REPORT NUMBER: CAL-91-N07

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

FORD MOTOR COMPANY
1991 FORD PROBE
2-DOOR HATCHBACK

NHTSA NUMBER: MM0202

CALSPAN TEST NUMBER: 7893-3

CALSPAN CORPORATION
ADVANCED TECHNOLOGY CENTER
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March 12, 1991

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 of a 1991 Ford Probe 2-Door Hatchback was performed at Calspan Advanced Technology Center crash test facility in Buffalo, New York on March 12, 1991.

The impact speed was 35.0 mph and the ambient temperature at the barrier face at the time of impact was 39°F. The maximum post-test vehicle crush was 23.6 inches. The test vehicle was equipped with an automatic torso belt and manual lap belt at each of the front seating positions.

With regard to FMVSS 208 "Occupant Crash Protection," injury criteria, both the driver and passenger dummies appeared to satisfy the 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 90 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 MM0202

A load cell barrier consisting of 36 load cells was impacted by a 1991 Ford Probe 2-Door Hatchback at a velocity of 35.0 mph. The test was performed at the Calspan Corporation Advanced Technology center on March 12, 1991. 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 572 B, 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. 749) was used in a previous test (MM5300) and the Injury Criteria Values were not exceeded in that test. The passenger ATD (Serial No. 320) was certified prior to this test. Certification details, along with instrumentation calibration data, can be found in Appendices 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. Accelerometer Pack #5 (X), (right front Disc Brake Caliper), contained questionable data therefore the velocity and displacement data traces have been excluded from this report.

The driver's HIC was 550.1 The maximum chest deceleration over 3 milliseconds was 42.4 g's and femur loads were 1051.0 and 1591.9 pounds.

The right front passenger's HIC was 418.4 and maximum chest deceleration over 3 milliseconds was 45.1 g's. Femur loads were 1501.1 and 1033.2 pounds.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Year/Make/Model/Body Style: 1991 Ford Probe 2-Door Hatchback

NHTSA No.: MM0202 VIN.: 1ZVPT20C3M5113720

Body Color: Red Date Of Manufacture: 9-25-90

Engine: 4 Cylinders; - C.I.D.; 2.2 Liters; - CC
X Gas; - Diesel; - Turbocharged
- Longitudinal; X Transverse

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

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

Date Received: 2-25-91 Odometer Reading: 23.6 miles

- A/C; X P/S; X P/B; - P/wdo.; - Tilt Wheel
- P/seats; - Cruise Control

Type of Occupant Restraint: Automatic torso belt and manual lap belt.

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 32 psi, Rear 26 psi

Recommended Tire Size: P185/70R14

Recommended Cold Tire Pressure: Front 32 psi, Rear 26 psi

Tires on Vehicle: P185/70R14 ; Manufacturer: Firestone

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) = 680 lbs. (A)

No. of Occupants x 150 lbs. = 600 lbs. (B)

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

GVWR 3560 lbs. GAWR: Front 2095 lbs. Rear 1740 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 = 890 lbs. Right Rear = 490 lbs.

Left Front = 890 lbs. Left Rear = 540 lbs.

TOTAL FRONT WEIGHT = 1780 lbs. (63.0 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1030 lbs. (37.0 % of Total Vehicle Weight)

TOTAL DELIVERY WEIGHT = 2810 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (2810 lbs.)

VCW = Vehicle Capacity Weight (680 lbs.)

DSC = Designated Seating Capacity (4)

RCLW = VCW - 150 (DSC) = 80 lbs.

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

Target Test Weight = 3218 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 72 POUNDS CARGO:

Right Front = 930 lbs. Right Rear = 660 lbs.

Left Front = 930 lbs. Left Rear = 690 lbs.

TOTAL FRONT WEIGHT = 1860 lbs. (58.0 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1350 lbs. (42.0 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 3210 lbs.

