V2453

REPORT NUMBER: CAL-96-N11

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

CHRYSLER CORPORATION
1996 DODGE CARAVAN
MPV

NHTSA NUMBER: MT0305

CALSPAN TEST NUMBER: 8313-11

Sept. 19, 1996

CALSPAN SRL CORPORATION
TRANSPORTATION SCIENCE CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225

FINAL REPORT

PREPARED FOR:

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National Highway Traffic Safety Administration
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Prepared: James A. Czarnecki
James A. Czarnecki, Project Engineer

Approved: David J. Travale
David J. Travale, Program Manager
Transportation Research/
Physical Sciences Department

FINAL REPORT ACCEPTED BY:

Richard N. Morgan
Manager, New Car Assessment Program (NCAP)

6 December 1996
Date of Report Acceptance

Contracting Officer's Tech. Rep. (COTR)

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16. *Abstract*

A frontal load cell barrier test of a 1996 Dodge Caravan MPV was performed at Calspan SRL Corporation crash test facility in Buffalo, New York, on Sept. 19, 1996.

The impact velocity was 56.2 kph and the temperature at the barrier face was 21°C. The maximum post-test vehicle crush was 595 mm. The test vehicle was equipped with a 3-point continuous belt system and supplemental airbags at both front outboard seating positions.

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 96 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-90-D-02121. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 48.3 kph requirements.

The 56.2 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 MT0305

A load cell barrier consisting of 36 load cells was impacted by a 1996 Dodge Caravan MPV at a velocity of 56.2 kph. The test was performed at the Calspan SRL Corporation on Sept. 19, 1996. 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) was calibrated previous to this test. The right-front passenger (position 2) ATD (Serial No. 064) was used in 2 previous tests (MV0200 AND MT 5202). Injury criteria for ATD No.064 were not exceeded in either test MV0200 and MT5202. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 129 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. Vehicle accelerometer number 2 (right rear seat crossmember) did not record accurately. Vehicle accelerometer number 3 and 4 (Top of Engine and Bottom of Engine) sustained cut wires during impact, data is not accurate after 40 msec. Both accelerometer integrations are omitted from this report. Position 1 - Redundant Chest Y acceleration - sustained a short data spike that occurs at 40 msec. Position 2 belt elongation did not record accurately and its data trace was omitted from this report. Barrier Load Cell C5 data is not available for this channel and its data trace was omitted from this report.

The driver's HIC was 773. The maximum chest deceleration over 3 milliseconds was 50.8 g's and maximum chest deflection was -27.3 mm. Femur loads were -7193.2 newtons on the left and -5624.5 newtons on the right.

The right front passenger's HIC was 419. Maximum chest deceleration over 3 milliseconds was 44.7 g's and maximum chest deflection was 18.5 mm. Femur loads were -4608.2 newtons on the left and -3535.3 newtons on the right.

Table 1

GENERAL TEST AND VEHICLE DATA

Vehicle Year/Make/Model/Body Style: 1996 Dodge Caravan MPV

NHTSA Test No.: MT0305 VIN.: 2B4FP25BXTR727083

Body Color: White Date of Manufacture: 3/96

Date Received: 8/6/96

Odometer Reading: 00085

Engine:	4	Cylinders;	-	C.I.D.;	2.4	Liters;	- CC
	X	Gas;	-	Diesel;	-	Turbocharged	
	X	Longitudinal;			-	Transverse	
Transmission:	3	Speed;	-	Manual;	X	Automatic;	- Overdrive
Final Drive:	X	Front Wheel;	-	Rear Wheel;	-	Four Wheel	
Accessories:	X	A/C;	X	P/S;	X	P/B;	- P/wdo
	-	Tilt Wheel;	-	P/seats;	-	Cruise Control	- Other

Type of Occupant Restraint: Driver and passenger position equipped with 3-point restraint system and supplemental airbags.

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

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

Recommended Tire Size: P205/75R14

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

Tires on Vehicle: P205/75R14 Manufacturer: Goodyear

Number of Occupants:	2	Front;	2	Rear;	3	3rd Seat;	7 TOTAL
Type of Front Seats:	X	Bucket;	-	Bench;	-	Split Bench	
Type of Front Seat Back:	-	Fixed;	X	Adj. with	X	Lever	- Rot. Knob

Rated Cargo and Luggage Weight (RCLW) A-B = 136 kgs.

GVWR 2268 kgs. GAWR: Front 1203 kgs. Rear 1225 kgs.

Table 1

GENERAL TEST AND VEHICLE DATA (cont'd)

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

Right Front = 475 kgs. Right Rear = 341 kgs.

Left Front = 491 kgs. Left Rear = 346 kgs.

TOTAL FRONT WEIGHT = 966 kgs. (58.4 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 687 kgs. (41.6 % of Total Vehicle Weight)

TOTAL DELIVERED WEIGHT = 1,653 kgs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight 1653 kgs.

VCW = Vehicle Capacity Weight 615 kgs.

DSC = Designated Seating Capacity 7

RCLW = VCW - 68 (DSC) = 136 kgs. (136 kg max.)

Target Test Weight = UDW + RCLW + (2 dummies x 74.4 kgs./ dummy)

Target Test Weight = 1938 kgs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 133 KGS CARGO:

Right Front = 527 kgs. Right Rear = 431 kgs.

Left Front = 539 kgs. Left Rear = 437 kgs.

TOTAL FRONT WEIGHT = 1,066 kgs. (55.1 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 868 kgs. (44.9 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 1,934 kgs.

Weight of ballast secured in vehicle trunk area = 133 kgs.

VEHICLE ATTITUDE (all dimensions in mm):

Delivered Attitude: RF 770 LF 772 RR 780 LR 780

Test Attitude: RF 758 LF 758 RR 733 LR 738

Wheel Base: 2879 mm.; C.G. = 1292 mm. rearward of front wheel C/L

Remarks: 70 liters of stoddard solvent was added to fuel tank.

Table 1

GENERAL TEST AND VEHICLE DATA (cont'd)

POST -IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0°

Date of Test: Sept. 19, 1996 Time of Test: 12:41

Ambient Temperature: 21 ° C at impact area

Temperature in Occupant Compartment: 21 ° C

Windshield Molding Temperature: 21 ° C

Required Impact Velocity Range: 55.5 to 57.1 kph

Impact Velocity: primary = 56.2 kph, secondary = 56.2 kph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 1321 mm

Exiting Speed Trap: 305 mm

VEHICLE REBOUND AND CRUSH (mm):

Vehicle Length:			C_L		L	
	Pre-test = R	4570	C_L	4715	L	4583
	Post-test = R	4115	C_L	4120	L	4145
	Crush = R	455	C_L	595	L	438

Distance from front of test vehicle to point of impact:

R 396 C_L 439 L 427

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	Airbag	Airbag (center and on rightside) and headrest
Chest	Airbag	Airbag
Abdomen	None	None
Left Knee	Knee bolster	Glove box
Right Knee	Knee bolster	Glove box

Table 1

GENERAL TEST AND VEHICLE DATA (cont'd)

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

	Front		Rear	
Seat Movement	Left	Right	Left	Right
Seat Back Failure	None	None	-	None
Seat Shift (mm.)	3 mm	0 mm	-	0

Glazing Damage

Backlight/Windshield: cracked on lower left side

Other Notable Impact Effects: None

Section 3

OCCUPANT AND VEHICLE INFORMATION

I. DATA

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

Table 2

DUMMY INJURY CRITERIA VALUES

NHTSA Test No.: MT0305 Vehicle: 1996 Dodge Caravan MPV

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-69.1	-10.2	19.4	70.9
Position #2 - Passenger	-52.6	21.2	23.2	54.0

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R*
Position #1 - Driver	-52.1	-5.2	12.0	50.8
Position #2 - Passenger	-45.9	9.0	-10.2	44.7

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

	MAXIMUM FORCE - FEMUR LOAD (nwt)	
	LEFT FEMUR	RIGHT FEMUR
Position #1 - Driver	-7193.2	-5624.5
Position #2 - Passenger	-4608.2	-3535.3

	MAXIMUM FORCE - SEAT BELT LOADS (nwt)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	5097.7	-	2817.4
Position #2 - Passenger	5667.3	3484.5	-

	HEAD INJURY CRITERIA (HIC)			
	HIC**	t_1 (mSec)	t_2 (mSec)	Average Acceleration t_1 to t_2
Position #1 - Driver	773	57.96	90.48	56.29
Position #2 - Passenger	419	69.72	105.72	42.29

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

Table 3

HYBRID III NECK AND CHEST DATA SHEET

Vehicle Year/Make/Model/Body Style: 1996 Dodge Caravan MPV

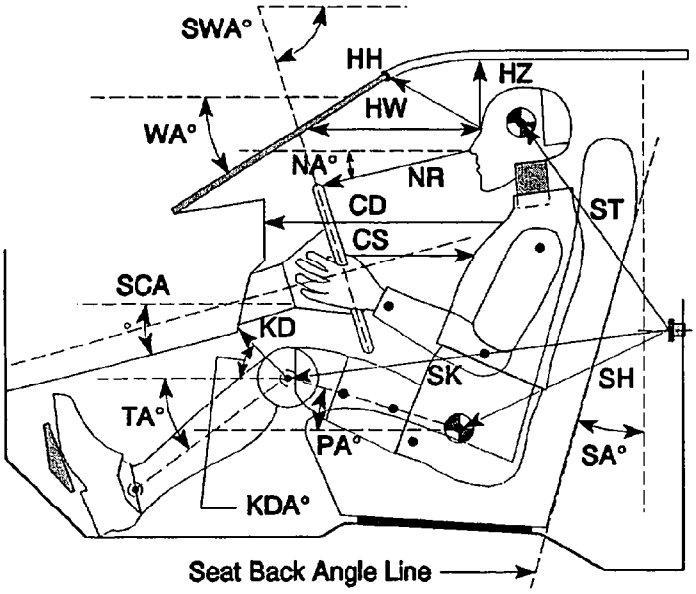
NHTSA Test No.: MT0305 Test Date: Sept. 19, 1996

MAXIMUM VALUES	DRIVER DUMMY ID #245:	PASSENGER DUMMY ID #064:
Neck Load X (nwt)	752.7	836.6
Neck Load Y (nwt)	454.0	474.7
Neck Load Z (nwt)	2399.6	1403.8
Neck Moment X (nwt-m)	20.4	-19.2
Neck Moment Y (nwt-m)	60.5	118.3
Neck Moment Z (nwt-m)	10.0	13.4
Chest Deflection X (mm.)	-27.3	-18.5
Time of Max. Occurrence (msec)	78.0	75.0

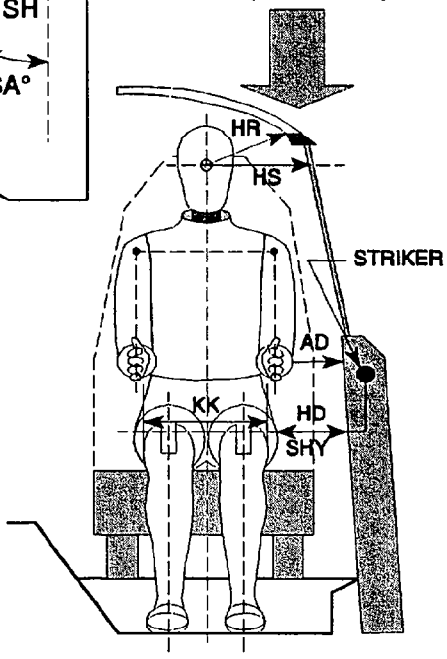
Note: All values listed occur during the primary impact event.

Figure 1

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

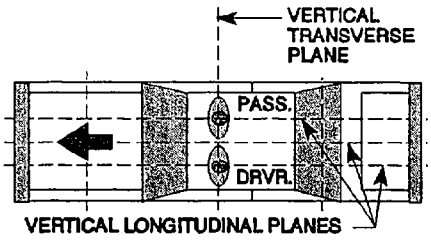


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Table 4

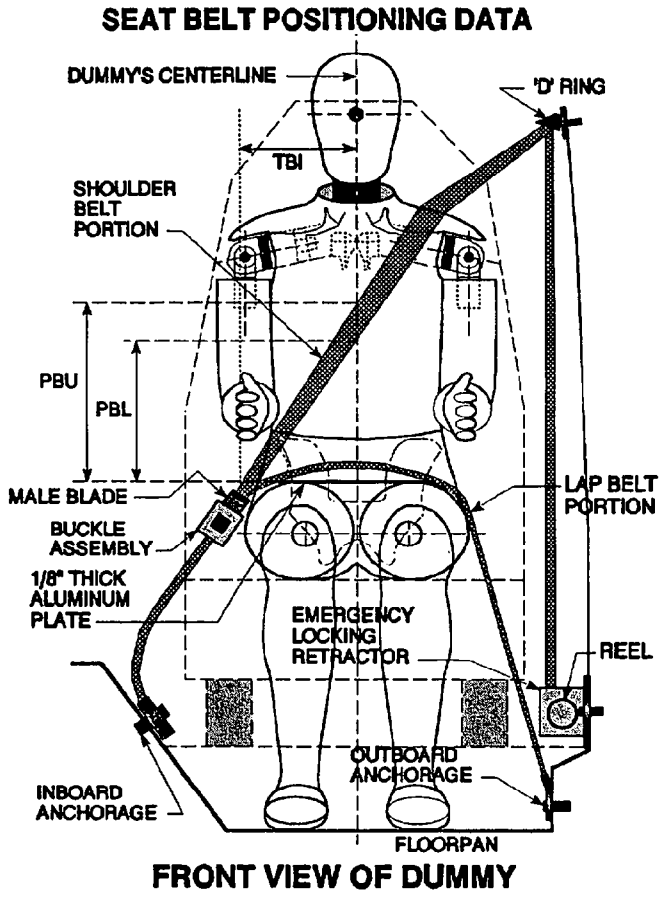
FRONT SEAT OCCUPANT MEASUREMENTS

	DRIVER (Serial #245)			PASS. (Serial # 064)		
WA°	-26 deg.			N/A		
SWA°	63 deg.			N/A		
SCA°	27 deg.			N/A		
SA°	18 deg.			18 deg.		
HZ	195			192		
HH	333			313		
HW	560			574		
HR	243			233		
NR	368	Angle	15 deg.	N/A		
CD	540			546		
CS	275			N/A		
RA	160			N/A		
KDL	183	Angle (KDA)	22 deg.	165		
KDR	181			169	Angle (KDA)	21 deg.
PA°	24 deg.			24 deg.		
TA°	55 deg.			55 deg.		
KK	378			303		
ST	645	Angle	13 deg.	671	Angle	12 deg.
SK	650	Angle	84 deg.	648	Angle	87 deg.
SH	249	Angle	96 deg.	234	Angle	98 deg.
SHY	254			245		
HS	342			345		
HD	157			123		
AD	139			123		

Dimensions in millimeters

Figure 2

SEAT BELT POSITIONING DATA



	DRIVER DUMMY (mm)	PASSENGER DUMMY (mm)
PBU -- Top surface of alum. plate to upper edge	337	353
PBL-- Top surface of alum. plate to belt lower edge	259	262
LAP BELT TENSION	Retractor	Retractor
SHOULDER BELT TENSION	10 nwt	10 nwt

Table 5

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.	2629	2607
Shoulder belt length as measured on Part 572 Dummy.	903	895
Lap belt length as measured on Part 572 Dummy.	980	972
SHOULDER BELT SPOOL-OFF DATA:		
As determined by film analysis.	50.8	63.5
As determined mechanically.	54	70
As determined electronically.	67.5	82.3
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	118.9	N/A
Measured mechanically.	0 mm/M	0 mm/M

Dimensions in millimeters

Figure 3

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera information shown in Table 6.

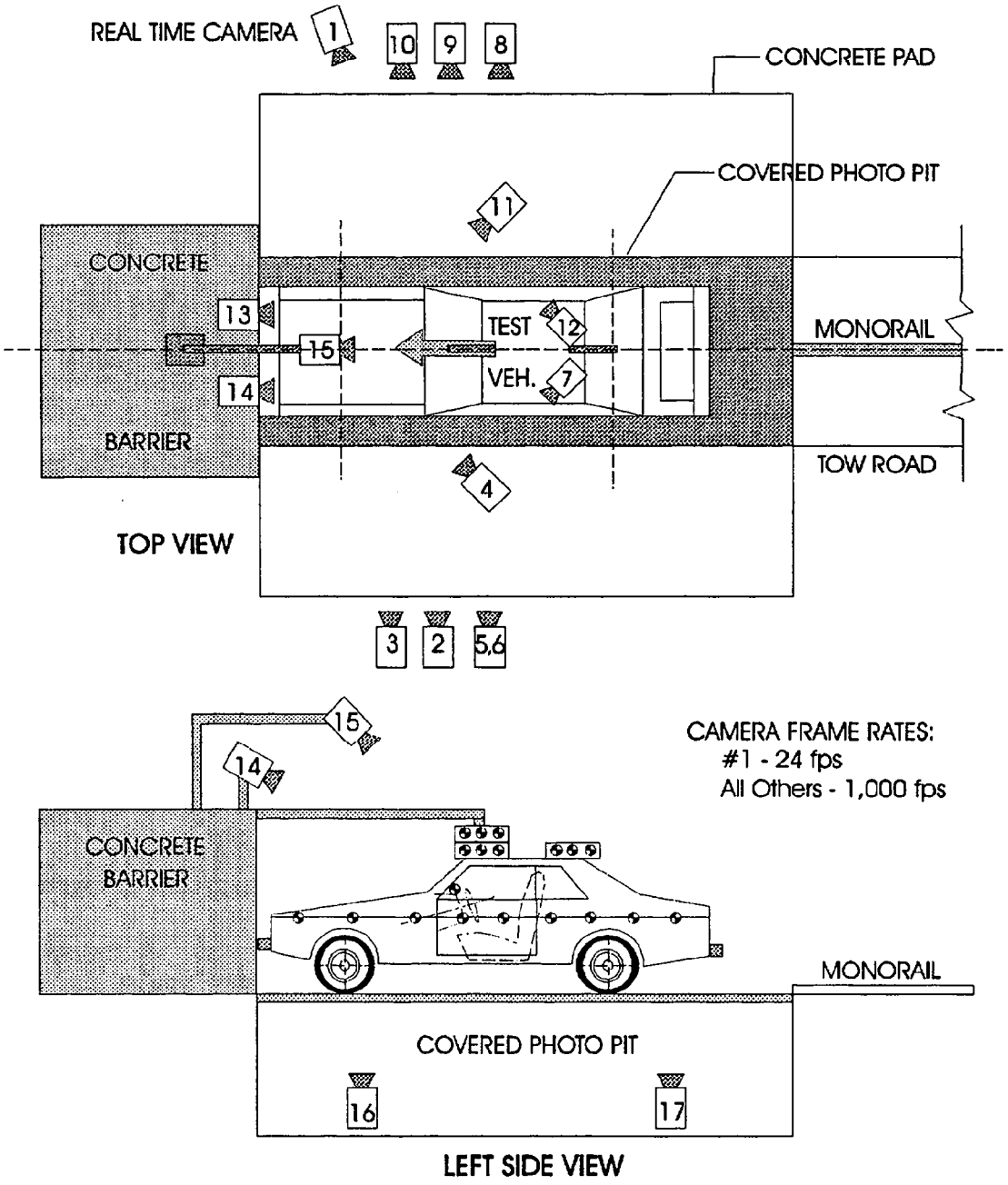


Table 6
HIGH-SPEED CAMERA LOCATIONS

NHTSA Test No.: MT0305 Vehicle: 1996 Dodge Caravan 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	6172	1626	1154	-3.8	5696	13	1095
3	Left Side View	8827	457	1224	-2.8	8351	25	800
4	Driver and Interior View	6553	2667	2105	-9.4	-	35	890
5	Steering Column (Bottom)	7493	1194	1176	-2.8	7017	25	1005
6	Steering Column (Top)	7493	1194	1780	-7.6	7017	25	1060
7	Left Belt	-	-	-	-	-	8	785
8	Overall Right Side	6553	2032	1167	-1.6	6077	13	1140
9	Right Side View	7341	1245	1167	-0.8	6865	25	1100
10	Right Passenger View	8052	1803	1468	-2.5	7576	35	1005
11	Passenger and Interior View	8230	2718	2100	-6.9	-	35	1005
12	Right Belt	-	-	-	-	-	8	675
13	Passenger Front View	580	0	2000	-32	-	13	1010
14	Driver Front View	580	0	2000	-32	-	13	1050
15	Windshield View	0	-530	3048	-51	-	13	1090
16	Pit View of Engine	0	505	-3048	90	-	13	1000
17	Pit View of Fuel Tank	0	3432	-3048	90	-	13	N.T.

*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 4

VEHICLE TARGET LOCATIONS

(Dimensions in millimeters)

A	400
B	620
C	1215
D	2252
E	330
F	1834
G	954
H	953
I	165
J	1395
K	1118
L	1248
M	330
N	164
O	954
P	953
Q	1248
R	1118
S	1396

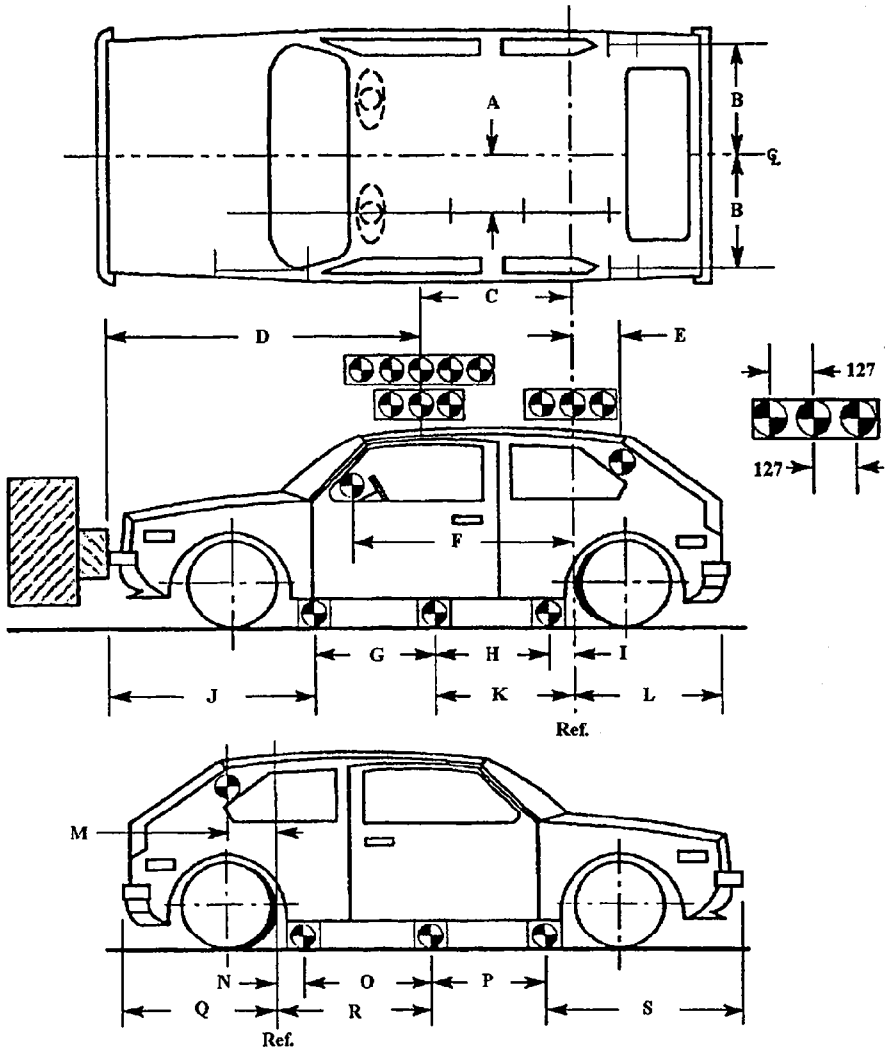
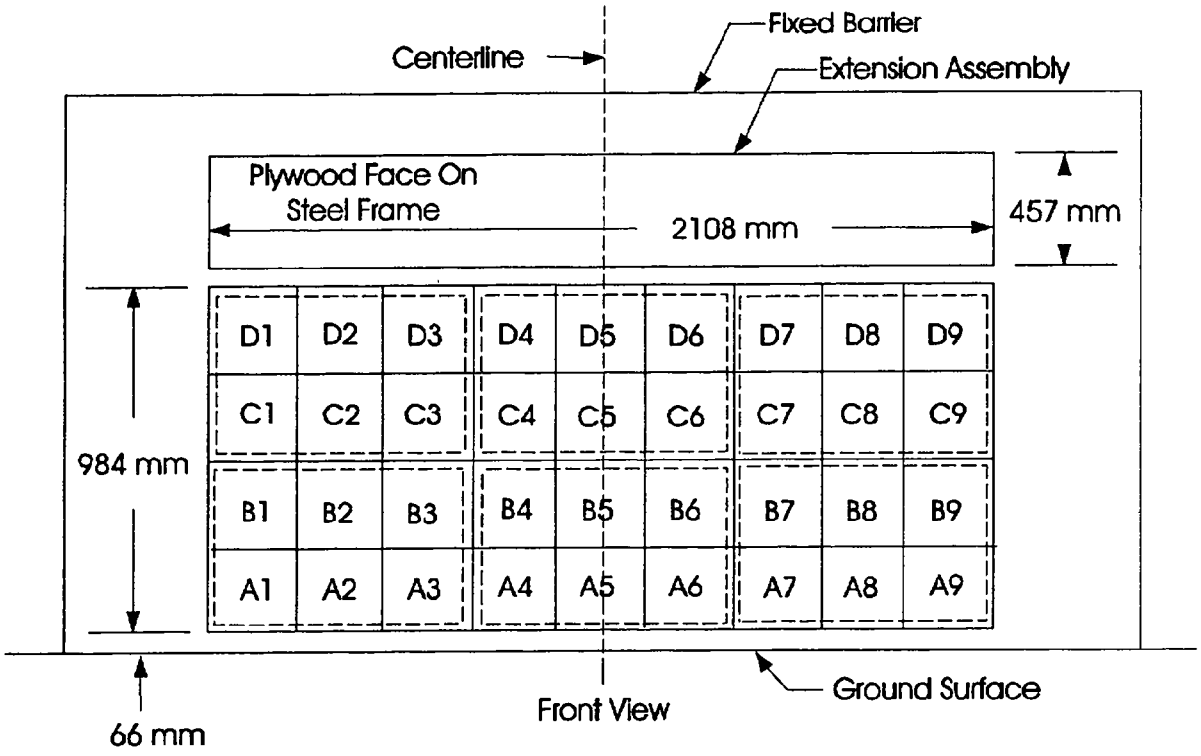


Figure 5

LOAD CELL LOCATIONS ON FIXED BARRIER

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



6 GROUPS OF 6 LOAD CELLS EACH

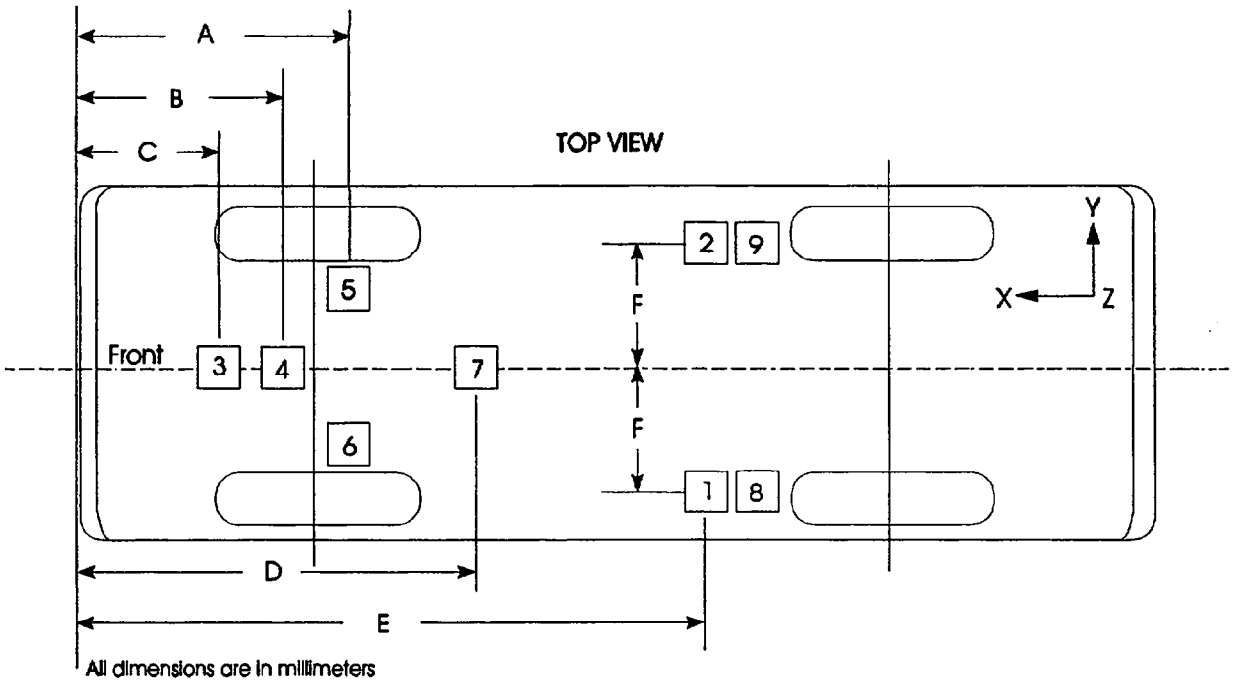
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

The following data is presented in Appendix B:

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

Figure 6

VEHICLE ACCELEROMETER LOCATIONS



ACCELEROMETER NUMBER*	ACCELEROMETER LOCATION	Distances From Vehicle Front All dimensions in millimeters	
1	Left Rear Seat Crossmember [E/F]	X = 2484	Y = -635
2	Right Rear Seat Crossmember [E/F]	X = 2484	Y = 638
3	Top of engine [C]	731	
4	Bottom of engine [B]	733	
5	Right Disc Brake Caliper [A]	1003	
6	Left Disc Brake Caliper [A]	1003	
7	Instrument Panel [D]	1644	
8	Left Rear Seat Crossmember [E/F]	X = 2484	Y = -664
9	Right Rear Seat Crossmember [E/F]	X = 2484	Y = 666

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

Figure 7

TEST VEHICLE MEASUREMENTS

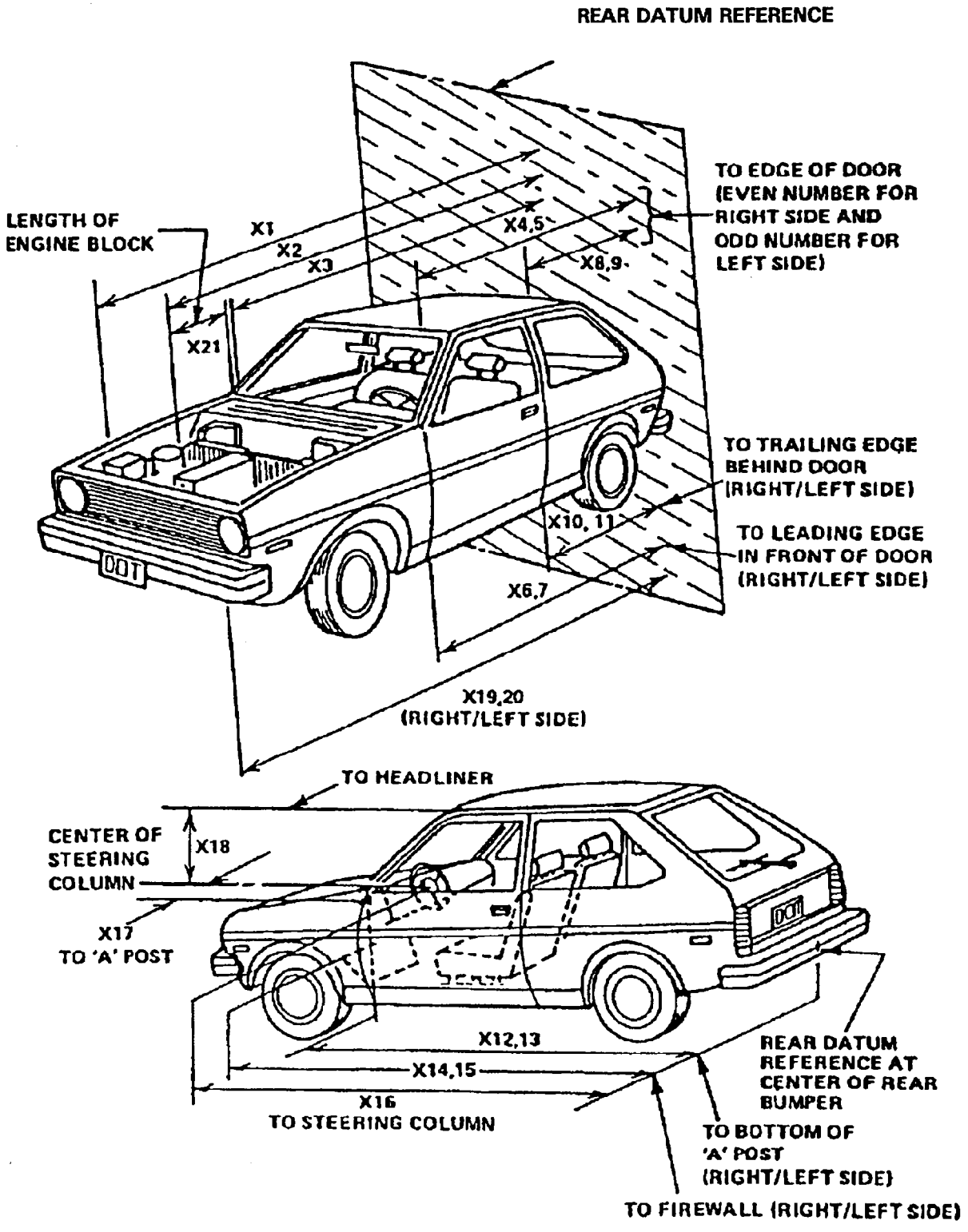


Table 7

VEHICLE MEASUREMENTS

		All Dimensions in mm		
No.		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	4715	4120	595
X2	Rear Surface of Vehicle to Front of Engine	4260	N.A.	N.A.
X3	Rear Surface of Vehicle to Firewall	3650	3610	40
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	3335	3340	-5
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	3324	3320	4
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	3305	3302	3
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	3297	3274	23
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	2320	2310	10
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	2310	2302	8
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	2307	2300	7
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	2308	2280	28
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	3262	3250	12
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	3250	3231	19
X14	Rear Surface of Vehicle to Firewall, Right Side	3715	3685	30
X15	Rear Surface of Vehicle to Firewall, Left Side	3636	3630	6
X16	Rear Surface of Vehicle to Steering Column	2900	2895	5
X17	Center of Steering Column to "A" Post	475	475	0
X18	Center of Steering Column to Headliner	435	420	15
X19	Rear Surface of Vehicle to Right Side of Front Bumper	4570	4115	455
X20	Rear Surface of Vehicle to Left Side of Front Bumper	4583	4145	438
X21	Length of Engine Block	530	530	0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	3130	3130	0
CD	Rear Surface of Vehicle to Center of Dash Panel	3140	3145	-5
LD	Rear Surface of Vehicle to Left Side of Dash Panel	3135	3120	15

Table 8

ACCIDENT INVESTIGATION DIVISION DATA

FOR 56.3 KPH FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: Dodge Caravan MPV

NHTSA Test No.: MT0305 VIN: 2B4FP25BXTR727083

Model Year: 1996 Build Date: 3/96 Test Date: Sept. 19, 1996

Vehicle Size Category: MPV Test Weight: 1934 Kgs

Vehicle Wheelbase: 2879 mm; Front Overhang: 1395 mm; Overall Width: 1920 mm

Collision Deformation Classification (CDC) Code: 12FDEW2

Crush Depth Dimensions;

C1 = 380 mm

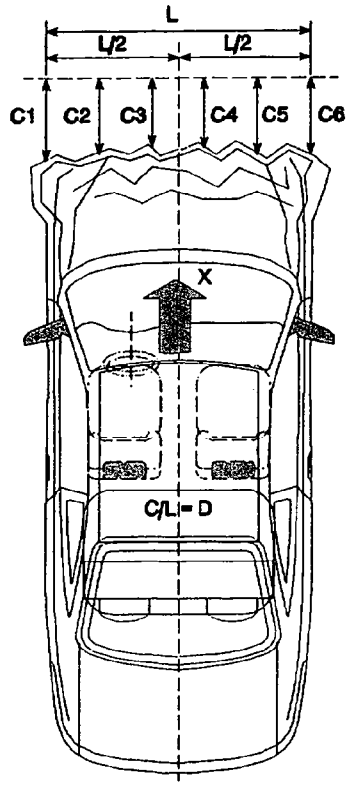
C2 = 583 mm

C3 = 596 mm

C4 = 599 mm

C5 = 575 mm

C6 = 430 mm



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

Longitude Length of Damaged Region: L= 1920 mm

Section 4

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

"Windshield Mounting" FMVSS No. 212 Data

"Windshield Zone Intrusion" FMVSS No. 219 Data

"Fuel System Integrity" FMVSS No. 301

Figure 8

FMVSS NO. 212 - "WINDSHIELD MOUNTING" DATA

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

Windshield is bonded in place and covered with 7 mm molding.

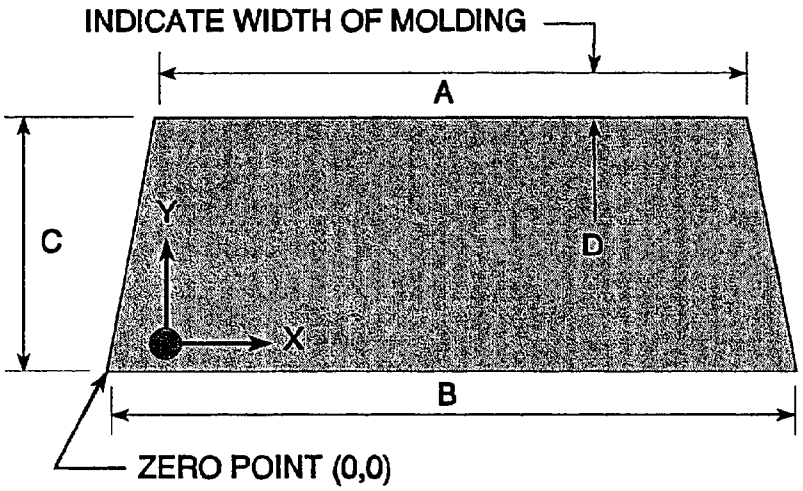
FMVSS 212 REQUIREMENTS:

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	2338	2338	100
LEFT SIDE	2338	2338	100
TOTAL	4,676	4,676	100

AREA OF RETENTION FAILURE:



FRONT VIEW OF WINDSHIELD

DIMENSIONS	
A	1240
B	1646
C	895
D	7

FAILURE DETAILS: None

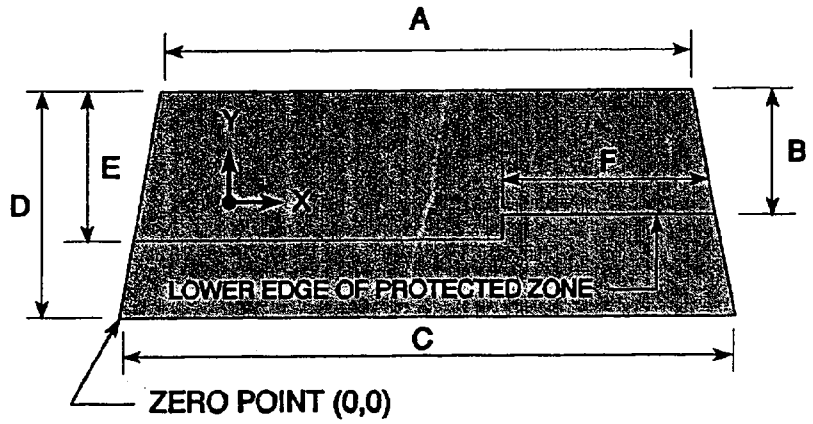
Figure 9

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

PROTECTED ZONE LOWER EDGE REQUIREMENT:

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

FMVSS 219 TEST DATA: (Dimensions in mm)



FRONT VIEW OF WINDSHIELD

DIMENSIONS	
A	1240
B	494
C	1646
D	895
E	603
F	664

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4": None

(Show location of penetration on the above sketch)

	COORDINATES	
	X	Y
1.		
2.		
3.		
4.		

Table 9

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

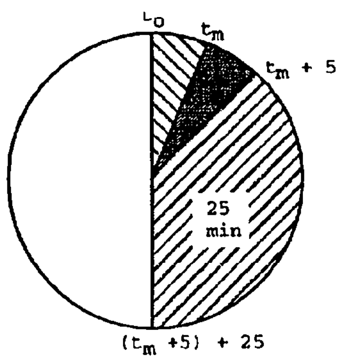
NHTSA TEST No.:	MT0305	TEST DATE:	Sept. 19, 1996
VEHICLE MAKE/MODEL:	1996 Dodge Caravan		

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

= =

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

FUEL SPILLAGE MEASUREMENT:



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

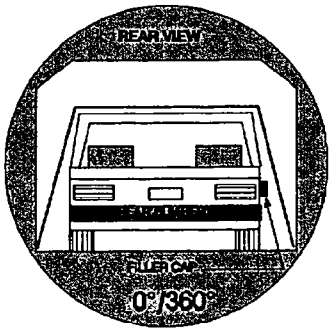
SOLVENT SPILLAGE DETAILS: None

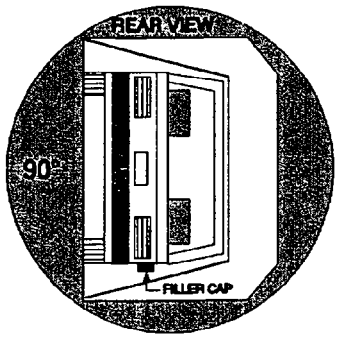
Table 10

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:

NHTSA Test No.:
MT0305





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	25	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	25	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

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A

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

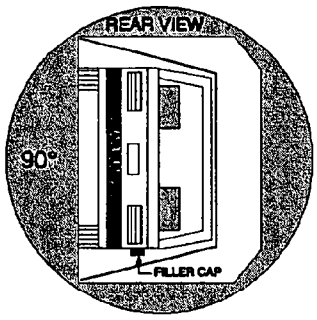
IV. SOLVENT SPILLAGE LOCATION(S): None

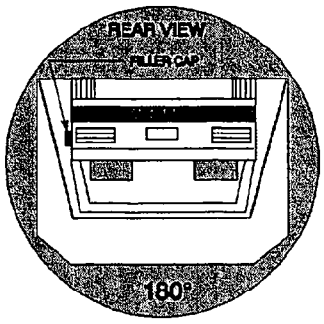
Table 10

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:

NHTSA Test No.:
MT0305





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	53	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	53	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

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A

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

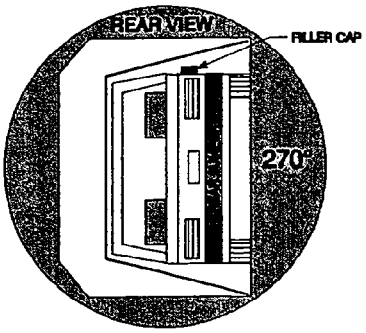
IV. SOLVENT SPILLAGE LOCATION(S): None

Table 10

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:

NHTSA Test No.:
MT0305



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time (Spec. Range = 1 to 3 minutes)	2	minutes	23	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	7	minutes	23	seconds
Next whole minute interval	8	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

5 ounces	1 ounce	1 ounce	1 ounce

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0

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

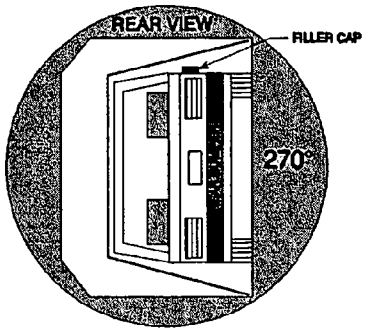
IV. SOLVENT SPILLAGE LOCATION(S): None

Table 10

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:

NHTSA Test No.:
MT0305



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	57	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	57	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

5 ounces	1 ounce	1 ounce	1 ounce

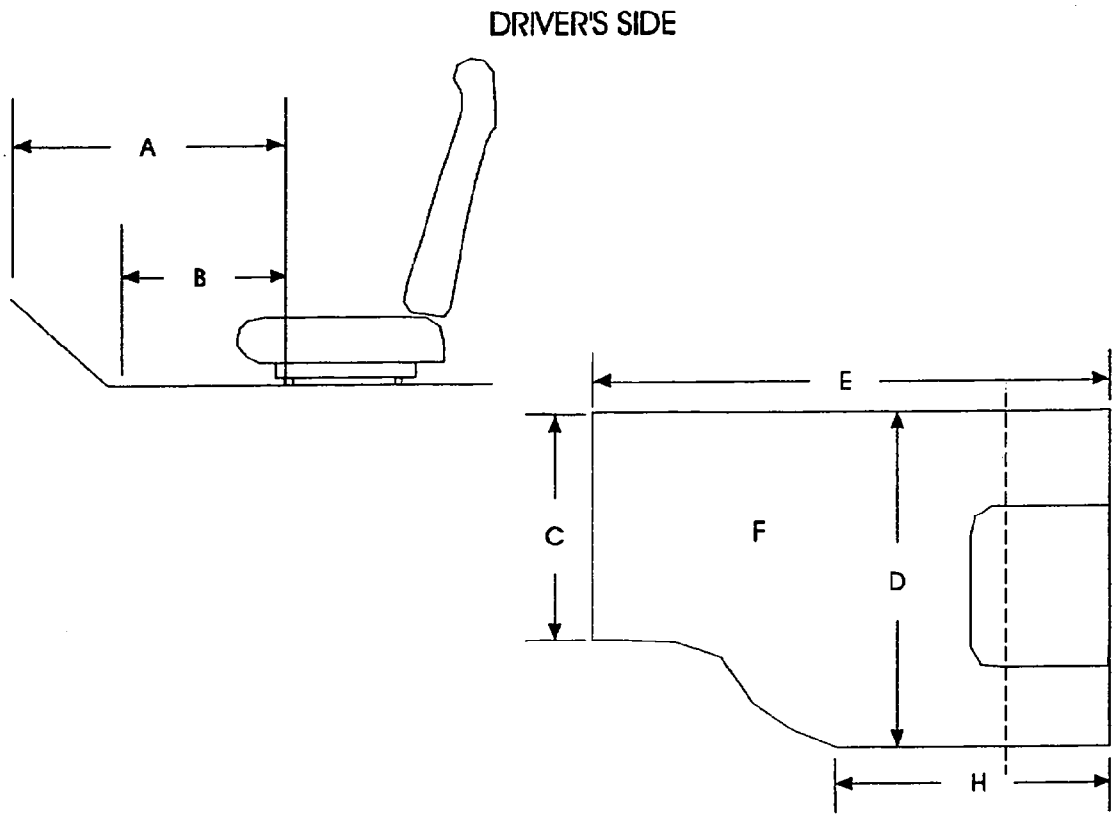
III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A

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

IV. SOLVENT SPILLAGE LOCATION(S): None

Figure 10
DRIVER SIDE FLOORBOARD DEFORMATION

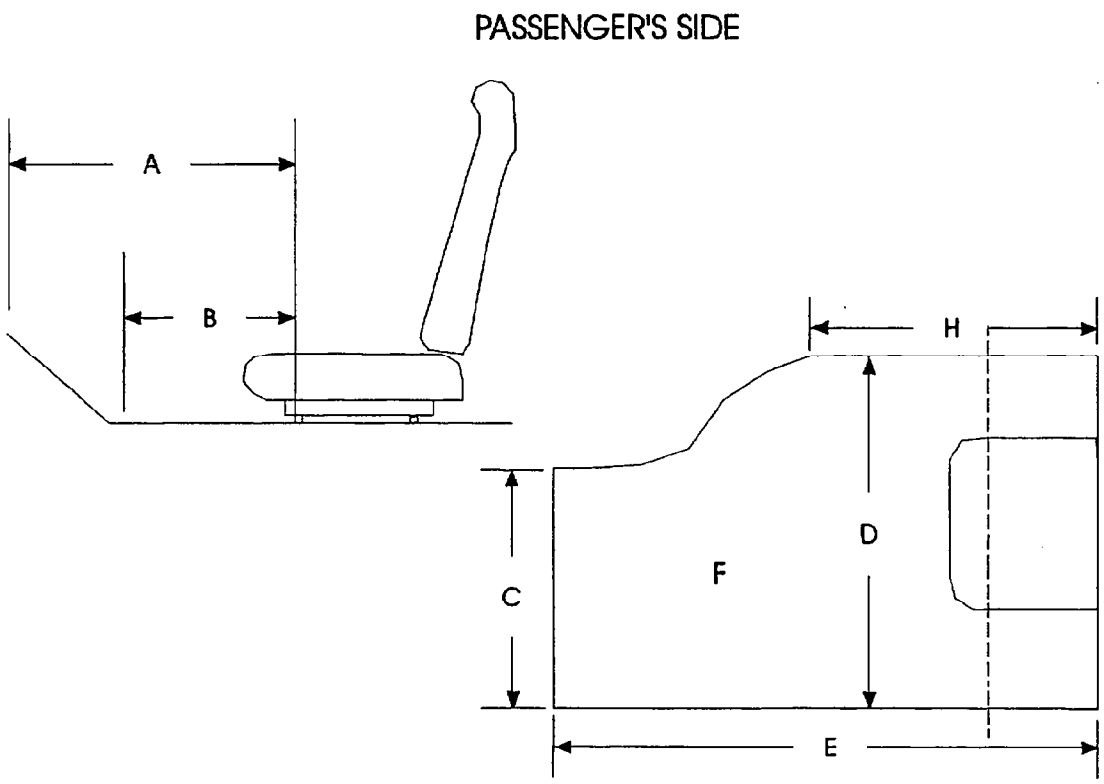


Measurement	Pre-Test	Post-Test	Difference
A	600	520	80
B	520	510	10
C	505	445	60
D	550	545	5
E	960	940	20
H	555	545	10
F $(cm)^2$	5098	4728	370

Units = mm

$F = H \times D + (E - H) \times C$

Figure 11
PASSENGER SIDE FLOORBOARD DEFORMATION

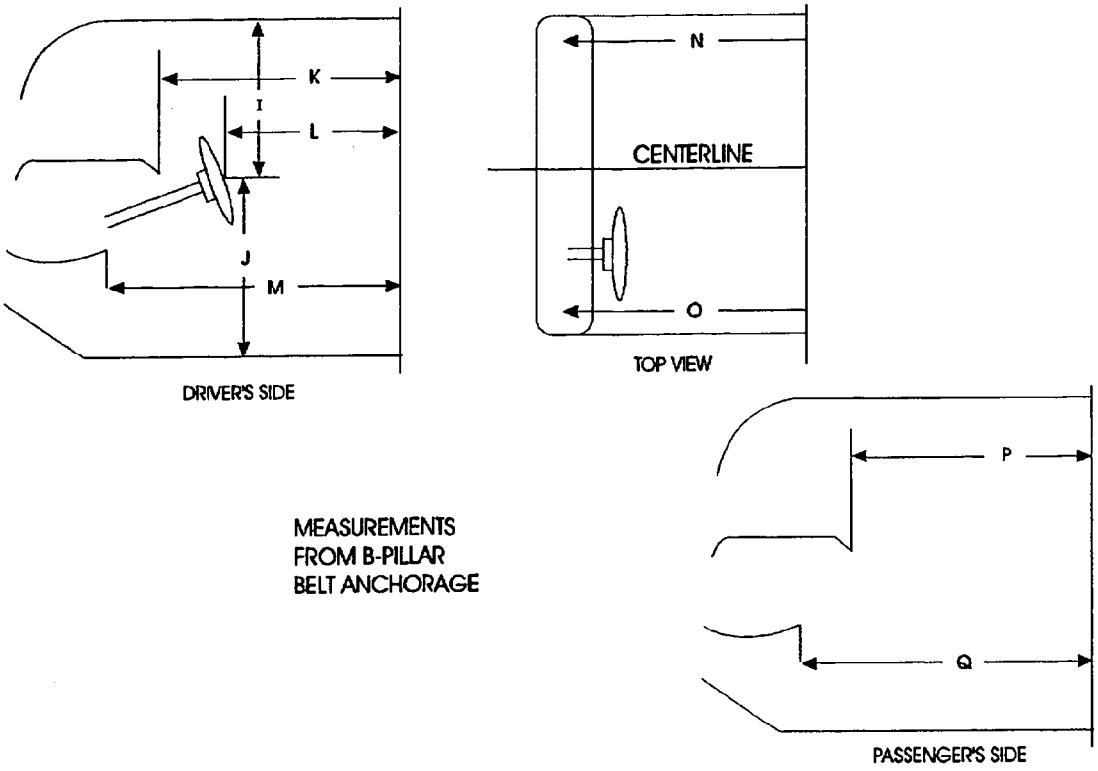


Measurement	Pre-Test	Post-Test	Difference
A	580	510	70
B	515	495	20
C	345	340	5
D	520	510	10
E	970	940	30
H	545	540	5
F $(cm)^2$	4300	4114	186

Units = mm

$F = H \times D + (E - H) \times C$

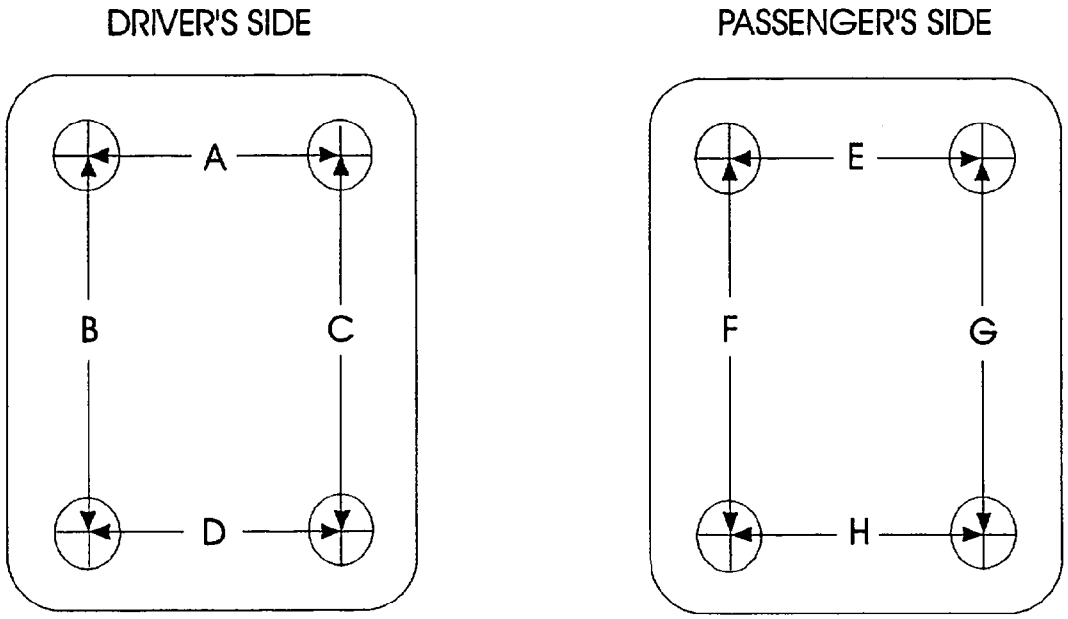
Figure 12
INTERIOR DEFORMATION



Measurement	Pre-Test	Post-Test	Difference
I	435	405	30
J	720	730	-10
K	1110	1100	10
L	845	840	5
M	1155	1135	20
N	1075	1075	0
O	1080	1065	15
P	1180	1180	0
Q	1110	1085	25

Units = mm

Figure 13
FLOORBOARD DEFORMATION



Measurement	Pre-Test	Post-Test	Difference
A	255	250	5
B	305	295	10
C	285	240	45
D	235	240	-5
E	375	380	-5
F	285	230	55
G	315	300	15
H	375	370	5

Units = mm

Appendix A

PHOTOGRAPHS

PHOTOGRAPHS

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A-9	POST-TEST RIGHT FRONT THREE-QUARTER VIEW	A-12
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A-14	PRE-TEST ENGINE COMPARTMENT VIEW	A-17
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A-20	PRE-TEST REAR UNDERBODY VIEW	A-23
A-21	POST-TEST REAR UNDERBODY VIEW	A-24
A-22	PRE-TEST DRIVER POSITION VIEW	A-25
A-23	POST-TEST DRIVER POSITION VIEW	A-26
A-24	PRE-TEST PASSENGER POSITION VIEW	A-27
A-25	POST-TEST PASSENGER POSITION VIEW.	A-28
A-26	PRE-TEST DRIVER AND INTERIOR VIEW	A-29
A-27	POST-TEST DRIVER AND INTERIOR VIEW	A-30
A-28	PRE-TEST PASSENGER AND INTERIOR VIEW	A-31
A-29	POST-TEST PASSENGER AND INTERIOR VIEW	A-32
A-30	PRE-TEST DRIVER HEAD LOCATION	A-33
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A-32	PRE-TEST PASSENGER HEAD LOCATION	A-35

Figure	Title	Page
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A-34	PRE-TEST DRIVER FLOOR PAN VIEW	A-37
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A-36	PRE-TEST PASSENGER FLOOR PAN VIEW	A-39
A-37	POST-TEST PASSENGER FLOOR PAN VIEW	A-40
A-38	ROLLOVER VIEW	A-41
A-39	IMPACT VIEW	A-42

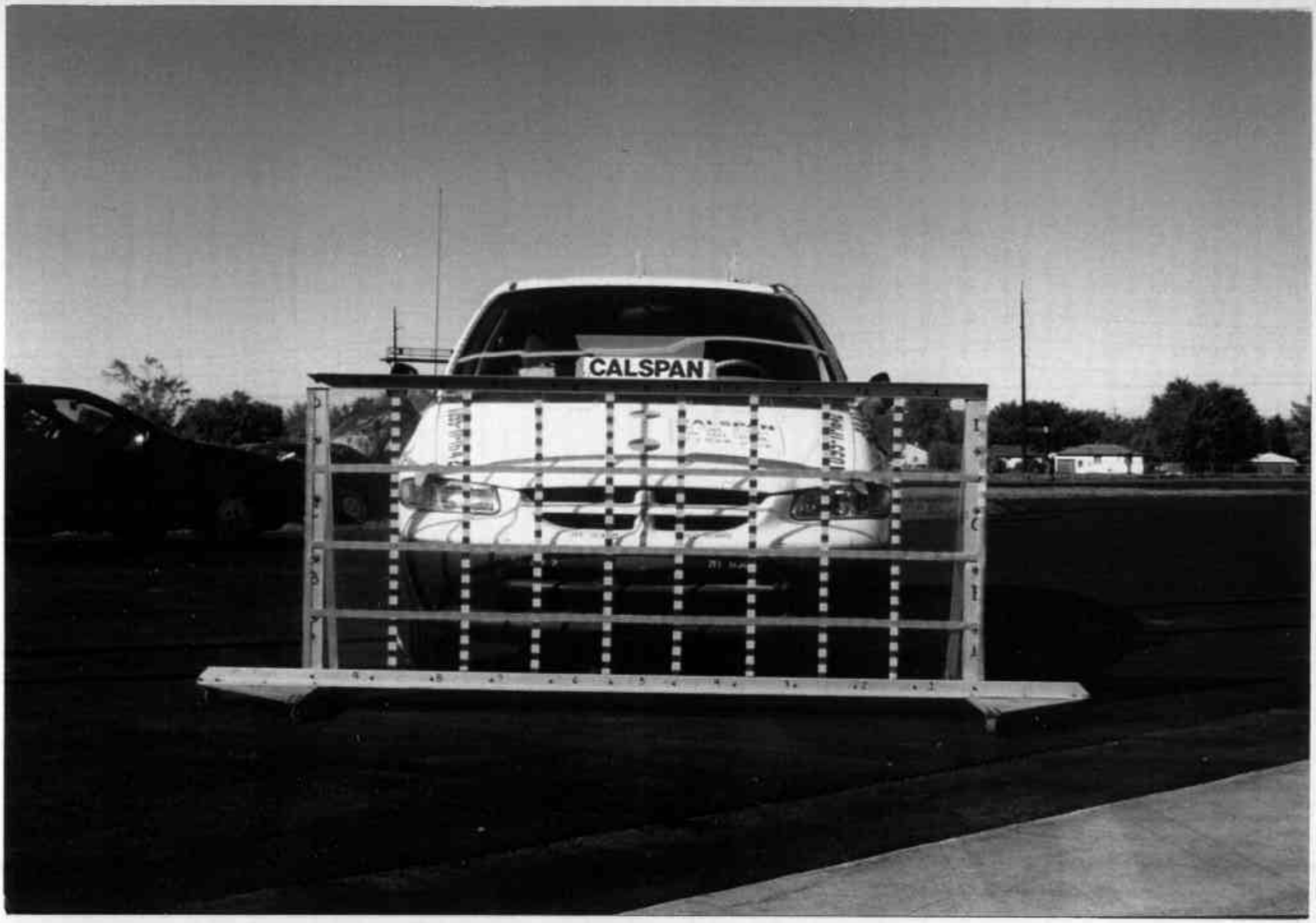

Figure A-1 LOAD CELL LOCATIONS

Figure A-2 PRE-TEST FRONT VIEW

8313-11

Figure A-3 POST-TEST FRONT VIEW

Figure A-4 PRE-TEST LEFT SIDE VIEW

Figure A-5 POST-TEST LEFT SIDE VIEW

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Figure A-6 PRE-TEST RIGHT SIDE VIEW

Figure A-7 POST-TEST RIGHT SIDE VIEW

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

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

8313-11

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

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

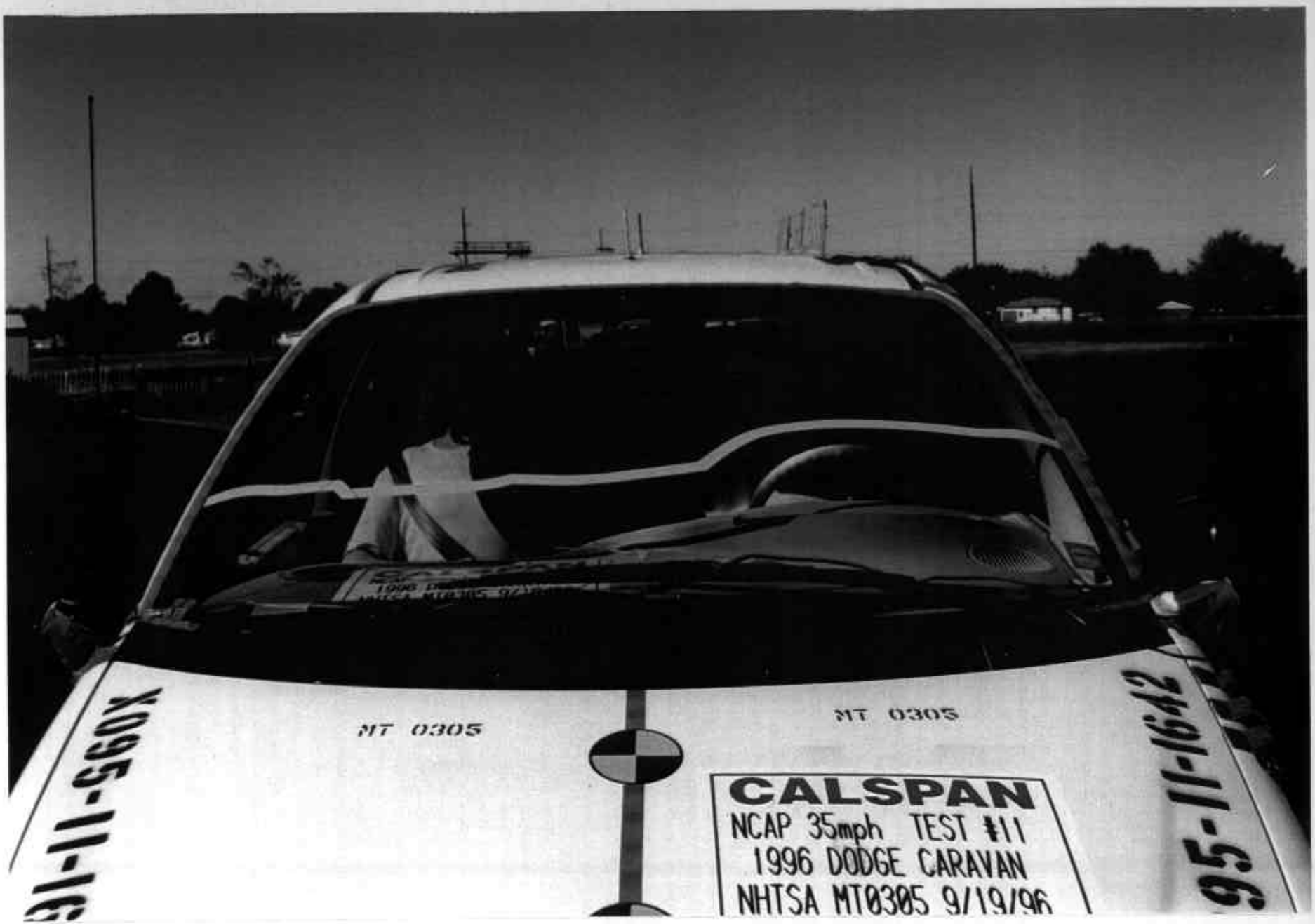

Figure A-12 PRE-TEST WINDSHIELD VIEW

Figure A-13 POST-TEST WINDSHIELD VIEW

8313-11

A-17

8313-11

Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

Figure A-15 FUEL CAP VIEW

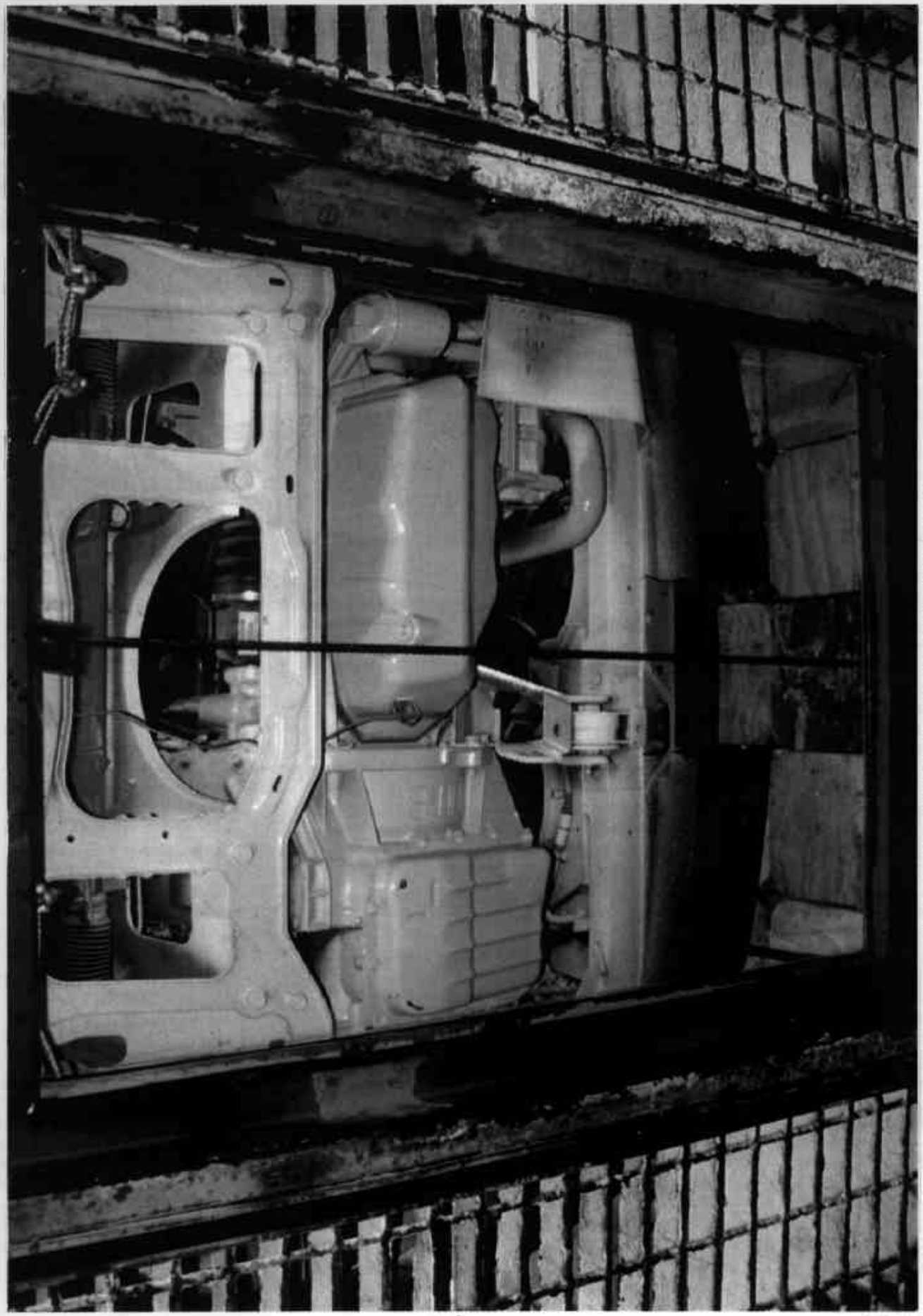

Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

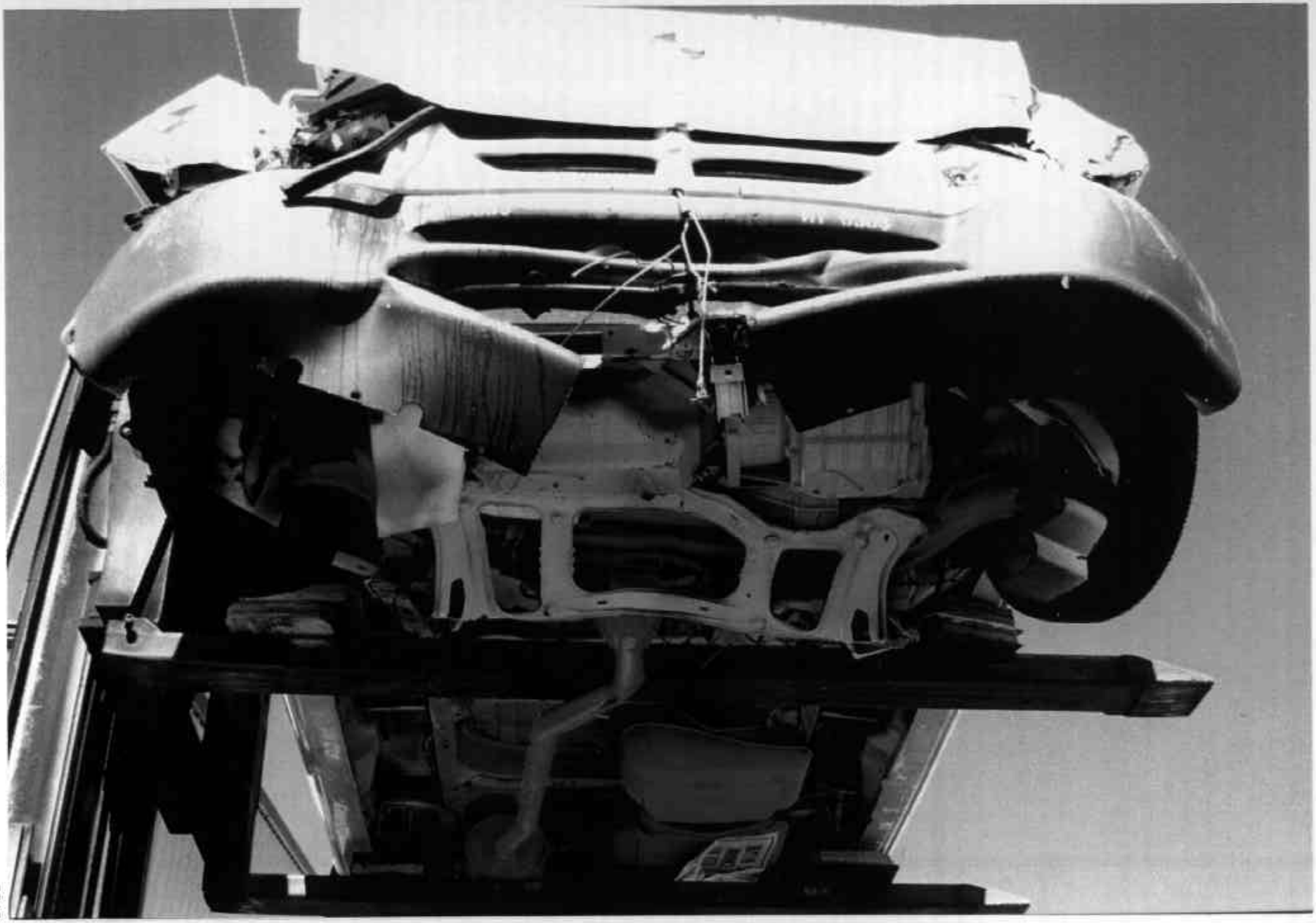

Figure A-17 POST-TEST FRONT UNDERBODY VIEW

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

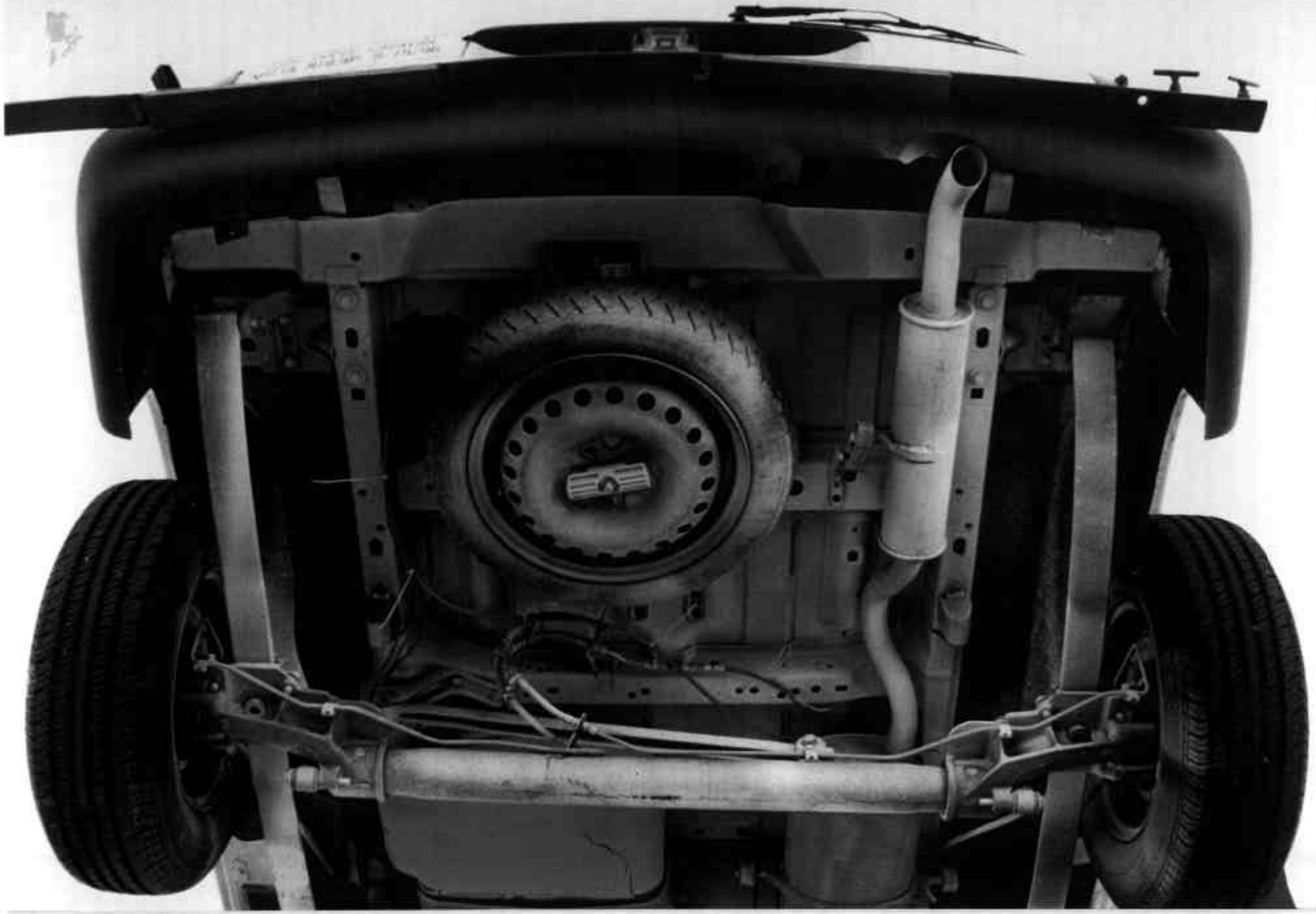

Figure A-21 POST-TEST REAR UNDERBODY VIEW

Figure A-22 PRE-TEST DRIVER POSITION VIEW

8313-11

Figure A-23 POST-TEST DRIVER POSITION VIEW

Figure A-24 PRE-TEST PASSENGER POSITION VIEW

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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

Figure A-30 PRE-TEST DRIVER HEAD LOCATION

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A-34

8313-11

Figure A-31 POST-TEST DRIVER HEAD LOCATION

Figure A-32 PRE-TEST PASSENGER HEAD LOCATION

A-36

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Figure A-33 POST-TEST PASSENGER HEAD LOCATION

8313-11

Figure A-34 PRE-TEST DRIVER FLOOR PAN VIEW

A-38

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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

NHTSA TEST NO. MT0305

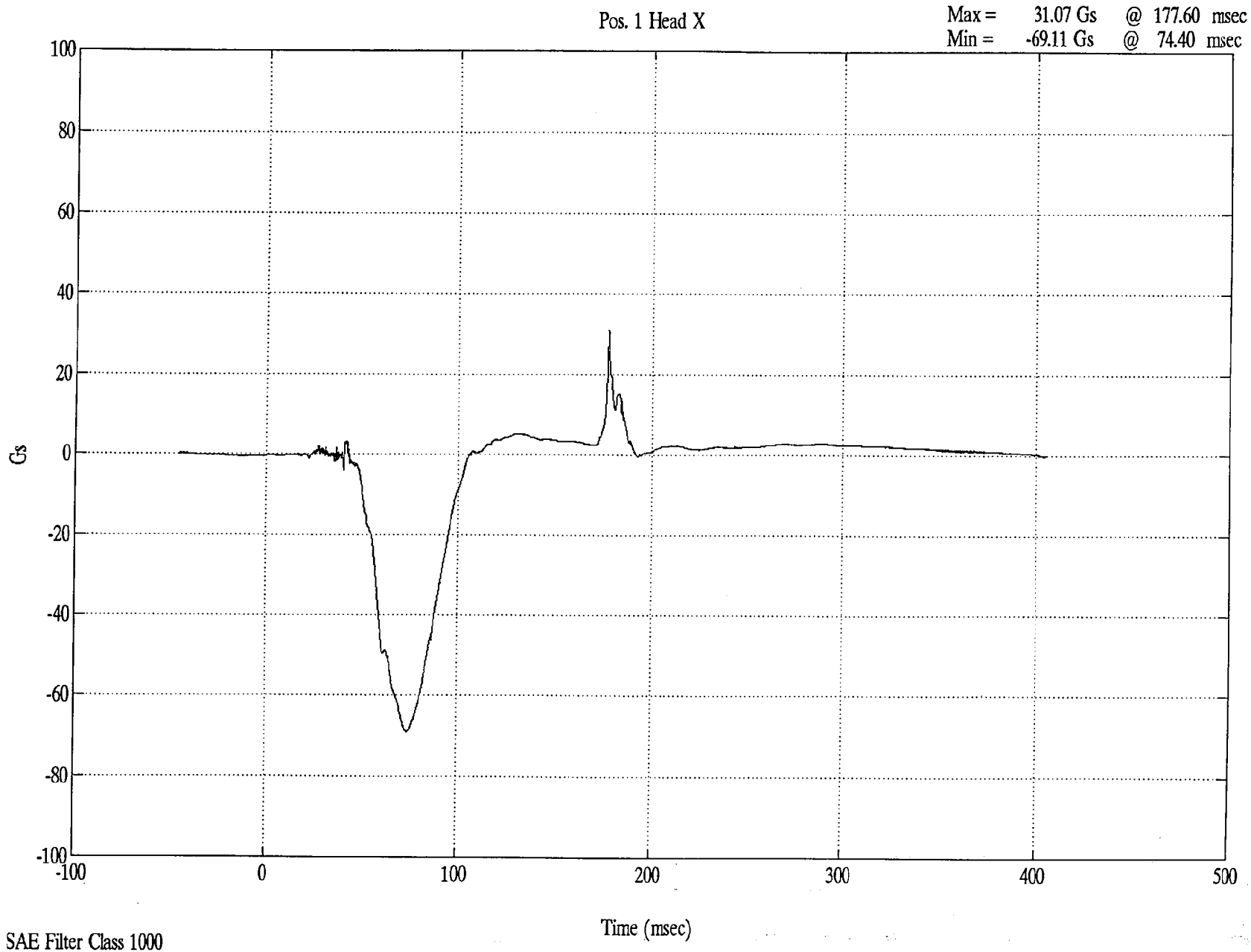
DUMMY DATA

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

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

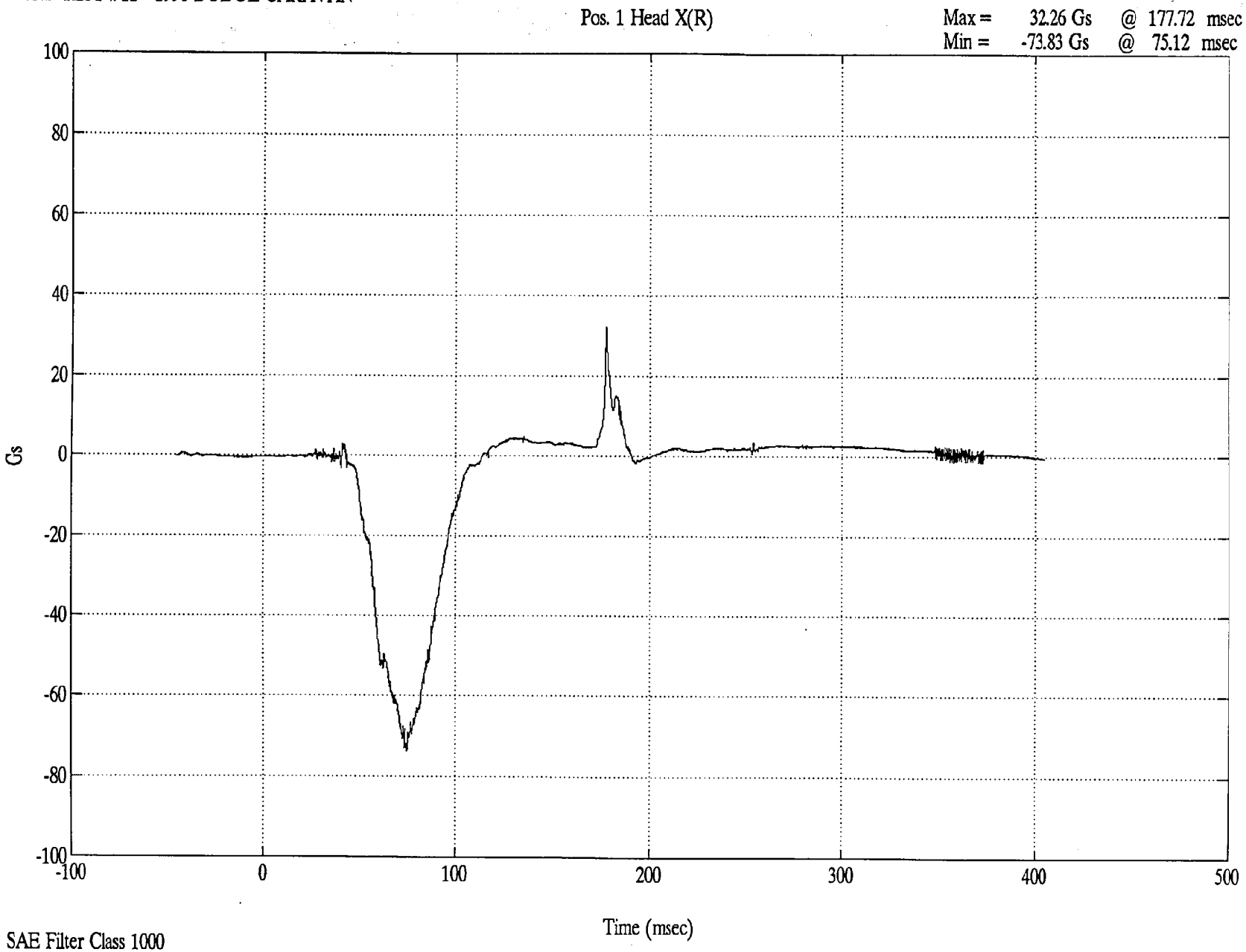
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 1000

8313-11

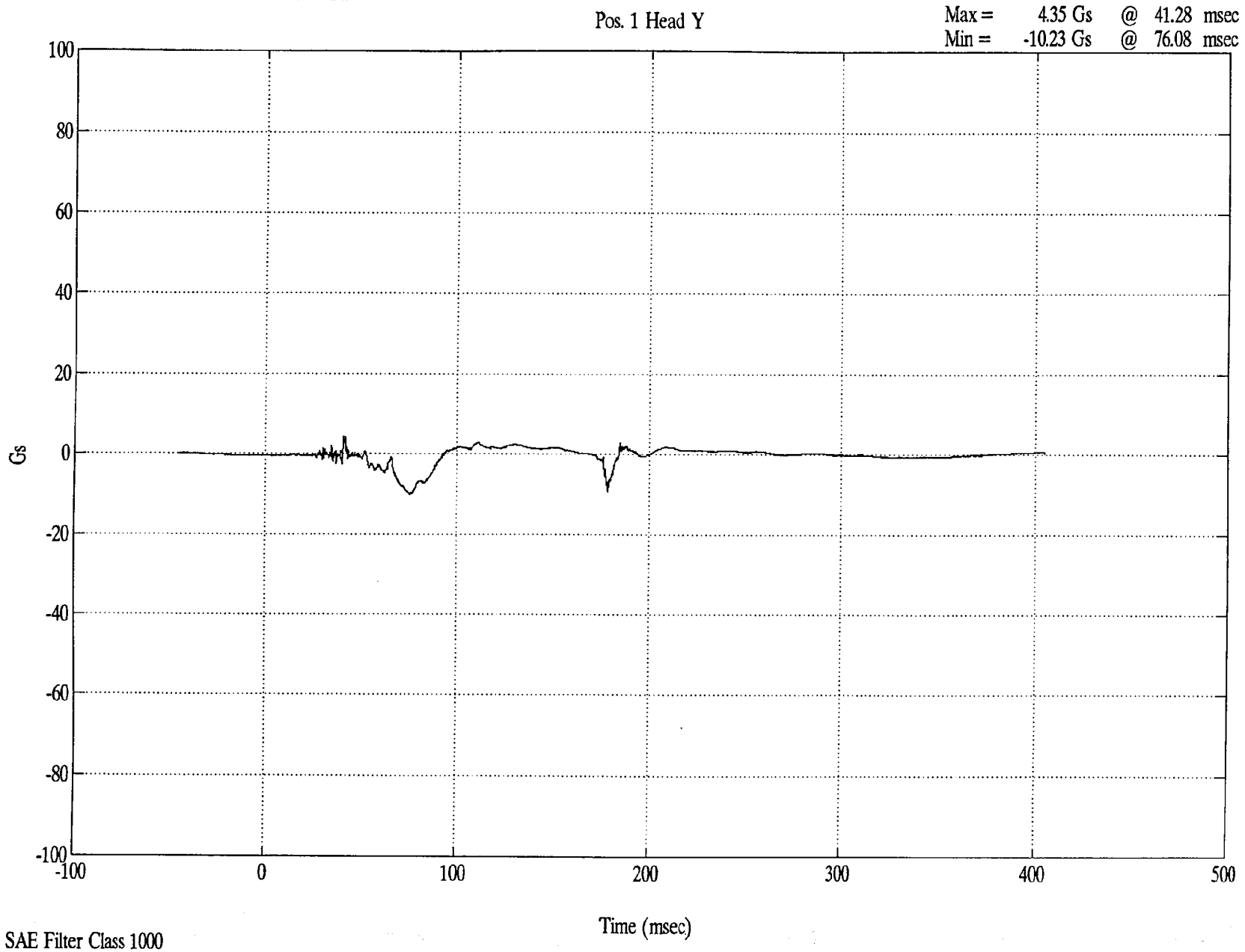
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 1000

