REPORT NUMBER: CAL-92-N13

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

FORD MOTOR COMPANY
1992 FORD AEROSTAR XL
7-PASSENGER

NHTSA NUMBER: MN0201

CALSPAN TEST NUMBER: 7978-3

MARCH 5, 1992

CALSPAN CORPORATION
ADVANCED TECHNOLOGY CENTER
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FINAL REPORT

PREPARED FOR:

U. S. Department of Transportation
National Highway Traffic Safety Administration
Office of Market Incentives
400 Seventh Street, S.W.
Room No. 5313 (NRM-20)
Washington, DC 20590

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15. Supplementary Notes

16. Abstract

A frontal load cell barrier test on a 1992 Ford Aerostar XL 7-Passenger MPV was performed at Calspan Advanced Technology Center crash test facility in Buffalo, New York on March 5, 1992.

The impact speed was 34.9 mph and the ambient temperature at the barrier face at the time of impact was 59°F. The maximum post-test vehicle crush was 19.8 inches. The test vehicle was equipped with a 3-point continuous belt system at each of the front outboard seating positions. The test vehicle was also equipped with a driver side airbag as a supplemental restraint device.

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

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Section 1

PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is part of the Composite FY 92 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-90-D-02121. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 30 mph requirements.

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

Section 2

SUMMARY OF TEST NUMBER MN0201

A load cell barrier consisting of 36 load cells was impacted by a 1992 Ford Aerostar XL 7-Passenger MPV at a velocity of 34.9 mph. The test was performed at the Calspan Corporation Advanced Technology Center on March 5, 1992. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 13 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

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

Both ATDs were fully instrumented with head and chest triaxial accelerometers and right/left femur load cells. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver ATD (Serial No. 357) and the right-front passenger ATD (Serial No. 358) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C and D.

The 67 channels of data were recorded on six 14-channel FM tape recorders. Appendix B contains the vehicle, load cell barrier and dummy response data traces.

The driver's head struck the airbag; the HIC was 484.8. The maximum chest deceleration over 3 milliseconds was 51.3 g's and femur loads were 1589.9 and 1309.8 pounds.

The right front passenger's HIC was 722.5 and maximum chest deceleration over 3 milliseconds was 57.3 g's. Femur loads were 946.8 pounds on the left femur and 342.2 pounds on the right femur.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Year/Make/Model/Body Style: 1992 Ford Aerostar XL 7-Passenger MPV

NHTSA Test No.: MN0201 VIN.: 1FMDA11U4NZA76843

Body Color: Blue Date of Manufacture: 1/92

Engine: 6 Cylinders; - C.I.D.; 3.0 Liters; - CC

✓ Gas; - Diesel; - Turbocharged

✓ Longitudinal; - Transverse

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

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

Odometer Reading: 29.2 miles

✓ A/C; ✓ P/S; ✓ P/B; - P/wdo;

✓ Tilt Wheel - P/seats; ✓ Cruise Control

Type of Occupant Restraint: Driver-3 point restraint with airbag

Passenger-3 point restraint

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 32 psi, Rear 35 psi

Recommended Tire Size: P215/70R14SL

Recommended Cold Tire Pressure: Front 32 psi, Rear 35 psi

Tires on Vehicle: P215/70RHxA4M&S ; Manufacturer: Michelin

Number of Occupants: 2 Front; 2 Rear; 3 3rd Seat; 7 TOTAL

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

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

Rated Cargo and Luggage
Weight (RCLW) A-B = 300 lbs.

GVWR 5020 lbs. GAWR: Front 2465 lbs. Rear 2630 lbs.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

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

Right Front = 1020 lbs. Right Rear = 800 lbs.

Left Front = 1040 lbs. Left Rear = 810 lbs.

TOTAL FRONT WEIGHT = 2060 lbs. (56.1 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1610 lbs. (43.9 % of Total Vehicle Weight)

TOTAL DELIVERED WEIGHT = 3670 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (3670 lbs.)

DSC = Designated Seating Capacity (7)

RCLW = 300 lbs.

Target Test Weight = UDW + RCLW + (2 dummies x 164 lbs./dummy)

Target Test Weight = 4298 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 282 POUNDS CARGO:

Right Front = 1160 lbs. Right Rear = 970 lbs.

Left Front = 1180 lbs. Left Rear = 970 lbs.

TOTAL FRONT WEIGHT = 2340 lbs. (54.7 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1940 lbs. (45.3 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 4280 lbs.

Weight of ballast secured in vehicle trunk area = 270 lbs.

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 27.4" LF 27.4" RR 28.3 " LR 28.0"

Test Attitude: RF 26.7" LF 26.7" RR 27.2" LR 27.1"

Wheel Base: 119.0 in.; C.G. = 53.9 in. rearward of front wheel C/L

Remarks: 19.5 gallons of Stoddard solution was placed in the fuel tank.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0 °

Date of Test: March 5, 1992 Time of Test: 13:35

Ambient Temperature: 59 °F at impact area

Temperature in Occupant Compartment: 70 °F

Windshield Molding Temperature: 70 °F

Required Impact Velocity Range: 34.5 to 35.5 mph

Impact Velocity: primary = 34.9 mph, secondary = 34.9 mph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 52 inches

Exiting Speed Trap: 12 inches

VEHICLE REBOUND AND CRUSH (inches):

		R	C_L	L
Vehicle Length:	Pre-test =	173.1	175.0	173.0
	Post-test =	157.0	155.2	158.0
	Crush =	16.1	19.8	15.0

Distance from front of test vehicle to point of impact:

R 13.2 C_L 15.8 L 14.1

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	Air bag	Chin with chest
Chest	Air bag	No contact
Abdomen	No contact	No contact
Left Knee	Lower dash panel	Glove box door
Right Knee	Lower dash panel	Glove box door

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

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

	Front		Rear	
Seat Movement	Left	Right	Left	Right
Seat Back Failure	None	None	N/A	N/A
Seat Shift (in.)	0.0	0.0	N/A	N/A

Glazing Damage

Backlight/Windshield Windshield sustained stress fractures but remained intact.

Other Notable Impact Effects: None.

Section 3

OMI FINAL DATA

Occupant and Vehicle Information

I. OMI DATA

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

II. OVR DATA

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

Table 2

DUMMY INJURY CRITERIA VALUES

NHTSA No.: MN0201 Vehicle: 1992 Ford Aerostar XL 7-Passenger MPV

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-47.0	-22.6	42.1	55.8
Position #2 - Passenger	-28.5	21.5	61.2	64.8

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-55.7	-9.6	-13.7	51.3
Position #2 - Passenger	-60.2	24.6	-15.0	57.3

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

	MAXIMUM FORCE - FEMUR LOAD (lbs.)	
	LEFT FEMUR	RIGHT FEMUR
Position #1 - Driver	1589.9	1309.8
Position #2 - Passenger	946.8	342.2

	MAXIMUM FORCE - SEAT BELT LOADS (lbs.)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	2138.2	-	1516.6
Position #2 - Passenger	2646.1	2338.8	-

	HEAD INJURY CRITERIA (HIC)			
	HIC	t_1 (SEC)	t_2 (SEC)	Average Acceleration t_1 TO t_2
Position #1 - Driver	484.8	.05376	.08892	45.3
Position #2 - Passenger	722.5	.05784	.09372	52.7

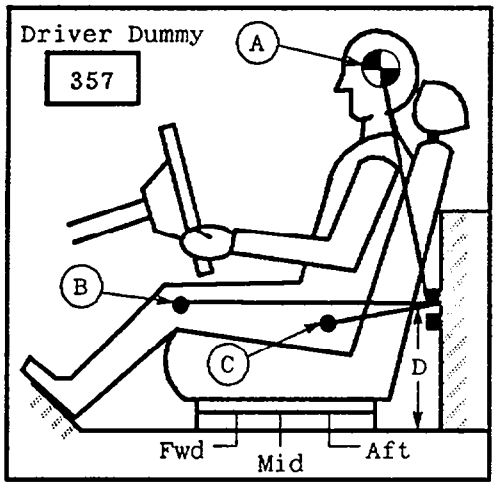
HIC is as defined in FMVSS 208. The maximum time interval from t_1 to t_2 is 36 milliseconds.

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION

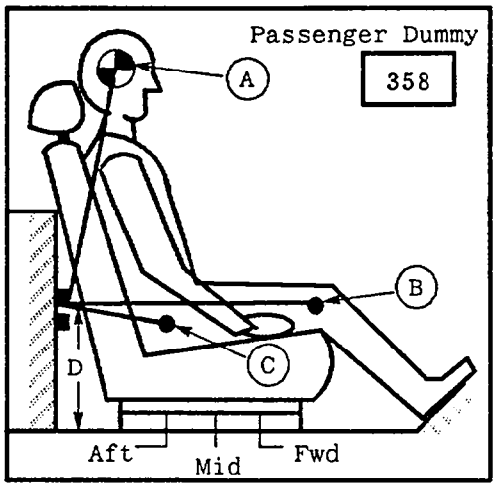
NHTSA No.: MN0201 Vehicle: 1992 Ford Aerostar XL 7-Passenger MPV

SEAT TYPE:	ADJUSTER TYPE:	SEAT BACK TYPE:
- Bench	✓ Manual	- Fixed
✓ Bucket	- Power	✓ Adjustable Reclining
- Split Bench		



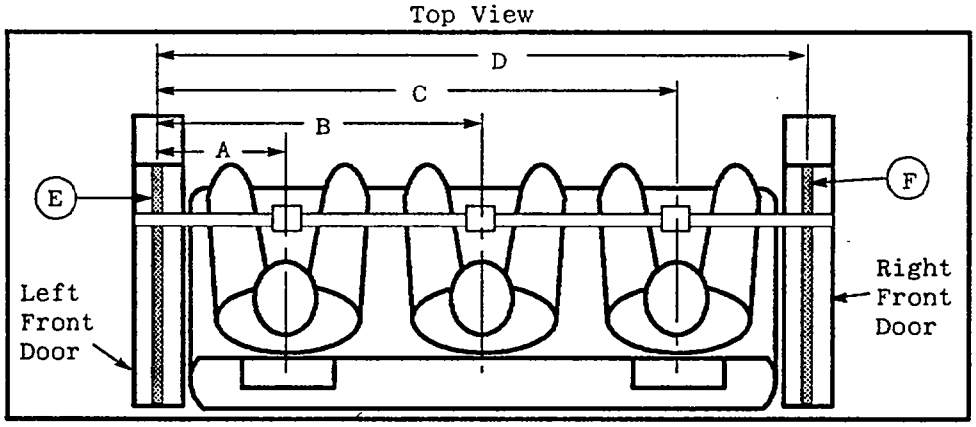
MEASUREMENT LOCATION

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



Driver Dummy			Passenger Dummy		
A = 20.7	in.	6 Degrees	A = N/A	in.	N/A Degrees
B = 22.7	in.	101 Degrees	B = 21.1	in.	105 Degrees
C = 8.5	in.	133 Degrees	C = 6.8	in.	140 Degrees
D = 26.3	in.		D = 26.3	in.	

Top View



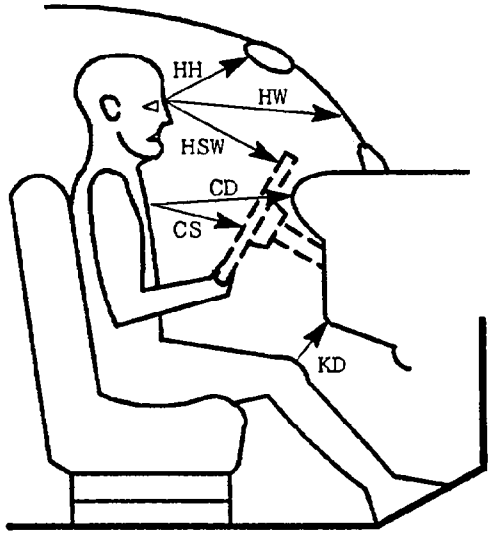
S/N 357 **DUMMY ID** S/N 358

A = Left Door to Driver Centerline	13.3	in.
B = Left Door to Center Passenger Centerline	-	in.
C = Left Door to Right Passenger Centerline	46.3	in.
D = Left Door to Right Door	58.6	in.
E,F = Window Glass Height (Right and Left Must Be Equal)	13.0	in.

Figure 2

OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	19.7	21.3
HW	25.3	26.4
CD	23.2	26.5
CS	13.8	-
KDL	4.7	9.2
KDR	5.1	9.1
SA	See Note	See Note
TA	23°	24°
HSW	20.1	-

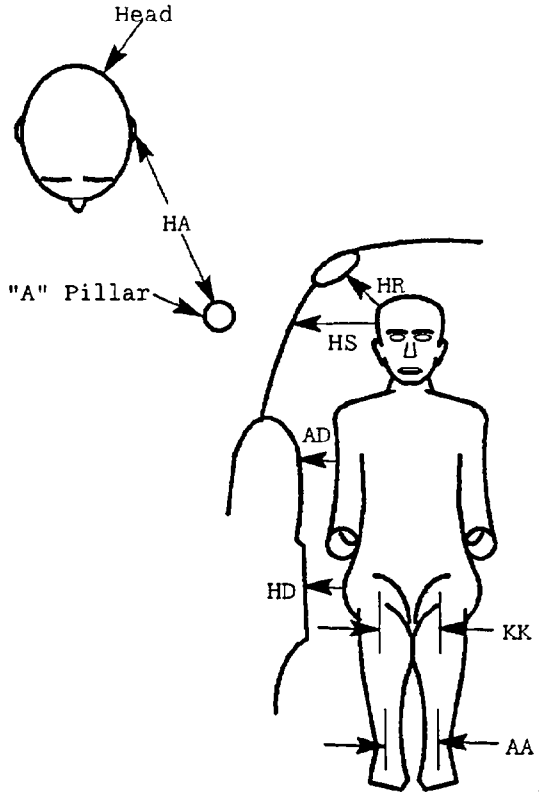


HH = Head to Windshield Header
HW = Head to Windshield
HSW = Head to Steering Wheel
CD = Chest to Dash
CS = Chest to Steering Wheel
KD(L/R) = Knee to Dash (Left/Right)
SA = Seat Back Angle
TA = Torso Angle

Note:

Seat back was positioned according to manufacturers specifications.

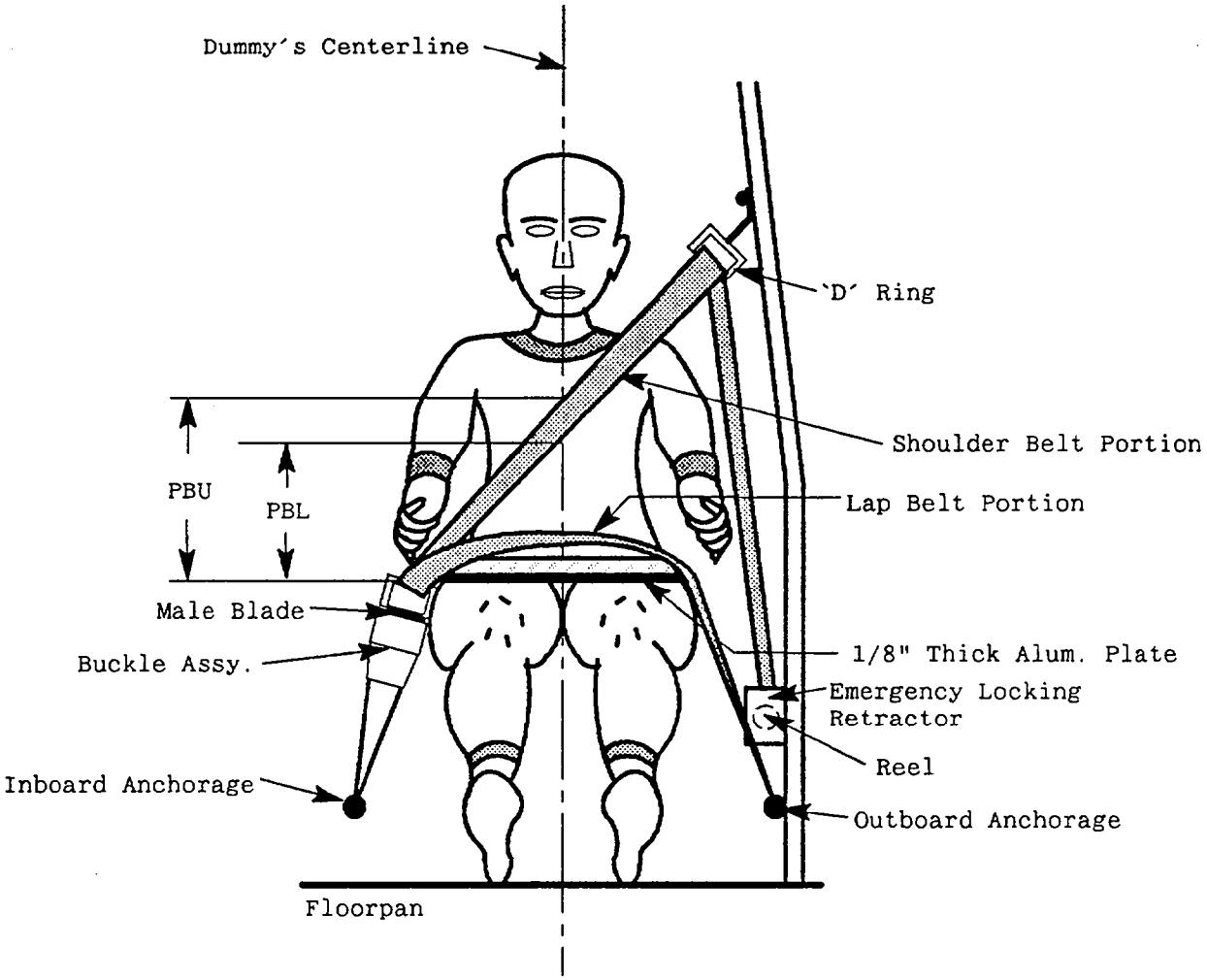
HA = Head Target to "A" Pillar
HR = Head to Side Roof
HS = Head to Side Window
AD = Arm to Door
HD = Hip to Door
KK = Knee to Knee
AA = Ankle to Ankle



	DRIVER	PASSENGER
HR	7.8	7.6
HS	10.5	9.5
AD	4.8	3.9
HD	5.3	4.3
KK	10.5	7.5
HA	25.3	26.3
AA	9.5	7.0

Figure 3

SEAT BELT POSITIONING DATA



Front View of Driver Dummy

	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
PBU -- Top surface of alum. plate to upper edge	14.5	14.5
PBL -- Top surface of alum. plate to belt lower edge	11.5	11.5
LAP BELT TENSION	2.0 lbs.	2.0 lbs.
SHOULDER BELT TENSION	-	-

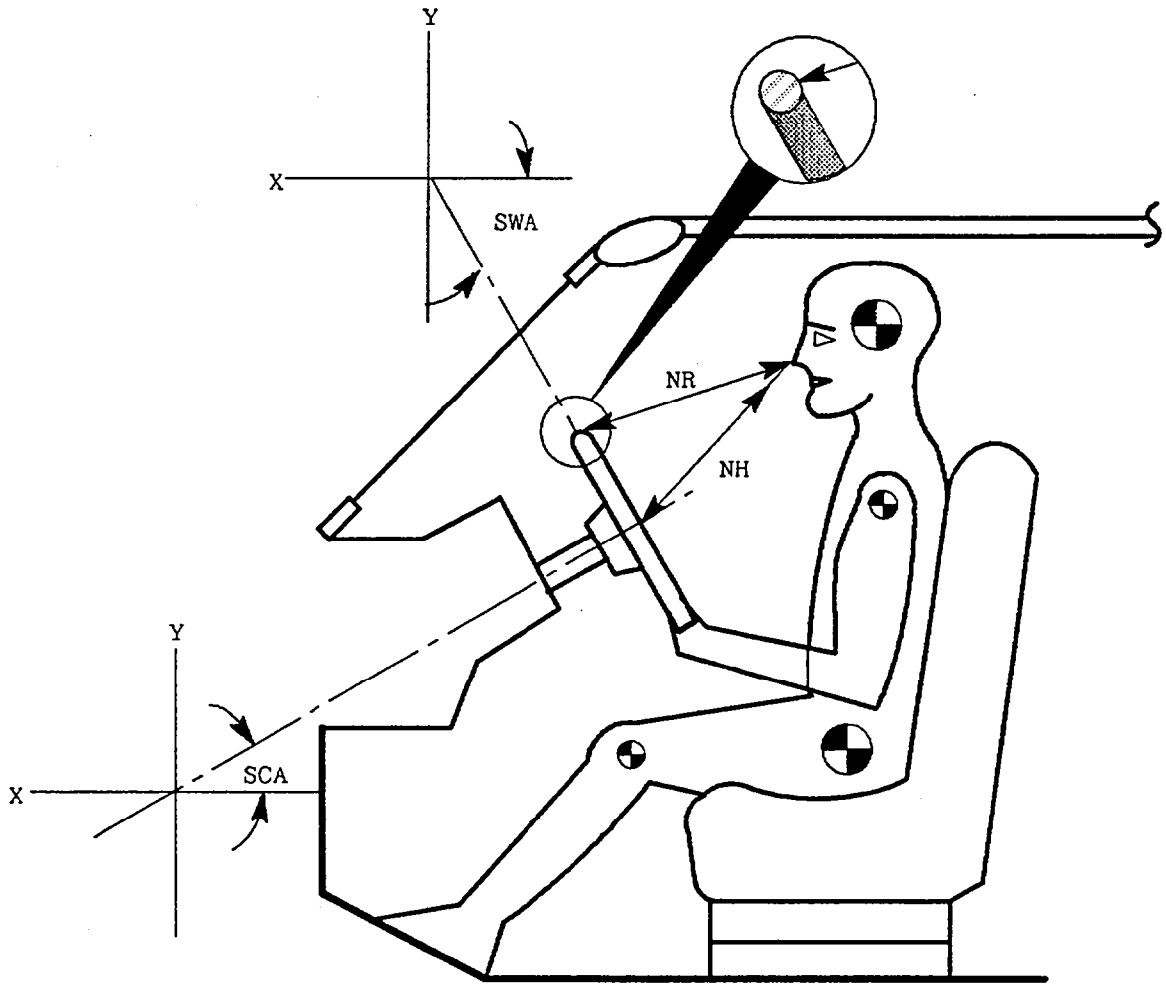
Table 3

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.	75.5 in.	73.0 in.
Shoulder belt length as measured on Part 572 Dummy.	36.5 in.	34.0 in.
Lap belt length as measured on Part 572 Dummy.	39.0 in.	39.0 in.
SHOULDER BELT SPOOL-OFF DATA:		
As determined mechanically.	4.8 in.	5.3 in.
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	0.76 in/ft	1.58 in/ft
Measured mechanically	0.6 in/ft	0.6 in/ft

Figure 4

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSEMBLY REFERENCE DIMENSIONS



Left Side View

	MEASUREMENTS	
NR -- Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	18.3	Inches
NH -- Distance from tip of dummy's nose to center of steering column hub	19.2	Inches
SCA -- Angle of steering column relative to the horizontal X axis	28	Degrees
SWA -- Angle of steering wheel relative to the horizontal X axis	-62	Degrees

Figure 5

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4

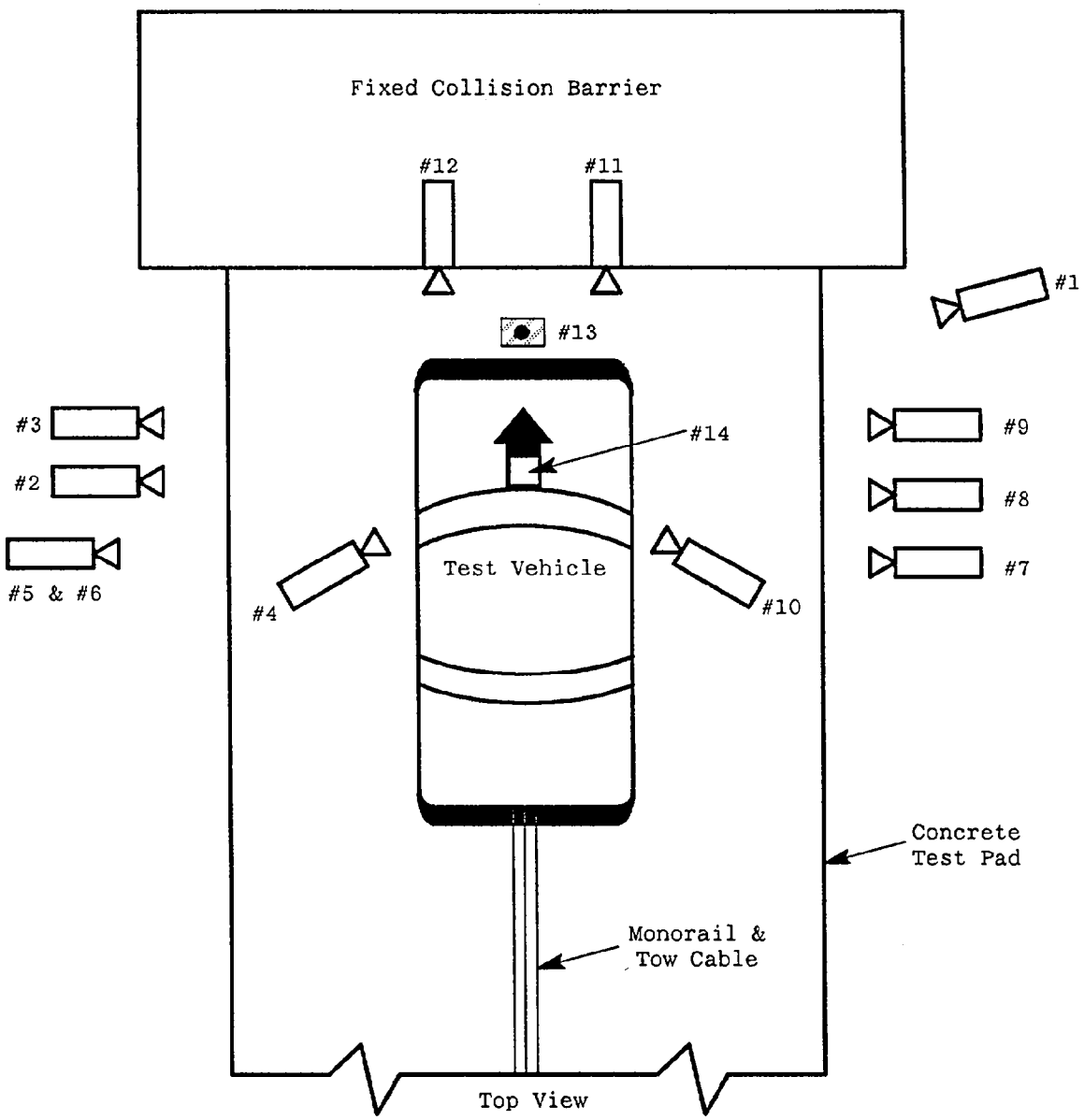


Table 4

HIGH-SPEED CAMERA LOCATIONS

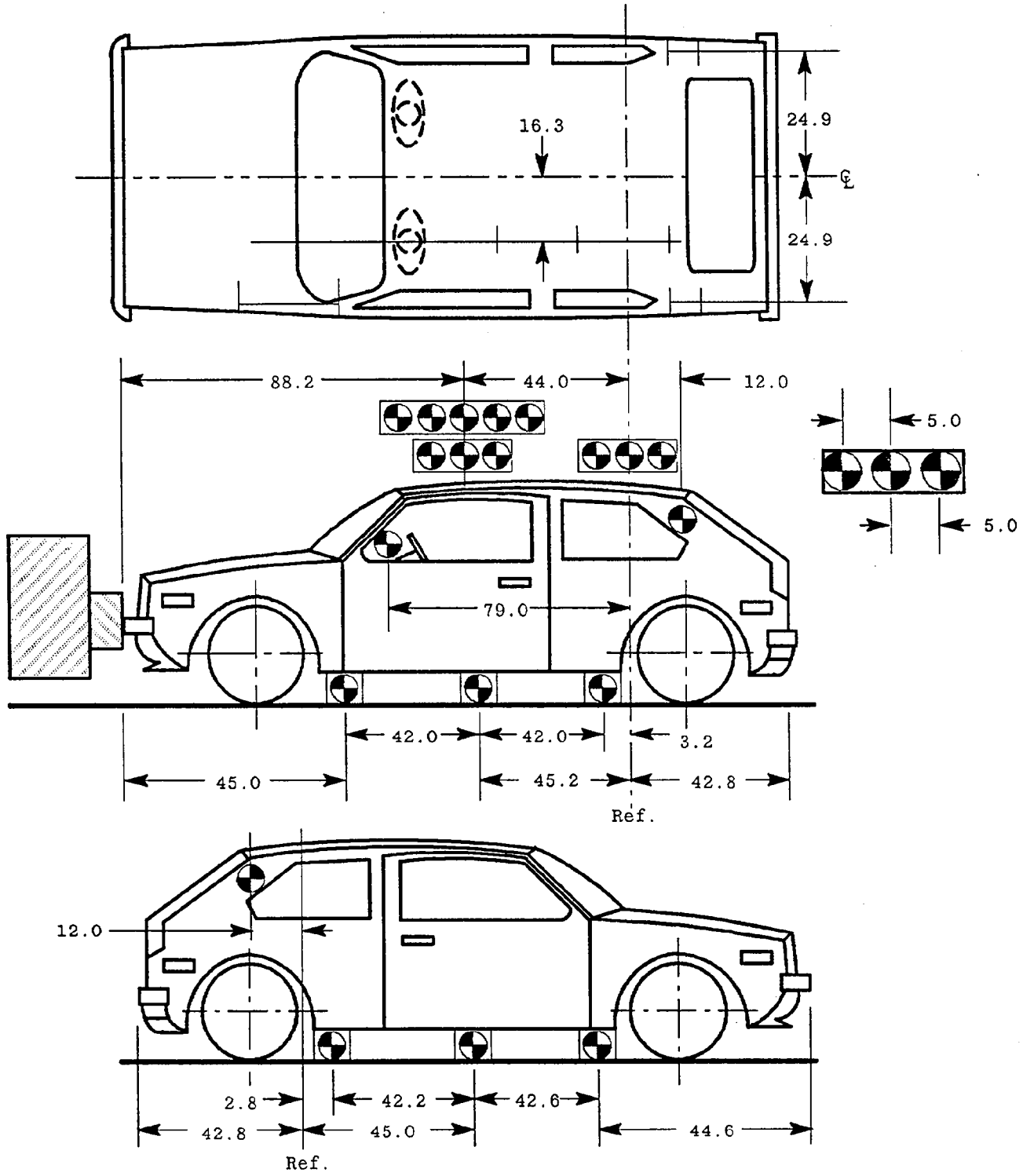
NHTSA No. MN0201 Vehicle: 1992 Ford Aerostar XL 7 Passenger MPV

CAMERA NO.	VIEW	CAMERA POSITIONS (in)* X	Y	Z	ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
1	Real-Time Camera	-	-	-	-	-	-	24
2	Overall Left Side	242	61	42	0	223	13	545
3	Left Side View	299	33	41	-3	280	25	560
4	Driver and Interior View	76	96	76	-24	57	13	540
5	Steering Column (Bottom)	293	78	46	-2	274	25	500
6	Steering Column (Top)	293	78	70	-7	274	25	490
7	Overall Right Side	252	61	42	0	233	13	640
8	Right Side View	301	46	41	-2	282	25	600
9	Right Passenger View	291	56	56	-4	272	35	600
10	Passenger adn Interior View	73	95	80	-28	54	25	500
11	Passenger Front View	23	0	76	-37	-	13	600
12	Driver Front View	23	0	77	-32	-	13	530
13	Windshield View	0	0	120	-43	-	13	480
14	Pit View of Engine	0	35	-120	90	-	13	810

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

Figure 6

VEHICLE TARGET LOCATIONS

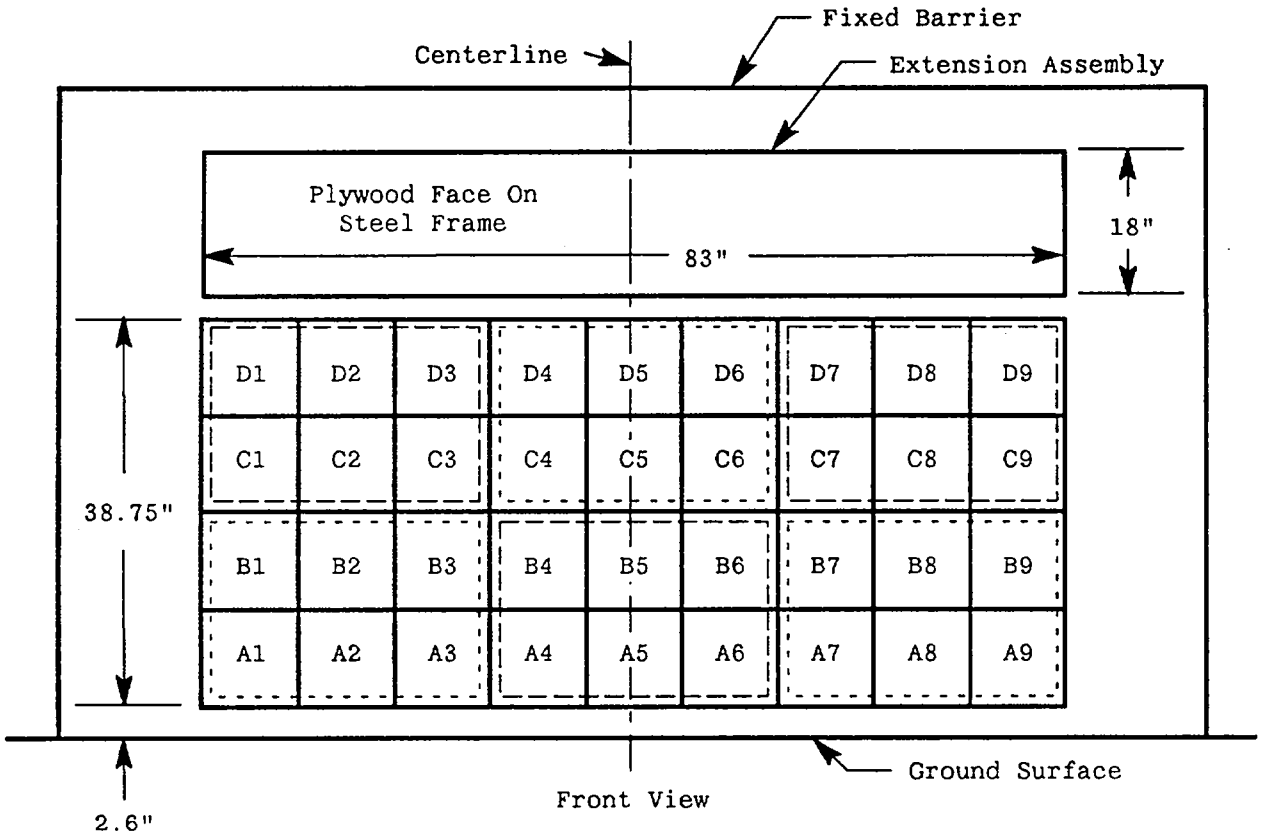


(Dimensions in inches)

Figure 7

LOAD CELL LOCATIONS ON FIXED BARRIER

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



6 GROUPS OF 6 LOAD CELLS EACH

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

The following data is presented in Appendix B:

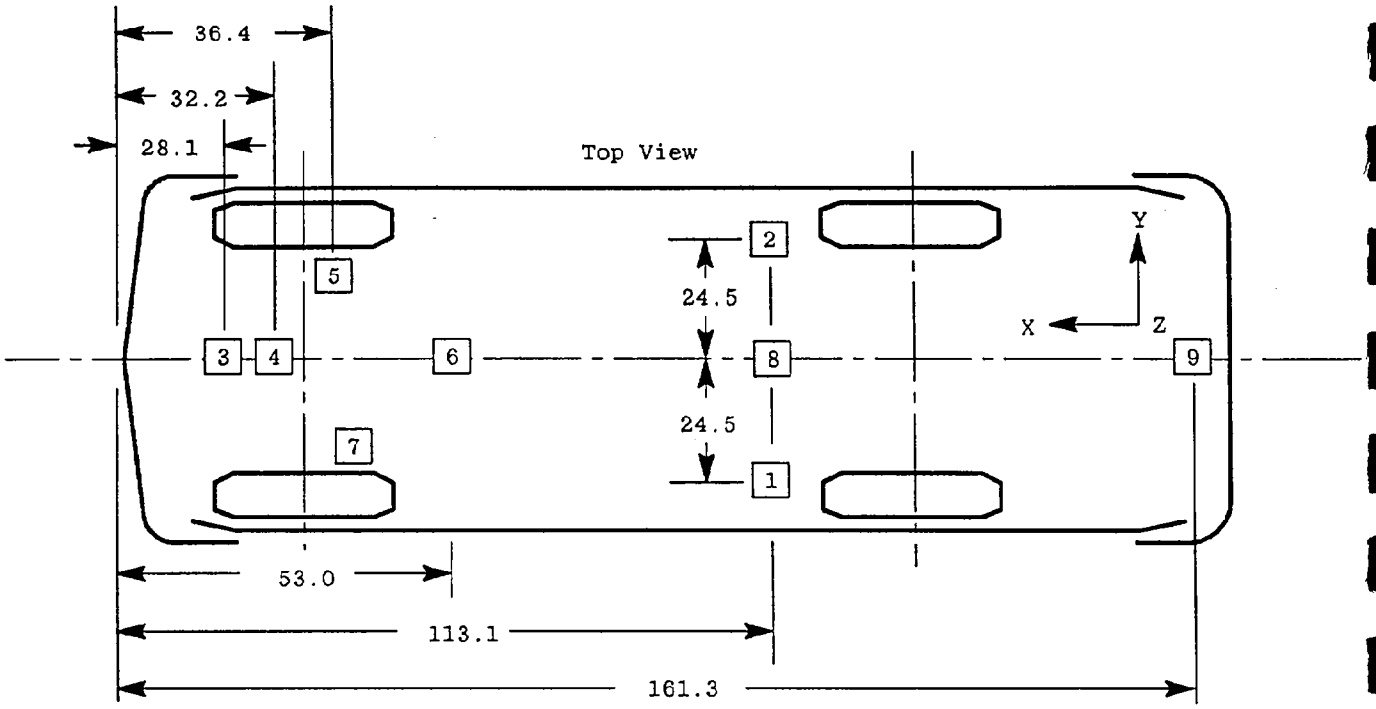
(1) Data from 36 individual load cells

(2) Total or Sum of 36 individual load cells

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

Figure 8

VEHICLE ACCELEROMETER LOCATIONS



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

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

Figure 9

TEST VEHICLE MEASUREMENTS

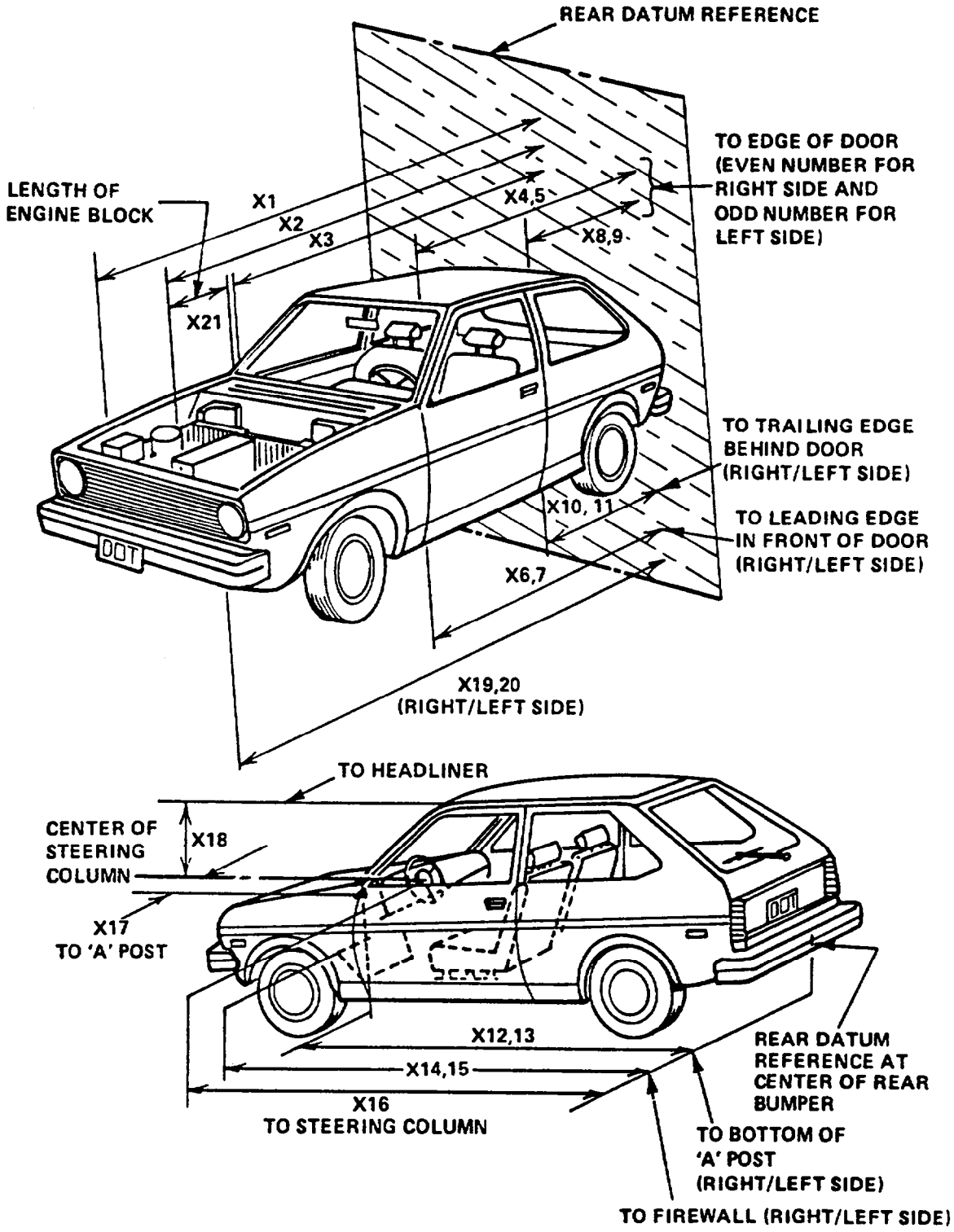


Table 5

VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	175.0	155.2	19.8
X2	Rear Surface of Vehicle to Front of Engine	152.8	147.9	4.9
X3	Rear Surface of Vehicle to Firewall	152.5	150.0	2.5
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	131.0	130.6	0.4
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	130.9	130.5	0.4
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	129.6	129.3	0.3
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	129.5	129.6	-0.1
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	90.9	90.4	0.5
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	90.5	90.2	0.3
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	90.2	90.2	0.0
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	90.0	90.3	-0.3
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	129.6	129.3	0.3
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	129.6	130.0	-0.4
X14	Rear Surface of Vehicle to Firewall, Right Side	146.7	147.2	-0.5
X15	Rear Surface of Vehicle to Firewall, Left Side	148.6	147.5	1.1
X16	Rear Surface of Vehicle to Steering Column	114.5	126.4	-11.9
X17	Center of Steering Column to "A" Post	15.9	16.2	-0.3
X18	Center of Steering Column to Headliner	17.5	15.3	2.2
X19	Rear Surface of Vehicle to Right Side of Front Bumper	173.1	157.0	16.1
X20	Rear Surface of Vehicle to Left Side of Front Bumper	173.0	158.0	15.0
X21	Length of Engine Block	22.0	22.0	0.0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	123.5	123.3	0.2
CD	Rear Surface of Vehicle to Center of Dash Panel	122.2	122.0	0.2
LD	Rear Surface of Vehicle to Left Side of Dash Panel	121.8	122.3	-0.5

