V2643

REPORT NUMBER: CAL-97-N07

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

FORD MOTOR COMPANY OF CANADA, LTD.
1998 FORD WINDSTAR
MPV

NHTSA NUMBER: MW0200

CALSPAN TEST NUMBER: 8406-7

CALSPAN SRL CORPORATION
TRANSPORTATION SCIENCE CENTER
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May 12, 1997

FINAL REPORT

PREPARED FOR:

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Performance Standards
Office of Crashworthiness Standards
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16. *Abstract*

A frontal load cell barrier test of a 1998 Ford Windstar MPV was performed at Calspan SRL Corporation crash test facility in Buffalo, New York, on May 12, 1997.

The impact velocity was 56.2 kph and the temperature at the barrier face was 11°C. The maximum post-test vehicle crush was 435 mm. The test vehicle was equipped with a 3-point restraint system and supplemental airbags at each front outboard seating position.

With respect to FMVSS 208 "Occupant Crash Protection - Injury Criteria" both the driver and passenger appear to comply with head, chest and femur requirements.

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Section 1

PURPOSE AND TEST PROCEDURE

This 56.2 kph 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.DTNH22-96-D-02010. 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 56.2 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 MW0200

A load cell barrier consisting of 36 load cells was impacted by a 1998 Ford Windstar MPV at a velocity of 56.2 kph. The test was performed at the Calspan SRL Corporation on My 12, 1997. 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 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 (position 1) ATD (Serial No. 245) and the right-front passenger (position 2) ATD (Serial No. 064) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 132 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.

The driver's HIC was 362.7. The maximum chest deceleration over 3 milliseconds was 41.6 g's and maximum chest deflection was -17.3 mm. Femur loads were -3949.0 Newtons on the left and -2381.7 Newtons on the right.

The right front passenger's HIC was 294.5. Maximum chest deceleration over 3 milliseconds was 37.9 g's and maximum chest deflection was -16.0 mm. Femur loads were -1786.3 Newtons on the left and -4304.4 Newtons on the right.

Driver head y redundant and upper neck moment x data are not accurate after 50 ms. Driver left ankle x data is not accurate after 60 ms. Instrument panel x data is not accurate after 90 ms. The engine top and bottom and left and right brake caliper x accelerometer data cables were damaged when the engine mounting bolts sheared during impact. This data is not accurate after 50 ms. A data tape machine malfunctioned during the test and we were unable to record barrier load cells C7 - C9 and D1 - D9. Consequently, a partial load cell summation plot is given.

Table 1

CRASH TEST SUMMARY

Vehicle NHTSA No. : MW0200 Test Mode : 56 kph Frontal Barrier

Test Date : May 12, 1997 Time: 16:00 Temperature : 11 °C

Vehicle Make/Model/Body Style : 1998 Ford Windstar MPV

Vehicle Test Weight : 1960 kg

Vehicle/Barrier Impact Angle : 0 °

Impact Velocity : 56.2 kph

Maximum Static Crush : 435.0 mm

Vehicle Rebound : 763.3 mm

DUMMIES:	DRIVER	PASSENGER
Type :	572E	572E
Restraint System :	Airbag, Seatbelt, Knee Bolster	Airbag, Seatbelt, Knee Bolster

Number of Data Channels : 132

Number of Cameras : 1 Real Time

16 High Speed

DOOR OPENING DATA : Closed/Operable - Left Front

Closed/Operable - Right Front

Front Seat(s) Data :	DRIVER	PASSENGER
Seat Track Failure :(mm of shift)	0	+10
Seat Back Failure :	None	None

VISIBLE DUMMY CONTACT POINTS :	DRIVER	PASSENGER
Head :	Face to Bag, Back of Head to Headrest	Face to Bag, Back of Head to Headrest
Abdomen :	Seatbelt	Seatbelt
Chest	Seatbelt, Airbag	Seatbelt, Airbag
Knees	Knee Bolster	Knee Bolster

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION :

Year/Make/Model/Body Style : 1998 Ford Windstar MPV

NHTSA No. : MW0200 ; VIN: 2FMDA51V4WBA30599 ; Color : White

Engine Data: 6 cylinders; - CID; 3.0 Liters; - cc

Placement : - Longitudinal or In-Line; X Transverse of Lateral

Transmission Data : 4 speeds; - Manual; X Automatic; X Overdrive

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

Major Options : X A/C; X Pwr.Strg.; X Pwr. Brakes

X Pwr. Windows; X Pwr. Door Locks; - Tilt Wheel

Date Received : 04/10/97 ; Odometer Reading 216 km

Selling Dealer : Al Maroone Ford

& Address: 4045 Transit Road Williamsville, NY 14221

DATA FROM TIRE VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by : Ford Motor Company of Canada, Ltd.

Date of Manufacture 02/97

GVWR : 2295 kg; GAWR: 1210 kg FRONT; 1104 kg REAR

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load : 241 kpa FRONT

241 kpa REAR

Recommended Tire Size : P205/70R15SL

* Recommended Cold Tire Pressure : 241 kpa FRONT; 241 kpa REAR

Size of Tires on Test Vehicle: P205/70R15SL ; Manufacturer: Firestone

Vehicle Capacity Data :

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

Number of Occupants: 2 Front; 5 Rear; 7 Total

Vehicle Capacity Weight (VCW) = 589 kg

No. of Occupants x 68 kg = 476 kg

Rated Cargo/Luggage Weight (RCLW) = 113 kg

*Tire pressure used for test

Table 2
GENERAL TEST AND VEHICLE PARAMETER DATA (cont.)

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with maximum fluids)= UDW:

Right Front =	521 kg	Right Rear =	334 kg
Left Front =	528 kg	Left Rear =	323 kg
TOTAL FRONT =	1,049 kg	TOTAL REAR =	657 kg

TOTAL DELIVERED WEIGHT = 1,706.0 kg

% of Total Front of Vehicle Weight = 61.5 % of Total Rear Weight = 38.5 %

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT :

Total Delivered Weight (UDW)	=	1,706 kg
Rated Cargo/Luggage Weight (RCLW)	=	113 kg
Weight of 2 p.572 Dummies @ 76 each	=	152 kg
TARGET TEST WEIGHT	=	1,971 kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 102 KG OF CARGO WEIGHT:

Right Front =	558.5 kg	Right Rear =	418 kg
Left Front =	567.5 kg	Left Rear =	416 kg
TOTAL FRONT =	1,126 kg	TOTAL REAR =	834 kg

TOTAL TEST WEIGHT = 1,960.0 kg

% of Total Front Weight = 57.4 % % of Total Rear Weight = 42.6 %

Weight of Ballast Secured in Vehicle Trunk Area = 71.4 kg

Vehicle Components Removed for Weight Reduction: None

VEHICLE ATTITUDE (all dimension in millimeters):

AS DELIVERED :	RF	735	LF	737	RR	762	LR 767
FULLY LOADED :	RF	723	LF	725	RR	713	LR 719
AS TESTED :	RF	730	LF	730	RR	730	LR 733

Vehicle's Wheel Base : 3070 mm

Location of Vehicle's C.G. : 1,306.3 mm rearward of front wheel center.

FUEL SYSTEM DATA :

Fuel System Capacity From Owner's Manual = 75.7 liters

Usable Capacity Figure Furnished by COTR = 75.7 liters

Test Volume Range (92 to 94% of Usable Capacity) = 69.6 to 71.2 liters

ACTUAL TEST VOLUME= 70.0 liters (with entire fuel system filled)

Test Fluid Type: Stoddard Solution ; Spec. Grav. = 0.764

Kinematic Viscosity = 0.96 centistokes; Color = Orange

Type of Fuel Pump: Electric- X ; Mechanical- -

Does Electric Pump operate with ignition switch "ON" & engine "OFF" Yes- X No- ___

Details of Fuel System Filler-Left, ahead of rear axle. Tank-Center, ahead of rear axle. Lines-Left frame rail.

Table 3

POST IMPACT DATA

TYPE OF TEST:

Type of Test : Frontal Barrier Impact Angle : 0°

Test Date : May 12, 1997 Time: 16:00 Temperature: 11 °C

Vehicle NHTSA No. : MW0200

Required Impact Velocity Range : 55.7 to 57.1 kph

BARRIER IMPACT VELOCITY : (Speed traps within 5 feet of impact plane.)

Trap No. 1 = 56.2 kph; Trap No. 2 = 56.2 kph

Distance from vehicle to barrier : (1) entering trap = 1321 mm

(2) exiting trap = 305 mm

VEHICLE STATIC CRUSH: (mm) (For frontal and rear impacts only.)

Vehicle Length:

Pre-Test	Right =	5070	; C/L =	5115	; Left =	5070
Post-Test	Right =	4635	; C/L =	4700	; Left =	4690
Crush	Right =	435.0	; C/L =	415.0	; Left =	380.0
AVERAGE	=	410.0	mm			

VEHICLE REBOUND: (From rigid barrier only.)

Distance from front of test vehicle to impact point :

	Right =	740	; C/L =	760	; Left =	790
AVERAGE	=	763.3	mm			

Section 3

OCCUPANT AND VEHICLE INFORMATION

I. DATA

1. Test Vehicle Information
2. Dummy Positioning Data
3. Vehicle Accelerometer Data
4. Dummy Injury Criteria Data Summary
5. Seat Belt Performance Assessment Data
6. Test Vehicle Measurements
7. Vehicle Intrusion Measurements
8. Camera Locations
9. Vehicle Target Locations
10. Load Cell Barrier Data
11. Post Test Air Bag Data

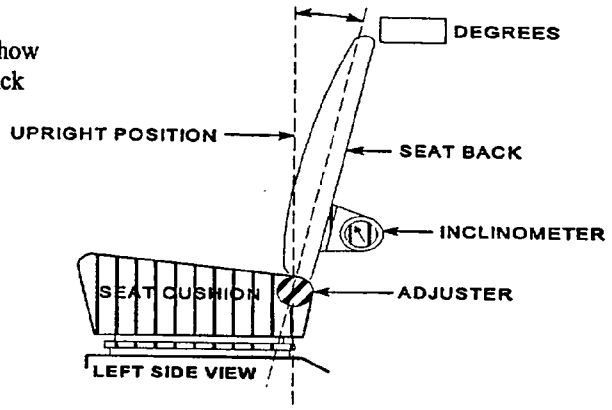
Figure 1

TEST VEHICLE INFORMATION

VEHICLE IDENTIFICATION:

Model Year : 1998 Vehicle Model: Ford Windstar Body Style : MPV

1. Nominal Design Riding Position for adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable.



FRONT SEAT ASSEMBLY

Seat back angle for driver's seat : 21.5°

Measurement instructions : Measure seat along rear edge of metal seatback on outboard side near the bottom.

Seat back angle for passenger's seat : 21.5°

Measurement instructions : Fixed seatback - same as driver.

2. Seat Fore and Aft Positioning

Positioning of the driver's seat : Position seat in mid position. Seat tracks number from 0 to 18, mid position is 9.

Positioning of the passenger's seat (if applicable) : Same as driver.

3. Fuel Tank Capacity Data

3.1

A. "Usable Capacity" of the standard equipment fuel tank is 75.7 liters

B. "Usable Capacity" of the optional equipment fuel tank is - liters

C. "Usable Capacity" of the vehicle(s) used for certification testing to requirements of FMVSS 301 = 75.7 liters

3.2 Amount of Stoddard solvent added to vehicle(s) used for certification test(s) = 70.0 liters

3.3 Is vehicle equipped with electric fuel pump? Yes- X ; No- ____

If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.

Fuel pump operates with ignition on and engine off.

Figure 1

TEST VEHICLE INFORMATION (cont.)

4. STEERING COLUMN ADJUSTMENTS :

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine the geometric center.

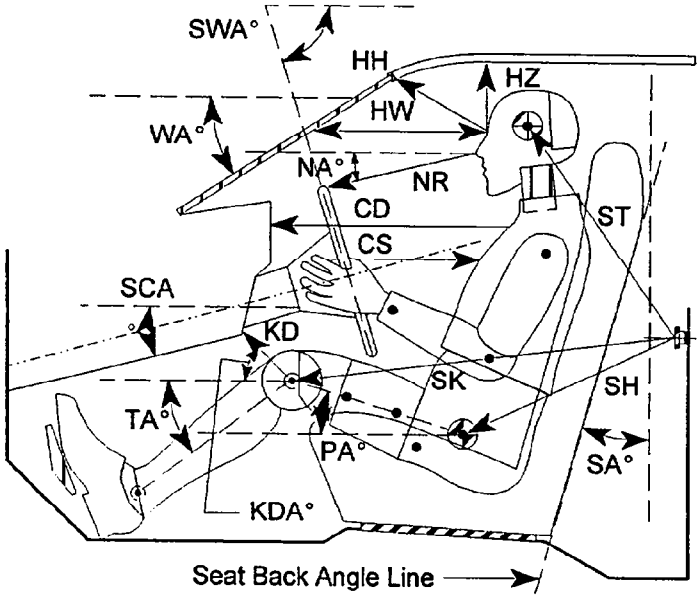
Operational Instructions: This vehicle was not equipped with an adjustable steering column.

5. SEAT BELT UPPER ANCHORAGE

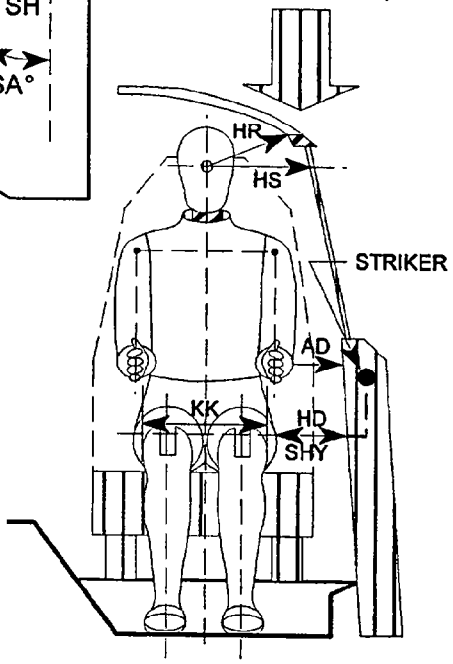
Nominal design riding position: 5 position adjustable. Mid position is notch 3.

Figure 2

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS



AD - Arm to Door
HD - H-Point to Door
HR - Head to Side Header
HS - Head to Side Window
KK - Knee to Knee
SHY- Striker to H-Point (Y Direction)



CD - Chest to Dash
CS - Steering Wheel to Chest
HH - Head to Header
HW - Head to Windshield
HZ - Head to Roof
KDA- Knee to Dash Angle
KDL- Left Knee to Dash
KDR- Right Knee to Dash
NA - Nose to Rim Angle
NR - Nose to Rim
PA - Pelvic Angle
RA - Rim to Abdomen
SA - Seat Back Angle
SCA- Steering Column Angle
SH - Striker to H-Point
SK - Striker to Knee
ST - Striker to Head
SWA- Steering Wheel Angle
TA - Tibial Angle
WA - Windshield Angle

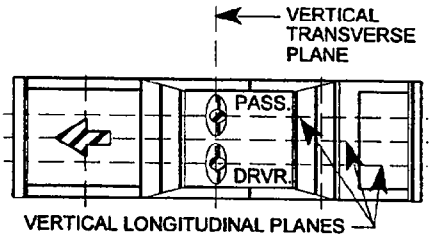


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Table 4

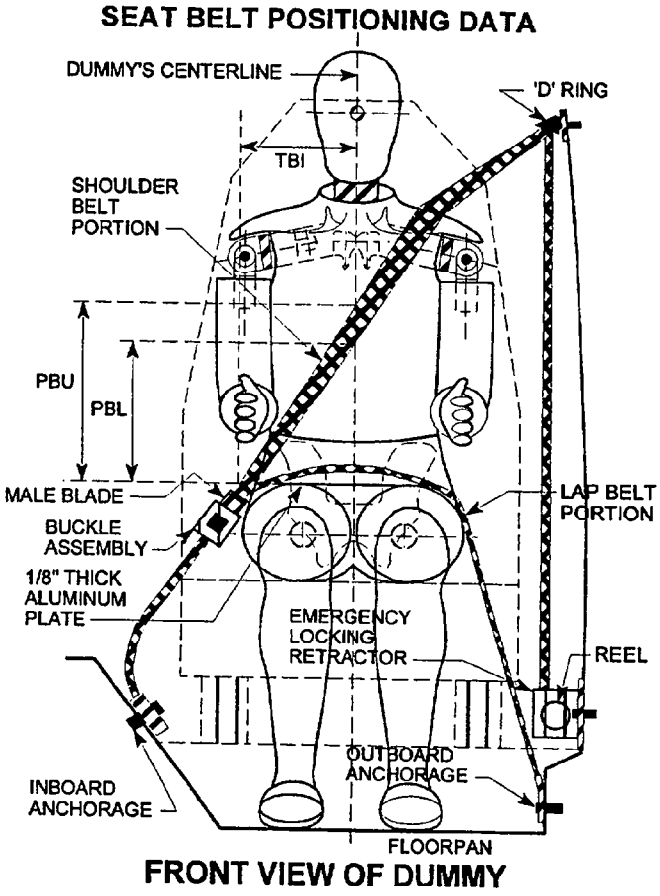
FRONT SEAT OCCUPANT MEASUREMENTS

	DRIVER (Serial #245)			PASS. (Serial # 064)		
WA°	32 deg.			N/A		
SWA°	64 deg.			N/A		
SCA°	26 deg.			N/A		
SA°	21.5 deg.			21.5 deg.		
HZ	208			200		
HH	382			385		
HW	612			620		
HR	270			264		
NR	394	Angle	-15 deg.	N/A		
CD	545			552		
CS	321			N/A		
RA	198			N/A		
KDL	145	Angle (KDA)	25 deg.	150		
KDR	116			160	Angle (KDA)	36 deg.
PA°	21.5 deg.			21.5 deg.		
TA°	-60 deg.			-50 deg.		
KK	280			252		
ST	648	Angle	31 deg.	625	Angle	14 deg.
SK	760	Angle	90 deg.	612	Angle	87 deg.
SH	360	Angle	106 deg.	222	Angle	112 deg.
SHY	270			267		
HS	329			330		
HD	172			158		
AD	105			100		

Dimensions in millimeters

Figure 3

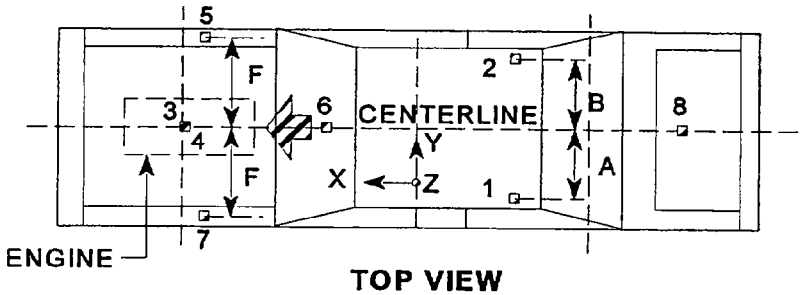
SEAT BELT POSITIONING DATA



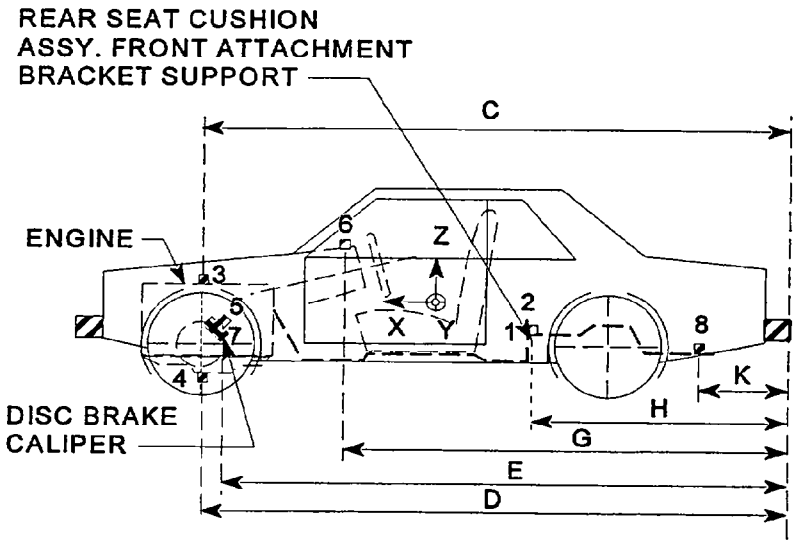
	DRIVER DUMMY (mm)	PASSENGER DUMMY (mm)
PBU -- Top surface of alum. plate to upper edge	325	325
PBL-- Top surface of alum. plate to belt lower edge	255	250
LAP BELT TENSION	10 Newtons	10 Newtons
SHOULDER BELT TENSION	Retractor	Retractor

Figure 4

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



TOP VIEW



LEFT SIDE VIEW

Table 5

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

DIMENSION	LENGTH (mm)
	PRE-TEST VALUES
A Left Rear Seat Crossmember Y	-617
B Right Rear Seat Crossmember Y	617
C Top of Engine X	4378
D Bottom of Engine X	4002
E Disc Brake Calipers X	3954
F Disc Brake Calipers Y	±610
G Instrument Panel X	3452
H Rear Seat Crossmembers X	2520

LOCATION NUMBER	DESCRIPTION	MAXIMUM VALUE (g's)			
		Pos.	msec.	Neg.	msec.
1	Rear Seat X-Member @ Left Side	0.9	183.9	-33.2	66.0
2	Rear Seat X-Member @ Right Side	1.0	167.7	-28.1	66.5
3	Top of Engine Block	44.6	44.5	-162.0	32.6
4	Bottom of Engine	48.6	20.7	-52.7	24.8
5	Disc Brake Caliper @ Right Side	553.3	67.0	-548.4	85.2
6	Instrument Panel	554.5	154.5	-569.6	126.4
7	Disc Brake Caliper @ Left Side	8.9	53.7	-51.2	78.3
8	Rear Seat X-Member @ Left-Redundant	1.1	183.9	-29.8	66.1
9	Rear Seat X-Member @ Right-Redundant	2.0	189.2	-29.5	66.2

Table 6

DUMMY INJURY CRITERIA VALUES

NHTSA Test No.: MW0200 Vehicle: 1998 Ford Windstar MPV

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-44.9	5.7	15.9	45.4
Position #2 - Passenger	-45.4	-14.7	20.6	47.6

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R*
Position #1 - Driver	-42.1	-6.1	-11.0	41.6
Position #2 - Passenger	-39.6	-5.3	-12.9	37.9

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

	MAXIMUM FORCE - FEMUR LOAD (N)	
	LEFT FEMUR	RIGHT FEMUR
Position #1 - Driver	-3949.0	-2381.7
Position #2 - Passenger	-1786.3	-4304.4

	MAXIMUM FORCE - SEAT BELT LOADS (N)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	5987.9	-	5212.2
Position #2 - Passenger	7995.2	4295.2	-

	HEAD INJURY CRITERIA (HIC)			
	HIC**	t_1 (msec)	t_2 (msec)	Average Acceleration t_1 to t_2
Position #1 - Driver	362.7	54.4	90.4	39.9
Position #2 - Passenger	294.5	56.6	95.6	36.7

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

Table 7
HYBRID III NECK AND CHEST DATA SHEET

Vehicle Year/Make/Model/Body Style: 1998 Ford Windstar MPV

NHTSA Test No.: MW0200 Test Date: May 12, 1997

MAXIMUM VALUES	DRIVER DUMMY	PASSENGER DUMMY
Neck Load X (N)	-435.8	-668.3
Neck Load Y (N)	220.3	-443.9
Neck Load Z (N)	1352.1	-2176.6
Neck Moment X (N-m)	-720.8	27.3
Neck Moment Y (N-m)	59.0	-37.0
Neck Moment Z (N-m)	13.3	39.6
Chest Deflection X (mm)	-17.3	-16.0
Time of Max. Occurrence (msec)	84.1	81.0

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

PELVIC DATA

MAXIMUM VALUES	DRIVER DUMMY	PASSENGER DUMMY
Pelvic X Acceleration (g's)	-49.8	-43.3
Pelvic Y Acceleration (g's)	-16.5	-6.4
Pelvic Z Acceleration (g's)	21.9	30.5

LOWER LEG INSTRUMENTATION (ABBREVIATED)

	DRIVER DUMMY		PASSENGER DUMMY	
MAXIMUM VALUES	Left	Right	Left	Right
Tibia Z Forces (N)	-1645.9	-2858.7	5416.6	-2291.2
Tibia Y Moments (N-m)	-39.2	-41.7	18.0	-21.9

ANKLE ACCELERATIONS

	DRIVER DUMMY		PASSENGER DUMMY	
MAXIMUM VALUES	Left	Right	Left	Right
X Acceleration (g's)	-51.8	-77.5	51.5	-51.7
Z Acceleration (g's)	-42.9	-66.7	-59.1	-43.2

Table 8

REDUNDANT DUMMY INJURY CRITERIA VALUES

NHTSA Test No.: MW0200 Vehicle: 1998 Ford Windstar MPV

	MAXIMUM HEAD ACCELERATION (g's) REDUNDANT			
	X	Y	Z	R
Position #1 - Driver	-48.1	N/A	17.6	113.7
Position #2 - Passenger	-50.7	-20.5	24.1	54.0

	MAXIMUM CHEST ACCELERATION (g's) REDUNDANT			
	X	Y	Z	R*
Position #1 - Driver	-40.5	-6.2	-10.7	40.4
Position #2 - Passenger	-38.6	-4.8	-10.7	37.2

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

	HEAD INJURY CRITERIA (HIC) REDUNDANT			
	HIC**	t_1 (msec)	t_2 (msec)	Average Acceleration t_1 to t_2
Position #1 - Driver	464.8	61.6	97.6	44.1
Position #2 - Passenger	351.2	56.2	92.2	39.4

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

Table 9

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

BELT LENGTH DATA:	Driver	Passenger
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	2245	2050
Shoulder belt length as measured on Part 572 Dummy.	1010	880
Lap belt length as measured on Part 572 Dummy.	1035	970
SHOULDER BELT SPOOL-OFF DATA:		
As determined by film analysis.	76	57
As determined mechanically.	72	50
As determined electronically.	**	**
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	2.4 mm/M	6.0 mm/M
Measured mechanically.	0 mm/M	1 mm/M

** Insufficient belt length between B-pillar opening and D-ring to attach string pot.

Dimensions in millimeters

Figure 5

TEST VEHICLE MEASUREMENTS

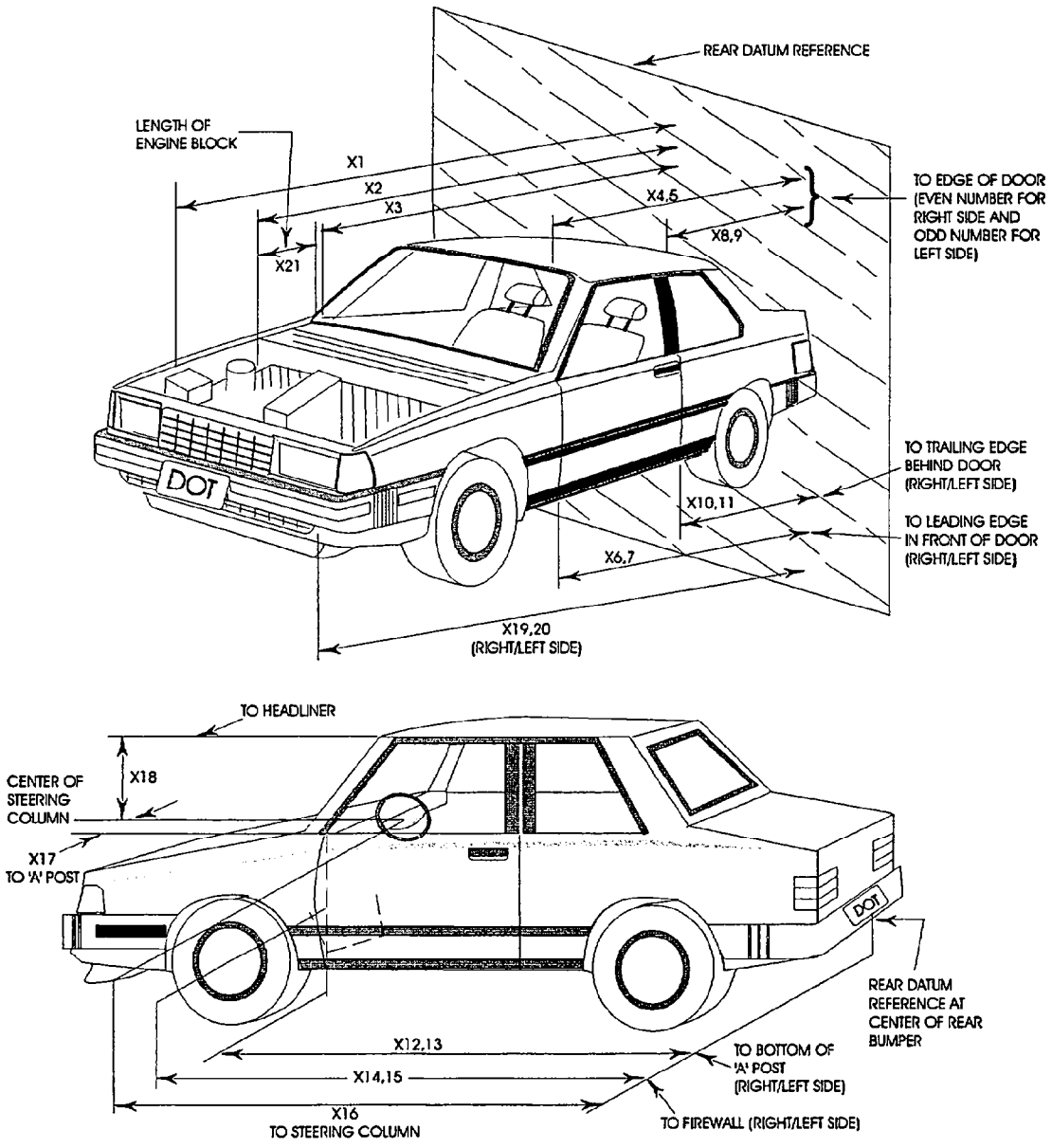


Table 10

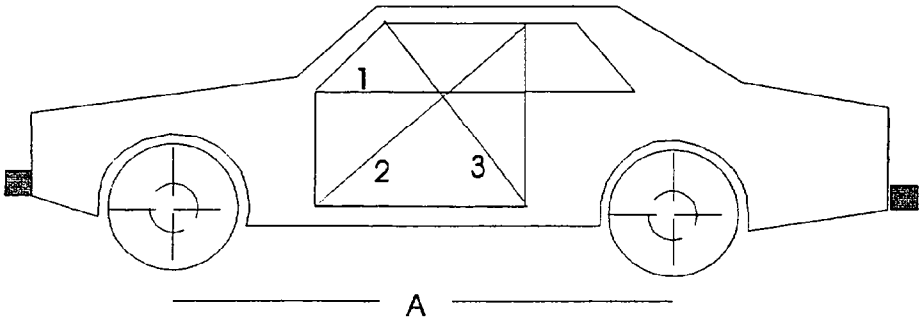
VEHICLE MEASUREMENTS

No.		All Dimensions in mm		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	5115	4700*	415
X2	Rear Surface of Vehicle to Front of Engine	4340	4080	260
X3	Rear Surface of Vehicle to Firewall	3890	3864	26
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	3676	3666	10
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	3662	3664	-2
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	3565	3570	-5
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	3559	3558	1
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	2481	2470	11
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	2314	2310	4
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	2505	2506	-1
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	2340	2340	0
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	3560	3560	0
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	3552	3555	-3
X14	Rear Surface of Vehicle to Firewall, Right Side	3890	3885*	5
X15	Rear Surface of Vehicle to Firewall, Left Side	3875	3885*	-10
X16	Rear Surface of Vehicle to Steering Column	3120	3175	-55
X17	Center of Steering Column to "A" Post	450	450	0
X18	Center of Steering Column to Headliner	465	470	-5
X19	Rear Surface of Vehicle to Right Side of Front Bumper	5070	4635*	435
X20	Rear Surface of Vehicle to Left Side of Front Bumper	5070	4690*	380
X21	Length of Engine Block	350	350	0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	3460	3460	0
CD	Rear Surface of Vehicle to Center of Dash Panel	3430	3440	-10
LD	Rear Surface of Vehicle to Left Side of Dash Panel	3355	3335	20

*Post-test length measurements are estimated.

Figure 6

VEHICLE INTRUSION MEASUREMENTS
DOOR OPENING WIDTH

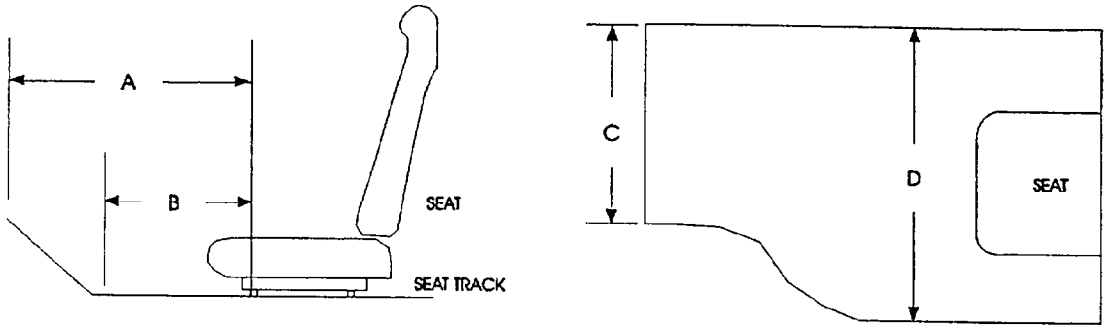


UNITS (mm)	LEFT			RIGHT		
MEASUREMENT	1	2	3	1	2	3
BEFORE TEST	1220	1710	1310	1075	1620	1245
AFTER TEST	1215	1695	1335	1070	1610	1270
DIFFERENCE	5	15	-25	5	10	-25

UNITS (mm)	A = WHEELBASE LEFT	A = WHEELBASE RIGHT
BEFORE TEST	3070	3070
AFTER TEST	2855	2855
DIFFERENCE	215	215

Figure 7

VEHICLE INTRUSION MEASUREMENTS
STATIC FOOTWELL DEFORMATION



DRIVER

Measurement	Pre-Test	Post-Test	Difference
A	645	640	5
B	485	485	0
C	560	555	5
D	610	610	0

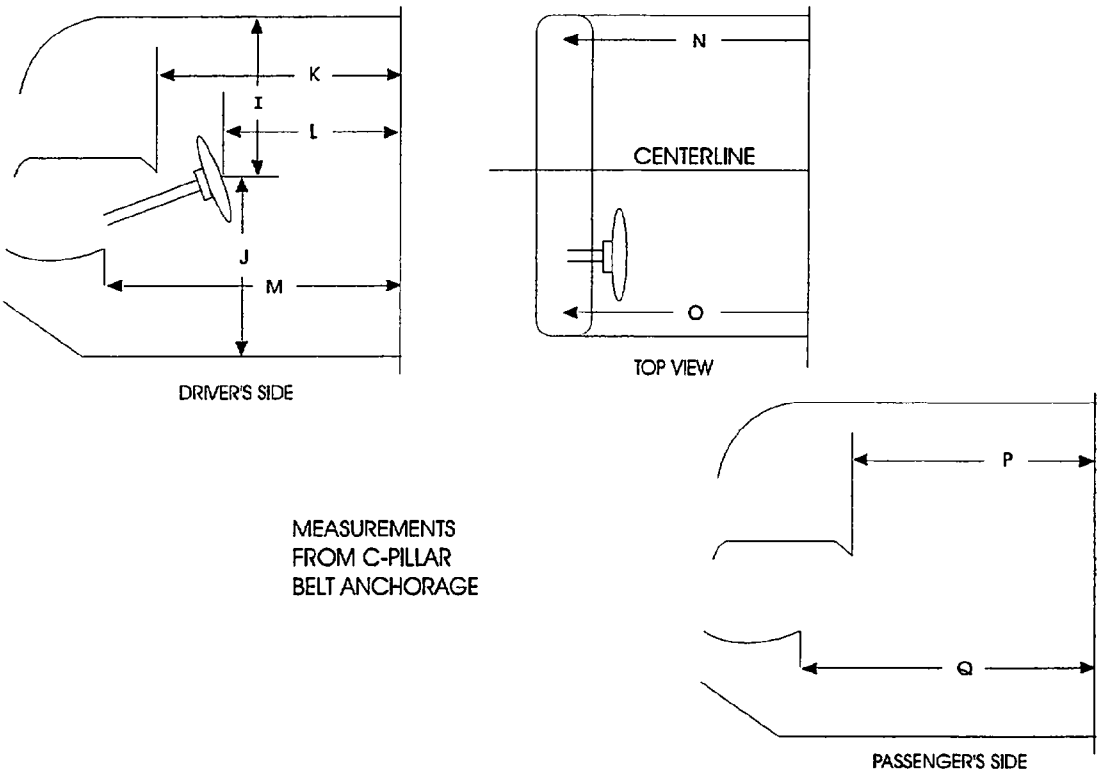
PASSENGER

Measurement	Pre-Test	Post-Test	Difference
A	675	655	20
B	520	520	0
C	540	545	-5
D	600	595	5

Units = mm

Figure 8

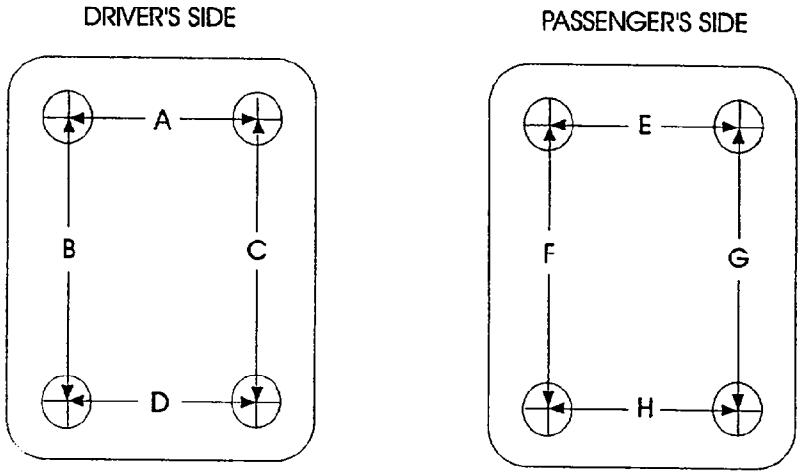
VEHICLE INTRUSION MEASUREMENTS
STATIC PASSENGER COMPARTMENT INTRUSION



Measurement	Pre-Test	Post-Test	Difference
I	490	490	0
J	720	720	0
K	830	845	-15
L	580	635	-55
M	800	800	0
N	920	920	0
O	795	800	-5
P = K (PASS.)	970	970	0
Q = M (PASS.)	770	780	-10

Units = mm

Figure 9
FLOORBOARD DEFORMATION



Measurement	Pre-Test	Post-Test	Difference
A	200	205	-5
B	300	300	0
C	320	315	5
D	200	205	-5
E	200	205	-5
F	410	405	5
G	400	410	-10
H	220	210	10

Units = mm

Figure 10

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera information shown in Table 11.

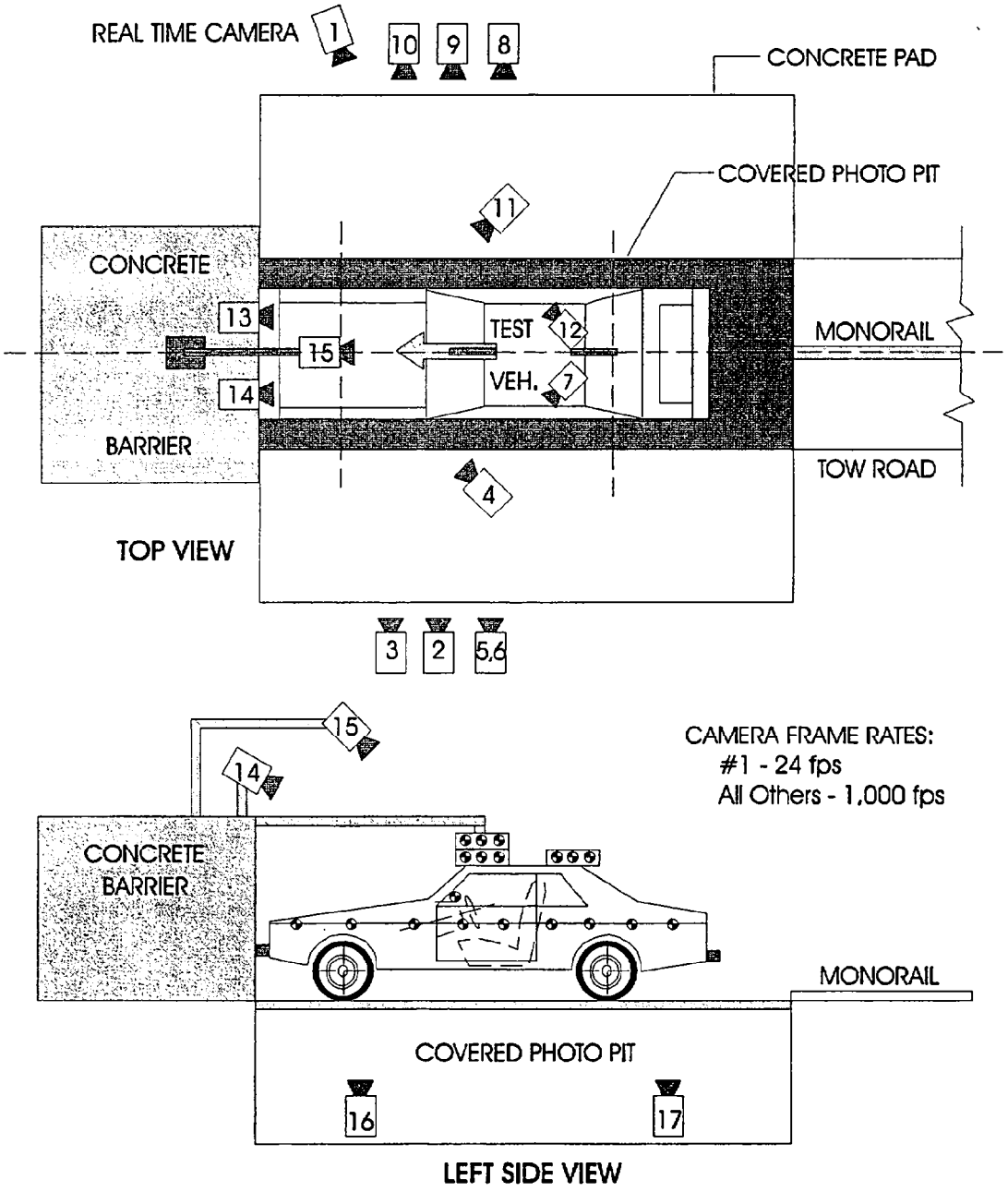


Table 11
HIGH-SPEED CAMERA LOCATIONS

NHTSA Test No.: MW0200 Vehicle: 1998 Ford Windstar MPV

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	6756	1565	1155	-5	6373	13	850
3	Left Side View	8404	717	1194	-3	8021	25	1010
4	Driver and Interior View	5208	2769	1930	-11	-	25	1010
5	Steering Column (Bottom)	7651	1223	1178	-3	7268	25	1050
6	Steering Column (Top)	7651	1223	1780	-8	7268	25	1000
7	Left Belt	-	-	-	-	-	8	550
8	Overall Right Side	6842	2207	1126	0	7225	13	1100
9	Right Side View	8412	1395	1214	-4	8795	25	1120
10	Right Passenger View	8100	1885	1383	-3	8483	35	1020
11	Passenger and Interior View	5052	3002	1920	-10	-	25	1100
12	Right Belt	-	-	-	-	-	8	600
13	Passenger Front View	1150	0	1850	-50	-	8	1100
14	Driver Front View	1150	0	1800	-50	-	8	1100
15	Windshield View	0	-515	3374	-52	-	8	1050
16	Pit View of Engine	0	652	-3048	90	-	13	1000
17	Pit View of Fuel Tank	0	2536	-3048	90	-	13	950

*X = film plane to monorail centerline

Y = film plane to impact location

Z = film plane to ground

** = referenced to horizontal plane

N.T. indicates No Timing

Figure 11

VEHICLE TARGET LOCATIONS

(Dimensions in millimeters)

A	307
B	540
C	1214
D	2563
E	319
F	2010
G	1045
H	1045
I	163
J	1524
K	1208
L	1338
M	319
N	163
O	1045
P	1045
Q	1338
R	1208
S	1524

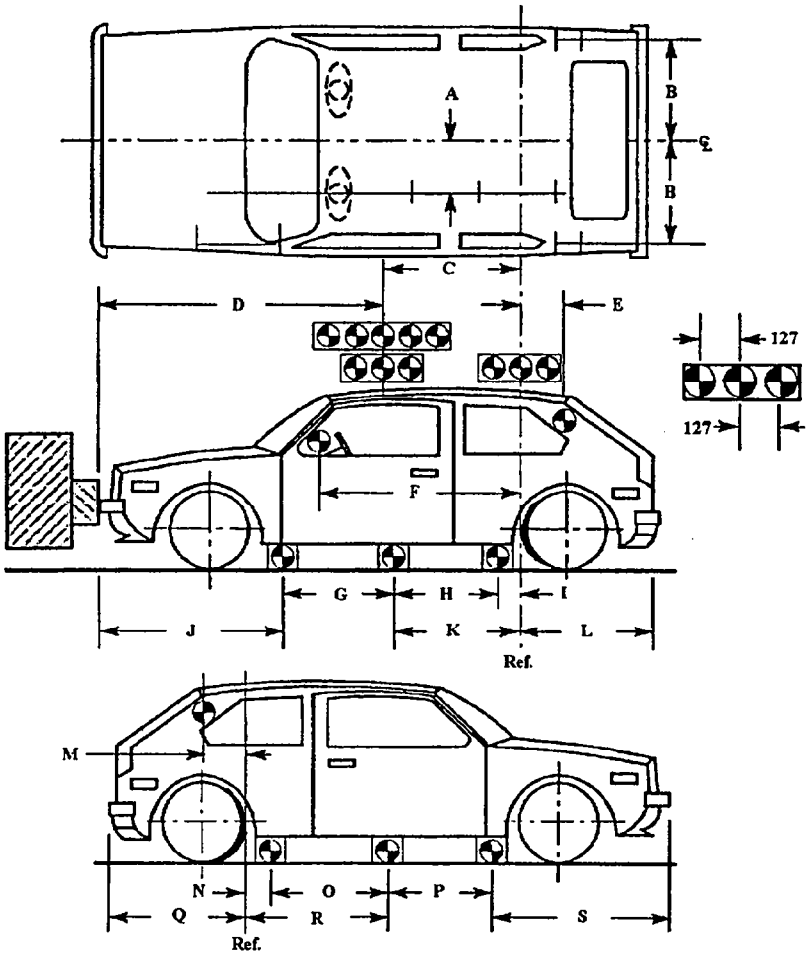
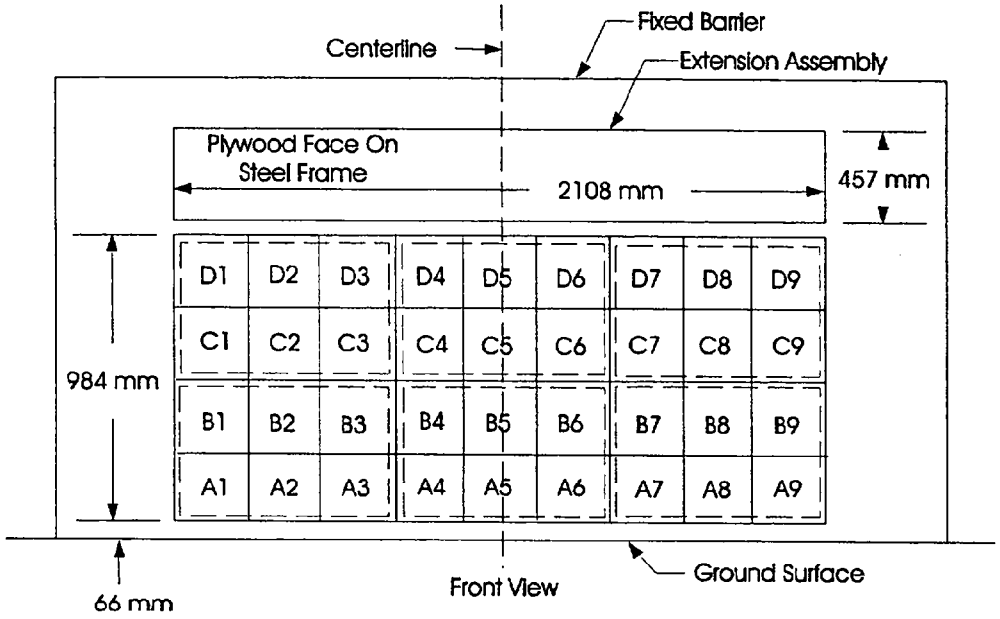


Figure 12

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)

Table 12

POST TEST AIR BAG DATA

NHTSA No. : MW0200; Test Date: May 12, 1997; Technician: Patrick MacDiarmid

Vehicle Model Year/Make/Model: 1998 Ford Windstar

A. No. of vent holes: 2 -Driver 1 -Passenger

B. Size of vent holes: (mm^2) 314 -Driver 1320 -Passenger

C. Total vent area: (mm^2) 628 -Driver 1320 -Passenger

D. Deflated air bag length and width dimensions or, if round,diameter. (mm)

Driver: 460 -Length; 635 -Width; 290 -Depth

Passenger: 700 -Height; 750 -Width; 650 -Depth

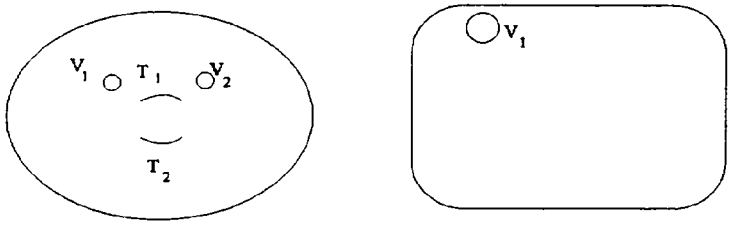
E. Is the air bag tethered?

Driver: X -Yes; ____ -No; If yes, record length of tether- 275 mm

Passenger: ____ -Yes; X -No; If yes, record length of tether- -

Sketch the air bag showing the location of the vent holes, how the bag is tethered, and where the bag is tethered. Also describe how the tethers are attached to the bag and the steering wheel.
(Note: Not to scale; V_n = Vent hole$_n$, T_n = Tether$_n$).

Driver **Passenger**



F. Record part numbers and manufacturer name of the air bag and gas generator.

Driver: Air bag: -

Generator: T1HM333J20396 120118513

Passenger: Air bag: -

Generator: F78B16044A7 AAJAFS P70311041 3047B GU2910 MS1F34001

MS1G02204 2000889B

Table 13

ACCIDENT INVESTIGATION DIVISION DATA

FOR 56.3 KPH FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: Ford Windstar MPV

NHTSA Test No.: MW0200 VIN: 2FMDA51V4WBA30599

Model Year: 1998 Build Date: 02/97 Test Date: May 12, 1997

Vehicle Size Category: _____ Test Weight: 1960 kg

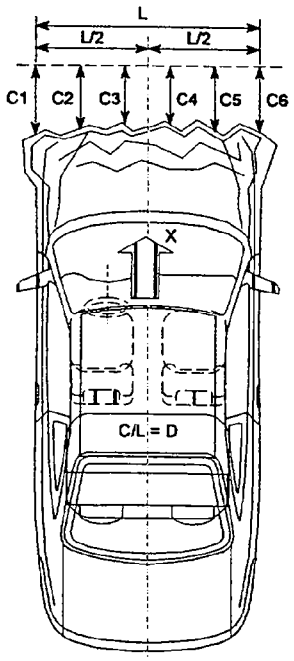
Vehicle Wheelbase: 3070 mm; Front Overhang: 1524 mm; Overall Width: 1887 mm

Collision Deformation Classification (CDC) Code: 12FDEW2

Crush Depth Dimensions:

	PRE	POST	DIFF	
C1 =	4940	4595*	-345	mm
C2 =	5040	4655*	-385	mm
C3 =	5075	4670*	-405	mm
C4 =	5075	4660*	-415	mm
C5 =	5045	4610*	-435	mm
C6 =	4950	4525*	-425	mm

*Estimated



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

Longitude Length of Damaged Region:

L1 = 1620 mm

L2 = 810 mm

L3 = 324 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 13

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 29 mm molding.

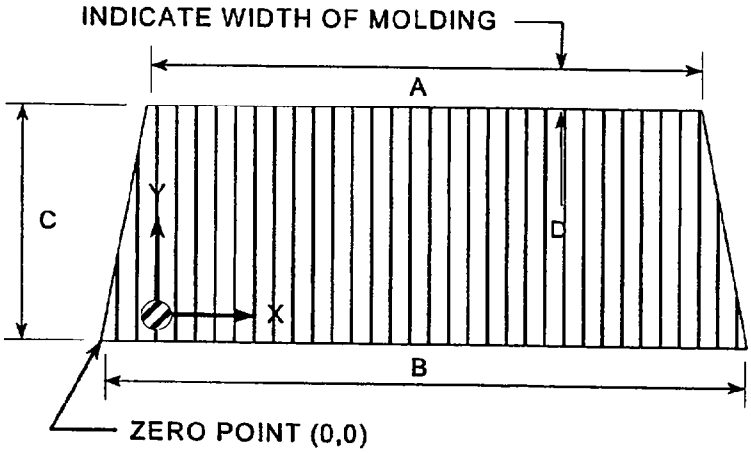
FMVSS 212 REQUIREMENTS:

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		
	PRE-TEST (mm)	POST-TEST(mm)	% OF RETENTION
RIGHT SIDE	2337.5	2337.5	100
LEFT SIDE	2337.5	2337.5	100
TOTAL	4,675	4,675	100

AREA OF RETENTION FAILURE: None.



FRONT VIEW OF WINDSHIELD

DIMENSIONS (mm)	
A	1300
B	1735
C	820
D	29

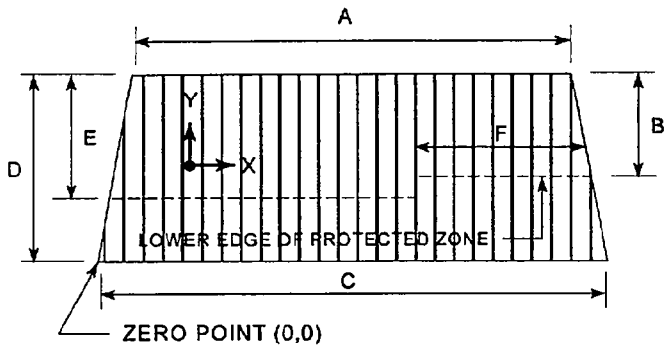
FAILURE DETAILS: None.

Figure 14

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 165 mm diameter rigid sphere weighing 6.8 kg 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 13 mm 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.



FRONT VIEW OF WINDSHIELD

FMVSS 219 TEST DATA:
(Dimensions in mm)

DIMENSIONS	
A	1300
B	453
C	1735
D	820
E	521
F	677

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 6 mm: None.

(Show location of penetration on the above sketch)

	COORDINATES	
	X	Y
1.		
2.		
3.		
4.		

Table 14

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

NHTSA TEST No.: MW0200 TEST DATE: May 12, 1997

VEHICLE MAKE/MODEL: 1998 Ford Windstar

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 (56 kph)

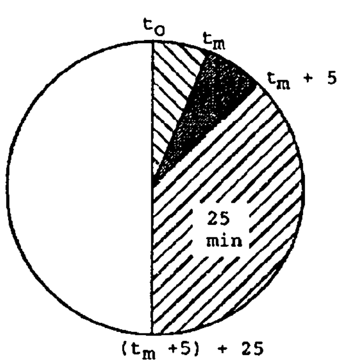
Oblique (48 kph) with ________ deg. barrier face first contacting ______________________

\- (driver/passenger) side

\- Rear Moving Barrier (48 kph)

\- Lateral Moving Barrier (32 kph)

FUEL SPILLAGE MEASUREMENT:



	ACTUAL	MAX ALLOWED
1. From impact until vehicle motion ceases	0	28 g
2. For 5 minute period after vehicle motion ceases	0	141 g
3. For next 25 minutes	0	28 g/min.

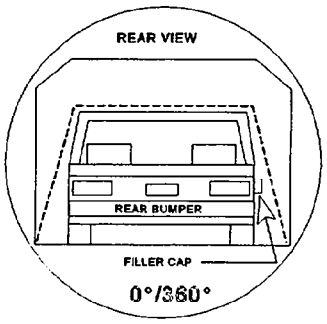
SOLVENT SPILLAGE DETAILS:
None

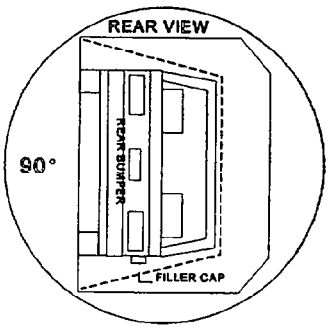
Table 15

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:
0-90 deg.

NHTSA Test No.:
MW0200





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	04	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	4	seconds
Next whole minute interval	7	minutes	00	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

141 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A

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

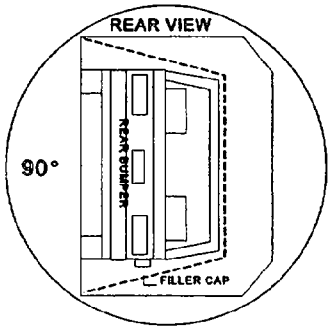
IV. SOLVENT SPILLAGE LOCATION(S): None

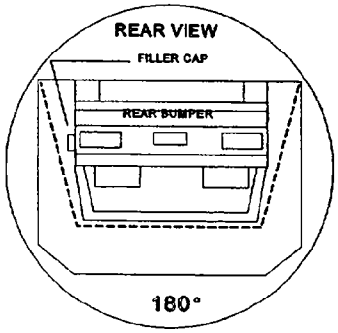
Table 15

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:
90-180 deg.

NHTSA Test No.:
MW0200





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	05	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	5	seconds
Next whole minute interval	7	minutes	00	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

141 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A

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

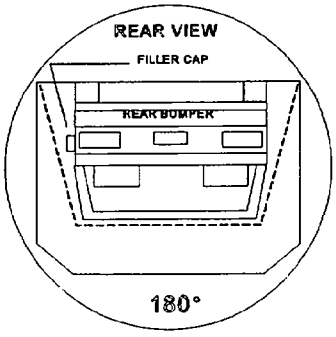
IV. SOLVENT SPILLAGE LOCATION(S): None

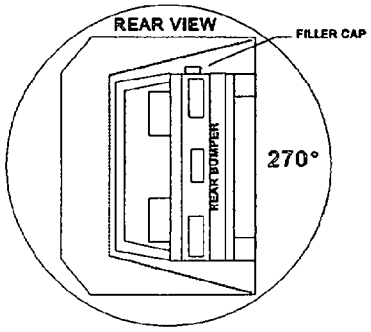
Table 15

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:
180-270 deg.

NHTSA Test No.:
MW0200





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	08	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	8	seconds
Next whole minute interval	7	minutes	00	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

141 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A

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

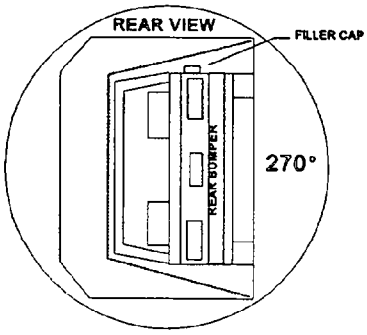
IV. SOLVENT SPILLAGE LOCATION(S): None

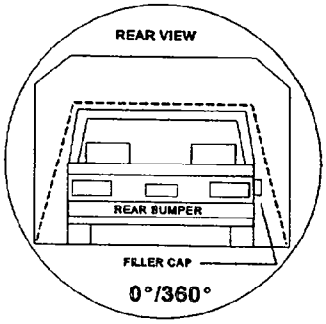
Table 15

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:
270 -360 deg.

NHTSA Test No.:
MW0200





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	07	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	7	seconds
Next whole minute interval	7	minutes	00	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

141 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A

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

IV. SOLVENT SPILLAGE LOCATION(S): None

Appendix A

PHOTOGRAPHS

PHOTOGRAPHS

PHOTOGRAPHS (continued)

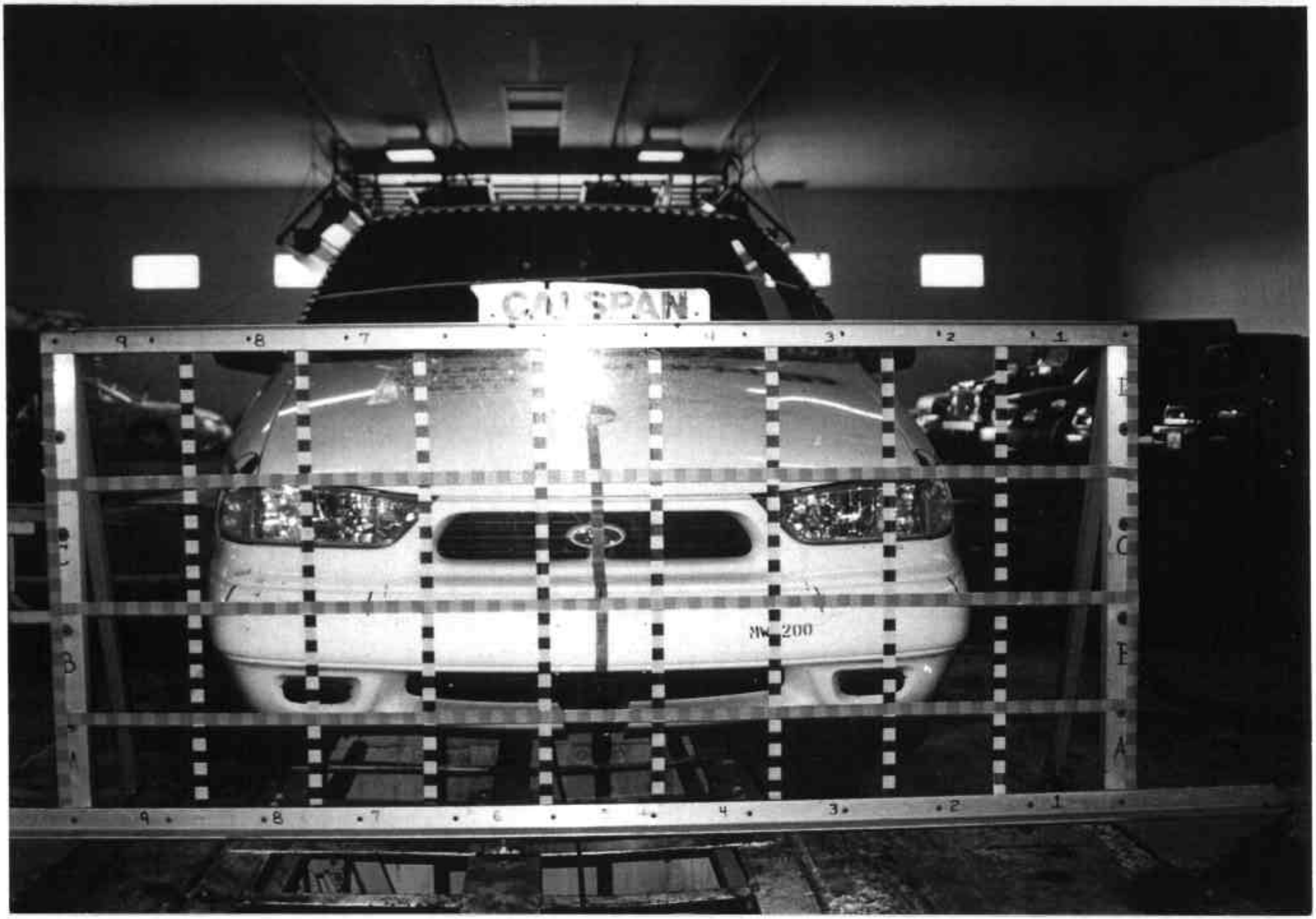


Figure A-1 LOAD CELL LOCATIONS

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

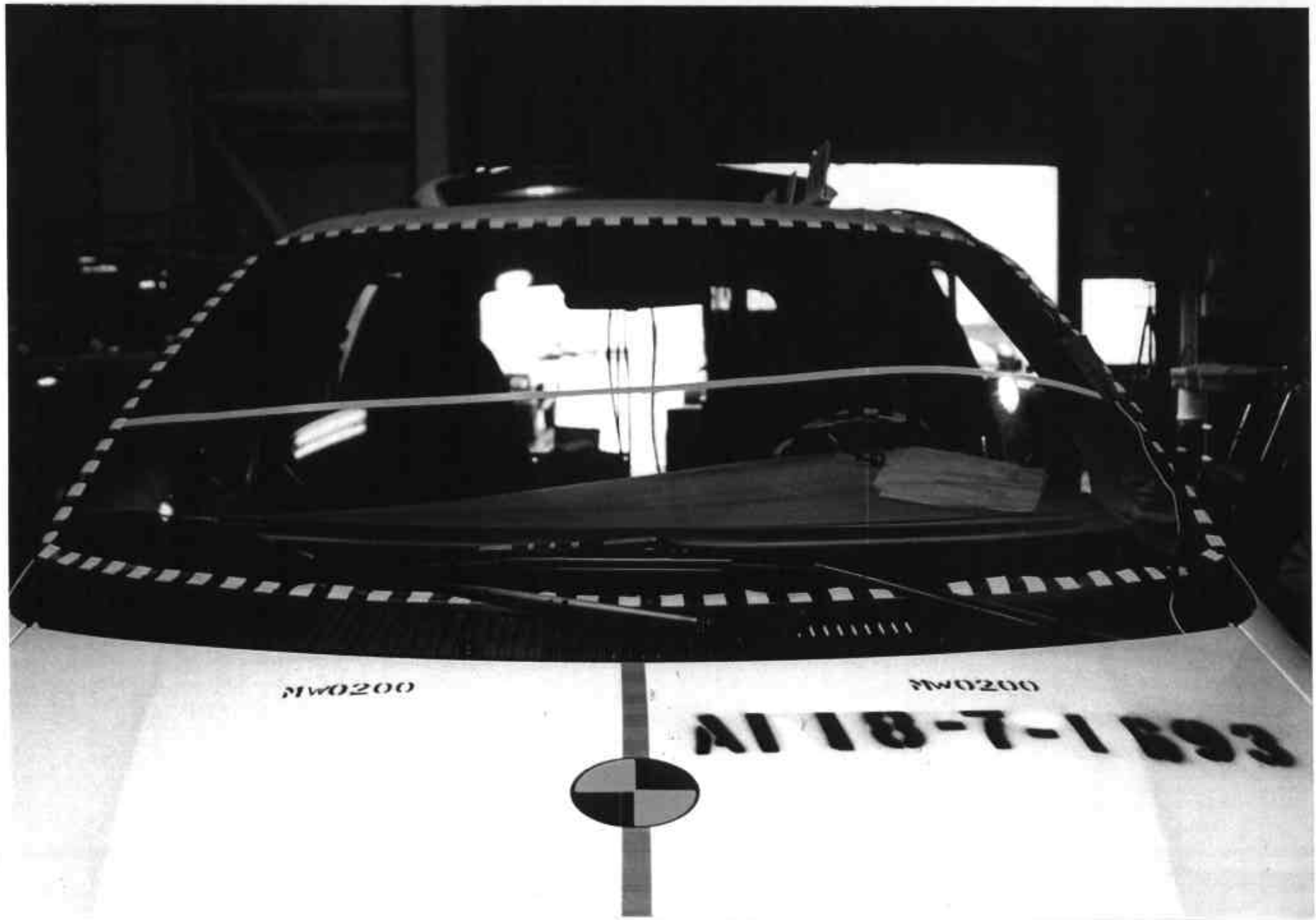


Figure A-12 PRE-TEST WINDSHIELD VIEW

Figure A-13 POST-TEST WINDSHIELD VIEW

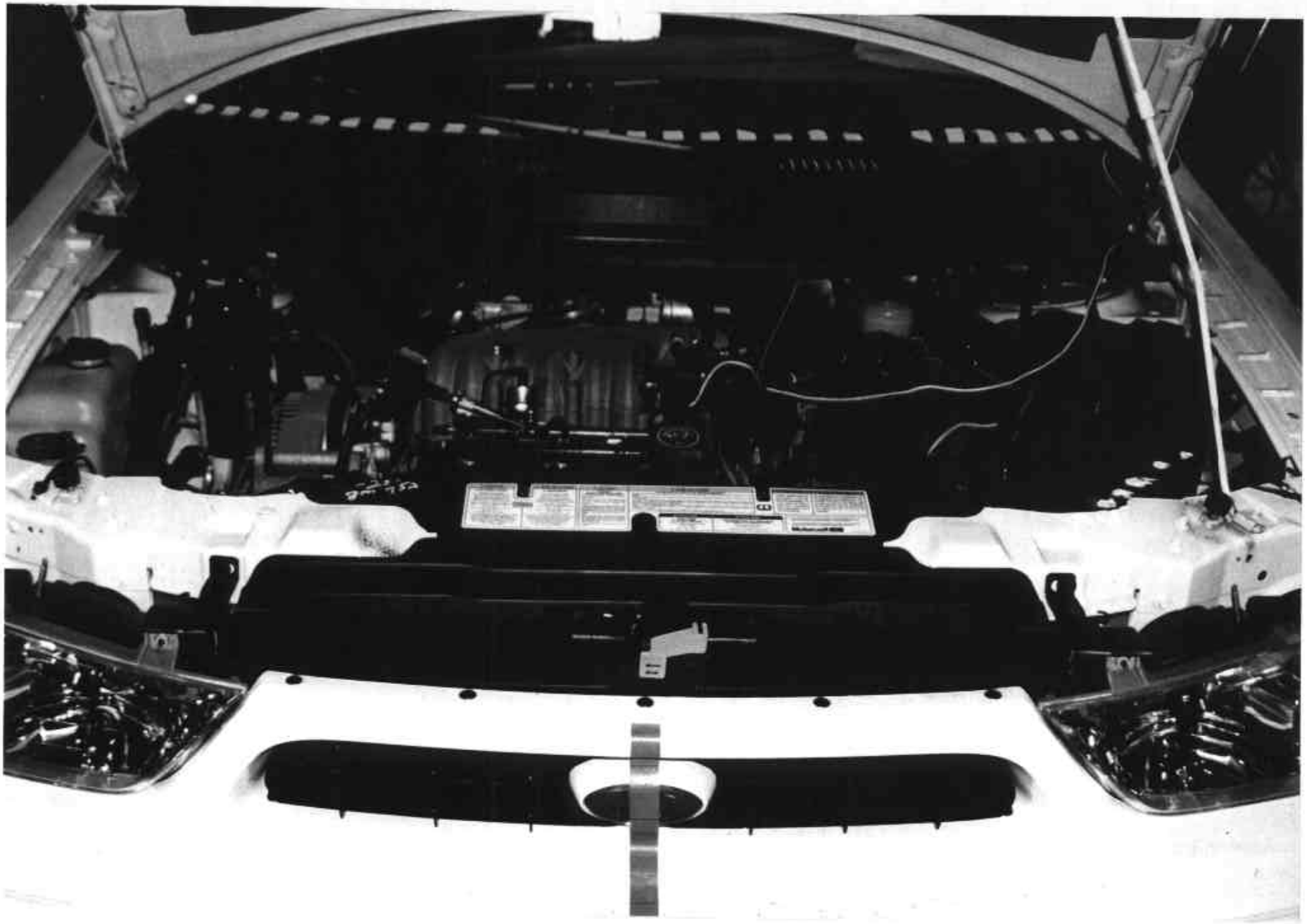


Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

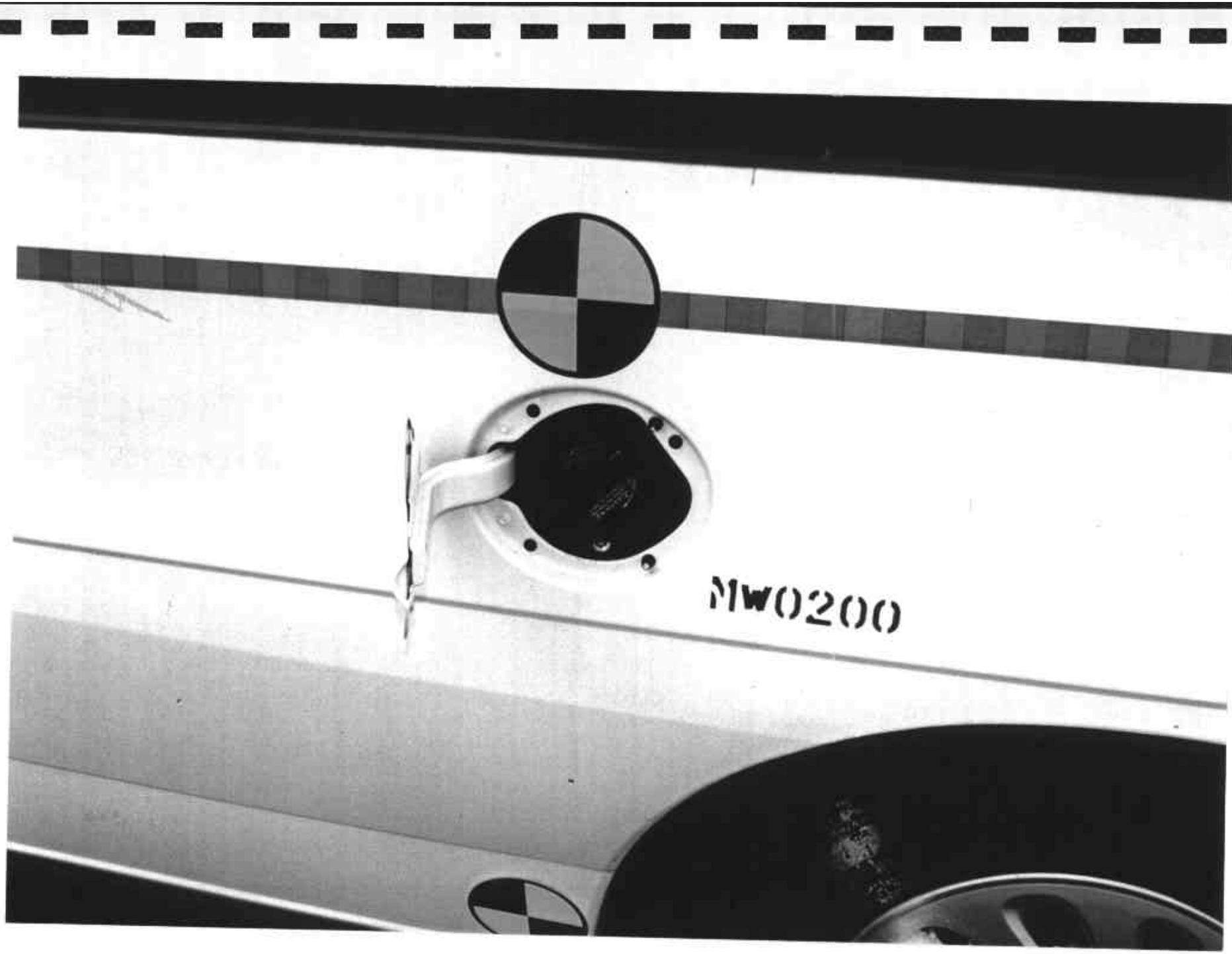


Figure A-15 FUEL CAP VIEW

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Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

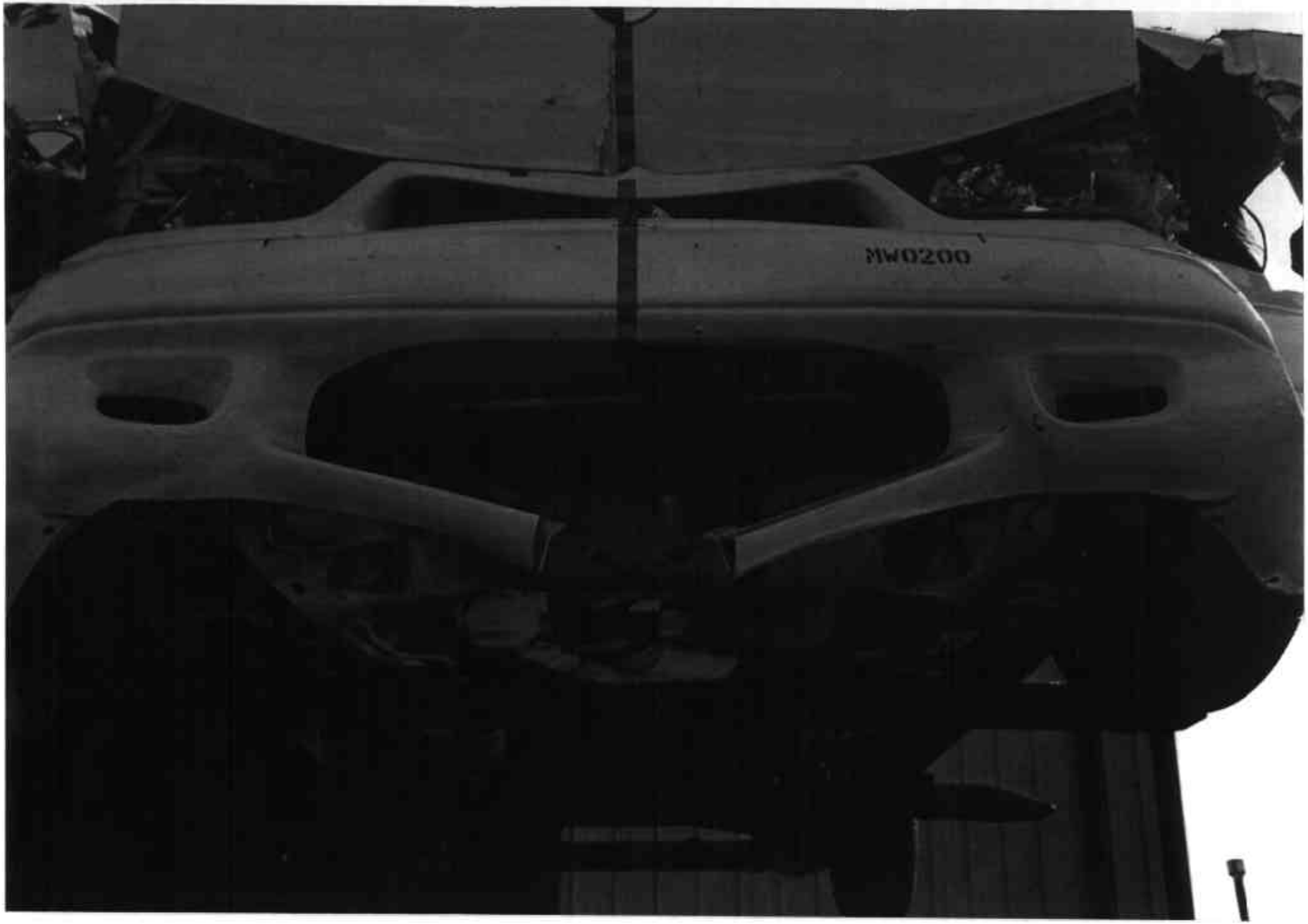

Figure A-17 POST-TEST FRONT UNDERBODY VIEW

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

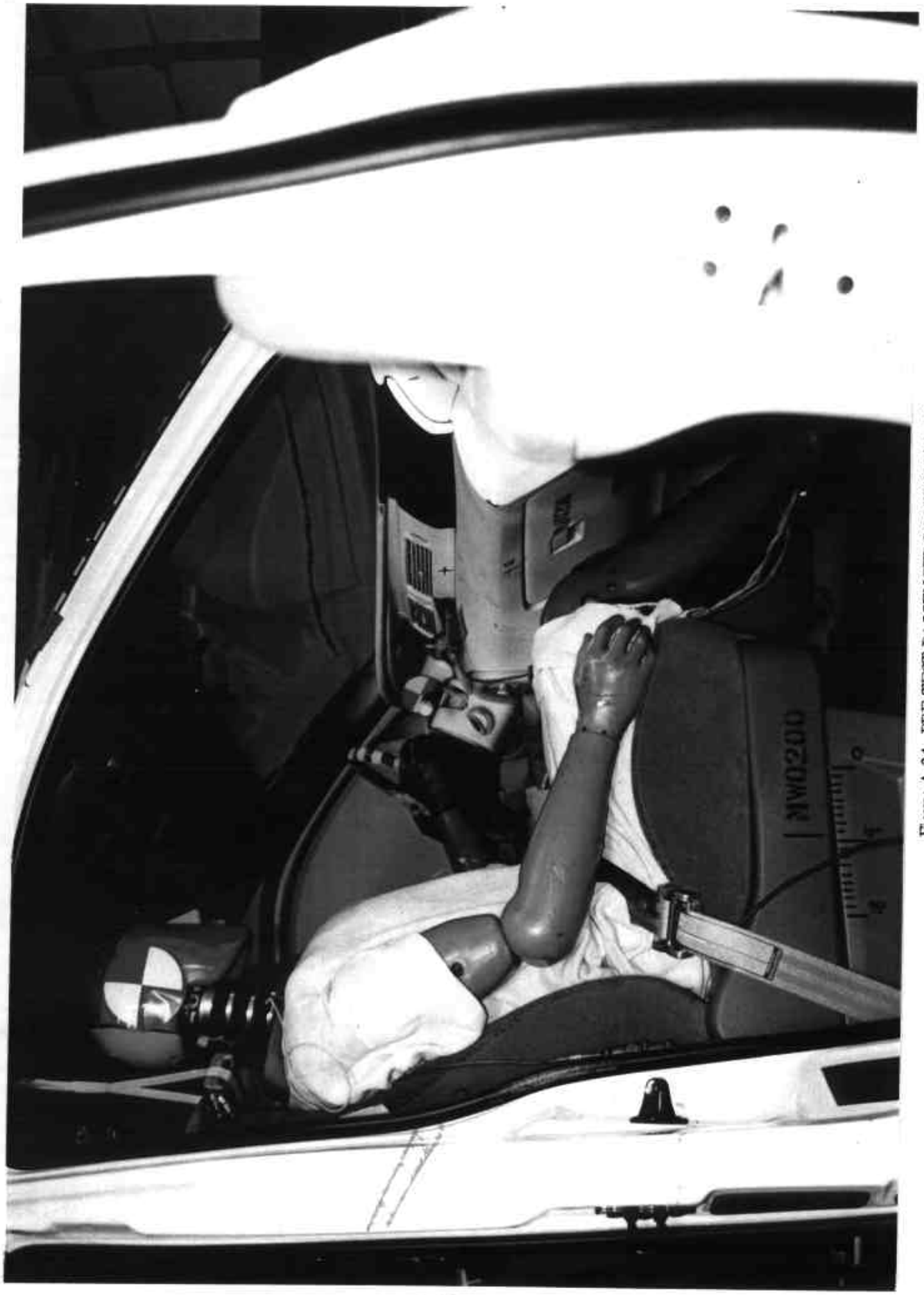

Figure A-24 PRE-TEST PASSENGER POSITION VIEW

Figure A-25 POST-TEST PASSENGER POSITION VIEW

Figure A-26 PRE-TEST DRIVER AND INTERIOR VIEW

Figure A-27 POST-TEST DRIVER AND INTERIOR VIEW

Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW

Figure A-29 POST-TEST PASSENGER AND INTERIOR VIEW

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Figure A-30 PRE-TEST DRIVER HEAD LOCATION

