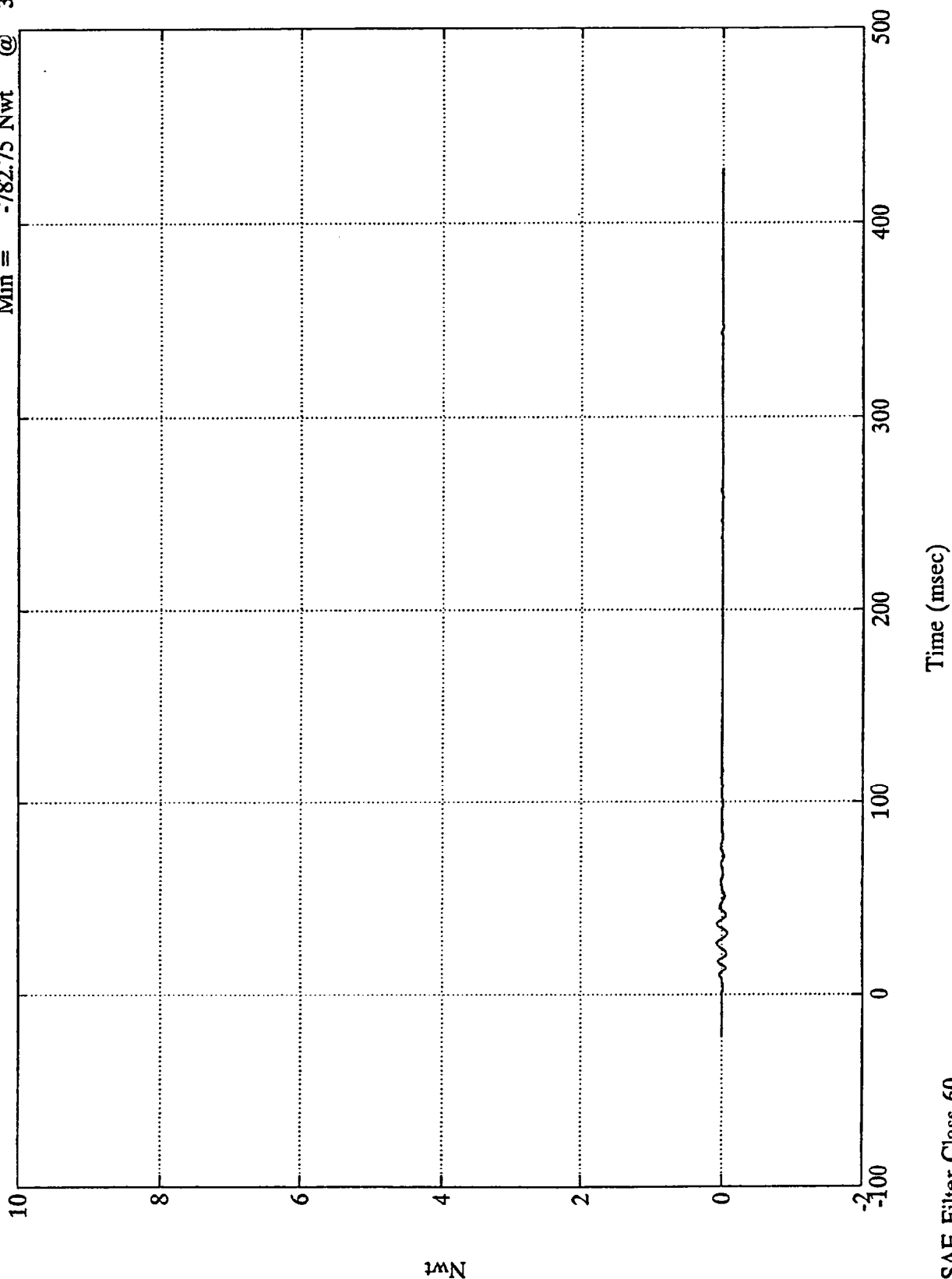
60

NCAP TEST #9 - 1995 GEO METRO

Max = 732.31 Nwt @ 27.00 msec
Min = -782.75 Nwt @ 32.52 msec

Barrier Load Cell A1

x10⁴



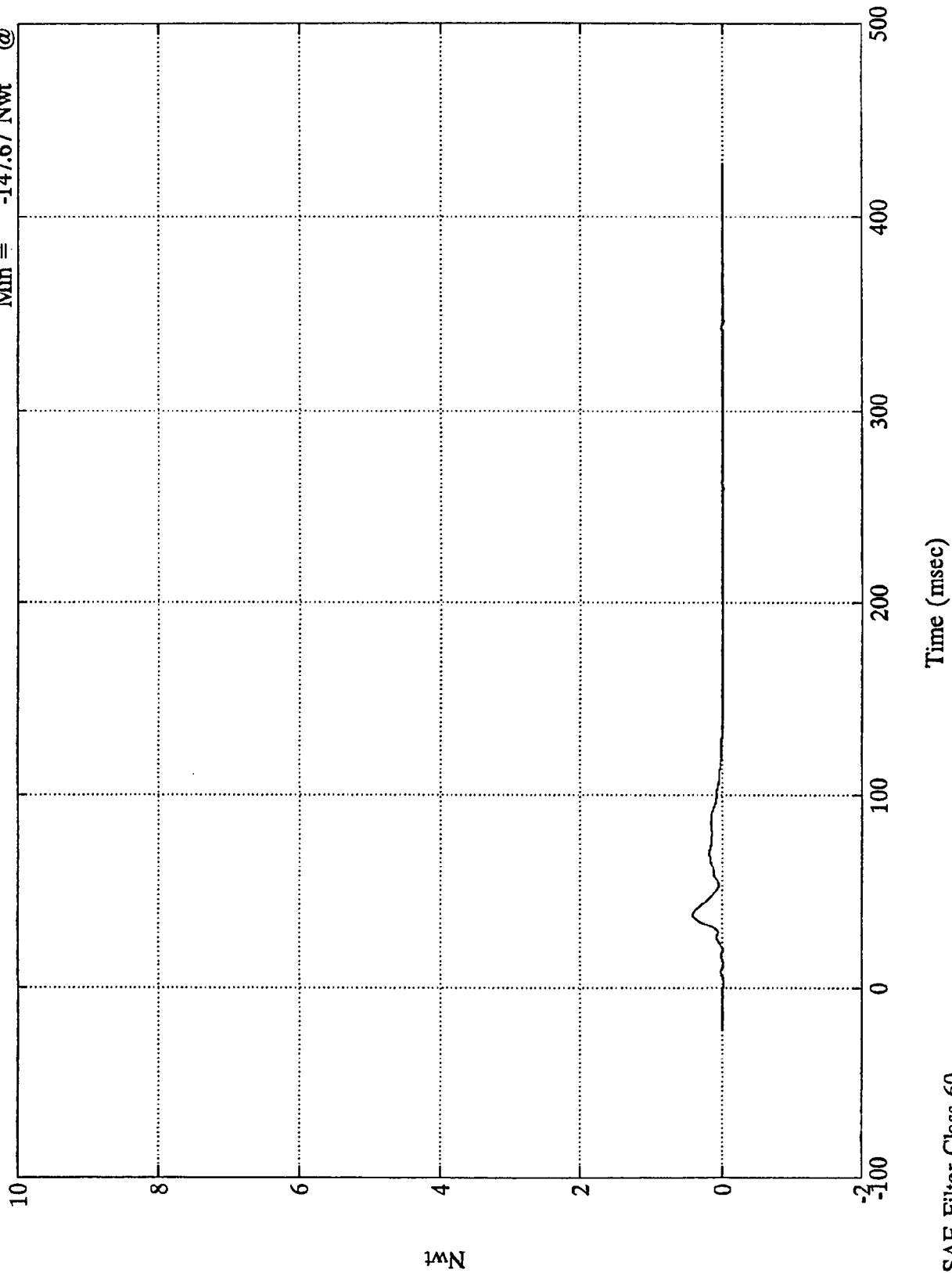
SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Max = 4178.12 Nwt @ 37.92 msec
 Min = -147.67 Nwt @ 2.75 msec

Barrier Load Cell A2

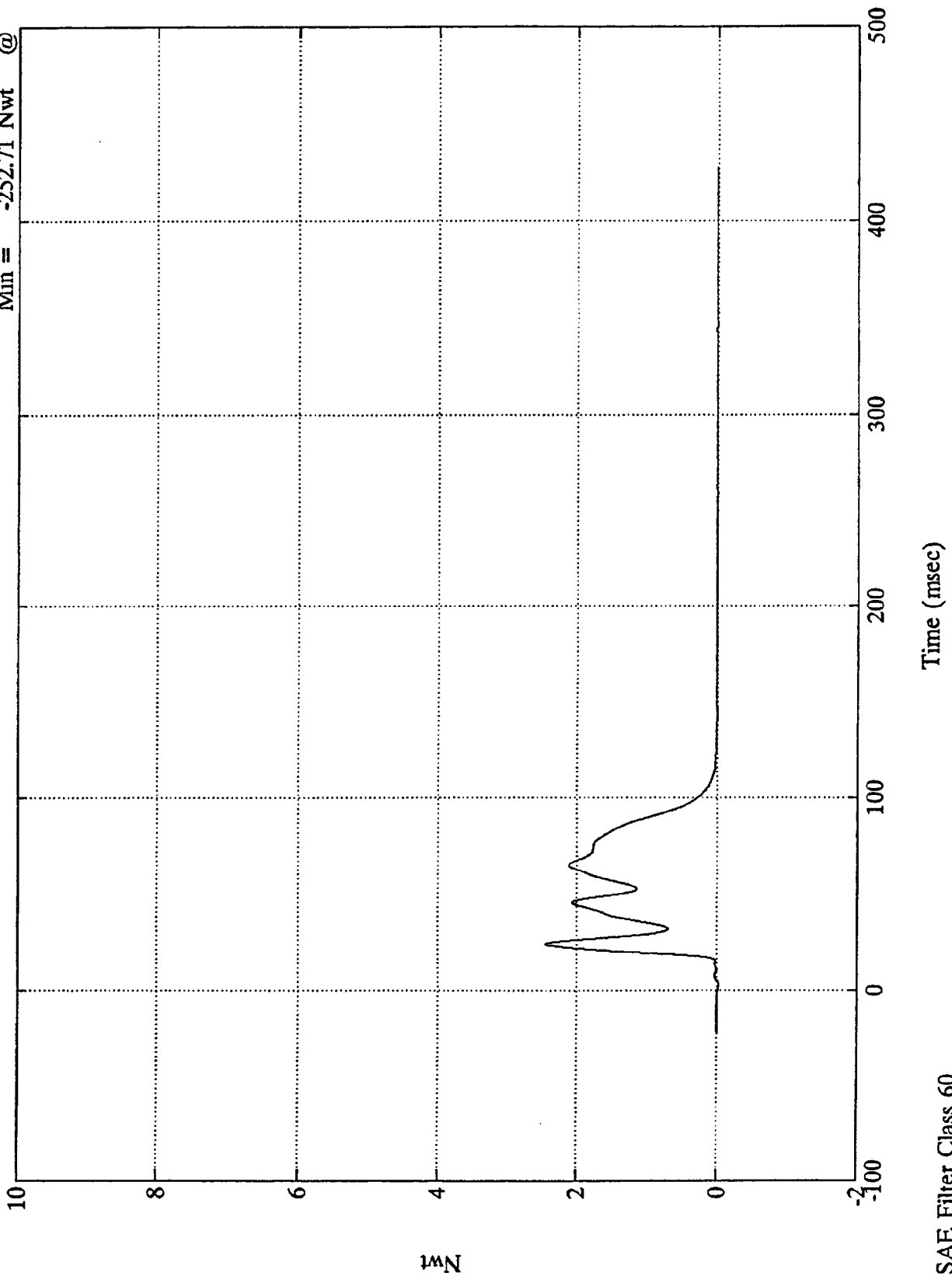
x10⁴



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

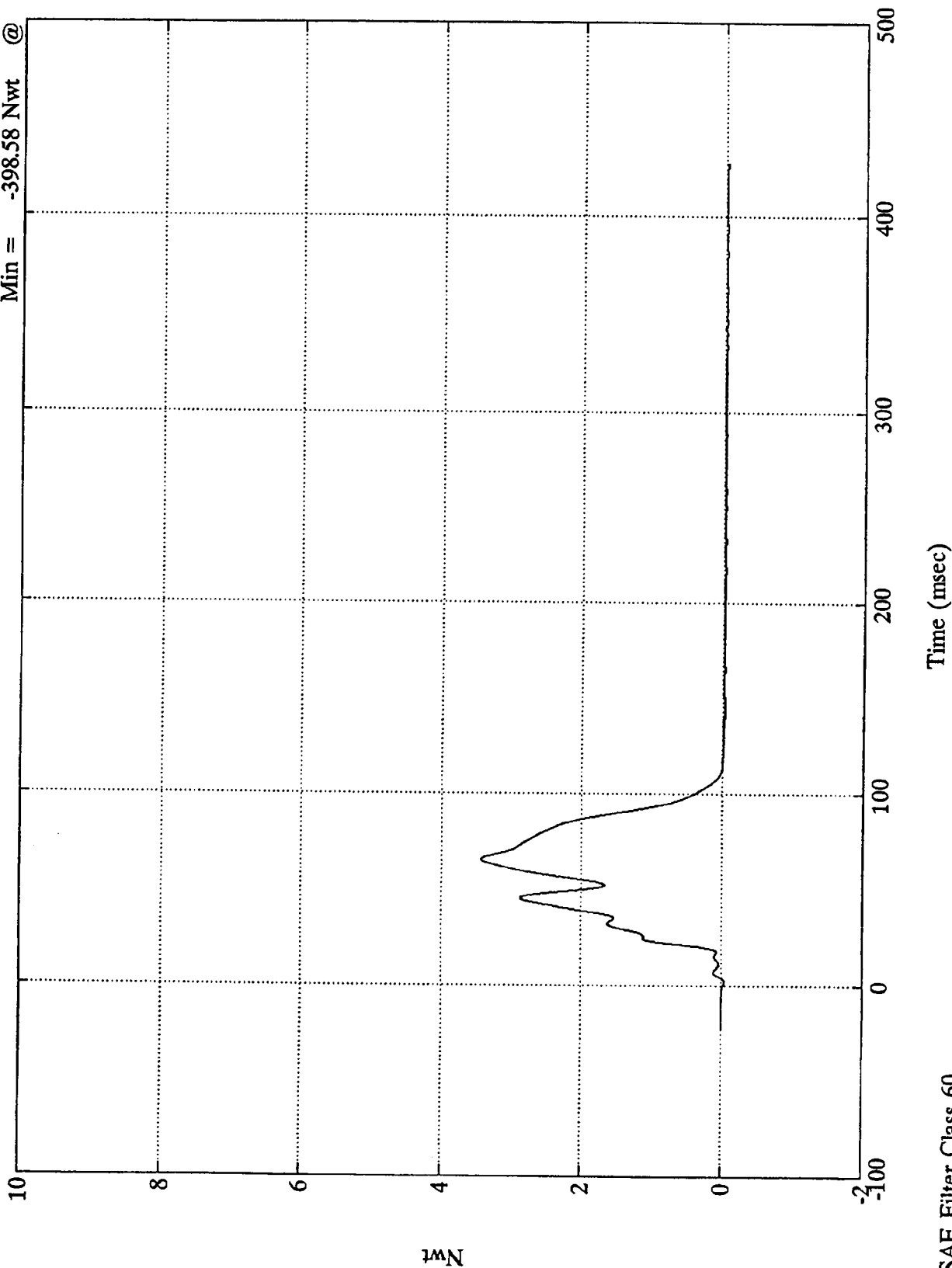
Barrier Load Cell A3
 Max = 24448.00 Nwt @ 24.23 msec
 Min = -252.71 Nwt @ 2.87 msec



NCAP TEST #9 - 1995 GEO METRO

Max = 34399.34 Nwt @ 65.76 msec
 Min = -398.58 Nwt @ 2.03 msec

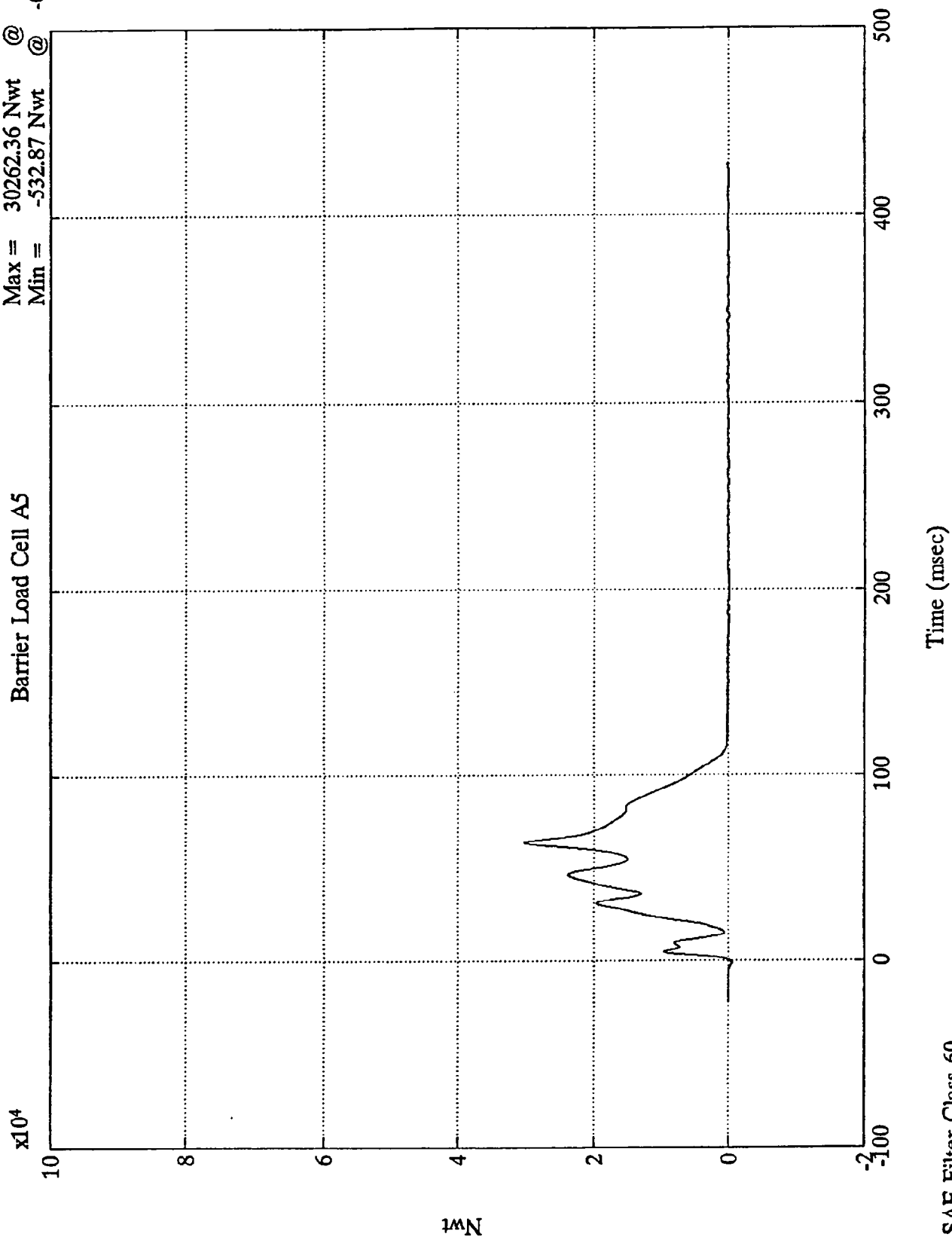
Barrier Load Cell A4



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

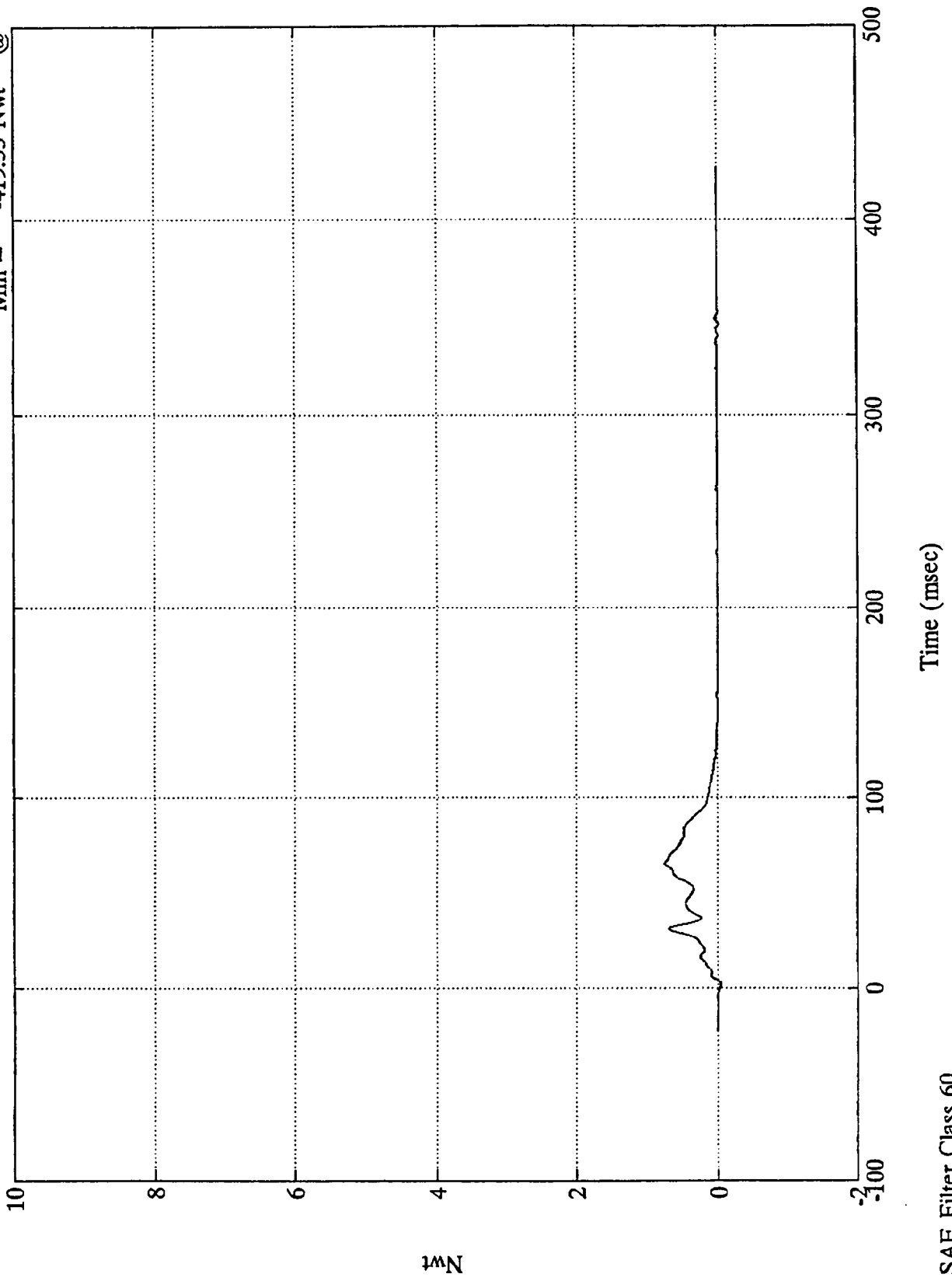
Barrier Load Cell A5
Max = 30262.36 Nwt @ 63.72 msec
Min = -532.87 Nwt @ -0.84 msec



SAE Filter Class 60

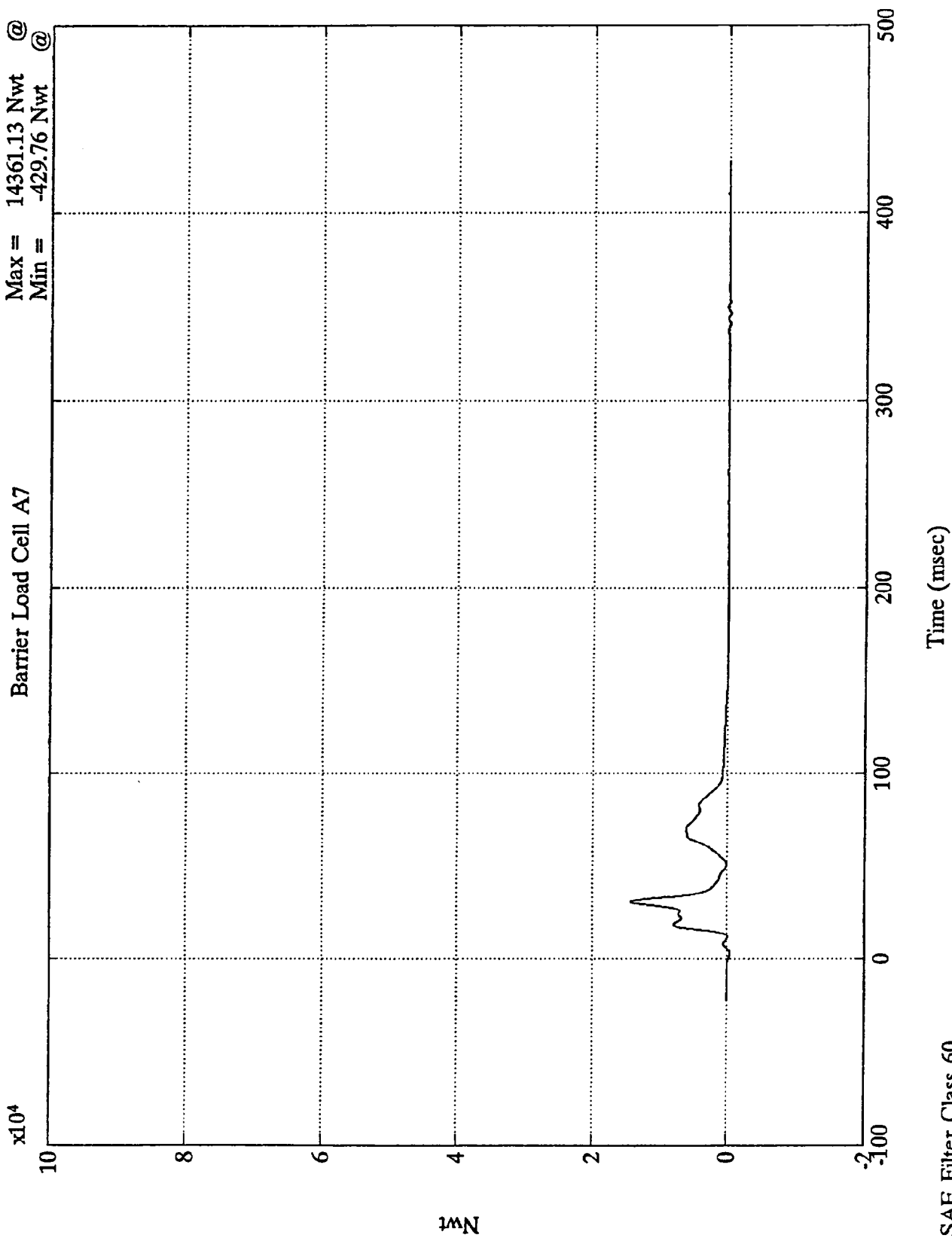
NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell A6
 Max = 7501.42 Nwt @ 65.40 msec
 Min = -419.33 Nwt @ 1.79 msec