Appendix A

PHOTOGRAPHS

PHOTOGRAPHS

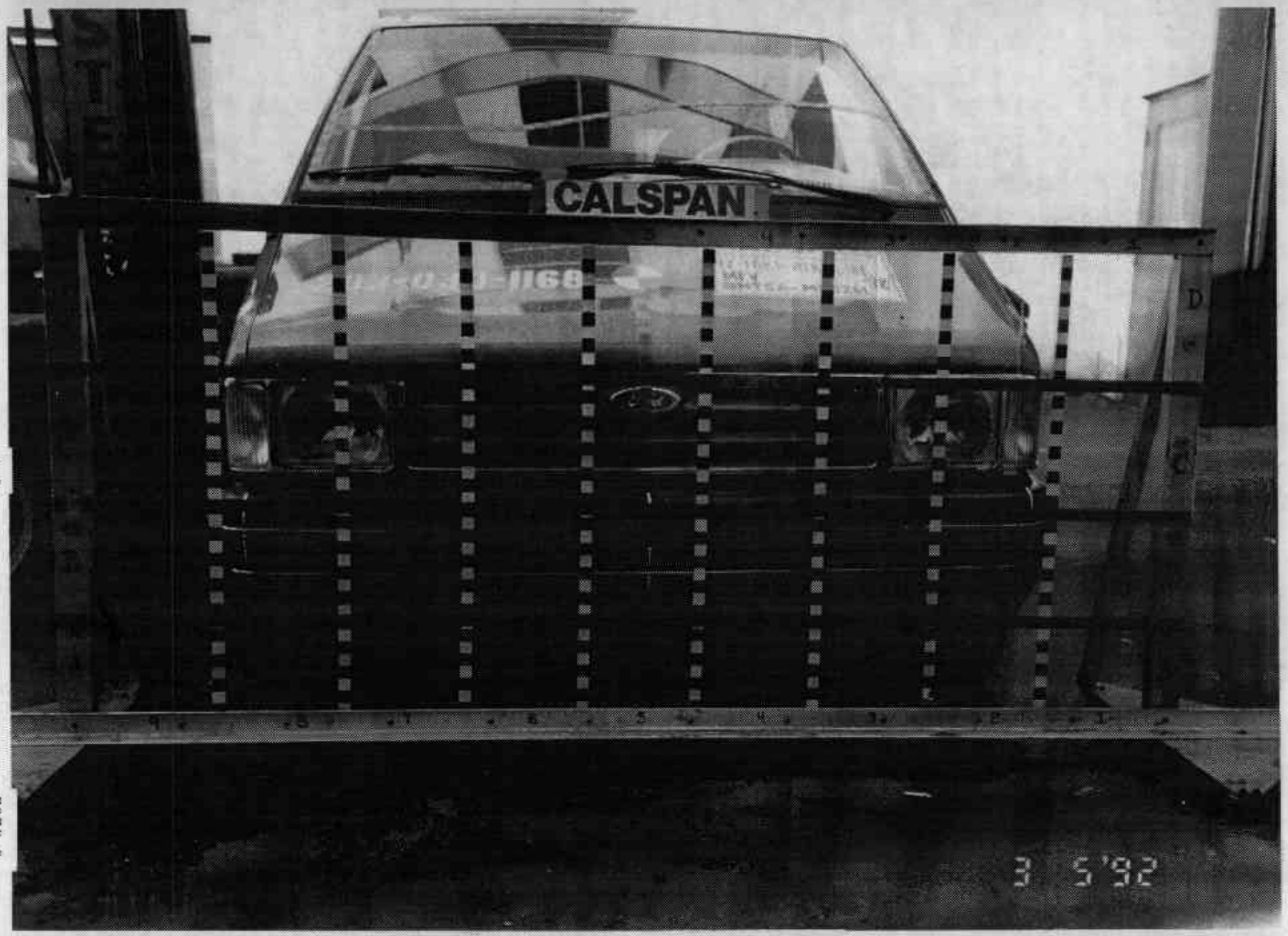


Figure A-1 LOAD CELL LOCATIONS

7078-3

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

A-8

78278-3

Figure A-6 PRE-TEST RIGHT SIDE VIEW

Figure A-7 POST-TEST RIGHT SIDE VIEW

7018-3

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

7978-3

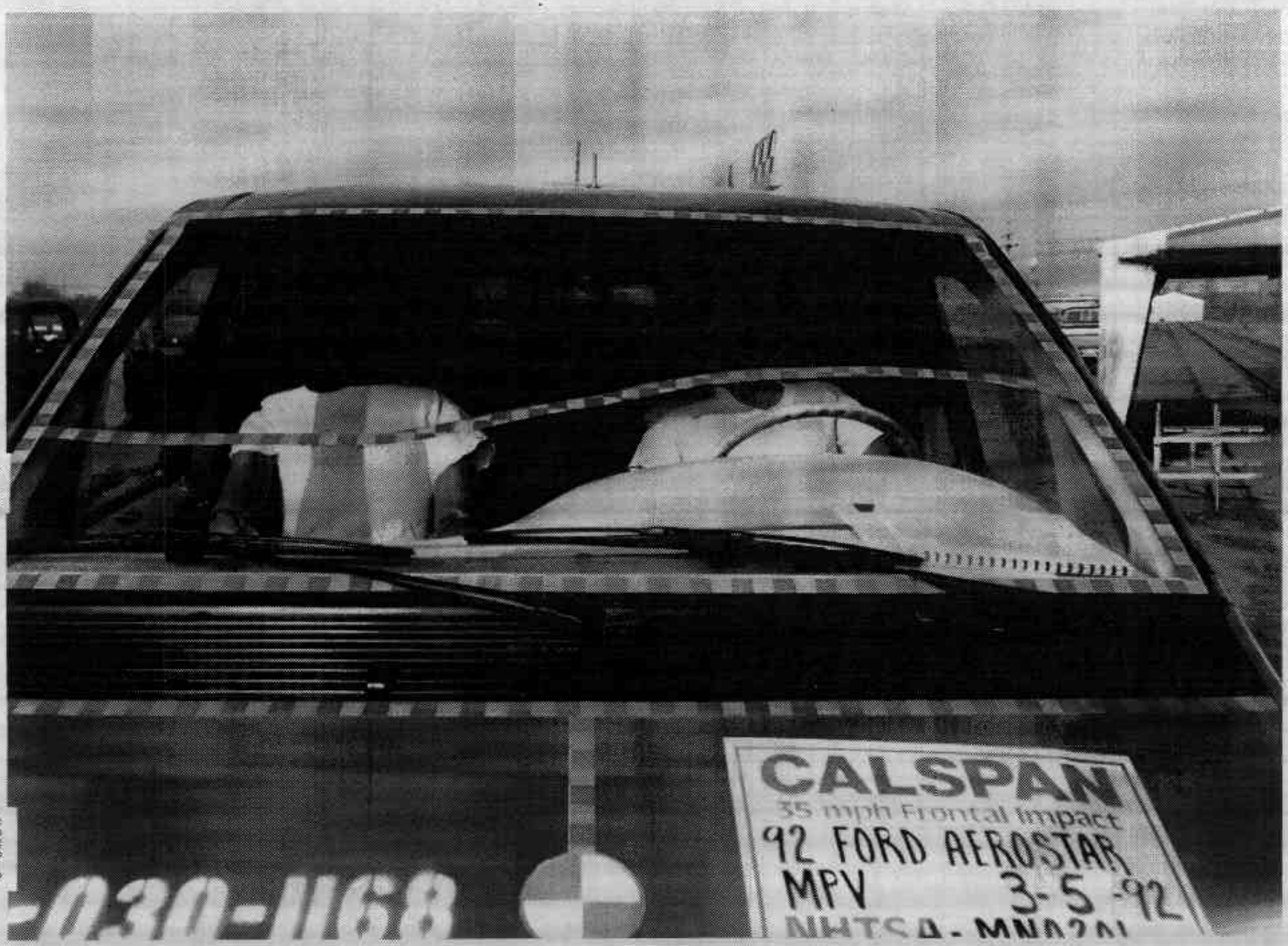


Figure A-12 PRE-TEST WINDSHIELD VIEW

Figure A-13 POST-TEST WINDSHIELD VIEW

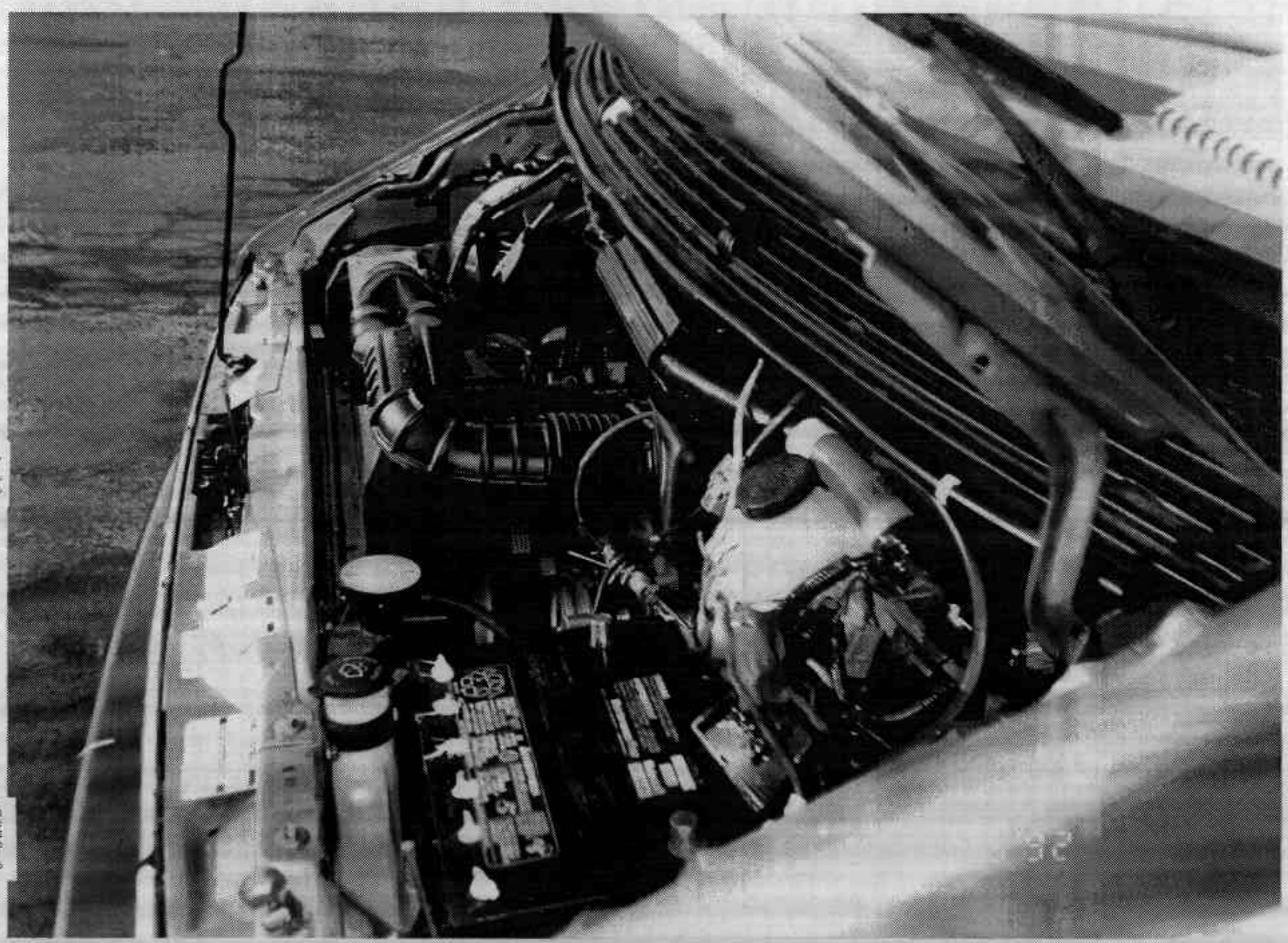


Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

Figure A-15 FUEL CAP VIEW

7978-3

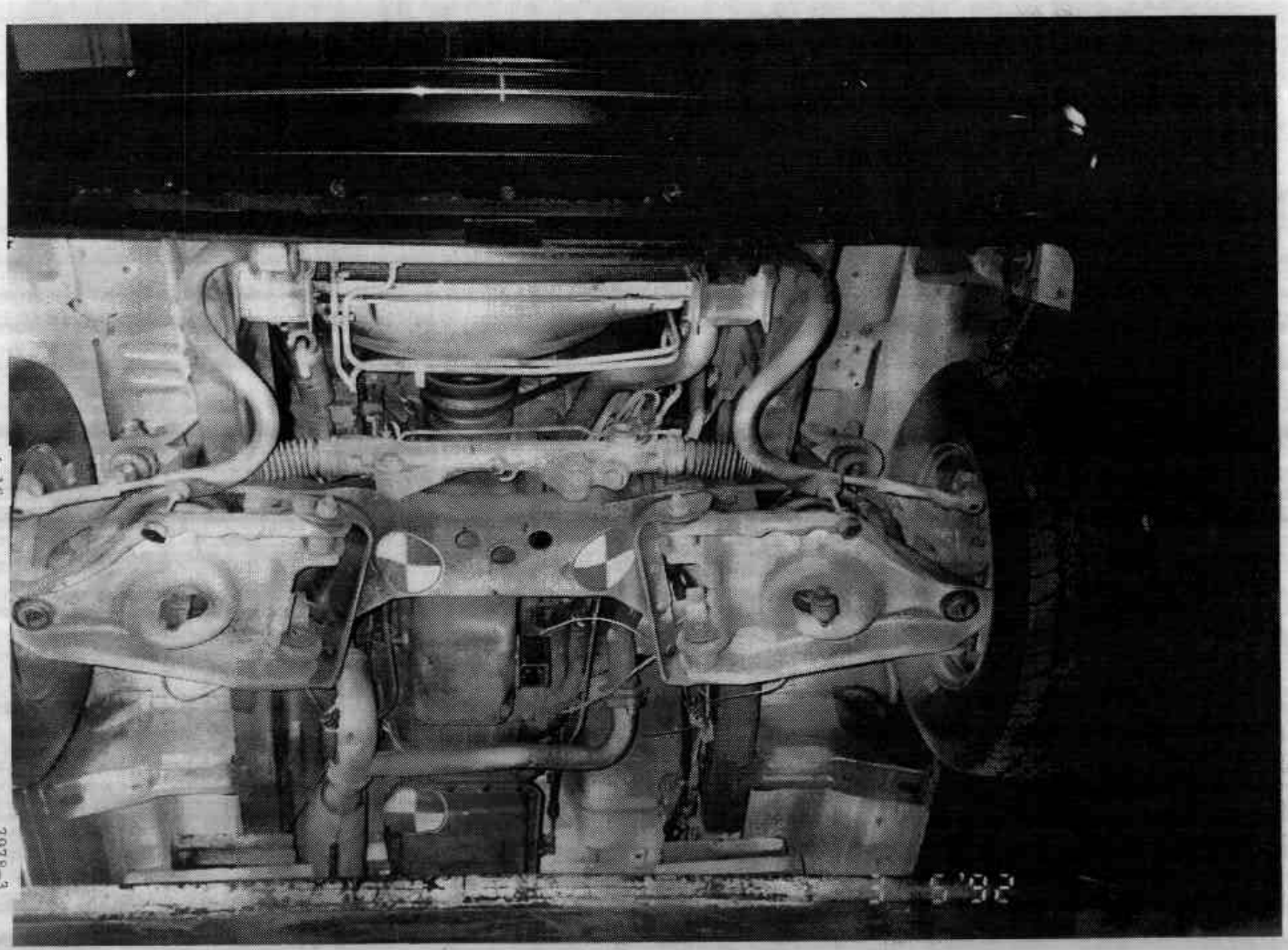


Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

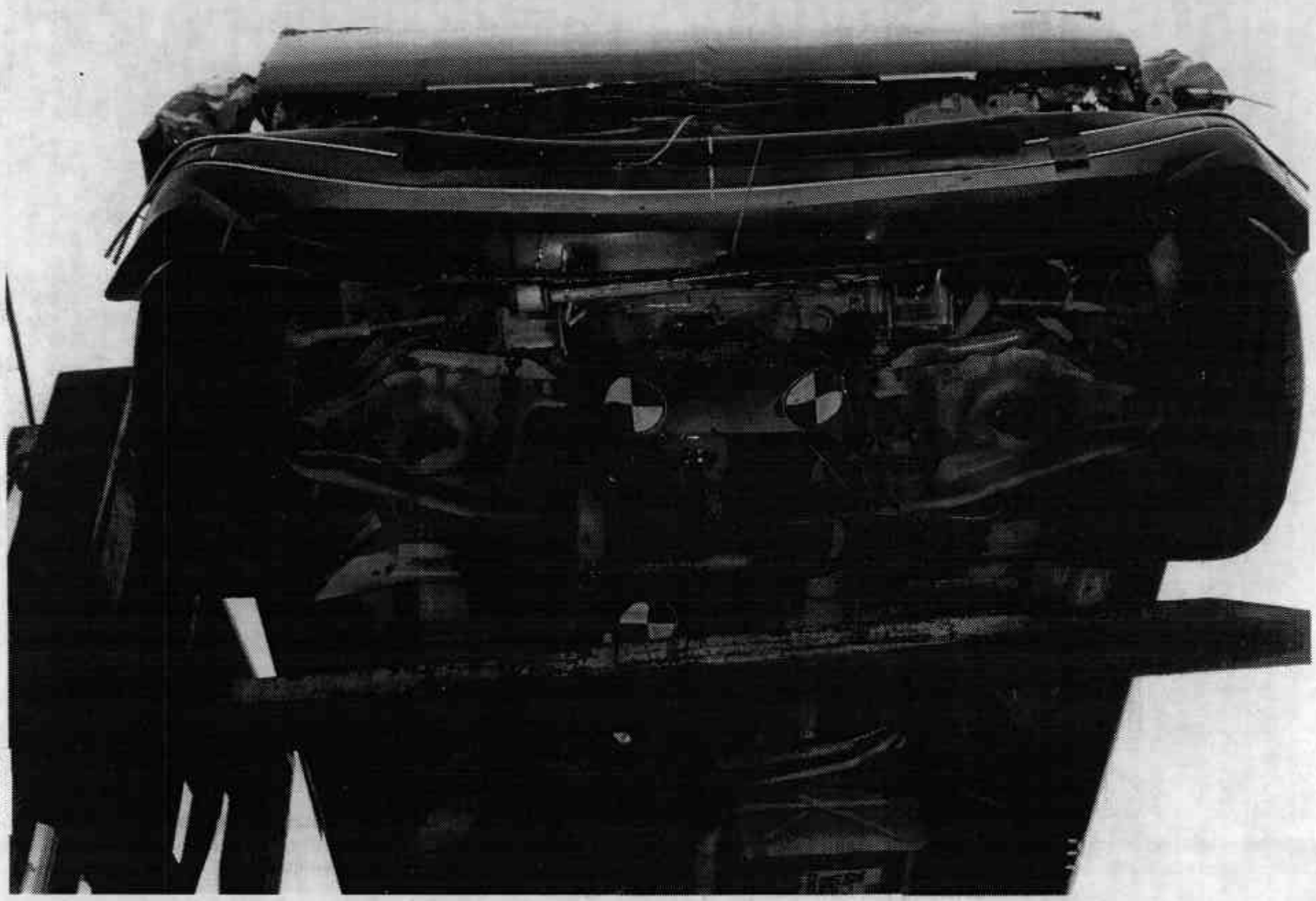


Figure A-17 POST-TEST FRONT UNDERBODY VIEW

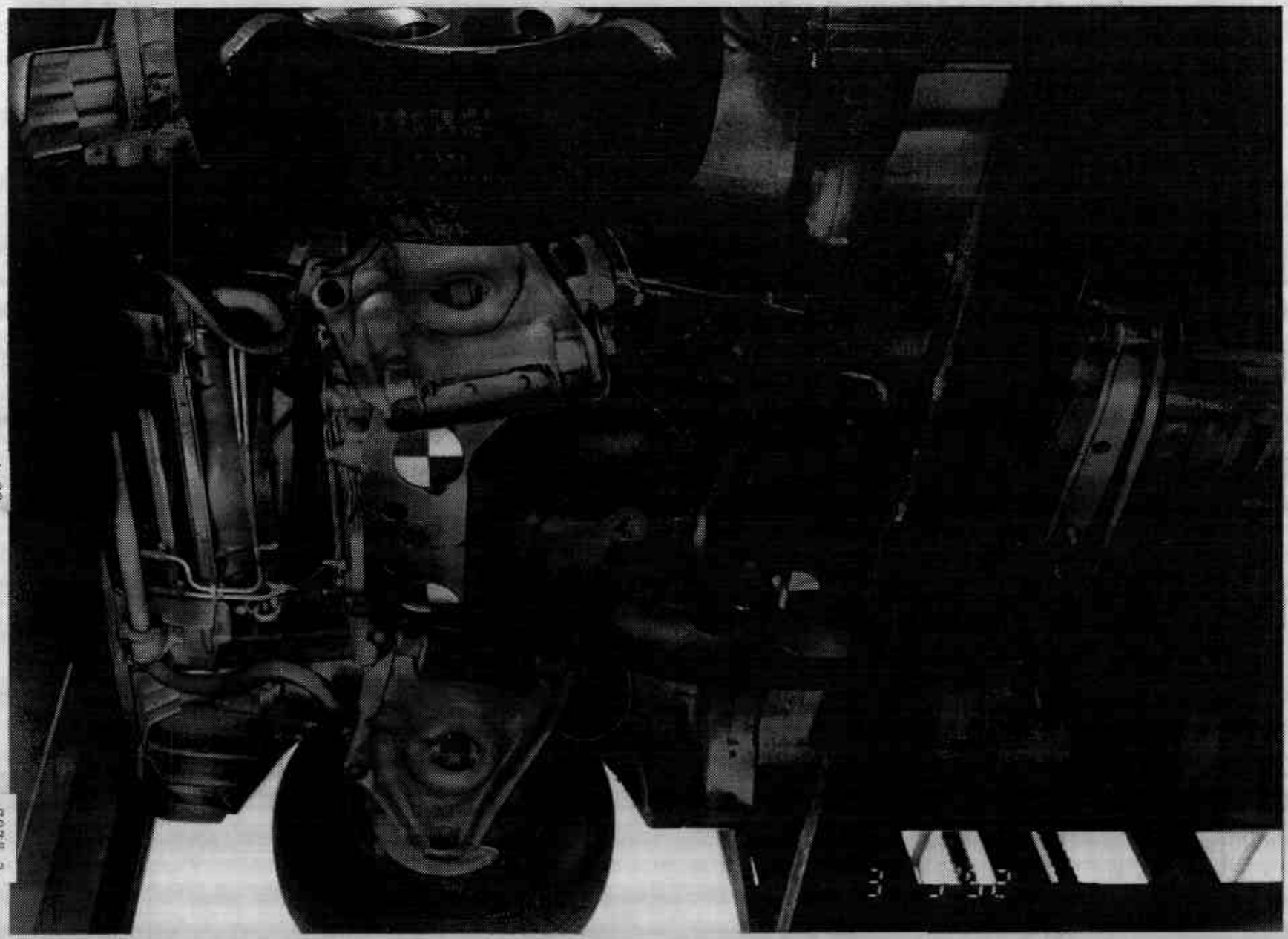


Figure A-18 PRE-TEST FRONT SIDE UNDERBODY VIEW

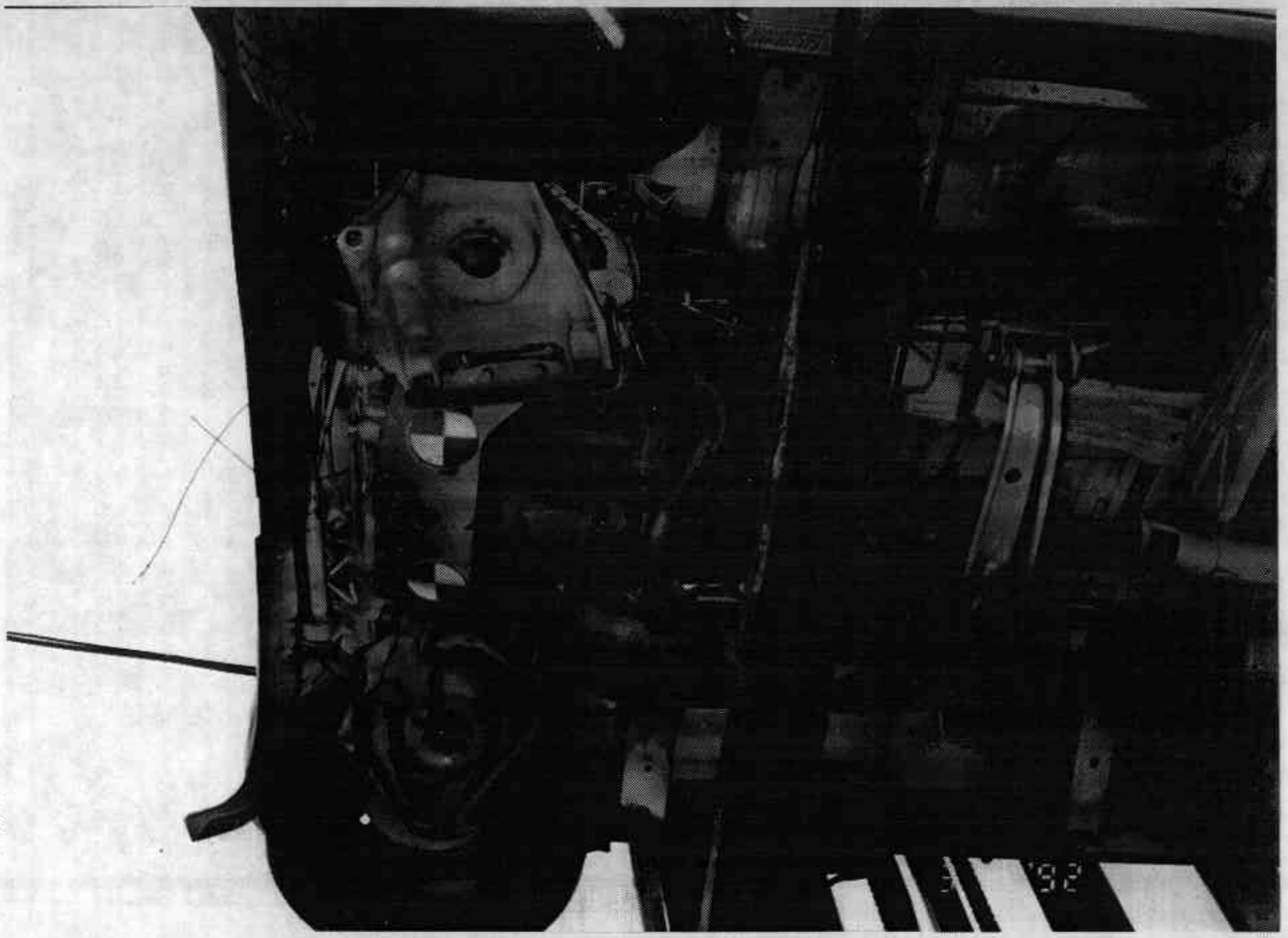


Figure A-19 POST-TEST FRONT SIDE UNDERBODY VIEW

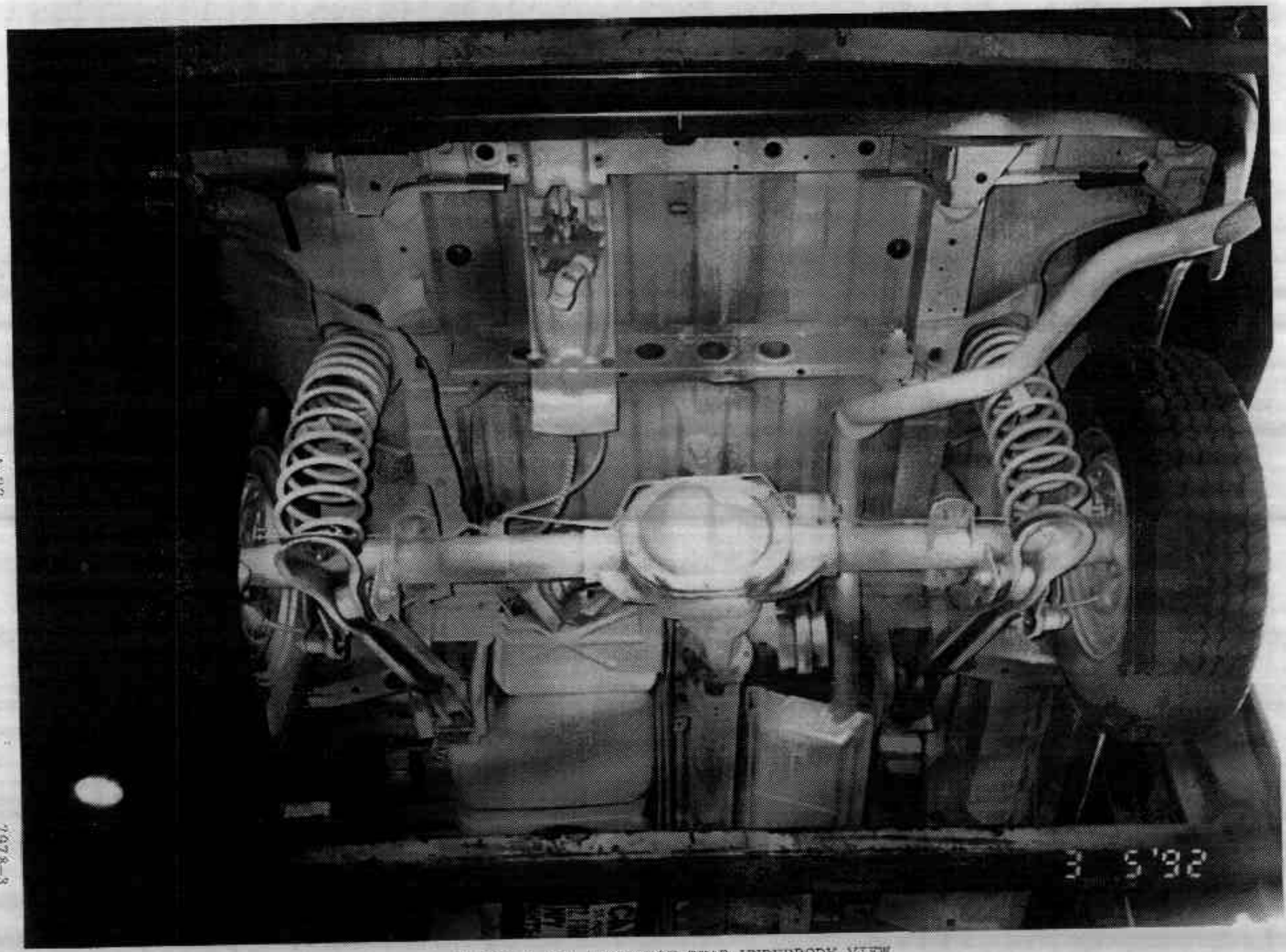


Figure A-20 PRE-TEST REAR UNDERBODY VIEW

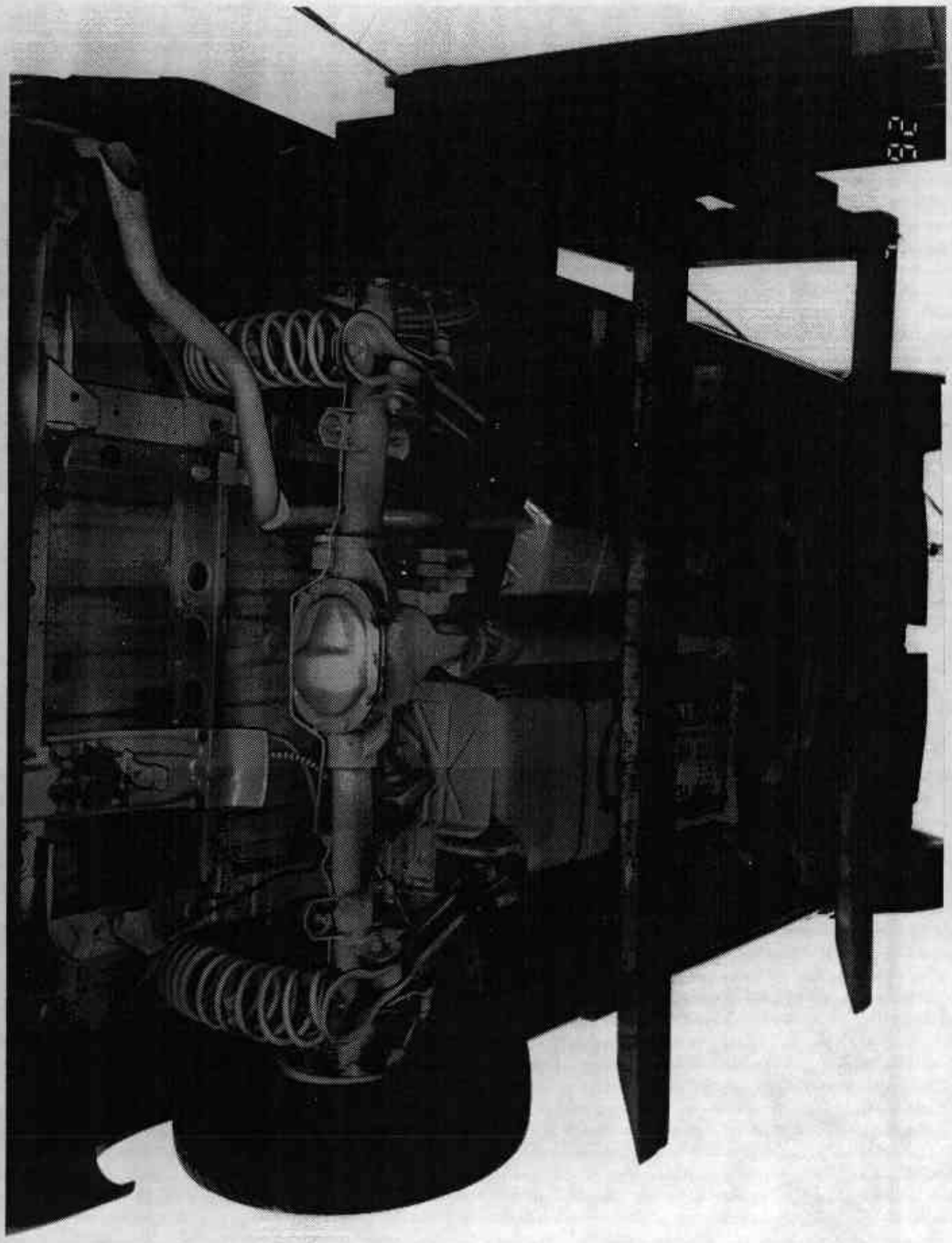


Figure A-21 POST-TEST REAR UNDERBODY VIEW

A-24

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Figure A-22 PRE-TEST DRIVER POSITION VIEW

Figure A-23 POST-TEST DRIVER POSITION VIEW

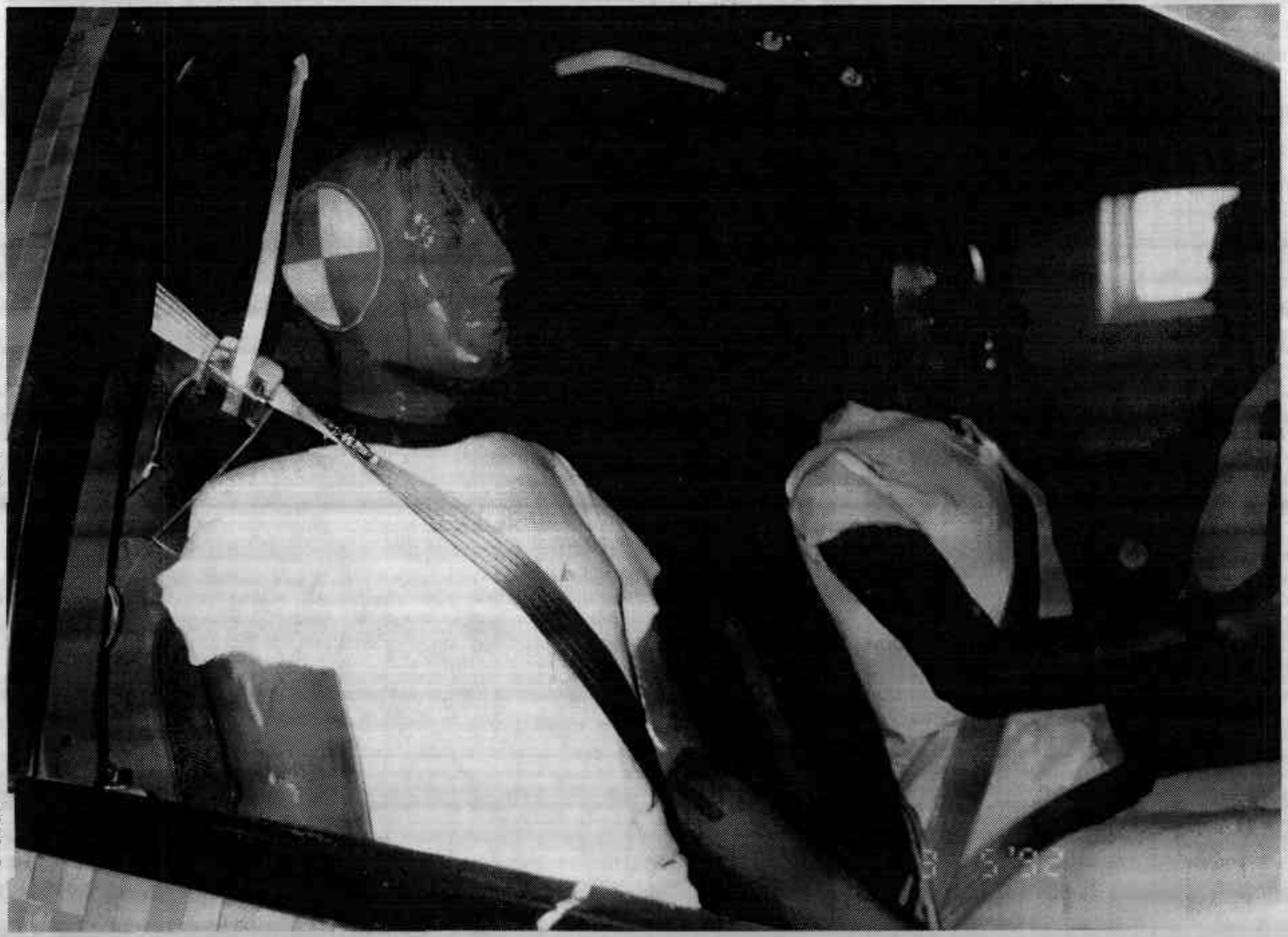


Figure A-24 PRE-TEST PASSENGER POSITION VIEW

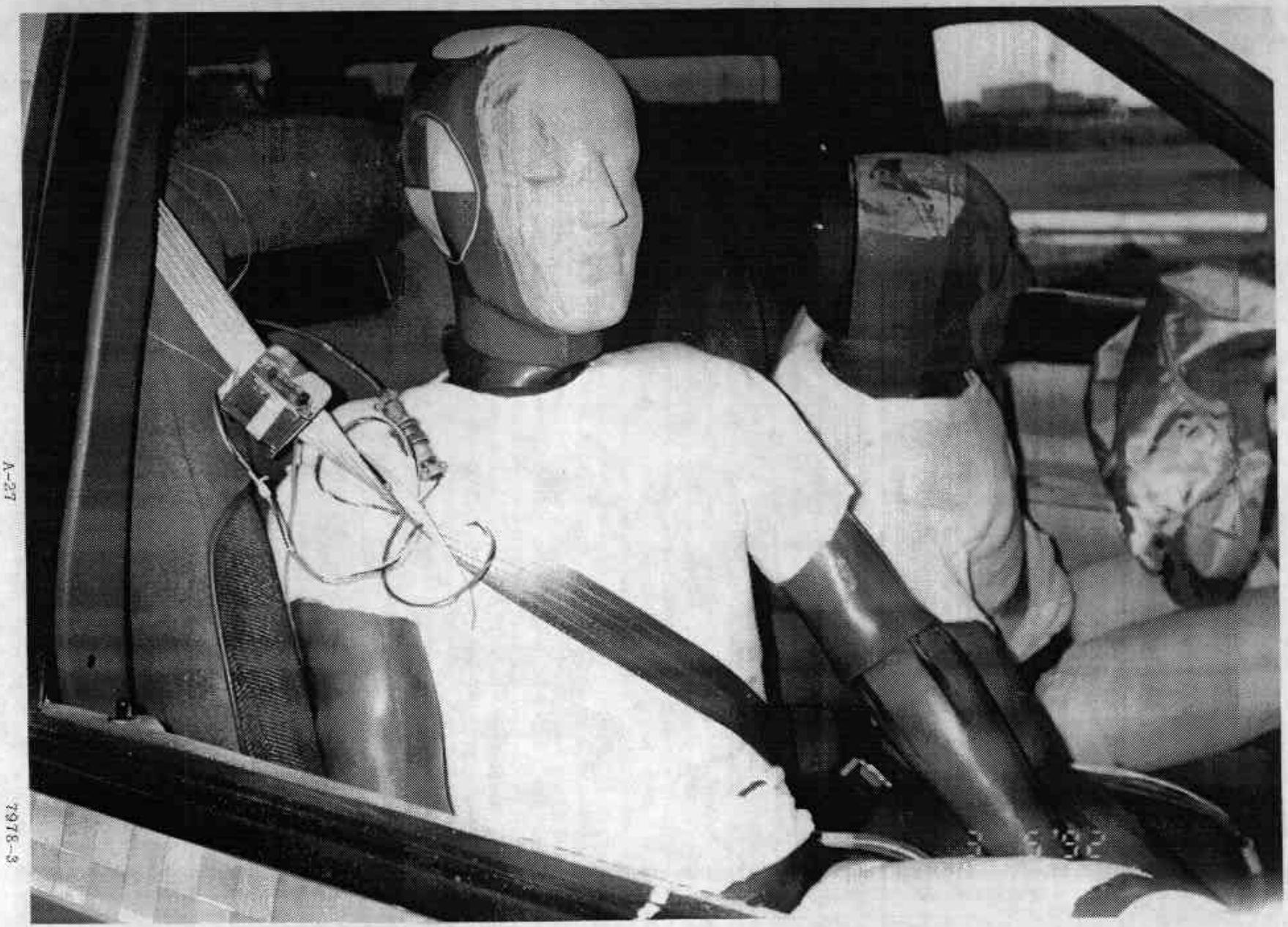


Figure A-25 POST-TEST PASSENGER POSITION VIEW

Figure A-26 PRE-TEST DRIVER AND INTERIOR VIEW

Figure A-27 POST-TEST DRIVER AND INTERIOR VIEW

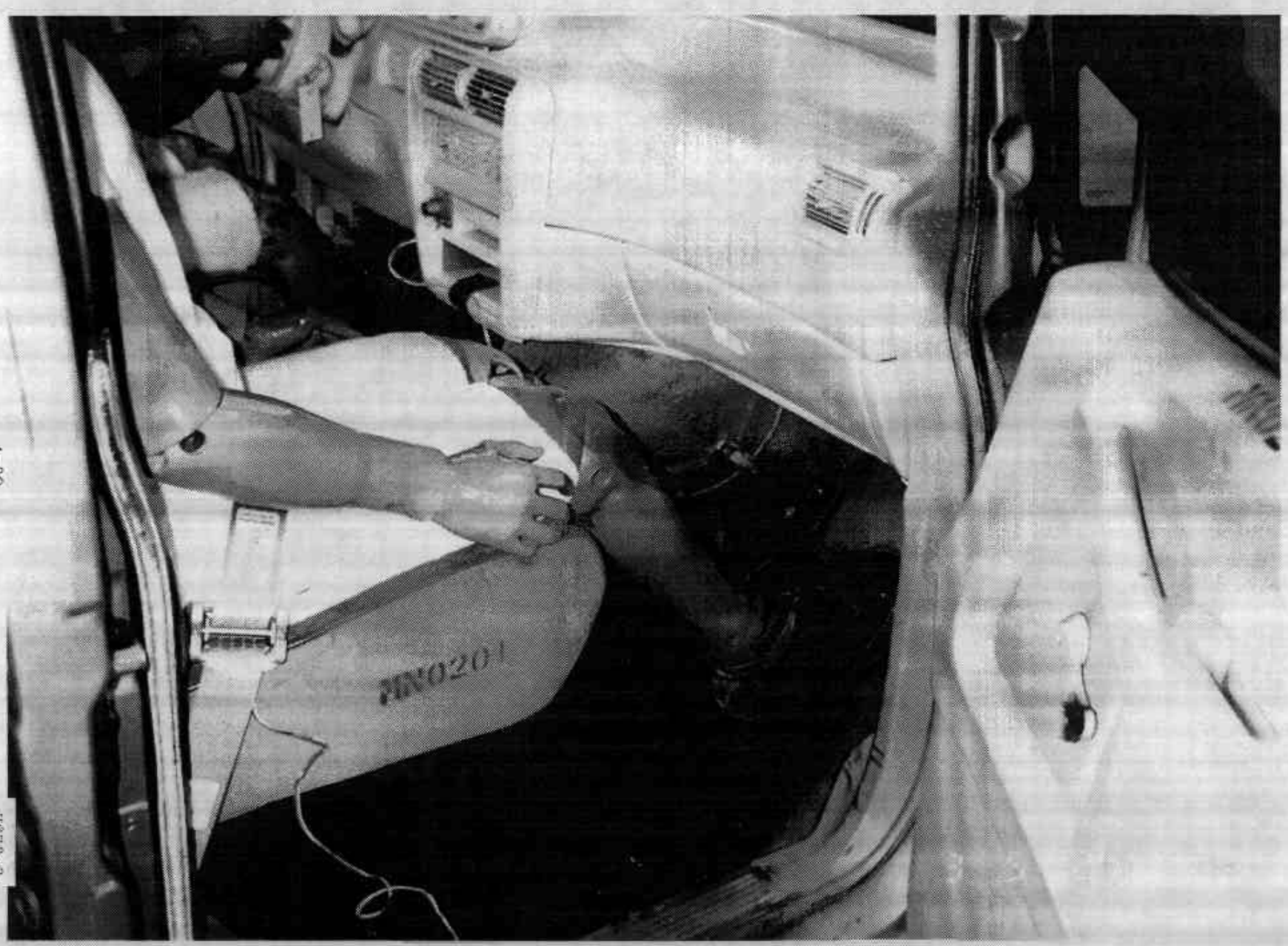


Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW

7978-3

Figure A-29 POST-TEST PASSENGER AND INTERIOR VIEW

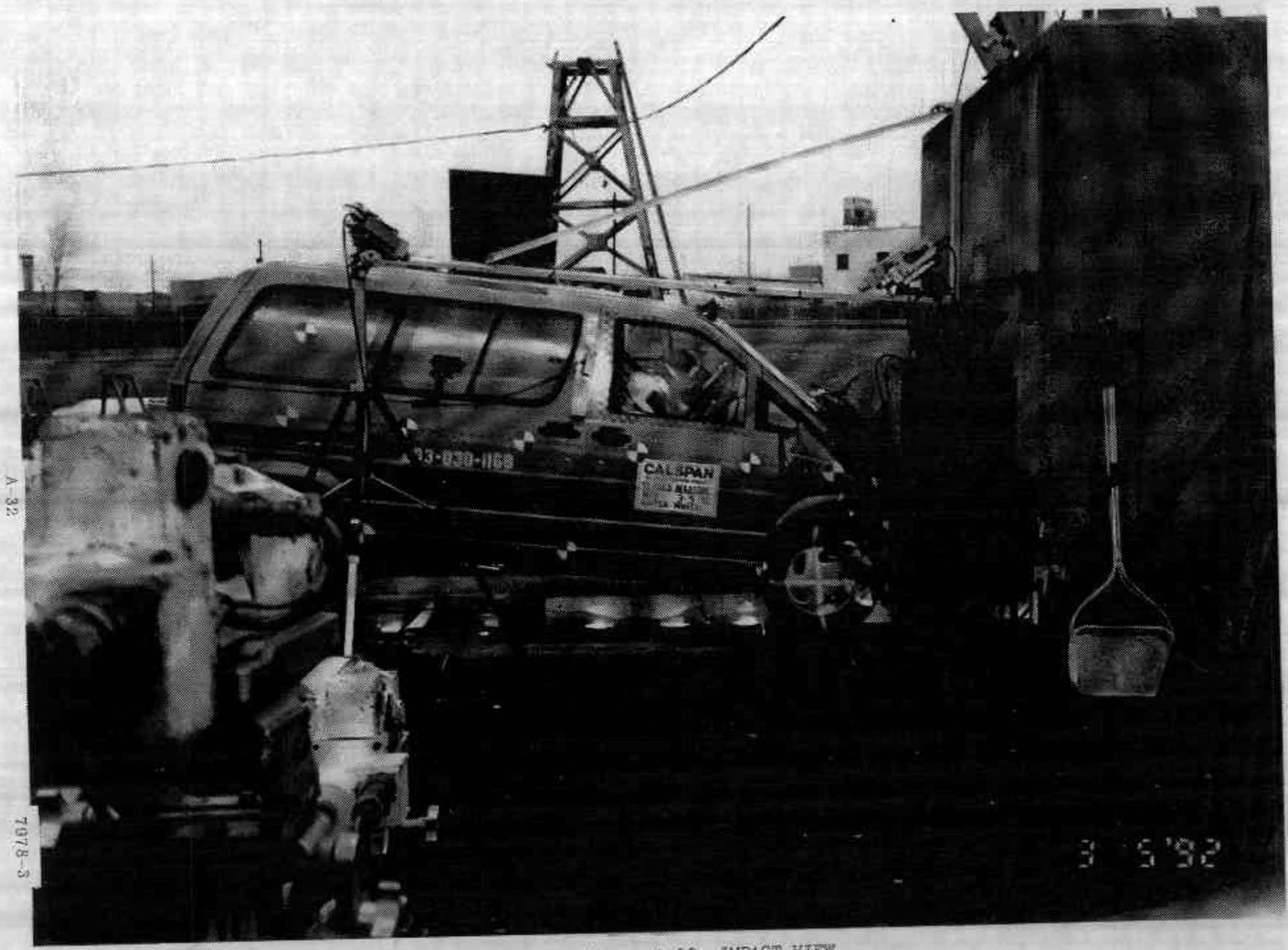


Figure A-30 IMPACT VIEW

Appendix B

VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

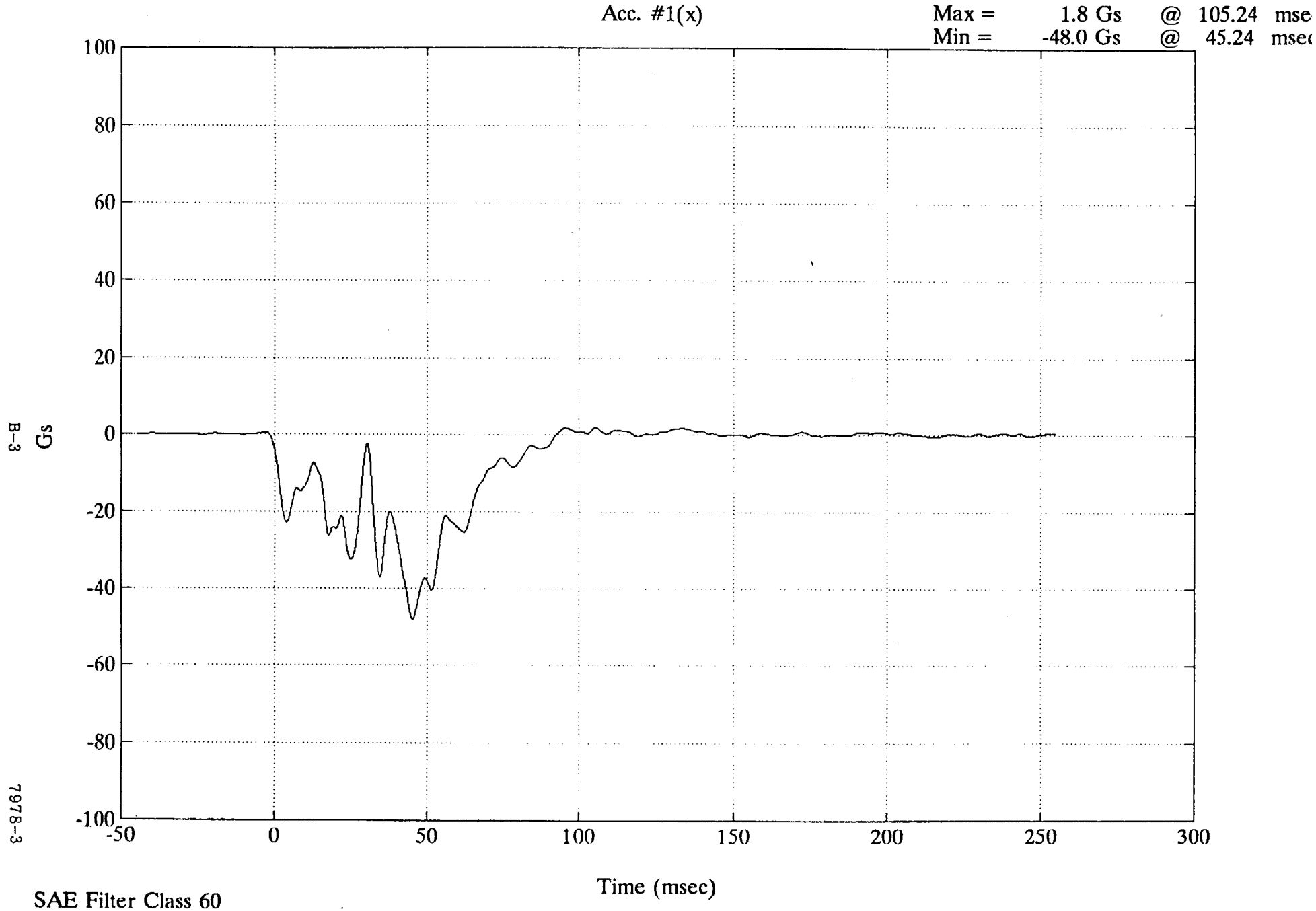
TEST NO. MN0201

VEHICLE DATA

SAE FILTER CHANNEL CLASS

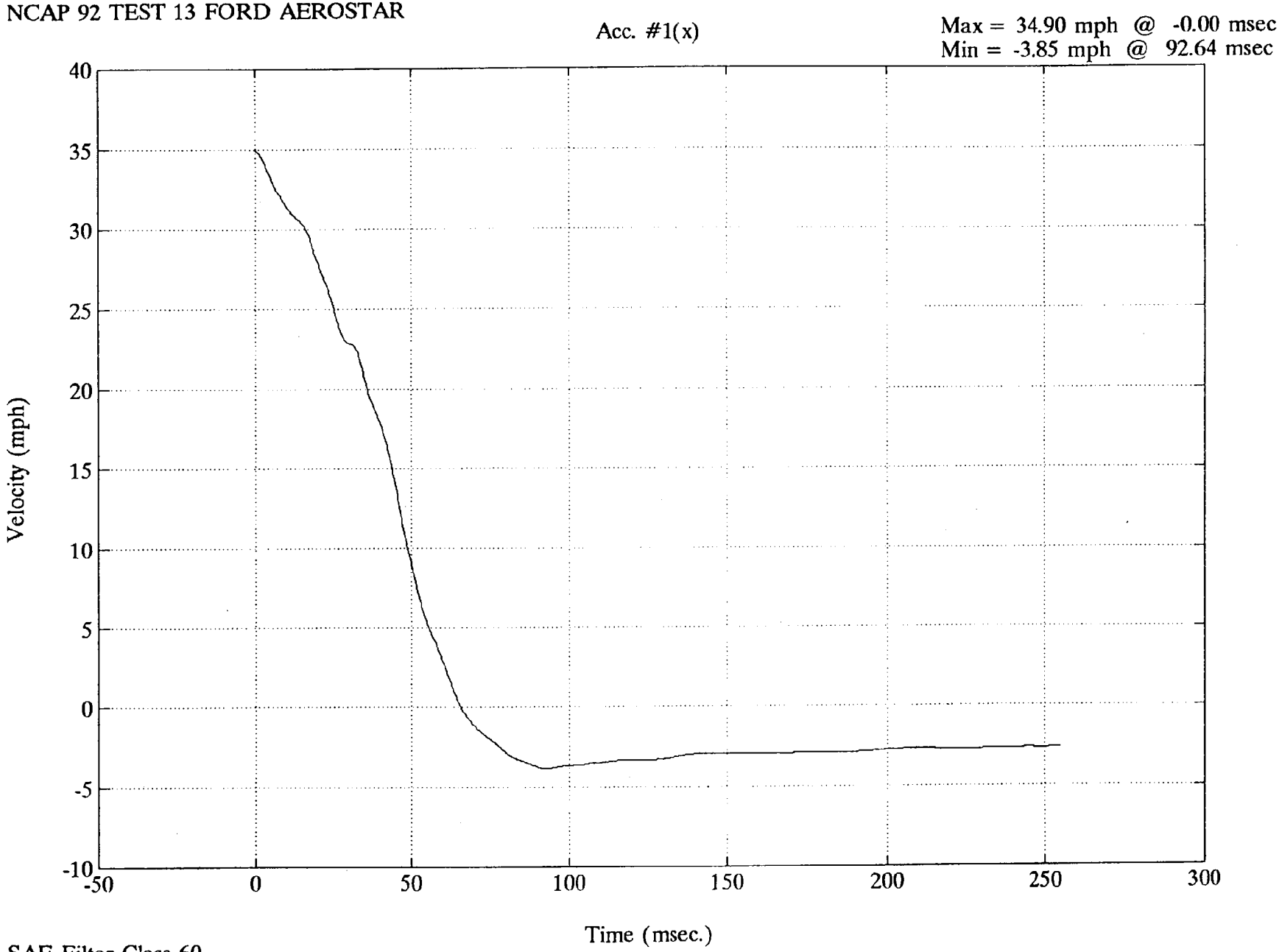
60

NCAP 92 TEST 13 FORD AEROSTAR



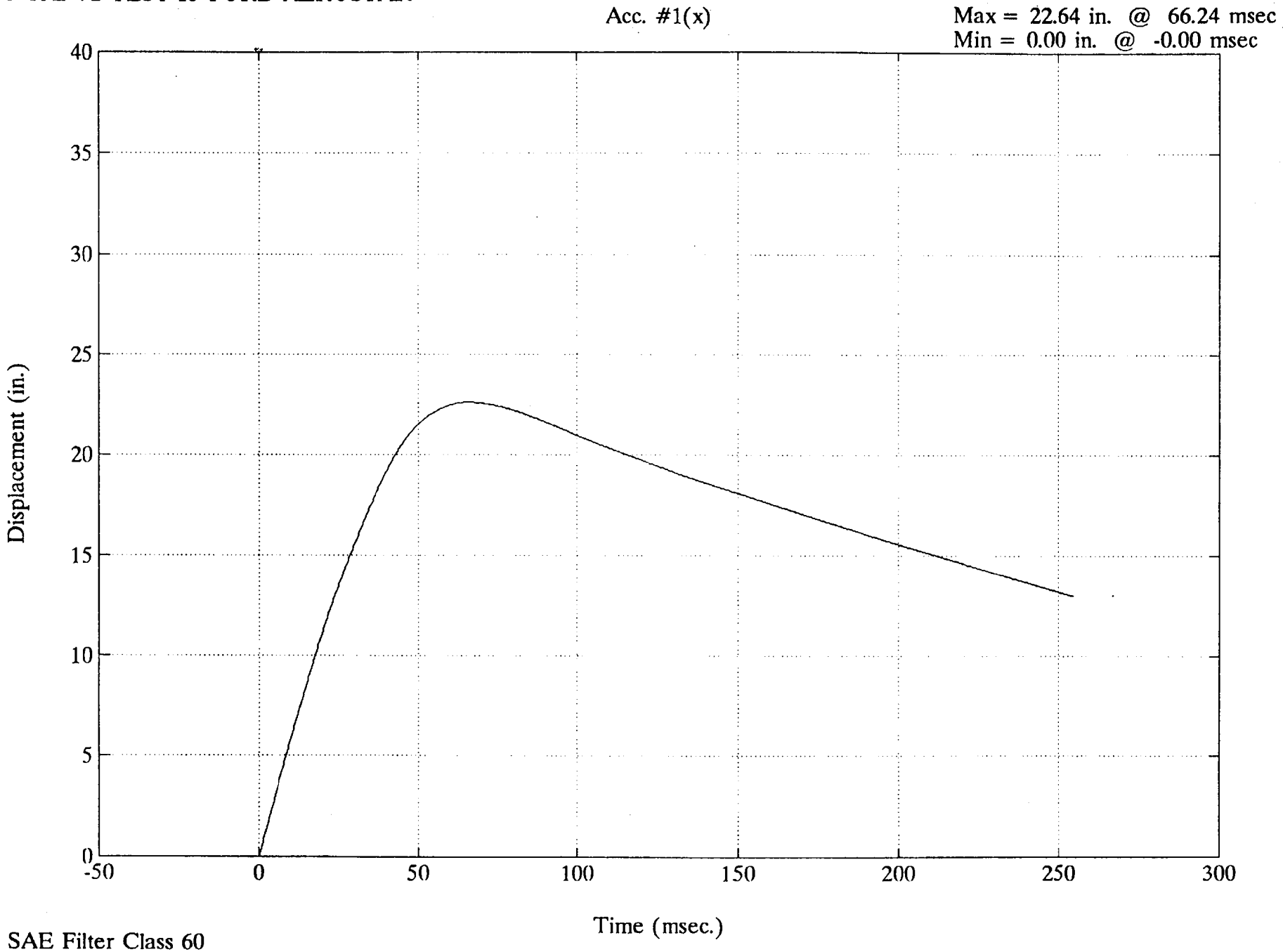
SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

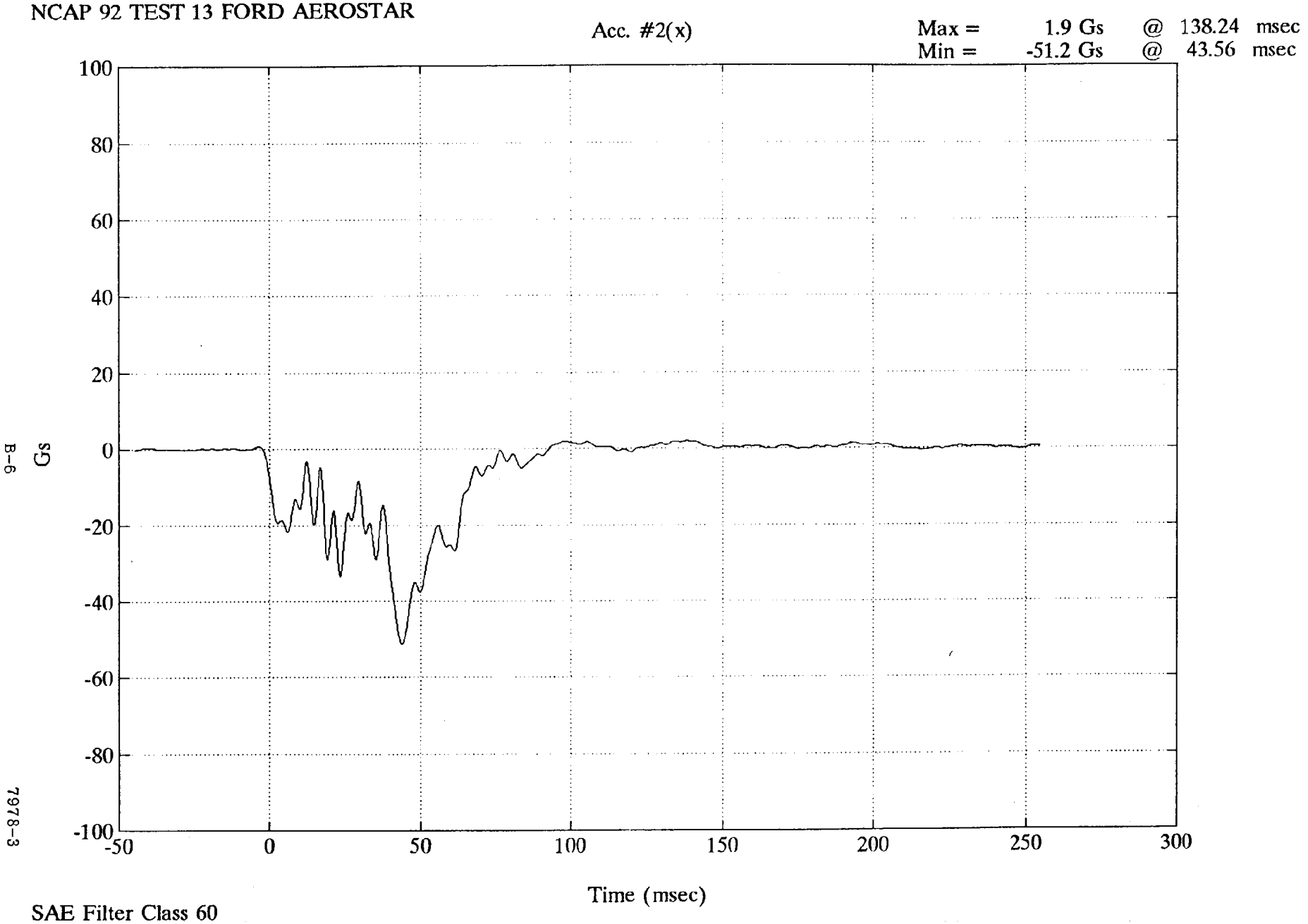
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

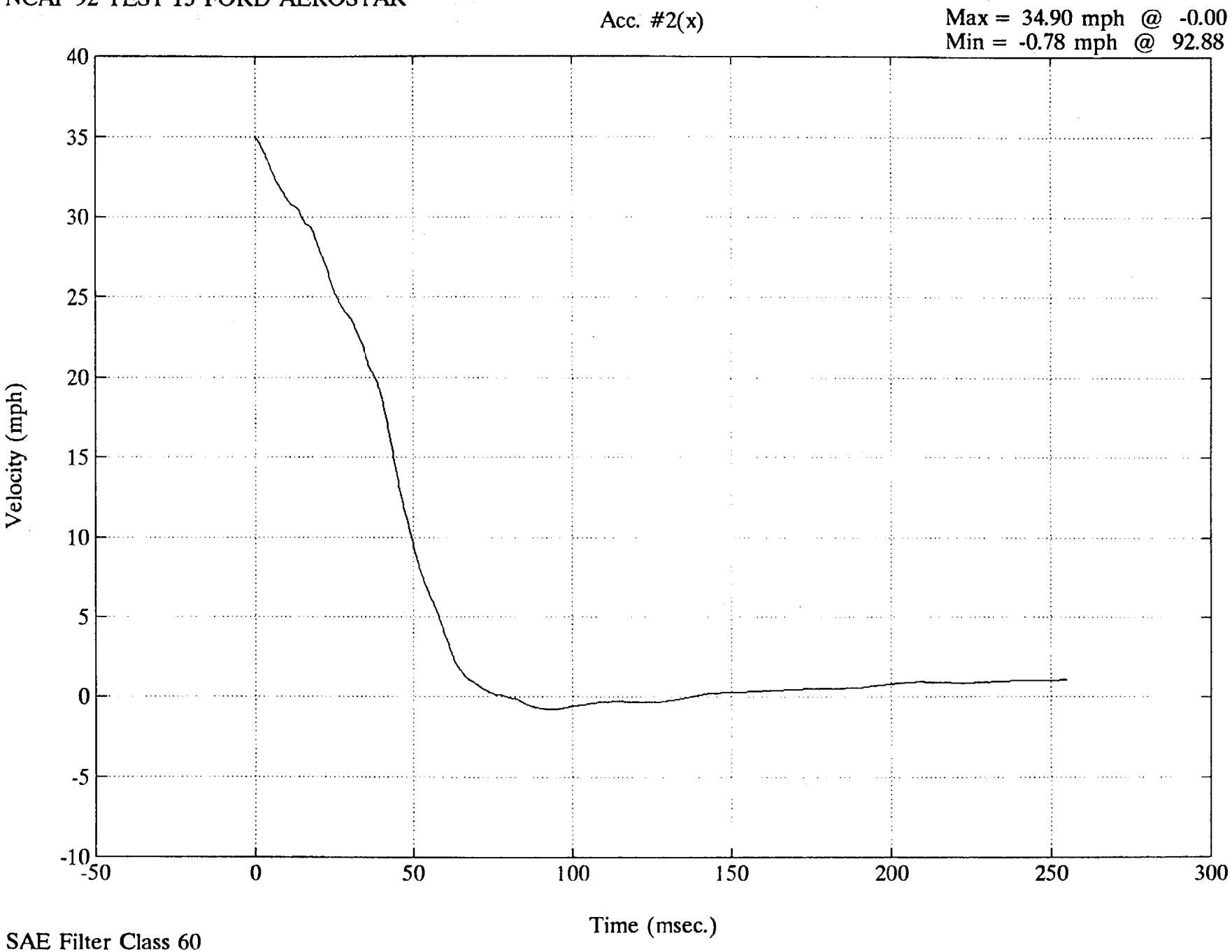
7978-3

NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

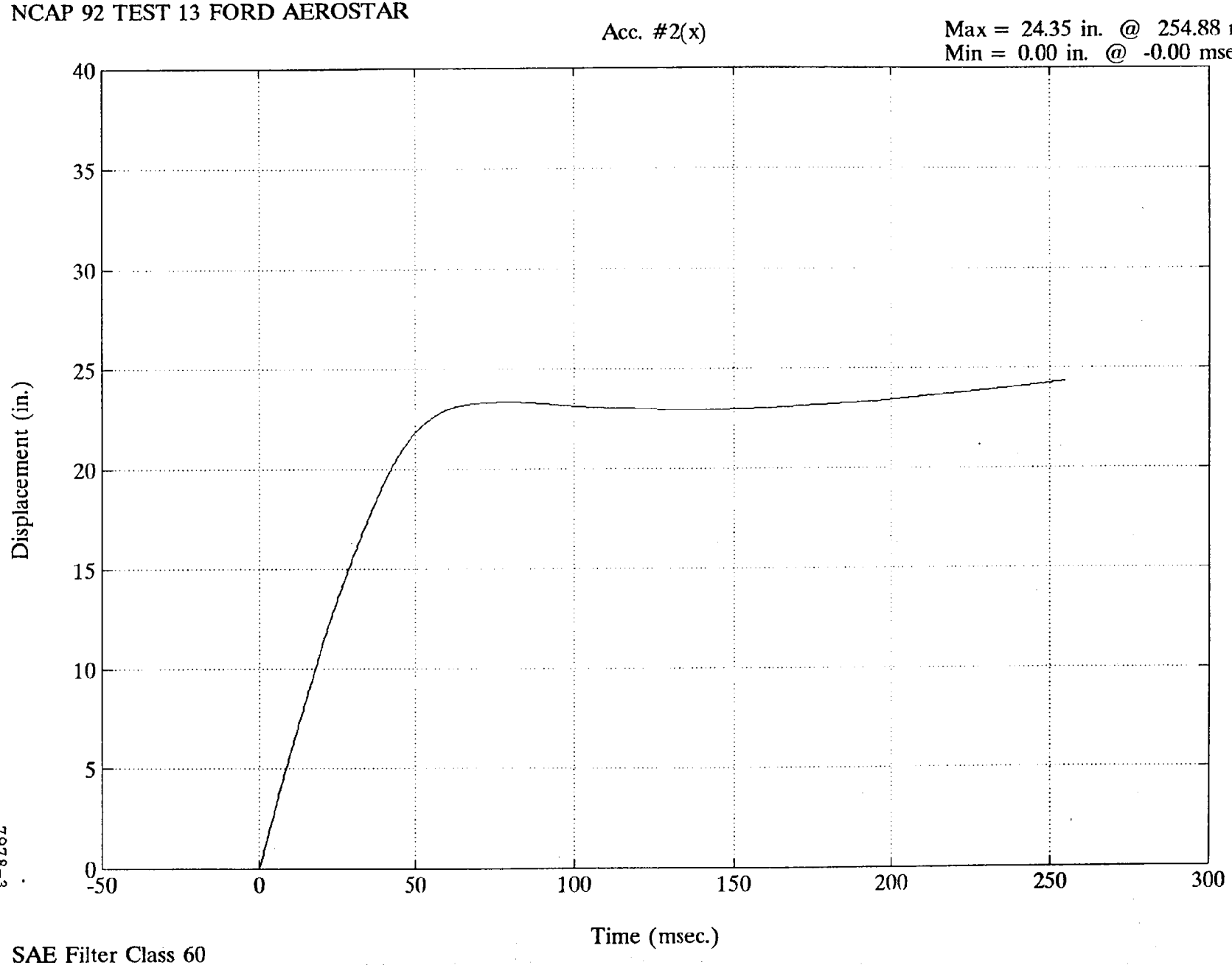
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

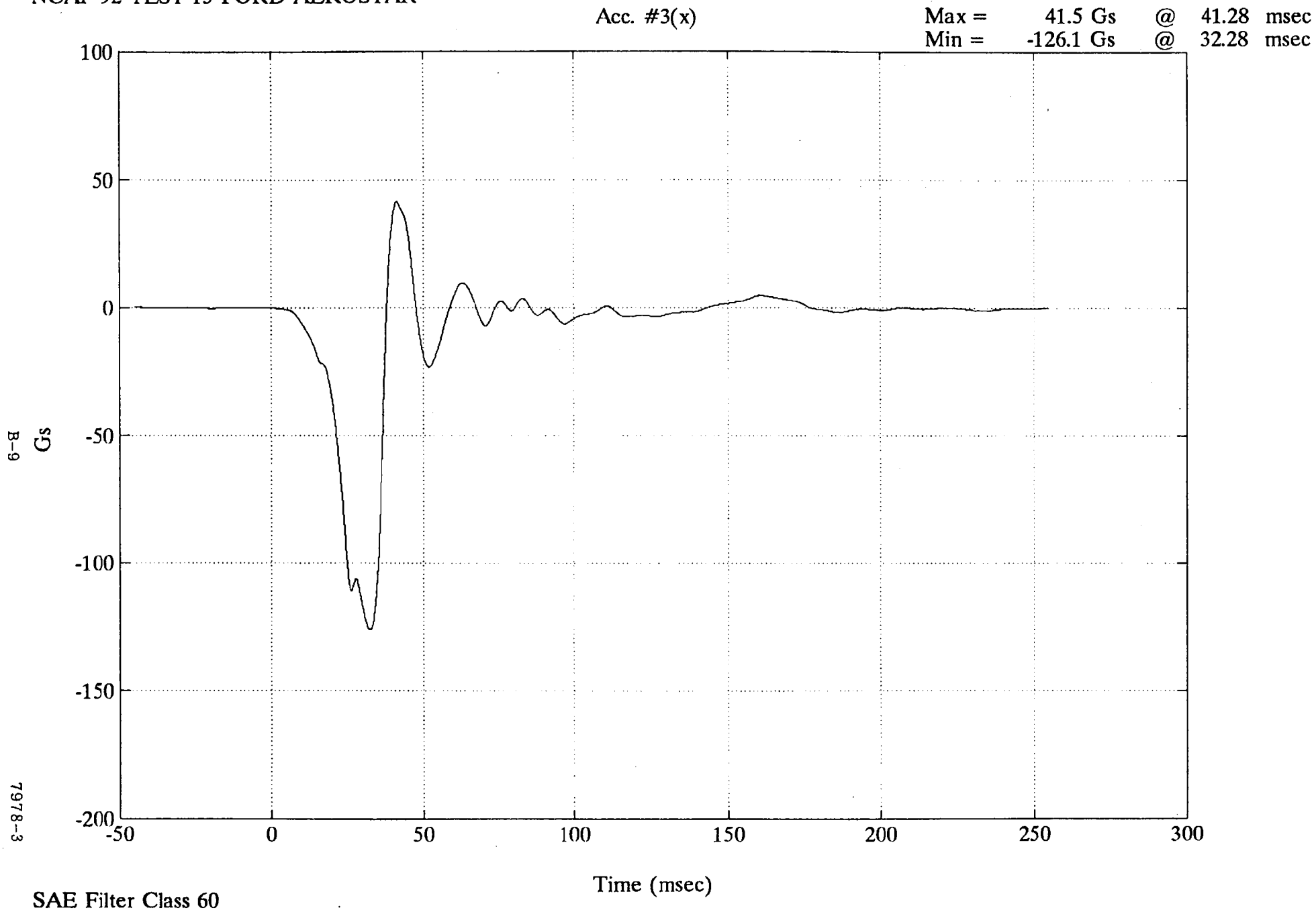
7978-3

NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

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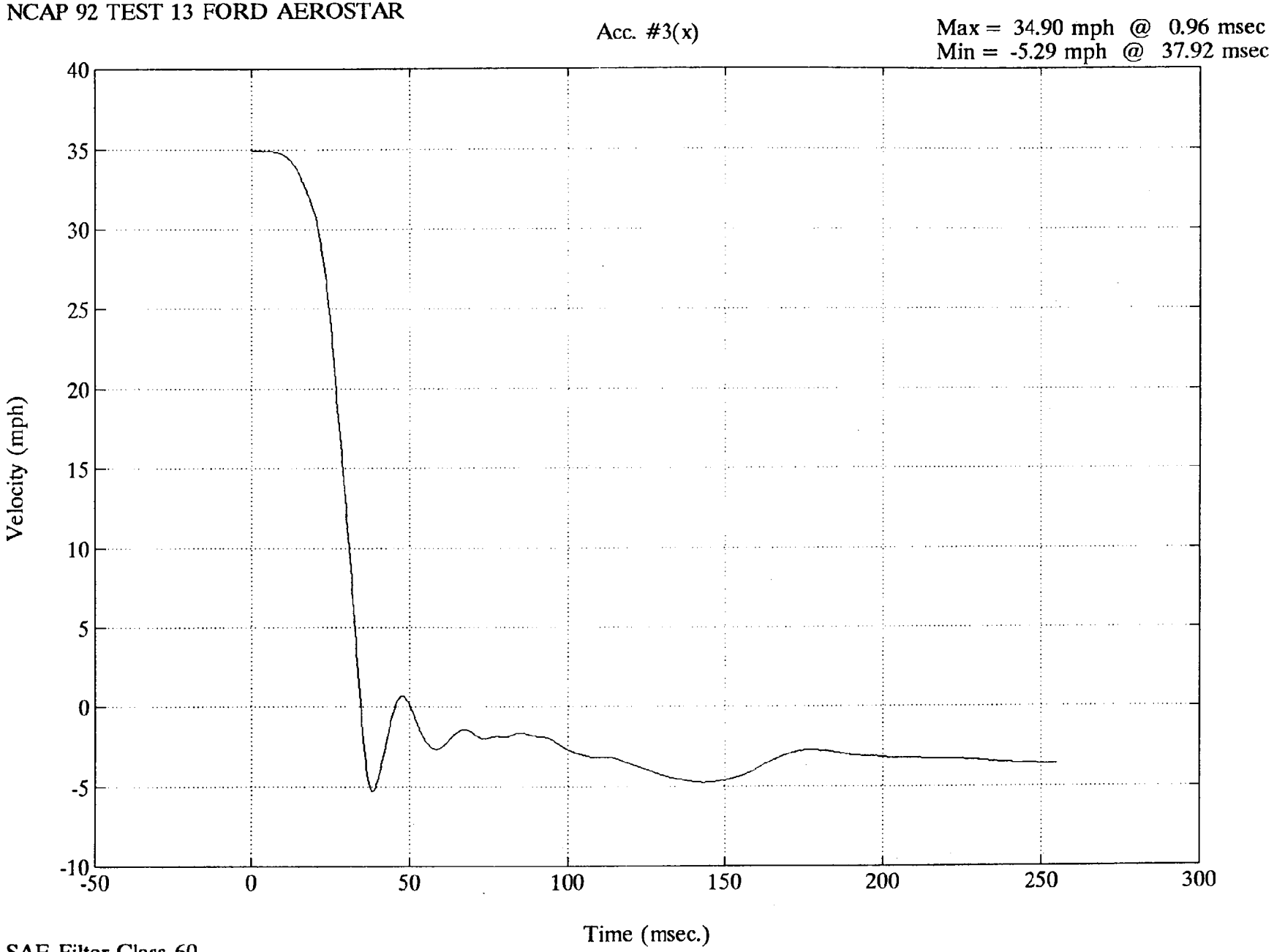