Figure A-31 POST-TEST DRIVER HEAD LOCATION

Figure A-32 PRE-TEST PASSENGER HEAD LOCATION

Figure A-33 POST-TEST PASSENGER HEAD LOCATION

Figure A-34 PRE-TEST DRIVER FLOOR PAN VIEW

Figure A-35 POST-TEST DRIVER FLOOR PAN VIEW

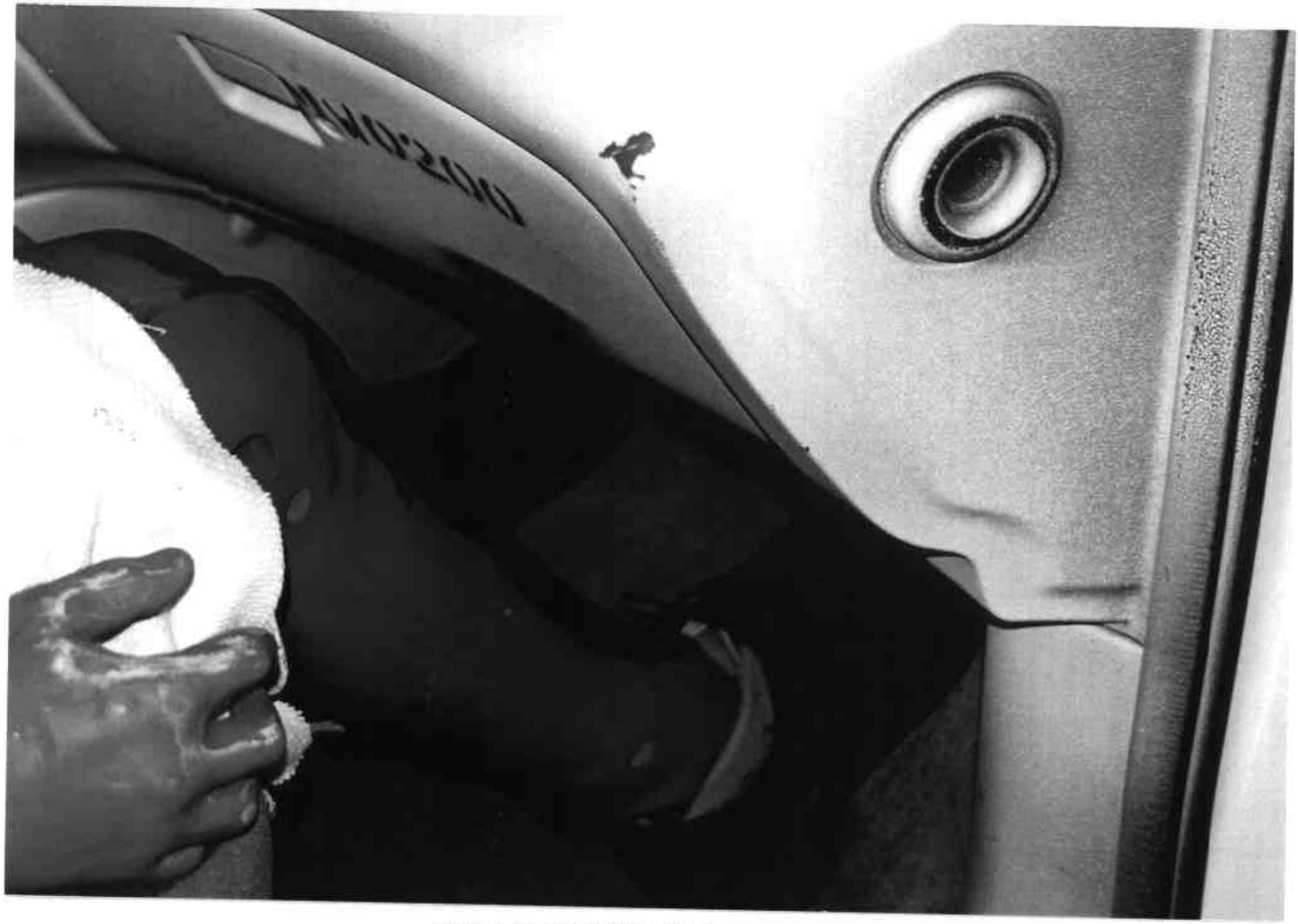


Figure A-36 PRE-TEST PASSENGER FLOOR PAN VIEW

Figure A-37 POST-TEST PASSENGER FLOOR PAN VIEW

Figure A-38 ROLLOVER VIEW

Figure A-39 IMPACT VIEW

Appendix B

DUMMY, VEHICLE AND LOAD CELL BARRIER RESPONSE DATA

Hybrid III Dummy Sign Conventions
Load Cells and Special Transducers

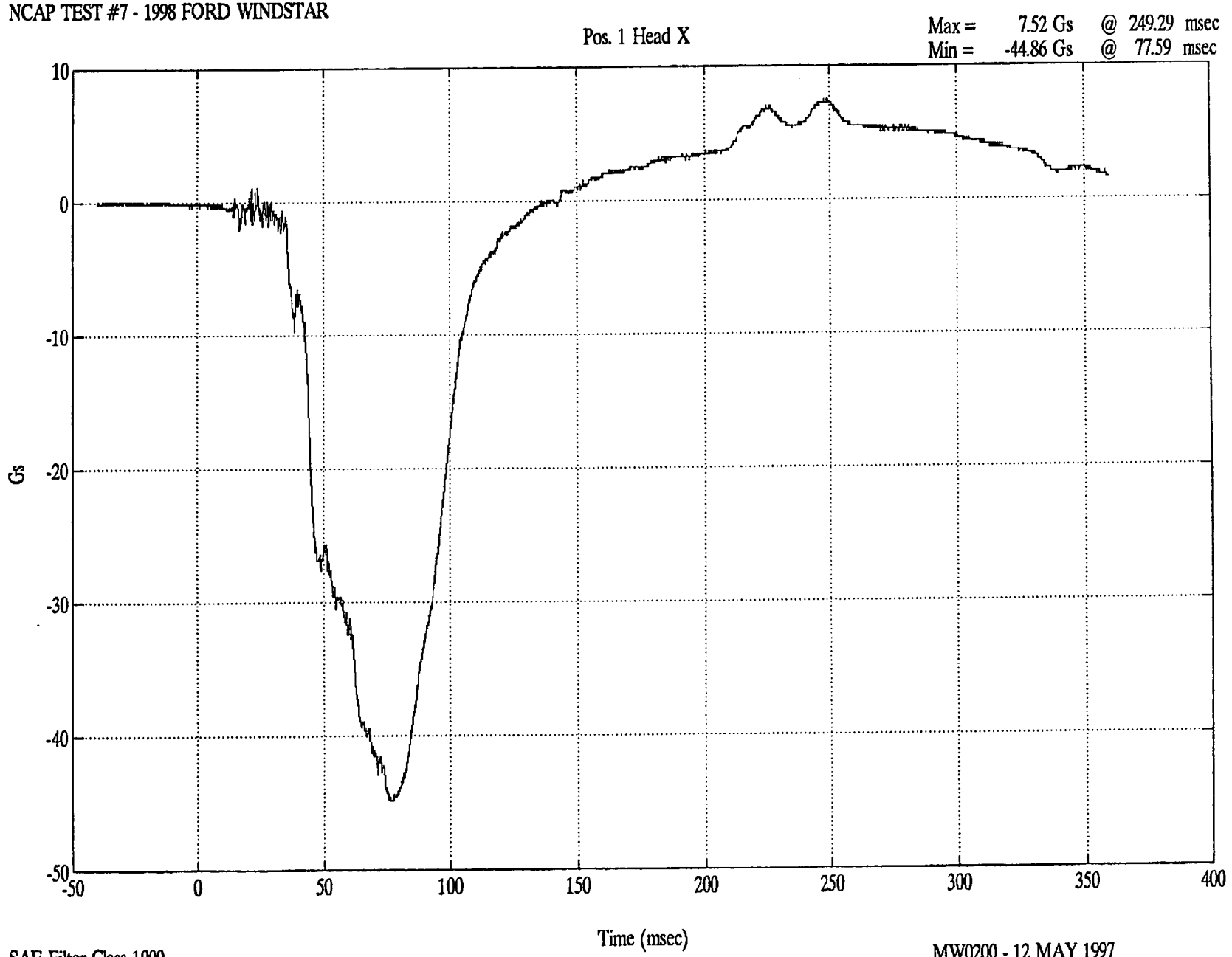
Transducer	DOT/NHTSA Sign Convention (positive unless noted)
Upper Neck Load Cell	Fx Head forward Fy Head left Fz Neck in tension Mx Right ear to right shoulder My Chin to chest (flexion) Mz Chin to left shoulder (look left)
Chest Displacement Potentiometer	Compression is negative
Pelvic Load Cell (Lower Lumbar)	Fx Chest forward Fy Chest left Fz Spine in tension
Femur Load Cell	Compression is negative
Upper Tibia Load Cell (right and left leg)	Mx Support tibia, load right side center My Support tibia, load front (shin) center
Lower Tibia Load Cell (right and left leg)	Fy Foot right w/r to left Fz Tibia in tension Mx Support tibia, press right side center

NHTSA TEST NO. MW0200

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

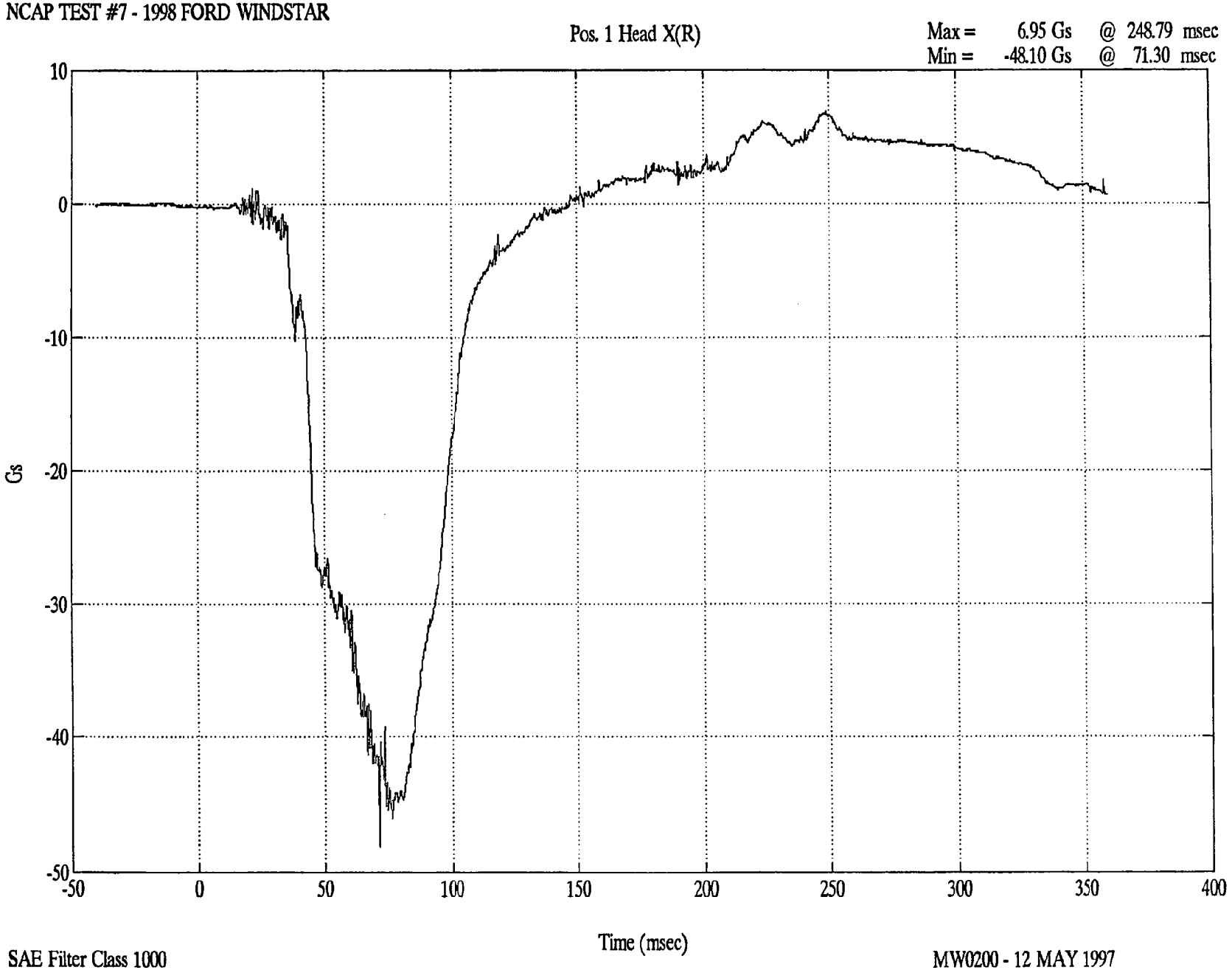
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 1000

MW0200 - 12 MAY 1997

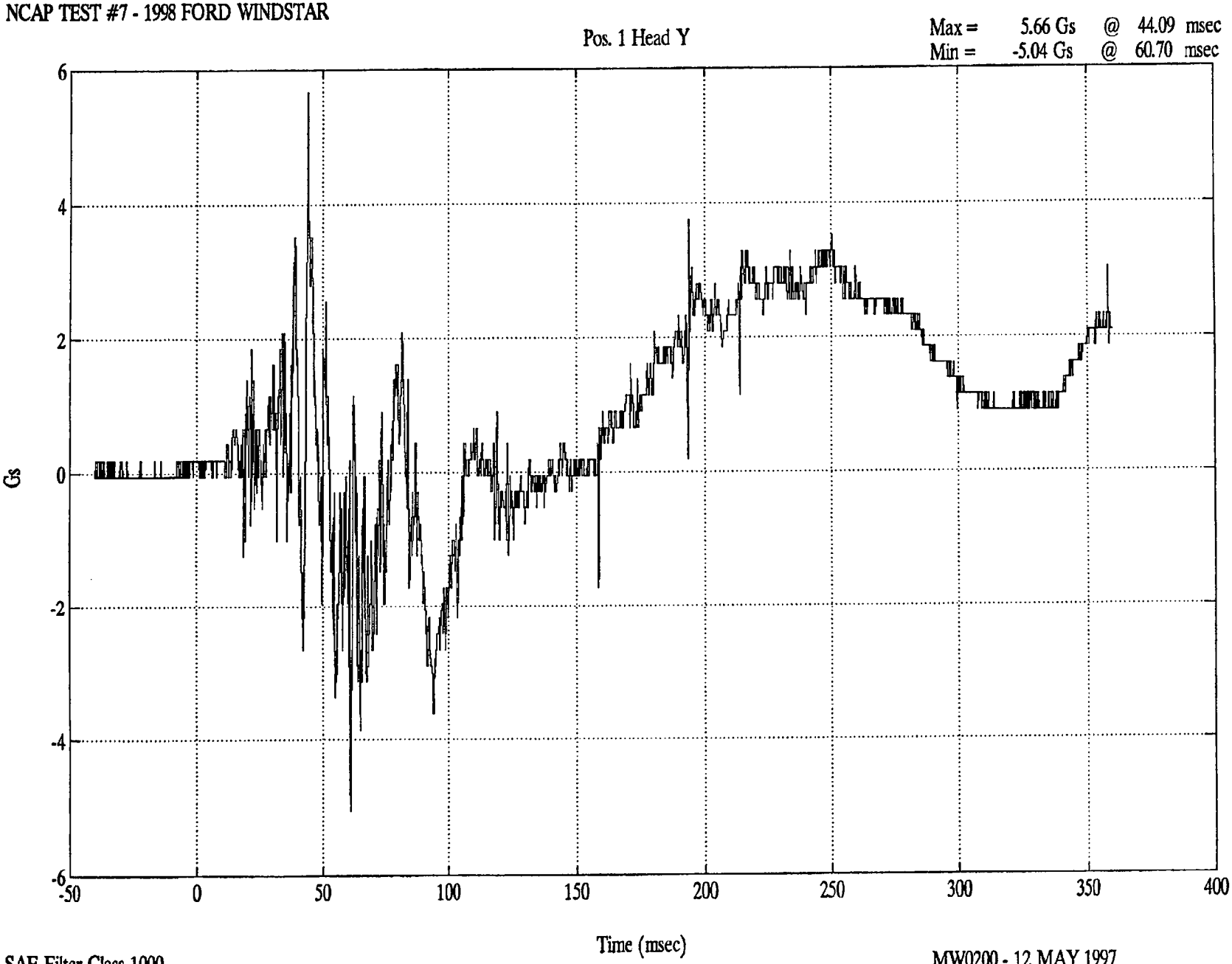
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 1000

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 1000

MW0200 - 12 MAY 1997

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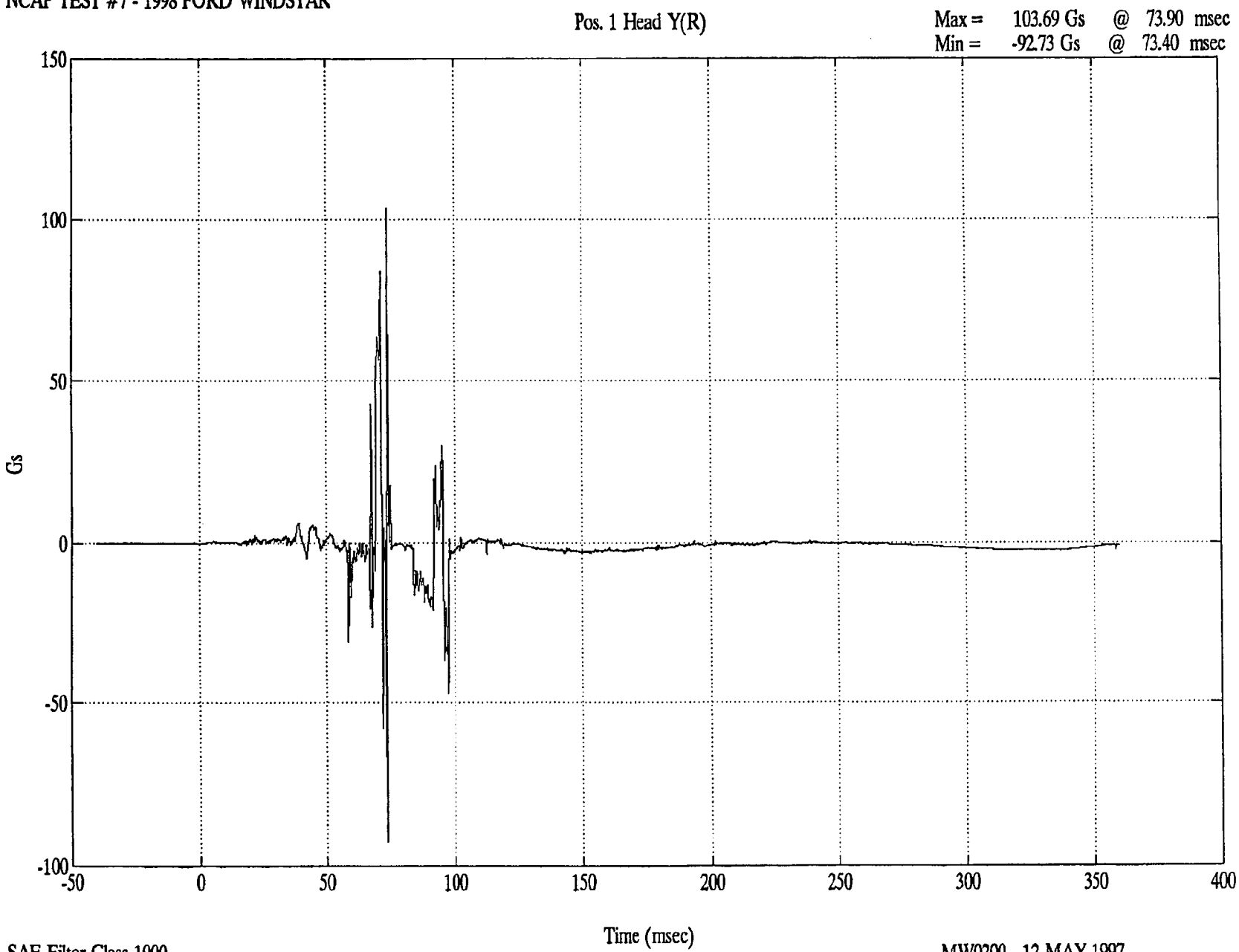
NCAP TEST #7 - 1998 FORD WINDSTAR



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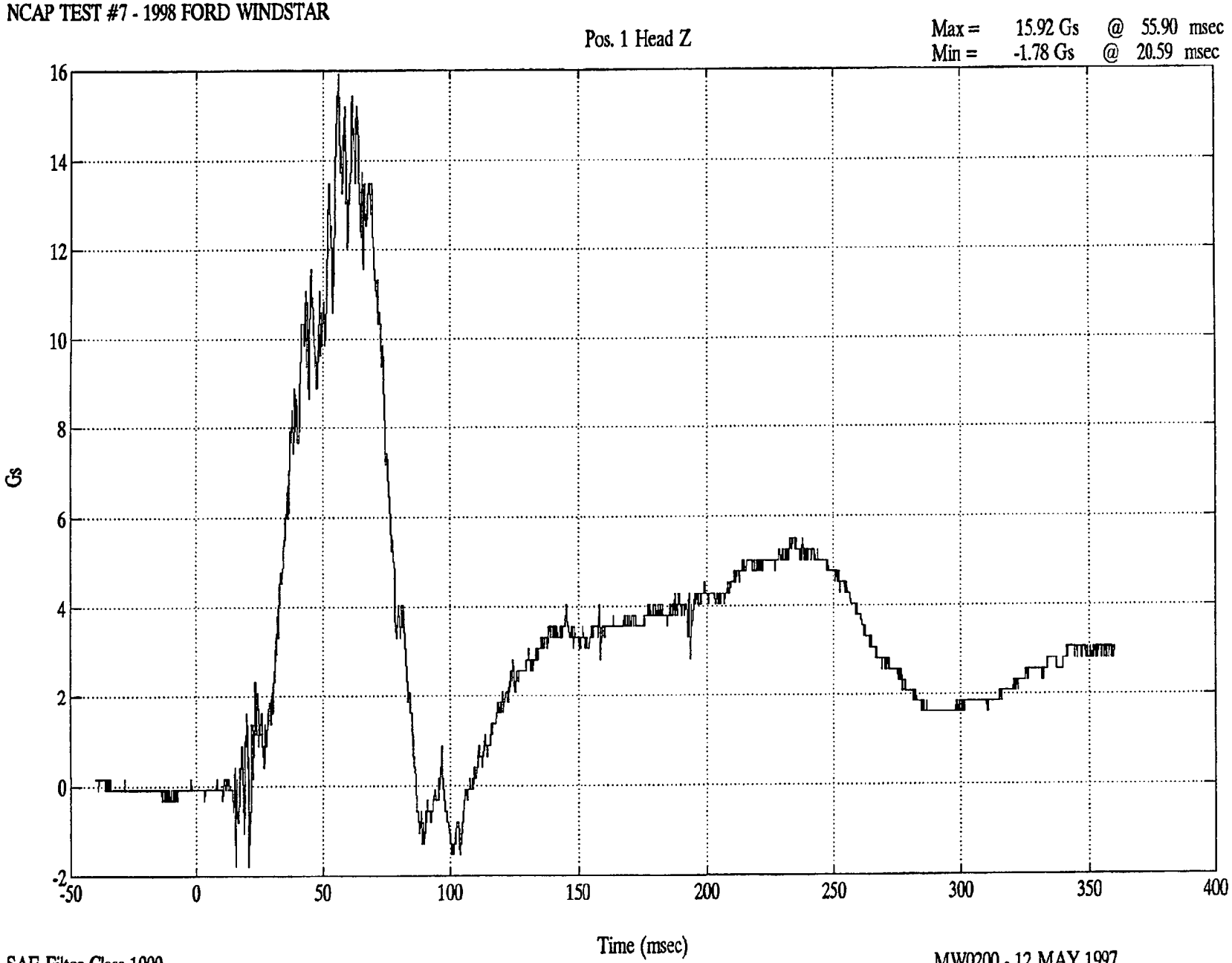
8406-7

SAE Filter Class 1000

MW0200 - 12 MAY 1997

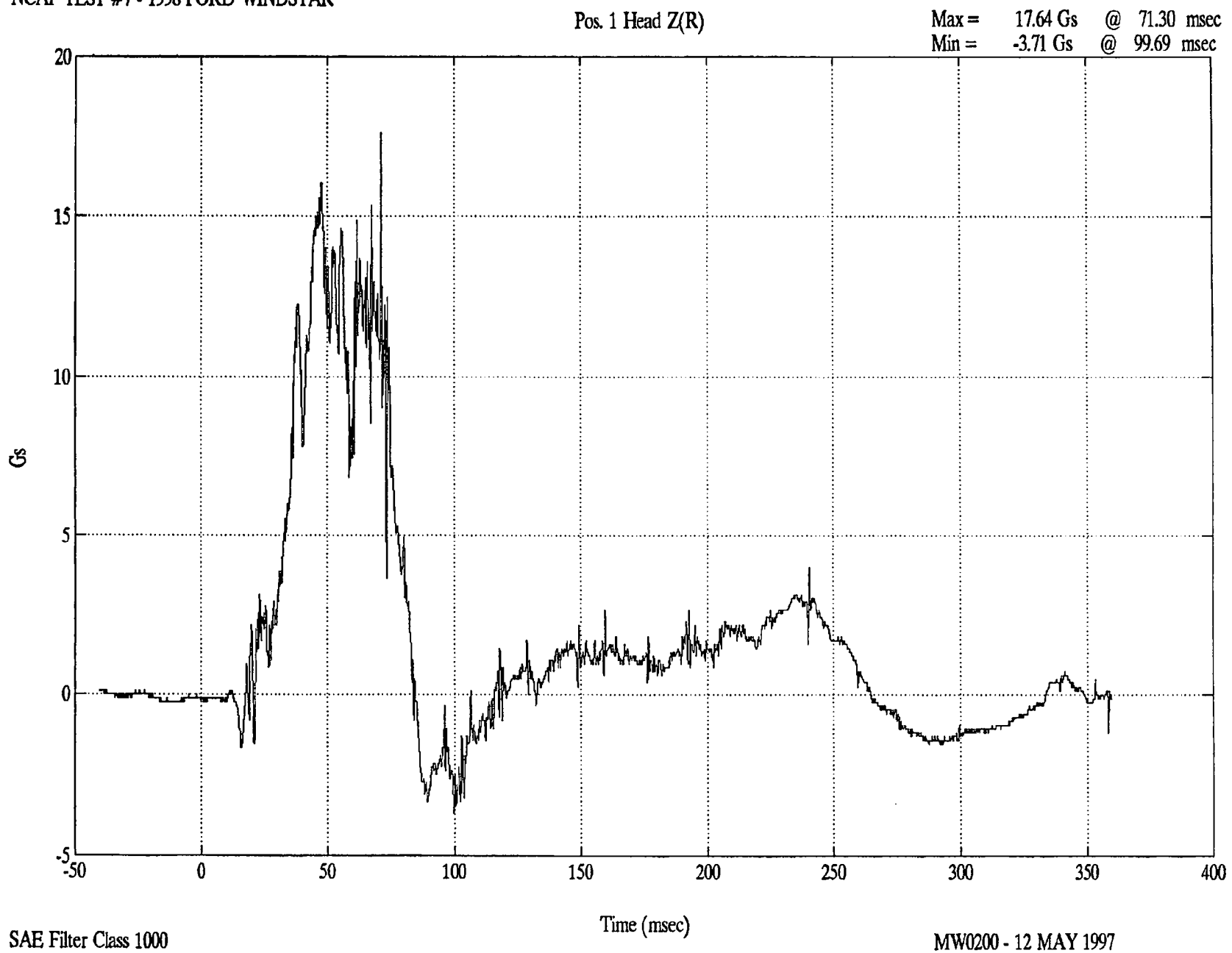
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 1000

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

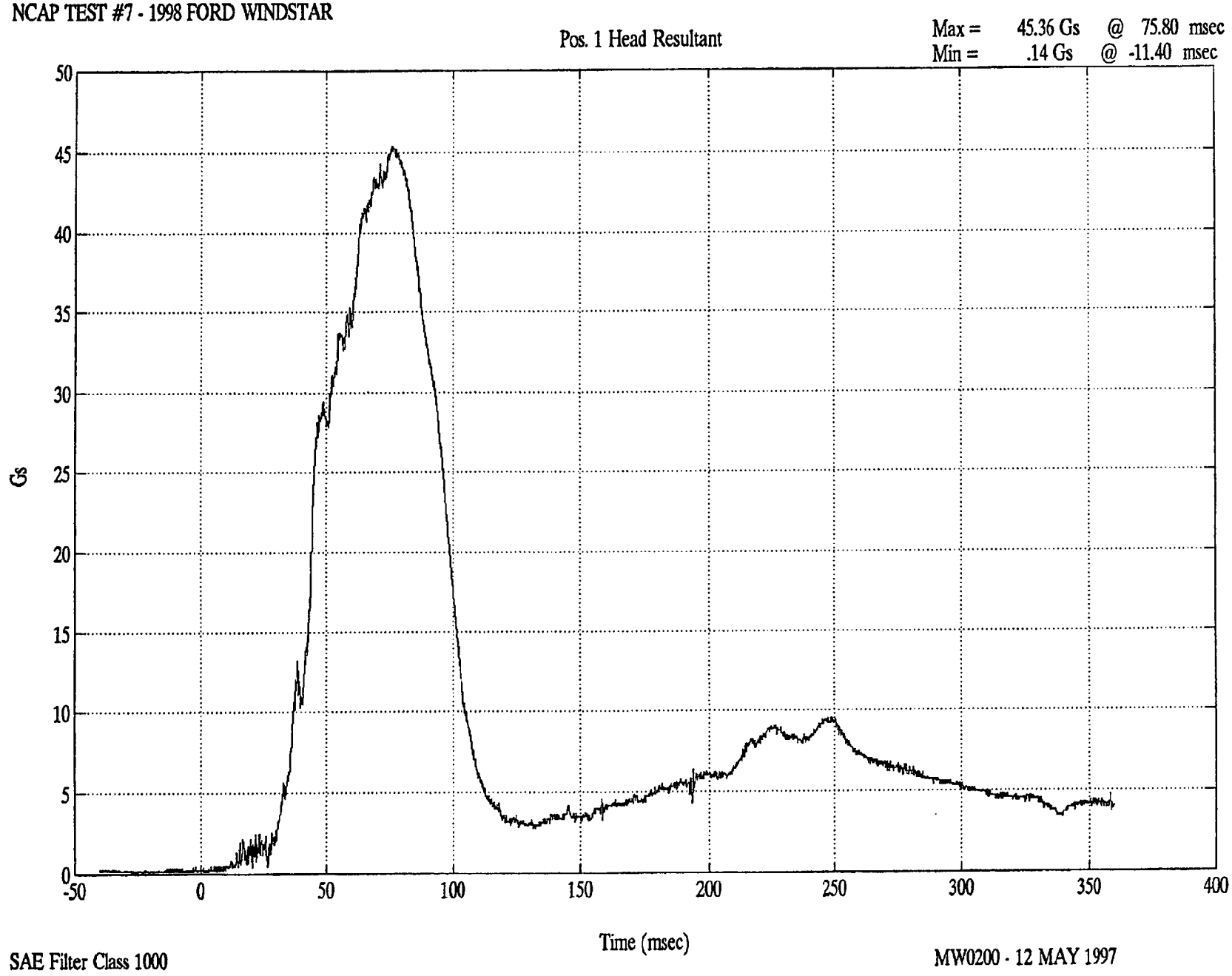


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 1000

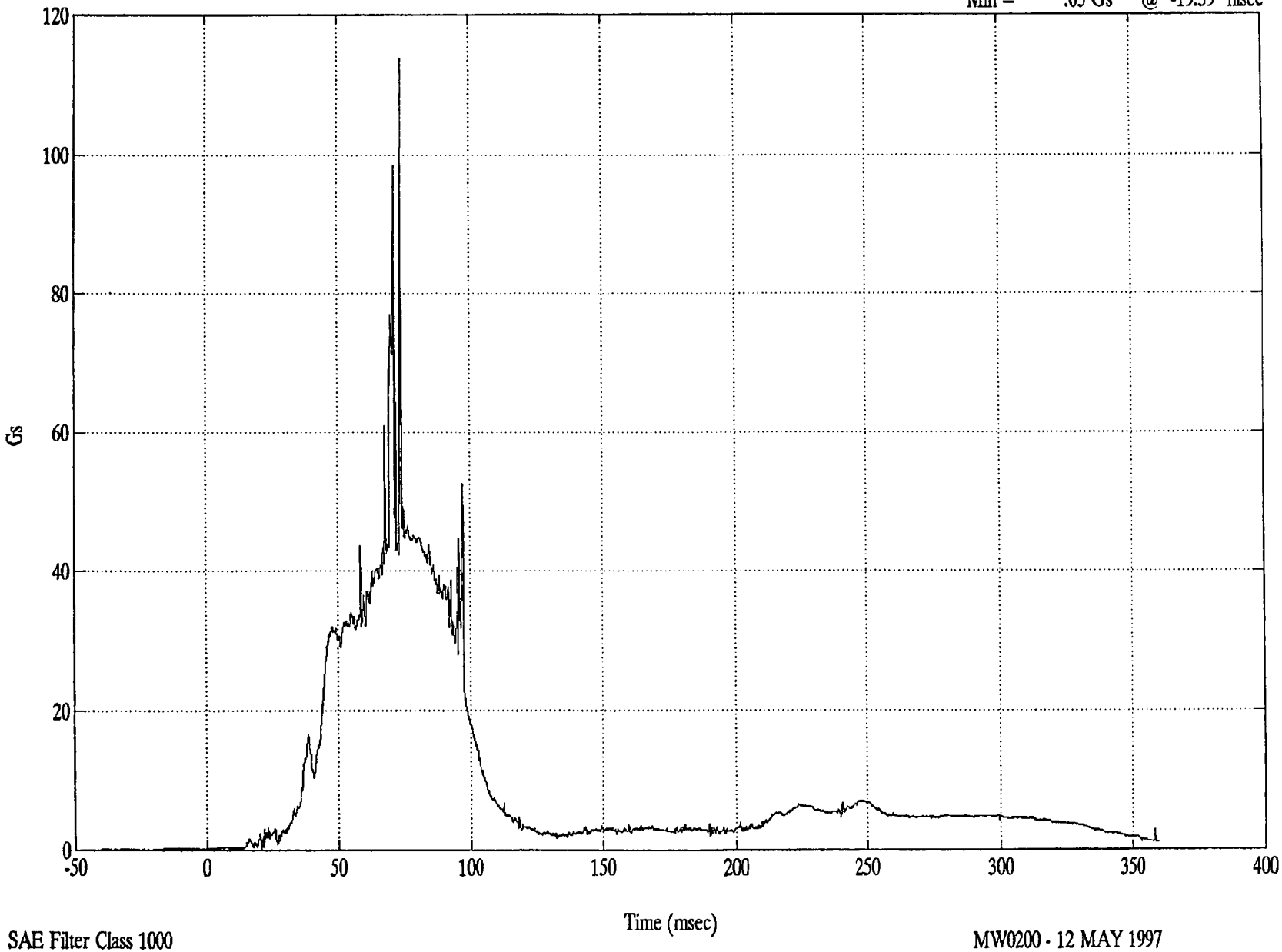
MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

Pos. 1 Head Resultant(RR)

Max = 113.70 Gs @ 73.90 msec
Min = .05 Gs @ -19.39 msec



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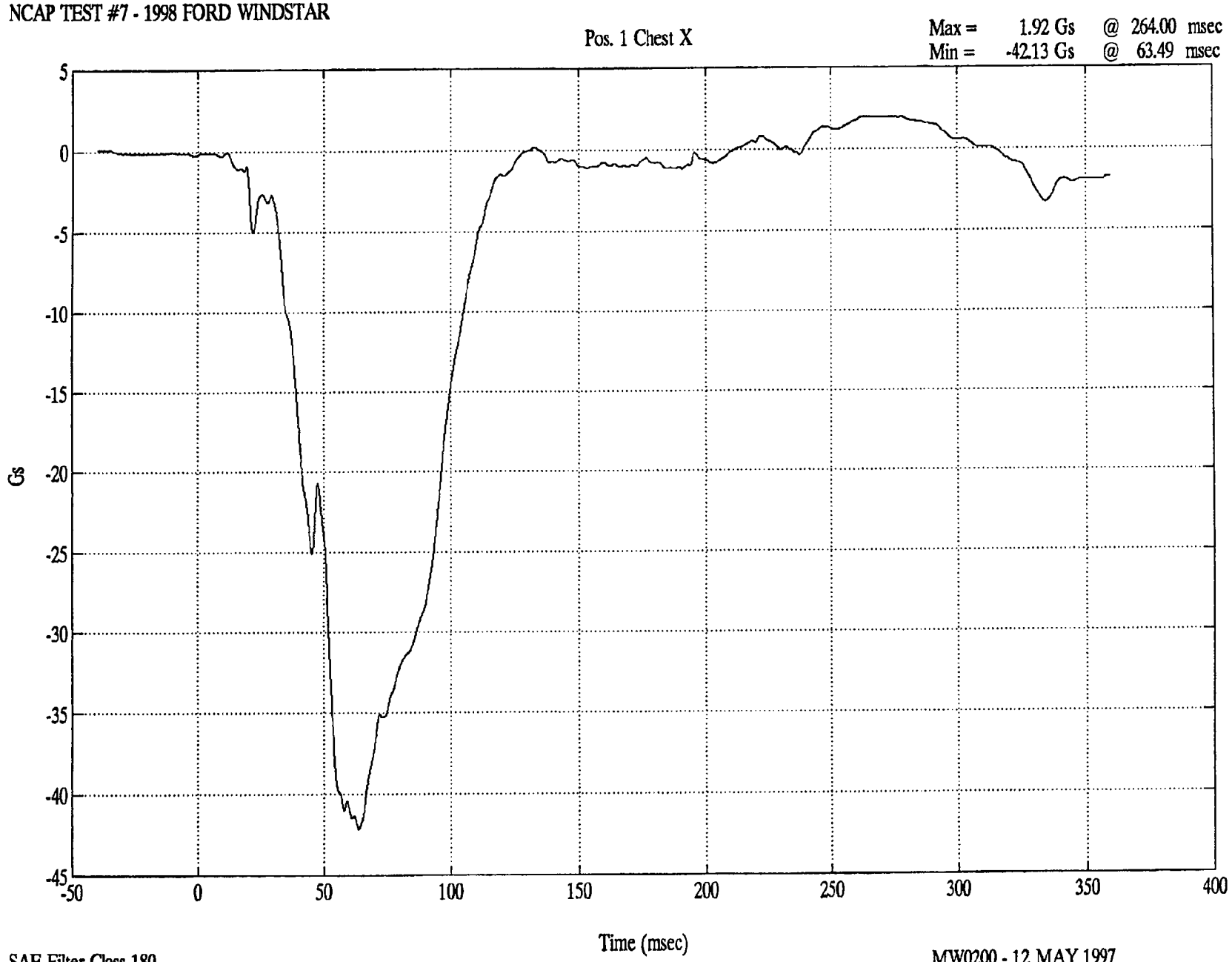
8406-7

SAE Filter Class 1000

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

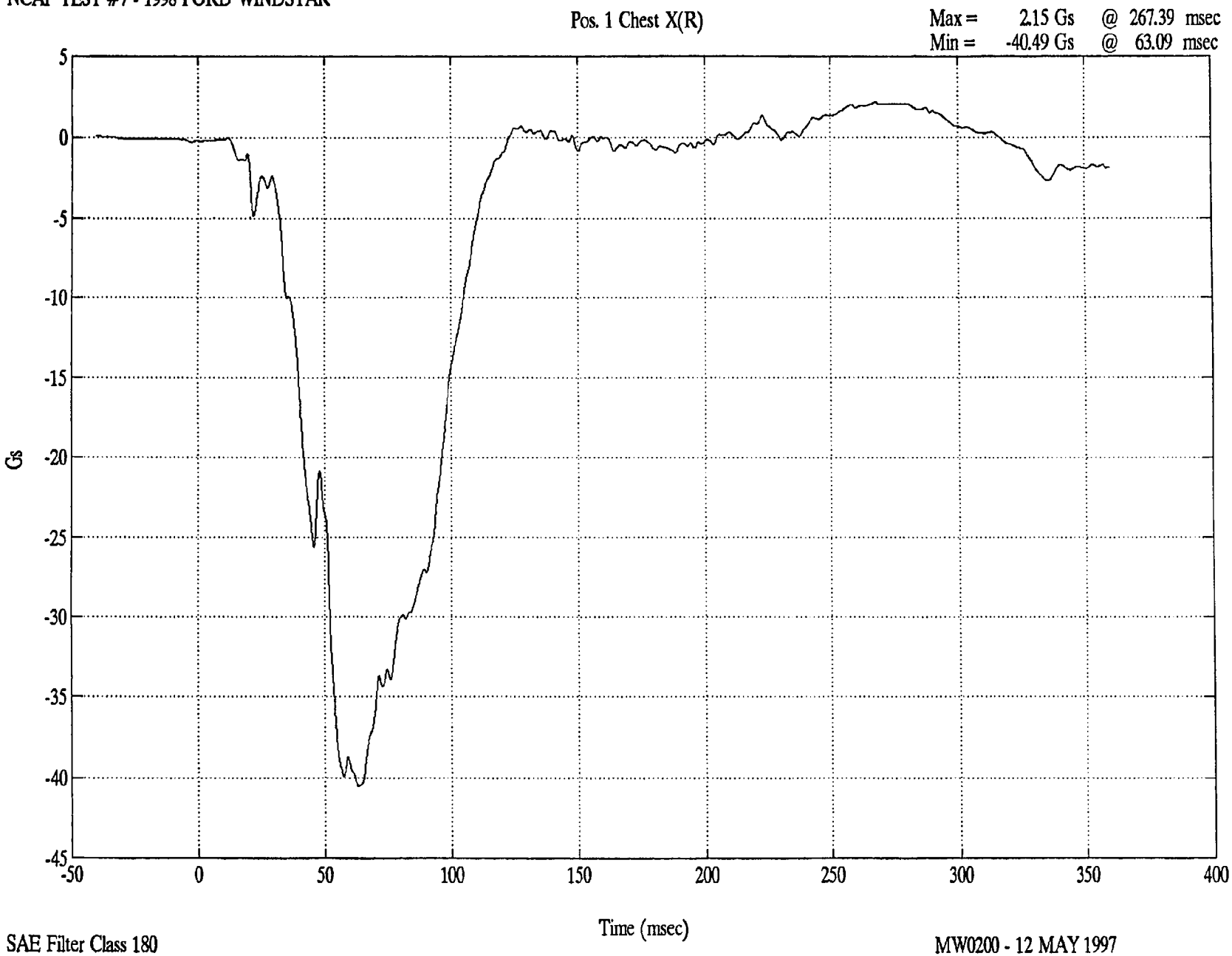


SAE Filter Class 180

MW0200 - 12 MAY 1997

8406-7

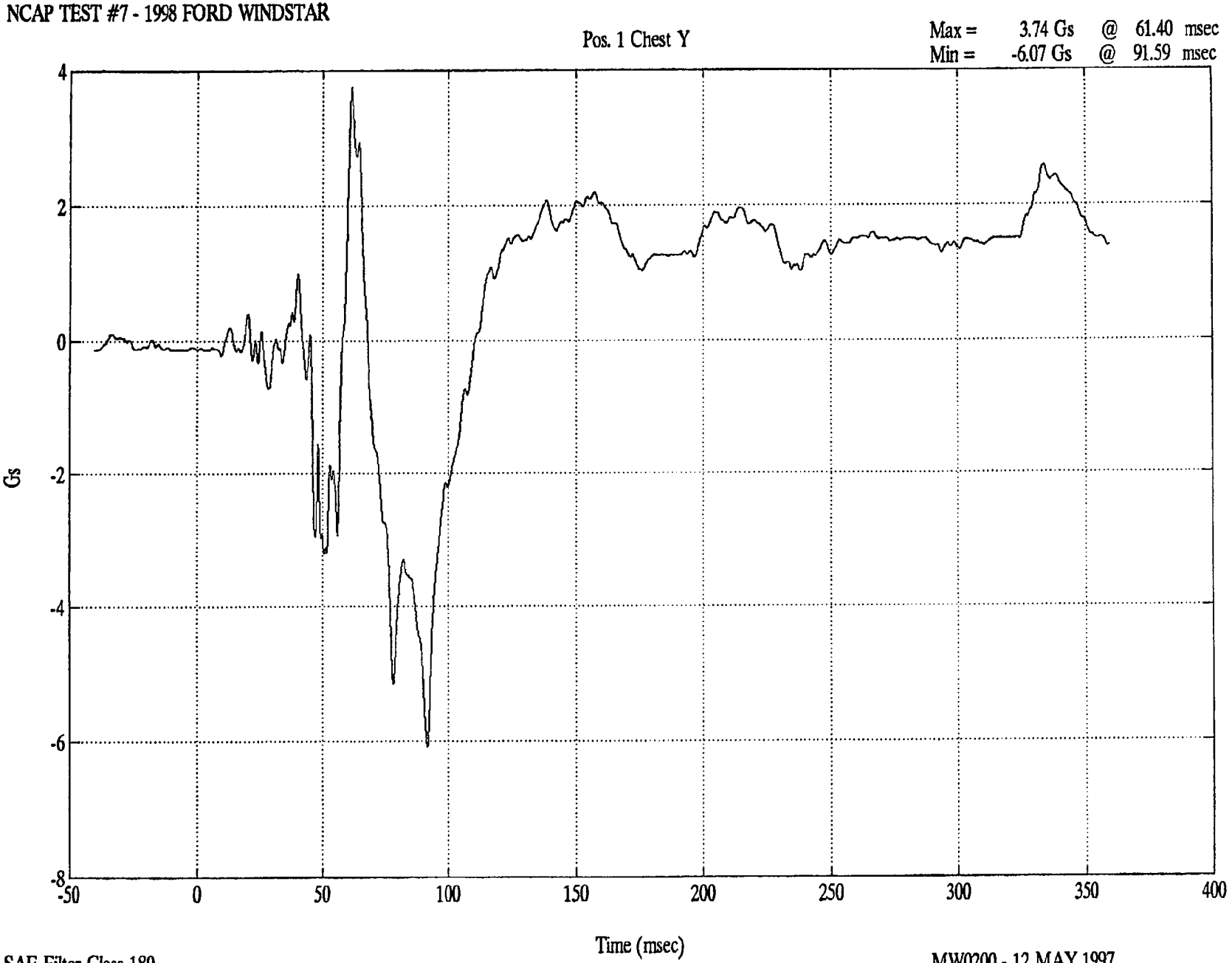
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 180

MW0200 - 12 MAY 1997

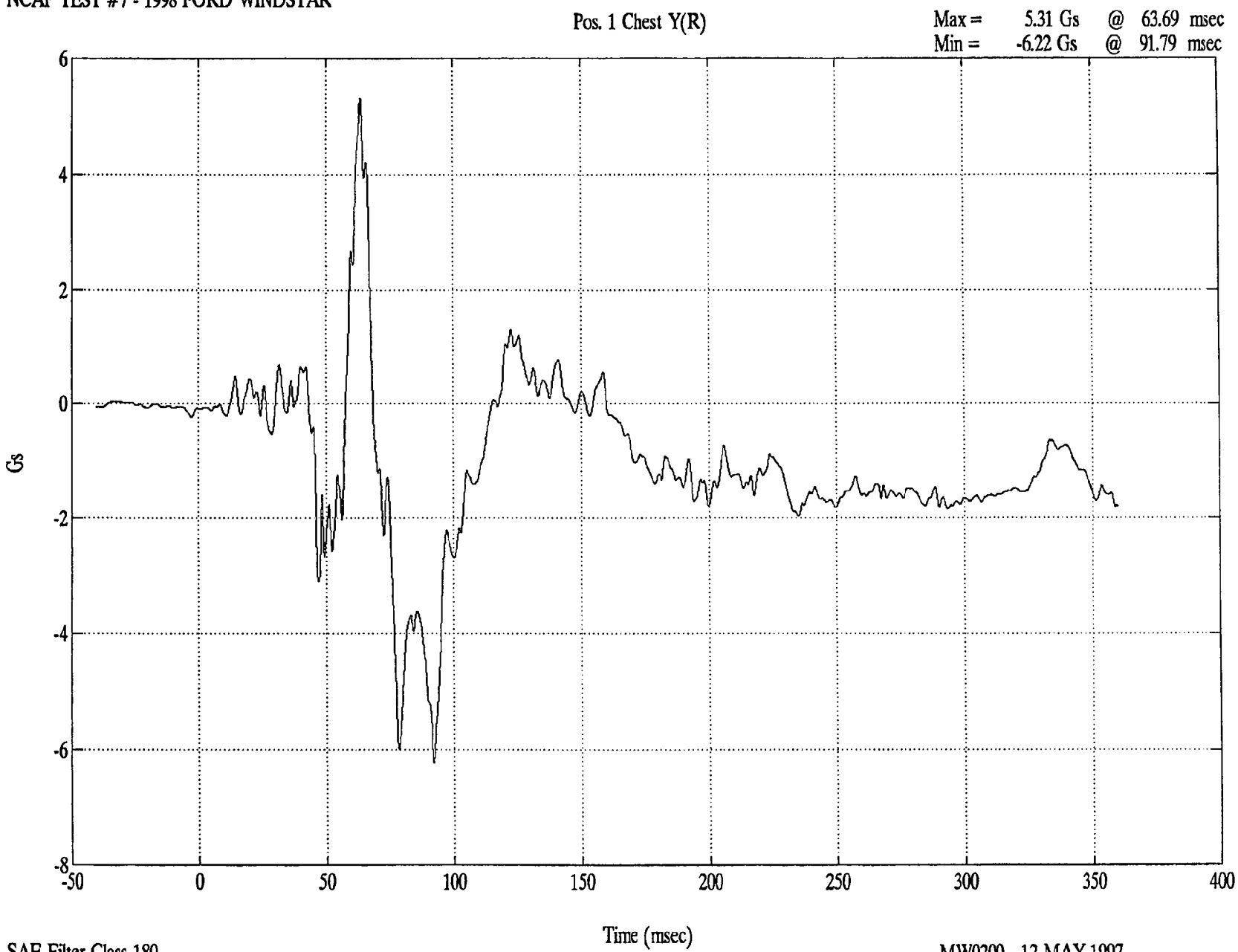
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



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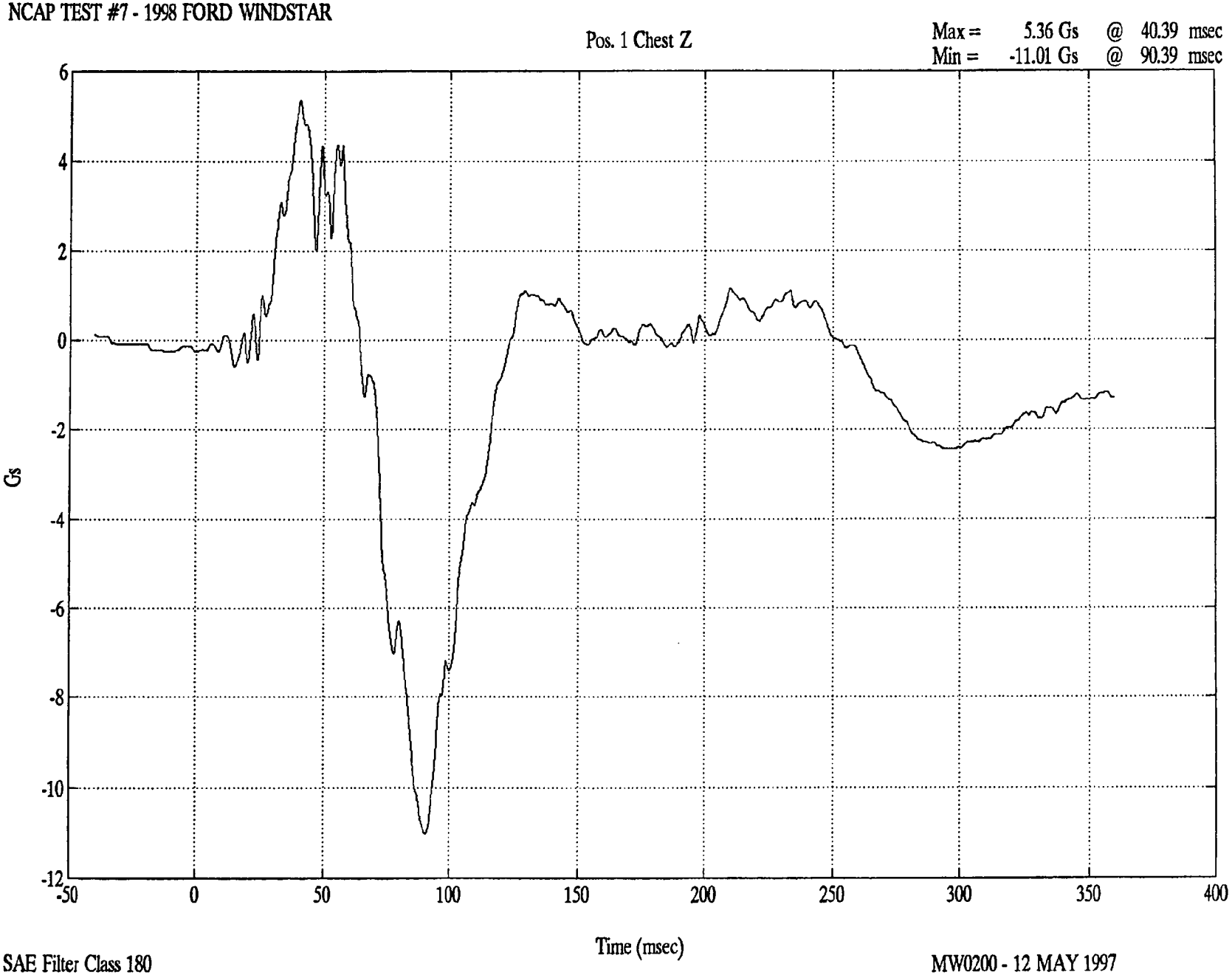
8406-7

SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

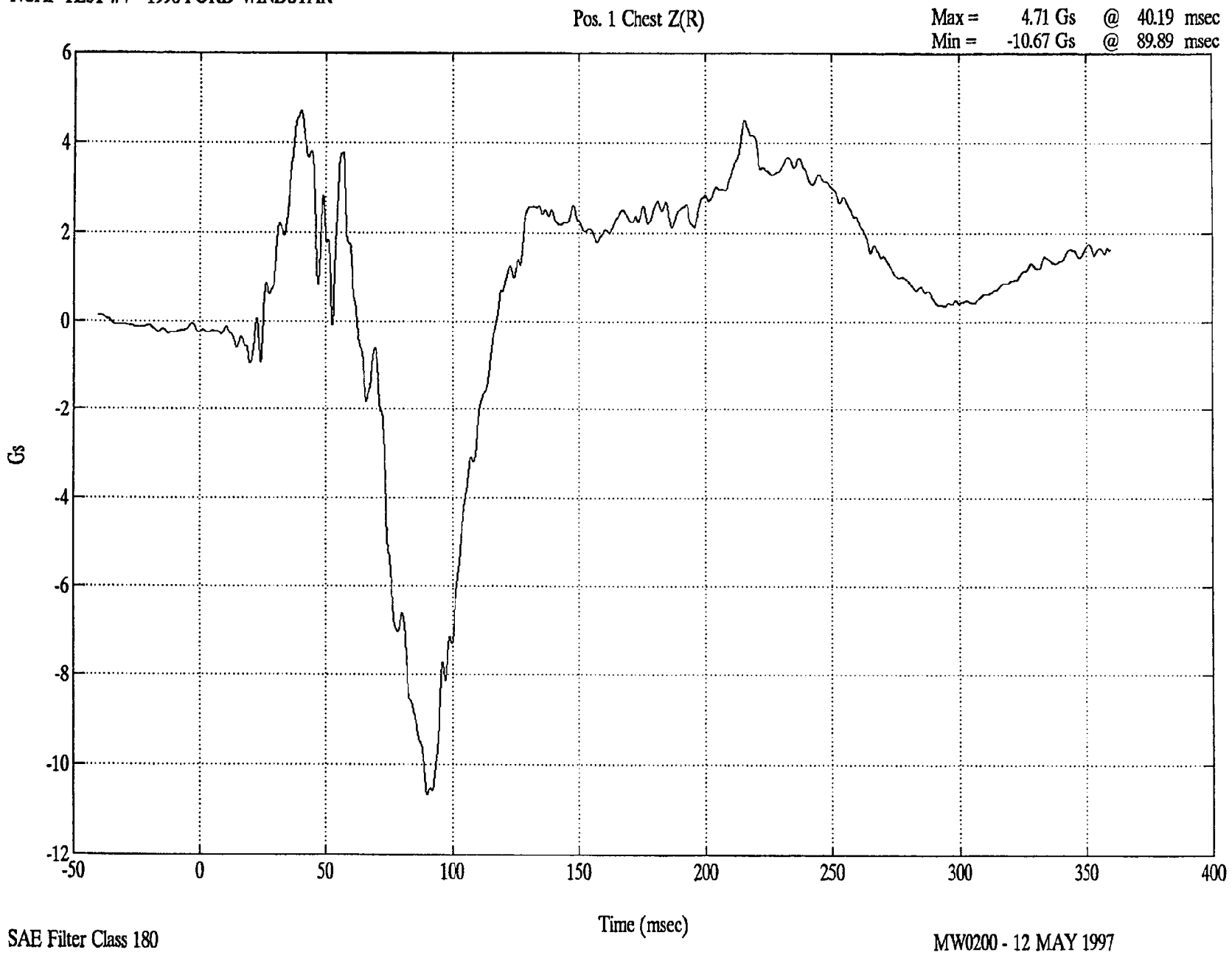


SAE Filter Class 180

MW0200 - 12 MAY 1997

8406-7

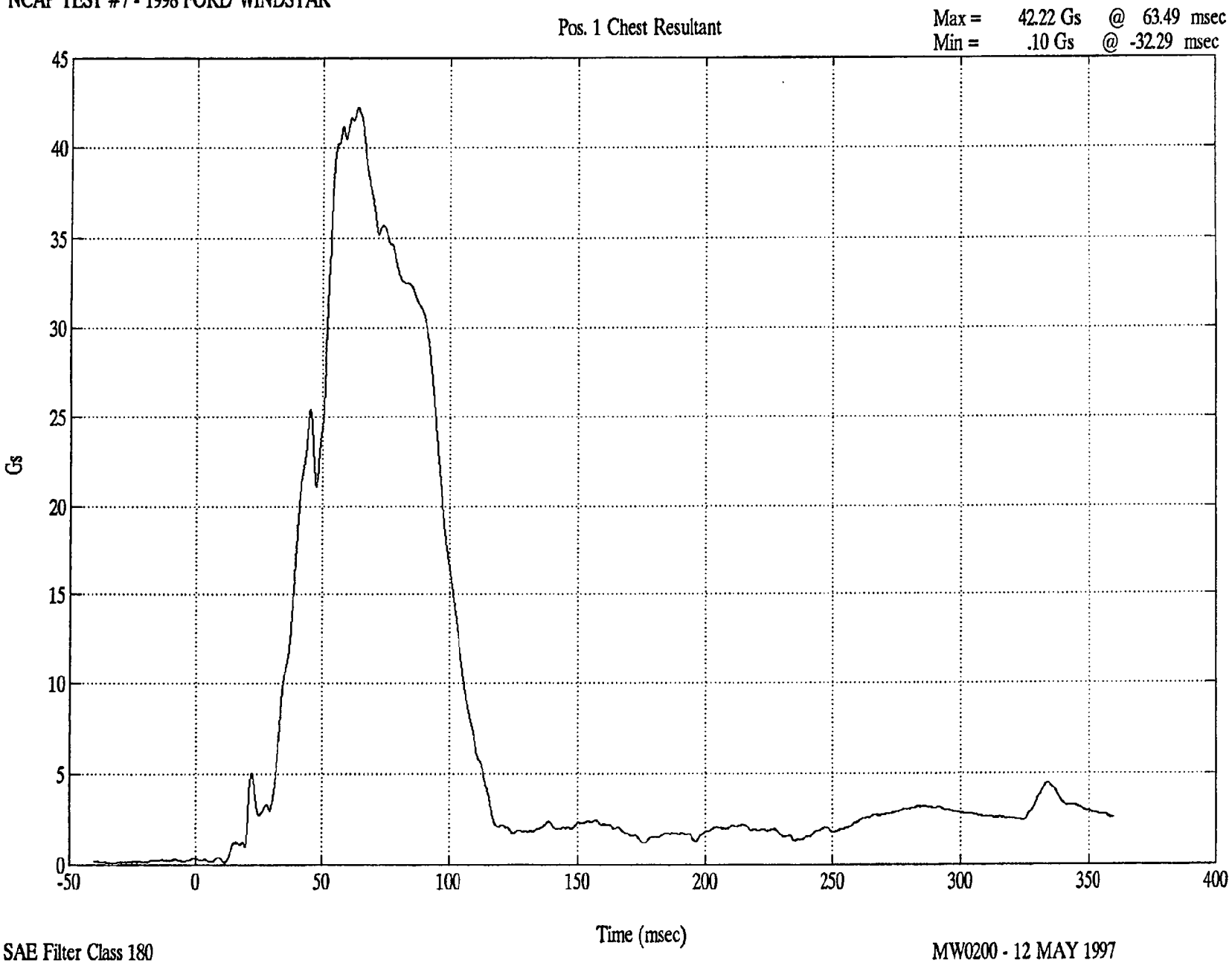
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



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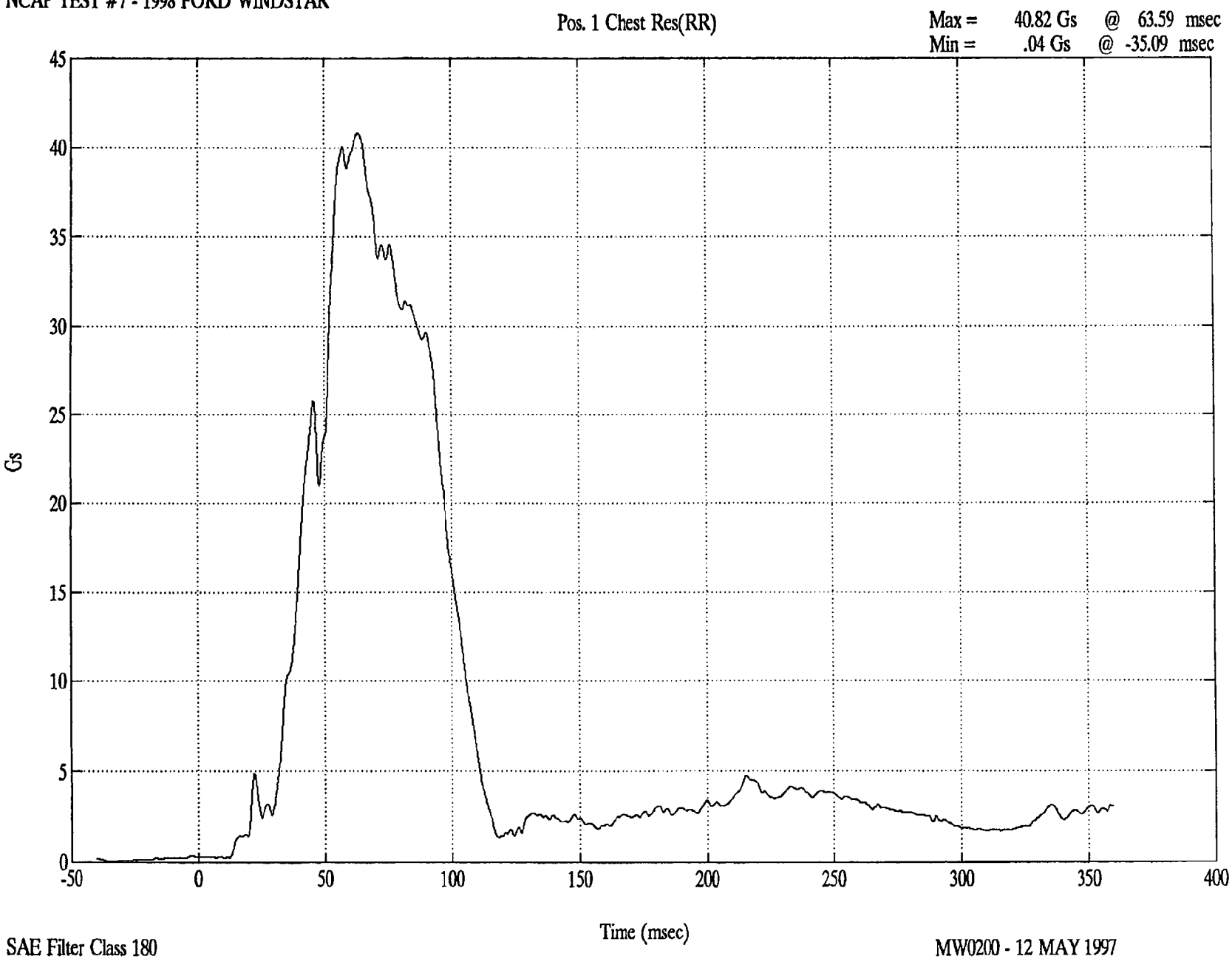
SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

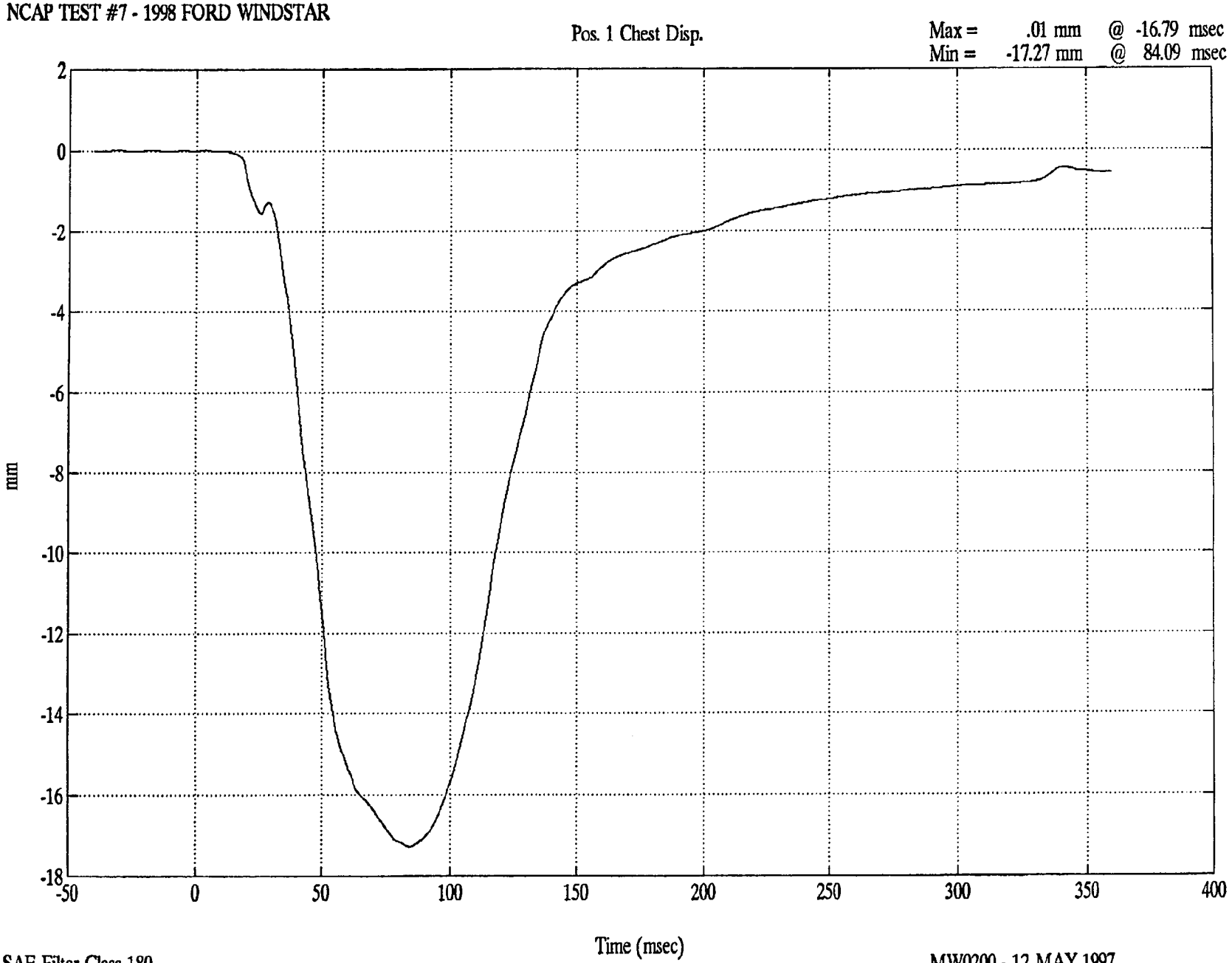


SAE Filter Class 180

MW0200 - 12 MAY 1997

8406-7

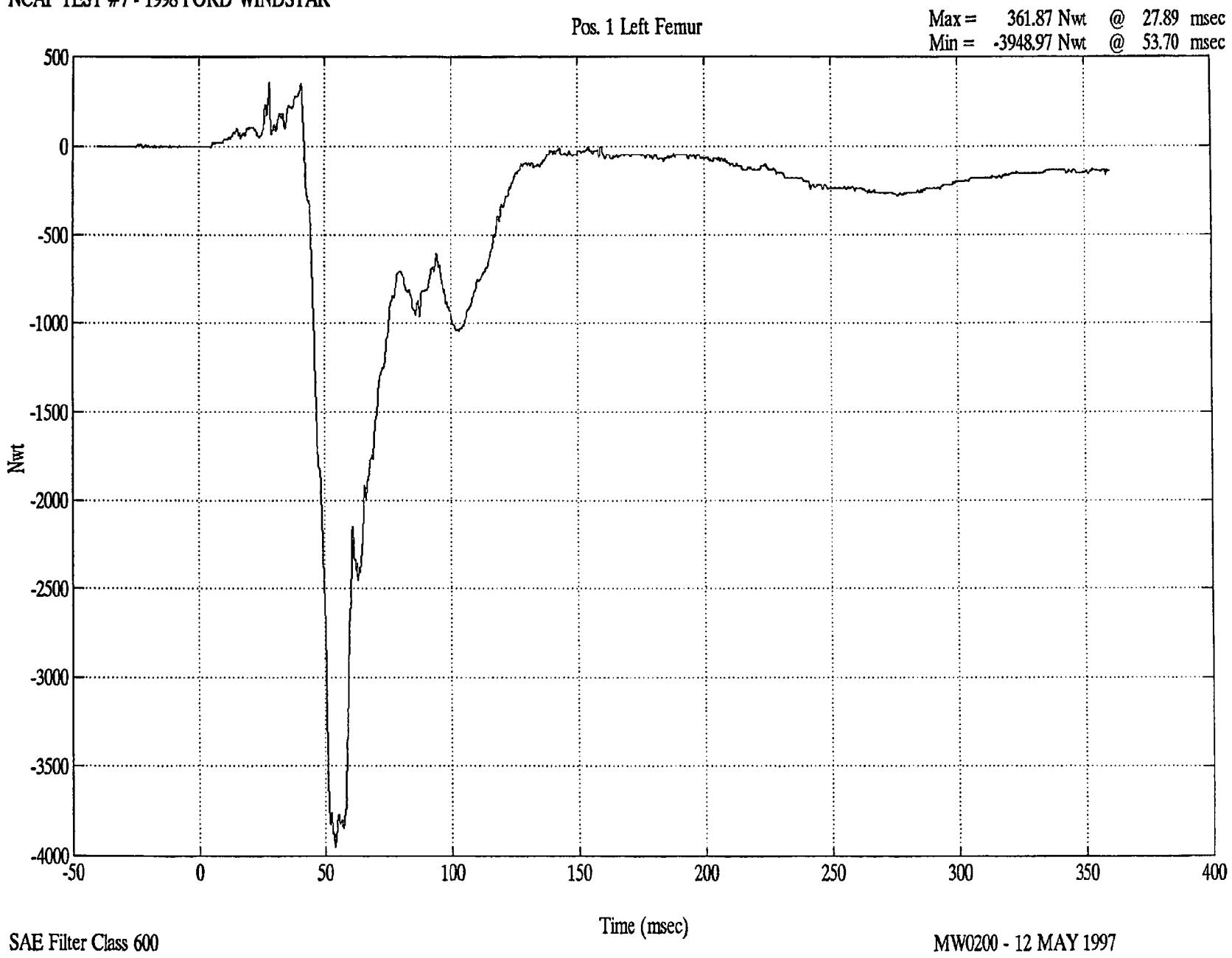
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 600

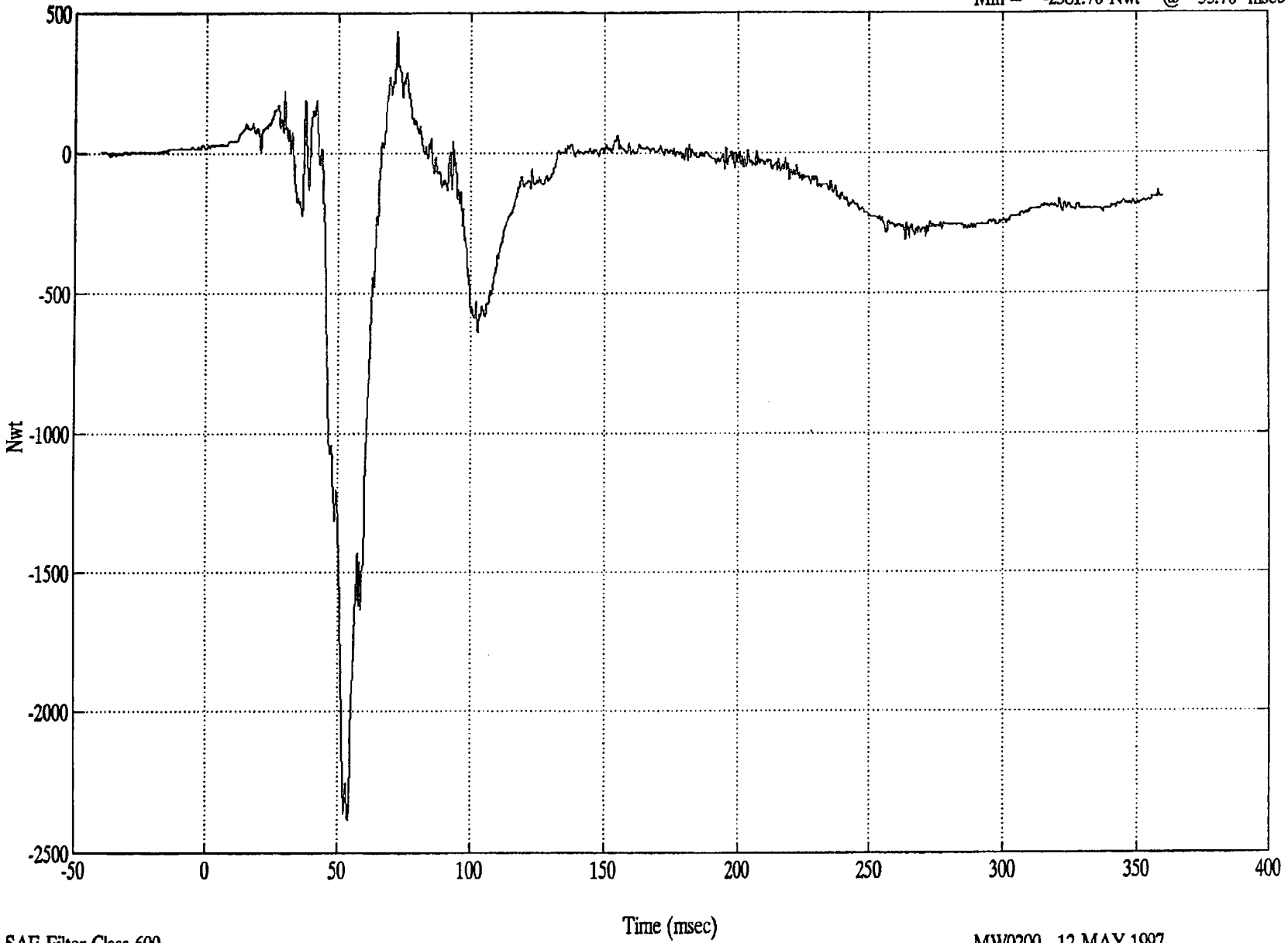
MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

Pos. 1 Right Femur

Max = 433.02 Nwt @ 72.09 msec
Min = -2381.70 Nwt @ 53.70 msec



SAE Filter Class 600

MW0200 - 12 MAY 1997

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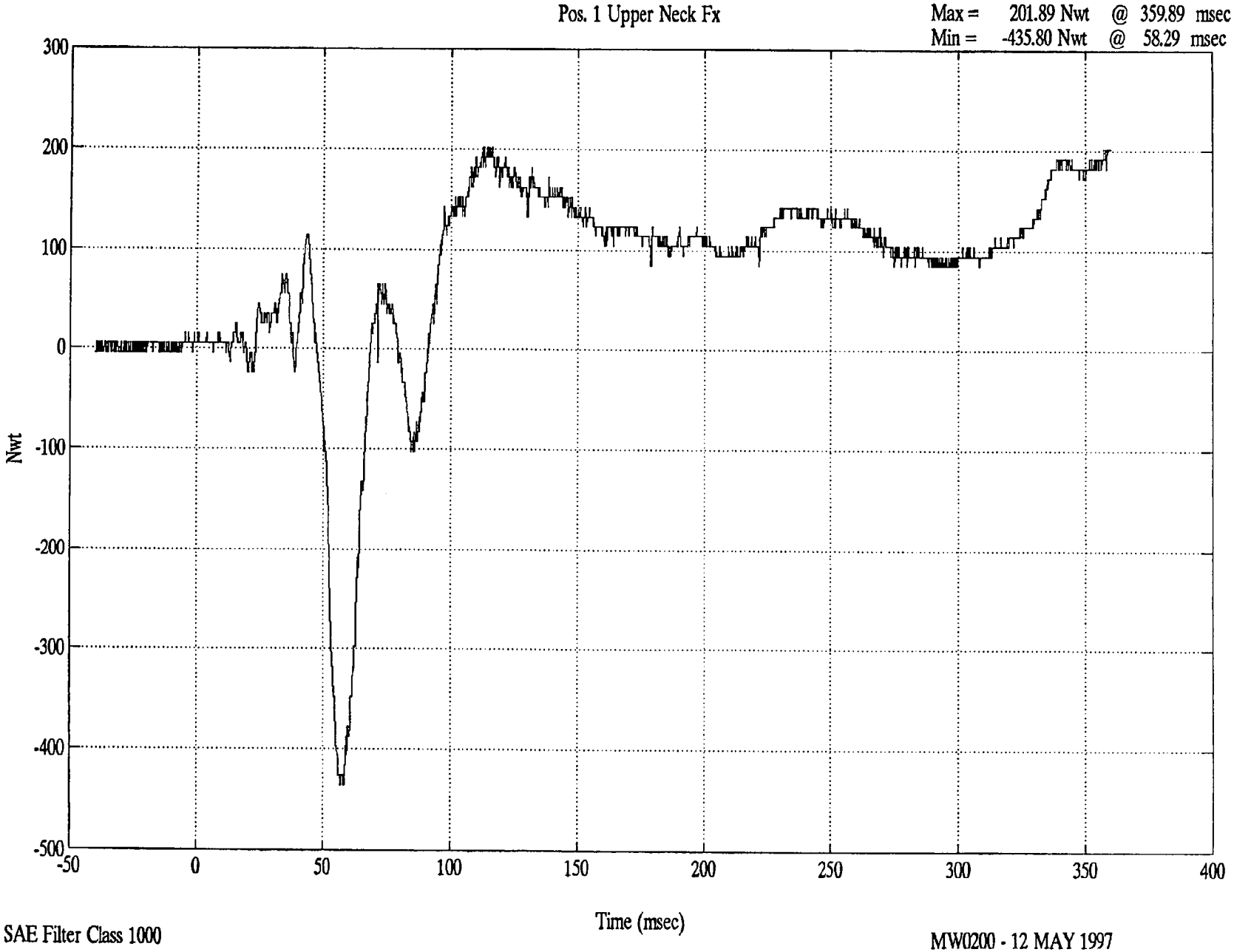
8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

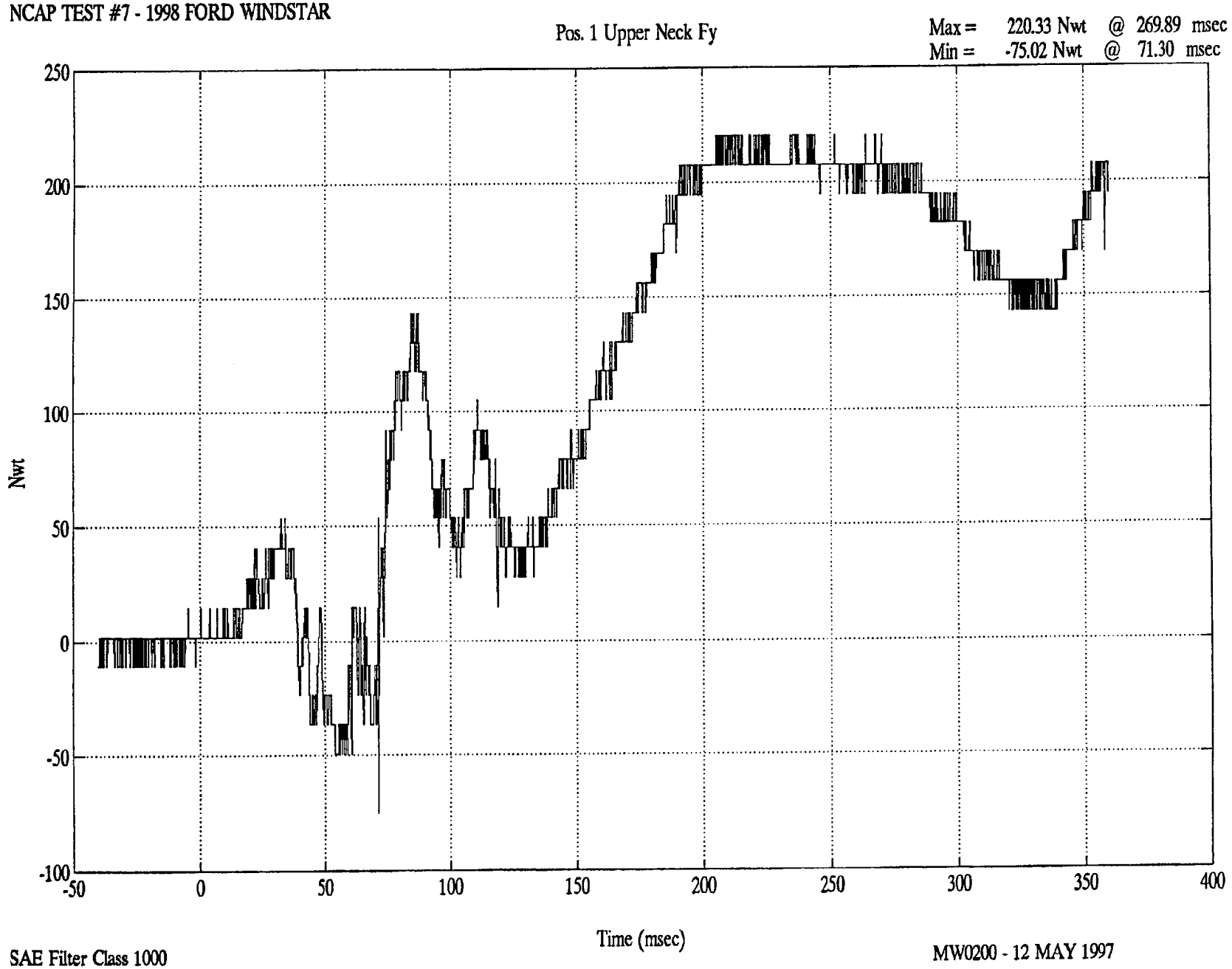


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

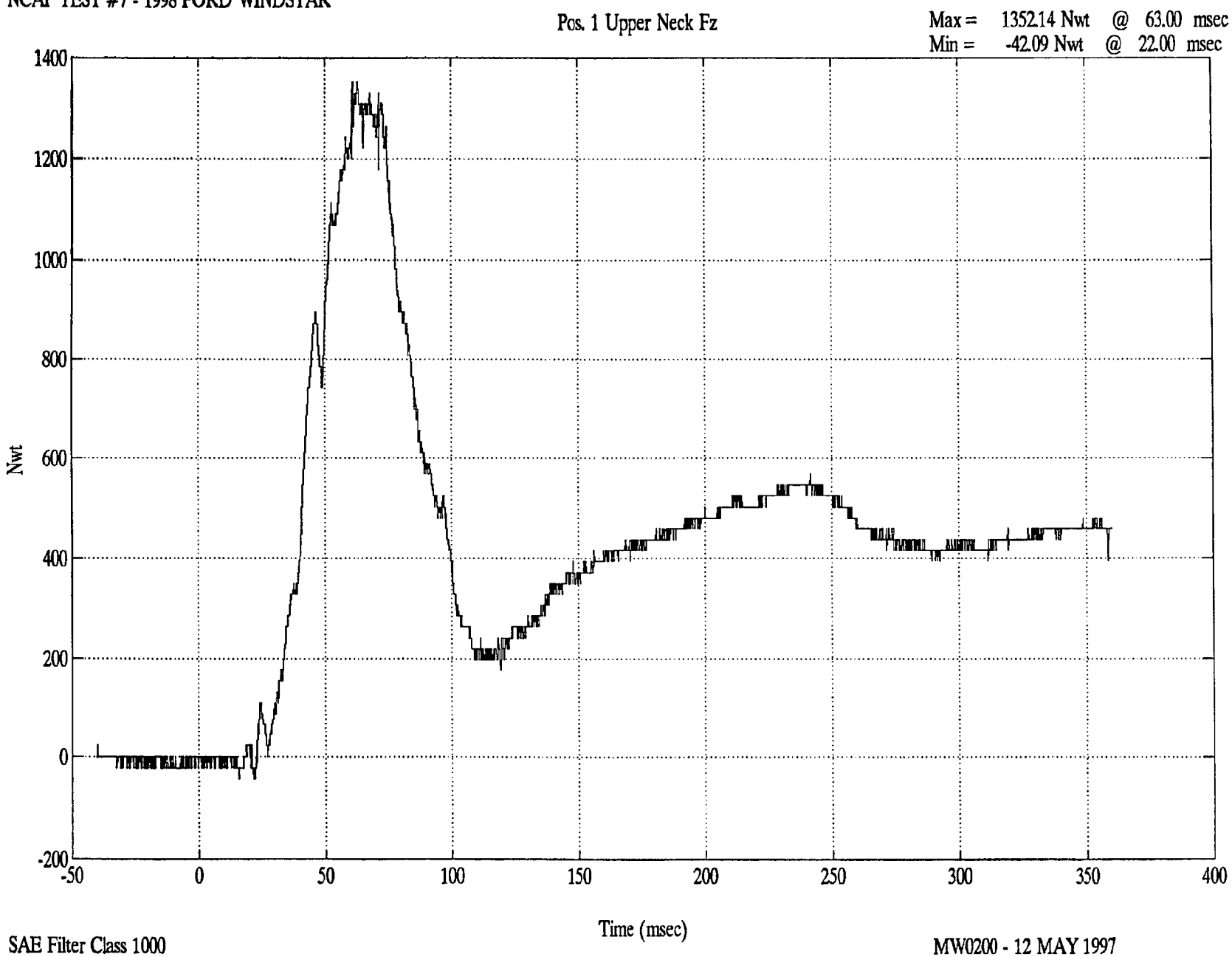
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 1000

MW0200 - 12 MAY 1997

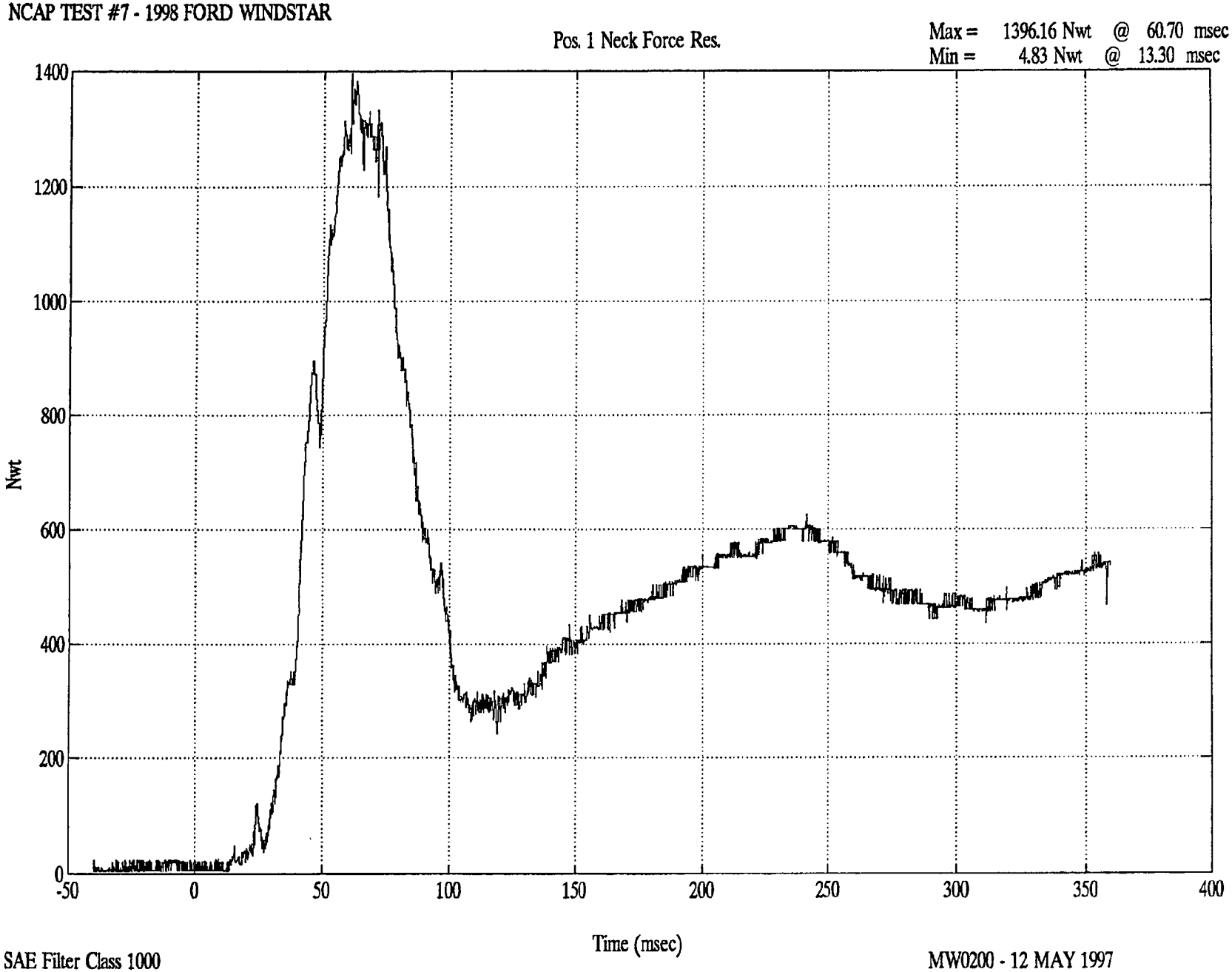
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 1000