NCAP TEST #9 - 1995 GEO METRO

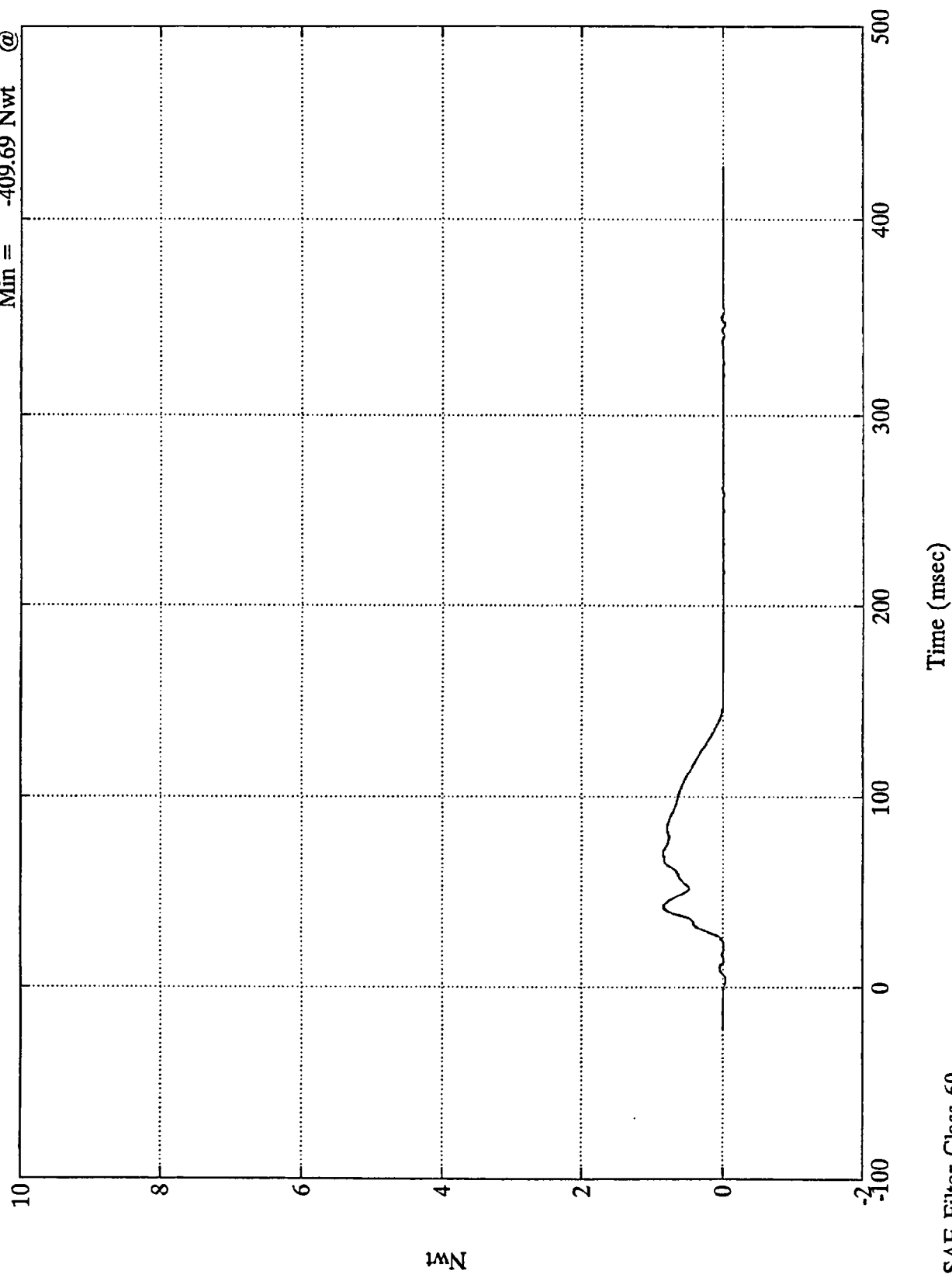
Barrier Load Cell A7
Max = 14361.13 Nwt @ 31.07 msec
Min = -429.76 Nwt @ 3.23 msec



SAE Filter Class 60

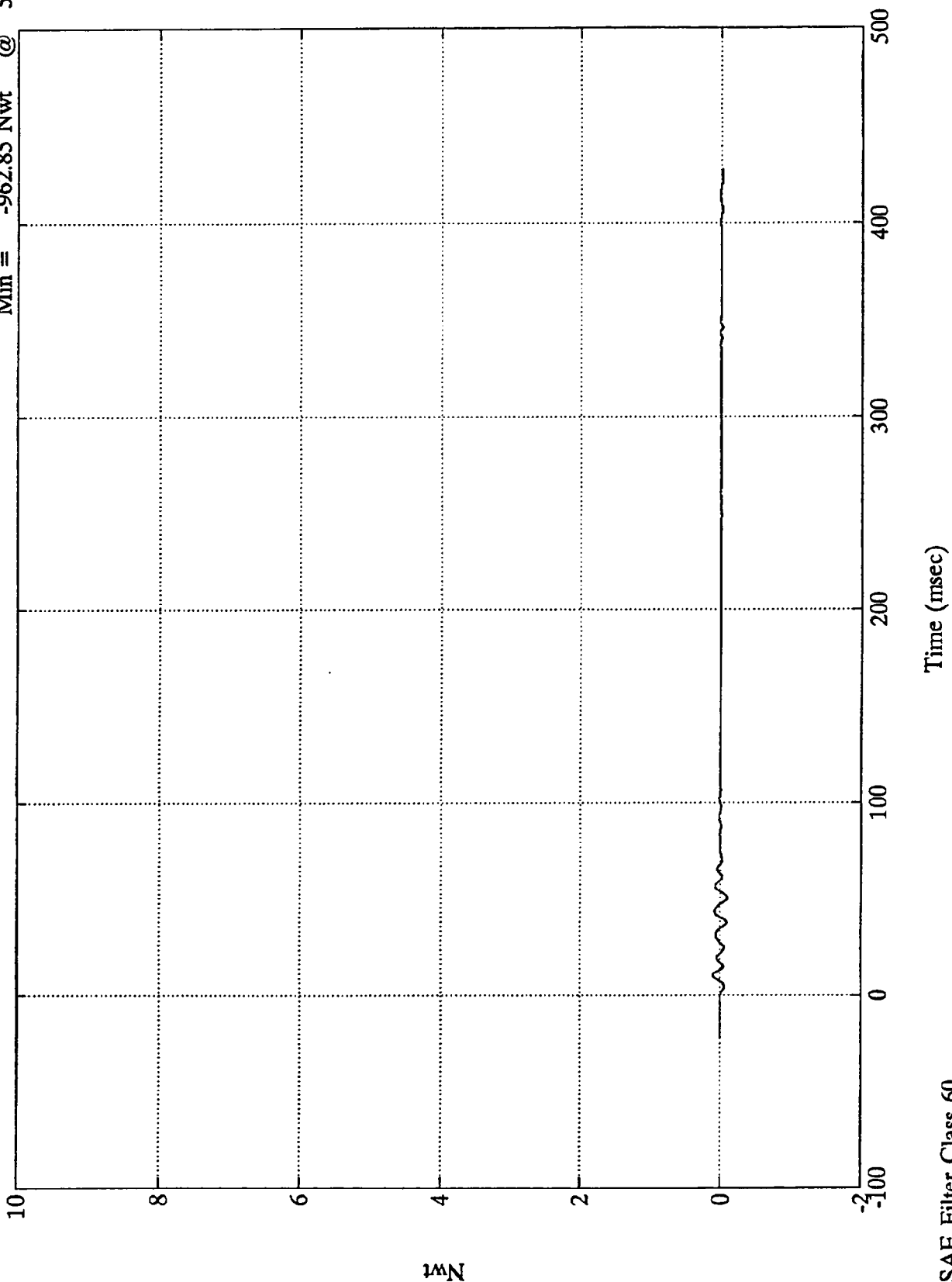
NCAP TEST #9 - 1995 GEO METRO x10⁴

Barrier Load Cell A8
Max = 8532.70 Nwt @ 70.68 msec
Min = -409.69 Nwt @ 4.07 msec



NCAP TEST #9 - 1995 GEO METRO

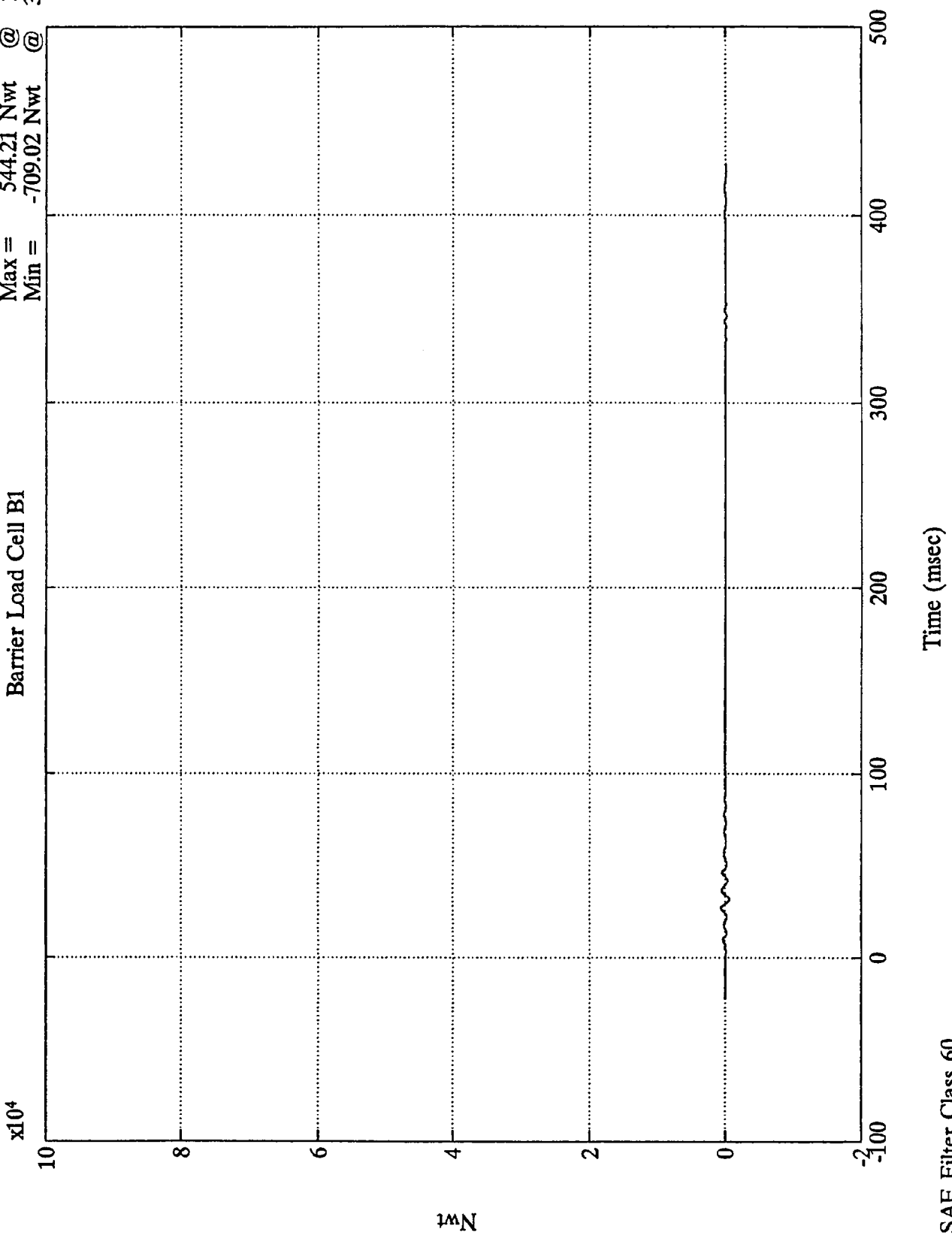
Barrier Load Cell A9
 Max = 1013.18 Nwt @ 10.55 msec
 Min = -962.85 Nwt @ 50.76 msec



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell B1
Max = 544.21 Nwt @ 27.60 msec
Min = -709.02 Nwt @ 32.28 msec

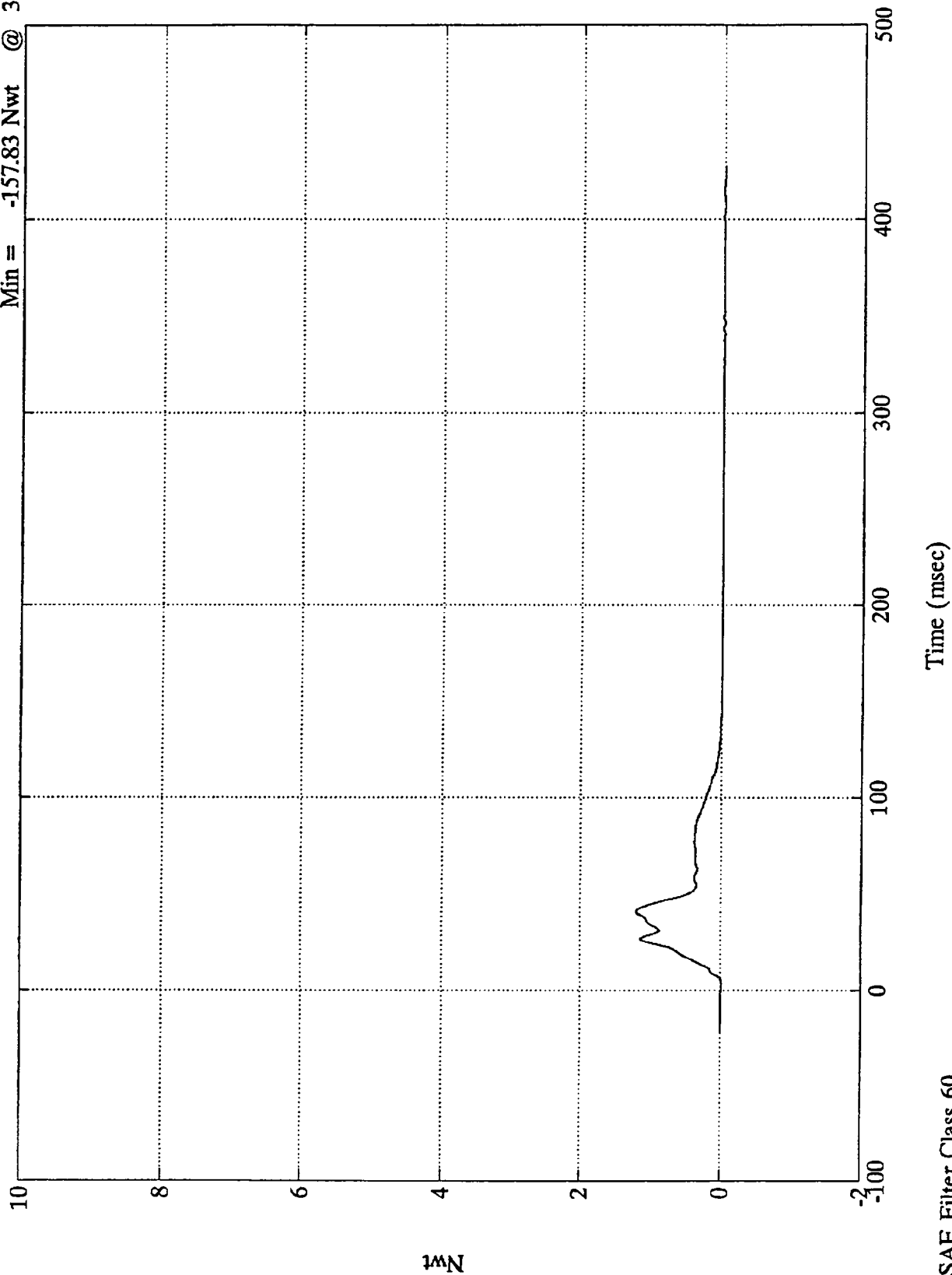


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell B2

Max = 11993.25 Nwt @ 41.16 msec
Min = -157.83 Nwt @ 345.83 msec

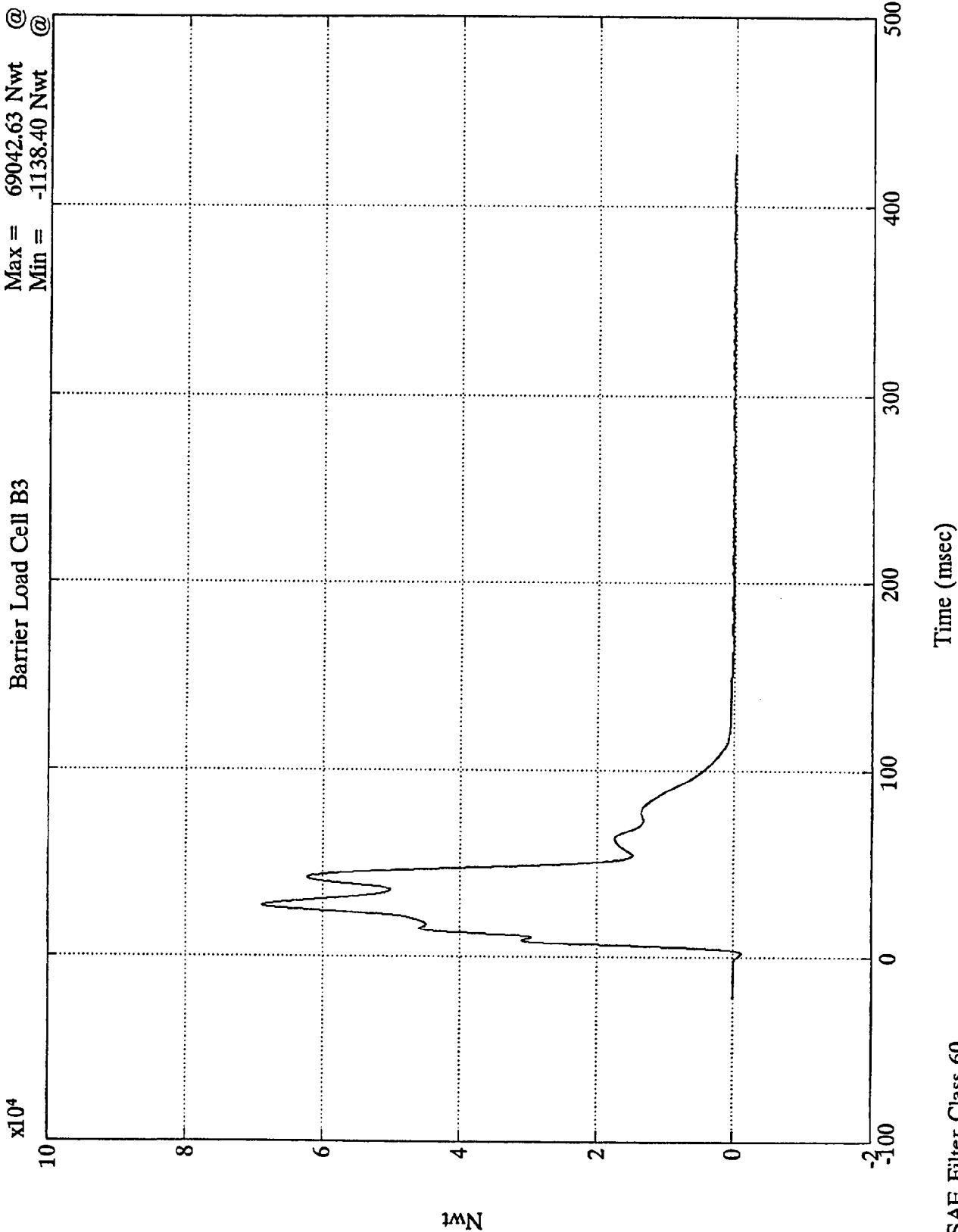


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Max = 69042.63 Nwt @ 27.84 msec
 Min = -1138.40 Nwt @ 2.03 msec

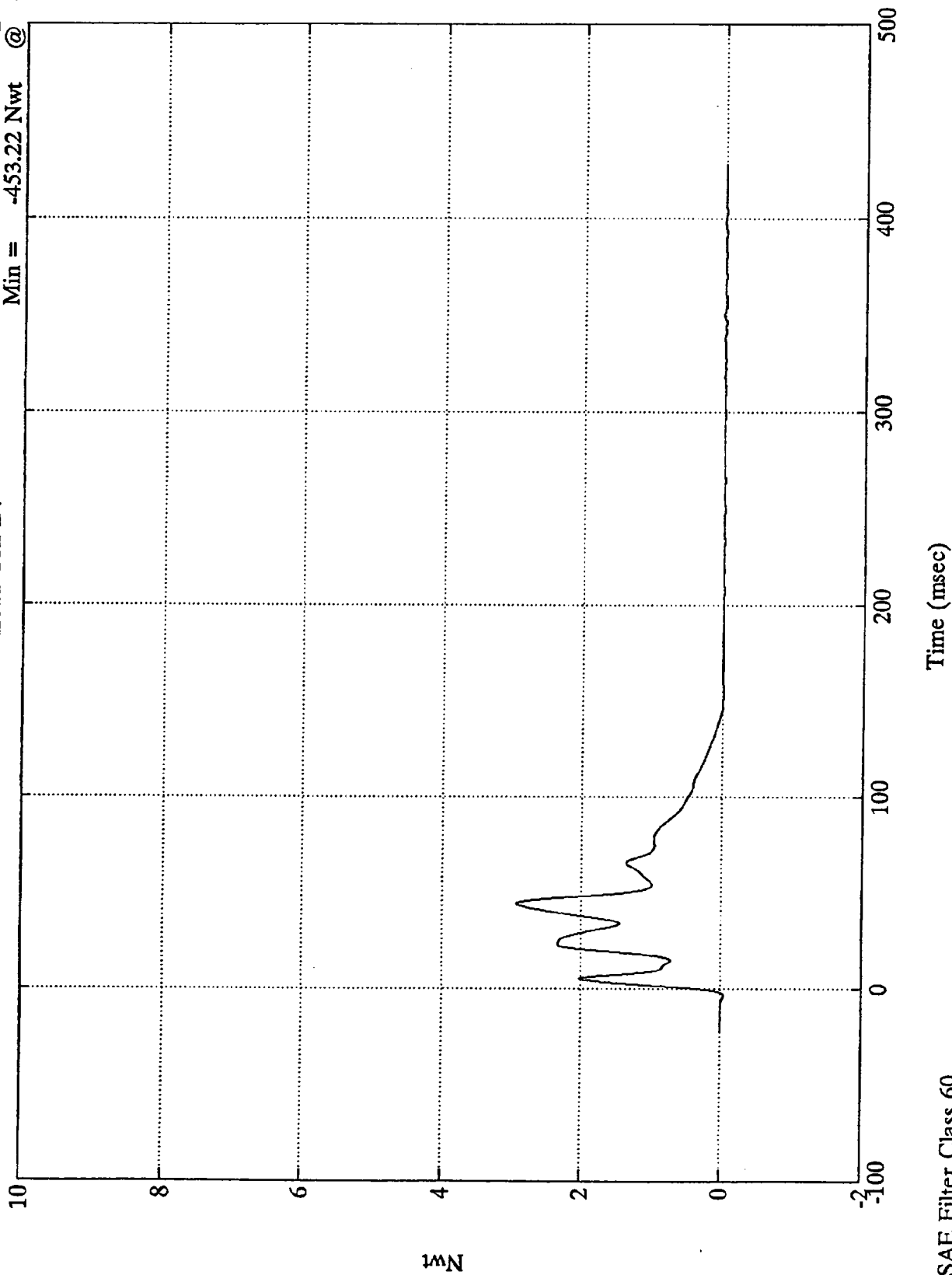
Barrier Load Cell B3



NCAP TEST #9 - 1995 GEO METRO

Max = 29416.76 Nwt @ 44.27 msec
 Min = -453.22 Nwt @ -3.24 msec

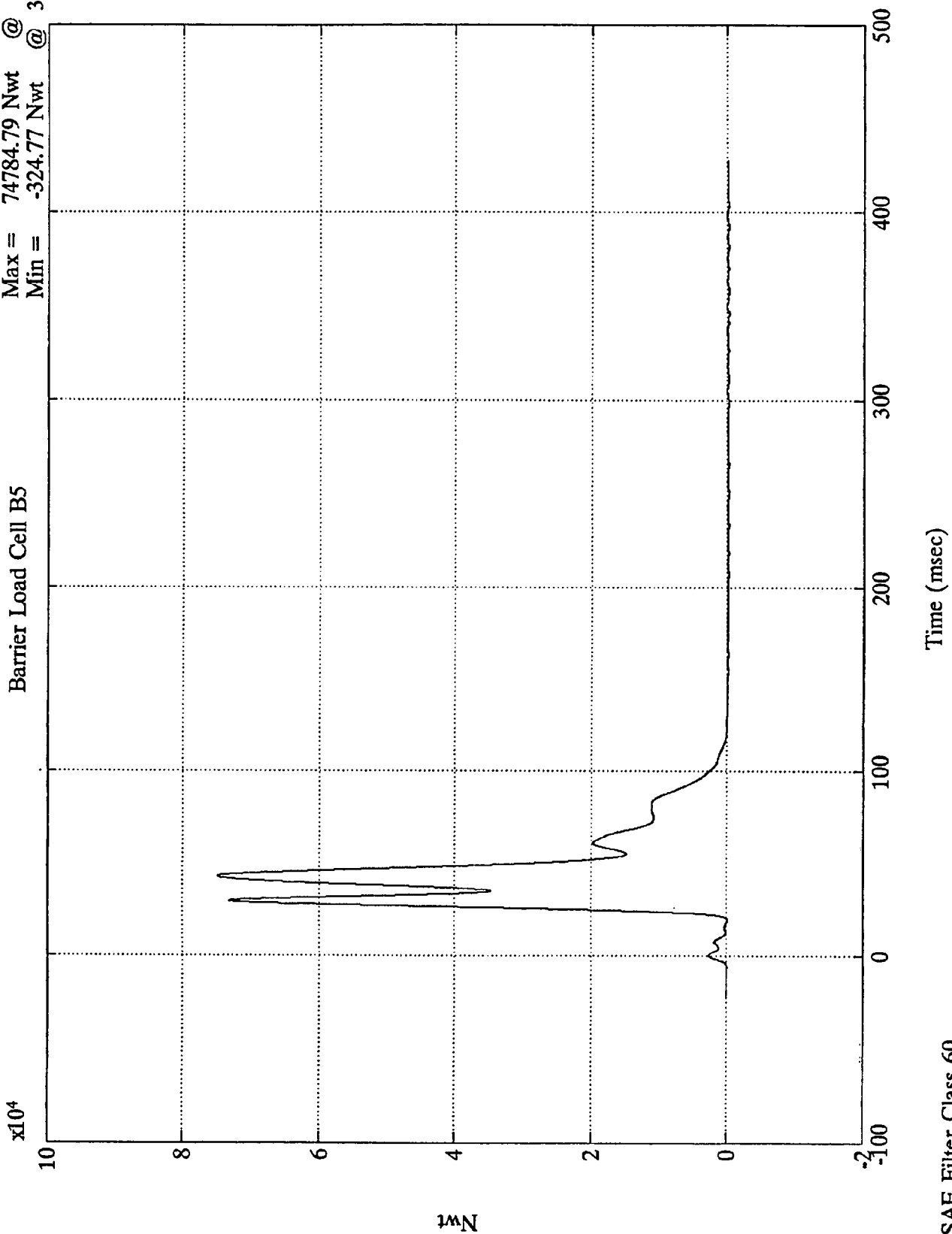
Barrier Load Cell B4



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell B5
 Max = 74784.79 Nwt @ 43.08 msec
 Min = -324.77 Nwt @ 346.20 msec