SAE Filter Class 60

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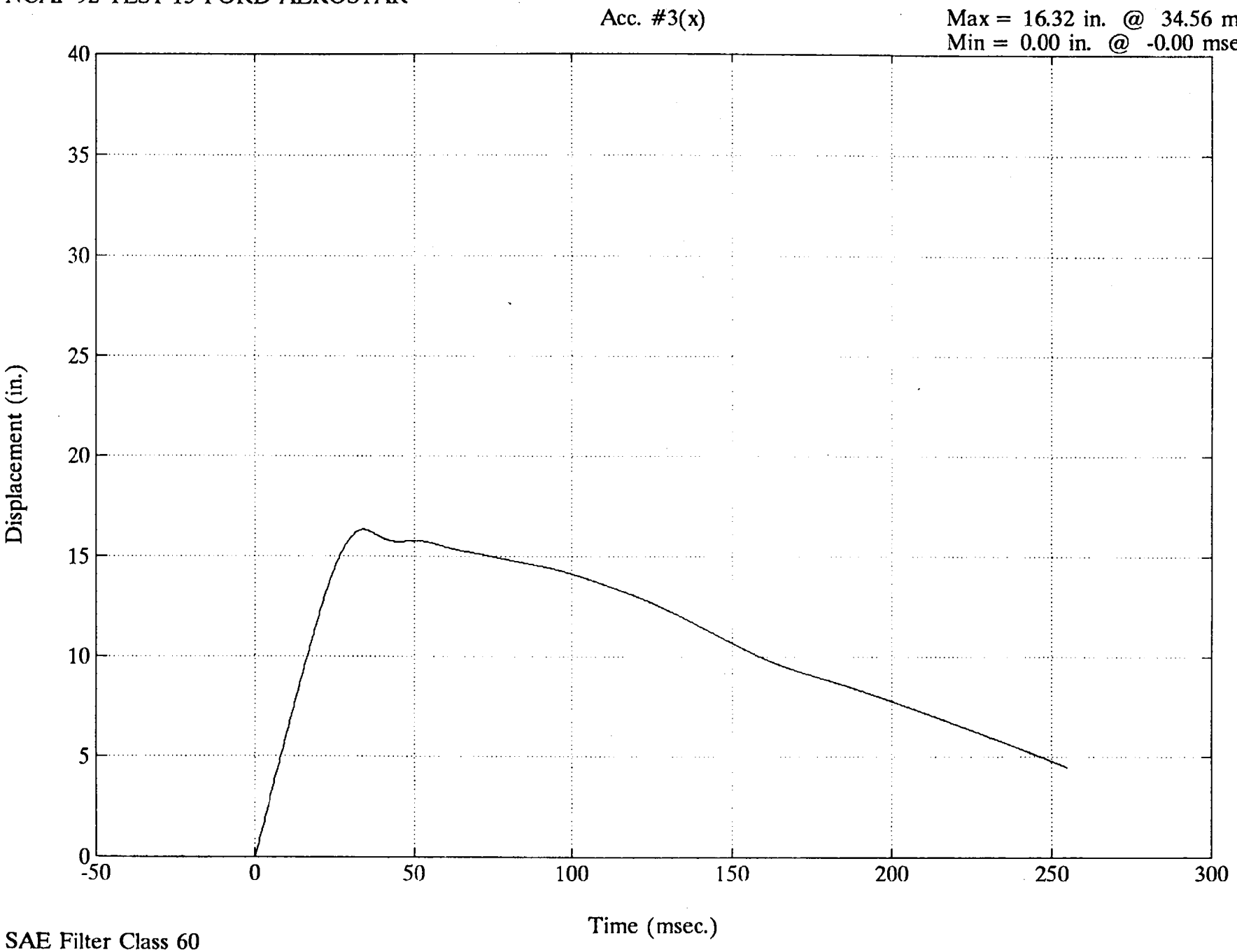
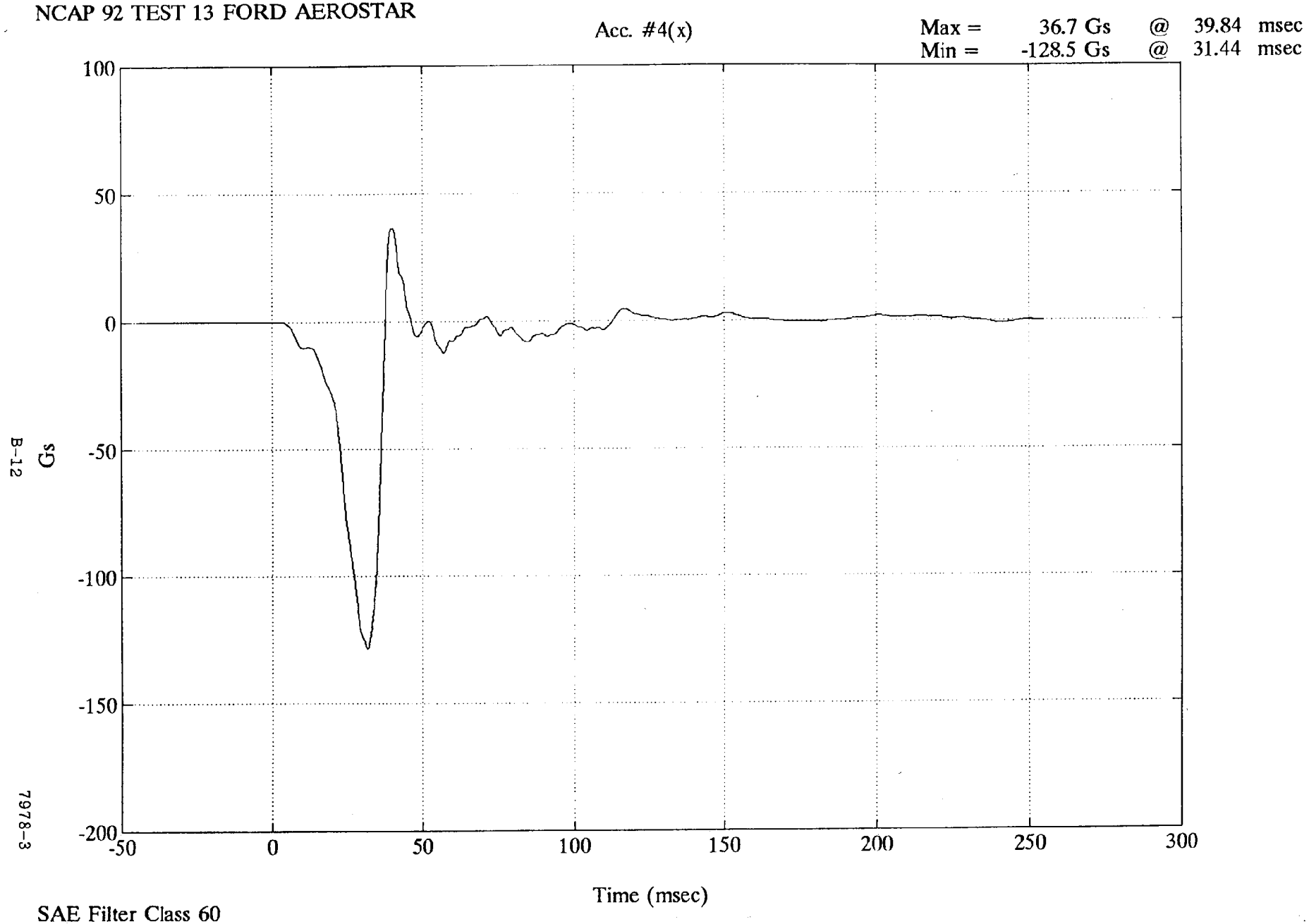


SAE Filter Class 60

7978-3

NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

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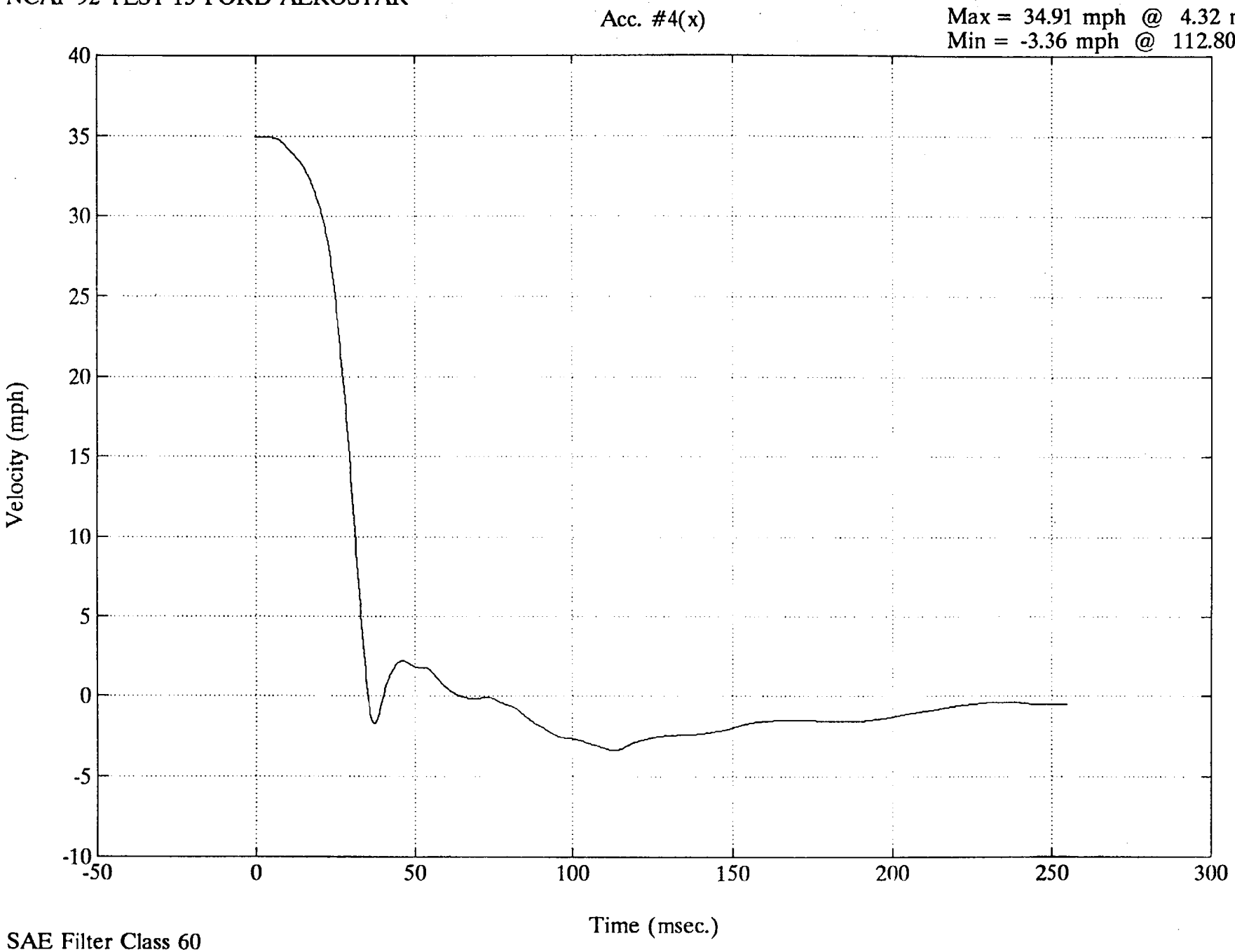

SAE Filter Class 60

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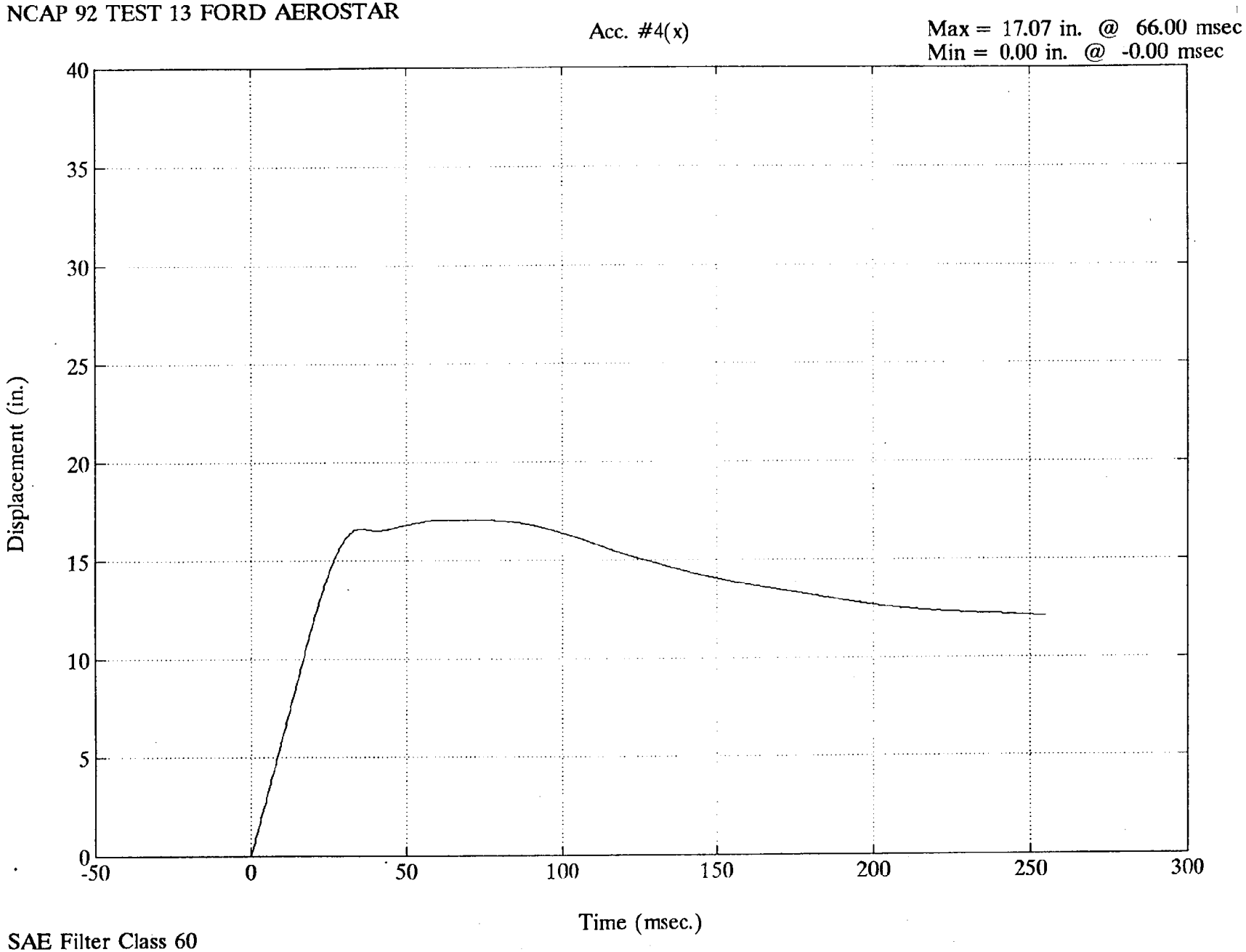
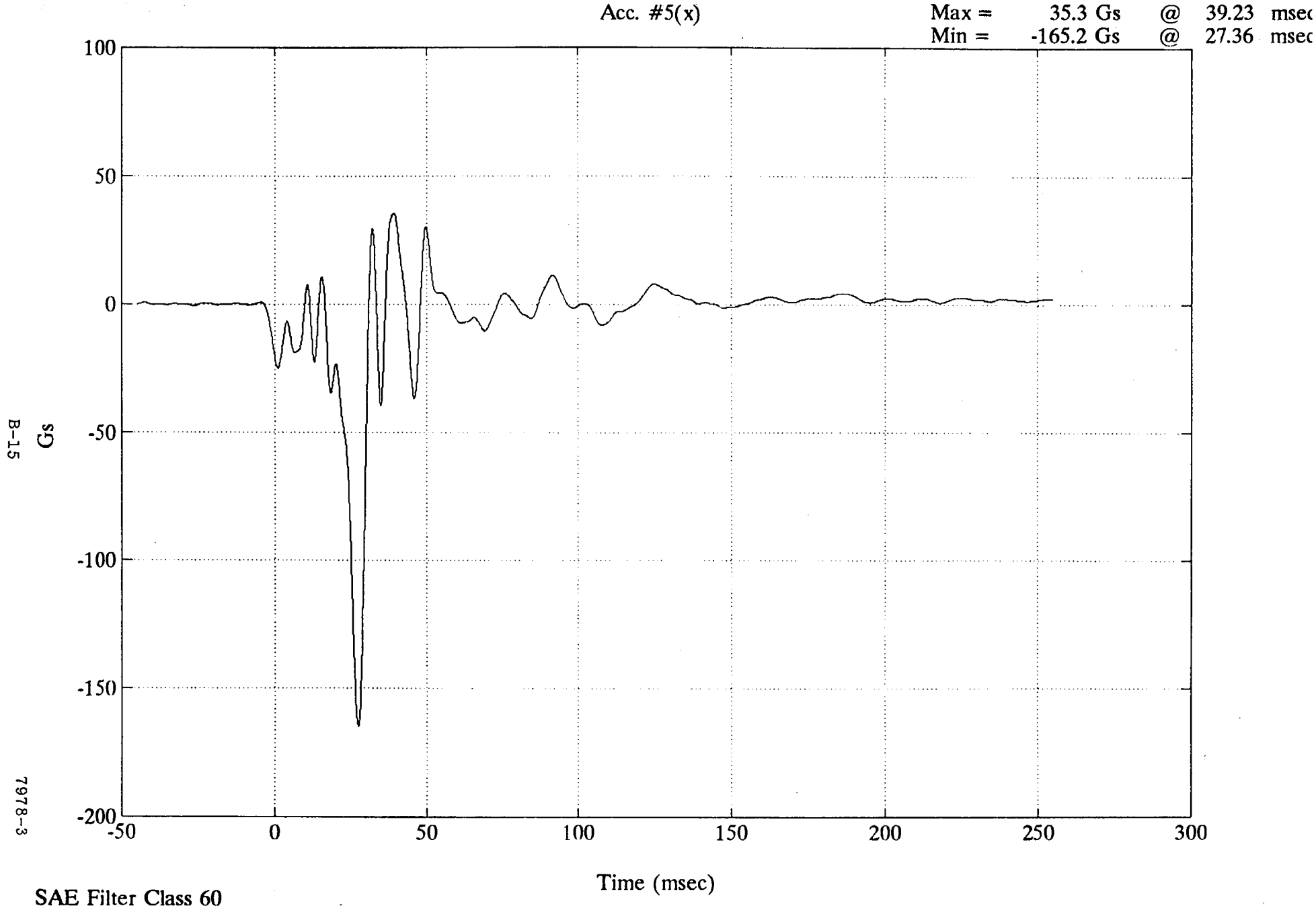


SAE Filter Class 60

7978-3

NCAP 92 TEST 13 FORD AEROSTAR



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7978-3

SAE Filter Class 60

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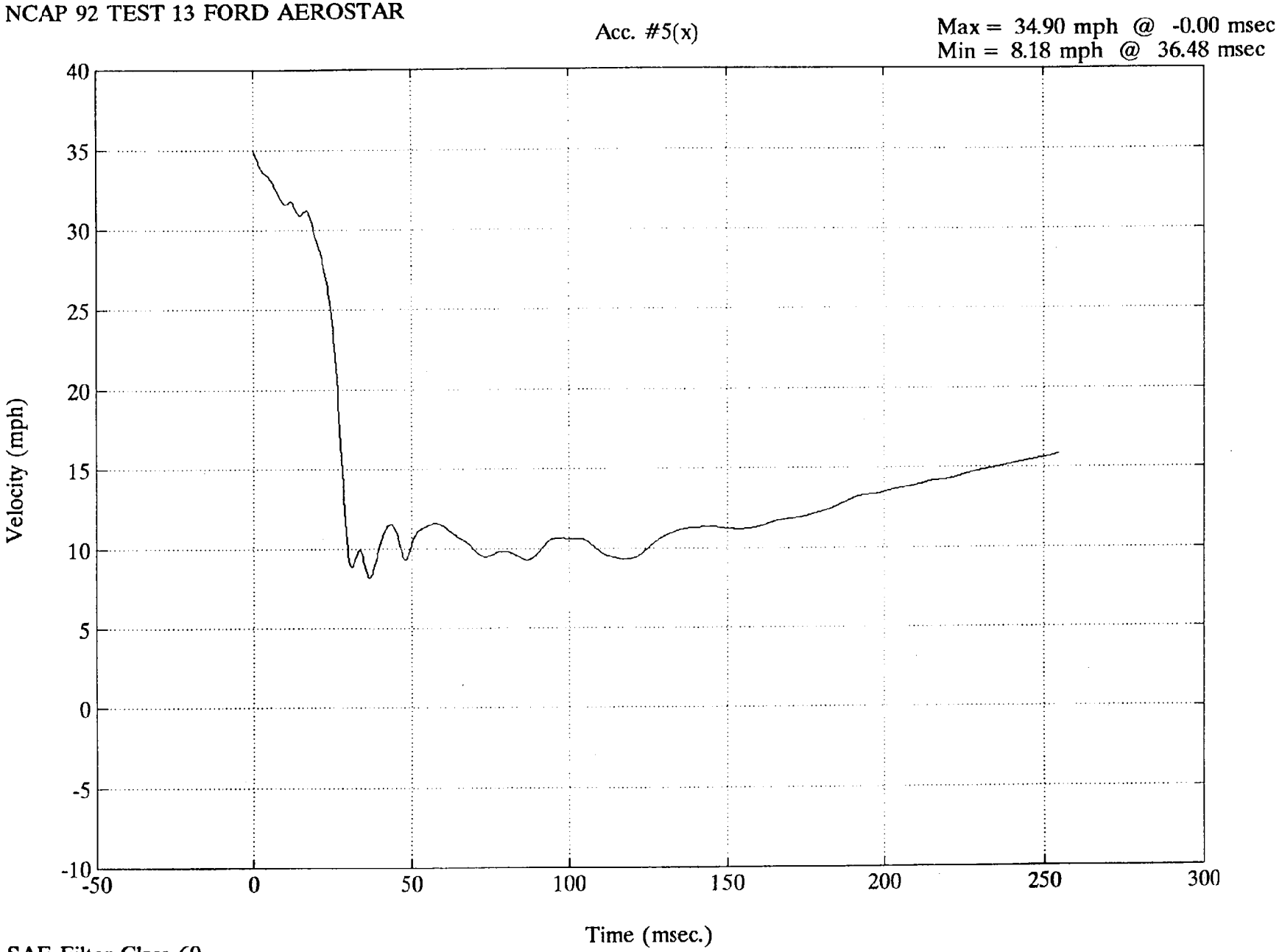
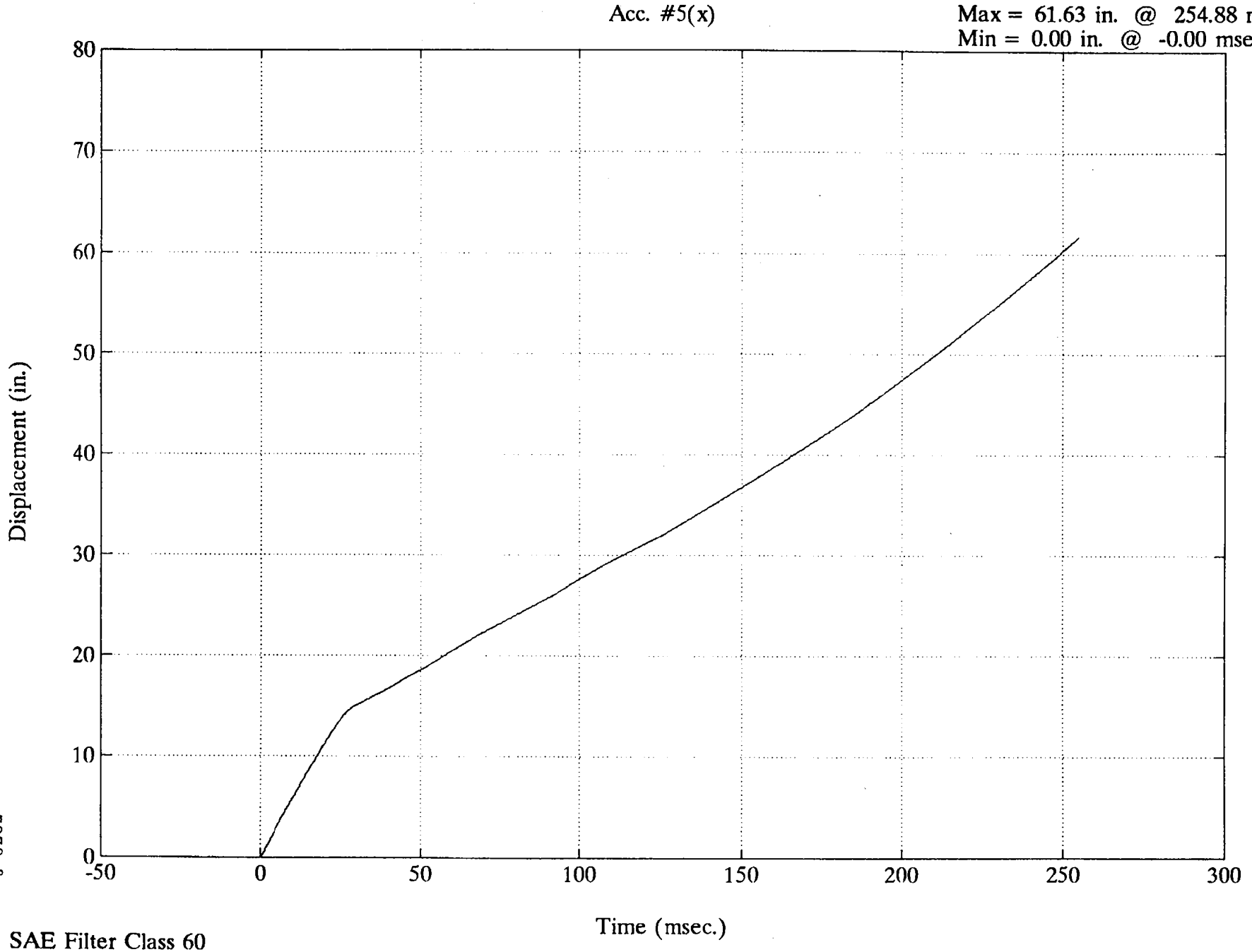


SAE Filter Class 60

7978-3

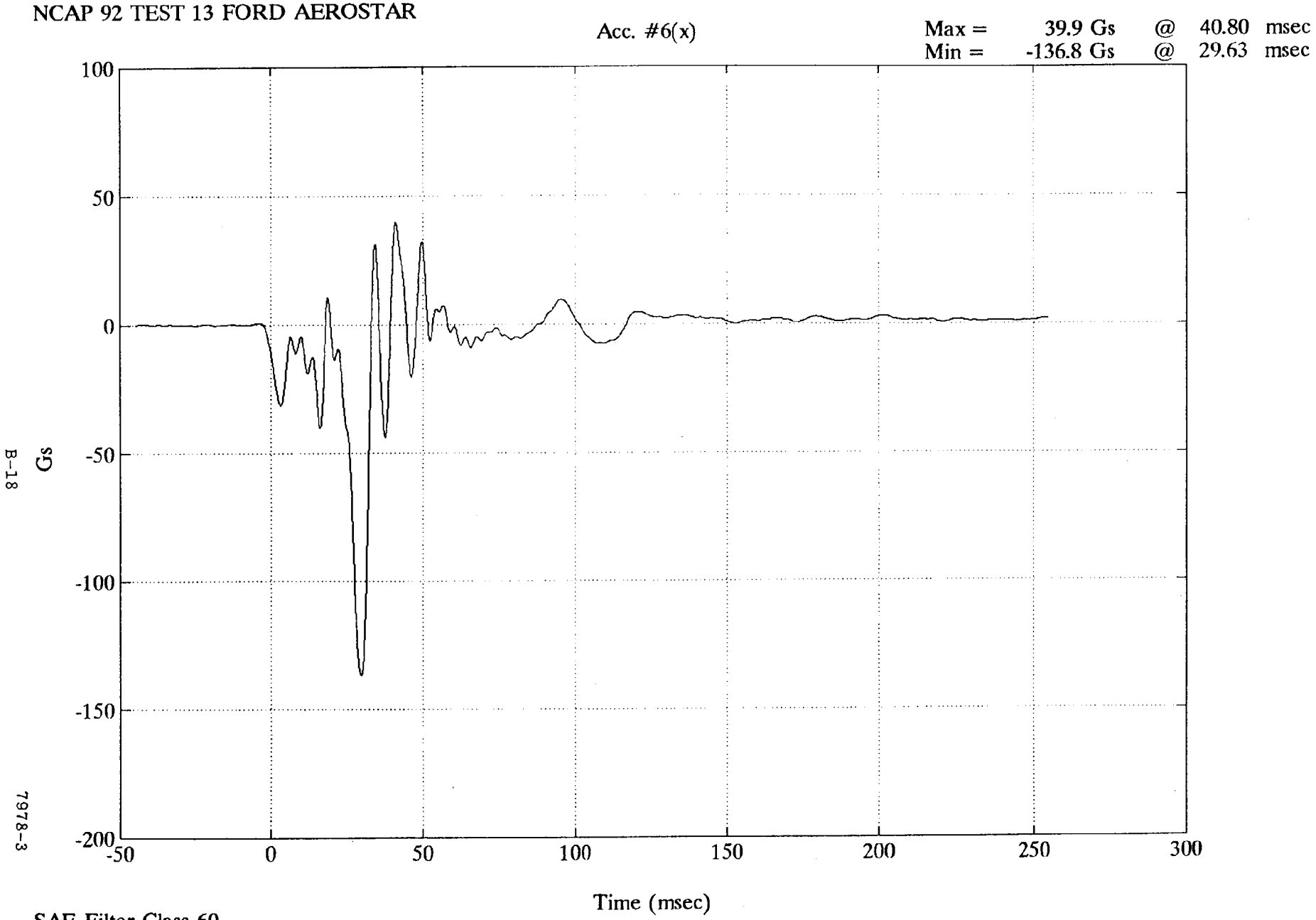
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

7978-3

NCAP 92 TEST 13 FORD AEROSTAR



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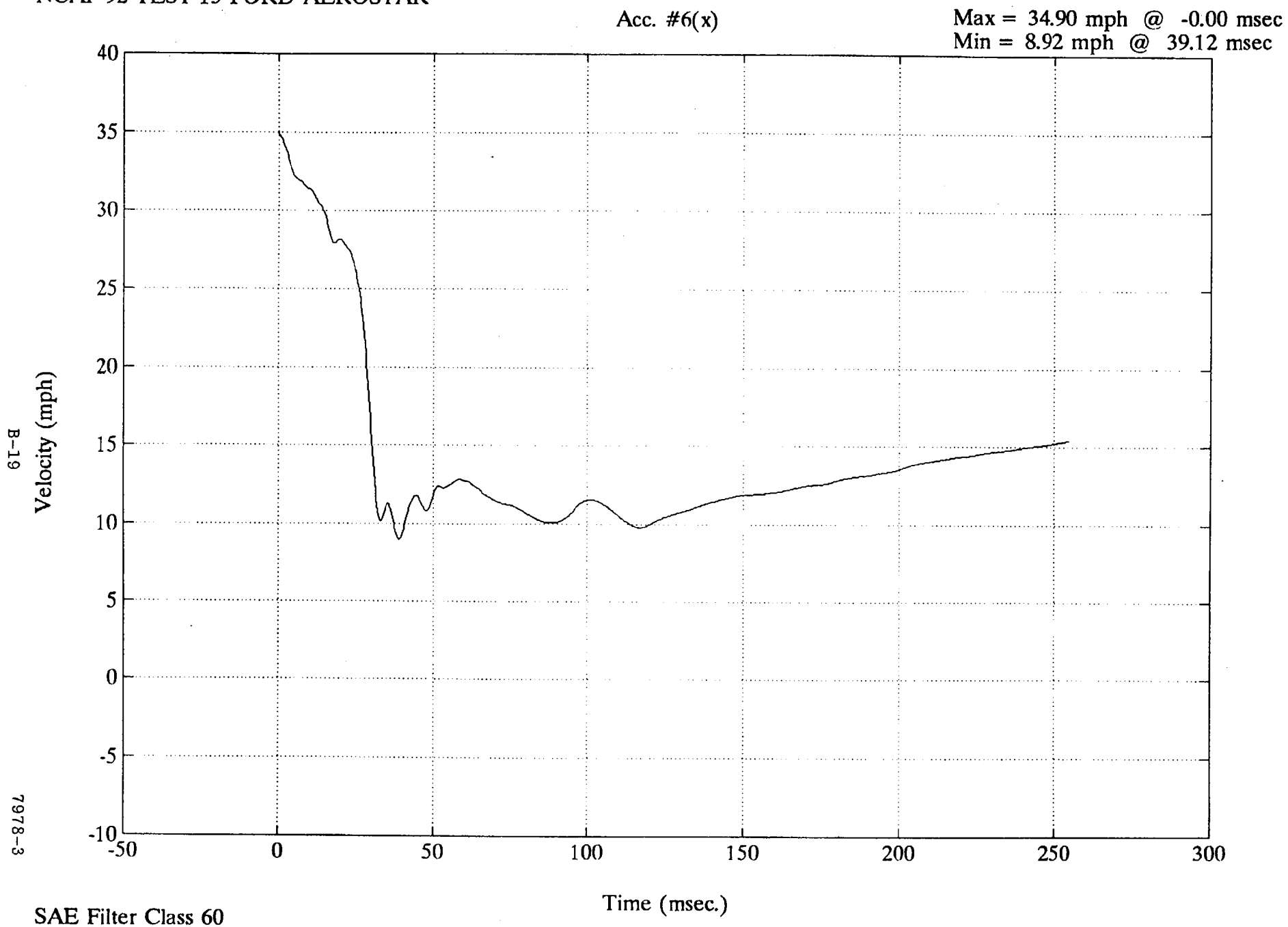

SAE Filter Class 60

7978-3

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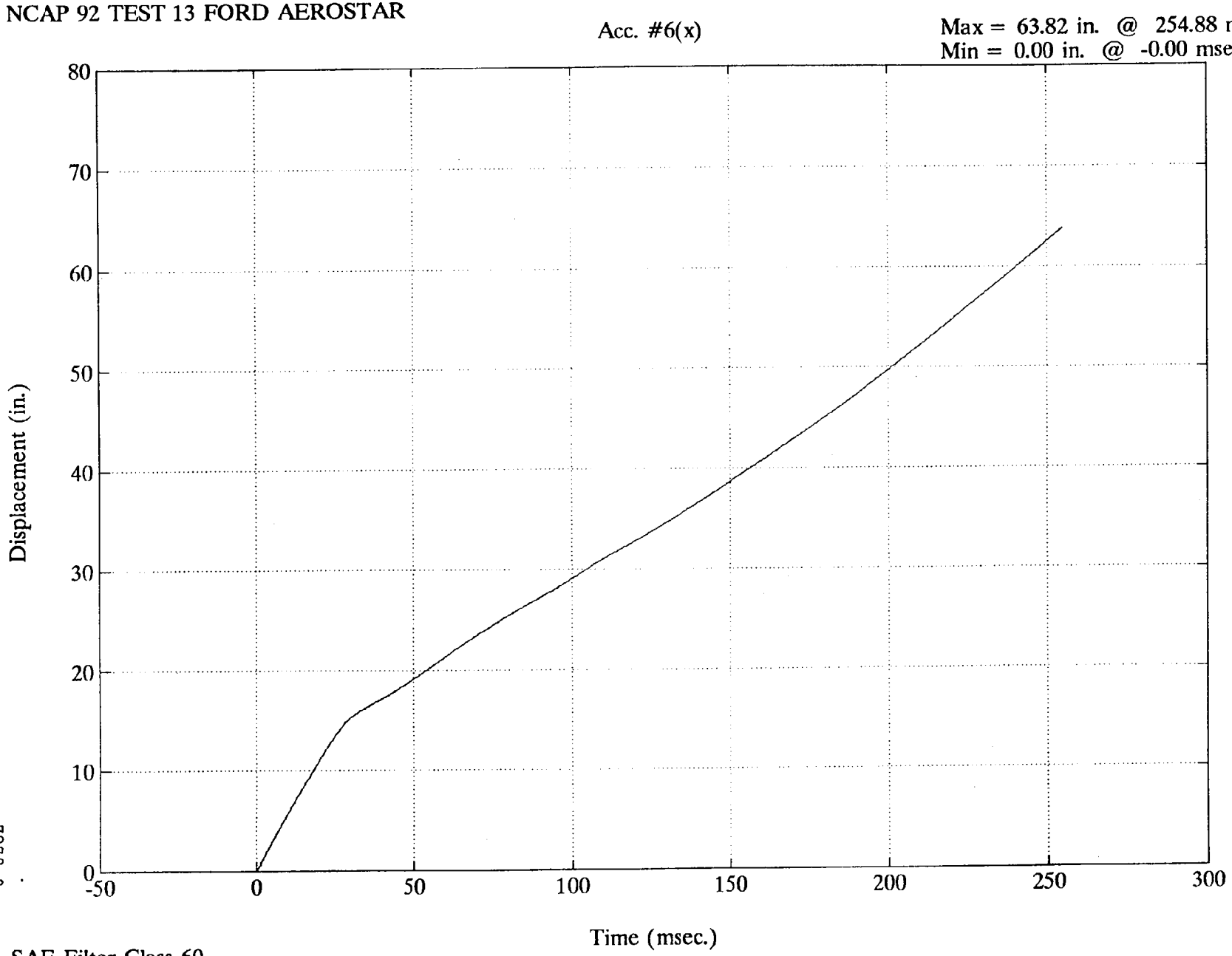

SAE Filter Class 60

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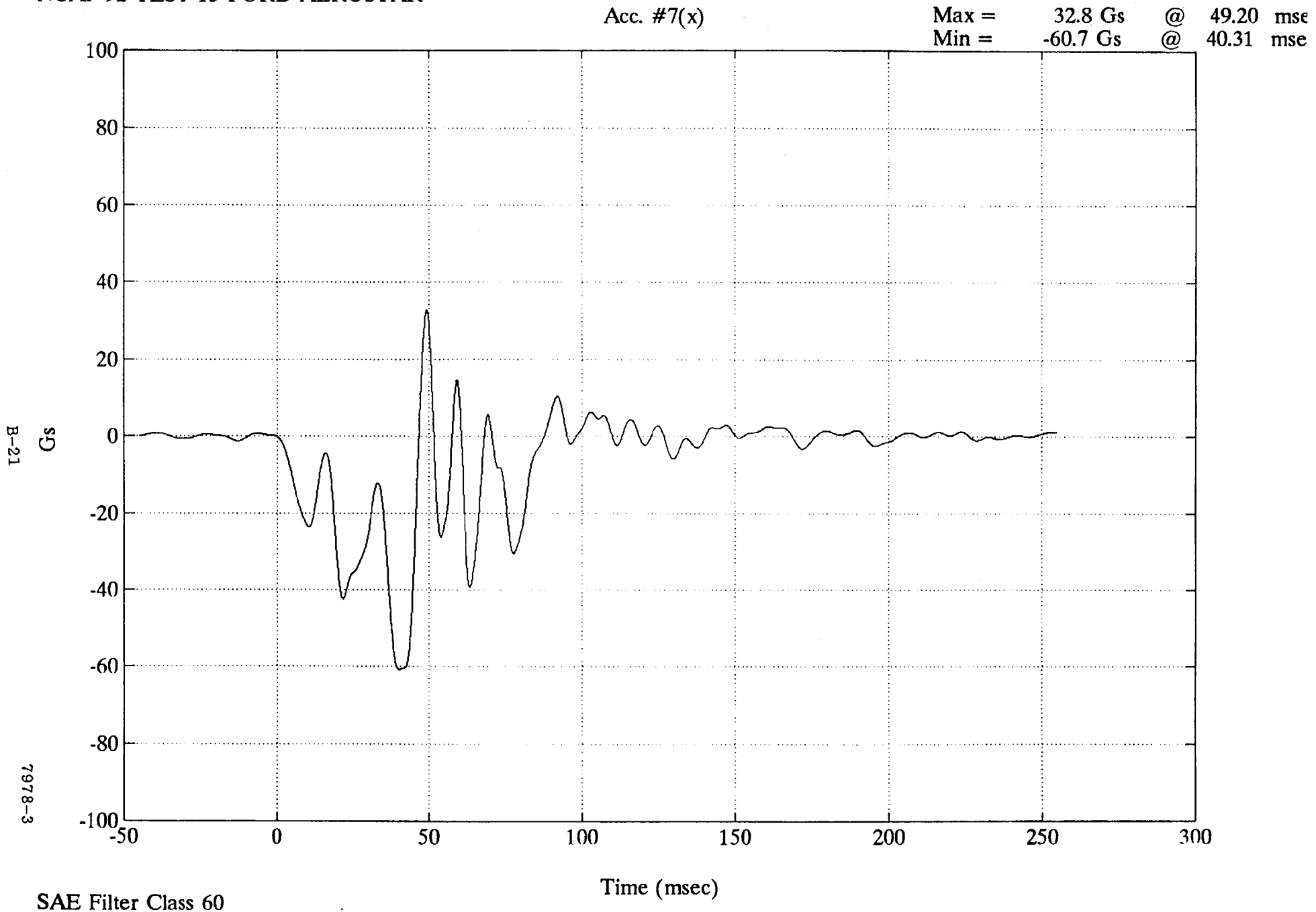

SAE Filter Class 60

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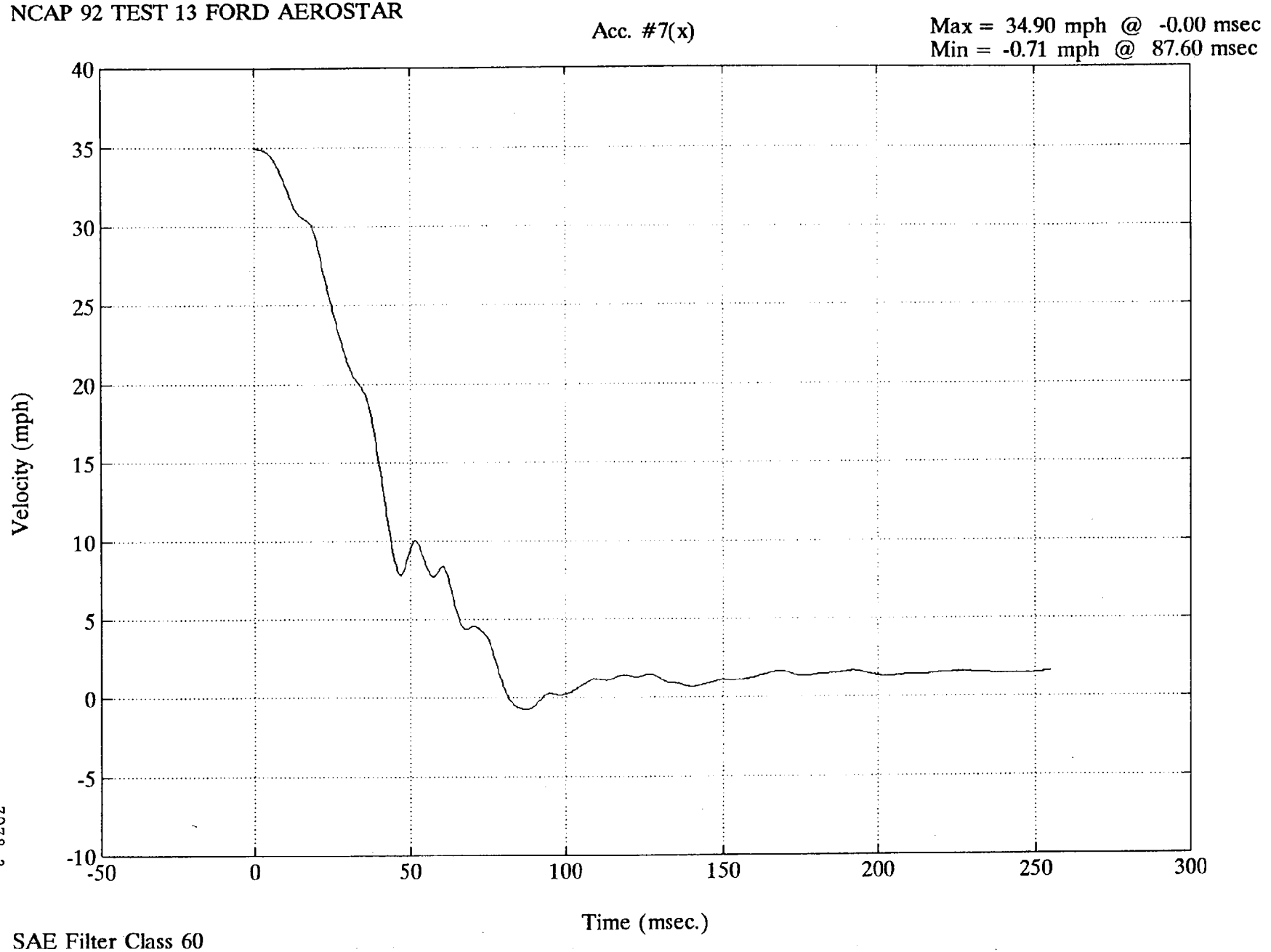
NCAP 92 TEST 13 FORD AEROSTAR



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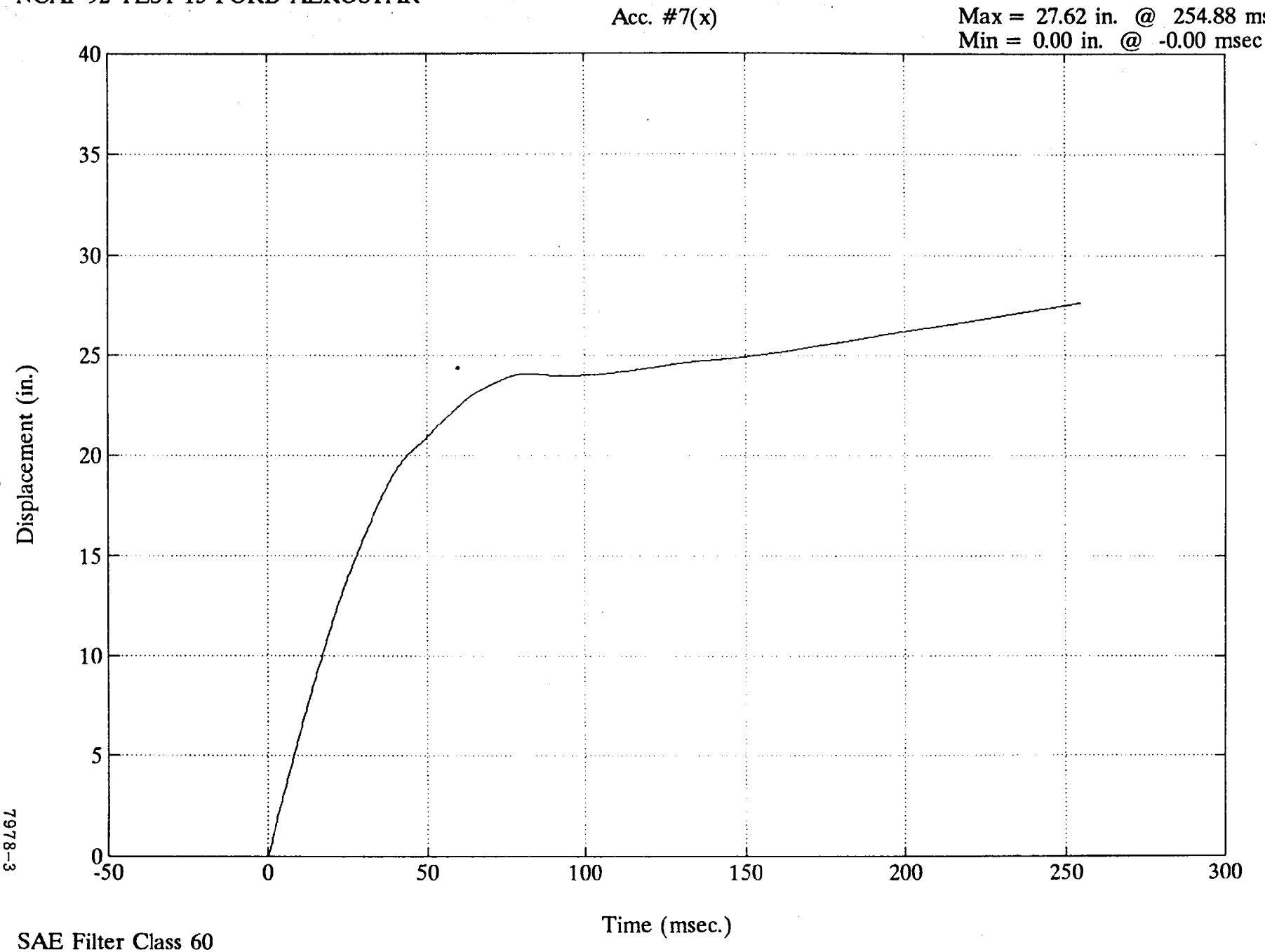

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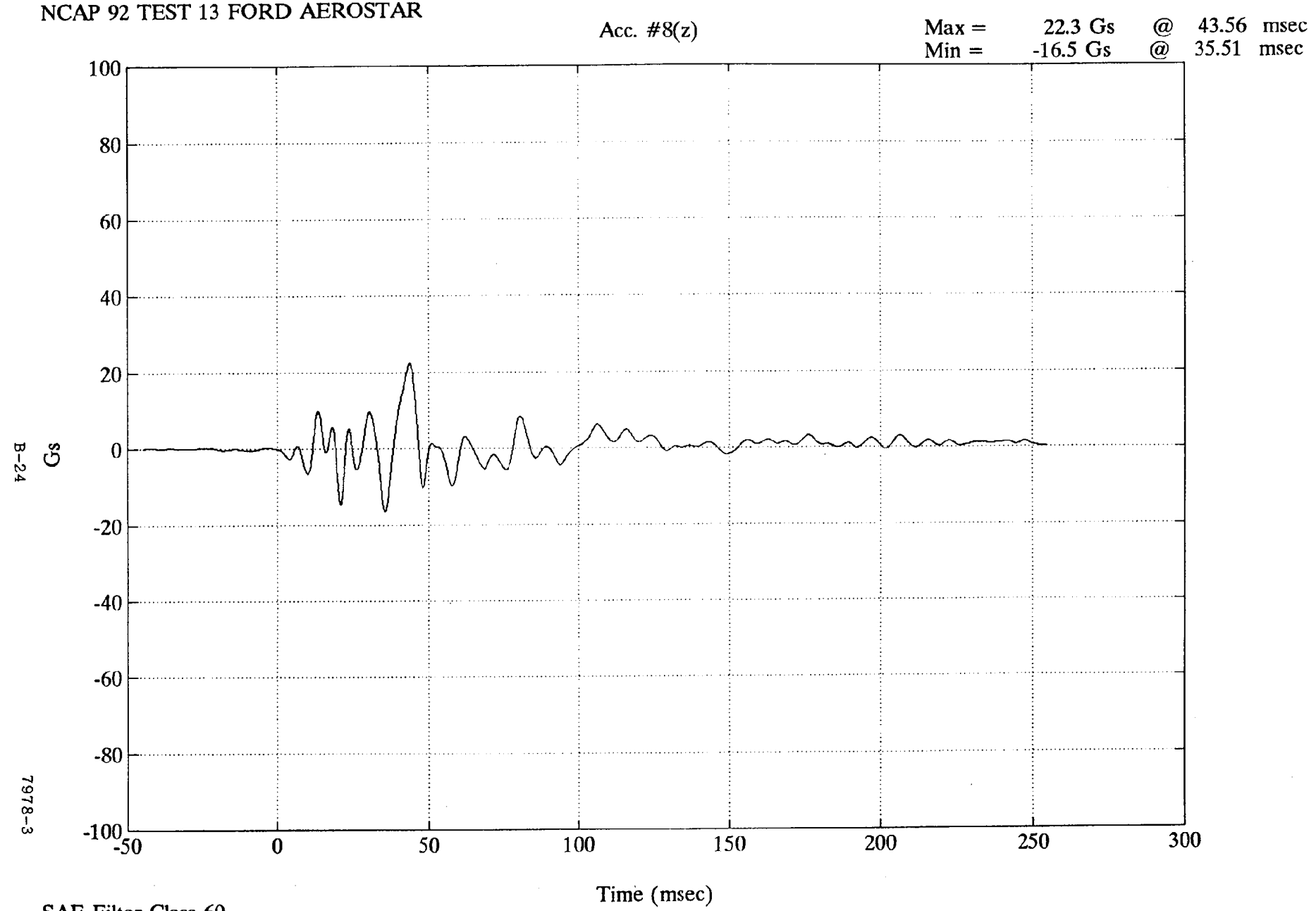

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7978-3

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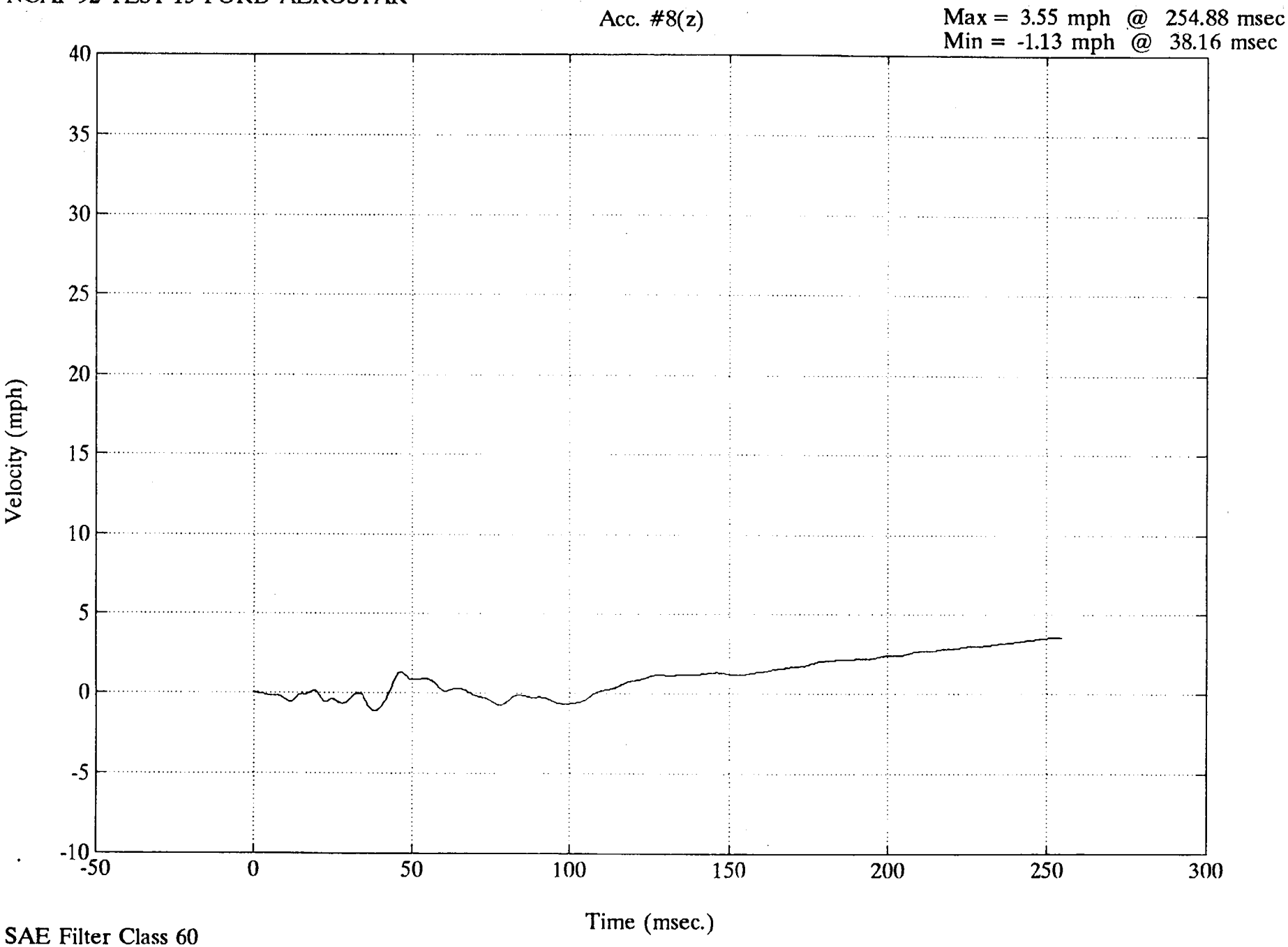

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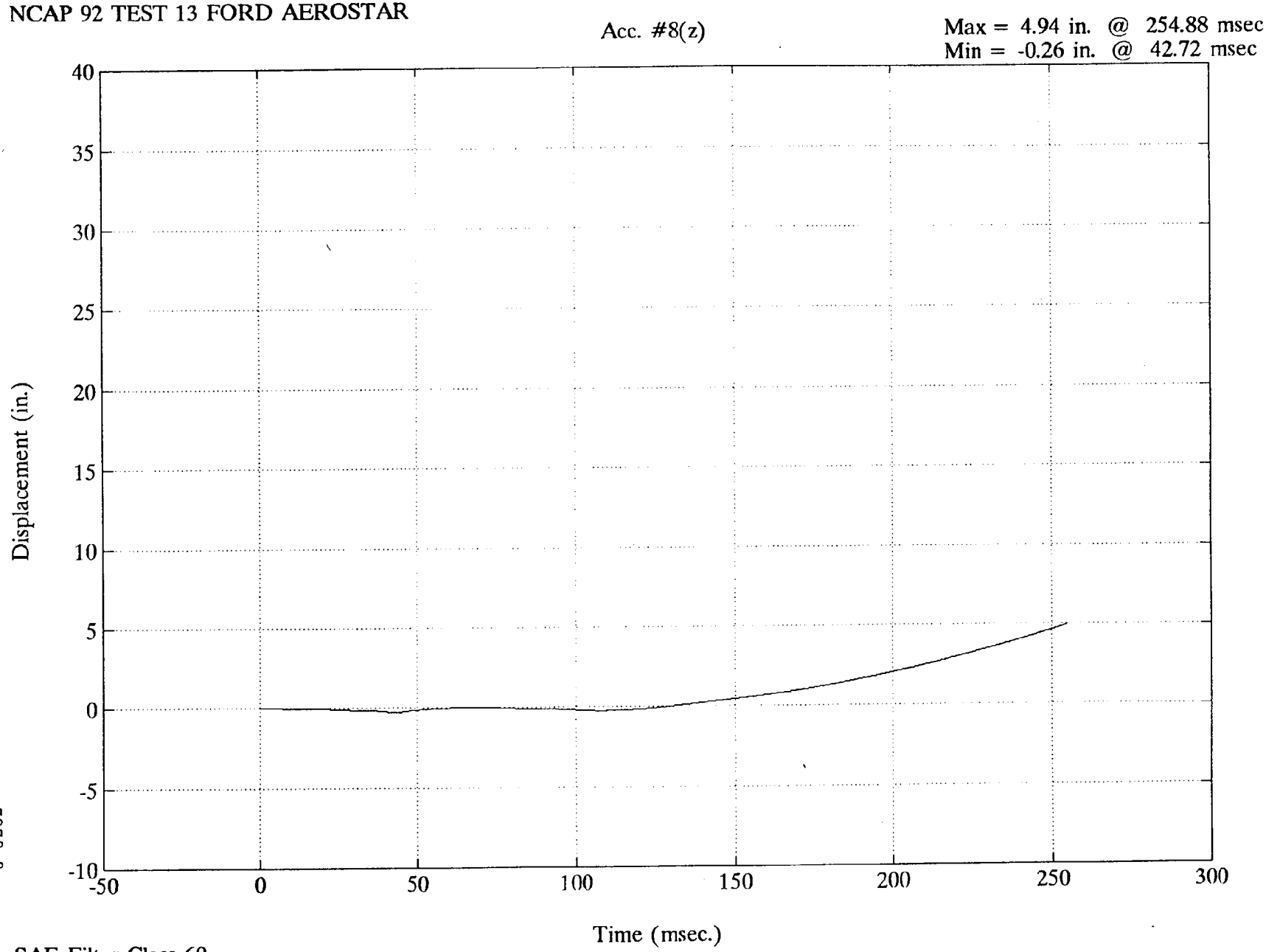

SAE Filter Class 60

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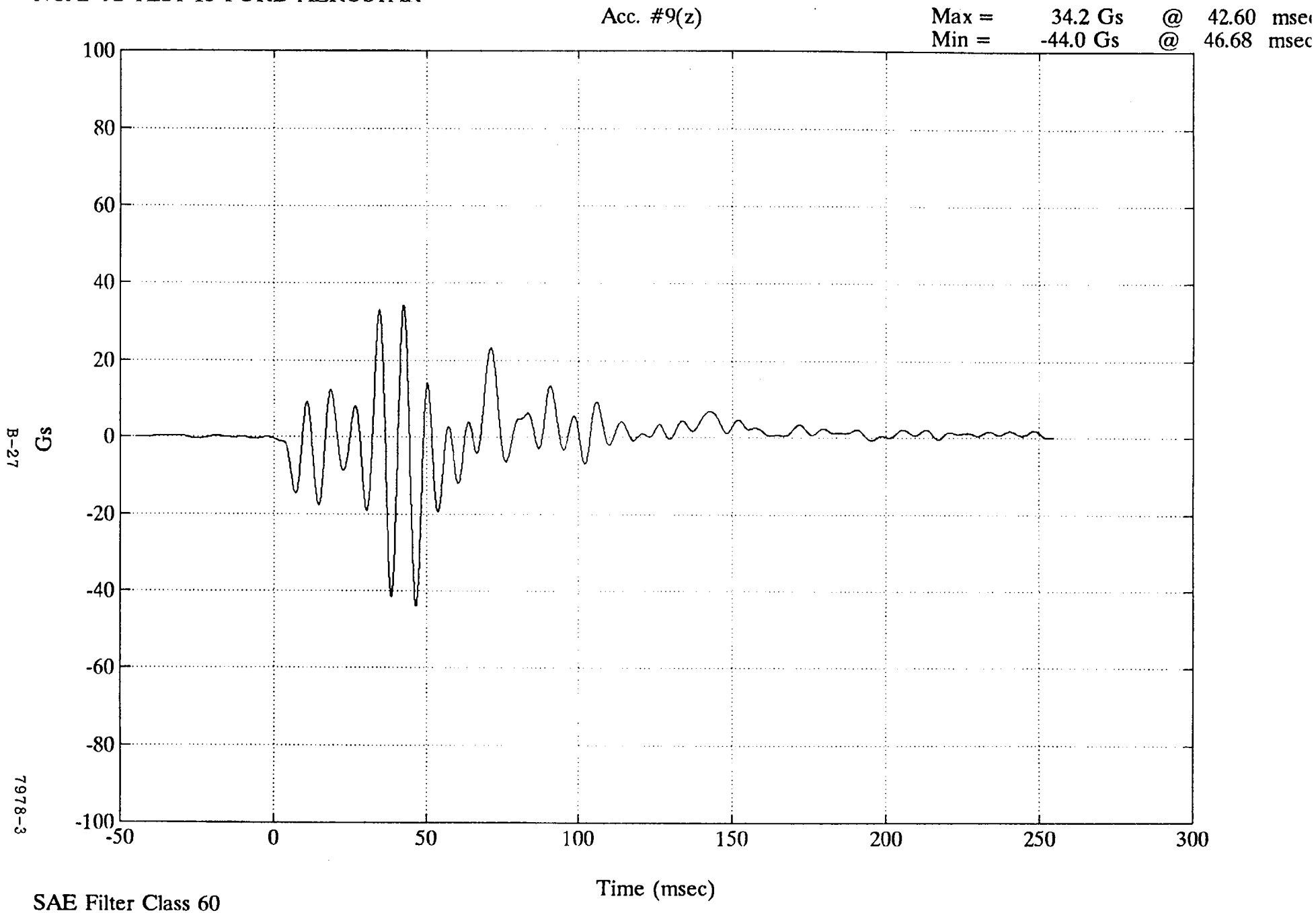