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

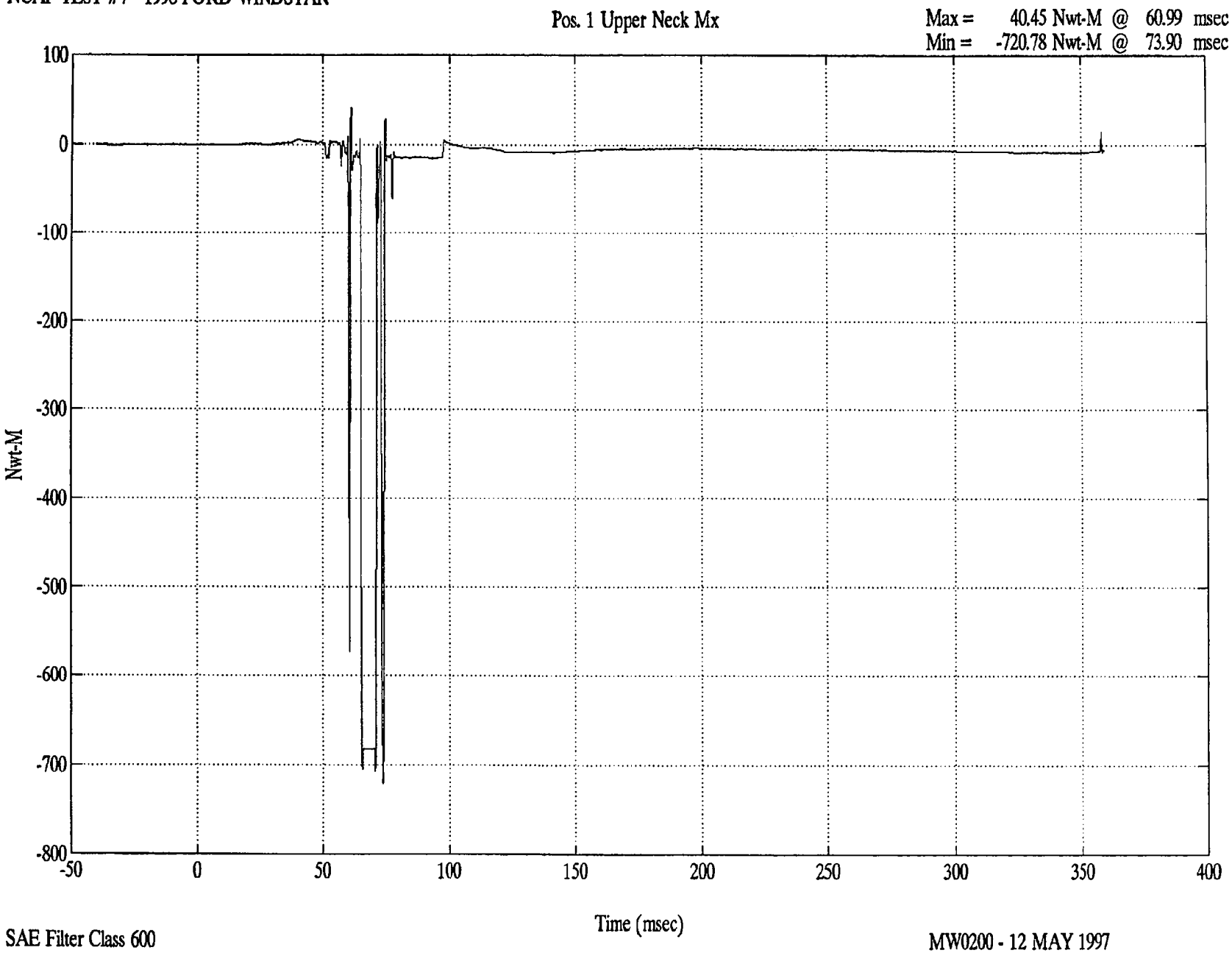


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 600

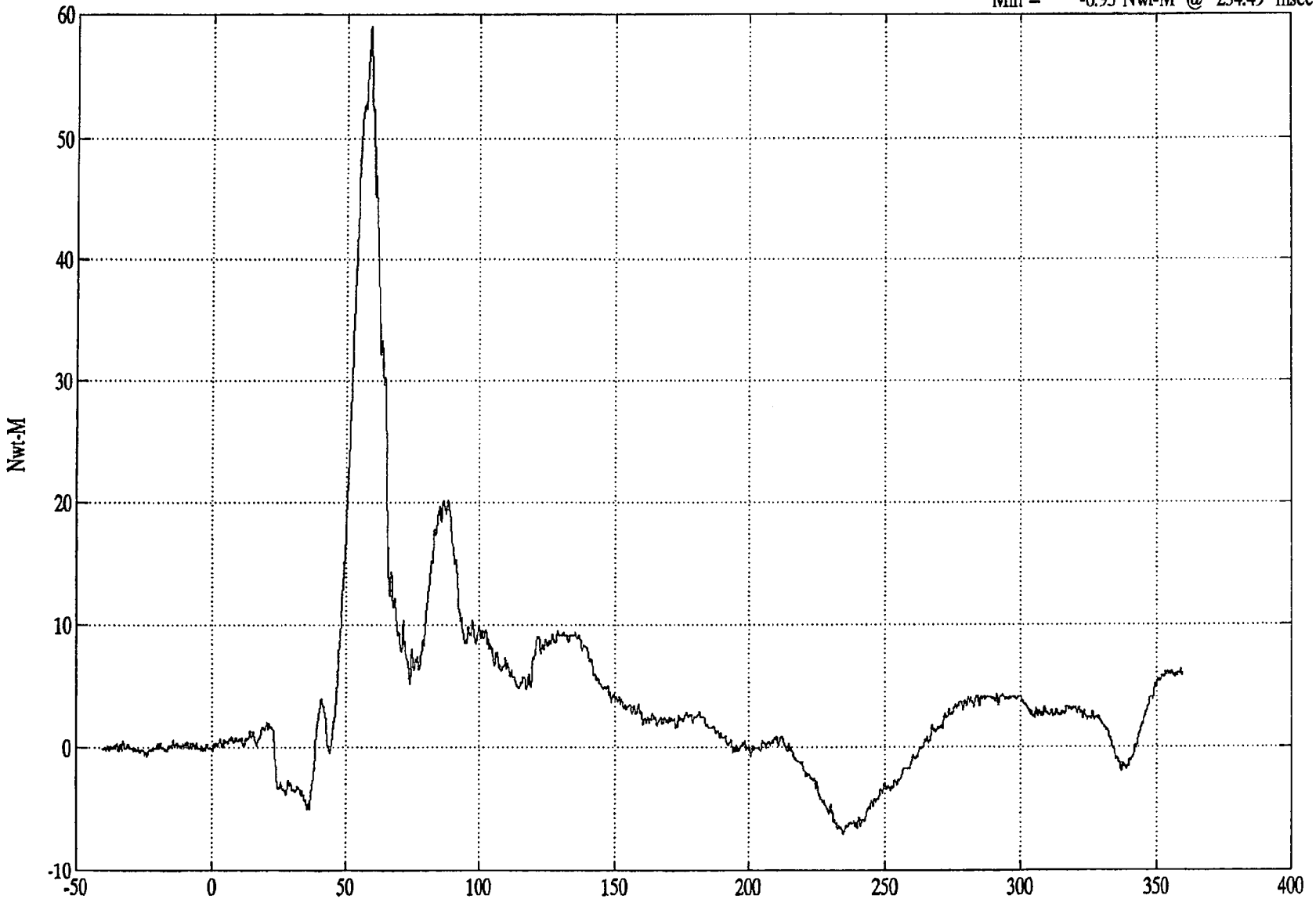
MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

Pos. 1 Upper Neck My

Max = 58.98 Nwt-M @ 58.50 msec
Min = -6.95 Nwt-M @ 234.49 msec



SAE Filter Class 600

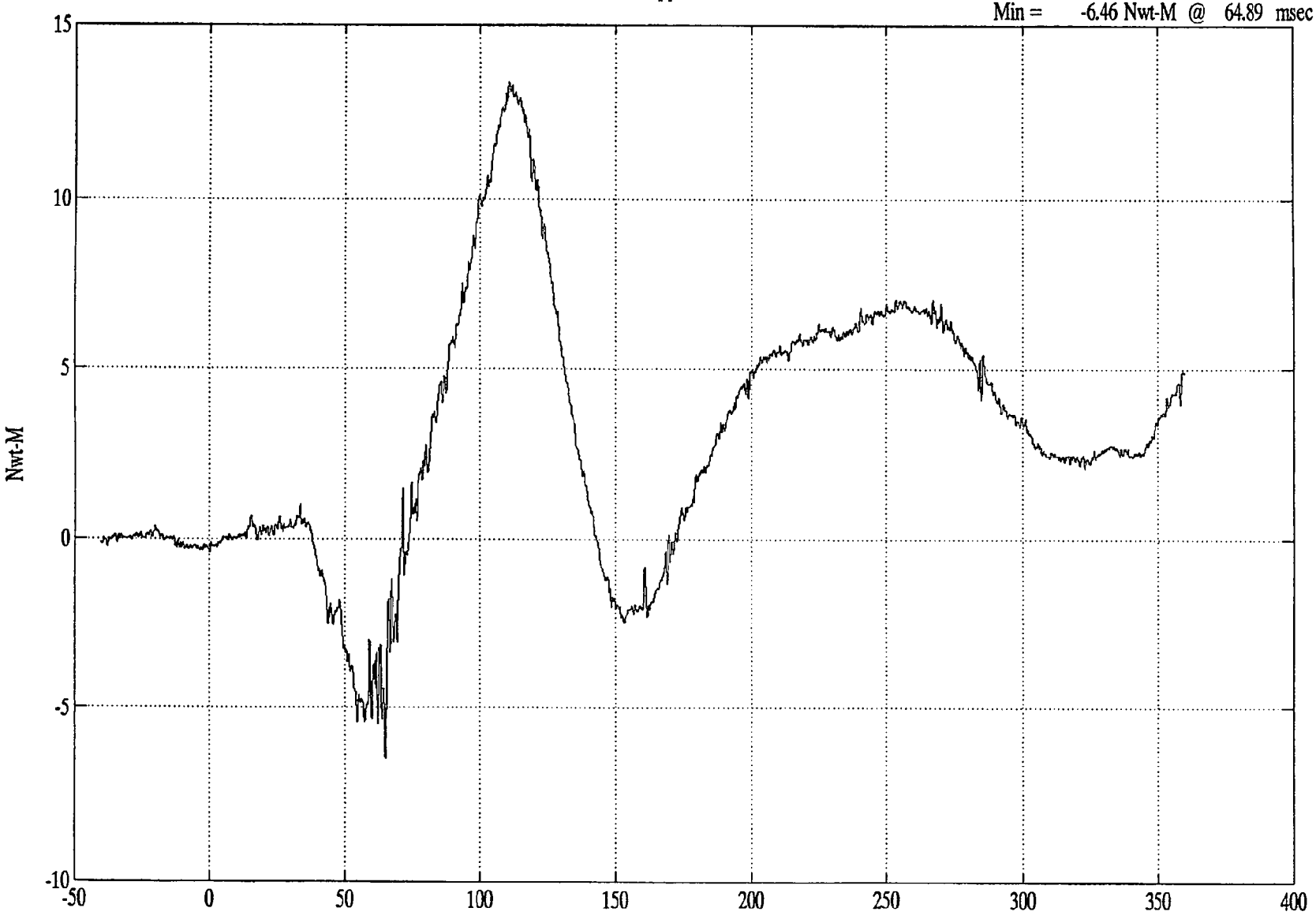
MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

Pos. 1 Upper Neck Mz

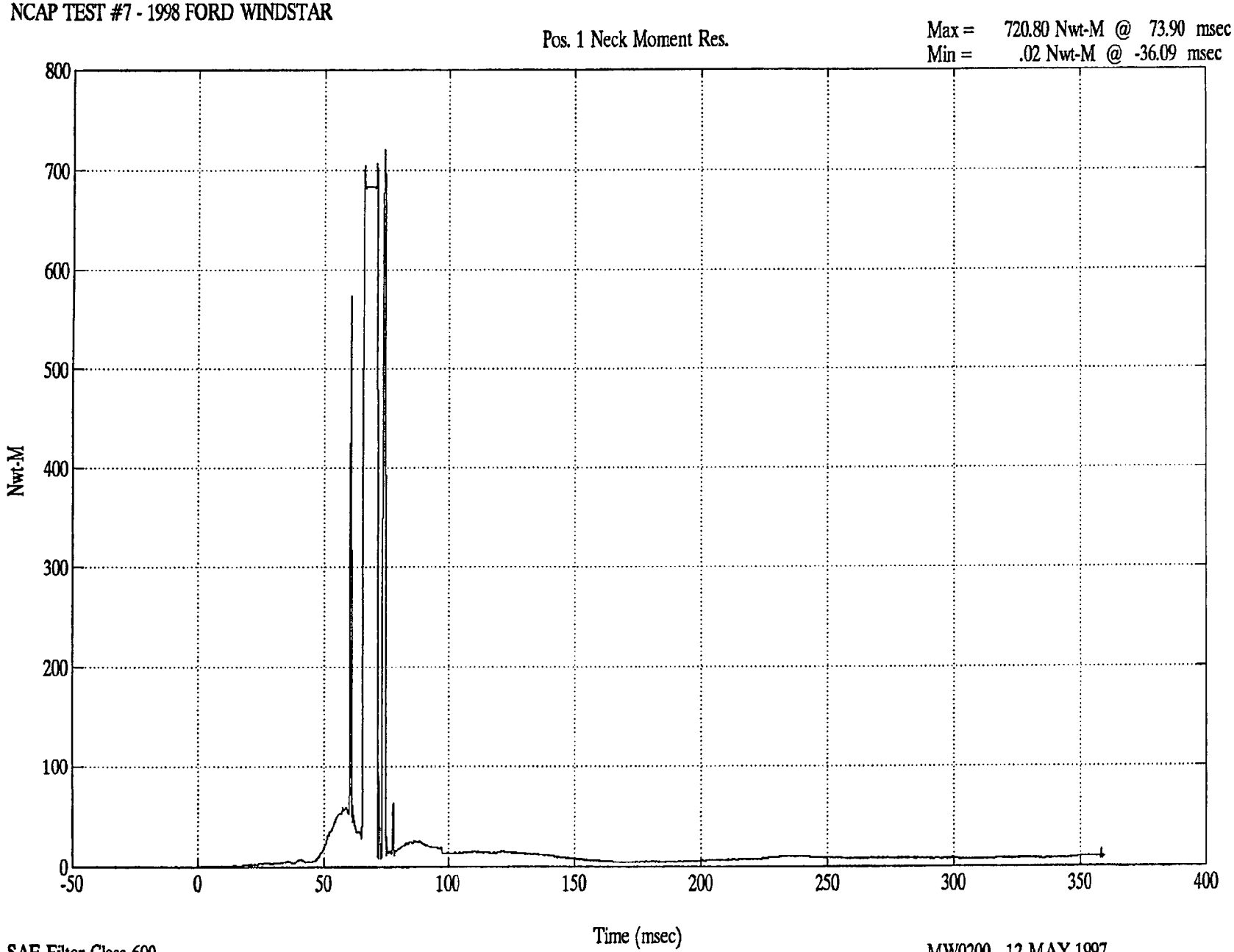
Max = 13.34 Nwt-M @ 110.69 msec
Min = -6.46 Nwt-M @ 64.89 msec



SAE Filter Class 600

MW0200 - 12 MAY 1997

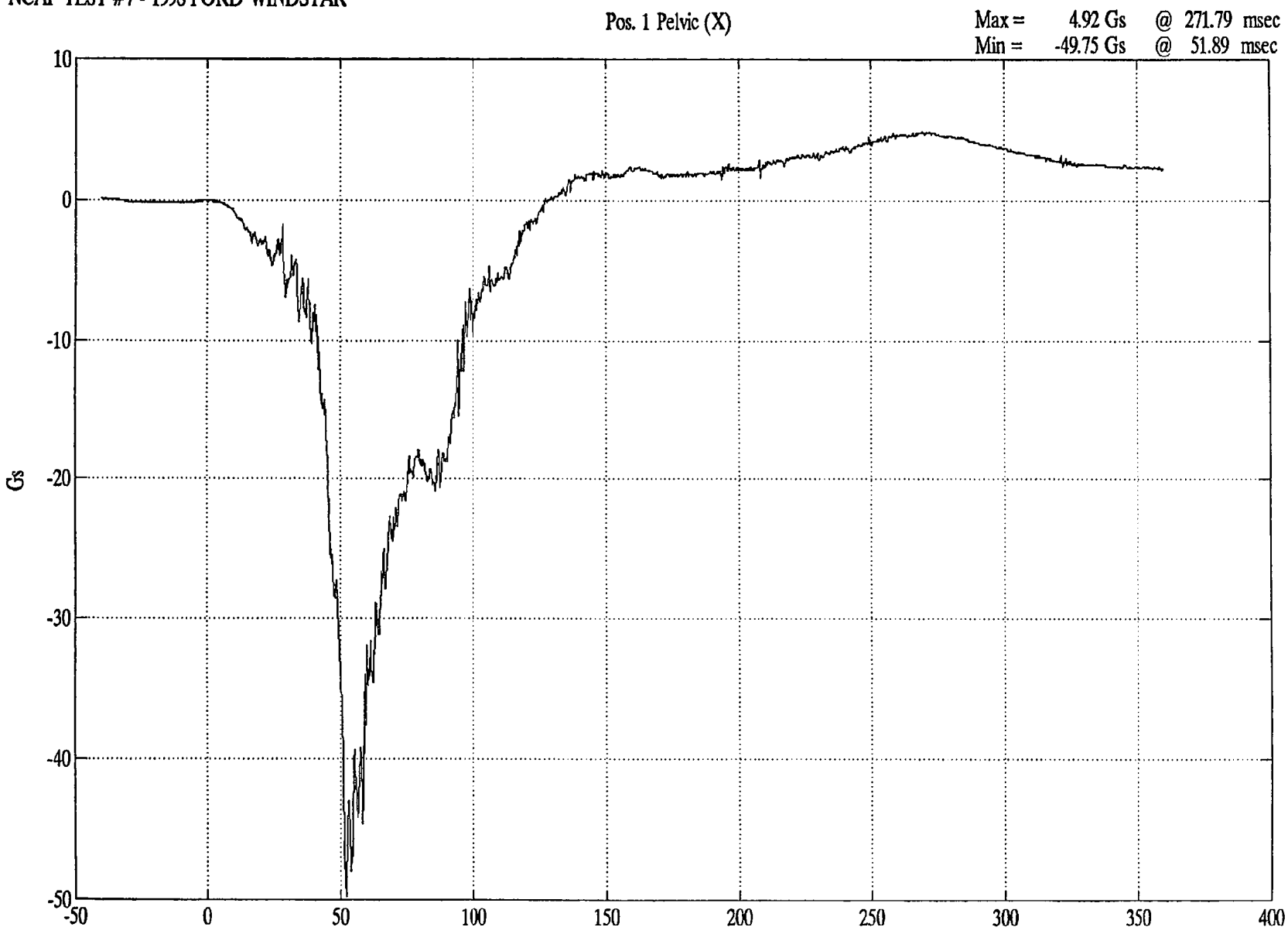
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 600

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

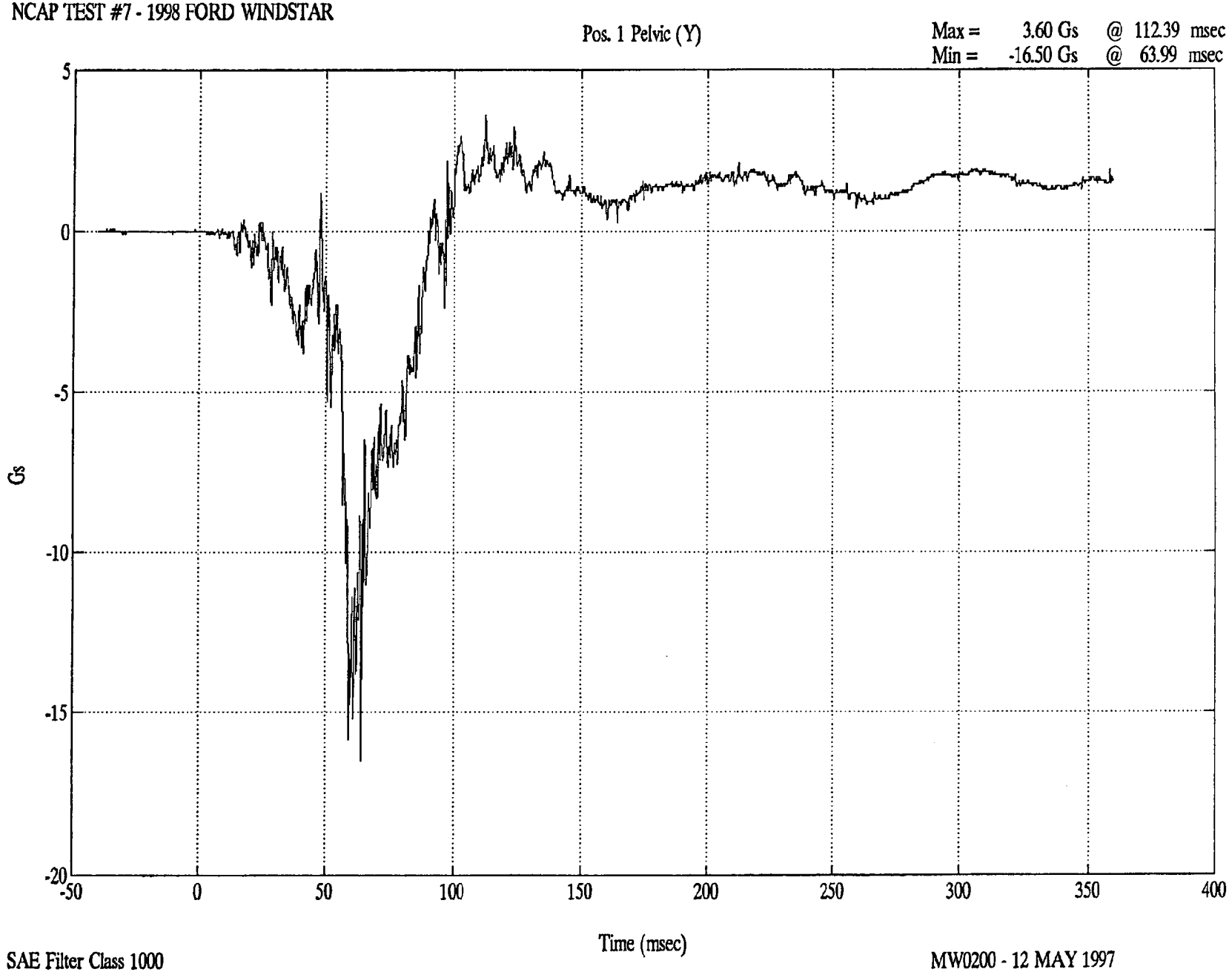


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

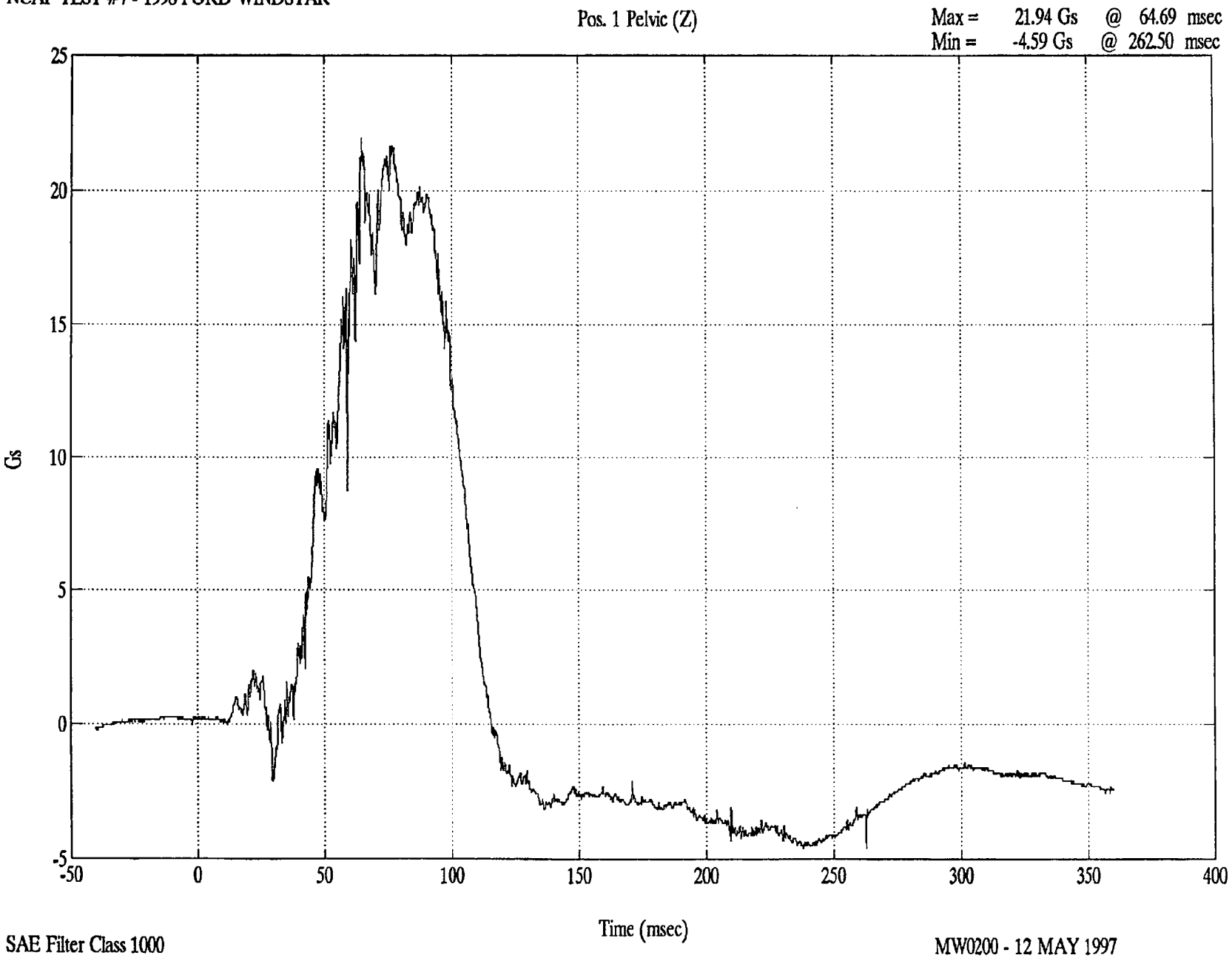
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 1000

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

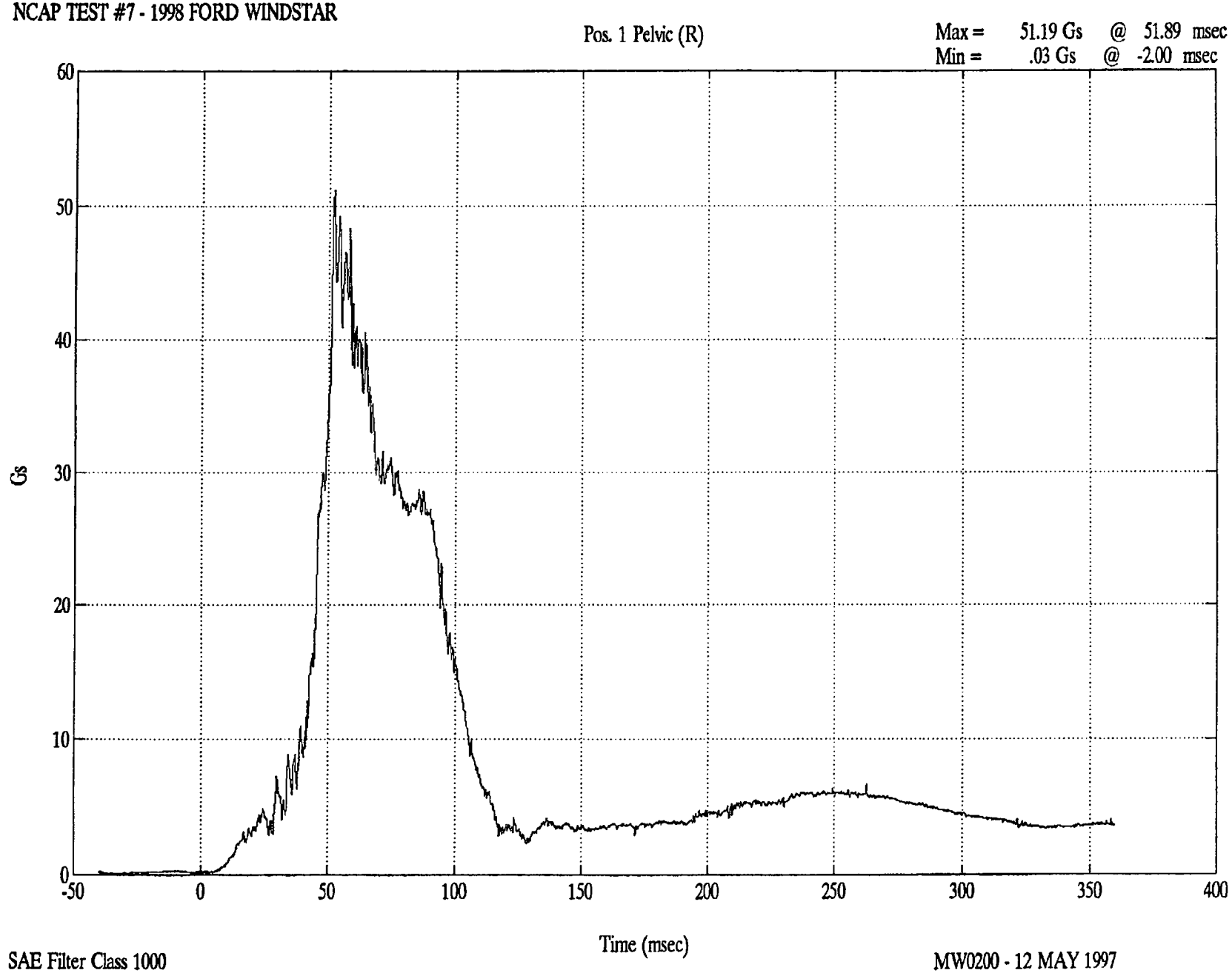


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

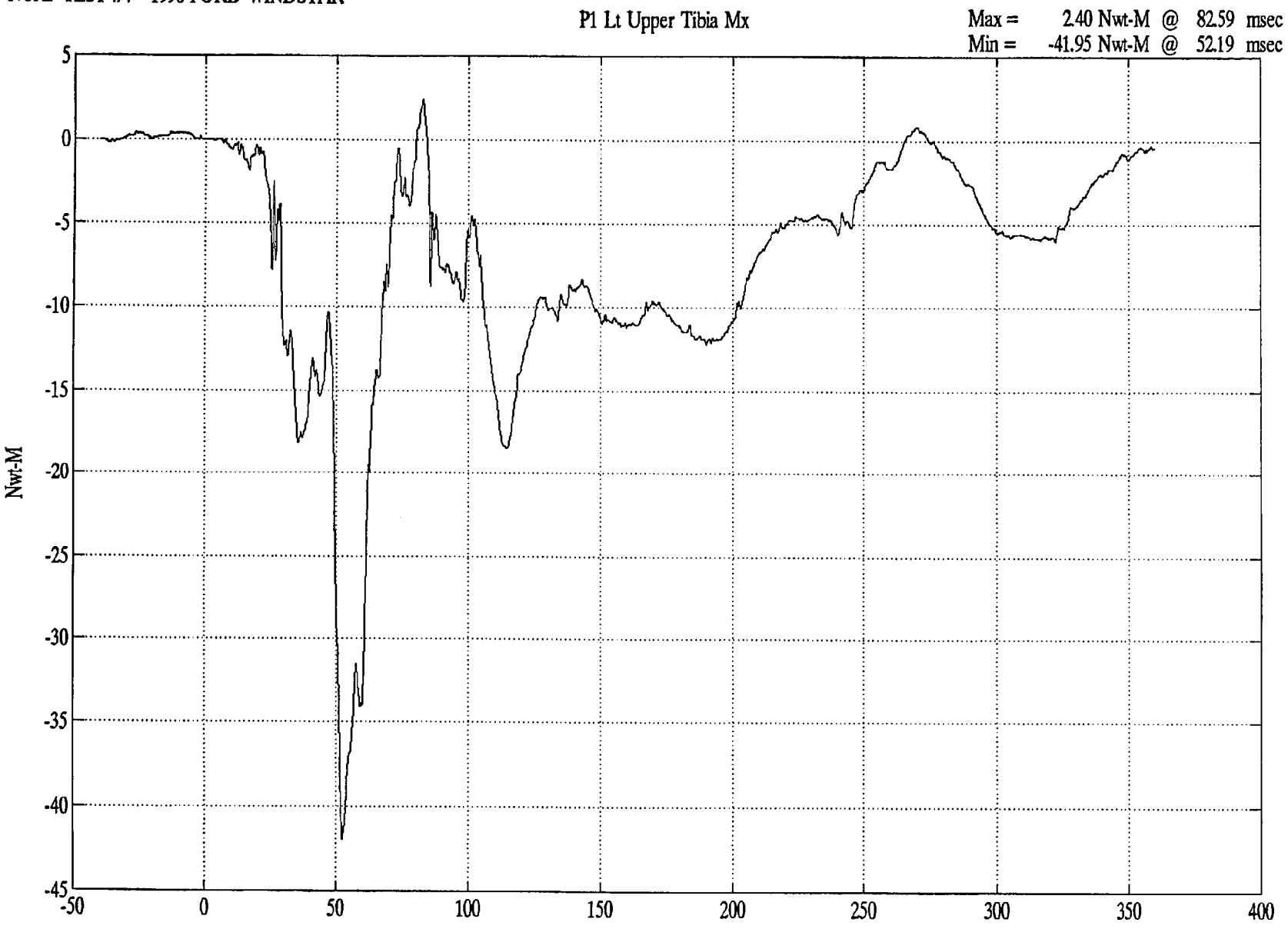


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

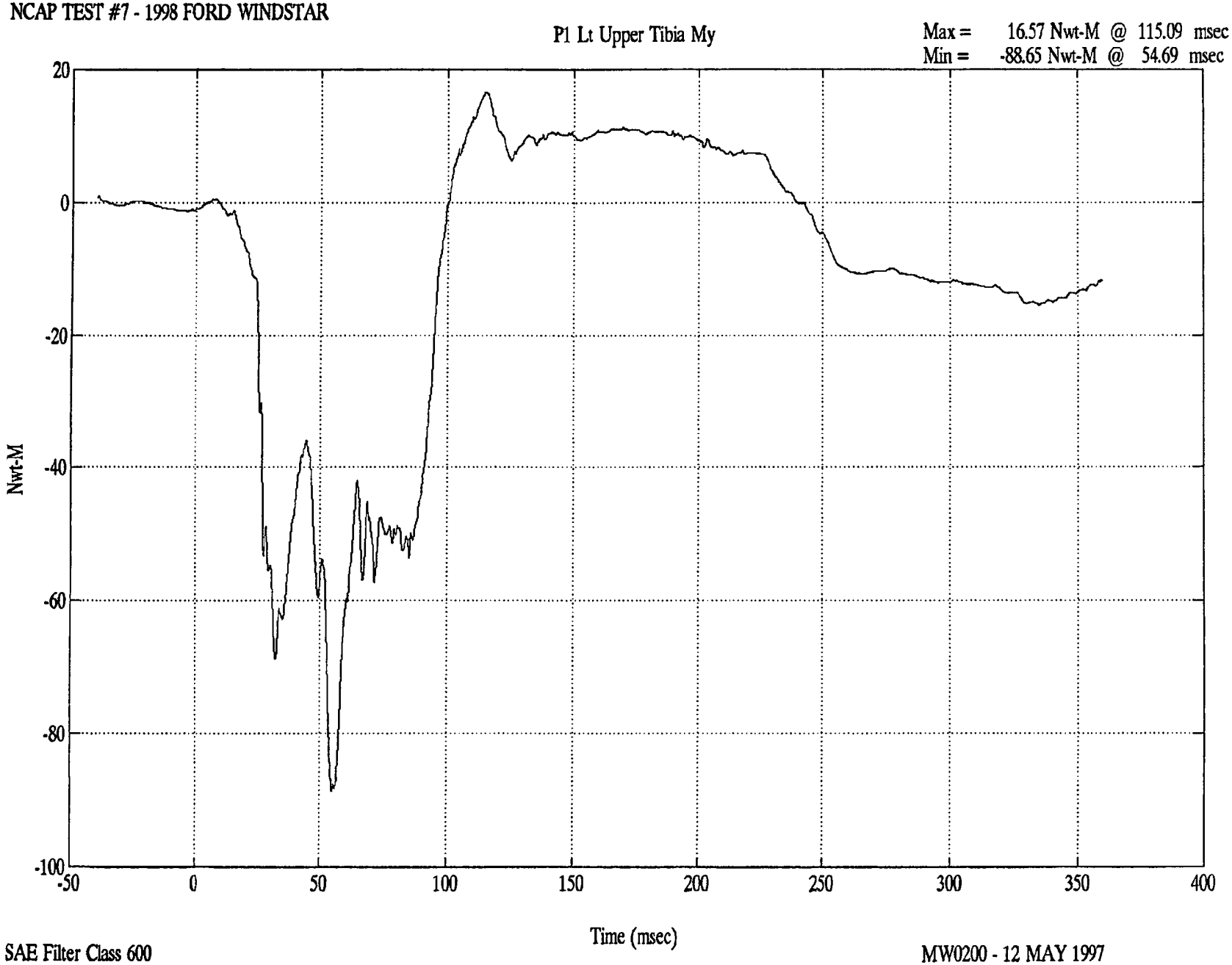


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

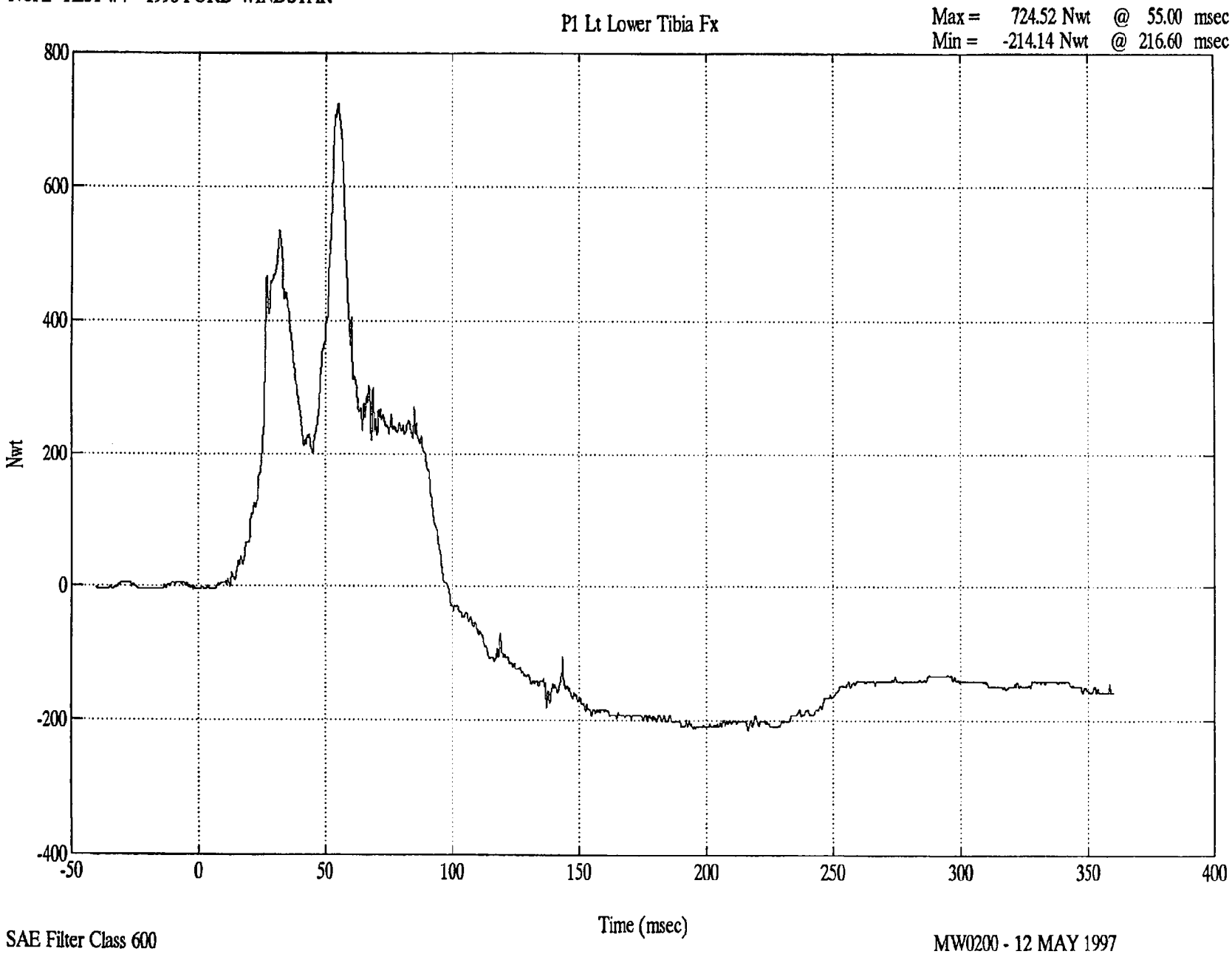


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

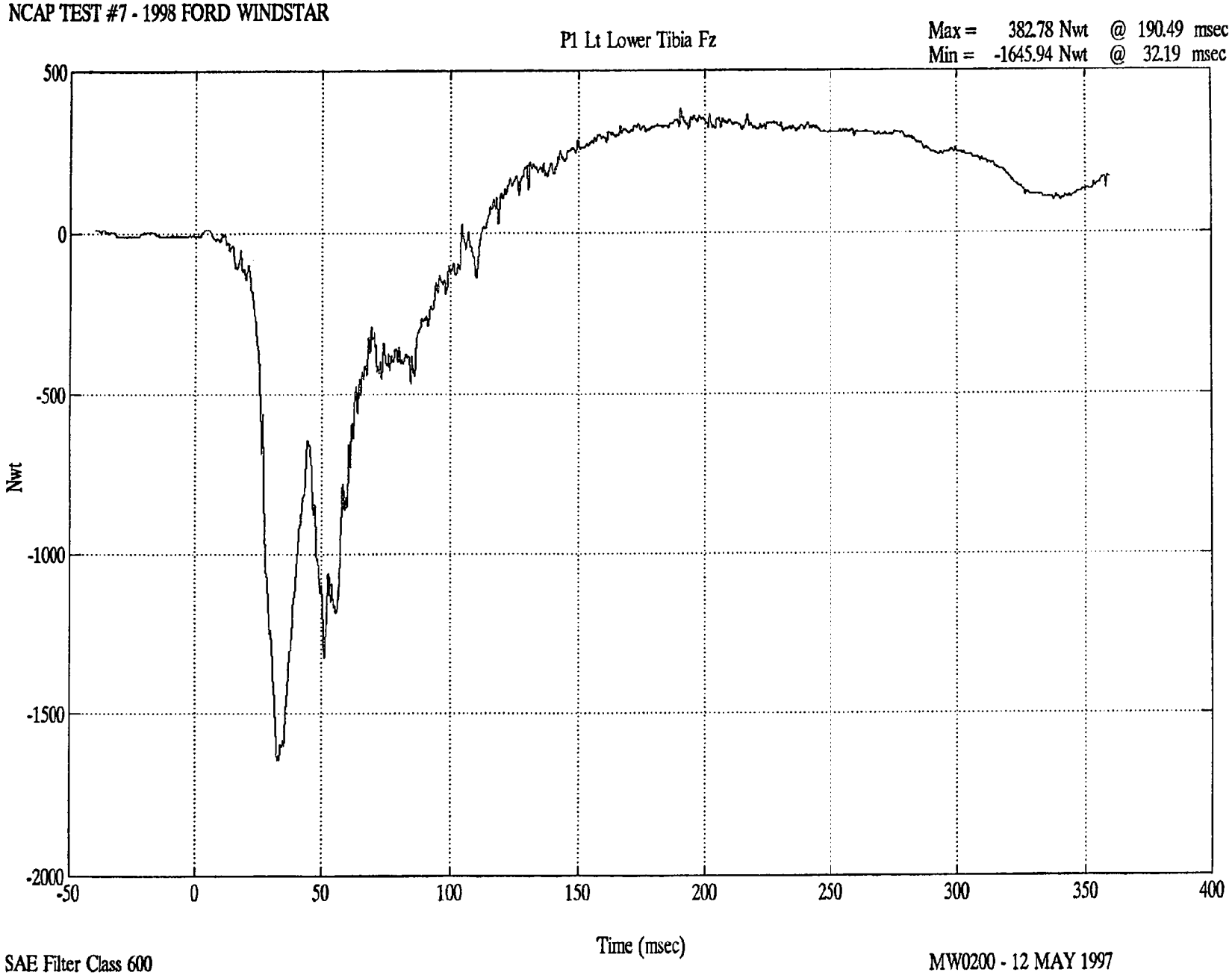


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR



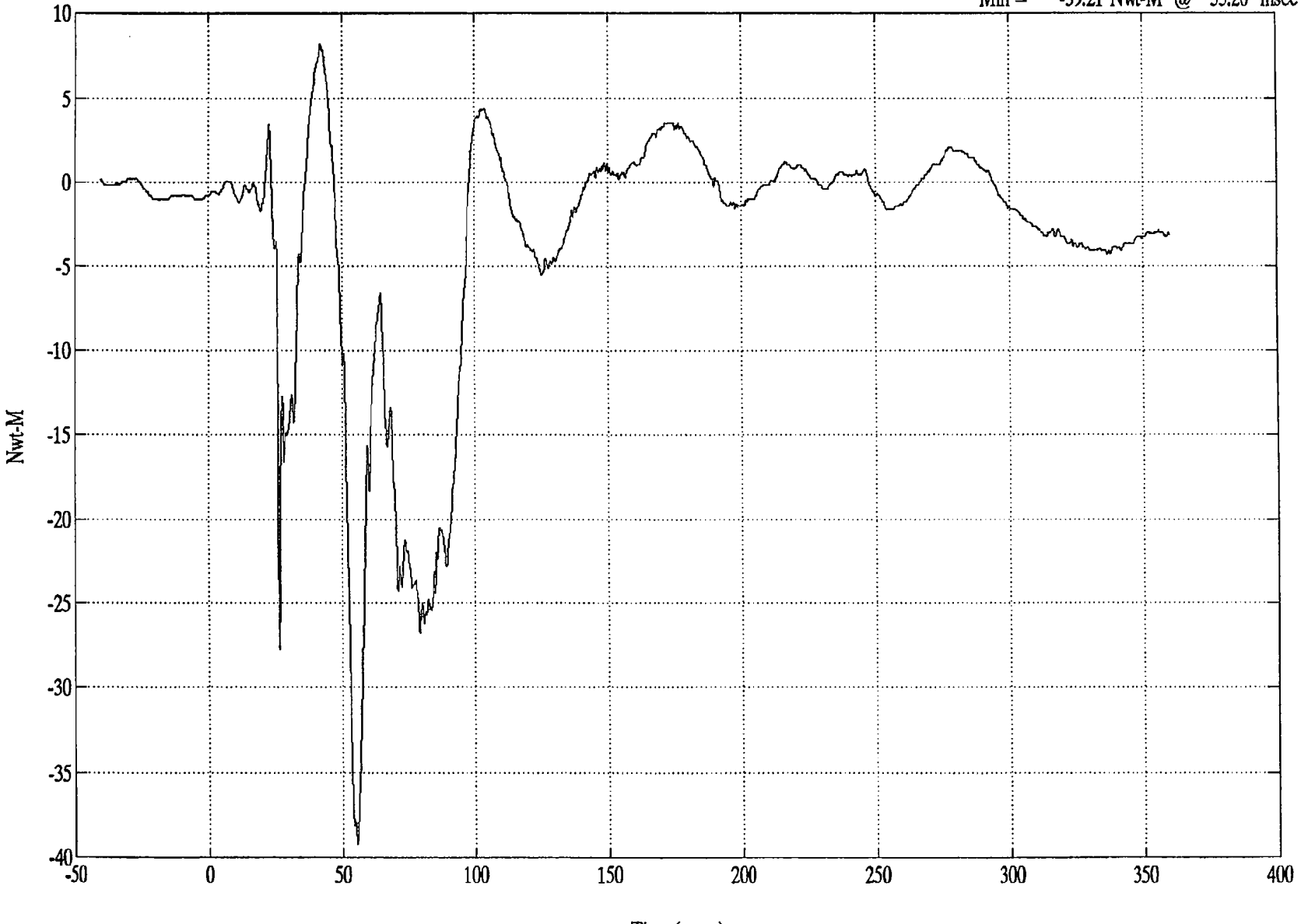
SAE Filter Class 600

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

P1 Lt Lower Tibia My

Max = 8.15 Nwt-M @ 41.79 msec
Min = -39.21 Nwt-M @ 55.20 msec



SAE Filter Class 600

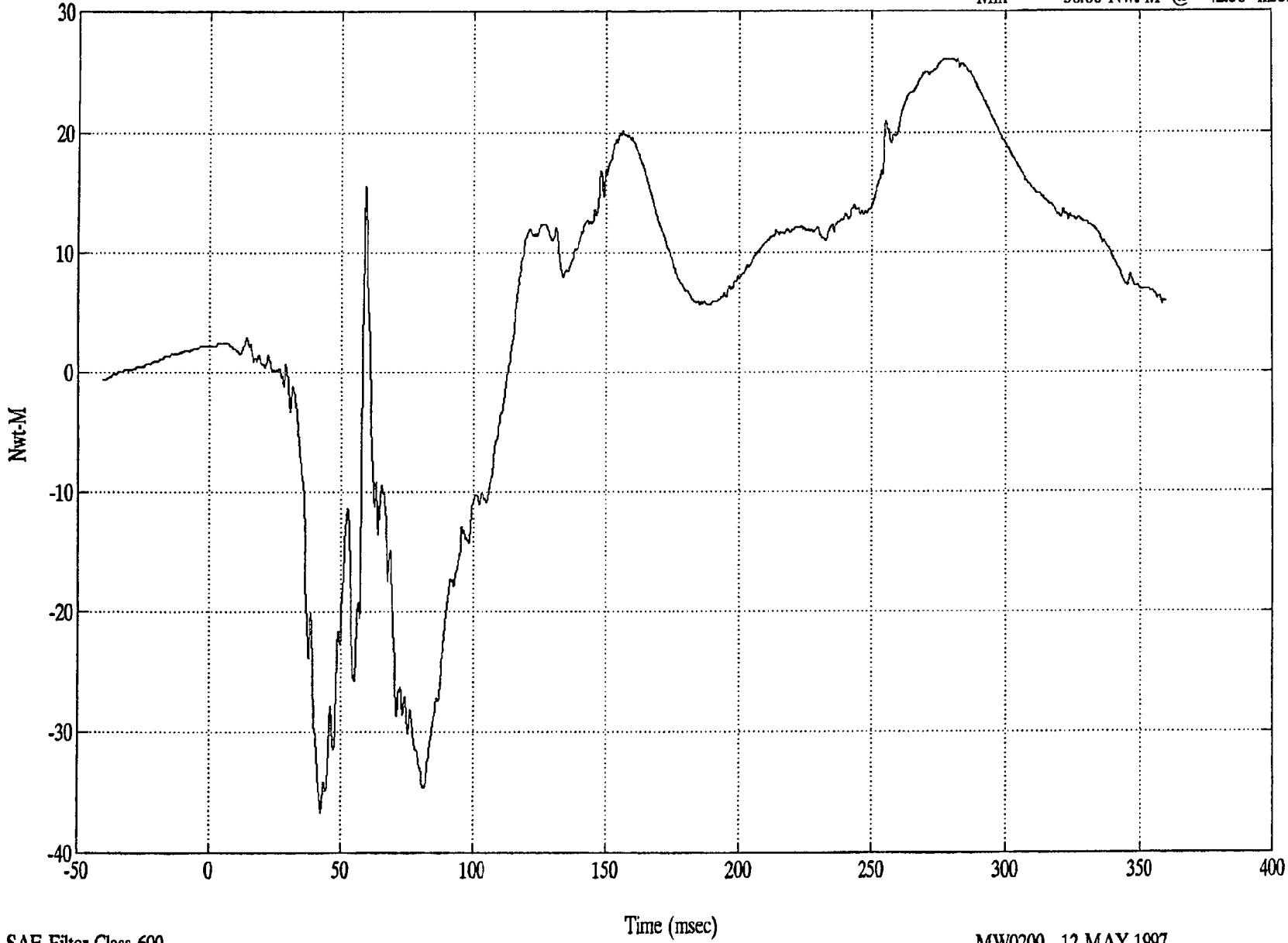
MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

P1 Rt Upper Tibia Mx

Max = 26.05 Nwt-M @ 276.69 msec
Min = -36.60 Nwt-M @ 42.50 msec

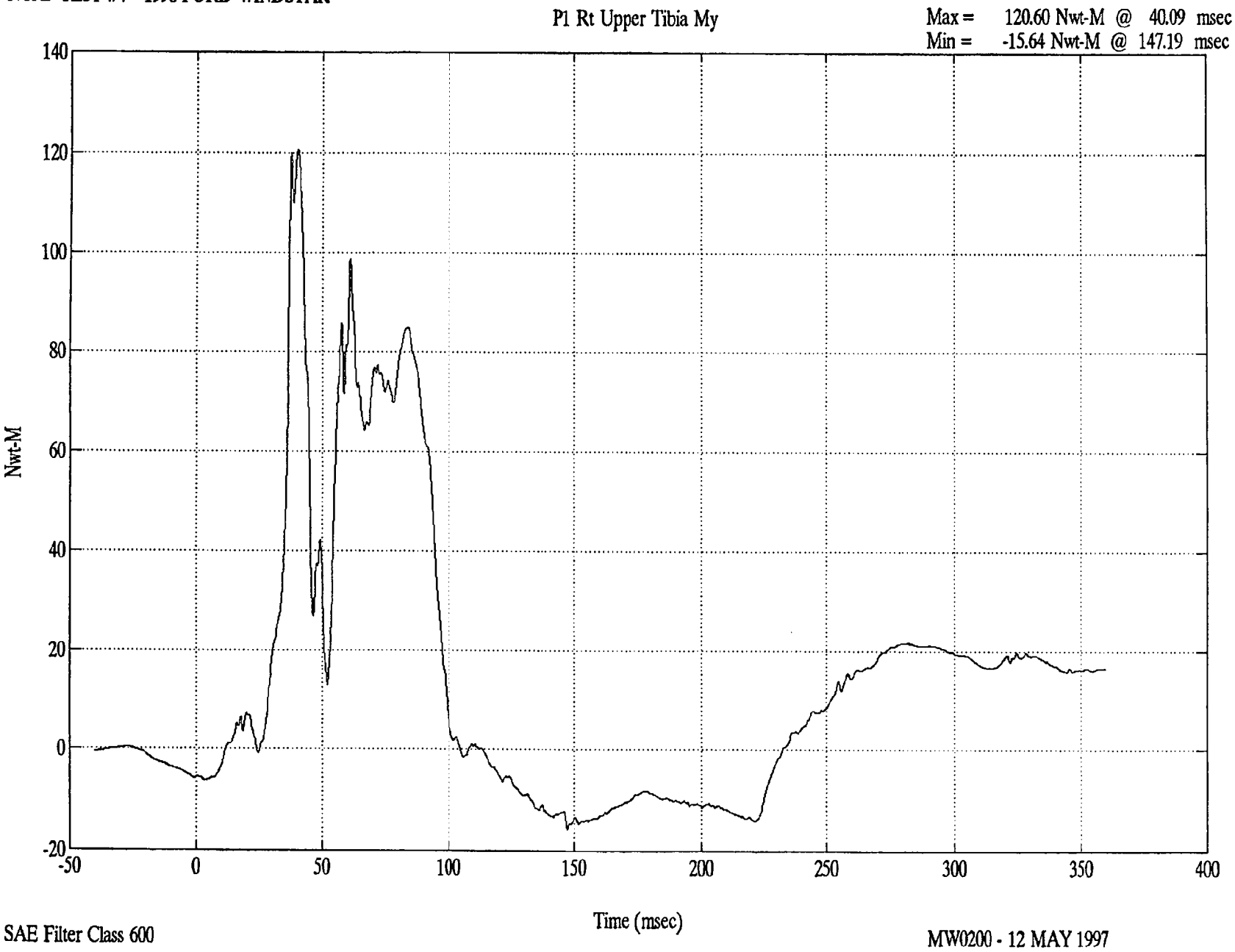


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

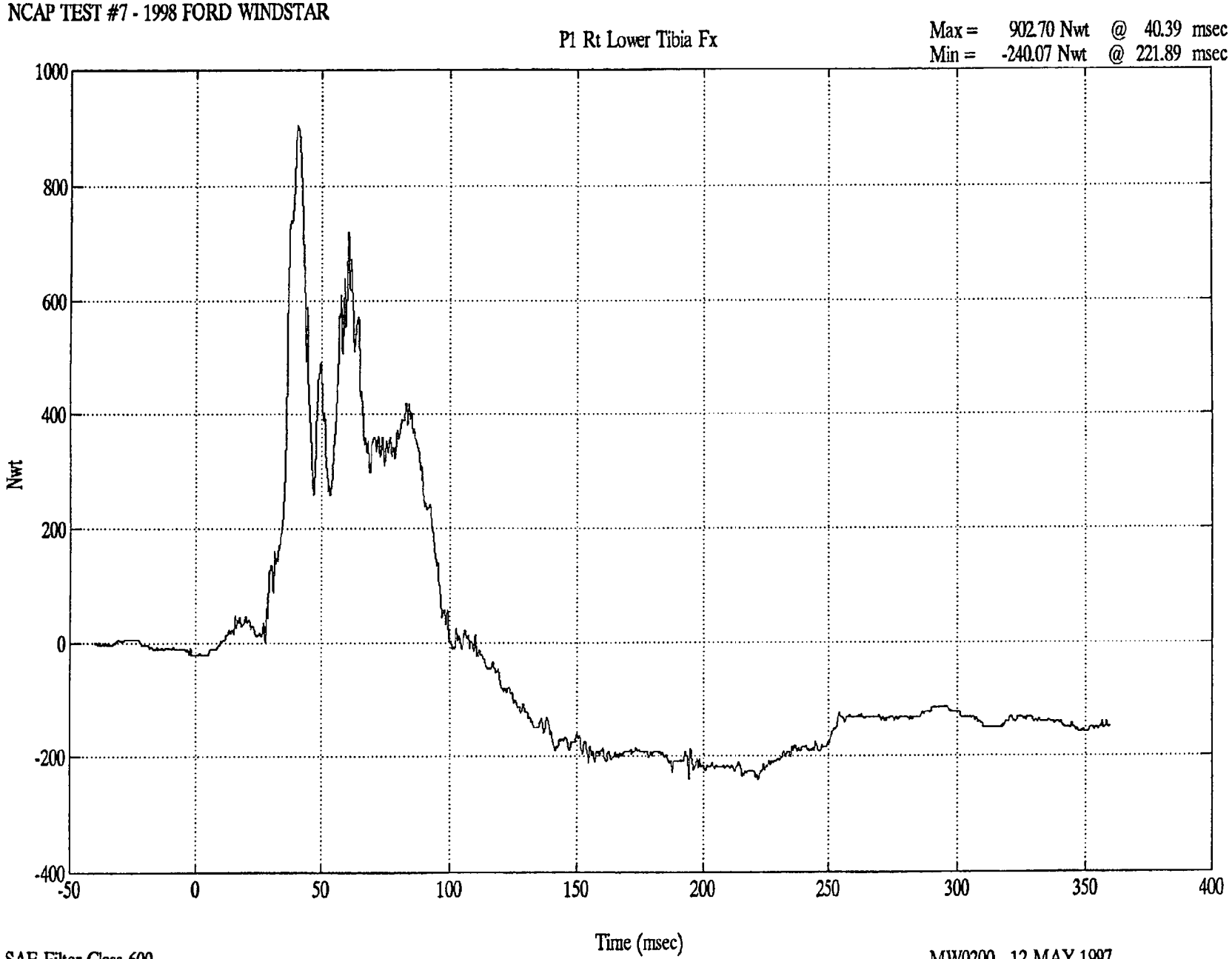


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

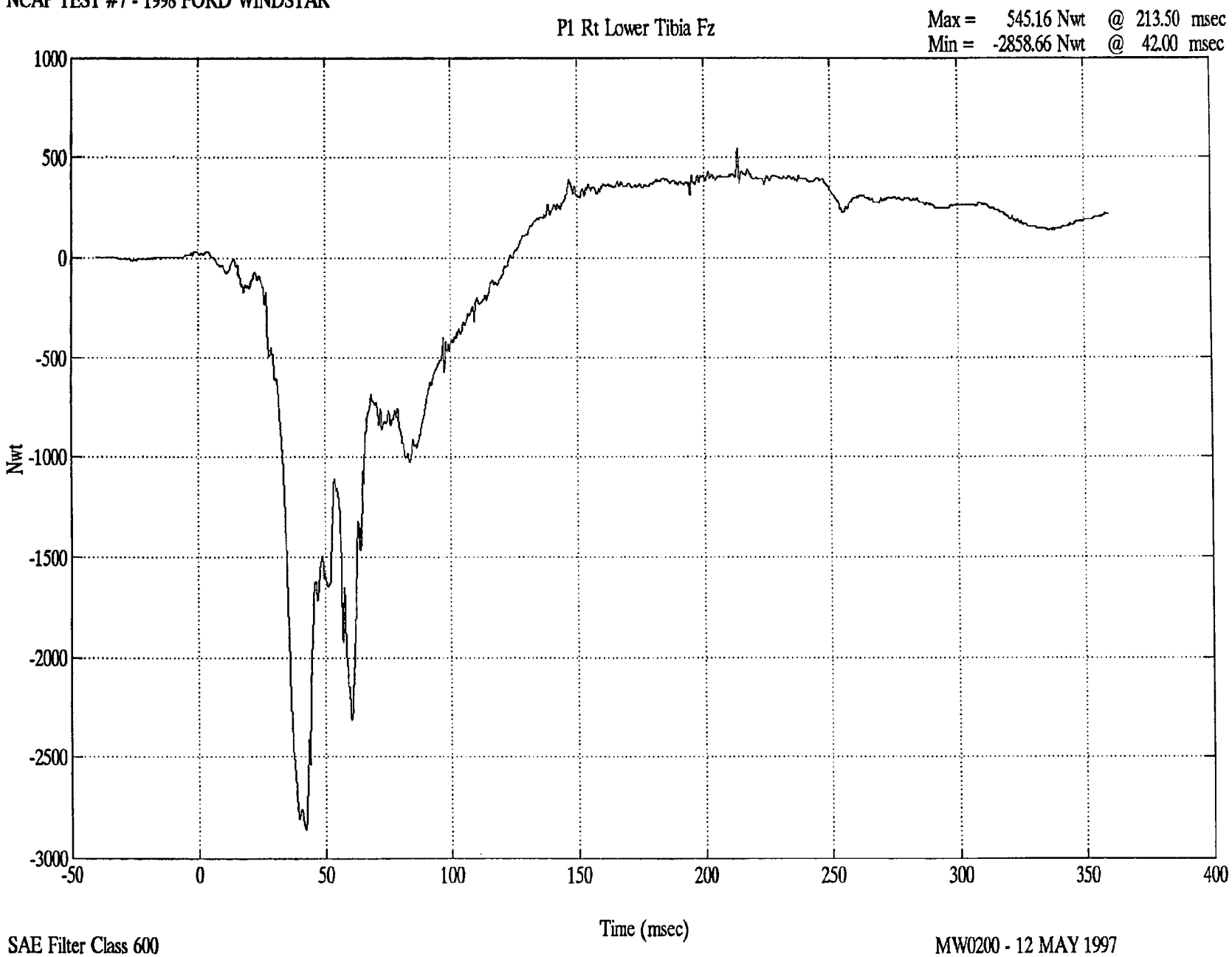


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

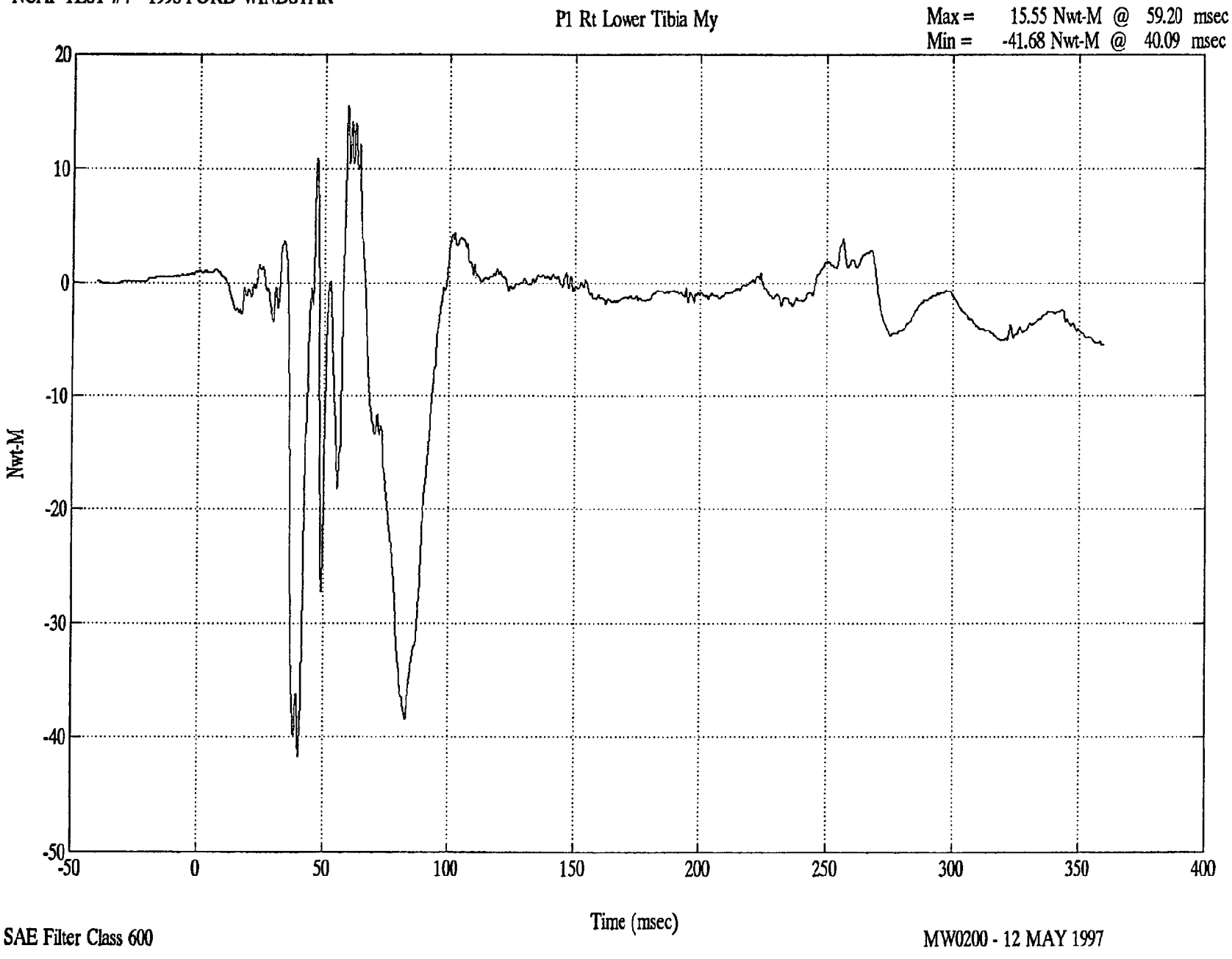


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

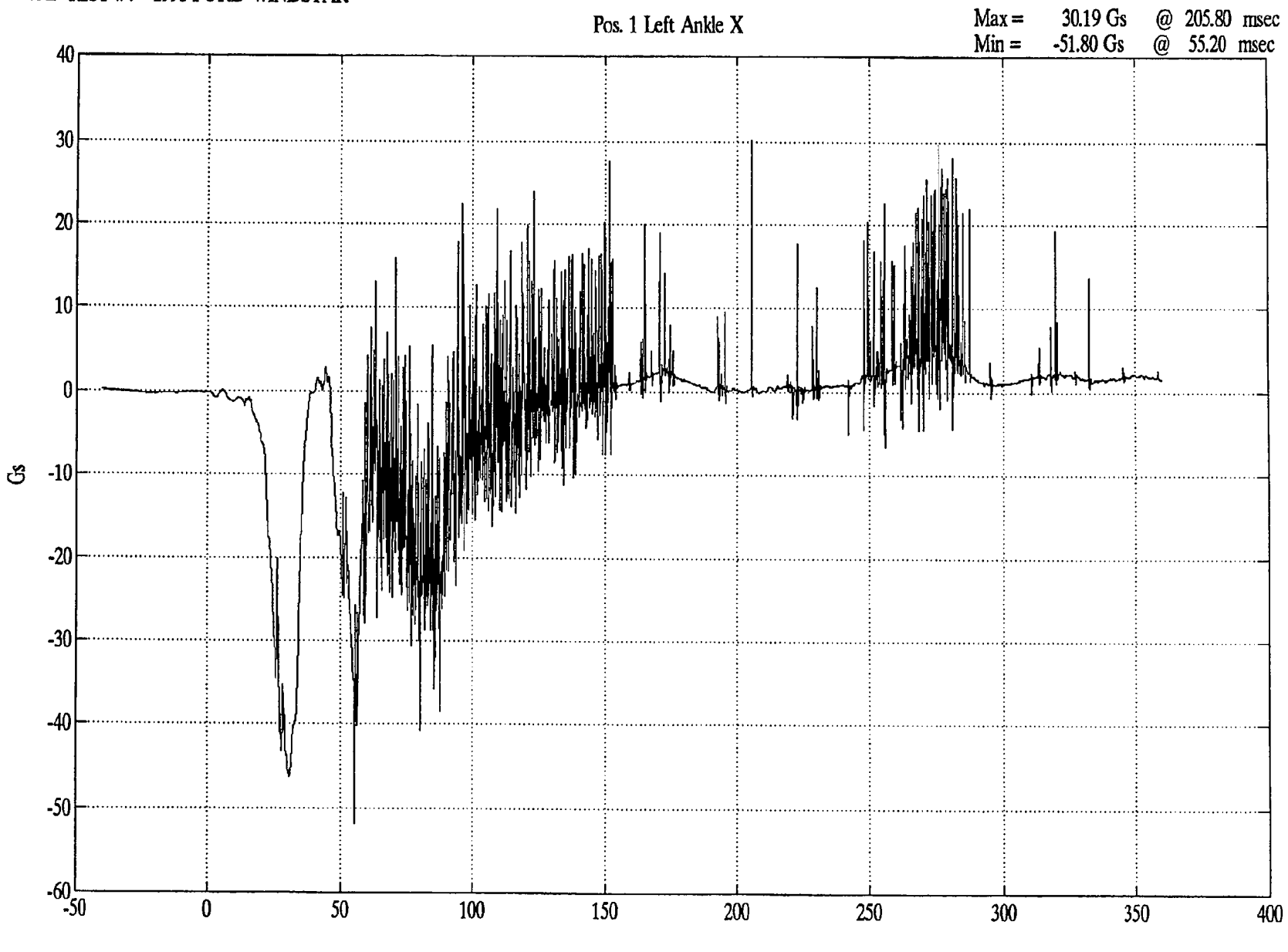


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

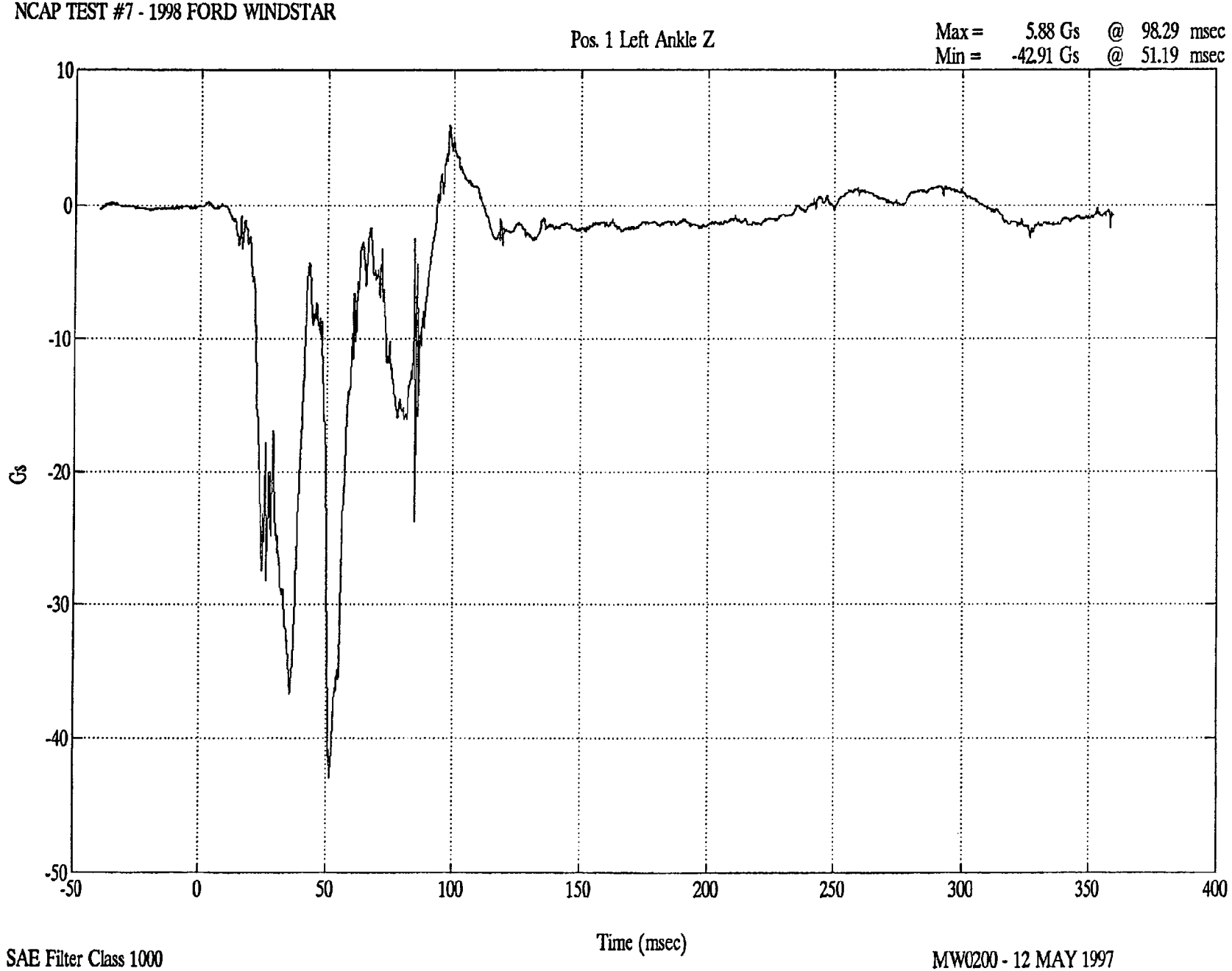


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

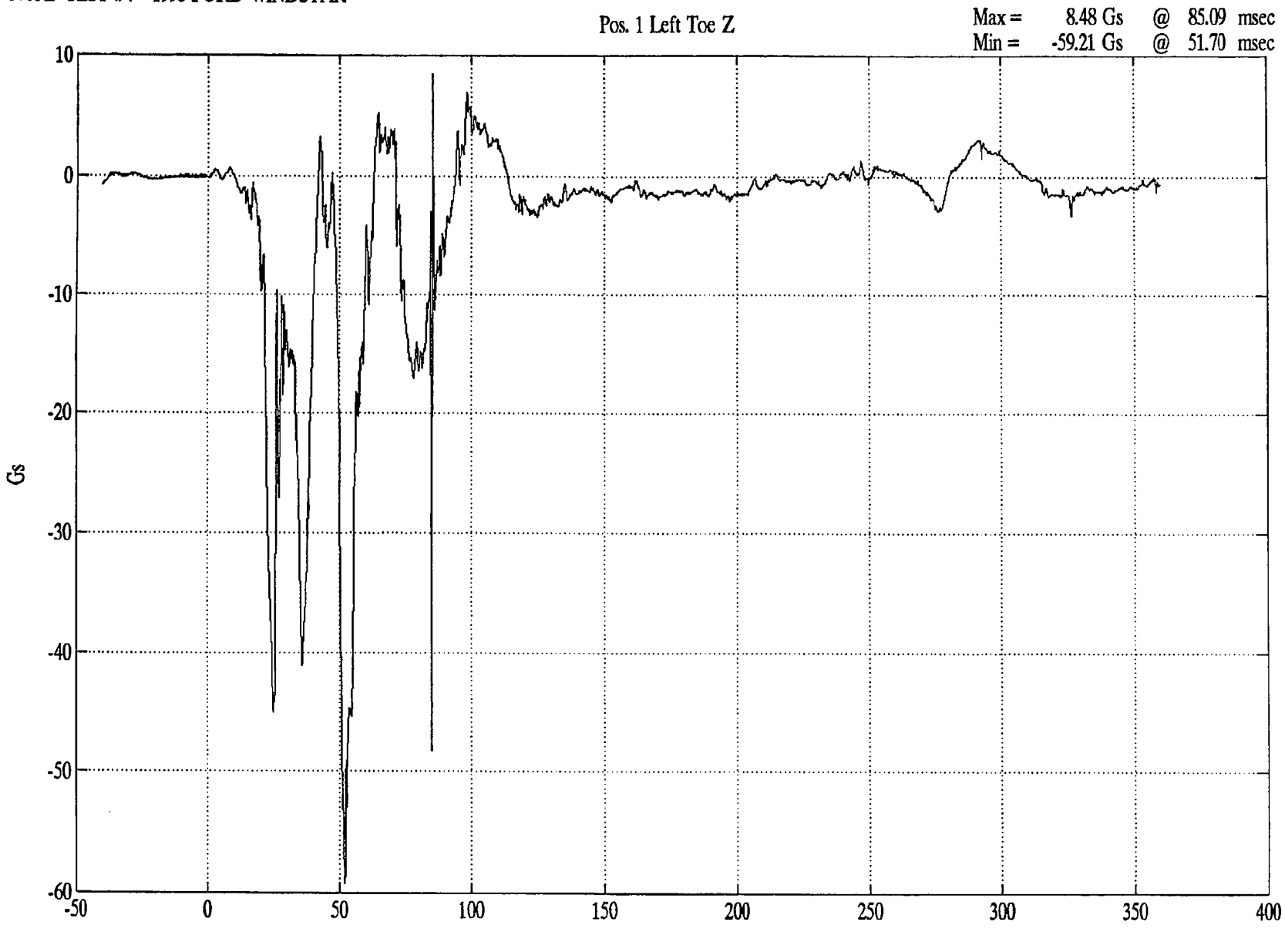


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

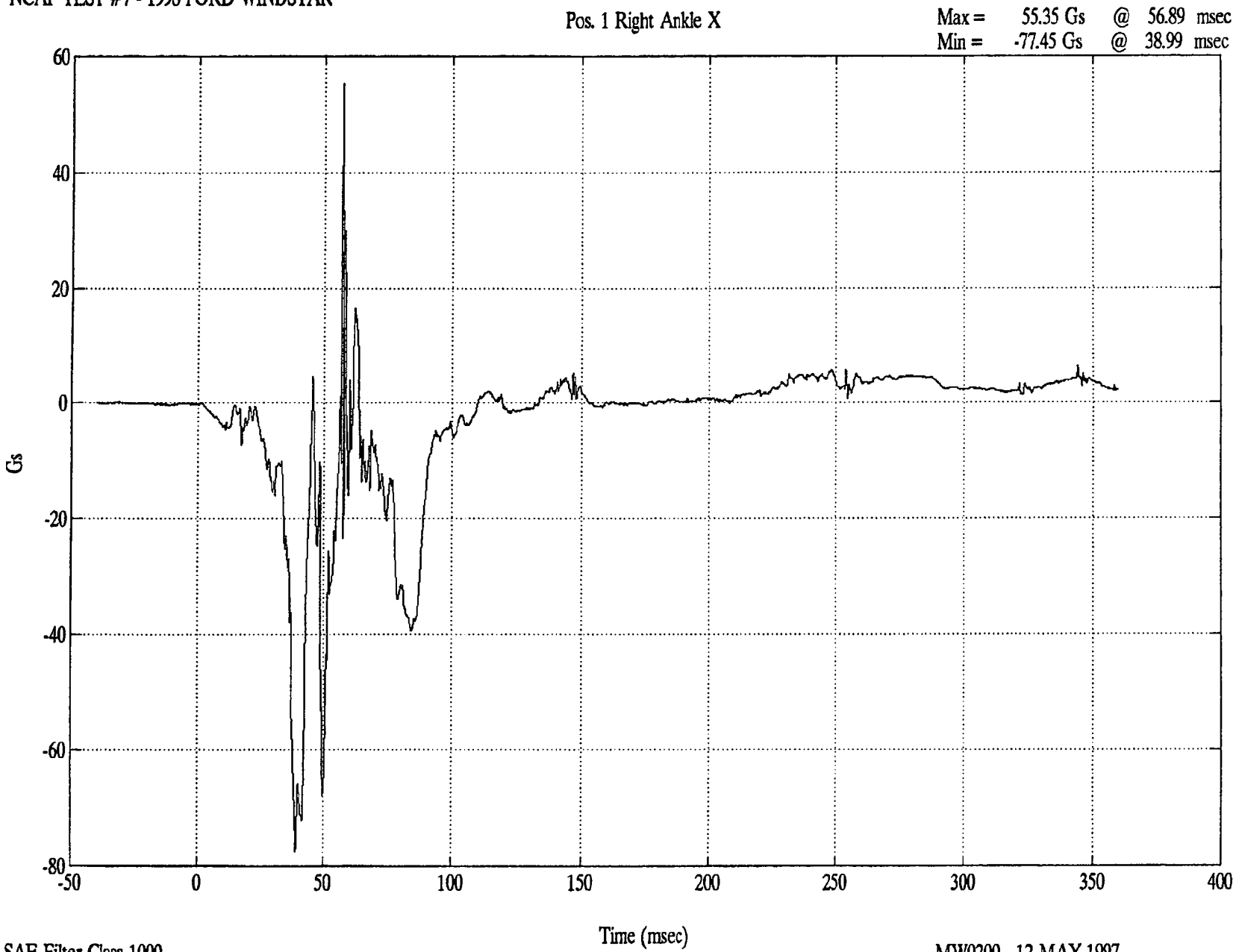


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

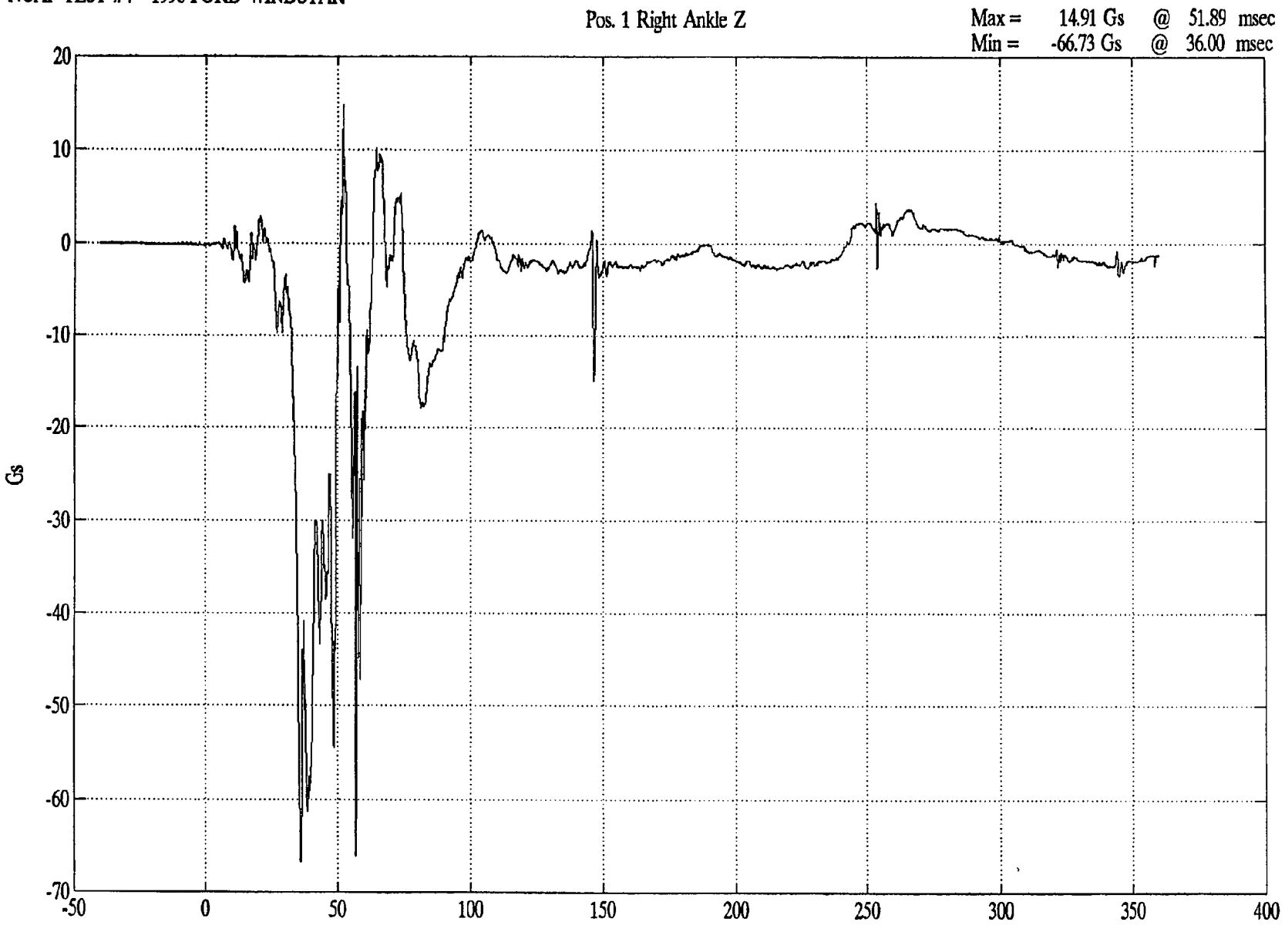


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

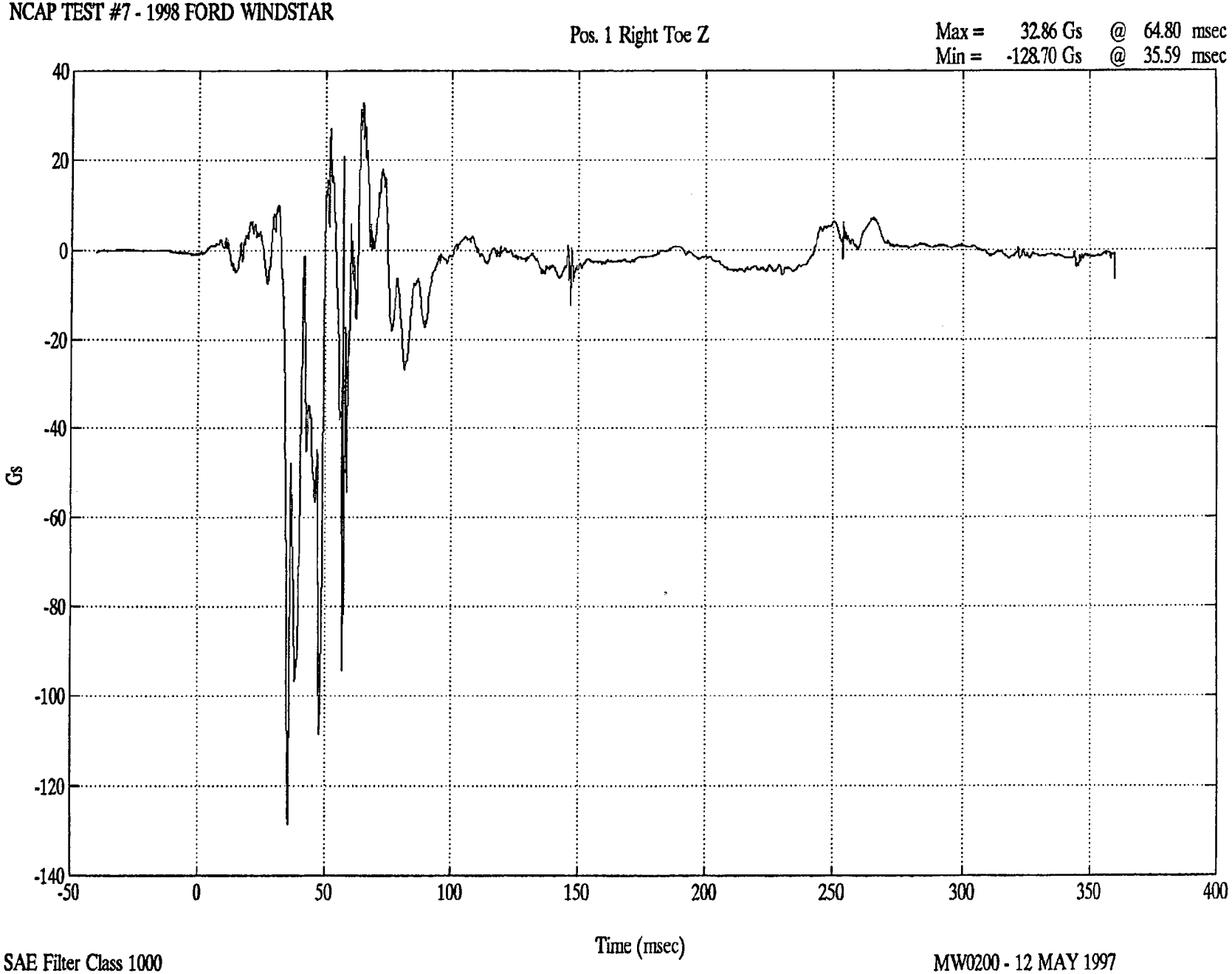


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

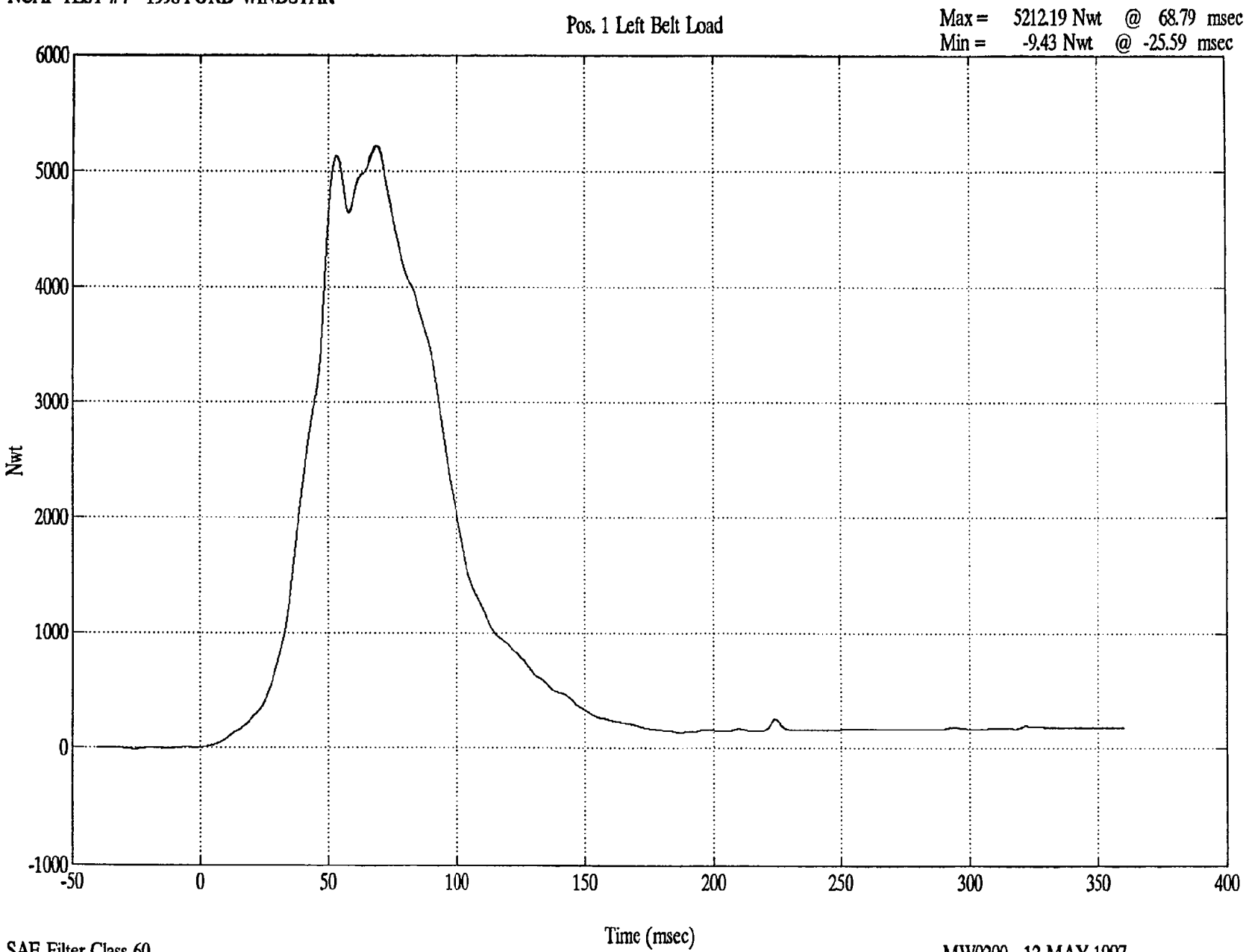
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 1000

