V 2455

REPORT NUMBER: CAL-97-N13

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

CHRYSLER CORPORATION
1997 JEEP WRANGLER
2-DOOR MPV

NHTSA NUMBER: MV0300

CALSPAN TEST NUMBER: 8313-13

September 25, 1996

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

FINAL REPORT

PREPARED FOR:

U. S. Department of Transportation
National Highway Traffic Safety Administration
Office of Market Incentives
400 Seventh Street, S. W.
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Prepared: _____
Michael J. Kilgallon, Project Engineer

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

FINAL REPORT ACCEPTED BY:

_____
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 1997 Jeep Wrangler 2-Door MPV was performed at Calspan SRL Corporation crash test facility in Buffalo, New York, on September 25, 1996.

The impact velocity was 56.0 kph and the temperature at the barrier face was 20.0□C. The maximum post-test vehicle crush was 555 mm. The test vehicle was equipped with a 3-point continuous belt system and a supplemental airbag at both front outboard seating positions.

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

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Section 1

PURPOSE AND TEST PROCEDURE

This 56.0 kph frontal barrier impact test is part of the 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 56.0 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 MV0300

A load cell barrier consisting of 36 load cells was impacted by a 1997 Jeep Wrangler 2-Door MPV at a velocity of 56.0 kph. The test was performed at the Calspan SRL Corporation on September 25, 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 used in two previous tests (MT0305 and MV0101). Injury criteria for ATD No. 245 were not exceeded in either test MT0305 or MV0101. The right-front passenger (position 2) ATD (Serial No. 061) was used in one previous test (MV0101). Injury criteria for ATD No. 061 was not exceeded in test MV0101. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 127 channels of data were recorded on a P.C. based data acquisition system. Appendix B contains the vehicle, load cell barrier and dummy response data traces. Position 2 belt elongation data did not record accurately, barrier load cell B3 saturated during the impact event, barrier load cell C7 did not record accurately and vehicle accelerometer number 4 (x) did not record correctly.

The driver's HIC was 566.0. The maximum chest deceleration over 3 milliseconds was 42.6 g's and maximum chest deflection was -23.9 mm. Femur loads were -5558.1 newtons on the left and -4595.9 newtons on the right.

The right front passenger's HIC was 487.8. Maximum chest deceleration over 3 milliseconds was 34.1 g's and maximum chest deflection was -15.9 mm. Femur loads were -3955.2 newtons on the left and -3471.1 newtons on the right.

Table 1

GENERAL TEST AND VEHICLE DATA

Vehicle Year/Make/Model/Body Style: 1997 Jeep Wrangler 2-Door MPV

NHTSA Test No.: MV0300 VIN.: 1J4FY29P2VP439532

Body Color: Red Date of Manufacture: 6-96

Date Received: 8-23-96

Odometer Reading: 104

Engine:	4	Cylinders;	-	C.I.D.;	2.5	Liters;	-	CC
	X	Gas;	-	Diesel;	-	Turbocharged		
	X	Longitudinal;			-	Transverse		
Transmission:	5	Speed;	X	Manual;	-	Automatic;	-	Overdrive
Final Drive:	-	Front Wheel;	-	Rear Wheel;	X	Four Wheel		
Accessories:	-	A/C;	X	P/S;	X	P/B;	-	P/wdo
	X	Tilt Wheel;	-	P/seats;	-	Cruise Control	-	Other

Type of Occupant Restraint: 3-point continuous belt system and a supplemental airbag at both front outboard seating positions.

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 300 kPa, Rear 300 kPa

Recommended Tire Size: P205/75R15

Recommended Cold Tire Pressure: Front 227 kPa, Rear 227 kPa

Tires on Vehicle: P205/75R15 Manufacturer: Goodyear

Number of Occupants:	2	Front;	2	Rear;	-	3rd Seat;	4	TOTAL
Type of Front Seats:	X	Bucket;	-	Bench;	-	Split Bench		
Type of Front Seat Back:	-	Fixed;	X	Adj. with	X	Lever	-	Rot. Knob

Vehicle Capacity Weight (VCW) = 524 kgs. (A)

No. of Occupants x 68 kgs. = 272 kgs. (B)

Rated Cargo and Luggage Weight (RCLW) A-B = 252 kgs.

GVWR 1978 kgs. GAWR: Front 998 kgs. Rear 1180 kgs.

Table 1

GENERAL TEST AND VEHICLE DATA (cont'd)

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

Right Front	= 344 kgs.		Right Rear	= 382	kgs.
Left Front	= 347 kgs.		Left Rear	= 381	kgs.

TOTAL FRONT WEIGHT = 691 kgs. (47.5 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 763 kgs. (52.5 % of Total Vehicle Weight)

TOTAL DELIVERED WEIGHT = 1,454 kgs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight 1454 kgs.

RCLW = 136 kgs. (RCLW or 136 kgs., whichever is less)

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

Target Test Weight = 1739 kgs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 129 KGS CARGO:

Right Front	= 371 kgs.		Right Rear	= 497	kgs.
Left Front	= 369 kgs.		Left Rear	= 495	kgs.

TOTAL FRONT WEIGHT = 740 kgs. (42.7 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 992 kgs. (57.3 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 1,732 kgs.

Weight of ballast secured in vehicle trunk area = 0 kgs.

VEHICLE ATTITUDE (all dimensions in mm):

Delivered Attitude:	RF	811	LF	817	RR	852	LR	856
Test Attitude:	RF	805	LF	808	RR	810	LR	815

Wheel Base: 2372 mm.; C.G. = 1359 mm. rearward of front wheel C/L

Remarks: 52.6 liters of Stoddard solution was placed in the fuel tank.

Table 1

GENERAL TEST AND VEHICLE DATA (cont'd)

POST -IMPACT DATA:

Type of Test:	Frontal Barrier	Impact Angle:	0°
Date of Test:	September 25, 1996	Time of Test:	14:45

Ambient Temperature: 20.0 ° C at impact area

Temperature in Occupant Compartment: 21.1 ° C

Windshield Molding Temperature: 21.1 ° C

Required Impact Velocity Range: 55.5 to 57.1 kph

Impact Velocity: primary = 56.0 kph, secondary = 55.8 kph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 1321 mm

Exiting Speed Trap: 305 mm

VEHICLE REBOUND AND CRUSH (mm):

Vehicle Length:	Pre-test = R	3748	C_L	3756	L	3736
	Post-test = R	3205	C_L	3215	L	3245
	Crush = R	543	C_L	541	L	491

Distance from front of test vehicle to point of impact:

R	1042	C_L	1086	L	1100

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	Center of airbag	Center of airbag
Chest	Airbag and belt	Airbag and belt
Abdomen	No contact	No contact
Left Knee	Knee bolster	Glove compartment door
Right Knee	Knee bolster	Glove compartment door

Table 1

GENERAL TEST AND VEHICLE DATA (cont'd)

	Front		Rear	
	Left	Right	Left	Right
Door Opening	Closed Operable	Closed Operable	N/A	N/A

	Front		Rear	
Seat Movement	Left	Right	Left	Right
Seat Back Failure	None	None	N/A	N/A
Seat Shift (mm.)	0	0	N/A	N/A

Glazing Damage

Backlight/Windshield: None

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.: MV0300 Vehicle: 1997 Jeep Wrangler 2-Door MPV

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-56.7	-14.2	15.4	58.0
Position #2 - Passenger	-54.4	8.3	19.7	56.5

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R*
Position #1 - Driver	-47.6	-9.3	10.4	42.6
Position #2 - Passenger	-34.8	6.0	12.8	34.1

* 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	-5558.1	-4595.9
Position #2 - Passenger	-3955.2	-3471.1

	MAXIMUM FORCE - SEAT BELT LOADS (nwt)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	4546.0	-	2737.5
Position #2 - Passenger	4607.4	2915.1	-

	HEAD INJURY CRITERIA (HIC)			
	HIC**	t_1 (mSec)	t_2 (mSec)	Average Acceleration t_1 to t_2
Position #1 - Driver	566.0	49.32	84.36	48.23
Position #2 - Passenger	487.8	61.68	97.56	45.01

** 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: 1997 Jeep Wrangler 2-Door MPV

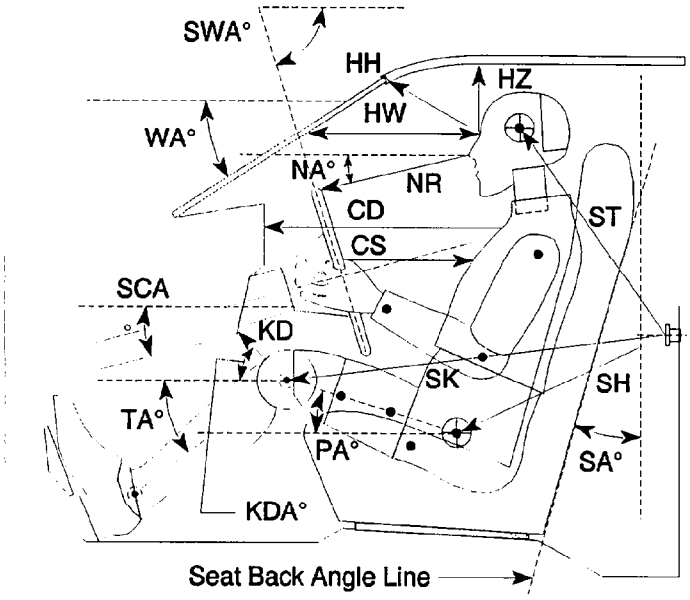
NHTSA Test No.: MV0300 Test Date: September 25, 1996

MAXIMUM VALUES	DRIVER DUMMY ID #245:	PASSENGER DUMMY ID #061:
Neck Load X (nwt)	-409.8	458.8
Neck Load Y (nwt)	-198.7	1792.9
Neck Load Z (nwt)	2680.6	758.7
Neck Moment X (nwt-m)	-18.0	-22.4
Neck Moment Y (nwt-m)	-49.0	-6.7
Neck Moment Z (nwt-m)	25.2	-14.5
Chest Deflection X (mm.)	-23.9	-15.9
Time of Max. Occurrence (msec)	63.5	82.9

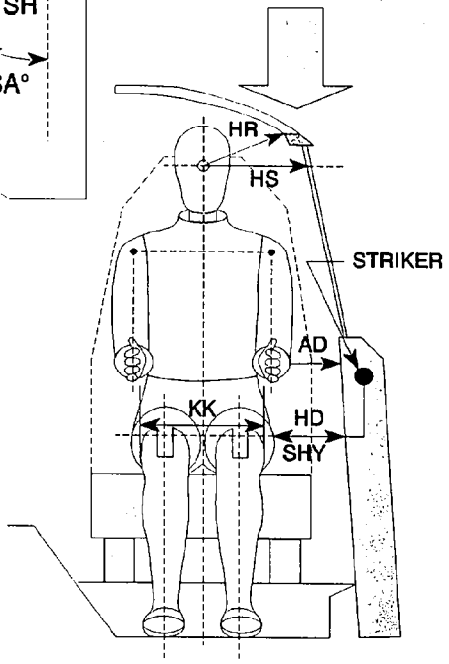
Note: All values listed occur during the primary impact event.

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

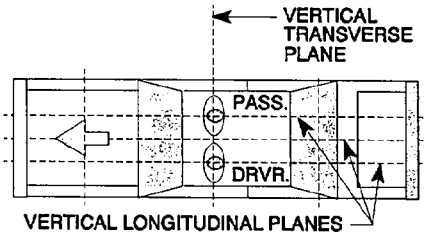


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Table 4

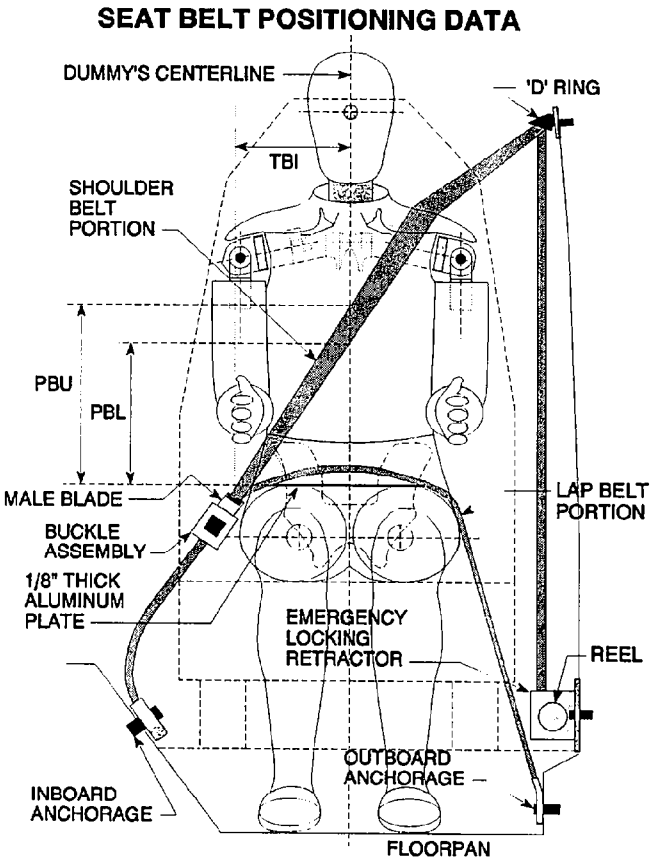
FRONT SEAT OCCUPANT MEASUREMENTS

	DRIVER (Serial #245)			PASS. (Serial # 061)		
WA°	63 deg.			N/A		
SWA°	25 deg.			N/A		
SCA°	65 deg.			N/A		
SA°	24 deg.			24 deg.		
HZ	255			250		
HH	512			524		
HW	568			568		
HR	280			277		
NR	326	Angle	13 deg.	N/A		
CD	490			489		
CS	260			N/A		
RA	140			N/A		
KDL	132	Angle (KDA)	30 deg.	128		
KDR	113			145	Angle (KDA)	25 deg.
PA°	20 deg.			23 deg.		
TA°	45 deg.			50 deg.		
KK	305			255		
ST	574	Angle	12 deg.	538	Angle	10 deg.
SK	602	Angle	98 deg.	574	Angle	98 deg.
SH	208	Angle	124 deg.	218	Angle	128 deg.
SHY	178			170		
HS	350			330		
HD	110			118		
AD	45			45		

Dimensions in millimeters

Figure 2

SEAT BELT POSITIONING DATA



	DRIVER DUMMY (mm)	PASSENGER DUMMY (mm)
PBU -- Top surface of alum. plate to upper edge	332	326
PBL-- Top surface of alum. plate to belt lower edge	251	247
LAP BELT TENSION	Retractor	Retractor
SHOULDER BELT TENSION	Retractor	Retractor

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.	2478	2506
Shoulder belt length as measured on Part 572 Dummy.	883	861
Lap belt length as measured on Part 572 Dummy.	845	890
SHOULDER BELT SPOOL-OFF DATA:		
As determined by film analysis.	N/A*	N/A*
As determined mechanically.	70	74
As determined electronically.	71	80
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	0 mm/M	N/A**
Measured mechanically.	0 mm/M	0 mm/M

Dimensions in millimeters

*Belt markings not visible during entire spool-off action.
**Position 2 belt elongation data did not record accurately.

Figure 3

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera information shown in Table 6.

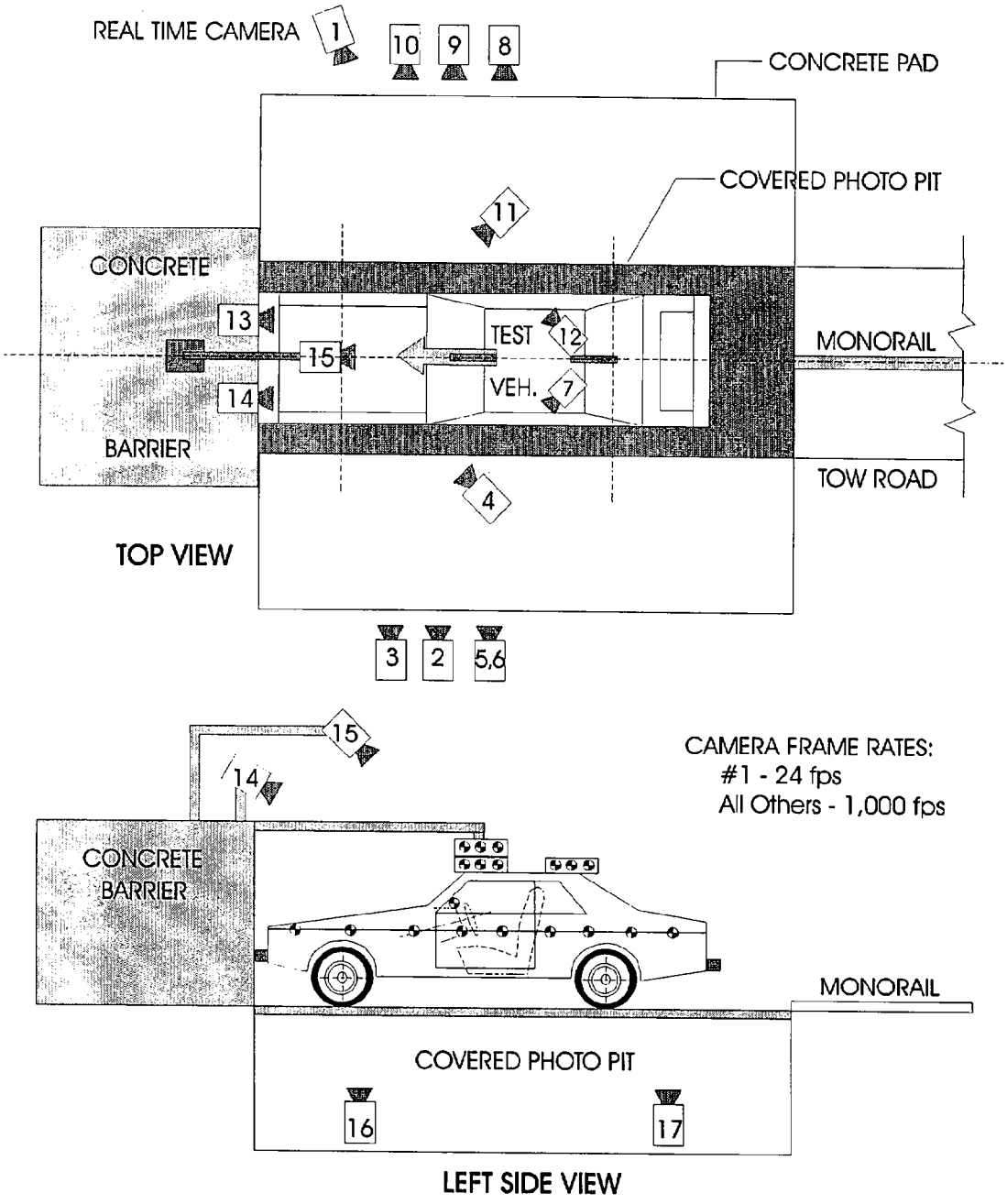


Table 6
HIGH-SPEED CAMERA LOCATIONS

NHTSA Test No.: MV0300 Vehicle: 1997 Jeep Wrangler 2-Door 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	9220	1252	1153	-3	9645	25	1110
3	Left Side View	8344	787	1224	-3	8769	25	900
4	Driver and Interior View	5527	2649	2115	-10	-	25	860
5	Steering Column (Bottom)	8491	1570	1176	-1	8916	35	1070
6	Steering Column (Top)	8491	1570	1783	-5	8916	35	955
7	Left Belt	-	-	-	-	-	13	600
8	Overall Right Side	9624	945	1150	-2	10049	25	1130
9	Right Side View	9949	1610	1210	-2	10374	35	1040
10	Right Passenger View	11455	1575	1565	-2	11880	50	1105
11	Passenger and Interior View	5210	112	2115	-10	-	25	1005
12	Right Belt	-	-	-	-	-	13	745
13	Passenger Front View	580	0	1985	-34	-	13	1000
14	Driver Front View	580	0	1985	-34	-	13	1030
15	Windshield View	0	-530	3048	-53	-	13	1070
16	Pit View of Engine	0	570	-3048	90	-	13	1020
17	Pit View of Fuel Tank	0	2930	-3048	90	-	13	925

*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	349
B	711
C	915
D	1726
E	345
F	935
G	605
H	597
I	235
J	1204
K	832
L	1115
M	345
N	236
O	592
P	607
Q	1115
R	828
S	1206

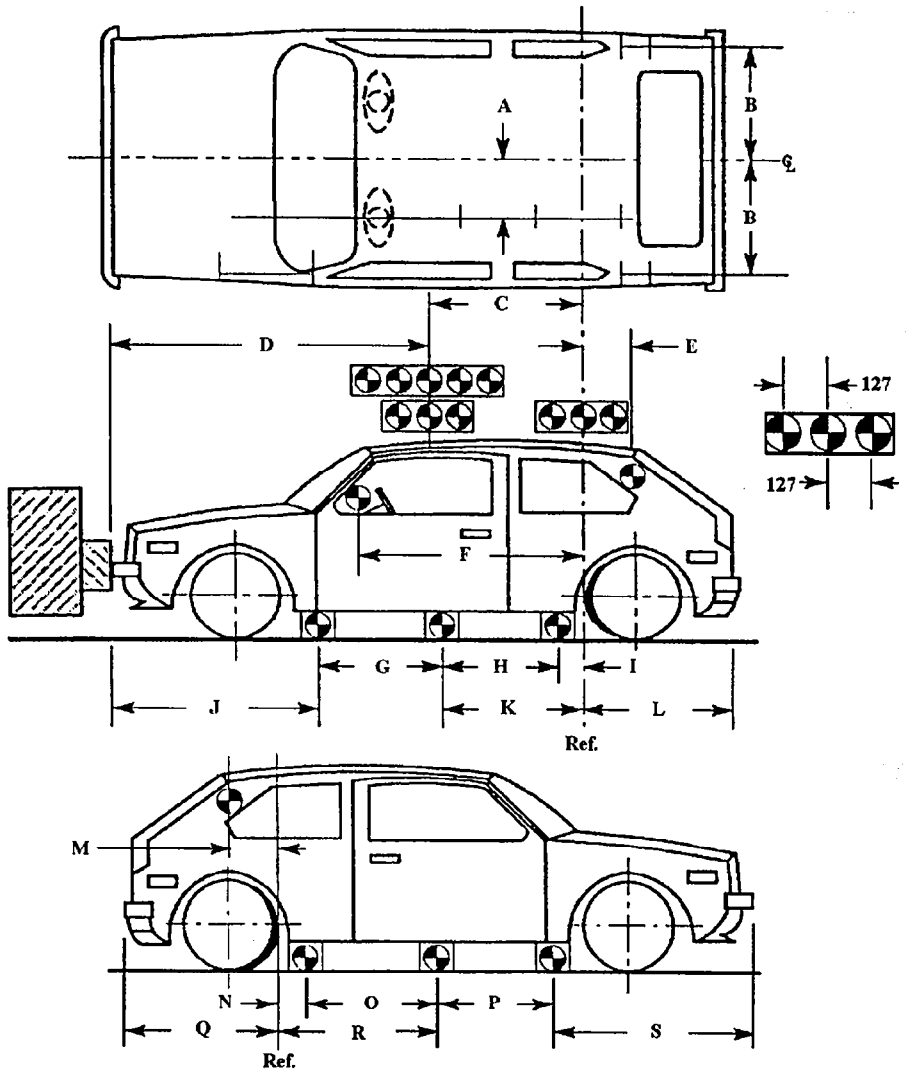
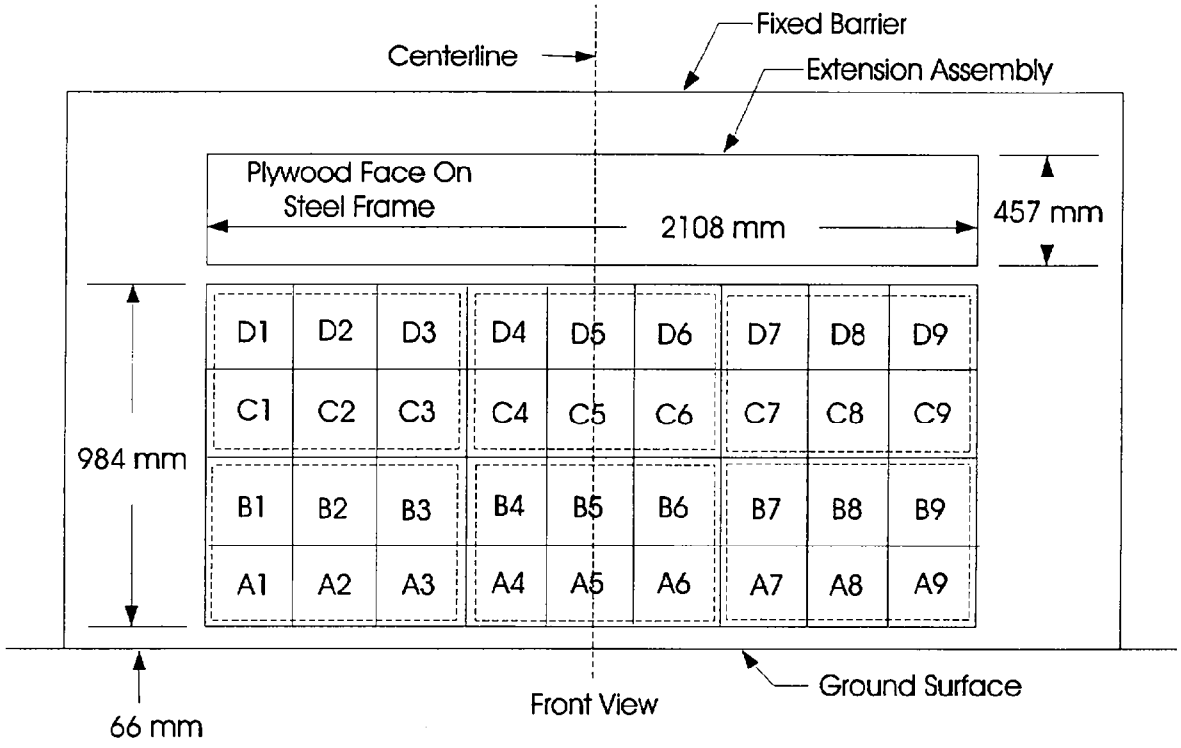


Figure 5

LOAD CELL LOCATIONS ON FIXED BARRIER

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



6 GROUPS OF 6 LOAD CELLS EACH

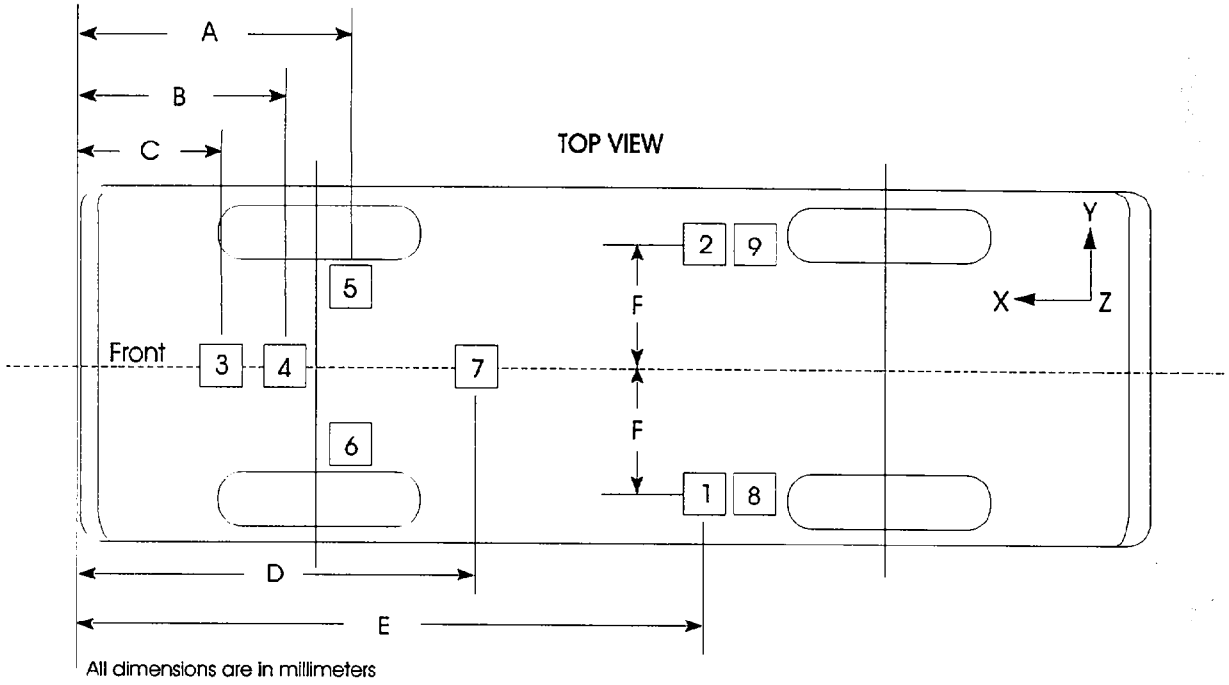
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

The following data is presented in Appendix B:

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

Figure 6

VEHICLE ACCELEROMETER LOCATIONS



ACCELEROMETER NUMBER*	ACCELEROMETER LOCATION	Distances From Vehicle Front All dimensions in millimeters	
1	Left Rear Seat Crossmember [E/F]	X = 2710	Y = -427
2	Right Rear Seat Crossmember [E/F]	X = 2710	Y = 427
3	Top of engine [C]	960	
4	Bottom of engine [B]	1155	
5	Right Disc Brake Caliper [A]	712	
6	Left Disc Brake Caliper [A]	685	
7	Instrument Panel [D]	1693	
8	Left Rear Seat Crossmember [E/F]	X = 2710	Y = -401
9	Right Rear Seat Crossmember [E/F]	X = 2710	Y = 401

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

Figure 7

TEST VEHICLE MEASUREMENTS

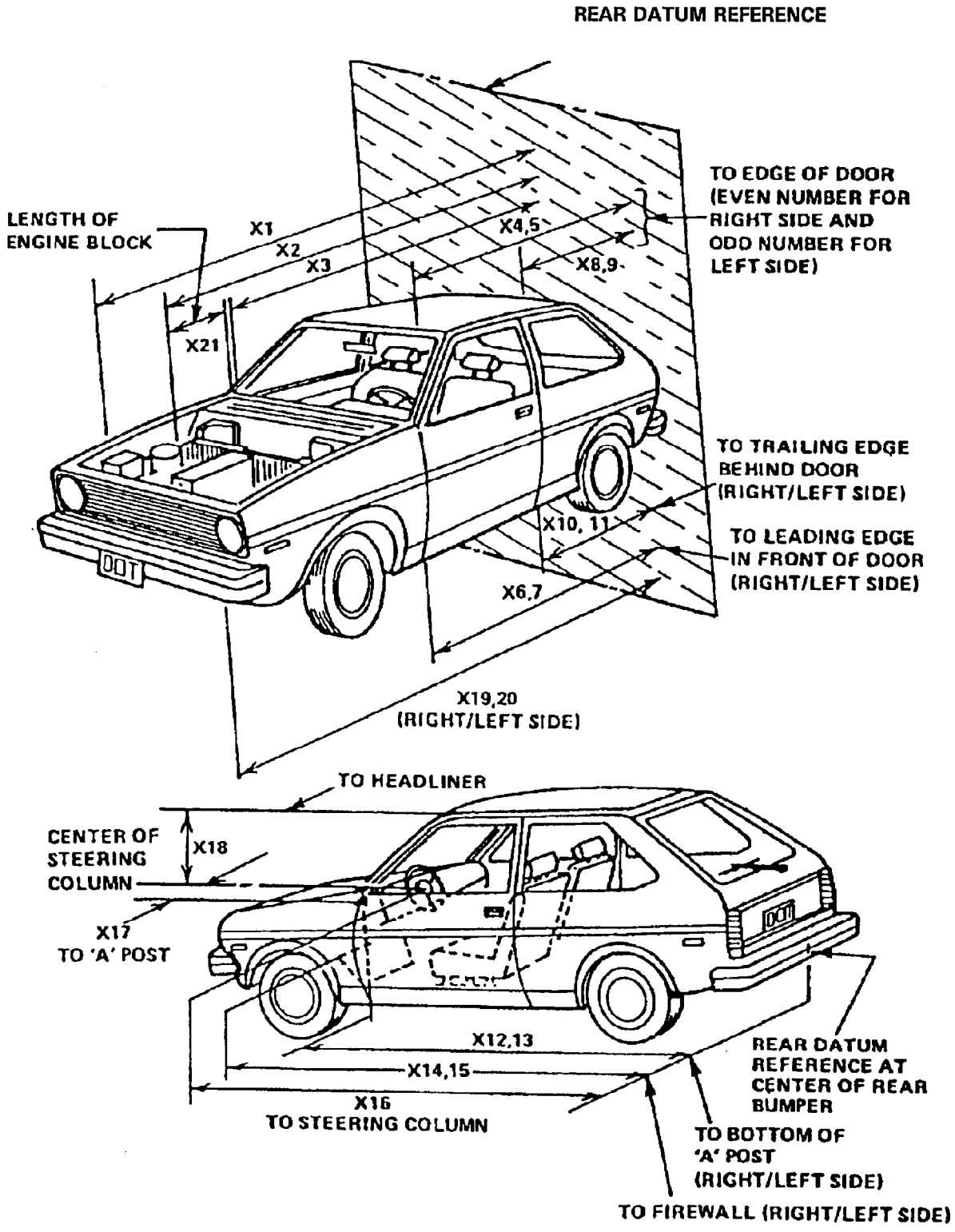


Table 7

VEHICLE MEASUREMENTS

		All Dimensions in mm		
No.		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	3756	3215	541
X2	Rear Surface of Vehicle to Front of Engine	2915	2795	120
X3	Rear Surface of Vehicle to Firewall	2490	2420	70
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	2171	2214	-43
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	2164	2197	-33
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	2172	2187	-15
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	2156	2154	2
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	1260	1310	-50
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	1254	1298	-44
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	1325	1332	-7
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	1322	1309	13
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	2370	2240	130
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	2367	2338	29
X14	Rear Surface of Vehicle to Firewall, Right Side	2500	2435	65
X15	Rear Surface of Vehicle to Firewall, Left Side	2500	2425	75
X16	Rear Surface of Vehicle to Steering Column	1805	1860	-55
X17	Center of Steering Column to "A" Post	365	380	-15
X18	Center of Steering Column to Headliner	500	390	110
X19	Rear Surface of Vehicle to Right Side of Front Bumper	3748	3205	543
X20	Rear Surface of Vehicle to Left Side of Front Bumper	3736	3245	491
X21	Length of Engine Block	430	430	0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	2060	2110	-50
CD	Rear Surface of Vehicle to Center of Dash Panel	1985	2015	-30
LD	Rear Surface of Vehicle to Left Side of Dash Panel	2055	2090	-35

Table 8

ACCIDENT INVESTIGATION DIVISION DATA

FOR 56.3 KPH FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: Jeep Wrangler 2-Door MPV

NHTSA Test No.: MV0300 VIN: 1J4FY29P2VP439532

Model Year: 1997 Build Date: 6-96 Test Date: September 25, 1996

Vehicle Size Category: MPV Test Weight: 1731 Kgs

Vehicle Wheelbase: 2372 mm; Front Overhang: 1205 mm; Overall Width: 1676 mm

Collision Deformation Classification (CDC) Code: 12FDEW2

Crush Depth Dimensions;

C1 = 415 mm

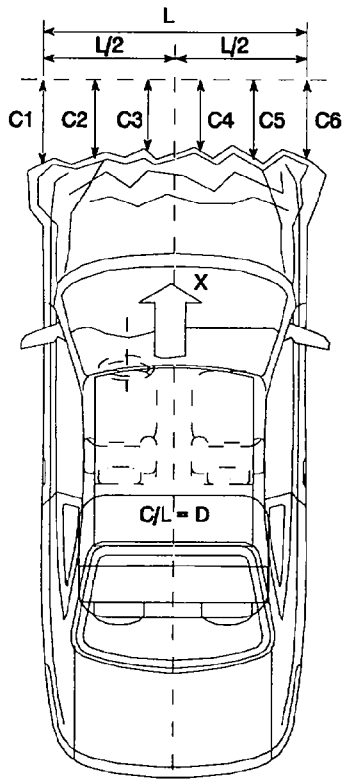
C2 = 510 mm

C3 = 530 mm

C4 = 550 mm

C5 = 555 mm

C6 = 490 mm



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

Longitude Length of Damaged Region: L= 1674 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 20 mm molding.

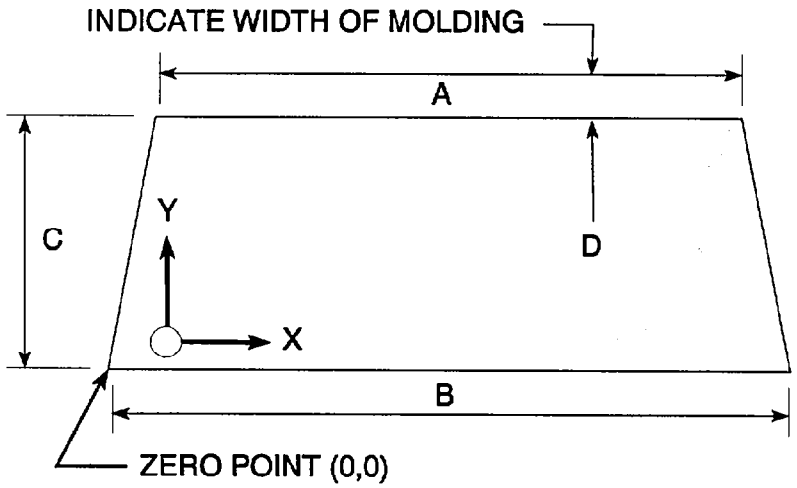
FMVSS 212 REQUIREMENTS:

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	1751	1751	100
LEFT SIDE	1751	1751	100
TOTAL	3,502	3,502	100

AREA OF RETENTION FAILURE:



FRONT VIEW OF WINDSHIELD

DIMENSIONS	
A	1303
B	1359
C	420
D	20

FAILURE DETAILS: None

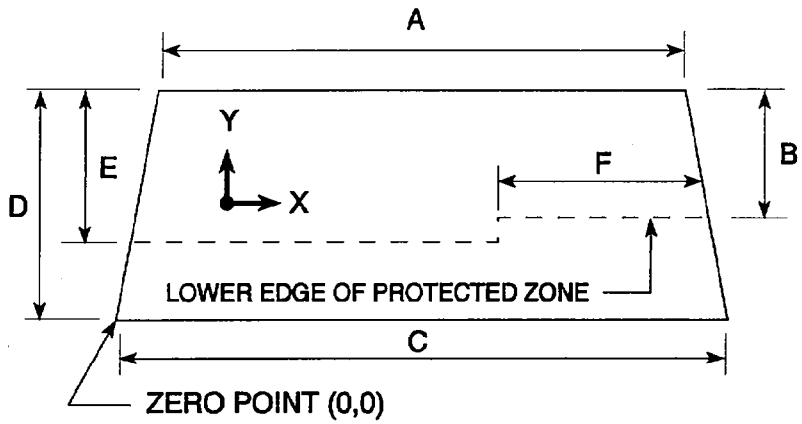
Figure 9

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	1303
B	305
C	1359
D	420
E	267
F	559

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.: MV0300 TEST DATE: September 25, 1996

VEHICLE MAKE/MODEL: 1997 Jeep Wrangler

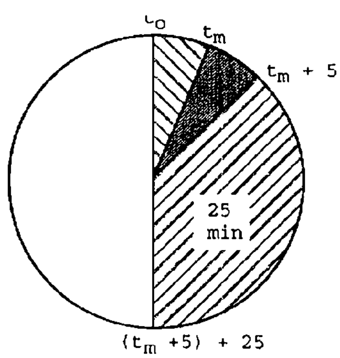
The test vehicle was filled from 92% to 94% of the manufacture's "usable" capacity. The electric fuel pump was operating if it will operate without engine operation. Two Part 572 anthropomorphic test devices were located at each of the front designated seating positions.

= =

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.

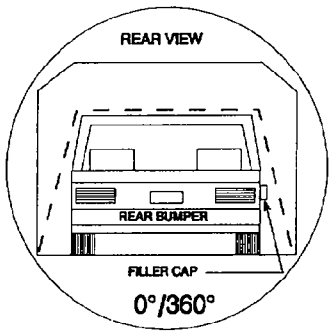
SOLVENT SPILLAGE DETAILS: None

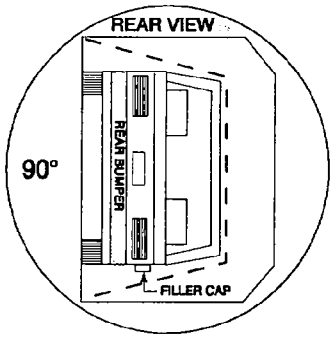
Table 10

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:

NHTSA Test No.:
MV0300





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time (Spec. Range = 1 to 3 minutes)	2	minutes	10	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	7	minutes	10	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 ounce	0 ounce	0 ounce	0 ounce

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

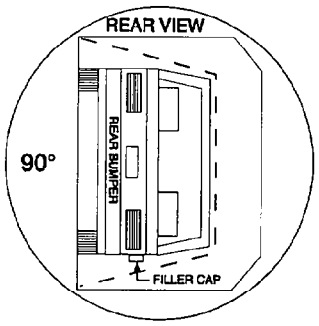
IV. SOLVENT SPILLAGE LOCATION(S): None

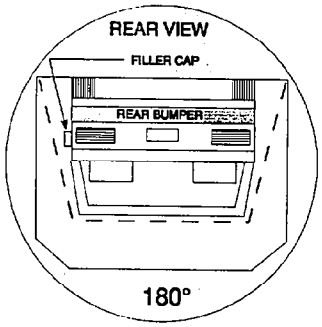
Table 10

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:

NHTSA Test No.:
MV0300





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time (Spec. Range = 1 to 3 minutes)	2	minutes	02	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	7	minutes	02	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 ounce	0 ounce	0 ounce	0 ounce

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

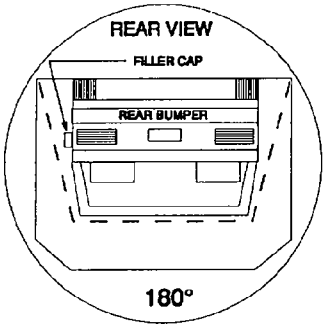
IV. SOLVENT SPILLAGE LOCATION(S): None

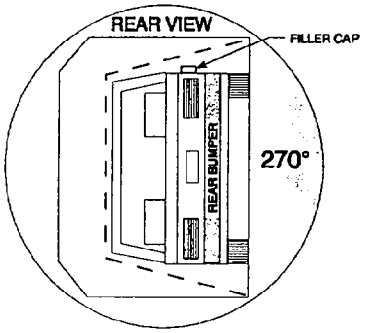
Table 10

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:

NHTSA Test No.:
MV0300





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time (Spec. Range = 1 to 3 minutes)	2	minutes	03	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	7	minutes	03	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 ounce	0 ounce	0 ounce	0 ounce

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

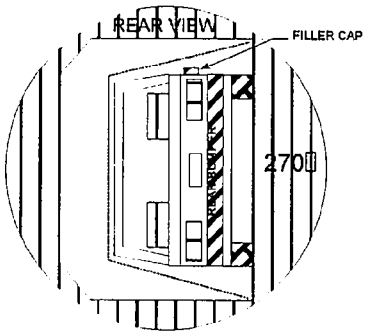
IV. SOLVENT SPILLAGE LOCATION(S): None

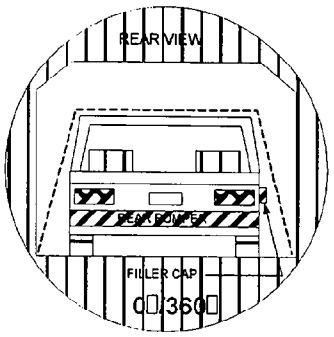
Table 10

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE: MV0300

NHTSA Test No.: _____





I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

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

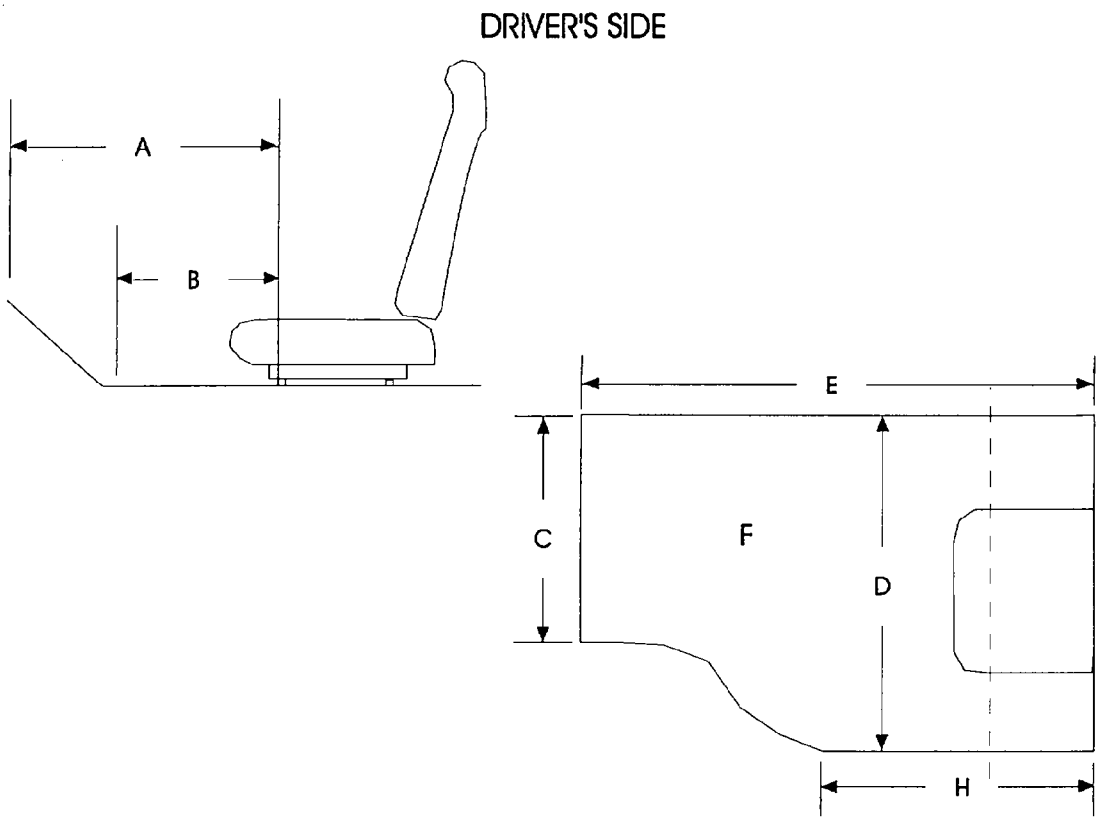
III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0 ounce	0 ounce	0 ounce	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

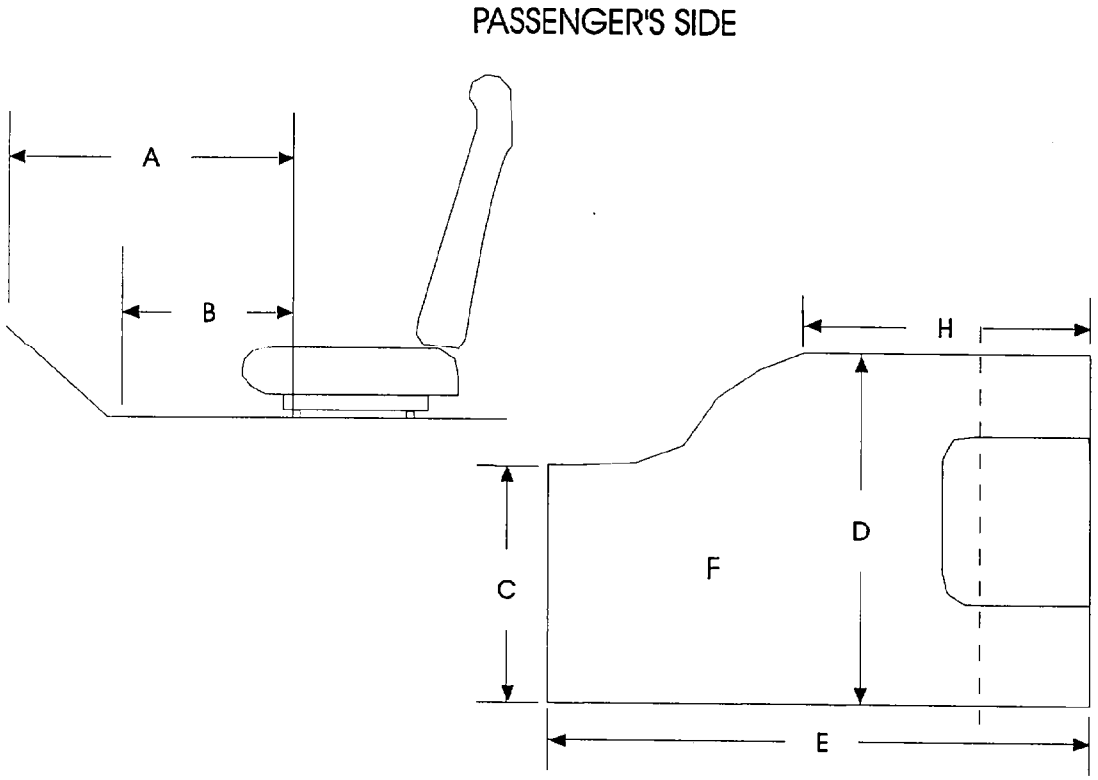


Measurement	Pre-Test	Post-Test	Difference
A	635	620	15
B	440	440	0
C	385	380	5
D	455	450	5
E	765	755	10
H	215	215	0
F $(cm)^2$	3095	3020	75

Units = mm

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

Figure 11
PASSENGER SIDE FLOORBOARD DEFORMATION

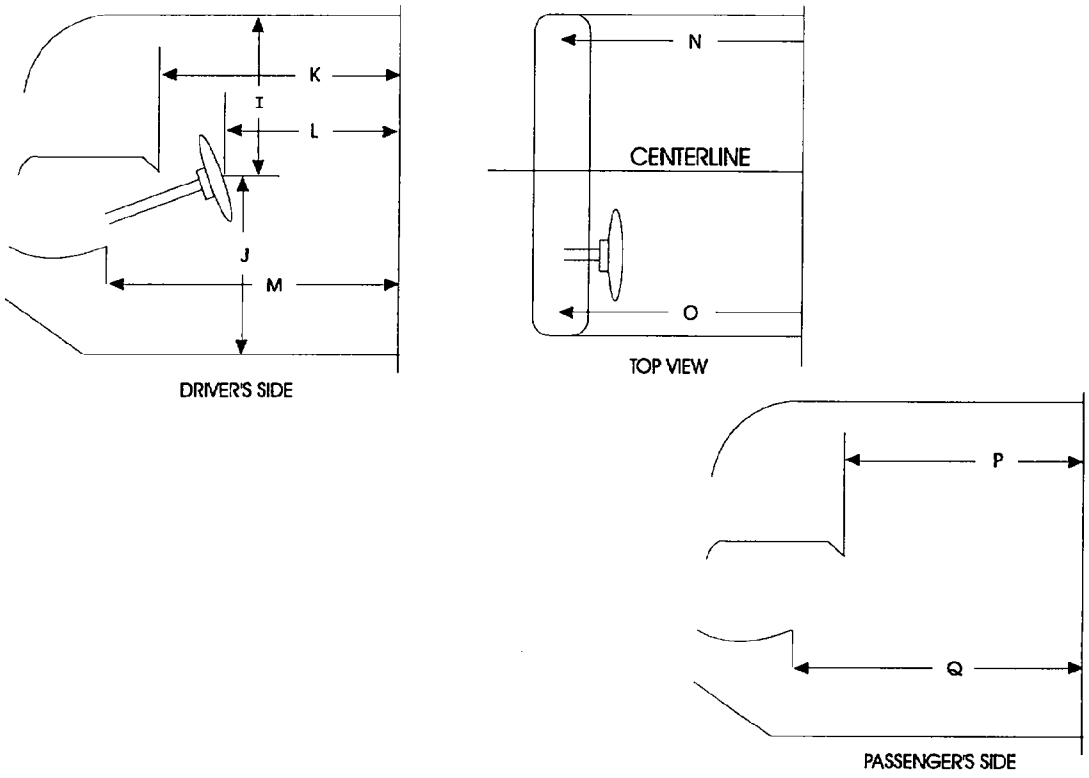


Measurement	Pre-Test	Post-Test	Difference
A	700	685	15
B	535	535	0
C	360	365	-5
D	500	500	0
E	850	850	0
H	205	210	-5
F $(cm)^2$	3347	3386	-39

Units = mm

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

Figure 12
INTERIOR DEFORMATION

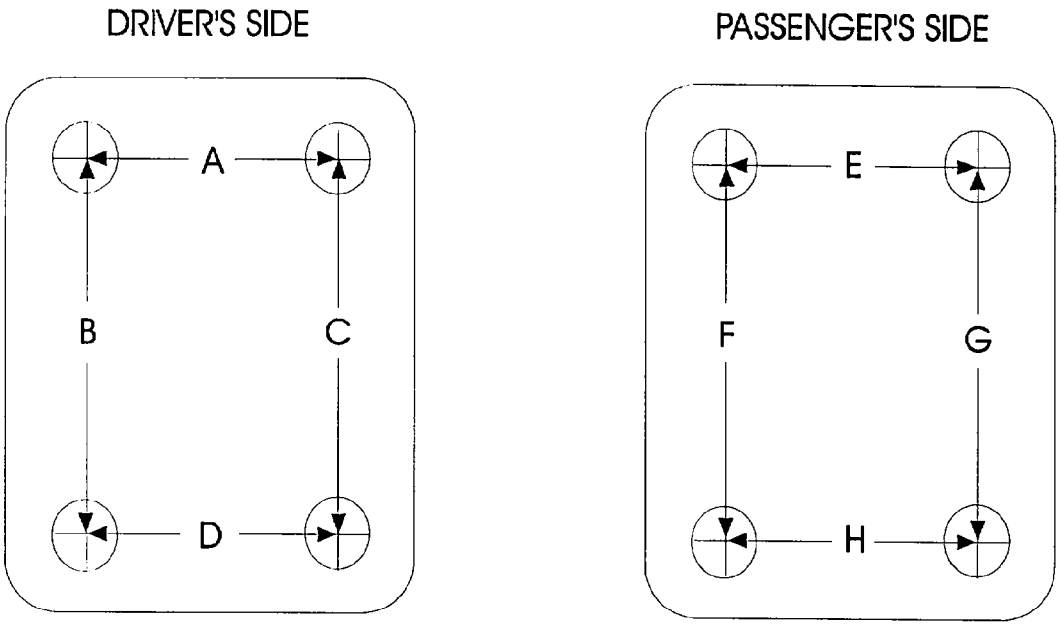


Measurements referenced from rear seat bolt.

Measurement	Pre-Test	Post-Test	Difference
I	540	415	125
J	695	860	-165
K	1460	1495	-35
L	1235	1290	-55
M	1470	1495	-25
N	1490	1540	-50
O	1485	1520	-35
P	1470	1540	-70
Q	1470	1514	-44

Units = mm

Figure 13
FLOORBOARD DEFORMATION



Measurement	Pre-Test	Post-Test	Difference
A	220	210	10
B	457	470	-13
C	432	415	17
D	198	245	-47
E	191	190	1
F	374	350	24
G	490	460	30
H	305	309	-4