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

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 27.1 LF 27.1 RR 26.1 LR 26.2

Test Attitude: RF 26.6 LF 26.5 RR 24.6 LR 24.5

Wheel Base: 99.2 in.; C.G. = 41.7 in. rearward of front wheel C/L

Remarks: 13.6 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: 3-12-91 Time of Test: 12:30

Ambient Temperature: 39 °F at impact area

Temperature in Occupant Compartment: 70 °F

Windshield Molding Temperature: 72 °F

Required Impact Velocity Range: 34.5 to 35.5 mph

Impact Velocity: primary = 35.0 mph, secondary = 35.0 mph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 52 inches

Exiting Speed Trap: 12 inches

VEHICLE REBOUND AND CRUSH (inches):

Vehicle Length:	Pre-test	= R	173.7	C_L	176.8	L	173.7
	Post-test	= R	156.0	C_L	153.2	L	155.1
	Crush	= R	17.7	C_L	23.6	L	18.6

Distance from front of test vehicle to point of impact:

R 13.5 C_L 16.2 L 15.0

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	Steering Wheel Hub	No Contact
Chest	No Contact	No Contact
Abdomen	Slight Contact with Lower Rim	No Contact
Left Knee	Dash Panel	Glove Box Door
Right Knee	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	-	-

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

Glazing Damage

Backlight/Windshield: The windshield sustained stress fractures but remained intact.

Other Notable Impact Effects: -

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.: MM0202 Vehicle: 1991 Ford Probe 2-Door Hatchback

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-60.9	-12.6	68.7	92.6
Position #2 - Passenger	-33.3	18.6	57.2	62.6

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-43.6	12.3	25.1	42.4
Position #2 - Passenger	-42.3	27.2	27.1	45.1

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	1051.0	1591.9
Position #2 - Passenger	1501.1	1033.2

	MAXIMUM FORCE - SEAT BELT LOADS (lbs.)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	1700.7	-	309.8
Position #2 - Passenger	2026.7	274.8	-

	HEAD INJURY CRITERIA (HIC)			
	HIC	t_1 (SEC)	t_2 (SEC)	Average Acceleration t_1 TO t_2
Position #1 - Driver	550.1	.05796	.09384	47.2
Position #2 - Passenger	418.4	.06960	.10548	42.3

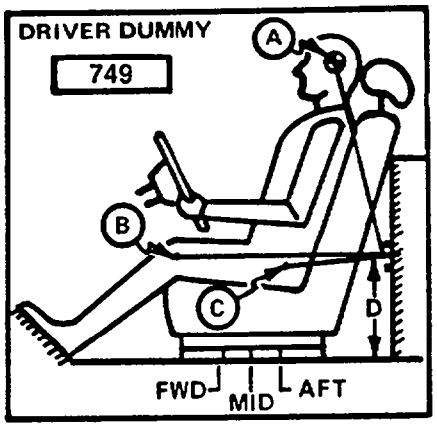
HIC is as defined in FMVSS 208. The maximum time interval from t_1 to t_2 is 36 milliseconds.

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION

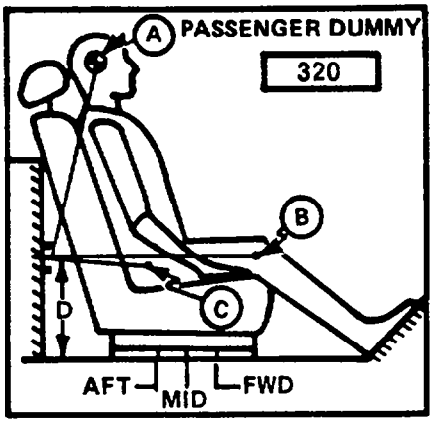
Test No.: MM0202 Vehicle: 1991 Ford Probe 2-Door Hatchback

SEAT TYPE:	ADJUSTER TYPE:	BUCKET SEAT BACK TYPE:
__-__ Bench	__X__ Manual	__-__ Fixed
__X__ Bucket	__-__ Power	__X__ Adjustable Reclining
__-__ Split Bench		

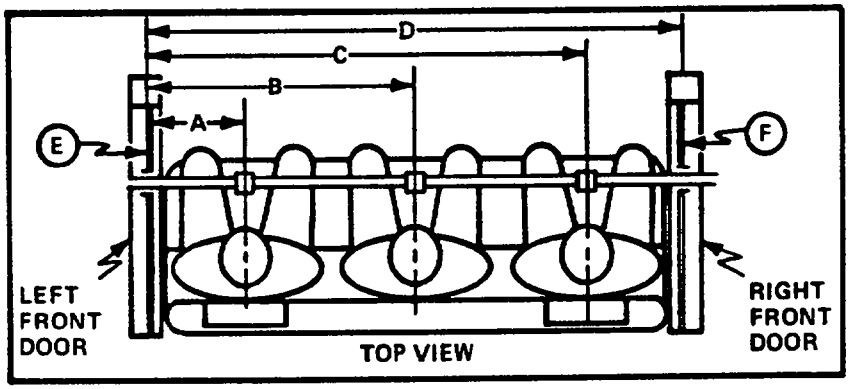


MEASUREMENT LOCATION

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



A =	21.0 in.	31 Degrees	A =	20.7 in.	33 Degrees
B =	33.2 in.	100 Degrees	B =	34.7 in.	100 Degrees
C =	20.5 in.	118 Degrees	C =	21.0 in.	113 Degrees
D =	15.7 in.		D =	15.7 in.	