MW0200 - 12 MAY 1997

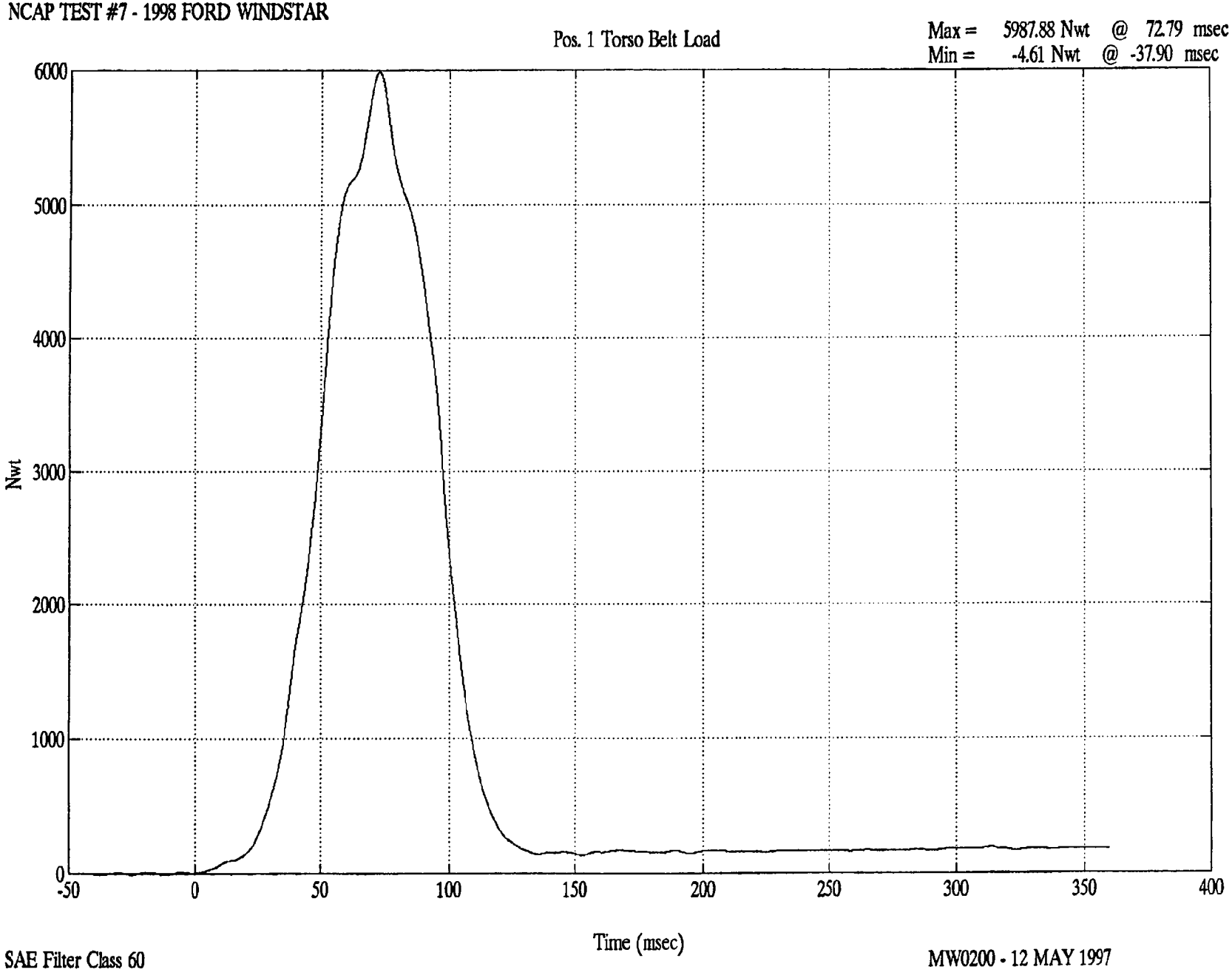
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997

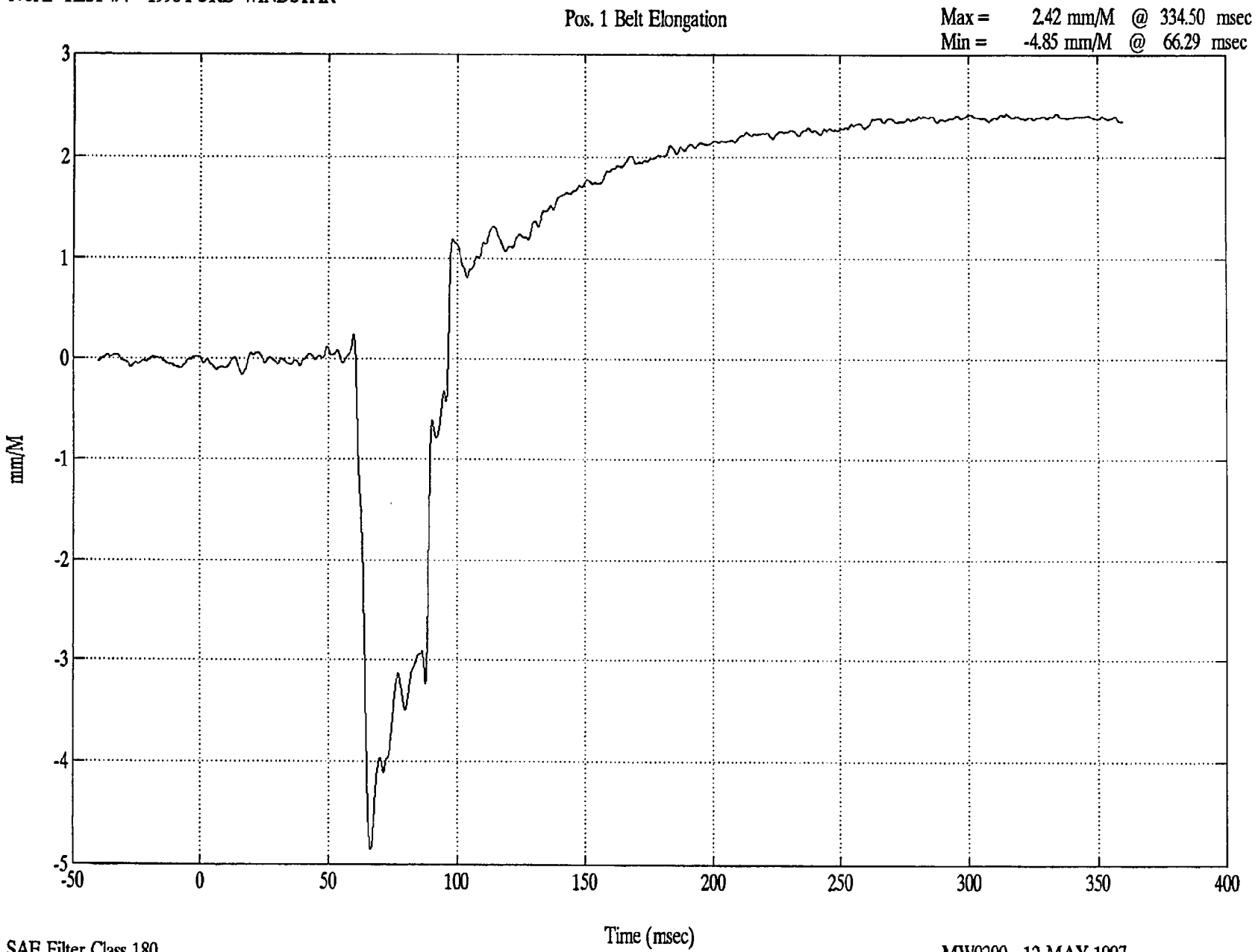
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

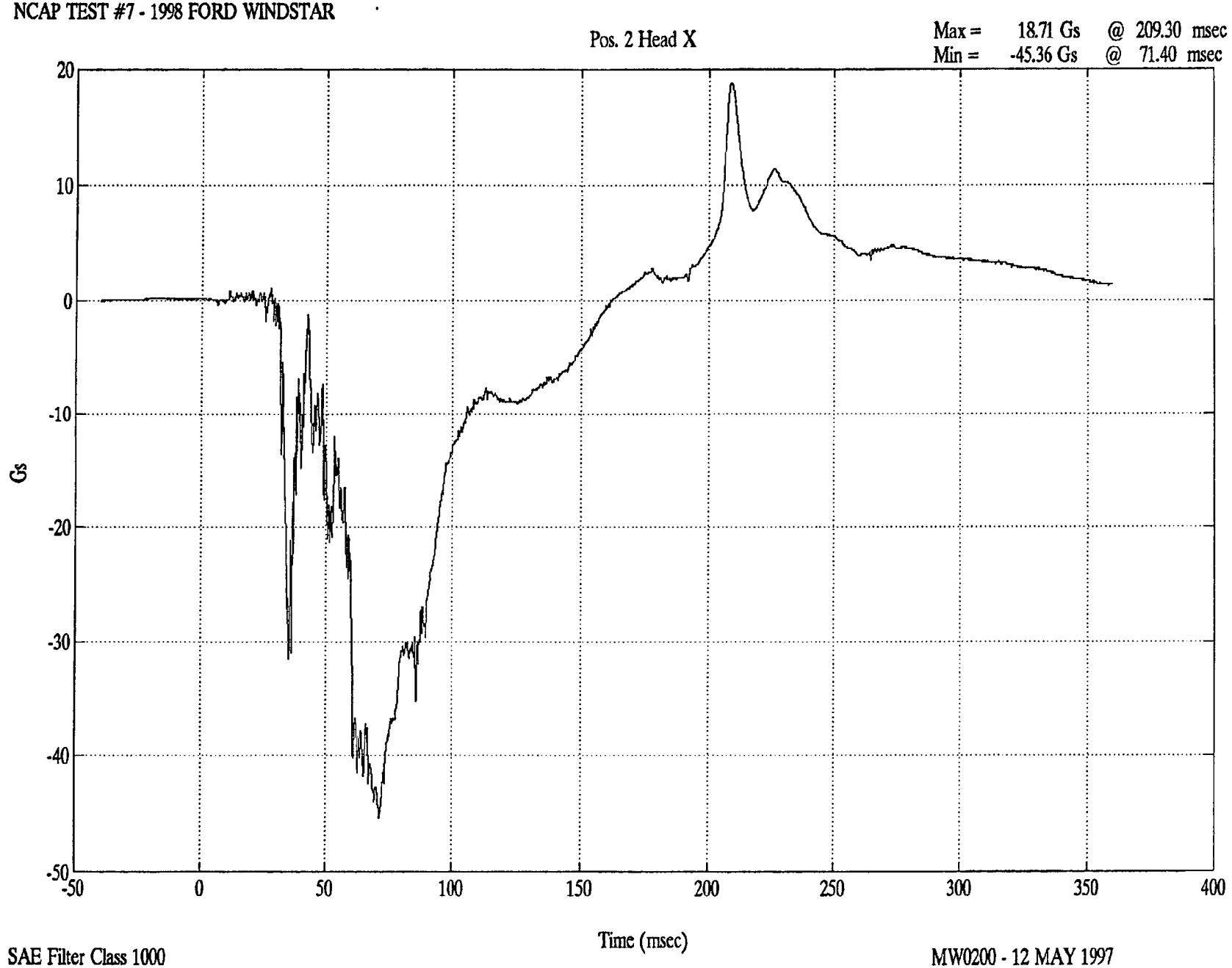


SAE Filter Class 180

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

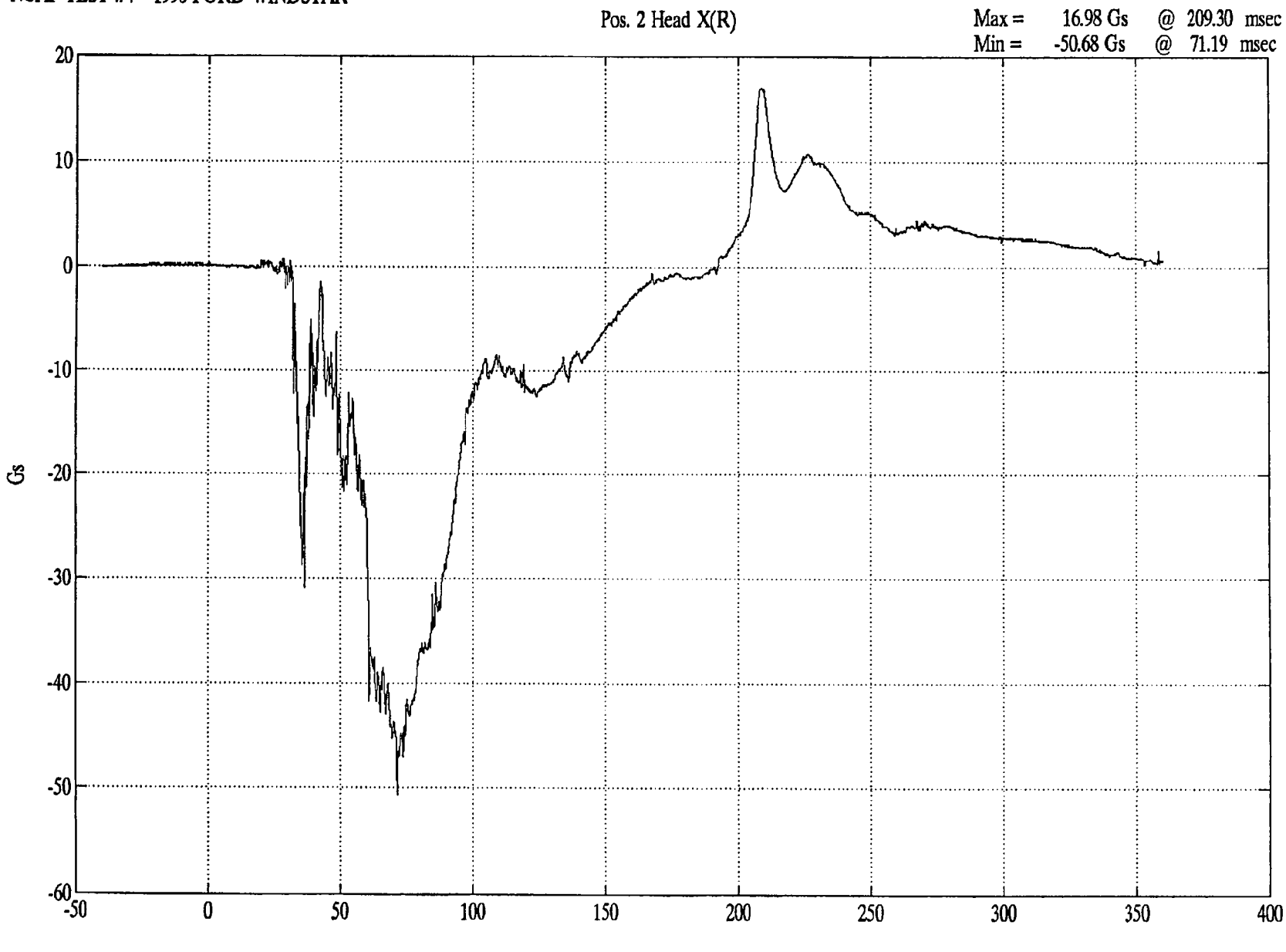


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

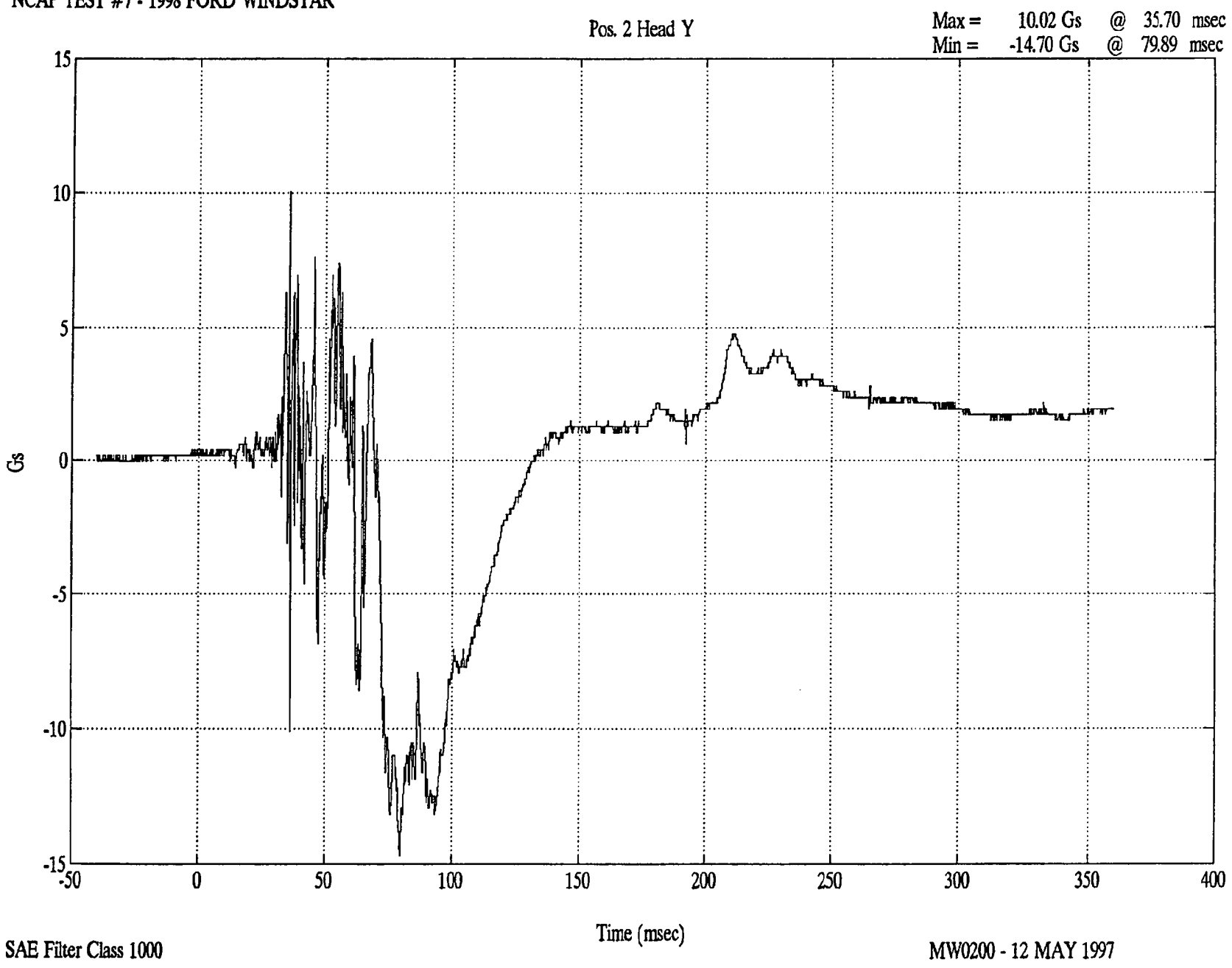


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

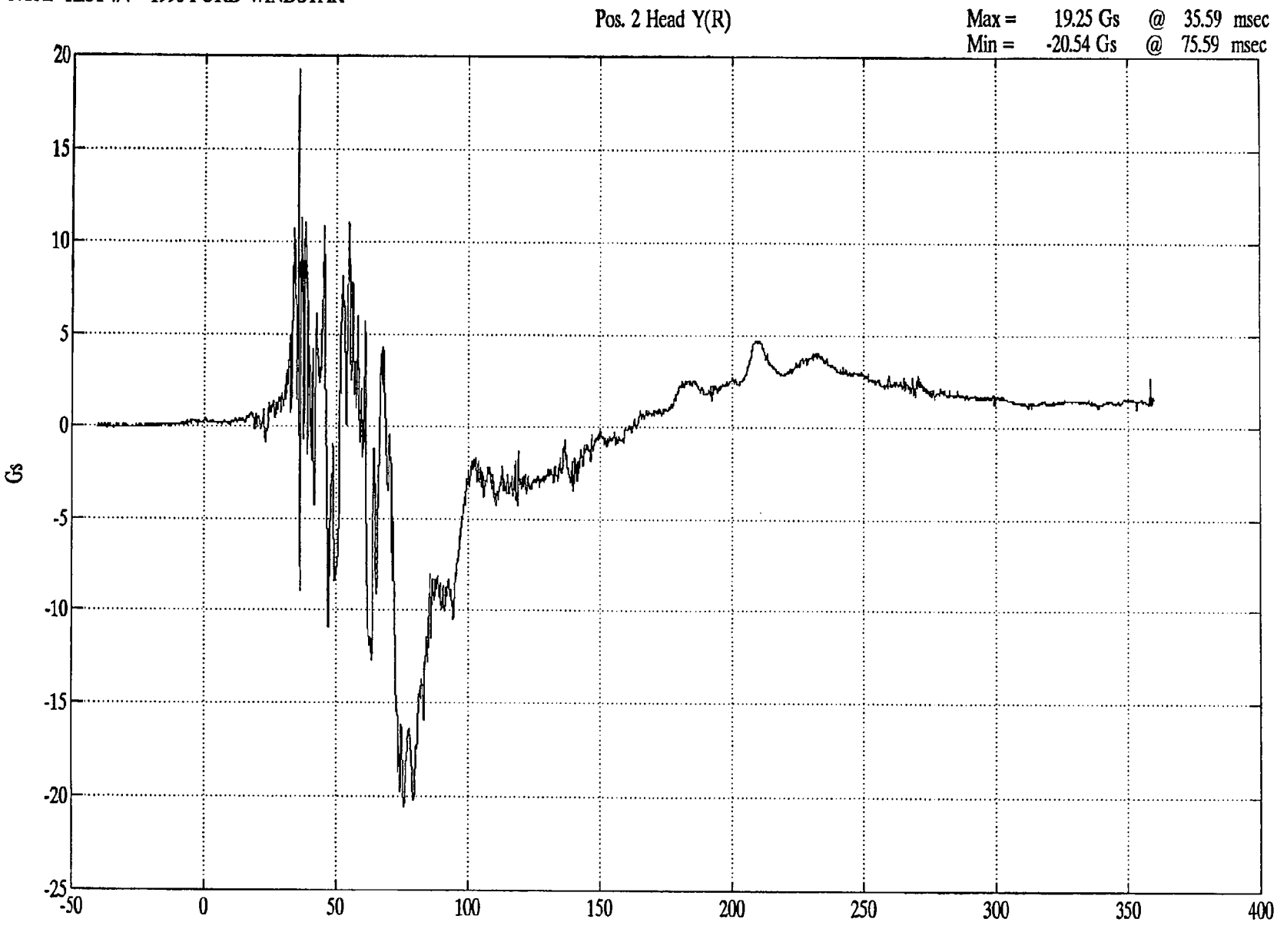
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 1000

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

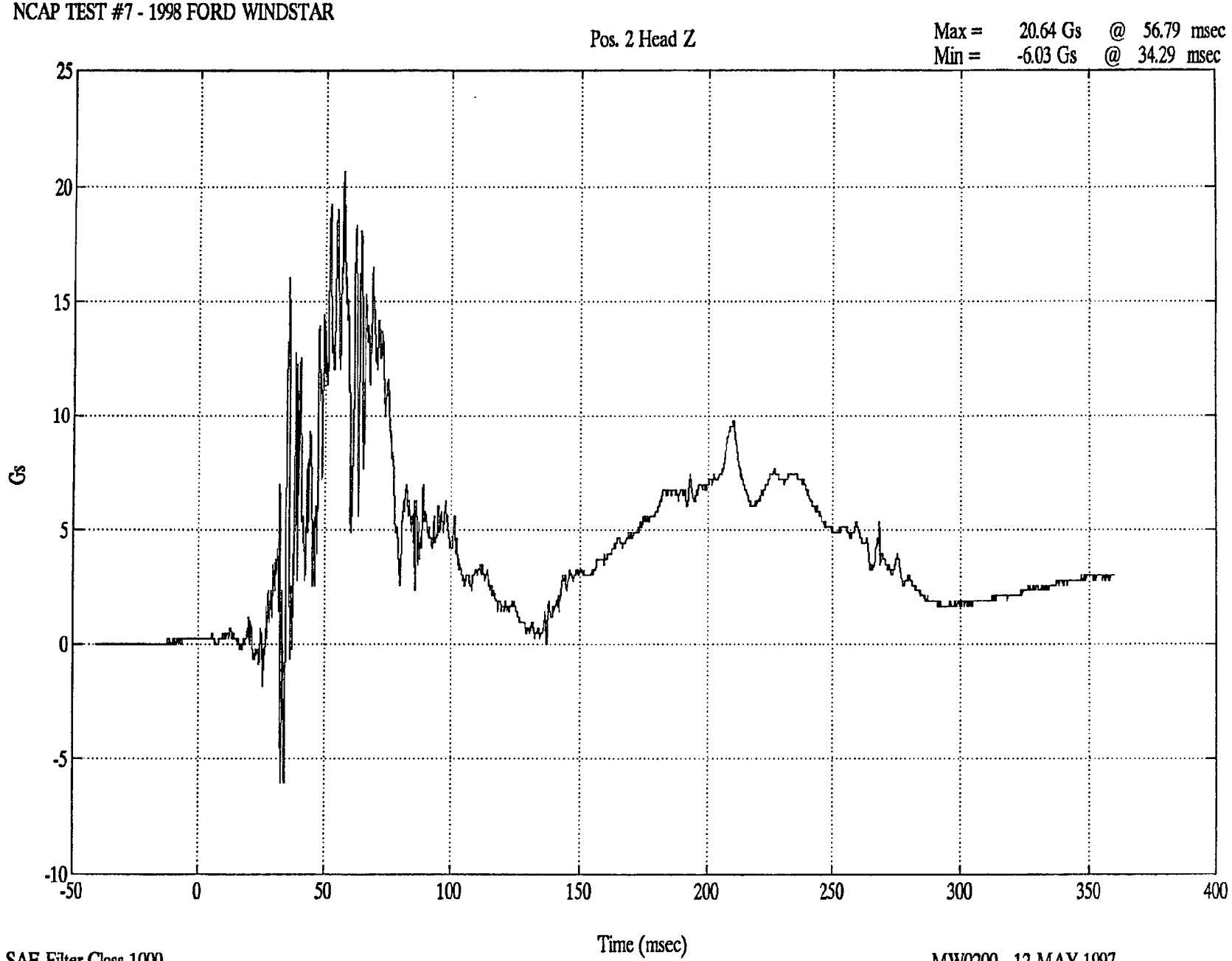


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR



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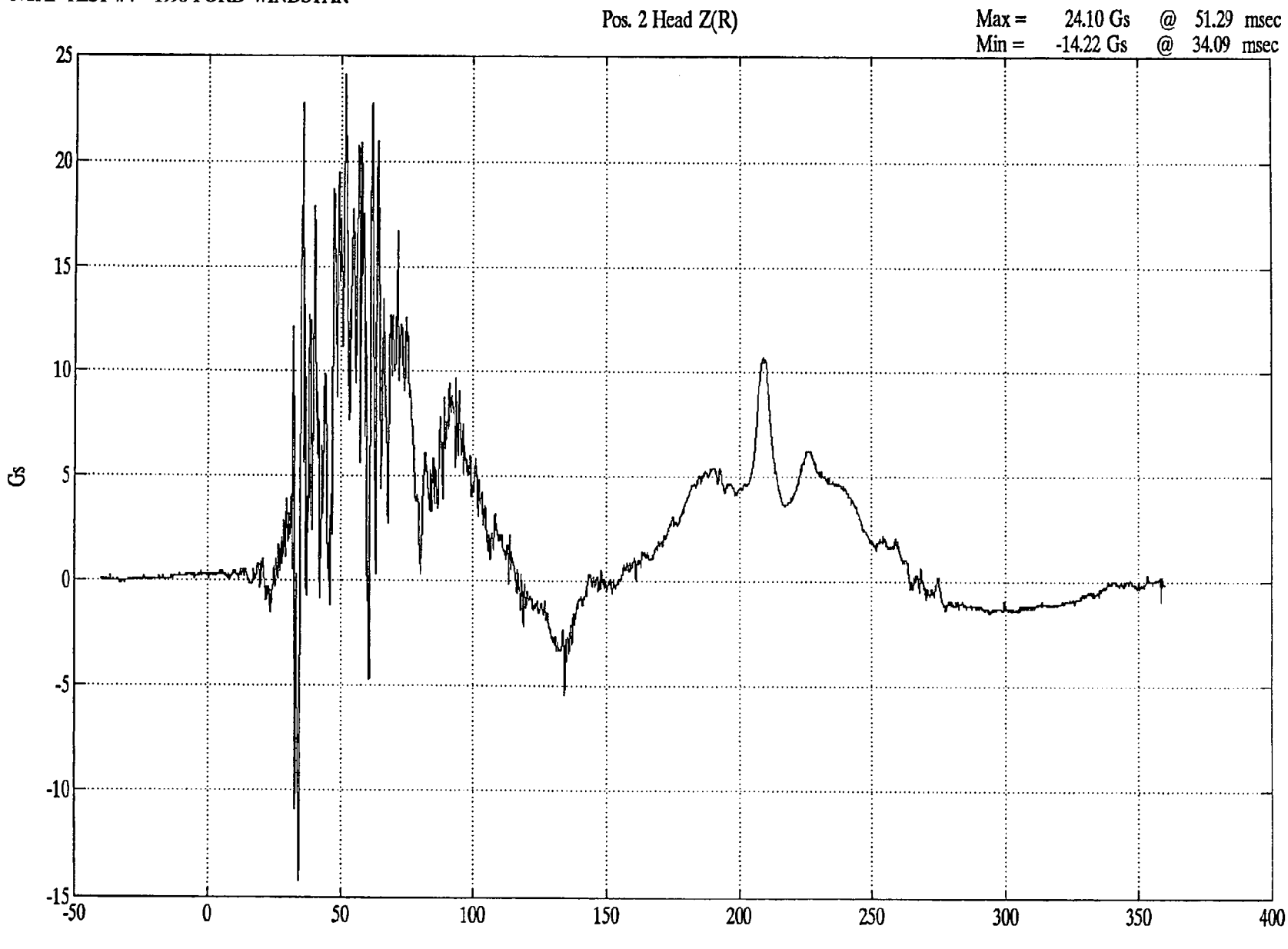
8406-7

SAE Filter Class 1000

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

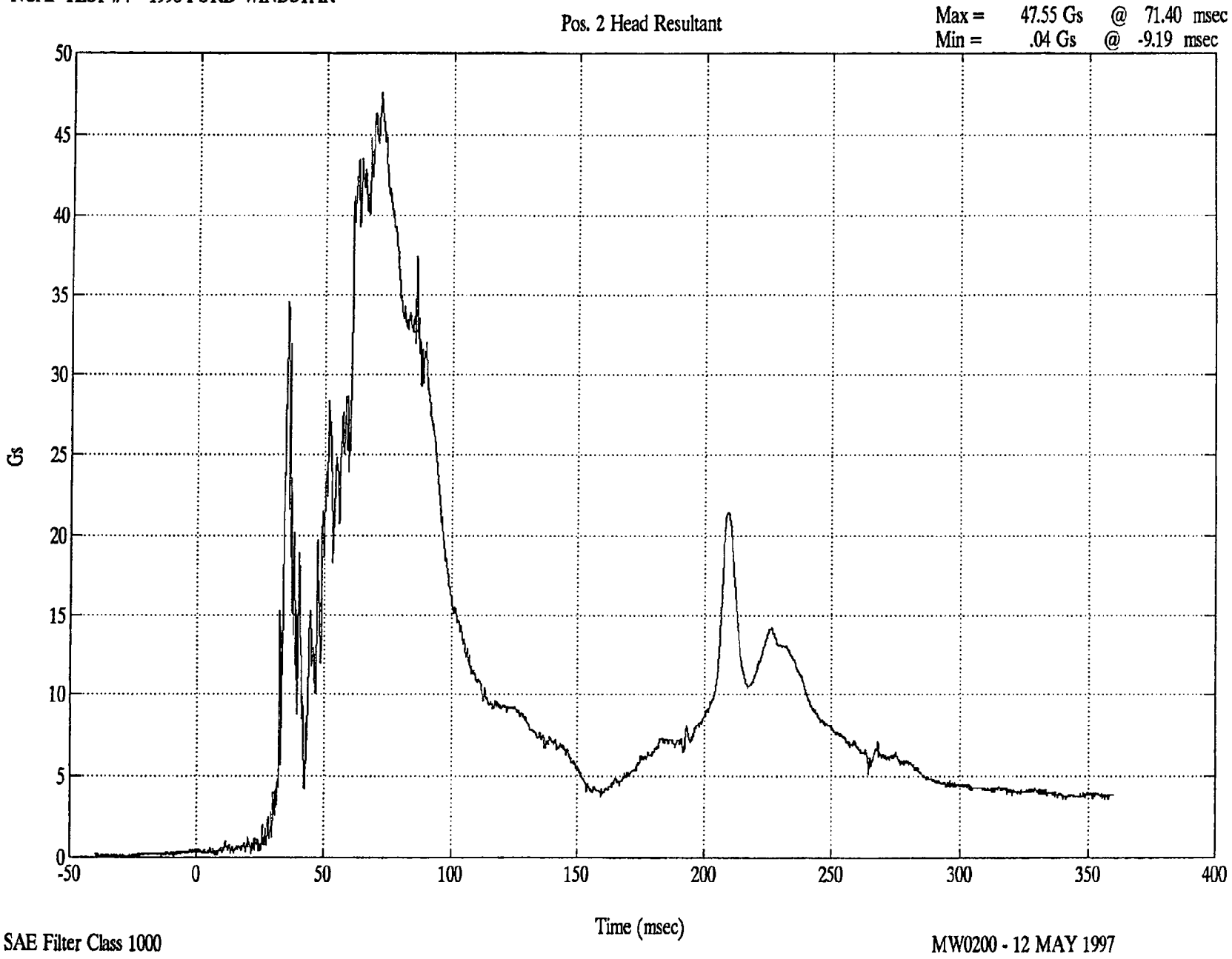


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

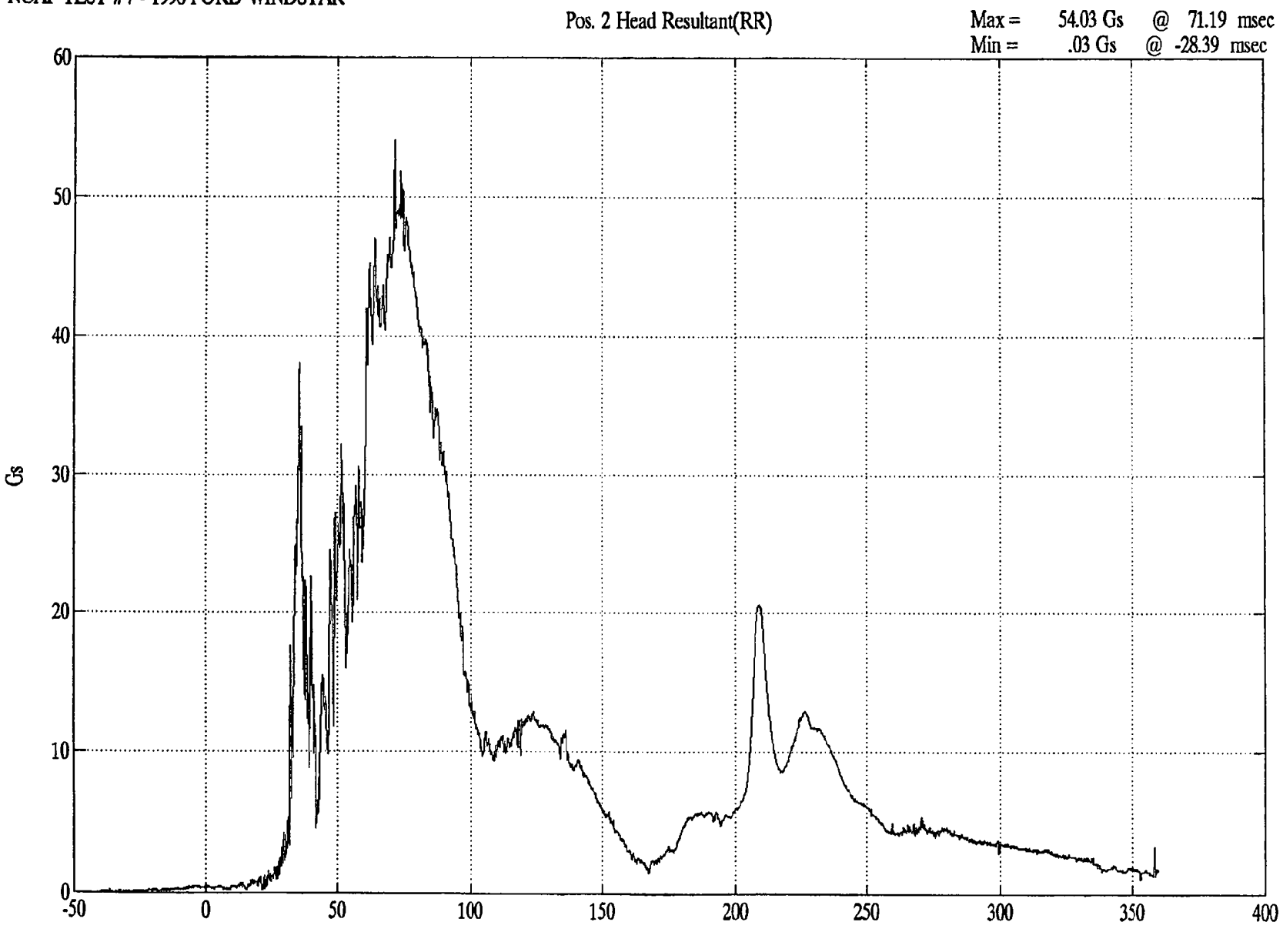


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

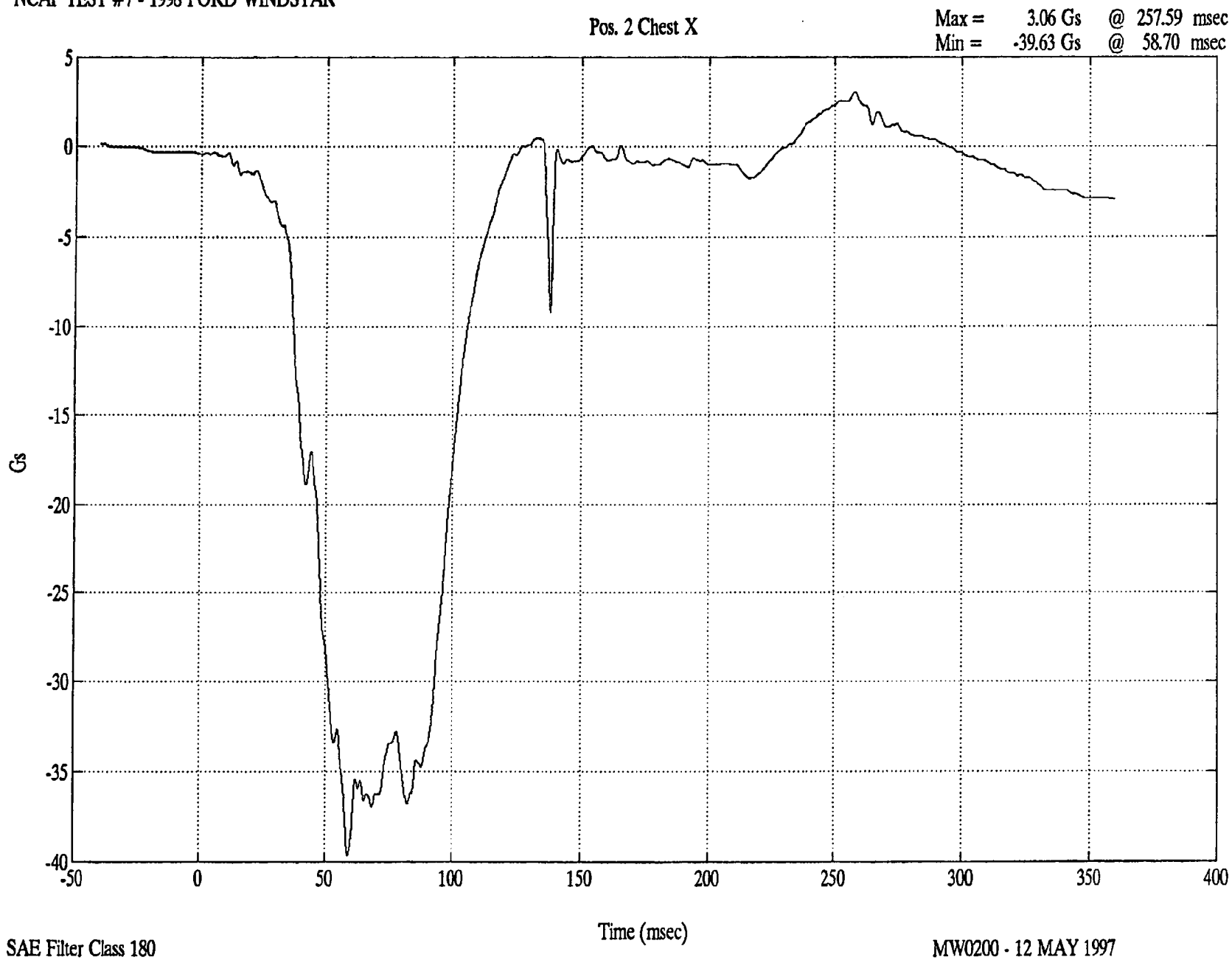


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

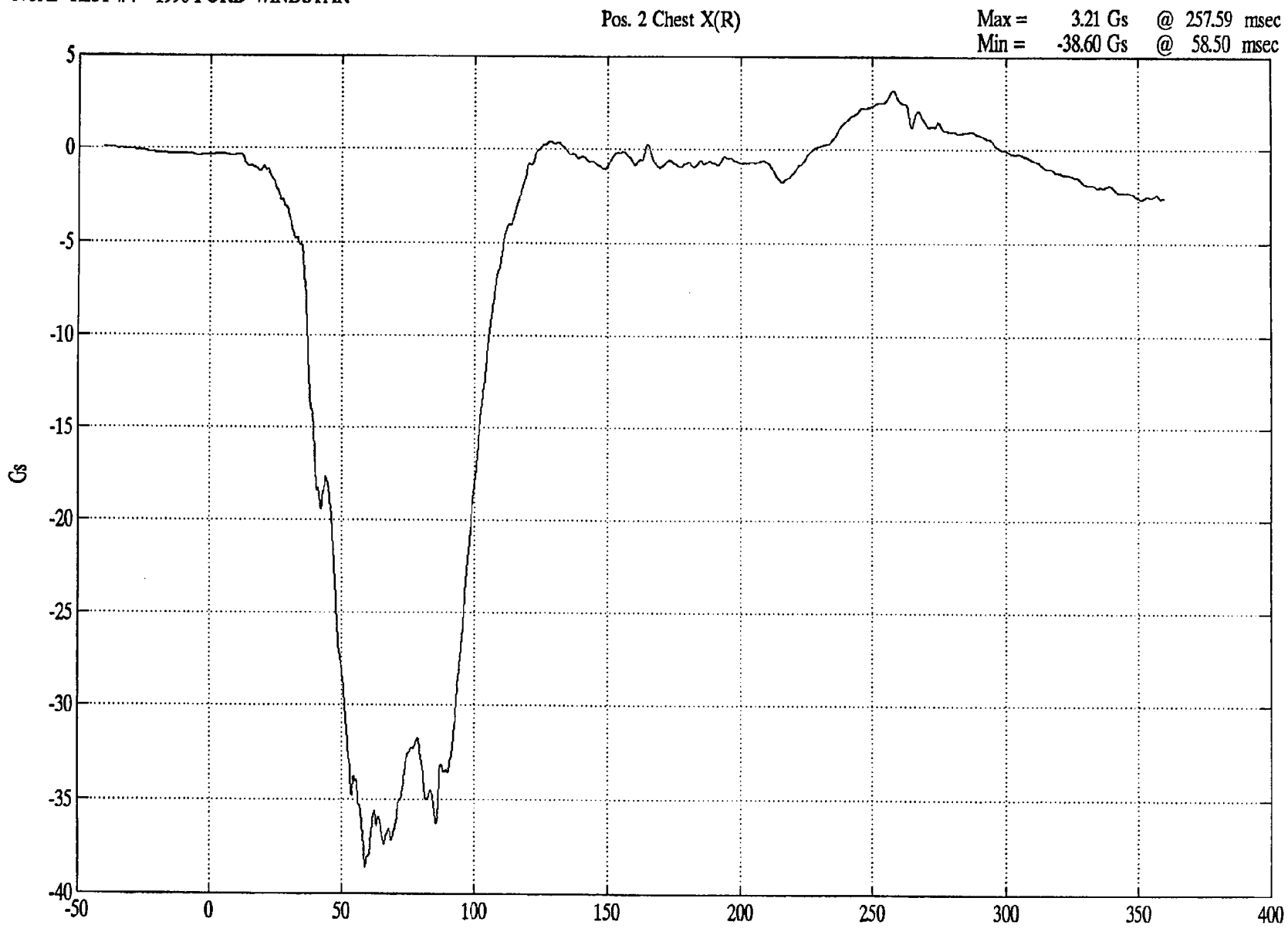


SAE Filter Class 180

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR



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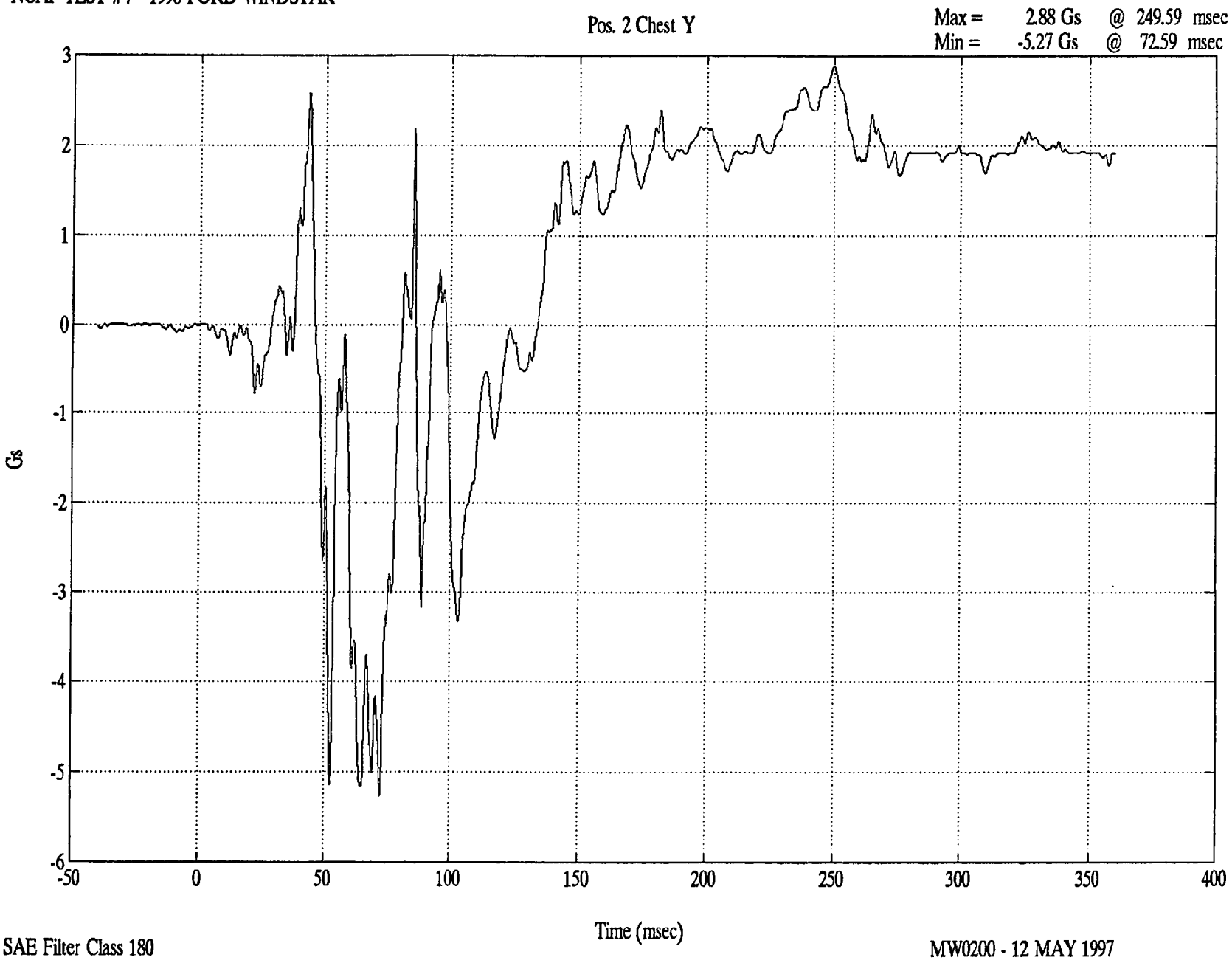
8406-7

SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

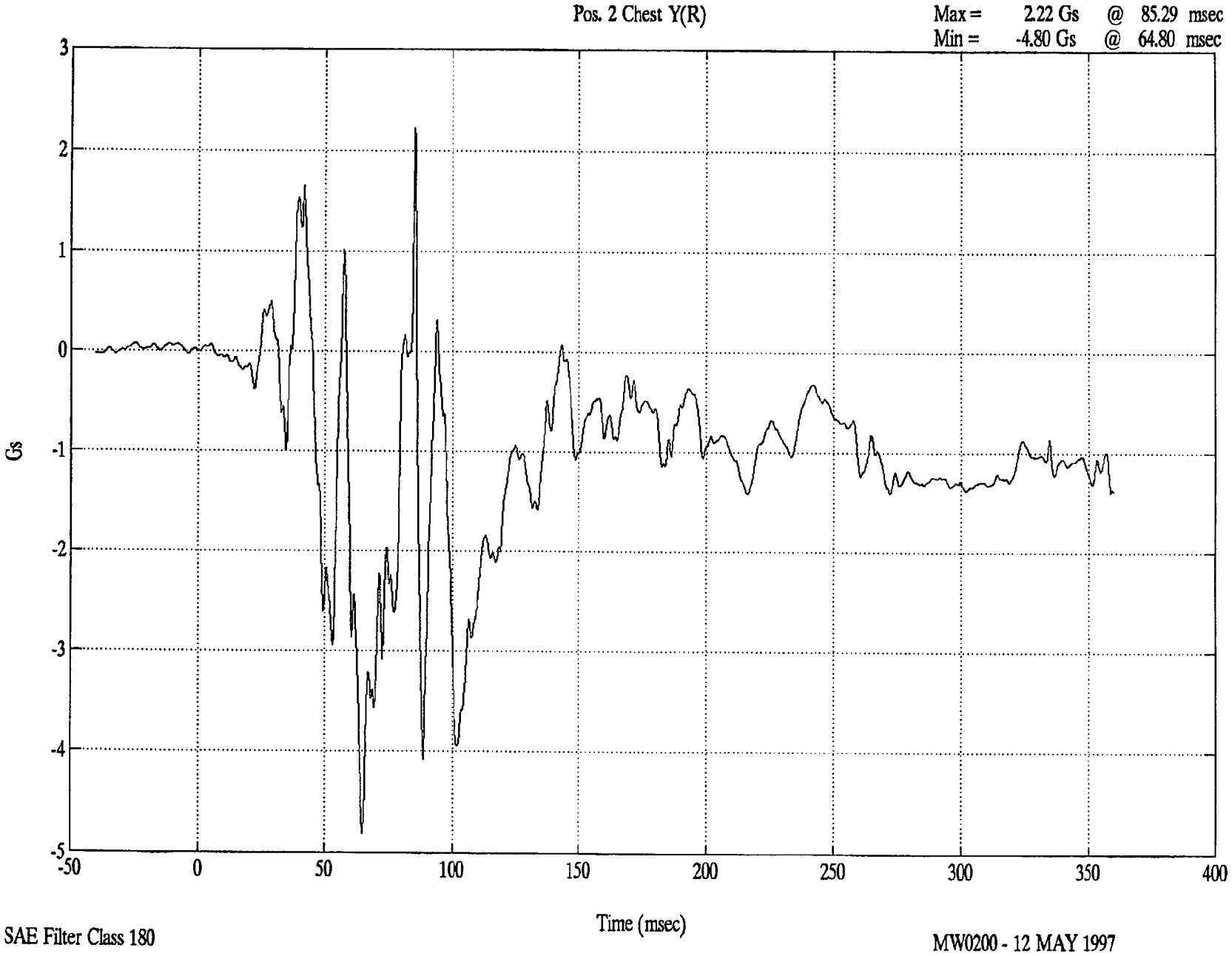


SAE Filter Class 180

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR



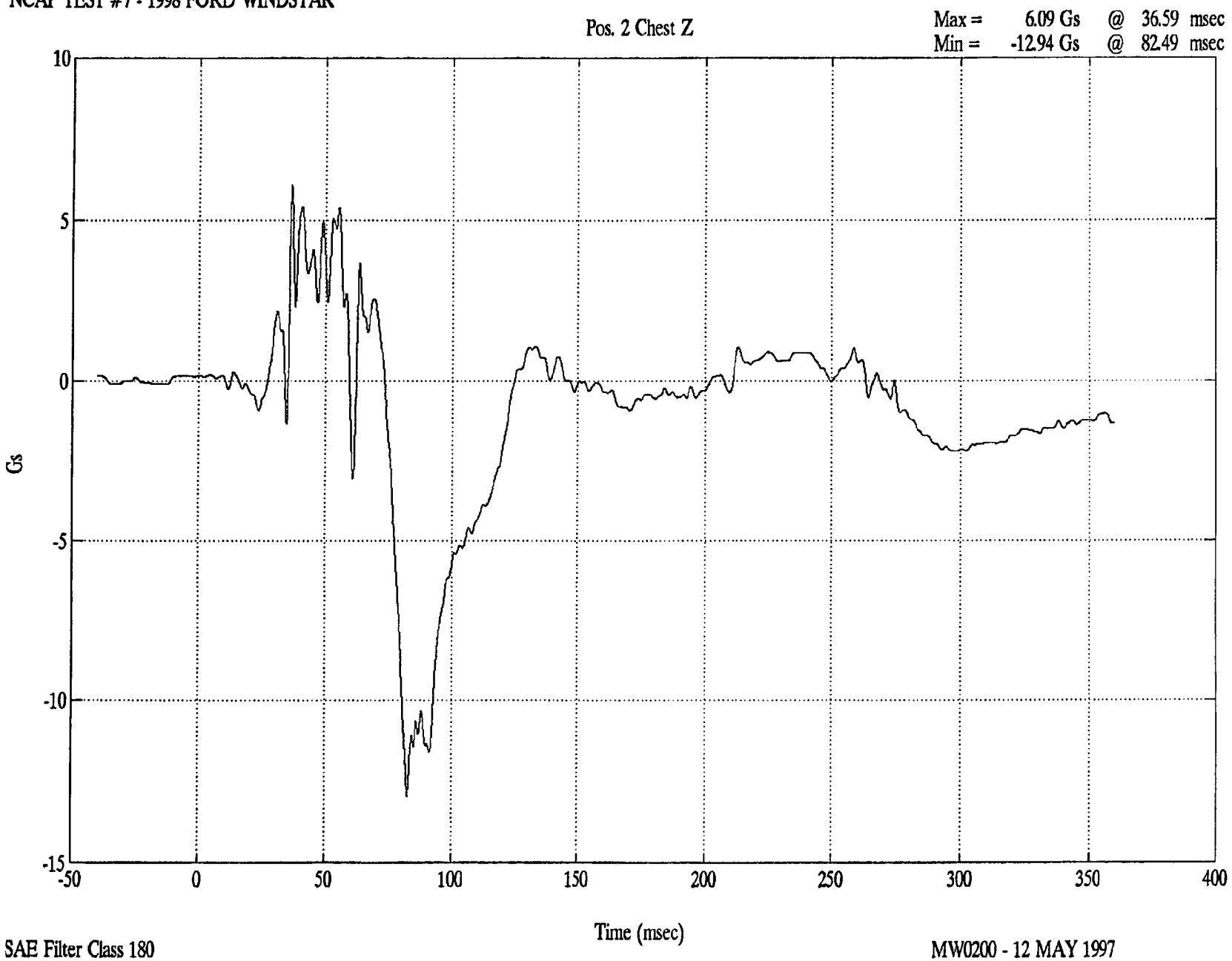
B-65

8406-7

SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



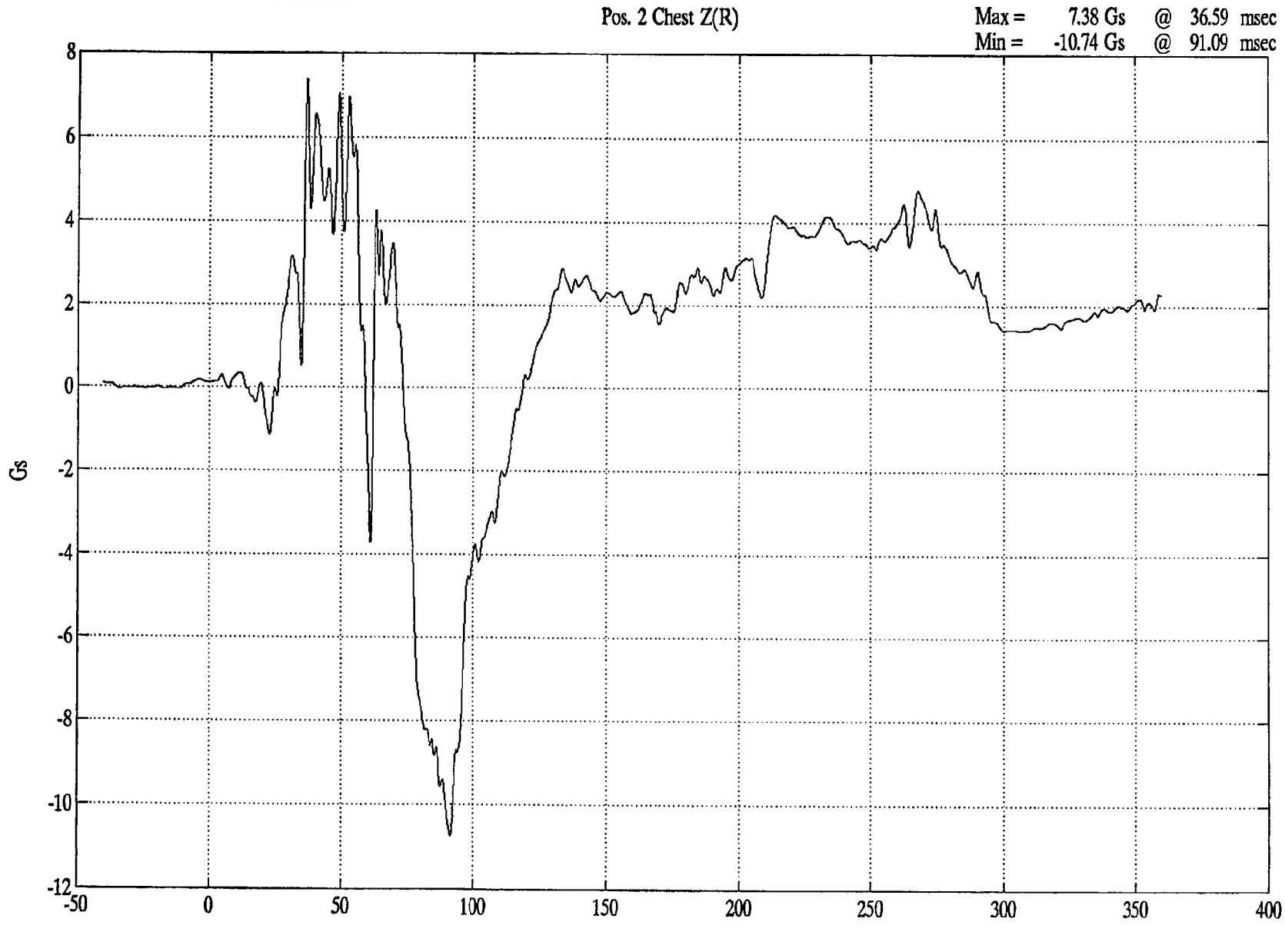
B-66

8406-7

SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

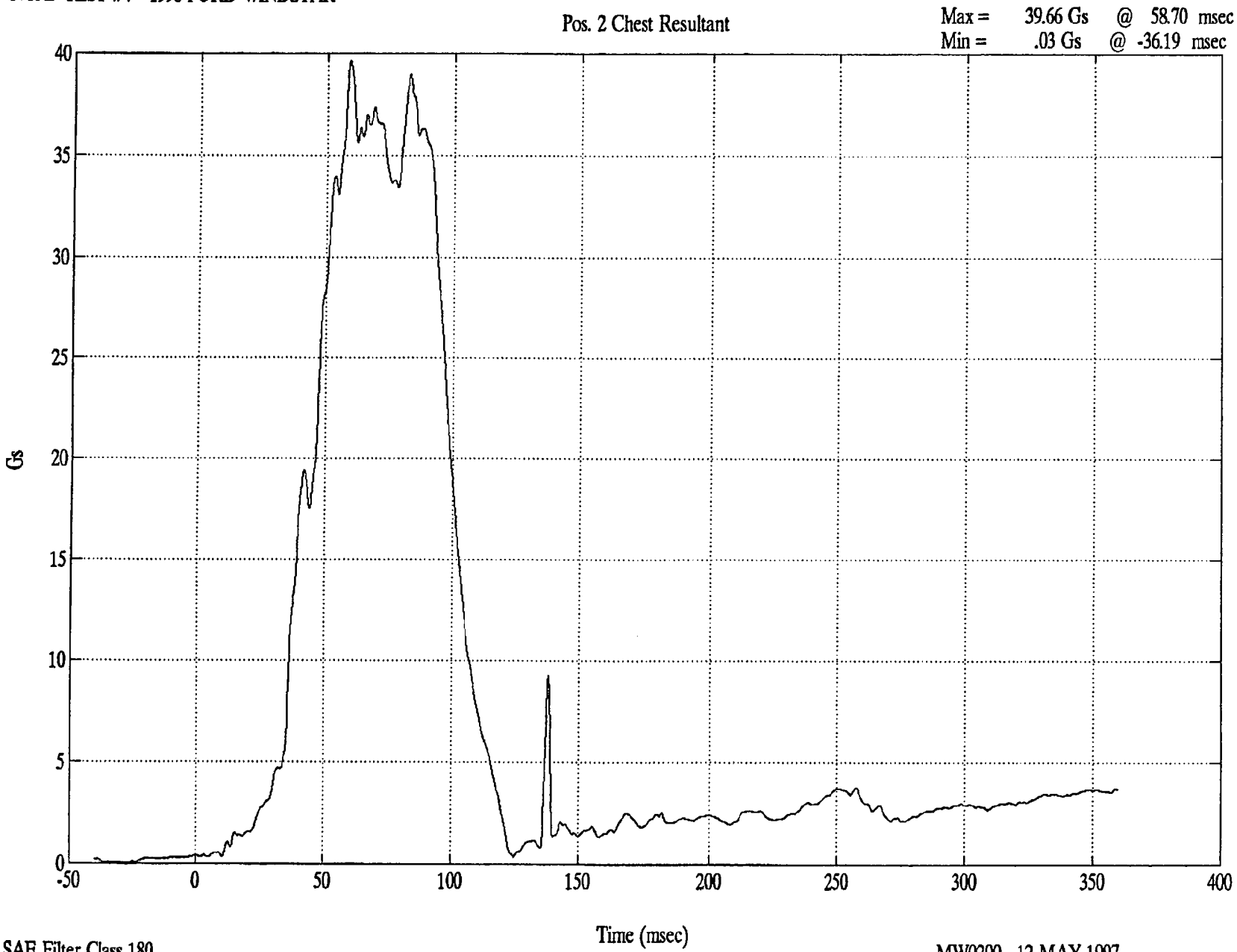


SAE Filter Class 180

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

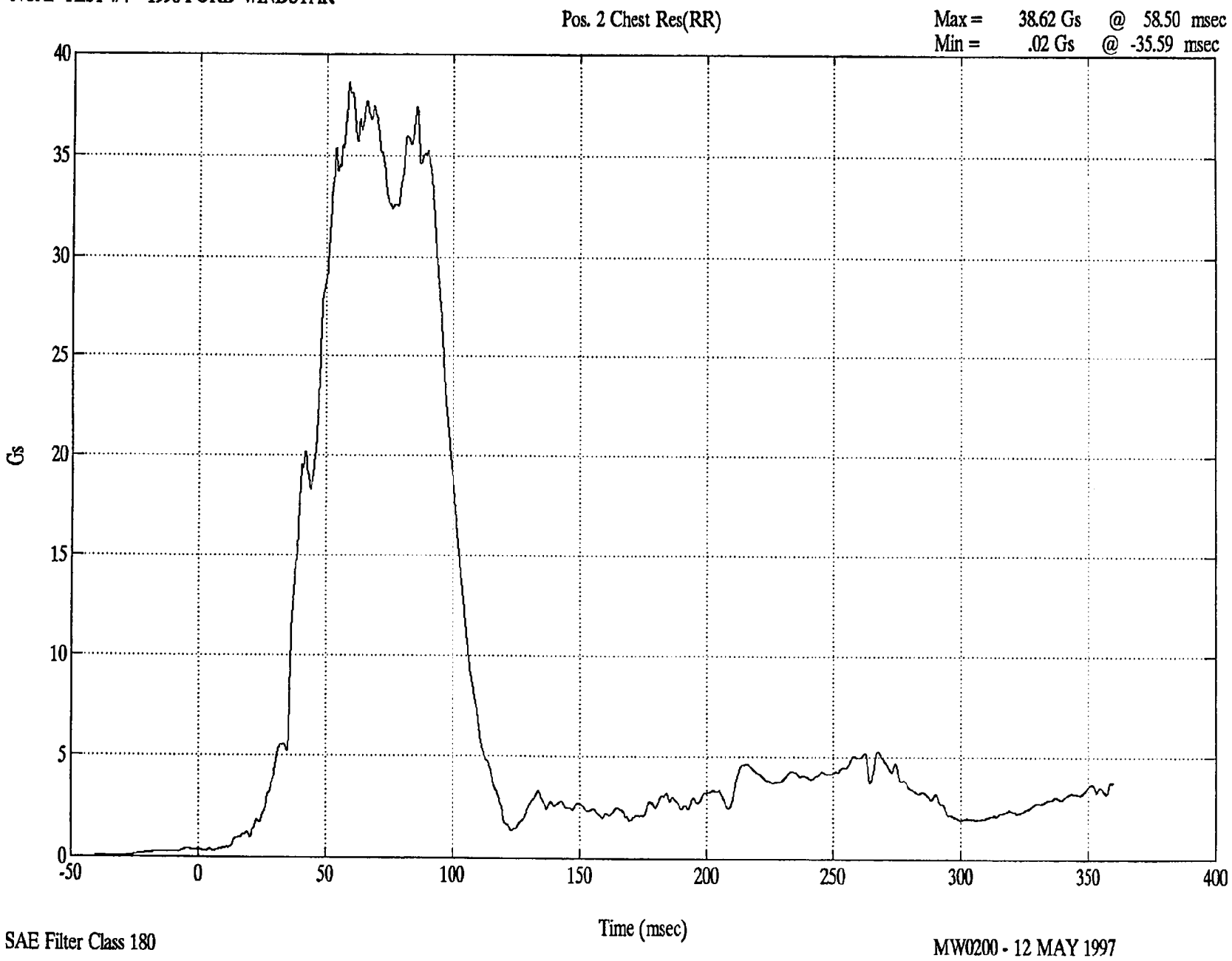


SAE Filter Class 180

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

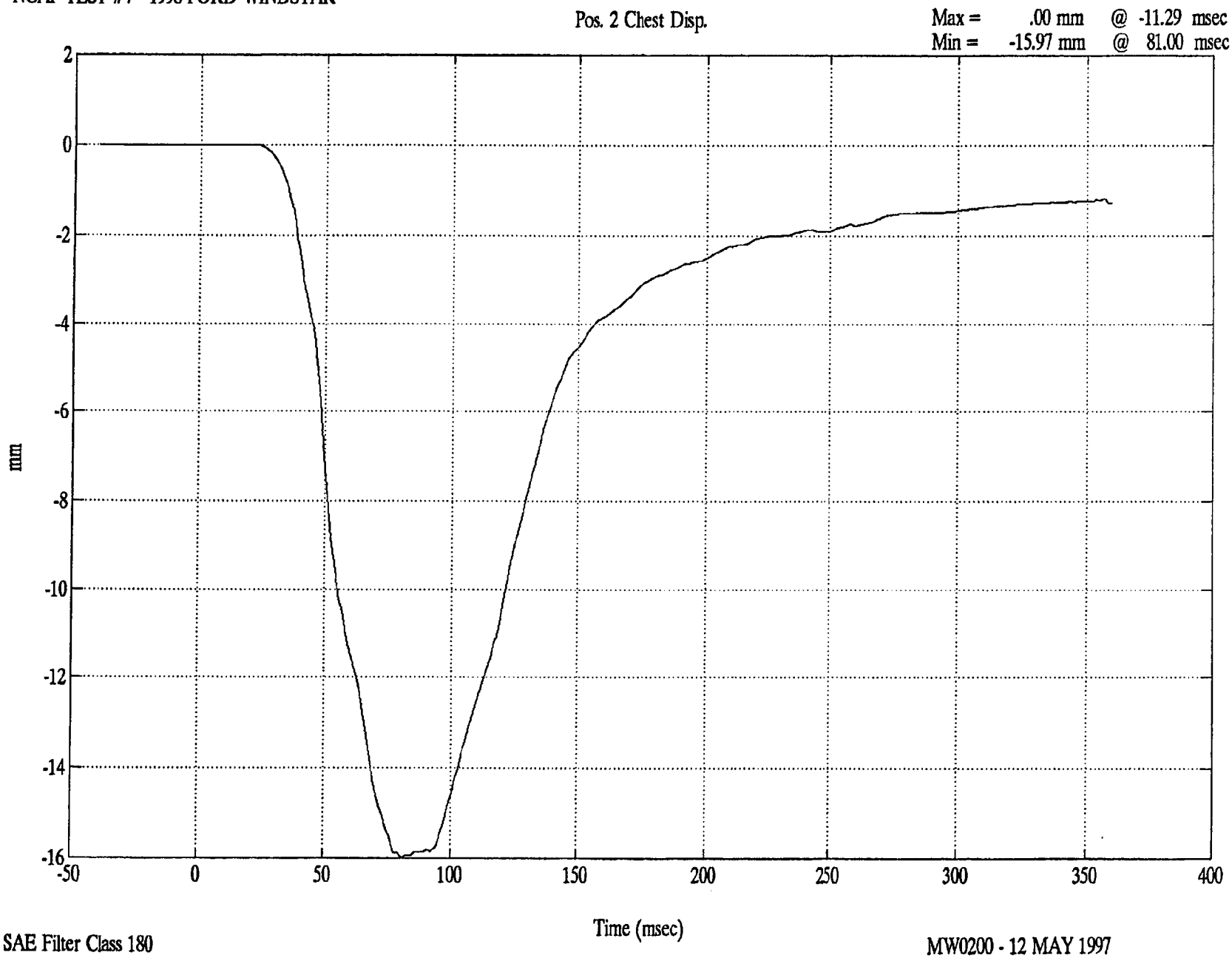


SAE Filter Class 180

MW0200 - 12 MAY 1997

8406-7

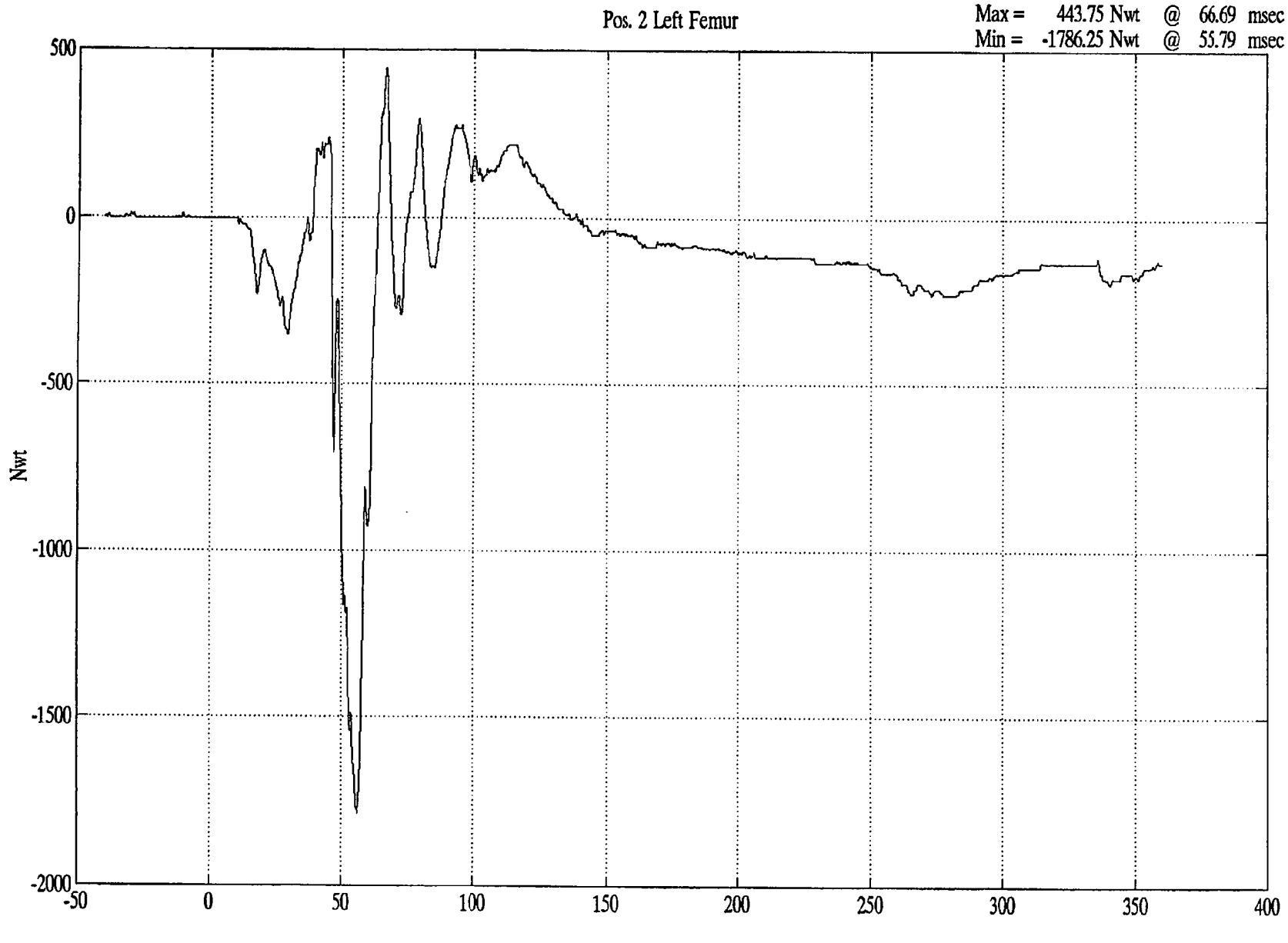
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 180

MW0200 - 12 MAY 1997

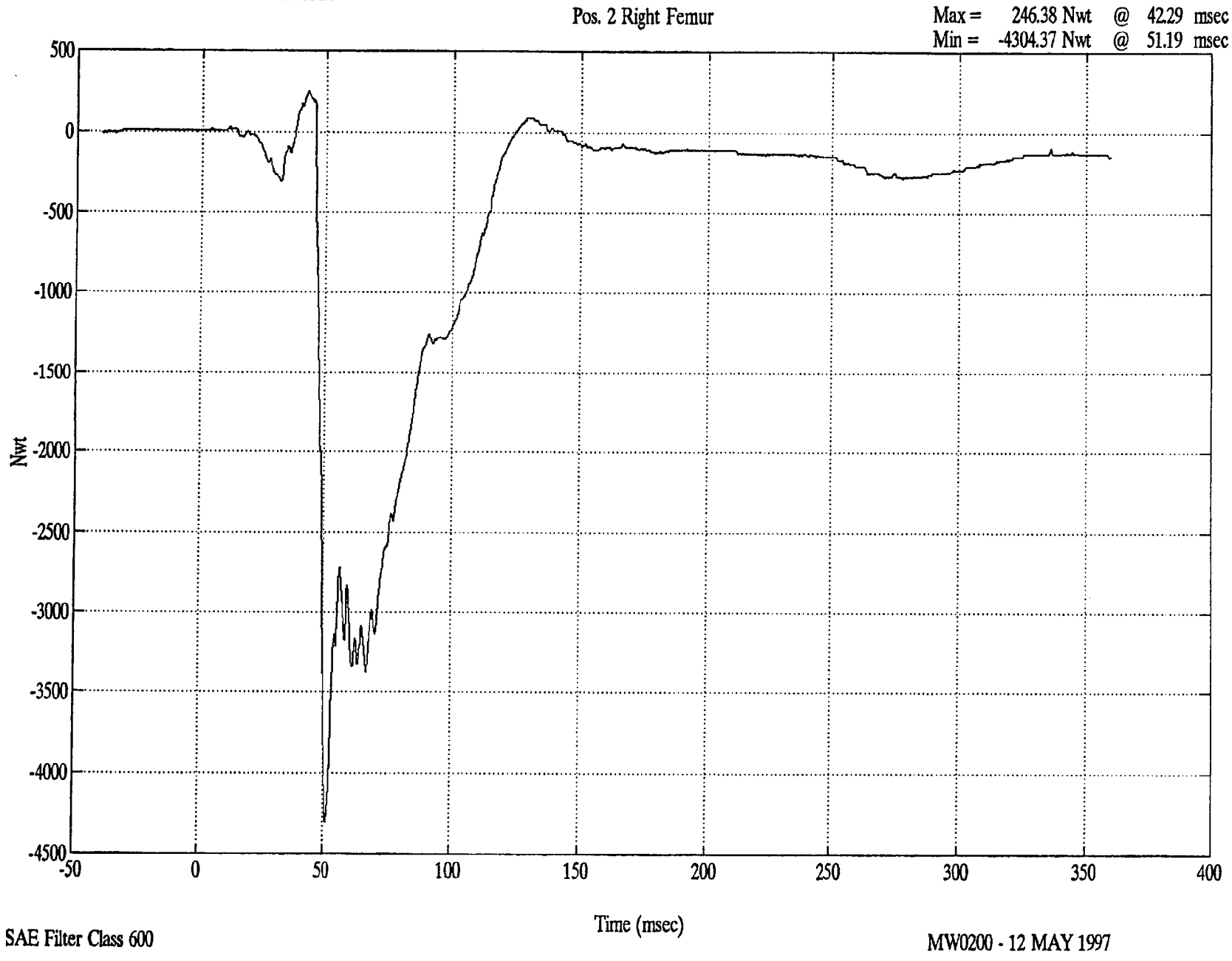
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 600