Units = mm

Appendix A

PHOTOGRAPHS

PHOTOGRAPHS

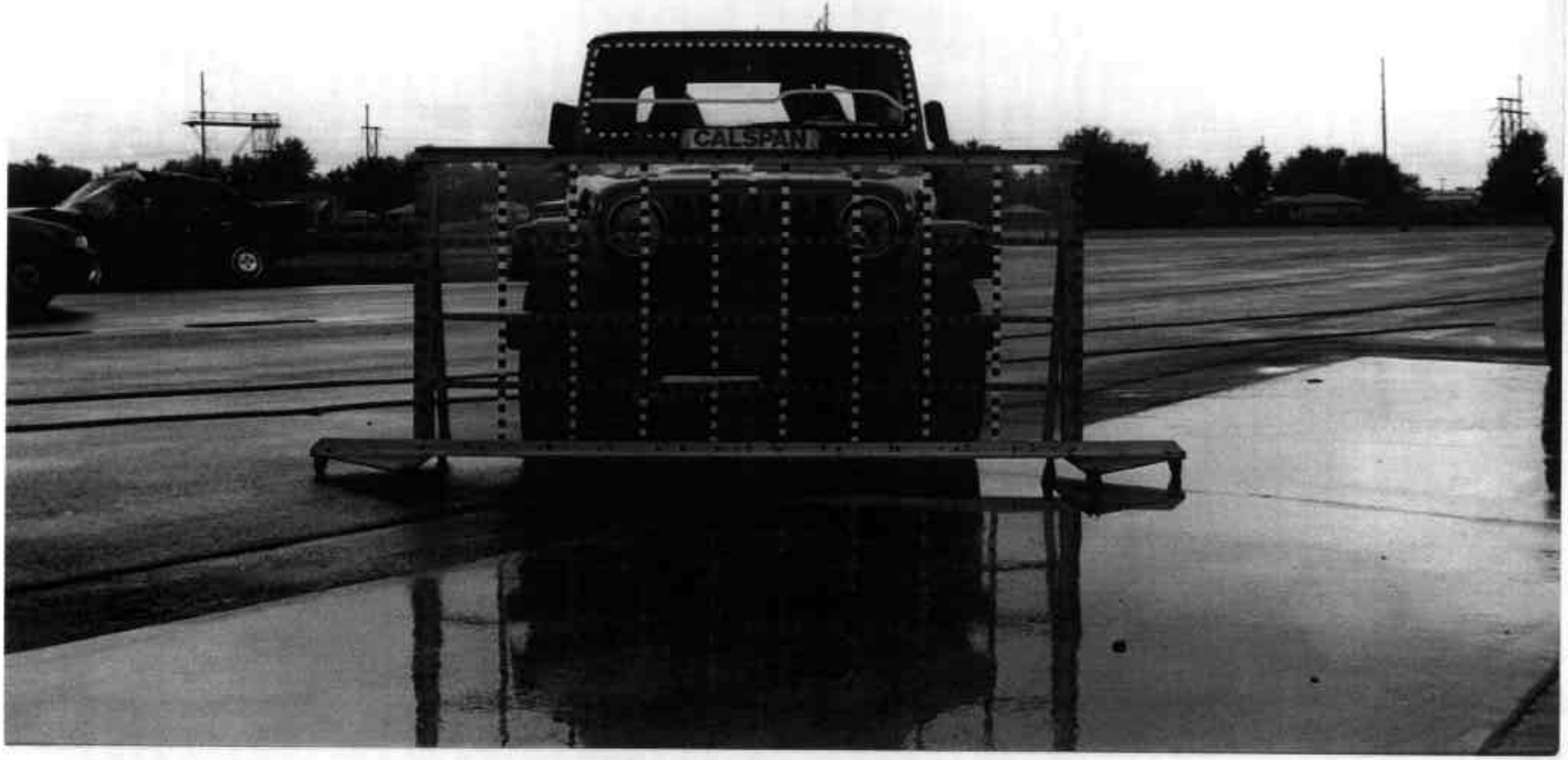


Figure A-1 LOAD CELL LOCATIONS

8313-13

Figure A-2 PRE-TEST FRONT VIEW

Figure A-3 POST-TEST FRONT VIEW

Figure A-4 PRE-TEST LEFT SIDE VIEW

Figure A-5 POST-TEST LEFT SIDE VIEW

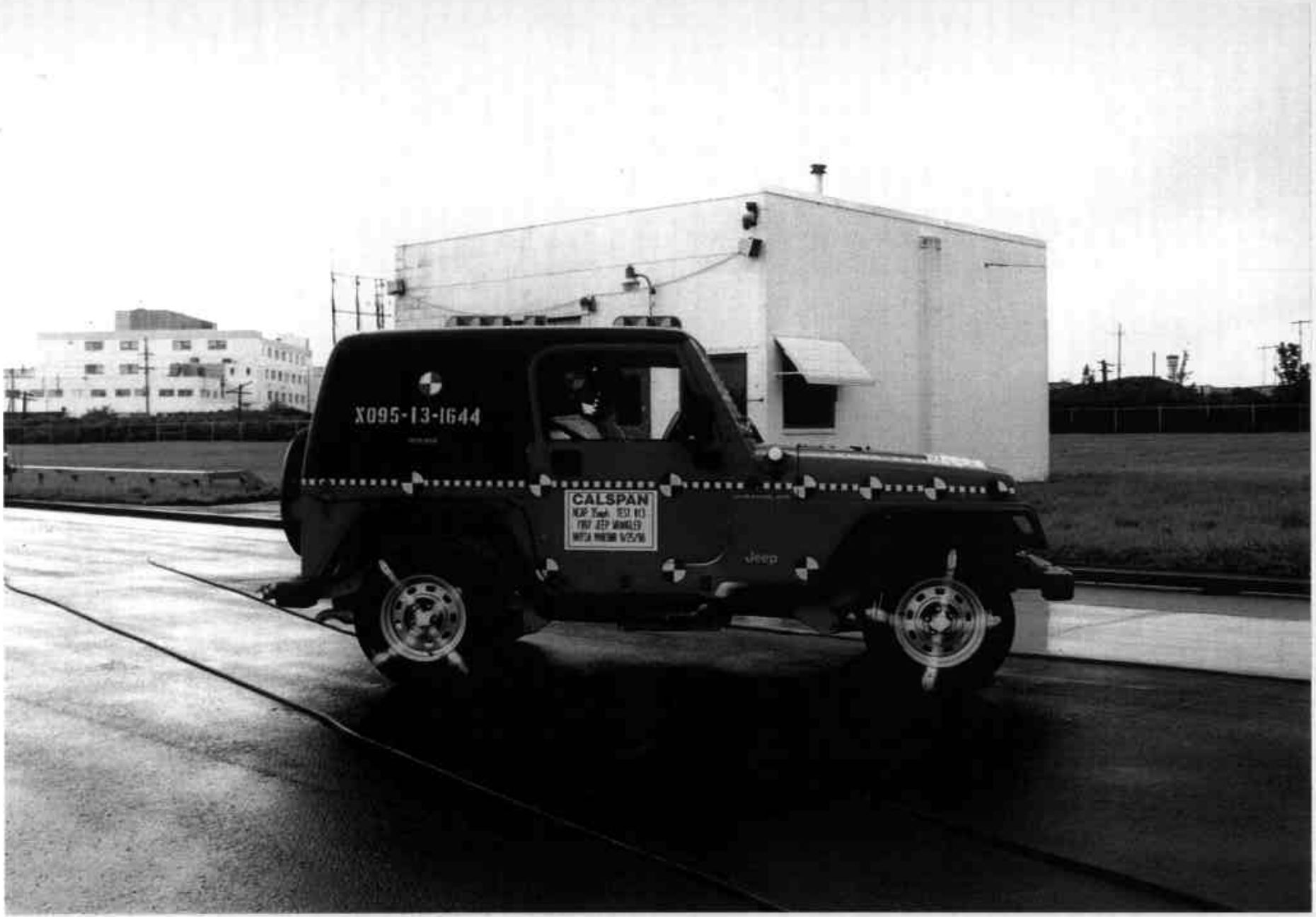


Figure A-6 PRE-TEST RIGHT SIDE VIEW

Figure A-7 POST-TEST RIGHT SIDE VIEW

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

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

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

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

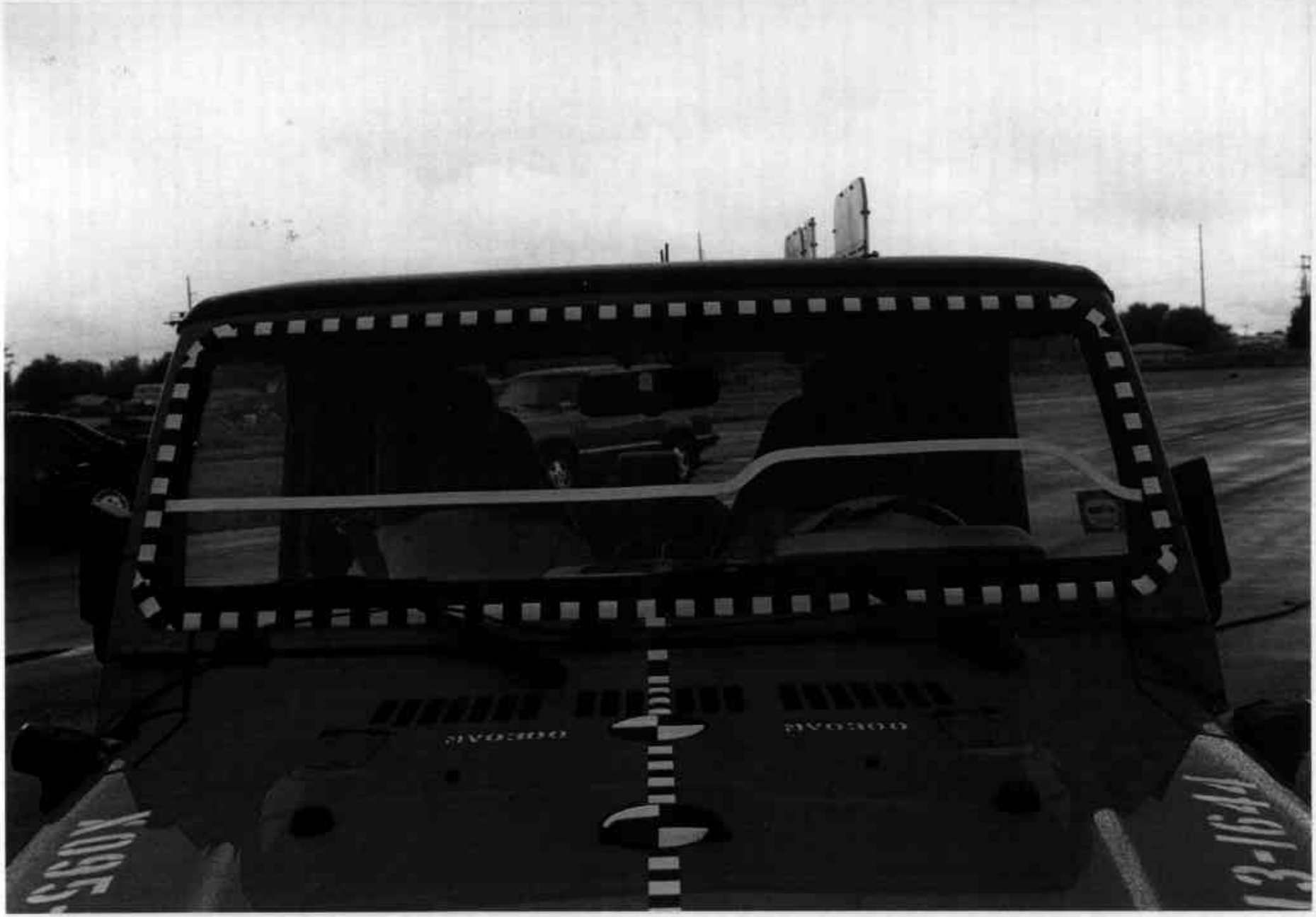


Figure A-12 PRE-TEST WINDSHIELD VIEW

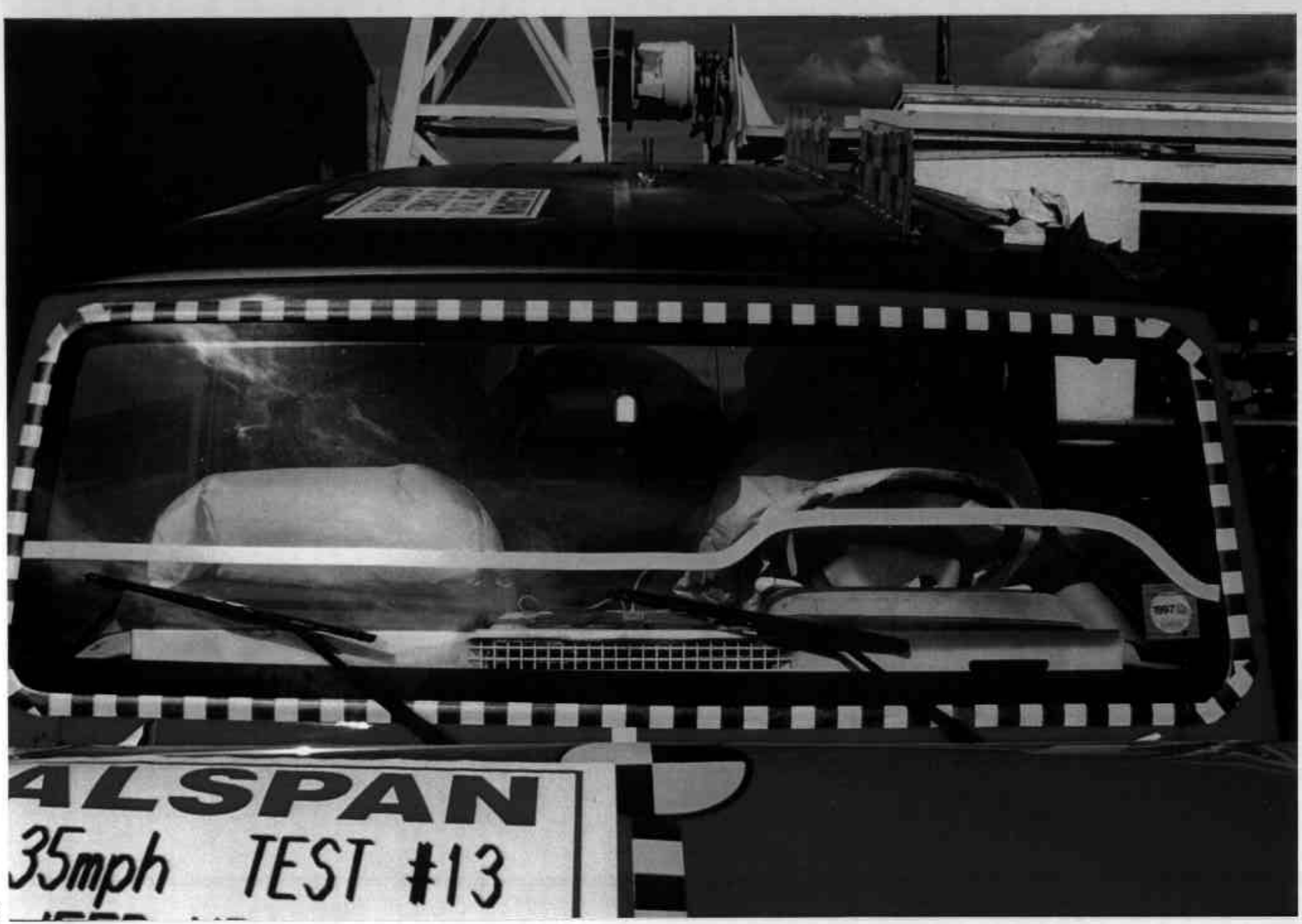


Figure A-13 POST-TEST WINDSHIELD VIEW

8313-13

Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

Figure A-15 FUEL CAP VIEW

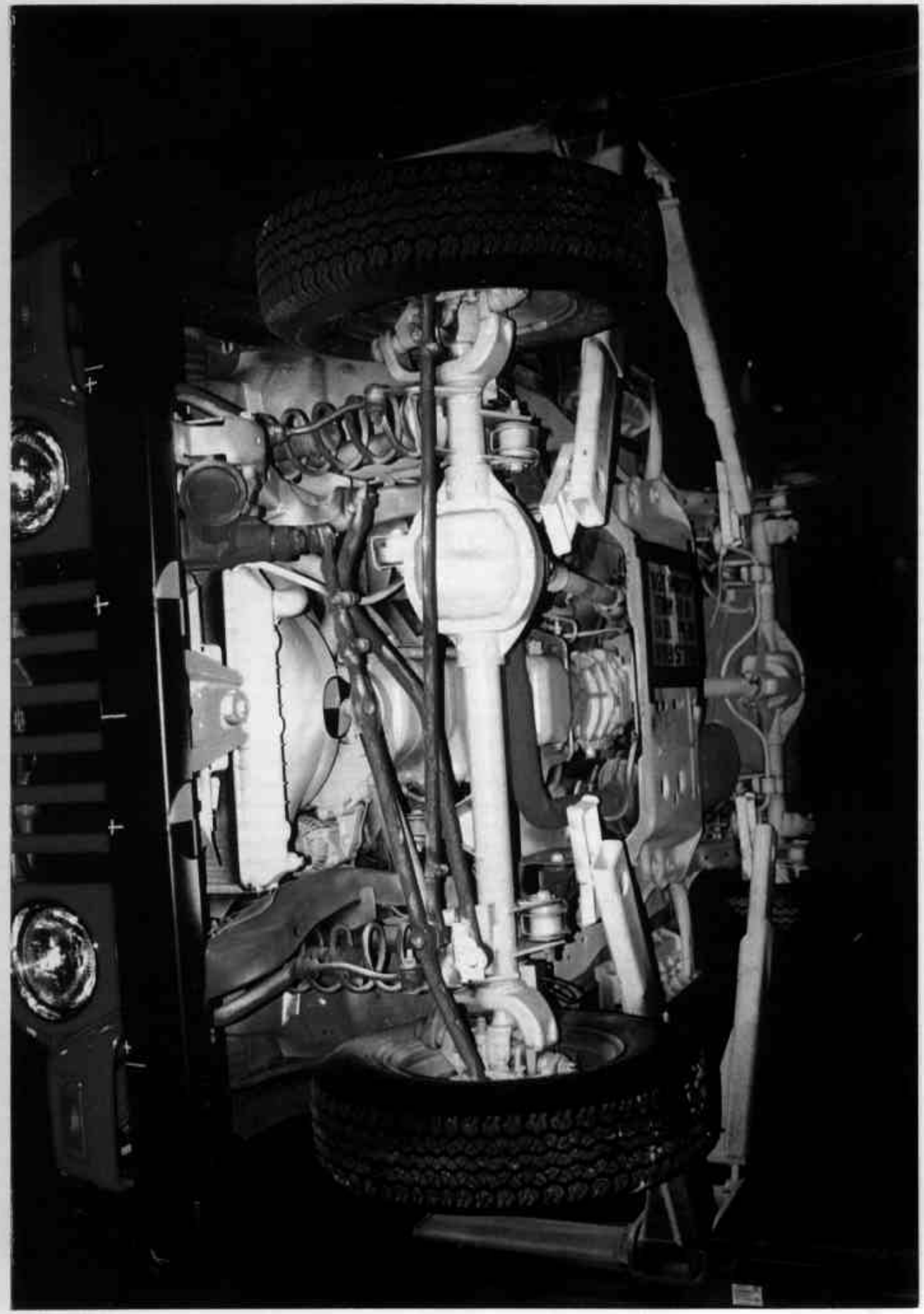


Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

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

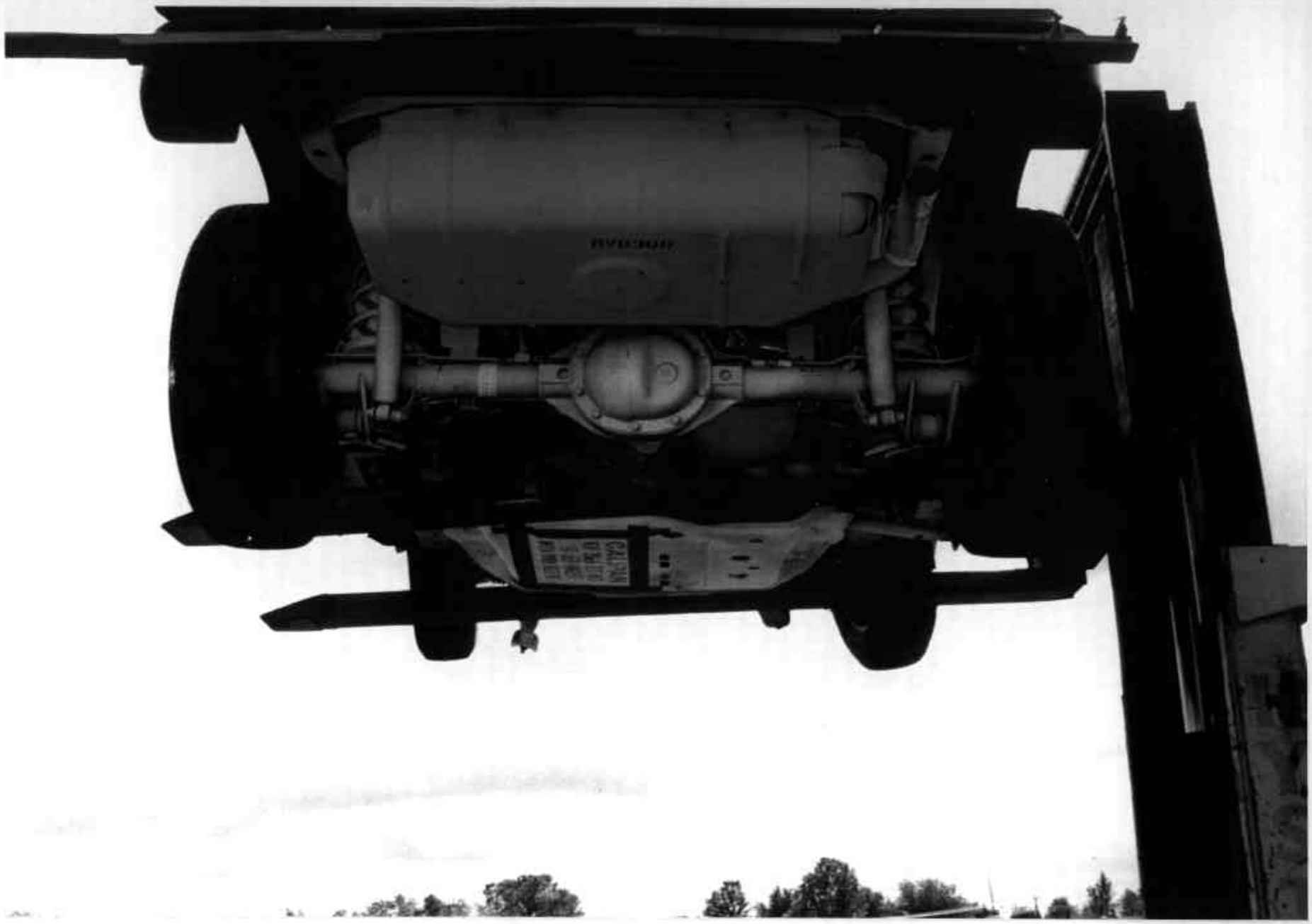


Figure A-21 POST-TEST REAR UNDERBODY VIEW

Figure A-22 PRE-TEST DRIVER POSITION VIEW

Figure A-23 POST-TEST DRIVER POSITION VIEW

Figure A-24 PRE-TEST PASSENGER POSITION VIEW

Figure A-25 POST-TEST PASSENGER POSITION VIEW

Figure A-26 PRE-TEST DRIVER AND INTERIOR VIEW

Figure A-27 POST-TEST DRIVER AND INTERIOR VIEW

8313-13

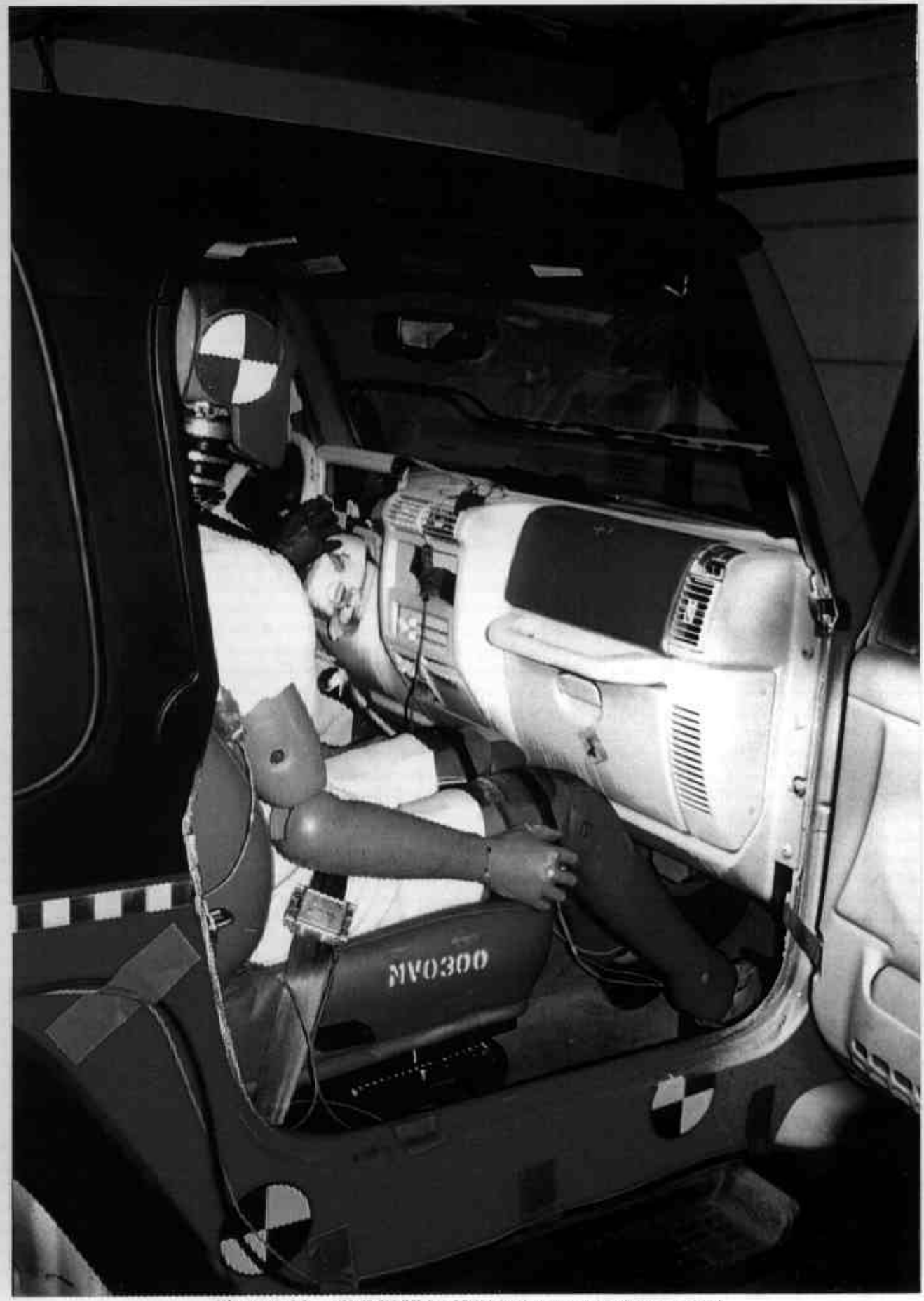


Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW

Figure A-29 POST-TEST PASSENGER AND INTERIOR VIEW

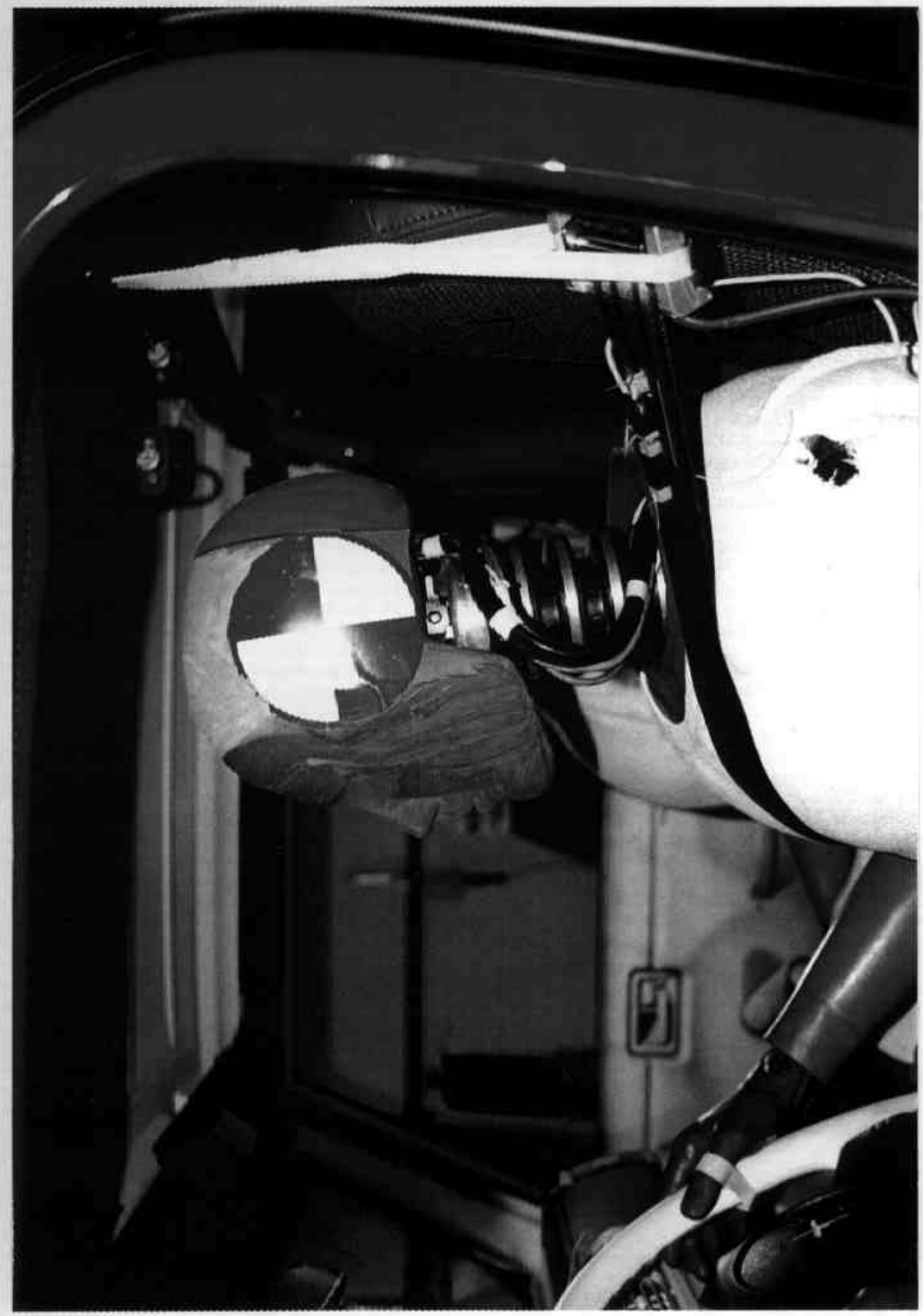


Figure A-30 PRE-TEST DRIVER HEAD LOCATION

Figure A-31 POST-TEST DRIVER HEAD LOCATION

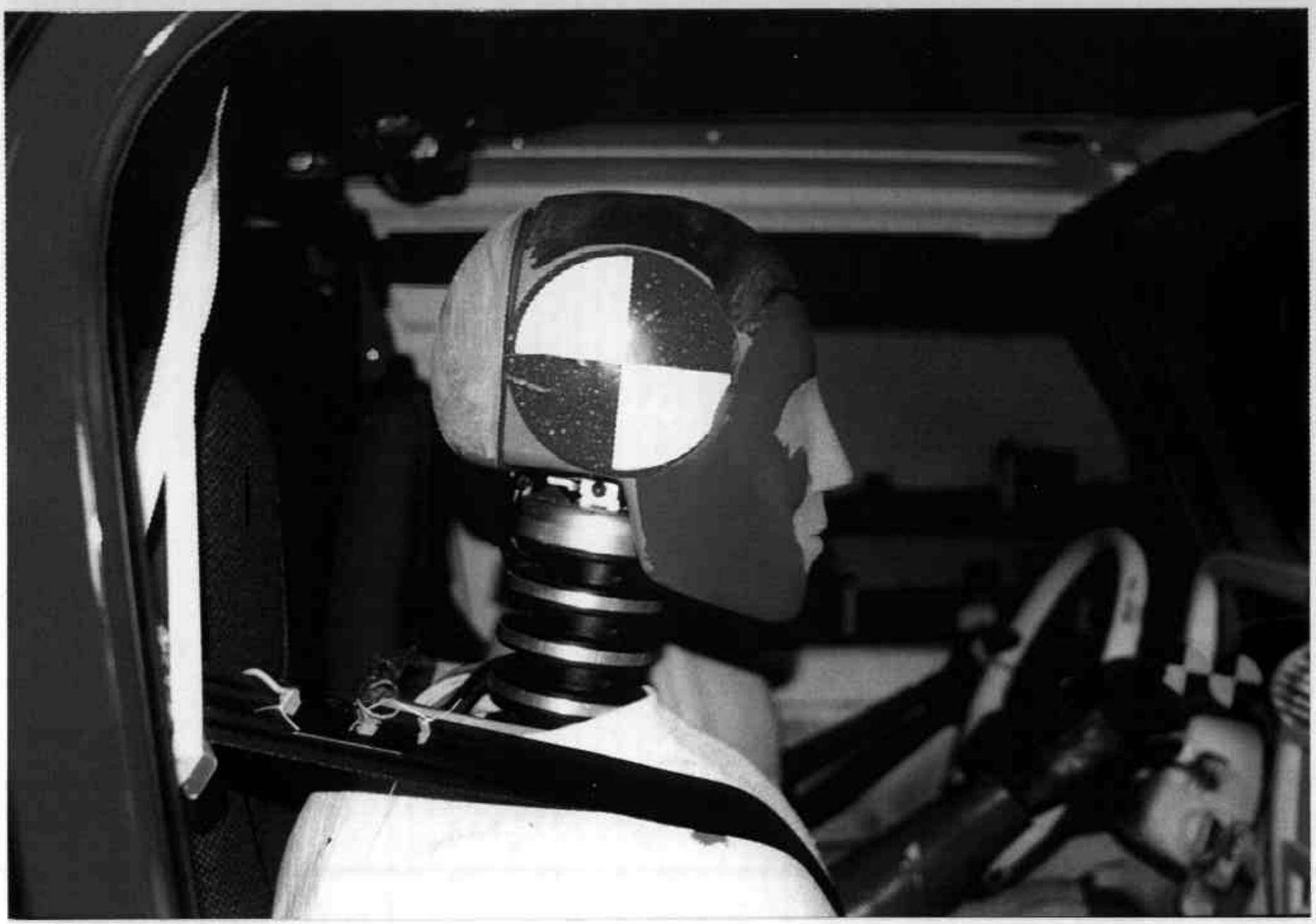


Figure A-32 PRE-TEST PASSENGER HEAD LOCATION

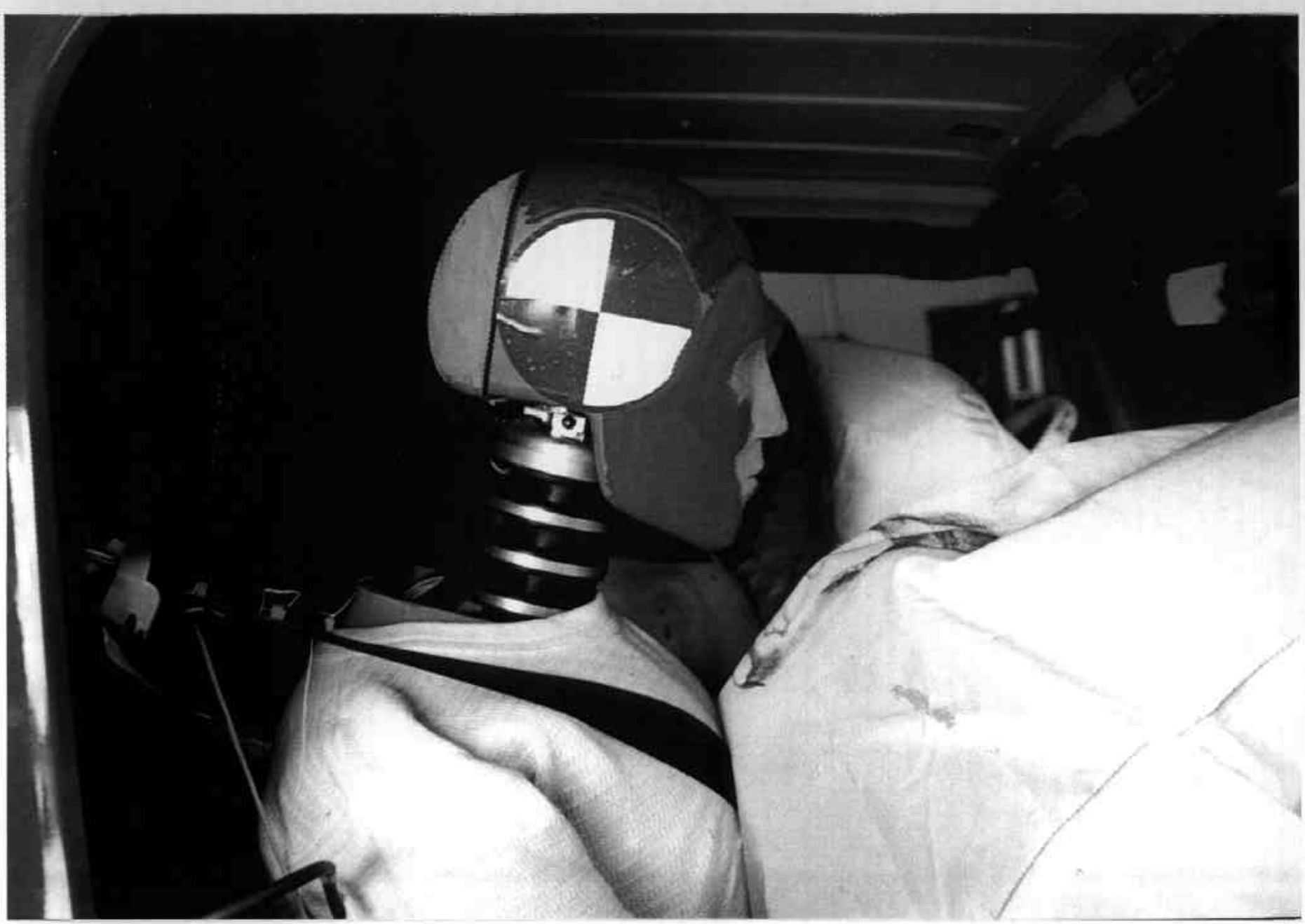


Figure A-33 POST-TEST PASSENGER HEAD LOCATION

Figure A-34 PRE-TEST DRIVER FLOOR PAN VIEW

Figure A-35 POST-TEST DRIVER FLOOR PAN VIEW

Figure A-36 PRE-TEST PASSENGER FLOOR PAN VIEW

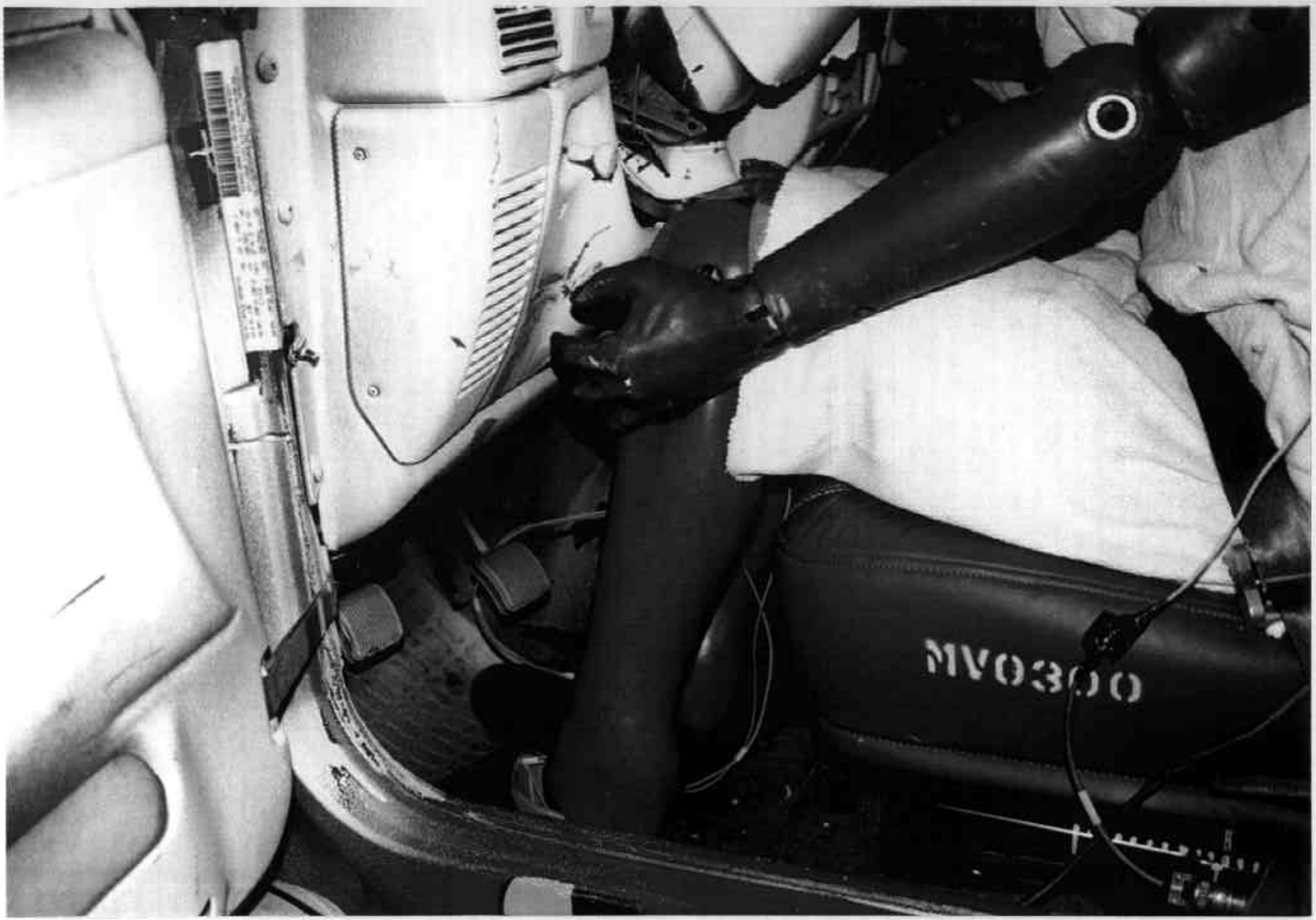


Figure A-37 POST-TEST PASSENGER FLOOR PAN VIEW

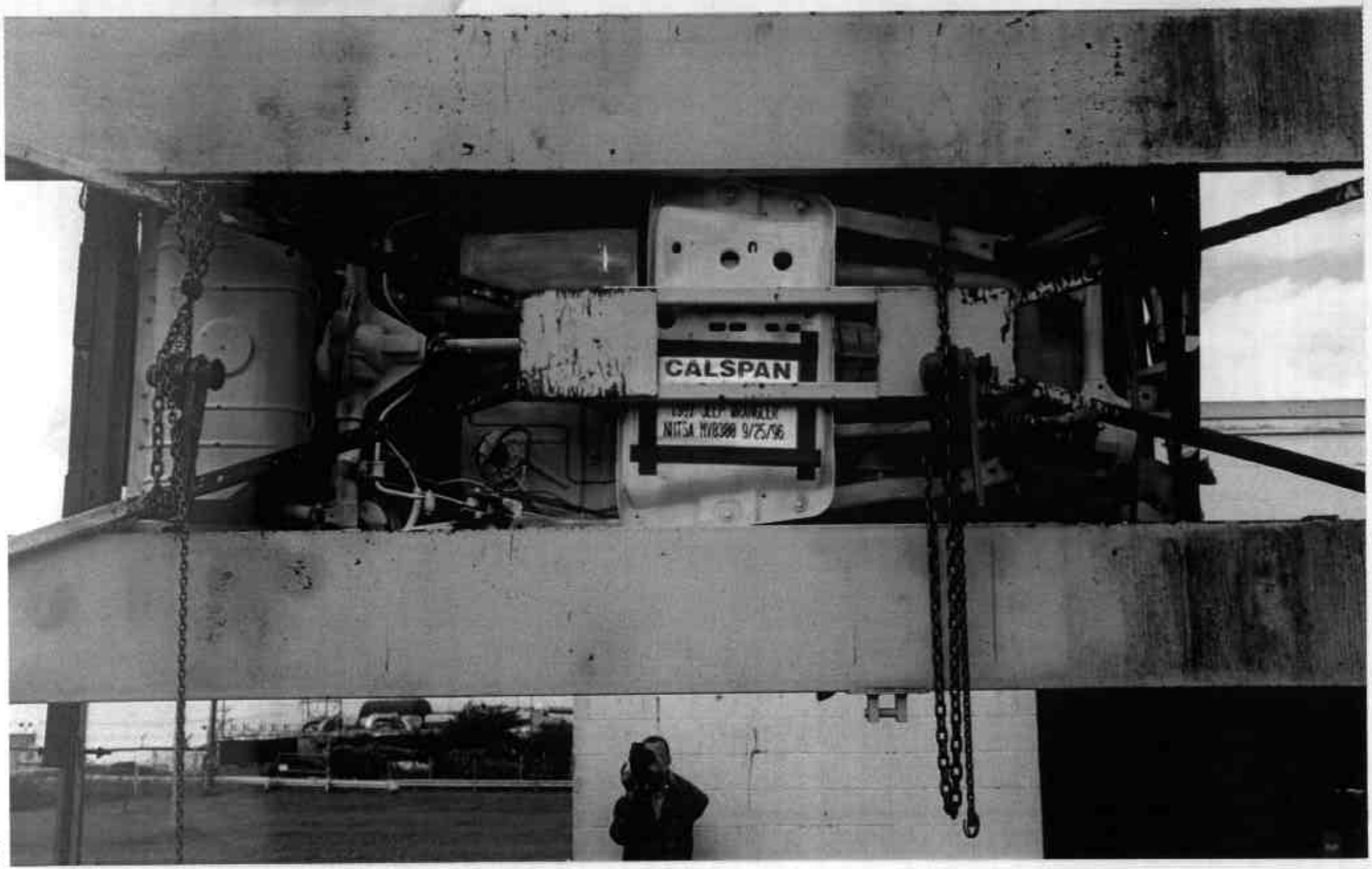


Figure A-38 ROLLOVER VIEW

8313-13

Figure A-39 IMPACT VIEW

Appendix B

DUMMY, VEHICLE AND LOAD CELL BARRIER RESPONSE DATA

NHTSA TEST NO. MV0300

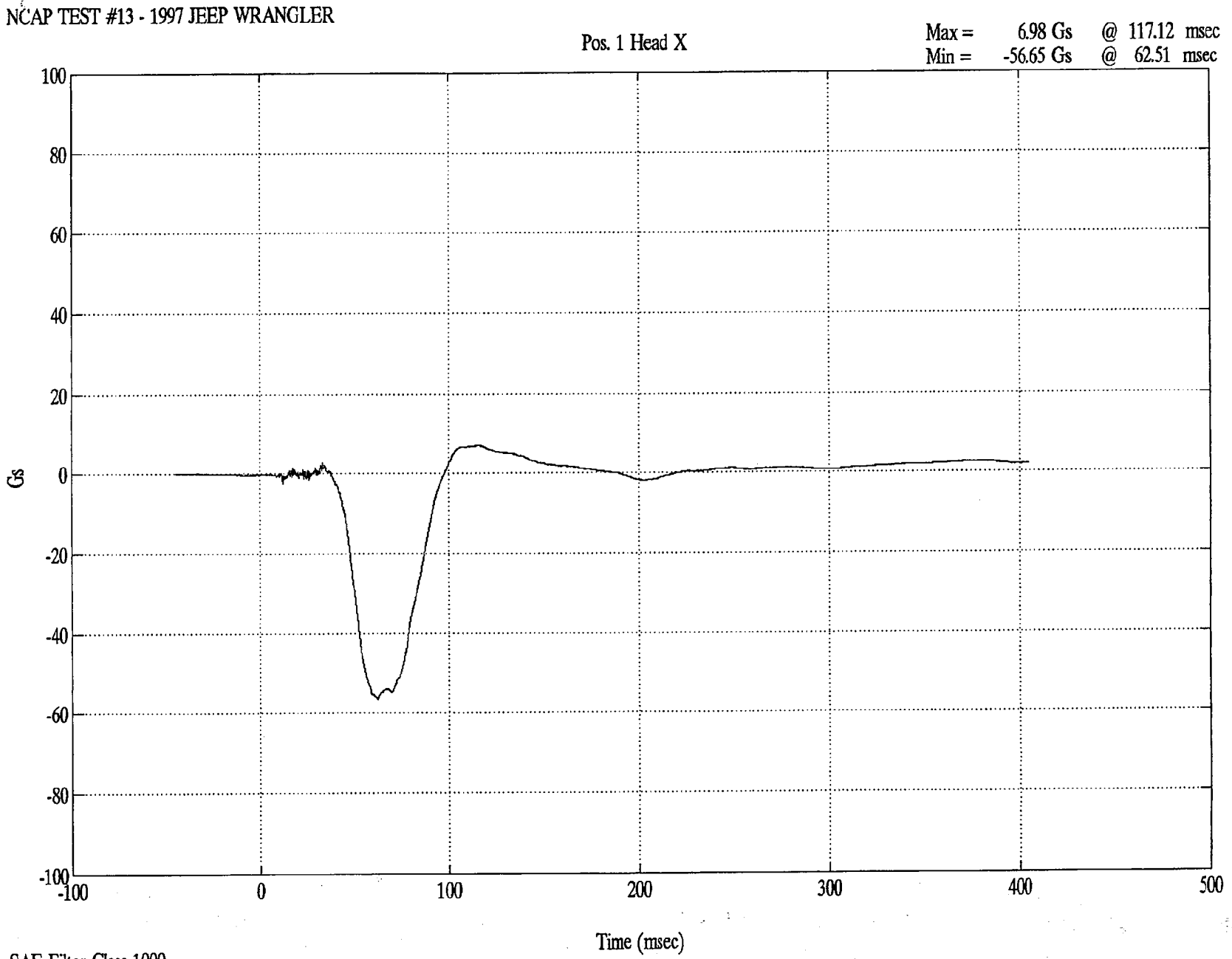
DUMMY DATA

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

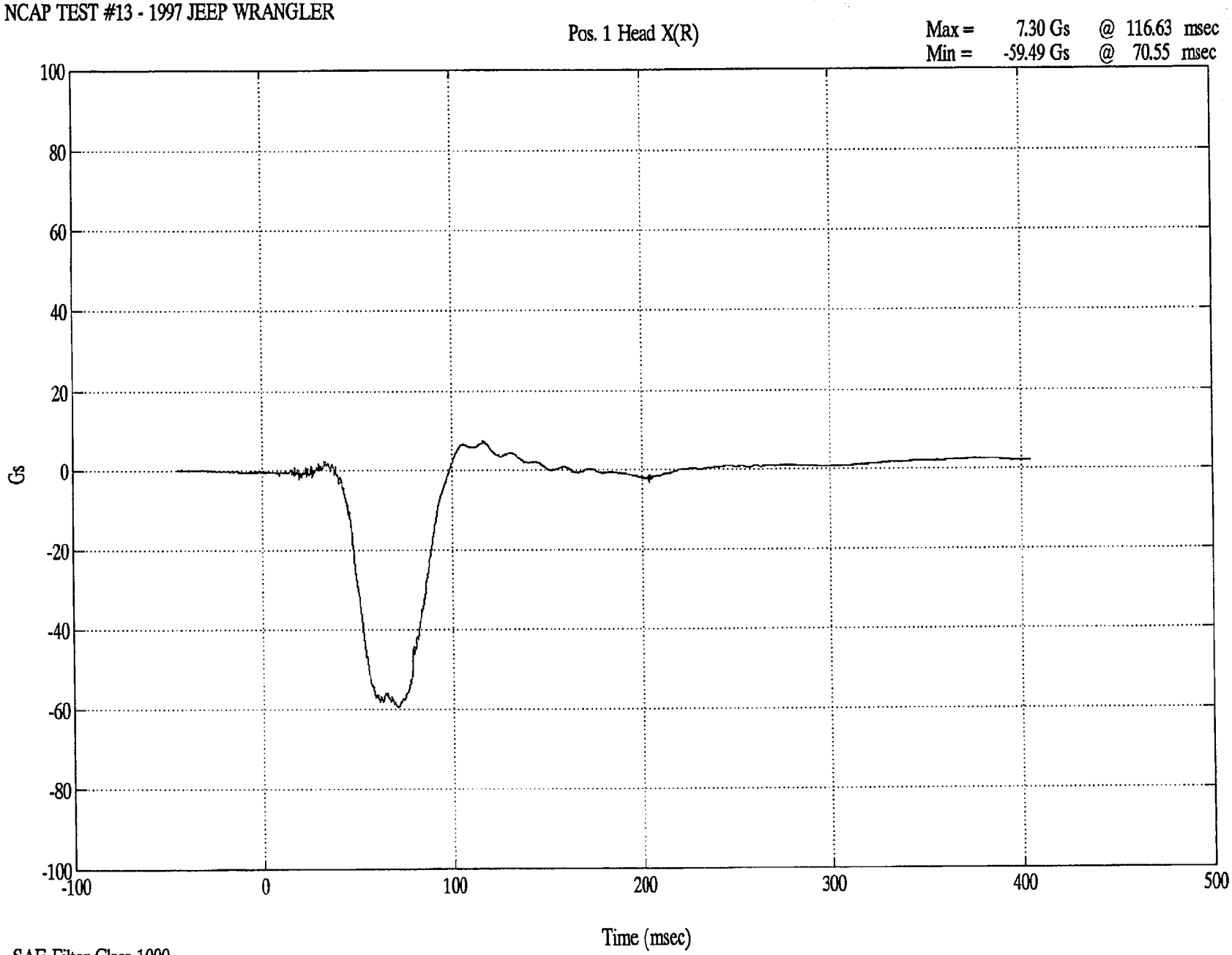
Transducer	DOT/NHTSA Sign Convention (positive unless noted)
Upper Neck Load Cell	Fx Head forward Fy Head left Fz Neck in tension Mx Right ear to right shoulder My Chin to chest (flexion) Mz Chin to left shoulder (look left)
Chest Displacement Potentiometer	Compression is negative
Pelvic Load Cell (Lower 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 #13 - 1997 JEEP WRANGLER



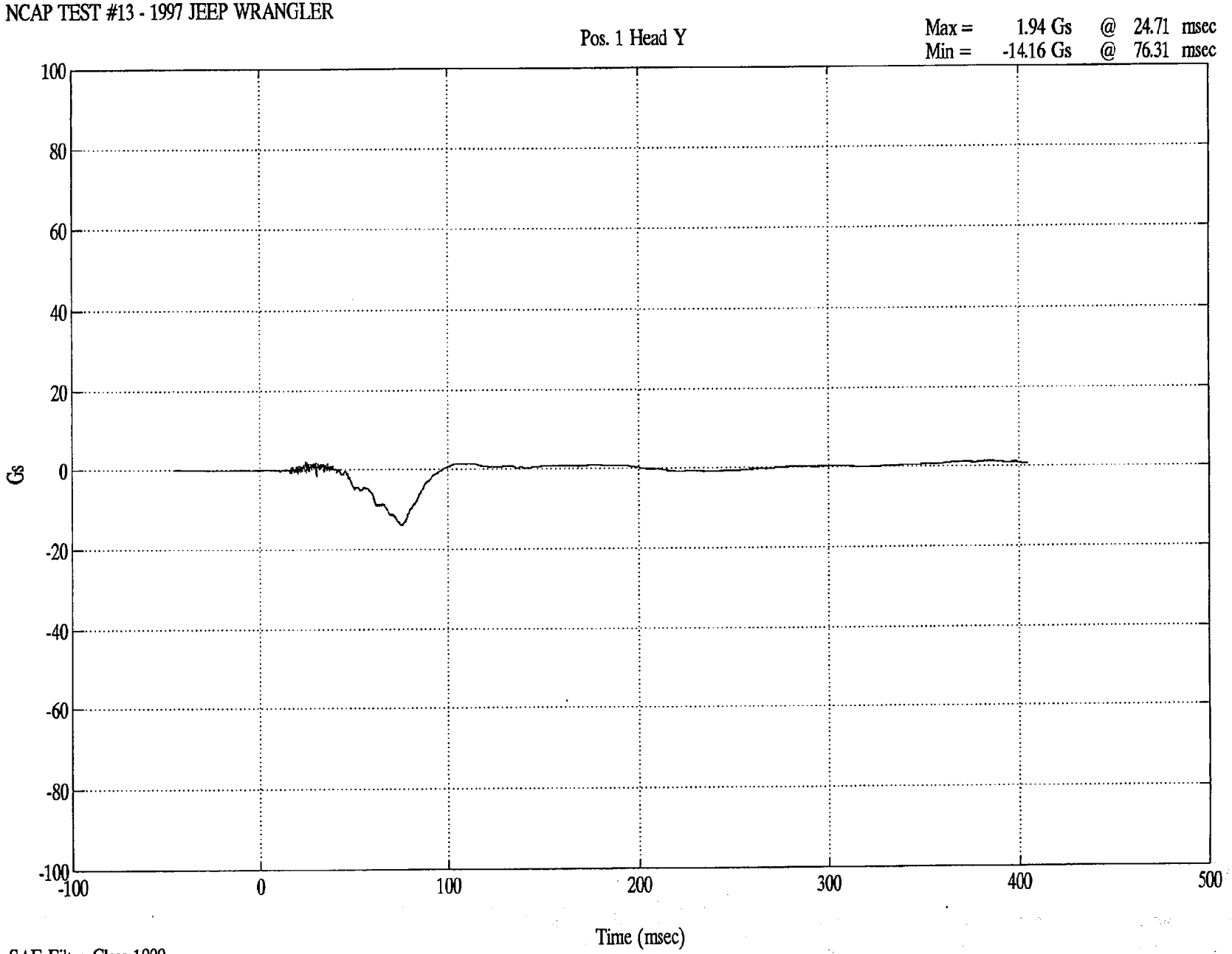
SAE Filter Class 1000

NCAP TEST #13 - 1997 JEEP WRANGLER



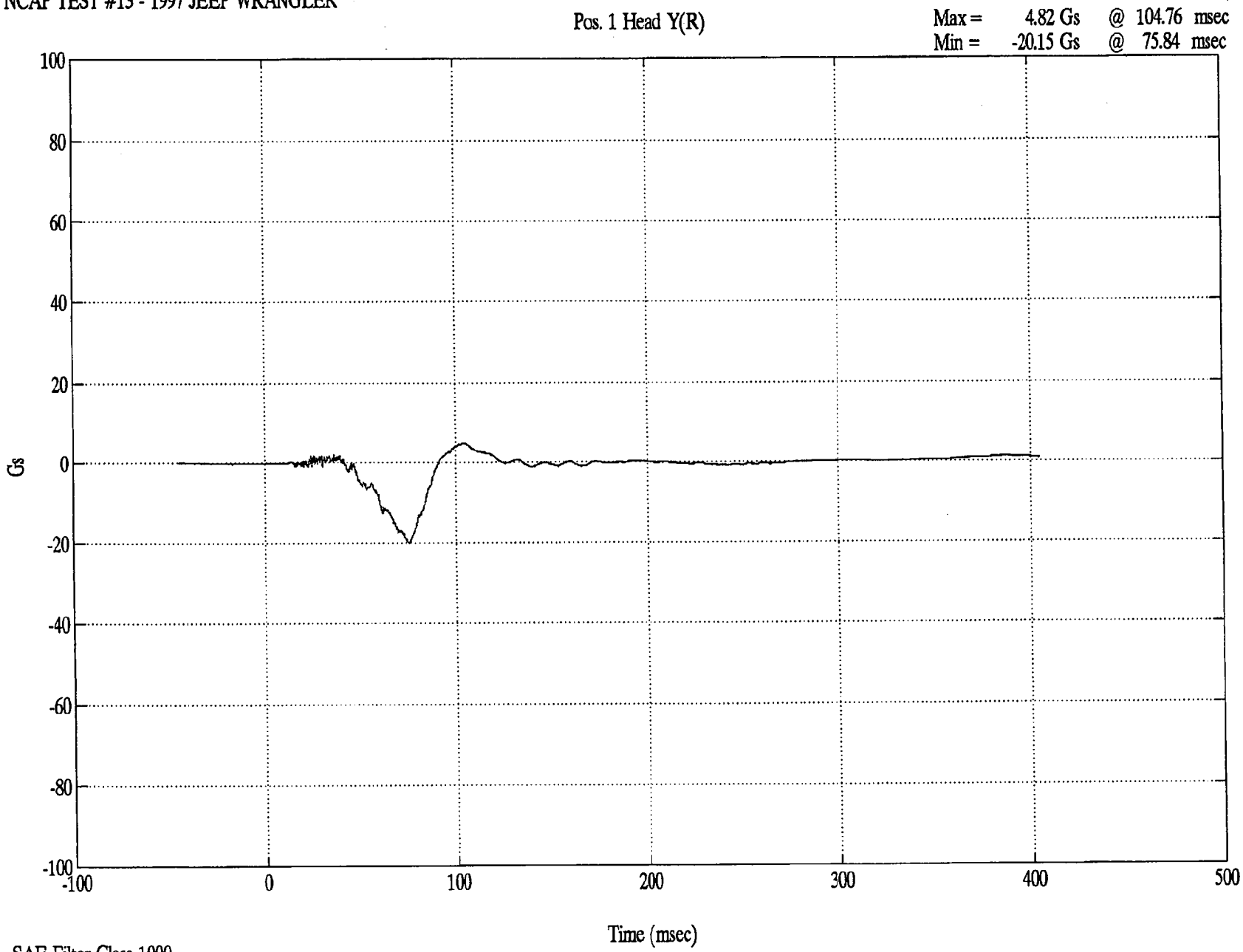
SAE Filter Class 1000

NCAP TEST #13 - 1997 JEEP WRANGLER



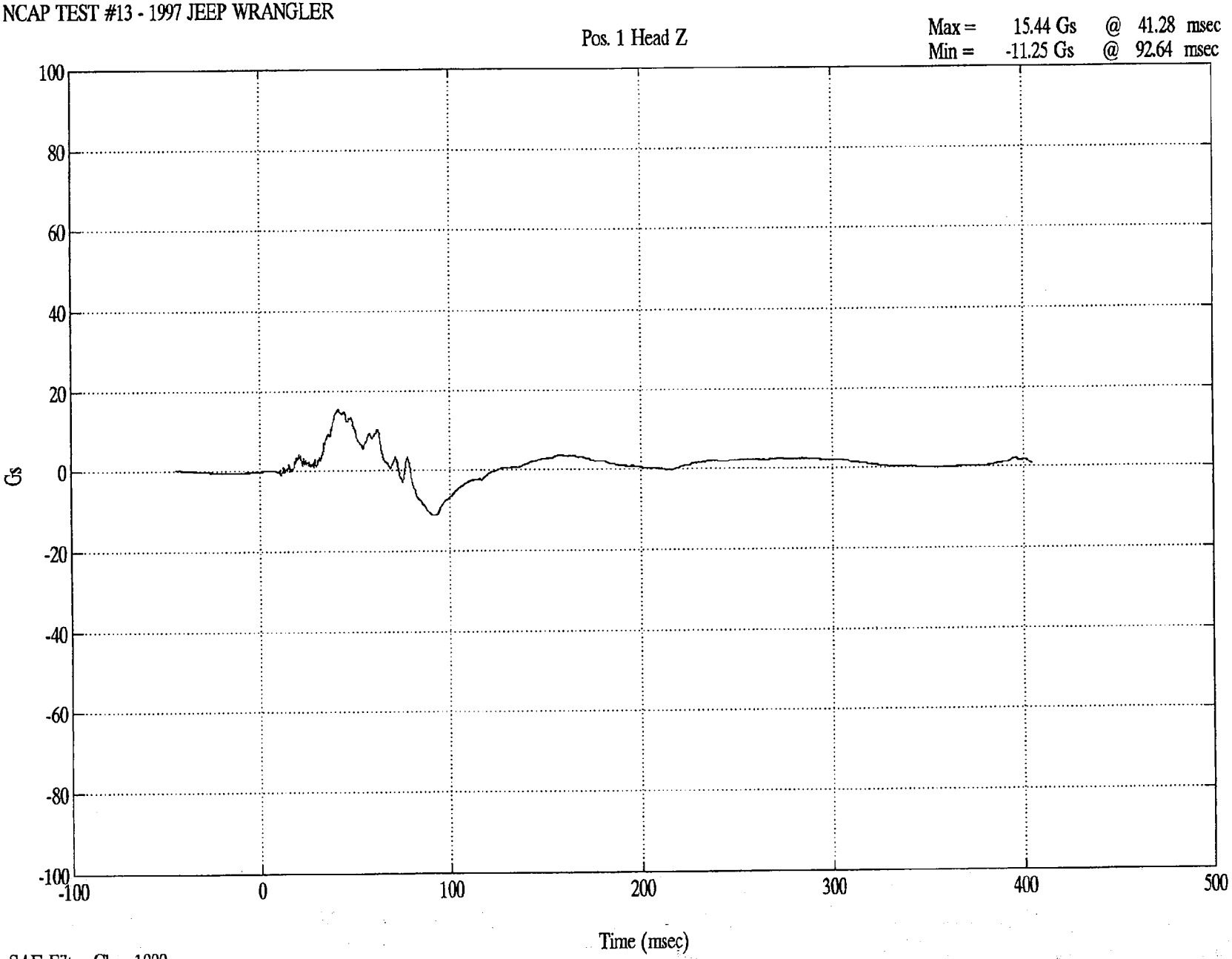
SAE Filter Class 1000

NCAP TEST #13 - 1997 JEEP WRANGLER



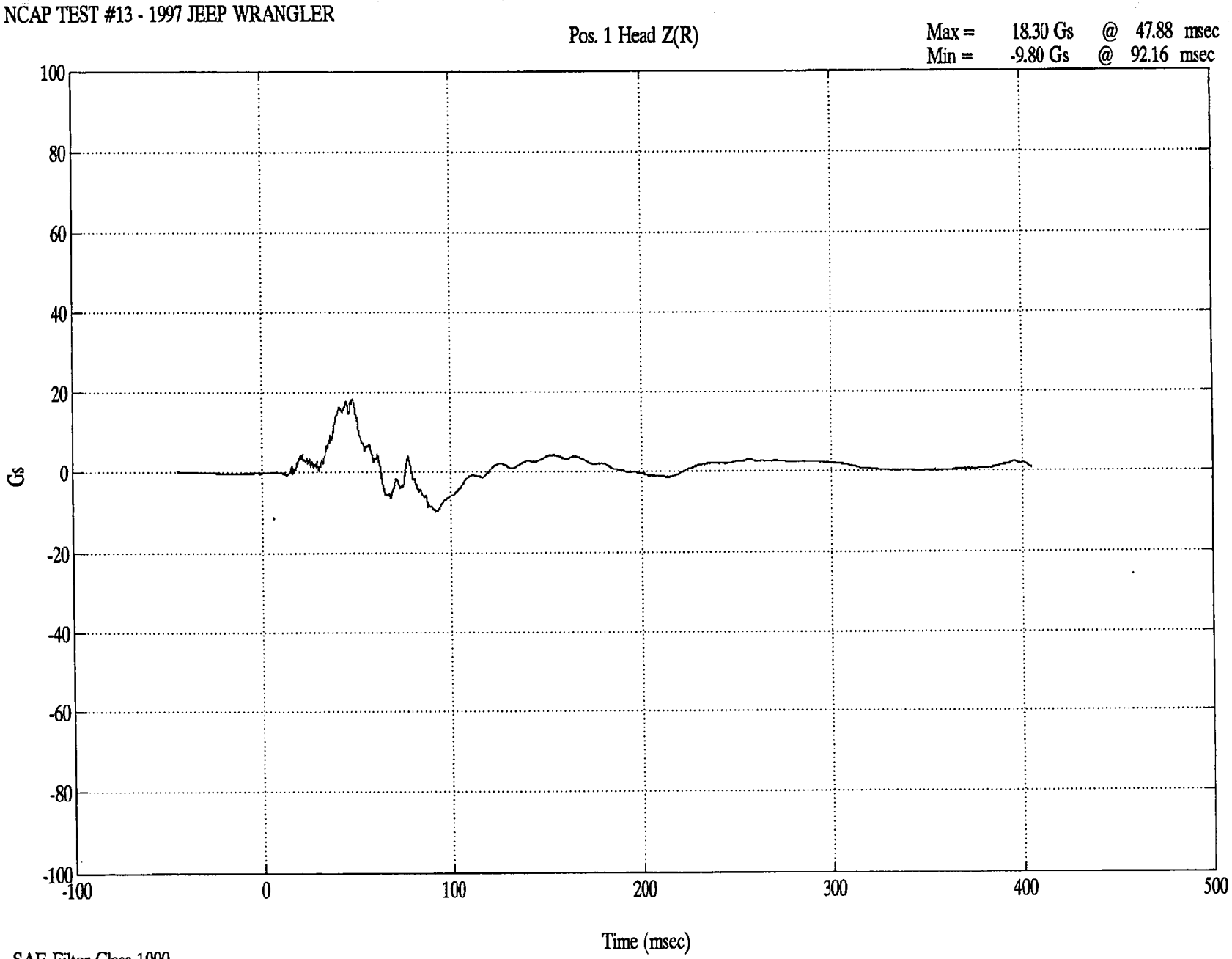
SAE Filter Class 1000

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

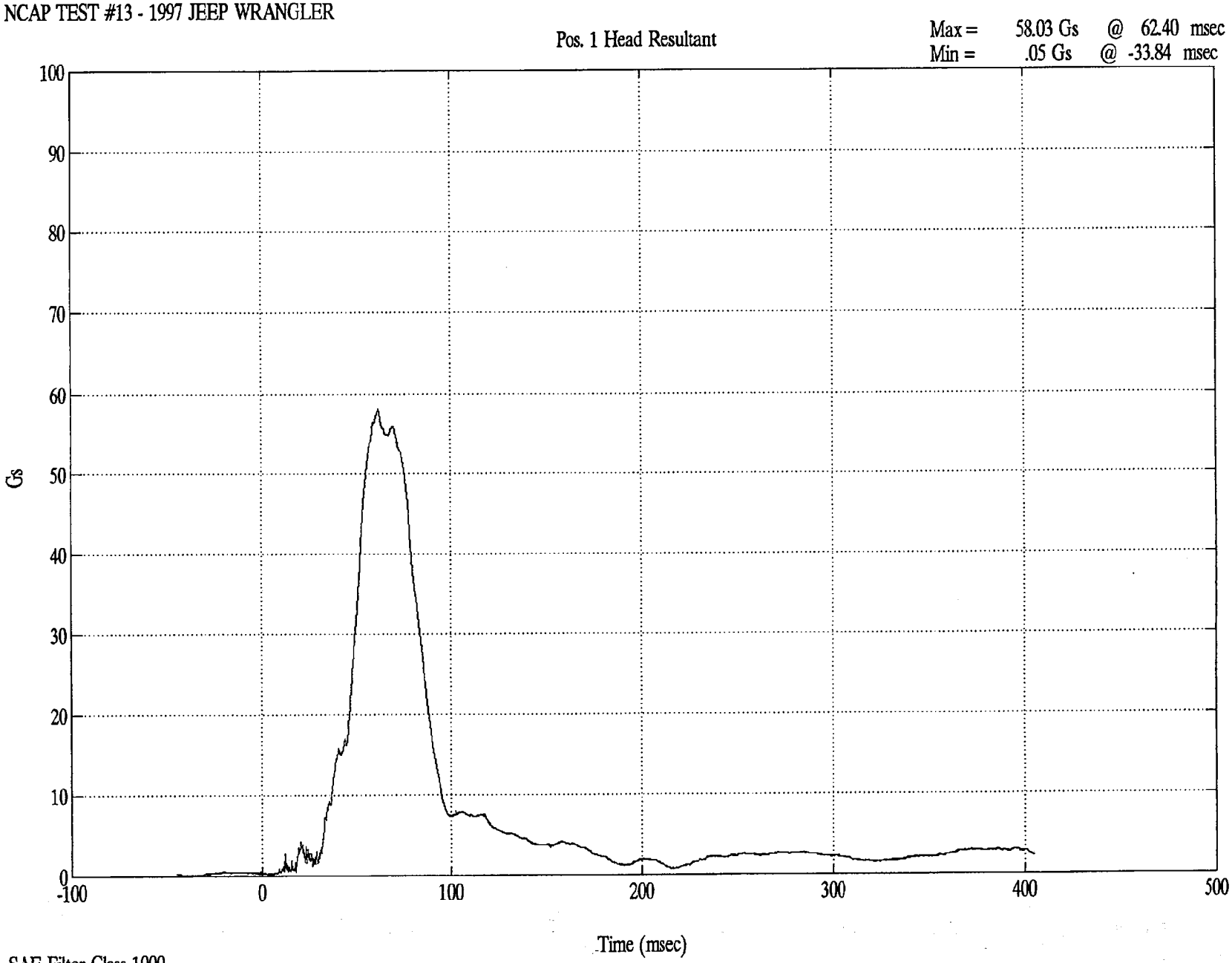
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

8313-13

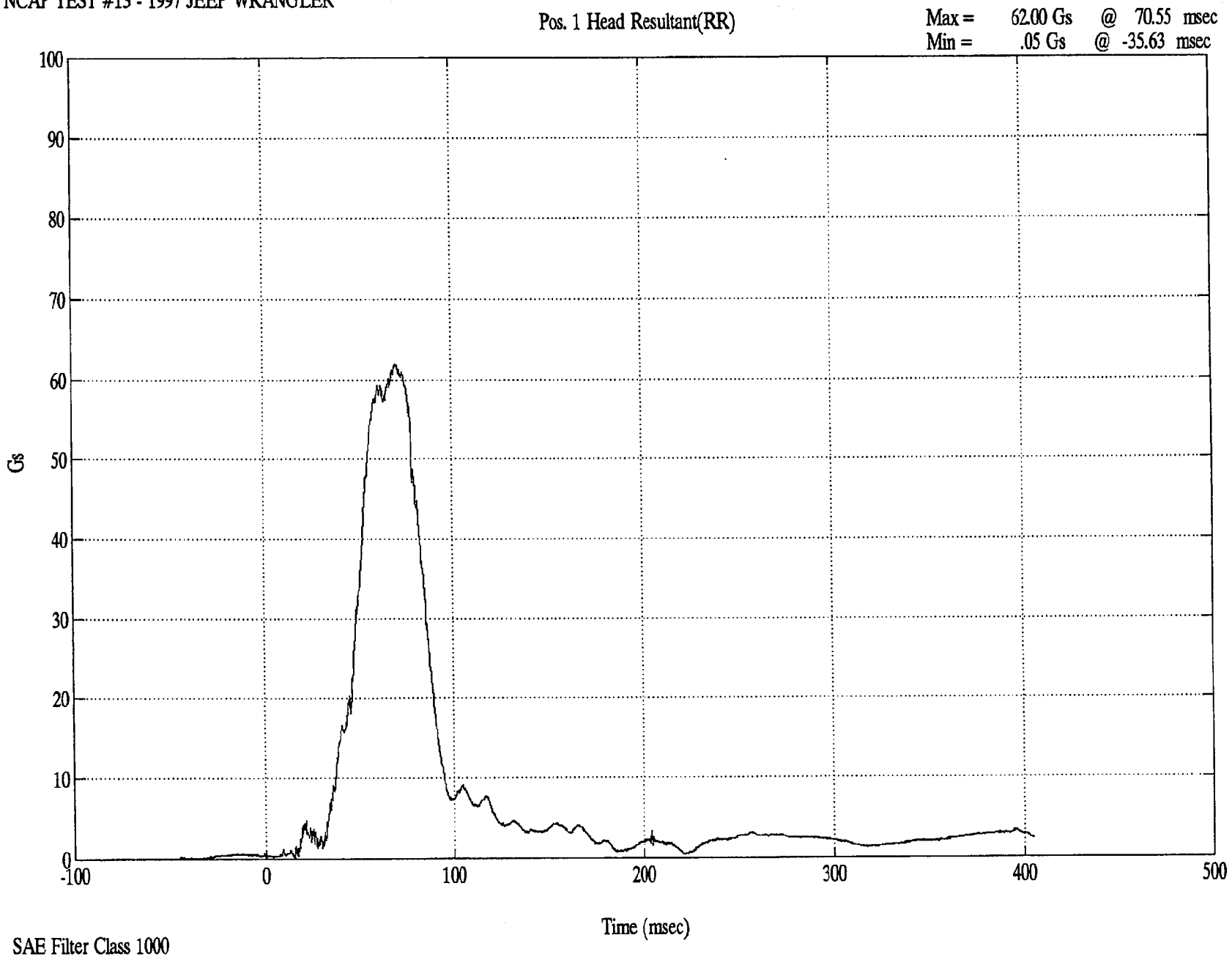
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

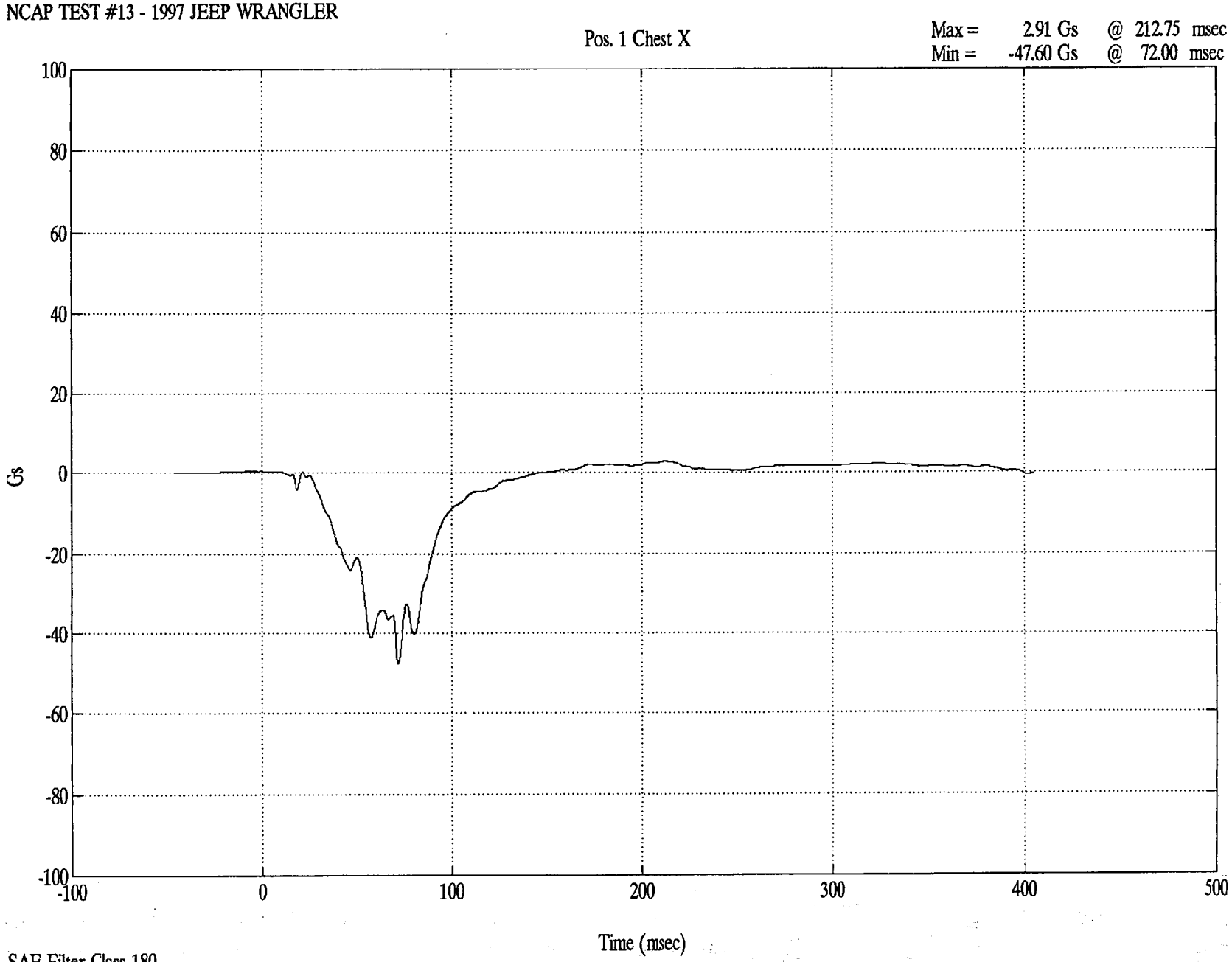
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



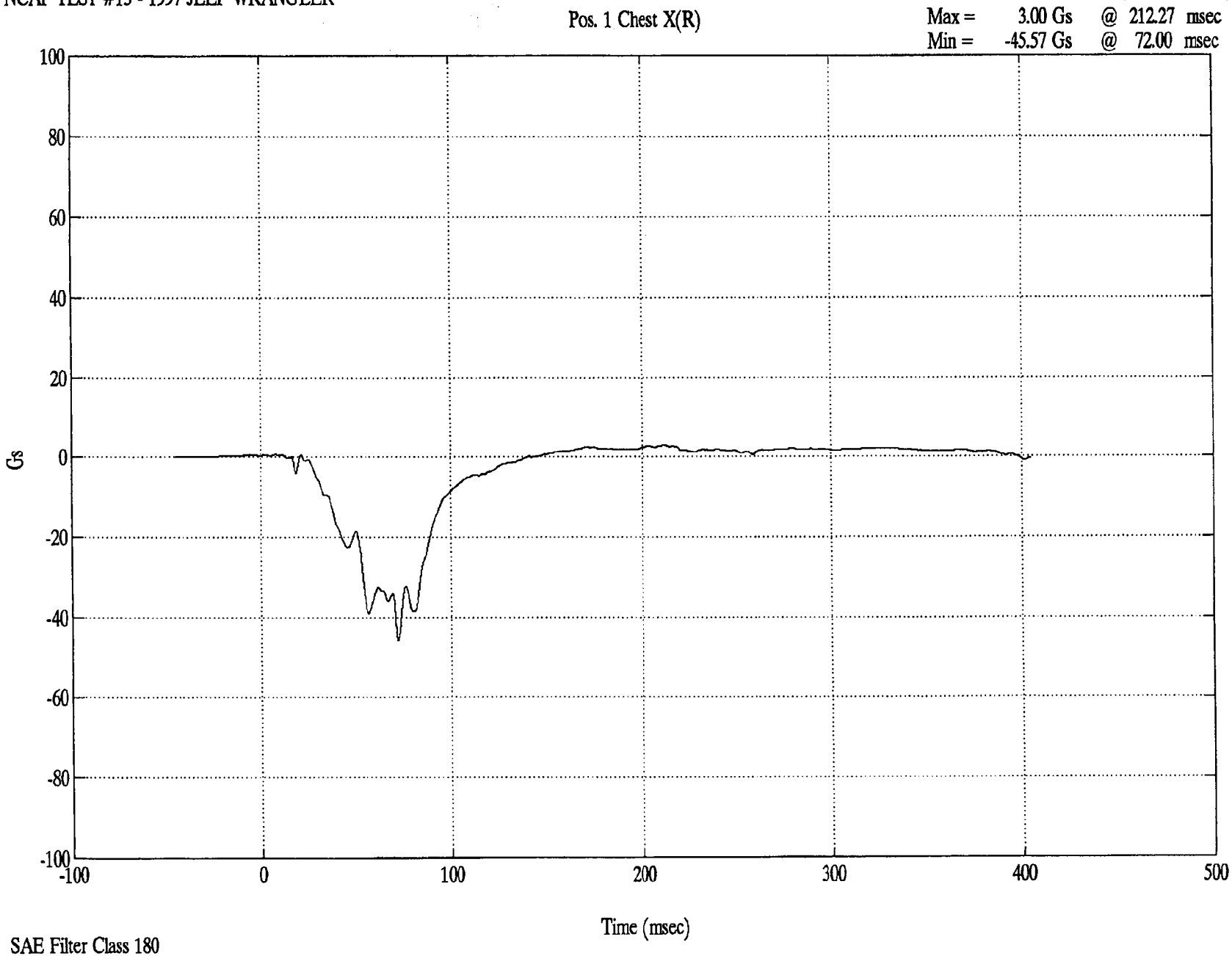
SAE Filter Class 1000

NCAP TEST #13 - 1997 JEEP WRANGLER



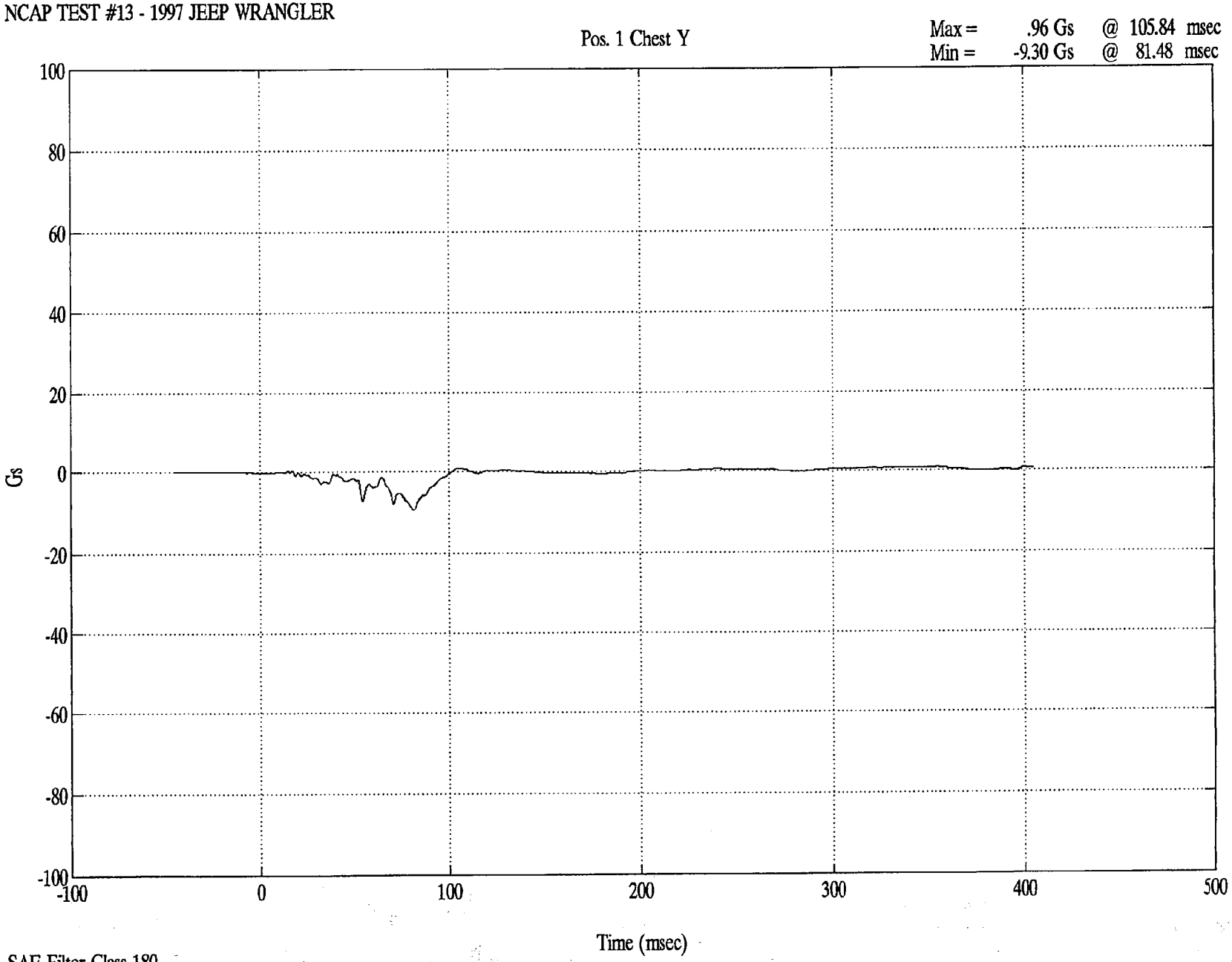
SAE Filter Class 180

NCAP TEST #13 - 1997 JEEP WRANGLER



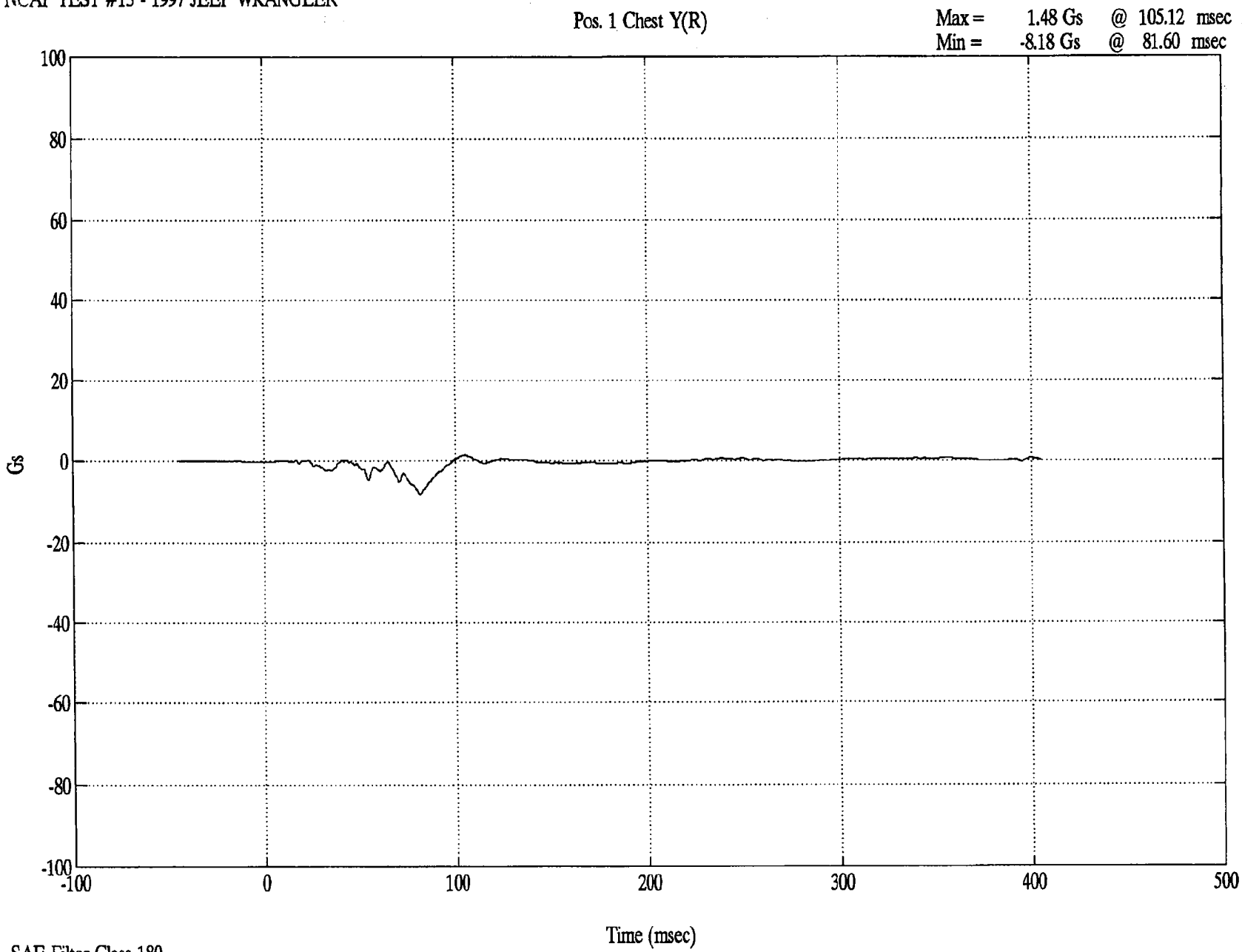
SAE Filter Class 180

NCAP TEST #13 - 1997 JEEP WRANGLER



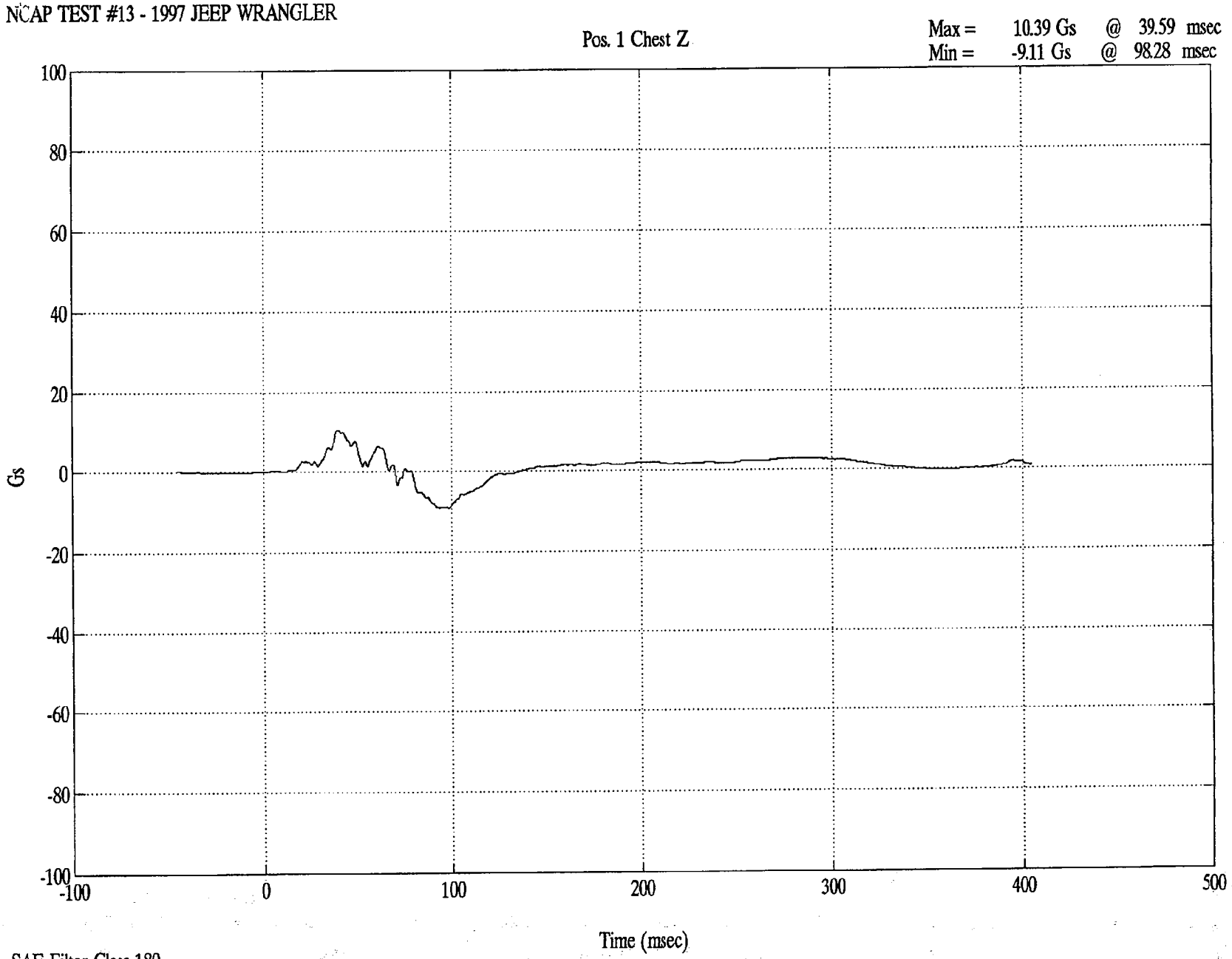
SAE Filter Class 180

NCAP TEST #13 - 1997 JEEP WRANGLER



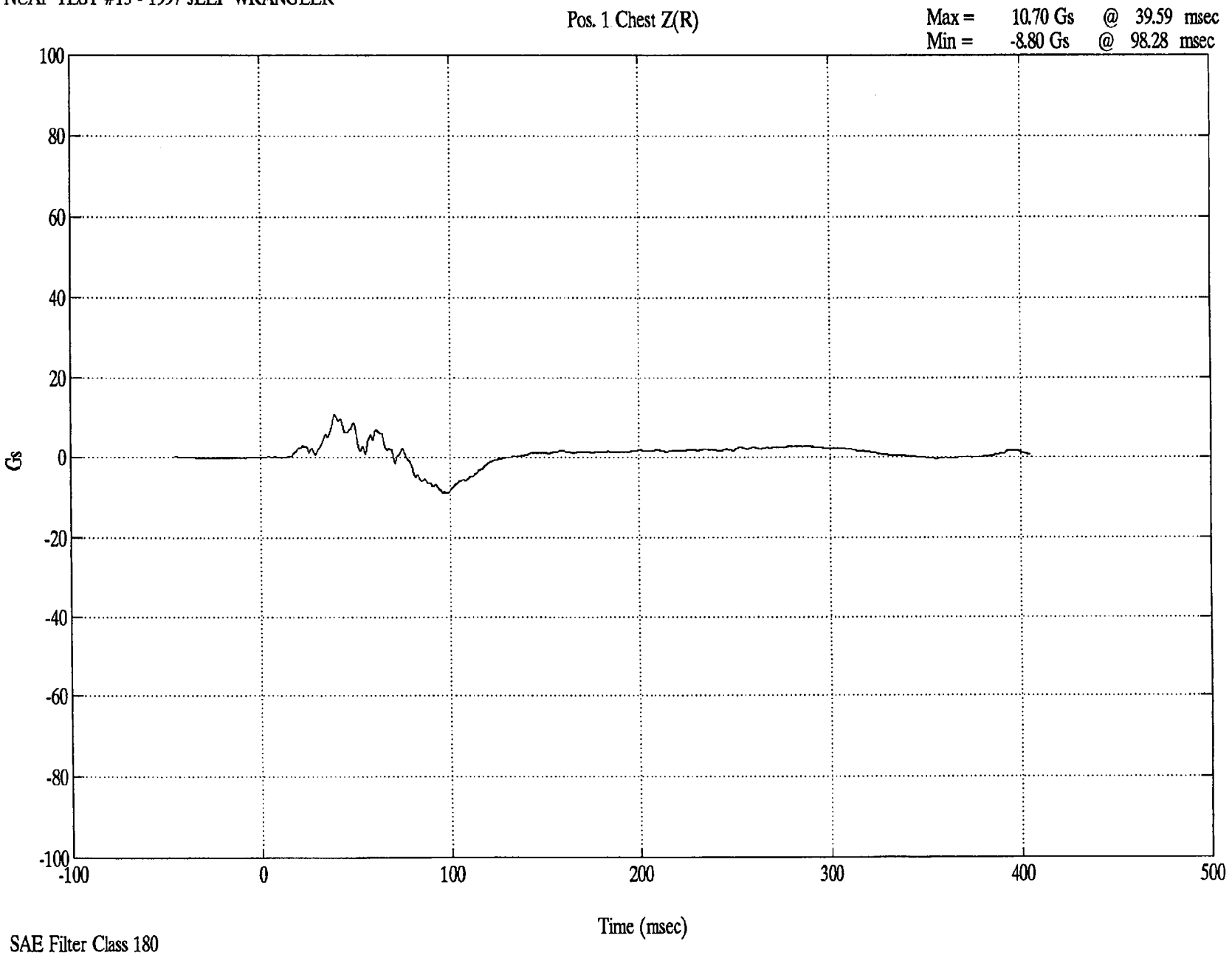
SAE Filter Class 180

NCAP TEST #13 - 1997 JEEP WRANGLER



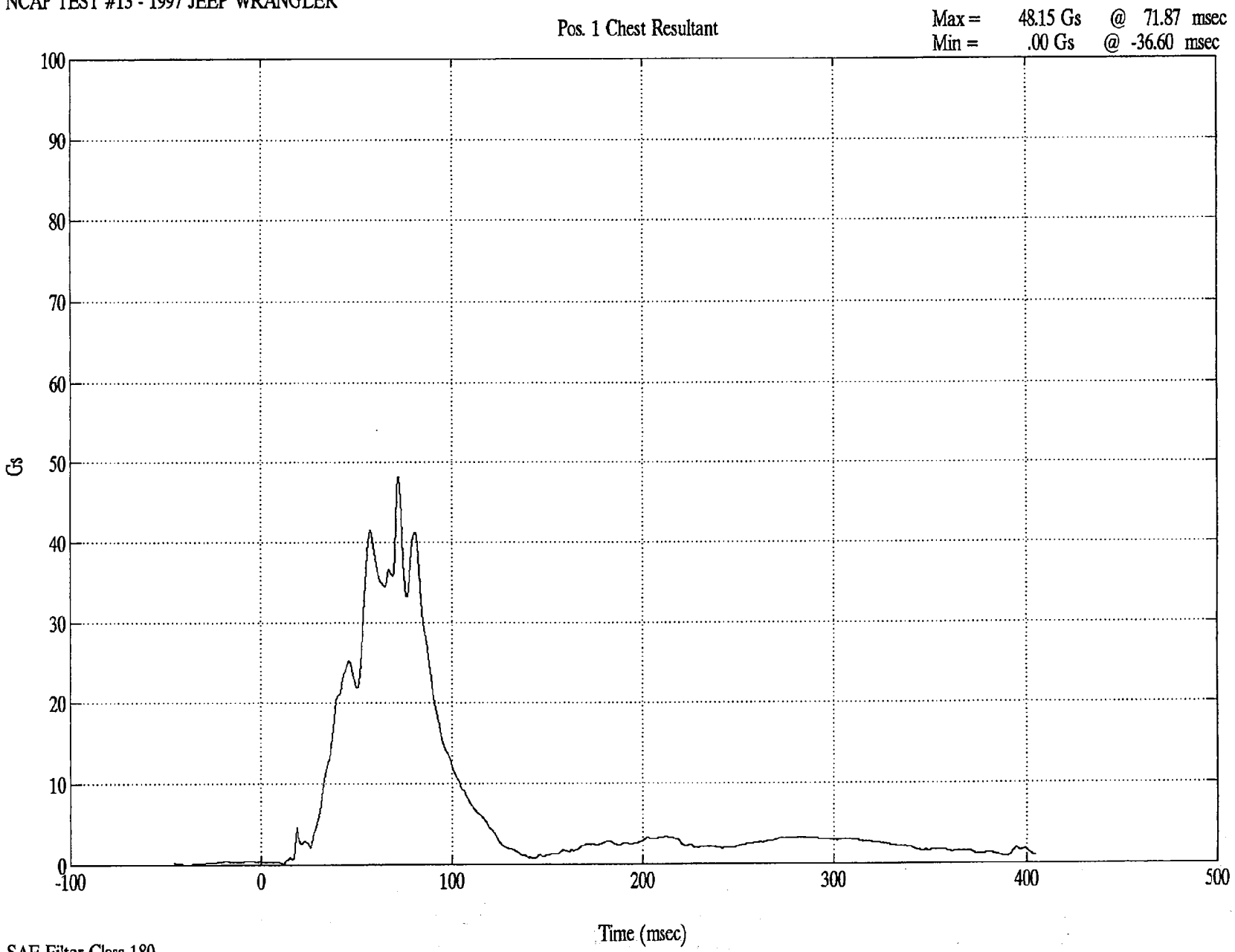
SAE Filter Class 180

NCAP TEST #13 - 1997 JEEP WRANGLER



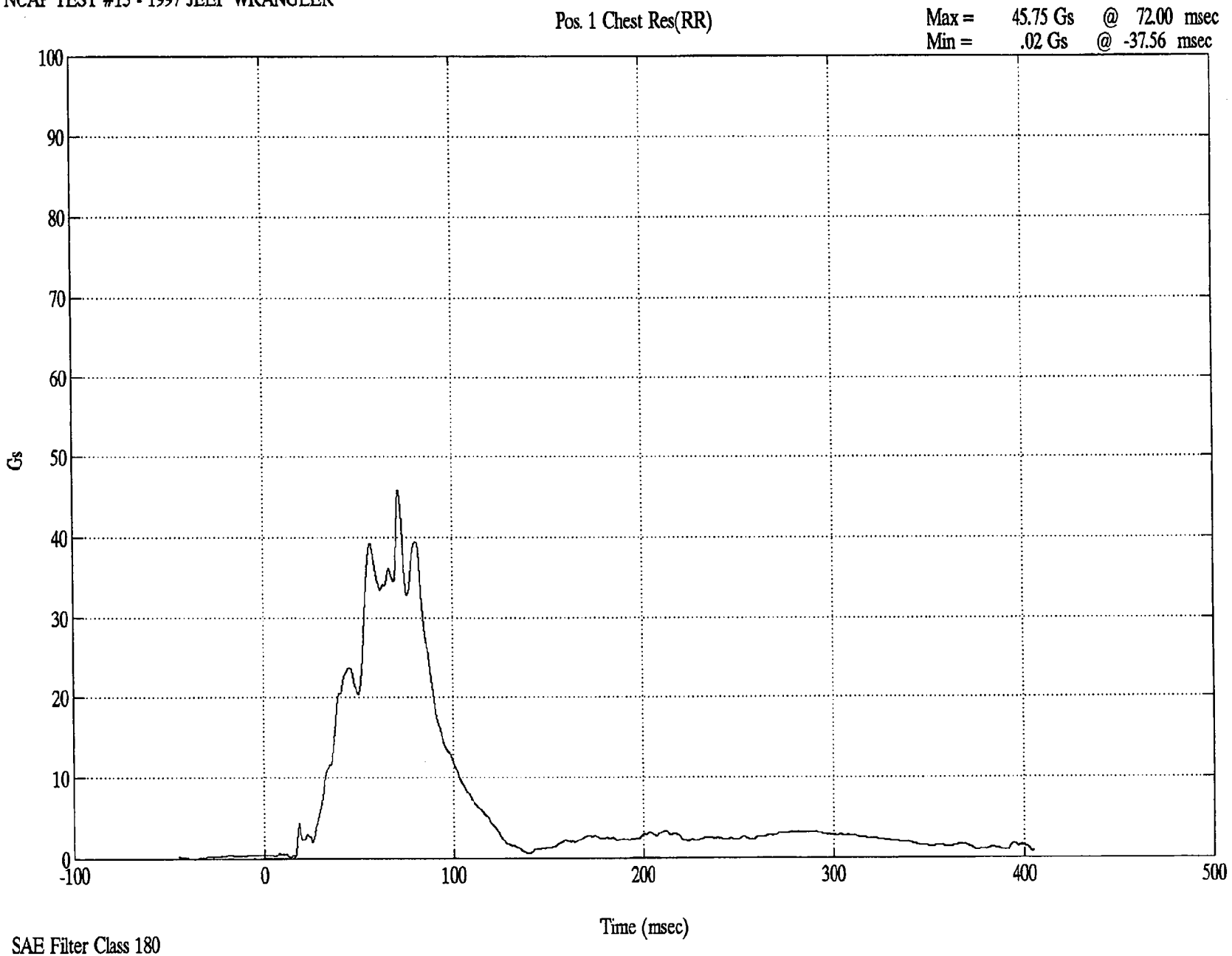
SAE Filter Class 180

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

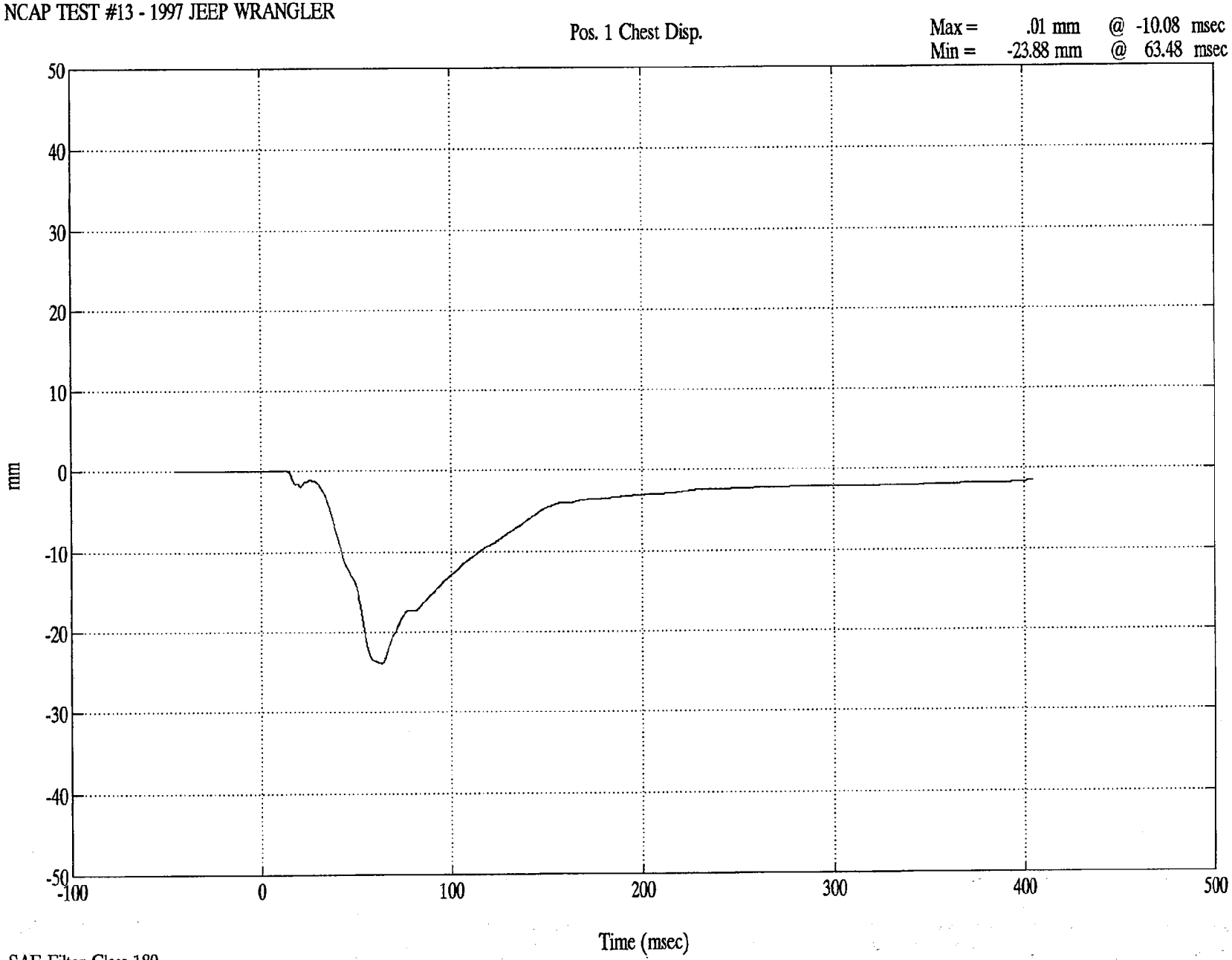
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

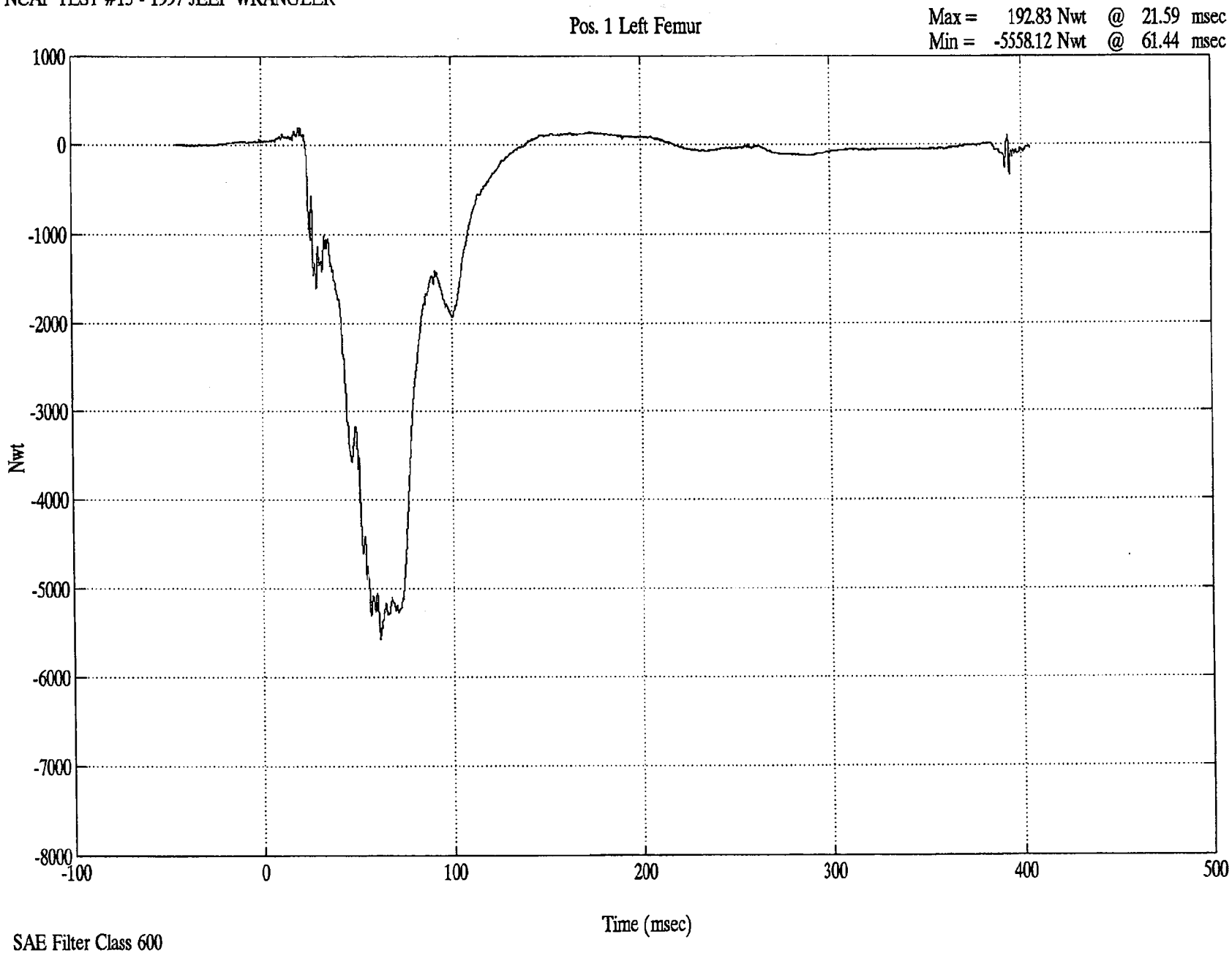
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

NCAP TEST #13 - 1997 JEEP WRANGLER

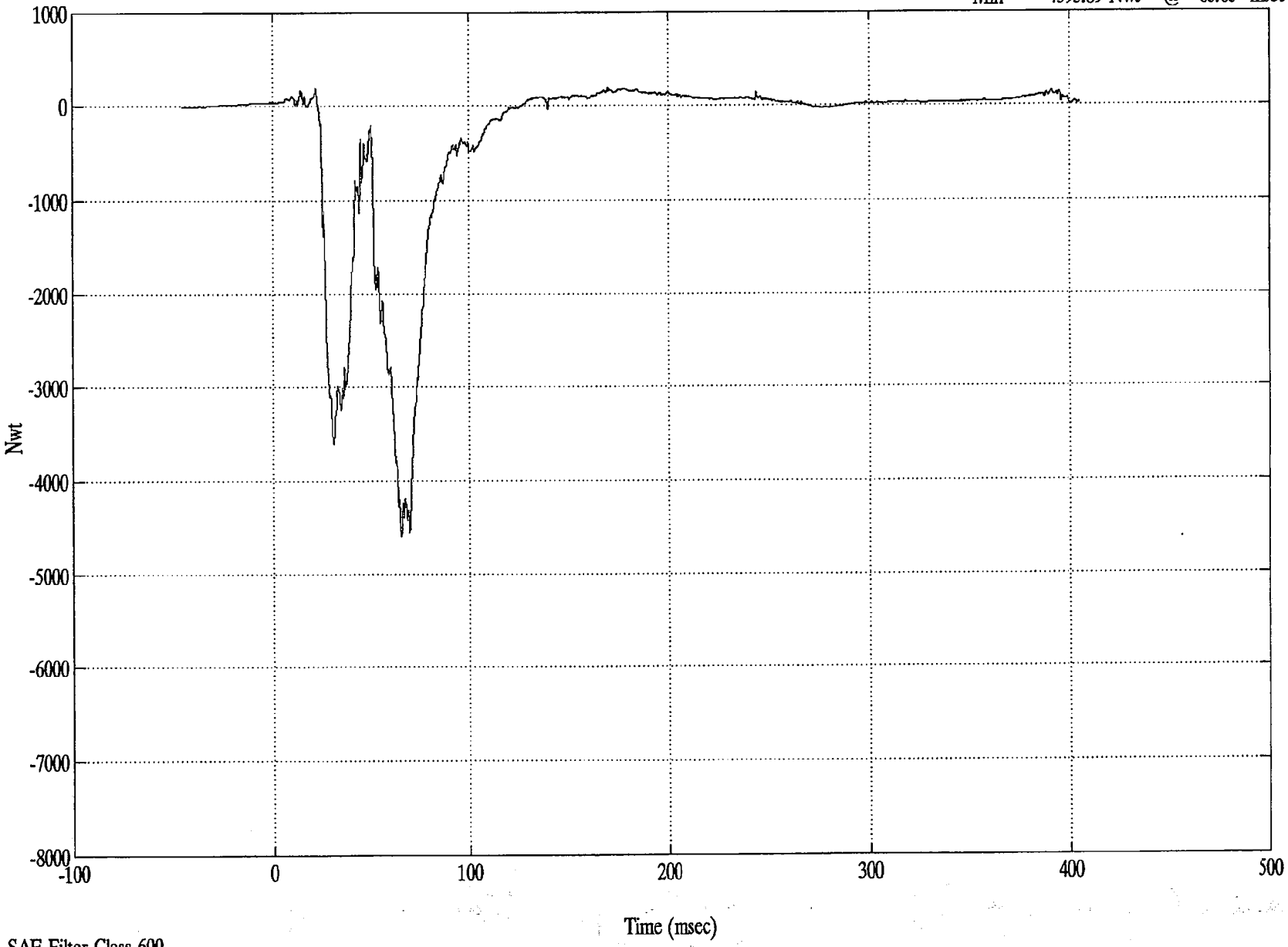


SAE Filter Class 600

NCAP TEST #13 - 1997 JEEP WRANGLER

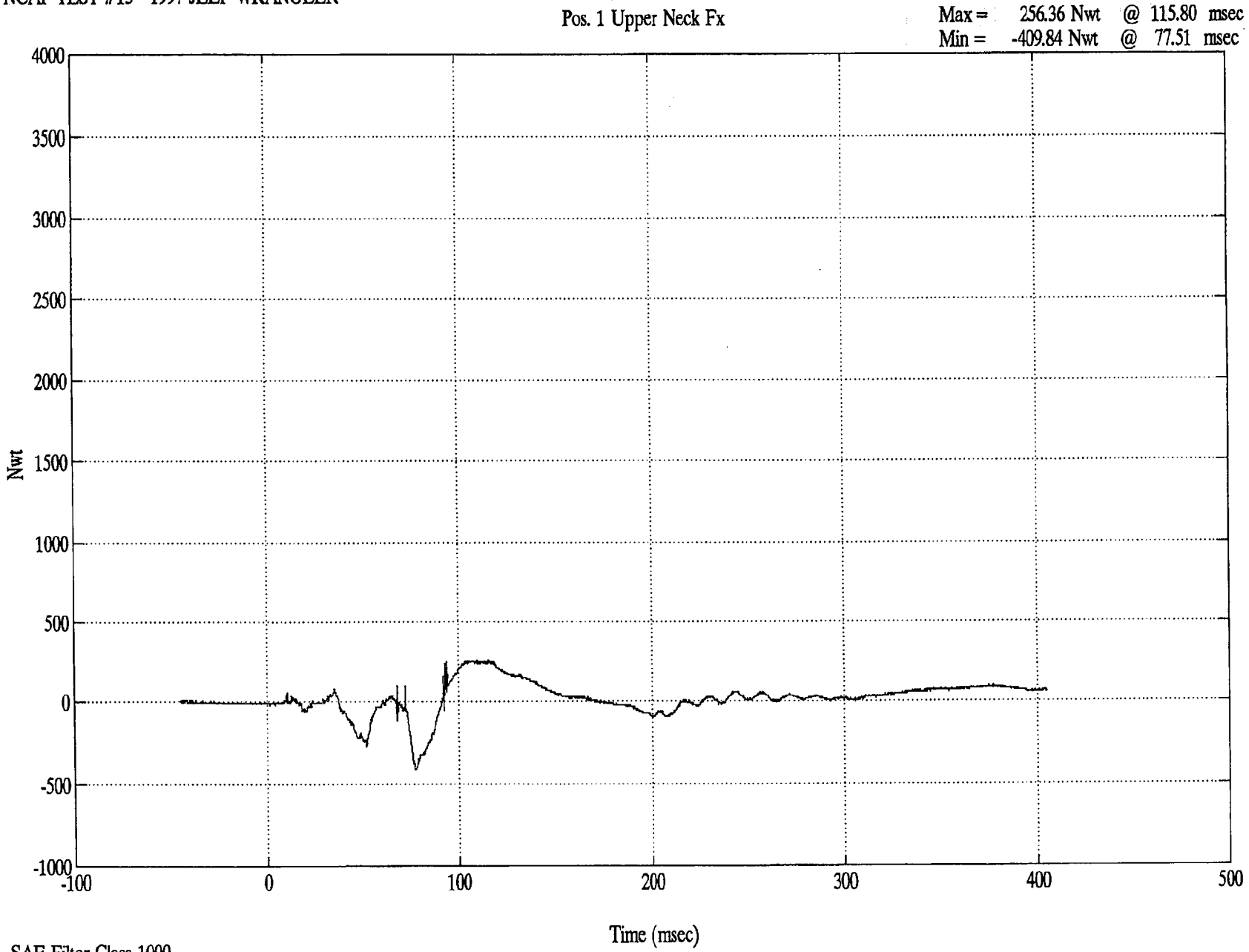
Pos. 1 Right Femur

Max = 200.41 Nwt @ 169.19 msec
Min = -4595.89 Nwt @ 65.63 msec



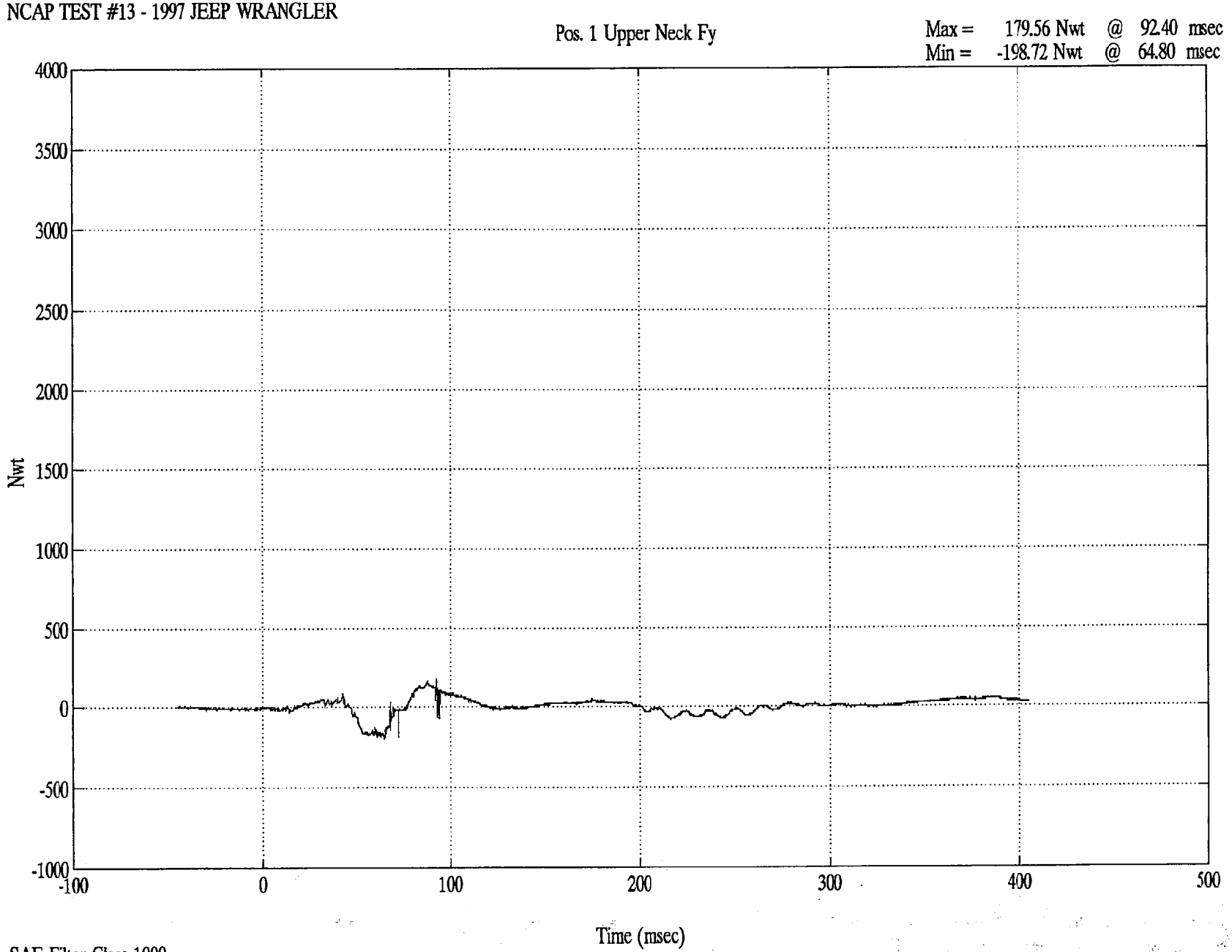
SAE Filter Class 600

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

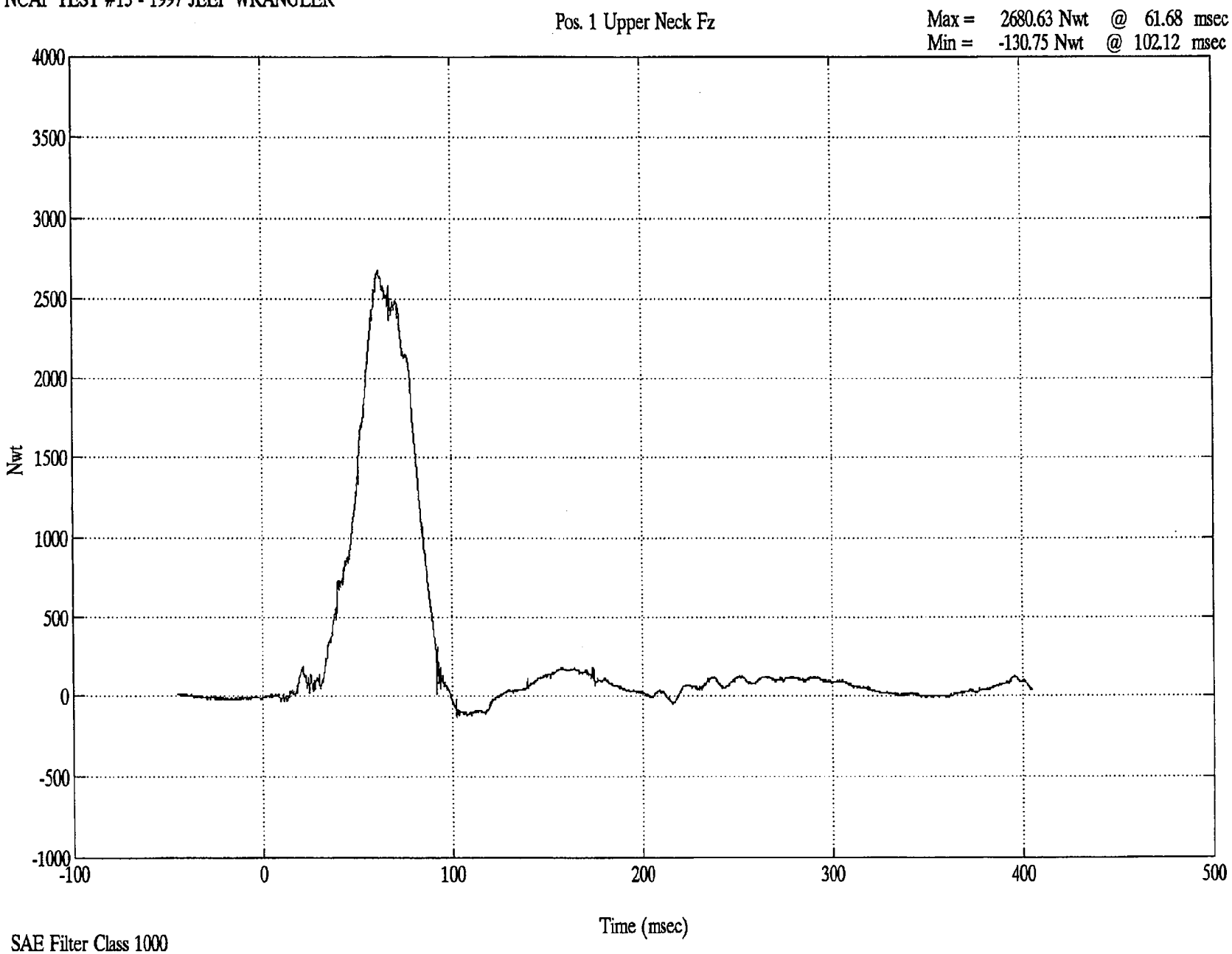
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