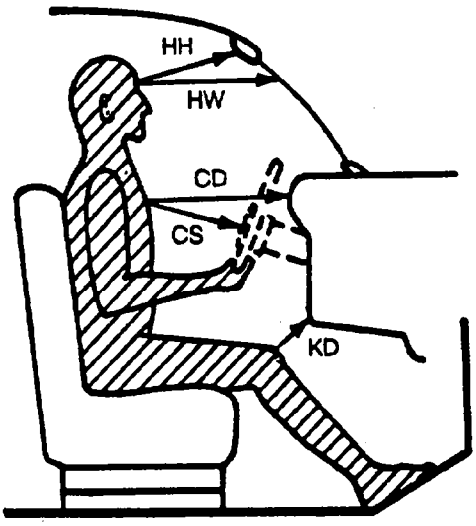


	DUMMY ID	
S/N	749	320
A = Left Door to Driver Centerline	11.6	in.
B = Left Door to Center Passenger Centerline	-	in.
C = Left Door to Right Passenger Centerline	39.4	in.
D = Left Door to Right Door	51.5	in.
E,F = Window Glass Height (Right and Left Must Be Equal)	10.0	in.

Figure 2

OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	13.0	12.8
HW	17.3	17.2
CD	20.5	21.7
CS	13.6	-
KDL	5.2	6.0
KDR	5.5	4.9
SA	See Note	See Note
TA	25°	24°
HSW	19.3	-