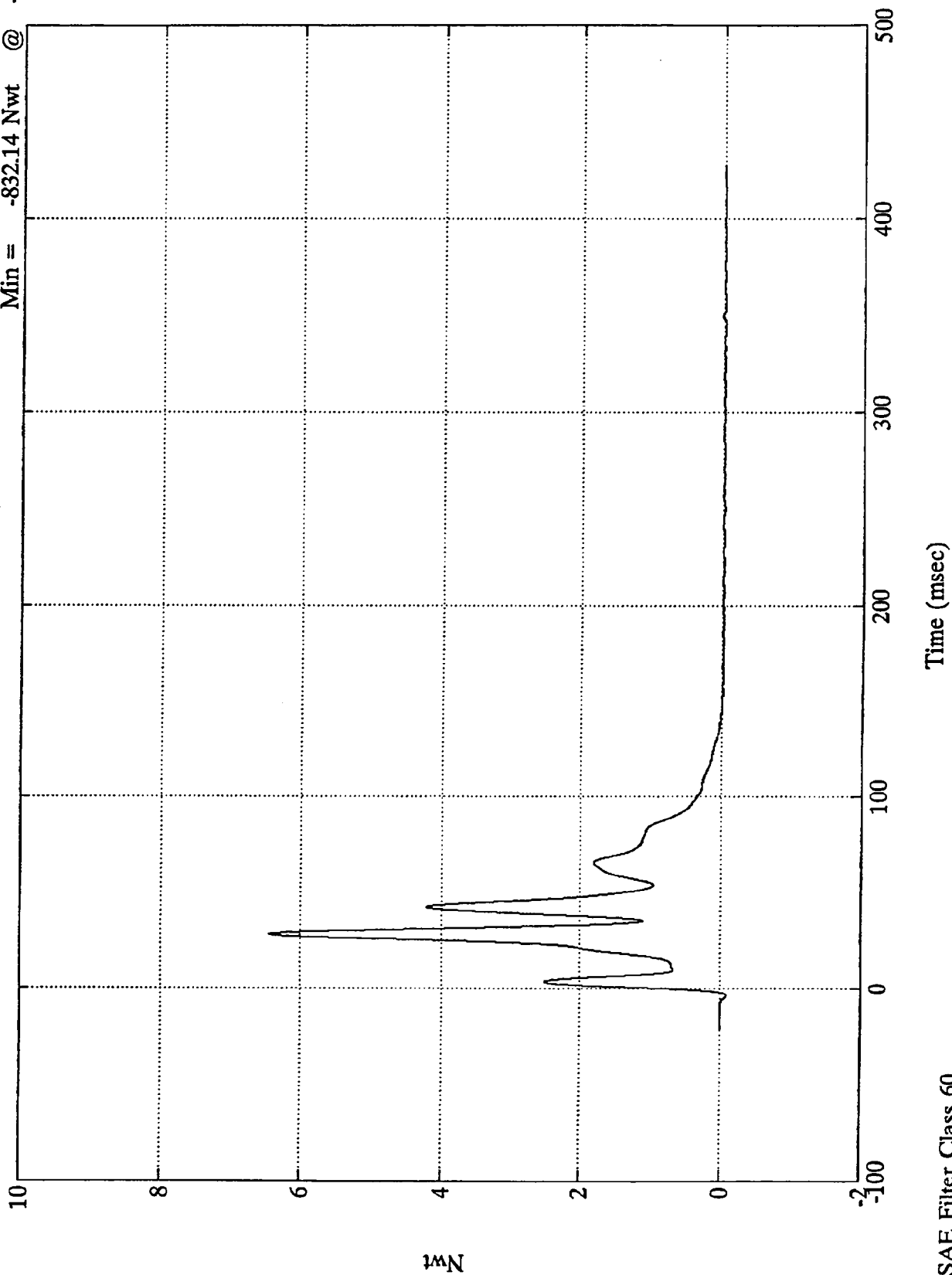


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell B6

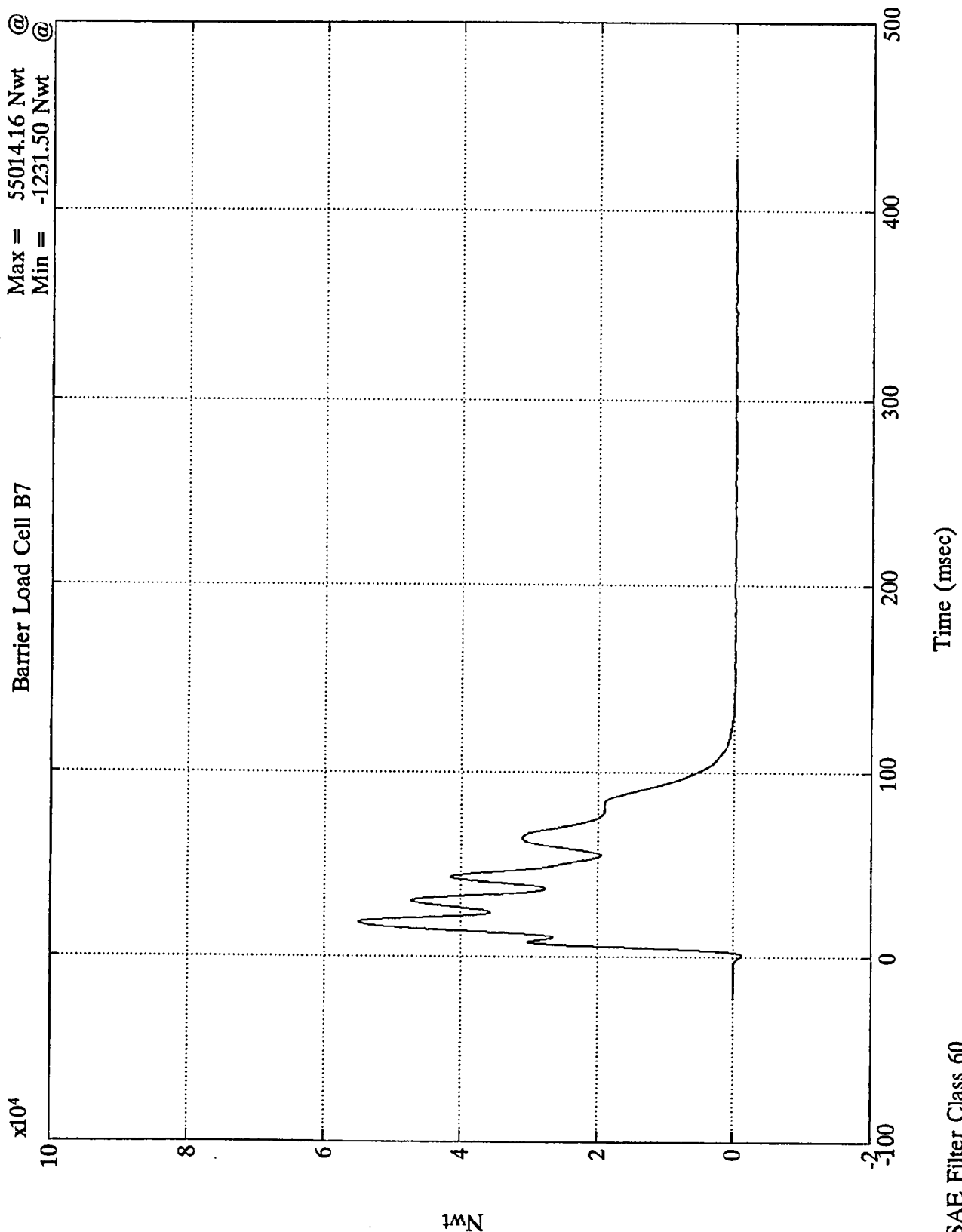
Max = 64404.48 Nwt @ 28.80 msec
 Min = -832.14 Nwt @ -3.60 msec



NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell B7

Max = 55014.16 Nwt @ 18.72 msec
 Min = -1231.50 Nwt @ 0.95 msec



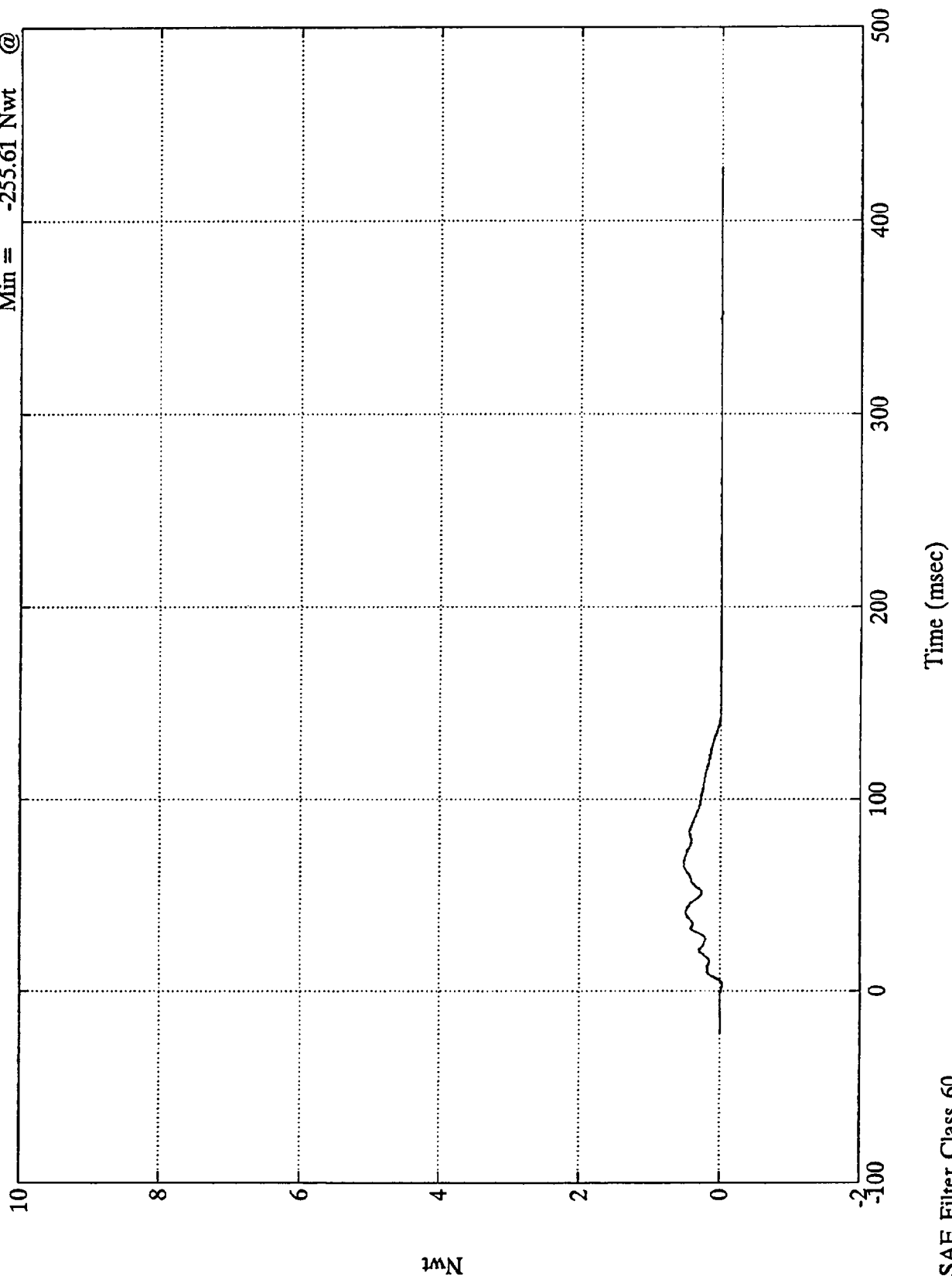
SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Max = 5288.53 Nwt @ 66.36 msec
 Min = -255.61 Nwt @ 3.47 msec

Barrier Load Cell B8

x10⁴

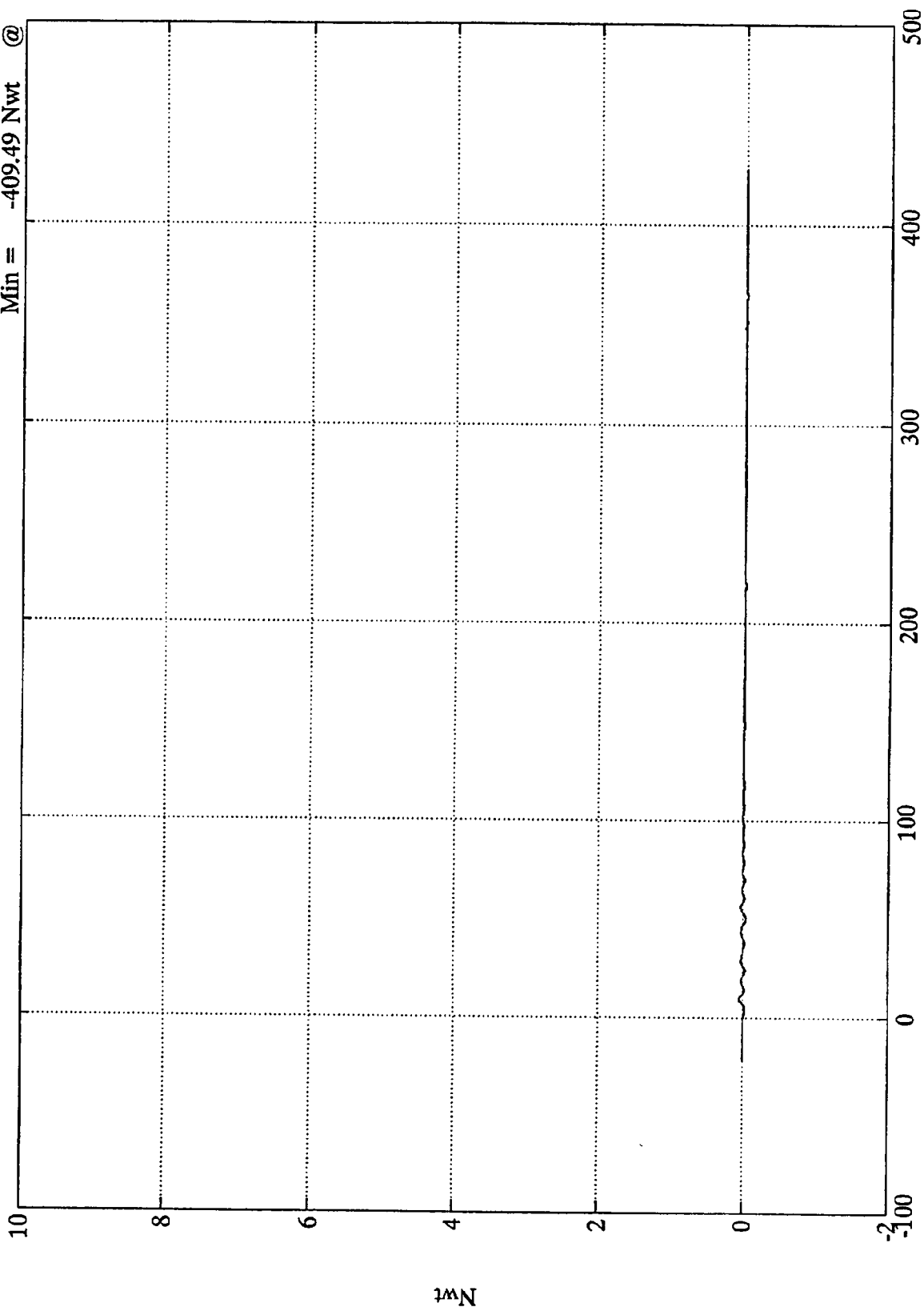


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Max = 583.79 Nwt @ 9.71 msec
Min = -409.49 Nwt @ 50.52 msec

Barrier Load Cell B9

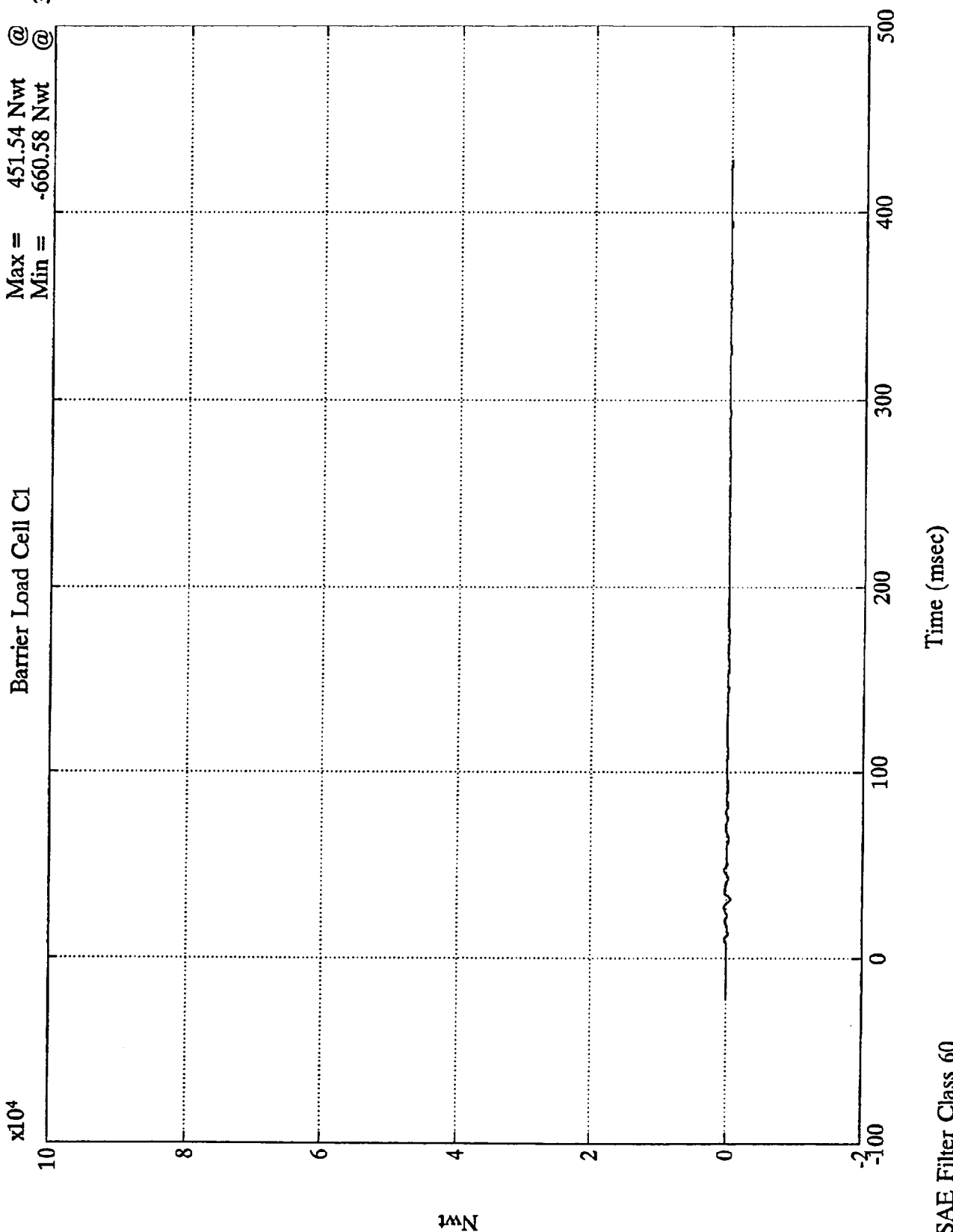


Time (msec)

SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

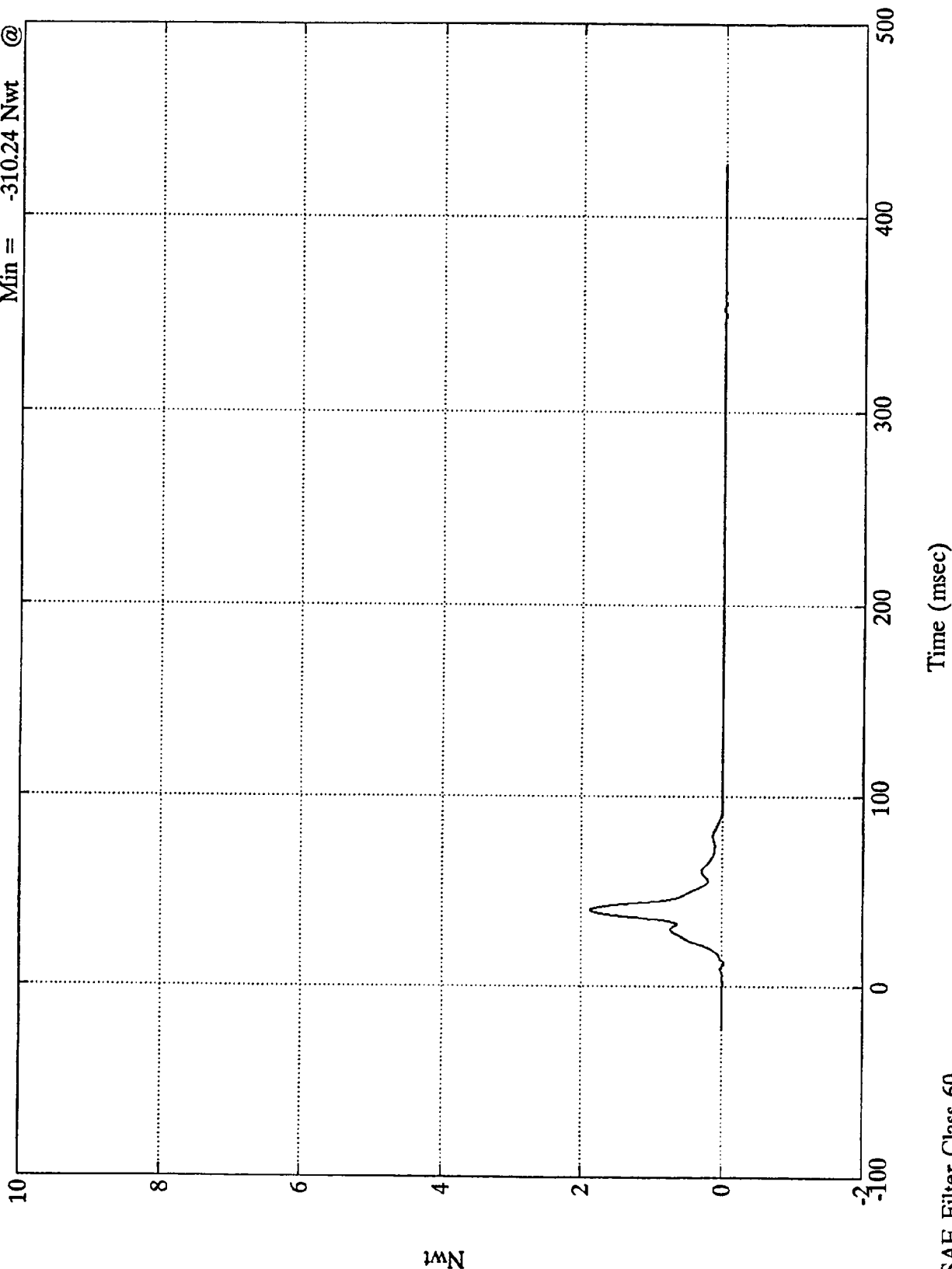
Barrier Load Cell C1
Max = 451.54 Nwt @ 47.04 msec
Min = -660.58 Nwt @ 31.55 msec



NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell C2

Max = 18703.85 Nwt @ 39.72 msec
 Min = -310.24 Nwt @ 12.11 msec



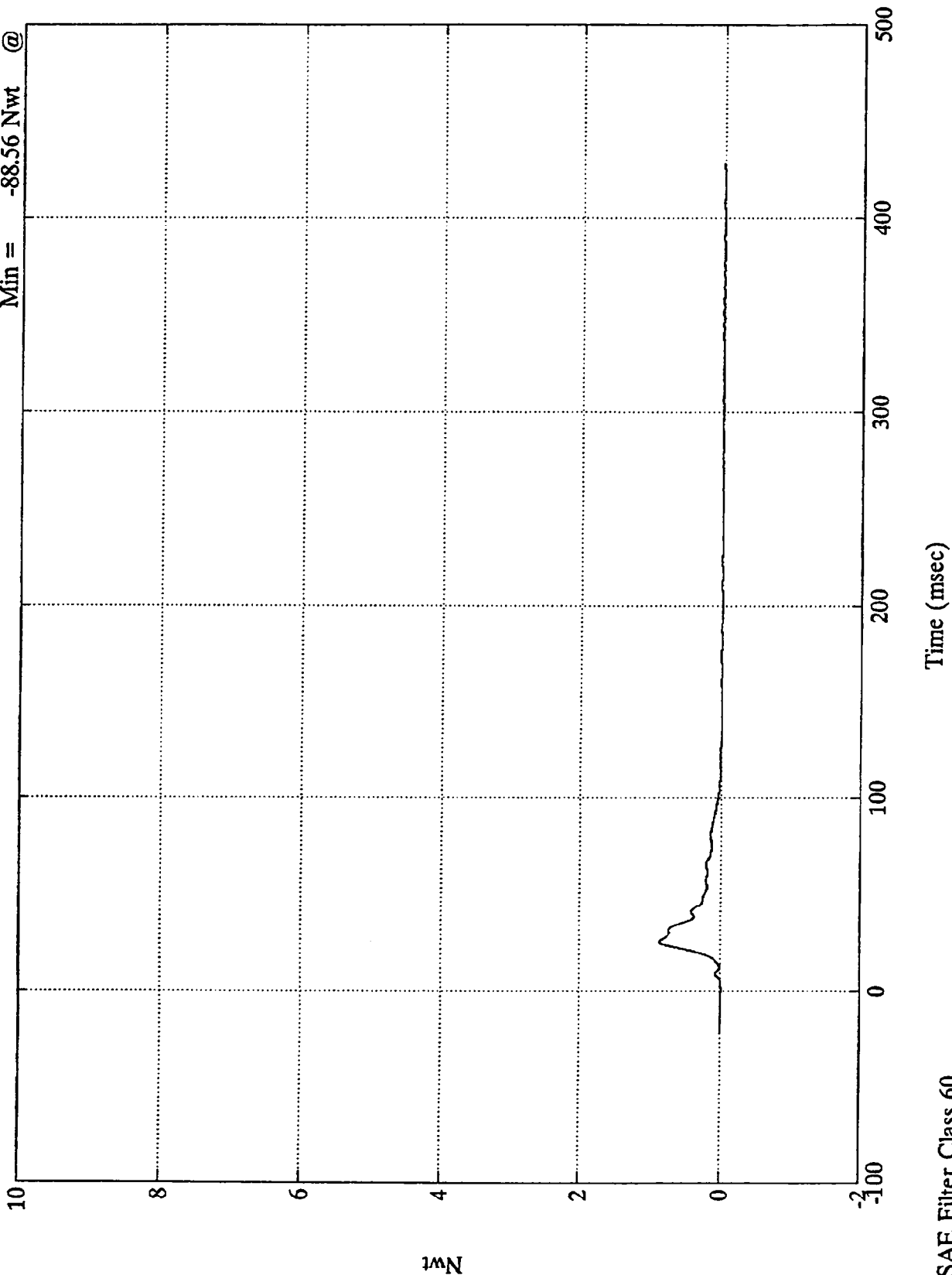
SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell C3

Max = 8693.54 Nwt @ 25.20 msec
 Min = -88.56 Nwt @ 1.07 msec

$\times 10^4$

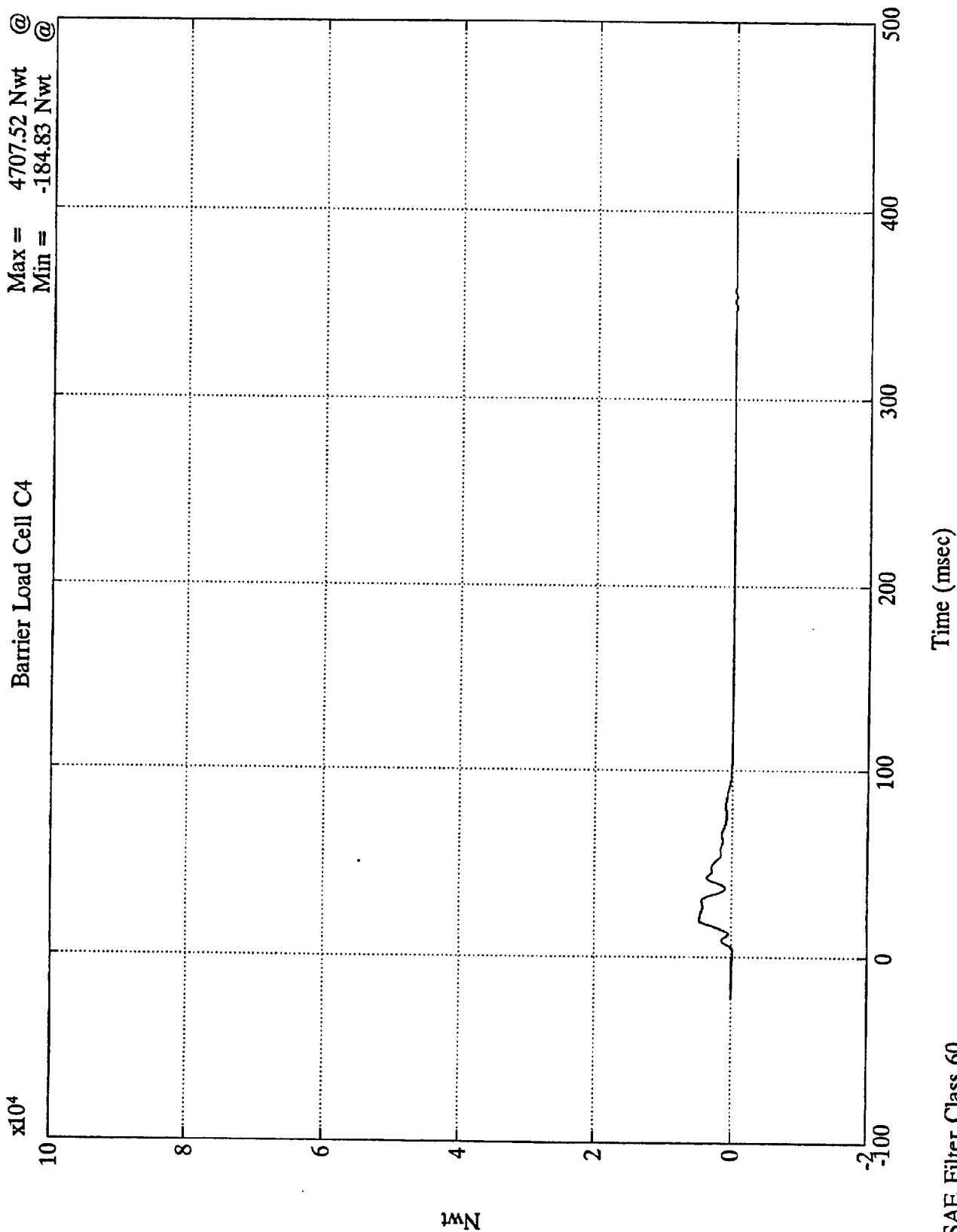


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell C4

Max = 4707.52 Nwt @ 20.40 msec
 Min = -184.83 Nwt @ 1.31 msec

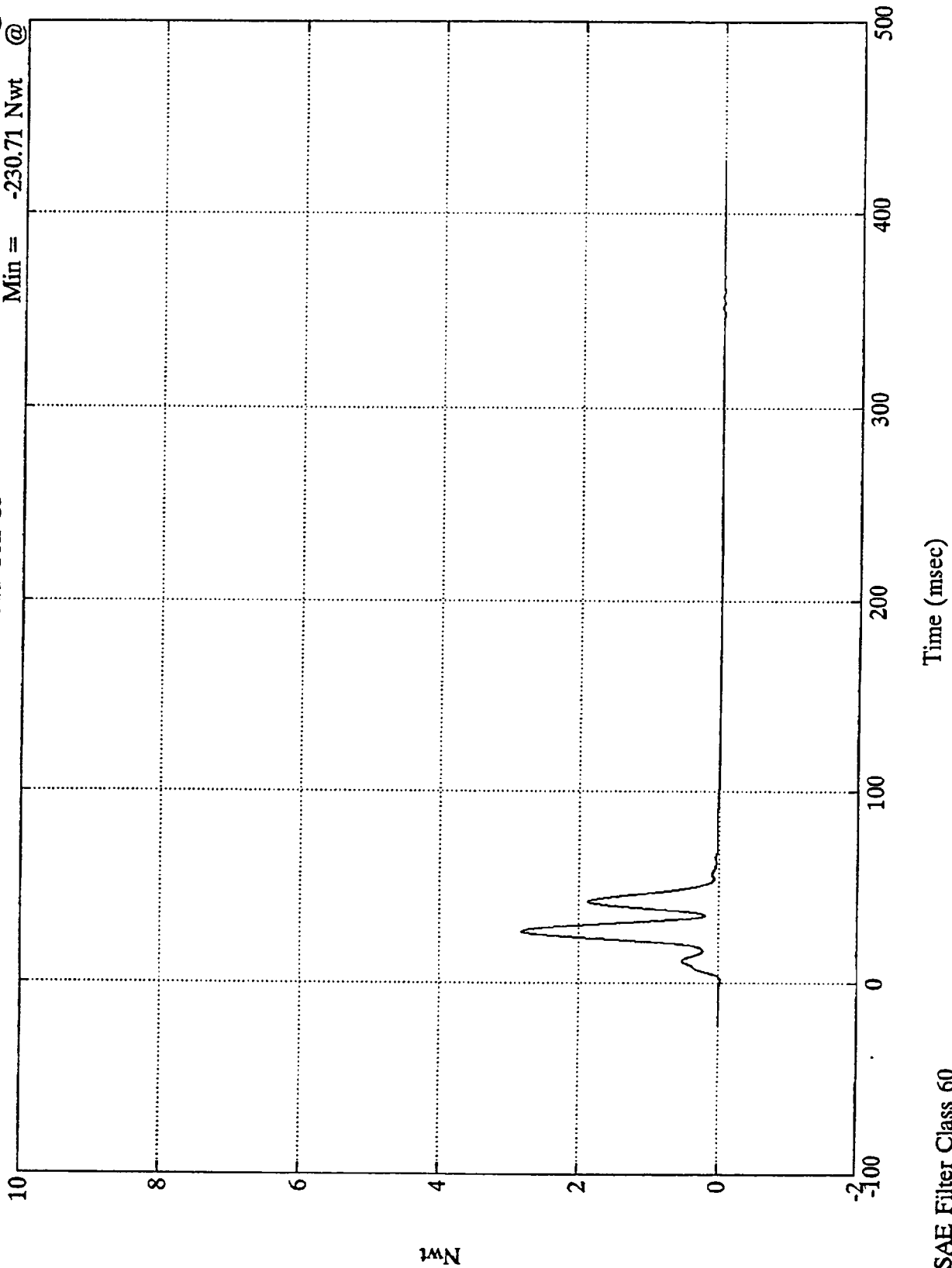


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Max = 28048.15 Nwt @ 27.11 msec
Min = -230.71 Nwt @ 1.19 msec

Barrier Load Cell C5



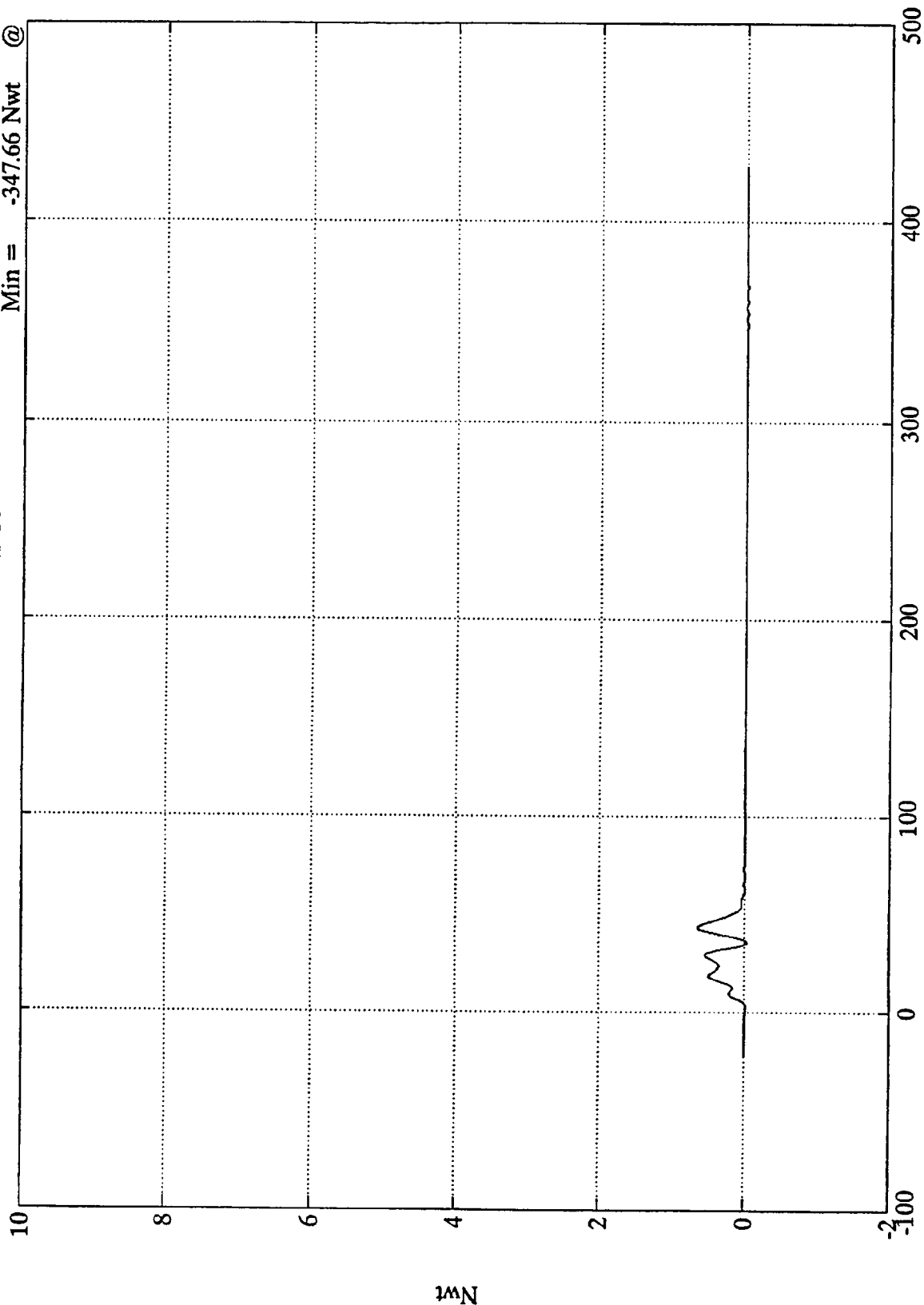
SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Max = 6514.74 Nwt @ 43.43 msec
 Min = -347.66 Nwt @ 36.00 msec

Barrier Load Cell C6

x10⁴



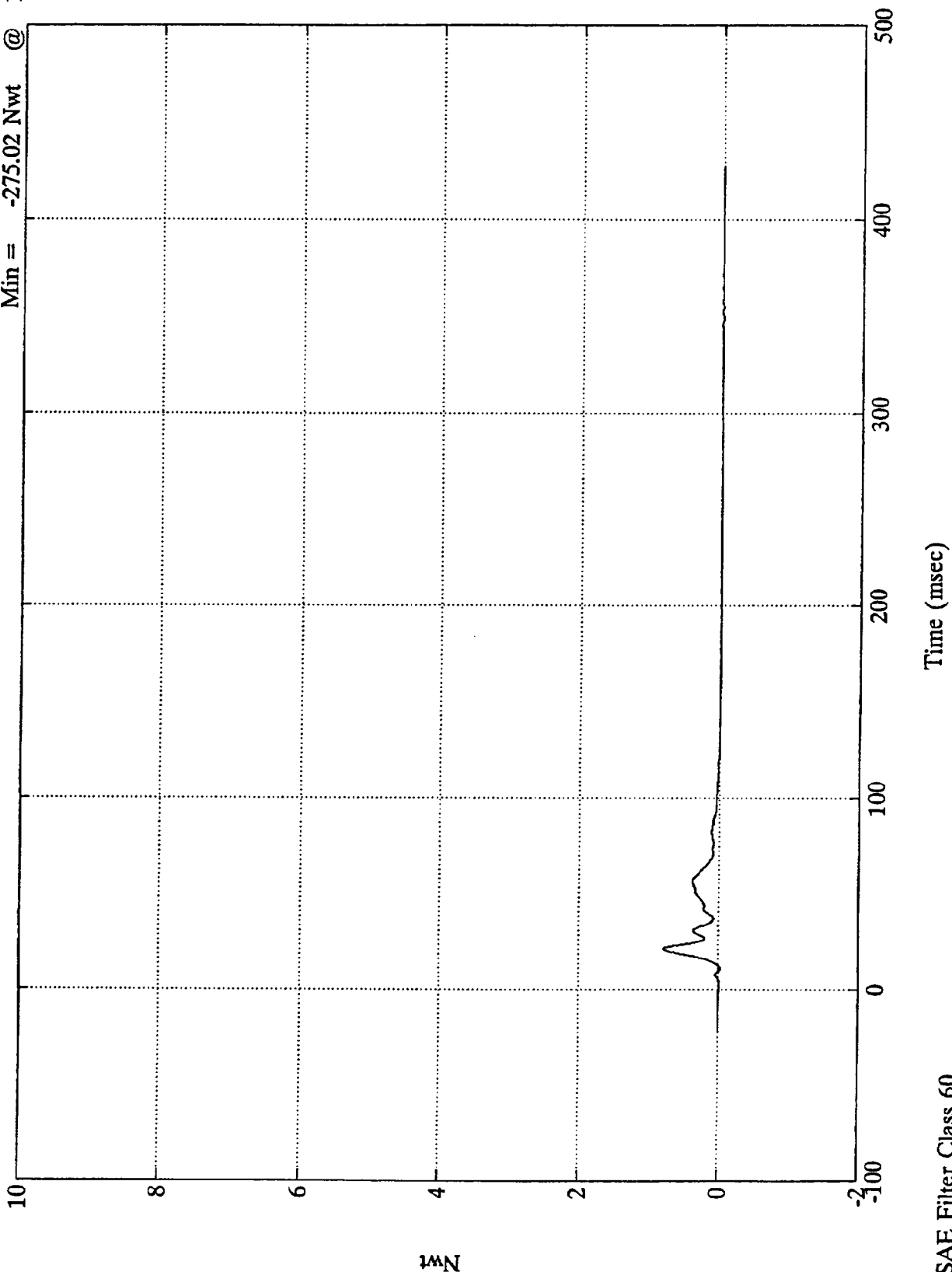
Time (msec)

SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell C7

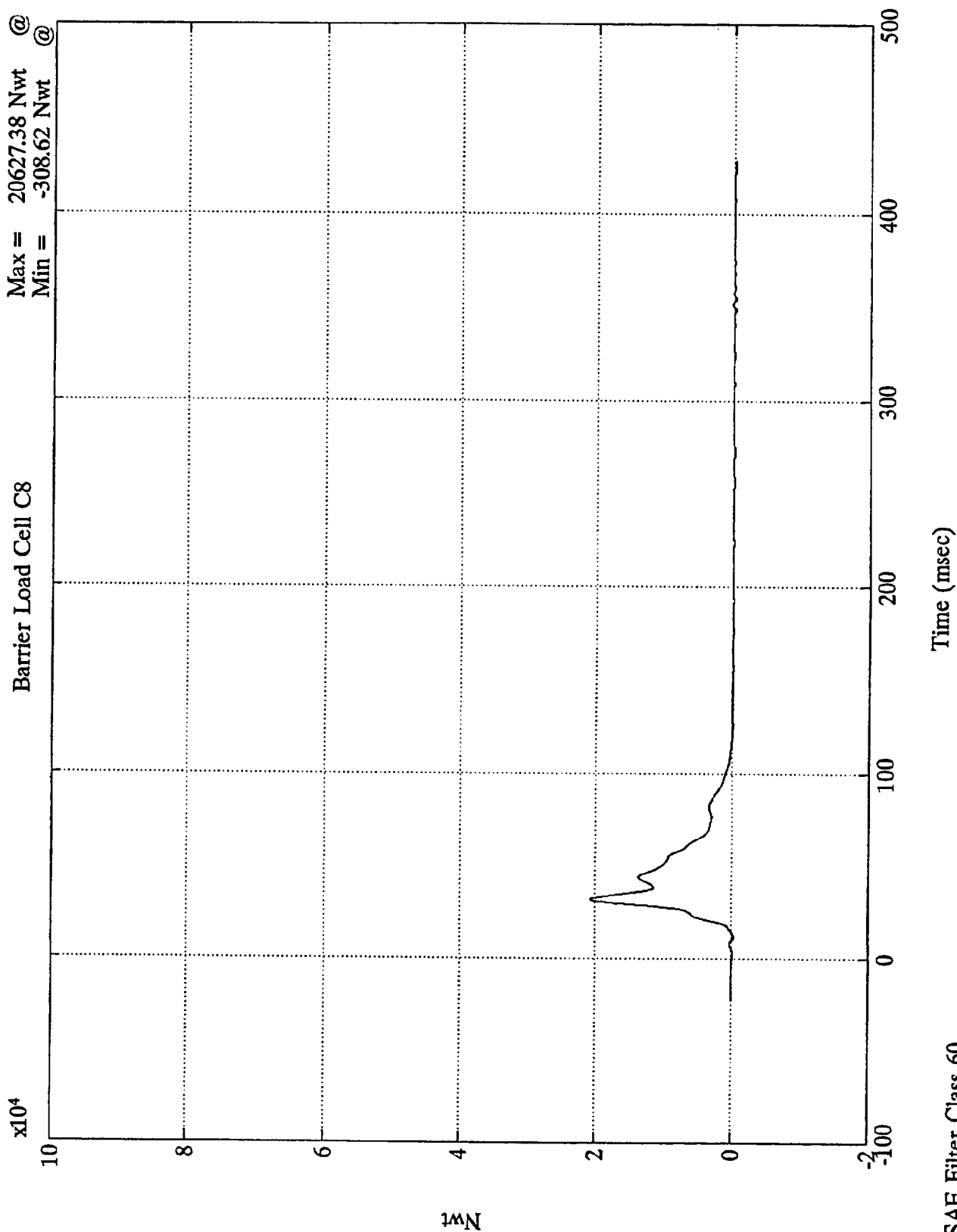
Max = 7942.25 Nwt @ 21.60 msec
 Min = -275.02 Nwt @ 11.52 msec



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell C8
 Max = 20627.38 Nwt @ 32.76 msec
 Min = -308.62 Nwt @ 11.76 msec

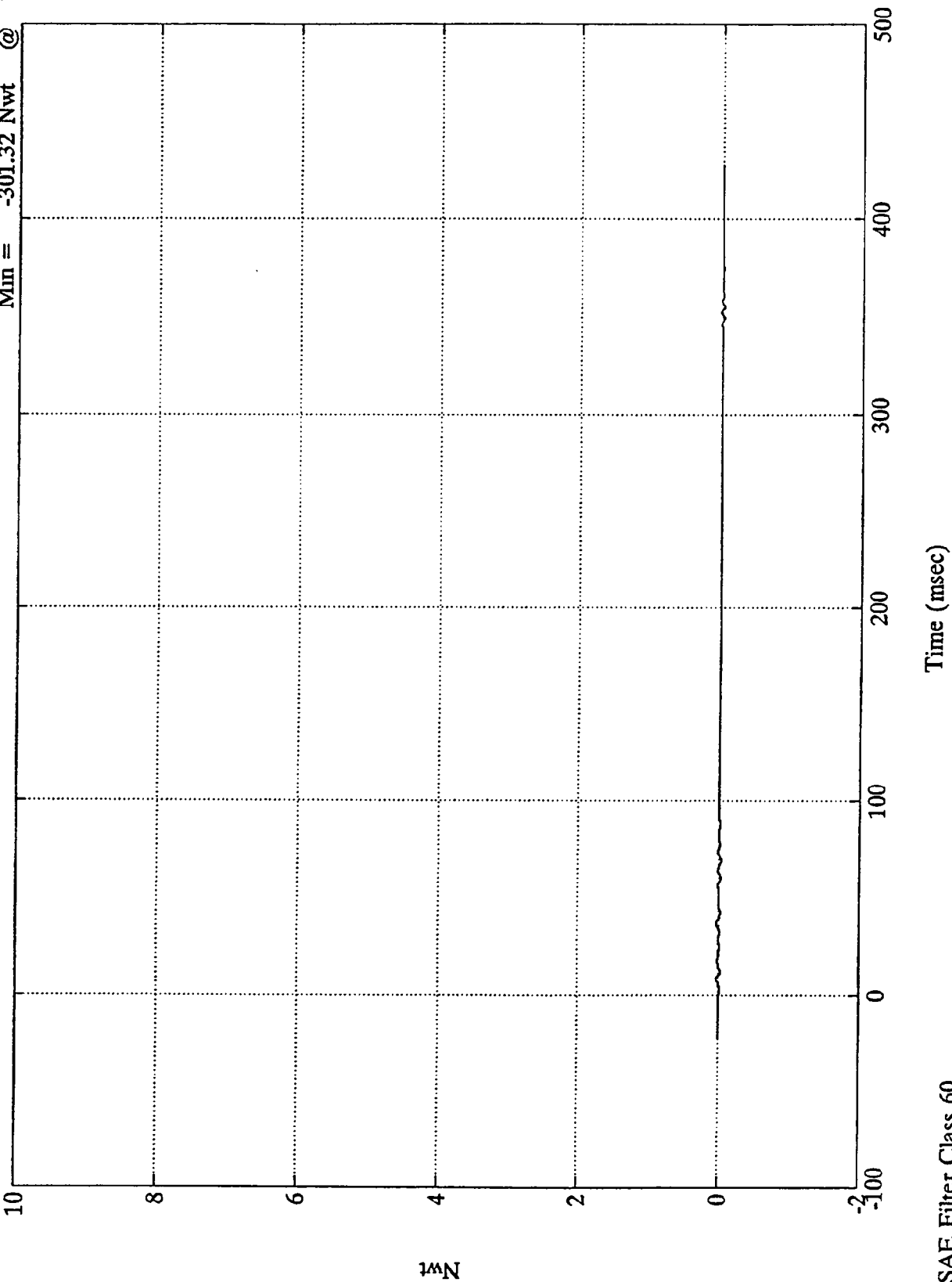


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell C9
 Max = 350.75 Nwt @ 8.75 msec
 Min = -301.32 Nwt @ 12.23 msec

