V1746

REPORT NUMBER: CAL-93-N03

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

GENERAL MOTORS CORPORATION
1992 PONTIAC BONNEVILLE SSE
4-DOOR SEDAN

NHTSA NUMBER: MN0110

CALSPAN TEST NUMBER: 8048-1

September 3, 1992

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FINAL REPORT

PREPARED FOR:

U. S. Department of Transportation
National Highway Traffic Safety Administration
Office of Market Incentives
400 Seventh Street, S.W.
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16. Abstract

A frontal load cell barrier test of a 1992 Pontiac Bonneville SSE 4-Door Sedan was performed at the Calspan Advanced Technology Center crash test facility in Buffalo, New York on September 3, 1992.

The impact velocity was 56.5 kph and the temperature at the barrier face was 19°C. The maximum post-test vehicle crush was 757 mm. The test vehicle was equipped with a 3-point continuous belt system at each of the front outboard seating positions. The vehicle was also equipped with driver and passenger air-bags as supplemental restraint devices.

With regard to FMVSS 208 "Occupant Crash Protection", injury criteria, both the driver and passenger dummies appear to comply with the maximum head, chest and femur requirements.

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Section 1

PURPOSE AND TEST PROCEDURE

This 56.3 kph (35 mph) frontal barrier impact test is part of the Composite FY 92 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 (30 mph) requirements.

The 56.3 kph (35 mph) frontal barrier impact test was conducted in accordance with the Office of Market Incentives (OMI) Laboratory Indicant Test procedure.

Section 2

SUMMARY OF TEST NUMBER MN0110

A load cell barrier consisting of 36 load cells was impacted by a 1992 Pontiac Bonneville SSE 4-Door Sedan at a velocity of 56.5 kph. The test was performed at the Calspan Corporation Advanced Technology Center on September 3, 1992. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 15 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

Two Part 572, 50th percentile male anthropomorphic test devices (ATDs), were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the 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. 45) and the right-front passenger ATD (Serial No. 150) were used in one previous test (MP0300). Injury criteria values were not exceeded during this previous test. Certification details, along with instrumentation calibration data, are found in Appendices C and D.

The 81 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 #1-Upper Neck Fz did not record accurately. The data trace for Position #1-Upper Neck Fz and the resultant Neck Force data trace were omitted from this report.

The driver's head struck the airbag; the HIC was 359.9. The maximum chest deceleration over 3 milliseconds was 44.1 g's and femur loads were -6122.3 and -6290.4 newtons. The maximum chest deflection was 29.4 mm.

The right front passenger's HIC was 768.2 and maximum chest deceleration over 3 milliseconds was 56.9 g's. Femur loads were -6667.5 and -3134.3 newtons. The maximum chest deflection was 38.9 mm.

The test vehicle had the left side of the front bumper destroyed at impact. Some of the post-test measurements are not available due to the loss of the bumper.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Year/Make/Model/Body Style: 1992 Pontiac Bonneville SSE 4-Door Sedan

NHTSA Test No.: MN0110 VIN.: 1G2HZ52L5N1313869

Body Color: White Date of Manufacture: 5/92

Engine: 6 Cylinders; - C.I.D.; 3.8 Liters; - CC

X Gas; - Diesel; - Turbocharged

- Longitudinal; X Transverse

Transmission: 4 Speed; - Manual; X Automatic; X Overdrive

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

Date Received: 7/27/92 Odometer Reading: 00104 km

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

X Tilt Wheel X P/seats; X Cruise Control (ABS)

Type of Occupant Restraint: 3-point continuous belt system with driver and passenger airbags.

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 207 kpa, Rear 207 kps

Recommended Tire Size: P22560R16

Recommended Cold Tire Pressure: Front 207 kpa, Rear 207 kpa

Tires on Vehicle: P22560R16 ; Manufacturer: GoodYear

Number of Occupants: 2 Front; 3 Rear; X 3rd Seat; 5 TOTAL

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

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

Vehicle Capacity Weight (VCW) = 420 kgs (A)

No. of Occupants x 68 kgs = 340 kgs (B)

Rated Cargo and Luggage Weight (RCLW) A-B = 80 kgs

GVWR 2072 kgs GAWR: Front 1142 kgs Rear 931 kgs

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

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

Right Front = 517 kgs Right Rear = 290 kgs

Left Front = 517 kgs Left Rear = 290 kgs

TOTAL FRONT WEIGHT = 1034 kgs (64 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 580 kgs (36 % of Total Vehicle Weight)

TOTAL DELIVERED WEIGHT = 1614 kgs

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (1614 kgs)

VCW = Vehicle Capacity Weight (420 kgs)

DSC = Designated Seating Capacity (5)

RCLW = VCW - 68 (DSC) = 80 kgs

Target Test Weight = UDW + RCLW + (2 dummies x 76 kgs/dummy)

Target Test Weight = 1846 kgs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 74 KILOGRAMS CARGO:

Right Front = 553 kgs Right Rear = 376 kgs

Left Front = 535 kgs Left Rear = 376 kgs

TOTAL FRONT WEIGHT = 1088 kgs (59 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 752 kgs (41 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 1840 kgs

Weight of ballast secured in vehicle trunk area = 0 kgs

VEHICLE ATTITUDE (all dimensions in millimeters):

Delivered Attitude: RF 711 LF 711 RR 732 LR 729

Test Attitude: RF 701 LF 701 RR 678 LR 681

Wheel Base: 2827 mm; C.G. = 1159 mm rearward of front wheel C/L

Remarks: 63 liters of stoddard solution was placed in fuel tank.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0°

Date of Test: 9/3/92 Time of Test: 14:50

Ambient Temperature: 19 °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 = 56.5 kph, secondary = 56.5 kph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 1321 millimeters

Exiting Speed Trap: 305 millimeters

VEHICLE REBOUND AND CRUSH (millimeters):

Vehicle Length:	Pre-test	= R 4953	C_L	5188	L	4958
	Post-test	= R N/A	C_L	4361	L	4407
	Crush	= R N/A	C_L	757	L	551

Distance from front of test vehicle to point of impact:

R 396 mm C_L 437 mm L 498 mm

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	Airbag	Airbag
Chest	Airbag	Airbag
Abdomen	No Contact	No Contact
Left Knee	Dash Panel	Lower Dash Panel
Right Knee	Dash Panel	Lower Dash Panel

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

	Front		Rear	
	Left	Right	Left	Right
Door Opening	Operable	Operable	Operable	Operable

	Front		Rear	
Seat Movement	Left	Right	Left	Right
Seat Back Failure	None	None	-	-
Seat Shift (in.)	0.0	0.0	-	-

Glazing Damage

Backlight/Windshield: Windshield sustained stress fractures but remainded intact

Other Notable Impact Effects: None

Section 3

OMI FINAL DATA

Occupant and Vehicle Information

I. OMI DATA

1. Dummy Injury Criteria Data Summary
2. Dummy Positioning Data
3. Seat Belt Positioning Data
4. Seat Belt Performance Assessment Data
5. Driver Dummy to Steering Column Dimensions
6. Camera Locations
7. Vehicle Target Locations

II. OVR DATA

1. Load Cell Barrier Data
2. Vehicle Accelerometer Data
3. Test Vehicle Measurements

Table 2

DUMMY INJURY CRITERIA VALUES

NHTSA No.: MN0110 Vehicle: 1992 Pontiac Bonneville SSE 4-Door Sedan

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-49.3	-16.6	-12.4	50.7
Position #2 - Passenger	-57.8	-12.9	33	66.5

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-45	4.8	-6.6	44.1
Position #2 - Passenger	-56.6	6.0	11.3	56.9

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

	MAXIMUM FORCE - FEMUR LOAD (Newtons)	
	LEFT FEMUR	RIGHT FEMUR
Position #1 - Driver	-6122.3	-6290.4
Position #2 - Passenger	-6667.5	-3134.3

	MAXIMUM FORCE - SEAT BELT LOADS (Newtons)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	5773.7	-	3132.4
Position #2 - Passenger	6076.8	4249.2	-

	HEAD INJURY CRITERIA (HIC)			
	HIC	t_1 (SEC)	t_2 (SEC)	Average Acceleration t_1 TO t_2
Position #1 - Driver	359.9	.07212	.10800	39.9
Position #2 - Passenger	768.2	.06900	.10488	53.9

HIC is as defined in FMVSS 208. The maximum time interval from t_1 to t_2 is 36 milliseconds.

Table 3

HYBRID III NECK AND CHEST DATA SHEET

Vehicle Year/Make/Model/Body Style: 1992 Pontiac Bonneville SSE 4-Door Sedan

Vehicle NHTSA No.: MN0110 Test Date: September 3, 1992

MAXIMUM VALUES	DRIVER DUMMY ID # 45	PASSENGER DUMMY ID # 150
Neck Load X (Newtons)	-246.6	-802.1
Neck Load Y (Newtons)	212.8	176.1
Neck Load Z (Newtons)	N/A	1262.7
Neck Moment X (N-M)	-177.7	280.3
Neck Moment Y (N-M)	-472.9	1019.2
Neck Moment Z (N-M)	353.5	194.7
Chest Deflection X (mm)	29.4	38.9
Time of Max. Occurance (mSec)	83.5	80.6

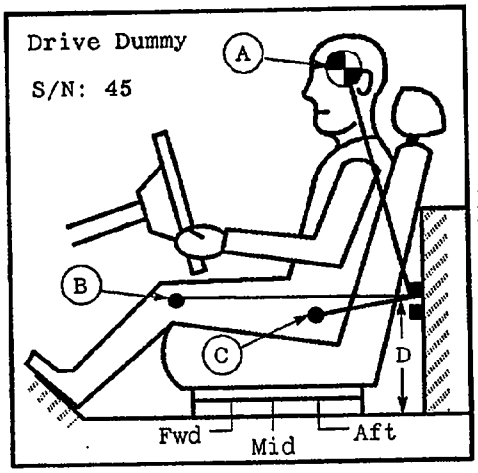
NOTE: All values listed must be occurring during primary impact event.

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION

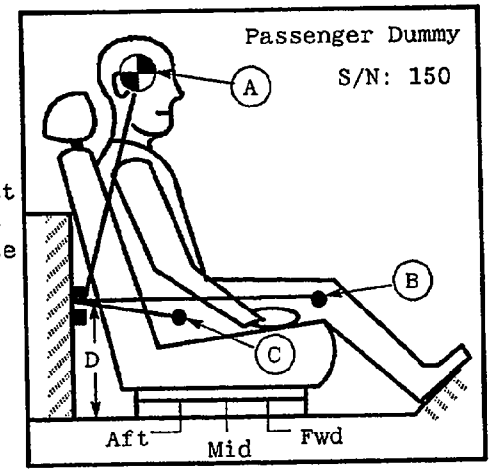
Test No.: MN0110 Vehicle: 1992 Pontiac Bonneville SSE 4-Door Sedan

SEAT TYPE:	ADJUSTER TYPE:	SEAT BACK TYPE:
- Bench	Passenger - Manual	- Fixed
X Bucket	Driver - Power	X Adjustable Reclining
- Split Bench		



MEASUREMENT LOCATION

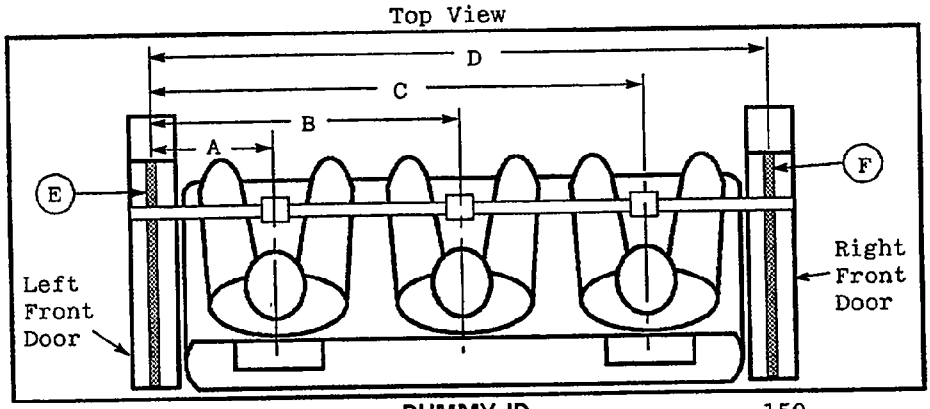
A - Head Target
B - Knee Joint
C - Approximate 'H' Point
D - Sill to Reference Point



A =	462	mm	18	Degrees	
B =	605	mm	98	Degrees	
C =	290	mm	132	Degrees	
D =	386	mm			

A =	488	mm	17	Degrees	
B =	622	mm	97	Degrees	
C =	292	mm	131	Degrees	
D =	386	mm			

Top View



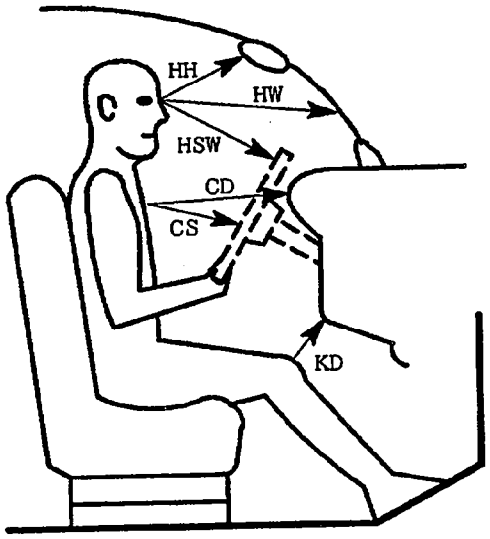
S/N 45 DUMMY ID S/N 150

A = Left Door to Driver Centerline	389	mm
B = Left Door to Center Passenger Centerline	-	mm
C = Left Door to Right Passenger Centerline	1100	mm
D = Left Door to Right Door	1496	mm
E,F = Window Glass Height (Right and Left Must Be Equal)	204	mm

Figure 2

OCCUPANT CLEARANCE DIMENSIONS

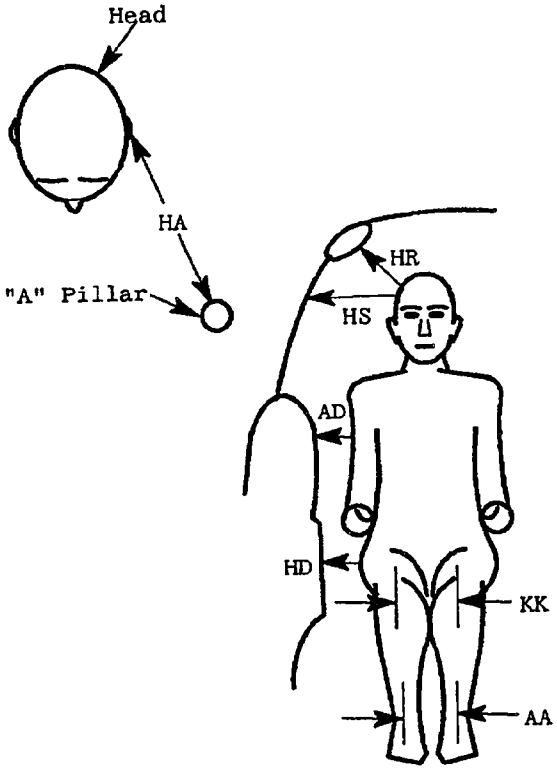
	DRIVER (millimeters)	PASSENGER (millimeters)
HH	325	320
HW	620	605
CD	462	478
CS	241	-
KDL	97	89
KDR	107	86
SA	See Note	See Note
TA	20°	20°
HSW	371	-



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

Note: Seat back angle was positioned as specified by manufacturer

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

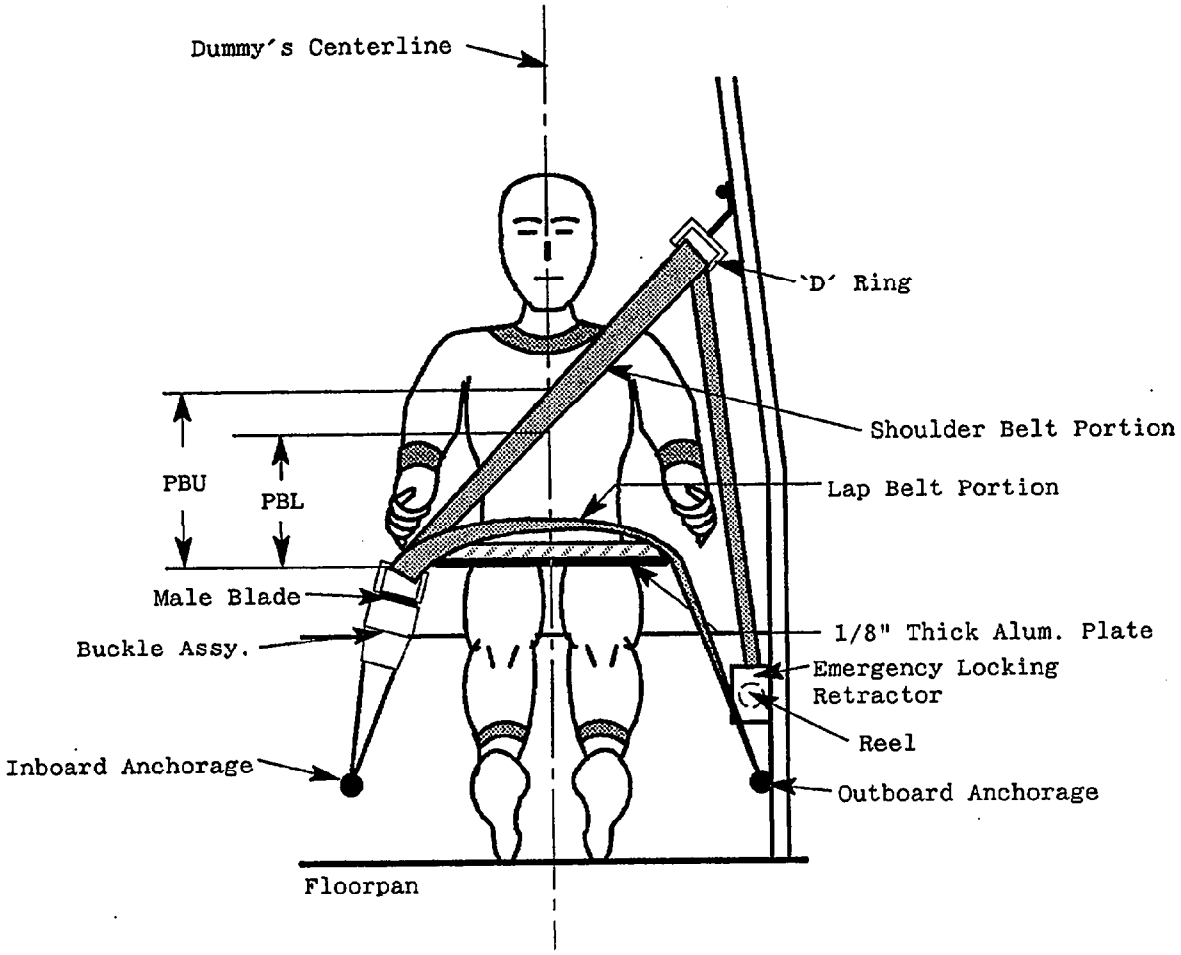


	DRIVER (millimeters)	PASSENGER (millimeters)
HR	224	218
HS	310	325
AD	137	149
HD	132	135
KK	254	191
HA	518	503
AA	330	191

8048-1

Figure 3

SEAT BELT POSITIONING DATA



Front View of Driver Dummy

	DRIVER DUMMY (mm)	PASSENGER DUMMY (mm)
PBU -- Top surface of alum. plate to upper edge	325	320
PBL -- Top surface of alum. plate to belt lower edge	251	246
LAP BELT TENSION	2.0 lbs.	2.0 lbs.
SHOULDER BELT TENSION	2.0 lbs.	2.0 lbs.

Upper adjustable retractor was placed in mid-position

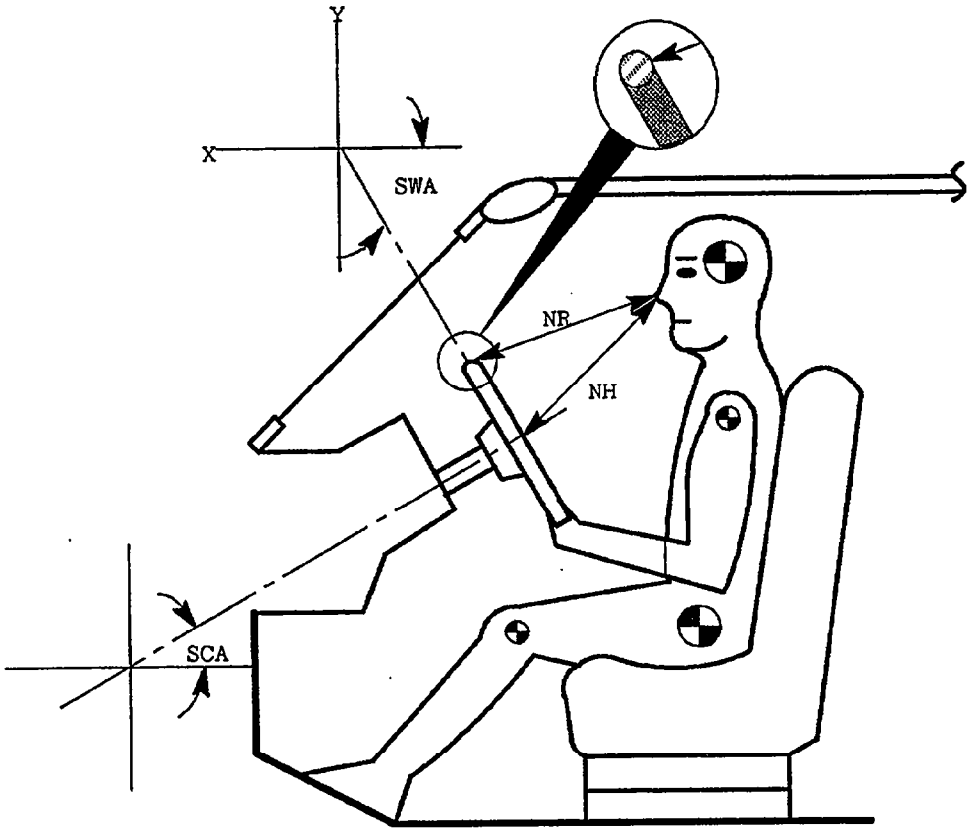
Table 4

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

	Driver	Passenger
BELT LENGTH DATA:		
Shoulder belt length as measured on Part 572 Dummy.	886 mm	886 mm
Lap belt length as measured on Part 572 Dummy.	652 mm	652 mm
SHOULDER BELT SPOOL-OFF DATA:		
As determined by film analysis.	N/A	76 mm
As determined mechanically.	56 mm	46 mm
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	36 mm/m	20 mm/m
Measured mechanically	0.0 mm/m	0.0 mm/m
LAP BELT SPOOL-OFF-DATA:		
As determined mechanically	51 mm	36 mm

Figure 4

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSEMBLY REFERENCE DIMENSIONS



Left Side View

	MEASUREMENTS	
NR -- Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	340	millimeters
NH -- Distance from tip of dummy's nose to center of steering column hub	335	millimeters
SCA -- Angle of steering column relative to the horizontal X axis	21	Degrees
SWA -- Angle of steering wheel relative to the horizontal X axis	69	Degrees

Figure 5

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 5

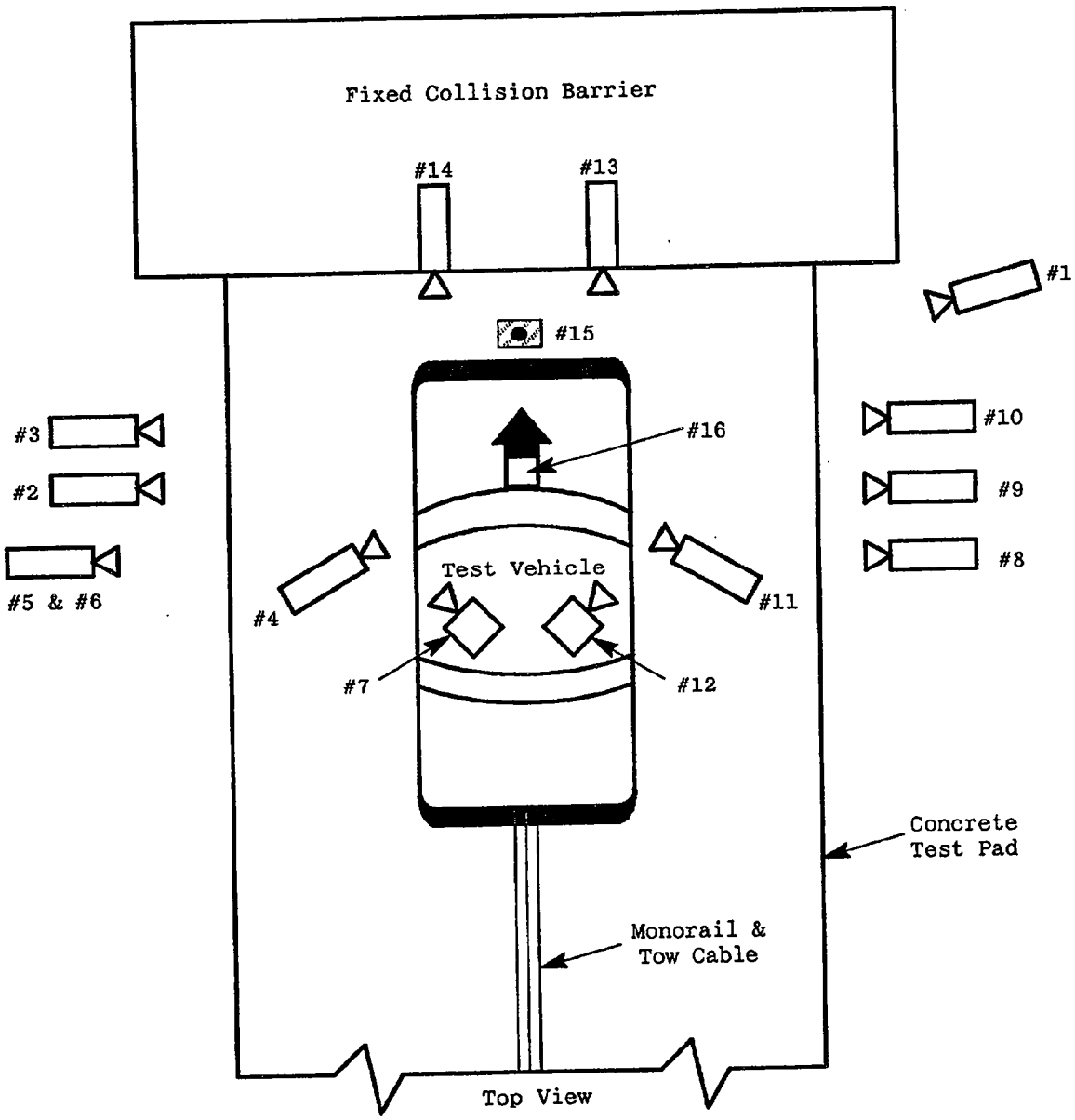


Table 5

HIGH-SPEED CAMERA LOCATIONS

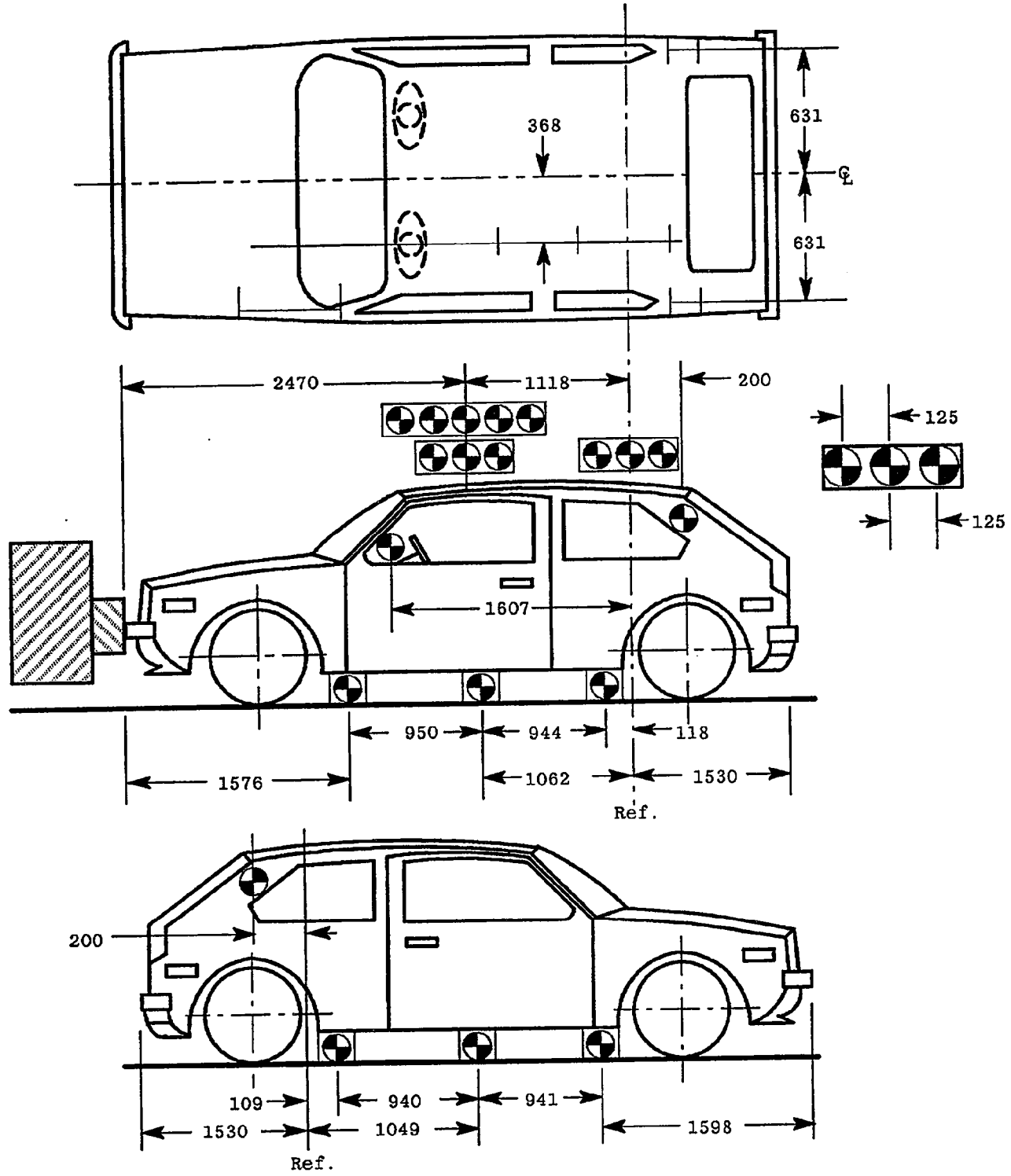
Test No. MN0110 Vehicle: 1992 Pontiac Bonneville SSE 4-Door Sedan

CAMERA NO.	VIEW	CAMERA POSITIONS (mm)* X	Y	Z	ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
1	Real-Time Camera	-	-	-	-	-	-	24
2	Overall Left Side	6553	2057	1067	-2	6127	13	550
3	Left Side View	8560	1422	1041	-3	8134	25	600
4	Driver and Interior View	2769	2896	1651	-14	2343	13	610
5	Steering Column (Bottom)	7391	2261	1168	-4	6965	25	580
6	Steering Column (Top)	7391	2261	1778	-8	6965	25	570
7	Left Belt	-	-	-	-	-	8	670
8	Overall Right Side	6553	2261	1067	-3	6127	13	550
9	Right Side View	8560	1626	1143	-3	8134	25	570
10	Right Passenger View	8255	1930	1397	-3	7829	35	540
11	Passenger and Interior View	2769	3099	1676	-14	2343	13	550
12	Right Belt	-	-	-	-	-	8	N/A
13	Passenger Front View	559	51	1930	-35	-	13	620
14	Driver Front View	559	51	1930	-34	-	13	540
15	Windshield View	0	0	3048	-45	-	13	600
16	Pit View of Engine	0	1092	-3048	90	-	13	670

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

Figure 6

VEHICLE TARGET LOCATIONS

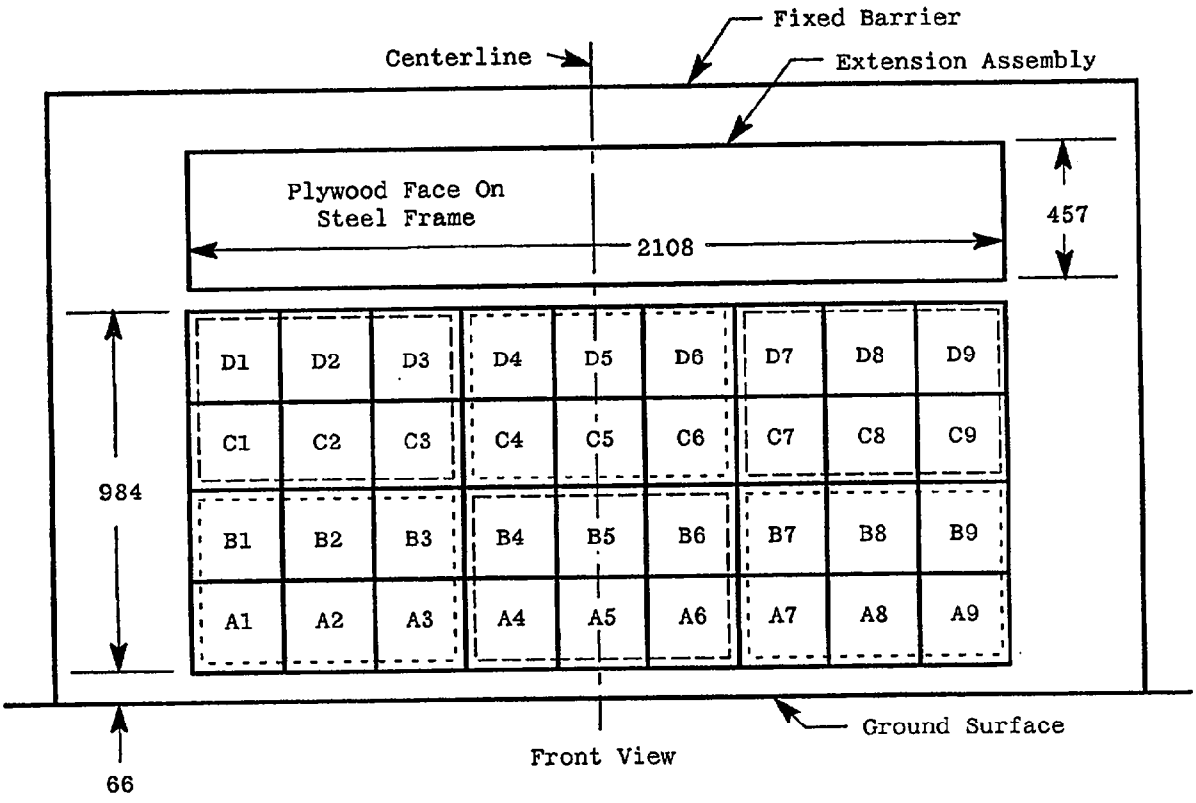


(Dimensions in millimeters)

Figure 7

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:

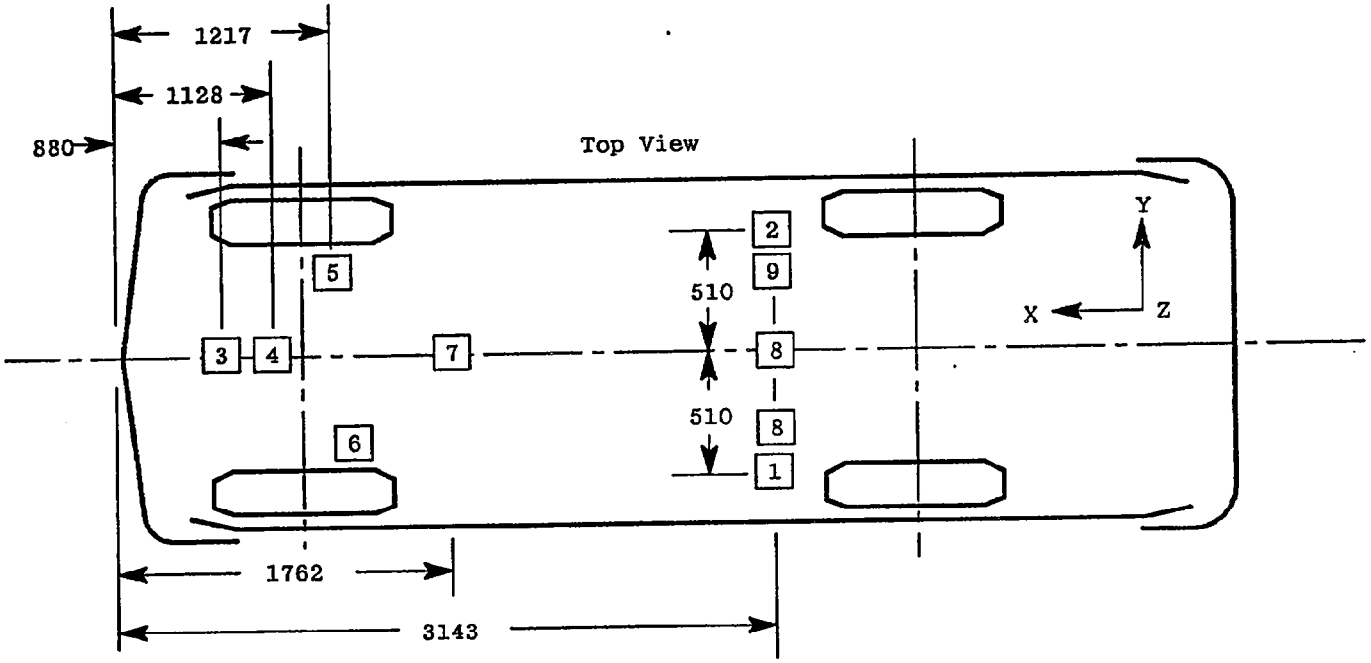
(1) Data from 36 individual load cells

(2) Total or Sum of 36 individual load cells

(3) Data from 6 Groupings shown above (6 cells/group)

Figure 8

VEHICLE ACCELEROMETER LOCATIONS



All dimensions are in millimeters

ACCELEROMETER NUMBER*	ACCELEROMETER LOCATION	DIRECTION		
		X	Y	Z
1	Left Rear Seat Crossmember	✓		
2	Right Rear Seat Crossmember	✓		
3	Top of Engine	✓		
4	Bottom of Engine	✓		
5	Right Disc Brake Caliper	✓		
6	Left Disc Brake Caliper	✓		
7	Instrument Panel	✓		
8	Left Rear Seat Crossmember	✓		
9	Right Rear Seat Crossmember	✓		

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

Figure 9

TEST VEHICLE MEASUREMENTS

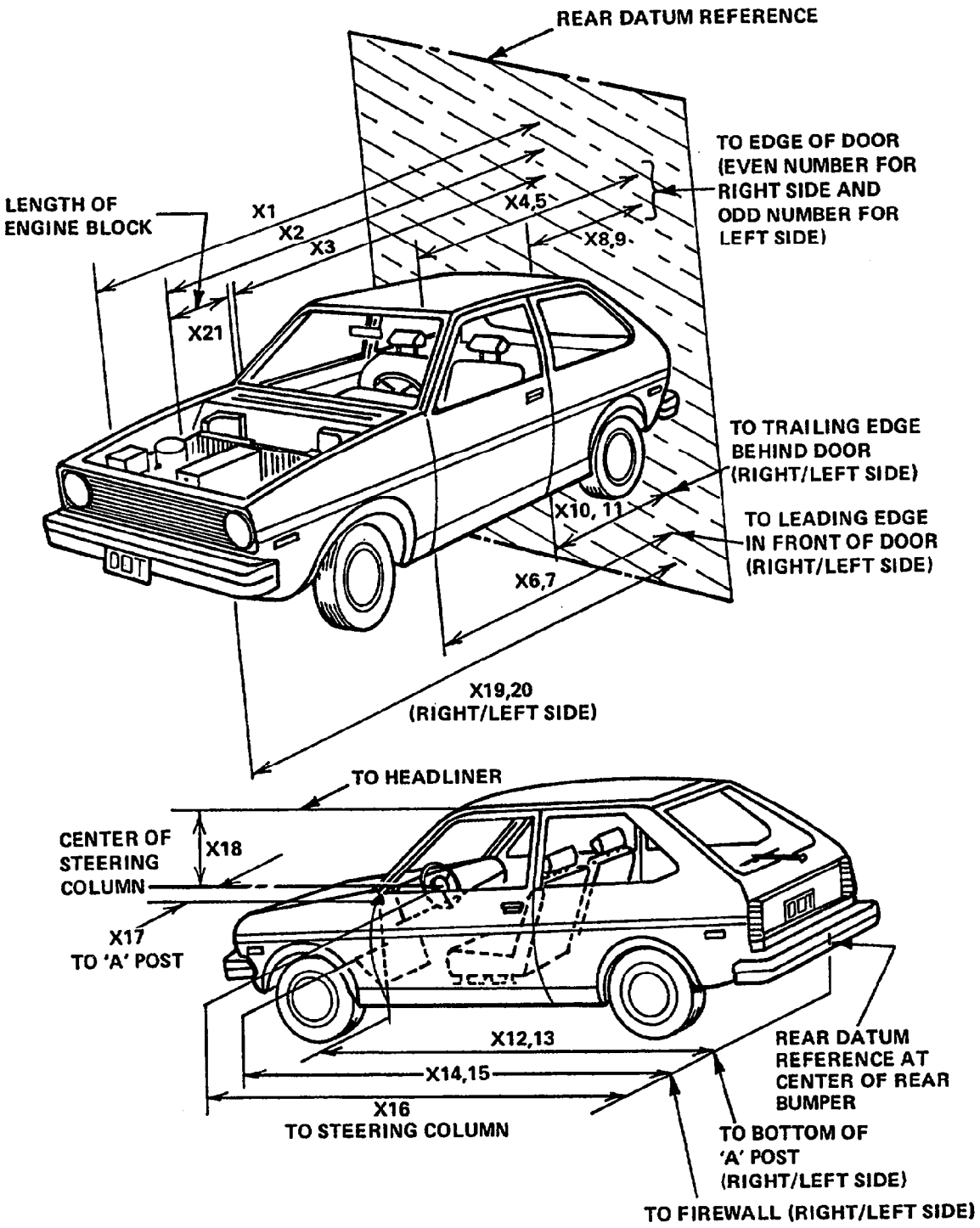


Table 6

VEHICLE MEASUREMENTS

No.		All Dimensions in Millimeters		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	5118	4361	757
X2	Rear Surface of Vehicle to Front of Engine	4511	4125	386
X3	Rear Surface of Vehicle to Firewall	3790	3719	71
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	3378	3373	5
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	3383	3383	0
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	3419	3401	18
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	3429	3424	5
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	2372	2360	12
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	2383	2377	6
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	2367	2357	10
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	2375	2370	5
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	3378	3360	18
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	3393	3368	25
X14	Rear Surface of Vehicle to Firewall, Right Side	3701	3688	13
X15	Rear Surface of Vehicle to Firewall, Left Side	3726	3696	30
X16	Rear Surface of Vehicle to Steering Column	2934	2731	203
X17	Center of Steering Column to "A" Post	432	417	15
X18	Center of Steering Column to Headliner	422	419	3
X19	Rear Surface of Vehicle to Right Side of Front Bumper	4953	N/A	N/A
X20	Rear Surface of Vehicle to Left Side of Front Bumper	4958	4407	551
X21	Length of Engine Block	521	521	0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	3150	3137	13
CD	Rear Surface of Vehicle to Center of Dash Panel	3175	3162	13
LD	Rear Surface of Vehicle to Left Side of Dash Panel	3150	3139	11

ACCIDENT INVESTIGATION DIVISION DATA
FOR 35 MPH FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: 1992 Pontiac Bonneville

Vehicle NHTSA No.: MN0110; Vin: 1G2HZ52L5N1313869

Model Year: 1992; Build Date: 5-92; Test Date: 9-3-92

Vehicle Size Category: Full Size; Test Weight: 1840 kgs

Vehicle Wheelbase: 1840 mm; Front Overhang: 1587 mm; Overall Width: N/A

Collision Deformation Classification (CDC) Code: 12FDEW3

Crush Depth Dimensions:

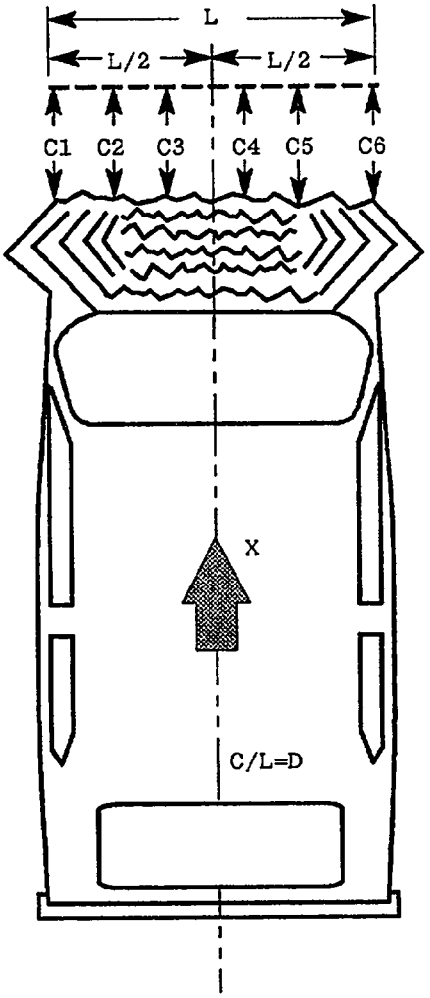
C1= 518 millimeters
C2= 627 millimeters
C3= 719 millimeters
C4= N/A millimeters
C5= N/A millimeters
C6= N/A millimeters

No Bumper

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

Length of Damaged Region: L= N/A inches

C4-C6 are not available due to the loss of the bumper



Appendix A

PHOTOGRAPHS

PHOTOGRAPHS

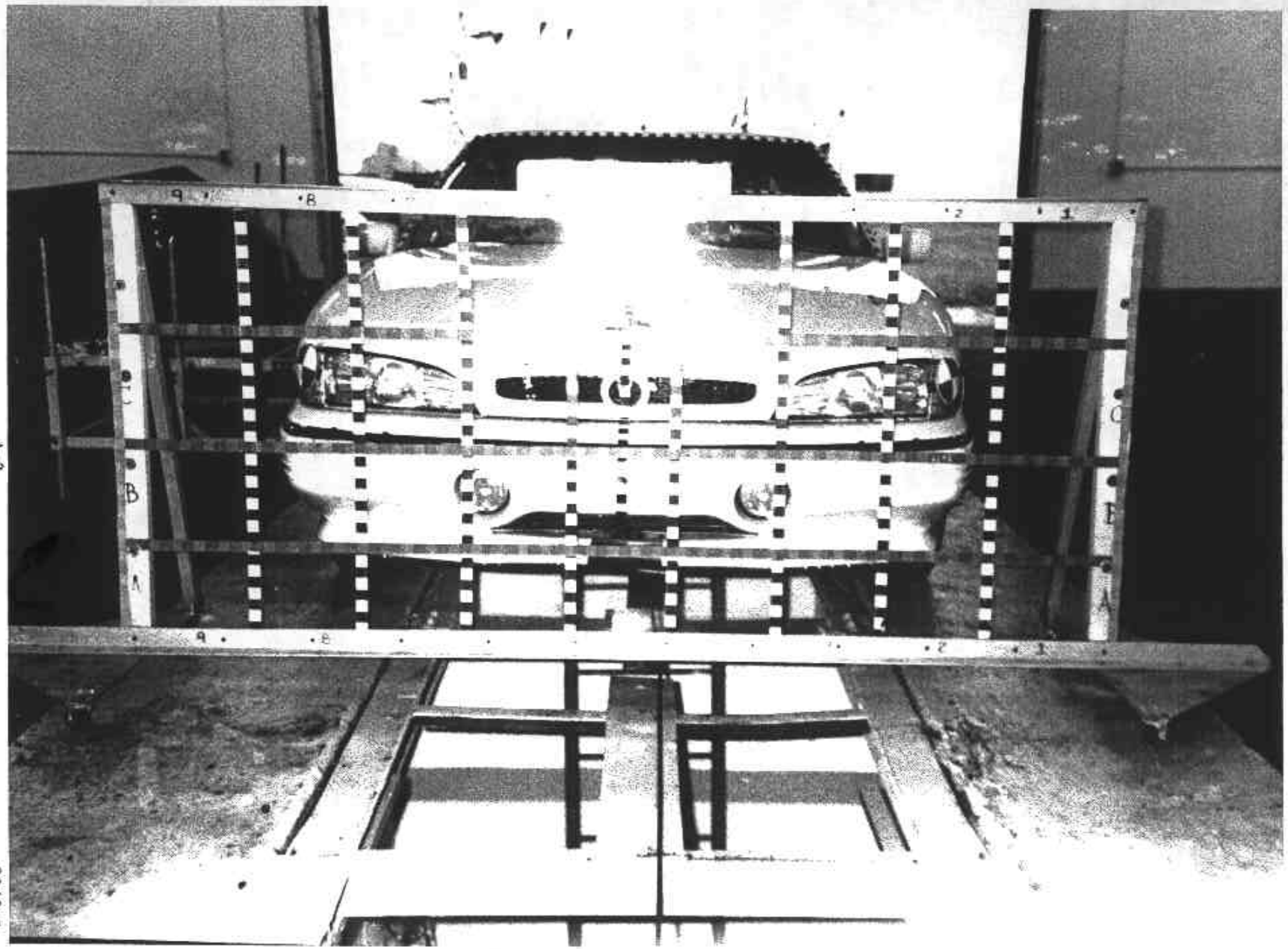


Figure A-1 LOAD CELL LOCATIONS

8048-1

Figure A-2 PRE-TEST FRONT VIEW

8048-1

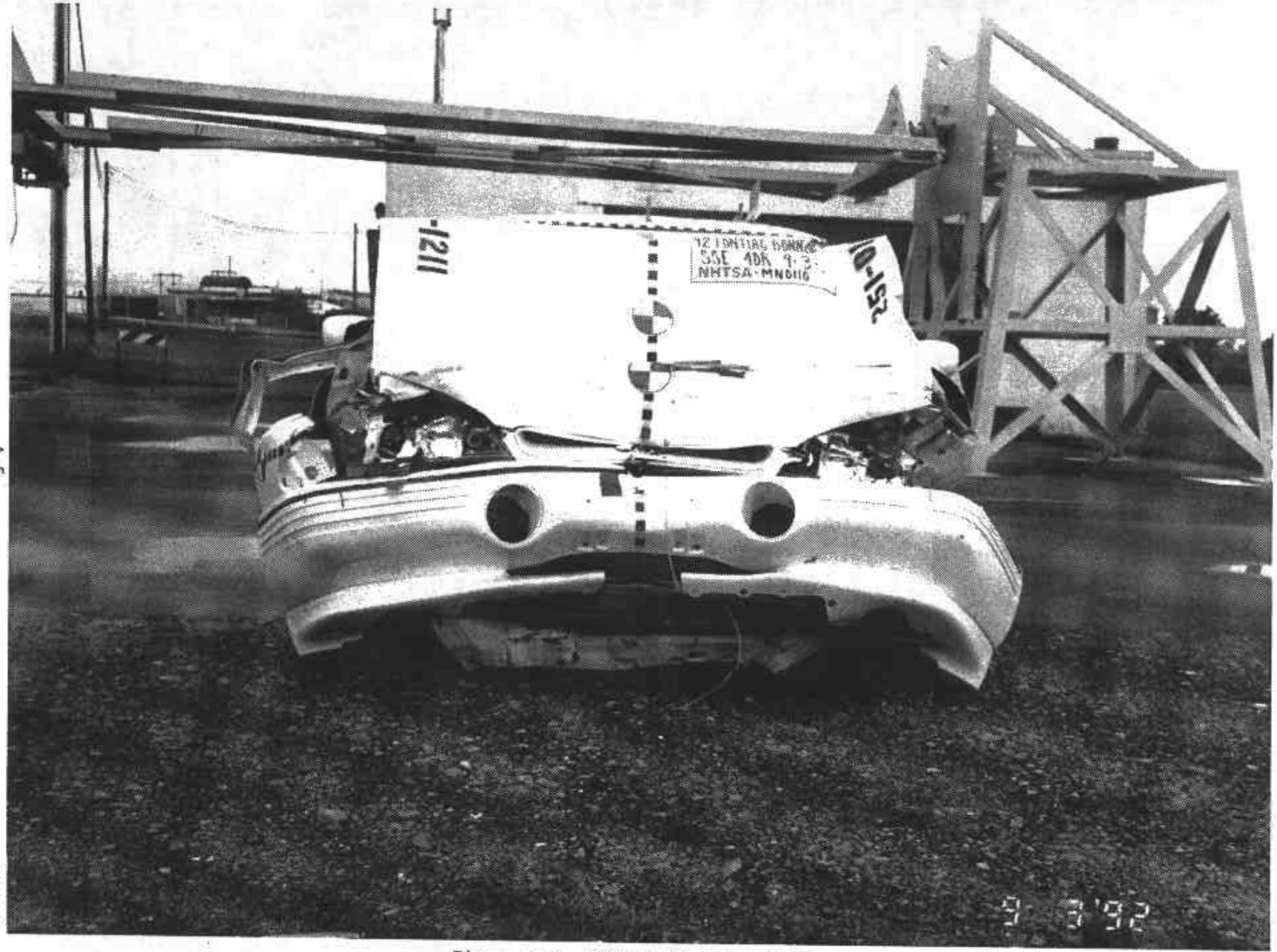


Figure A-3 POST TEST FRONT VIEW

8048-1

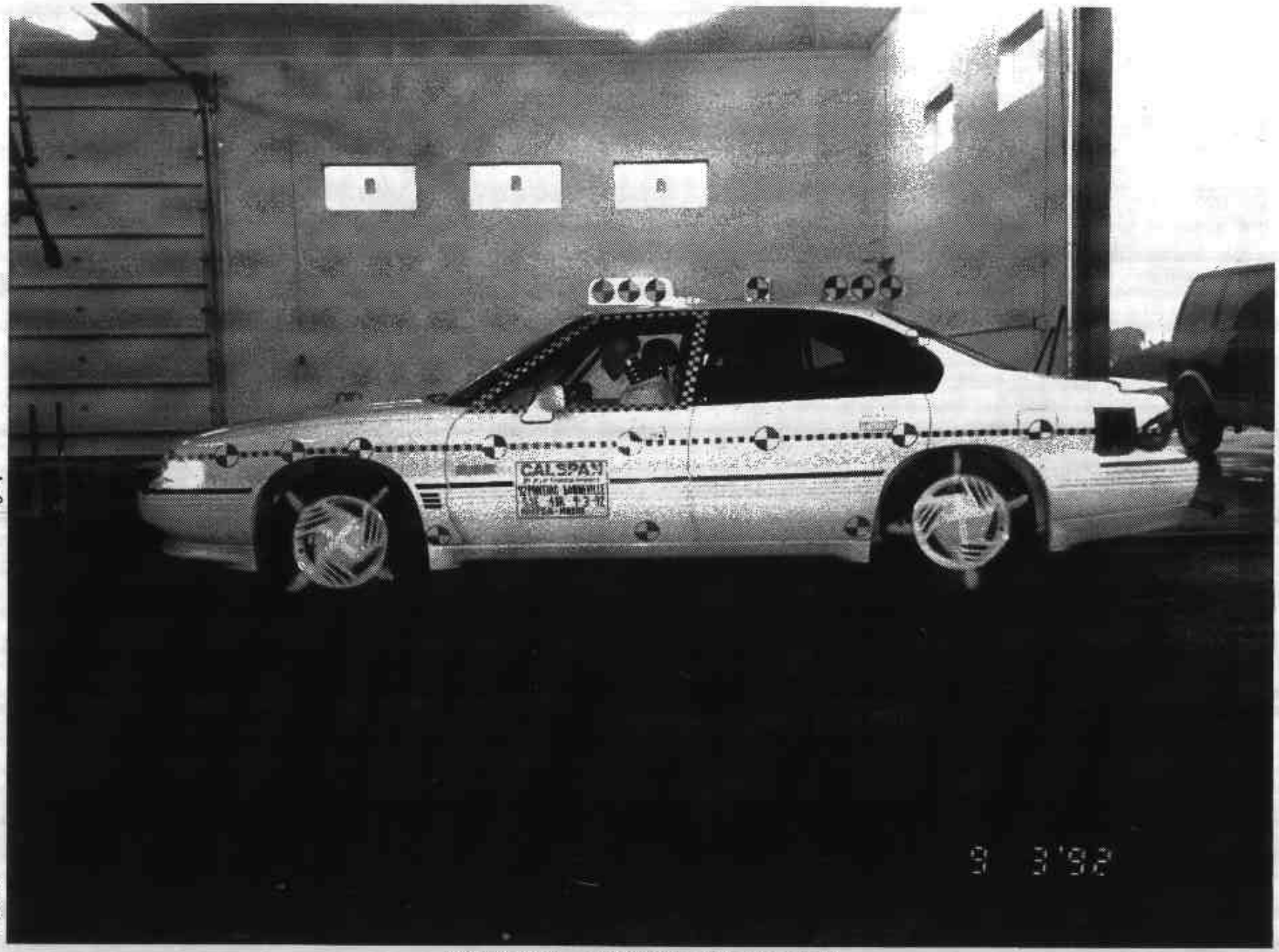


Figure A-4 PRE-TEST LEFT SIDE VIEW

8048-1

A-7

8048-1

Figure A-5 POST TEST LEFT SIDE VIEW

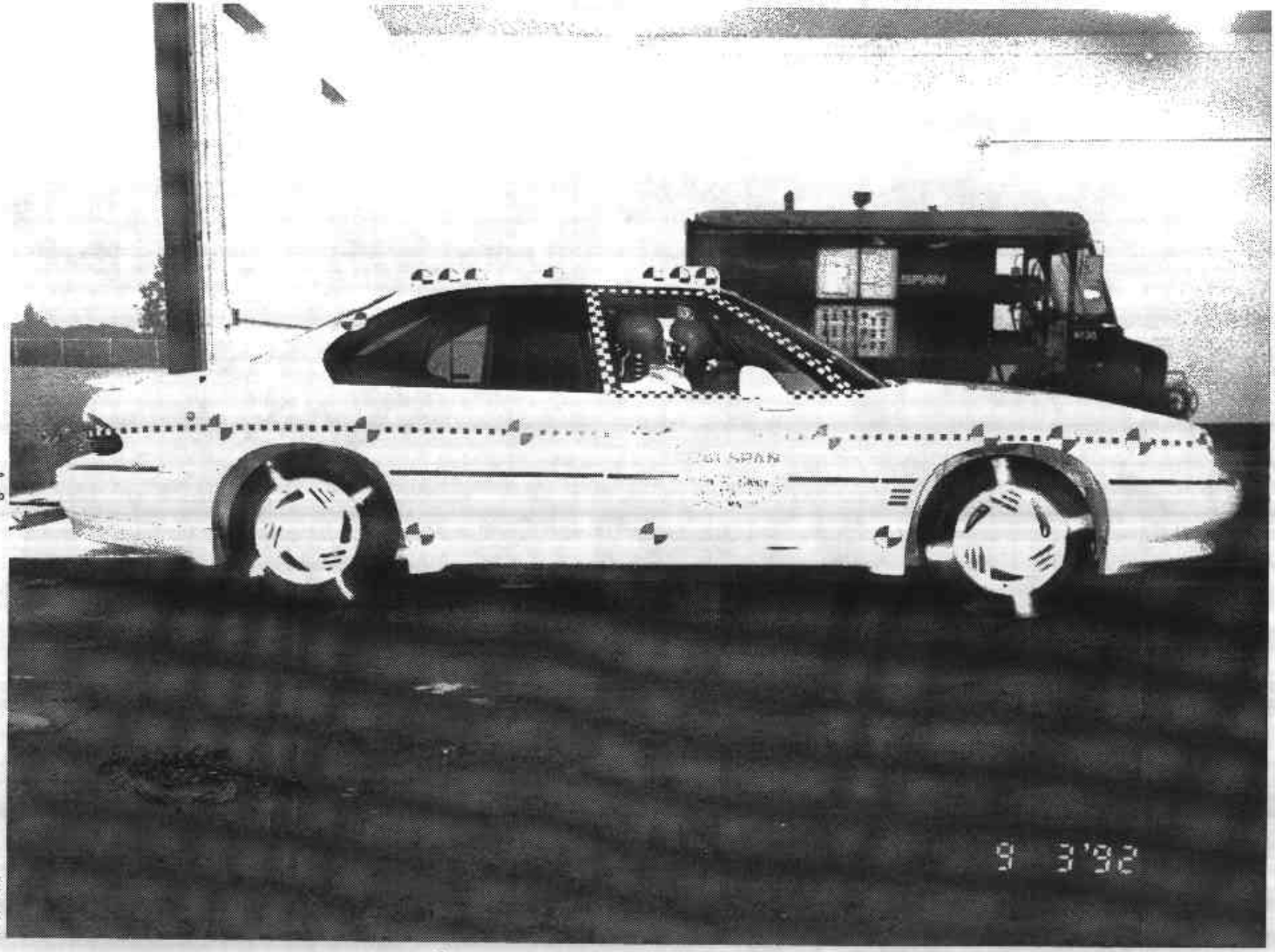


Figure A-6 PRE-TEST RIGHT SIDE VIEW

8048-1

Figure A-7 POST-TEST RIGHT SIDE VIEW

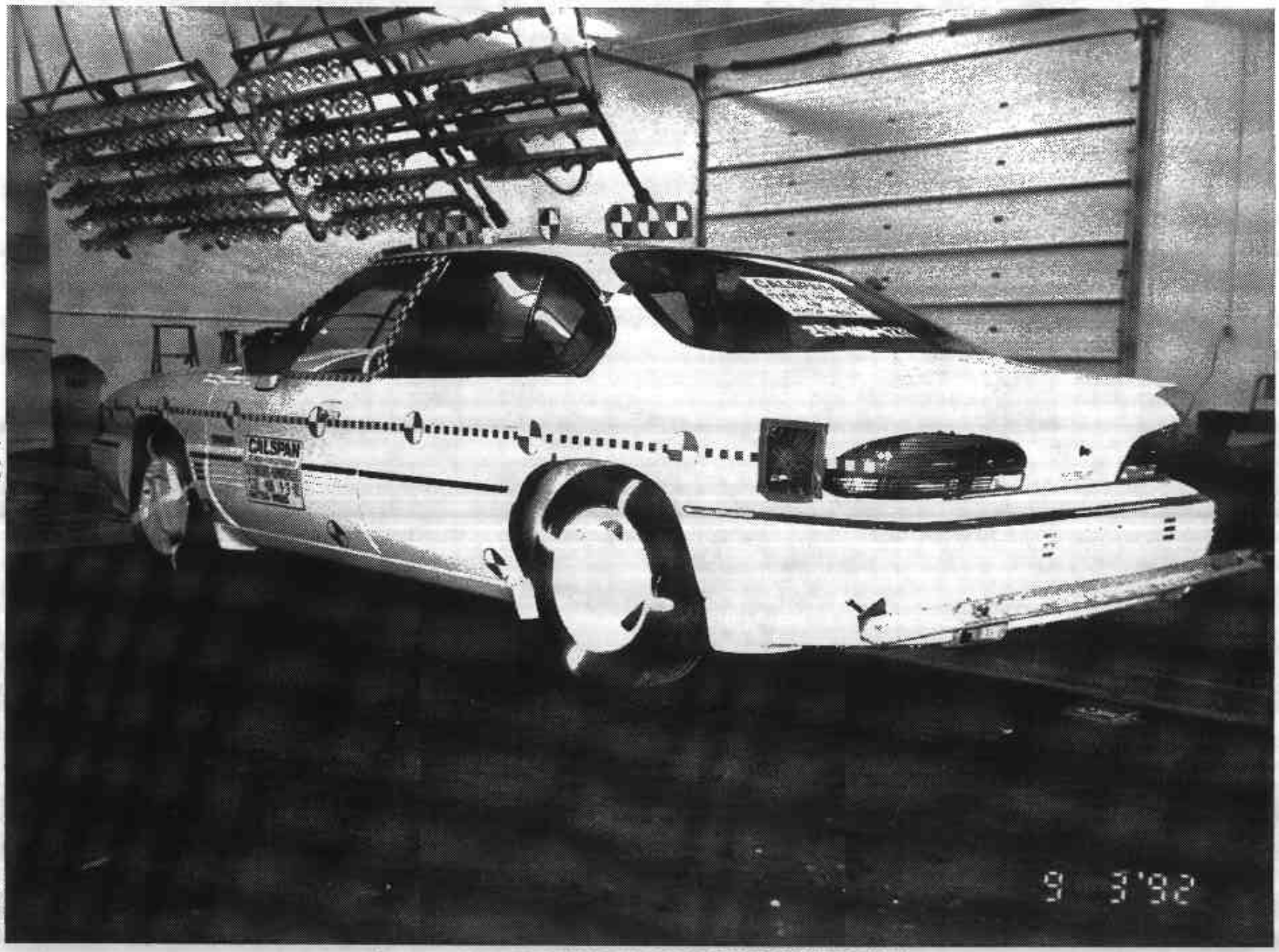
A-10

8048-1

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

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

8048-1



A-12

8048-1

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

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

8048-1

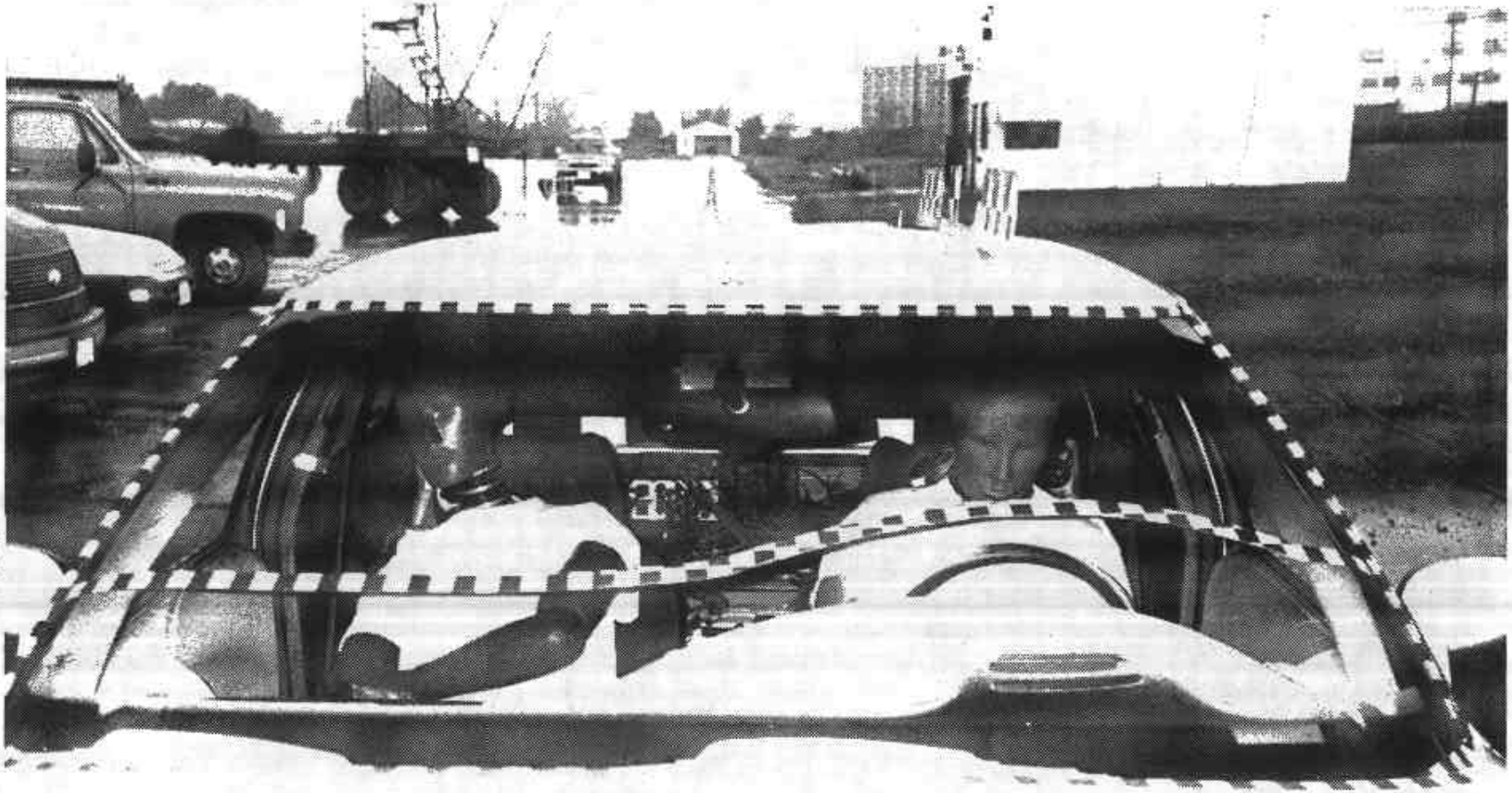
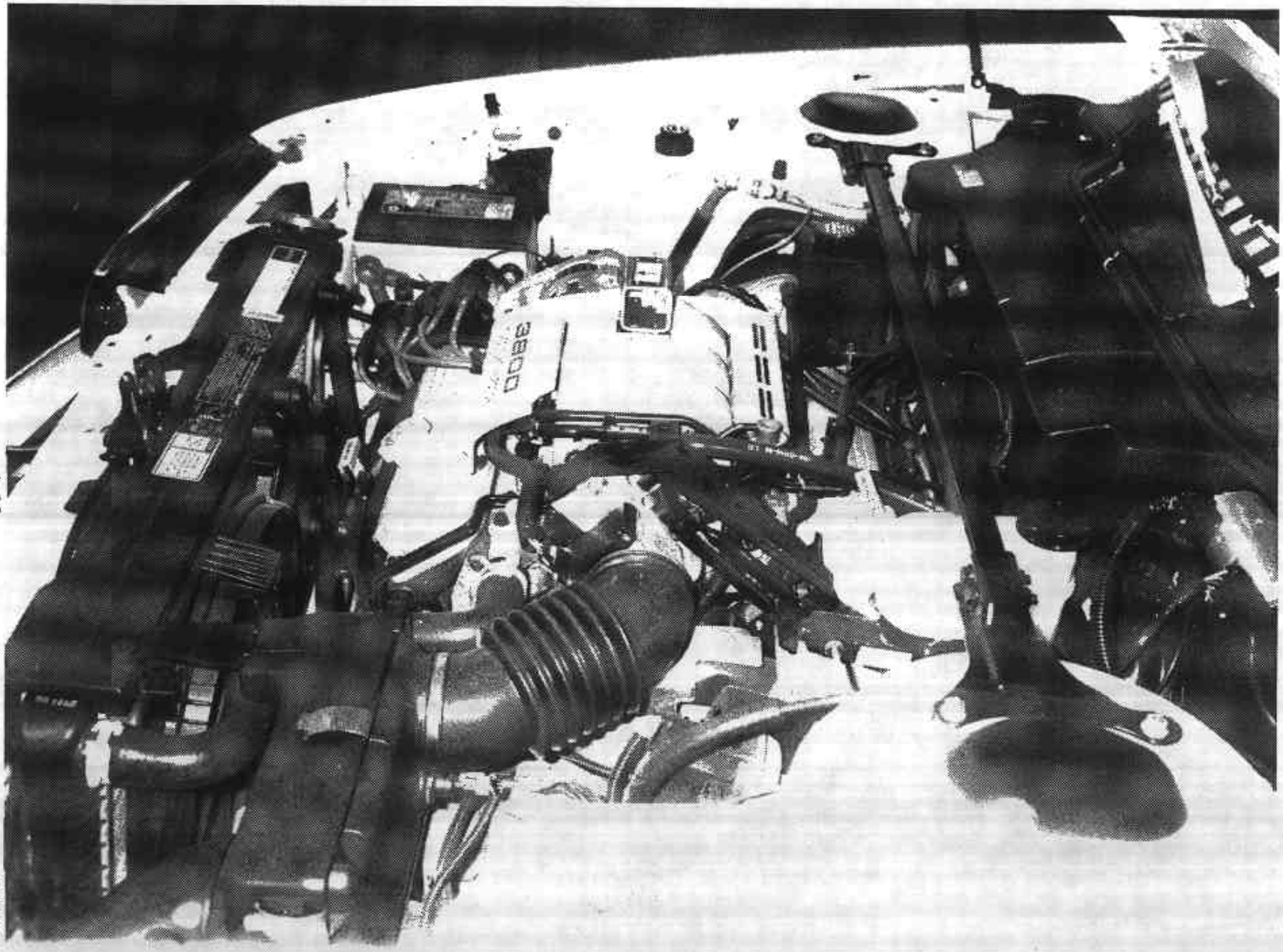