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

HA = Head Target to "A" Pillar

HR = Head to Side Roof

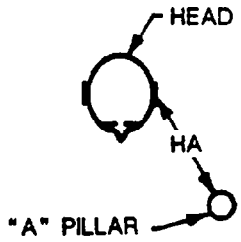
HS = Head to Side Window

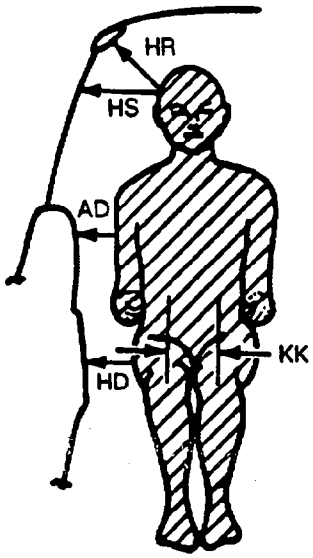
AD = Arm to Door

HD = Hip to Door

KK = Knee to Knee

AA = Ankle to Ankle



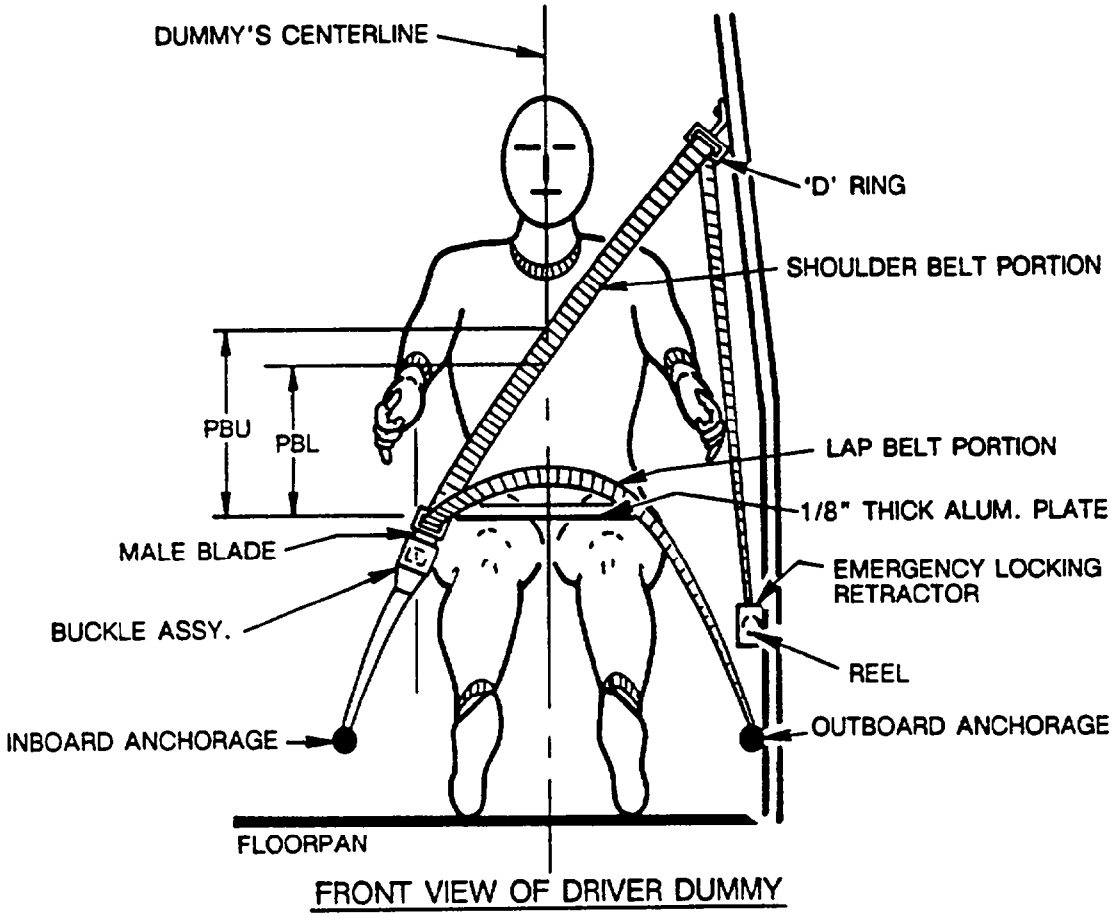


	DRIVER	PASSENGER
HR	5.7	5.6
HS	8.5	8.9
AD	4.0	3.7
HD	7.2	6.8
KK	9.3	7.3
HA	17.8	17.7
AA	13.0	8.8

Note: Seat was placed in the 5th notch as specified by manufacturer.

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	14.7	14.7
PBL -- Top surface of alum. plate to belt lower edge	11.7	11.7
LAP BELT TENSION	-	-
SHOULDER BELT TENSION	-	-

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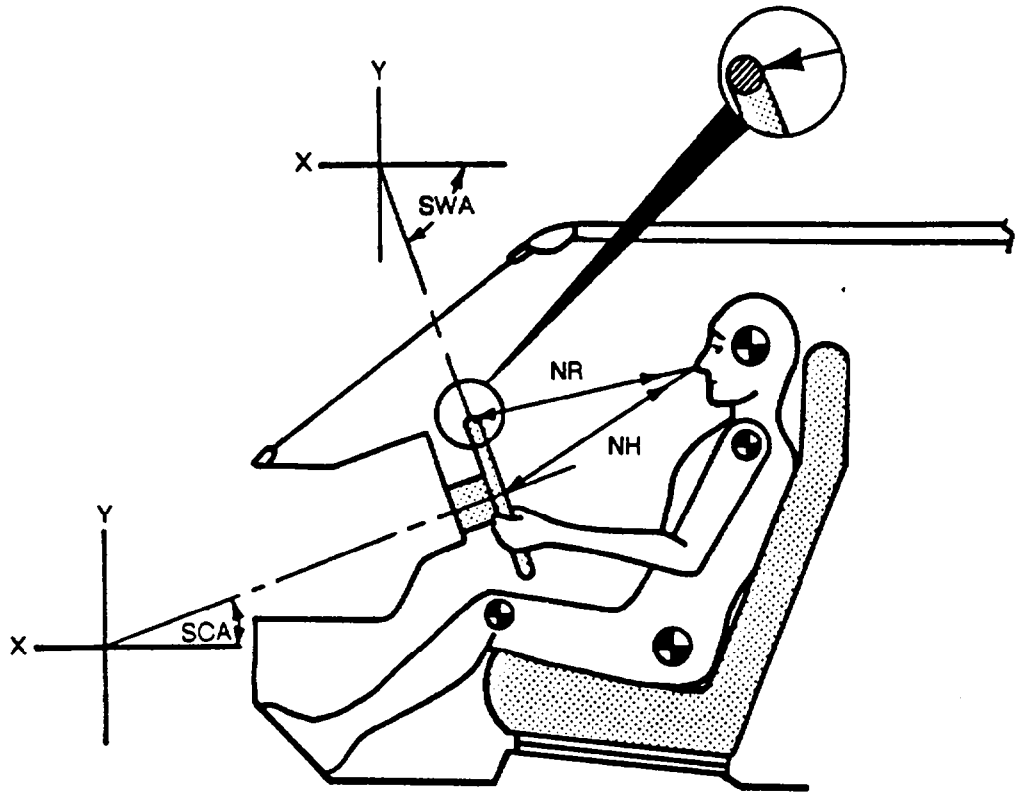
Table 3