8313-11

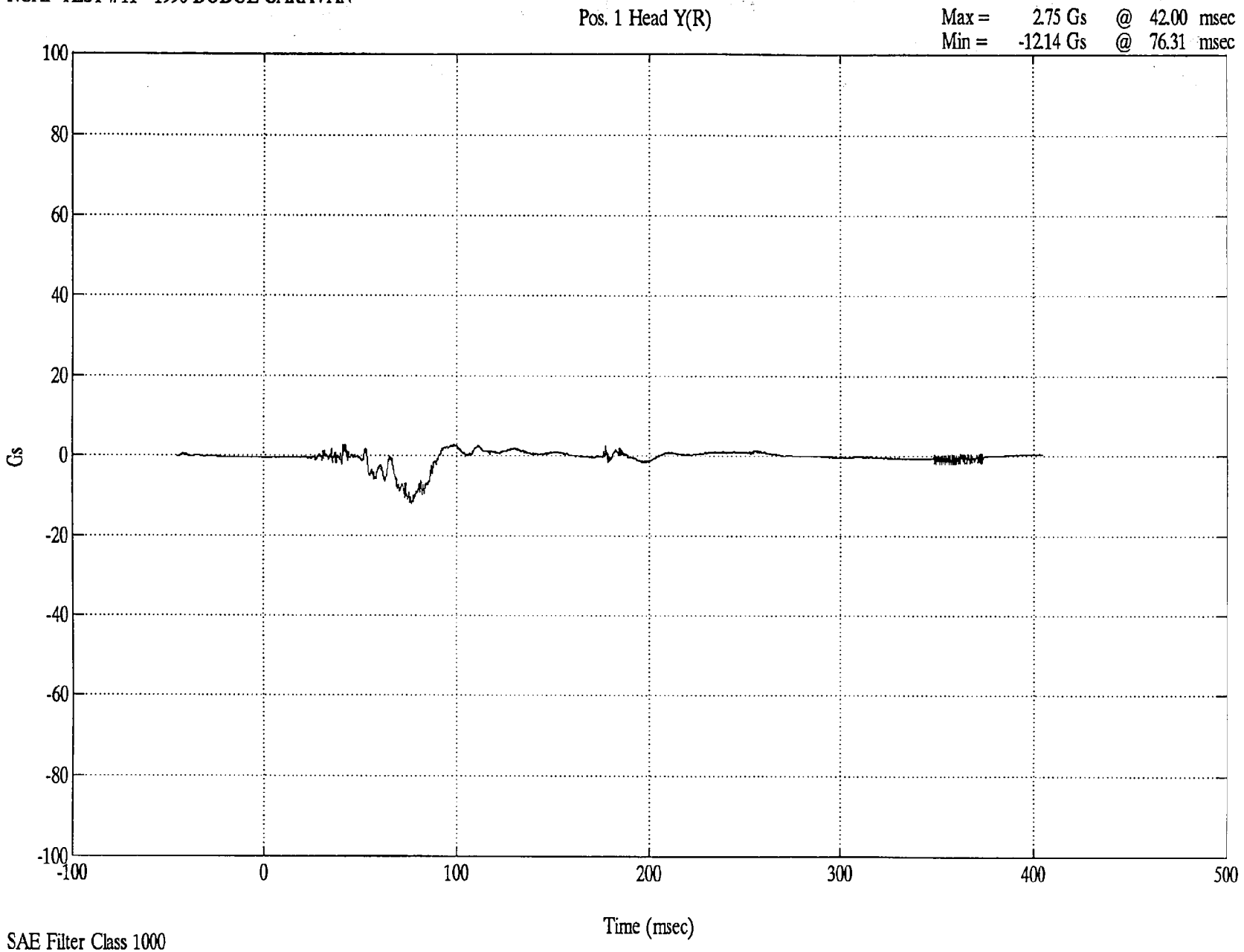
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 1000

8313-11

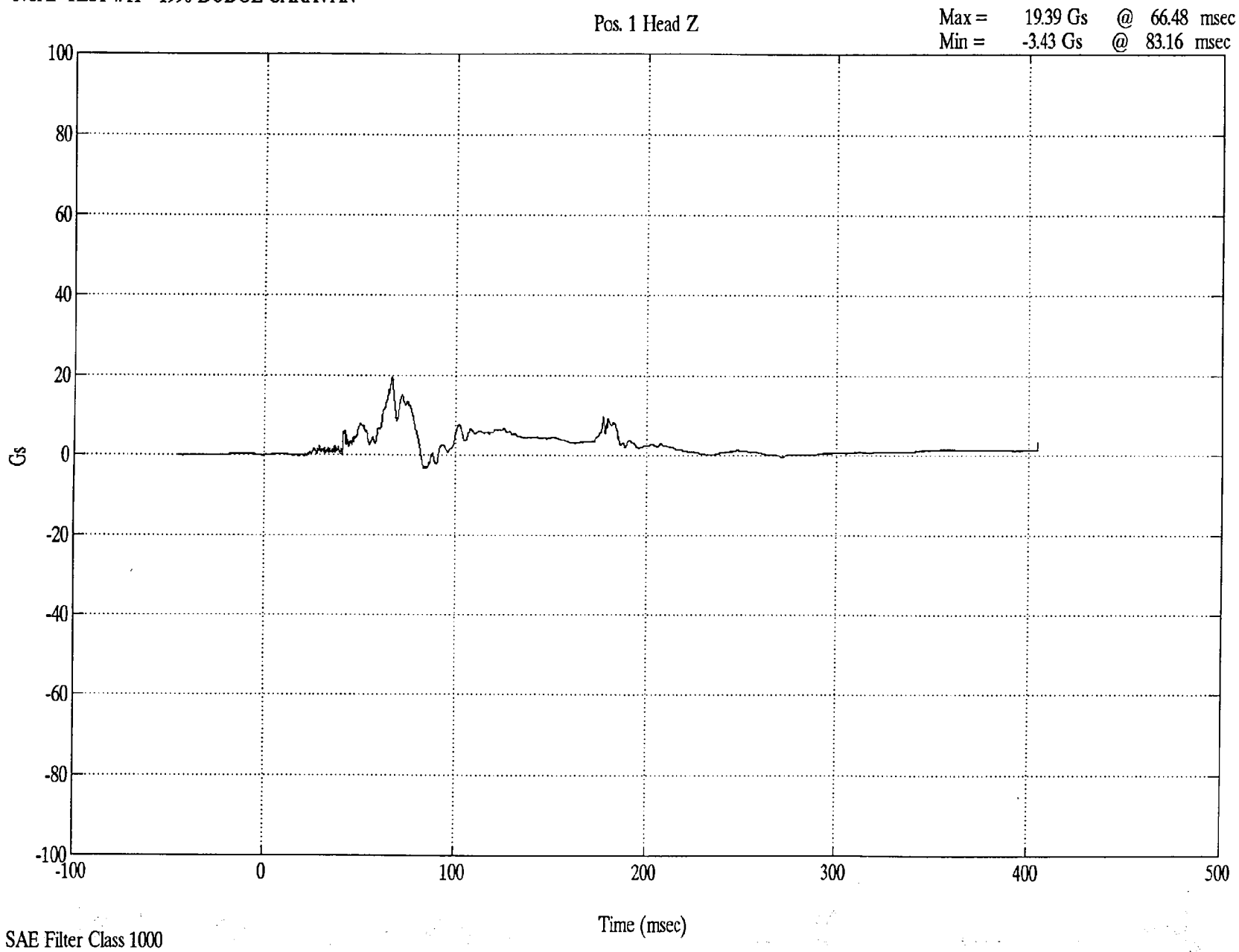
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 1000

8313-11

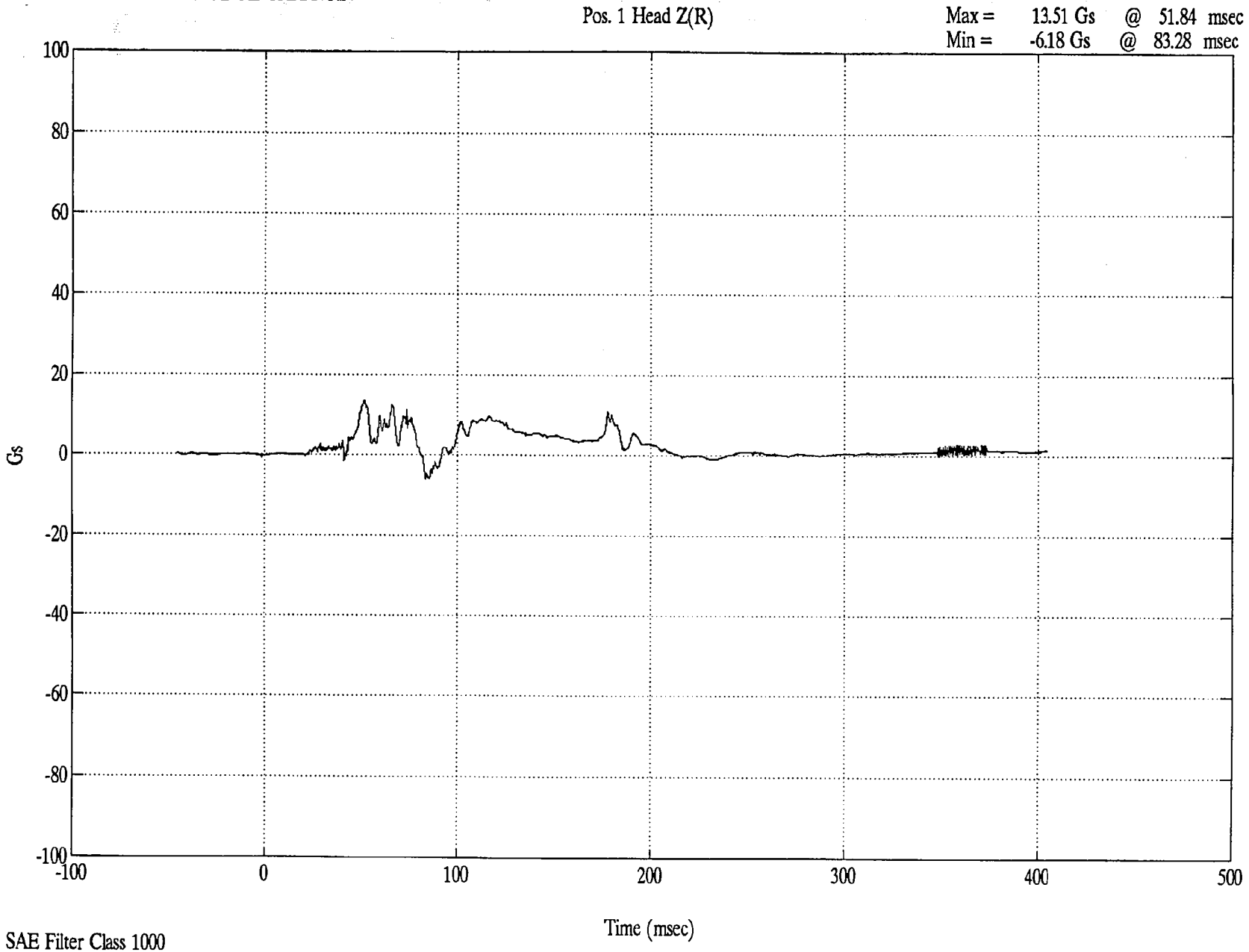
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 1000

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

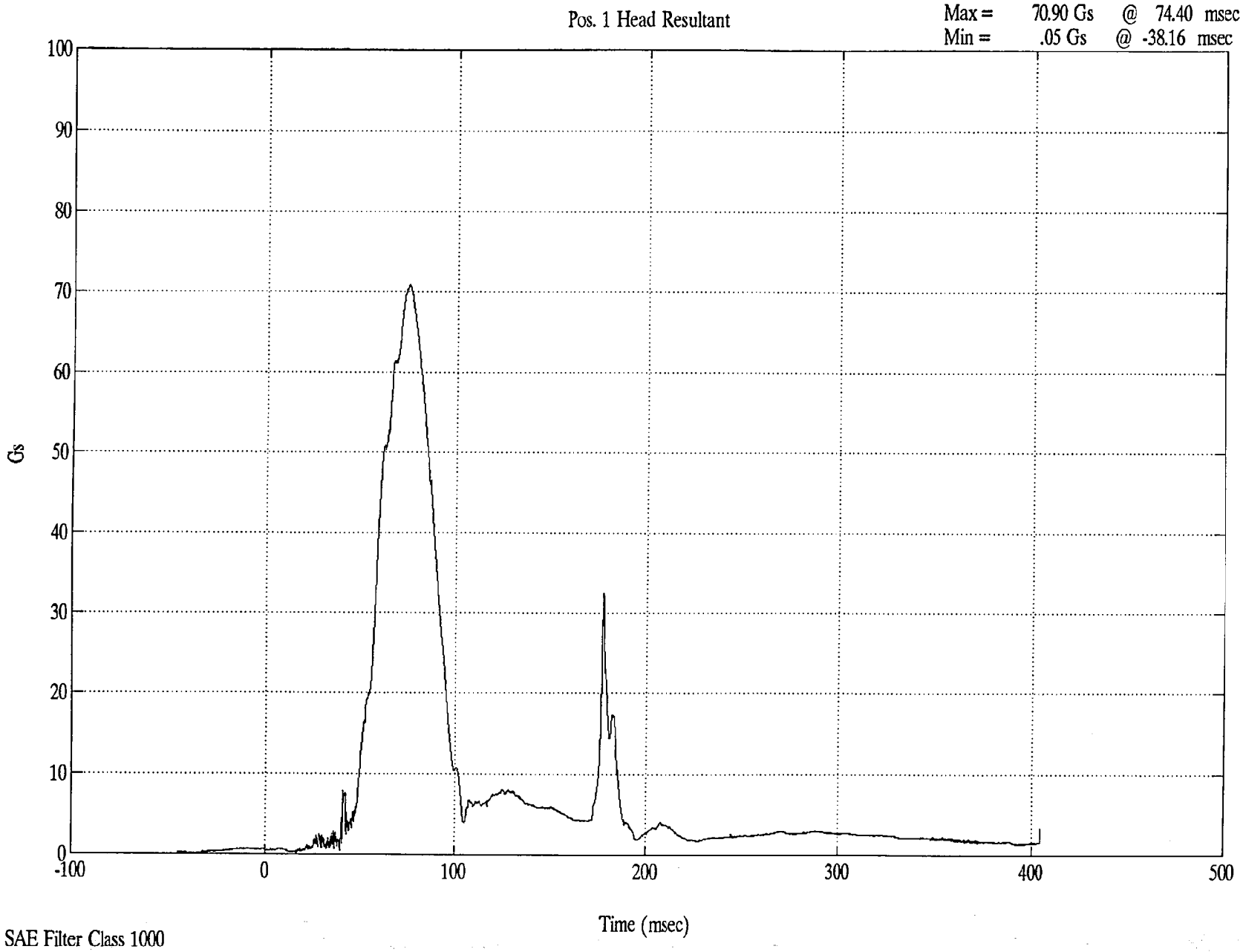


B-9

8313-11

SAE Filter Class 1000

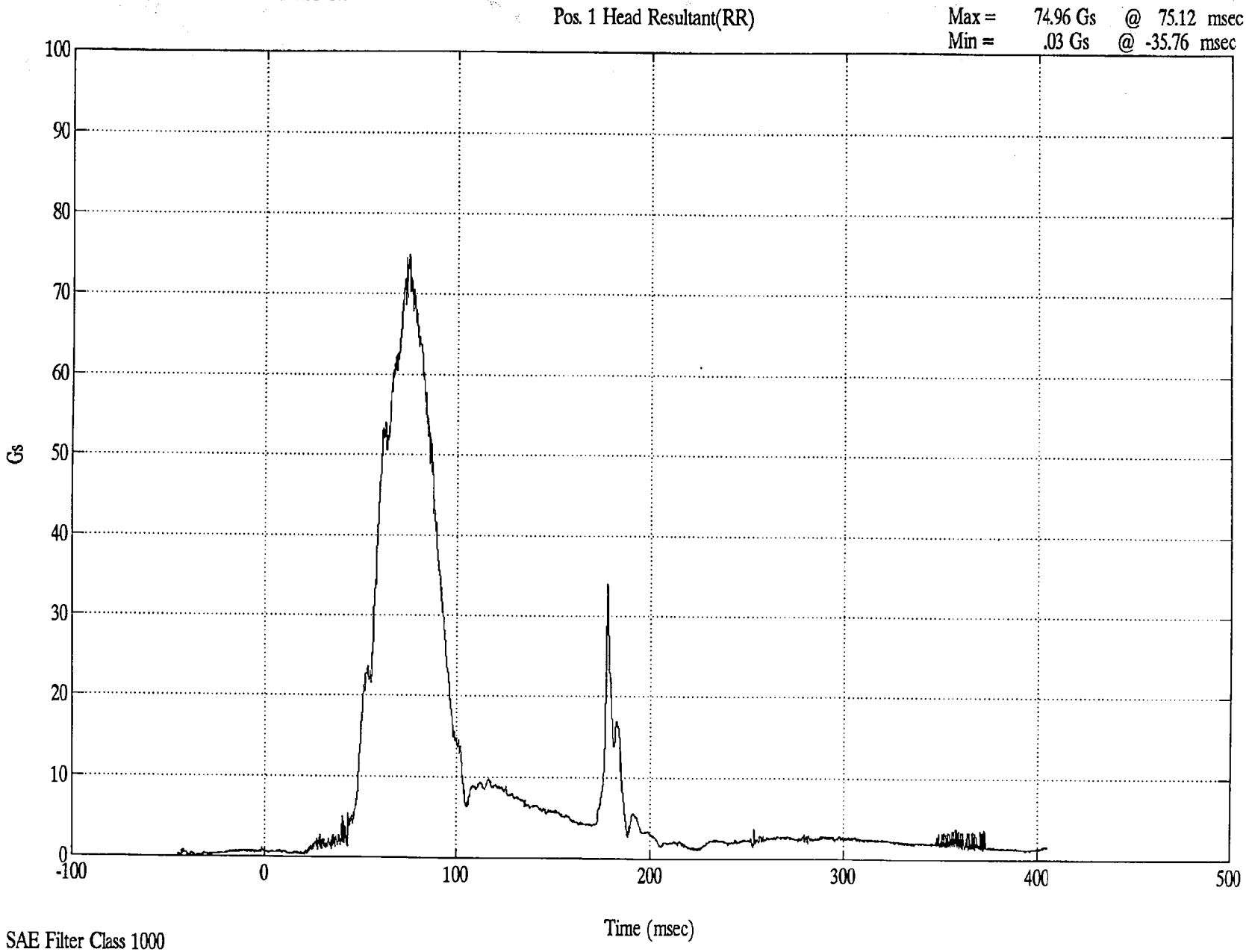
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 1000

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

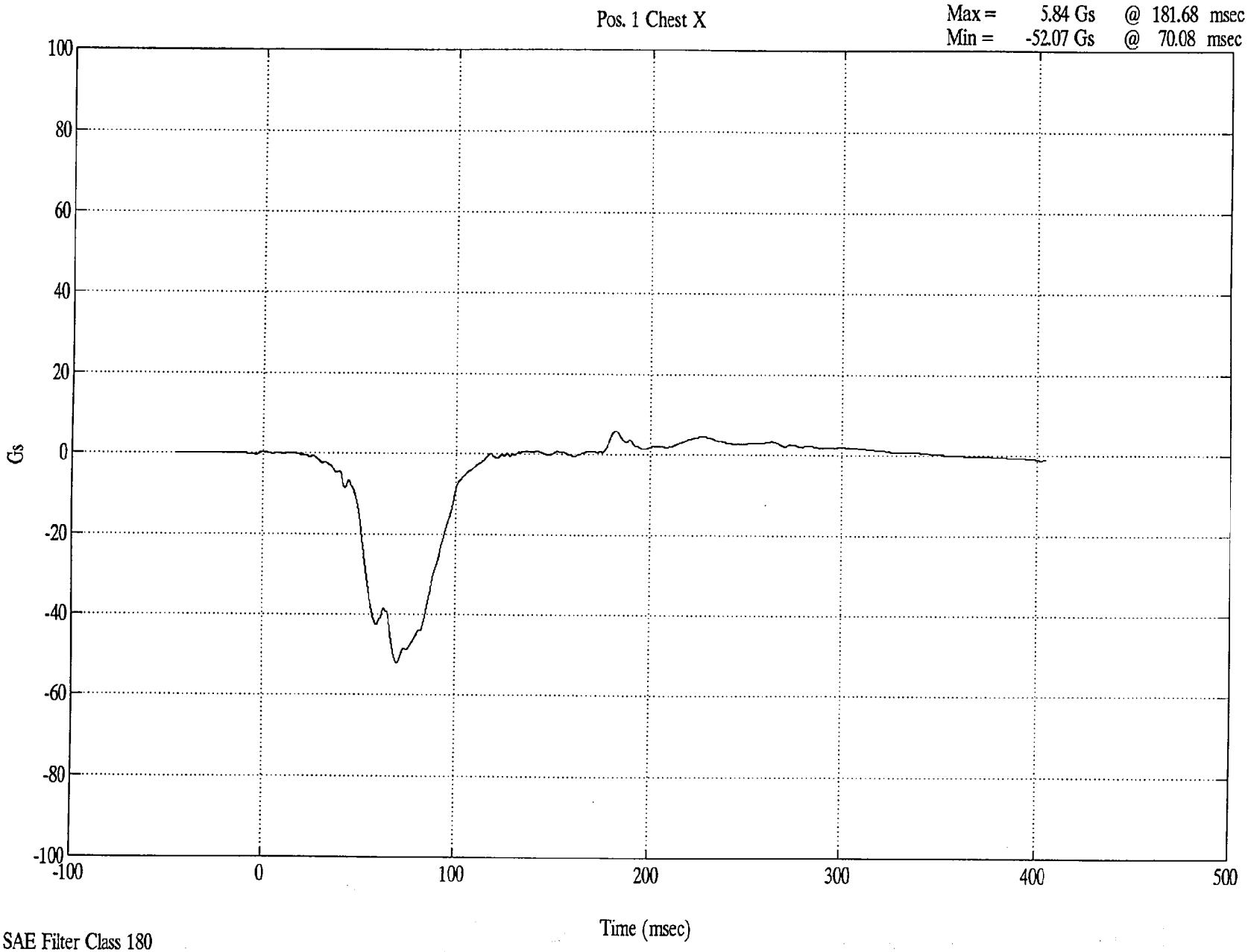


B-11

8313-11

SAE Filter Class 1000

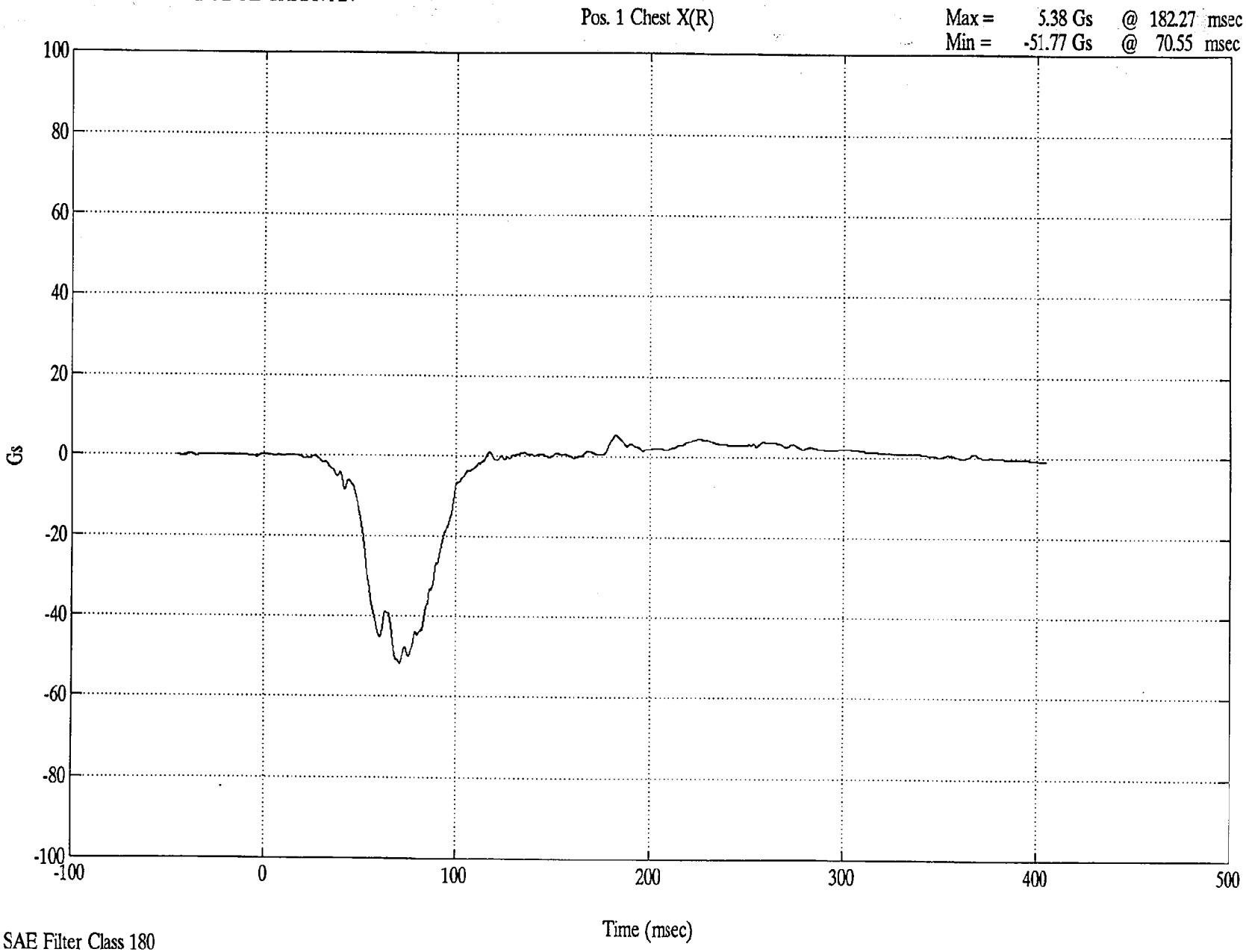
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

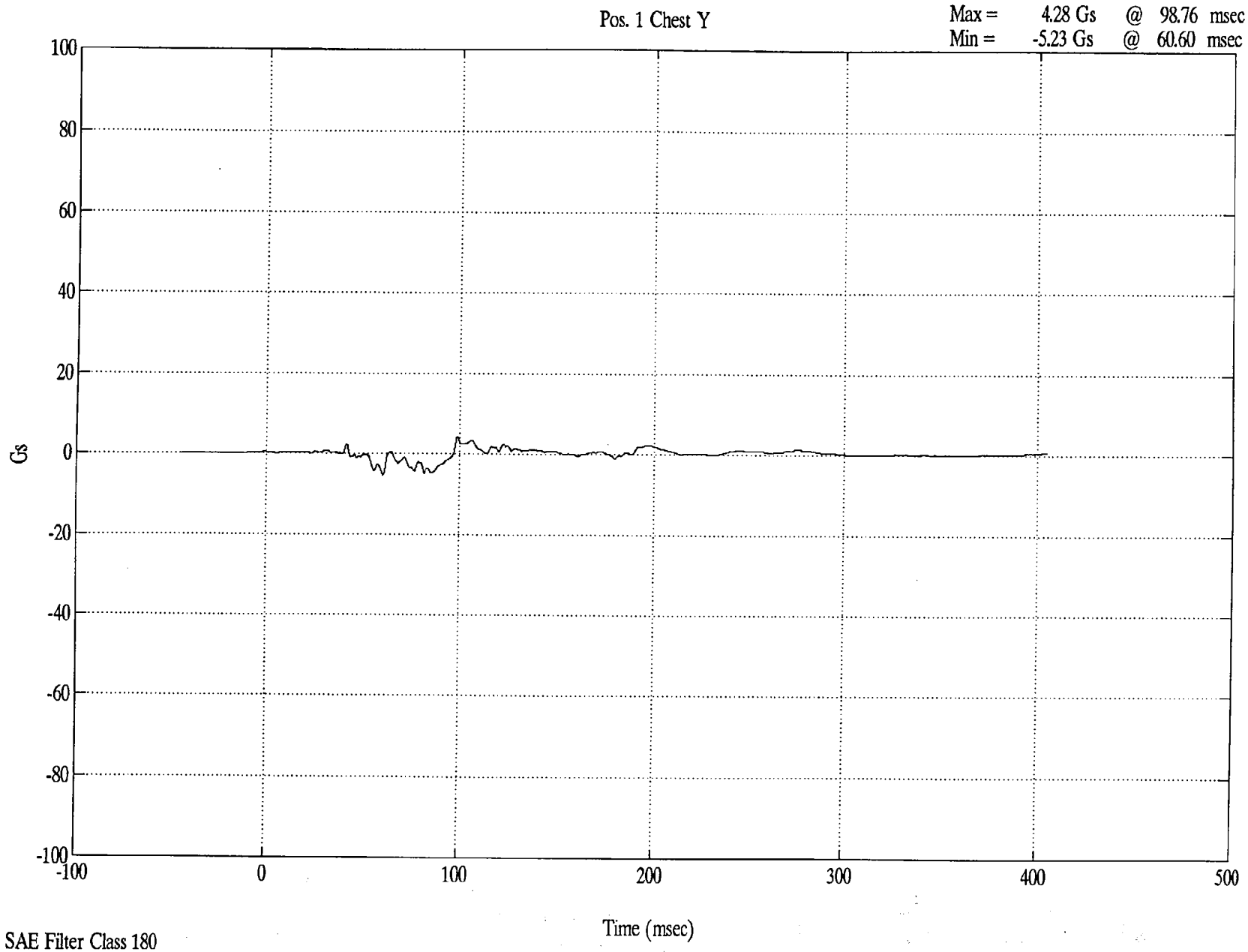


B-13

8313-11

SAE Filter Class 180

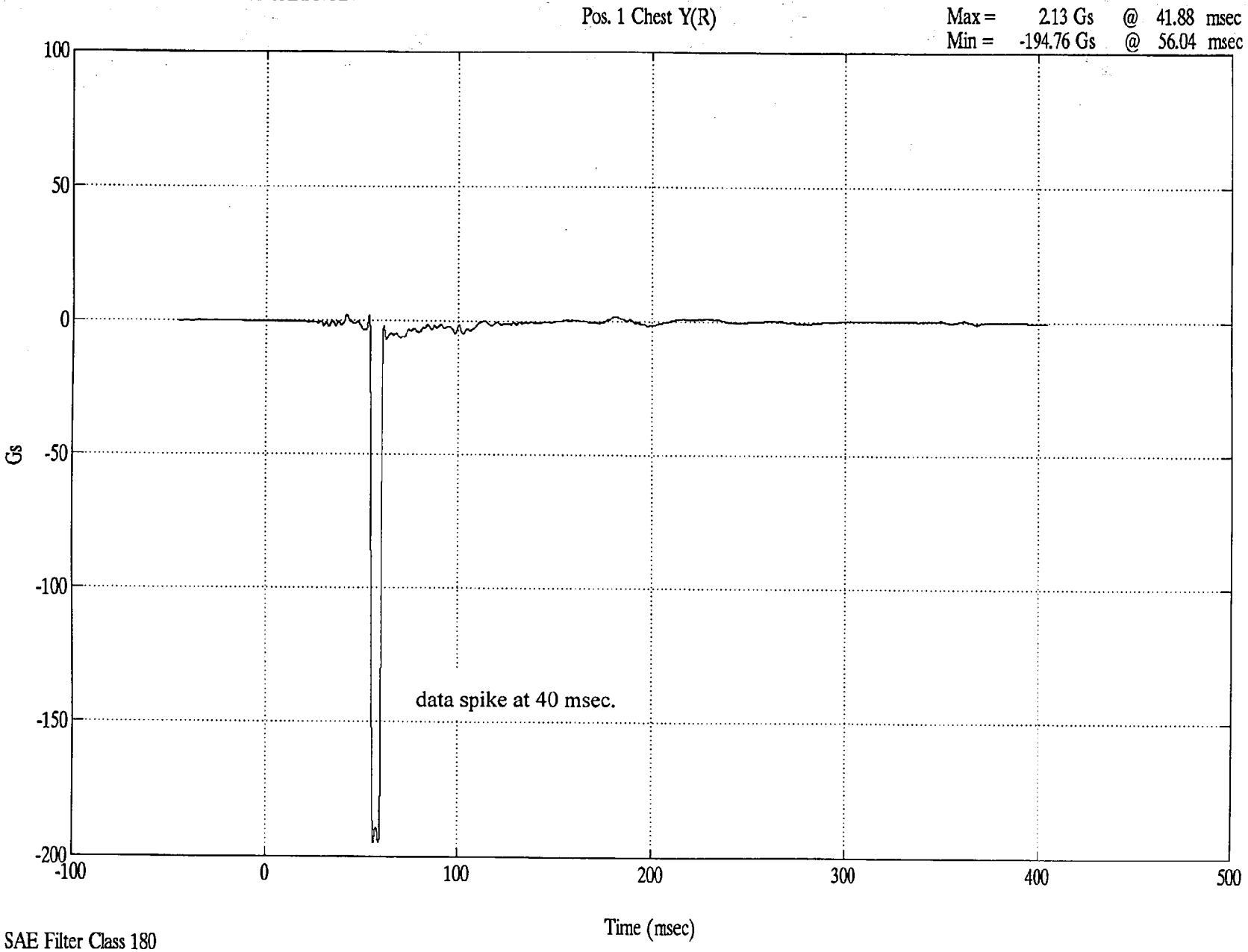
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

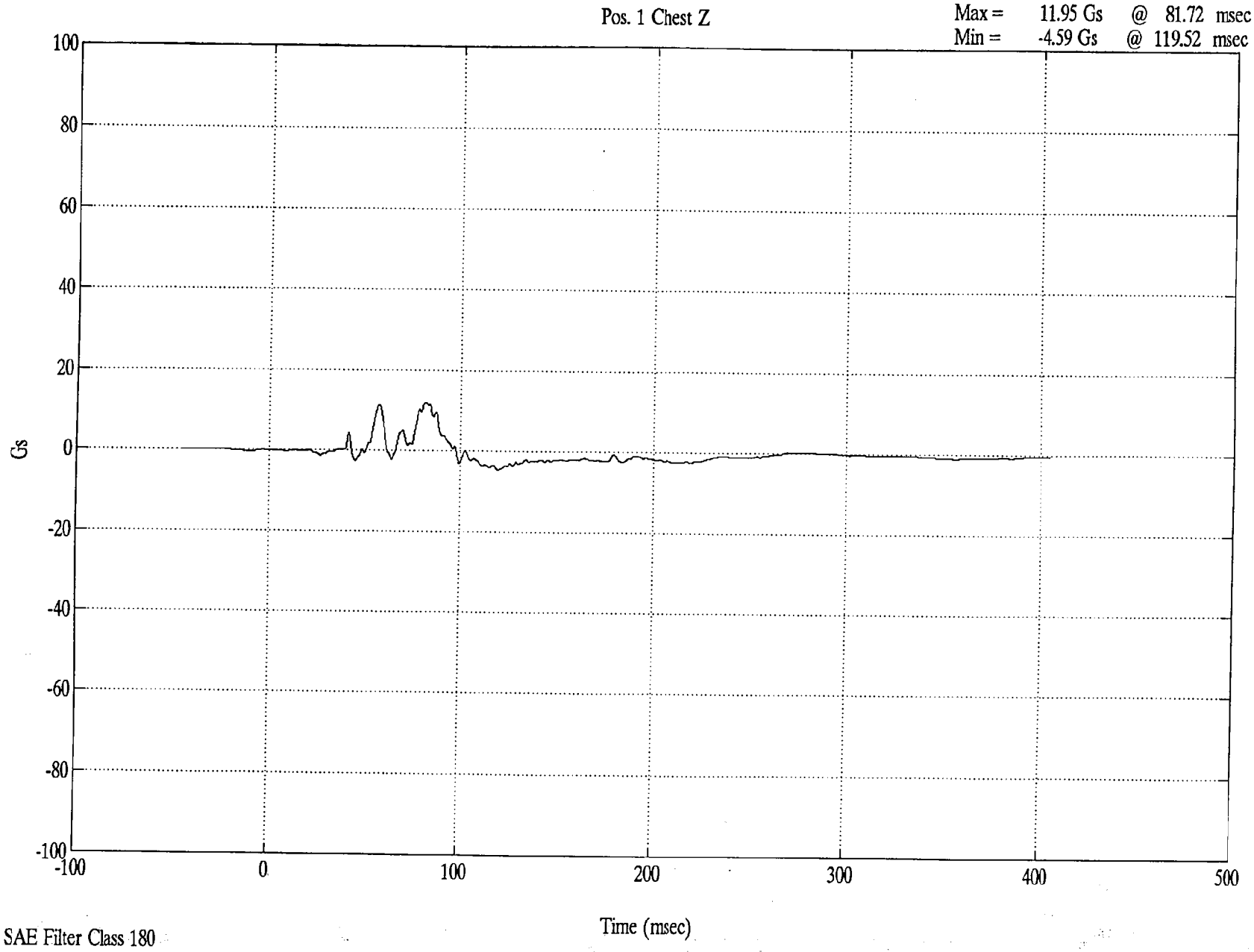


B-15

8313-11

SAE Filter Class 180

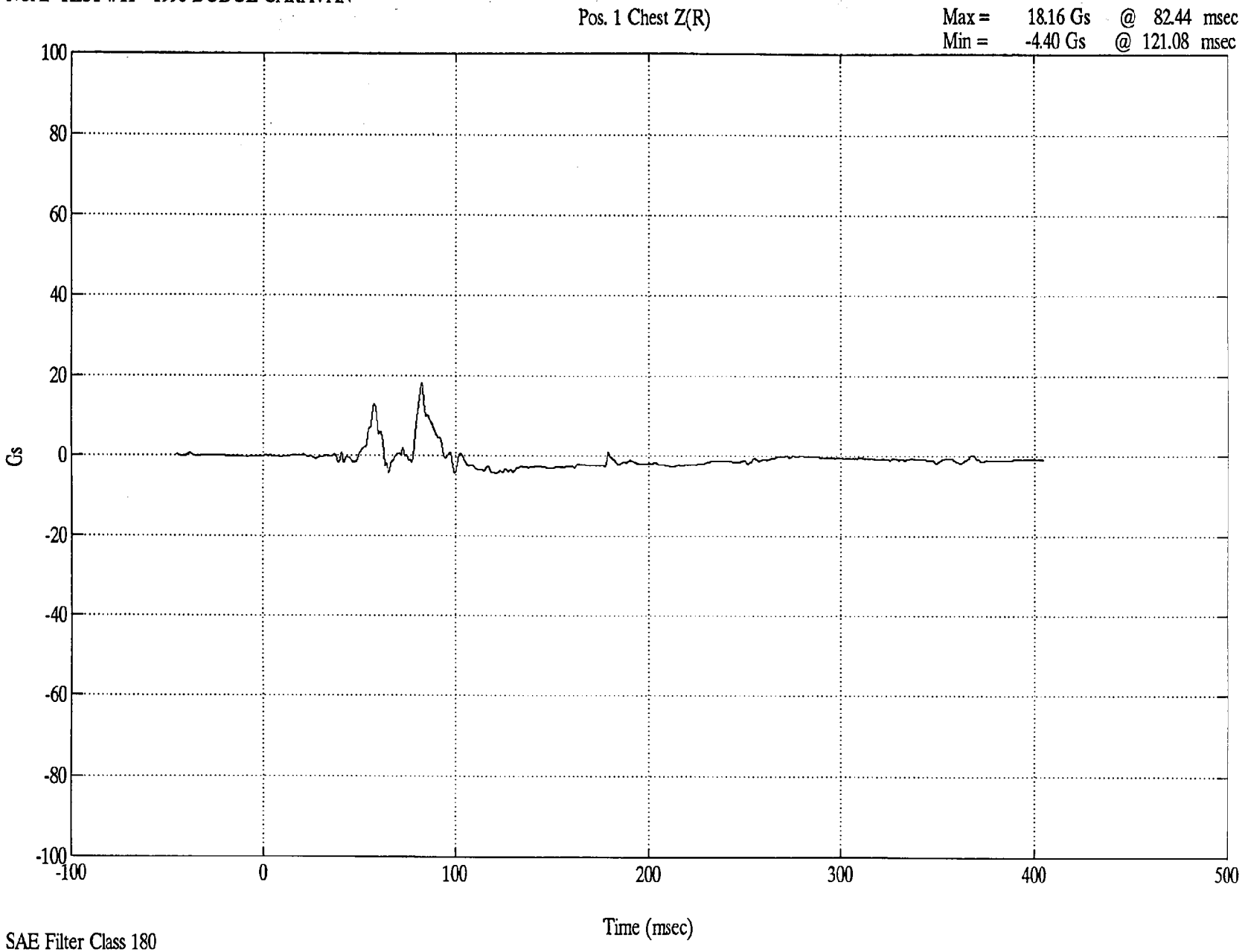
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

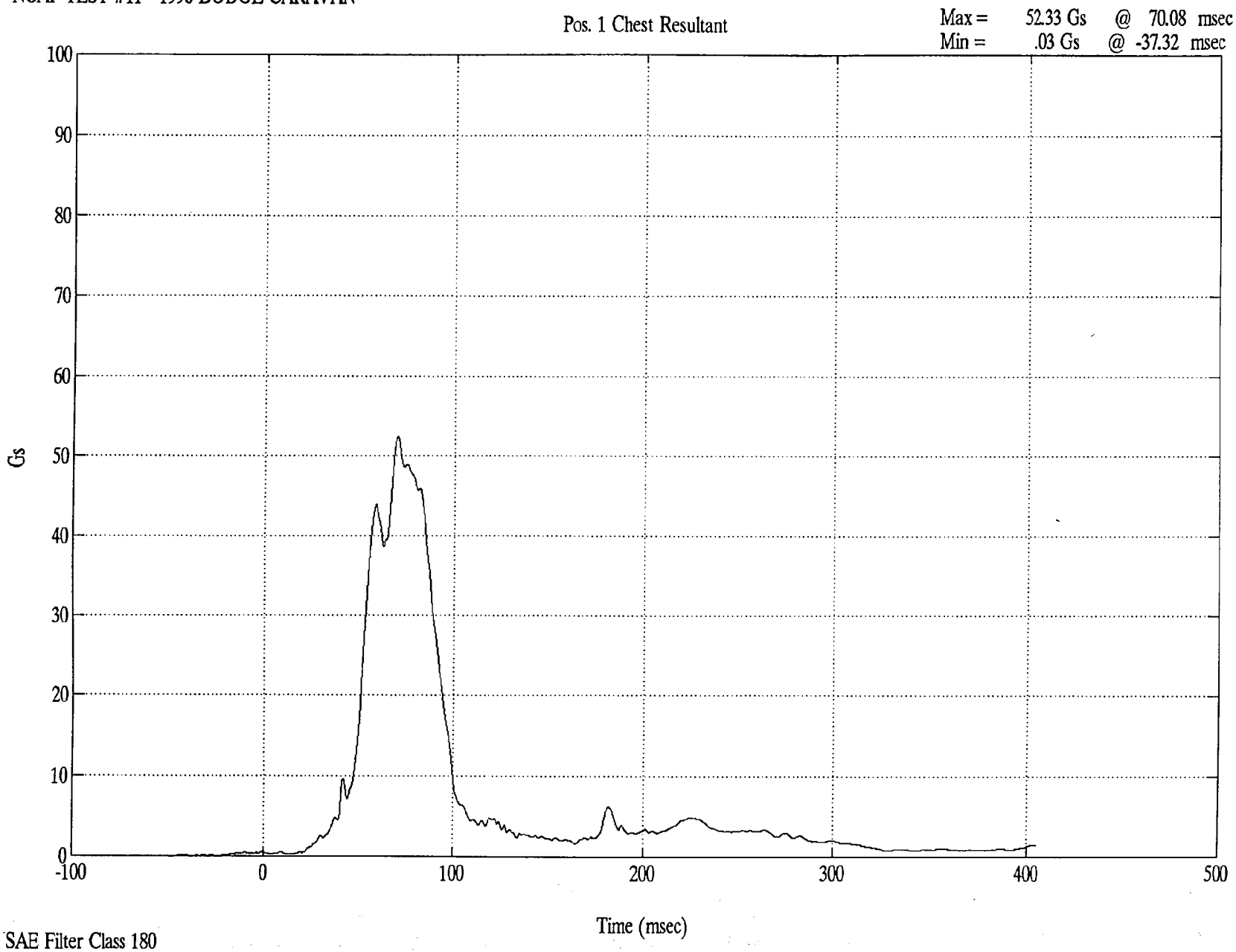


B-17

8313-11

SAE Filter Class 180

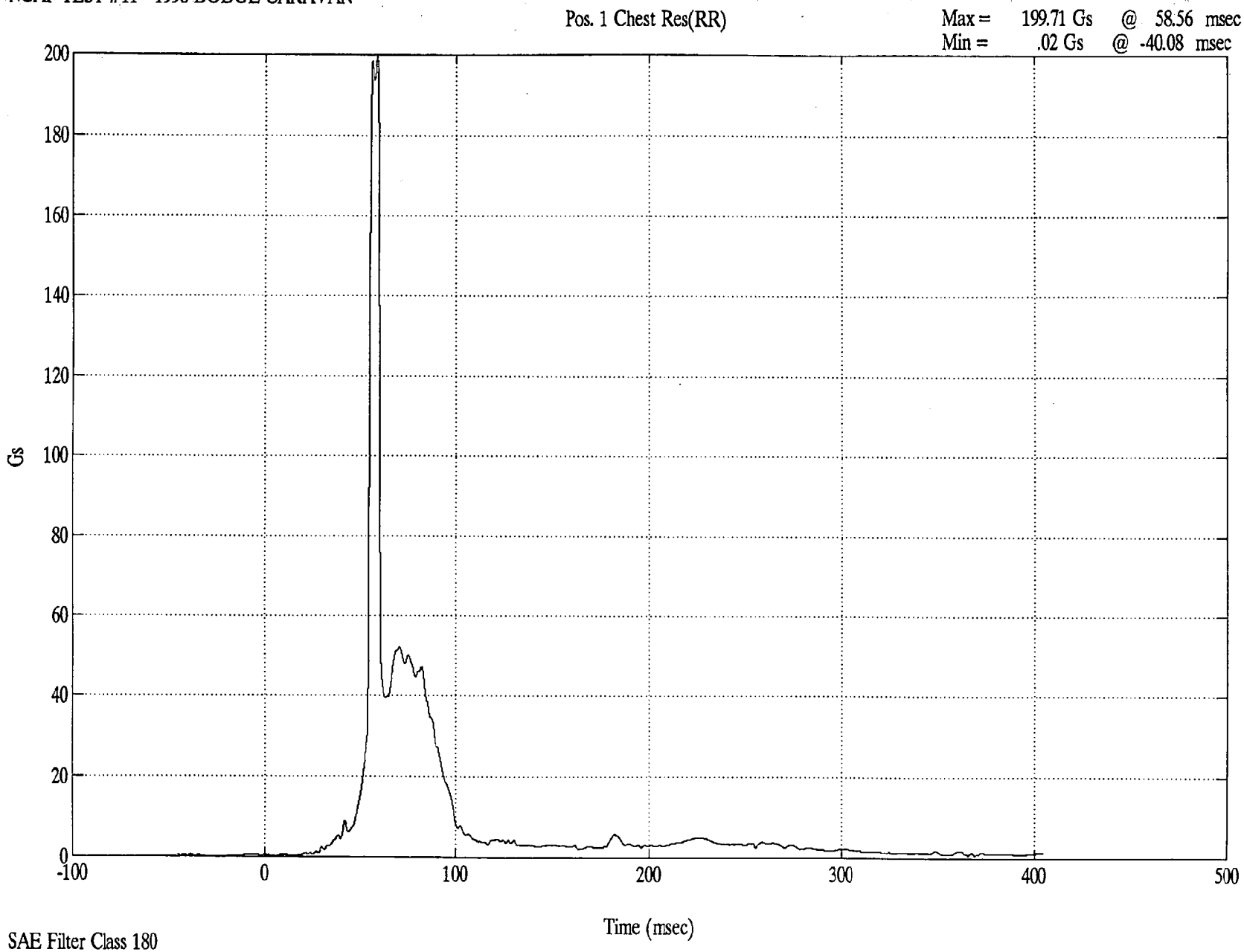
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

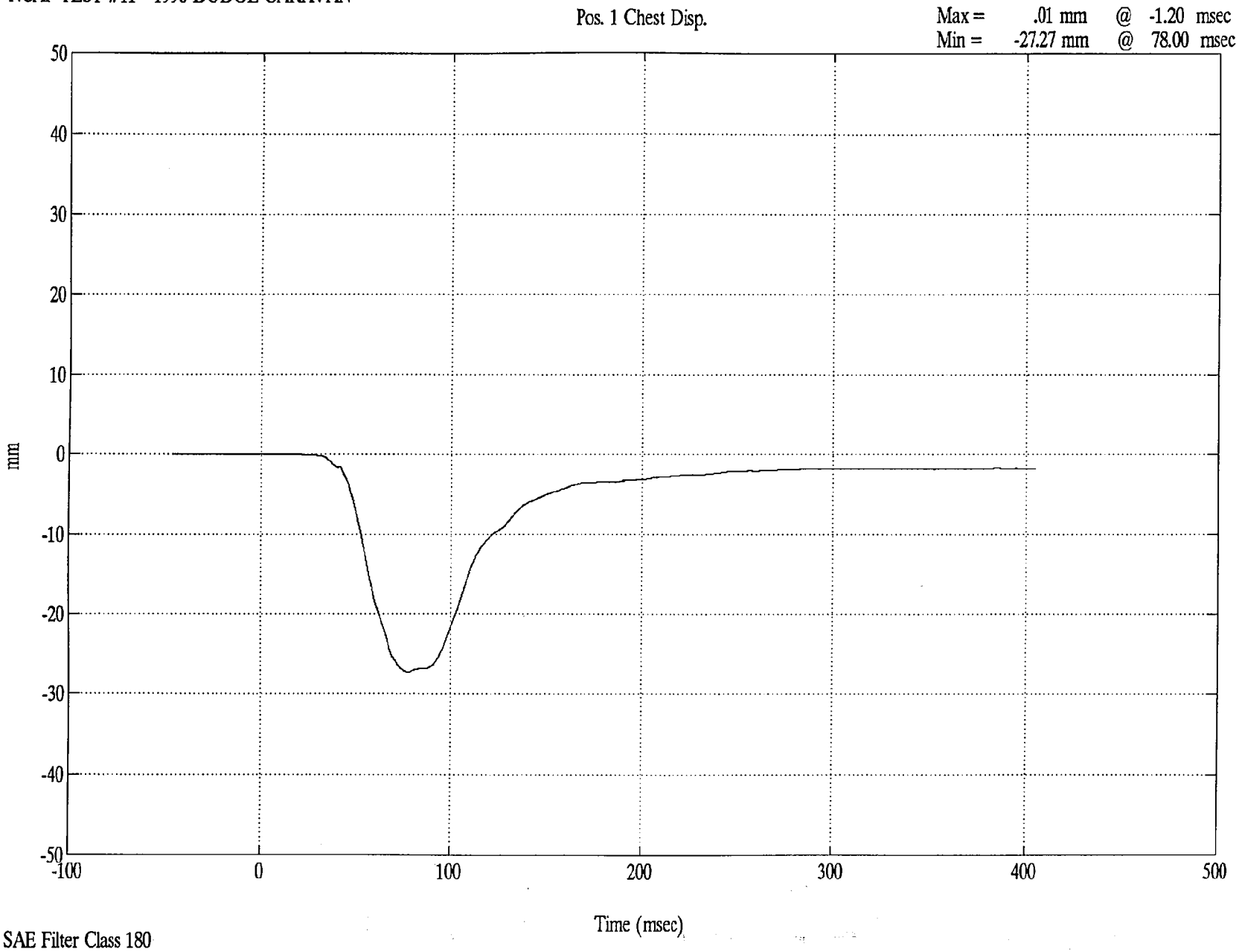
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

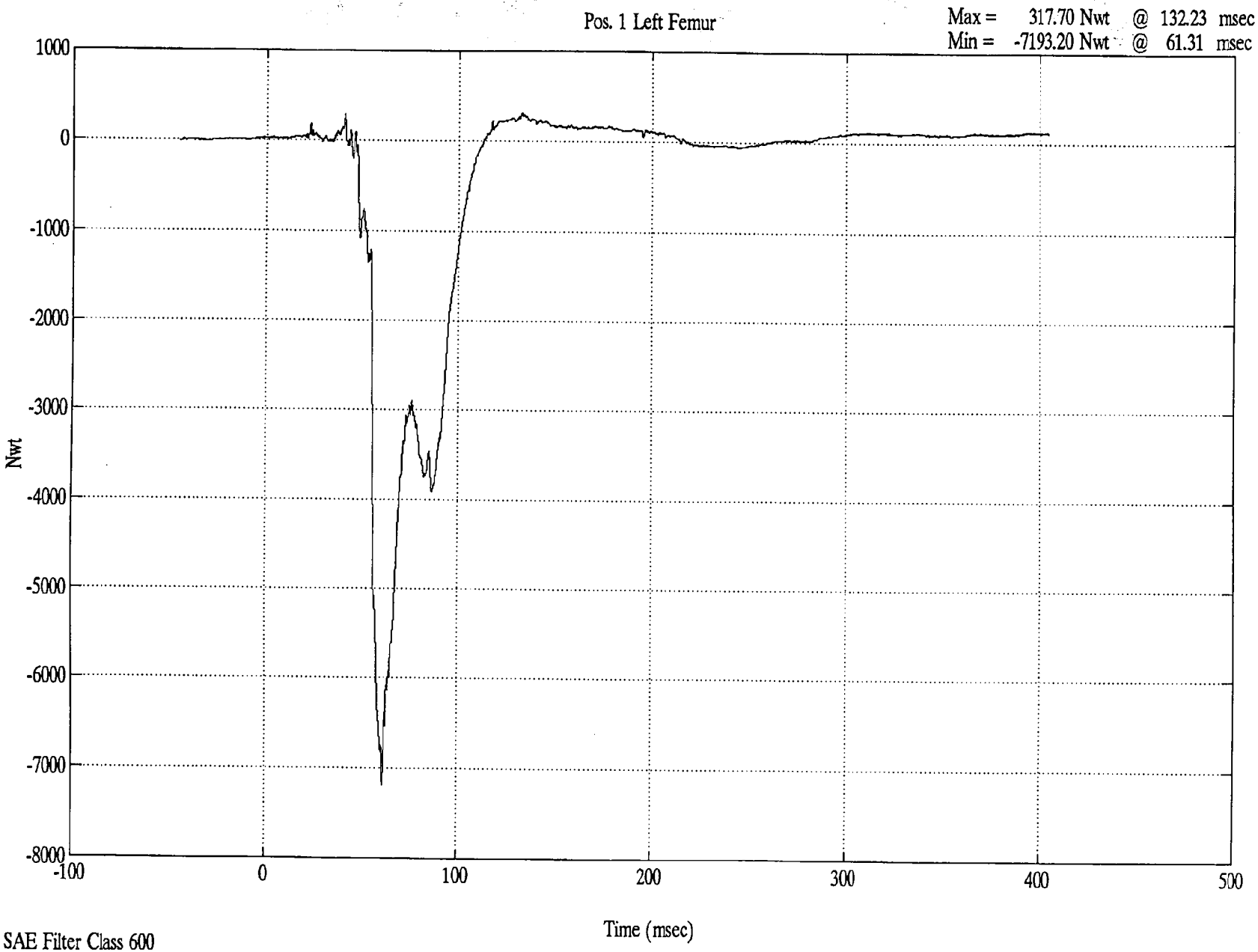
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

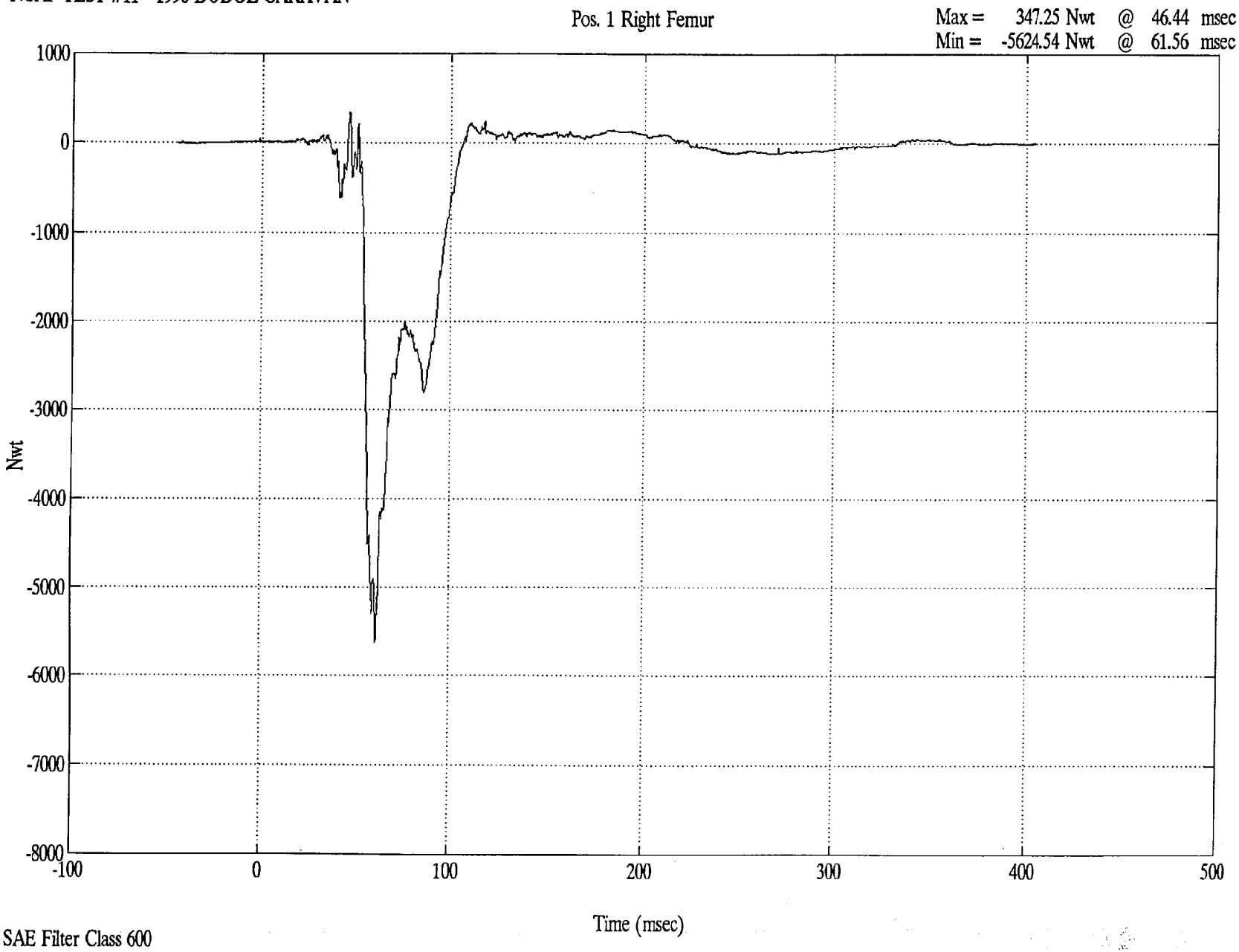
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 600

8313-11

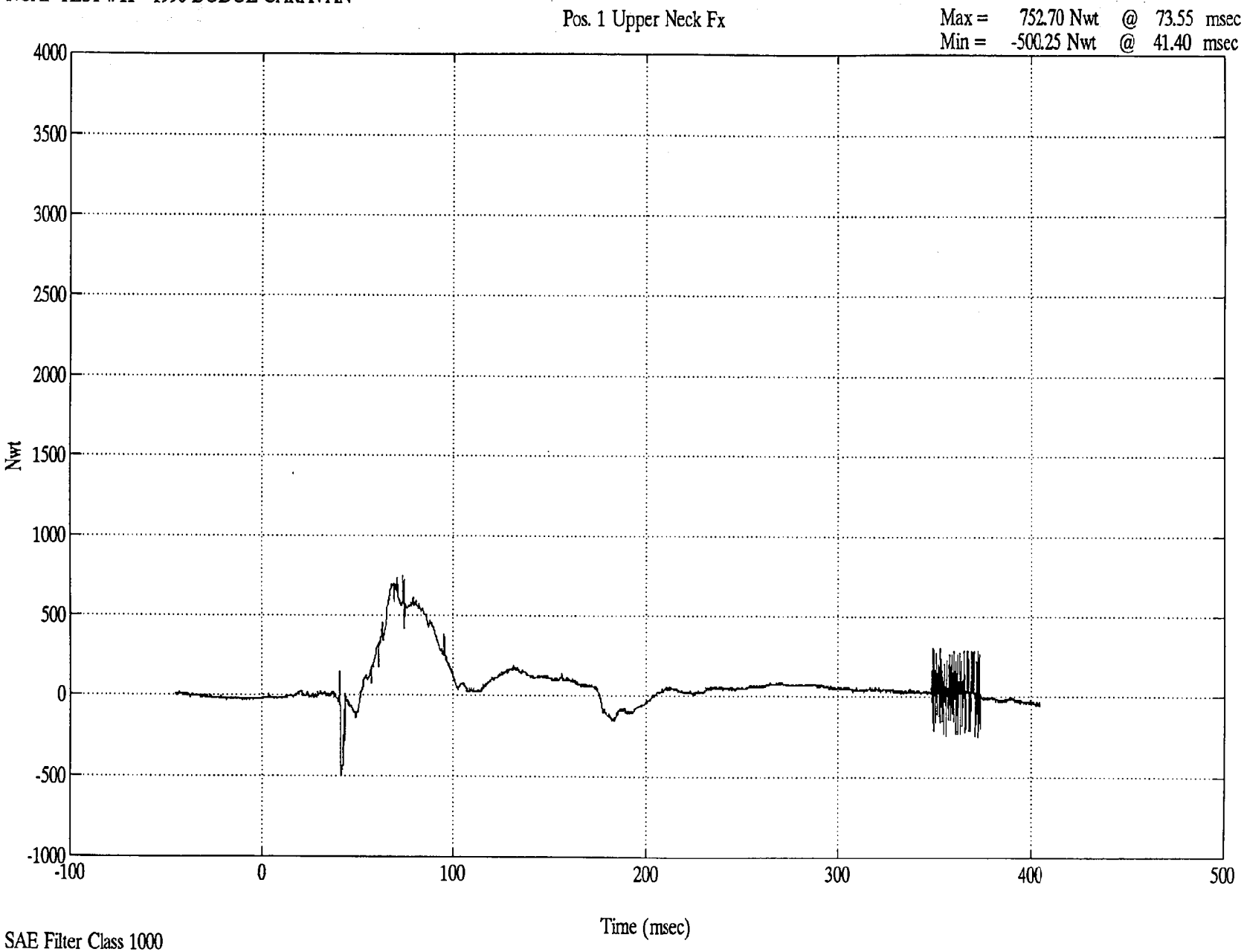
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 600

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 1000

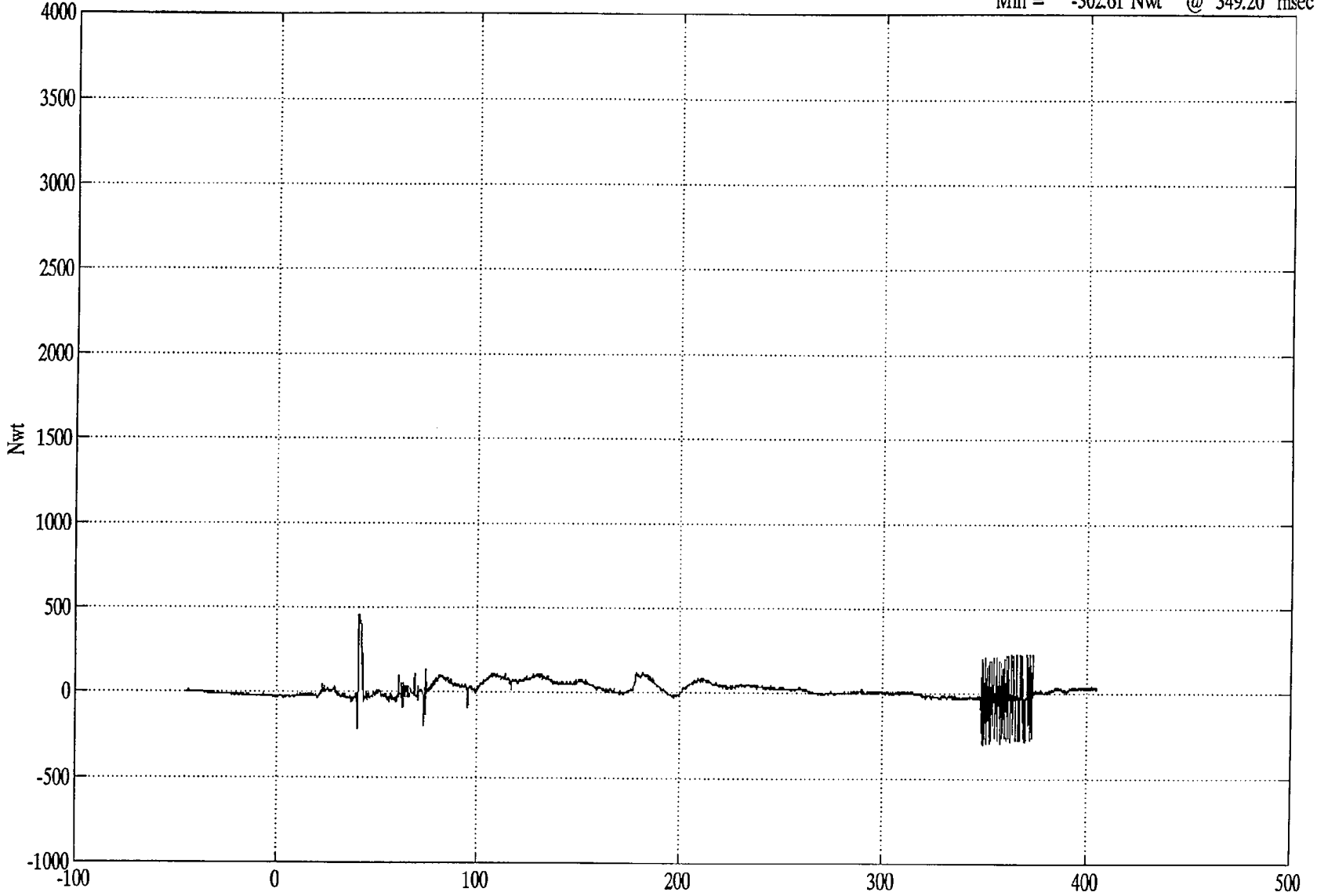
B-23

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

Pos. 1 Upper Neck Fy

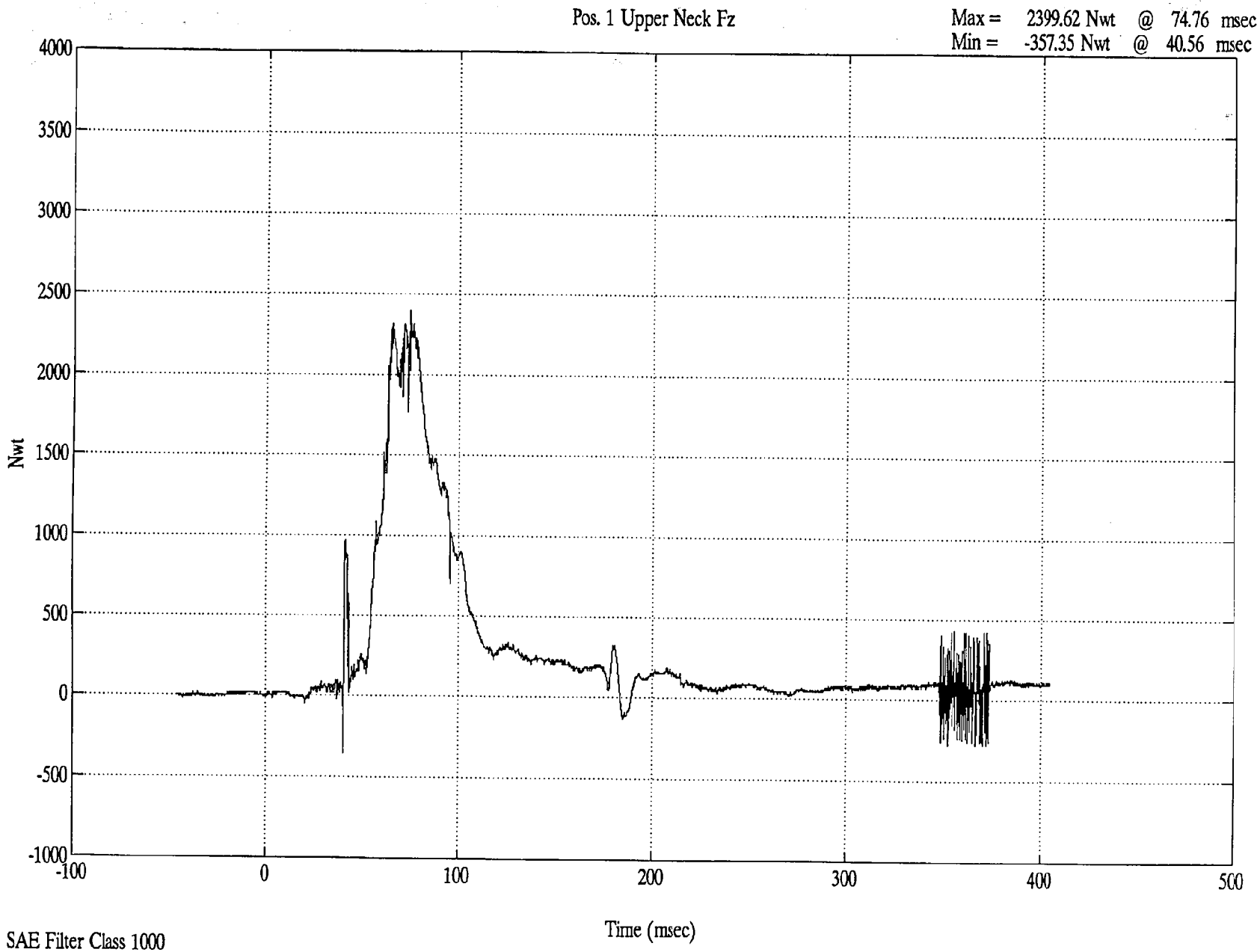
Max = 453.96 Nwt @ 41.40 msec
Min = -302.61 Nwt @ 349.20 msec



SAE Filter Class 1000

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

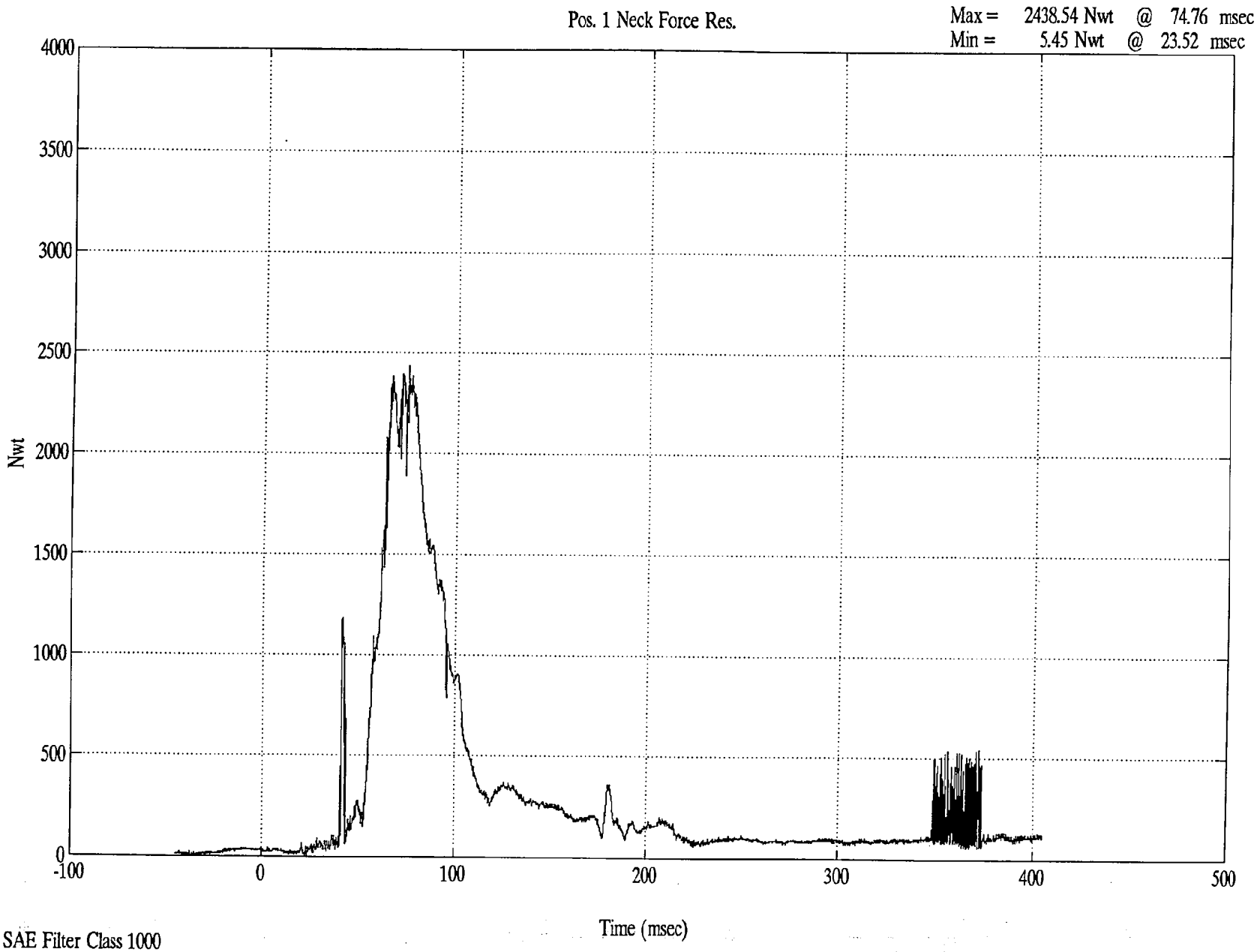


B-25

8313-11

SAE Filter Class 1000

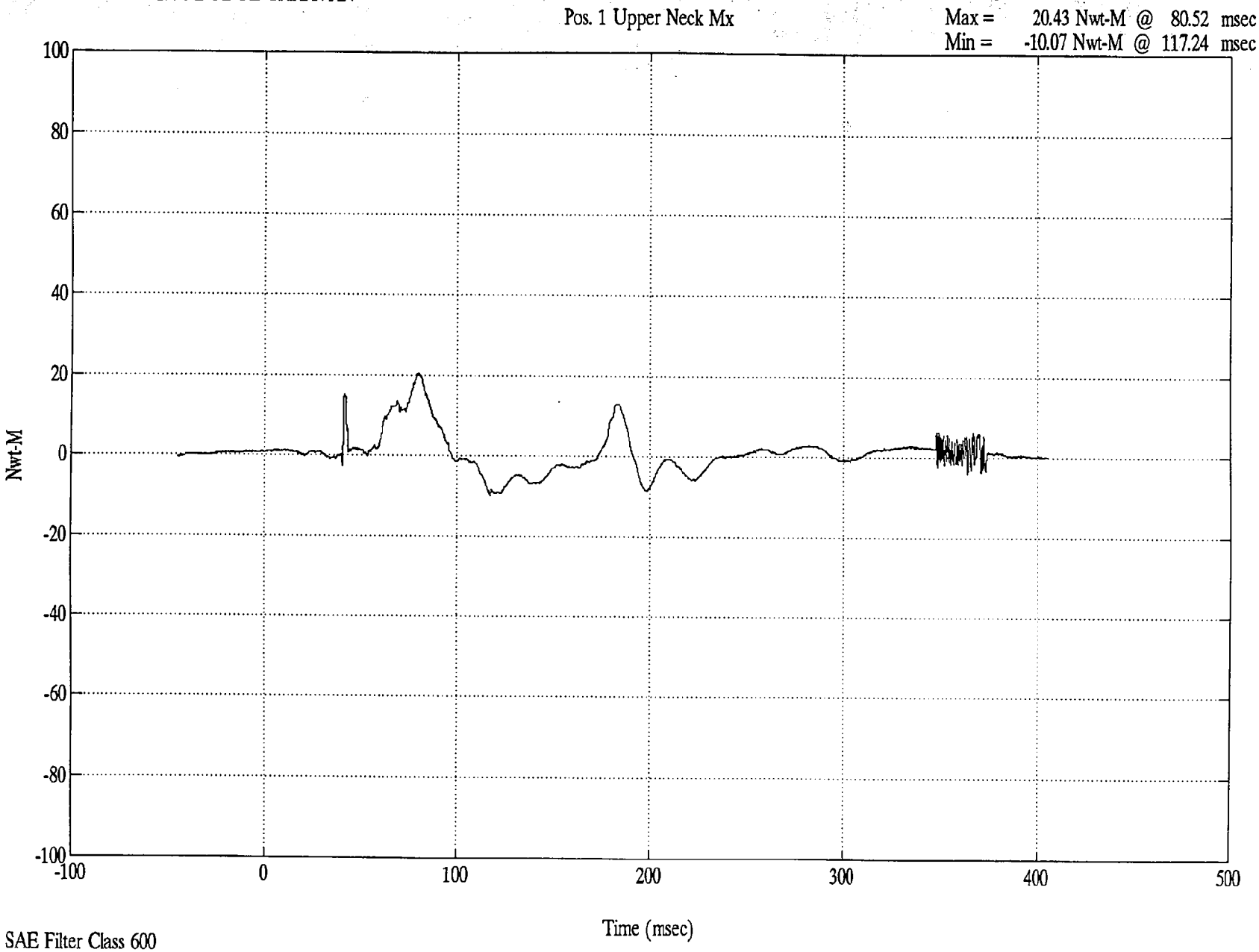
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 1000

8313-11

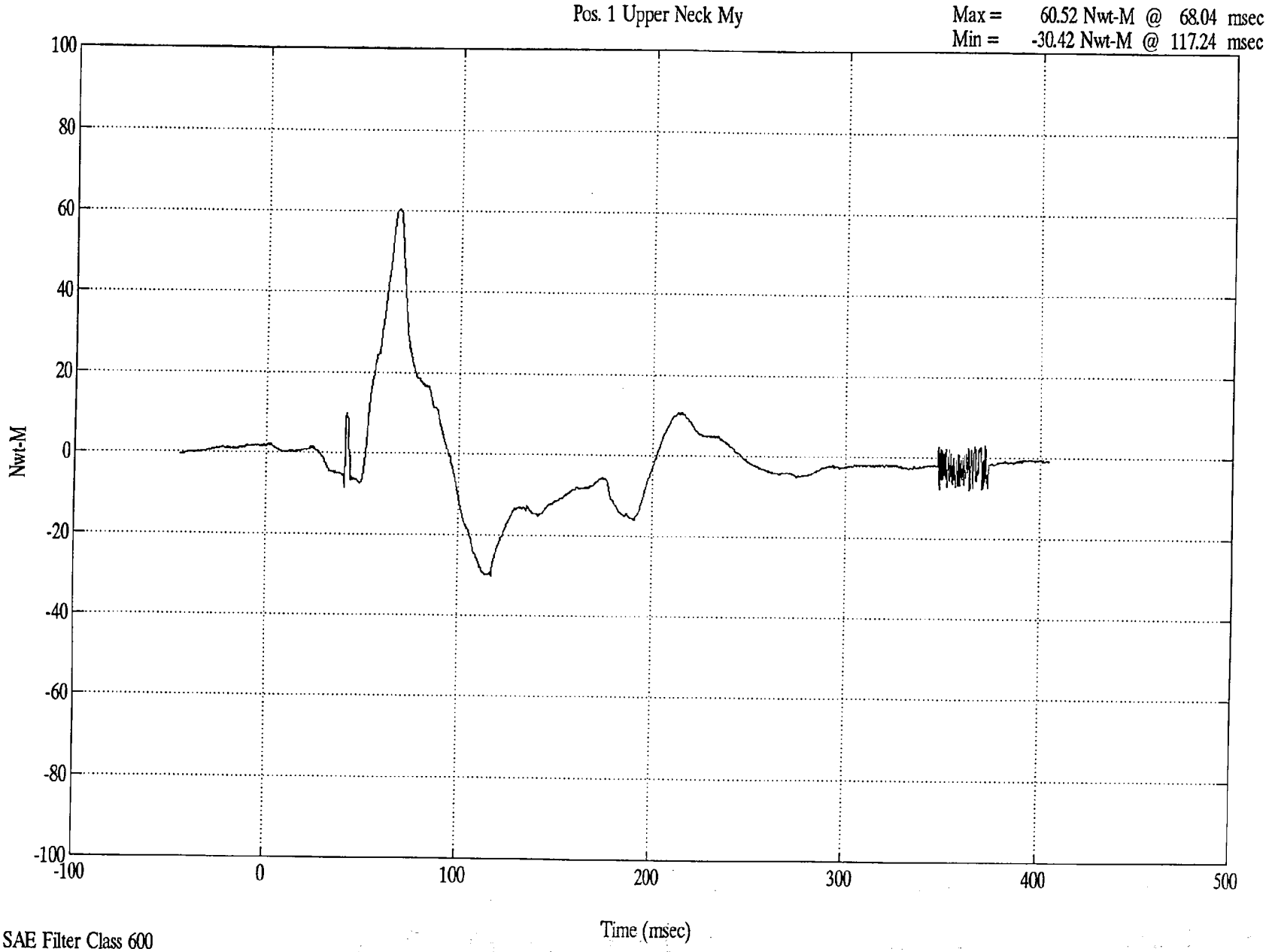
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 600

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

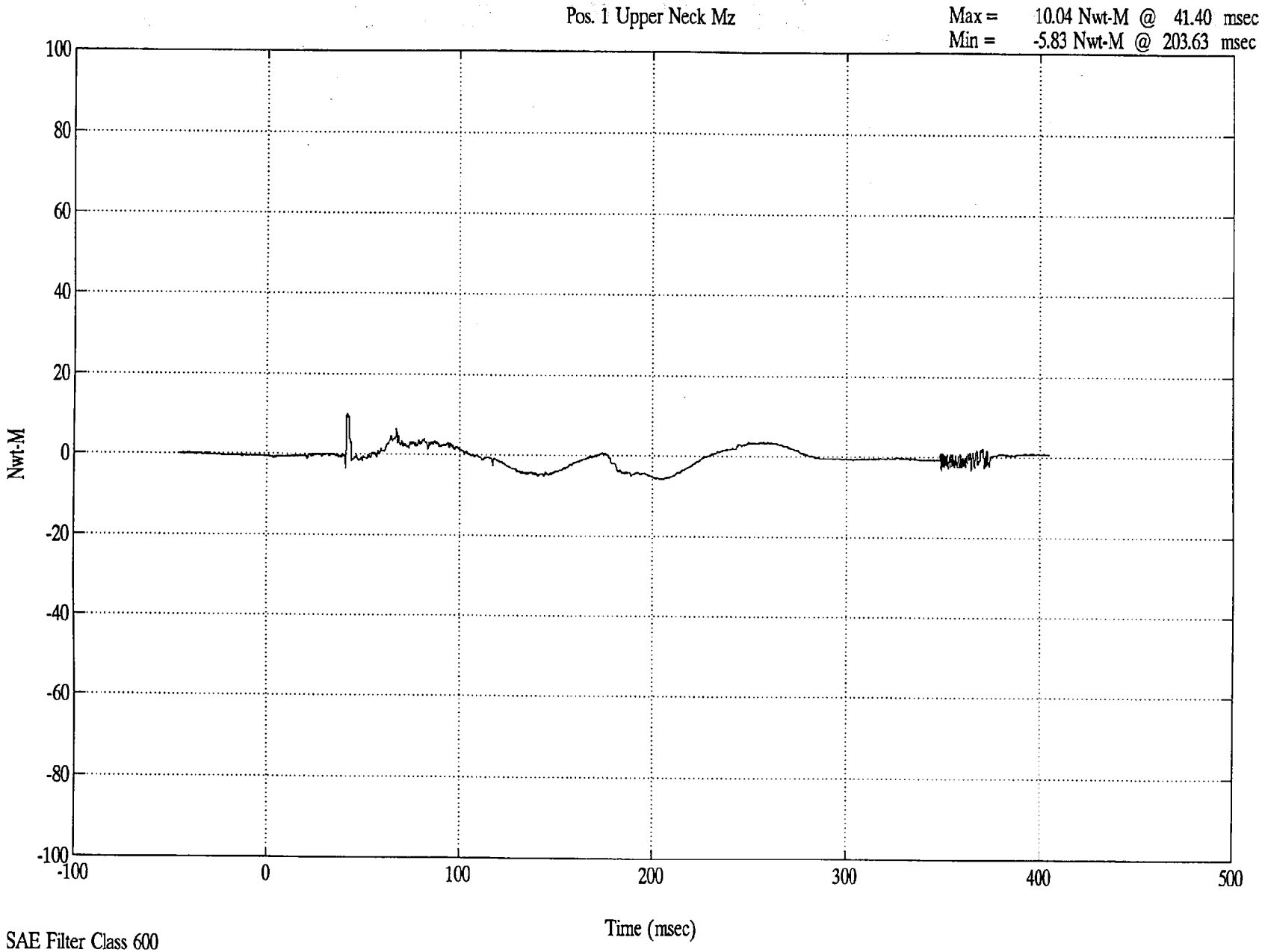


B-28

8313-11

SAE Filter Class 600

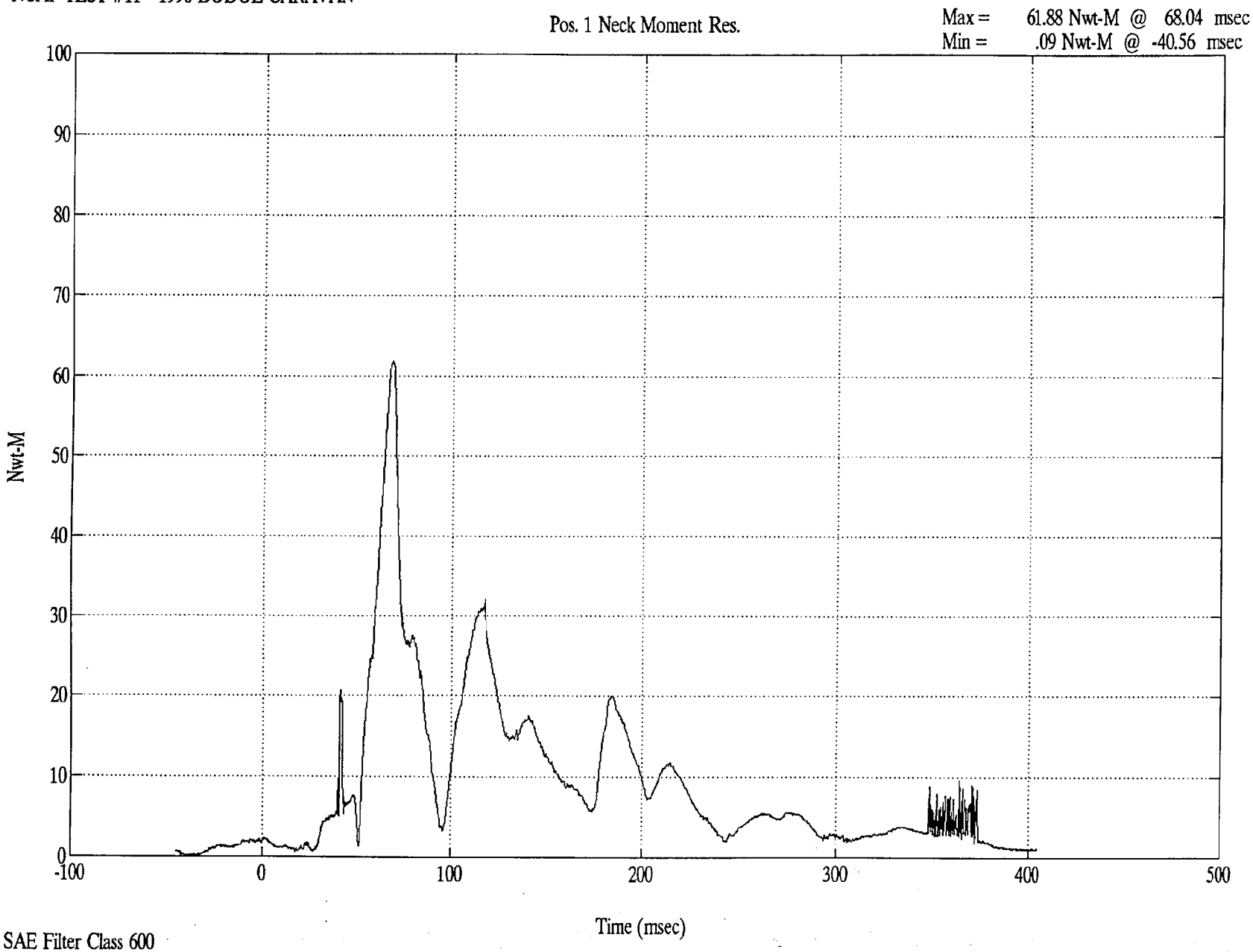
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 600

8313-11

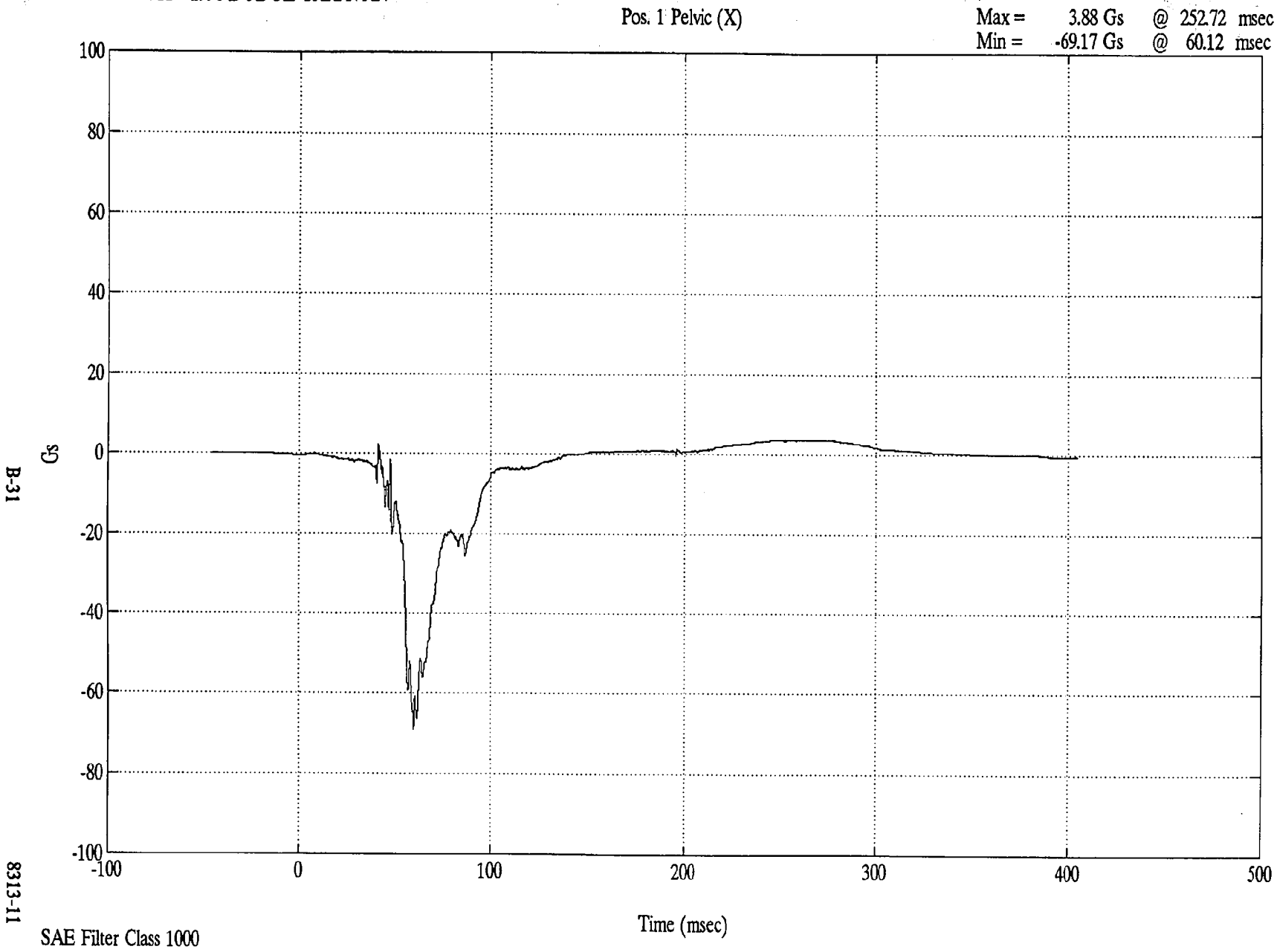
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 600