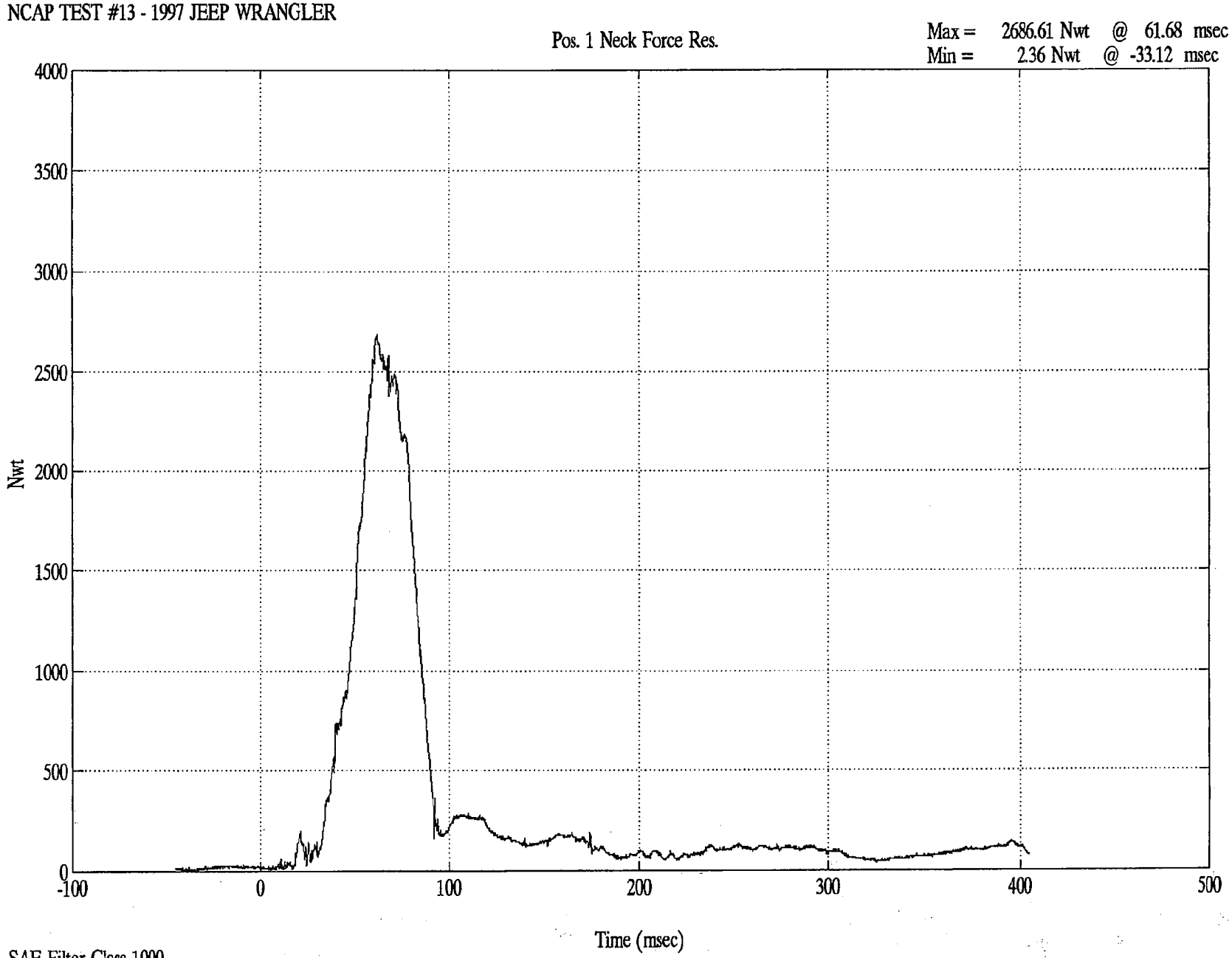
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

NCAP TEST #13 - 1997 JEEP WRANGLER



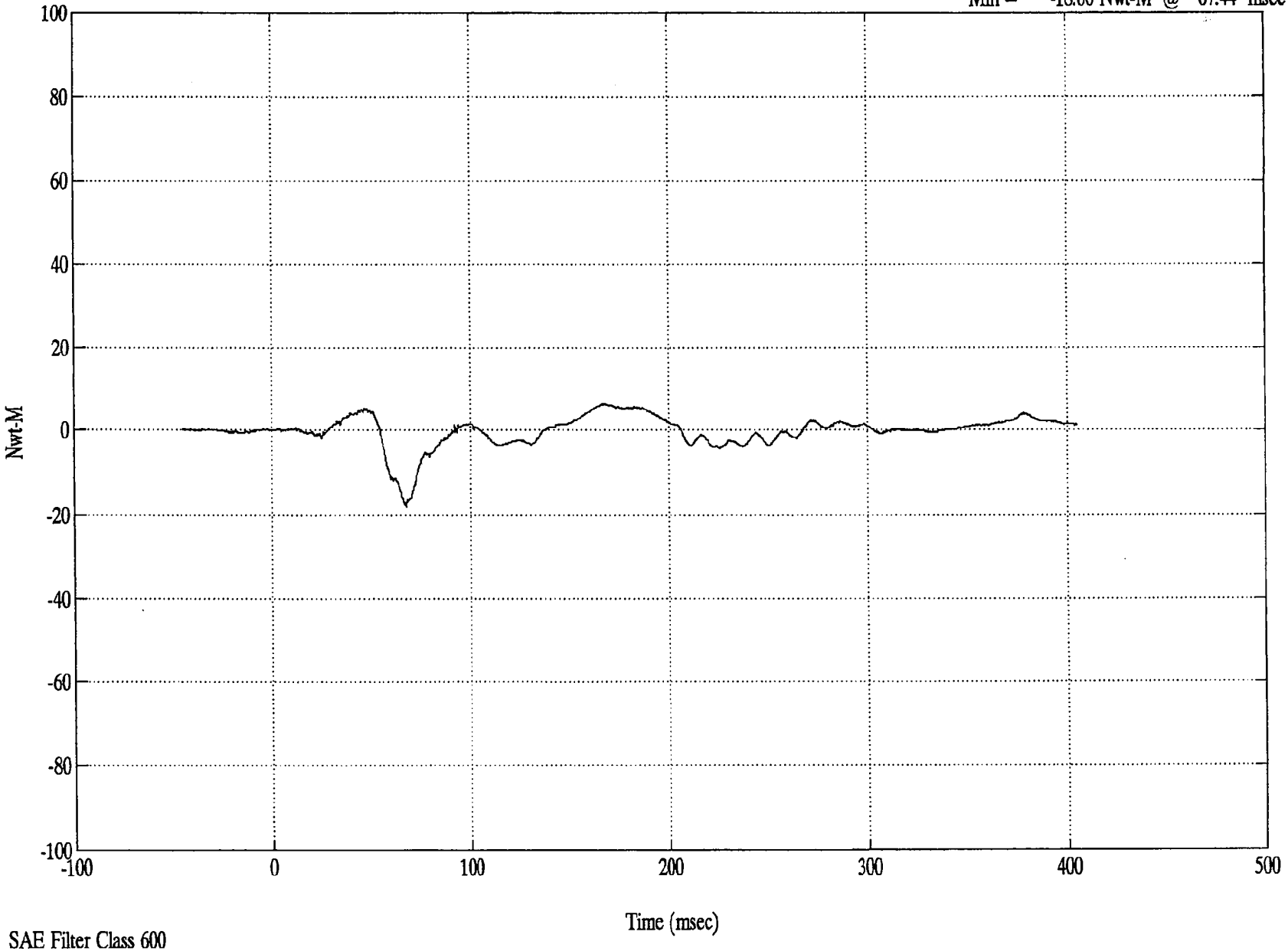
SAE Filter Class 1000

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

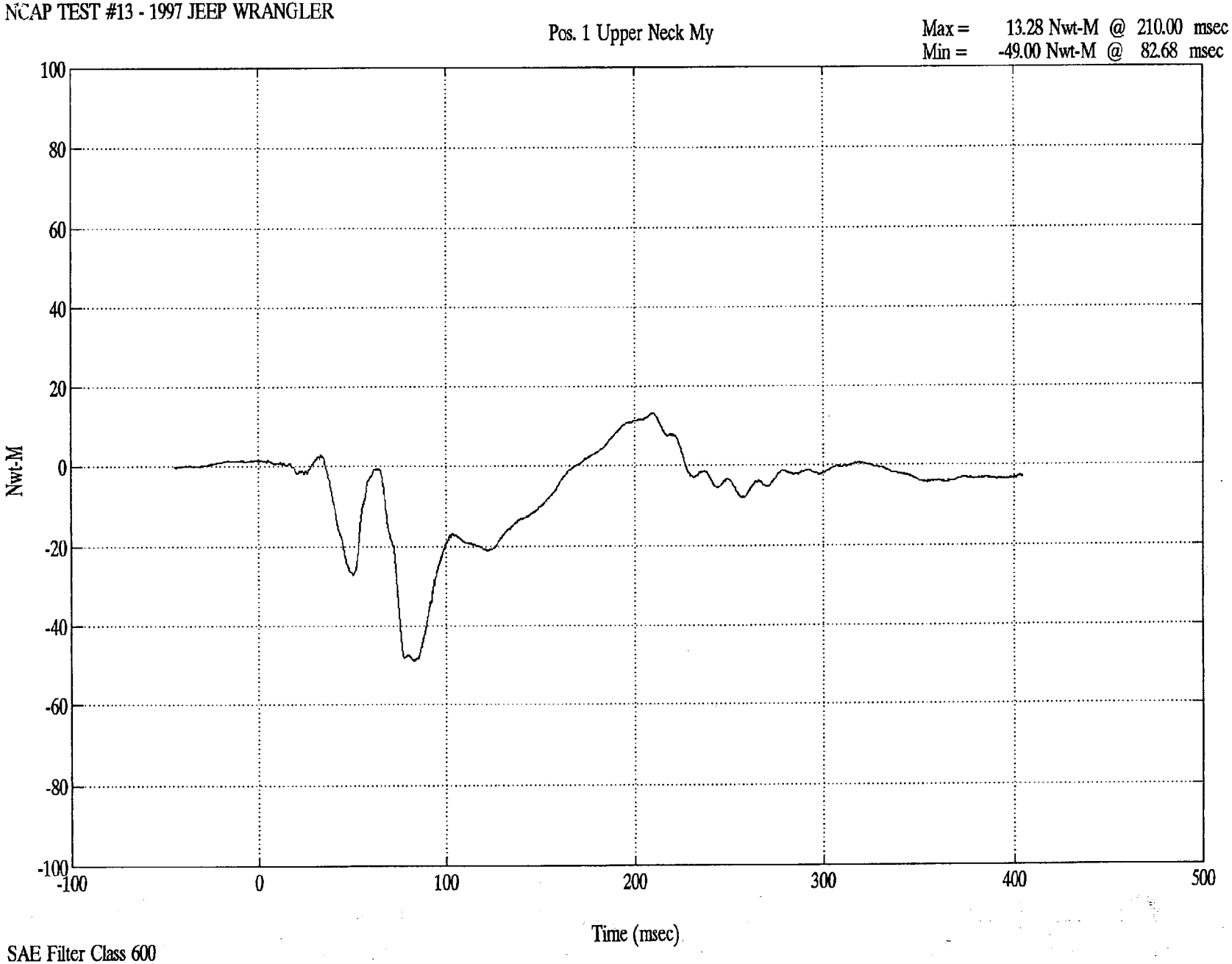
Pos. 1 Upper Neck Mx

Max = 6.27 Nwt-M @ 167.04 msec
Min = -18.00 Nwt-M @ 67.44 msec



SAE Filter Class 600

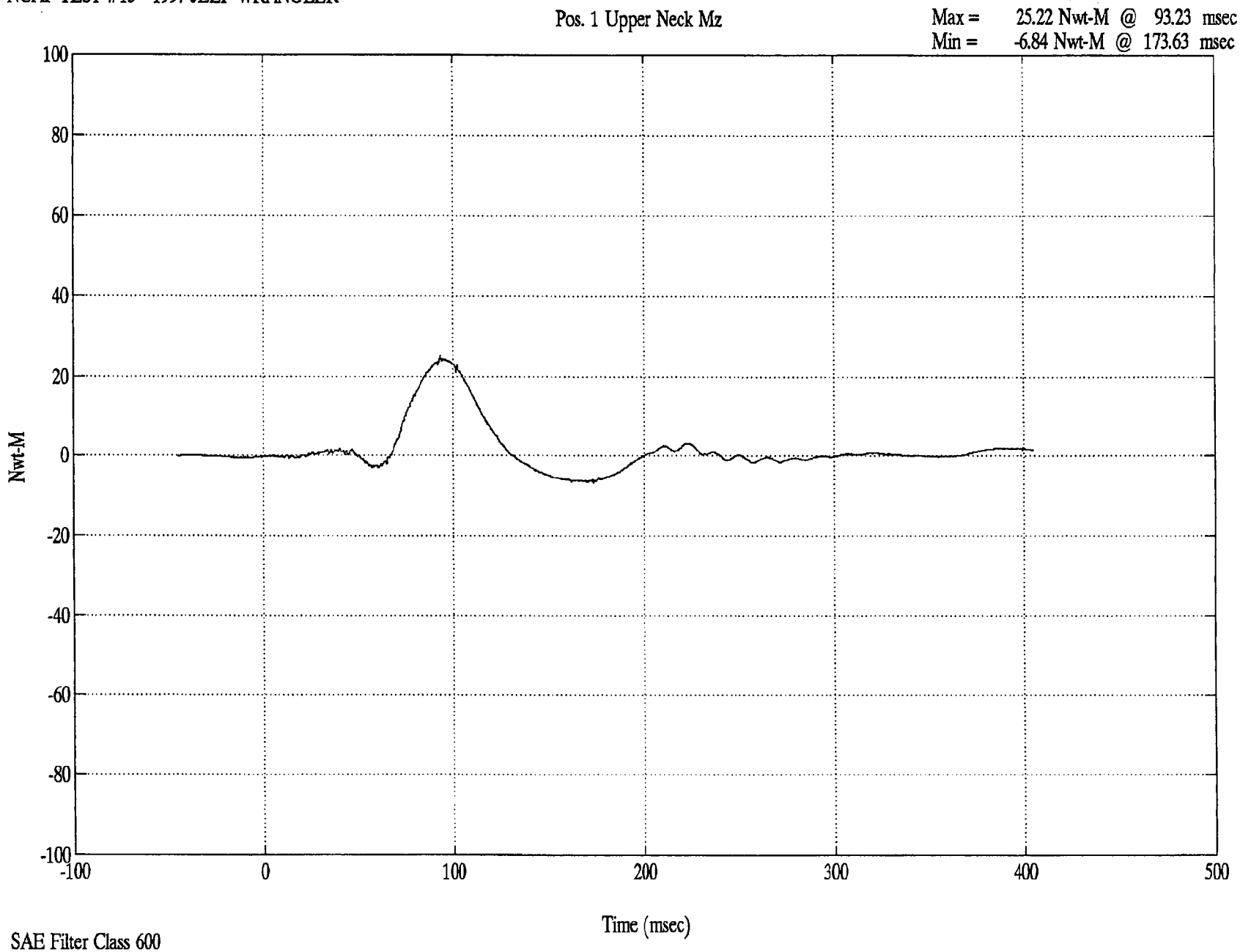
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

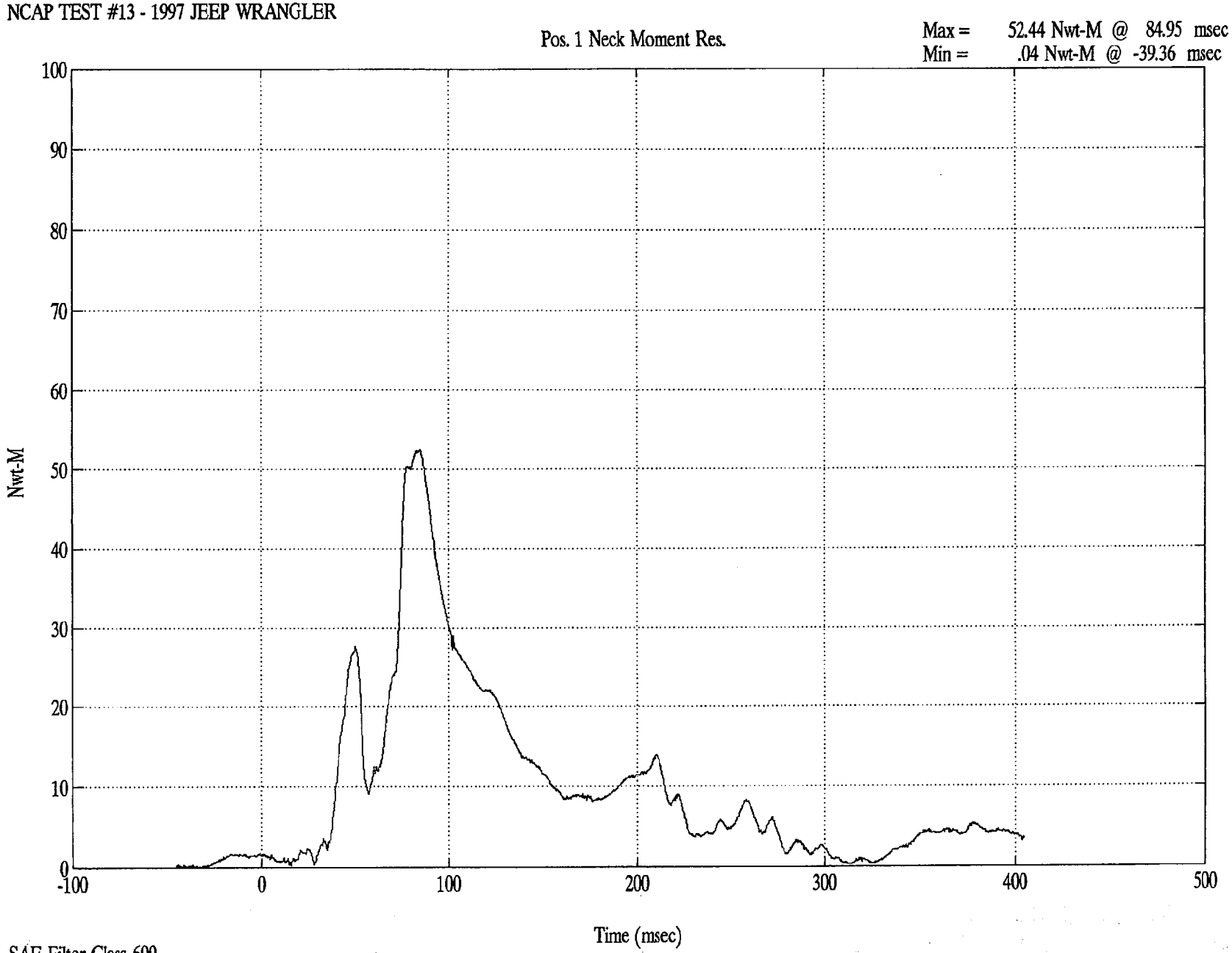
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

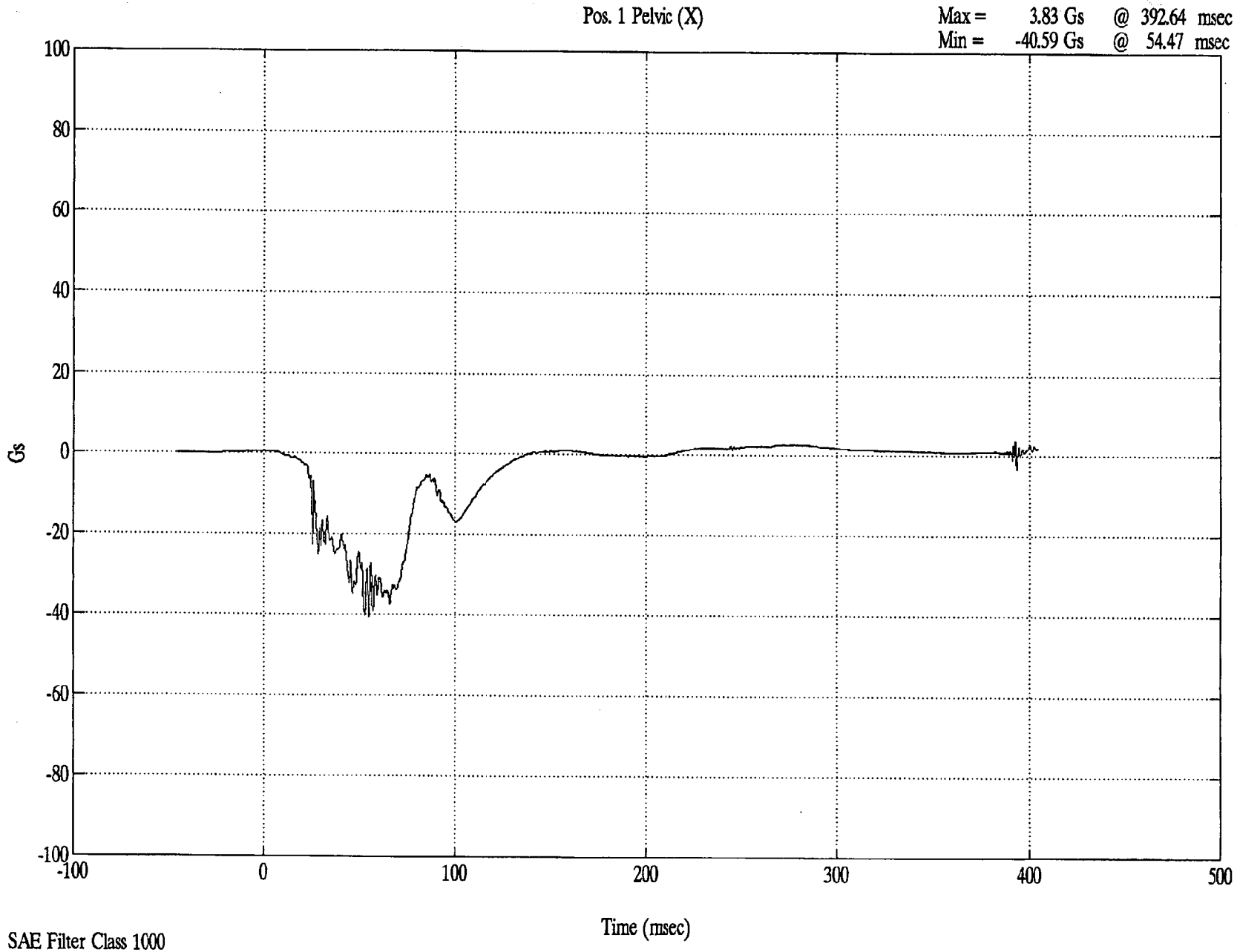
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

8313-13

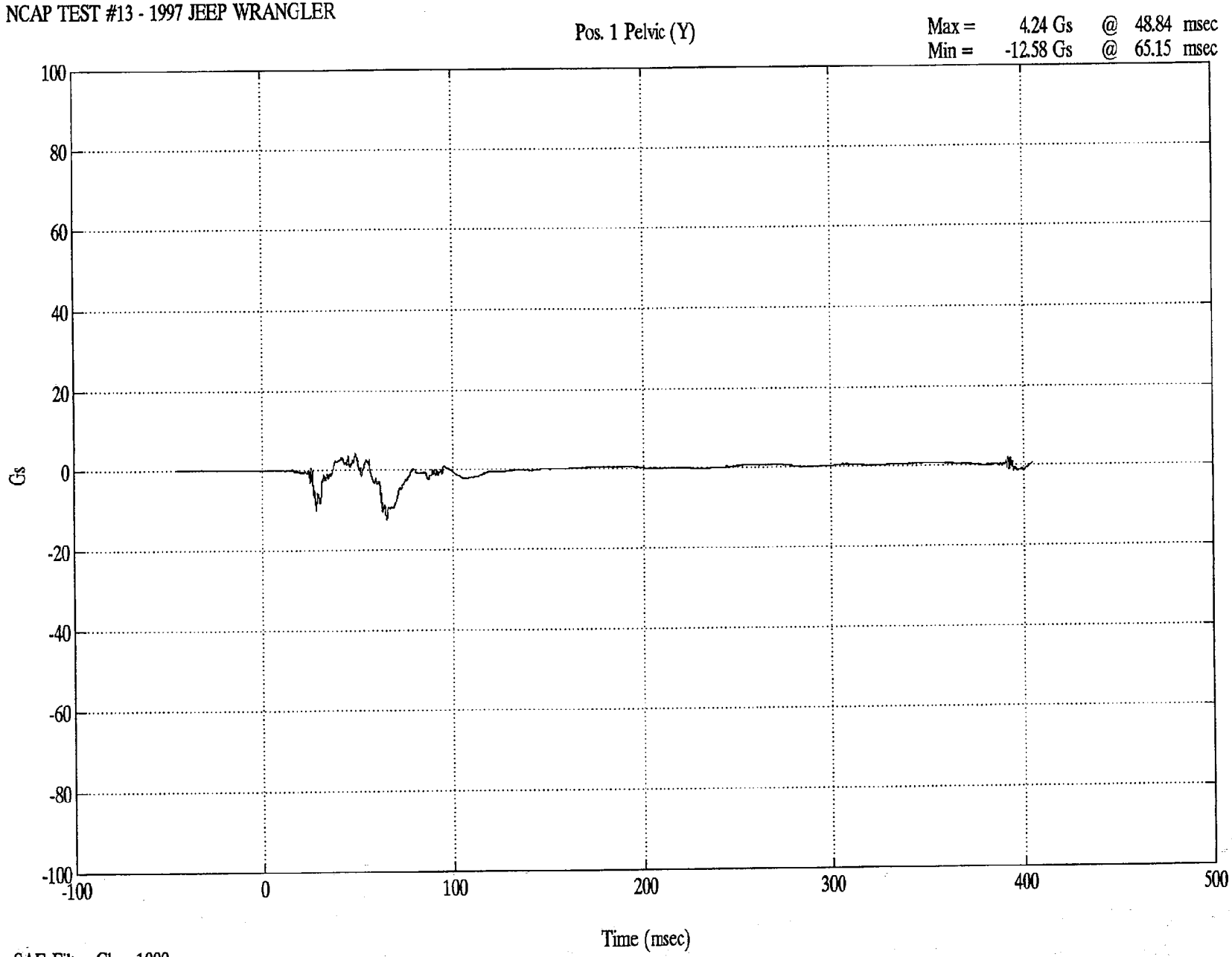
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

8313-13

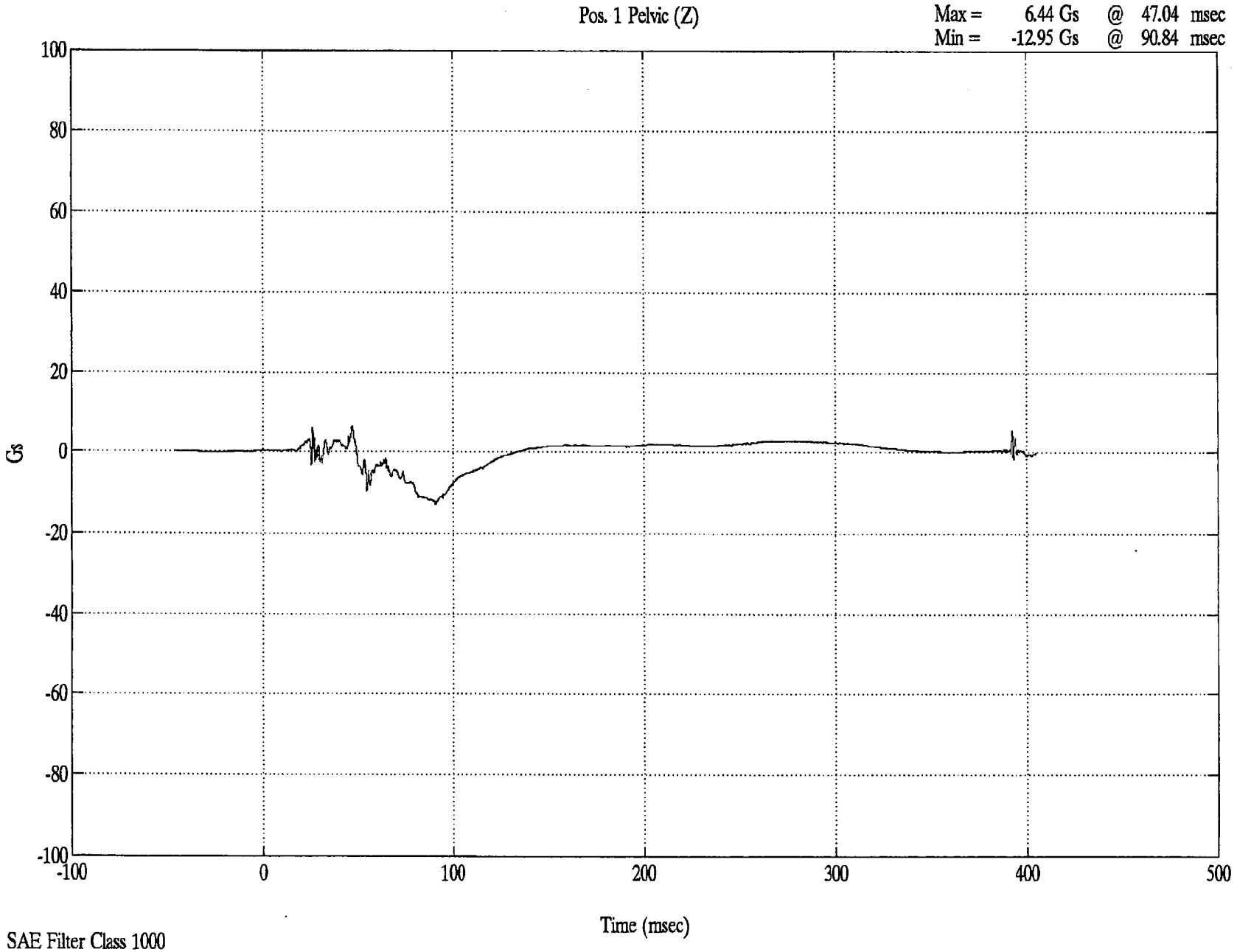
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

8313-13

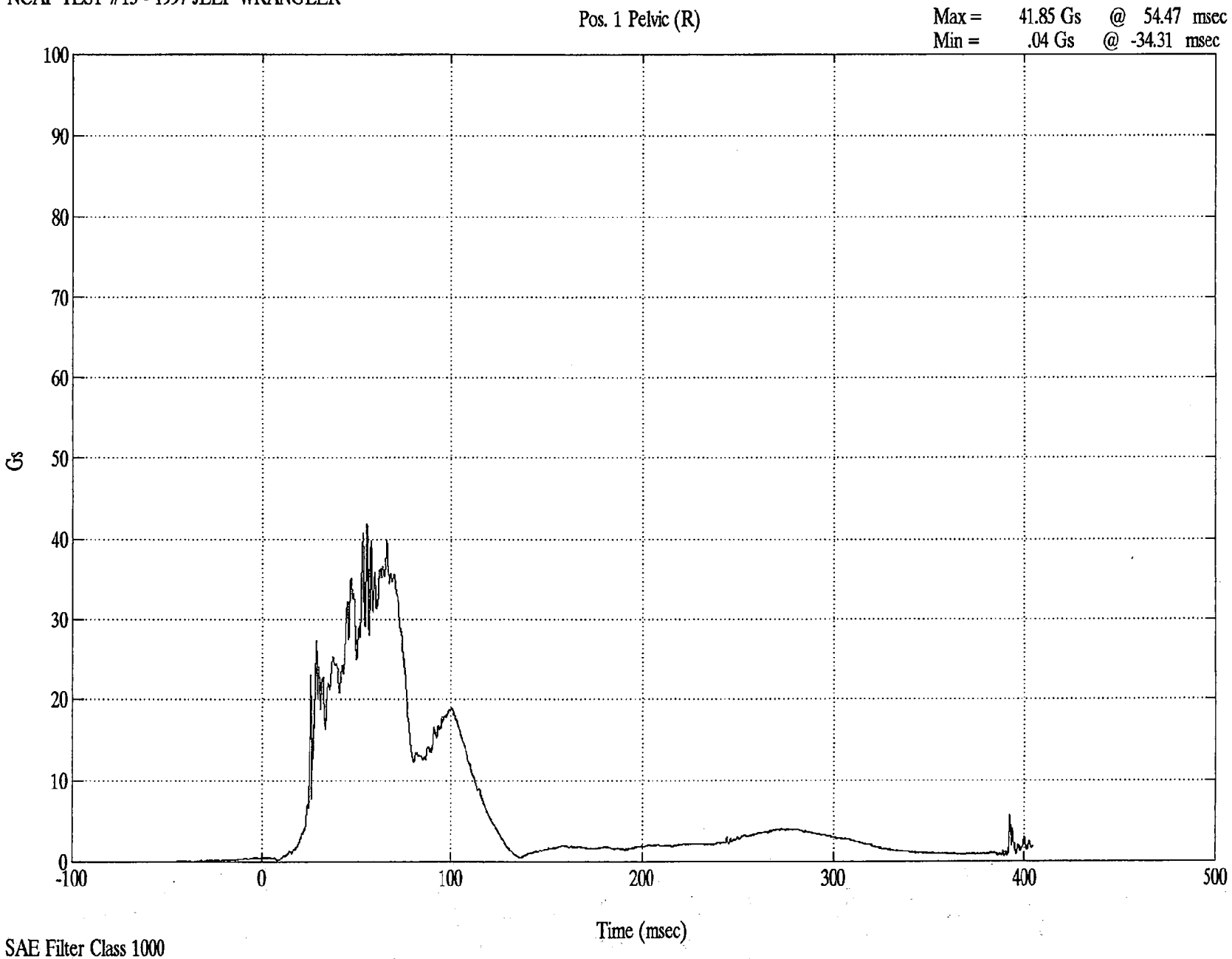
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

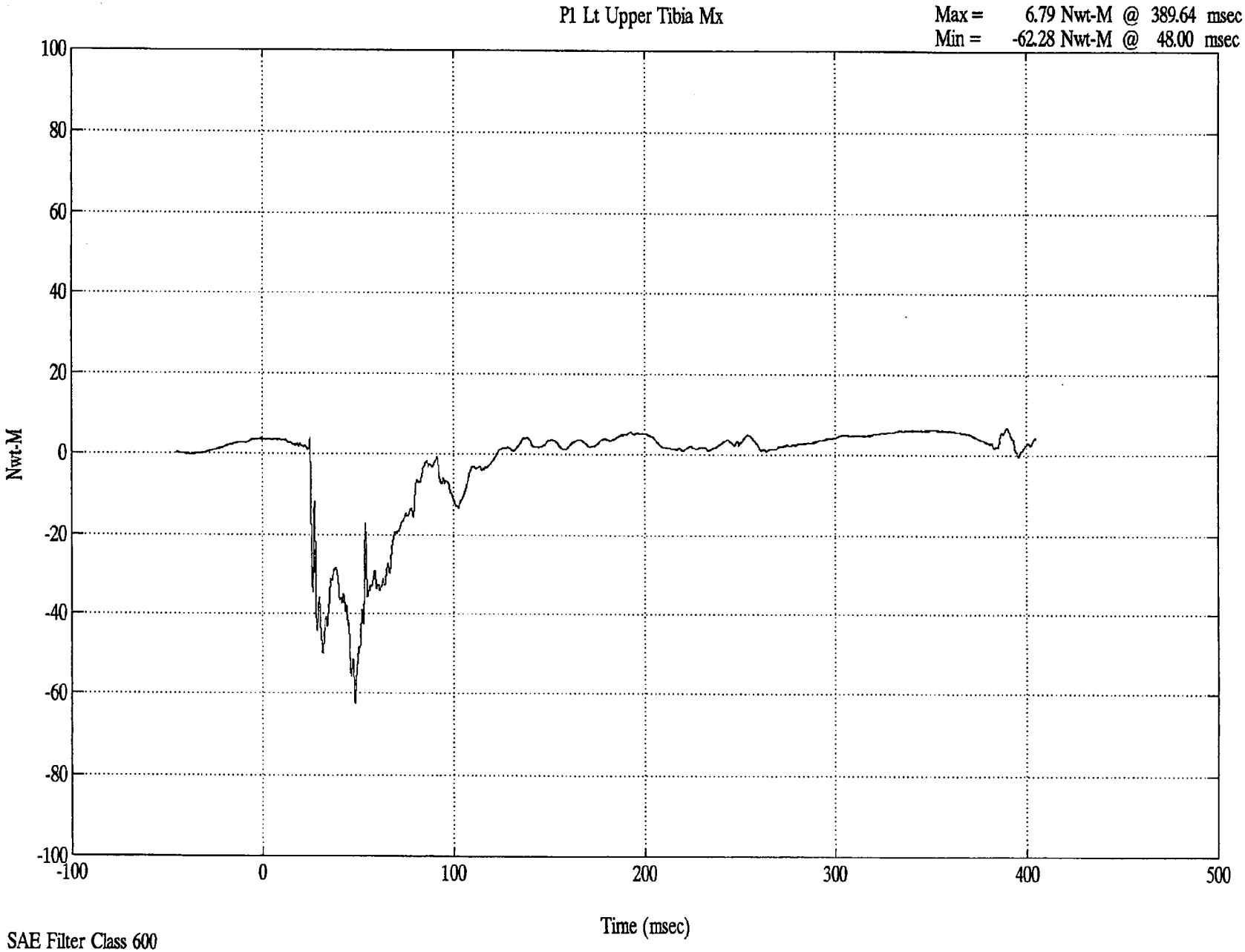
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

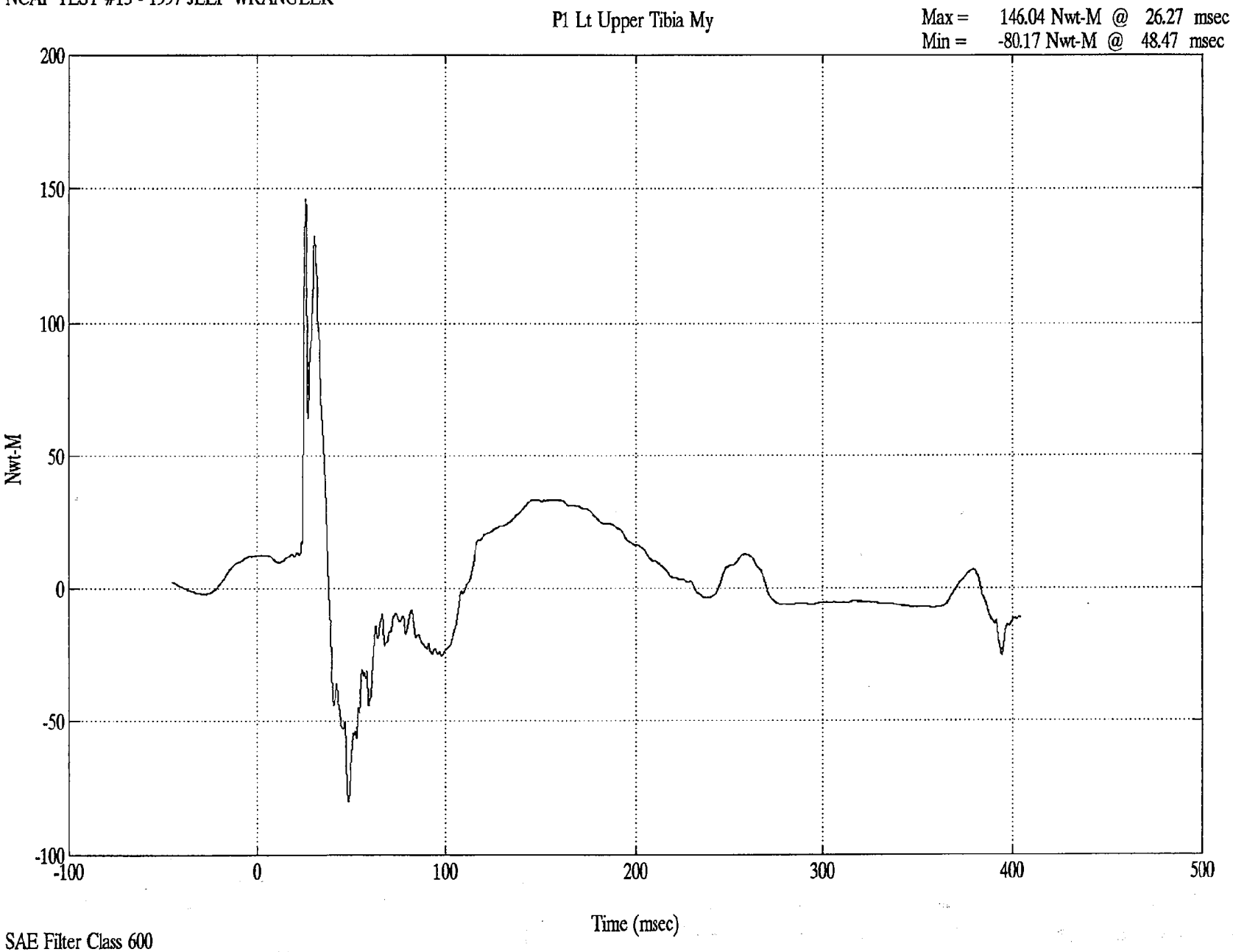
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

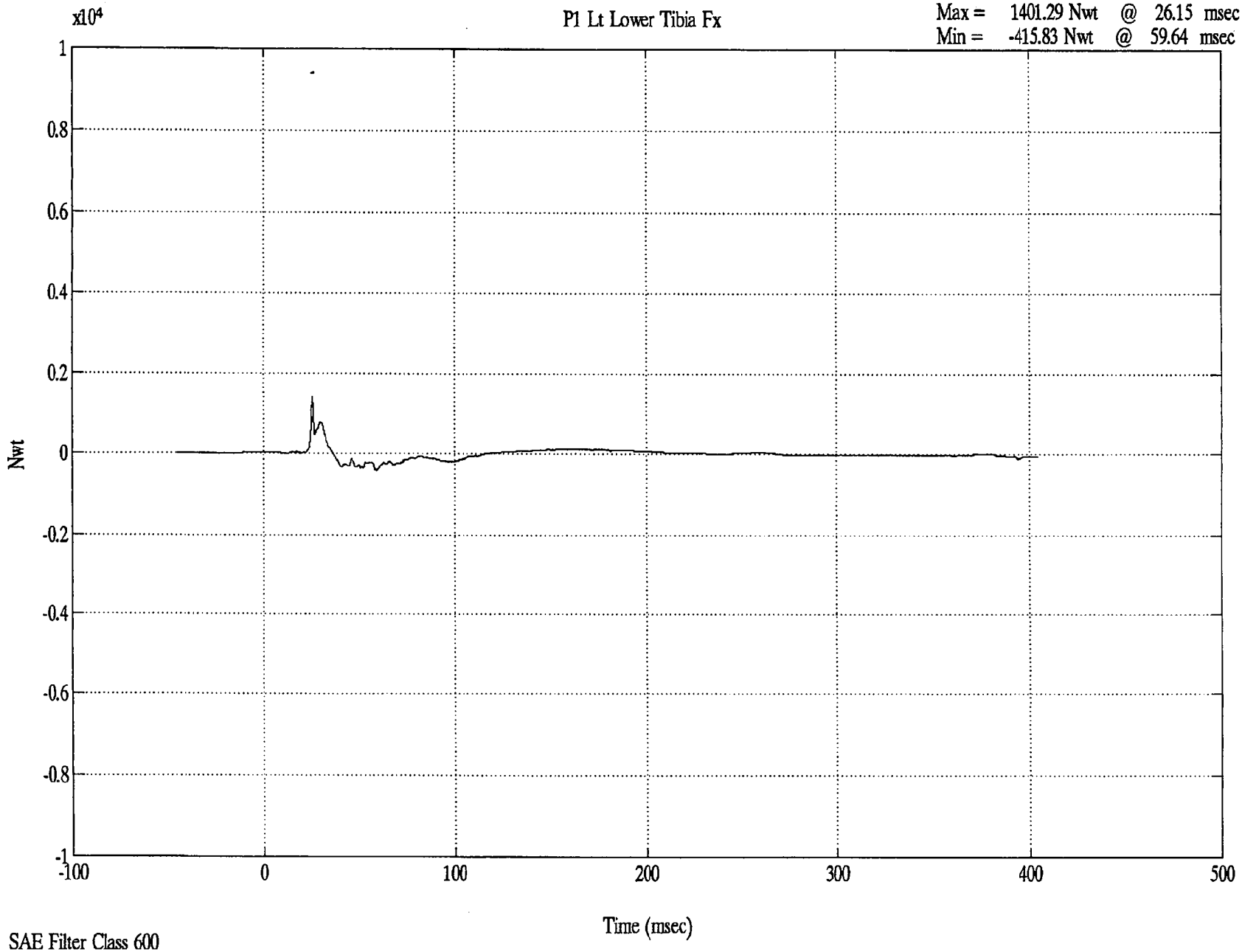
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

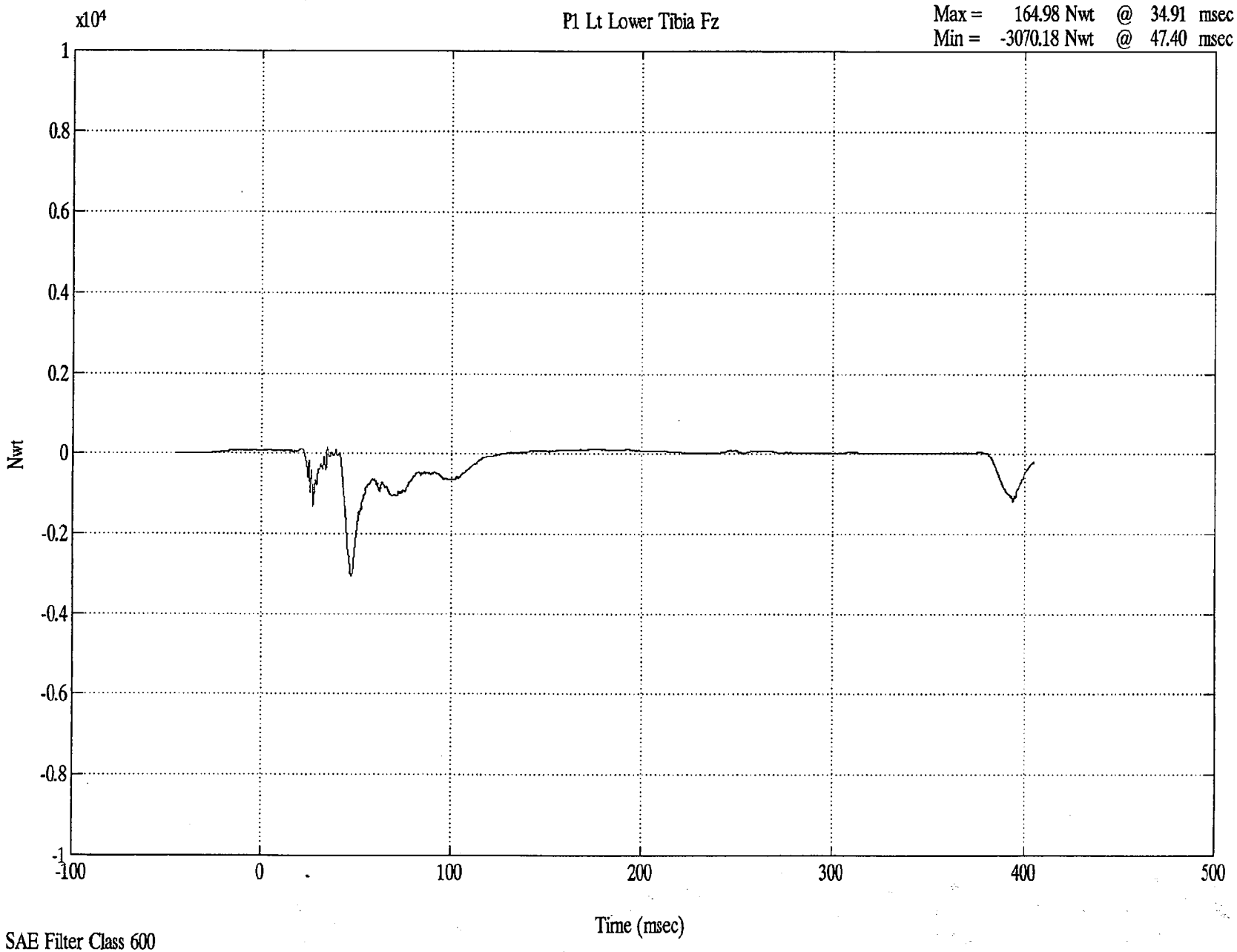
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

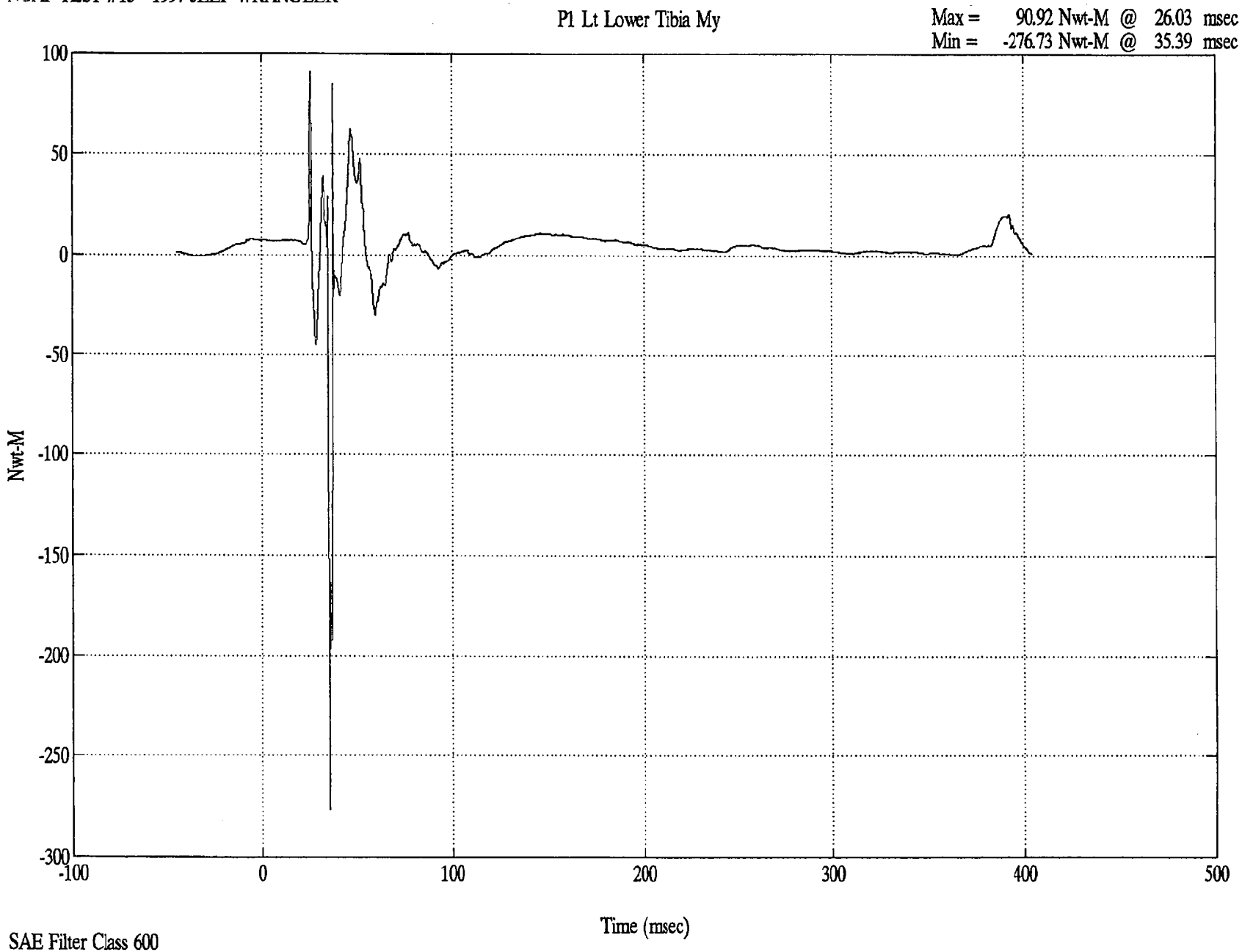
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

NCAP TEST #13 - 1997 JEEP WRANGLER



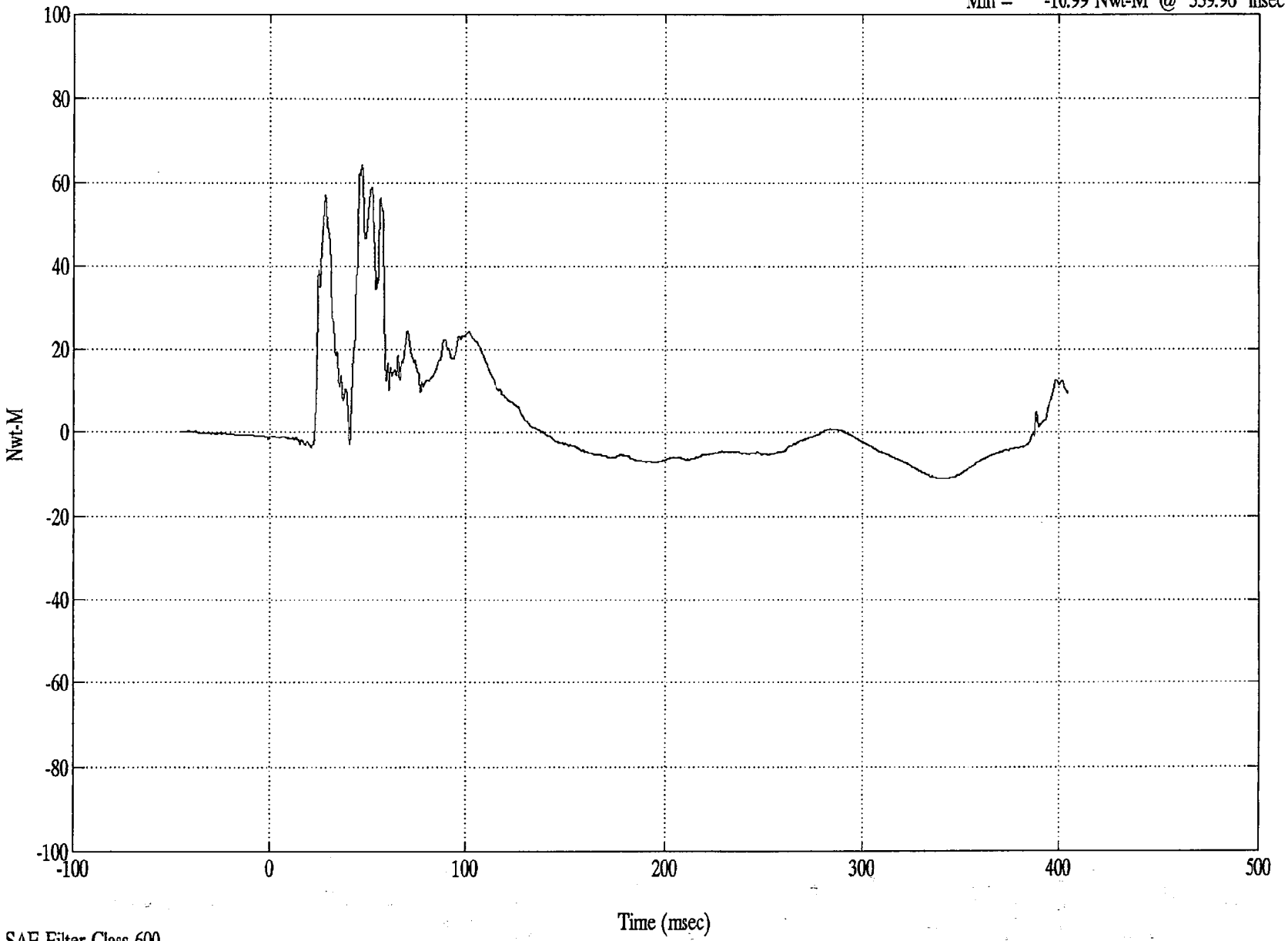
SAE Filter Class 600

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

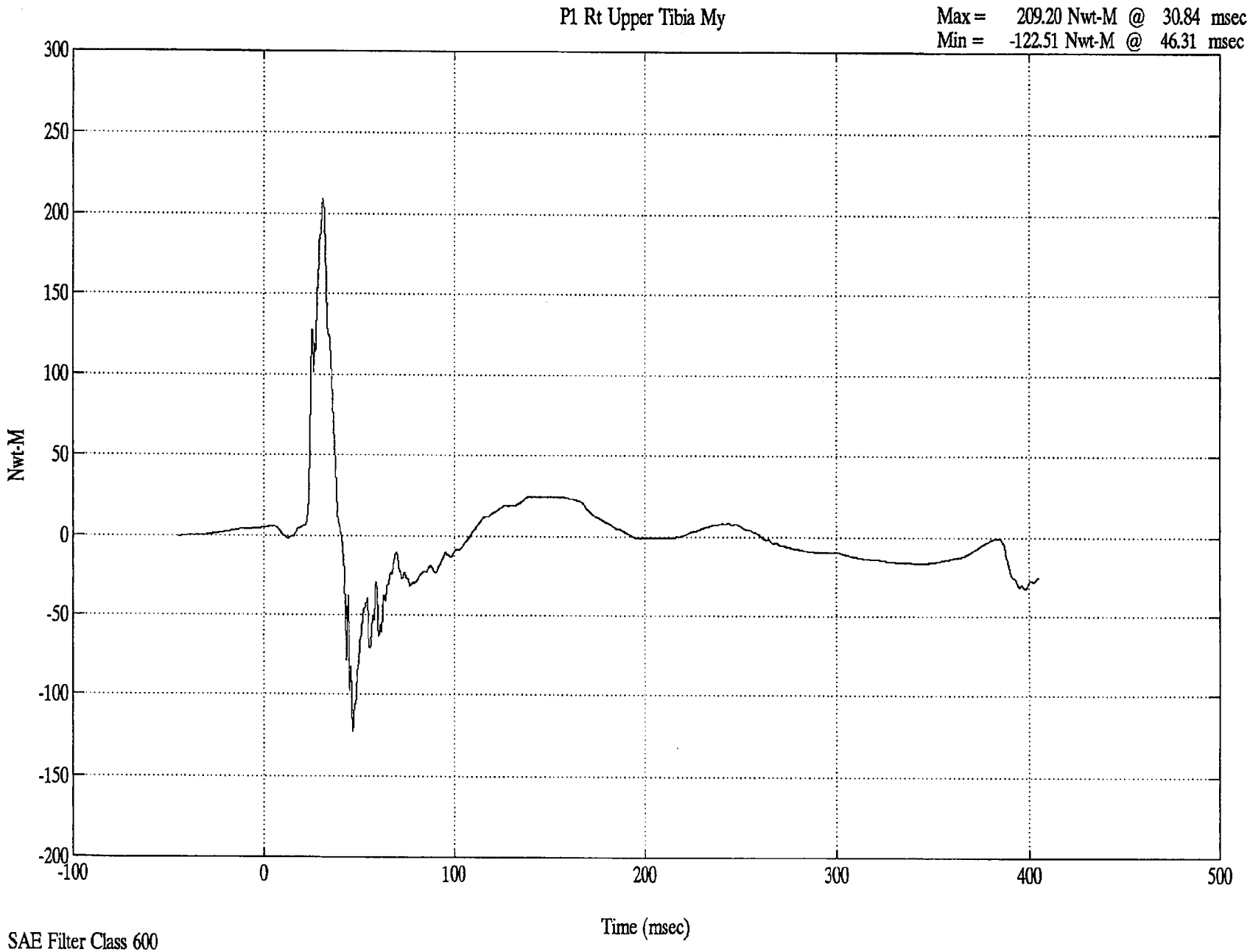
P1 Rt Upper Tibia Mx

Max = 64.18 Nwt-M @ 47.27 msec
Min = -10.99 Nwt-M @ 339.96 msec



SAE Filter Class 600

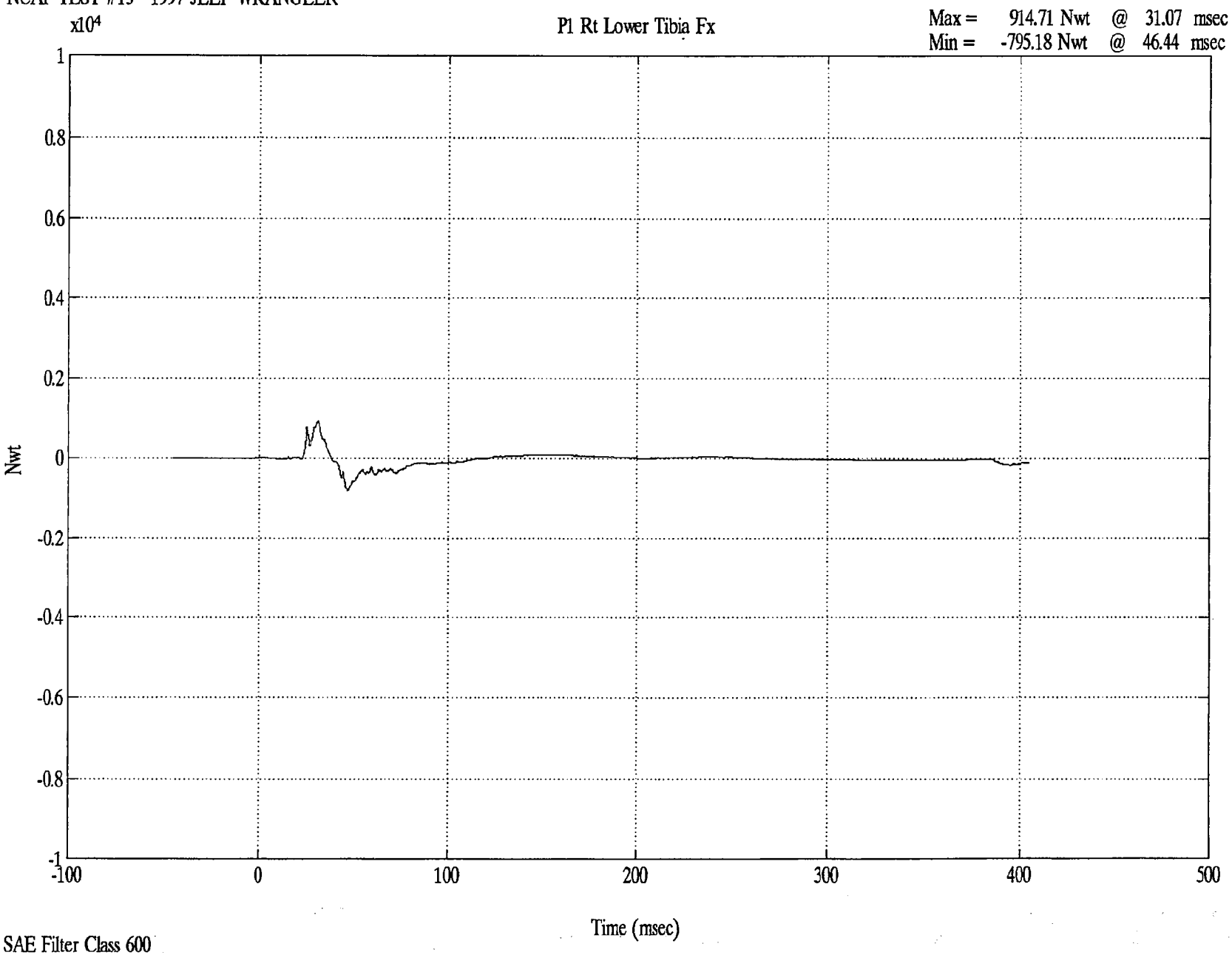
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

8313-13

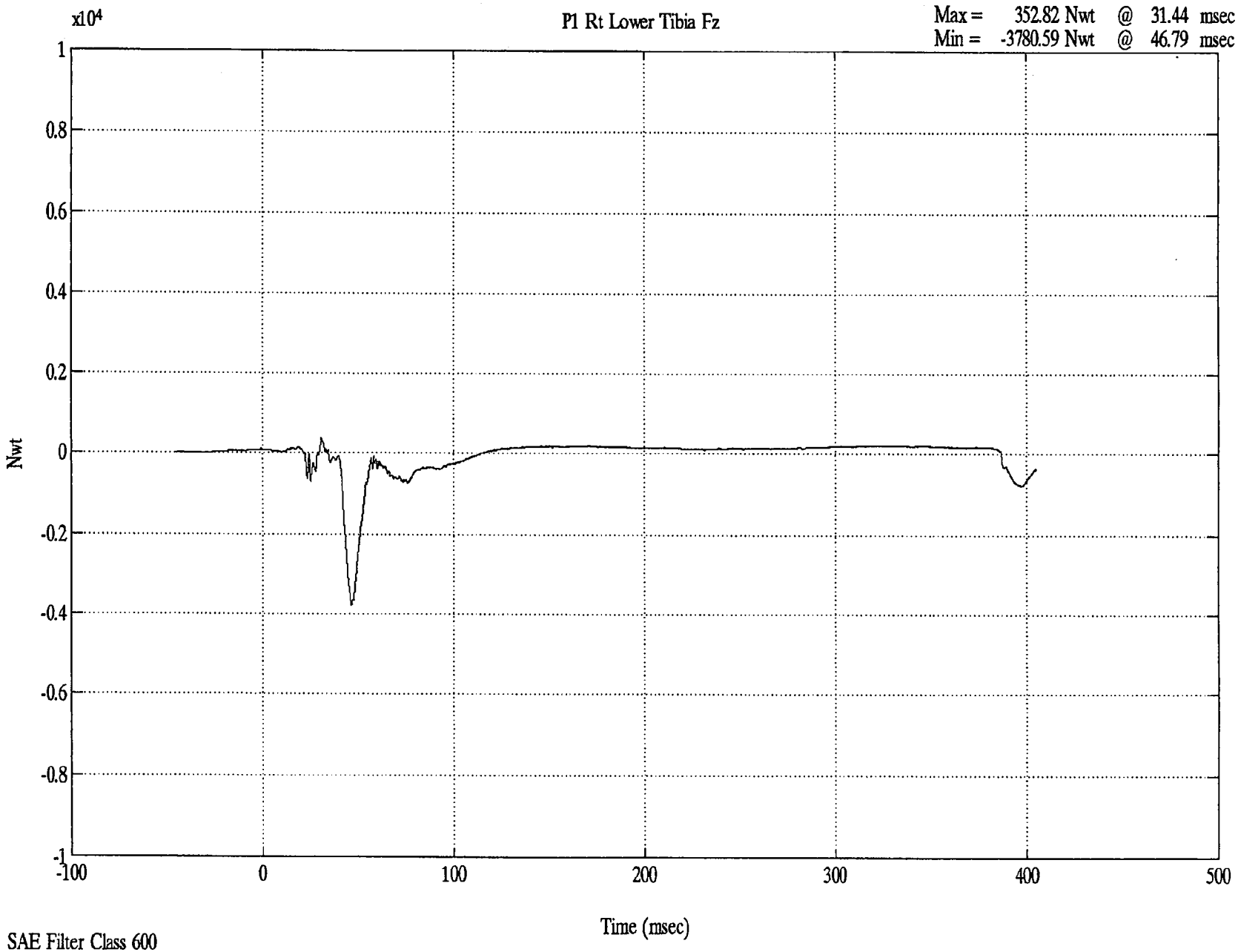
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

8313-13

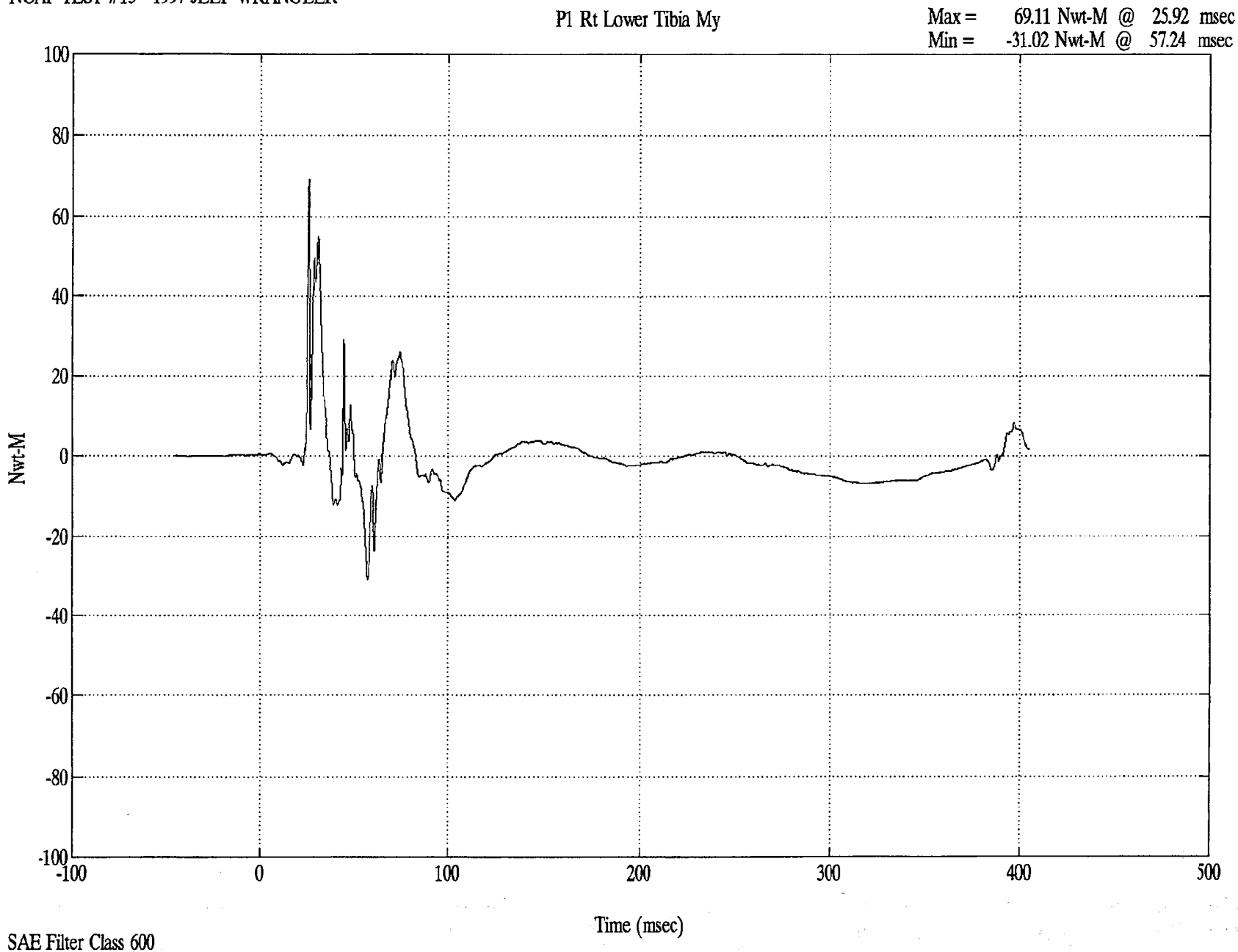
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

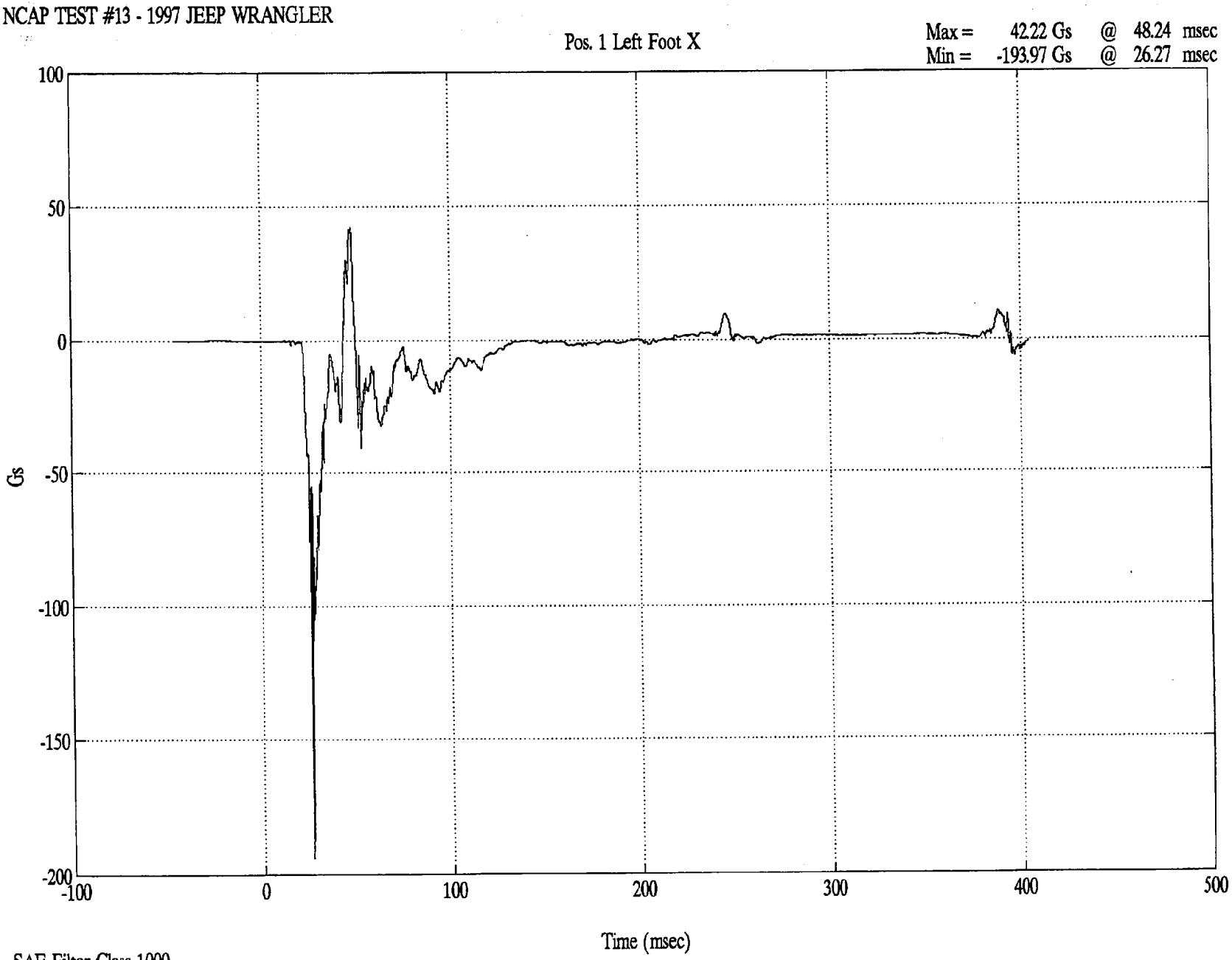
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

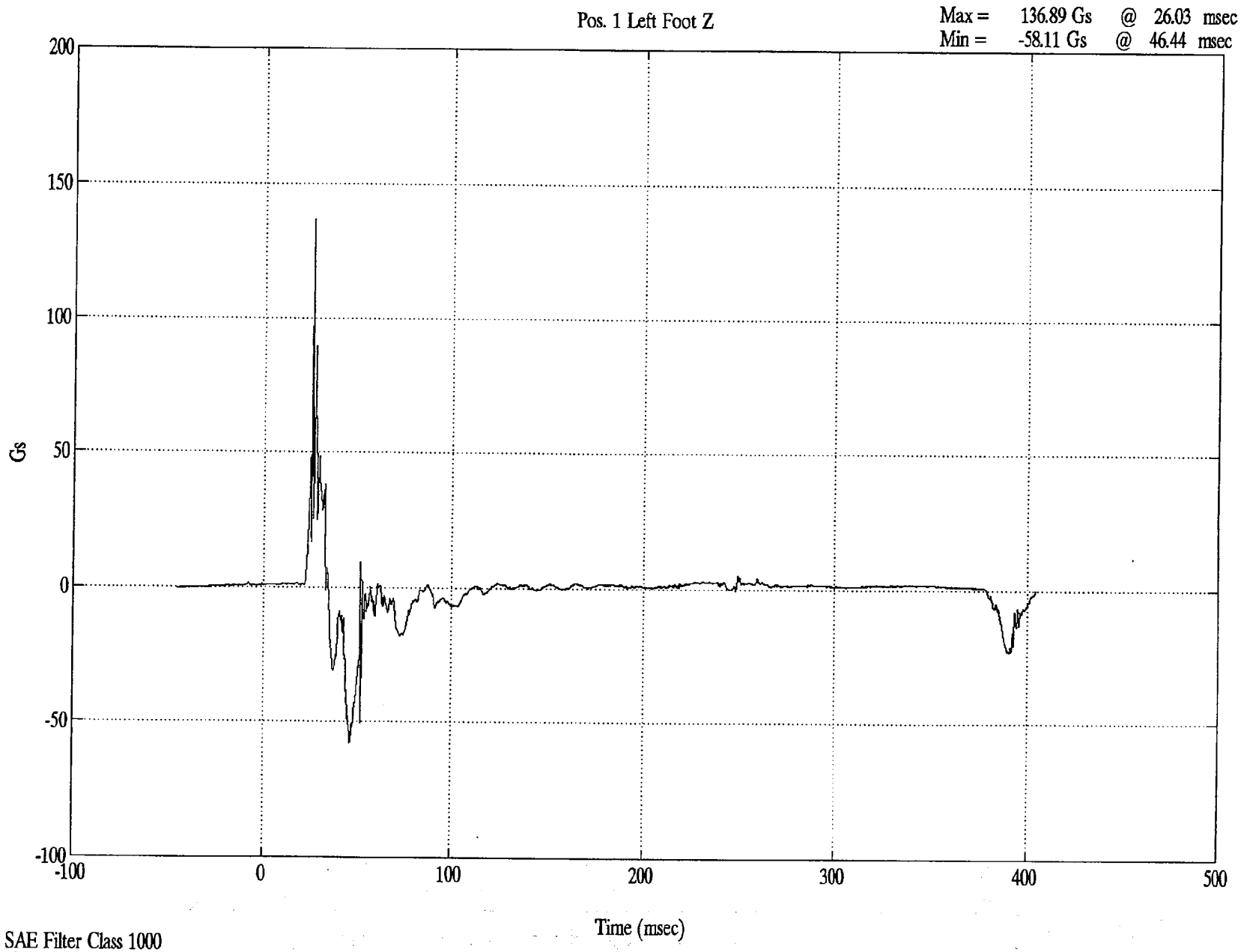
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

8313-13

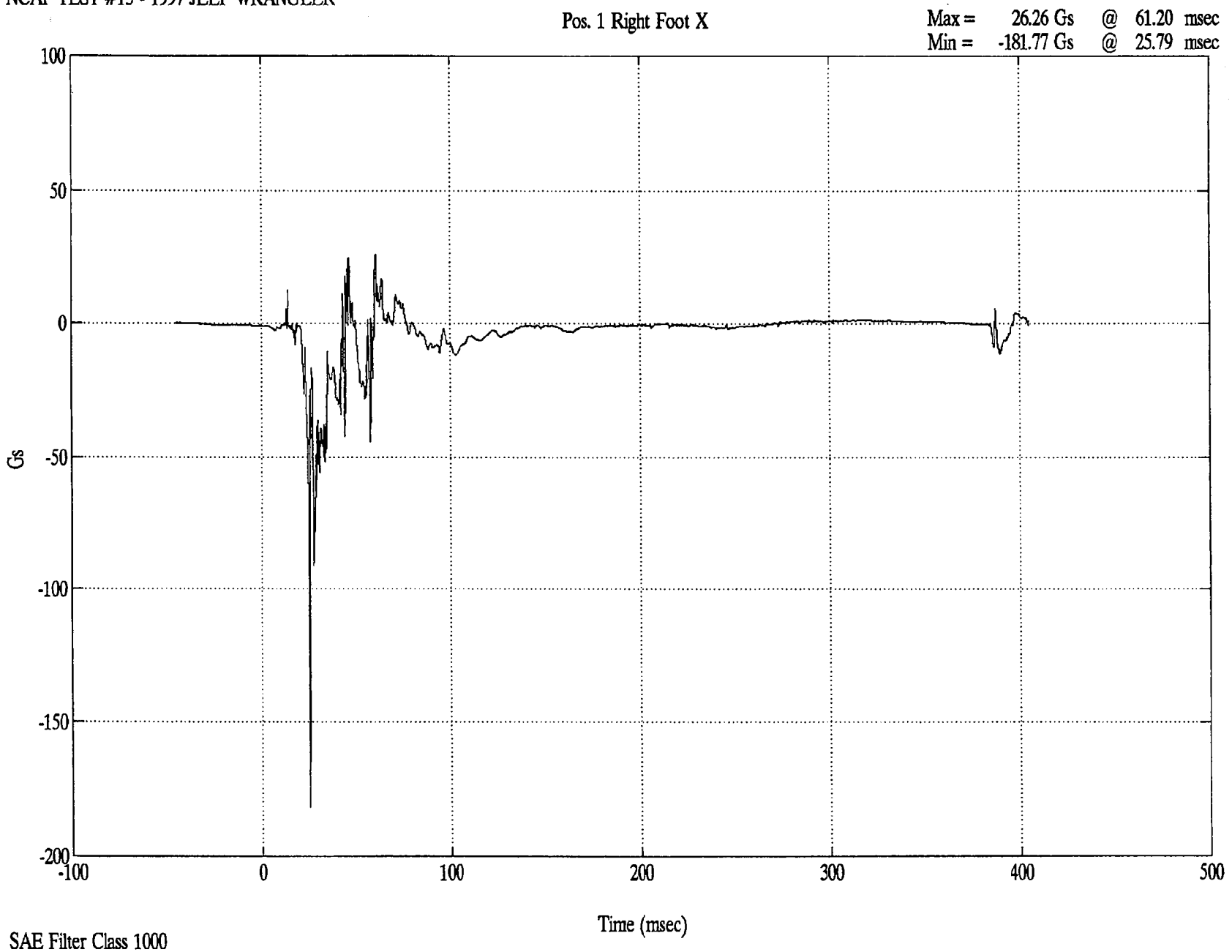
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

8313-13

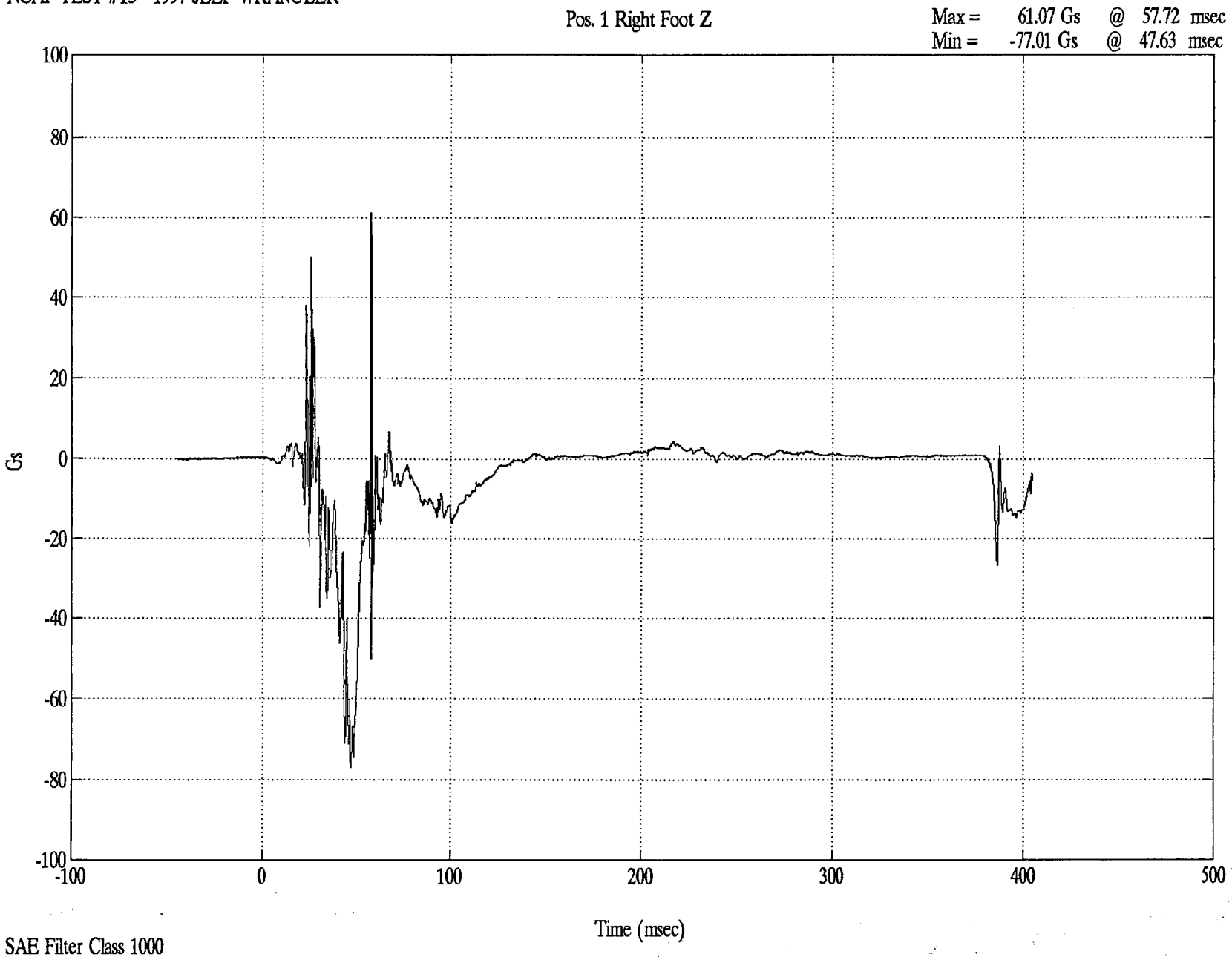
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

8313-13

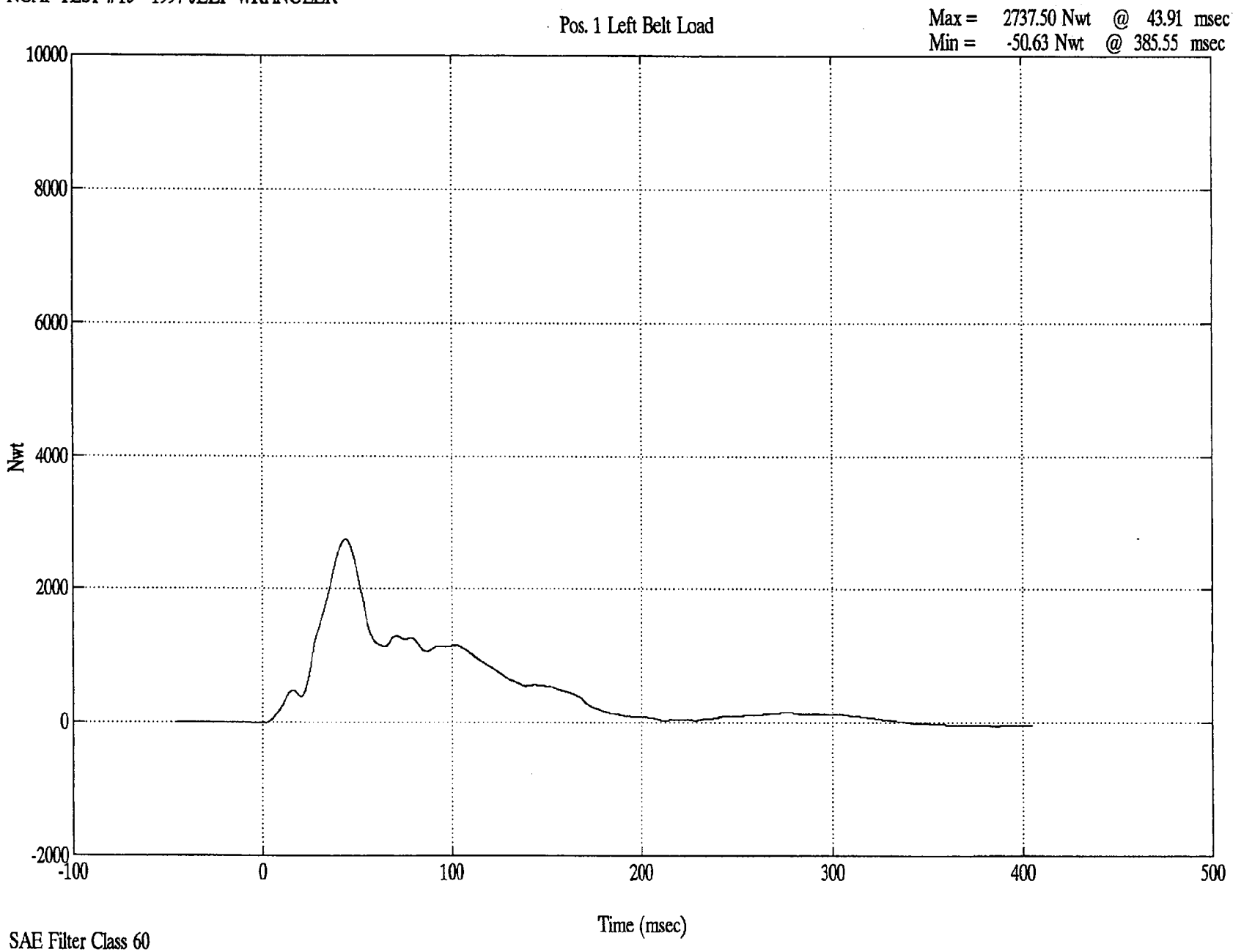
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

8313-13

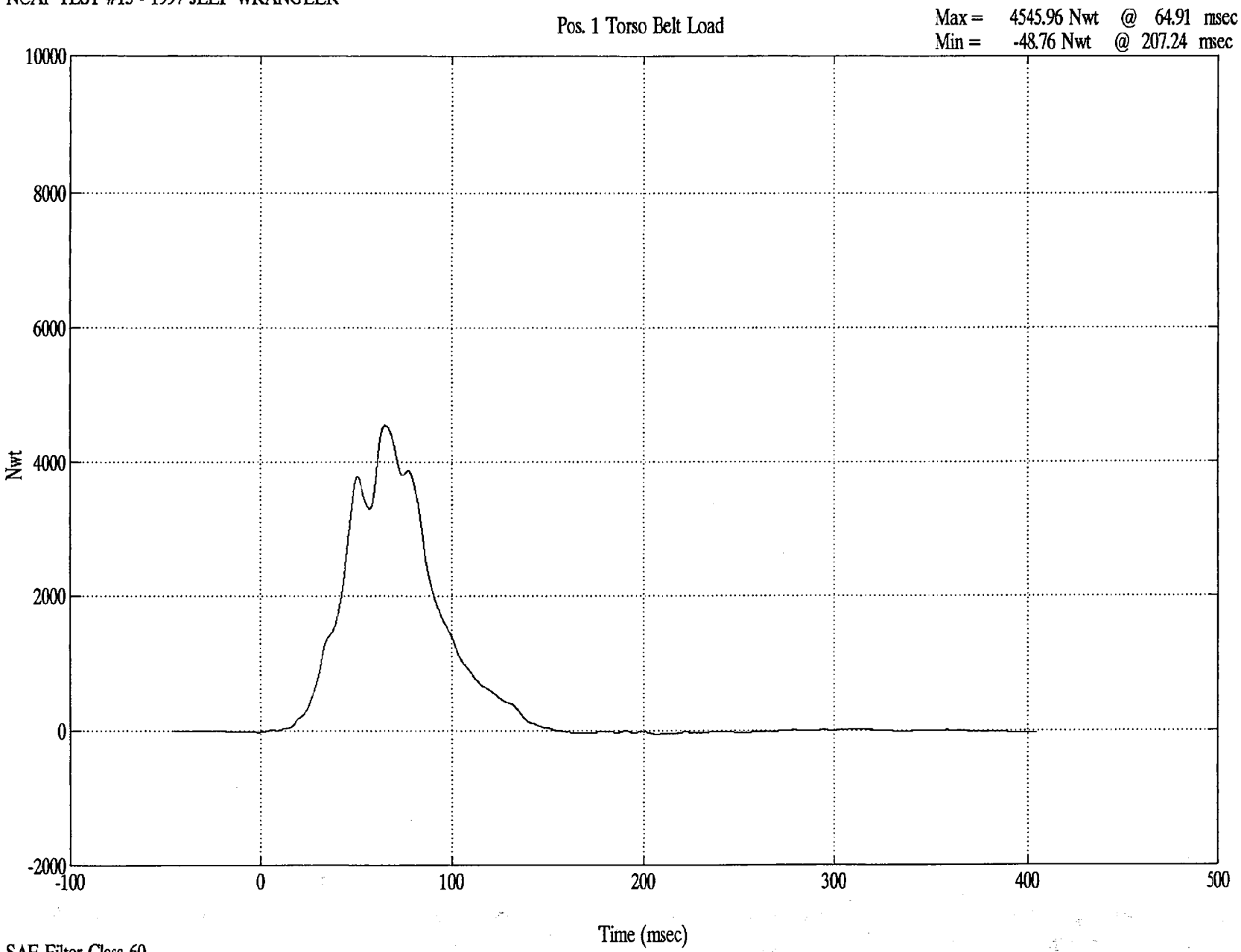
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