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

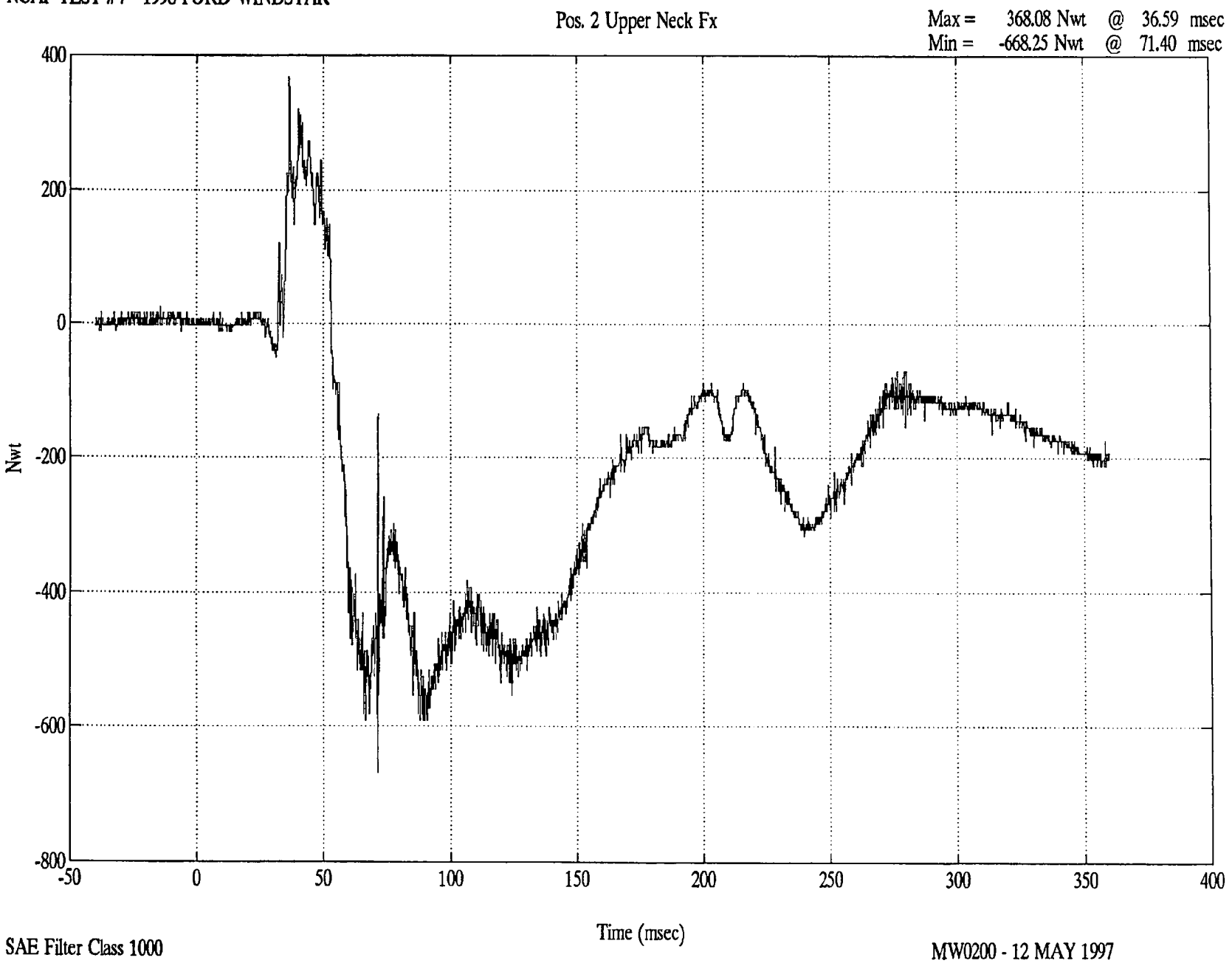


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

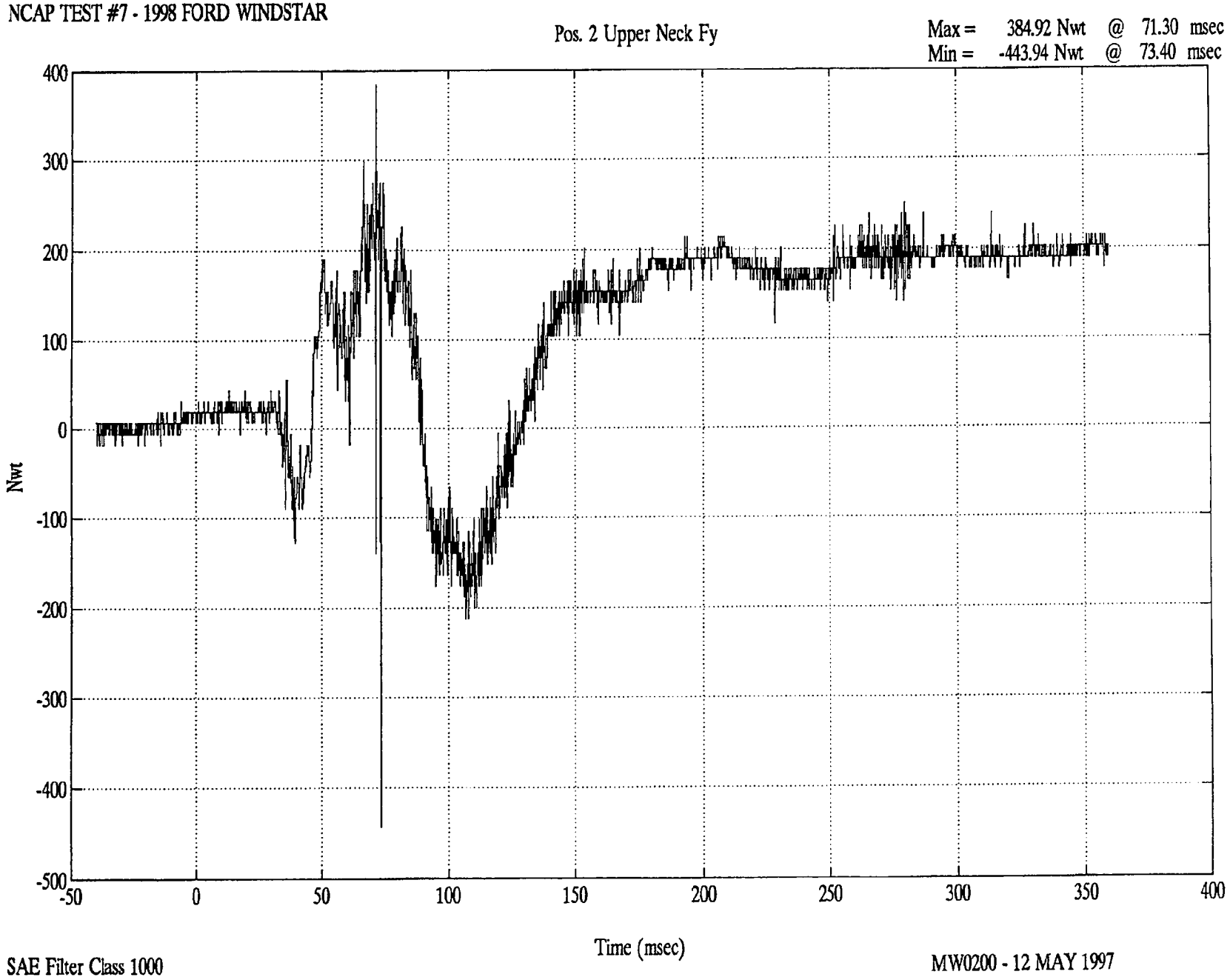
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 1000

MW0200 - 12 MAY 1997

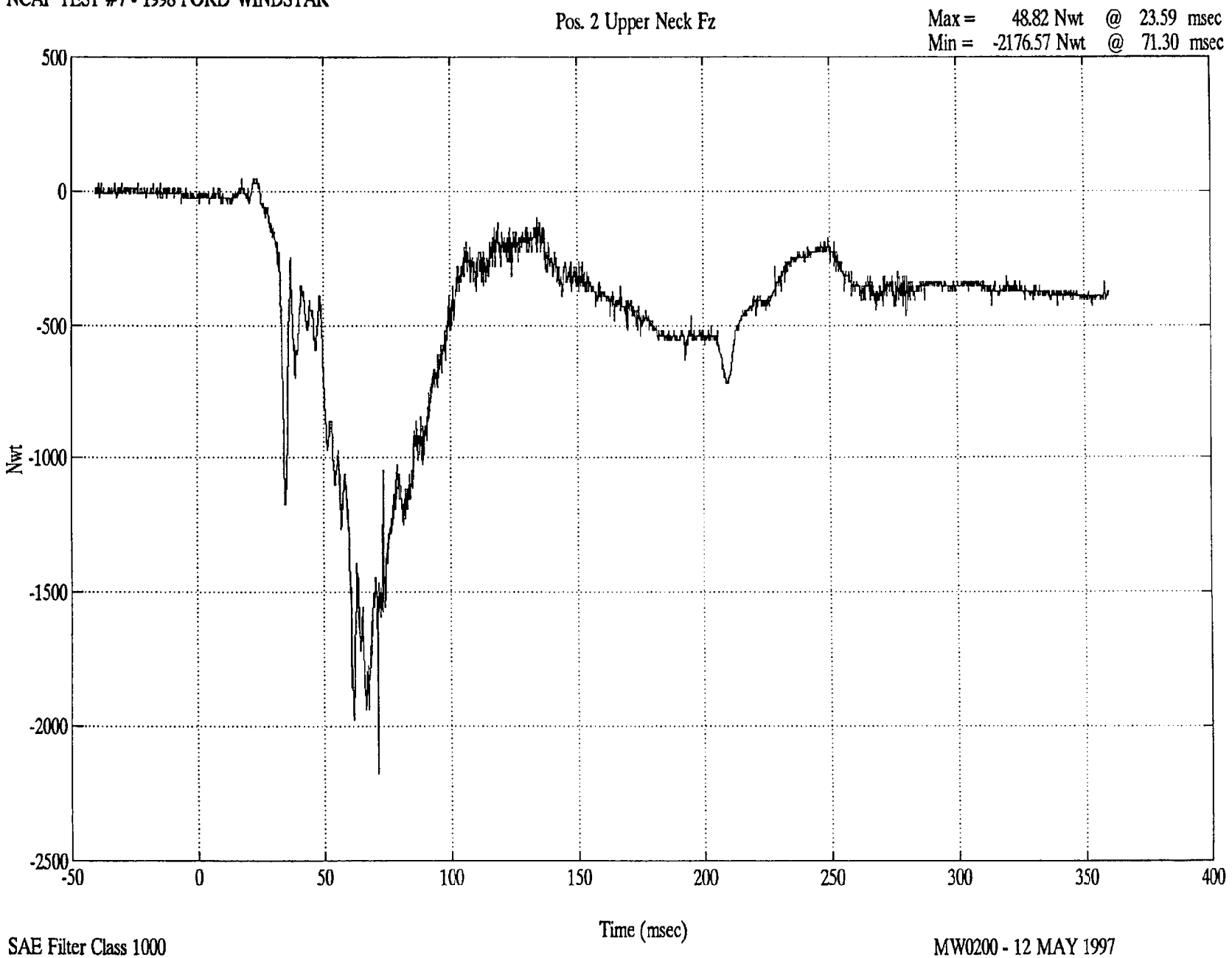
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 1000

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



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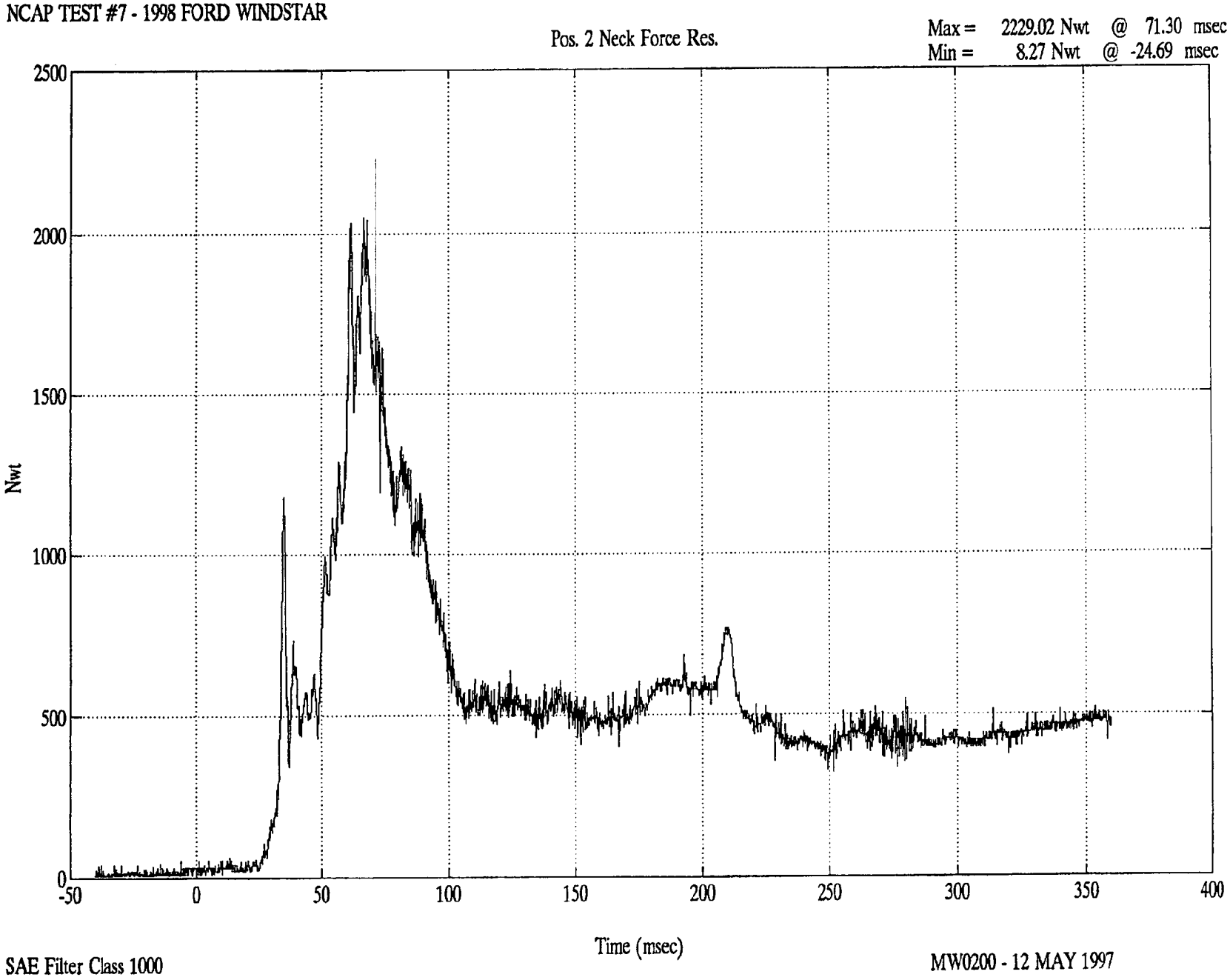
8406-7

SAE Filter Class 1000

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

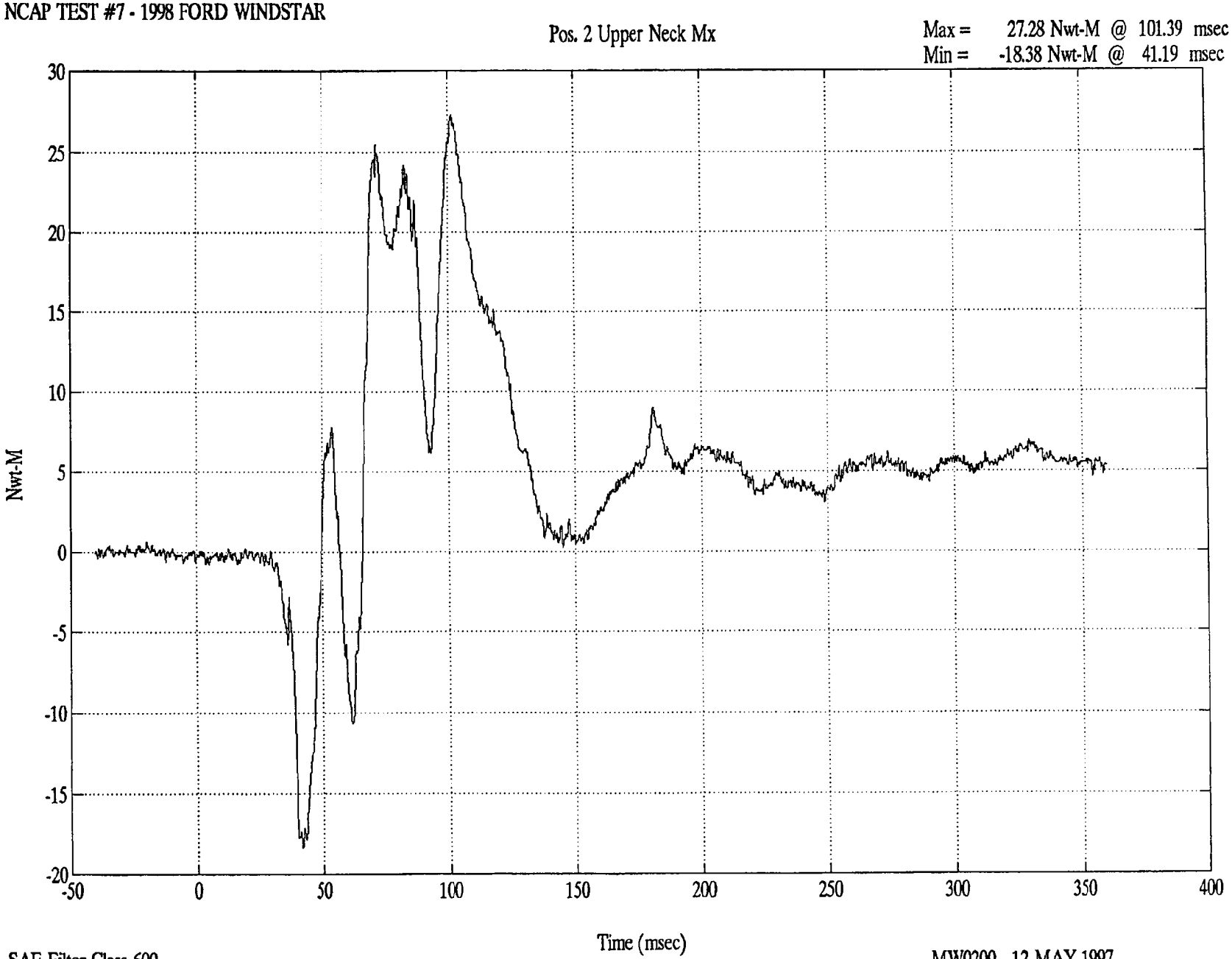


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

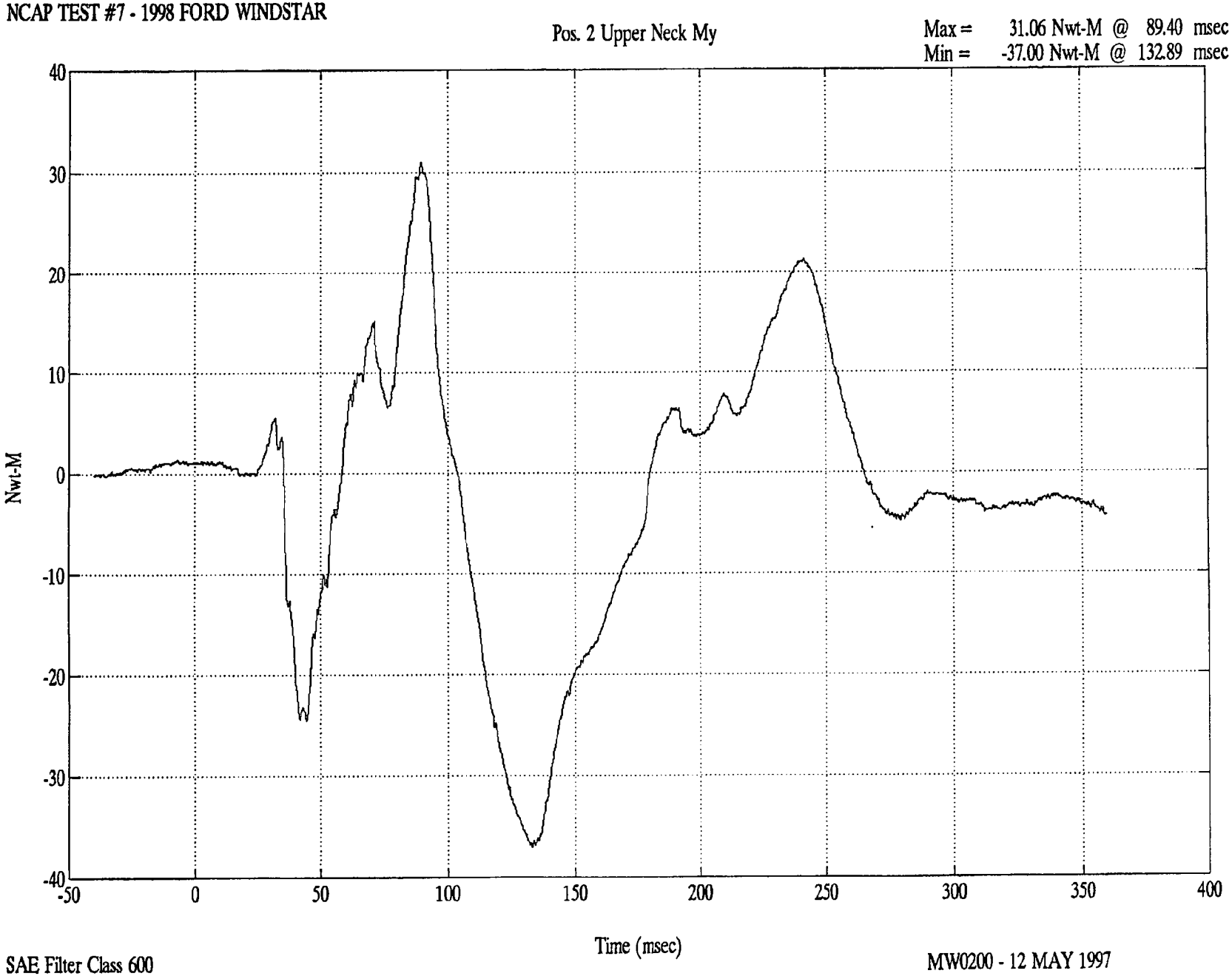


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

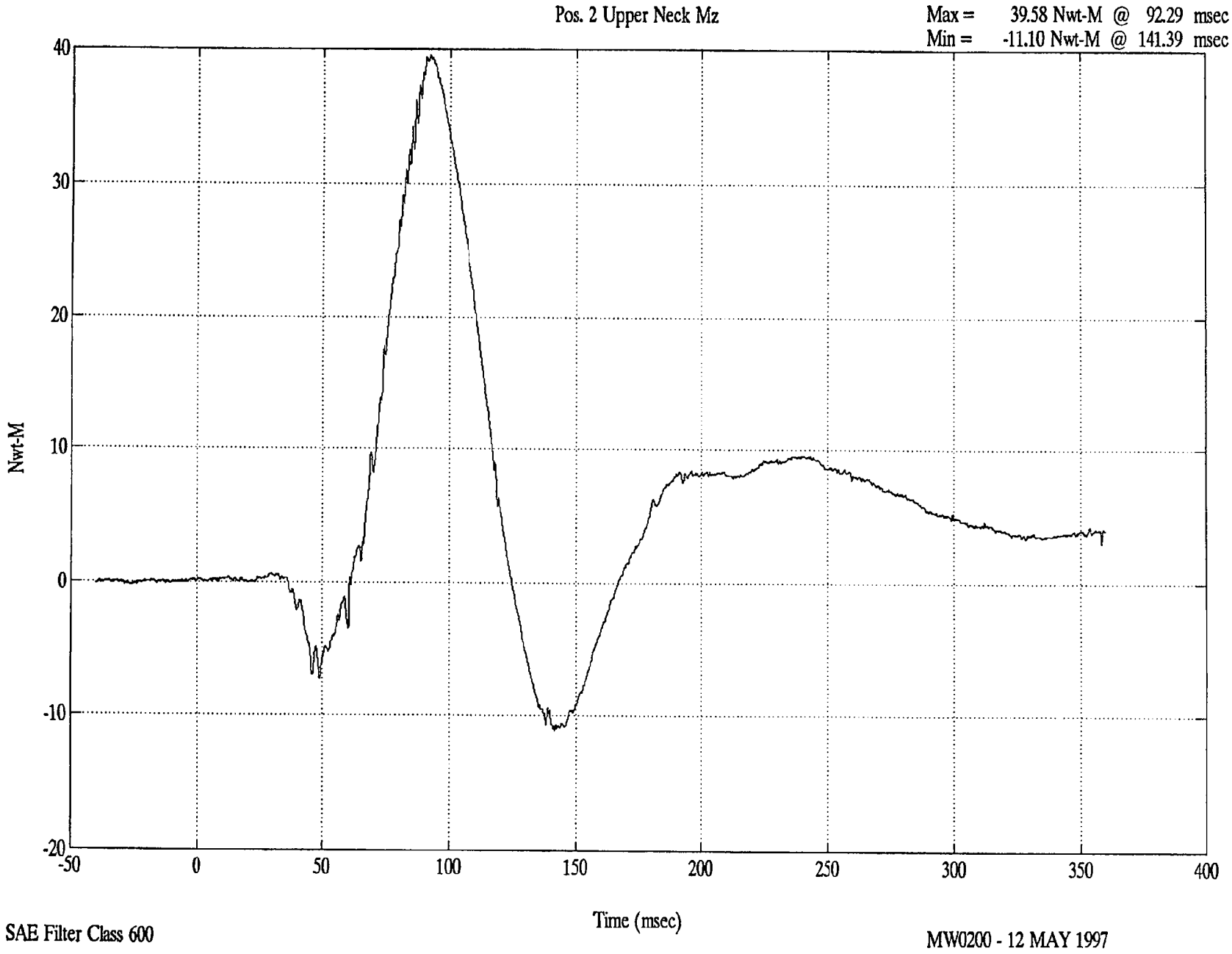


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 600

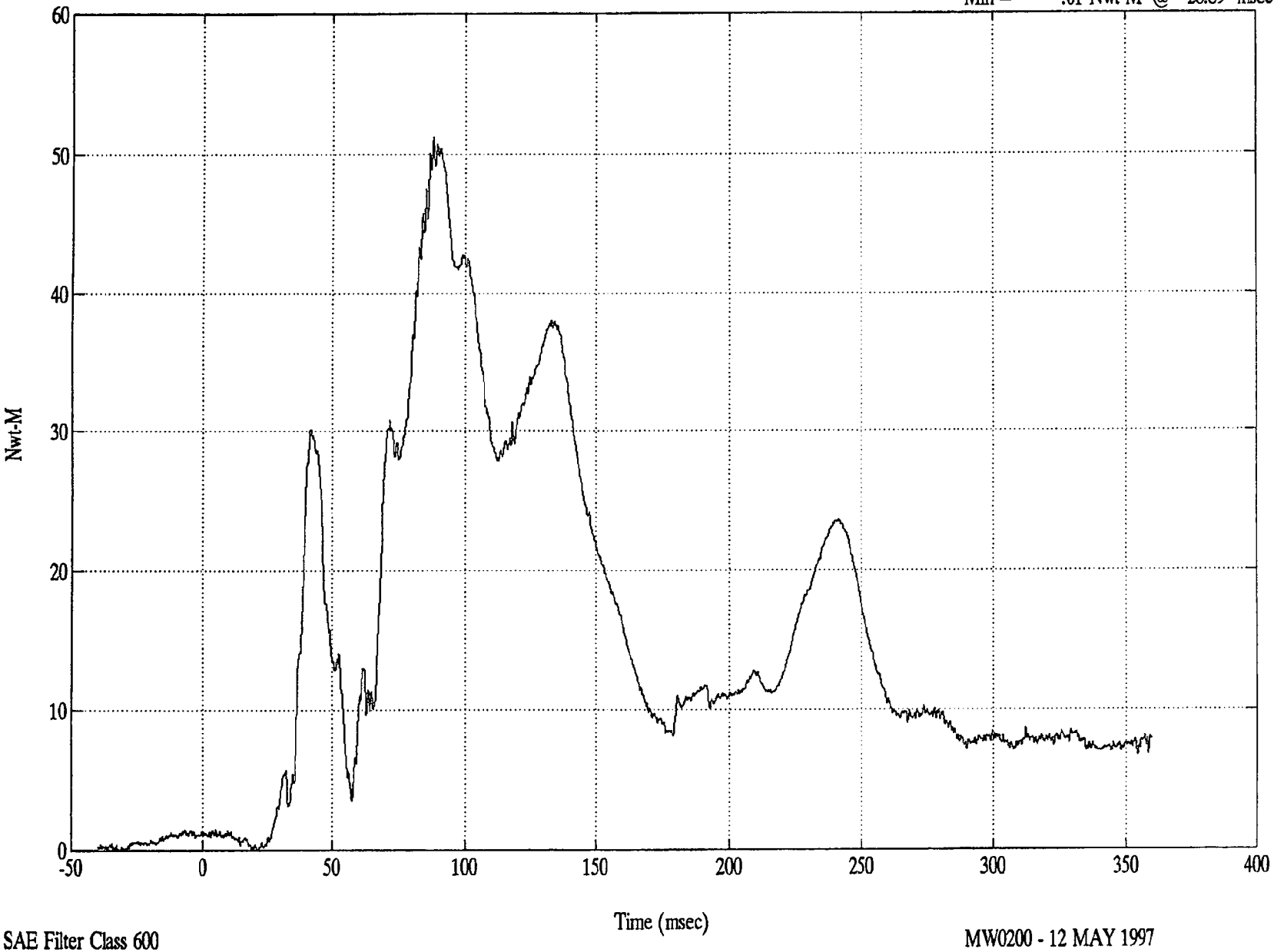
MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

Pos. 2 Neck Moment Res.

Max = 51.23 Nwt-M @ 87.90 msec
Min = .01 Nwt-M @ -28.89 msec

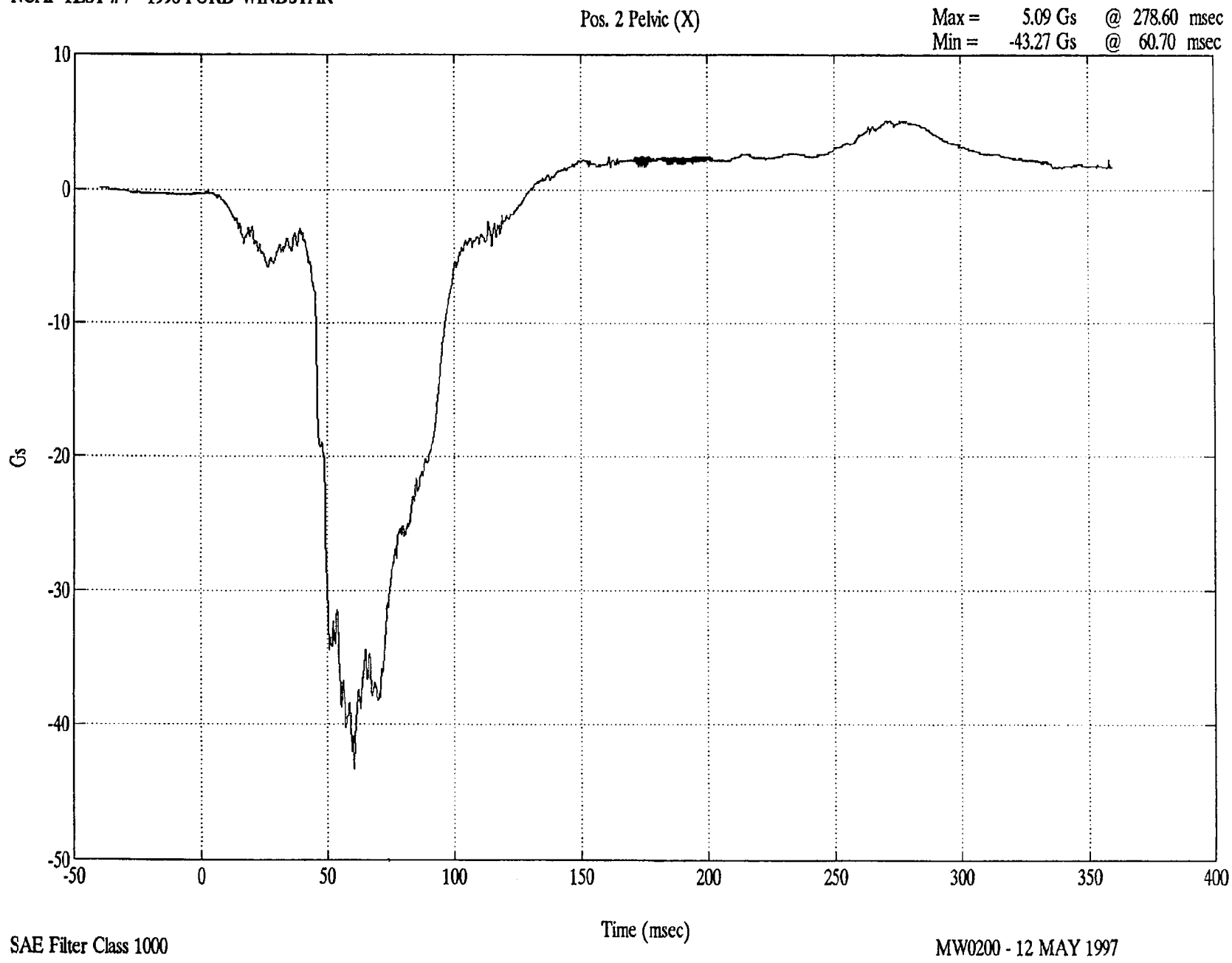


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

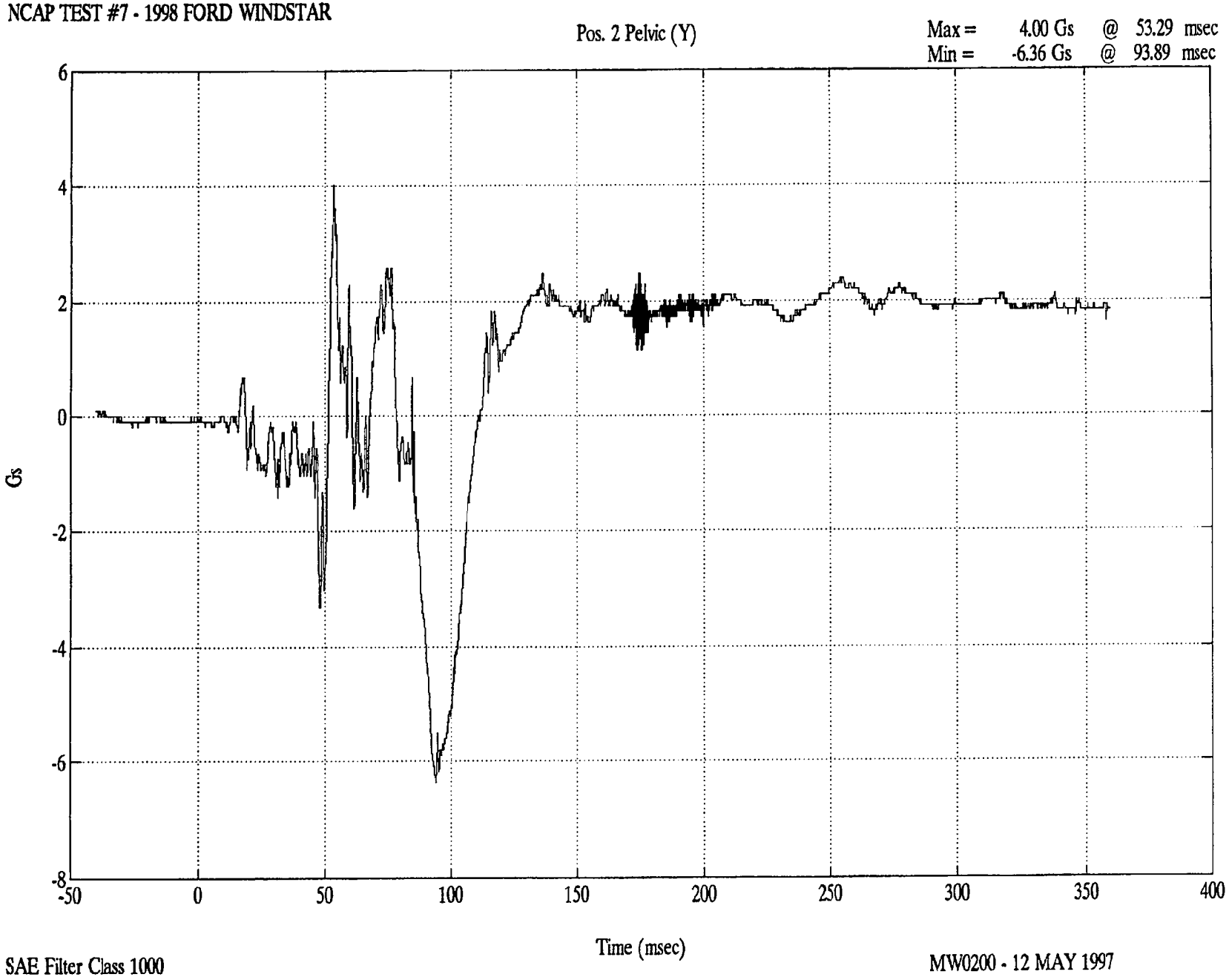


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

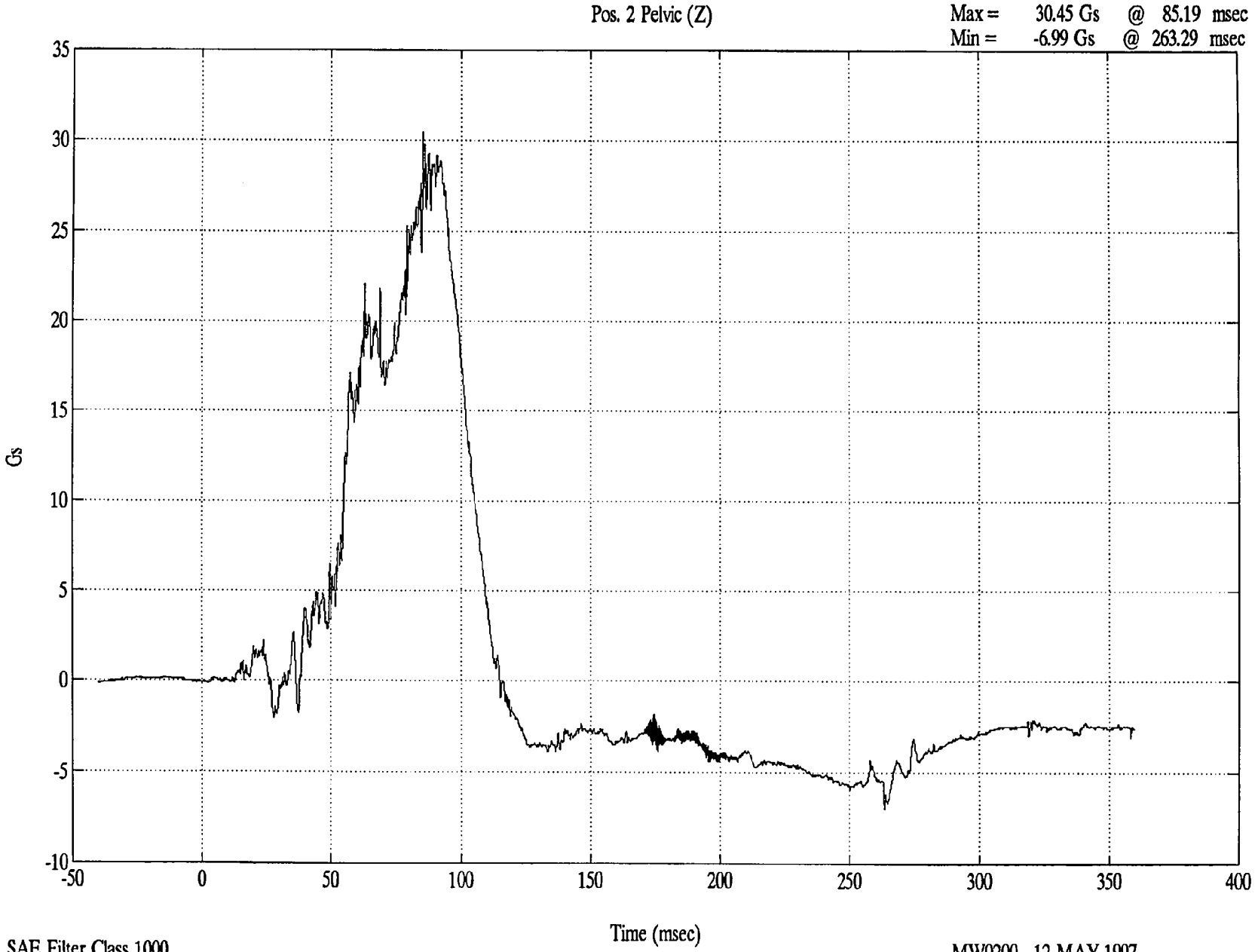
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 1000

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

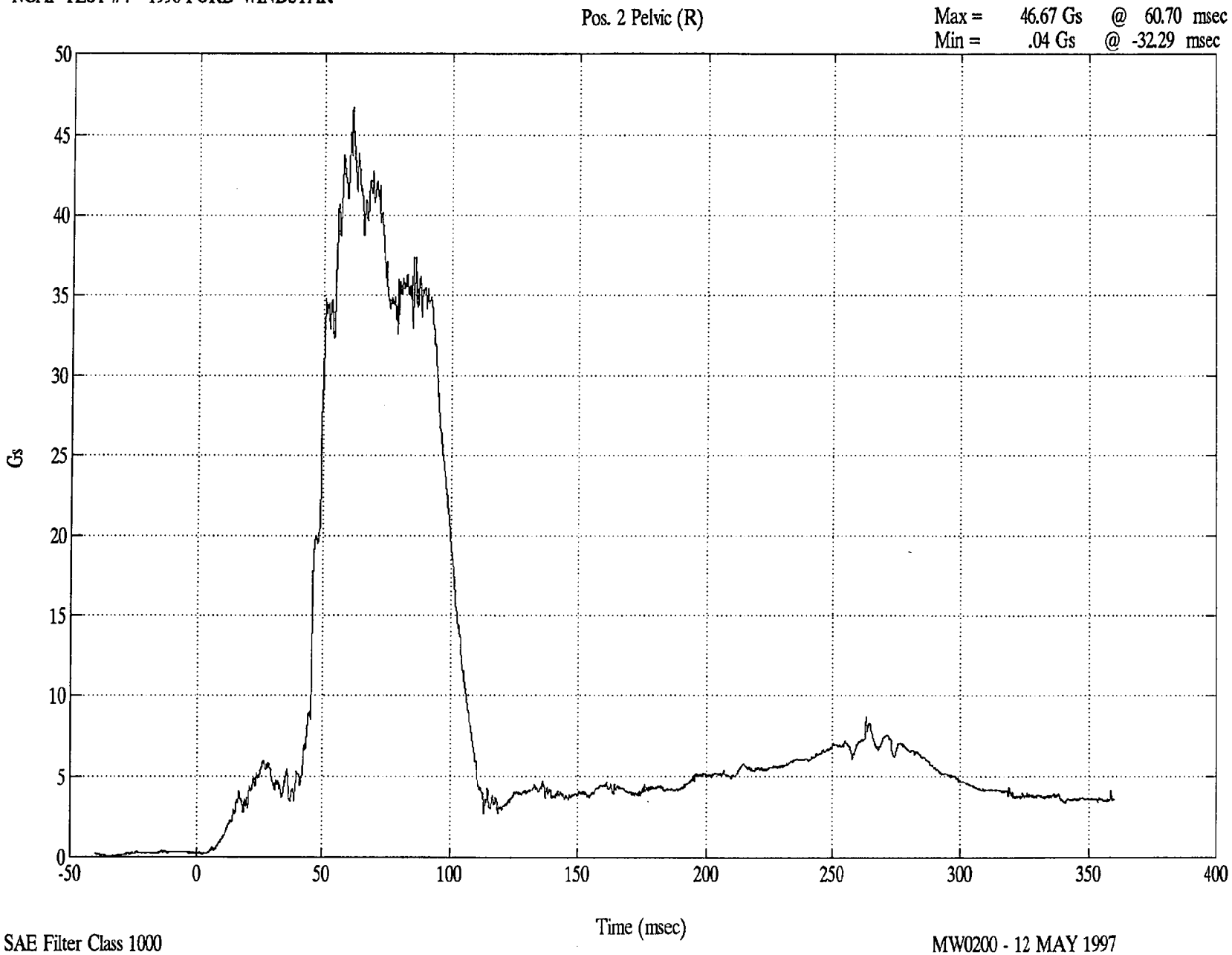


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

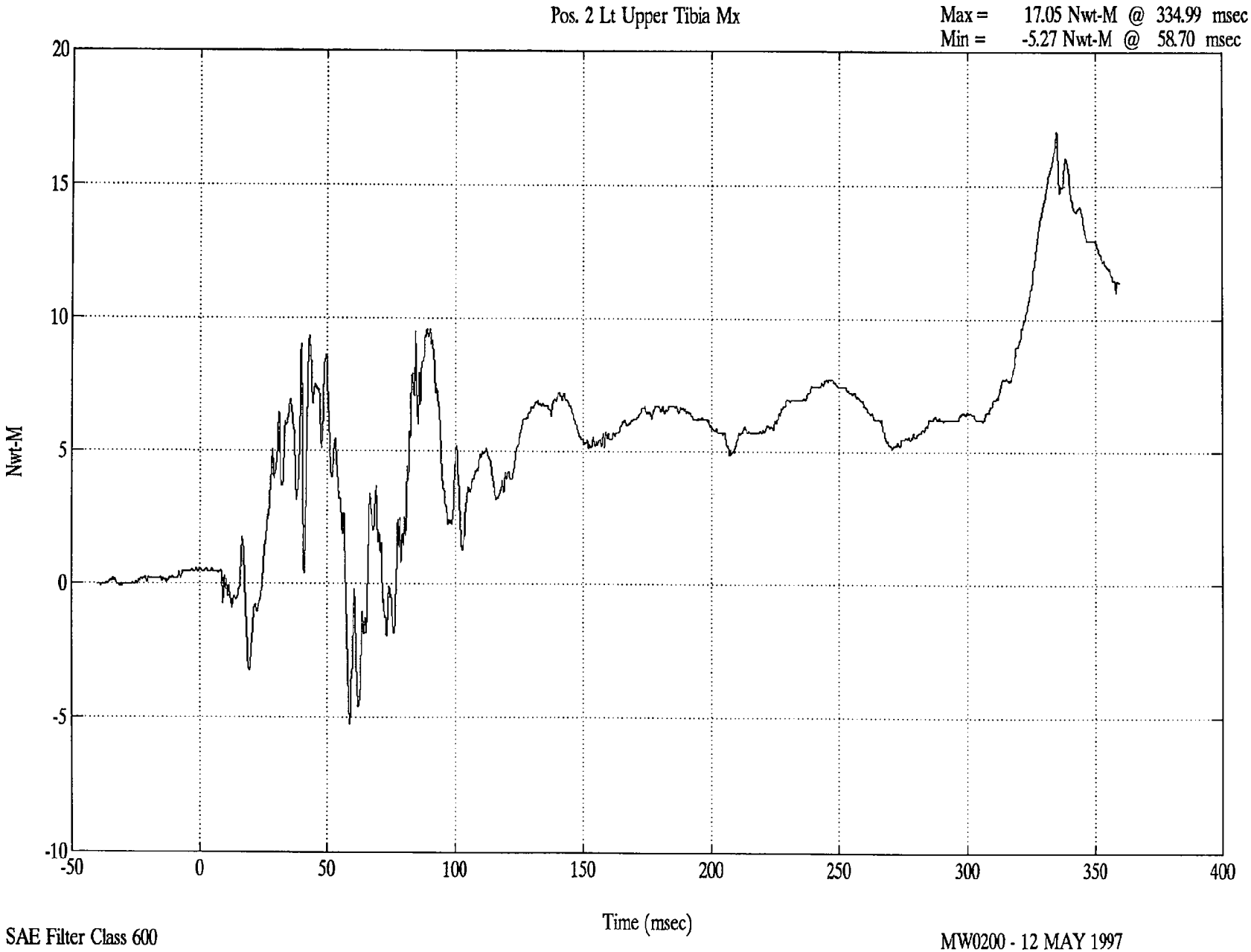


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR



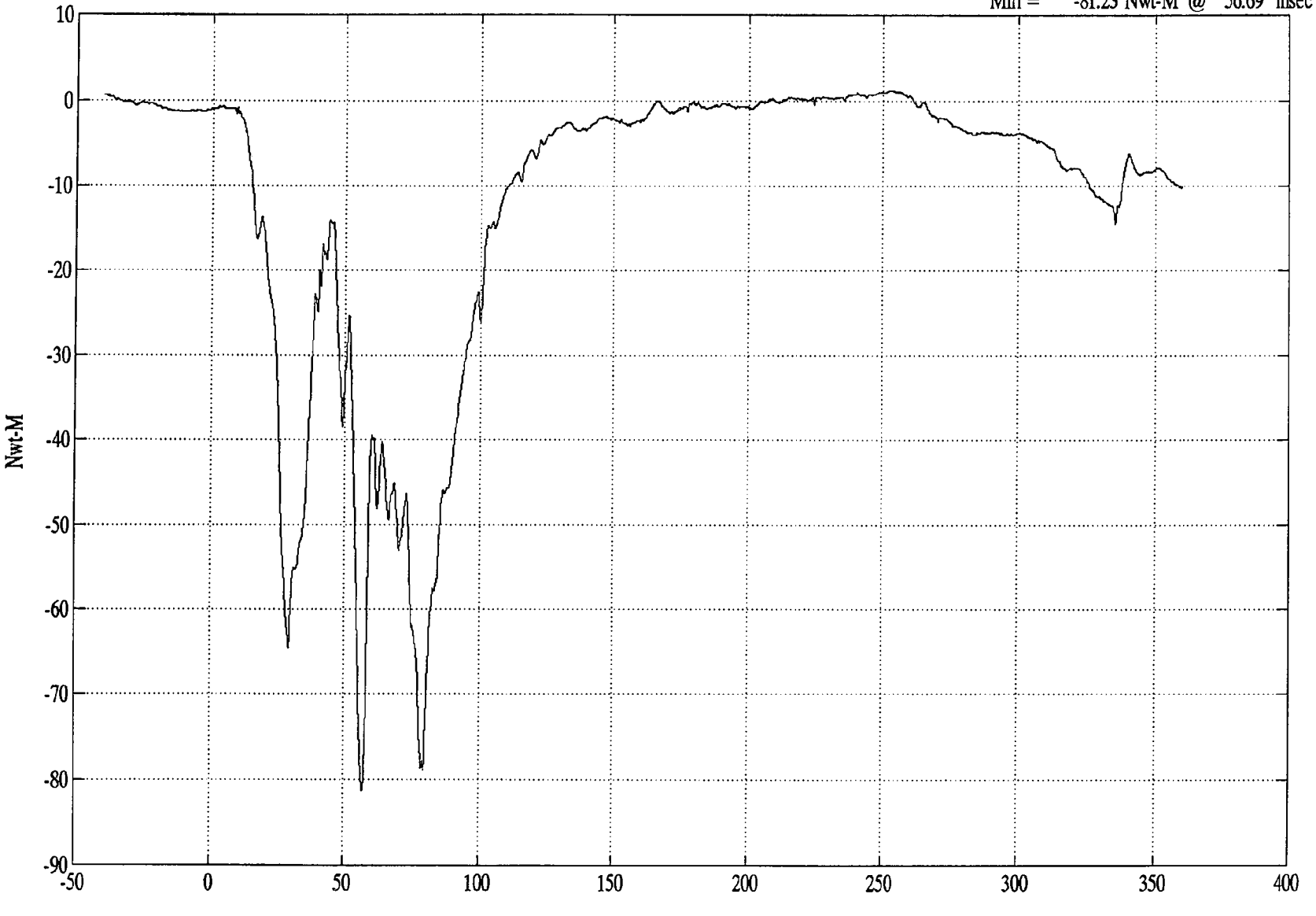
SAE Filter Class 600

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

Pos. 2 Lt Upper Tibia My

Max = 1.22 Nwt-M @ 253.60 msec
Min = -81.23 Nwt-M @ 56.69 msec

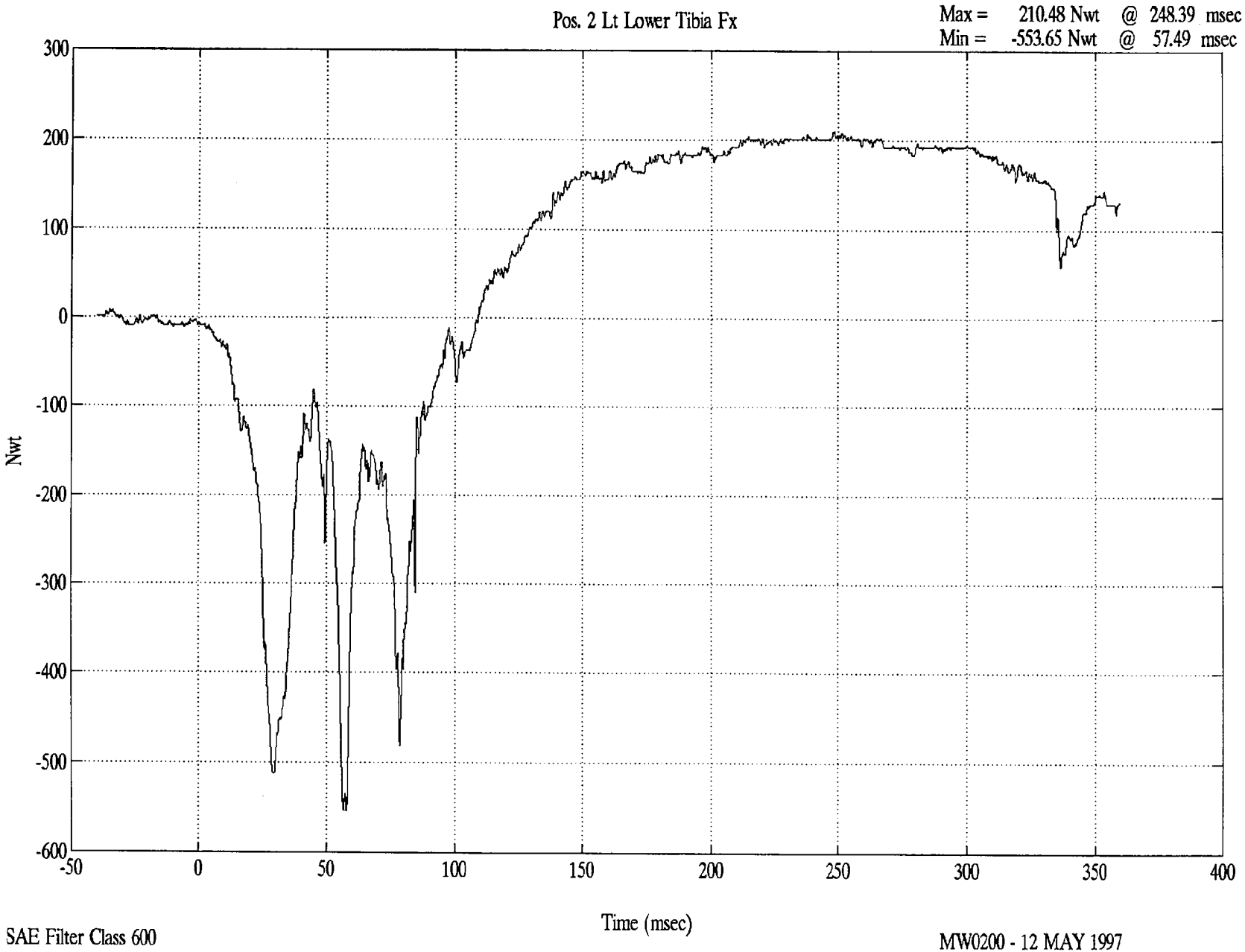


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

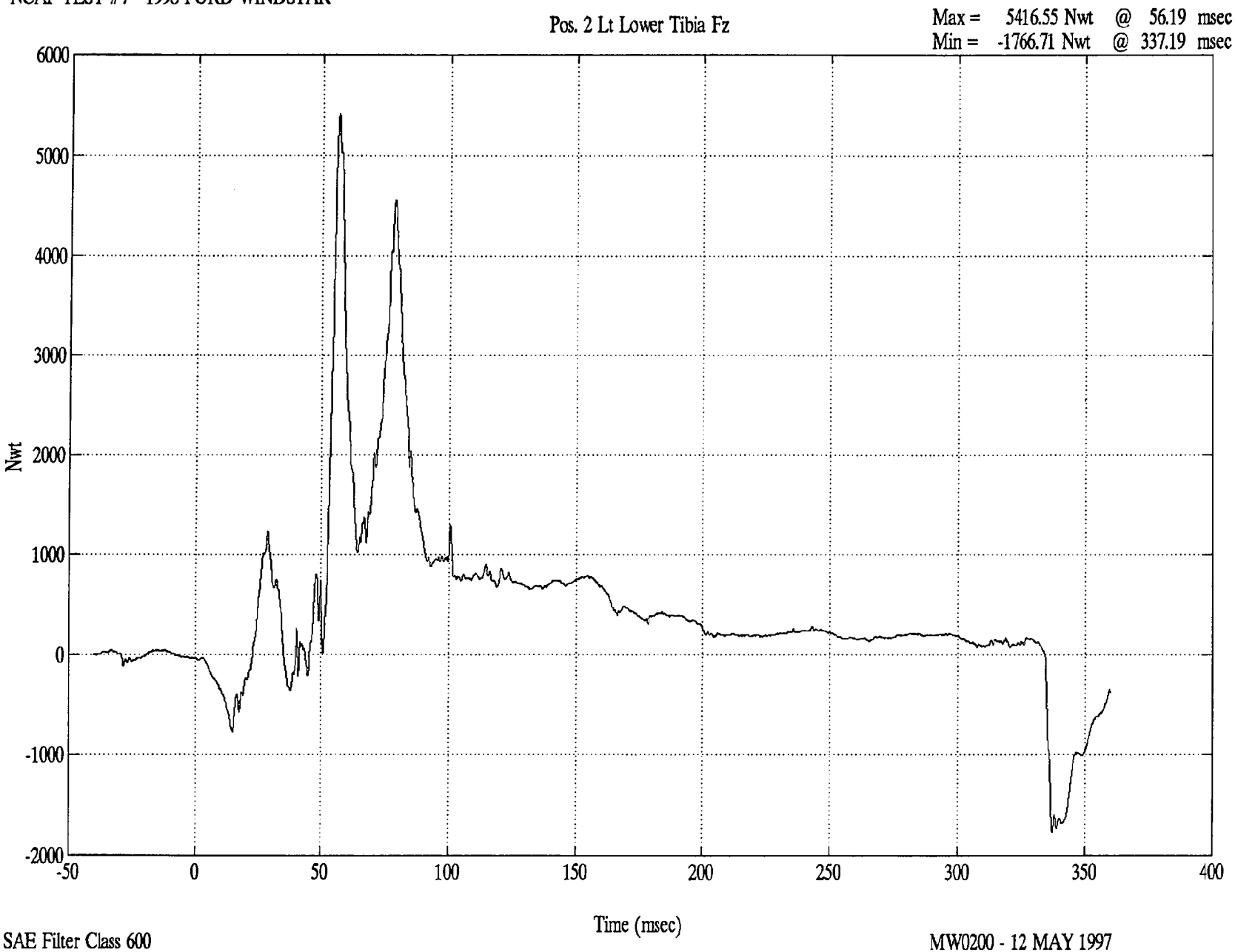


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR



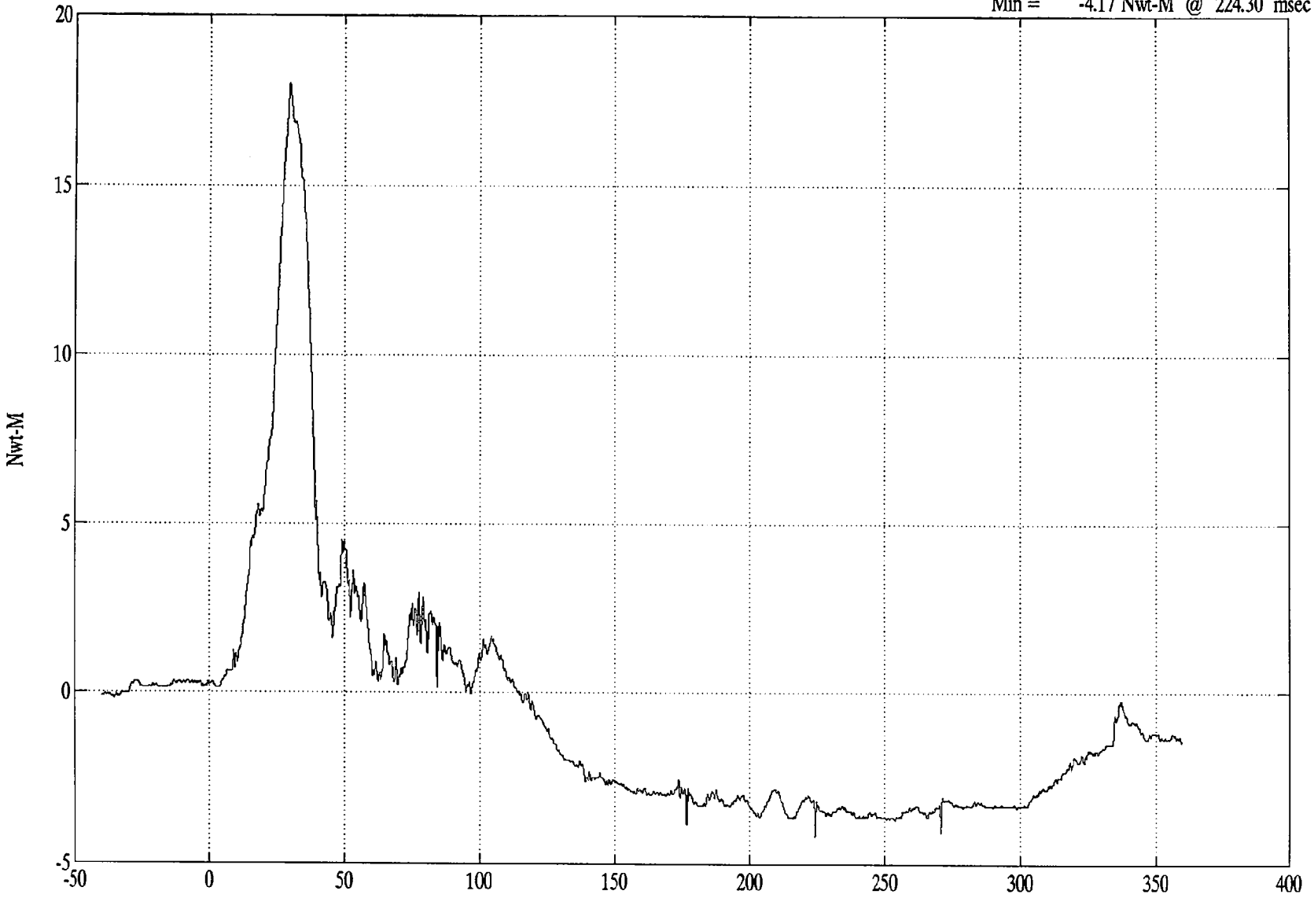
SAE Filter Class 600

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

Pos. 2 Lt Lower Tibia My

Max = 18.02 Nwt-M @ 29.39 msec
Min = -4.17 Nwt-M @ 224.30 msec



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8406-7

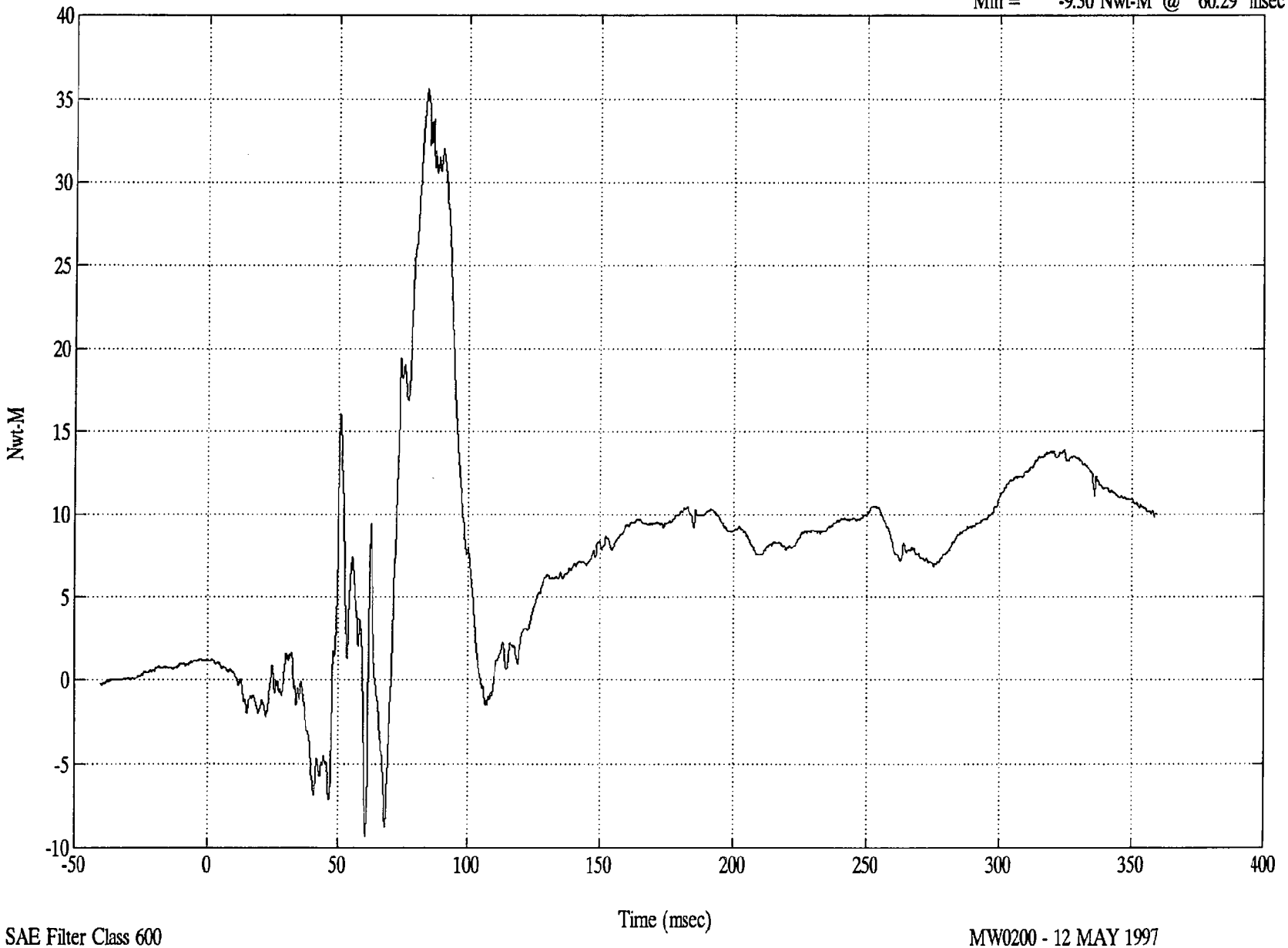
SAE Filter Class 600

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

Pos. 2 Rt Upper Tibia Mx

Max = 35.65 Nwt-M @ 84.09 msec
Min = -9.30 Nwt-M @ 60.29 msec



SAE Filter Class 600

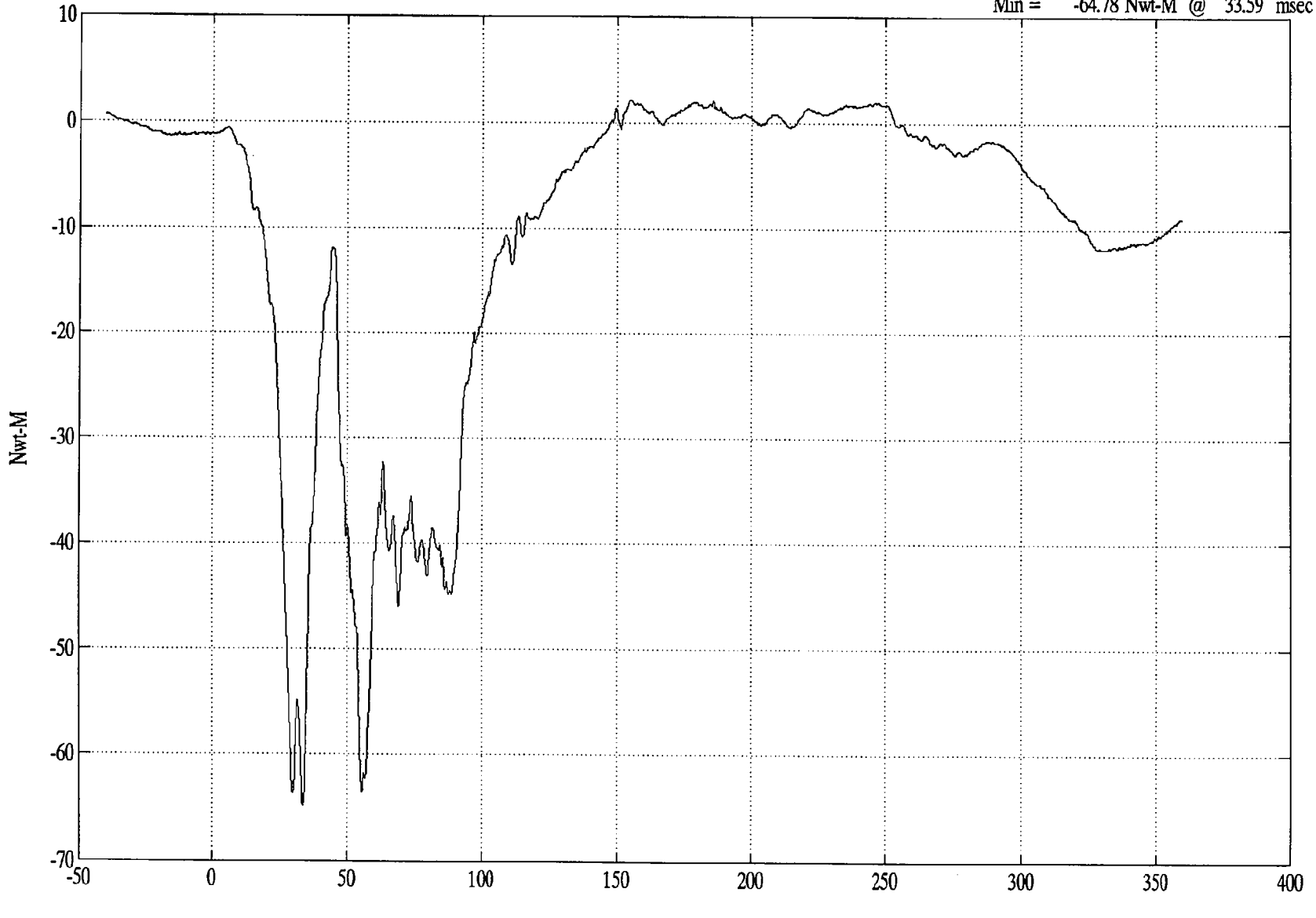
MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

Pos. 2 Rt Upper Tibia My

Max = 2.13 Nwt-M @ 185.69 msec
Min = -64.78 Nwt-M @ 33.59 msec

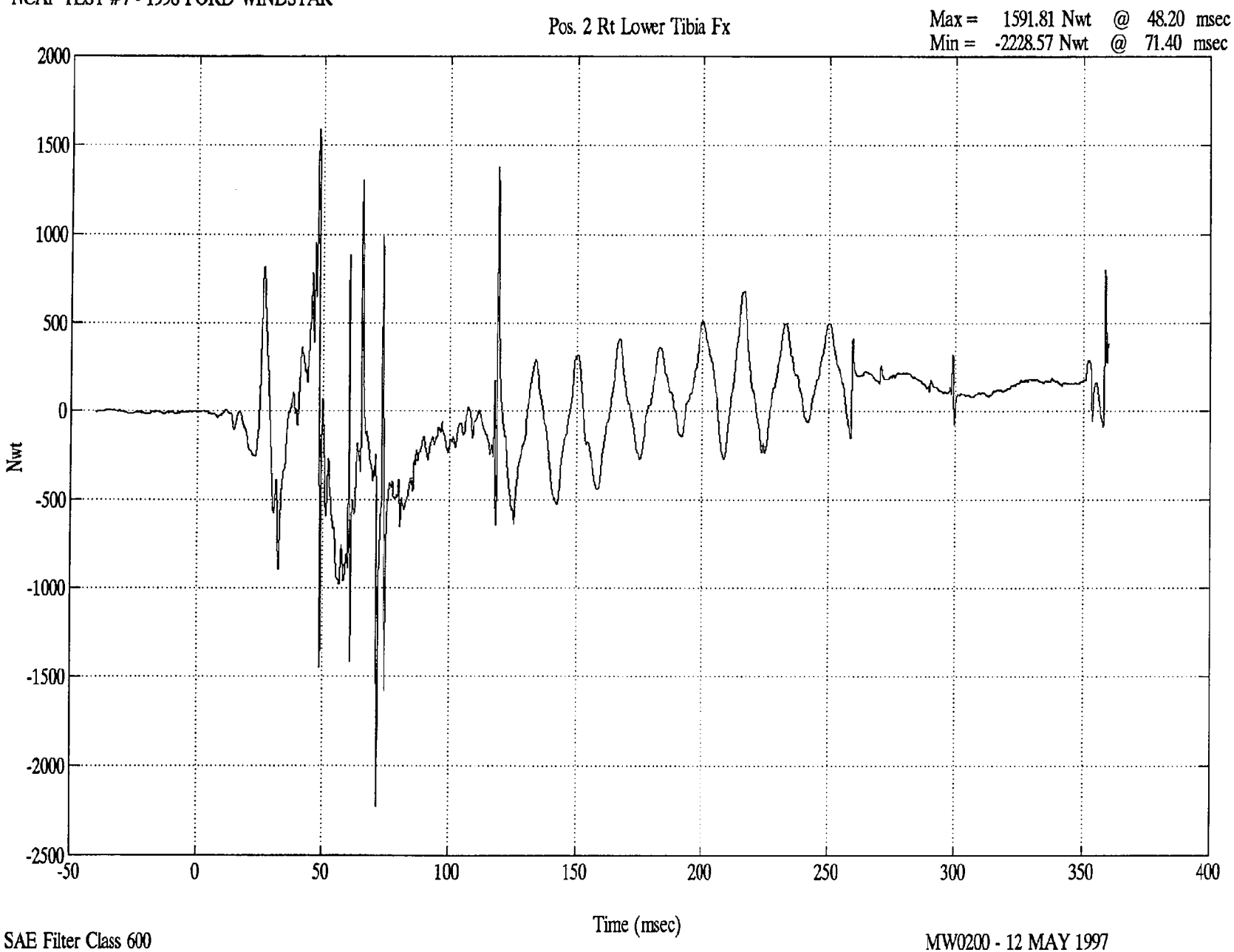


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

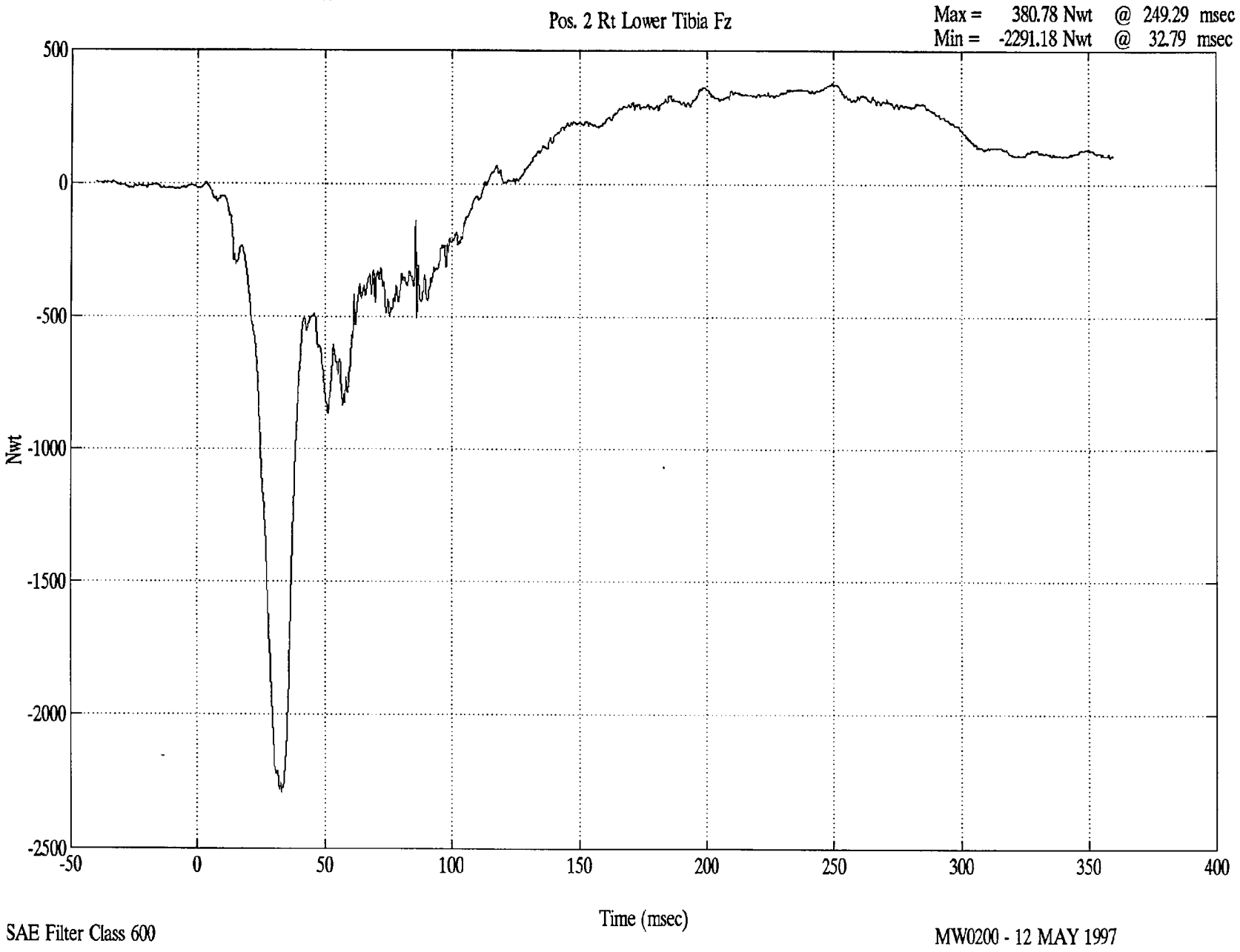


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 600

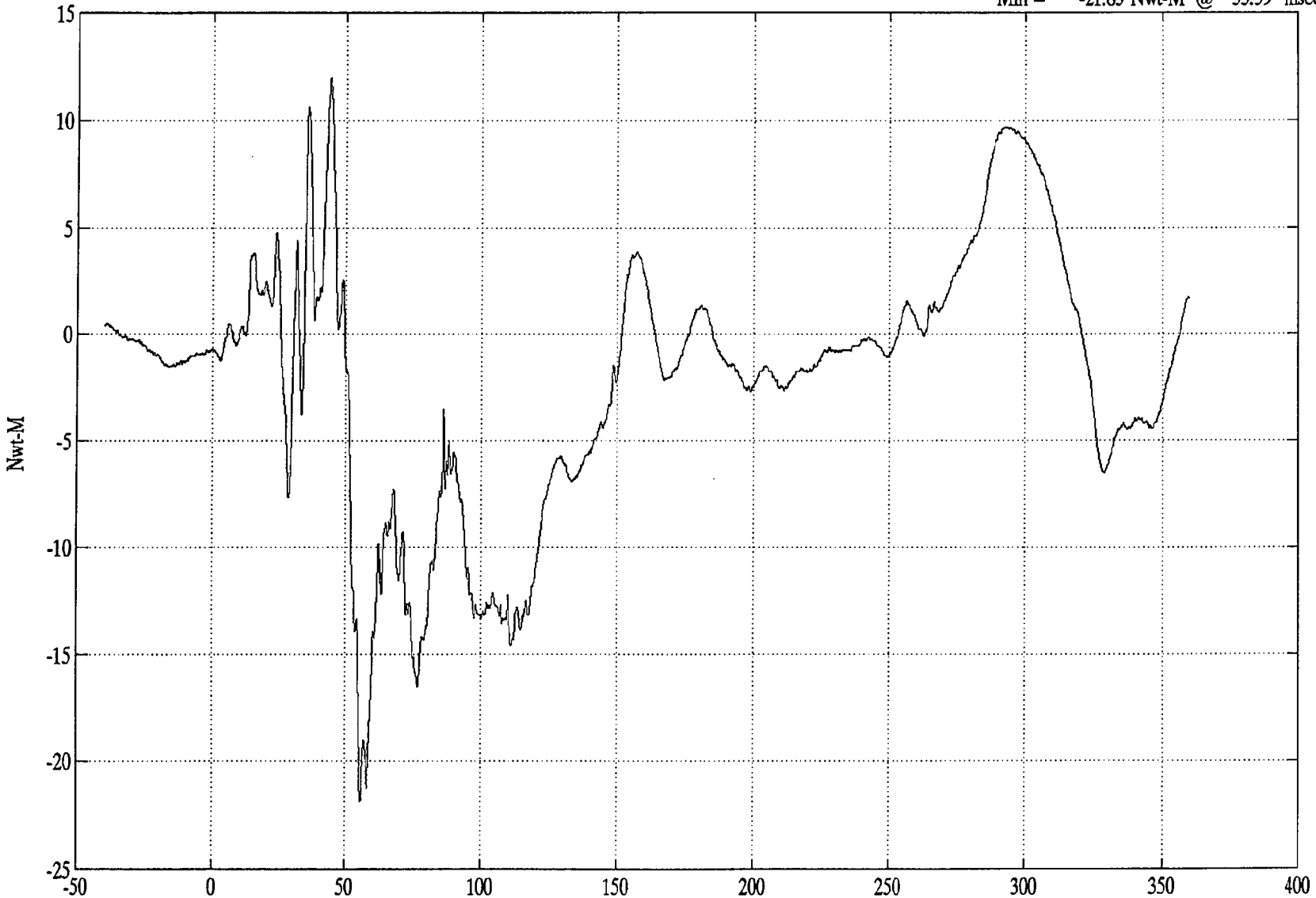
MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