Figure A-12 PRE-TEST WINDSHIELD VIEW

Figure A-13 POST-TEST WINDSHIELD VIEW

8048-1



A-16

80481-1

Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

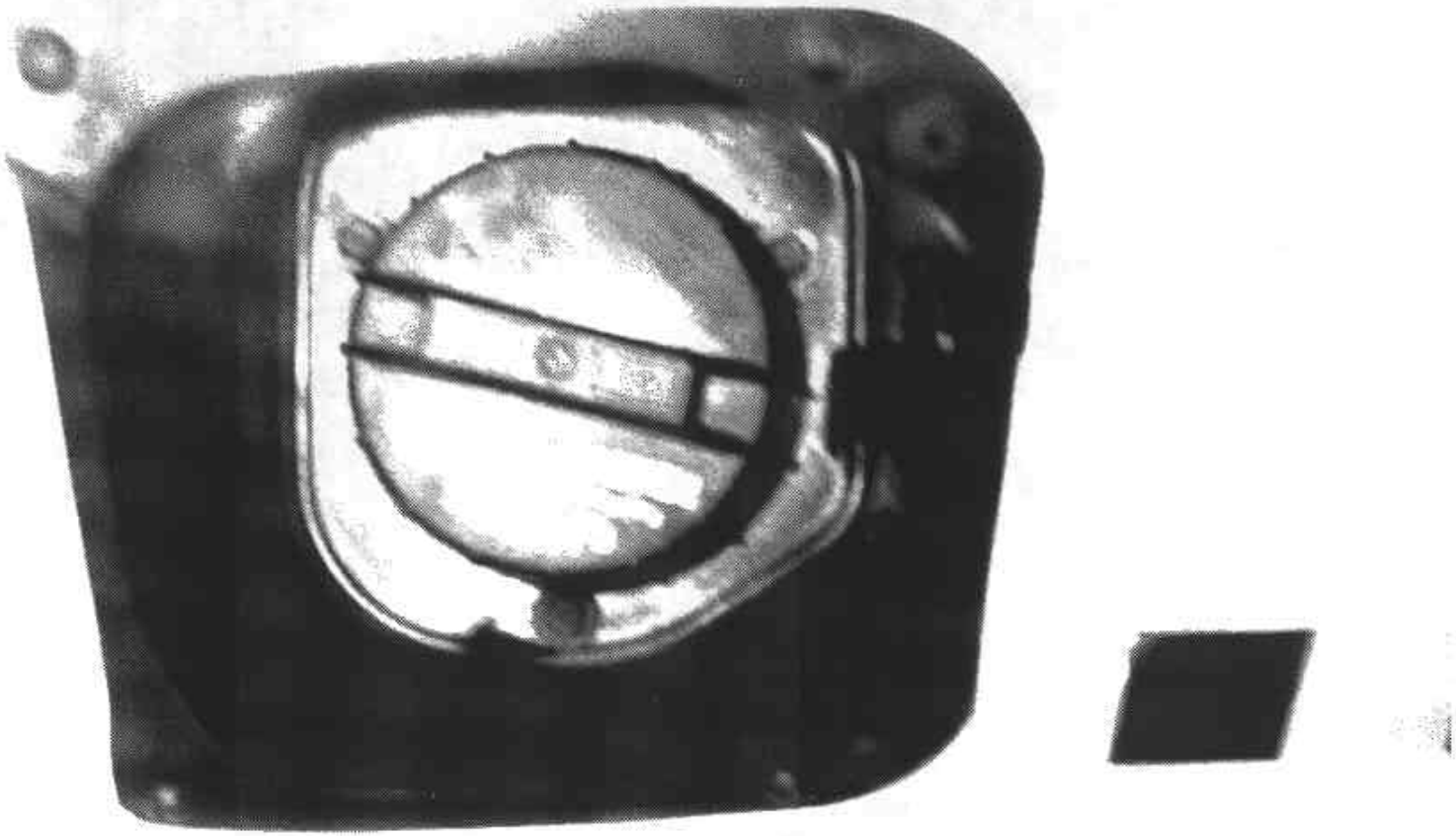
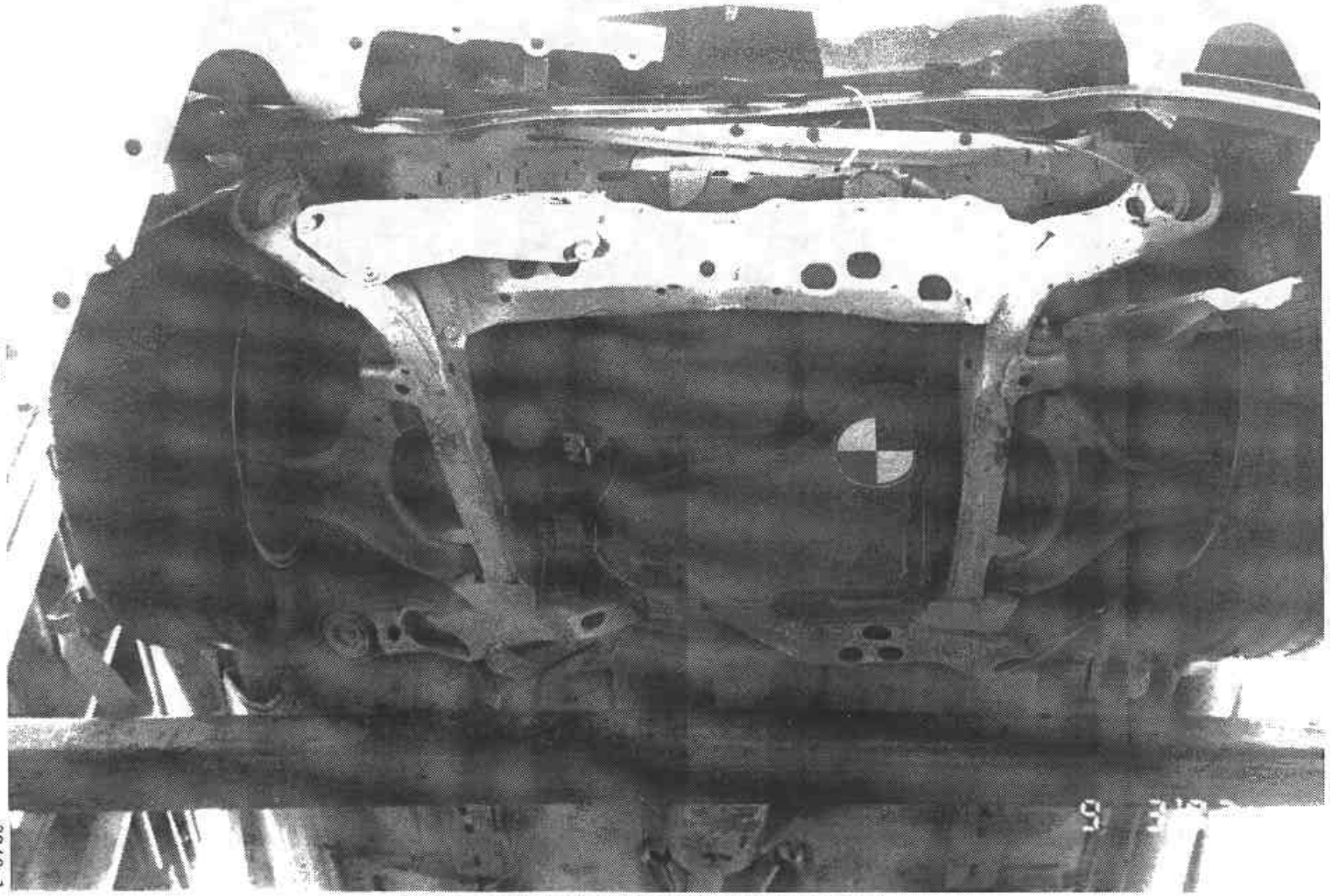


Figure A-15 FUEL CAP VIEW

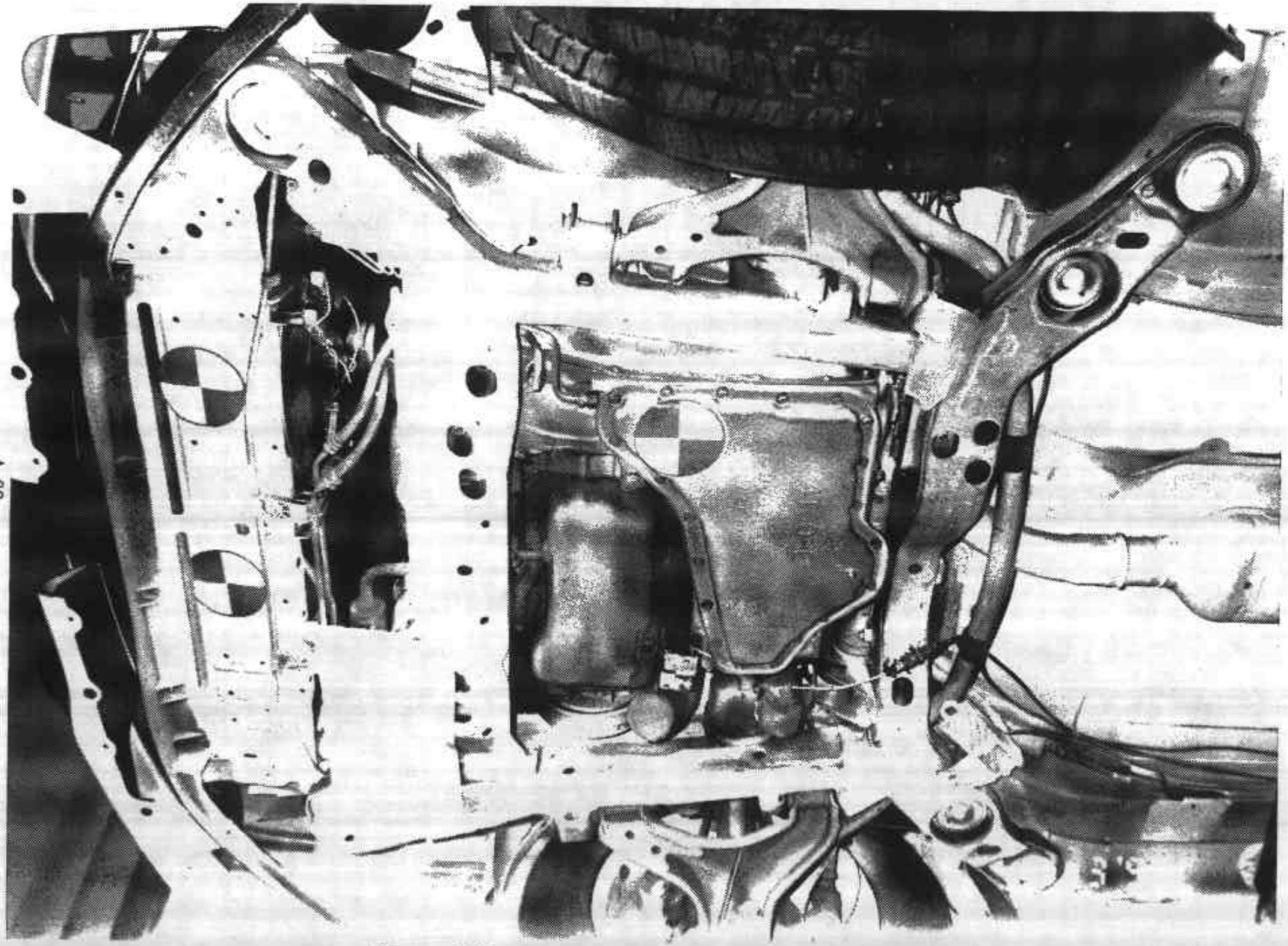
8048-1

Figure A-16 PRE-TEST FRONT UNDERBODY VIEW



8048-1

Figure A-17 POST-TEST FRONT UNDERBODY VIEW

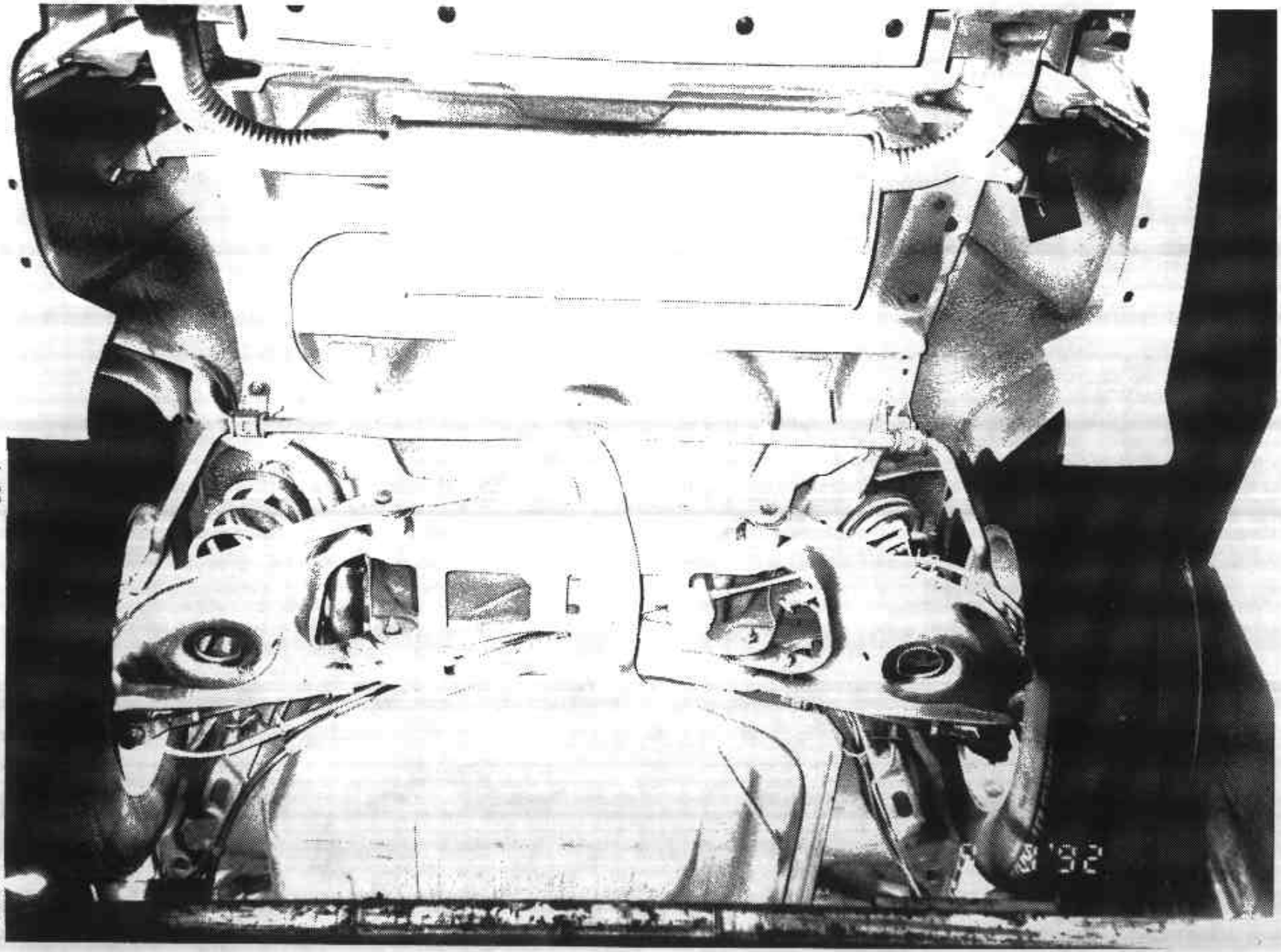


A-20

8048-1

Figure A-18 PRE-TEST FRONT SIDE UNDERBODY VIEW

Figure A-19 POST-TEST FRONT SIDE UNDERBODY VIEW



8048-1

Figure A-20 PRE-TEST REAR UNDERBODY VIEW

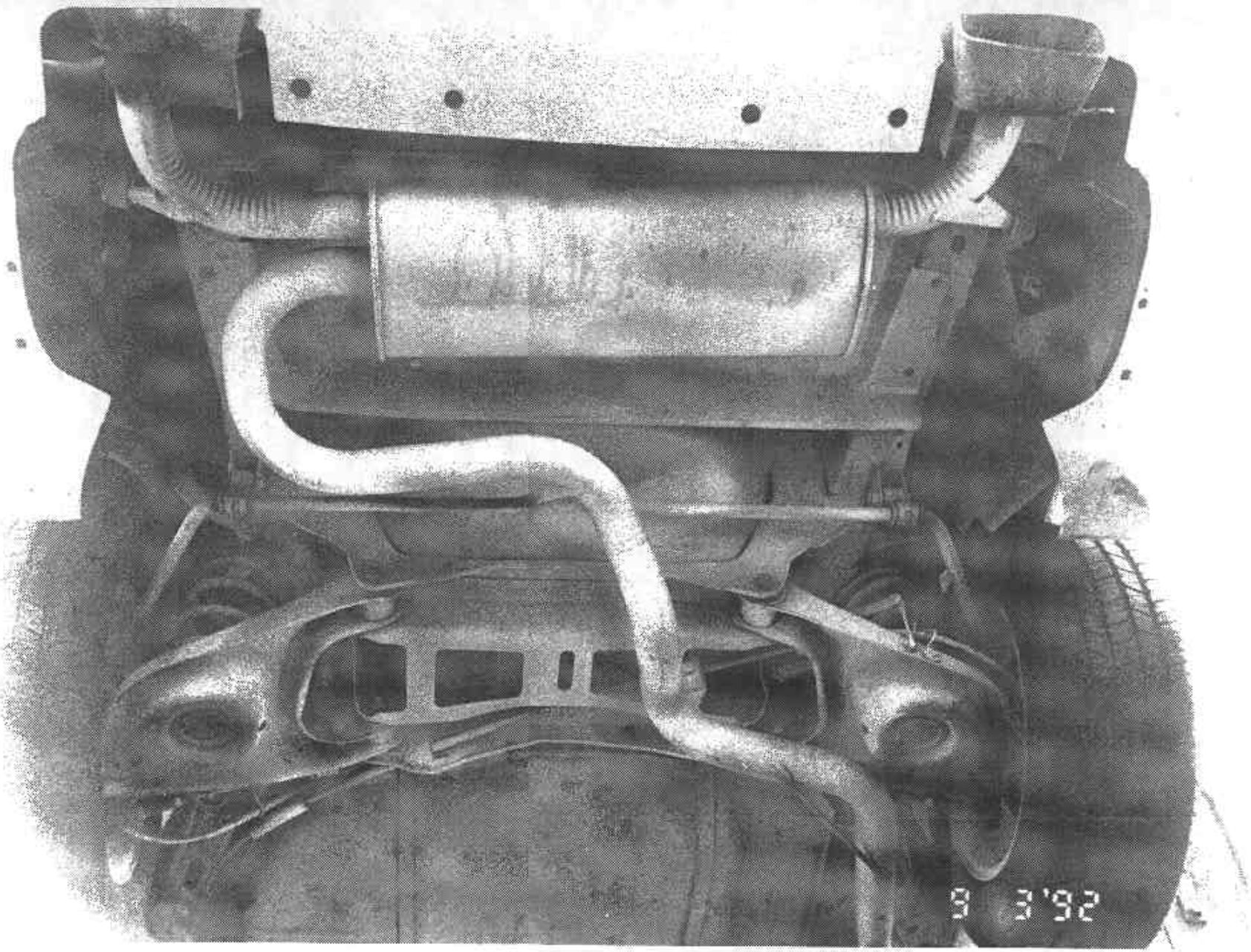
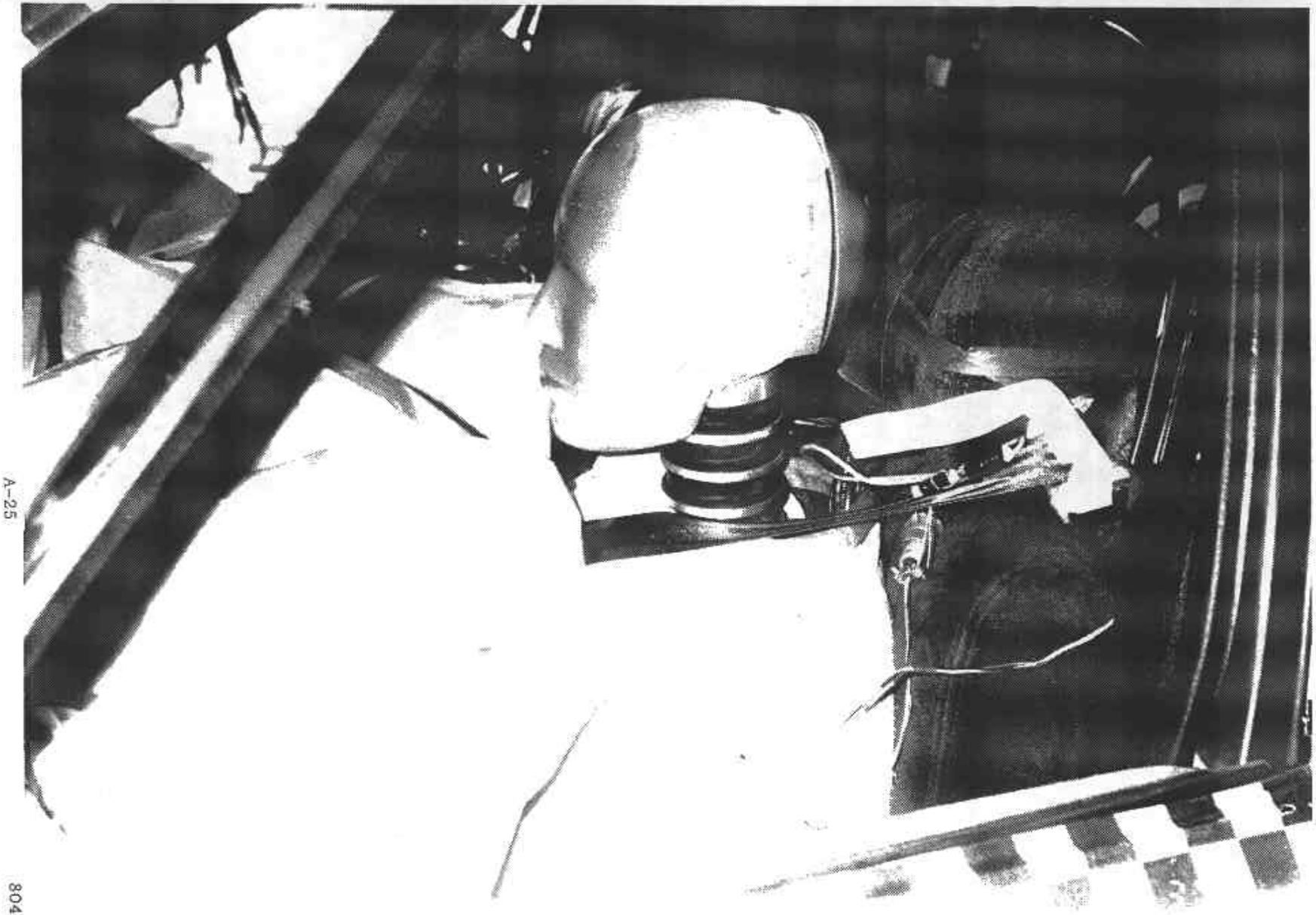


Figure A-21 POST-TEST REAR UNDERBODY VIEW

A-24

8048-1

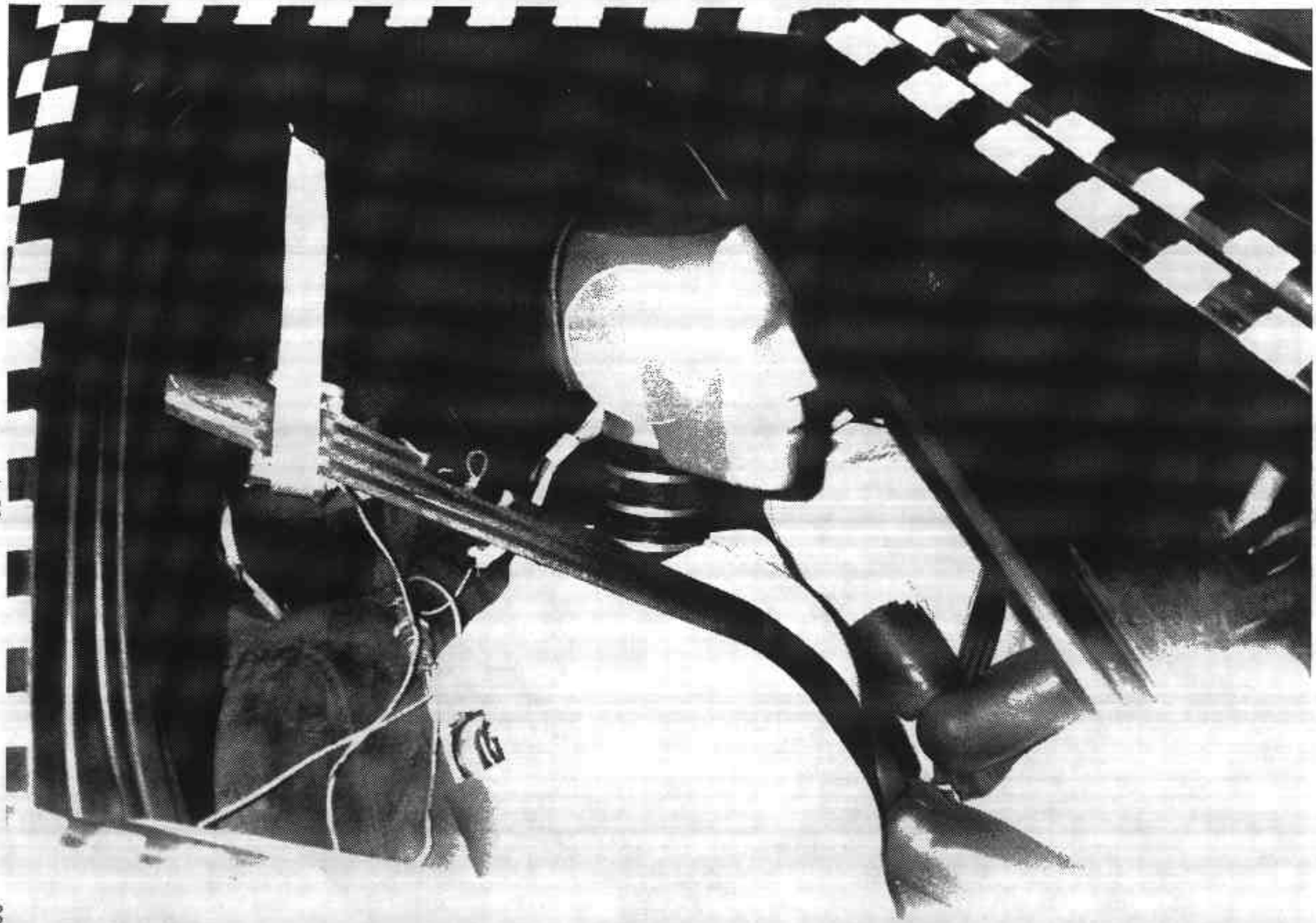
Figure A-22 PRE-TEST DRIVER POSITION VIEW



A-25

8048-1

Figure A-23 POST-TEST DRIVER POSITION VIEW



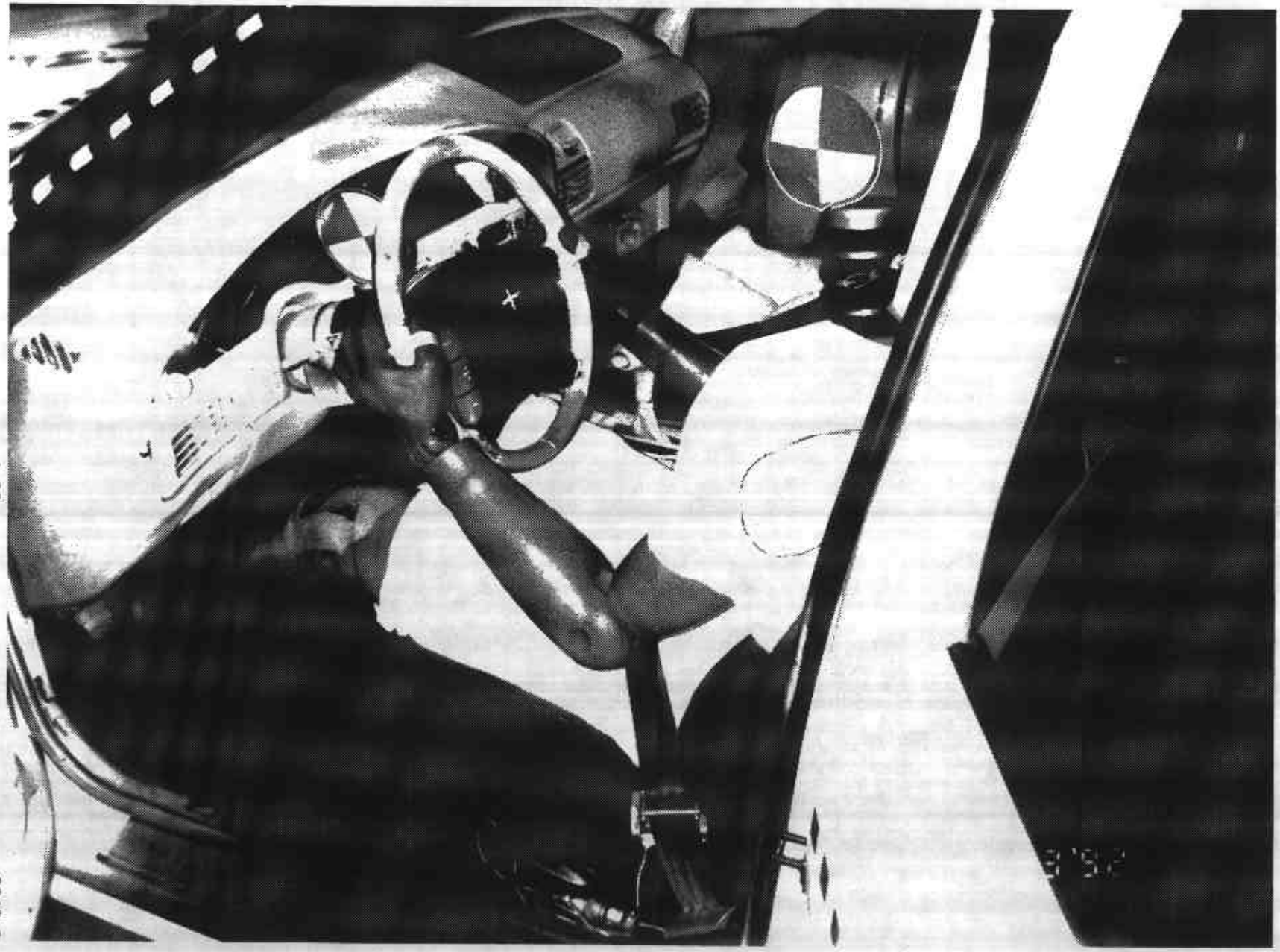
A-26

8048-1

Figure A-24 PRE-TEST PASSENGER POSITION VIEW

8048-1

Figure A-25 POST-TEST PASSENGER POSITION VIEW



8048-1

Figure A-26 PRE-TEST DRIVER AND INTERIOR VIEW

8048-1

Figure A-27 POST-TEST DRIVER AND INTERIOR VIEW

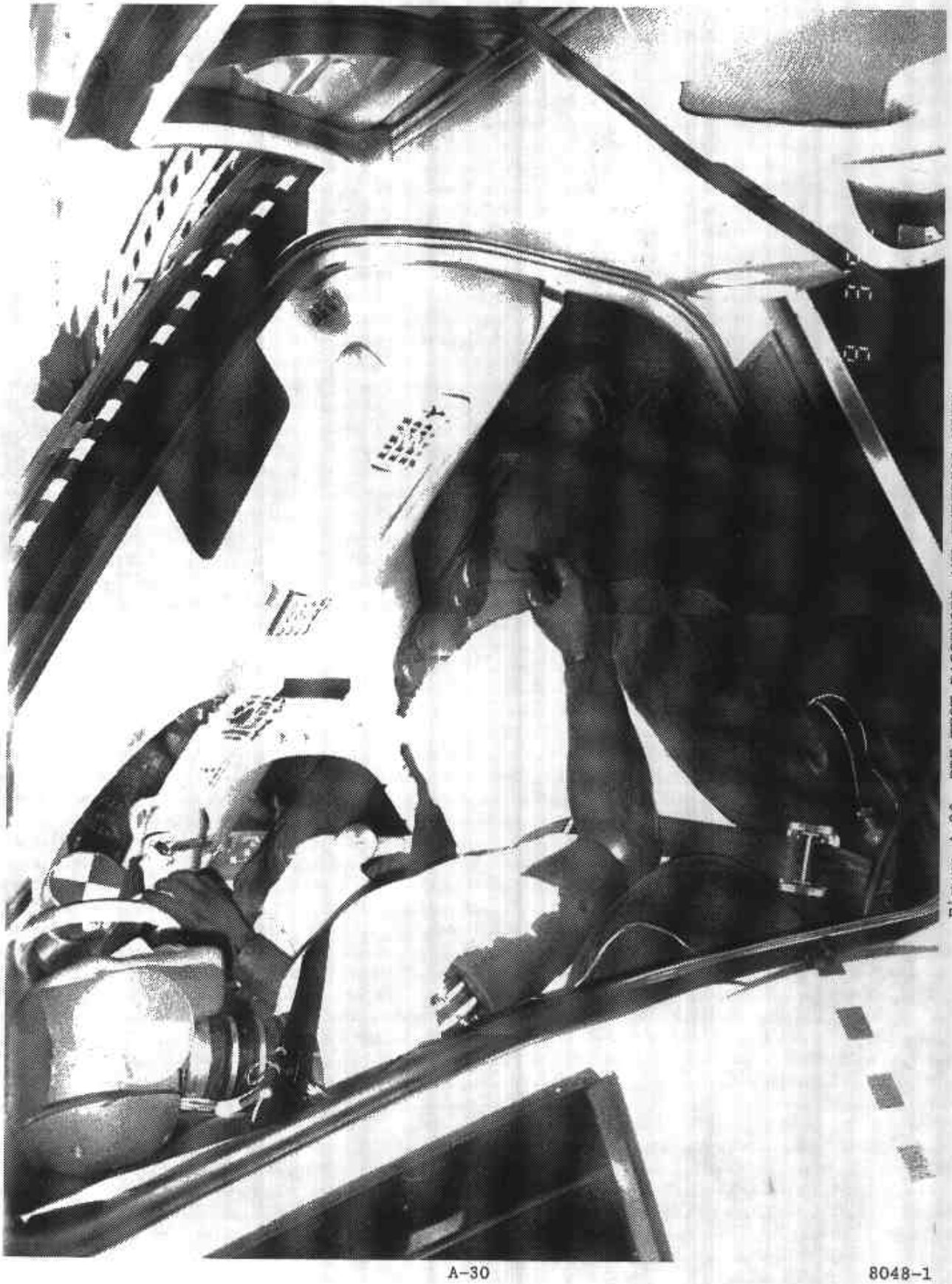
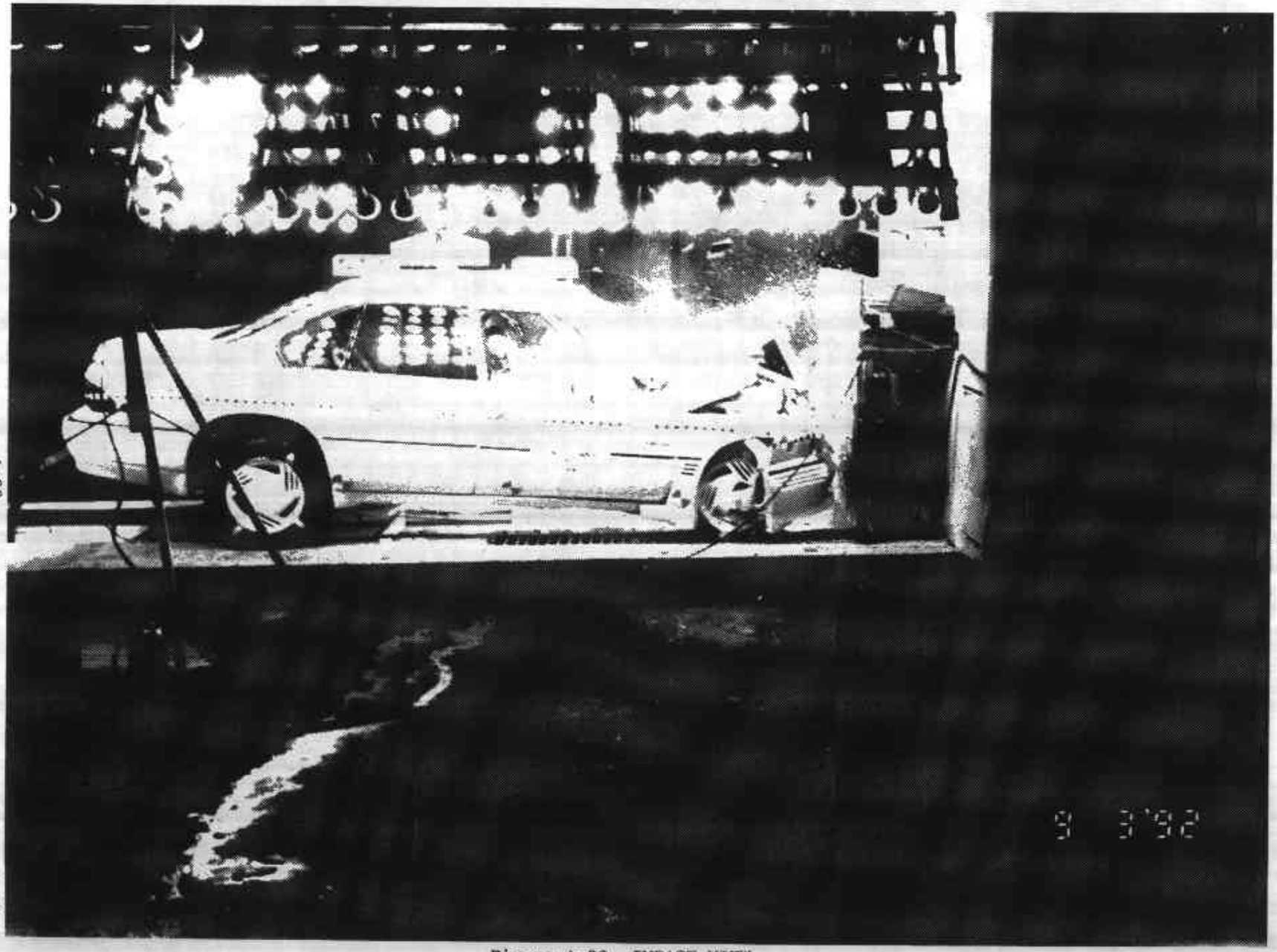


Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW

8048-1

Figure A-29 POST-TEST PASSENGER AND INTERIOR VIEW

8048-1



A-32

8048-1

Figure A-30 IMPACT VIEW

Appendix B

VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

TEST NO. MN0110

VEHICLE DATA

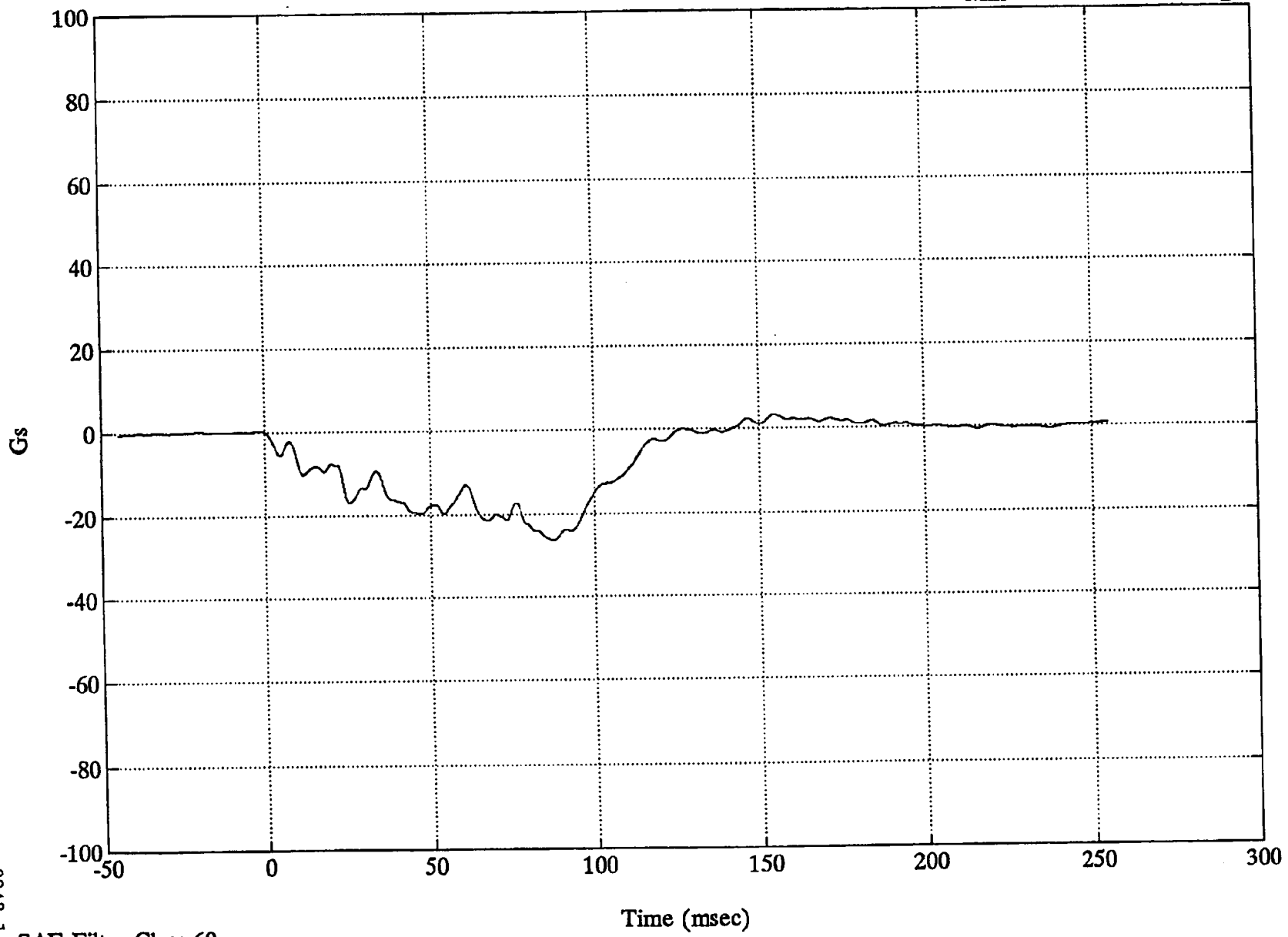
FILTER CHANNEL CLASS

60

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Acc. #1(x)

Max = 3.20 Gs @ 154.44 msec
Min = -26.44 Gs @ 87.24 msec



B-3

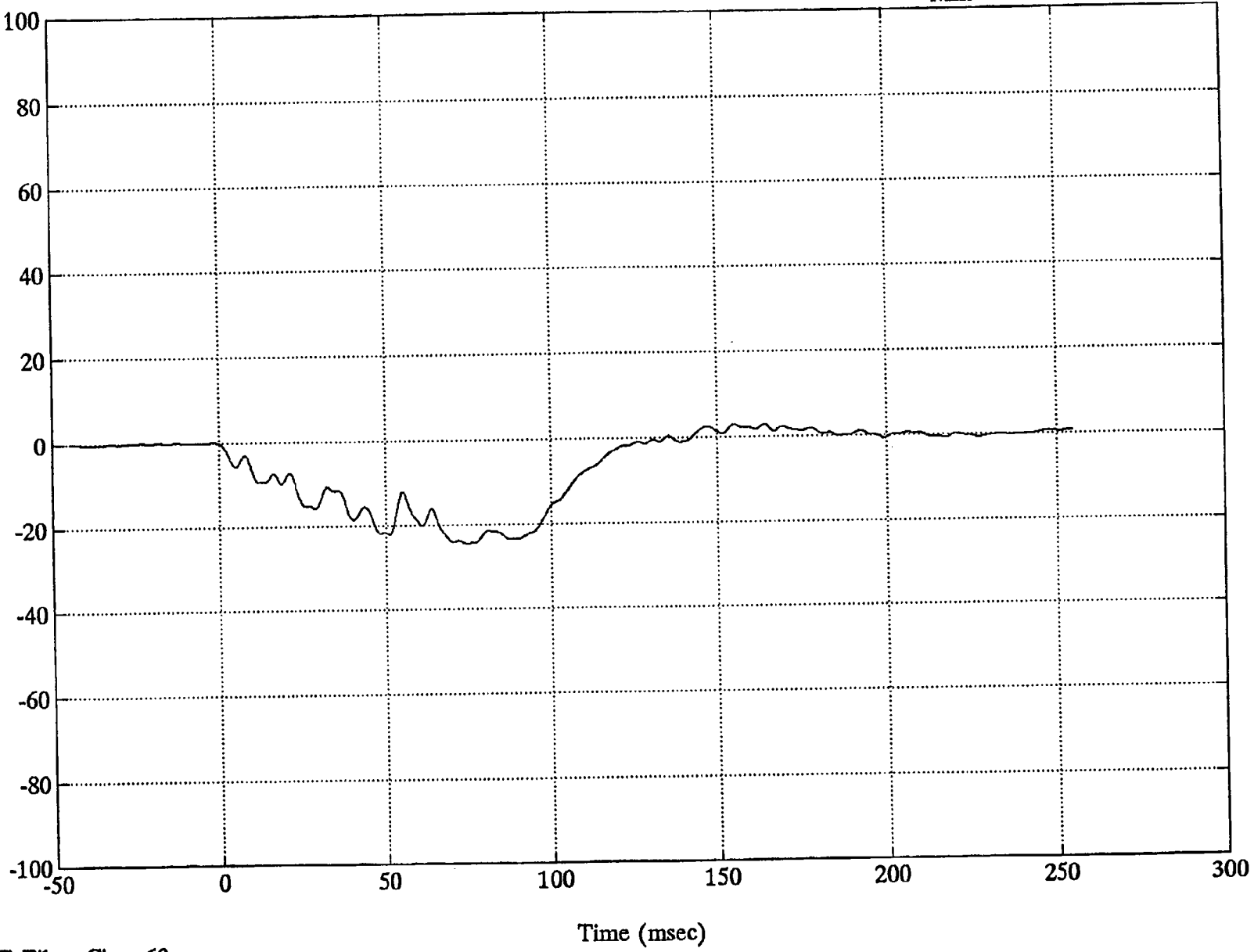
8048-1

SAE Filter Class 60

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Acc. #2(x)

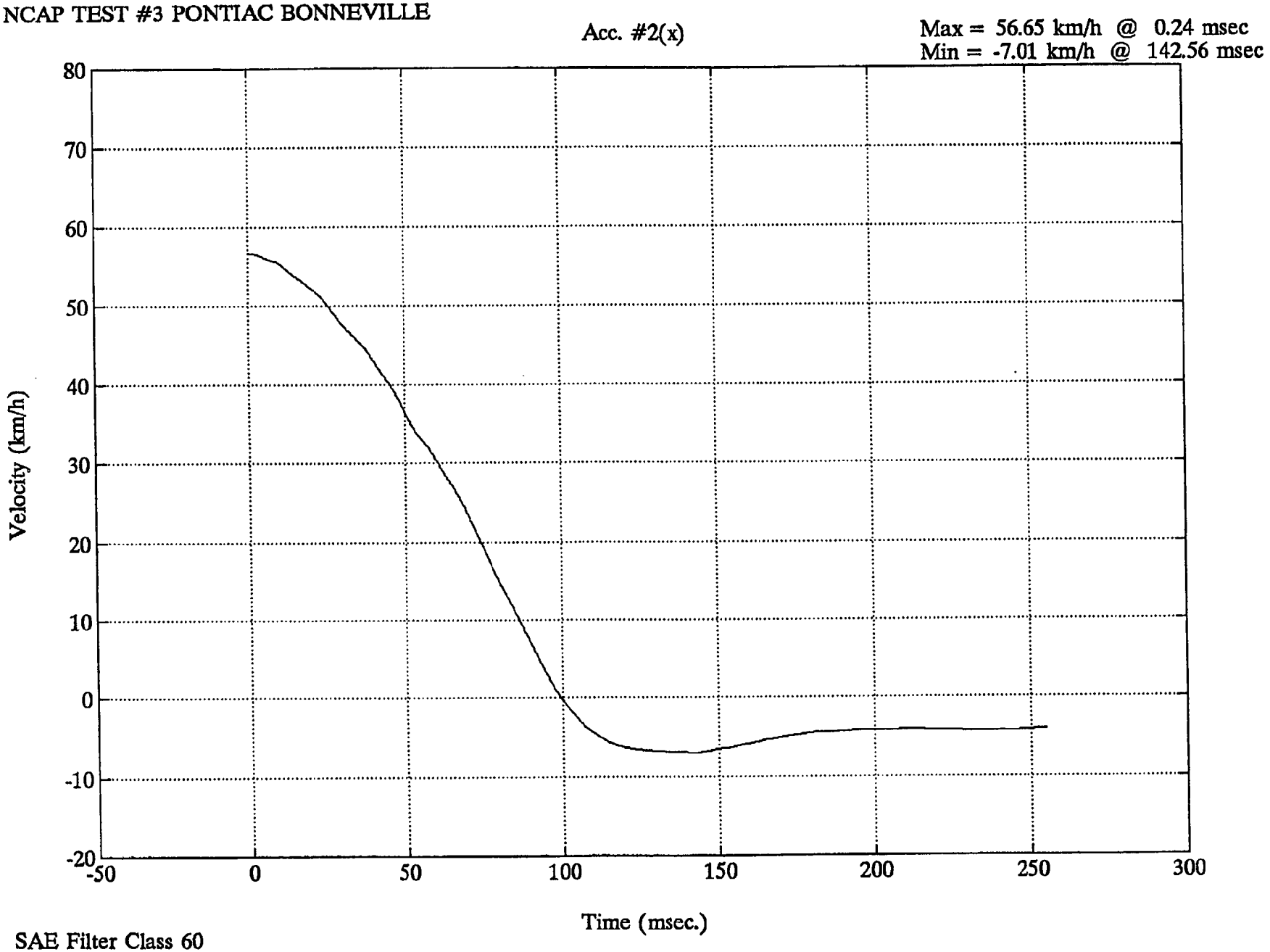
Max = 2.99 Gs @ 155.16 msec
Min = -24.51 Gs @ 74.76 msec



SAE Filter Class 60

8048-1

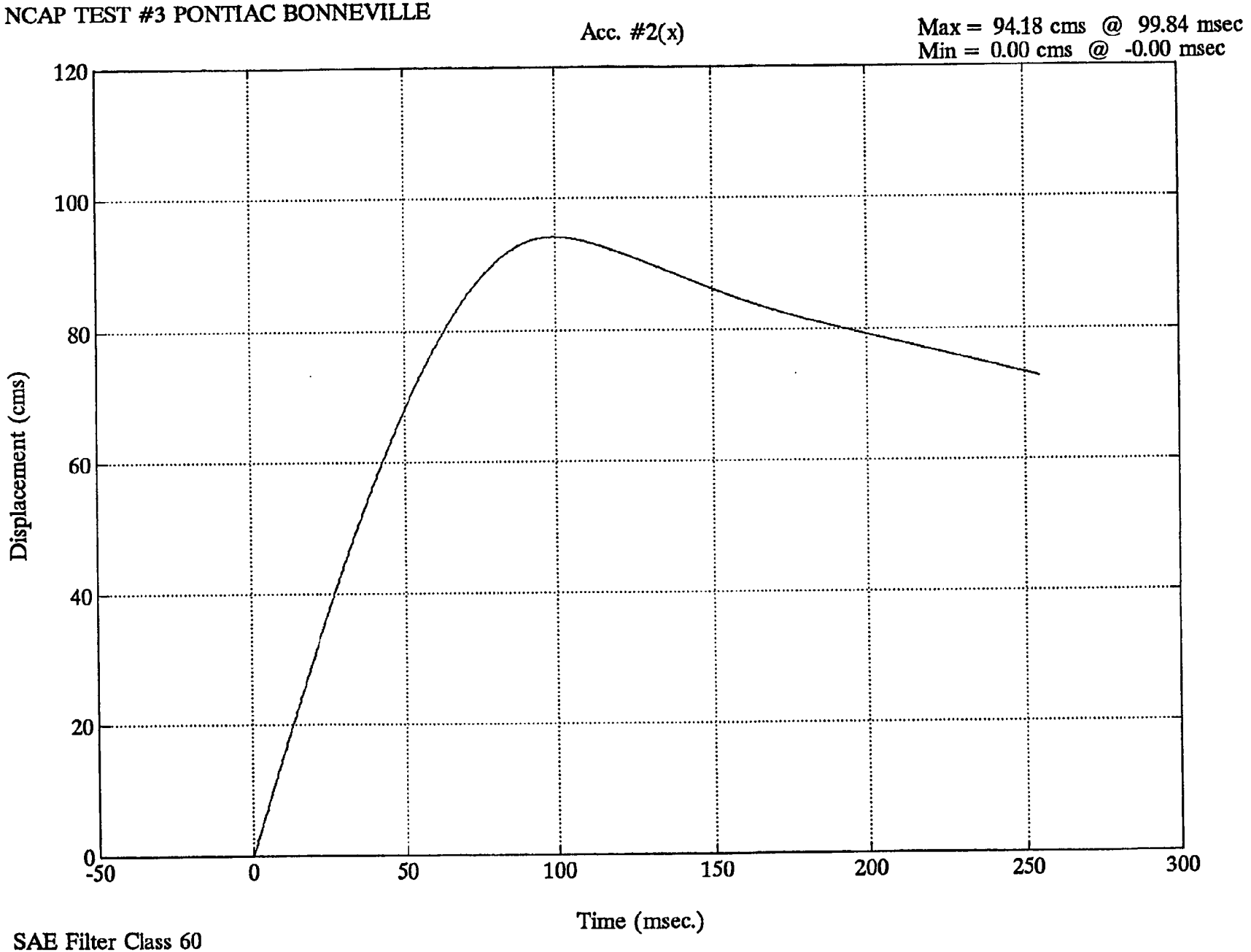
NCAP TEST #3 PONTIAC BONNEVILLE



SAE Filter Class 60

8048-1

NCAP TEST #3 PONTIAC BONNEVILLE



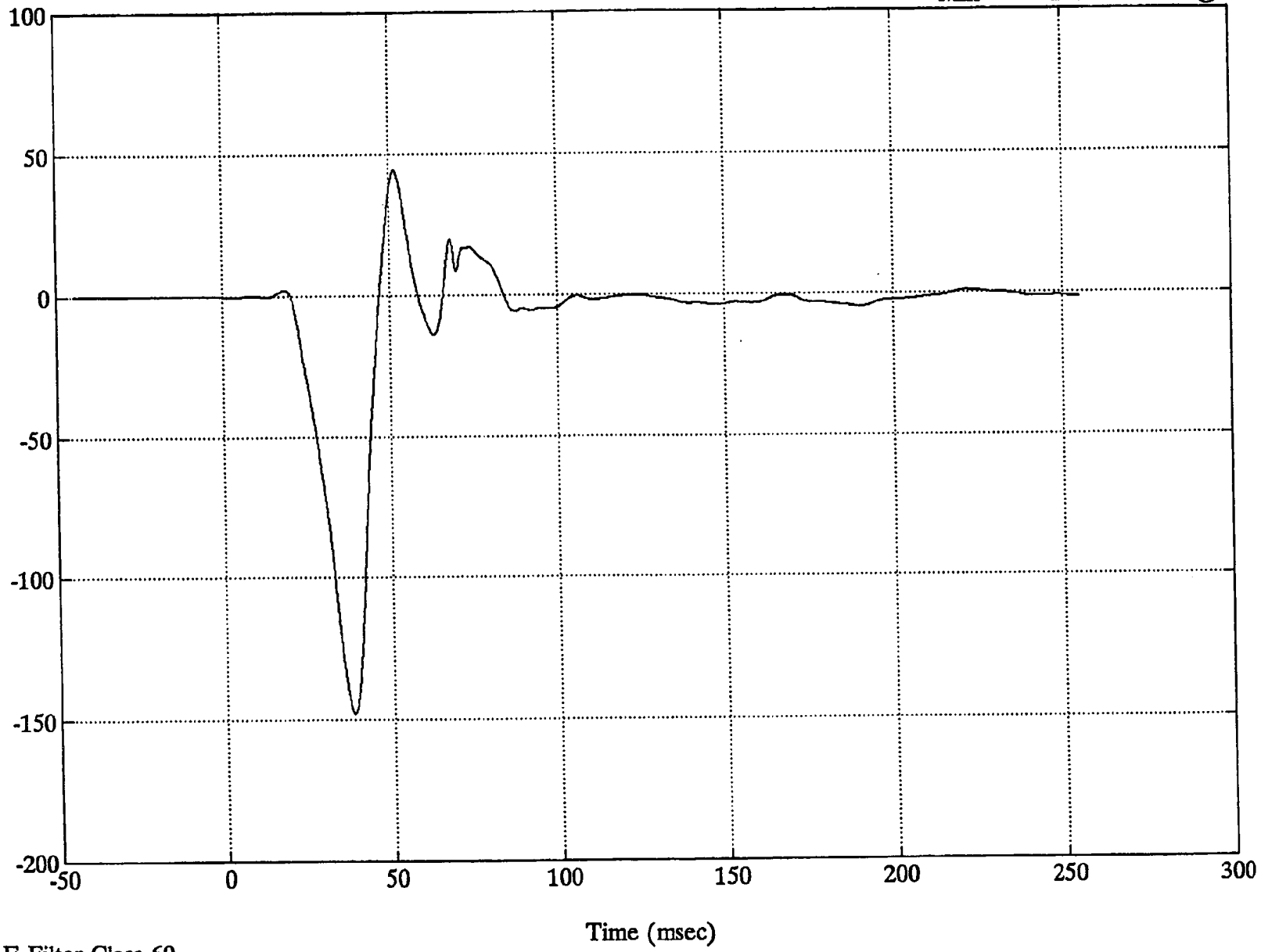
SAE Filter Class 60

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Acc. #3(x)

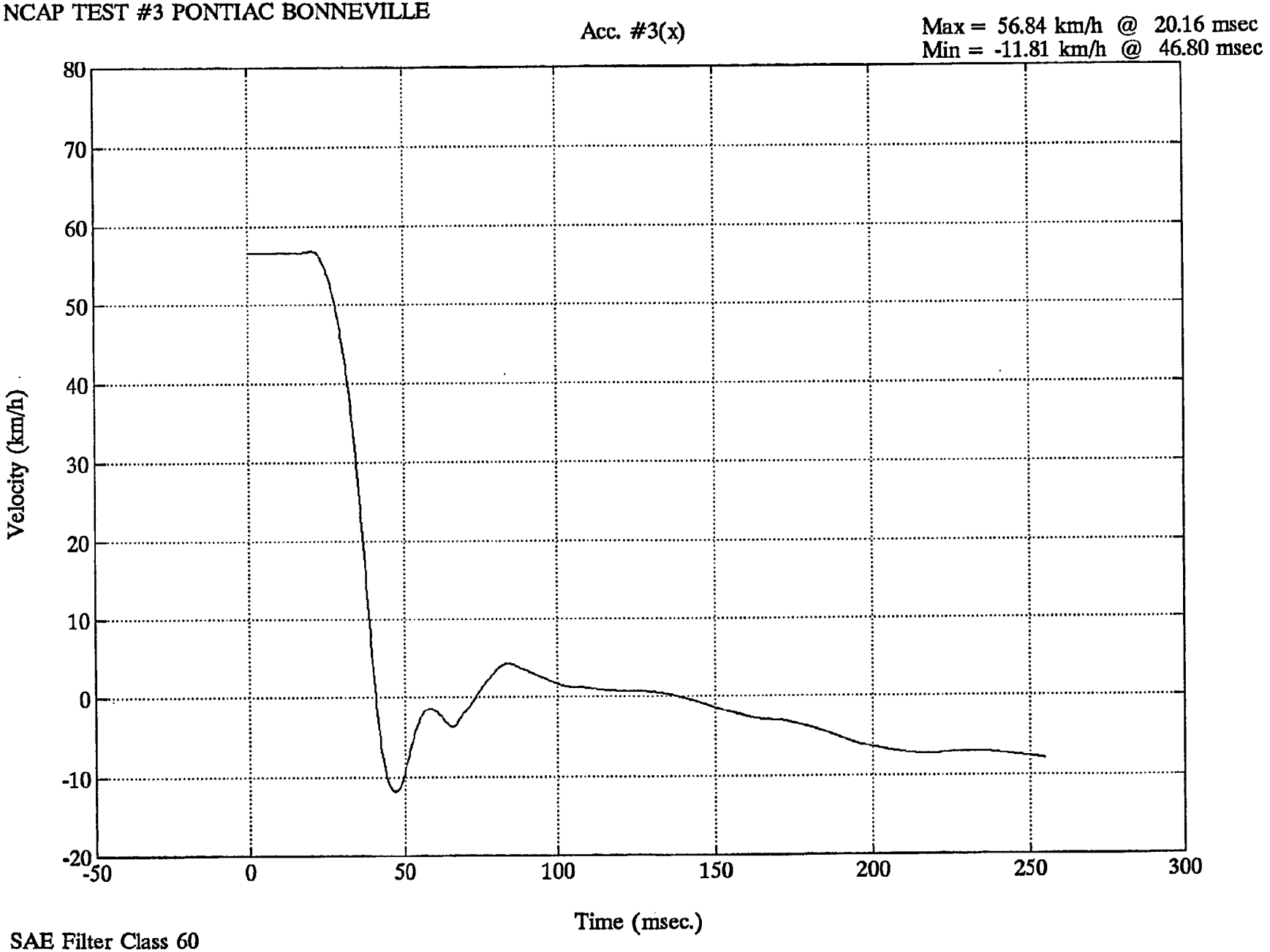
Max = 44.33 Gs @ 51.72 msec
Min = -147.79 Gs @ 37.79 msec