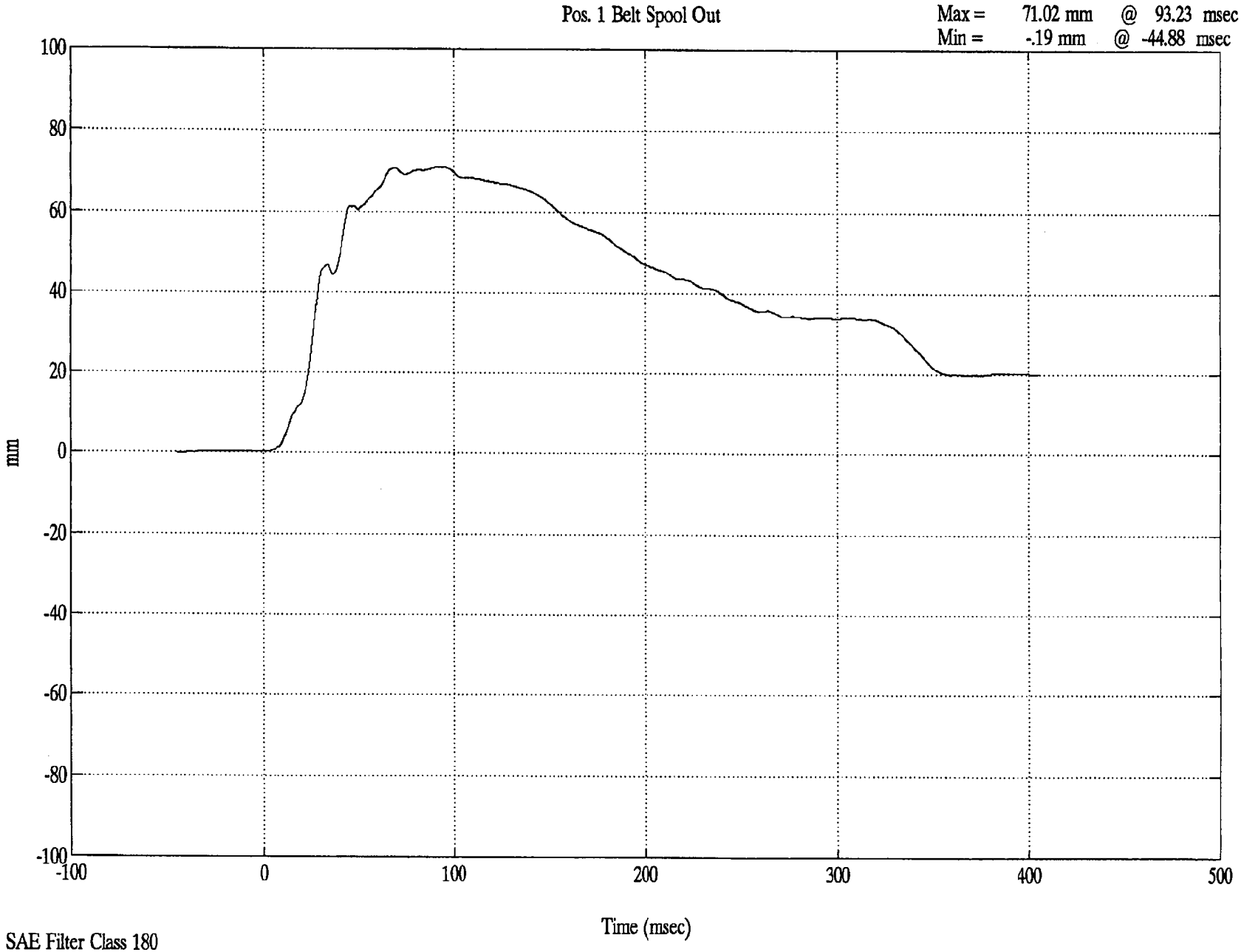
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

NCAP TEST #13 - 1997 JEEP WRANGLER



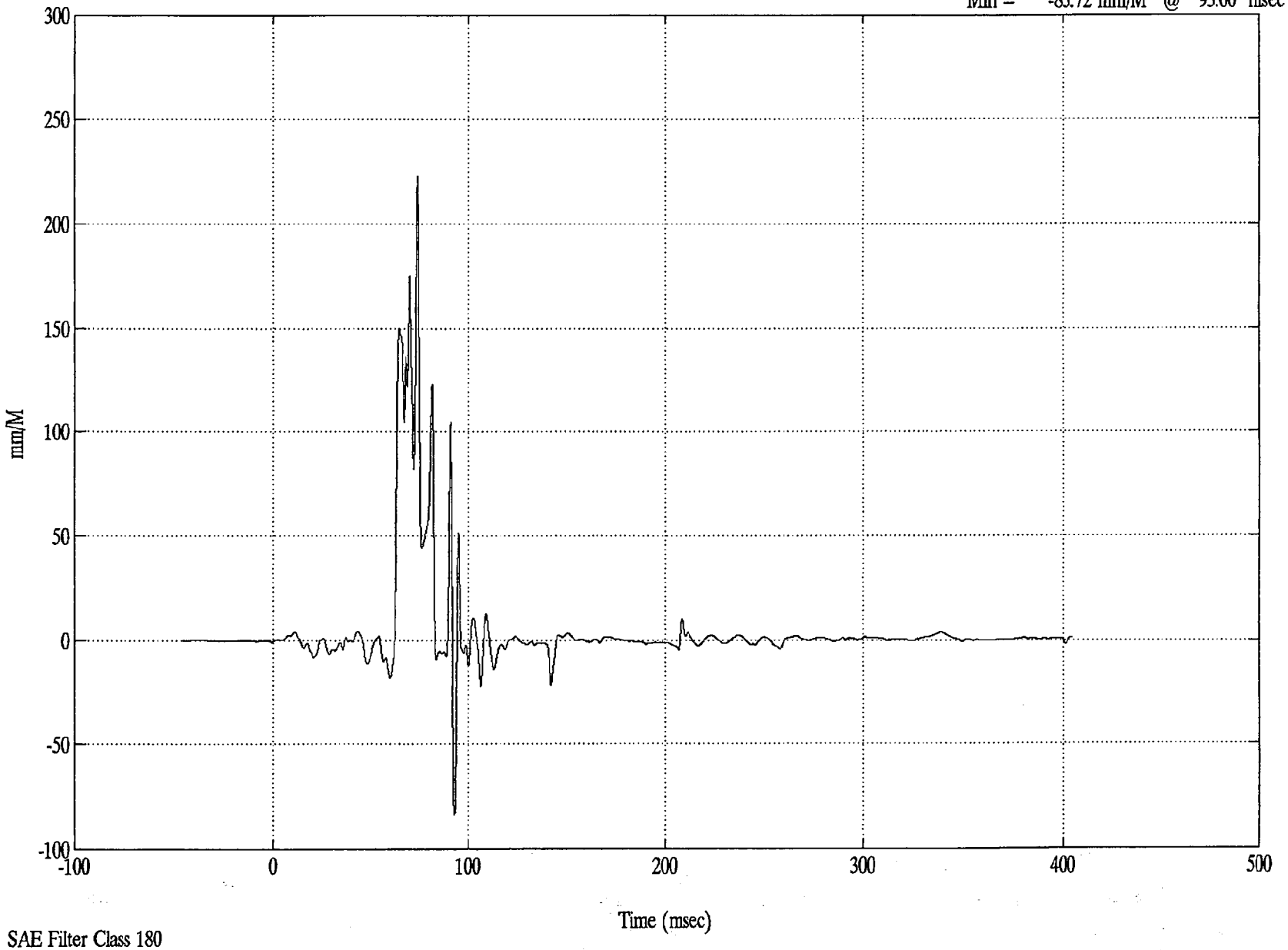
SAE Filter Class 180

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

Pos. 1 Belt Elongation

Max = 222.84 mm/M @ 74.04 msec
Min = -83.72 mm/M @ 93.00 msec

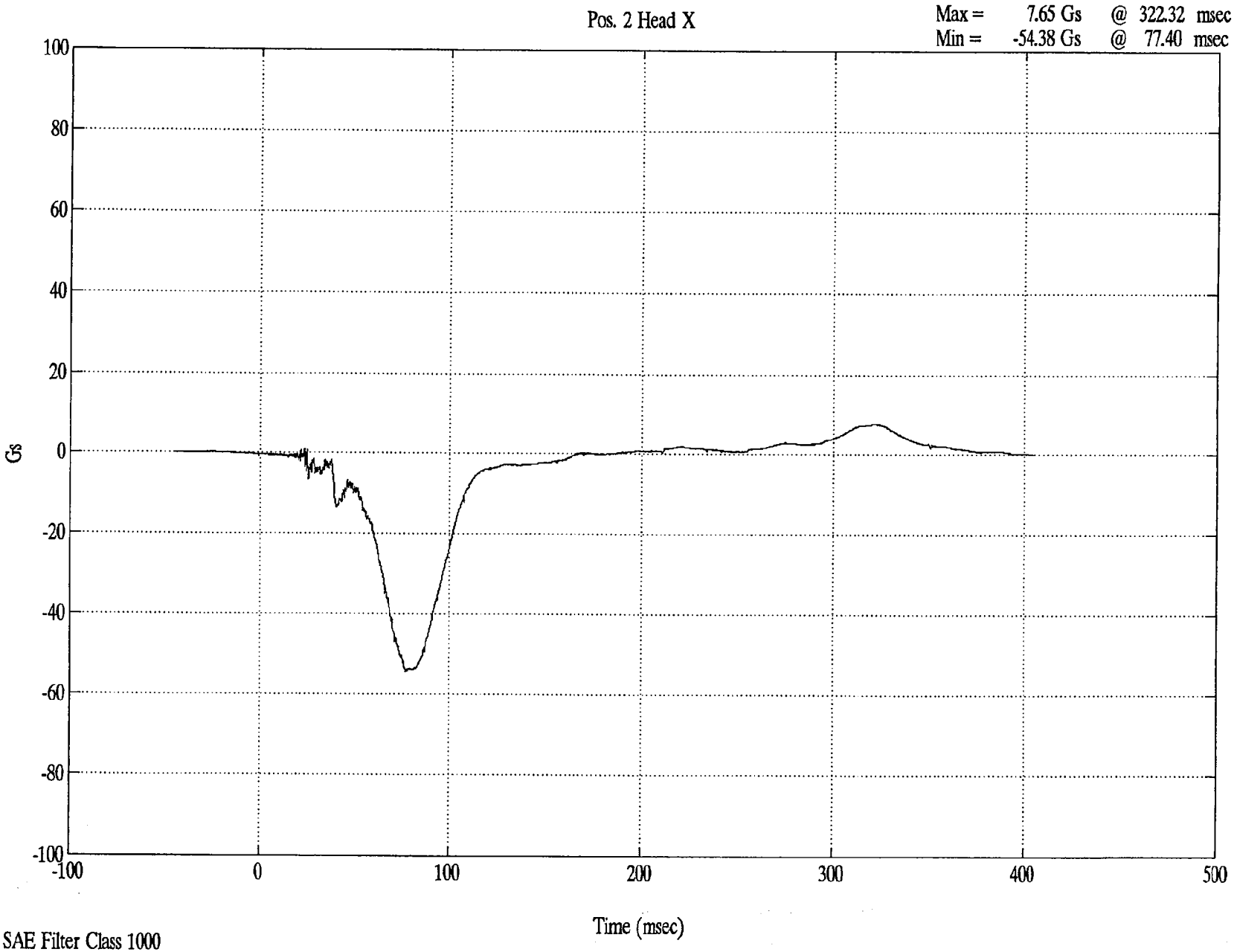


SAE Filter Class 180

B-52

8313-13

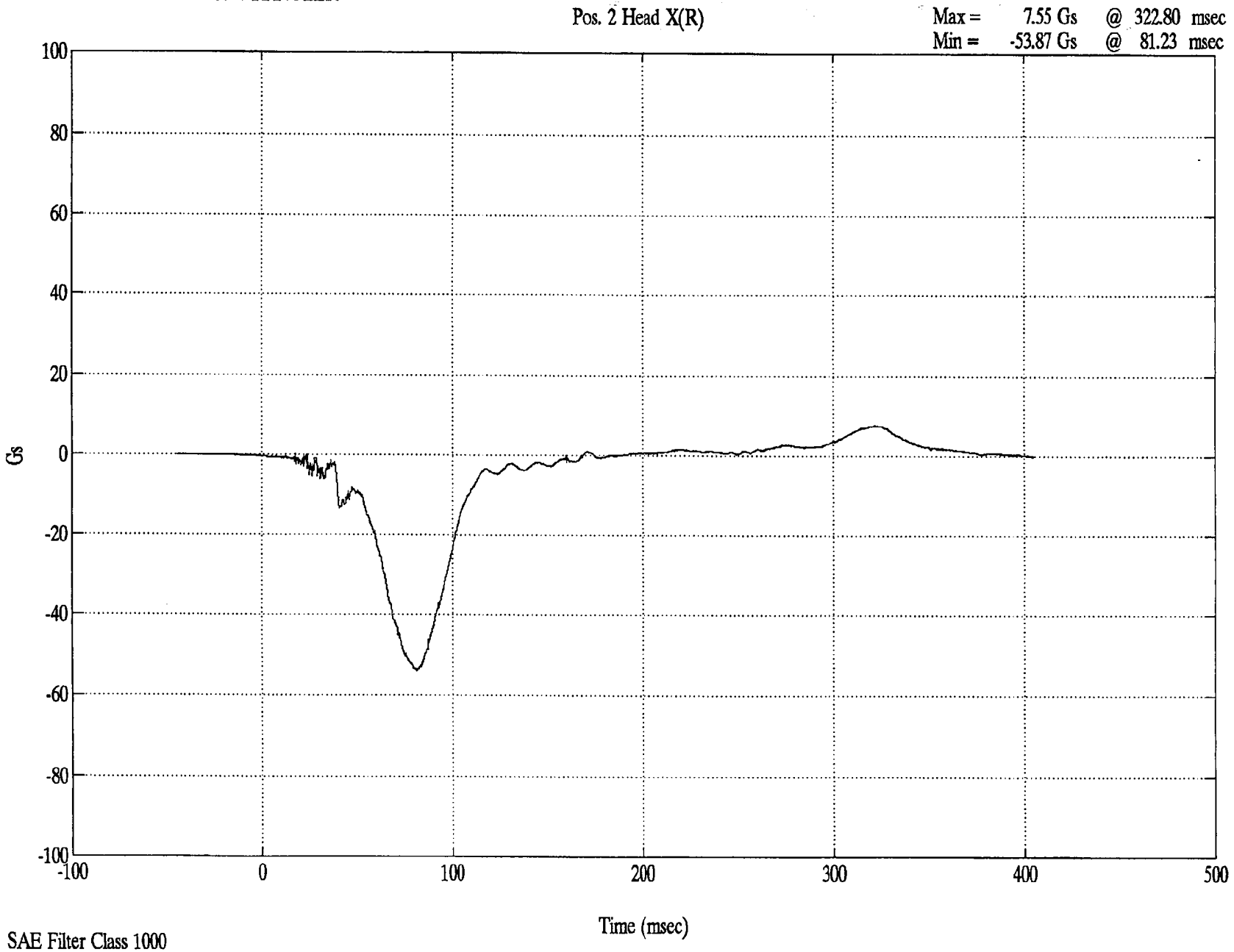
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

8313-13

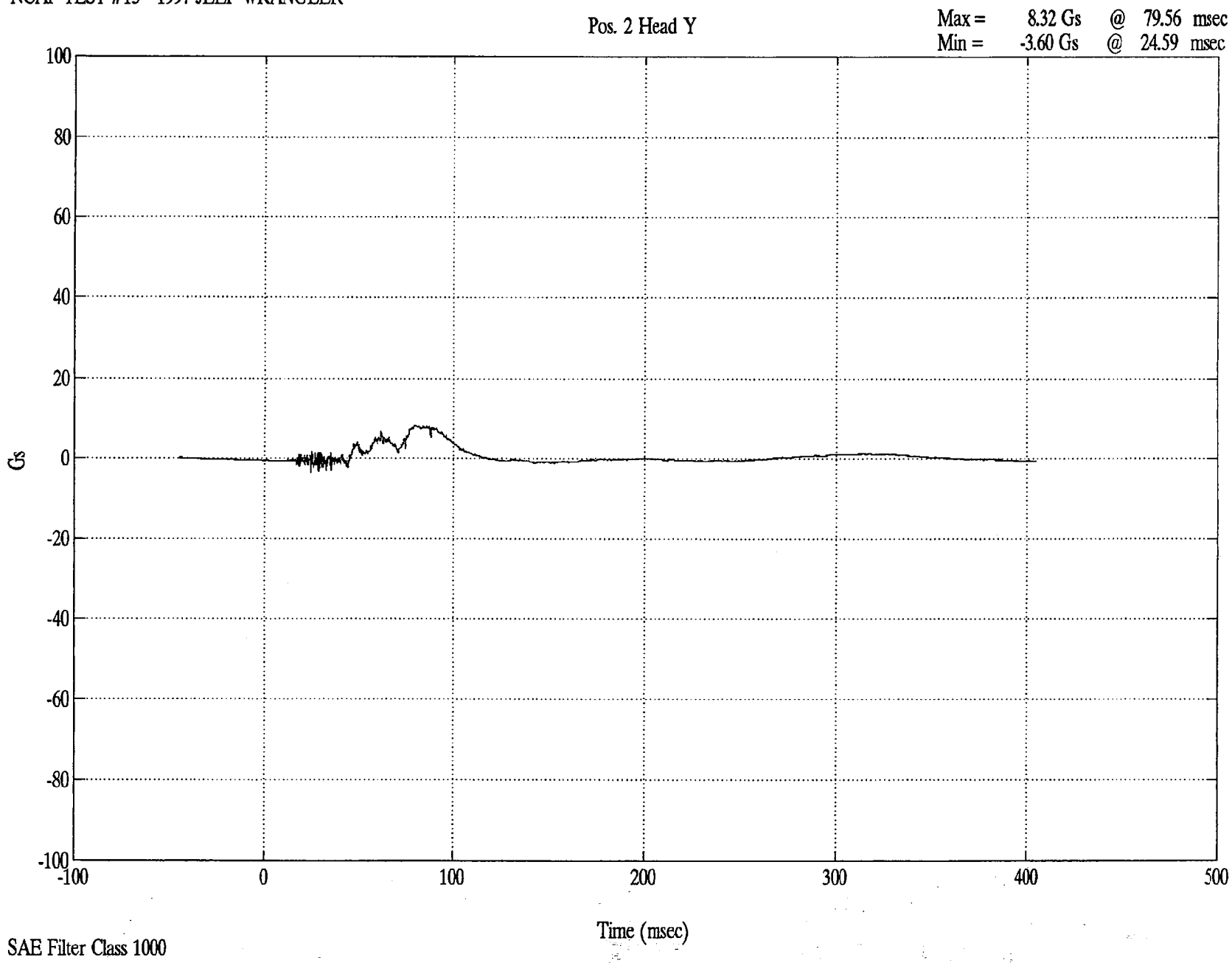
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

8313-13

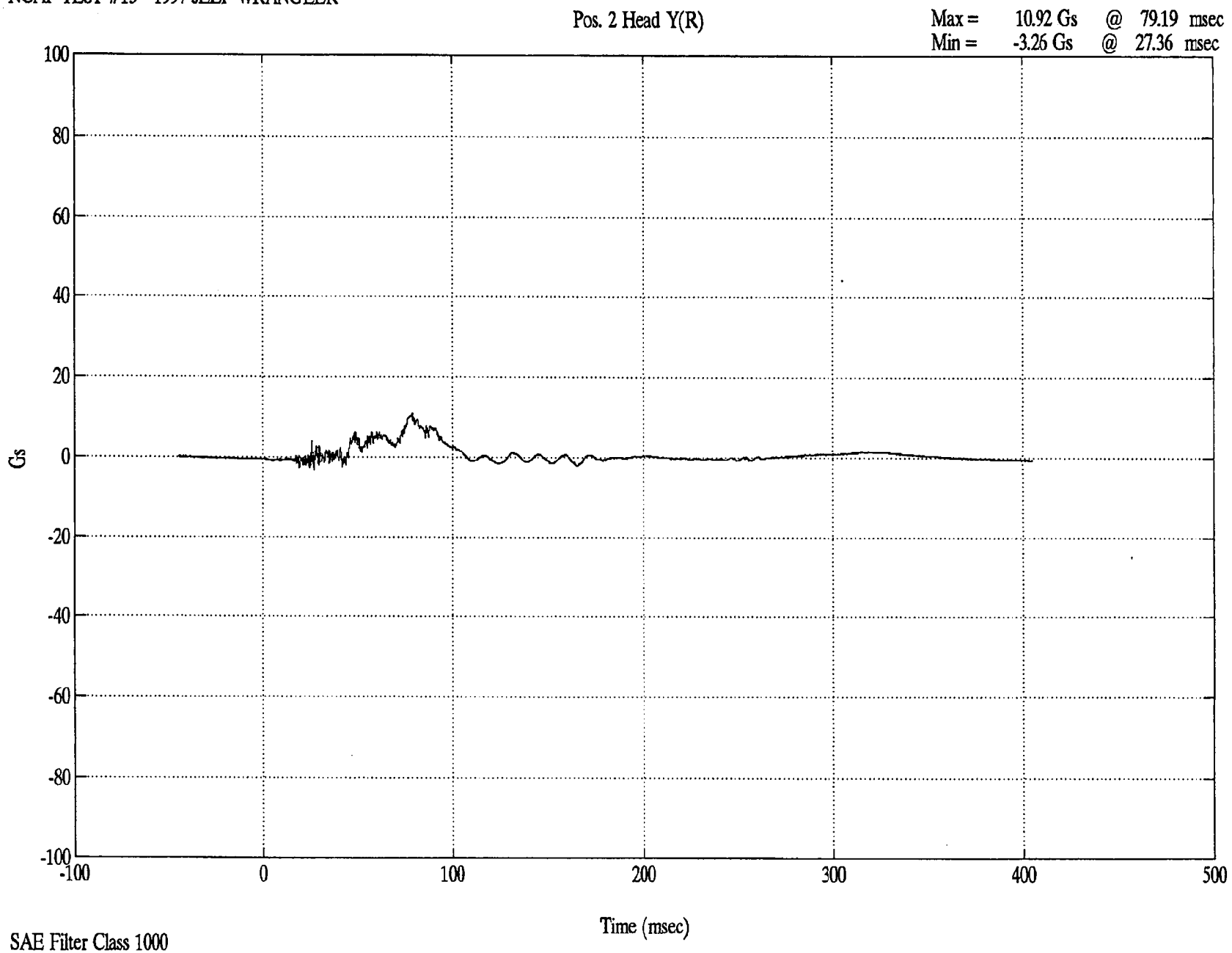
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

8313-13

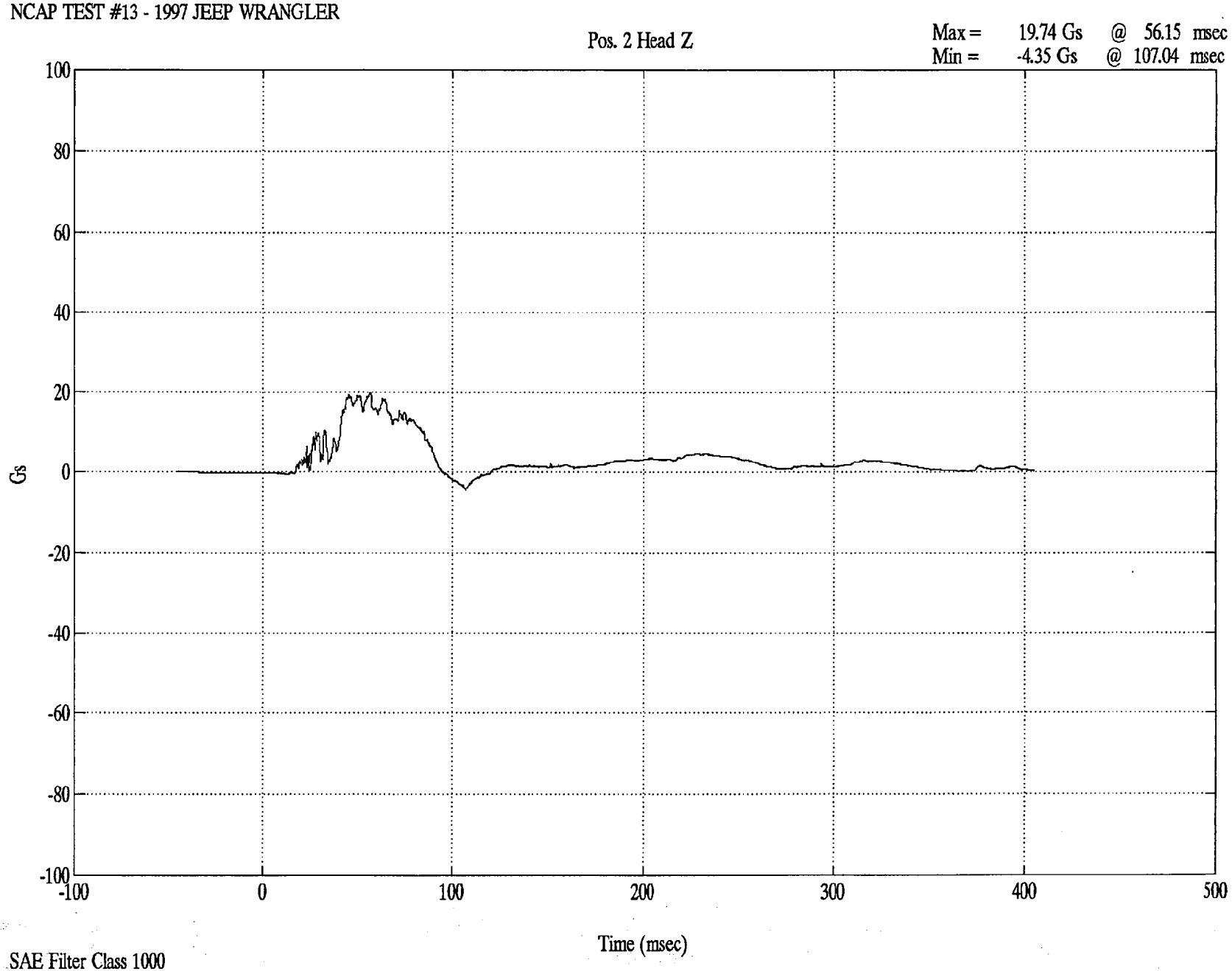
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

8313-13

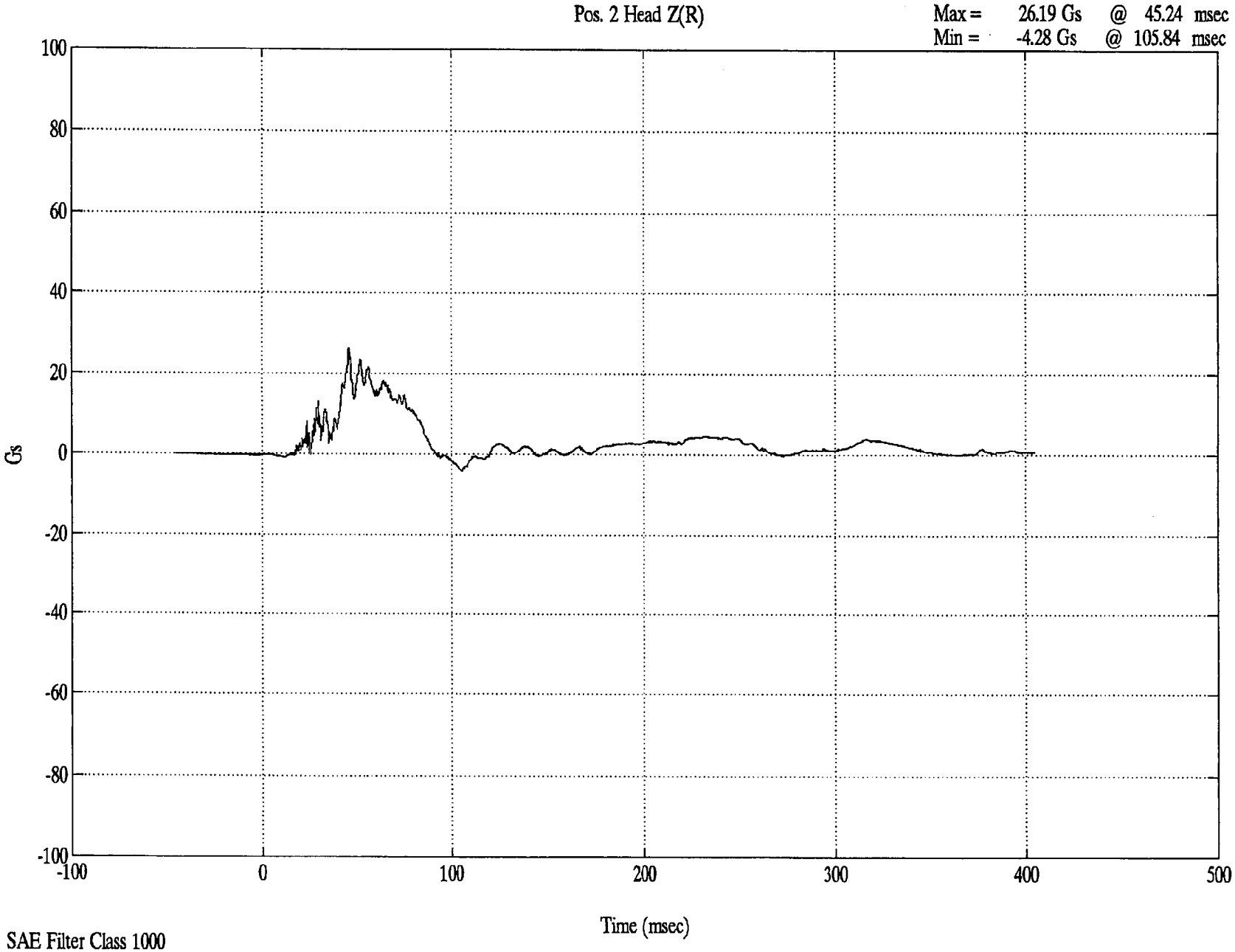
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

8313-13

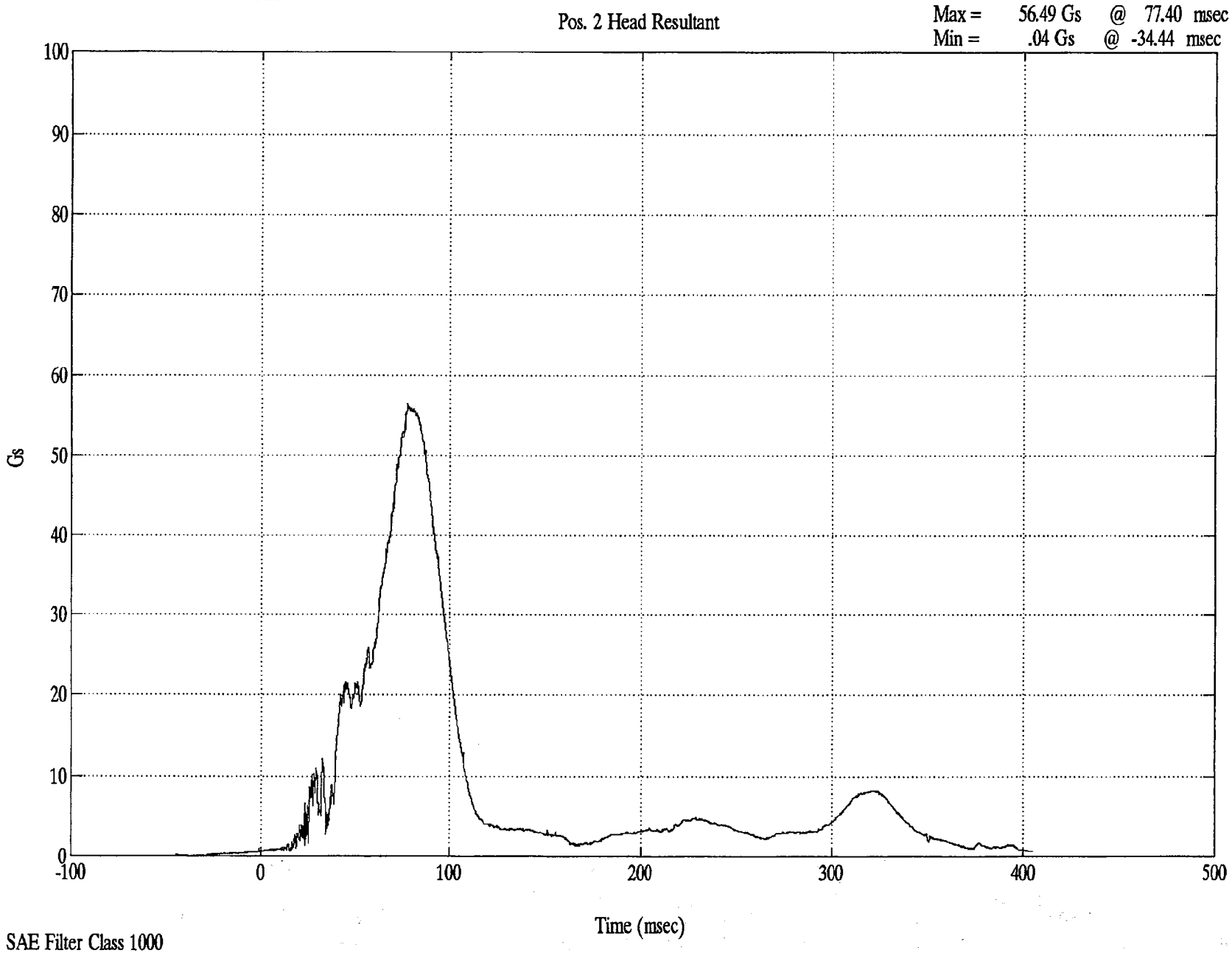
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

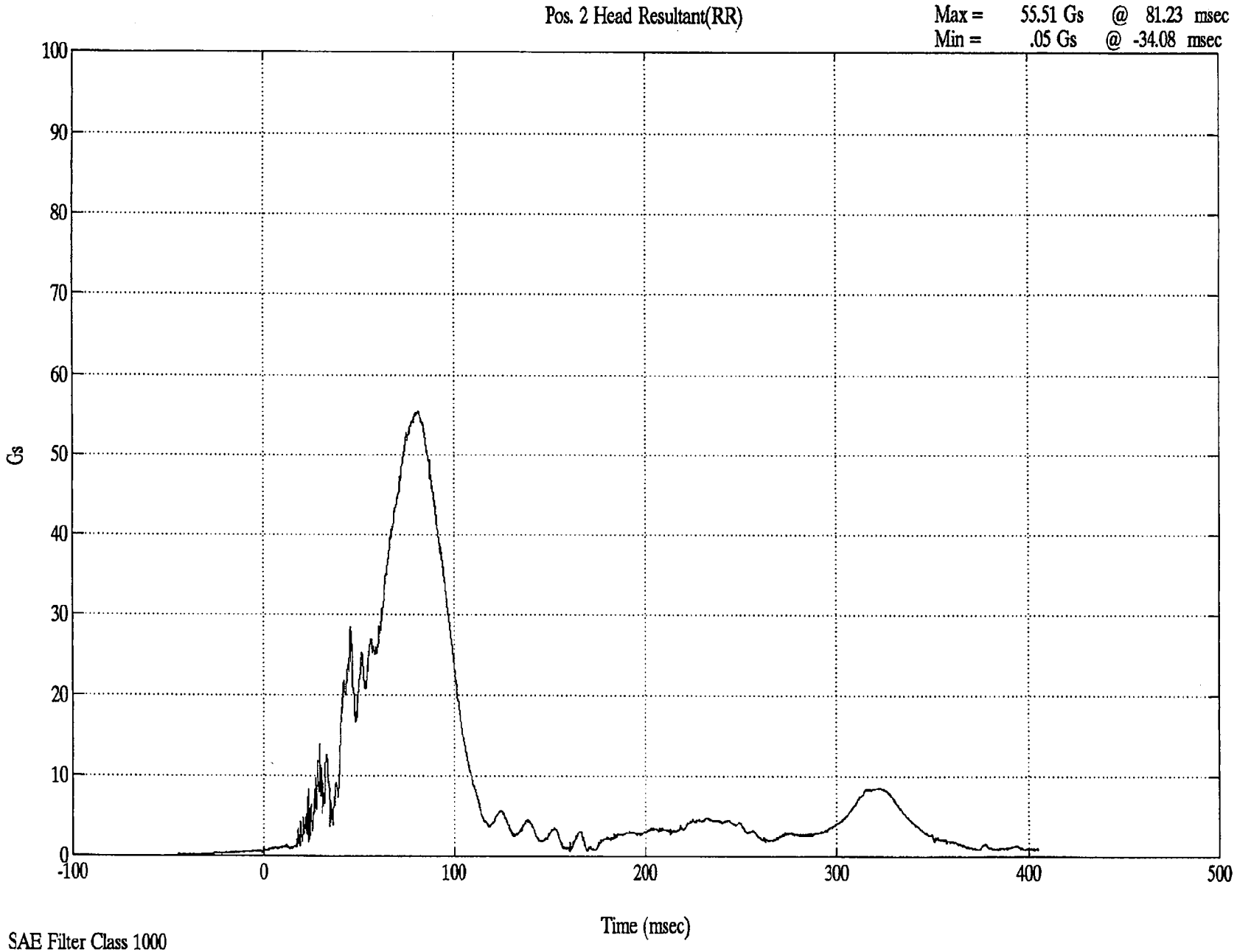
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

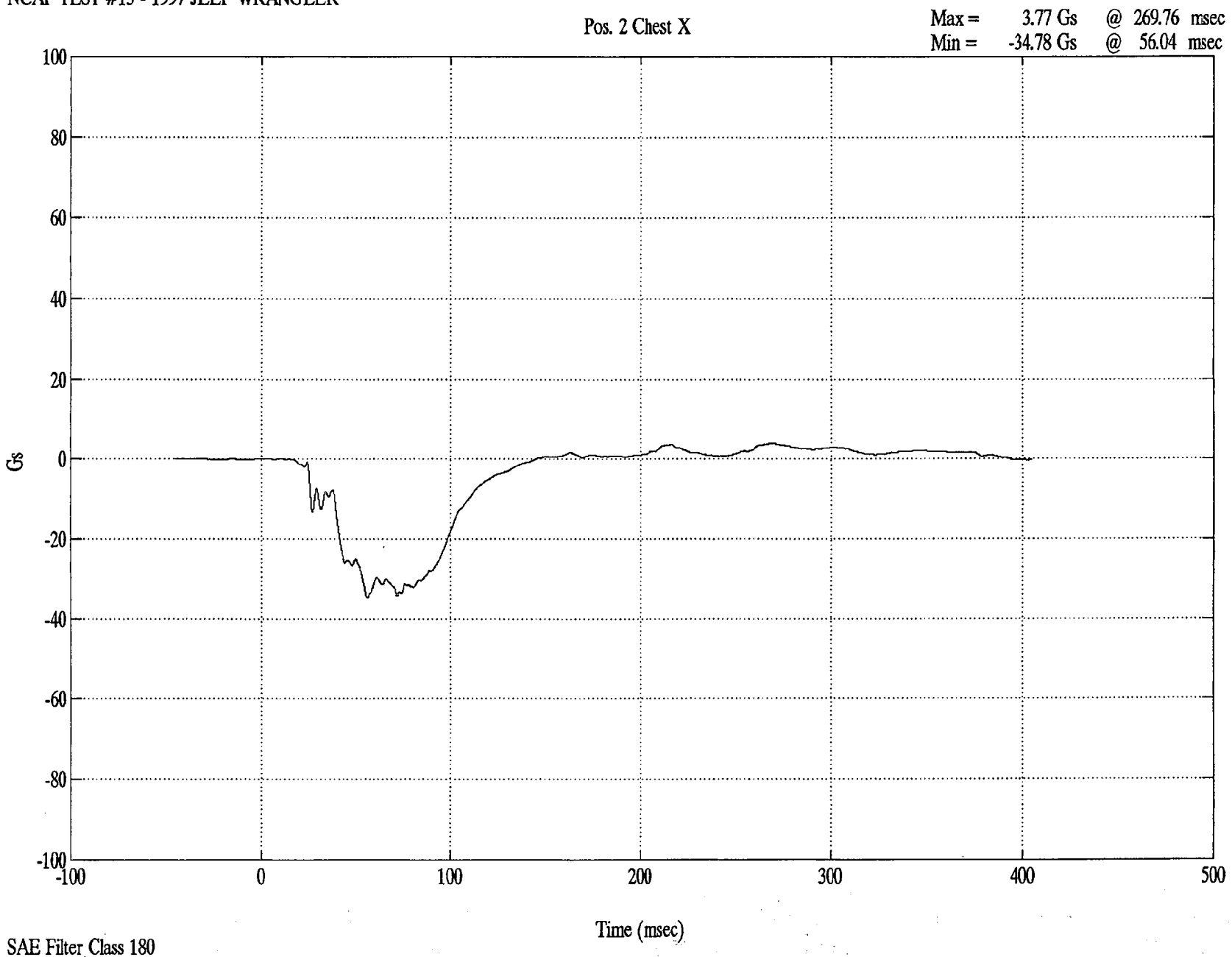
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 1000

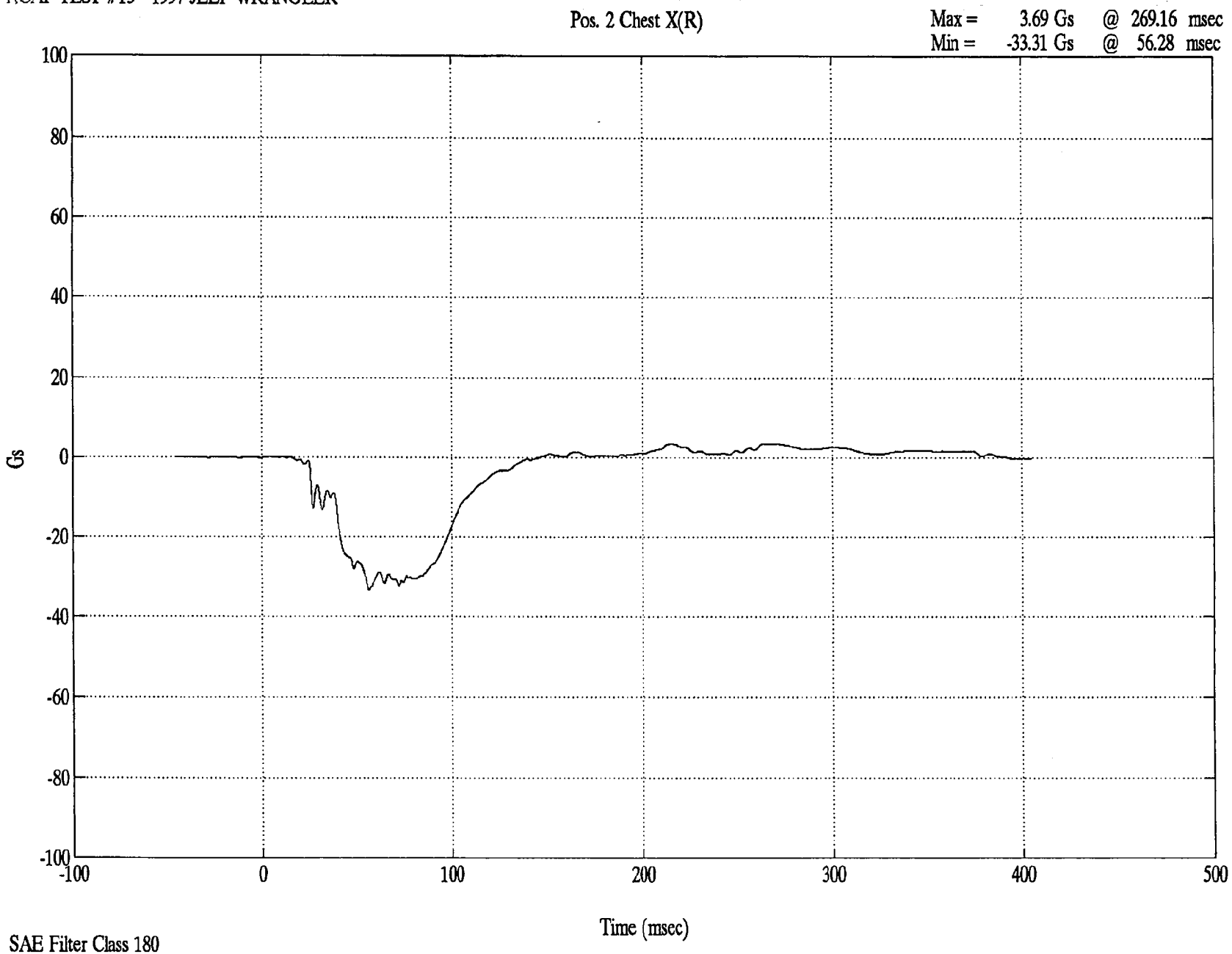
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

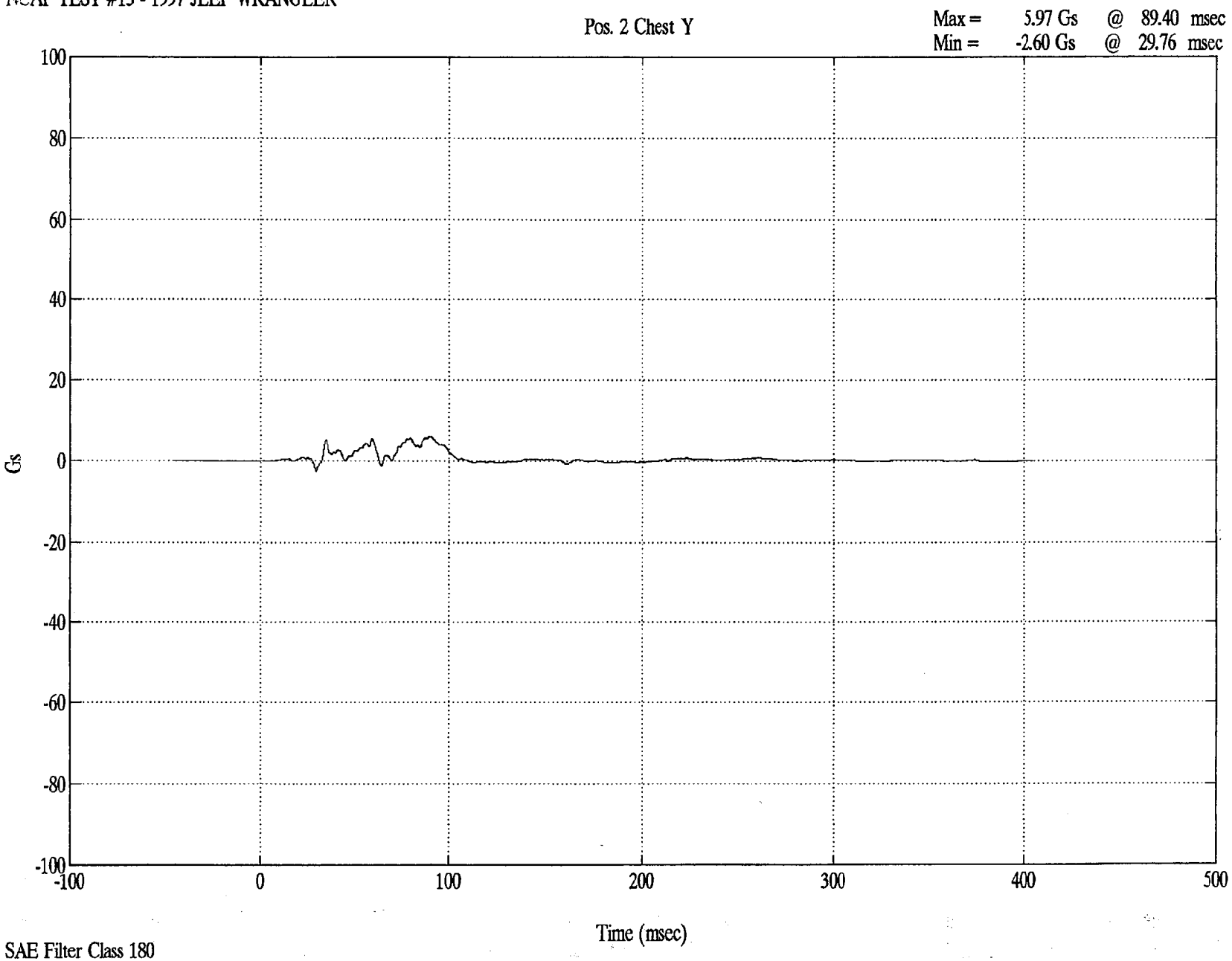
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

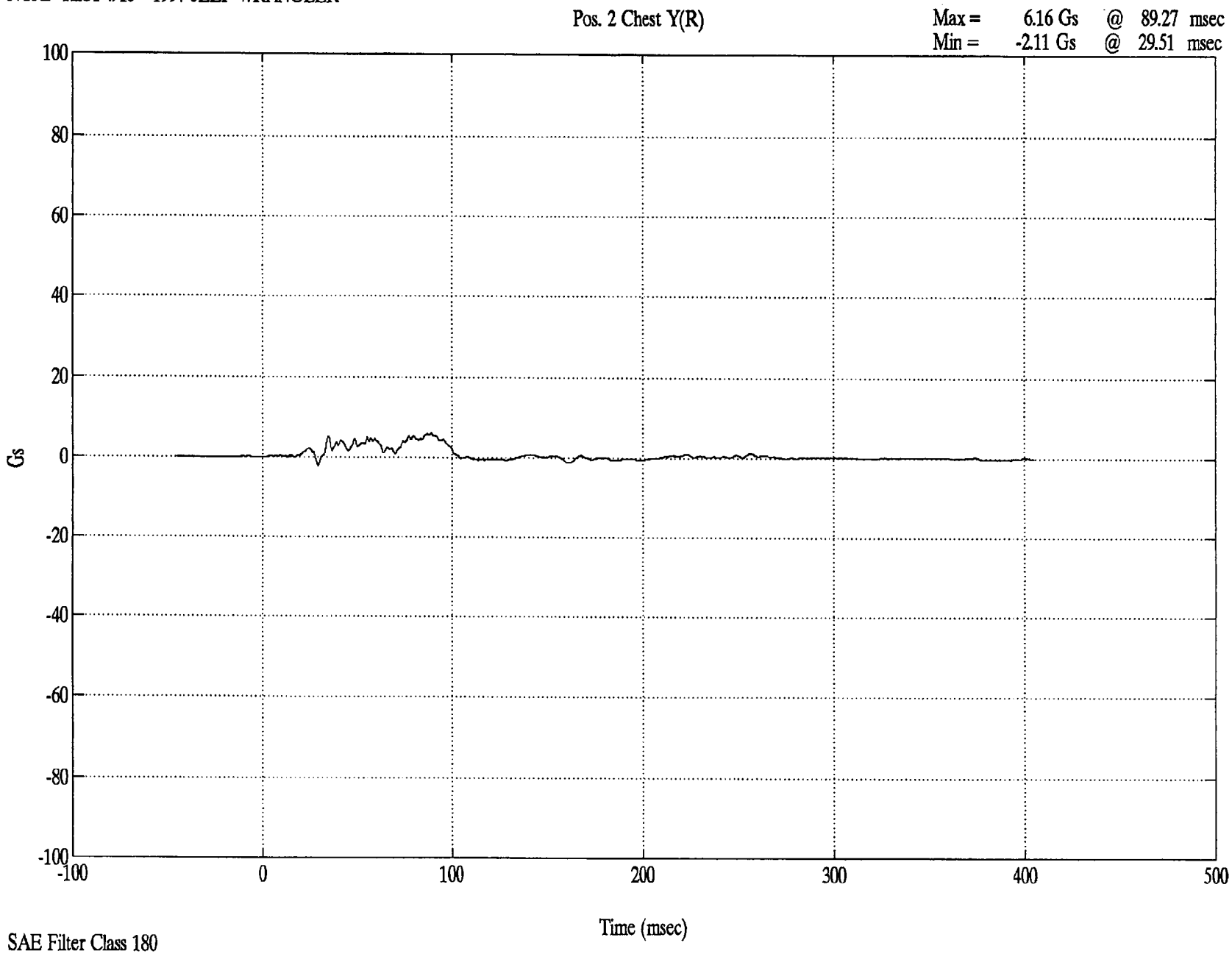
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

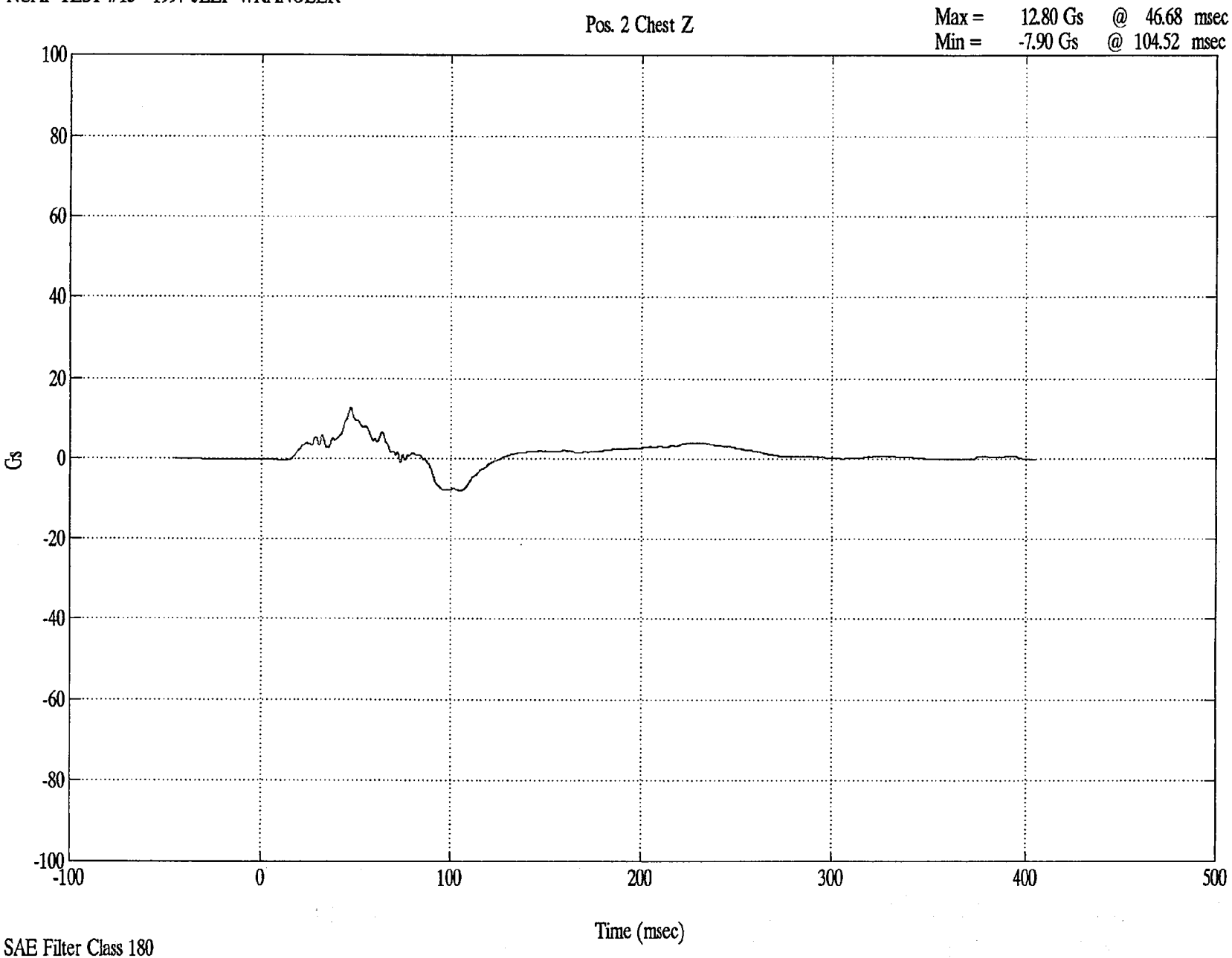
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

8313-13

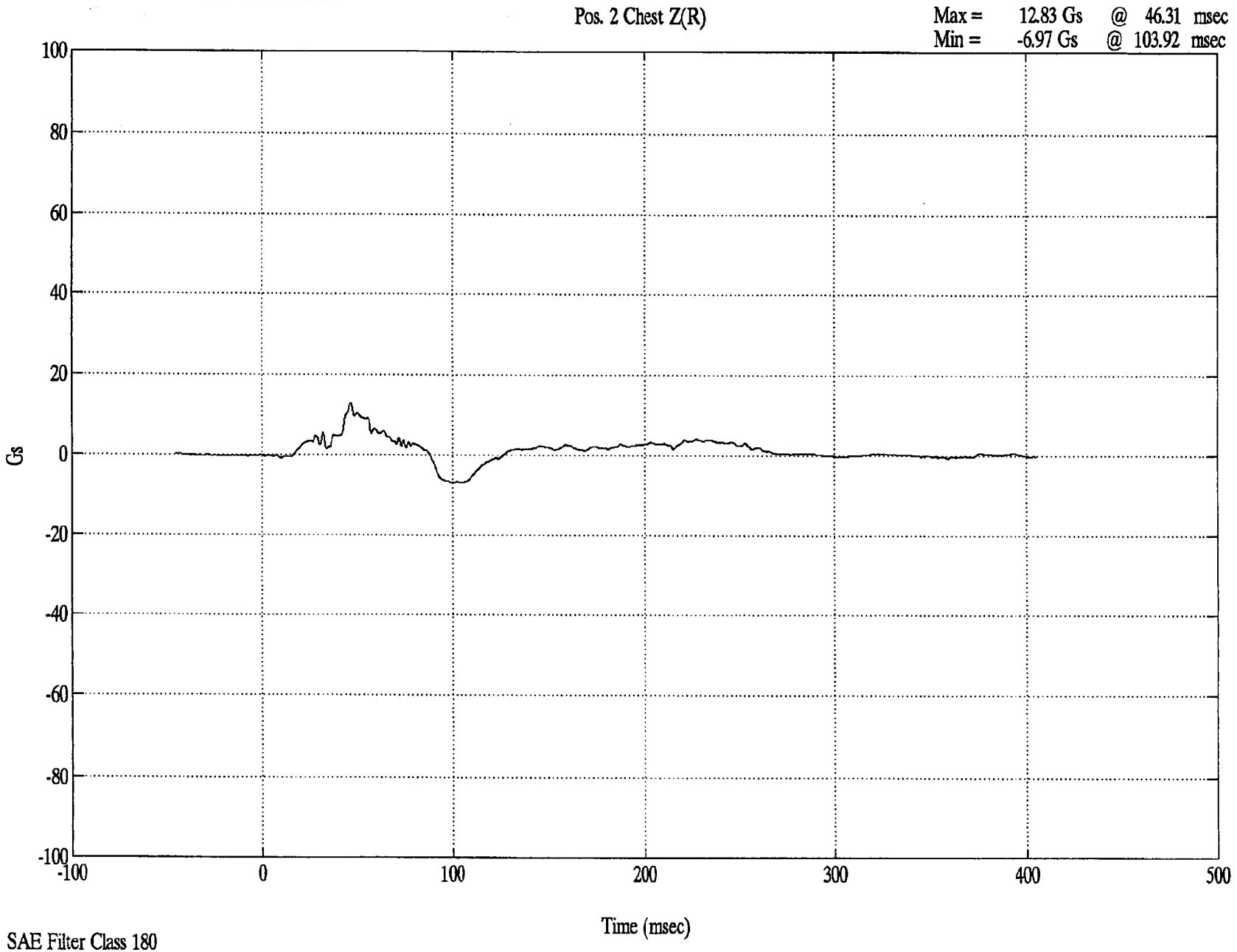
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

8313-13

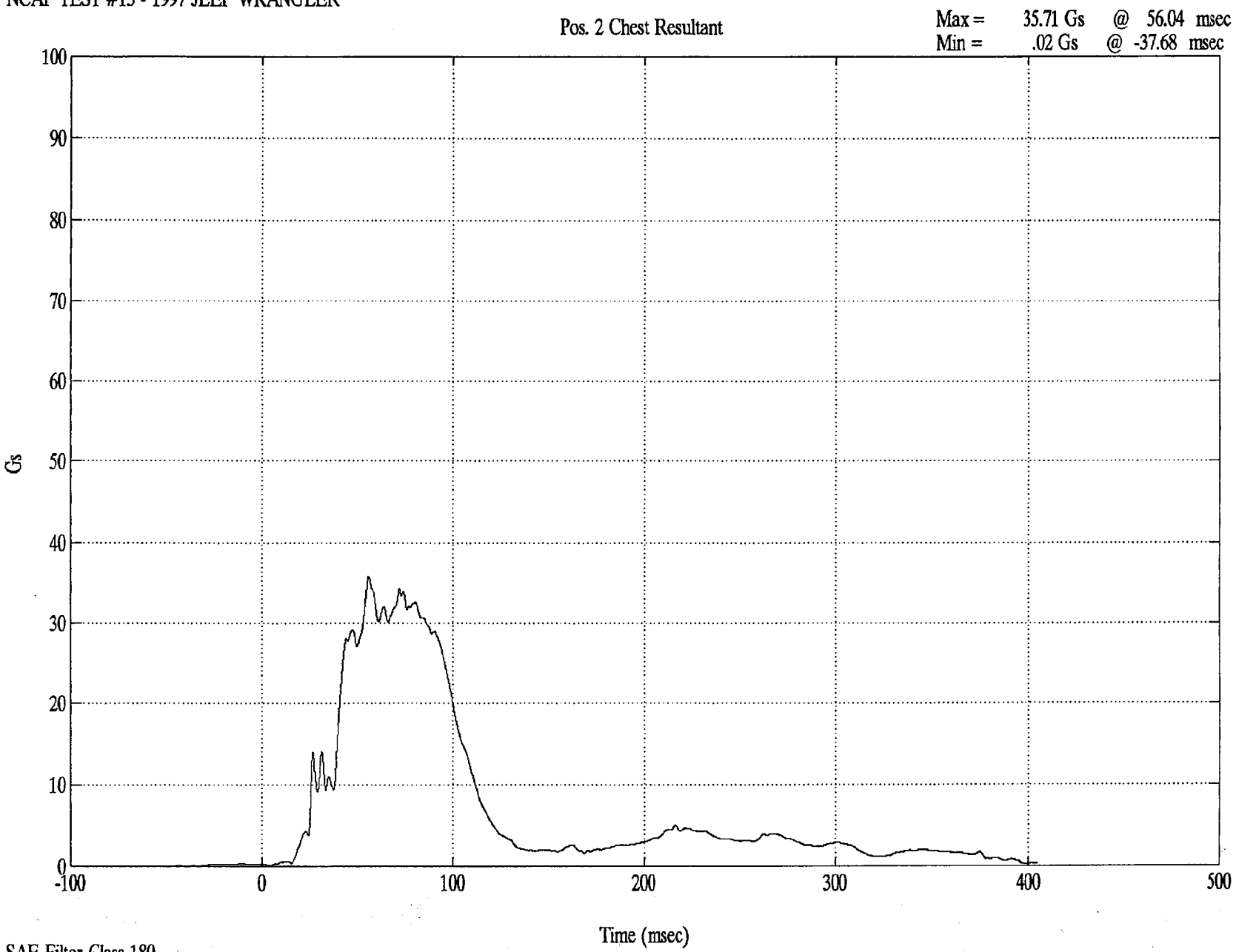
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

8313-13

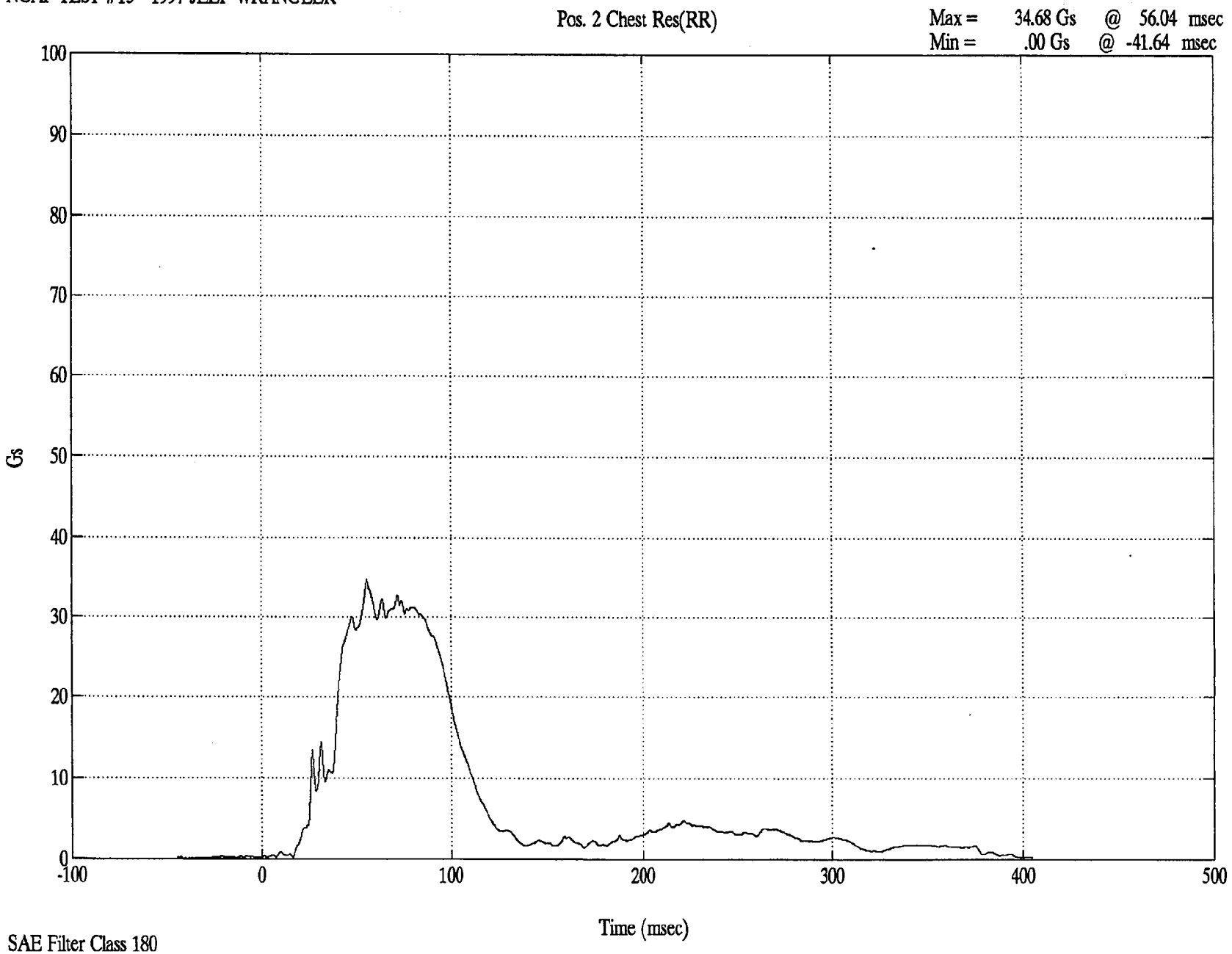
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

8313-13

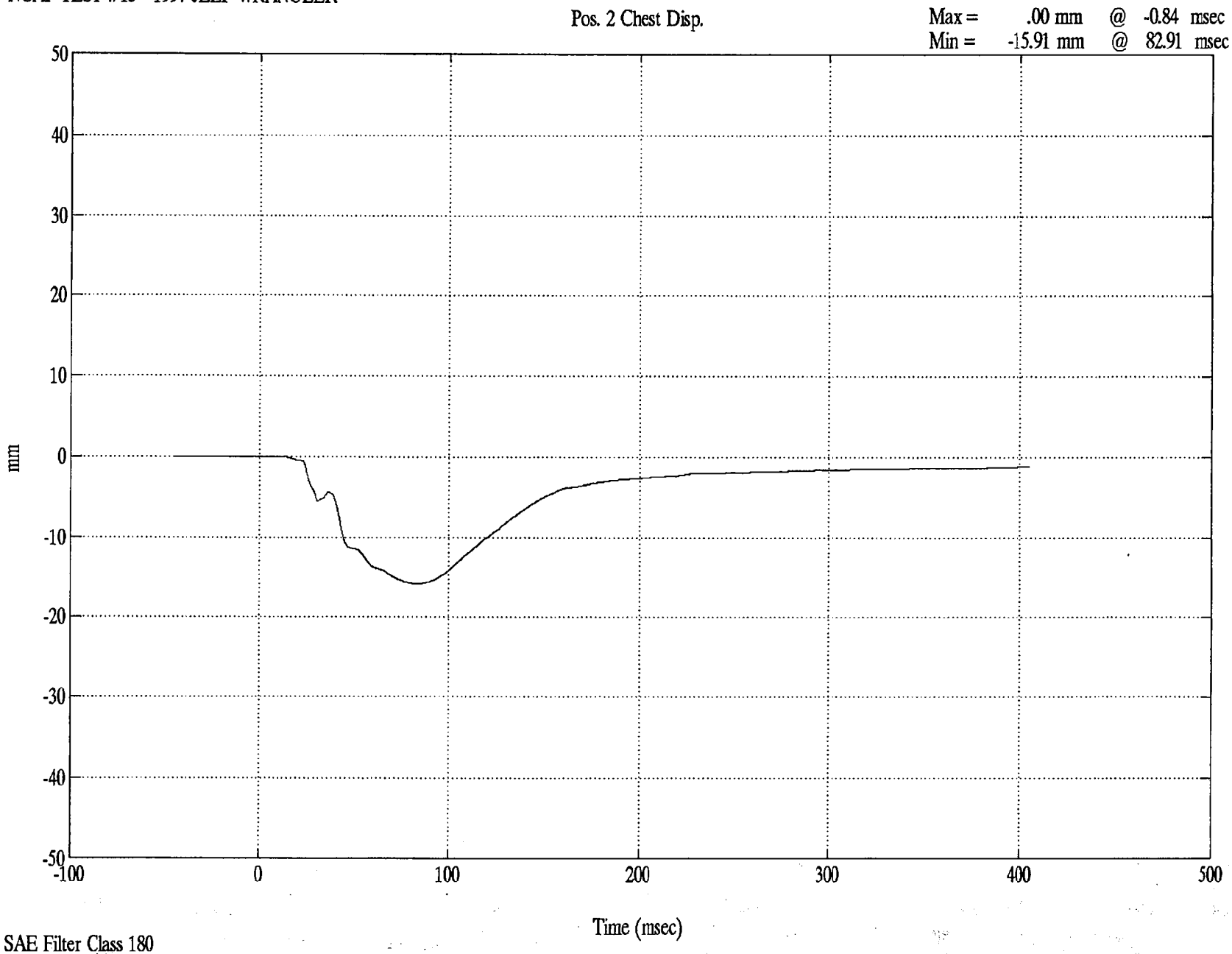
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

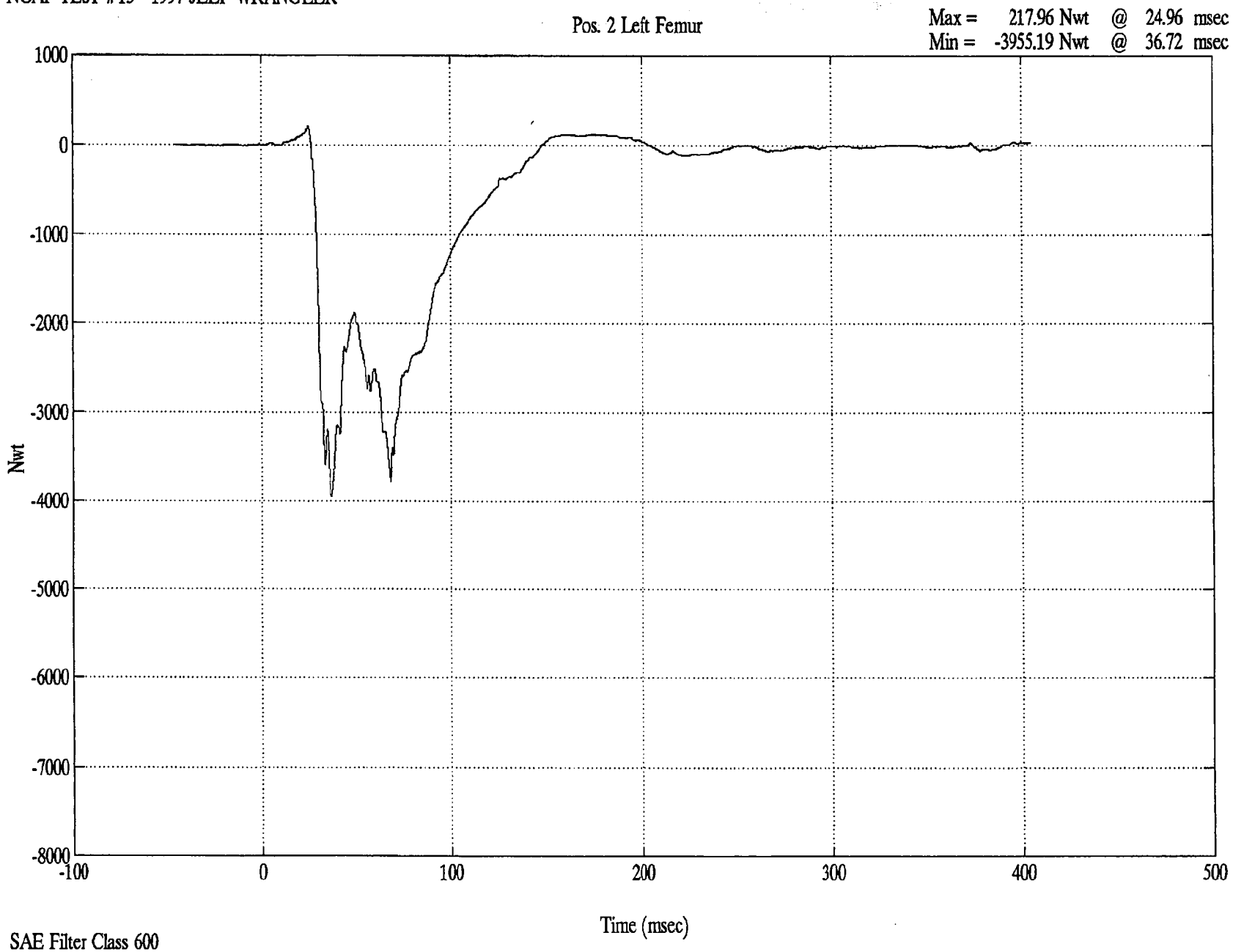
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

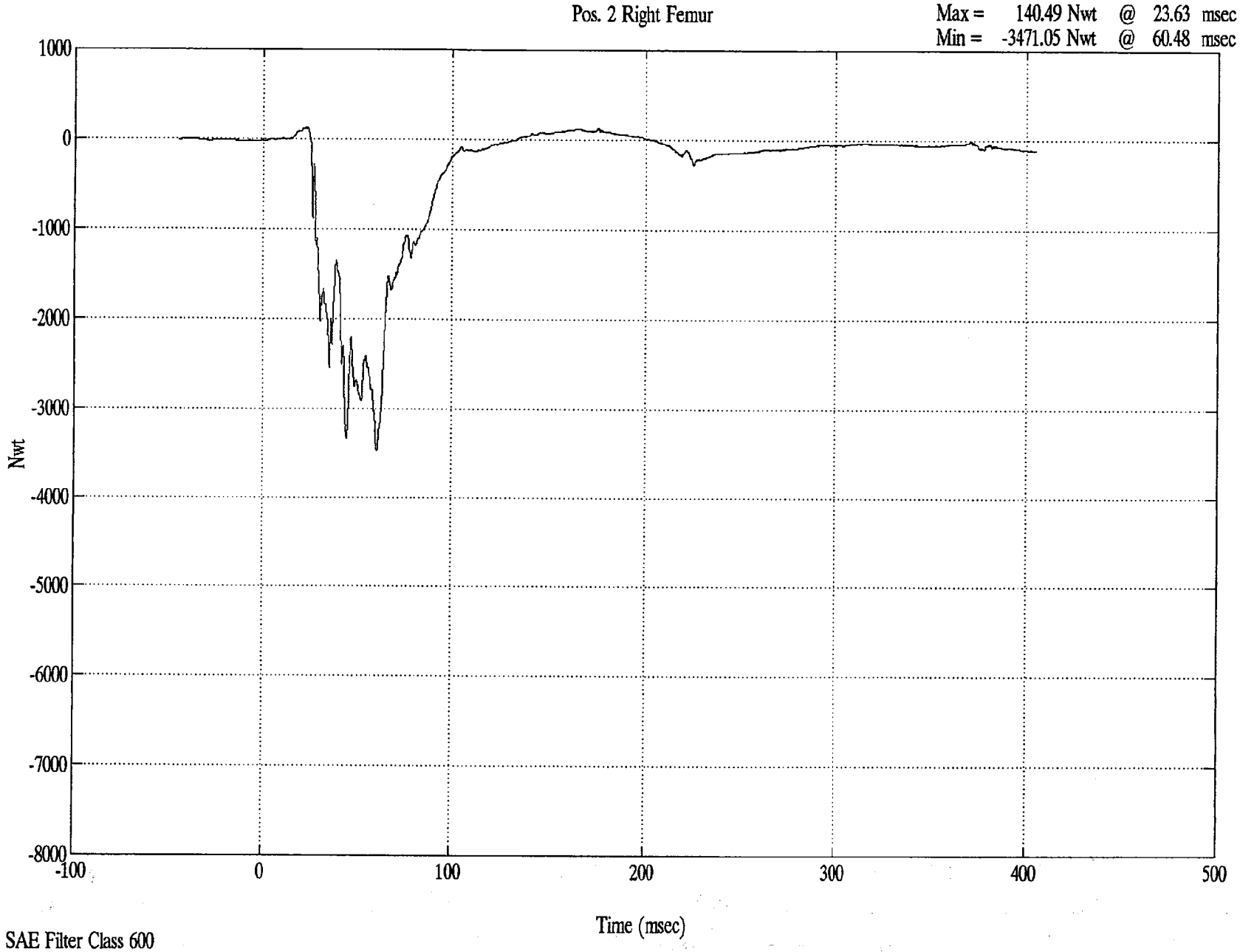
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

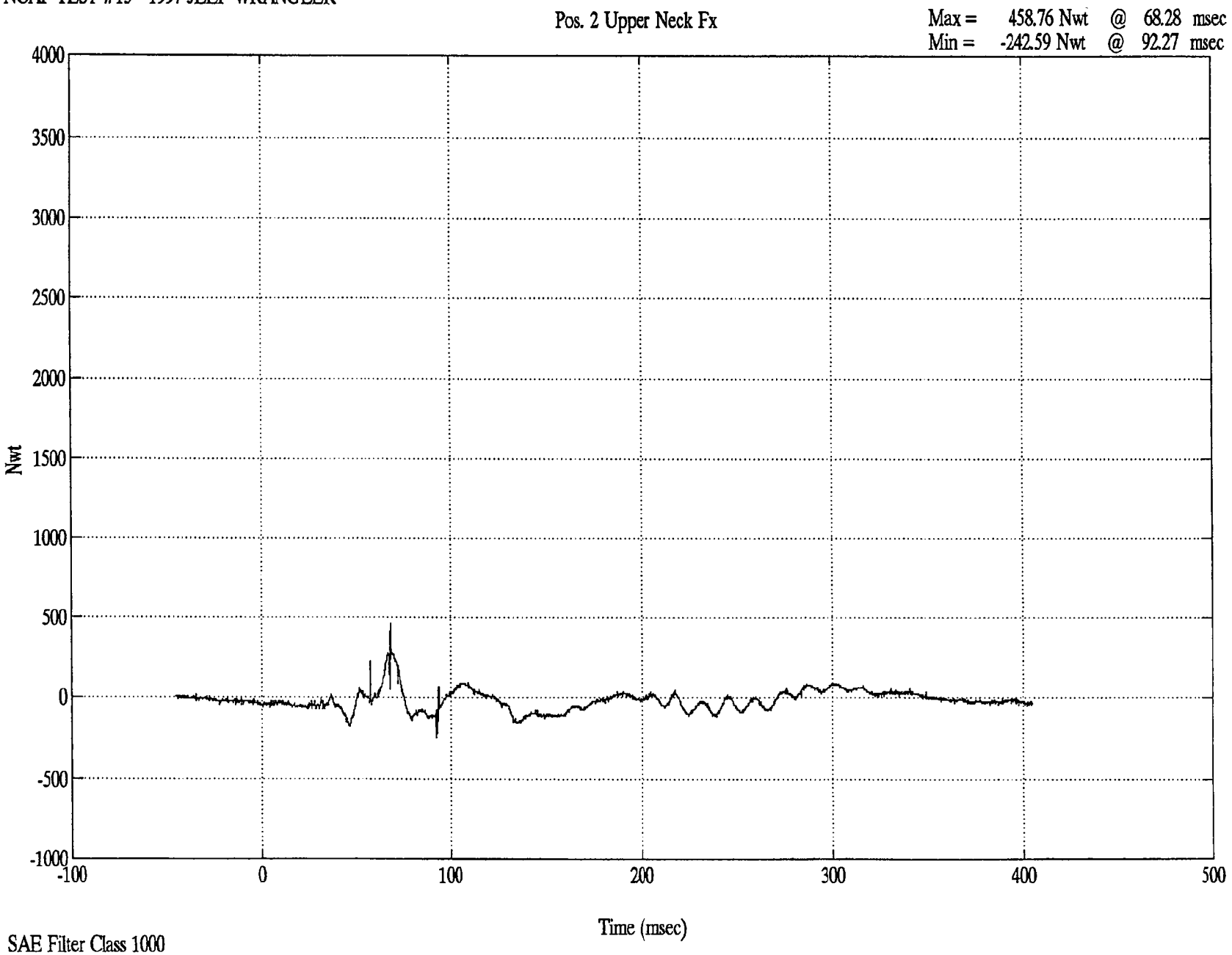
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

NCAP TEST #13 - 1997 JEEP WRANGLER



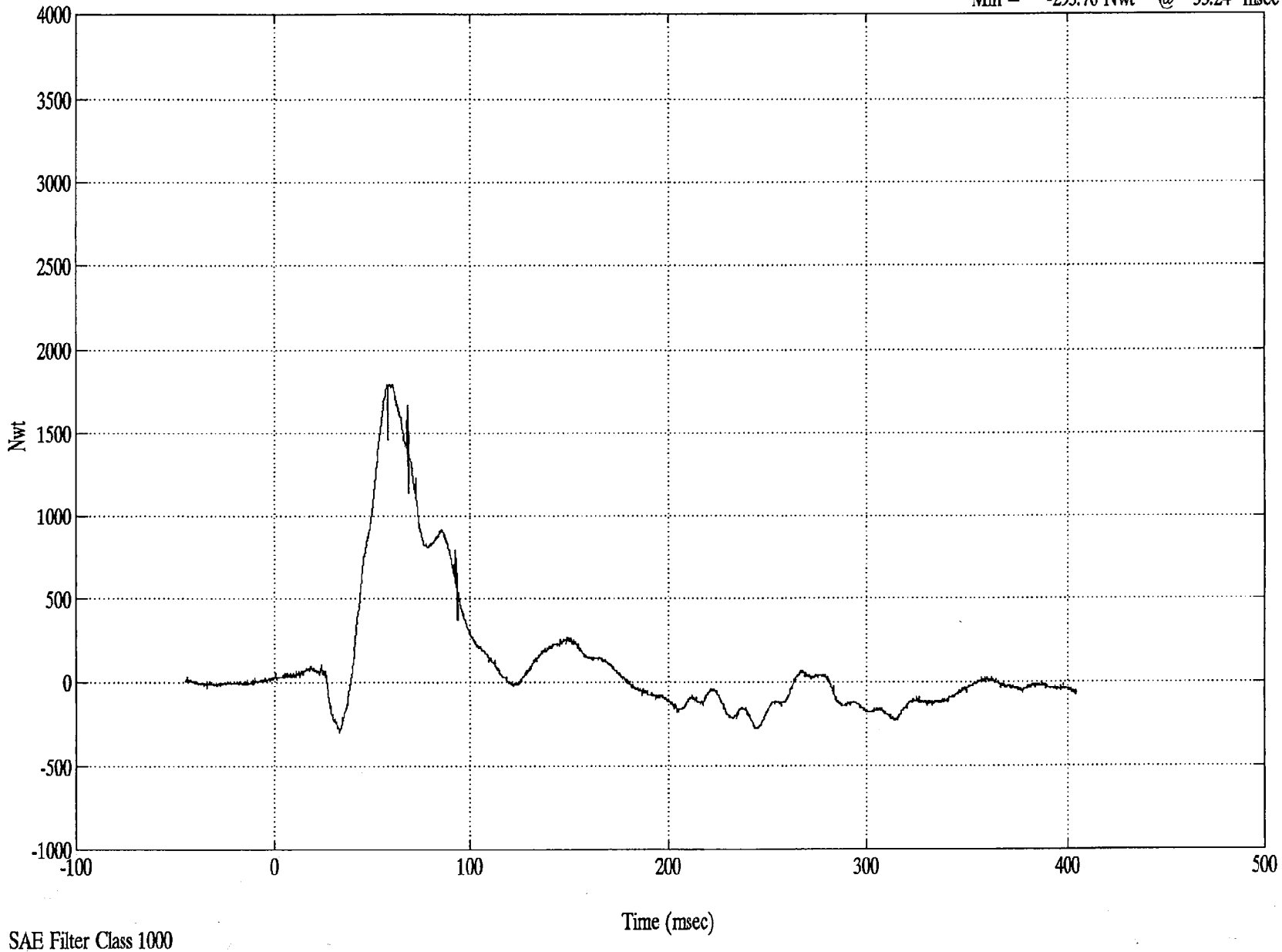
SAE Filter Class 1000

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

Pos. 2 Upper Neck Fy

Max = 1792.94 Nwt @ 59.76 msec
Min = -293.70 Nwt @ 33.24 msec

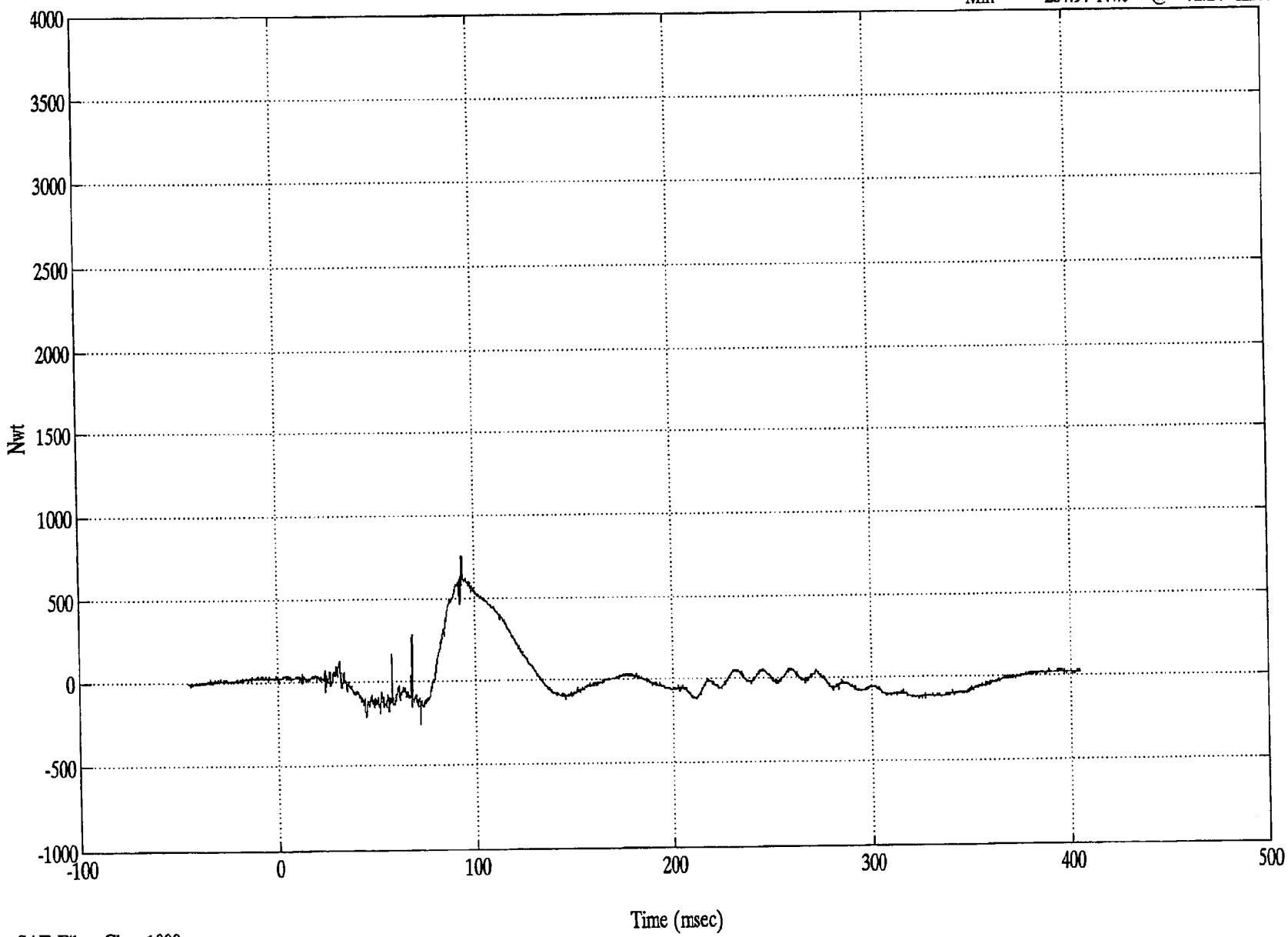


SAE Filter Class 1000

NCAP TEST #13 - 1997 JEEP WRANGLER

Pos. 2 Upper Neck Fz

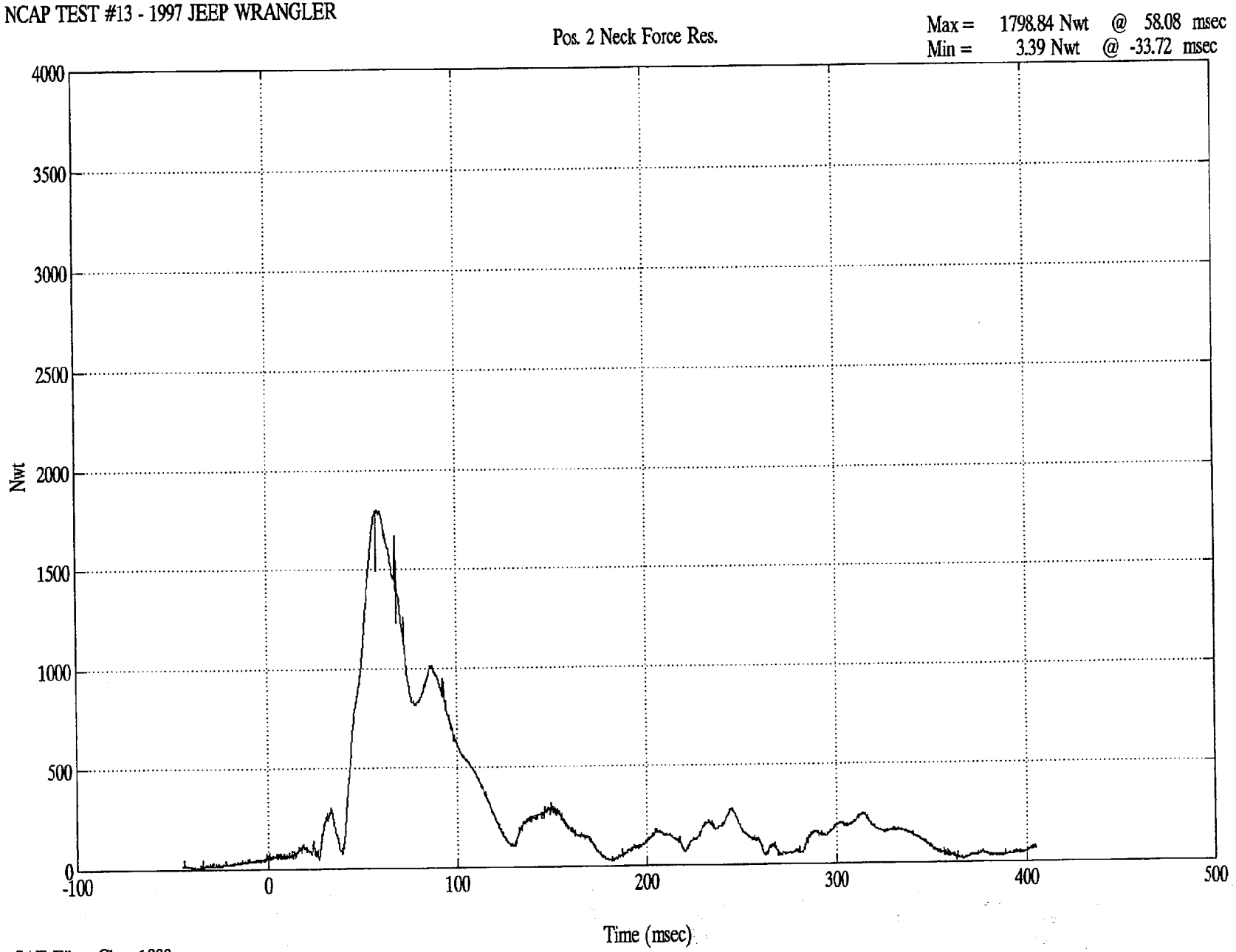
Max = 758.68 Nwt @ 93.36 msec
Min = -257.97 Nwt @ 72.24 msec