Pos. 2 Rt Lower Tibia My

Max = 11.99 Nwt-M @ 44.09 msec
Min = -21.85 Nwt-M @ 55.59 msec

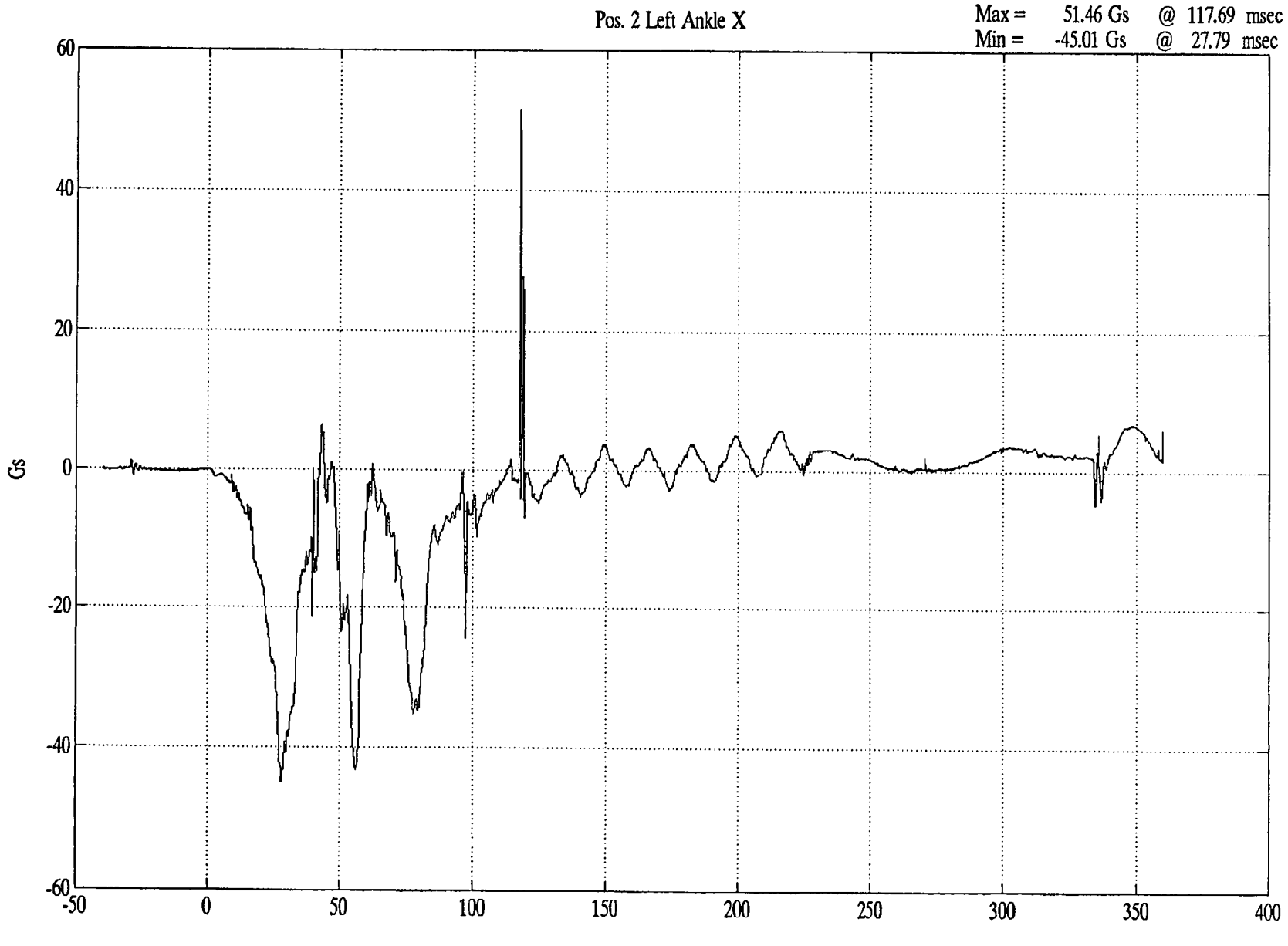


SAE Filter Class 600

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR



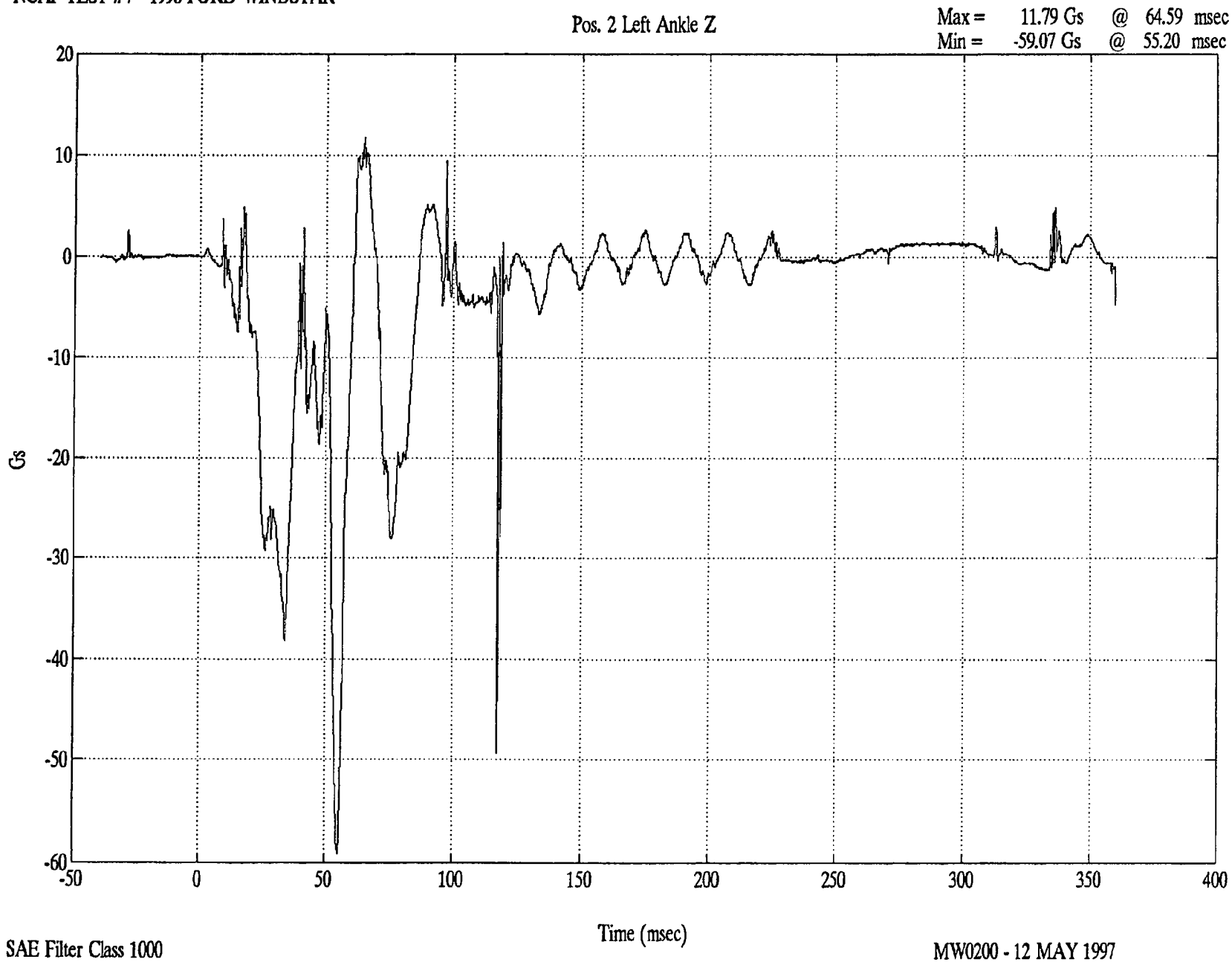
B-95

8406-7

SAE Filter Class 1000

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

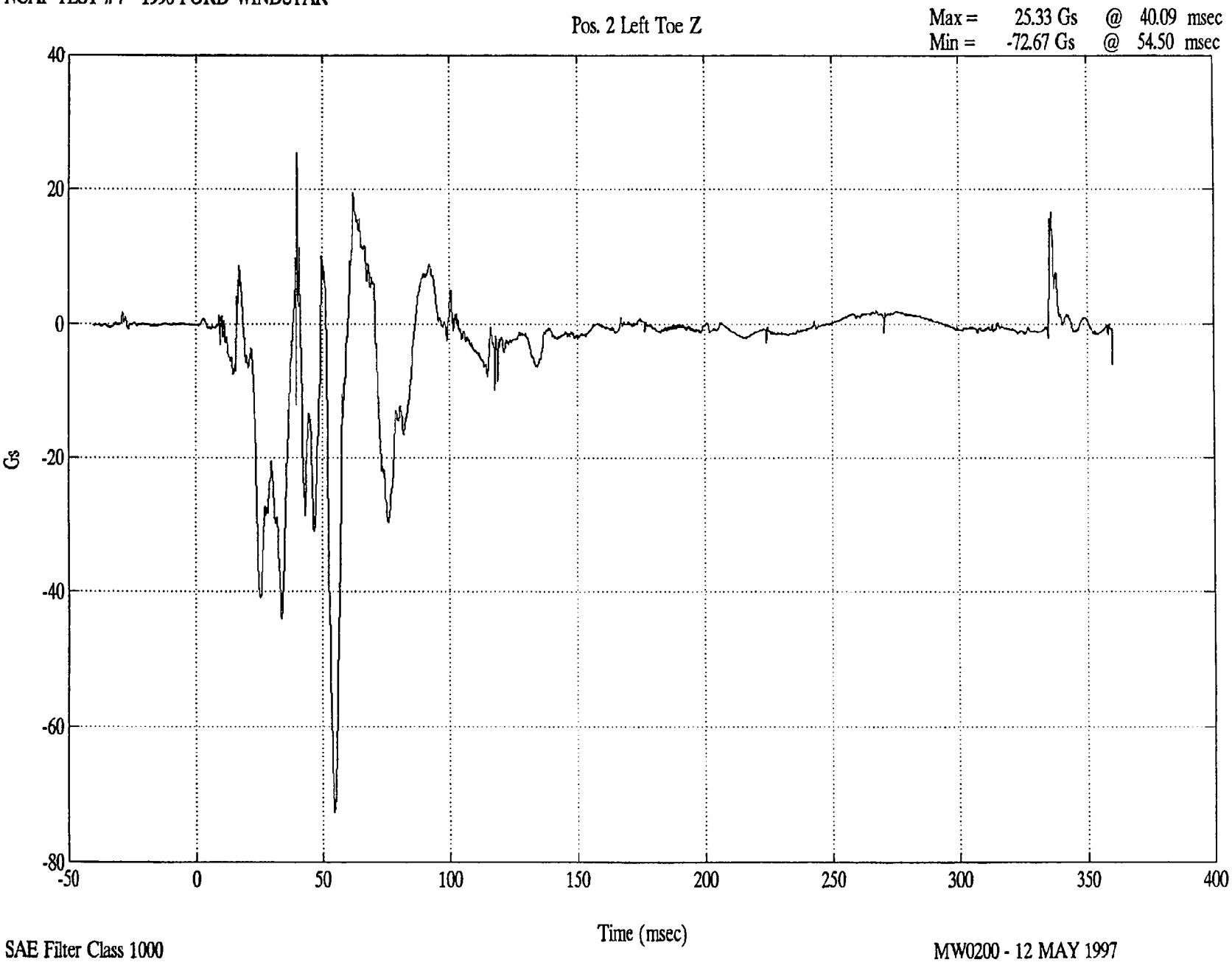


SAE Filter Class 1000

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR



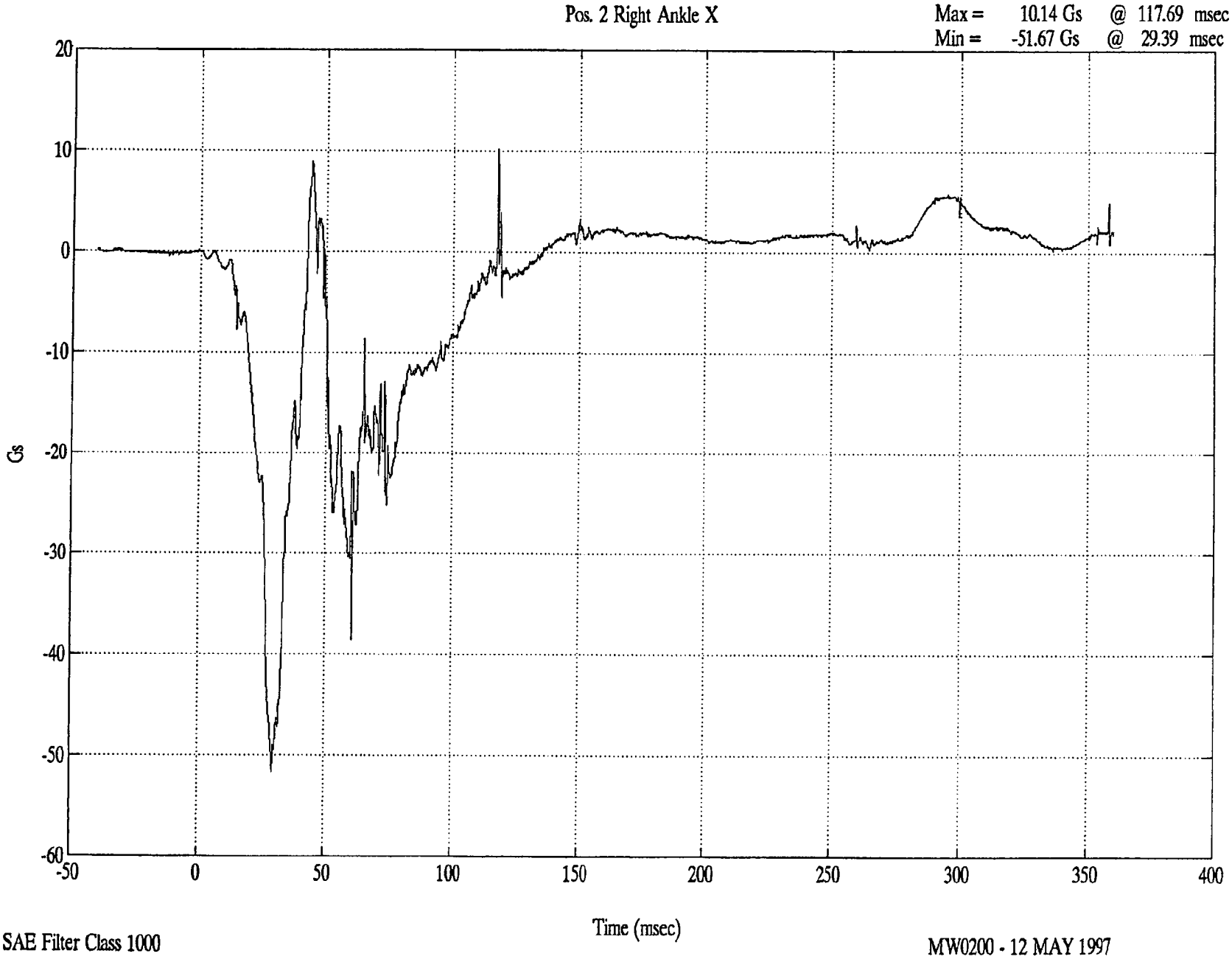
B-97

8406-7

SAE Filter Class 1000

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



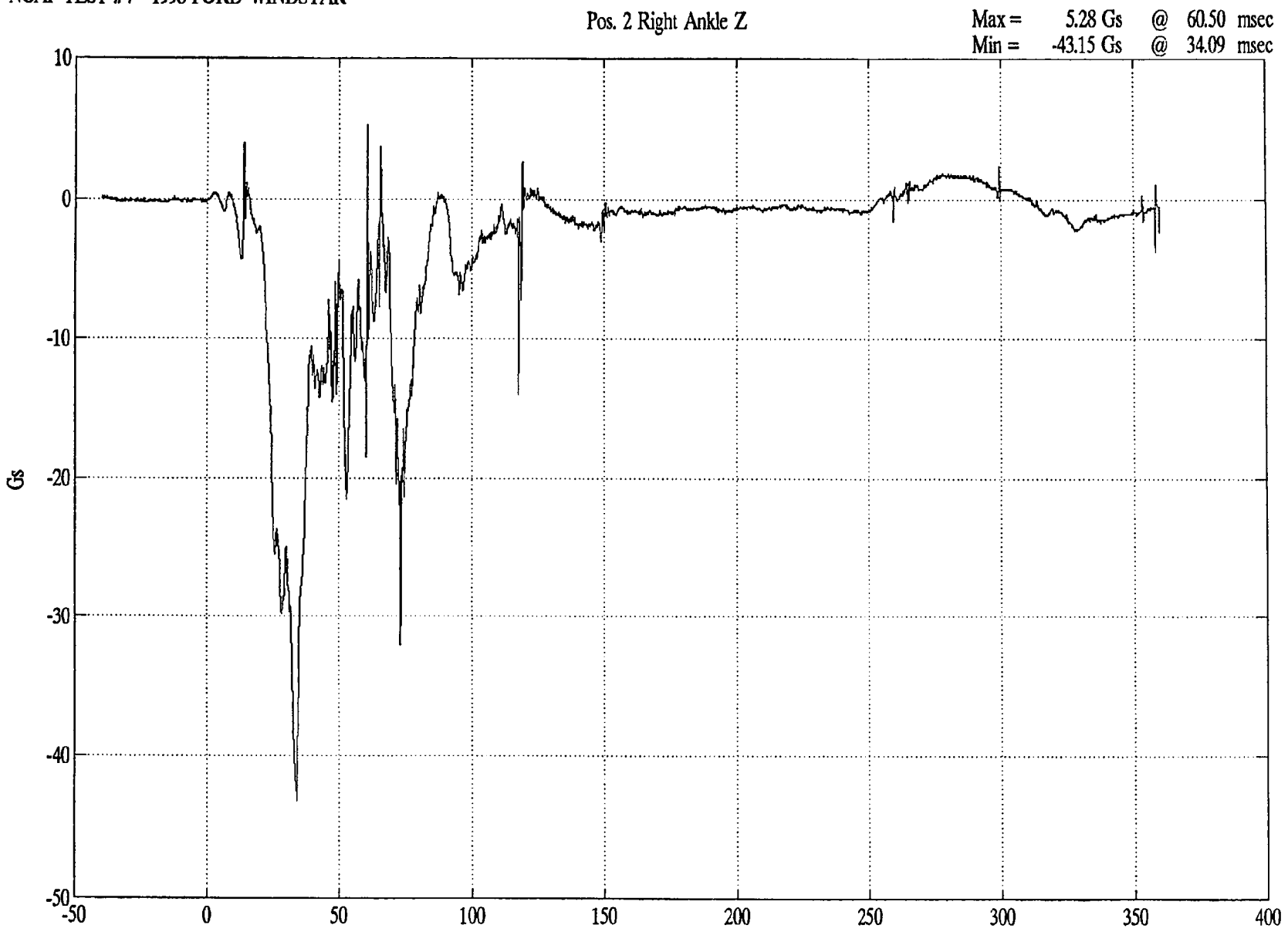
SAE Filter Class 1000

MW0200 - 12 MAY 1997

B-98

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR



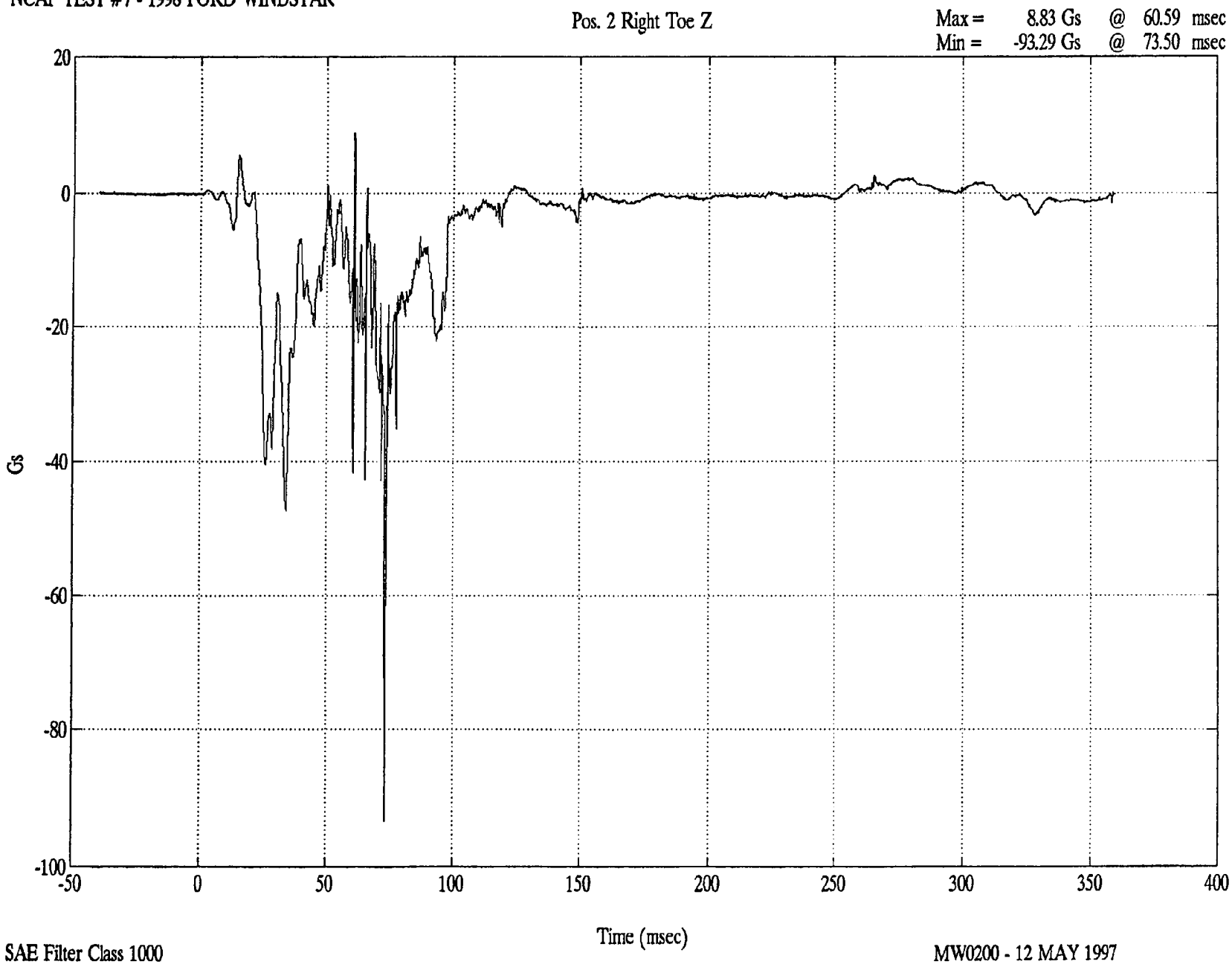
B-99

8406-7

SAE Filter Class 1000

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



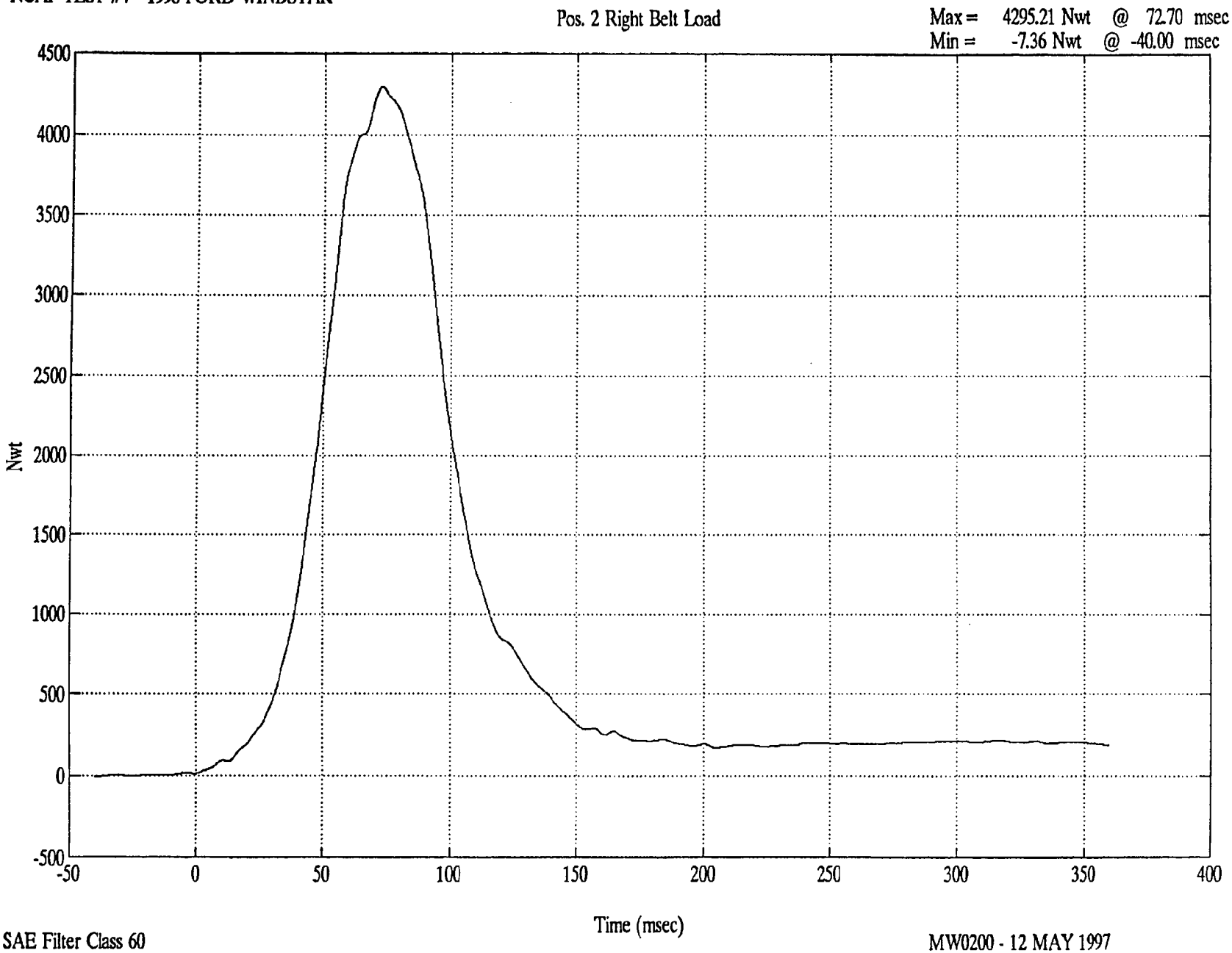
B-100

8406-7

SAE Filter Class 1000

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



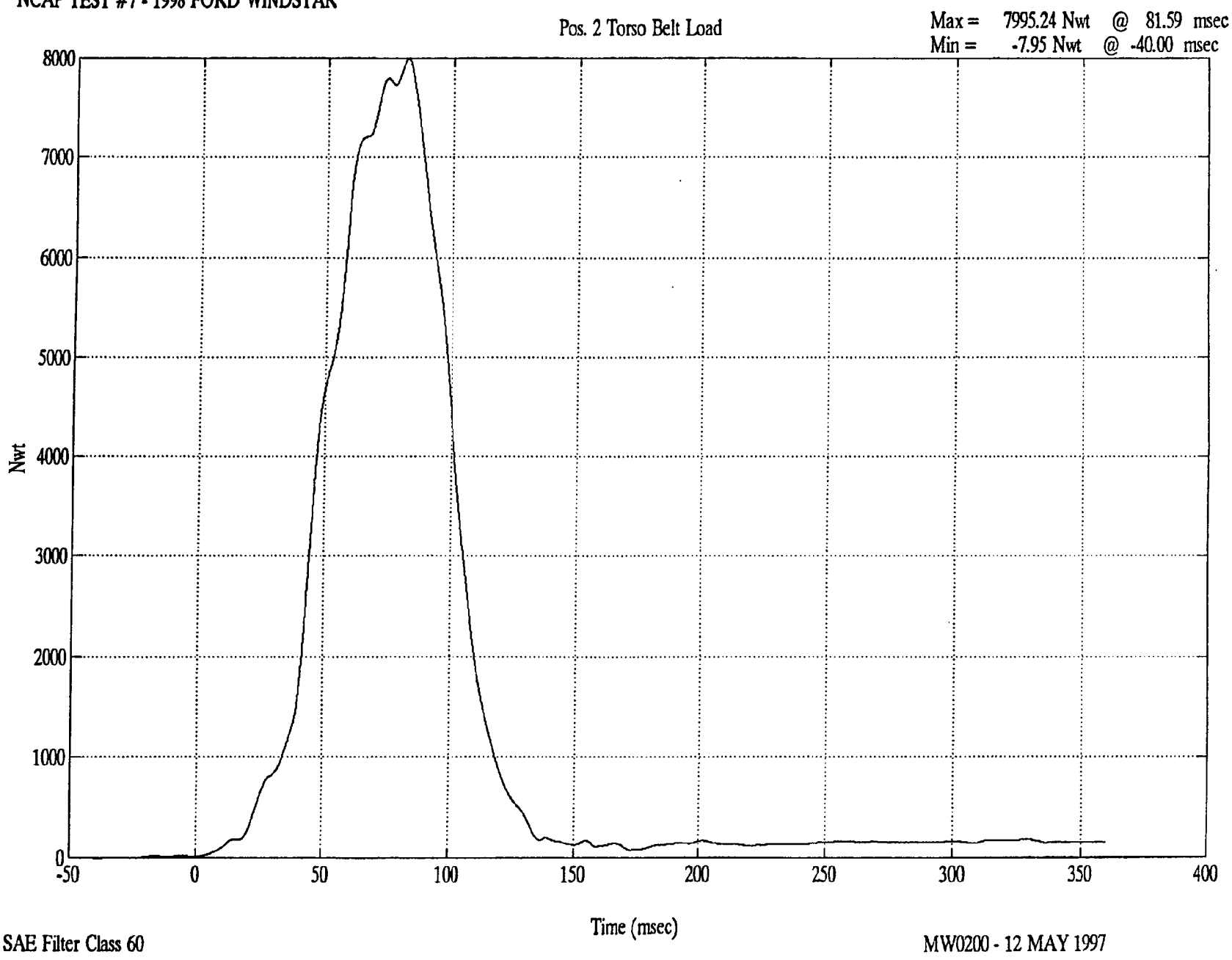
B-101

8406-7

SAE Filter Class 60

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



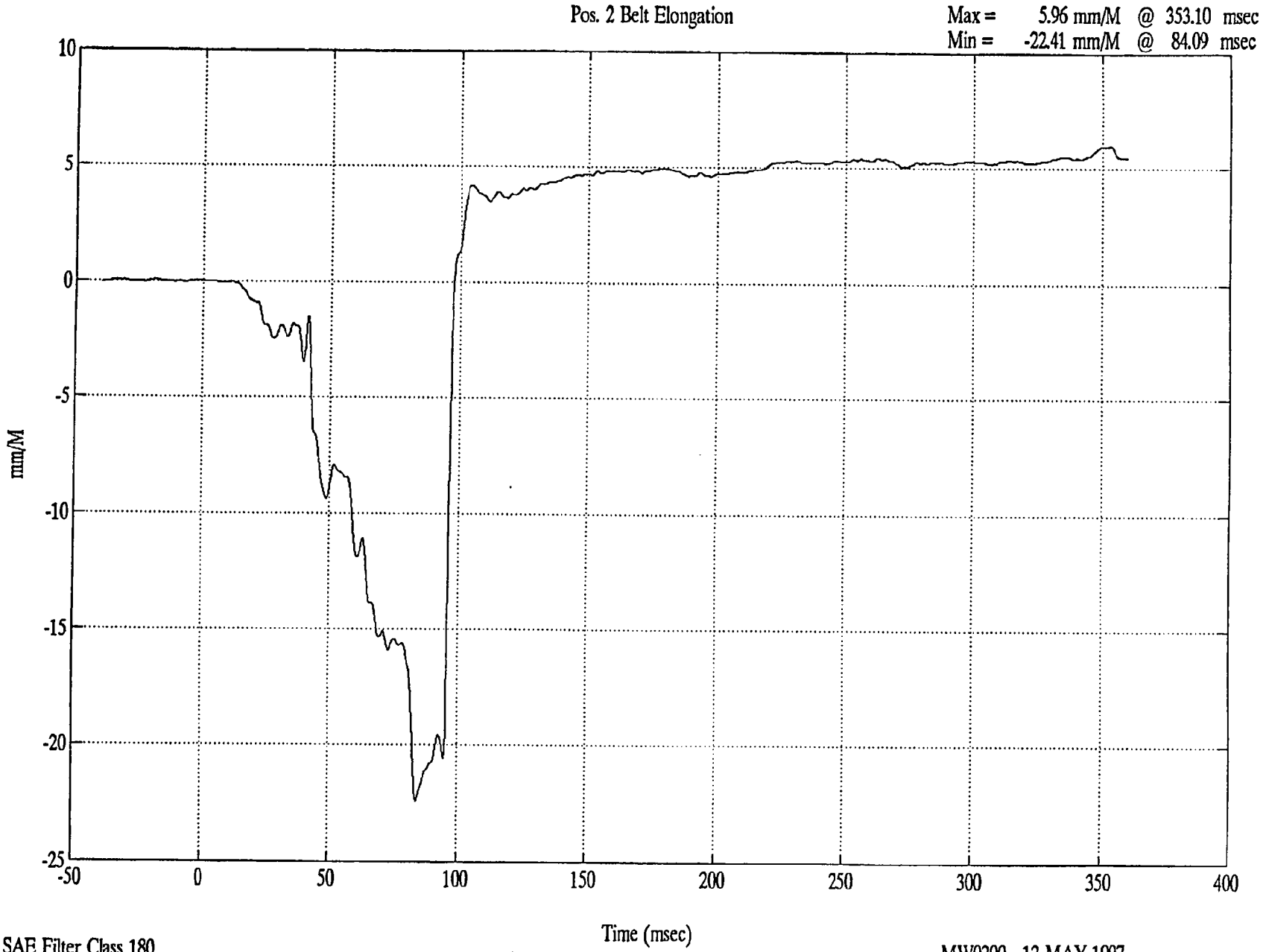
SAE Filter Class 60

MW0200 - 12 MAY 1997

B-102

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR



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8406-7

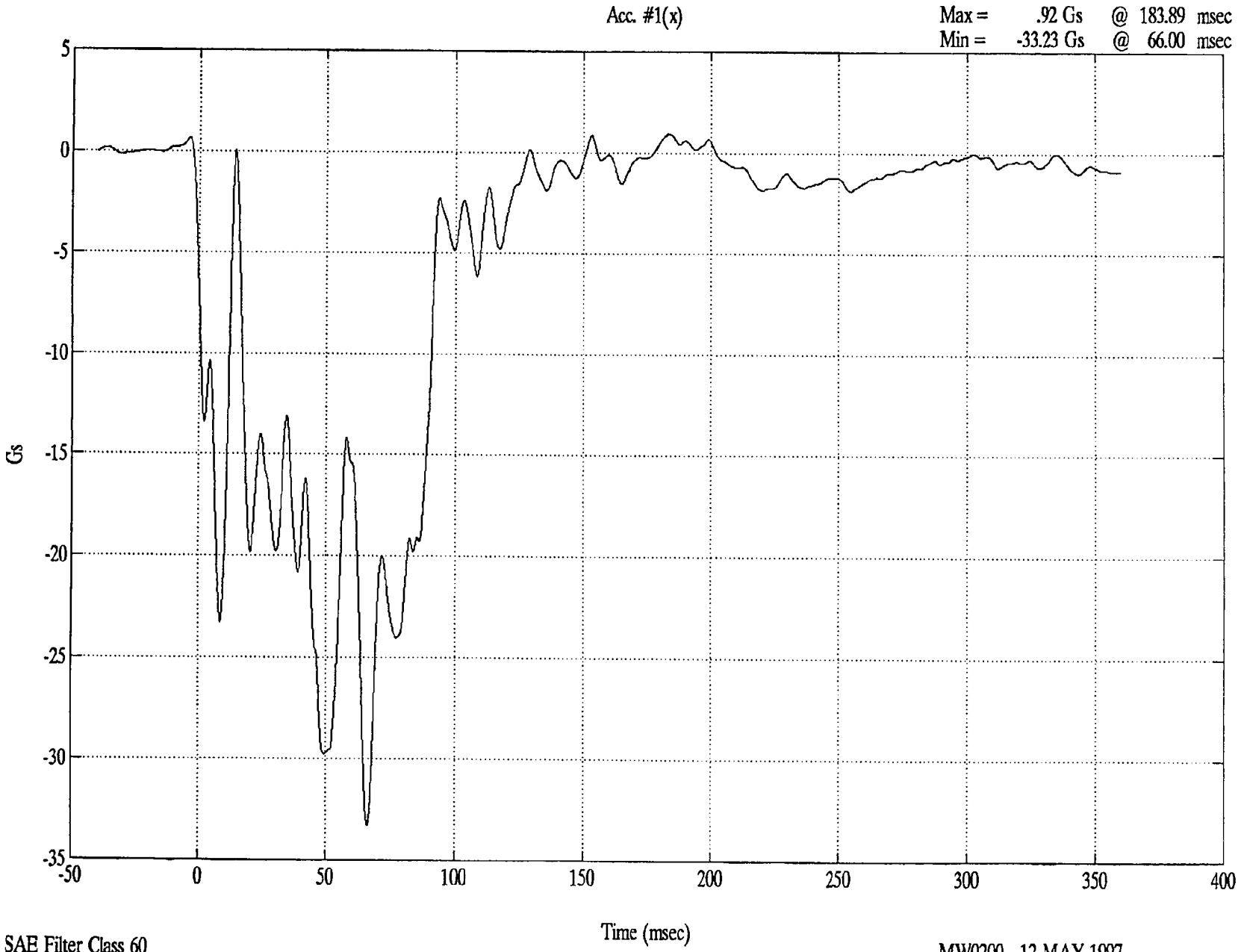
SAE Filter Class 180

MW0200 - 12 MAY 1997

NHTSA TEST NO. MW0200

VEHICLE DATA	FILTER CHANNEL CLASS
Acceleration	60
Velocity	180
Displacement	180

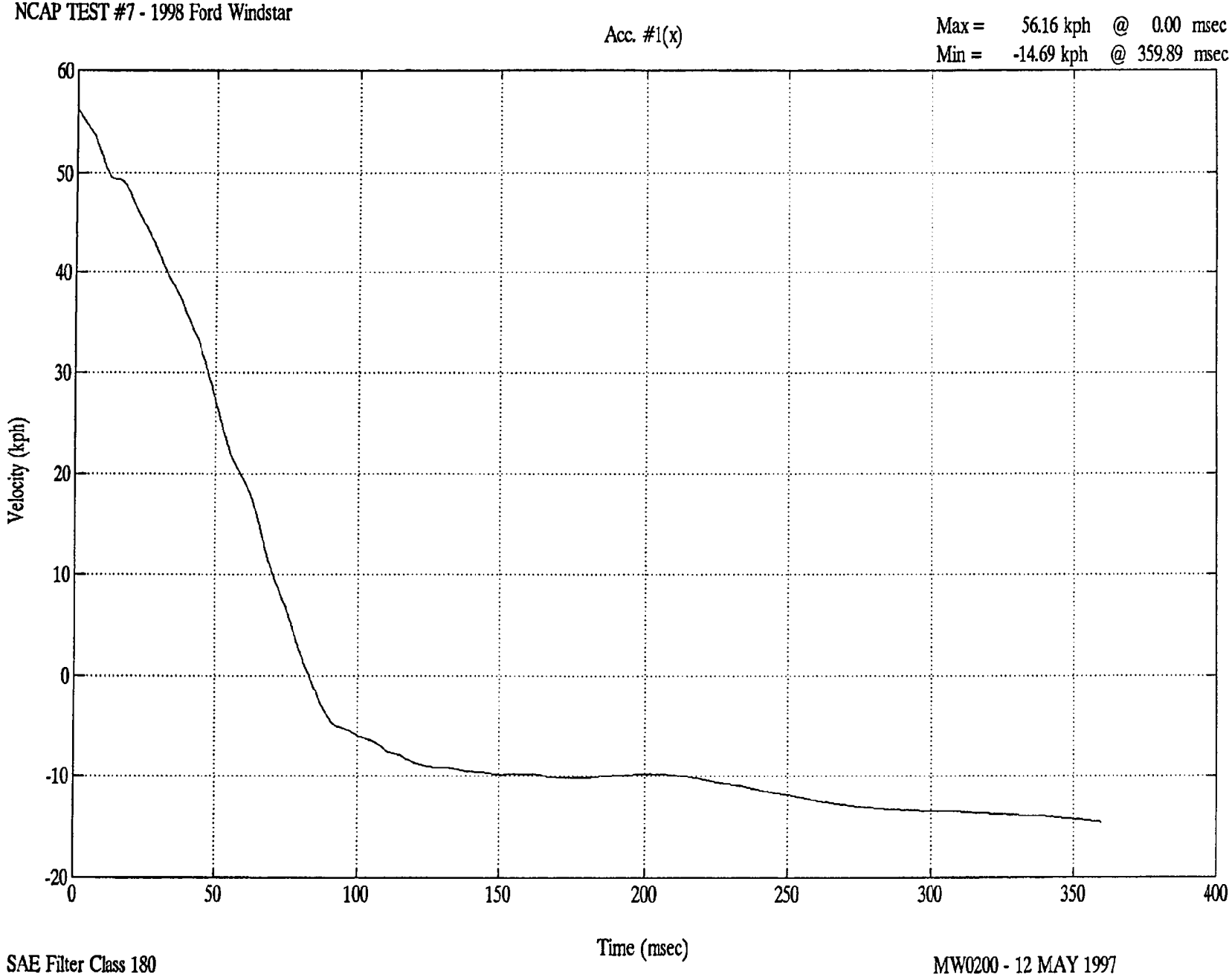
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 Ford Windstar