SAE Filter Class 60

8048-1

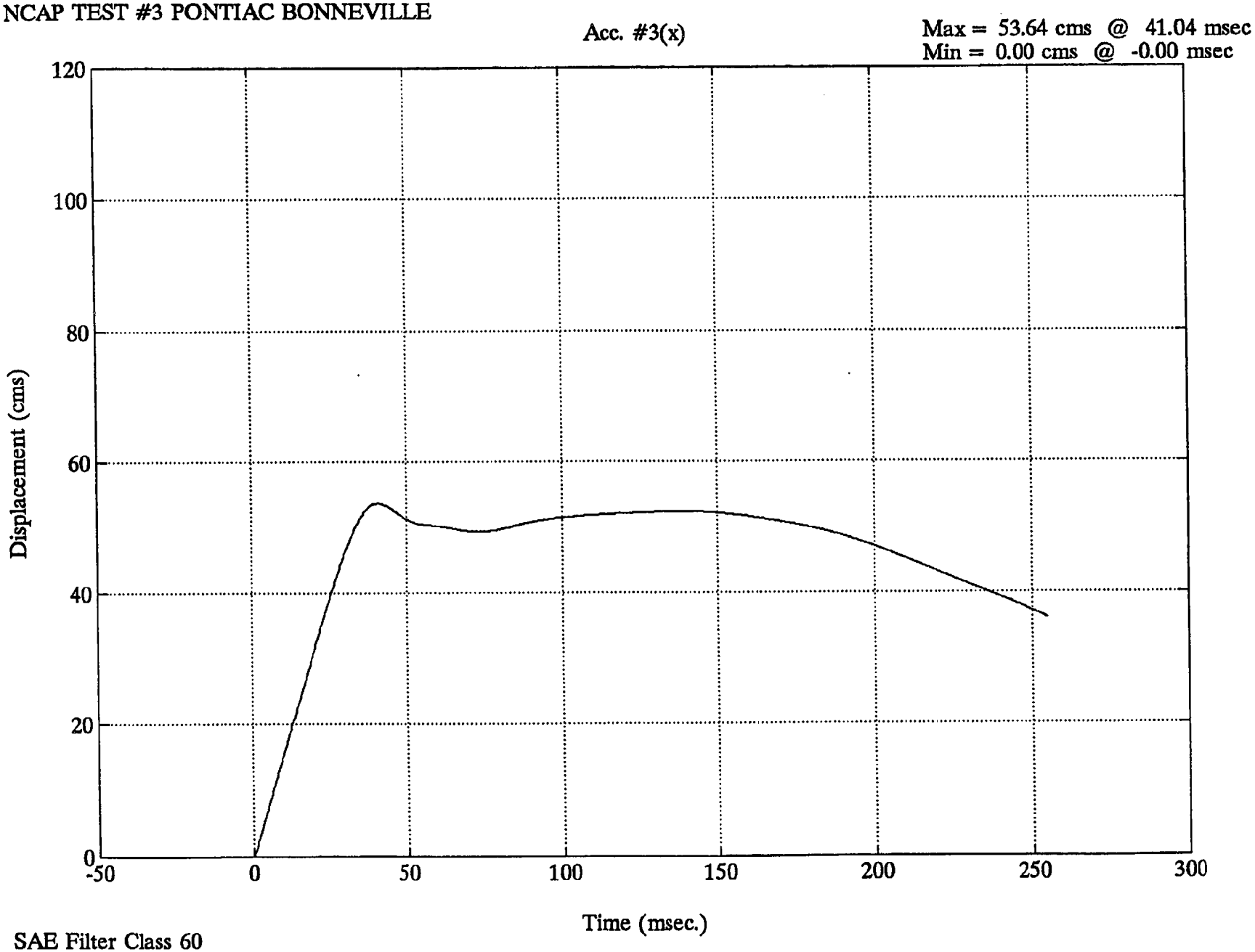
NCAP TEST #3 PONTIAC BONNEVILLE



SAE Filter Class 60

8048-1

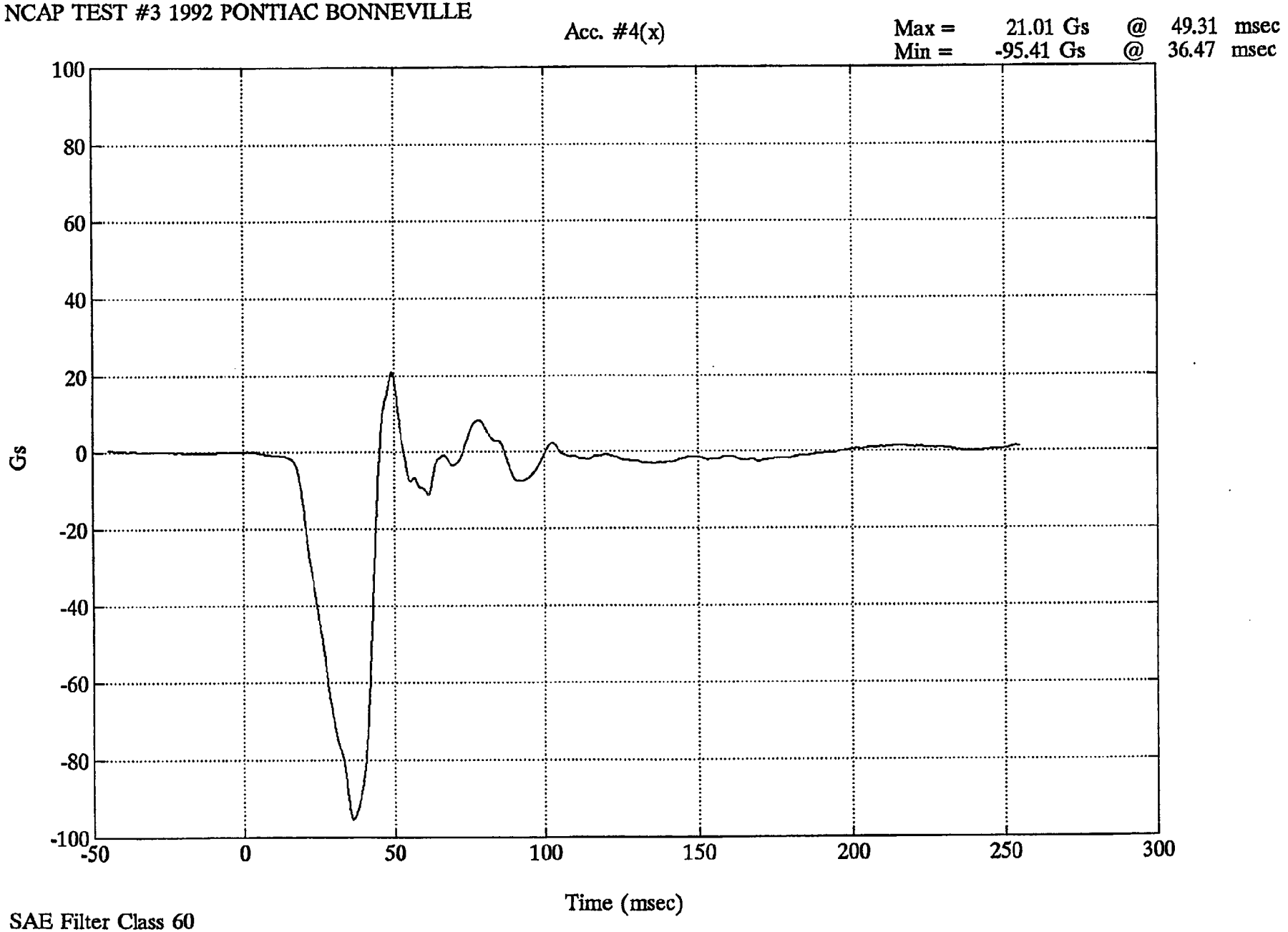
NCAP TEST #3 PONTIAC BONNEVILLE



SAE Filter Class 60

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

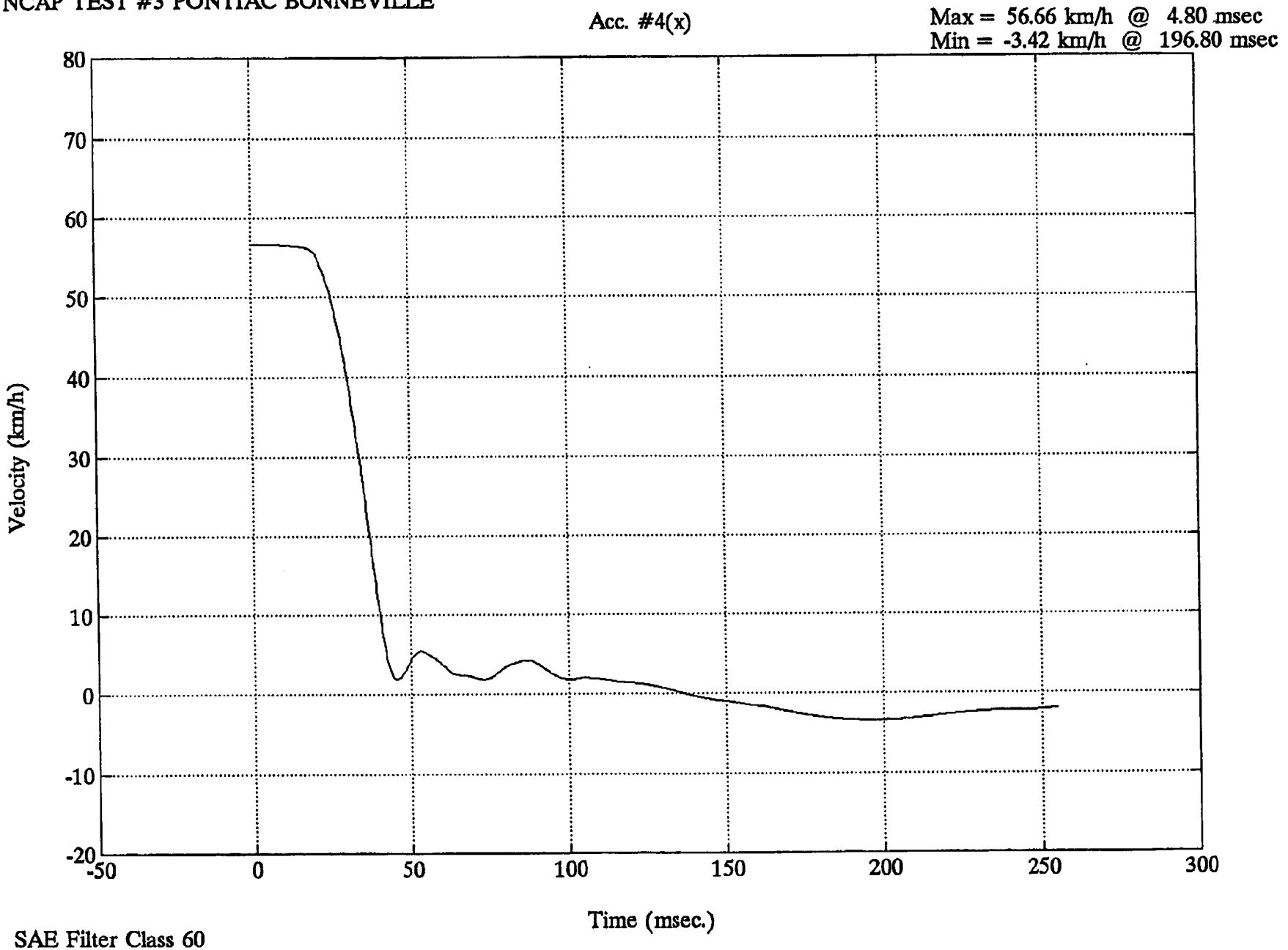


B-12

8048-1

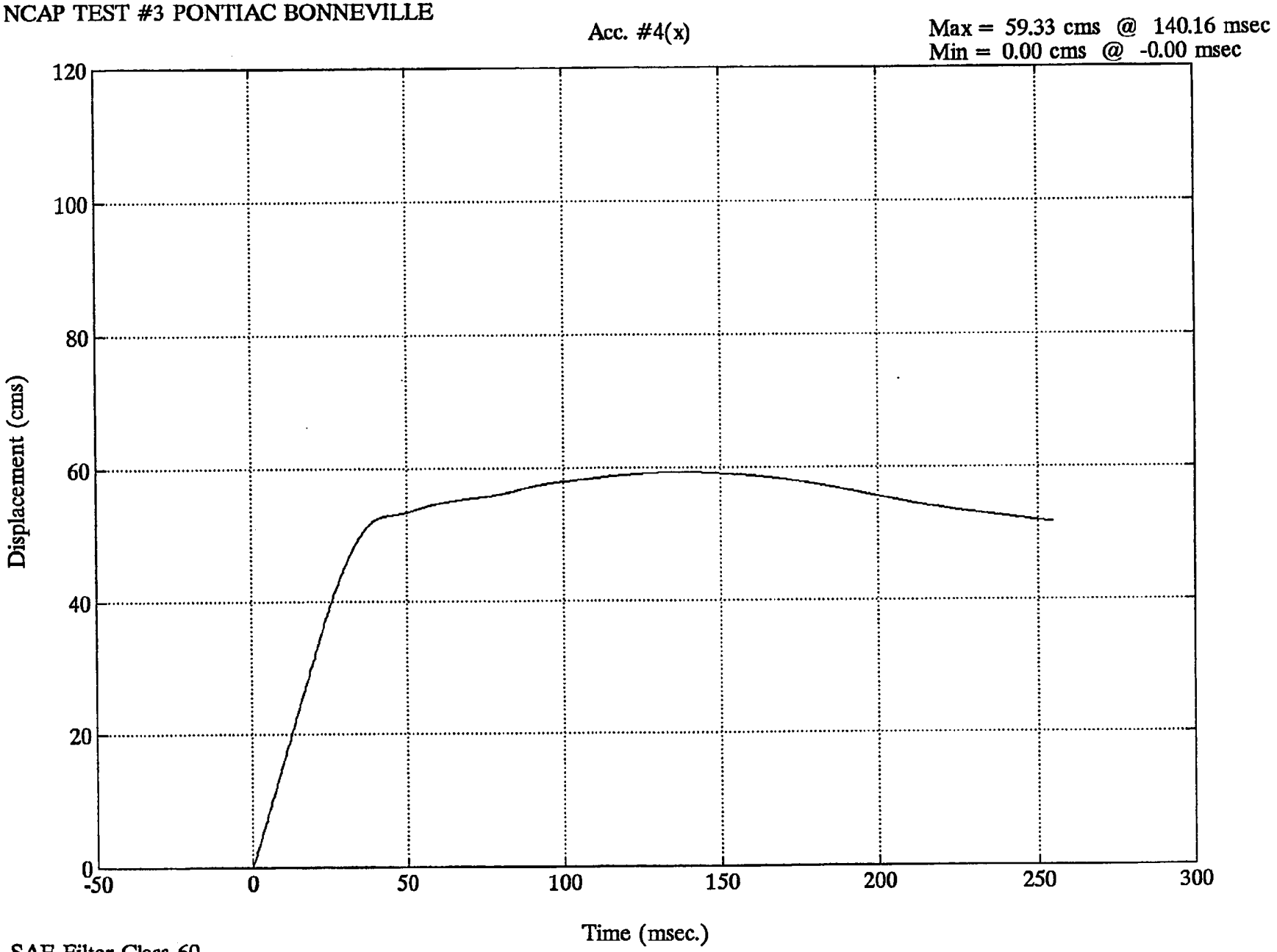
SAE Filter Class 60

NCAP TEST #3 PONTIAC BONNEVILLE



SAE Filter Class 60

NCAP TEST #3 PONTIAC BONNEVILLE



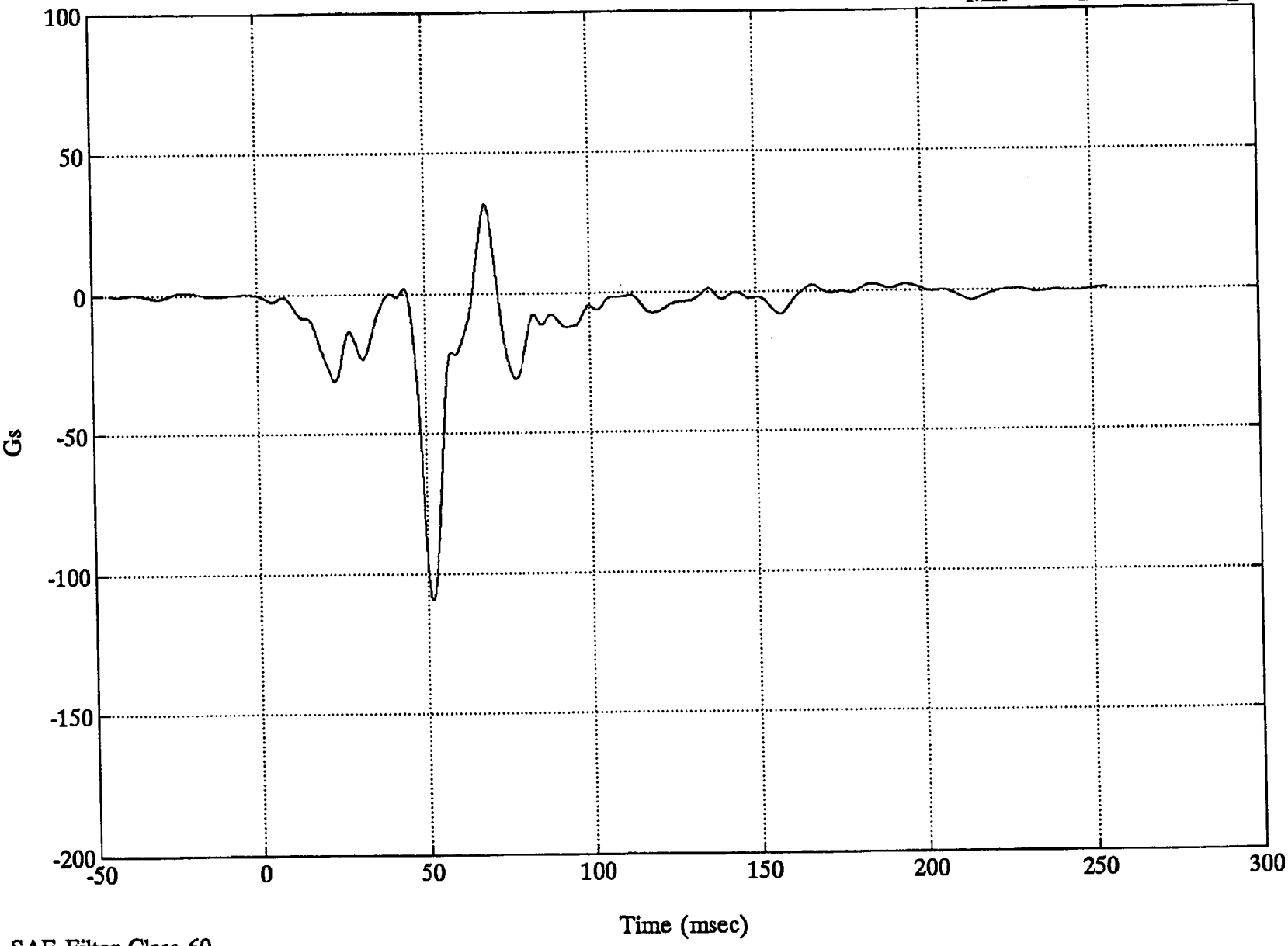
SAE Filter Class 60

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Acc. #5(x)

Max = 31.80 Gs @ 68.52 msec
Min = -109.27 Gs @ 51.47 msec

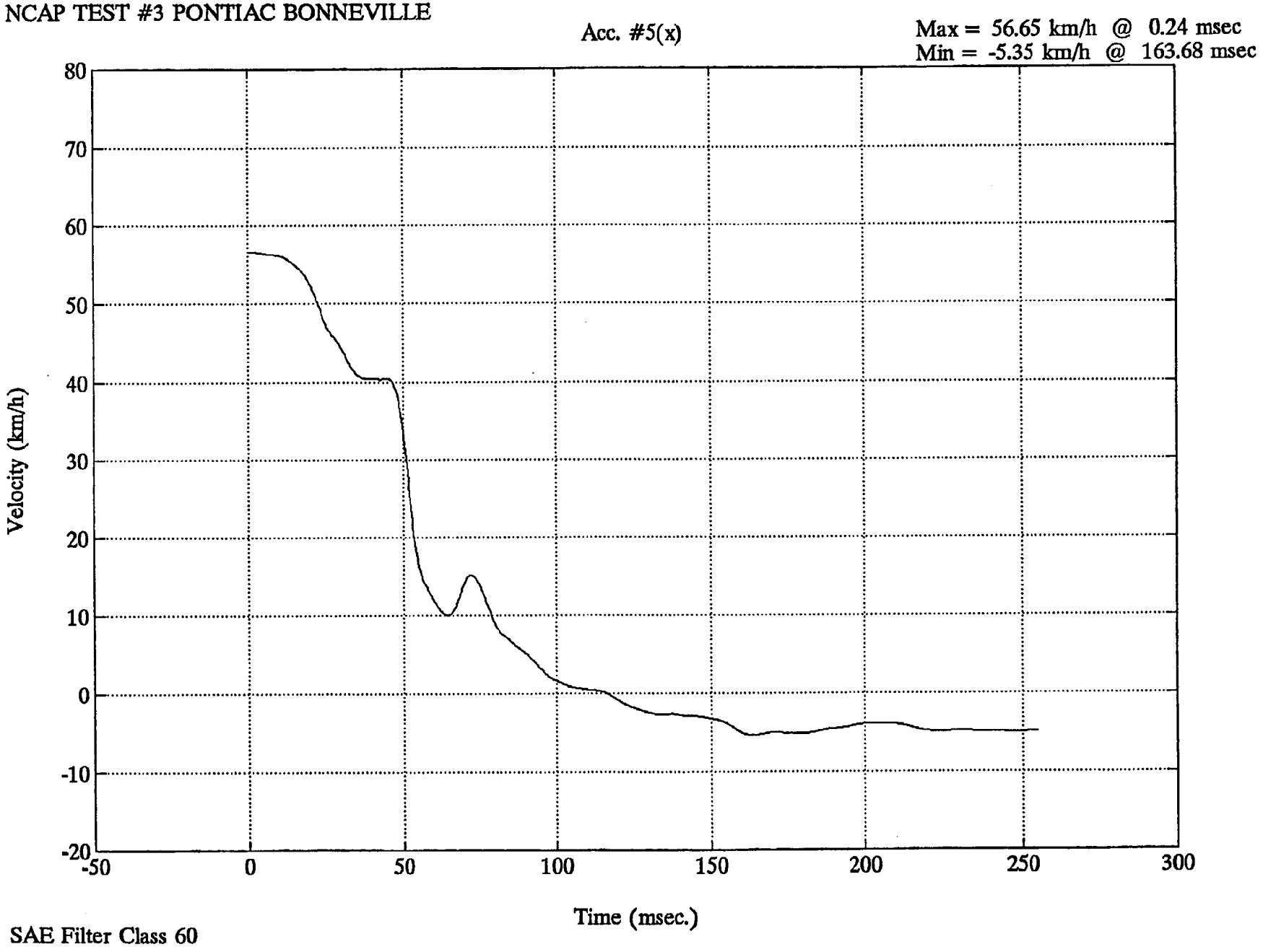


B-15

8048-1

SAE Filter Class 60

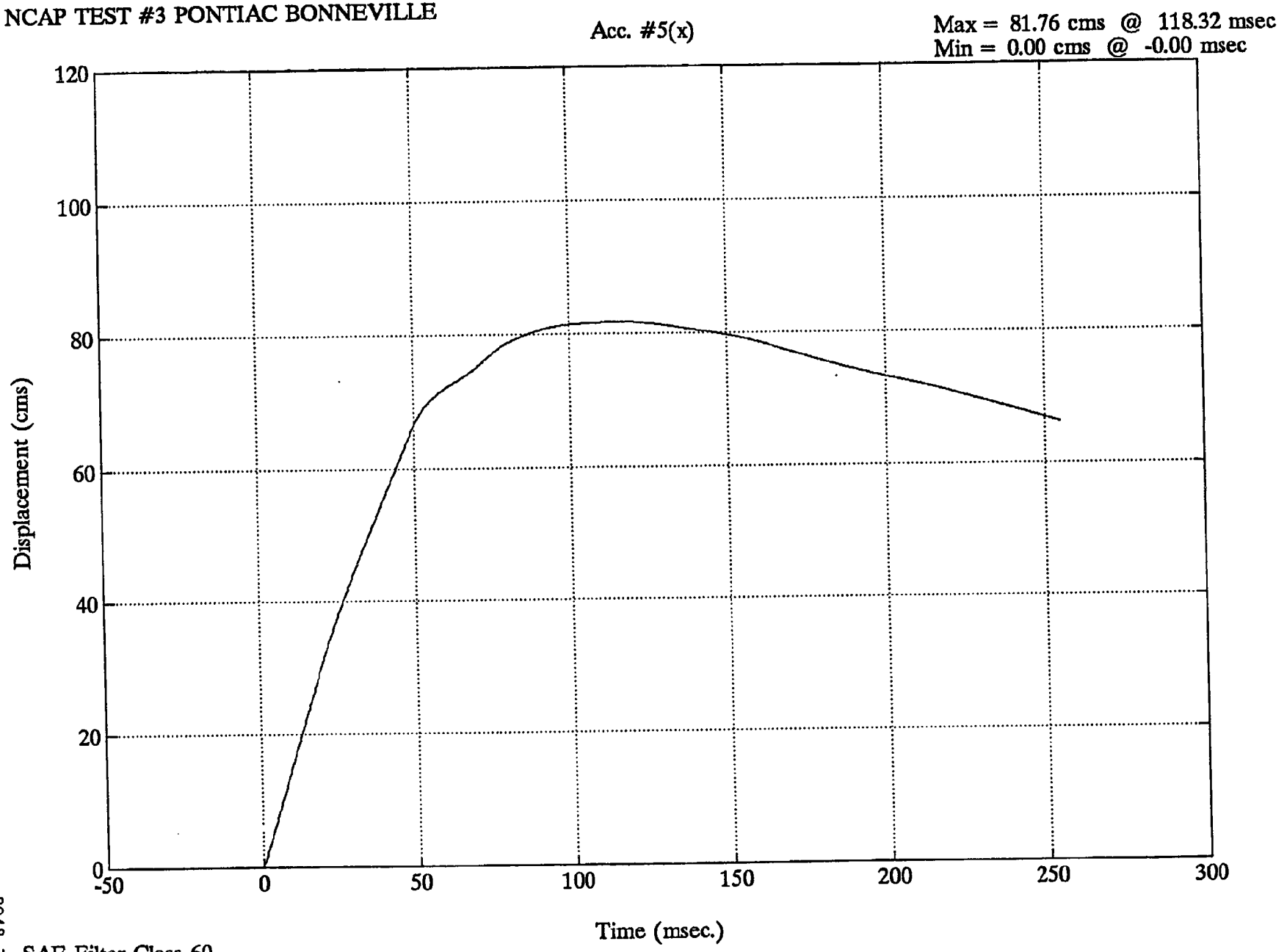
NCAP TEST #3 PONTIAC BONNEVILLE



SAE Filter Class 60

8048-1

NCAP TEST #3 PONTIAC BONNEVILLE



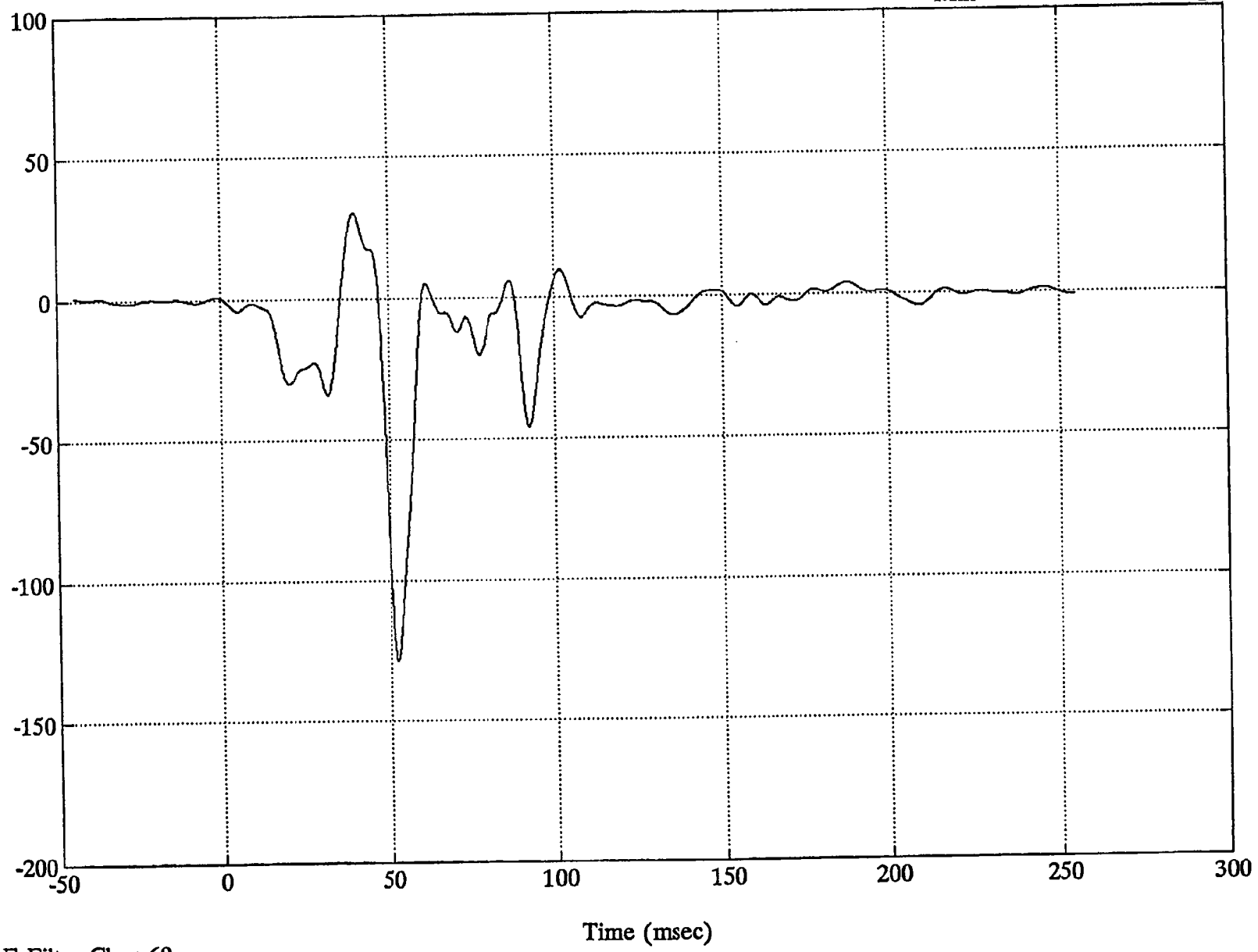
SAE Filter Class 60

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Acc. #6(x)

Max = 30.51 Gs @ 39.59 msec
Min = -128.53 Gs @ 52.20 msec

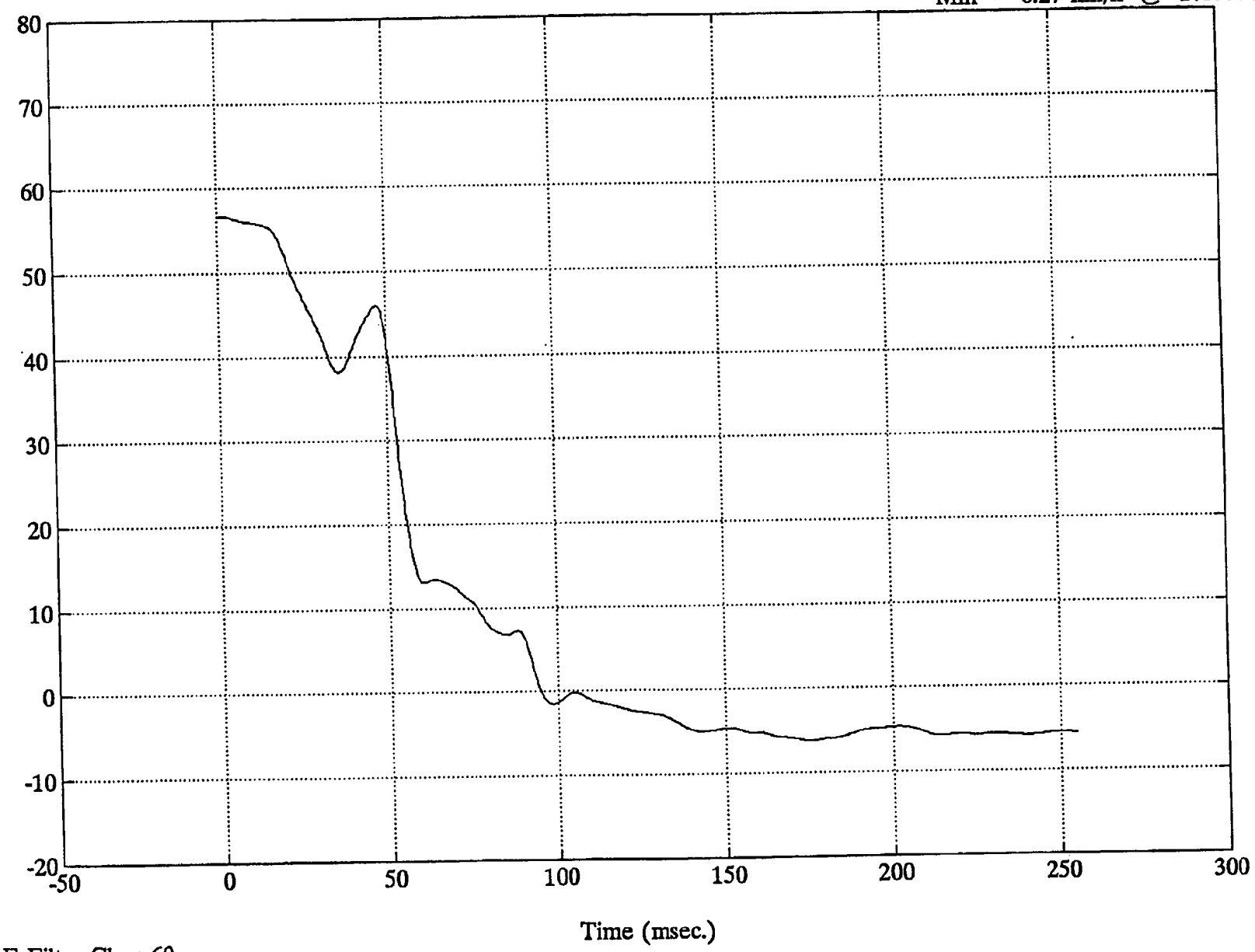


SAE Filter Class 60

NCAP TEST #3 PONTIAC BONNEVILLE

Acc. #6(x)

Max = 56.66 km/h @ 1.20 msec
Min = -6.27 km/h @ 175.44 msec



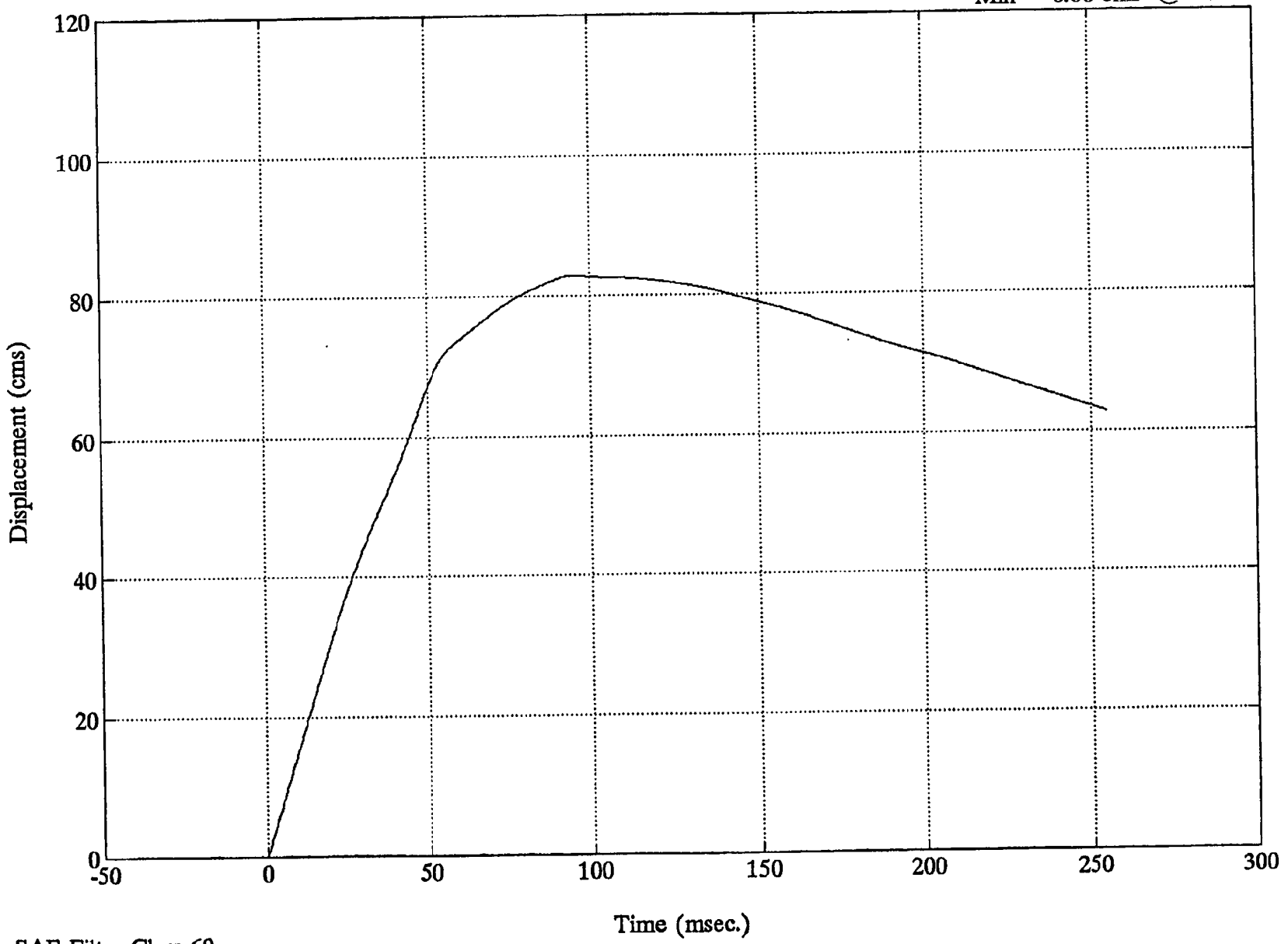
SAE Filter Class 60

8048-1

NCAP TEST #3 PONTIAC BONNEVILLE

Acc. #6(x)

Max = 82.88 cms @ 95.04 msec
Min = 0.00 cms @ -0.00 msec



B-20

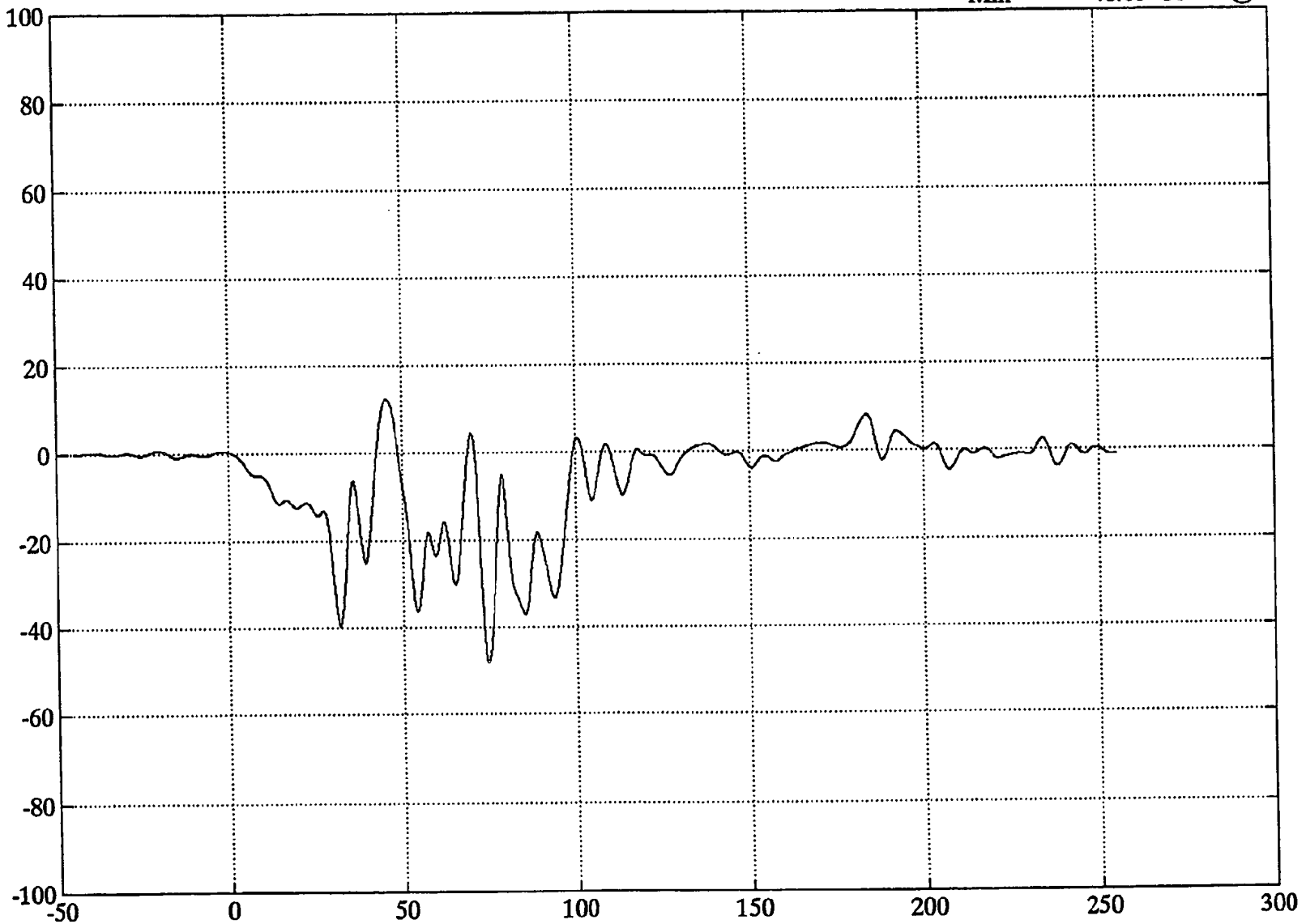
8048-1

SAE Filter Class 60

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Acc. #7(x)

Max = 12.28 Gs @ 45.24 msec
Min = -48.05 Gs @ 74.27 msec

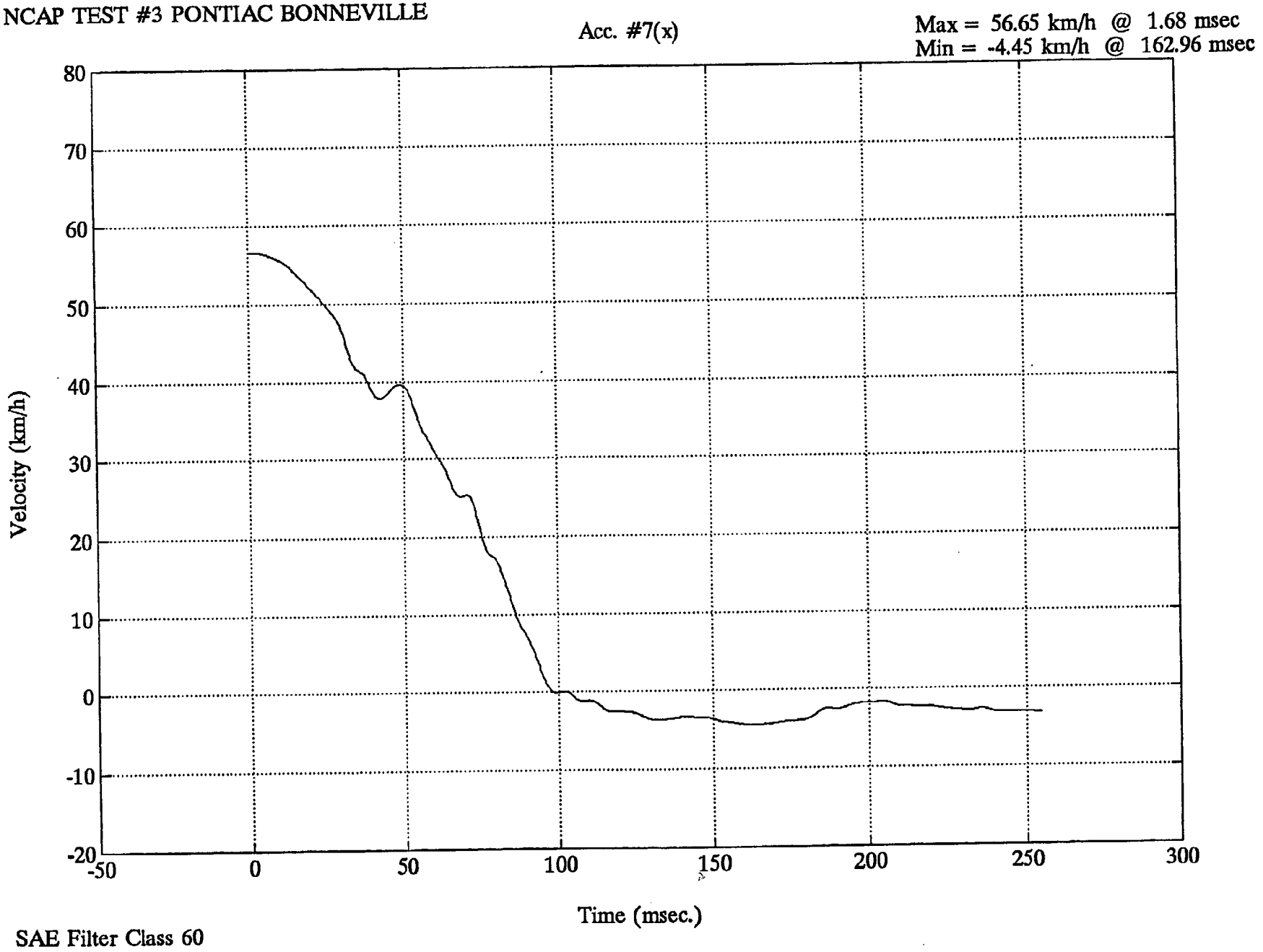


B-21

8048-1

SAE Filter Class 60

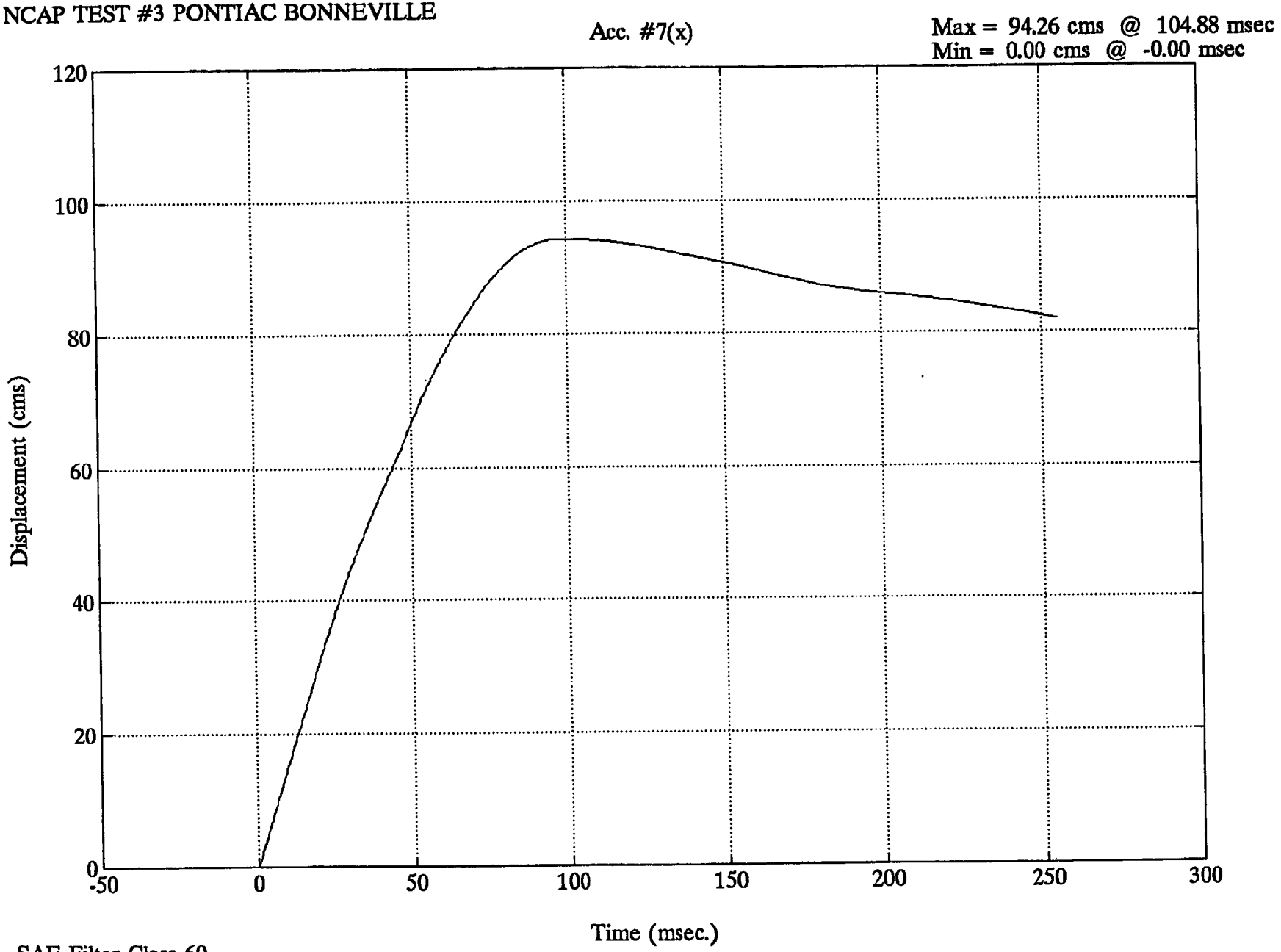
NCAP TEST #3 PONTIAC BONNEVILLE



SAE Filter Class 60

8048-1

NCAP TEST #3 PONTIAC BONNEVILLE

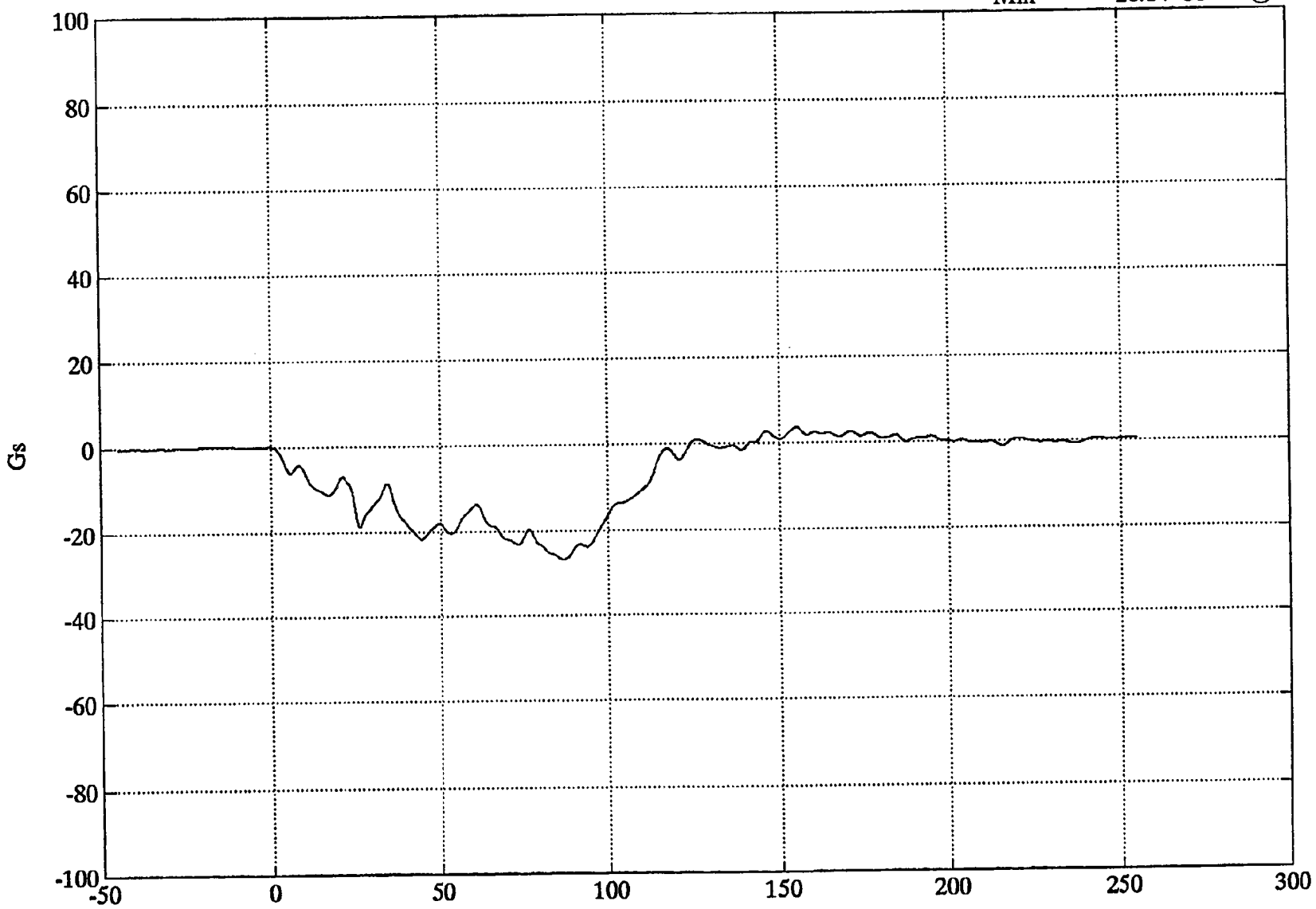


SAE Filter Class 60

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Acc. #8(x)

Max = 3.56 Gs @ 155.04 msec
Min = -26.84 Gs @ 86.63 msec

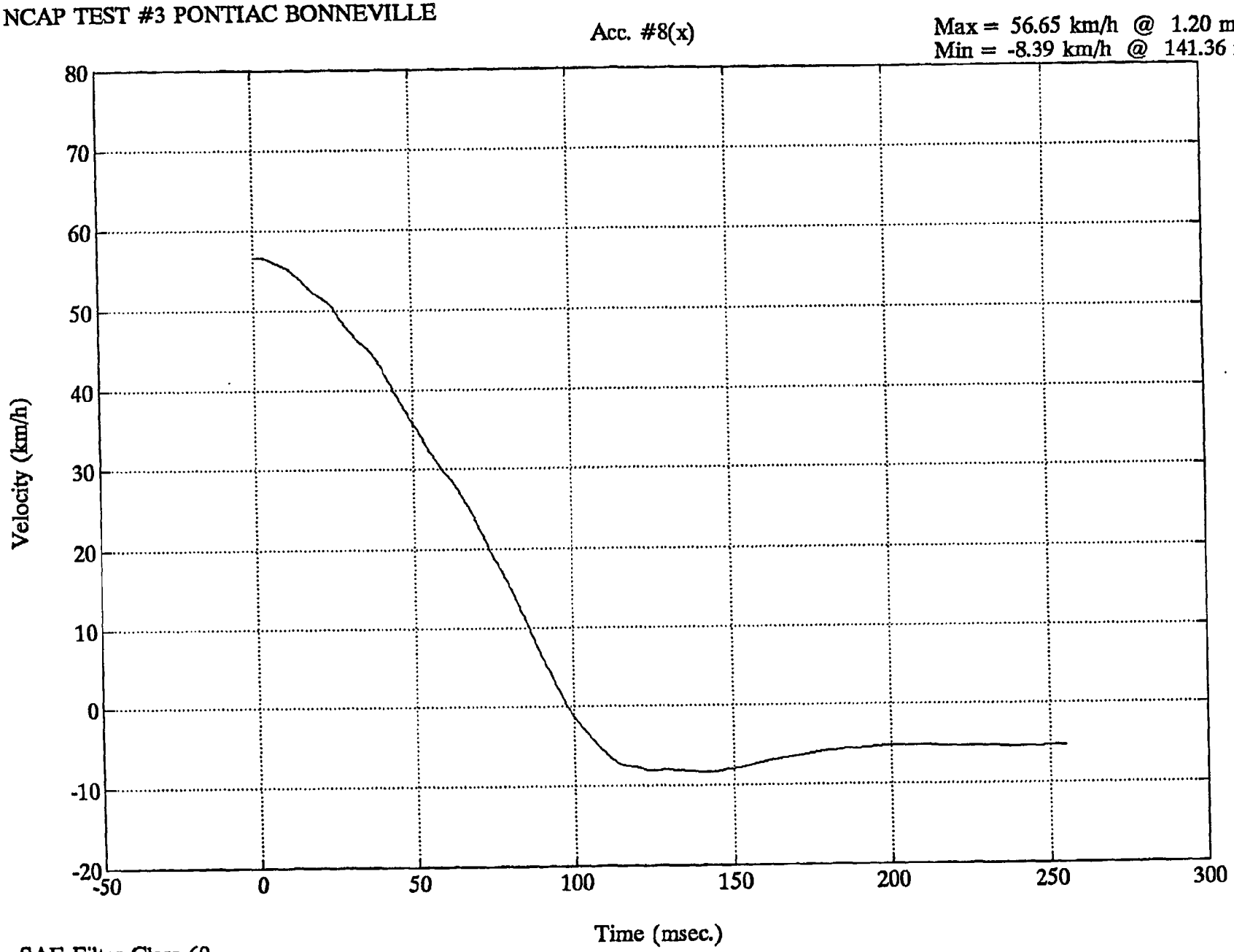


B-24

8048-1

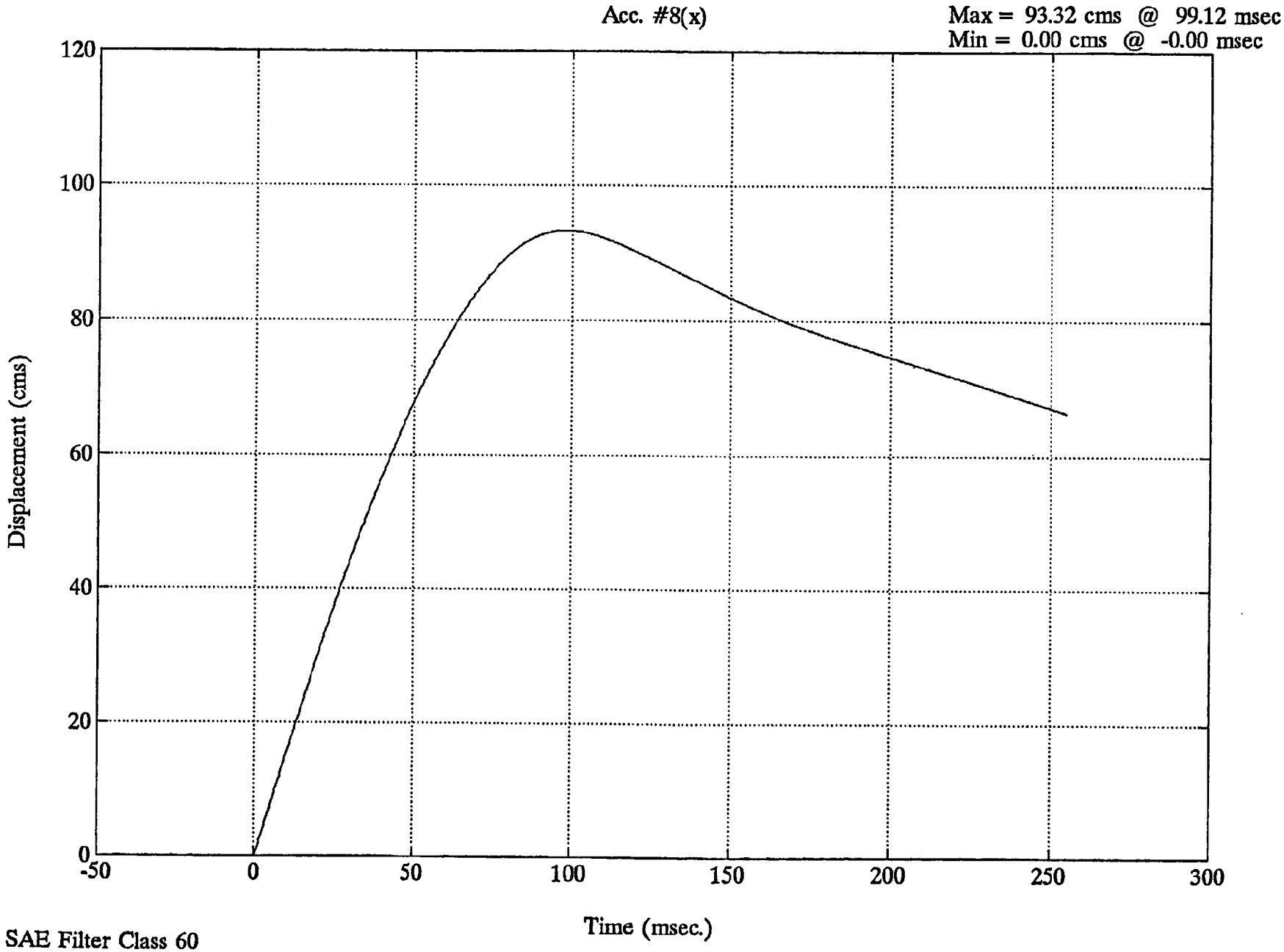
SAE Filter Class 60

NCAP TEST #3 PONTIAC BONNEVILLE



SAE Filter Class 60

NCAP TEST #3 PONTIAC BONNEVILLE

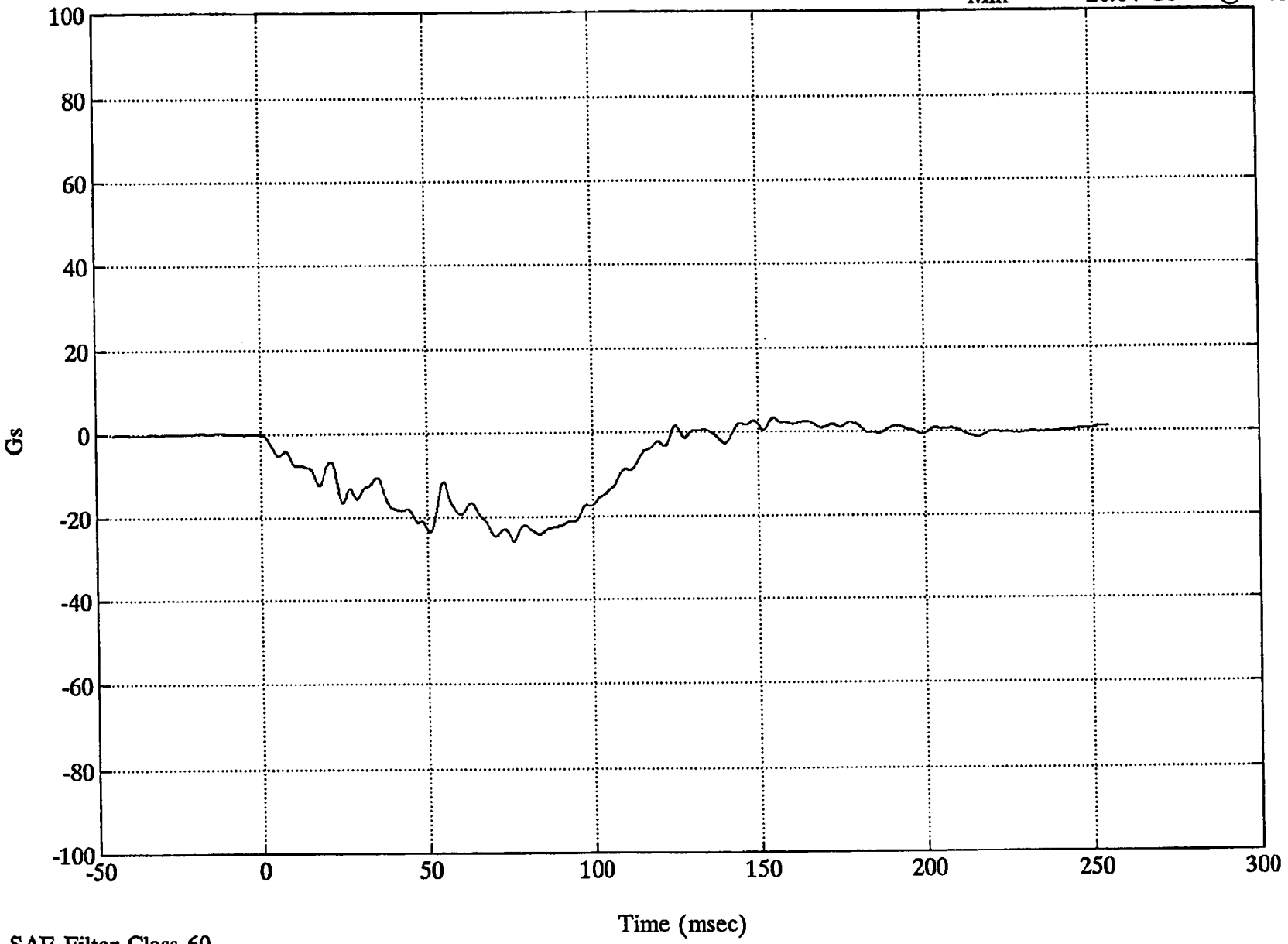


SAE Filter Class 60

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Acc. #9(x)

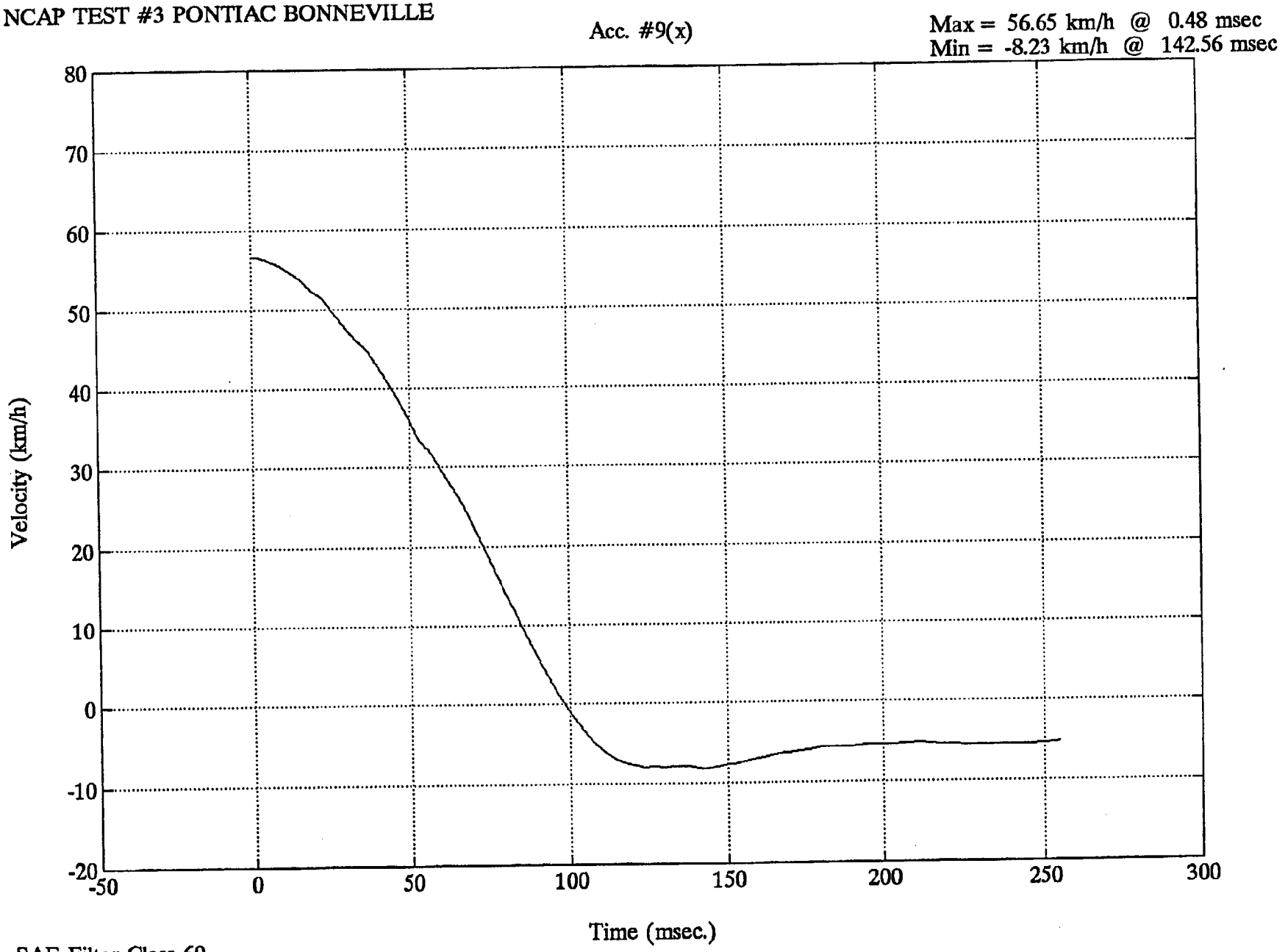
Max = 3.33 Gs @ 154.55 msec
Min = -26.04 Gs @ 75.95 msec



SAE Filter Class 60

8048-1

NCAP TEST #3 PONTIAC BONNEVILLE

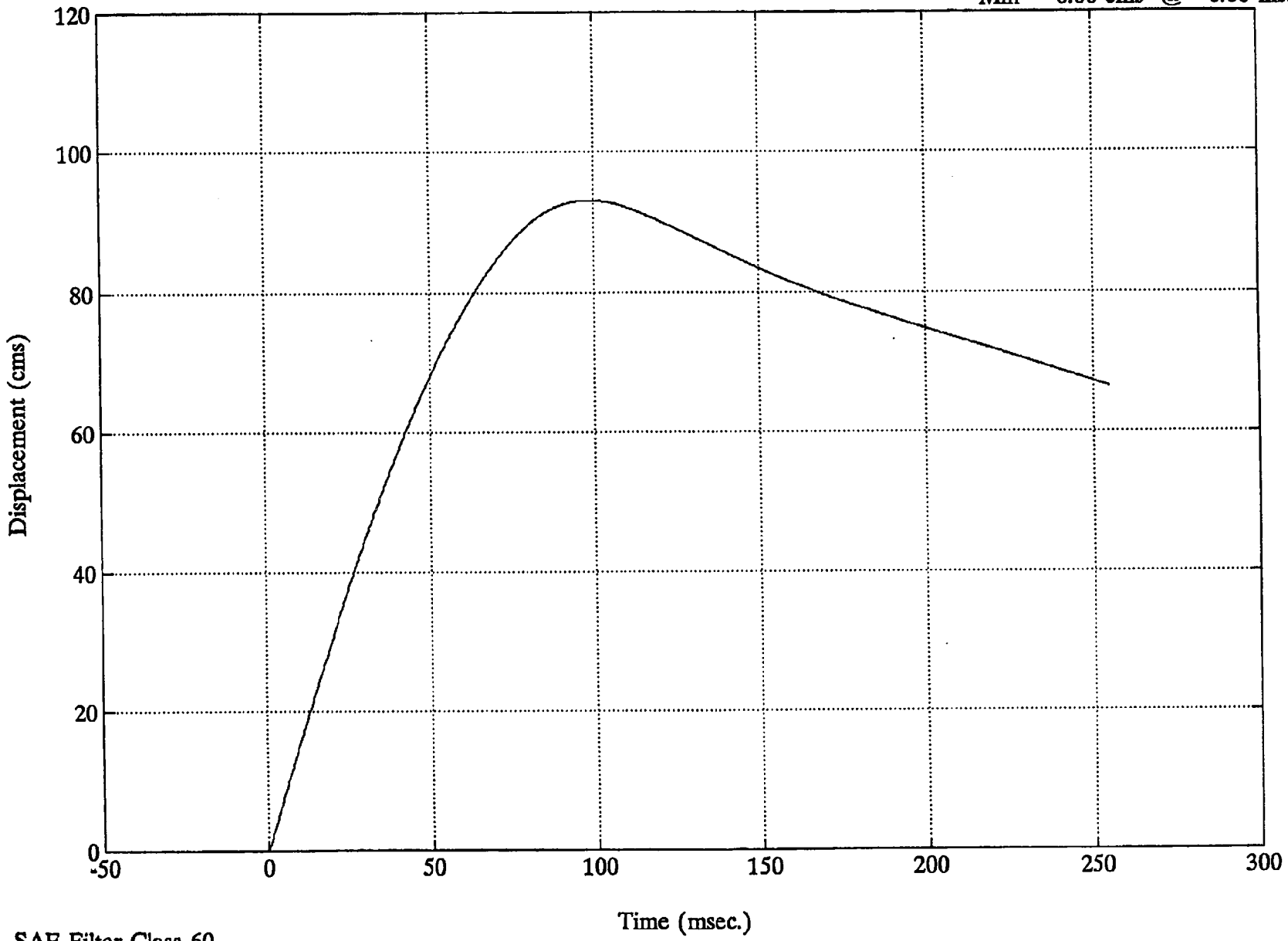


SAE Filter Class 60

NCAP TEST #3 PONTIAC BONNEVILLE

Acc. #9(x)