SAE Filter Class 1000

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

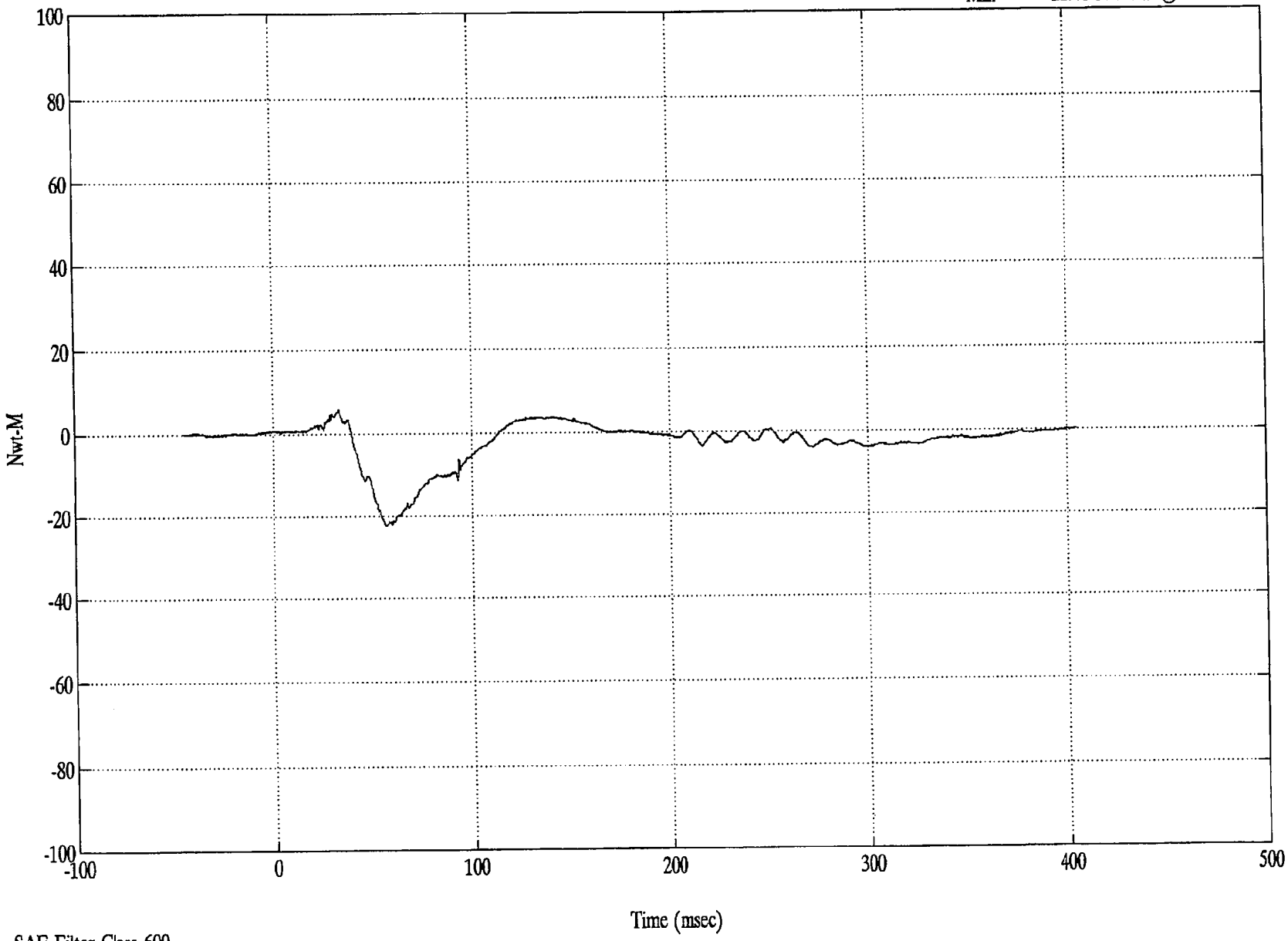


SAE Filter Class 1000

NCAP TEST #13 - 1997 JEEP WRANGLER

Pos. 2 Upper Neck Mx

Max = 5.87 Nwt-M @ 33.36 msec
Min = -22.40 Nwt-M @ 56.40 msec



SAE Filter Class 600

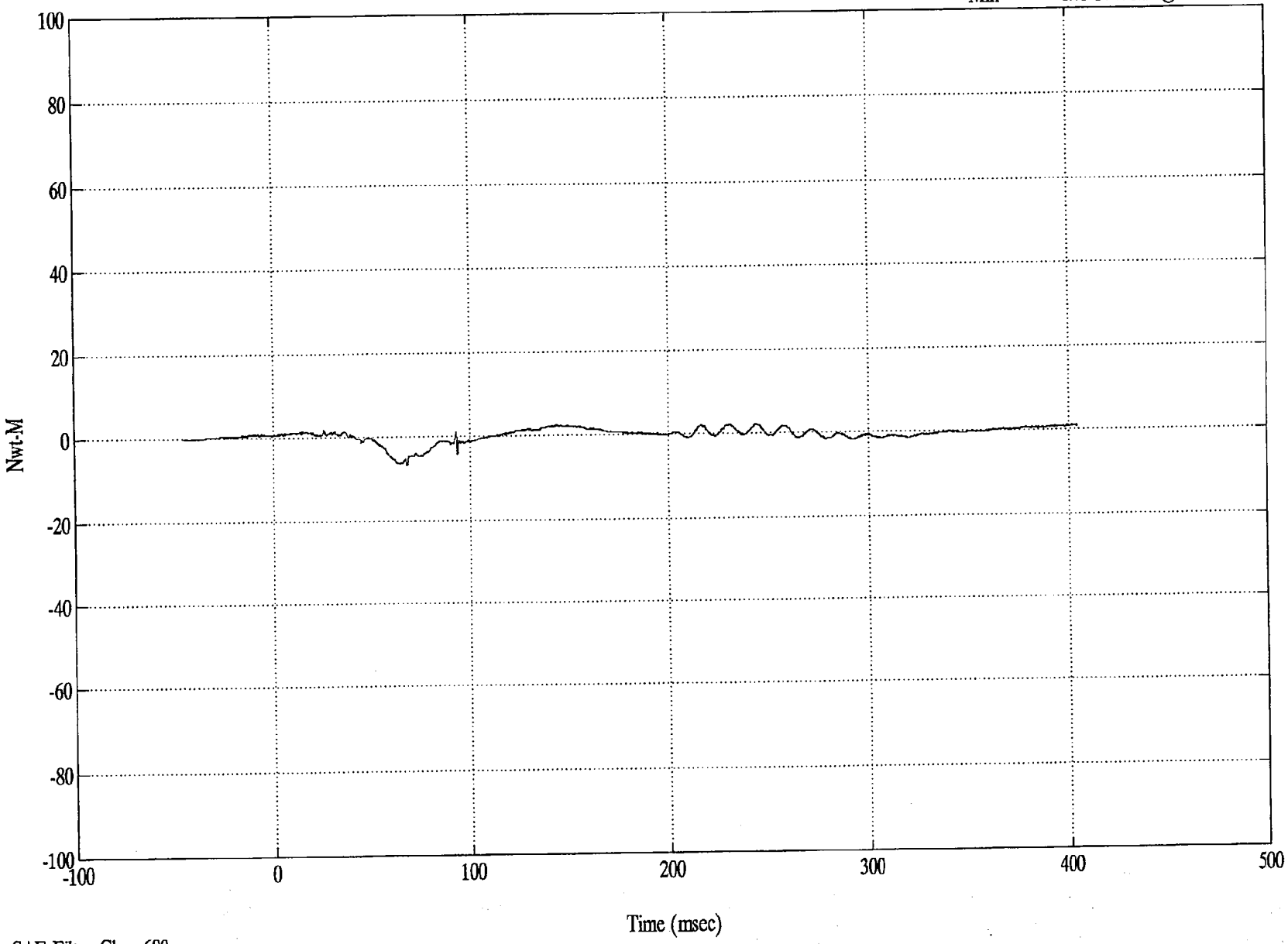
B-77

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

Pos. 2 Upper Neck My

Max = 2.42 Nwt-M @ 143.88 msec
Min = -6.73 Nwt-M @ 67.44 msec

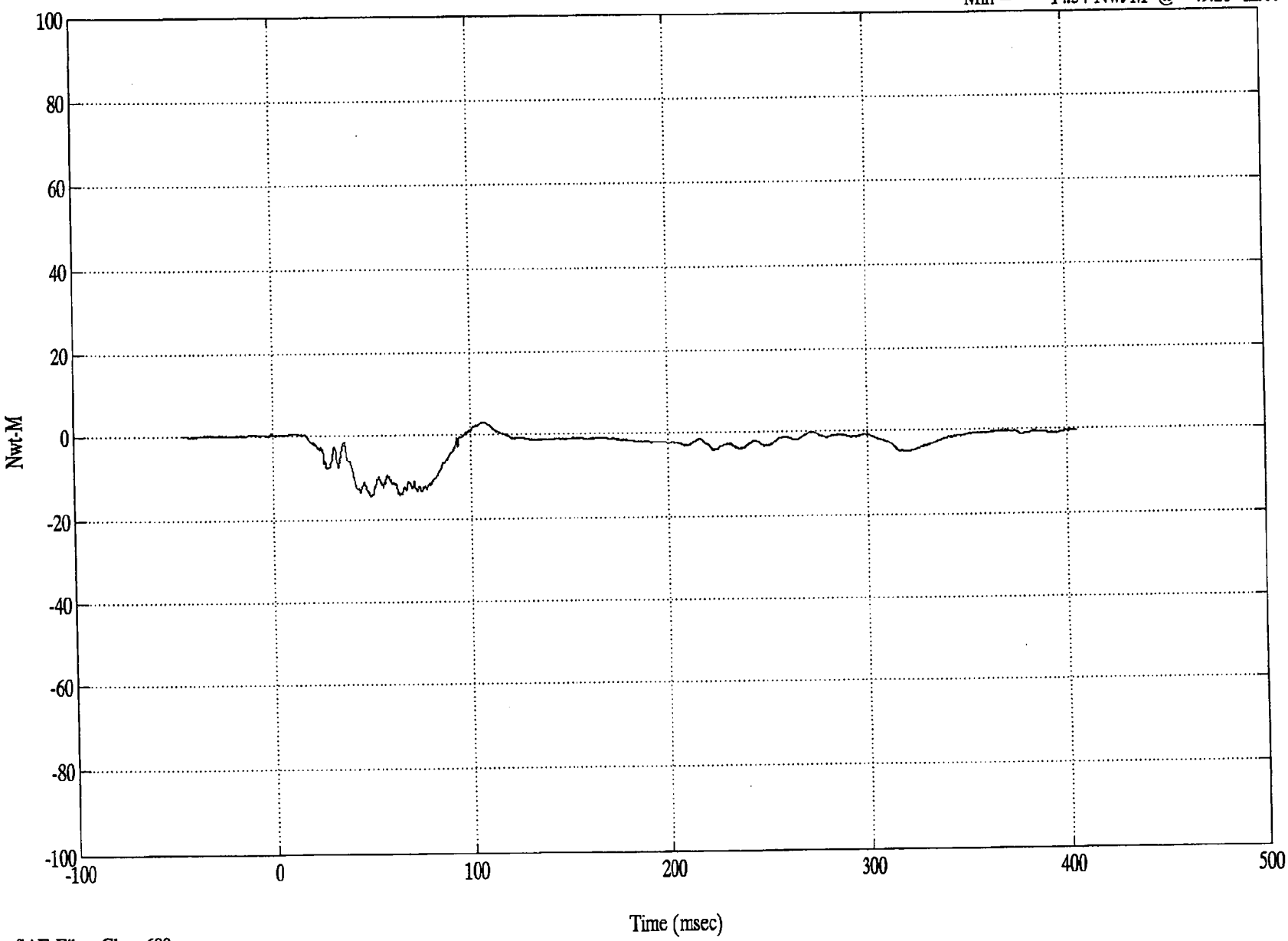


SAE Filter Class 600

NCAP TEST #13 - 1997 JEEP WRANGLER

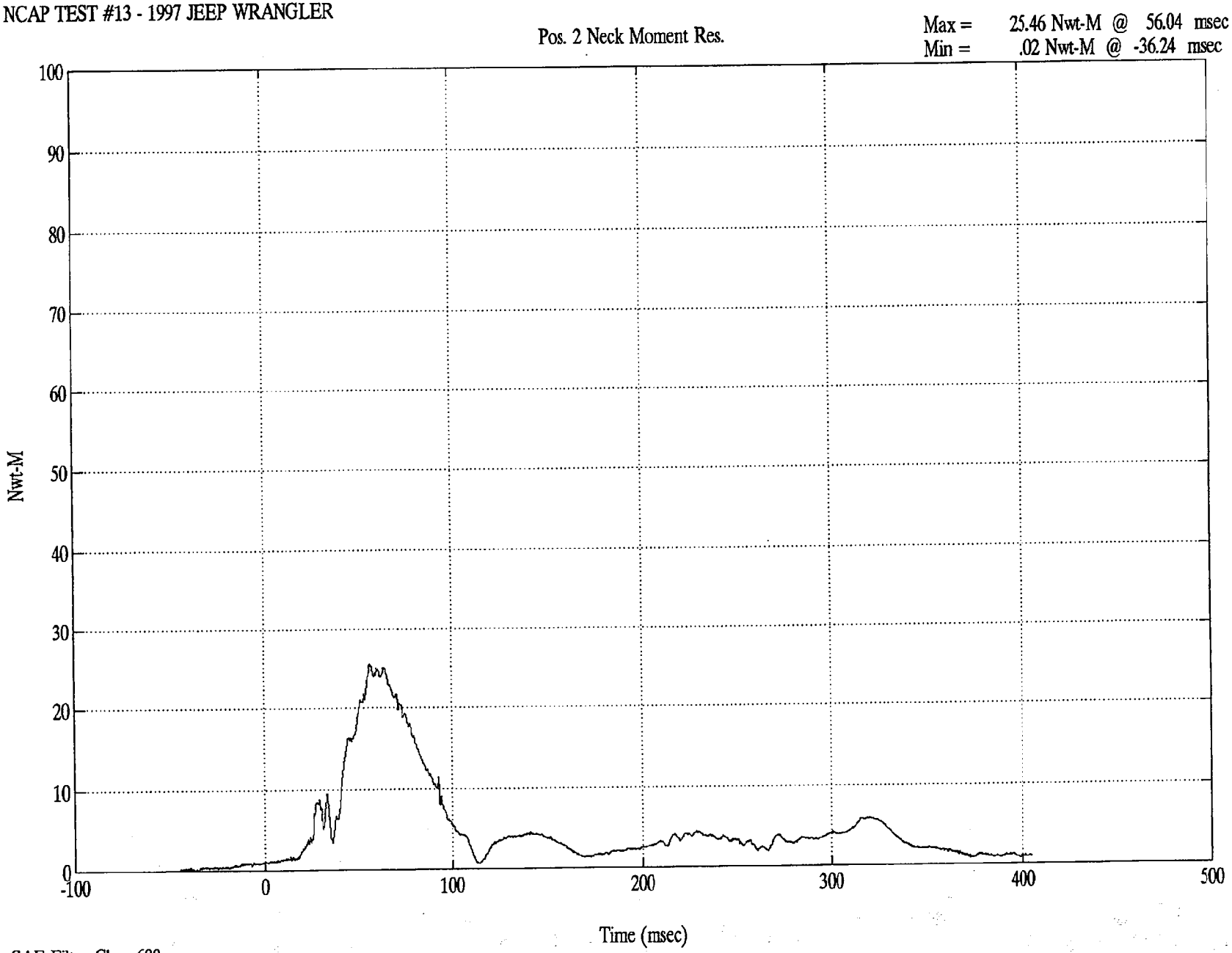
Pos. 2 Upper Neck Mz

Max = 3.00 Nwt-M @ 105.96 msec
Min = -14.54 Nwt-M @ 49.20 msec



SAE Filter Class 600

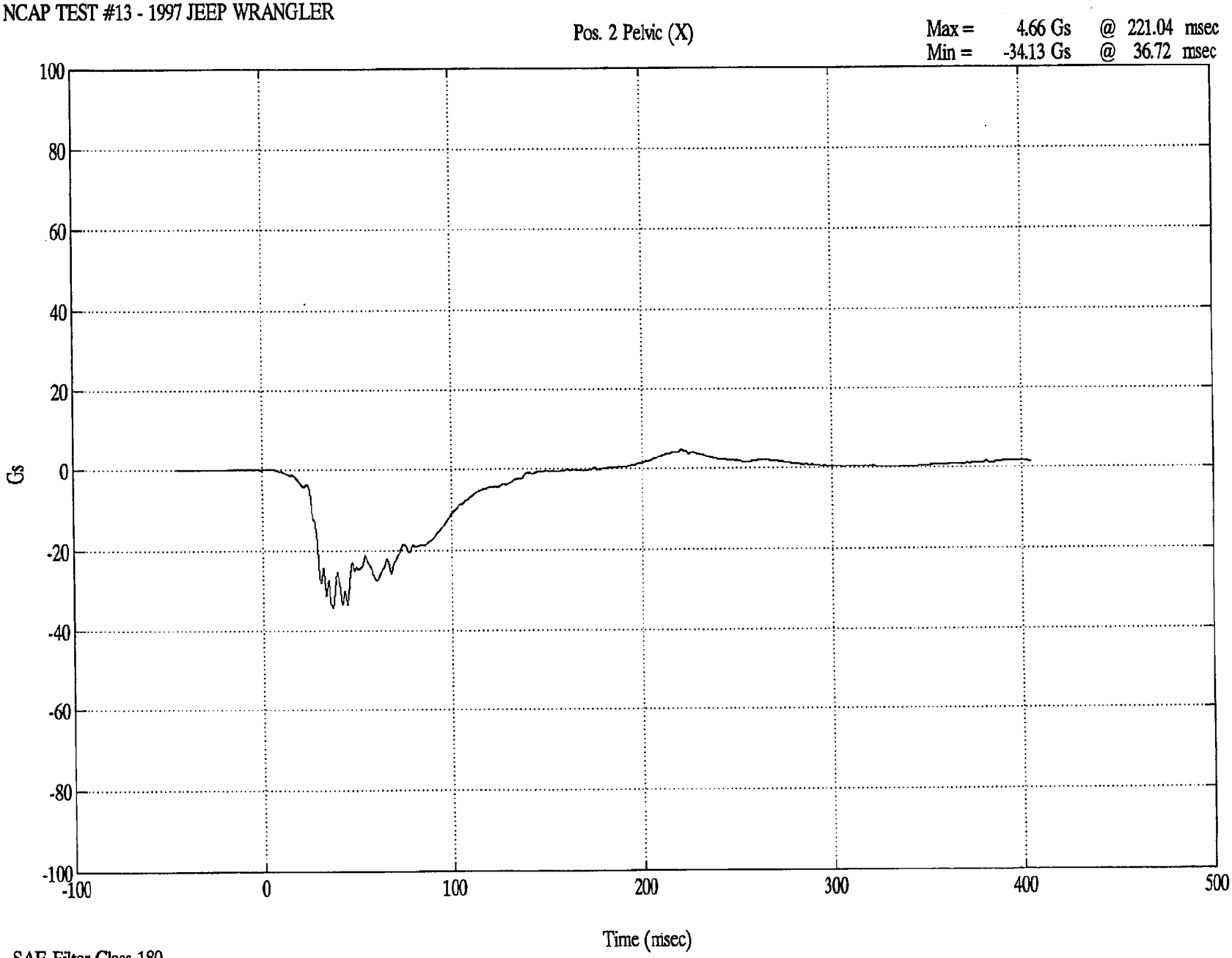
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

8313-13

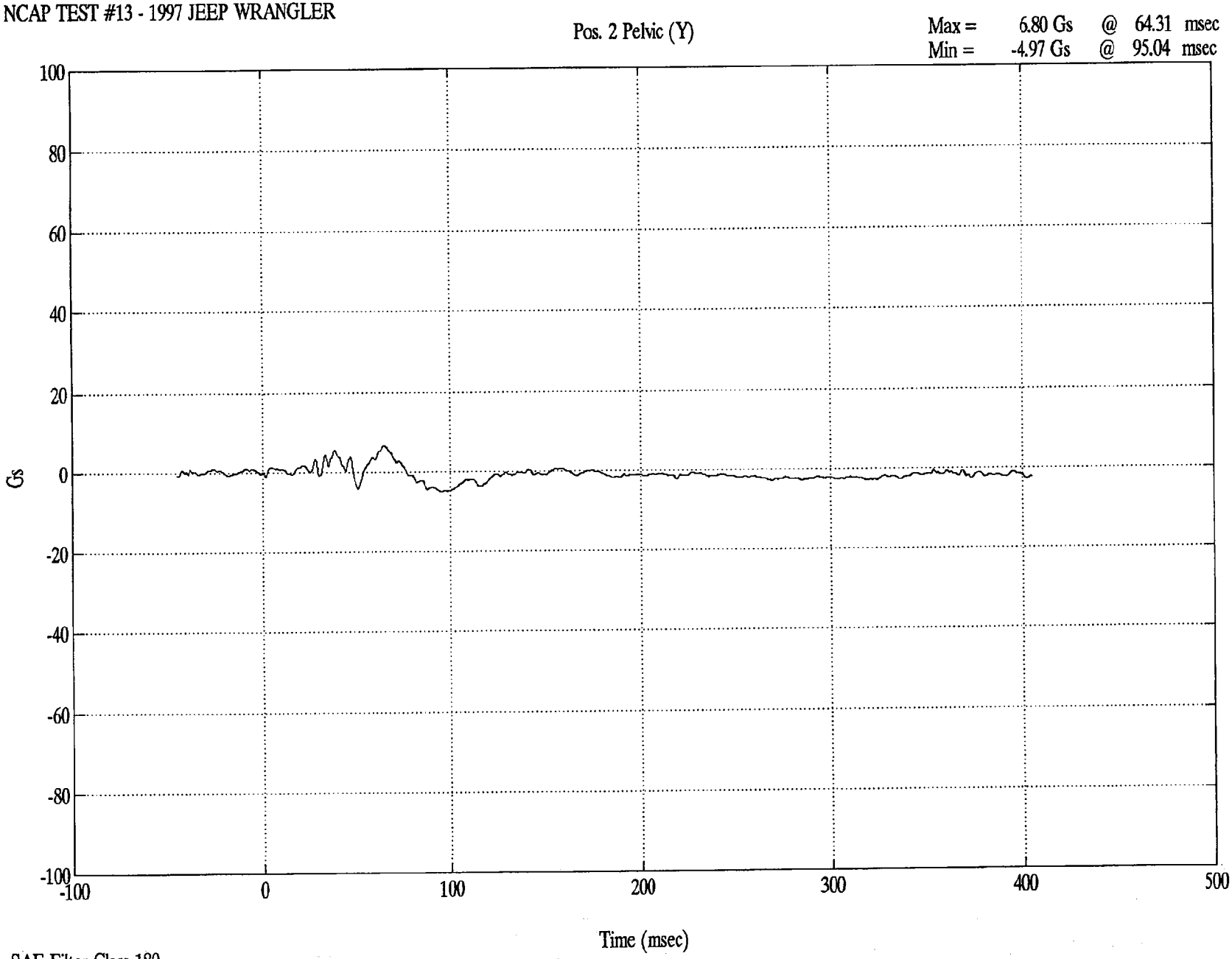
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

8313-13

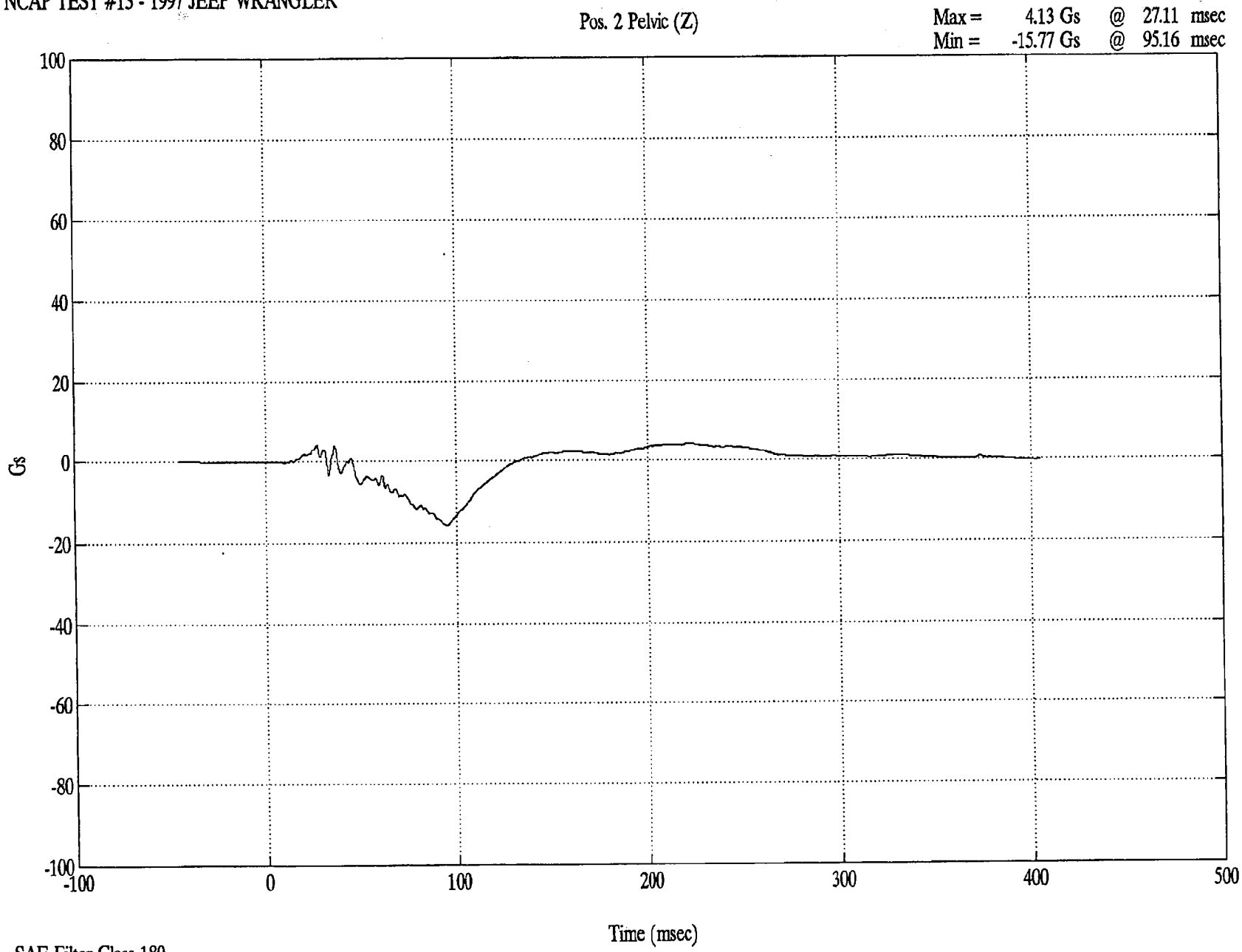
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

8313-13

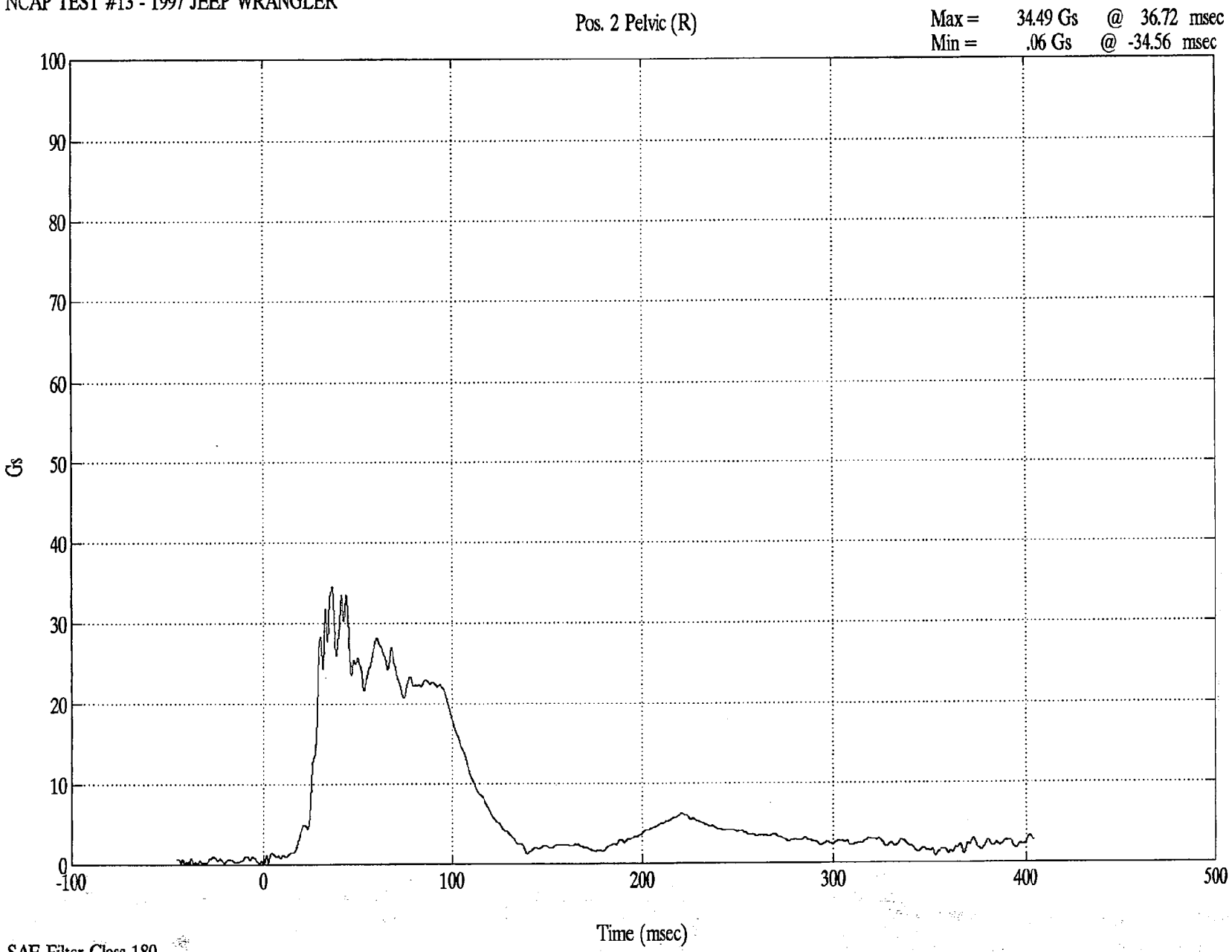
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



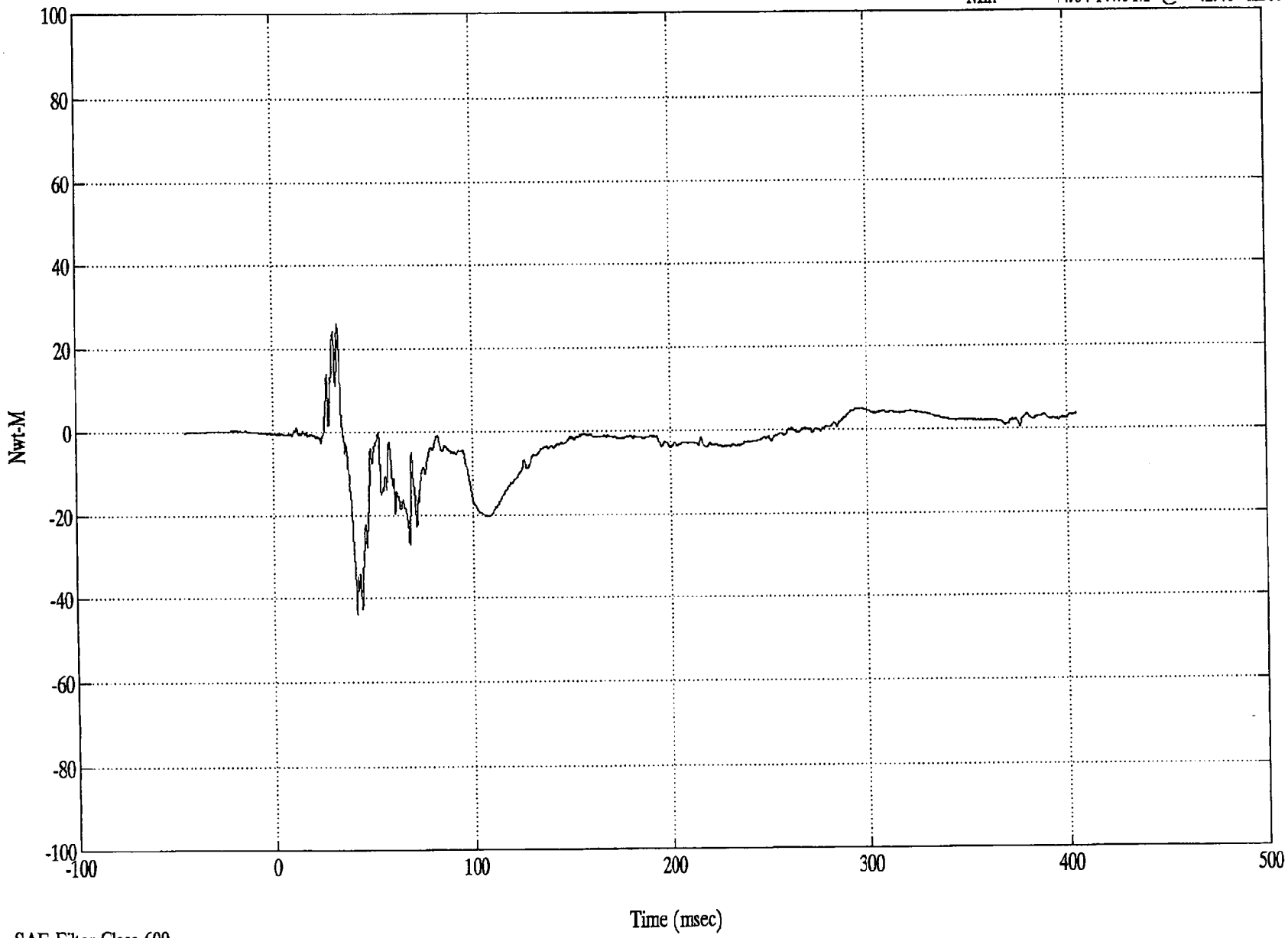
SAE Filter Class 180

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

Pos. 2 Lt Upper Tibia Mx

Max = 26.08 Nwt-M @ 32.76 msec
Min = -44.04 Nwt-M @ 41.40 msec

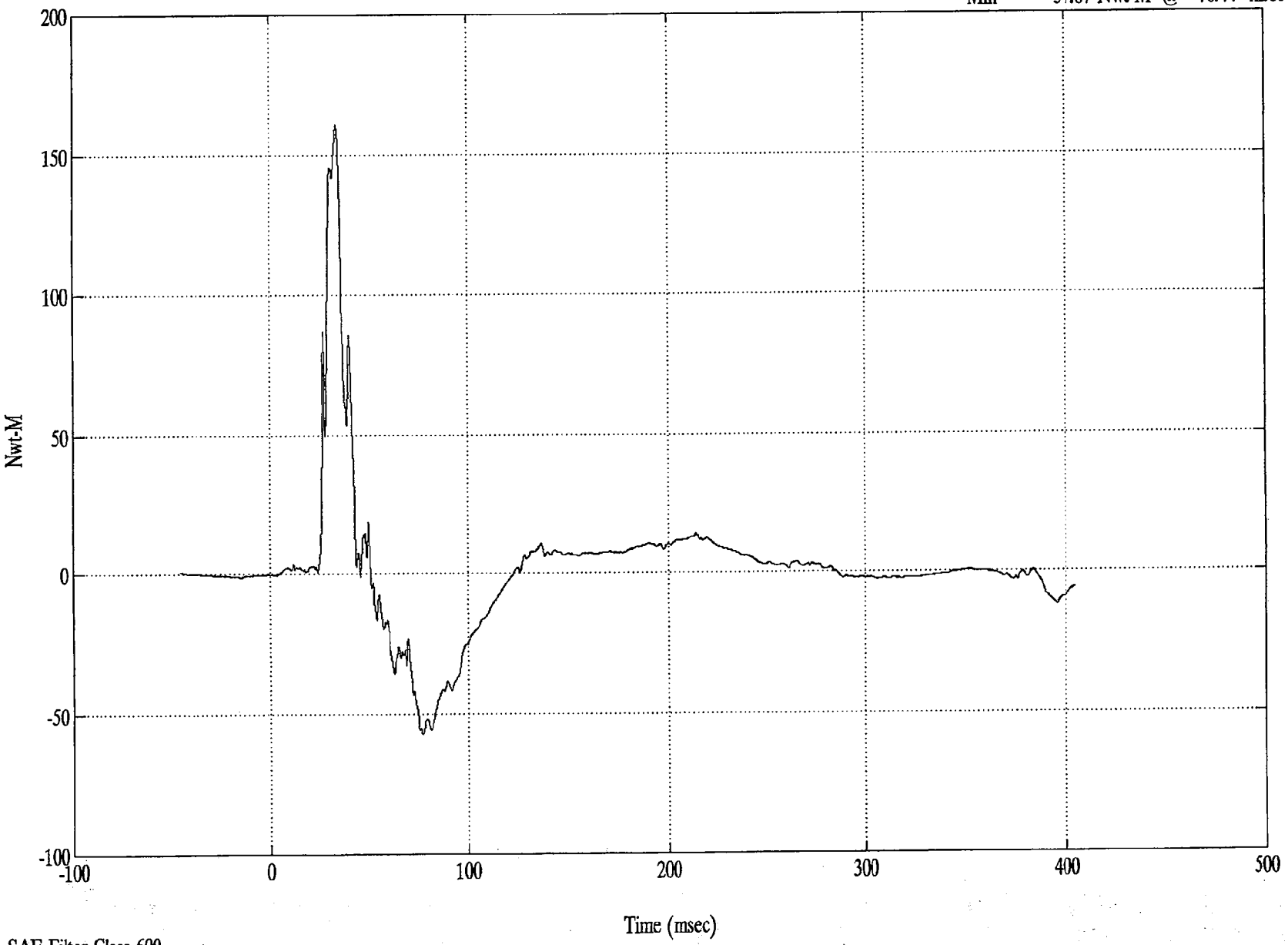


SAE Filter Class 600

NCAP TEST #13 - 1997 JEEP WRANGLER

Pos. 2 Lt Upper Tibia My

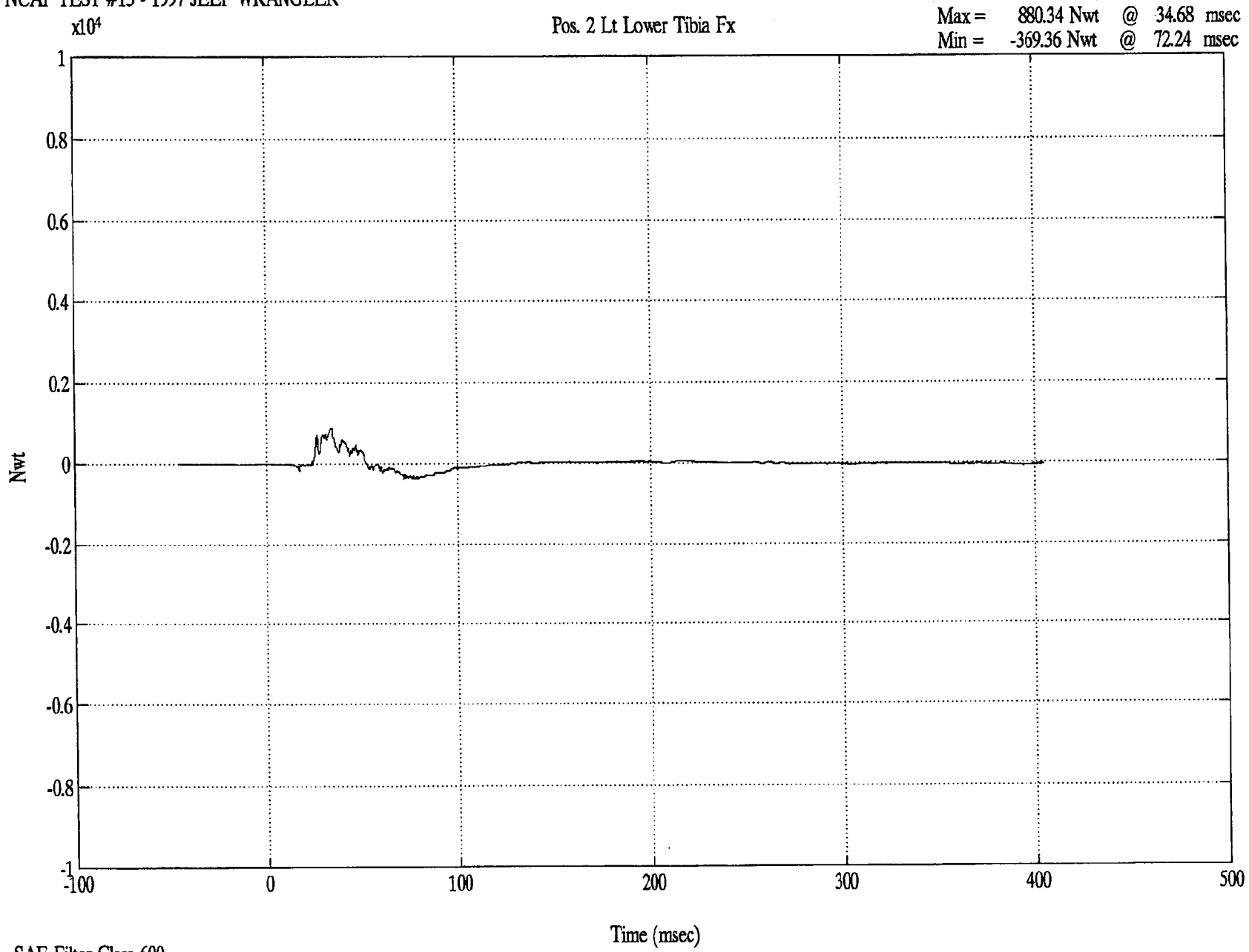
Max = 161.11 Nwt-M @ 33.72 msec
Min = -57.07 Nwt-M @ 76.44 msec



SAE Filter Class 600

8313-13

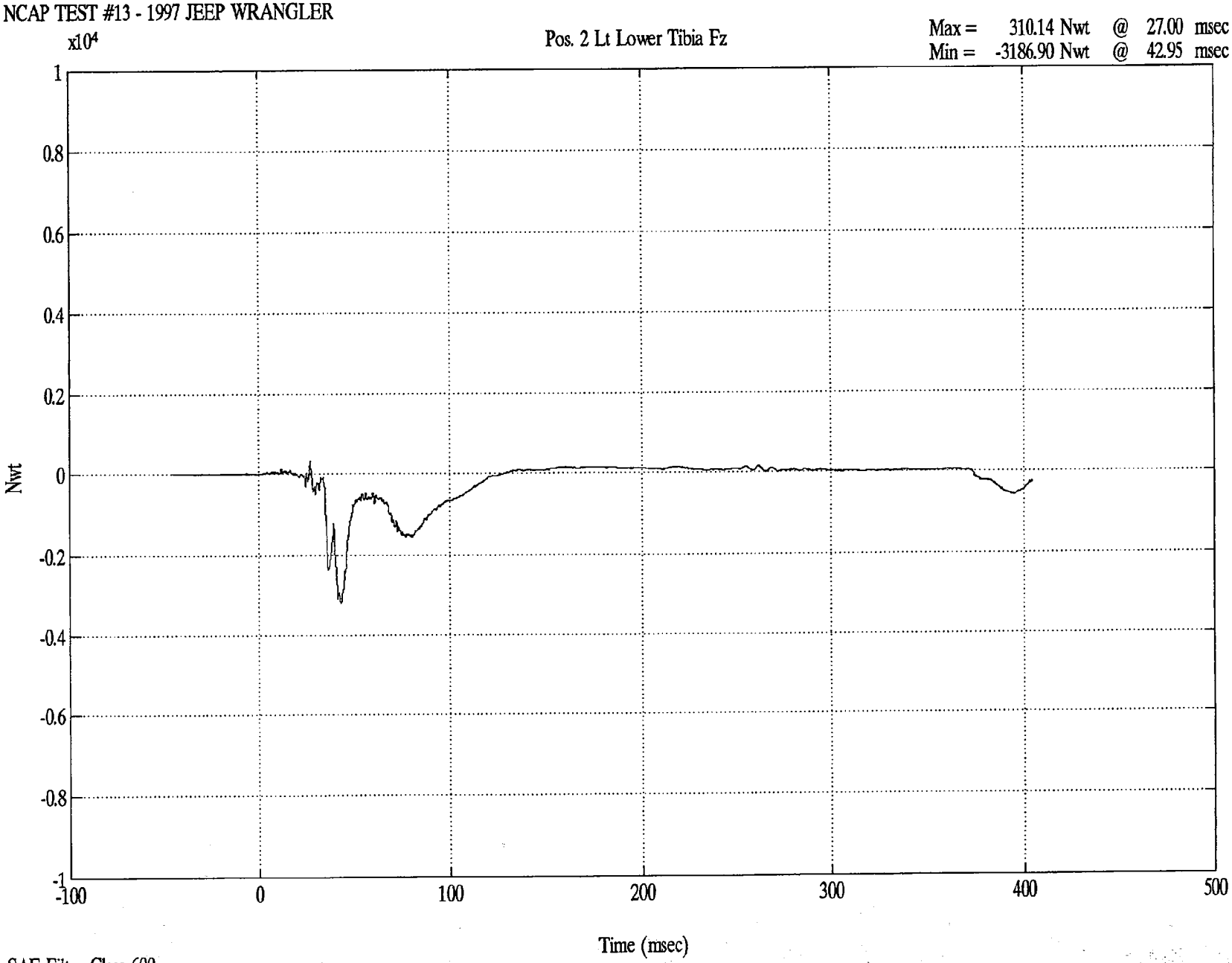
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

8313-13

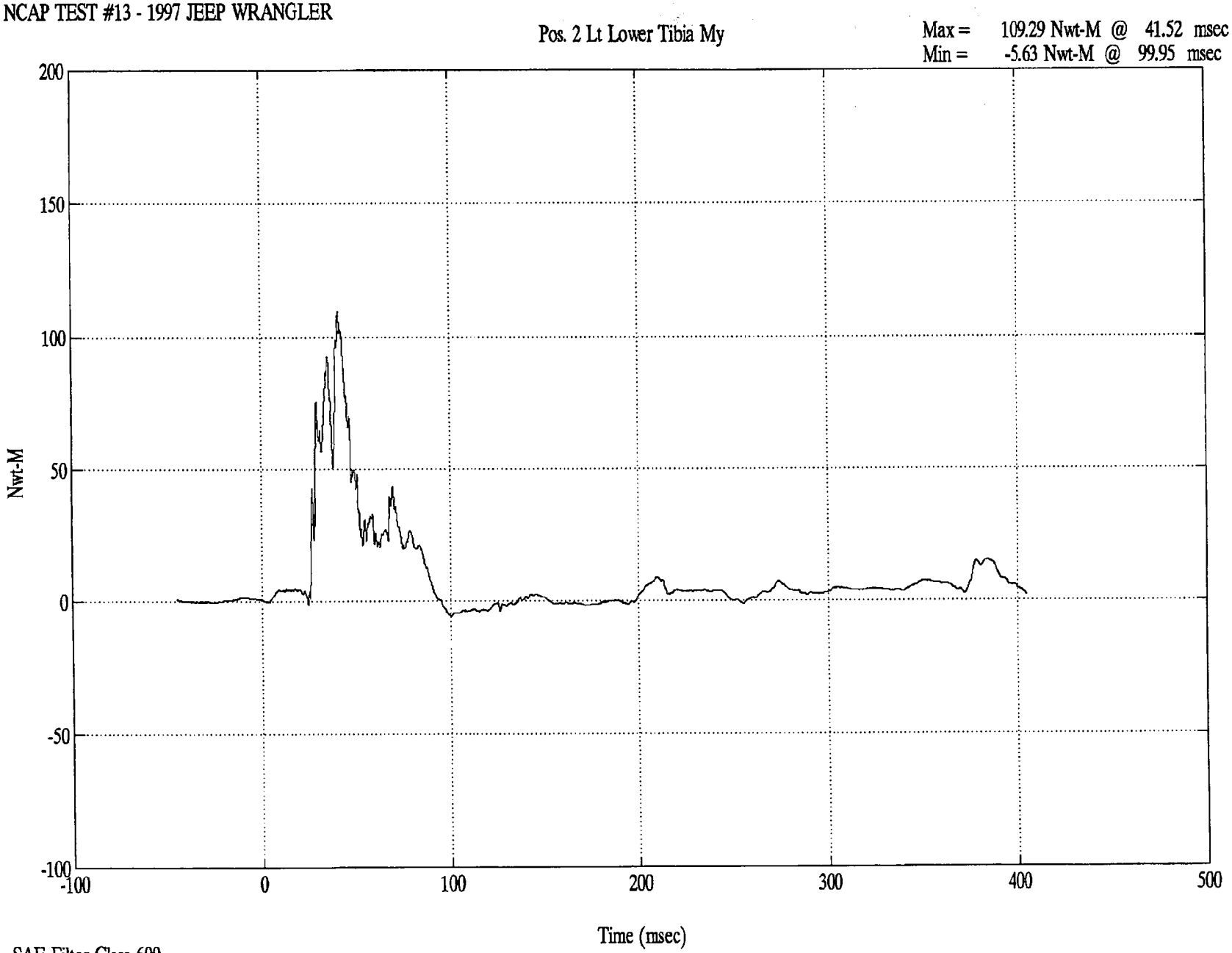
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



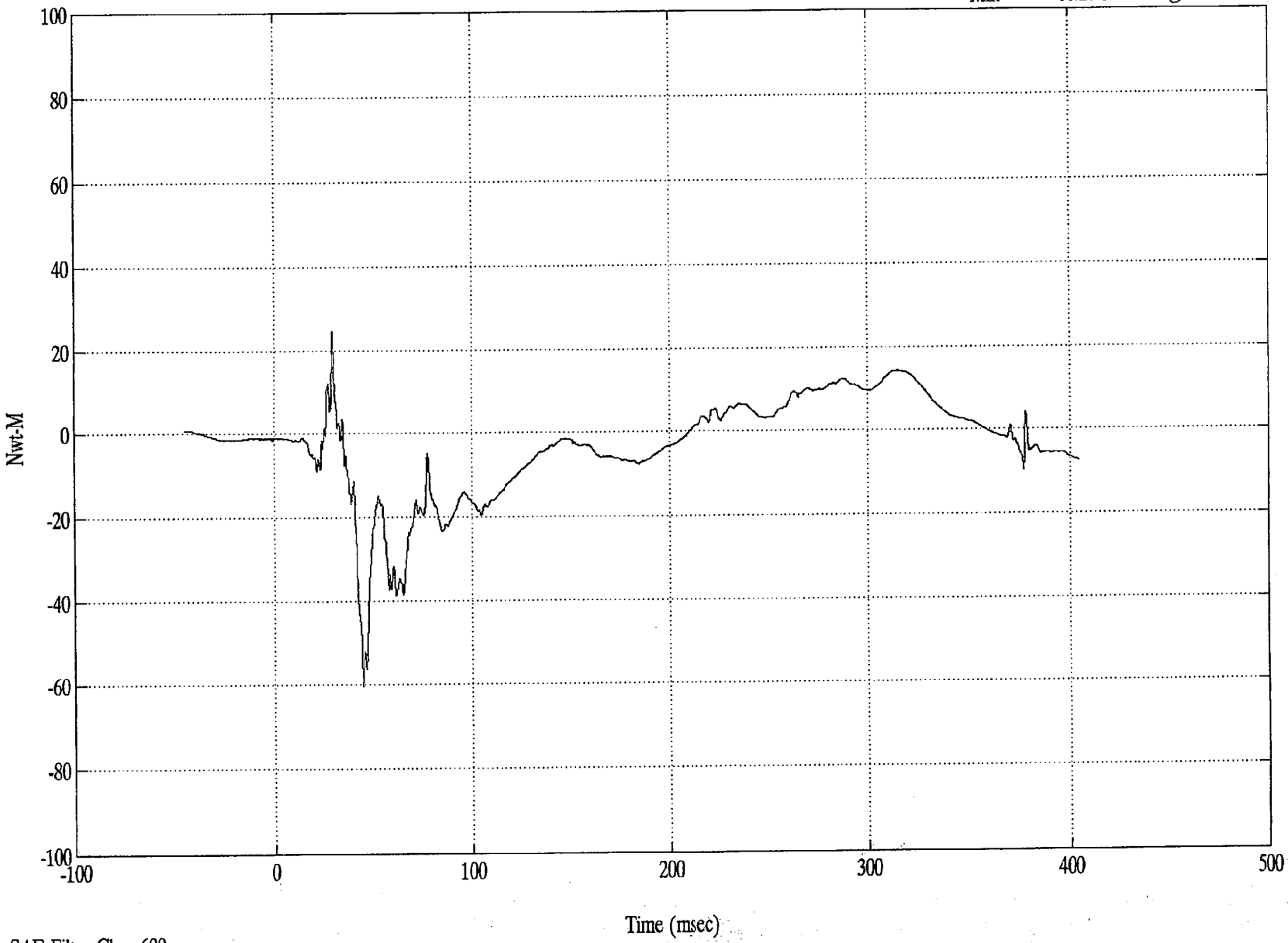
SAE Filter Class 600

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

Pos. 2 Rt Upper Tibia Mx

Max = 24.67 Nwt-M @ 30.12 msec
Min = -60.27 Nwt-M @ 45.00 msec

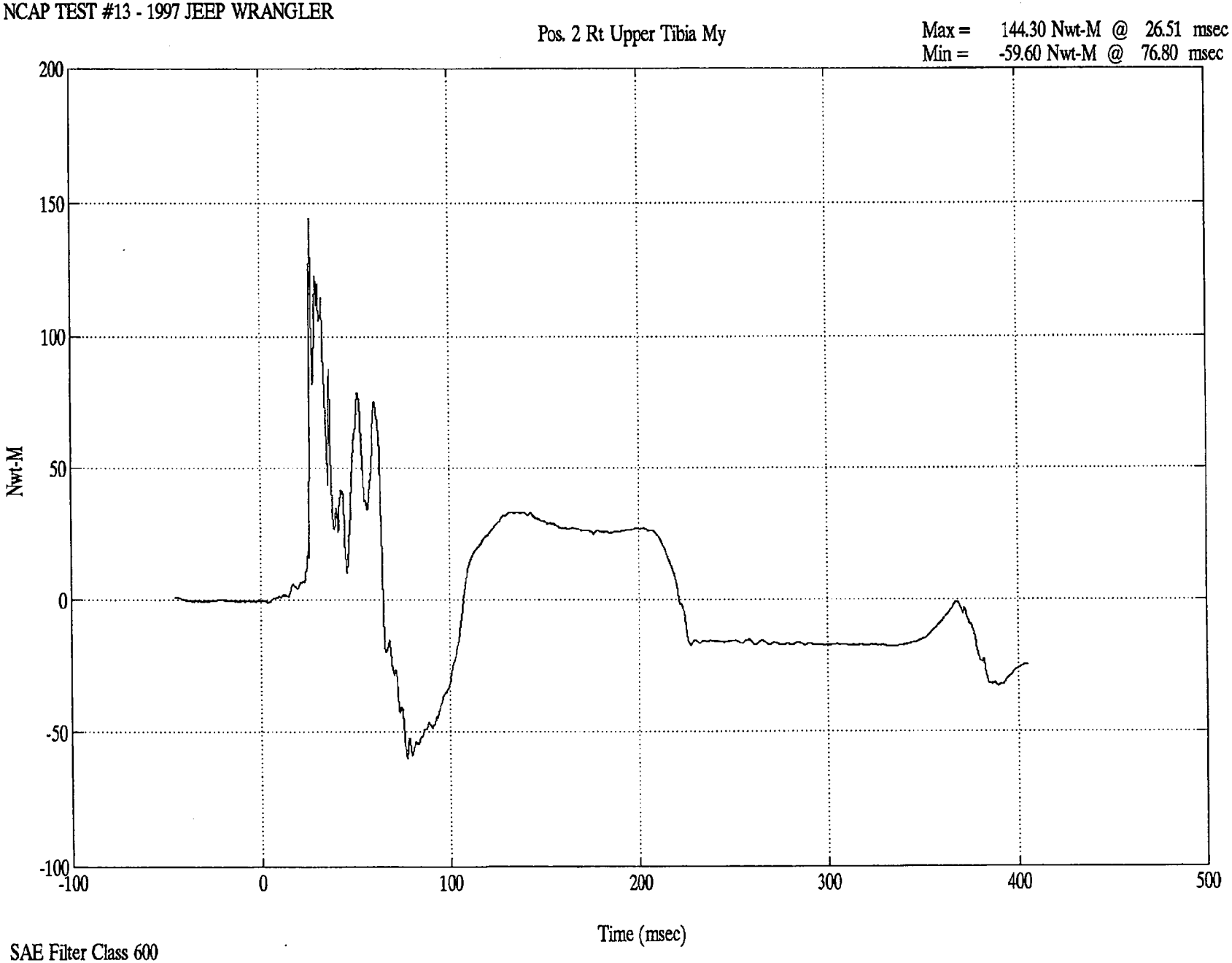


SAE Filter Class 600

B-90

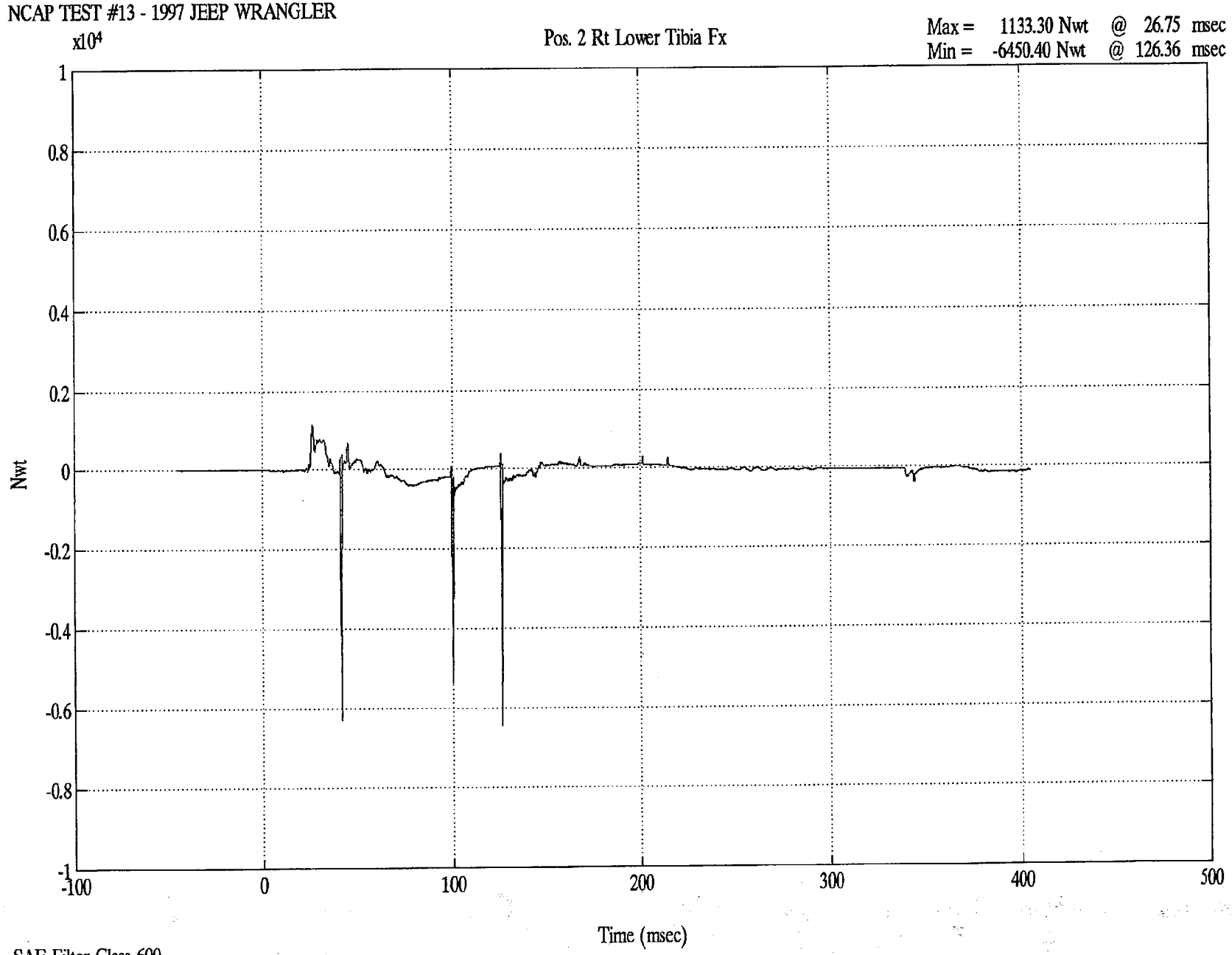
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

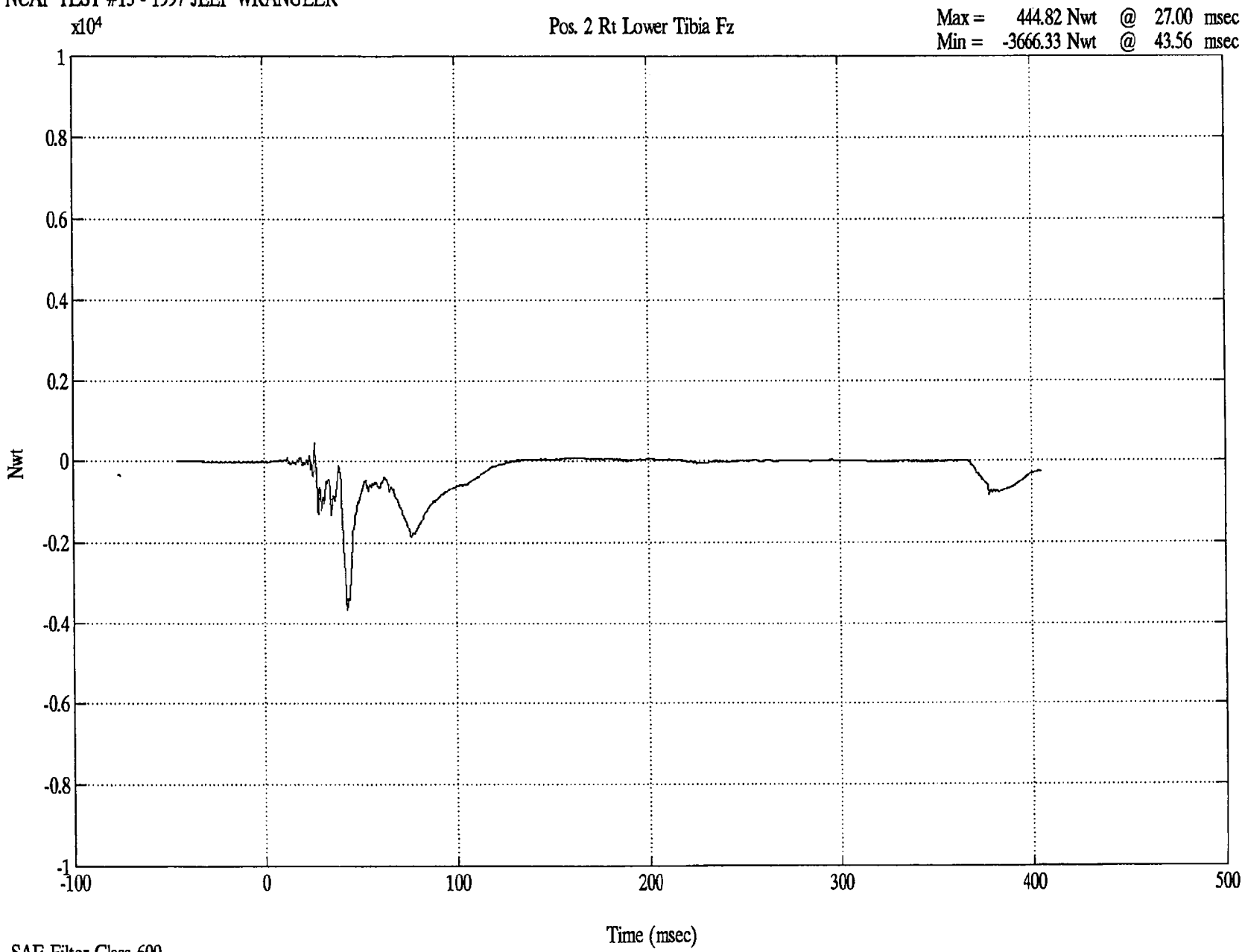
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 600

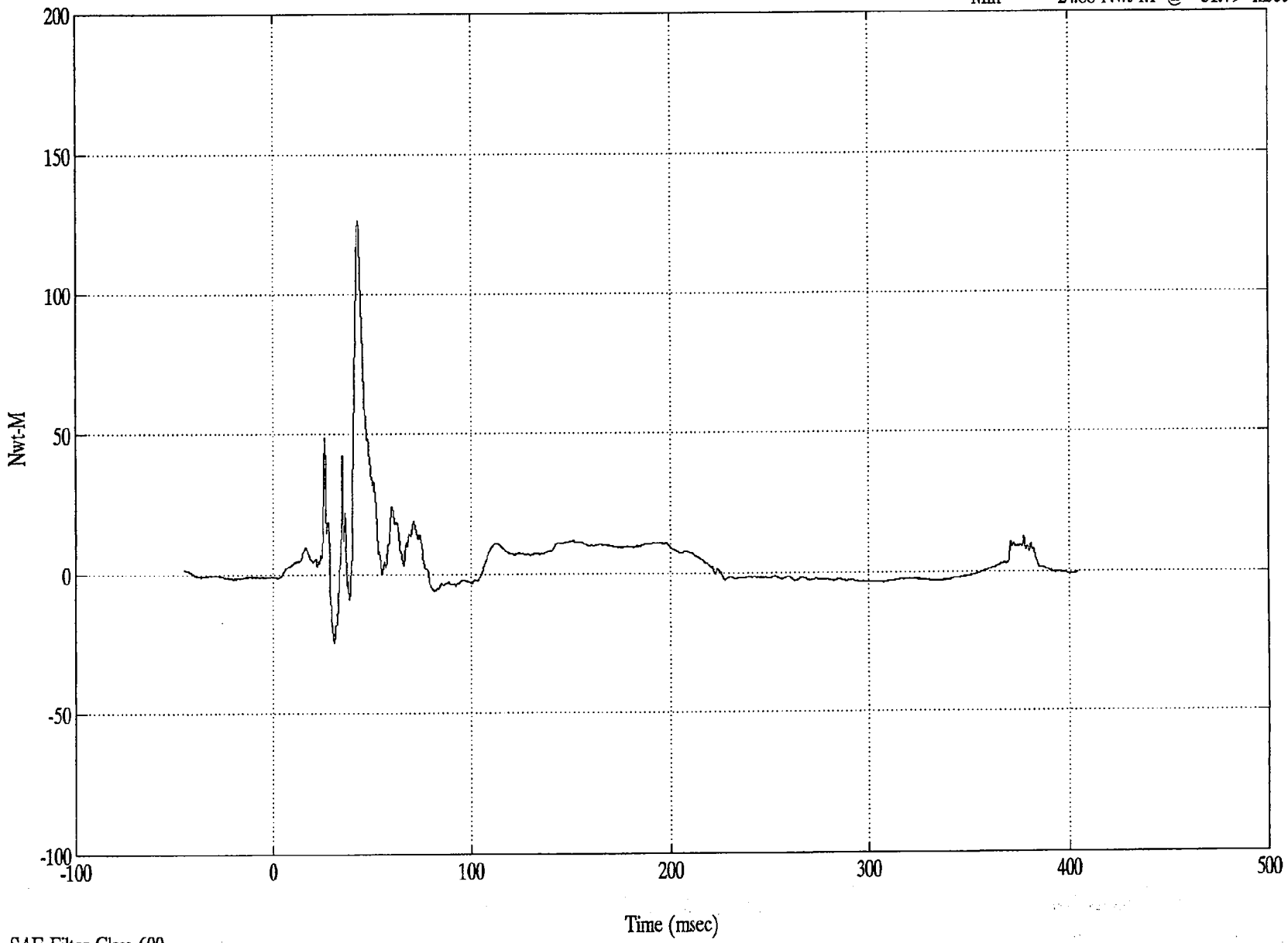
B-93

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

Pos. 2 Rt Lower Tibia My

Max = 126.57 Nwt-M @ 43.56 msec
Min = -24.88 Nwt-M @ 31.79 msec

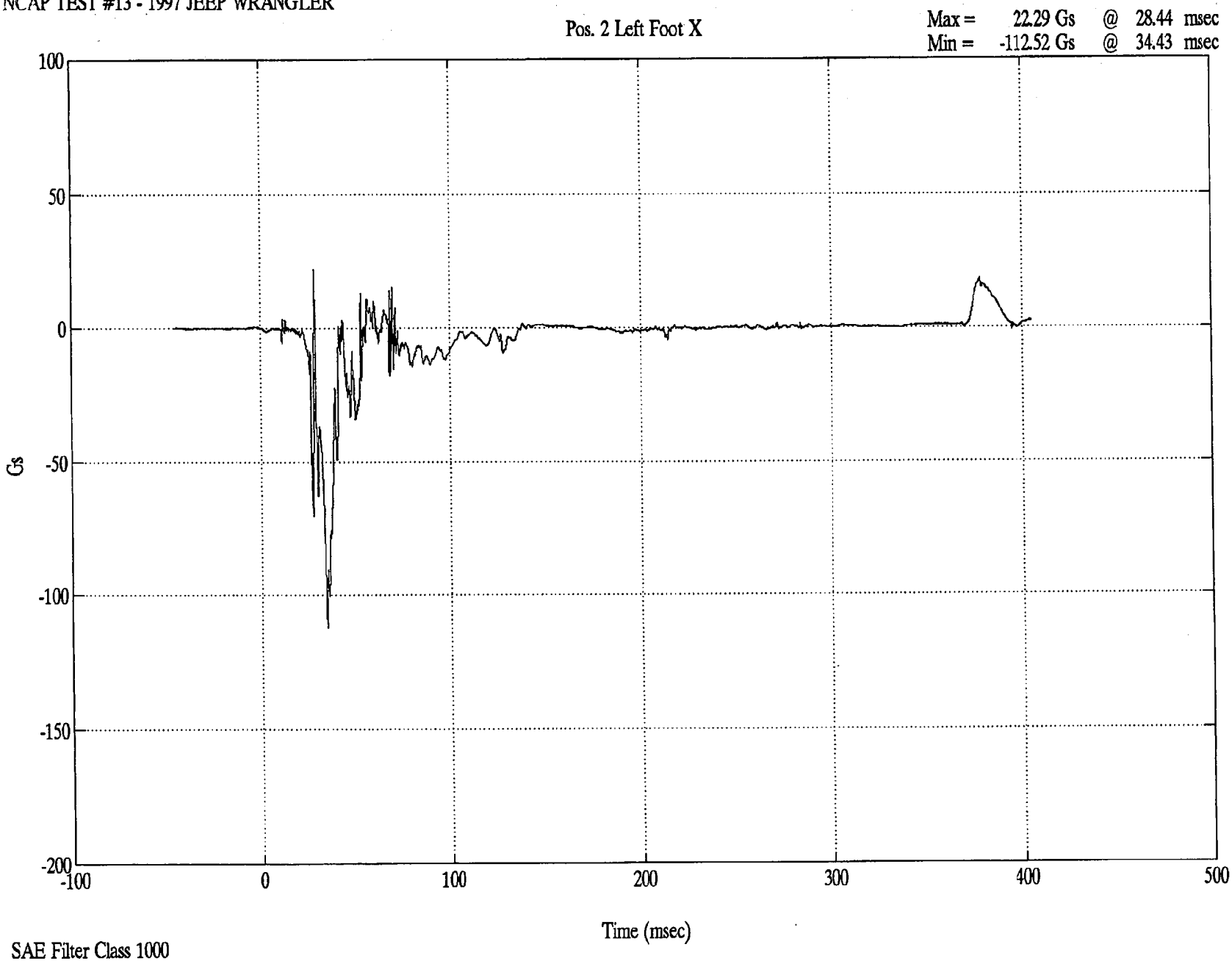


SAE Filter Class 600

B-94

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

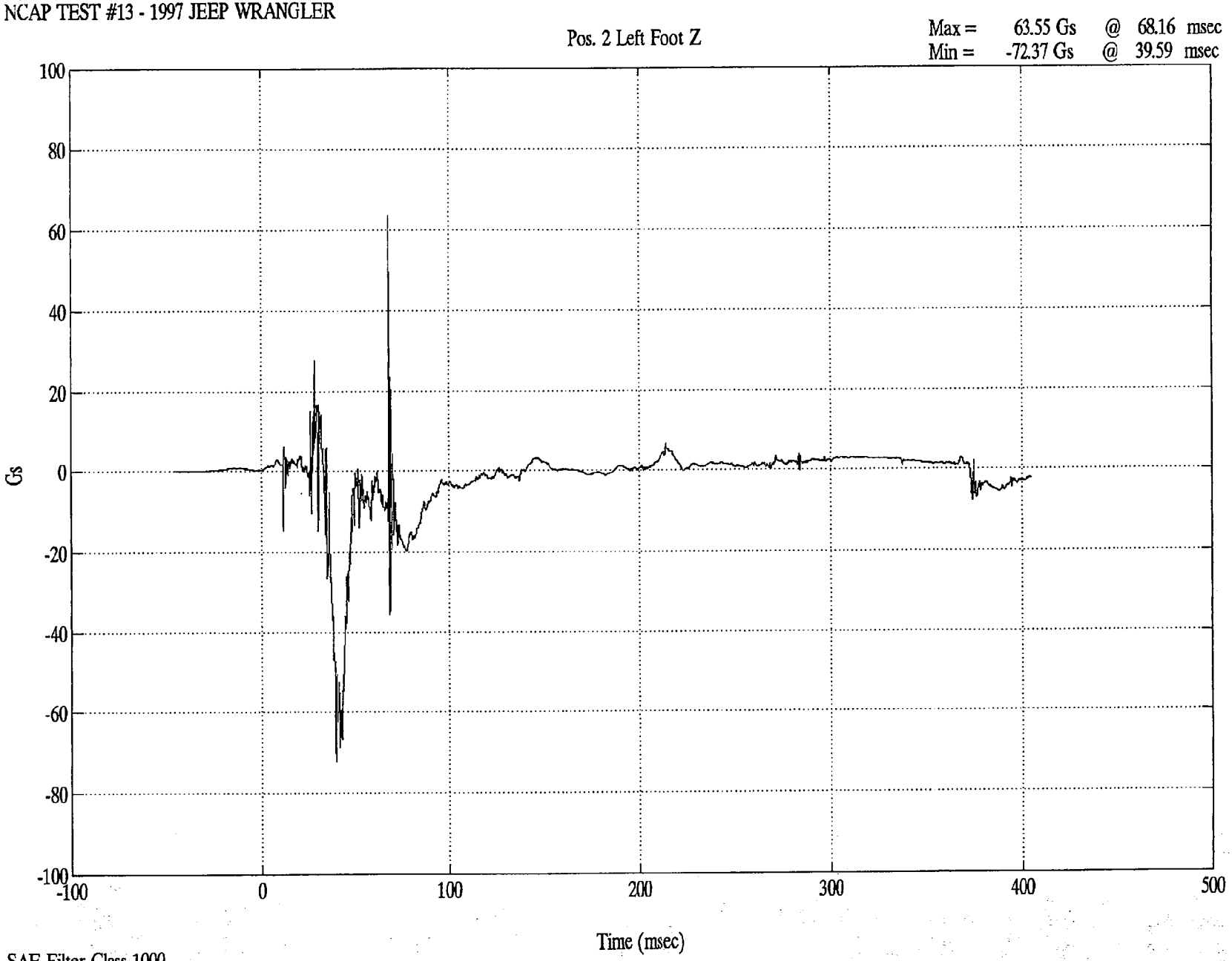


B-95

8313-13

SAE Filter Class 1000

NCAP TEST #13 - 1997 JEEP WRANGLER

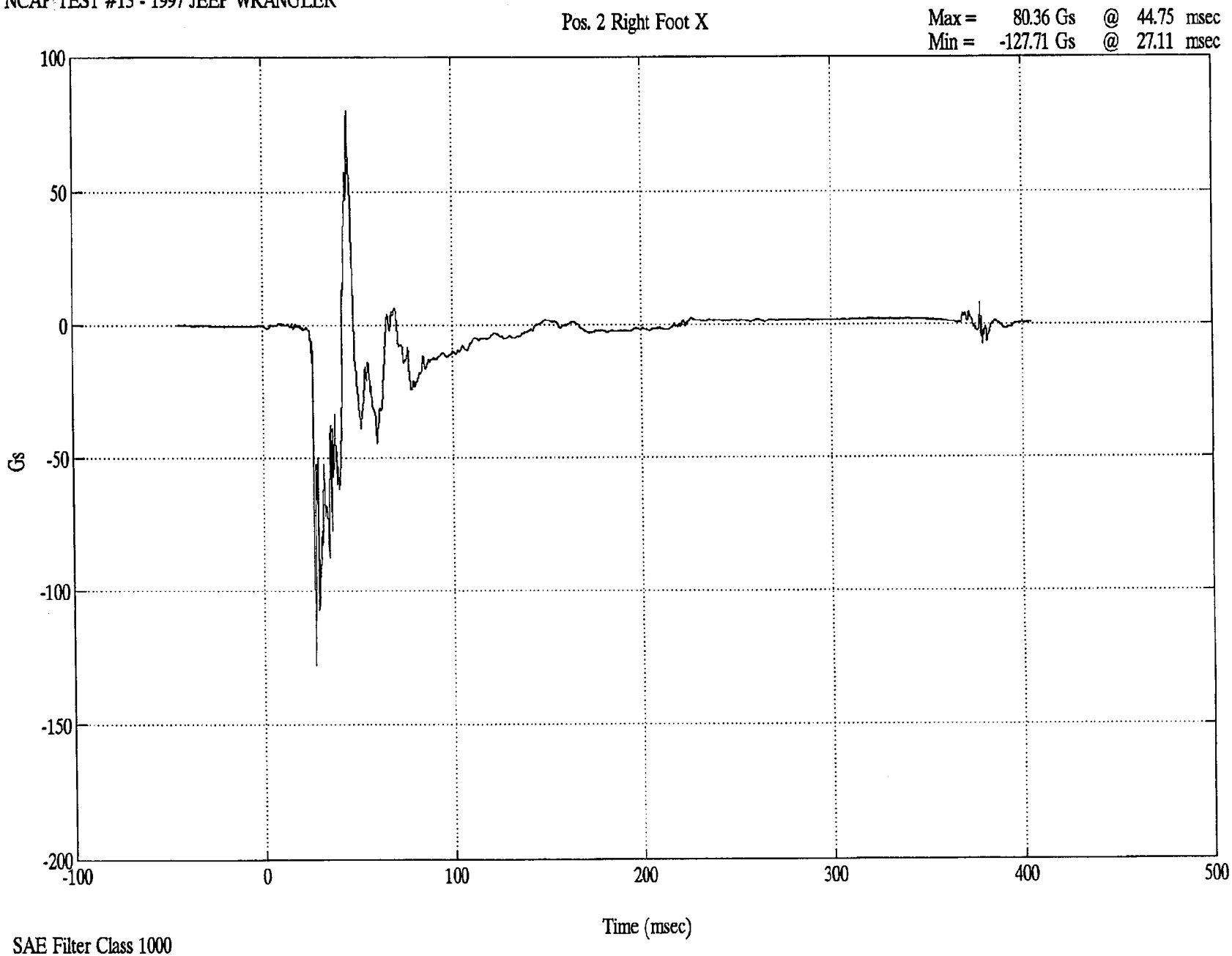


SAE Filter Class 1000

B-96

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



B-97

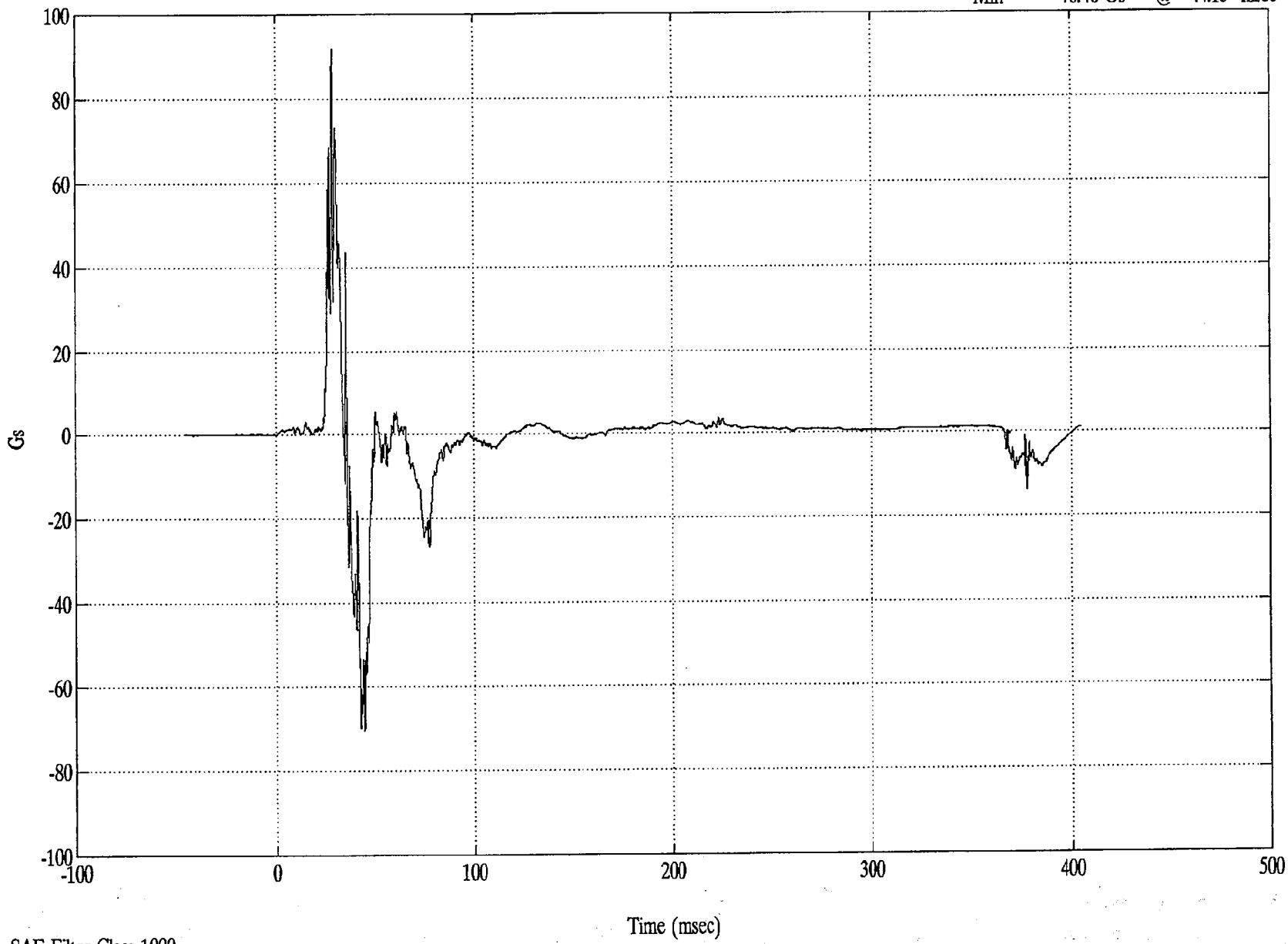
8313-13

SAE Filter Class 1000

NCAP TEST #13 - 1997 JEEP WRANGLER

Pos. 2 Right Foot Z

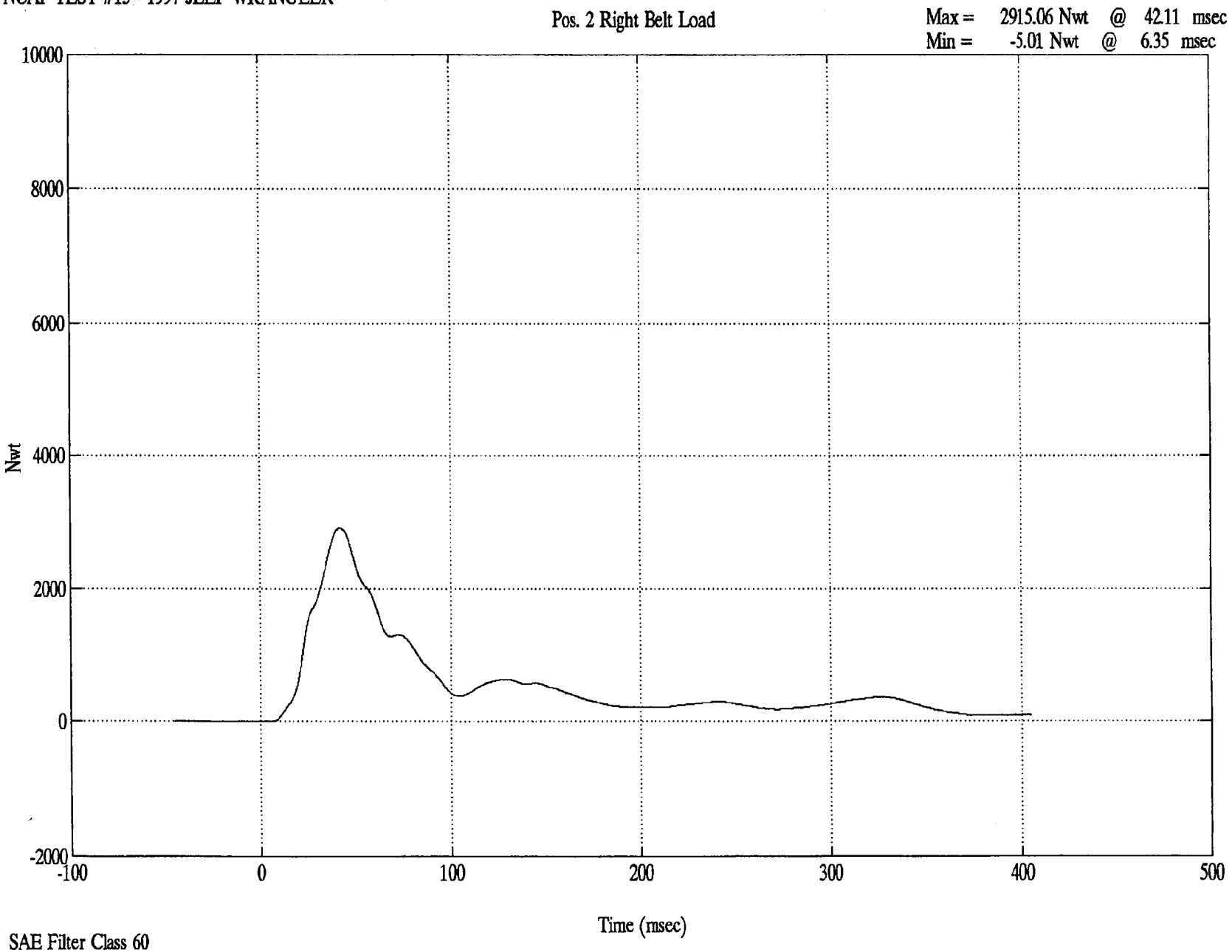
Max = 91.65 Gs @ 28.68 msec
Min = -70.46 Gs @ 44.15 msec



SAE Filter Class 1000

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



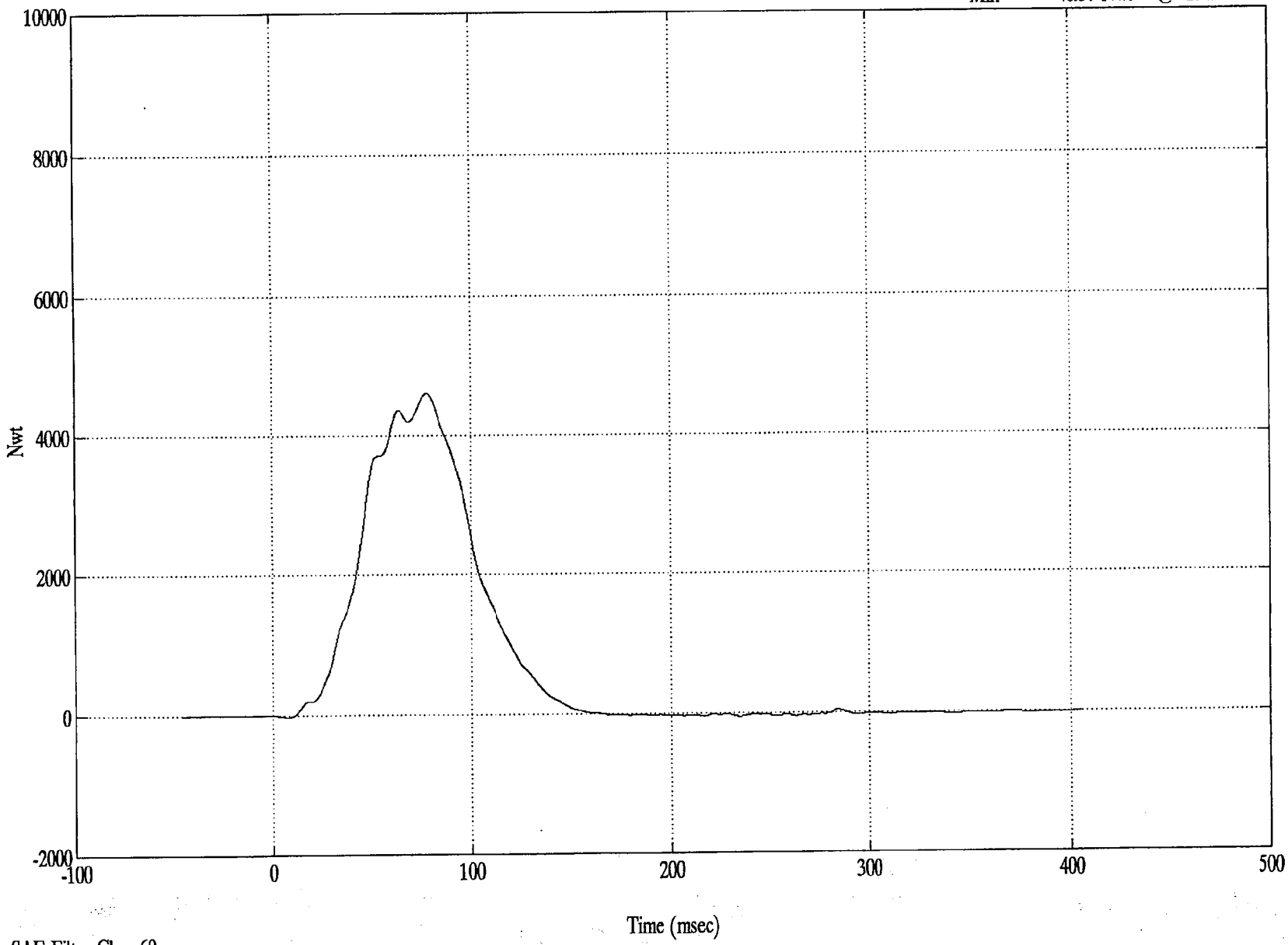
SAE Filter Class 60

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

Pos. 2 Torso Belt Load

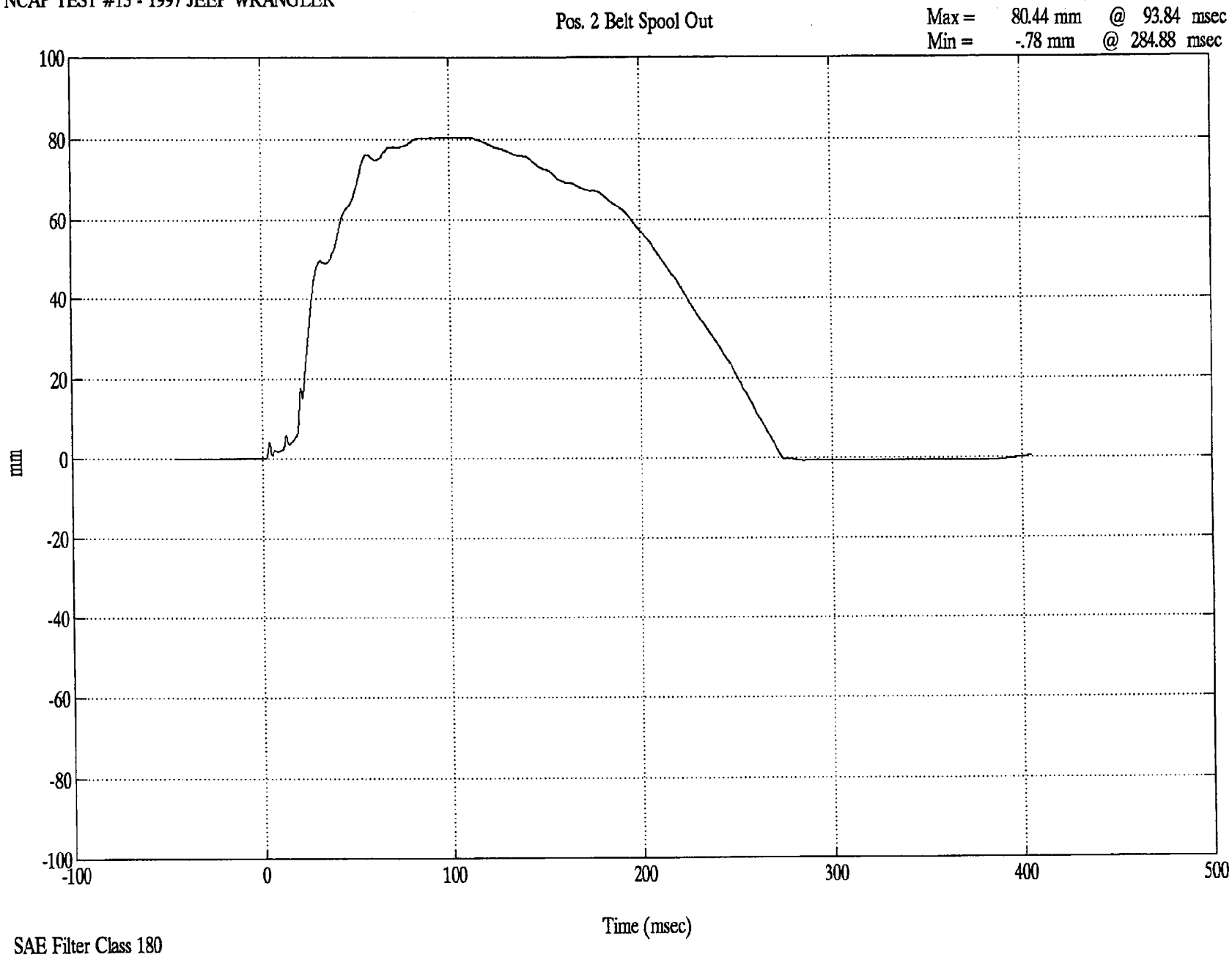
Max = 4607.44 Nwt @ 78.12 msec
Min = -48.57 Nwt @ 234.60 msec