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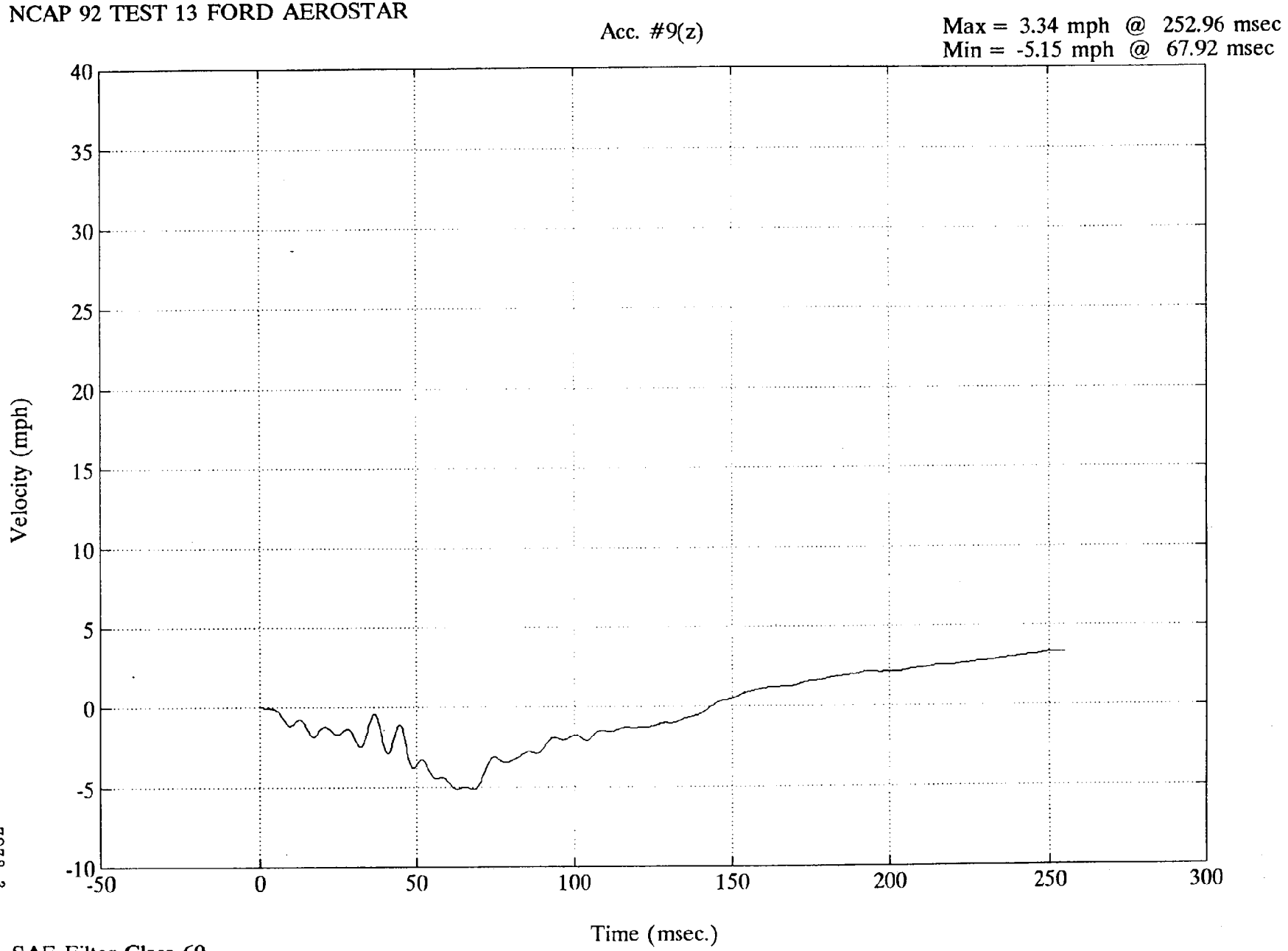
7978-3

SAE Filter Class 60

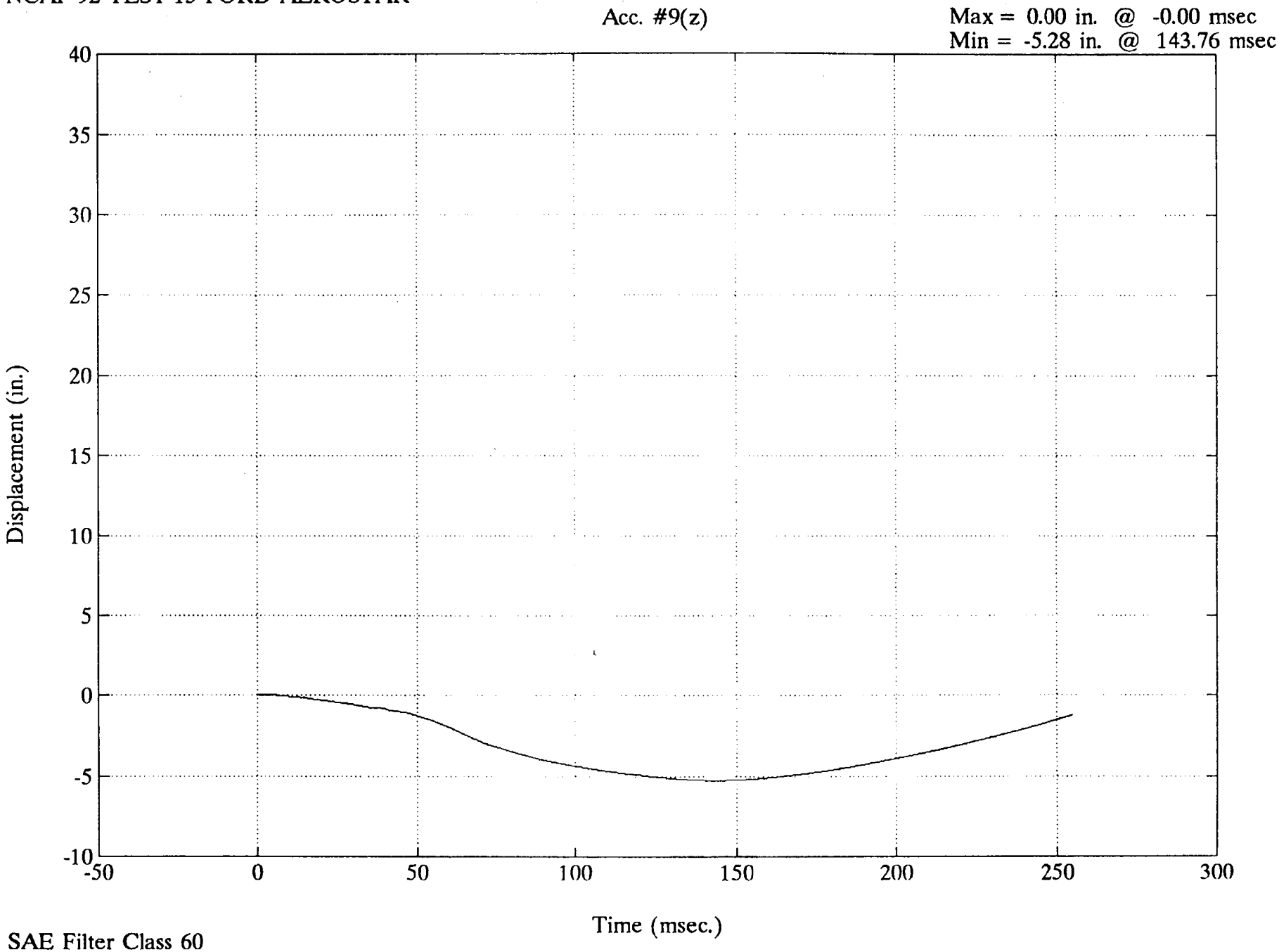
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

7978-3

NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

7978-3

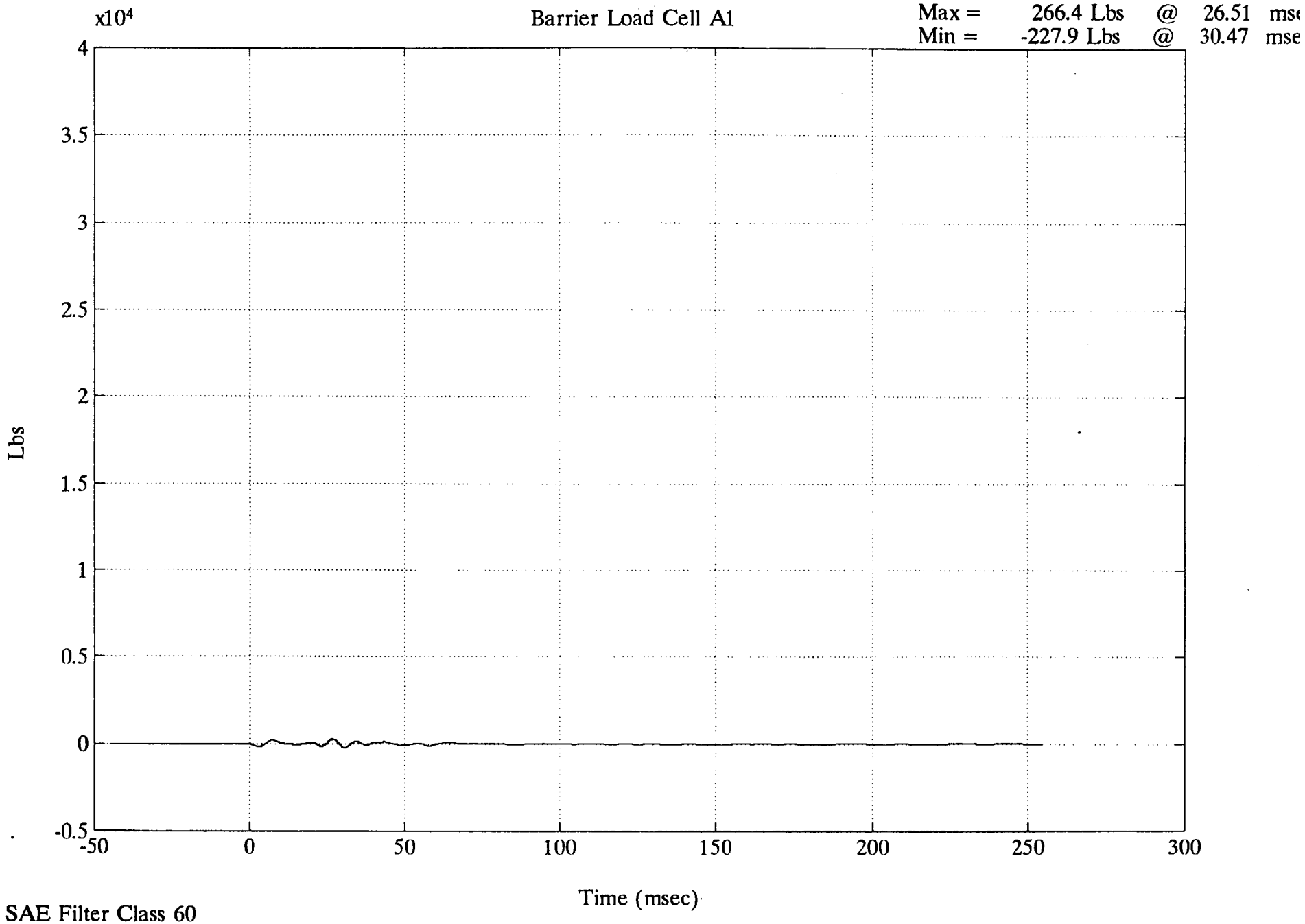
TEST NO. MN0201

LOAD CELL BARRIER DATA

SAE FILTER CHANNEL CLASS

60

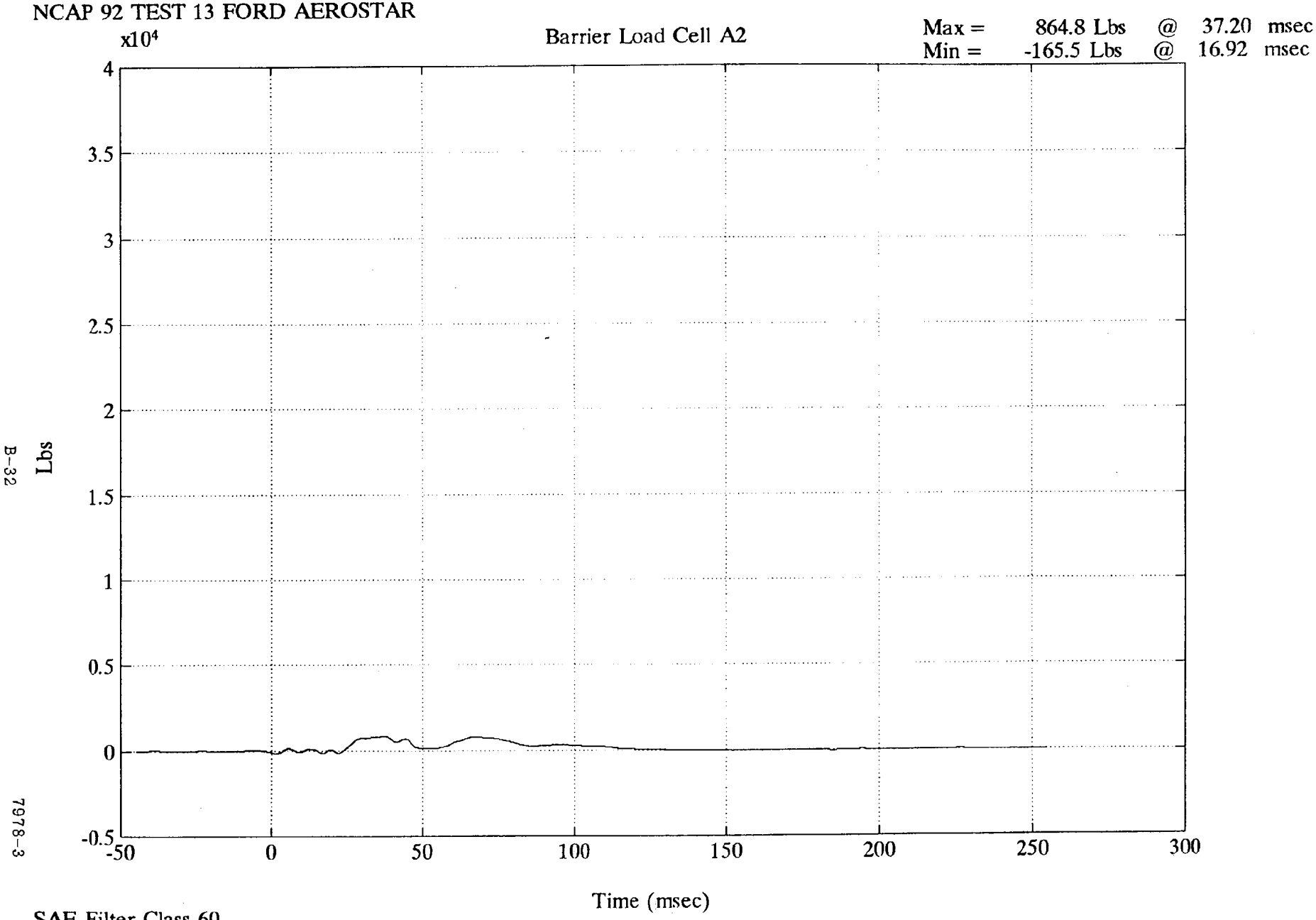
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

7978-3

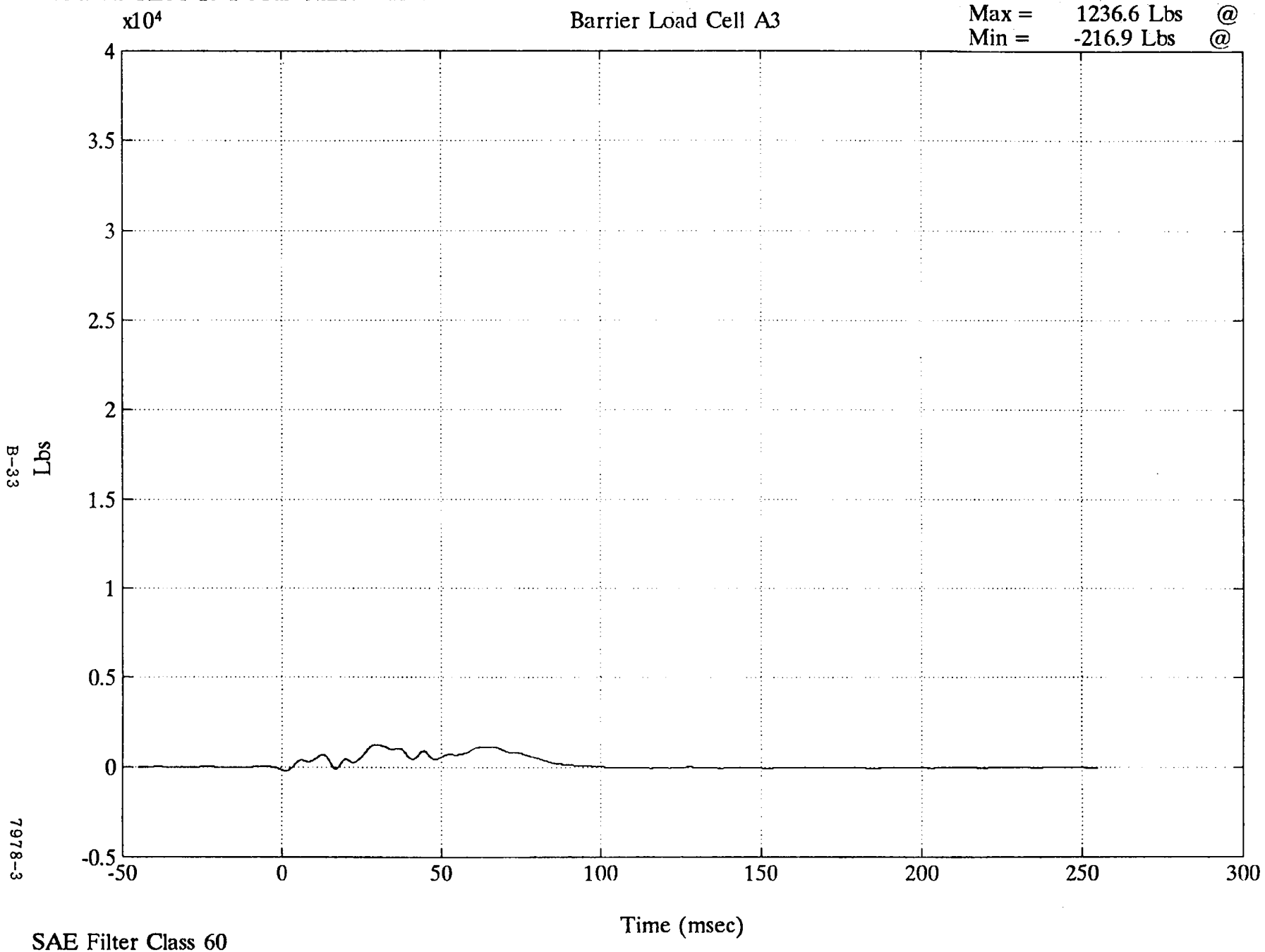
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

7978-3

NCAP 92 TEST 13 FORD AEROSTAR



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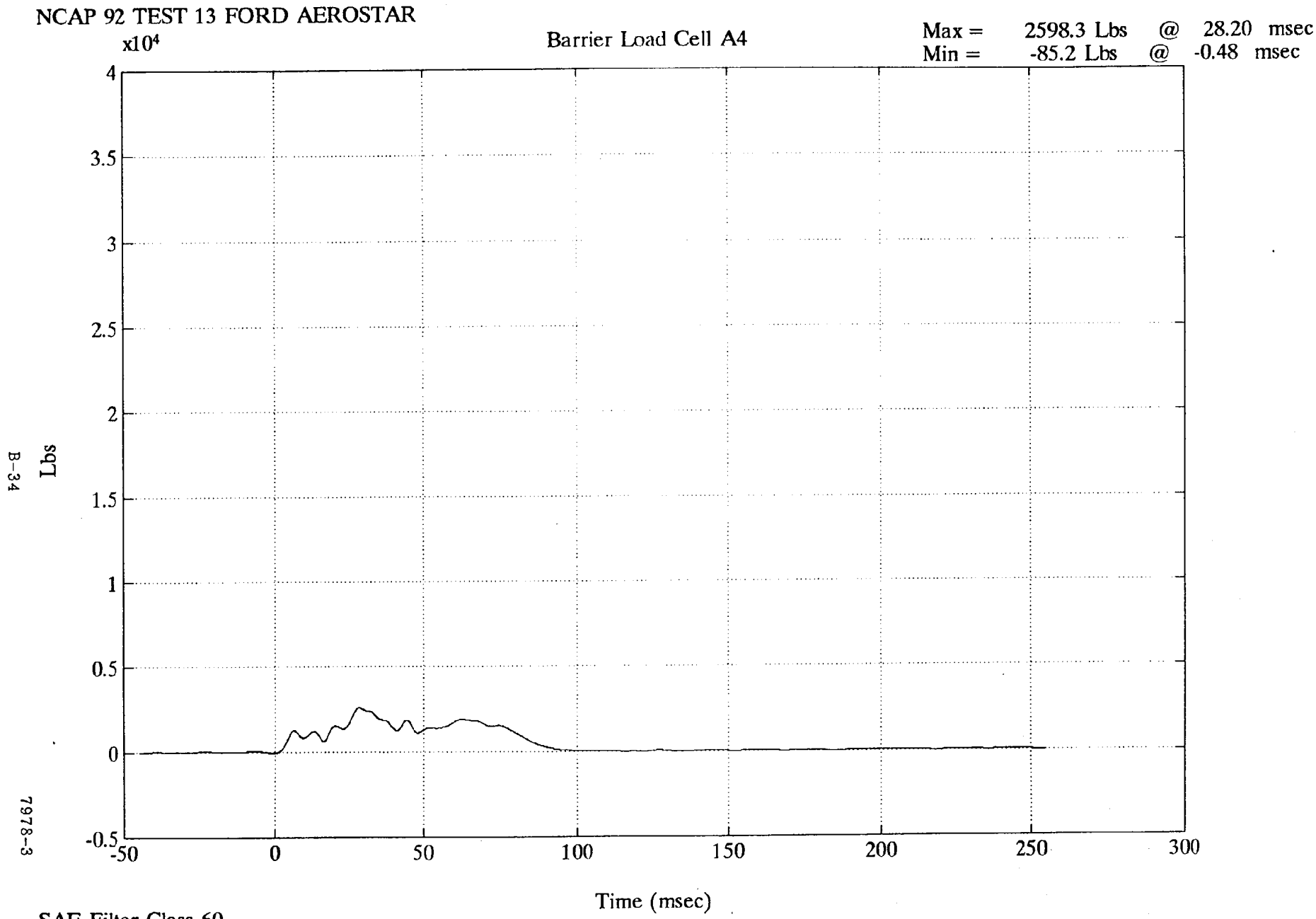
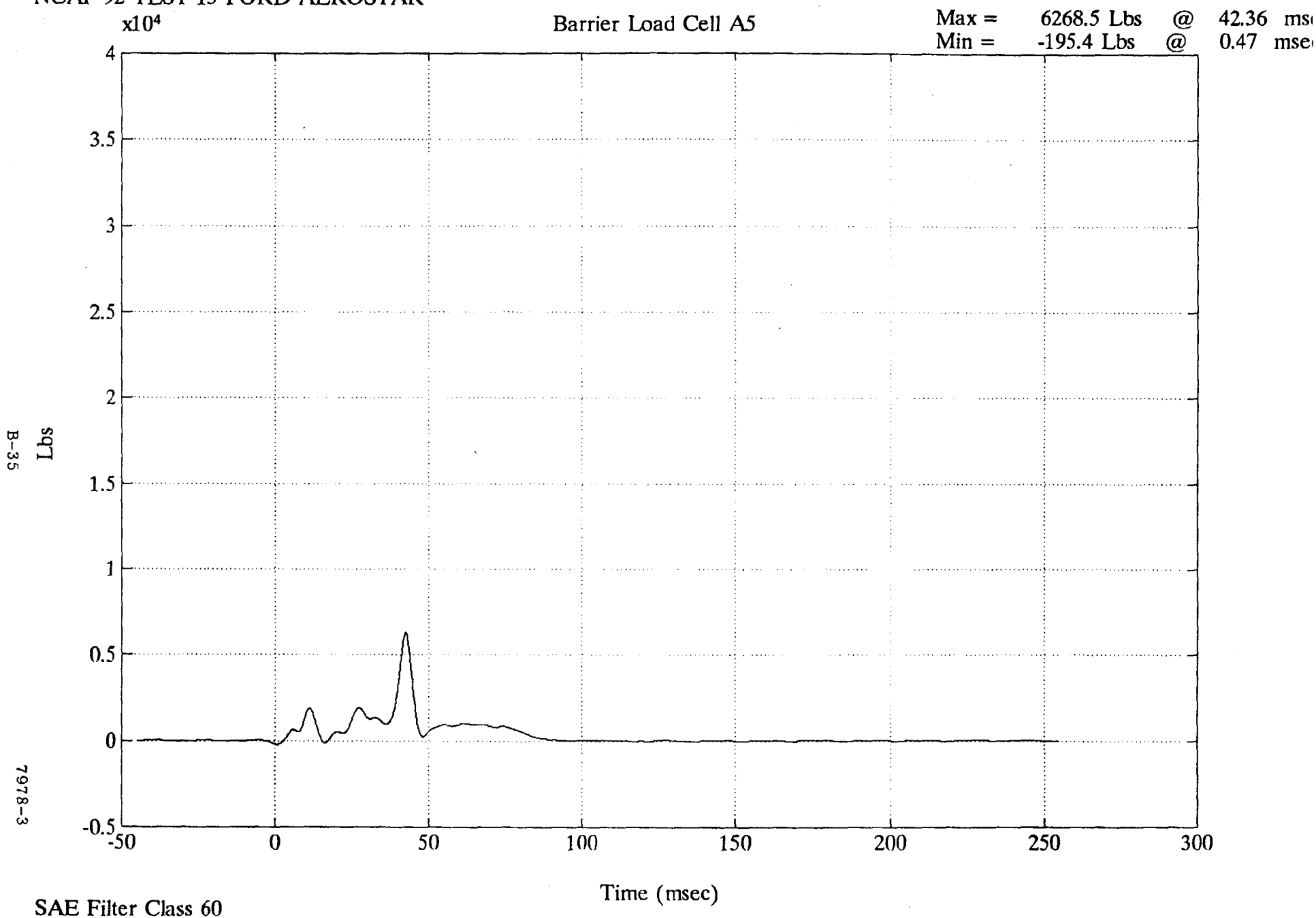
7978-3

SAE Filter Class 60


NCAP 92 TEST 13 FORD AEROSTAR
x10⁴
Barrier Load Cell A4
Max = 2598.3 Lbs @ 28.20 msec
Min = -85.2 Lbs @ -0.48 msec
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
Lbs
-50
0
50
100
150
200
250
300
Time (msec)
SAE Filter Class 60
B-34
7978-3

NCAP 92 TEST 13 FORD AEROSTAR

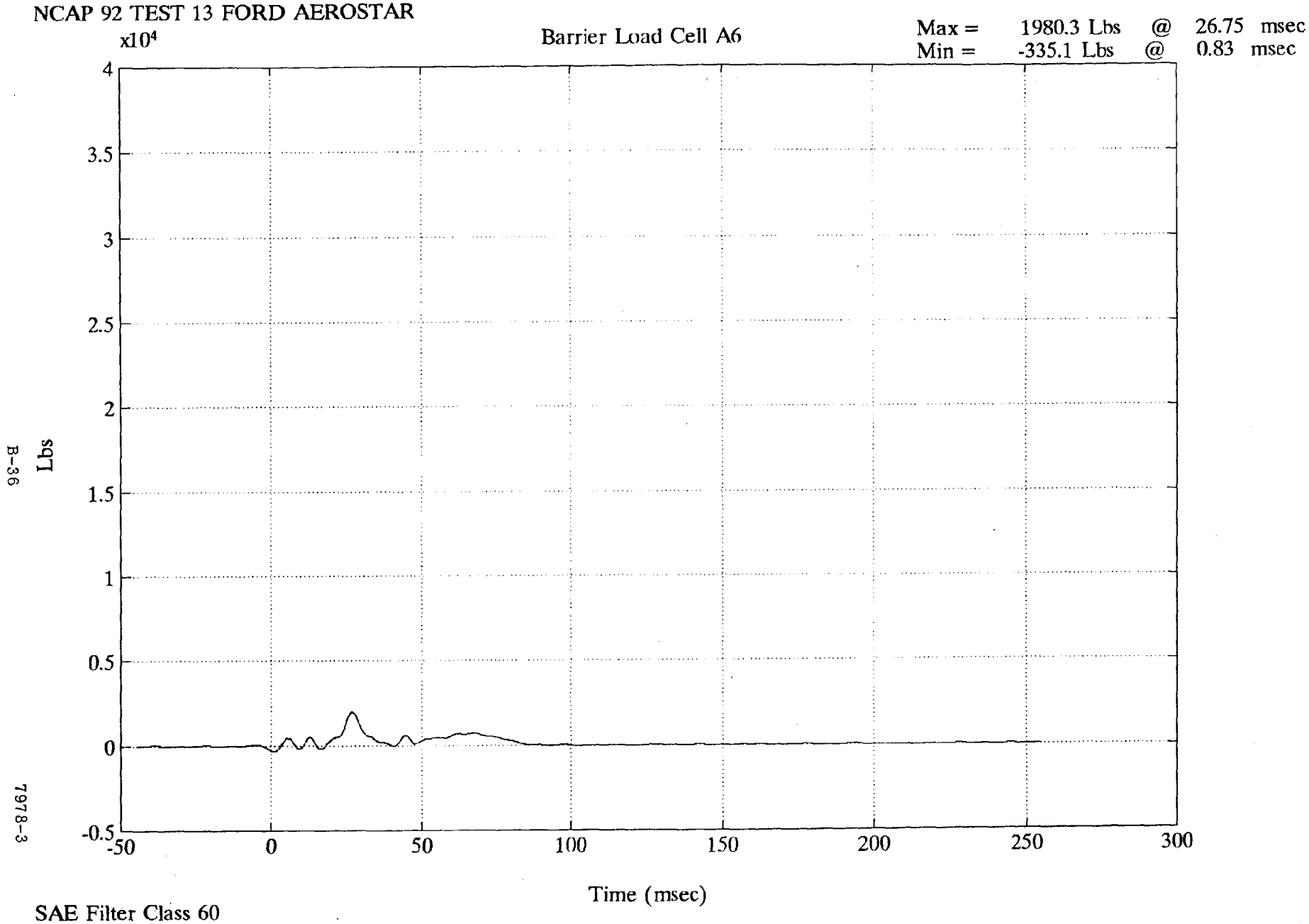


B-35

7978-3

SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR

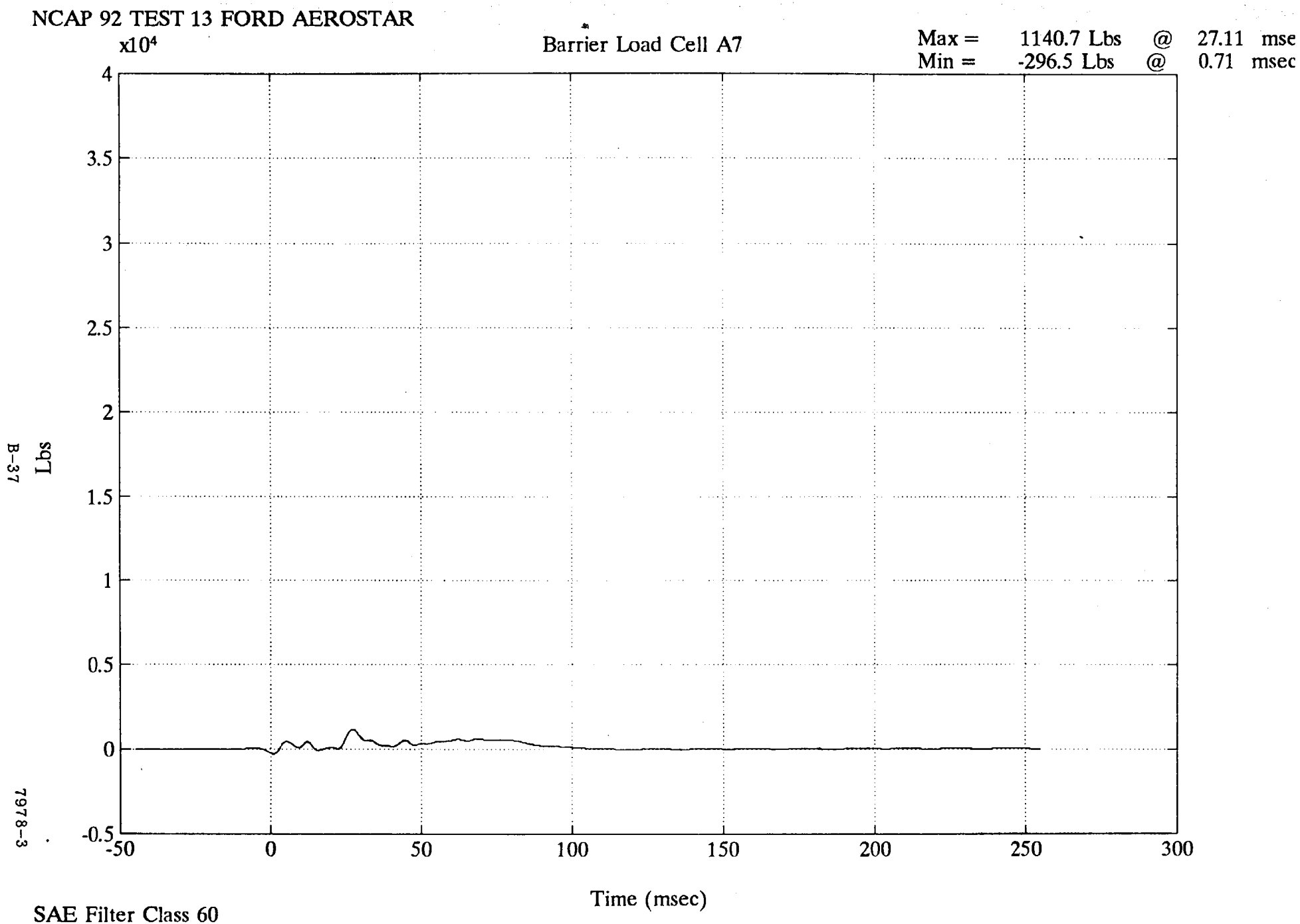


B-36

7978-3

SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR

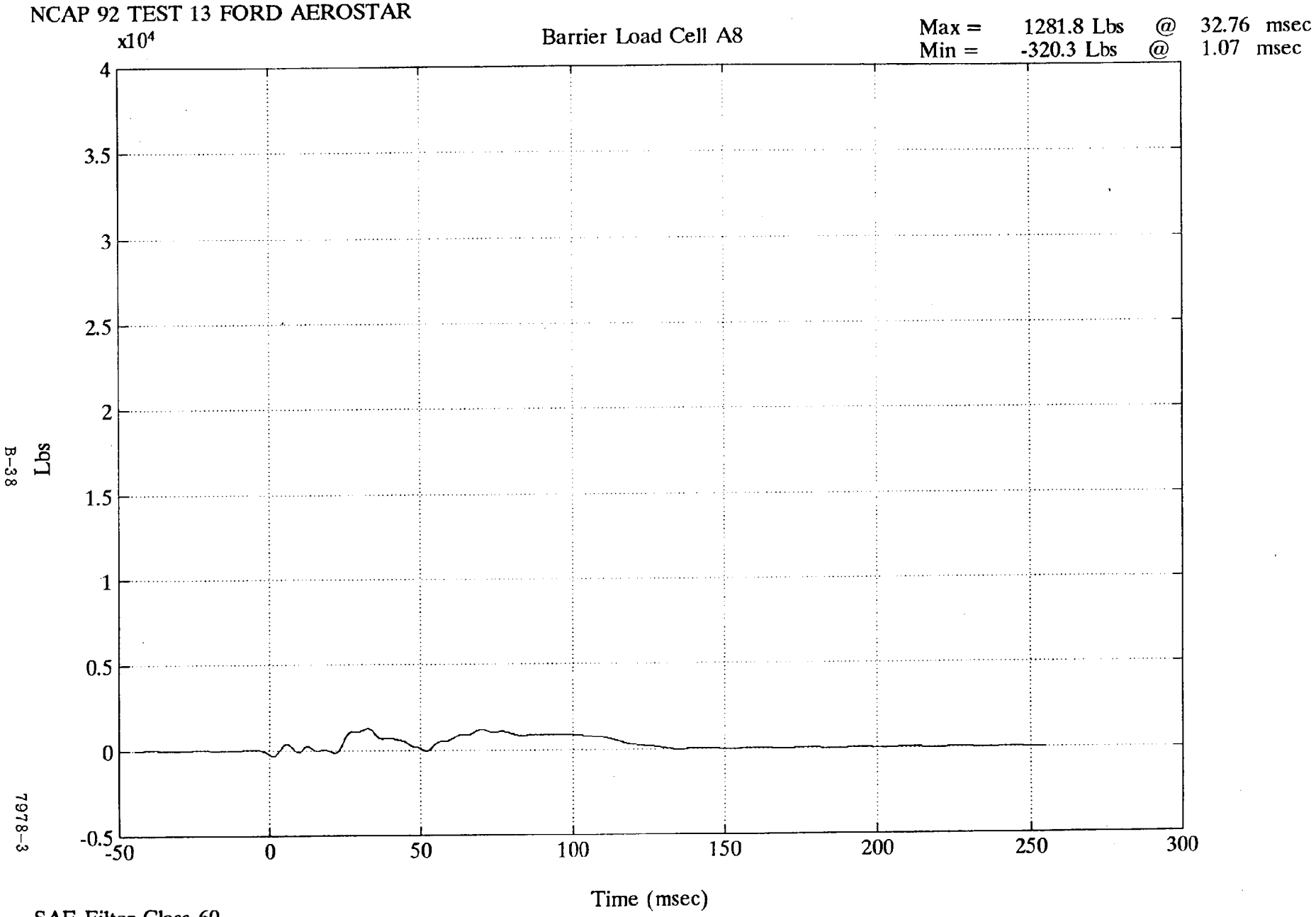


B-37

7978-3

SAE Filter Class 60

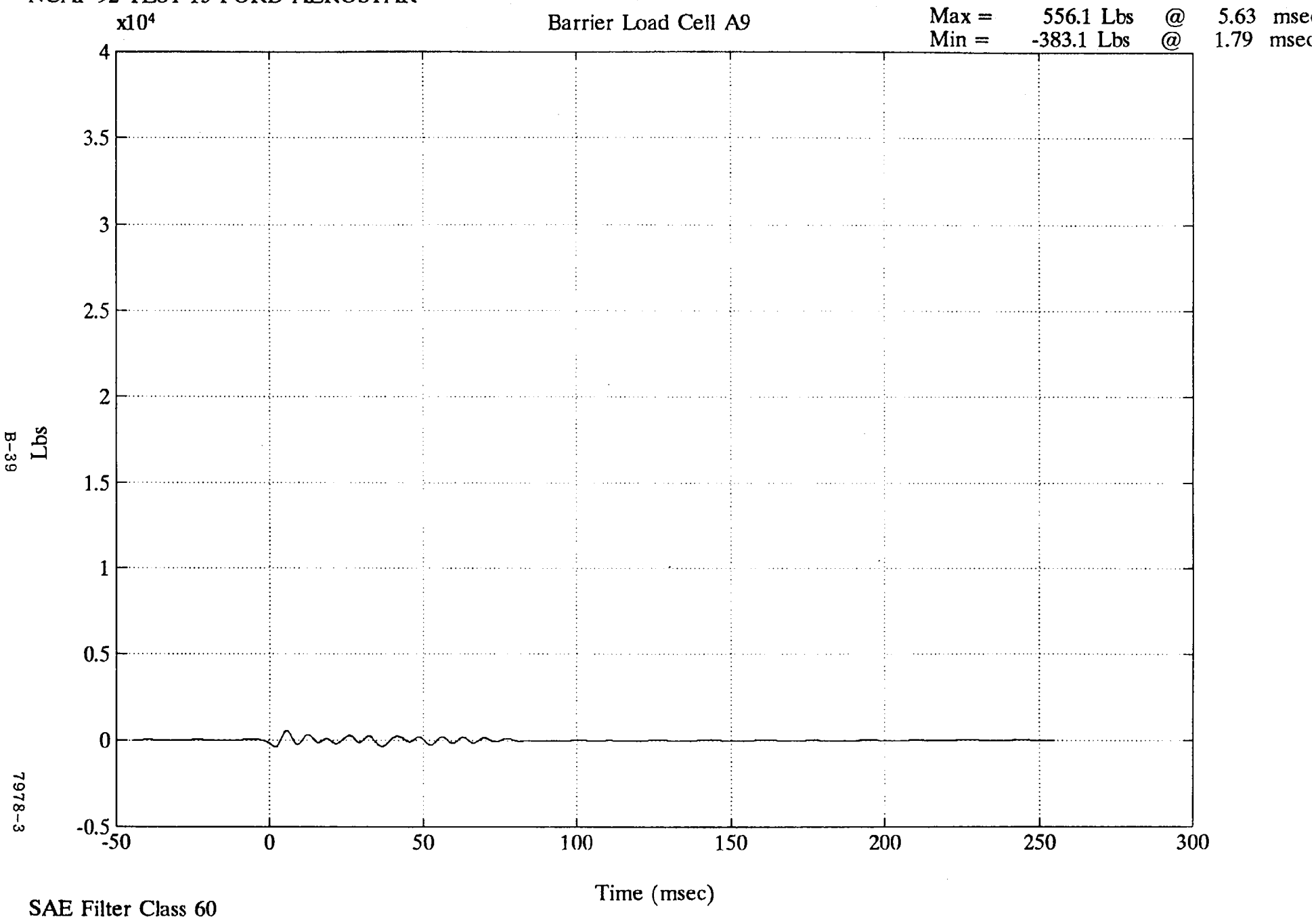
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

7978-3

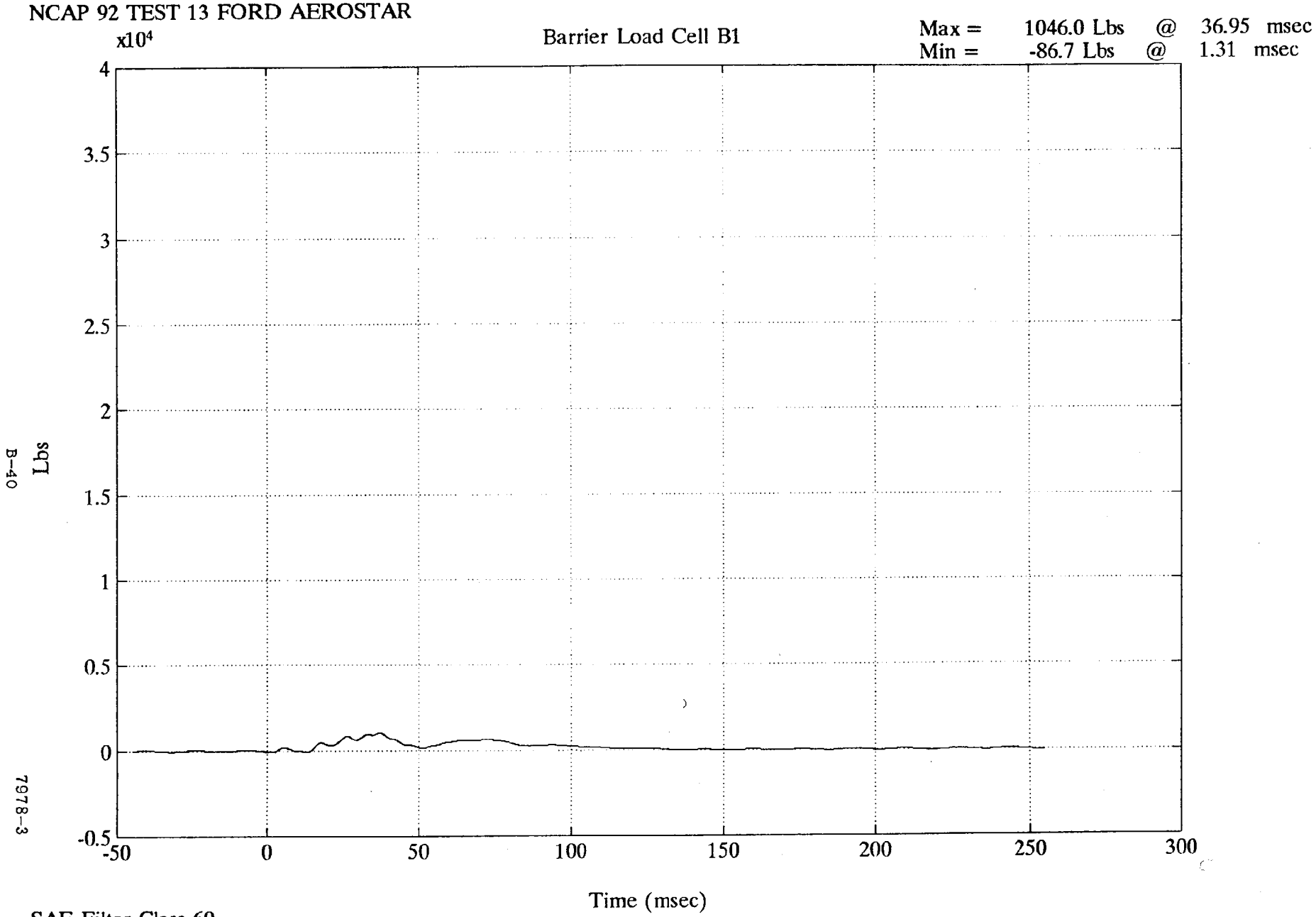
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

7978-3

NCAP 92 TEST 13 FORD AEROSTAR



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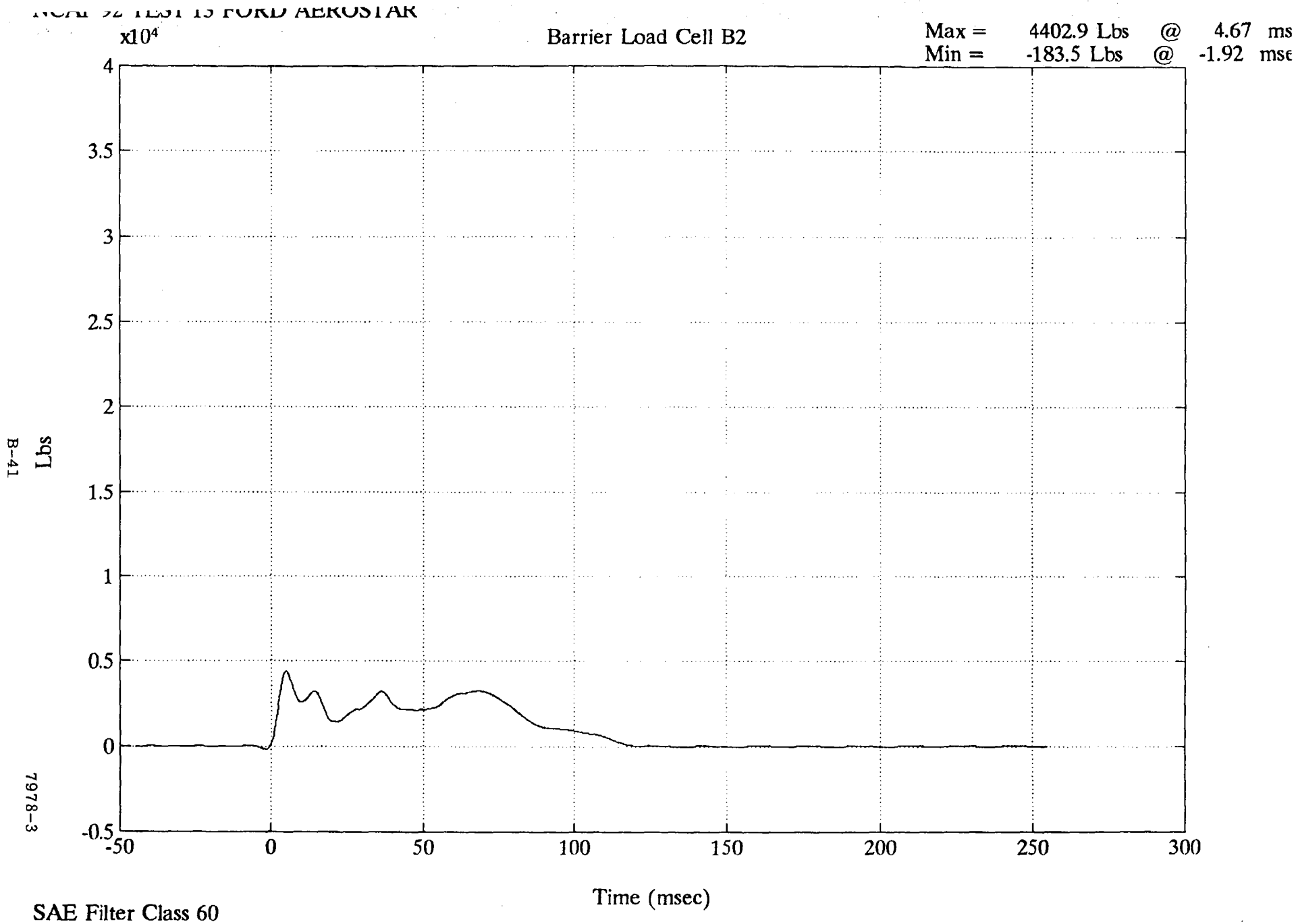
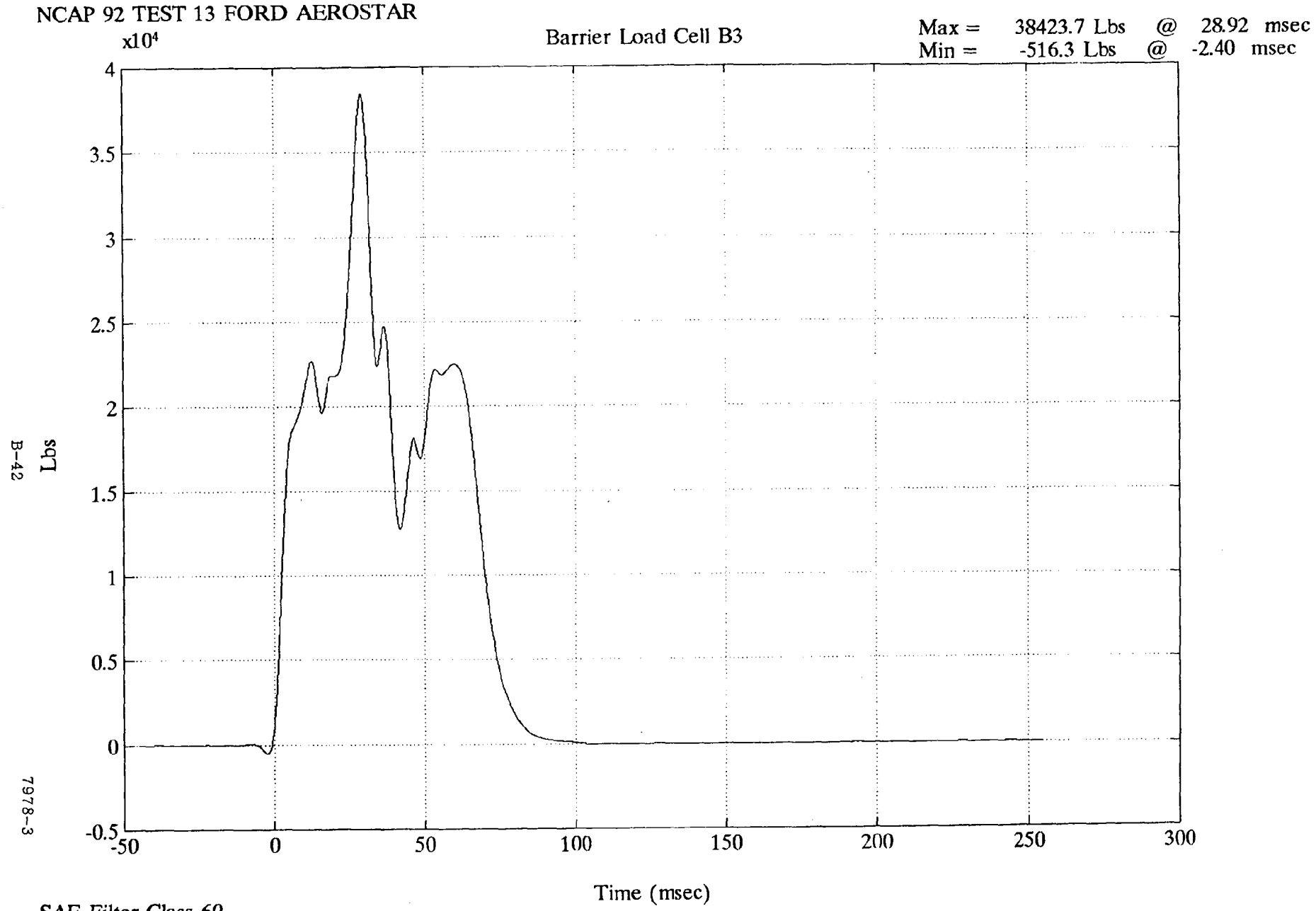
7978-3

SAE Filter Class 60



SAE Filter Class 60

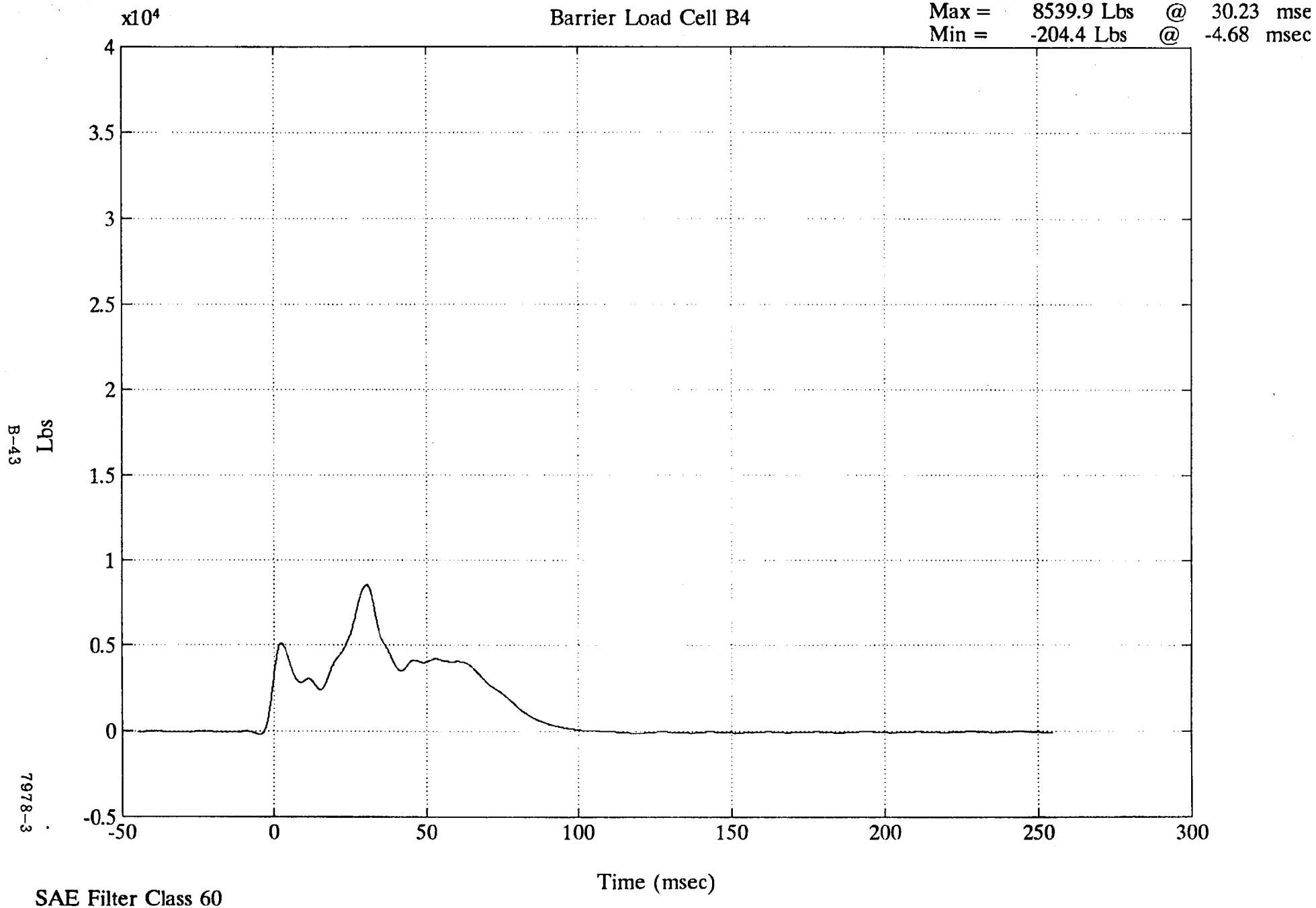
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