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

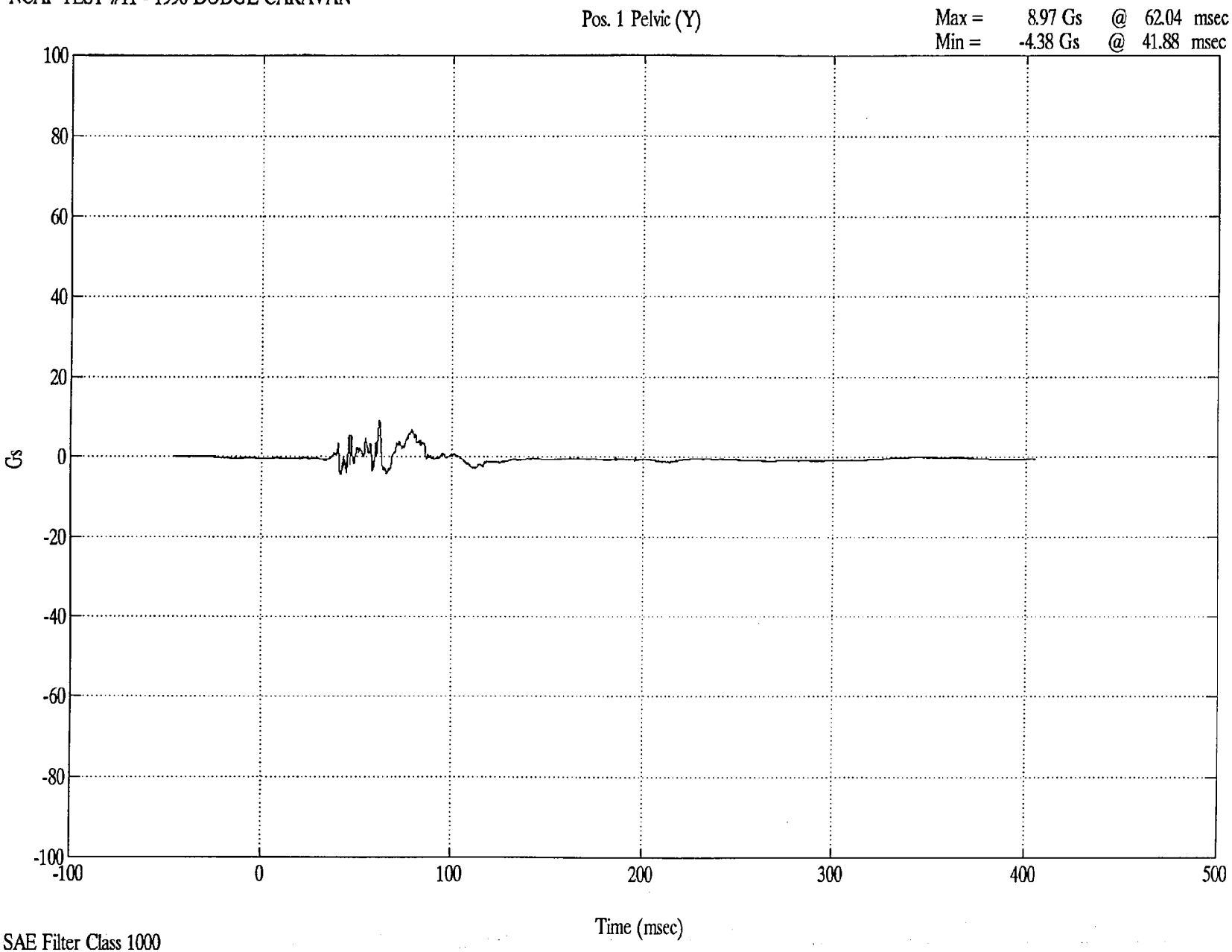


B-31

8313-11

SAE Filter Class 1000

NCAP TEST #11 - 1996 DODGE CARAVAN

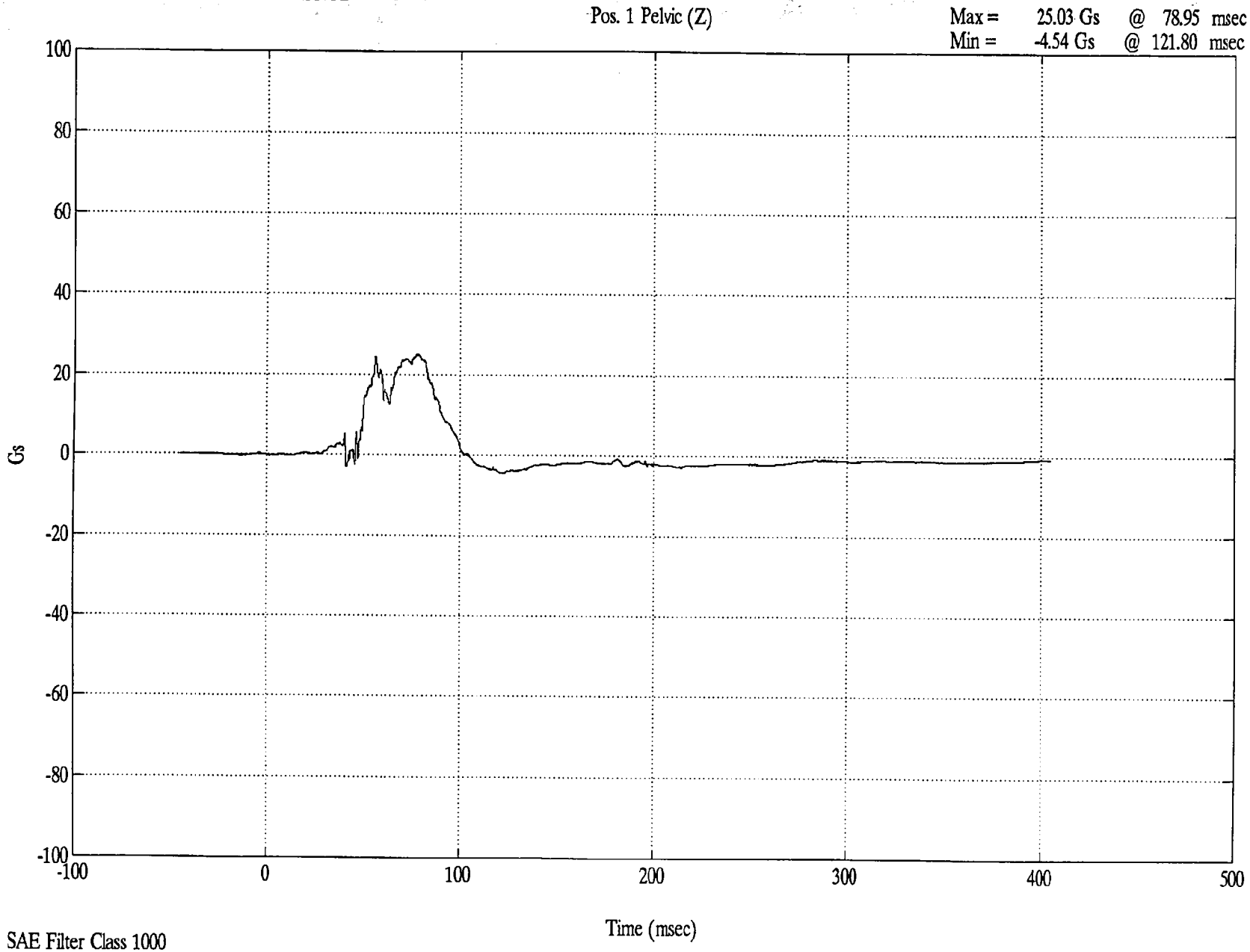


B-32

8313-11

SAE Filter Class 1000

NCAP TEST #11 - 1996 DODGE CARAVAN

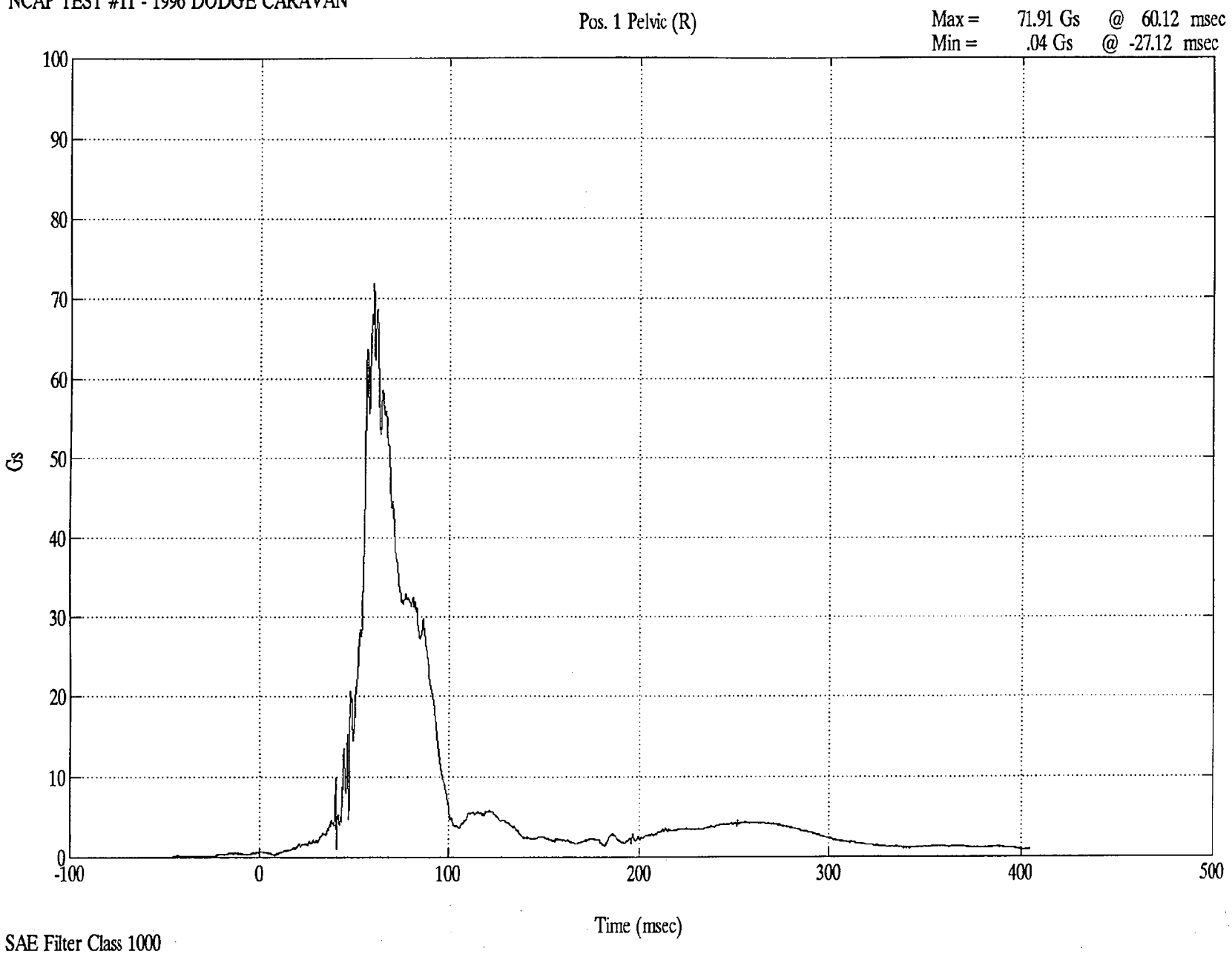


SAE Filter Class 1000

B-33

8313-11

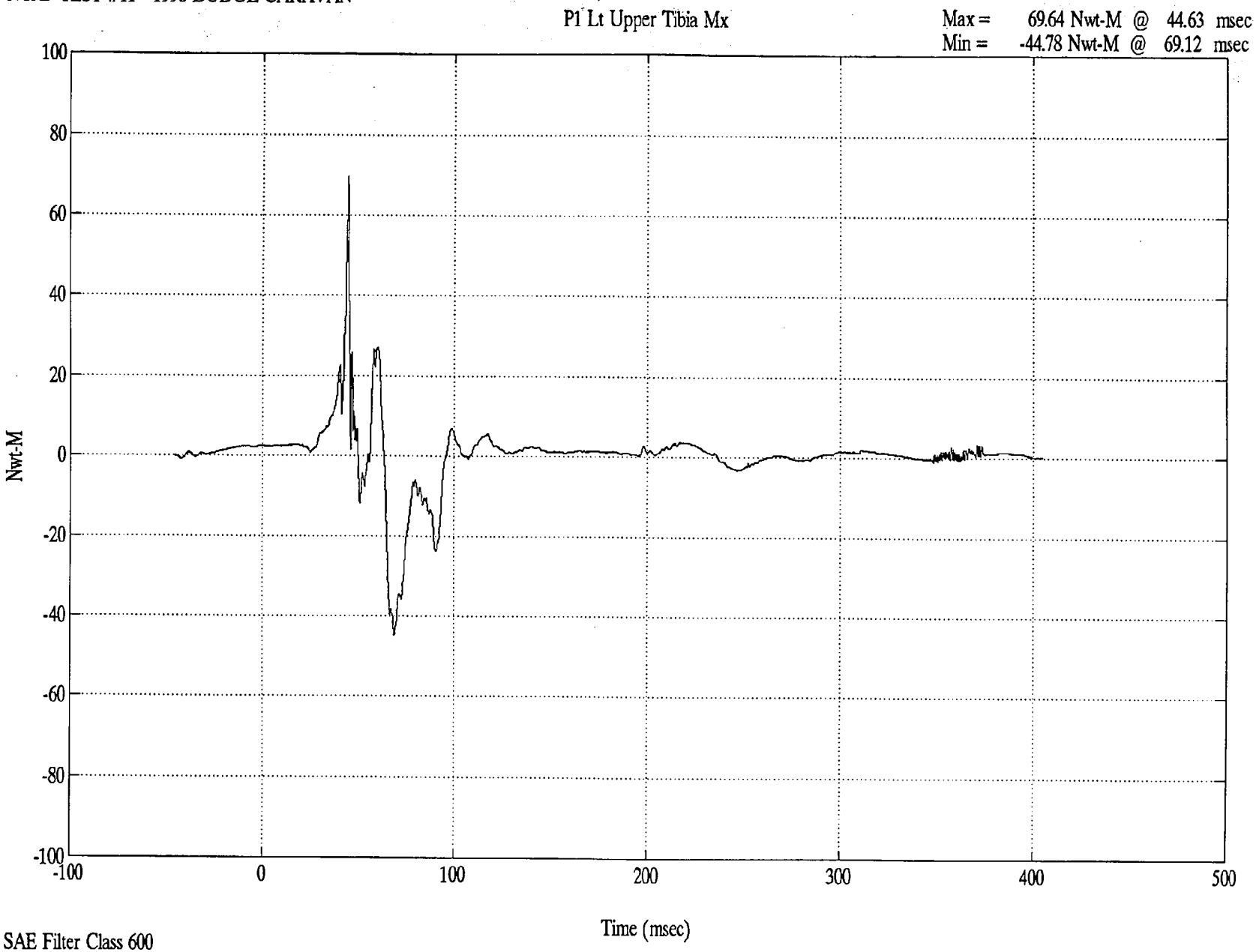
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 1000

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN



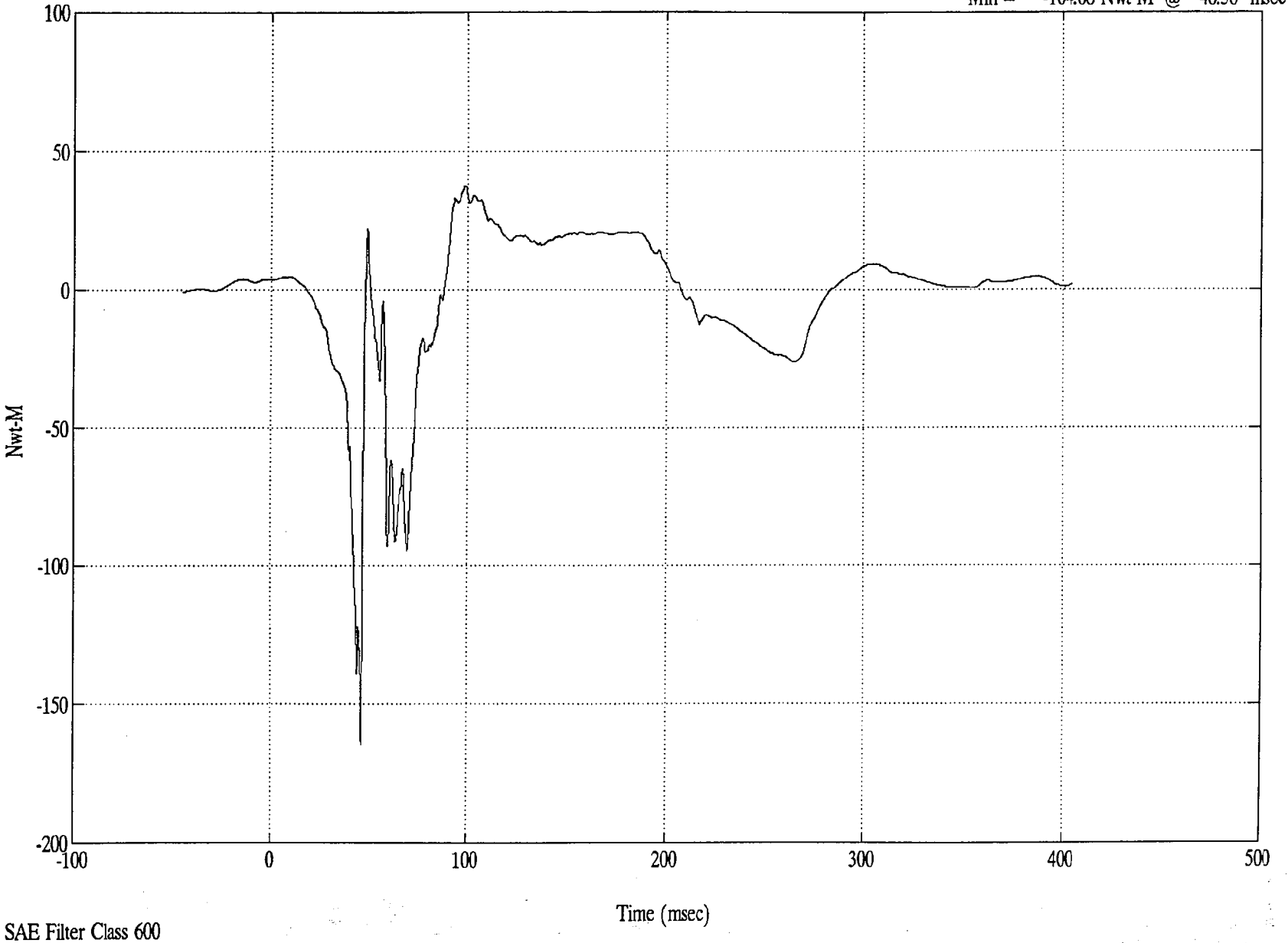
SAE Filter Class 600

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

P1 Lt Upper Tibia My

Max = 37.72 Nwt-M @ 98.52 msec
Min = -164.68 Nwt-M @ 46.56 msec

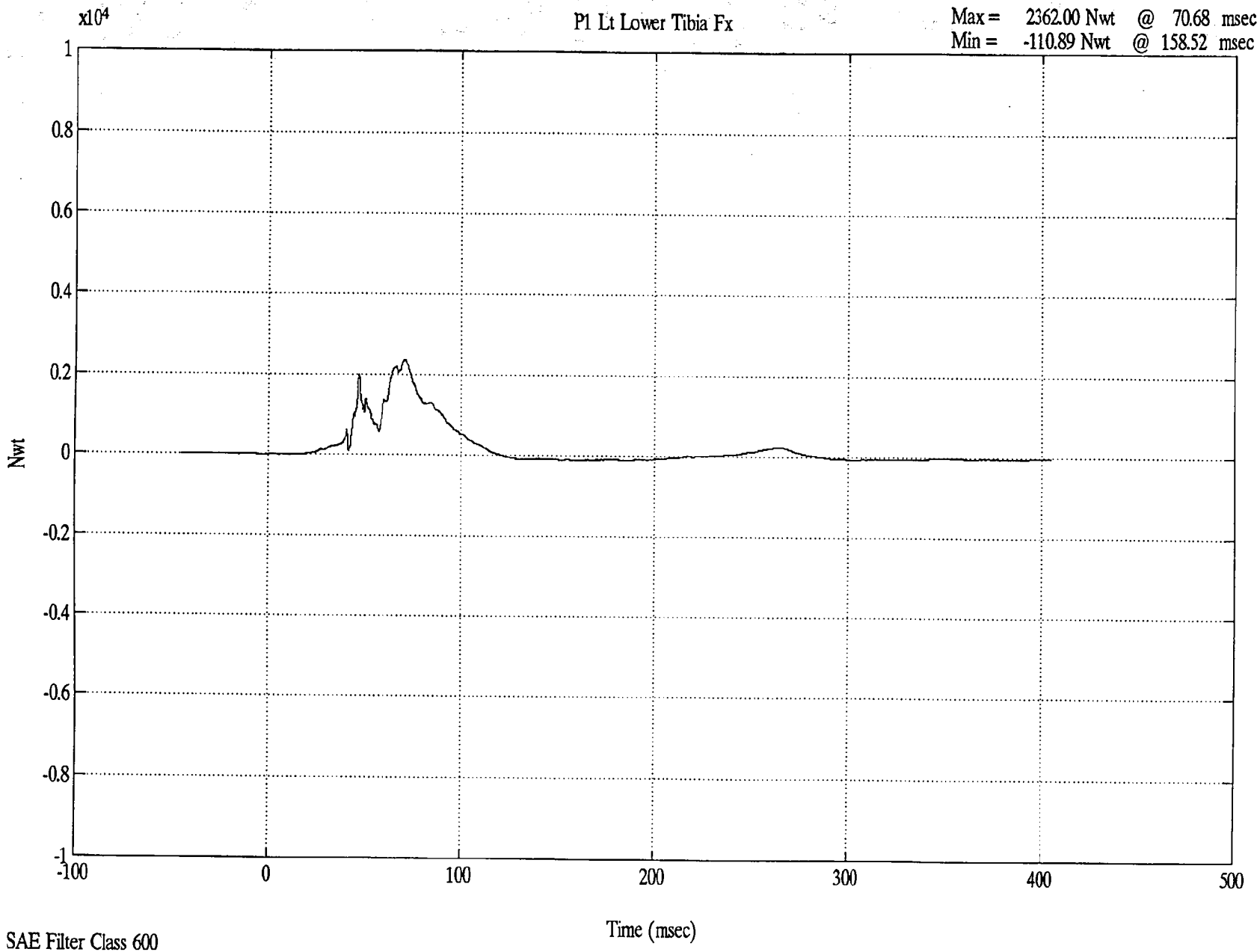


B-36

8313-11

SAE Filter Class 600

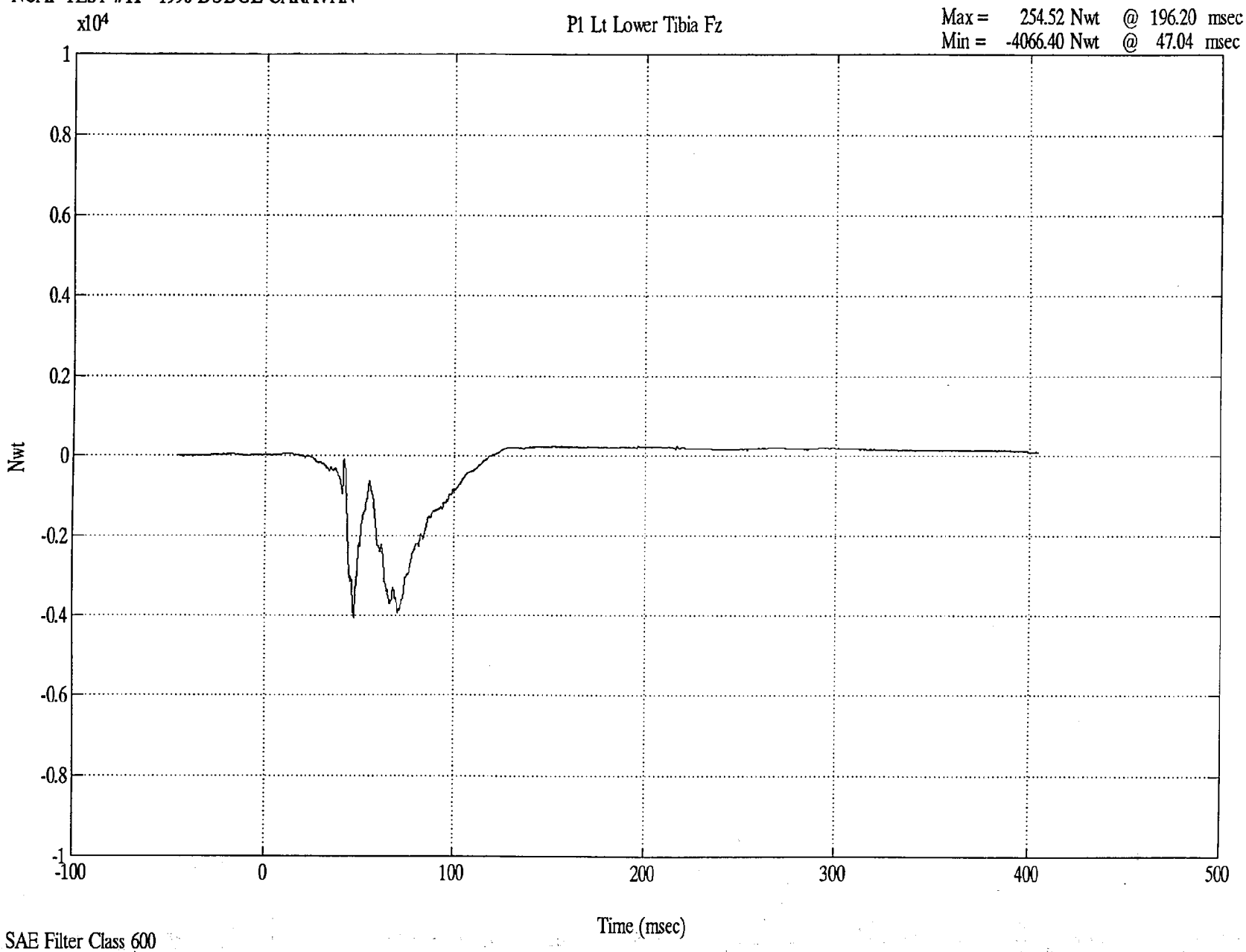
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 600

8313-11

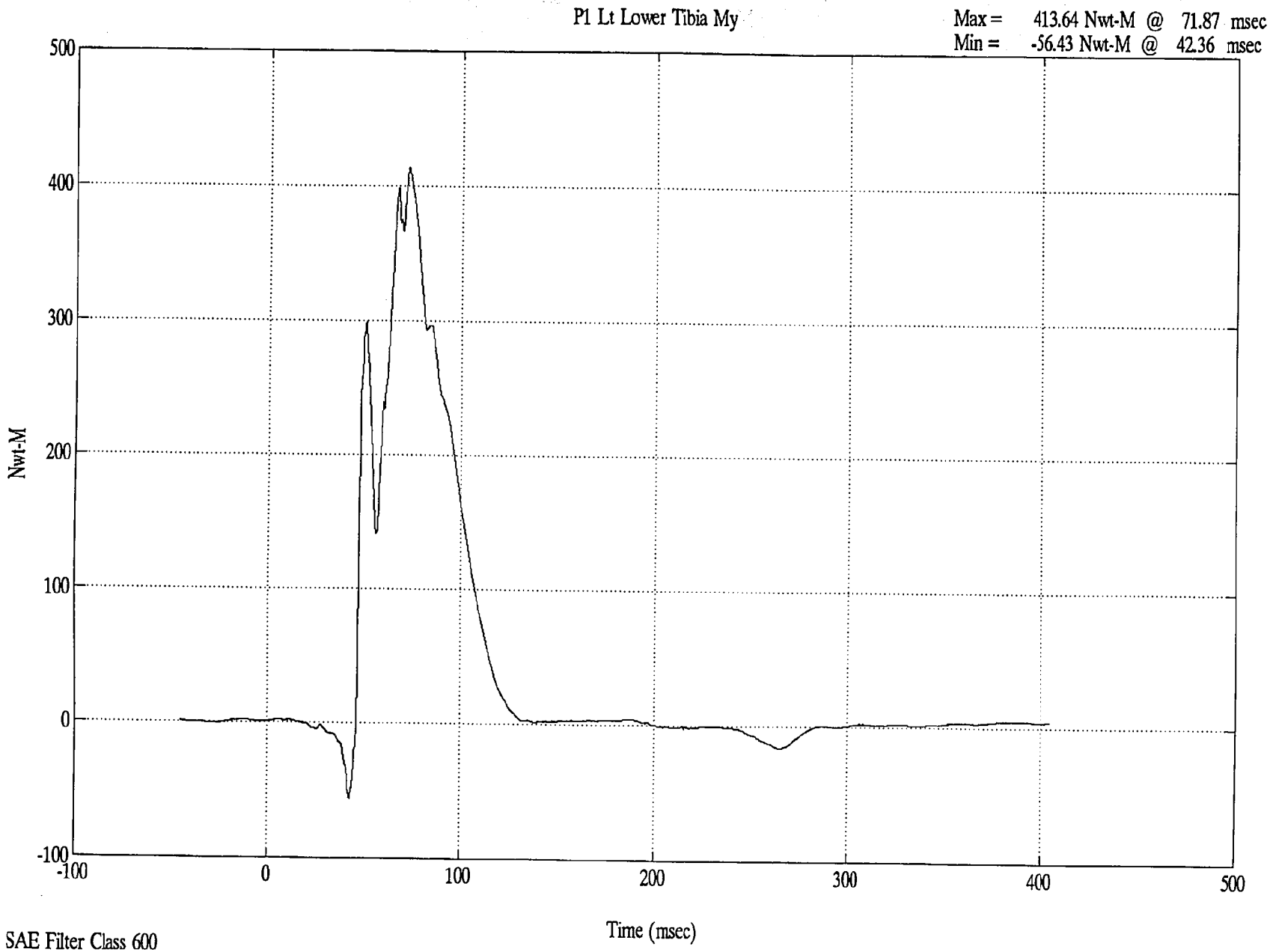
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 600

8313-11

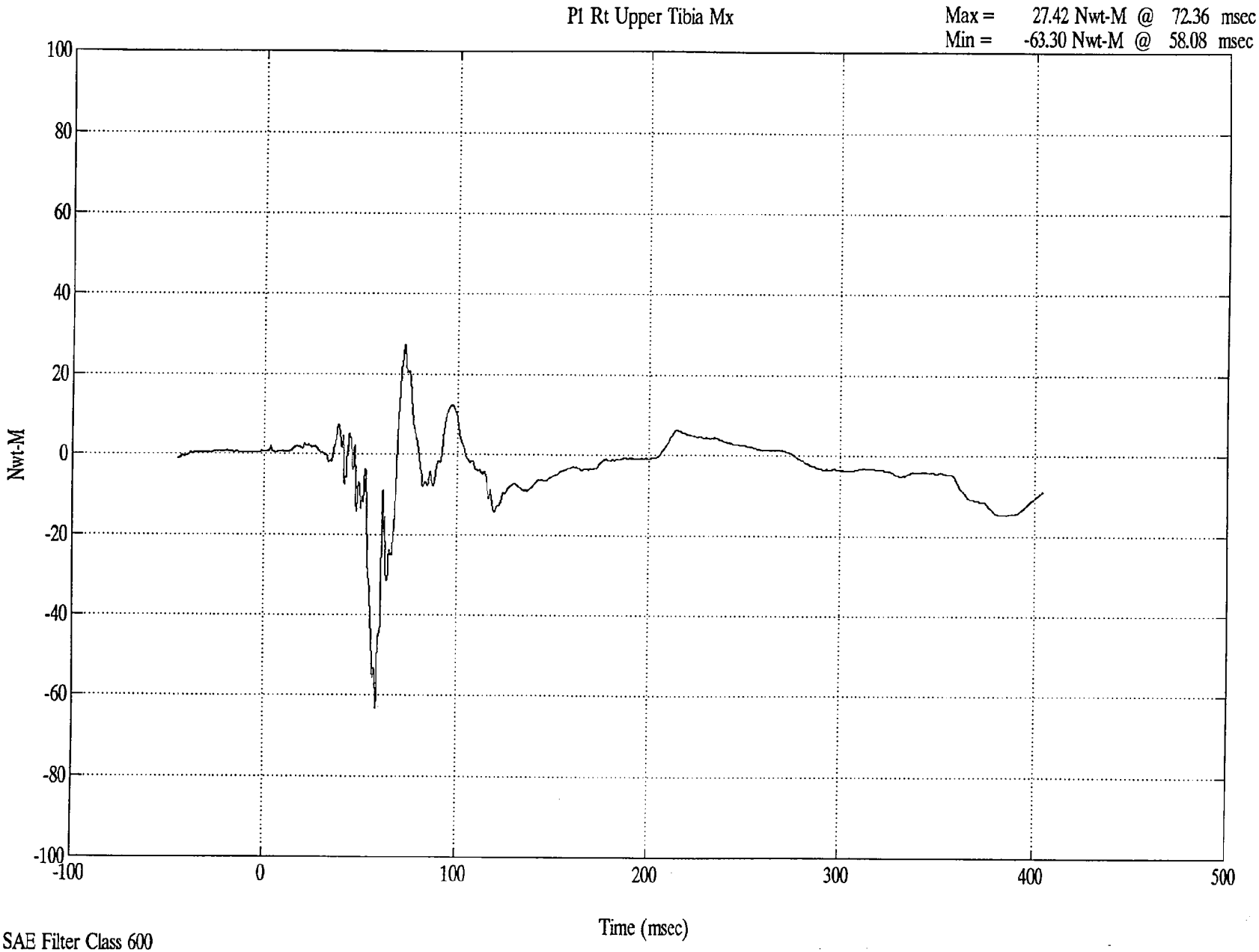
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 600

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN



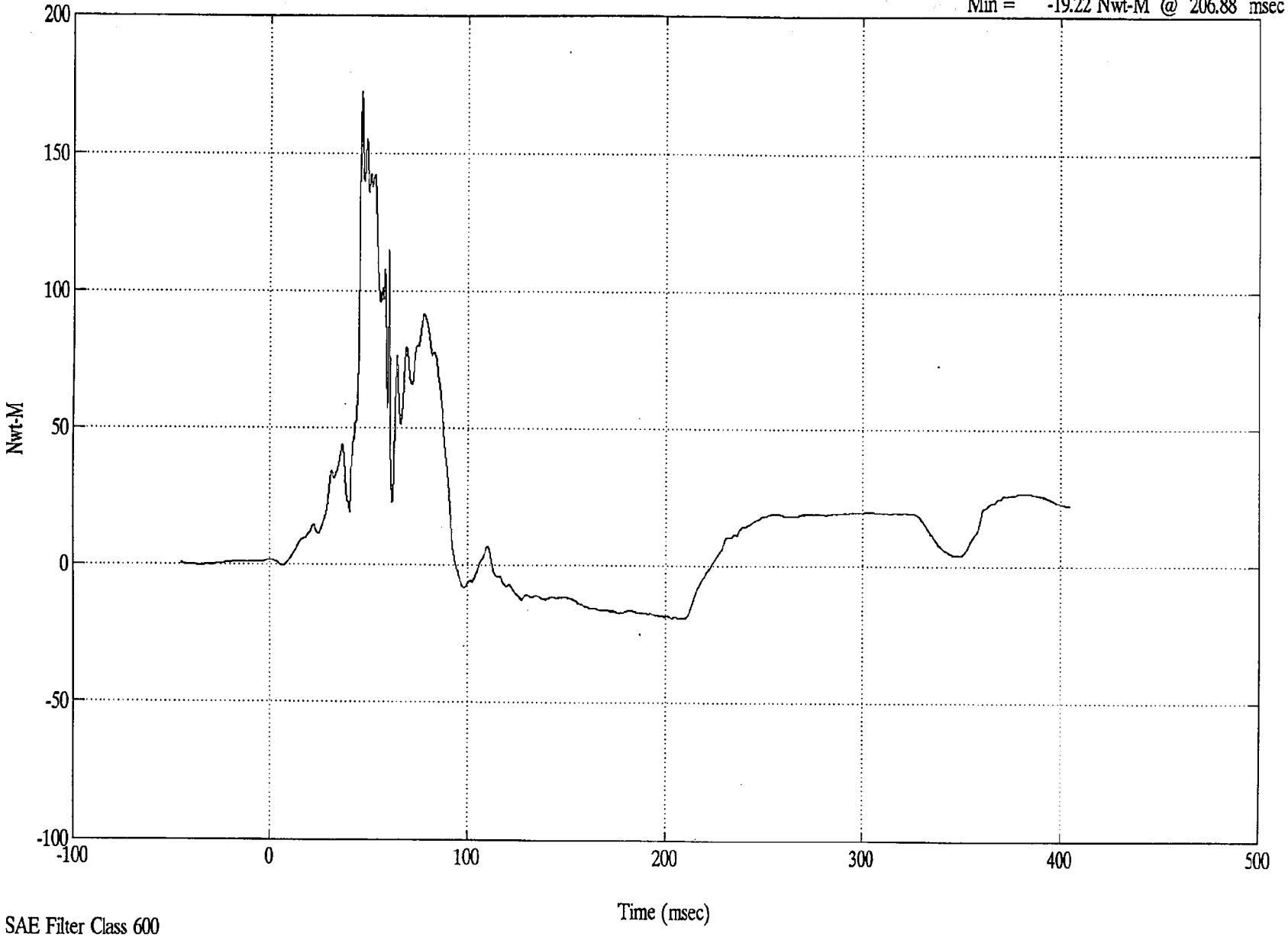
SAE Filter Class 600

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

P1 Rt Upper Tibia My

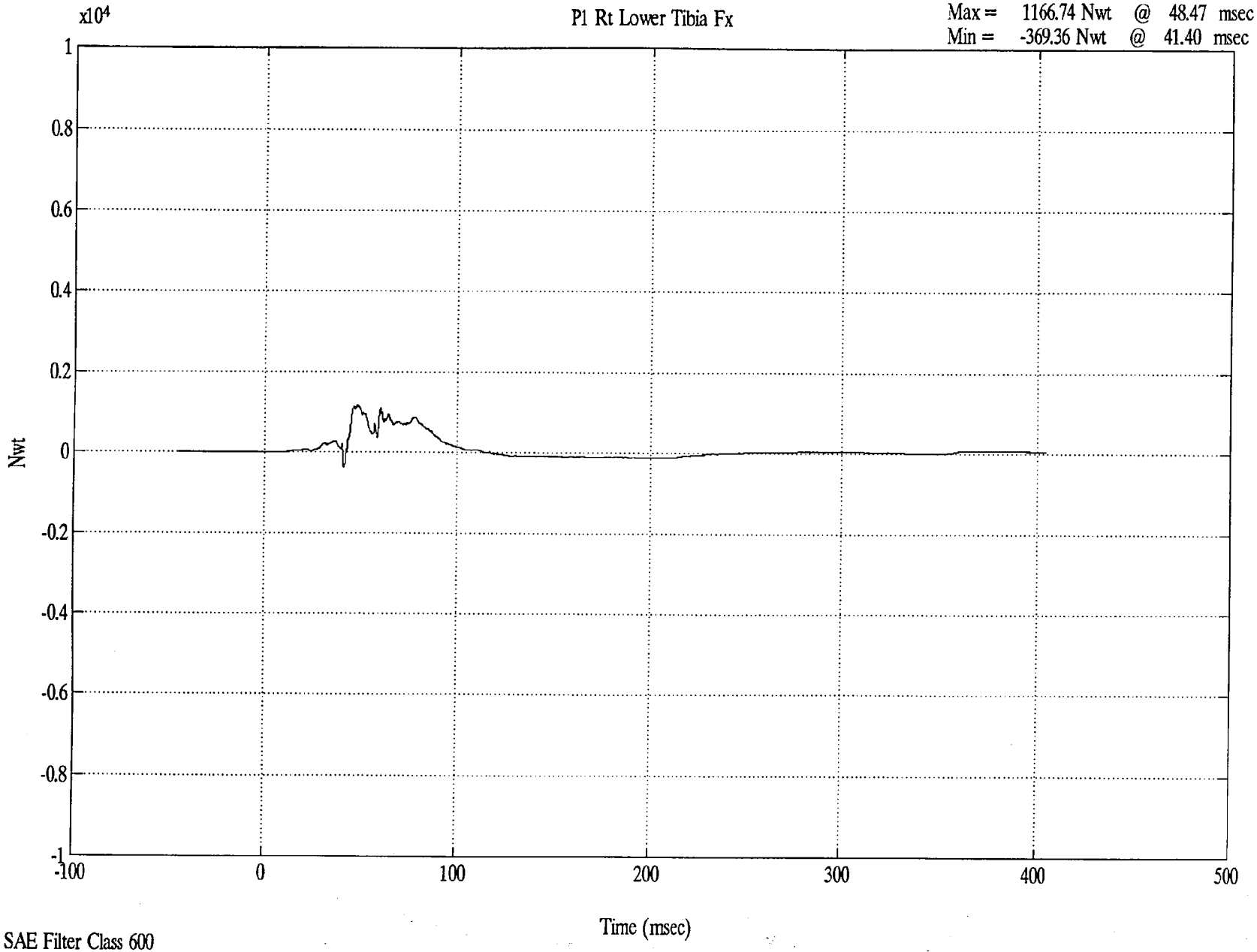
Max = 172.42 Nwt-M @ 46.31 msec
Min = -19.22 Nwt-M @ 206.88 msec



SAE Filter Class 600

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

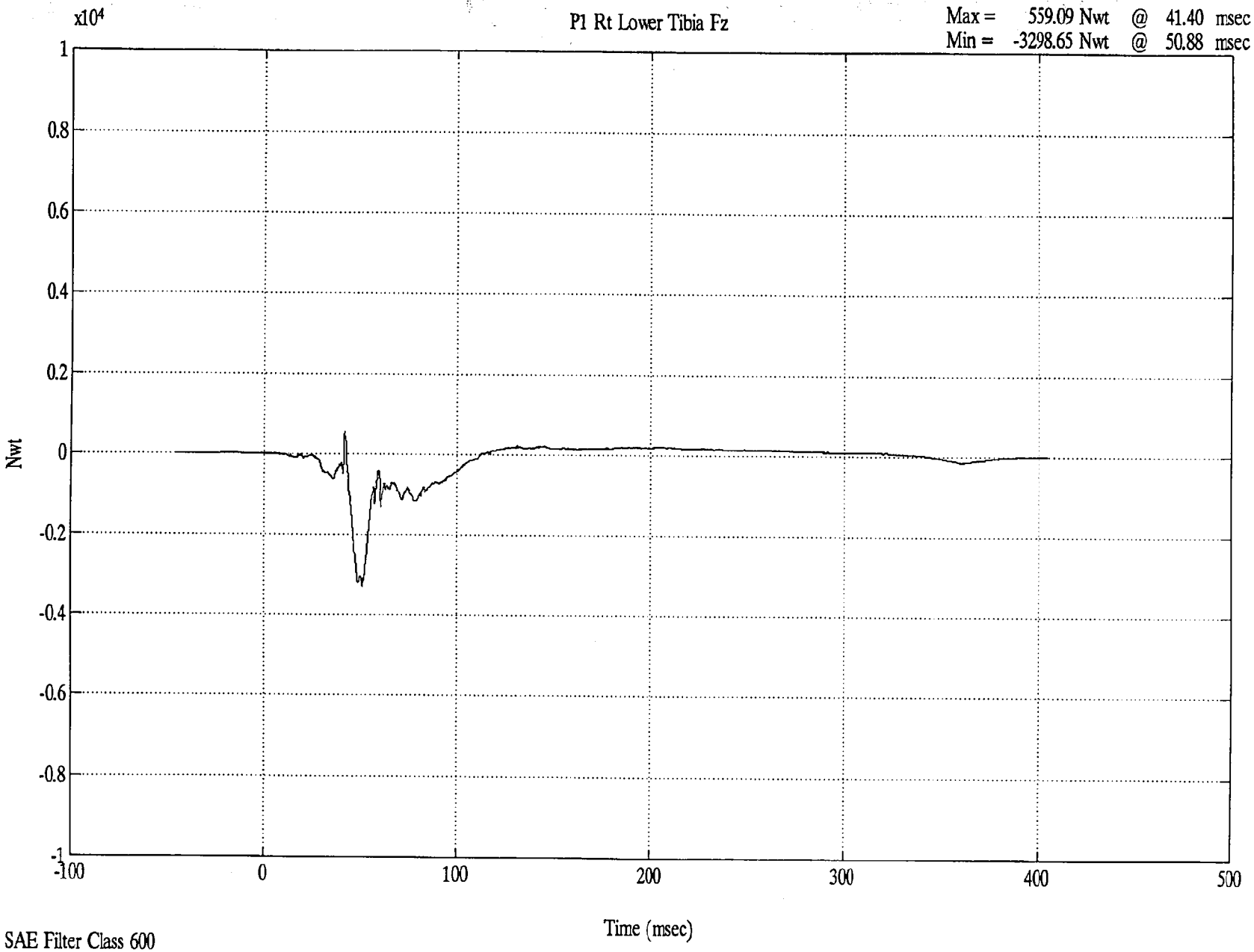


B-42

8313-11

SAE Filter Class 600

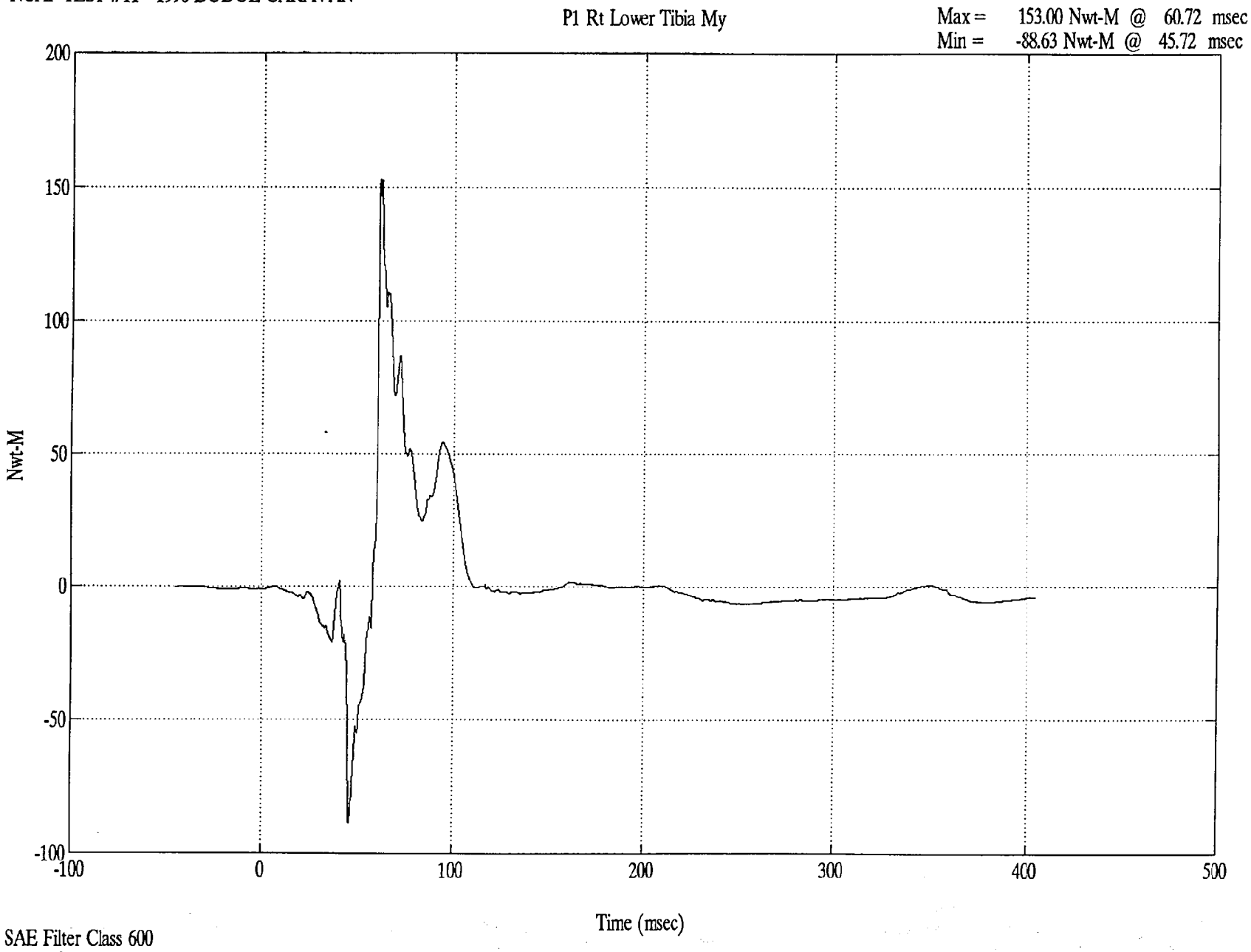
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 600

8313-11

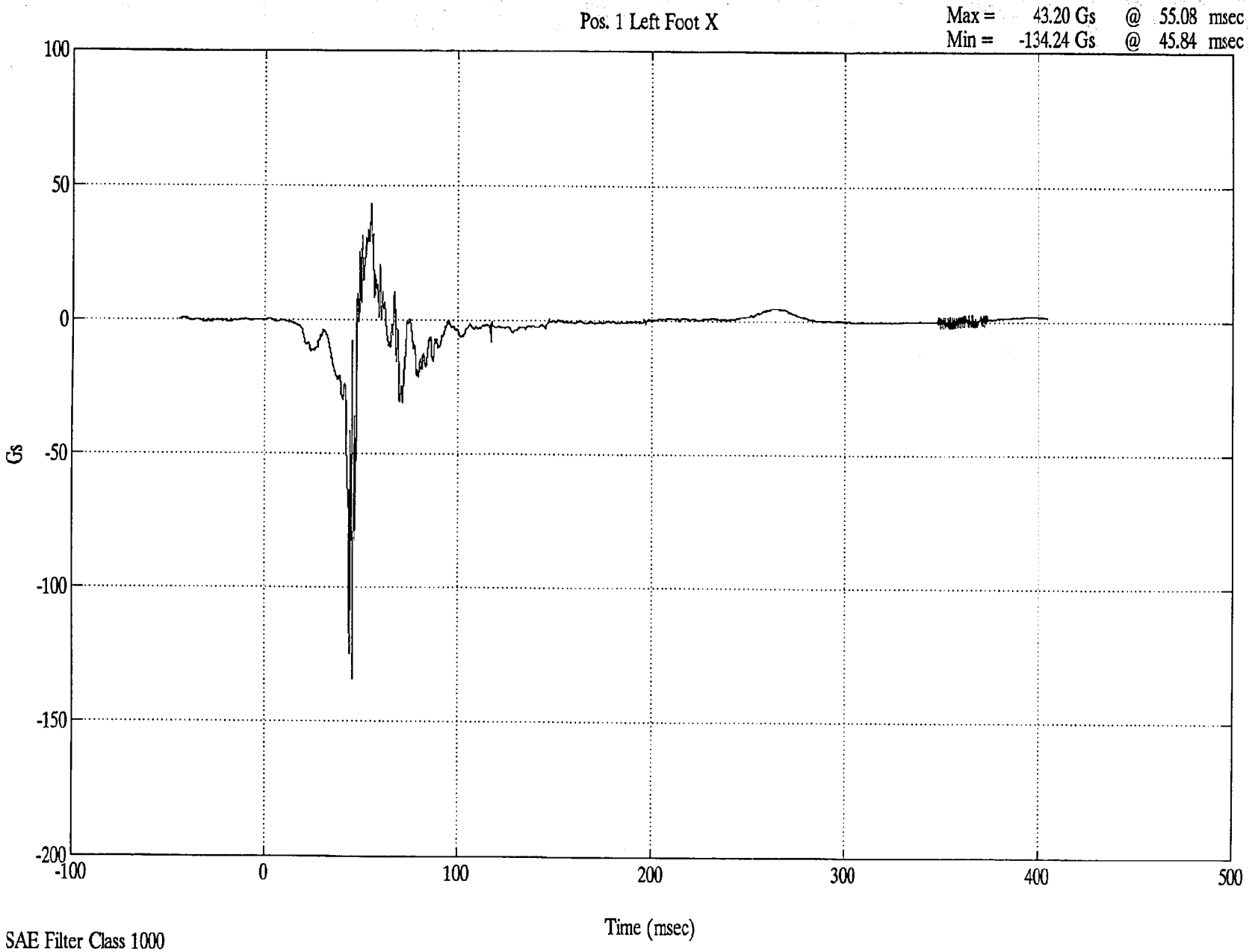
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 600

8313-11

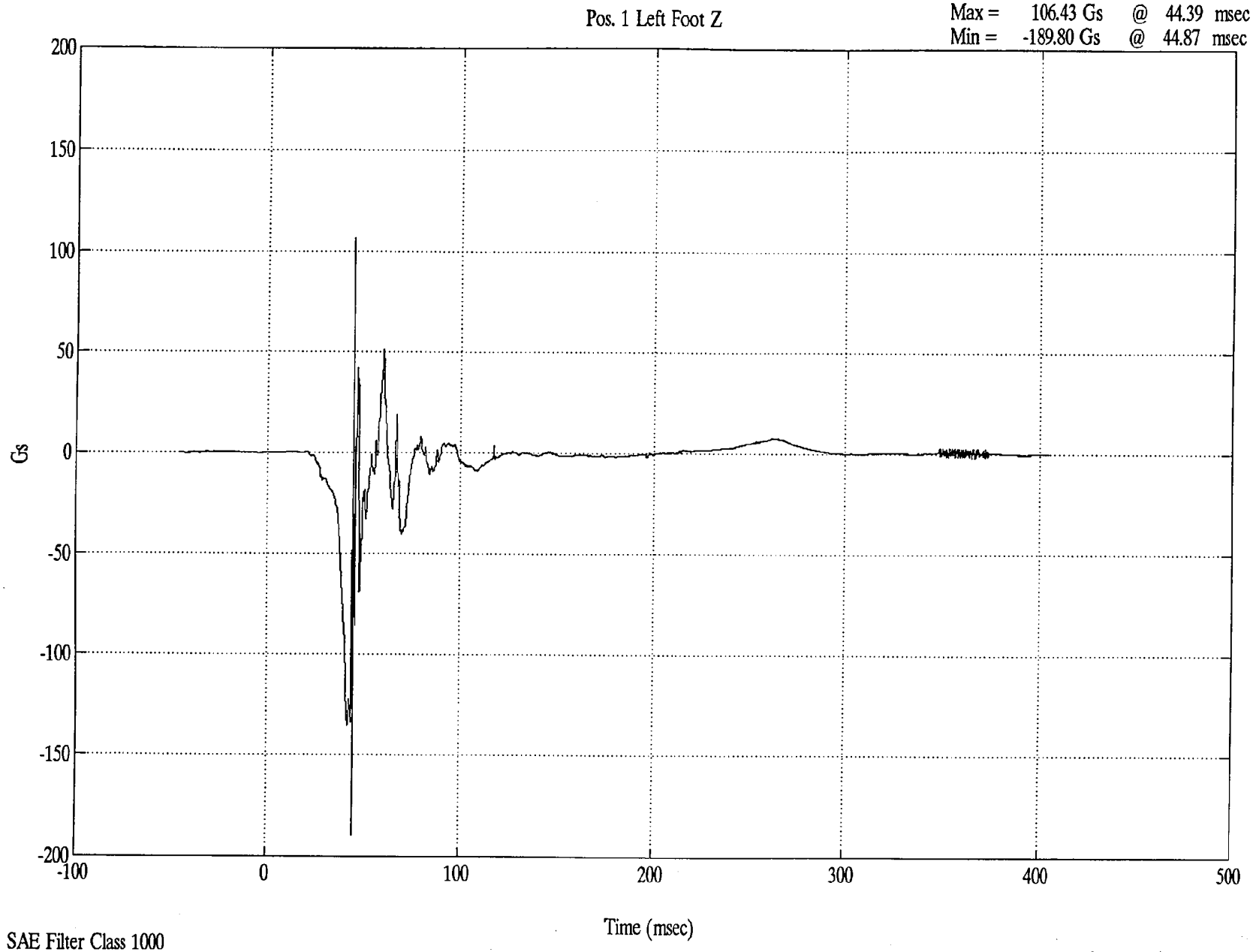
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 1000

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

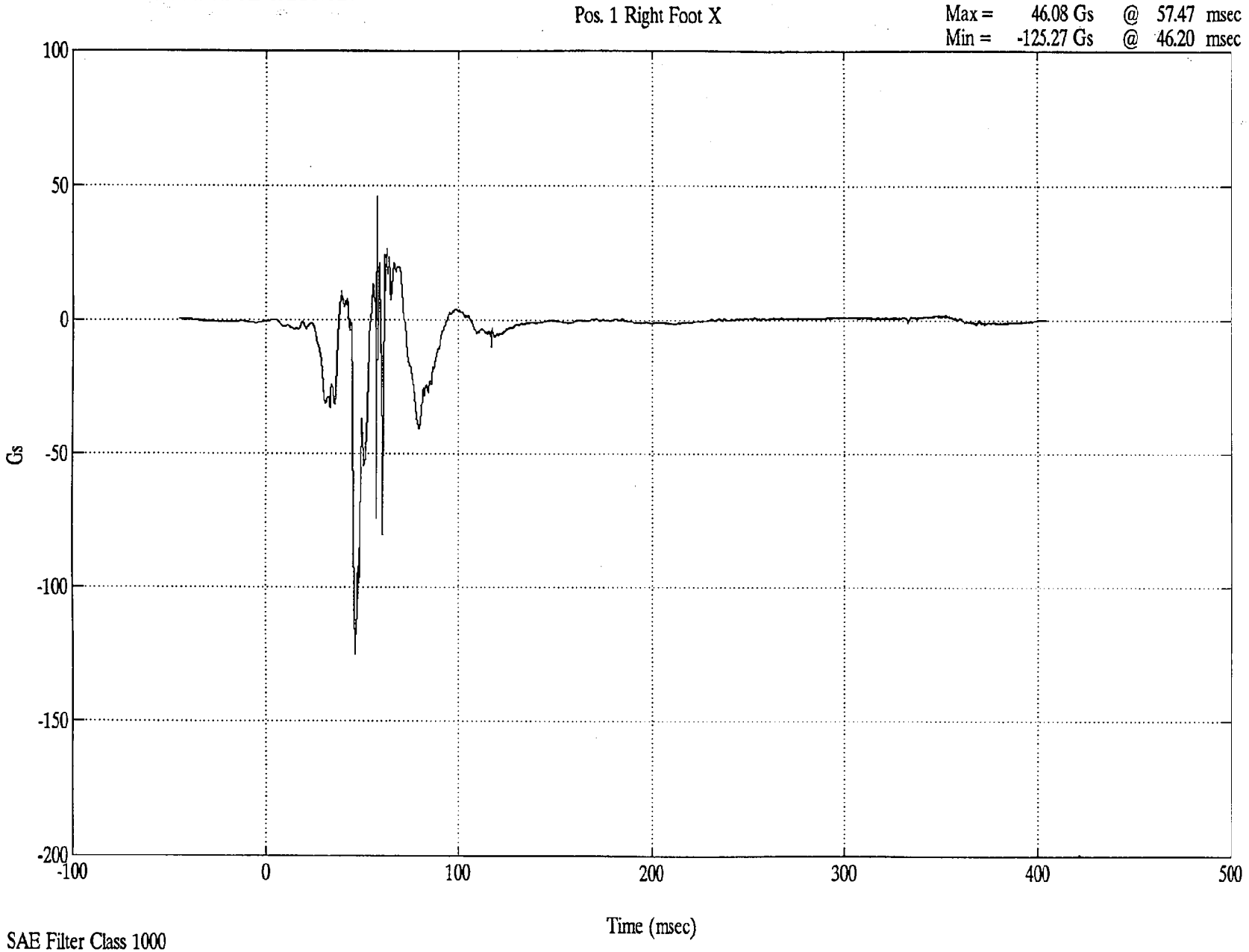


B-46

8313-11

SAE Filter Class 1000

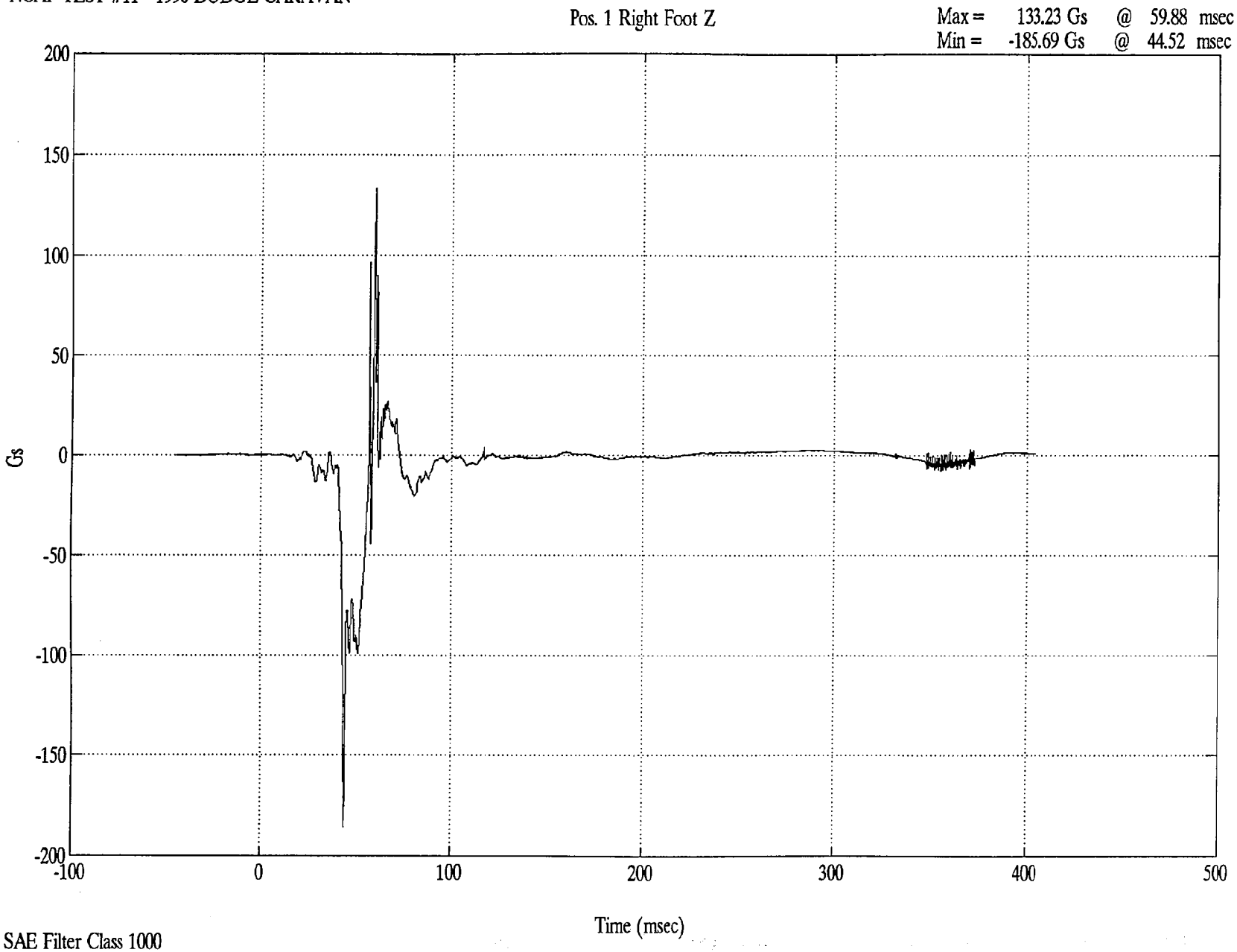
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 1000

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

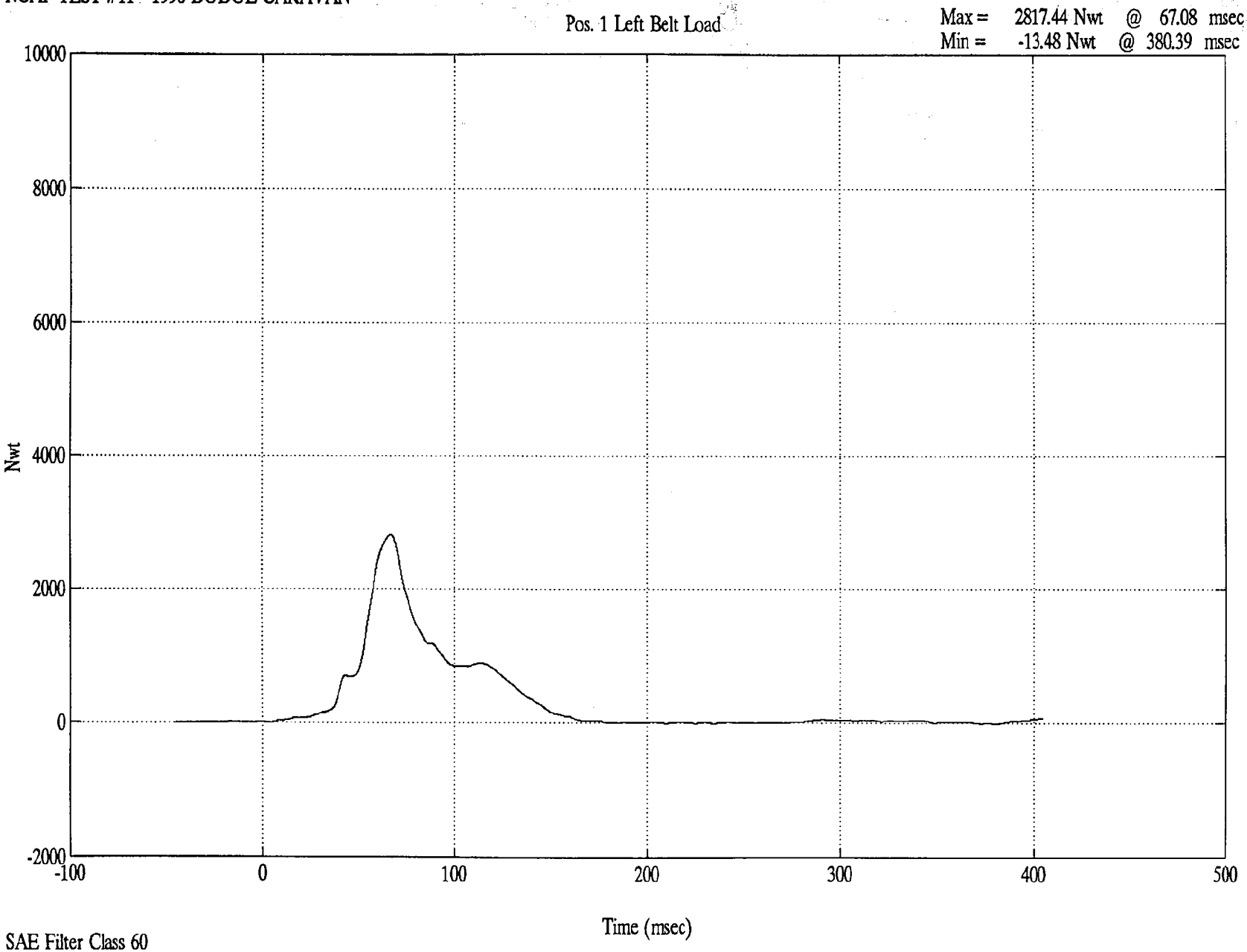


B-48

8313-11

SAE Filter Class 1000

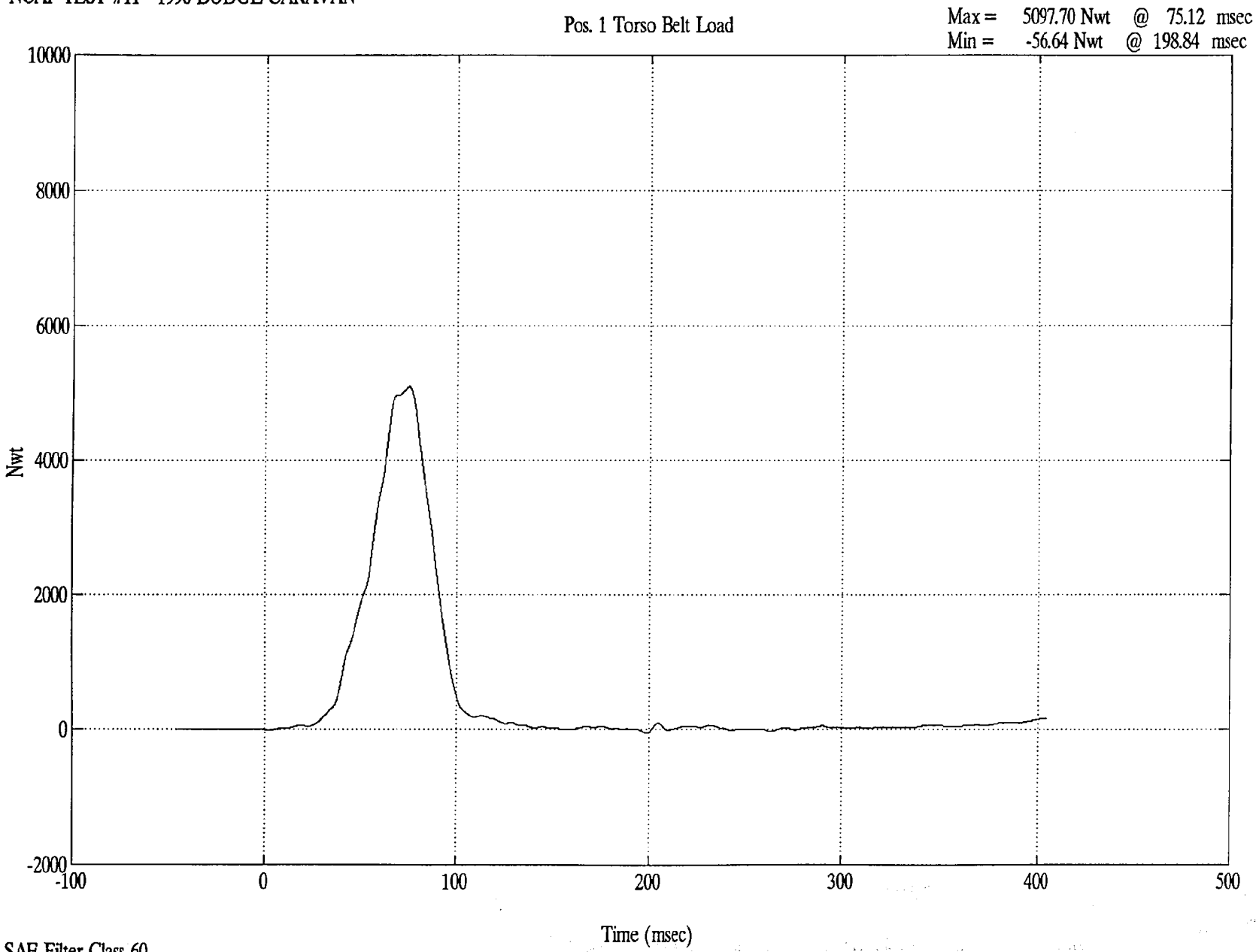
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 60

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

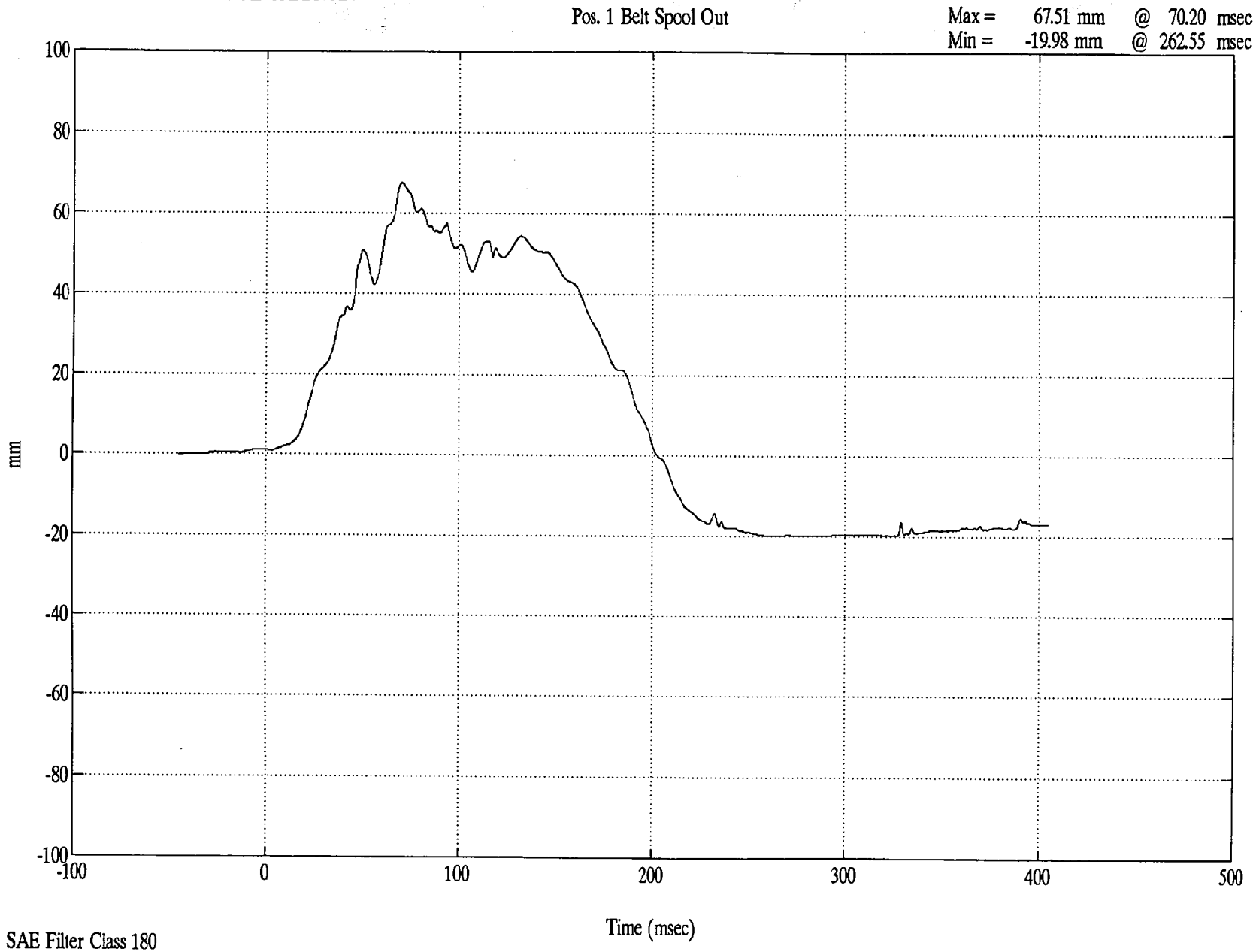


B-50

8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

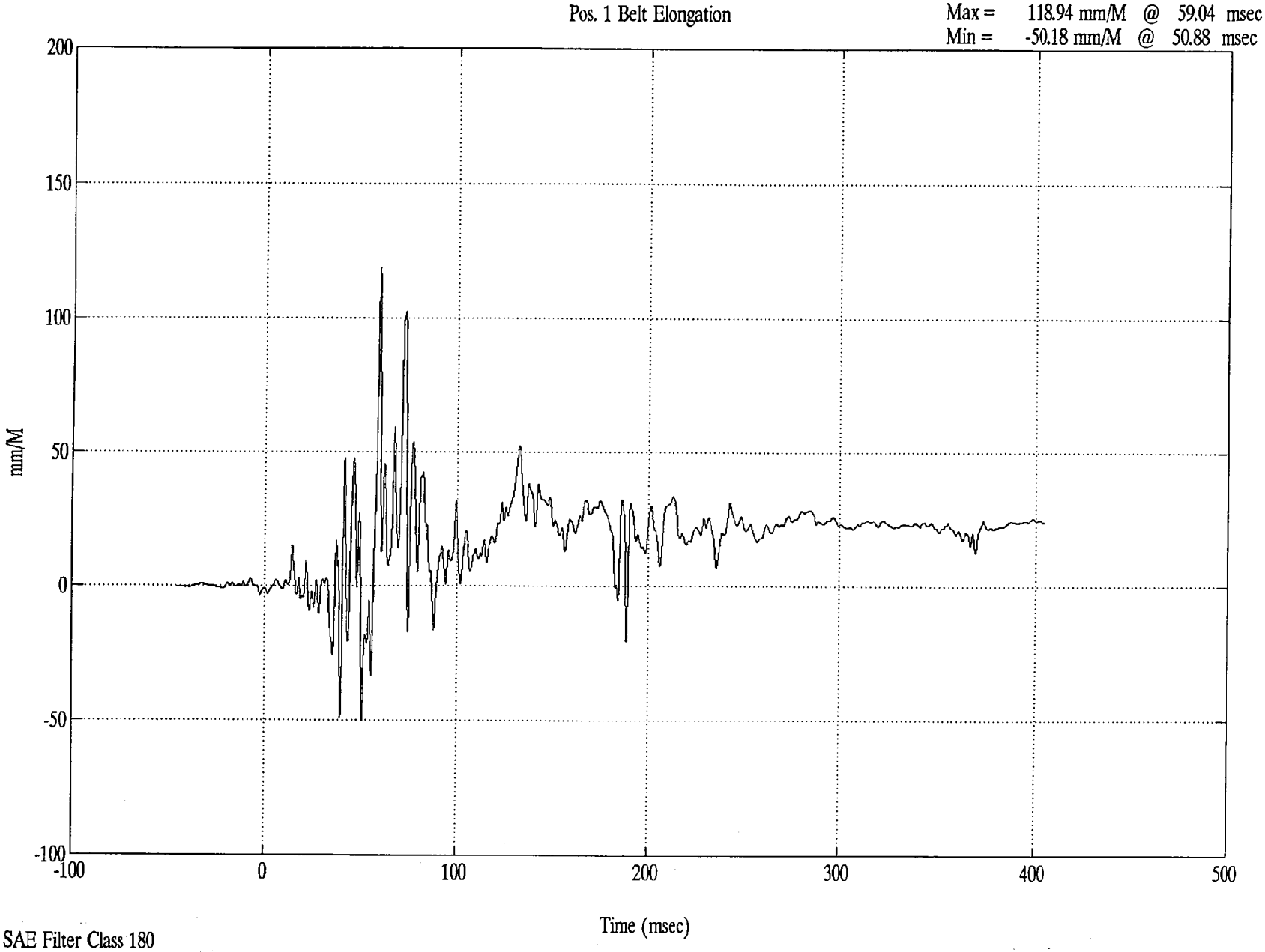


B-51

8313-11

SAE Filter Class 180

NCAP TEST #11 - 1996 DODGE CARAVAN

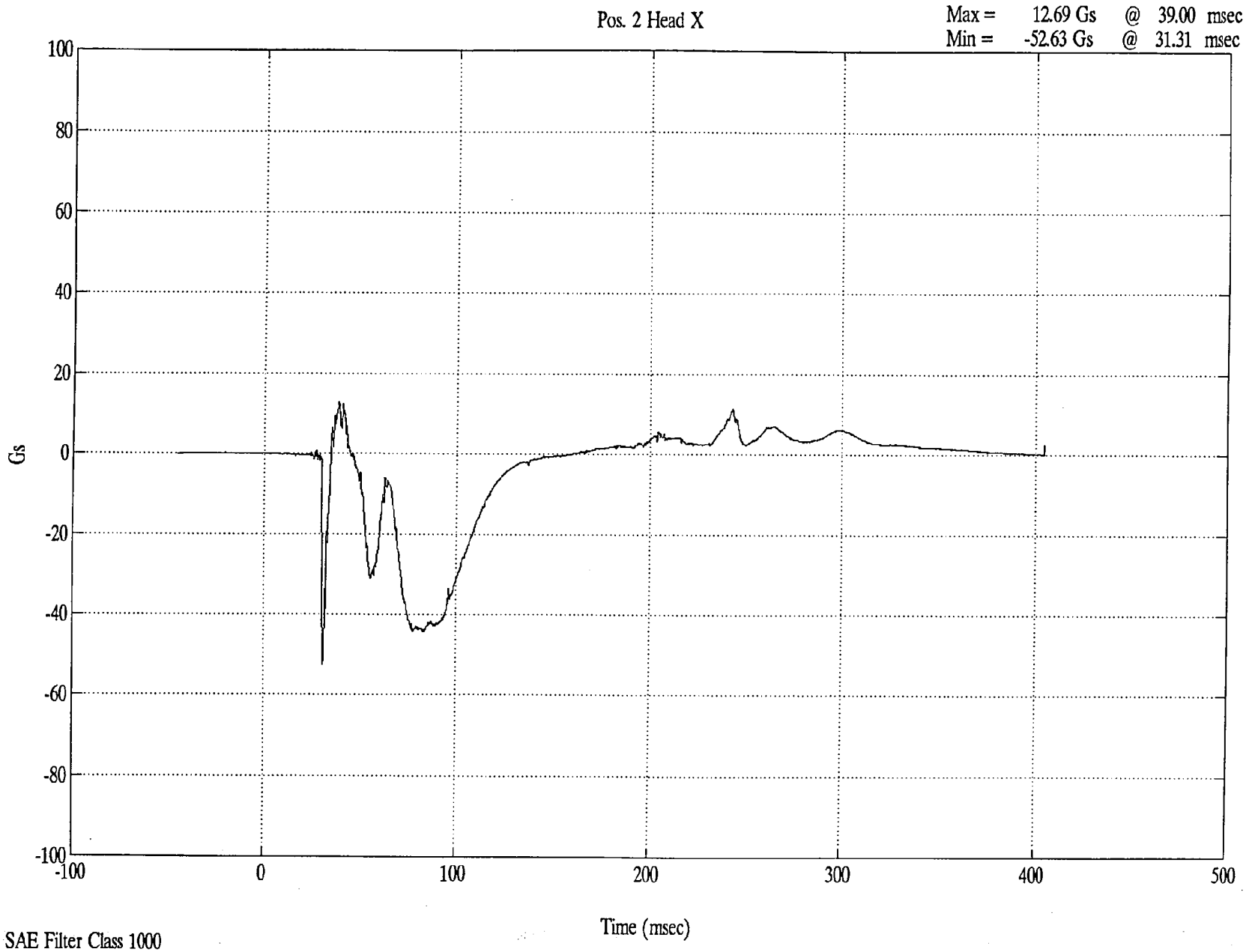


SAE Filter Class 180

B-52

8313-11

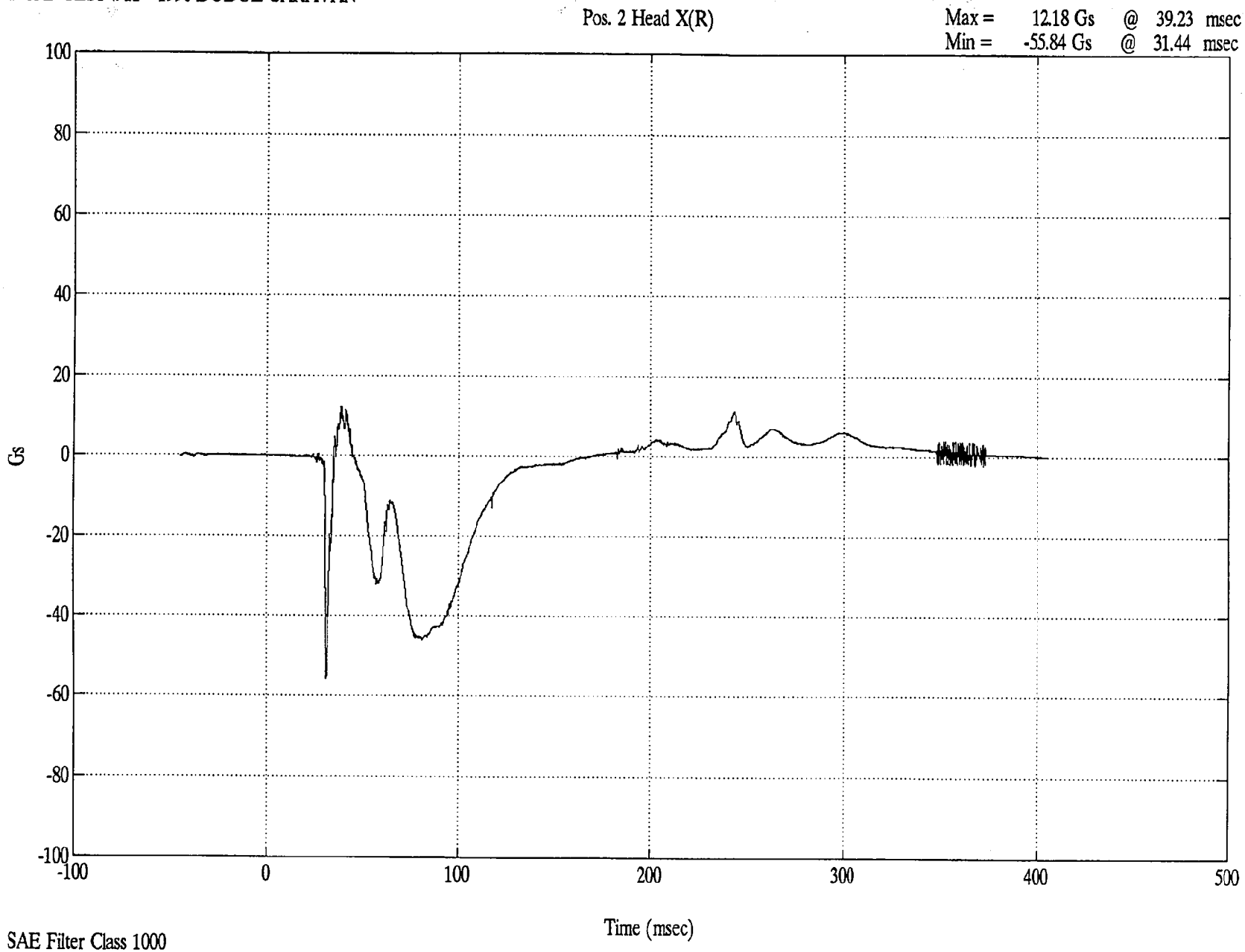
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 1000