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

BELT LENGTH DATA:	Driver	Passenger
Shoulder belt length as measured on Part 572 Dummy.	42.0"	41.5"
Lap belt length as measured on Part 572 Dummy.	27.0"	27.0"
SHOULDER BELT SPOOL-OFF DATA:		
As determined mechanically.	2.0"	2.0"
LAP BELT SPOOL-OFF DATA:		
As determined mechanically.	1.5"	1.5"
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	2.3 in/ft	1.2 in/ft
Measured mechanically	0.0 in/ft	0.0 in/ft

Figure 4

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY. REFERENCE DIMENSIONS



LEFT SIDE VIEW

	MEASUREMENTS	
NR -- Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	18.1	Inches
NH -- Distance from tip of dummy's nose to center of steering column hub	18.9	Inches
SCA -- Angle of steering column relative to the horizontal X axis	21.0	Degrees
SWA -- Angle of steering wheel relative to the horizontal X axis	-69.0	Degrees

Figure 5

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4

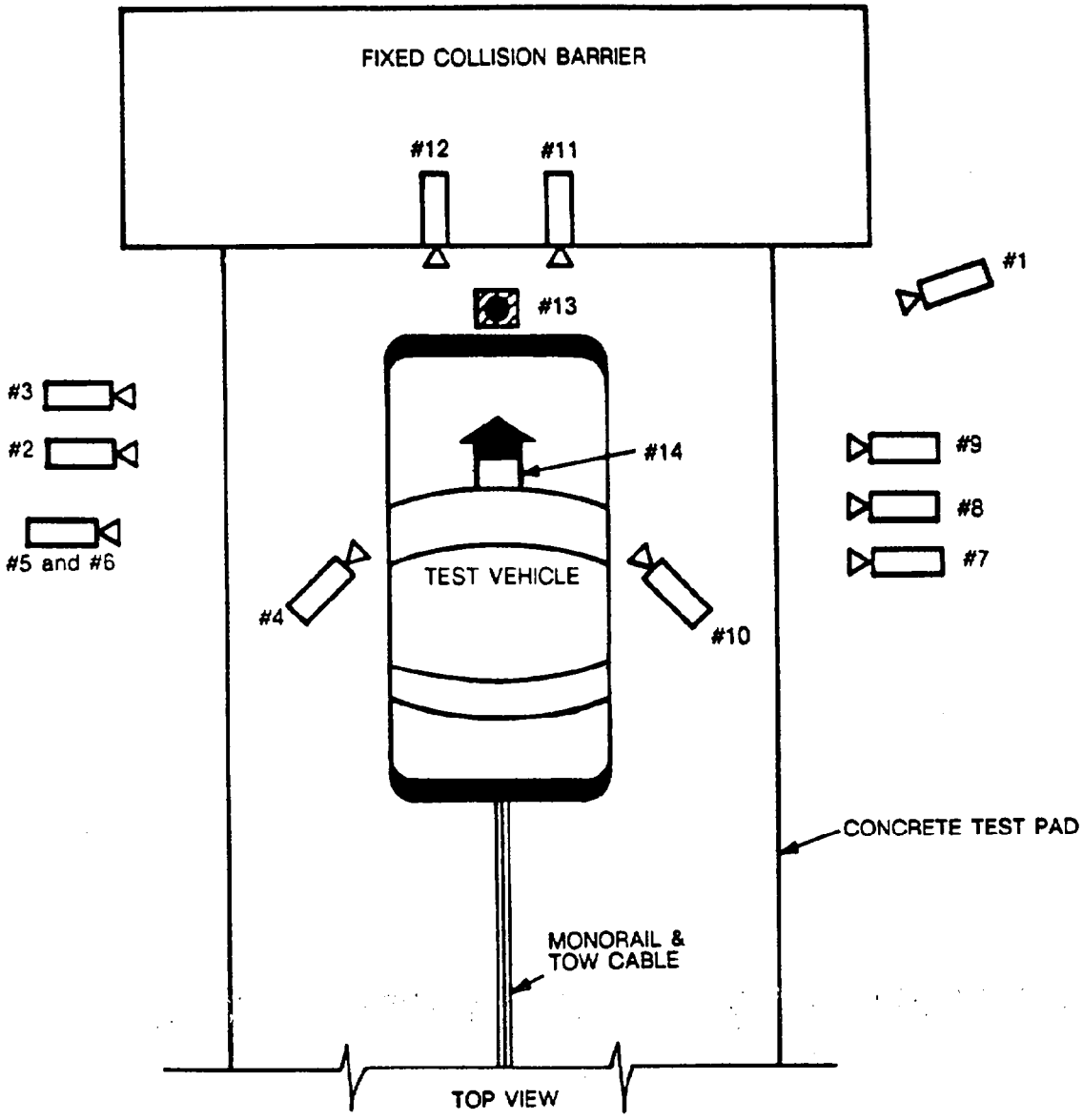


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Table 4

HIGH-SPEED CAMERA LOCATIONS

Test No. MM0202 Vehicle: 1991 Ford Probe 2-Door Hatchback

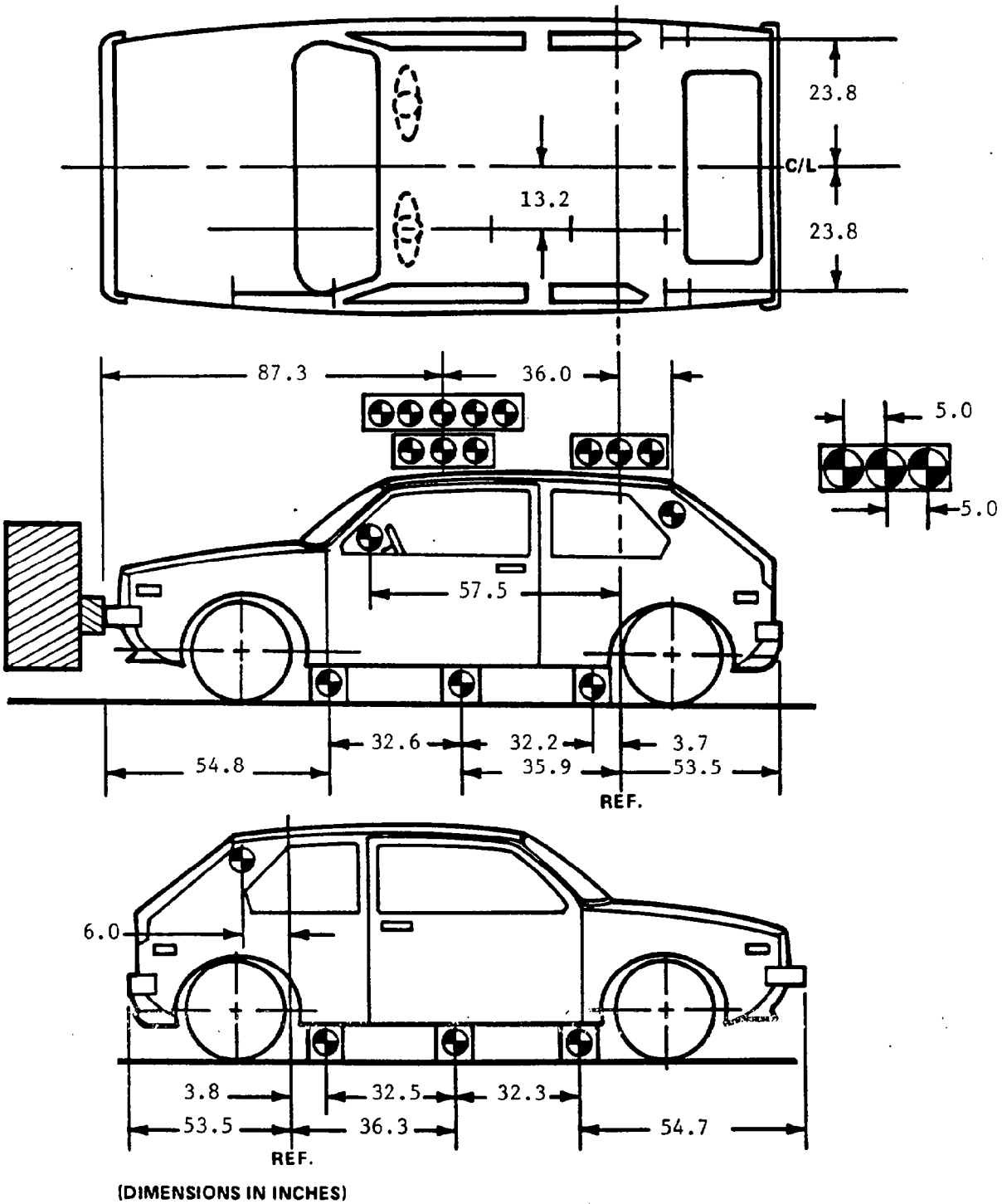
CAMERA NO.	VIEW	CAMERA POSITIONS (in)* X	Y	Z	ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
1	Real-Time Camera	–	–	–	–	–	–	24
2	Overall Left Side	216	62	4–	-5	119.8	13	560
3	Left Side View	308	35	41	-3	291.8	25	590
4	Driver and Interior View	100	115	65	-17	83.8	13	665
5	Steering Column (Bottom)	261	82	46	-4	244.8	25	560
6	Steering Column (Top)	261	82	70	-10	244.8	25	610
7	Overall Right Side	219	75	42	-2	202.8	13	N.T.
8	Right Side View	296	53	42	-2	279.8	25	N.T.
9	Right Passenger View	284	62	52	-3	267.8	35	N.T.
10	Passenger and Interior View	101	112	65	-18	84.8	25	545
11	Passenger Front View	24	-5	73	-45	–	13	545
12	Driver Front View	24	-5	73	-43	–	13	545
13	Windshield View	0	0	126	-47	–	13	560
14	Pit View of Engine	0	34	-120	90	–	13	N.T.