Max = 93.09 cms @ 99.84 msec
Min = 0.00 cms @ -0.00 msec



SAE Filter Class 60

8048-1

TEST NO. MN0110

LOAD CELL BARRIER DATA

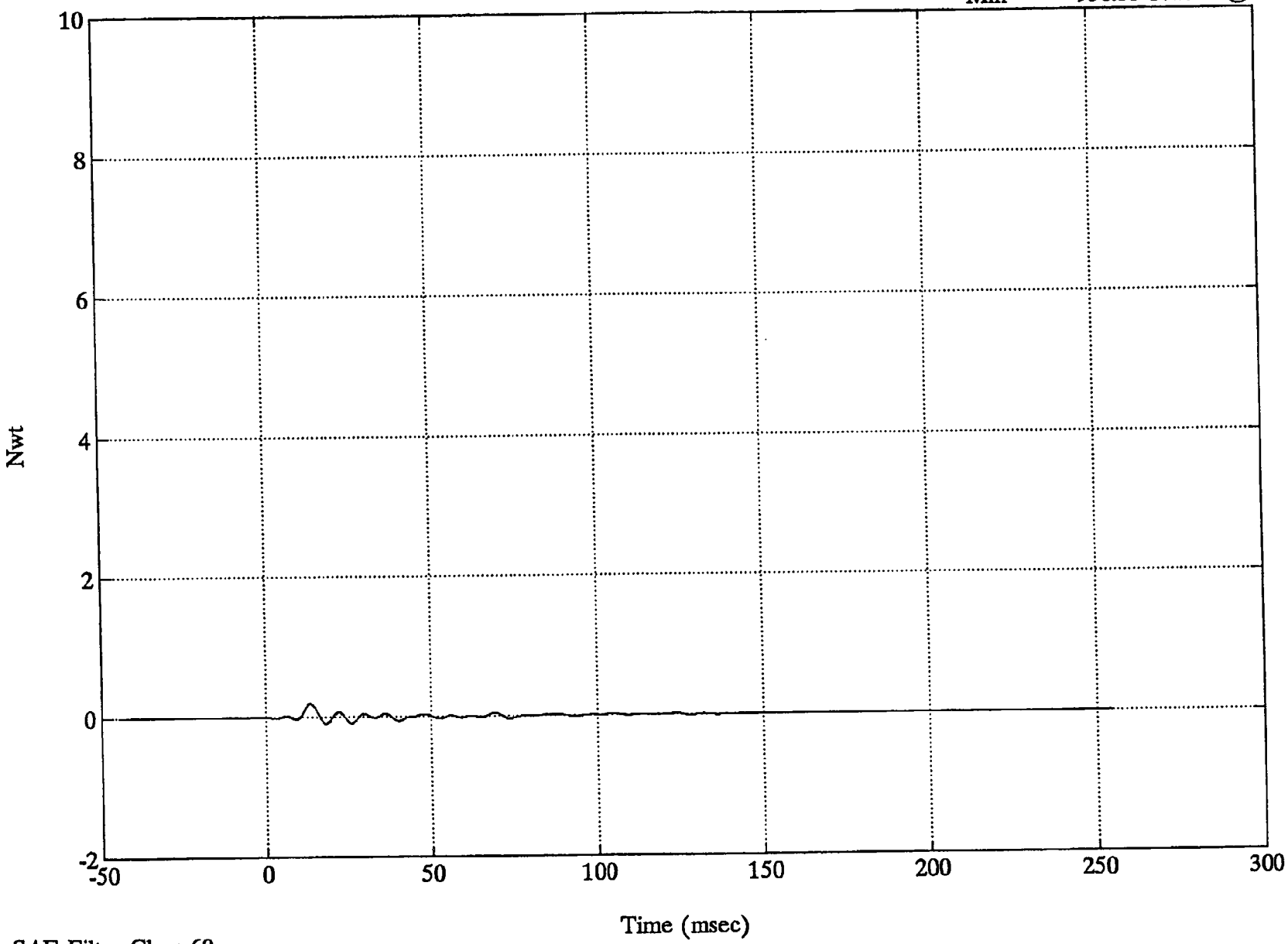
FILTER CHANNEL CLASS

60

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Barrier Load Cell A1

Max = 1893.31 Nwt @ 13.07 msec
Min = -936.35 Nwt @ 18.00 msec



SAE Filter Class 60

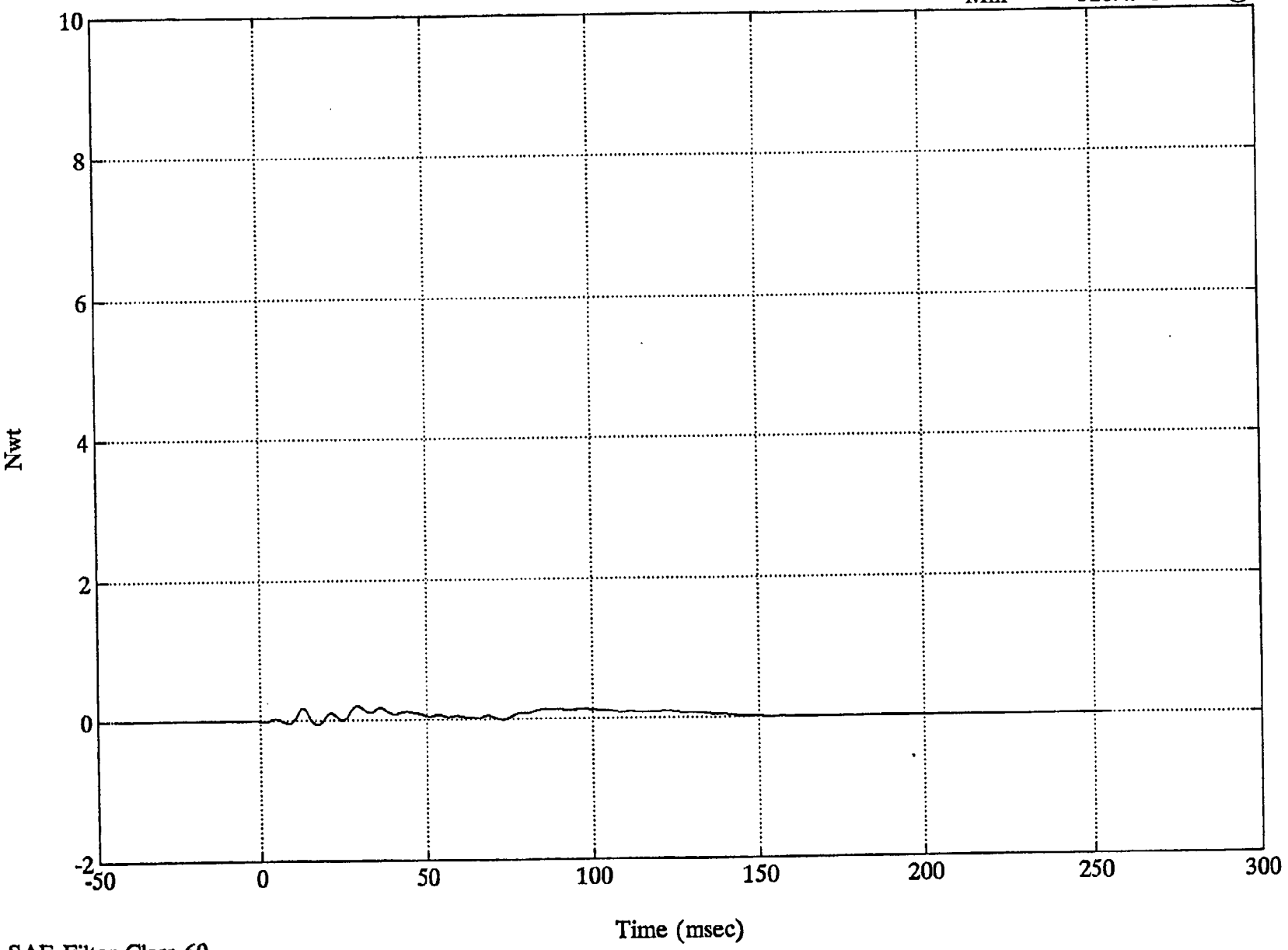
B-31

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Barrier Load Cell A2

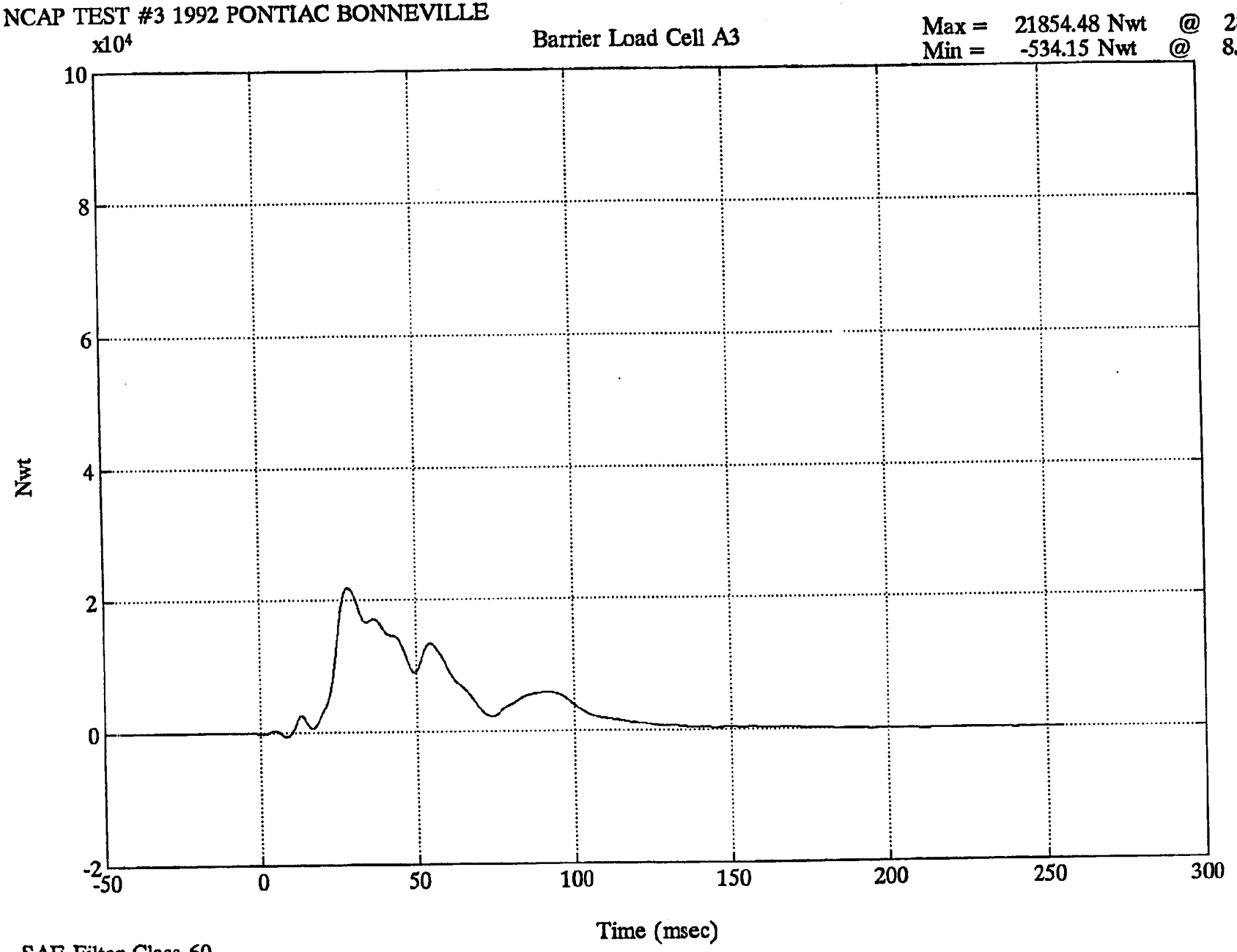
Max = 2045.38 Nwt @ 29.15 msec
Min = -528.49 Nwt @ 17.03 msec



SAE Filter Class 60

8048-1

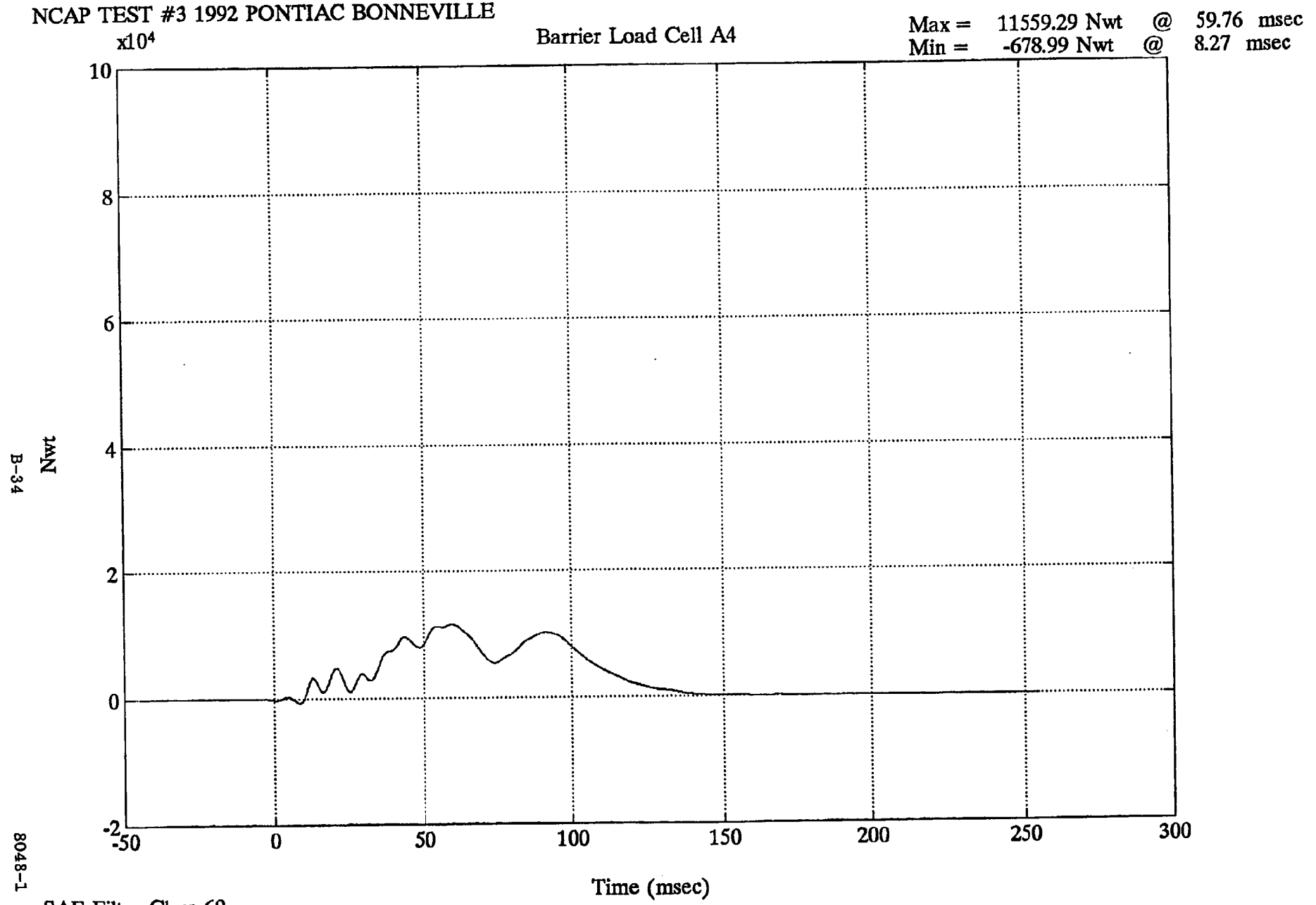
NCAP TEST #3 1992 PONTIAC BONNEVILLE



SAE Filter Class 60

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE



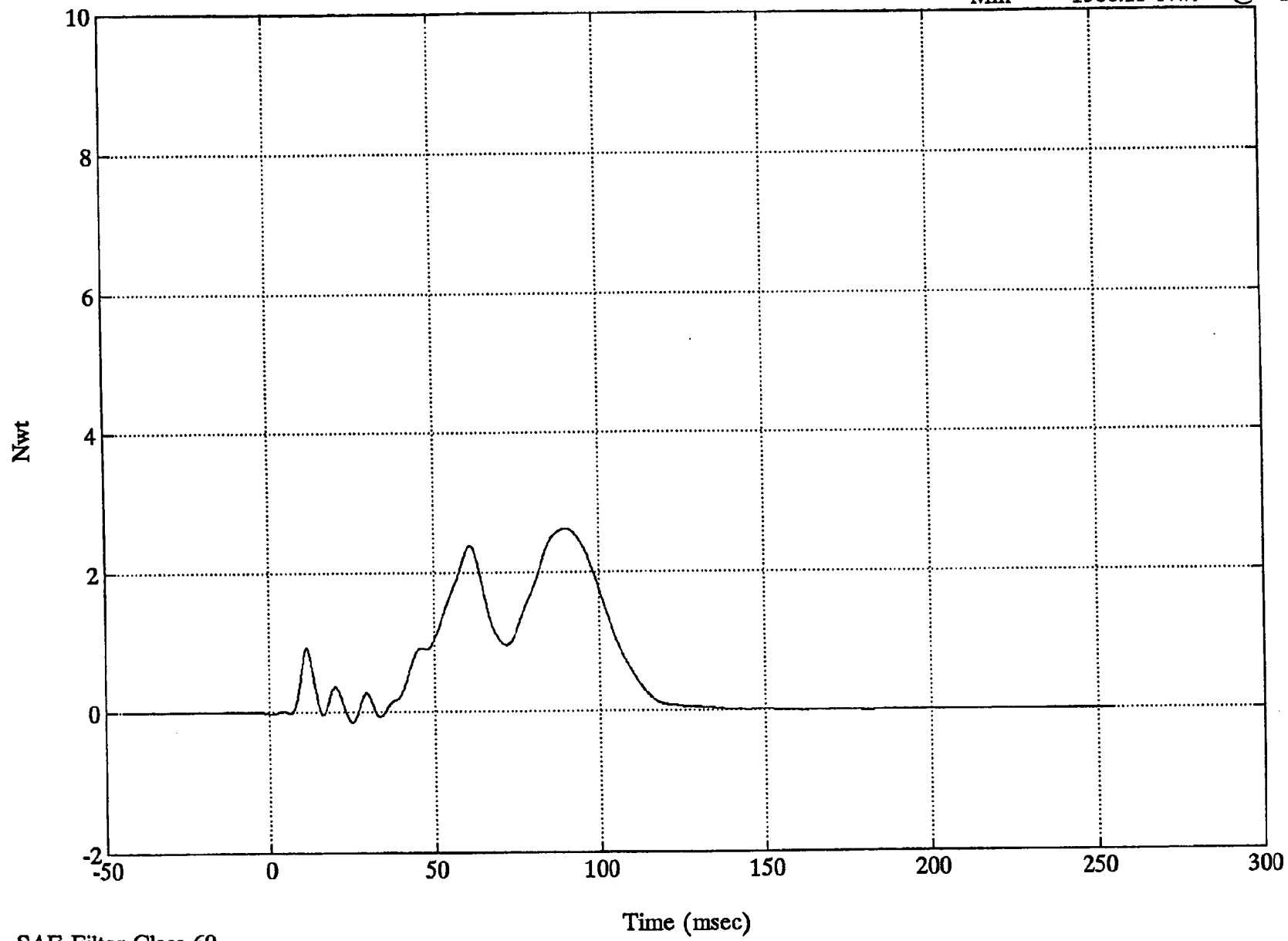
SAE Filter Class 60

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Barrier Load Cell A5

Max = 26220.32 Nwt @ 90.00 msec
Min = -1500.15 Nwt @ 24.83 msec



B-35

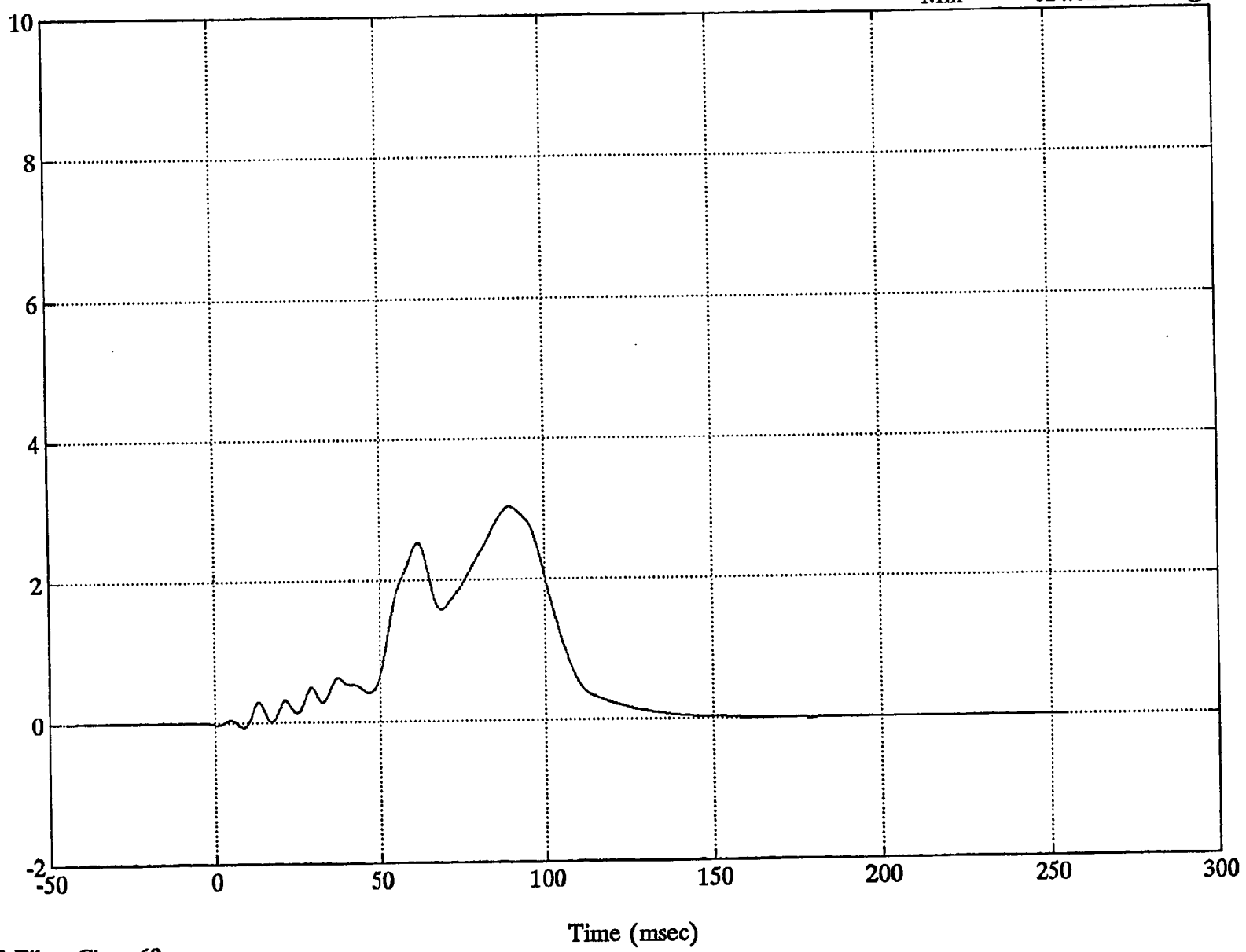
8048-1

SAE Filter Class 60

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Barrier Load Cell A6

Max = 30321.61 Nwt @ 89.63 msec
Min = -624.82 Nwt @ 8.27 msec



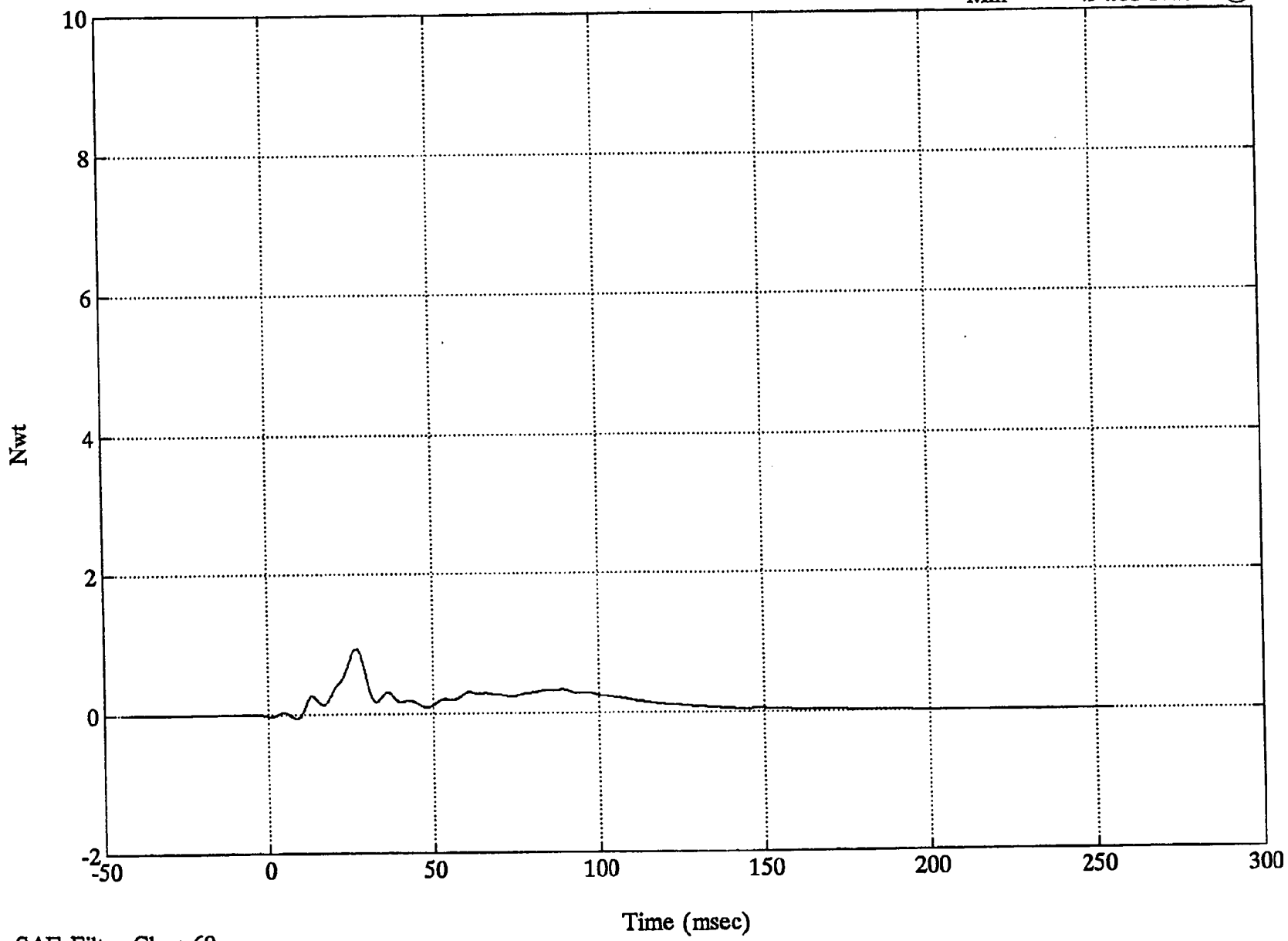
SAE Filter Class 60

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Barrier Load Cell A7

Max = 9318.47 Nwt @ 26.87 msec
Min = -494.08 Nwt @ 8.51 msec

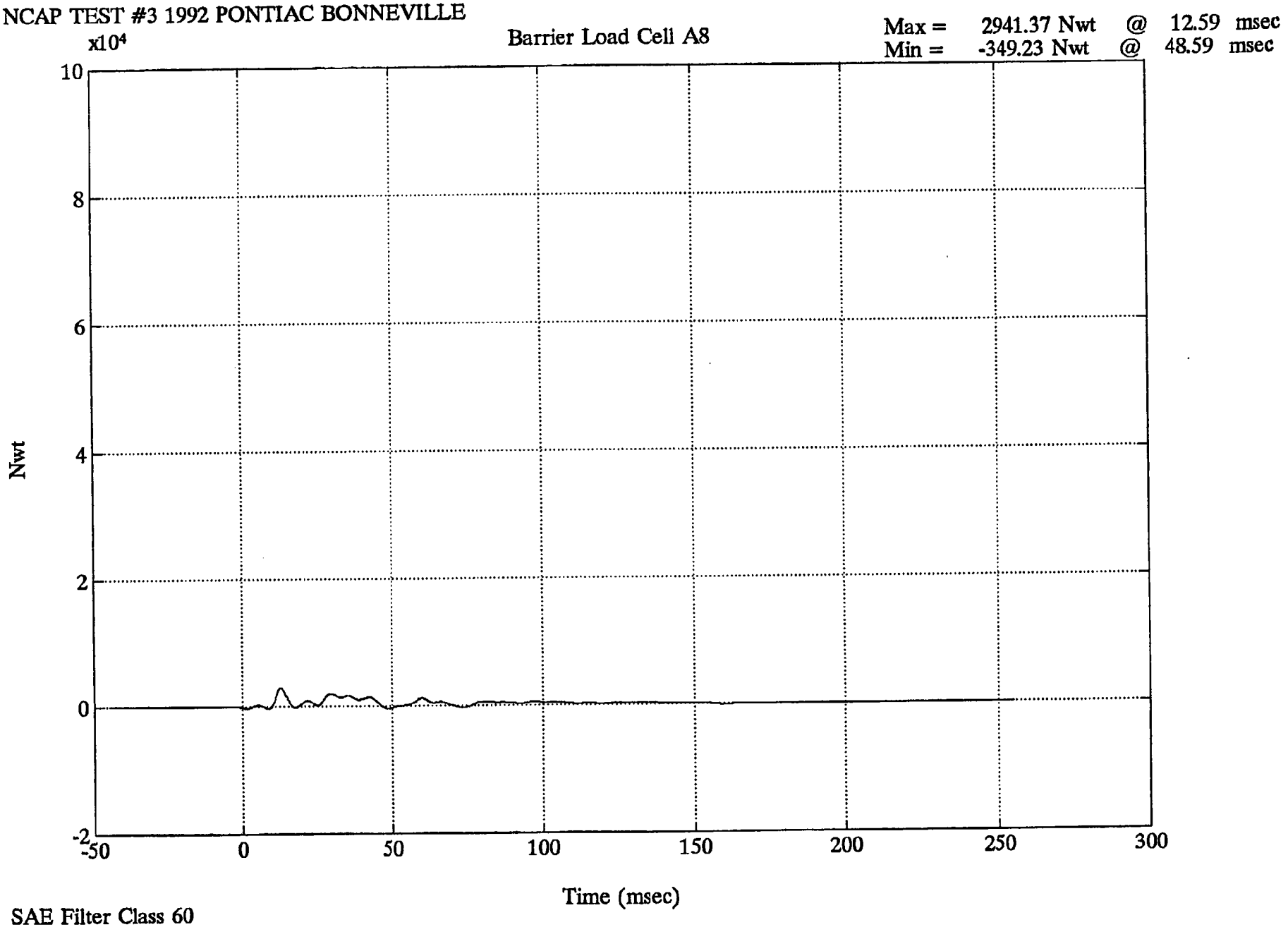


B-37

8048-1

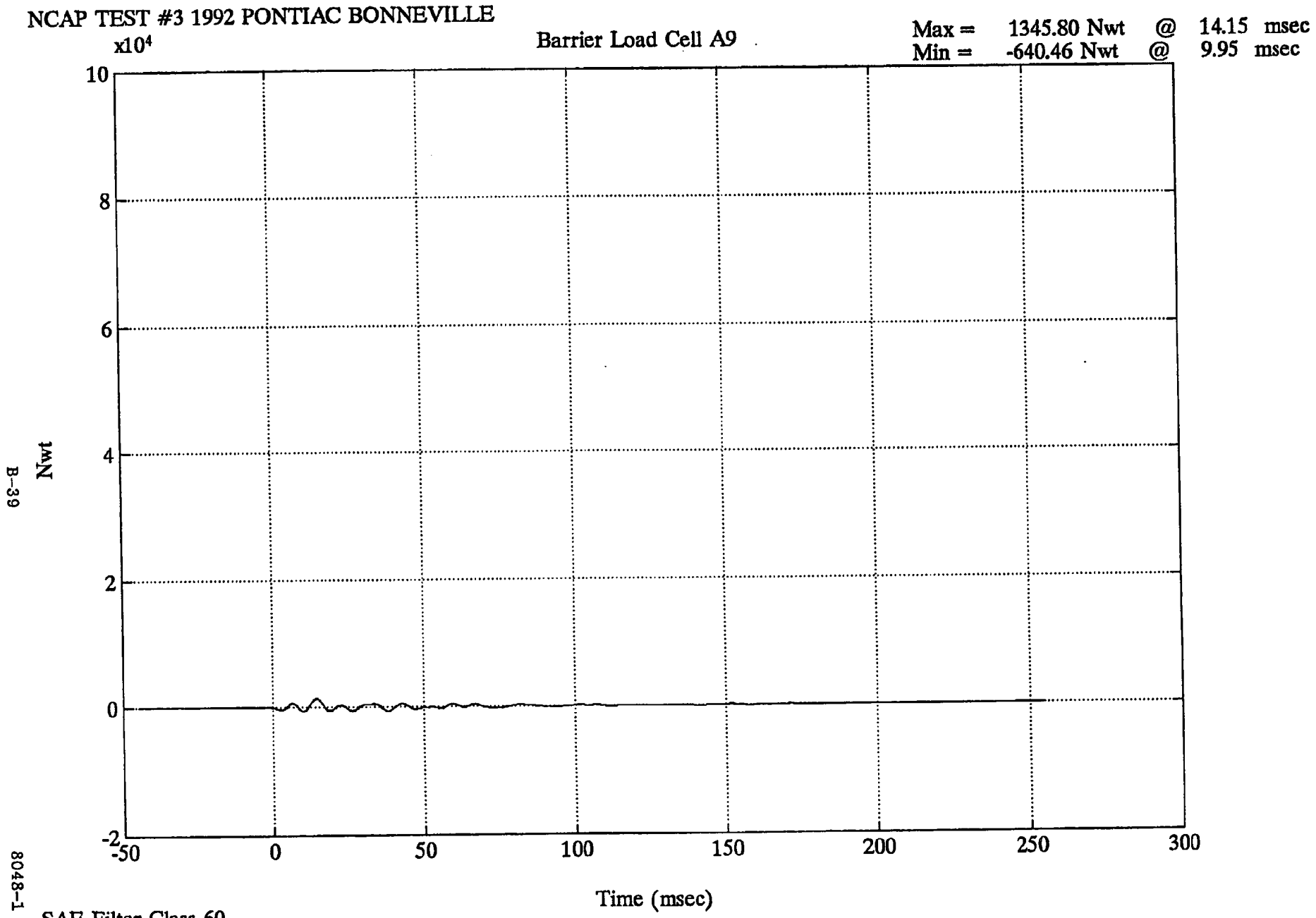
SAE Filter Class 60

NCAP TEST #3 1992 PONTIAC BONNEVILLE

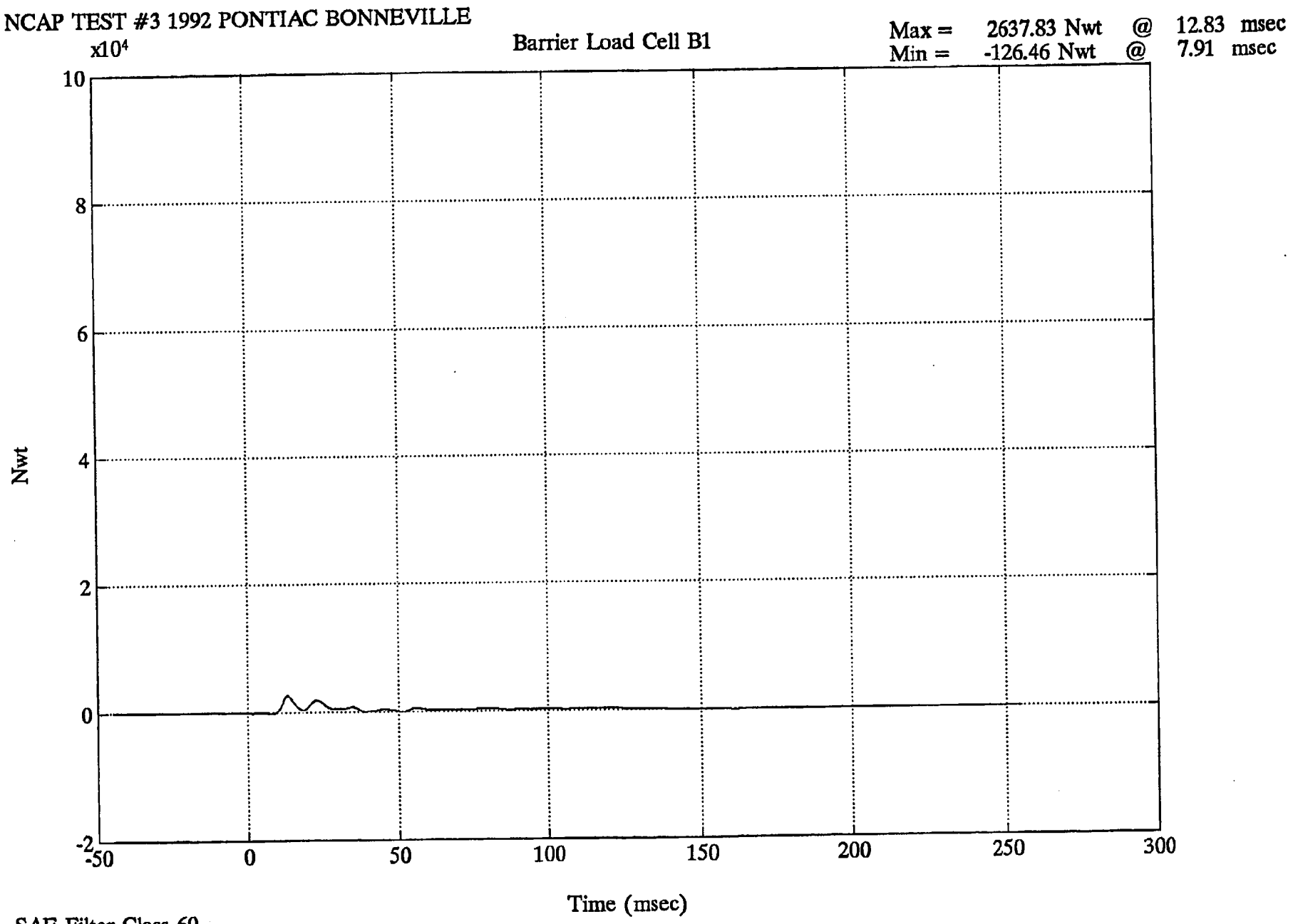


SAE Filter Class 60

8048-1


NCAP TEST #3 1992 PONTIAC BONNEVILLE
Barrier Load Cell A9
Max = 1345.80 Nwt @ 14.15 msec
Min = -640.46 Nwt @ 9.95 msec
x10^4
10
8
6
4
2
0
-2
Nwt
-50
0
50
100
150
200
250
300
Time (msec)
SAE Filter Class 60
8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE



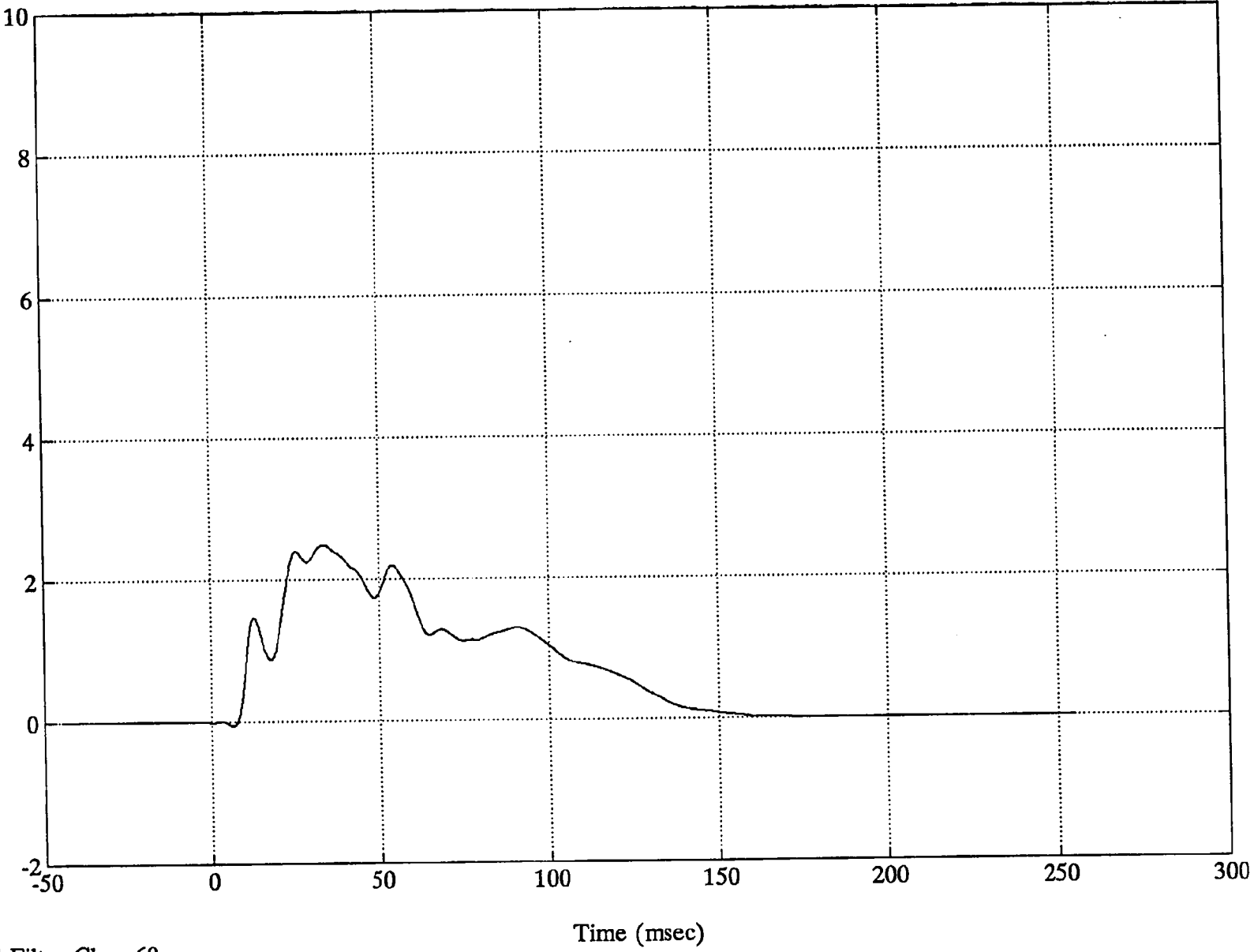
SAE Filter Class 60

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Barrier Load Cell B2

Max = 24888.37 Nwt @ 33.47 msec
Min = -568.14 Nwt @ 6.23 msec



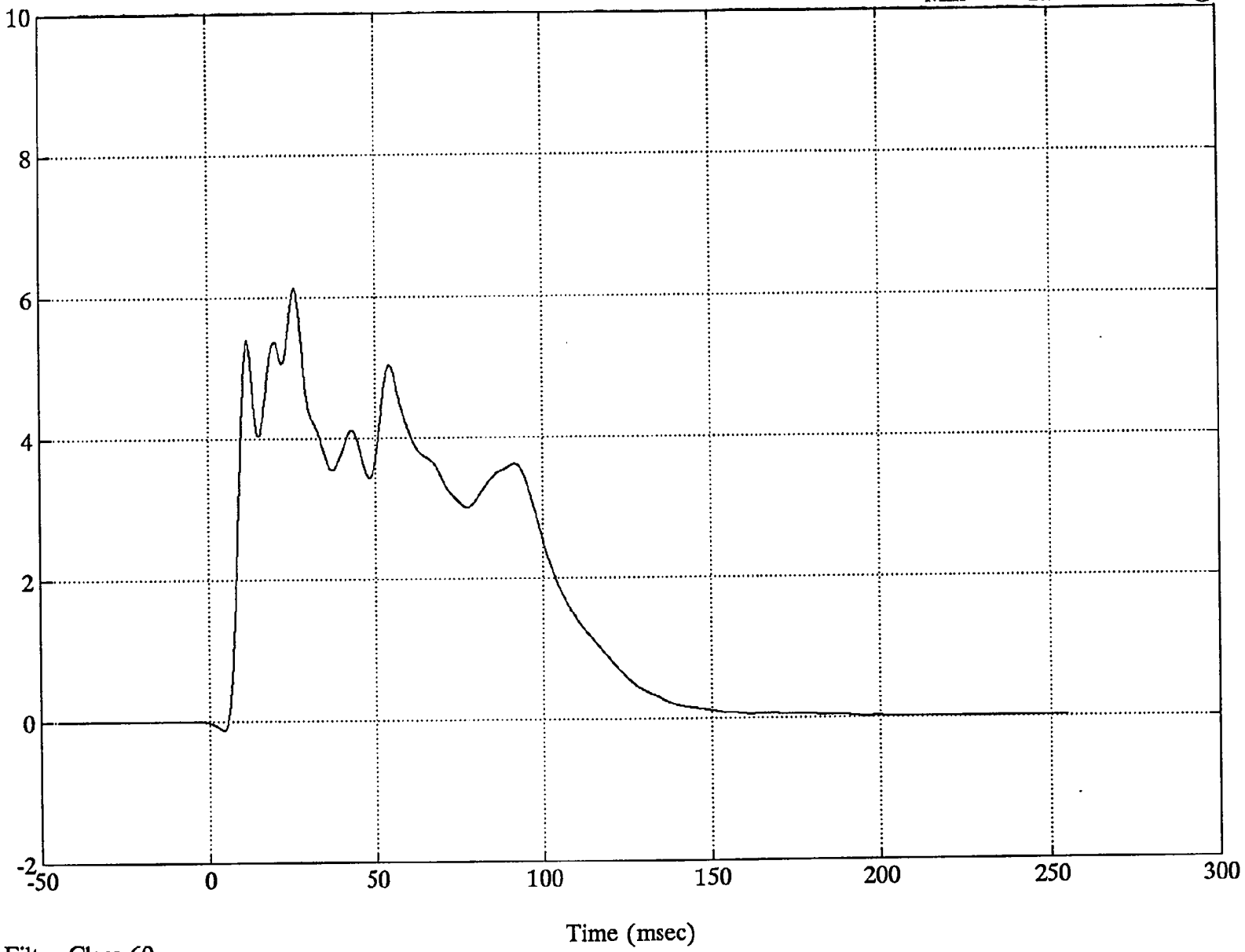
SAE Filter Class 60

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

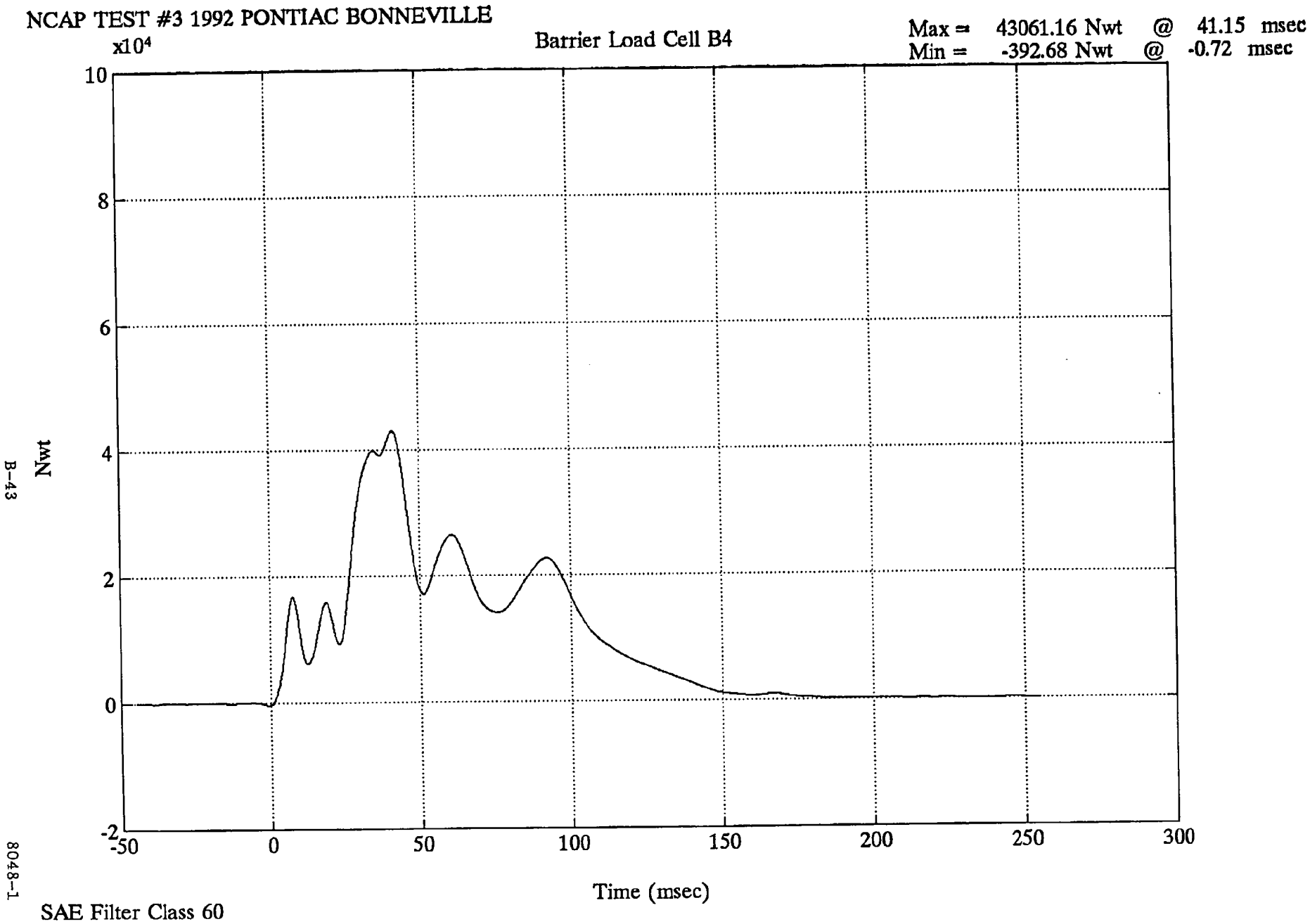
Barrier Load Cell B3

Max = 61309.52 Nwt @ 25.79 msec
Min = -1256.15 Nwt @ 4.07 msec



SAE Filter Class 60

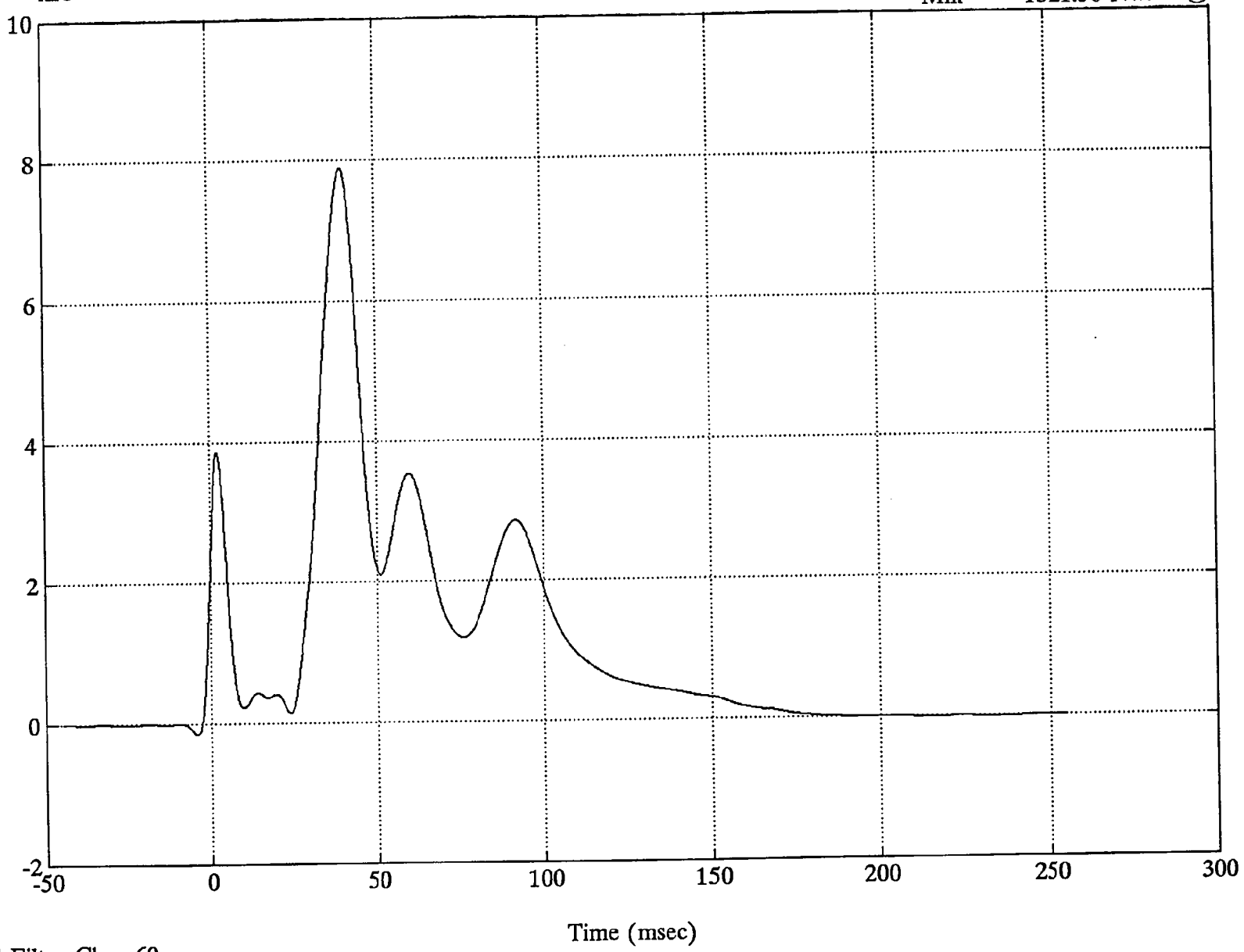
8048-1


NCAP TEST #3 1992 PONTIAC BONNEVILLE
Barrier Load Cell B4
Max = 43061.16 Nwt @ 41.15 msec
Min = -392.68 Nwt @ -0.72 msec
x10^4
10
8
6
4
2
0
-2
Nwt
-50
0
50
100
150
200
250
300
Time (msec)
SAE Filter Class 60
B-43
8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

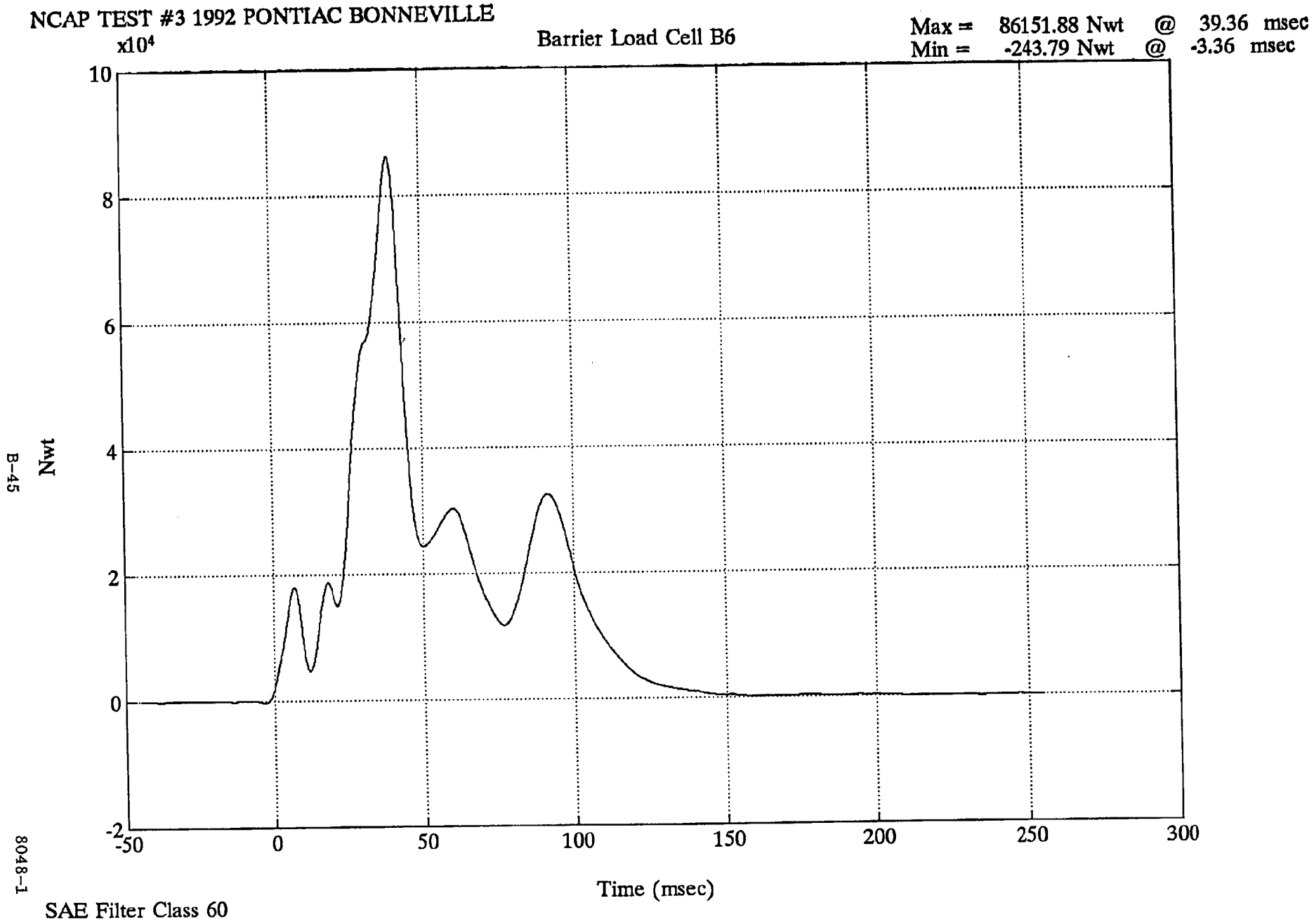
Barrier Load Cell B5

Max = 78812.91 Nwt @ 39.84 msec
Min = -1521.56 Nwt @ -4.32 msec



SAE Filter Class 60

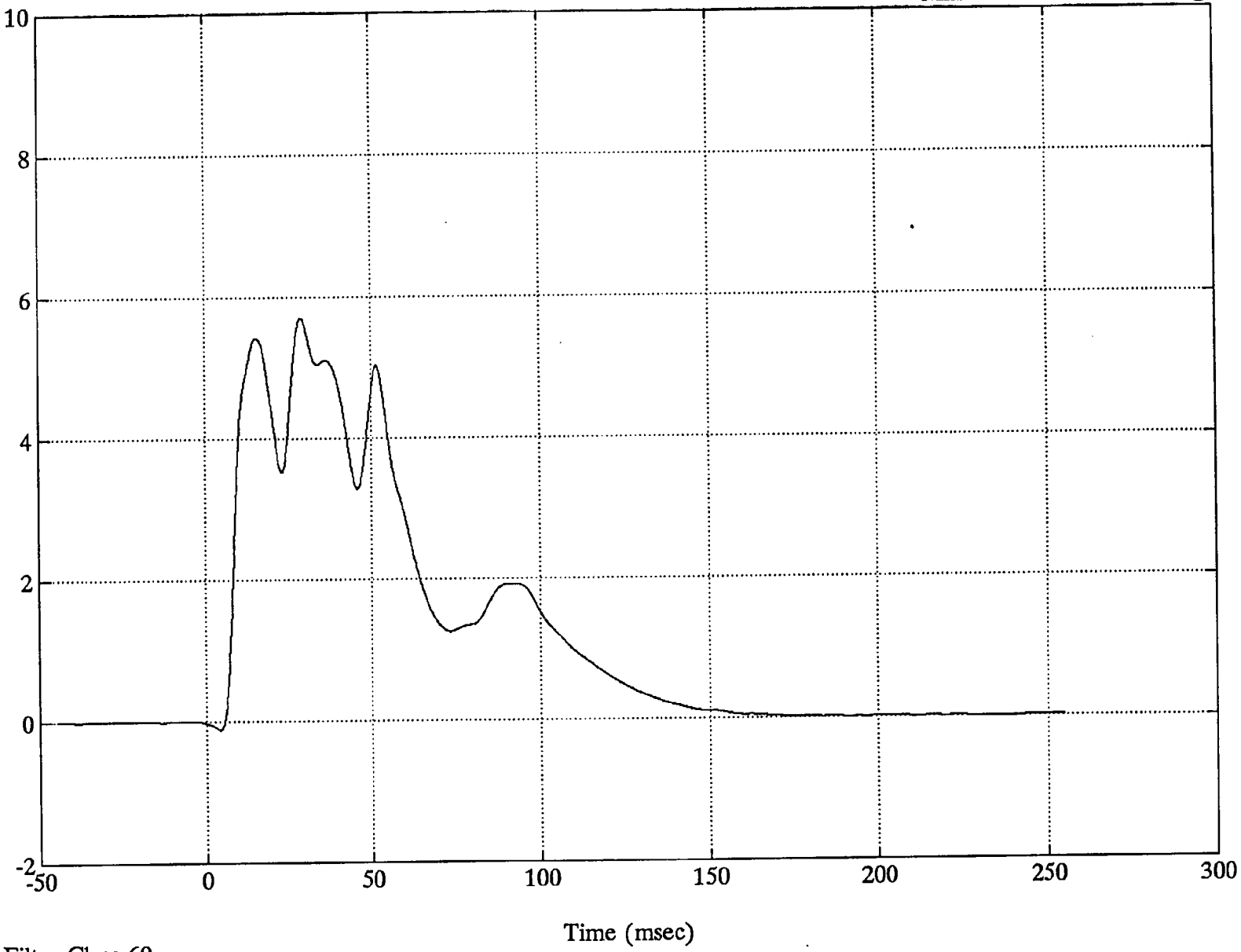
8048-1


NCAP TEST #3 1992 PONTIAC BONNEVILLE
Barrier Load Cell B6
Max = 86151.88 Nwt @ 39.36 msec
Min = -243.79 Nwt @ -3.36 msec
x10^4
10
8
6
4
2
0
-2
Nwt
-50
0
50
100
150
200
250
300
Time (msec)
SAE Filter Class 60
8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

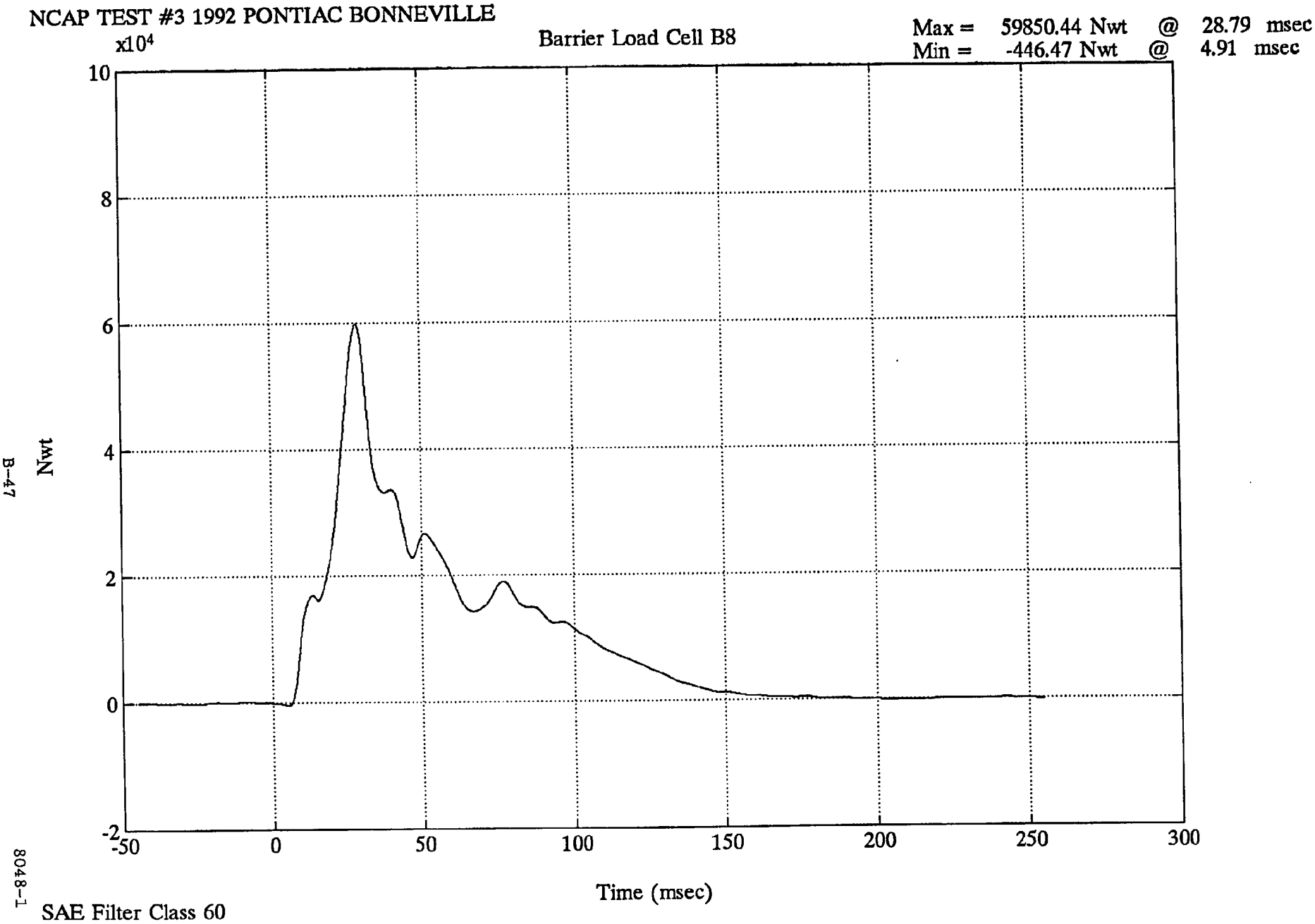
Barrier Load Cell B7

Max = 57068.69 Nwt @ 29.03 msec
Min = -1154.91 Nwt @ 3.95 msec

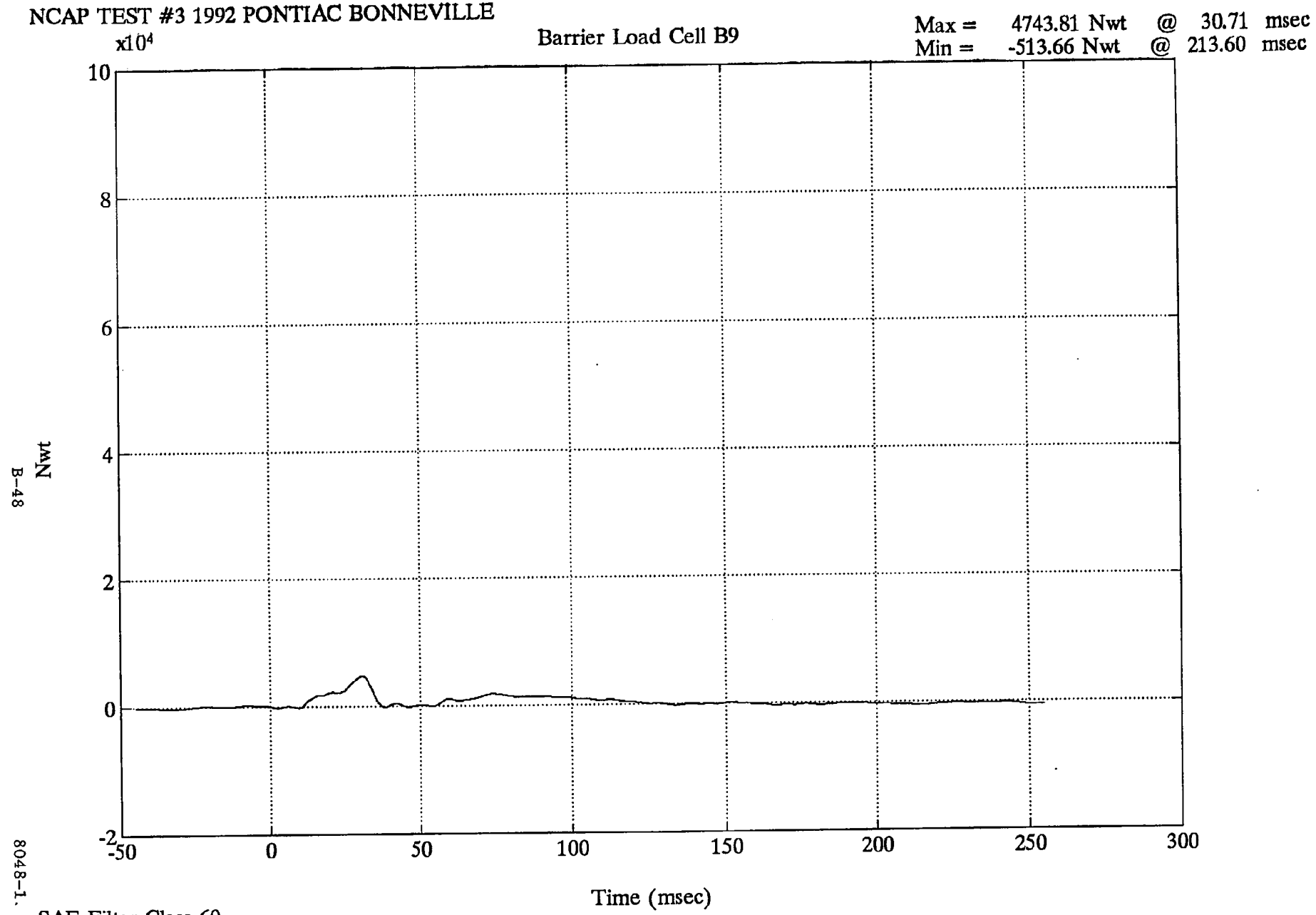


SAE Filter Class 60

8048-1


NCAP TEST #3 1992 PONTIAC BONNEVILLE
Barrier Load Cell B8
Max = 59850.44 Nwt @ 28.79 msec
Min = -446.47 Nwt @ 4.91 msec
x10^4
10
8
6
4
2
0
-2
Nwt
-50
0
50
100
150
200
250
300
Time (msec)
SAE Filter Class 60
8048-1

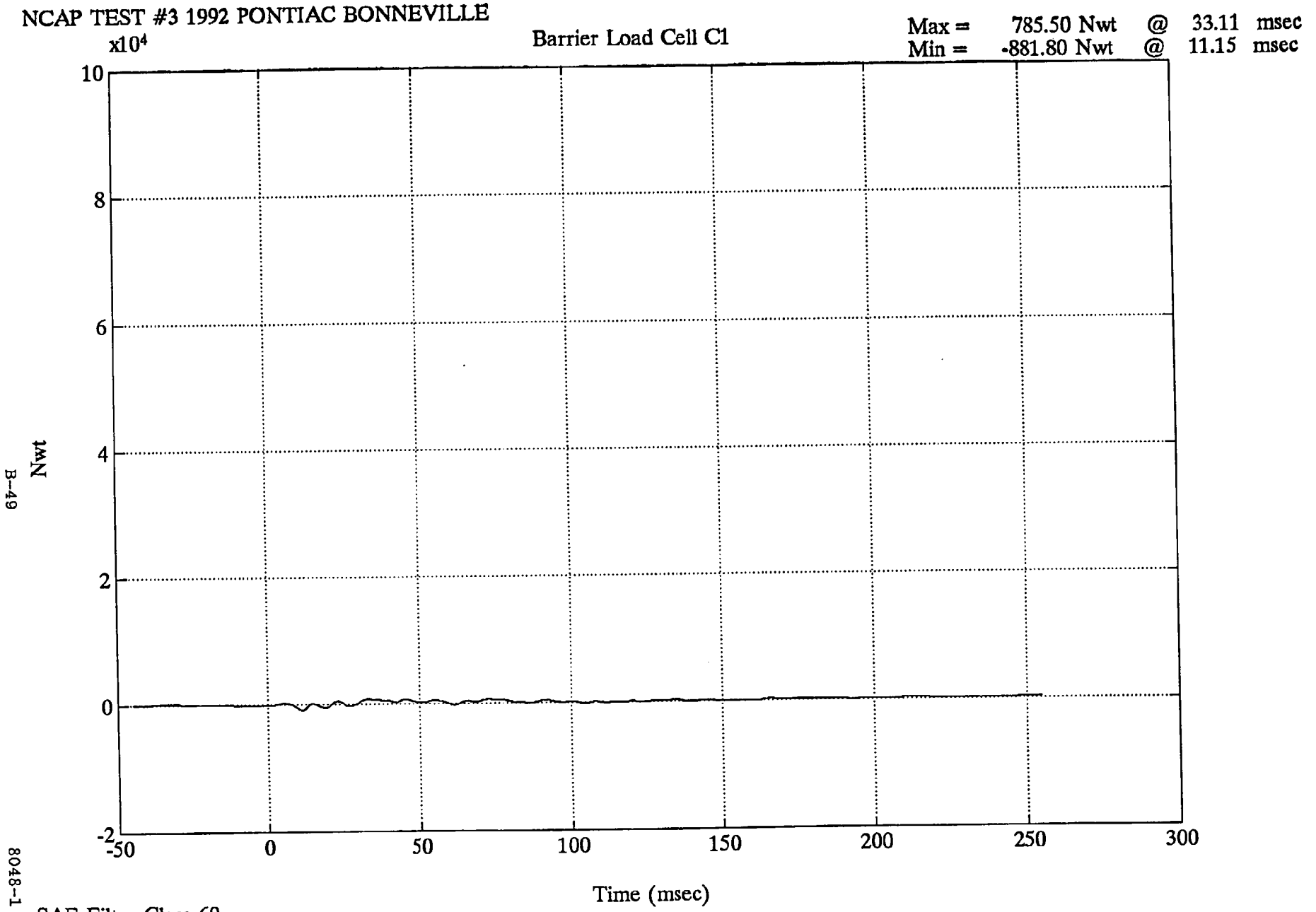
NCAP TEST #3 1992 PONTIAC BONNEVILLE



SAE Filter Class 60

8048-1.