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

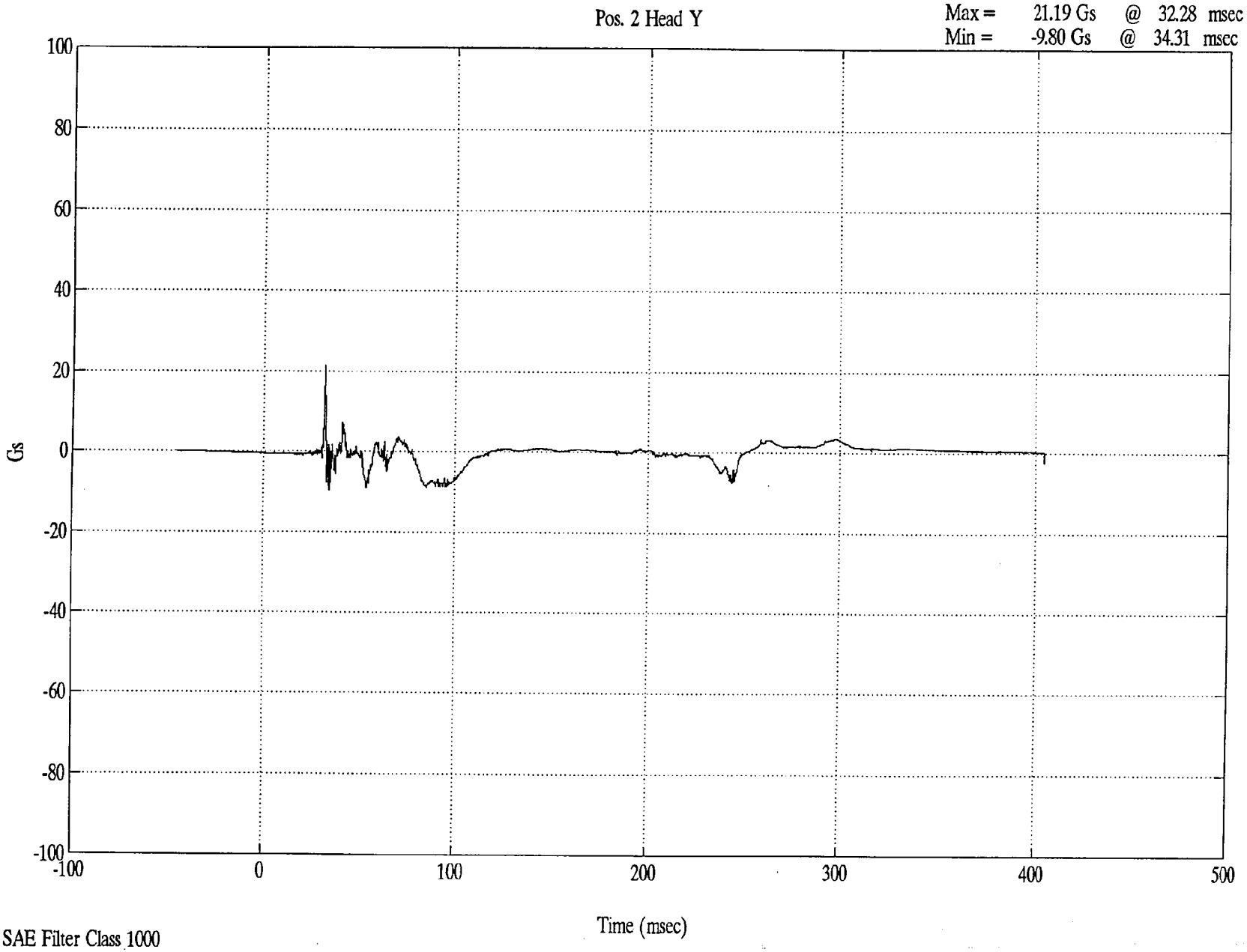


B-55

8313-11

SAE Filter Class 1000

NCAP TEST #11 - 1996 DODGE CARAVAN

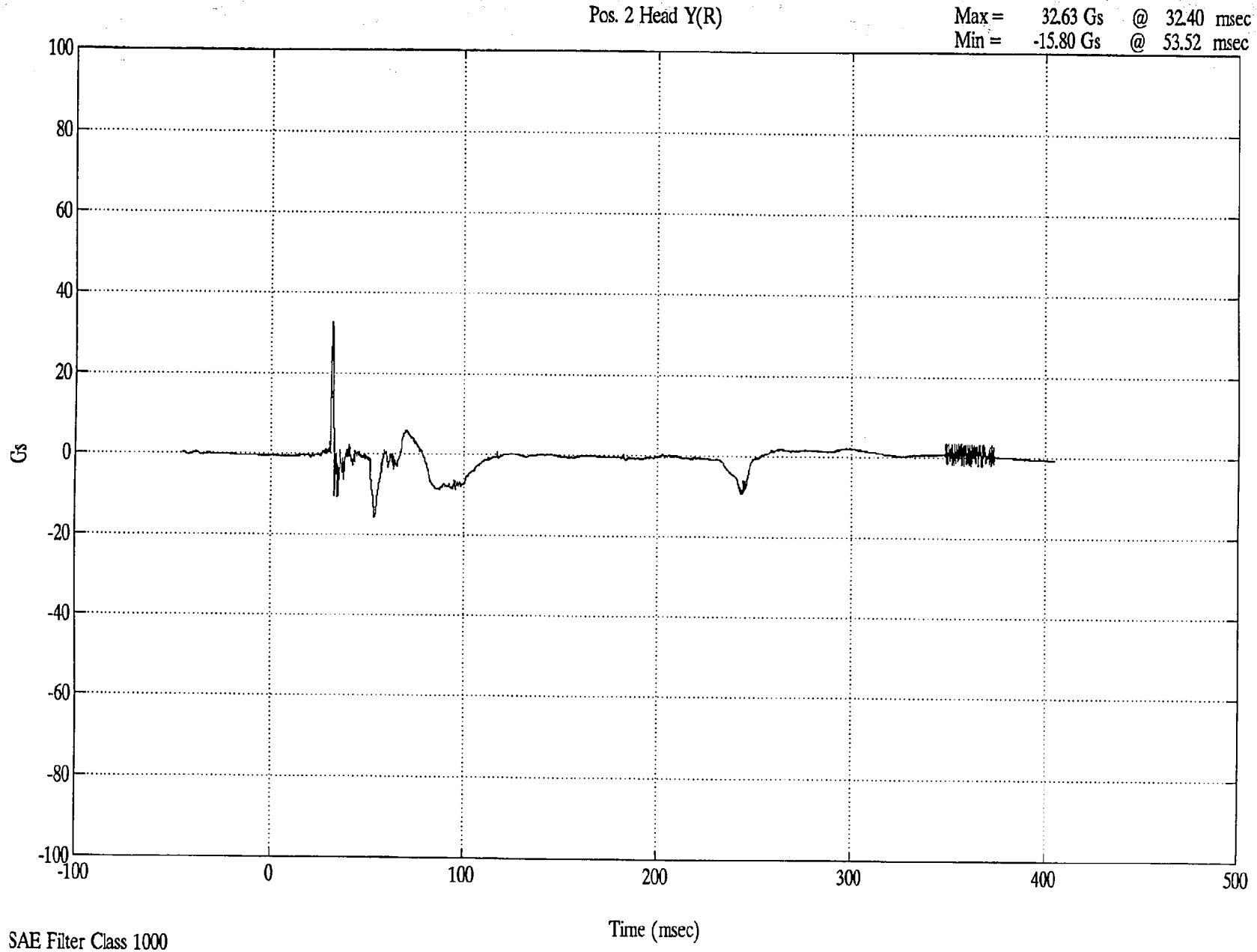


B-56

8313-11

SAE Filter Class 1000

NCAP TEST #11 - 1996 DODGE CARAVAN

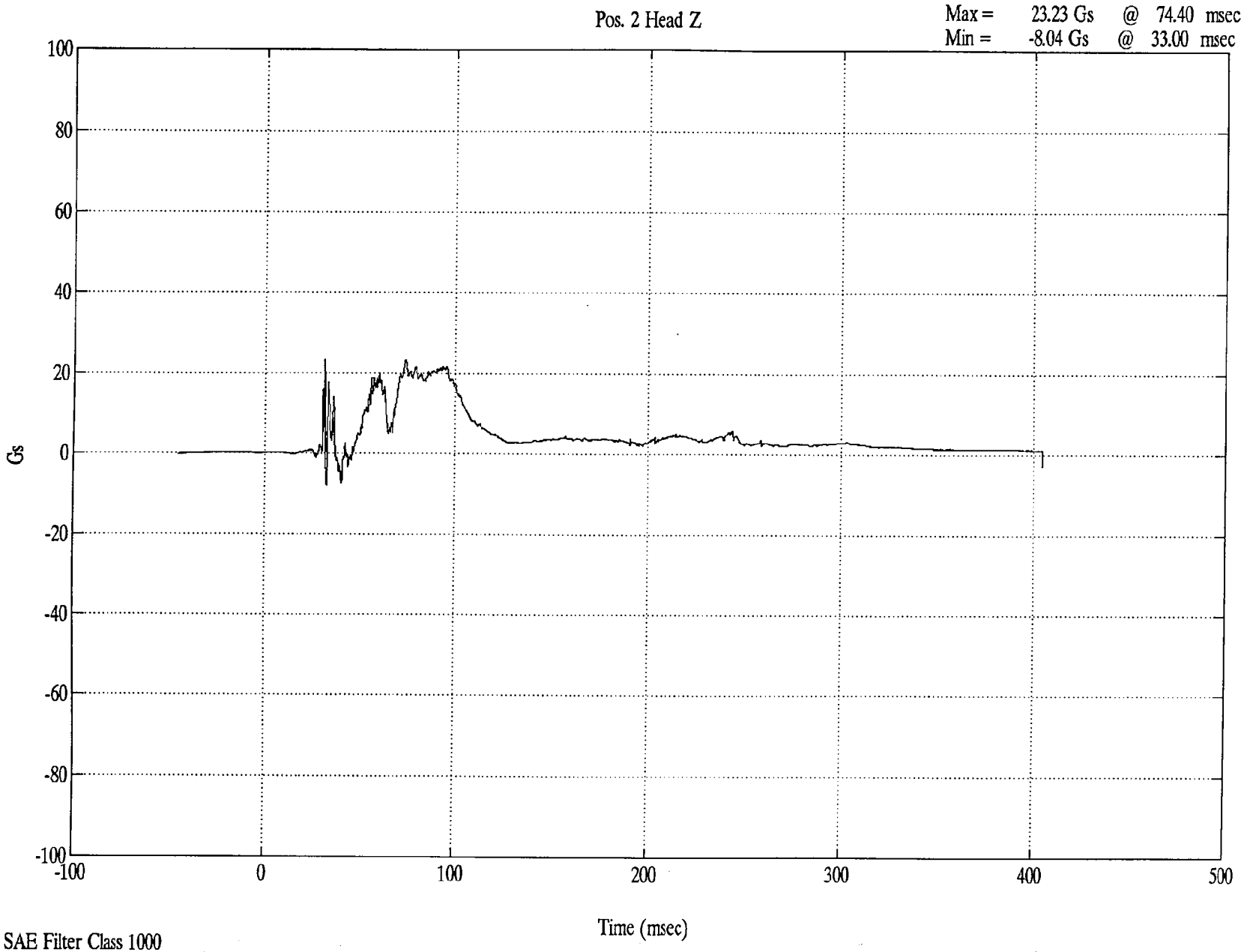


B-57

8313-11

SAE Filter Class 1000

NCAP TEST #11 - 1996 DODGE CARAVAN

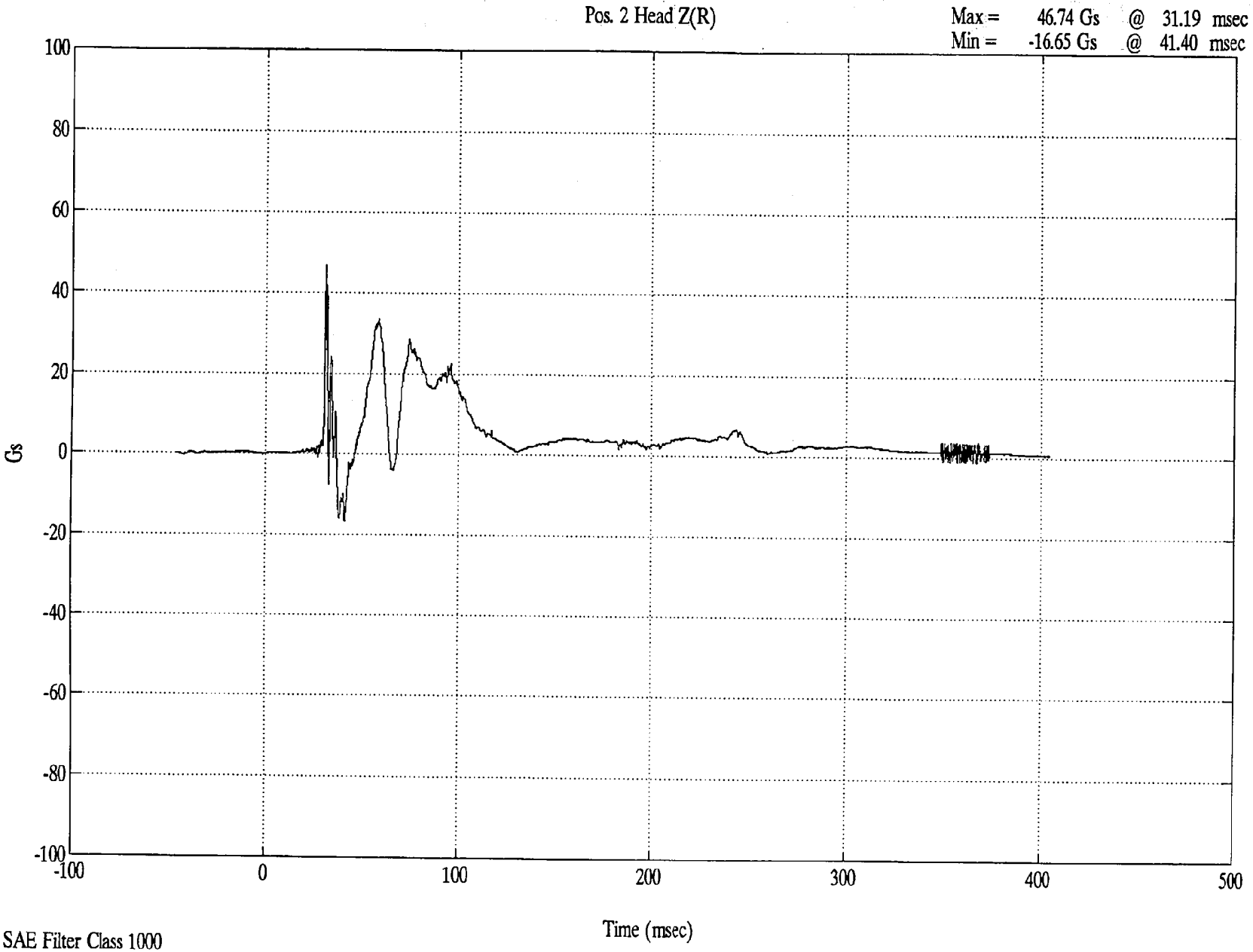


B-58

8313-11

SAE Filter Class 1000

NCAP TEST #11 - 1996 DODGE CARAVAN

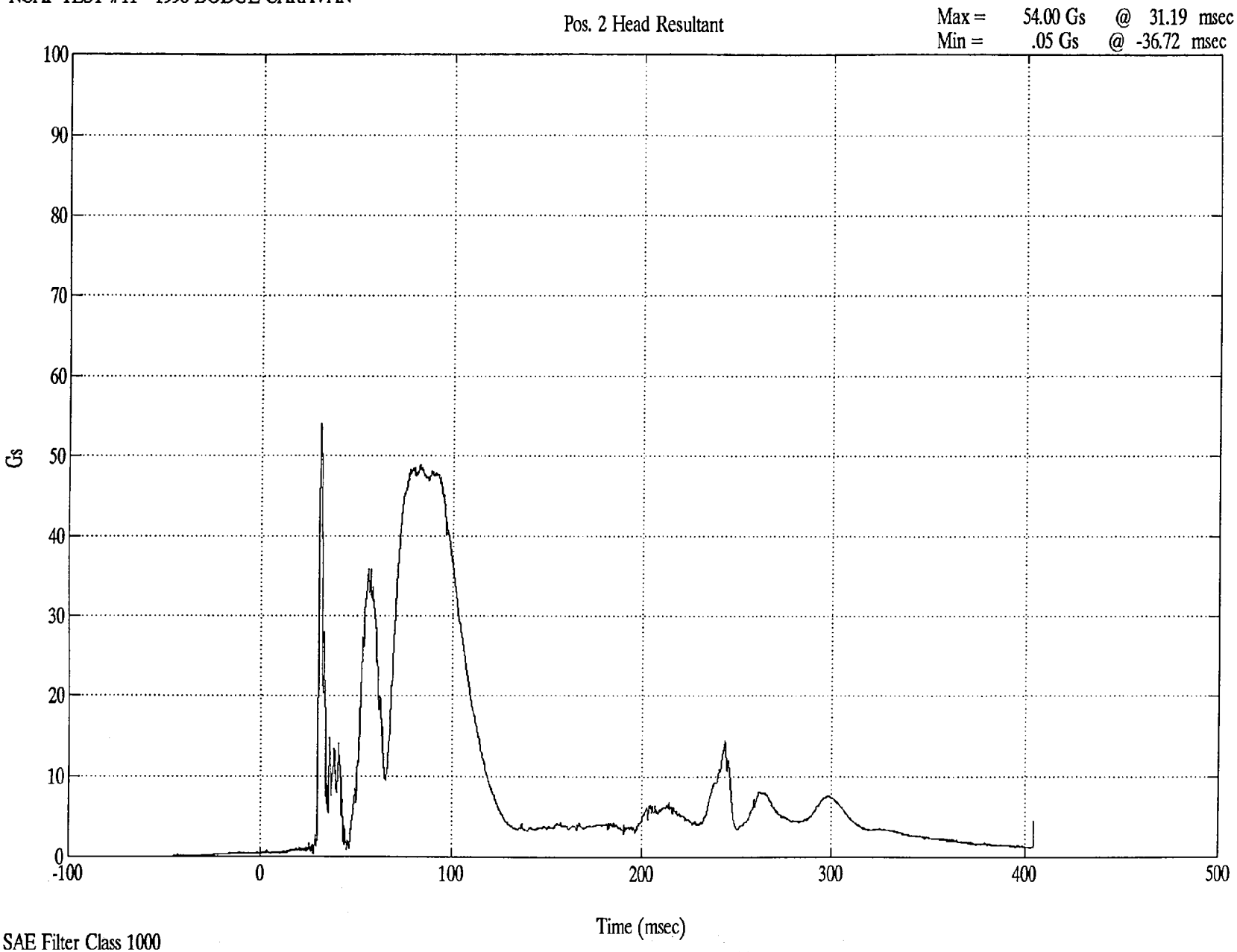


B-59

8313-11

SAE Filter Class 1000

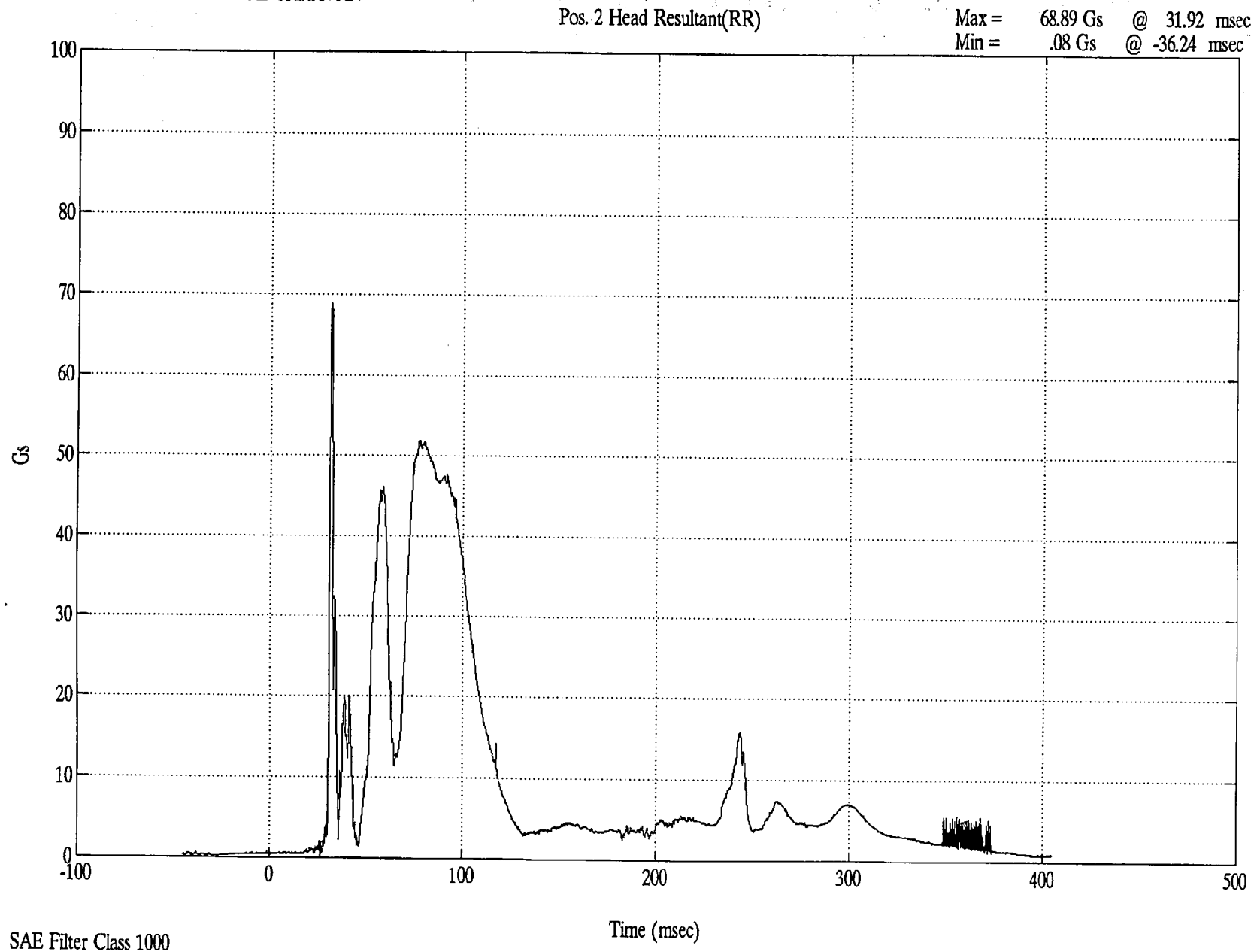
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 1000

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

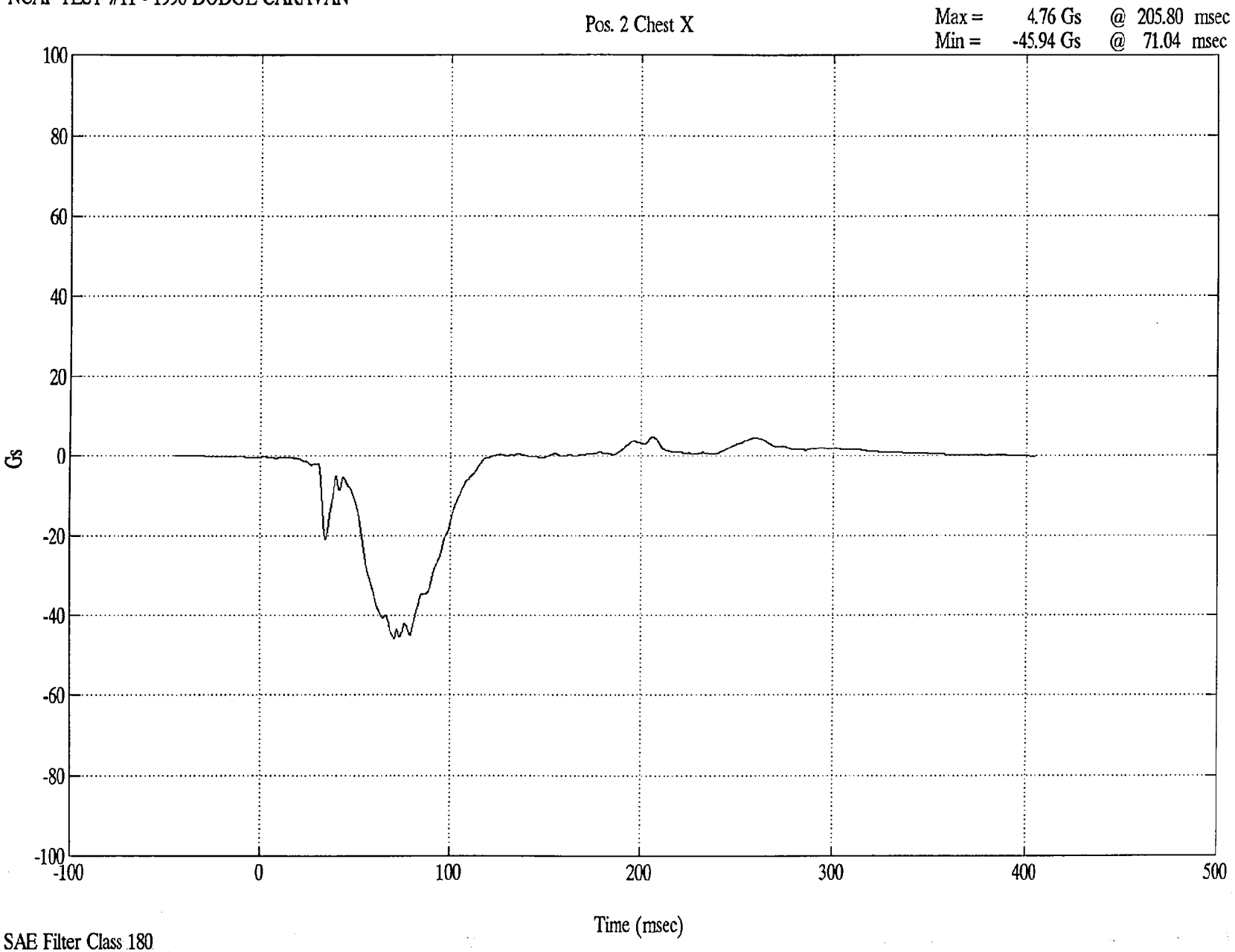


B-61

8313-11

SAE Filter Class 1000

NCAP TEST #11 - 1996 DODGE CARAVAN

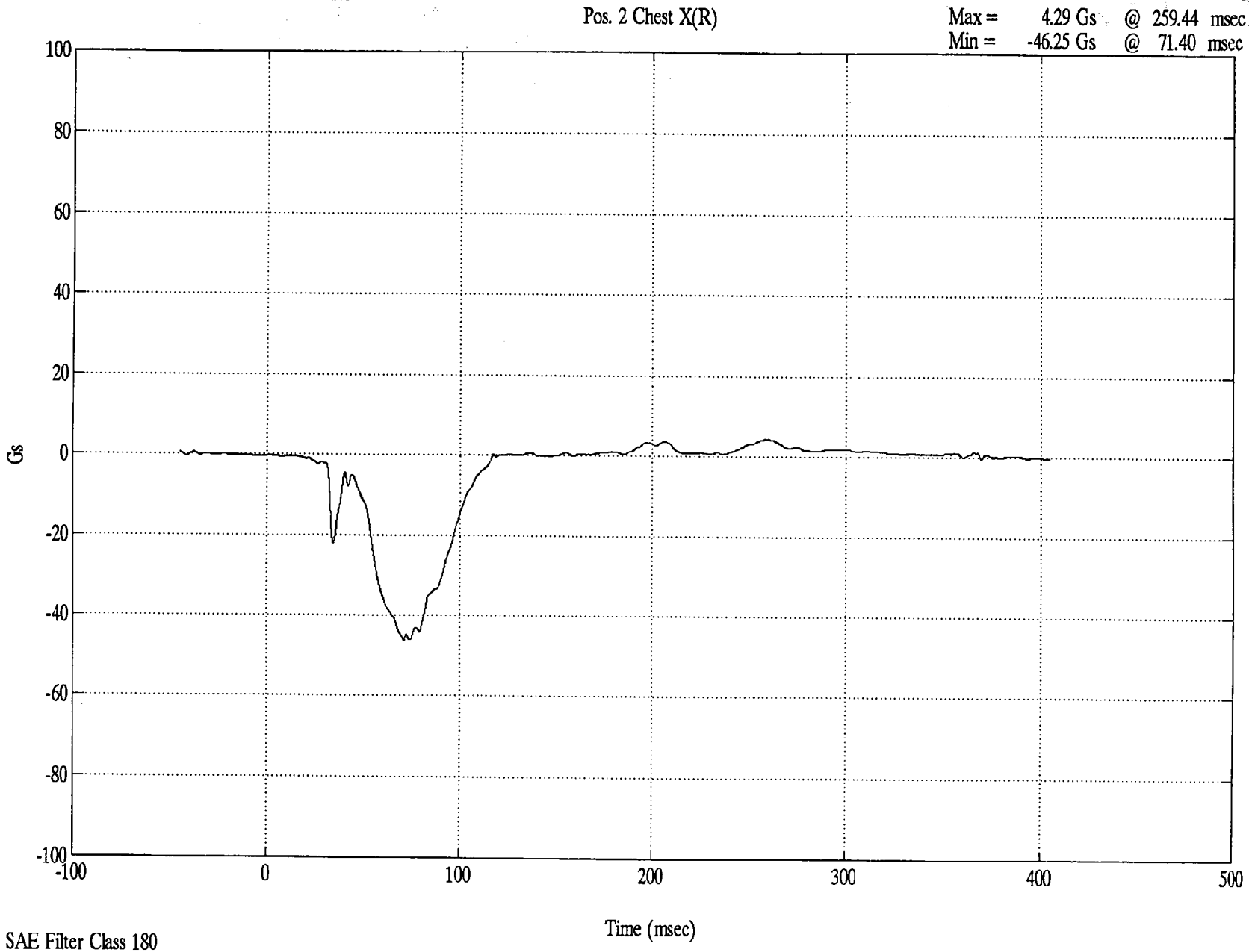


B-62

8313-11

SAE Filter Class 180

NCAP TEST #11 - 1996 DODGE CARAVAN

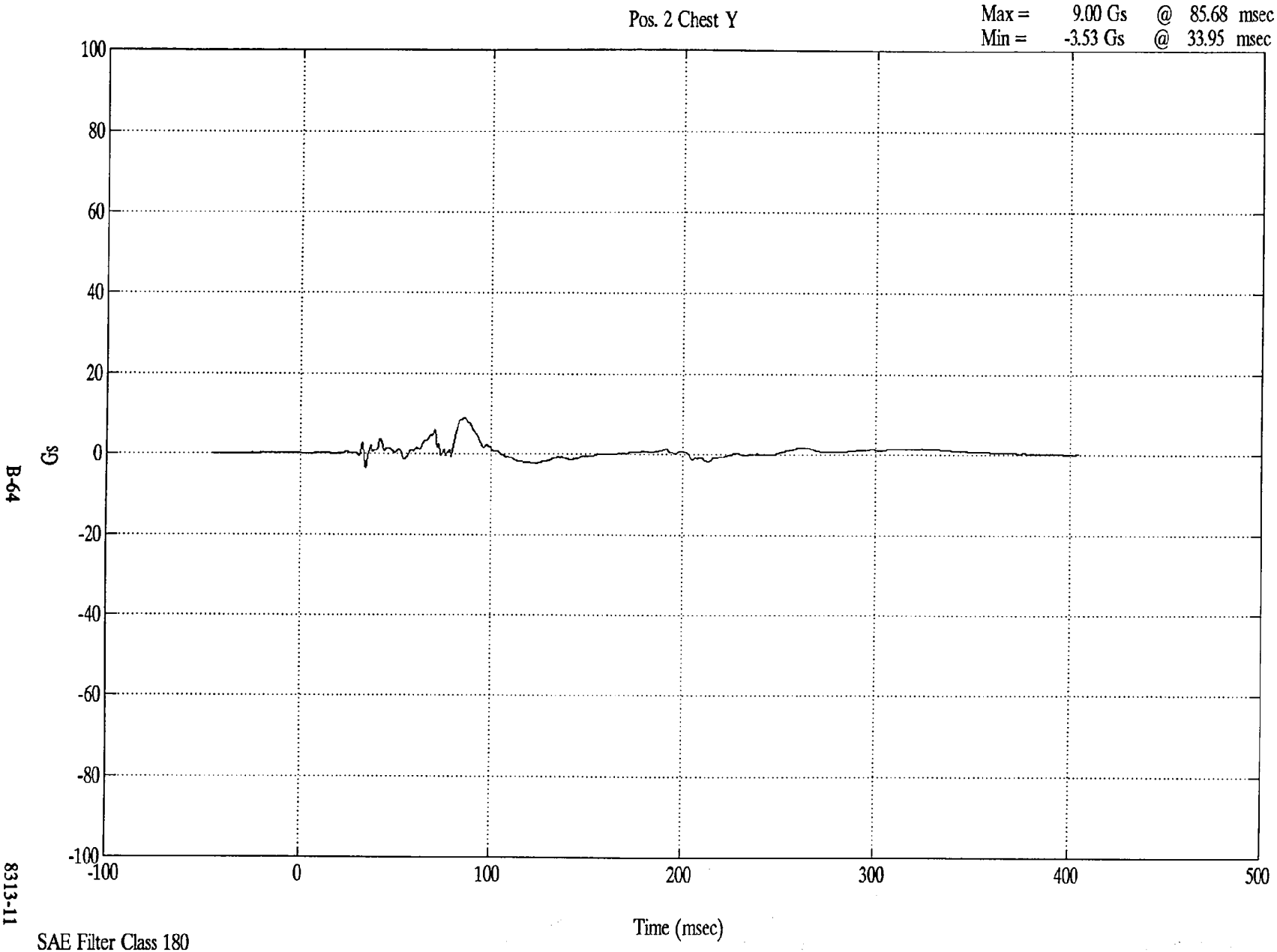


B-63

8313-11

SAE Filter Class 180

NCAP TEST #11 - 1996 DODGE CARAVAN

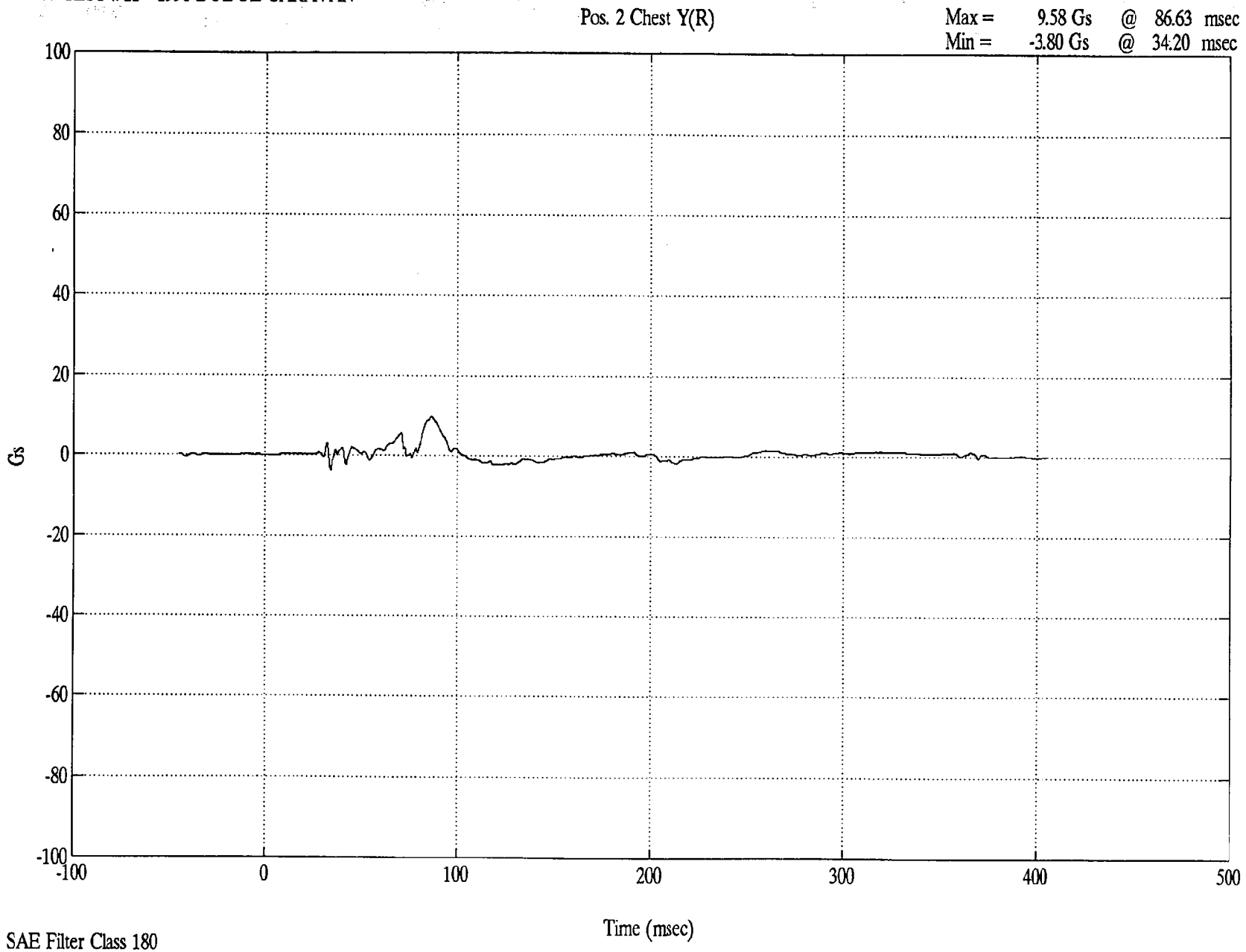


B-64

8313-11

SAE Filter Class 180

NCAP TEST #11 - 1996 DODGE CARAVAN

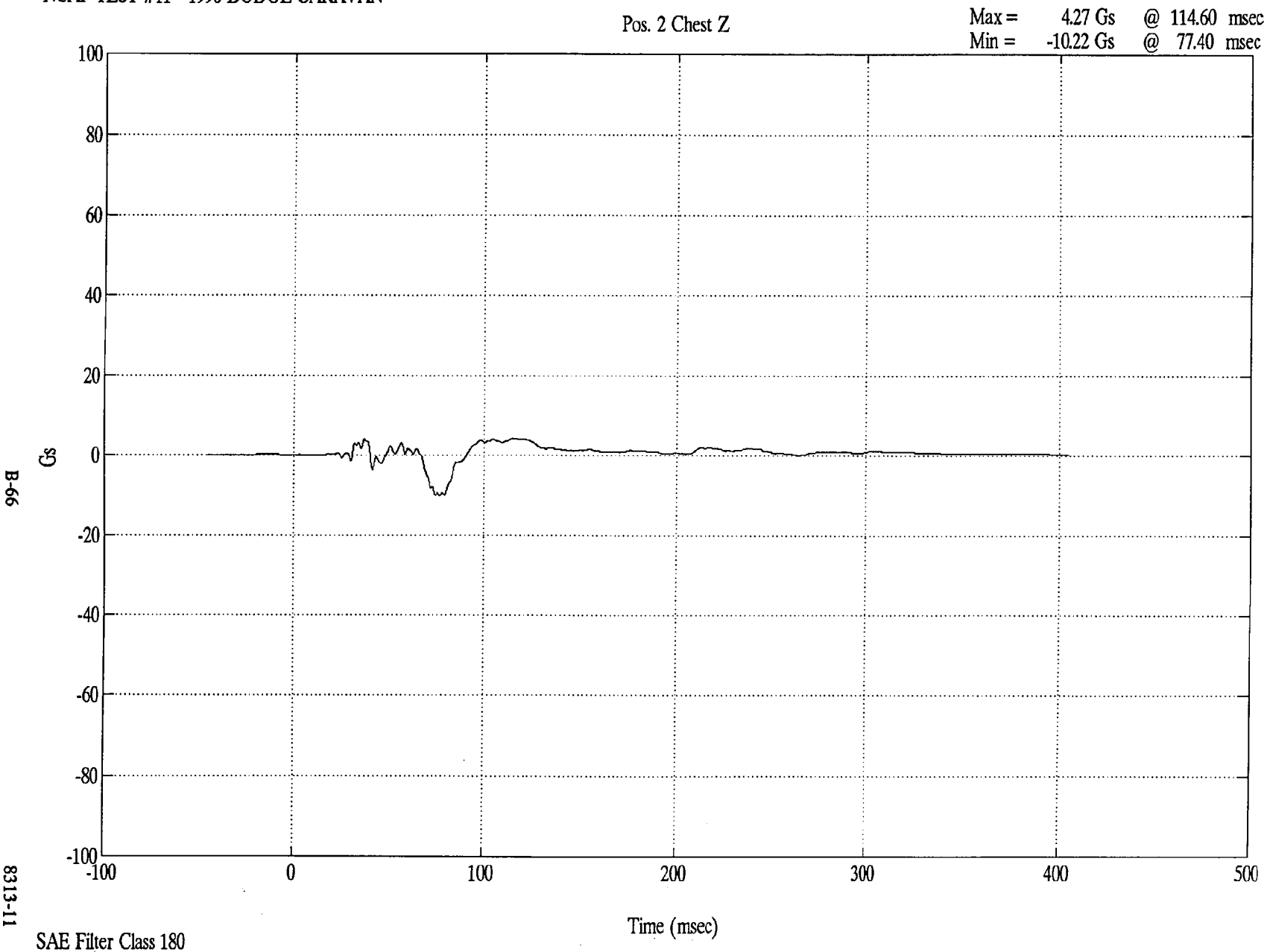


B-65

8313-11

SAE Filter Class 180

NCAP TEST #11 - 1996 DODGE CARAVAN

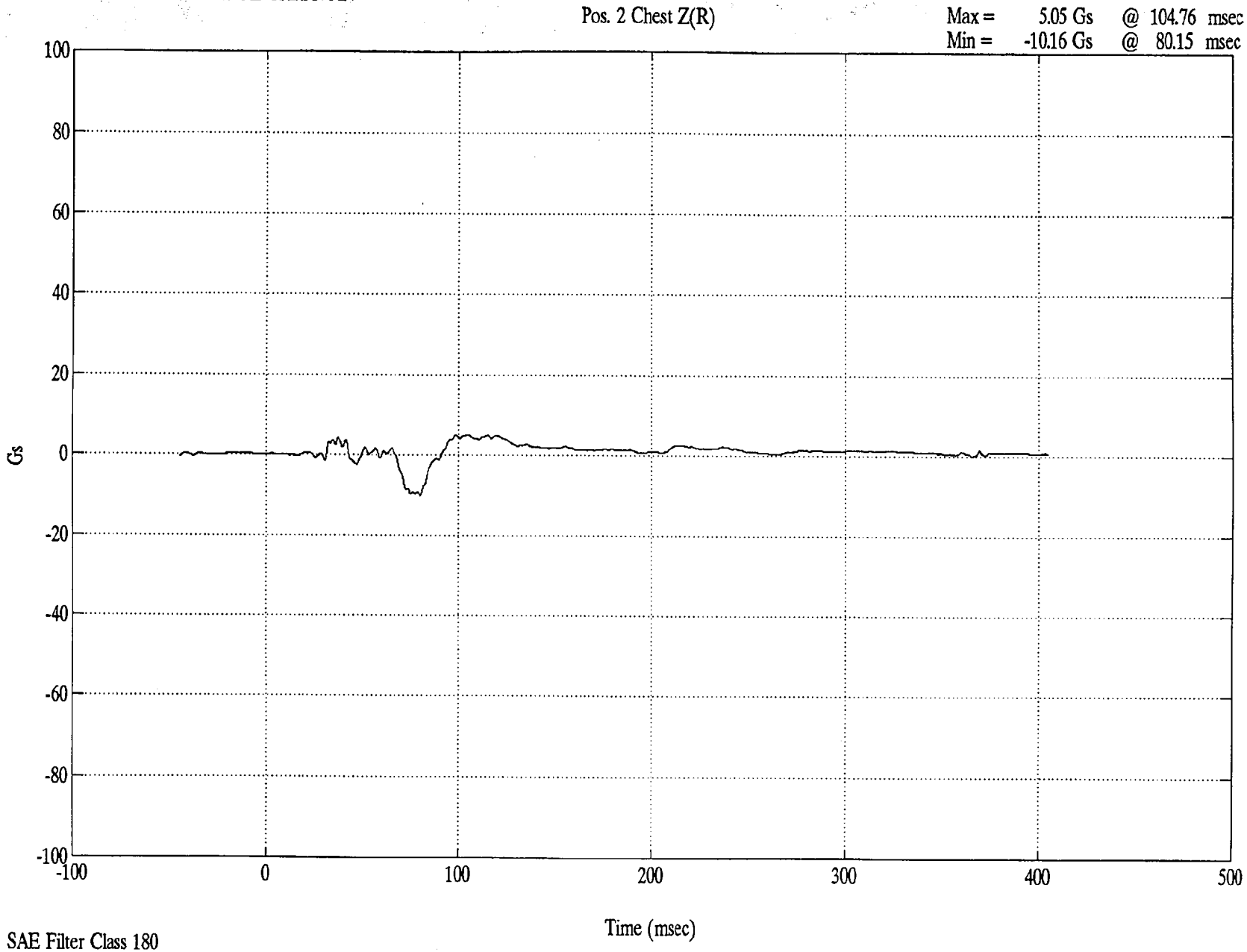


B-66

8313-11

SAE Filter Class 180

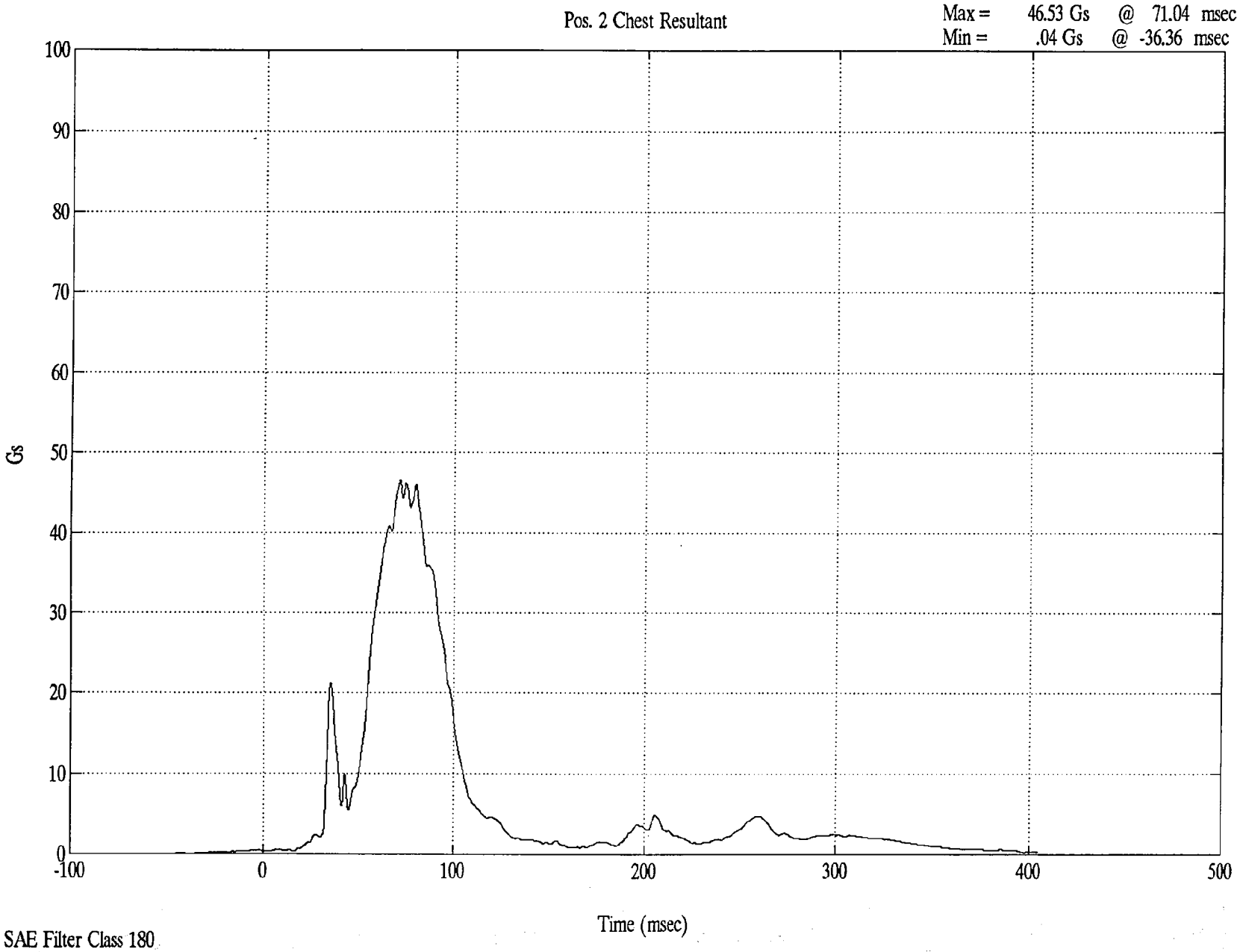
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

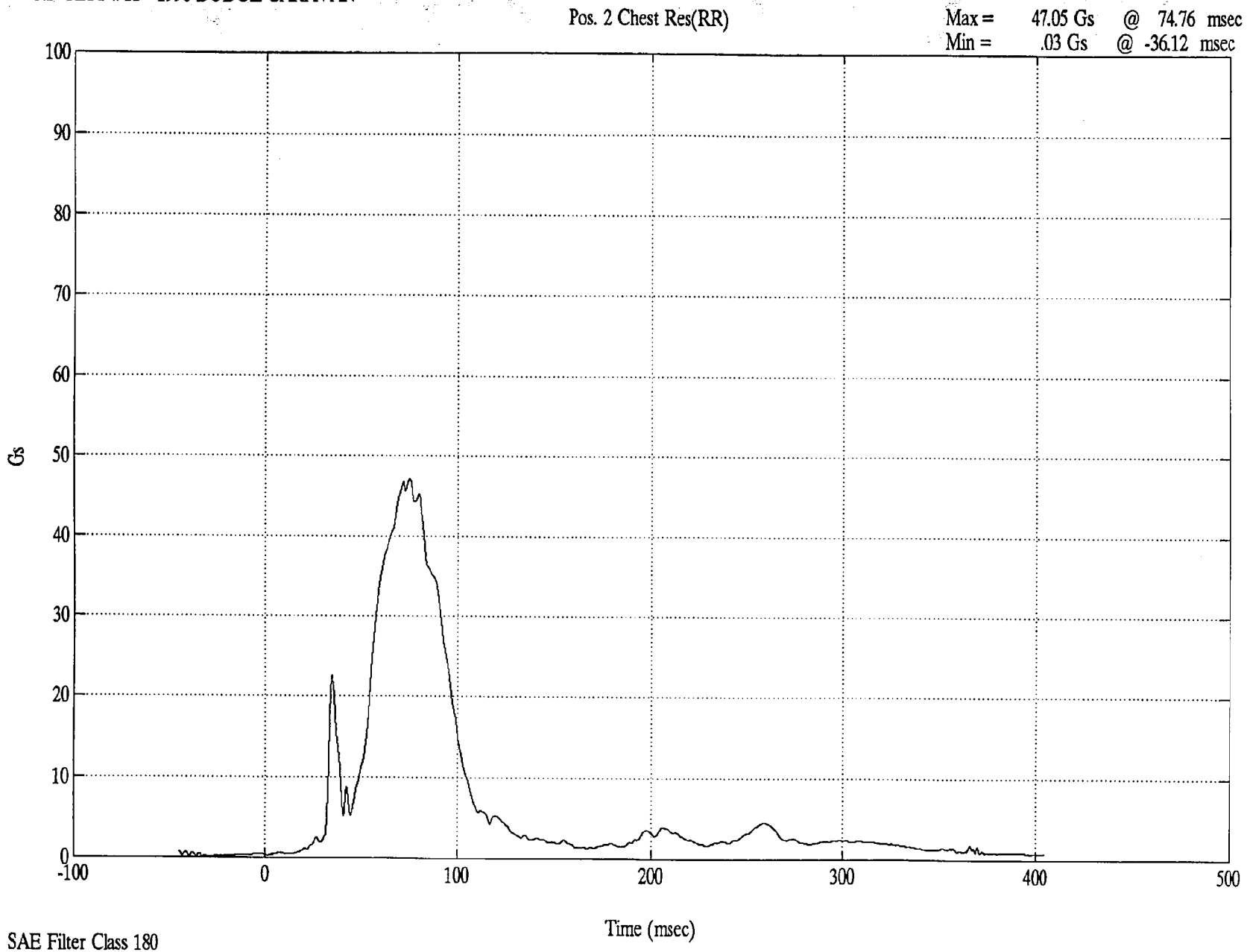
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

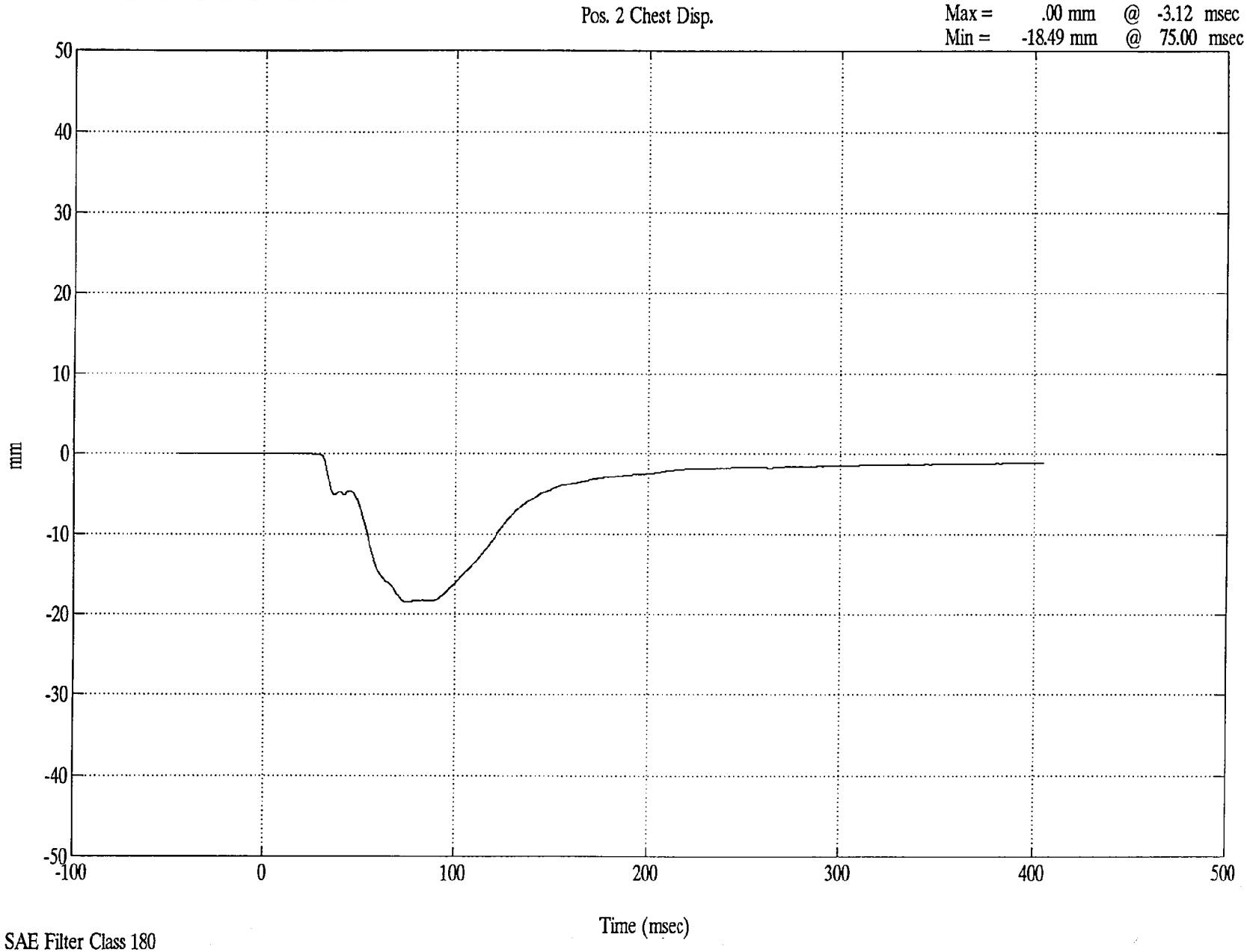
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

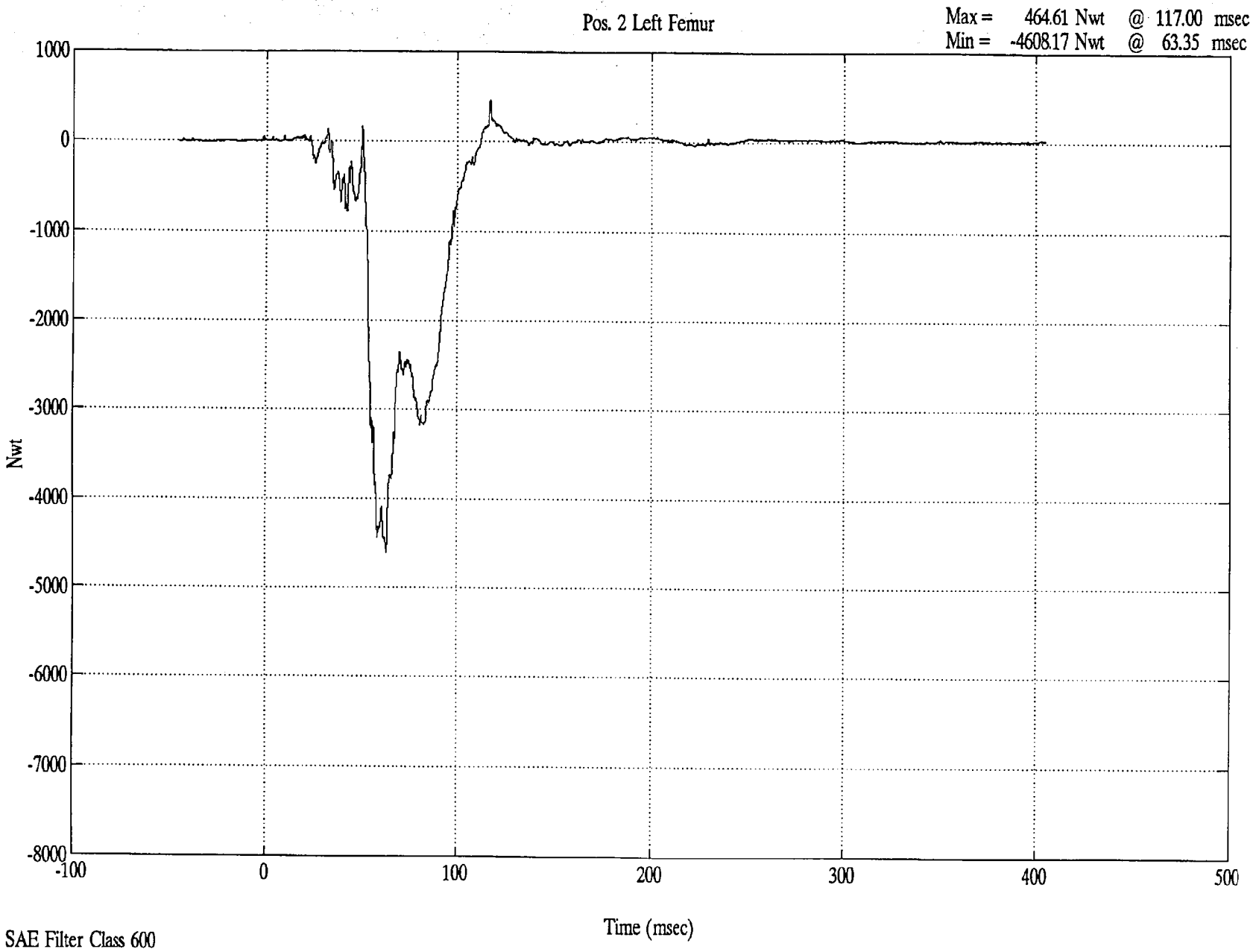


SAE Filter Class 180

B-70

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

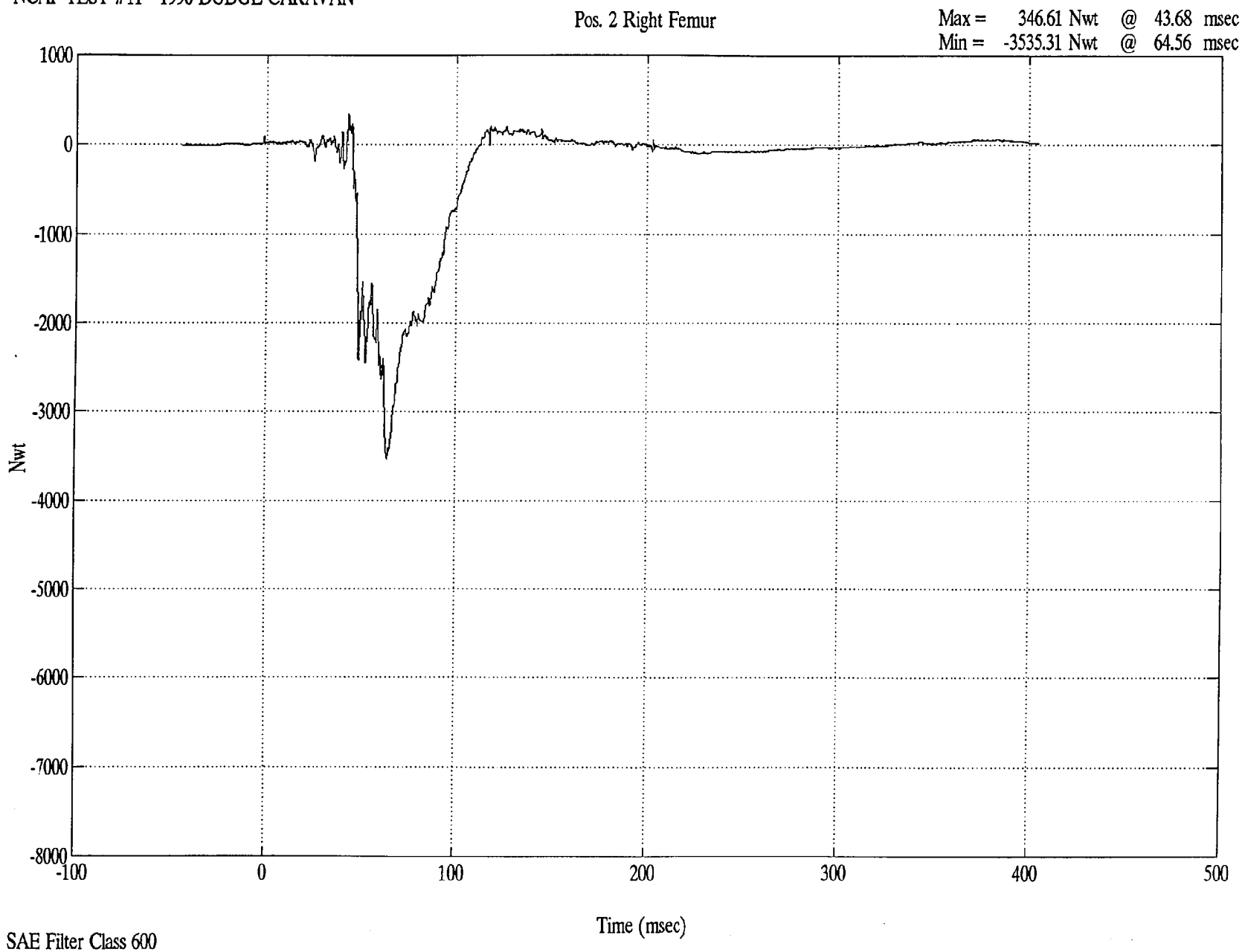


B-71

8313-11

SAE Filter Class 600

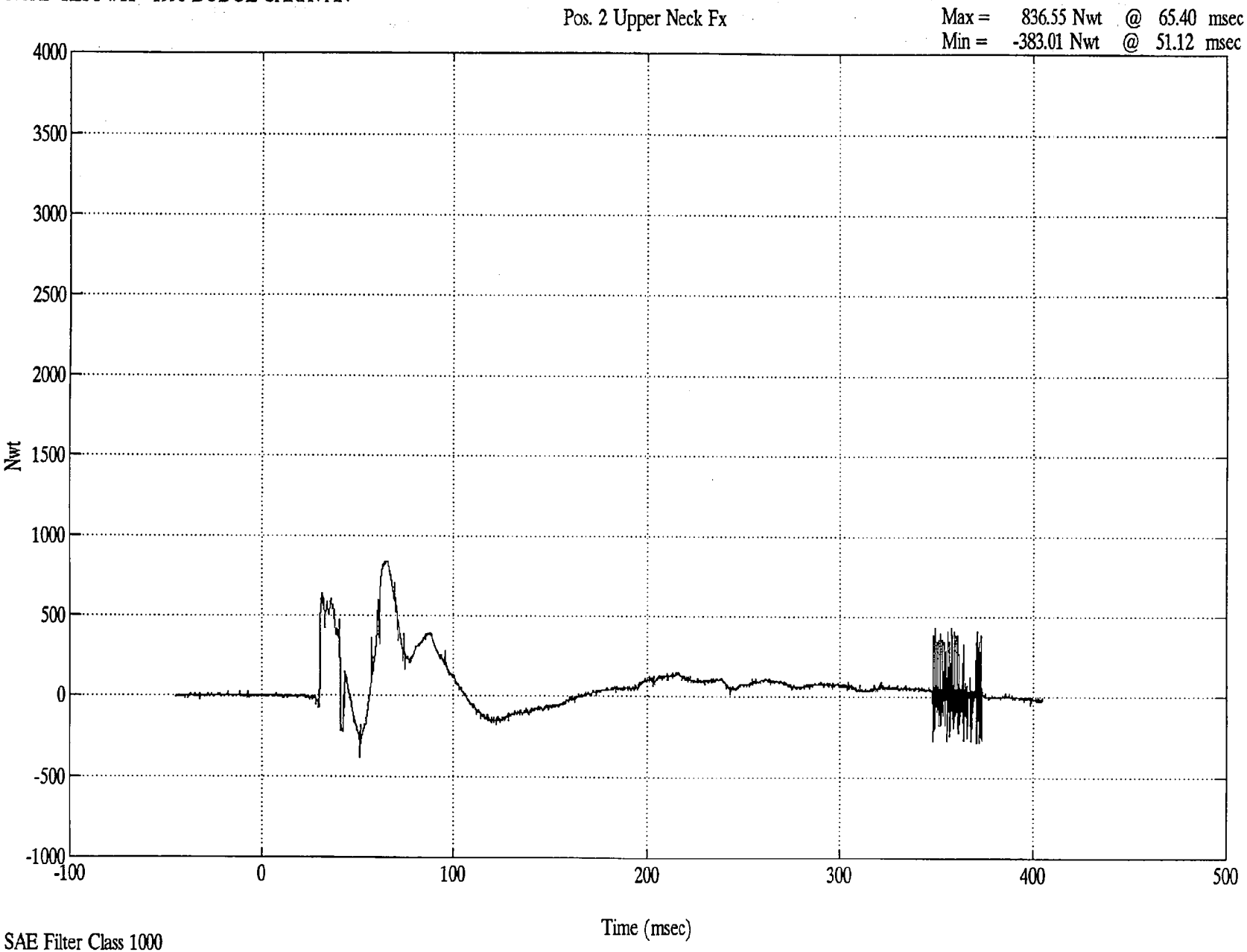
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 600

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

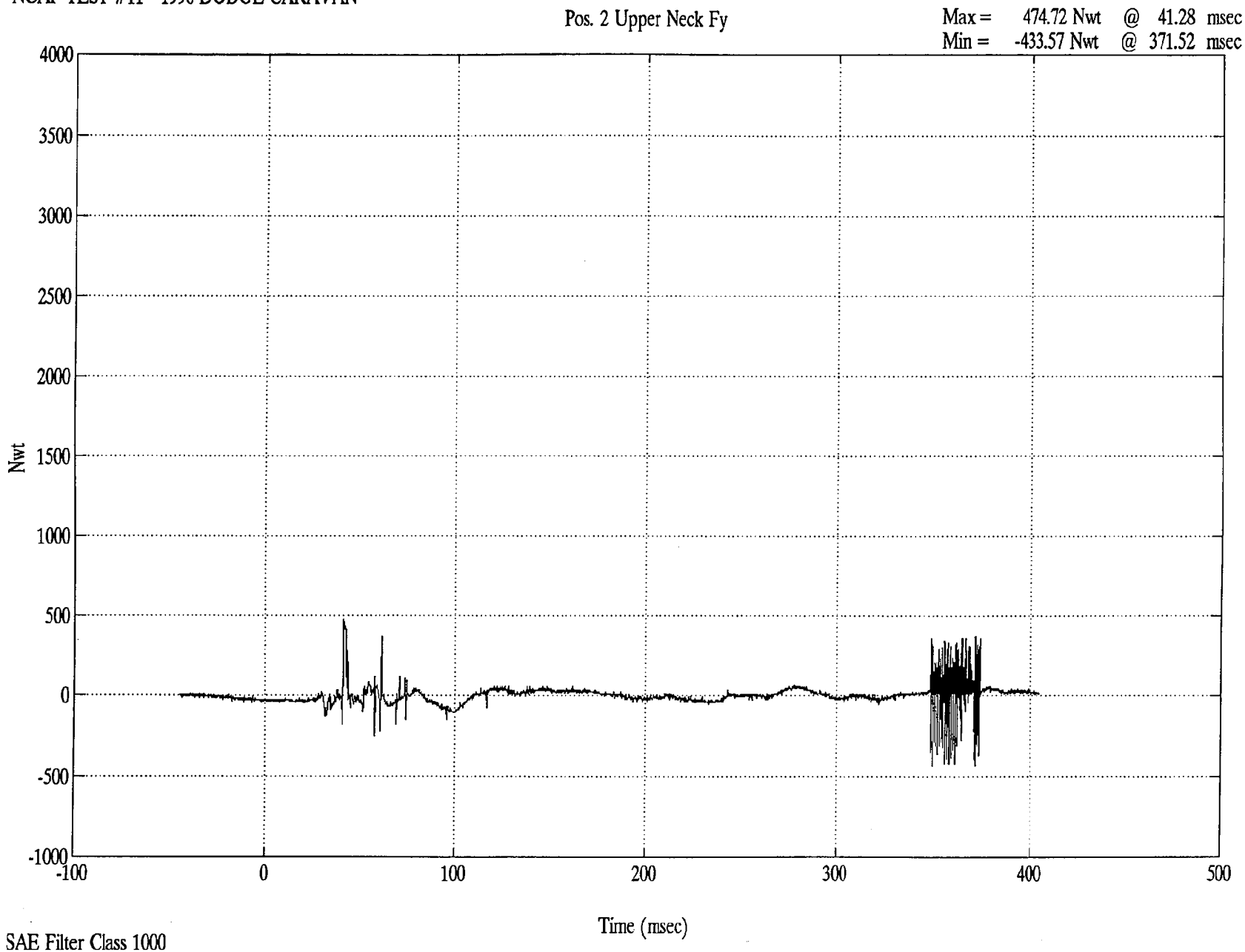


SAE Filter Class 1000

B-73

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN



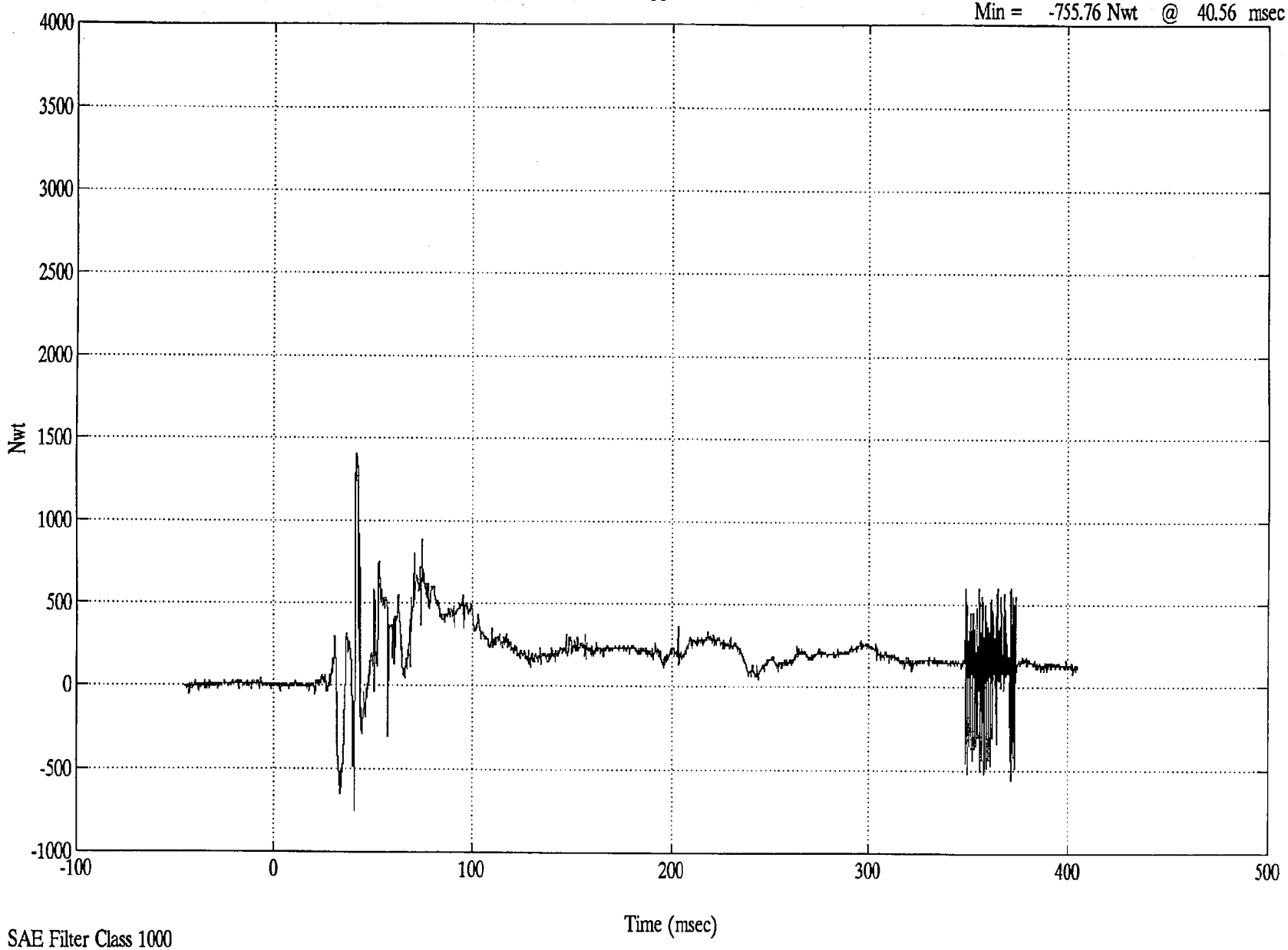
SAE Filter Class 1000

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

Pos. 2 Upper Neck Fz

Max = 1403.79 Nwt @ 41.76 msec
Min = -755.76 Nwt @ 40.56 msec

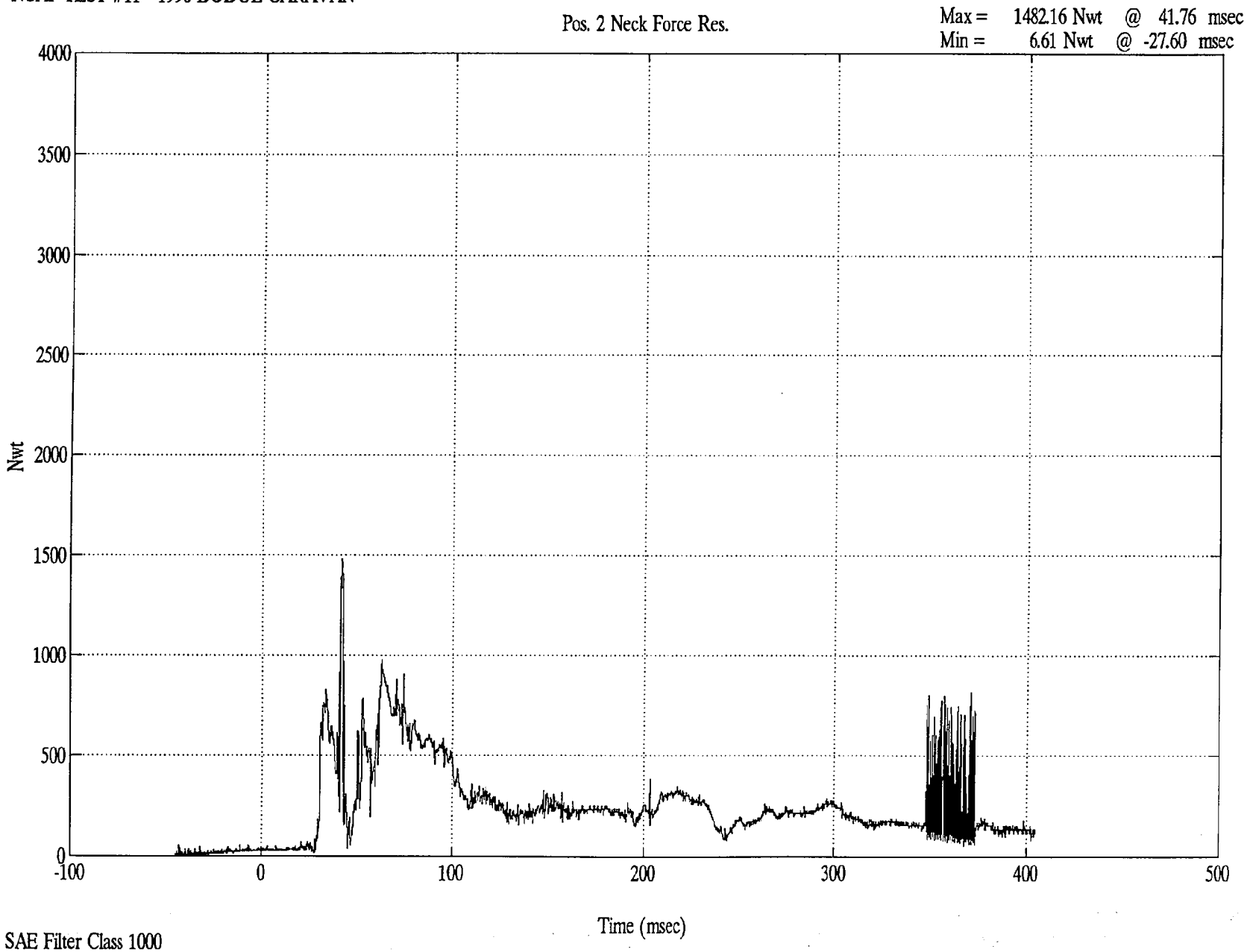


B-75

8313-11

SAE Filter Class 1000

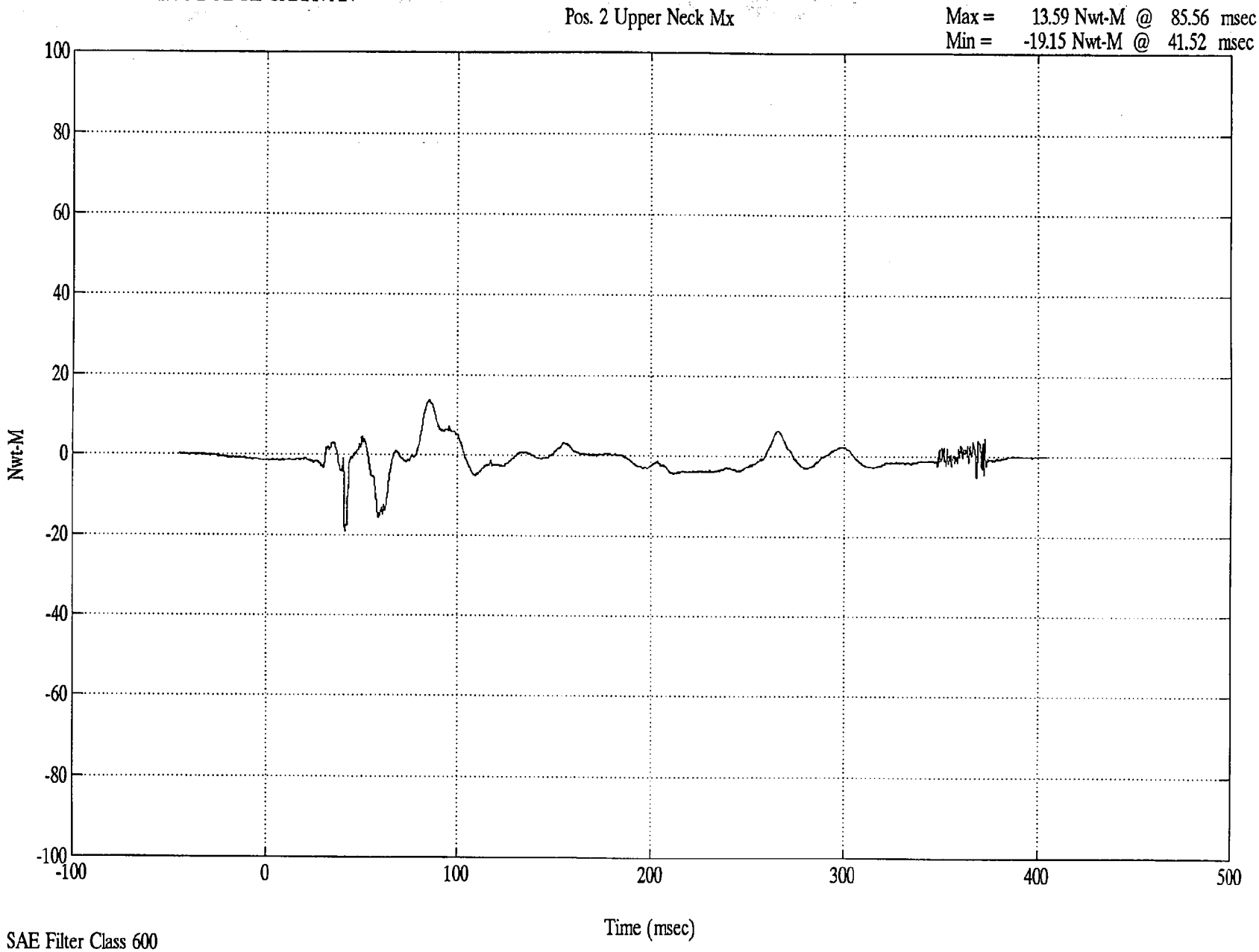
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 1000

8313-11

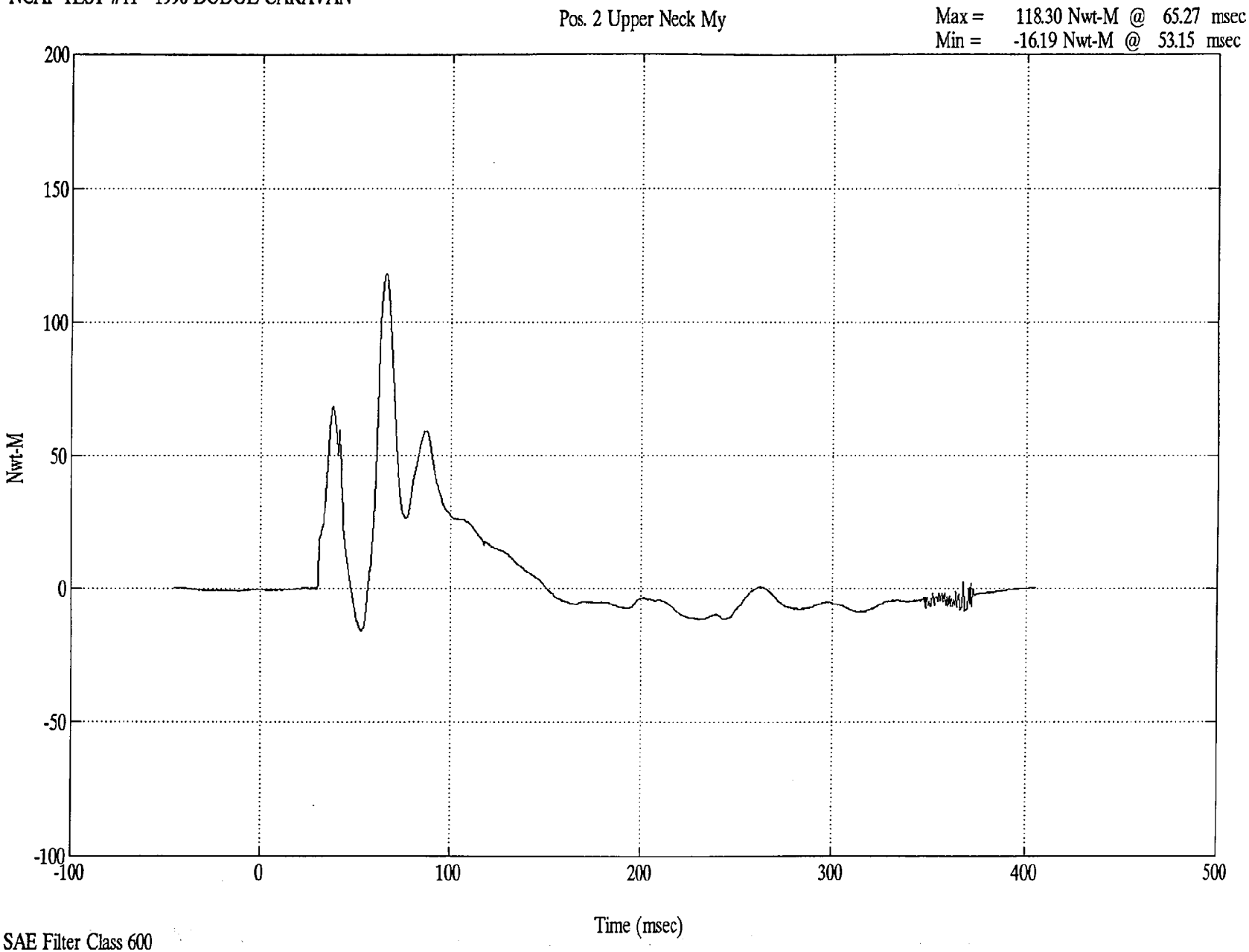
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 600

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

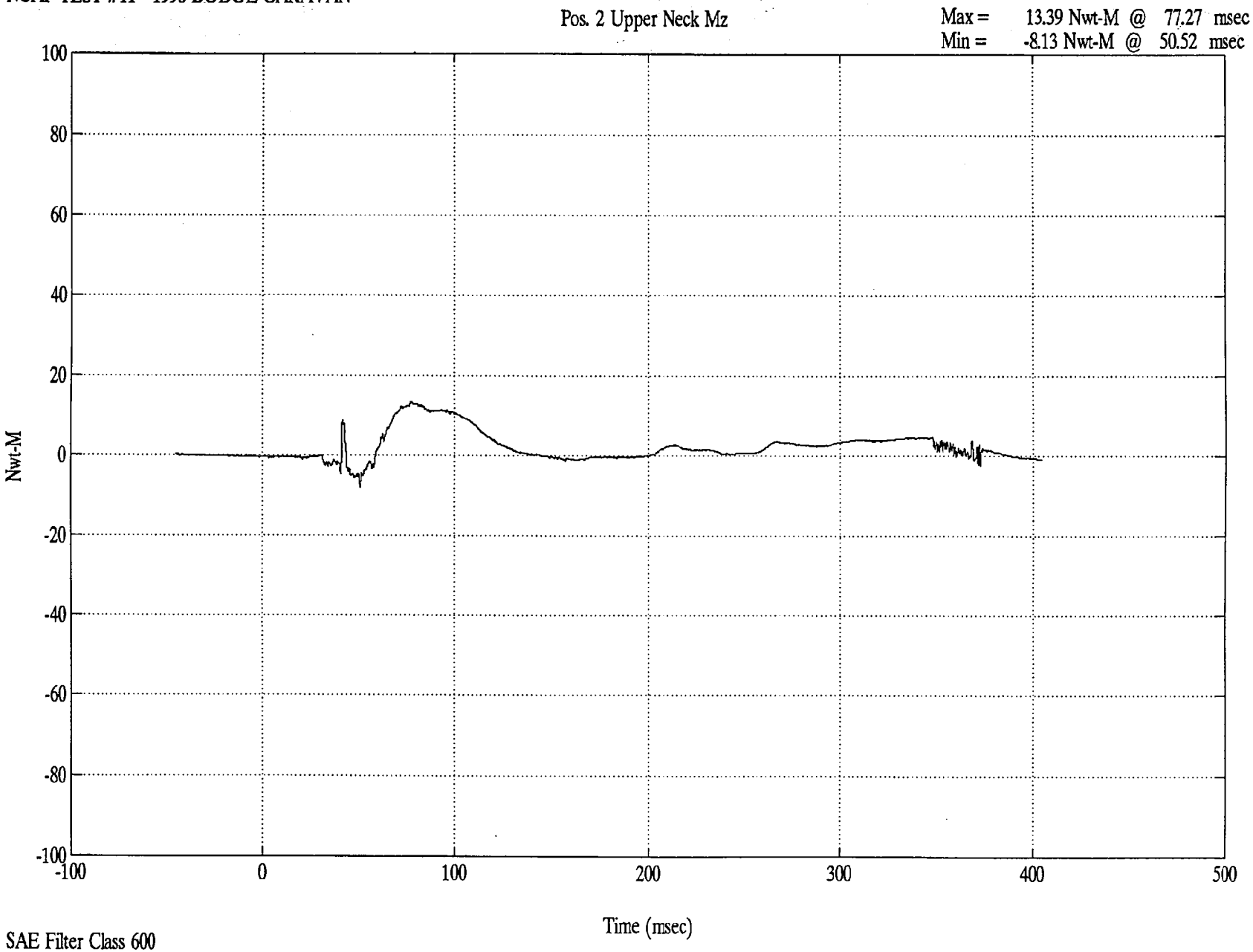


B-78

8313-11

SAE Filter Class 600

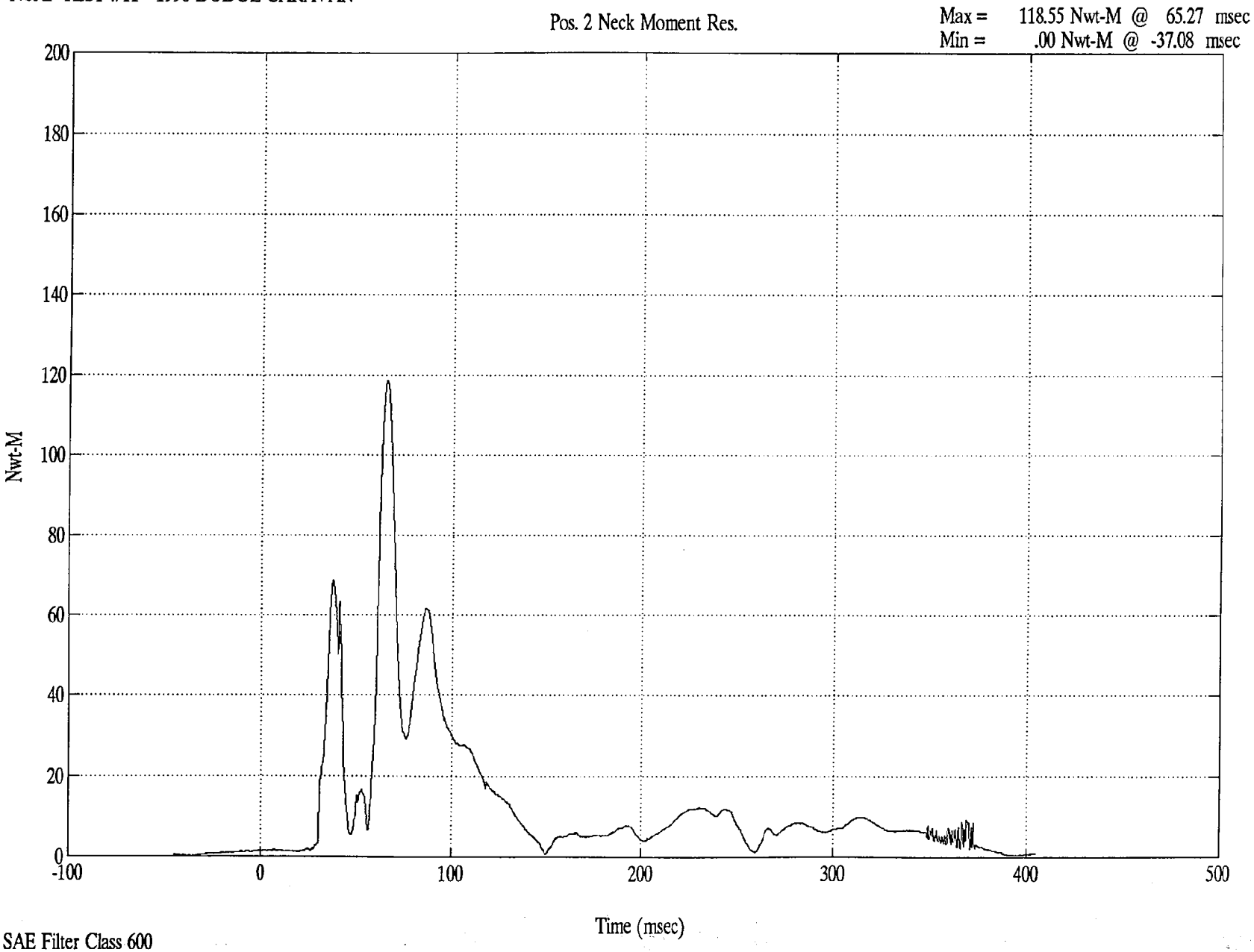
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 600