7978-3

NCAP 92 TEST 13 FORD AEROSTAR

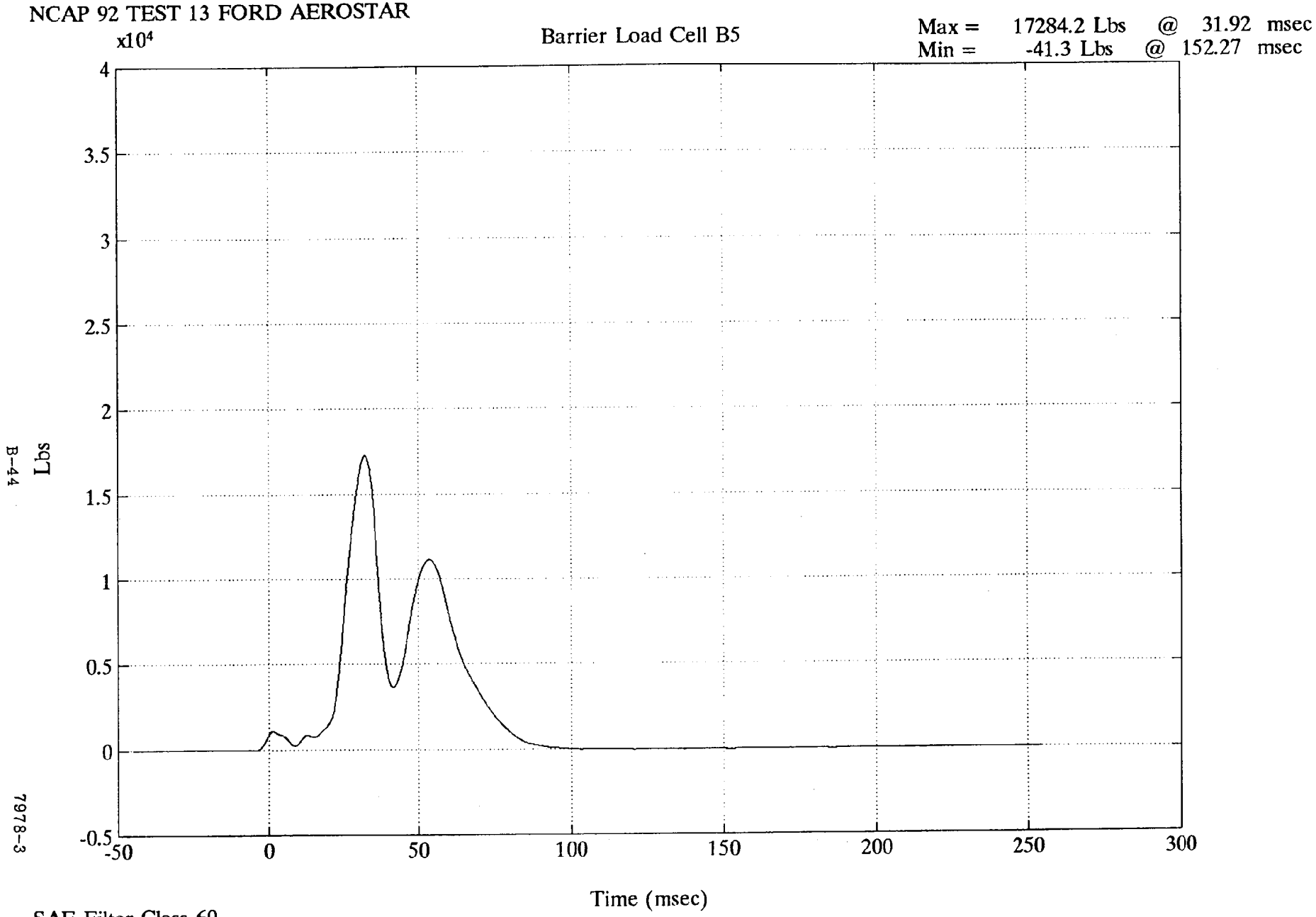


B-43

7978-3

SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR

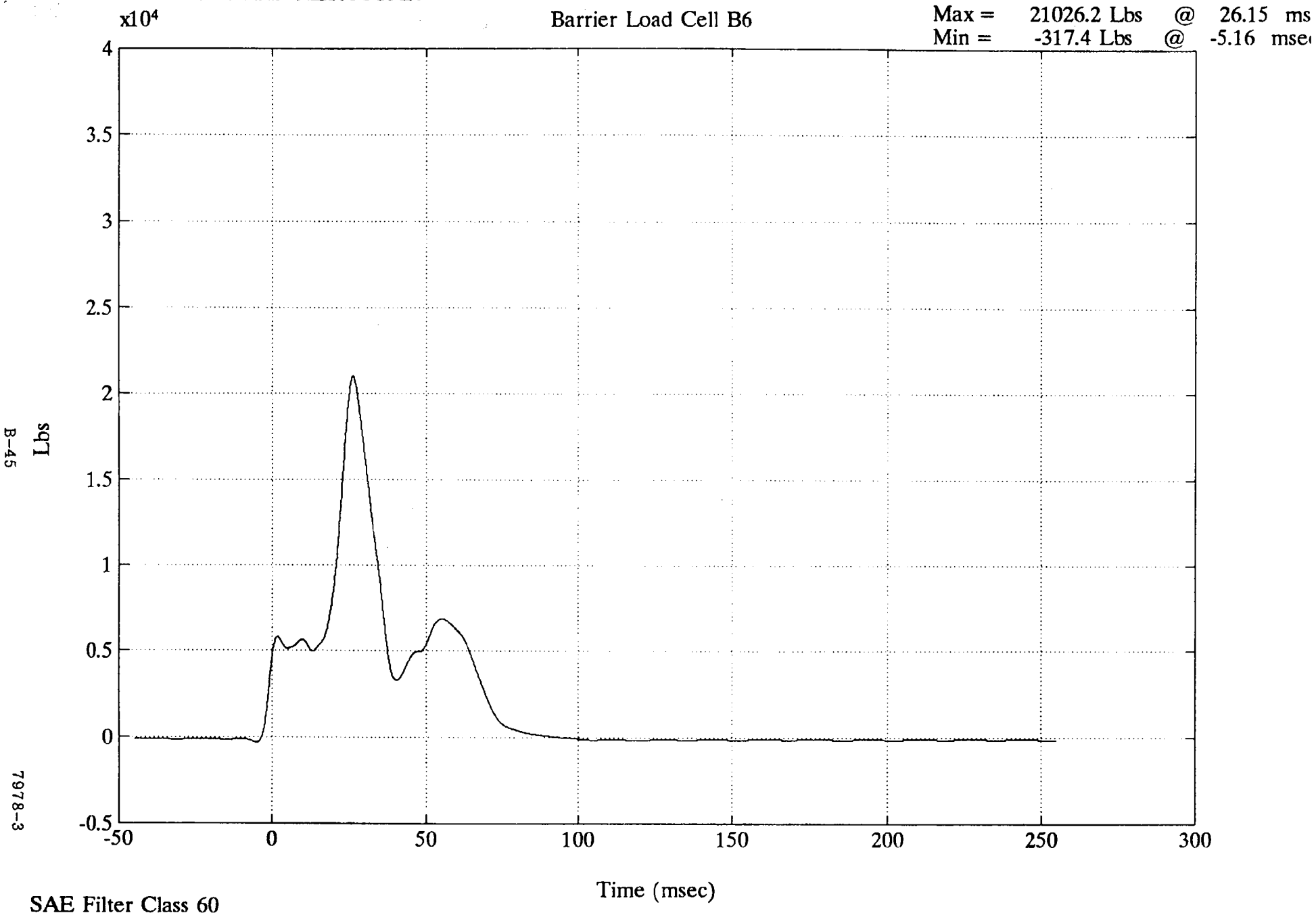


B-44

7978-3

SAE Filter Class 60

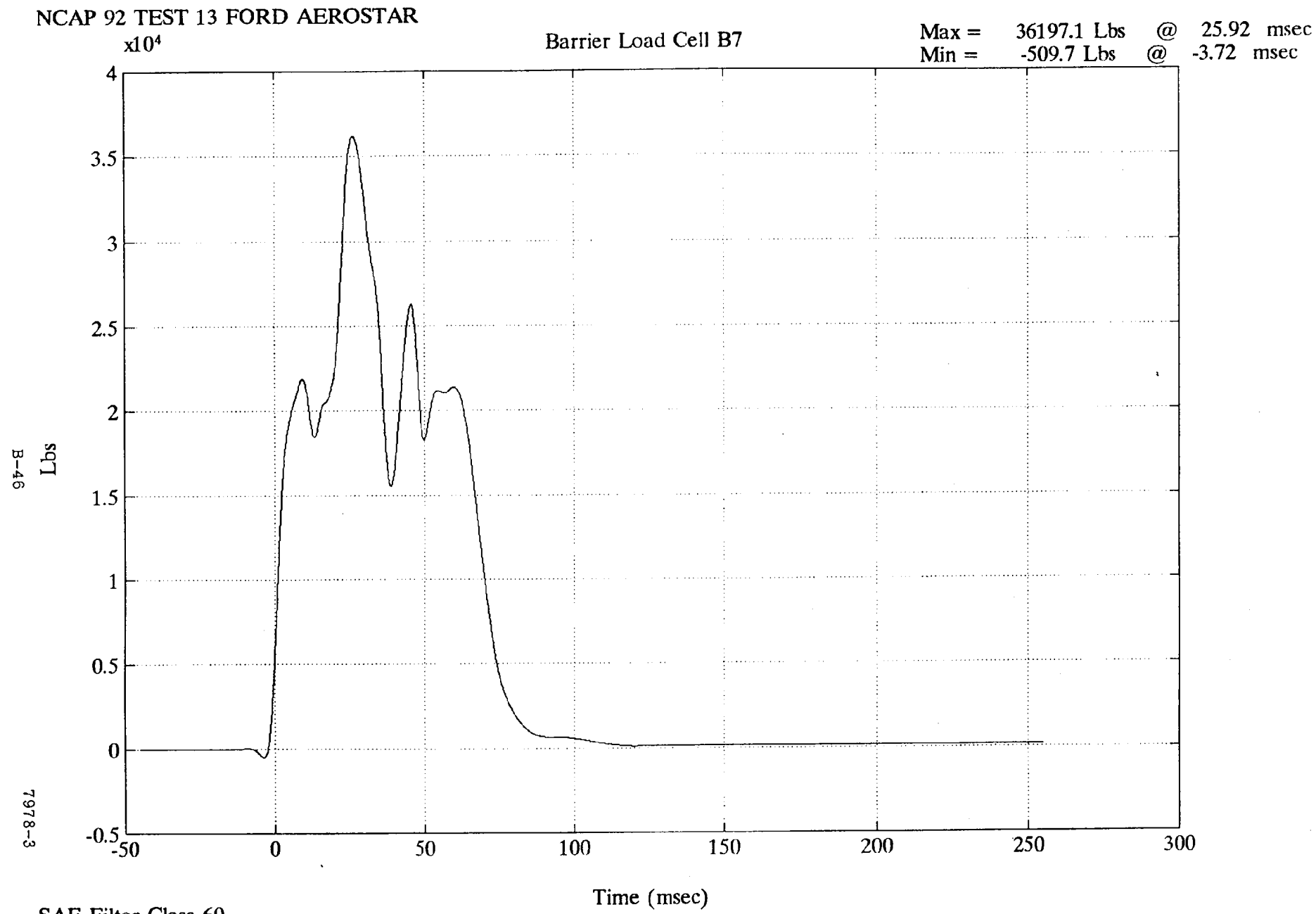
NCAP 92 TEST 13 FORD AEROSTAR



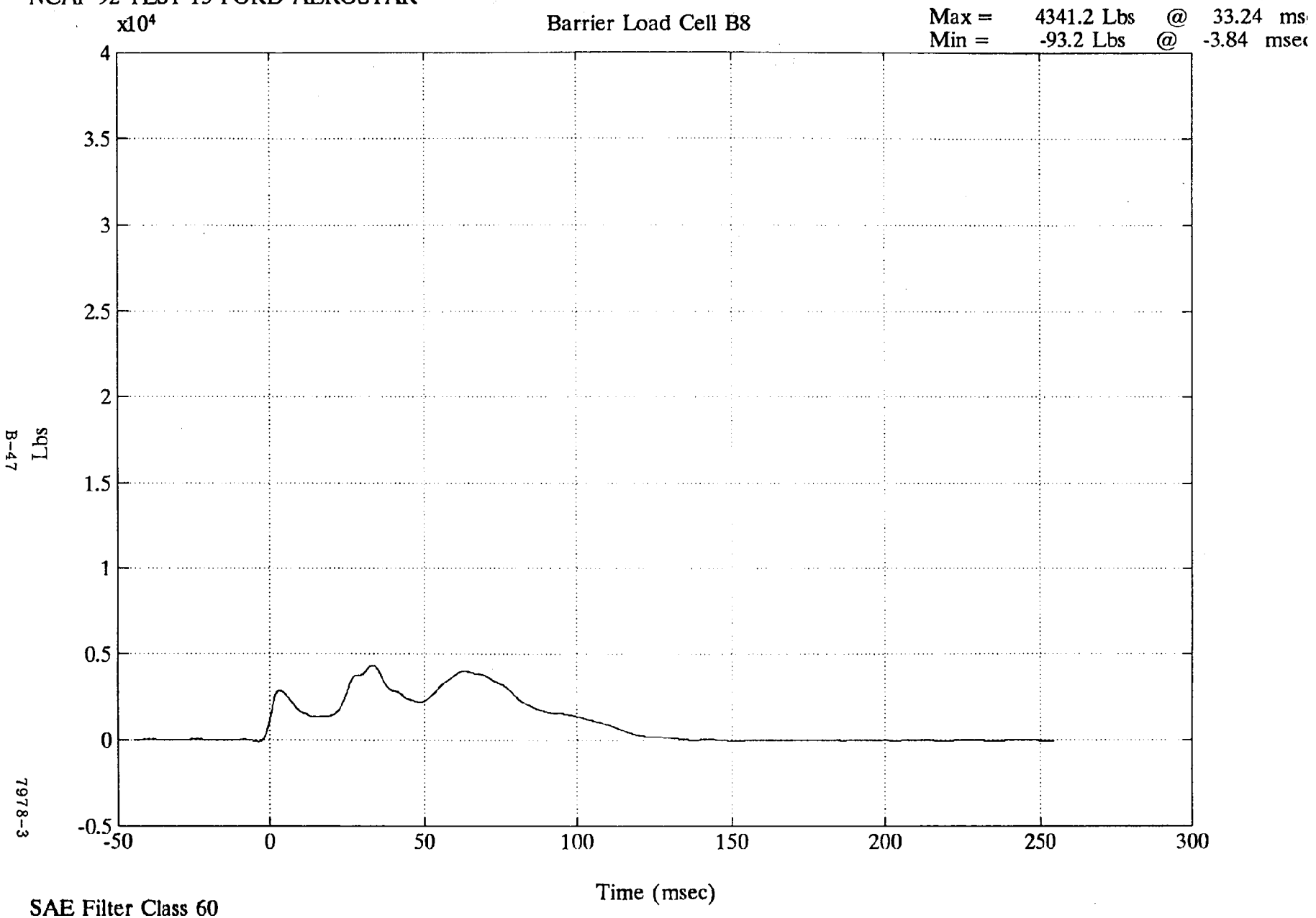
B-45

7978-3

SAE Filter Class 60


NCAP 92 TEST 13 FORD AEROSTAR
x10^4
Barrier Load Cell B7
Max = 36197.1 Lbs @ 25.92 msec
Min = -509.7 Lbs @ -3.72 msec
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
Lbs
-50
0
50
100
150
200
250
300
Time (msec)
B-46
7978-3
SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR

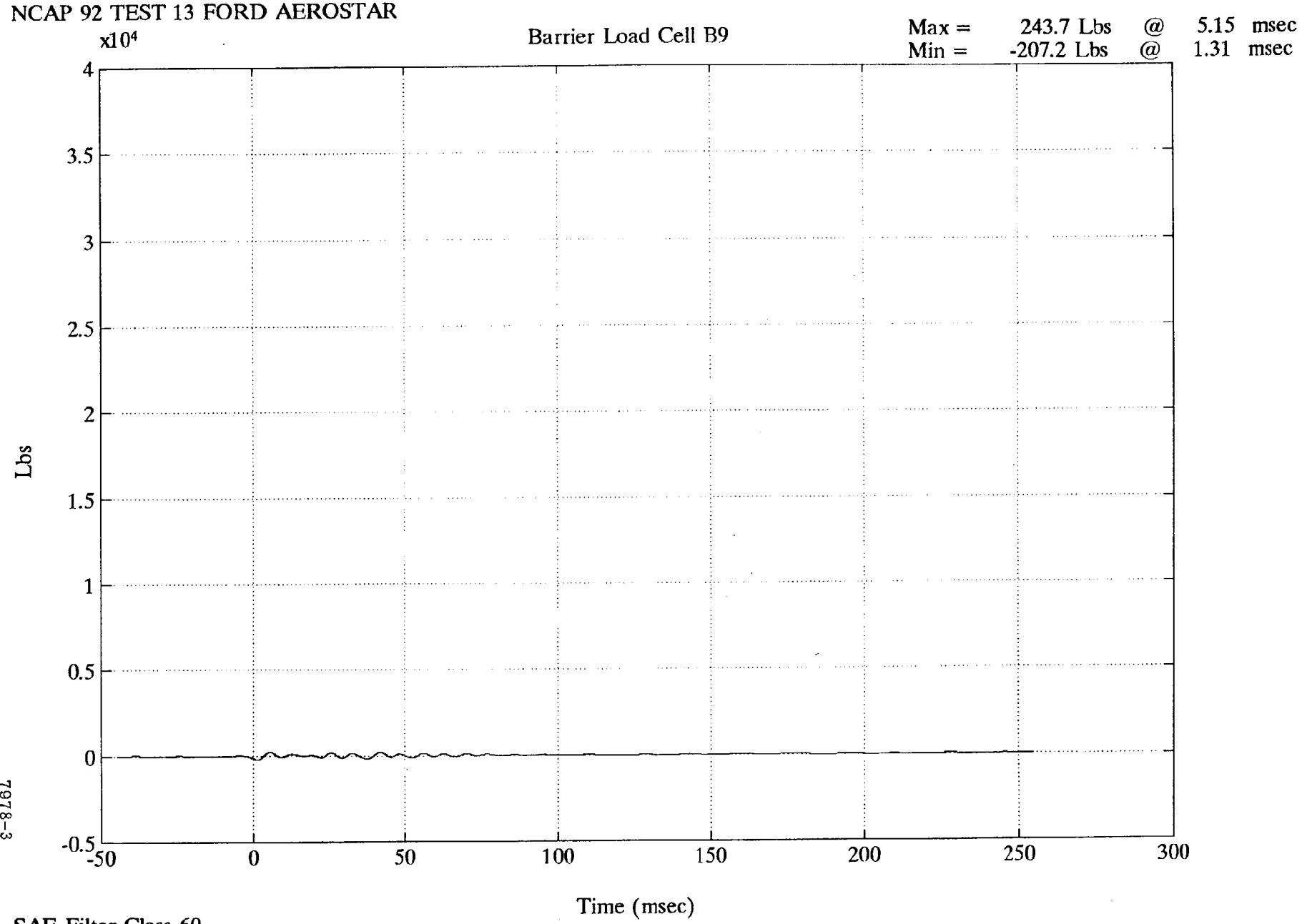


B-47

7978-3

SAE Filter Class 60

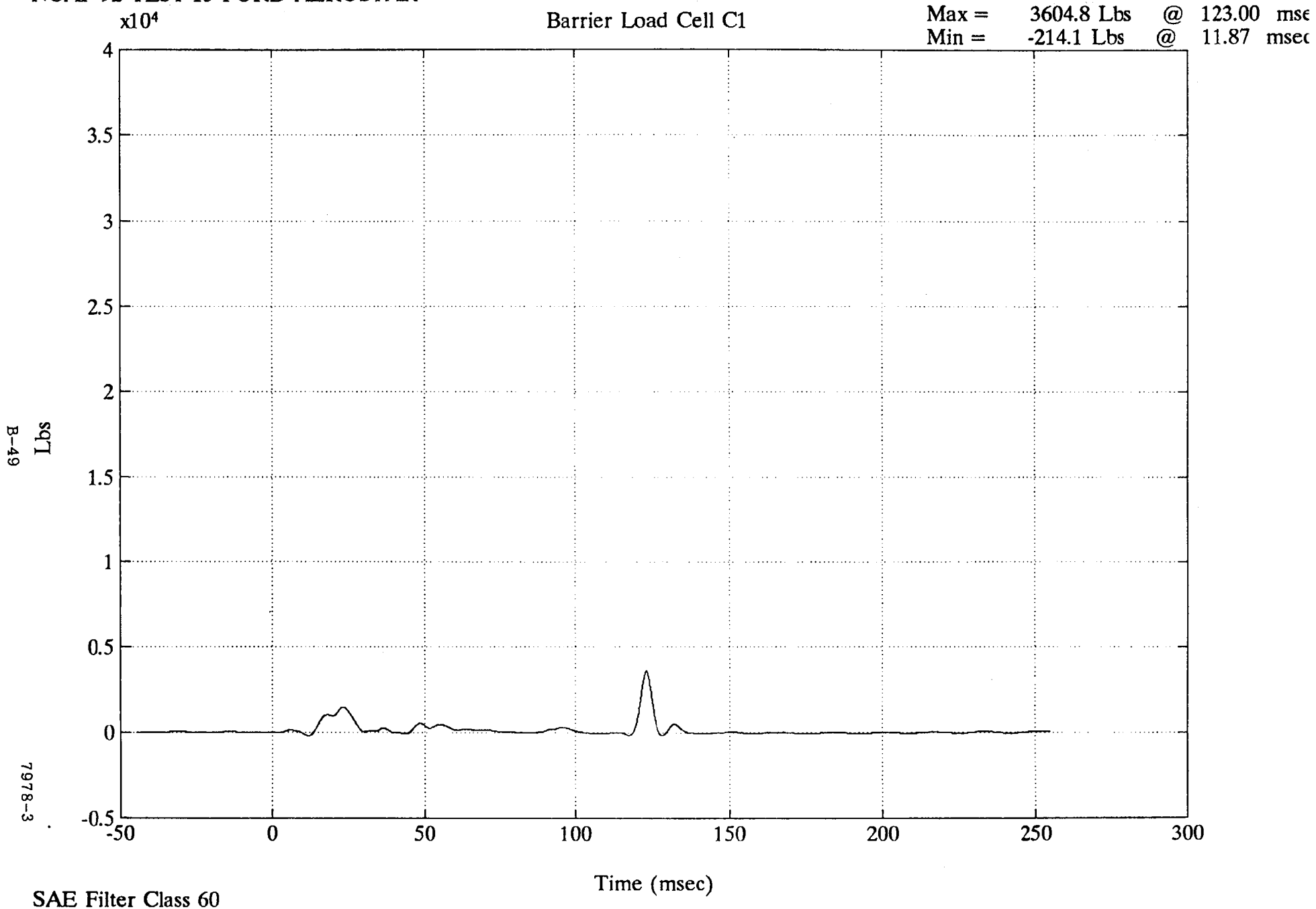
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

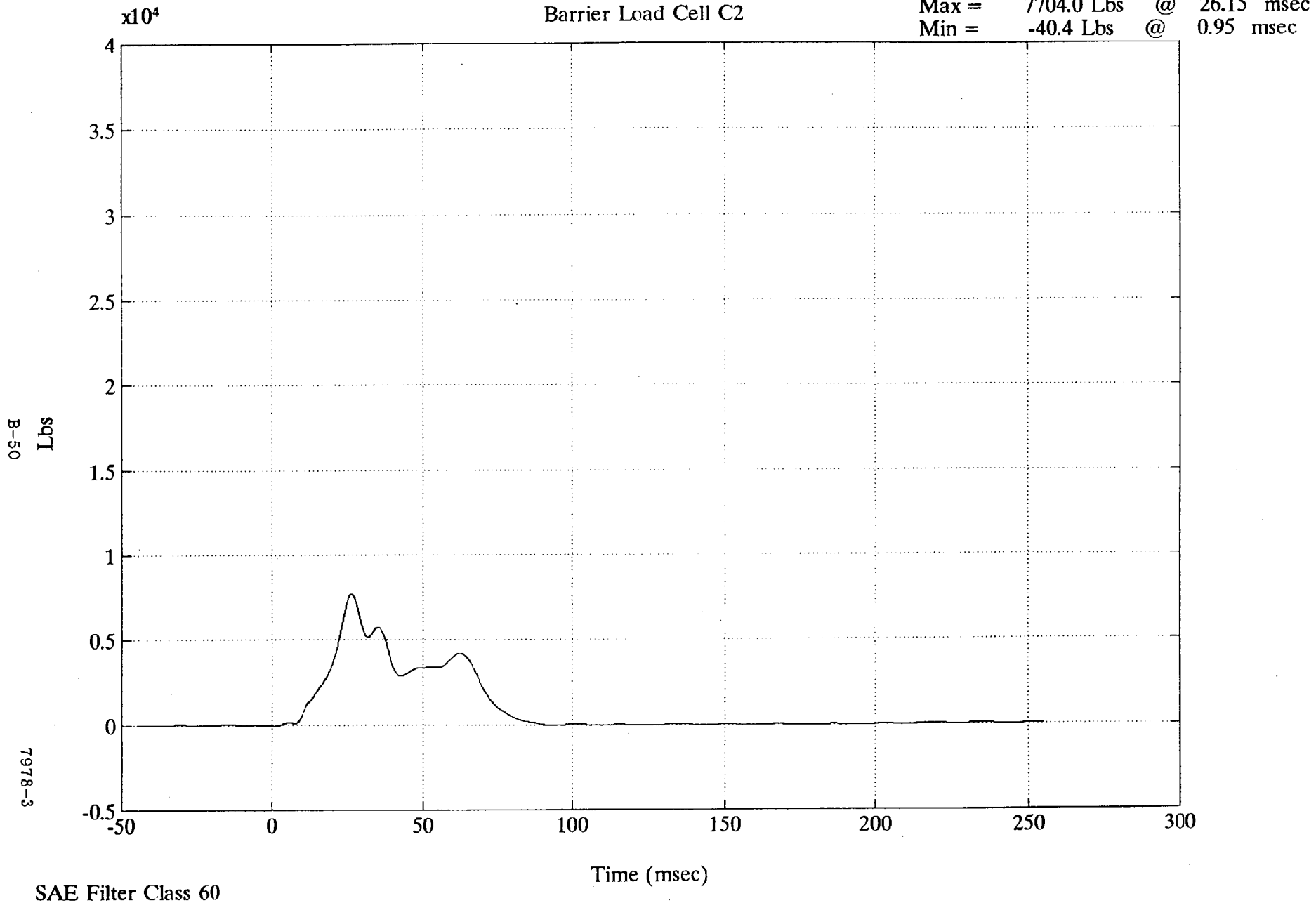
7978-3

NCAP 92 TEST 13 FORD AEROSTAR



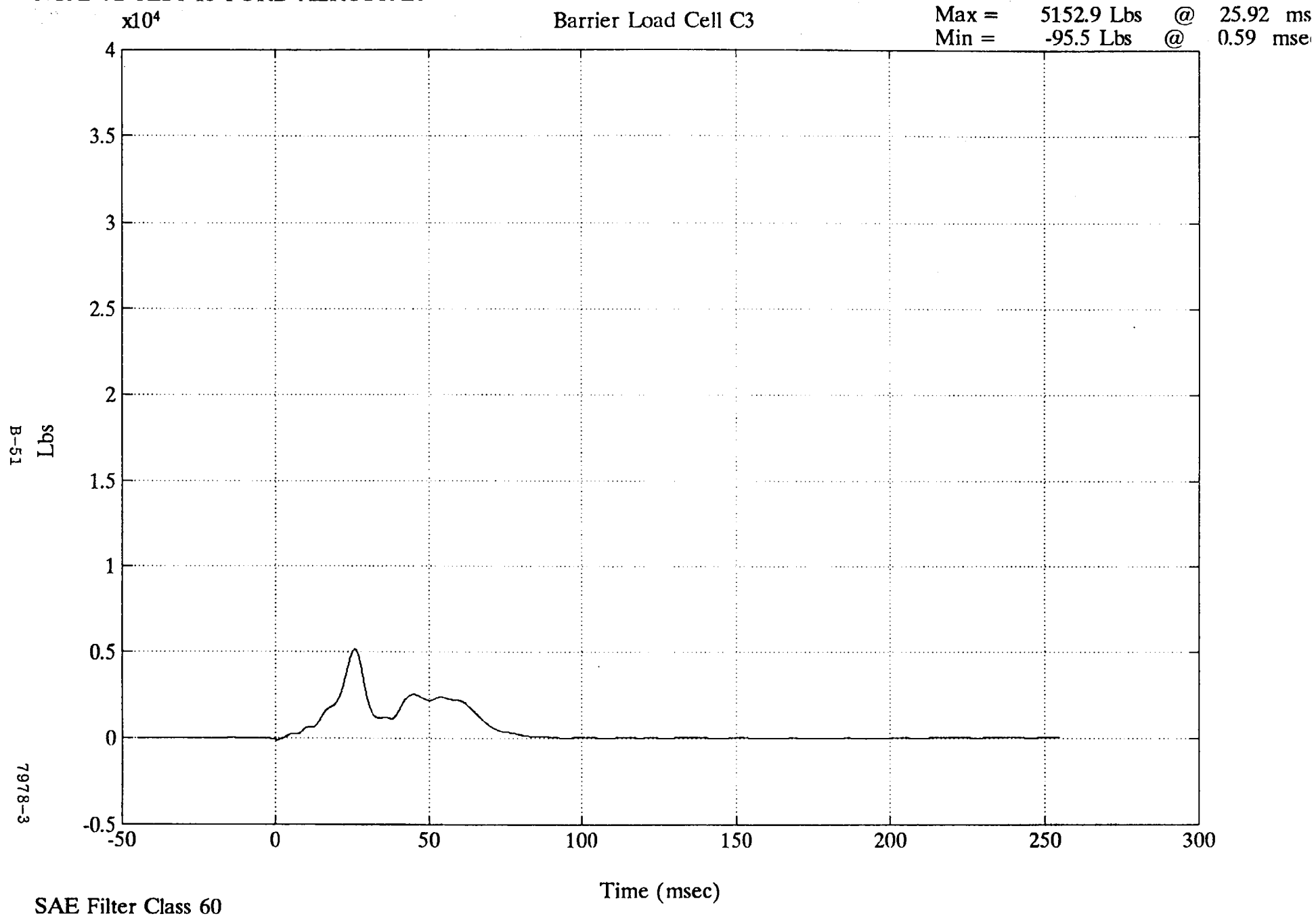
SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR

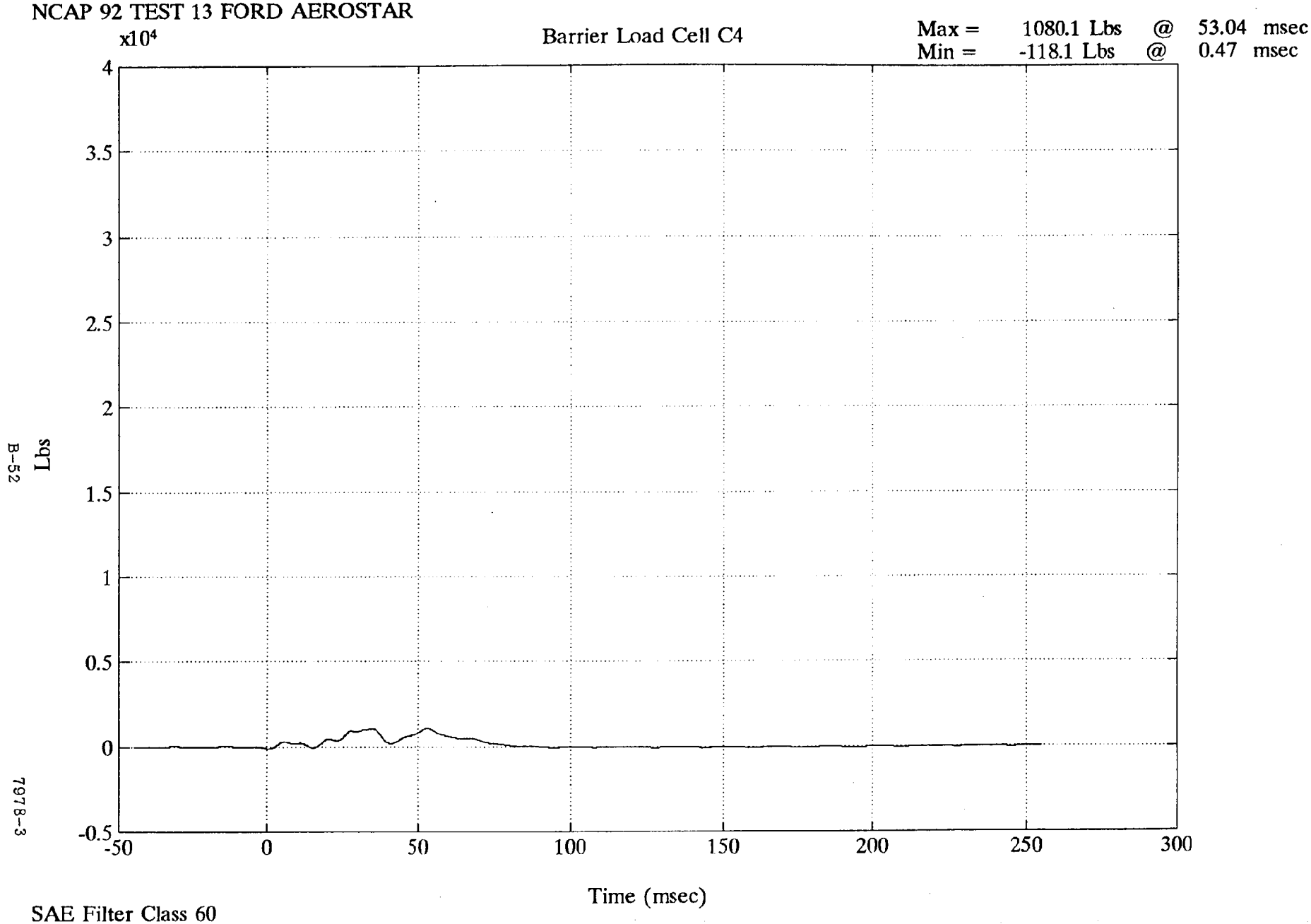


B-51

7978-3

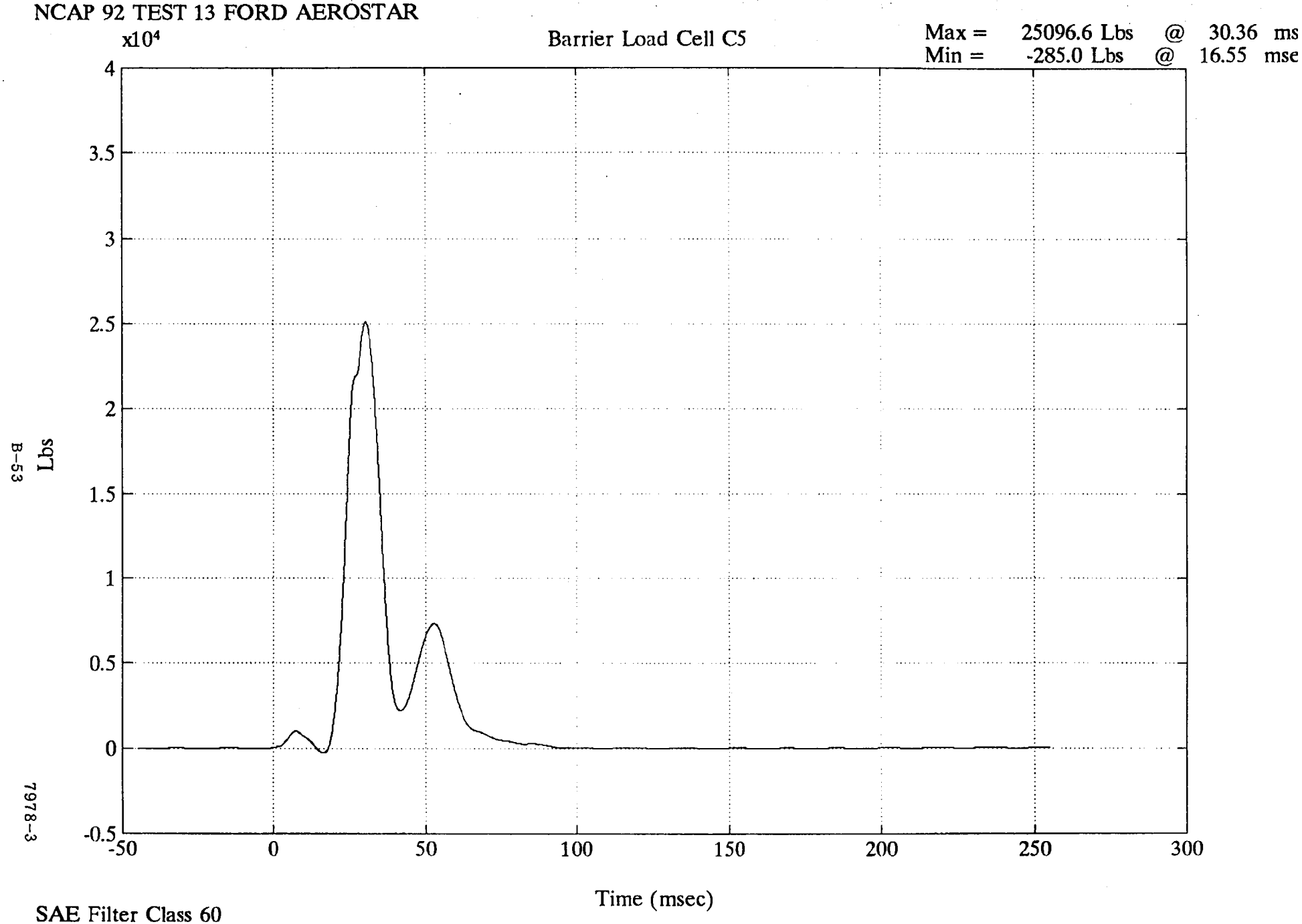
SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR



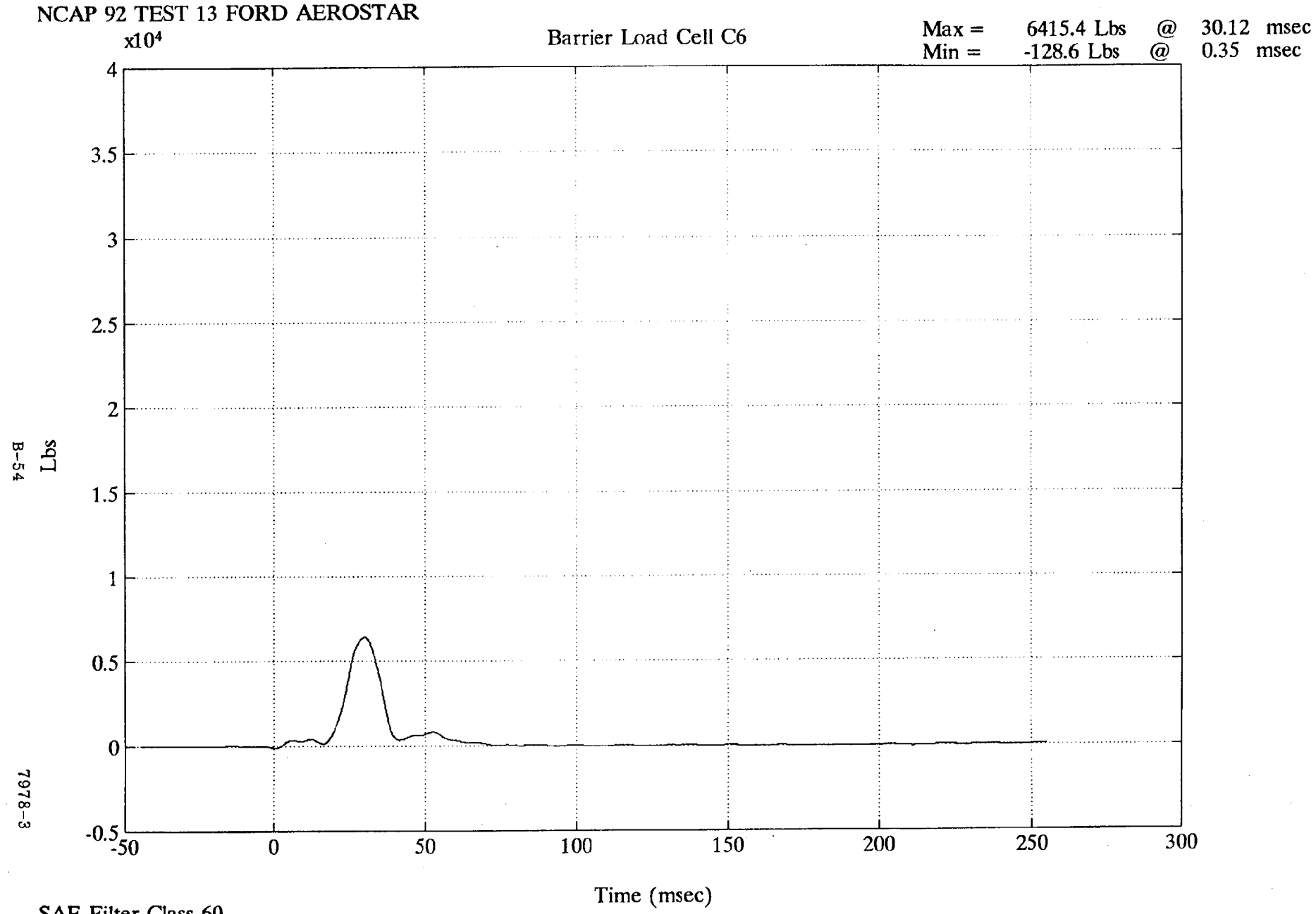
SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR

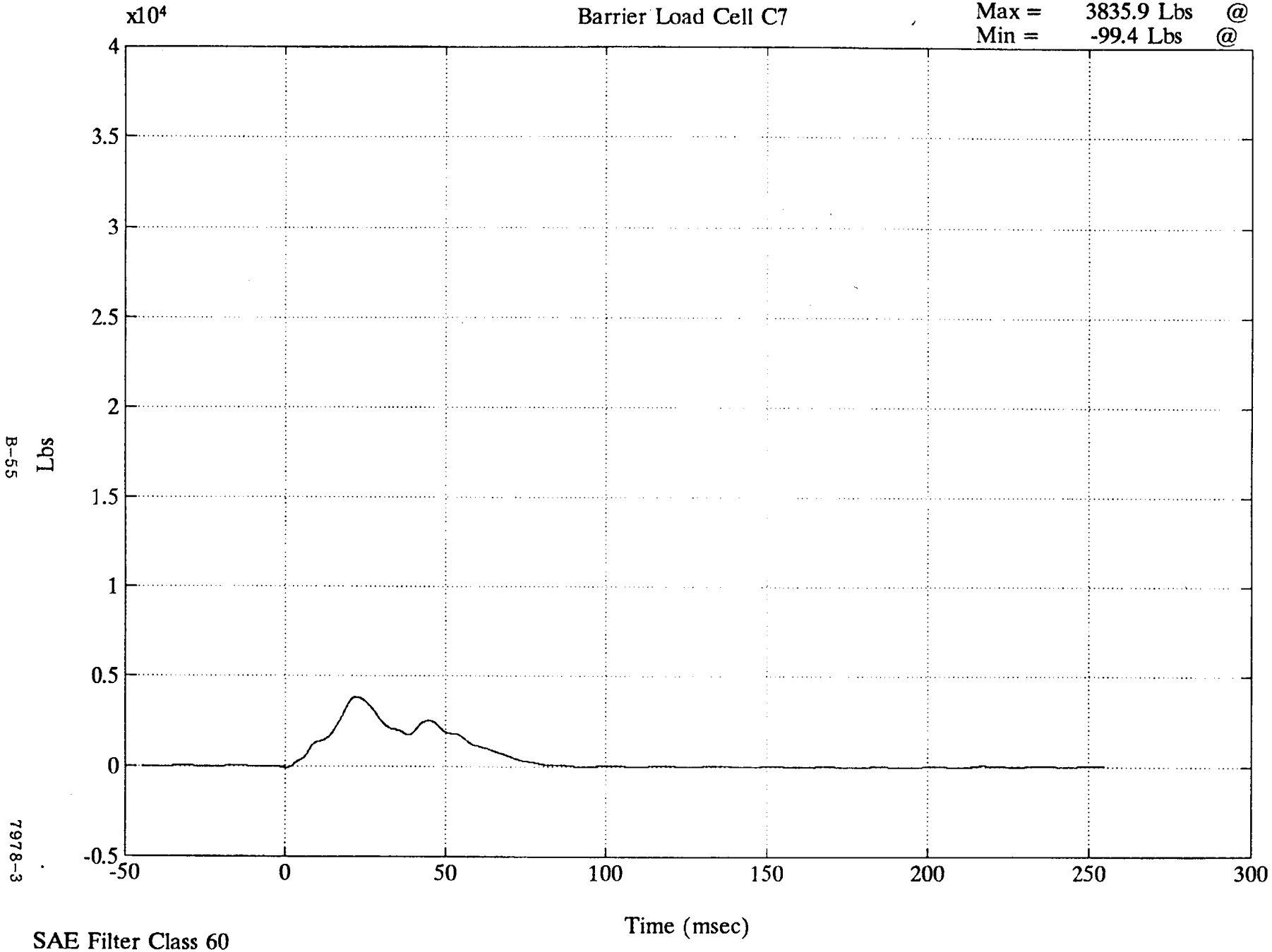


B-54

7978-3

SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR

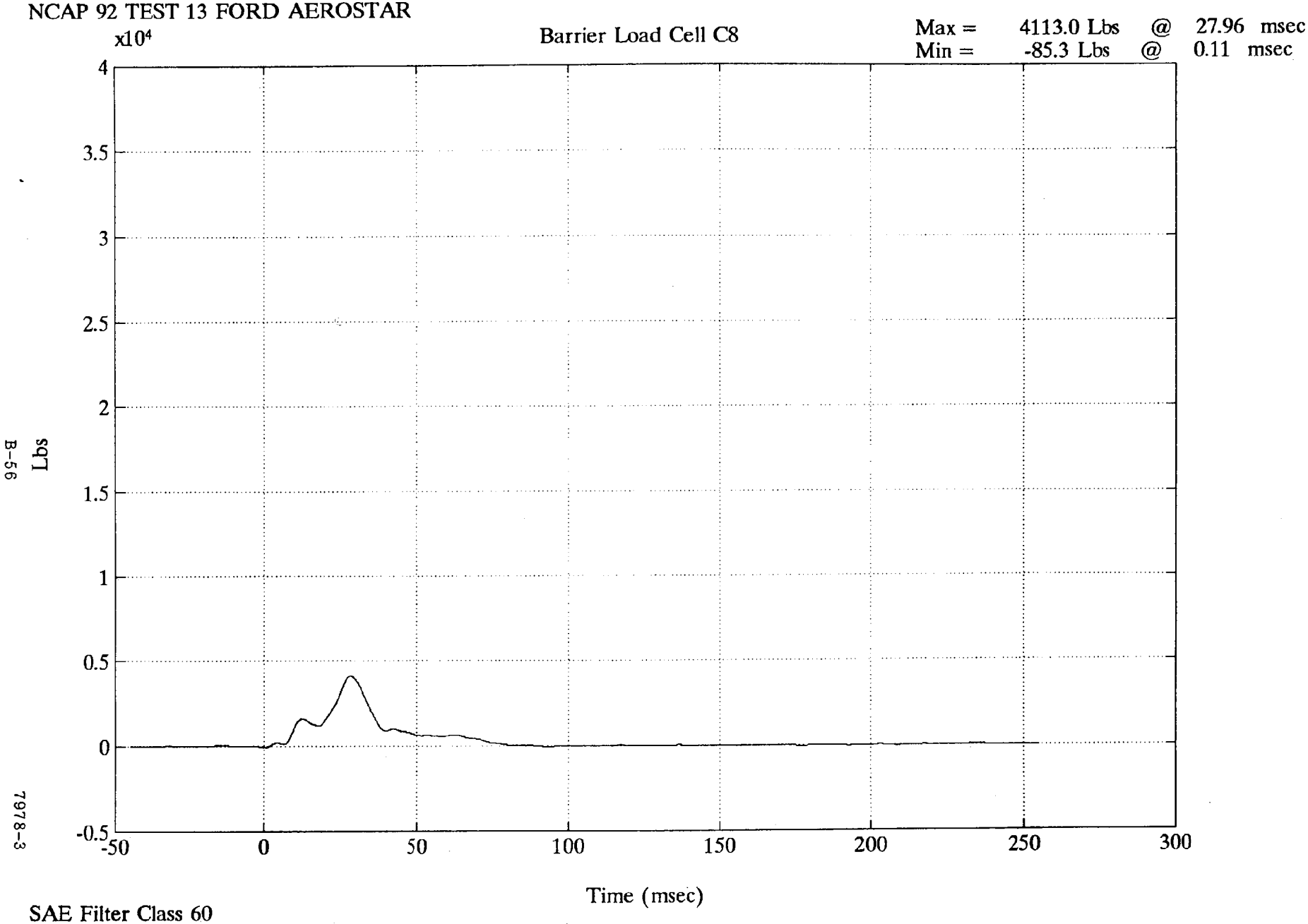


B-55

7978-3

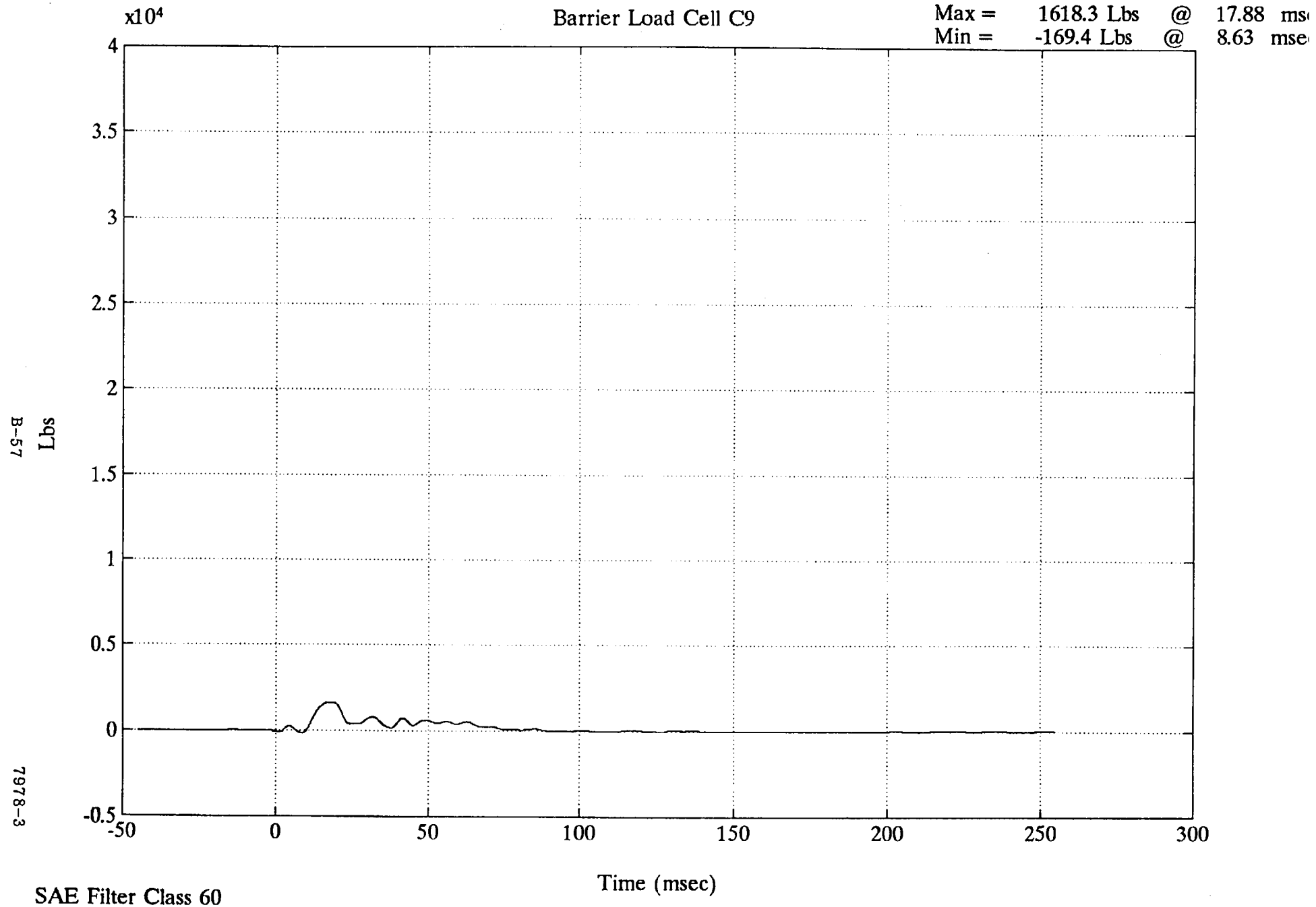
SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR

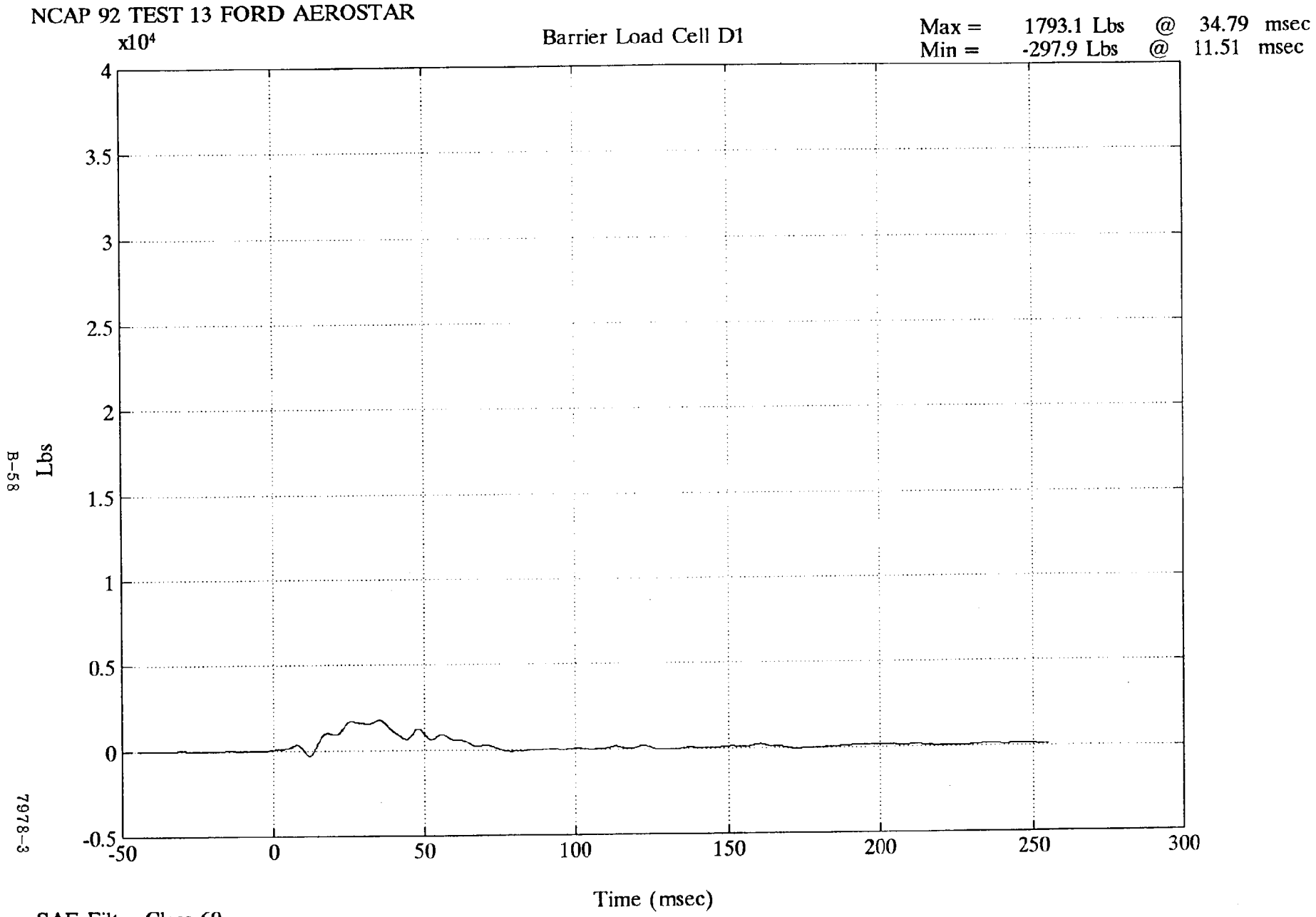


B-57

7978-3

SAE Filter Class 60

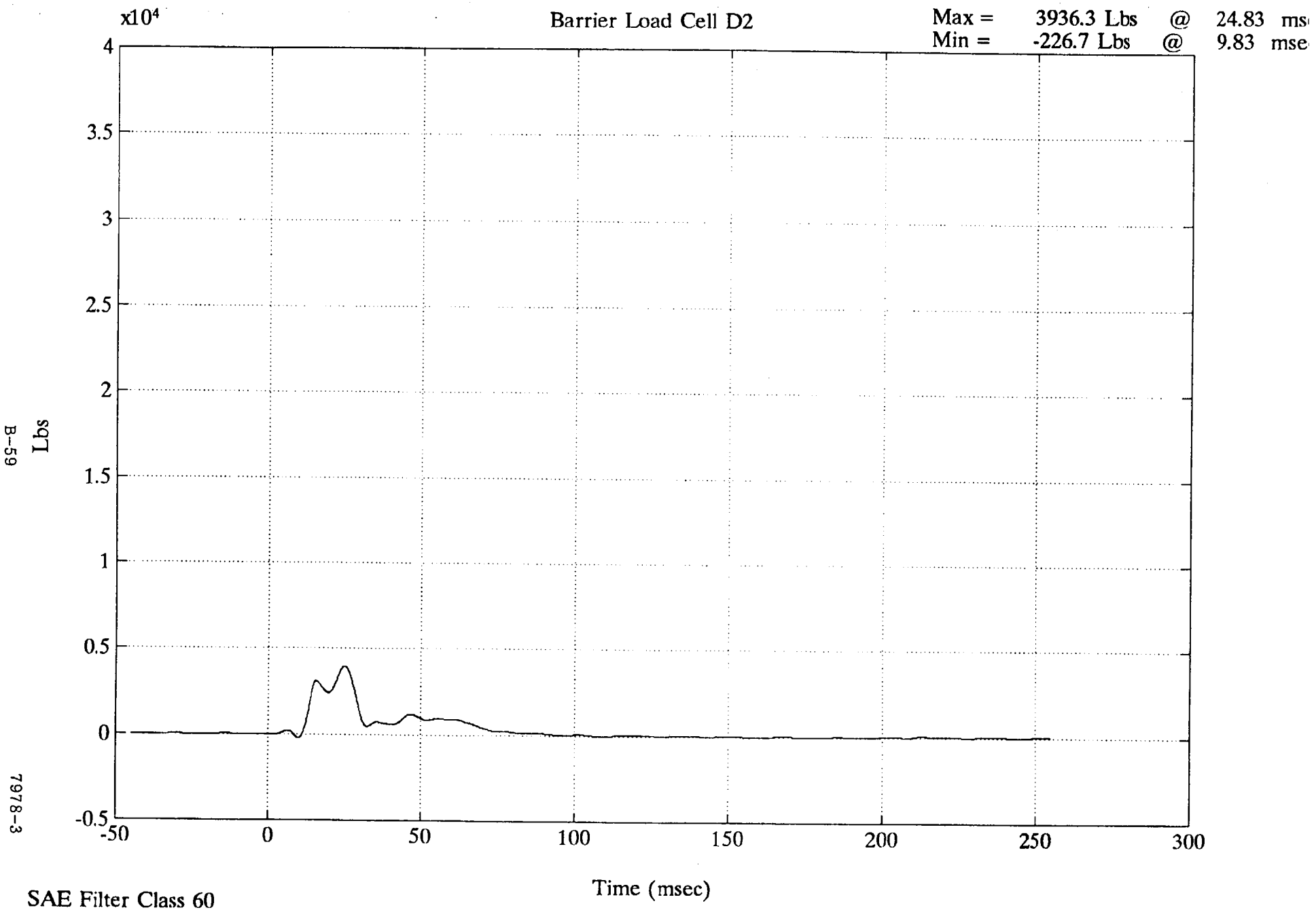
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

7978-3

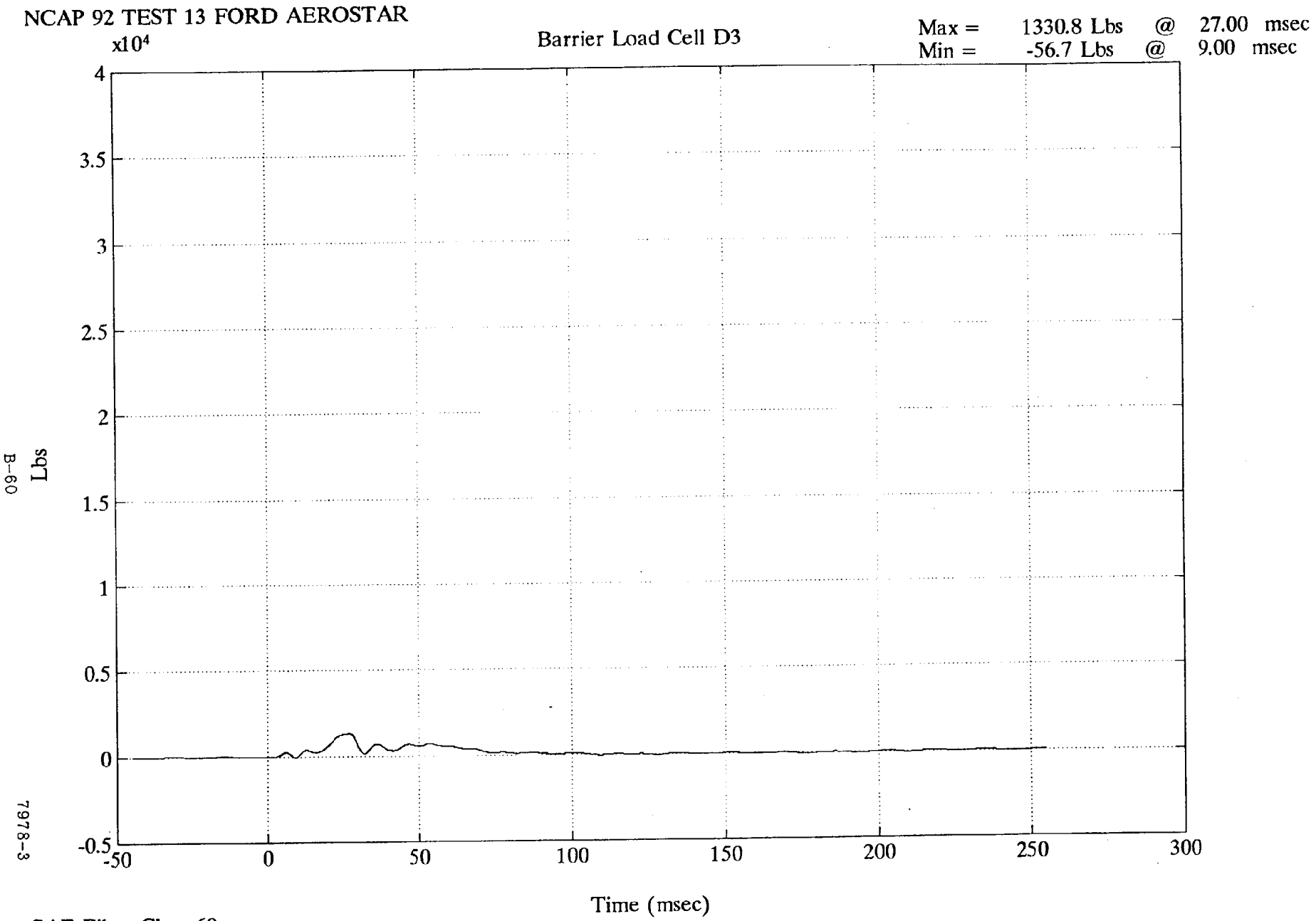
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

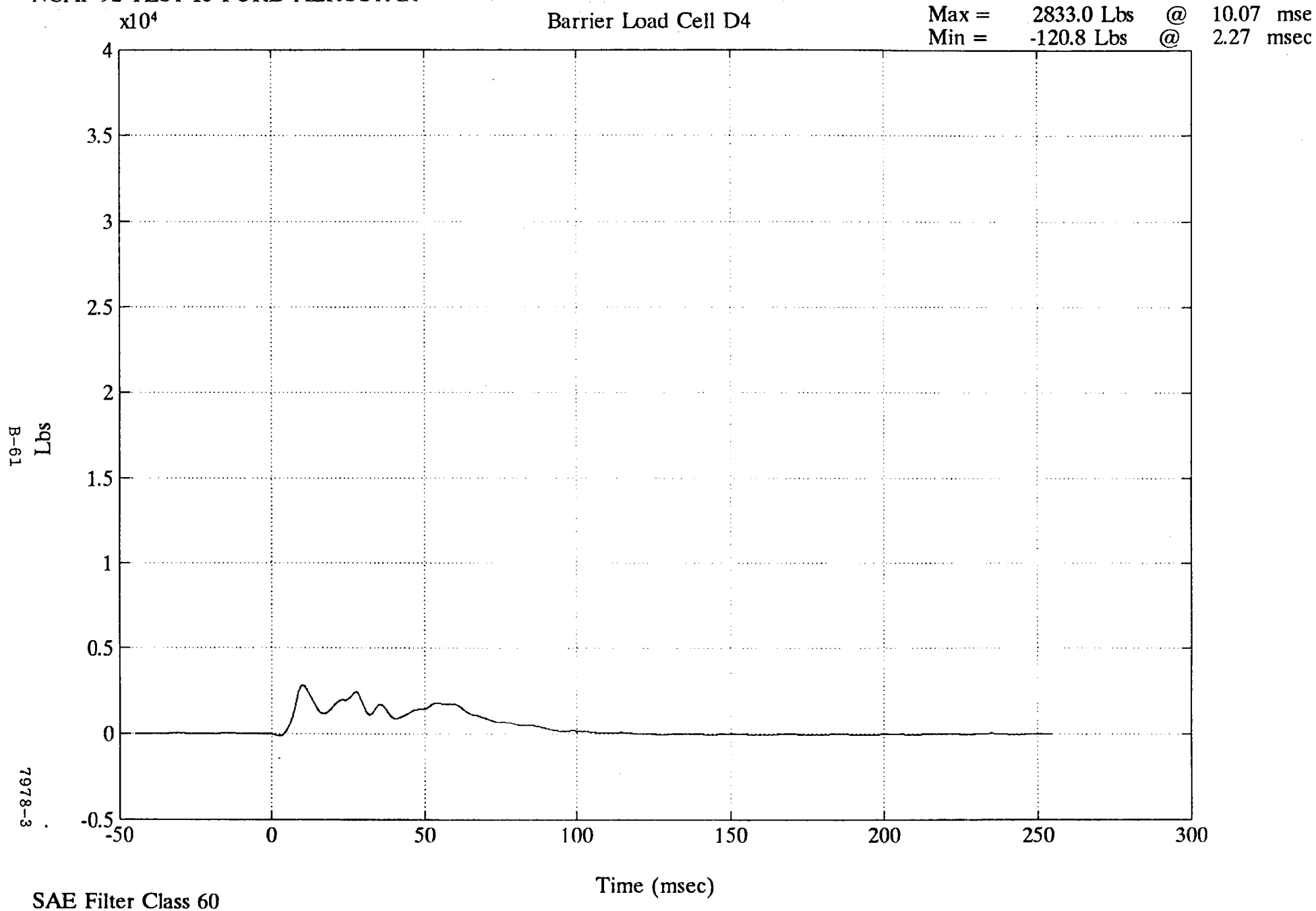
7978-3

NCAP 92 TEST 13 FORD AEROSTAR



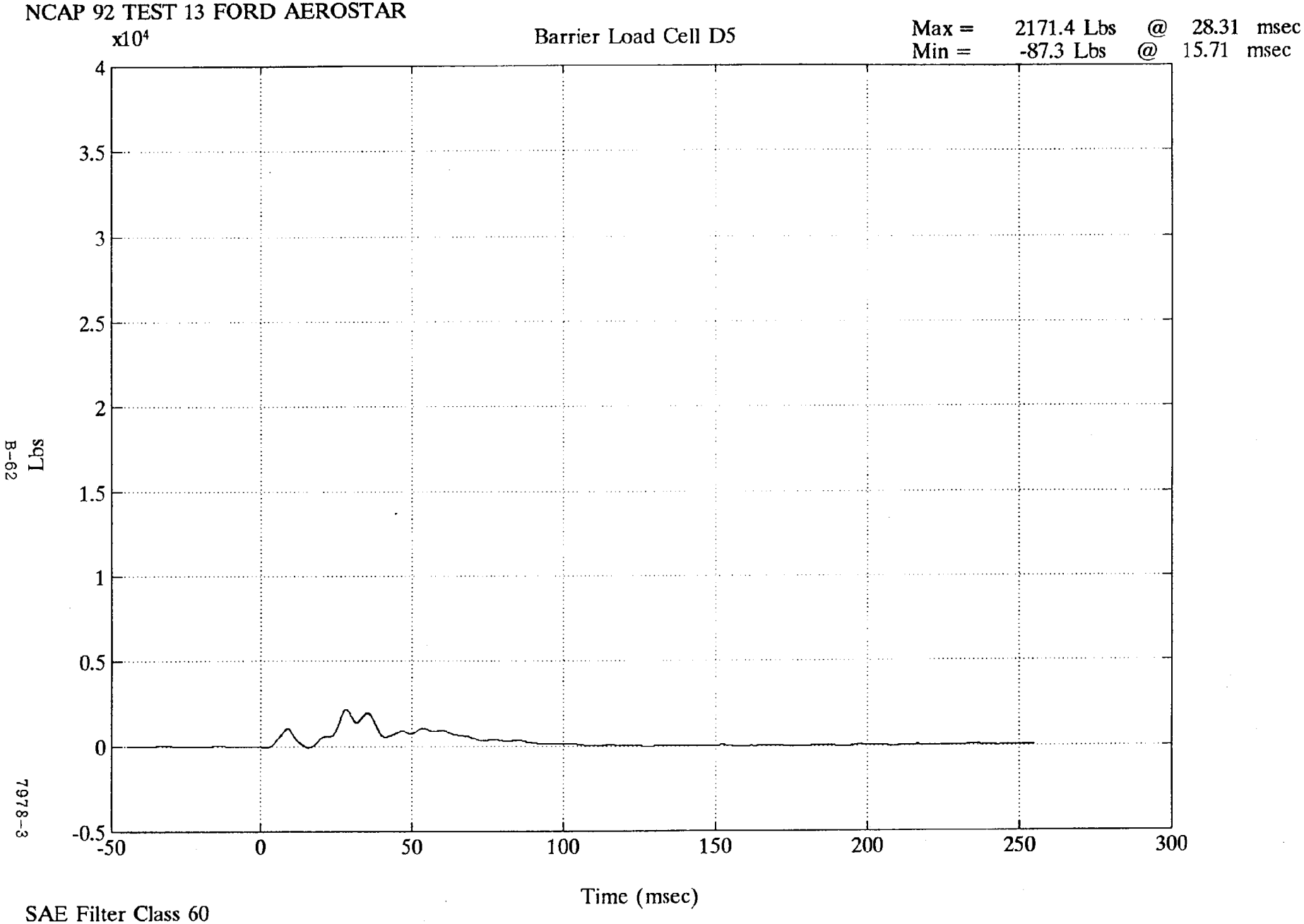
SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR



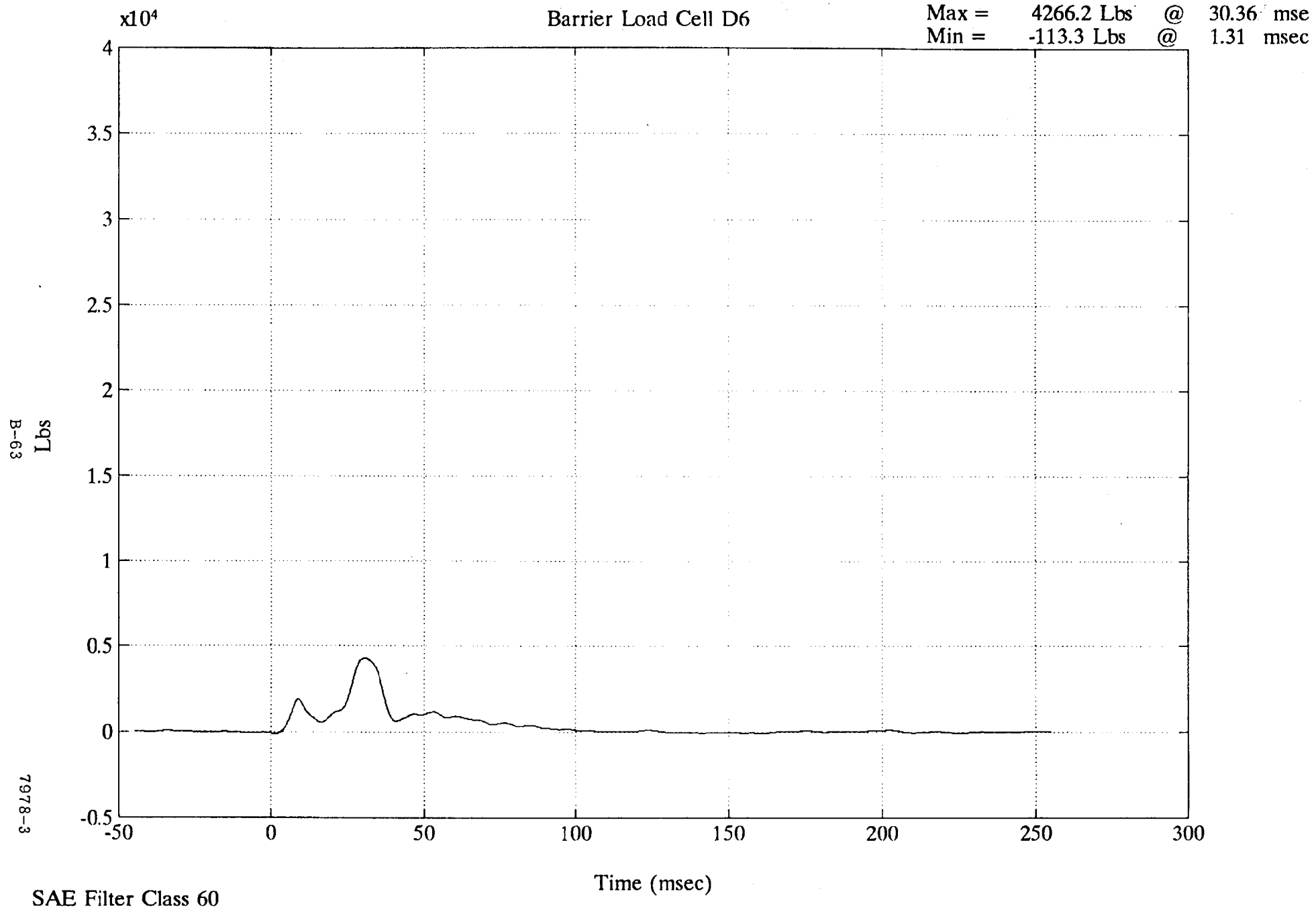
SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR

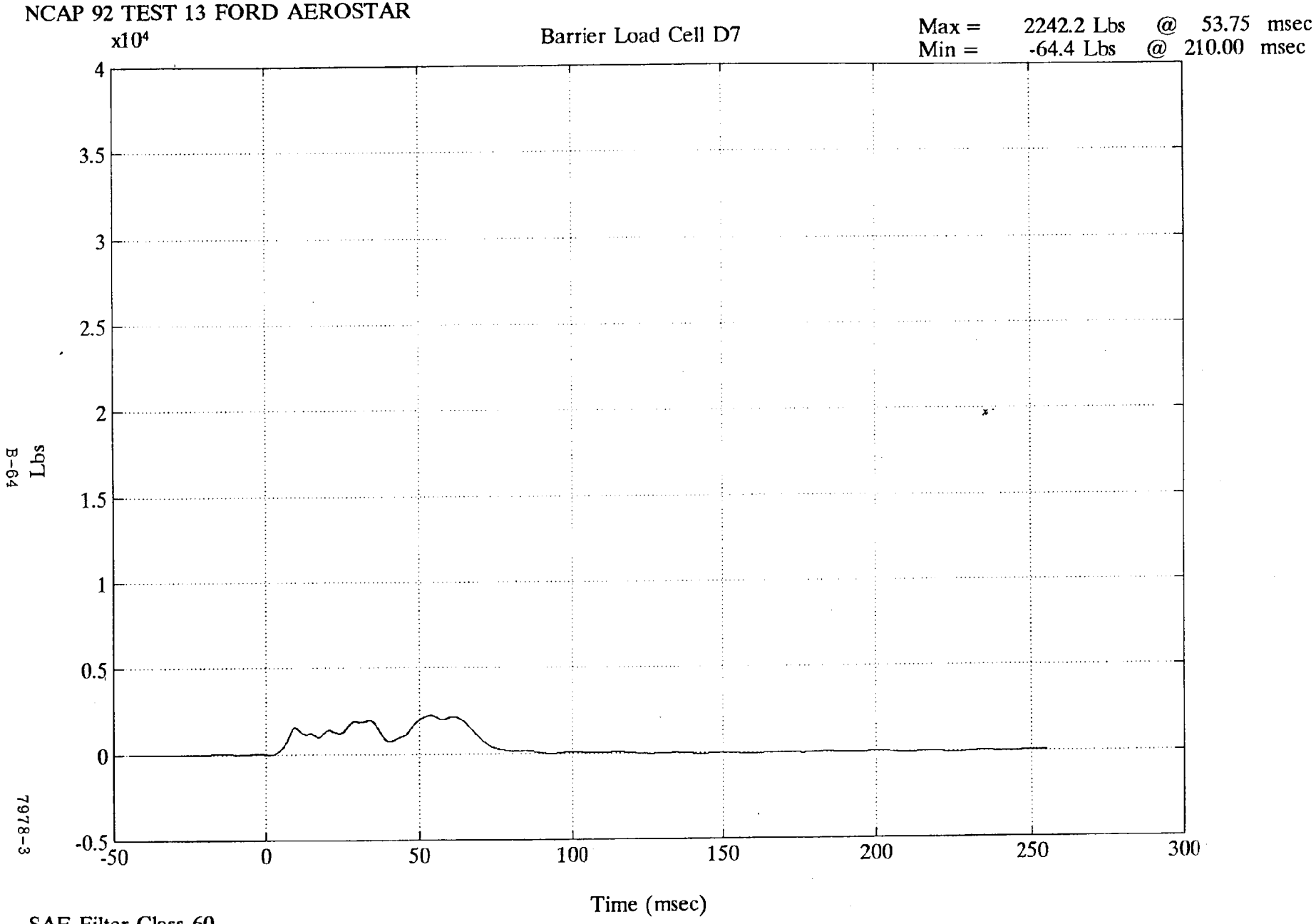


B-63

7978-3

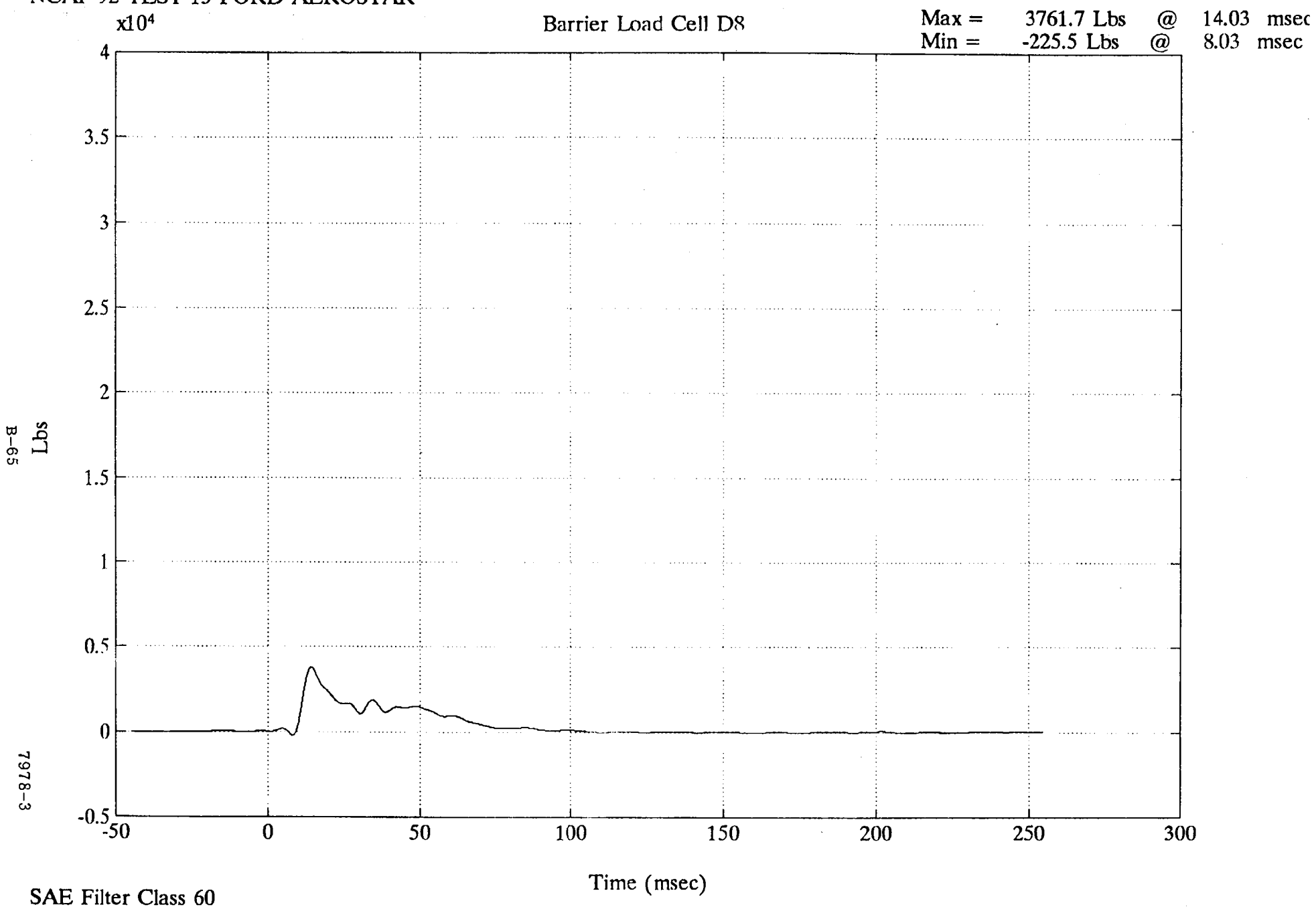
SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR



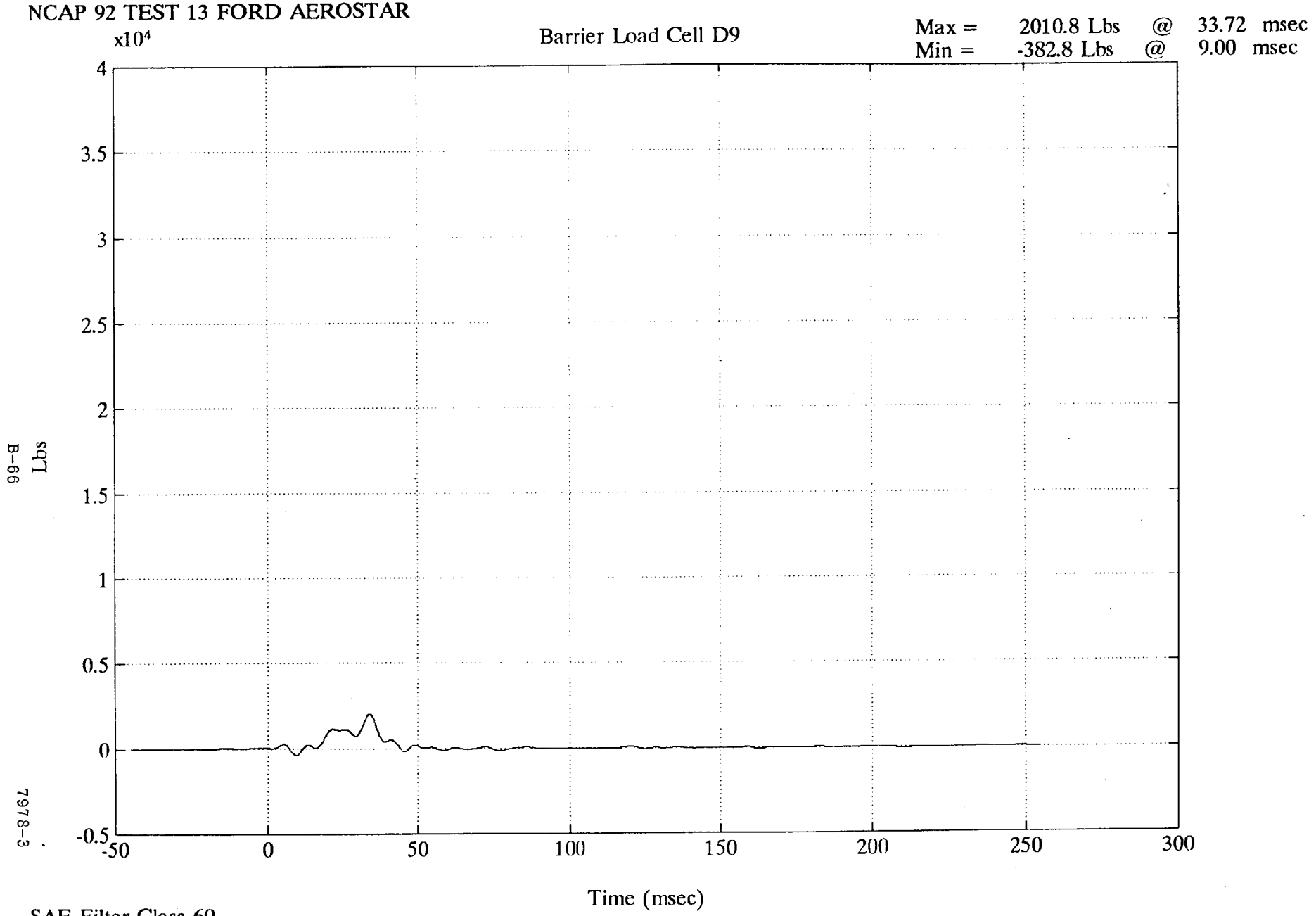
SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR



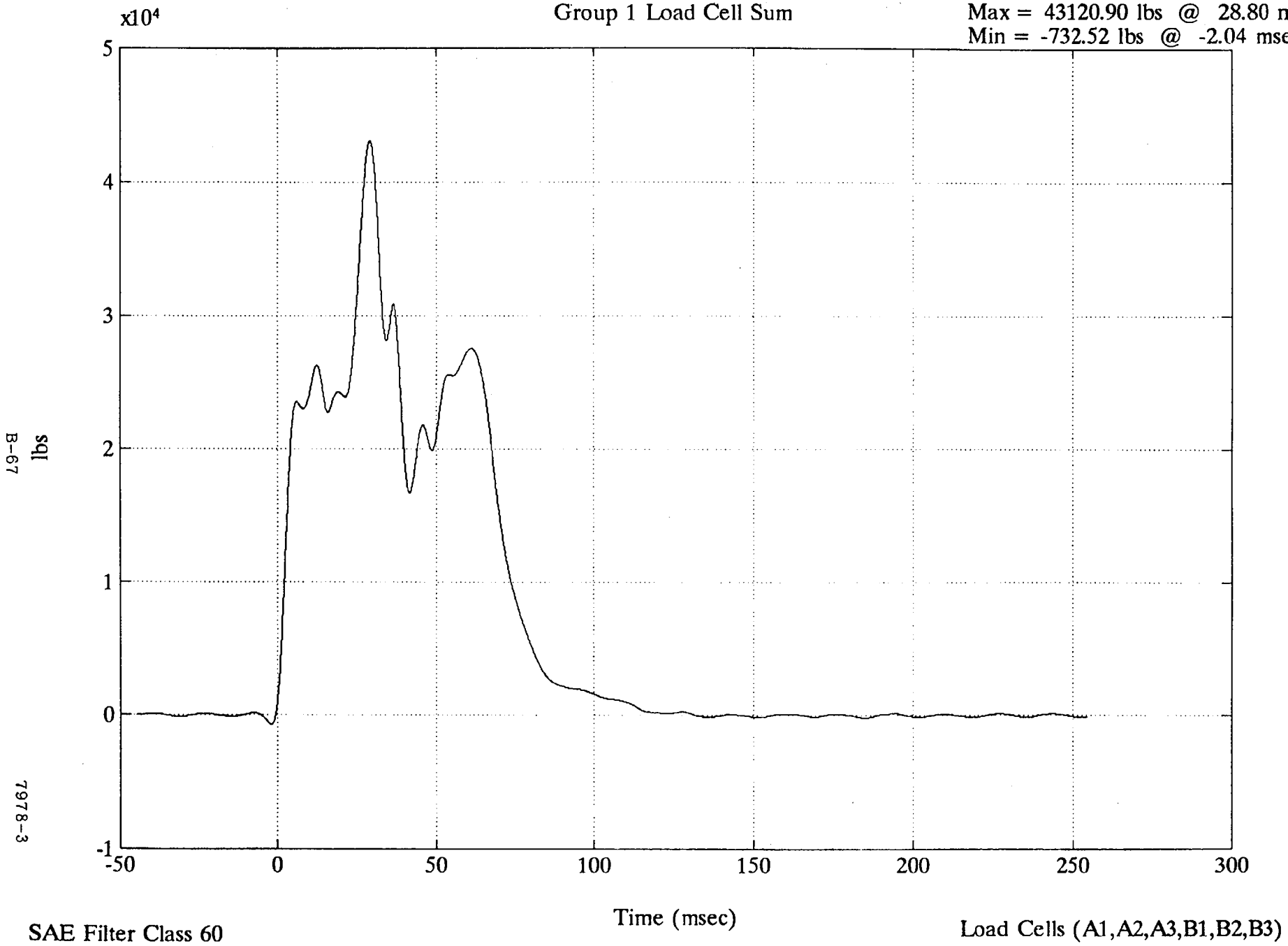
SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

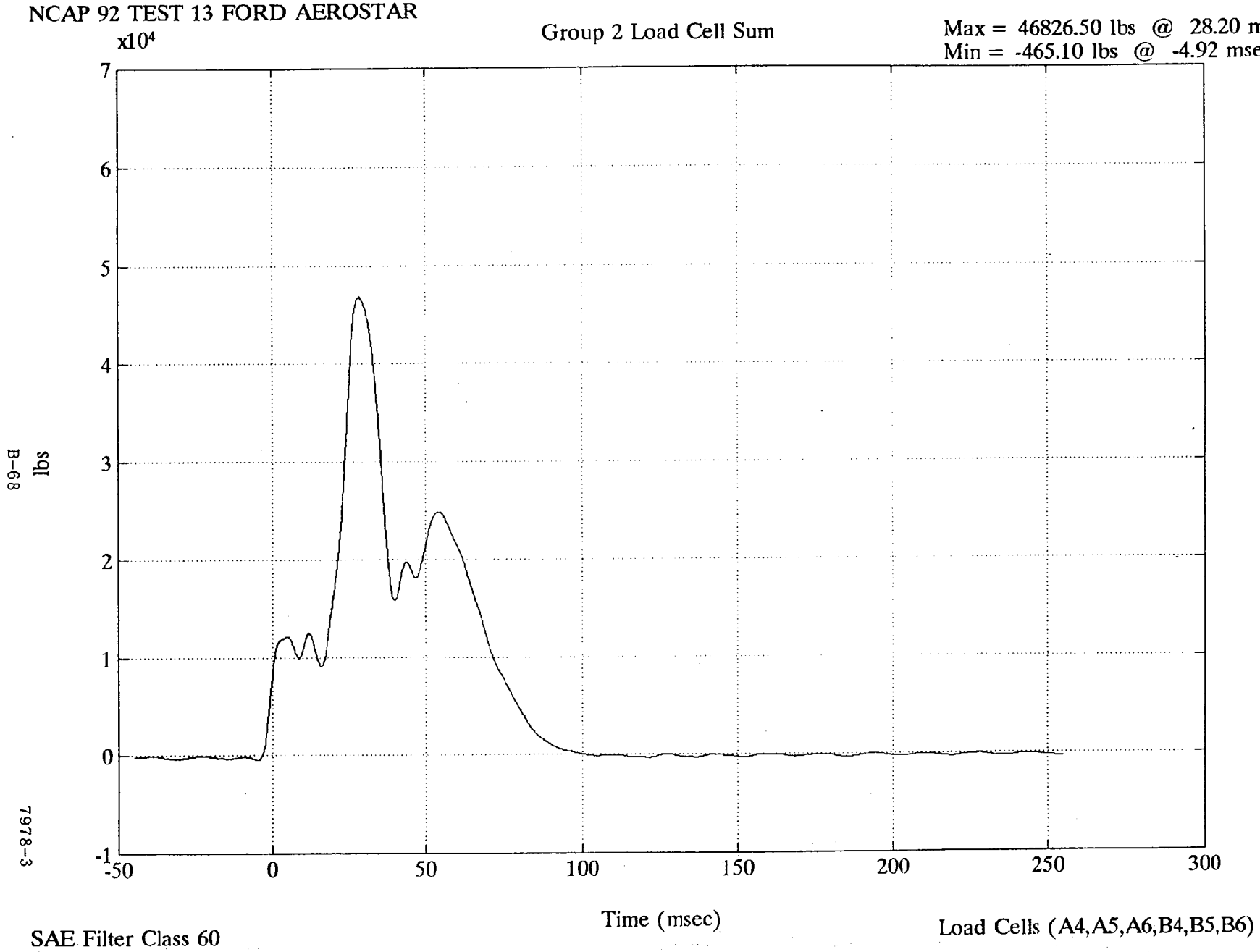
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

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

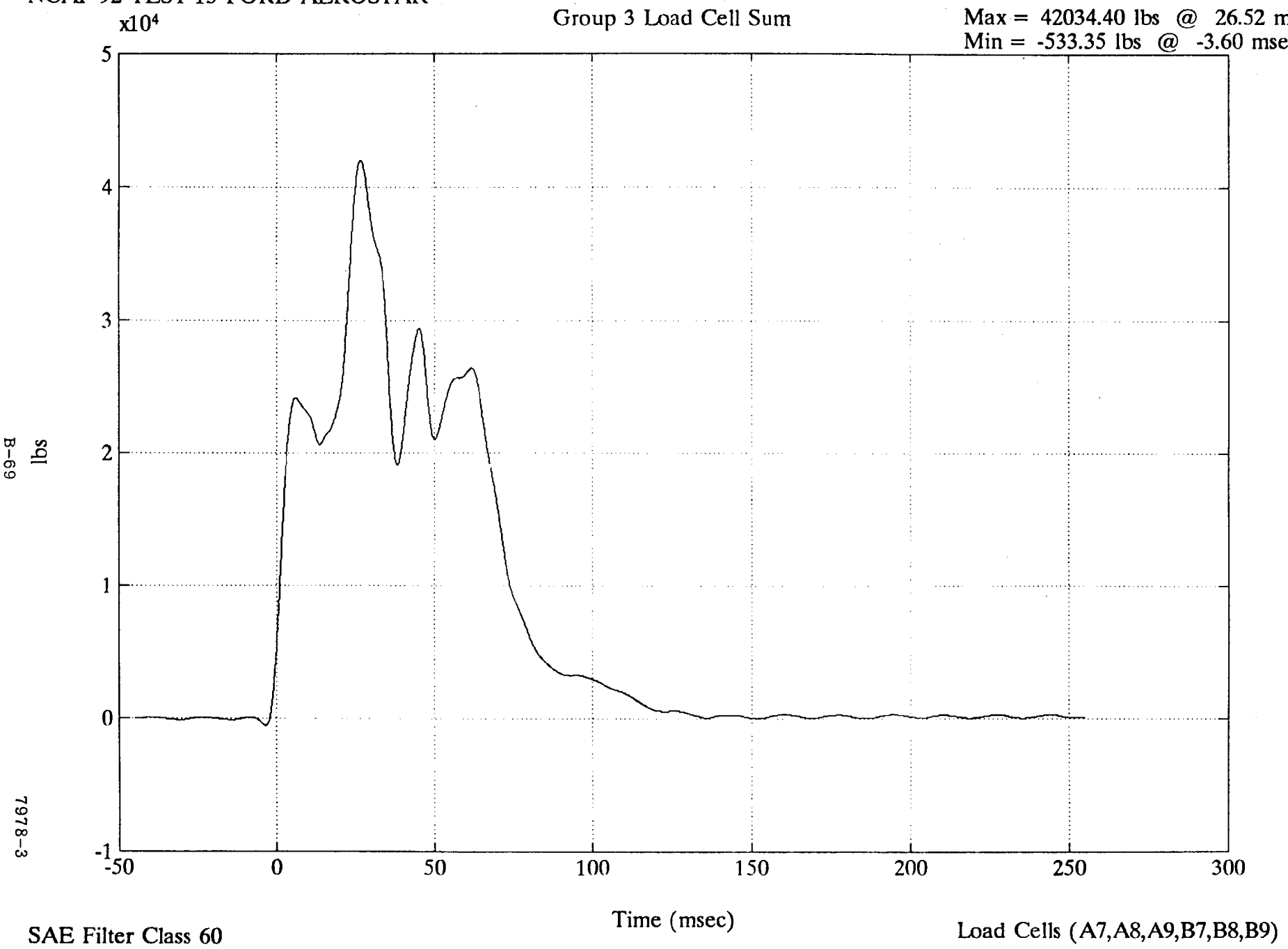
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

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

NCAP 92 TEST 13 FORD AEROSTAR



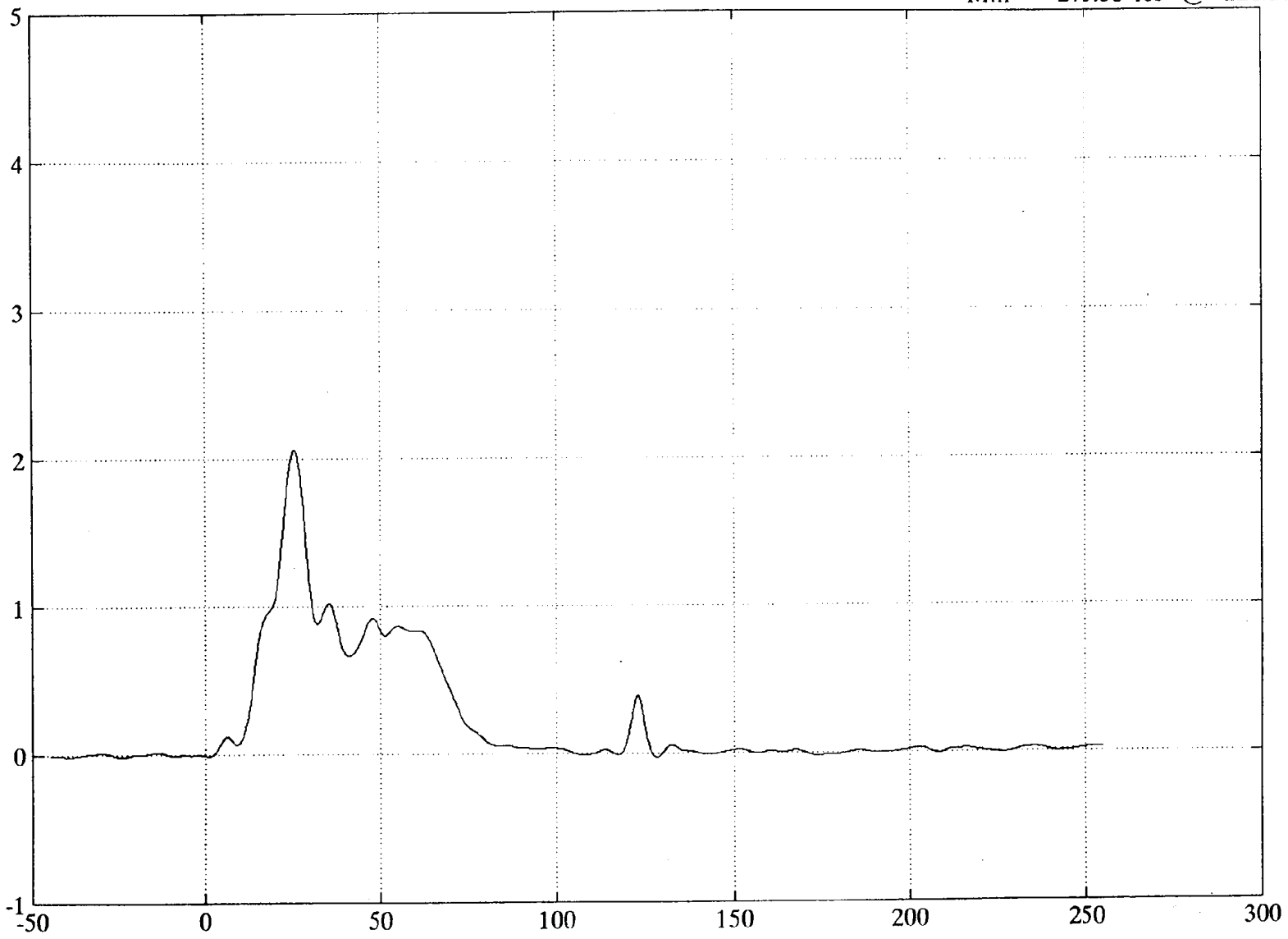
SAE Filter Class 60

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

NCAP 92 TEST 13 FORD AEROSTAR

Group 4 Load Cell Sum

Max = 20643.90 lbs @ 25.56 msec
Min = -273.33 lbs @ 128.16 msec



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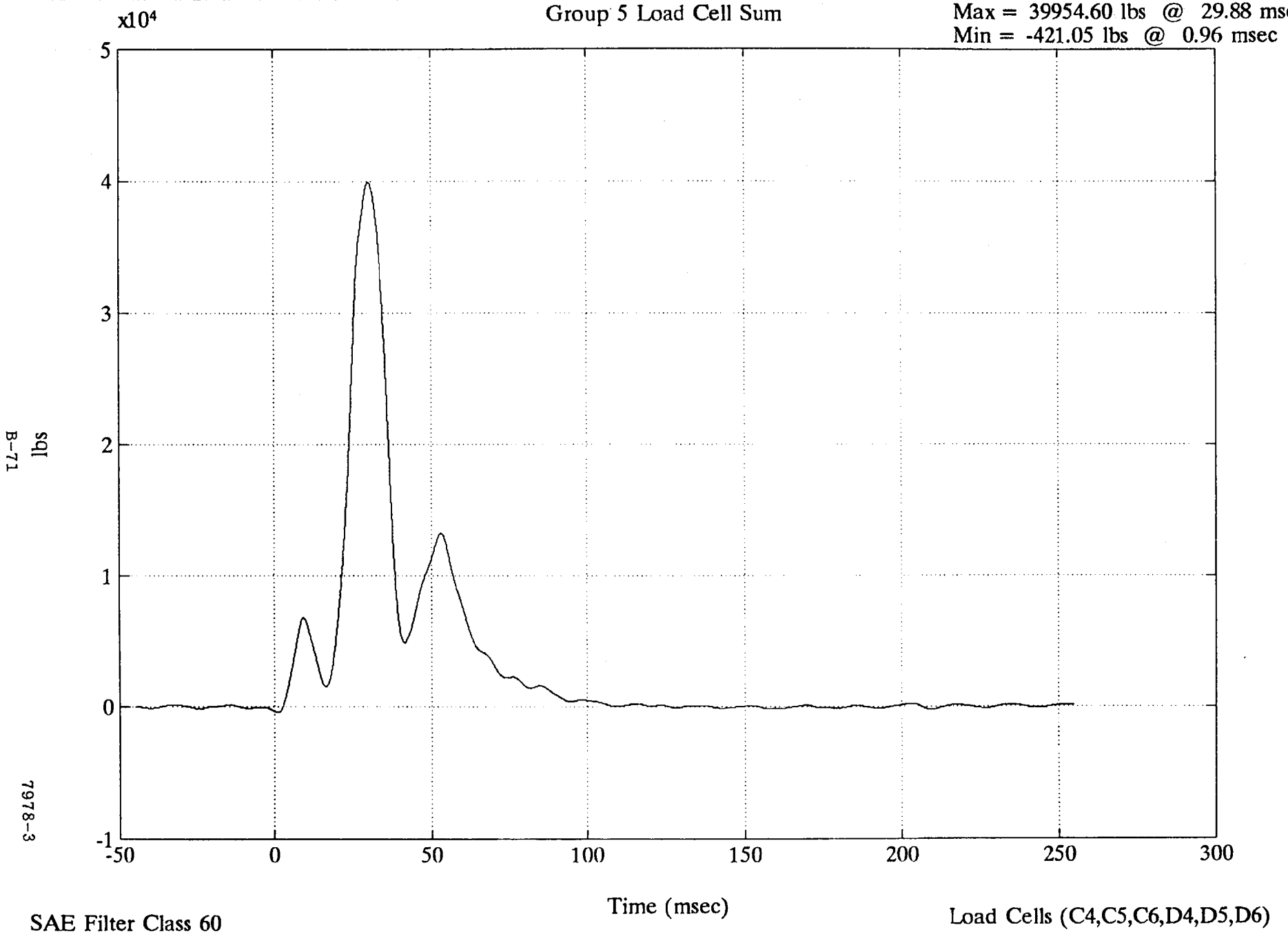
7978-3

SAE Filter Class 60

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

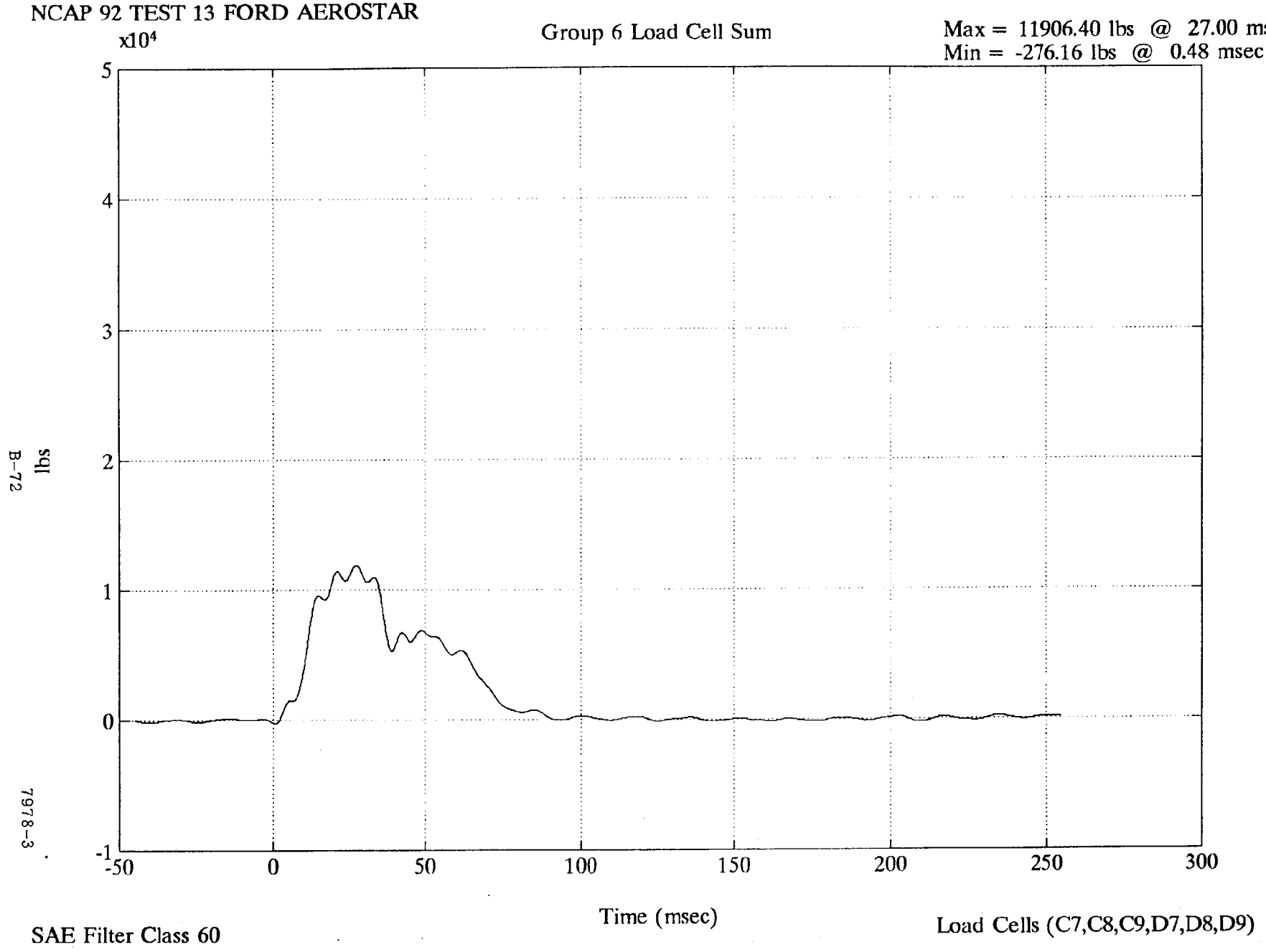
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

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

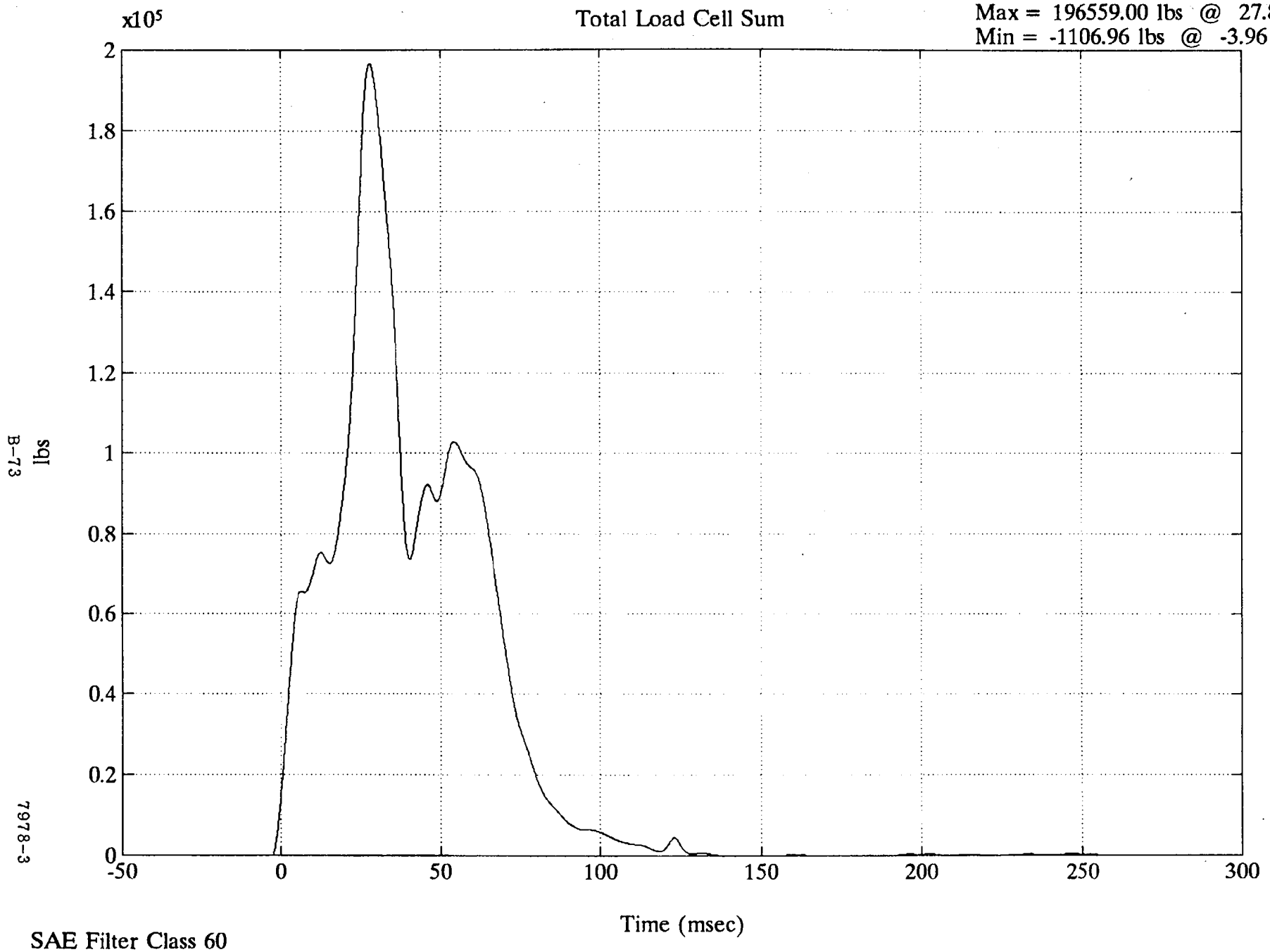
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

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

NCAP 92 TEST 13 FORD AEROSTAR



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7978-3

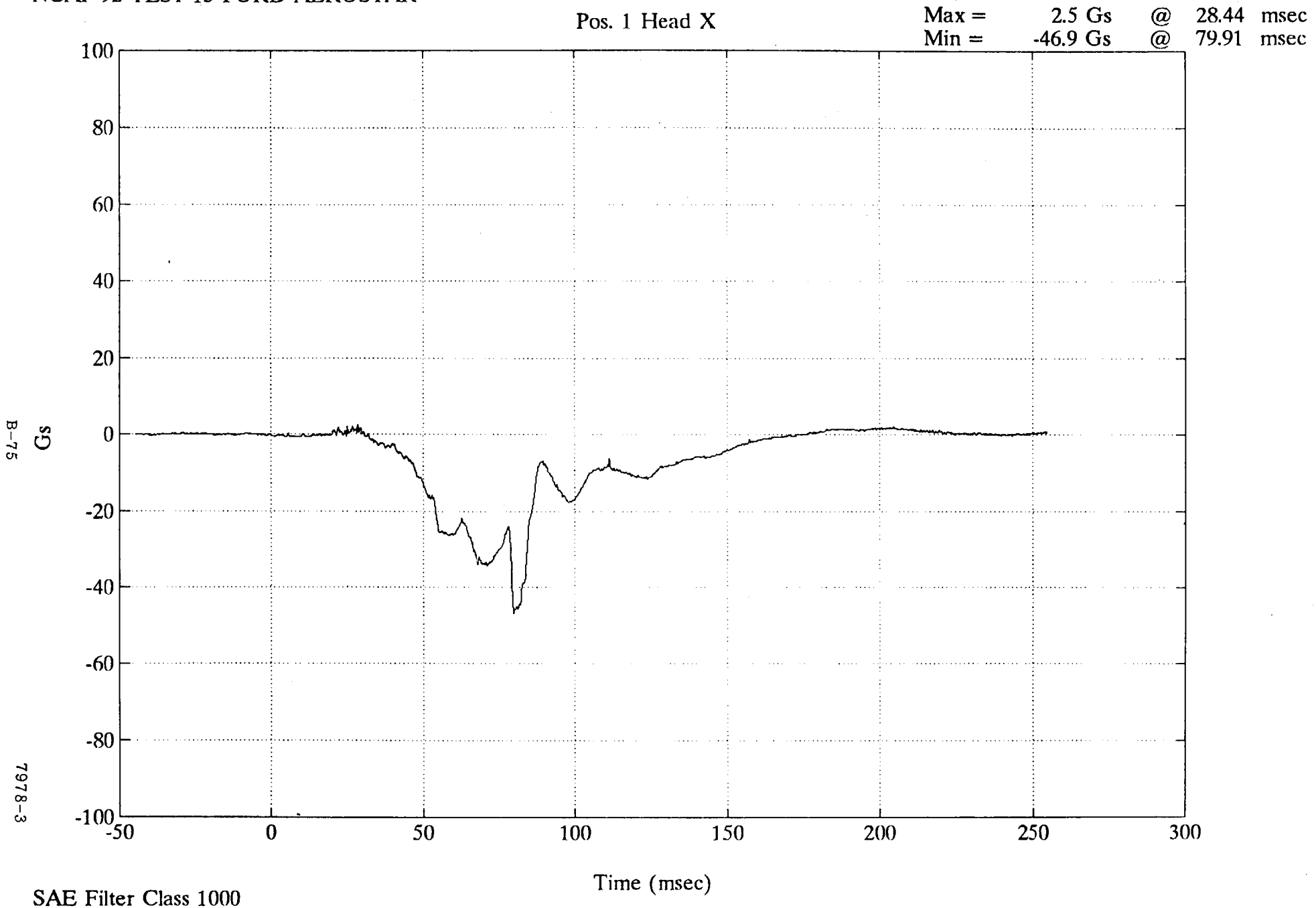
SAE Filter Class 60

TEST NO. MN0201

DUMMY DATA

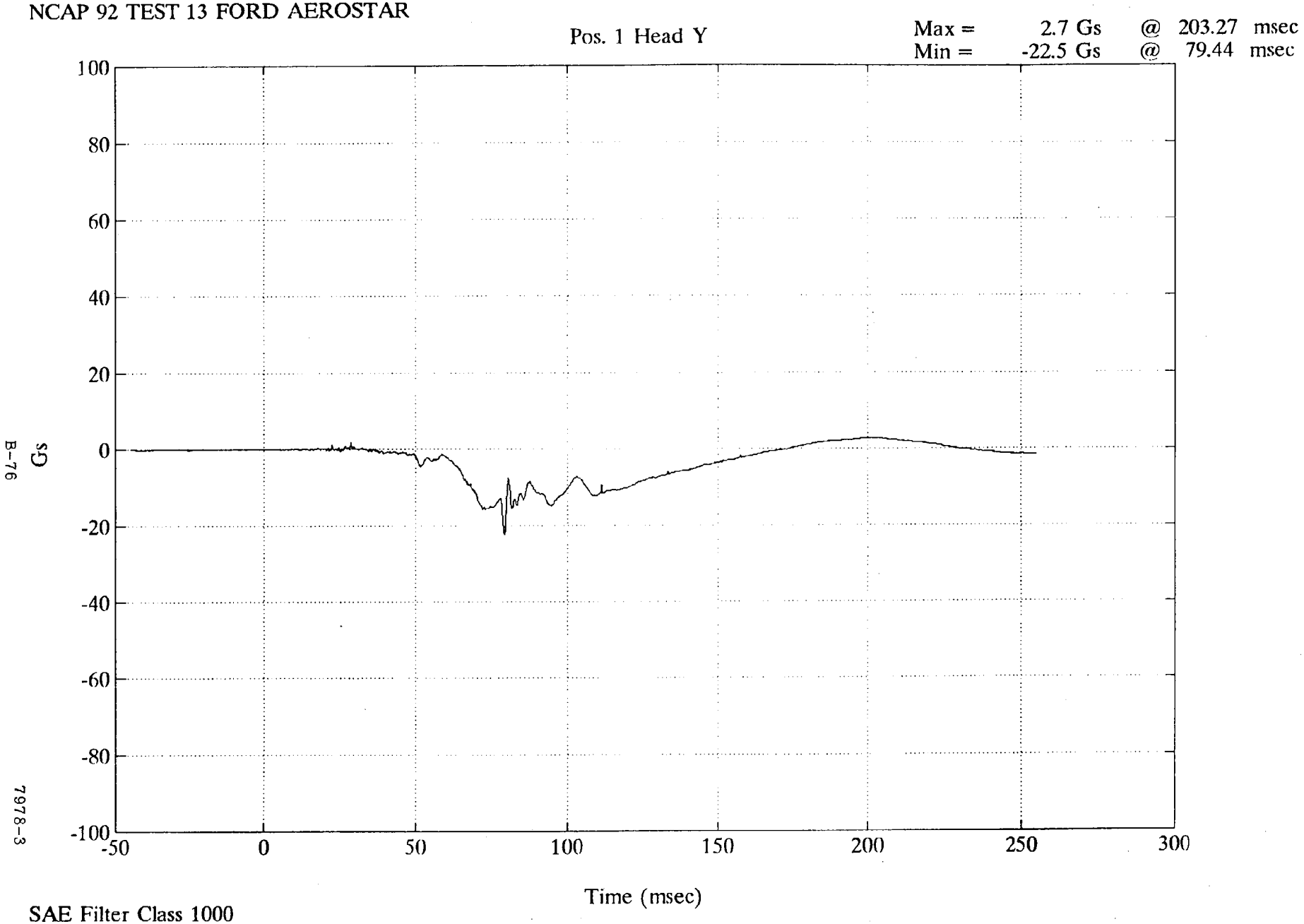
CLASS	FILTER CHANNEL
Head Accelerations	1000
Chest Accelerations	180
Femur Forces	600
Belt Loads	60
Belt Displacements	180