$\times 10^4$

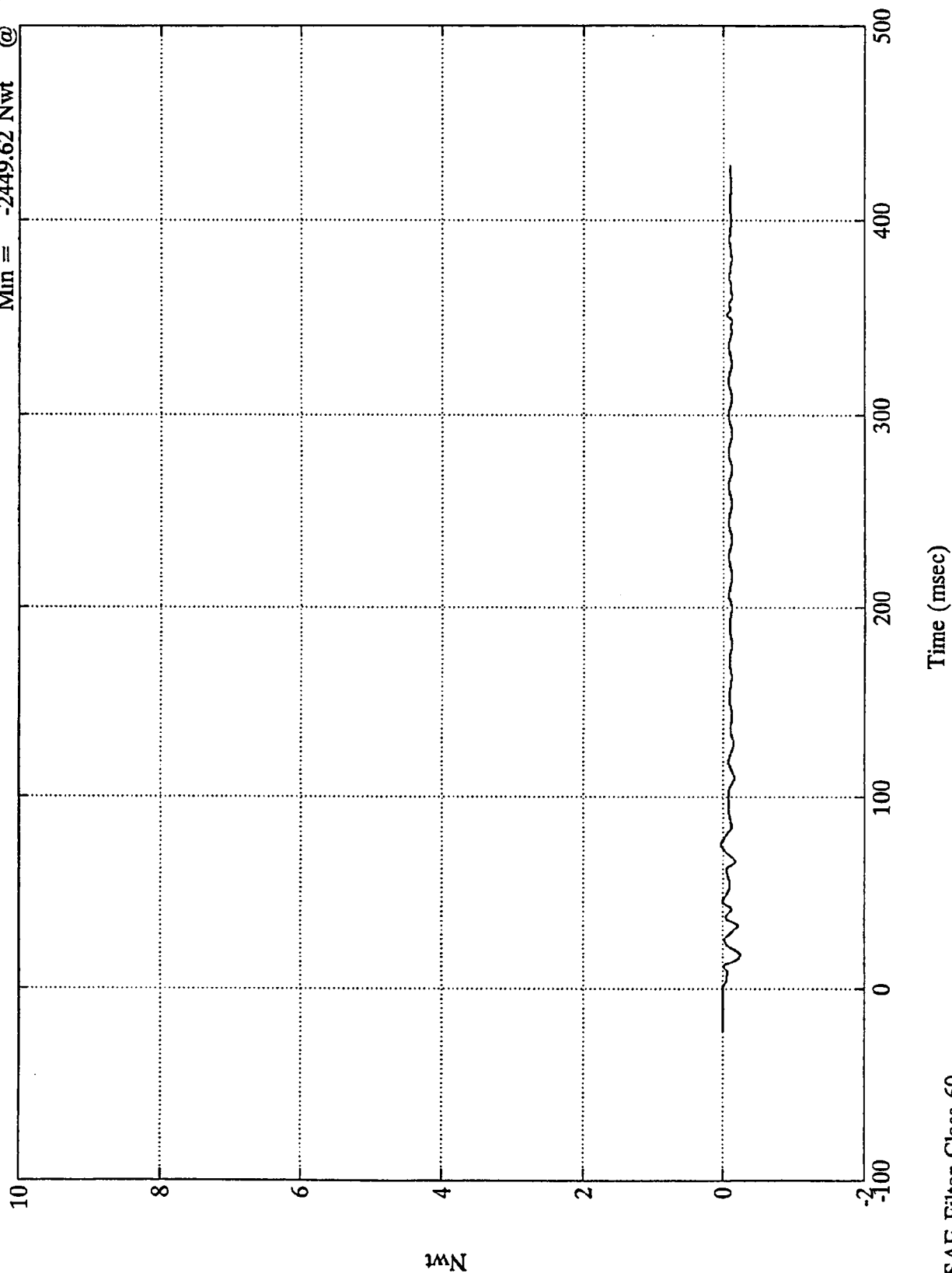


NCAP TEST #9 - 1995 GEO METRO

Max = 298.58 Nwt @ 75.95 msec
 Min = -2449.62 Nwt @ 18.12 msec

Barrier Load Cell D1

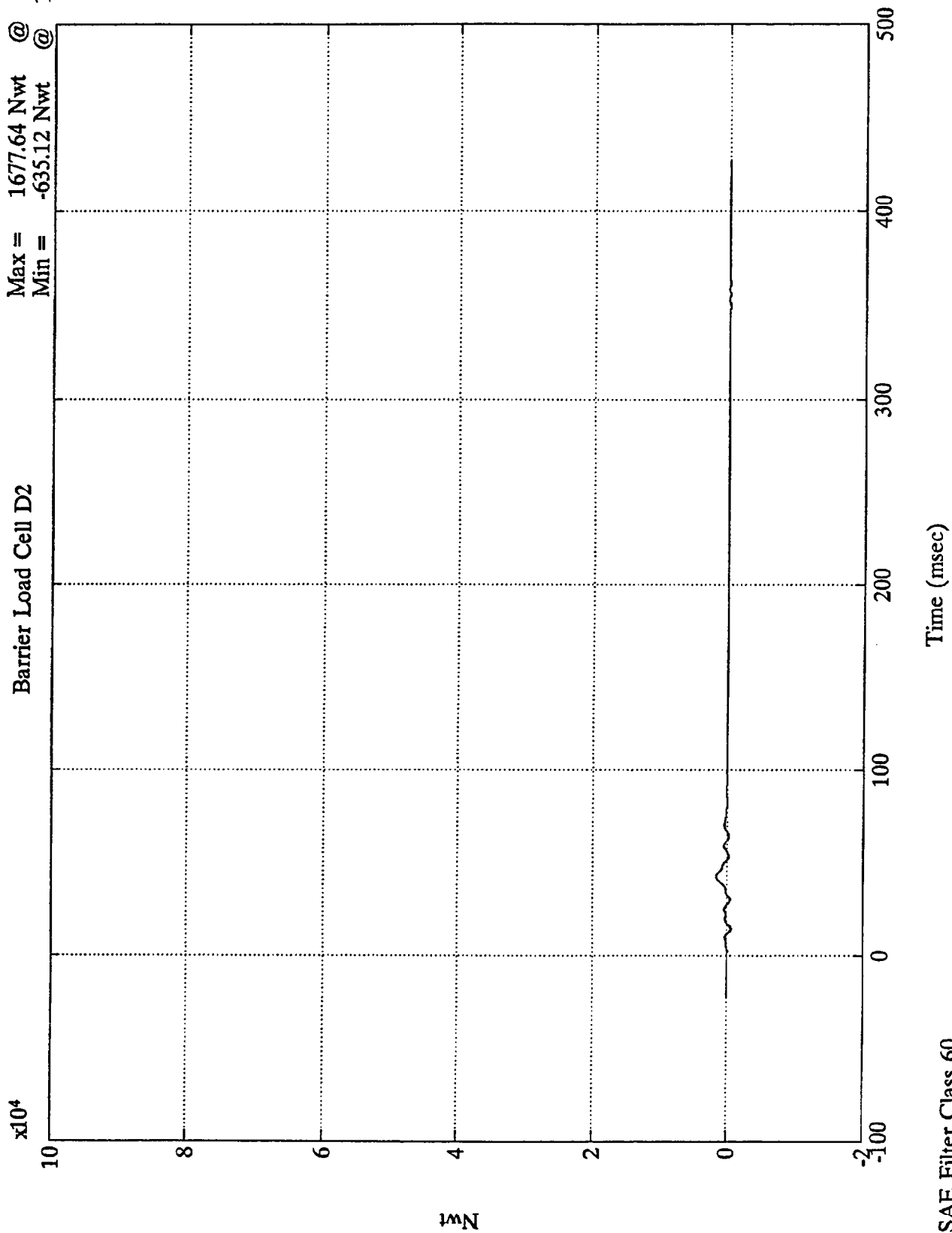
x10⁴



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell D2
Max = 1677.64 Nwt @ 42.60 msec
Min = -635.12 Nwt @ 14.63 msec

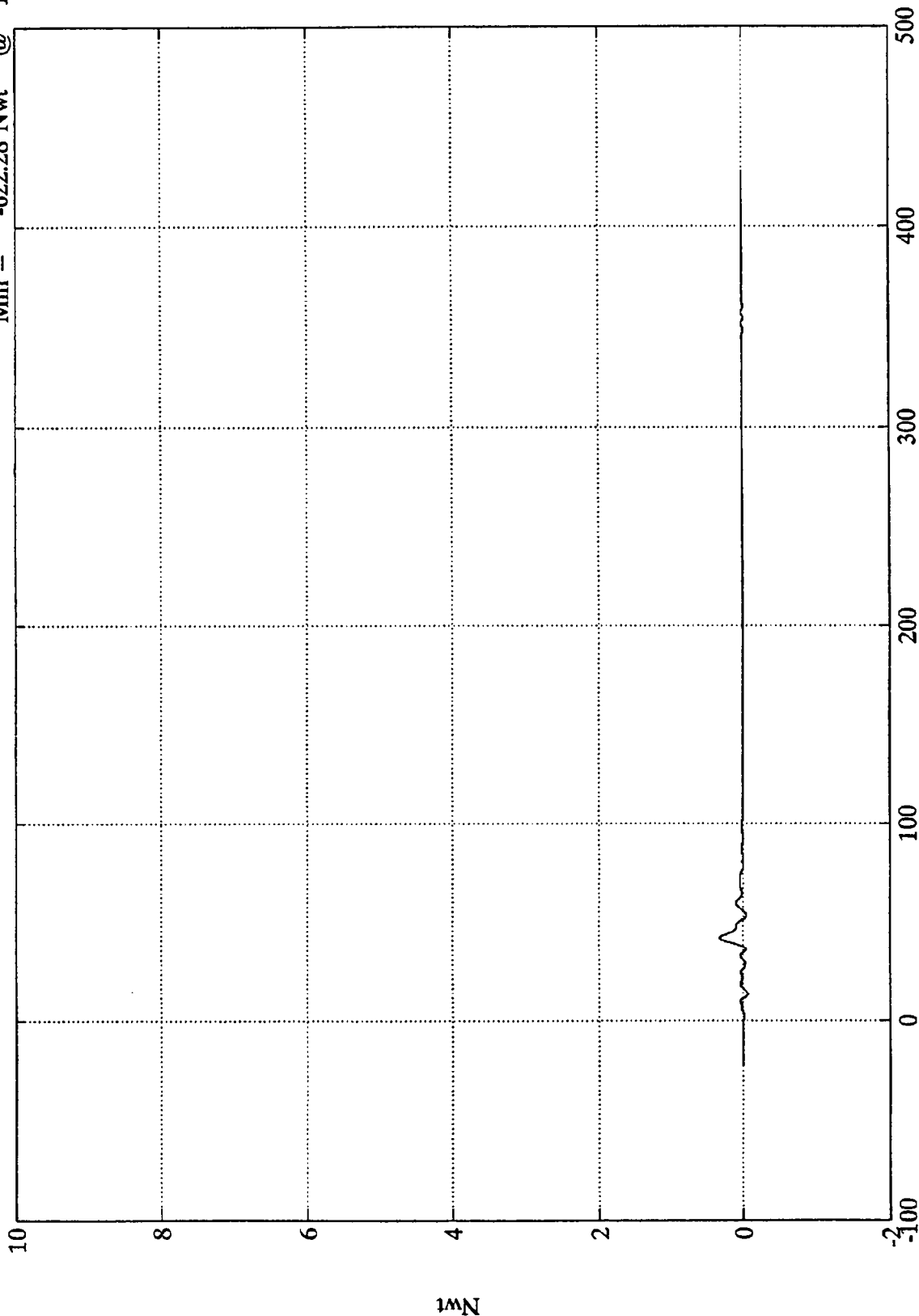


NCAP TEST #9 - 1995 GEO METRO

Max = 3195.72 Nwt @ 42.00 msec
 Min = -622.28 Nwt @ 13.68 msec

Barrier Load Cell D3

x10⁴



Time (msec)

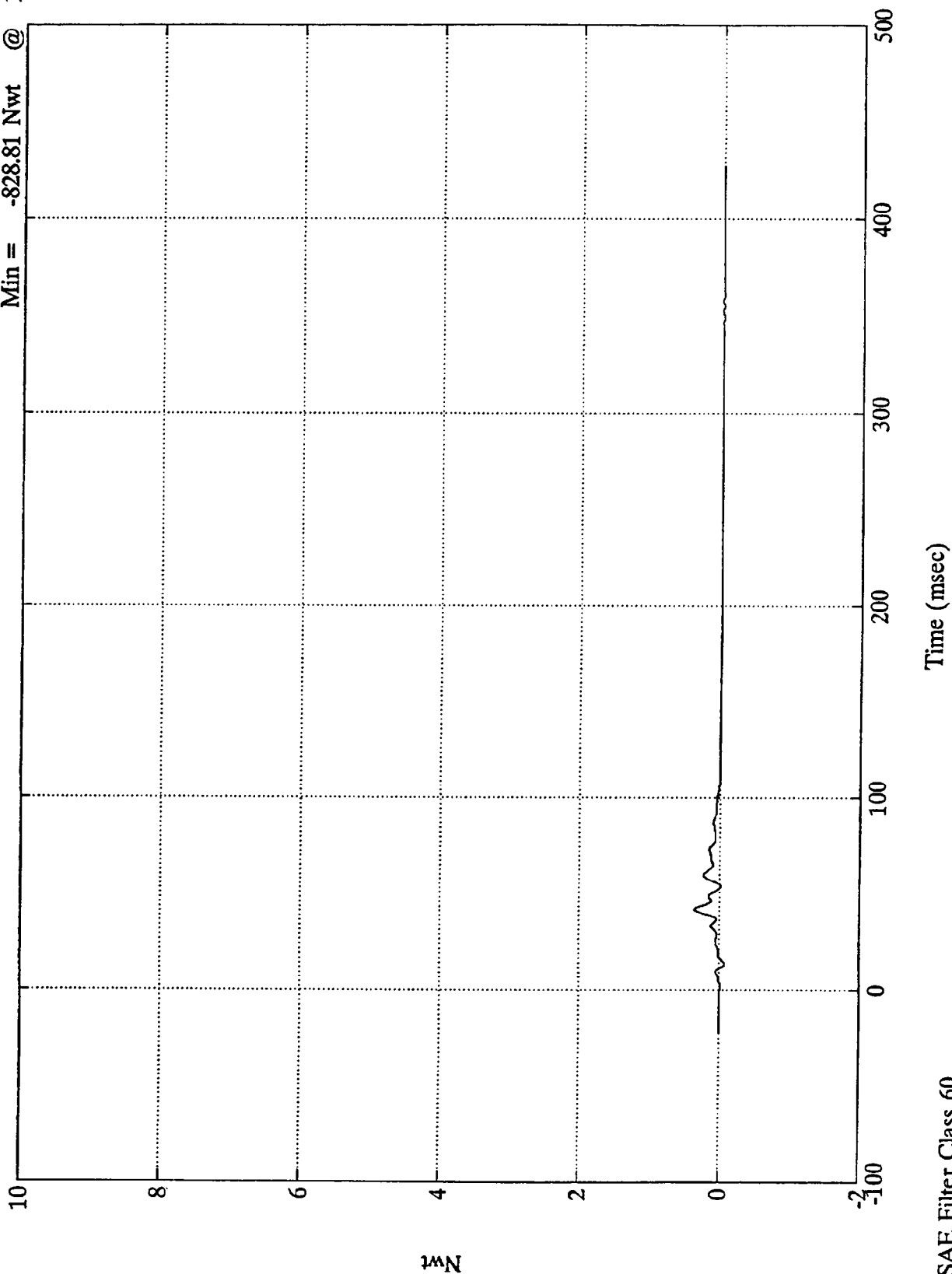
SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell D4

Max = 3588.94 Nwt @ 41.76 msec
Min = -828.81 Nwt @ 13.68 msec

$\times 10^4$

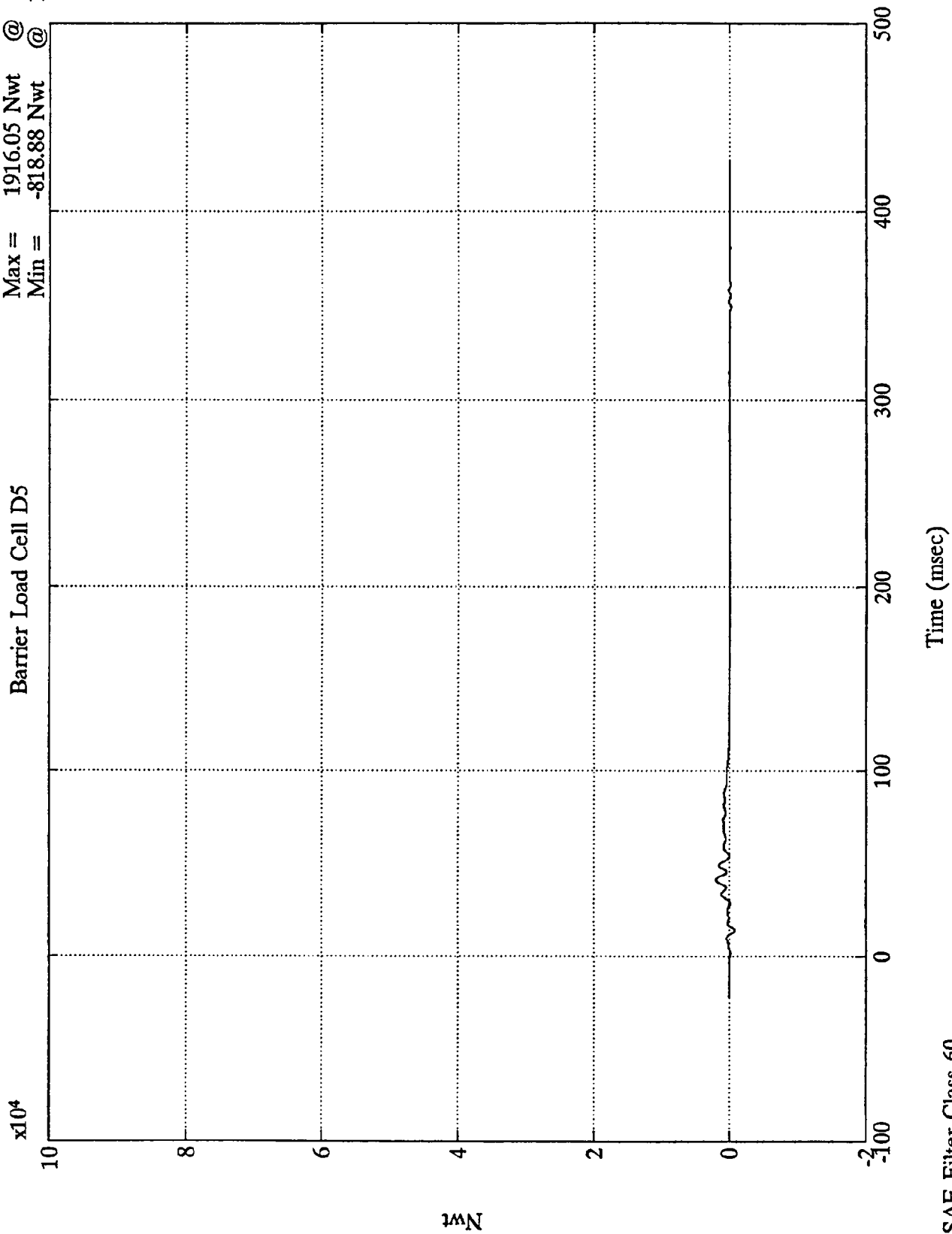


SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell D5

Max = 1916.05 Nwt @ 41.40 msec
 Min = -818.88 Nwt @ 13.80 msec



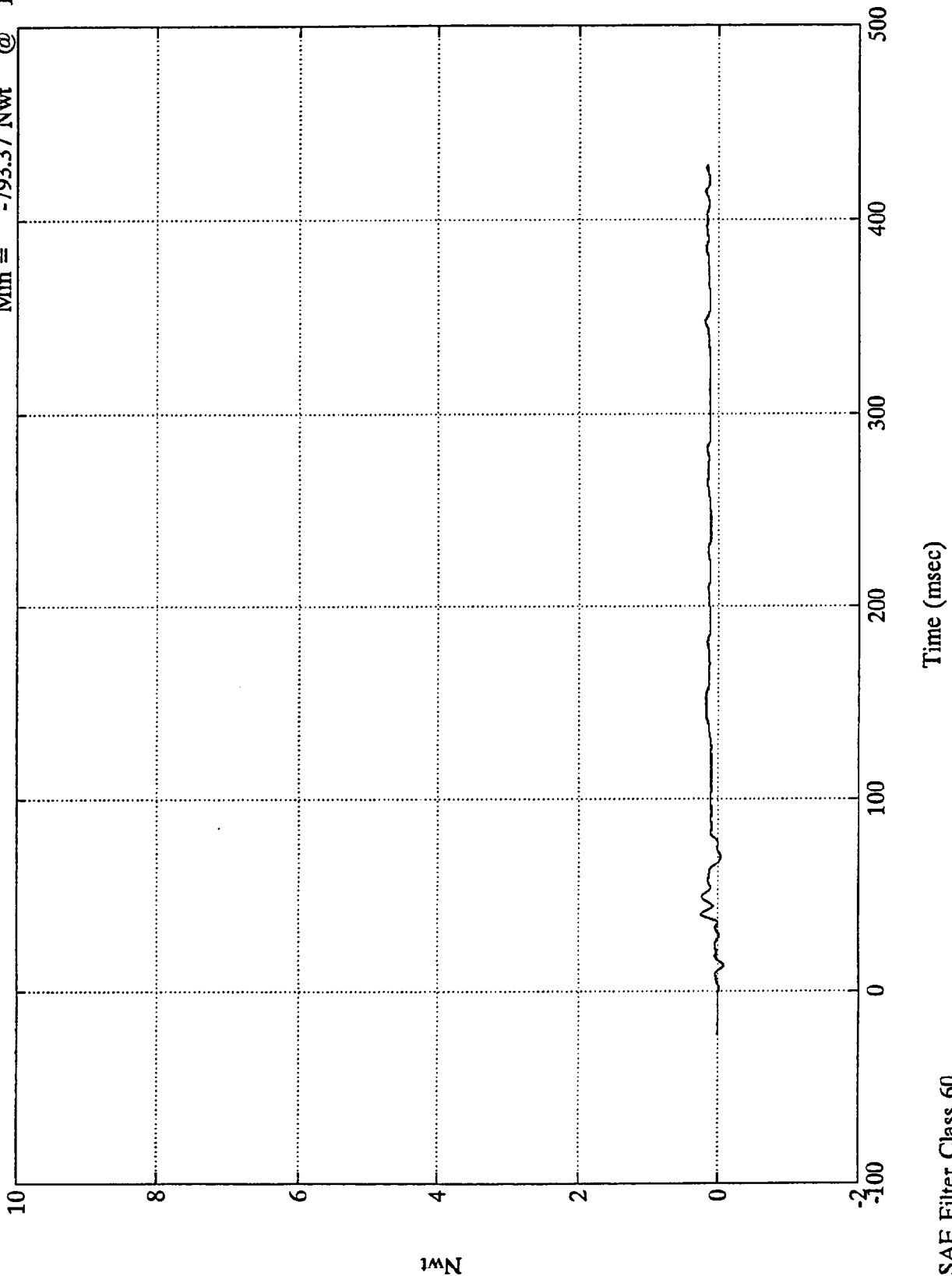
SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell D6