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

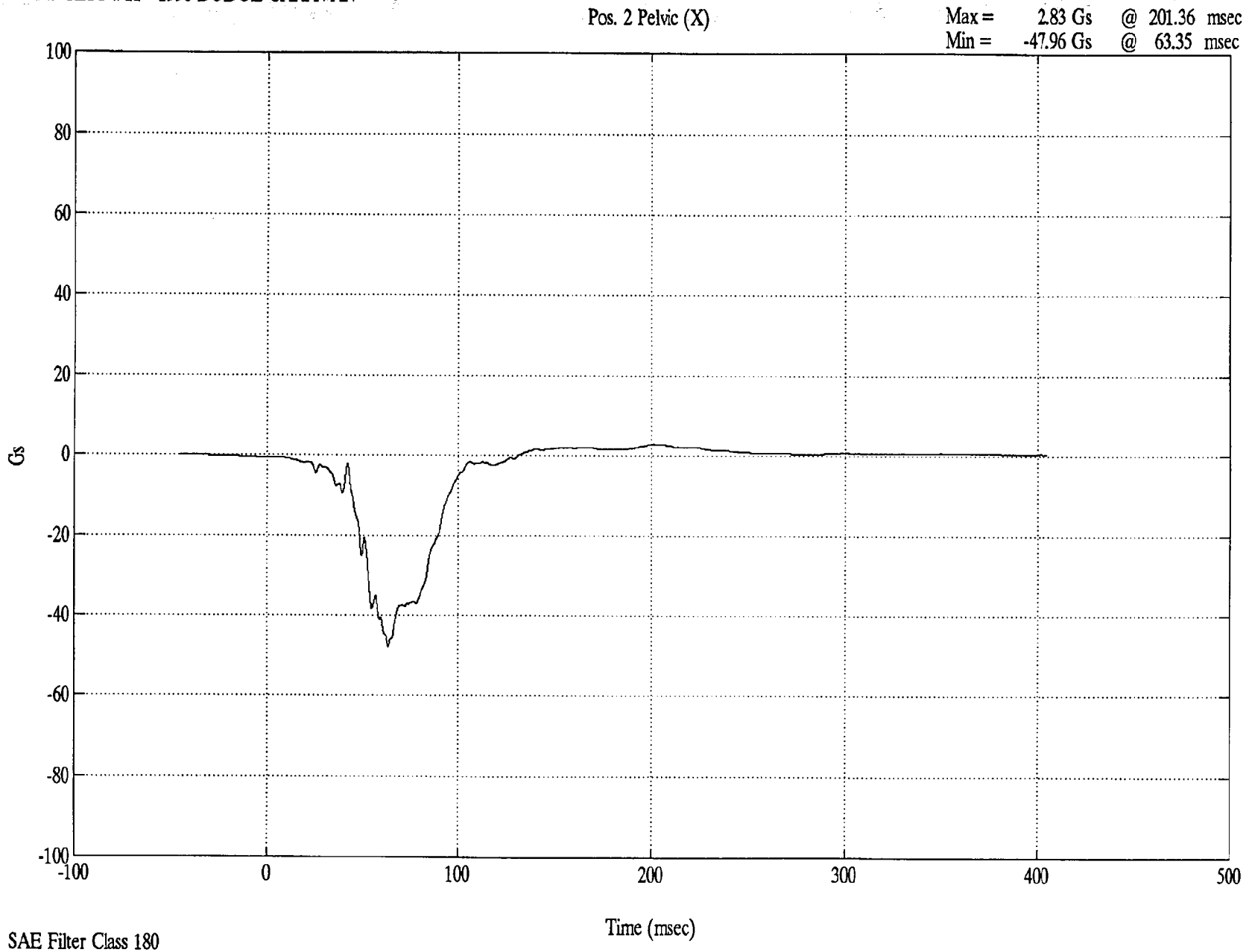


B-80

8313-11

SAE Filter Class 600

NCAP TEST #11 - 1996 DODGE CARAVAN

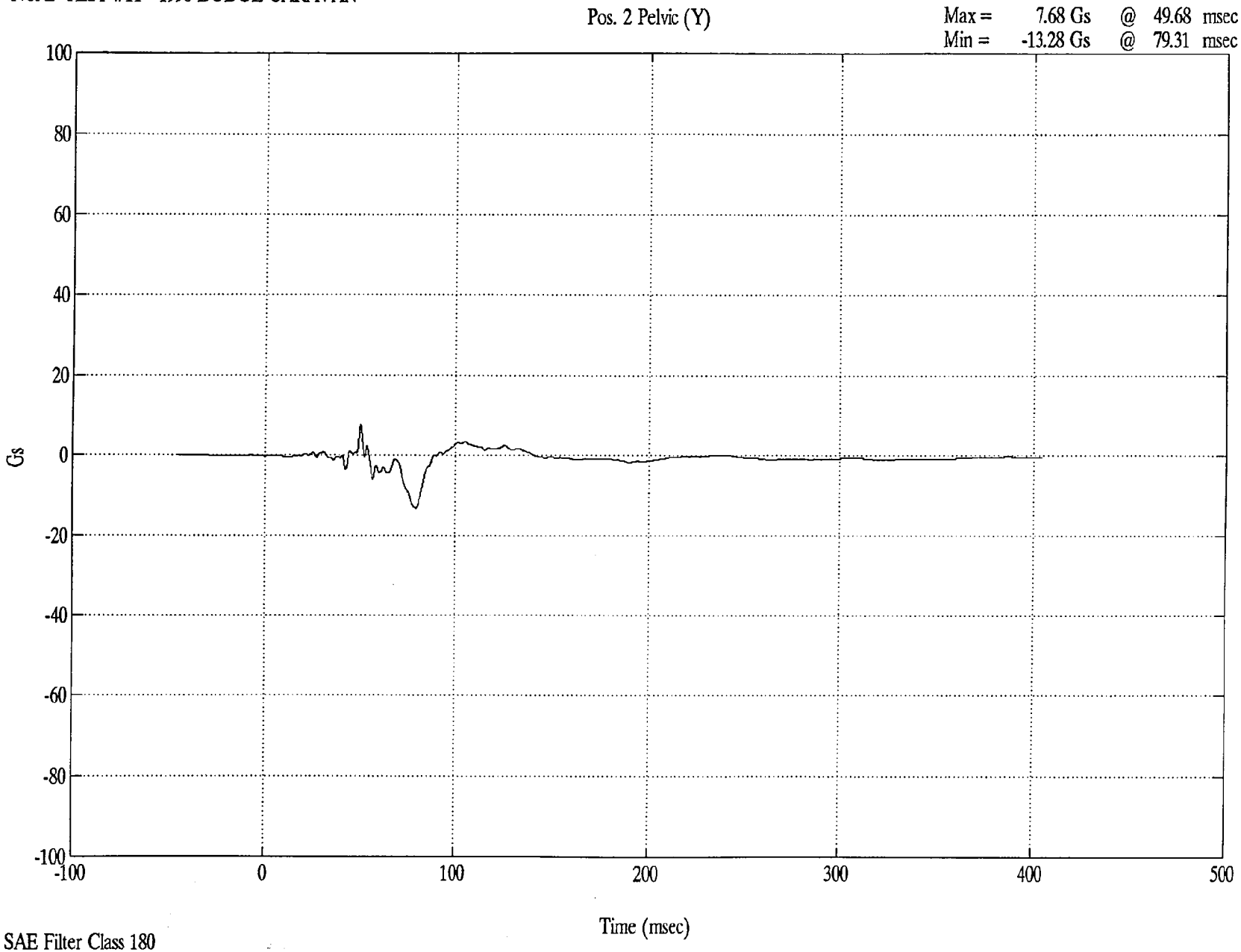


B-81

8313-11

SAE Filter Class 180

NCAP TEST #11 - 1996 DODGE CARAVAN

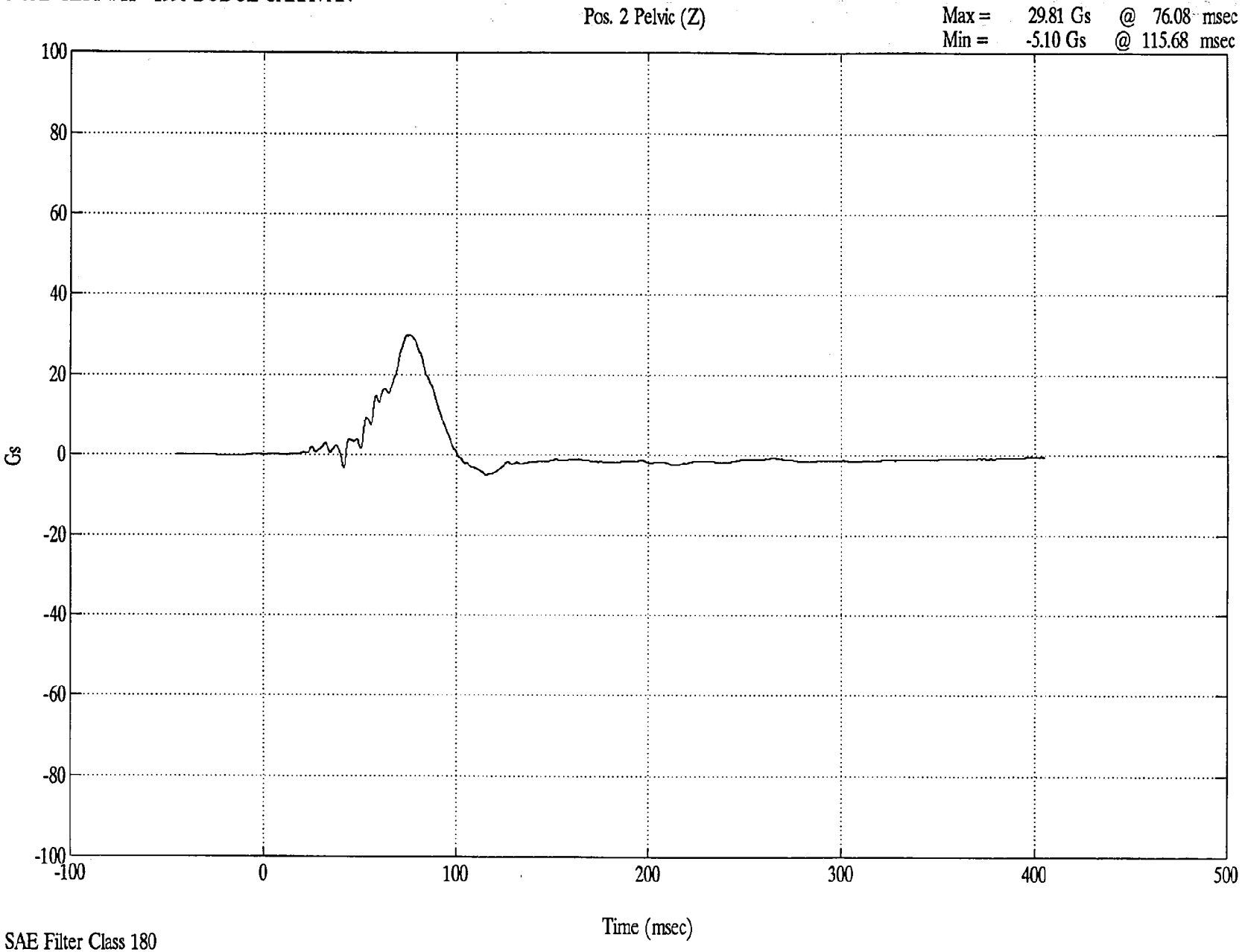


B-82

8313-11

SAE Filter Class 180

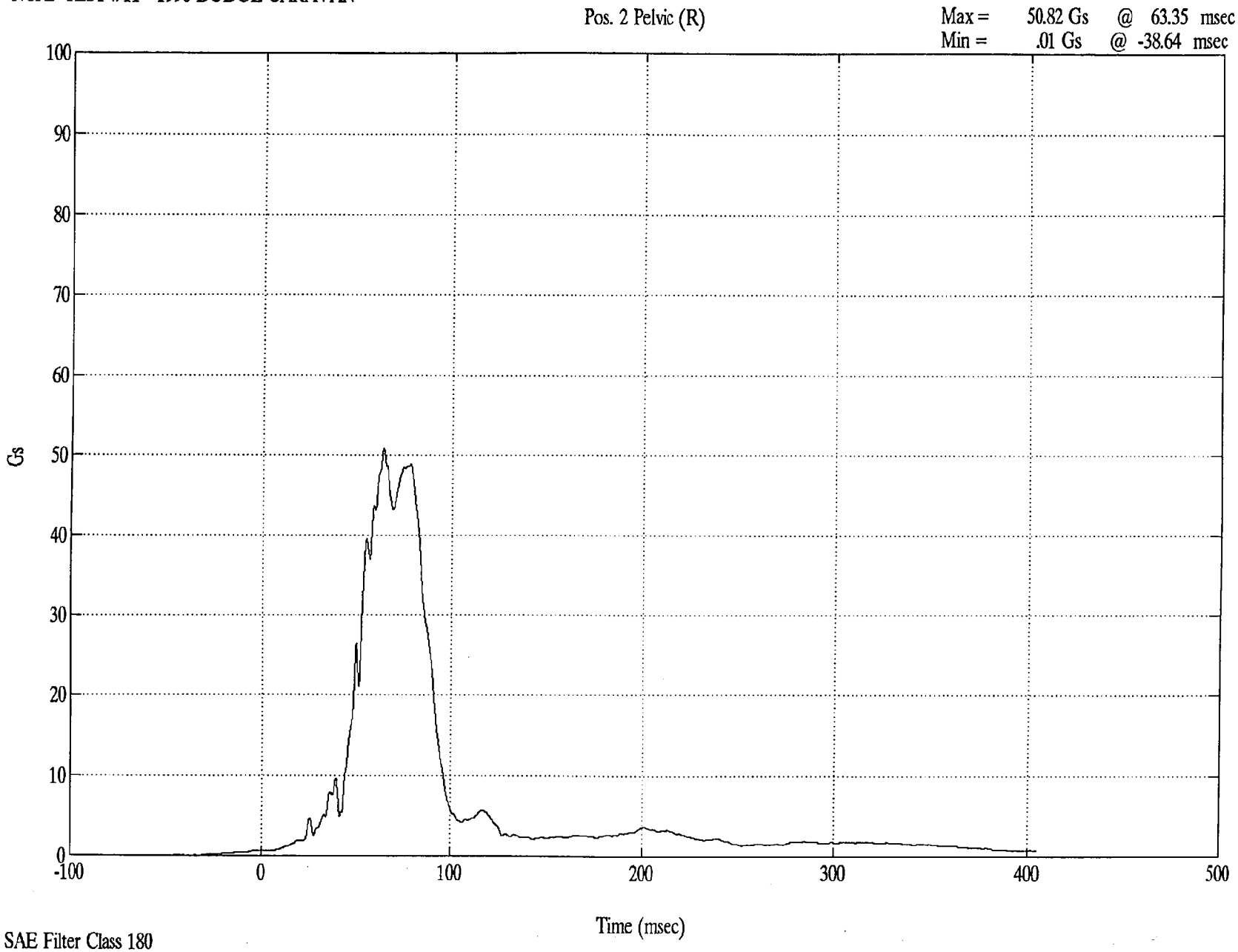
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN



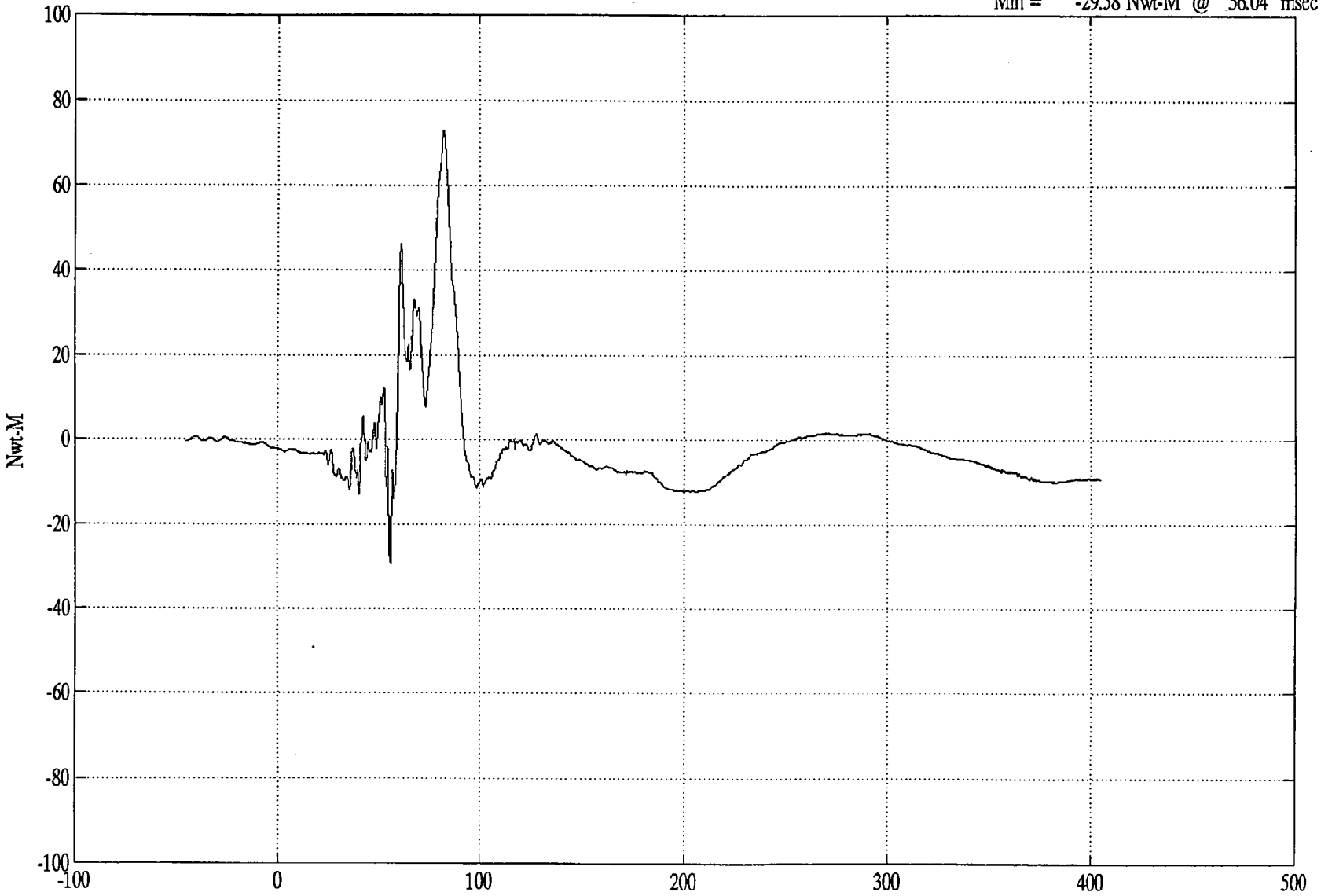
SAE Filter Class 180

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

Pos. 2 Lt Upper Tibia Mx

Max = 72.98 Nwt-M @ 82.32 msec
Min = -29.58 Nwt-M @ 56.04 msec

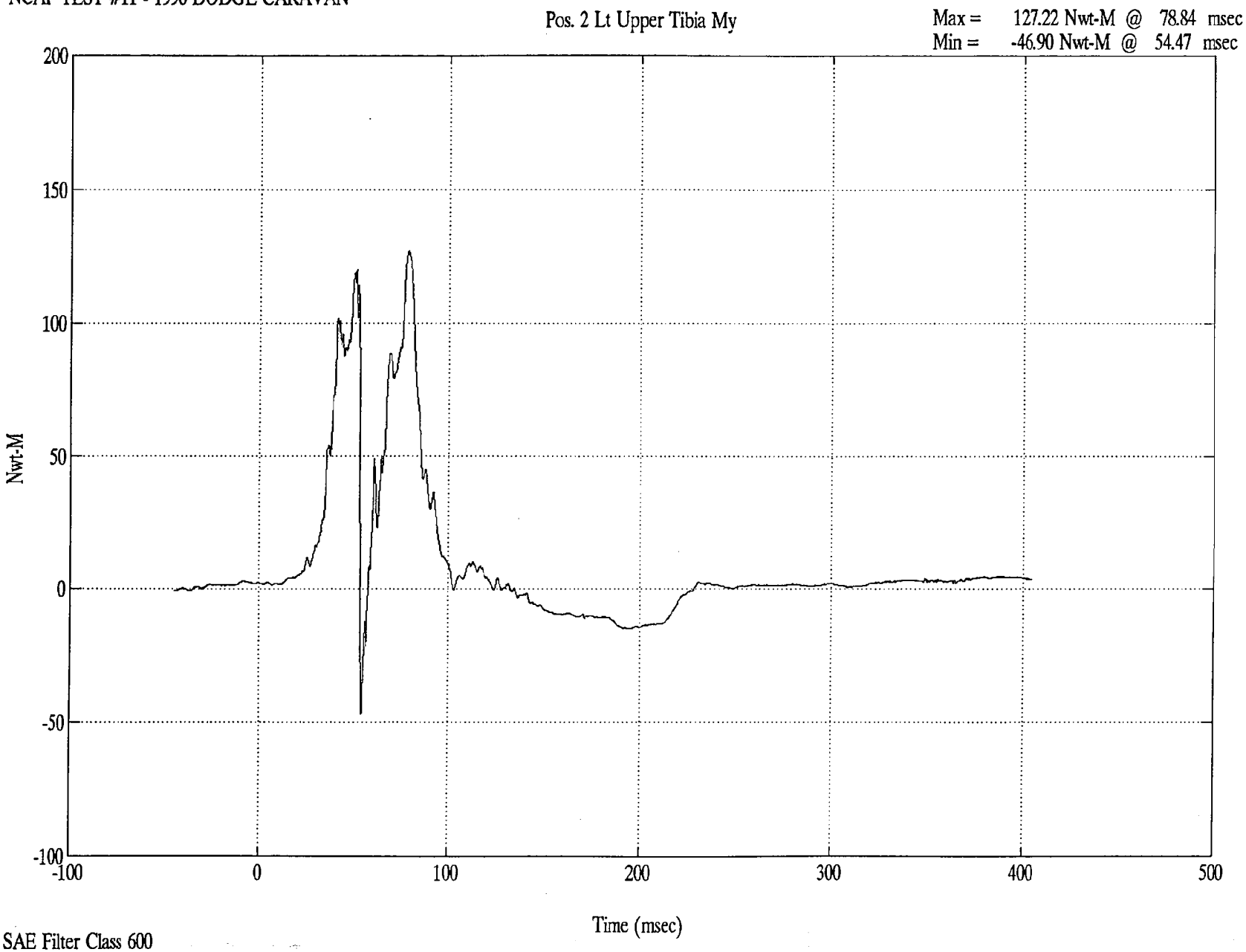


SAE Filter Class 600

B-85

8313-11

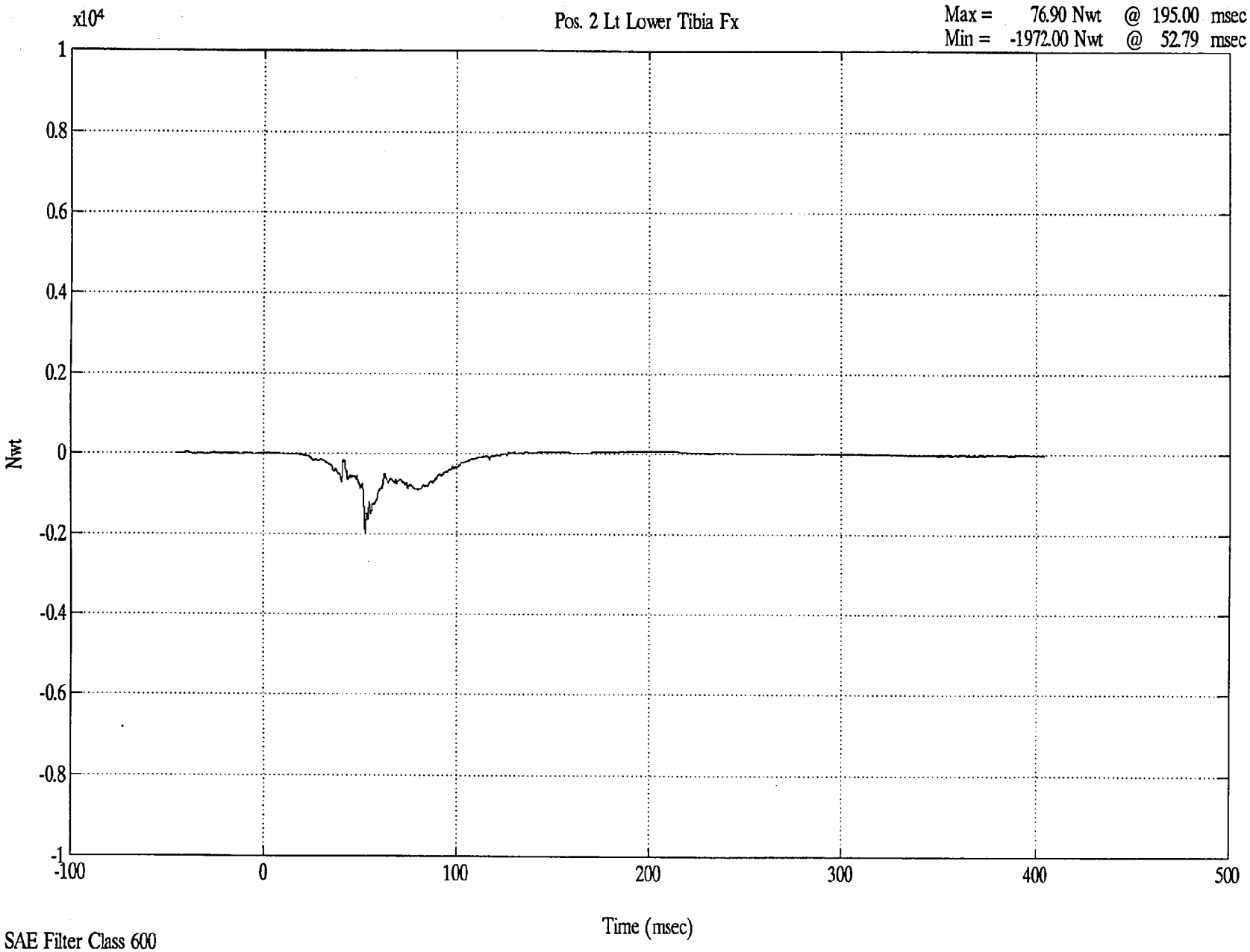
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 600

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

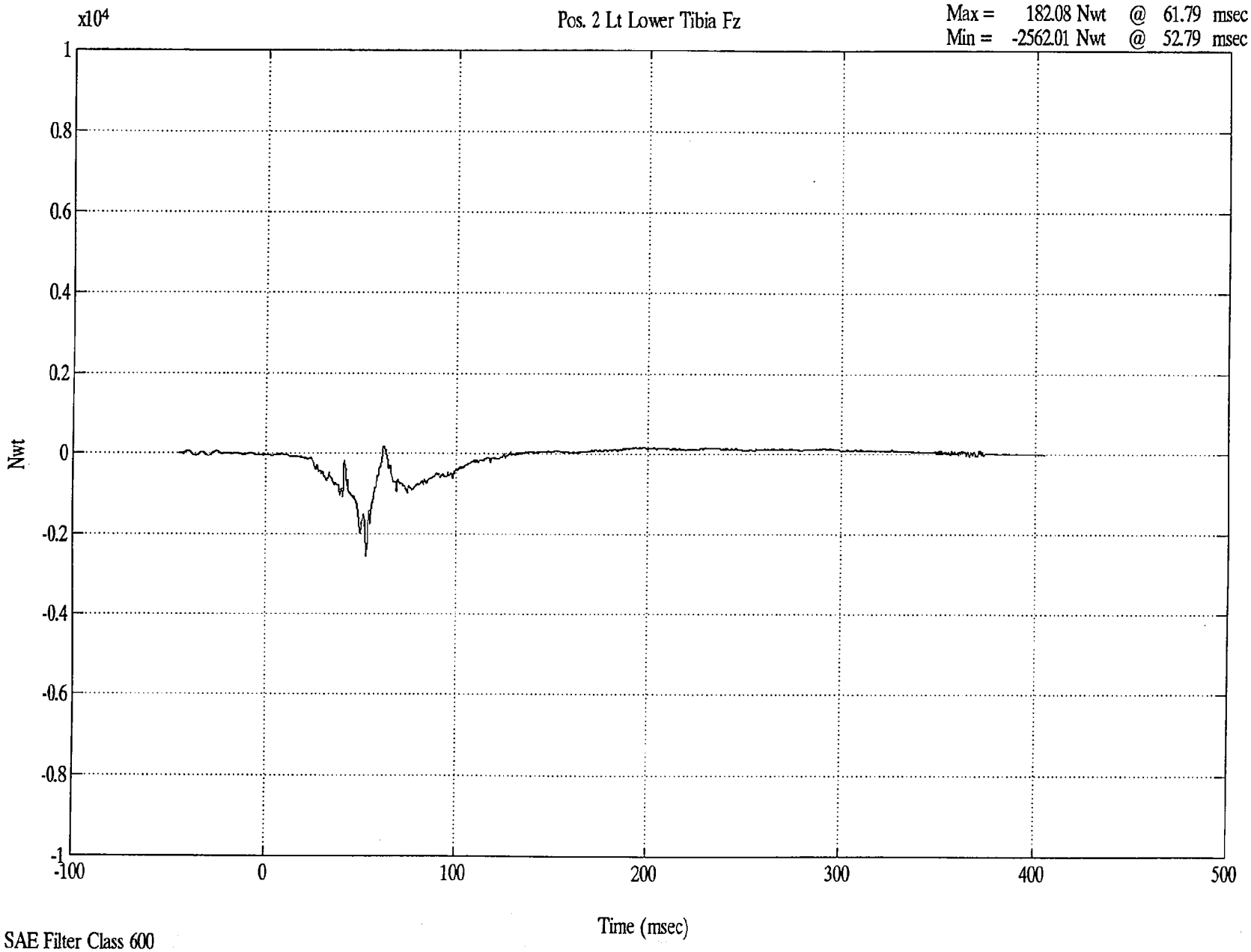


B-87

8313-11

SAE Filter Class 600

NCAP TEST #11 - 1996 DODGE CARAVAN

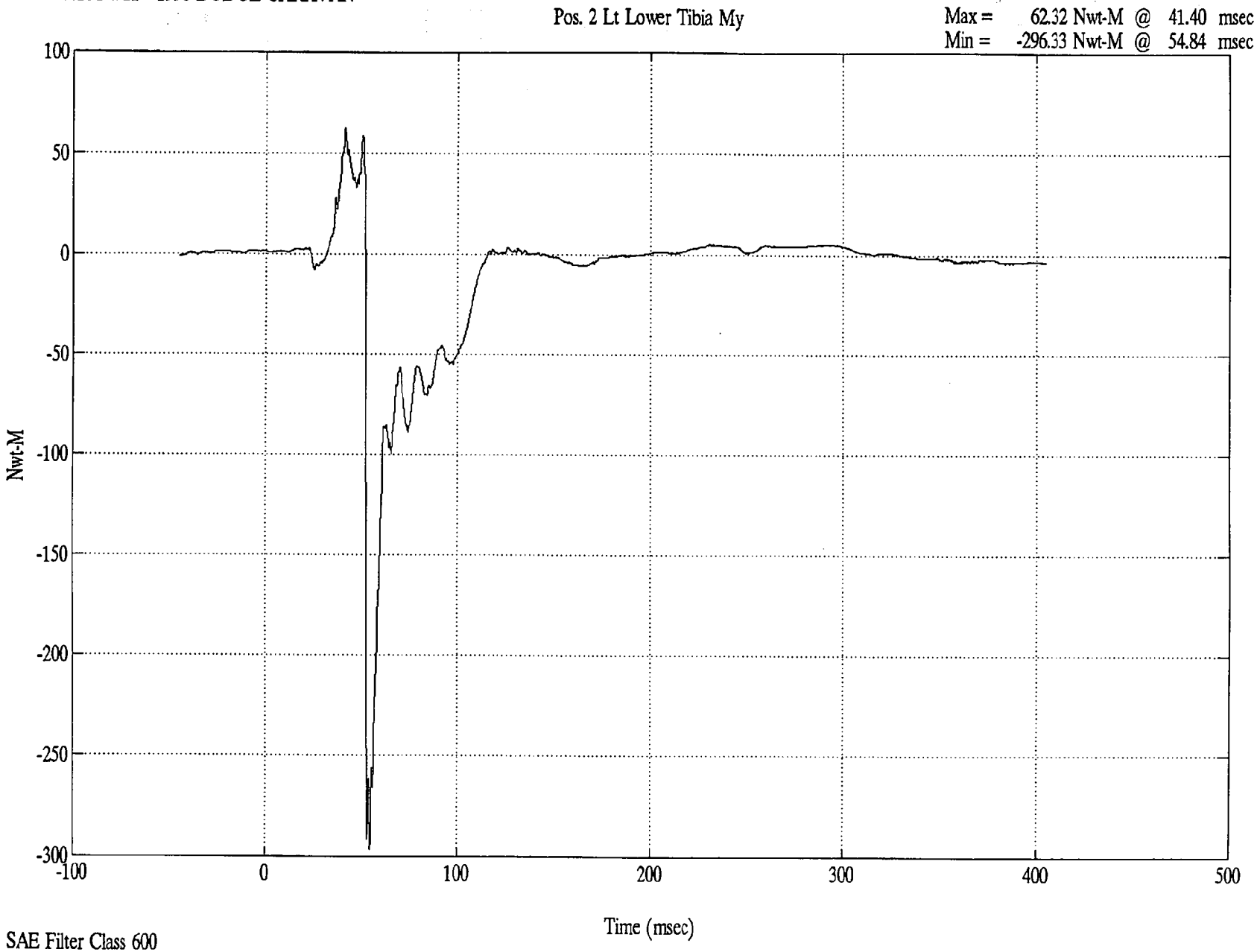


B-88

8313-11

SAE Filter Class 600

NCAP TEST #11 - 1996 DODGE CARAVAN

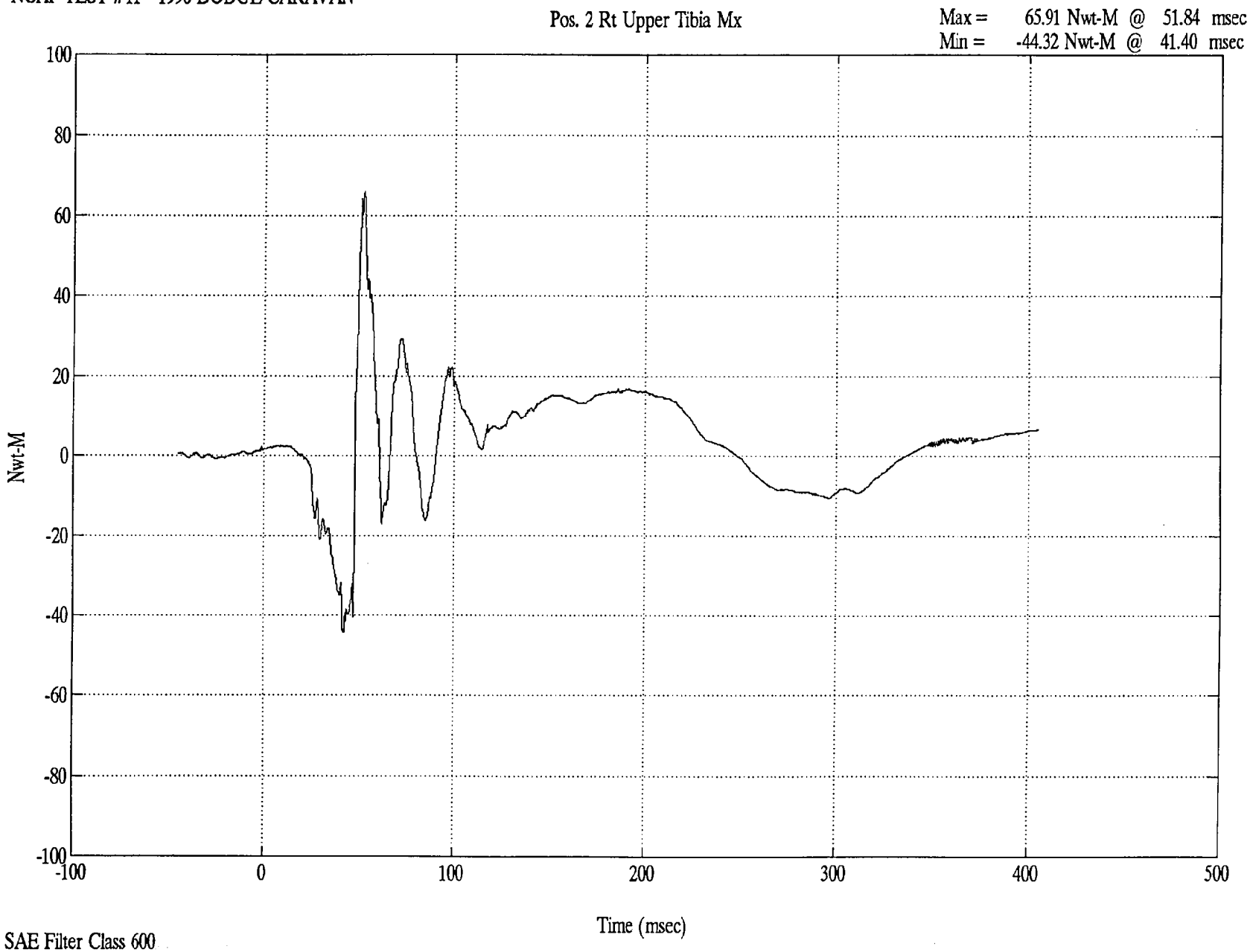


B-89

8313-11

SAE Filter Class 600

NCAP TEST #11 - 1996 DODGE CARAVAN

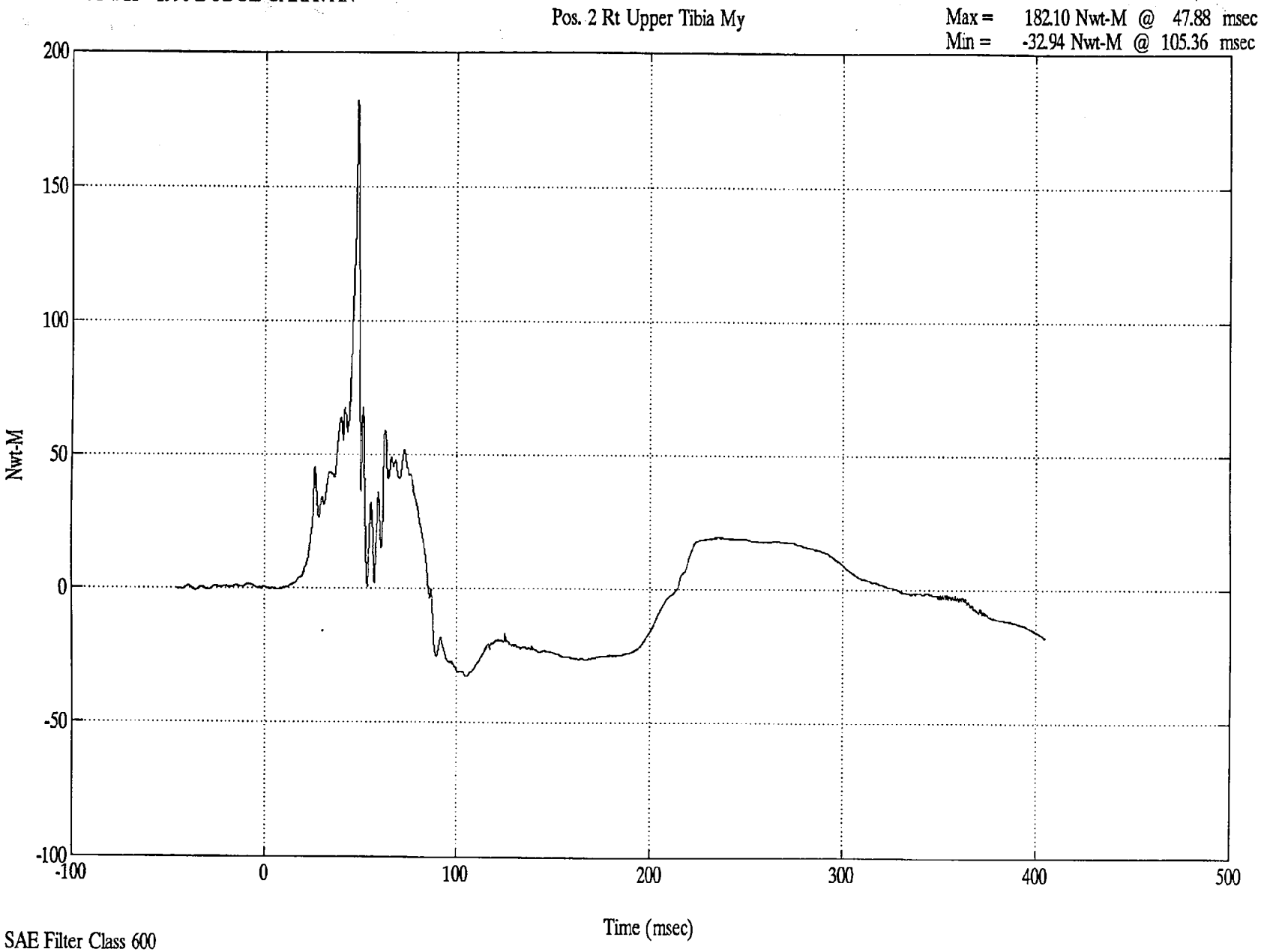


B-90

8313-11

SAE Filter Class 600

NCAP TEST #11 - 1996 DODGE CARAVAN

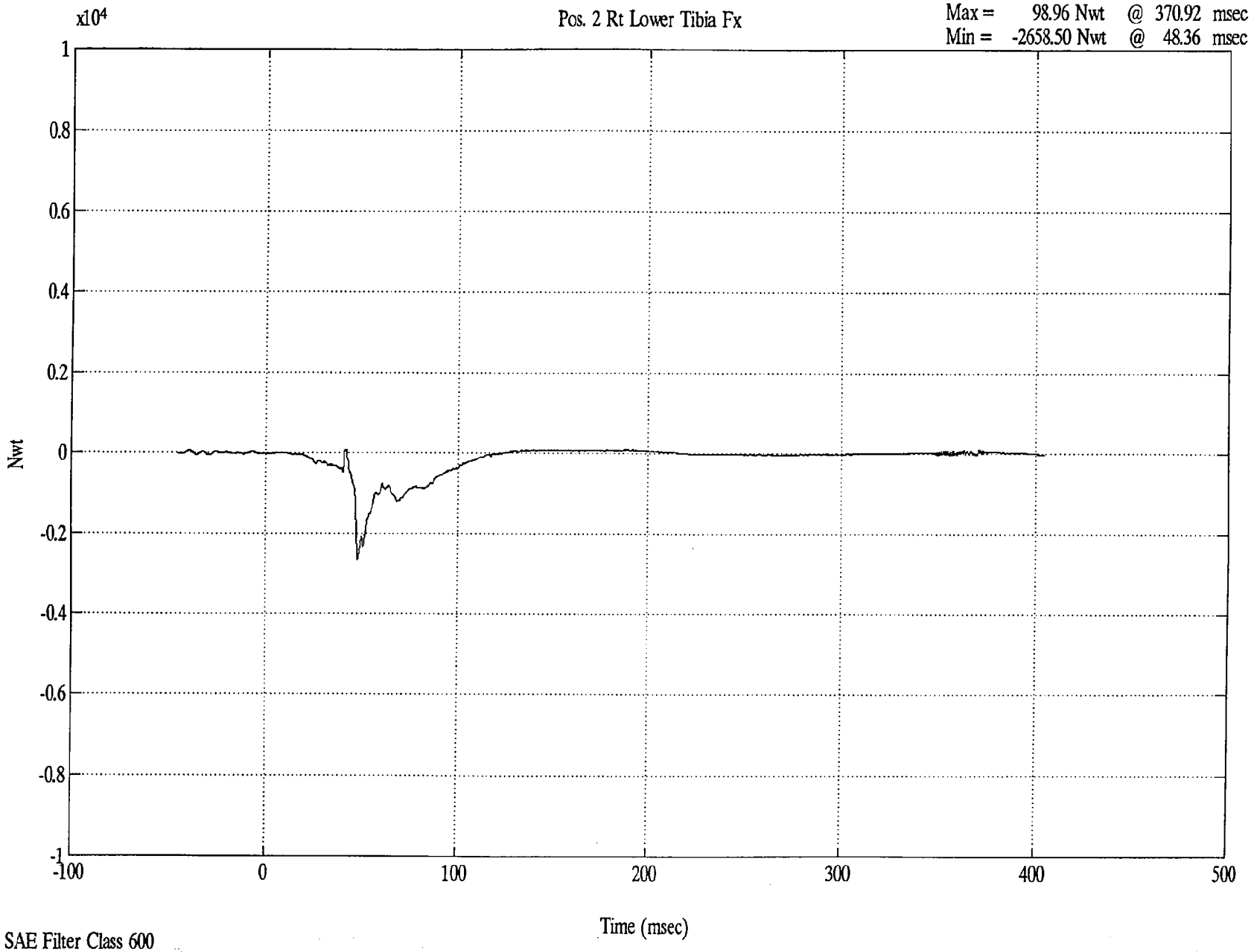


B-91

8313-11

SAE Filter Class 600

NCAP TEST #11 - 1996 DODGE CARAVAN

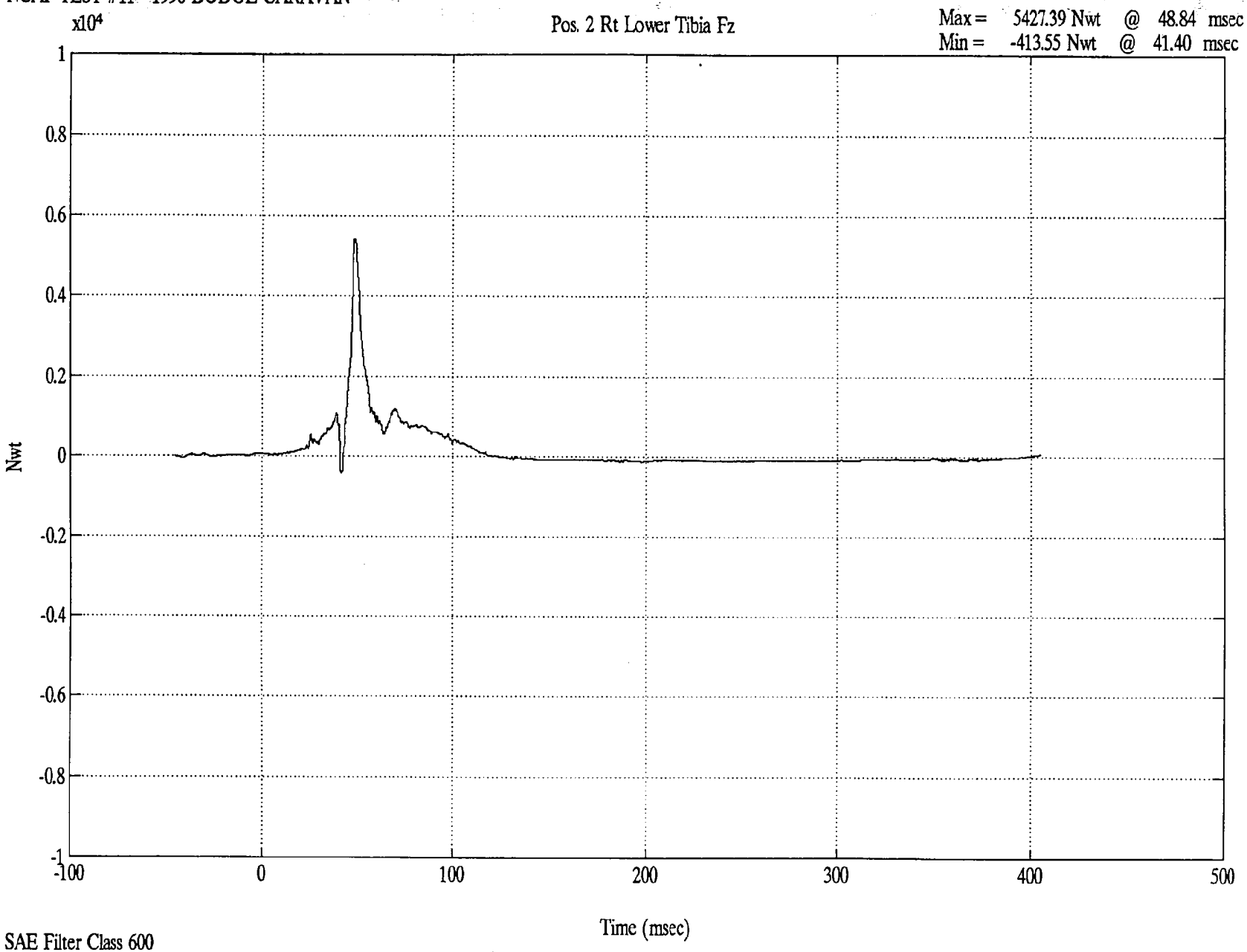


B-92

8313-11

SAE Filter Class 600

NCAP TEST #11 - 1996 DODGE CARAVAN

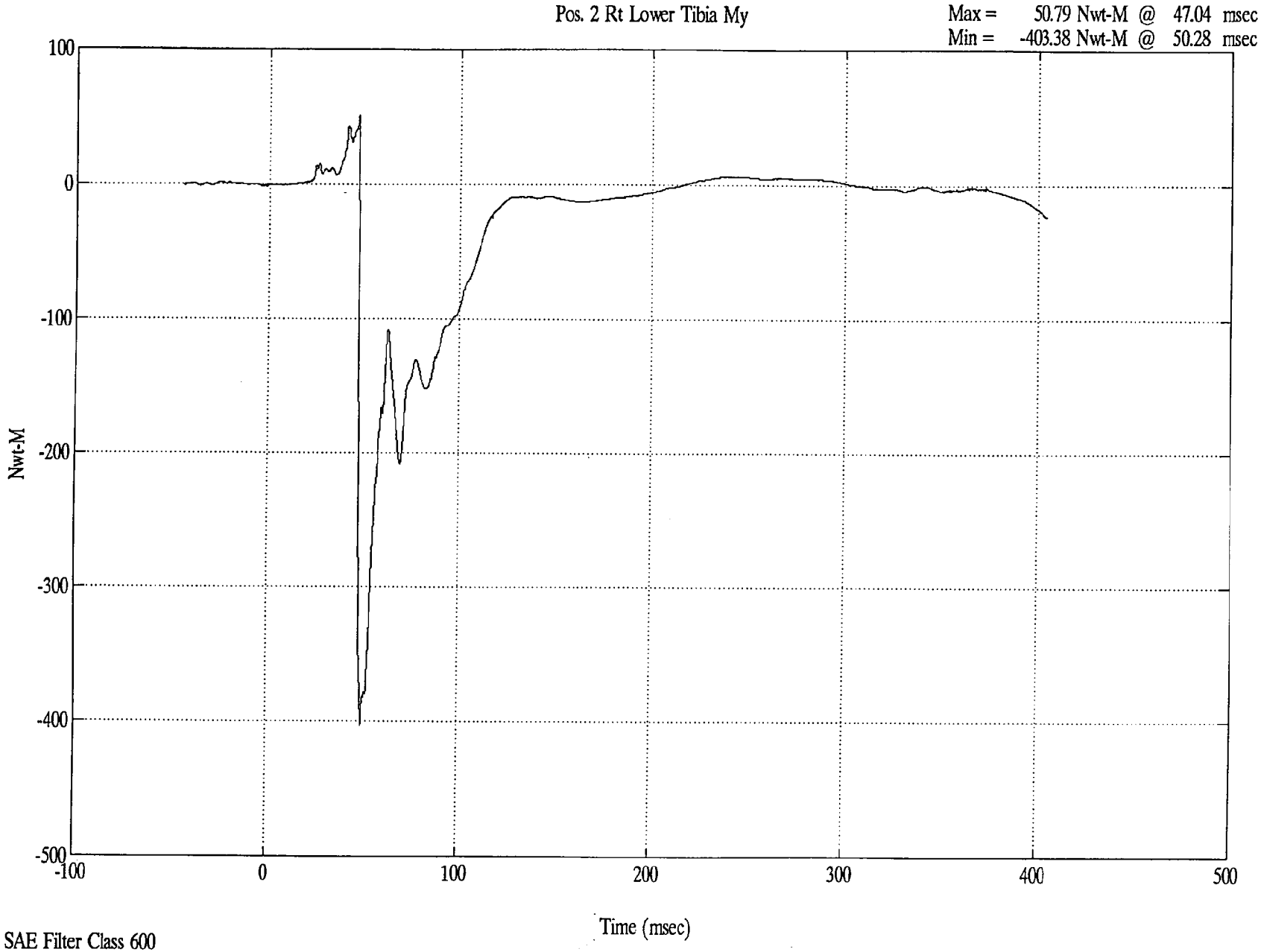


SAE Filter Class 600

B-93

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

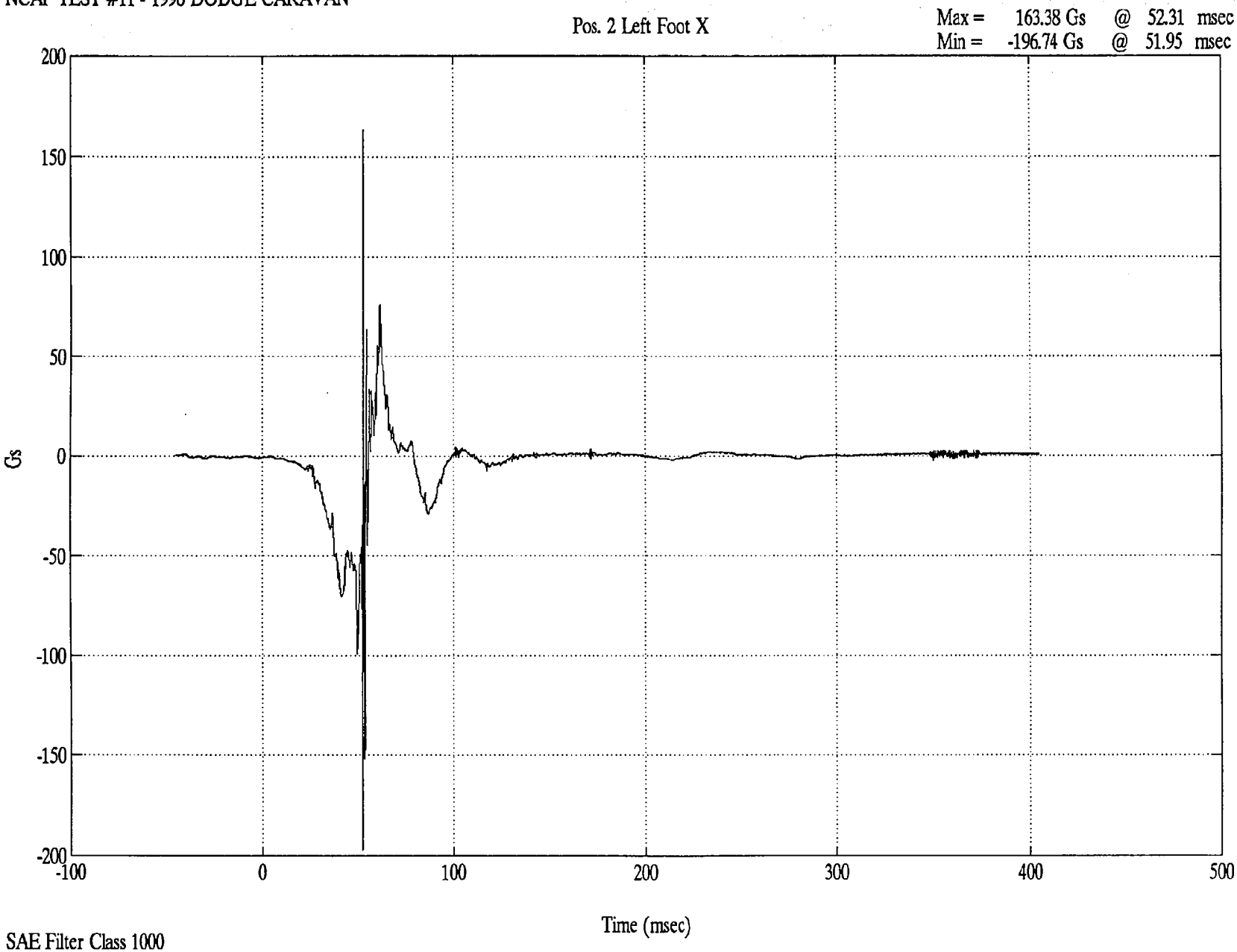


B-94

8313-11

SAE Filter Class 600

NCAP TEST #11 - 1996 DODGE CARAVAN

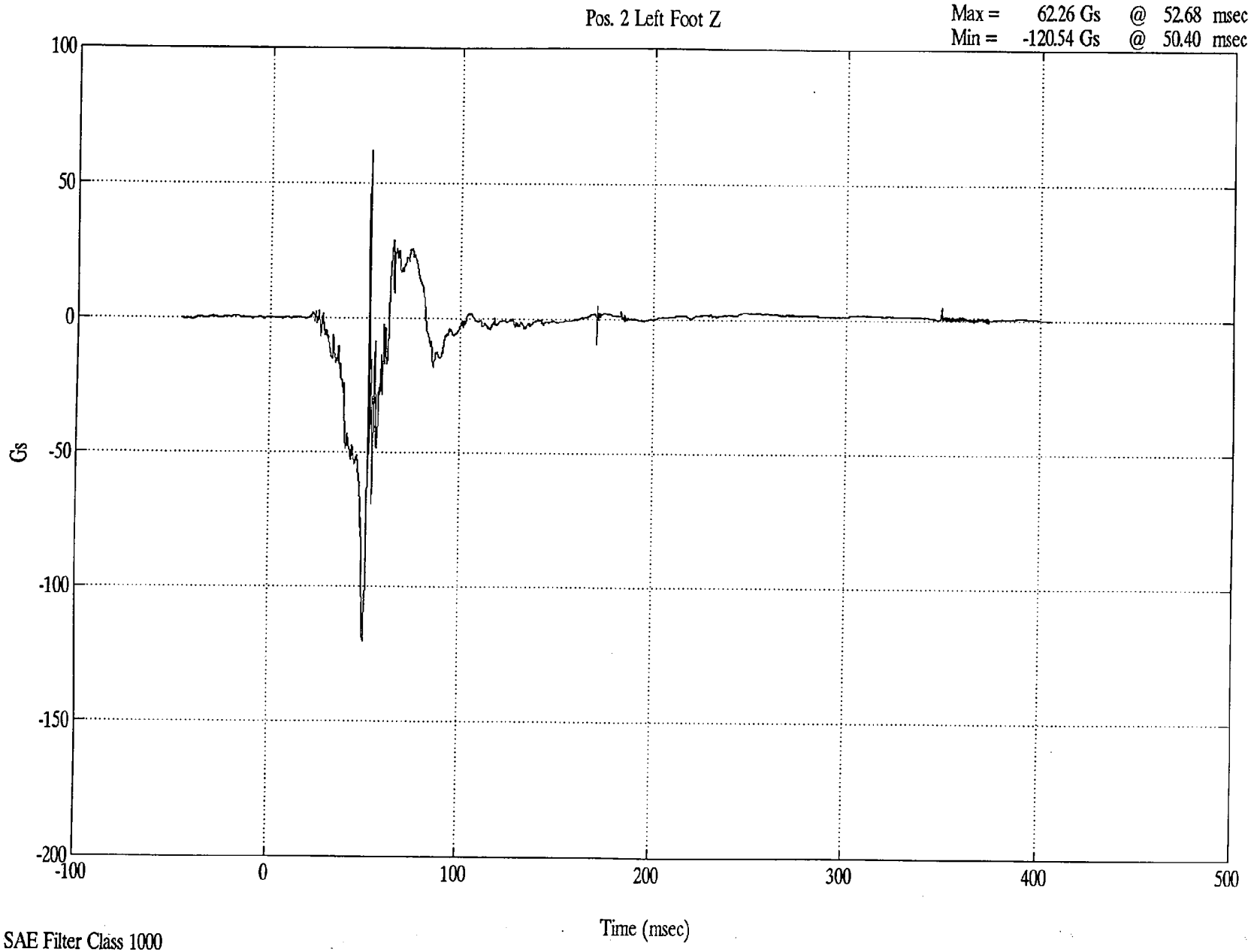


B-95

8313-11

SAE Filter Class 1000

NCAP TEST #11 - 1996 DODGE CARAVAN

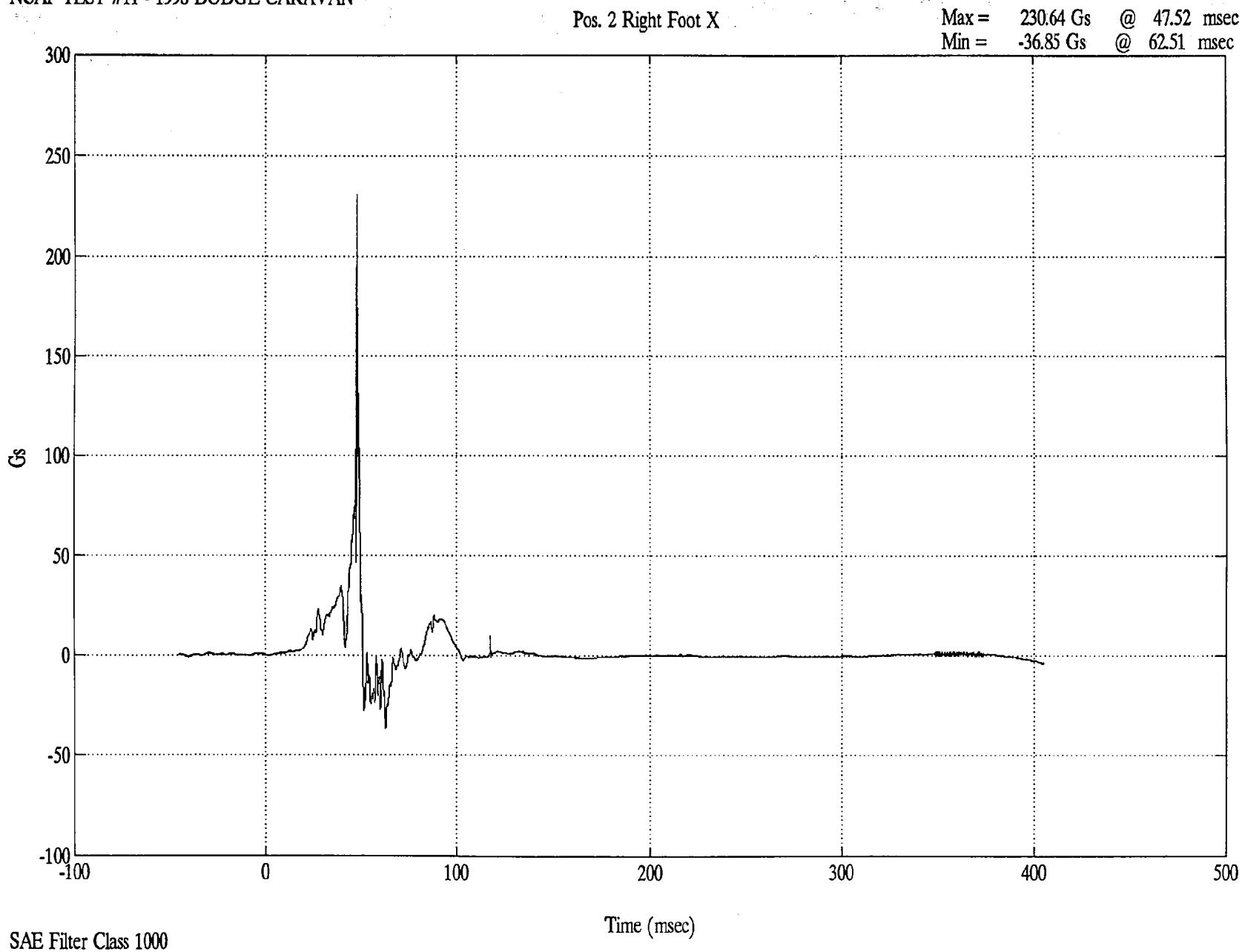


B-96

8313-11

SAE Filter Class 1000

NCAP TEST #11 - 1996 DODGE CARAVAN

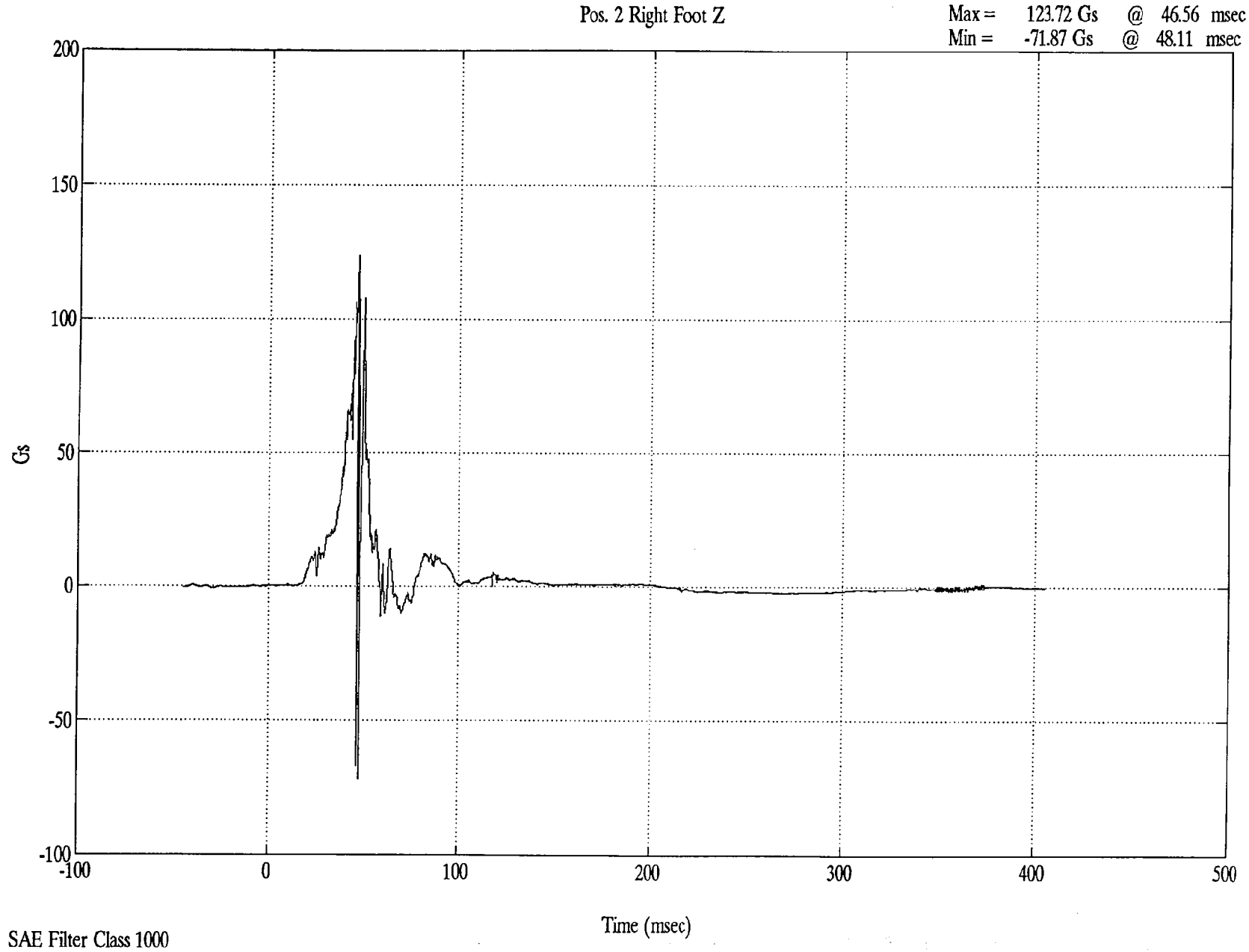


B-97

8313-11

SAE Filter Class 1000

NCAP TEST #11 - 1996 DODGE CARAVAN

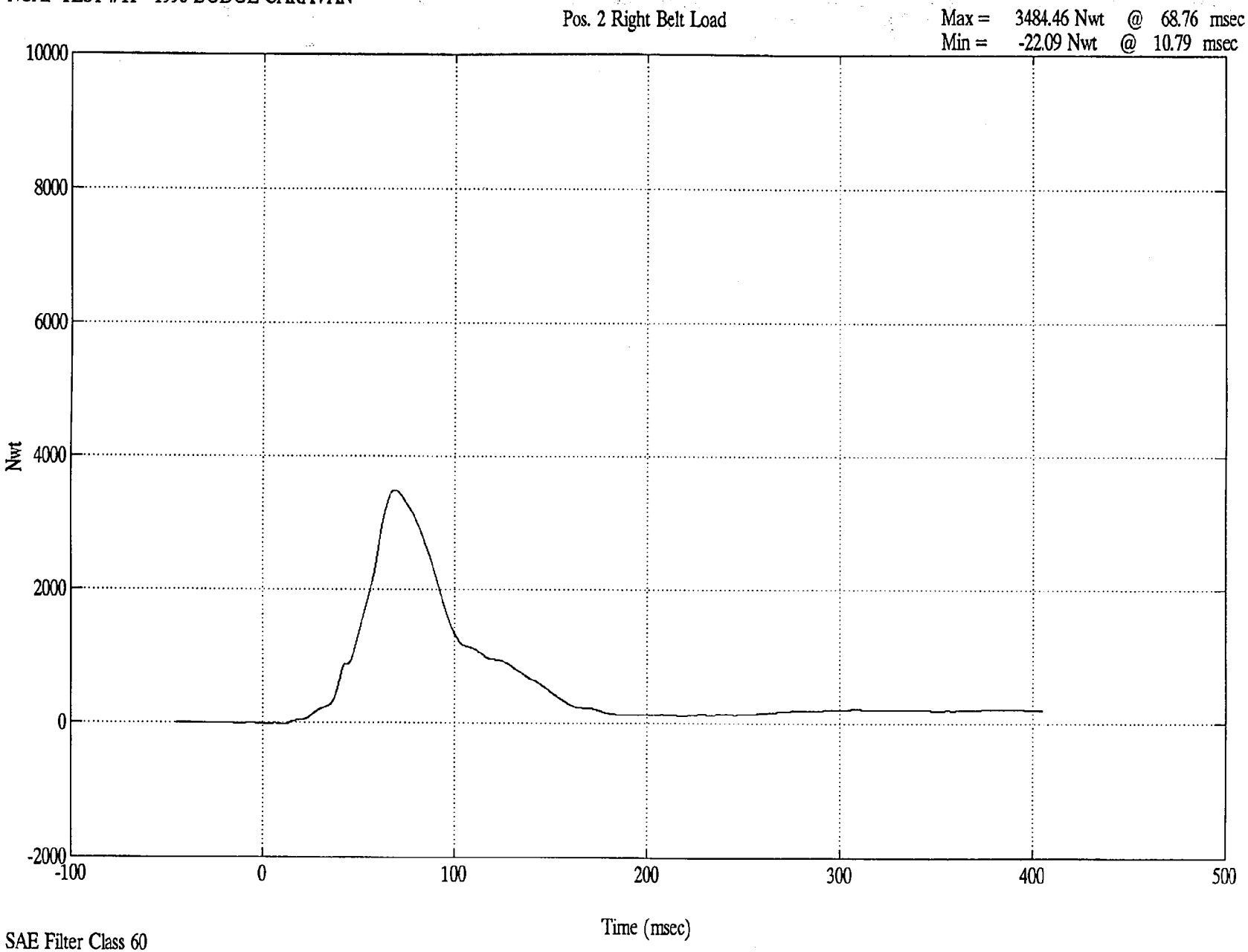


B-98

8313-11

SAE Filter Class 1000

NCAP TEST #11 - 1996 DODGE CARAVAN

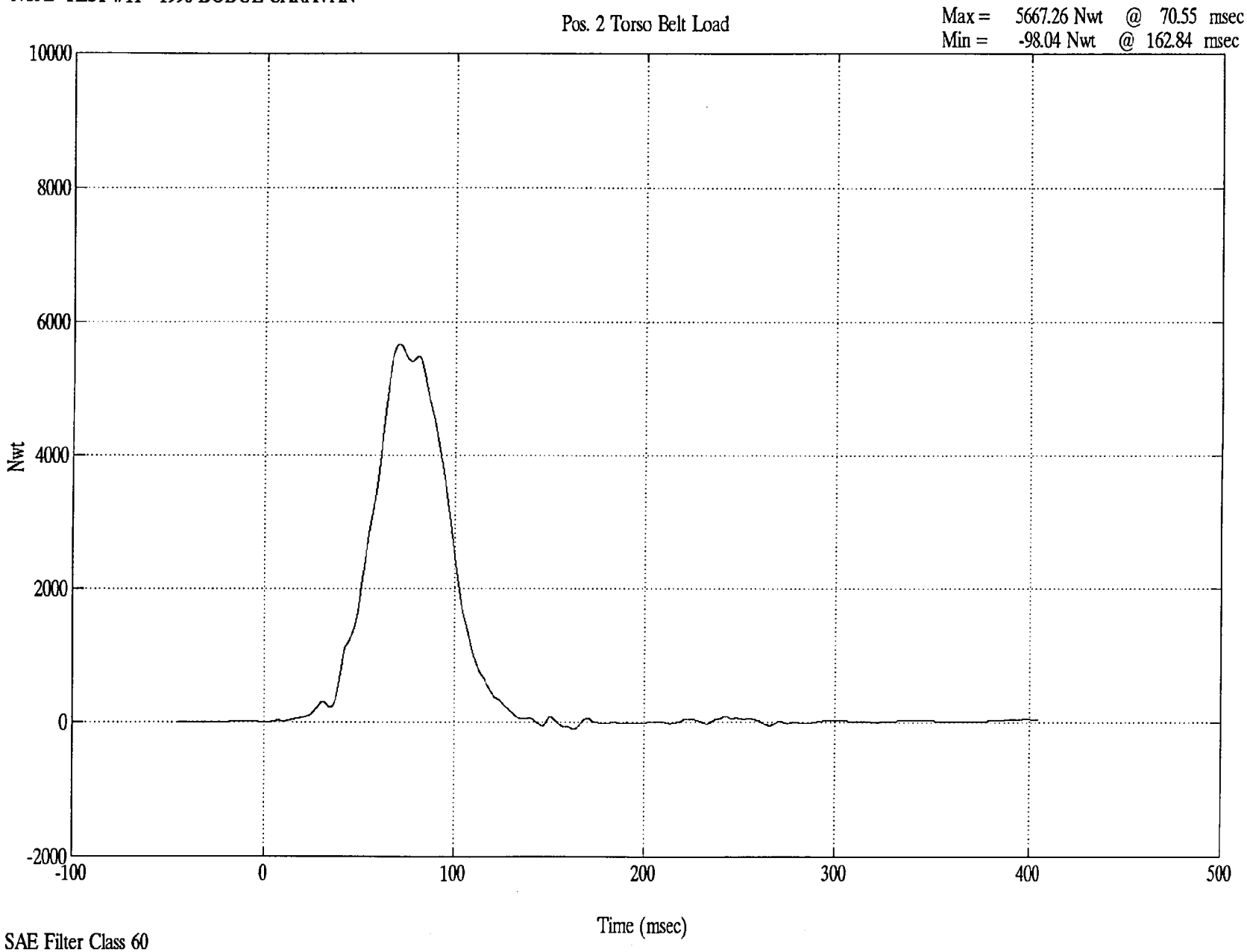


B-99

8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

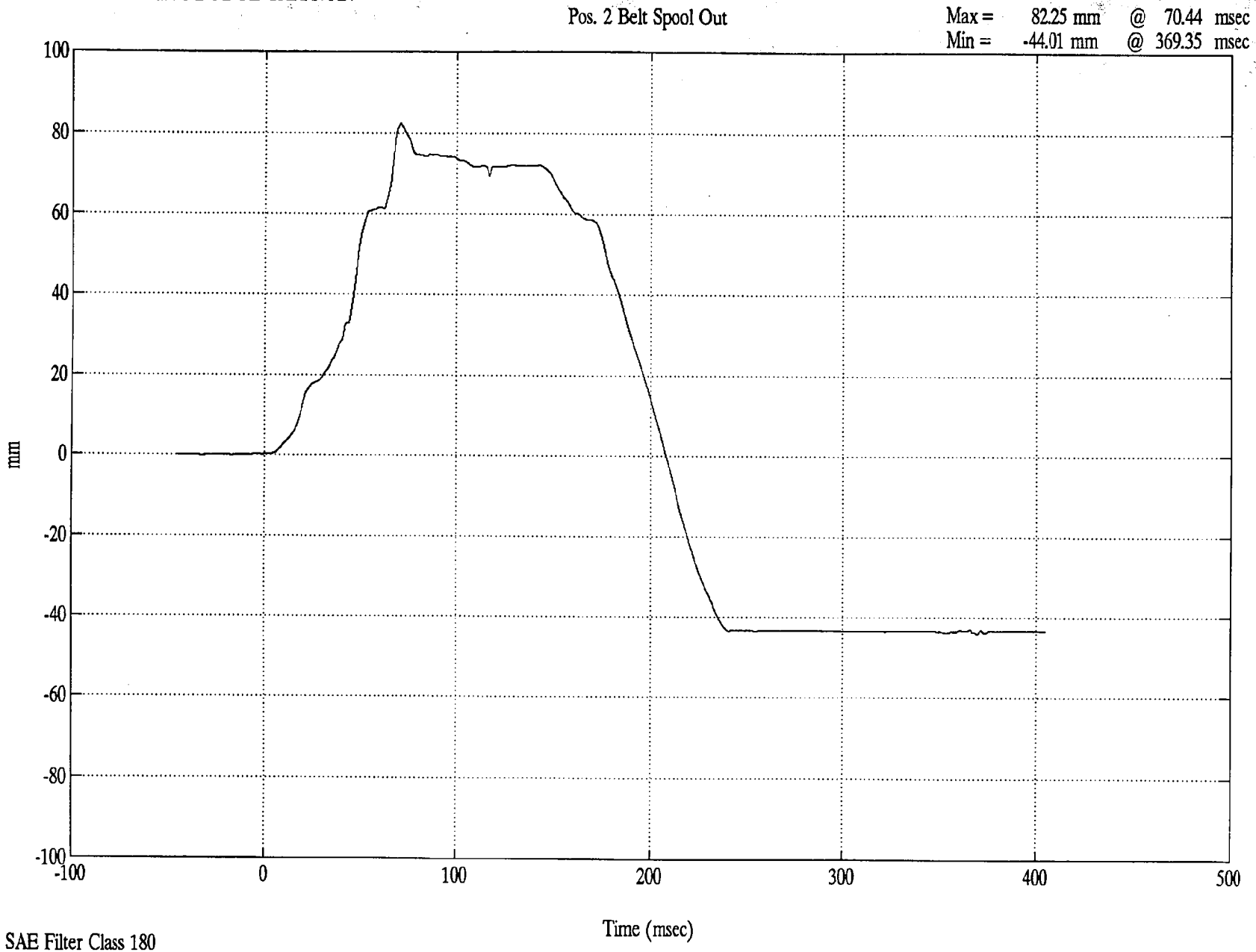


SAE Filter Class 60

B-100

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN



B-101

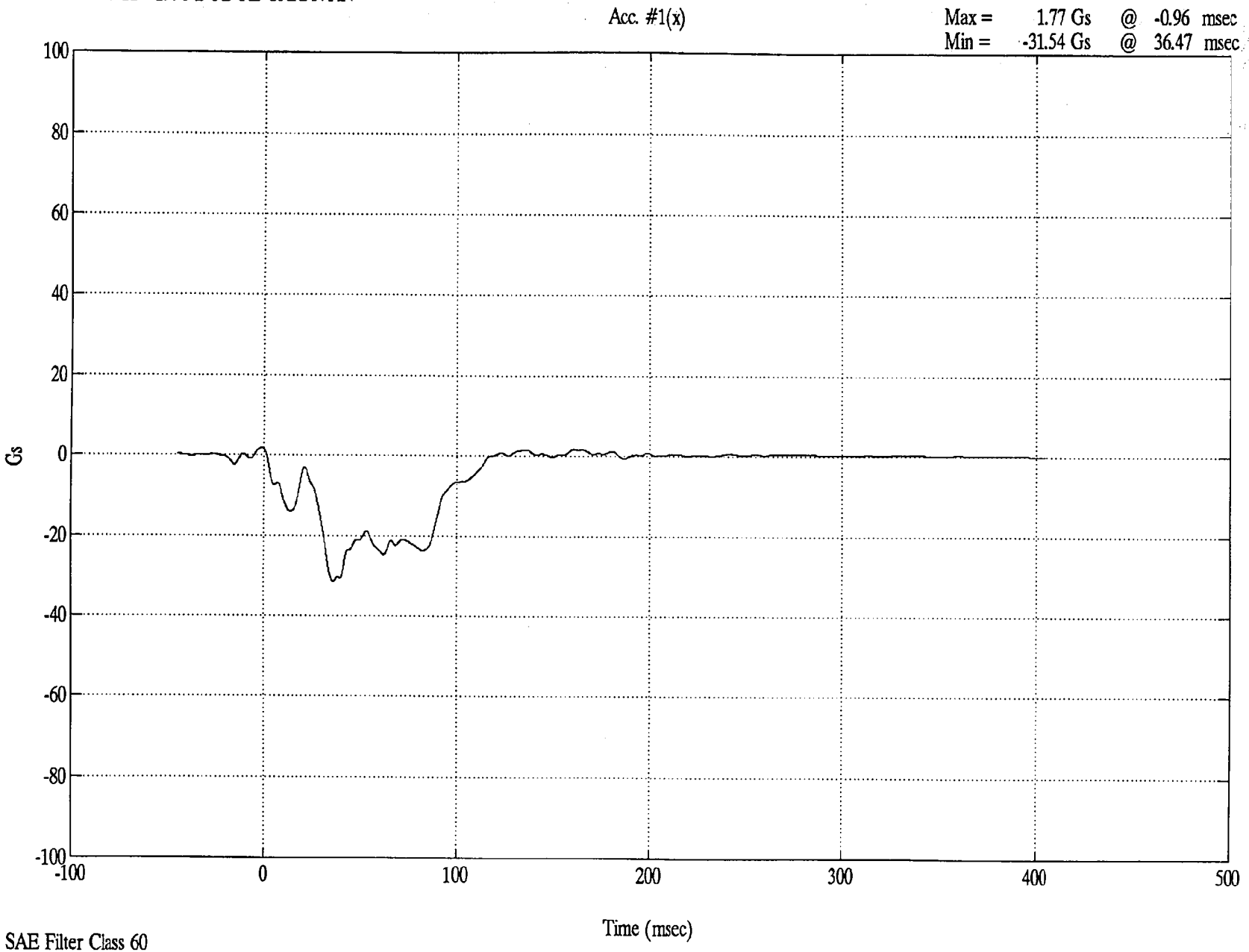
8313-11

SAE Filter Class 180

NHTSA TEST NO. MT0305

VEHICLE DATA	FILTER CHANNEL CLASS
Acceleration	60
Velocity	180
Displacement	180

NCAP TEST #11 - 1996 DODGE CARAVAN



B-103

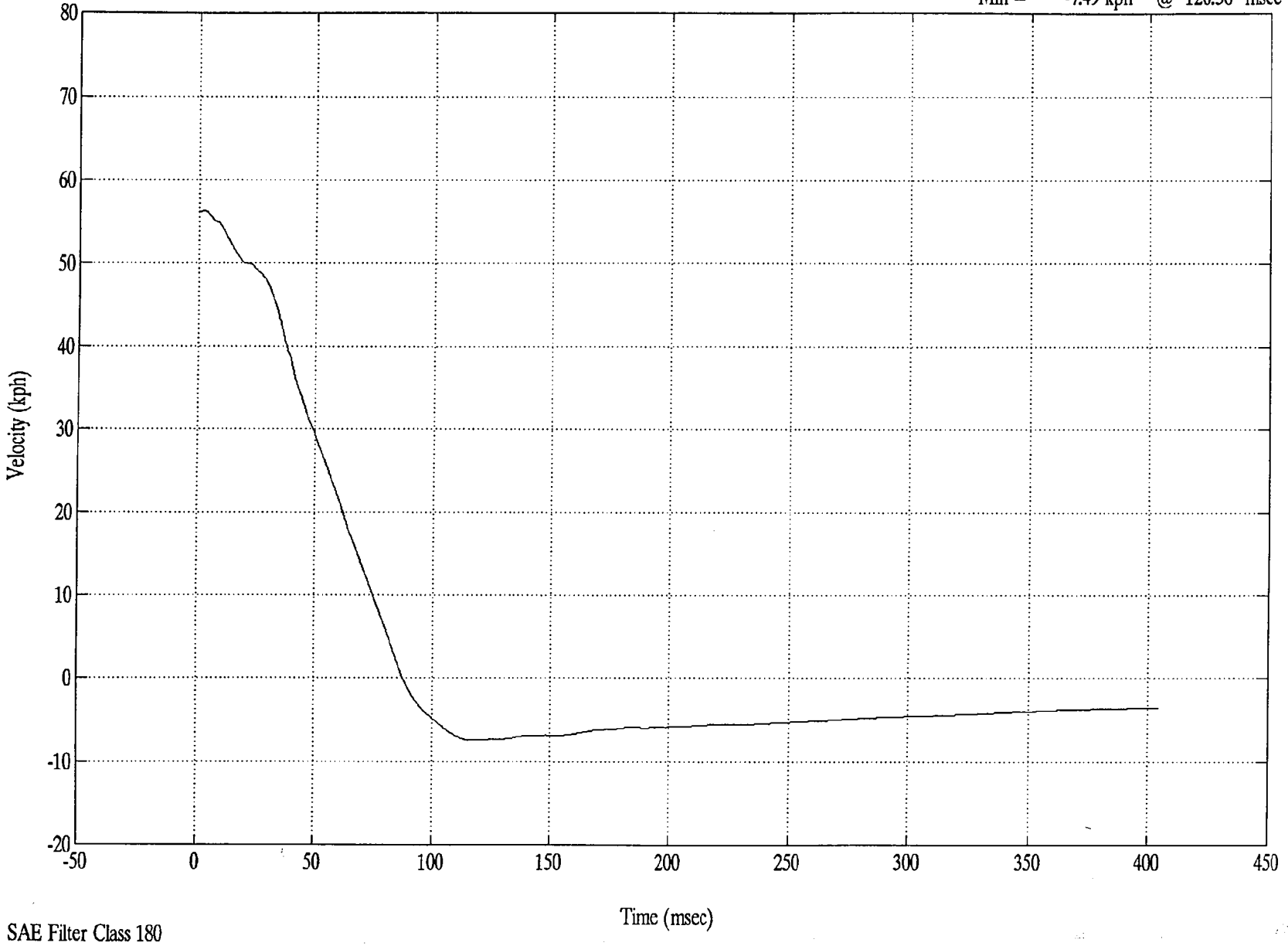
8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

Acc. #1(x)