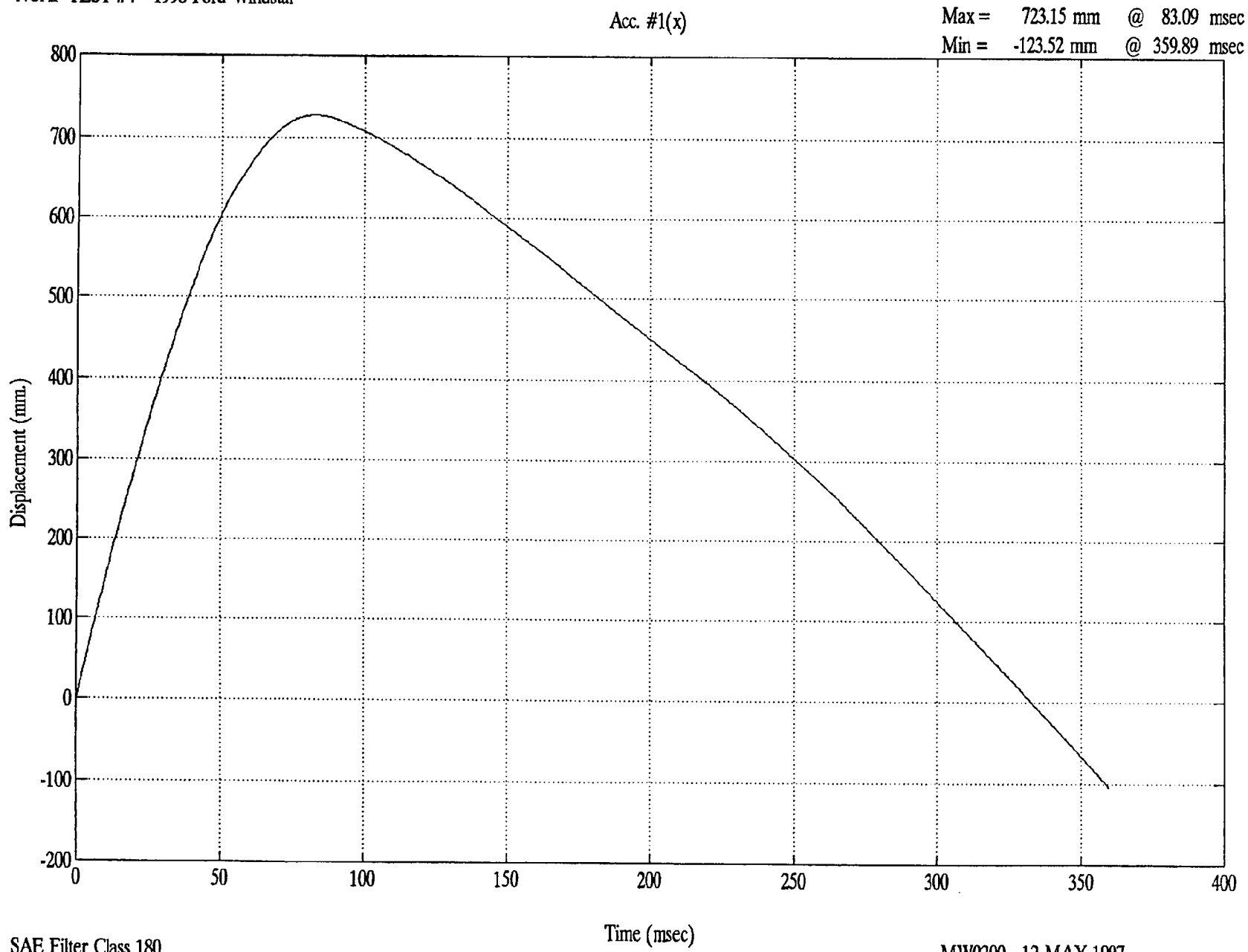


SAE Filter Class 180

MW0200 - 12 MAY 1997

8406-7

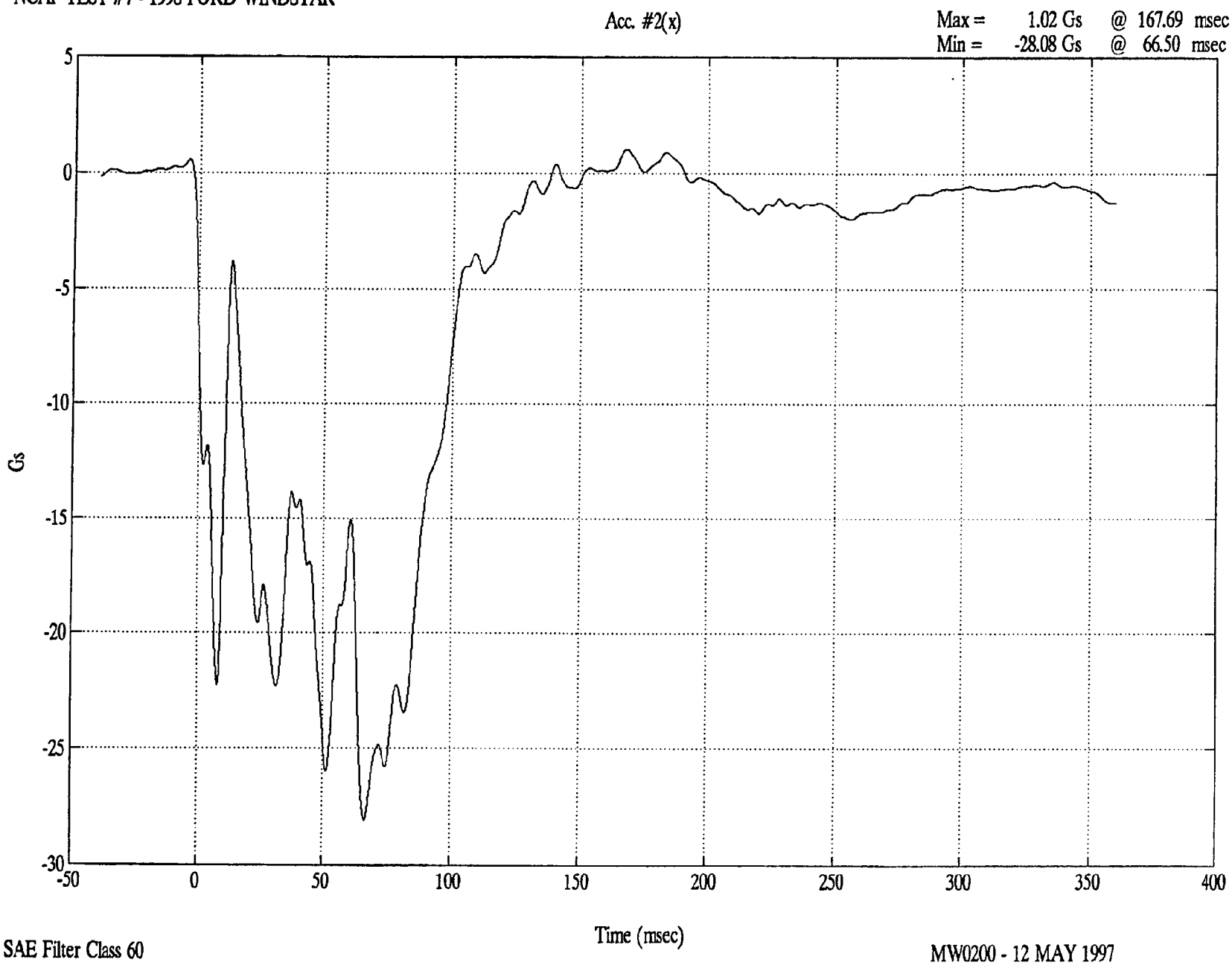
NCAP TEST #7 - 1998 Ford Windstar



SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

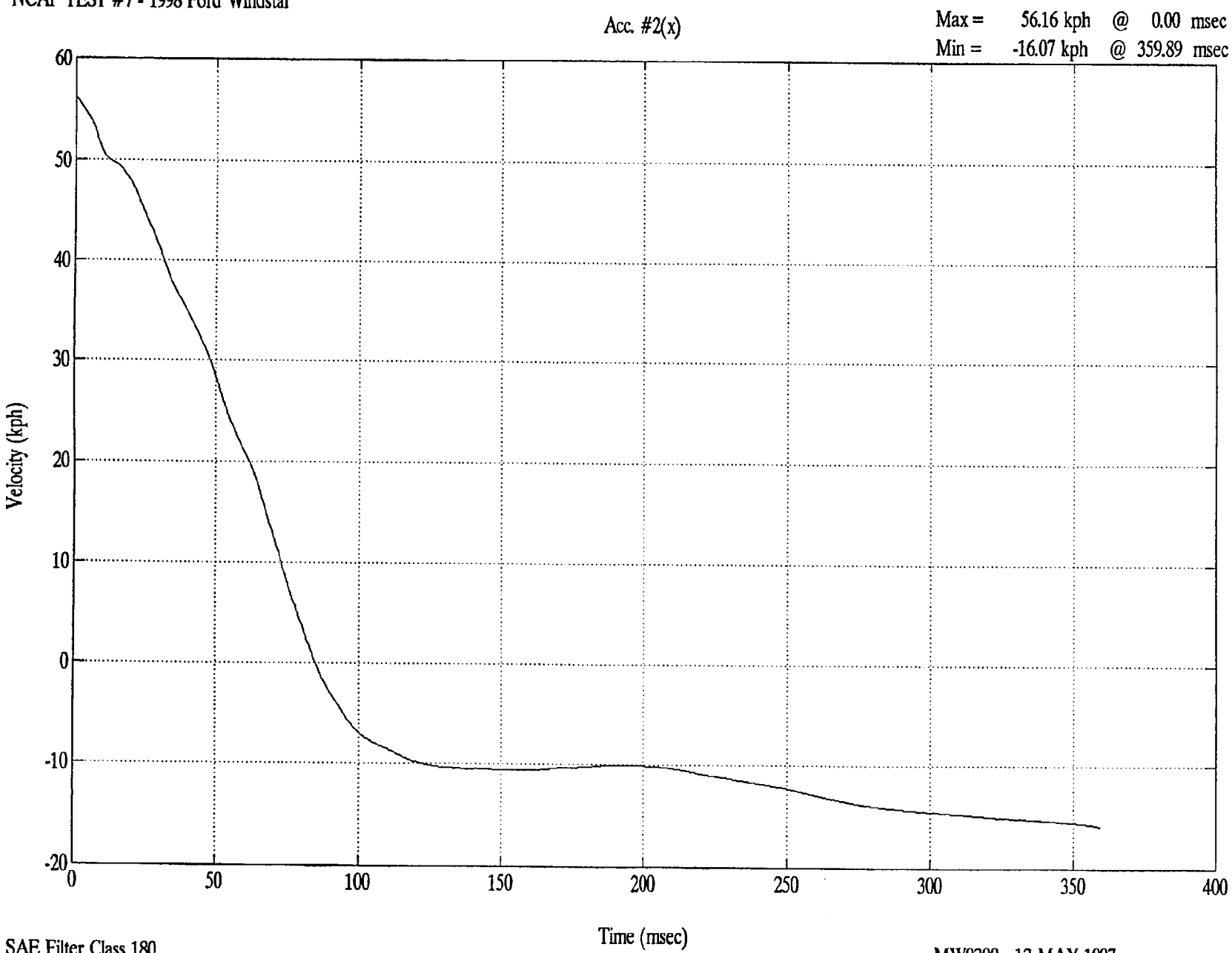


SAE Filter Class 60

MW0200 - 12 MAY 1997

8406-7

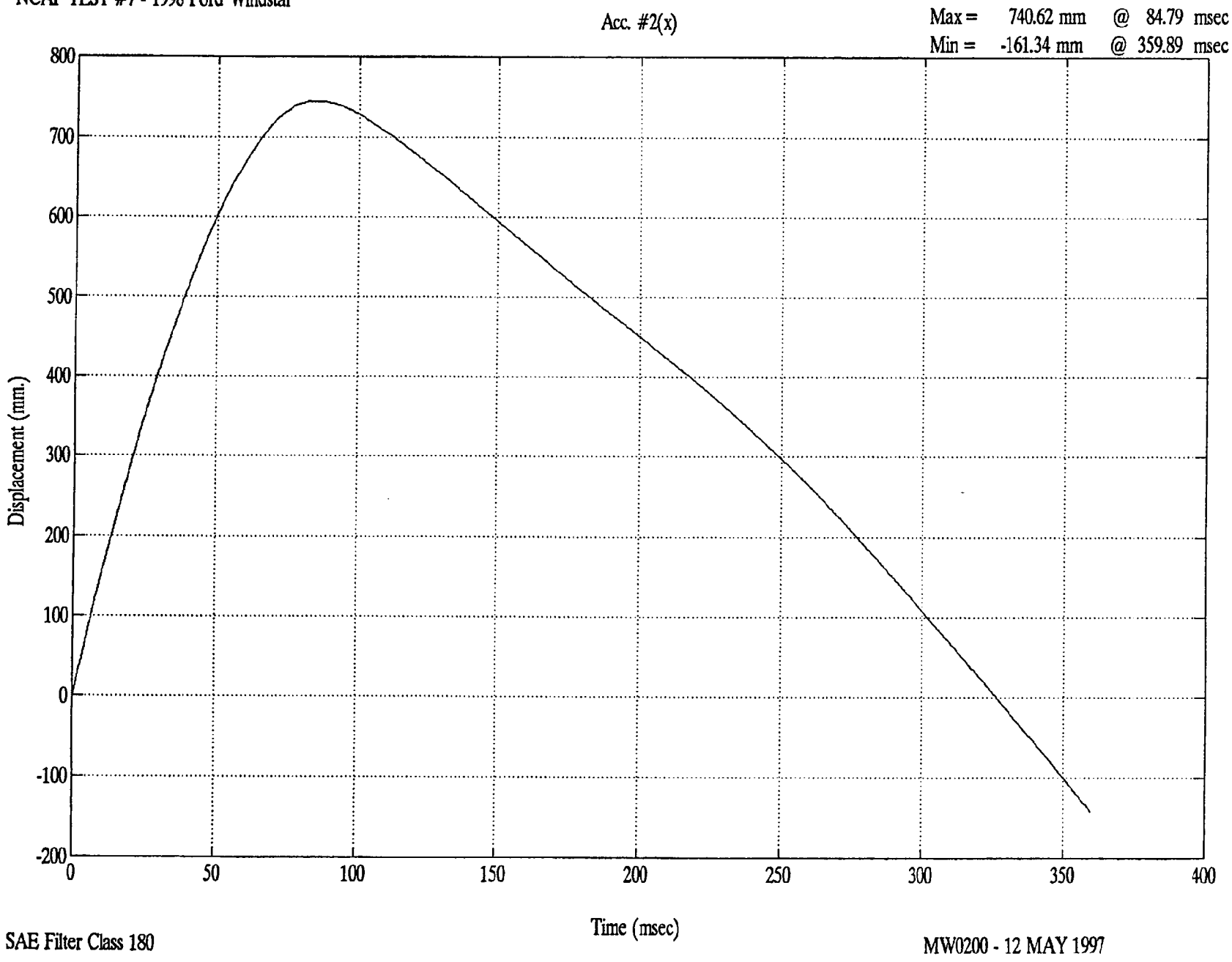
NCAP TEST #7 - 1998 Ford Windstar



SAE Filter Class 180

MW0200 - 12 MAY 1997

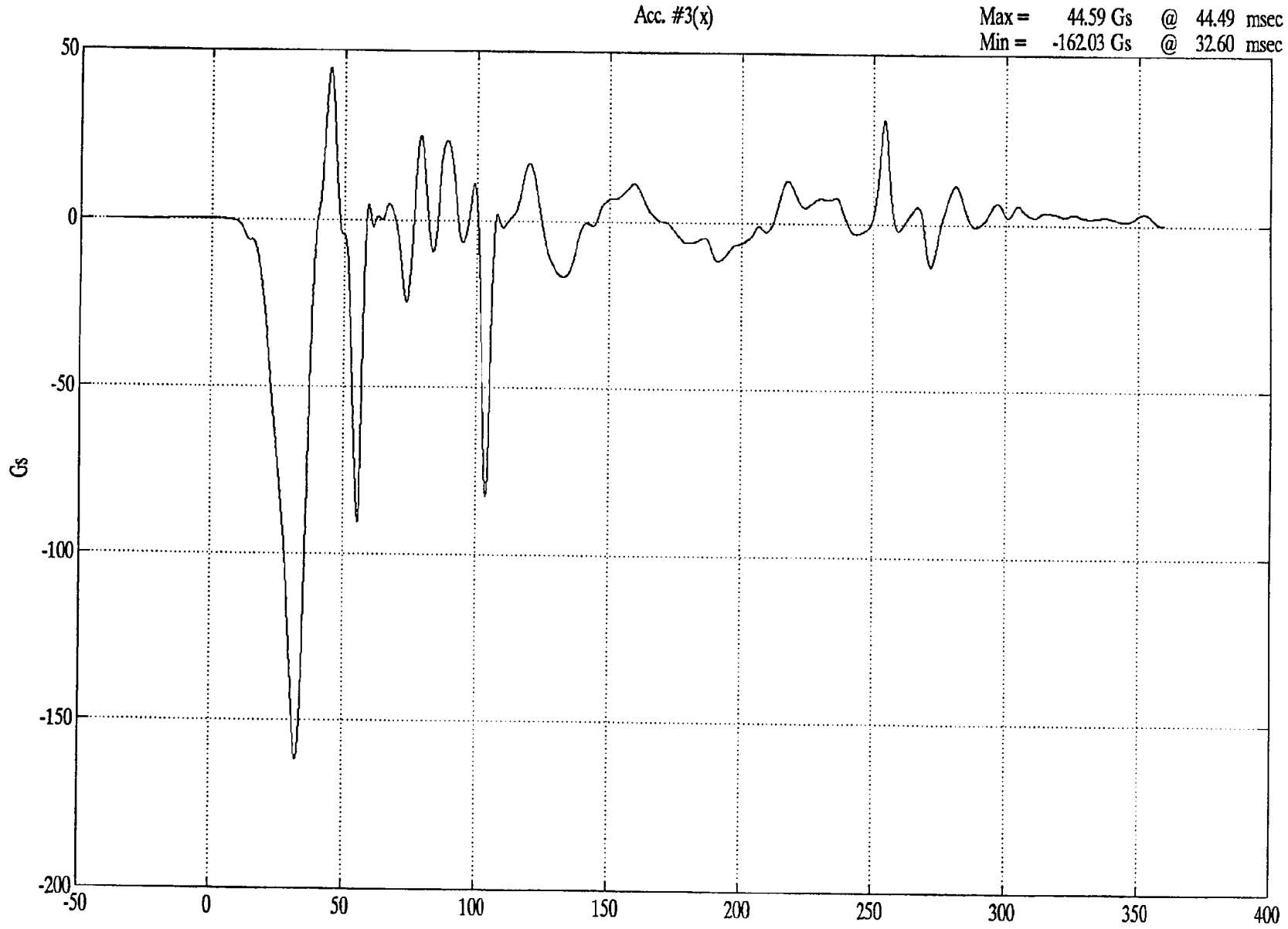
NCAP TEST #7 - 1998 Ford Windstar



SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



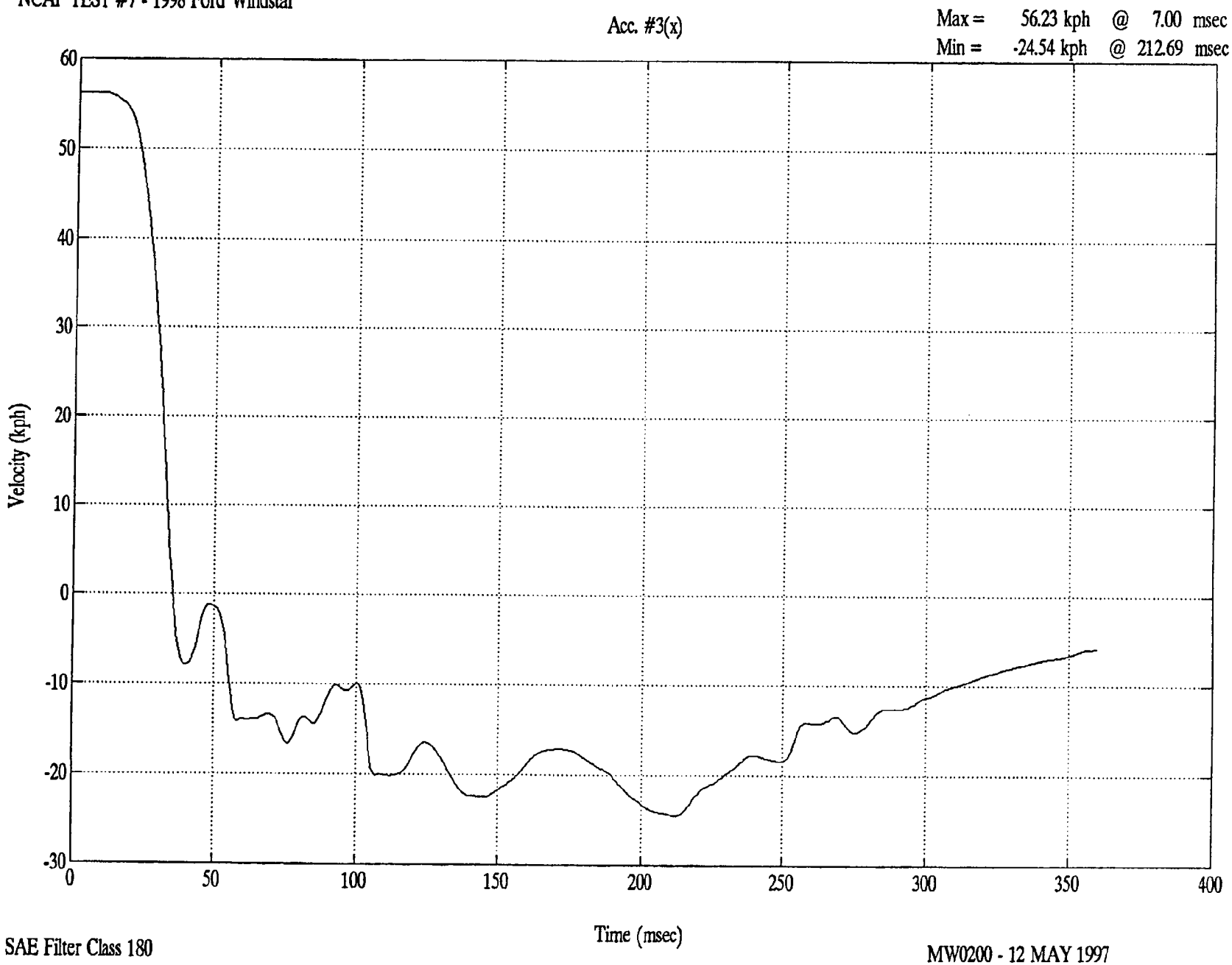
B-111

8406-7

SAE Filter Class 60

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 Ford Windstar

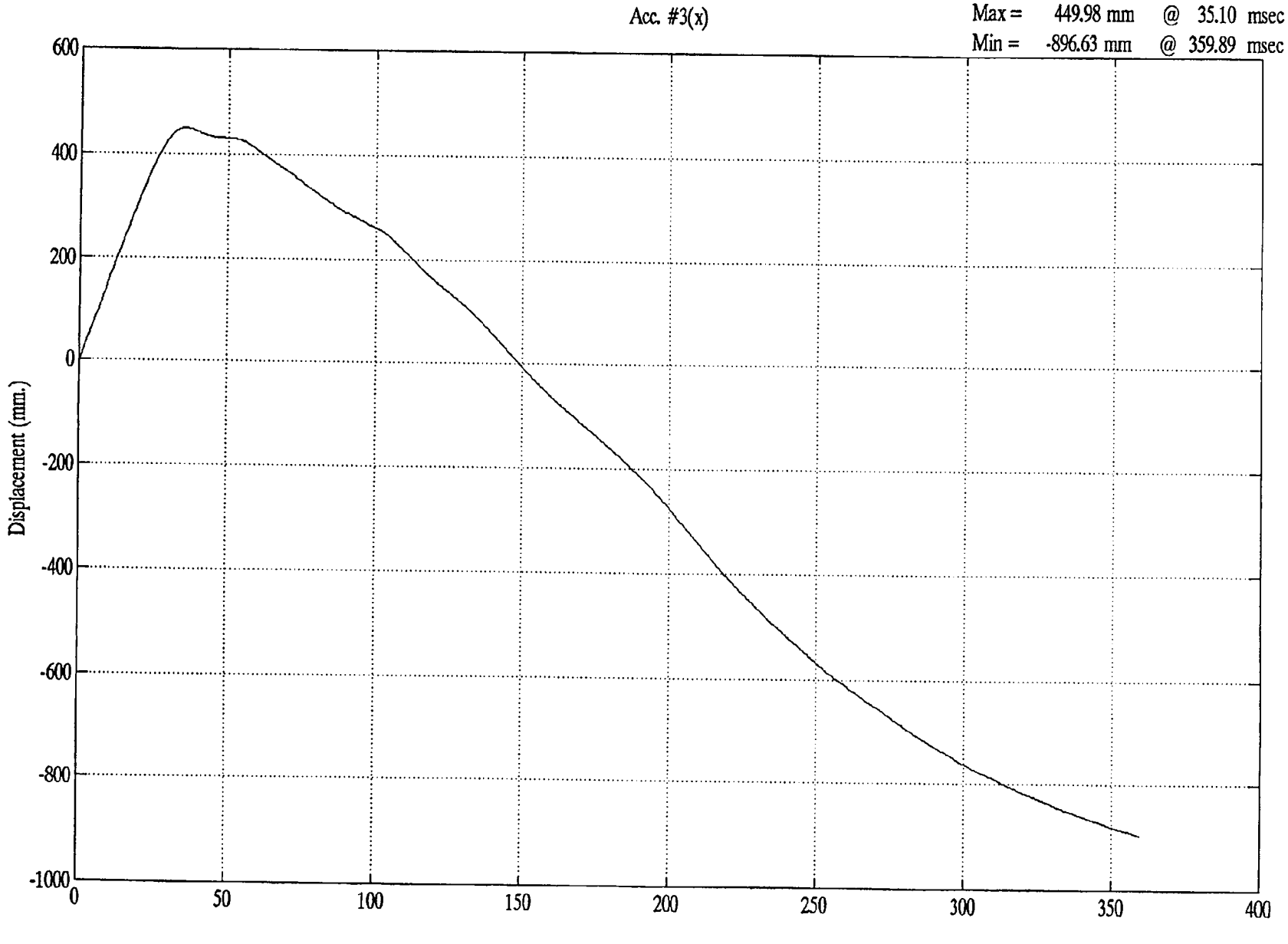


SAE Filter Class 180

MW0200 - 12 MAY 1997

8406-7

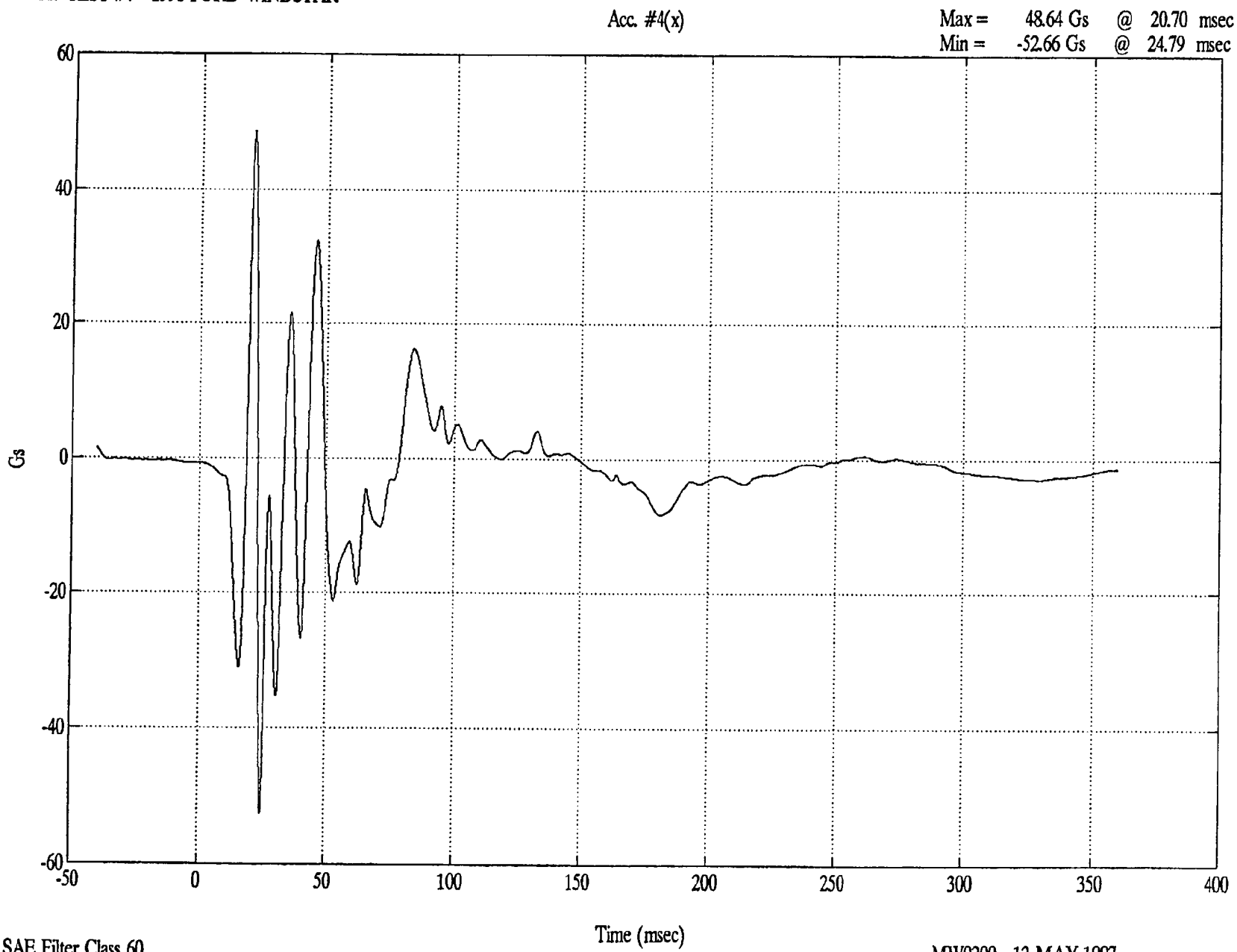
NCAP TEST #7 - 1998 Ford Windstar



SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

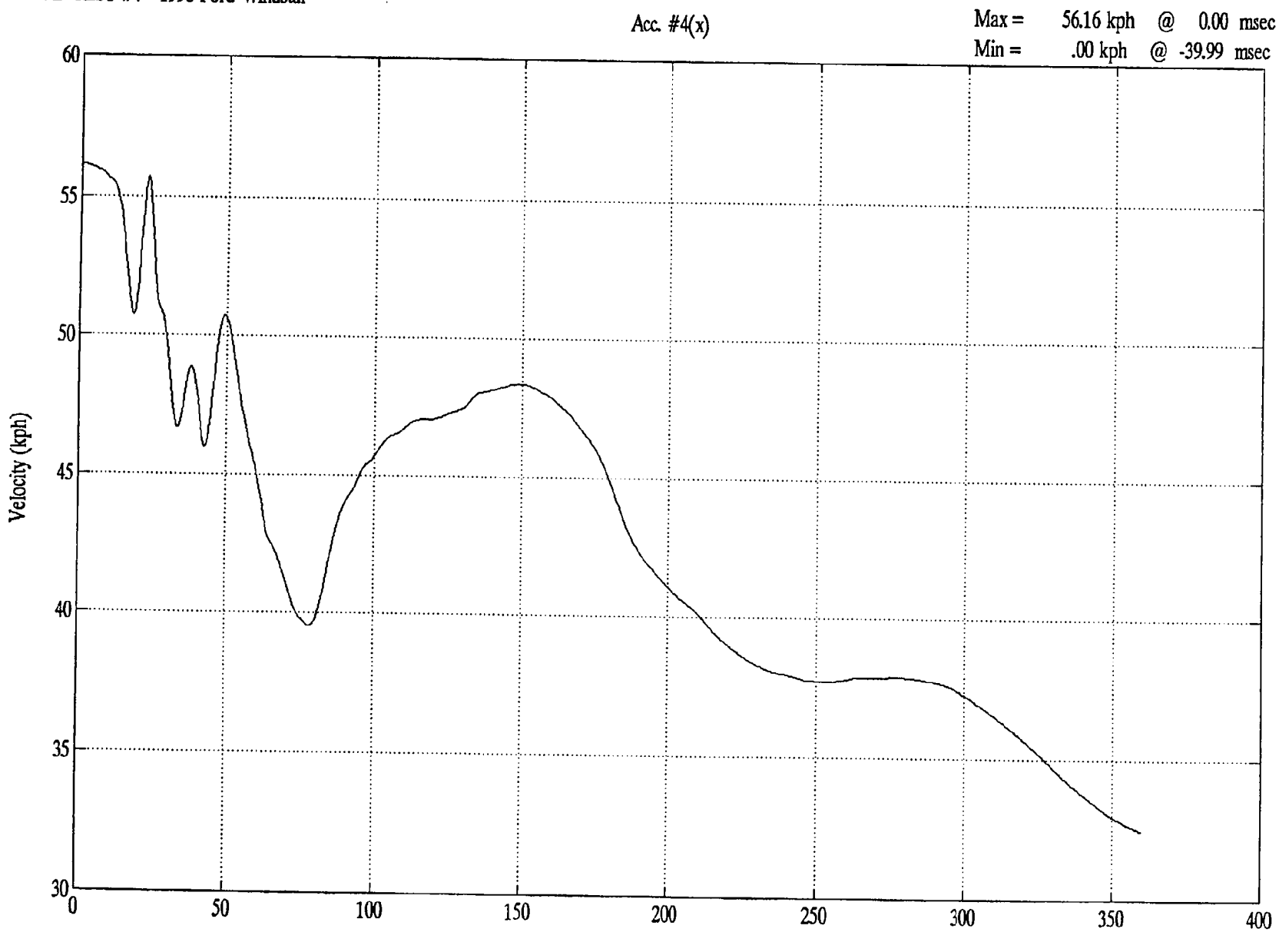


SAE Filter Class 60

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 Ford Windstar

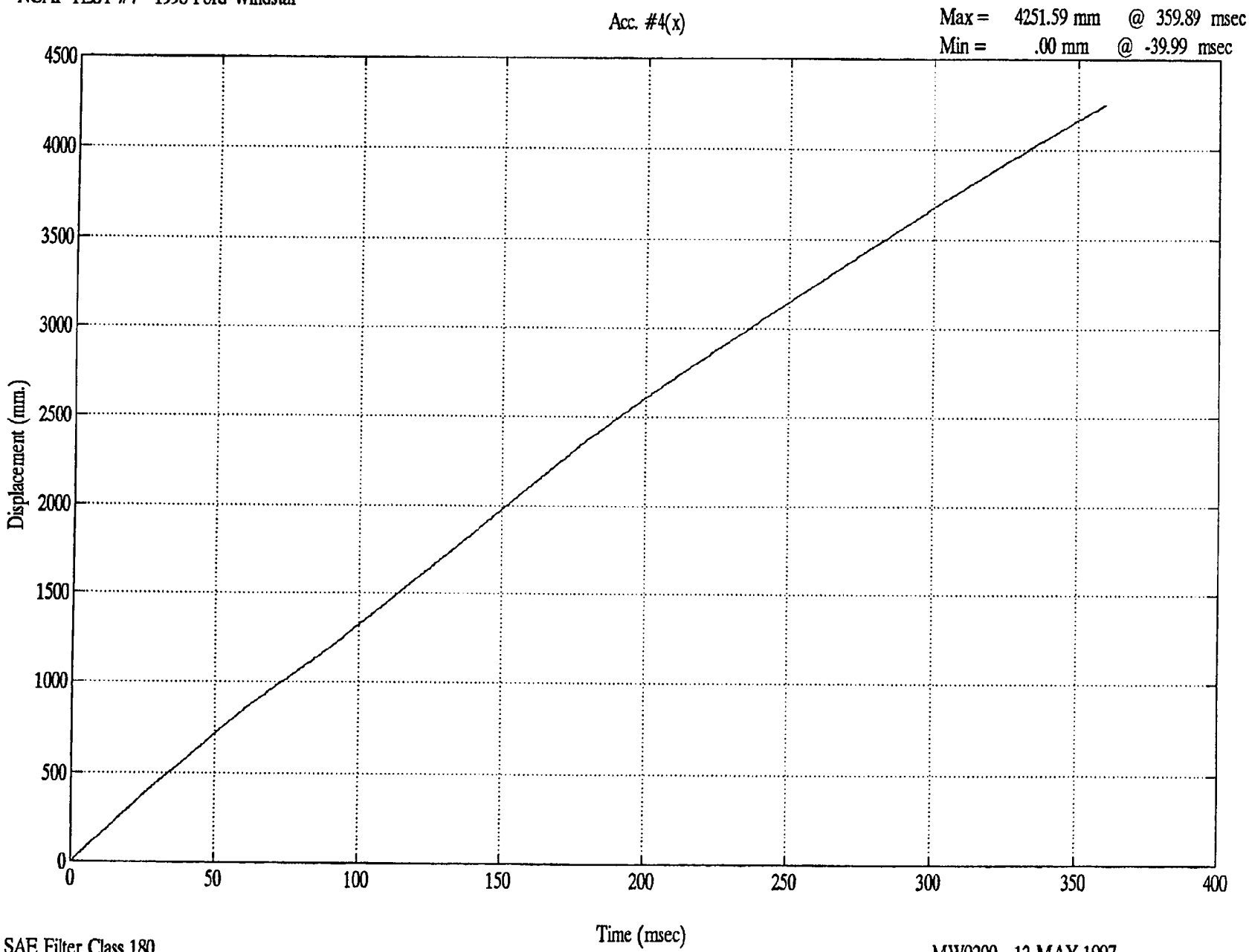


SAE Filter Class 180

MW0200 - 12 MAY 1997

8406-7

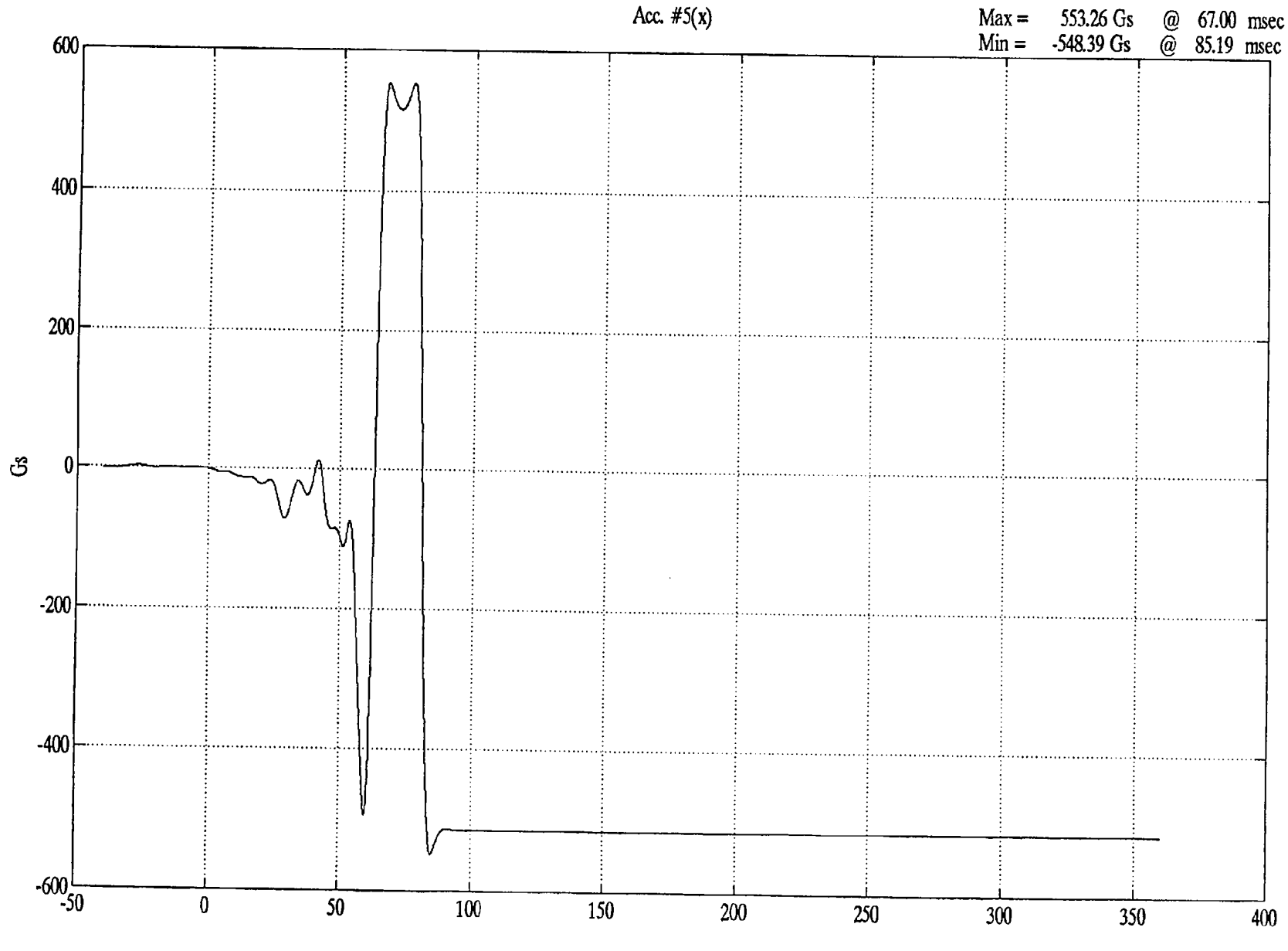
NCAP TEST #7 - 1998 Ford Windstar



SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

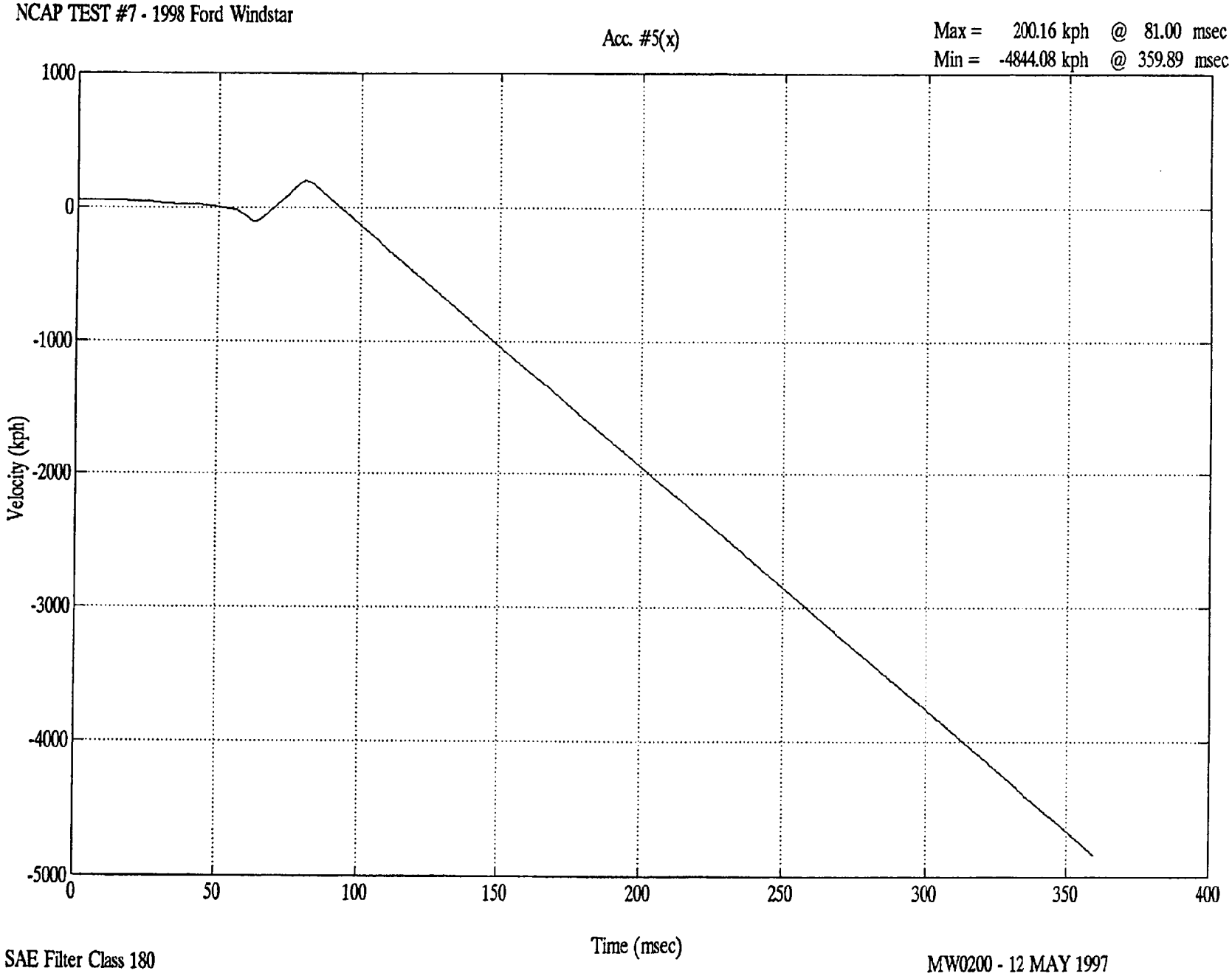


SAE Filter Class 60

MW0200 - 12 MAY 1997

8406-7

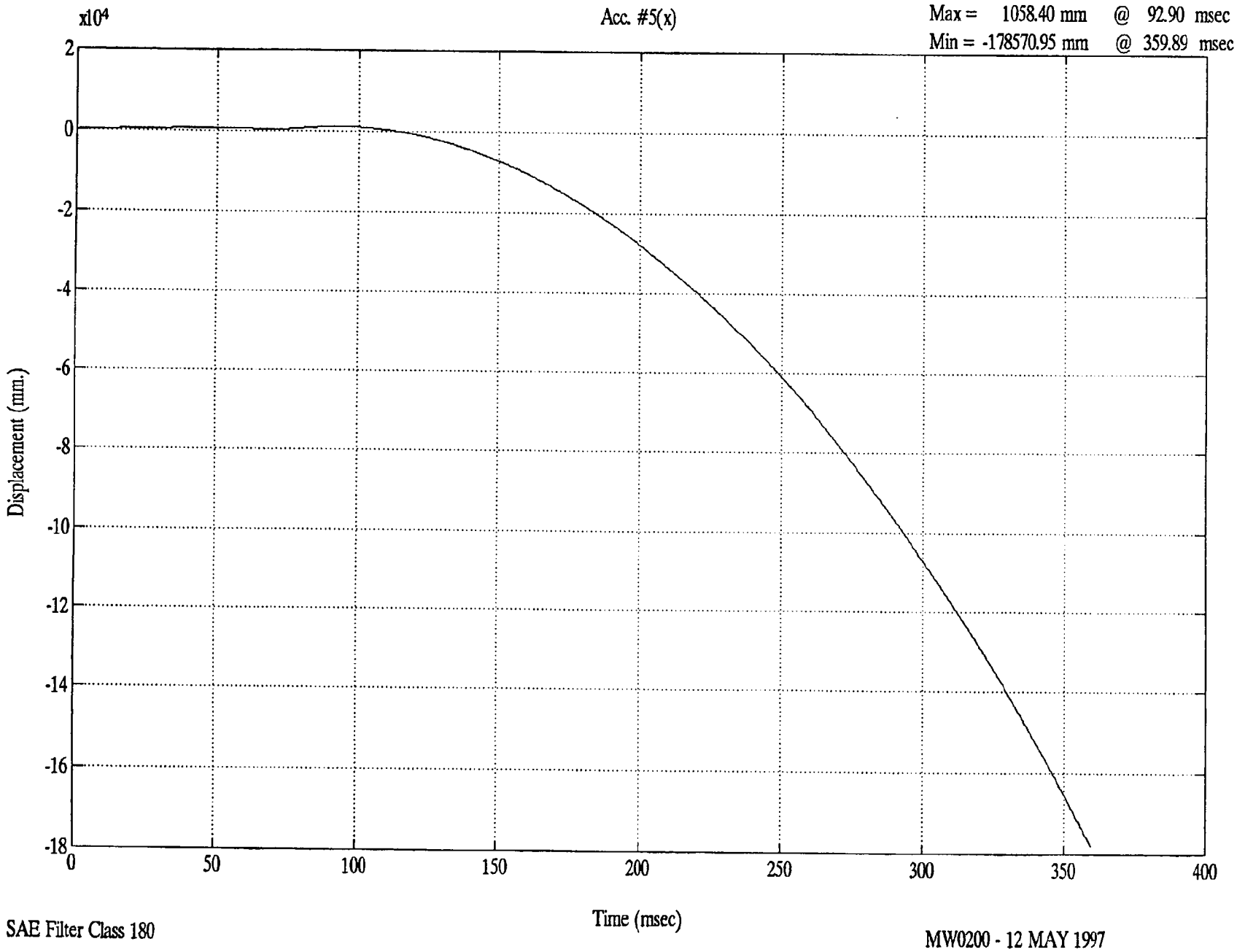
NCAP TEST #7 - 1998 Ford Windstar



SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 Ford Windstar

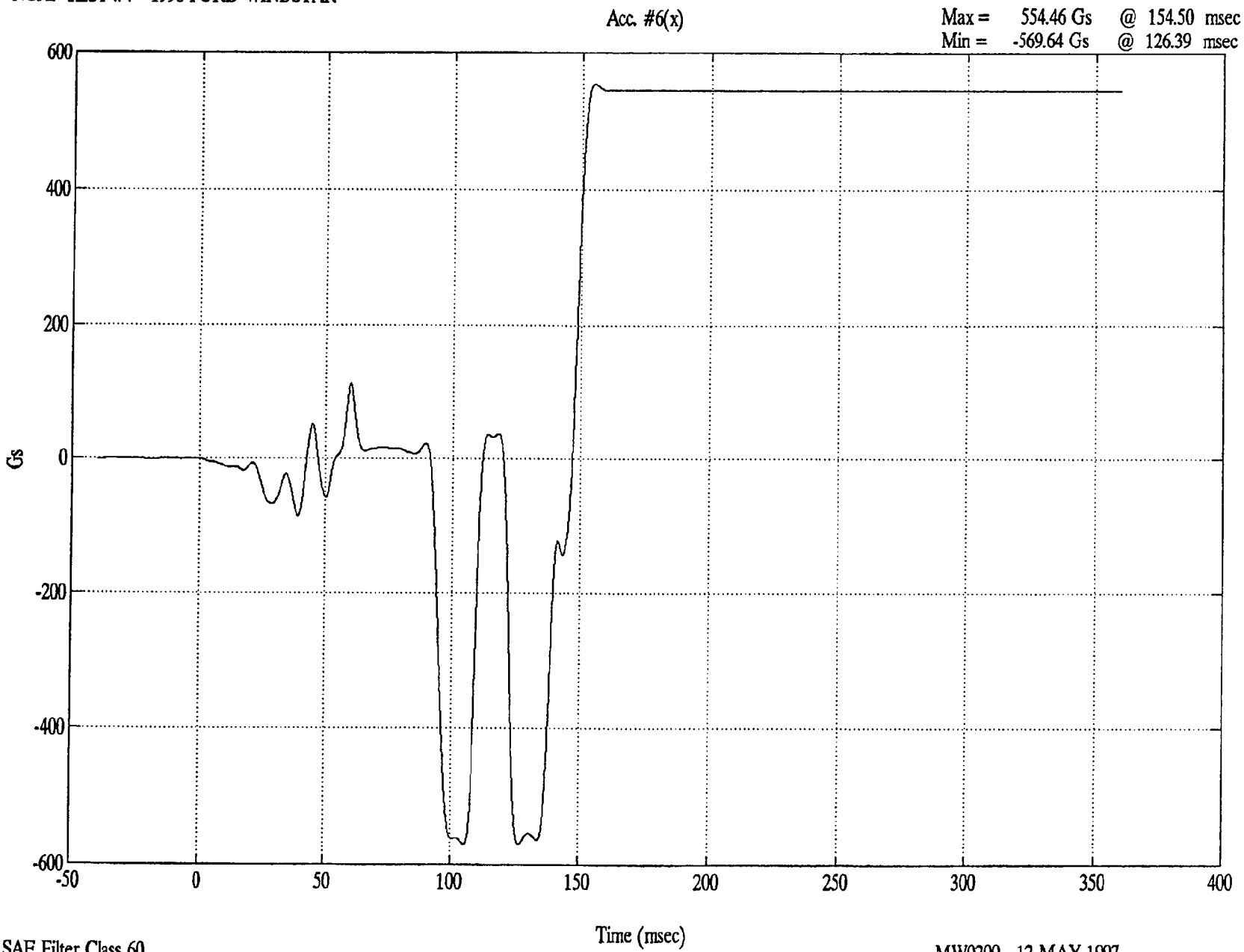


SAE Filter Class 180

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

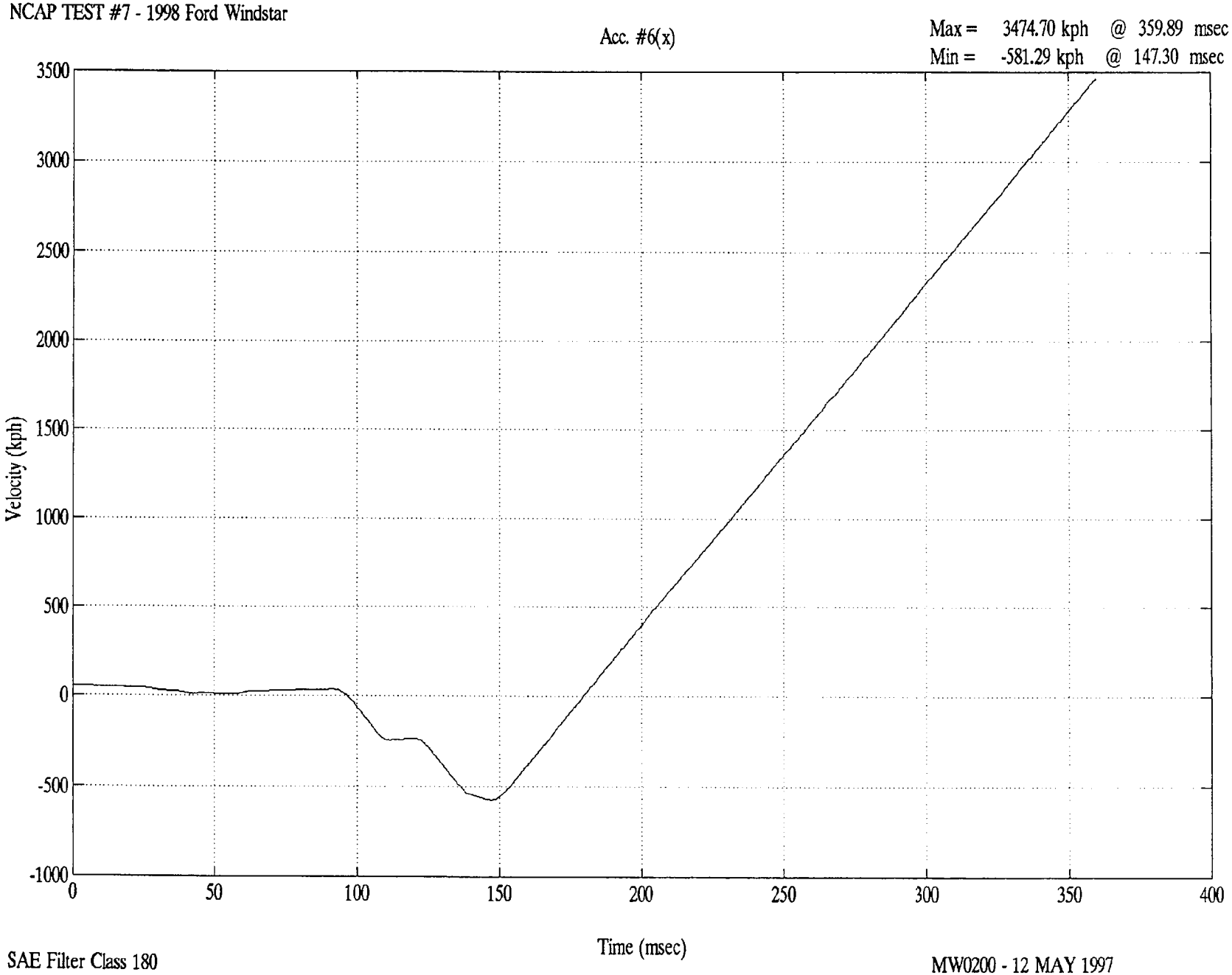


SAE Filter Class 60

MW0200 - 12 MAY 1997

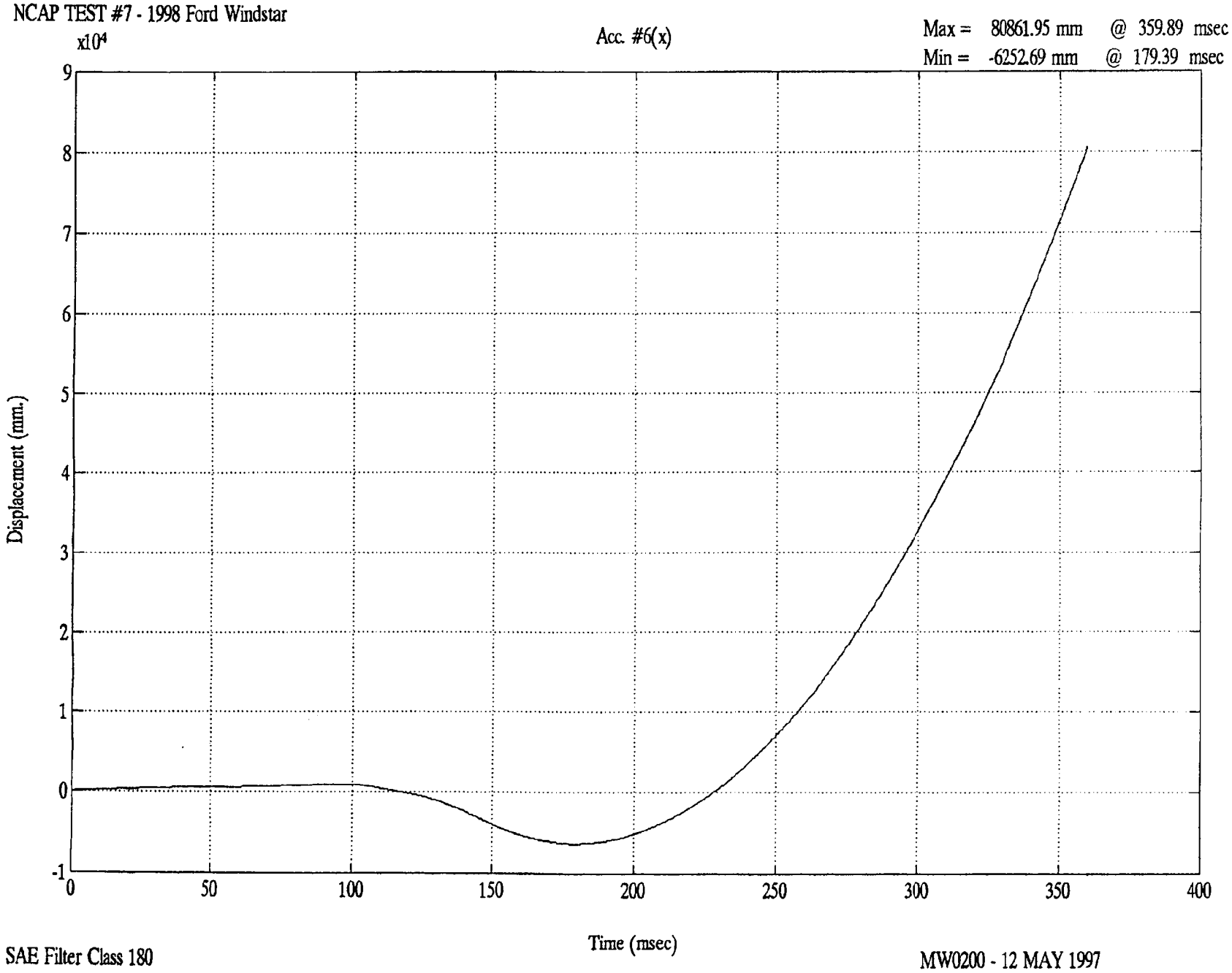
8406-7

NCAP TEST #7 - 1998 Ford Windstar



SAE Filter Class 180

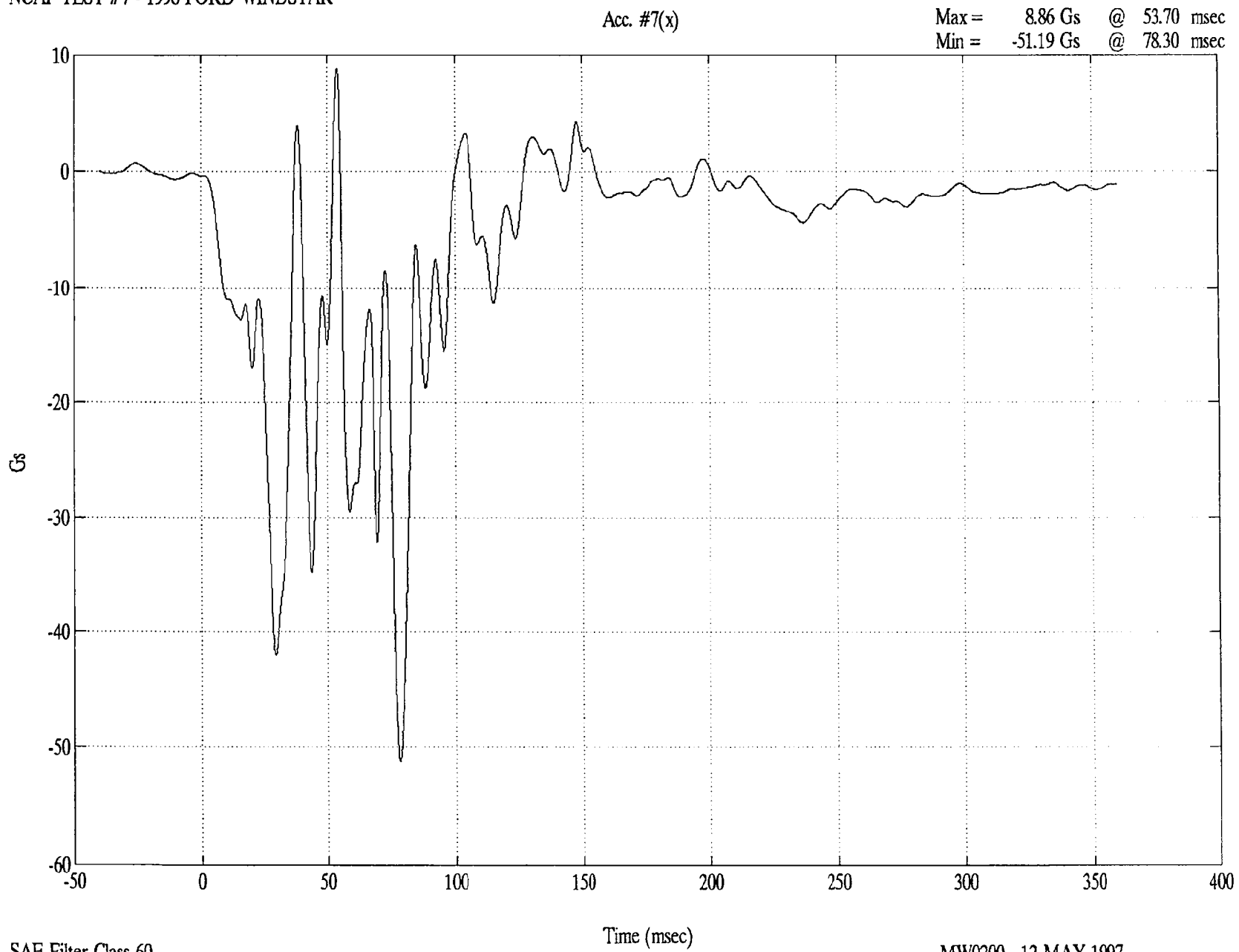
MW0200 - 12 MAY 1997



SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



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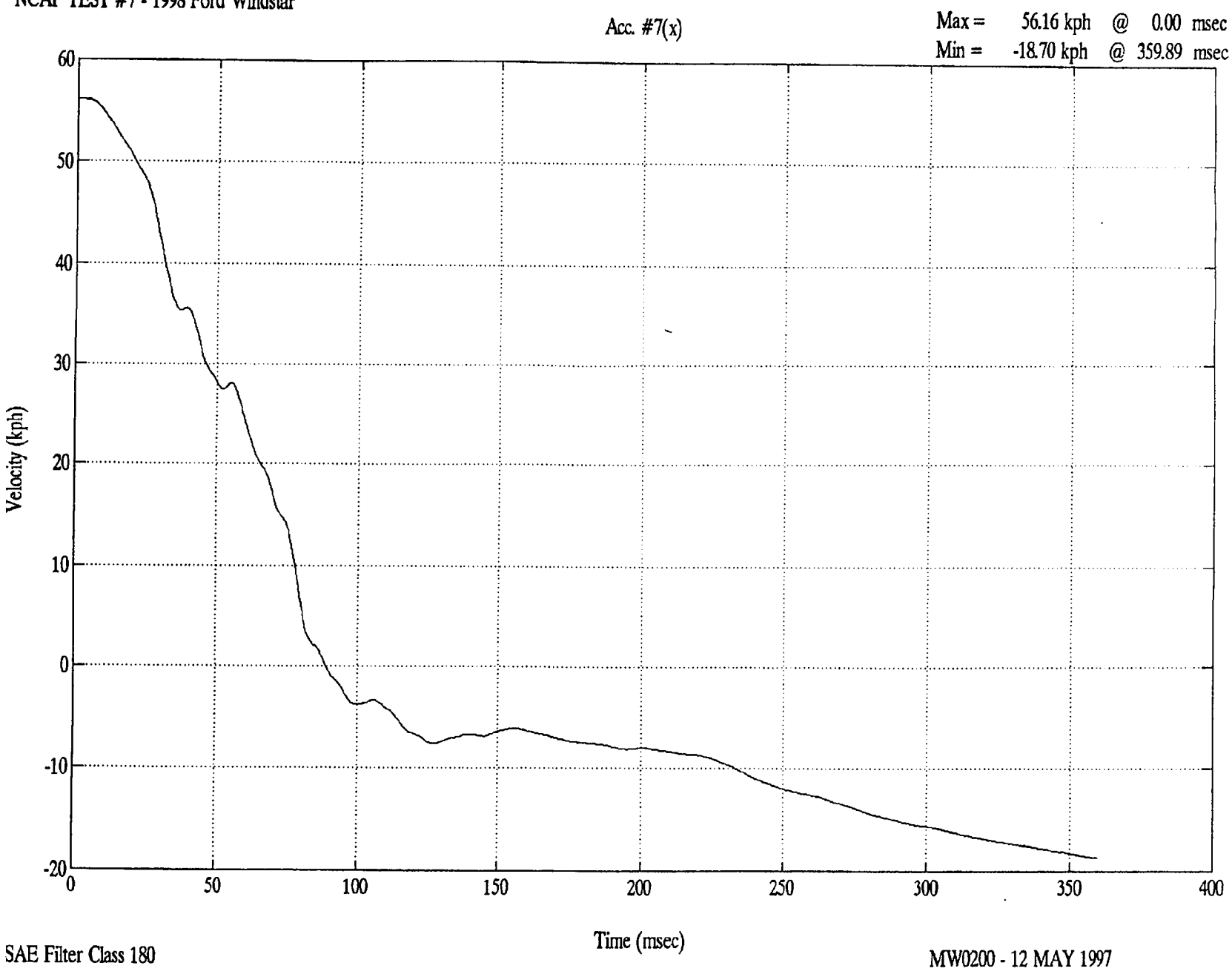
8406-7

SAE Filter Class 60

MW0200 - 12 MAY 1997

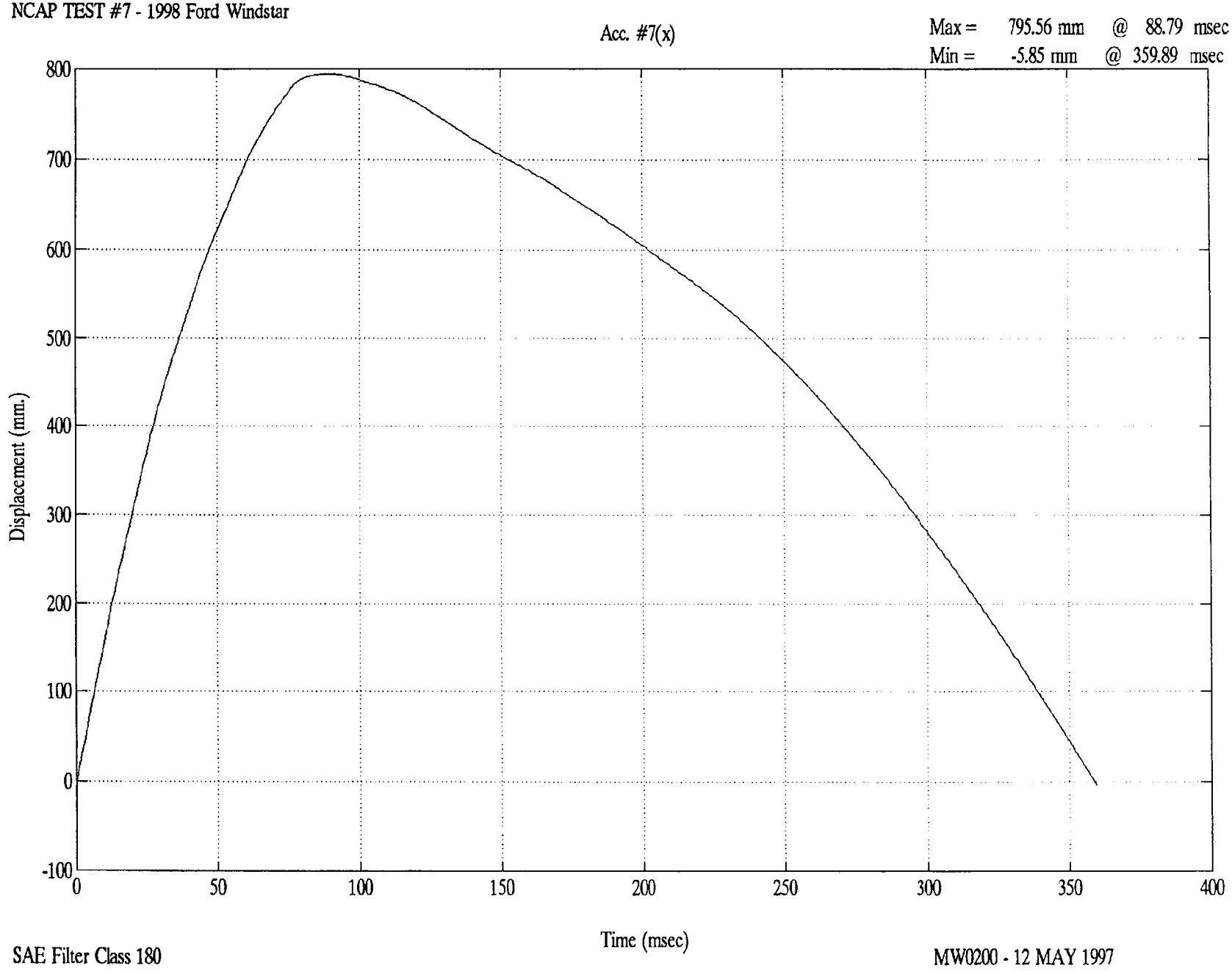
NCAP TEST #7 - 1998 Ford Windstar



SAE Filter Class 180

MW0200 - 12 MAY 1997

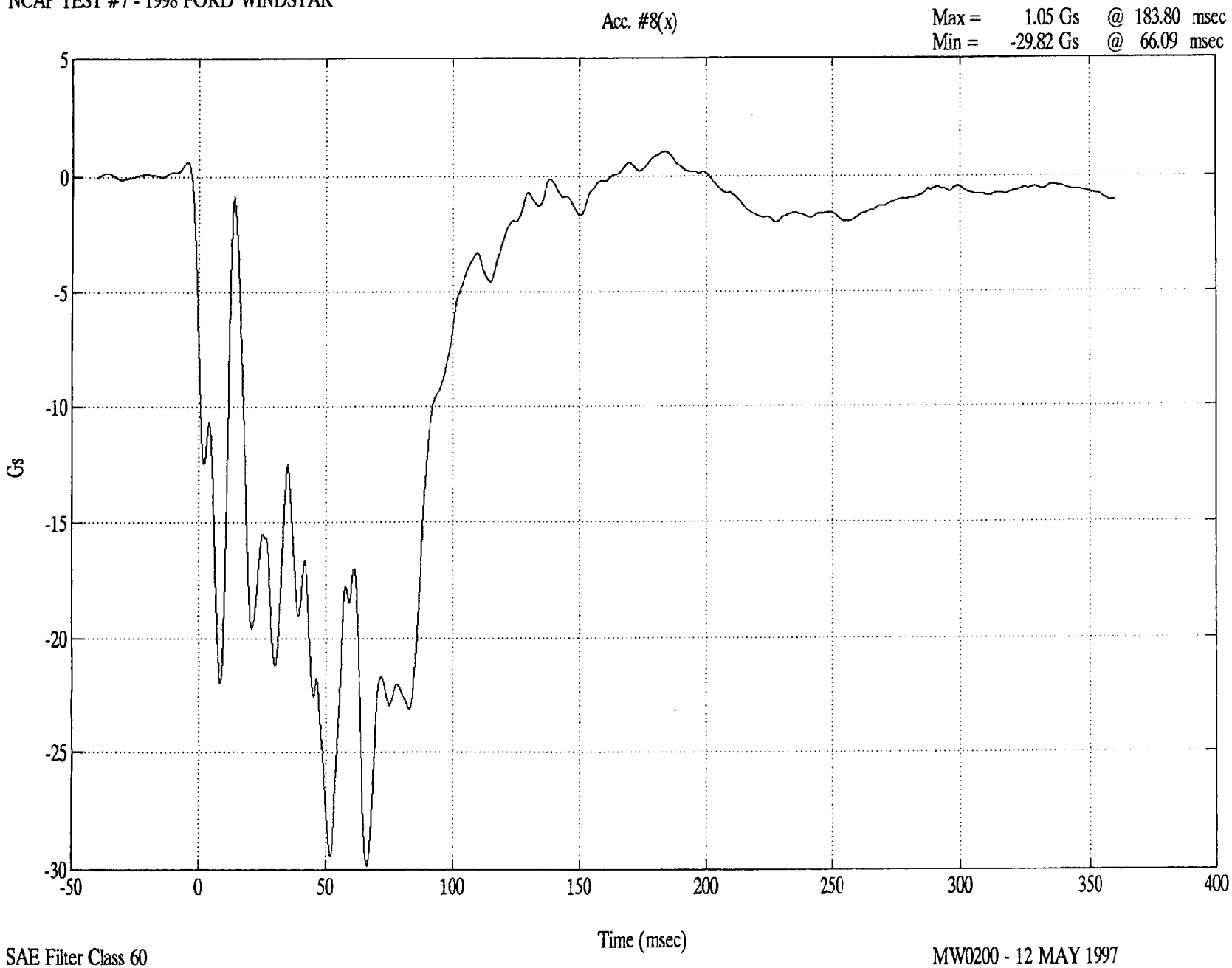
NCAP TEST #7 - 1998 Ford Windstar



SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

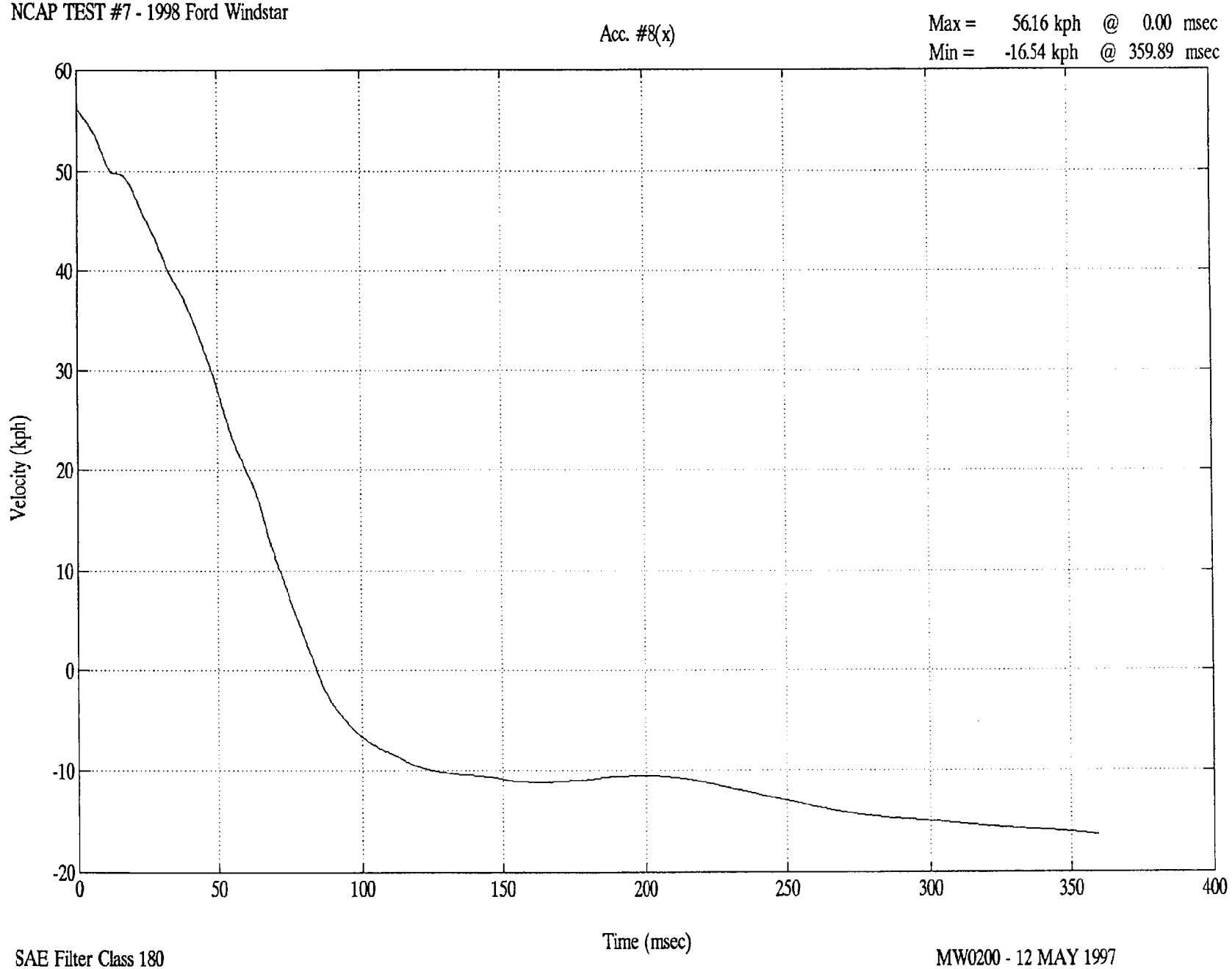


SAE Filter Class 60

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 Ford Windstar



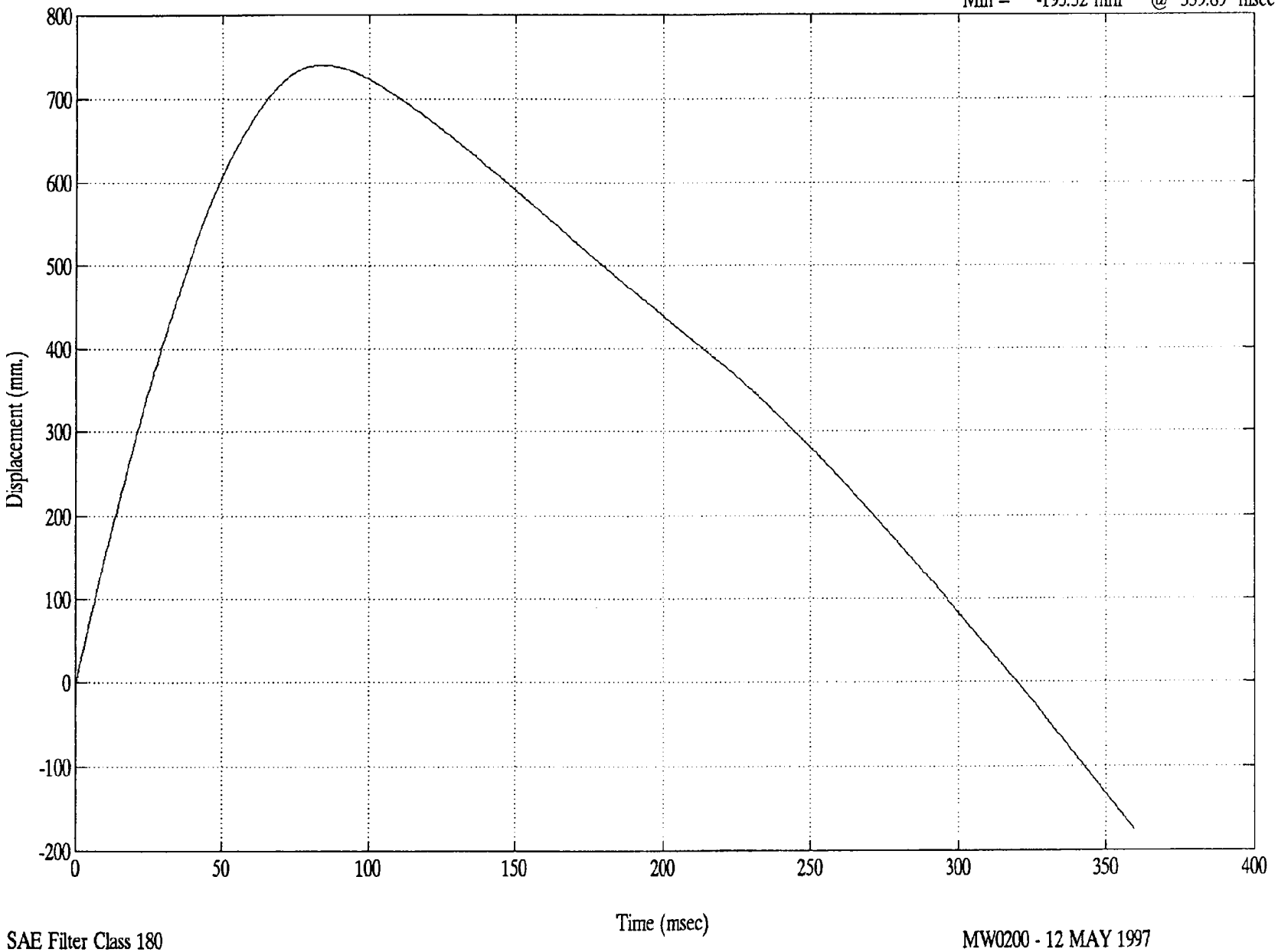
SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 Ford Windstar

Acc. #8(x)

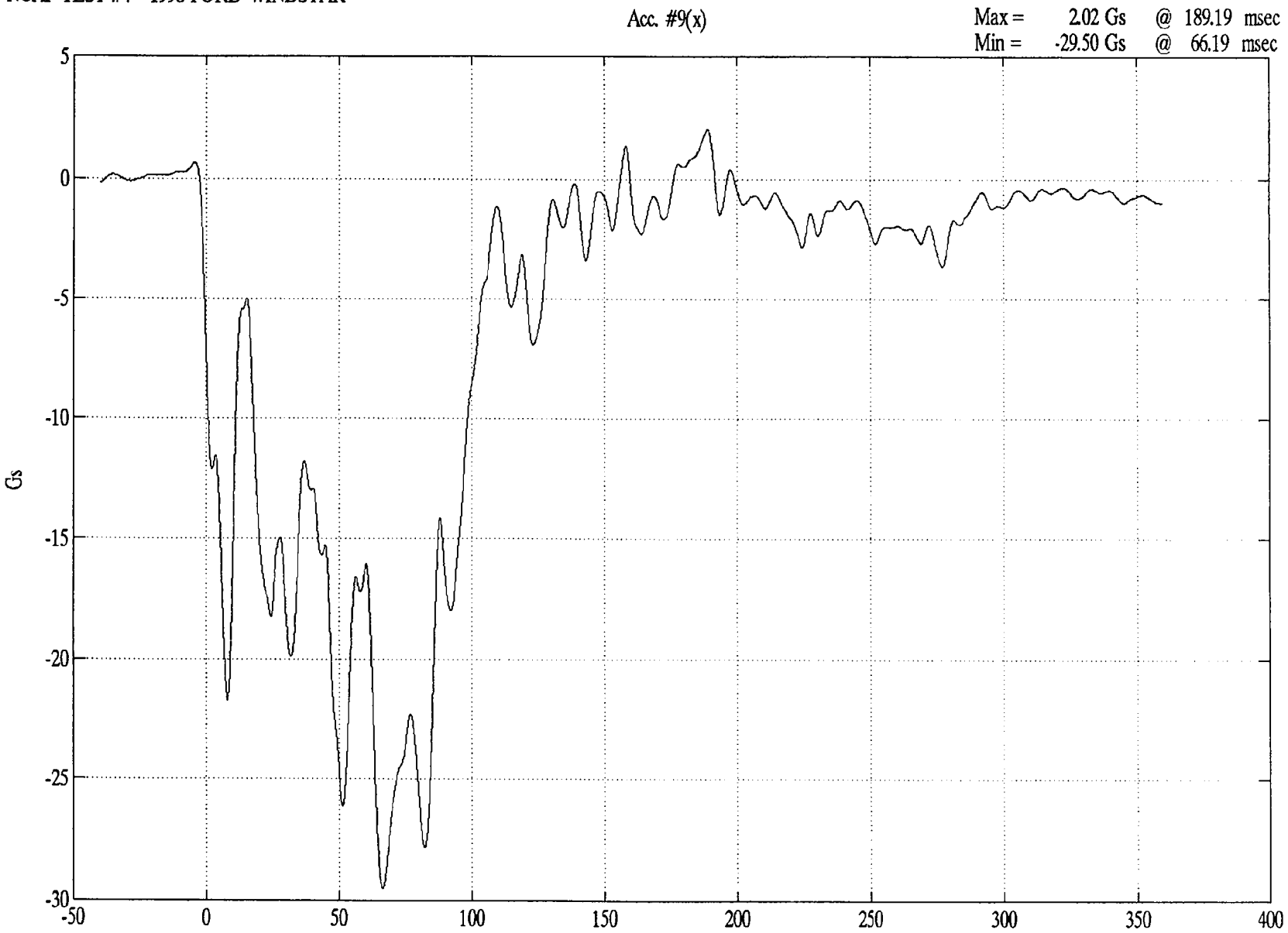
Max = 735.96 mm @ 83.99 msec
Min = -195.32 mm @ 359.89 msec



SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



B-129

8406-7

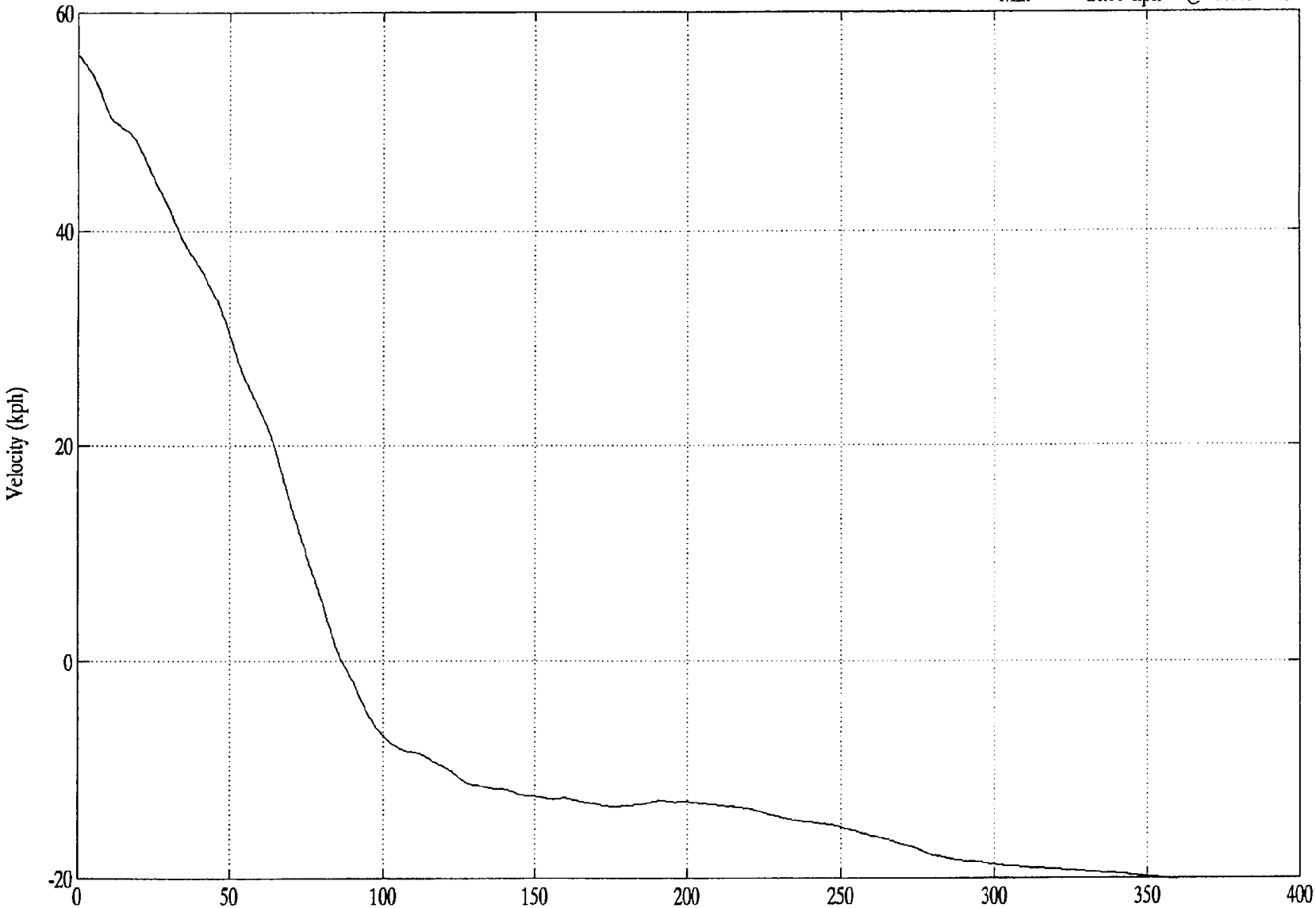
SAE Filter Class 60

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 Ford Windstar

Acc. #9(x)

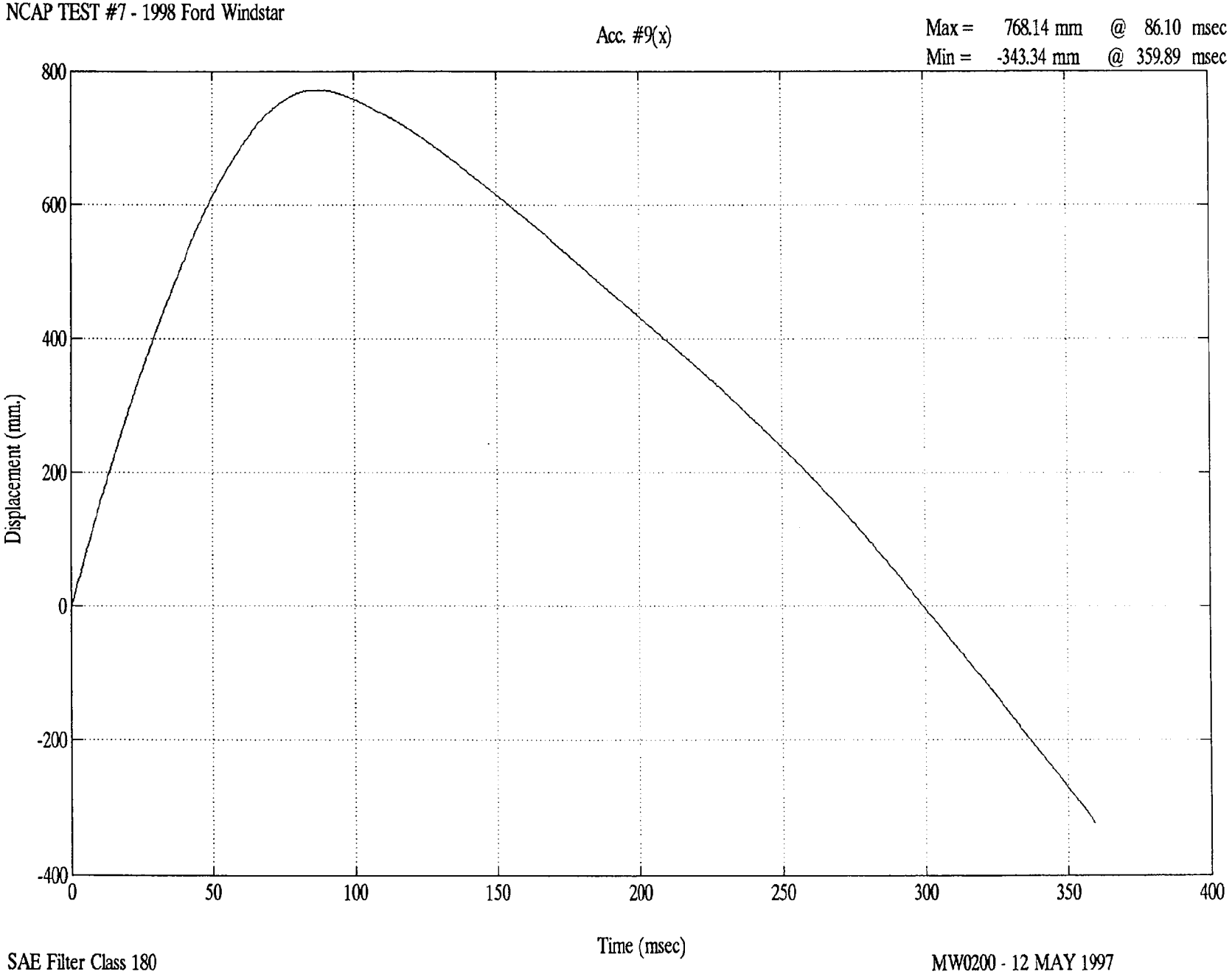
Max = 56.16 kph @ 0.00 msec
Min = -20.33 kph @ 359.89 msec



SAE Filter Class 180

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 Ford Windstar



SAE Filter Class 180

MW0200 - 12 MAY 1997

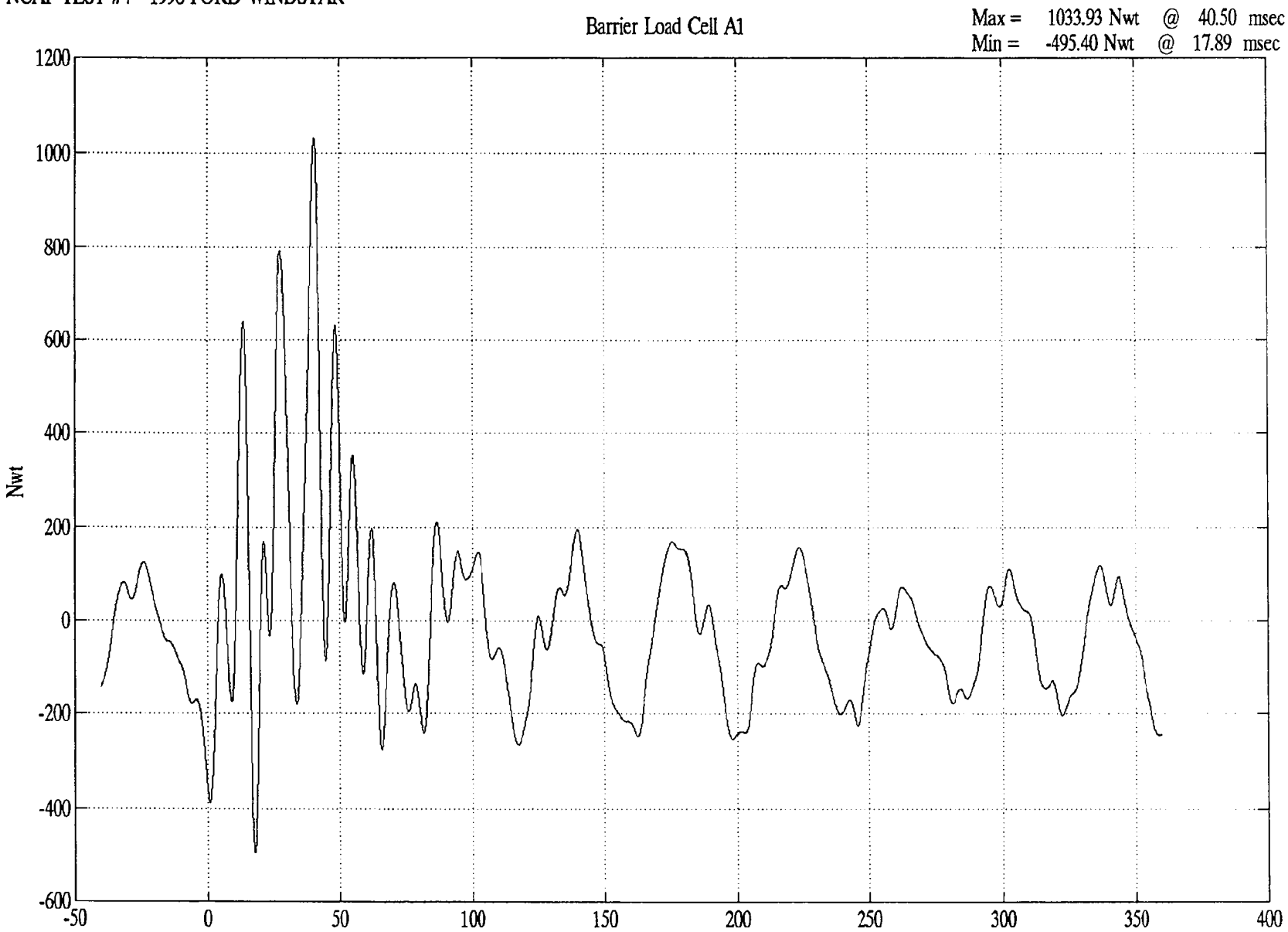
NHTSA TEST NO. MW0200

LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

60

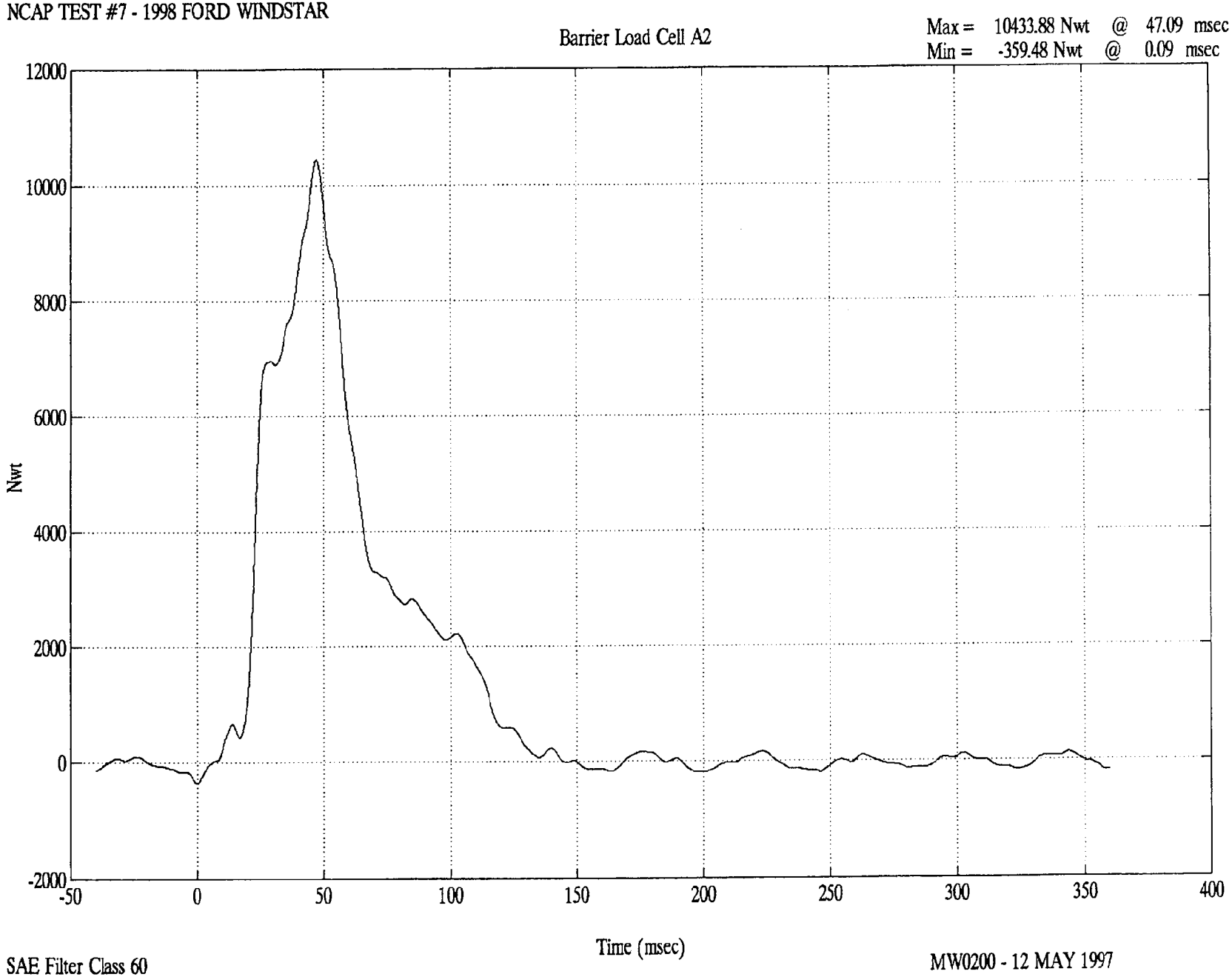
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997

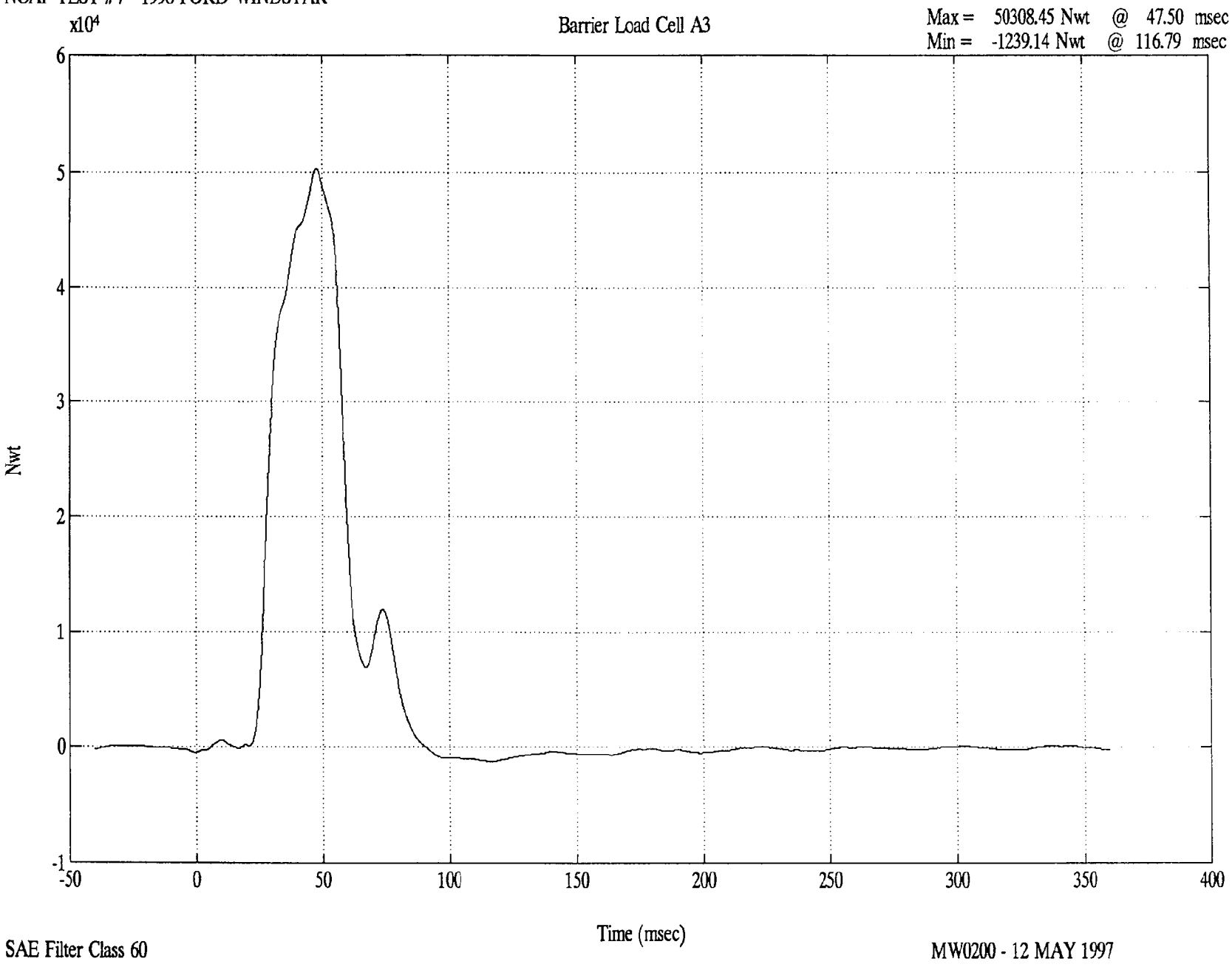
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997

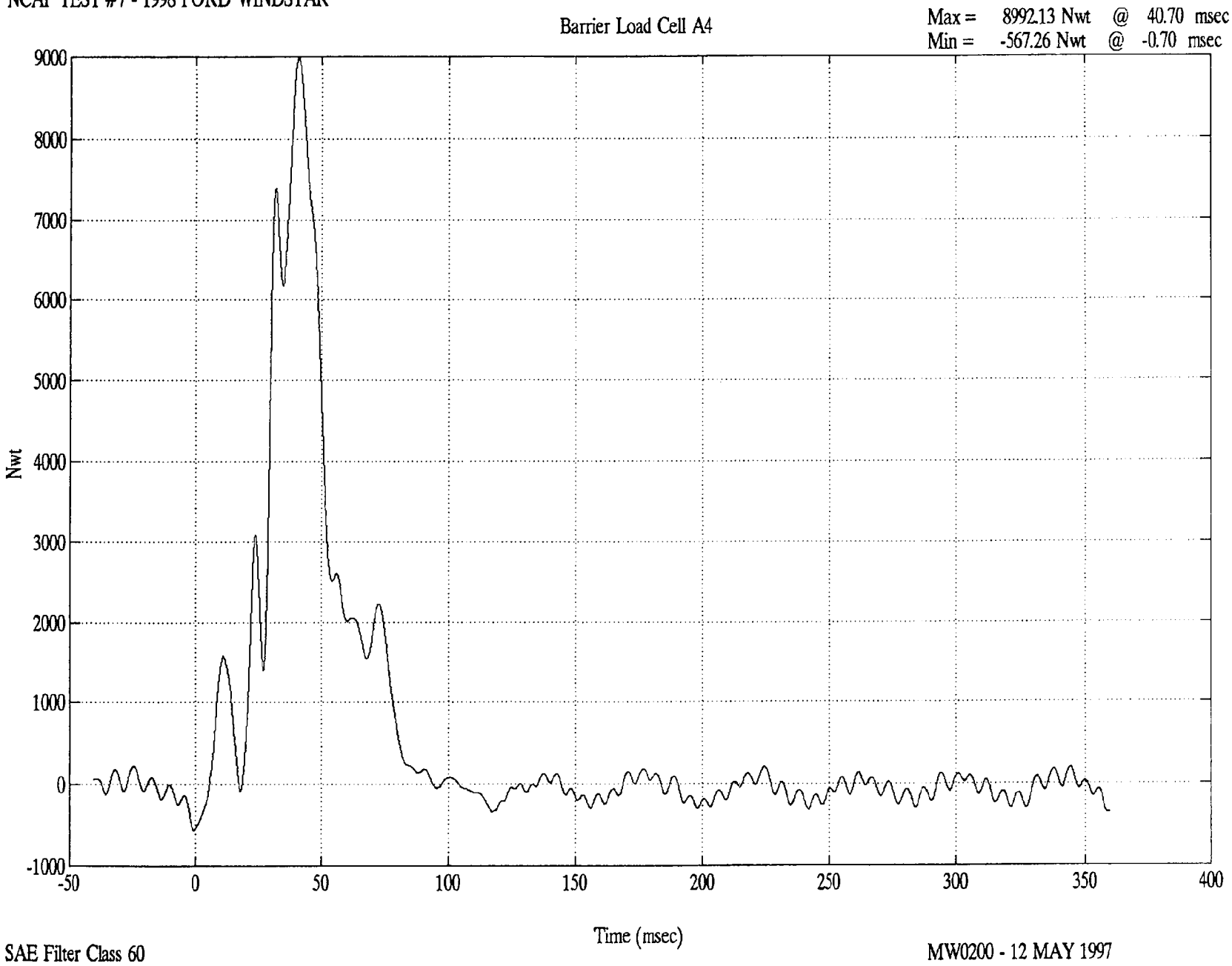
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997

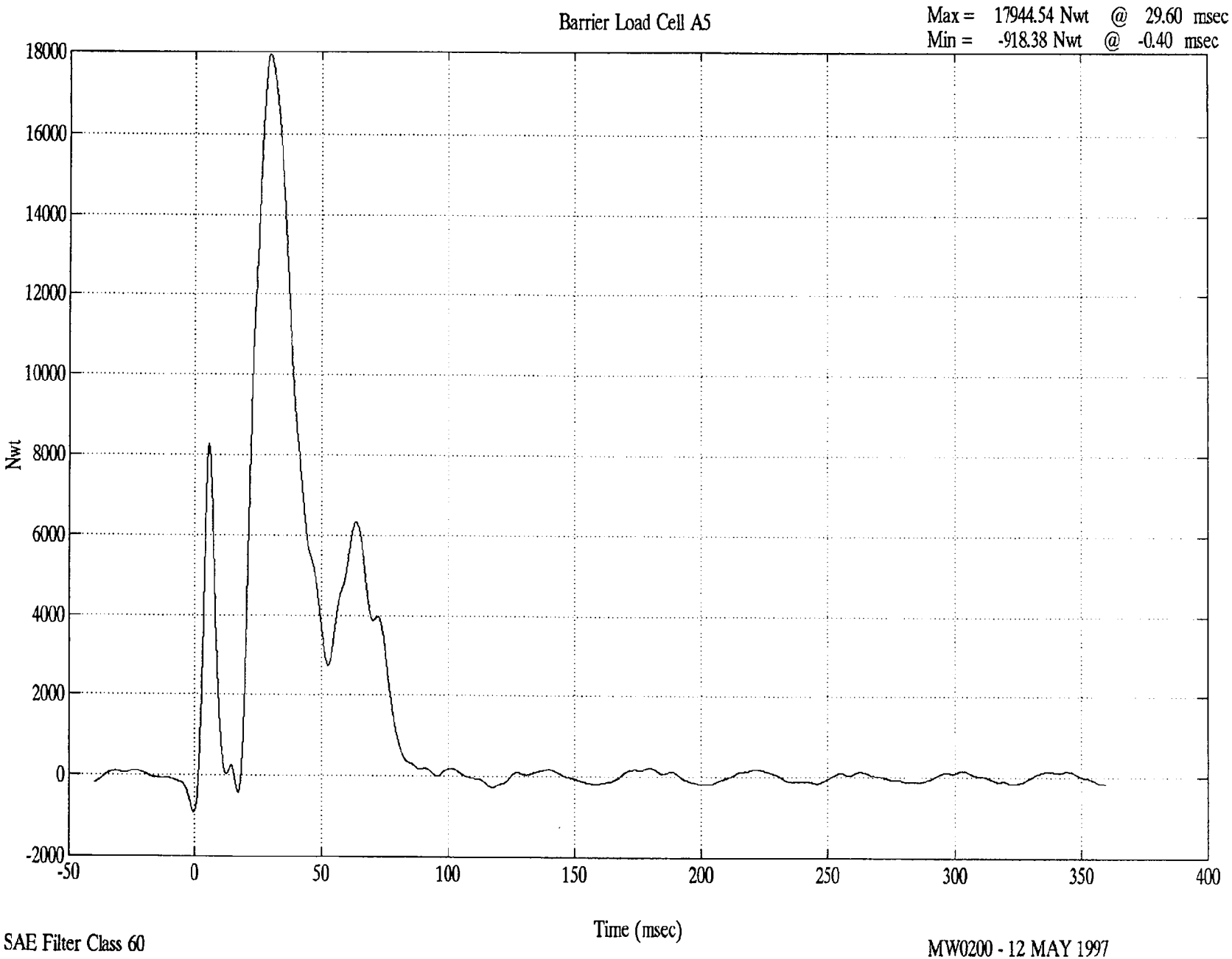
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997

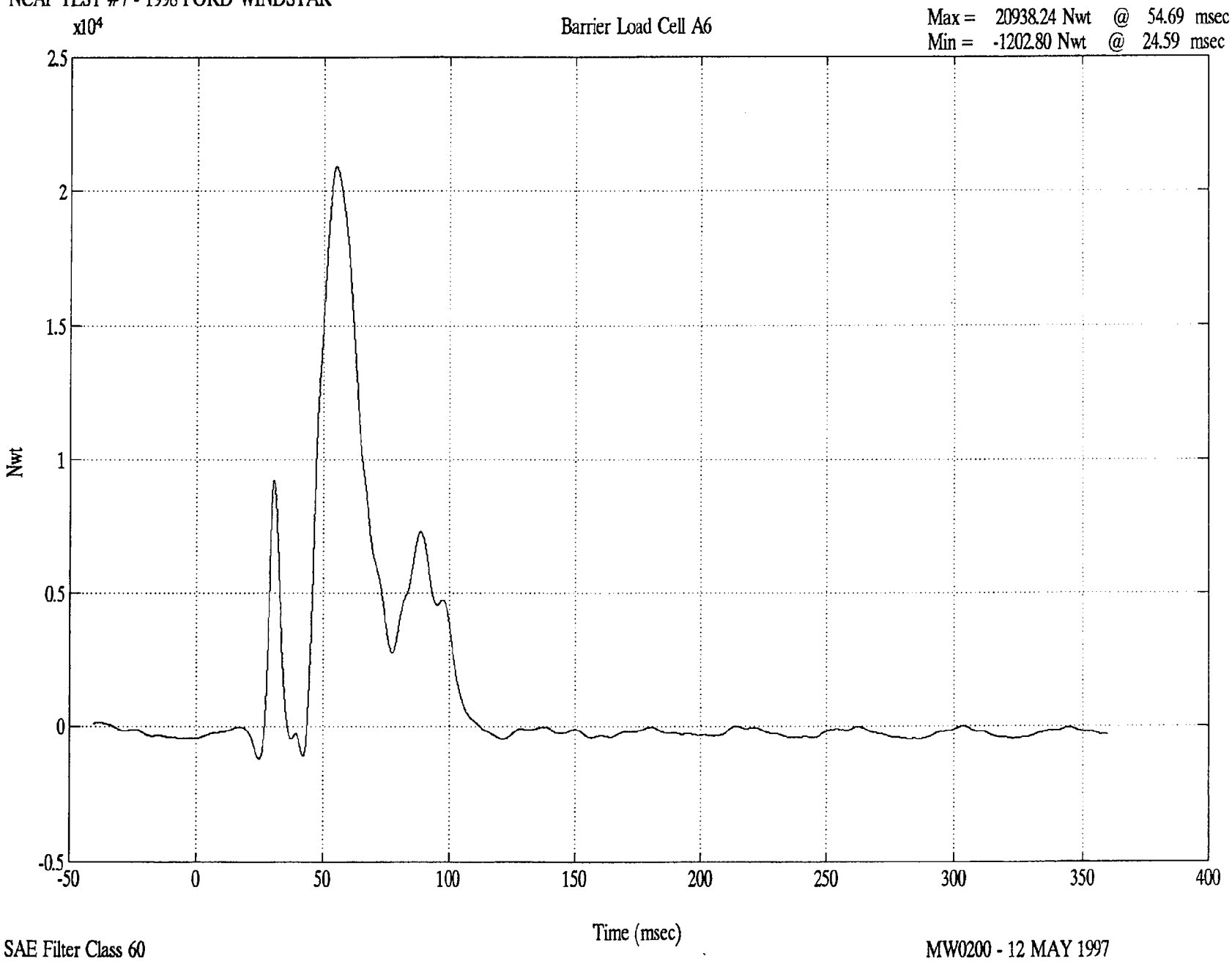
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

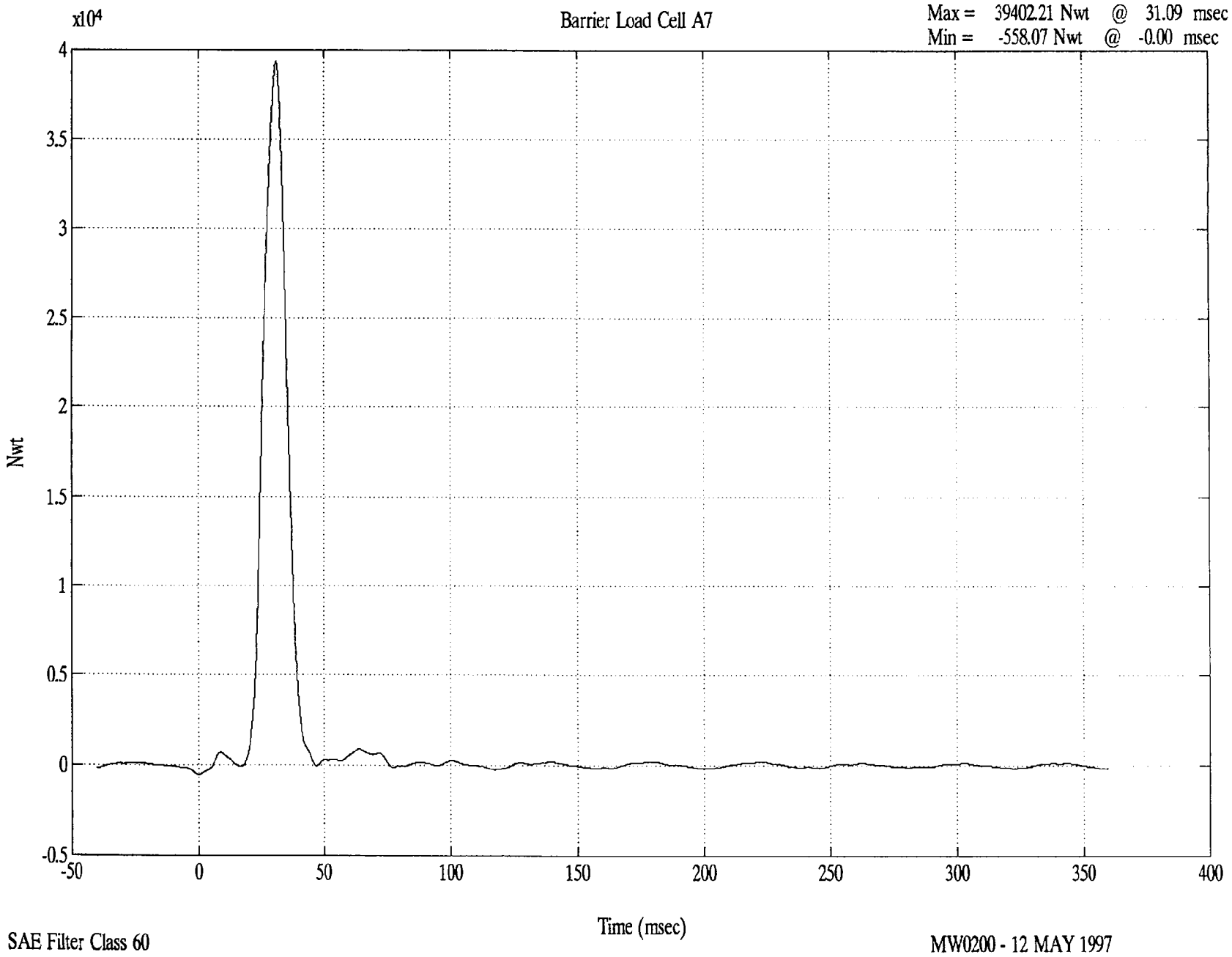


SAE Filter Class 60

MW0200 - 12 MAY 1997

8406-7

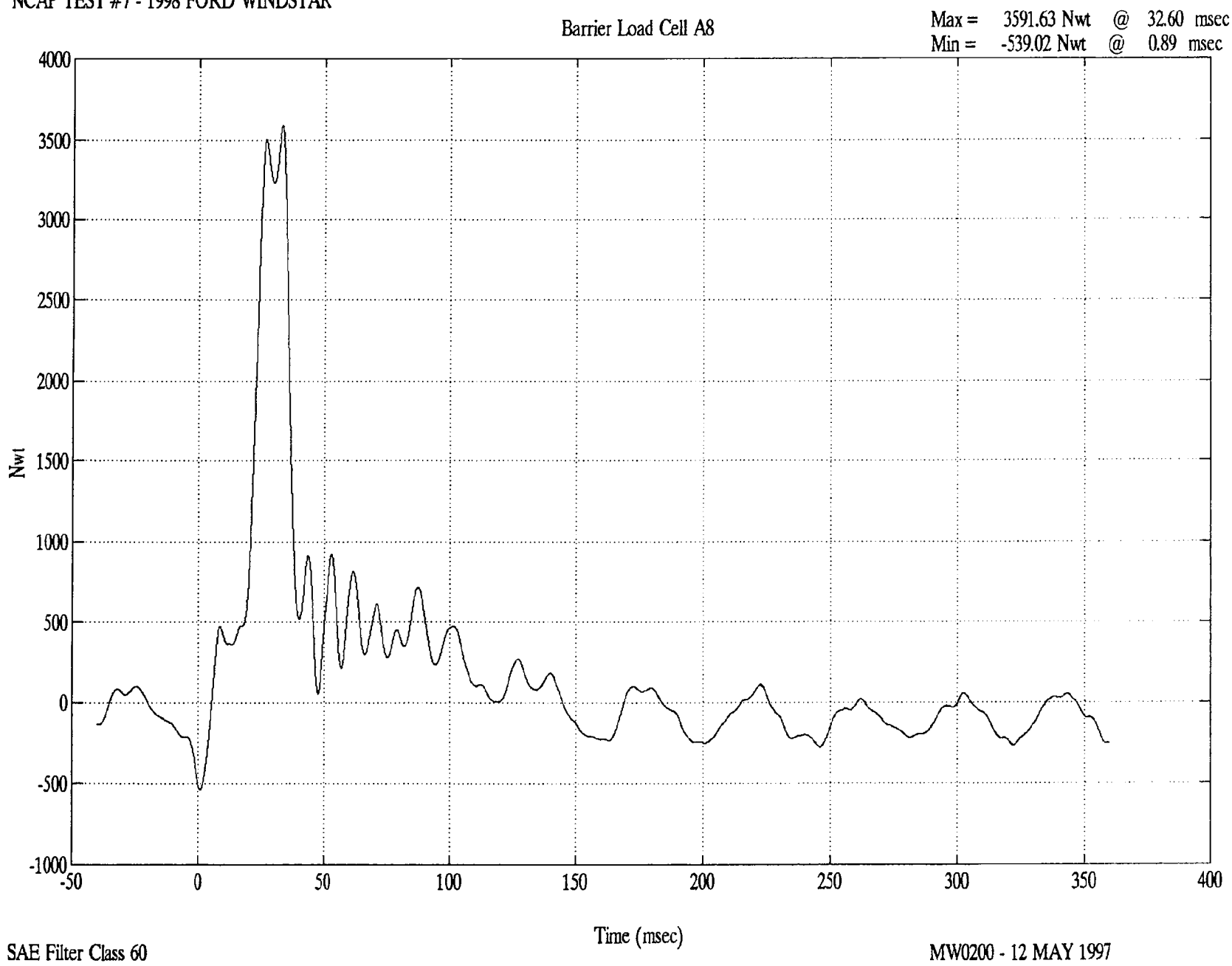
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997

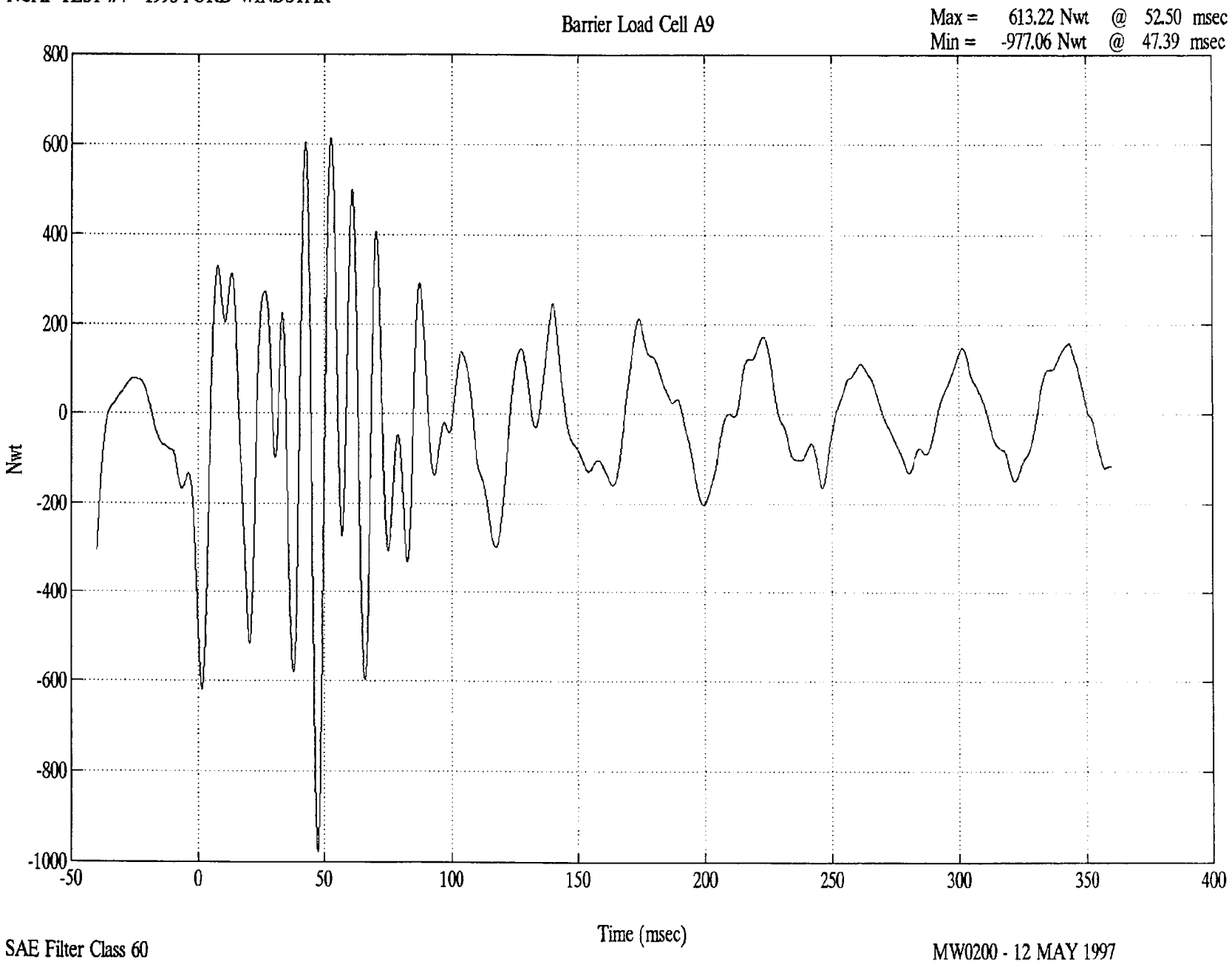
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997

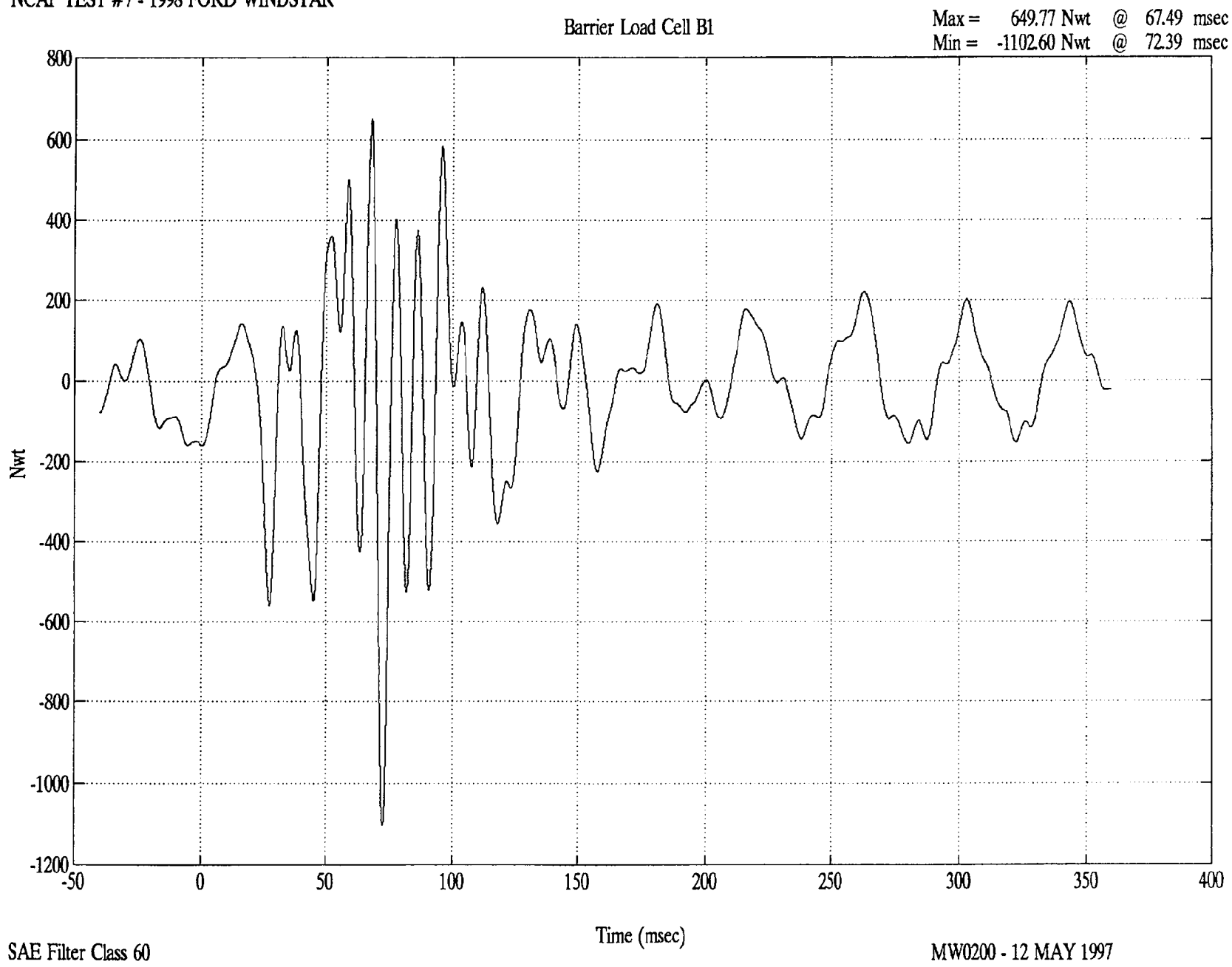
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

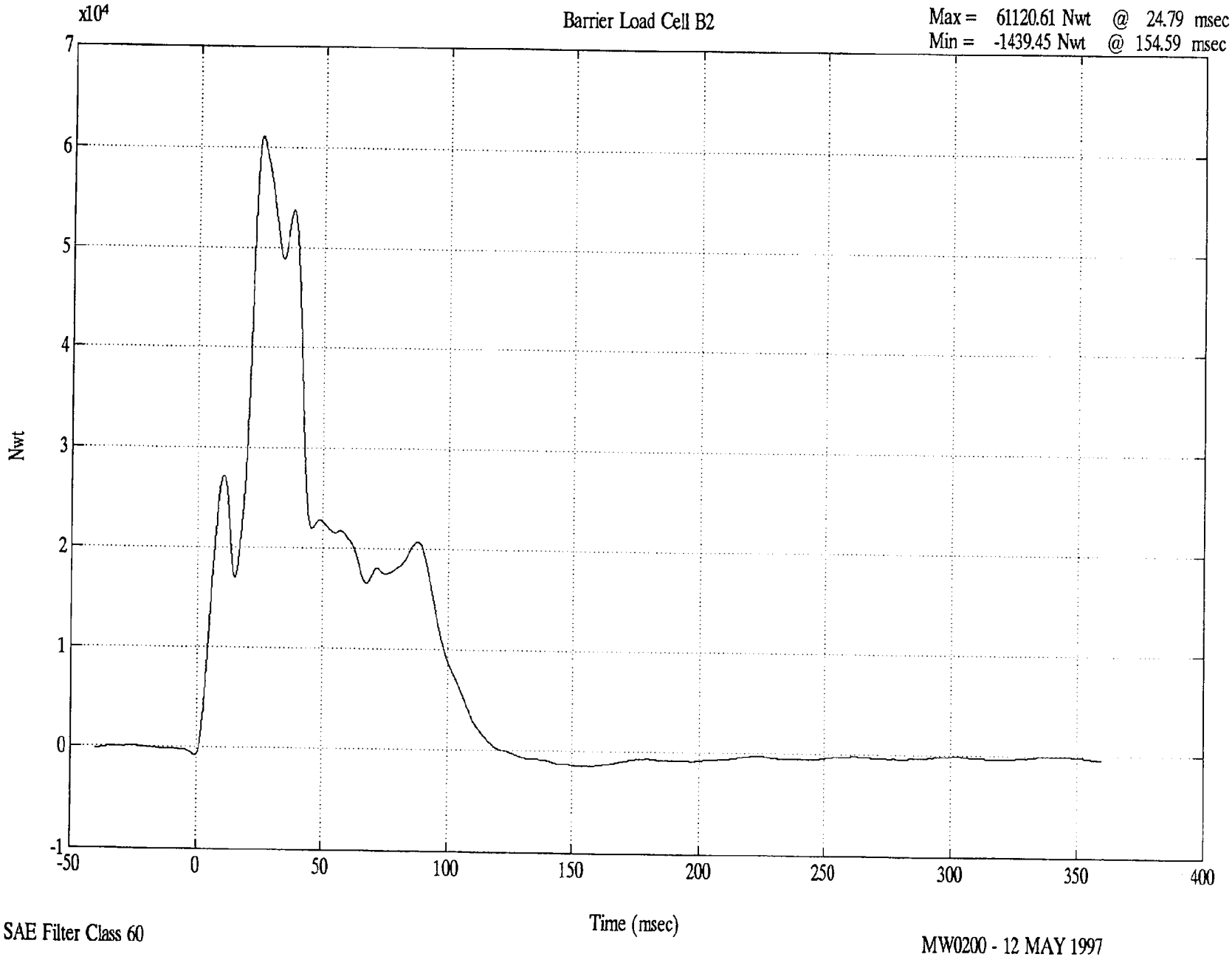


SAE Filter Class 60

MW0200 - 12 MAY 1997

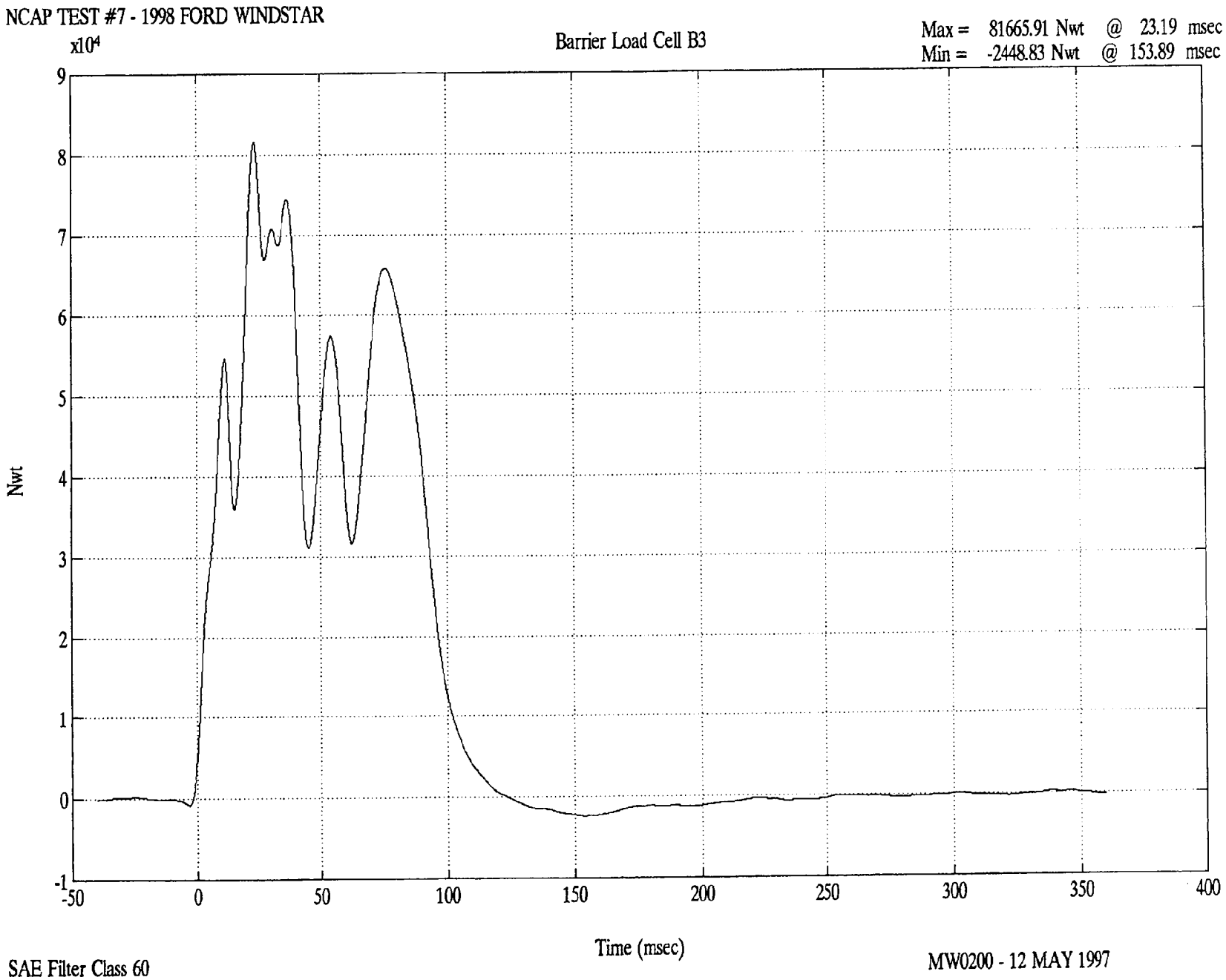
8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

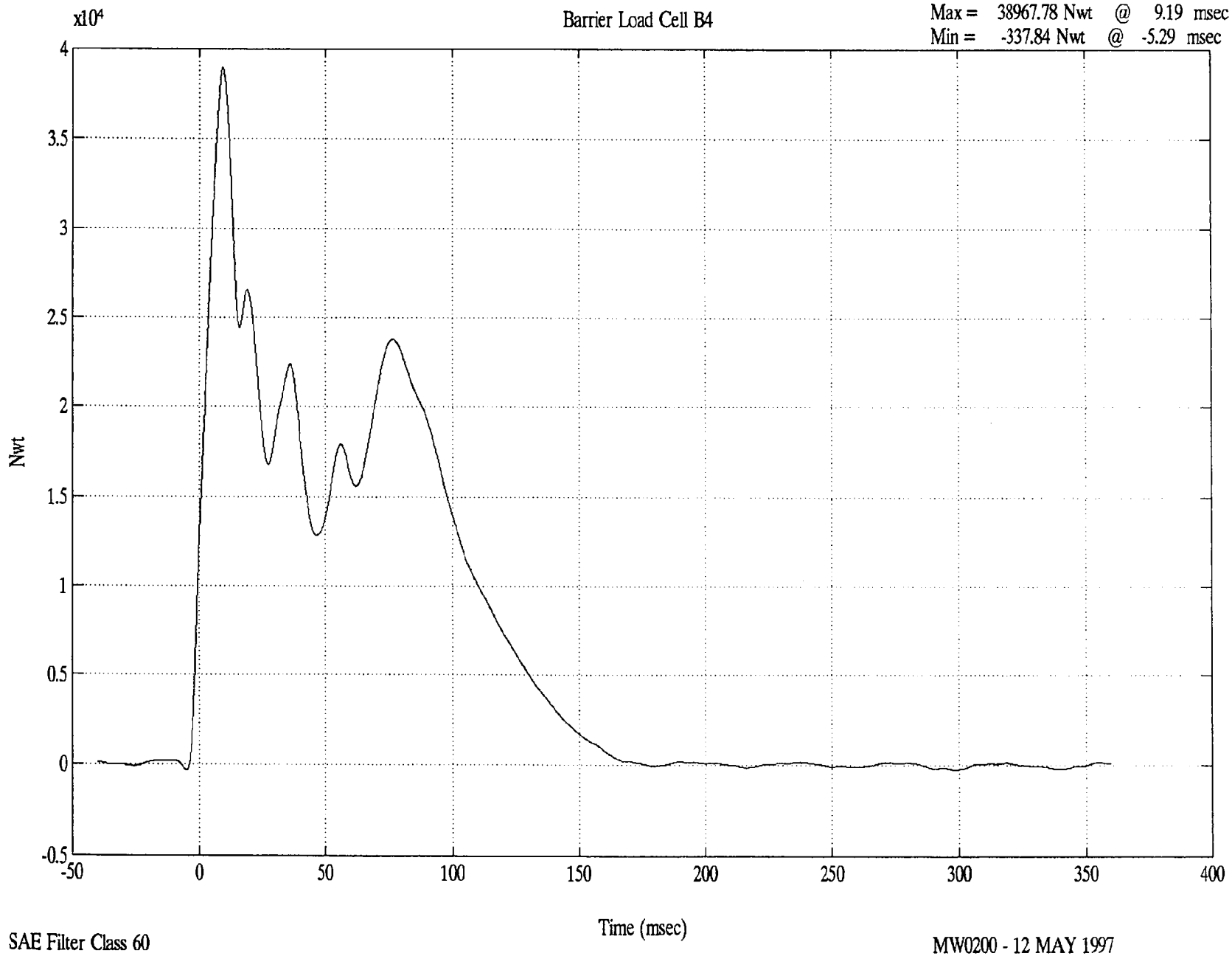


SAE Filter Class 60

MW0200 - 12 MAY 1997


NCAP TEST #7 - 1998 FORD WINDSTAR
Barrier Load Cell B3
Max = 81665.91 Nwt @ 23.19 msec
Min = -2448.83 Nwt @ 153.89 msec
x10^4
Nwt
Time (msec)
9
8
7
6
5
4
3
2
1
0
-1
-50
0
50
100
150
200
250
300
350
400
SAE Filter Class 60
MW0200 - 12 MAY 1997