SAE Filter Class 60

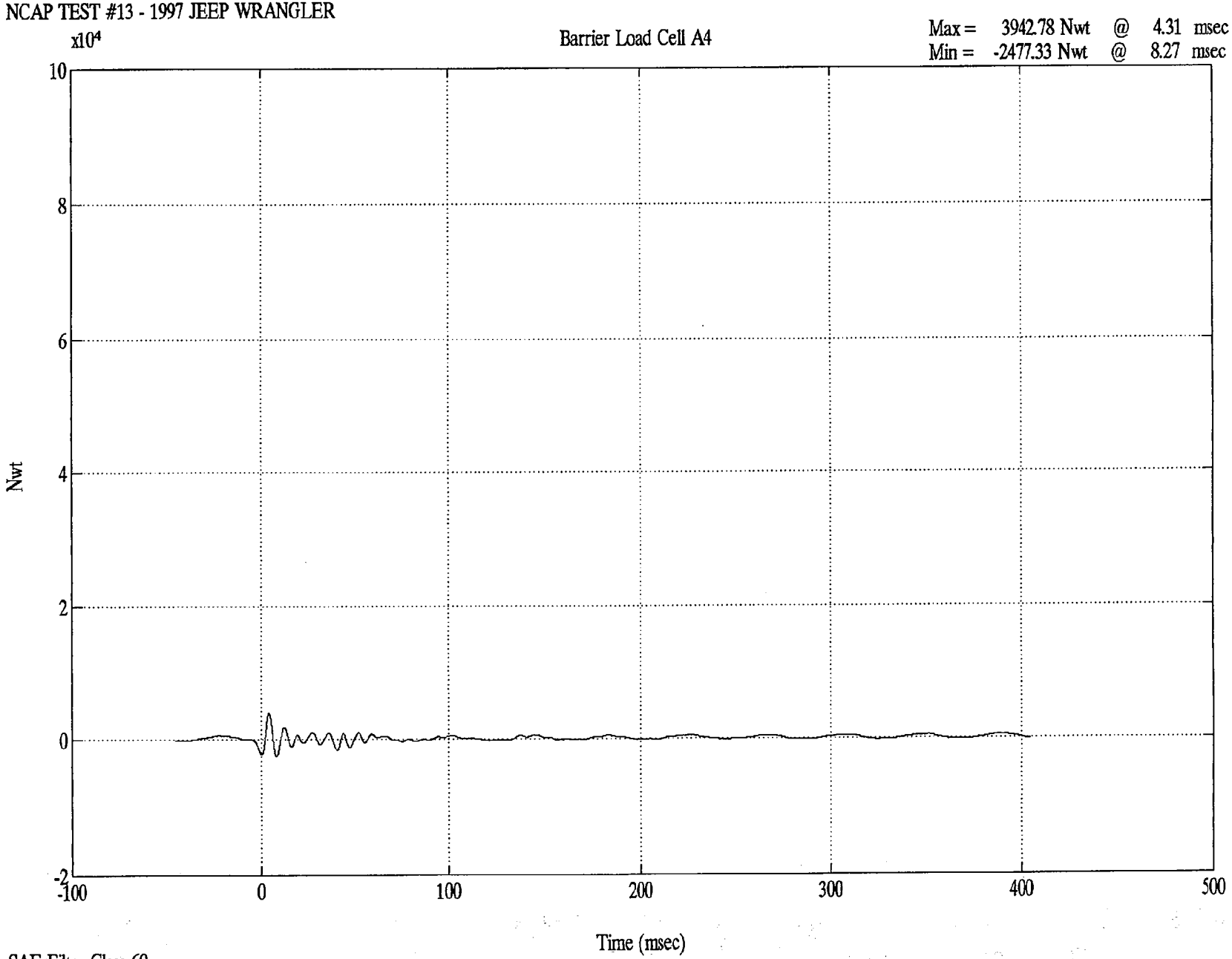
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

NCAP TEST #13 - 1997 JEEP WRANGLER

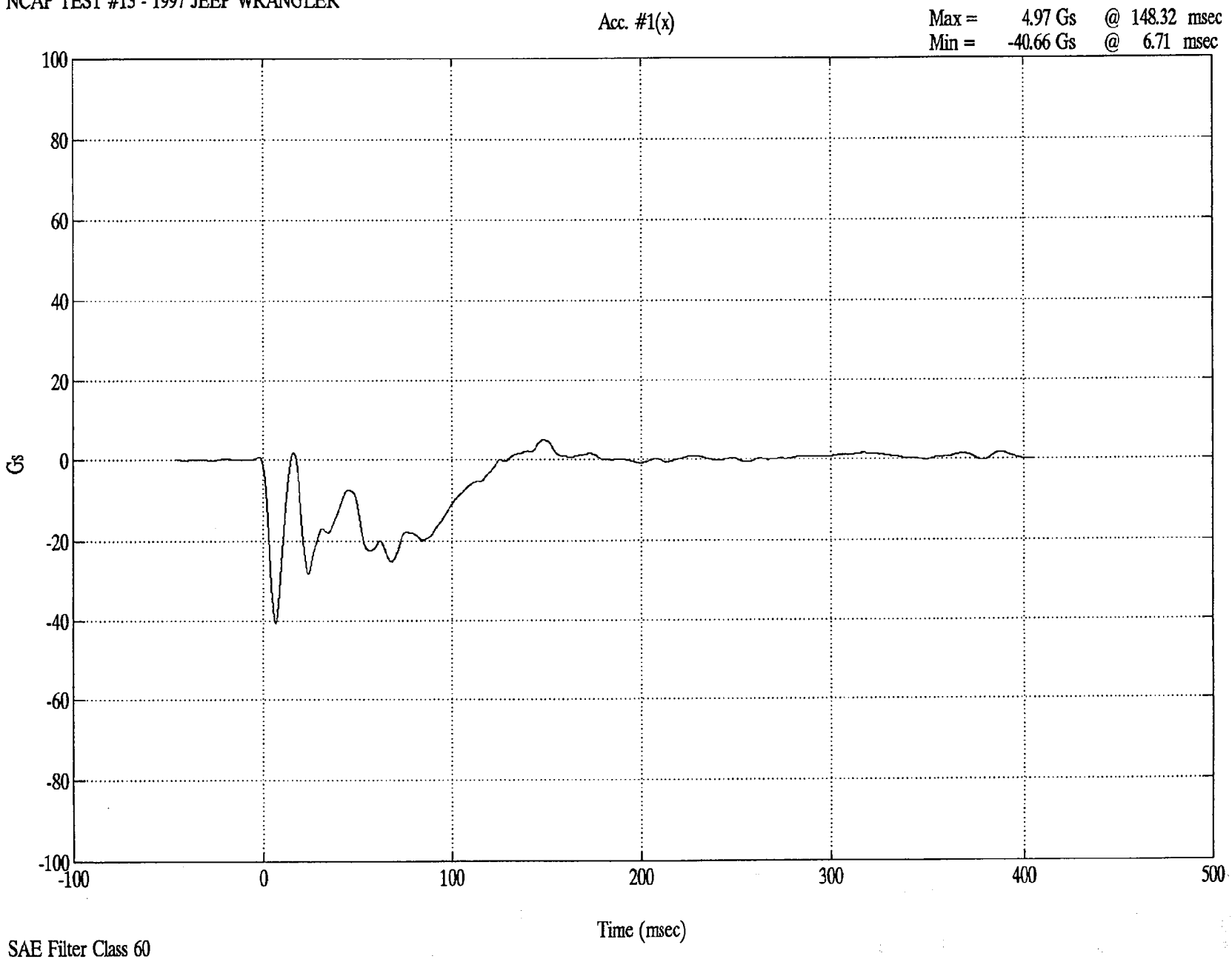


SAE Filter Class 60

NHTSA TEST NO. MV0300

VEHICLE DATA	FILTER CHANNEL CLASS
Acceleration	60
Velocity	180
Displacement	180

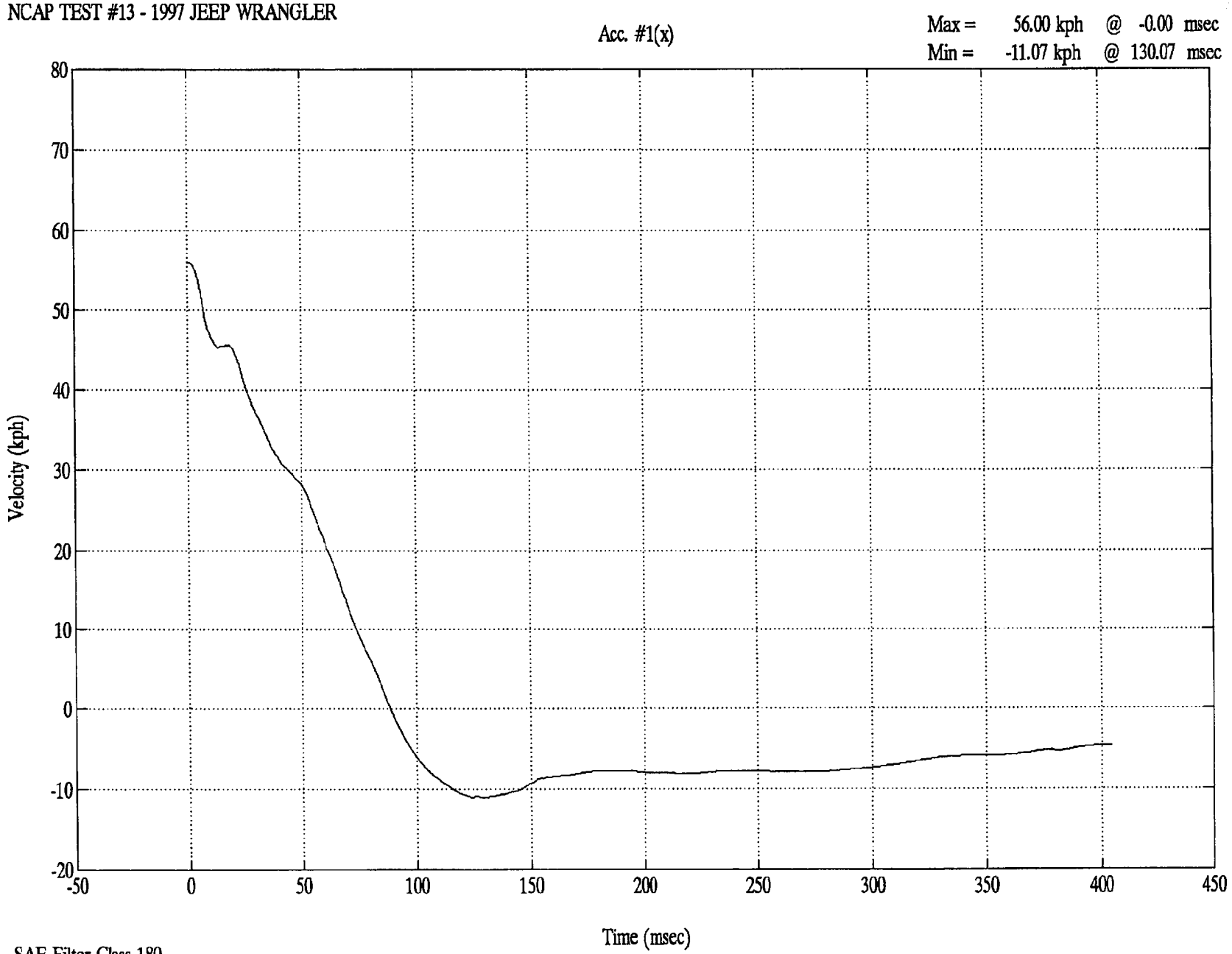
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

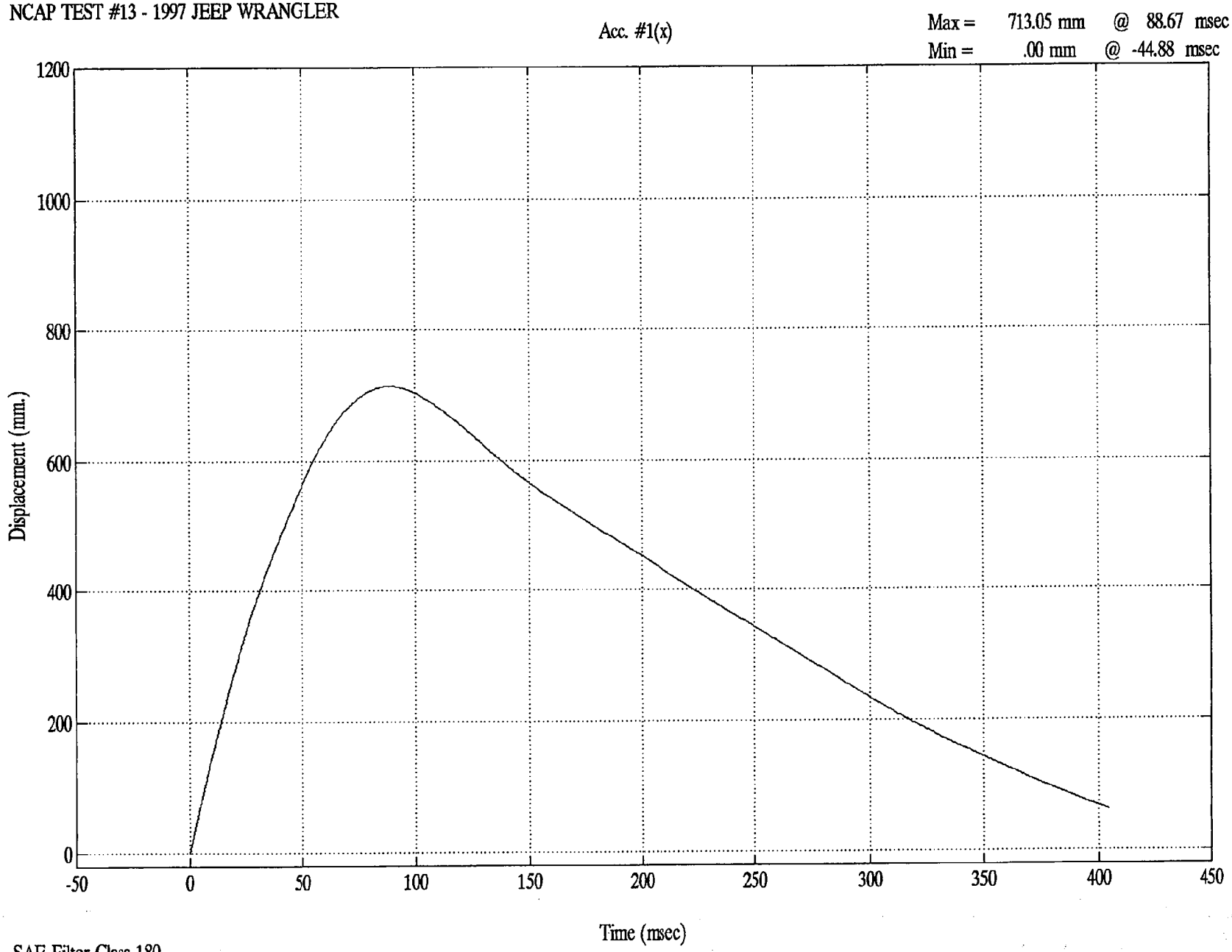
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

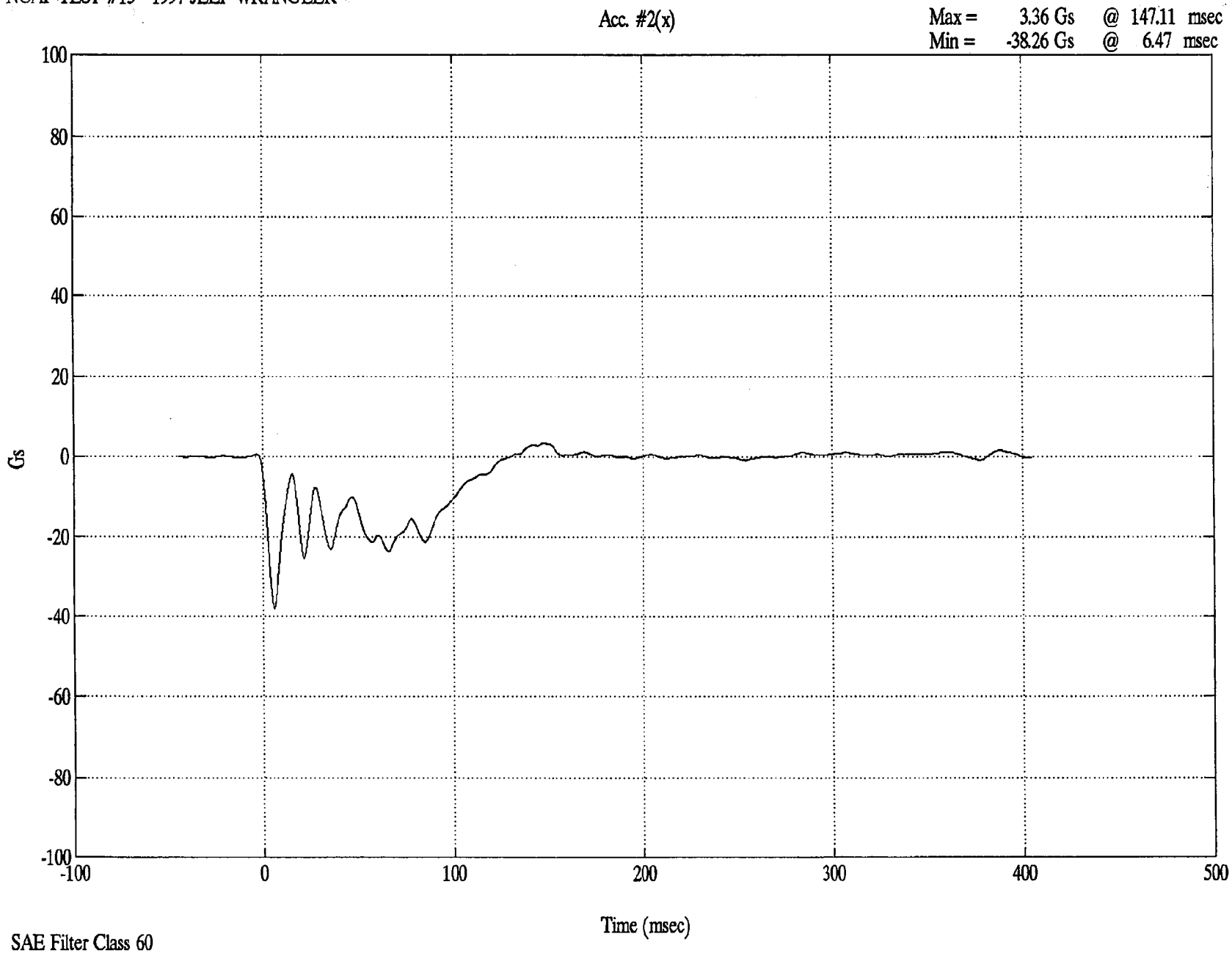
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

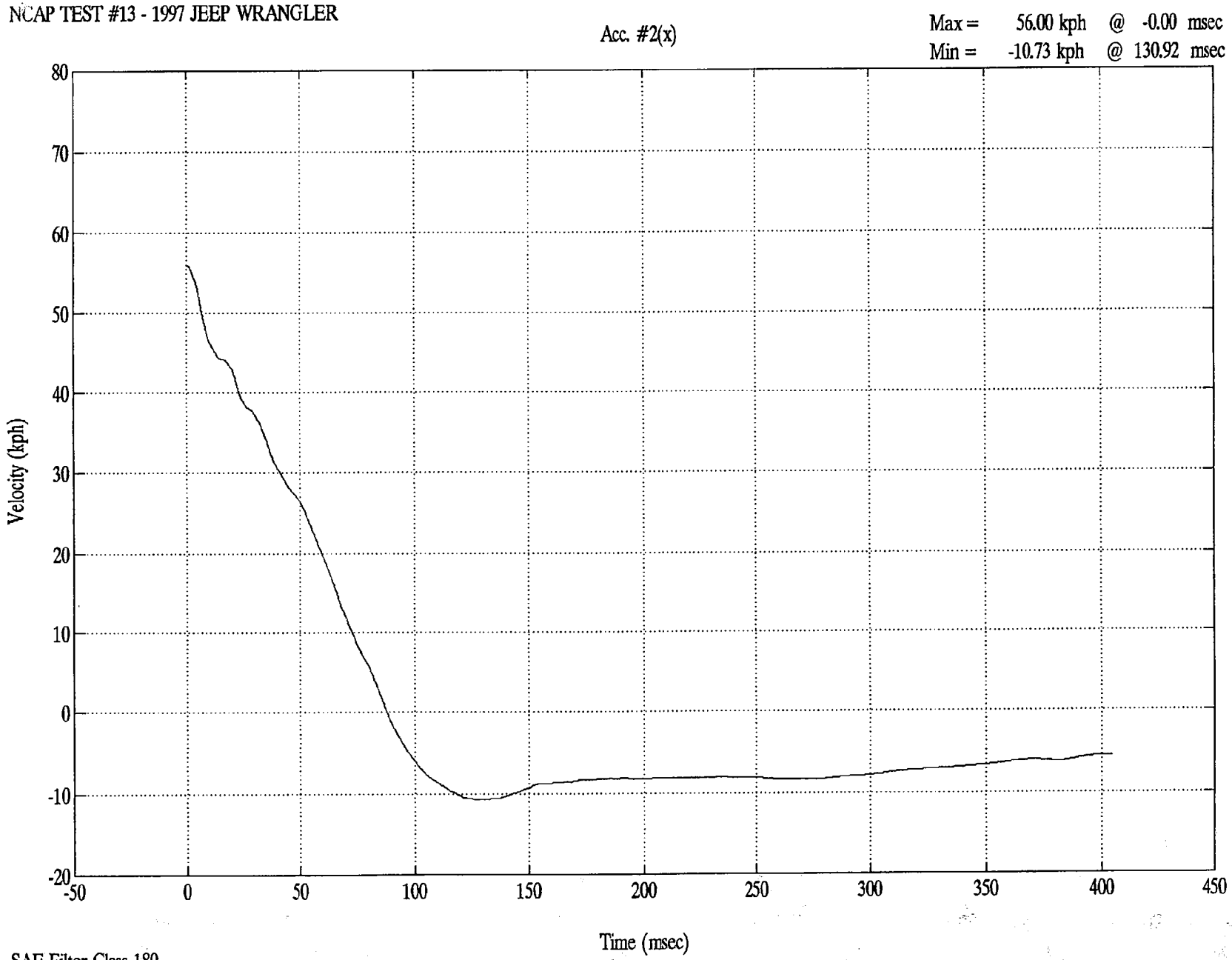


B-106

8313-13

SAE Filter Class 60

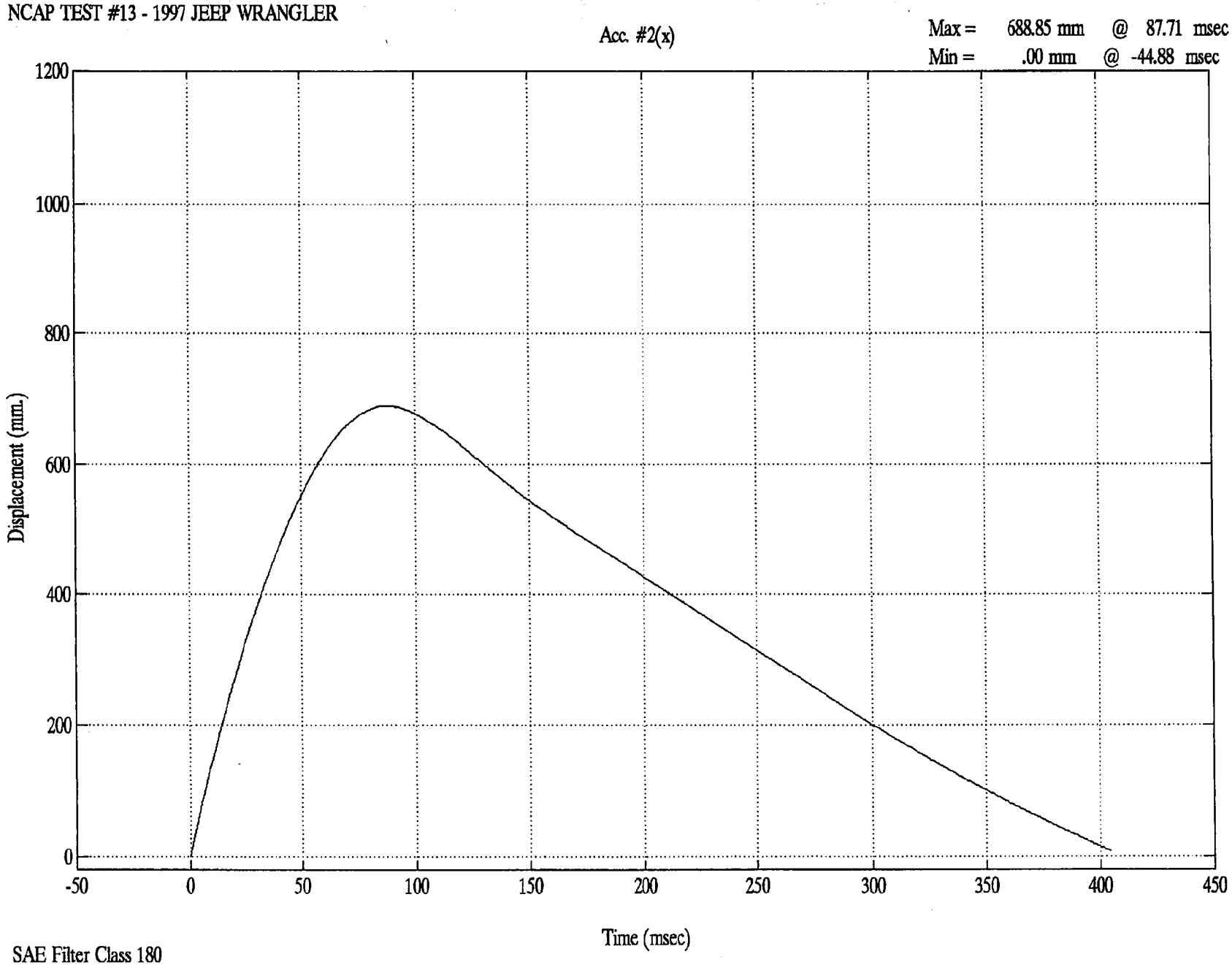
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

8313-13

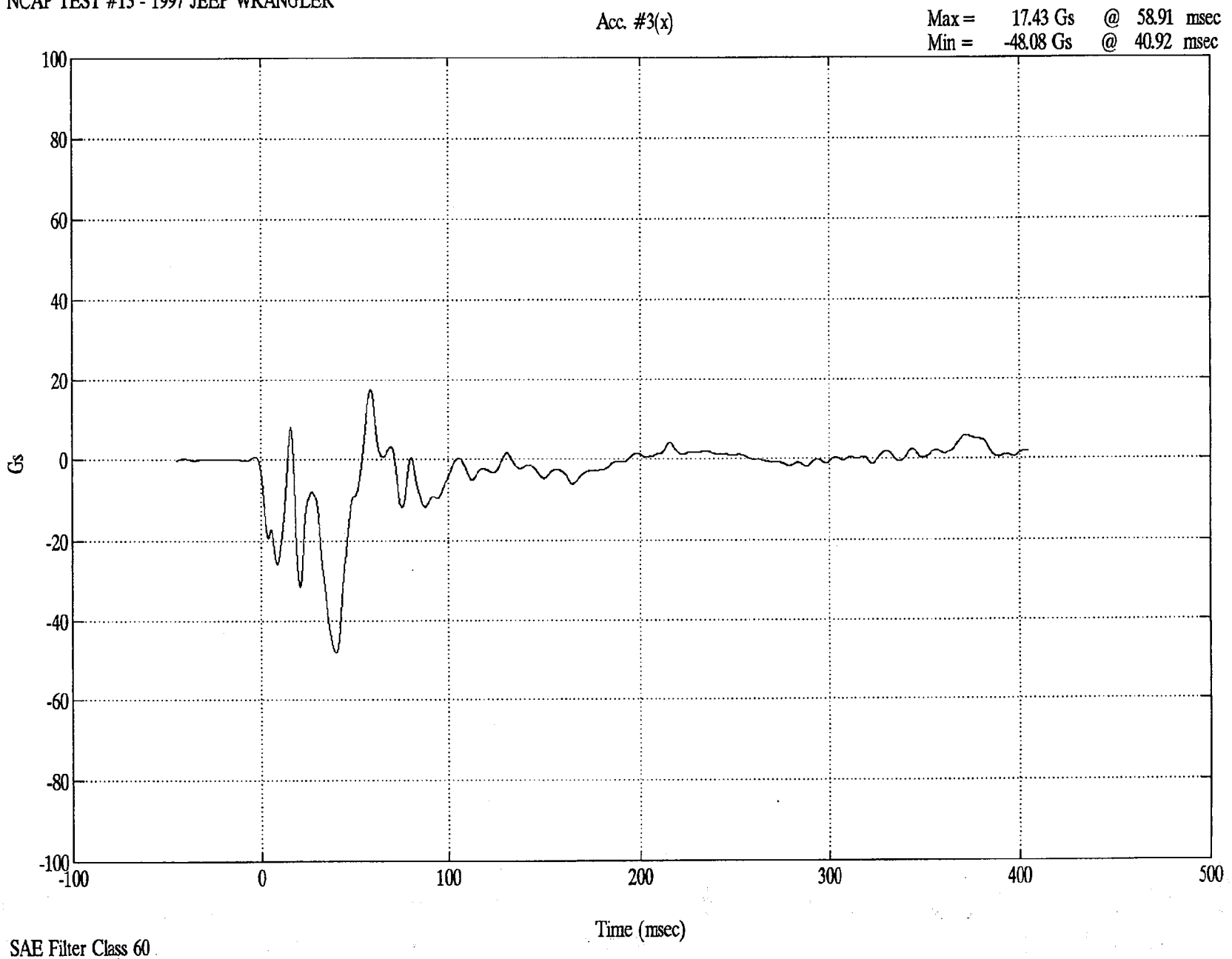
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

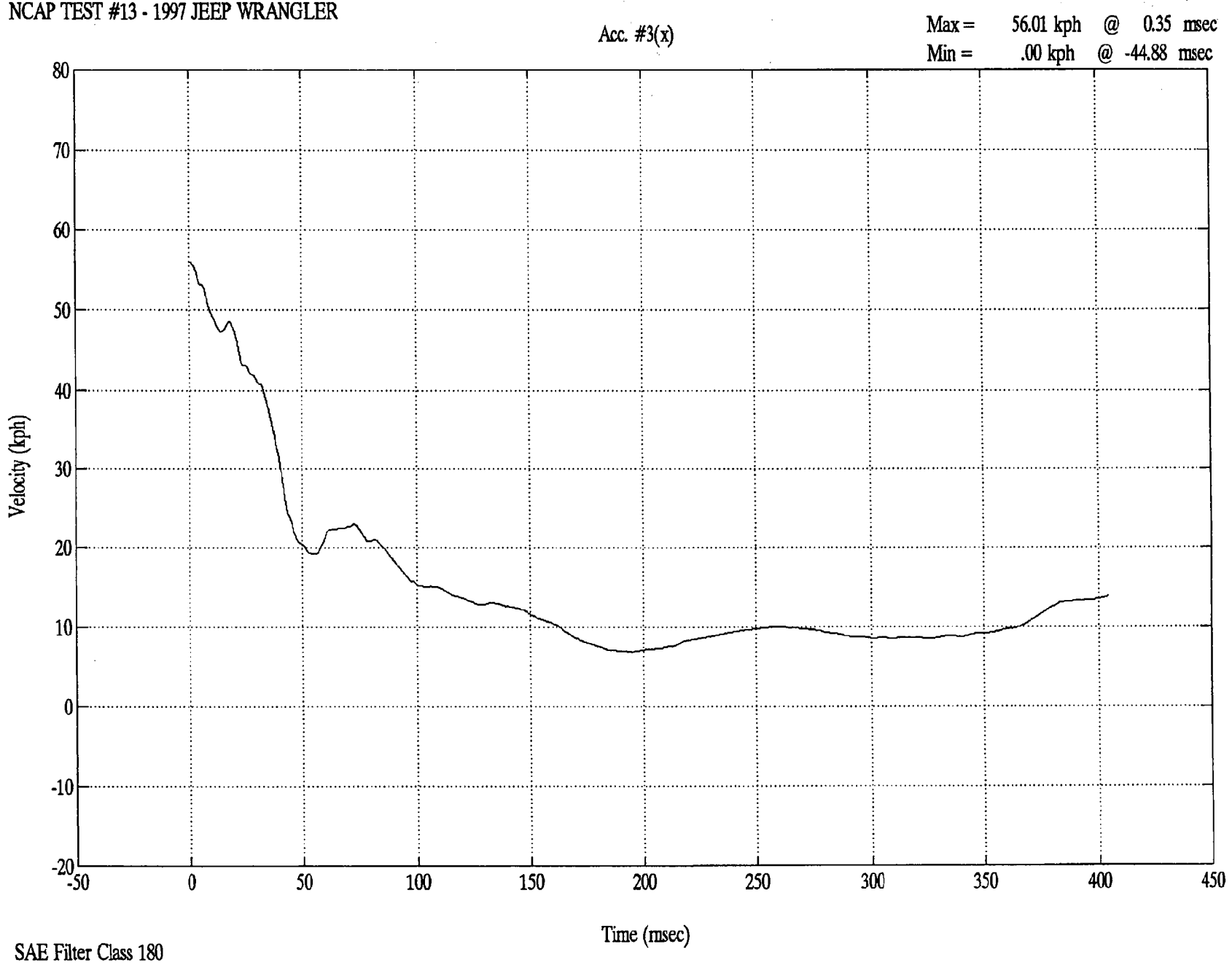
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

NCAP TEST #13 - 1997 JEEP WRANGLER

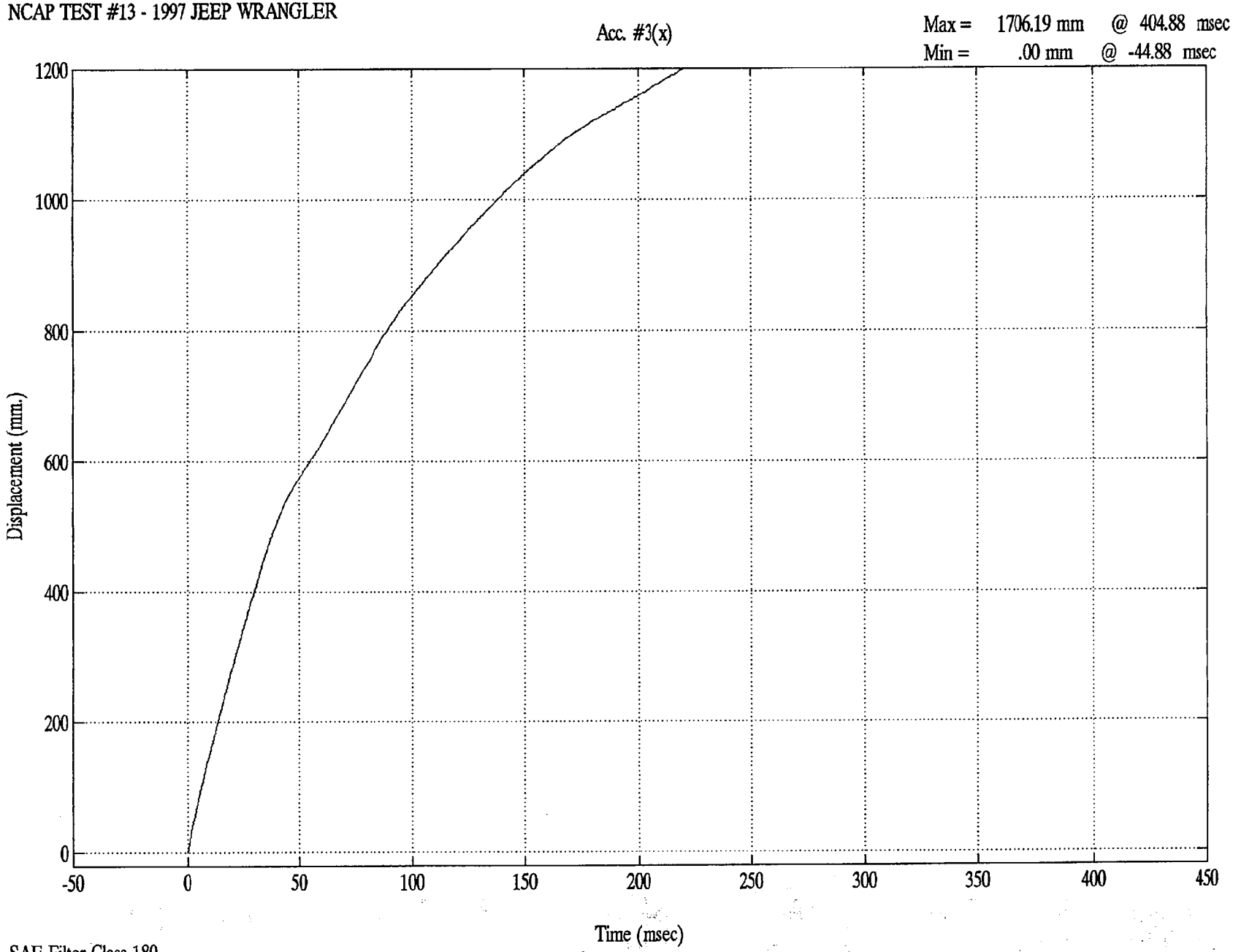


SAE Filter Class 180

B-110

8313-13

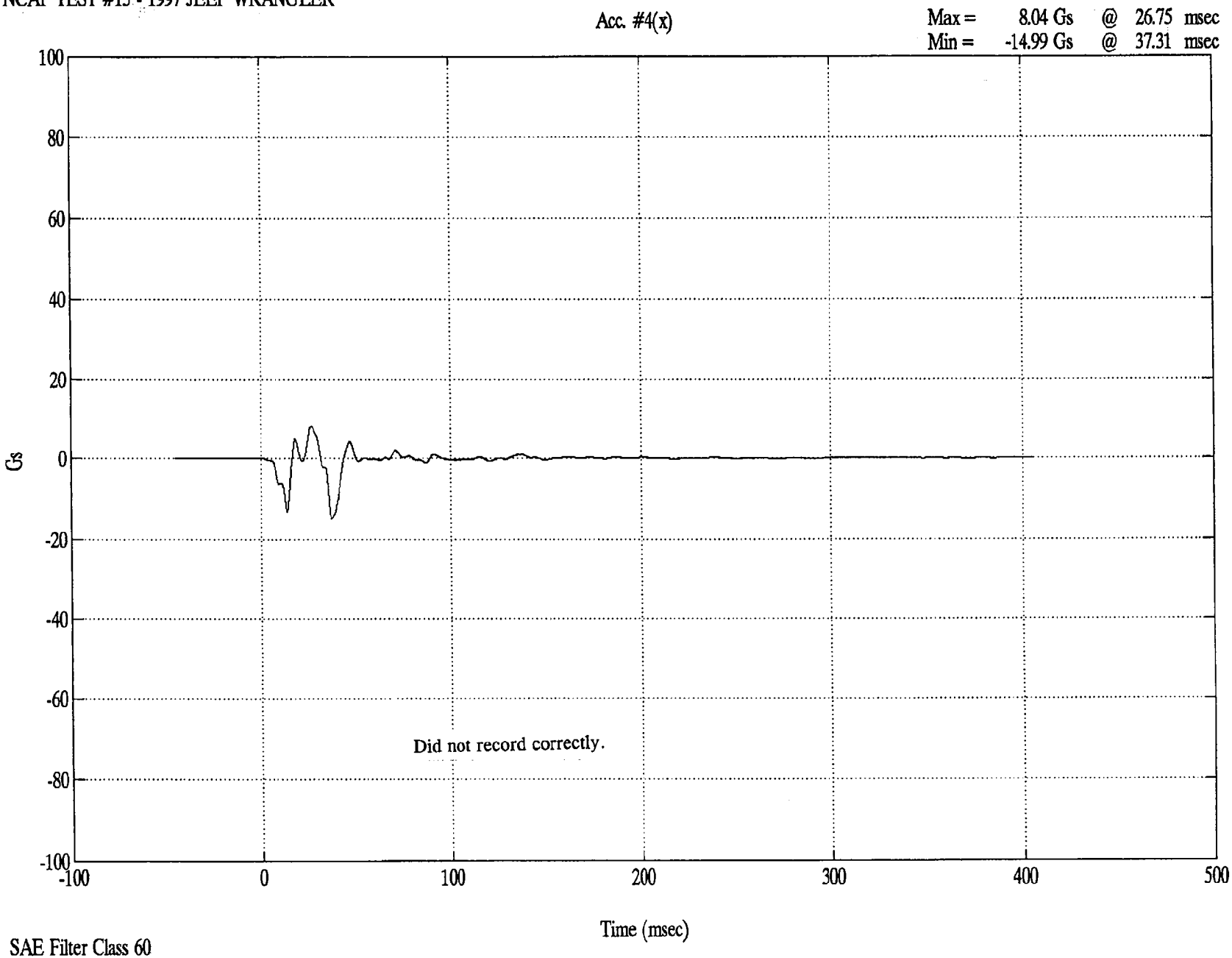
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

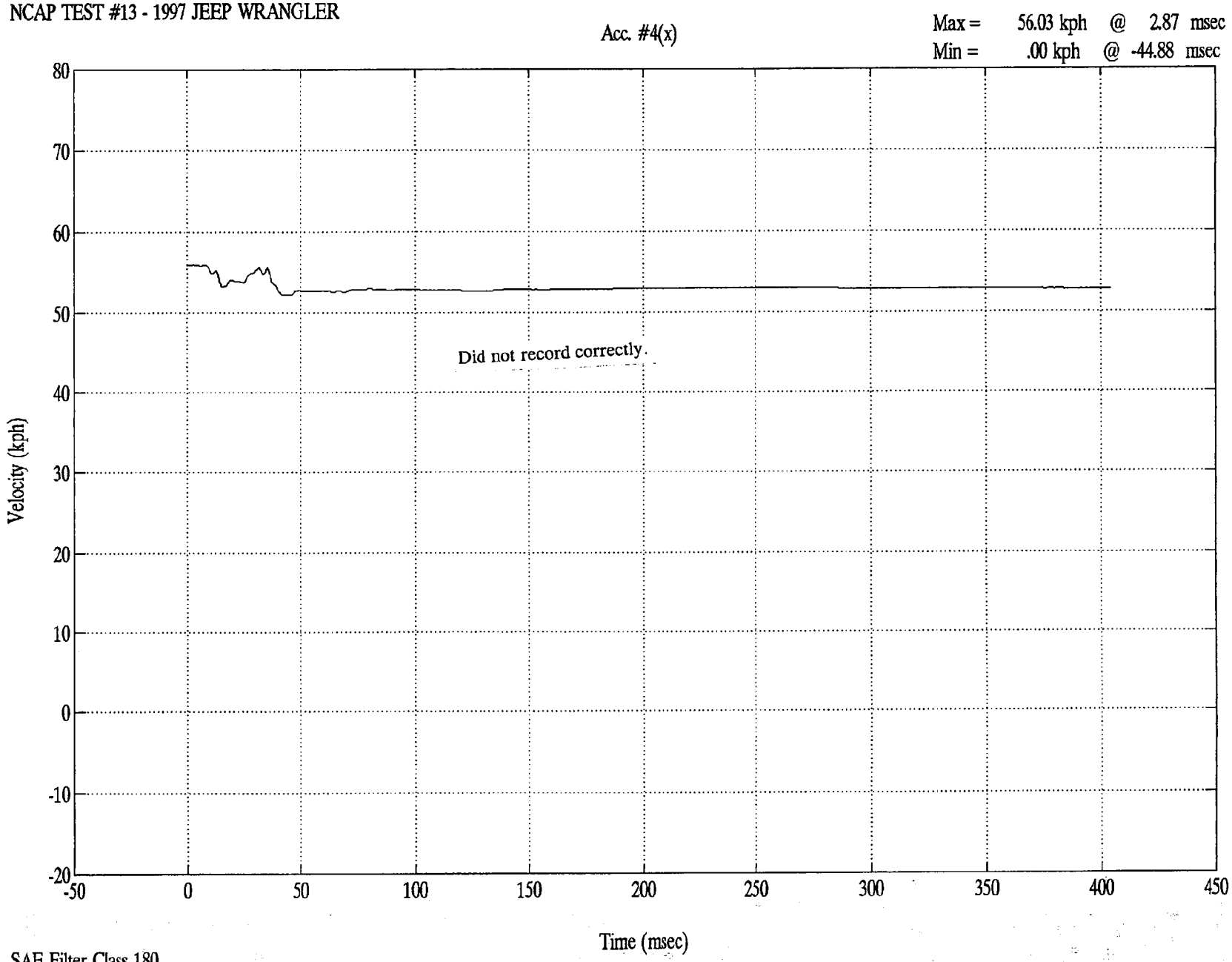
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

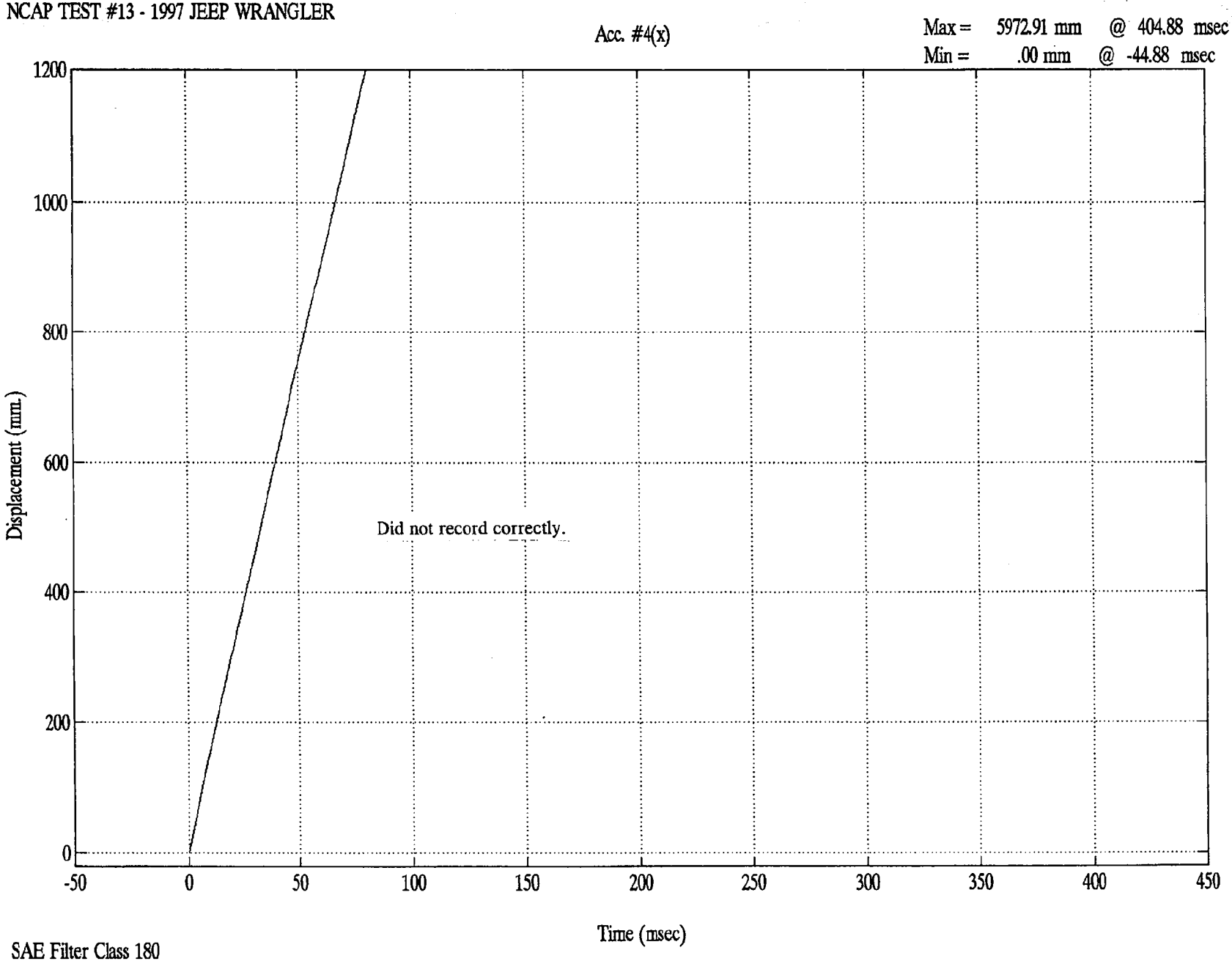
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

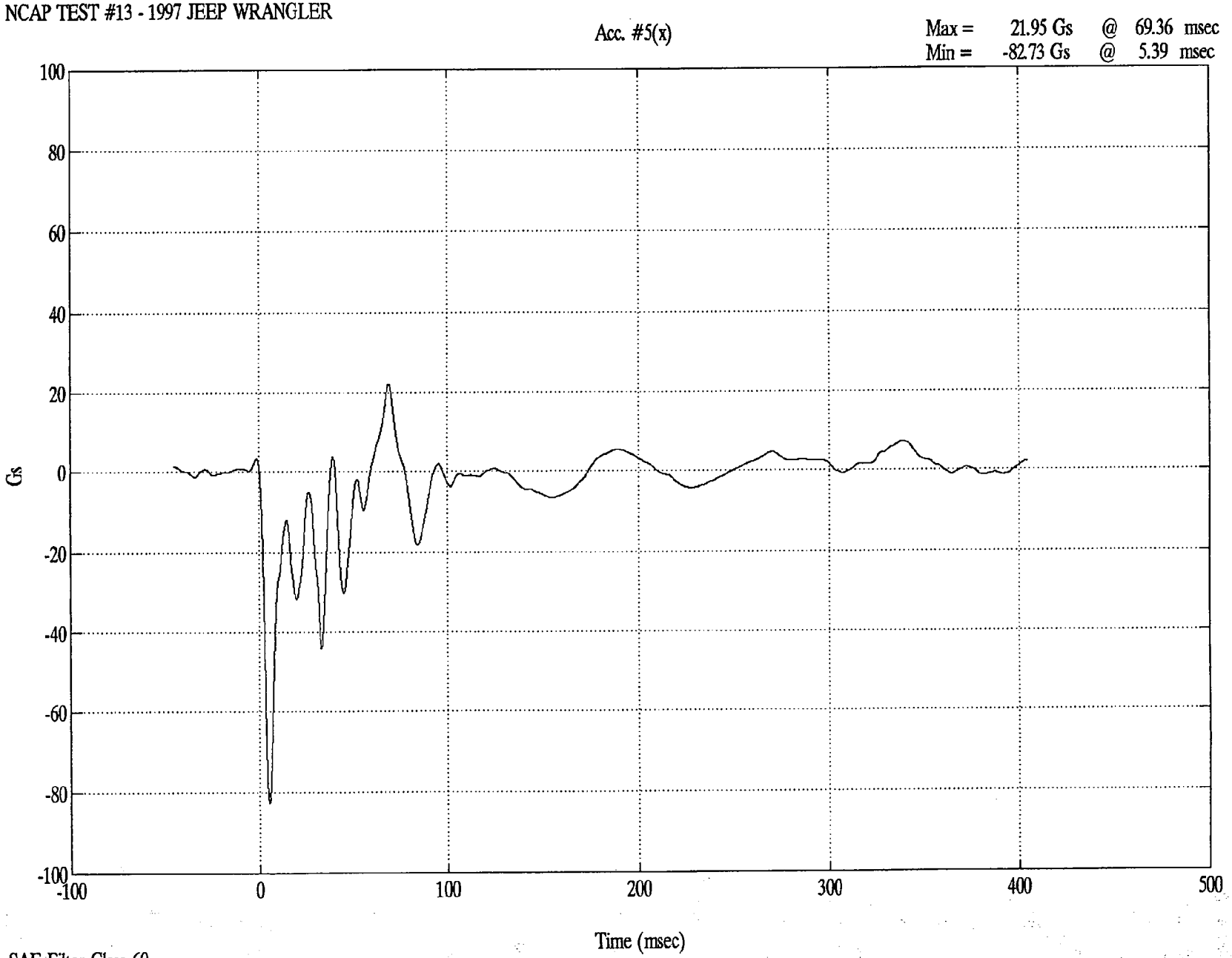
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



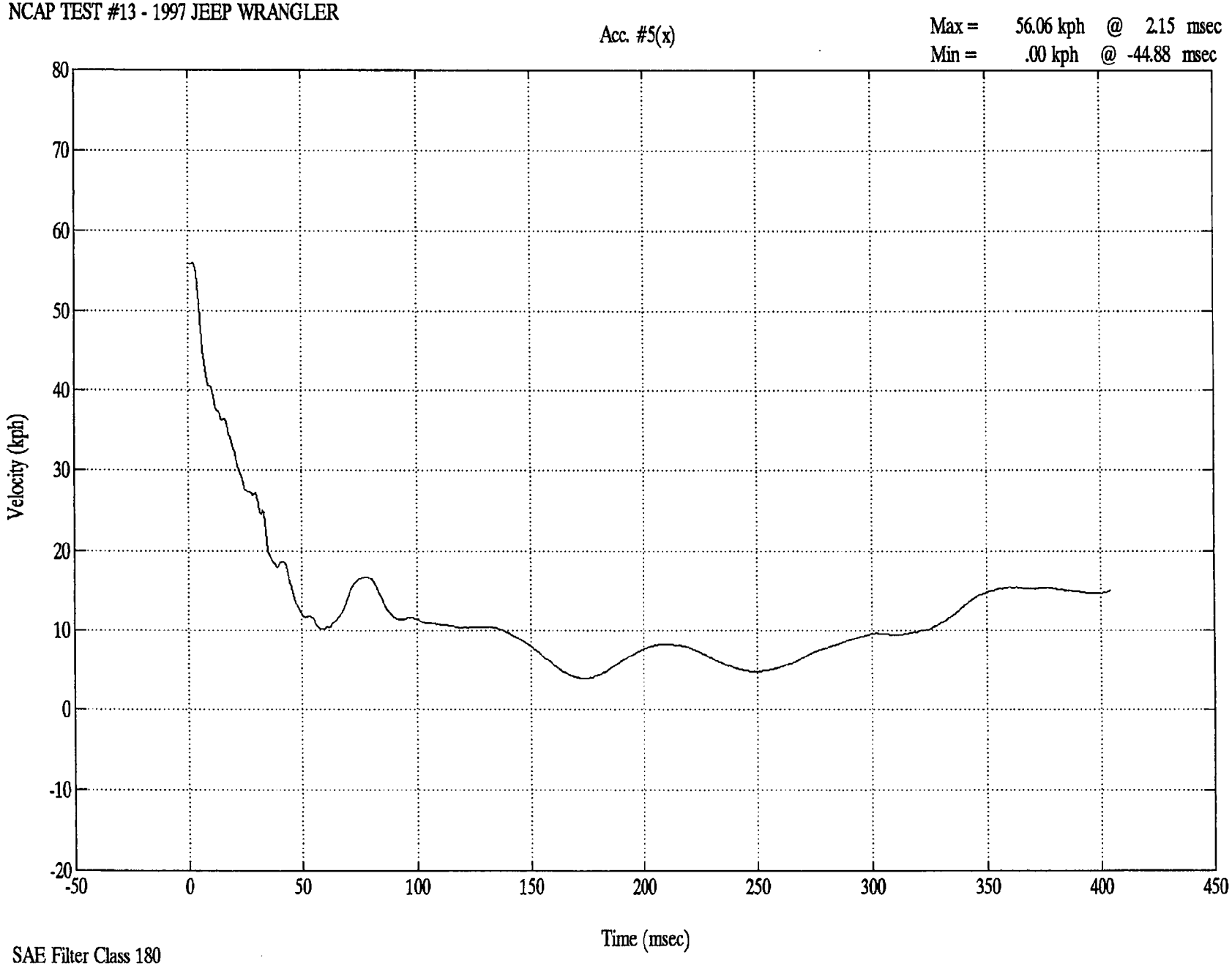
SAE Filter Class 180

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

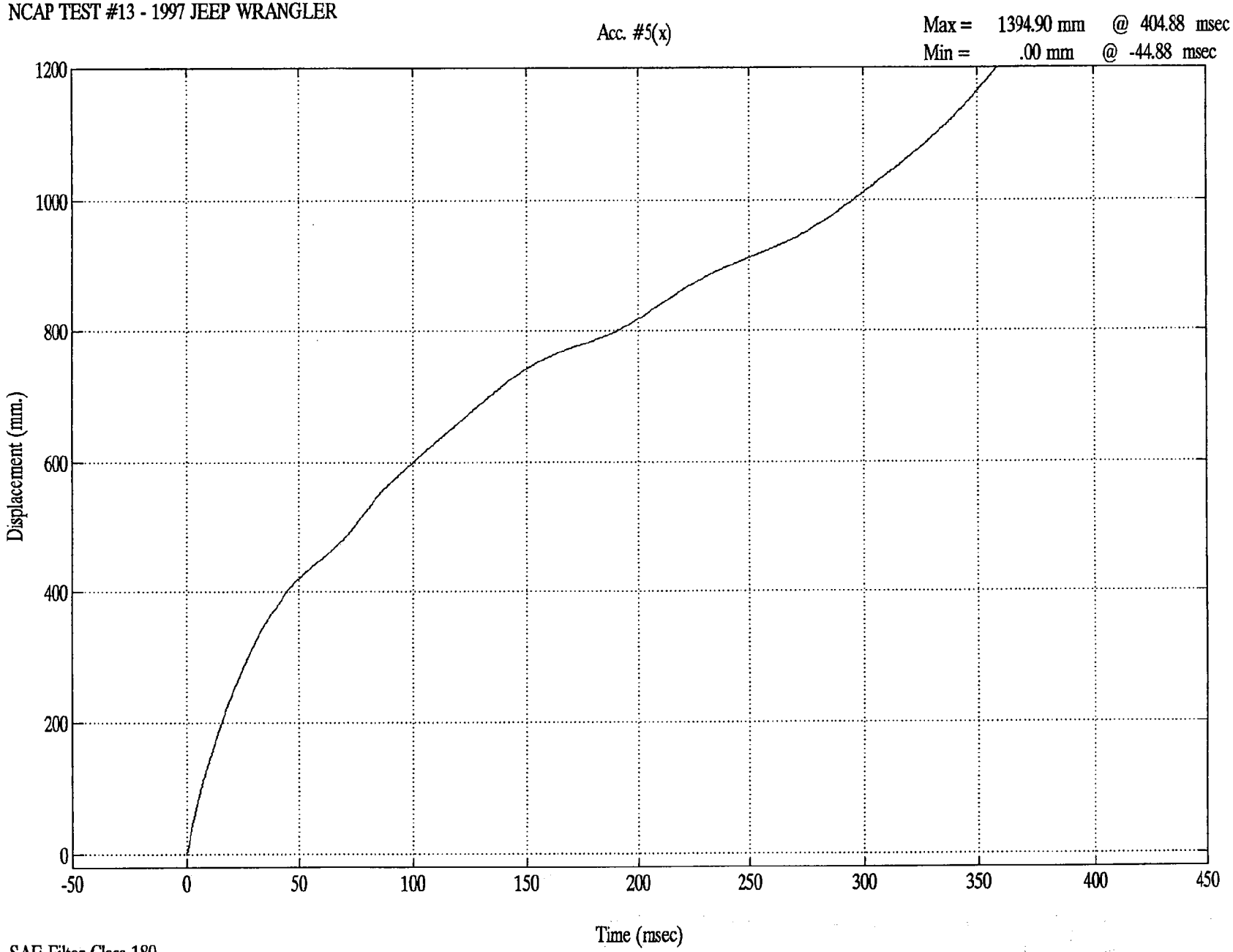
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

8313-13

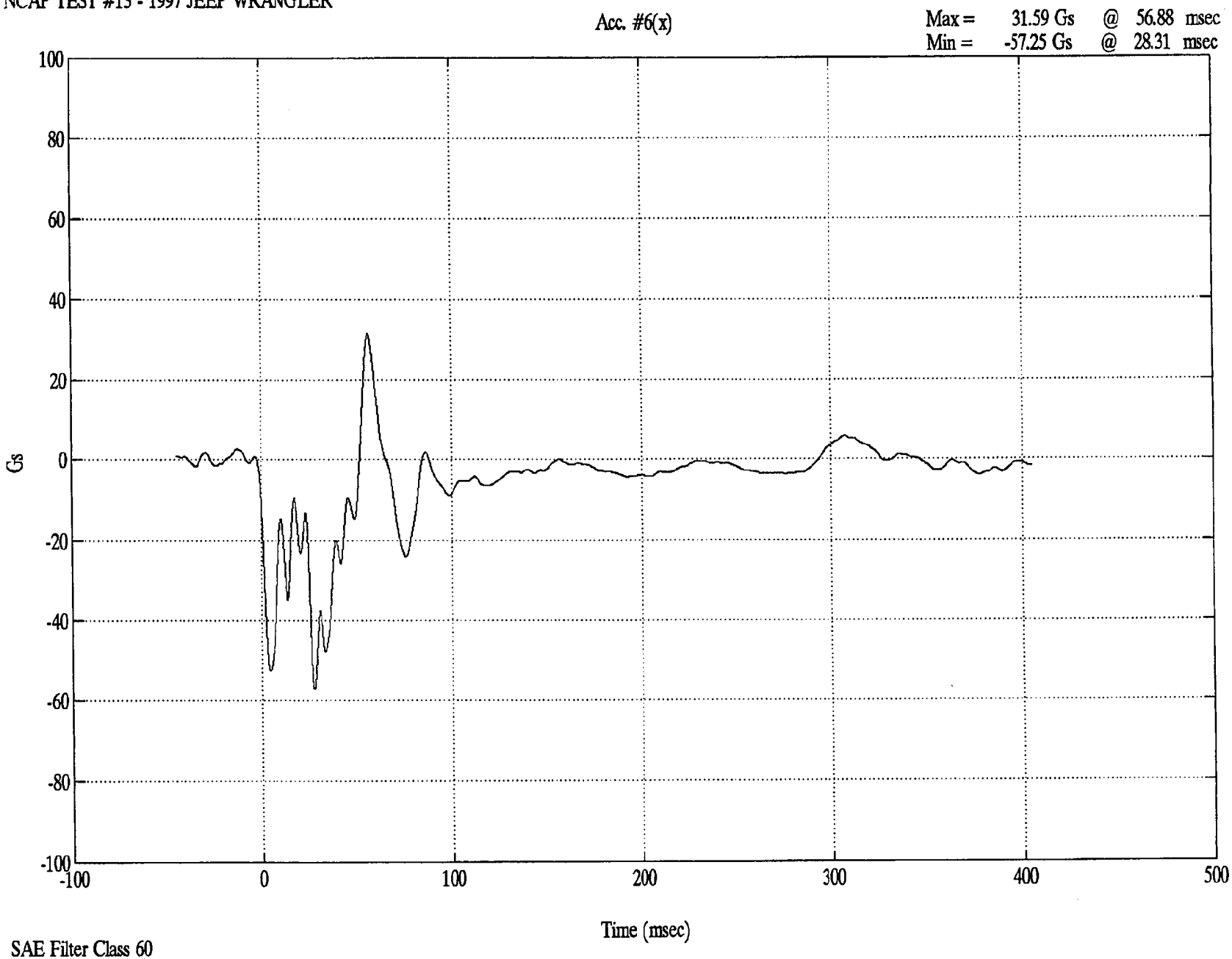
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

8313-13

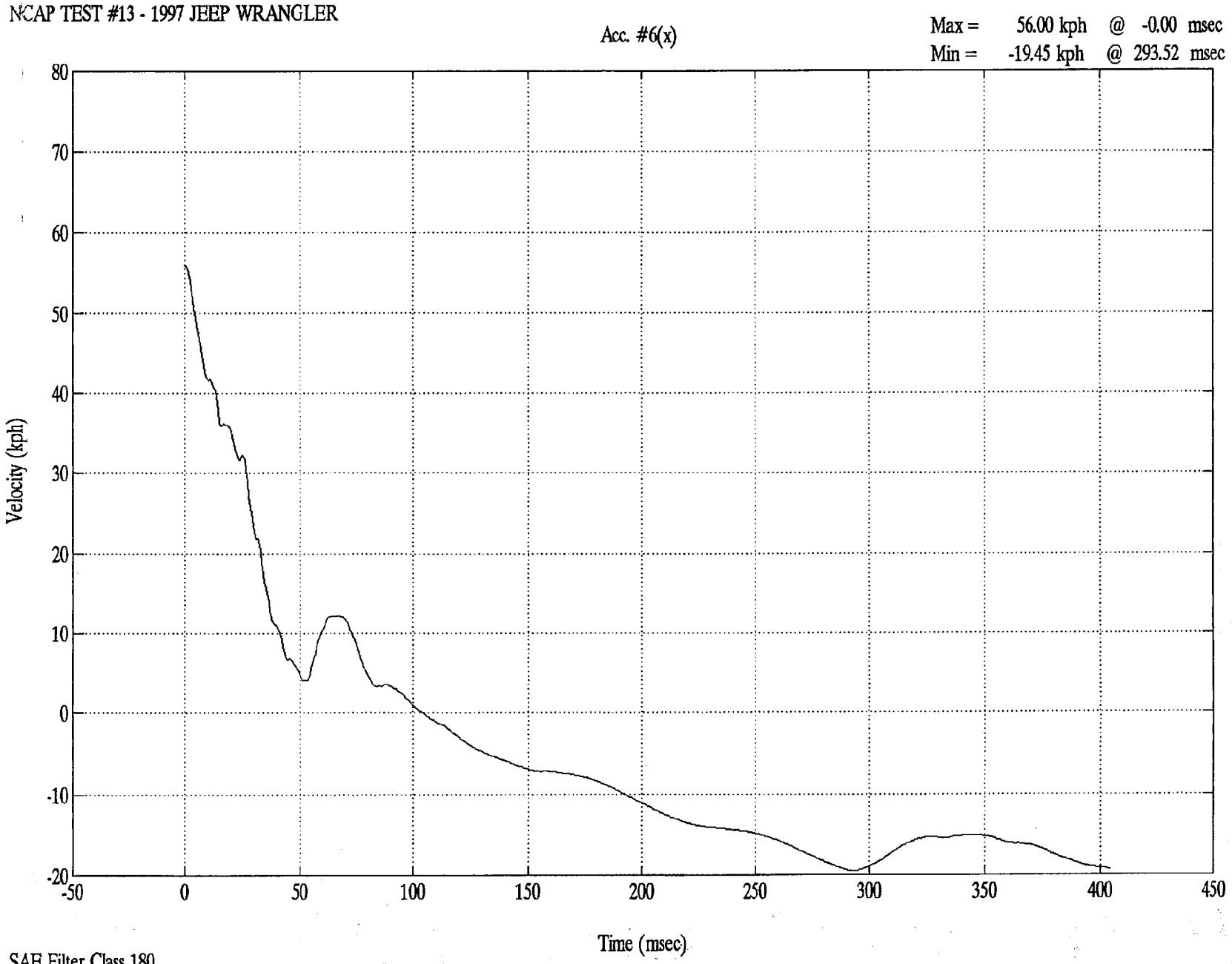
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

8313-13

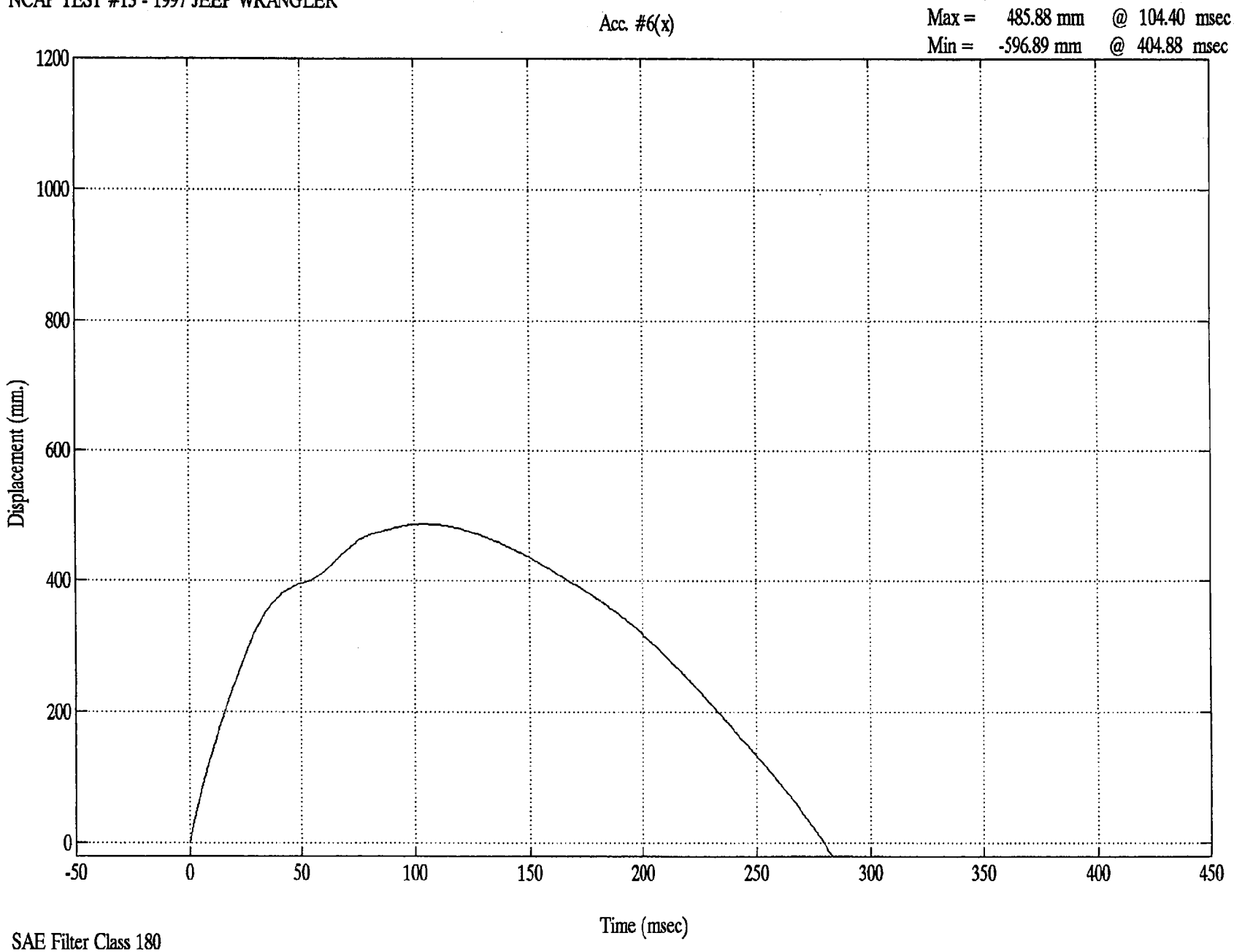
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

8313-13

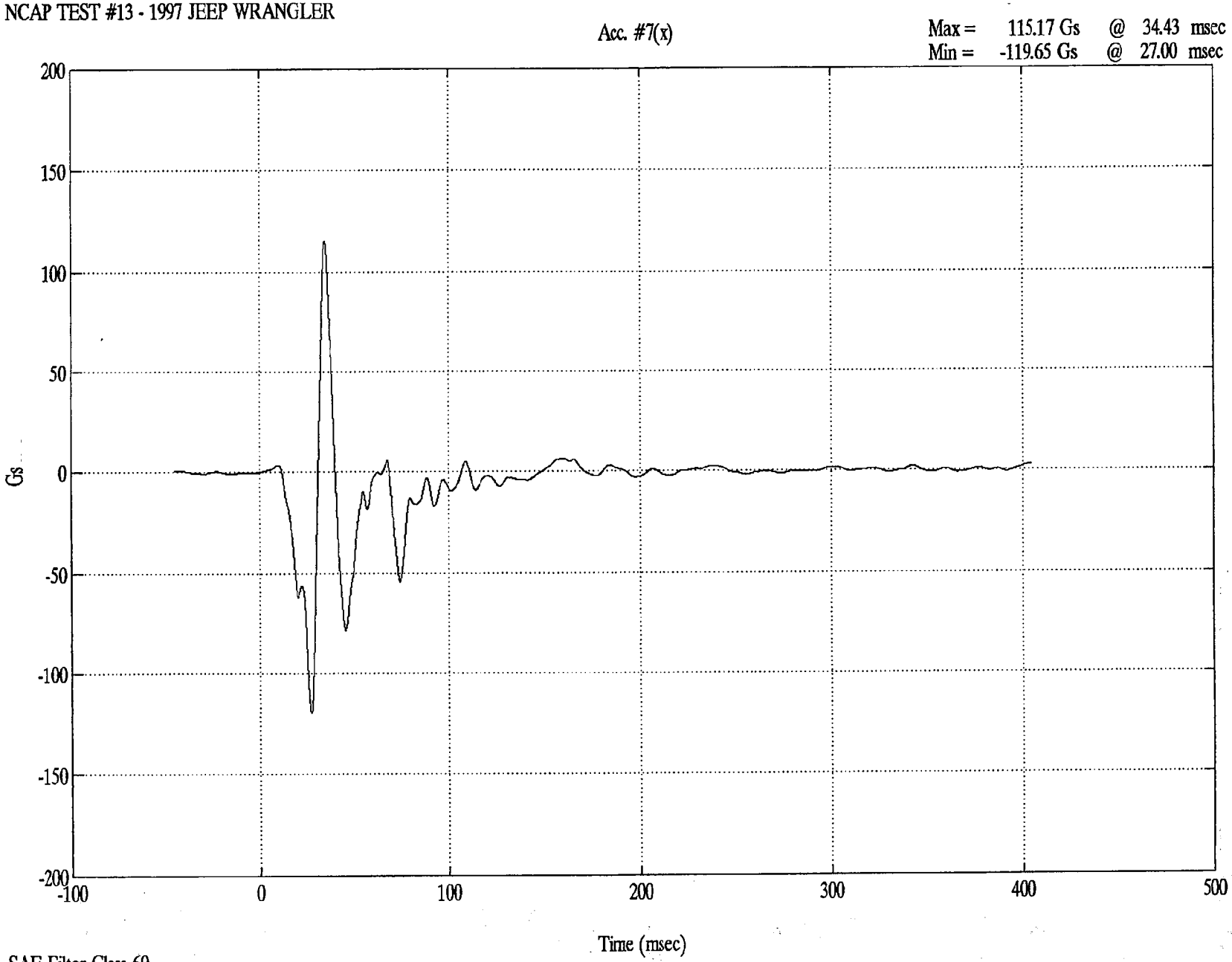
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



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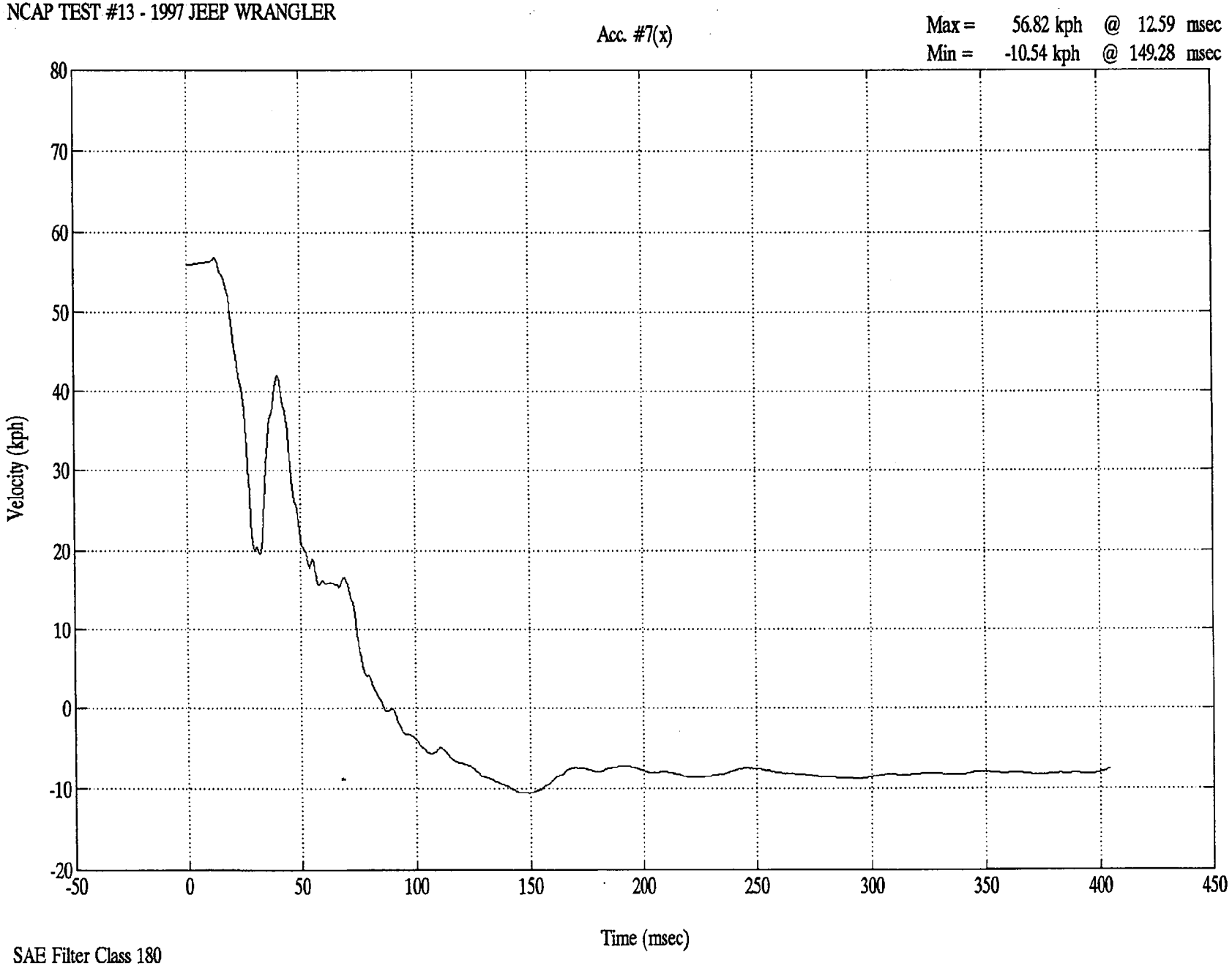
8313-13

SAE Filter Class 60

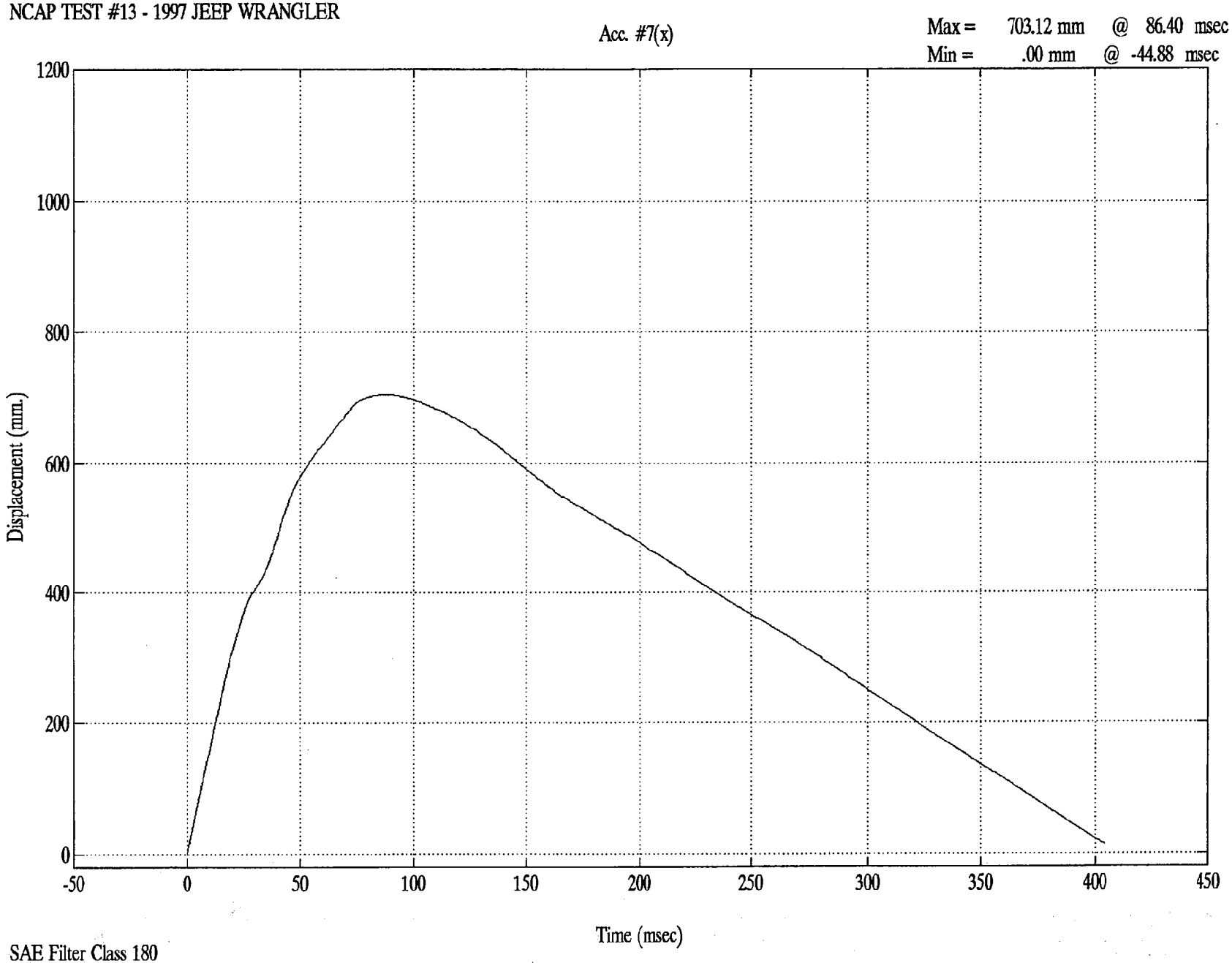
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

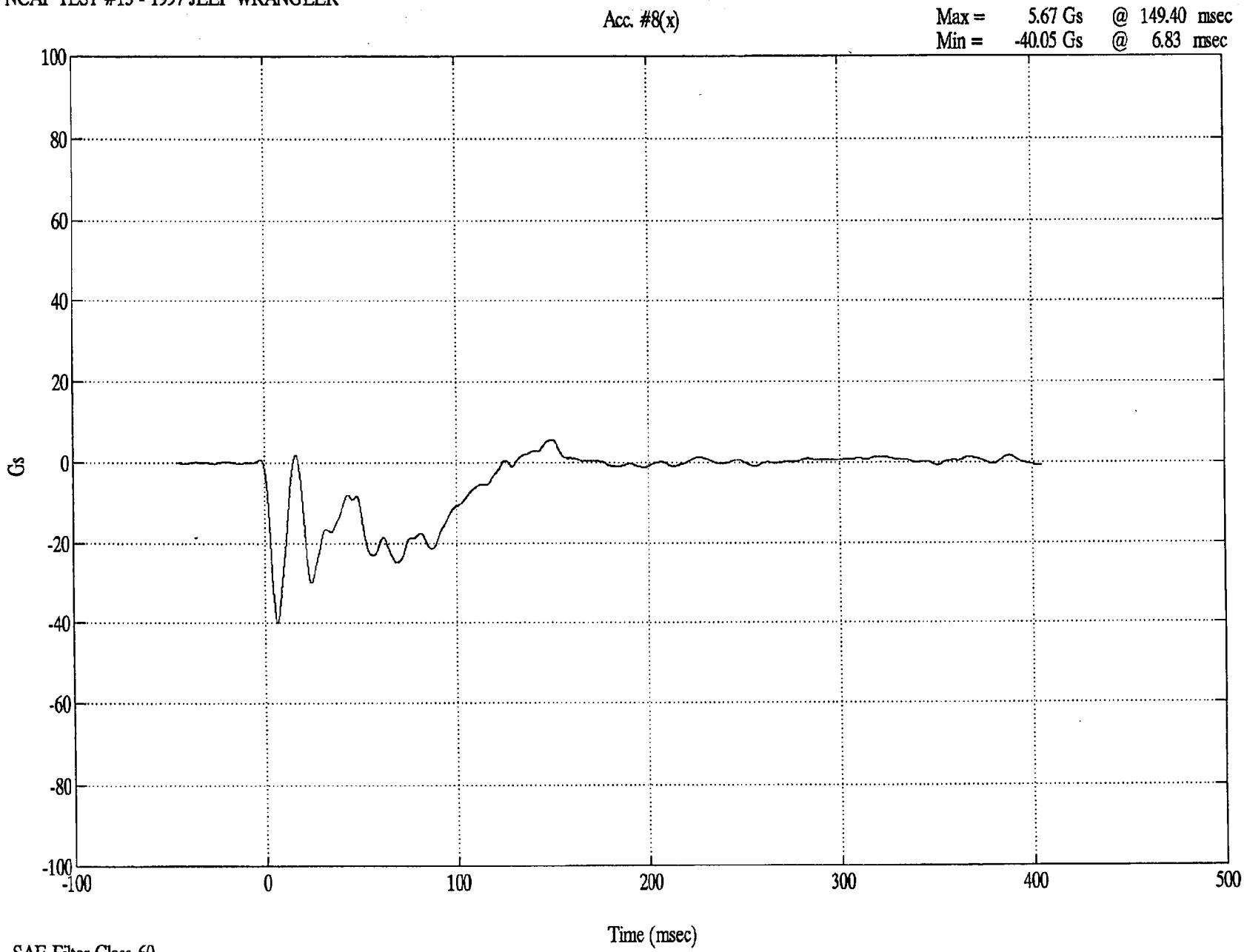
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



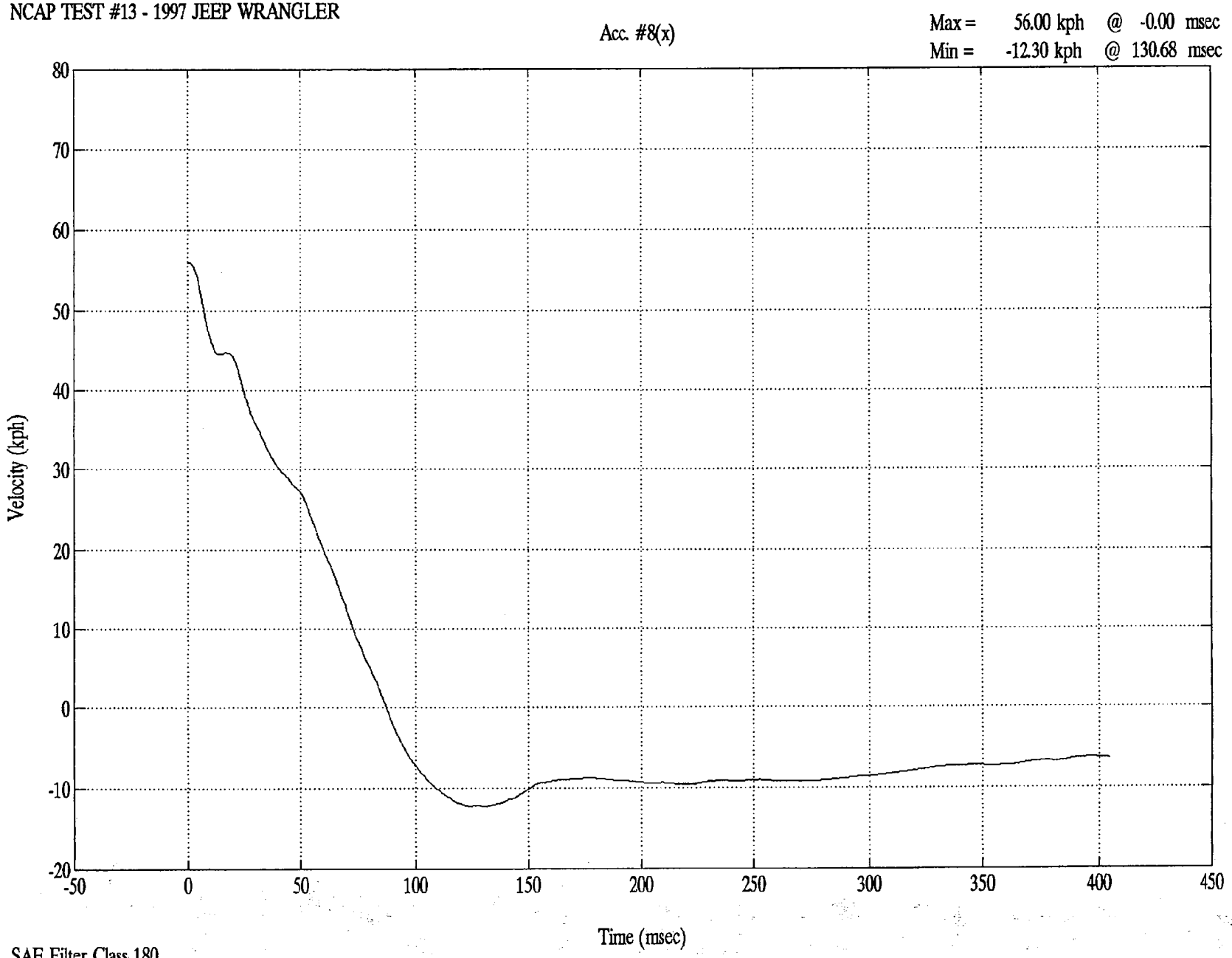
SAE Filter Class 180

NCAP TEST #13 - 1997 JEEP WRANGLER



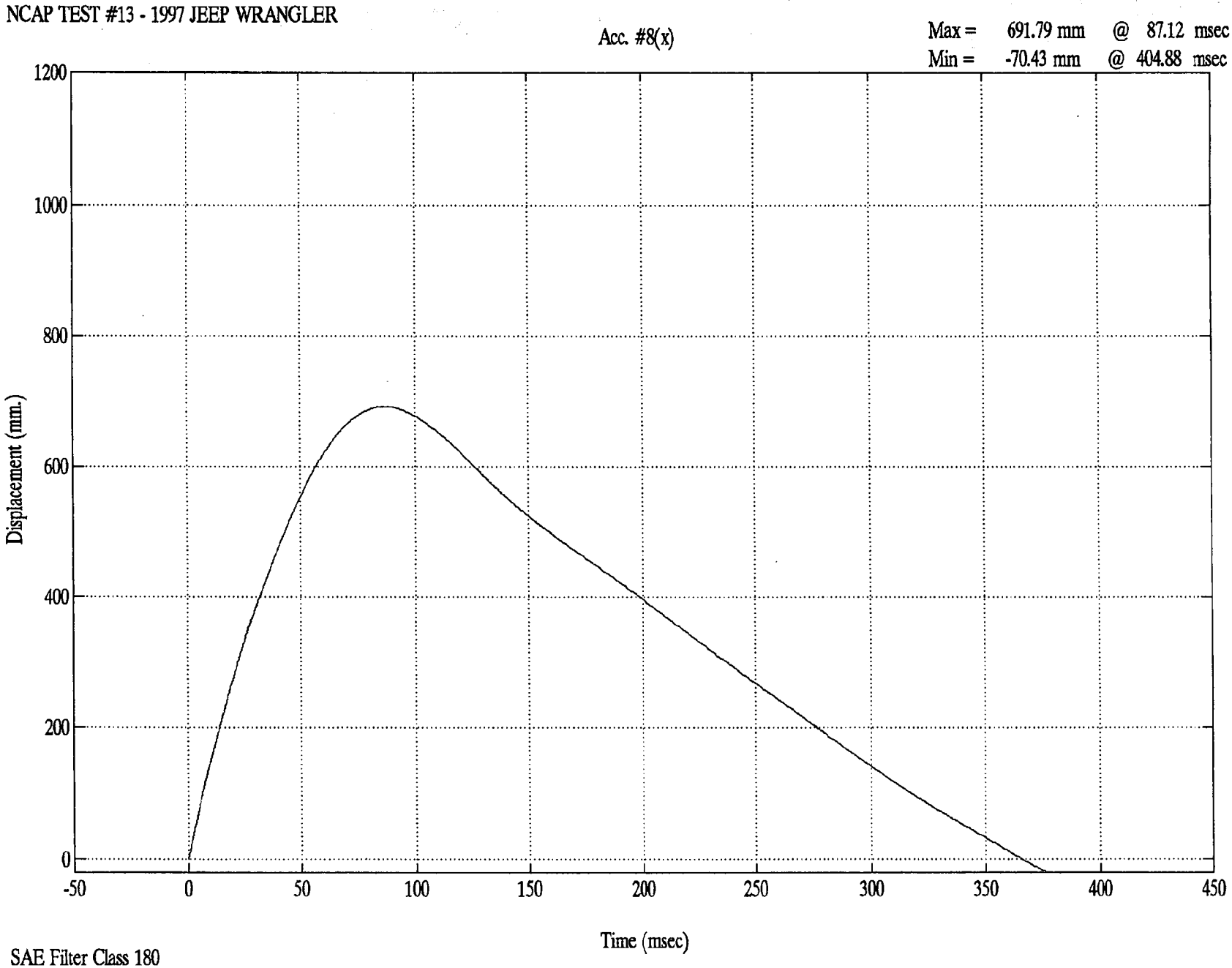
SAE Filter Class 60

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

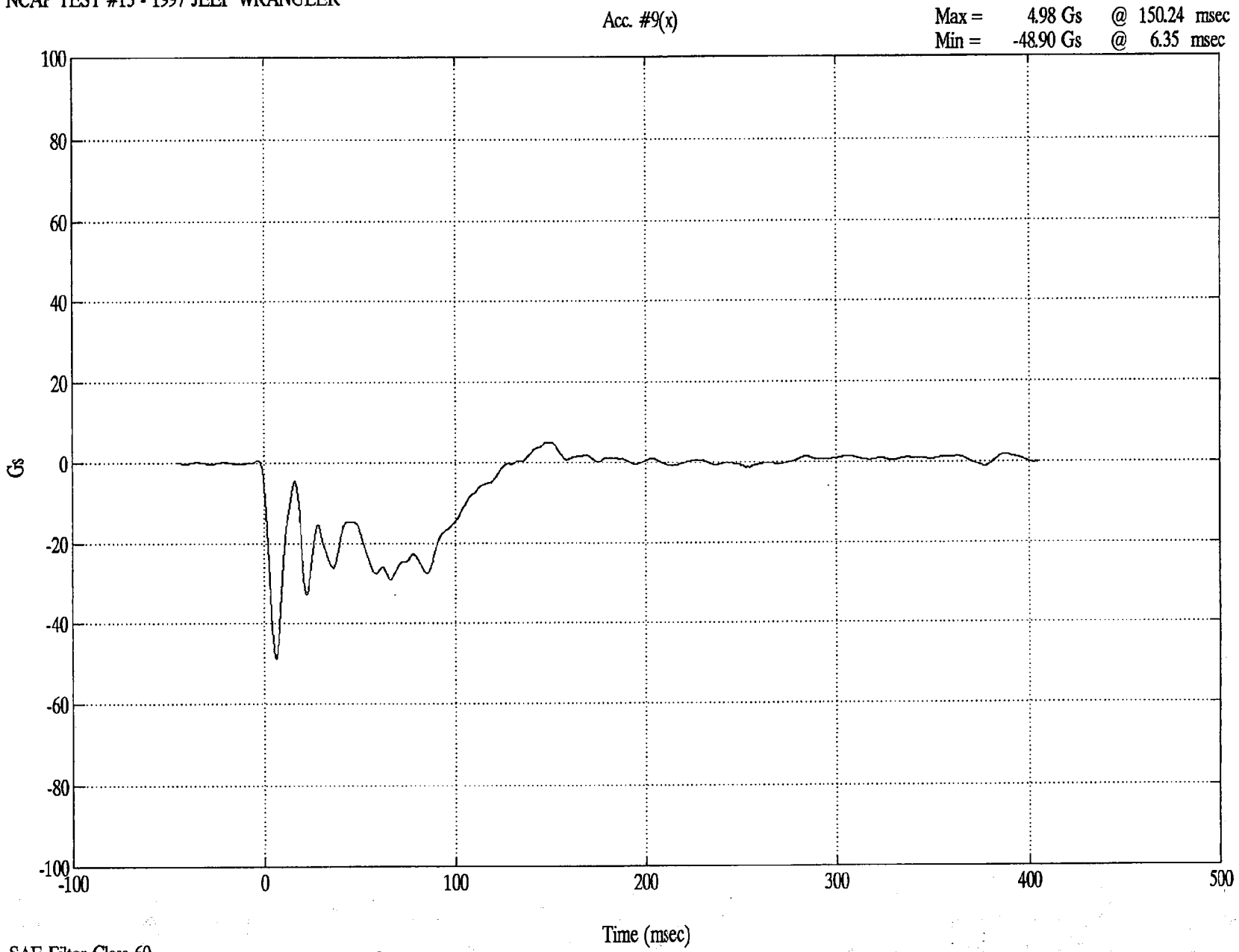
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