Max = 56.29 kph @ 2.39 msec
Min = -7.49 kph @ 120.36 msec

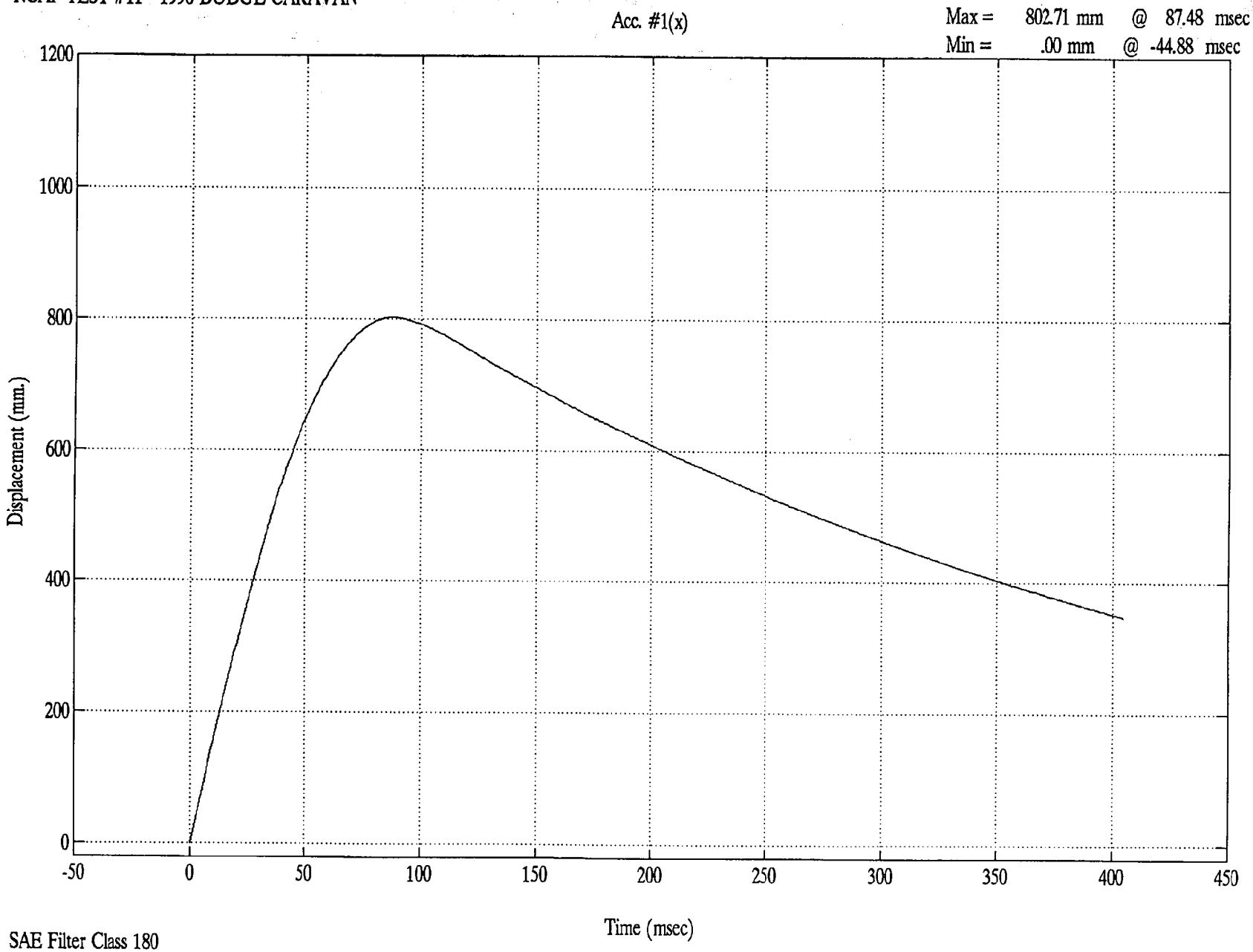


B-104

8313-11

SAE Filter Class 180

NCAP TEST #11 - 1996 DODGE CARAVAN

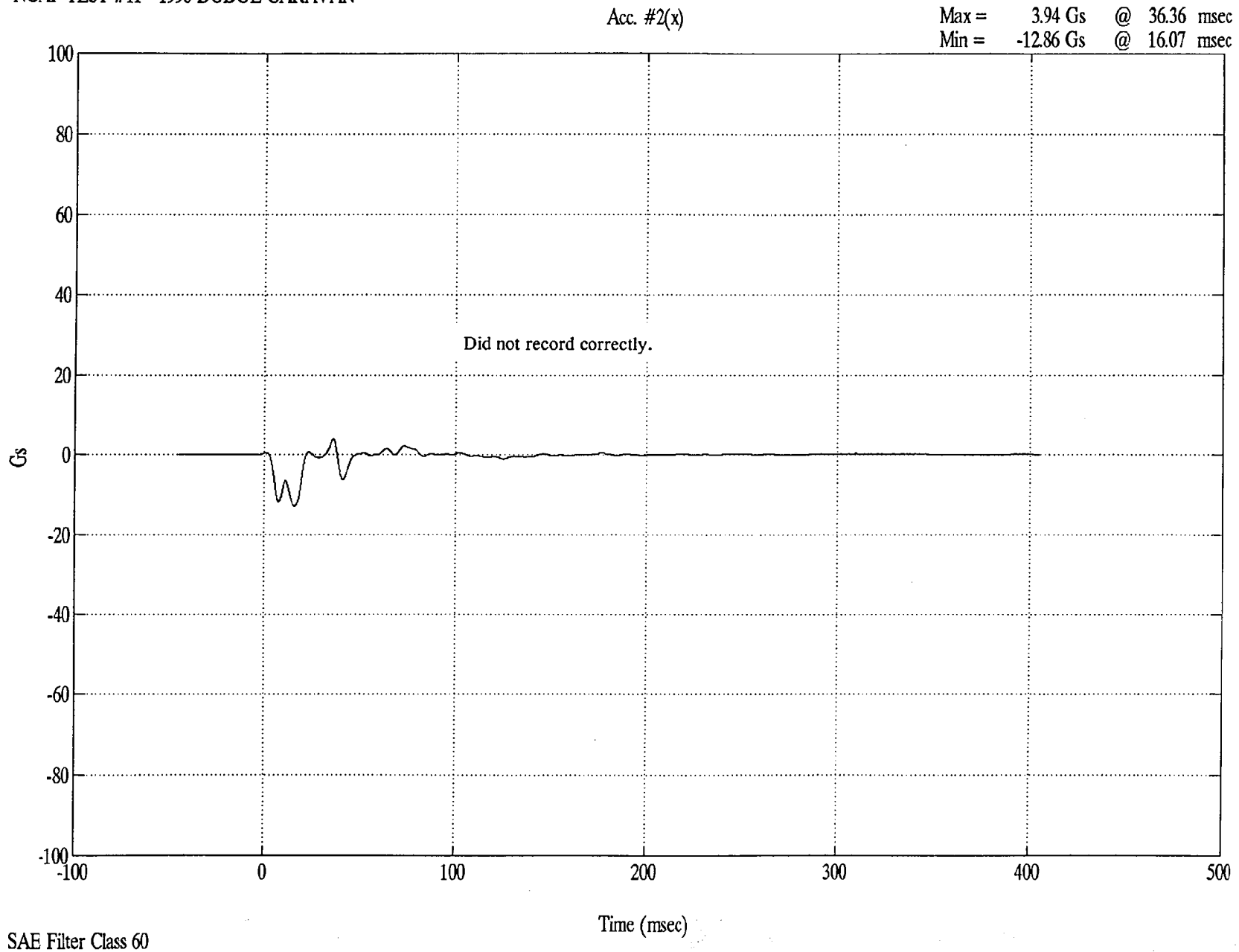


SAE Filter Class 180

B-105

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

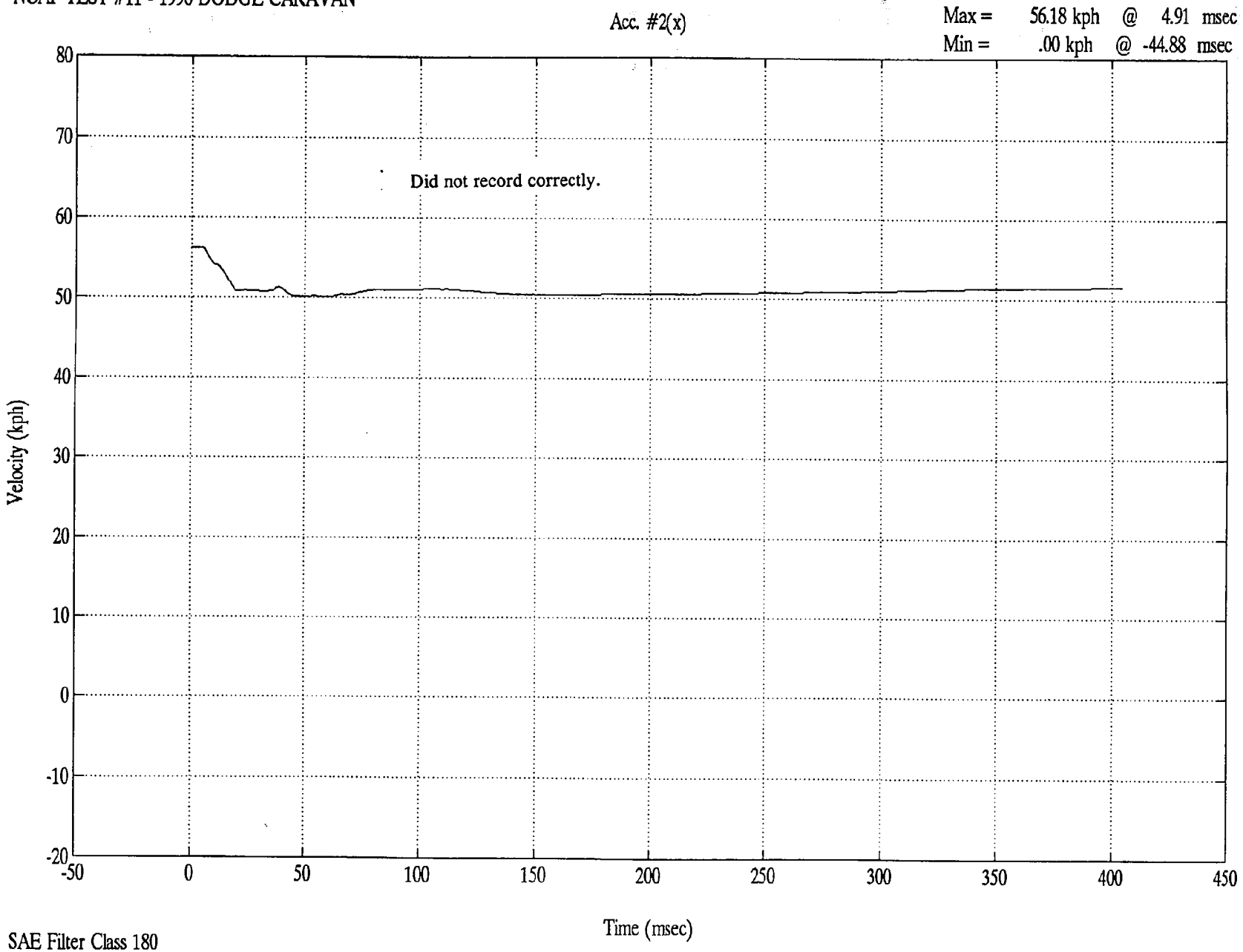


B-106

8313-11

SAE Filter Class 60

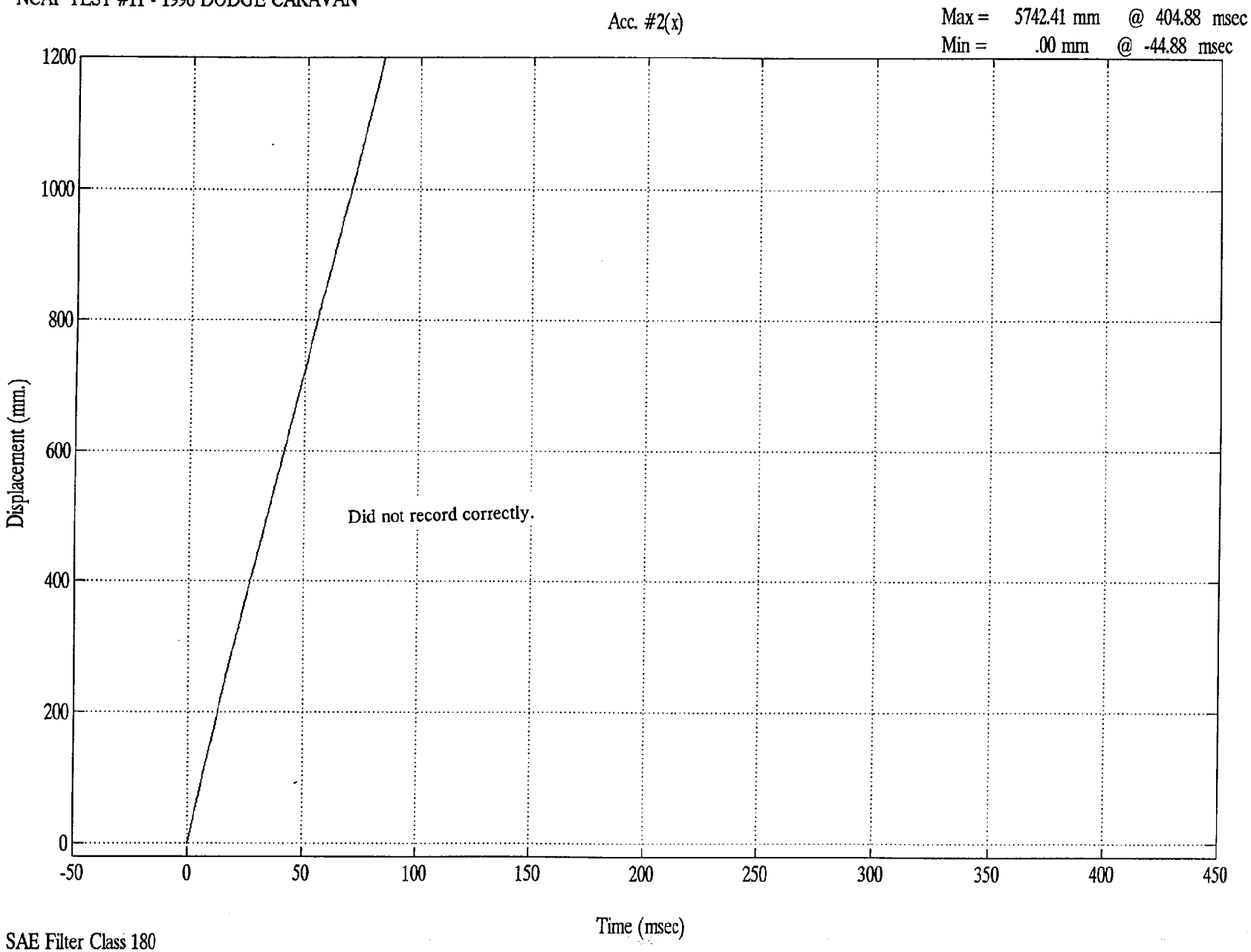
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

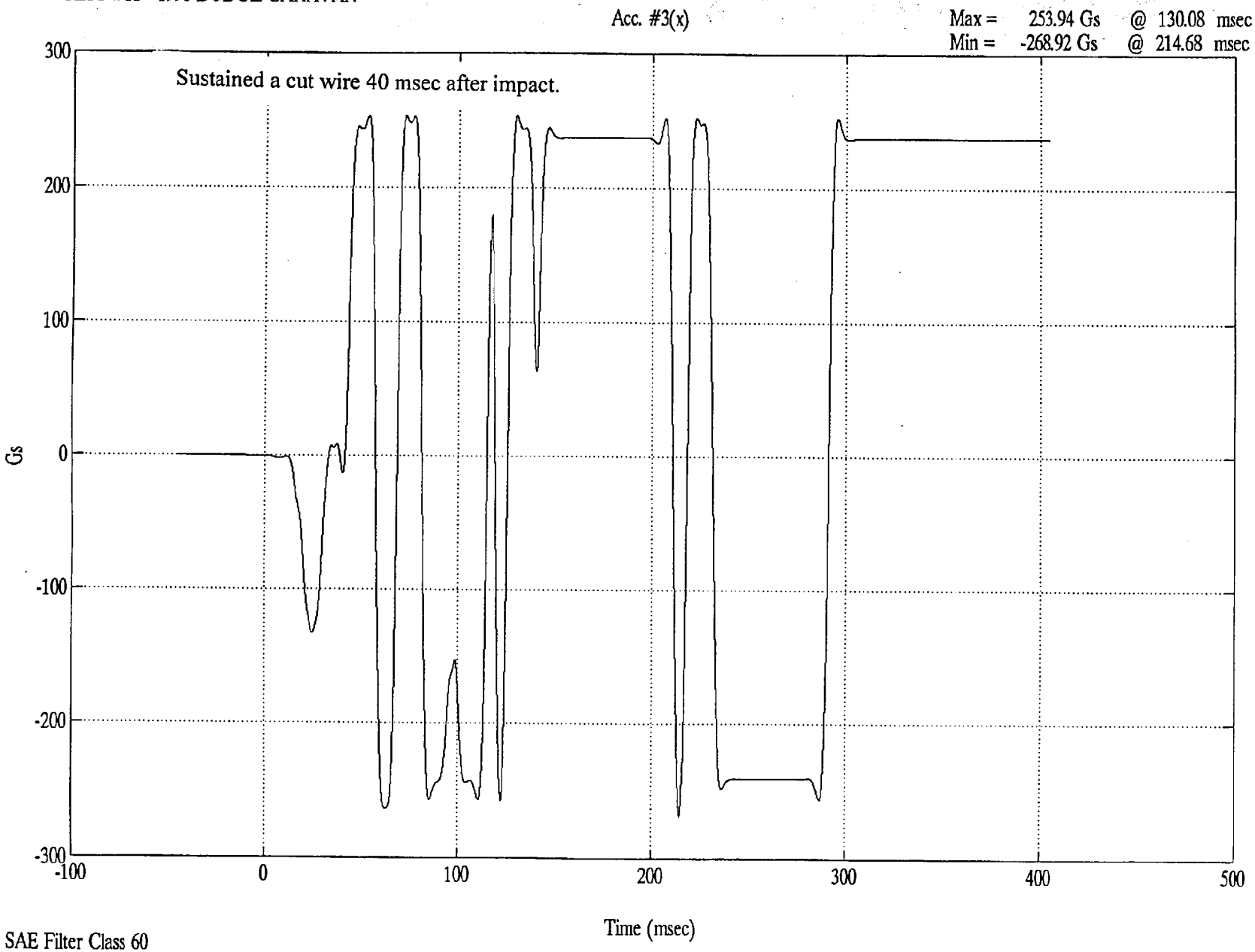
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

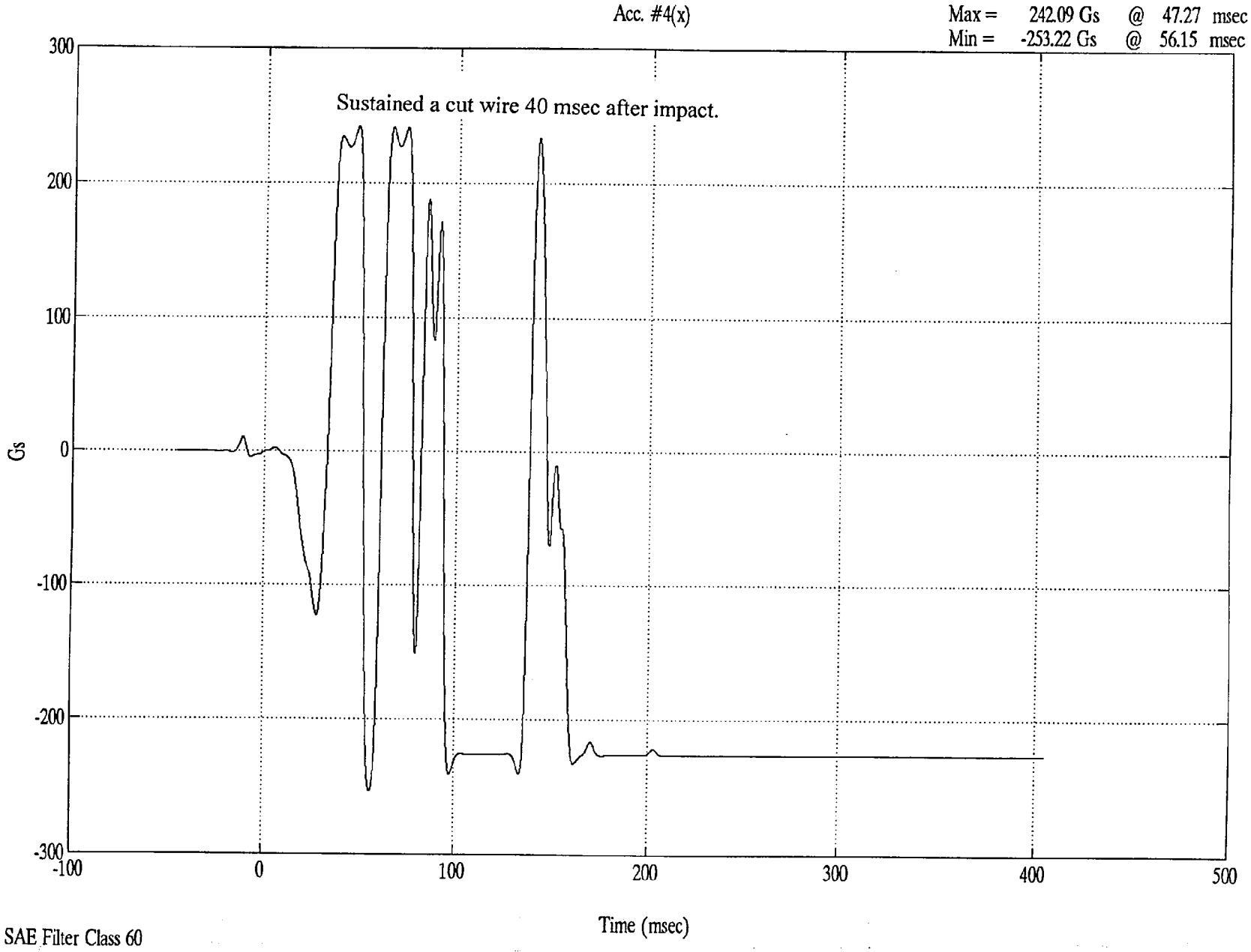
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 60

8313-11

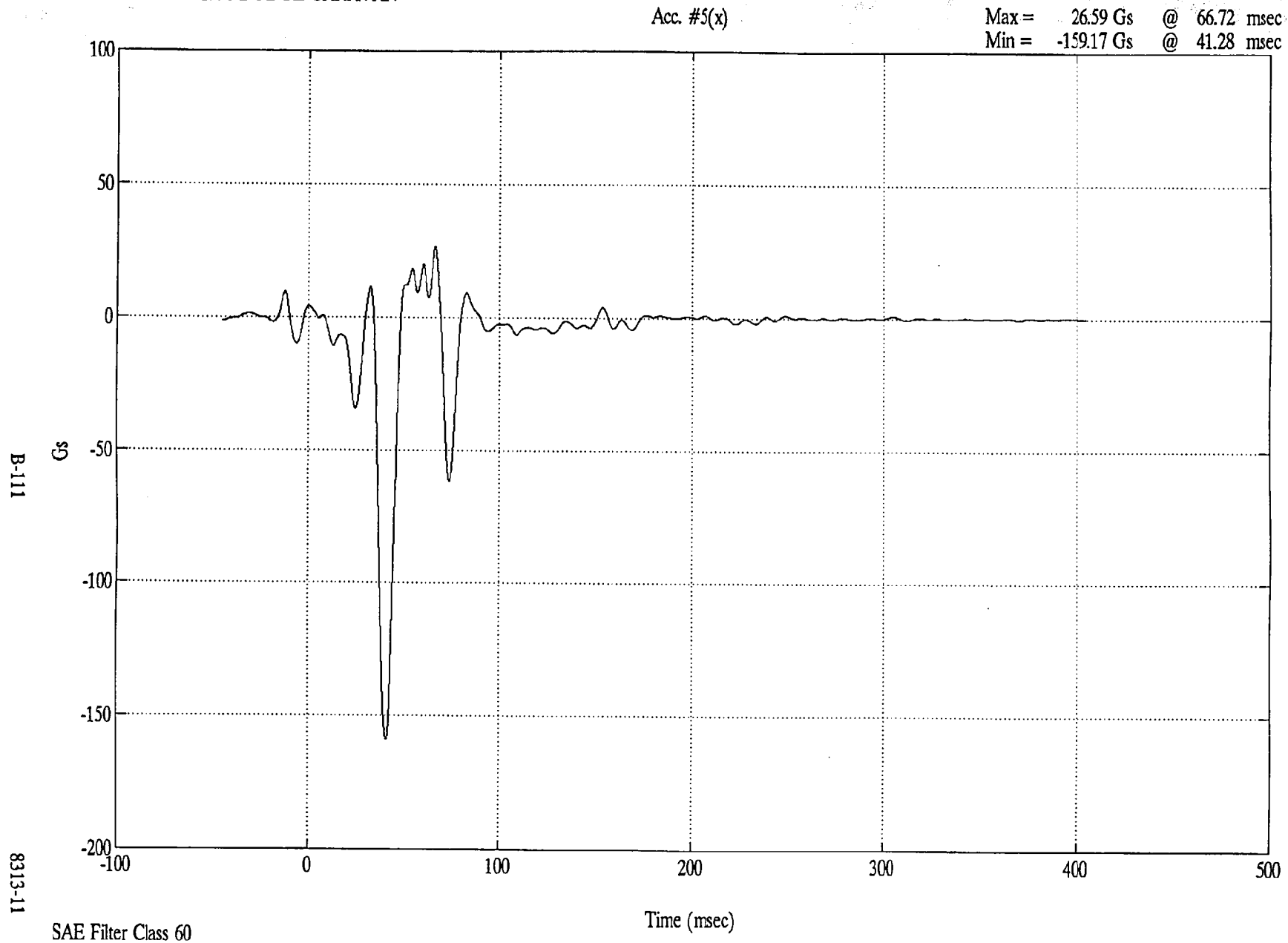
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 60

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

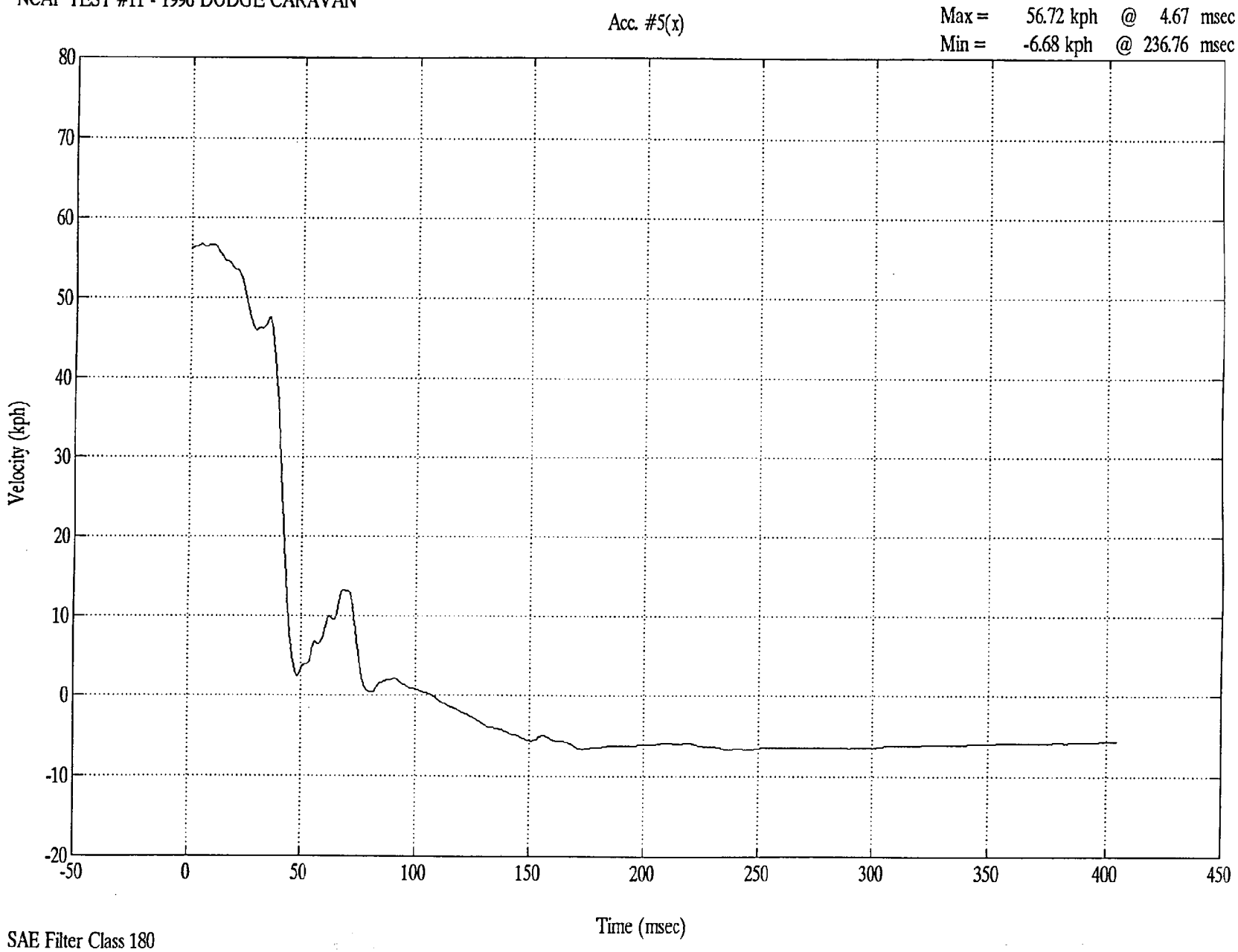


B-111

8313-11

SAE Filter Class 60

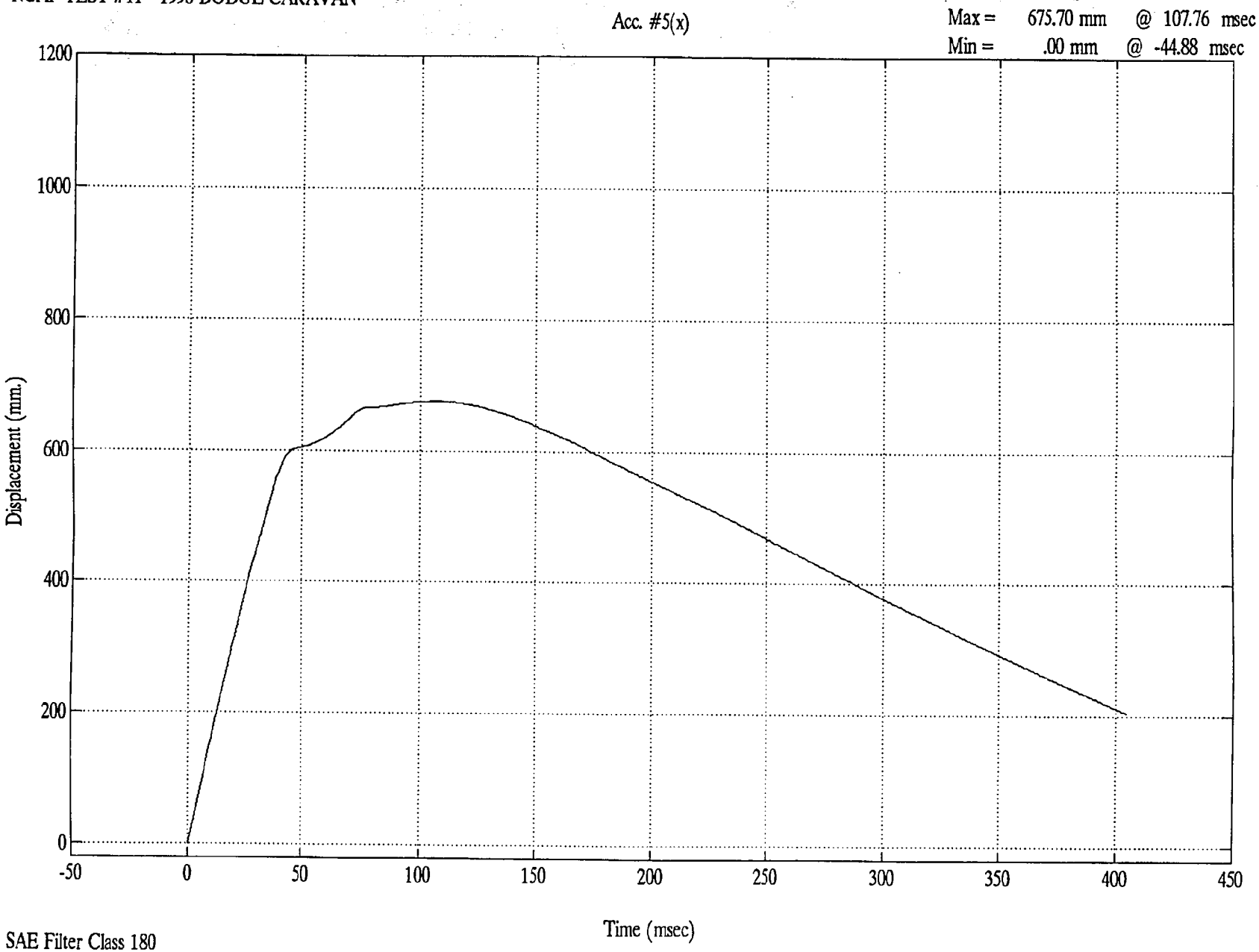
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

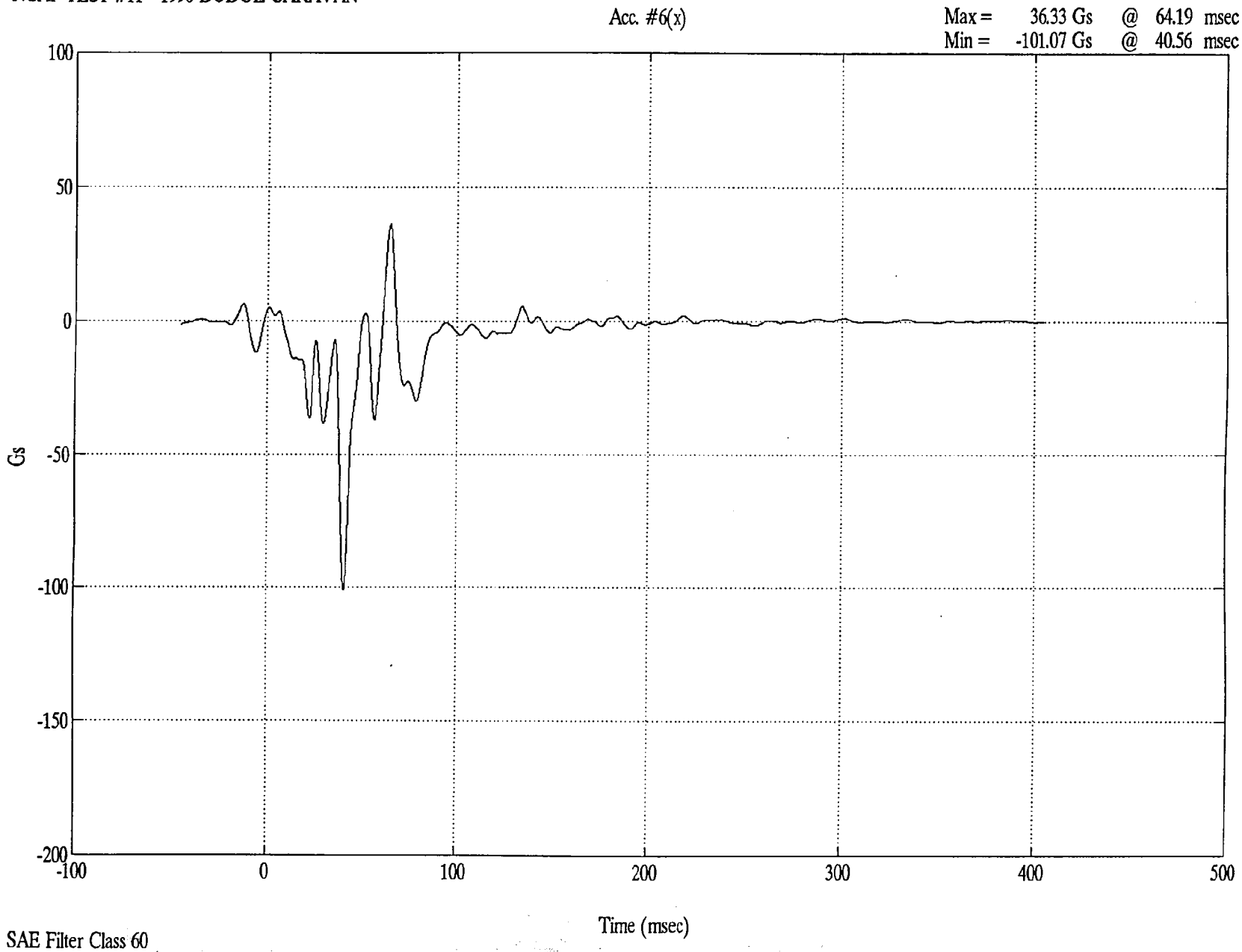
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

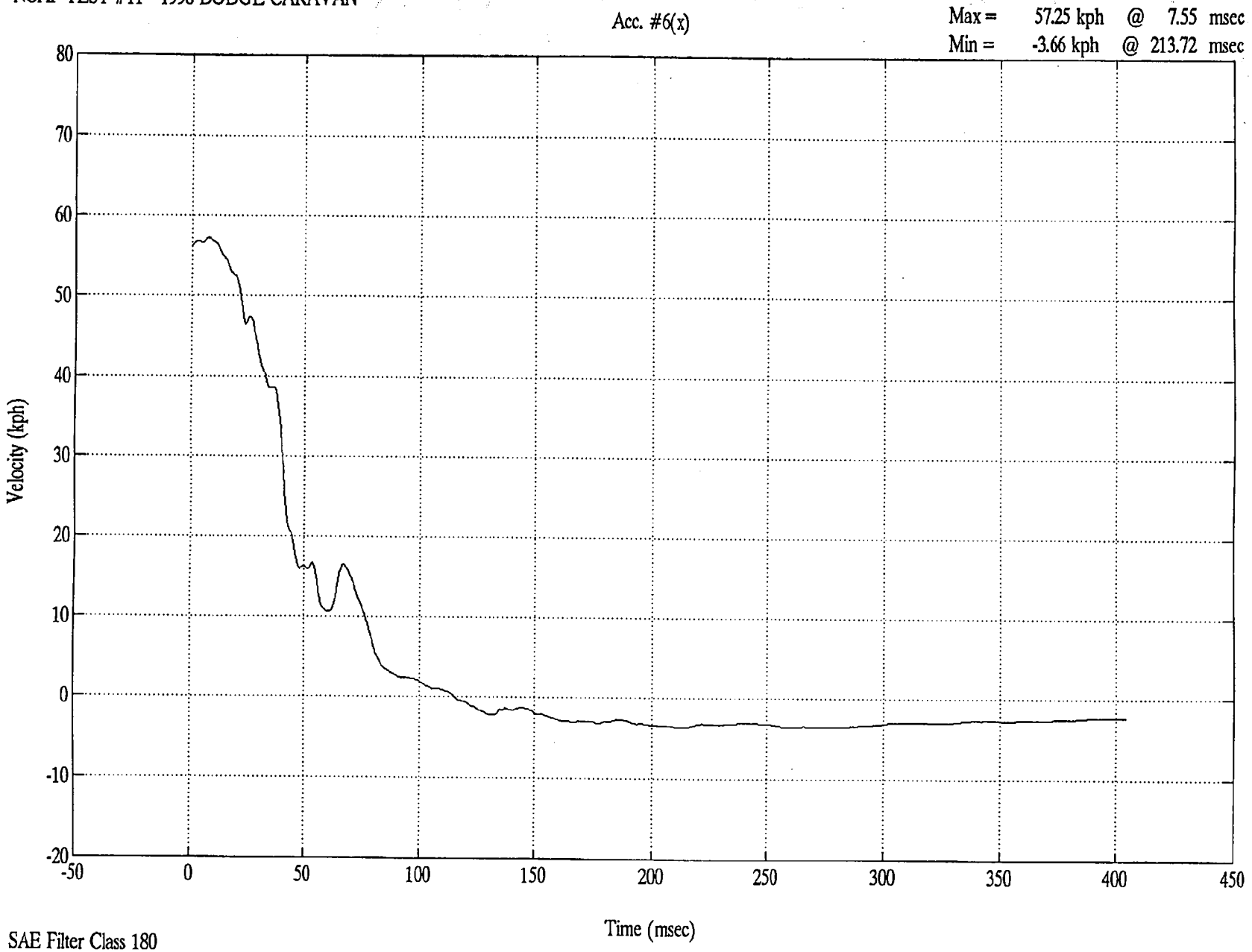
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 60

8313-11

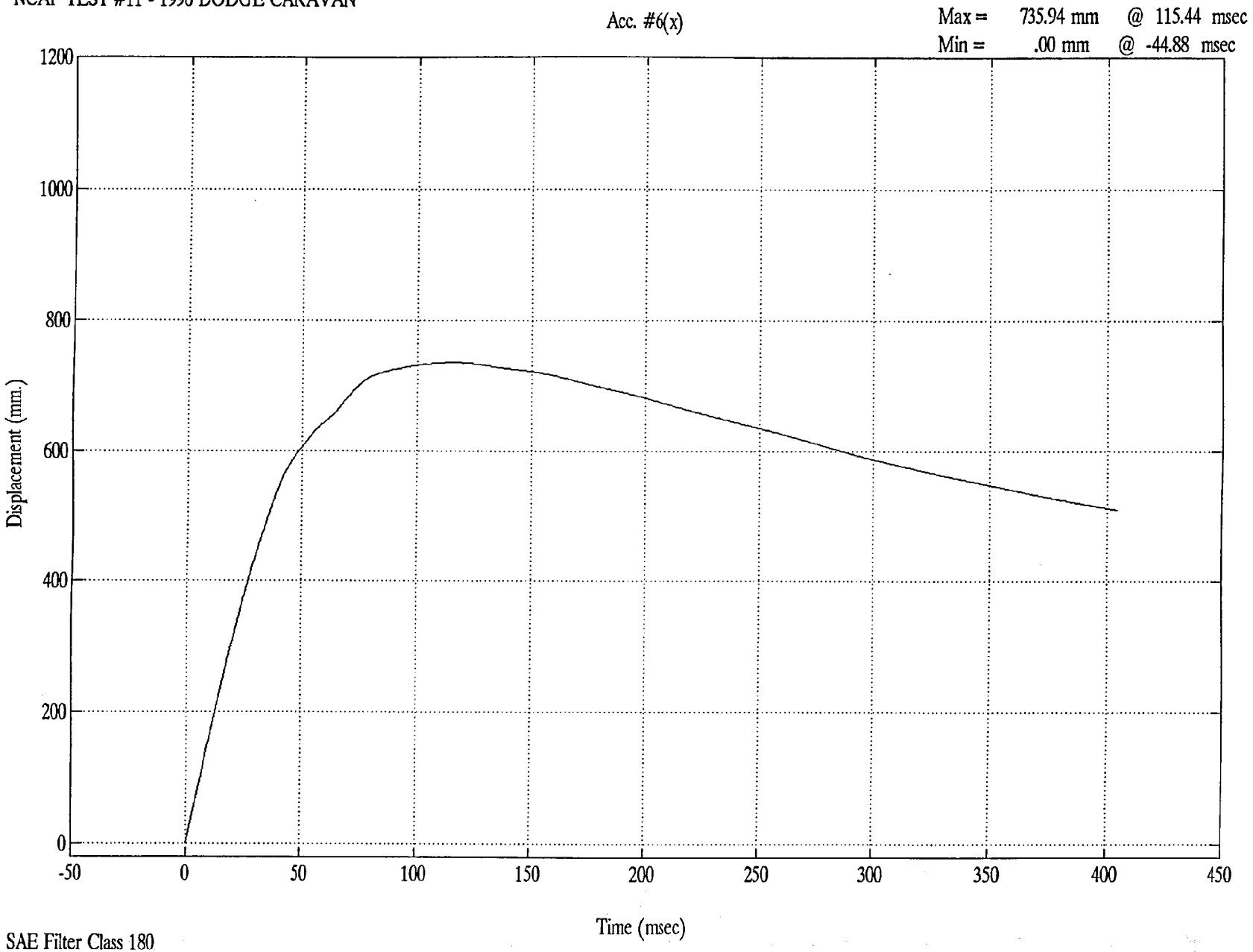
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

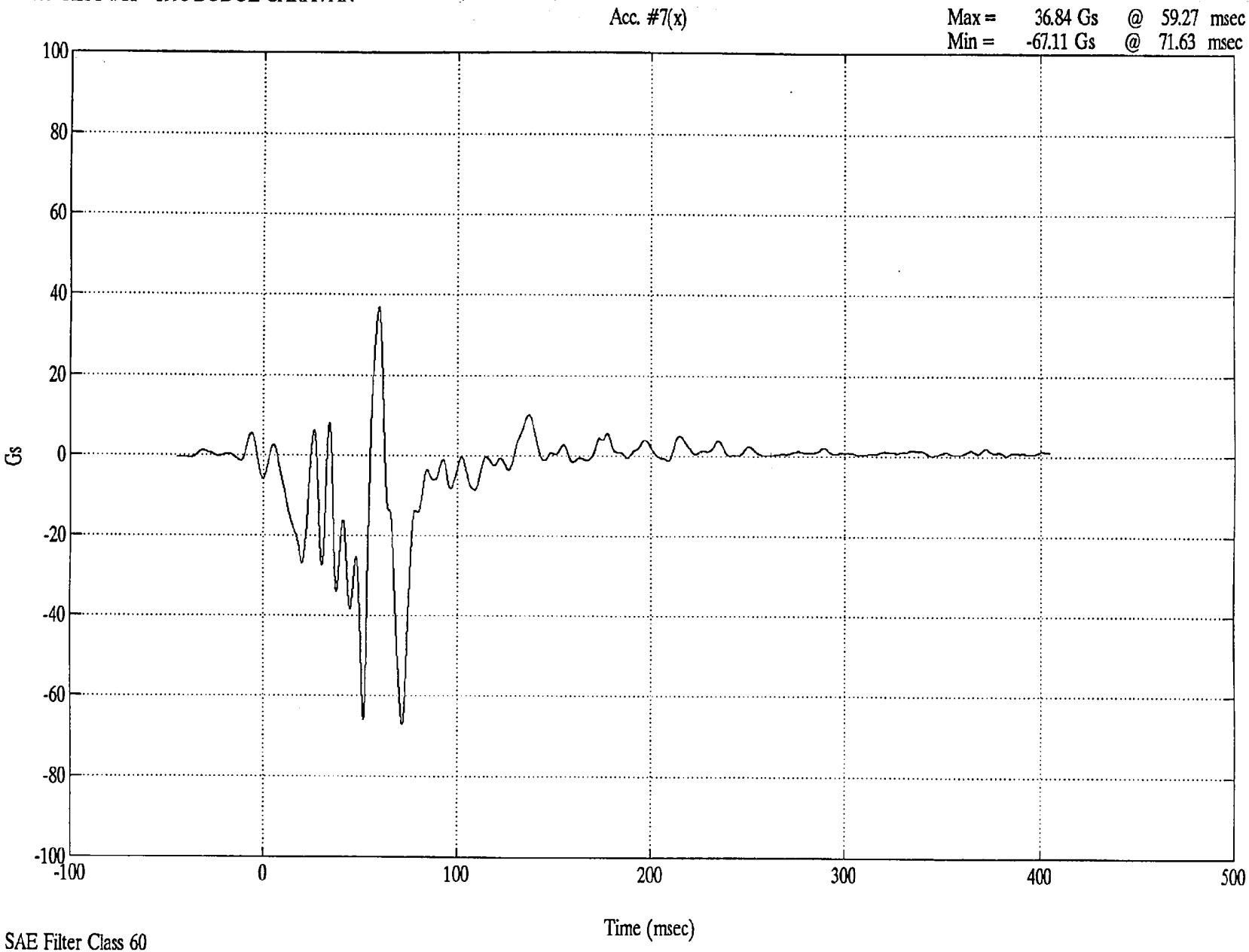
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

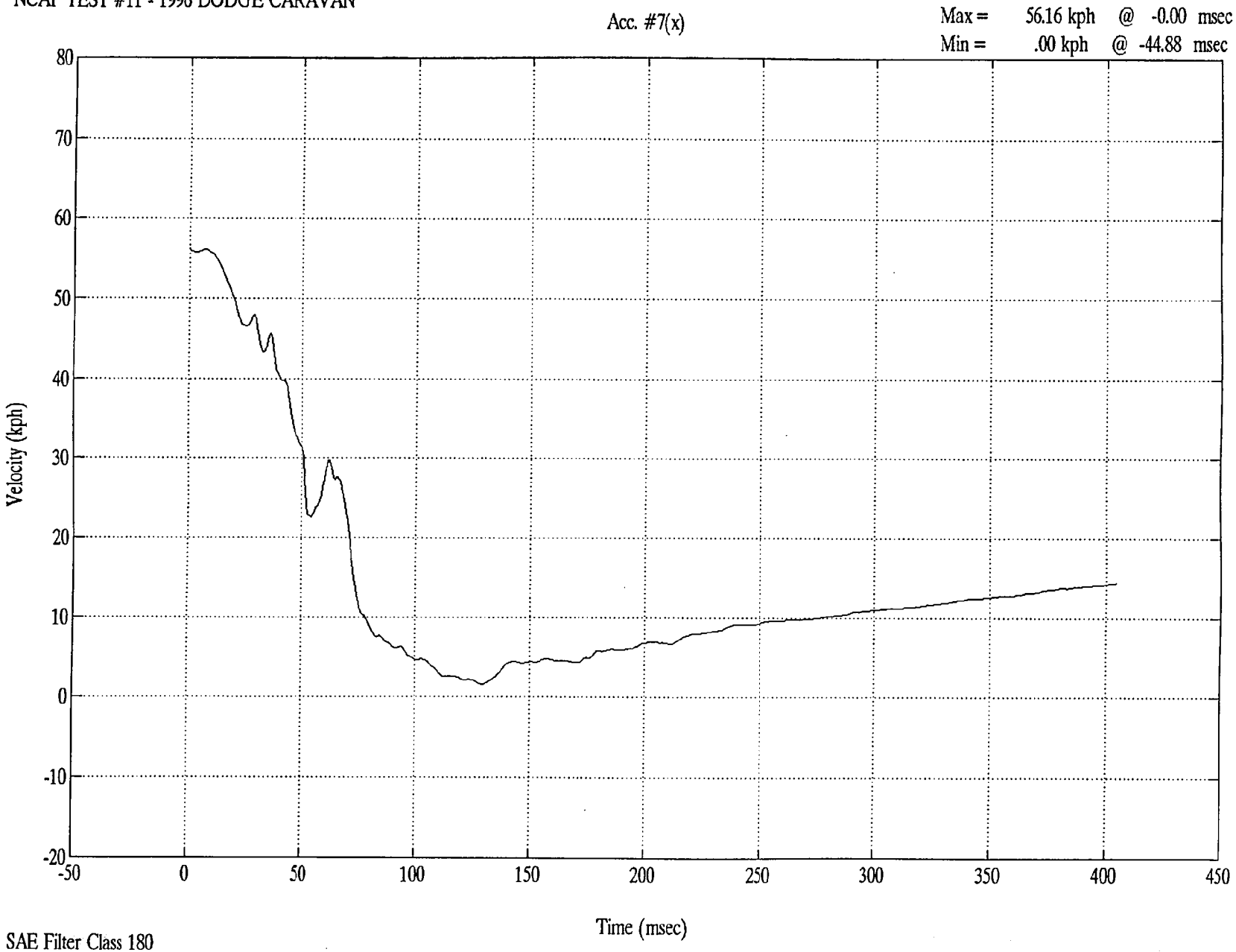
8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 60

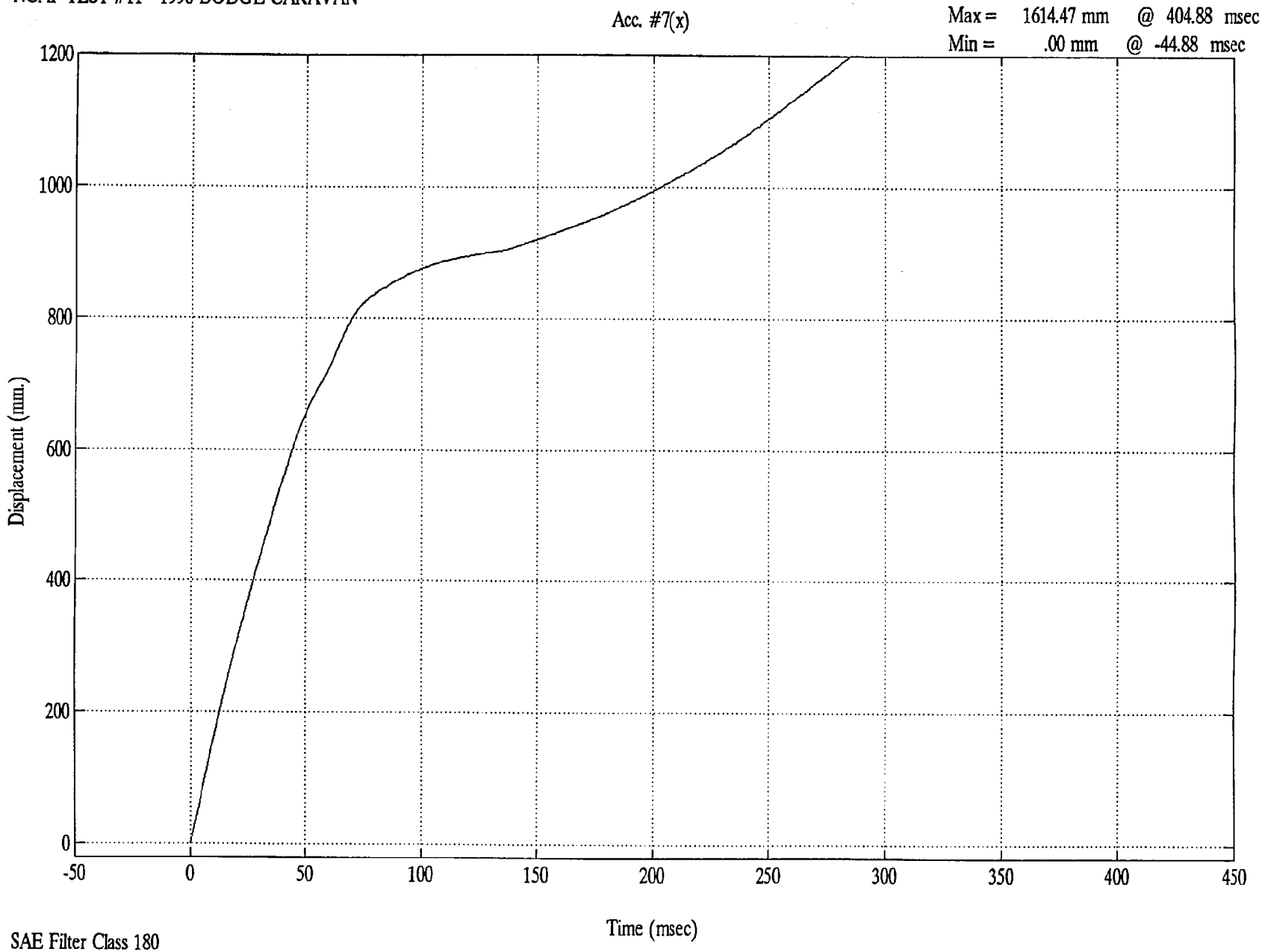
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

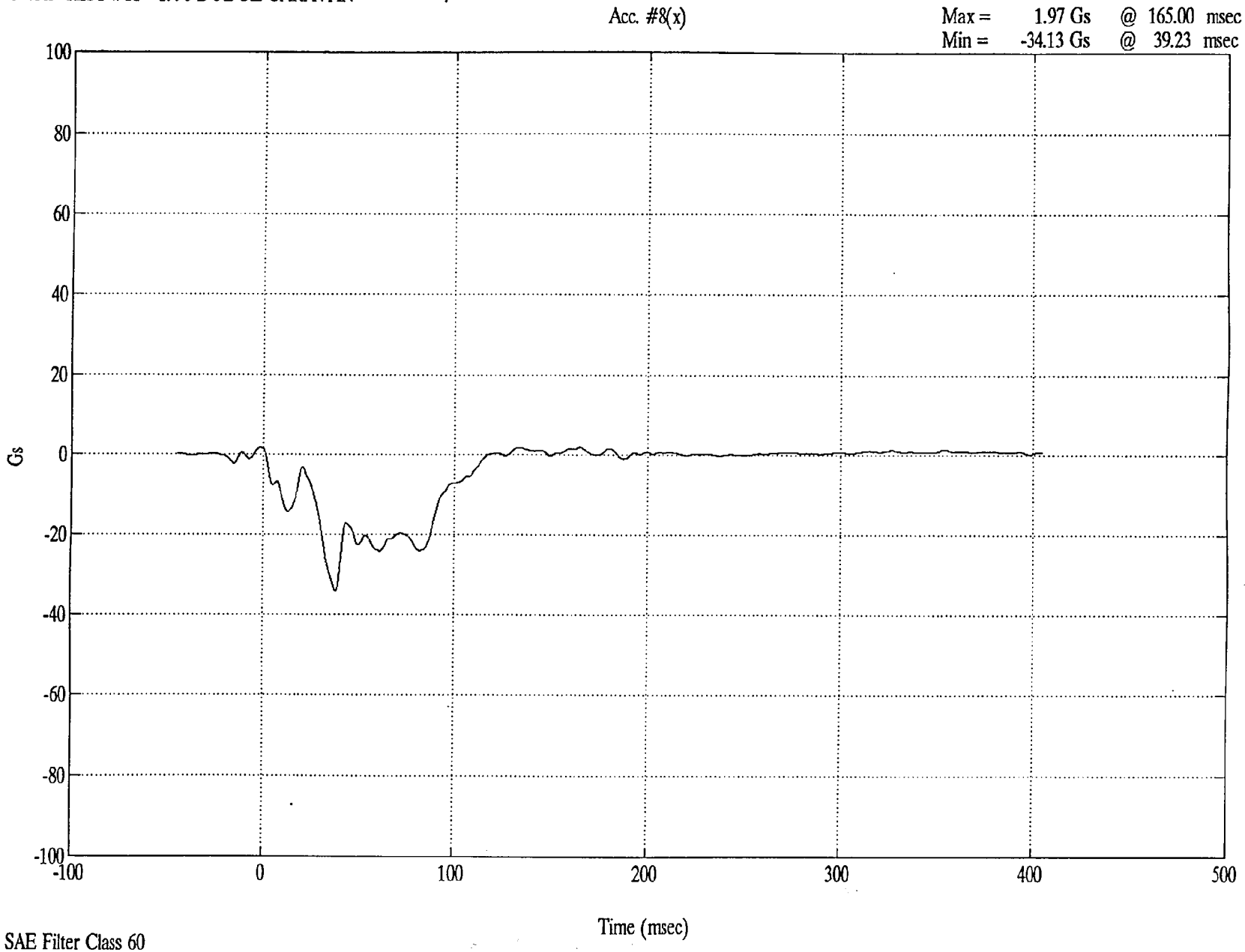
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

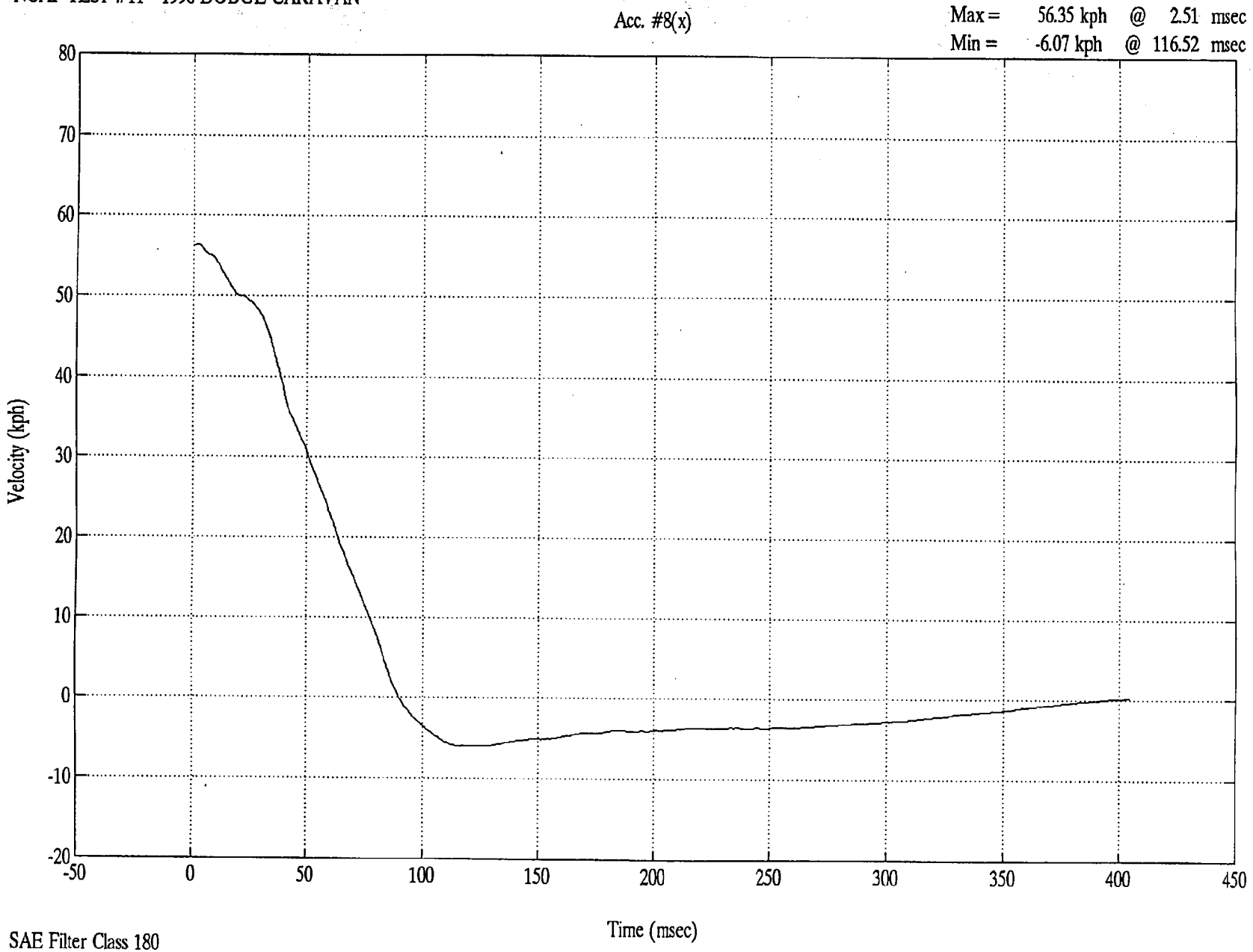


SAE Filter Class 60

B-120

8313-11

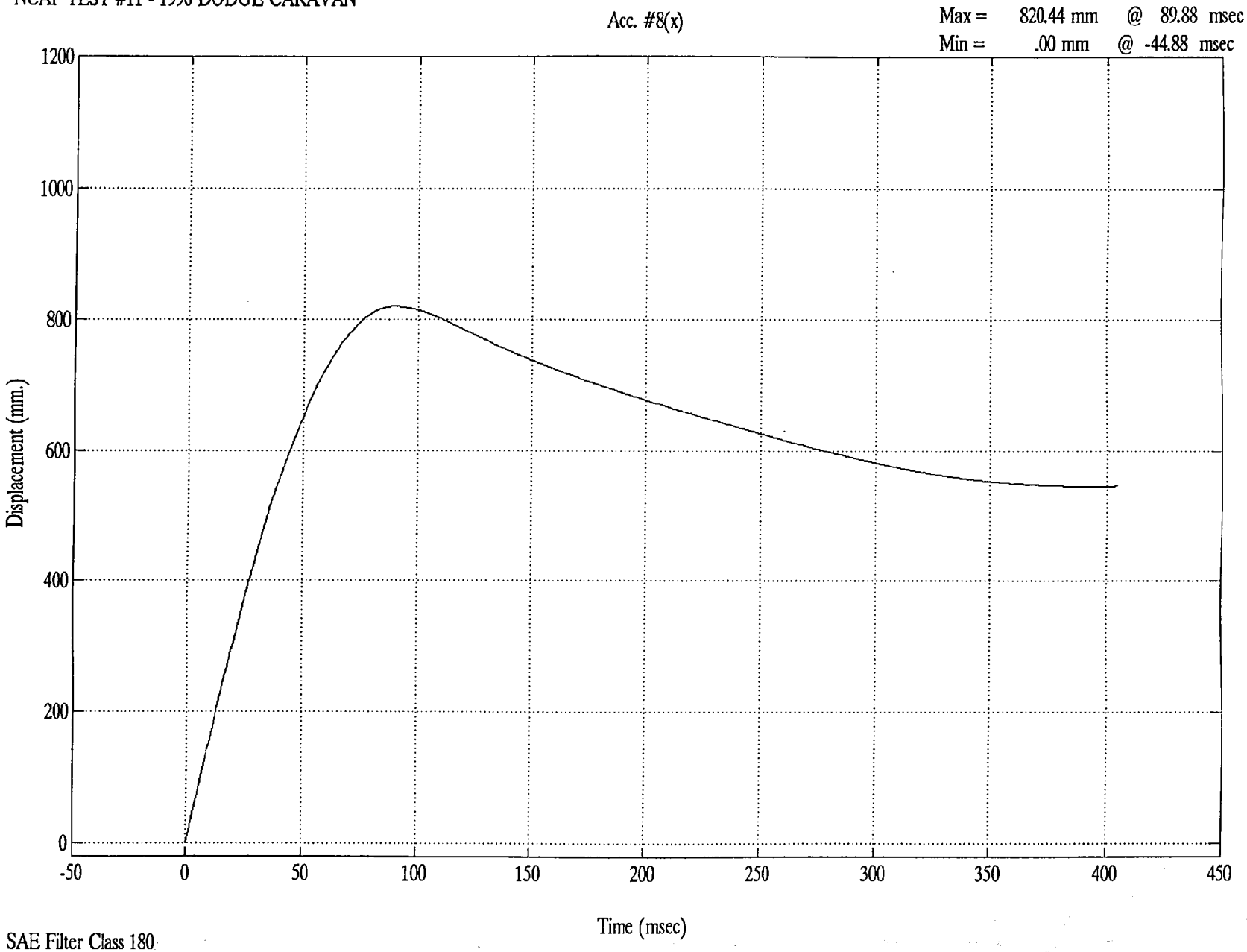
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

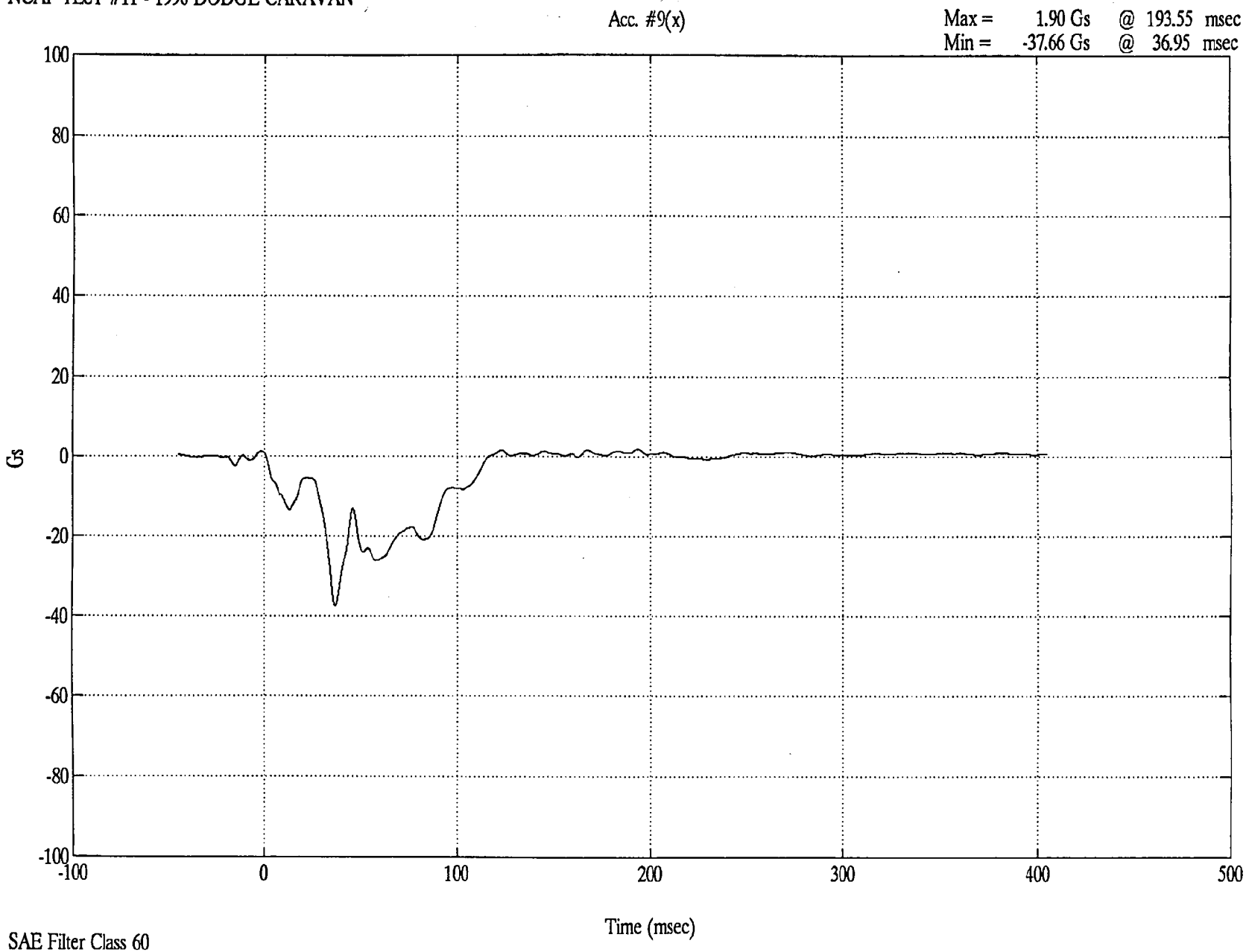
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