NCAP TEST #3 1992 PONTIAC BONNEVILLE



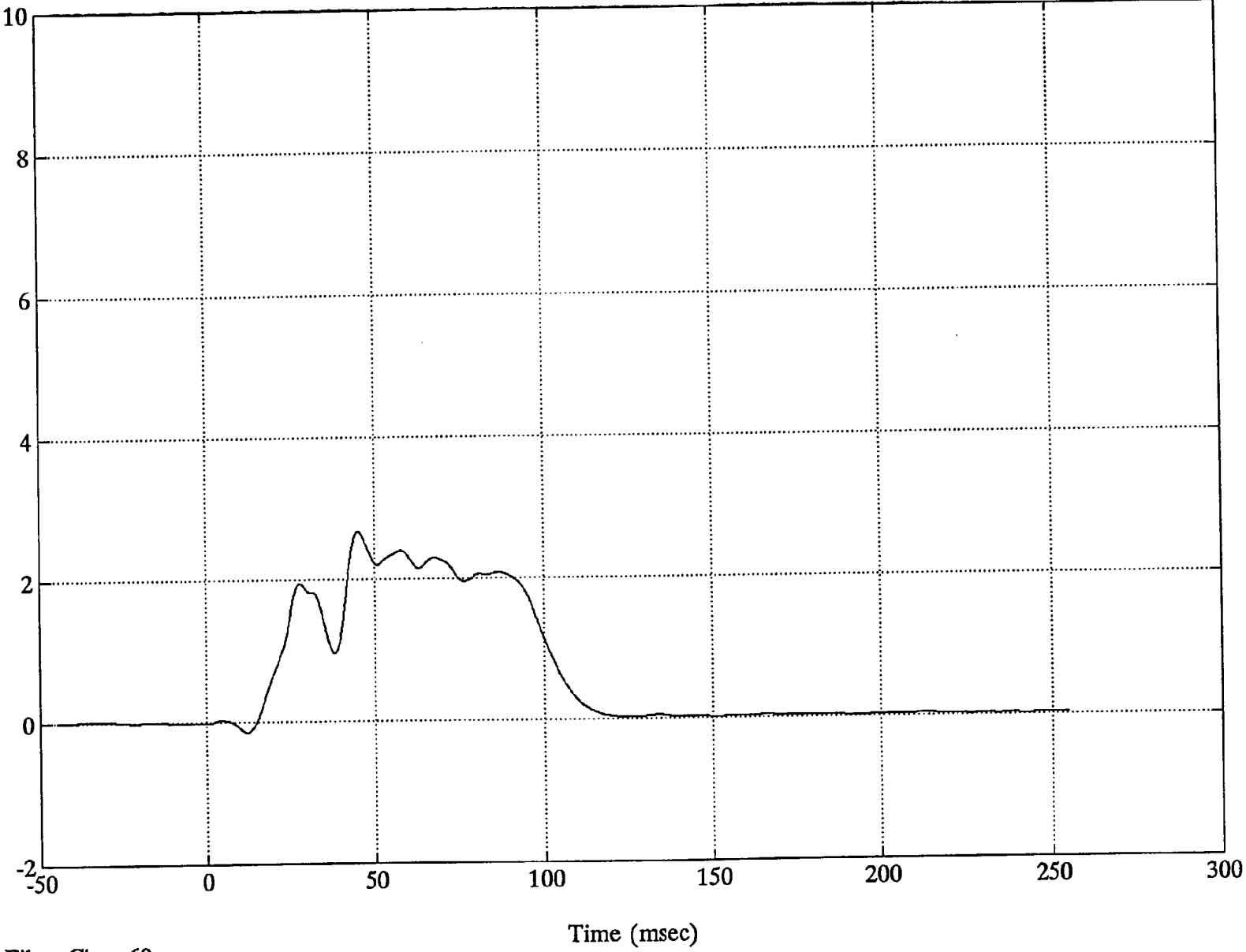
SAE Filter Class 60

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Barrier Load Cell C2

Max = 26769.24 Nwt @ 45.12 msec
Min = -1499.73 Nwt @ 11.99 msec

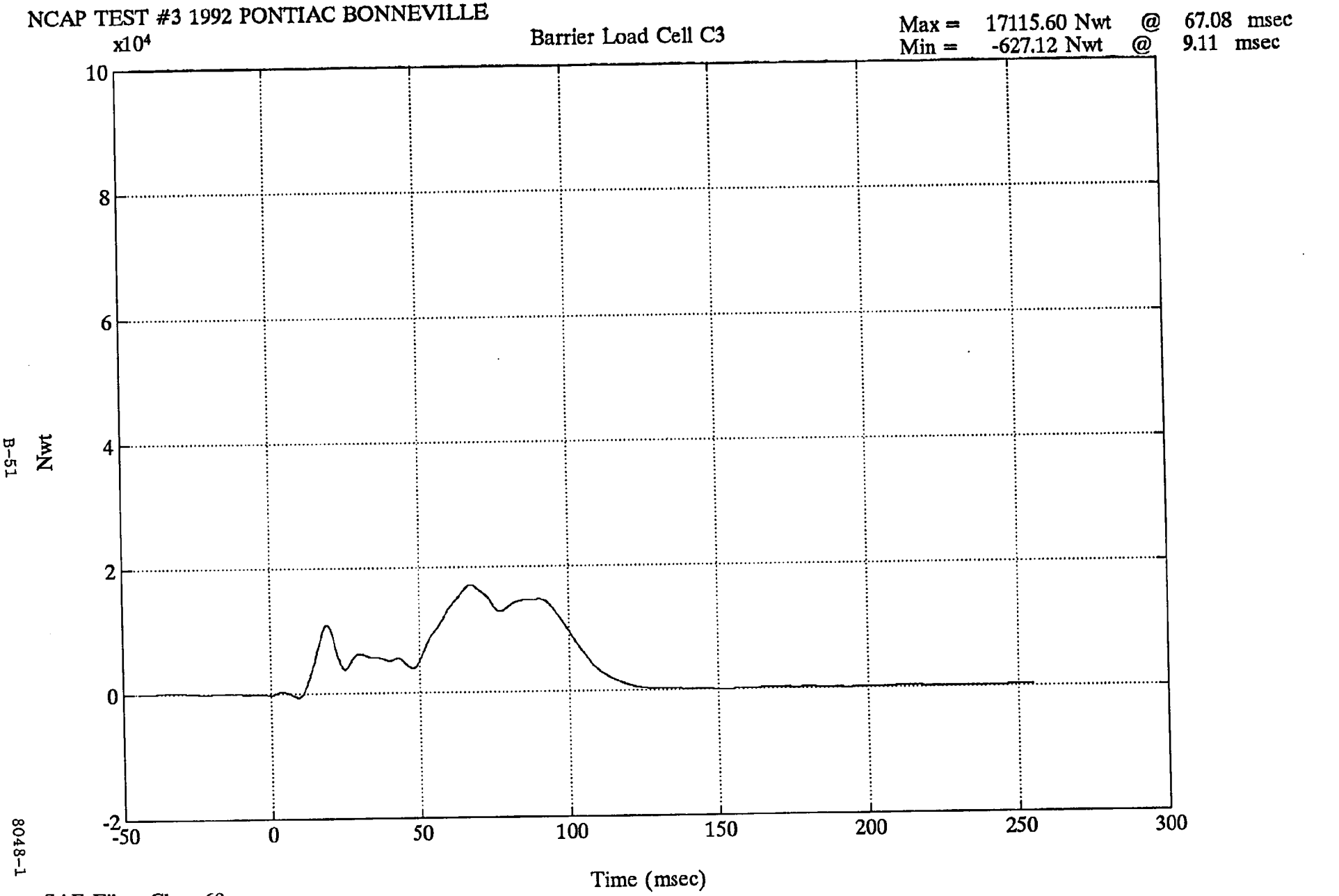


B-50

8048-1

SAE Filter Class 60

NCAP TEST #3 1992 PONTIAC BONNEVILLE



SAE Filter Class 60

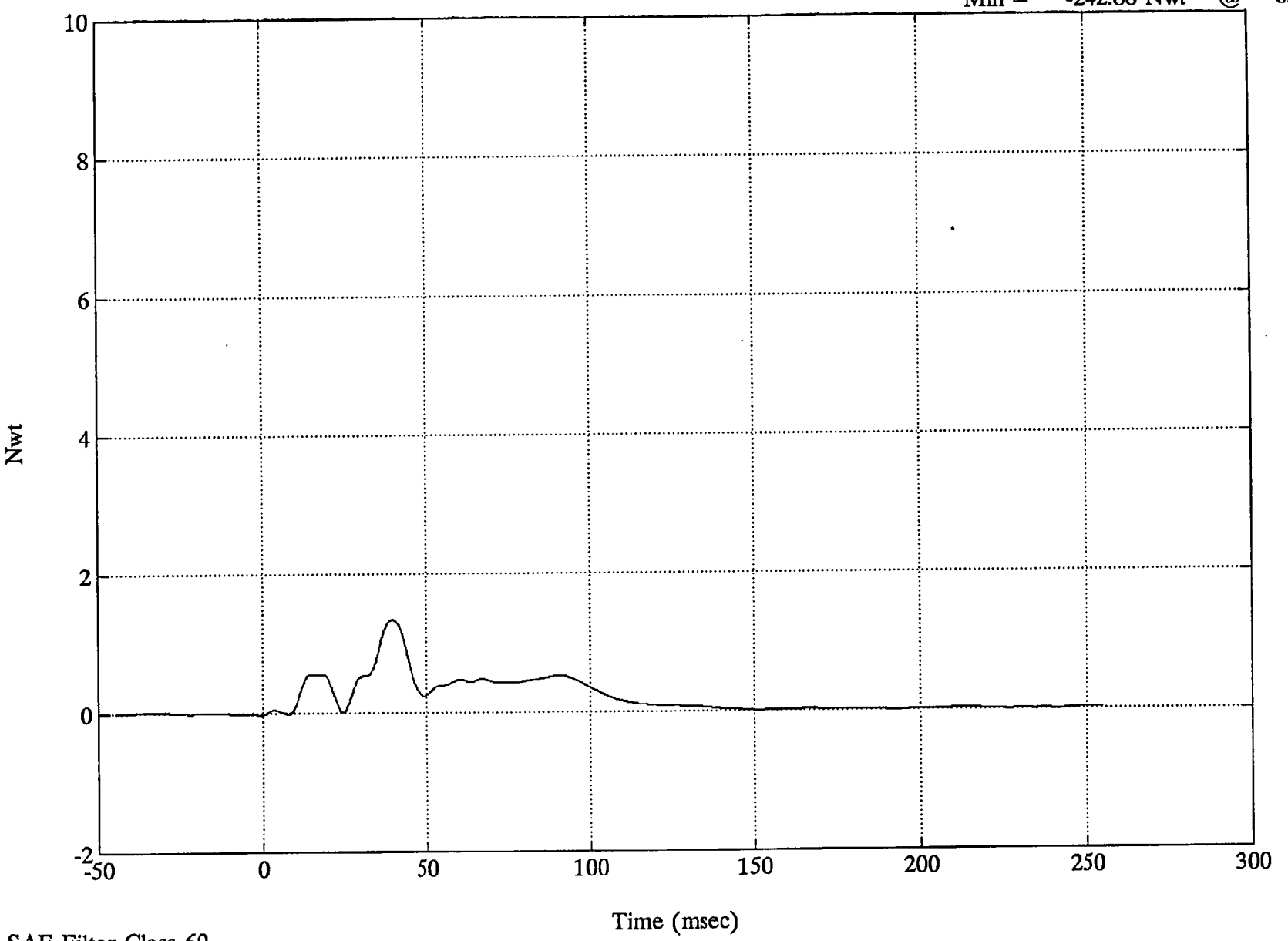
B-51

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Barrier Load Cell C4

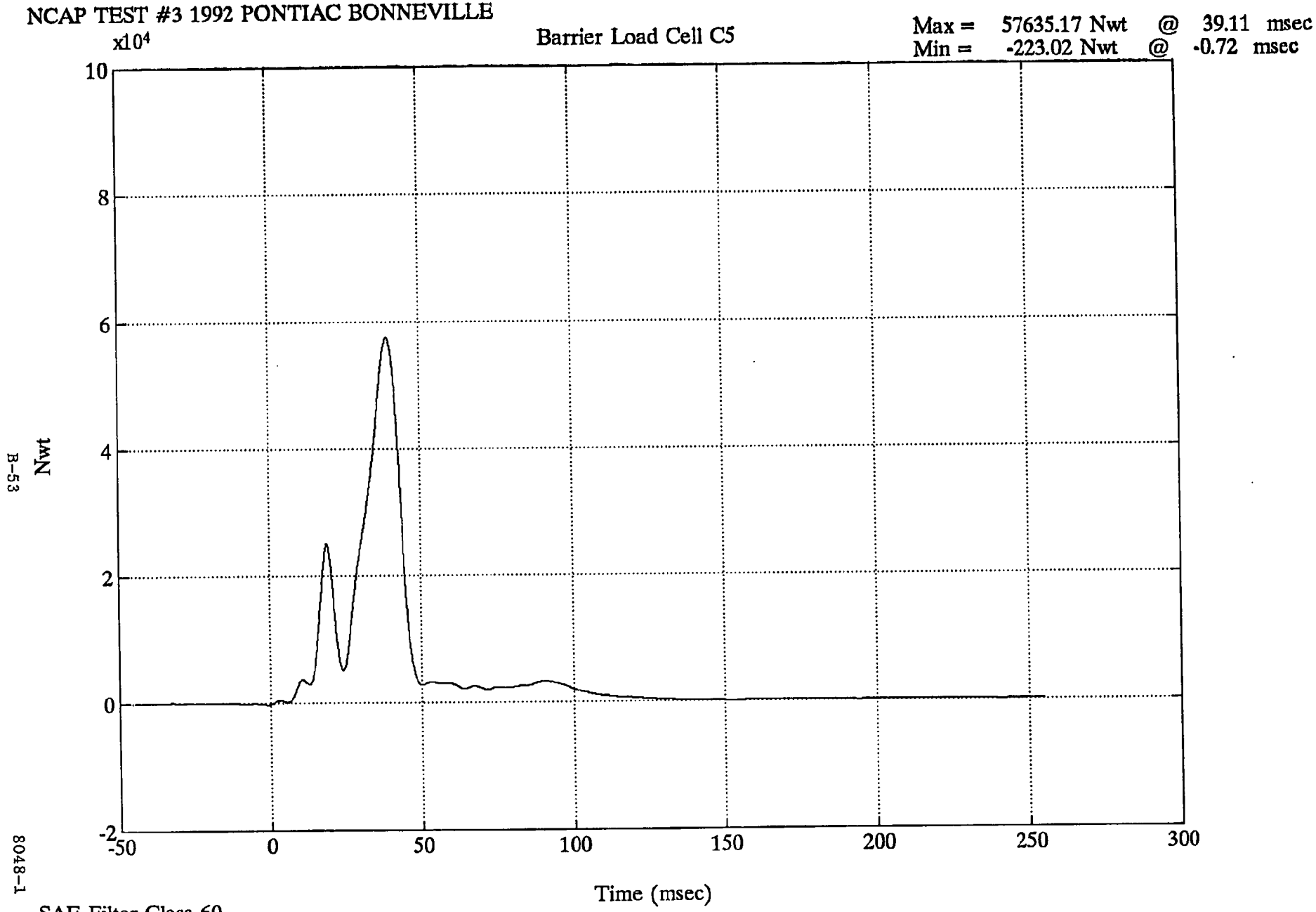
Max = 13430.98 Nwt @ 39.36 msec
Min = -242.88 Nwt @ -0.48 msec



SAE Filter Class 60

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE



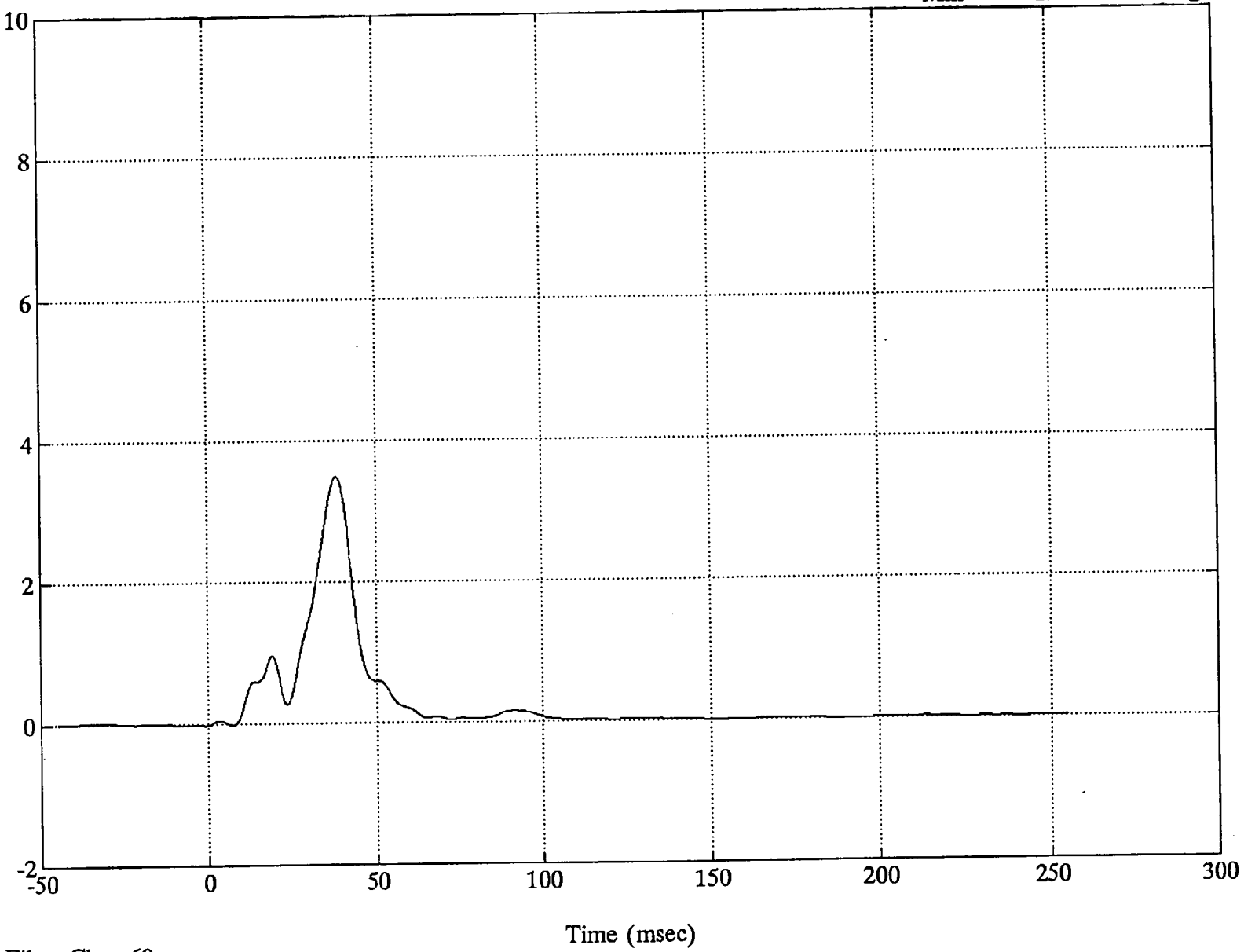
SAE Filter Class 60

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Barrier Load Cell C6

Max = 34905.05 Nwt @ 38.27 msec
Min = -193.25 Nwt @ -0.84 msec

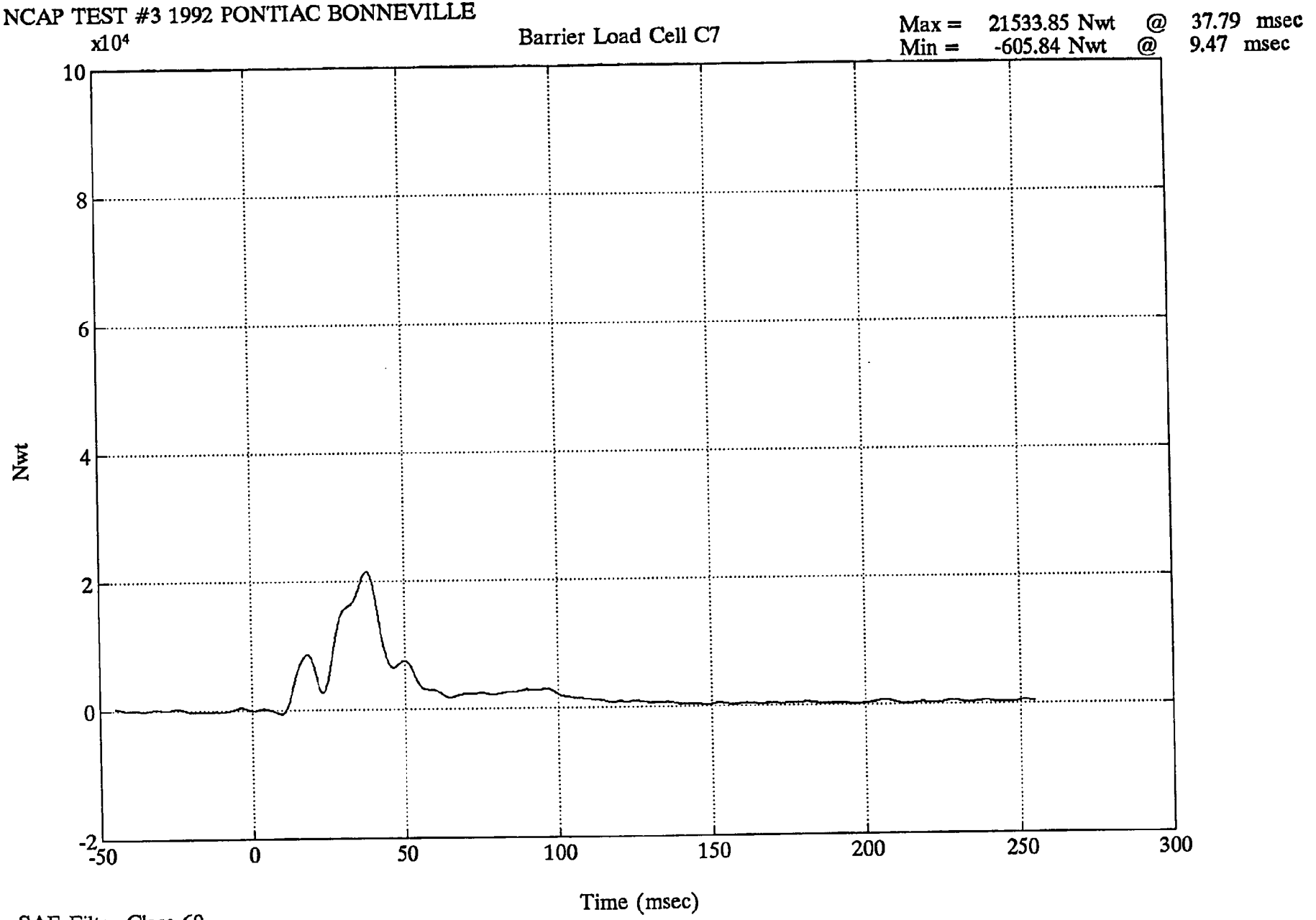


B-54

8048-1

SAE Filter Class 60

NCAP TEST #3 1992 PONTIAC BONNEVILLE



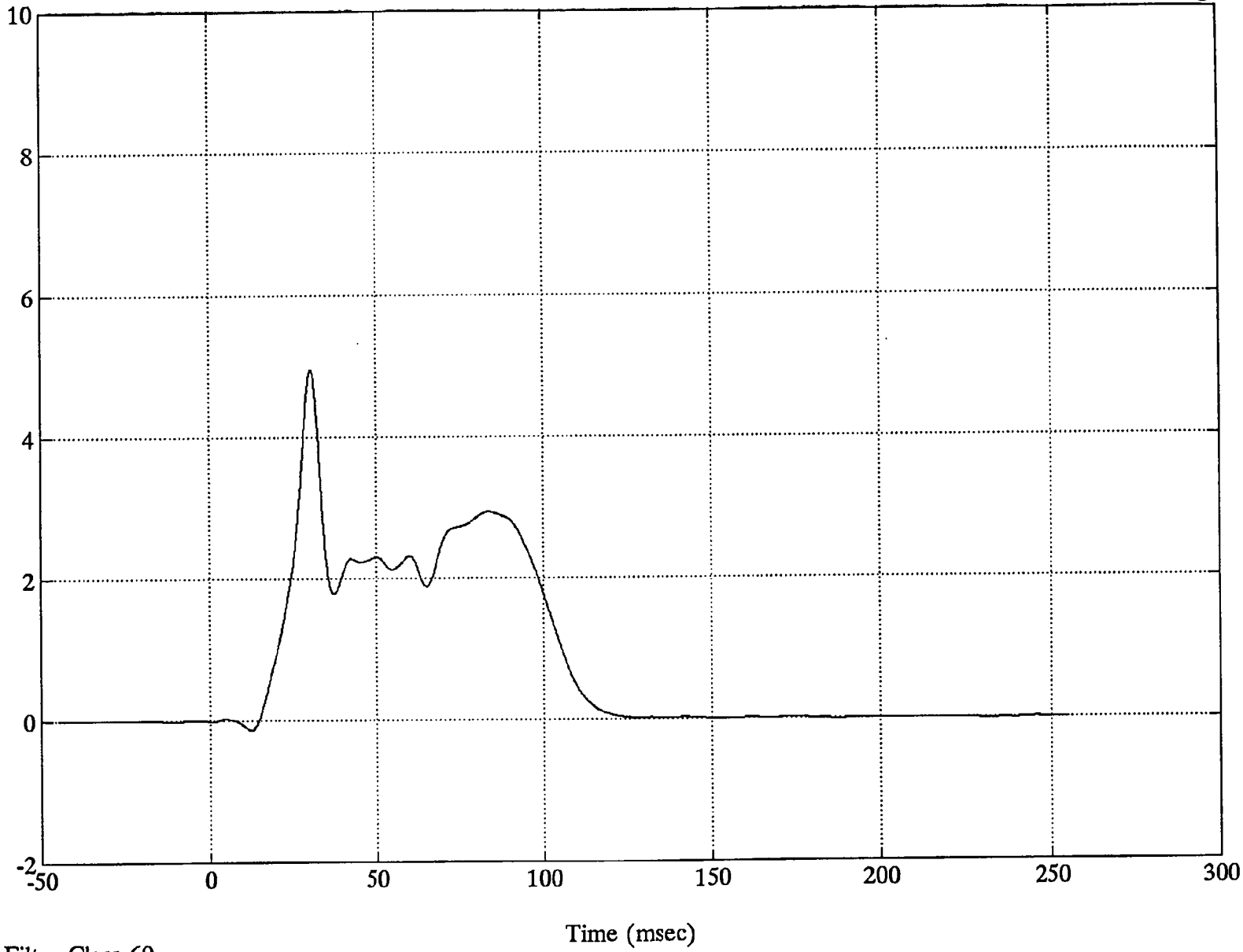
SAE Filter Class 60

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Barrier Load Cell C8

Max = 49599.35 Nwt @ 30.47 msec
Min = -1391.41 Nwt @ 12.23 msec

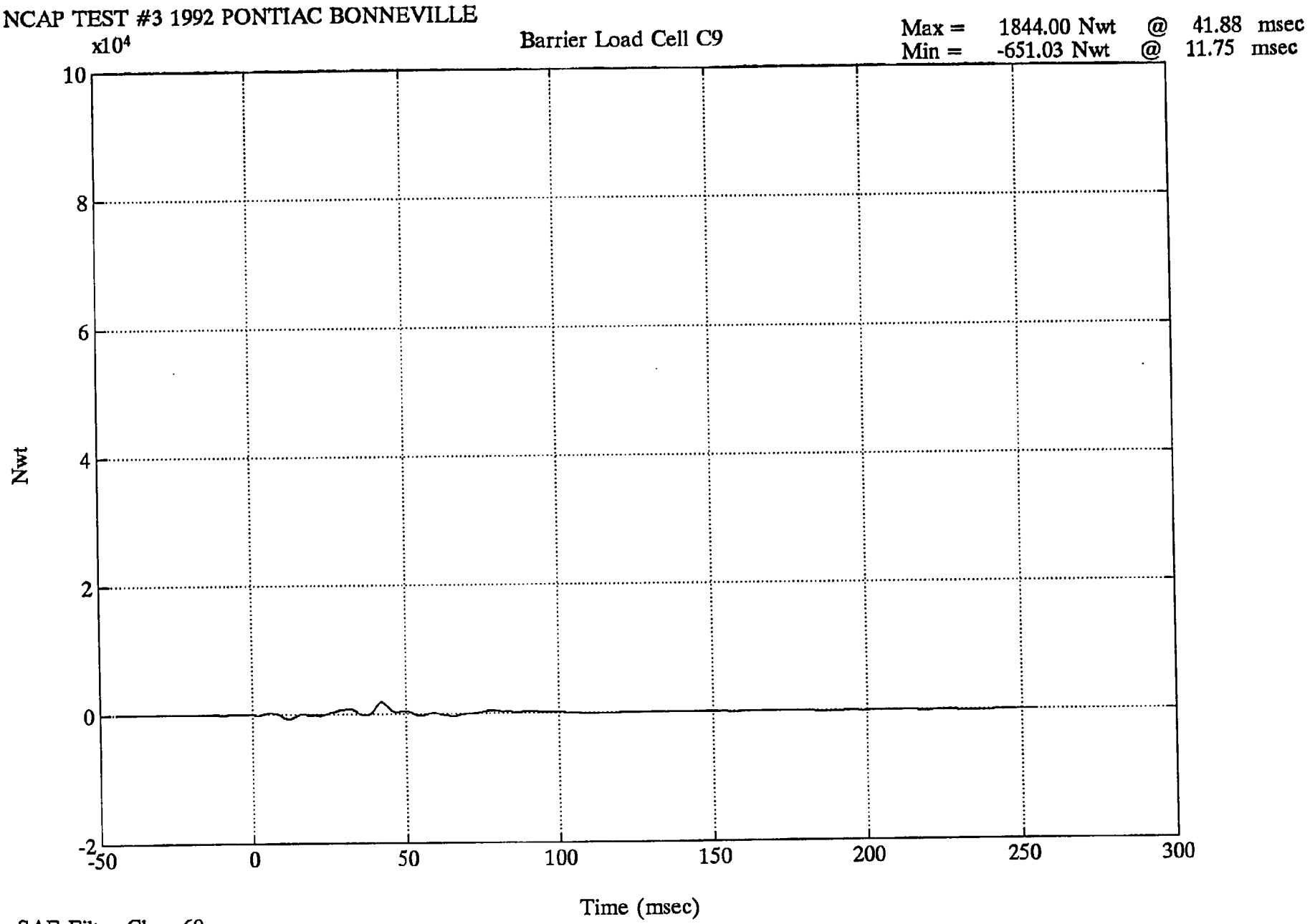


SAE Filter Class 60

B-56

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE



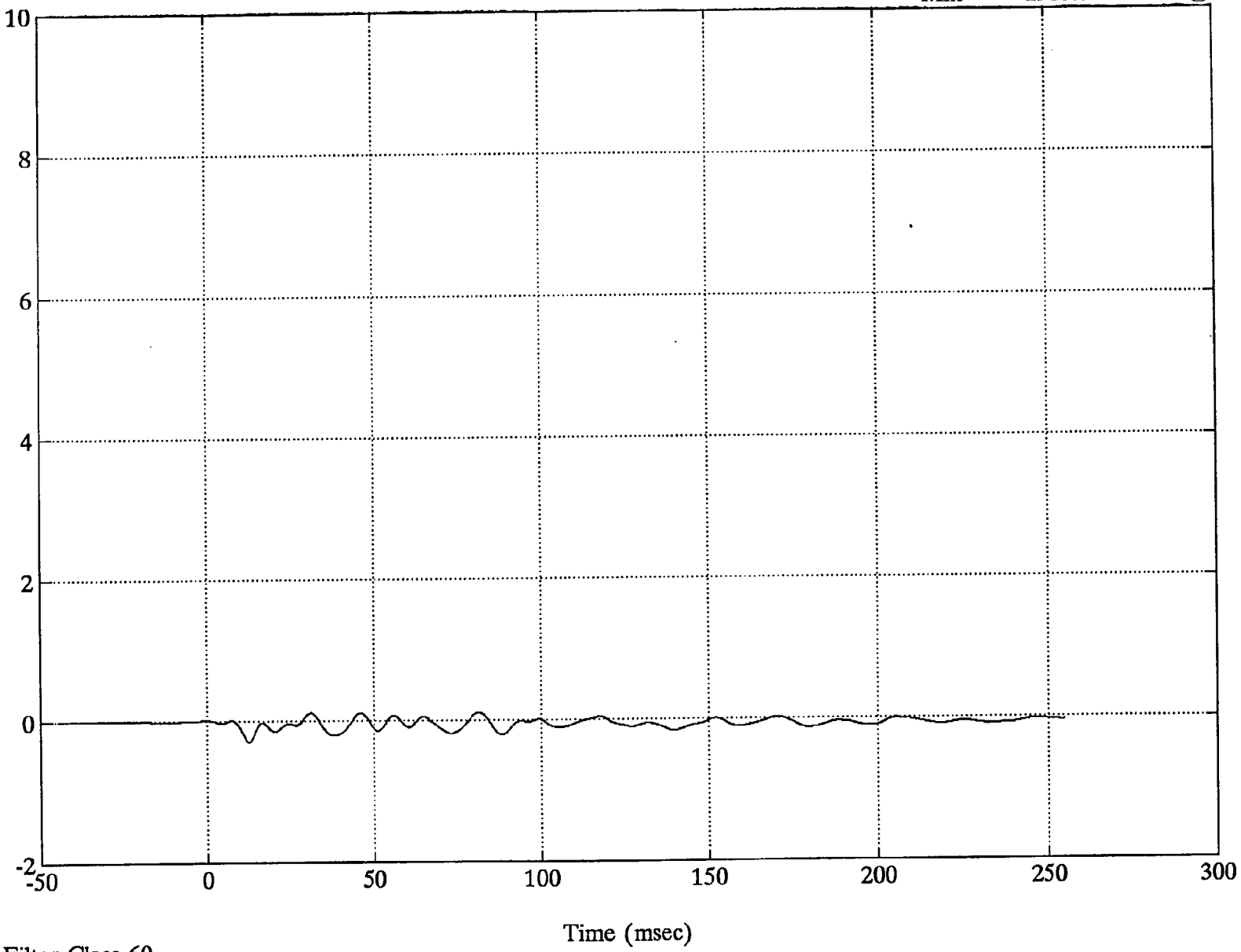
SAE Filter Class 60

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Barrier Load Cell D1

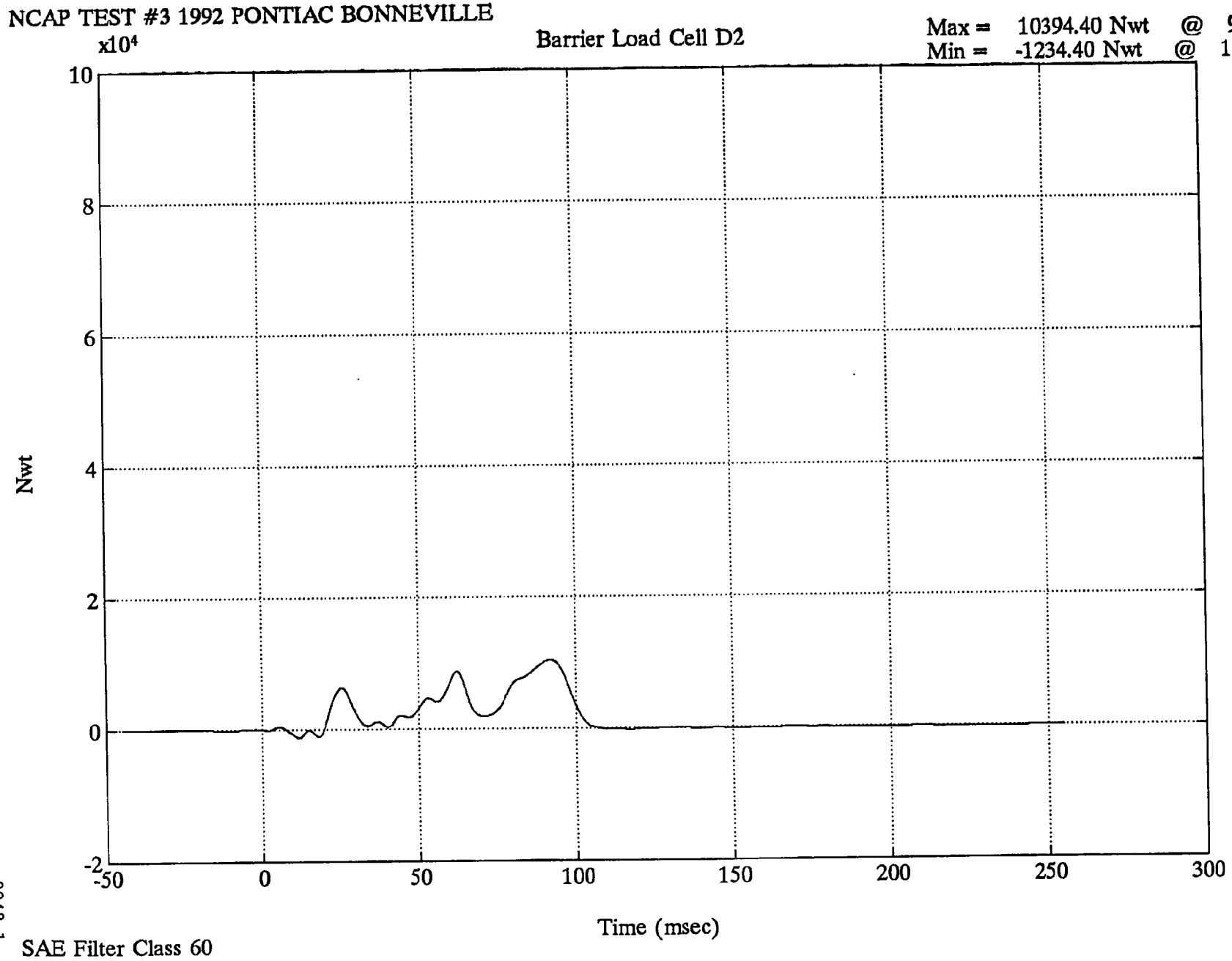
Max = 1160.29 Nwt @ 30.95 msec
Min = -2985.76 Nwt @ 12.35 msec



SAE Filter Class 60

8048-1

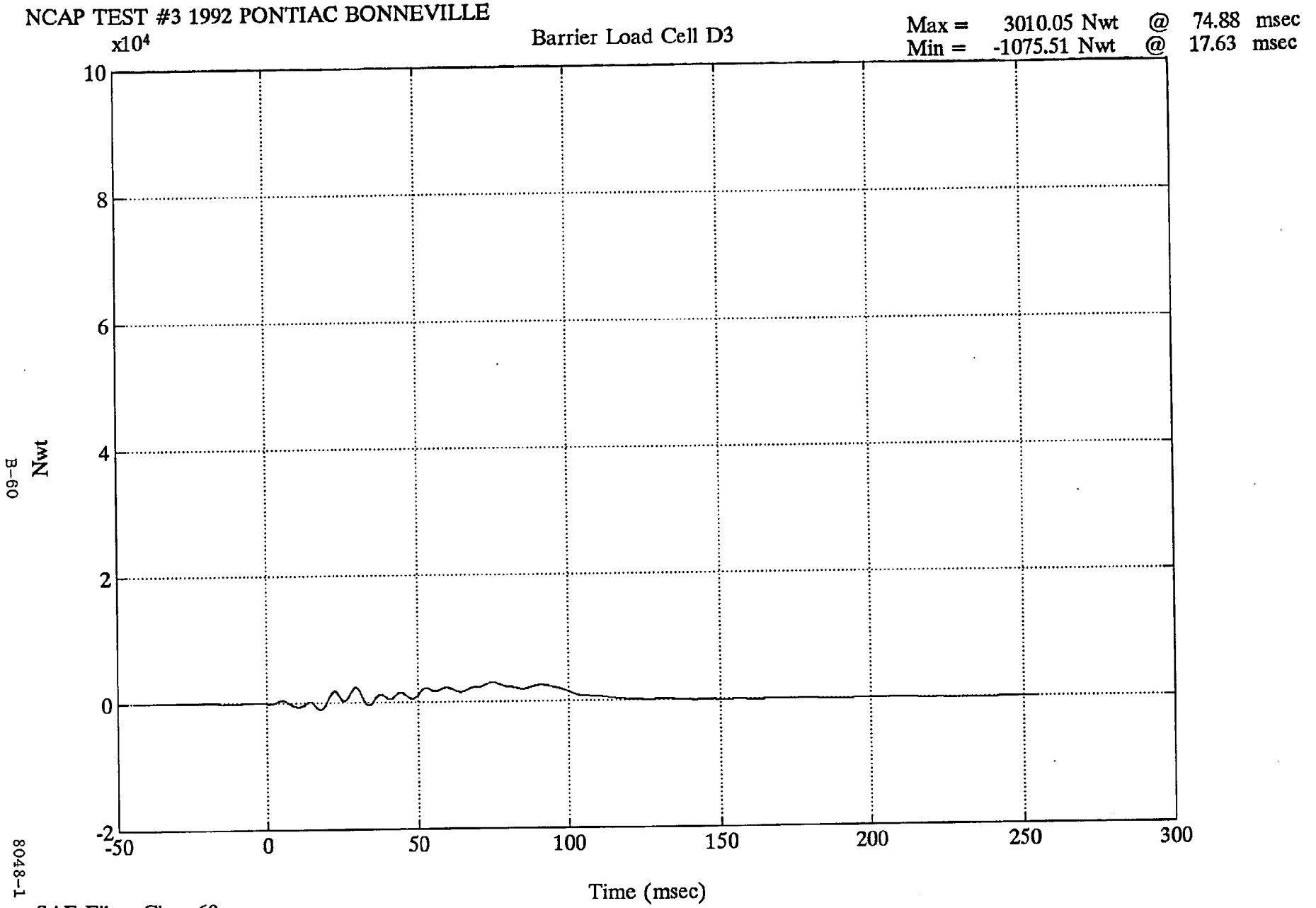
NCAP TEST #3 1992 PONTIAC BONNEVILLE



SAE Filter Class 60

8048-1

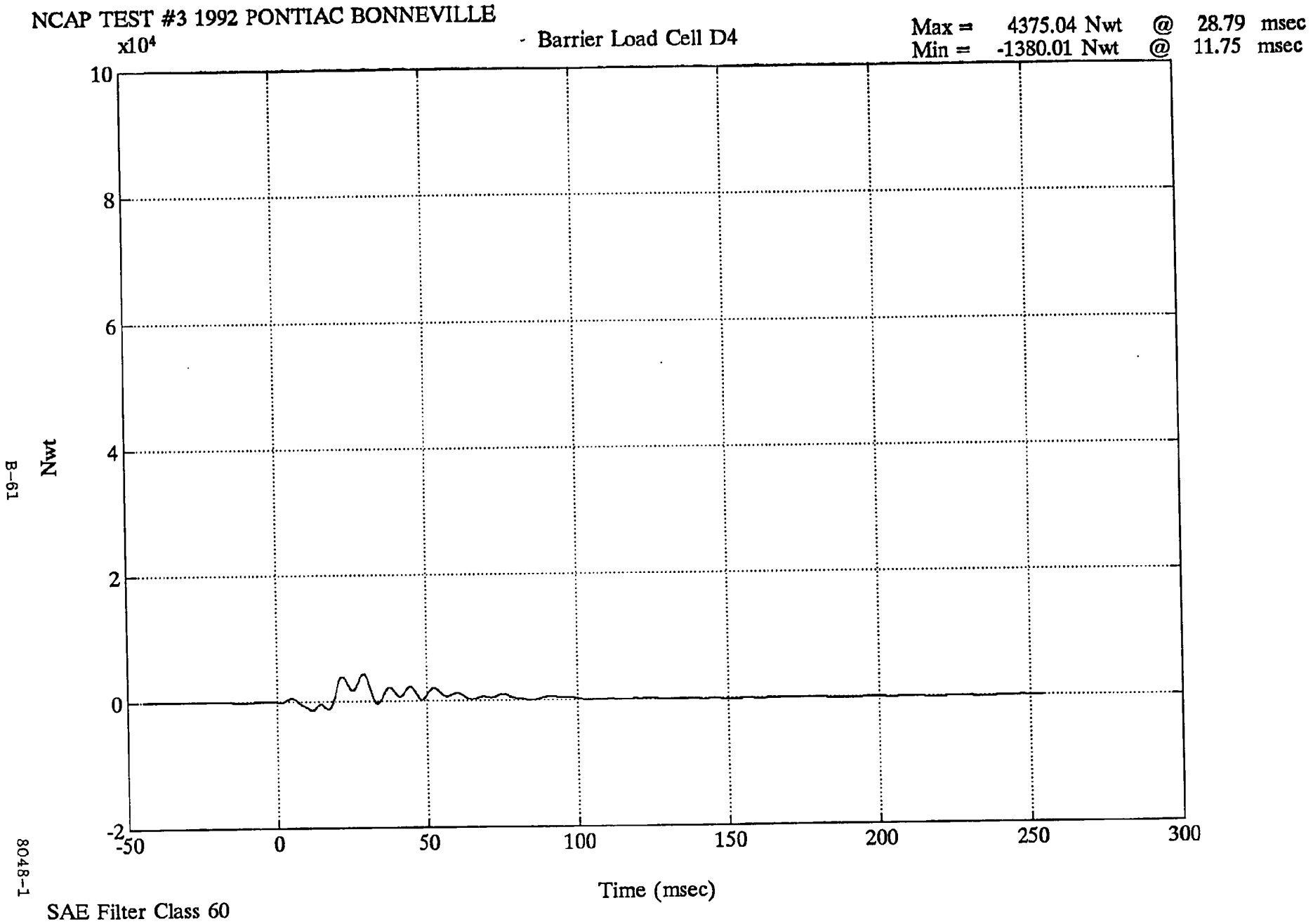
NCAP TEST #3 1992 PONTIAC BONNEVILLE



B-60

8048-1

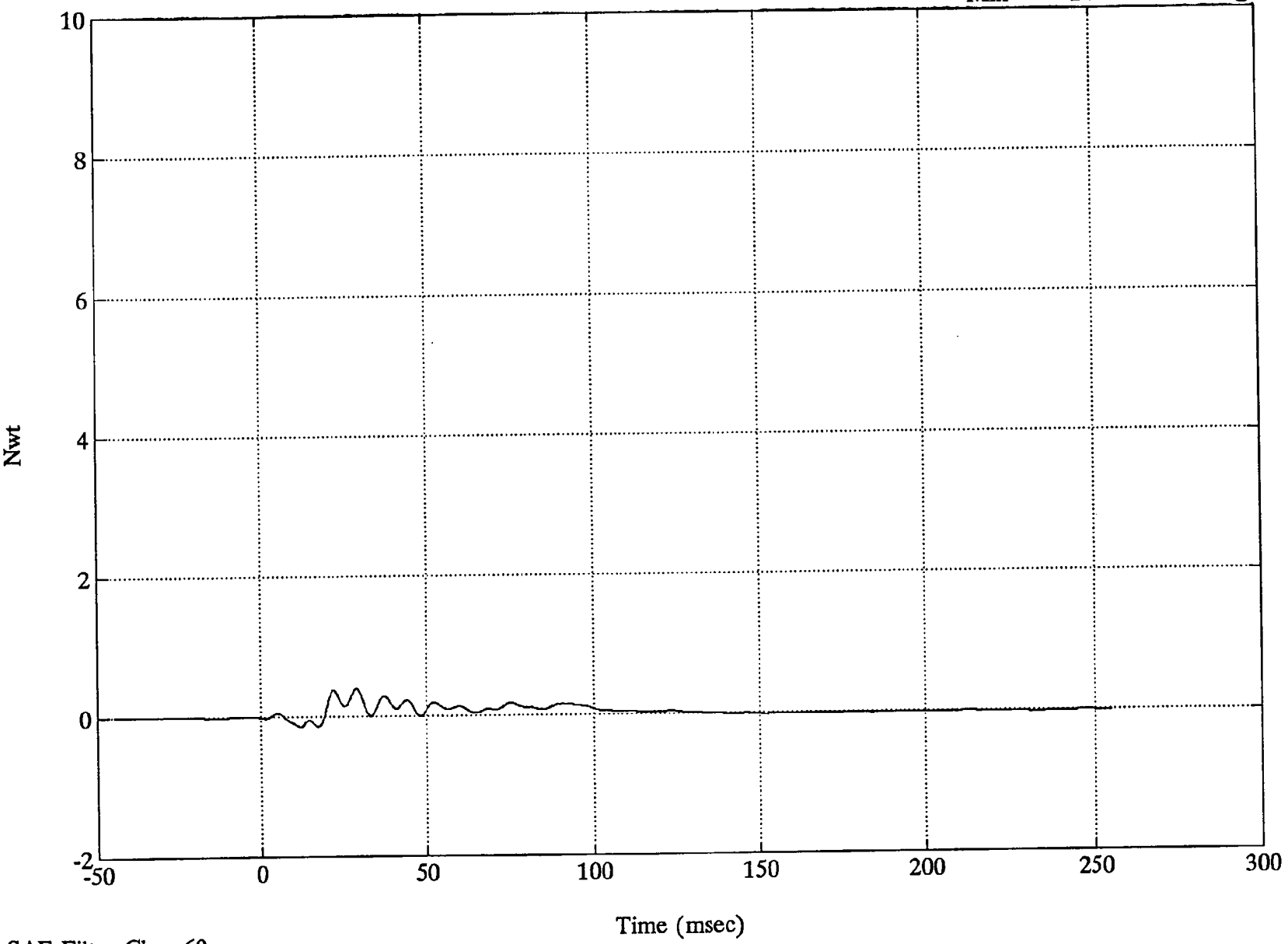
SAE Filter Class 60


NCAP TEST #3 1992 PONTIAC BONNEVILLE
x10⁴
- Barrier Load Cell D4
Max = 4375.04 Nwt @ 28.79 msec
Min = -1380.01 Nwt @ 11.75 msec
10
8
6
4
2
0
-2
Nwt
-50
0
50
100
150
200
250
300
Time (msec)
SAE Filter Class 60
B-61
8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Barrier Load Cell D5

Max = 4007.91 Nwt @ 29.03 msec
Min = -1436.09 Nwt @ 11.87 msec

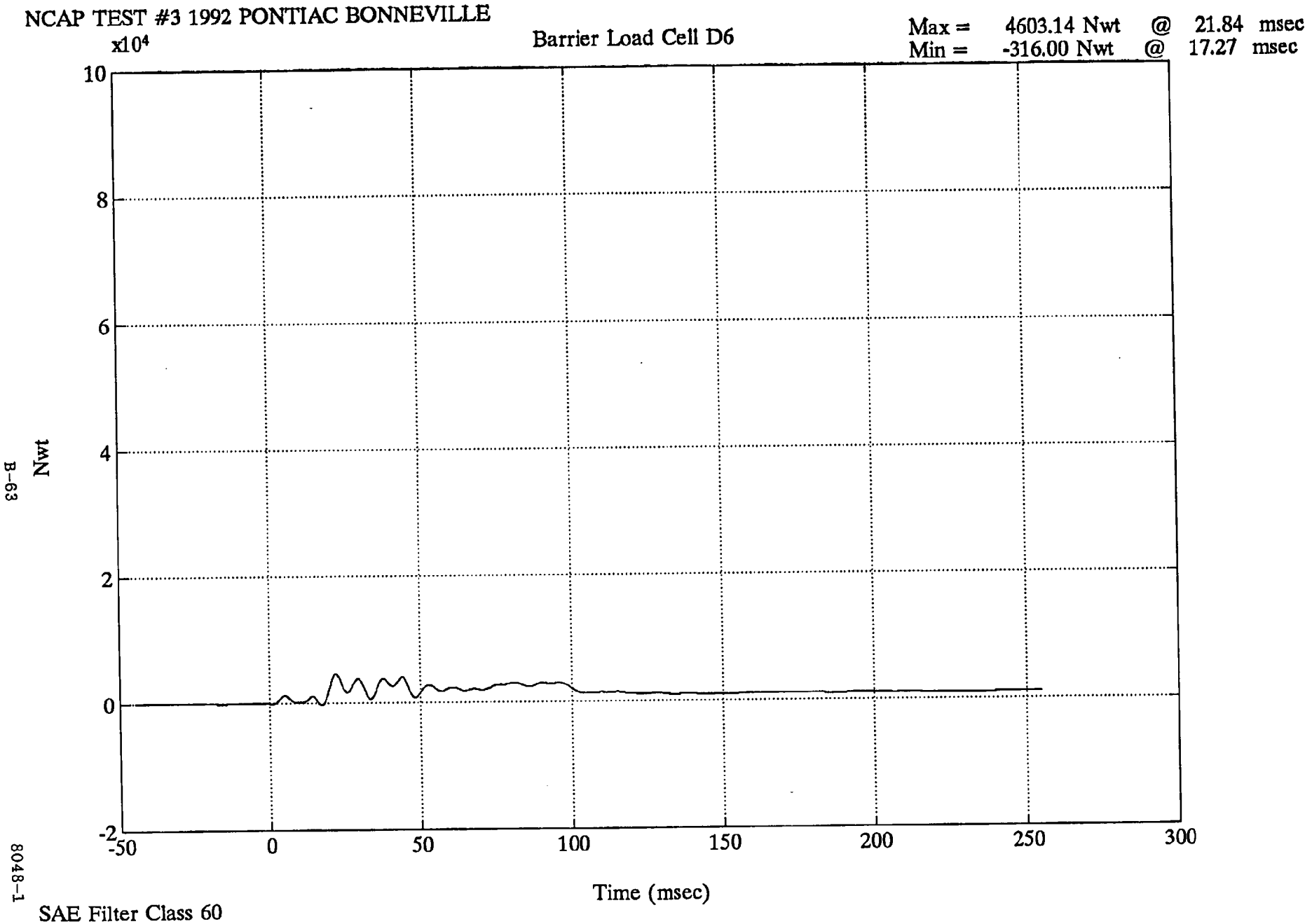


SAE Filter Class 60

B-62

8048-1

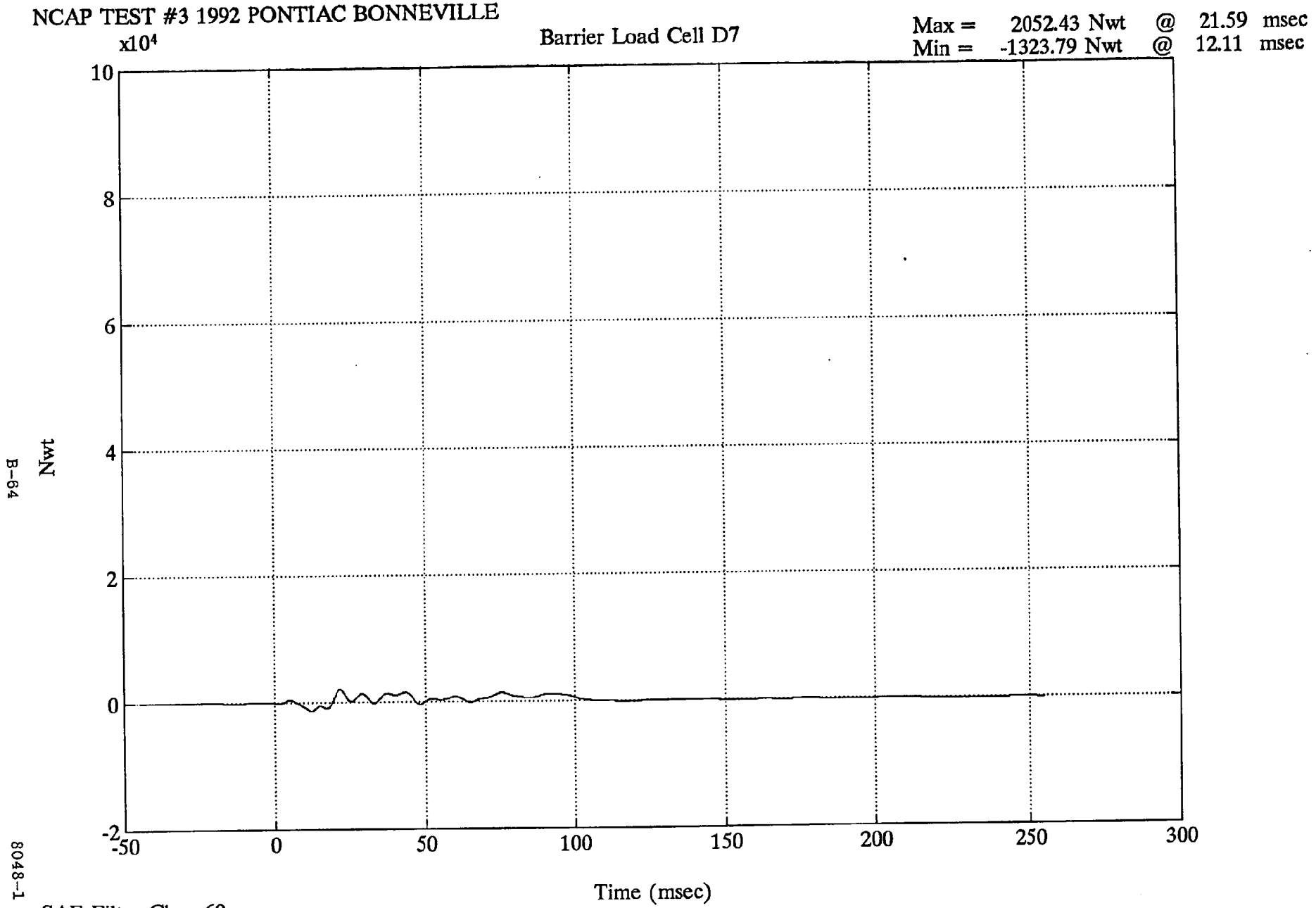
NCAP TEST #3 1992 PONTIAC BONNEVILLE



SAE Filter Class 60

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE



SAE Filter Class 60

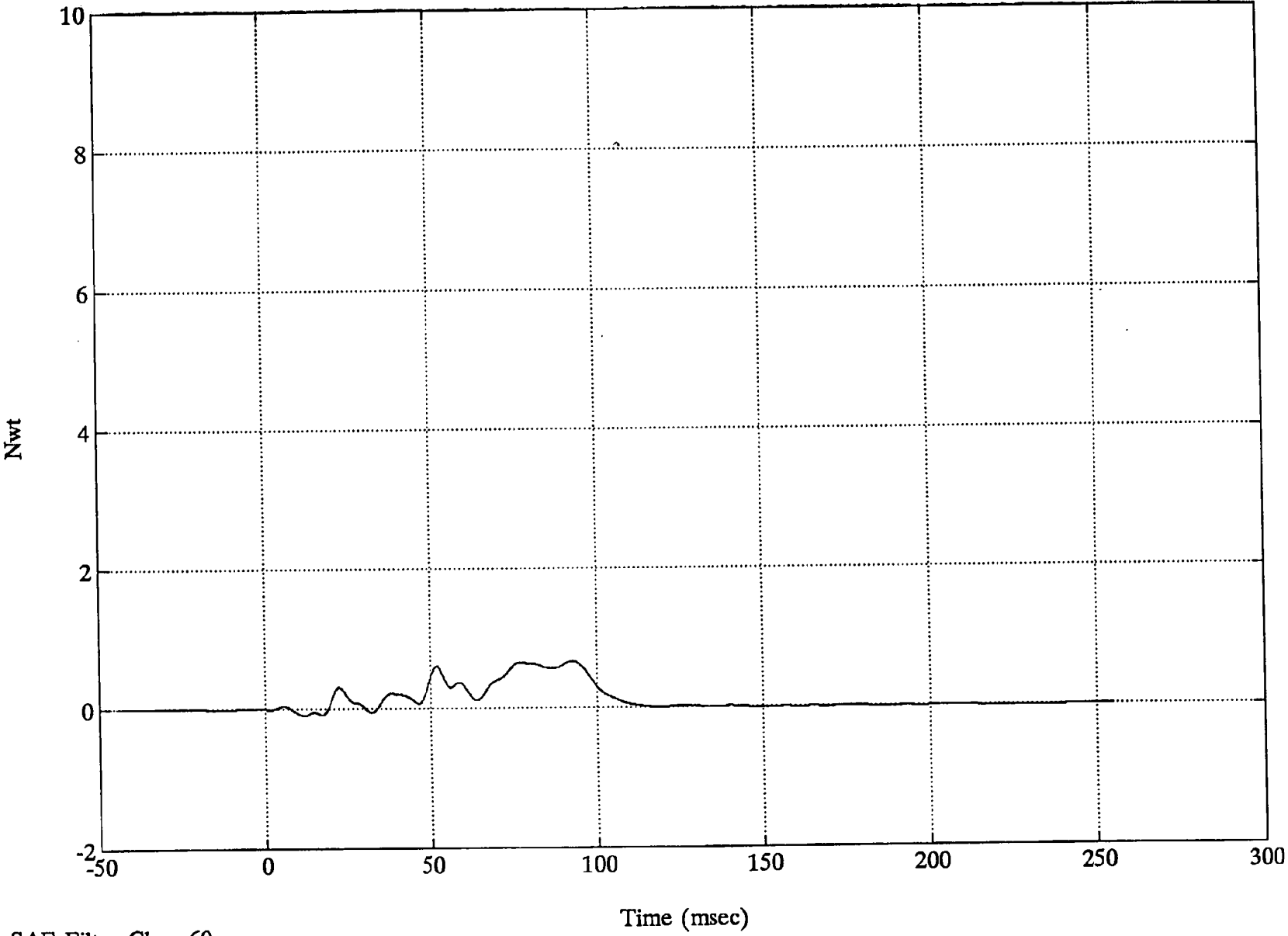
B-64

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Barrier Load Cell D8

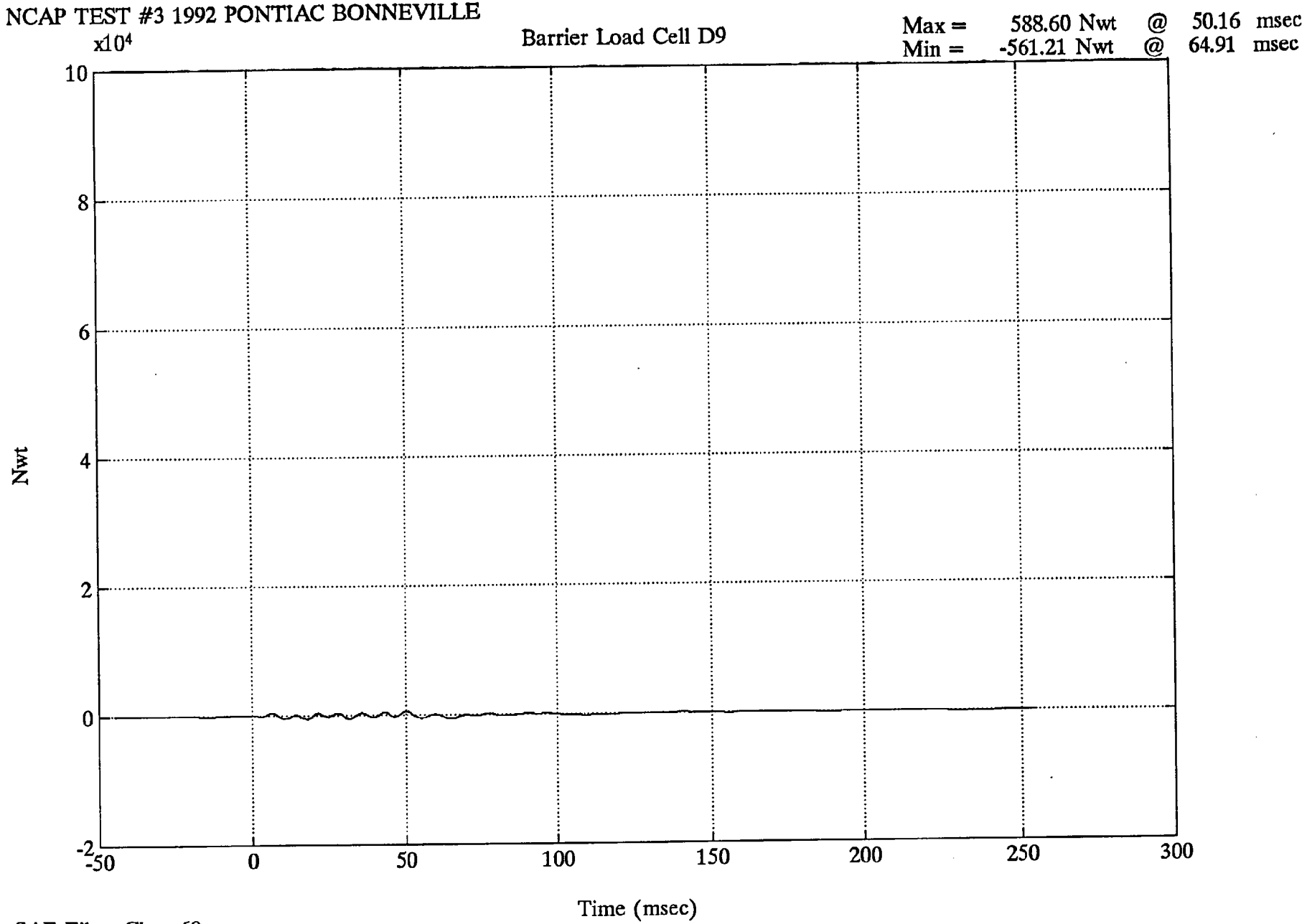
Max = 6650.17 Nwt @ 92.51 msec
Min = -971.05 Nwt @ 11.99 msec



SAE Filter Class 60

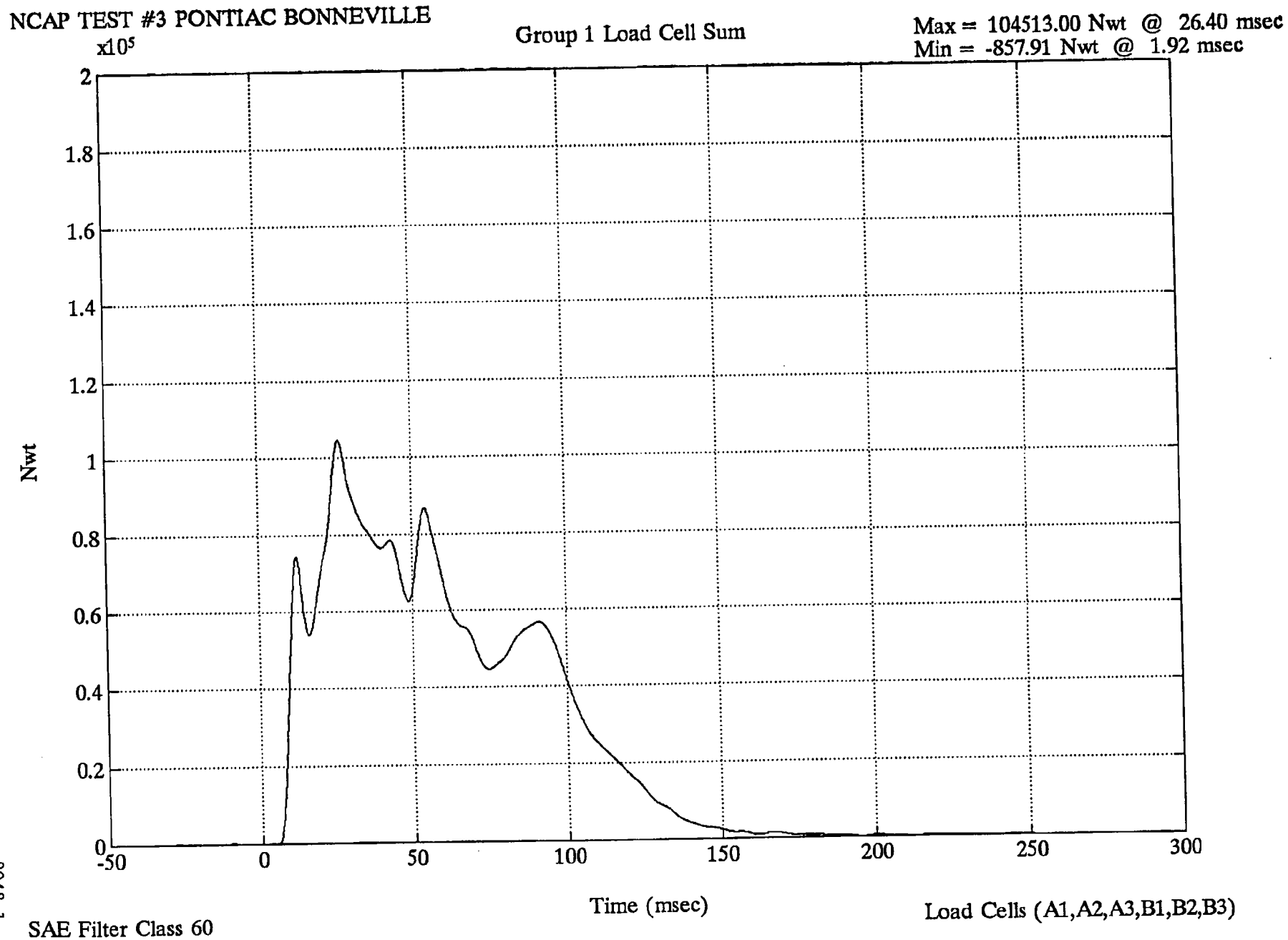
8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE



SAE Filter Class 60

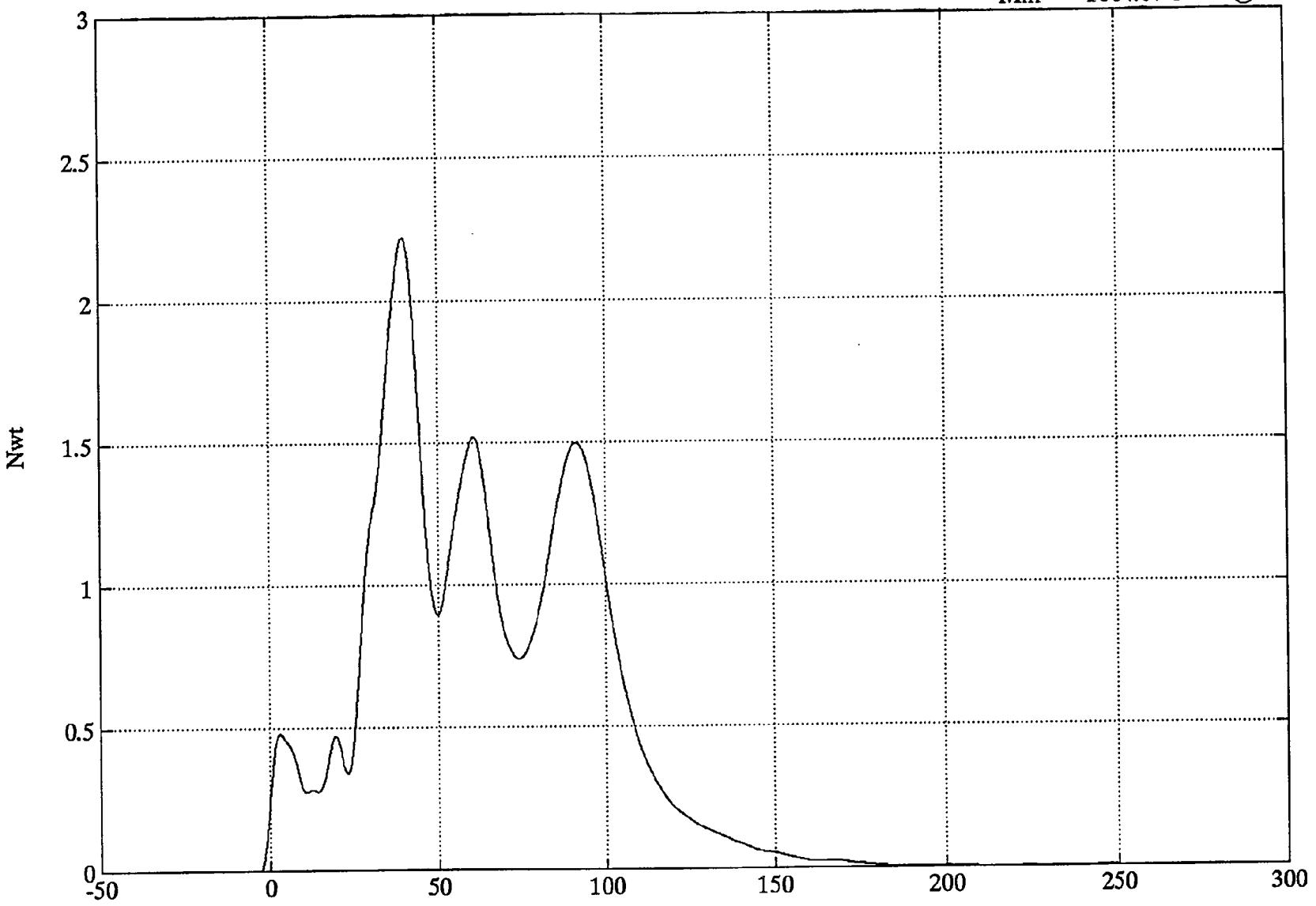
8048-1


NCAP TEST #3 PONTIAC BONNEVILLE
Group 1 Load Cell Sum
Max = 104513.00 Nwt @ 26.40 msec
Min = -857.91 Nwt @ 1.92 msec
x10^5
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Nwt
-50
0
50
100
150
200
250
300
Time (msec)
Load Cells (A1,A2,A3,B1,B2,B3)
SAE Filter Class 60

NCAP TEST #3 PONTIAC BONNEVILLE

Group 2 Load Cell Sum

Max = 222287.00 Nwt @ 39.96 msec
Min = -1604.67 Nwt @ -4.20 msec

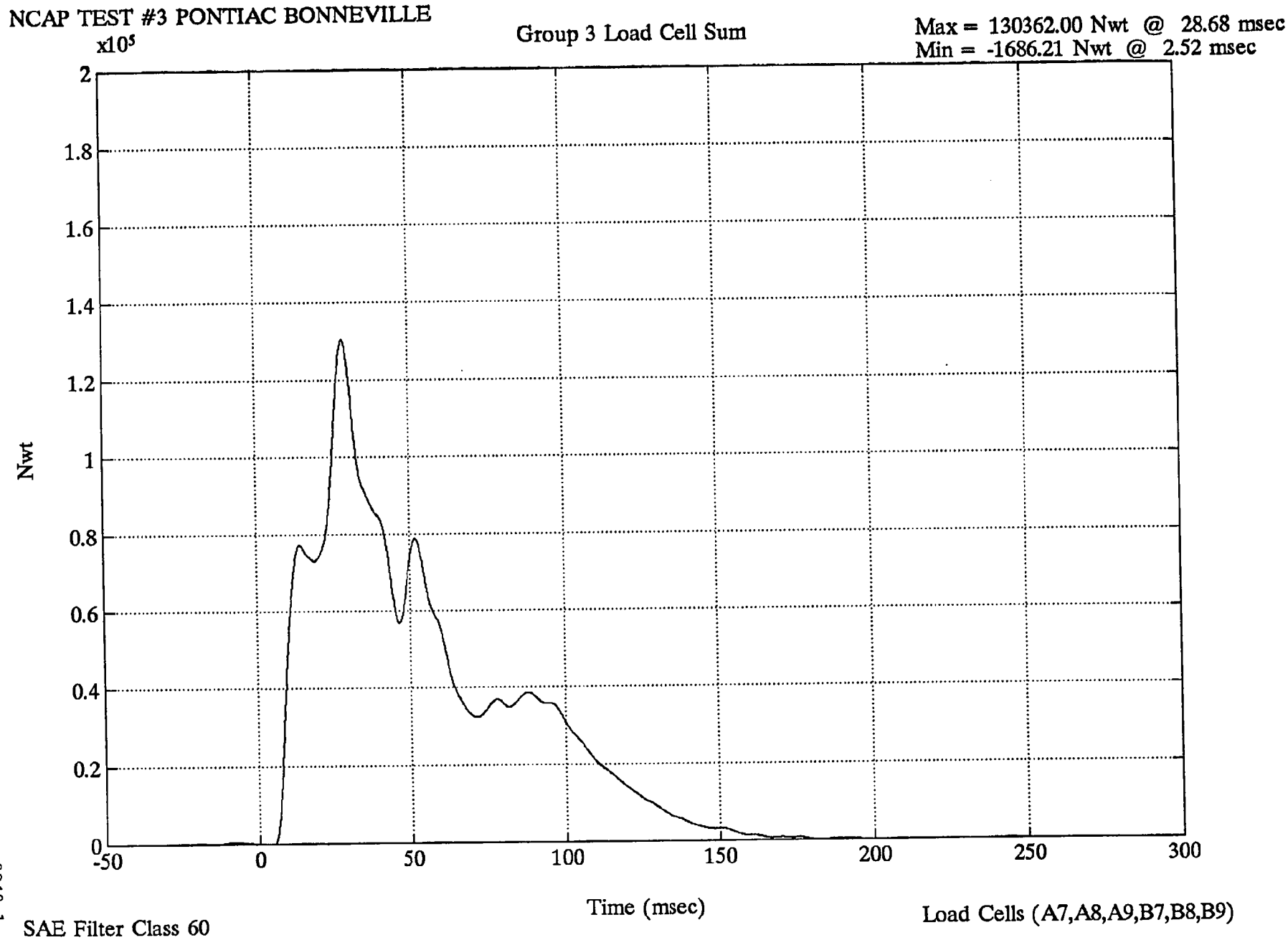


Load Cells (A4,A5,A6,B4,B5,B6)

SAE Filter Class 60

B-68

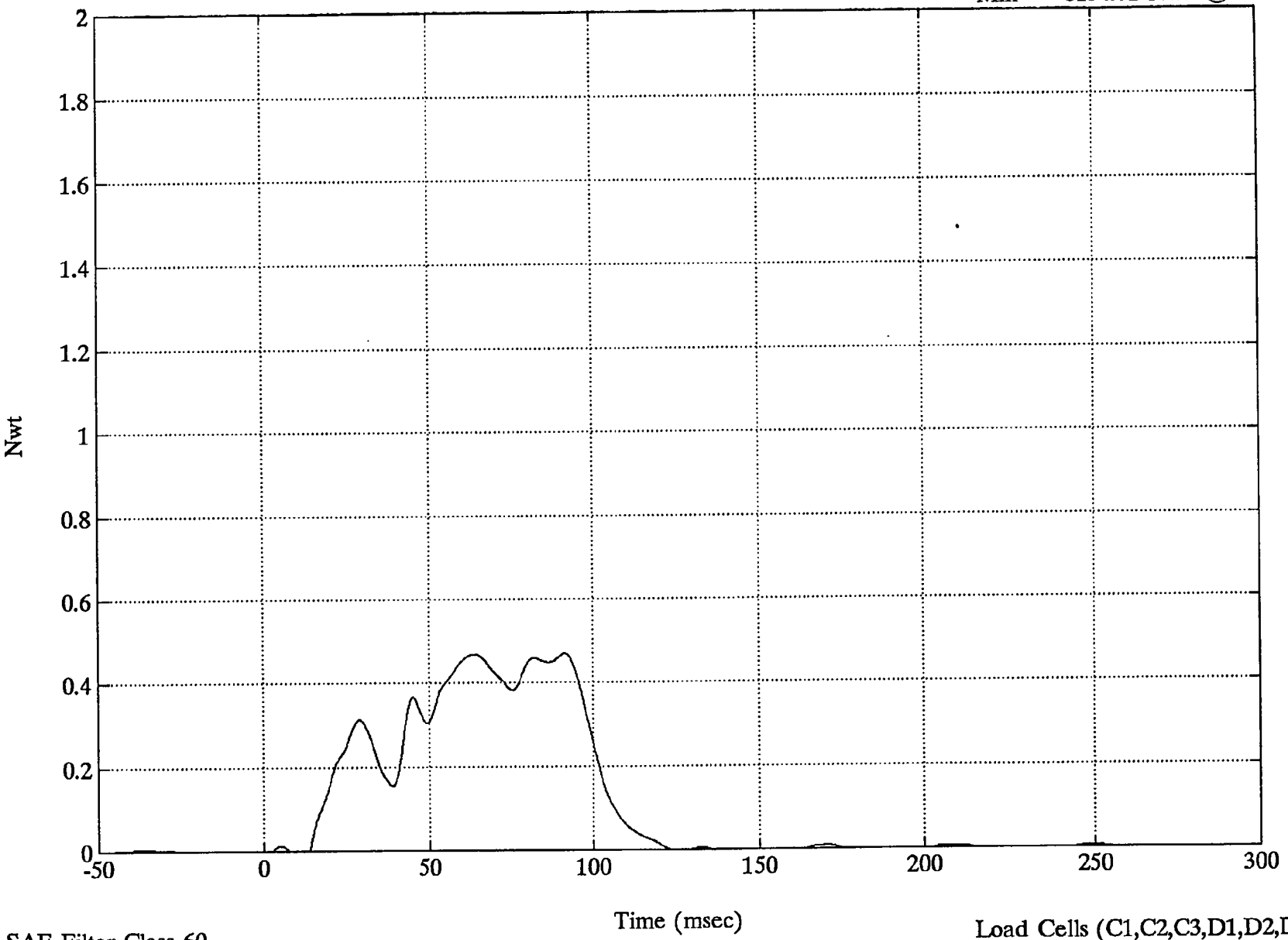
8048-1


NCAP TEST #3 PONTIAC BONNEVILLE
Group 3 Load Cell Sum
Max = 130362.00 Nwt @ 28.68 msec
Min = -1686.21 Nwt @ 2.52 msec
x10^5
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Nwt
-50
0
50
100
150
200
250
300
Time (msec)
SAE Filter Class 60
Load Cells (A7,A8,A9,B7,B8,B9)
8048-1

NCAP TEST #3 PONTIAC BONNEVILLE

Group 4 Load Cell Sum

Max = 46957.10 Nwt @ 91.44 msec
Min = -6154.71 Nwt @ 11.40 msec



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

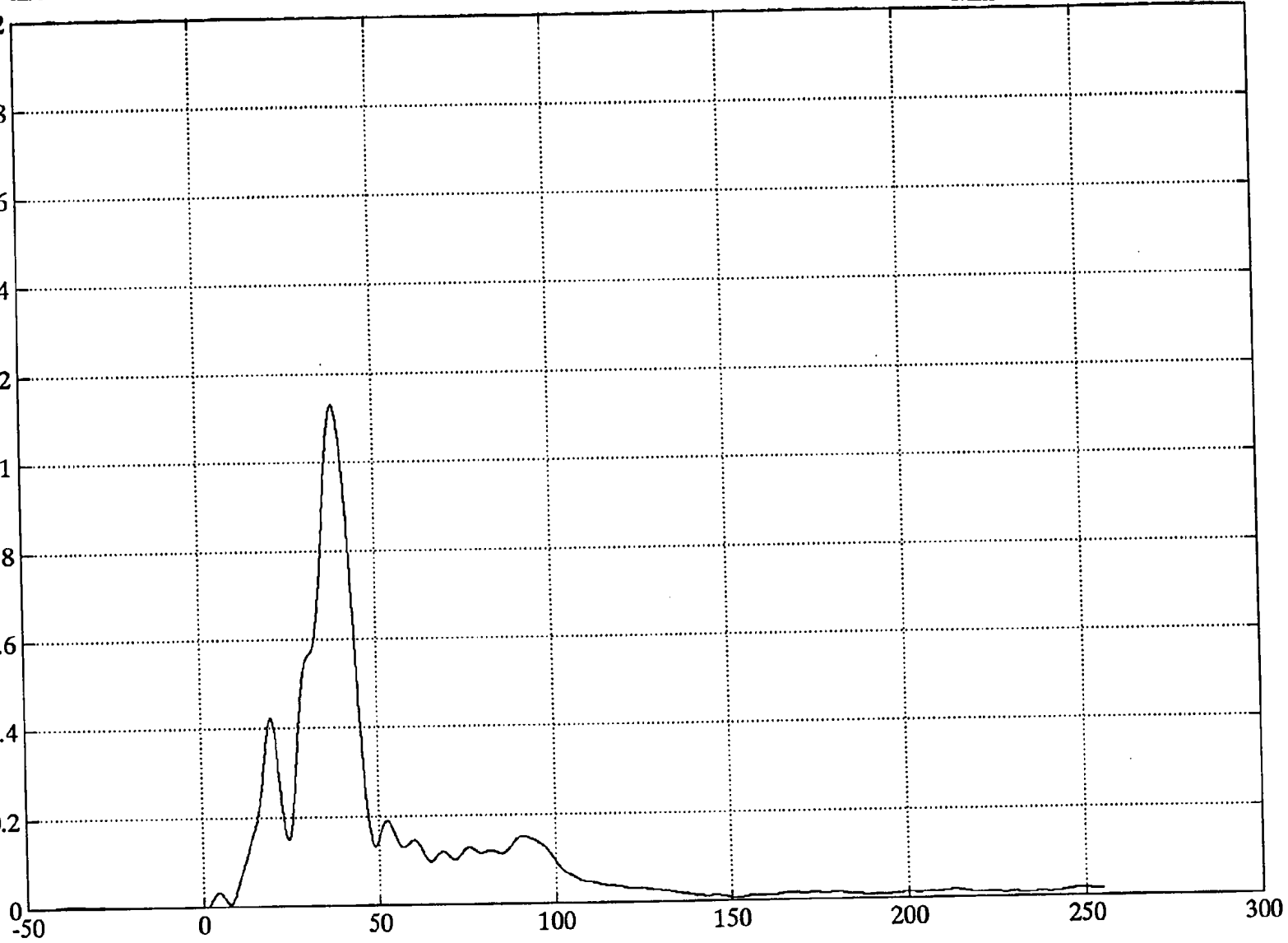
SAE Filter Class 60

8048-1

NCAP TEST #3 PONTIAC BONNEVILLE

Group 5 Load Cell Sum

Max = 113016.00 Nwt @ 38.40 msec
Min = -824.68 Nwt @ -0.12 msec



Load Cells (C4,C5,C6,D4,D5,D6)

SAE Filter Class 60

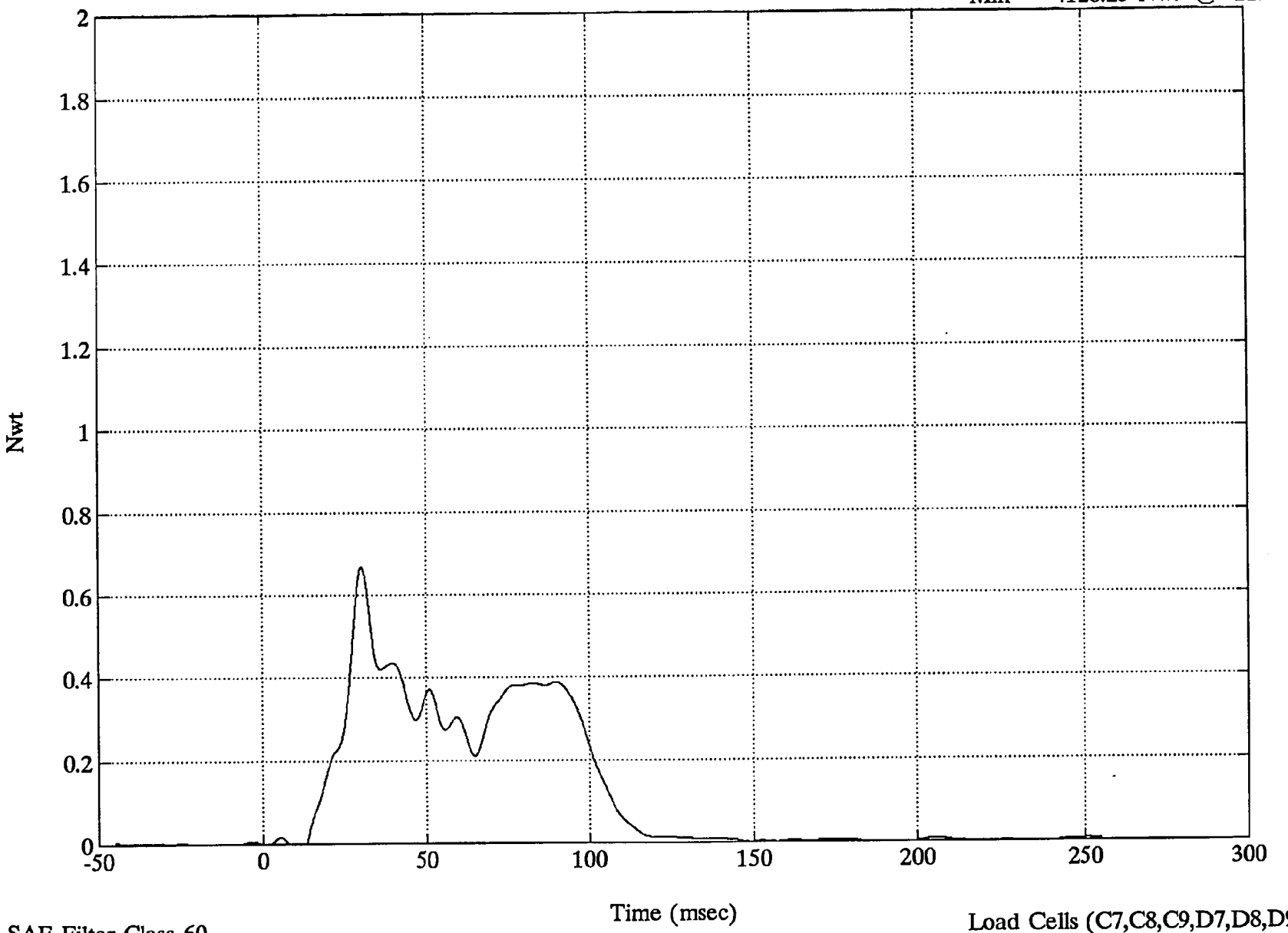
B-71

8048-1

NCAP TEST #3 PONTIAC BONNEVILLE

Group 6 Load Cell Sum

Max = 66748.60 Nwt @ 30.24 msec
Min = -4128.23 Nwt @ 11.04 msec



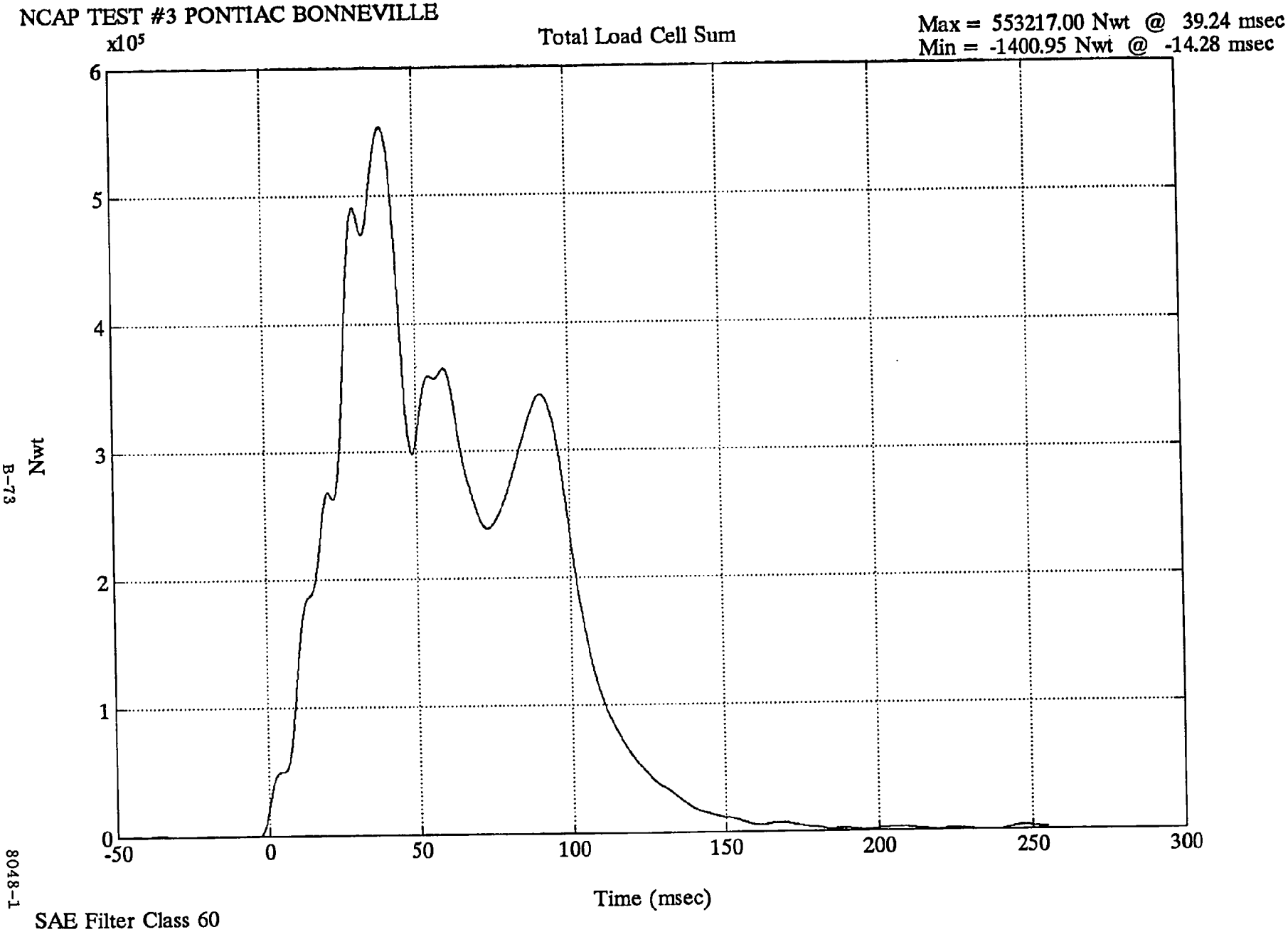
B-72

8048-1

SAE Filter Class 60

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

NCAP TEST #3 PONTIAC BONNEVILLE



SAE Filter Class 60

8048-1

TEST NO. MN0110

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

FACILITY: TRACK
RUN #: 1211
SERIES #: 3

TEST DATE: 03 Sep 1992
TEST TIME: 14:44:18
BOARD: a

TITLE: NCAP TEST #3 1992 PONTIAC BONNEVILLE

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM AMP	MAXIMUM msec	MINIMUM AMP	MINIMUM msec
1	Pos. 1 Head X	Gs	10.3	241.6	-49.3	88.1
2	Pos. 1 Head Y	Gs	3.4	253.1	-16.6	99.1
3	Pos. 1 Head Z	Gs	11.7	73.7	-12.4	93.1
4	Pos. 1 Left Femur	Nwt	885.7	81.5	-6122.4	60.7
5	Pos. 1 Chest X	Gs	8.6	193.2	-45.0	84.5
6	Pos. 1 Chest Y	Gs	4.8	109.1	-3.0	197.0
7	Pos. 1 Chest Z	Gs	6.1	75.6	-6.6	124.9
8	Pos. 1 Right Femur	Nwt	141.8	28.7	-6290.5	65.5
9	Pos. 2 Head X	Gs	18.0	177.2	-57.8	87.2
10	Pos. 2 Head Y	Gs	3.9	70.1	-12.9	100.9
11	Pos. 2 Head Z	Gs	33.0	85.3	-7.6	124.1
12	Pos. 2 Left Femur	Nwt	295.8	132.1	-6667.5	63.2
13	Pos. 2 Chest X	Gs	9.2	180.1	-56.6	82.1
14	Pos. 2 Chest Y	Gs	6.0	77.6	-2.2	85.7
15	Pos. 2 Chest Z	Gs	11.3	86.3	-9.7	123.5
16	Pos. 2 Right Femur	Nwt	296.1	47.9	-3134.3	70.8
17	Pos. 1 Head Resultant	Gs	50.7	90.5	.1	-16.1
18	Pos. 1 Chest Resultant	Gs	45.0	84.5	.0	-29.5
19	Pos. 2 Head Resultant	Gs	66.5	88.2	.0	-14.0
20	Pos. 2 Chest Resultant	Gs	57.5	82.1	.0	-24.4

36 ms Fixed Duration HIC SUMMARY: Pos. 1 Head Resultant

hic: 359.94
t1 = 72.120 msec
t2 = 108.000 msec
Average G's Over Hic Duration = 39.86

36 ms Fixed Duration HIC SUMMARY: Pos. 2 Head Resultant

hic: 768.21
t1 = 69.000 msec
t2 = 104.880 msec
Average G's Over Hic Duration = 53.98

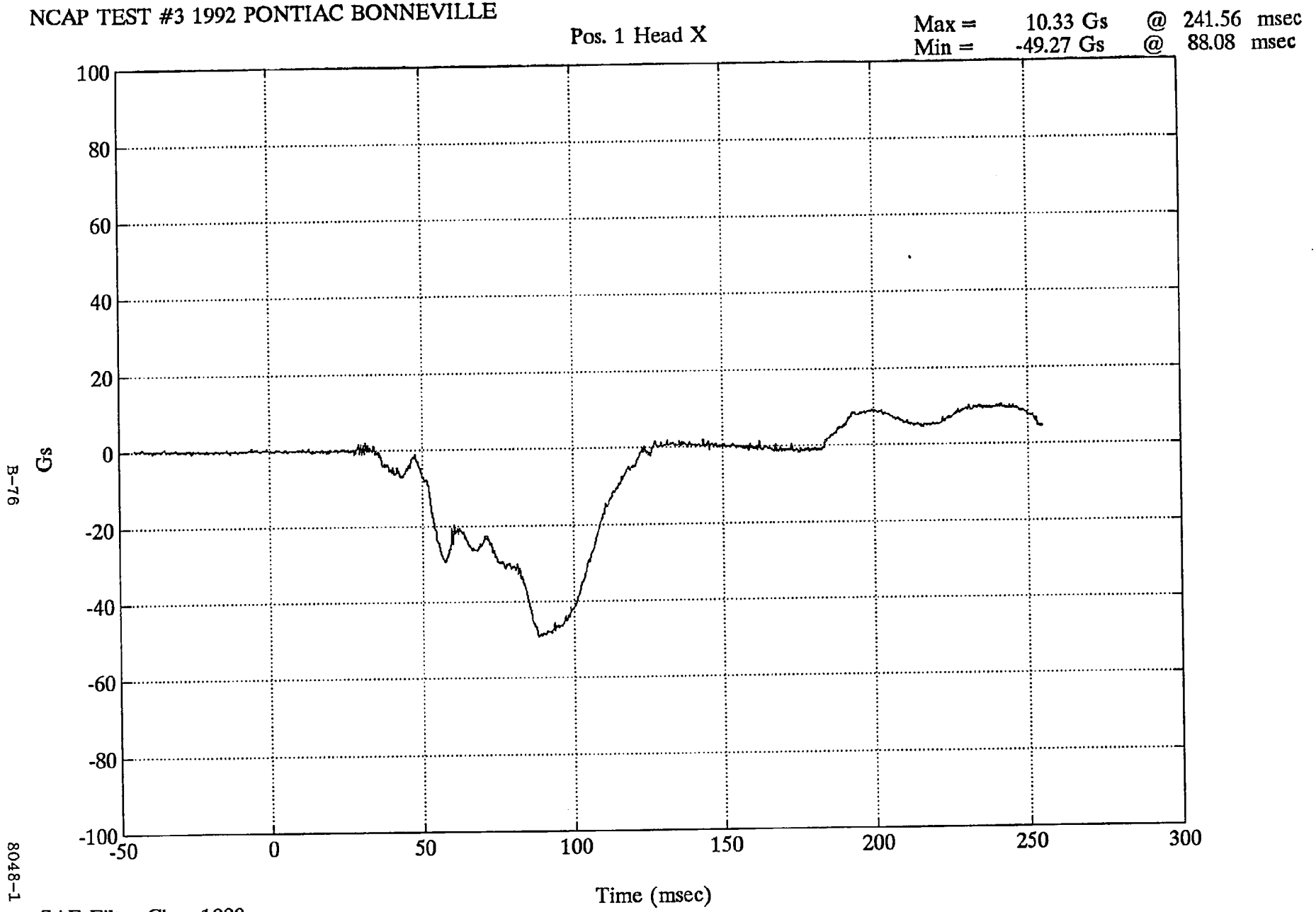
CLIP SUMMARY: Pos. 1 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 44.145 G's
Tstart = 88.0800 ms
Tend = 91.2000 ms
CSI = 410.767

CLIP SUMMARY: Pos. 2 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 56.880 G's
Tstart = 79.9200 ms
Tend = 83.0400 ms
CSI = 553.949