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

N.T. = No Timing

Figure 6

VEHICLE TARGET LOCATIONS



(DIMENSIONS IN INCHES)

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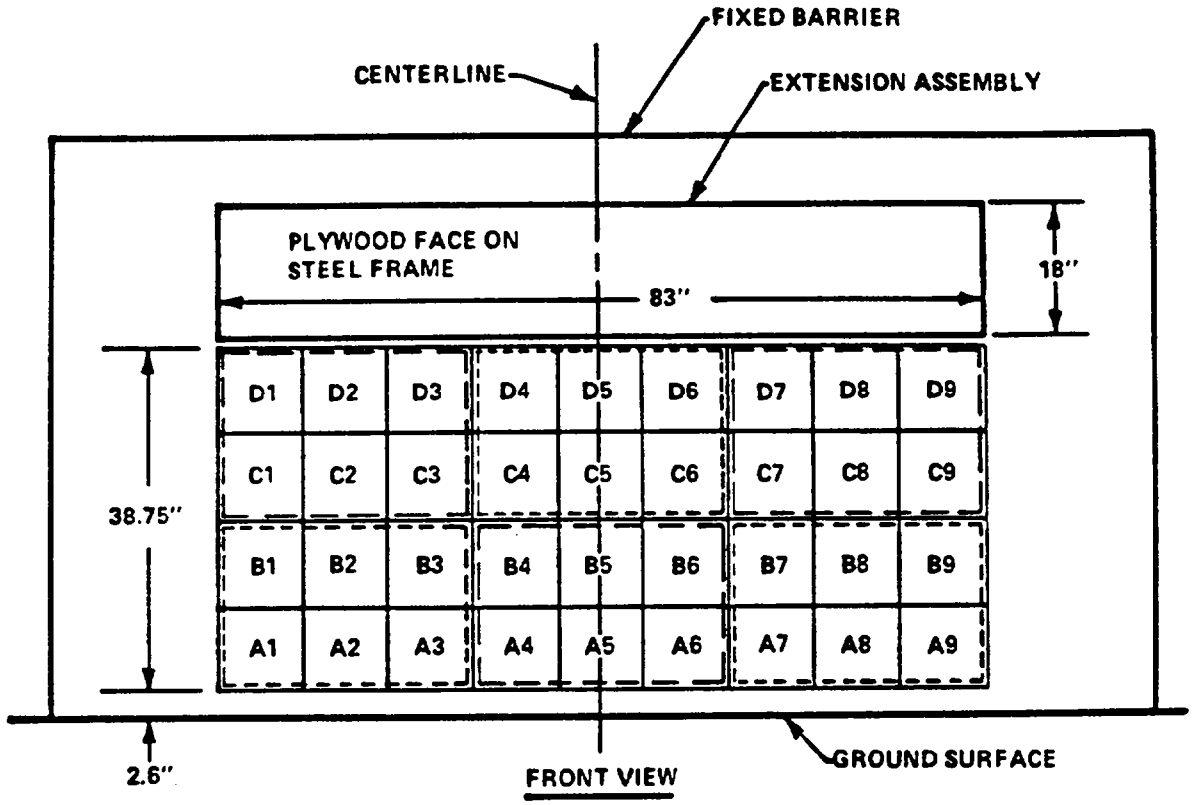
Figure 7