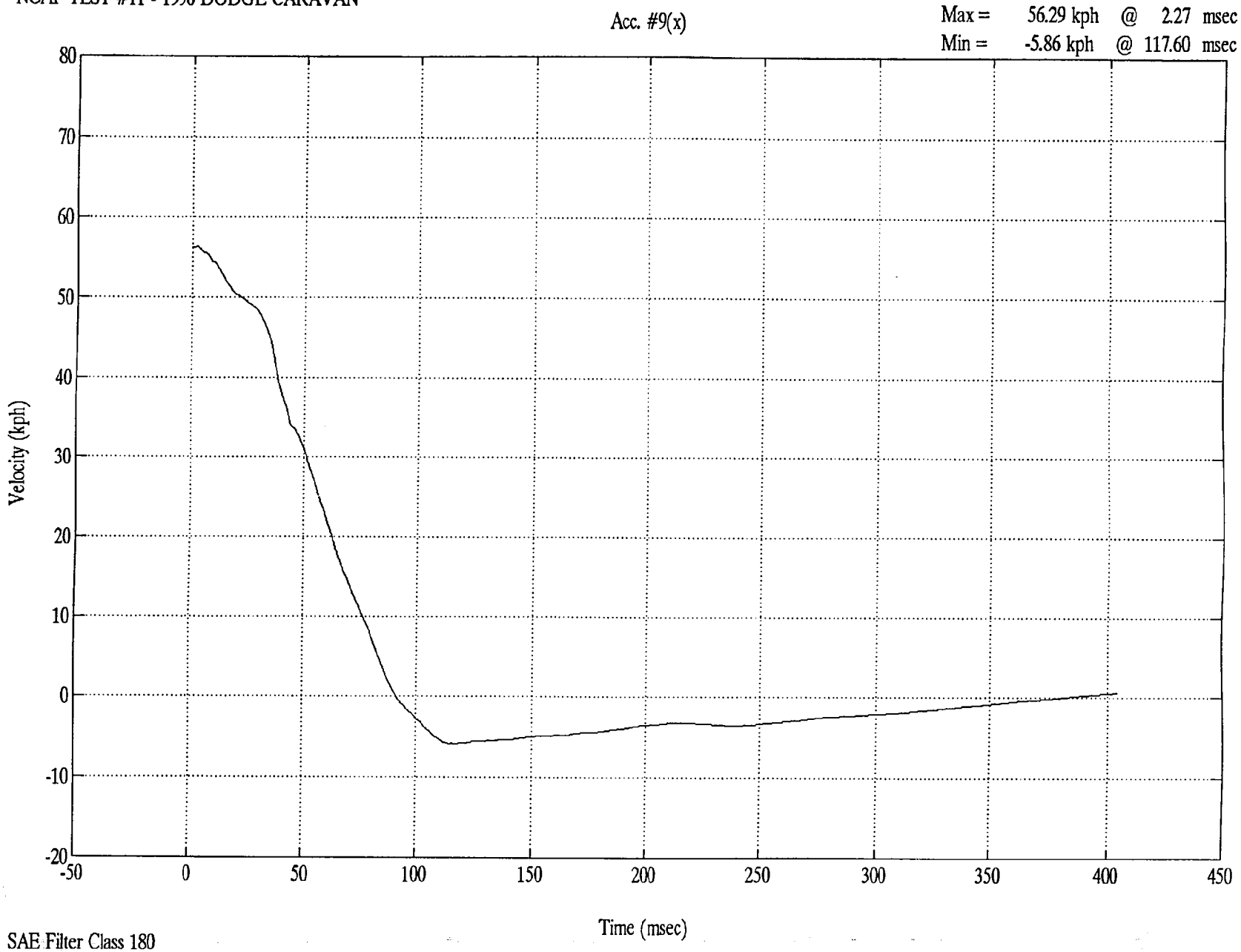


B-123

8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

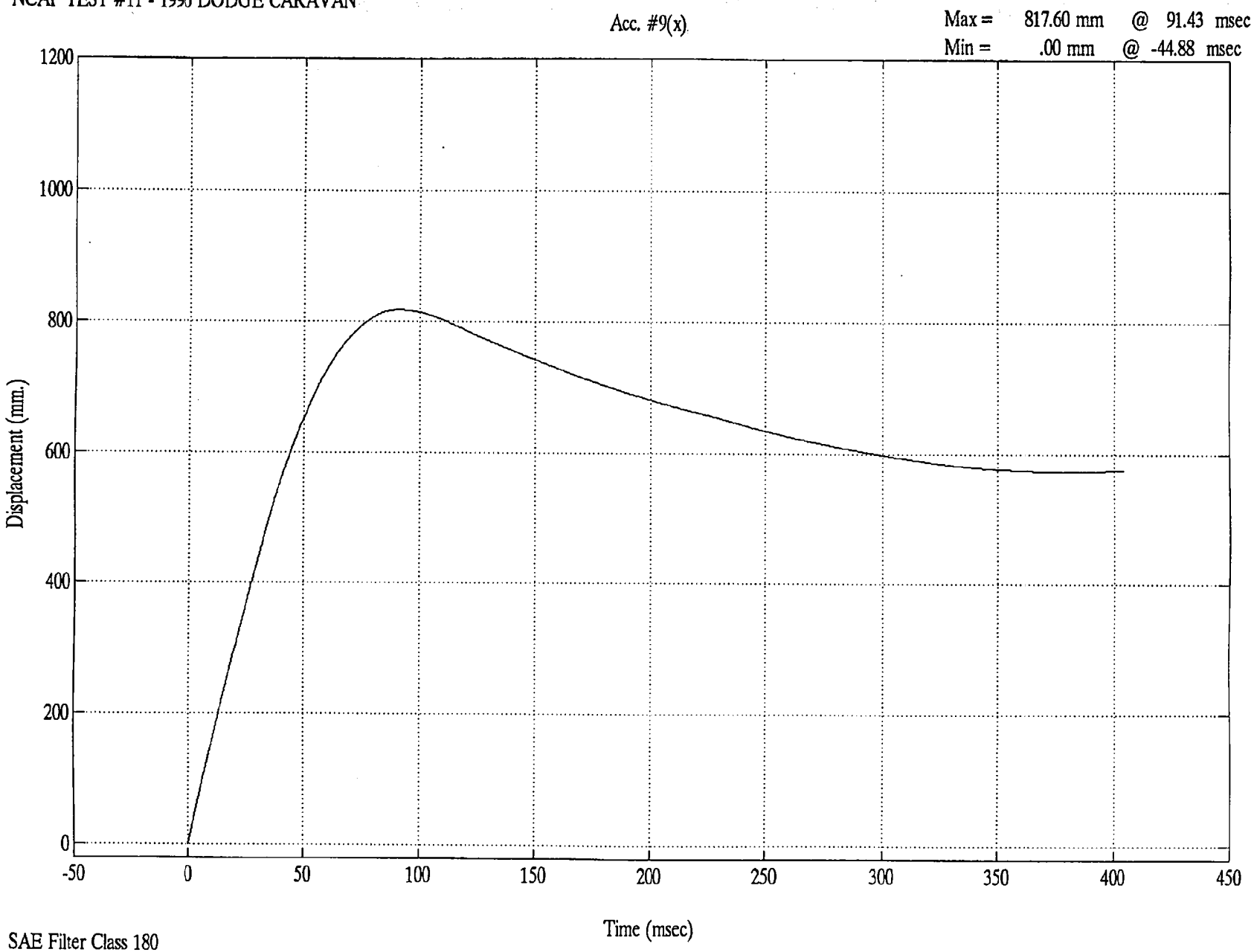


SAE Filter Class 180

B-124

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 180

8313-11

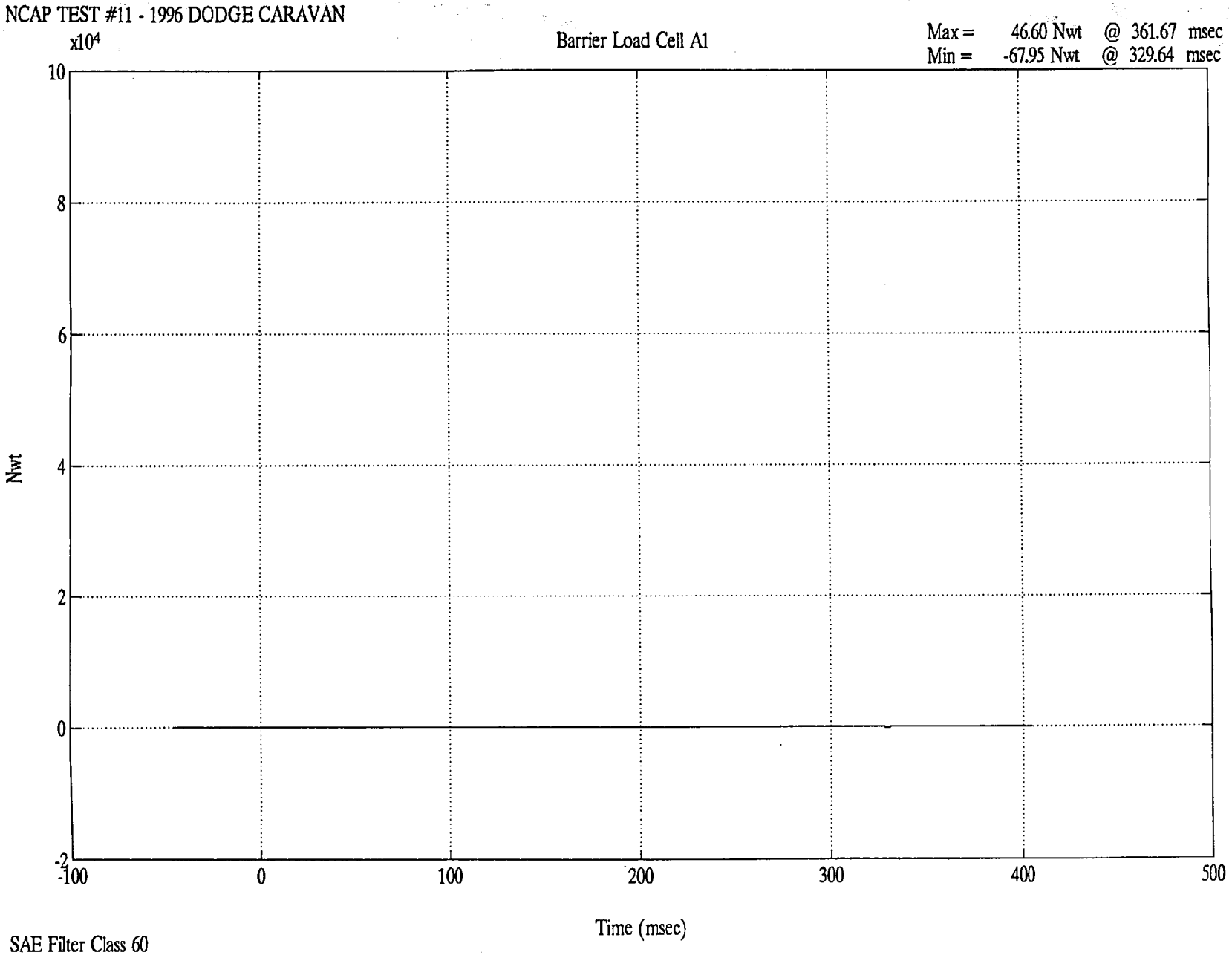
NHTSA TEST NO. MT0305

LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

60

NCAP TEST #11 - 1996 DODGE CARAVAN

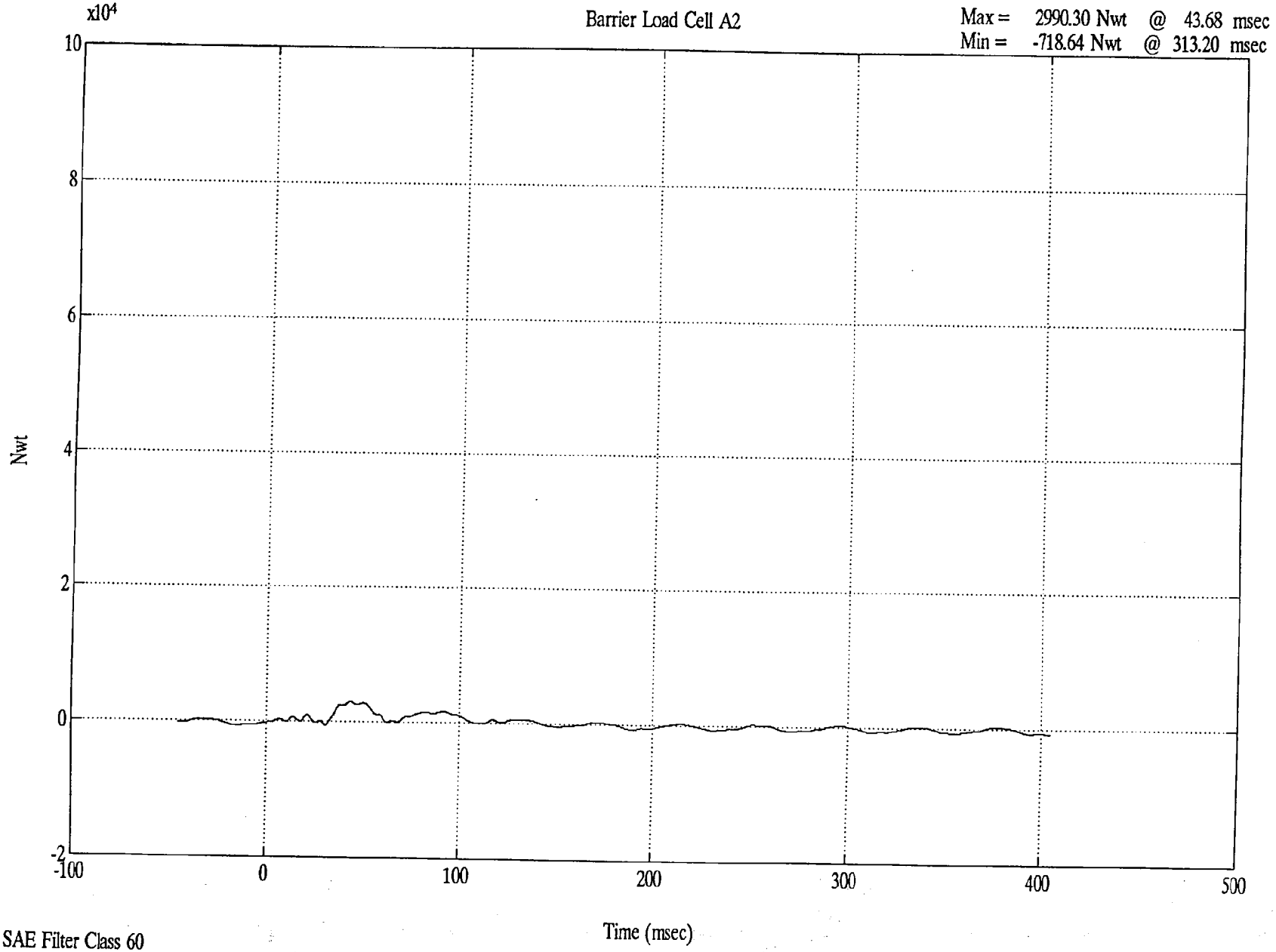


B-127

8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

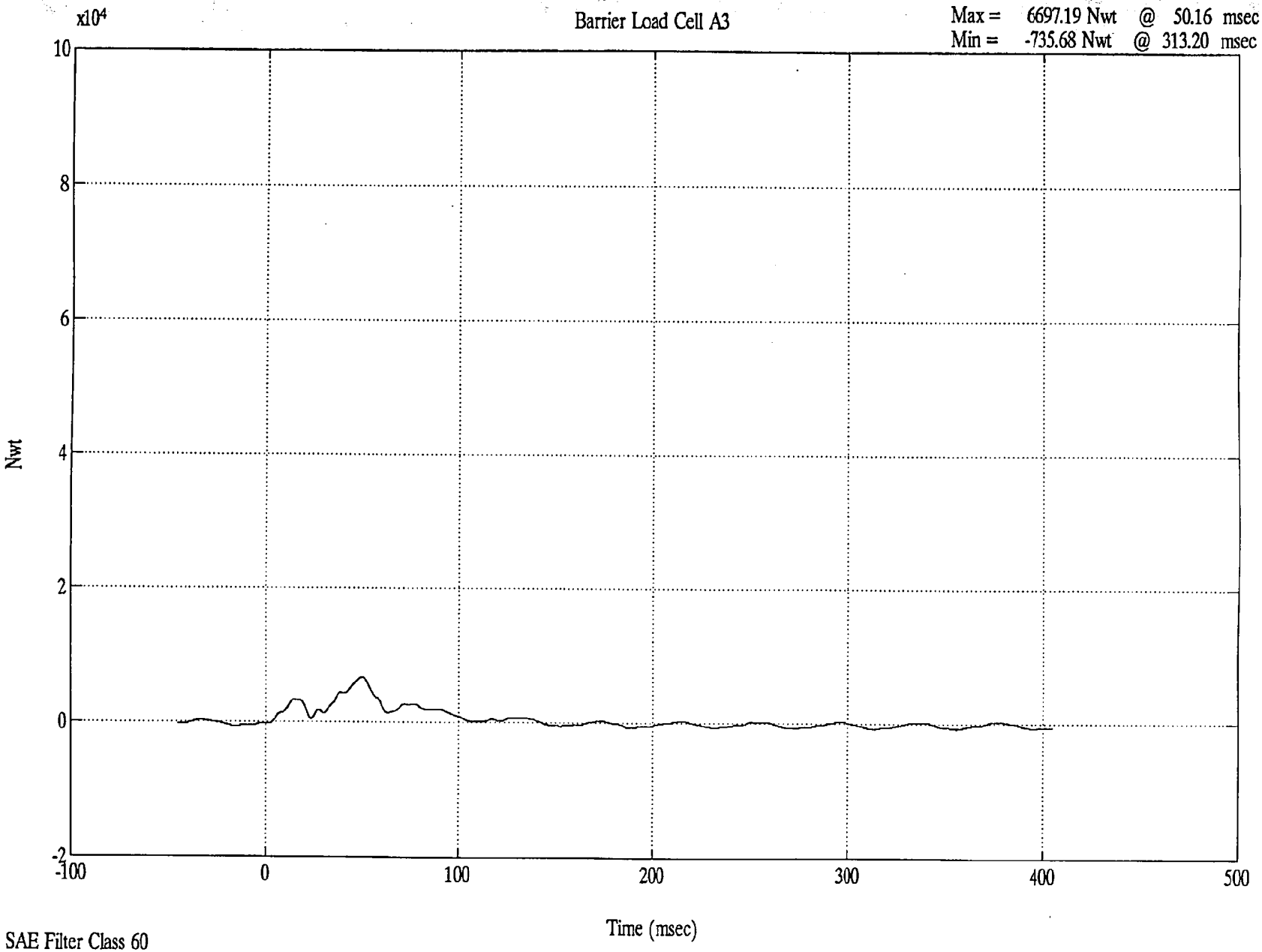


B-128

8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

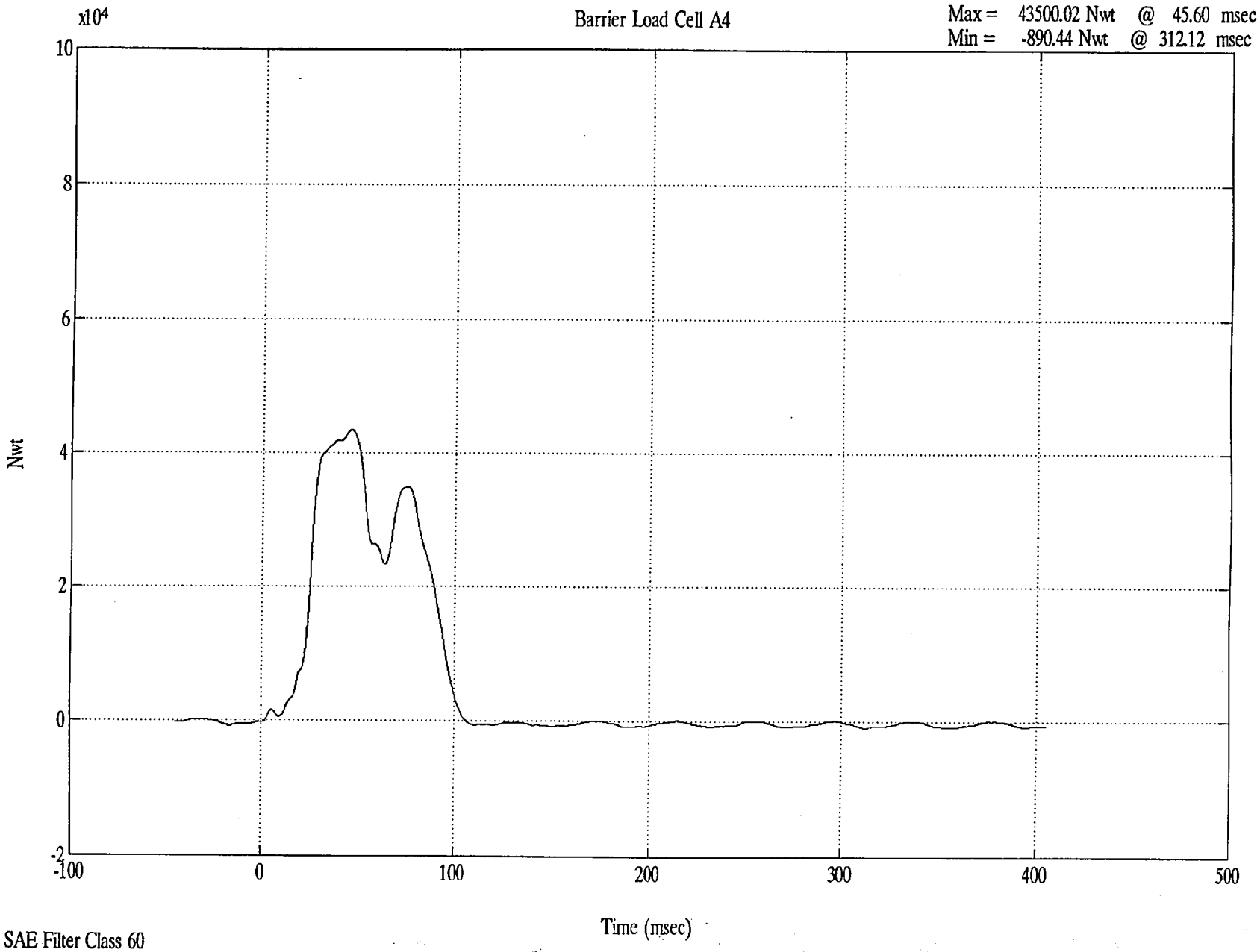


SAE Filter Class 60

B-129

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

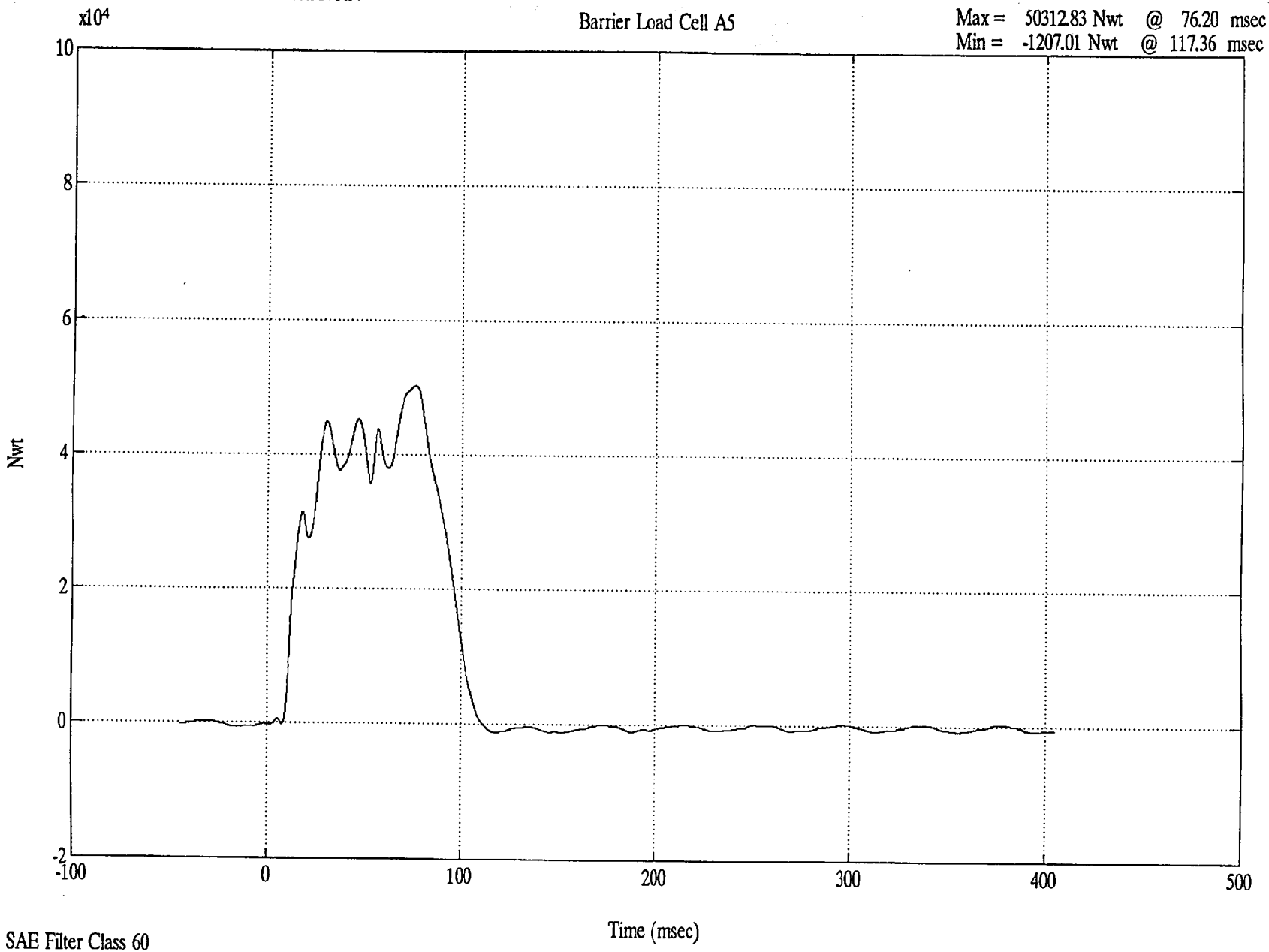


SAE Filter Class 60

B-130

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

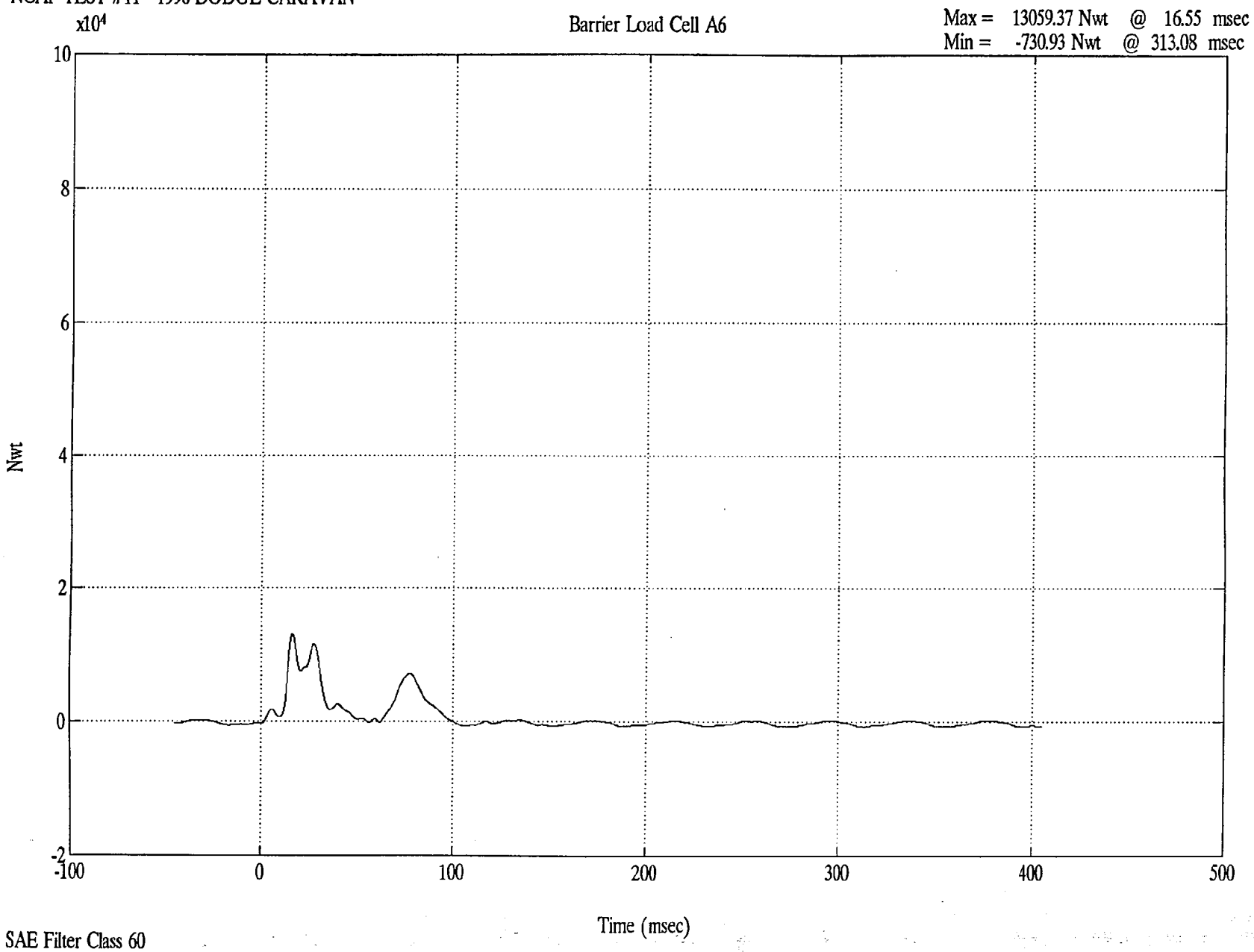


B-131

8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

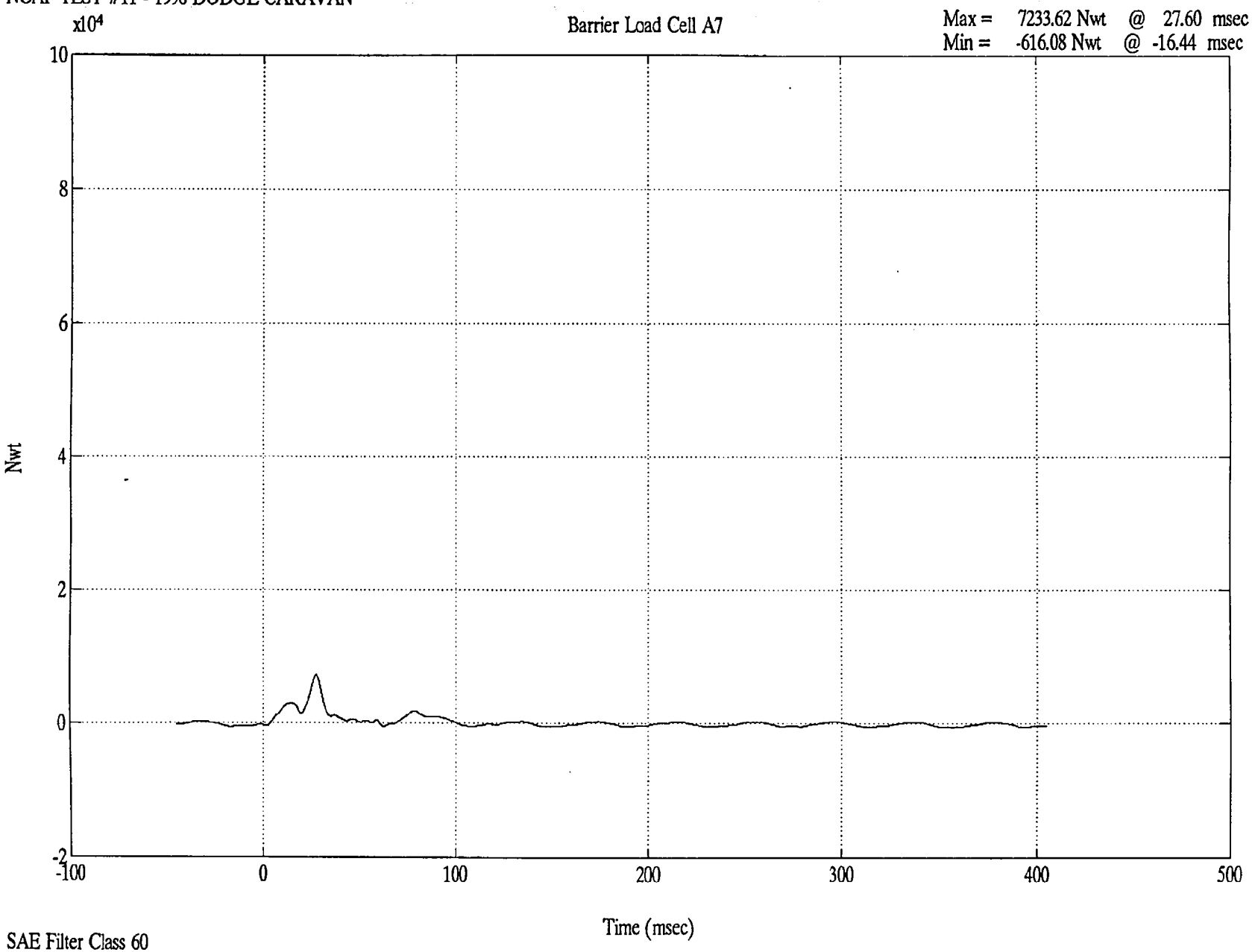


SAE Filter Class 60

B-132

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

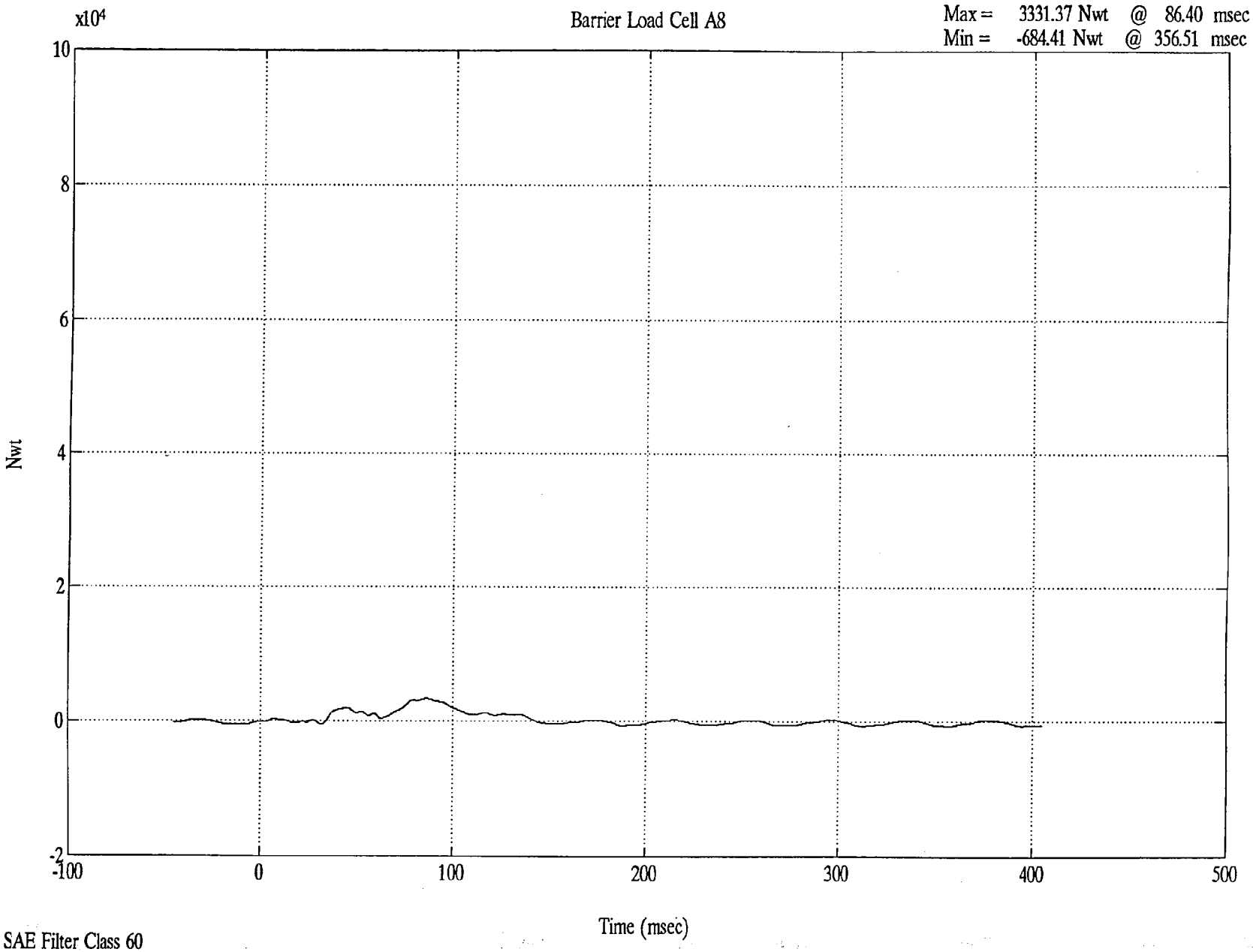


SAE Filter Class 60

B-133

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

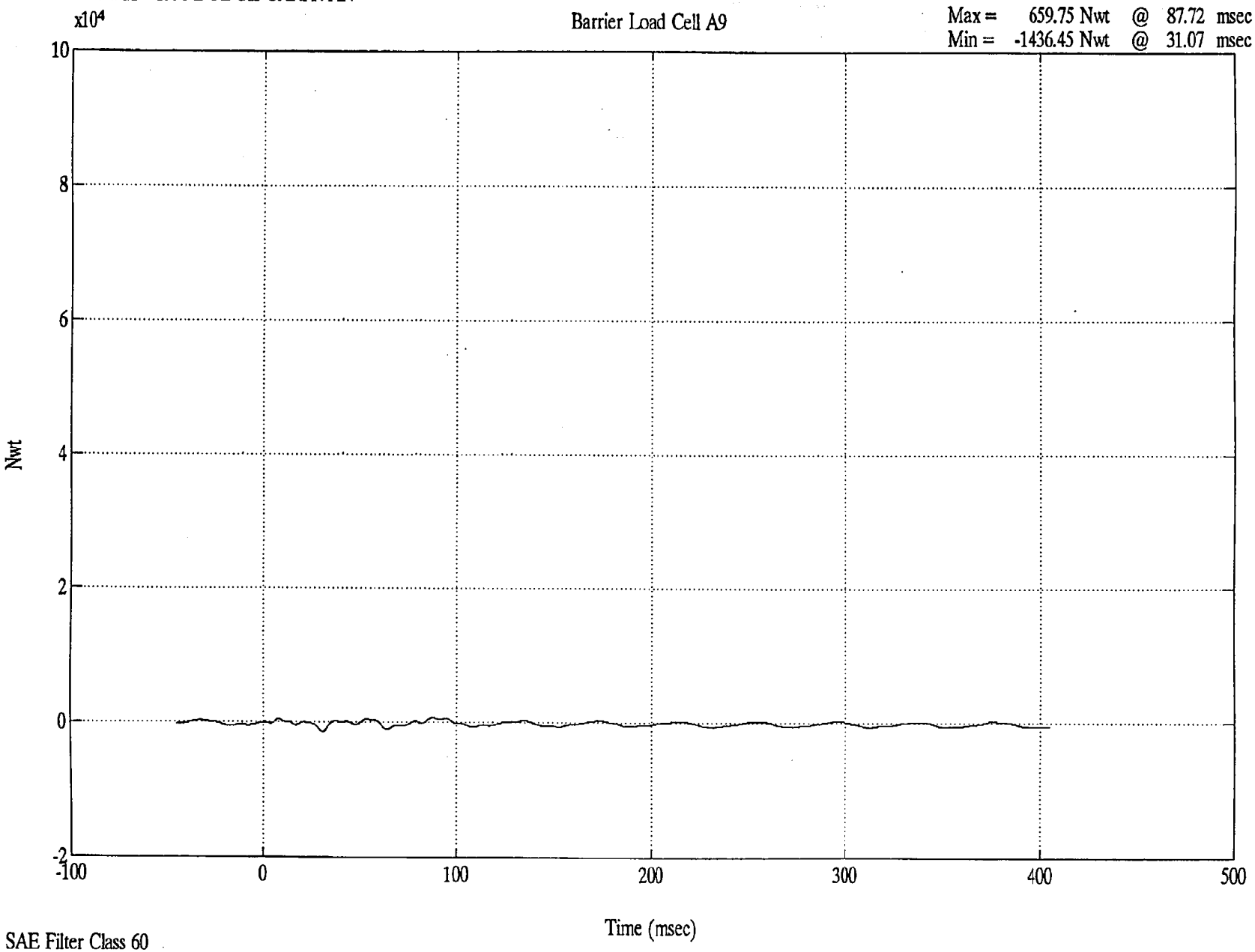


SAE Filter Class 60

B-134

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

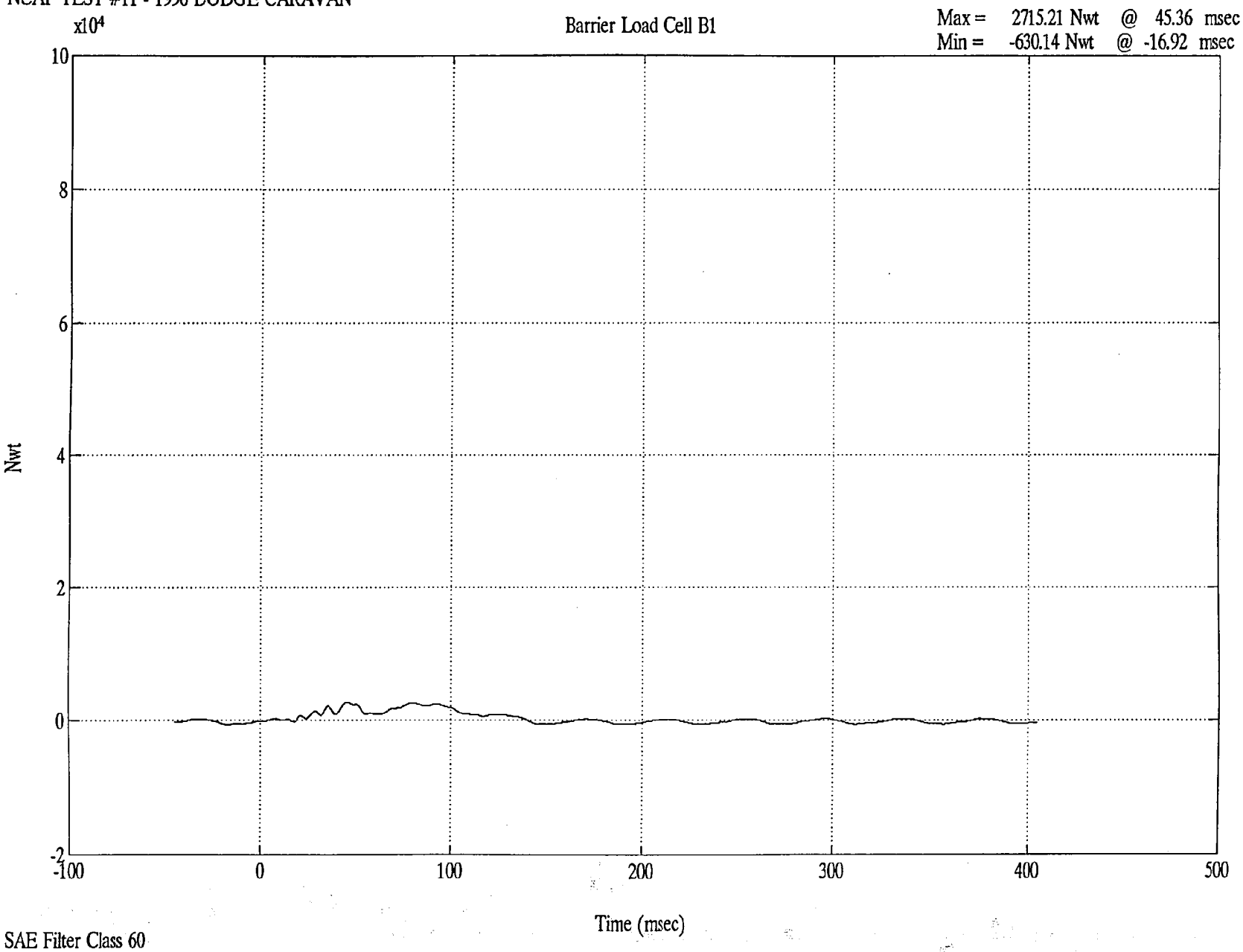


B-135

8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

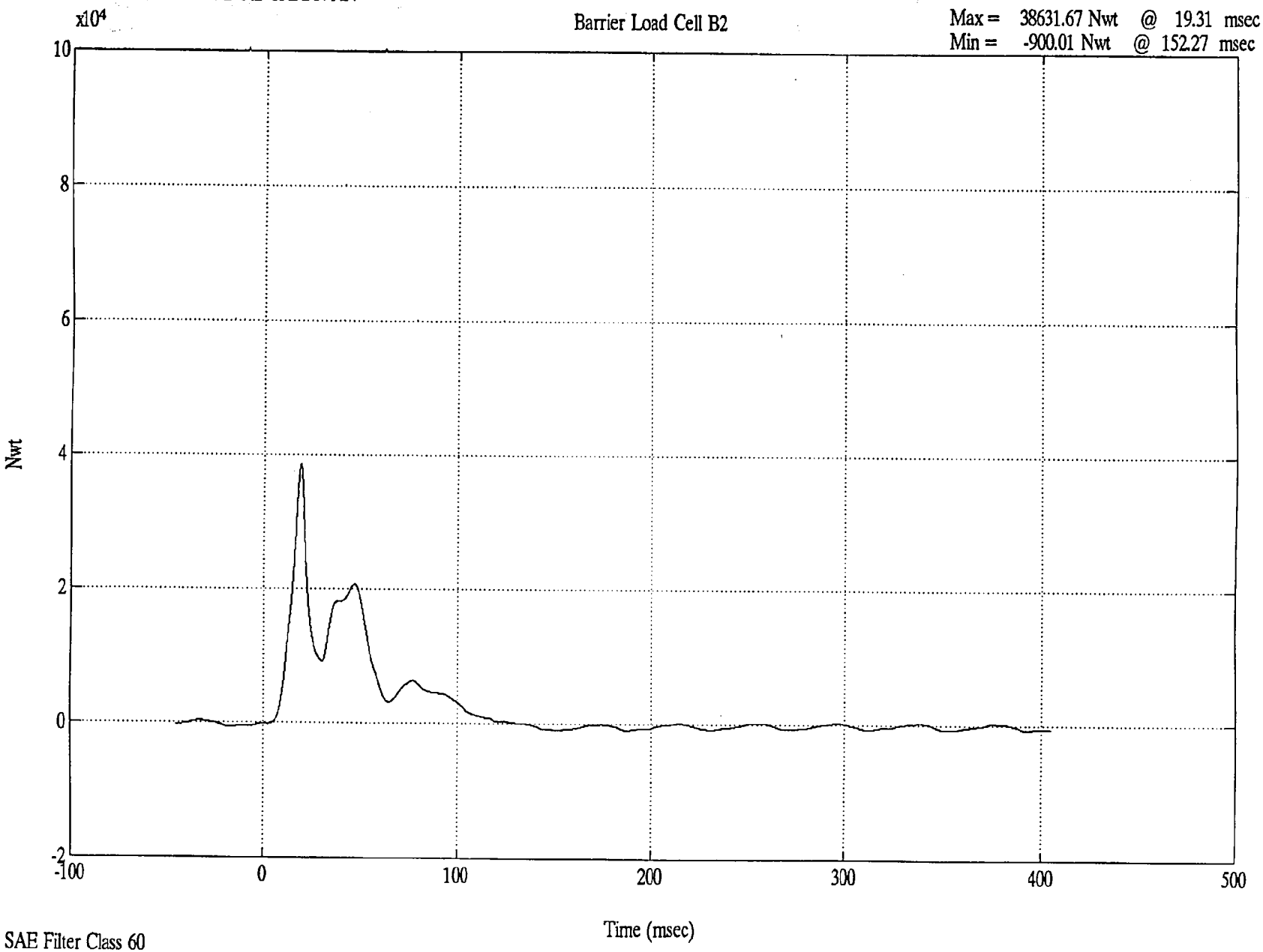


SAE Filter Class 60

B-136

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

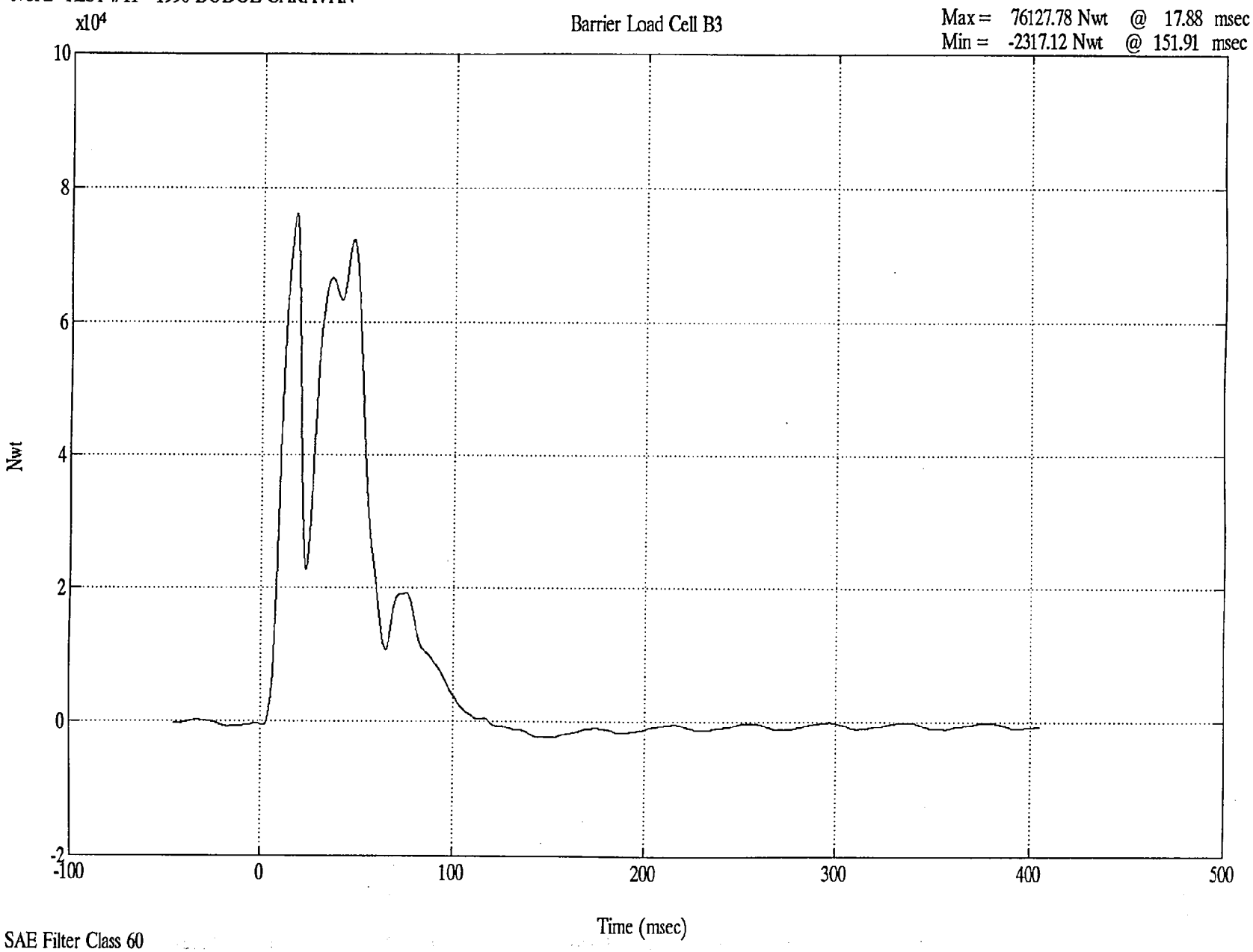


B-137

8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

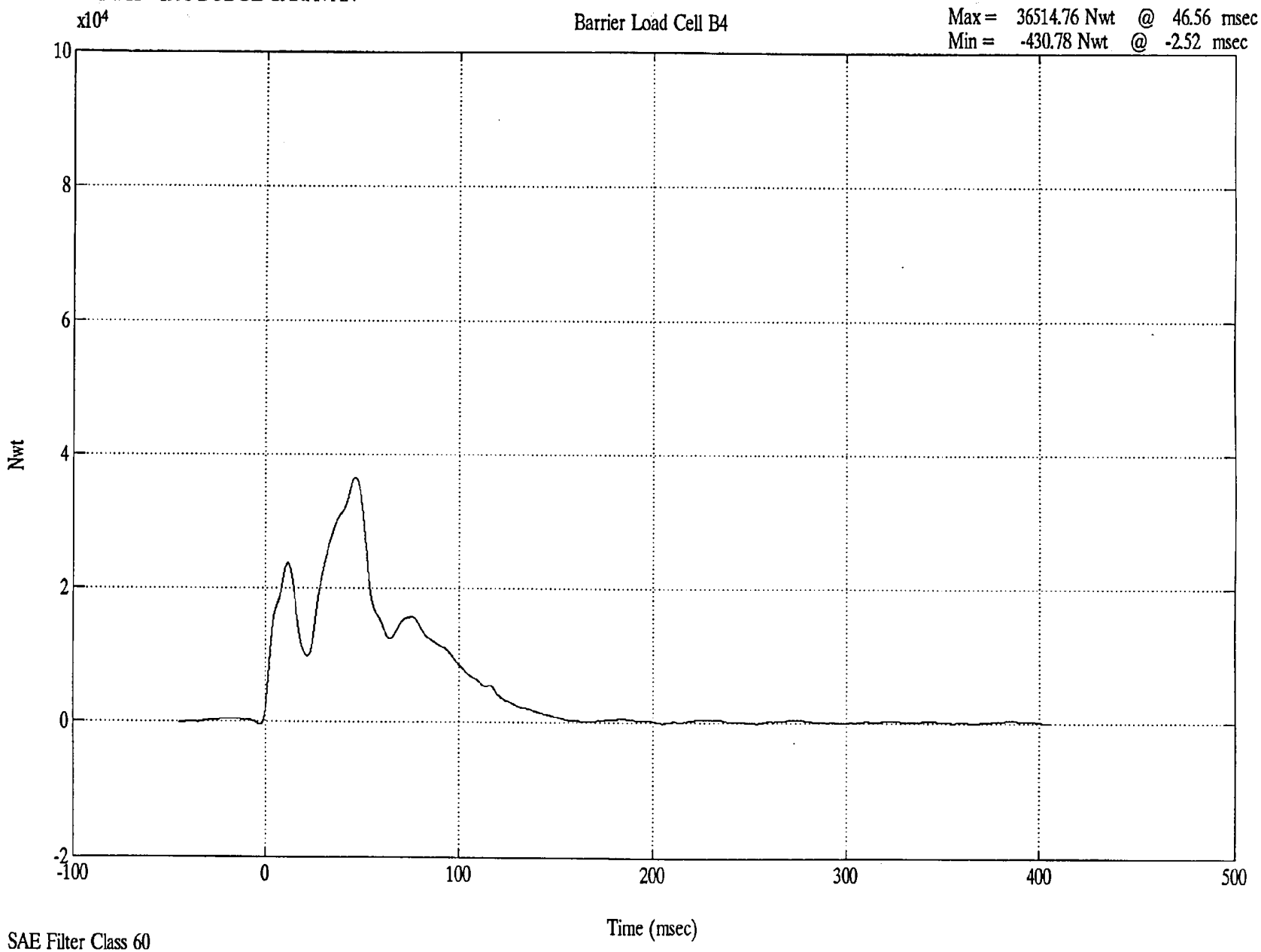


B-138

8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

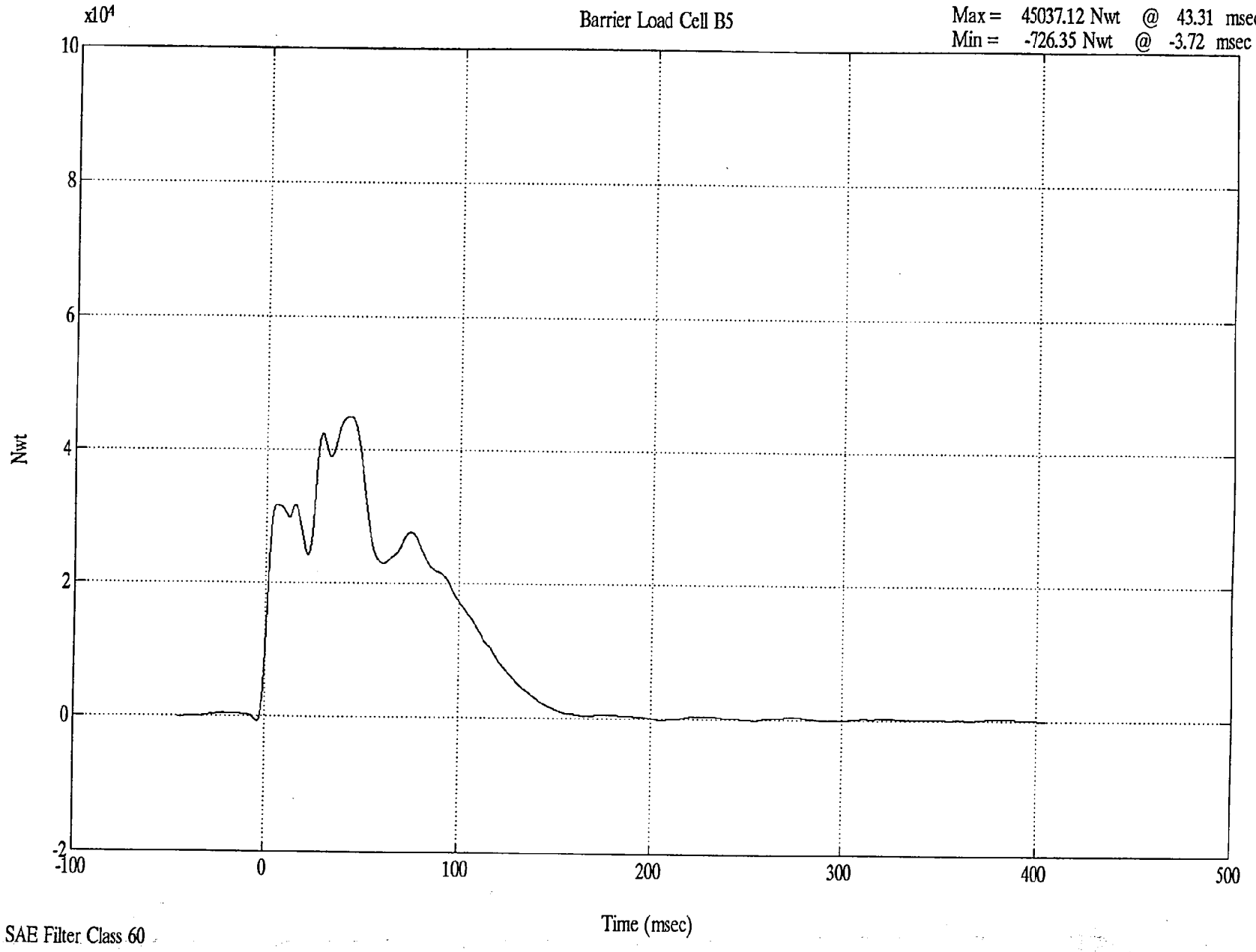


B-139

8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

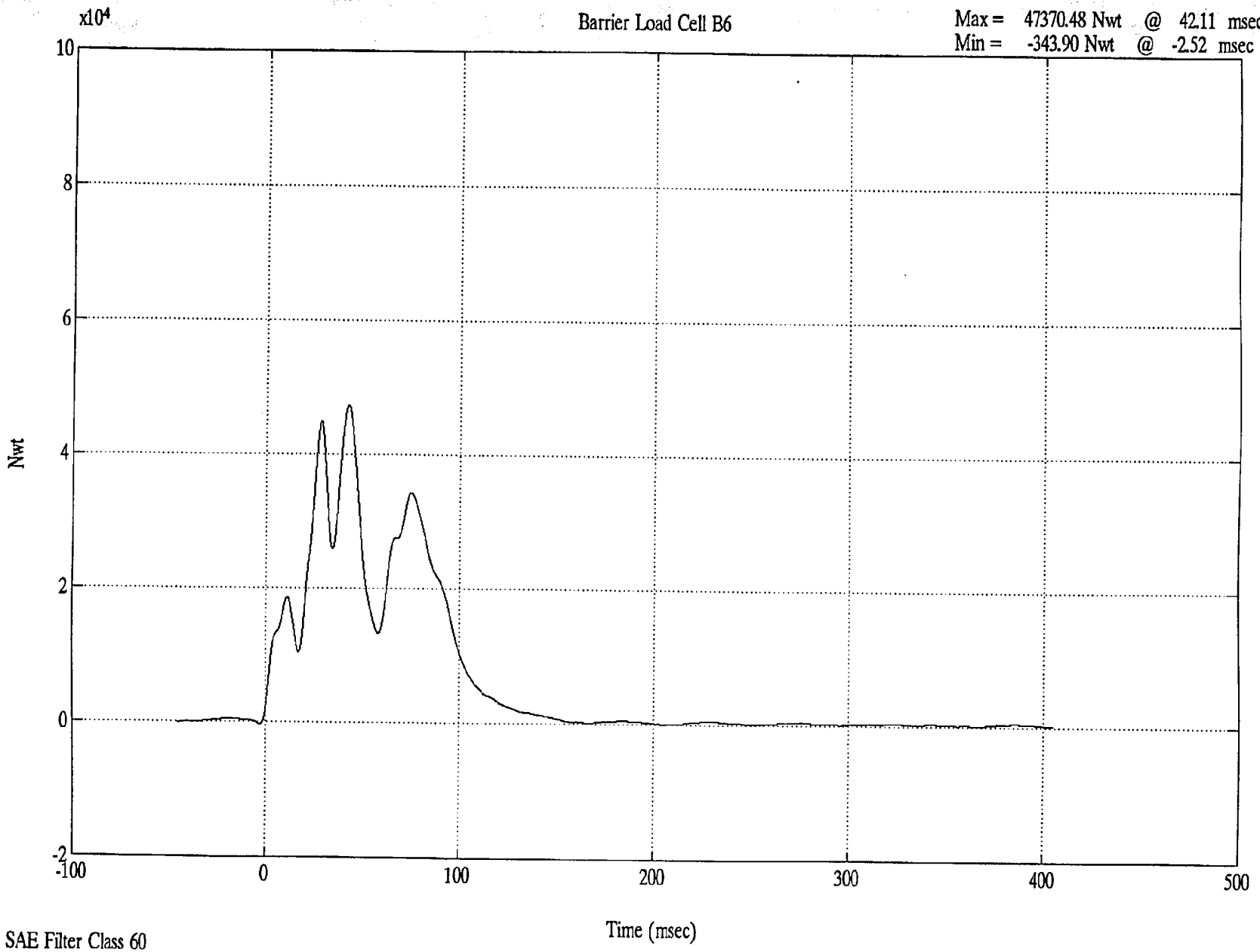


B-140

8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

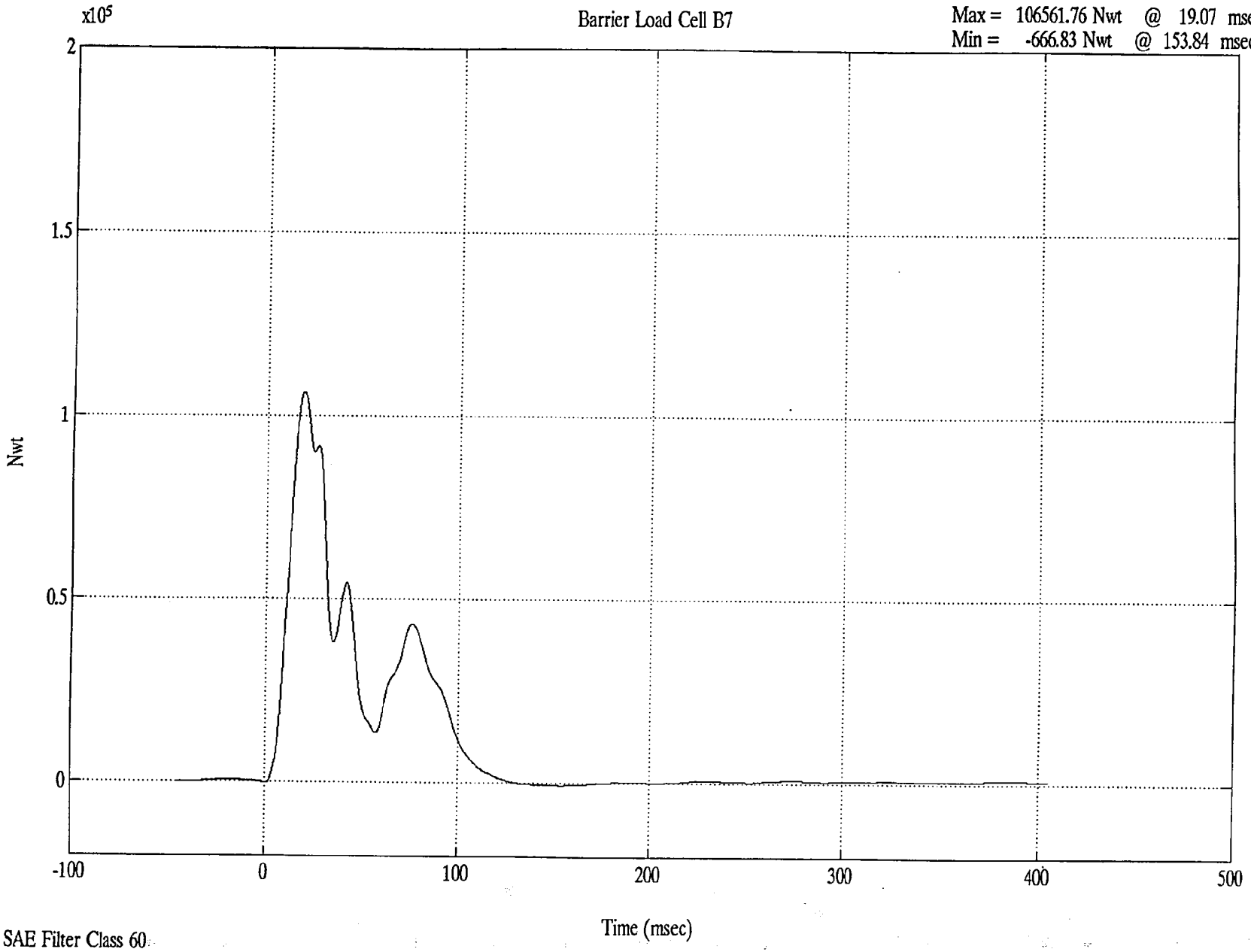


B-141

8313-11

SAE Filter Class 60

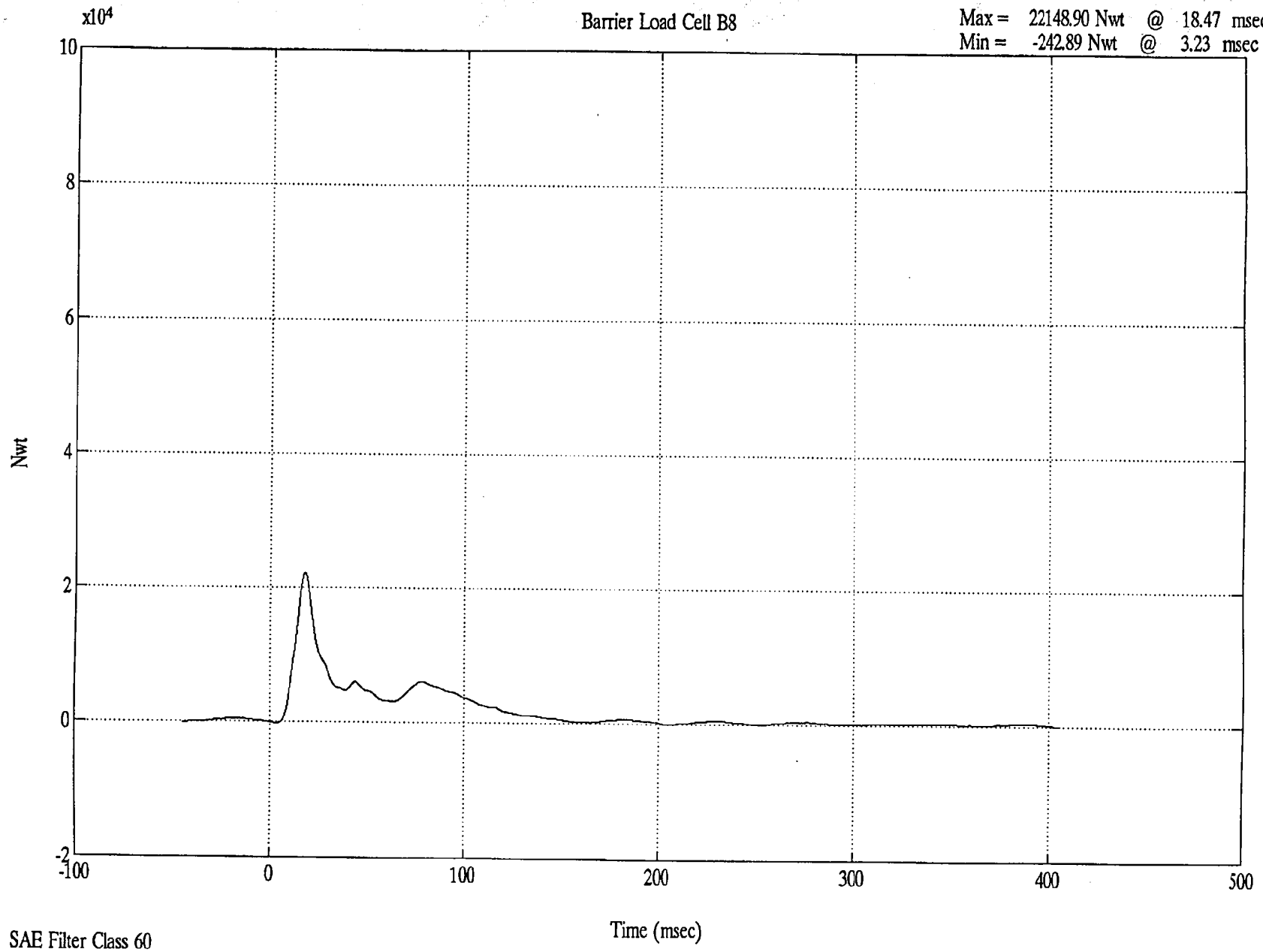
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 60

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

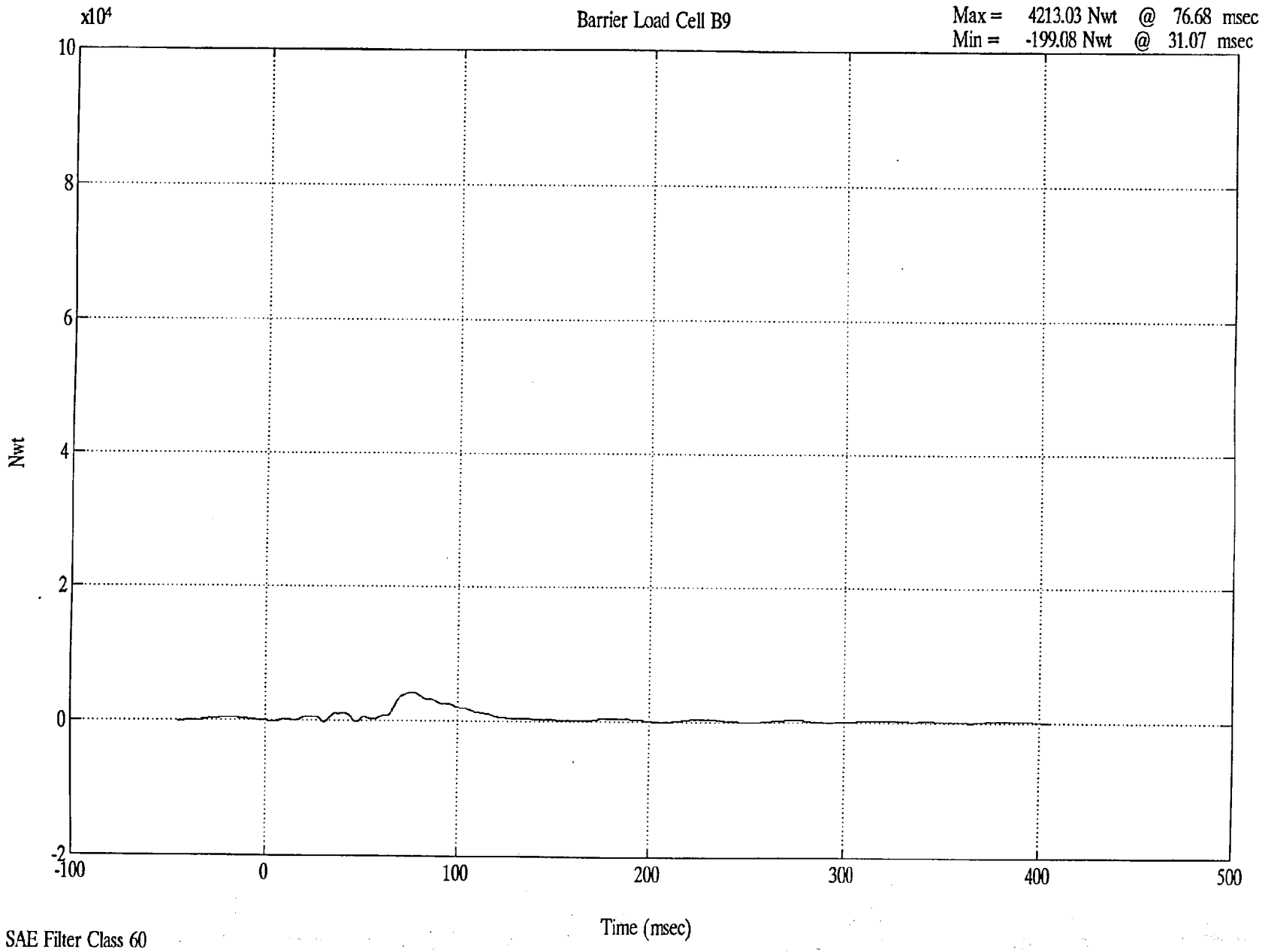


SAE Filter Class 60

B-143

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

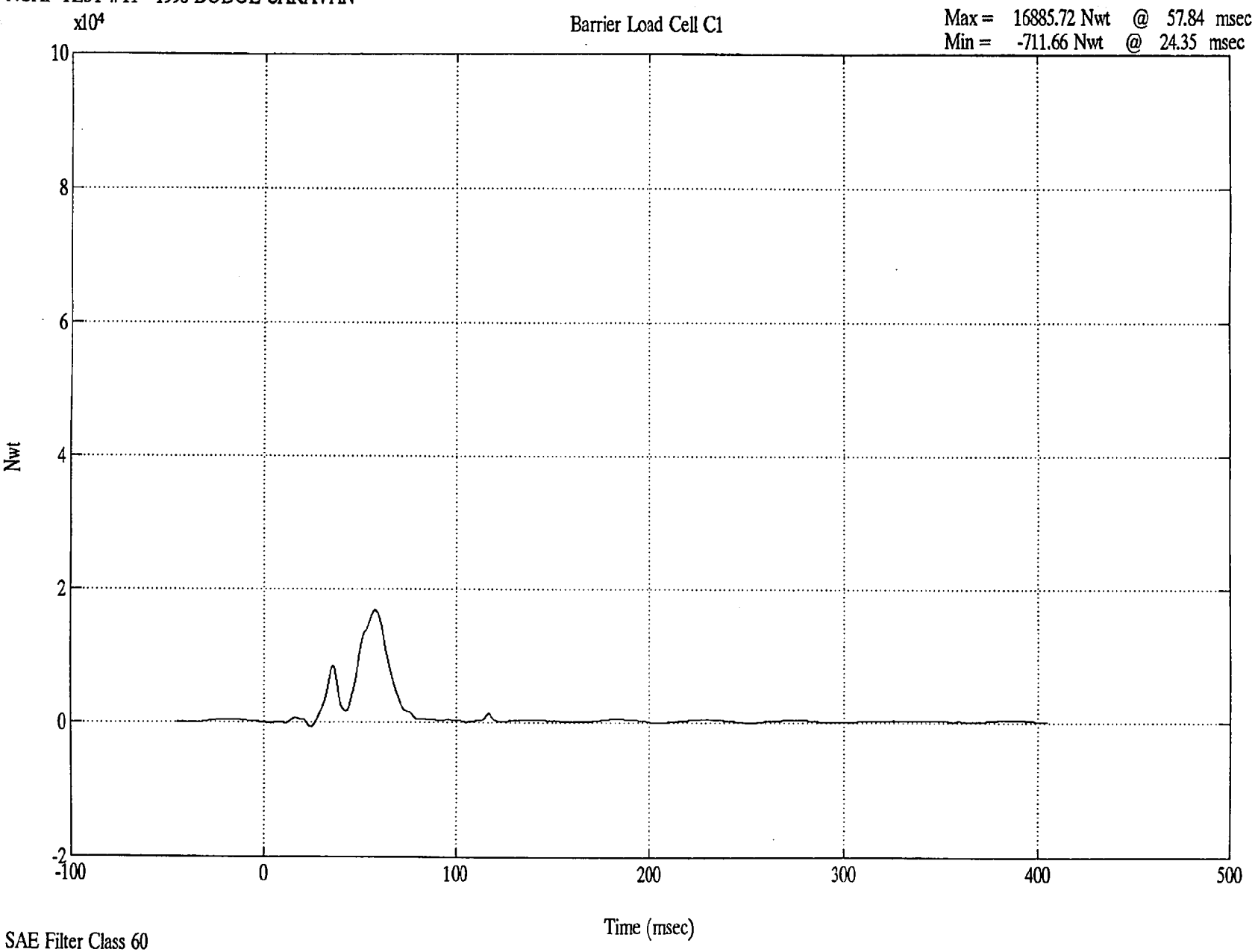


SAE Filter Class 60

B-144

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

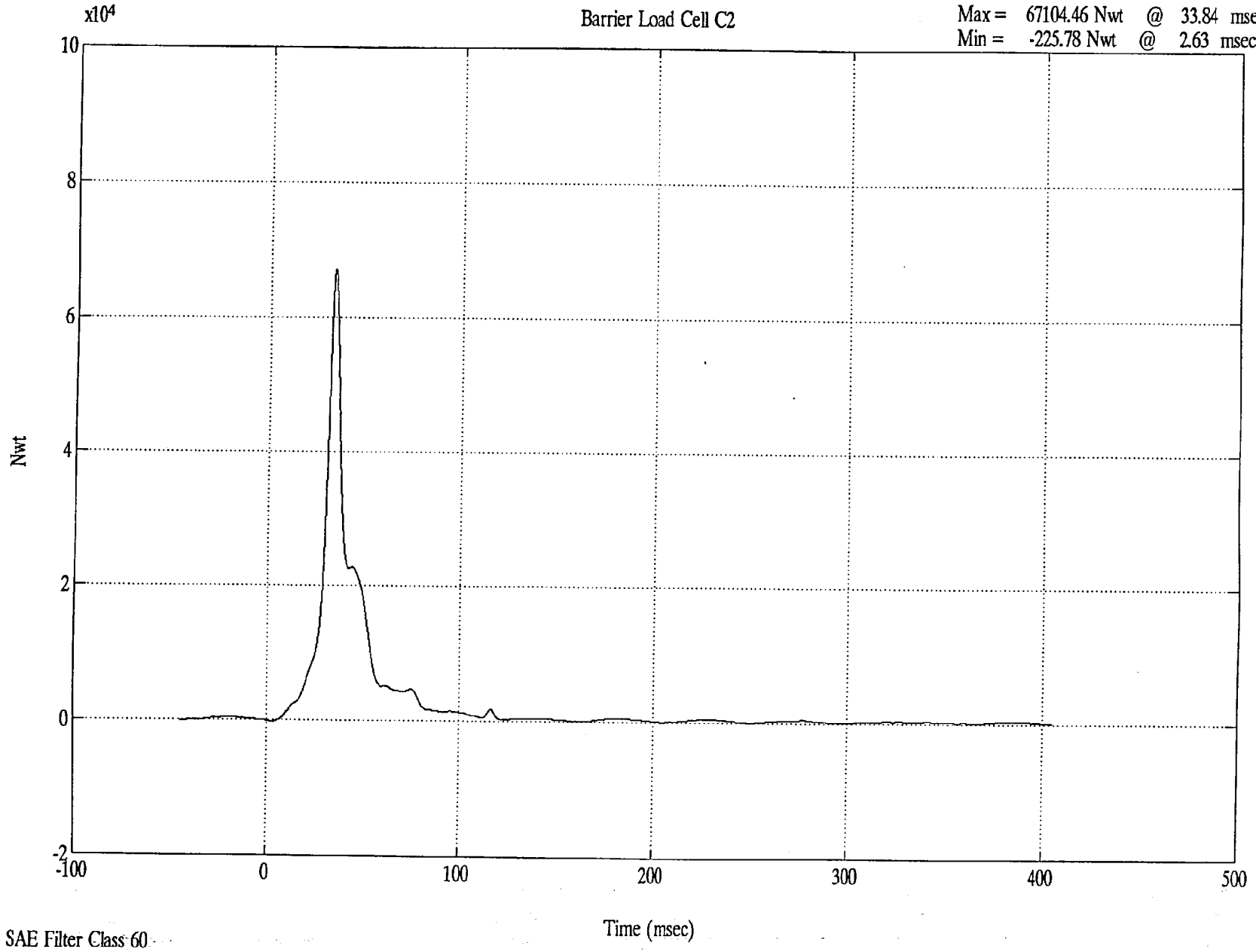


SAE Filter Class 60

B-145

8313-11

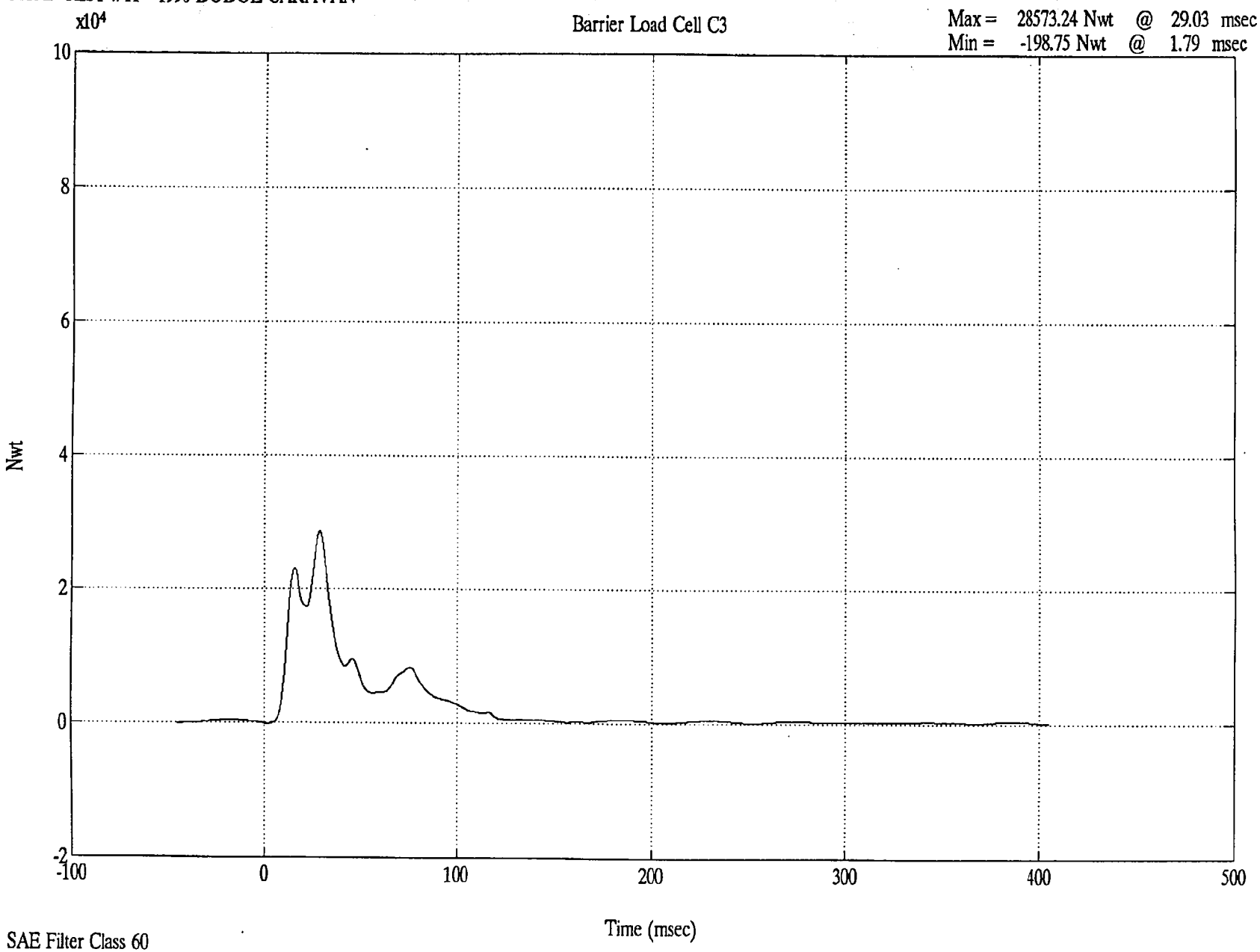
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 60

8313-11

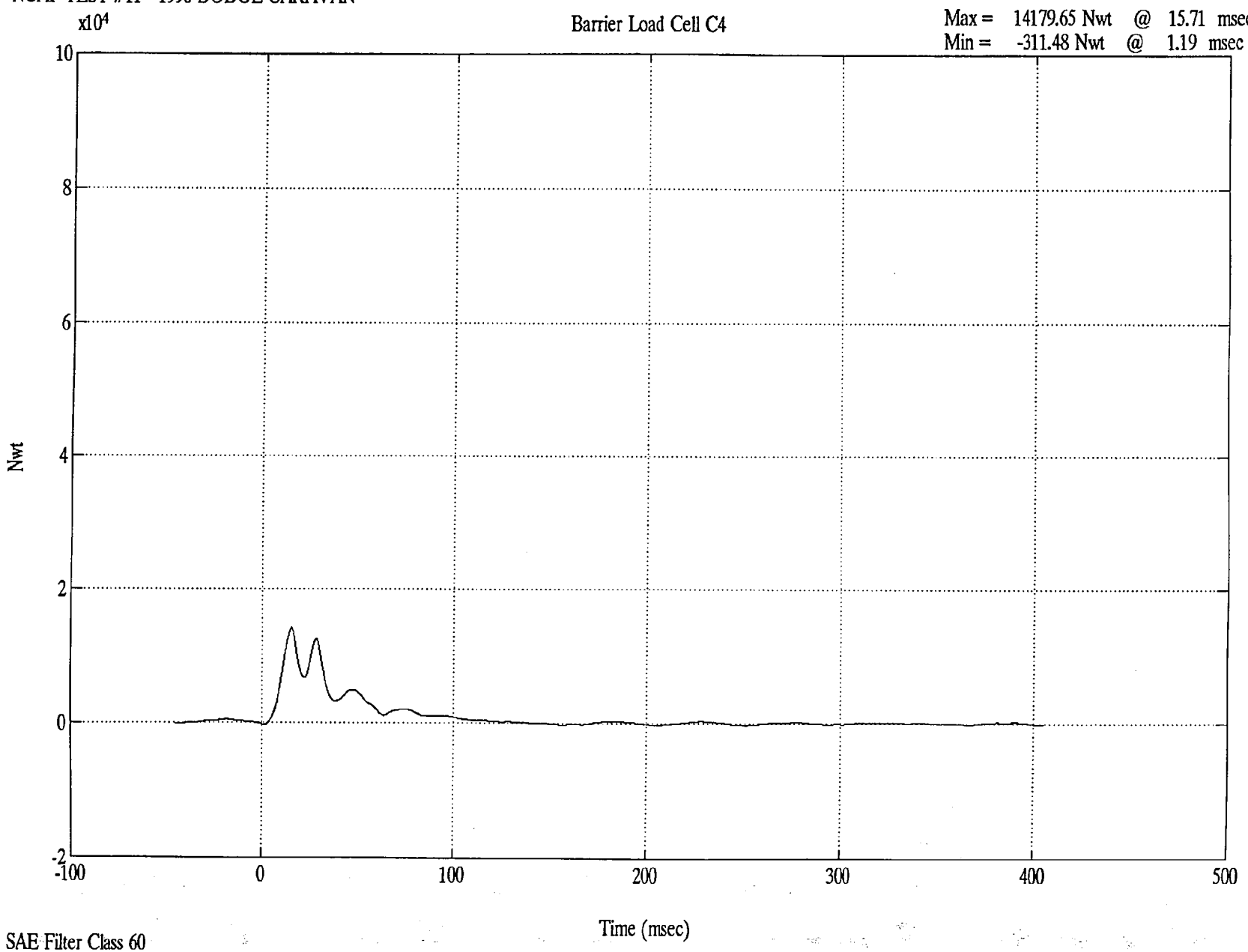
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 60

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

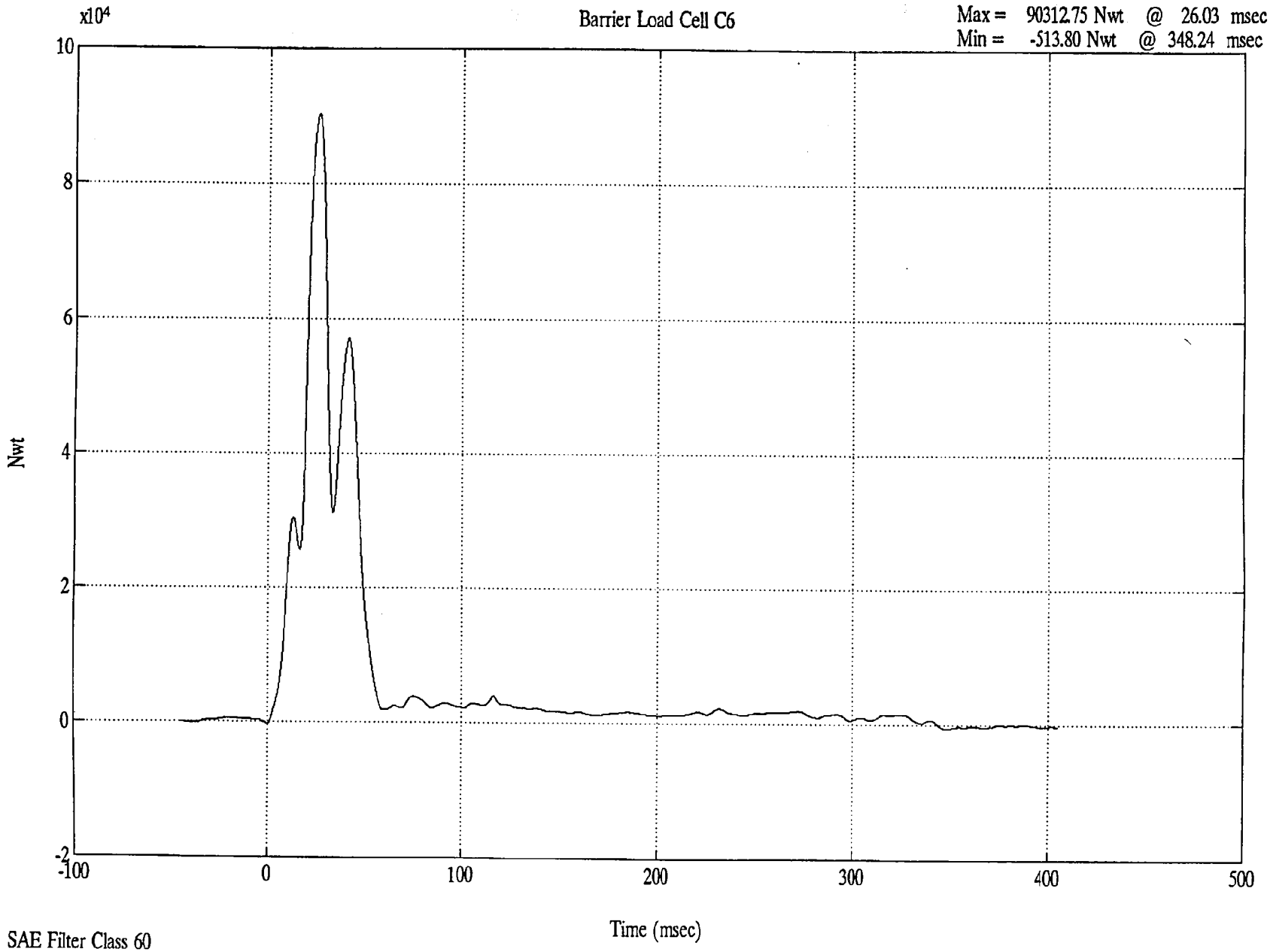


SAE Filter Class 60

B-148

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

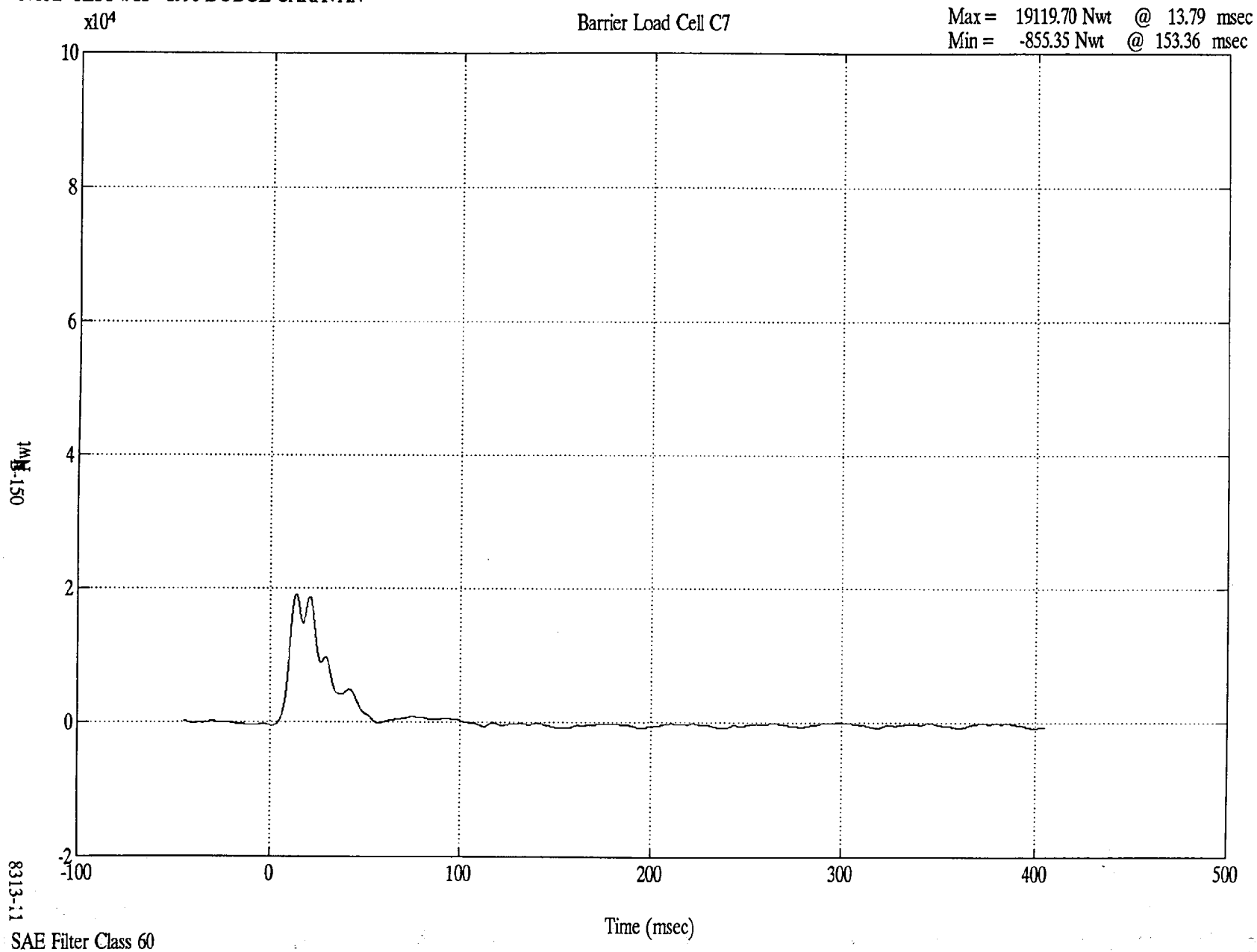


B-149

8313-11

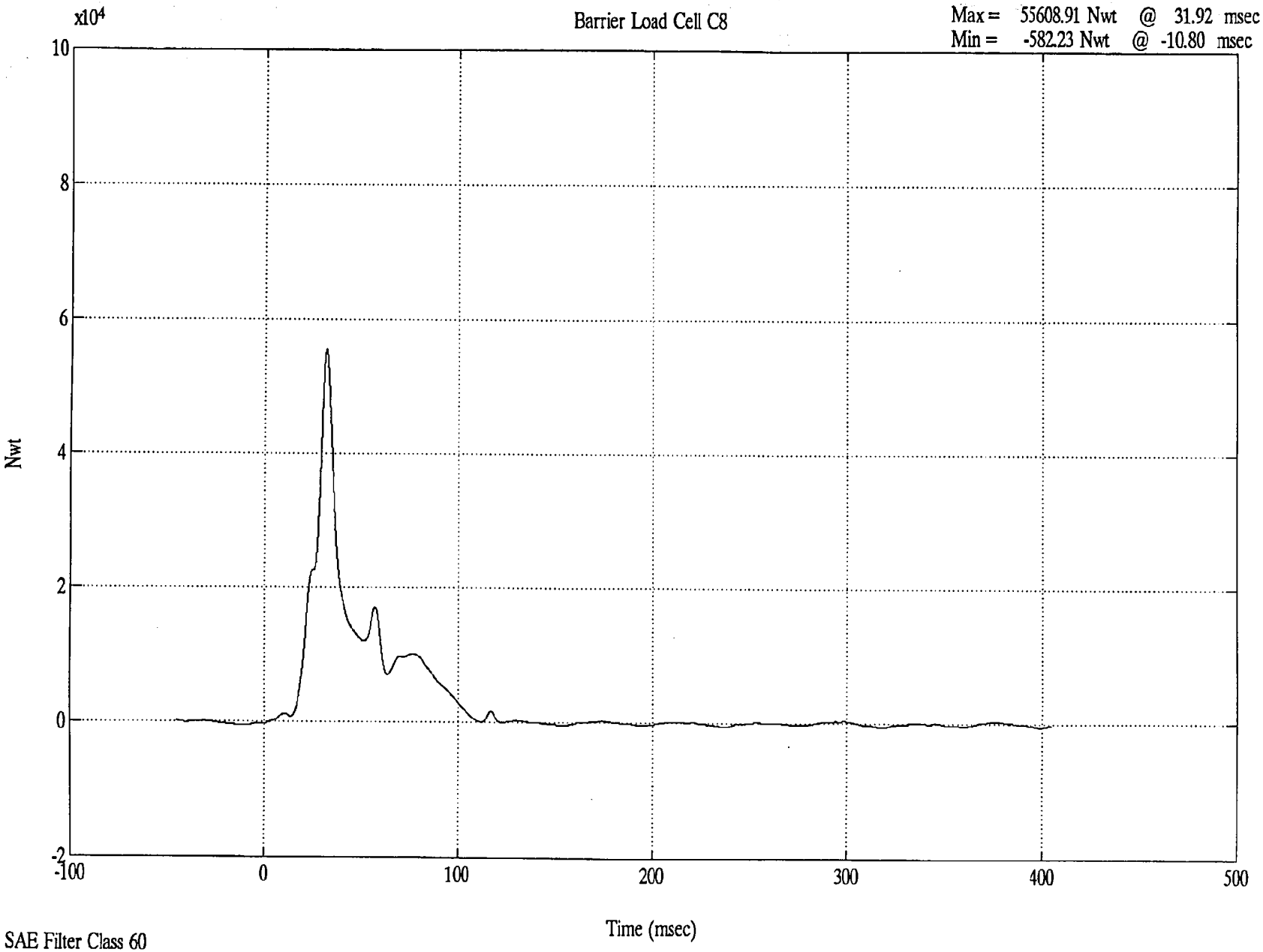
SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