NCAP TEST #3 1992 PONTIAC BONNEVILLE

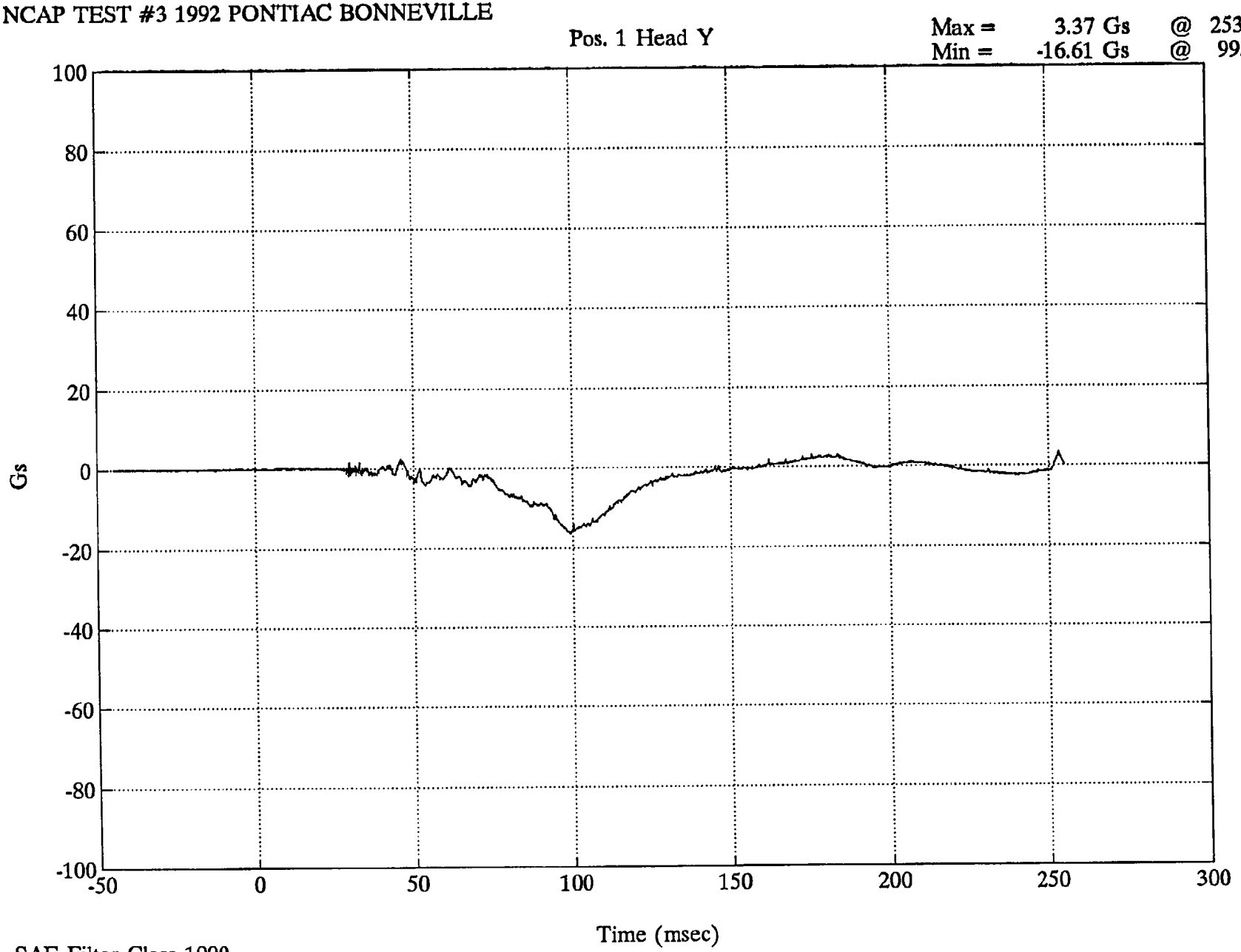


B-76

8048-1

SAE Filter Class 1000

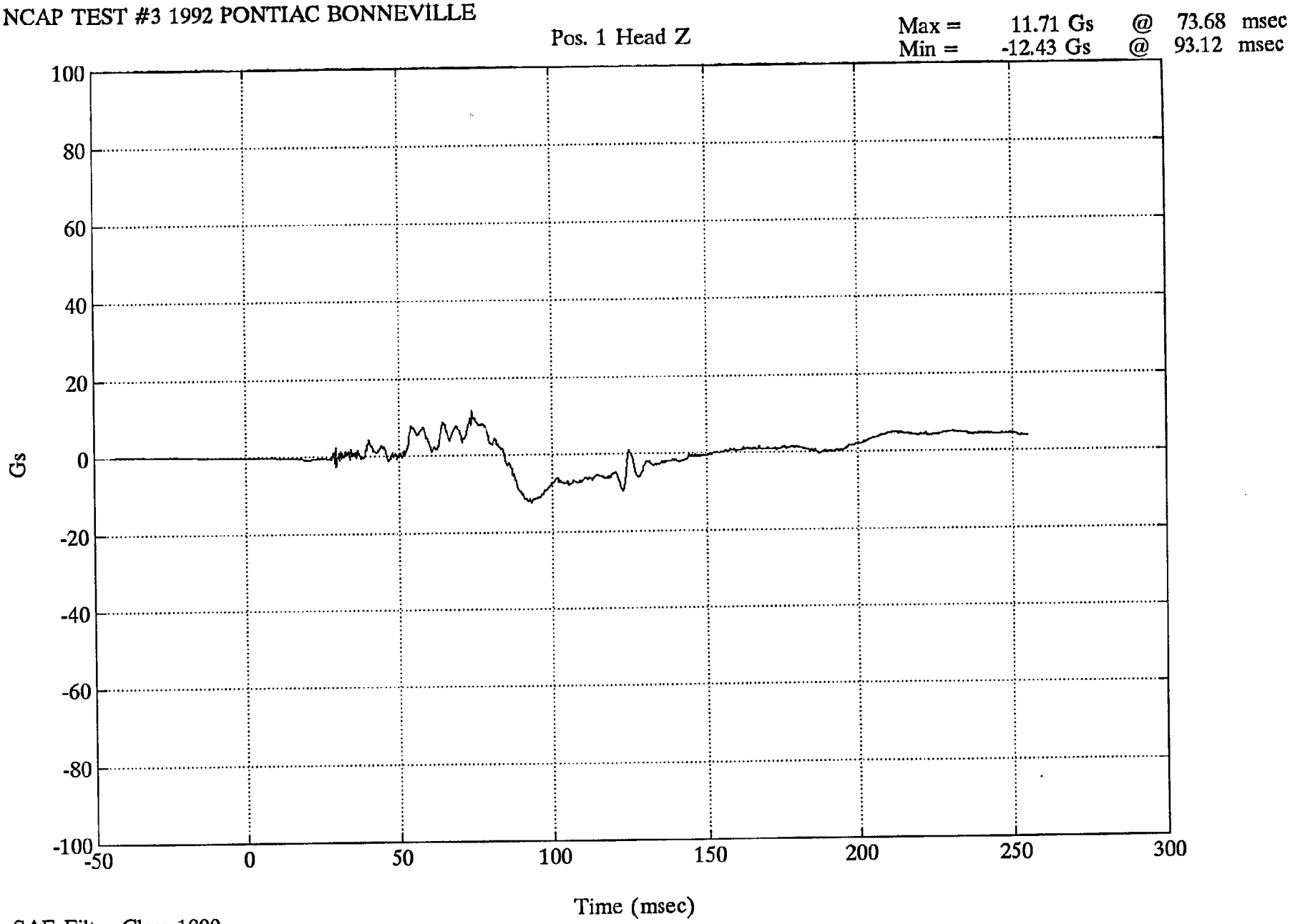
NCAP TEST #3 1992 PONTIAC BONNEVILLE



SAE Filter Class 1000

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE



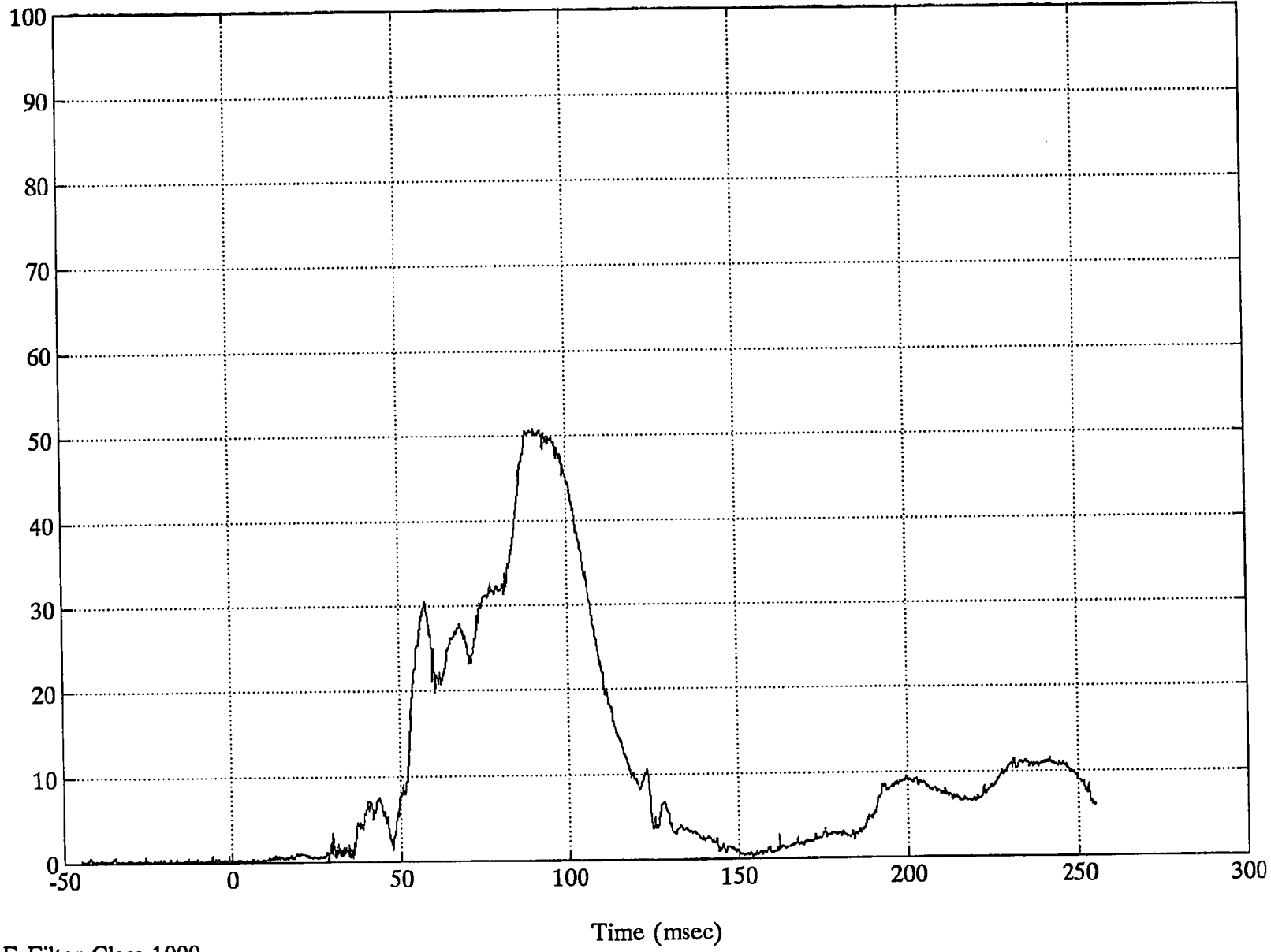
SAE Filter Class 1000

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Head Resultant

Max = 50.74 Gs @ 90.48 msec
Min = .07 Gs @ -16.08 msec



B-79

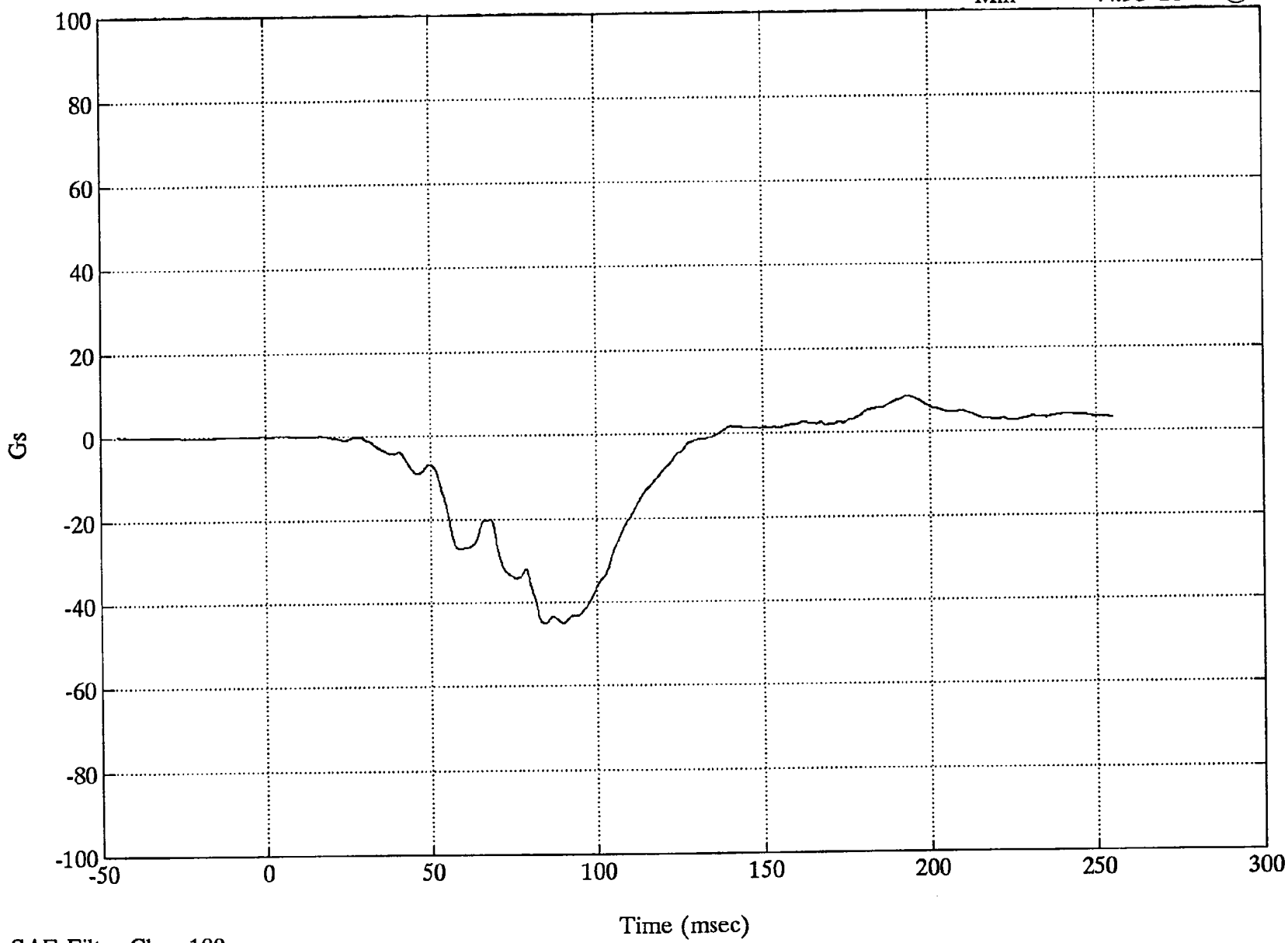
8048-1

SAE Filter Class 1000

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Chest X

Max = 8.57 Gs @ 193.20 msec
Min = -44.98 Gs @ 84.48 msec



B-80

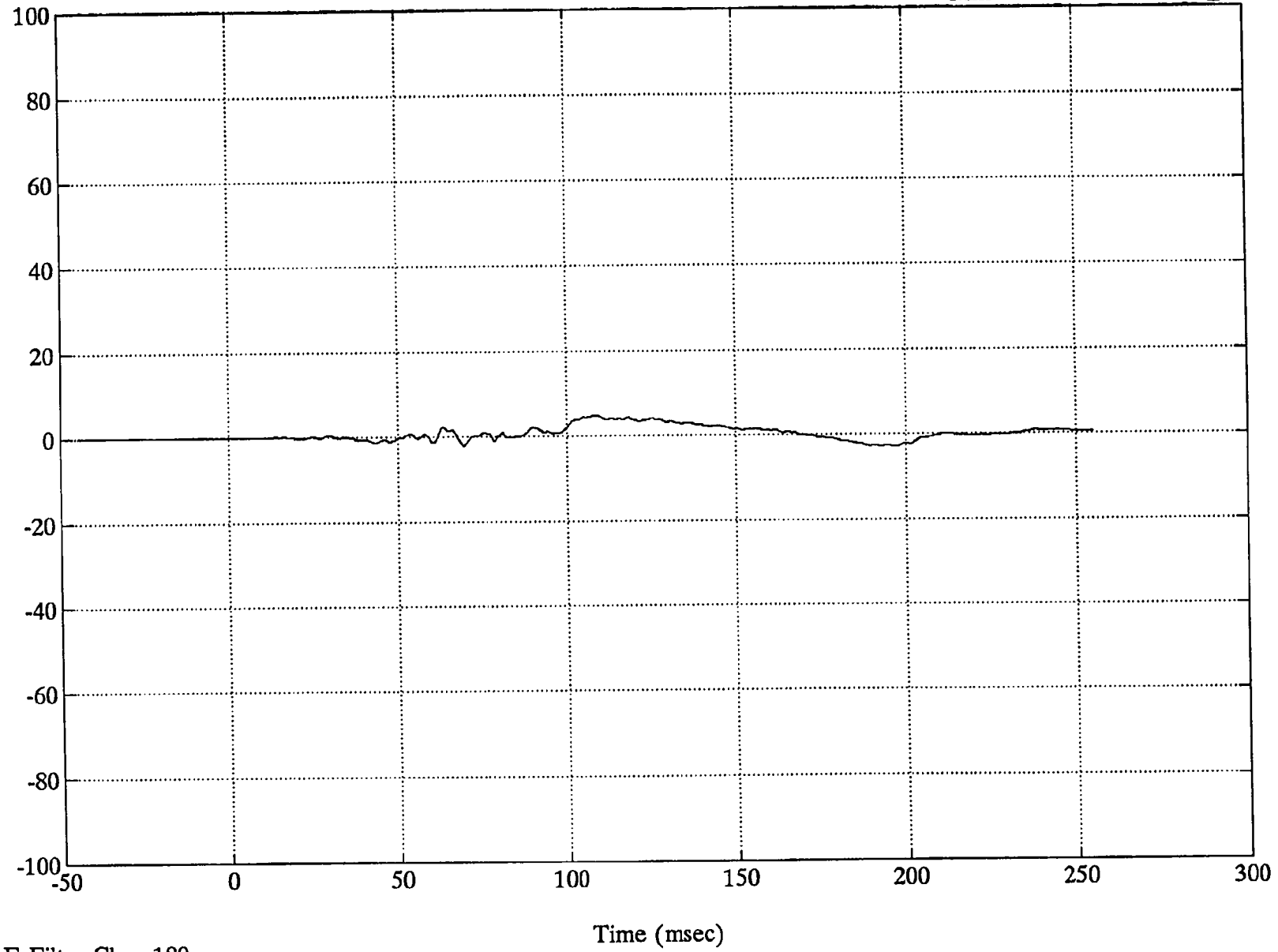
8048-1

SAE Filter Class 180

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Chest Y

Max = 4.77 Gs @ 109.08 msec
Min = -2.95 Gs @ 197.04 msec



B-81

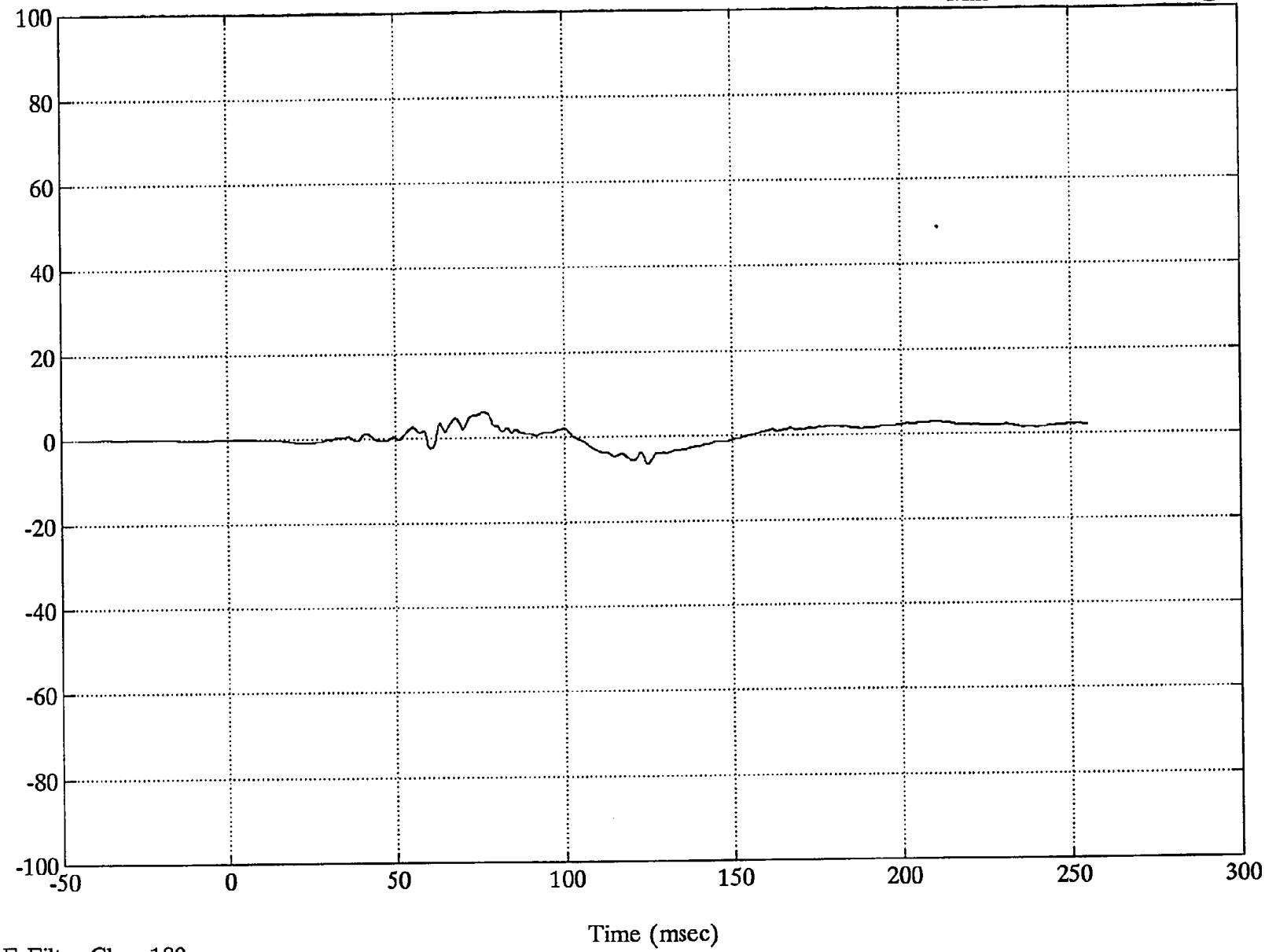
8048-1

SAE Filter Class 180

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Chest Z

Max = 6.14 Gs @ 75.59 msec
Min = -6.56 Gs @ 124.92 msec



B-82

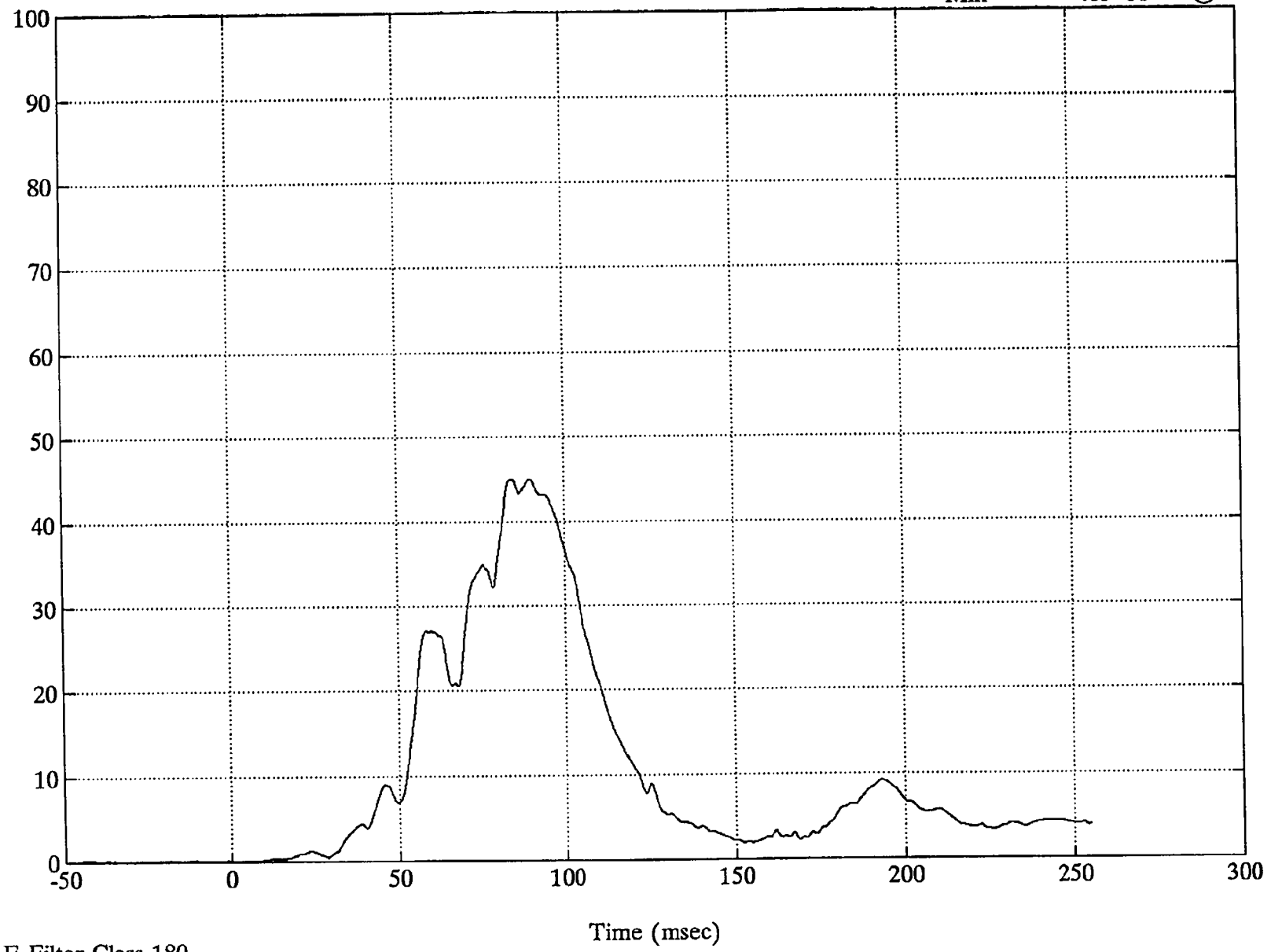
8048-1

SAE Filter Class 180

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Chest Resultant

Max = 45.00 Gs @ 84.48 msec
Min = .05 Gs @ -29.52 msec



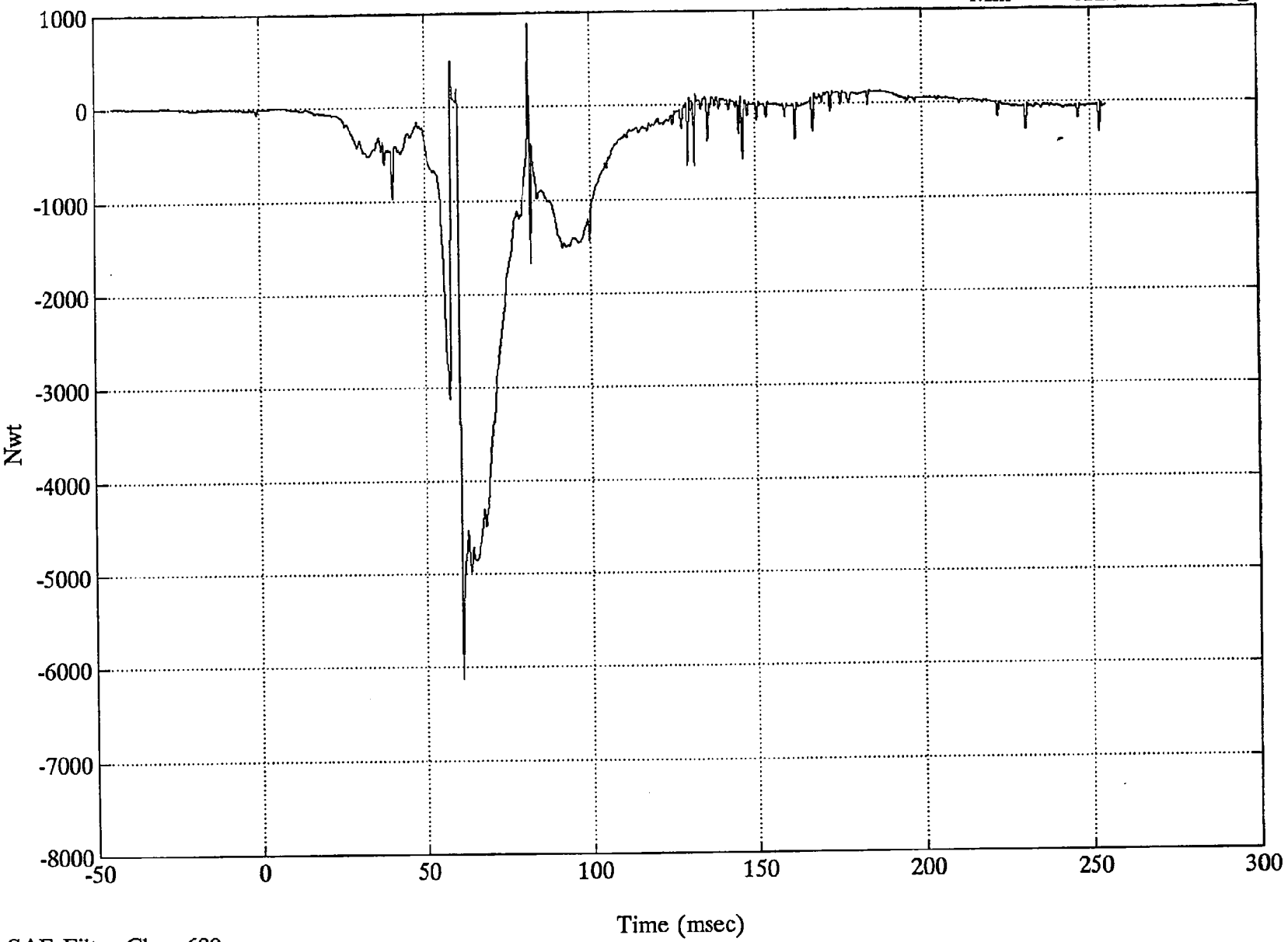
SAE Filter Class 180

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Left Femur

Max = 885.67 Nwt @ 81.48 msec
Min = -6122.35 Nwt @ 60.72 msec



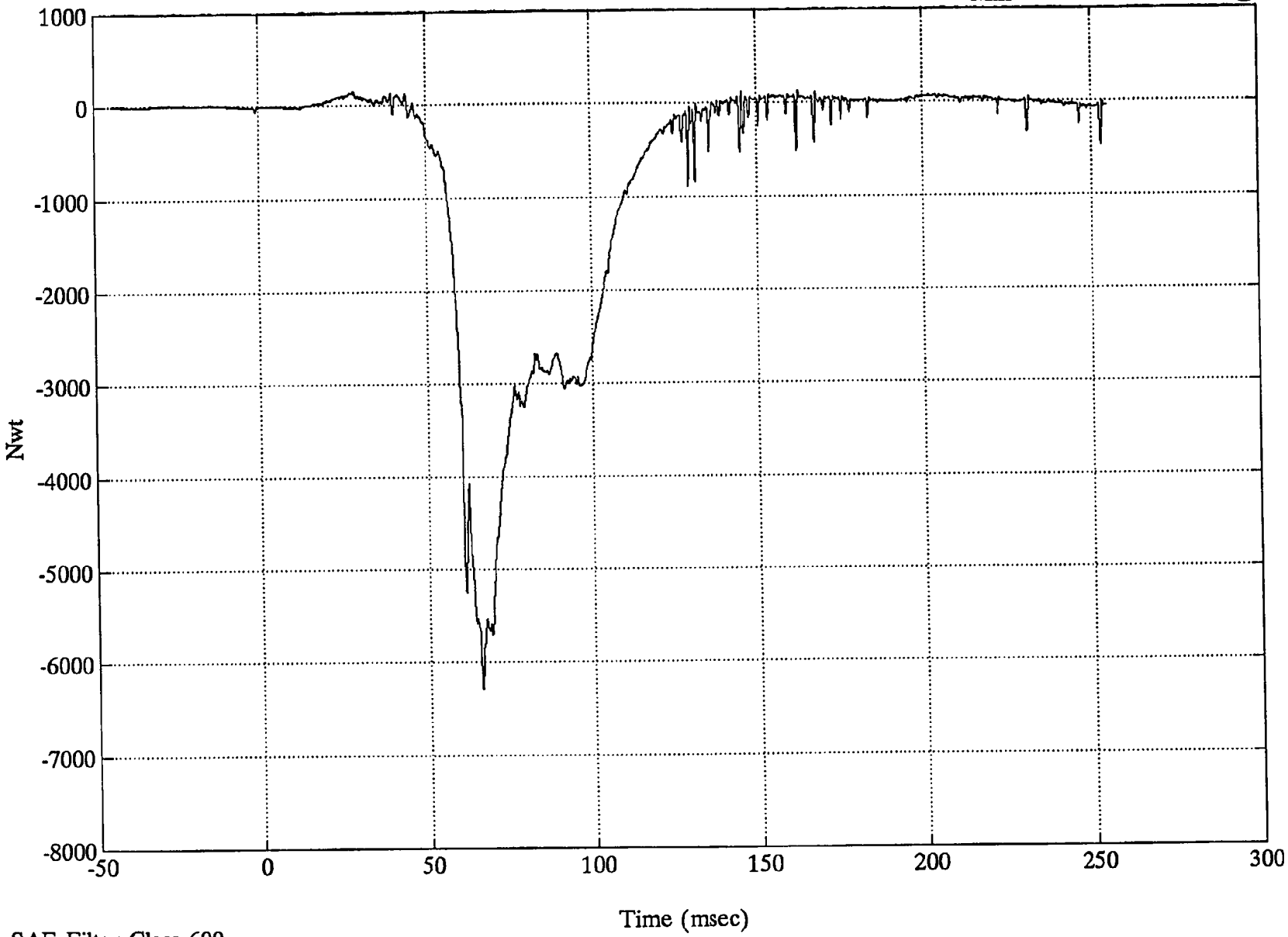
SAE Filter Class 600

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Right Femur

Max = 141.85 Nwt @ 28.68 msec
Min = -6290.45 Nwt @ 65.52 msec



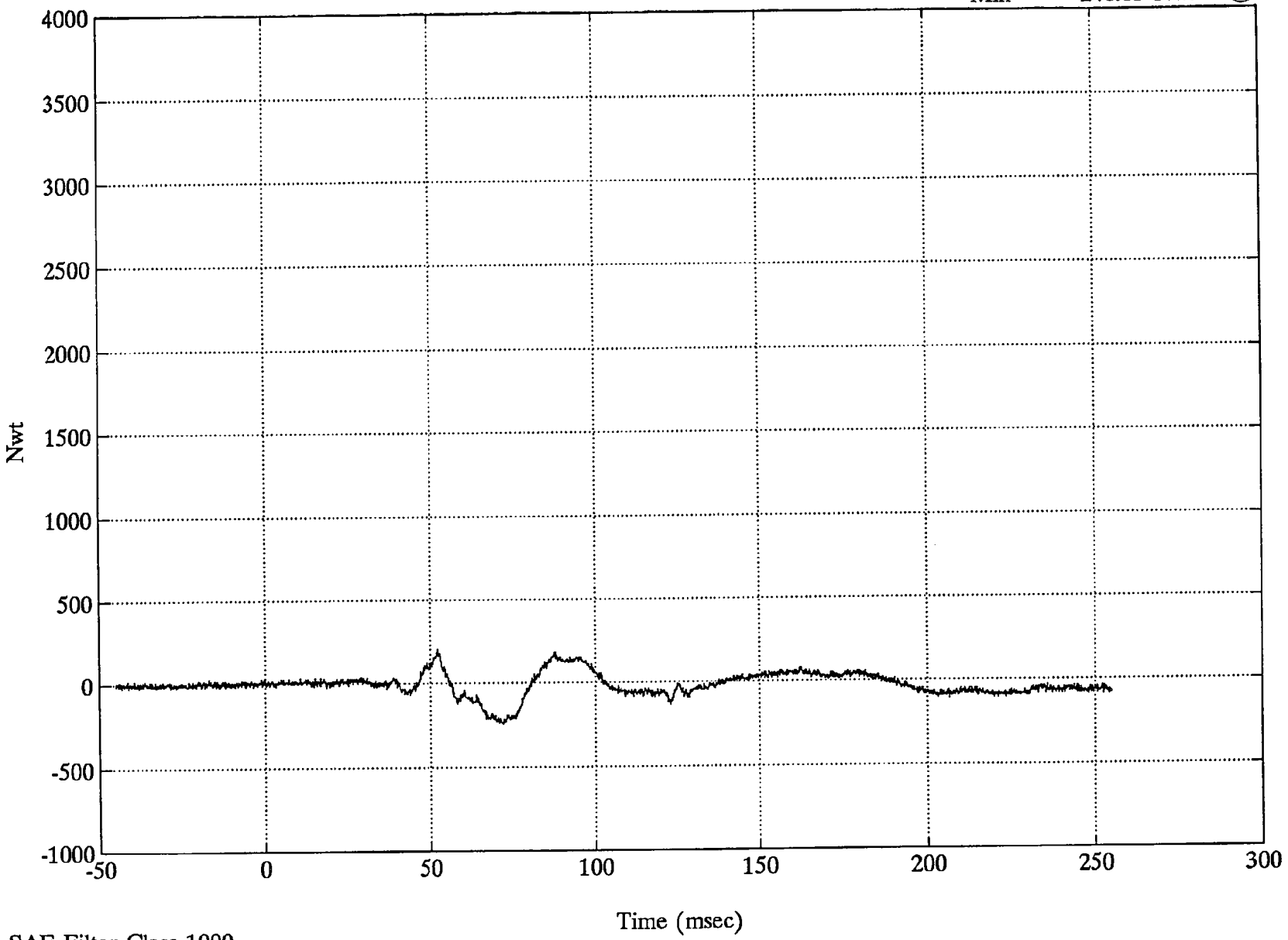
SAE Filter Class 600

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Upper Neck Fx

Max = 202.19 Nwt @ 52.31 msec
Min = -246.63 Nwt @ 71.76 msec



B-86

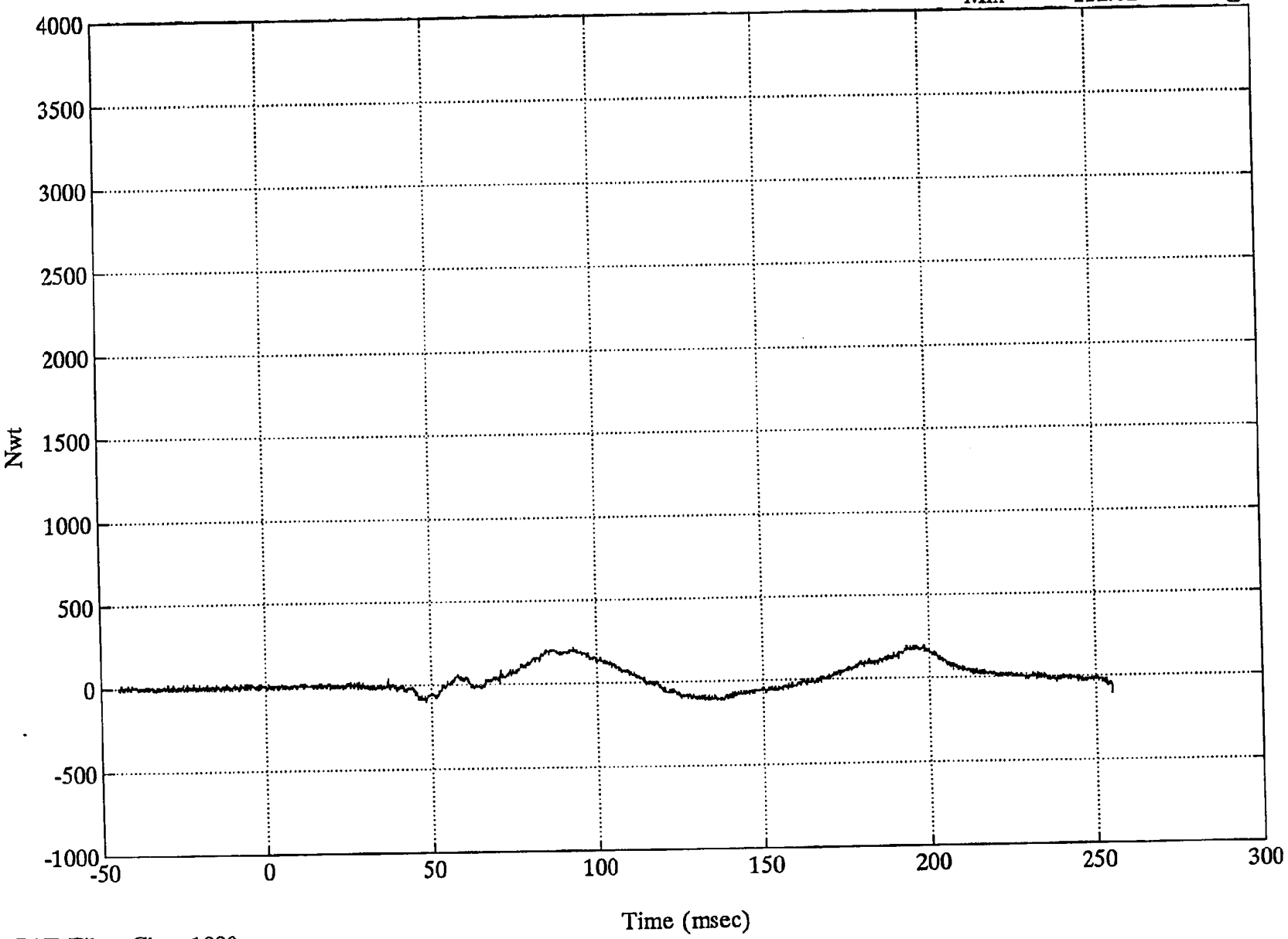
8048-1

SAE Filter Class 1000

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Upper Neck Fy

Max = 212.78 Nwt @ 92.88 msec
Min = -112.62 Nwt @ 138.36 msec



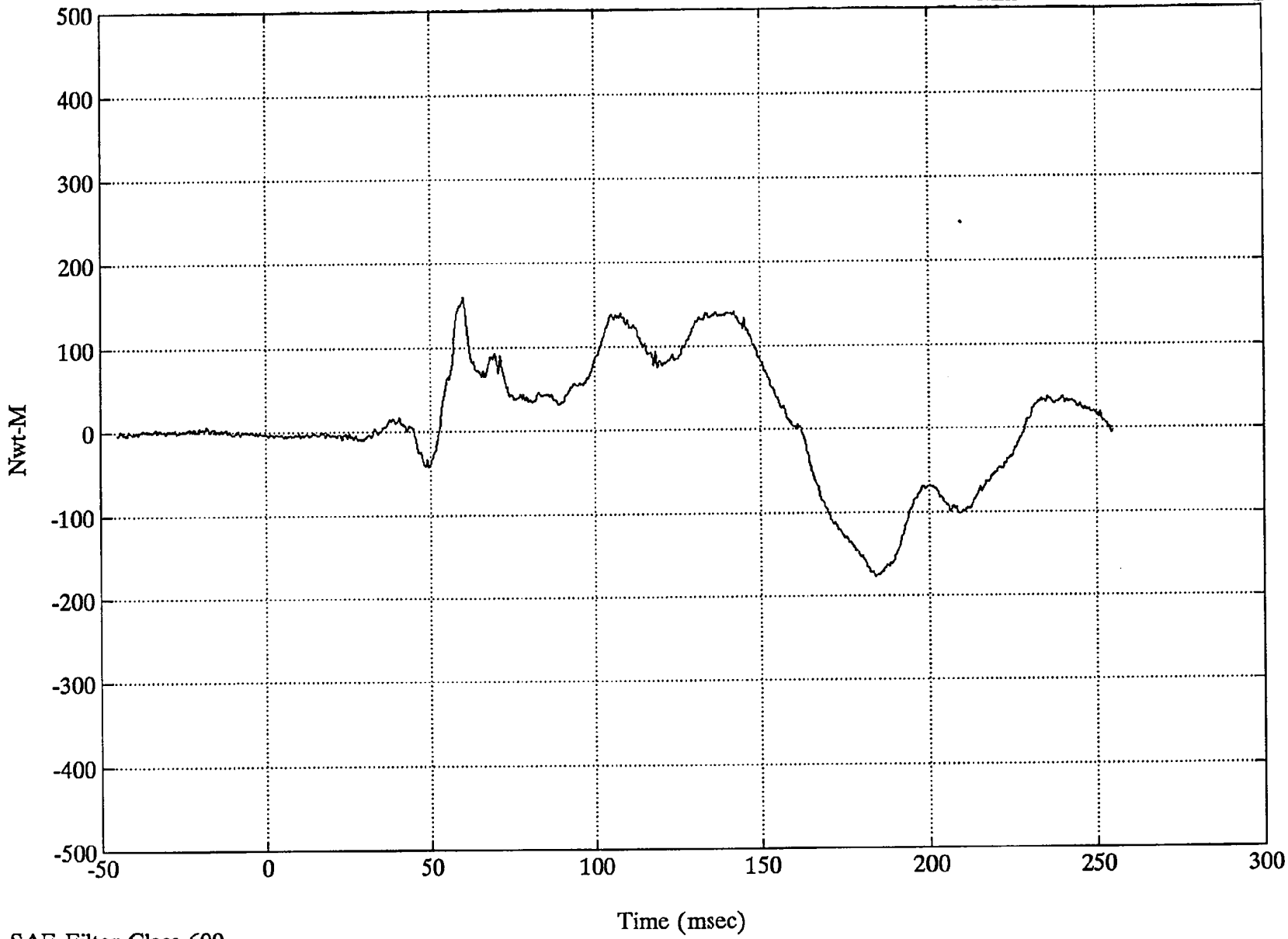
SAE Filter Class 1000

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Upper Neck Mx

Max = 159.76 Nwt-M @ 60.00 msec
Min = -177.66 Nwt-M @ 184.19 msec



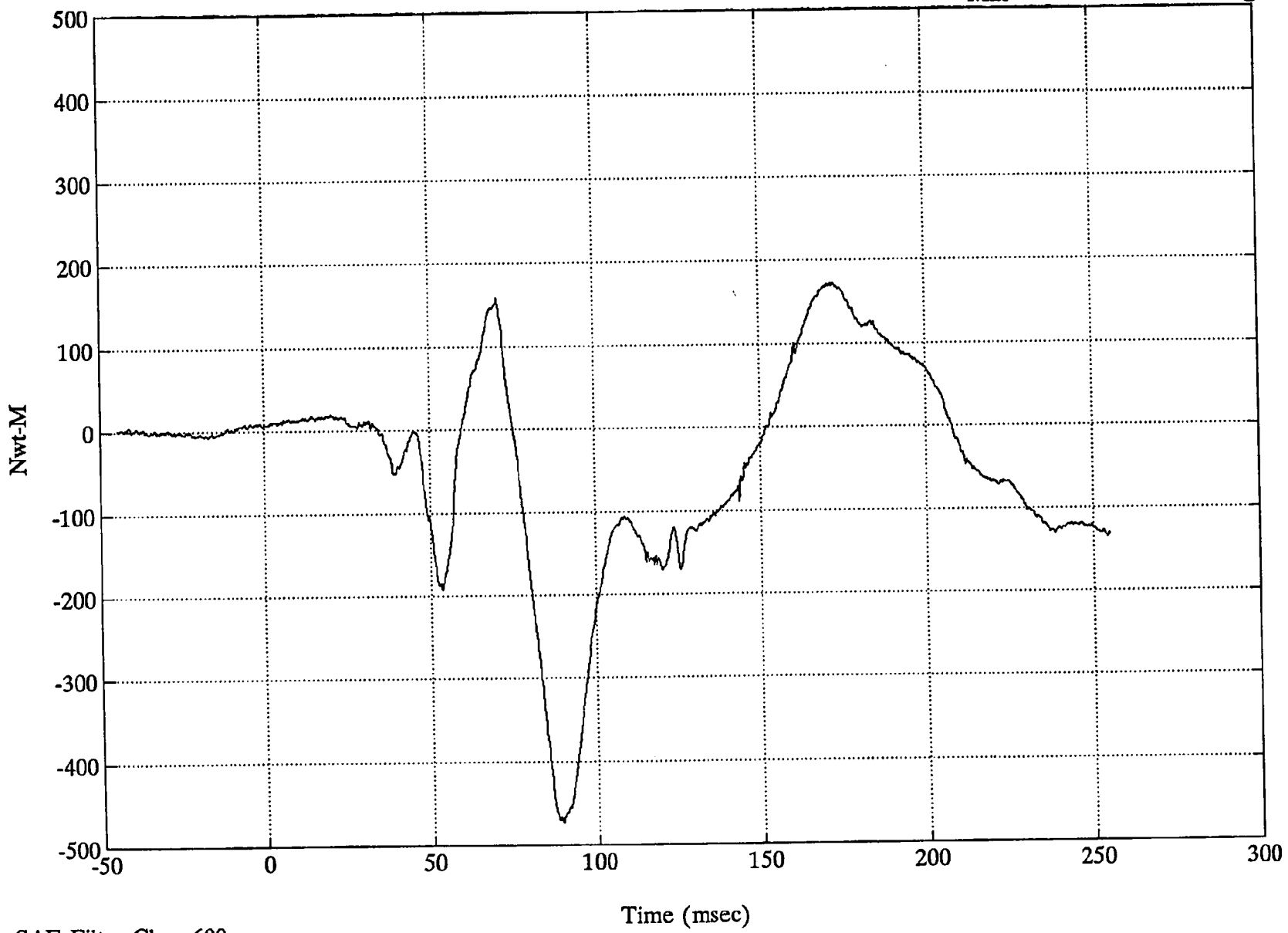
SAE Filter Class 600

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Upper Neck My

Max = 172.87 Nwt-M @ 171.84 msec
Min = -472.92 Nwt-M @ 89.16 msec



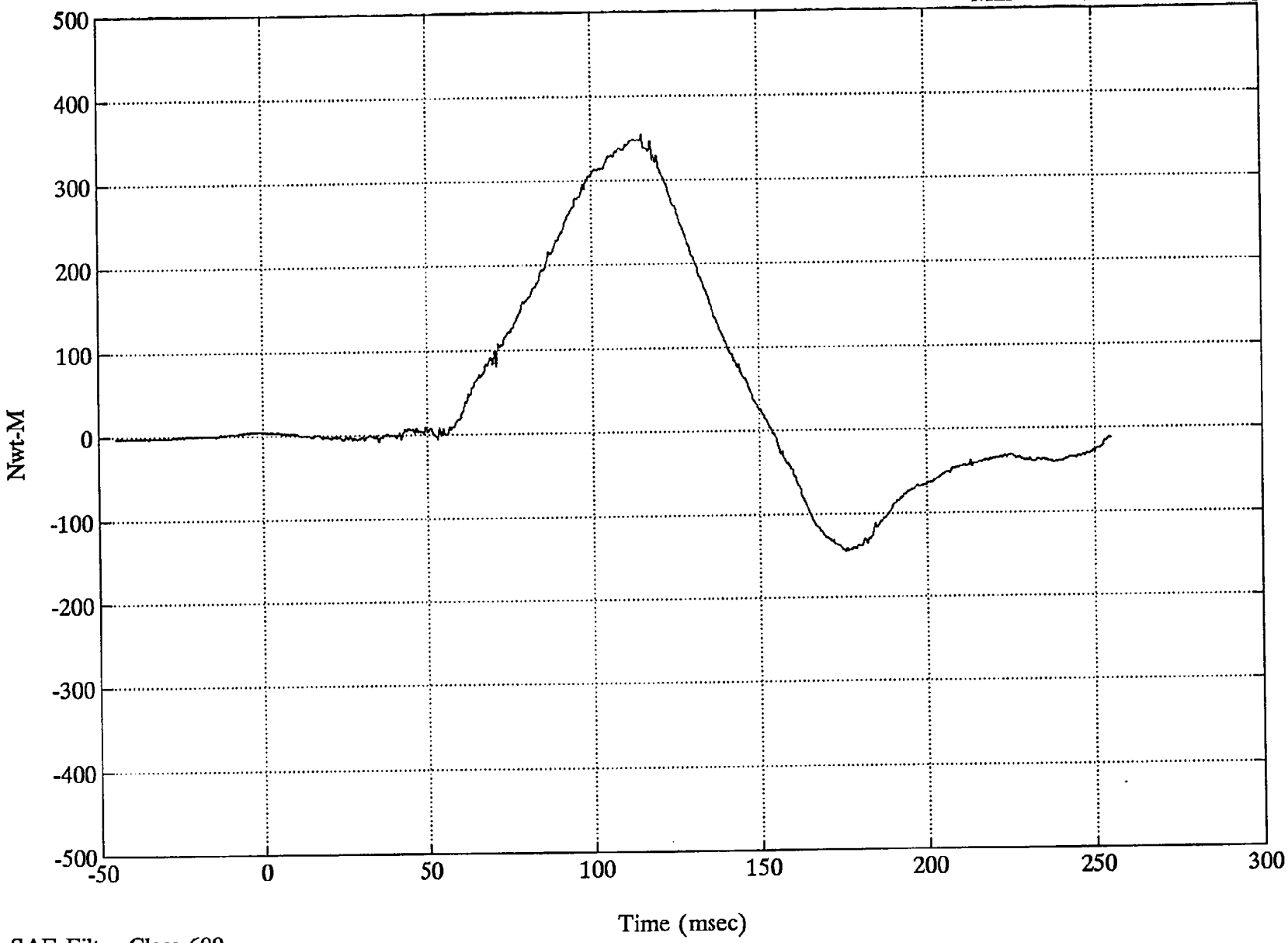
SAE Filter Class 600

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Upper Neck Mz

Max = 353.48 Nwt-M @ 115.08 msec
Min = -145.26 Nwt-M @ 175.19 msec



B-90

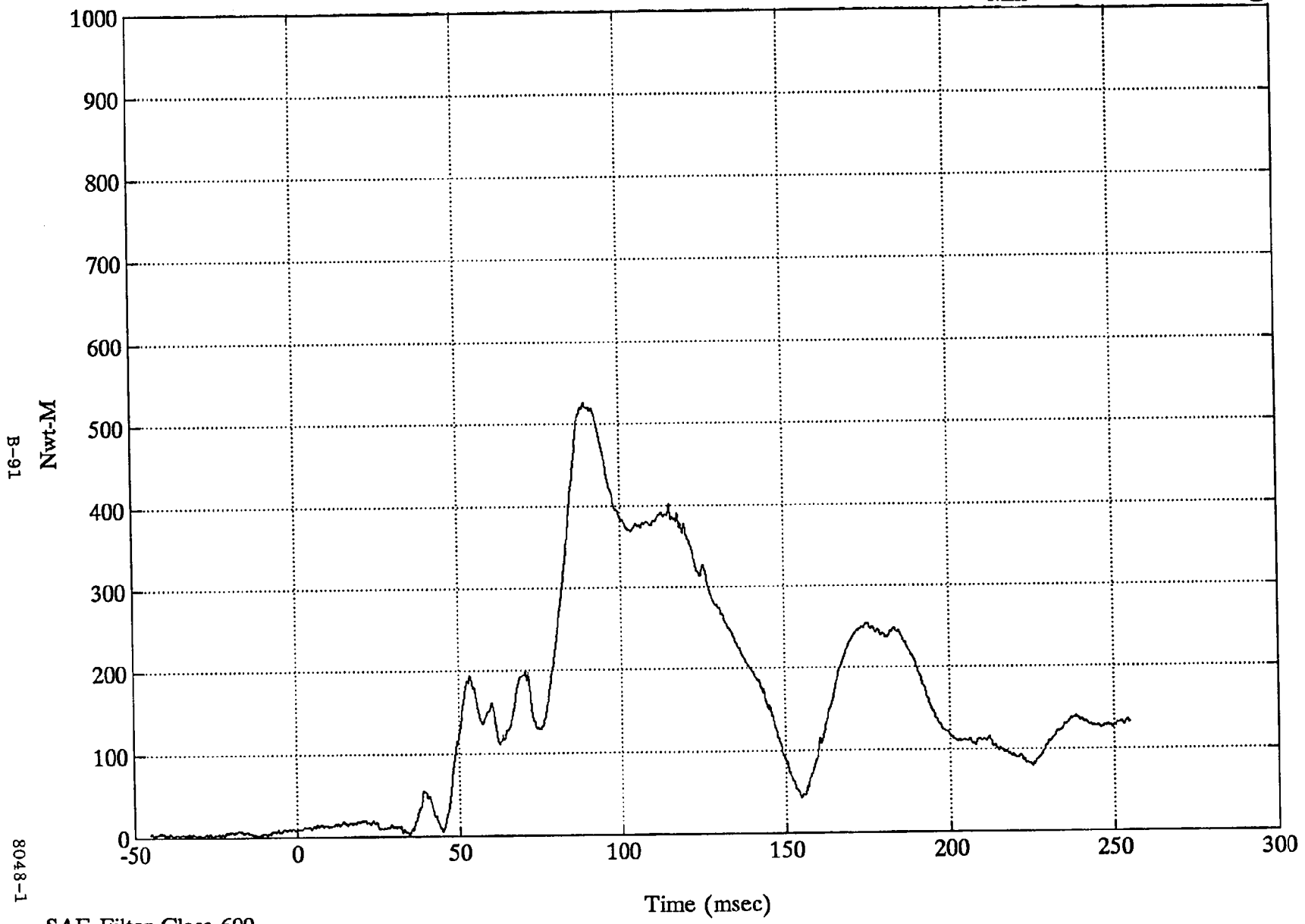
8048-1

SAE Filter Class 600

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Neck Moment Res.

Max = 526.42 Nwt-M @ 89.16 msec
Min = .95 Nwt-M @ 34.43 msec



B-91

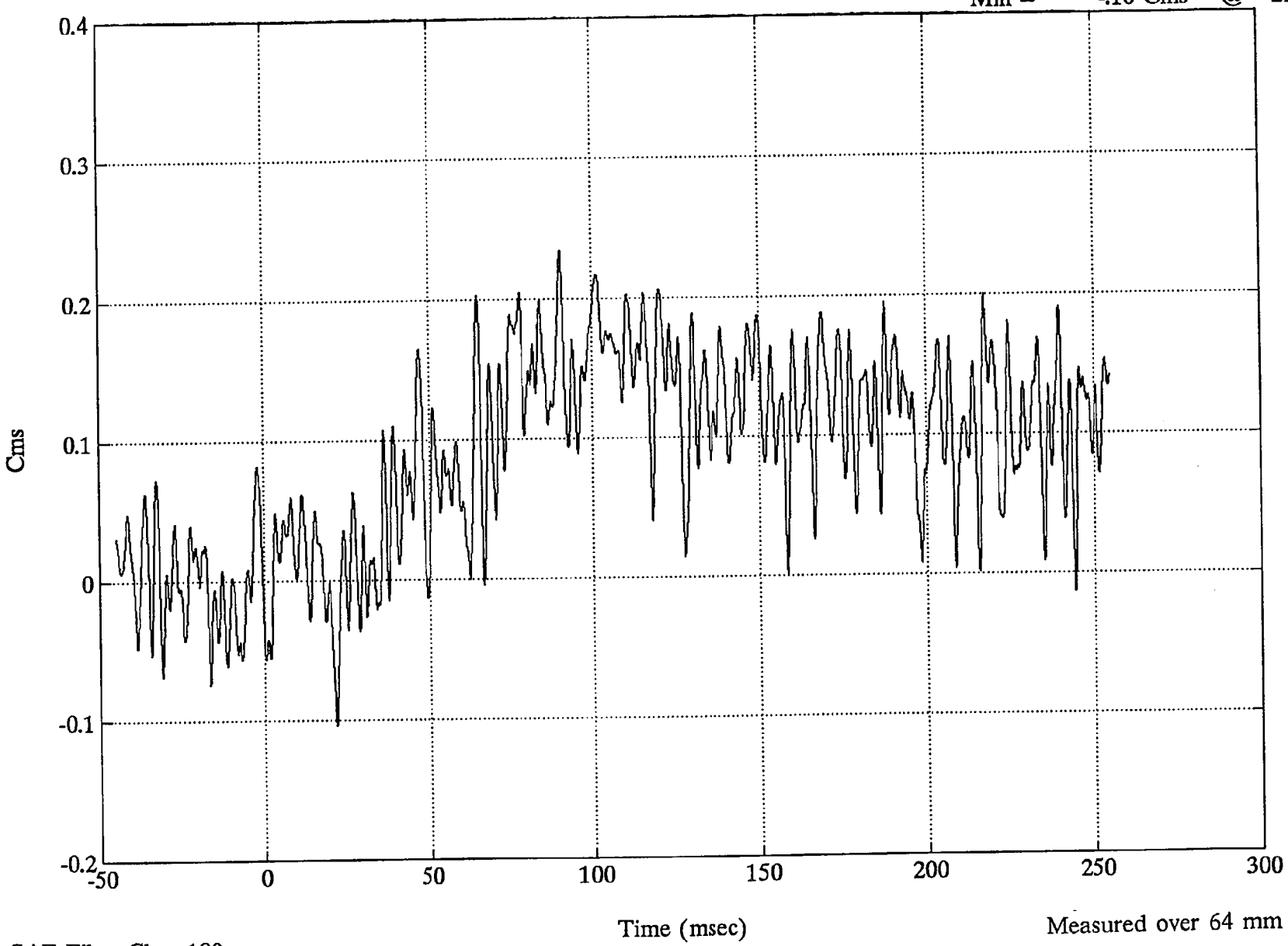
8048-1

SAE Filter Class 600

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Belt Elongation

Max = .23 Cms @ 90.72 msec
Min = -.10 Cms @ 21.47 msec



Measured over 64 mm

SAE Filter Class 180

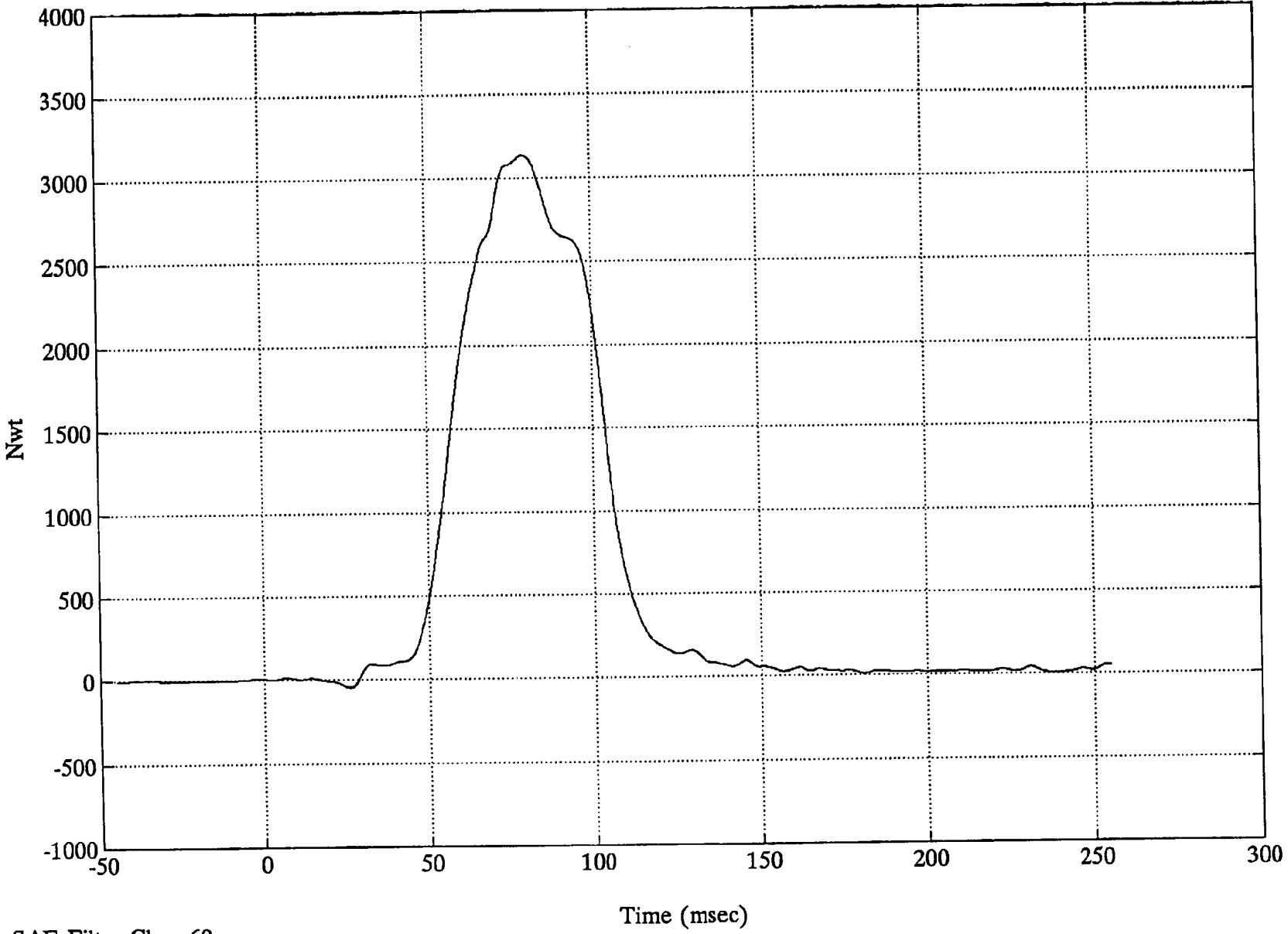
B-92

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Left Belt Load

Max = 3132.42 Nwt @ 79.91 msec
Min = -45.92 Nwt @ 25.92 msec



B-93

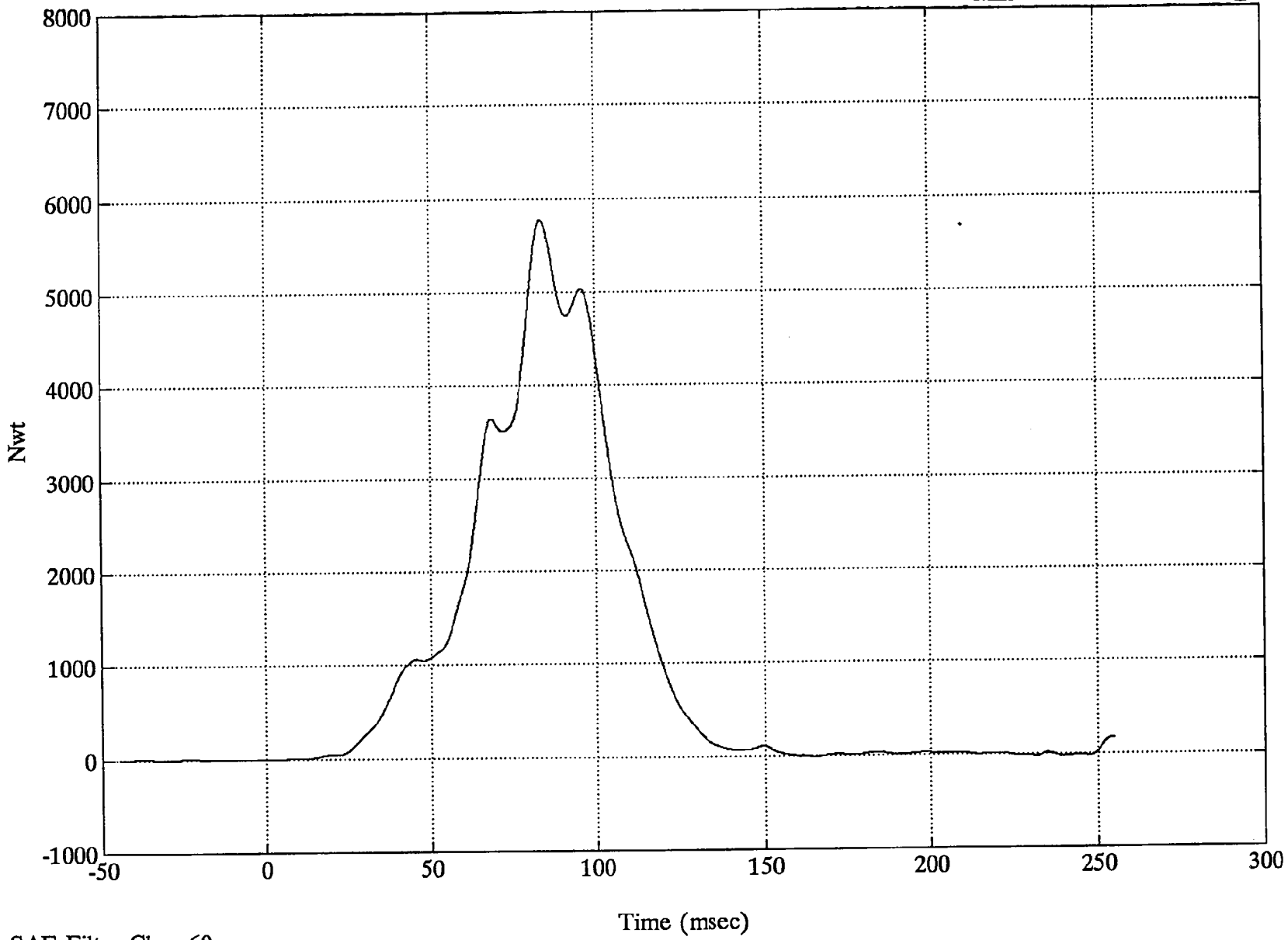
8048-1

SAE Filter Class 60

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Torso Belt Load

Max = 5773.66 Nwt @ 83.76 msec
Min = -23.96 Nwt @ 240.12 msec



SAE Filter Class 60

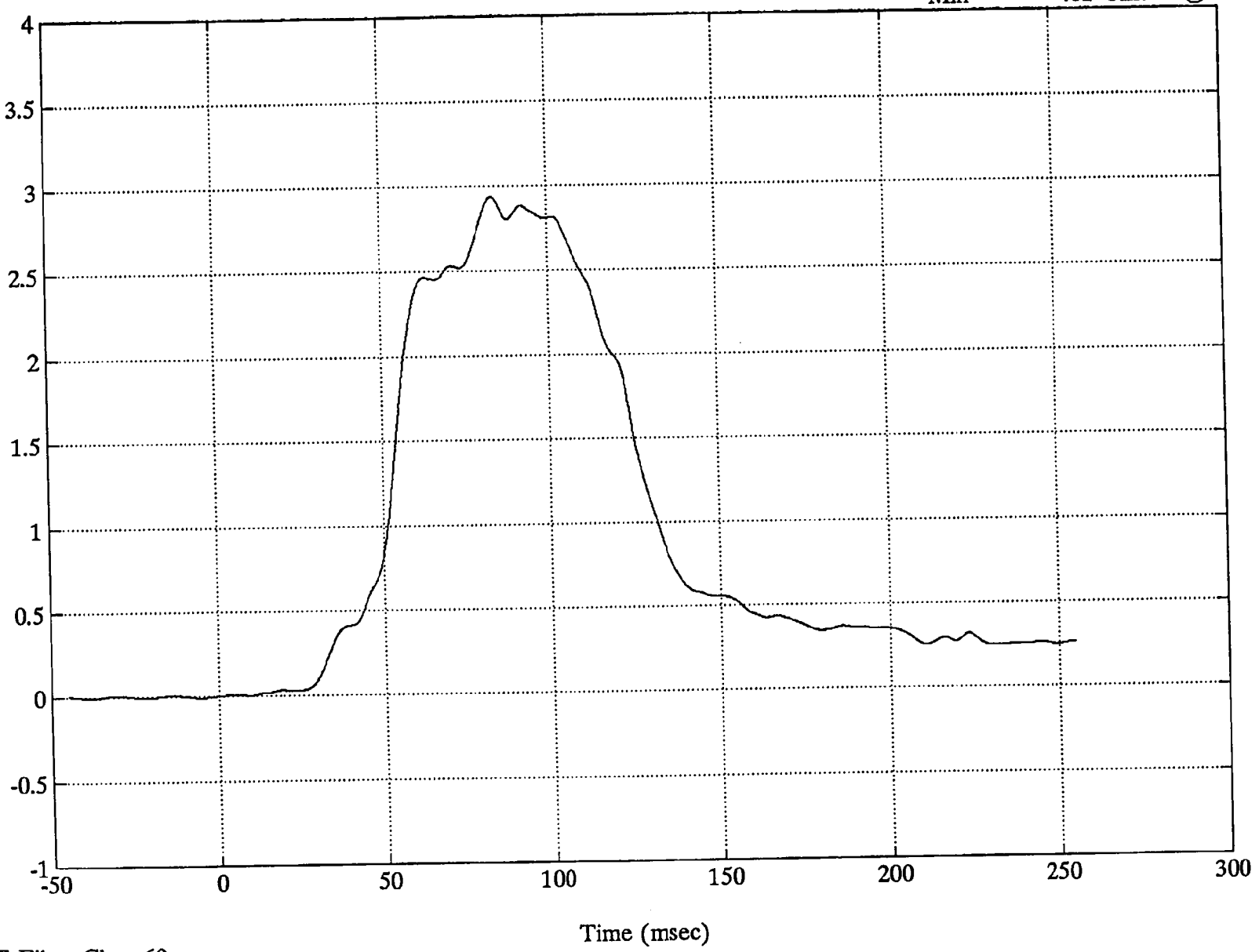
B-94

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 1 Chest Disp.