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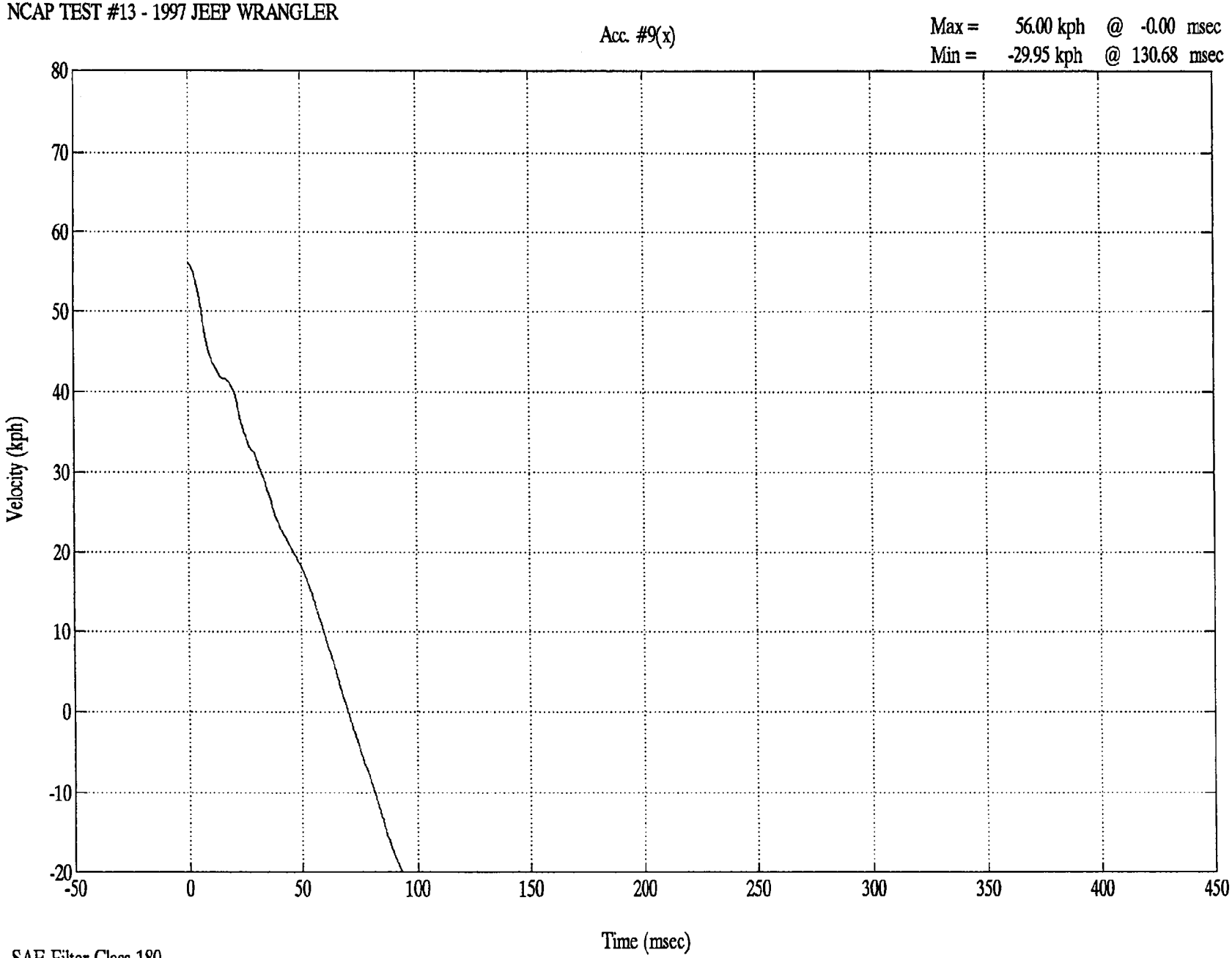
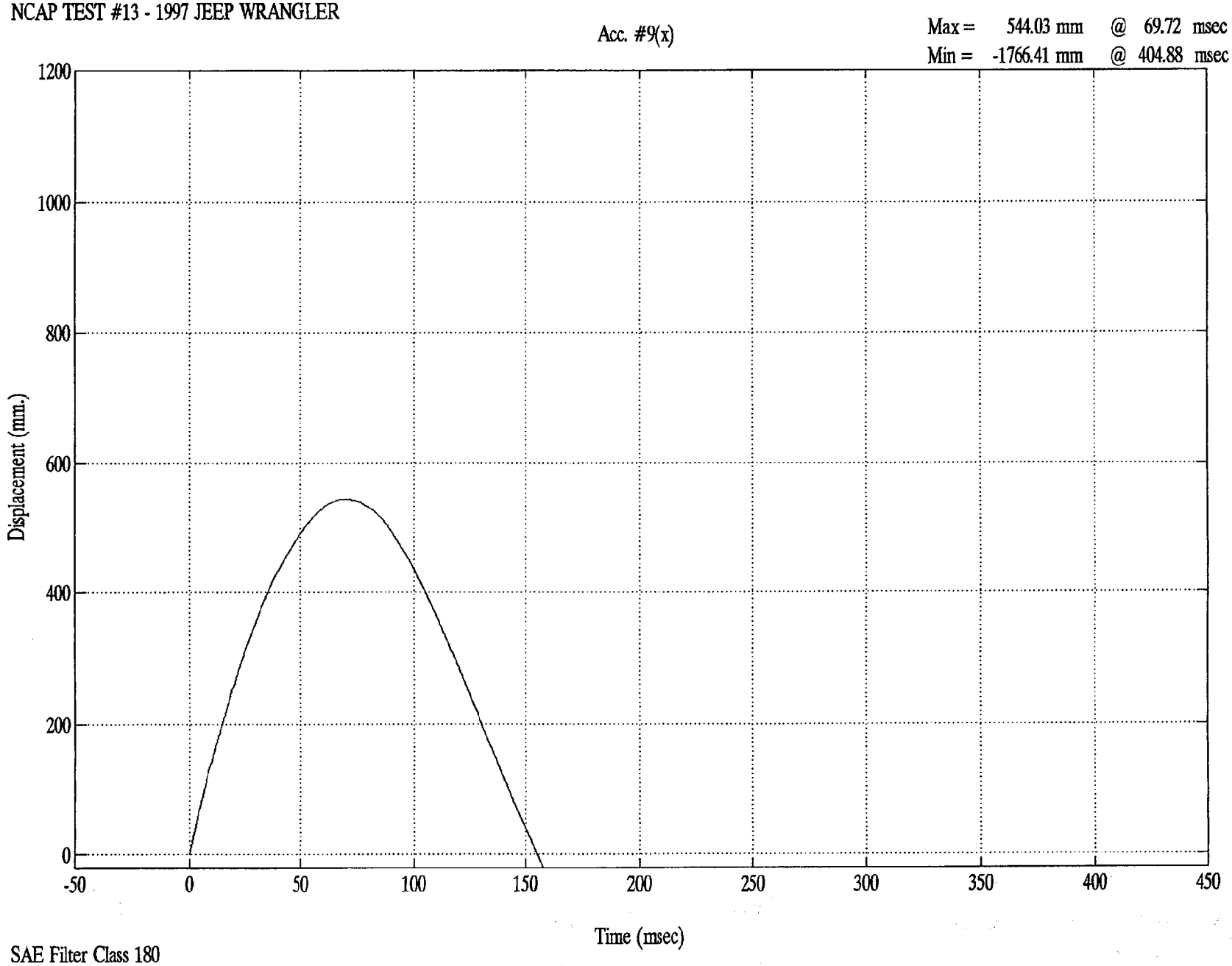
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 180

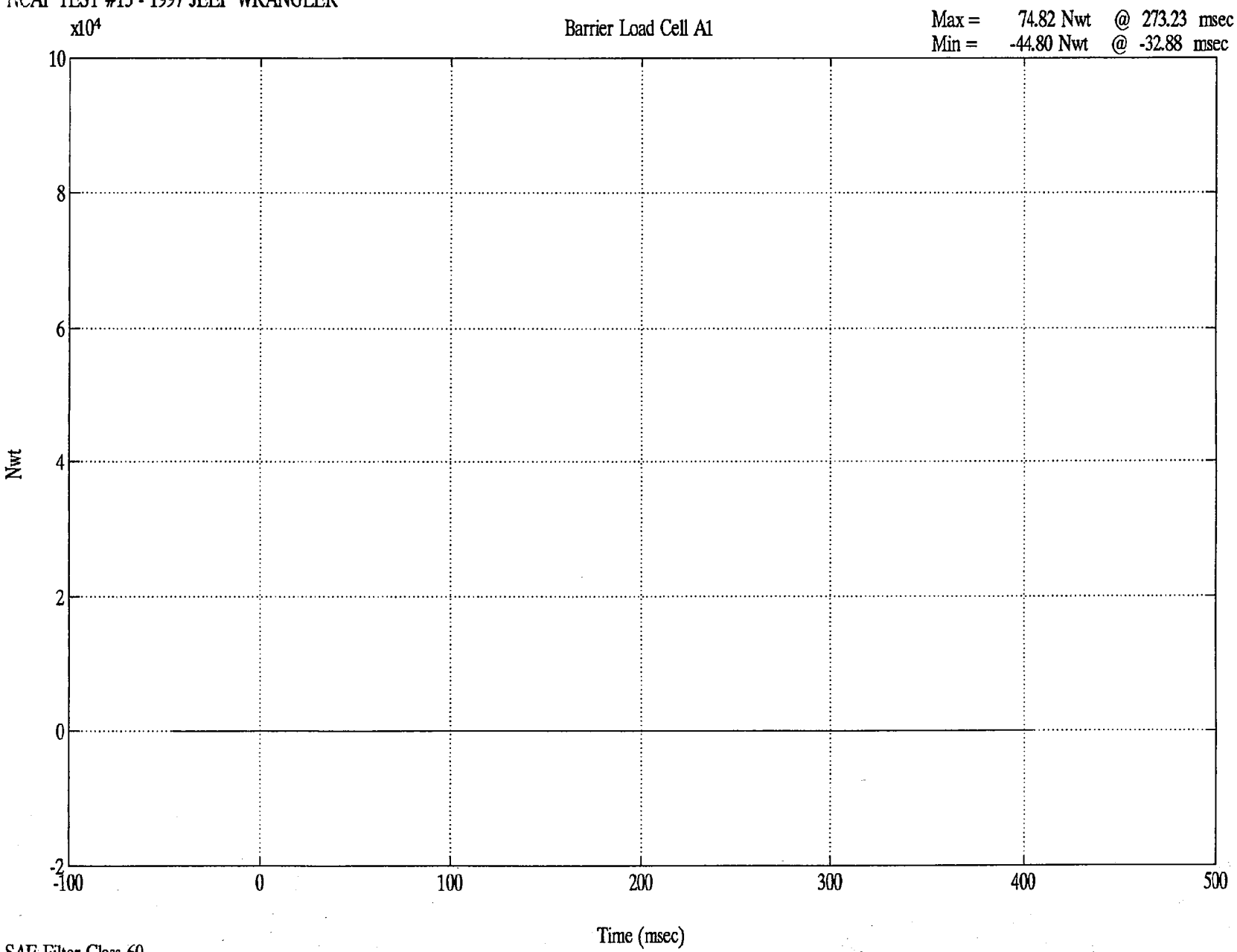
NHTSA TEST NO. MV0300

LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

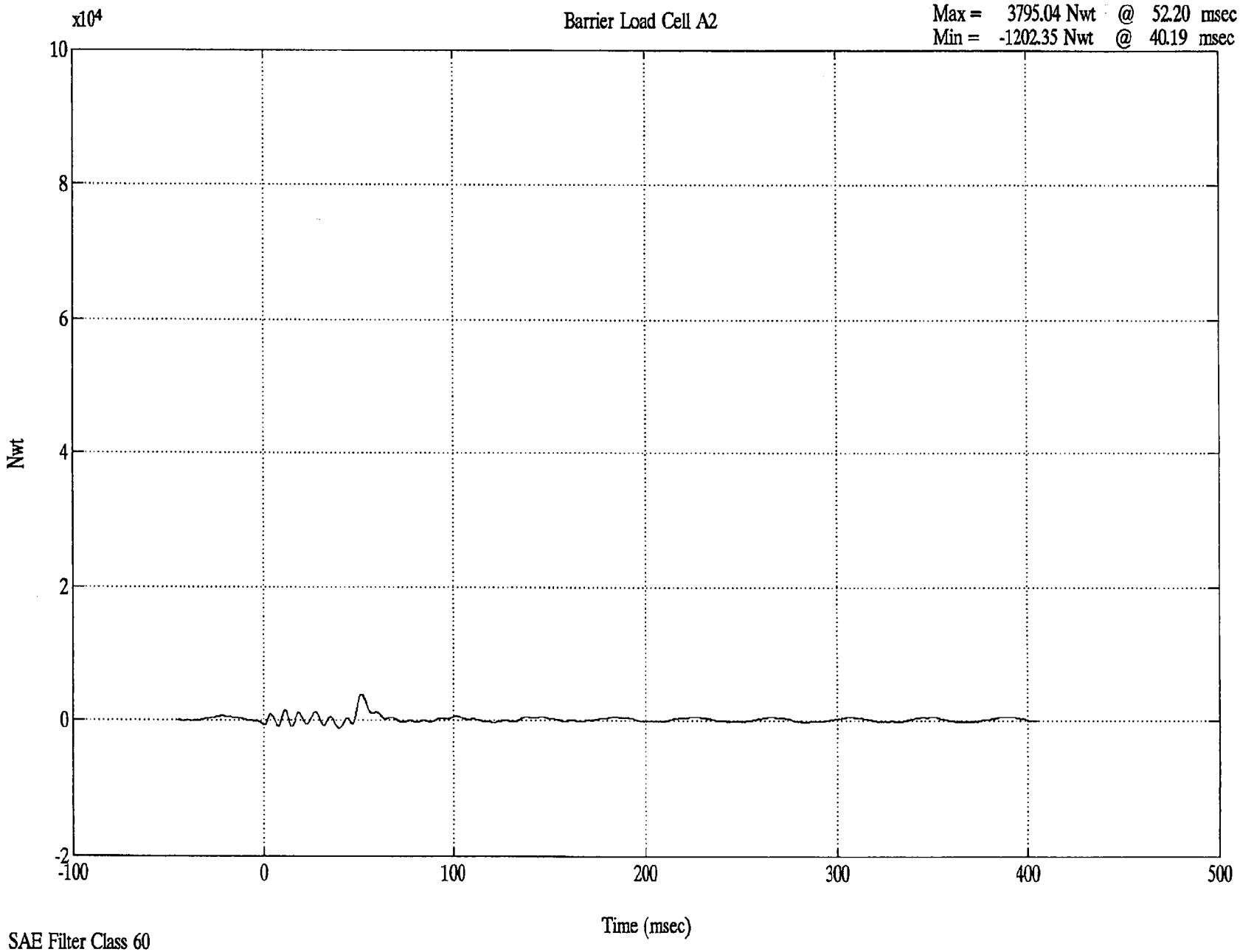
60

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

NCAP TEST #13 - 1997 JEEP WRANGLER

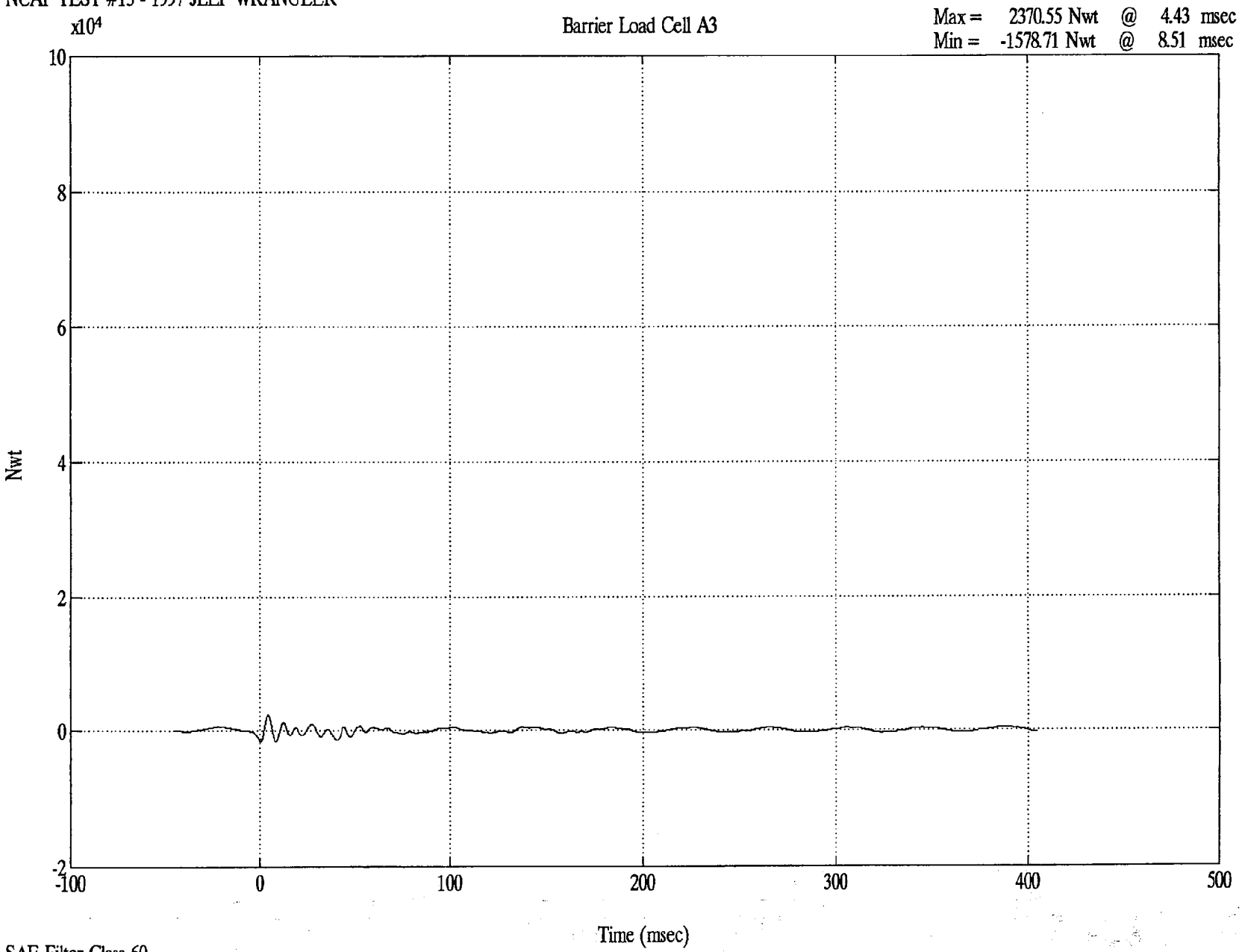


B-132

8313-13

SAE Filter Class 60

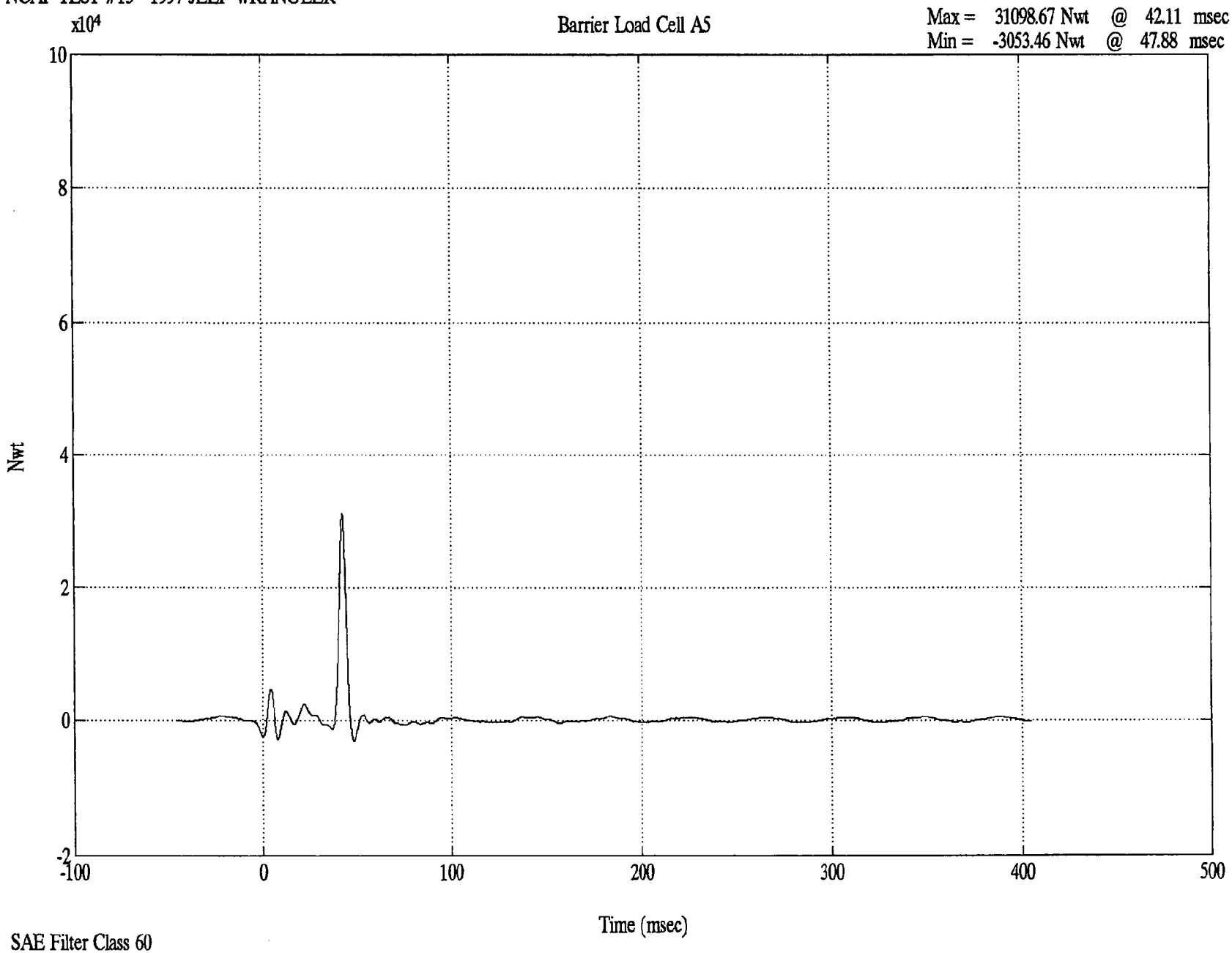
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

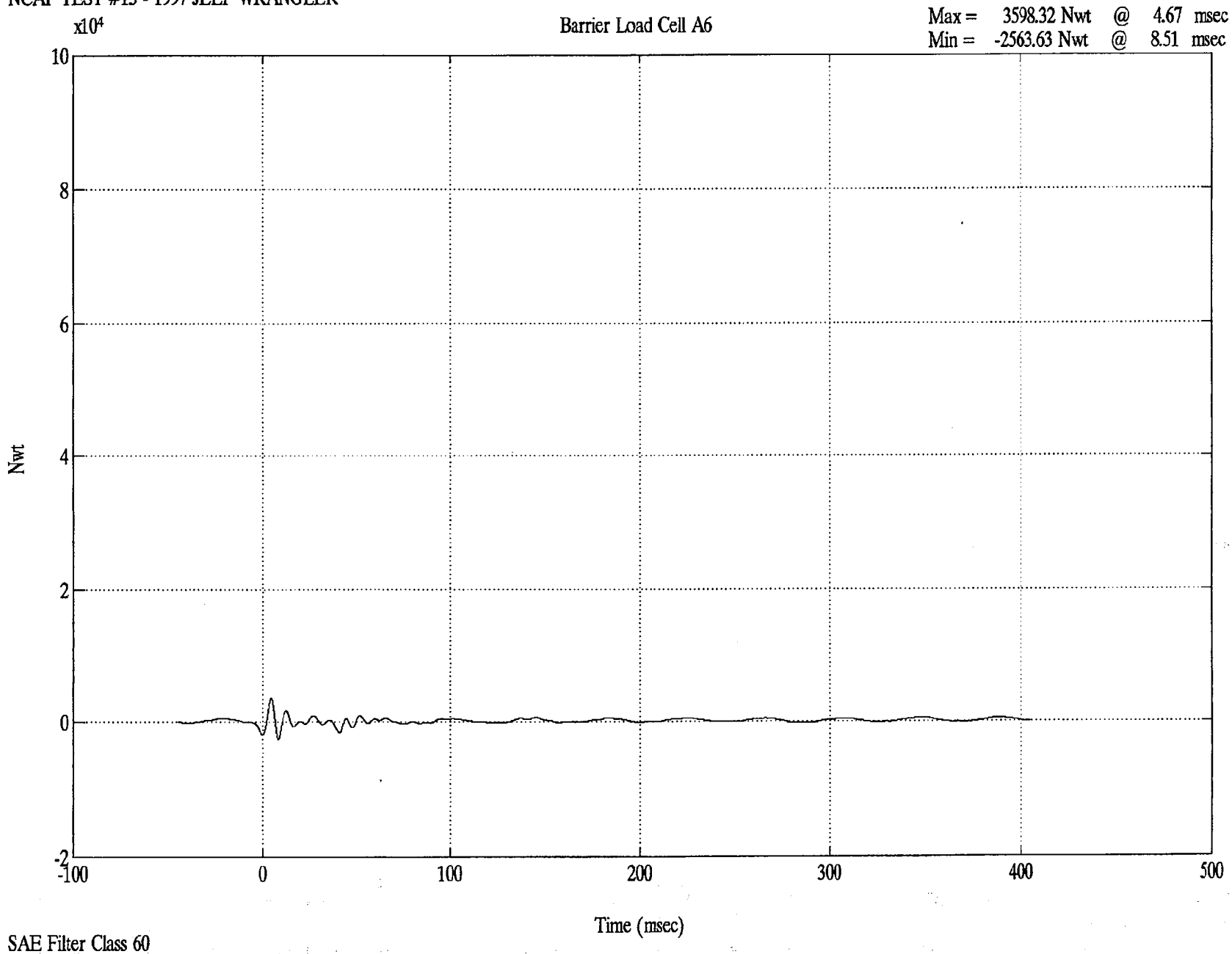
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



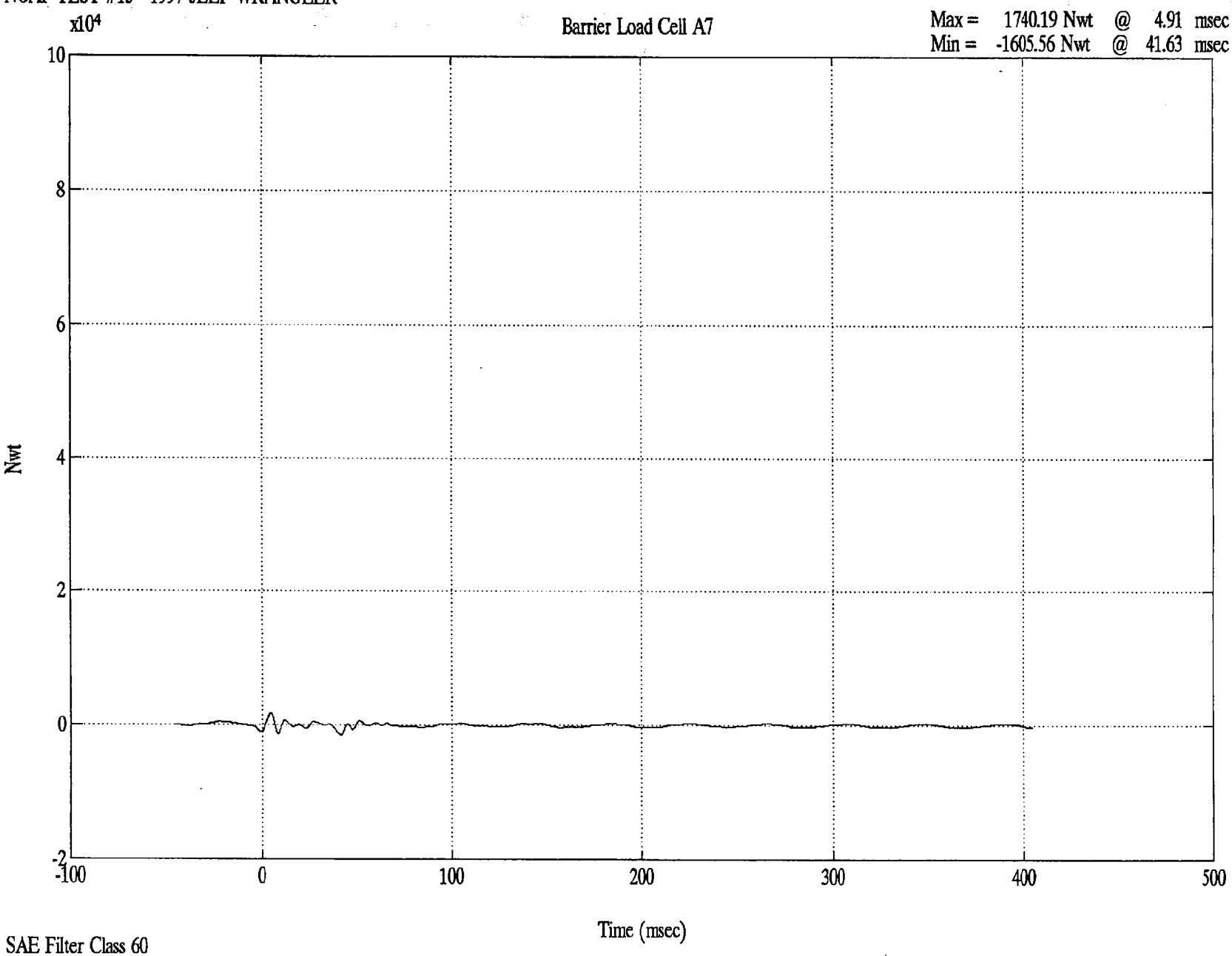
SAE Filter Class 60

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

NCAP TEST #13 - 1997 JEEP WRANGLER

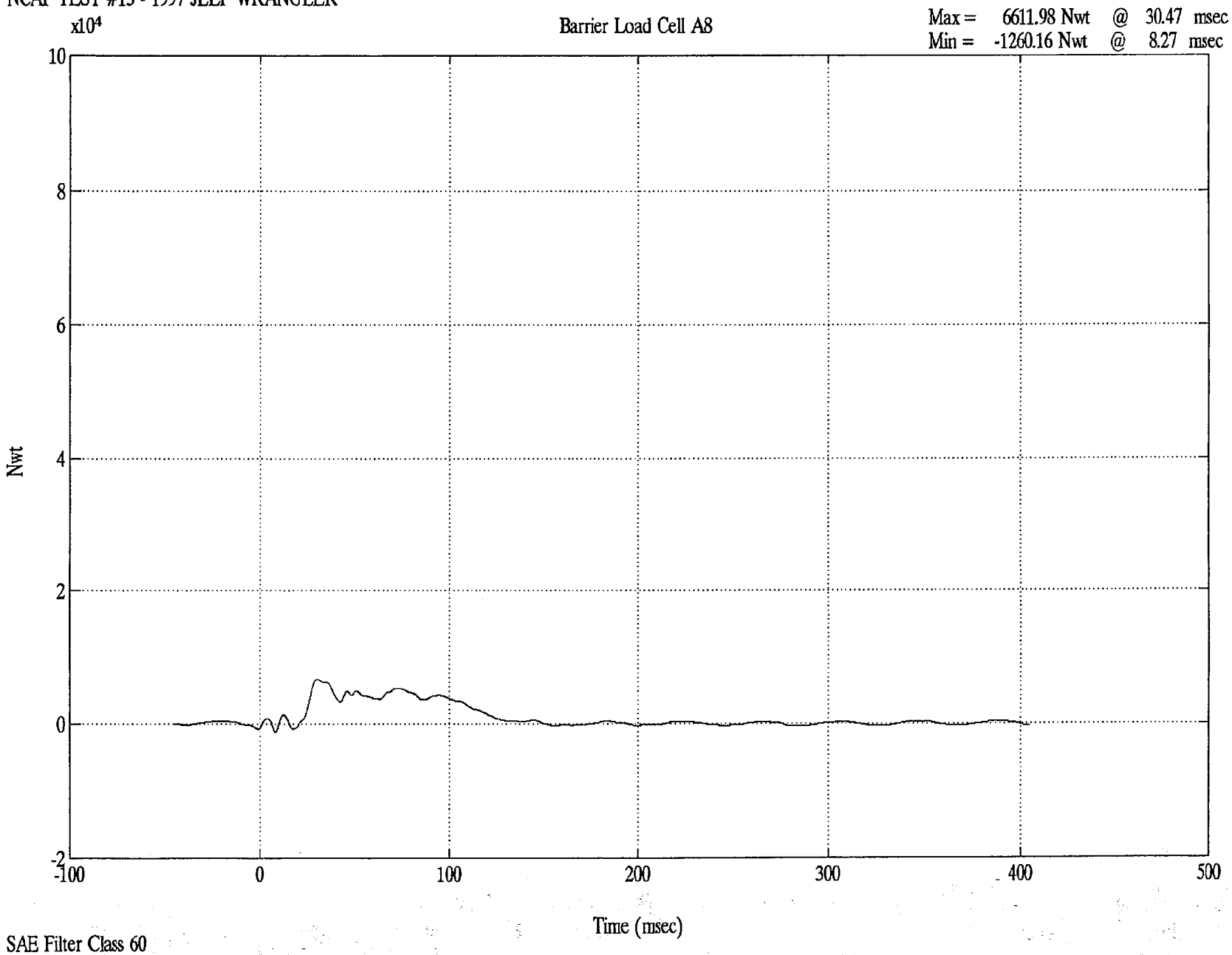


B-137

8313-13

SAE Filter Class 60

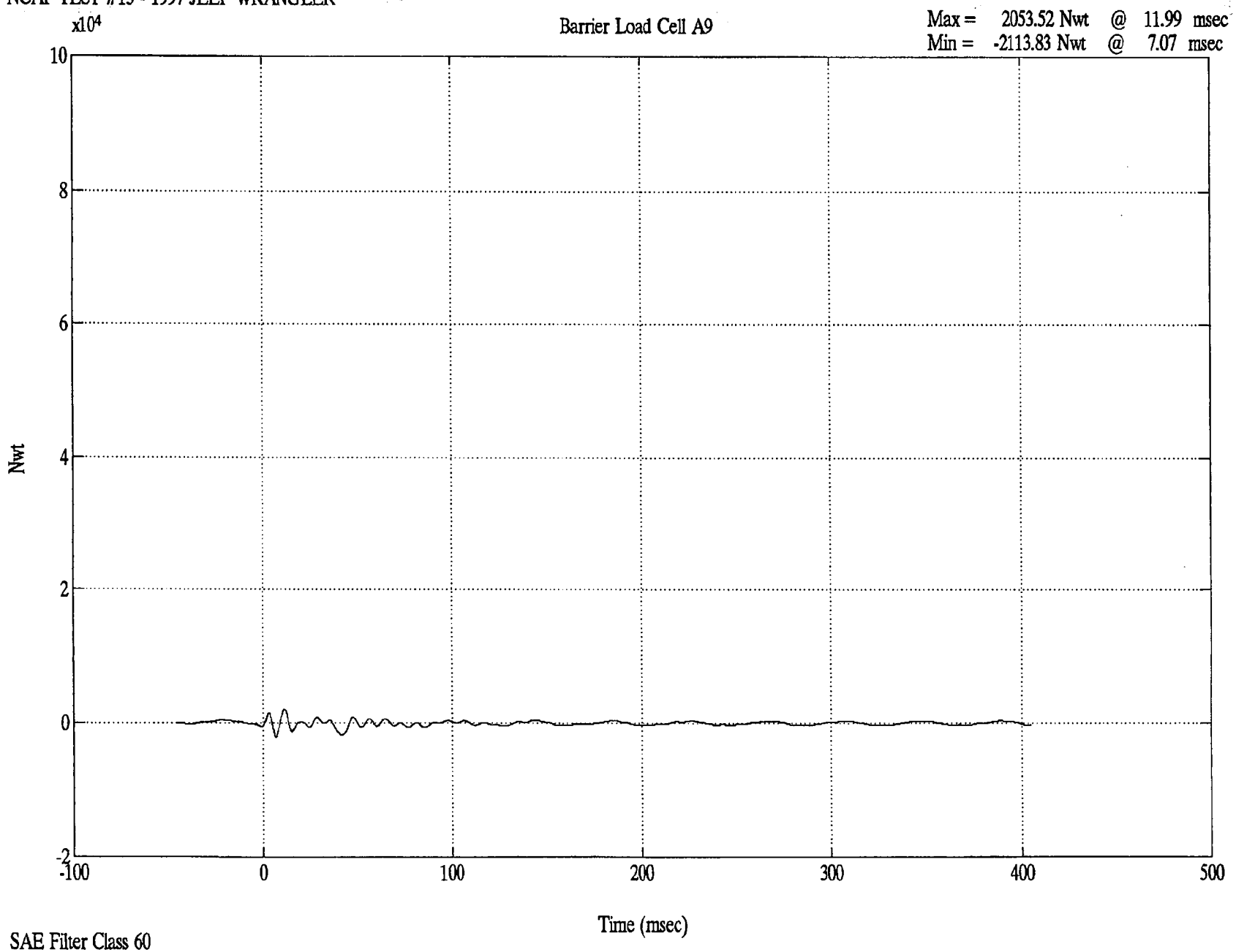
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

8313-13

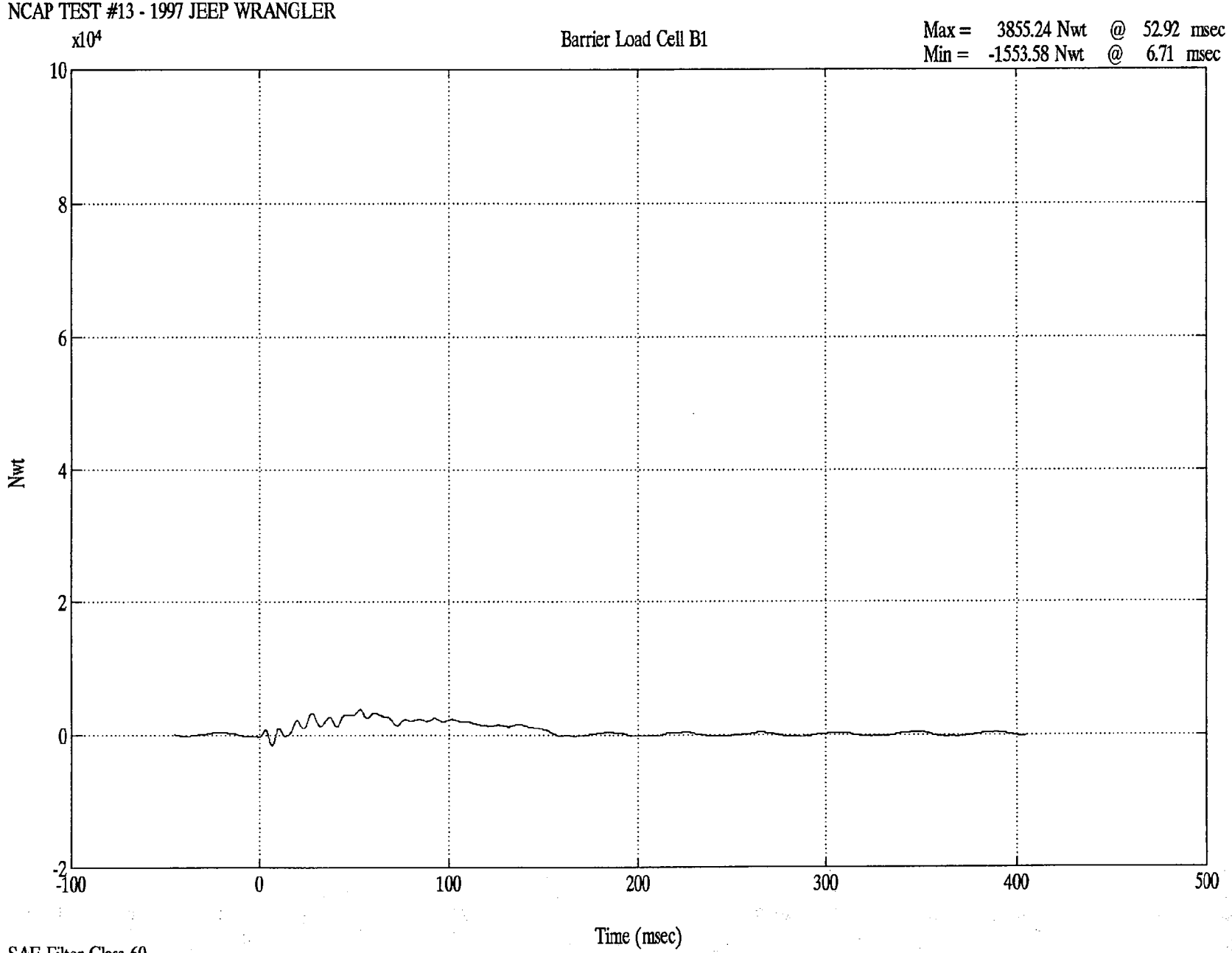
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

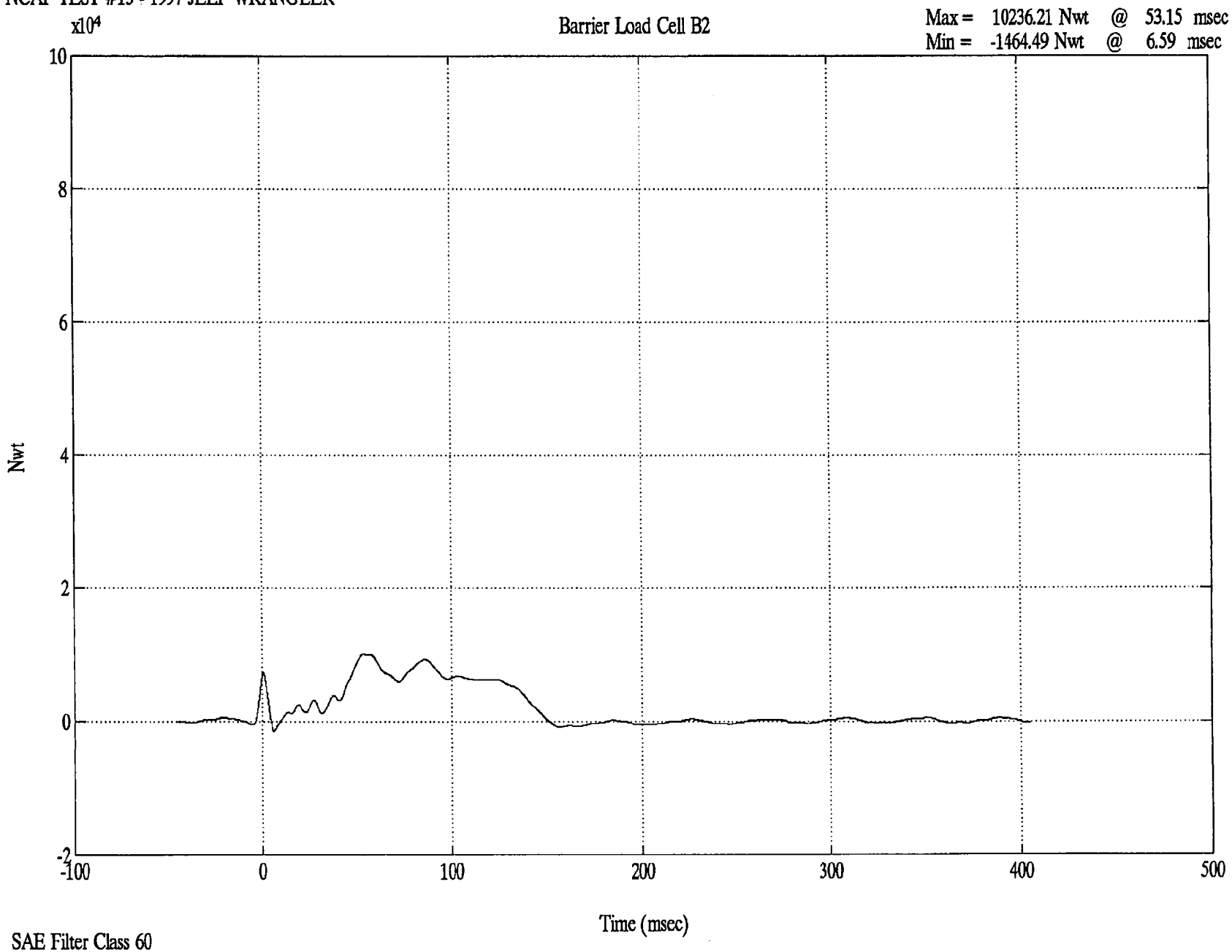


SAE Filter Class 60

B-140

8313-13

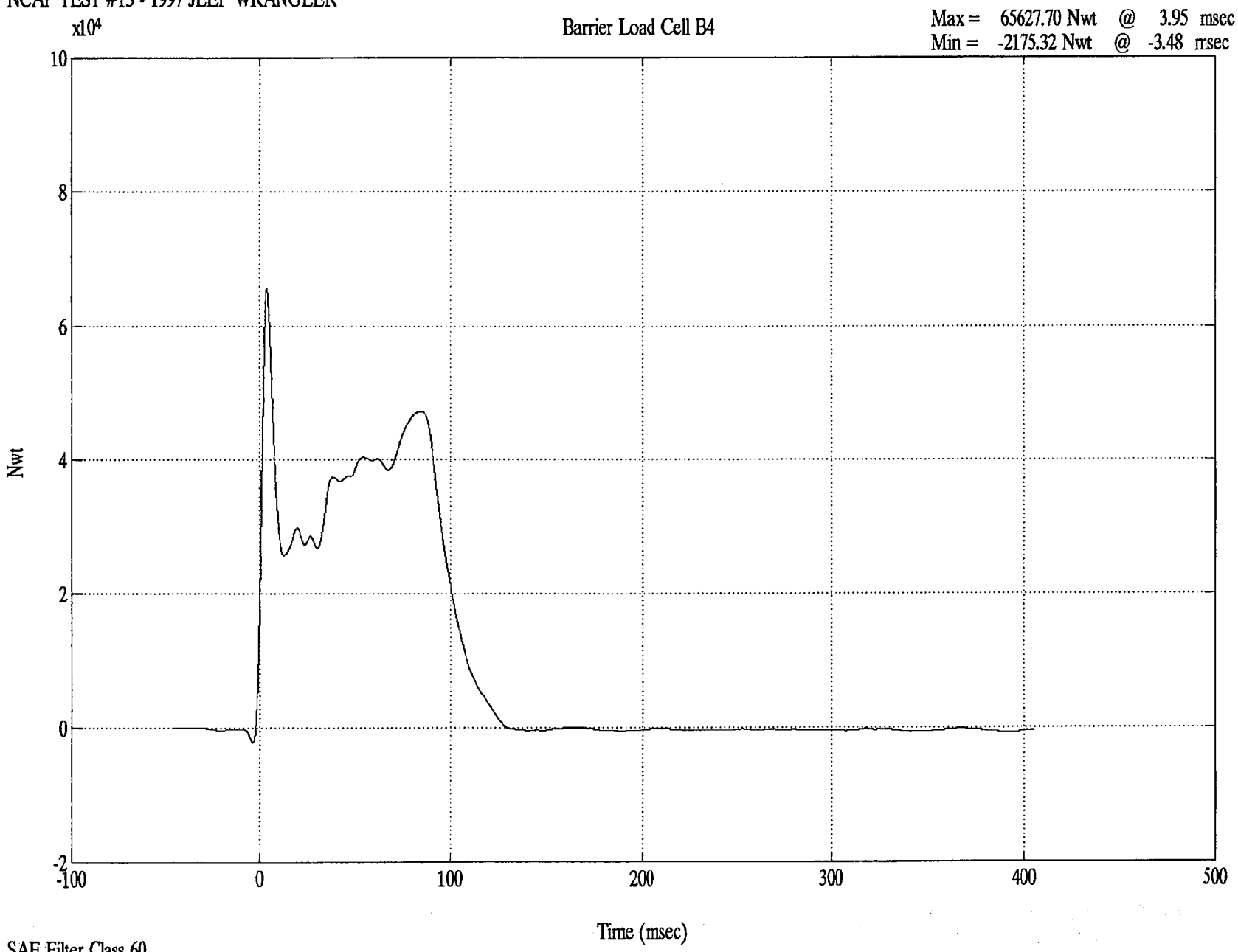
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

8313-13

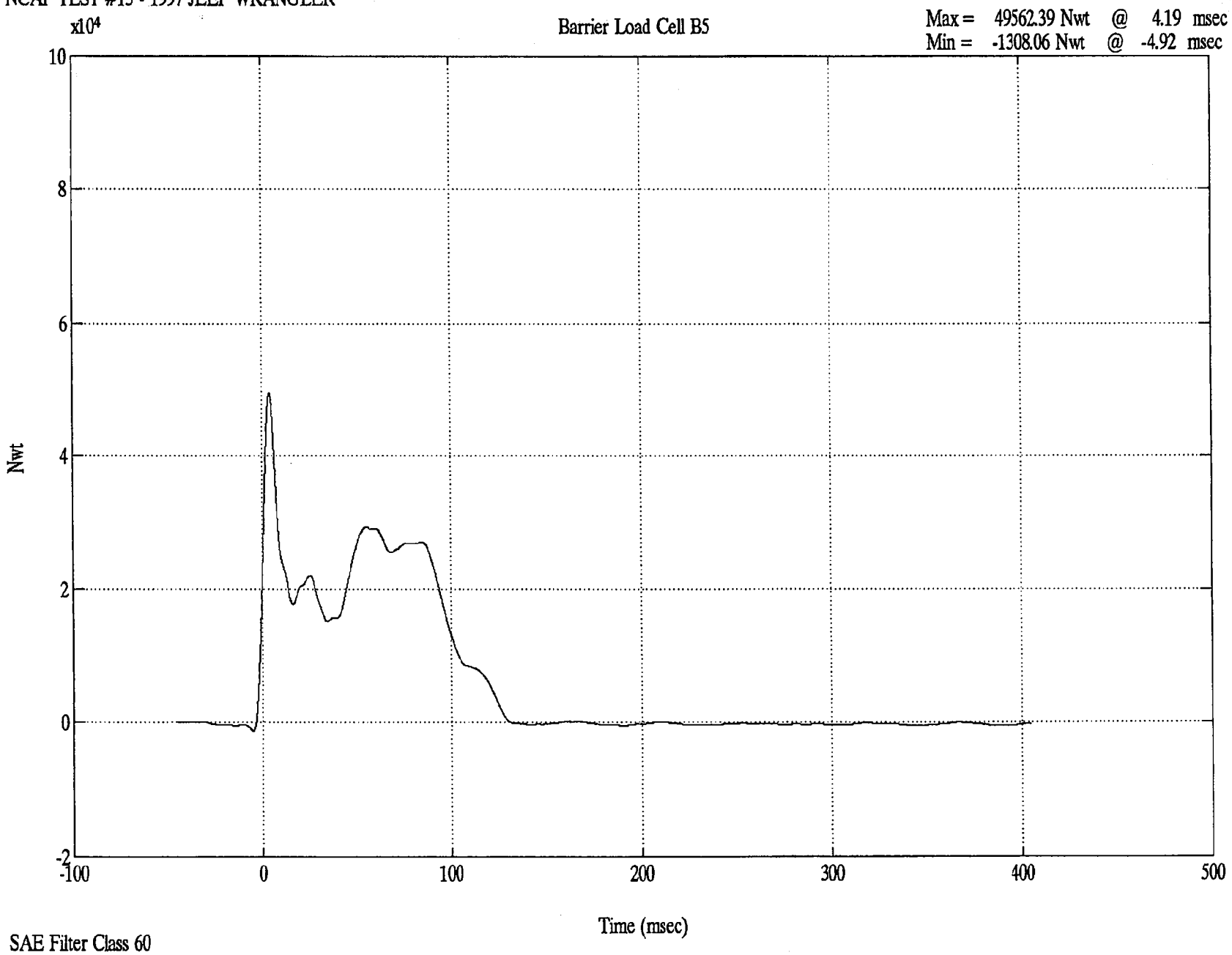
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

8313-13

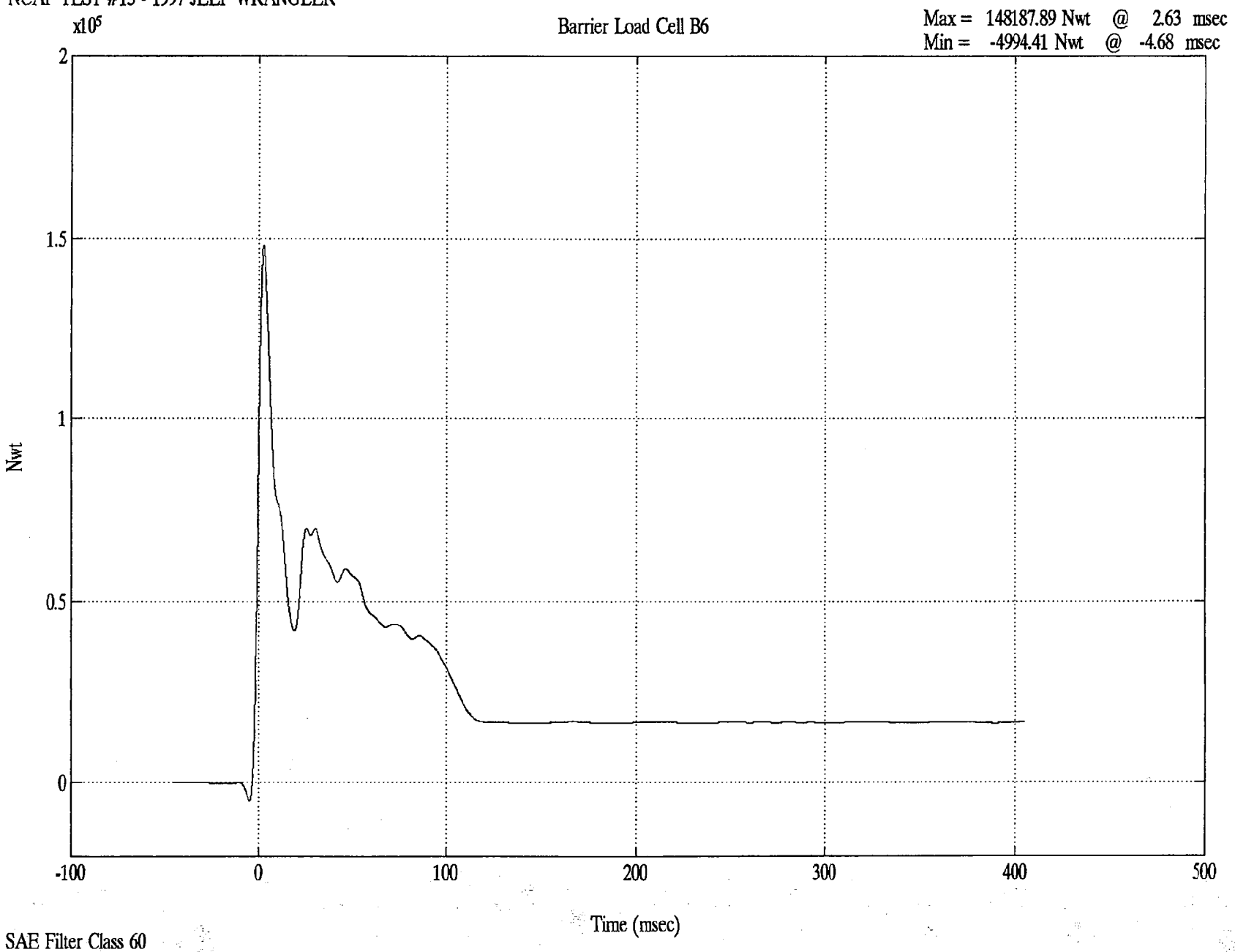
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

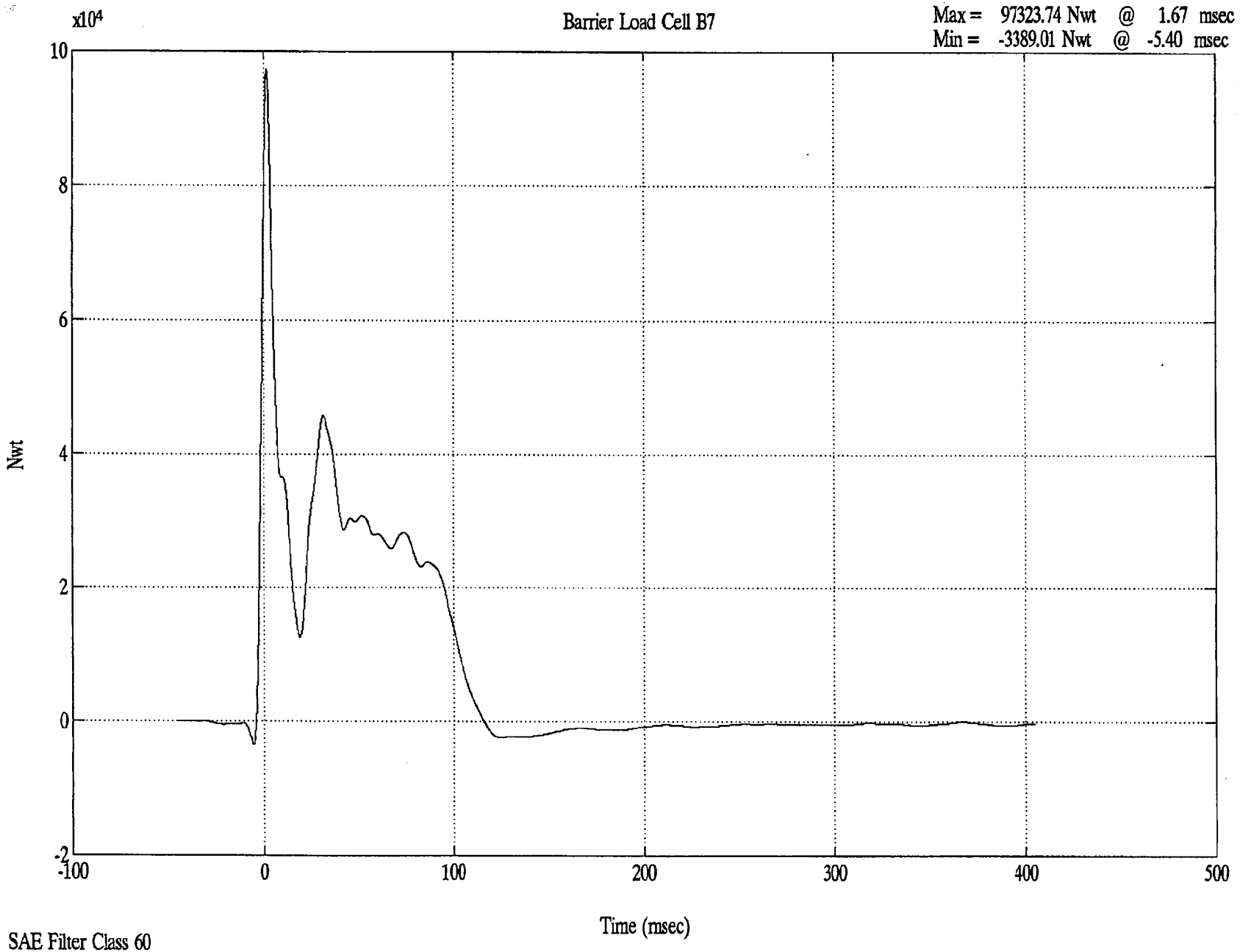
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

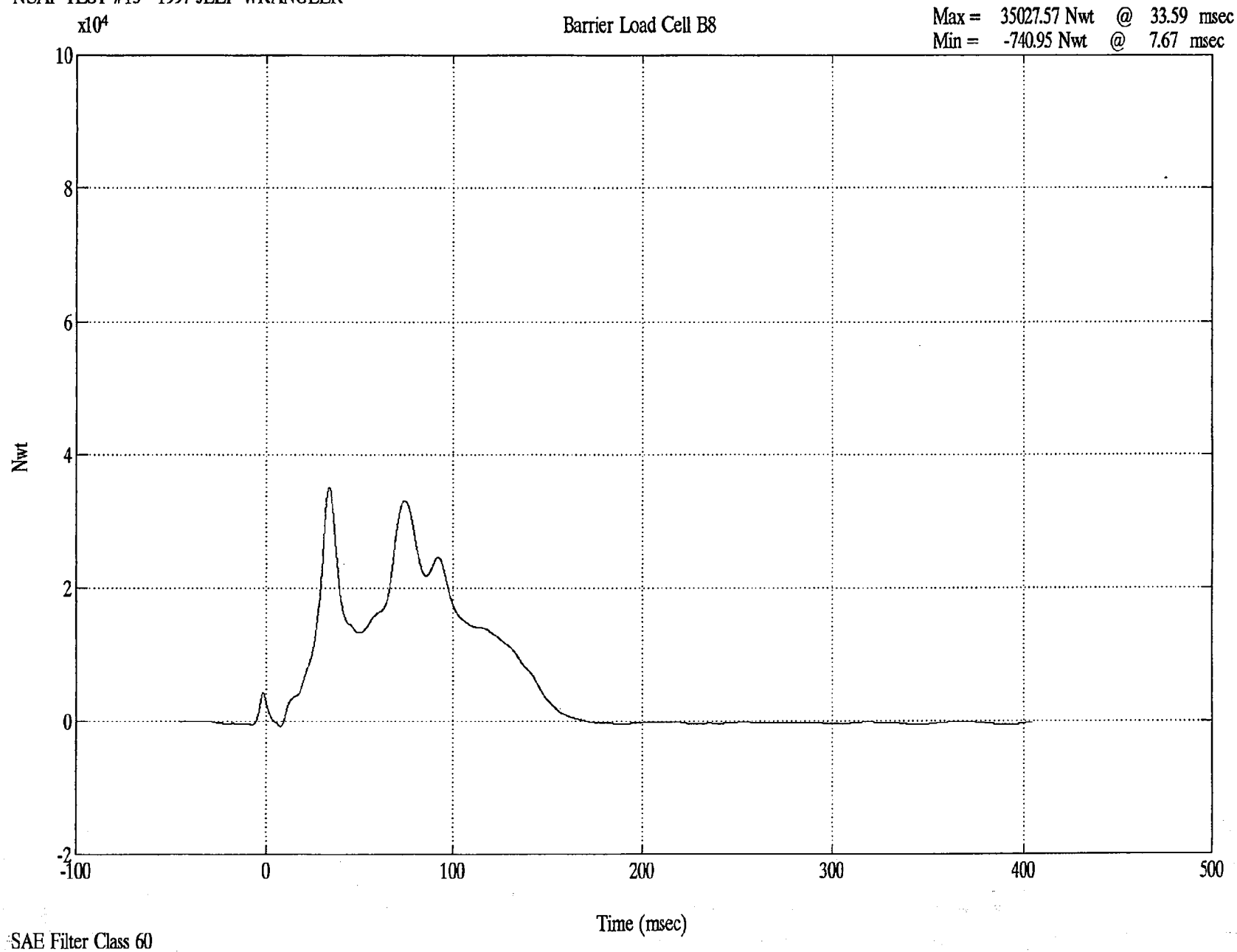
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

8313-13

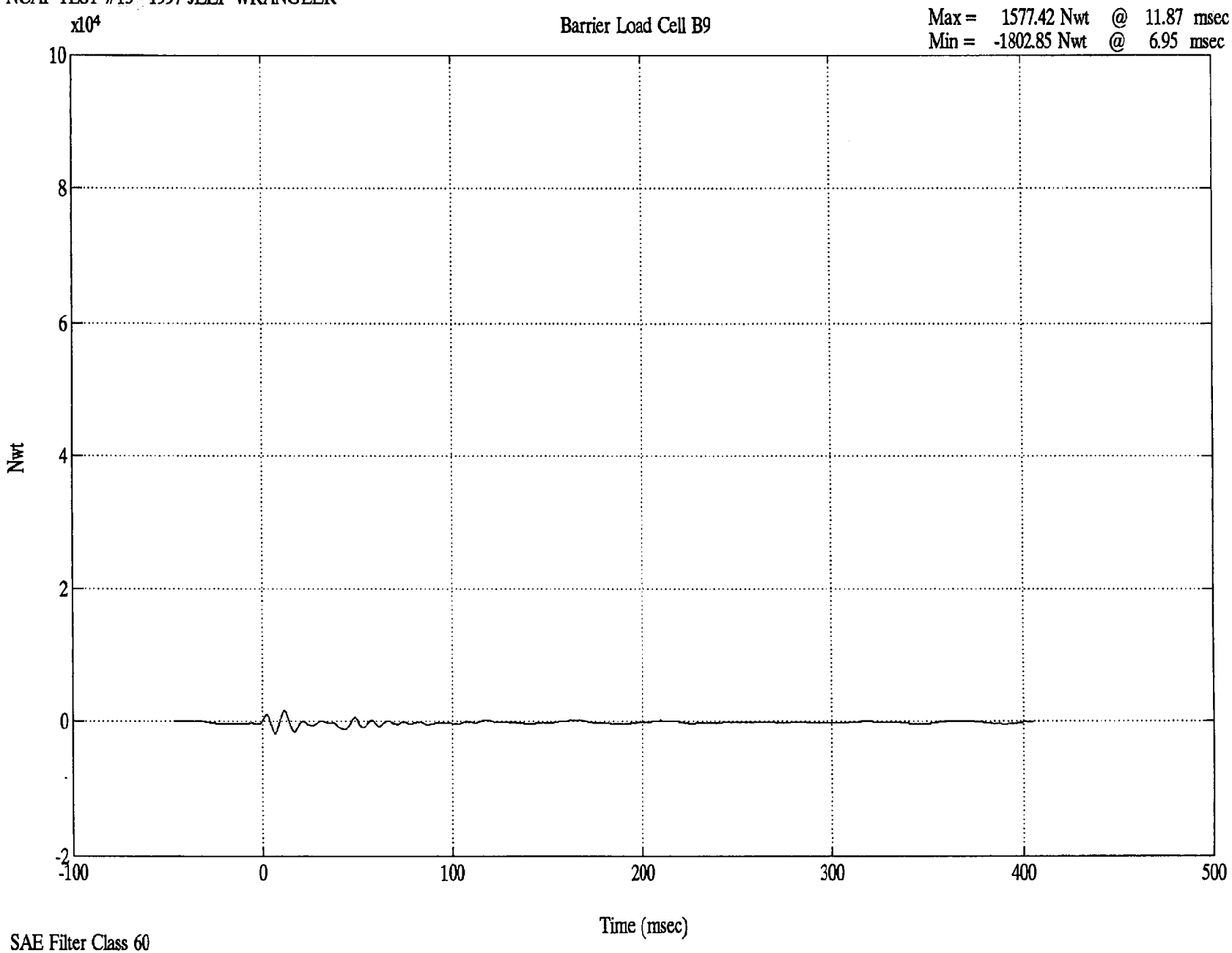
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

8313-13

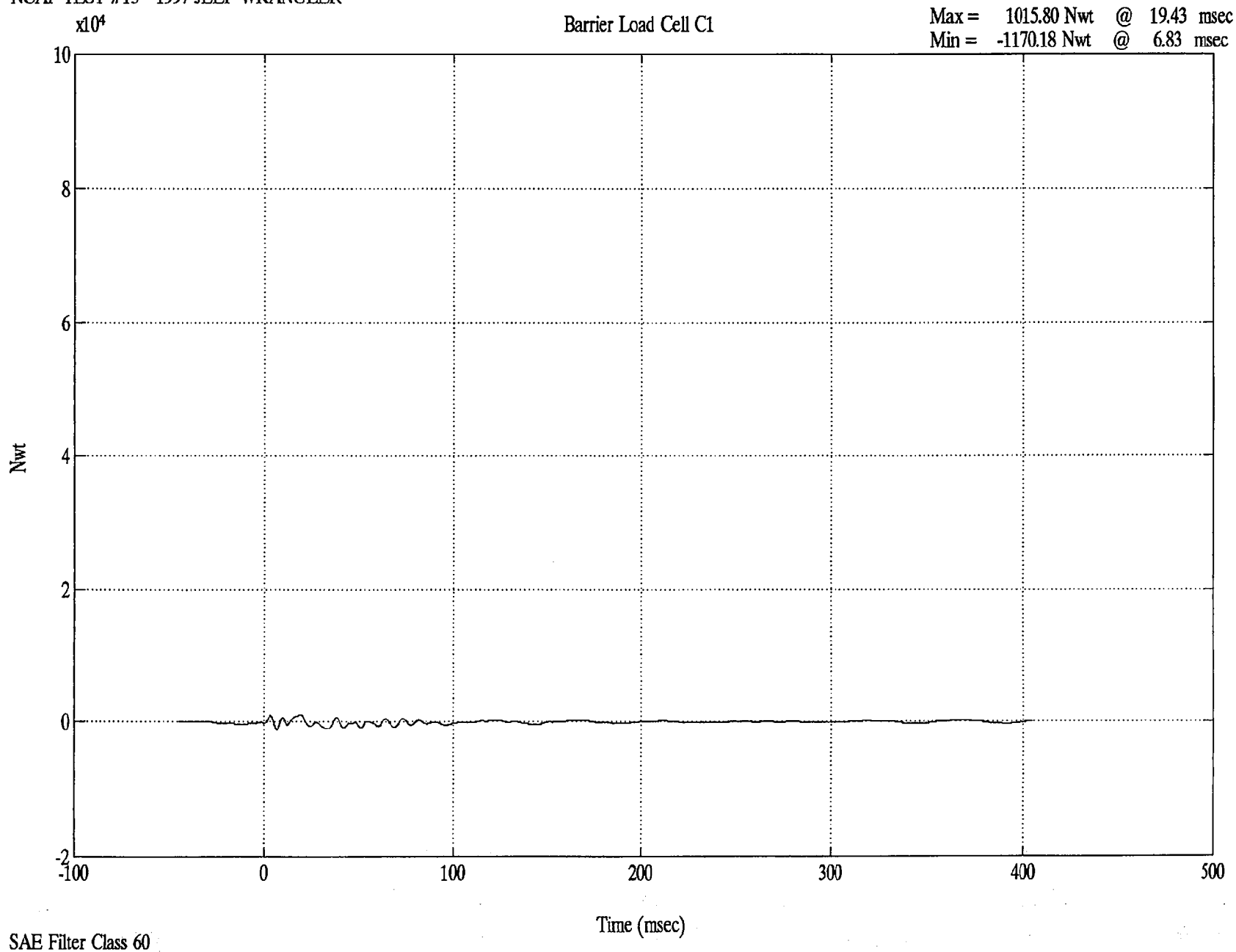
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

8313-13

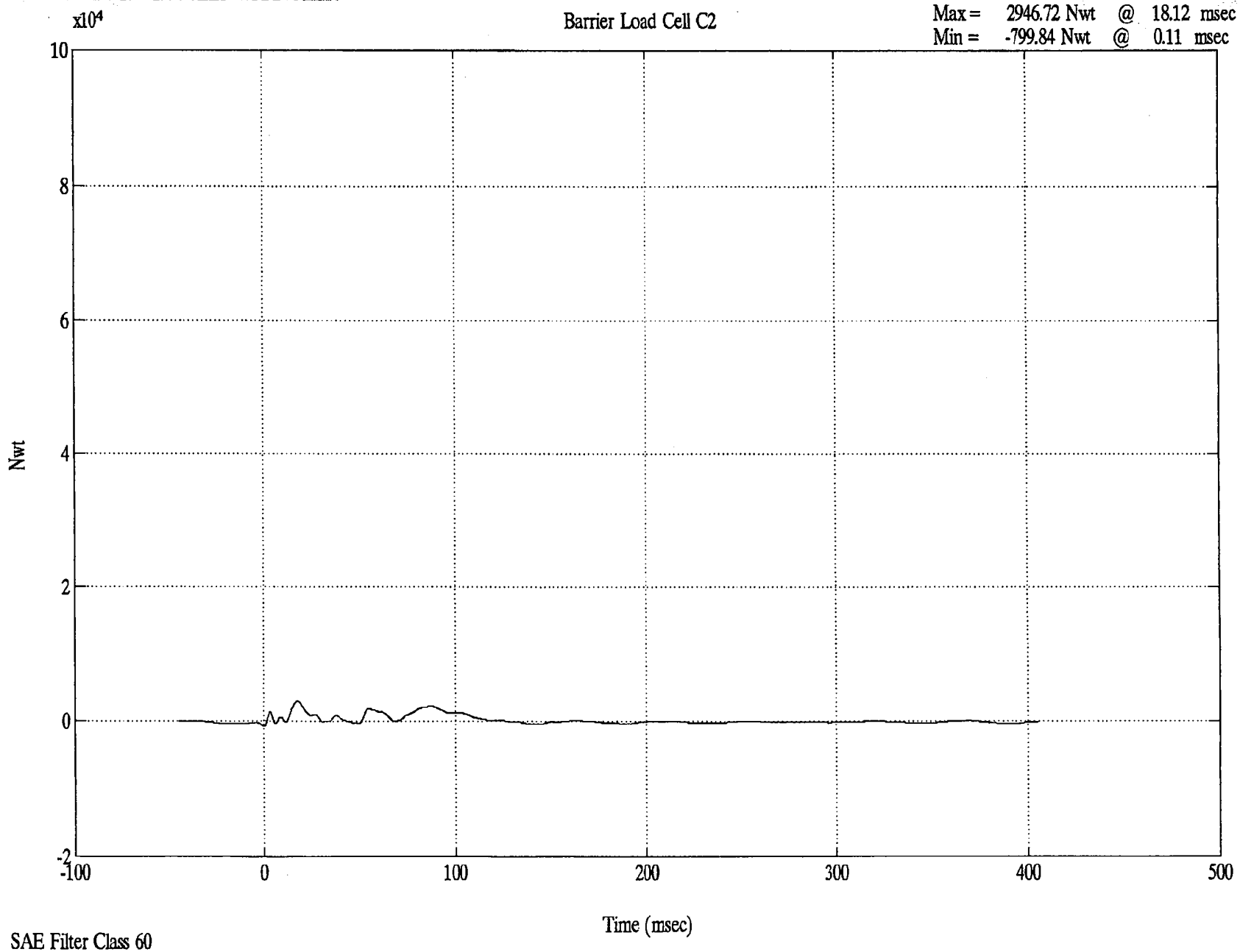
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

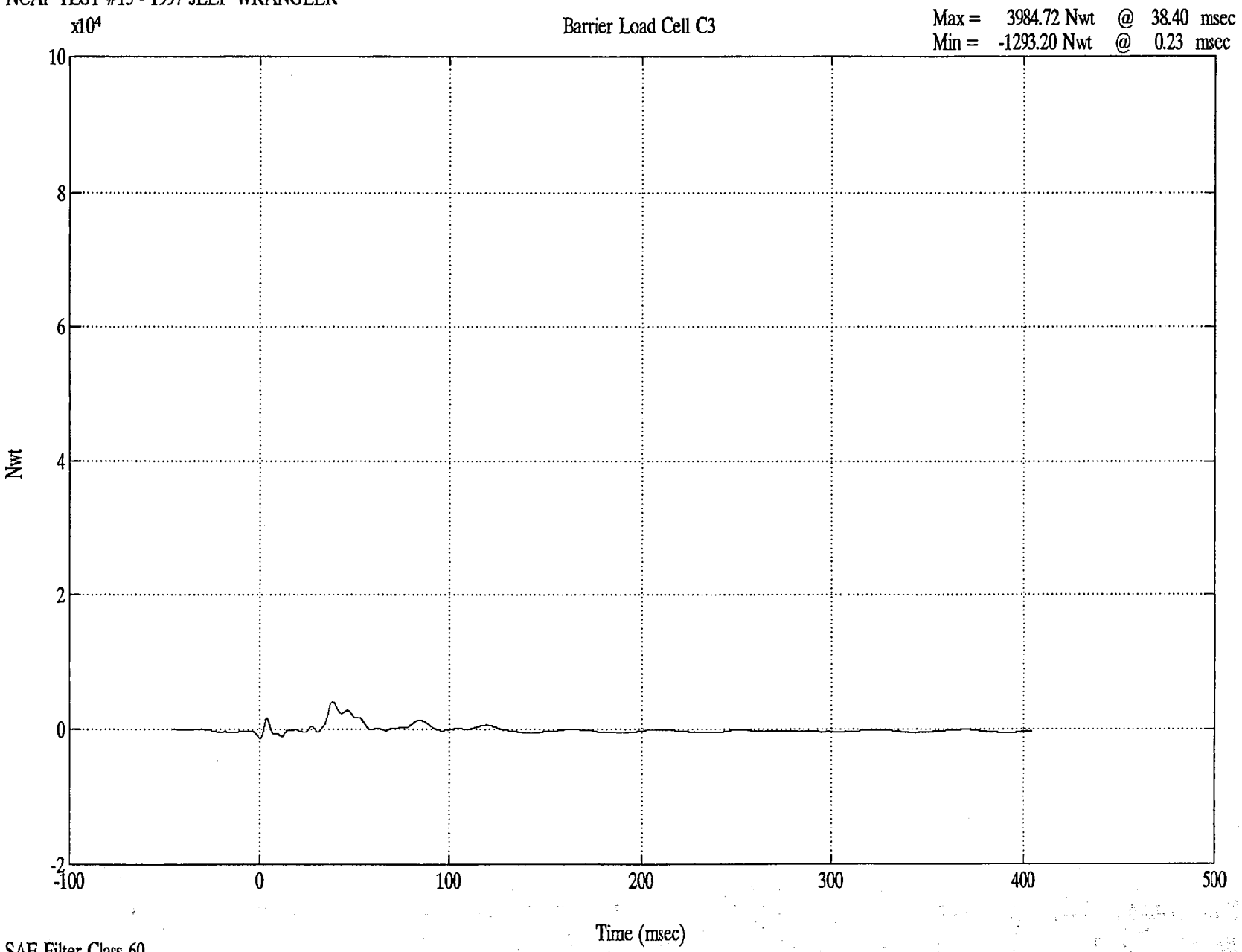


SAE Filter Class 60

B-149

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

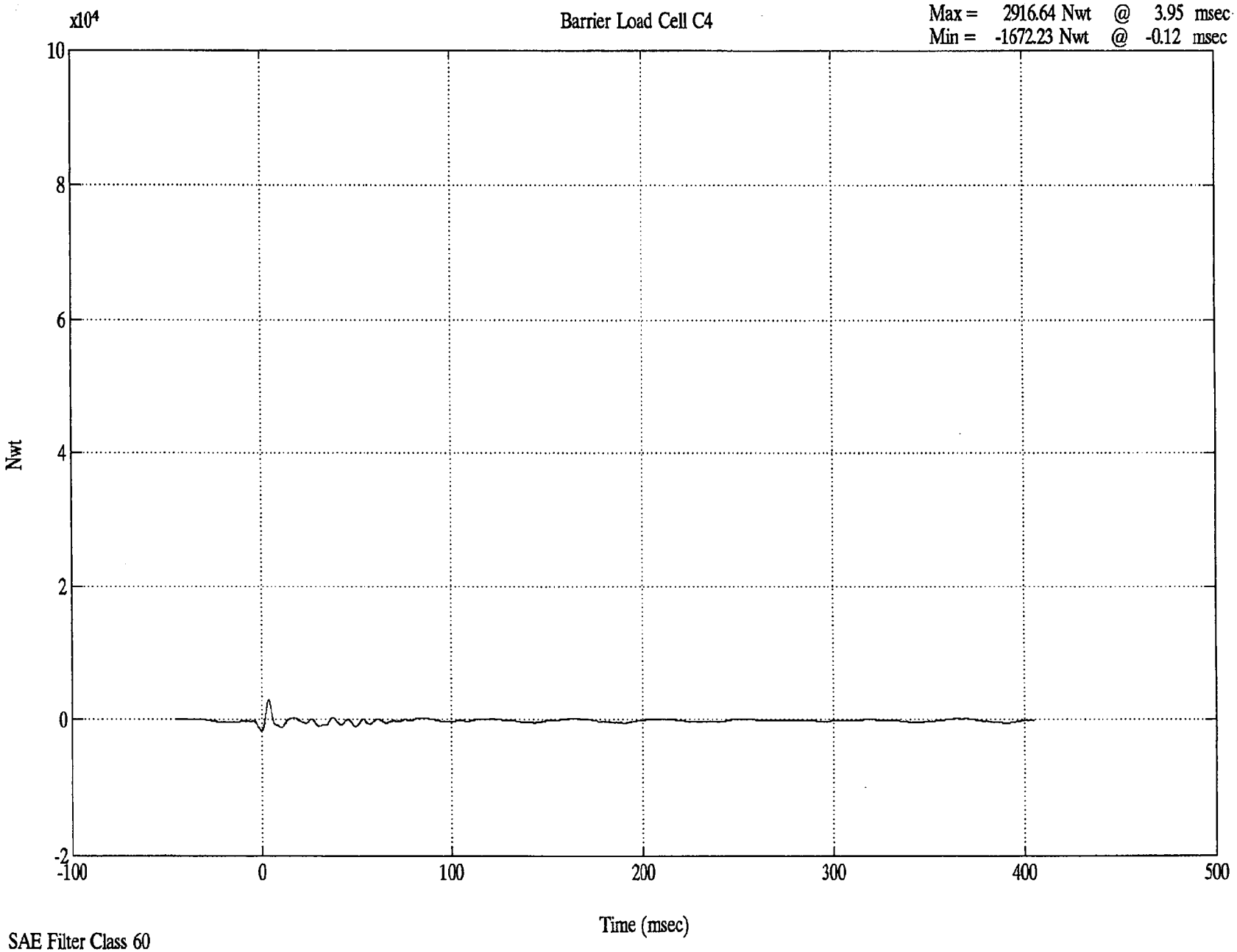


B-150

8313-13

SAE Filter Class 60

NCAP TEST #13 - 1997 JEEP WRANGLER

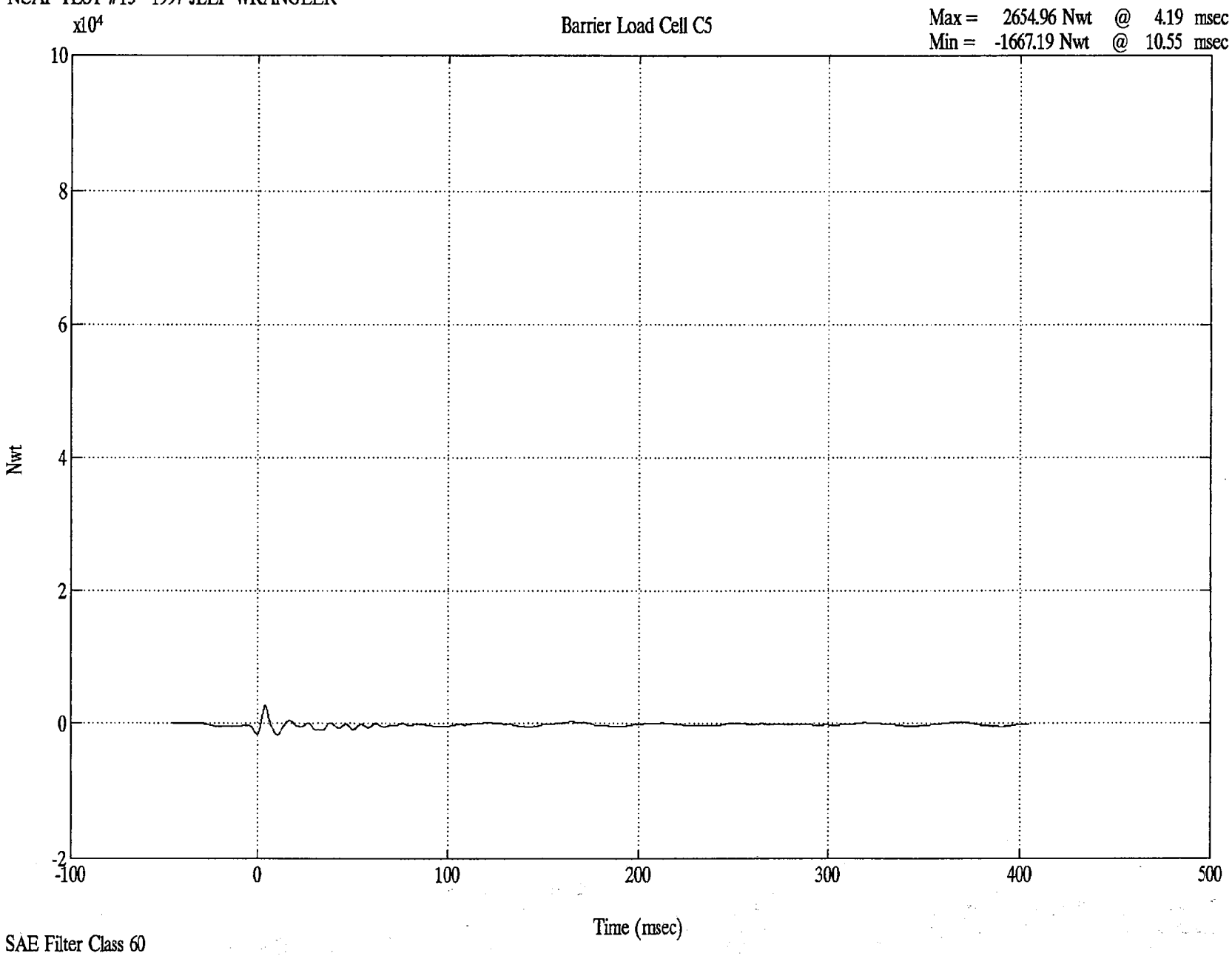


SAE Filter Class 60

B-151

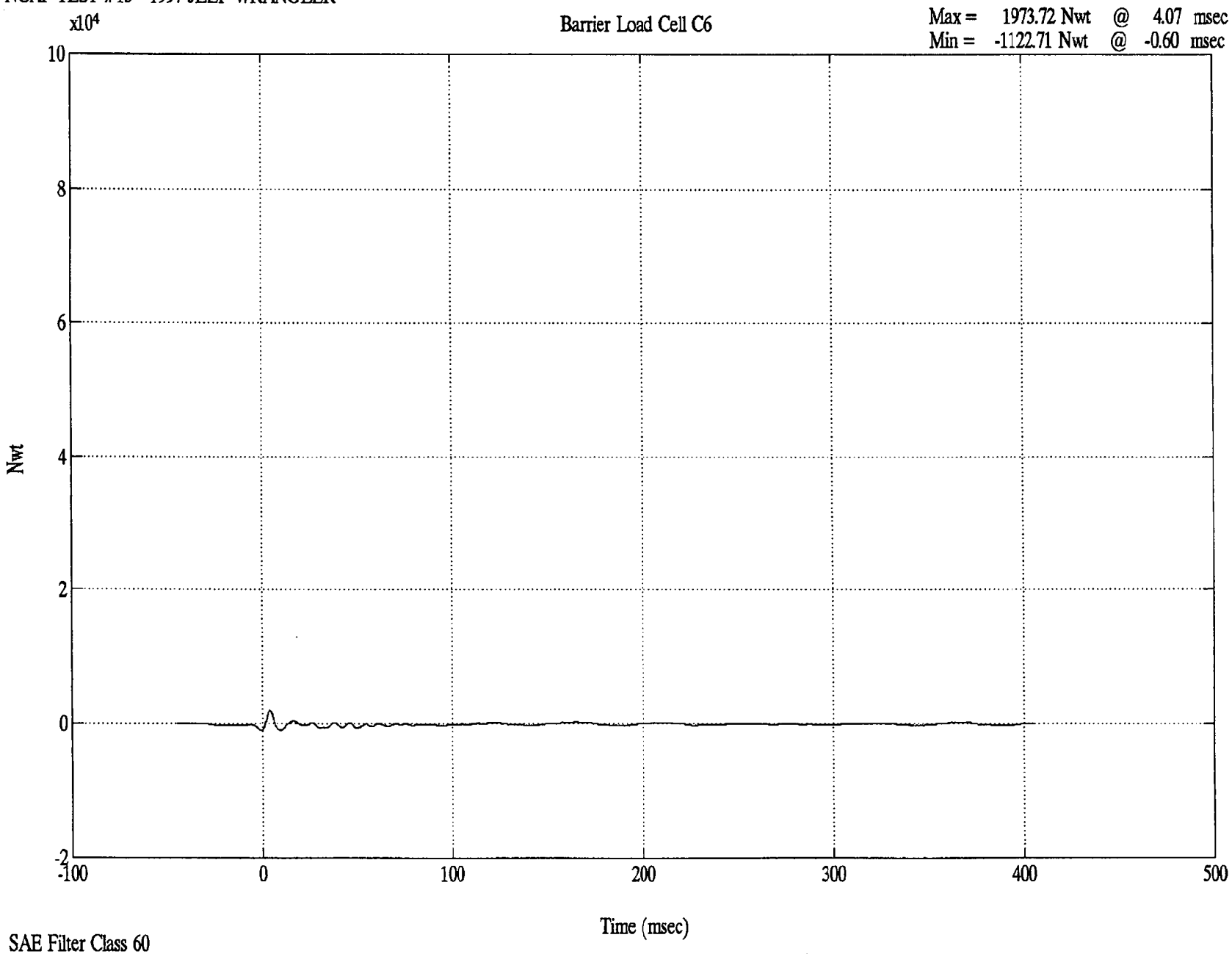
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