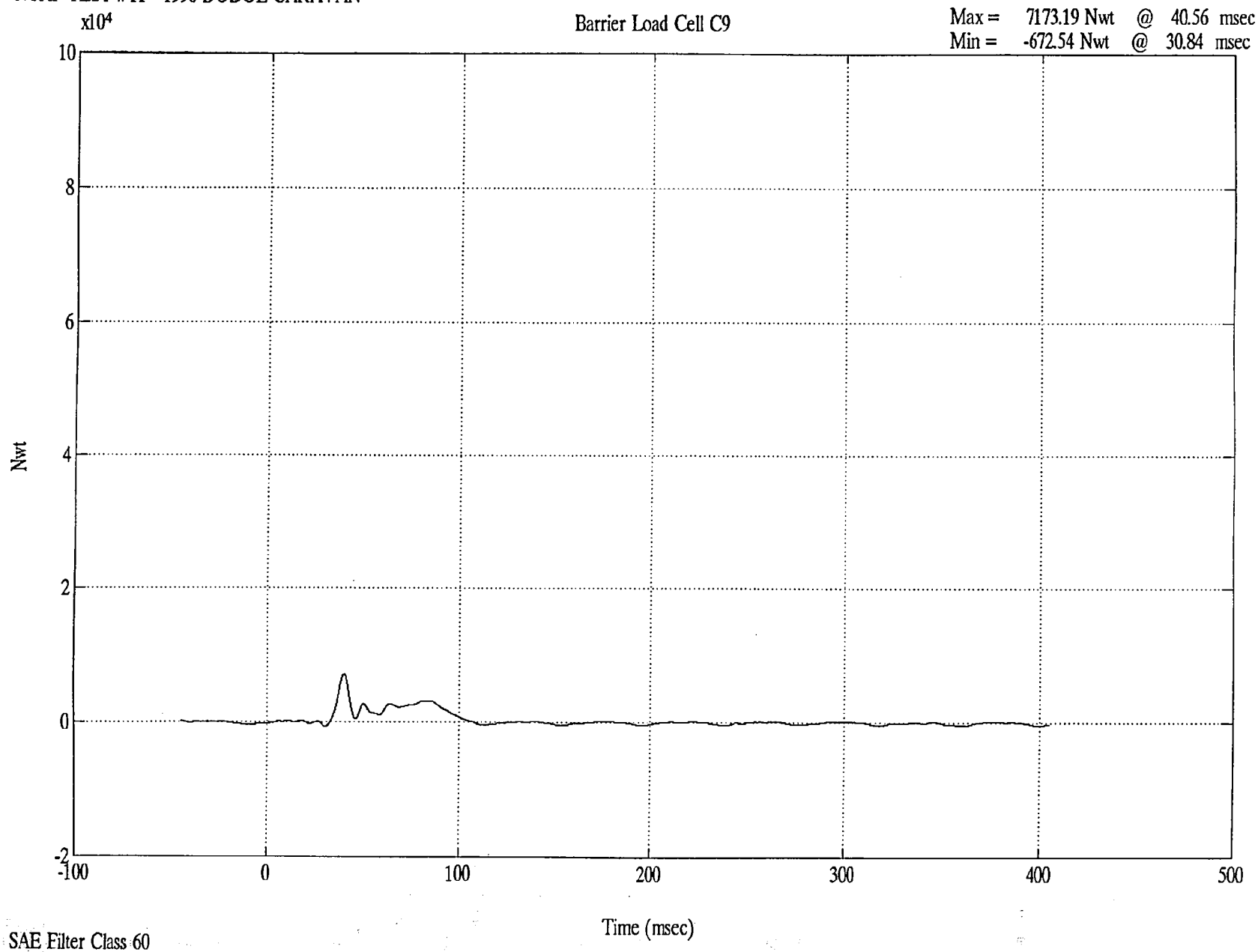


B-151

8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

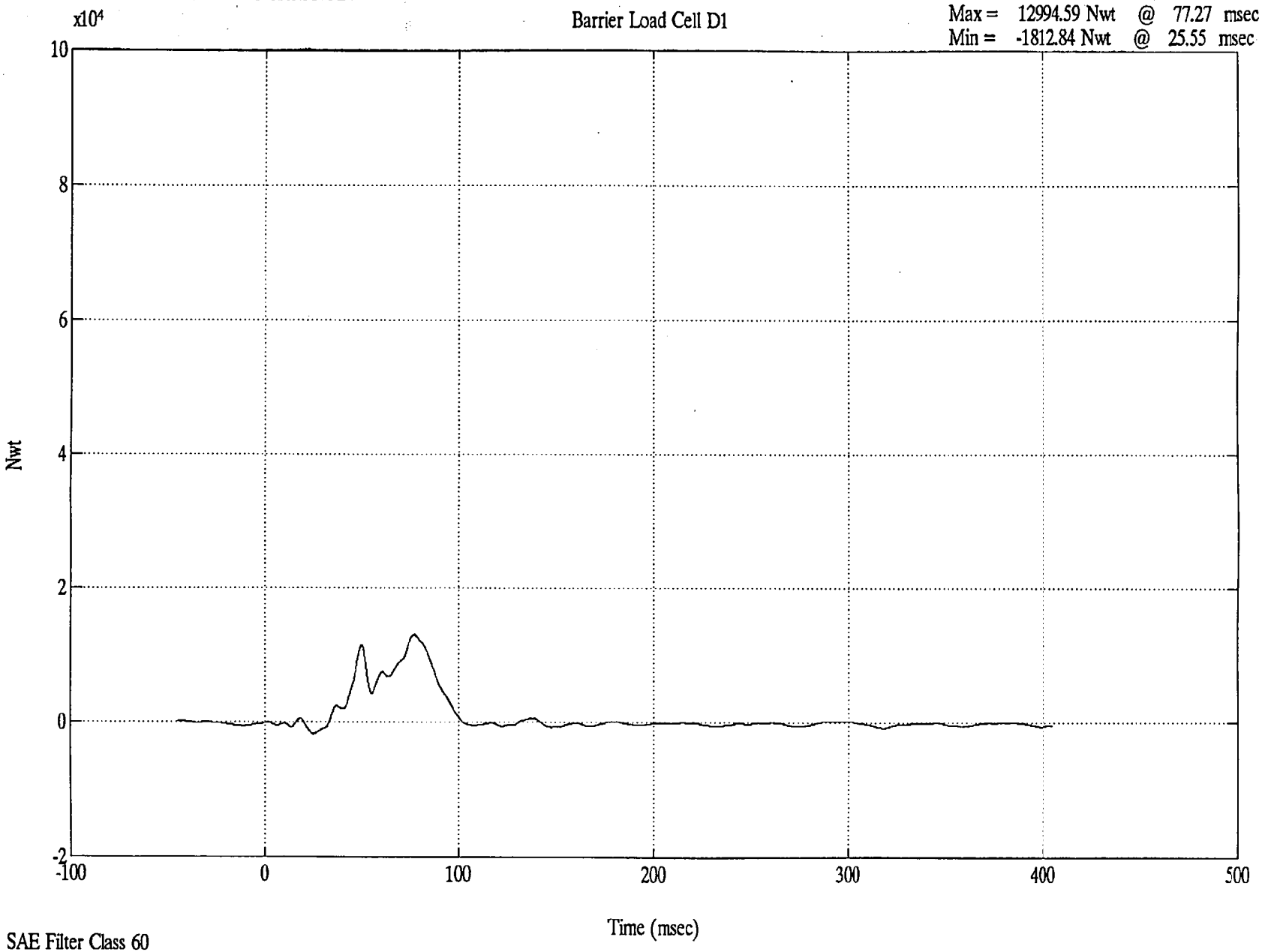


SAE Filter Class 60

B-152

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

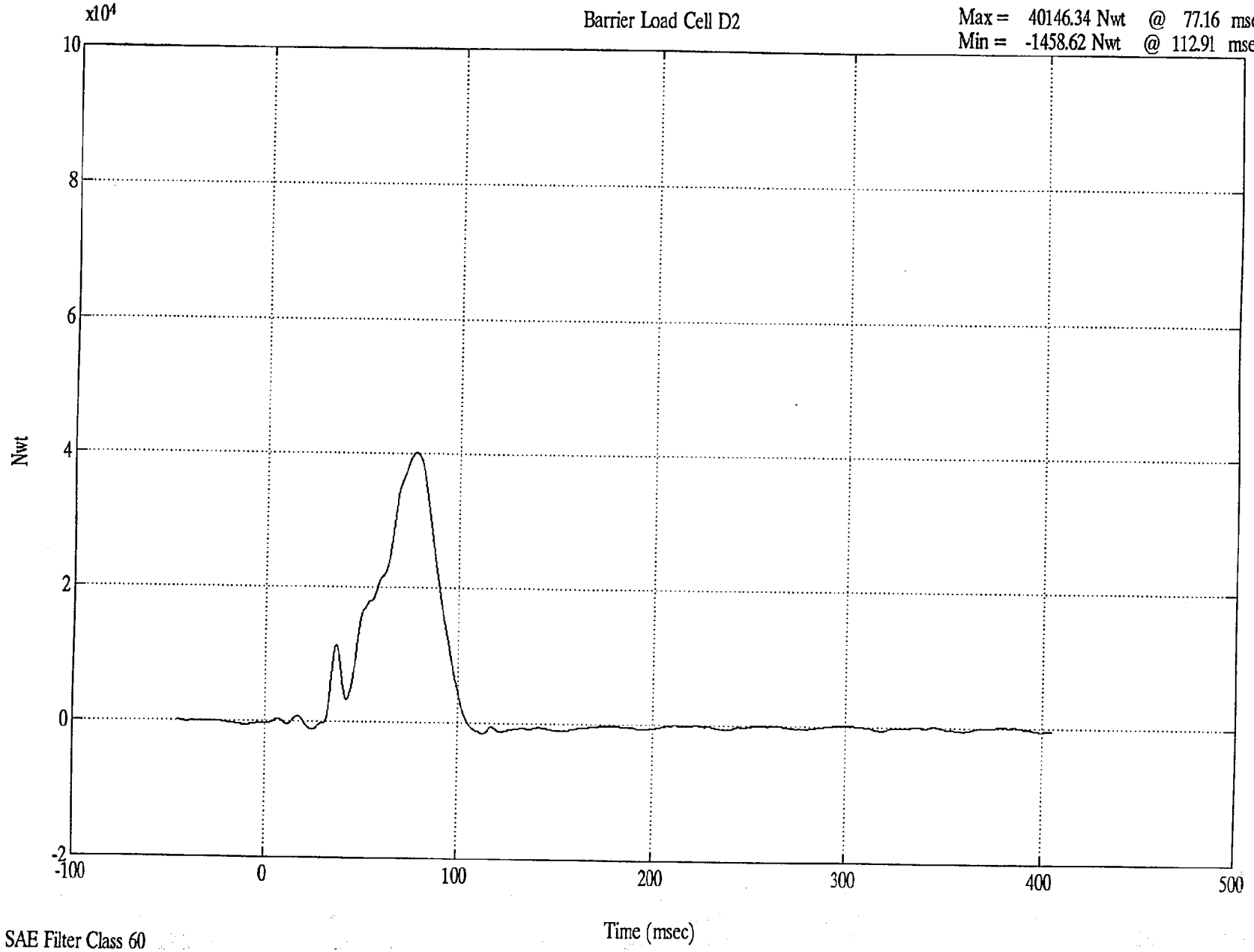


SAE Filter Class 60

B-153

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

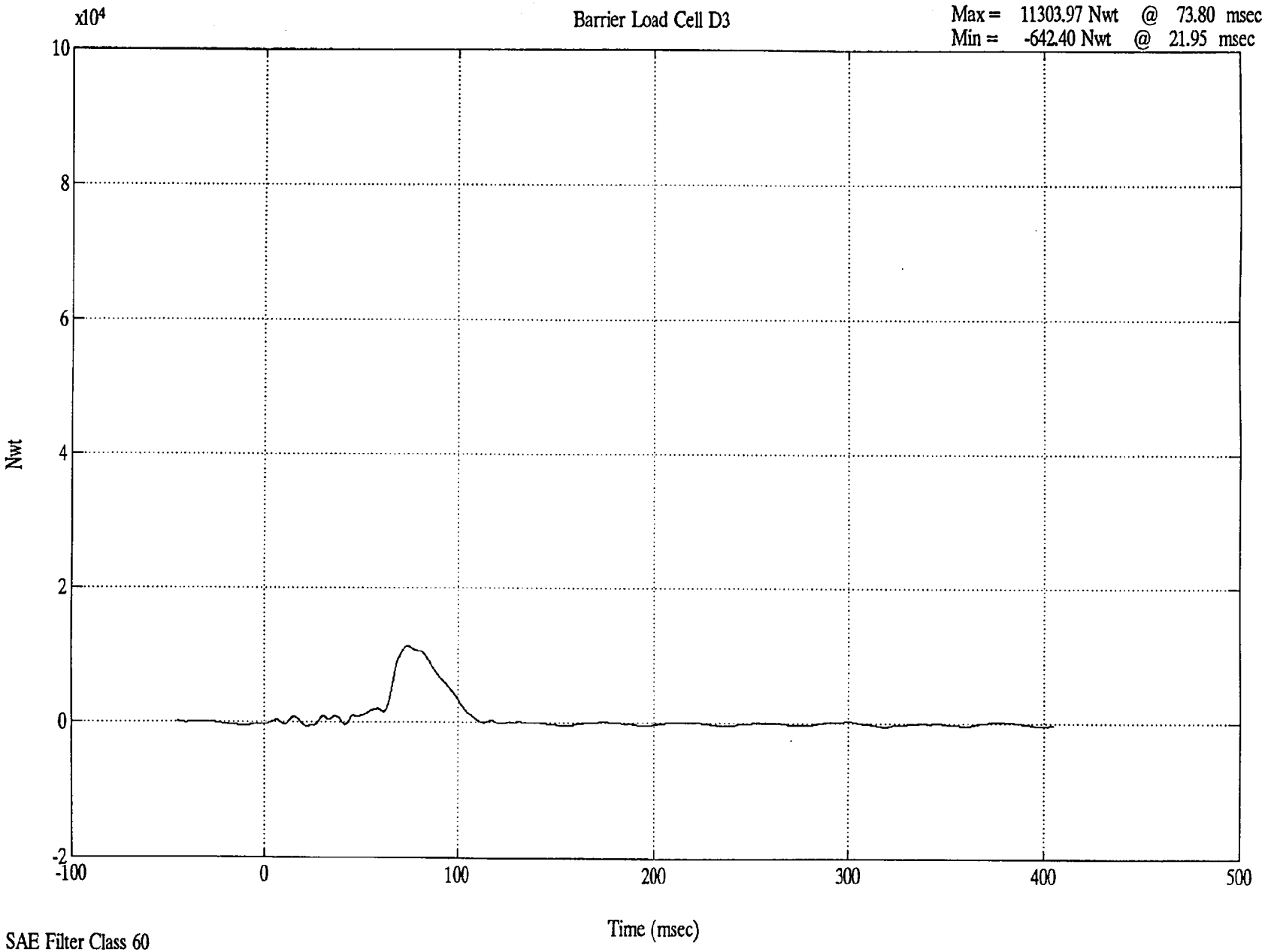


SAE Filter Class 60

B-154

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

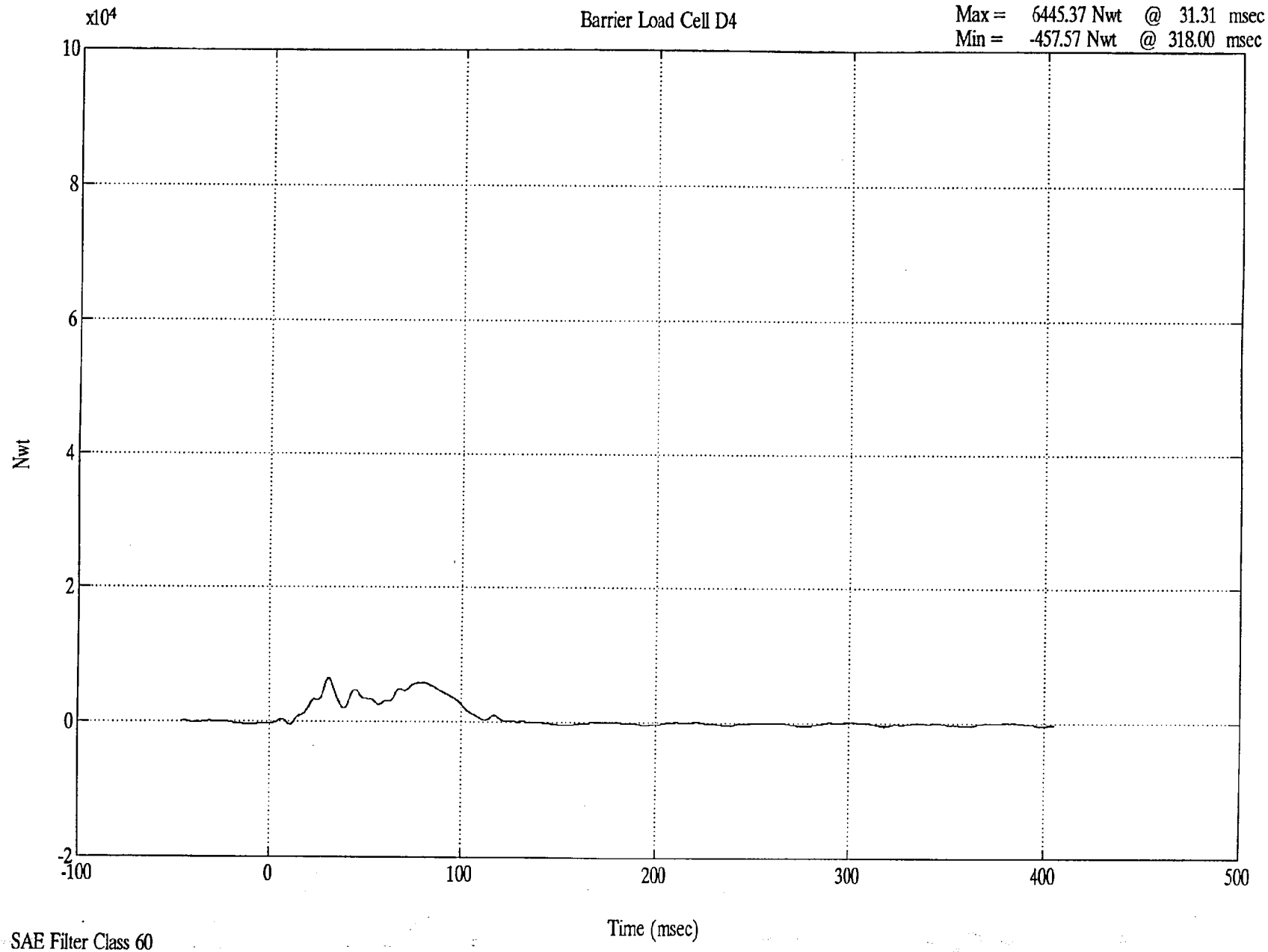


SAE Filter Class 60

B-155

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

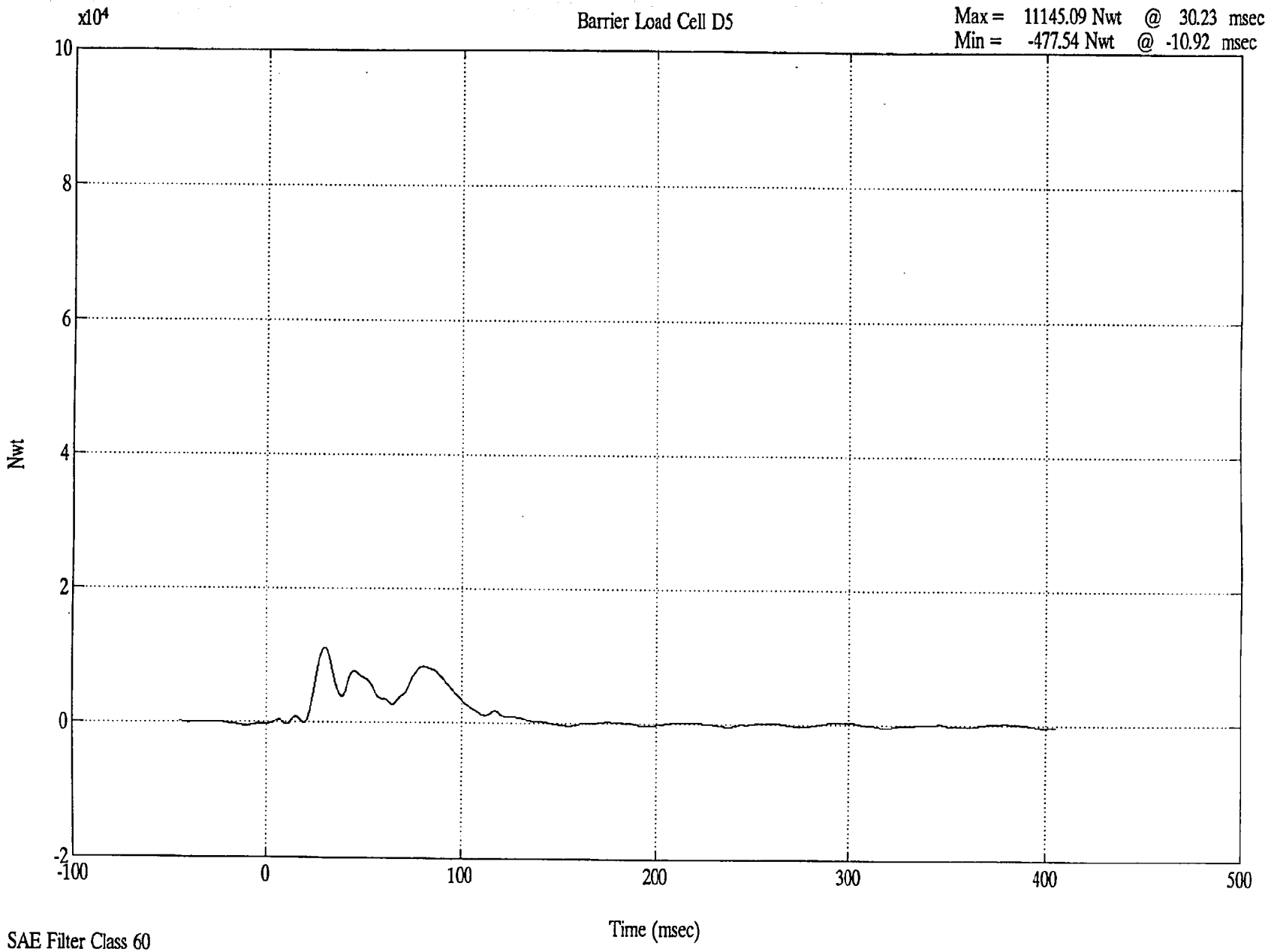


B-156

8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

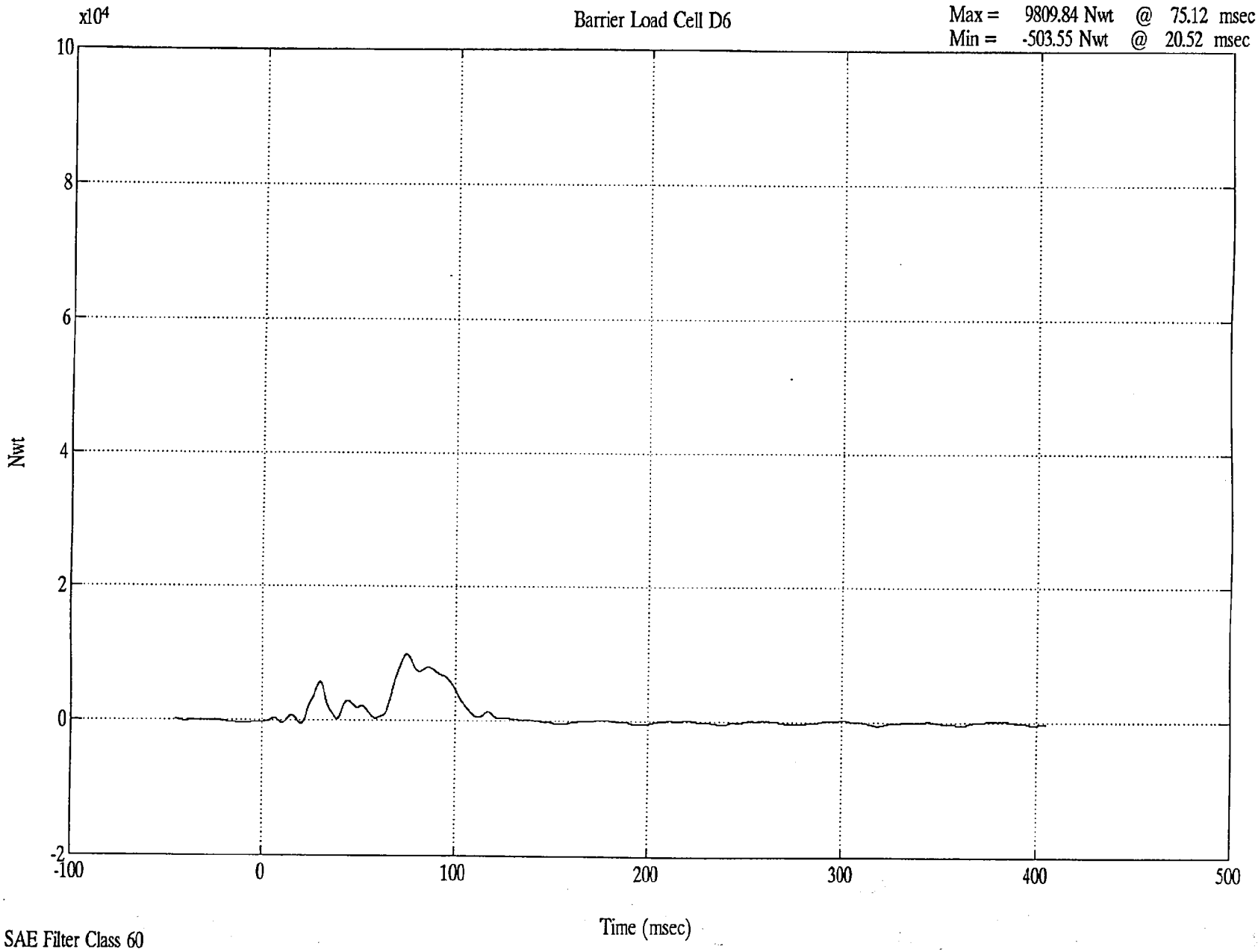


SAE Filter Class 60

B-157

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

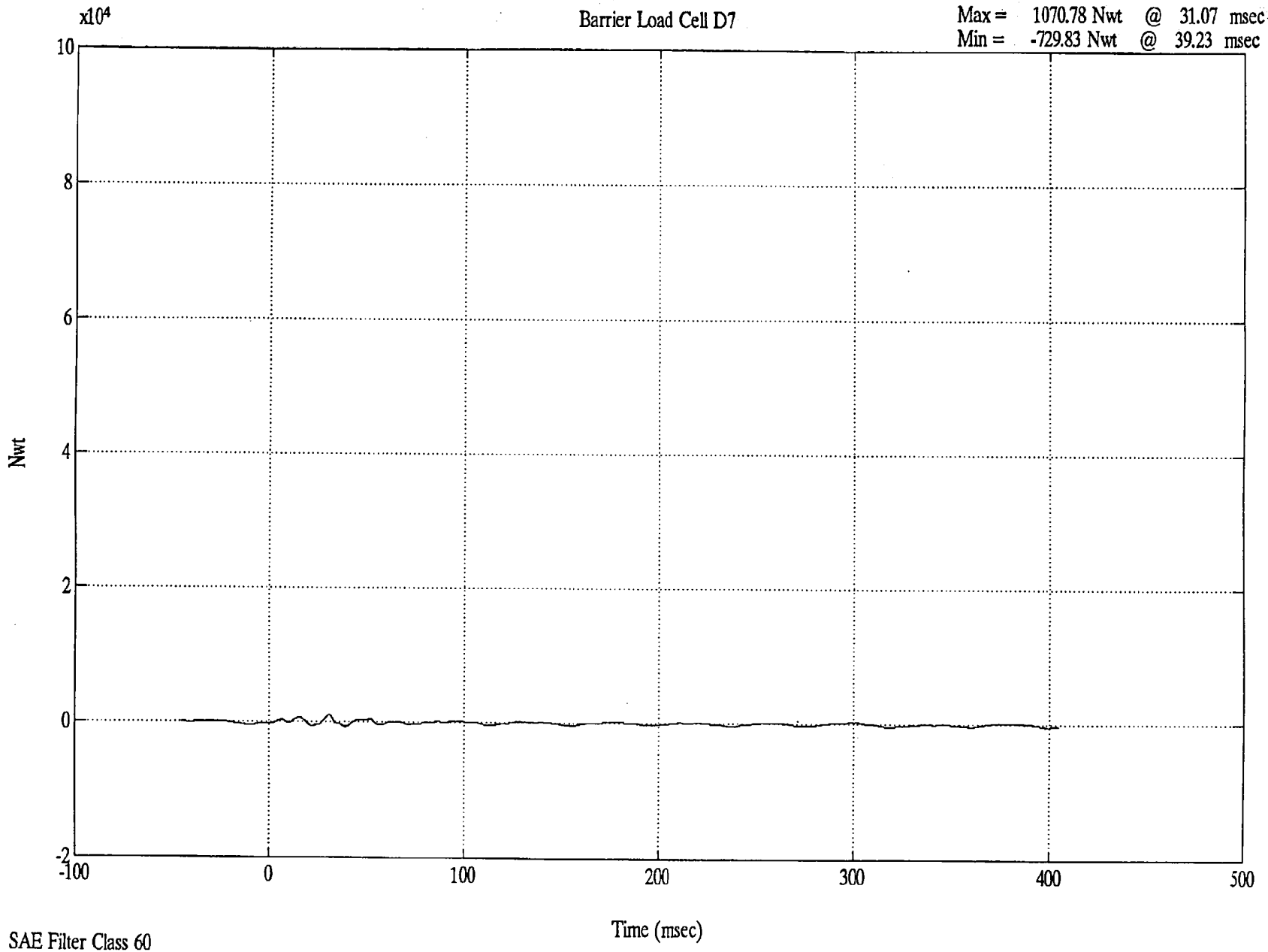


B-158

8313-11

SAE Filter Class 60

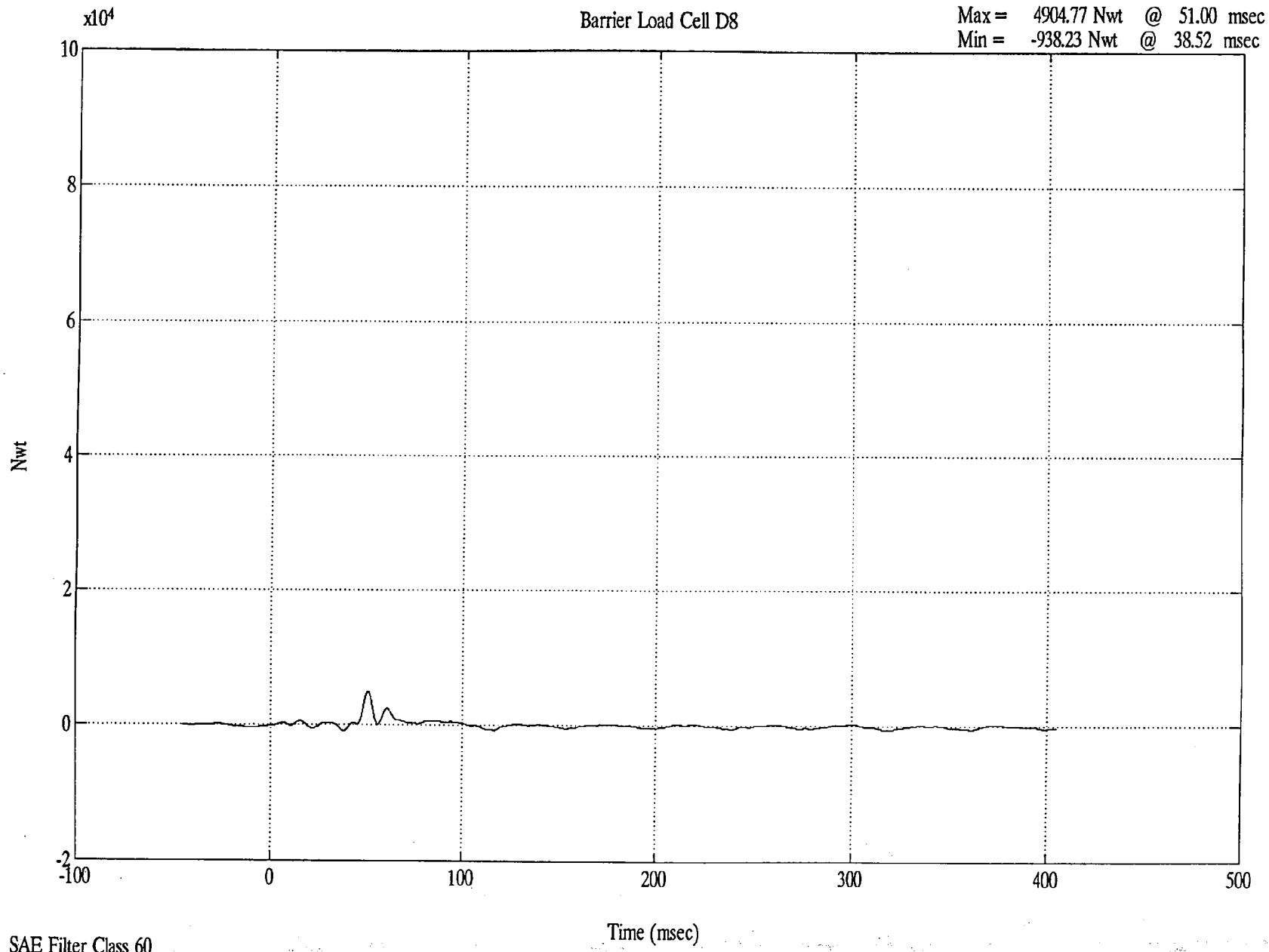
NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 60

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

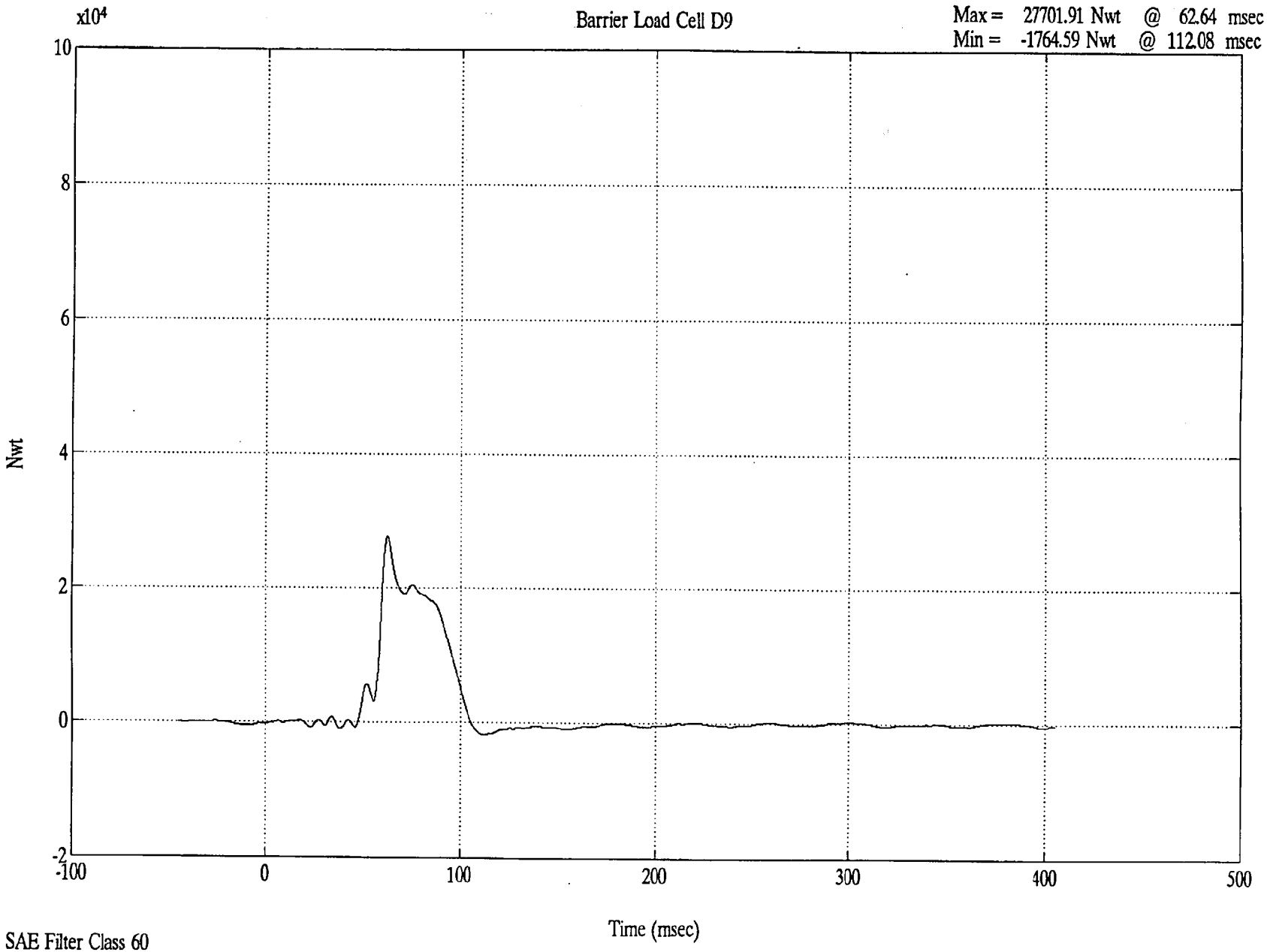


B-160

8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

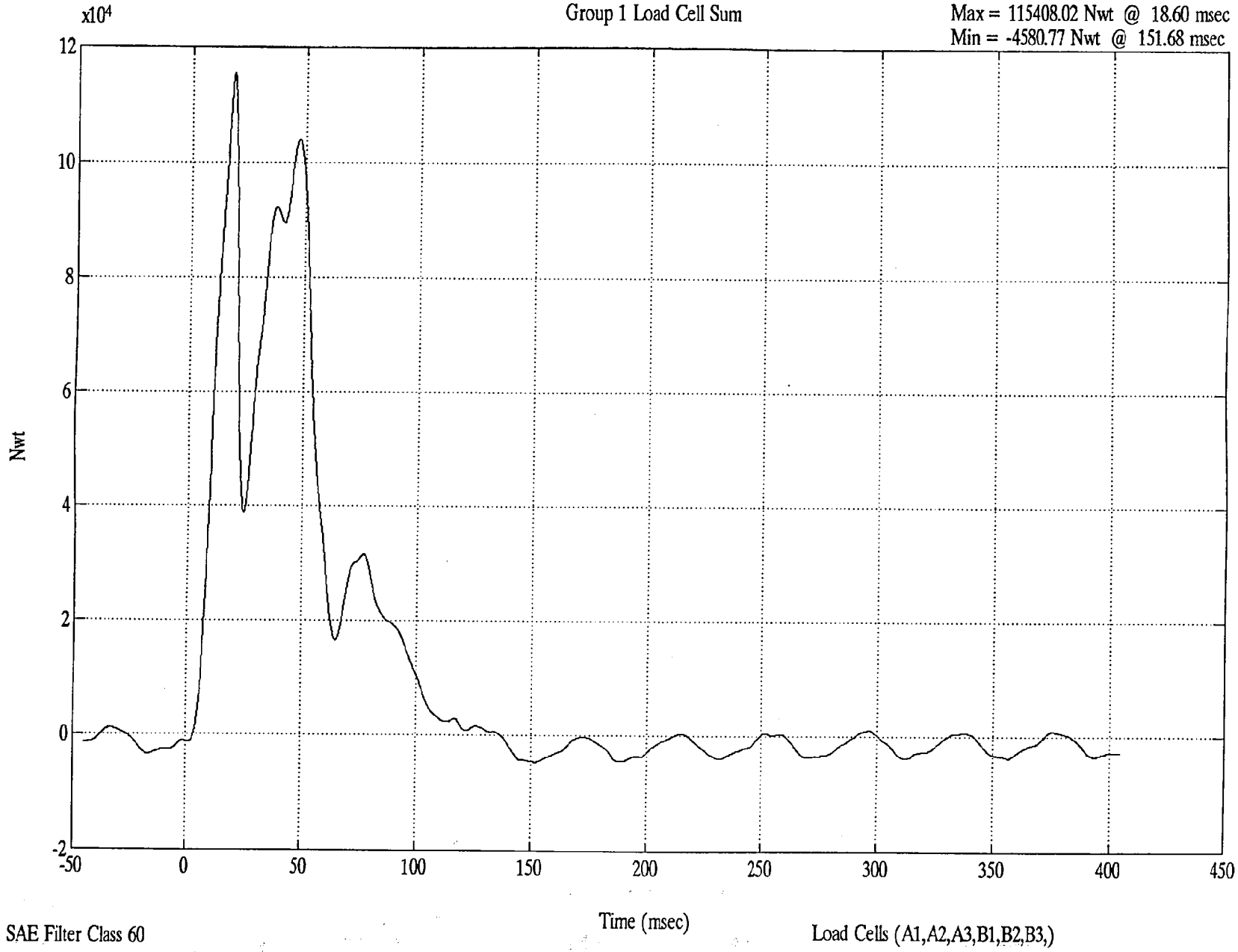


B-161

8313-11

SAE Filter Class 60

NCAP TEST #11 - 1996 DODGE CARAVAN

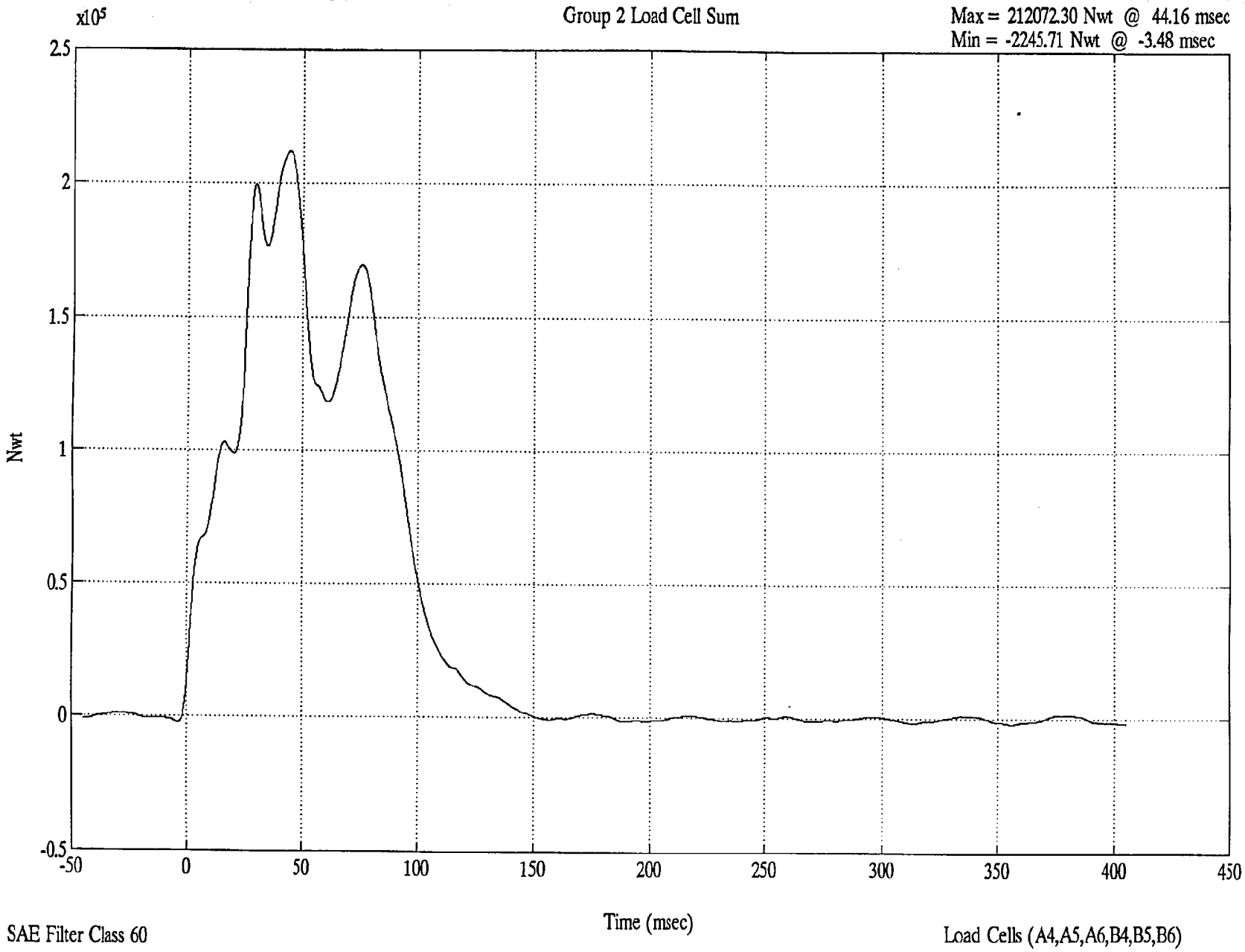


SAE Filter Class 60

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

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN



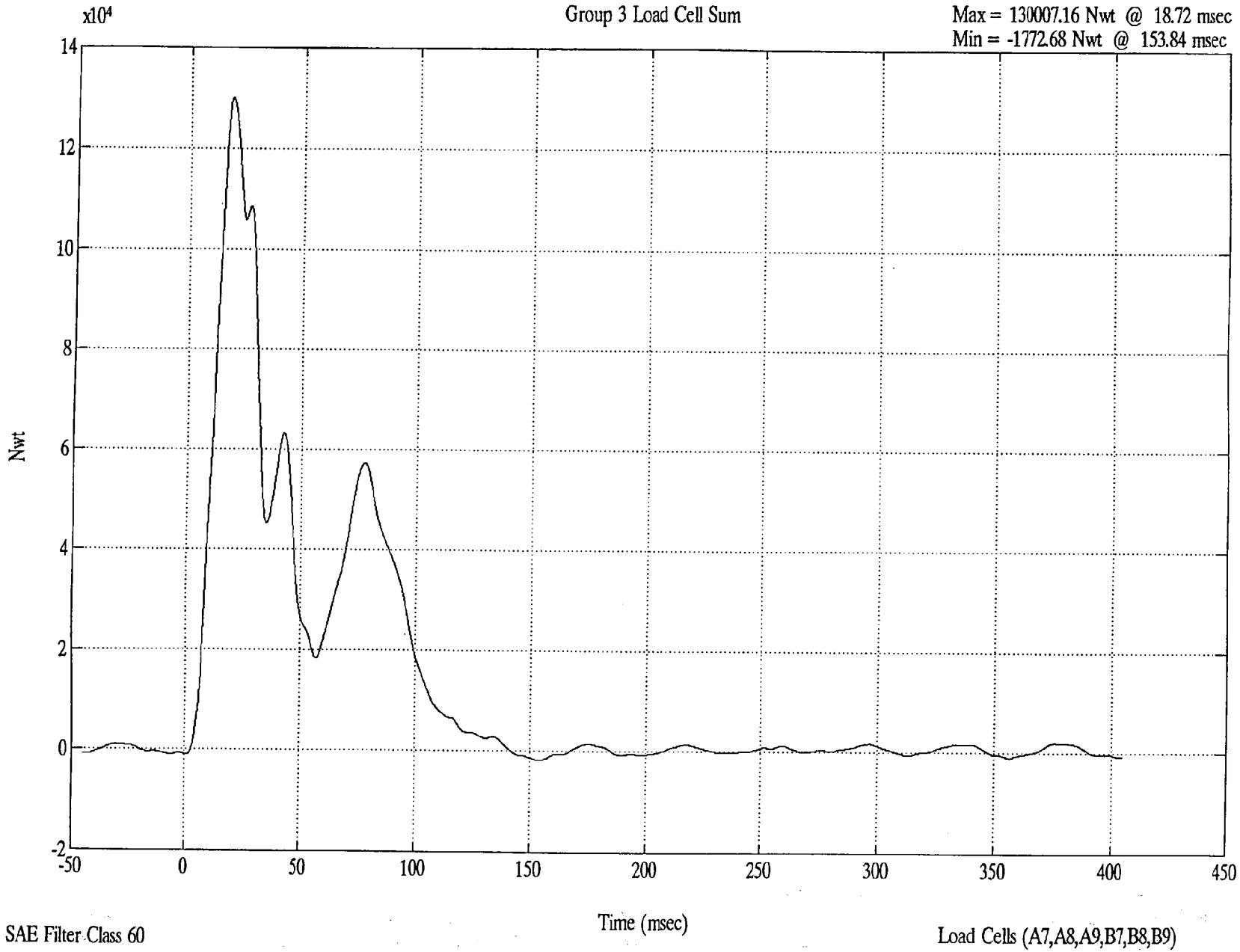
B-163

8313-11

SAE Filter Class 60

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

NCAP TEST #11 - 1996 DODGE CARAVAN

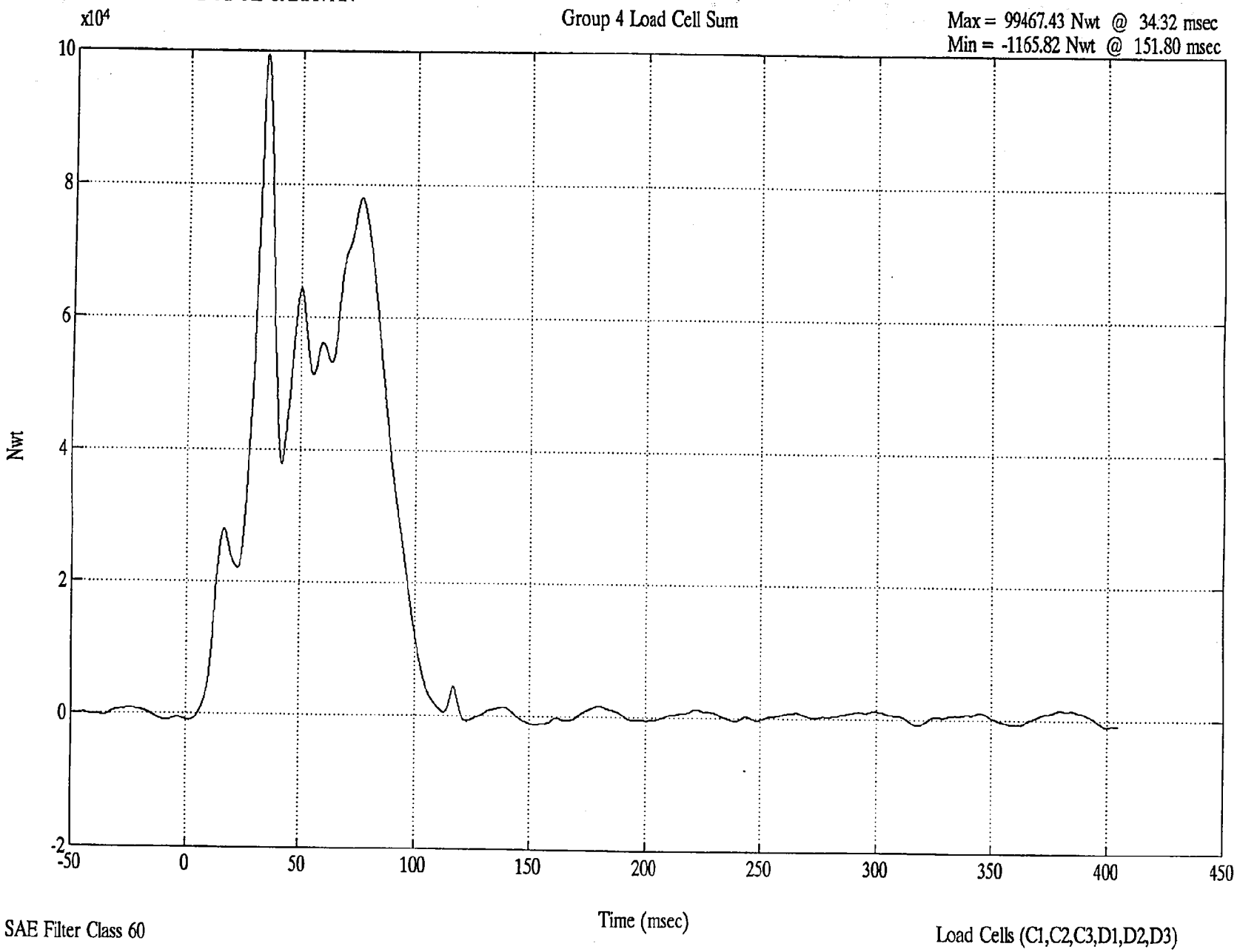


SAE Filter Class 60

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

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

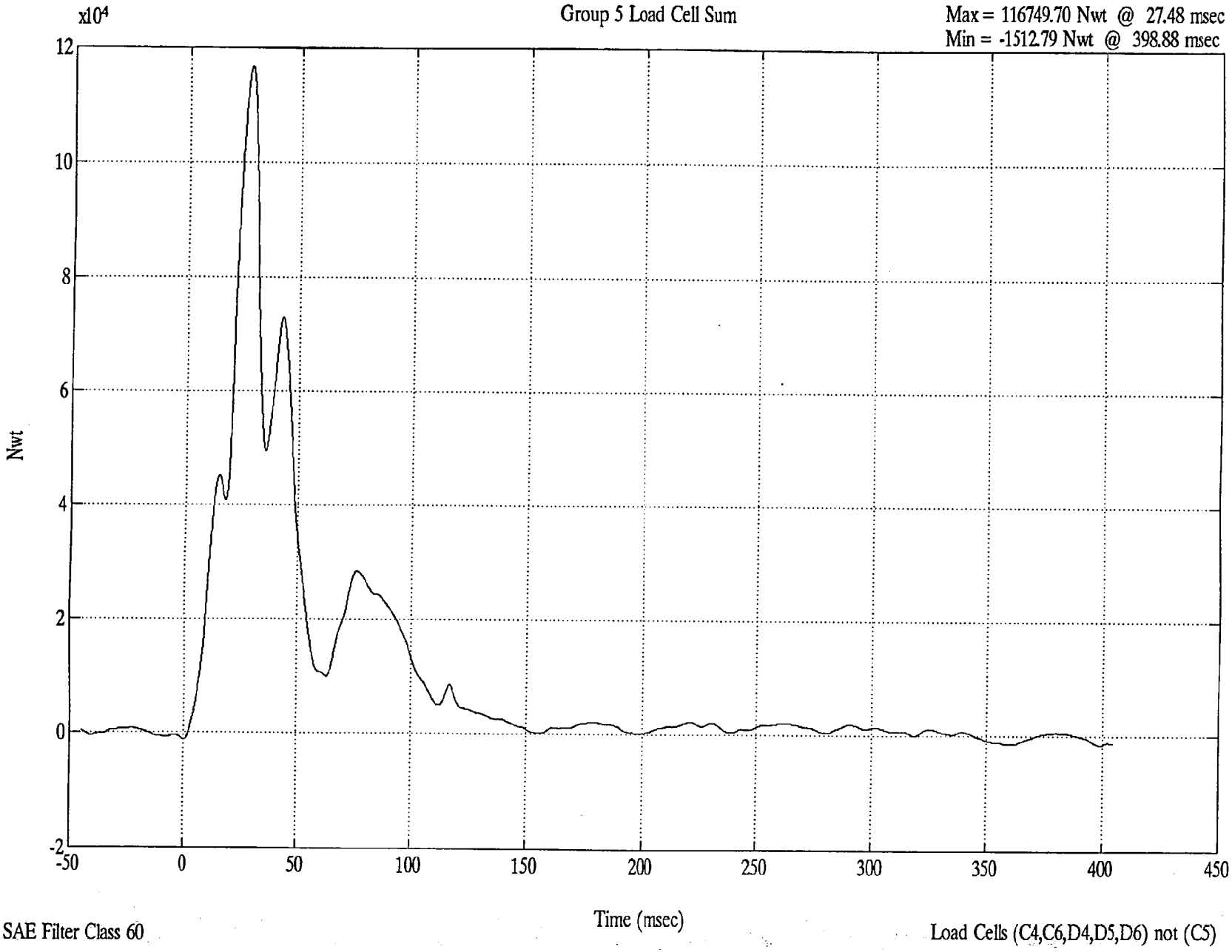


SAE Filter Class 60

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

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN

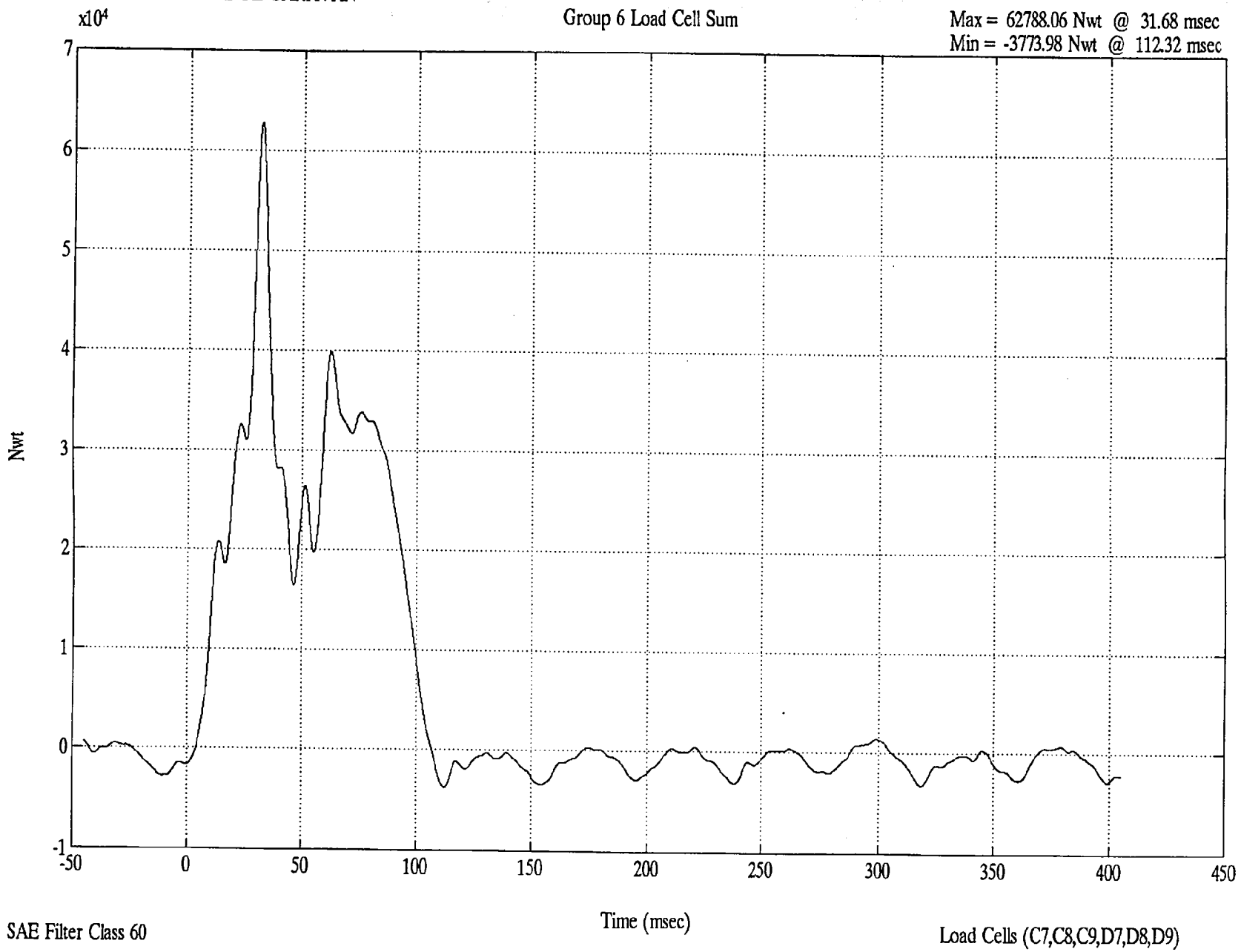


SAE Filter Class 60

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

8313-11

NCAP TEST #11 - 1996 DODGE CARAVAN



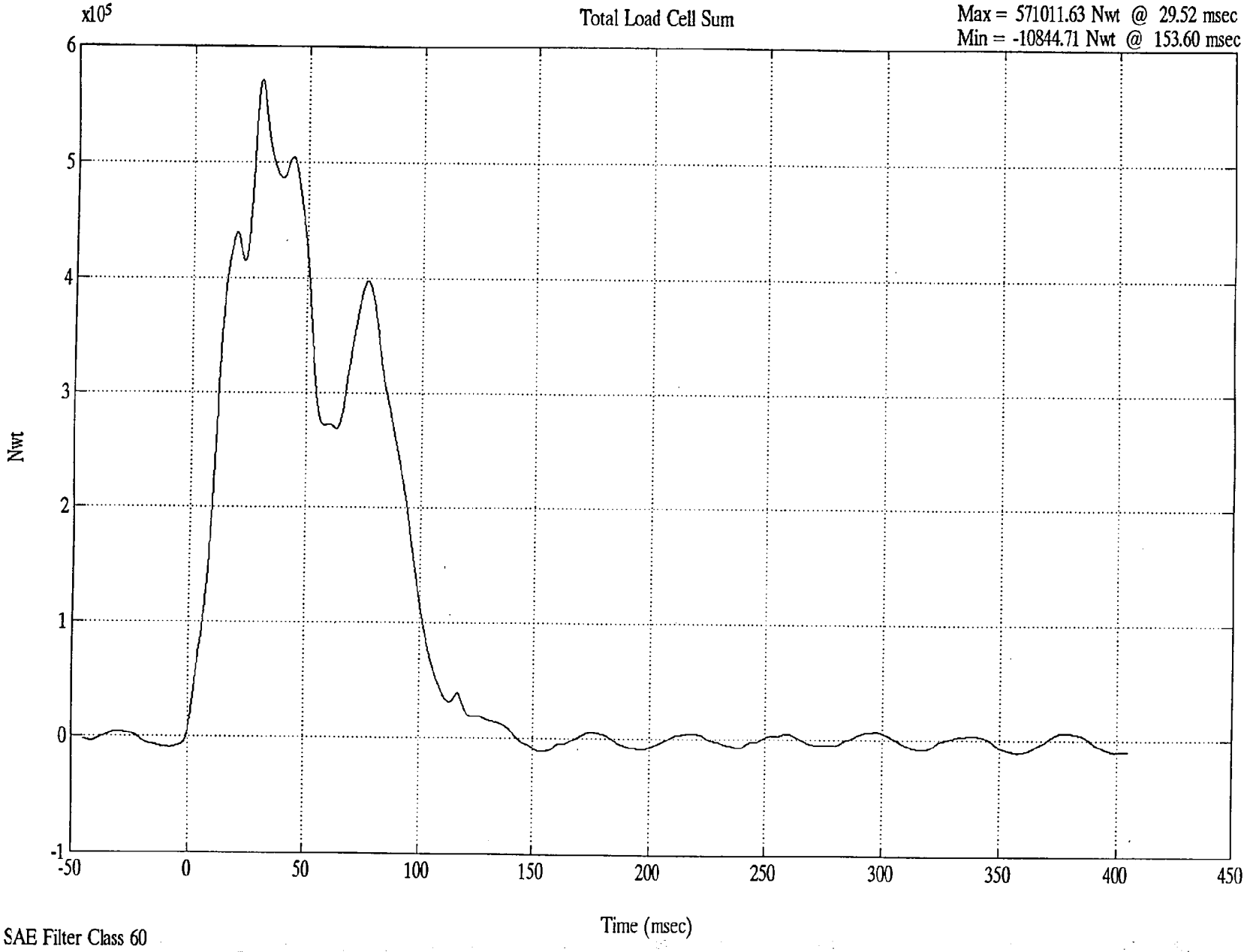
B-167

8313-11

SAE Filter Class 60

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

NCAP TEST #11 - 1996 DODGE CARAVAN



SAE Filter Class 60

8313-11

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	9/13/96
#2/Right Front Passenger	064	9/19/96

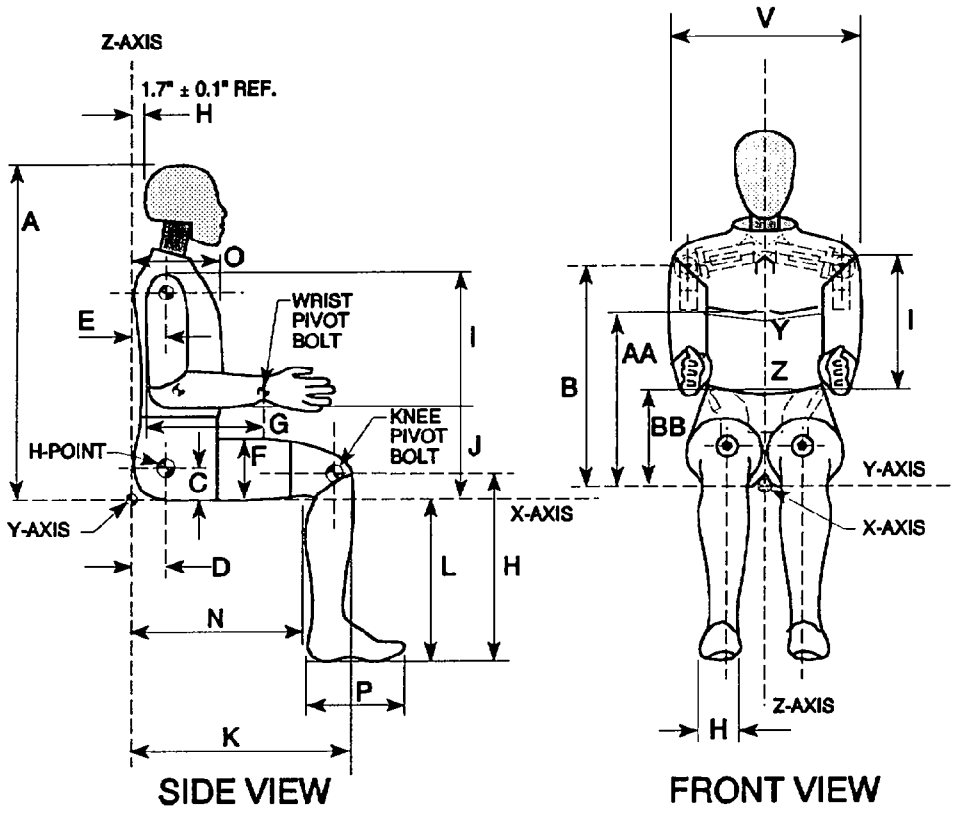
Electronic Test Equipment

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 14

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))

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number: 245
Calspan Sequential Test Number: 1
Date: 9/13/96

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			21 Deg C
Relative Humidity			65 %
Location for Chest Circumference	AA	429 - 434 mm	432 mm
Location for Waist Circumference	BB	226 - 231 mm	229 mm
Chest Circumference (With Jacket)	Y	970 - 1001 mm	993 mm
Waist Circumference	Z	815 - 866 mm	856 mm
Chest Depth	O	213 - 229 mm	213 mm
H-Point Height	C	84 - 89 mm	86 mm
H-Point from Backline	D	135 - 140 mm	137 mm
Skull Cap to Backline	H	41 - 46 mm	43 mm
Total Sitting Height	A	879 - 889 mm	884 mm
Thigh Clearance	F	140 - 155 mm	152 mm
Buttock Knee Length	K	579 - 604 mm	594 mm
Buttock Popliteal Length	N	452 - 477 mm	467 mm
Popliteal Height	L	429 - 455 mm	445 mm
Knee Pivot Height	M	485 - 500 mm	488 mm
Foot Length	P	252 - 267 mm	259 mm
Foot Breadth	W	91 - 107 mm	97 mm
Shoulder Pivot from Backline	E	84 - 94 mm	91 mm
Shoulder Breadth	V	422 - 437 mm	427 mm
Shoulder Pivot Height	B	505 - 521 mm	513 mm
Elbow Rest Height	J	190 - 211 mm	203 mm
Shoulder - Elbow Length	I	330 - 345 mm	335 mm
Back of Elbow to Wrist Pivot	G	290 - 305 mm	295 mm

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

CALSPAN SRL CORPORATION

Transportation Sciences Center

PART 572E
HEAD DROP TEST

Dummy Serial Number: 245
Calspan Sequential Test Number: 1
Date: 9/8/96
Workfile: 2451996.hdp

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	19 - 25 Deg. C	21.1 Deg. C
Relative Humidity	10% - 70%	58 %
Peak Resultant Acceleration	225 - 275 G's	261.8 G's
Peak Lateral Acceleration	15 G's Max	7.8 G's
Is Acceleration Curve Unimodal?	YES	YES

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

CALSPAN SRL CORPORATION

Transportation Sciences Center

PART 572E
NECK FLEXION TEST

Dummy Serial Number: 245
Calspan Sequential Test Number: 1
Date: 9/9/96
Workfile: 2451996.nf1

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.5 - 22.2 Deg. C	21.1 Deg. F
Relative Humidity		10% - 70%	56 %
Impact Velocity		24.8 - 25.7 Kph	25.5 Kph
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	22.55 G's
	20 ms	17.60 - 22.60 G's	20.58 G's
	30 ms	12.50 - 18.50 G's	16.27 G's
Max Pendulum G's Above 30 ms		29 G's Max	16.27 G's
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	37.00 ms
D Plane Rotation	Max	64 - 78 Deg	64.88 Deg.
	Time	57 - 64 ms	62.50 ms
Moment About Occipital Condyle	Max	88 - 108 N-M	88.45 N-M
	Time	47 - 58 ms	50.75 ms
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	117.50 ms
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	100.38 ms

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

CALSPAN SRL CORPORATION
Transportation Sciences Center

PART 572E
NECK EXTENSION TEST

Dummy Serial Number: 245
Calspan Sequential Test Number: 1
Date: 9/9/96
Workfile: 2451996.nex

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.5 - 22.2 Deg. C	21.1 Deg. C
Relative Humidity		10% - 70%	56 %
Impact Velocity		21.4 - 22.3 Kph	21.61 Kph
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	17.73 G's
	20 ms	14.00 - 19.00 G's	16.60 G's
	30 ms	11.00 - 16.00 G's	13.48 G's
Max Pendulum G's Above 30 ms		22 G's Max	13.48 G's
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	38.75 ms
D Plane Rotation	Max	81 - 106 Deg	89.45 Deg.
	Time	72 - 82 ms	75.25 ms
Moment About Occipital Condyle	Max	-80.0/-52.9 N-M	-52.97 N-M
	Time	65 - 79 ms	69.63 ms
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	152.75 ms
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	128.25 ms

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number: 245
Calspan Sequential Test Number: 1
Date: 9/13/96
Workfile: 2451896.th3

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.5 - 22.2 Deg. C	21.1 Deg. C
Relative Humidity	10% - 70%	65 %
Pendulum Velocity	23.7 - 24.6 Kph	24.13 Kph
Maximum Deflection	64 - 73 mm	71.9 mm
Maximum Resistive Force	5160 - 5894 Newton's	5420 Newton's
Internal Hysteresis	69 - 85 %	73.6 %

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number: 245
Calspan Sequential Test Number: 1
Date: 9/14/96
Workfile:

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	19 - 25 Deg. C	21.1 Deg. C
Relative Humidity	10% - 70%	65 %
Probe Velocity	7.5 - 7.7 Kph	7.7 Kph
Peak Knee Impact Force	4715 - 5782 N	4884 N
RIGHT KNEE		
Temperature	19 - 25 Deg. C	21.1 Deg. C
Relative Humidity	10% - 70%	65 %
Probe Velocity	7.5 - 7.7 Kph	7.7 Kph
Peak Knee Impact Force	4715 - 5782 N	5044 N

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number: 064
Calspan Sequential Test Number: 3
Date: 8/19/96

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			21.1 Deg C
Relative Humidity			62 %
Location for Chest Circumference	AA	429 - 434 mm	432 mm
Location for Waist Circumference	BB	226 - 231 mm	229 mm
Chest Circumference (With Jacket)	Y	970 - 1001 mm	988 mm
Waist Circumference	Z	815 - 866 mm	846 mm
Chest Depth	O	213 - 229 mm	218 mm
H-Point Height	C	84 - 89 mm	86 mm
H-Point from Backline	D	135 - 140 mm	137 mm
Skull Cap to Backline	H	41 - 46 mm	43 mm
Total Sitting Height	A	879 - 889 mm	884 mm
Thigh Clearance	F	140 - 155 mm	152 mm
Buttock Knee Length	K	579 - 604 mm	599 mm
Buttock Popliteal Length	N	452 - 477 mm	467 mm
Popliteal Height	L	429 - 455 mm	439 mm
Knee Pivot Height	M	485 - 500 mm	493 mm
Foot Length	P	252 - 267 mm	256 mm
Foot Breadth	W	91 - 107 mm	96 mm
Shoulder Pivot from Backline	E	84 - 94 mm	91 mm
Shoulder Breadth	V	422 - 437 mm	427 mm
Shoulder Pivot Height	B	505 - 521 mm	518 mm
Elbow Rest Height	J	190 - 211 mm	203 mm
Shoulder - Elbow Length	I	330 - 345 mm	340 mm
Back of Elbow to Wrist Pivot	G	290 - 305 mm	295 mm

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

CALSPAN SRL CORPORATION

Transportation Sciences Center

PART 572E
HEAD DROP TEST

Dummy Serial Number: 064
Calspan Sequential Test Number: 3
Date: 8/14/96
Workfile: 0641896.hdp

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	19 - 25 Deg. C	23.3 Deg. C
Relative Humidity	10% - 70%	59 %
Peak Resultant Acceleration	225 - 275 G's	262.0 G's
Peak Lateral Acceleration	15 G's Max	12.1 G's
Is Acceleration Curve Unimodal?	YES	YES

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

CALSPAN SRL CORPORATION
Transportation Sciences Center

PART 572E
NECK FLEXION TEST

Dummy Serial Number: 064
Calspan Sequential Test Number: 3
Date: 8/15/96
Workfile: 0641896.nf1

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.5 - 22.2 Deg. C	21.1 Deg. C
Relative Humidity		10% - 70%	60 %
Impact Velocity		24.8 - 25.7 Kph	25.0 Kph
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	22.70 G's
	20 ms	17.60 - 22.60 G's	18.89 G's
	30 ms	12.50 - 18.50 G's	15.03 G's
Max Pendulum G's Above 30 ms		29 G's Max	15.03 G's
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	38.50 ms
D Plane Rotation	Max	64 - 78 Deg.	66.95 Deg.
	Time	57 - 64 ms	63.50 ms
Moment About Occipital Condyle	Max	88 - 108 N-M	89.38 N-M
	Time	47 - 58 ms	52.00 ms
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	118.38 ms
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	105.00 ms

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

CALSPAN SRL CORPORATION

Transportation Sciences Center

PART 572E
NECK EXTENSION TEST

Dummy Serial Number: 064
Calspan Sequential Test Number: 3
Date: 8/15/96
Workfile: 0641896.nex

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.5 - 22.2 Deg. C	21.1 Deg. C
Relative Humidity		10% - 70%	60 %
Impact Velocity		21.4 - 22.3 Kph	21.6 Kph
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	17.23 G's
	20 ms	14.00 - 19.00 G's	14.97 G's
	30 ms	11.00 - 16.00 G's	13.55 G's
Max Pendulum G's Above 30 ms		22 G's Max	13.55 G's
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	43.63 ms
D Plane Rotation	Max	81 - 106 Deg.	95.02 Deg.
	Time	72 - 82 ms	77.63 ms
Moment About Occipital Condyle	Max	-80.0/-52.9 N-M	-65.19 N-M
	Time	65 - 79 ms	73.50 ms
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	155.38 ms
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	143.13 ms

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

CALSPAN SRL CORPORATION
Transportation Sciences Center

PART 572E
THORAX IMPACT TEST

Dummy Serial Number: 064
Calspan Sequential Test Number: 3
Date: 8/18/96
Workfile: 0641896.th3

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.5 - 22.2 Deg. C	21.1 Deg. C
Relative Humidity	10% - 70%	58 %
Pendulum Velocity	23.7 - 24.6 Kph	24.1 Kph
Maximum Deflection	64 - 73 mm	64.0 mm
Maximum Resistive Force	5160 - 5894 Newton's	5598 Newton's
Internal Hysteresis	69 - 85 %	73.6 %

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

CALSPAN SRL CORPORATION
Transportation Sciences Center

PART 572E
KNEE IMPACT TEST

Dummy Serial Number: 064
Calspan Sequential Test Number: 3
Date: 8/24/96
Workfile:

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	19 - 25 Deg. C	23.3 Deg. C
Relative Humidity	10% - 70%	59 %
Probe Velocity	7.5 - 7.7 Kph	7.7 Kph
Peak Knee Impact Force	4715 - 5782 N	4748 N
RIGHT KNEE		
Temperature	19 - 25 Deg. C	23.3 Deg. C
Relative Humidity	10% - 70%	58 %
Probe Velocity	7.5 - 7.7 Kph	7.7 Kph
Peak Knee Impact Force	4715 - 5782 N	5006 N

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian 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	AC2M6	ENDEVCO	8/96	2/97
	Y	AF5C9	ENDEVCO	8/96	2/97
	Z	ACT12	ENDEVCO	8/96	2/97
Chest	X	AF5P8	ENDEVCO	8/96	2/97
	Y	AF5C4	ENDEVCO	8/96	2/97
	Z	AE8K1	ENDEVCO	8/96	2/97
Right Femur Load Cell		450	GSE	7/96	1/97
Left Femur Load Cell		449	GSE	7/96	1/97
Neck Load Cell	X	205	DENTON	8/96	2/97
	Y	205	DENTON	8/96	2/97
	Z	205	DENTON	8/96	2/97
Neck Moment	X	205	DENTON	8/96	2/97
	Y	205	DENTON	8/96	2/97
	Z	205	DENTON	8/96	2/97
Chest Deflection Gauge		245	HUMANOID	9/96	3/97
Hybrid III Use Only					
Lap Belt Load Cells		706	LEBOW	9/96	3/97
Shoulder Belt Load Cells		707	LEBOW	9/96	3/97
Spool-Out Potentiometer		M8	MAGNETEK	9/96	3/97
Belt Stretch Transducer		E6	CALSPAN	7/96	1/97

INSTRUMENT CALIBRATION FOR DRIVER DUMMY

(6 Month Calibration Minimum)

DRIVER DUMMY		Serial #	Manufacturer	Calibration	
				Last	Next
Head	X (R)	AP064	ENDEVCO	9/96	3/97
	Y (R)	APBB6	ENDEVCO	8/96	2/97
	Z (R)	APBD9	ENDEVCO	8/96	2/97
Chest	X (R)	AP1A5	ENDEVCO	8/96	2/97
	Y (R)	AN943	ENDEVCO	8/96	2/97
	Z (R)	AP1A6	ENDEVCO	8/96	2/97
Pelvic	X	ADMB8	ENDEVCO	9/96	3/97
	Y	ADL44	ENDEVCO	9/96	3/97
	Z	AC2J3	ENDEVCO	9/96	3/97
Left Upper Tibia	Mx	038	DENTON	9/96	3/97
Left Upper Tibia	My	038	DENTON	9/96	3/97
Left Lower Tibia	Fy	032	DENTON	9/96	3/97
Left Lower Tibia	Fz	032	DENTON	9/96	3/97
Left Lower Tibia	Mx	032	DENTON	9/96	3/97
Right Upper Tibia	Mx	045	DENTON	9/96	3/97
Right Upper Tibia	My	045	DENTON	9/96	3/97
Right Lower Tibia	Fy	041	DENTON	9/96	3/97
Right Lower Tibia	Fz	041	DENTON	9/96	3/97
Right Lower Tibia	Mx	041	DENTON	9/96	3/97

INSTRUMENT CALIBRATION FOR DRIVER DUMMY

(6 Month Calibration Minimum)

DRIVER DUMMY		Serial #	Manufacture	Calibration	
				Last	Next
Left Foot	X	AET34	ENDEVCO	9/96	3/97
Left Foot	Z	AKD93	ENDEVCO	9/96	3/97
Right Foot	X	AEW70	ENDEVCO	9/96	3/97
Right Foot	Z	AEWK1	ENDEVCO	8/96	2/97

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY

(6 Month Calibration Minimum)

PASSENGER DUMMY (S/N 064)		Serial #	Manufacturer	Calibration	
				Last	Next
Head	X	AD4A9	ENDEVCO	9/96	3/97
	Y	AE8T7	ENDEVCO	9/96	3/97
	Z	AF5R1	ENDEVCO	9/96	3/97
Chest	X	AE8R7	ENDEVCO	9/96	3/97
	Y	AF5H9	ENDEVCO	9/96	3/97
	Z	AH5L8	ENDEVCO	9/96	3/97
Right Femur Load Cell		419	GSE	7/96	1/97
Left Femur Load Cell		723	GSE	7/96	1/97
Neck Load Cell	X	576	DENTON	7/96	1/97
	Y	576	DENTON	7/96	1/97
	Z	576	DENTON	7/96	1/97
Neck Moment	X	576	DENTON	7/96	1/97
	Y	576	DENTON	7/96	1/97
	Z	576	DENTON	7/96	1/97
Chest Deflection Gauge		064	HUMANOID	9/96	3/97
Hybrid III Use Only					
Lap Belt Load Cells		635	LEBOW	9/96	3/97
Shoulder Belt Load Cells		711	LEBOW	9/96	3/97
Spool-Out Potentiometer		M6	MAGNETEK	5/96	11/96
Belt Stretch Transducer		E7	CALSPAN	7/96	1/97

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY

(6 Month Calibration Minimum)

PASSENGER DUMMY		Serial #	Manufacturer	Calibration	
				Last	Next
Head	X (R)	AC7Y3	ENDEVCO	9/96	3/97
	Y (R)	AC824	ENDEVCO	9/96	3/97
	Z (R)	AC814	ENDEVCO	9/96	3/97
Chest	X (R)	AP1E0	ENDEVCO	9/96	3/97
	Y (R)	AJ9F8	ENDEVCO	9/96	3/97
	Z (R)	AP1A2	ENDEVCO	9/96	3/97
Pelvic	X	AH5F3	ENDEVCO	9/96	3/97
	Y	AL6H7	ENDEVCO	9/96	3/97
	Z	AL6C8	ENDEVCO	9/96	3/97
Left Upper Tibia	Mx	015	DENTON	9/96	3/97
Left Upper Tibia	My	015	DENTON	9/96	3/97
Left Lower Tibia	Fx	011	DENTON	9/96	3/97
Left Lower Tibia	Fz	011	DENTON	9/96	3/97
Left Lower Tibia	My	011	DENTON	9/96	3/97
Right Upper Tibia	Mx	016	DENTON	9/96	3/97
Right Upper Tibia	My	016	DENTON	9/96	3/97
Right Lower Tibia	Fx	012	DENTON	9/96	3/97
Right Lower Tibia	Fz	012	DENTON	9/96	3/97
Right Lower Tibia	My	012	DENTON	9/96	3/97

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY

(6 Month Calibration Minimum)

PASSENGER DUMMY		Serial #	Manufacture	Calibration	
				Last	Next
Left Foot	X	AKEB3	ENDEVCO	9/96	3/97
Left Foot	Z	AEW71	ENDEVCO	9/96	3/97
Right Foot	X	AEWJ5	ENDEVCO	8/96	2/97
Right Foot	Z	AEWE3	ENDEVCO	8/96	2/97

INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS

(6 Month Calibration Minimum)

	Serial #	Manufacturer	Calibration	
			Last	Next
Left Seat Rear Crossmember	E03	ICS	4/96	10/96
Right Rear Seat Crossmember	Y26	ICS	8/96	2/97
Top of Engine	X84	ICS	5/96	11/96
Bottom of Engine	X28	ICS	5/96	11/96
Left Disc Brake Caliper	A147	CEC	9/96	3/97
Right Disc Brake Caliper	A44	CEC	9/96	3/97
Instrument Panel	Y89	CEC	5/96	11/96
Left Seat Rear Crossmember (R)	A217	ICS	8/96	2/97
Right Seat Rear Crossmember (R)	Y22	ICS	8/96	2/97

Appendix E

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

Unibelts

The UNIBELT, or single continuous-belt restraint system, is installed for the driver, front seat passenger, and right and left rear seating positions.

Each unibelt is a combined lap/shoulder belt system. The belt webbing retractor will lock only during very sudden stops or impacts. This feature allows the shoulder part of the belt to move freely with you under normal conditions. But in a collision, the belt will lock and reduce the risk of your striking the inside of the vehicle or being thrown out.

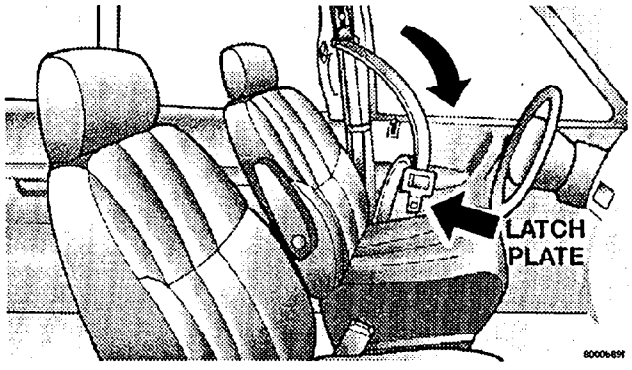
WARNING!

Wearing a seat belt incorrectly is dangerous. Seat belts are designed to go around the large bones of your body. These are the strongest parts of your body and can take the forces of a collision the best. Wearing your belt in the wrong place could make your injuries in a collision much worse. You might suffer internal injuries, or you could even slide out of part of the belt. Follow these instructions to wear your seat belt safely and to keep your passengers safe, too.

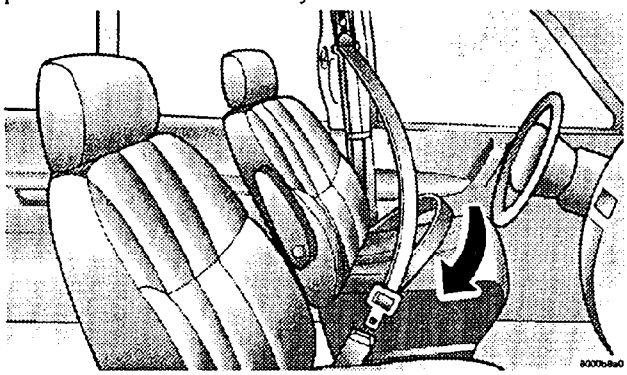
Unibelt Operating Instructions

1. Enter the vehicle and close the door. Sit back and adjust the seat.

2. The seat belt latch plate is above the back of your seat. Grasp the latch plate and pull out the belt. Slide the latch plate up the webbing as far as necessary to make the belt go around your lap.



3. When the belt is long enough to fit, insert the latch plate into the buckle until you hear a "click".



WARNING!

- A belt that is buckled into the wrong buckle will not protect you properly. The lap portion could ride too high on your body, possibly causing internal injuries. Always buckle your belt into the buckle nearest you.
- A belt that is too loose will not protect you as well. In a sudden stop you could move too far forward, increasing the possibility of injury. Wear your seat belt snugly.
- A belt that is worn under your arm is very dangerous. Your body could fall into the inside surfaces of the vehicle in a collision, increasing head and neck injury. And a belt worn under the arm can cause internal injuries. Ribs aren't as strong as shoulder bones. Wear the belt over your shoulder so that your strongest bones will take the force in a collision.

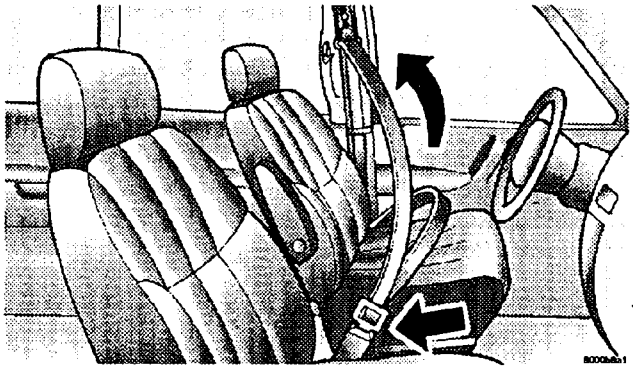
4. Position the lap belt across your thighs, below your abdomen. To remove slack in the lap belt portion, pull up a bit on the shoulder belt. To loosen the lap belt if it is too tight, tilt the latch plate and pull on the lap belt. A snug lap belt reduces the risk of sliding under the belt in a collision.

2

WARNING!

A lap belt worn too high can increase the risk of internal injury in a collision. The belt forces won't be at the strong hip and pelvic bones, but across your abdomen. Always wear the lap belt as low as possible and keep it snug.

5. Position the lap/shoulder belt on your chest so that it is comfortable and not resting on your neck. The retractor will withdraw any slack in the belt.

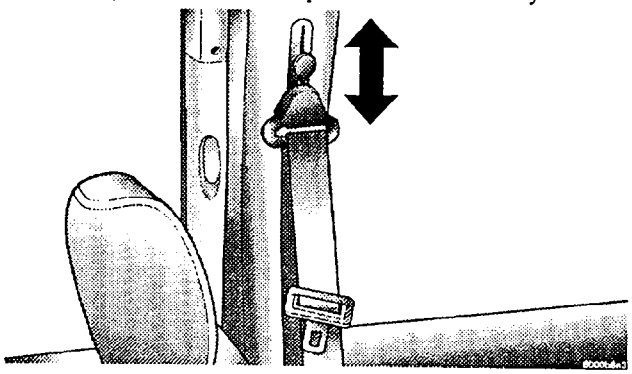


WARNING!

A twisted belt can't do its job as well. In a collision it could even cut into you. Be sure the belt is straight. Use the unibelt untwisting procedure outlined in this section. If this does not straighten the belt, take it to your dealer to have it fixed.

6. To release the belt, push the red button on the buckle. The belt will automatically retract to its stowed position. If necessary, slide the latch plate down the webbing to allow it to retract fully.

Adjustable Upper Shoulder Belt Anchorage
In the front seat and the second row outboard seats, the shoulder belt can be adjusted upward or downward to position the belt away from your neck. Push up or down on the release lever to release the anchorage, and then move it up or down to the position that serves you best.



As a guide, if you are shorter than average, you will prefer a lower position, and if you are taller than average, you'll prefer a higher position. When you release the anchorage, try to move it up or down to make sure that it is locked in position.

In the rear most seat, move toward the center of the seat to position the belt away from your neck.

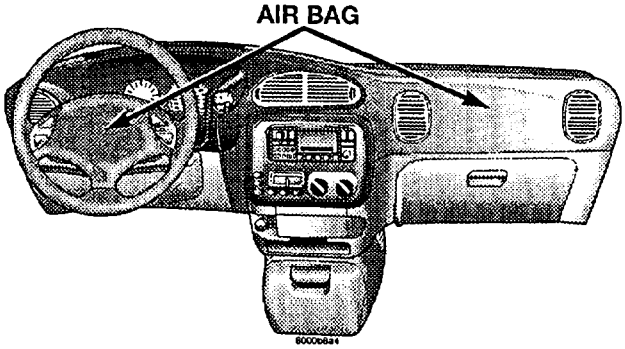
Seat Belts and Pregnant Women

We recommend that pregnant women use the seat belts throughout their pregnancies. Keeping the mother safe is the best way to keep the baby safe.

Pregnant women should wear the lap part of the belt across the thighs and as snug across the hips as possible. Keep the belt low so that it does not come across the abdomen. That way the strong bones of the hips will take the force if there is a collision.

Driver and Right Front Passenger Supplemental Restraint System - Airbag

This vehicle has airbags for the driver and right front passenger as a supplement to the seat belt restraint systems. The driver's airbag is mounted in the steering wheel. The passenger side airbag is mounted in the instrument panel above the glove compartment. These airbags inflate in higher speed frontal impacts. They work with the instrument panel knee bolsters and the seat belts to provide improved protection for the driver and right front passenger.



WARNING!

Relying on airbags alone could lead to more severe injuries in a collision. The airbags do not provide any restraint in side or rear collisions or rollovers. Always wear the seat belt.

The seat belt system is designed to protect you in many types of collisions. The airbags deploy only in frontal collisions. They will not deploy in collisions at slow speed. But even in collisions where the airbags deploy, you need the seat belt to keep you in the right position for the airbags to protect you properly.

Ignoring the AIRBAG light in your message center could mean you won't have the airbags to protect you in a collision. If the light does not come on when starting, stays on for more than 8 seconds after you start the vehicle, or if it comes on as you drive, have the airbag system checked right away.

The airbag system consists of the following:

- Airbag Control Module and Internal Crash Sensor

- AIRBAG Light
- Driver and Passenger Airbag/Inflator Units
- Unique Steering Wheel and Column
- Unique Instrument Panel
- Interconnecting Wiring
- Knee Impact Bolster

How The Airbag System Works

- **The Airbag Control Module** in the occupant compartment determines if a frontal impact is severe enough to require the airbags. The sensor in the control module will not detect side, rollover, or rear impacts. The control module signals the airbag/inlfator units to deploy the airbags.

  This module also monitors the readiness of the electronic parts of the system whenever the ignition switch is in the START or RUN positions. These include all of the items listed above except the knee bolster, instrument panel and the steering wheel and column.

The airbag control module also turns on the Airbag light in the instrument panel for 6 to 8 seconds when the ignition is first turned on, then turns the light off. If it detects a malfunction in any part of the system, it turns on the light either momentarily or continuously.

- **The Airbag/Inflator Units** are in the center of the steering wheel and the instrument panel. The words SRS/AIRBAG are embossed on the airbag covers.

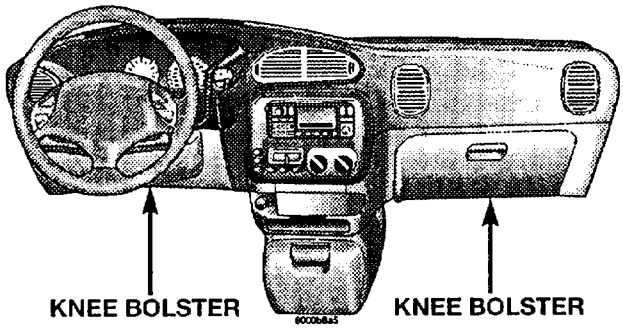
NOTE: Airbag covers may not be visually evident as they blend in with vehicle styling; but they are designed to open at designated locations on airbag deployment.

WARNING!

Do not put anything on or around the airbag covers or attempt to manually open them. You may damage the airbags and you could be injured because the airbags are not there to protect you. These protective covers for the airbag cushions are designed to open only when the airbags are inflating.

When the airbag control module detects an impact requiring the airbags, the control module sends a signal to the inflator units. A large quantity of non-toxic nitrogen and argon gas is generated to inflate the airbags. The airbag covers separate and fold out of the way as the airbags inflate to their full size. The airbags fully inflate in about 50 milliseconds. This is only about half of the time it takes you to blink your eyes. The airbags then quickly deflate while helping to restrain the driver and right front passenger. The airbag gas is vented through the airbag material towards the instrument panel. In this way the airbags do not interfere with your control of the vehicle.

- **The Knee Impact Bolsters** help protect the knees and position you for the best interaction with the airbags.



WARNING!

- **Being too close to the steering wheel or instrument panel during airbag deployment could cause serious injury. Airbags need room to inflate. Sit back, comfortably extending your arms to reach the steering wheel or instrument panel.**
- **A rearward-facing child restraint should only be used in a rear seat. A child may be seriously or fatally injured in a rearward-facing child restraint placed in the front seat if the restraint is struck by a deploying passenger airbag.**

If A Deployment Occurs

The airbag system is designed to deploy when the airbag control module detects a moderate-to-severe frontal collision, to help restrain the driver and right front passenger, and then immediately deflate.

NOTE: A frontal collision that is not severe enough to need airbag protection will not activate the system. This does not mean something is wrong with the airbag system.

If you do have a collision which deploys the airbag, any or all of the following may occur:

- The nylon airbag material may sometimes cause abrasions and/or skin reddening to the driver and right front passenger as the airbags deploy and unfold.
- The abrasions are similar to friction rope burns or those you might get sliding along a carpet or gymnasium floor. They are not caused by contact with chemicals. They are not permanent and normally heal quickly. However, if you haven't healed significantly within a few days, or if you have any blistering, see your doctor immediately.
- As the airbags deflate you may see some smoke-like particles. The particles are a normal by-product of the process that generates the non-toxic nitrogen and argon gas used for airbag inflation. These airborne particles may irritate the skin, eyes, nose, or throat. If you have skin or eye irritation, rinse the area with cool water. For nose or throat irritation, move to fresh air. If the irritation continues, see your doctor.

If these particles settle on your clothing, follow the garment manufacturer's instructions for cleaning.

- Your vehicle may be driveable after the airbags deploy. If so, you can tuck the deployed airbags inside the opening in the steering wheel hub and instrument panel trim covers to make driving somewhat easier.

WARNING!

Deployed airbags cannot protect you in another collision. Have the airbags replaced by an authorized dealer as soon as possible.

Transporting Pets

Airbags deploying in the front seat could harm your pet. An unrestrained pet could be thrown about and possibly injured, or injure a passenger during panic braking or in a collision.

Pets should be restrained in the rear seat in pet harnesses or pet carriers that are secured by seat belts.

Maintaining Your Airbag System

WARNING!

- **Modifications to any part of the airbag system could cause it to fail when you need it. You could be injured because the airbag is not there to protect you. Do not modify the components or wiring, including adding any kind of badges or stickers to the airbag covers. Do not modify the front bumper or vehicle body structure.**
- **You need proper knee impact protection in a collision. Do not mount or locate any aftermarket equipment on or behind the knee bolsters.**
- **It is dangerous to try to repair any part of the airbag system yourself. Don't try to repair the airbag system. Be sure to tell anyone who works on your vehicle that it has airbags.**

You will want to have the airbags ready for your protection in a collision. While the airbag Supplemental Re-

straint System (SRS) is designed to be maintenance free, if any of the following occurs, have an authorized dealer service the system immediately.

- The AIRBAG light does not come on or flickers during the 6 to 8 seconds when the ignition switch is first turned on.
- The light remains on or flickers after the 6 to 8 second interval.
- The light flickers or comes on and remains on while driving.

ENGINE BREAK-IN RECOMMENDATIONS

A long break-in period is not required for the engine in your new vehicle.

Drive moderately during the first 300 miles (500 km). After the initial 60 miles (100 km), speeds up to 50 or 55 mph (80 or 90 km/h) are desirable.

While cruising, brief full-throttle acceleration, within the limits of local traffic laws, contributes to a good break-in. Wide open throttle acceleration in low gear can be detrimental and should be avoided.

The engine oil installed in the engine at the factory is a high quality energy conserving type lubricant. Oil changes should be consistent with anticipated climate conditions under which vehicle operations will occur. The recommended viscosity and quality grades are shown in Section 7 of this manual. NON-DETERGENT OR STRAIGHT MINERAL OILS MUST NEVER BE USED.

A new engine may consume some oil during its first few thousand miles of operation. This should be considered as a normal part of the break-in and not interpreted as an indication of difficulty.