Max = 2.94 Cms @ 83.52 msec
Min = -.01 Cms @ -5.52 msec

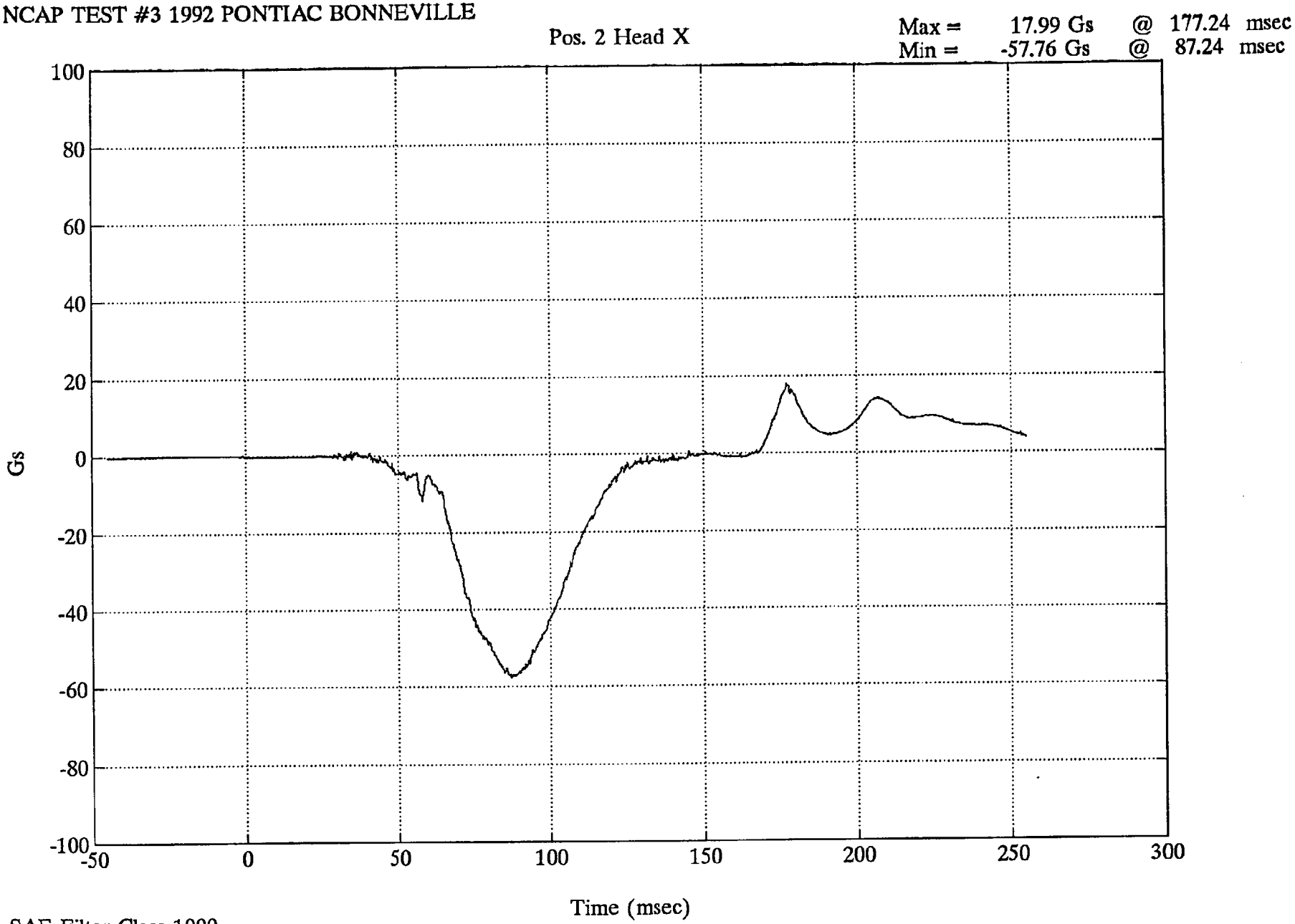


B-95

8048-1

SAE Filter Class 60

NCAP TEST #3 1992 PONTIAC BONNEVILLE

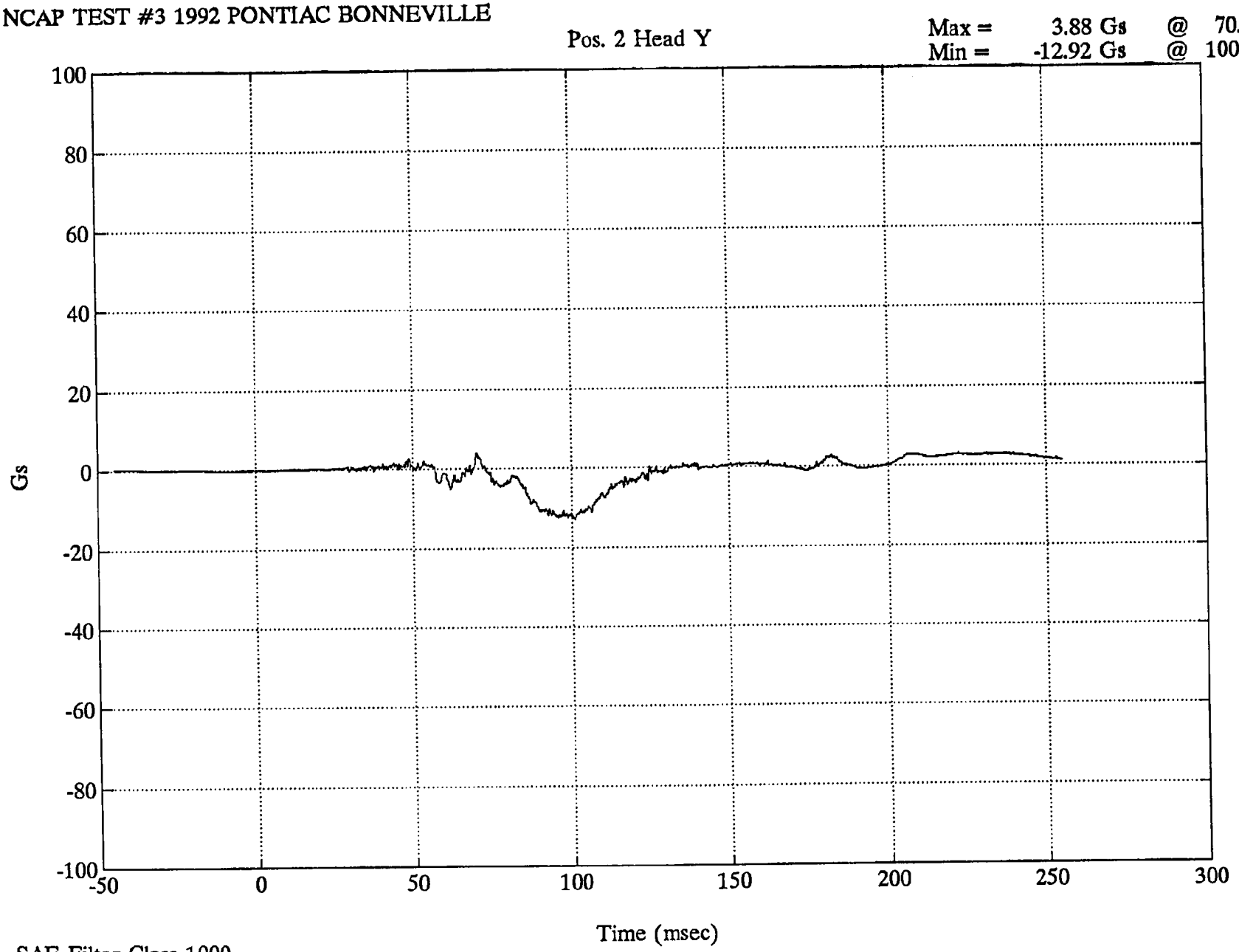


B-96

8048-1

SAE Filter Class 1000

NCAP TEST #3 1992 PONTIAC BONNEVILLE



SAE Filter Class 1000

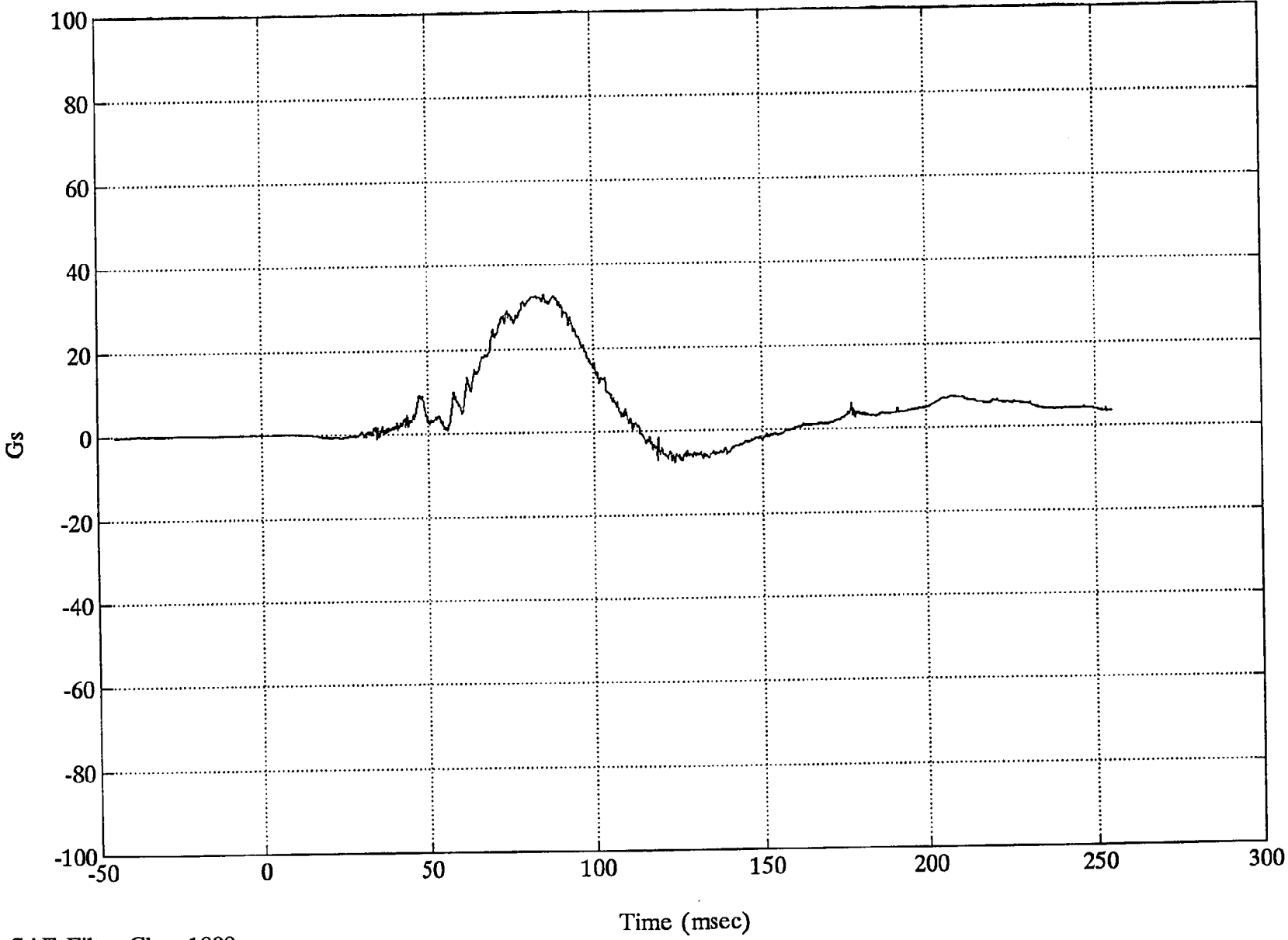
B-97

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Head Z

Max = 32.99 Gs @ 85.31 msec
Min = -7.55 Gs @ 124.08 msec

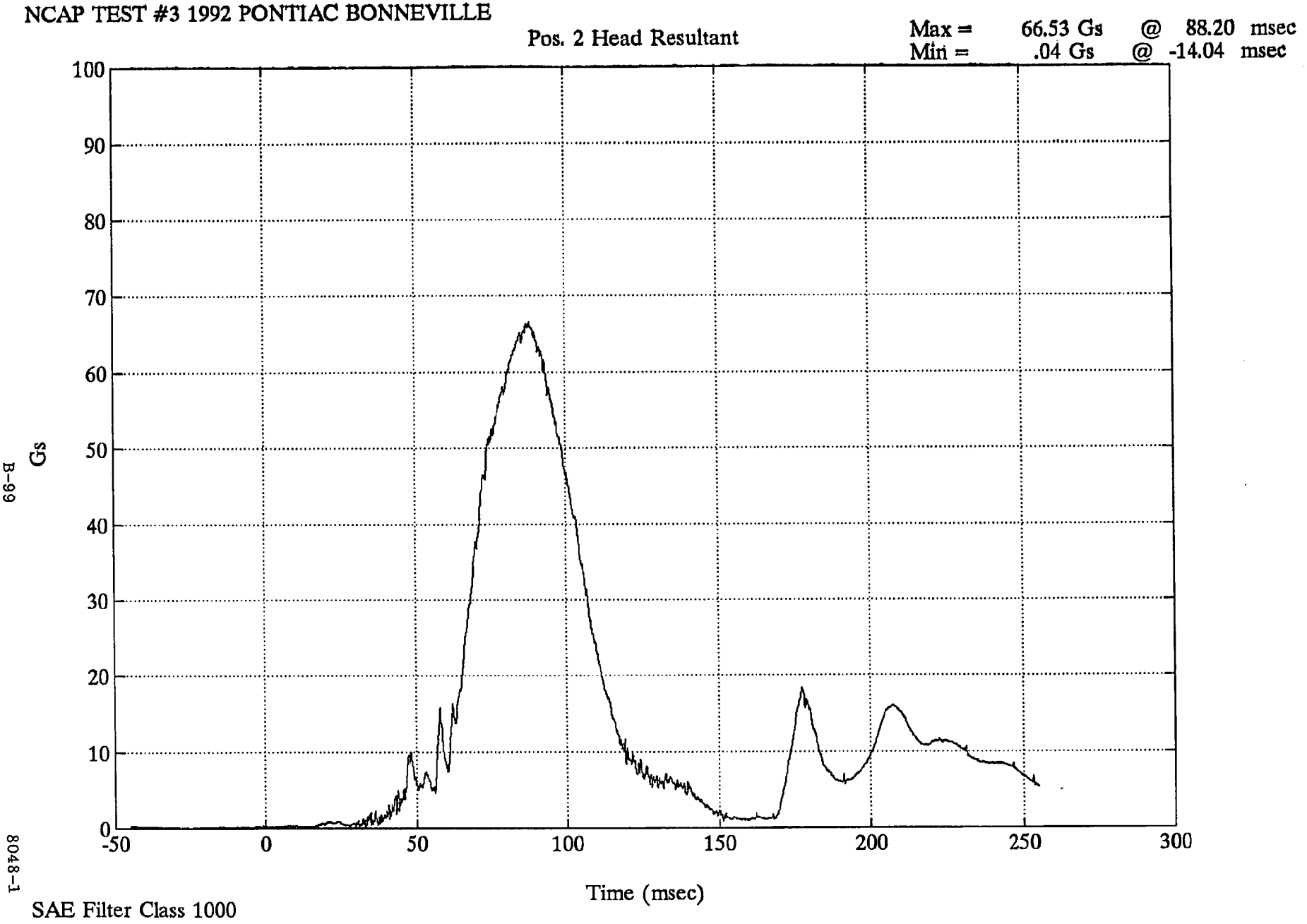


B-98

8048-1

SAE Filter Class 1000

NCAP TEST #3 1992 PONTIAC BONNEVILLE



B-99

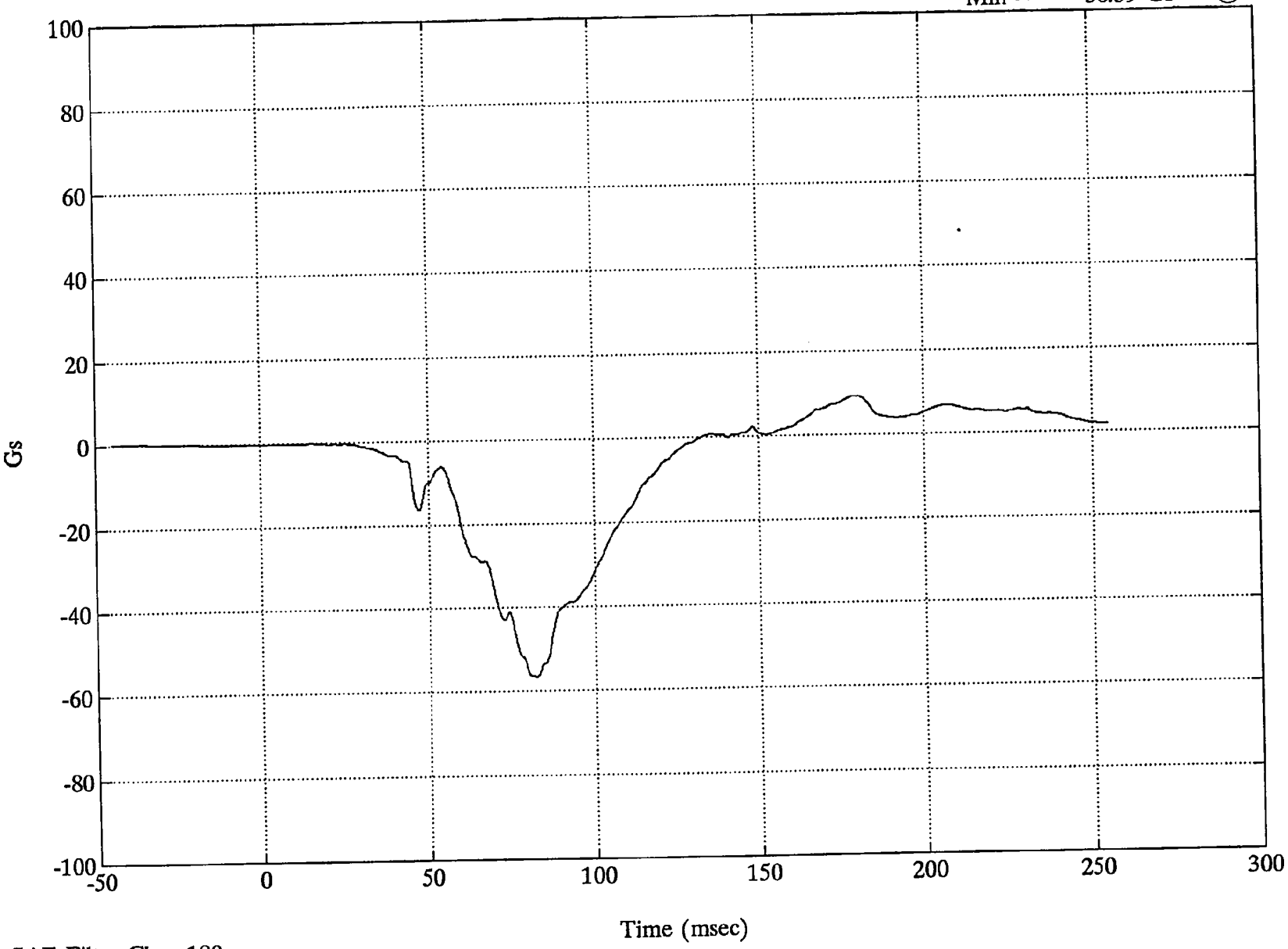
8048-1

SAE Filter Class 1000

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Chest X

Max = 9.22 Gs @ 180.12 msec
Min = -56.59 Gs @ 82.08 msec



B-100

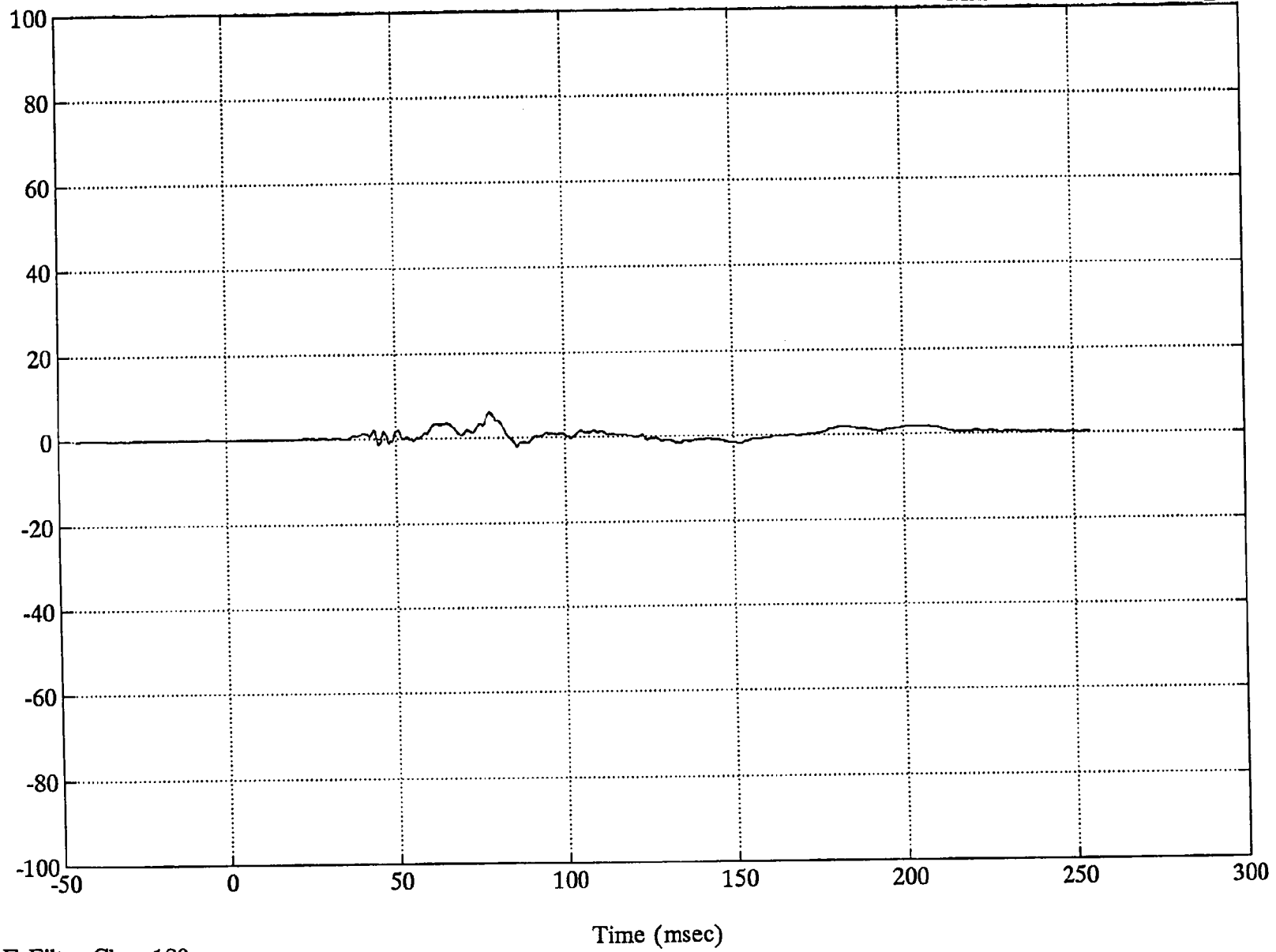
8048-1

SAE Filter Class 180

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Chest Y

Max = 6.02 Gs @ 77.64 msec
Min = -2.16 Gs @ 85.68 msec



B-101

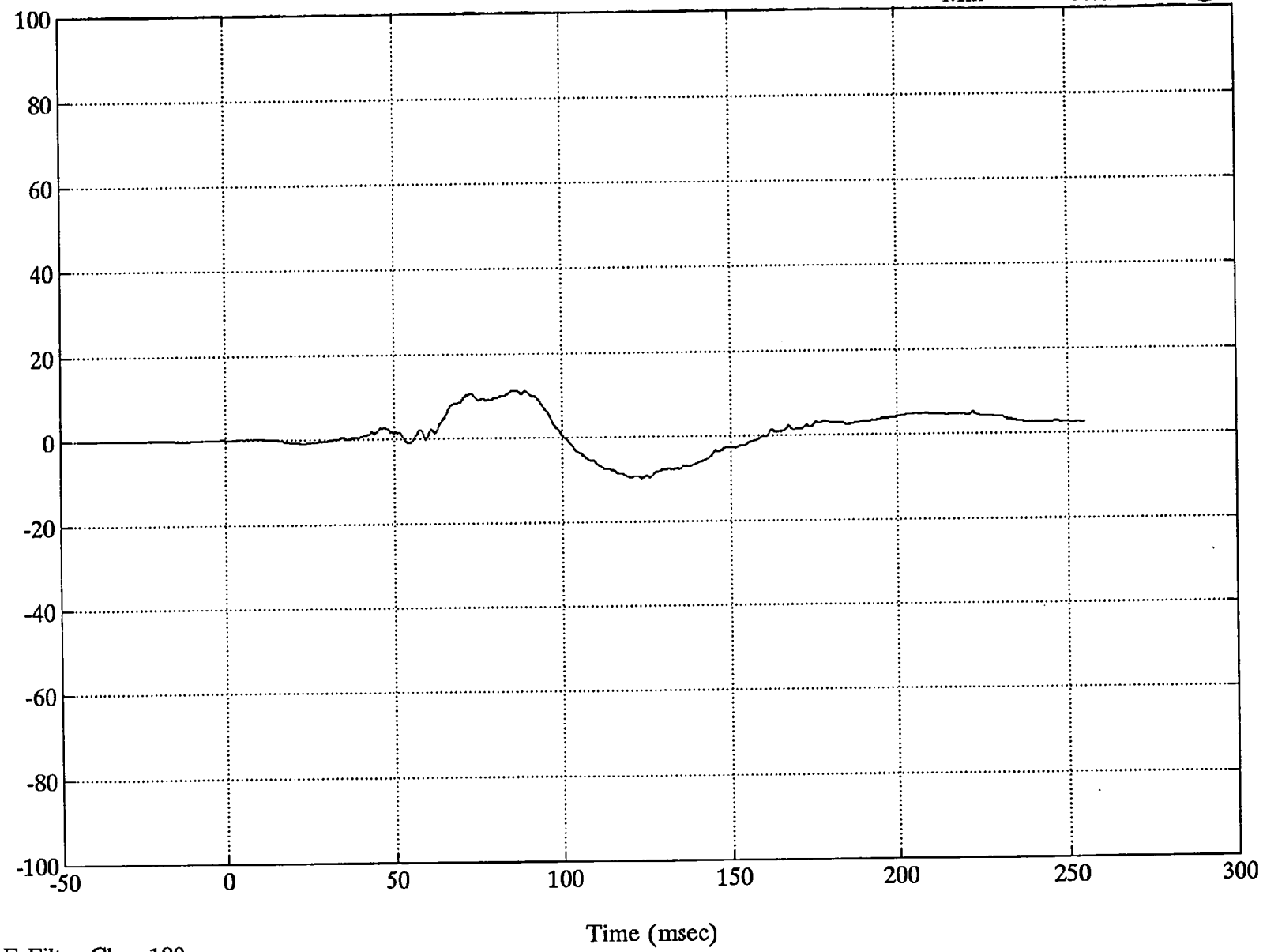
8048-1

SAE Filter Class 180

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Chest Z

Max = 11.27 Gs @ 86.28 msec
Min = -9.71 Gs @ 123.48 msec



B-102

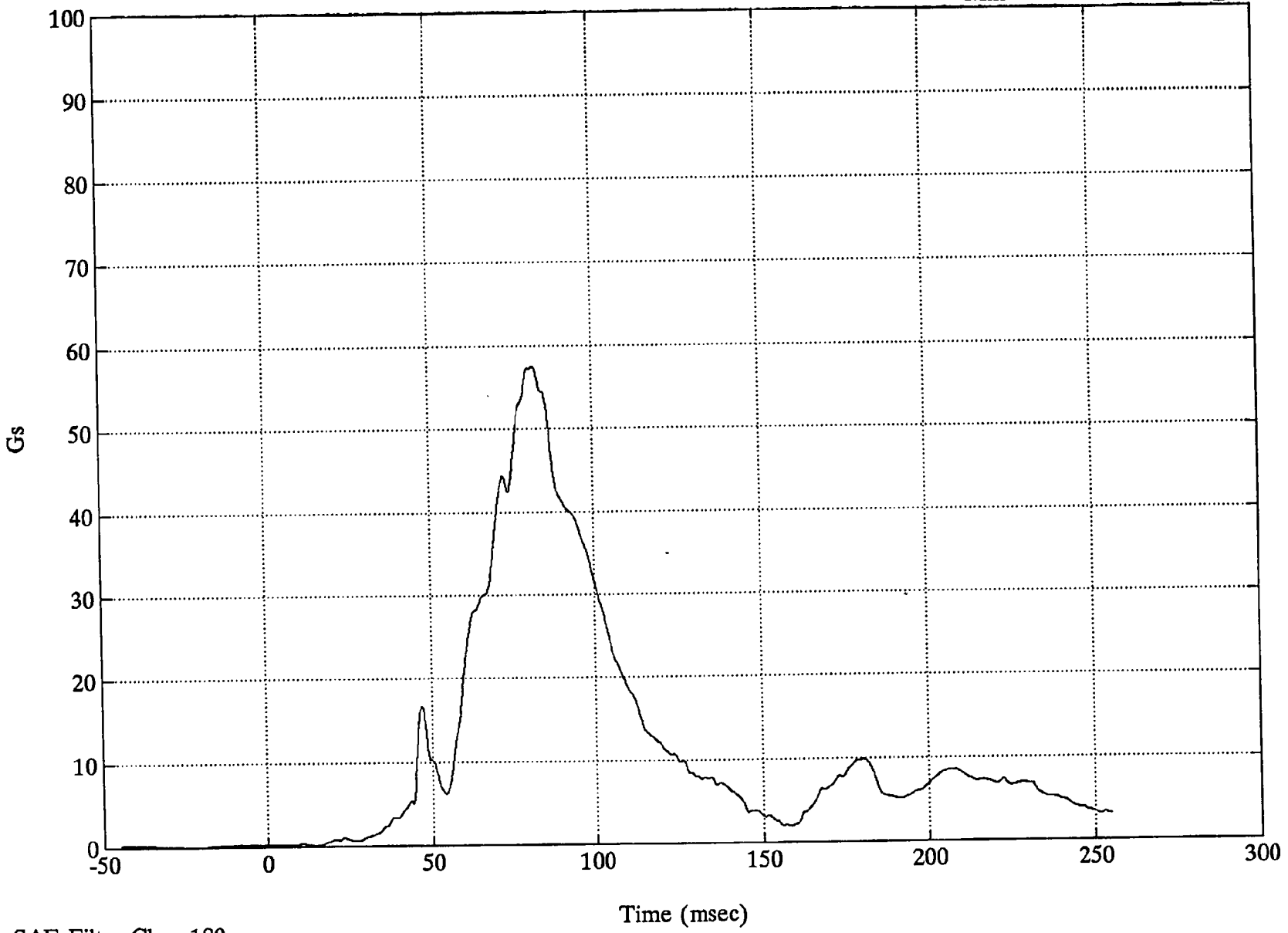
8048-1

SAE Filter Class 180

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Chest Resultant

Max = 57.51 Gs @ 82.08 msec
Min = .01 Gs @ -24.36 msec



B-103

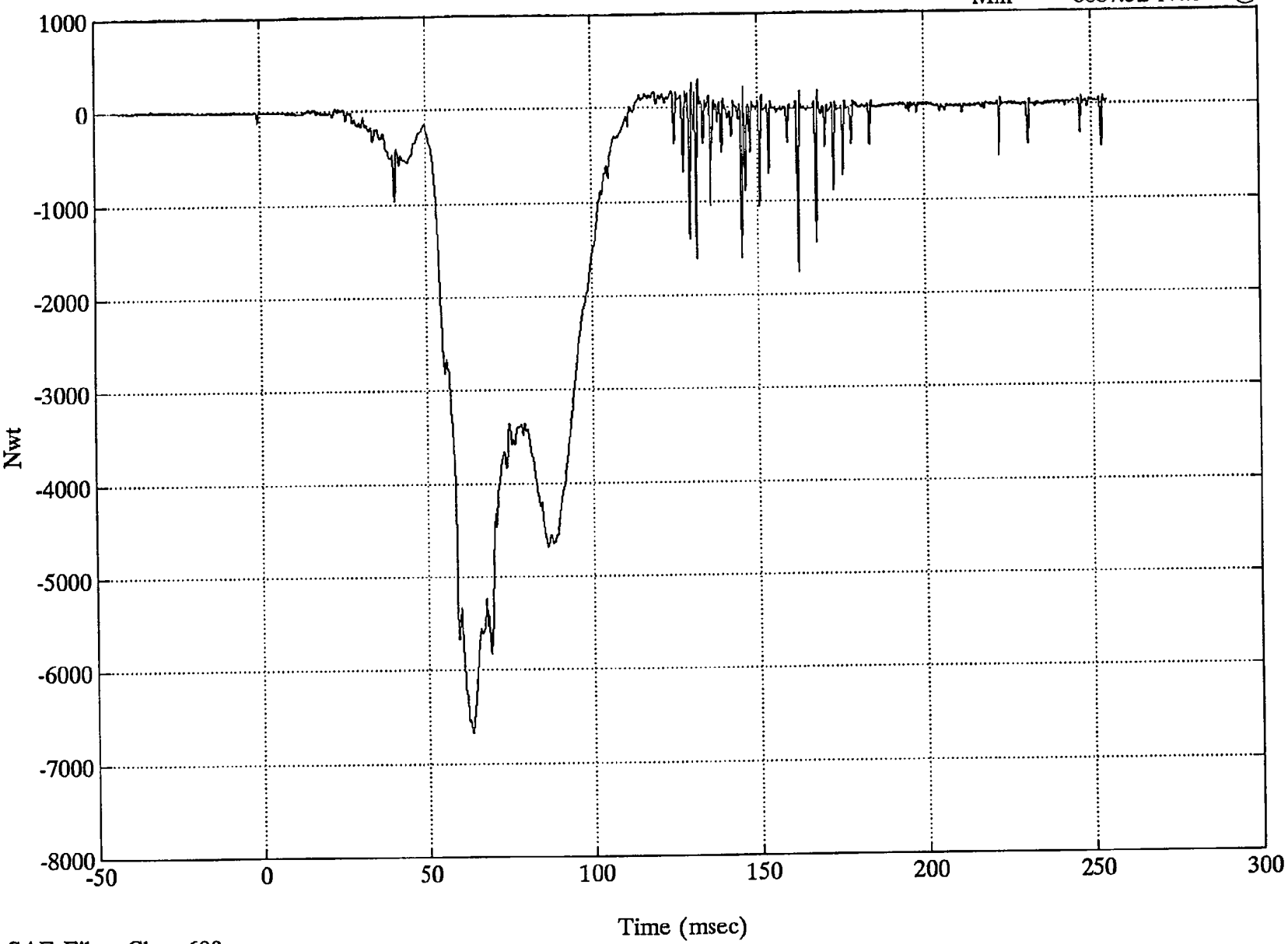
8048-1

SAE Filter Class 180

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Left Femur

Max = 295.84 Nwt @ 132.11 msec
Min = -6667.52 Nwt @ 63.23 msec



SAE Filter Class 600

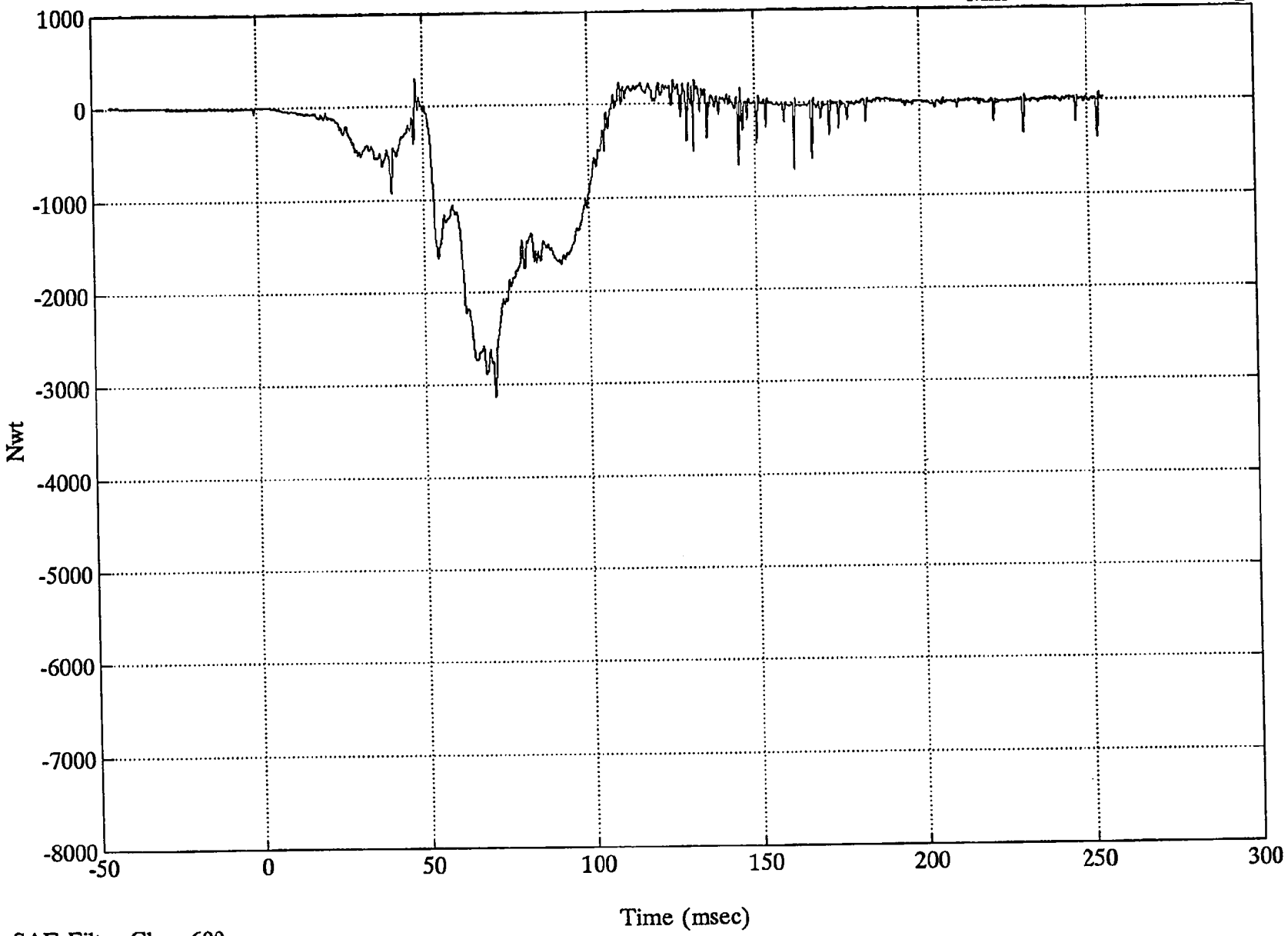
B-104

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Right Femur

Max = 296.14 Nwt @ 47.88 msec
Min = -3134.26 Nwt @ 70.79 msec



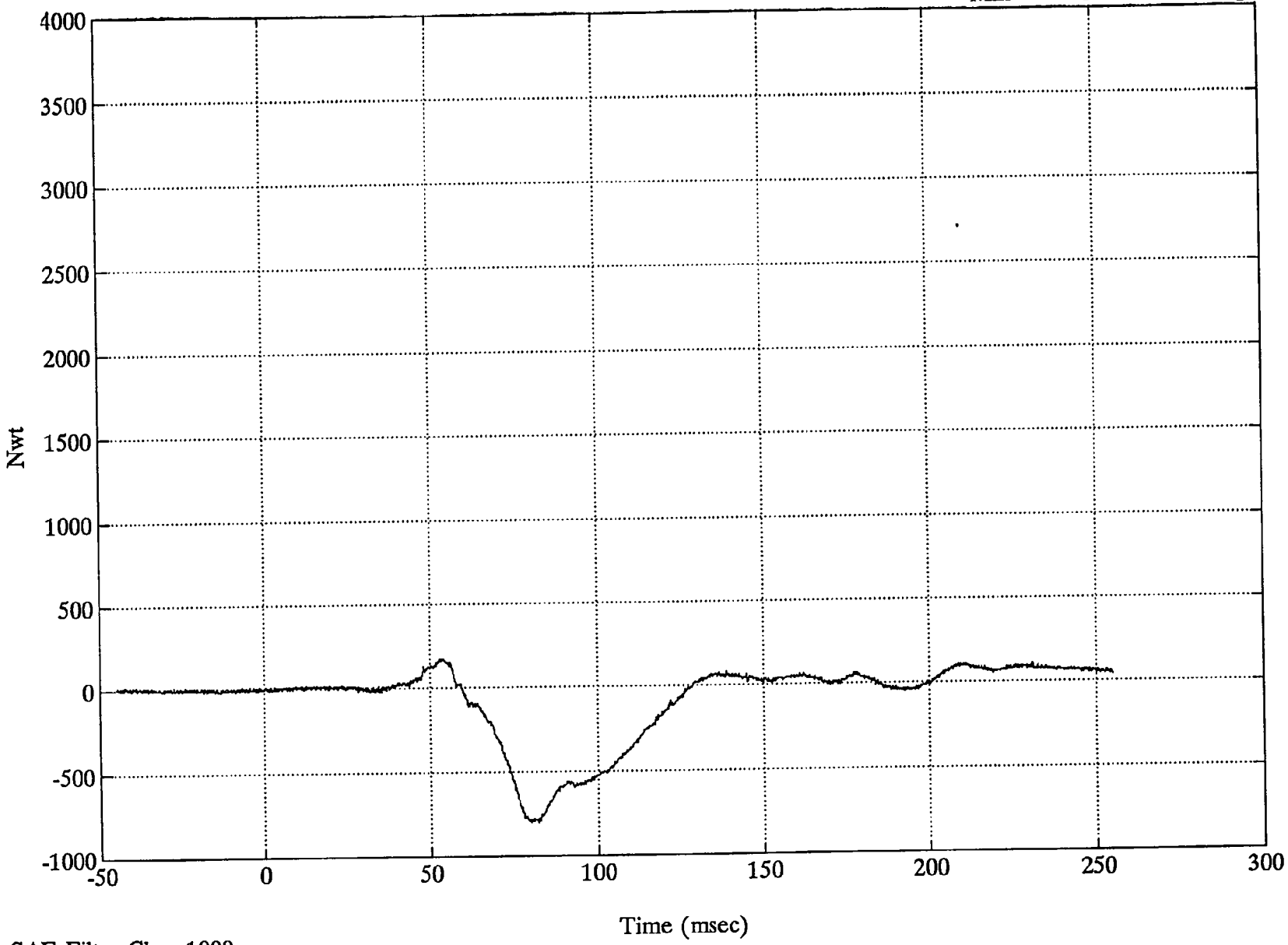
SAE Filter Class 600

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Upper Neck Fx

Max = 173.21 Nwt @ 54.11 msec
Min = -802.06 Nwt @ 82.19 msec



B-106

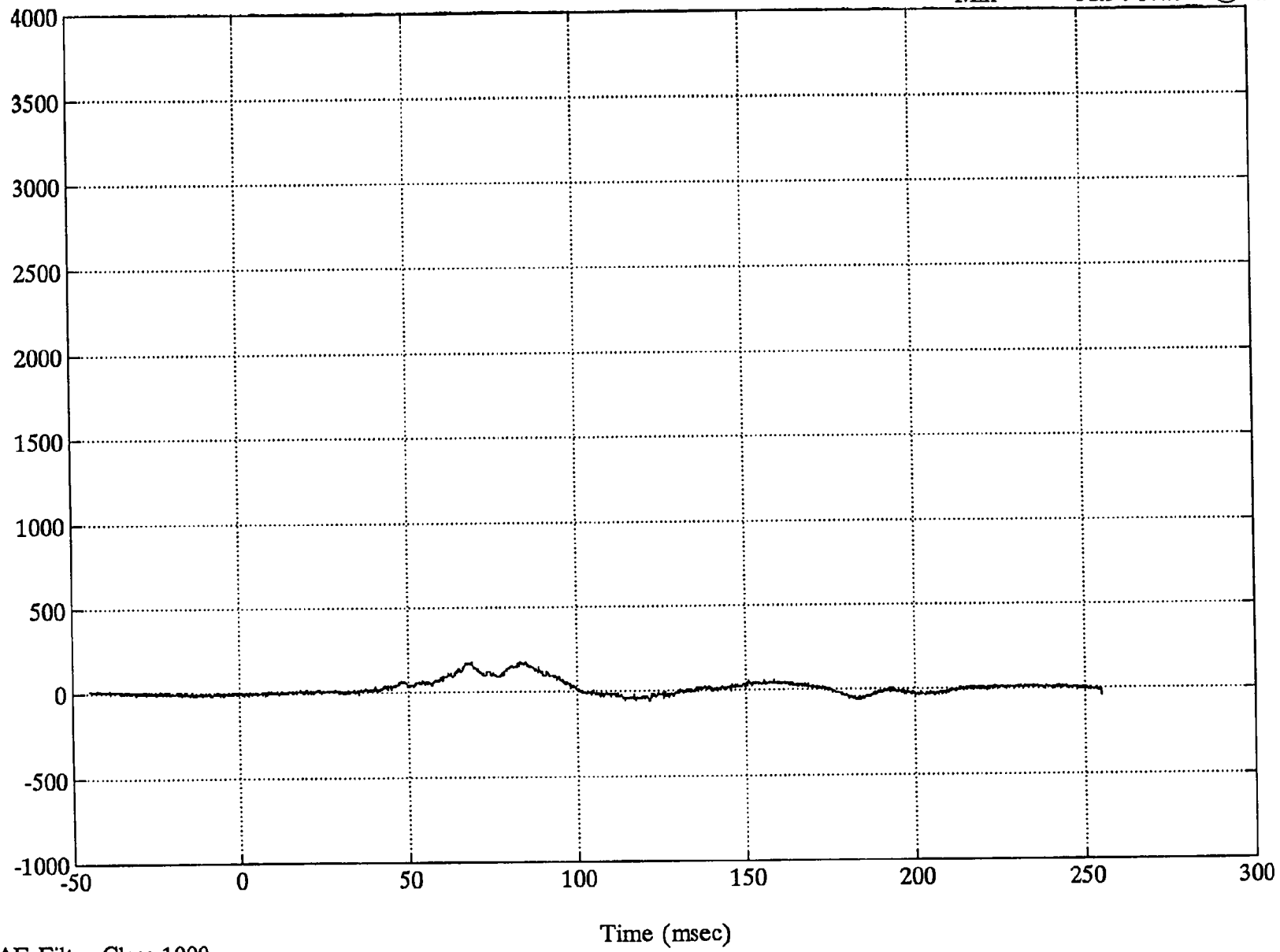
8048-1

SAE Filter Class 1000

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Upper Neck Fy

Max = 176.09 Nwt @ 84.83 msec
Min = -58.94 Nwt @ 183.84 msec



B-107

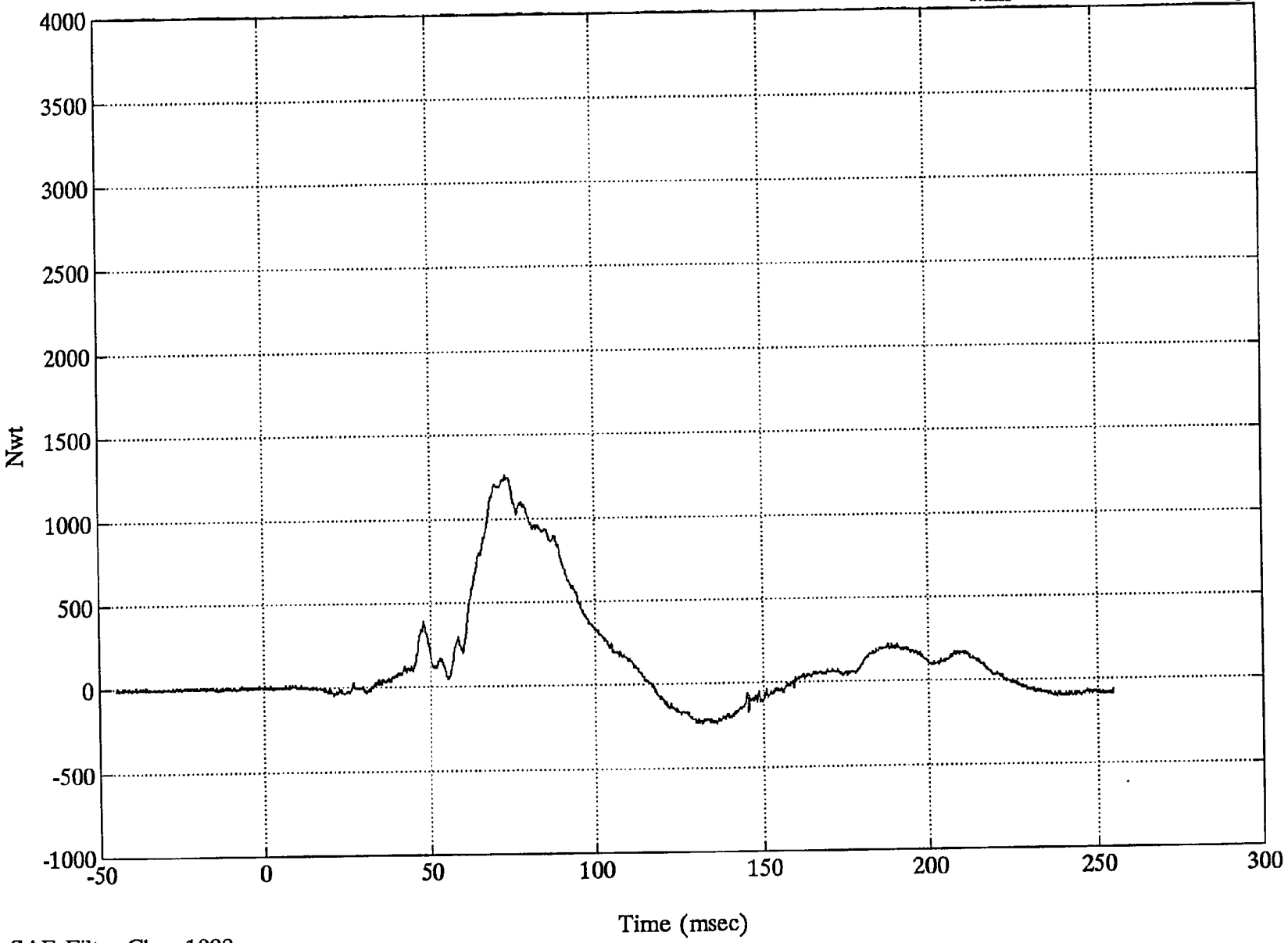
8048-1

SAE Filter Class 1000

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Upper Neck Fz

Max = 1262.67 Nwt @ 73.08 msec
Min = -240.79 Nwt @ 136.20 msec



B-108

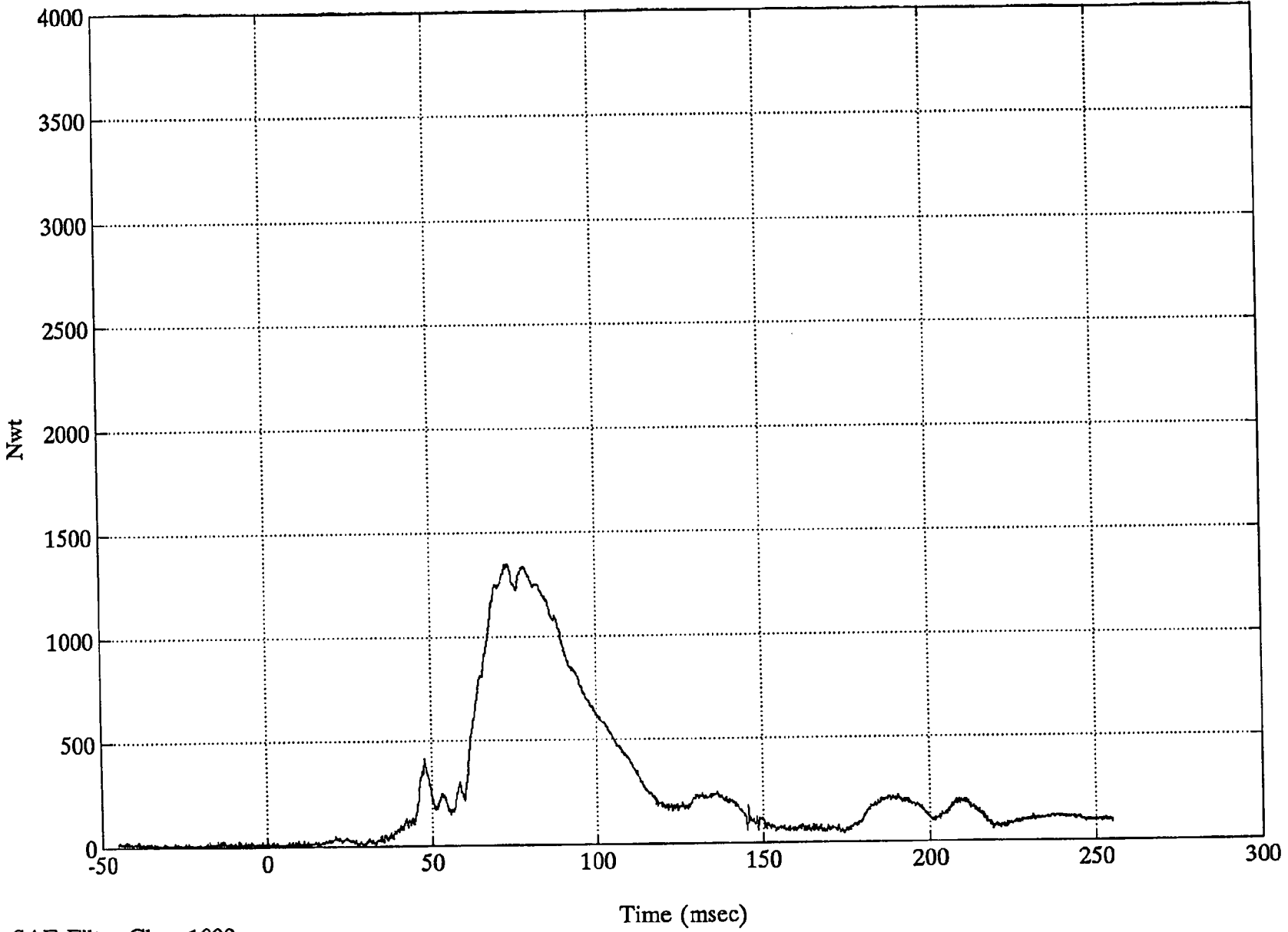
8048-1

SAE Filter Class 1000

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Neck Force Res.

Max = 1348.31 Nwt @ 73.80 msec
Min = 3.25 Nwt @ 3.95 msec



B-109

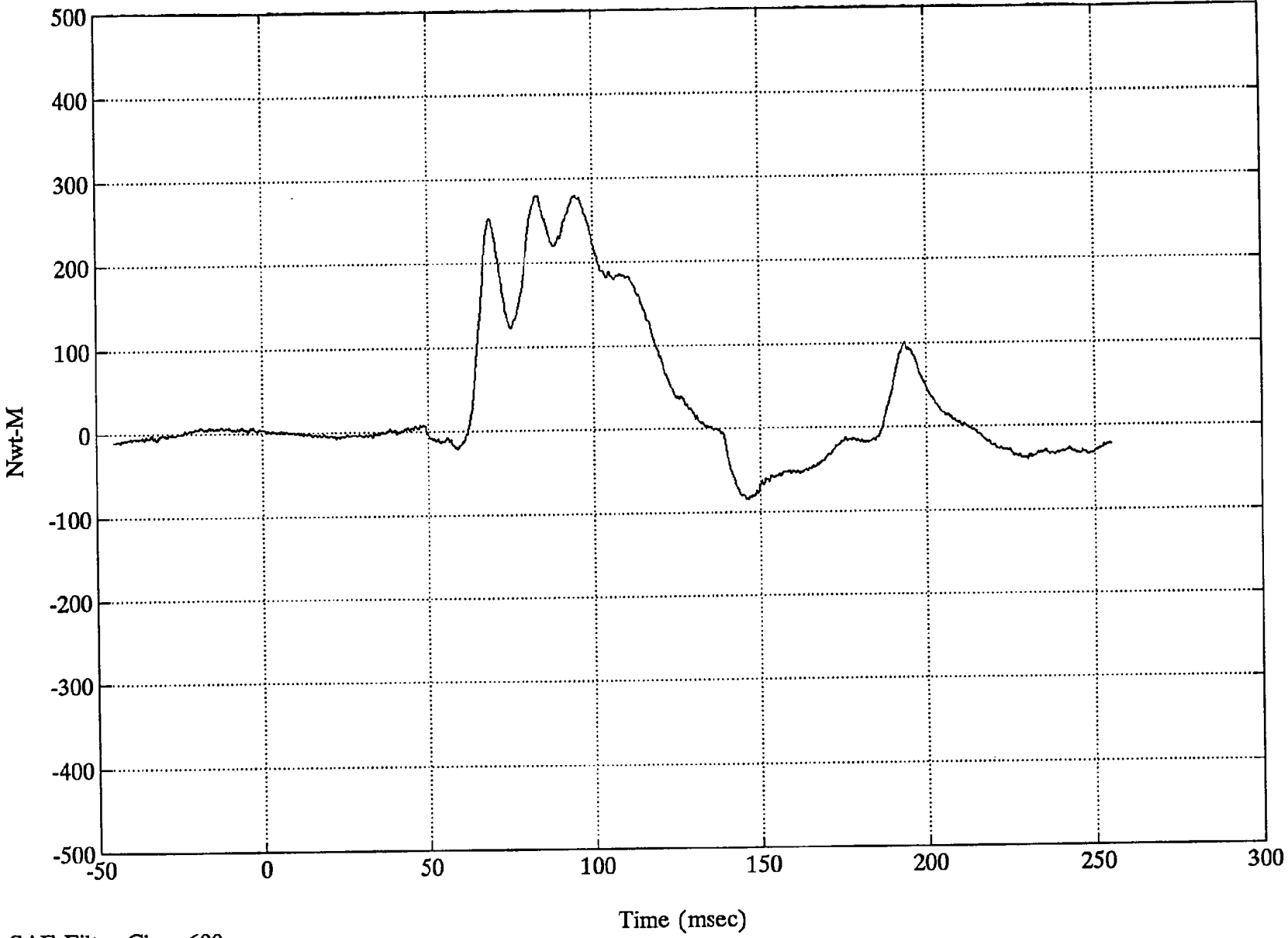
8048-1

SAE Filter Class 1000

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Upper Neck Mx

Max = 280.35 Nwt-M @ 82.80 msec
Min = -84.52 Nwt-M @ 146.52 msec



SAE Filter Class 600

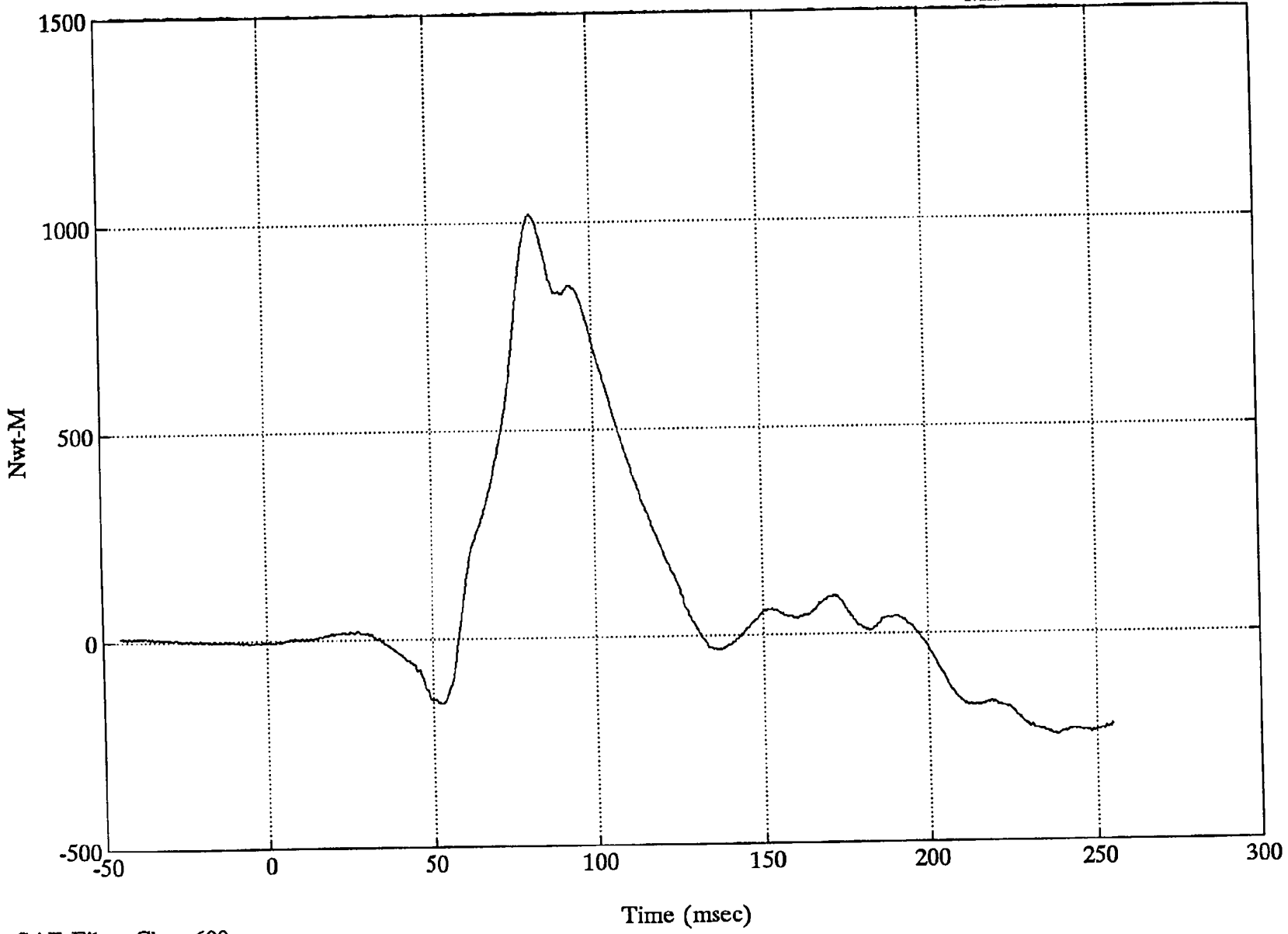
B-110

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Upper Neck My

Max = 1019.22 Nwt-M @ 81.60 msec
Min = -247.25 Nwt-M @ 238.20 msec



B-111

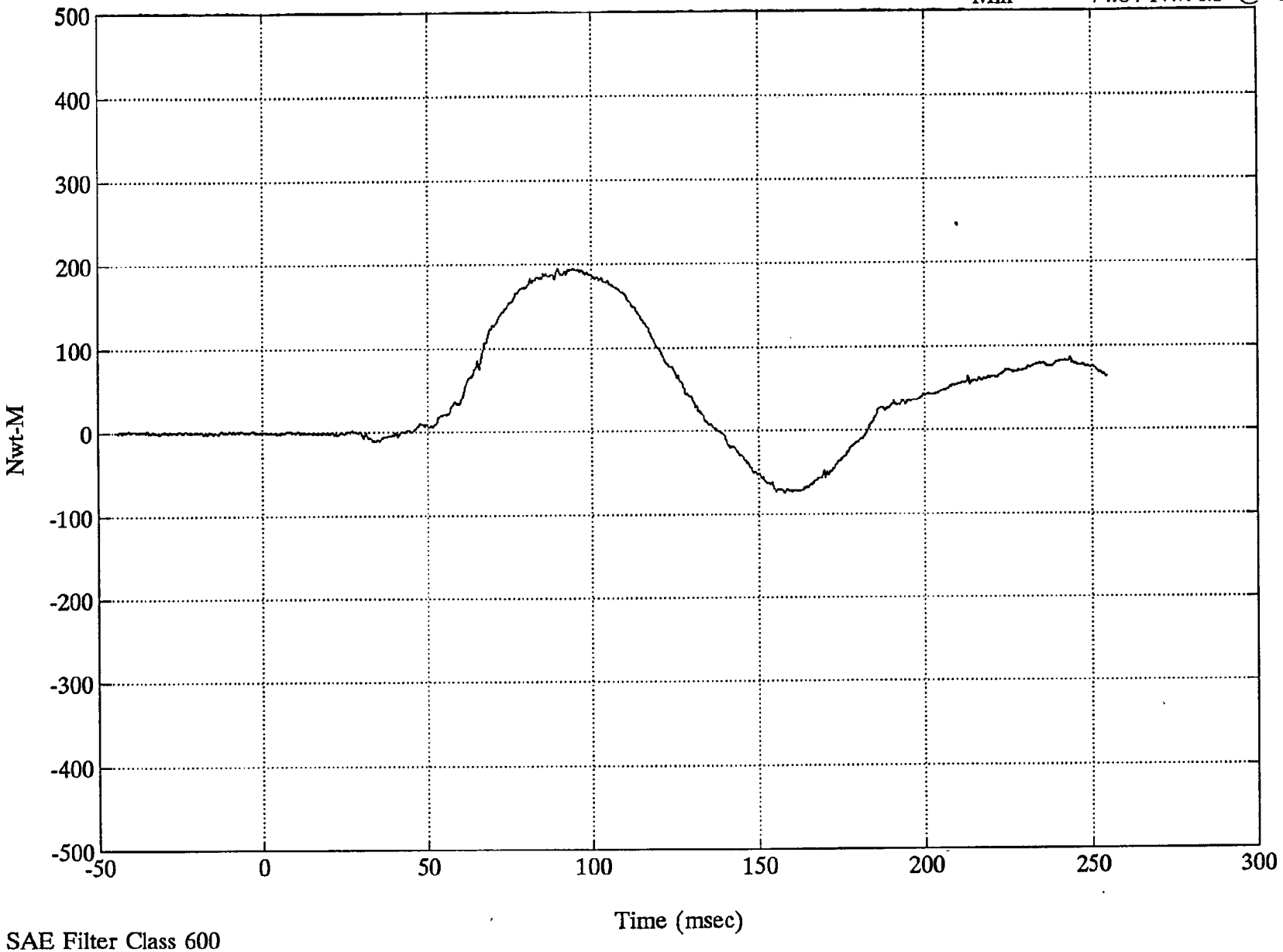
8048-1

SAE Filter Class 600

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Upper Neck Mz

Max = 194.72 Nwt-M @ 89.88 msec
Min = -74.84 Nwt-M @ 157.80 msec



B-112

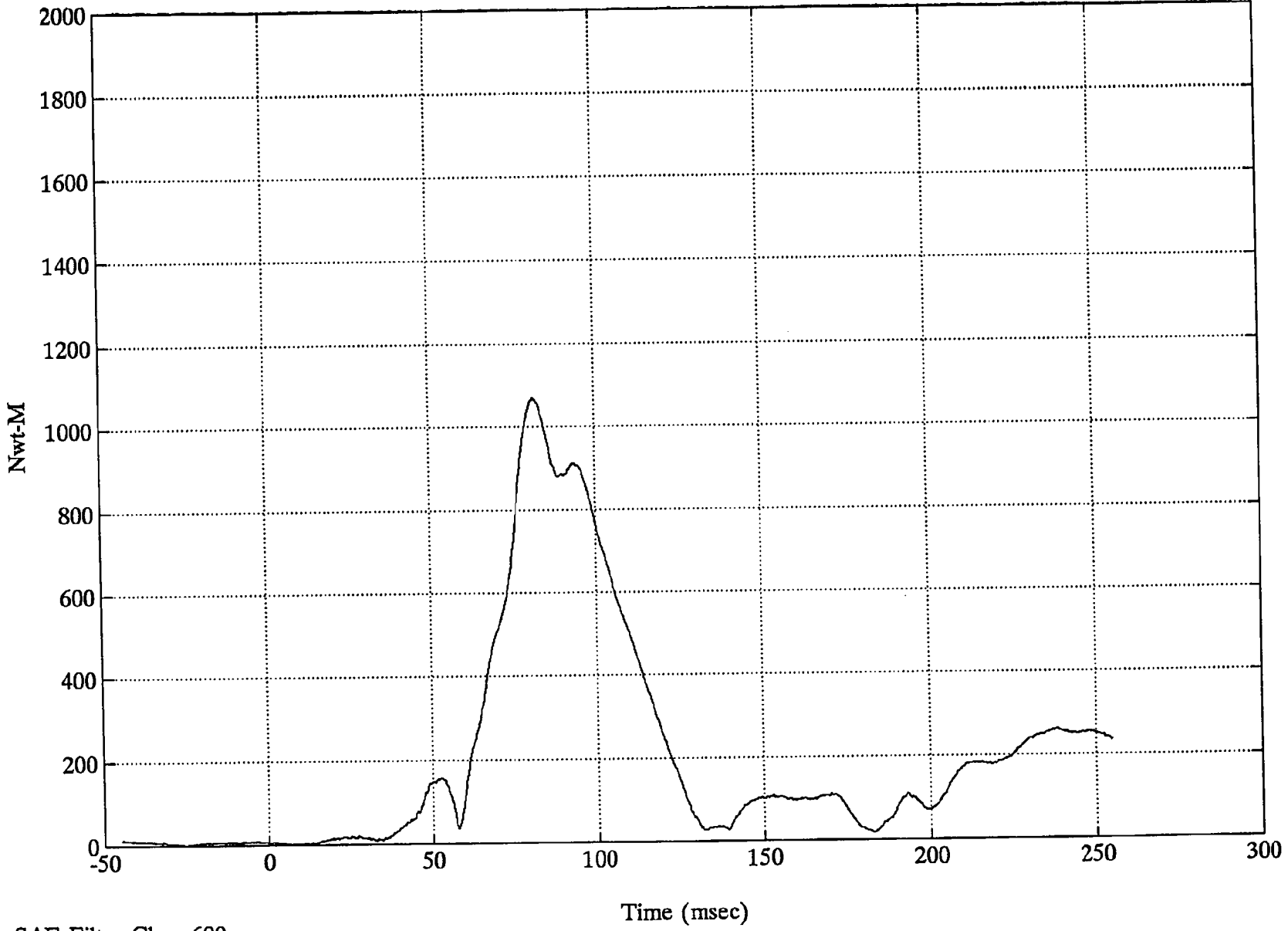
8048-1

SAE Filter Class 600

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Neck Moment Res.

Max = 1069.56 Nwt-M @ 81.60 msec
Min = .24 Nwt-M @ 7.55 msec



B-113

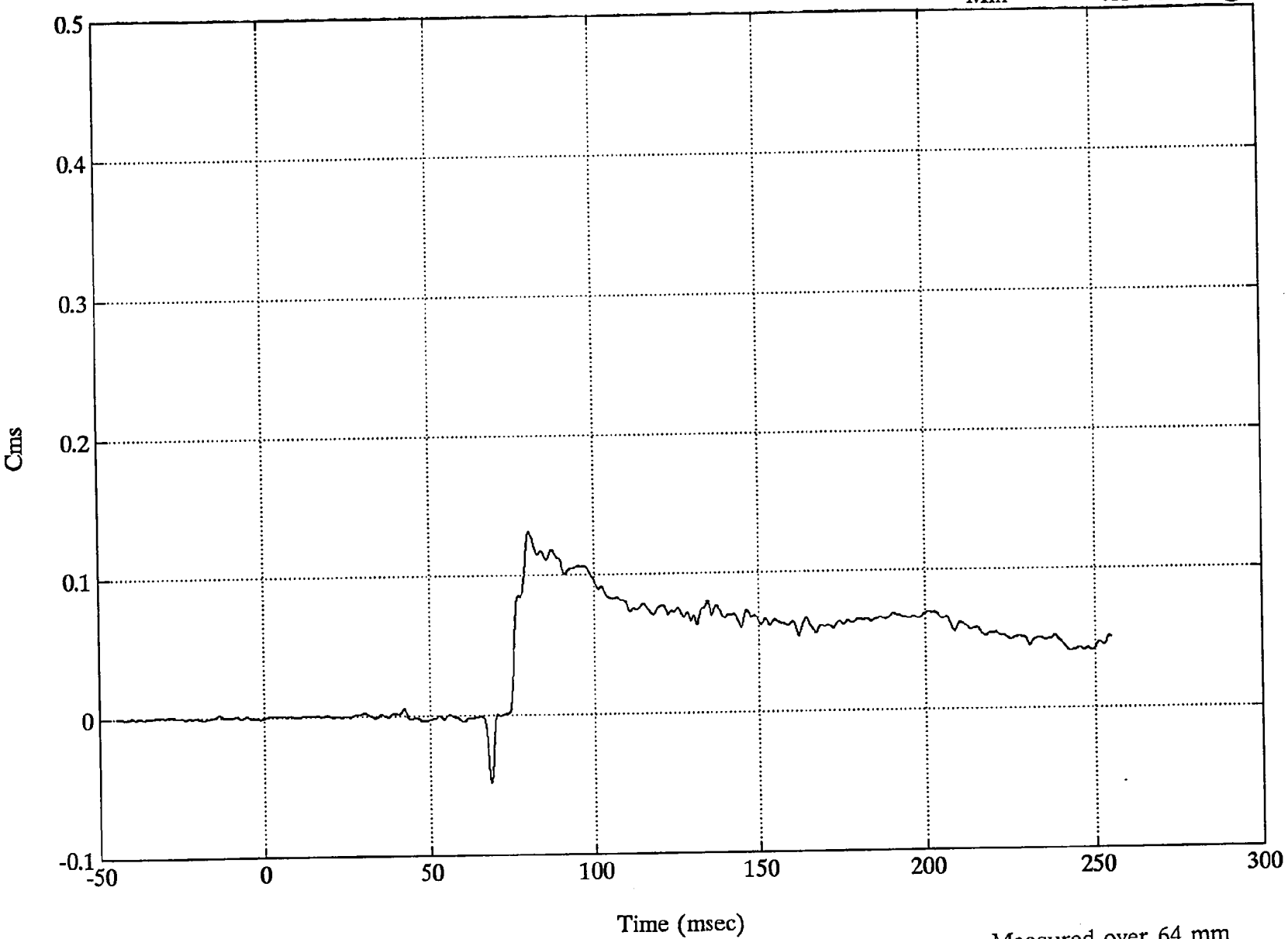
8048-1

SAE Filter Class 600

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Belt Elongation

Max = .13 Cms @ 80.27 msec
Min = -.05 Cms @ 68.28 msec



B-114

8048-1

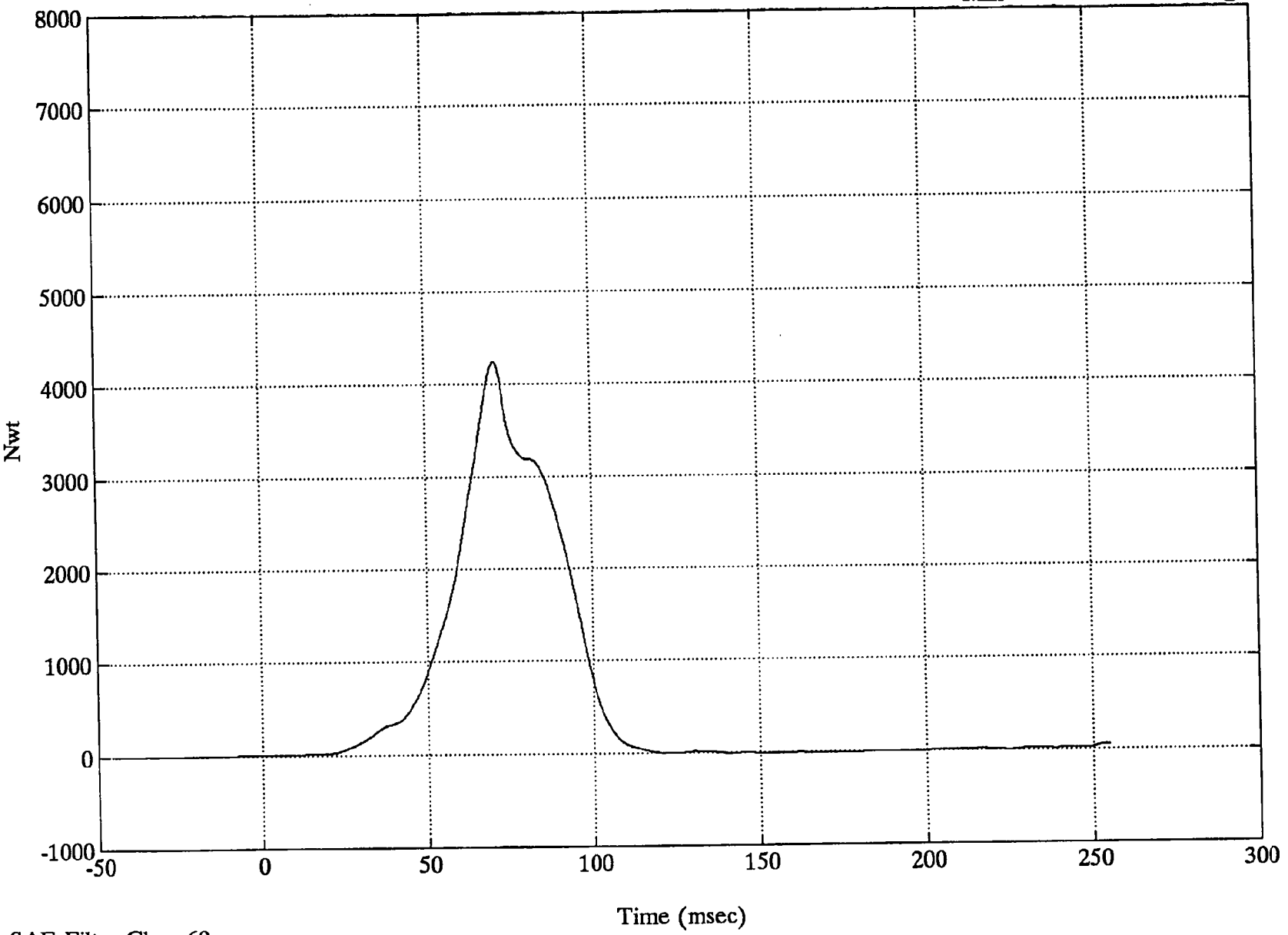
SAE Filter Class 180

Measured over 64 mm

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Right Belt Load

Max = 4249.23 Nwt @ 70.91 msec
Min = -16.58 Nwt @ 156.11 msec



B-115

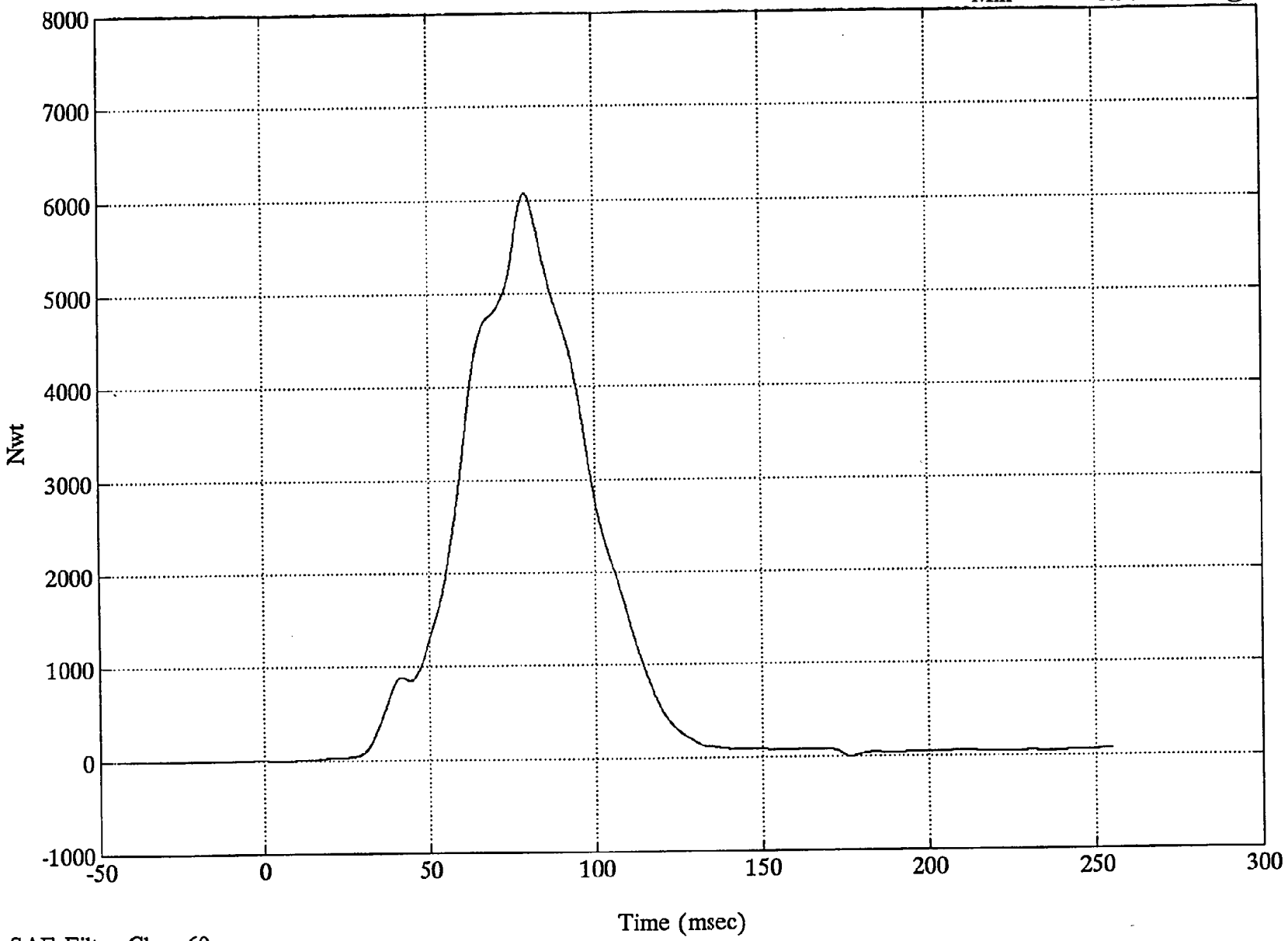
8048-1

SAE Filter Class 60

NCAP TEST #3 1992 PONTIAC BONNEVILLE

Pos. 2 Torso Belt Load

Max = 6076.81 Nwt @ 79.44 msec
Min = -5.90 Nwt @ 176.40 msec

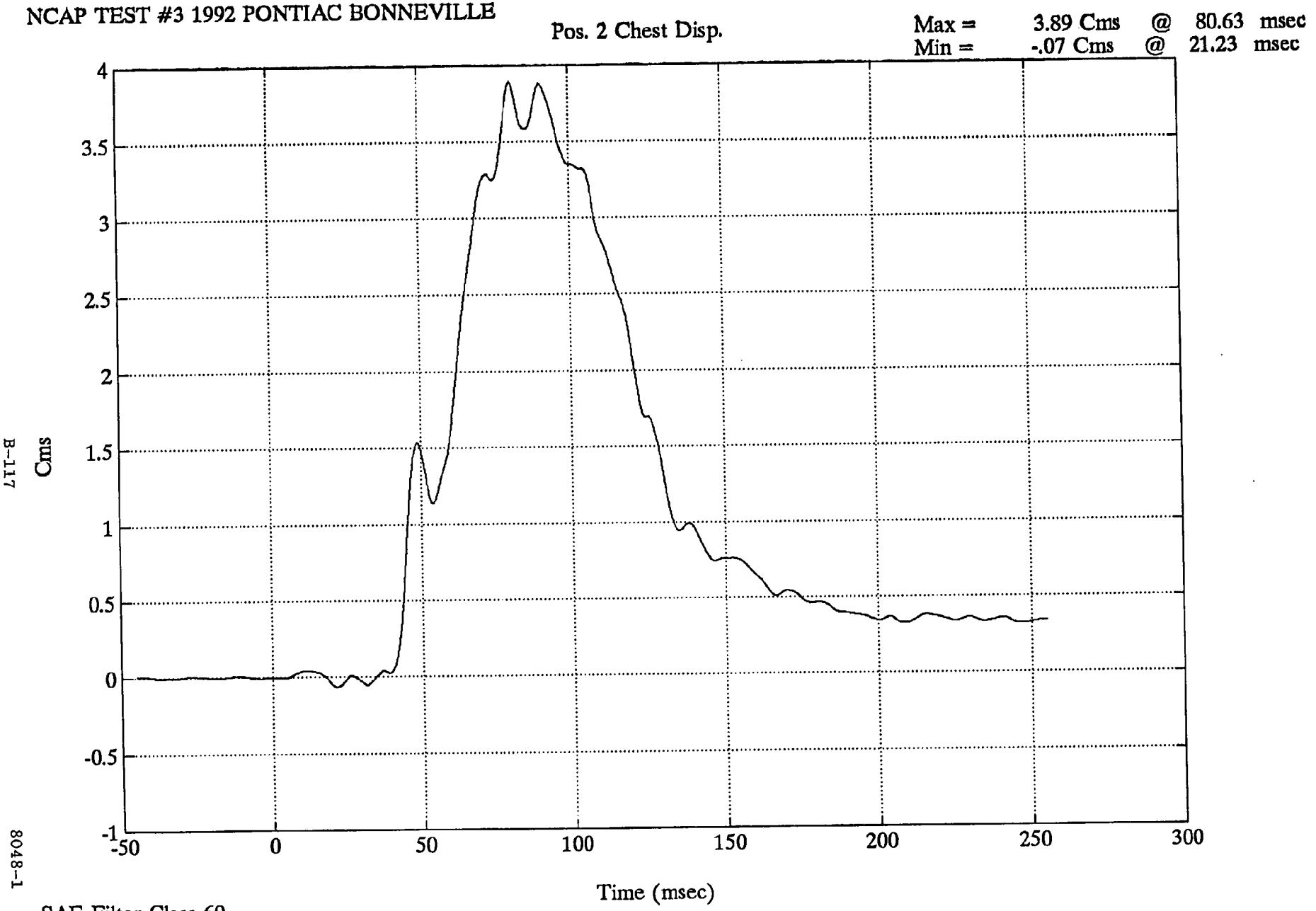


SAE Filter Class 60

B-116

8048-1

NCAP TEST #3 1992 PONTIAC BONNEVILLE



B-117

8048-1

SAE Filter Class 60

Appendix C

PART 572B/E 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:

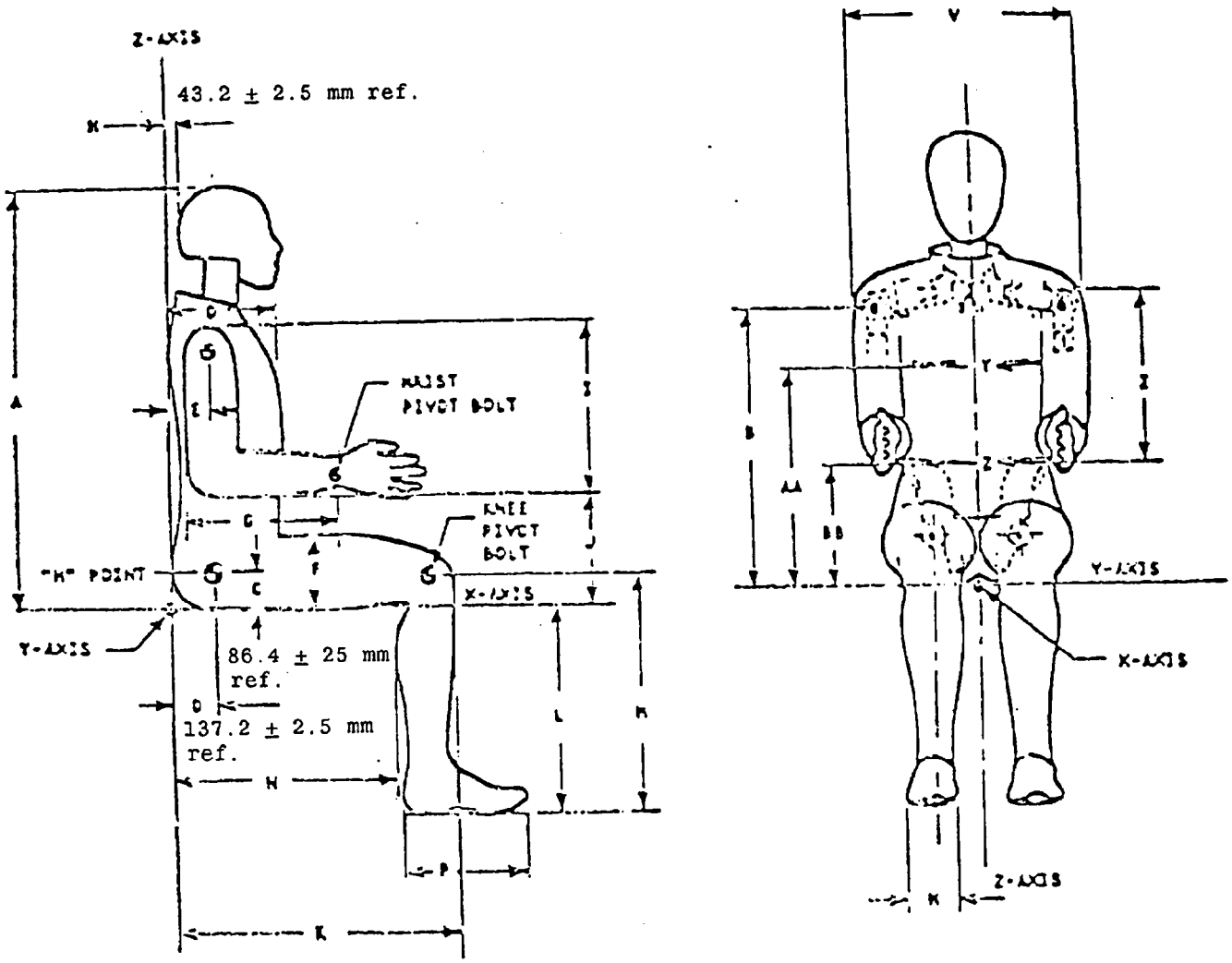
Serial No.	Completion Date
45	8-20-92
150	8-20-92

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 Indicant 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 45 HUMANOID

DUMMY SERIAL NO. 45 DATE: 8-21-92

TEMPERATURE		20.6 DEG. C
RELATIVE HUMIDITY		45 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)	429-434 mm	432 mm
LOCATION FOR WAIST CIRCUMFERENCE (BB)	226-231 mm	229 mm
CHEST CIRCUMFERENCE (Y)	970-1001 mm	1001 mm
WAIST CIRCUMFERENCE (Z)	815-866 mm	866 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	879 mm
THIGH CLEARANCE (F)	140-155 mm	147 mm
BUTTOCK KNEE LENGTH (K)	580-605 mm	601 mm
BUTTOCK POPLITAL LENGTH (N)	452-477 mm	475 mm
POPLITEAL LENGTH (L)	430-455 mm	447 mm
KNEE PIVOT HEIGHT (M)	485-501 mm	488 mm
FOOT LENGTH (P)	252-267 mm	259 mm
FOOT BREADTH (W)	91-107 mm	102 mm
SHOULDER PIVOT FROM BACKLINE (E)	84-94 mm	94 mm
SHOULDER BREADTH (V)	422-437 mm	427 mm
SHOULDER PIVOT HEIGTH (B)	505-521 mm	510 mm
ELBOW REST HEIGHT (J)	190-211 mm	196 mm
SHOULDER-ELBOW LENGTH (I)	330-345 mm	338 mm
BACK OF ELBOW TO WRIST PIVOT (G)	290-305 mm	292 mm

DUMMY MEETS SPECIFICATIONS

TECHNICIAN: IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

HEAD DROP TEST

HYBRID III

DATE : 8-5-92

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN: 45 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	21 DEG. C
RELATIVE HUMIDITY	10% - 70%	45 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	247.5 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	5.1 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 : 8-19-92 6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN: 45 CAL NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5-22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY		10% - 70%	44 %
IMPACT VELOCITY		24.8 - 25.7 KPH	24.8 KPH
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	23.33 G'S
	20 MS	17.60 - 22.60 G'S	21.57 G'S
	30 MS	12.50 - 18.50 G'S	16.75 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	16.75 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	40.63 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	74.06 DEG.
	TIME	57 - 64 MS	60.75 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88 - 108 N-M	99.2 N-M
	TIME	47 - 58 MS	54.63 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	122.13 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	103.25 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

NECK EXTENSION TEST

HYBRID III

DATE : 8-19-92

AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 45 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5 - 22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY		10% - 70%	43 %
IMPACT VELOCITY		21.4 - 22.3 KPH	21.9 KPH
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G'S	18.48 G'S
	20 MS	14.00 - 19.00 G'S	18.20 G'S
	30 MS	11.00 - 16.00 G'S	15.96 G'S
MAX PENDULUM G'S ABOVE 30 MS		22 G'S MAX	15.96 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		38 - 46 MS	41.25 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	94.69 DEG.
	TIME	72 - 82 MS	74.63 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-80.0/-52.9 N-M	-76.3 N-M
	TIME	65 - 79 MS	70.00 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	153.75 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	130.50 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

THORAX IMPACT TEST

HYBRID III

DATE : 8-20-92

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN 45 H.S. THORAX CAL

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.5 - 22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	45 %
PENDULUM VELOCITY	23.7 - 24.6 KPH	23.7 KPH
MAXIMUM DEFLECTION	64 - 73 mm	64.7 mm
MAXIMUM RESISTIVE FORCE	4804 - 5538 NEWTONS	5515 NEWTONS
INTERNAL HYSTERESIS	69% - 85%	71.6 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 7-31-92 KNEE: LEFT

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN: 45 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	46 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.7 KPH
PEAK KNEE IMPACT FORCE	4430 - 6965 N	4813 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 7-31-92 KNEE: RIGHT

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN: 45 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	20.6 DEG. C
RELATIVE HUMIDITY	10% - 70%	46 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.7 KPH
PEAK KNEE IMPACT FORCE	4430 - 6965 N	4942 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY I.D. NUMBER: 45

A. DUMMY INSTRUMENTS

	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER				
HX LONGITUDINAL	ENDEVCO	ER74	3/92	9/92
HY LATERAL	ENDEVCO	A57G	3/92	9/92
HZ VERTICAL	ENDEVCO	A84J	3/92	9/92
2. CHEST ACCELEROMETER				
CX LONGITUDINAL	ENDEVCO	A27F	3/92	9/92
CY LATERAL	ENDEVCO	A39J	3/92	9/92
CZ VERTICAL	ENDEVCO	A33F	3/92	9/92
3. FEMUR LOAD CELLS				
LEFT SIDE	GSE	951	5/92	11/92
RIGHT SIDE	GSE	952	5/92	11/92

B. CALIBRATION LABORATORY INSTRUMENTS

	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. PENDULUM ACC.	CEC	A160	7/92	1/93
2. TEST PROBE ACCELEROMETER	CEC	A161	7/92	1/93
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE	TRANS-DUCER INC	20051	7/92	1/93
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE	BLH	72952	7/92	1/93
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE	CIC	567-11	7/92	1/93

HYBRID III EXTERNAL DIMENSIONS

S/N 150 HUMANOID

DUMMY SERIAL NO. 150 DATE: 8-21-92

TEMPERATURE		20.5 DEG. C
RELATIVE HUMIDITY		45 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)	429-434 mm	432 mm
LOCATION FOR WAIST CIRCUMFERENCE (BB)	226-231 mm	229 mm
CHEST CIRCUMFERENCE (Y)	970-1001 mm	998 mm
WAIST CIRCUMFERENCE (Z)	815-866 mm	864 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	881 mm
THIGH CLEARANCE (F)	140-155 mm	142 mm
BUTTOCK KNEE LENGTH (K)	580-605 mm	592 mm
BUTTOCK POPLITAL LENGTH (N)	452-477 mm	470 mm
POPLITEAL LENGTH (L)	430-455 mm	452 mm
KNEE PIVOT HEIGHT (M)	485-501 mm	500 mm
FOOT LENGTH (P)	252-267 mm	259 mm
FOOT BREADTH (W)	91-107 mm	96 mm
SHOULDER PIVOT FROM BACKLINE (E)	84-94 mm	94 mm
SHOULDER BREADTH (V)	422-437 mm	429 mm
SHOULDER PIVOT HEIGTH (B)	505-521 mm	513 mm
ELBOW REST HEIGHT (J)	190-211 mm	208 mm
SHOULDER-ELBOW LENGTH (I)	330-345 mm	338 mm
BACK OF ELBOW TO WRIST PIVOT (G)	290-305 mm	292 mm

DUMMY MEETS SPECIFICATIONS

TECHNICIAN: IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

HEAD DROP TEST

HYBRID III

DATE : 8-7-92

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN: 150 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	45 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	261.2 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	1.5 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 : 8-19-92 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN:150 CAL NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5-22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY		10% - 70%	43 %
IMPACT VELOCITY		24.8 - 25.7 KPH	25.0 KPH
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	23.67 G'S
	20 MS	17.60 - 22.60 G'S	21.74 G'S
	30 MS	12.50 - 18.50 G'S	17.62 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	17.62 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	39.13 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	74.77 DEG.
	TIME	57 - 64 MS	59.5 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88 - 108 N-M	107.2 N-M
	TIME	47 - 58 MS	53.88 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	107.2 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	98.13 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

NECK EXTENSION TEST

HYBRID III

DATE : 8-19-92

AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN:150 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5 - 22.2 DEG. C	21 DEG. C
RELATIVE HUMIDITY		10% - 70%	43 %
IMPACT VELOCITY		21.4 - 22.3 KPH	21.9 KPH
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G'S	18.47 G'S
	20 MS	14.00 - 19.00 G'S	18.46 G'S
	30 MS	11.00 - 16.00 G'S	16.0 G'S
MAX PENDULUM G'S ABOVE 30 MS		22 G'S MAX	16.0 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		38 - 46 MS	39.5 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	94.99 DEG.
	TIME	72 - 82 MS	72.63 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-80.0/-52.9 N-M	-79.4 N-M
	TIME	65 - 79 MS	68.63 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	149.75 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	128.63 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

THORAX IMPACT TEST

HYBRID III

DATE : 8-20-92

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN 150 H.S. THORAX CAL

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.5 - 22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	43 %
PENDULUM VELOCITY	23.7 - 24.6 KPH	23.7 KPH
MAXIMUM DEFLECTION	64 - 73 mm	65.0 mm
MAXIMUM RESISTIVE FORCE	4804 - 5538 NEWTONS	5471 NEWTONS
INTERNAL HYSTERESIS	69% - 85%	74.4 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 7-31-92 KNEE: LEFT

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN: 150 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	48 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.7 KPH
PEAK KNEE IMPACT FORCE	4430 - 6965 N	4991 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 7-31-92 KNEE: RIGHT

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN: 150 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	48 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.7 KPH
PEAK KNEE IMPACT FORCE	4430 - 6965 N	5235 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY I.D. NUMBER: 150

A. DUMMY INSTRUMENTS

	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER				
HX LONGITUDINAL	ENDEVCO	A12C	3/92	9/92
HY LATERAL	ENDEVCO	A60C	3/92	9/92
HZ VERTICAL	ENDEVCO	A84G	3/92	9/92
2. CHEST ACCELEROMETER				
CX LONGITUDINAL	ENDEVCO	EM94	3/92	9/92
CY LATERAL	ENDEVCO	A83G	3/92	9/92
CZ VERTICAL	ENDEVCO	A30G	3/92	9/92
3. FEMUR LOAD CELLS				
LEFT SIDE	GSE	954	5/92	11/92
RIGHT SIDE	GSE	955	5/92	11/92

B. CALIBRATION LABORATORY INSTRUMENTS

	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. PENDULUM ACC.	CEC	A160	7/92	1/93
2. TEST PROBE ACCELEROMETER	CEC	A161	7/92	1/93
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE	TRANS-DUCER INC	20051	7/92	1/93
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE	BLH	72952	7/92	1/93
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE	CIC	567-11	7/92	1/93

Appendix D

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(6 Month Calibration Minimum)

DRIVER DUMMY	Serial #	Manufacturer	Calibration Last	Calibration Next
Head X	FR74	ENDEVCO	3/92	9/92
Y	A57G	ENDEVCO	3/92	9/92
Z	A84J	ENDEVCO	3/92	9/92
Chest X	A27F	ENDEVCO	3/92	9/92
Y	A39J	ENDEVCO	3/92	9/92
Z	A33F	ENDEVCO	3/92	9/92
Right Femur Load Cell	952	GSE	5/92	11/92
Left Femur Load Cell	951	GSE	5/92	11/92
Neck Load Cell X	269	DENTON	8/91	2/92
Y	269	DENTON	8/91	2/92
Z	269	DENTON	8/91	2/92
Neck Moment X	269	DENTON	8/91	2/92
Y	269	DENTON	8/91	2/92
Z	269	DENTON	8/91	2/92
Chest Deflection Gauge Hybrid III Use Only	45	HUMANOID	7/92	1/93
Lap Belt Load Cells	123	LEBOW	5/92	11/92
Shoulder Belt Load Cells	127	LEBOW	5/92	11/92
Spool-Out Potentiometer	32	SERVONIC INST.	8/92	2/93
Belt Stretch Transducer	E1	CALSPAN	8/92	2/93

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(6 Month Calibration Minimum)

PASSENGER DUMMY	Serial #	Manufacturer	Calibration Last	Calibration Next
Head X	A12C	ENDEVCO	3/92	9/92
Y	A60C	ENDEVCO	3/92	9/92
Z	A84G	ENDEVCO	3/92	9/92
Chest X	EM94	ENDEVCO	3/92	9/92
Y	A83G	ENDEVCO	3/92	9/92
Z	A30G	ENDEVCO	3/92	9/92
Right Femur Load Cell	955	GSE	5/92	11/92
Left Femur Load Cell	954	GSE	5/92	11/92
Neck Load Cell X	076	DENTON	7/91	1/92
Y	076	DENTON	7/91	1/92
Z	076	DENTON	7/91	1/92
Neck Moment X	076	DENTON	7/91	1/92
Y	076	DENTON	7/91	1/92
Z	076	DENTON	7/91	1/92
Chest Deflection Gauge Hybrid III Use Only	150	HUMANOID	7/92	1/93
Lap Belt Load Cells	133	LEBOW	5/92	11/92
Shoulder Belt Load Cells	135	LEBOW	5/92	11/92
Spool-Out Potentiometer	22	SERVONIC INST.	8/92	2/93
Belt Stretch Transducer	E2	CALSPAN	8/92	2/93

INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS
(6 Month Calibration Minimum)

	Serial #	Manufacturer	Calibration Last	Calibration Next
Left Seat Rear Crossmember	A44	CEC	7/92	1/93
Right Rear Seat Crossmember	A181	CEC	5/92	11/92
Top of Engine	A178	CEC	4/92	10/92
Bottom of Engine	A177	CEC	4/92	10/92
Left Disc Brake Caliper	A152	CEC	4/92	10/92
Right Disc Brake Caliper	A156	CEC	4/92	10/92
Instrument Panel	A142	CEC	7/92	1/93
Left Seat Crossmember Redundant	A115	CEC	6/92	12/92
Right Seat Crossmember Redundant	A73	CEC	7/92	1/93

INSTRUMENT CALIBRATION FOR LABORATORY INSTRUMENTS

(6 Month Calibration Minimum)