Max = 2385.18 Nwt @ 40.31 msec
 Min = -793.37 Nwt @ 13.55 msec

$\times 10^4$



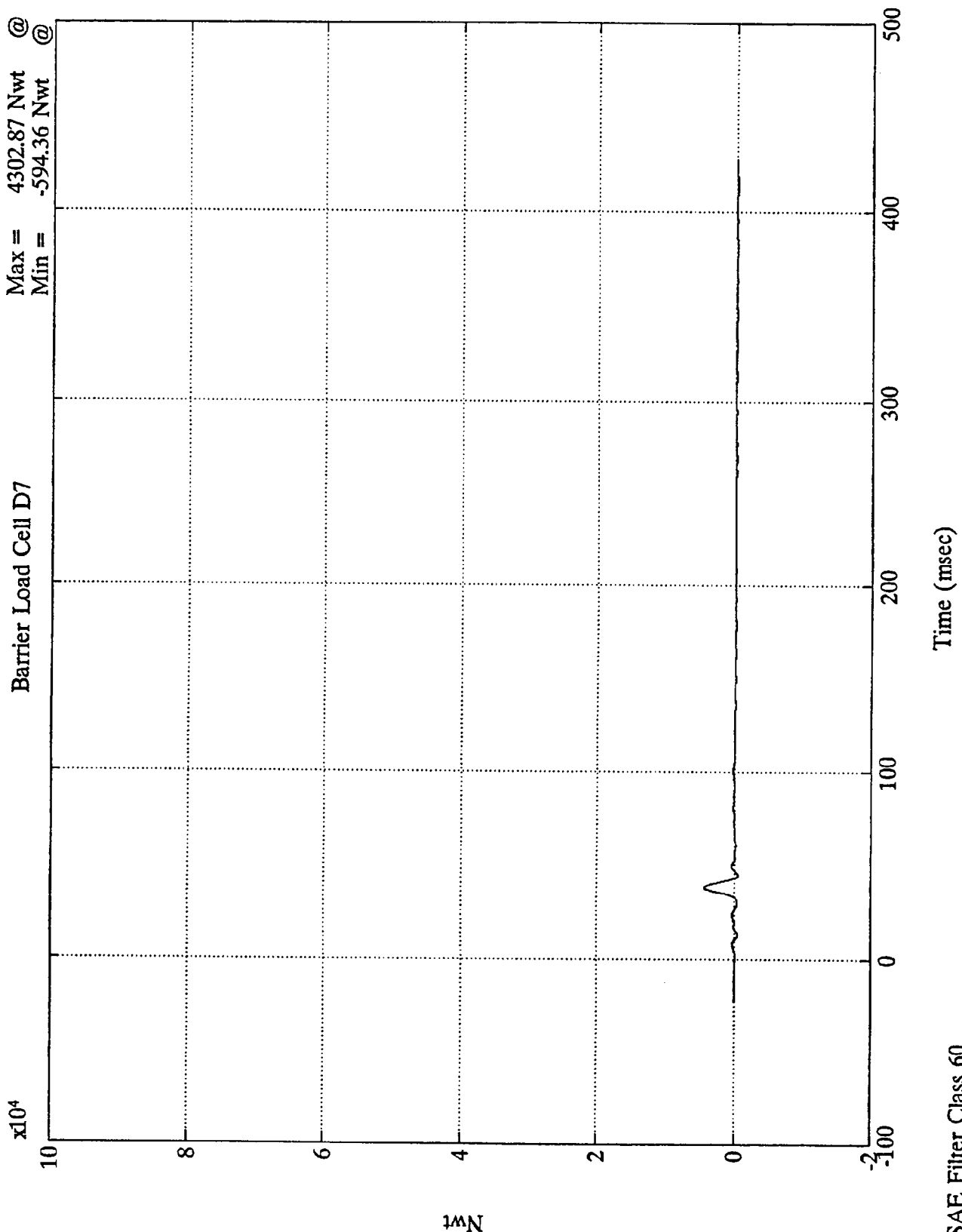
Nwt

SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell D7

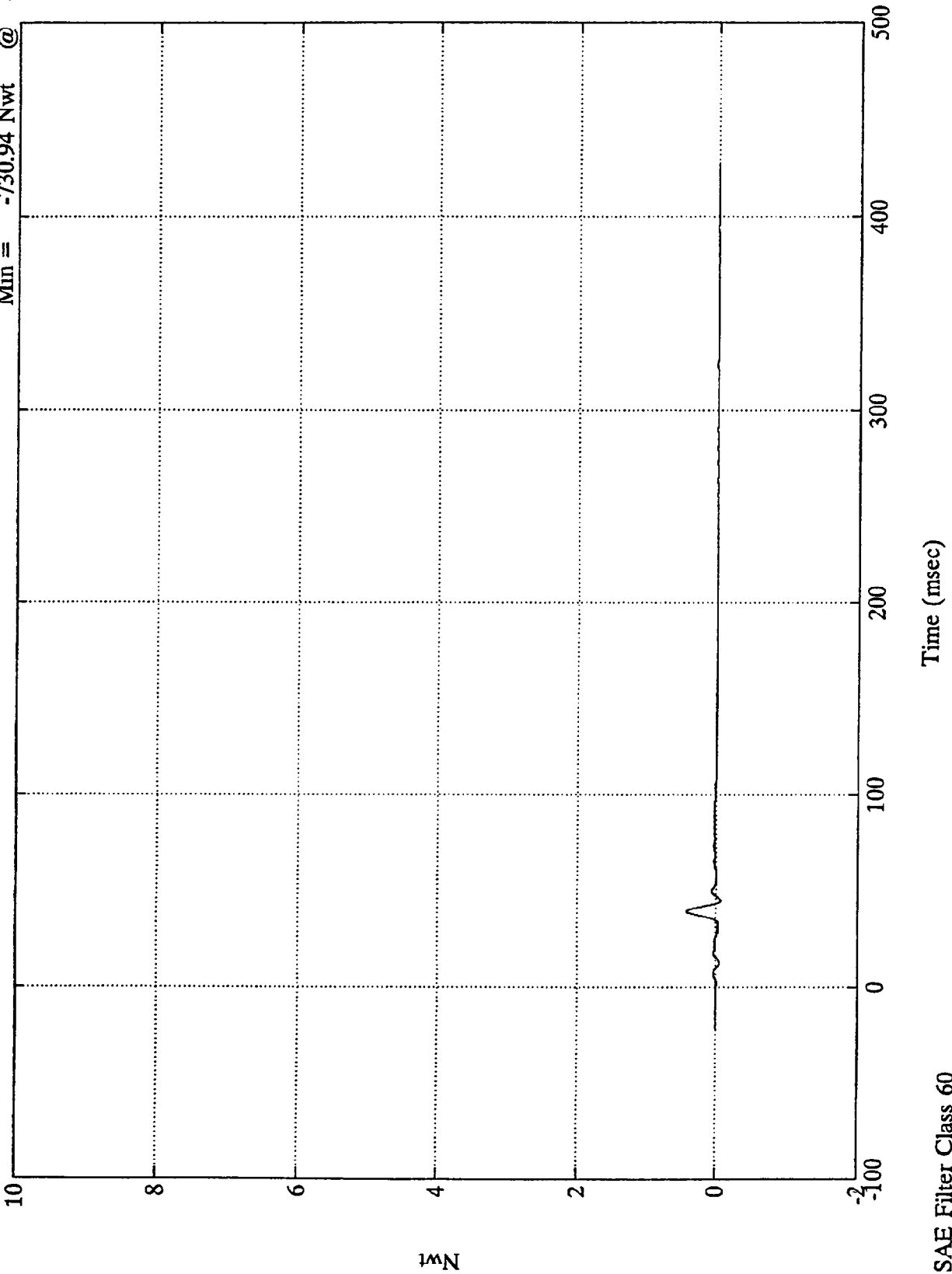
Max = 4302.87 Nwt @ 38.52 msec
 Min = -594.36 Nwt @ 44.88 msec



SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Barrier Load Cell D8
 Max = 4126.30 Nwt @ 39.24 msec
 Min = -730.94 Nwt @ 44.75 msec

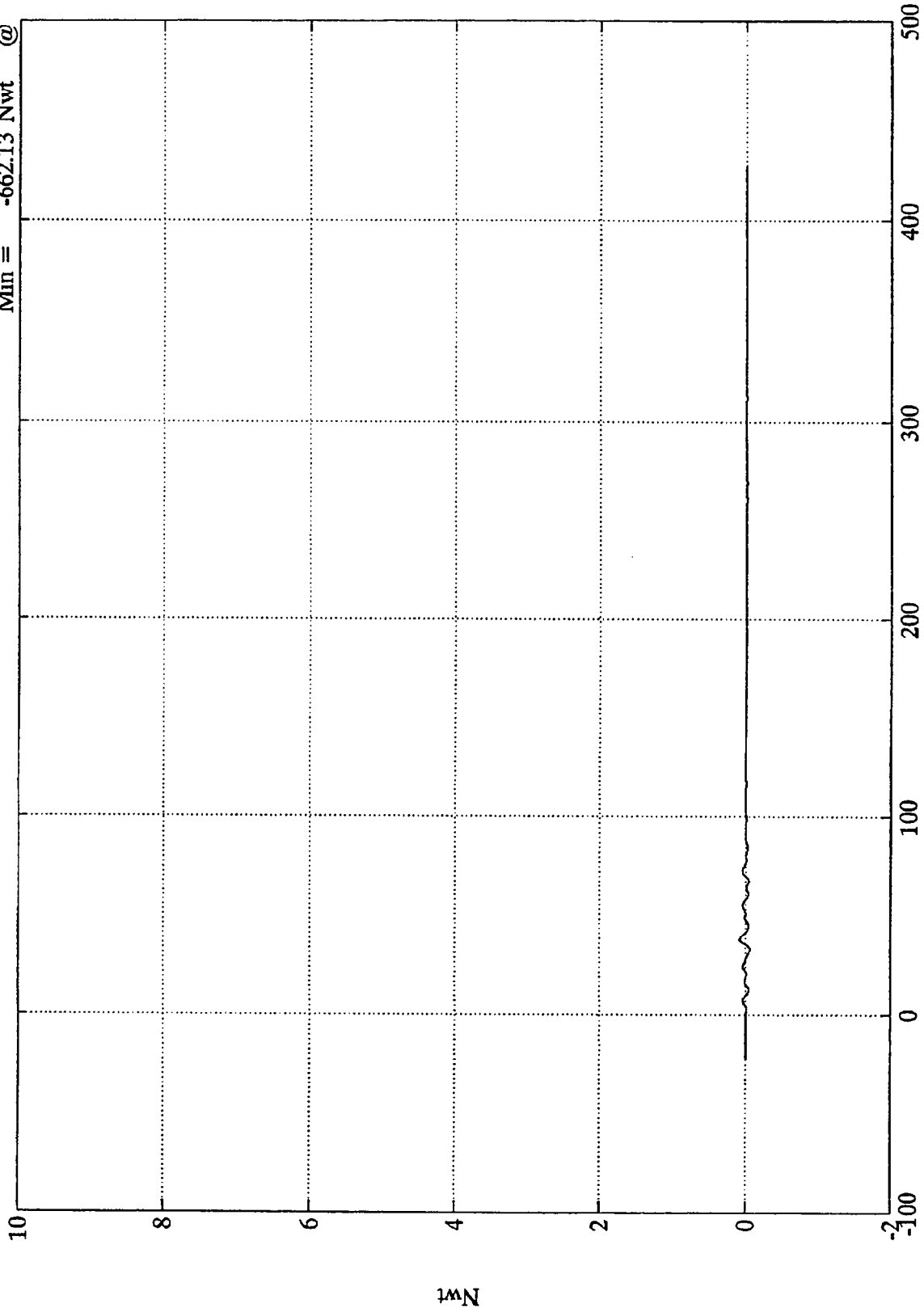


NCAP TEST #9 - 1995 GEO METRO

Max = 783.07 Nwt @ 38.15 msec
 Min = -662.13 Nwt @ 32.88 msec

Barrier Load Cell D9

x10⁴



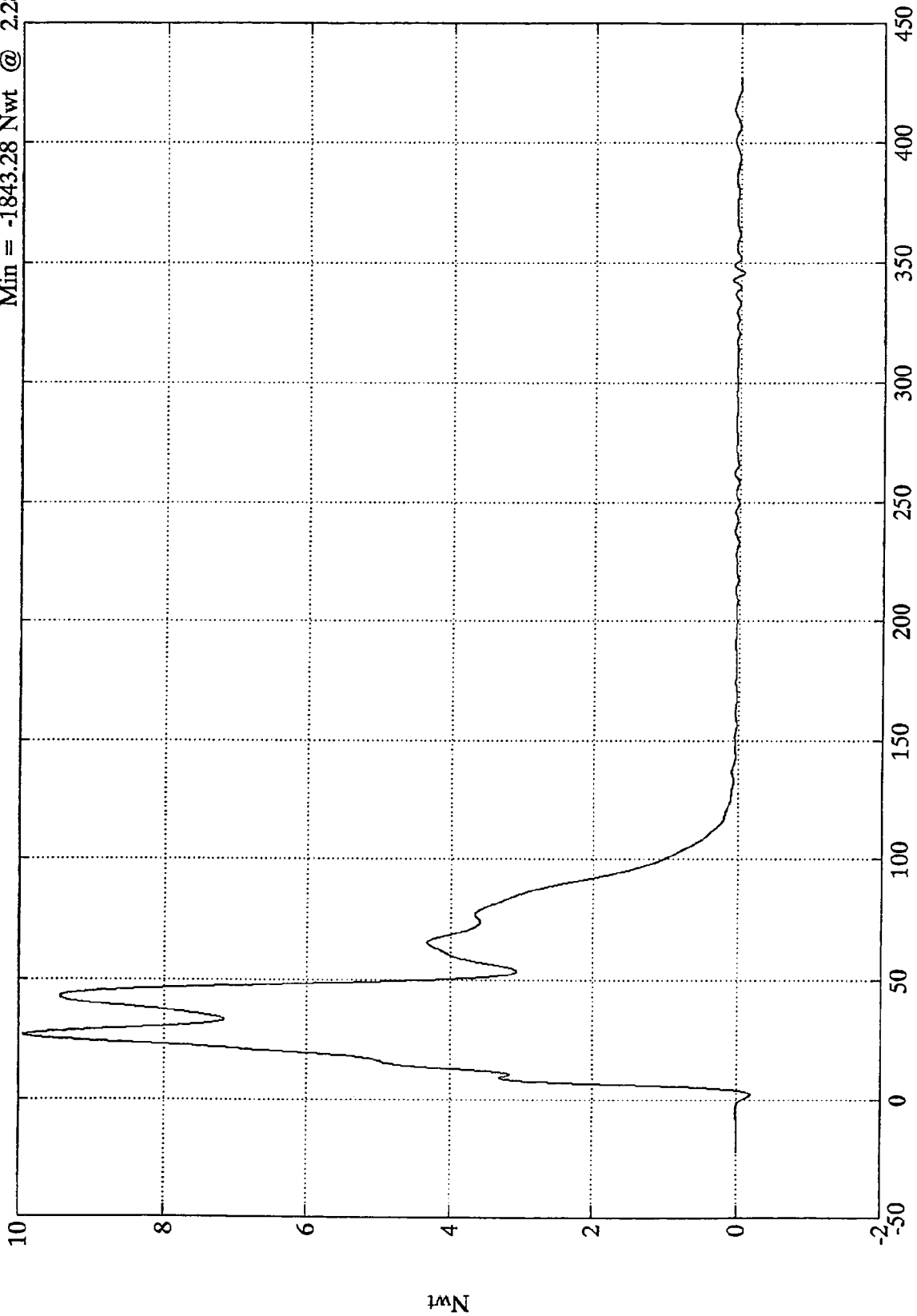
Time (msec)

SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Group 1 Load Cell Sum

Max = 99506.15 Nwt @ 26.64 msec
Min = -1843.28 Nwt @ 2.28 msec



SAE Filter Class 60

Time (msec)

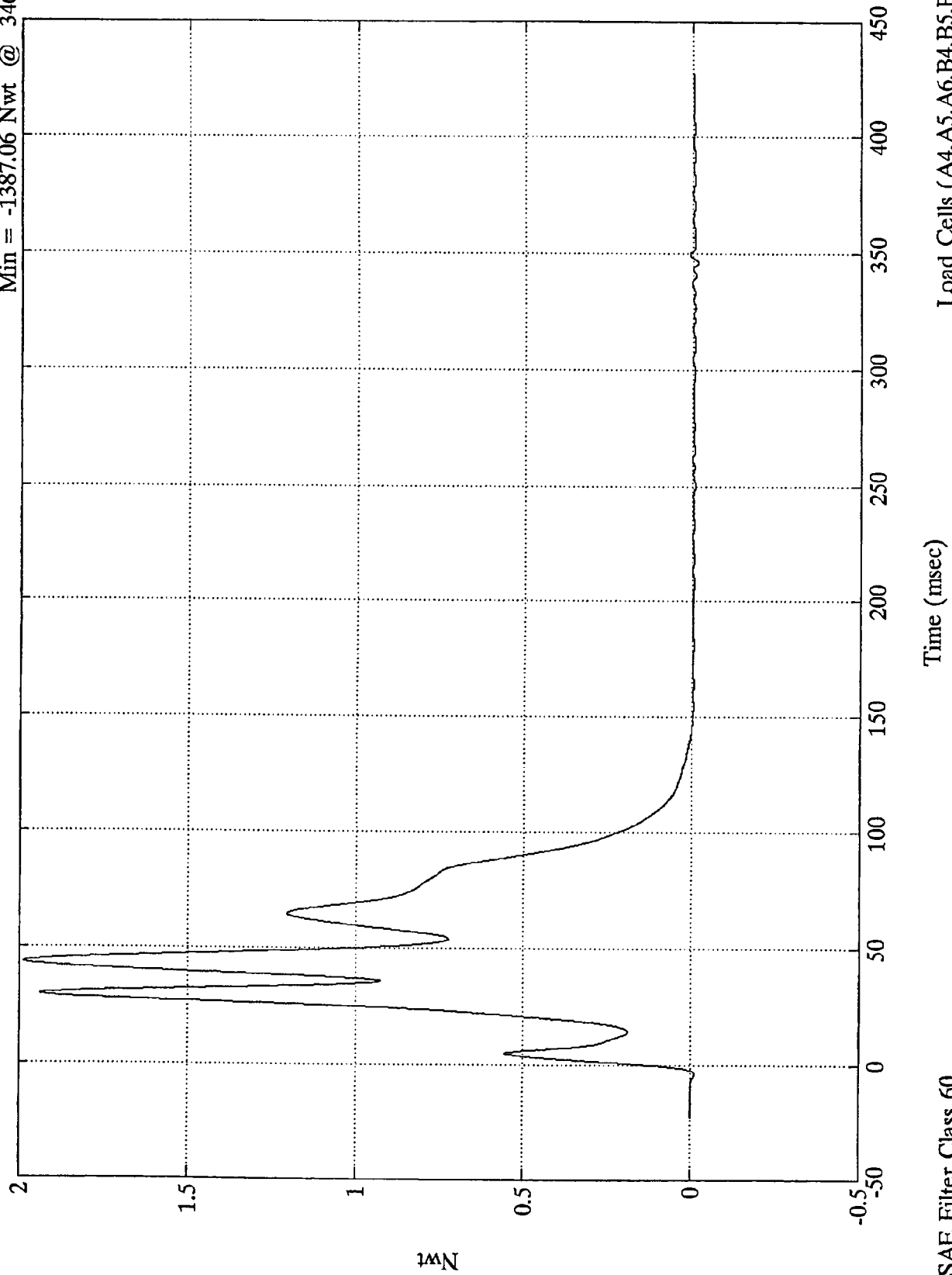
Load Cells (A1,A2,A3,B1,B2,B3,)

NCAP TEST #9 - 1995 GEO METRO

Group 2 Load Cell Sum

Max = 198863.40 Nwt @ 43.44 msec
Min = -1387.06 Nwt @ 346.08 msec

$\times 10^5$



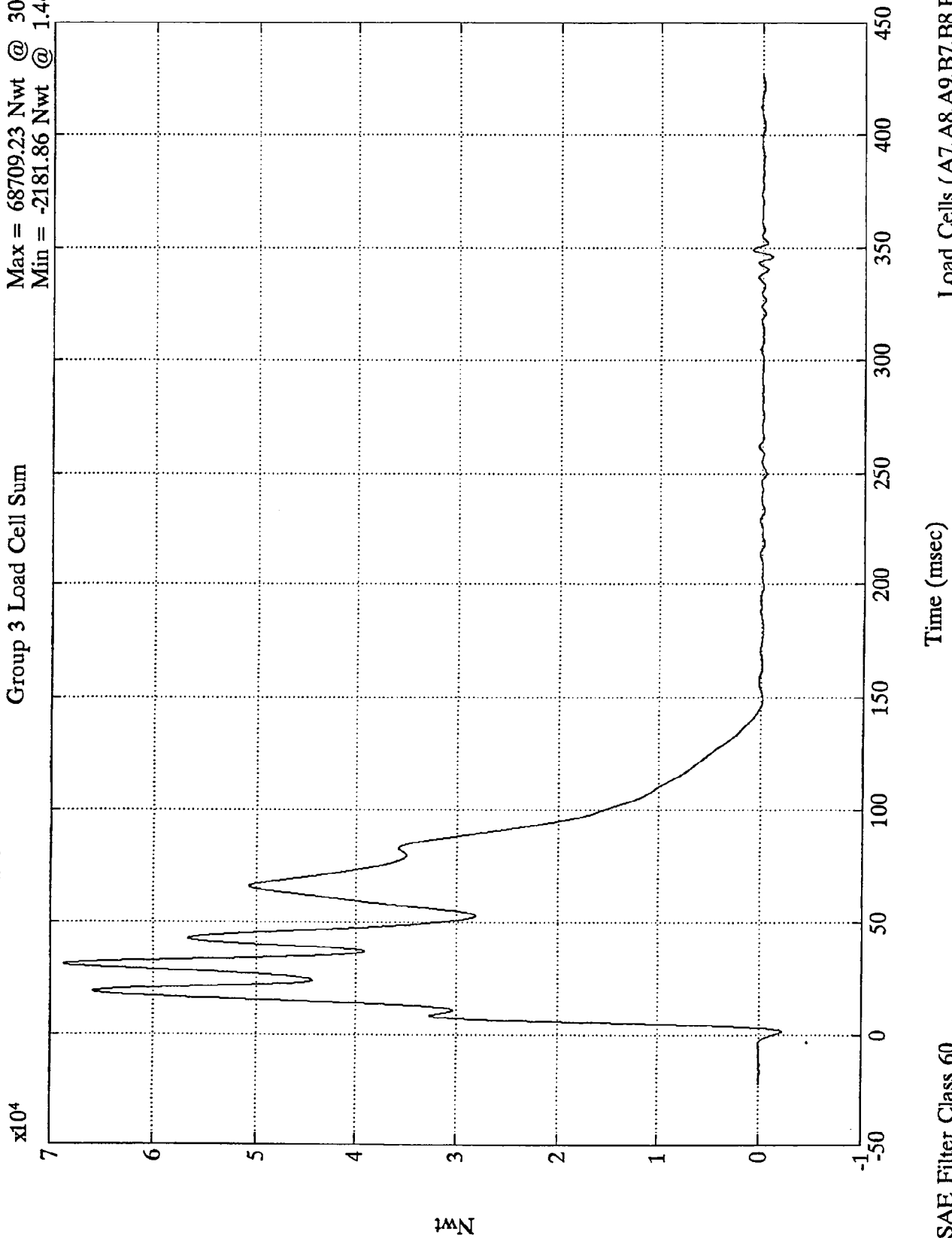
SAE Filter Class 60

Time (msec)

Load Cells (A4,A5,A6,B4,B5,B6)

NCAP TEST #9 - 1995 GEO METRO

Group 3 Load Cell Sum
 Max = 68709.23 Nwt @ 30.84 msec
 Min = -2181.86 Nwt @ 1.44 msec



SAE Filter Class 60

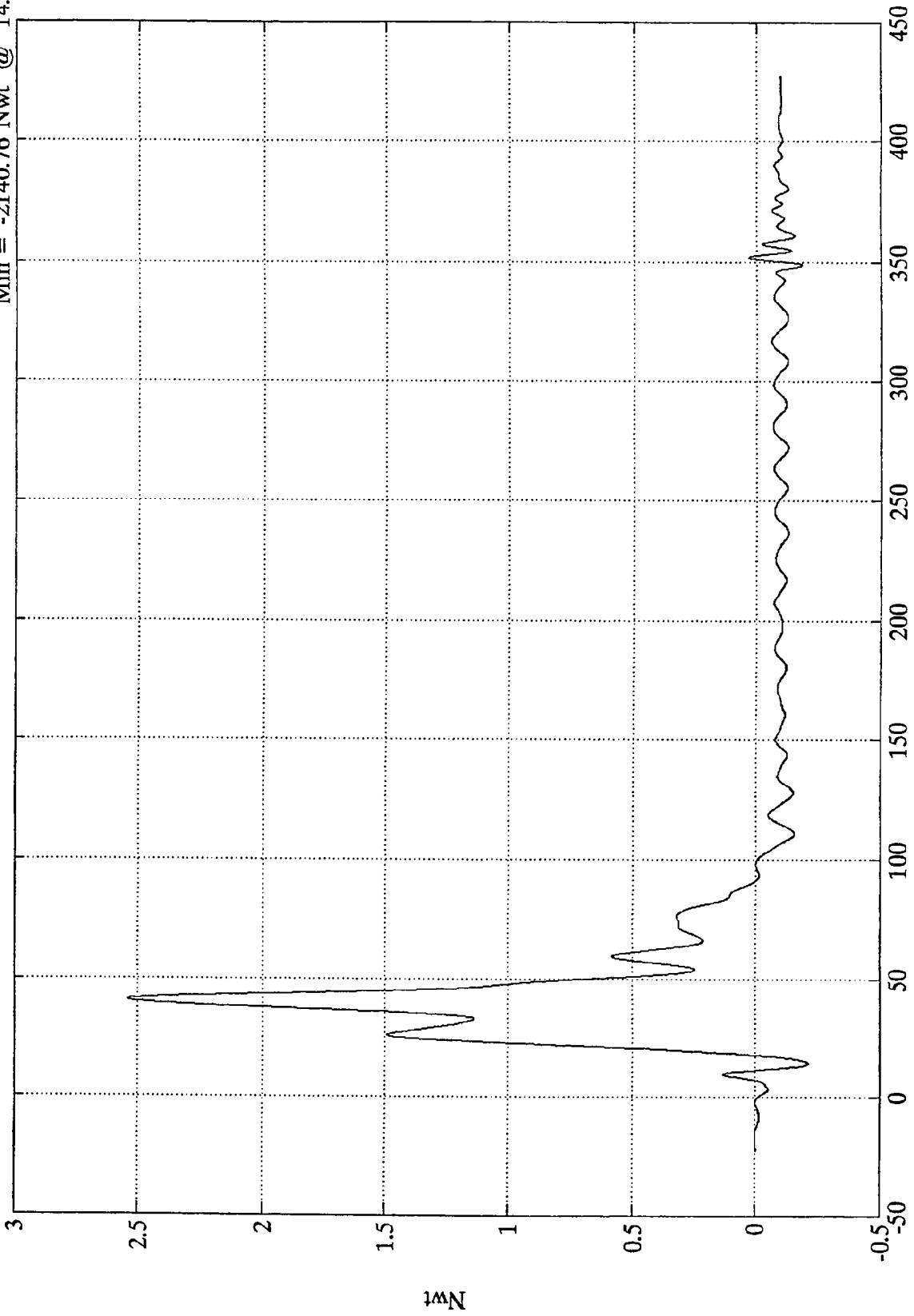
Load Cells (A7,A8,A9,B7,B8,B9)

NCAP TEST #9 - 1995 GEO METRO

Group 4 Load Cell Sum

Max = 25413.48 Nwt @ 40.56 msec
Min = -2140.76 Nwt @ 14.28 msec

$\times 10^4$



Load Cells (C1,C2,C3,D1,D2,D3)

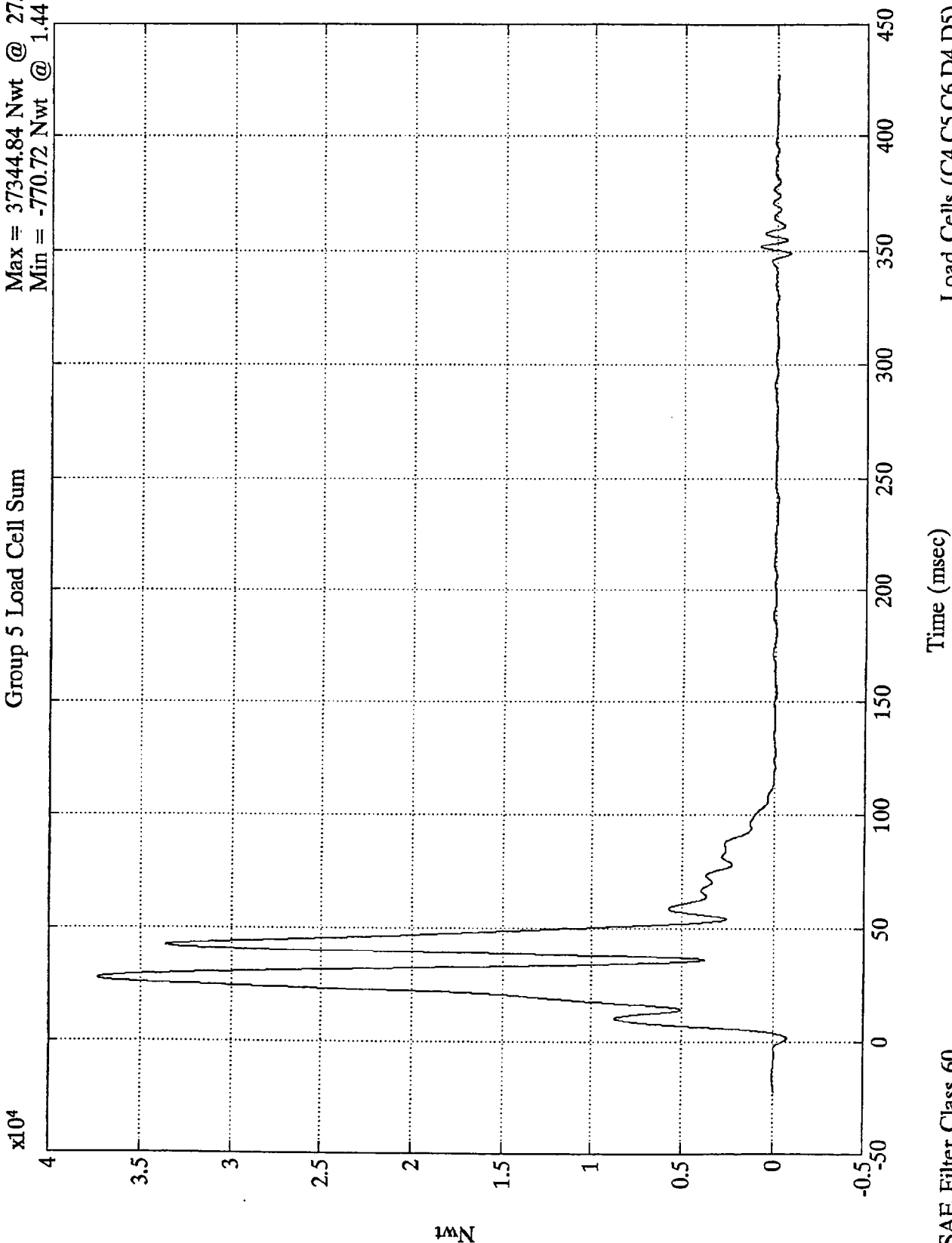
Time (msec)