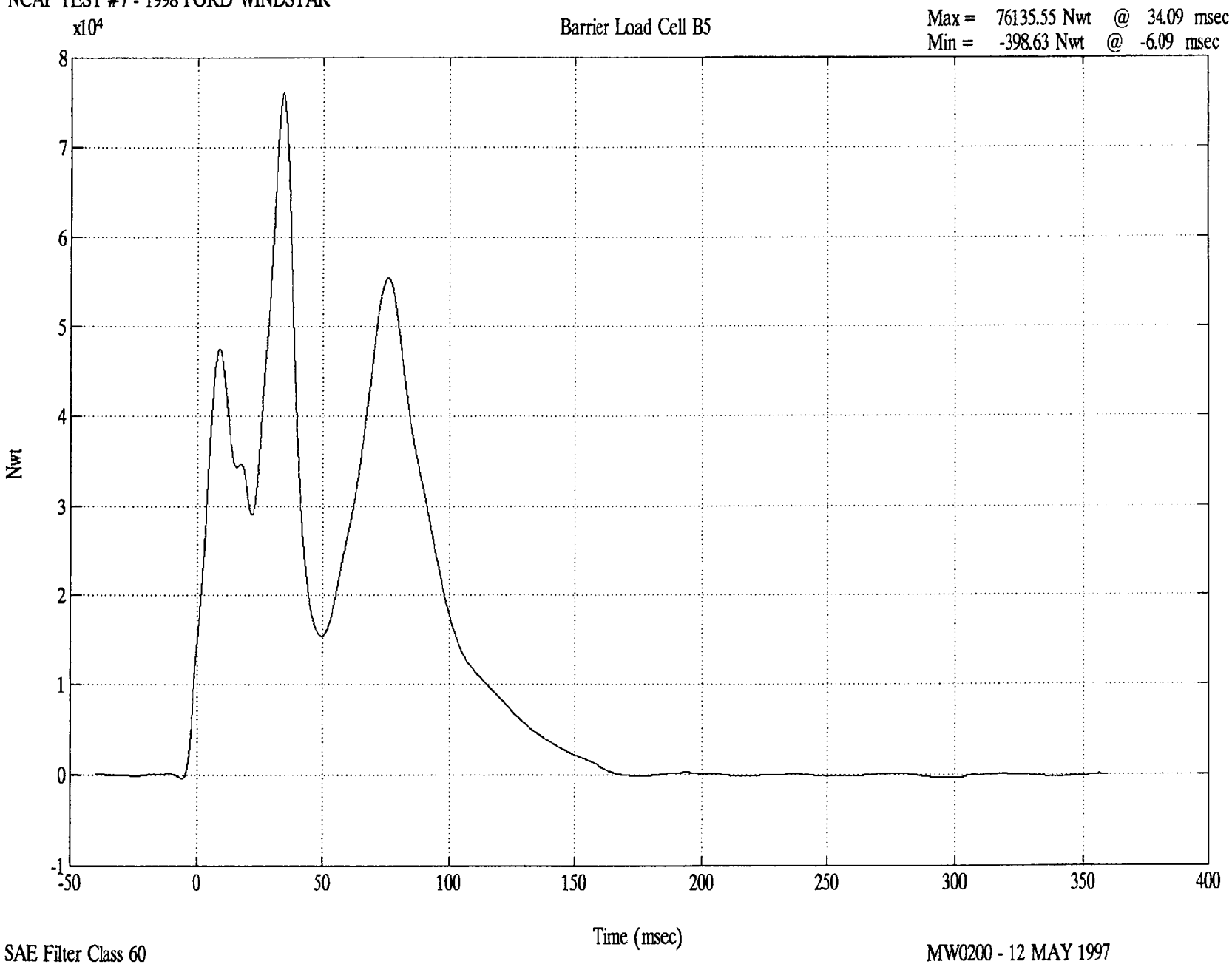
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997

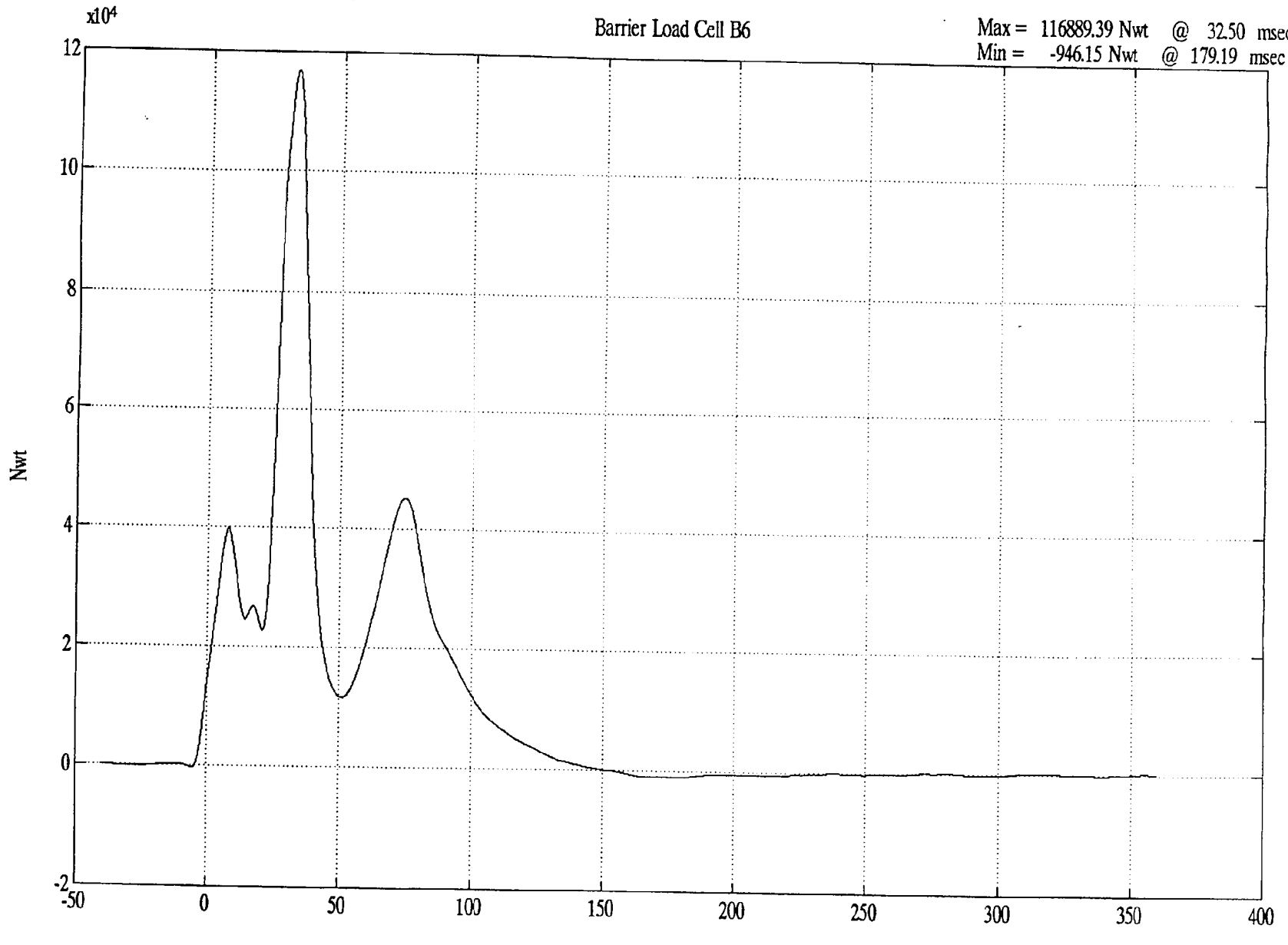
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



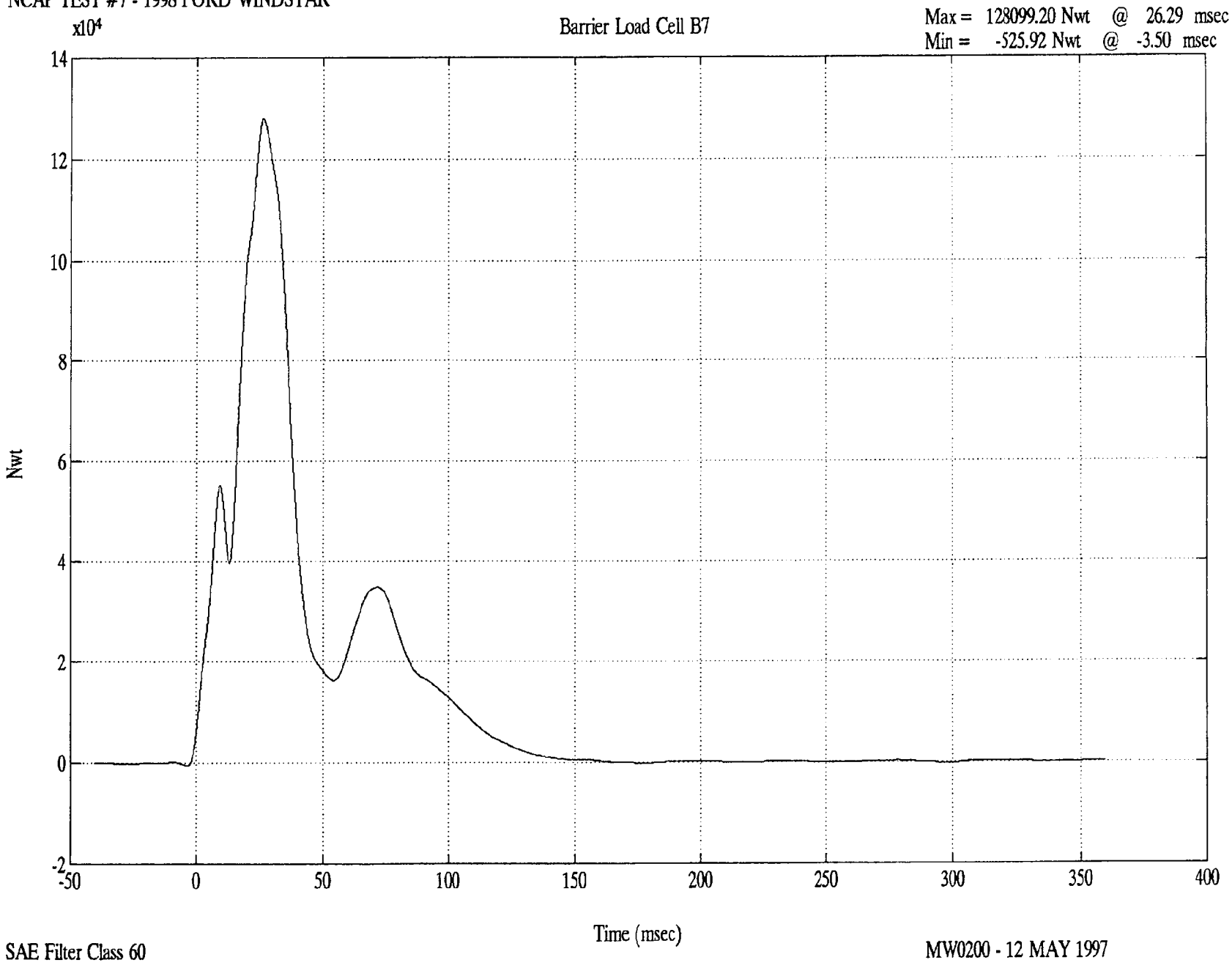
B-147

8406-7

SAE Filter Class 60

MW0200 - 12 MAY 1997

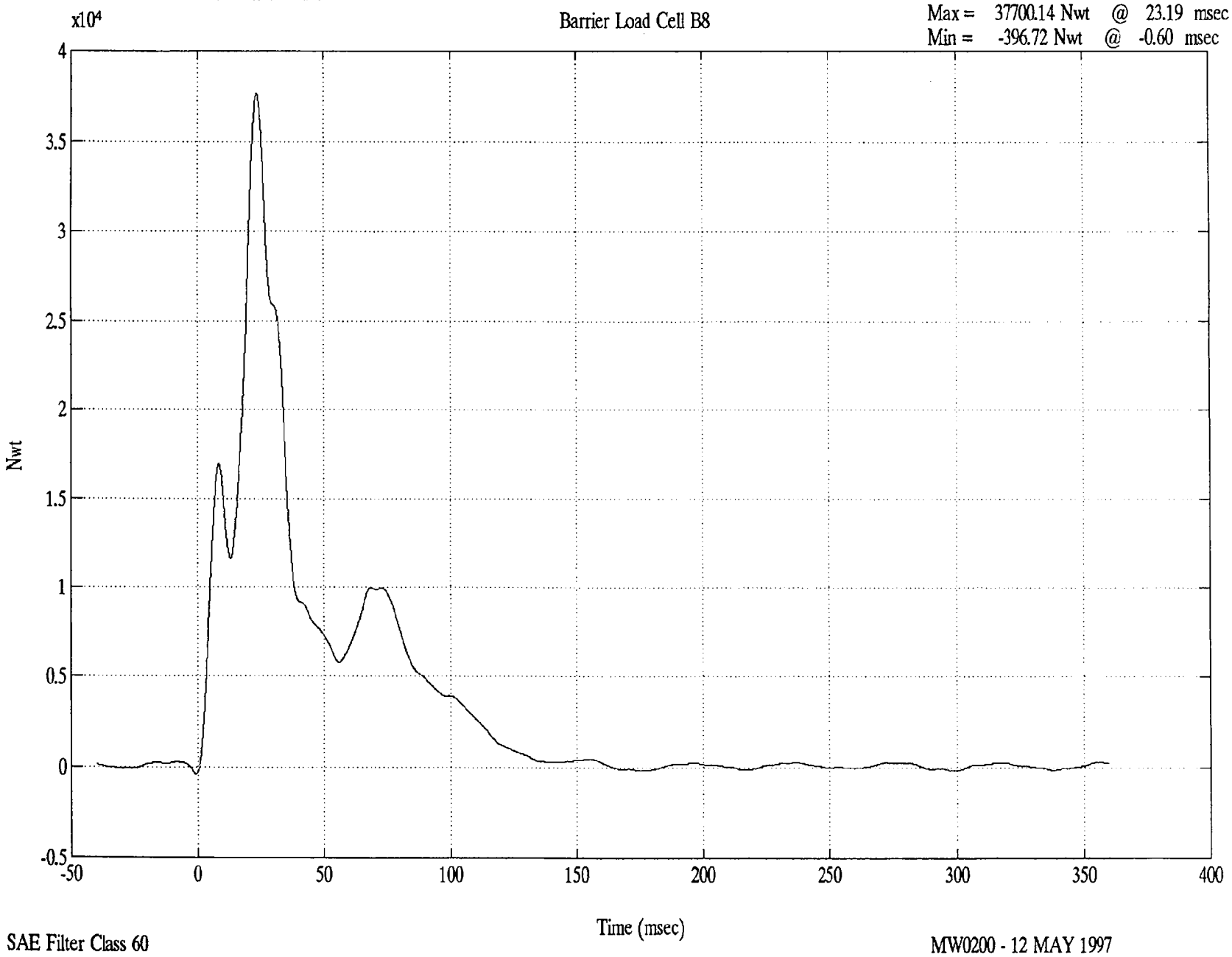
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



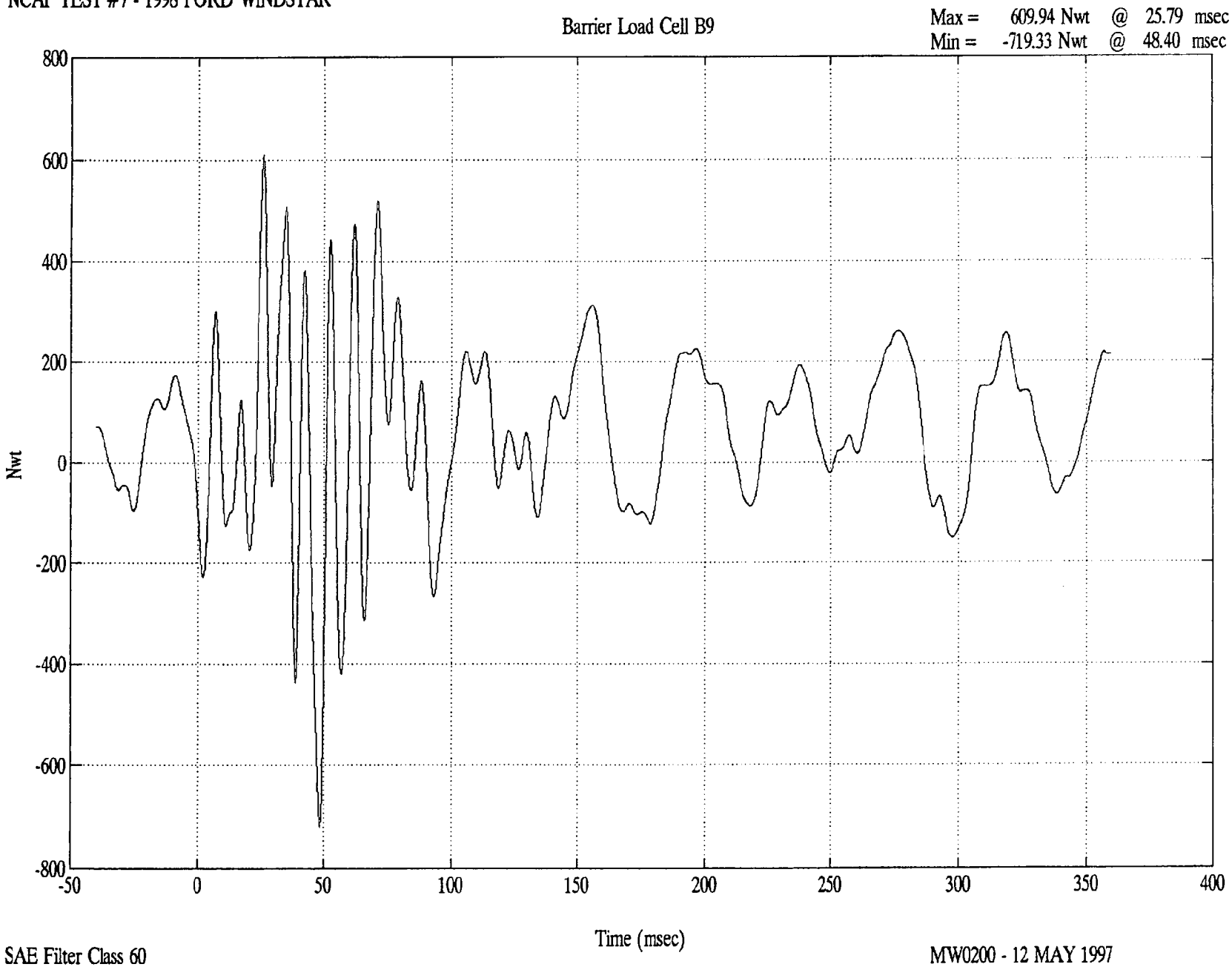
B-149

8406-7

SAE Filter Class 60

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR



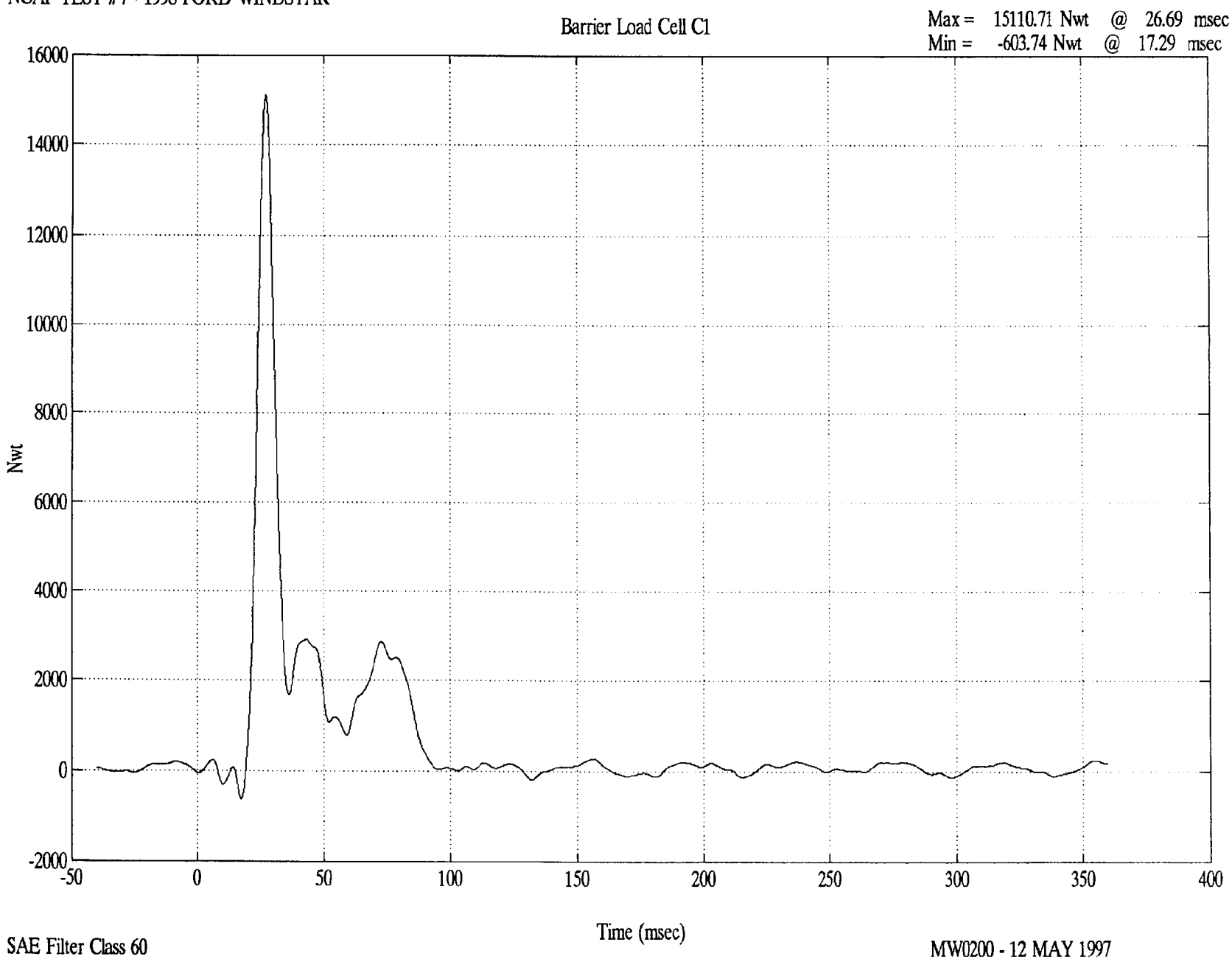
SAE Filter Class 60

MW0200 - 12 MAY 1997

B-150

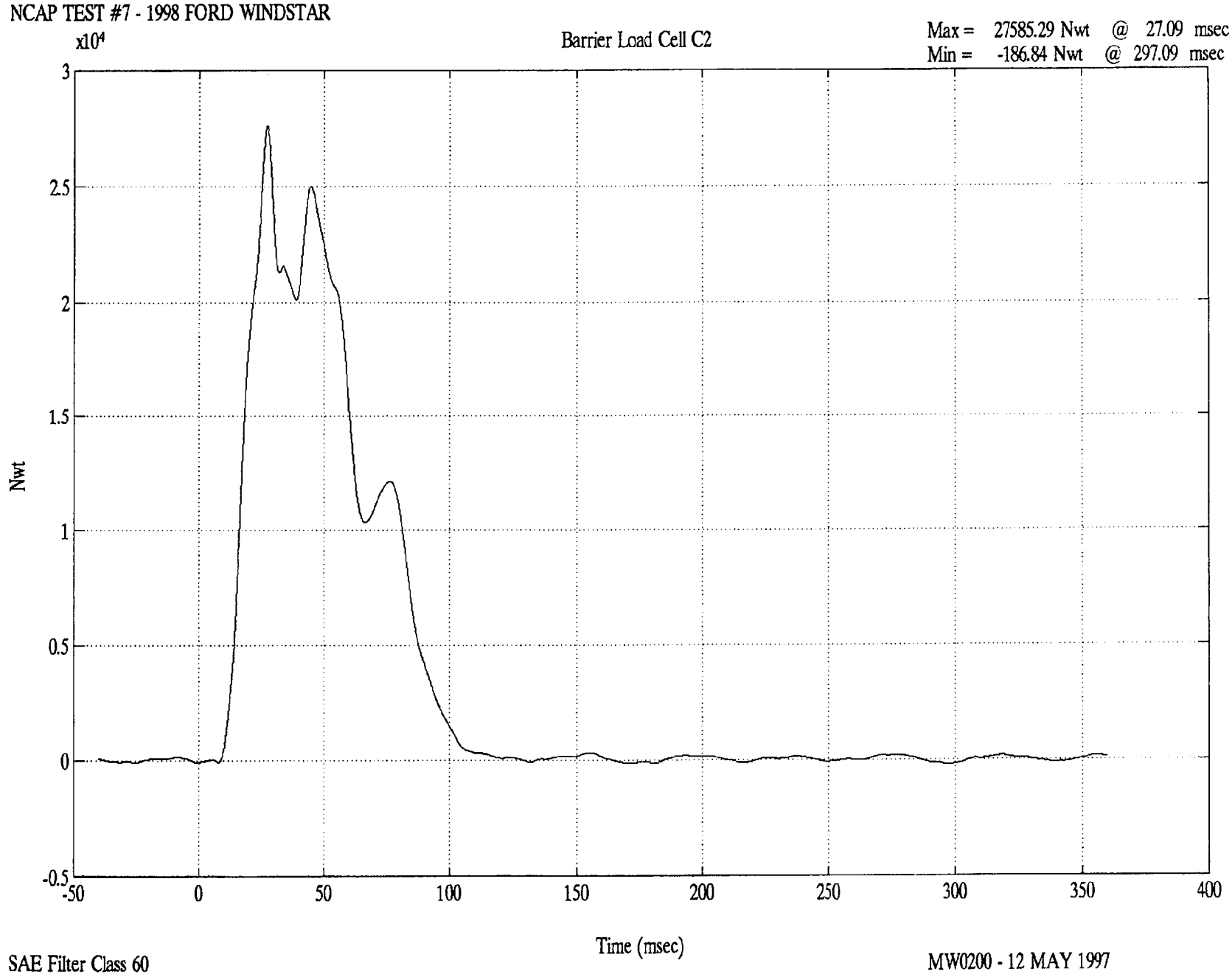
8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997



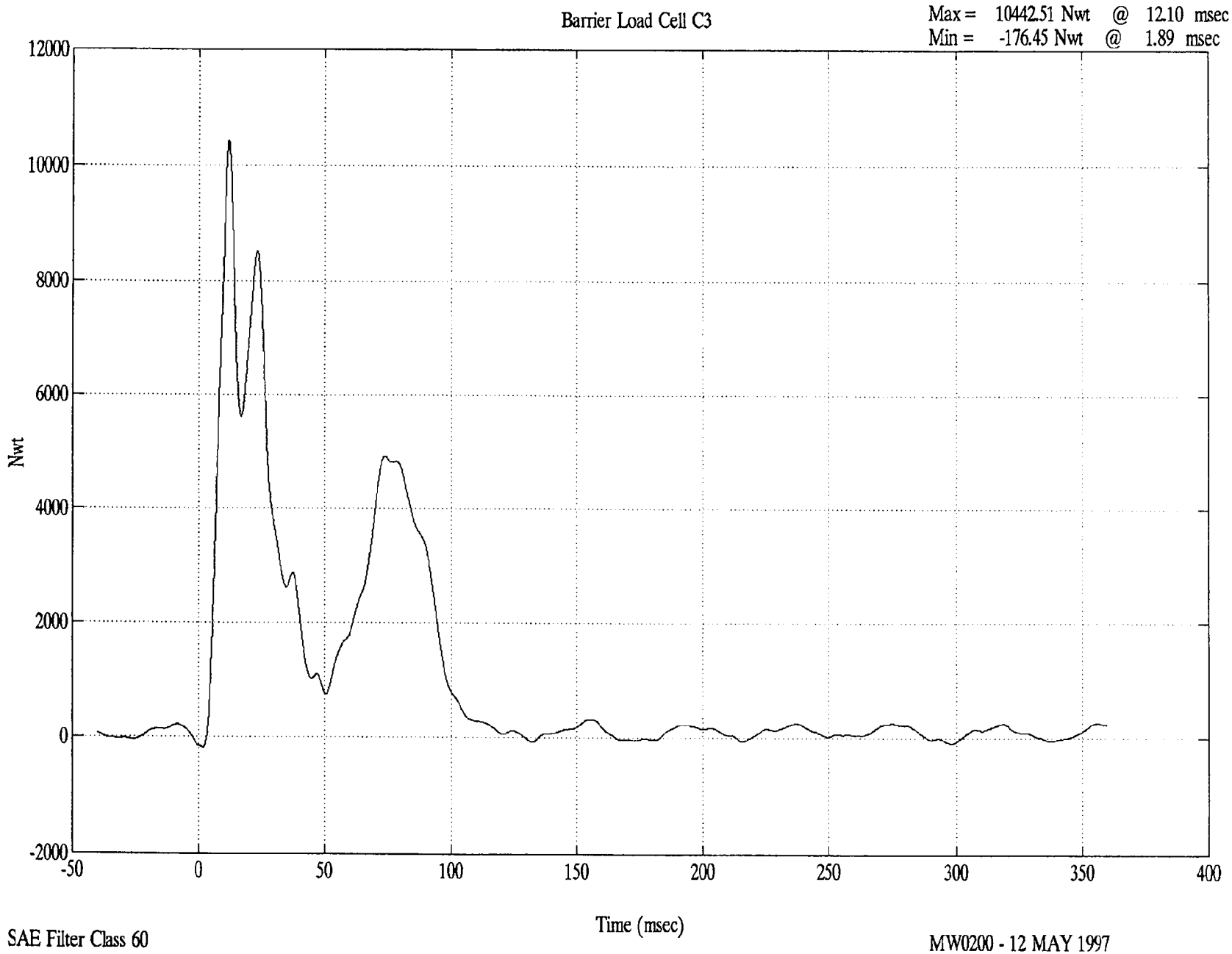
SAE Filter Class 60

MW0200 - 12 MAY 1997

B-152

8406-7

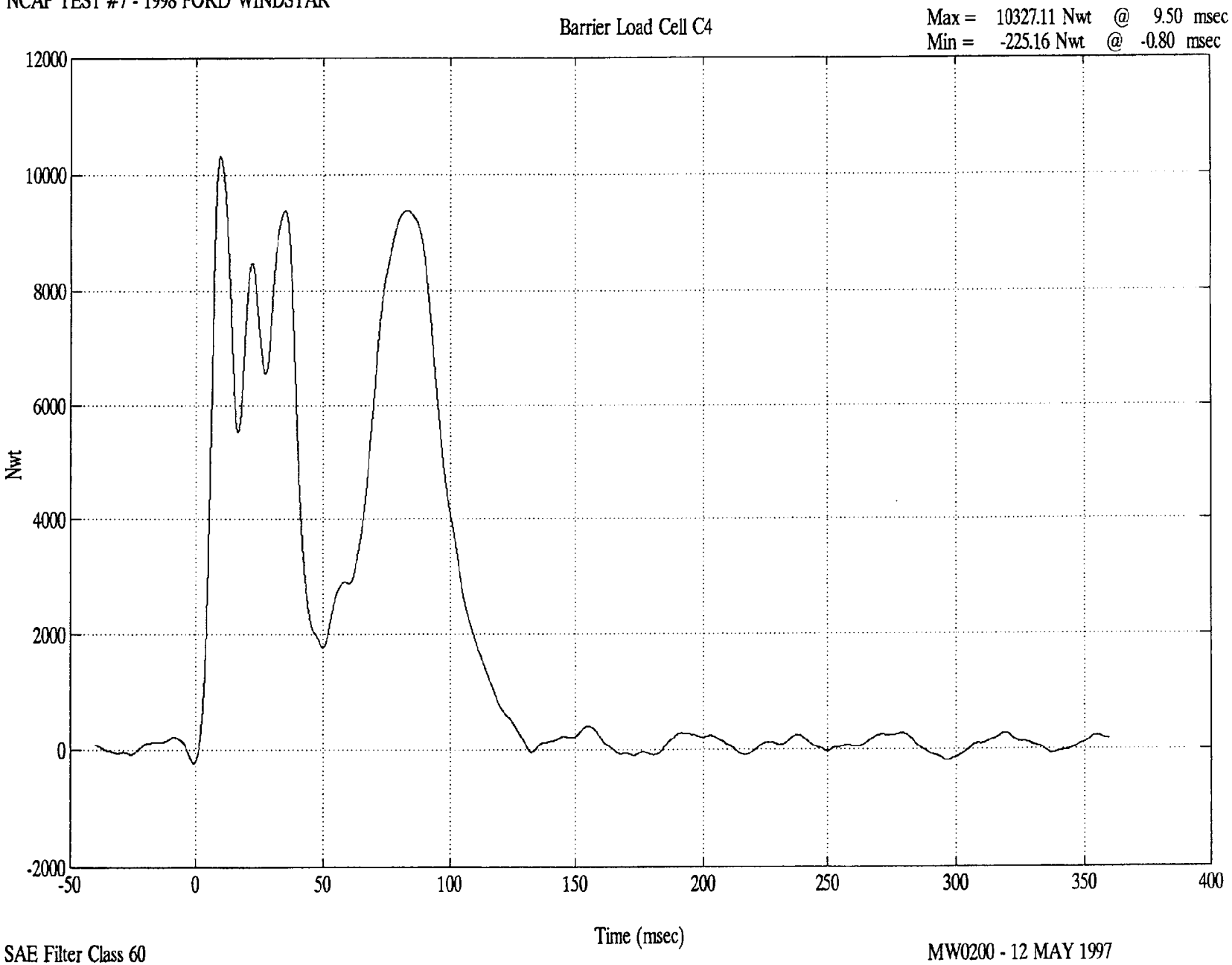
NCAP TEST #7 - 1998 FORD WINDSTAR



SAE Filter Class 60

MW0200 - 12 MAY 1997

NCAP TEST #7 - 1998 FORD WINDSTAR

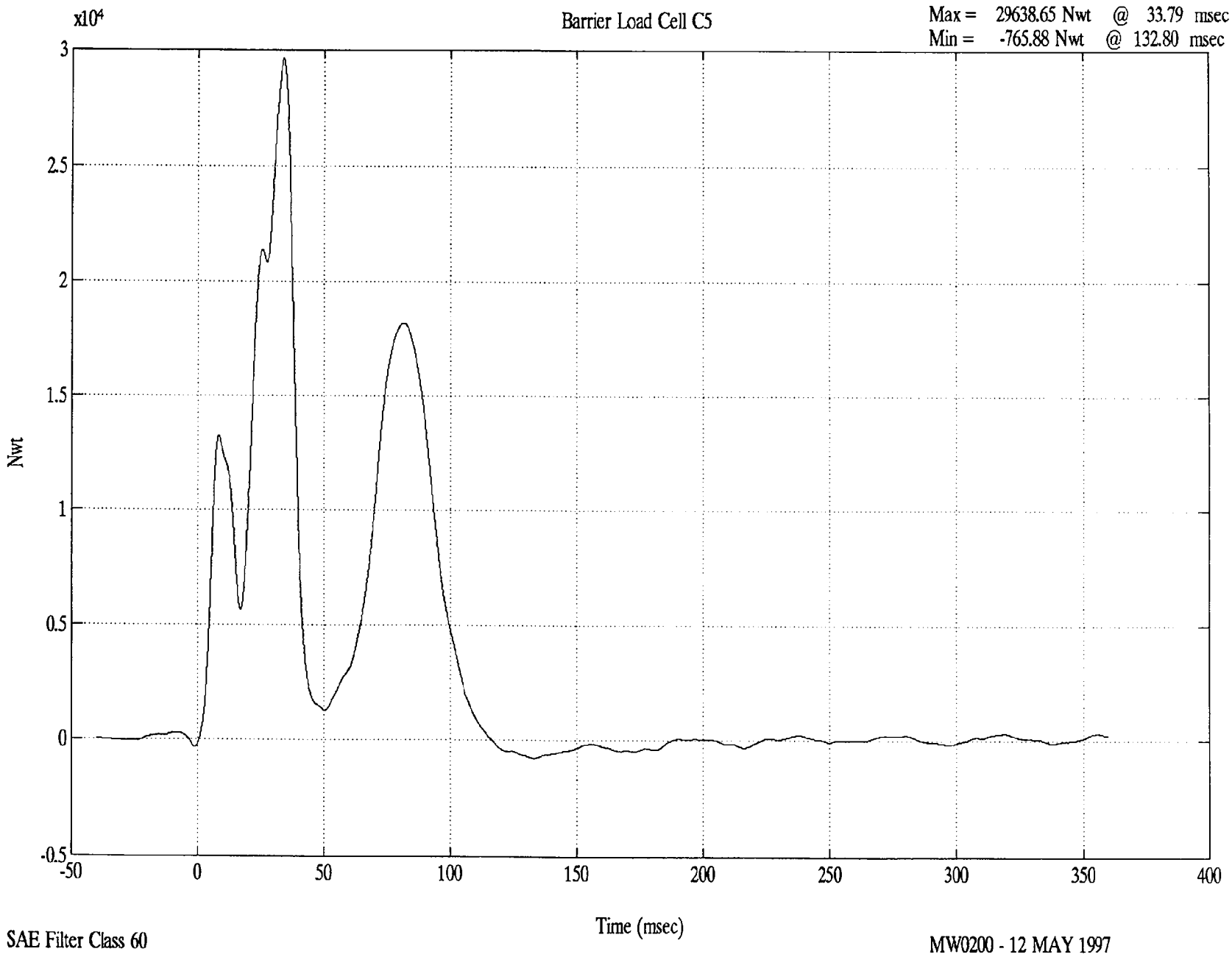


SAE Filter Class 60

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

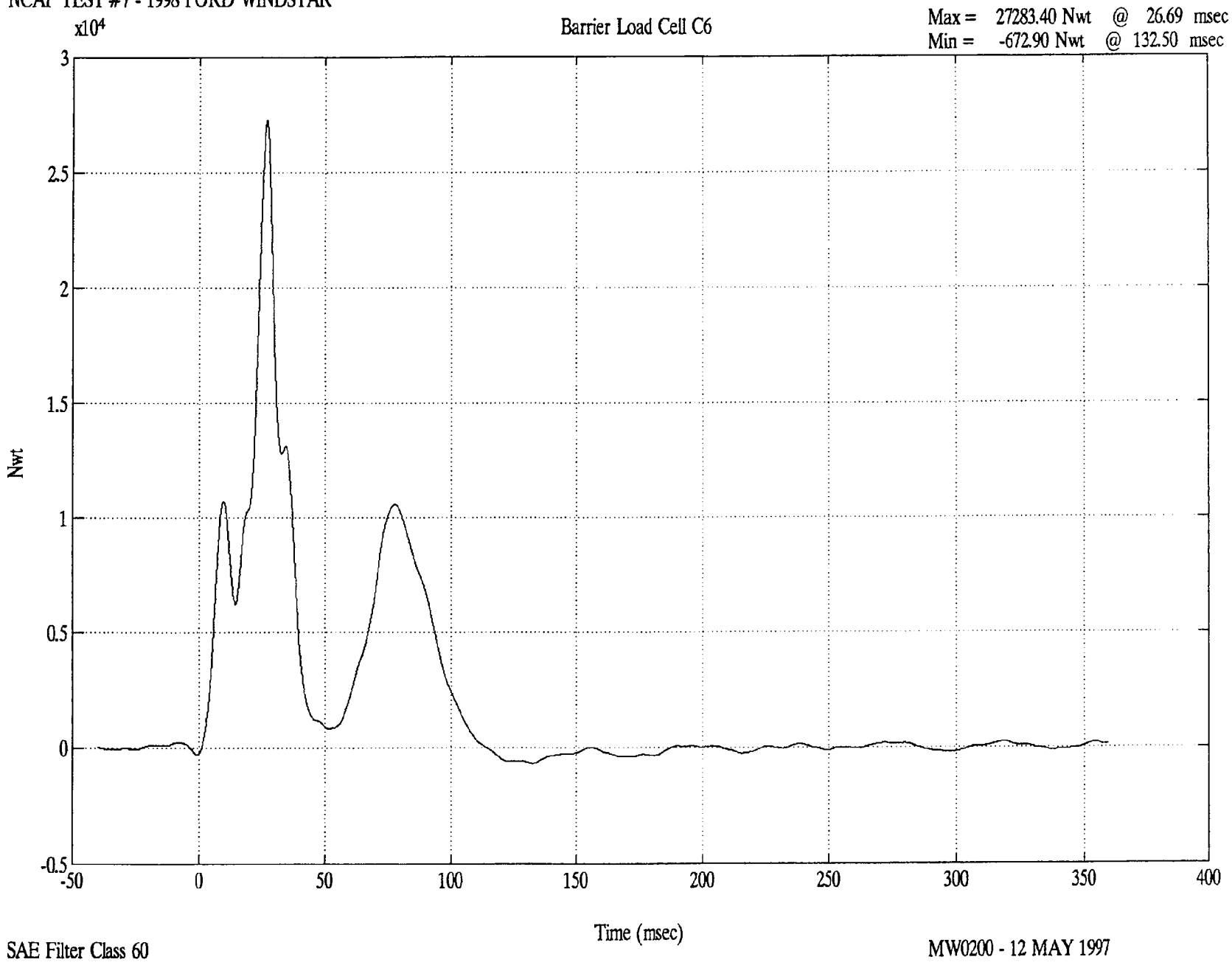


SAE Filter Class 60

MW0200 - 12 MAY 1997

8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

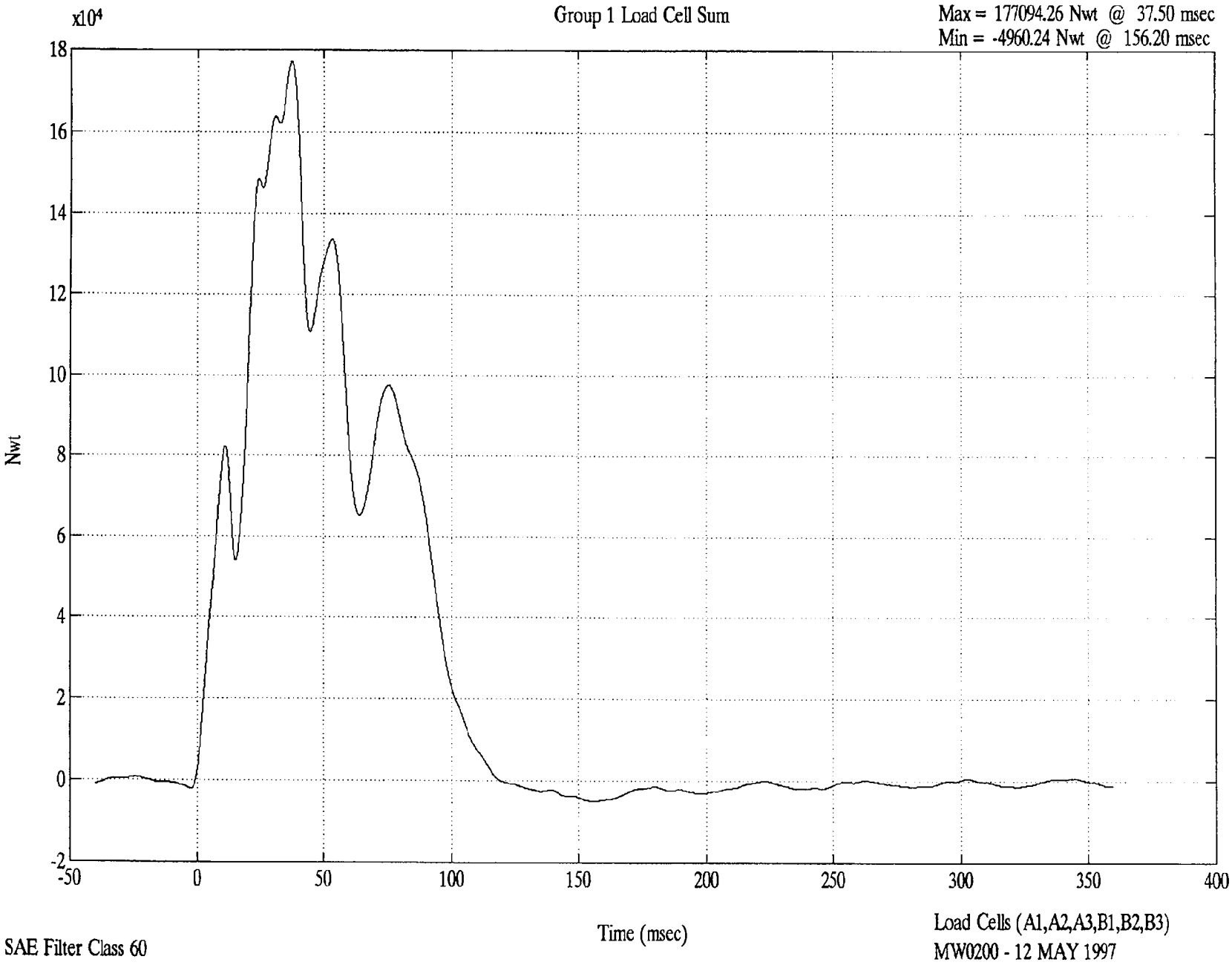


SAE Filter Class 60

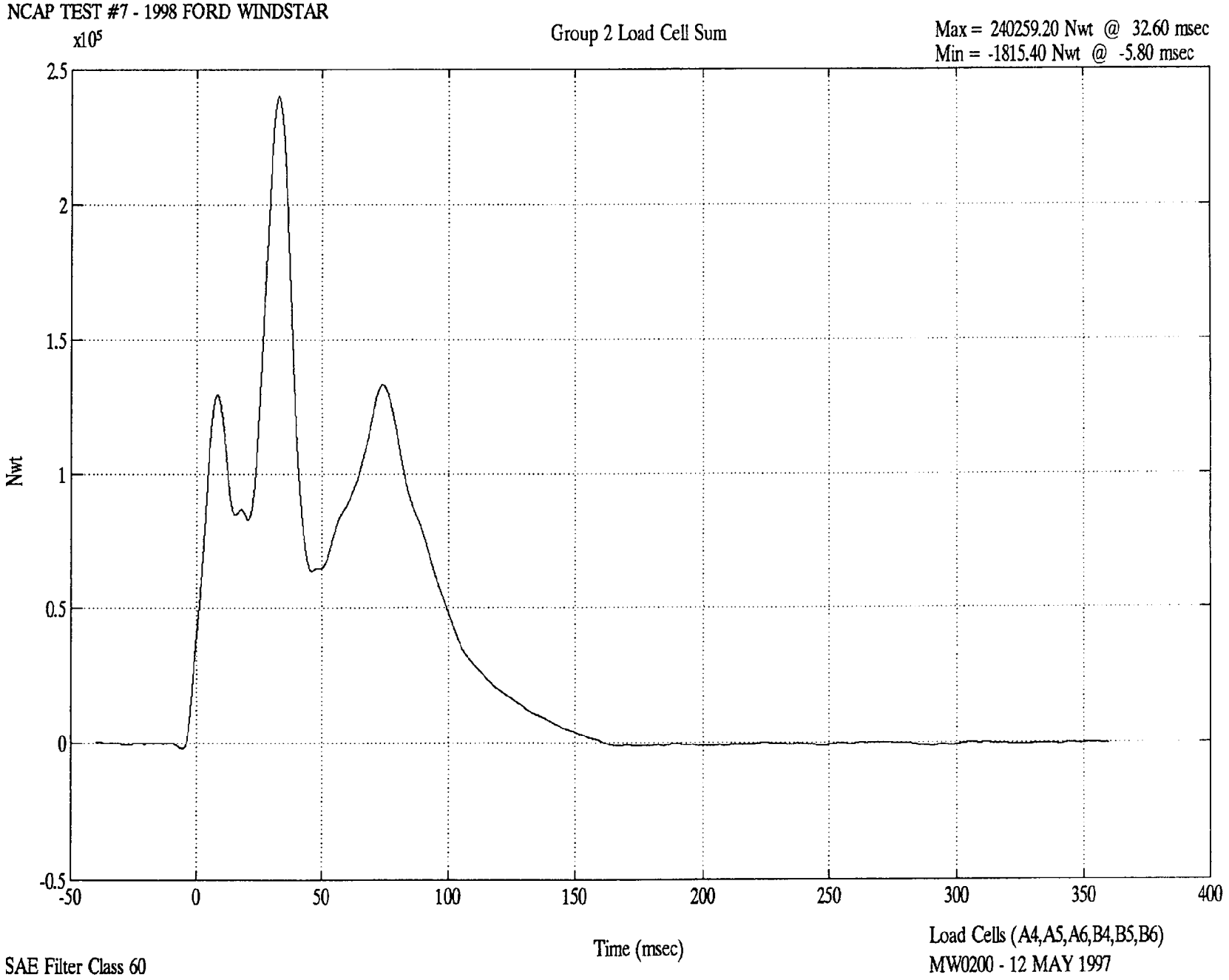
MW0200 - 12 MAY 1997

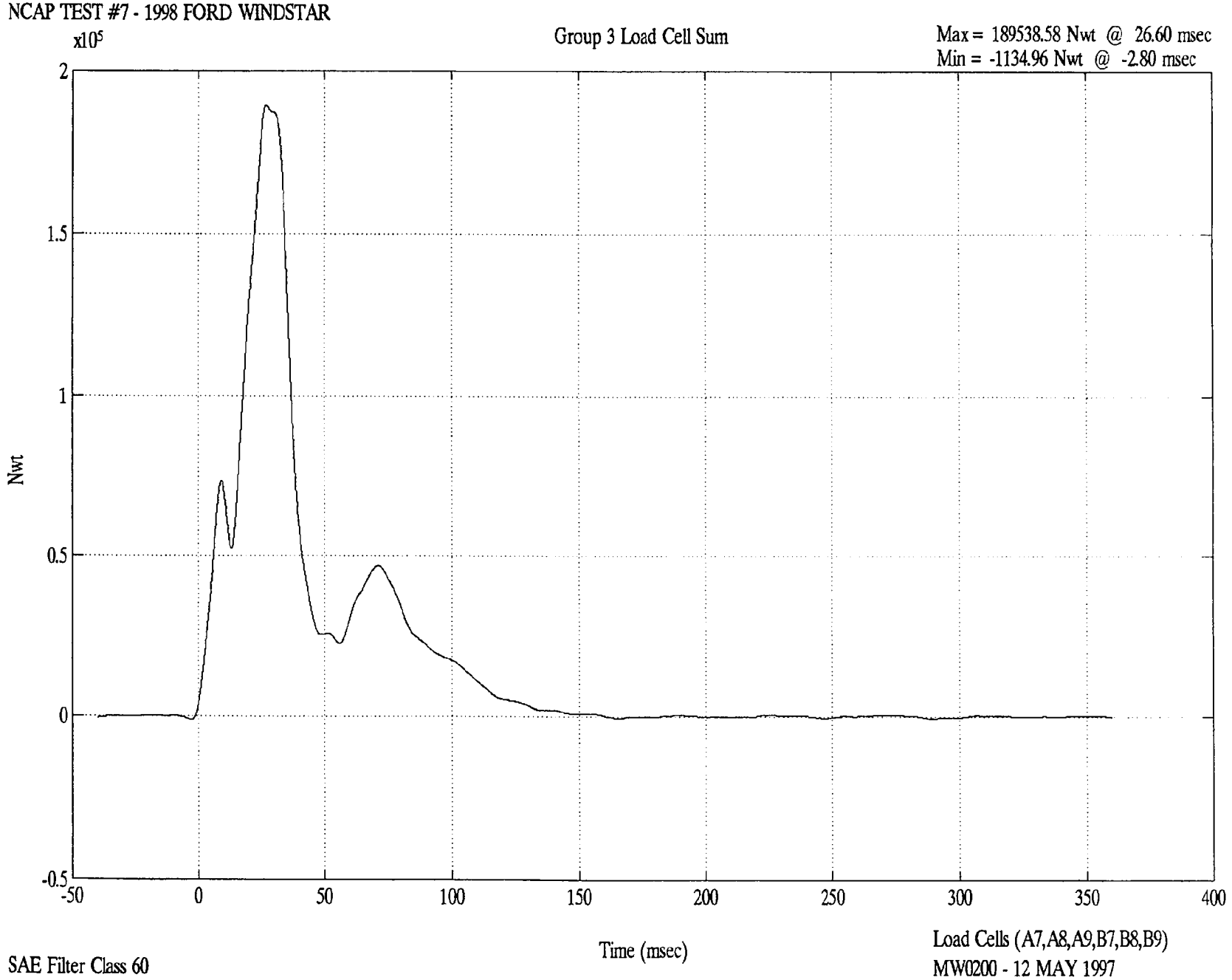
8406-7

NCAP TEST #7 - 1998 FORD WINDSTAR

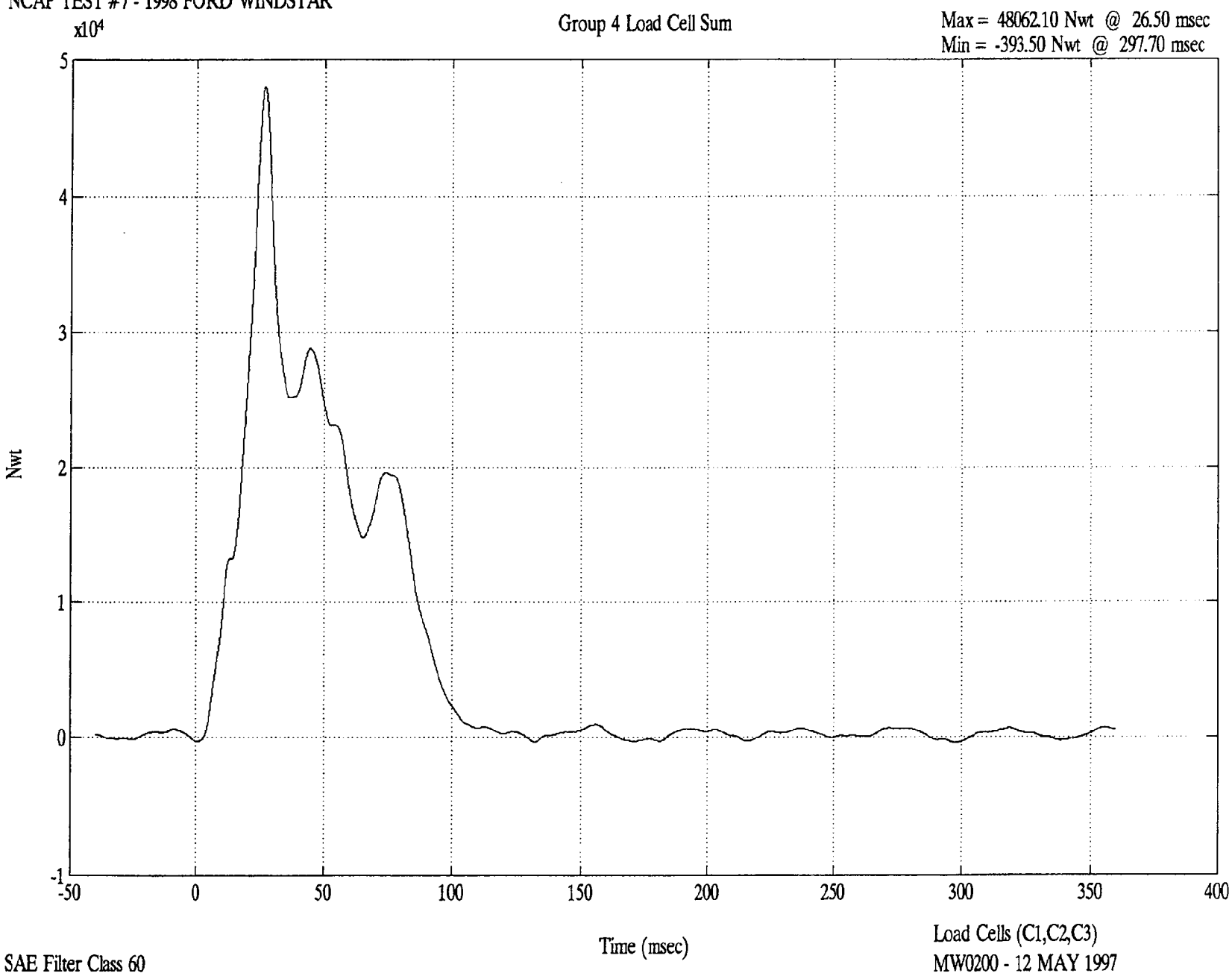


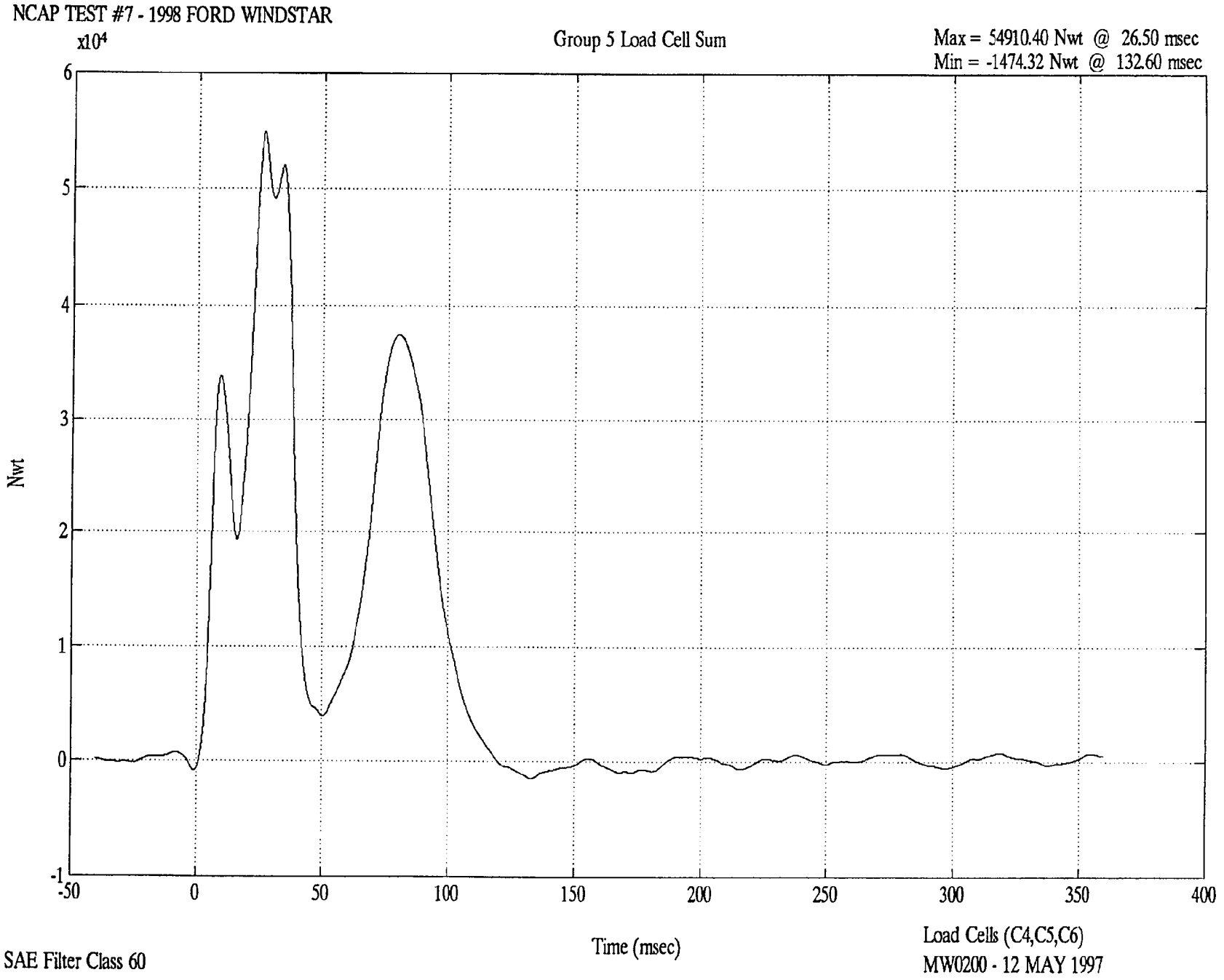
SAE Filter Class 60

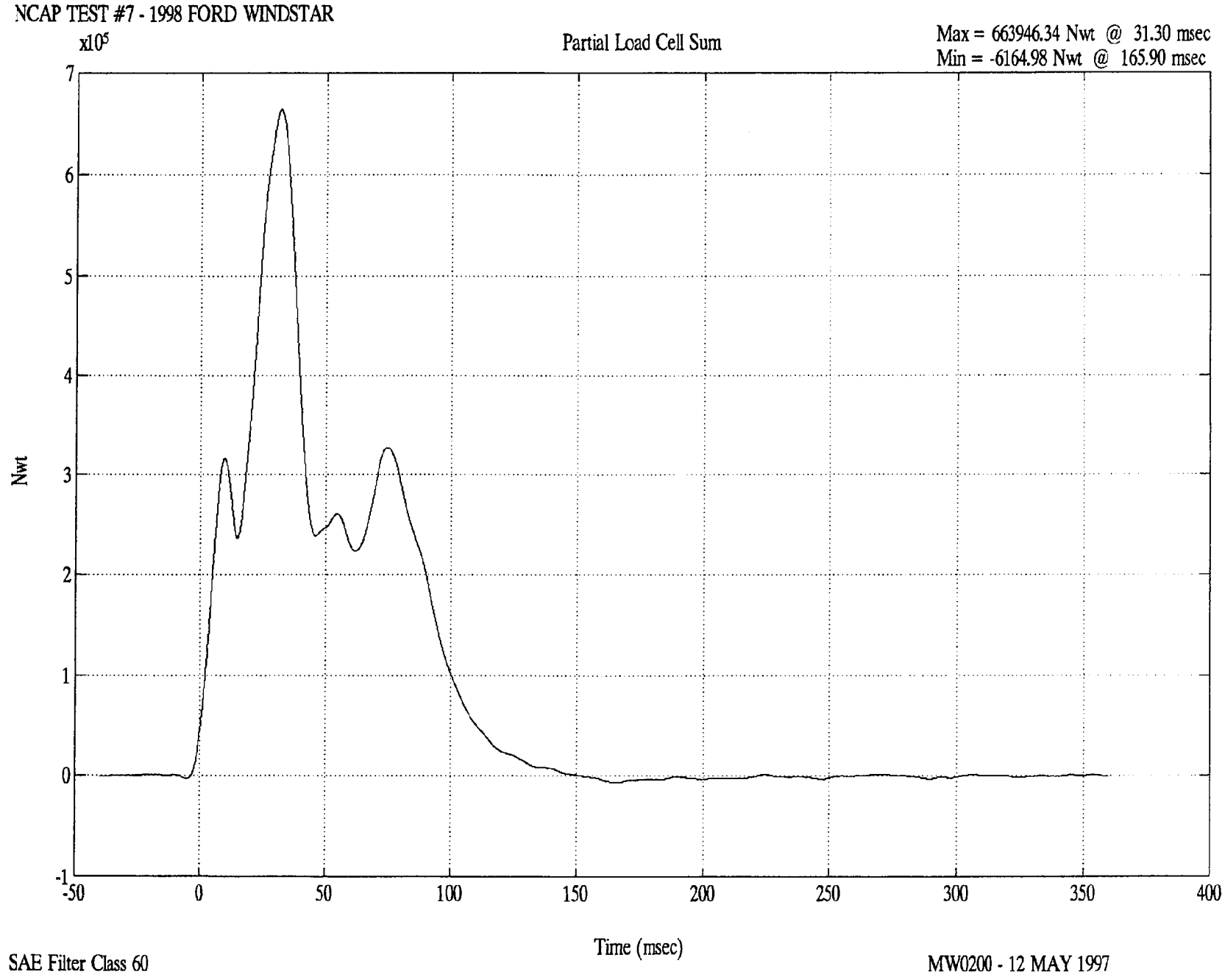

NCAP TEST #7 - 1998 FORD WINDSTAR
x10^5
Group 2 Load Cell Sum
Max = 240259.20 Nwt @ 32.60 msec
Min = -1815.40 Nwt @ -5.80 msec
Nwt
2.5
2
1.5
1
0.5
0
-0.5
-50
0
50
100
150
200
250
300
350
400
Time (msec)
Load Cells (A4,A5,A6,B4,B5,B6)
MW0200 - 12 MAY 1997
SAE Filter Class 60


NCAP TEST #7 - 1998 FORD WINDSTAR
x10^5
Group 3 Load Cell Sum
Max = 189538.58 Nwt @ 26.60 msec
Min = -1134.96 Nwt @ -2.80 msec
Nwt
Time (msec)
Load Cells (A7,A8,A9,B7,B8,B9)
MW0200 - 12 MAY 1997
SAE Filter Class 60

NCAP TEST #7 - 1998 FORD WINDSTAR




NCAP TEST #7 - 1998 FORD WINDSTAR
x10^4
Group 5 Load Cell Sum
Max = 54910.40 Nwt @ 26.50 msec
Min = -1474.32 Nwt @ 132.60 msec
Nwt
6
5
4
3
2
1
0
-1
-50
0
50
100
150
200
250
300
350
400
Time (msec)
Load Cells (C4,C5,C6)
MW0200 - 12 MAY 1997
SAE Filter Class 60


NCAP TEST #7 - 1998 FORD WINDSTAR
x10^5
Partial Load Cell Sum
Max = 663946.34 Nwt @ 31.30 msec
Min = -6164.98 Nwt @ 165.90 msec
Nwt
7
6
5
4
3
2
1
0
-1
-50
0
50
100
150
200
250
300
350
400
Time (msec)
SAE Filter Class 60
MW0200 - 12 MAY 1997

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 SRL Corporation. A summary of the test results, and Part 572 specifications are included in this Appendix.

Dummy serial numbers and certification dates are:

Position No./Location	Serial No.	Completion Date
#1/Driver	245	04/10/97
#2/Right Front Passenger	064	04/10/97

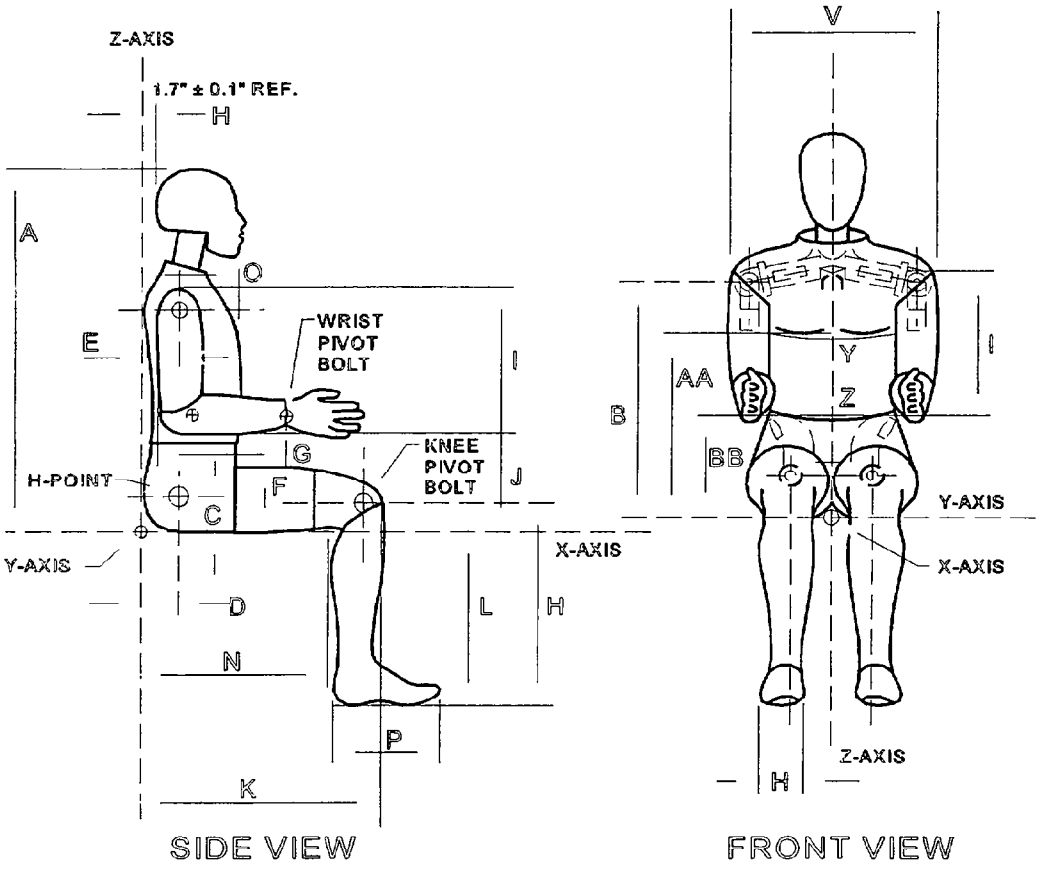
Electronic Test Equipment

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 15

DUMMY CONFIGURATION DIMENSIONS

EXTERNAL DIMENSIONS
SPECIFICATIONS



NOTE: Figure is referenced to the erect seated position. The curved lumbar does not allow the Hybrid III to be positioned in a perfect erect attitude. (REF: S572.31(A)(6))

CALSPAN CORPORATION
Transportation Sciences Center

PART 572E
HEAD DROP TEST

Dummy Serial Number	245
Calspan Sequential Test Number	2
Date	April 10,1997
Workfile	245297.HDP

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	66-78 Deg F	70
Relative Humidity	10% - 70%	30
Peak Resultant Acceleration	225-275 G's	226.1
Peak Lateral Acceleration	15 G's Max	3.2
Is Acceleration Curve Unimodal?	YES	YES

Remarks:

Laboratory Technician: B. Swiecicki

CALSPAN CORPORATION
Transportation Sciences Center

PART 572E
NECK FLEXION TEST

Dummy Serial Number	245	
Calspan Sequential Test Number	2	
Date	April 01,1997	6 Axis Neck Transducer
Workfile	245297.NFL	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	70
Relative Humidity		10% - 70%	29
Impact Velocity		22.60 - 23.40 Ft/s	23.20
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	24.10
	20 ms	17.60 - 22.60 G's	20.12
	30 ms	12.50 - 18.50 G's	14.90
Max Pendulum G's Above 30 ms		29 G's Max	14.90
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	36.38
D Plane Rotation	Max	64 - 78 Deg	66.45
	Time	57 - 64 ms	60.75
Moment About Occipital Condyle	Max	65 - 80 Ft-Lbs	73.71
	Time	47 - 58 ms	52.00
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	119.00
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	97.25

Remarks:

Laboratory Technician: B. Swiecicki

CALSPAN CORPORATION
Transportation Sciences Center

PART 572E
NECK EXTENSION TEST

Dummy Serial Number	245
Calspan Sequential Test Number	2
Date	April 1,1997
Workfile	245297.NXT

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	70
Relative Humidity		10% - 70%	27
Impact Velocity		19.50 - 20.30 Ft/s	19.70
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	17.97
	20 ms	14.00 - 19.00 G's	15.70
	30 ms	11.00 - 16.00 G's	12.92
Max Pendulum G's Above 30 ms		22 G's Max	12.92
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	40.00
D Plane Rotation	Max	81 - 106 Deg	89.82
	Time	72 - 82 ms	77.50
Moment About Occipital Condyle	Max	-59.0 - -39.0 Ft-Lbs	-45.32
	Time	65 - 79 ms	69.88
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	150.13
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	136.75

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number	70
Calspan Sequential Test Number	30
Date	April 10,1997
Workfile	245297.TH3

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	69-72 Deg F	70
Relative Humidity	10% - 70%	30
Pendulum Velocity	21.6 - 22.4 Ft/s	21.90
Maximun Deflection	2.50 - 2.86 in	2.52
Maximum Resistive Force	1160 - 1325 Lbs	1264.44
Internal Hysteresis	69 - 85 %	75.3

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number	245
Calspan Sequential Test Number	2
Date	April 10,1997
Workfile	245297

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	66-78 Deg F	70
Relative Humidity	10% - 70%	30
Probe Velocity	6.8 - 7.0 Ft/s	7.00
Peak Knee Impact Force	1060 -1300 Lbs	1226.0
RIGHT KNEE		
Temperature	66-78 Deg F	70
Relative Humidity	10% - 70%	30
Probe Velocity	6.8 - 7.0 Ft/s	7.00
Peak Knee Impact Force	1060 -1300 Lbs	1214.0

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 245
Calspan Sequential Test Number 2
Date April 10,1997

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			70
Relative Humidity			30
Location for Chest Circumference	AA	16.9 -17.1 in	17.0
Location for Waist Circumference	BB	8.9 - 9.1 in	9.0
Chest Circumference (With Jacket)	Y	38.2 - 39.4 in	39.0
Waist Circumference	Z	32.9 - 34.1 in	33.7
Chest Depth	O	8.4 - 9.0 in	8.4
H-Point Height	C	3.3 - 3.5 in	3.4
H-Point from Backline	D	5.3 - 5.5 in	5.4
Skull Cap to Backline	H	1.6 - 1.8 in	1.7
Total Sitting Height	A	34.6 - 35.0 in	34.9
Thigh Clearance	F	5.5 - 6.1 in	6.0
Buttock Knee Length	K	22.8 - 23.8 in	23.4
Buttock Popliteal Length	N	17.8 - 18.8 in	18.3
Popliteal Height	L	16.9 - 17.9 in	17.5
Knee Pivot Height	M	19.1 - 19.7 in	19.2
Foot Length	P	9.9 - 10.5 in	10.2
Foot Breadth	W	3.6 - 4.2 in	3.8
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.6
Shoulder Breadth	V	16.6 - 17.2 in	16.8
Shoulder Pivot Height	B	19.9 20.5 in	20.2
Elbow Rest Height	J	7.5 - 8.3 in	8.0
Shoulder - Elbow Length	I	13.0 - 13.6 in	13.3
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.6

Remarks:

Laboratory Technician: B. Swiecicki

CALSPAN CORPORATION
Transportation Sciences Center

PART 572E
HEAD DROP TEST

Dummy Serial Number	064
Calspan Sequential Test Number	2
Date	March 30,1997
Workfile	064297.HDP

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	66-78 Deg F	70
Relative Humidity	10% - 70%	30
Peak Resultant Acceleration	225-275 G's	270.4
Peak Lateral Acceleration	15 G's Max	14.4
Is Acceleration Curve Unimodal?	YES	YES

Remarks:

Laboratory Technician: B. Swiecicki

CALSPAN CORPORATION

Transportation Sciences Center

PART 572E
NECK FLEXION TEST

Dummy Serial Number	064	
Calspan Sequential Test Number	2	
Date	March 31,1997	6 Axis Neck Transducer
Workfile	064297.NFL	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	70
Relative Humidity		10% - 70%	30
Impact Velocity		22.60 - 23.40 Ft/s	23.20
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	22.66
	20 ms	17.60 - 22.60 G's	19.81
	30 ms	12.50 - 18.50 G's	15.13
Max Pendulum G's Above 30 ms		29 G's Max	15.13
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	39.25
D Plane Rotation	Max	64 - 78 Deg	64.34
	Time	57 - 64 ms	59.63
Moment About Occipital Condyle	Max	65 - 80 Ft-Lbs	65.49
	Time	47 - 58 ms	52.00
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	115.38
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	100.75

Remarks:

Laboratory Technician: B. Swiecicki

CALSPAN CORPORATION
Transportation Sciences Center

PART 572E
NECK EXTENSION TEST

Dummy Serial Number	064	
Calspan Sequential Test Number	2	
Date	March 31,1997	6 Axis Neck Transducer
Workfile	064297.NXT	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	70
Relative Humidity		10% - 70%	30
Impact Velocity		19.50 - 20.30 Ft/s	19.70
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	19.37
	20 ms	14.00 - 19.00 G's	15.60
	30 ms	11.00 - 16.00 G's	11.54
Max Pendulum G's Above 30 ms		22 G's Max	11.54
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	41.88
D Plane Rotation	Max	81 - 106 Deg	88.9
	Time	72 - 82 ms	76.13
Moment About Occipital Condyle	Max	-59.0 - -39.0 Ft-Lbs	-42.38
	Time	65 - 79 ms	72.13
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	150.00
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	142.63

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number	064
Calspan Sequential Test Number	2
Date	April 10,1997
Workfile	064297.TH3

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	69-72 Deg F	70
Relative Humidity	10% - 70%	30
Pendulum Velocity	21.6 - 22.4 Ft/s	22.0
Maximun Deflection	2.50 - 2.86 in	2.53
Maximum Resistive Force	1160 - 1325 Lbs	1313.53
Internal Hysteresis	69 - 85 %	76.03

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number	064
Calspan Sequential Test Number	2
Date	April 18,1997
Workfile	064297

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	66-78 Deg F	70
Relative Humidity	10% - 70%	30
Probe Velocity	6.8 - 7.0 Ft/s	7.00
Peak Knee Impact Force	1060 -1300 Lbs	1213.0
RIGHT KNEE		
Temperature	66-78 Deg F	70
Relative Humidity	10% - 70%	30
Probe Velocity	6.8 - 7.0 Ft/s	7.00
Peak Knee Impact Force	1060 -1300 Lbs	1228.0

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 064
Calspan Sequential Test Number 2
Date April 10,1997

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			70
Relative Humidity			30
Location for Chest Circumference	AA	16.9 -17.1 in	17.0
Location for Waist Circumference	BB	8.9 - 9.1 in	9.0
Chest Circumference (With Jacket)	Y	38.2 - 39.4 in	38.8
Waist Circumference	Z	32.9 - 34.1 in	33.3
Chest Depth	O	8.4 - 9.0 in	8.6
H-Point Height	C	3.3 - 3.5 in	3.4
H-Point from Backline	D	5.3 - 5.5 in	5.4
Skull Cap to Backline	H	1.6 - 1.8 in	1.7
Total Sitting Height	A	34.6 - 35.0 in	34.8
Thigh Clearance	F	5.5 - 6.1 in	6.0
Buttock Knee Length	K	22.8 - 23.8 in	23.6
Buttock Popliteal Length	N	17.8 - 18.8 in	18.4
Popliteal Height	L	16.9 - 17.9 in	17.3
Knee Pivot Height	M	19.1 - 19.7 in	19.4
Foot Length	P	9.9 - 10.5 in	10.1
Foot Breadth	W	3.6 - 4.2 in	3.8
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.6
Shoulder Breadth	V	16.6 - 17.2 in	16.8
Shoulder Pivot Height	B	19.9 20.5 in	20.4
Elbow Rest Height	J	7.5 - 8.3 in	8.0
Shoulder - Elbow Length	I	13.0 - 13.6 in	13.3
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.6

Remarks:

Laboratory Technician: B. Swiecicki

Appendix D

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENT CALIBRATION FOR DRIVER DUMMY

(6 Month Calibration Minimum)

DRIVER DUMMY (S/N 245)		Serial #	Manufacturer	Calibration	
				Last	Next
Head	X	ADL98	ENDEVCO	1/97	7/97
	Y	AE8K0	ENDEVCO	1/97	7/97
	Z	ADMB6	ENDEVCO	1/97	7/97
Chest	X	A26A	ENDEVCO	1/97	7/97
	Y	A27A	ENDEVCO	1/97	7/97
	Z	A51A	ENDEVCO	1/97	7/97
Right Femur Load Cell		951	GSE	1/97	7/97
Left Femur Load Cell		952	GSE	1/97	7/97
Neck Load Cell	X	440	DENTON	1/97	7/97
	Y	440	DENTON	1/97	7/97
	Z	440	DENTON	1/97	7/97
Neck Moment	X	440	DENTON	1/97	7/97
	Y	440	DENTON	1/97	7/97
	Z	440	DENTON	1/97	7/97
Chest Deflection Gauge		245	HUMANOID	5/97	11/97
Hybrid III Use Only					
Lap Belt Load Cells		706	LEBOW	12/96	6/97
Shoulder Belt Load Cells		707	LEBOW	12/96	6/97
Spool-Out Potentiometer		-	MAGNETEK	-	-
Belt Stretch Transducer		E1	CALSPAN	2/97	8/97

INSTRUMENT CALIBRATION FOR DRIVER DUMMY

(6 Month Calibration Minimum)

DRIVER DUMMY		Serial #	Manufacturer	Calibration	
				Last	Next
Head	X (R)	AP1A0	ENDEVCO	1/97	7/97
	Y (R)	AC8F6	ENDEVCO	1/97	7/97
	Z (R)	ACCW0	ENDEVCO	1/97	7/97
Chest	X (R)	AHRC9	ENDEVCO	1/97	7/97
	Y (R)	AC7W8	ENDEVCO	1/97	7/97
	Z (R)	ACC06	ENDEVCO	1/97	7/97
Pelvic	X	AL6N5	ENDEVCO	1/97	7/97
	Y	AL6R7	ENDEVCO	1/97	7/97
	Z	A12C	ENDEVCO	1/97	7/97
Left Upper Tibia	Mx	038	DENTON	4/97	10/97
Left Upper Tibia	My	038	DENTON	4/97	10/97
Left Lower Tibia	Fy	032	DENTON	4/97	10/97
Left Lower Tibia	Fz	032	DENTON	4/97	10/97
Left Lower Tibia	Mx	032	DENTON	4/97	10/97
Right Upper Tibia	Mx	045	DENTON	4/97	10/97
Right Upper Tibia	My	045	DENTON	4/97	10/97
Right Lower Tibia	Fy	041	DENTON	4/97	10/97
Right Lower Tibia	Fz	041	DENTON	4/97	10/97
Right Lower Tibia	Mx	041	DENTON	4/97	10/97

INSTRUMENT CALIBRATION FOR DRIVER DUMMY

(6 Month Calibration Minimum)

DRIVER DUMMY		Serial #	Manufacture	Calibration	
				Last	Next
Left Foot Front	Z	J18439	ENDEVCO	12/96	6/97
Left Foot Rear	X	J18624	ENDEVCO	1/97	7/97
Left Foot Rear	Z	J18408	ENDEVCO	1/97	7/97
Right Foot Front	Z	J18418	ENDEVCO	12/96	6/97
Right Foot Rear	X	AEWK1	ENDEVCO	1/97	7/97
Right Foot Rear	Z	AKD92	ENDEVCO	1/97	7/97

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY

(6 Month Calibration Minimum)

PASSENGER DUMMY (S/N 064)		Serial #	Manufacturer	Calibration	
				Last	Next
Head	X	AH5M9	ENDEVCO	1/97	7/97
	Y	AGHF5	ENDEVCO	1/97	7/97
	Z	AL6K2	ENDEVCO	1/97	7/97
Chest	X	A33A	ENDEVCO	1/97	7/97
	Y	FB32L	ENDEVCO	1/97	7/97
	Z	AD395	ENDEVCO	1/97	7/97
Right Femur Load Cell		231	GSE	1/97	7/97
Left Femur Load Cell		232	GSE	1/97	7/97
Neck Load Cell	X	076	DENTON	4/97	10/97
	Y	076	DENTON	4/97	10/97
	Z	076	DENTON	4/97	10/97
Neck Moment	X	076	DENTON	4/97	10/97
	Y	076	DENTON	4/97	10/97
	Z	076	DENTON	4/97	10/97
Chest Deflection Gauge		064	HUMANOID	5/97	11/97
Hybrid III Use Only					
Lap Belt Load Cells		635	LEBOW	12/96	6/97
Shoulder Belt Load Cells		711	LEBOW	12/96	6/97
Spool-Out Potentiometer		-	MAGNETEK	-	-
Belt Stretch Transducer		E2	CALSPAN	2/97	8/97

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY

(6 Month Calibration Minimum)

PASSENGER DUMMY		Serial #	Manufacturer	Calibration	
				Last	Next
Head	X (R)	APBF4	ENDEVCO	1/97	7/97
	Y (R)	APBD7	ENDEVCO	1/97	7/97
	Z (R)	AN967	ENDEVCO	1/97	7/97
Chest	X (R)	APA30	ENDEVCO	1/97	7/97
	Y (R)	AP1B5	ENDEVCO	1/97	7/97
	Z (R)	AP057	ENDEVCO	1/97	7/97
Pelvic	X	AF480	ENDEVCO	1/97	7/97
	Y	AL508	ENDEVCO	1/97	7/97
	Z	AF5C1	ENDEVCO	1/97	7/97
Left Upper Tibia	Mx	015	DENTON	4/97	10/97
Left Upper Tibia	My	015	DENTON	4/97	10/97
Left Lower Tibia	Fy	011	DENTON	4/97	10/97
Left Lower Tibia	Fz	011	DENTON	4/97	10/97
Left Lower Tibia	Mx	011	DENTON	4/97	10/97
Right Upper Tibia	Mx	016	DENTON	4/97	10/97
Right Upper Tibia	My	016	DENTON	4/97	10/97
Right Lower Tibia	Fy	012	DENTON	4/97	10/97
Right Lower Tibia	Fz	012	DENTON	4/97	10/97
Right Lower Tibia	Mx	012	DENTON	4/97	10/97

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY

(6 Month Calibration Minimum)

PASSENGER DUMMY		Serial #	Manufacture	Calibration	
				Last	Next
Left Foot Front	Z	J18400	ENDEVCO	12/96	6/97
Left Foot Rear	X	J18649	ENDEVCO	1/97	7/97
Left Foot Rear	Z	J17965	ENDEVCO	1/97	7/97
Right Foot Front	Z	J18406	ENDEVCO	12/96	6/97
Right Foot Rear	X	J18465	ENDEVCO	12/96	6/97
Right Foot Rear	Z	J18623	ENDEVCO	12/96	6/97

INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS

(6 Month Calibration Minimum)

	Serial #	Manufacturer	Calibration	
			Last	Next
Left Seat Rear Crossmember	Y95	ICS	4/97	10/97
Right Rear Seat Crossmember	X90	ICS	4/97	10/97
Top of Engine	D03	ICS	4/97	10/97
Bottom of Engine	MB18	ICS	5/97	11/97
Left Disc Brake Caliper	A147	CEC	2/97	8/97
Right Disc Brake Caliper	A157	CEC	4/97	10/97
Instrument Panel	A129	CEC	11/96	5/97
Left Seat Rear Crossmember (R)	Y85	ICS	4/97	10/97
Right Seat Rear Crossmember (R)	X93	ICS	4/97	10/97