NCAP 92 TEST 13 FORD AEROSTAR



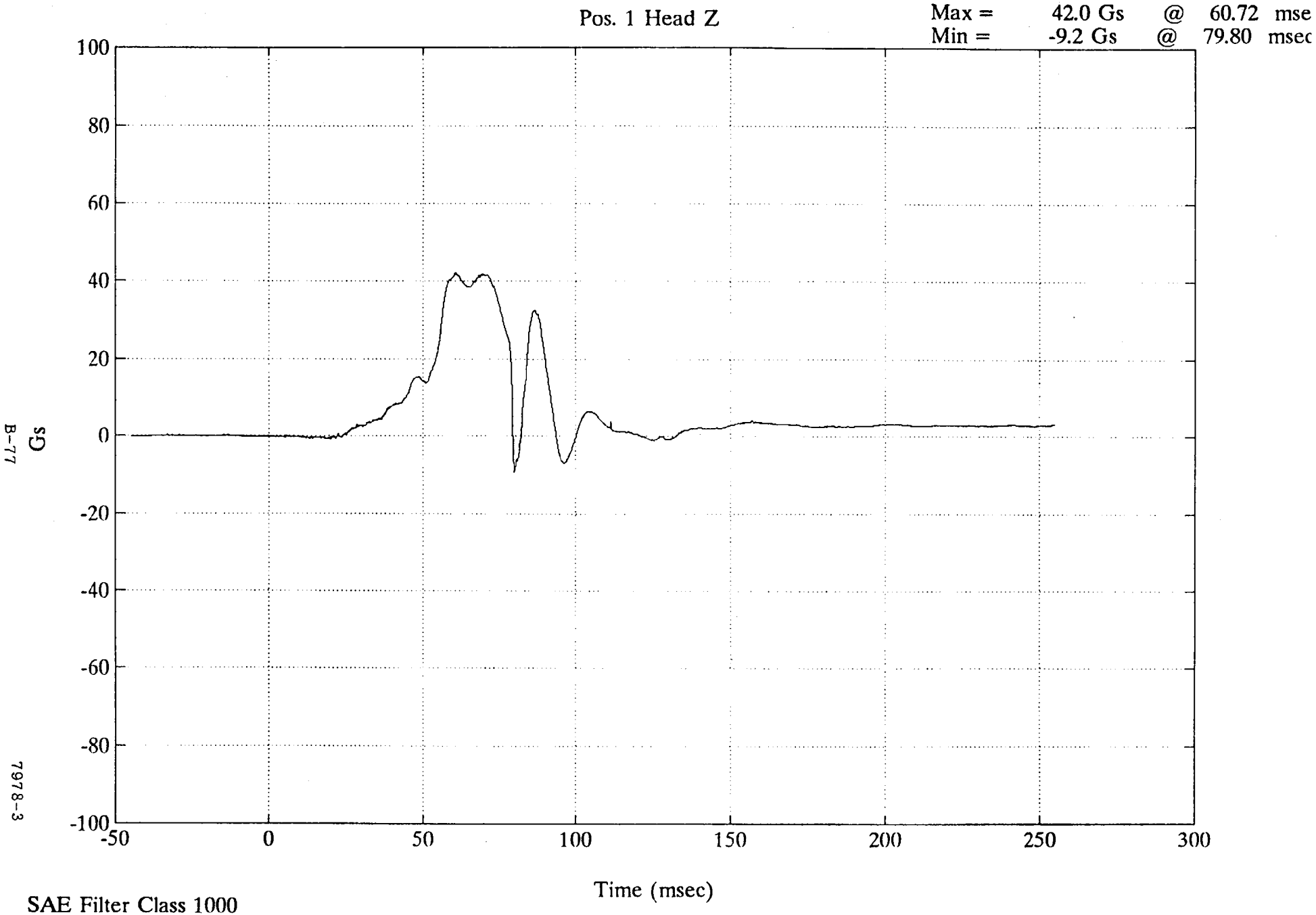
SAE Filter Class 1000

NCAP 92 TEST 13 FORD AEROSTAR



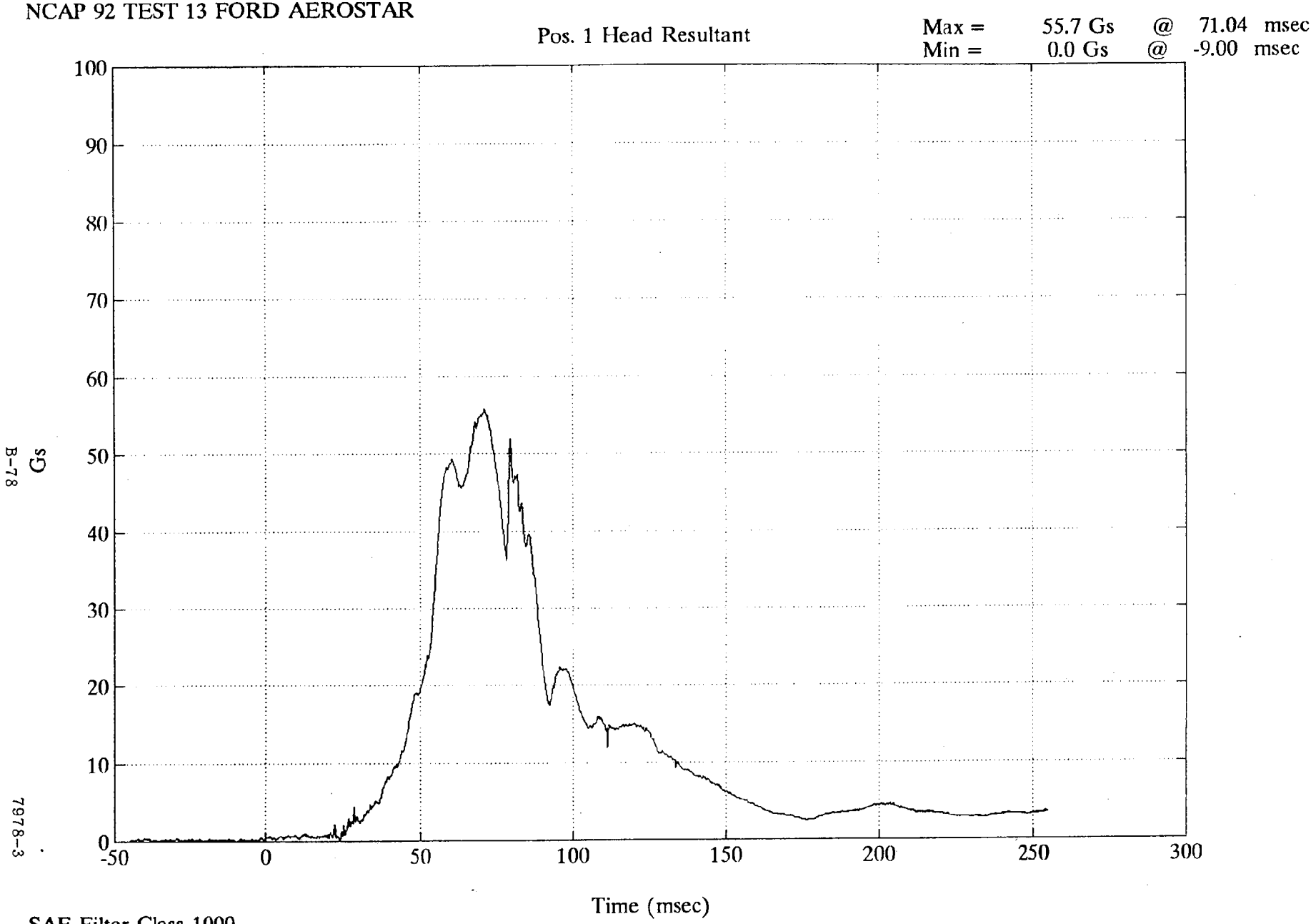
SAE Filter Class 1000

NCAP 92 TEST 13 FORD AEROSTAR



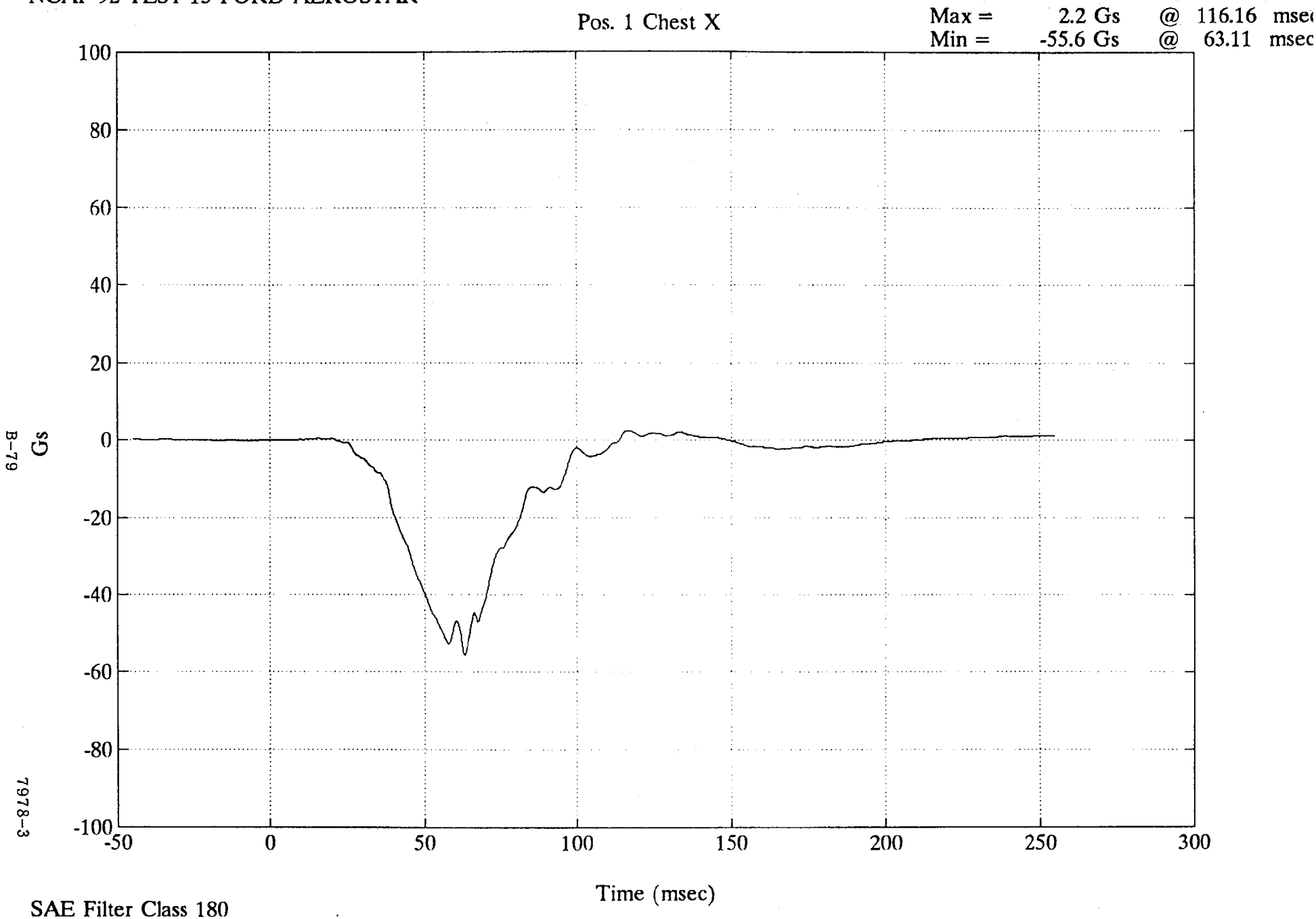
SAE Filter Class 1000

NCAP 92 TEST 13 FORD AEROSTAR



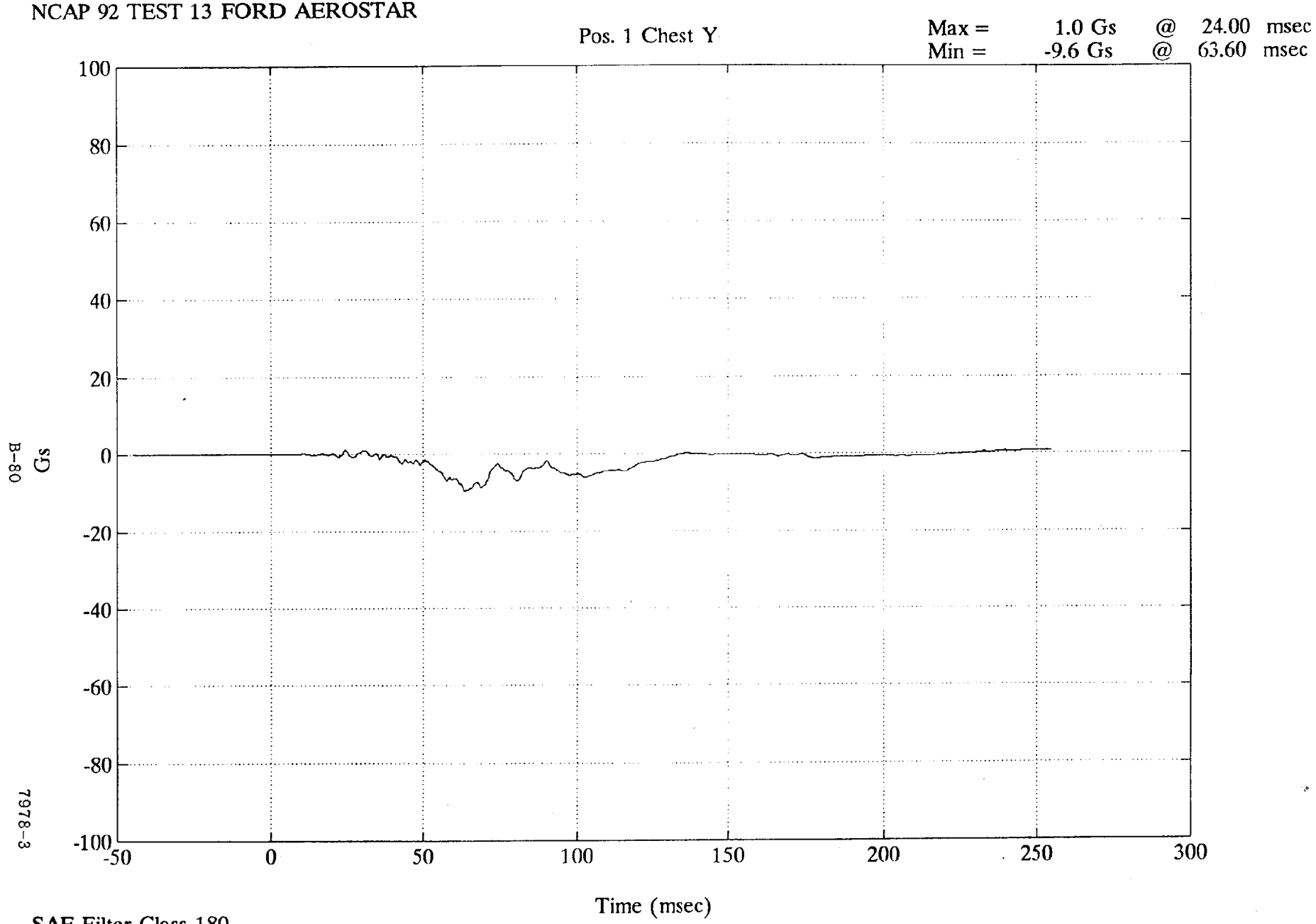
SAE Filter Class 1000

NCAP 92 TEST 13 FORD AEROSTAR



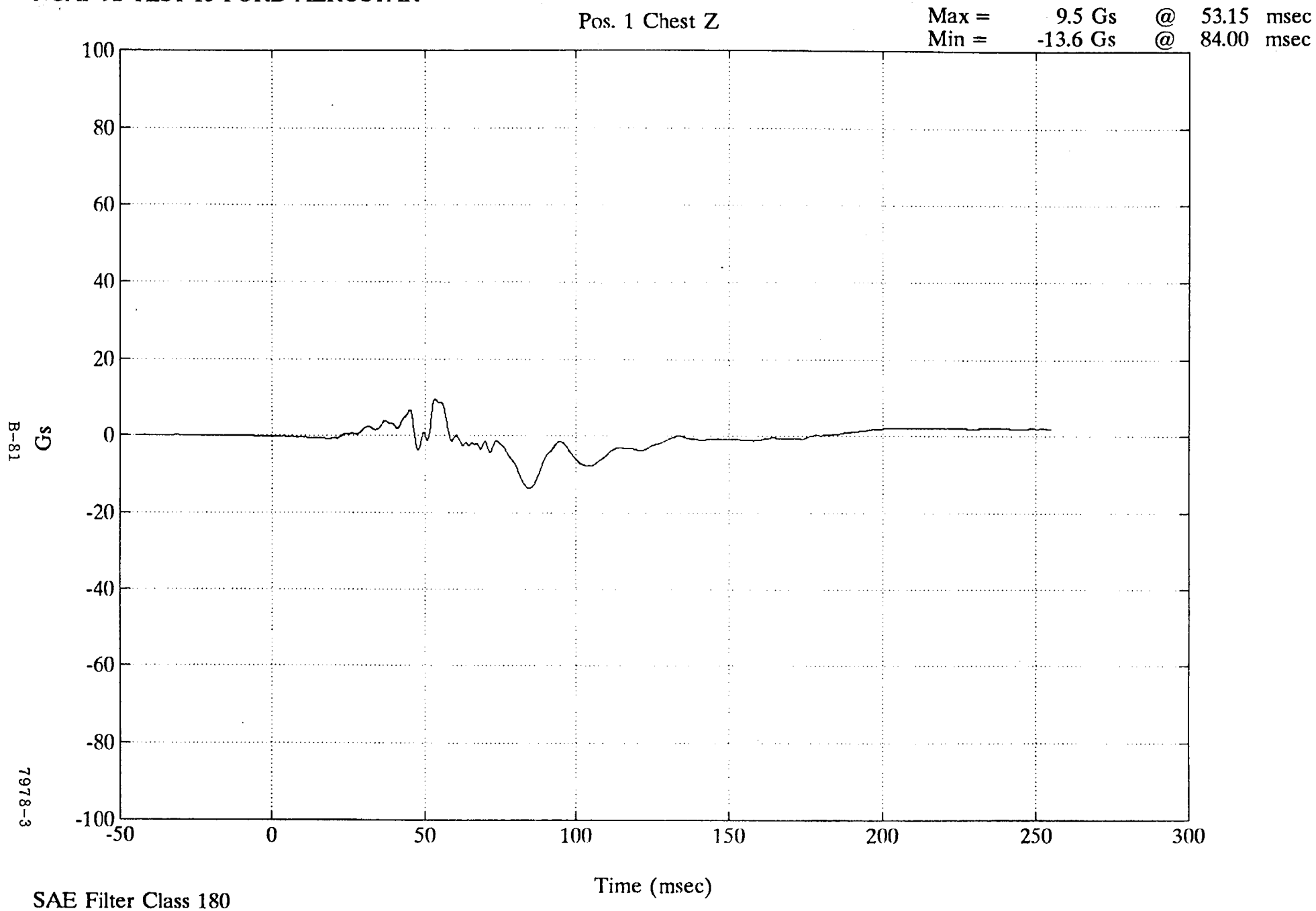
SAE Filter Class 180

NCAP 92 TEST 13 FORD AEROSTAR



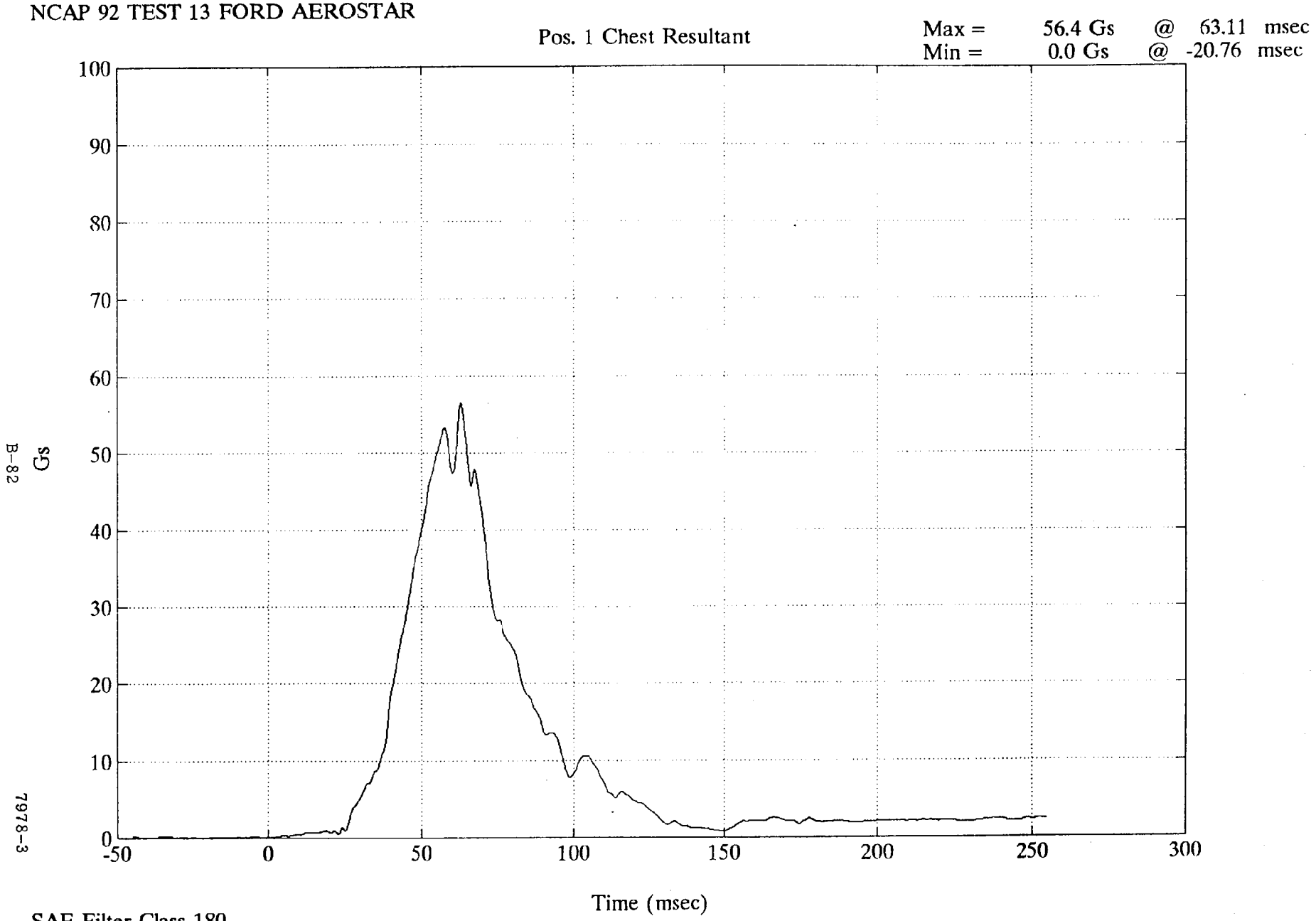
SAE Filter Class 180

NCAP 92 TEST 13 FORD AEROSTAR



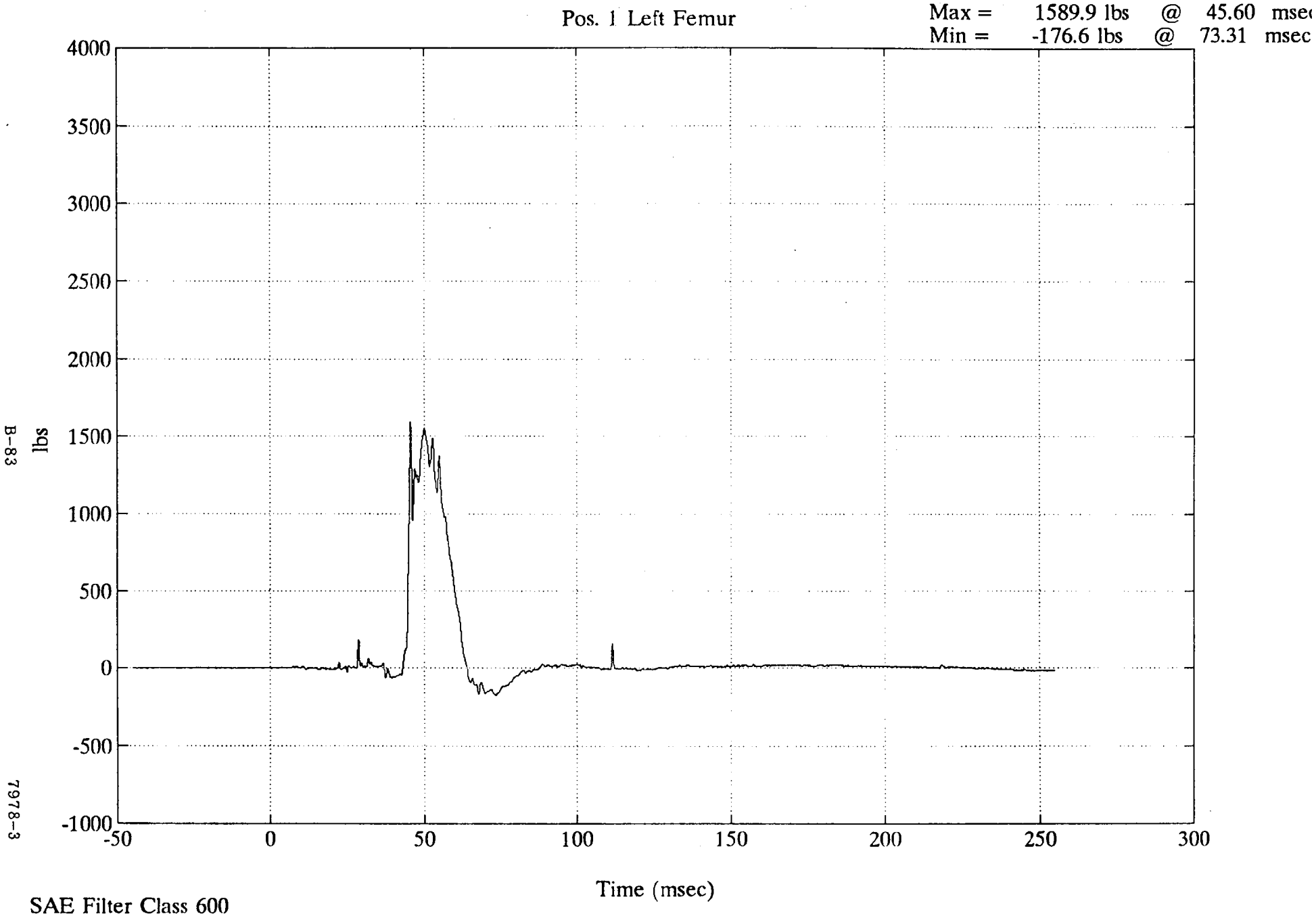
SAE Filter Class 180

NCAP 92 TEST 13 FORD AEROSTAR



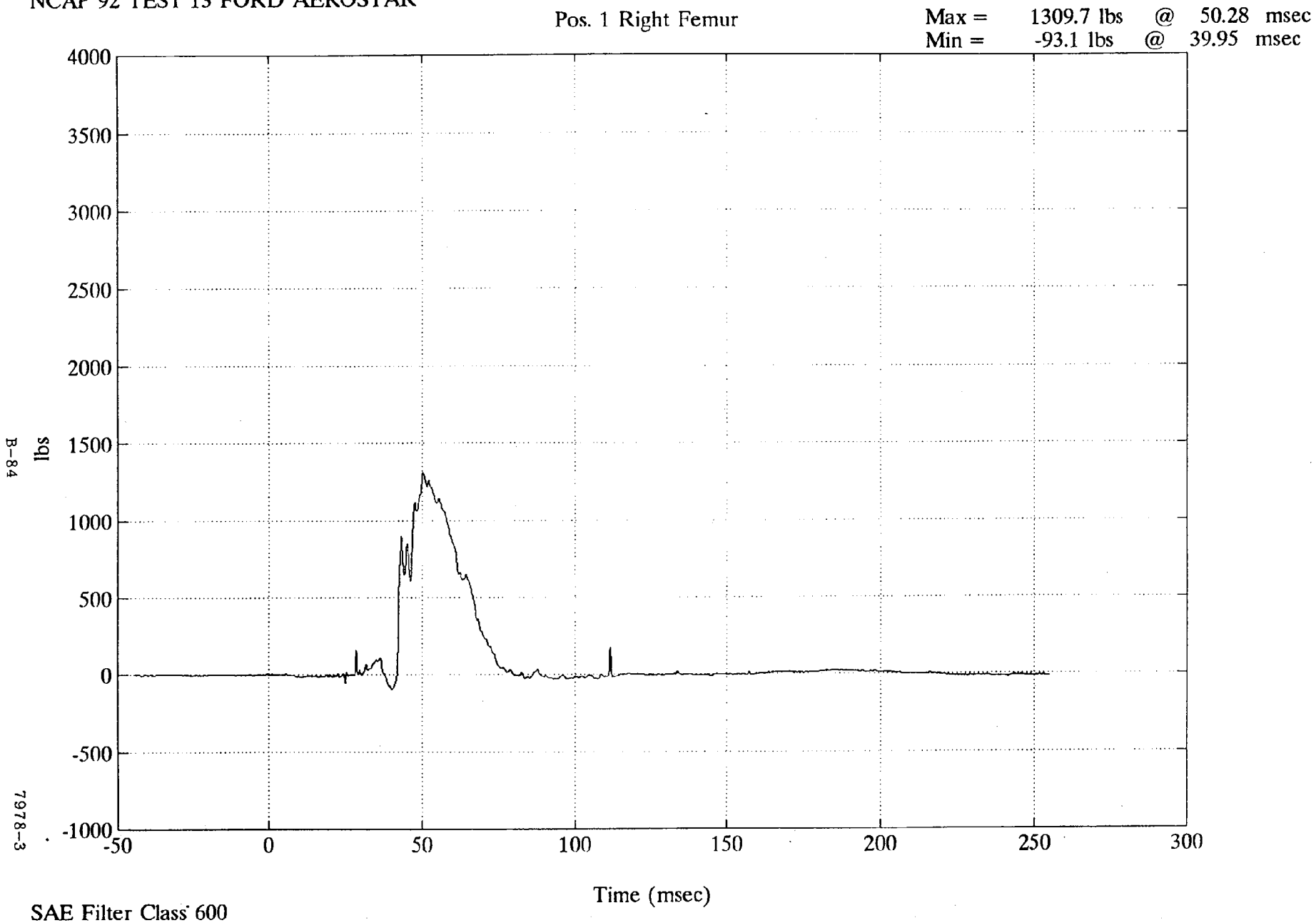
SAE Filter Class 180

NCAP 92 TEST 13 FORD AEROSTAR



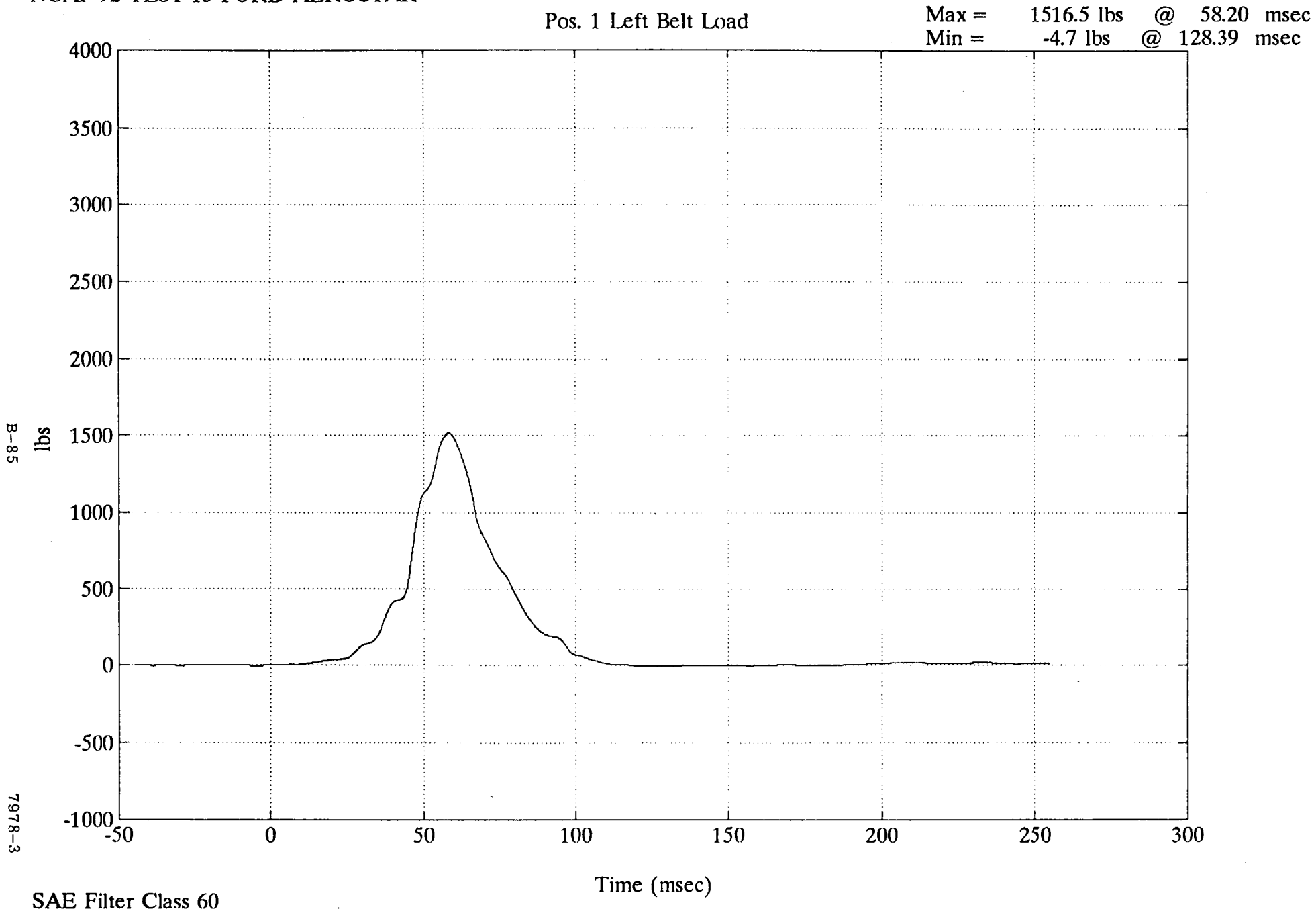
SAE Filter Class 600

NCAP 92 TEST 13 FORD AEROSTAR



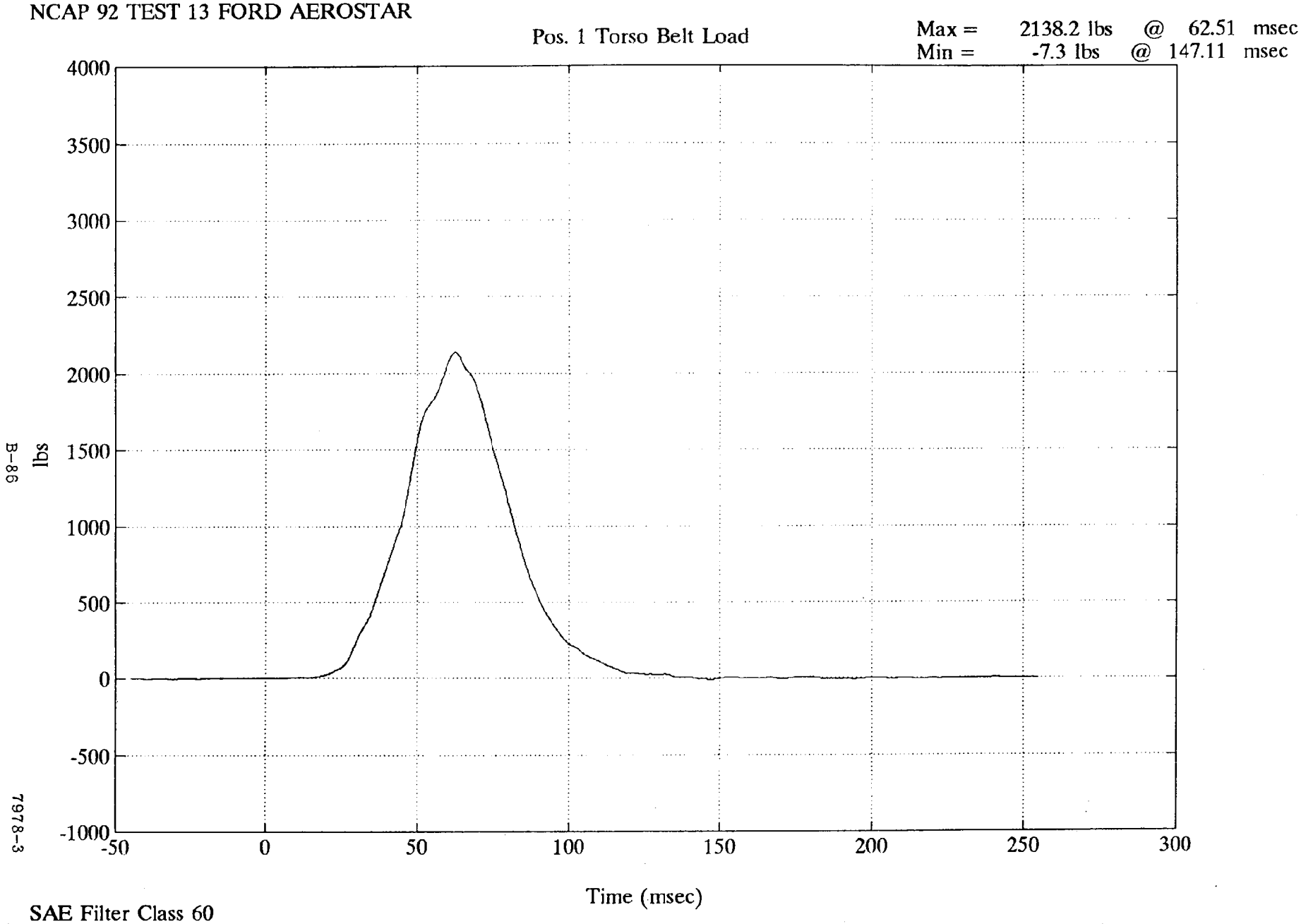
SAE Filter Class 600

NCAP 92 TEST 13 FORD AEROSTAR



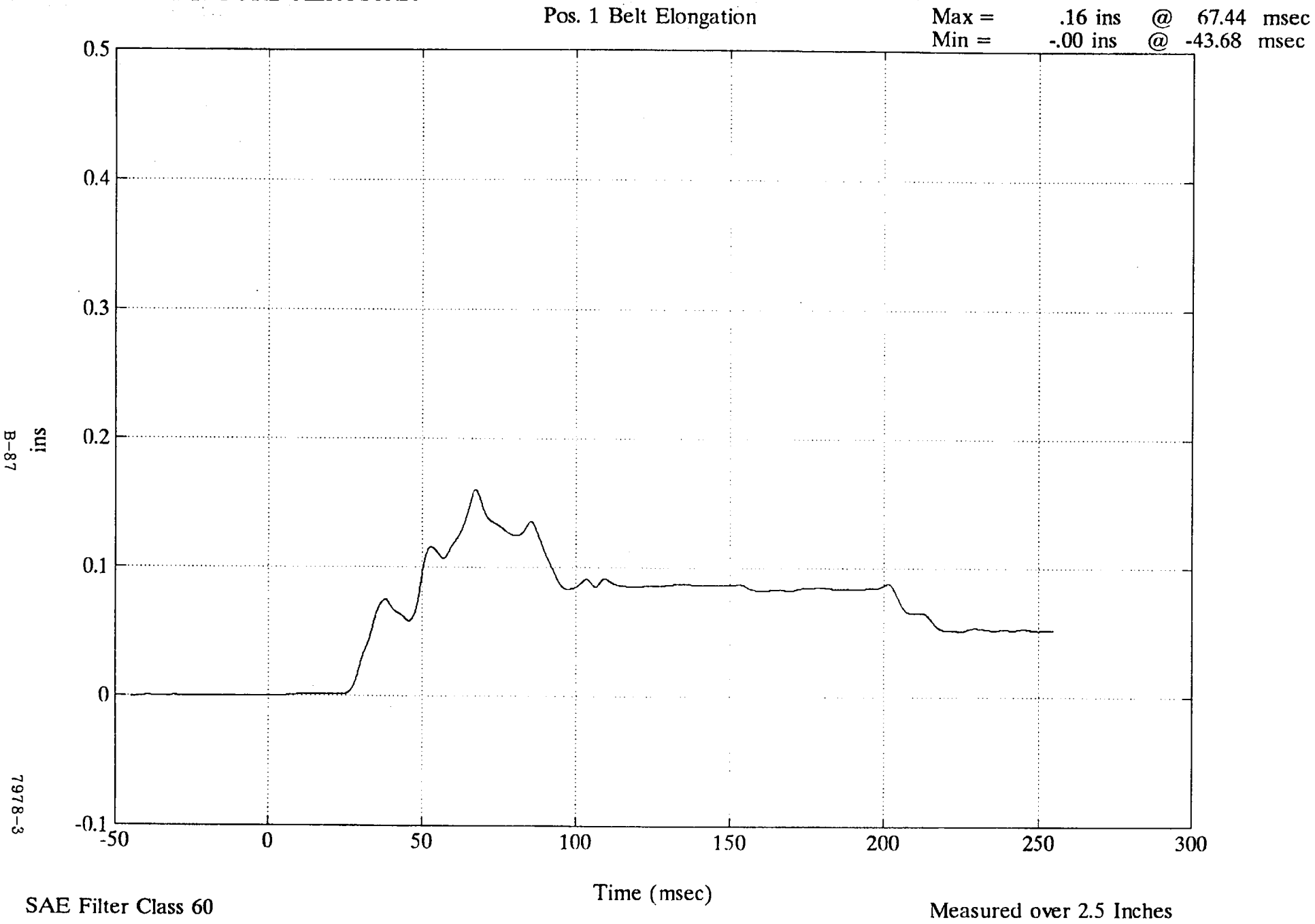
SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

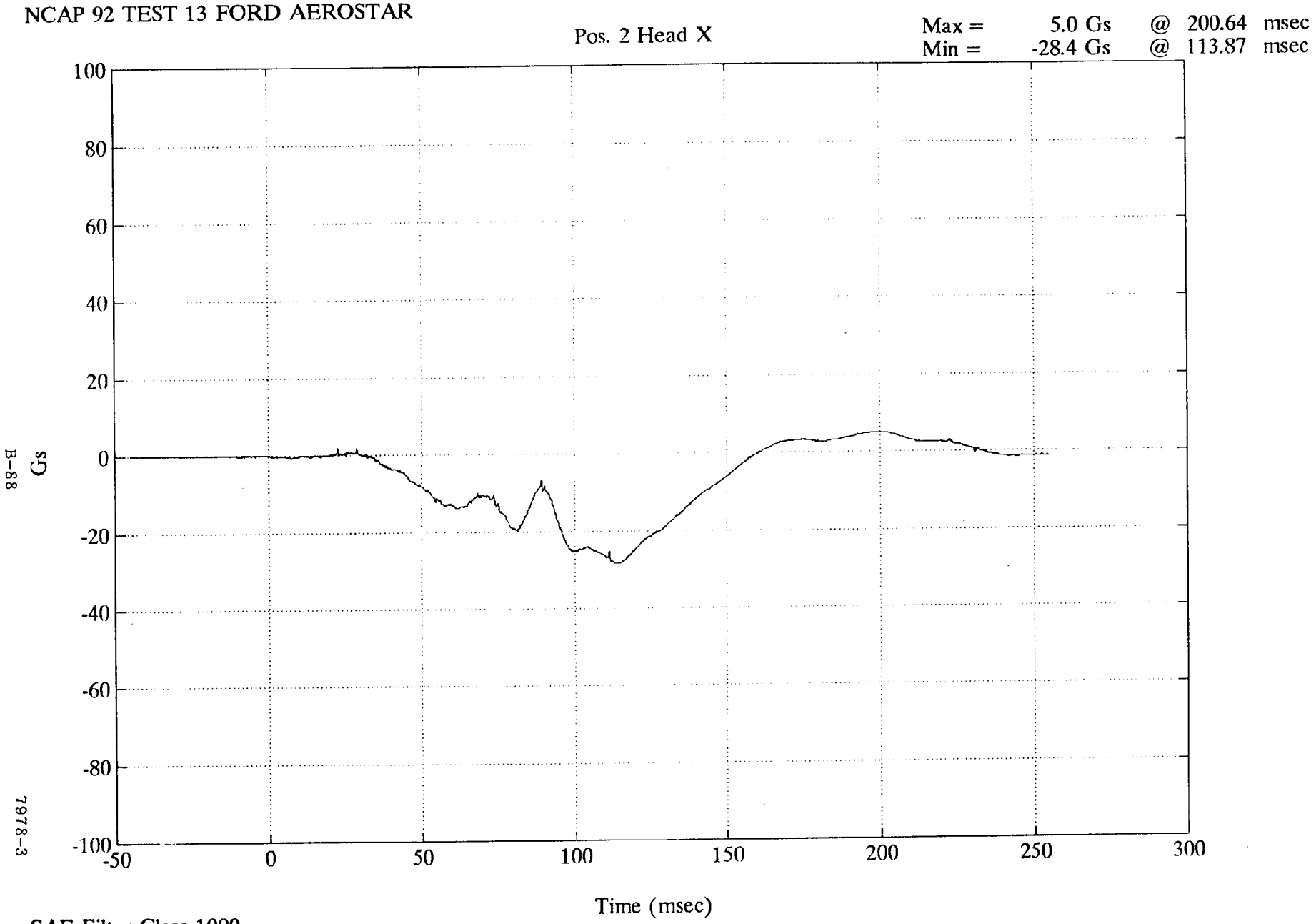
NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

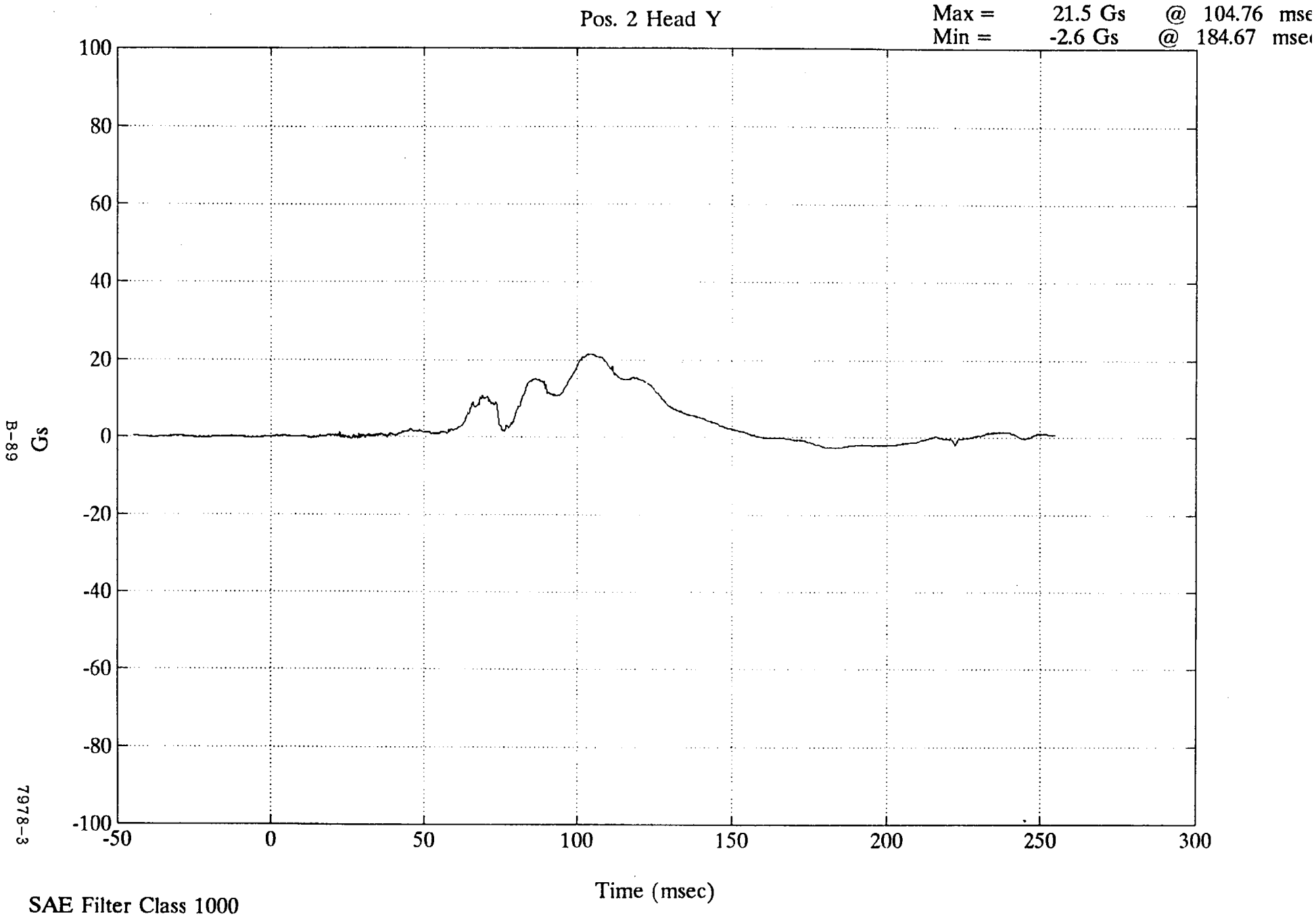
Measured over 2.5 Inches

NCAP 92 TEST 13 FORD AEROSTAR



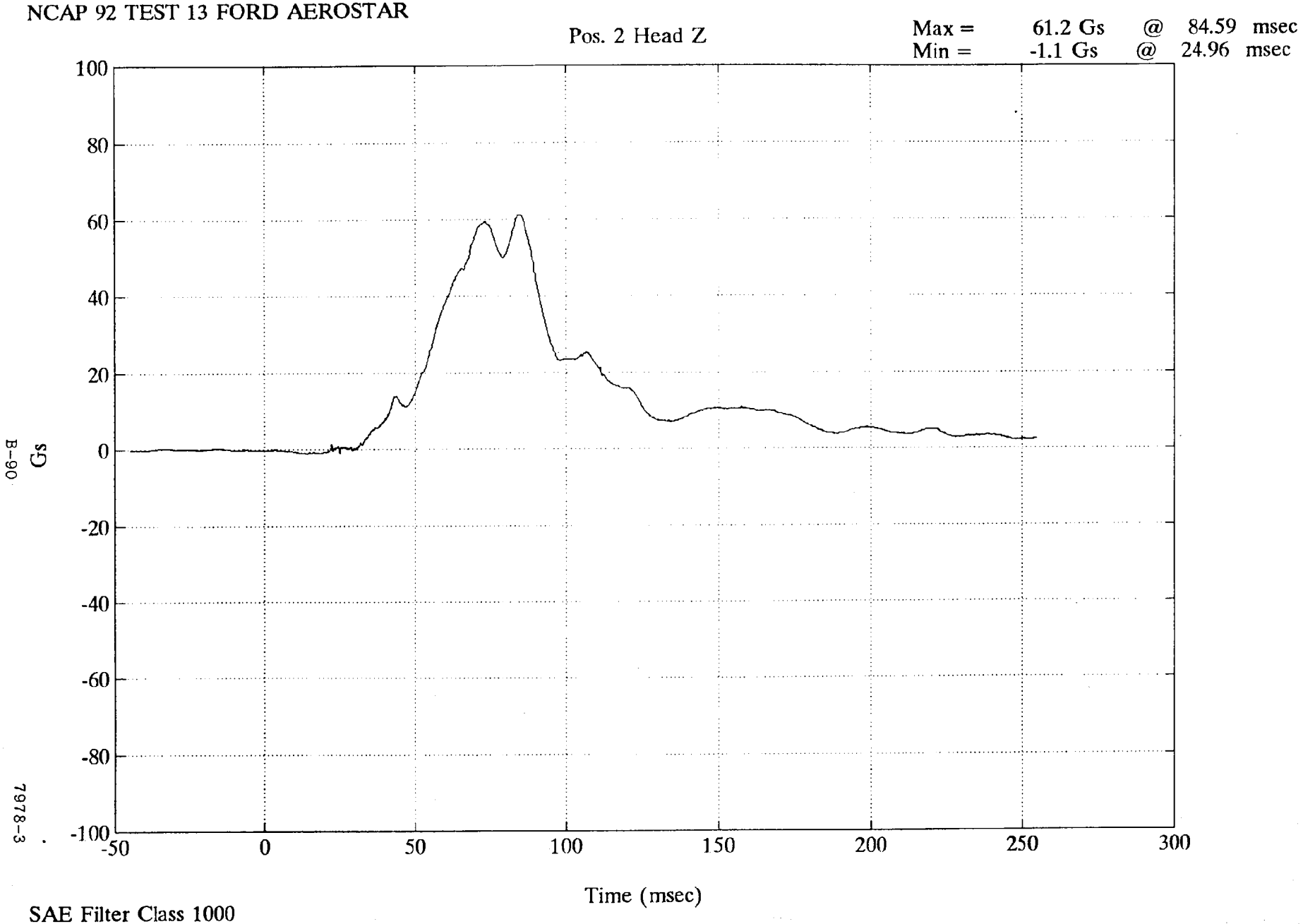
SAE Filter Class 1000

NCAP 92 TEST 13 FORD AEROSTAR



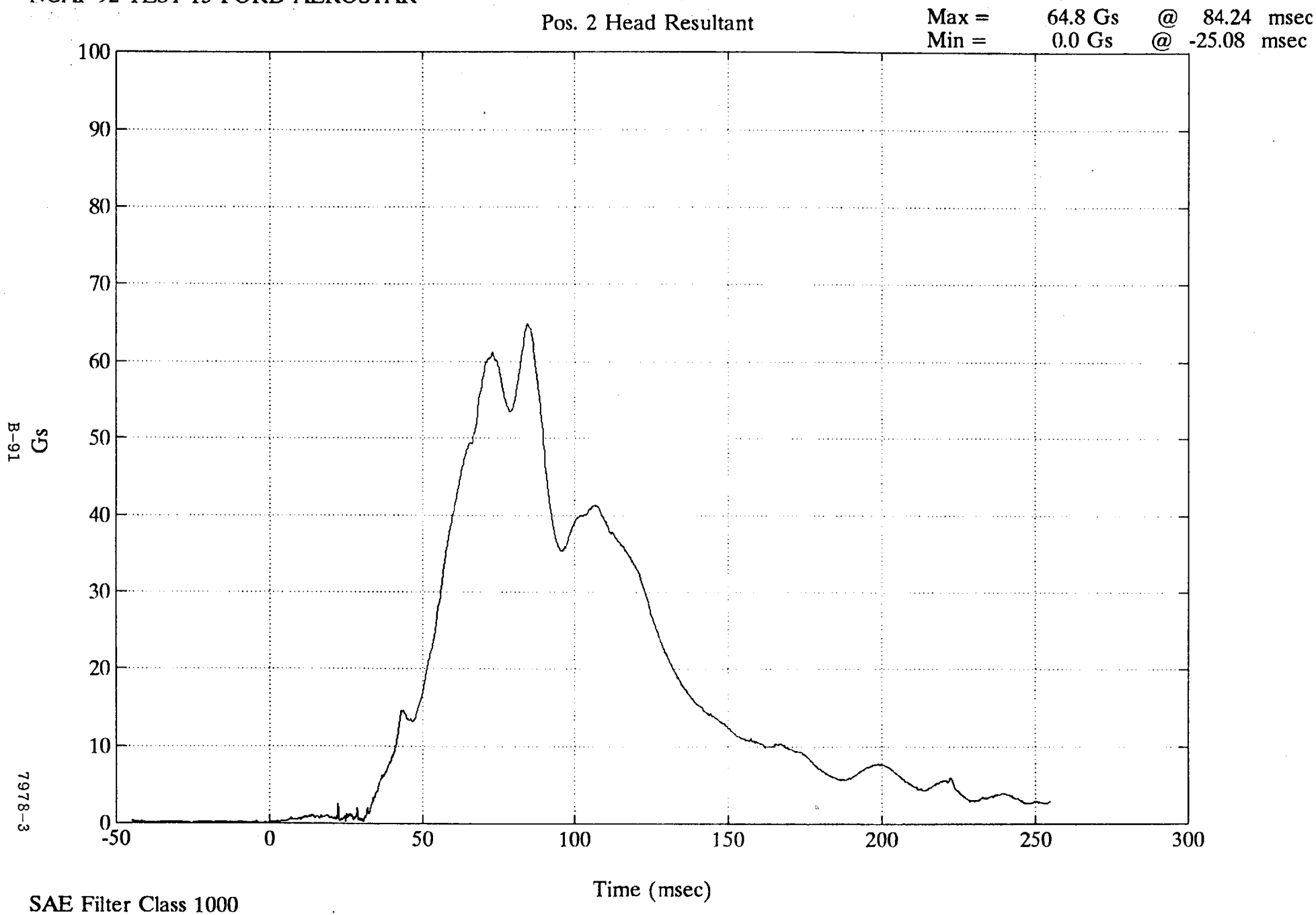
SAE Filter Class 1000

NCAP 92 TEST 13 FORD AEROSTAR



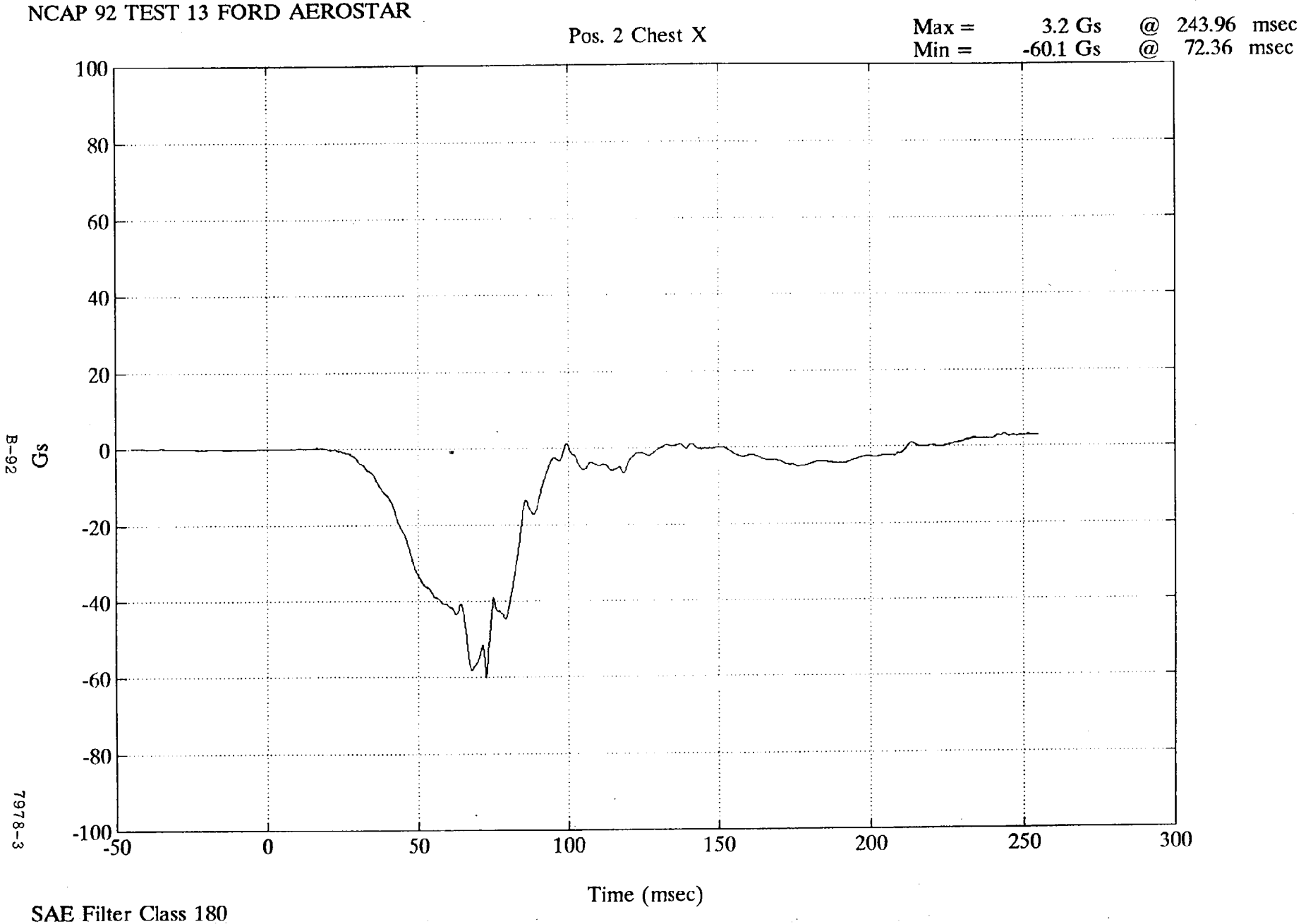
SAE Filter Class 1000

NCAP 92 TEST 13 FORD AEROSTAR



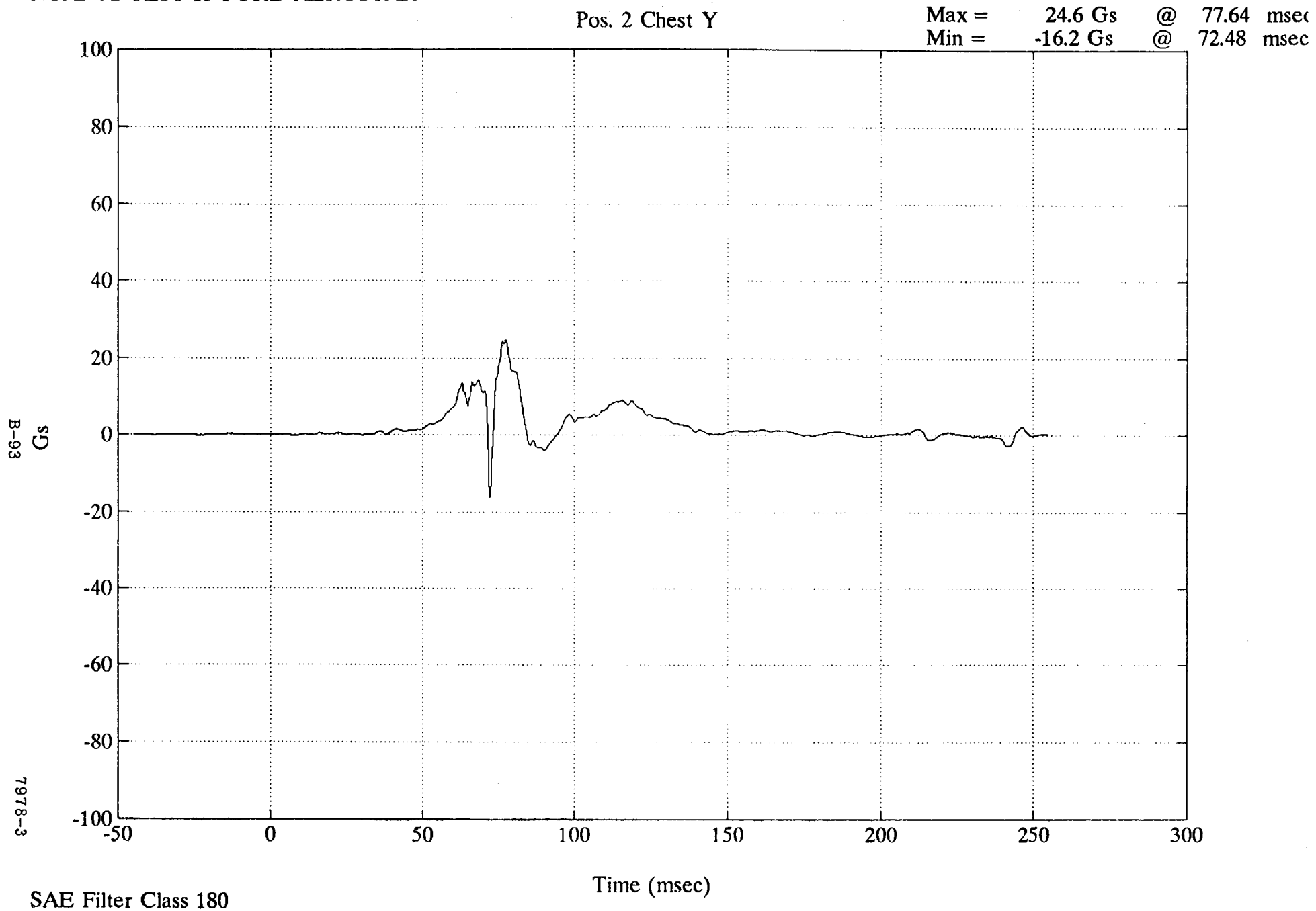
SAE Filter Class 1000

NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 180

NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 180

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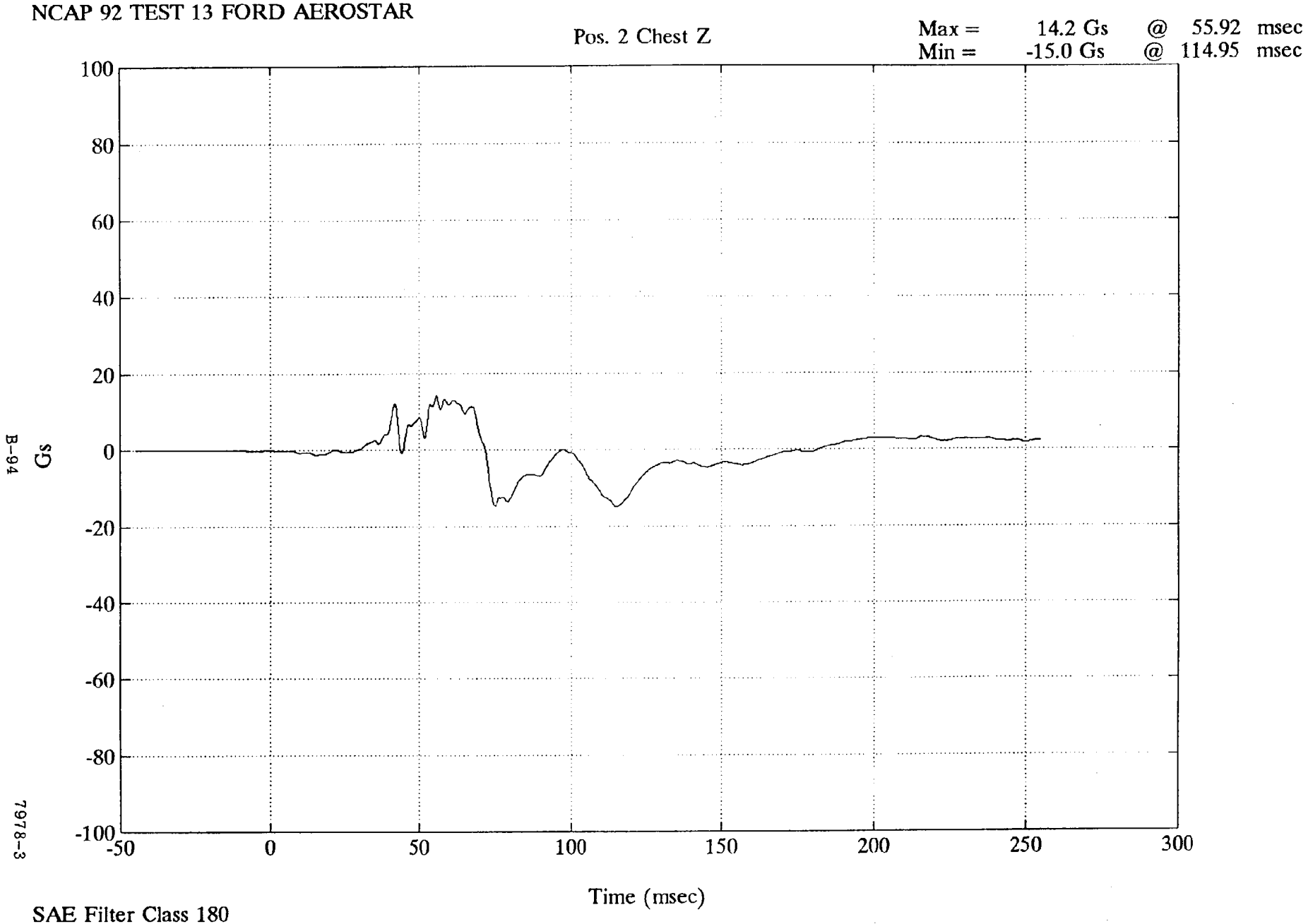
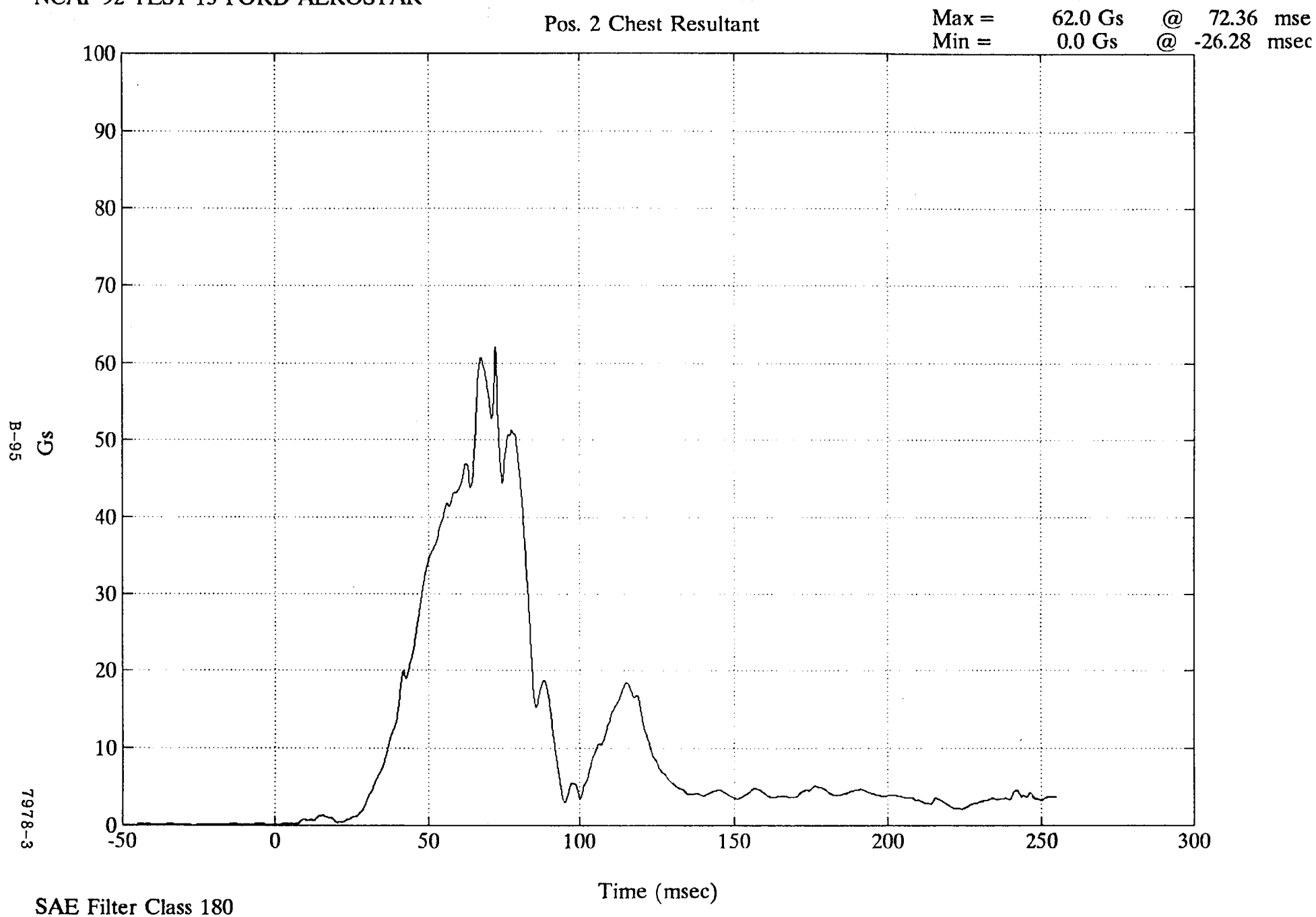