SAE Filter Class 60

NCAP TEST #9 - 1995 GEO METRO

Group 5 Load Cell Sum

Max = 37344.84 Nwt @ 27.36 msec
Min = -770.72 Nwt @ 1.44 msec



SAE Filter Class 60

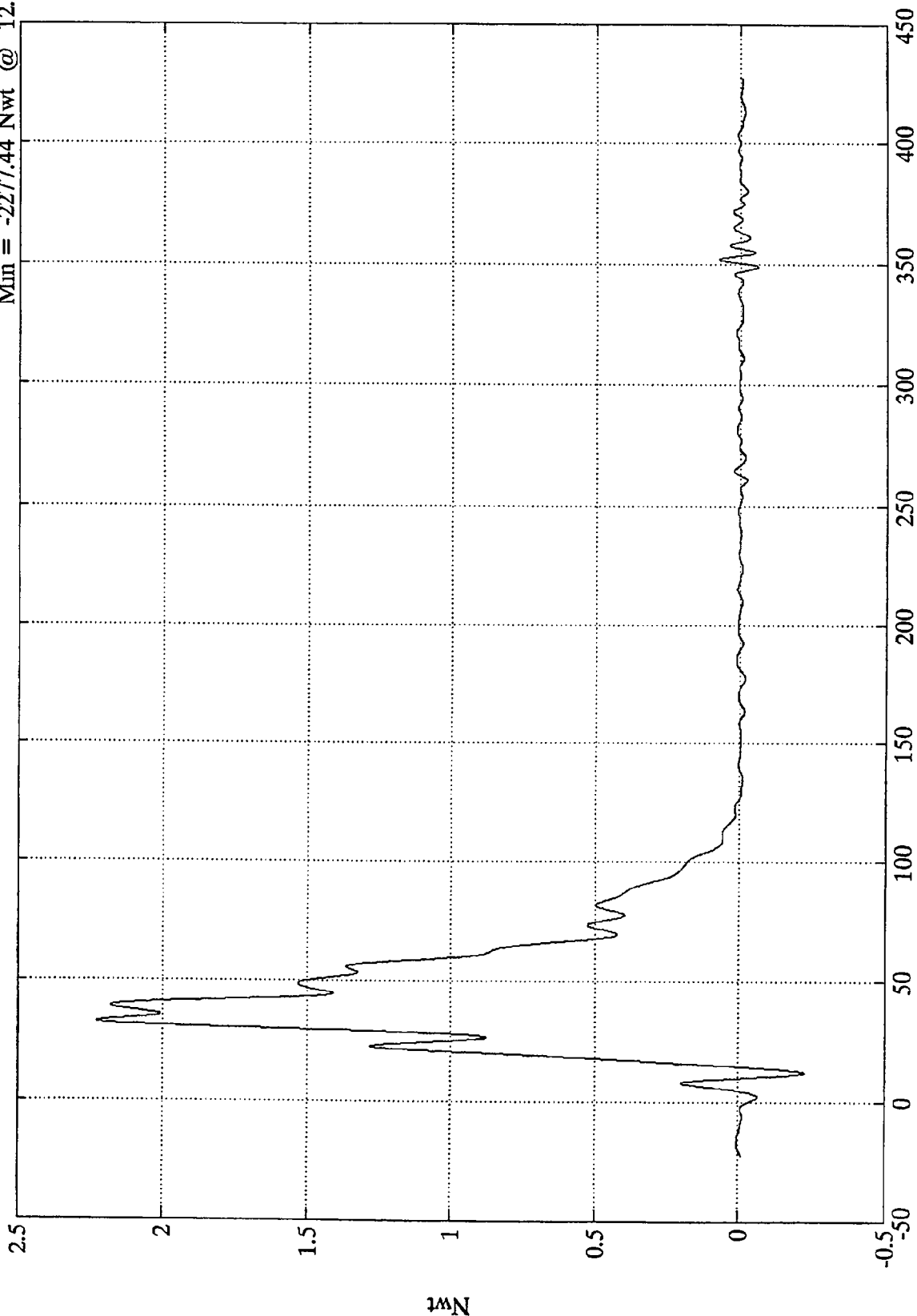
Time (msec)

Load Cells (C4,C5,C6,D4,D5) not D6

NCAP TEST #9 - 1995 GEO METRO

Max = 22257.91 Nwt @ 32.40 msec
 Min = -2277.44 Nwt @ 12.36 msec

Group 6 Load Cell Sum



Time (msec)

SAE Filter Class 60

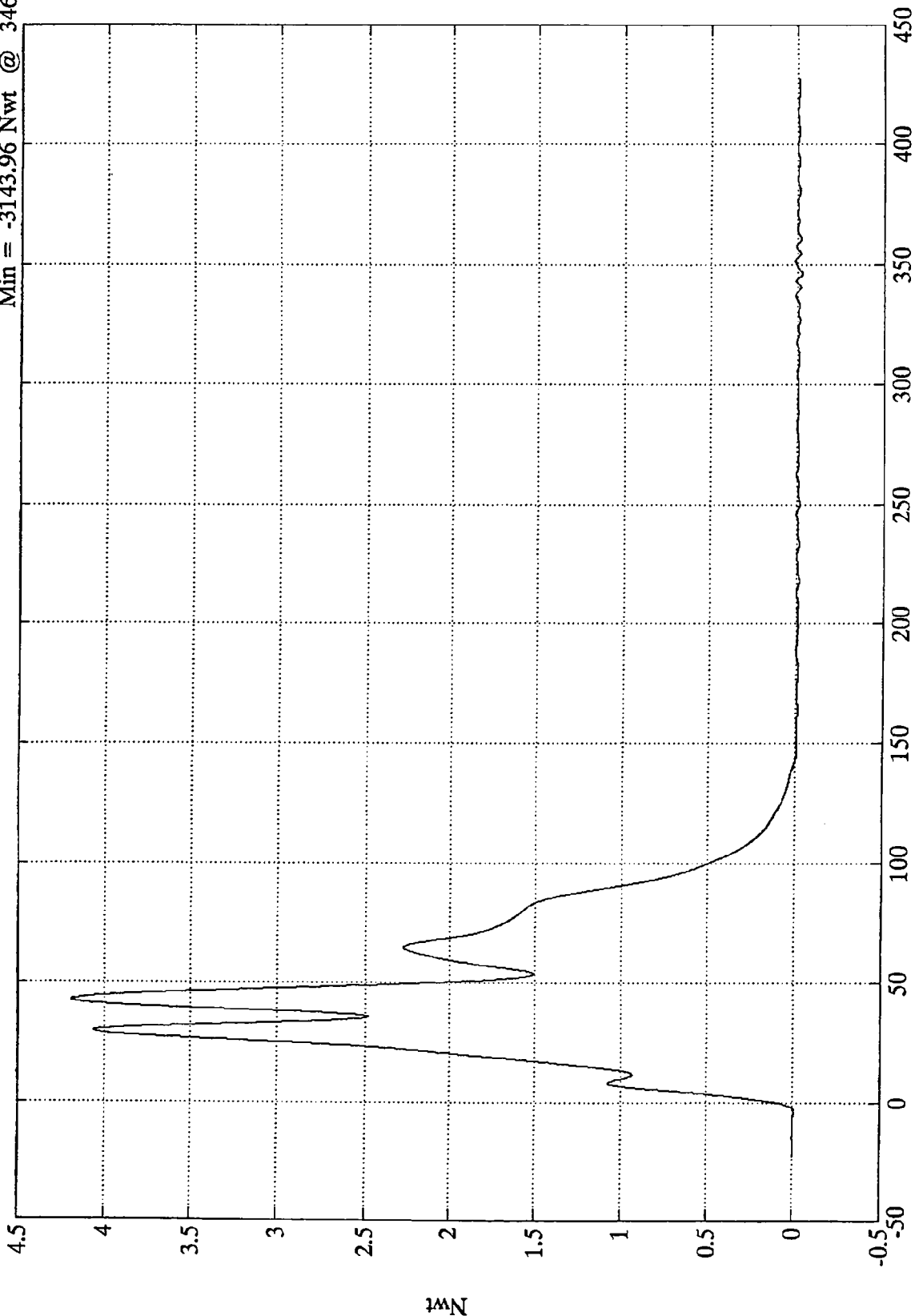
Load Cells (C7,C8,C9,D7,D8,D9)

NCAP TEST #9 - 1995 GEO METRO

Max = 418712.88 Nwt @ 42.60 msec
Min = -3143.96 Nwt @ 346.20 msec

Total Load Cell Sum

$\times 10^5$



SAE Filter Class 60

Time (msec)

Load Cell D6 Did Not Record

Appendix C

PART 572E DUMMY CONFIGURATION

AND PERFORMANCE VERIFICATION DATA SHEETS

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

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

Dummy serial numbers and certification dates are:

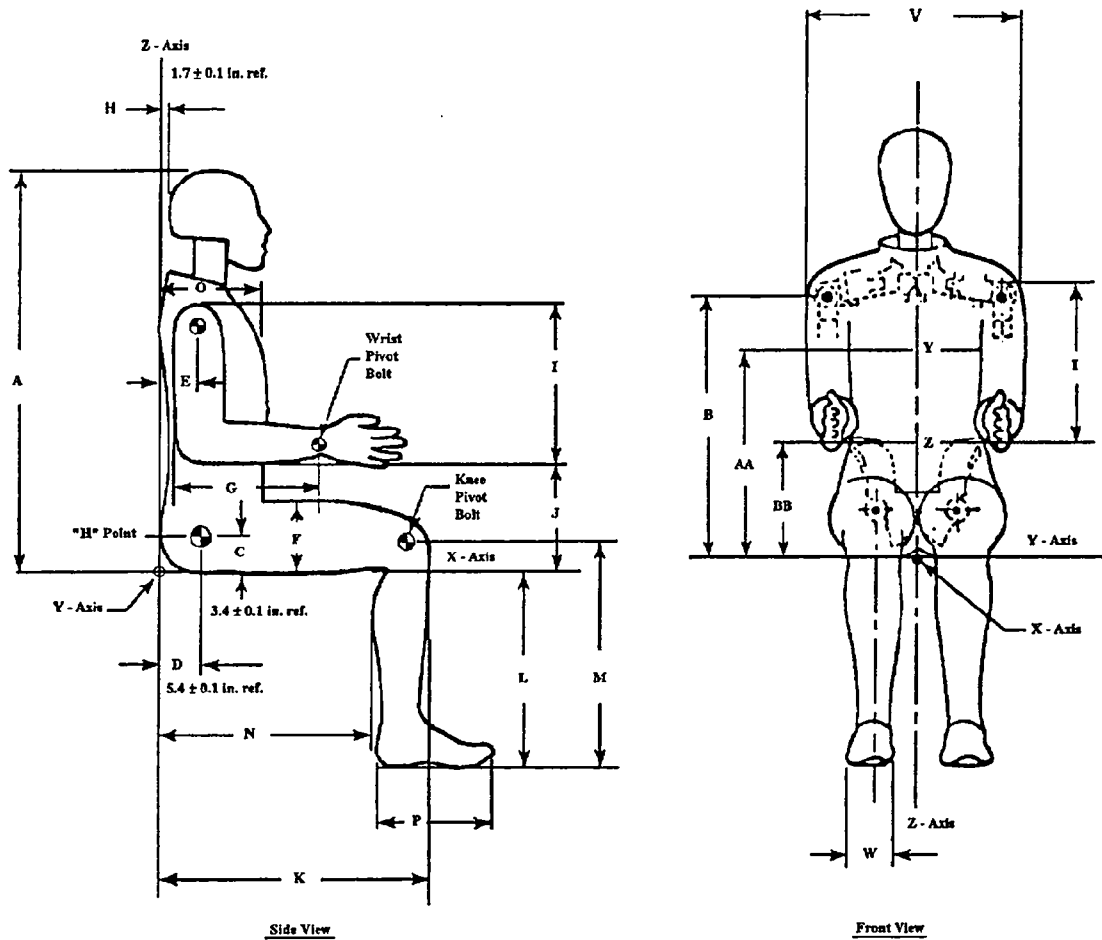
<u>Serial No.</u>	<u>Completion Date</u>
061	12-6-94
245	12-12-94

Electronic Test Equipment

The complement of signal conditioning, recording and display equipment, in conjunction with dummy certification testing, can be found in New Car Assessment and Standards Inducant Testing Final Report No. 6525-V-1.

Figure 10

DUMMY CONFIGURATION DIMENSIONS



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.

HYBRID III EXTERNAL DIMENSIONS

S/N 061 HUMANOID

DUMMY SERIAL NO. 061

DATE: 12/6/94

TEMPERATURE		20.5 DEG. C
RELATIVE HUMIDITY		42 %
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	1000 mm
WAIST CIRCUMFERENCE (Z)	836-866 mm	851 mm
CHEST DEPTH (O)	213-229 mm	216 mm
H-POINT HEIGHT (C)	84-89 mm	86 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	884 mm
THIGH CLEARANCE (F)	140-155 mm	155 mm
BUTTOCK KNEE LENGTH (K)	580-605 mm	592 mm
BUTTOCK POPLITAL LENGTH (N)	452-477 mm	465 mm
POPLITEAL LENGTH (L)	430-455 mm	450 mm
KNEE PIVOT HEIGHT (M)	485-501 mm	493 mm
FOOT LENGTH (P)	252-267 mm	257 mm
FOOT BREADTH (W)	91-107 mm	97 mm
SHOULDER PIVOT FROM BACKLINE (E)	84-94 mm	89 mm
SHOULDER BREADTH (V)	422-437 mm	427 mm
SHOULDER PIVOT HEIGHT (B)	505-521 mm	511 mm
ELBOW REST HEIGHT (J)	190-211 mm	196 mm
SHOULDER-ELBOW LENGTH (I)	330-345 mm	340 mm
BACK OF ELBOW TO WRIST PIVOT (G)	290-305 mm	295 mm

DUMMY MEETS SPECIFICATIONS

TECHNICIAN: IVAN MINKIEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

HEAD DROP TEST

HYBRID III

DATE : 10/21/94

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 061 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	19 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	50 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	265 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	3.8 G'S
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
NECK FLEXION TEST

HYBRID III

DATE : 12/6/94

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN:061 CAL NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5-22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY		10% - 70%	42 %
IMPACT VELOCITY		24.8 - 25.7 KPH	25.1 KPH
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	24.85 G'S
	20 MS	17.60 - 22.60 G'S	21.86 G'S
	30 MS	12.50 - 18.50 G'S	17.9 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	17.9 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	39.38 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	70.91 DEG.
	TIME	57 - 64 MS	57.5 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88 - 108 N-M	97.3 N-M
	TIME	47 - 58 MS	51.88 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	118.25 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	99.88 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
NECK EXTENSION TEST
HYBRID III

DATE : 12/6/94

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN:061 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5 - 22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY		10% - 70%	42 %
IMPACT VELOCITY		21.4 - 22.3 KPH	22.0 KPH
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G'S	20.46 G'S
	20 MS	14.00 - 19.00 G'S	18.18 G'S
	30 MS	11.00 - 16.00 G'S	14.71 G'S
MAX PENDULUM G'S ABOVE 30 MS		22 G'S MAX	14.71 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		38 - 46 MS	43.25 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	97.5 DEG.
	TIME	72 - 82 MS	75.13 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-80.0/-52.9 N-M	-73.7 N-M
	TIME	65 - 79 MS	69.75 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	155.5 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	130.5 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
THORAX IMPACT TEST
HYBRID III

DATE : 11/30/94

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN 061 H.S. THORAX CAL

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.5 - 22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	33 %
PENDULUM VELOCITY	23.7 - 24.6 KPH	23.7 KPH
MAXIMUM DEFLECTION	64 - 73 mm	65.3 mm
MAXIMUM RESISTIVE FORCE	5160 - 5894 NEWTONS	5653 NEWTONS
INTERNAL HYSTERESIS	69% - 85%	72.2 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
KNEE IMPACT TEST
HYBRID III

DATE : 10/21/94

KNEE: LEFT

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 061 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	19 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	52 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.68 KPH
PEAK KNEE IMPACT FORCE	4715 - 5782 N	4986 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
KNEE IMPACT TEST
HYBRID III

DATE : 10/21/94

KNEE: RIGHT

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 061 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	19 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	52 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.68 KPH
PEAK KNEE IMPACT FORCE	4715 - 5782 N	4946 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

HYBRID III EXTERNAL DIMENSIONS

S/N 245 HUMANOID

DUMMY SERIAL NO. 245

DATE: 12/12/94

TEMPERATURE		20.5 DEG. C
RELATIVE HUMIDITY		28 %
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 MINKIEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
HEAD DROP TEST
HYBRID III

DATE : 12/9/94

CALSPAN SEQUENTIAL NUMBER 4

HY3 SN: 245 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	19 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	33 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	242.7 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	5.3 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 : 12/8/94

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 4

HY3 SN: 245 CAL NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5-22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY		10% - 70%	31 %
IMPACT VELOCITY		24.8 - 25.7 KPH	24.9 KPH
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	25.01 G'S
	20 MS	17.60 - 22.60 G'S	22.55 G'S
	30 MS	12.50 - 18.50 G'S	17.3 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	17.3 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	38.38 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	77.75 DEG.
	TIME	57 - 64 MS	59.88 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88 - 108 N-M	105.15 N-M
	TIME	47 - 58 MS	54 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	120.63 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	97.38 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
NECK EXTENSION TEST
HYBRID III

DATE : 12/8/94

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 4

HY3 SN: 245 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5 - 22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY		10% - 70%	31 %
IMPACT VELOCITY		21.4 - 22.3 KPH	22.16 KPH
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G'S	18.66 G'S
	20 MS	14.00 - 19.00 G'S	17.99 G'S
	30 MS	11.00 - 16.00 G'S	14.68 G'S
MAX PENDULUM G'S ABOVE 30 MS		22 G'S MAX	14.68 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		38 - 46 MS	45.25 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	94.47 DEG.
	TIME	72 - 82 MS	74.5 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-80.0/-52.9 N-M	-74.9 N-M
	TIME	65 - 79 MS	69 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	150.88 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	130.63 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
KNEE IMPACT TEST
HYBRID III

DATE : 12/12/94

KNEE: LEFT

CALSPAN SEQUENTIAL NUMBER 4

HY3 SN: 245 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	19 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	28 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.68 KPH
PEAK KNEE IMPACT FORCE	4715 - 5782 N	5124 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
KNEE IMPACT TEST
HYBRID III

DATE : 12/12/94

KNEE: RIGHT

CALSPAN SEQUENTIAL NUMBER 4

HY3 SN: 245 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	19 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	28 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.68 KPH
PEAK KNEE IMPACT FORCE	4715 - 5782 N	4723 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
THORAX IMPACT TEST
HYBRID III

DATE : 12/8/94

CALSPAN SEQUENTIAL NUMBER 4

HY3 SN 245 H.S. THORAX CAL

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.5 - 22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	32 %
PENDULUM VELOCITY	23.7 - 24.6 KPH	23.7 KPH
MAXIMUM DEFLECTION	64 - 73 mm	64.8 mm
MAXIMUM RESISTIVE FORCE	5160 - 5894 NEWTONS	5747 NEWTONS
INTERNAL HYSTERESIS	69% - 85%	73.6 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

Appendix D

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENT CALIBRATION FOR DRIVER DUMMY

(6 Month Calibration Minimum)

DRIVER DUMMY	Serial #	Manufacturer	Calibration	
			Last	Next
Head	X	ENDEVCO	8/94	2/95
	Y	ENDEVCO	8/94	2/95
	Z	ENDEVCO	10/94	4/95
Chest	X	ENDEVCO	8/94	2/95
	Y	ENDEVCO	10/94	4/95
	Z	ENDEVCO	8/94	2/95
Right Femur Load Cell	F231	GSE	12/94	6/95
Left Femur Load Cell	F232	GSE	12/94	6/95
Neck Load Cell	X	DENTON	8/94	2/95
	Y	DENTON	8/94	2/95
	Z	DENTON	8/94	2/95
Neck Moment	X	DENTON	8/94	2/95
	Y	DENTON	8/94	2/95
	Z	DENTON	8/94	2/95
Chest Deflection Gauge	CP061	HUMANOID	8/94	2/95
Lap Belt Load Cells	706	LEBOW	1/95	7/95
Shoulder Belt Load Cells	707	LEBOW	1/95	7/95
Spool-Out Potentiometer	--	SERVONIC INST.		
Belt Stretch Transducer	E6	CALSPAN	8/94	2/95

INSTRUMENT CALIBRATION FOR DRIVER DUMMY

(6 Month Calibration Minimum)

DRIVER DUMMY	Serial #	Manufacturer	Calibration	
			Last	Next
Head	X (R)	ENDEVCO	11/94	5/95
	Y (R)	ENDEVCO	11/94	5/95
	Z (R)	ENDEVCO	11/94	5/95
Chest	X (R)	ENDEVCO	11/94	5/95
	Y (R)	ENDEVCO	11/94	5/95
	Z (R)	ENDEVCO	11/94	5/95
Pelvic	X	ENDEVCO	11/94	5/95
	Y	ENDEVCO	11/94	5/95
	Z	ENDEVCO	12/94	6/95

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY

(6 Month Calibration Minimum)

PASSENGER DUMMY	Serial #	Manufacturer	Calibration	
			Last	Next
Head				
X	AF5B3	ENDEVCO	10/94	4/95
Y	AF5F7	ENDEVCO	10/94	4/95
Z	AF5E1	ENDEVCO	10/94	4/95
Chest				
X	AF5C1	ENDEVCO	10/94	4/95
Y	AF480	ENDEVCO	10/94	4/95
Z	AF5H9	ENDEVCO	10/94	4/95
Right Femur Load Cell	F232	GSE	12/94	6/95
Left Femur Load Cell	F231	GSE	12/94	6/95
Neck Load Cell	269	DENTON	8/94	2/95
Y	269	DENTON	8/94	2/95
Z	269	DENTON	8/94	2/95
Neck Moment	269	DENTON	8/94	2/95
X	269	DENTON	8/94	2/95
Y	269	DENTON	8/94	2/95
Z	269	DENTON	8/94	2/95
Chest Deflection Gauge	CP245	HUMANOID	8/94	2/95
Hybrid III Use Only				
Lap Belt Load Cells	710	LEBOW	1/95	7/95
Shoulder Belt Load Cells	711	LEBOW	1/95	7/95
Spool-Out Potentiometer		SERVONIC INST.		
Belt Stretch Transducer	E7	CALSPAN	8/94	2/95

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY

(6 Month Calibration Minimum)

PASSENGER DUMMY	Serial #	Manufacturer	Calibration	
			Last	Next
Head	X (R)	AER75	11/94	5/95
	Y (R)	AKEB3	11/94	5/95
	Z (R)	AEW71	11/94	5/95
Chest	X (R)	AA5G8	11/94	5/95
	Y (R)	AEWJ5	11/94	5/95
	Z (R)	AEWK1	11/94	5/95
Pelvic	X	AH5F3	12/94	6/95
	Y	AL6H7	12/94	6/95
	Z	AL6C8	12/94	6/95

INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS

(6 Month Calibration Minimum)

	Serial #	Manufacturer	Calibration	
			Last	Next
Left Seat Rear Crossmember	A73	CEC	11/94	5/95
Right Rear Seat Crossmember	A68	CEC	8/94	2/95
Top of Engine	BC21	CEC	8/94	2/95
Bottom of Engine	A70	CEC	9/94	3/95
Left Disc Brake Caliper	A69	CEC	11/94	5/95
Right Disc Brake Caliper	A149	CEC	8/94	2/95
Instrument Panel	A56	CEC	11/94	5/95
Left Rear Crossmember	A44	CEC	8/94	2/95
Right Rear Crossmember	A129	CEC	11/94	5/95

Appendix E

VEHICLE OWNER'S MANUAL - OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

Safety Belts: They're for Everyone

This part of the manual tells you how to use safety belts properly. It also tells you some things you should not do with safety belts. And it explains the Supplemental Inflatable Restraint, or "air bag" system.



CAUTION:

Don't let anyone ride where he or she can't wear a safety belt properly. If you are in a crash and you're not wearing a safety belt, your injuries can be much worse. You can hit things inside the vehicle or be ejected from it. You can be seriously injured or killed. In the same crash, you might not be if you are buckled up. Always fasten your safety belt, and check that your passengers' belts are fastened properly too.



Your vehicle has a light that comes on as a reminder to buckle up. (See "Safety Belt Reminder Light" in the Index.)

In many states and Canadian provinces, the law says to wear safety belts. Here's why: *They work.*

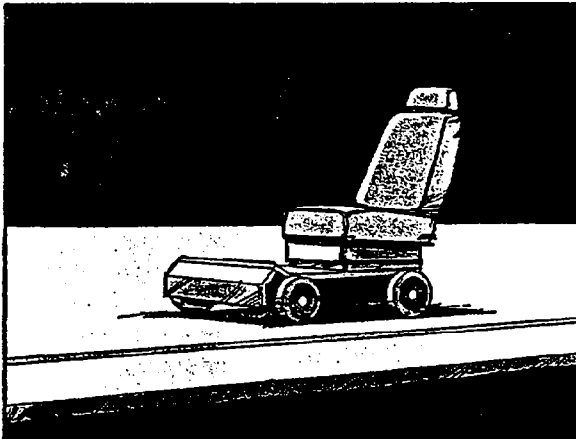
You never know if you'll be in a crash. If you do have a crash, you don't know if it will be a bad one.