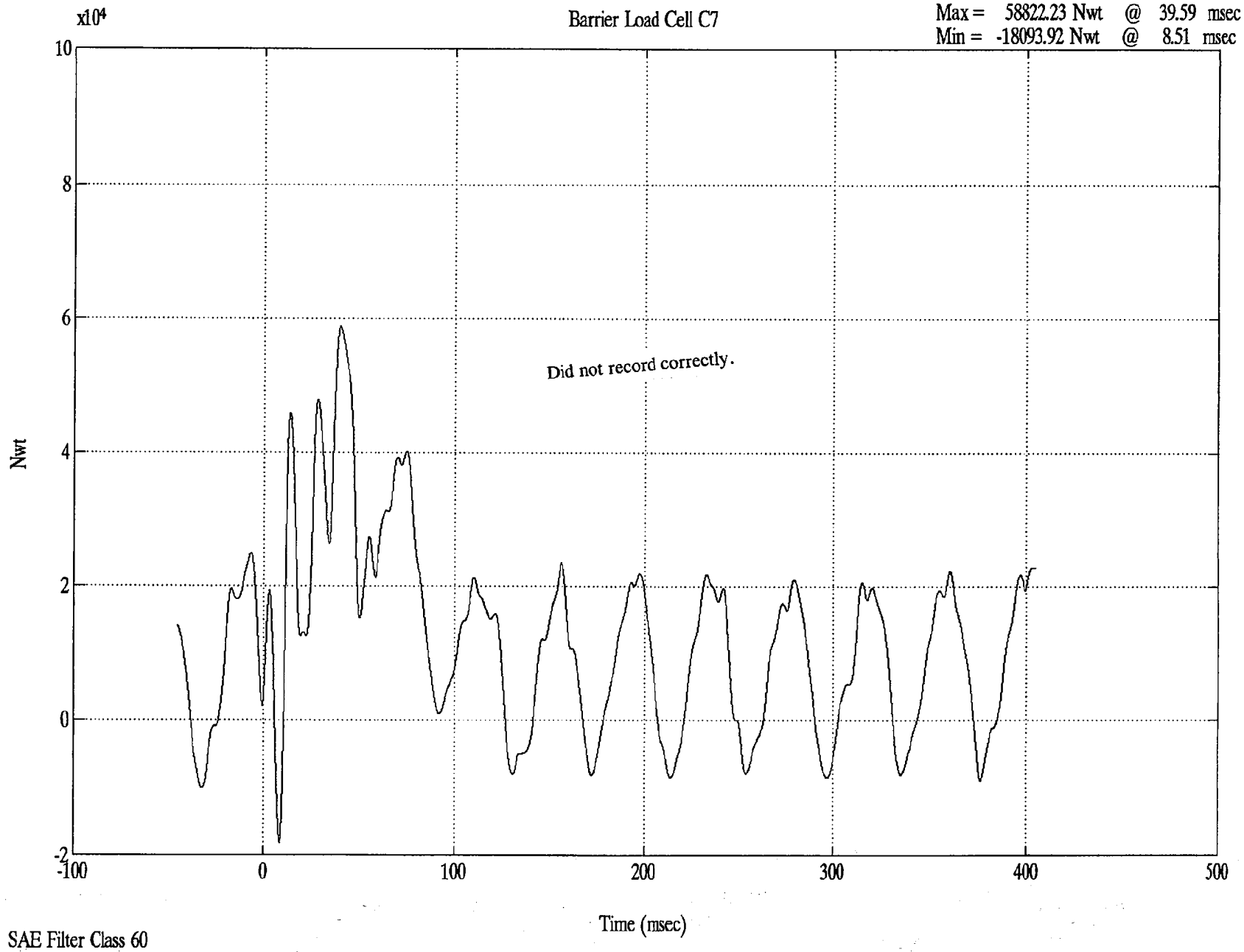
SAE Filter Class 60

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

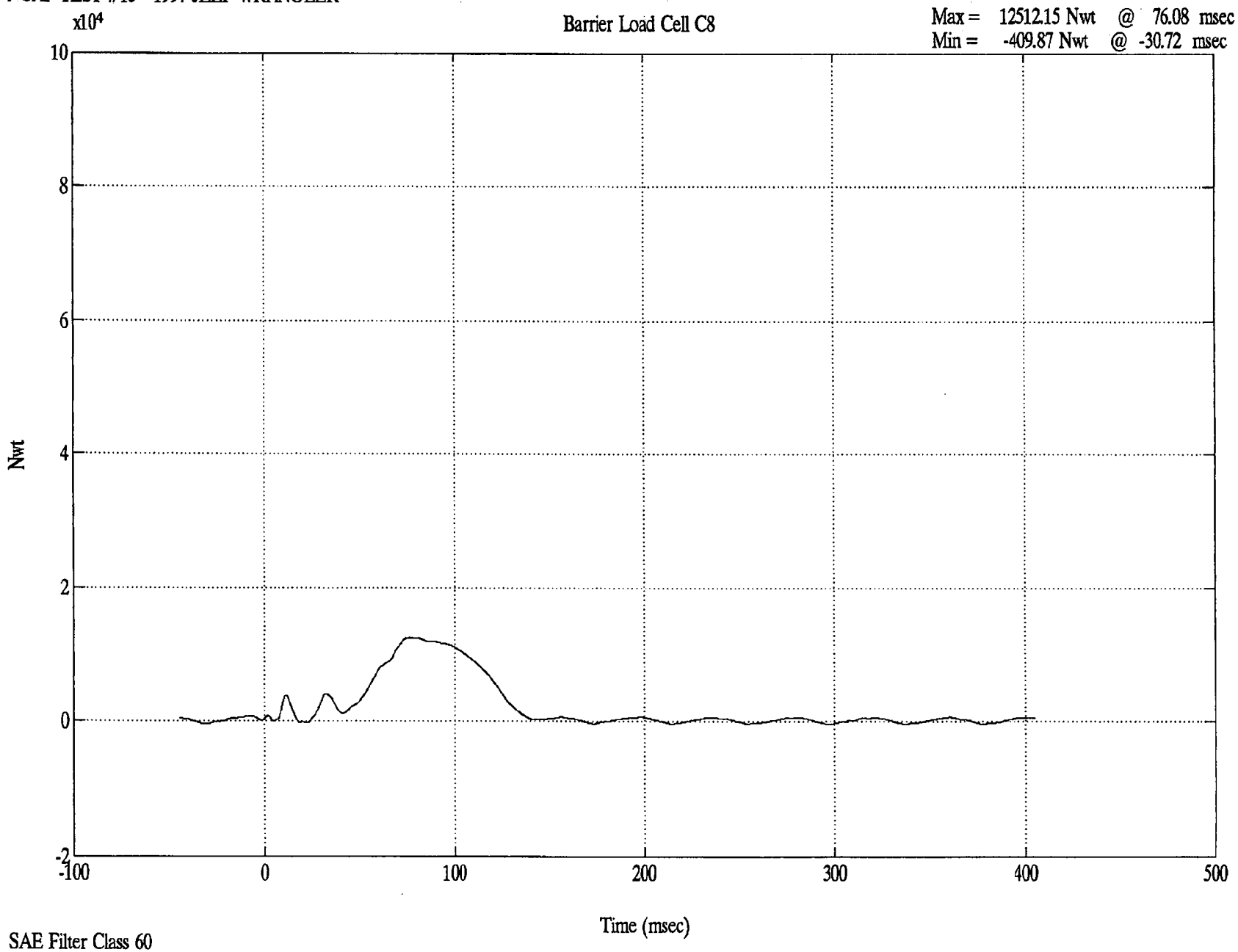
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

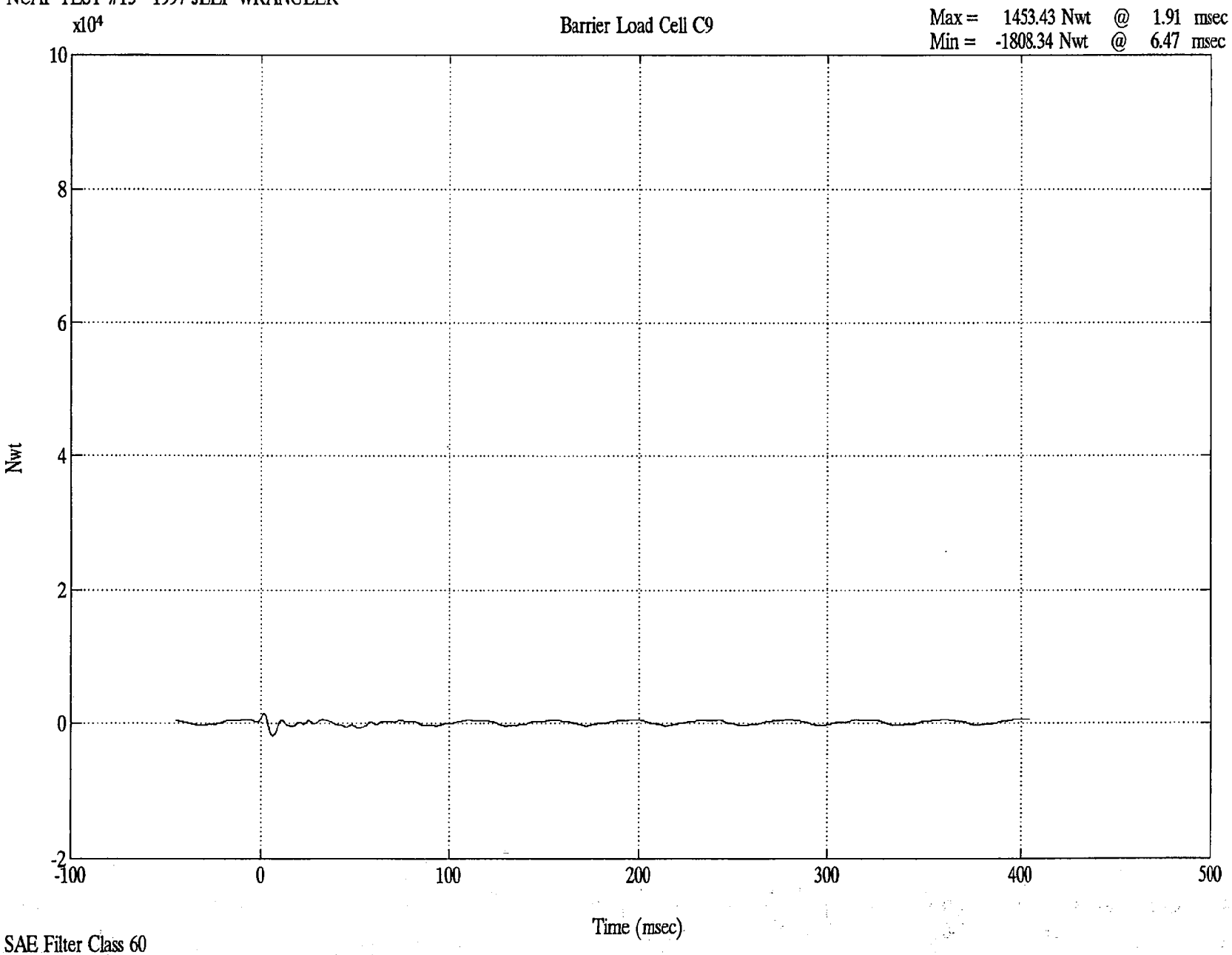
8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



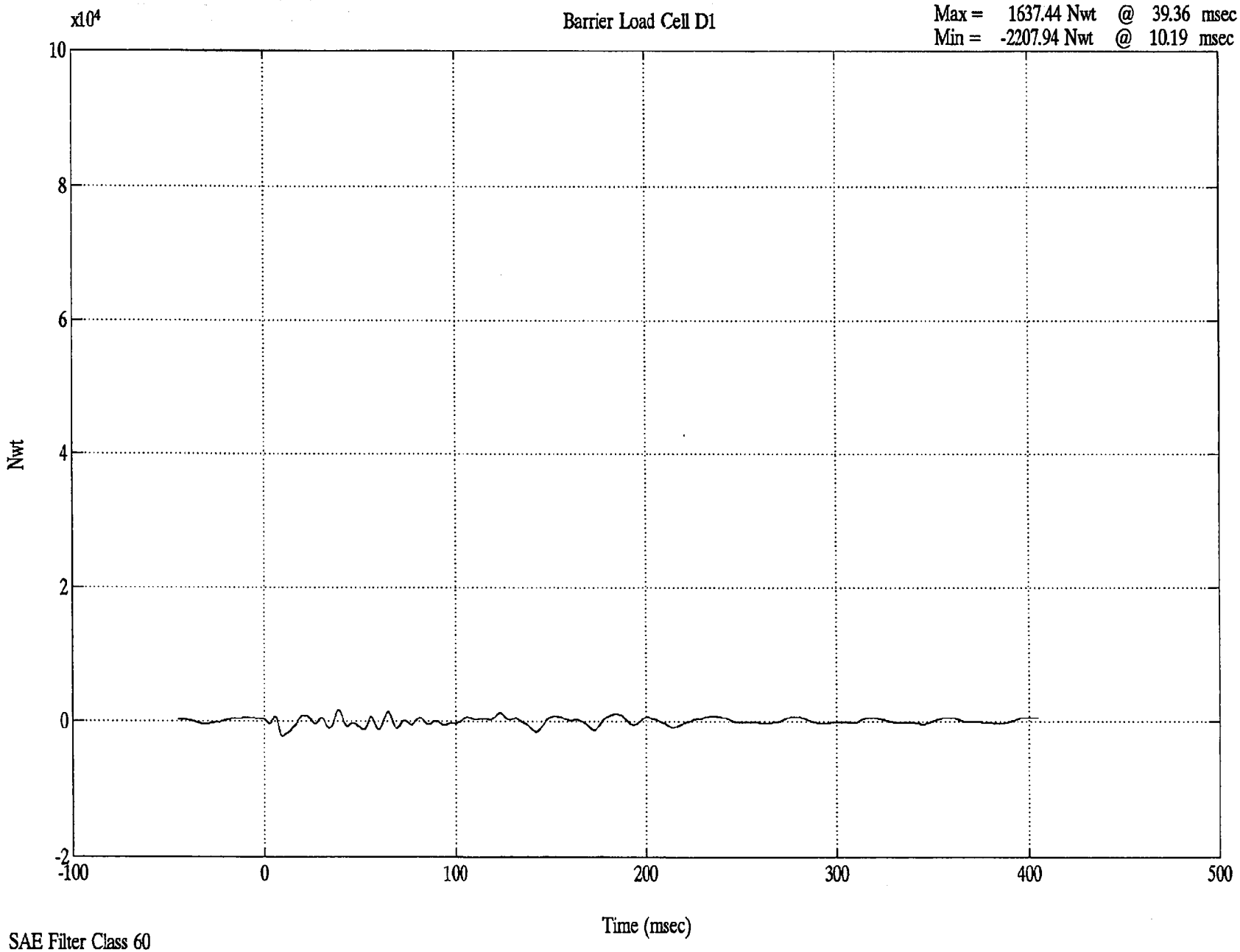
SAE Filter Class 60

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

NCAP TEST #13 - 1997 JEEP WRANGLER

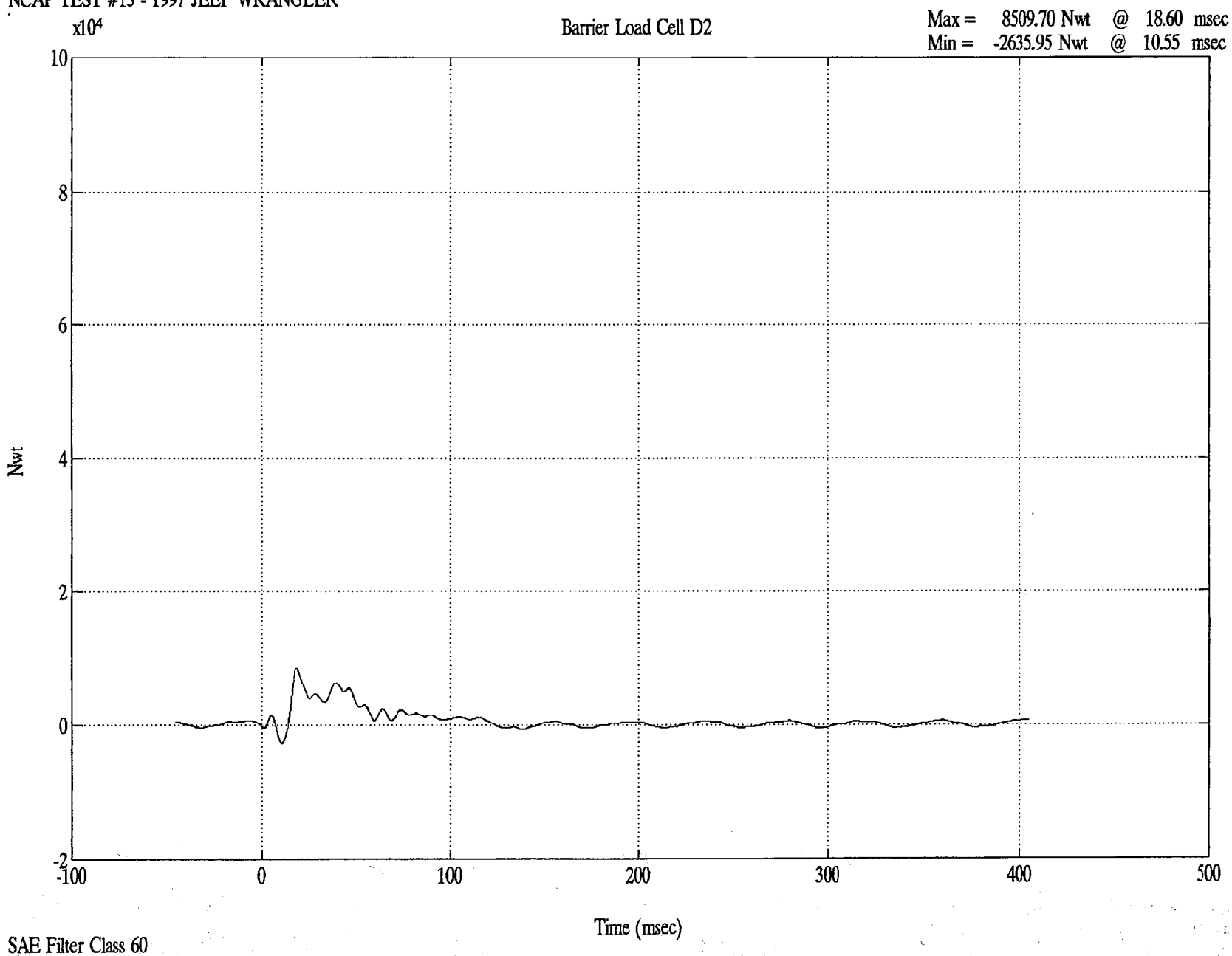


SAE Filter Class 60

B-157

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

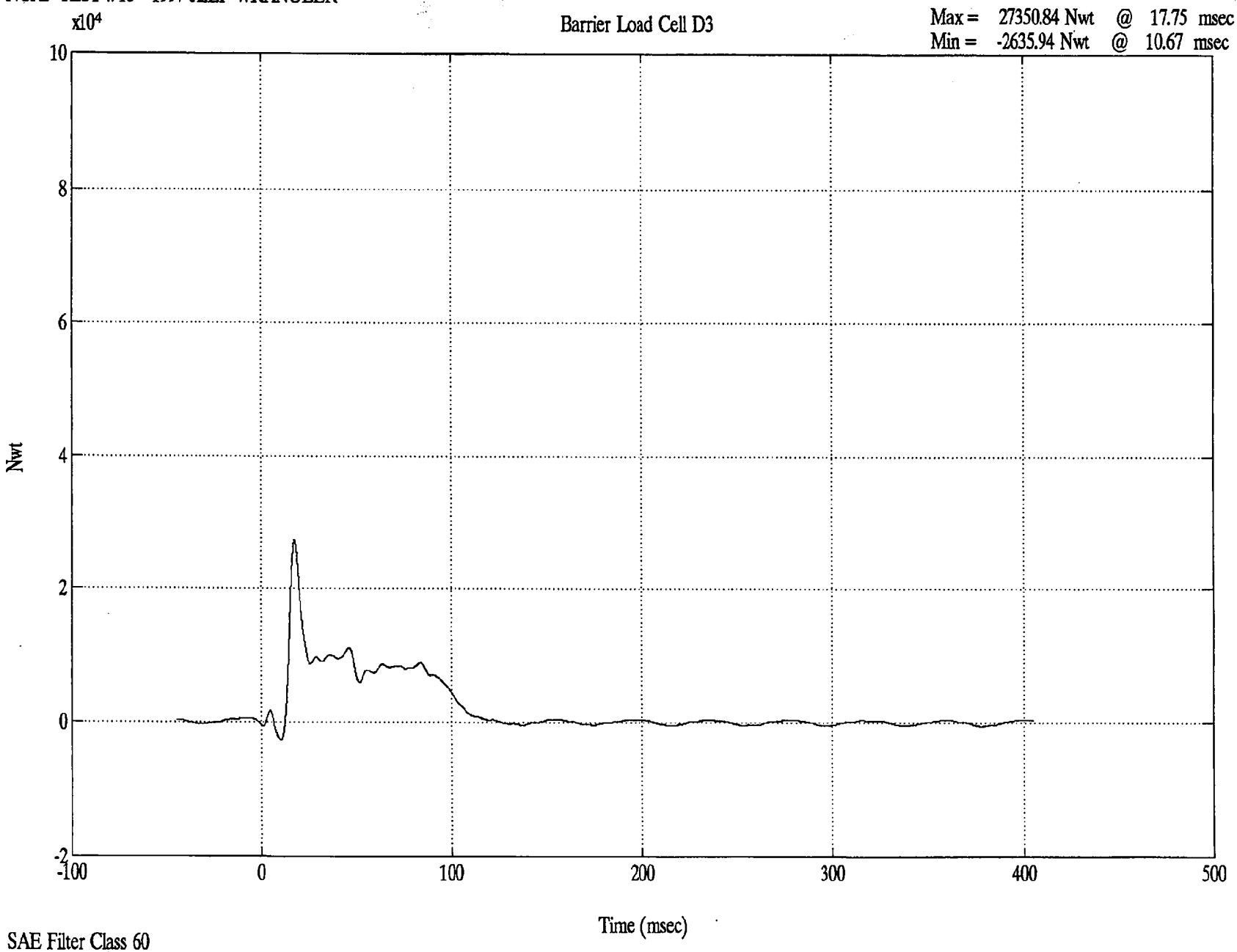


SAE Filter Class 60

B-158

8313-13

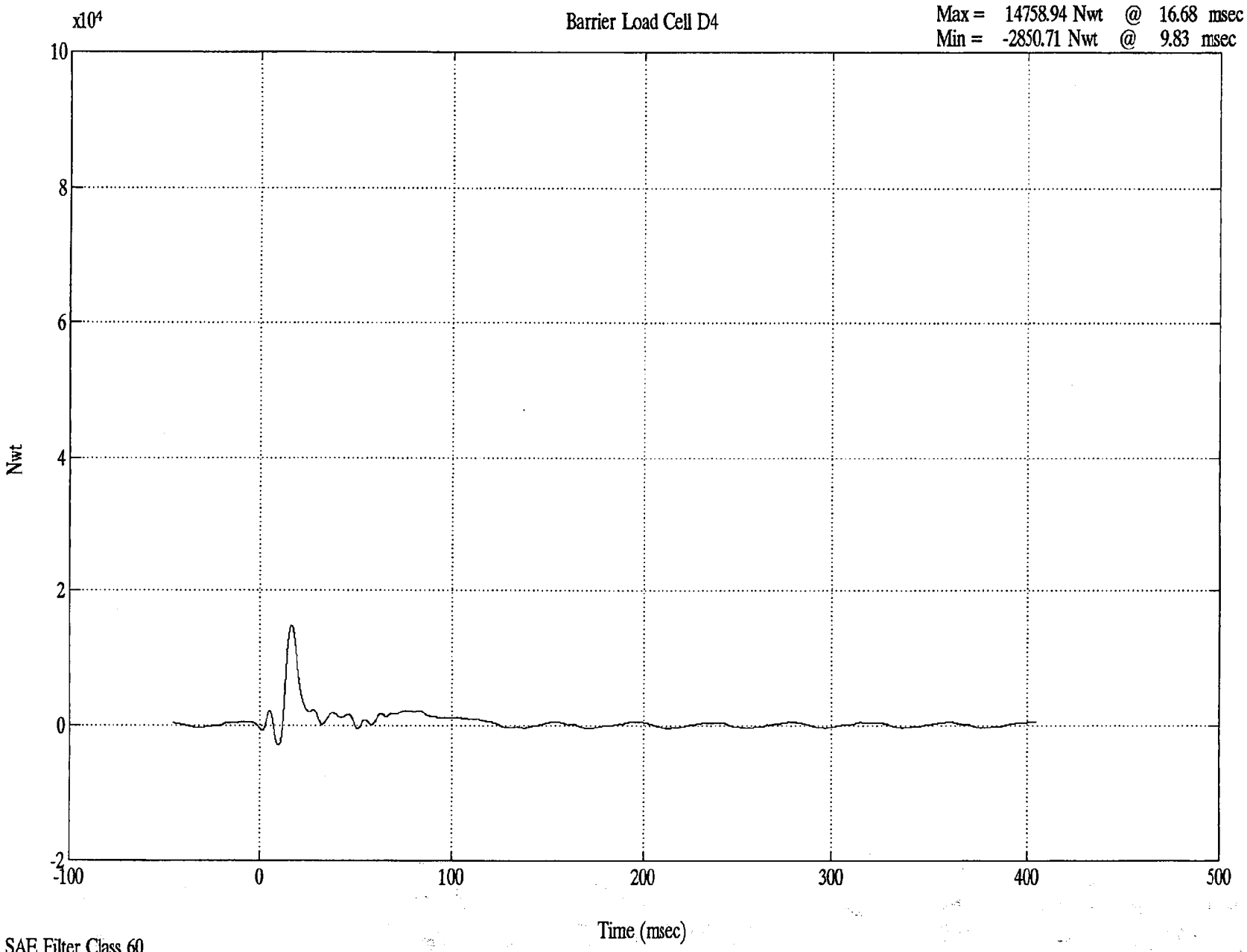
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

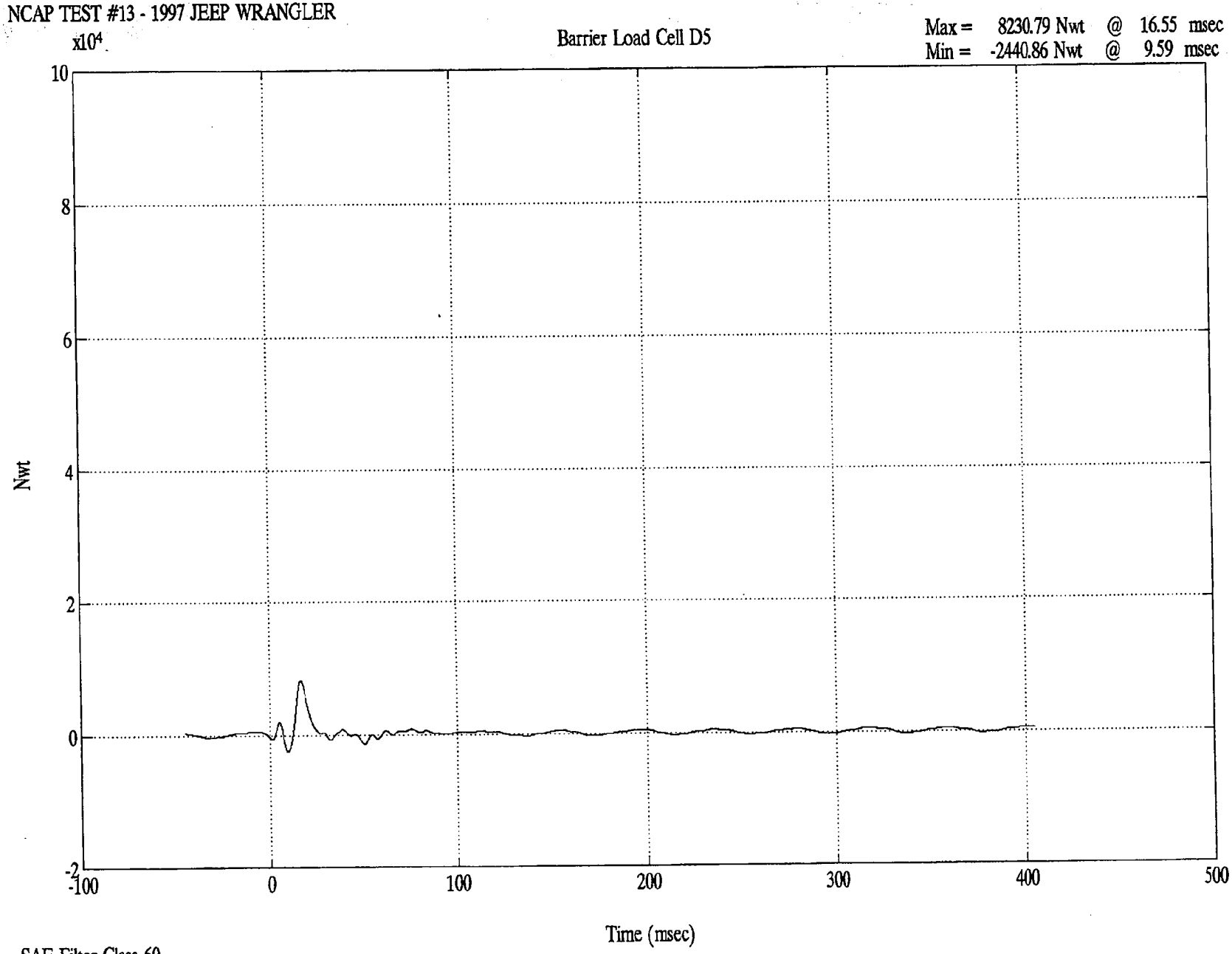


B-160

8313-13

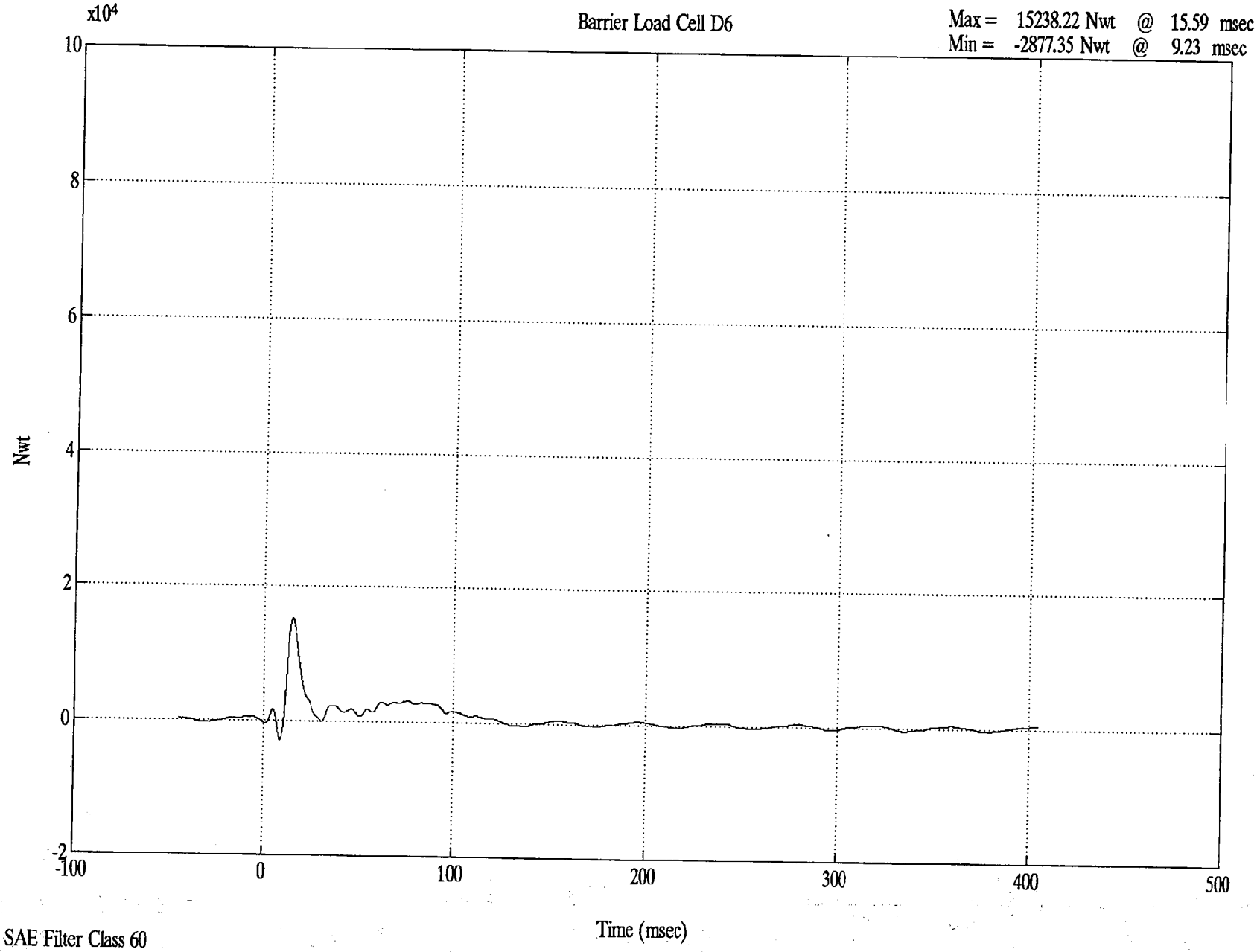
SAE Filter Class 60

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

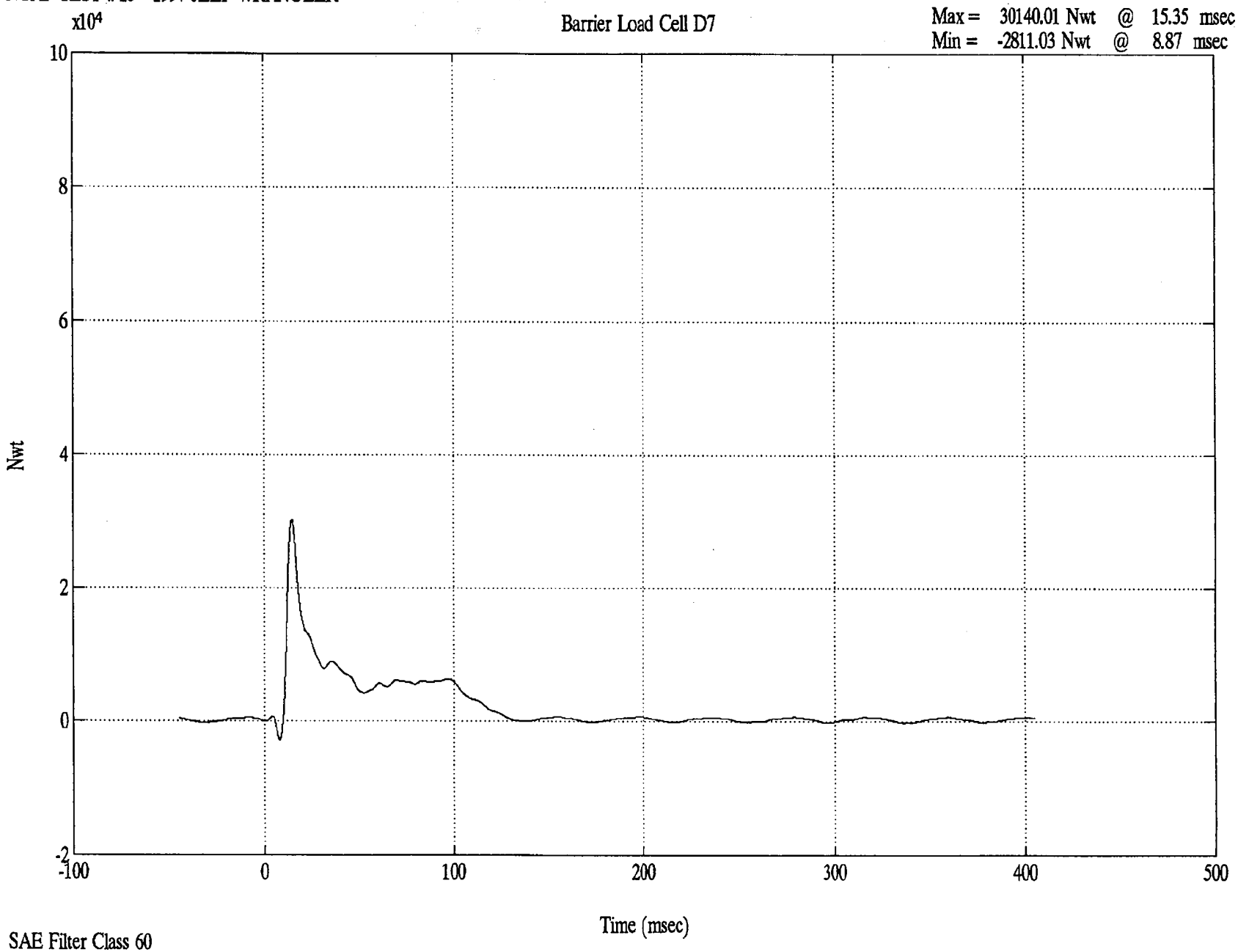
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

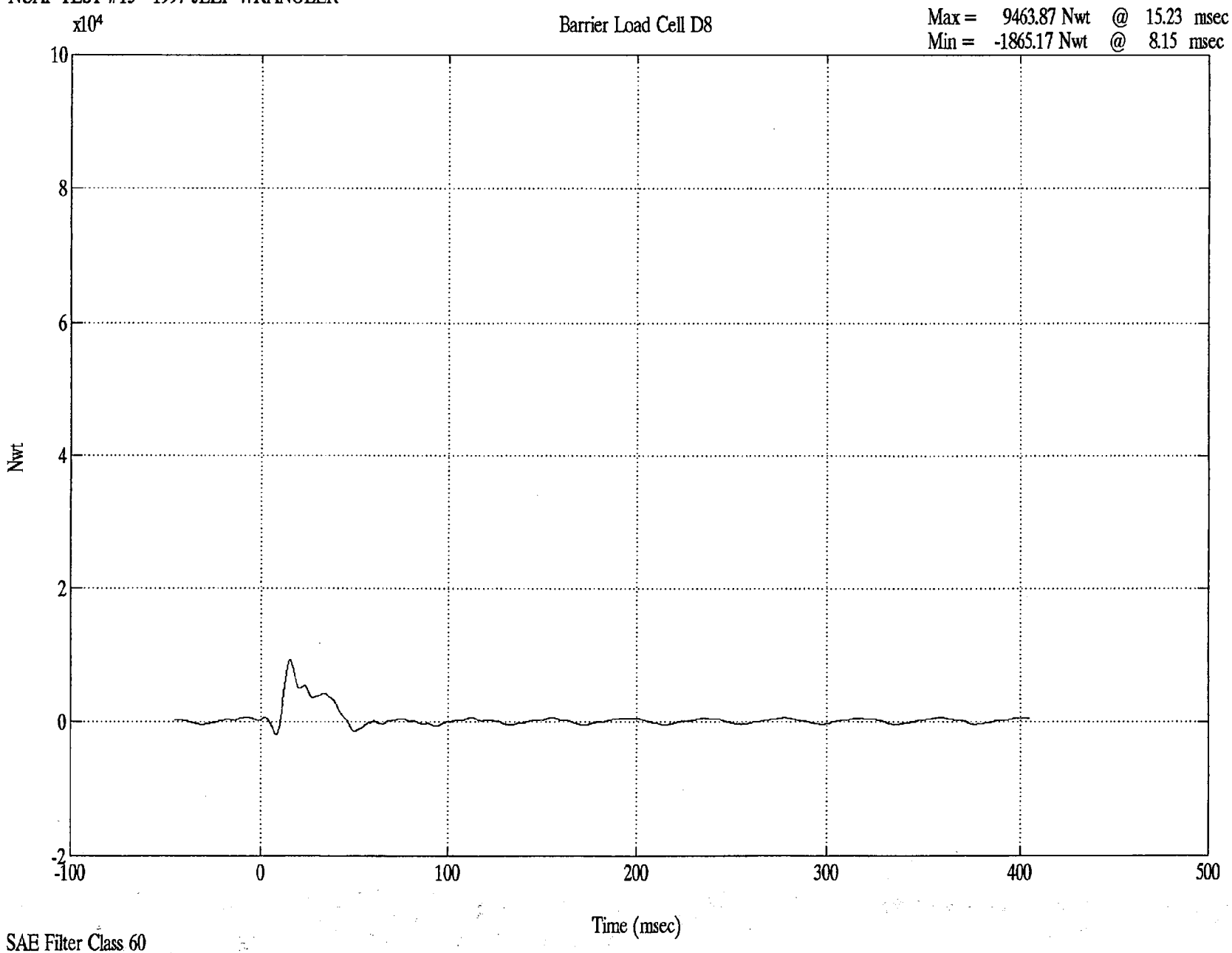


SAE Filter Class 60

B-163

8313-13

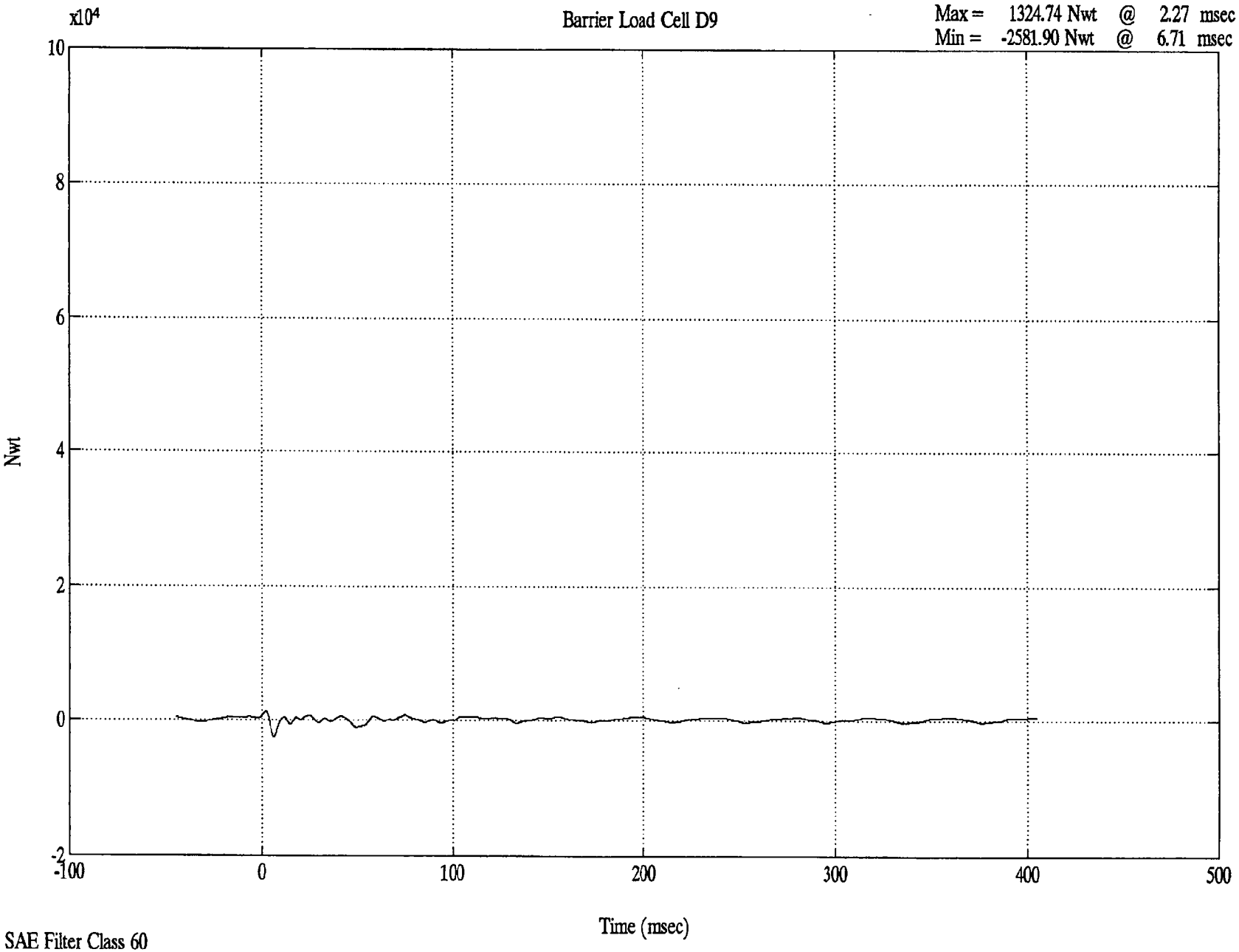
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

8313-13

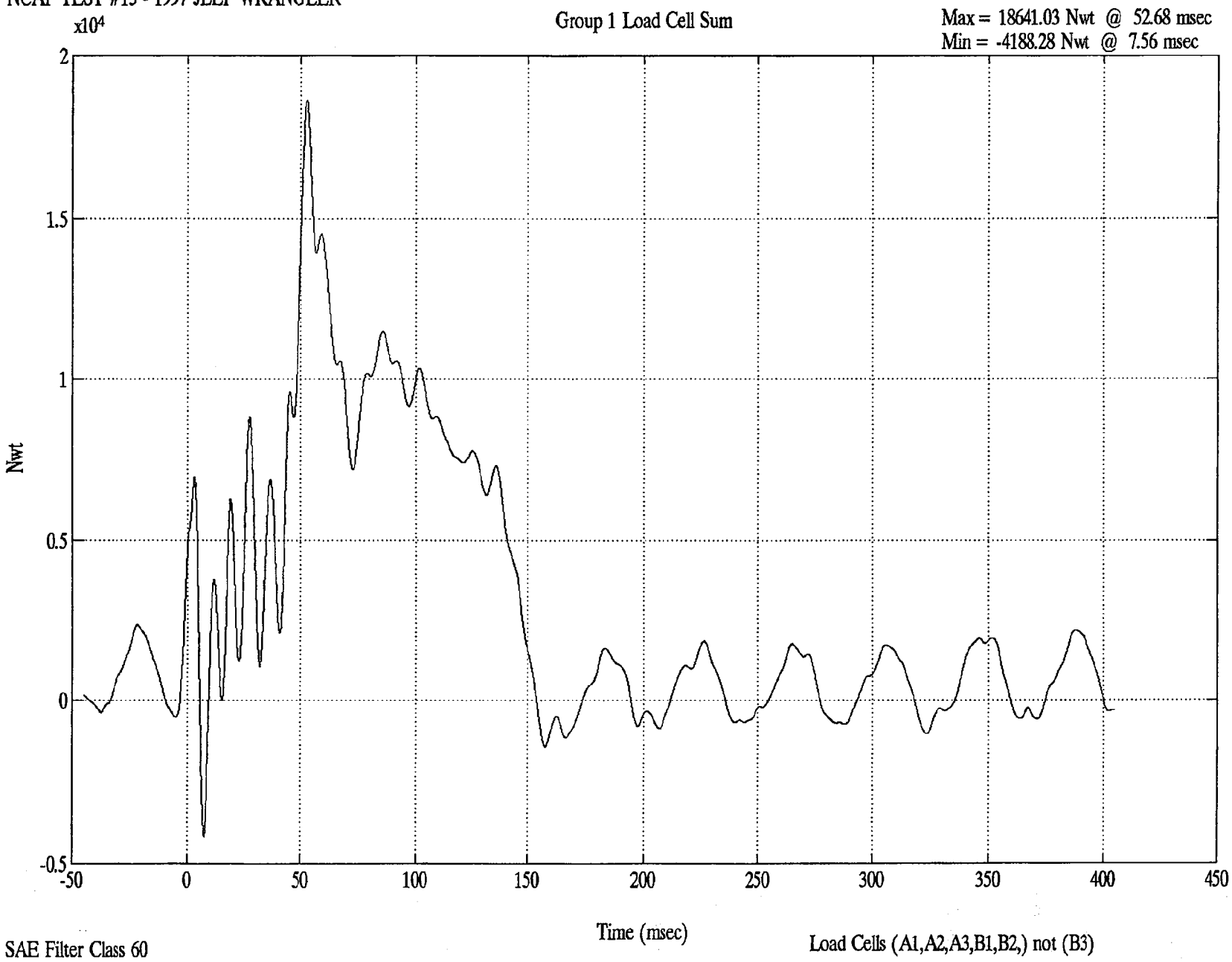
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

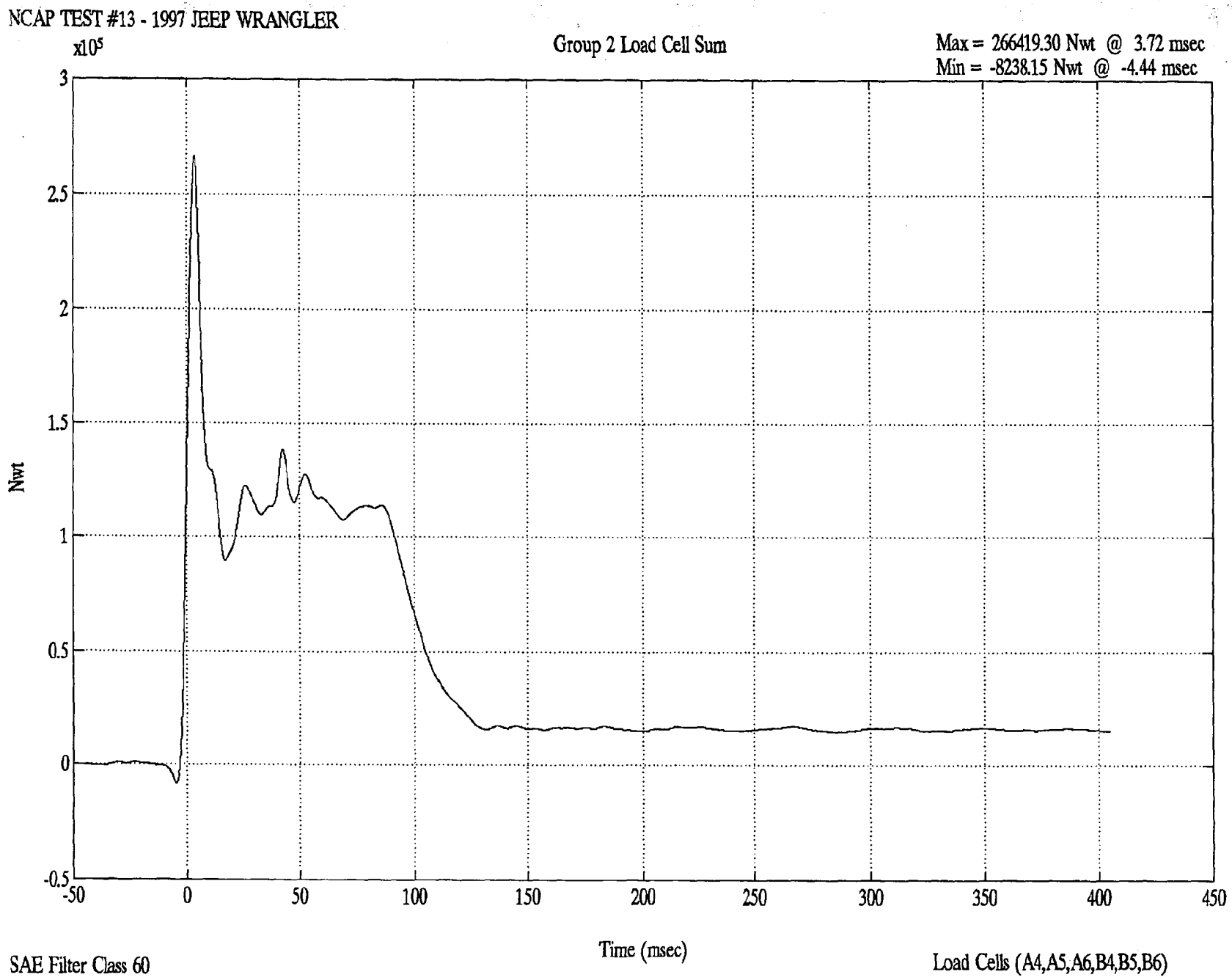
8313-13

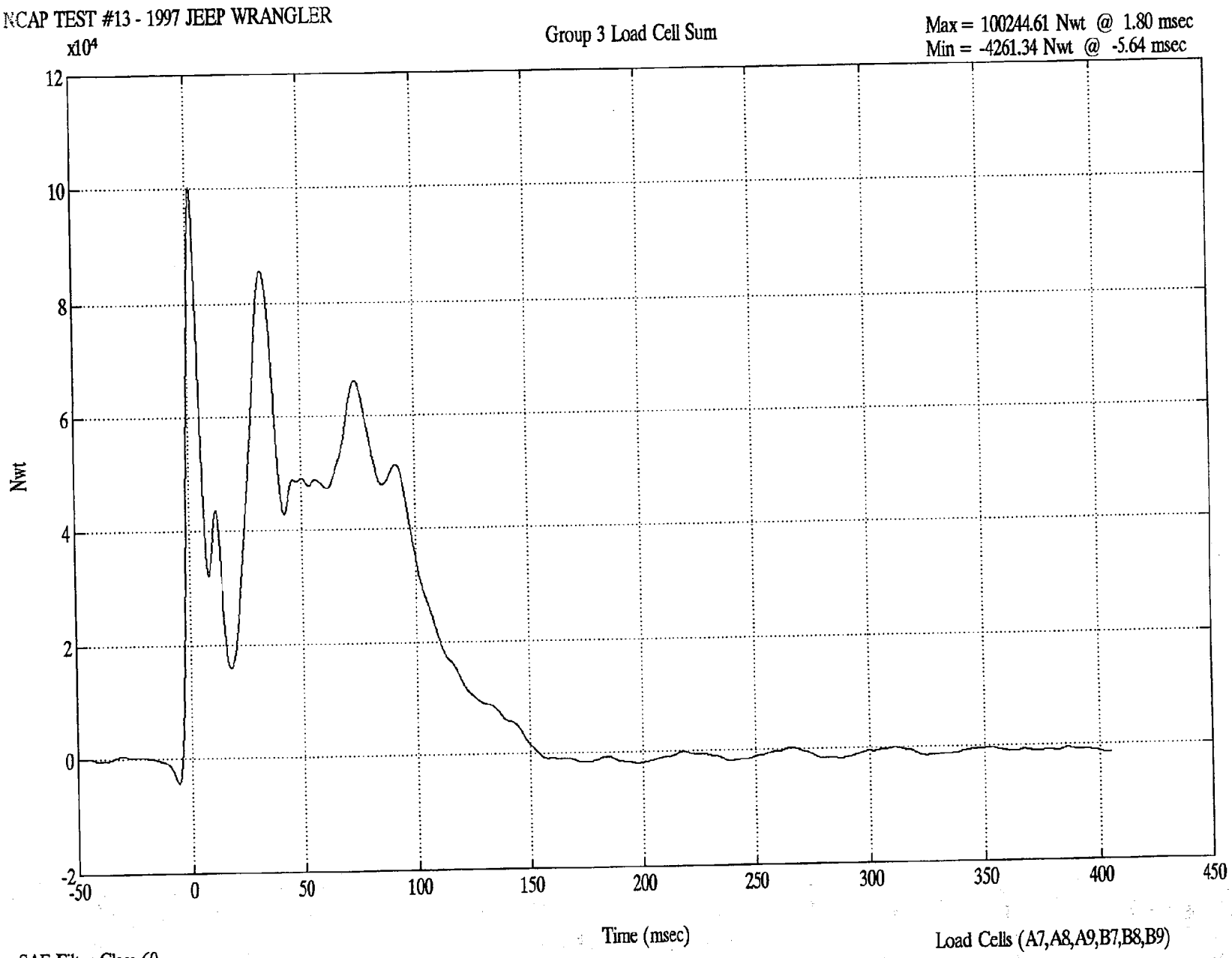
NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

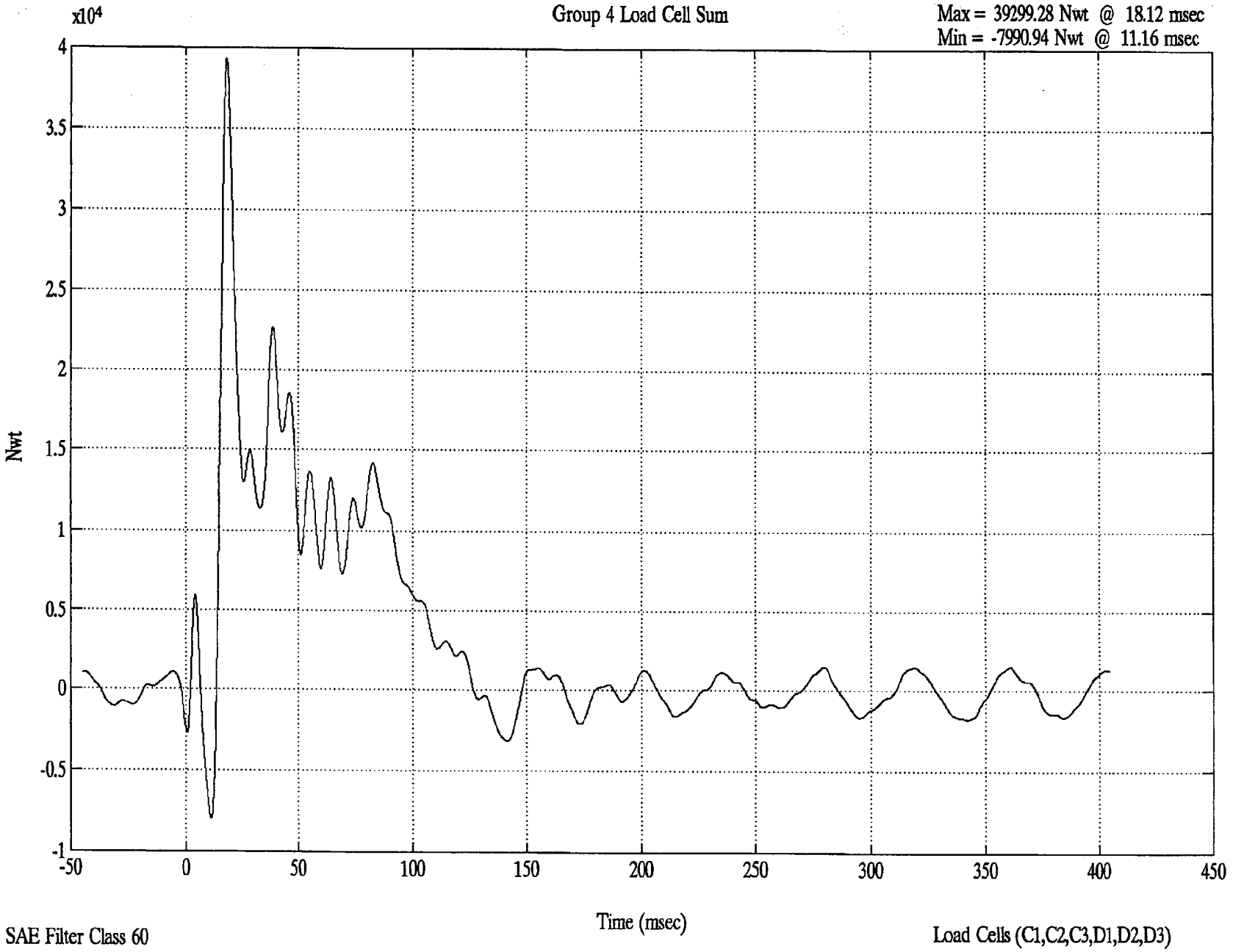
8313-13


NCAP TEST #13 - 1997 JEEP WRANGLER
x10^5
Group 2 Load Cell Sum
Max = 266419.30 Nwt @ 3.72 msec
Min = -8238.15 Nwt @ -4.44 msec
Nwt
3
2.5
2
1.5
1
0.5
0
-0.5
-50
0
50
100
150
200
250
300
350
400
450
Time (msec)
SAE Filter Class 60
Load Cells (A4,A5,A6,B4,B5,B6)


NCAP TEST #13 - 1997 JEEP WRANGLER
Group 3 Load Cell Sum
Max = 100244.61 Nwt @ 1.80 msec
Min = -4261.34 Nwt @ -5.64 msec
x10^4
12
10
8
6
4
2
0
-2
Nwt
-50
0
50
100
150
200
250
300
350
400
450
Time (msec)
Load Cells (A7,A8,A9,B7,B8,B9)
SAE Filter Class 60

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER

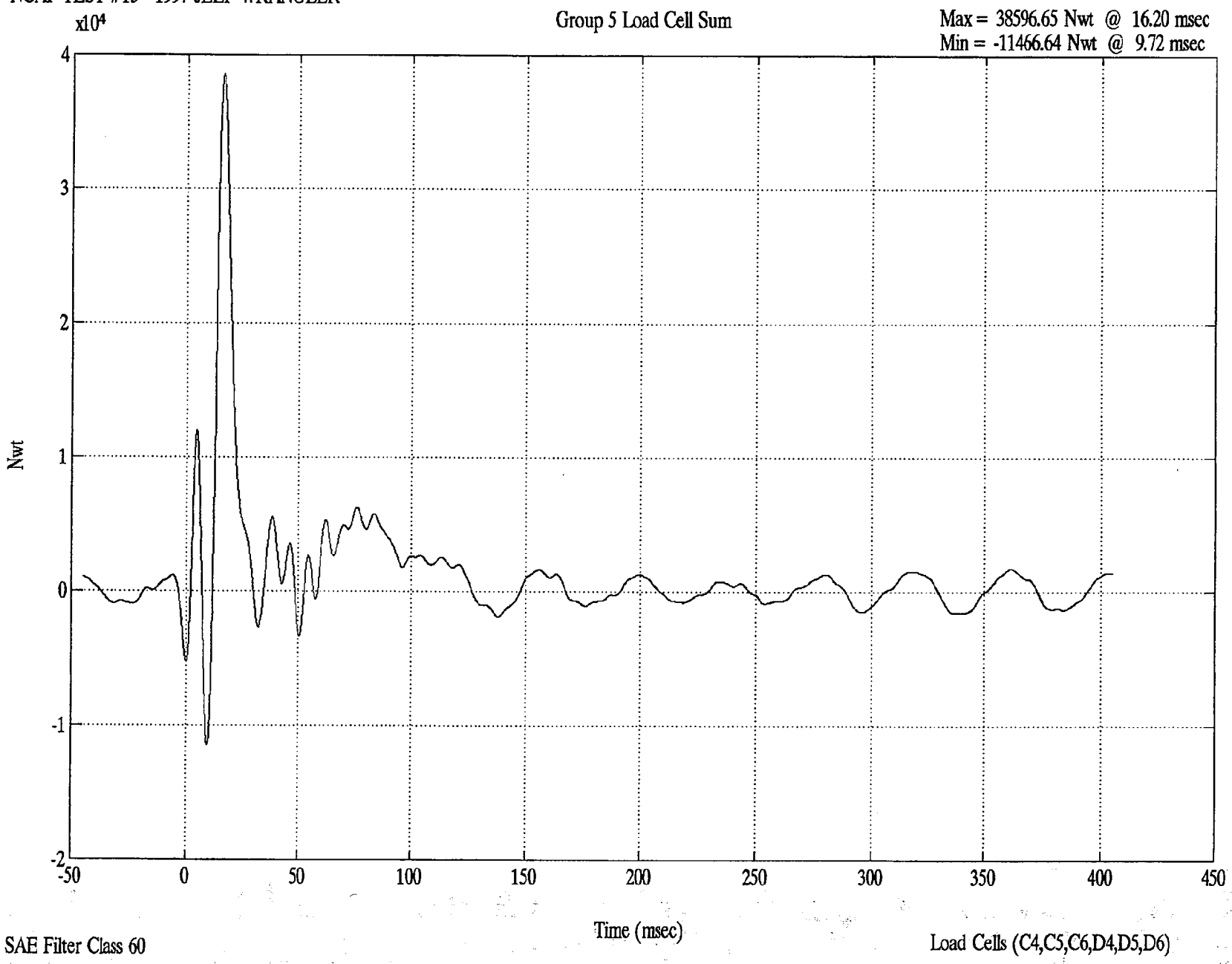


SAE Filter Class 60

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

8313-13

NCAP TEST #13 - 1997 JEEP WRANGLER



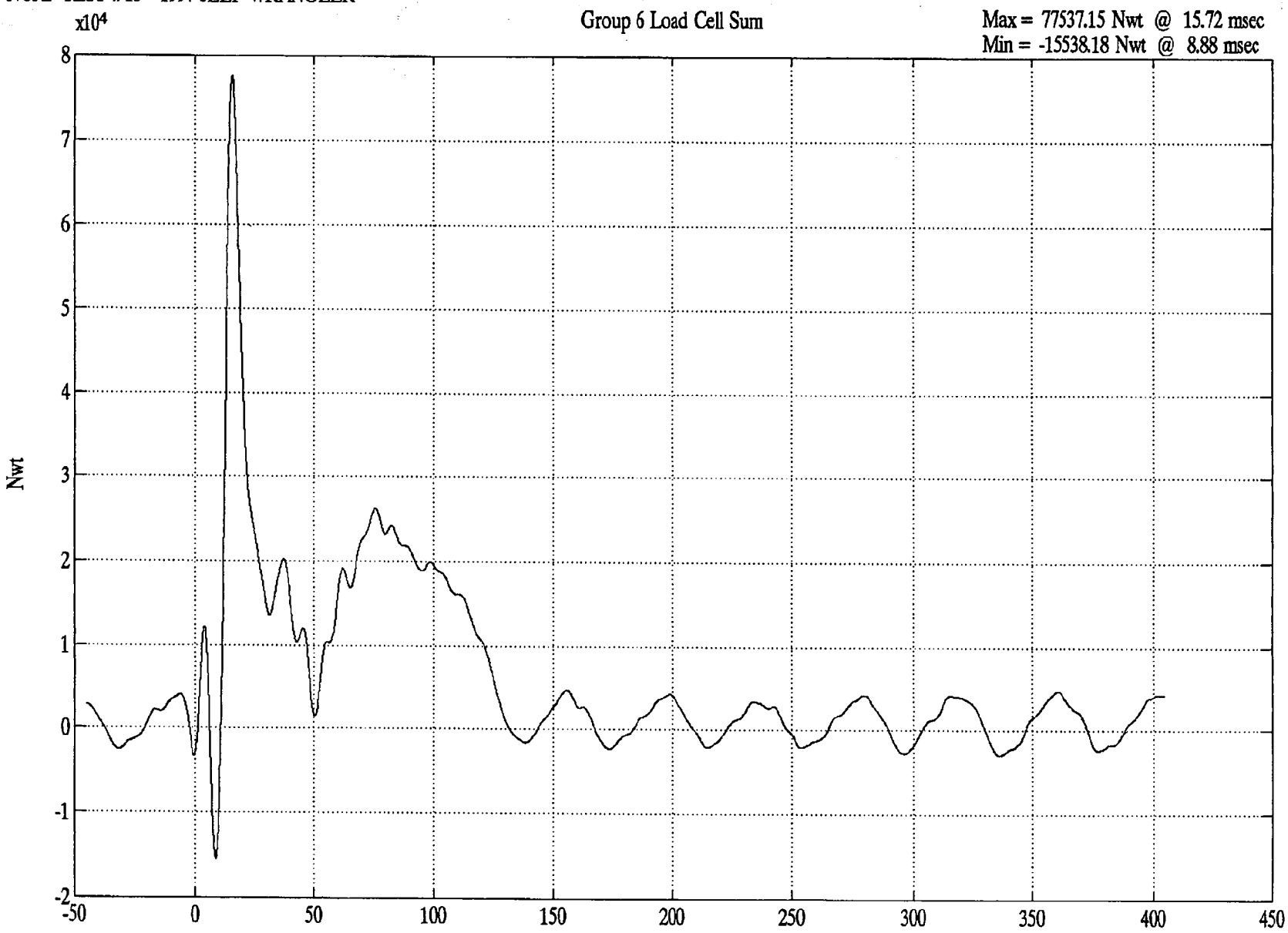
B-170

8313-13

SAE Filter Class 60

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

NCAP TEST #13 - 1997 JEEP WRANGLER



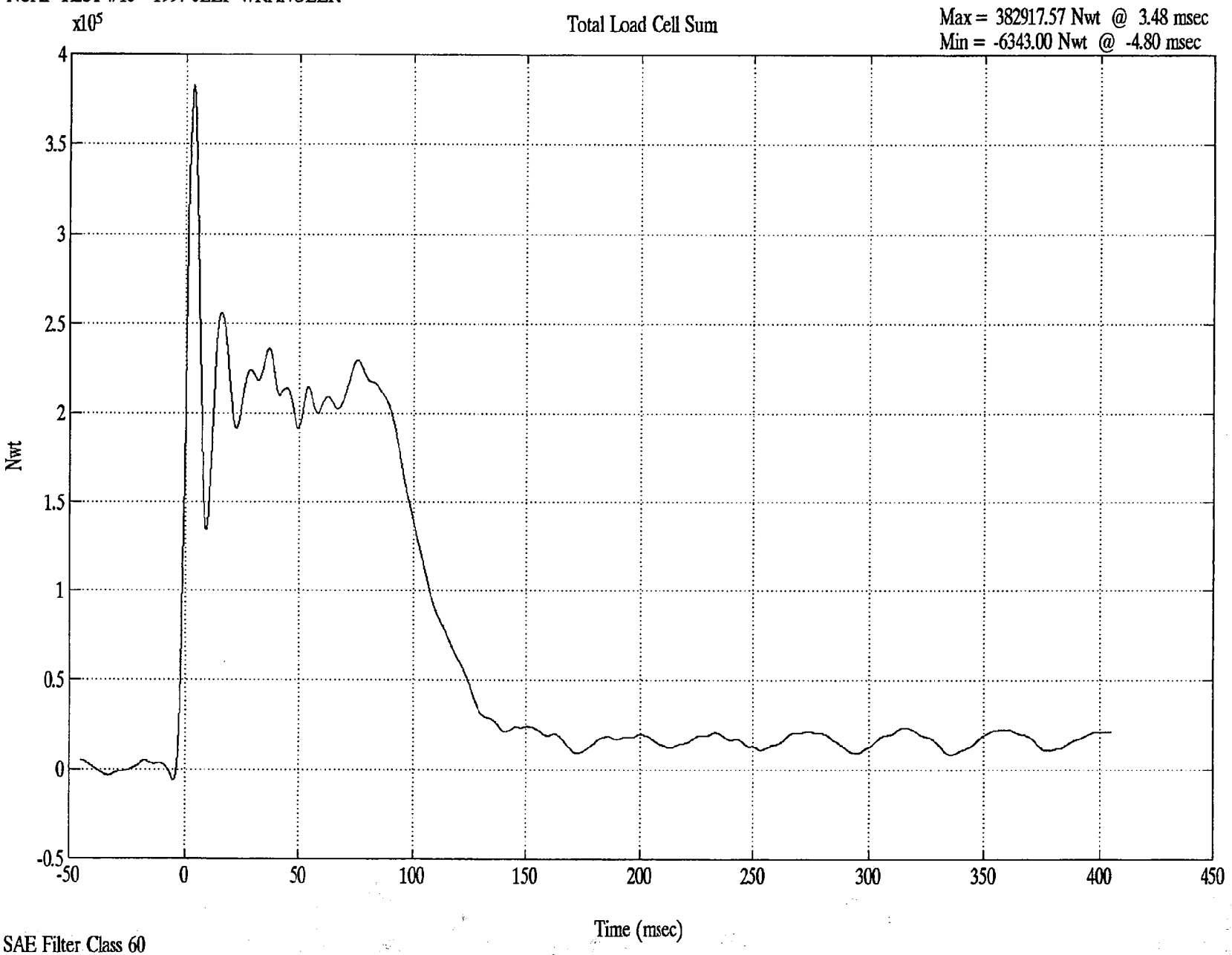
B-171

8313-13

SAE Filter Class 60

Load Cells (C8,C9,D7,D8,D9) not (C7)

NCAP TEST #13 - 1997 JEEP WRANGLER



SAE Filter Class 60

Appendix C

PART 572B/E DUMMY CONFIGURATION

AND PERFORMANCE VERIFICATION DATA SHEETS

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

The tests were conducted at the Dummy Certification Test Facility of Calspan 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	9/14/96
#2/Right Front Passenger	061	9/16/96

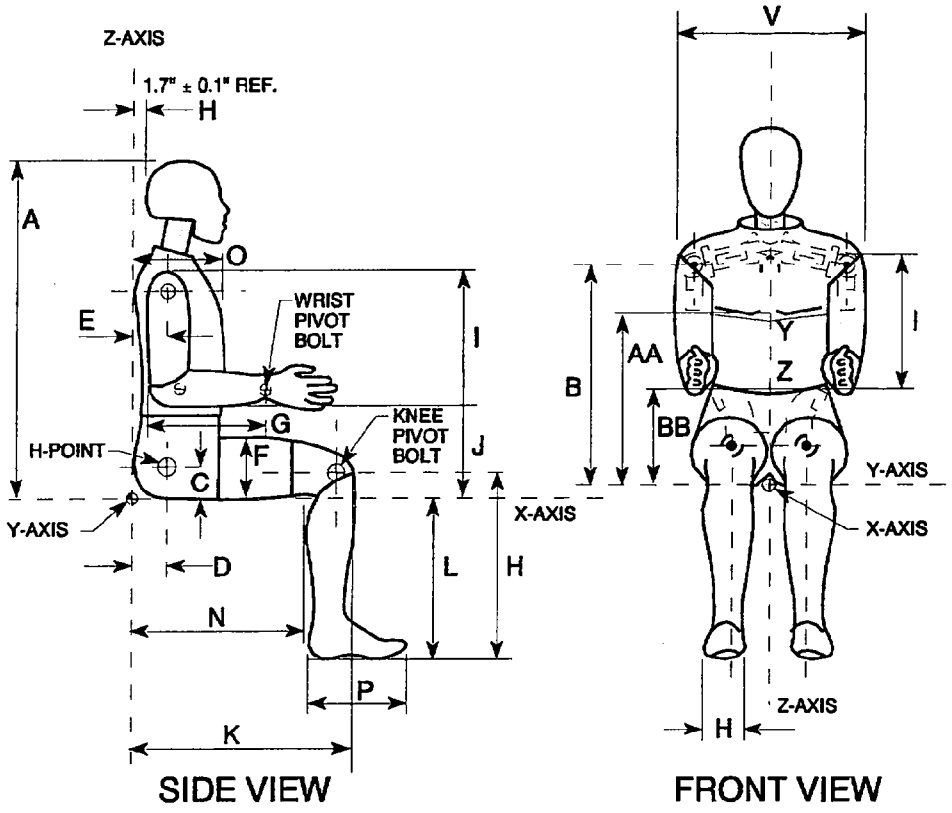
Electronic Test Equipment

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))

CALSPAN SRL CORPORATION
Transportation Sciences Center

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number: 245
Calspan Sequential Test Number: 3
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: 3
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: 3
Date: 9/9/96
Workfile: 2451996.nfl

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: 3
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

CALSPAN SRL CORPORATION
Transportation Sciences Center

PART 572E
THORAX IMPACT TEST

Dummy Serial Number: 245
Calspan Sequential Test Number: 3
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

CALSPAN SRL CORPORATION
Transportation Sciences Center

PART 572E
KNEE IMPACT TEST

Dummy Serial Number: 245
Calspan Sequential Test Number: 3
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: 061
Calspan Sequential Test Number: 2
Date: 9/14/96

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			21.1 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	998 mm
Waist Circumference	Z	815 - 866 mm	851 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	41 mm
Total Sitting Height	A	879 - 889 mm	884 mm
Thigh Clearance	F	140 - 155 mm	155 mm
Buttock Knee Length	K	579 - 604 mm	594 mm
Buttock Popliteal Length	N	452 - 477 mm	465 mm
Popliteal Height	L	429 - 455 mm	452 mm
Knee Pivot Height	M	485 - 500 mm	493 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	89 mm
Shoulder Breadth	V	422 - 437 mm	427 mm
Shoulder Pivot Height	B	505 - 521 mm	511 mm
Elbow Rest Height	J	190 - 211 mm	196 mm
Shoulder - Elbow Length	I	330 - 345 mm	340 mm
Back of Elbow to Wrist Pivot	G	290 - 305 mm	295 mm

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

CALSPAN SRL CORPORATION
Transportation Sciences Center

PART 572E
HEAD DROP TEST

Dummy Serial Number: 061
Calspan Sequential Test Number: 2
Date: 9/8/96
Workfile: 0611996.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	268.5 G's
Peak Lateral Acceleration	15 G's Max	9.0 G's
Is Acceleration Curve Unimodal?	YES	YES

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

PART 572E
NECK FLEXION TEST

Dummy Serial Number: 061
Calspan Sequential Test Number: 2
Date: 9/15/96
Workfile: 0611996.nfl

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.5 - 22.2 Deg. C	21.1 Deg. C
Relative Humidity		10% - 70%	65 %
Impact Velocity		24.8 - 25.7 Kph	25.5 Kph
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	24.83 G's
	20 ms	17.60 - 22.60 G's	20.40 G's
	30 ms	12.50 - 18.50 G's	16.53 G's
Max Pendulum G's Above 30 ms		29 G's Max	16.53 G's
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	35.25 ms
D Plane Rotation	Max	64 - 78 Deg.	65.94 Deg.
	Time	57 - 64 ms	60.25 ms
Moment About Occipital Condyle	Max	88 - 108 N-M	91.26 N-M
	Time	47 - 58 ms	46.50 ms
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	121.75 ms
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	101.50 ms

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

CALSPAN SRL CORPORATION
Transportation Sciences Center

PART 572E
NECK EXTENSION TEST

Dummy Serial Number: 061
Calspan Sequential Test Number: 2
Date: 9/16/96
Workfile: 0611996.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%	45 %
Impact Velocity		21.4 - 22.3 Kph	21.6 Kph
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	18.42 G's
	20 ms	14.00 - 19.00 G's	15.67 G's
	30 ms	11.00 - 16.00 G's	13.85 G's
Max Pendulum G's Above 30 ms		22 G's Max	13.85 G's
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	38.88 ms
D Plane Rotation	Max	81 - 106 Deg.	93.93 Deg.
	Time	72 - 82 ms	75.88 ms
Moment About Occipital Condyle	Max	-80.0/-52.9 N-M	-64.82 N-M
	Time	65 - 79 ms	70.00 ms
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	154.00 ms
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	139.50 ms

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

CALSPAN SRL CORPORATION
Transportation Sciences Center

PART 572E
THORAX IMPACT TEST

Dummy Serial Number: 061
Calspan Sequential Test Number: 2
Date: 9/14/96
Workfile: 0611996.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	24.1 Kph
Maximum Deflection	64 - 73 mm	64.3 mm
Maximum Resistive Force	5160 - 5894 Newton's	5817 Newton's
Internal Hysteresis	69 - 85 %	73.4 %

Remarks: DUMMY COMPONENT MEETS SPECIFICATIONS

Laboratory Technician: Brian Swiecicki

CALSPAN SRL CORPORATION
Transportation Sciences Center

PART 572E
KNEE IMPACT TEST

Dummy Serial Number: 061
Calspan Sequential Test Number: 2
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	4995 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	4897 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		M6	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)	AKD92	ENDEVCO	8/96	2/97
	Y (R)	APBB9	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	ADK93	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 061)		Serial #	Manufacturer	Calibration	
				Last	Next
Head	X	AH5M9	ENDEVCO	9/96	3/97
	Y	AGHF5	ENDEVCO	9/96	3/97
	Z	AL6K2	ENDEVCO	9/96	3/97
Chest	X	A33A	ENDEVCO	8/96	2/97
	Y	FB32L	ENDEVCO	8/96	2/97
	Z	AD395	ENDEVCO	8/96	2/97
Right Femur Load Cell		232	GSE	7/96	1/97
Left Femur Load Cell		231	GSE	7/96	1/97
Neck Load Cell	X	076	DENTON	9/96	3/97
	Y	076	DENTON	9/96	3/97
	Z	076	DENTON	9/96	3/97
Neck Moment	X	076	DENTON	9/96	3/97
	Y	076	DENTON	9/96	3/97
	Z	076	DENTON	9/96	3/97
Chest Deflection Gauge		061	HUMANOID	8/96	2/97
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		M8	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)	APBF4	ENDEVCO	9/96	3/97
	Y (R)	APBD7	ENDEVCO	9/96	3/97
	Z (R)	AN967	ENDEVCO	7/96	1/97
Chest	X (R)	APA30	ENDEVCO	7/96	1/97
	Y (R)	AP1B5	ENDEVCO	8/96	2/97
	Z (R)	AP057	ENDEVCO	8/96	2/97
Pelvic	X	AF480	ENDEVCO	9/96	3/97
	Y	AL508	ENDEVCO	9/96	3/97
	Z	AF5C1	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	X78	ICS	7/96	1/97
Right Rear Seat Crossmember	Y93	ICS	10/96	10/96
Top of Engine	Y171	ICS	8/96	2/97
Bottom of Engine	Y26	ICS	8/96	2/97
Left Disc Brake Caliper	A56	CEC	9/96	3/97
Right Disc Brake Caliper	A147	CEC	9/96	3/97
Instrument Panel	Y22	CEC	8/96	2/97
Left Seat Rear Crossmember (R)	X26	ICS	4/96	10/96
Right Seat Rear Crossmember (R)	X81	ICS	5/96	11/96

Appendix E

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

OCCUPANT RESTRAINTS

One of the most important safety features in your vehicle is the restraint system. This system includes the front and rear seat belts. Your seat belts can also be used to hold infant and child restraint systems if you will be carrying children too small for adult-size belts.

Please pay careful attention to the information in this section. It tells you how to use your restraint system properly to keep you and your passengers as safe as possible.

WARNING!

In a collision you and your passengers can suffer much greater injuries if you are not properly buckled up. You can strike parts of the inside of the vehicle or other passengers, or you can be thrown out of the vehicle. Always be sure you and others in your vehicle are buckled up properly.

Buckle up even though you are an excellent driver, even on short trips. Someone else on the road may be a poor driver and cause a collision which involves you. And this can happen far from home or on your own street.

Research has shown that safety belts save lives. And they can reduce the seriousness of injuries in a collision. Some of the worst injuries happen when people are thrown from the vehicle. Seat belts provide protection against that, and they reduce the risk of injury caused by striking the inside of the vehicle. Everyone in a motor vehicle needs to be buckled up all the time.

WARNING!

It is extremely dangerous to ride in a cargo area, inside or outside of a vehicle. In a collision, people riding in these areas are more likely to be seriously injured or killed.

Do not allow people to ride in any area of your vehicle that is not equipped with seats and seat belts.

Be sure everyone in your vehicle is in a seat and using a seat belt properly.

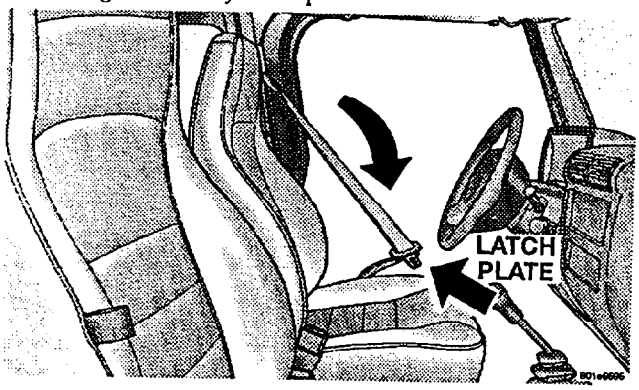
Unibelts

The front and rear seats of your vehicle have combination lap/shoulder belts, or unibelts. The retractor is designed to lock 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.

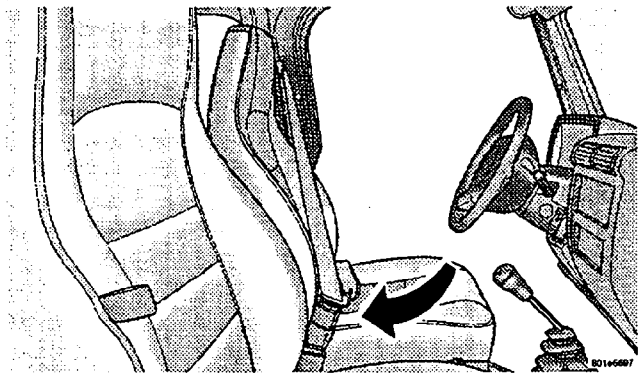
Unibelt Operating Instructions

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

2. The latch plate of the belt 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 notice a "click".



WARNING!

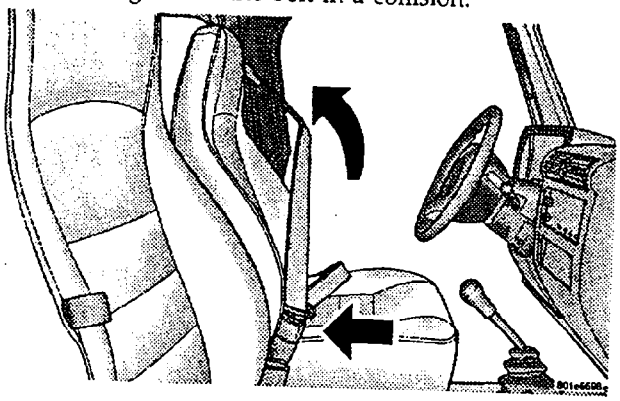
A belt buckled into the wrong buckle will not protect you properly. The lap portion could ride too high on your body, possibly causing internal injuries. Always buckle your belt into the buckle nearest you.

WARNING!

- 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 shoulder belt worn under your arm is very dangerous. Your body could fall into the inside surfaces of the vehicle in a crash, 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.

2

4. Position the lap belt across your thighs, below your abdomen. If you need the lap portion tighter, pull up a bit on the shoulder part, as shown. A snug belt reduces the risk of sliding under the belt in a collision.



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 part of your seat belt as low as possible, and keep it snug.

5. Position the 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 your belt is straight. If you can't straighten a belt in your vehicle, take it to your dealer and have it fixed.

6. To release the belt, push the red button marked "Press" on the buckle. The belt will automatically retract to its stowed position.

If necessary, slide the latch plate down the webbing to allow the belt to retract fully.

WARNING!

A frayed or torn belt could rip apart in a collision and leave you with no protection. Inspect your belts periodically, checking for cuts, frays, and loose parts. Damaged parts must be replaced immediately. Do not disassemble or modify the system. Seat belt assemblies must be replaced after an accident if they have been damaged (bent retractor, torn webbing, etc.).

WARNING!

Belting two people into one seat belt can lead to greater injury. People belted together can crash into one another in an accident, hurting one another badly. Never use a belt for more than one person, no matter what their size.

Seat Belts and Pregnant Women

We recommend that pregnant women use 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 against 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.

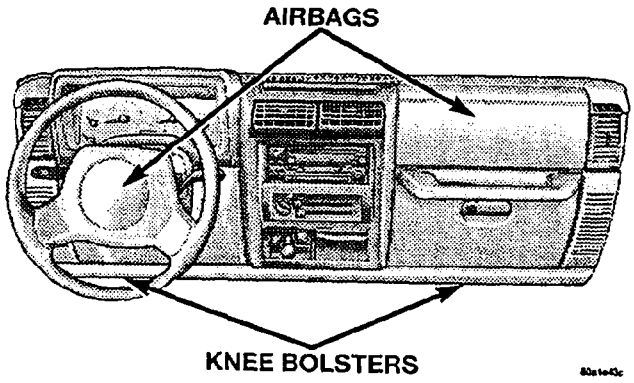
Seat Belt Extender

If a seat belt is too short, even when fully extended, your dealer can provide you with a seat belt extender. This extender should be used only if the existing belt is not

that it meets applicable Motor Vehicle Safety Standards. Make sure it is satisfactory for use in this vehicle.

Driver And Right Front Passenger Supplemental Restraint System (SRS) — AIRBAG

This vehicle has airbags for the driver and right front passenger as a supplement to the seat belt restraint system. 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 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 the airbags alone could lead to more severe injuries. Wear your seat belt even though you have an airbag.**
- **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.**

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

WARNING!

Ignoring the AIRBAG light in your instrument panel could mean you won't have the airbags to protect you in a collision. If the light does not come on for approximately 7 seconds when the vehicle is first started, stays on 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:

- A Crash Sensing/Diagnostic Computer
- AIRBAG Light
- Airbag/Inflator Unit (Driver & Passenger)
- Unique Steering Wheel and Column
- Interconnecting Wiring
- Knee Impact Bolster

How The Airbag System Works

- A **Crash Sensing Computer** in the vehicle determines if a frontal impact is severe enough to require the airbags. The computer will not detect side, rollover, or rear impacts.

  The computer monitors the readiness of the electronic parts of the system whenever the ignition switch is in the START or RUN position. These include all of the items listed above except the steering wheel and column and the knee impact bolsters.

  The computer 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. If the instrument cluster detects an airbag lamp failure it turns on the seat belt light either momentarily or continuously.

- The **Airbag/Inflator Units** are located in the center of the steering wheel for the driver and in the upper right side of the instrument panel for the front seat passenger. When the computer detects an impact requiring the airbags, it signals the inflator units. A large quantity of non-toxic nitrogen and/or argon gas is generated to inflate the airbag. The steering wheel hub trim cover and the upper right side of the instrument panel separate and fold out of the way as the bags inflate to their full size. The bags fully inflate in about 50–70 milliseconds. This is about half of the time it takes to blink your eyes. The bags then quickly deflate by venting the gas through pores in the airbag fabric toward the instrument panel. In this way the bags do not interfere with your control of the vehicle.

If A Deployment Occurs

The airbag system is designed to deploy when the impact sensor detects certain moderate-to-severe frontal collisions, 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 airbags, any or all of the following may occur:

- The nylon airbag material may sometimes cause abrasions and/or skin reddening to the occupants as the airbag deploys and unfolds itself from the steering wheel and the upper right side of the instrument panel.

  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 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 driver side airbag inside the opening in the steering wheel hub trim cover to make driving somewhat easier. You may tuck the passenger side airbag under the trim cover in the right side of the instrument panel.

WARNING!

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

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 if the airbag system is not there to protect you. Do not modify the components or wiring, including adding any kind of badges or stickers to the steering wheel hub trim cover or the upper right side of the instrument panel. Do not modify the front bumper or vehicle body structure.**

  If you equip this vehicle with a snow plow, do not expect that the airbag will perform as previously described in this section.
- **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 an airbag system.**

Airbag Light

You will want to have the airbag system ready to inflate for your protection in an impact. The airbag system is designed to be maintenance free. If any of the following occurs, have an authorized dealer service the system promptly:

- 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.
- The seat belt light remains on or flashes after the 6 to 8 second interval after the vehicle has been started or comes on while driving. The seat belt light is used in place of the airbag light when there is an airbag lamp malfunction.

NOTE: The above mentioned conditions may be caused by a blown fuse. In this case the airbag system may not be ready to inflate for your protection. Promptly check fuse numbers 5 and 9 in the fuse block. If a fuse needs replaced, do so only when the ignition key is in the OFF position. If fuses continue to blow, seek authorized service immediately.

NEW VEHICLE BREAK-IN RECOMMENDATIONS

Your new Jeep engine is ready for the road. To provide the longest engine life, follow these guidelines for the first few hundred miles (or kilometers).

- Check the fluid and engine oil levels regularly and be alert for indications of overheating in any component of the vehicle. Engines tend to use more fuel and oil until they are broken in, so don't expect top economy for the first 1,200 miles (1 900 km).
- After starting a cold engine, let it warm up for 15 seconds or so before shifting into gear.
- Allow proper break-in, at least 1,200 miles (1 900 km), before requesting engine adjustments, if then needed.
- Drive at varying speeds below 50 mph (80 km/h) for first 100 miles (160 km) and below 55 mph (88 km/h) for first 500 miles (800 km). Avoid driving at full throttle or top speeds, steady speeds, or excessive idling during this period. Avoid fast starts and quick stops.
- A break-in oil is not used. The original engine oil is the same type specified for regular oil changes. There is no need to have it changed or the oil filter replaced until the first scheduled maintenance interval except in heavy-duty operation. Don't add anti-friction compounds or special break-in oils during the first few thousand miles (or kilometers) of operation, since these additives might interfere with proper piston ring seating.

NOTE: Maintaining proper fluid levels is particularly important during the break-in period. Refer to the **Service and Maintenance** section for checking fluid levels.