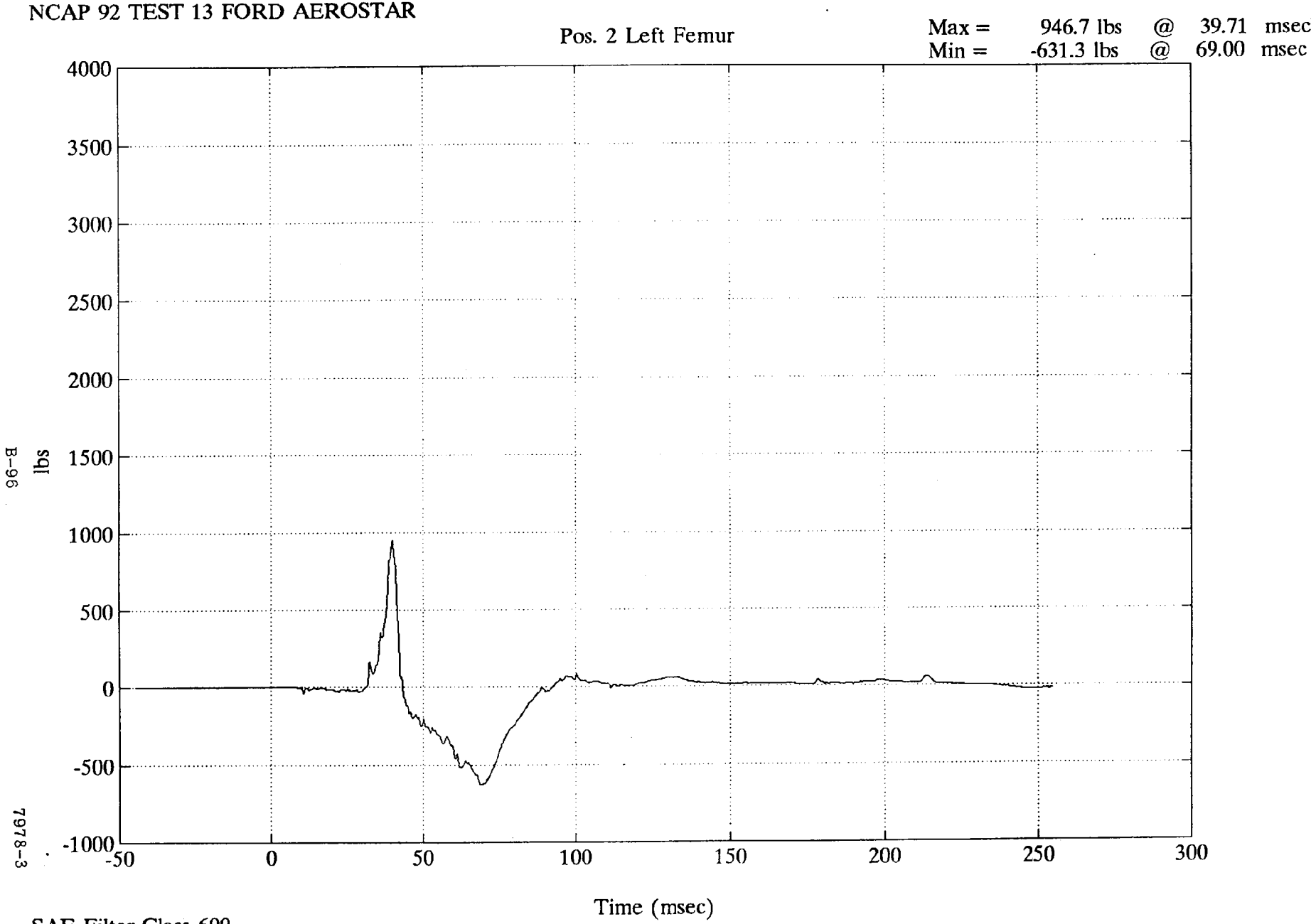
SAE Filter Class 180

NCAP 92 TEST 13 FORD AEROSTAR



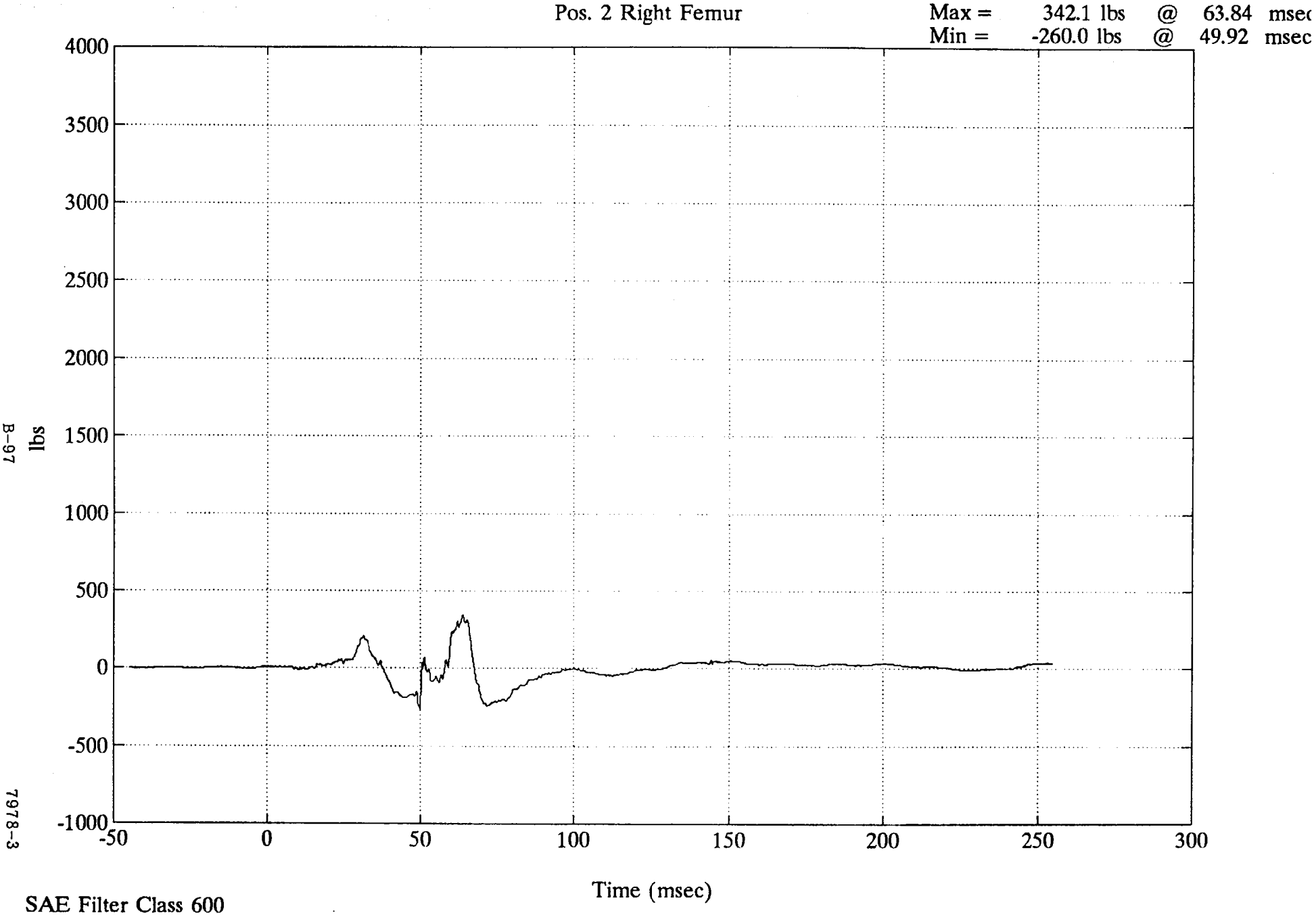
SAE Filter Class 180

NCAP 92 TEST 13 FORD AEROSTAR



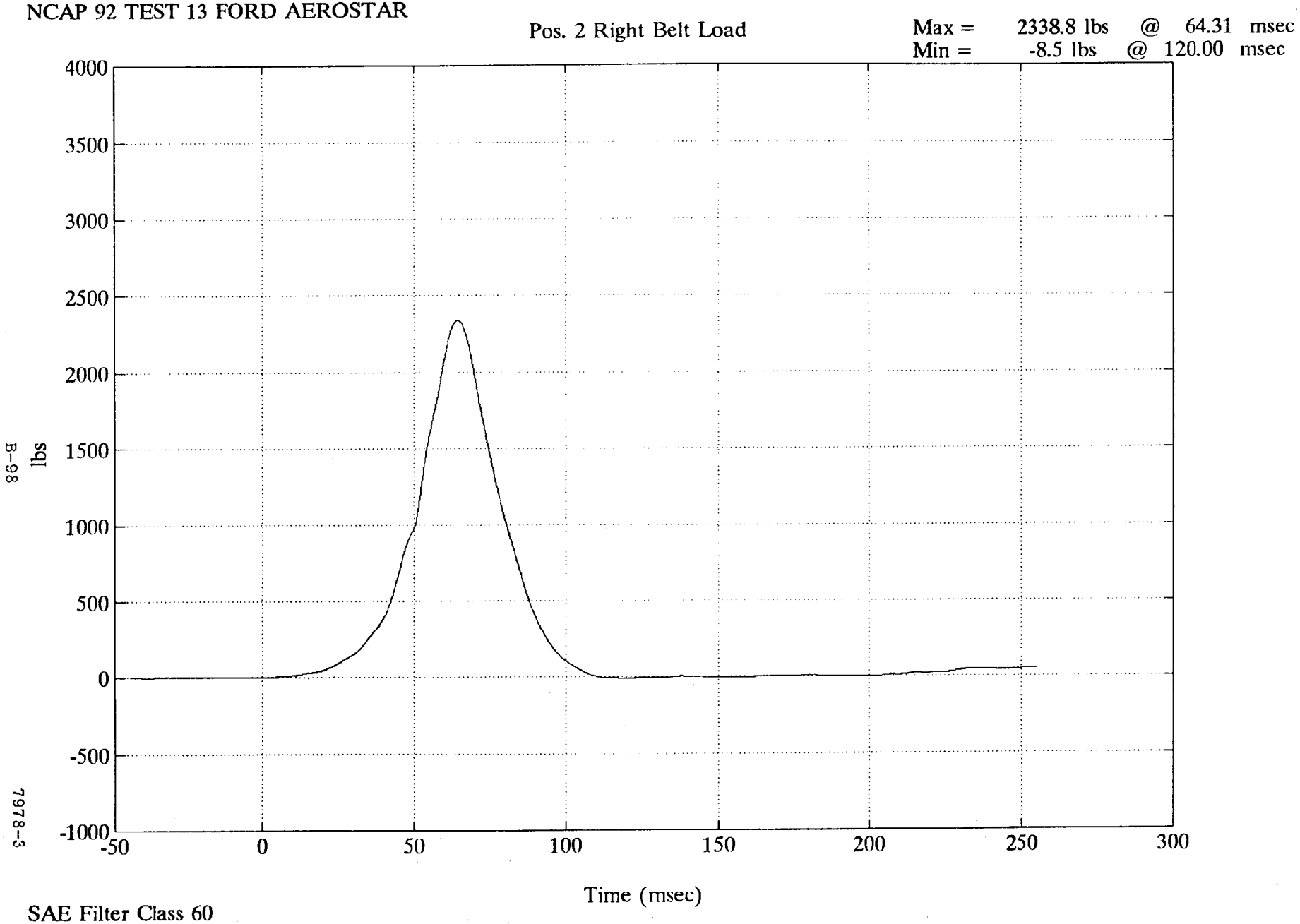
SAE Filter Class 600

NCAP 92 TEST 13 FORD AEROSTAR



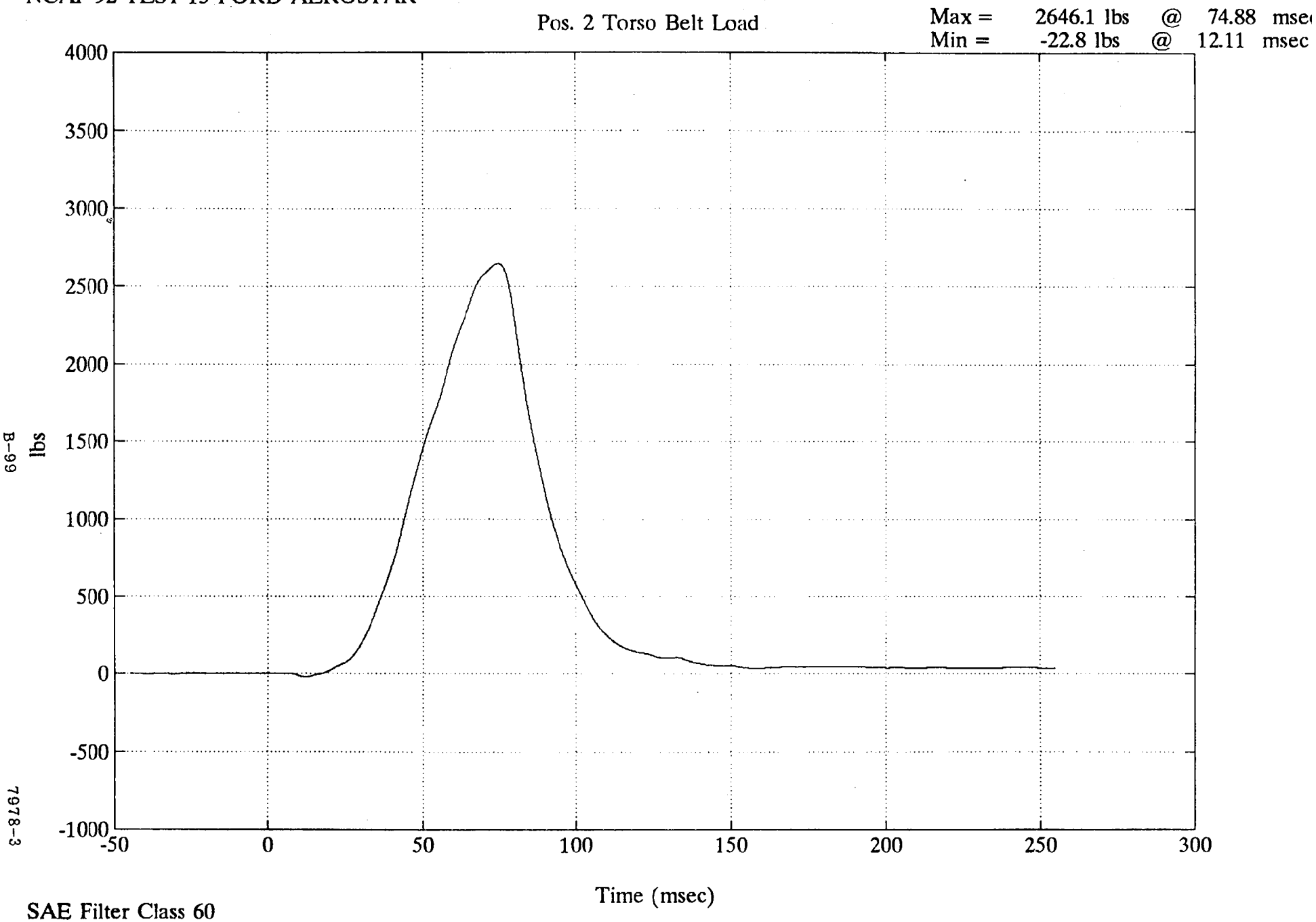
SAE Filter Class 600

NCAP 92 TEST 13 FORD AEROSTAR



SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR

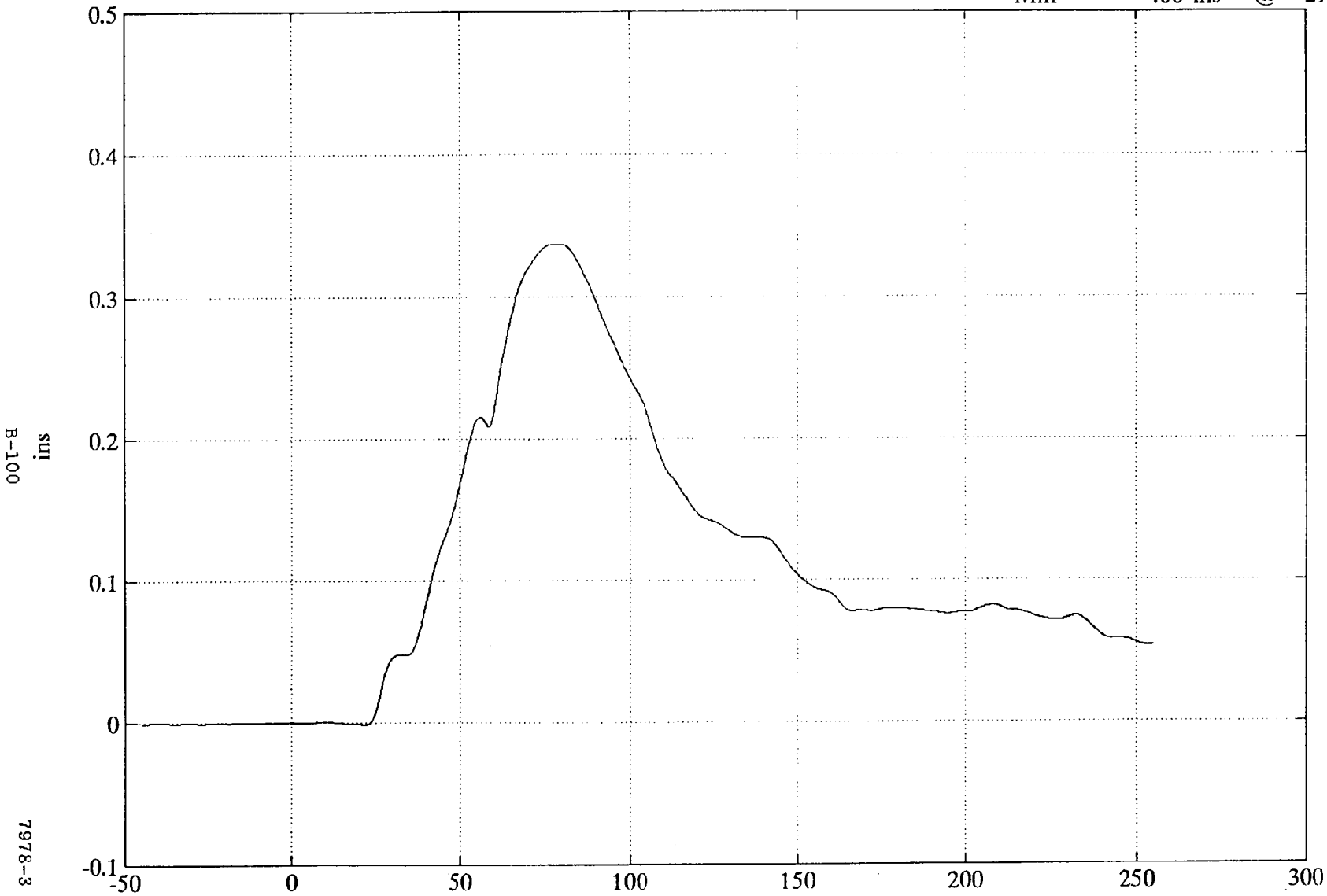


SAE Filter Class 60

NCAP 92 TEST 13 FORD AEROSTAR

Pos. 2 Belt Elongation

Max = .33 ins @ 79.56 msec
Min = -.00 ins @ 21.95 msec



SAE Filter Class 60

Measured over 2.5 Inches

Appendix C

PART 572B DUMMY CONFIGURATION

AND PERFORMANCE VERIFICATION DATA SHEETS

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

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

Dummy serial numbers and certification dates are:

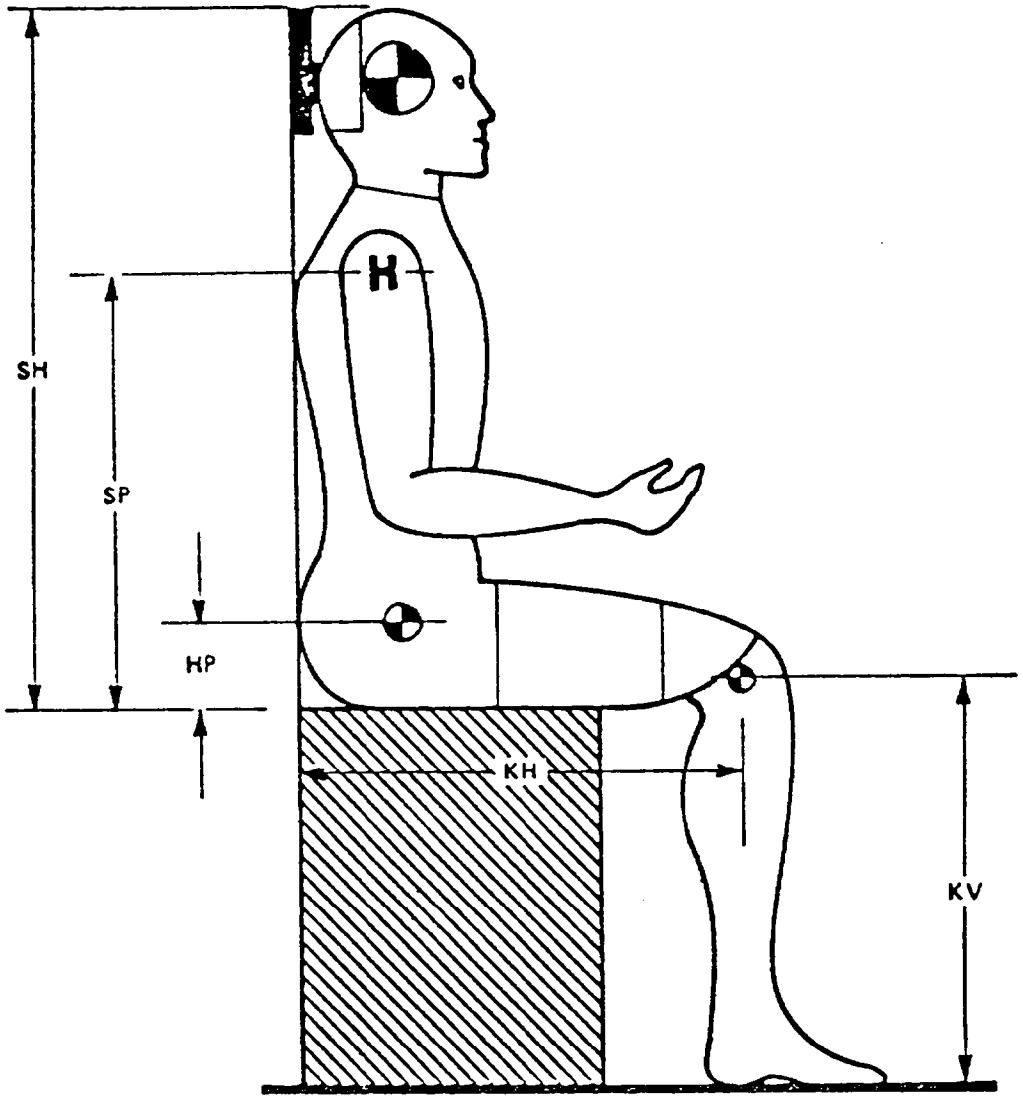
Serial No.	Completion Date
357	11/25/91
358	11/25/91

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 9

DUMMY CONFIGURATION DIMENSIONS



PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER: 357

I. CONFIGURATION VERIFICATION DATA:

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXX	11/25/91	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXX	3	
SH - Seated Height	35.6 to 35.8"	35.6 "	"
SP - Shoulder Pivot Height	21.8 to 22.4"	21.9 "	"
HP - Hip Pivot Height	3.9" ref.	3.9 "	"
KH - Knee Pivot from Back Line	20.1 to 20.7"	20.4 "	"
KV - Knee Pivot from floor	19.3 to 19.9"	19.5 "	"
SW - Shoulder Width	17.8 to 18.4"	18.0 "	"
HW - Hip Width	14.0 to 15.4"	14.3 "	"

II. PERFORMANCE VERIFICATION DATA:

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION		11/25/91	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		3	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		69-71 deg	deg
VERIFICATION LAB HUMIDITY (10 TO 70 %)		33-41 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	210.8 G's	G's
b. peak lateral accel.	<= 10 G's	5.4 G's	G's
c. Time above 100 G's	0.9 to 1.5 ms.	1.38 ms	ms

* Sequential number beginning with "1" at the start of each fiscal year crash test program.

TECHNICIAN'S NAME: Ivan Minkewicz

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 357

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	23.7 fps	fps
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	22.9 G's	G's
c. Peak Resultant Head Acceleration		26 G's max.	25.47 G's	G's
d. Pendulum Decel. (t2-t1)		<= 3 ms.	2.73 ms	ms
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	26.54 ms	ms
f. Pendulum Decel. (t4-t3)		<= 10 ms.	6.2 ms	ms
g. Max. Head Rotation		63 to 73 deg.	68.33 deg	deg
h. Chordal Displacement				
HEAD ROTATION ANGLE				
0 deg.	Time	-2 to 2 ms.	0.0 ms	ms
	Displ.	-.5 to .5"	0.0 "	"
30 deg.	Time	25.6 to 34.4 ms.	30.51 ms	ms
	Displ.	2.1 to 3.1"	2.49 "	"
60 deg.	Time	40.3 to 51.7 ms.	44.64 ms	ms
	Displ.	4.3 to 5.3"	4.73 "	"
Maximum	Time	53.2 to 66.8 ms.	53.94 ms	ms
	Displ.	5.0 to 6.0"	5.12 "	"
60 deg.	Time	67.0 to 83.0 ms.	69.44 ms	ms
	Displ.	4.3 to 5.3"	4.73 "	"
30 deg.	Time	85.4 to 104.6 ms.	87.55 ms	ms
	Displ.	2.1 to 3.1"	2.15 "	"
0 deg.	Time	101.0 - 123.0 ms.	101.81 ms	ms
	Displ.	-.5 to 0.5"	0.0 "	"

TECHNICIANS NAME: Ivan Minkewicz

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 357

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
3. ABDOMINAL COMPRESSION TEST: (preload = 50 lbs.)			
a. Force @ 0.5"	23 to 36 lbs.	24 lbs	lbs
b. Force @ 0.75"	36 to 50 lbs.	39 lbs	lbs
c. Force @ 1.0"	50 to 63 lbs.	56.5 lbs	lbs
d. Force @ 1.3"	73 to 88 lbs.	87 lbs	lbs
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	23 lbs	lbs
b. Force @ 30 deg.	34 to 46 lbs.	37 lbs	lbs
c. Force @ 40 deg.	46 to 58 lbs.	50 lbs	lbs
d. Return Angle	12 deg. maximum	10 deg	deg
5. CHEST IMPACT TESTS:			
A. High Speed			
(1) Probe Speed	21.78-22.22 fps.	21.8 fps	fps
(2) Peak Deflection	1.7" maximum	1.53 "	"
(3) Peak Resistive Force	2250 lbs maximum	2125 lbs	lbs
(4) Internal Hysteresis	50 to 70%	58.4 %	%
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	13.9 fps	fps
(2) Peak Deflection	1.1" maximum	.95 "	"
(3) Peak Resistive Force	1450 lbs maximum	1273 lbs	lbs
(4) Internal Hysteresis	50 to 70%	55.5 %	%

TECHNICIAN'S NAME: Ivan Minkewicz

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 357

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
6. KNEE IMPACT TEST			
A. Left Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	fps
(2) Maximum Force	1850 to 2500 lbs	2267 lbs	lbs
(3) Time above 1000 lbs.	1.7 ms. minimum	1.75 ms	ms
B. Right Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	fps
(2) Maximum Force	1850 to 2500 lbs	2027 lbs	lbs
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.75 ms	ms

REMARKS:

TECHNICIAN'S NAME: Ivan Minkewicz

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY I.D. NUMBER: 357

A. DUMMY INSTRUMENTS

	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER				
HX LONGITUDINAL	ENDEVCO	A67A	1/92	7/92
HY LATERAL	ENDEVCO	A33A	1/92	7/92
HZ VERTICAL	ENDEVCO	A60A	1/92	7/92
2. CHEST ACCELEROMETER				
CX LONGITUDINAL	CEC	A08A	1/92	7/92
CY LATERAL	ENDEVCO	A28F	1/92	7/92
CZ VERTICAL	CEC	A39A	1/92	7/92
3. FEMUR LOAD CELLS				
LEFT SIDE	GSE	951	11/91	5/92
RIGHT SIDE	GSE	952	11/91	5/92

B. CALIBRATION LABORATORY INSTRUMENTS

	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. PENDULUM ACC.	CEC	A160	1/92	7/92
2. TEST PROBE ACCELEROMETER	CEC	A161	12/91	6/92
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE	TRANS-DUCER INC	20051	7/91	1/92
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE	BLH	72952	7/91	1/92
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE	CIC	567-11	7/91	1/92

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER: 358

I. CONFIGURATION VERIFICATION DATA:

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXX	11-25-91	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXX	2	
SH - Seated Height	35.6 to 35.8"	35.6 "	"
SP - Shoulder Pivot Height	21.8 to 22.4"	22.1 "	"
HP - Hip Pivot Height	3.9" ref.	3.9 "	"
KH - Knee Pivot from Back Line	20.1 to 20.7"	20.5 "	"
KV - Knee Pivot from floor	19.3 to 19.9"	19.6 "	"
SW - Shoulder Width	17.8 to 18.4"	18.0 "	"
HW - Hip Width	14.0 to 15.4"	14.8 "	"

II. PERFORMANCE VERIFICATION DATA:

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION		11-25-91	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		2	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		69-71 deg	deg
VERIFICATION LAB HUMIDITY (10 TO 70 %)		33-41 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	245 G's	G's
b. peak lateral accel.	<= 10 G's	2.7 G's	G's
c. Time above 100 G's	0.9 to 1.5 ms.	1.25 ms	ms

* Sequential number beginning with "1" at the start of each fiscal year crash test program.

TECHNICIAN'S NAME: Ivan Minkewicz

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA...continued

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 358

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	23.9 fps	fps
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	23.6 G's	G's
c. Peak Resultant Head Acceleration		26 G's max.	25.24 G's	G's
d. Pendulum Decel. (t2-t1)		<= 3 ms.	2.48 ms	ms
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	25.42 ms	ms
f. Pendulum Decel. (t4-t3)		<= 10 ms.	9.42 ms	ms
g. Max. Head Rotation		63 to 73 deg.	69.05 deg	deg
h. Chordal Displacement				
HEAD ROTATION ANGLE				
0 deg.	Time	-2 to 2 ms.	0.0 ms	ms
	Displ.	-.5 to .5"	0.0 "	"
30 deg.	Time	25.6 to 34.4 ms.	30.13 ms	ms
	Displ.	2.1 to 3.1"	2.37 "	"
60 deg.	Time	40.3 to 51.7 ms.	44.52 ms	ms
	Displ.	4.3 to 5.3"	4.62 "	"
Maximum	Time	53.2 to 66.8 ms.	57.04 ms	ms
	Displ.	5.0 to 6.0"	5.26 "	"
60 deg.	Time	67.0 to 83.0 ms.	71.92 ms	ms
	Displ.	4.3 to 5.3"	4.62 "	"
30 deg.	Time	85.4 to 104.6 ms.	89.16 ms	ms
	Displ.	2.1 to 3.1"	2.11 "	"
0 deg.	Time	101.0 - 123.0 ms.	103.3 ms	ms
	Displ.	-.5 to 0.5"	0.0 "	"

TECHNICIANS NAME: Ivan Minkewicz

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 358

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
3. ABDOMINAL COMPRESSION TEST: (preload = 50 lbs.)			
a. Force @ 0.5"	23 to 36 lbs.	25 lbs	lbs
b. Force @ 0.75"	36 to 50 lbs.	38.5 lbs	lbs
c. Force @ 1.0"	50 to 63 lbs.	56 lbs	lbs
d. Force @ 1.3"	73 to 88 lbs.	81.5 lbs	lbs
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	31 lbs	lbs
b. Force @ 30 deg.	34 to 46 lbs.	41.5 lbs	lbs
c. Force @ 40 deg.	46 to 58 lbs.	55 lbs	lbs
d. Return Angle	12 deg. maximum	7 deg	deg
5. CHEST IMPACT TESTS:			
A. High Speed			
(1) Probe Speed	21.78-22.22 fps.	21.8 fps	fps
(2) Peak Deflection	1.7" maximum	1.5 "	"
(3) Peak Resistive Force	2250 lbs maximum	2098 lbs	lbs
(4) Internal Hysteresis	50 to 70%	64.3 %	%
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	14.1 fps	fps
(2) Peak Deflection	1.1" maximum	1.02 "	"
(3) Peak Resistive Force	1450 lbs maximum	1361 lbs	lbs
(4) Internal Hysteresis	50 to 70%	58.6 %	%

TECHNICIAN'S NAME: Ivan Minkewicz

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 358

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
6. KNEE IMPACT TEST			
A. Left Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	fps
(2) Maximum Force	1850 to 2500 lbs	2083 lbs	lbs
(3) Time above 1000 lbs.	1.7 ms. minimum	1.875 ms	ms
B. Right Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	fps
(2) Maximum Force	1850 to 2500 lbs	1951 lbs	lbs
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.875 ms	ms

REMARKS:

TECHNICIAN'S NAME: Ivan Minkewicz

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY I.D. NUMBER: 358

A. DUMMY INSTRUMENTS

	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER				
HX LONGITUDINAL	ENDEVCO	A27A	1/92	7/92
HY LATERAL	ENDEVCO	A26A	1/92	7/92
HZ VERTICAL	ENDEVCO	A51A	1/92	7/92
2. CHEST ACCELEROMETER				
CX LONGITUDINAL	CEC	A48A	1/92	7/92
CY LATERAL	ENDEVCO	A73A	1/92	7/92
CZ VERTICAL	CEC	A19A	1/92	7/92
3. FEMUR LOAD CELLS				
LEFT SIDE	GSE	954	11/91	6/92
RIGHT SIDE	GSE	955	11/91	6/92

B. CALIBRATION LABORATORY INSTRUMENTS

	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. PENDULUM ACC.	CEC	A160	1/92	7/92
2. TEST PROBE ACCELEROMETER	CEC	A161	12/91	6/92
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE	TRANS-DUCER INC	20051	7/91	1/92
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE	BLH	72952	7/91	1/92
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE	CIC	567-11	7/91	1/92

Appendix D

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(6 Month Calibration Minimum)

DRIVER DUMMY	Serial #	Manufacturer	Calibration Last	Calibration Next
Head X	A67A	ENDEVCO	1/92	7/92
Y	A33A	ENDEVCO	1/92	7/92
Z	A60A	ENDEVCO	1/92	7/92
Chest X	A08A	CEC	1/92	7/92
Y	A28F	ENDEVCO	1/92	7/92
Z	A39A	CEC	1/92	7/92
Right Femur Load Cell	952	GSE	11/91	5/92
Left Femur Load Cell	951	GSE	11/91	5/92
Neck Load Cell X		DENTON		
Y		DENTON		
Z		DENTON		
Neck Moment X		DENTON		
Y		DENTON		
Z		DENTON		
Chest Deflection Gauge		HUMANOID		
Hybrid III Use Only				
Lap Belt Load Cells	123	LEBOW	11/91	5/92
Shoulder Belt Load Cells	127	LEBOW	11/91	5/92
Spool-Out Potentiometer	-	SERVONIC INST.	-	-
Belt Stretch Transducer	E1	CALSPAN	10/91	4/92

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(6 Month Calibration Minimum)

PASSENGER DUMMY	Serial #	Manufacturer	Calibration Last	Calibration Next
Head X	A27A	ENDEVCO	1/92	7/92
Y	A26A	ENDEVCO	1/92	7/92
Z	A51A	ENDEVCO	1/92	7/92
Chest X	A48A	CEC	1/92	7/92
Y	A73A	ENDEVCO	1/92	7/92
Z	A19A	CEC	1/92	7/92
Right Femur Load Cell	955	GSE	11/91	5/92
Left Femur Load Cell	954	GSE	11/91	5/92
Neck Load Cell X		DENTON		
Y		DENTON		
Z		DENTON		
Neck Moment X		DENTON		
Y		DENTON		
Z		DENTON		
Chest Deflection Gauge Hybrid III Use Only		HUMANOID		
Lap Belt Load Cells	133	LEBOW	11/91	5/92
Shoulder Belt Load Cells	135	LEBOW	11/91	5/92
Spool-Out Potentiometer	-	SERVONIC INST.		
Belt Stretch Transducer	E3	CALSPAN	10/91	4/92

INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS
(6 Month Calibration Minimum)

	Serial #	Manufacturer	Calibration	
			Last	Next
Left Seat Rear Crossmember	A175	CEC	10/92	4/92
Right Rear Seat Crossmember	A176	CEC	11/92	5/92
Top of Engine	A115	CEC	11/92	5/92
Bottom of Engine	A75	CEC	10/92	4/92
Left Disc Brake Caliper	A185	CEC	11/92	5/92
Right Disc Brake Caliper	A181	CEC	10/92	4/92
Instrument Panel	A142	CEC	10/92	4/92
Center Rear Crossmember Z	A29	CEC	10/92	4/92
Vehicle Rear Z	A69	CEC	10/92	4/92

INSTRUMENT CALIBRATION FOR LABORATORY INSTRUMENTS
(6 Month Calibration Minimum)

	Serial #	Manufacturer	Calibration	
			Last	Next
Neck Bending Pendulum Accel.	A160	CEC	12/92	6/92
Neck Bending Rotary Potentiometer	None	BOURNS	1/92	7/92
Femur Probe Accelerometer	A161	CEC	12/91	6/92
Chest/Thorax Probe Accel.	A161	CEC	12/91	6/92
Lumbar Flexion Force Gauge	20051	TRANSDUCER INC.	1/92	7/92

Appendix E

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

Safety Restraints

Using Safety Restraints Properly

Safety Belts

The use of safety belts help to restrain you and your passengers in case of a collision. In most states, the law requires their use. We strongly recommend that you use them every time you travel in your vehicle.

Safety belts provide best restraint when:

- ❑ the seat back is upright
- ❑ the occupant is sitting upright (not slouched)
- ❑ the lap belt is snug and low on the hips
- ❑ the shoulder belt is snug against the chest
- ❑ the knees are straight forward

For your safety, your vehicle has different types of safety belts:

- ❑ Combination lap and shoulder belts - for people who sit next to the side windows in either front or rear seats
- ❑ Lap belts without retractors

See the following sections for directions on how to properly use these safety belts. Also see *Safety Restraints for Children* in this chapter for special instructions about using safety belts for children.

Warning: Make sure that you and your passengers, including pregnant women, wear safety belts. Be sure that lap belts fit snugly and as low as possible around the hips. If safety belts are not used properly, the risk of you or your passengers being injured in a collision greatly increases.

Warning: Always drive and ride with your seatback upright and the lap belt snug and low across the hips to reduce the risk of serious injury to the abdomen or neck that could be caused by sliding under the safety belts in a collision.

Do not allow any people to ride in the cargo area of your vehicle. People who are not riding in seats with their safety belts fastened are much more likely to be injured in a collision.

Never let a passenger hold a child on his or her lap while the vehicle is moving. The passenger cannot protect the child from injury in a collision.

Children should always ride with the seatback in the fully upright position. When the seatback is not fully upright, there is a greater risk that the child will slide under the safety belt and be seriously injured in a collision.

Never use a single belt for more than one person or across more than one seating position. This greatly increases the risk that one or both of the people will be injured in a collision. Each seating position in your vehicle has a specific safety belt assembly which is made up of one buckle and one tongue that are designed to be used as a pair.

Warning: Use the shoulder belt on the outside shoulder only. Never wear the shoulder belt under the arm. Never swing it around the neck over the inside shoulder. Failure to follow these precautions could increase the risk and/or severity of injury in an accident.

Warning: Be sure to lock all doors before you drive away. This will lessen your risk of being thrown from the vehicle in a collision.

Combination Lap and Shoulder Belts

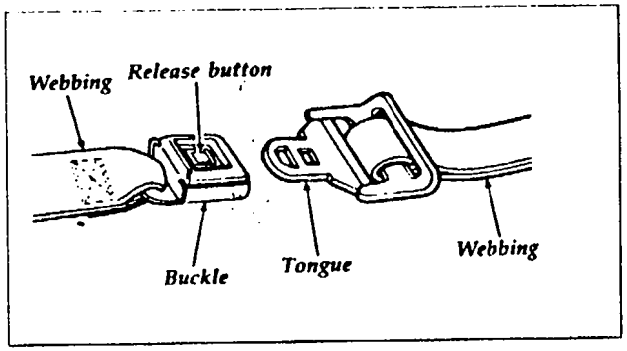
While your vehicle is in motion, the combination lap and shoulder belt adjusts to your movement. However, if you brake hard, corner hard or if your vehicle receives an impact of 5 mph (8 km/h) or more, the lap and shoulder belt locks and prevents you from moving. The front seat belt systems can also be made to lock by jerking on the belt.

After you get into your vehicle, close the door and lock it. Then adjust the seat to the position that suits you best.

To fasten the belt, pull the lap-shoulder belt from the retractor so that the shoulder portion of the belt crosses your shoulder and chest. Insert the belt tongue into the proper buckle until you hear a snap and feel it latch.

Warning: Use the shoulder belt only on the shoulder that is closest to the side of the vehicle. Never wear the belt under your arm. Never swing it around your neck over the inside shoulder. If you do not use the shoulder belt properly, the chances of your being injured in a collision greatly increase.

To tighten the lap portion of the belt, pull up on the shoulder belt until it fits you snugly. The belt should rest as low on your hips as possible.



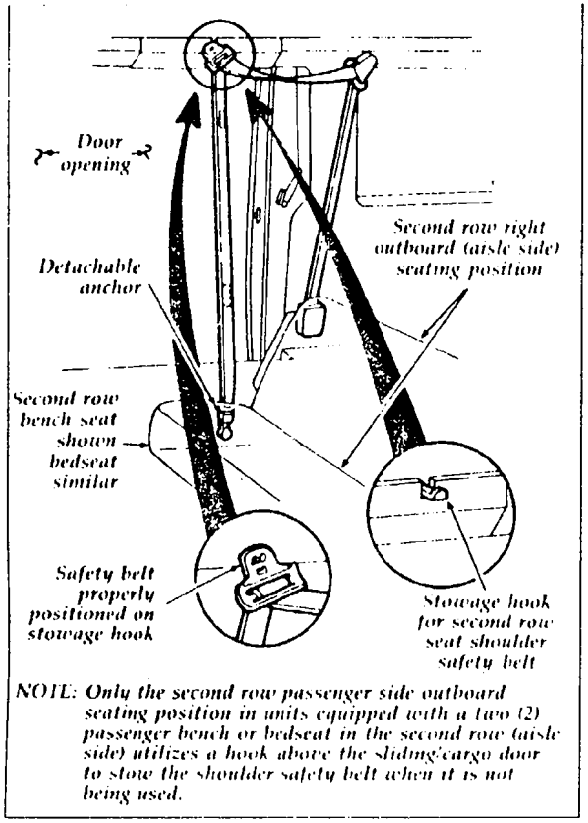
Unfastening the outboard lap/shoulder belts

All Two Passenger Bench or Bedseat

In addition to anchorages in the floor and roof structures, some rear safety belts have a detachable anchor mounted to the outboard side of the rear seat. This should remain attached, except when removing the rear seats.

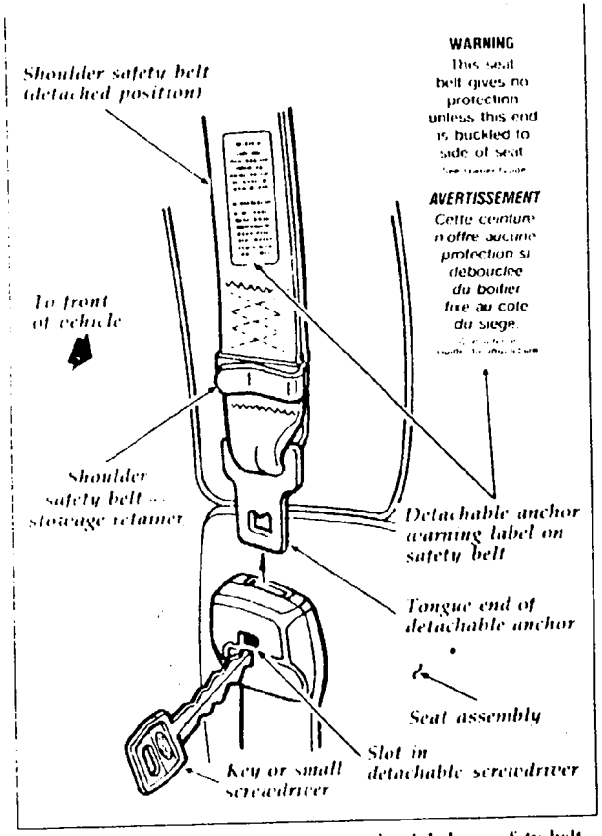
The second row passenger side outboard seating position uses a hook above the sliding/cargo door to stow the shoulder safety belt when it is not being used.

NOTE: When the belt is stowed using the hook, DO NOT use the hanging belt as an assist when entering the vehicle.



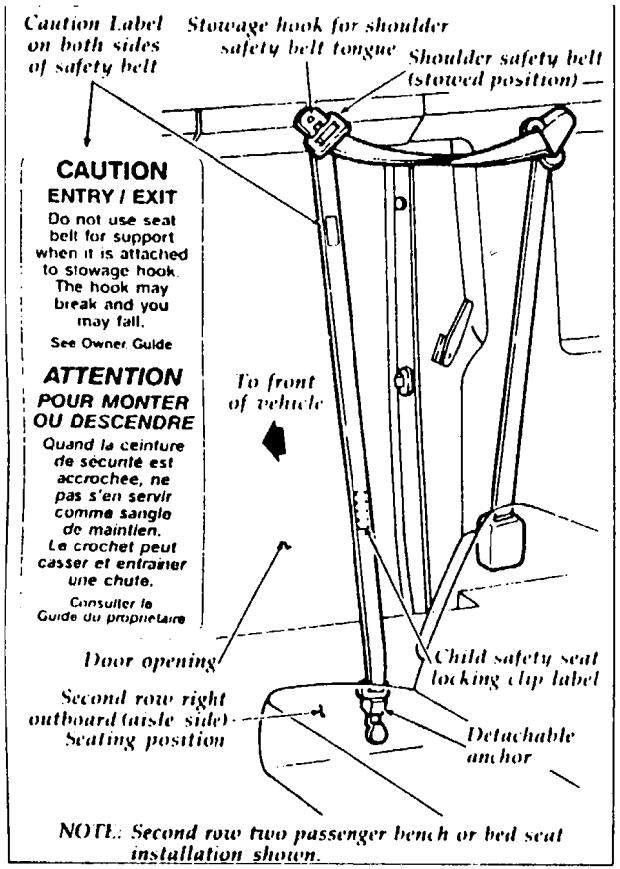
NOTE: Only the second row passenger side outboard seating position in units equipped with a two (2) passenger bench or bedseat in the second row (aisle side) utilizes a hook above the sliding/cargo door to stow the shoulder safety belt when it is not being used.

Proper stowage of shoulder safety belt.



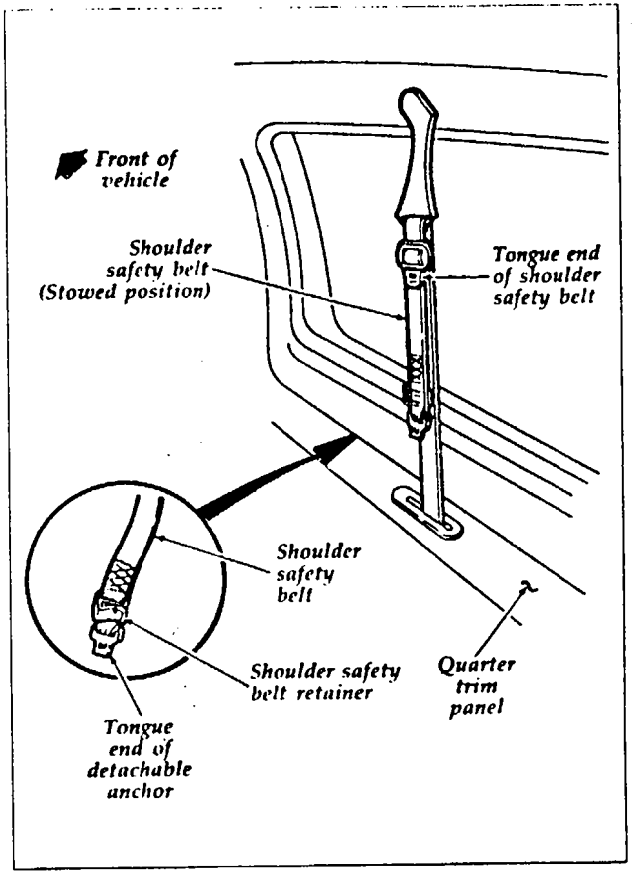
Location of the detachable anchor warning label on safety belt

In order to remove the rear seat, the safety belt must be disengaged from the seat. To disengage the safety belt from the seat, insert a key or small screwdriver into the slot provided on the detachable anchor. Then lift upward. See previous illustration.



Location of the detachable anchor caution label on safety belt

Whenever a rear seat has been removed, the tongue end of the detachable anchor must be correctly stowed. See the following illustration.



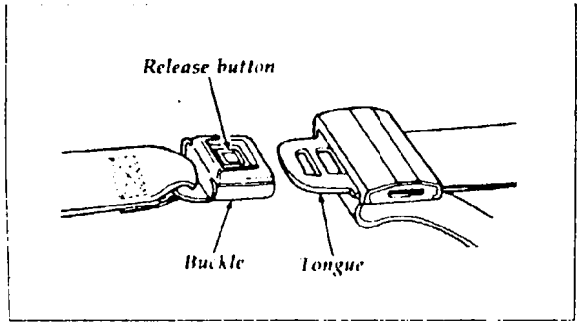
Rear seat shoulder safety belt — stowage (with seat removed)

Warning: When reinstalling a rear seat in the vehicle, install the seat in its original location. Improper installation of the seat will prevent correct use of the shoulder safety belt and could increase the risk and/or severity of injury in an accident.

After installing the rear seat, make sure that the safety belt is not twisted before you insert it into the detachable anchor. A twisted safety belt may cause the retractor to not work properly. Then insert the detachable anchor tongue into the detachable anchor until you hear a "snap" and feel the latch engage.

Lap Belts Without Retractors

On the center seat of the rear three-passenger seats you will find a lap-belt without a retractor. Shorten this belt and fasten it when you are not using it. To lengthen the belt, tip the tongue at a right angle to the belt and pull the belt over your lap until the tongue reaches the buckle.



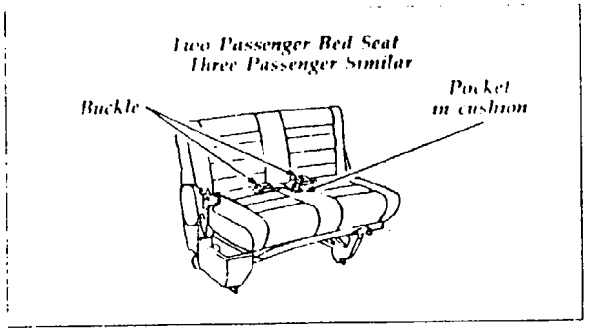
Fastening and unfastening rear occupant safety belts

To fasten the belt, pull the belt across your hips and insert the tongue into the correct buckle on your seat until you hear a snap and feel it lock. Make sure the buckle is securely fastened.

Adjust the belt so that it fits snugly and as low as possible around the hips:

- If you need to lengthen the belt, unfasten it and repeat the procedure above.
- If you need to shorten the belt, pull on the loose end of the webbing.

Bed/Seat Tongue and Stop



Location of the safety belt bed/seat pocket

To Unfasten the Safety Belts with Retractors:

1. Push the release button on the buckle. This allows the tongue to unlatch from the buckle.
2. While the belt retracts, guide the tongue to its original position. If you do not guide the tongue, it may strike you or part of the vehicle.

To Untwist or Unjam a Safety Belt (Retractor):

If you should jam the lap belt retractor by allowing the belt to retract when it is twisted, you can free the webbing with this procedure:

1. Pull on the belt with both hands to tighten it on the retractor spool.
2. Feed the belt back into the retractor until it is completely retracted. Repeat previous step if necessary.
3. Pull the belt out of its holder as far as it will go and untwist the belt or remove the object that is jamming the belt. Let the belt retract.

4. Then, pull the belt out and let it retract several times to make sure that the belt works properly.

For Twisted Rear Outboard Combination Lap and Shoulder Safety Belts

Disengage the detachable anchor tongue from the detachable anchor, remove the twist and re-install the detachable anchor tongue end into the detachable anchor until you hear a snap and feel the latch engage.

Safety Belt Extension Assembly

For some people, the safety belt may be too short even when it is fully extended. You can add about eight inches (20 cm) to the belt length with a safety belt extension assembly (611C22). Safety belt extensions are available from your dealer.

Warning: To ensure that the safety belt extension assembly will hold in the event of a collision, only safety belt extensions manufactured by the same supplier as the safety belt should be used. Manufacturer identification is located at the end of the webbing on a label.

Safety Belt Maintenance

Check your safety belt system periodically to make sure that it works properly and isn't damaged. If the webbing shows any wear, nicks or cuts, have it examined by a qualified technician to determine if replacement is necessary. Always have your safety belt system checked after a collision.

For information on cleaning the webbing of seat belt assemblies, see *"Cleaning the Safety Belts"* in the Index.

Warning: All safety belt assemblies including retractors and attaching hardware should be inspected after any collision. Ford recommends that all safety belt assemblies used during a collision be replaced unless the collision was minor and a qualified technician finds that the belts do not show damage and continue to operate properly. Safety belt assemblies not in use during a collision should also be inspected and replaced if either damage or improper operation is noted.

Air Bag Supplemental Restraint System (SRS)

Driver Air Bag

This vehicle has a driver side supplemental air bag and can be identified by the letters "SRS" located in the center of the steering wheel.

The air bag is a Supplemental Restraint System (SRS). It is designed to be used in addition to the safety belt to help protect against head and chest injuries in certain moderate to severe frontal collisions.

Warning: Safety belts must be worn by all vehicle occupants to help reduce the risk of injury in an accident.

The Importance of Wearing Safety Belts

There are four very important reasons to use safety belts even with an air bag system. Use your safety belts to:

- help keep you in the proper position when the air bag inflates

- reduce the risk of harm in rollover, side or rear impact accidents, since an air bag is not designed to inflate in such situations
- reduce the risk of harm in frontal collisions that are not severe enough to activate the air bag
- reduce the risk of being thrown from your vehicle

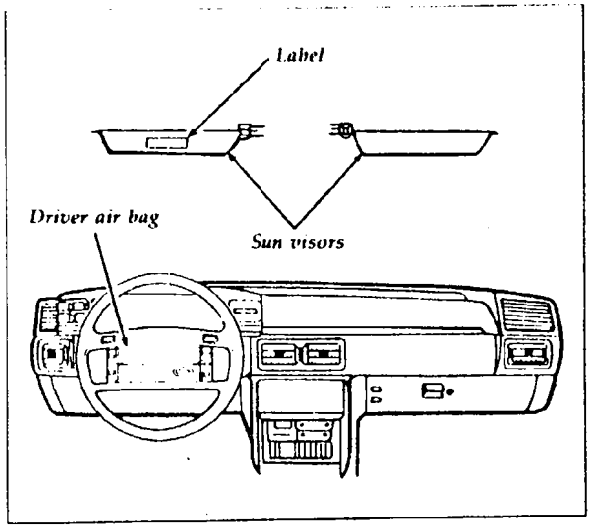
The Importance of Proper Seated Position

In an accident, the air bag must inflate extremely fast to help provide additional protection for you. In order to do this, the air bag must inflate with considerable force. If you are not seated in a normal riding position with your back against the seat back, the air bag may not protect you properly and could possibly hurt you as it inflates.

Warning: Do not put objects in front of the air bag system storage area that might restrict inflation or that might increase personal injury.

How the Air Bag Supplemental Restraint System Operates

The air bag supplemental restraint system has two main parts. One part is the air bag system with the driver air bag and inflator located in the center of the steering wheel. The second part is the electrical system, which has impact sensors, a diagnostic module, and backup power supply. The diagnostic module monitors its own internal circuits and the supplemental air bag electrical system readiness, including the crash sensors, the system wiring, the air bag system readiness light, air bag power, and the supplemental air bag ignitor.



The location of the air bag and warning labels

The air bag system uses a readiness light and a tone to indicate the condition of the system. The readiness light is in the instrument cluster. When you turn the ignition key to ON, this light will illuminate for approximately six (6) seconds and then turn off. This indicates that the system is operating normally. **NOTE:** Regularly scheduled maintenance of the air bag system is not required.

Warning: A problem with the system is indicated by one or more of the following:

- the readiness light will either flash or stay lit,
- or it will not light,
- or groups of five beeps will be heard.

If any of these things happen, have the air bag system serviced at your Ford or Lincoln-Mercury dealer immediately.

Tone Generator

The air bag readiness light indicates the air bag system condition. However, a series of five sets of five beeps will be heard only if the readiness light doesn't work and there is a problem with the air bag system. This also means that the Air Bag Supplemental Restraint System (SRS) is in need of service. The tone pattern will repeat (five sets of five beeps) periodically until the problem and light are repaired. Unless serviced, the Air Bag Supplemental Restraint System may not function properly in the event of an accident.

Warning: Do not attempt to service, repair, or modify the Air Bag Supplemental Restraint System; tampering could cause activation of the system and increase the risk of personal injury. For servicing of the Air Bag Supplemental Restraint System, see your Ford or Lincoln-Mercury dealer.

The air bag system is designed to stay out of sight until it is activated. The air bag system is designed to operate in frontal and front-angled collisions more severe than hitting a parked car of similar size and weight head-on at about 28 mph (45 km/h). Because the system senses severe crashes rather than vehicle speed, **some** frontal collisions at speeds above 28 mph (45 km/h) will not inflate the air bag.

The following four steps show how the air bag system works:

1. Sensors in the vehicle detect a severe frontal impact. When two sensors close at the same time, electricity flows to the inflator and ignites the chemicals.
2. The chemical then rapidly burns in the metal container. The rapid burning produces nitrogen gas and small amounts of dust. The nitrogen gas and dust are cooled and filtered during inflation of the air bag.
3. The inflating air bag splits open the trim cover. The air bag then rapidly unfolds and inflates in front of the occupant.

NOTE: STEPS 1-3 TAKE PLACE IN A FRACTION OF A SECOND.

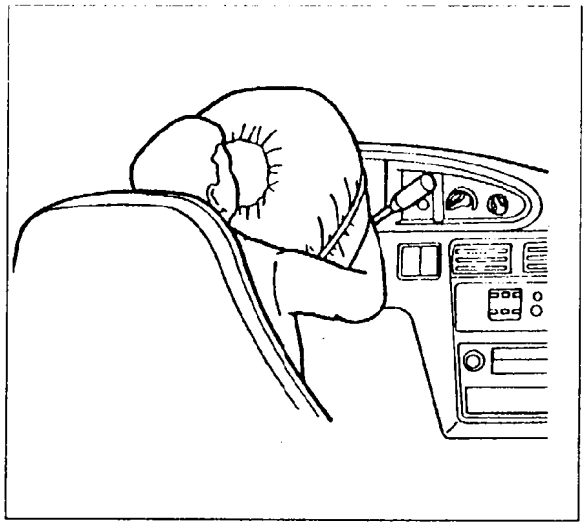
4. After inflation, the gas empties through holes in the air bag. The air bag deflates at once.

The surface of the air bag(s) and the vehicle interior may be dusted with a powdery residue. The powder is corn starch or talcum powder, which is used to lubricate the air bag as it inflates, and sodium compounds such as sodium carbonates (e.g., baking soda), and possibly a very small amount of sodium hydroxide that may be irritating to the skin and eyes, but is not toxic.

Right after air bag inflation, you may notice smoke (from the powder and dust) and smell the burnt chemicals. This is normal.

NOTE: Several air bag system components get hot after inflation. Do not try to touch them after inflation.

Air bags may not inflate in certain frontal collisions, even though the vehicle may be badly damaged. The fact that your air bag did not inflate in such a collision does not mean that something is wrong with the air bag system. Rather, it means the crash forces were not severe enough to need an air bag.



The driver side supplemental air bag inflated

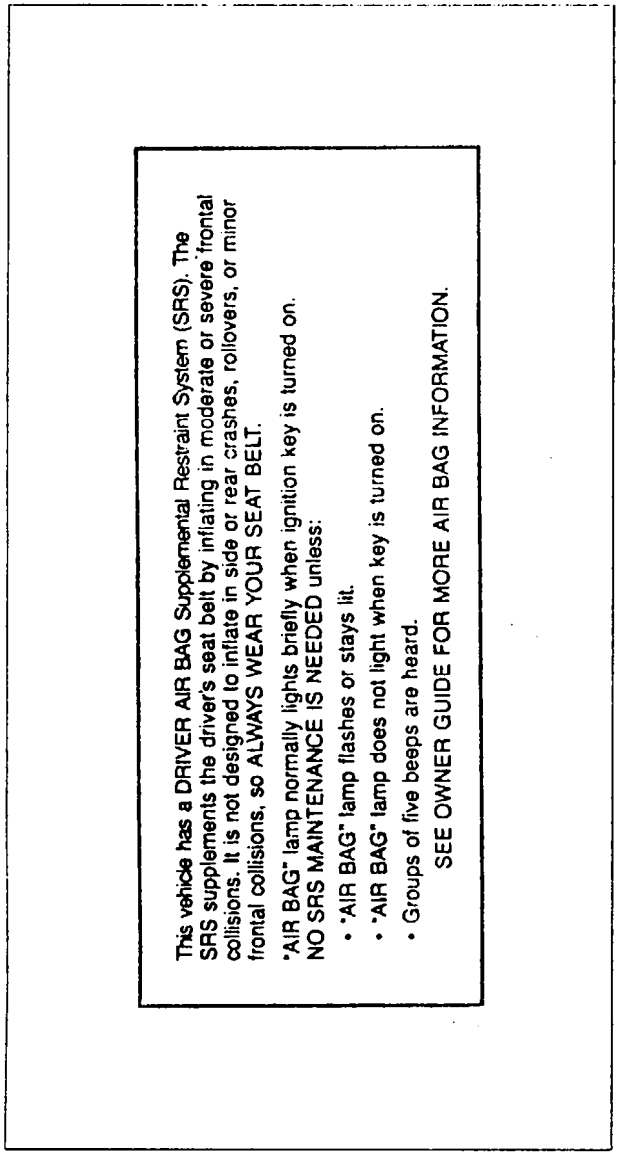
Warning: The air bag will inflate only once. The system is designed to function on a one-time-only basis. If the air bag is inflated, THE AIR BAG WILL NOT FUNCTION AGAIN AND MUST BE REPLACED IMMEDIATELY. If the air bag is not replaced, the unrepaired area will increase the risk of injury in a collision.

Disposal of Air Bag Equipped Vehicles

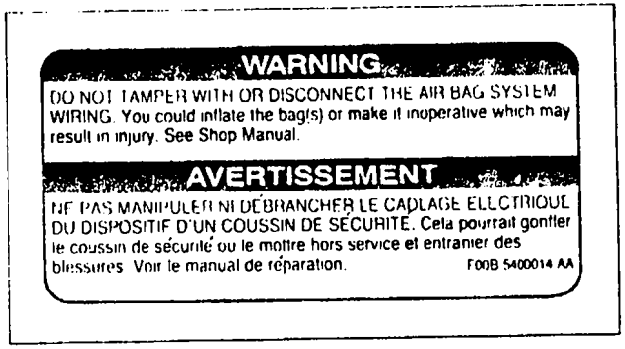
For disposal of air bags or air bag equipped vehicles, see your local Ford or Lincoln-Mercury dealer, or refer to the procedures in the 1992 Ford Shop Manual. Information on how to order a shop manual is available at an authorized Ford or Lincoln-Mercury Dealer. You can also order a shop manual using the order form in the back of your Owner's Guide.

Service and Information Labels

Service and information labels are attached to the sun visor(s), and the radiator support in the engine compartment.



The label located on the back of the driver's sun visor



Label on radiator support in the engine compartment

Safety Restraints for Children

In most states, you are required by law to use safety restraints for children. If small children ride in your vehicle – this generally includes children who are four years old or younger and who weigh 40 pounds (18 kg) or less – you must put them in safety seats that are made specially for children. Safety belts alone do not provide maximum protection for these children. Check your local and state laws for specific requirements.

Warning: Never let a passenger hold a child on his or her lap while the vehicle is moving. The passenger cannot protect the child from injury in a collision.

Warning: Never let children or adults ride in the cargo area of your vehicle. Make sure that all passengers sit where they can be properly restrained. If they are not restrained, the risk of their being injured in a collision greatly increases.