A few crashes are mild, and some crashes can be so serious that even buckled up a person wouldn't survive. But most crashes are in between. In many of them, people who buckle up can survive and sometimes walk away. Without belts they could have been badly hurt or killed.

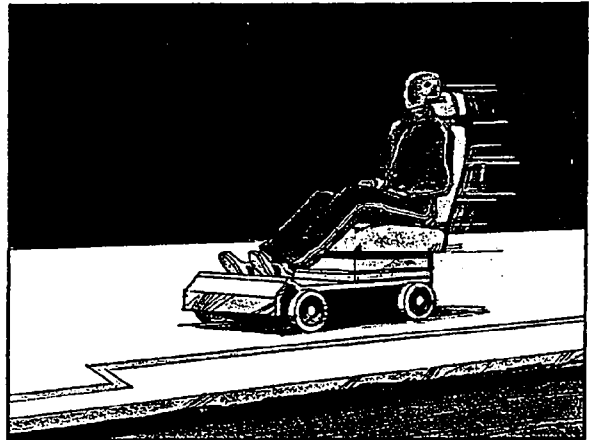
After more than 25 years of safety belts in vehicles, the facts are clear. In most crashes buckling up does matter ... a lot!

Why Safety Belts Work

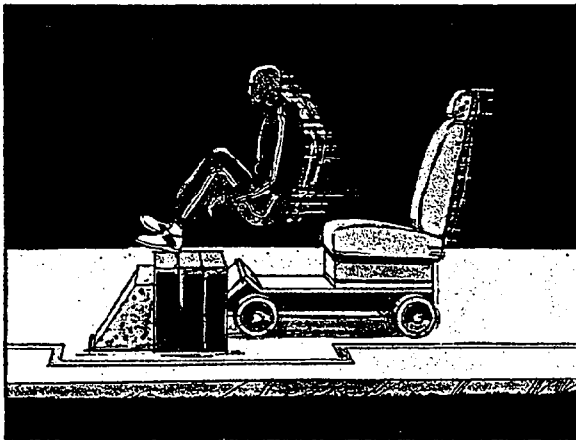
When you ride in or on anything, you go as fast as it goes.



Take the simplest vehicle. Suppose it's just a seat on wheels.



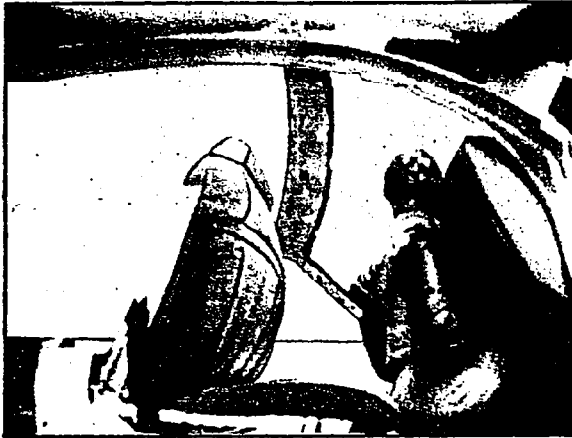
Put someone on it.



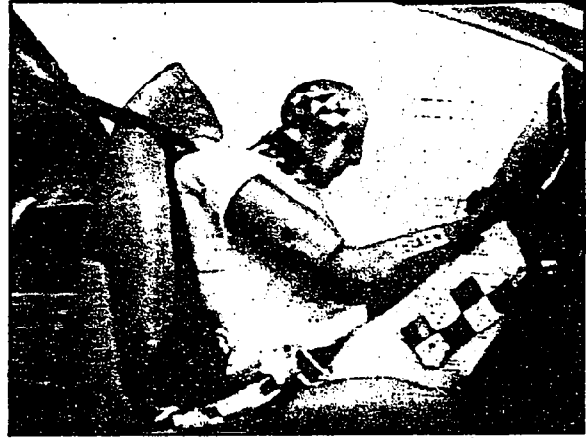
Get it up to speed. Then stop the vehicle. The rider doesn't stop.



The person keeps going until stopped by something. In a real vehicle, it could be the windshield ...



or the instrument panel ...



or the safety belts!

With safety belts, you slow down as the vehicle does. You get more time to stop. You stop over more distance, and your strongest bones take the forces. That's why safety belts make such good sense.

Here Are Questions Many People Ask About Safety Belts -- and the Answers

Q: Won't I be trapped in the vehicle after an accident if I'm wearing a safety belt?

A: You *could* be -- whether you're wearing a safety belt or not. But you can unbuckle a safety belt, even if you're upside down. And your chance of being conscious during and after an accident, so you *can* unbuckle and get out, is *much* greater if you are belted.

Q: Why don't they just put in air bags so people won't have to wear safety belts?

A: Air bags are in many vehicles today and will be in more of them in the future. But they are supplemental systems only; so they work *with* safety belts -- not instead of them. Every air bag system ever offered for sale has required the use of safety belts. Even if you're in a vehicle that has air bags, you still have to buckle up to get the most protection. That's true not only in frontal collisions, but especially in side and other collisions.

Q: If I'm a good driver, and I never drive far from home, why should I wear safety belts?

A: You may be an excellent driver, but if you're in an accident -- even one that isn't your fault -- you and your passengers can be hurt. Being a good driver doesn't protect you from things beyond your control, such as bad drivers.

Most accidents occur within 25 miles (40 km) of home. And the greatest number of serious injuries and deaths occur at speeds of less than 40 mph (65 km/h).

Safety belts are for everyone.

How to Wear Safety Belts Properly

Adults

This part is only for people of adult size.

Be aware that there are special things to know about safety belts and children. And there are different rules for smaller children and babies. If a child will be riding in your Geo, see the part of this manual called "Children." Follow those rules for everyone's protection.

First, you'll want to know which restraint systems your vehicle has.

We'll start with the driver position.

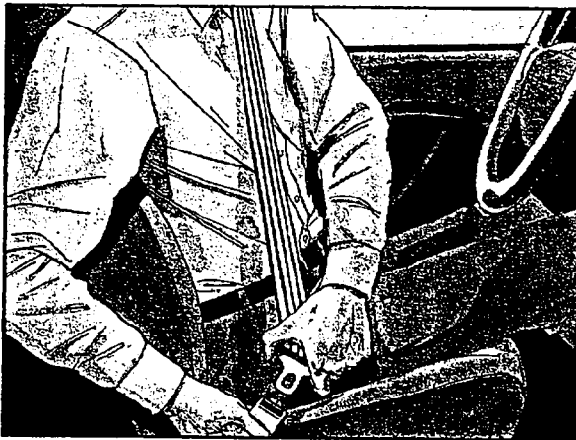
Driver Position

This part describes the driver's restraint system.

Lap-Shoulder Belt

The driver has a lap-shoulder belt. Here's how to wear it properly.

1. Close and lock the door.
2. Adjust the seat (to see how, see "Seats" in the Index) so you can sit up straight.



3. Pick up the latch plate and pull the belt across you. Don't let it get twisted.

The shoulder belt may lock if you pull the belt across you very quickly. If this happens, let the belt go back slightly to unlock it. Then pull the belt across you more slowly.

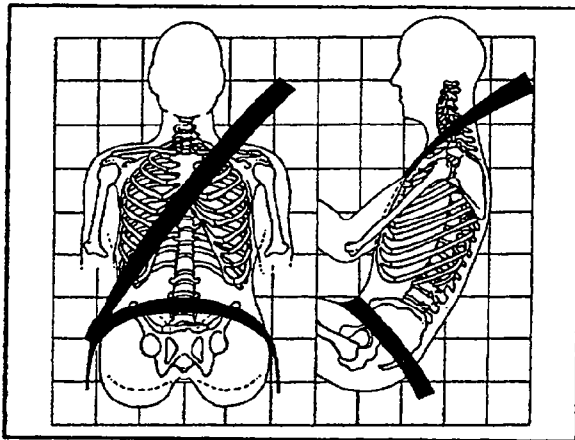
4. Push the latch plate into the buckle until it clicks.

Pull up on the latch plate to make sure it is secure. If the belt isn't long enough, see "Safety Belt Extender" at the end of this section.

Make sure the release button on the buckle is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.



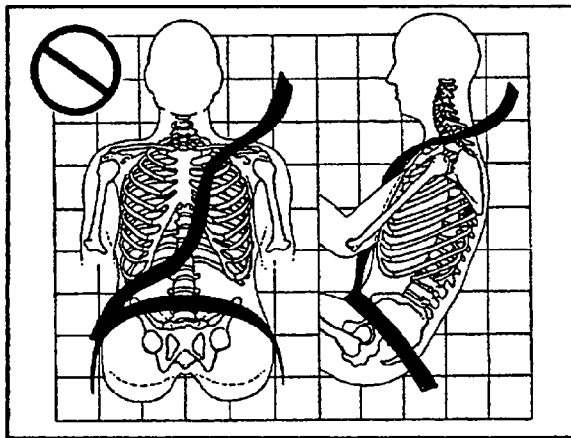
5. To make the lap part tight, pull down on the buckle end of the belt as you pull up on the shoulder belt.



The lap part of the belt should be worn low and snug on the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces.

The safety belt locks if there's a sudden stop or crash, or if you pull the belt very quickly out of the retractor.

Q: What's wrong with this?

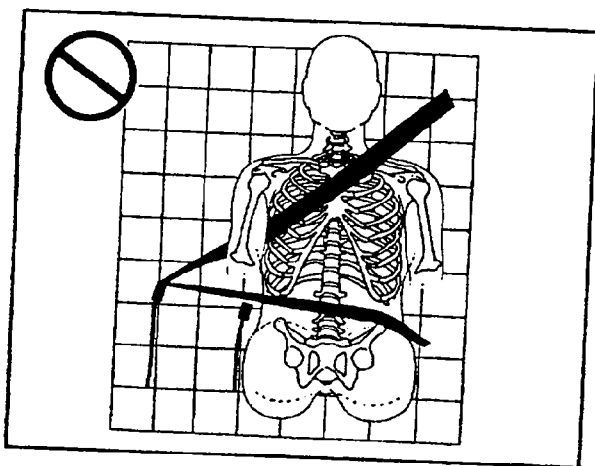


A: The shoulder belt is too loose. It won't give nearly as much protection this way.

⚠ CAUTION:

You can be seriously hurt if your shoulder belt is too loose. In a crash you would move forward too much, which could increase injury. The shoulder belt should fit against your body.

Q: What's wrong with this?

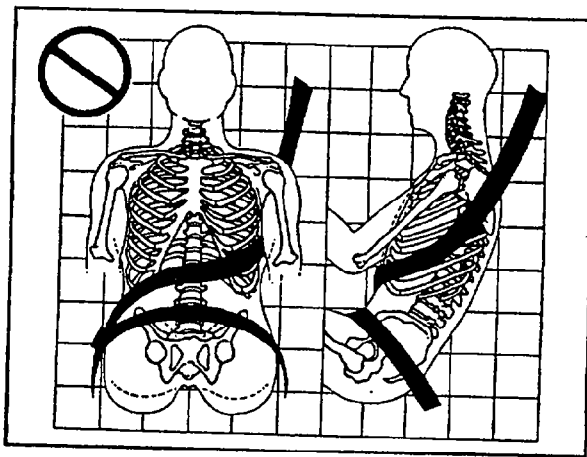


A: The belt is buckled in the wrong place.

⚠ CAUTION:

You can be seriously injured if your belt is buckled in the wrong place like this. In a crash, the belt would go up over your abdomen. The belt forces would be there, not at the pelvic bones. This could cause serious internal injuries. Always buckle your belt into the buckle nearest you.

Q: What's wrong with this?

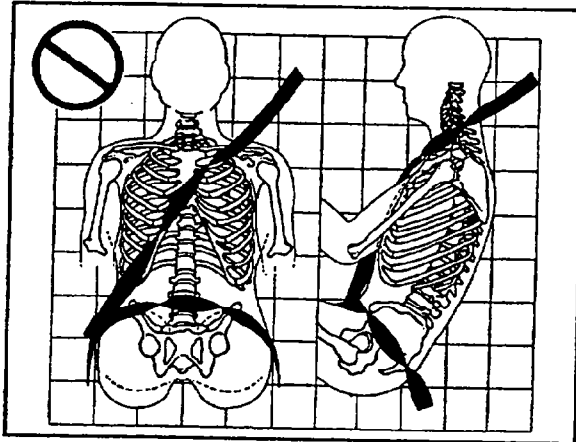


A: The shoulder belt is worn under the arm. It should be worn over the shoulder at all times.

⚠ CAUTION:

You can be seriously injured if you wear the shoulder belt under your arm. In a crash, your body would move too far forward, which would increase the chance of head and neck injury. Also, the belt would apply too much force to the ribs, which aren't as strong as shoulder bones. You could also severely injure internal organs like your liver or spleen.

Q: What's wrong with this?



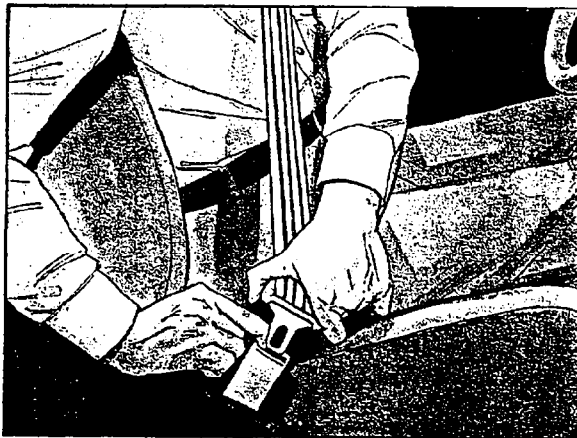
A: The belt is twisted across the body.



CAUTION:

You can be seriously injured by a twisted belt. In a crash, you wouldn't have the full width of the belt to spread impact forces. If a belt is twisted, make it straight so it can work properly, or ask your dealer to fix it.

To unlatch the belt, just push the button on the buckle. The belt should go back out of the way.



Before you close the door, be sure the belt is out of the way. If you slam the door on it, you can damage both the belt and your vehicle.

Supplemental Inflatable Restraint System (SIR)

This part explains the Supplemental Inflatable Restraint (SIR), or air bag, system.

Your Geo has two air bags -- one air bag for the driver and another air bag for the right front passenger.

Here are the most important things to know about the air bag system:

⚠ CAUTION:

You can be severely injured or killed in a crash if you aren't wearing your safety belt -- even if you have an air bag. Wearing your safety belt during a crash helps reduce your chance of hitting things inside the vehicle or being ejected from it. The air bag is only a "supplemental restraint." That is, it works with safety belts but doesn't replace them. Air bags are designed to work only in moderate to severe crashes where the front of your vehicle hits something. They aren't designed to inflate at all in rollover, rear, side, or low-speed frontal crashes. Everyone in your vehicle, including the driver, should wear a safety belt properly -- whether or not there's an air bag for that person.

 CAUTION:

Air bags inflate with great force, faster than the blink of an eye. If you're too close to an inflating air bag, it could seriously injure you. Safety belts help keep you in position for an air bag inflation in a crash. Always wear your safety belt, even with an air bag. The driver should sit as far back as possible while still maintaining control of the vehicle.

 CAUTION:

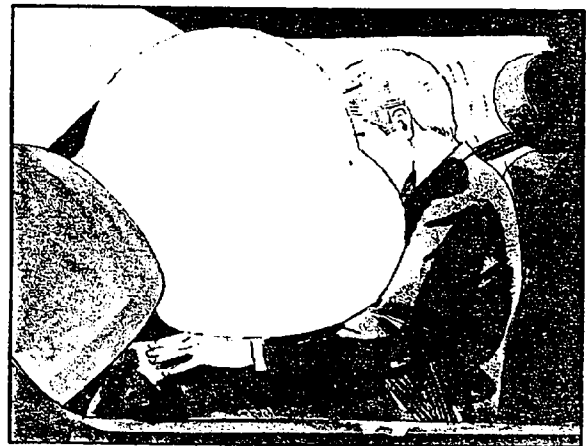
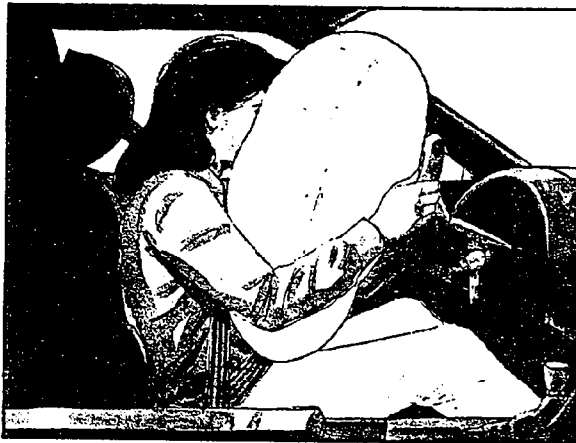
An inflating air bag can seriously injure small children. Always secure children properly in your vehicle. To read how, see the part of this manual called "Children" and the caution label on the right front passenger's safety belt.

AIR
BAG

There is an air bag readiness light on the instrument panel, which shows AIR BAG on it.

The system checks the air bag's electrical system for malfunctions. The light tells you if there is an electrical problem. See "Air Bag Readiness Light" in the Index for more information.

How the Air Bag System Works



Where is the air bag?

The driver's air bag is in the middle of the steering wheel. The right front passenger's air bag is in the instrument panel on the passenger's side.



CAUTION:

Don't put anything on, or attach anything to, the steering wheel or instrument panel. Also, don't put anything (such as pets, or objects) between any occupant and the steering wheel or instrument panel. If something is between an occupant and an air bag, it could affect the performance of the air bag -- or worse, it could cause injury.

When should an air bag inflate?

The air bag is designed to inflate in moderate to severe frontal or near-frontal crashes. The air bag will inflate only if the impact speed is above the system's designed "threshold level." If your vehicle goes straight into a wall that doesn't move or deform, the threshold level is about 9 to 15 mph (14 to 24 km/h). The threshold level can vary, however, with specific vehicle design, so that it can be somewhat above or below this range. If your vehicle strikes something that will move or deform, such as a parked car, the threshold level will be higher. The

air bag is not designed to inflate in rollovers, side impacts, or rear impacts, because inflation would not help the occupant.

It is possible that in a crash only one of the two air bags in your Metro will deploy. This is rare, but can happen in a crash just severe enough to make an air bag inflate.

In any particular crash, no one can say whether an air bag should have inflated simply because of the damage to a vehicle or because of what the repair costs were. Inflation is determined by the angle of the impact and the vehicle's deceleration. Vehicle damage is only one indication of this.

What makes an air bag inflate?

In a frontal or near-frontal impact of sufficient severity, the air bag sensing system detects that the vehicle is suddenly stopping as a result of a crash. The sensing system triggers a chemical reaction of the sodium azide sealed in the inflator. The reaction produces nitrogen gas, which inflates the air bag. The inflator, air bag, and related hardware are all part of the air bag modules packed inside the steering wheel and in the instrument panel in front of the right front passenger.

How does an air bag restrain?

In moderate to severe frontal or near-frontal collisions, even belted occupants can contact the steering wheel or the instrument panel. The air bag supplements the protection provided by safety belts. Air bags distribute the force of the impact more evenly over the occupant's upper body, stopping the occupant more gradually. But air bags would not help you in many types of collisions, including rollovers and rear and side impacts, primarily because an occupant's motion is not toward the air bag. Air bags should never be regarded as anything more than a supplement to safety belts, and then only in moderate to severe frontal or near-frontal collisions.

What will you see after an air bag inflates?

After the air bag inflates, it quickly deflates. This occurs so quickly that some people may not even realize the air bag inflated. Some components of the air bag module in the steering wheel hub for the driver's air bag, or the instrument panel for the right front passenger's bag, will be hot for a short time, but the part of the bag that comes into contact with you will not be hot to the touch. There will be some smoke and dust coming from vents in the deflated air bags. Air bag inflation will not prevent the driver from seeing or from being able to steer the vehicle, nor will it stop people from leaving the vehicle.



CAUTION:

When an air bag inflates, there is dust in the air. This dust could cause breathing problems for people with a history of asthma or other breathing trouble. To avoid this, everyone in the vehicle should get out as soon as it is safe to do so. If you have breathing problems but can't get out of the vehicle after an air bag inflates, then get fresh air by opening a window or door.

In many crashes severe enough to inflate an air bag, windshields are broken by vehicle deformation. Additional windshield breakage may also occur from the right front passenger air bag.

- The air bags are designed to inflate only once. After they inflate, you'll need some new parts for your air bag system. If you don't get them, the air bag system won't be there to help protect you in another crash. A new system will include air bag modules and possibly other parts. The service manual for your vehicle covers the need to replace other parts.

- Your vehicle is equipped with a diagnostic module, which records information about the air bag system. The module records information about the readiness of the system, when the sensors are activated and driver's safety belt usage at deployment.
- Let only qualified technicians work on your air bag system. Improper service can mean that your air bag system won't work properly. See your dealer for service.

NOTICE:

If you damage the cover for the driver's or the right front passenger's air bag, they may not work properly. You may have to replace the air bag module in the steering wheel or both the air bag module and the instrument panel for the right front passenger's air bag. Do not open or break the air bag covers.

Servicing Your Air Bag-Equipped Geo

Air bags affect how your Geo should be serviced. There are parts of the air bag system in several places around your vehicle. You don't want the system to inflate while someone is working on your vehicle. Your Chevrolet/Geo dealer and the 1995 Metro Service Manual have information about servicing your vehicle and the air bag system. To purchase a service manual, see "Service Publications" in the Index.

The air bag system does not need regular maintenance.



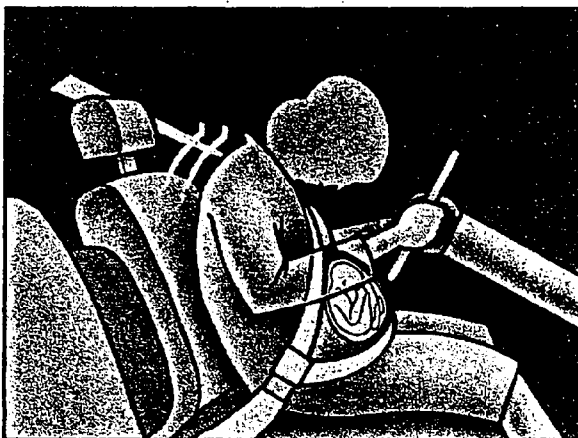
CAUTION:

For up to 10 seconds after the ignition key is turned off and the battery is disconnected, an air bag can still inflate during improper service. You can be injured if you are close to an air bag when it inflates. Avoid wires wrapped with yellow tape, or yellow connectors. They are probably part of the air bag system. Be sure to follow proper service procedures, and make sure the person performing work for you is qualified to do so.

Safety Belt Use During Pregnancy

Safety belts work for everyone, including pregnant women. Like all occupants, they are more likely to be seriously injured if they don't wear safety belts.

A pregnant woman should wear a lap-shoulder belt, and the lap portion should be worn as low as possible throughout the pregnancy.



The best way to protect the fetus is to protect the mother. When a safety belt is worn properly, it's more likely that the fetus won't be hurt in a crash. For pregnant women, as for anyone, the key to making safety belts effective is wearing them properly.

Right Front Passenger Position

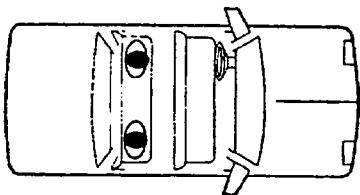
The right front passenger's safety belt works the same way as the driver's safety belt. See "Driver Position," earlier in this section.

When the shoulder belt is pulled out all the way, it will lock. If it does, let it go back all the way and start again.

Rear Seat Passengers

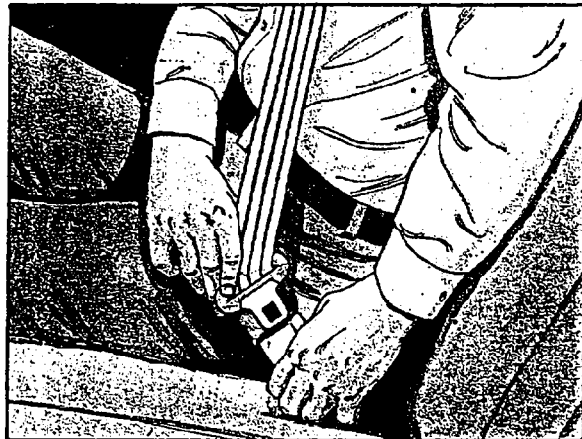
It's very important for rear seat passengers to buckle up! Accident statistics show that unbelted people in the rear seat are hurt more often in crashes than those who are wearing safety belts.

Rear passengers who aren't safety belted can be thrown out of the vehicle in a crash. And they can strike others in the vehicle who are wearing safety belts.



Lap-Shoulder Belt

The rear seats have lap-shoulder belts. Here's how to wear one properly.



1. Pick up the latch plate and pull the belt across you. Don't let it get twisted.

The shoulder belt may lock if you pull the belt across you very quickly. If this happens, let the belt go back slightly to unlock it. Then pull the belt across you more slowly.

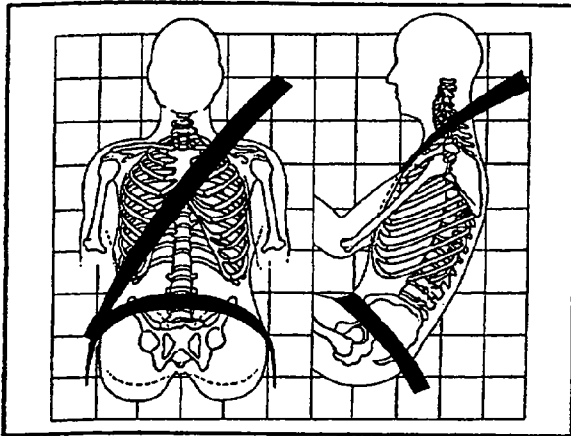
2. Push the latch plate into the buckle until it clicks.

Pull up on the latch plate to make sure it is secure.

When the shoulder belt is pulled out all the way, it will lock. If it does, let it go back all the way and start again. If the belt is not long enough, see "Safety Belt Extender" at the end of this section. Make sure the release button on the buckle is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.



3. To make the lap part tight, pull down on the buckle end of the belt as you pull up on the shoulder part.



The lap part of the belt should be worn low and snug on the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces.

The safety belt locks if there's a sudden stop or a crash, or if you pull the belt very quickly out of the retractor.

⚠ CAUTION:

You can be seriously hurt if your shoulder belt is too loose. In a crash you would move forward too much, which could increase injury. The shoulder belt should fit against your body.