LOAD CELL LOCATIONS ON FIXED BARRIER

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



6 GROUPS OF 6 LOAD CELLS EACH

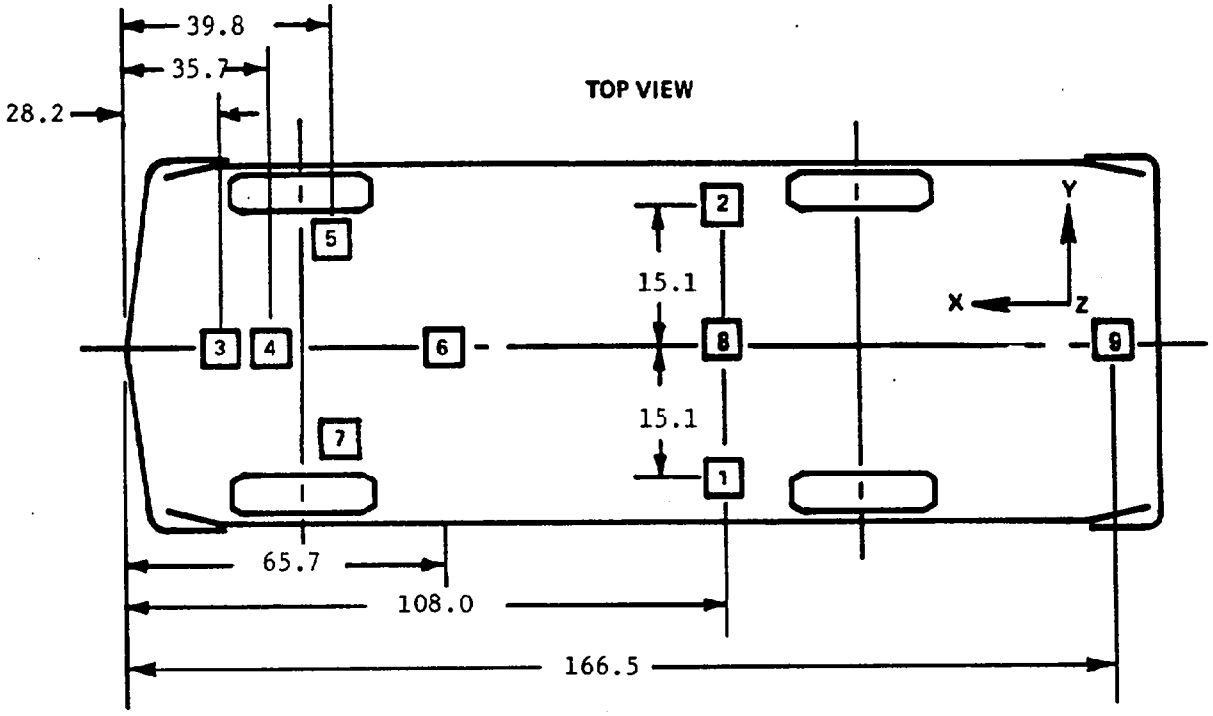
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

The following data is presented in Appendix B:

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

Figure 8

VEHICLE ACCELEROMETER LOCATIONS



(All Measurements in Inches)

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

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

**Note: Due to location the top engine accelerometer was removed prior to test.

Figure 9

TEST VEHICLE MEASUREMENTS

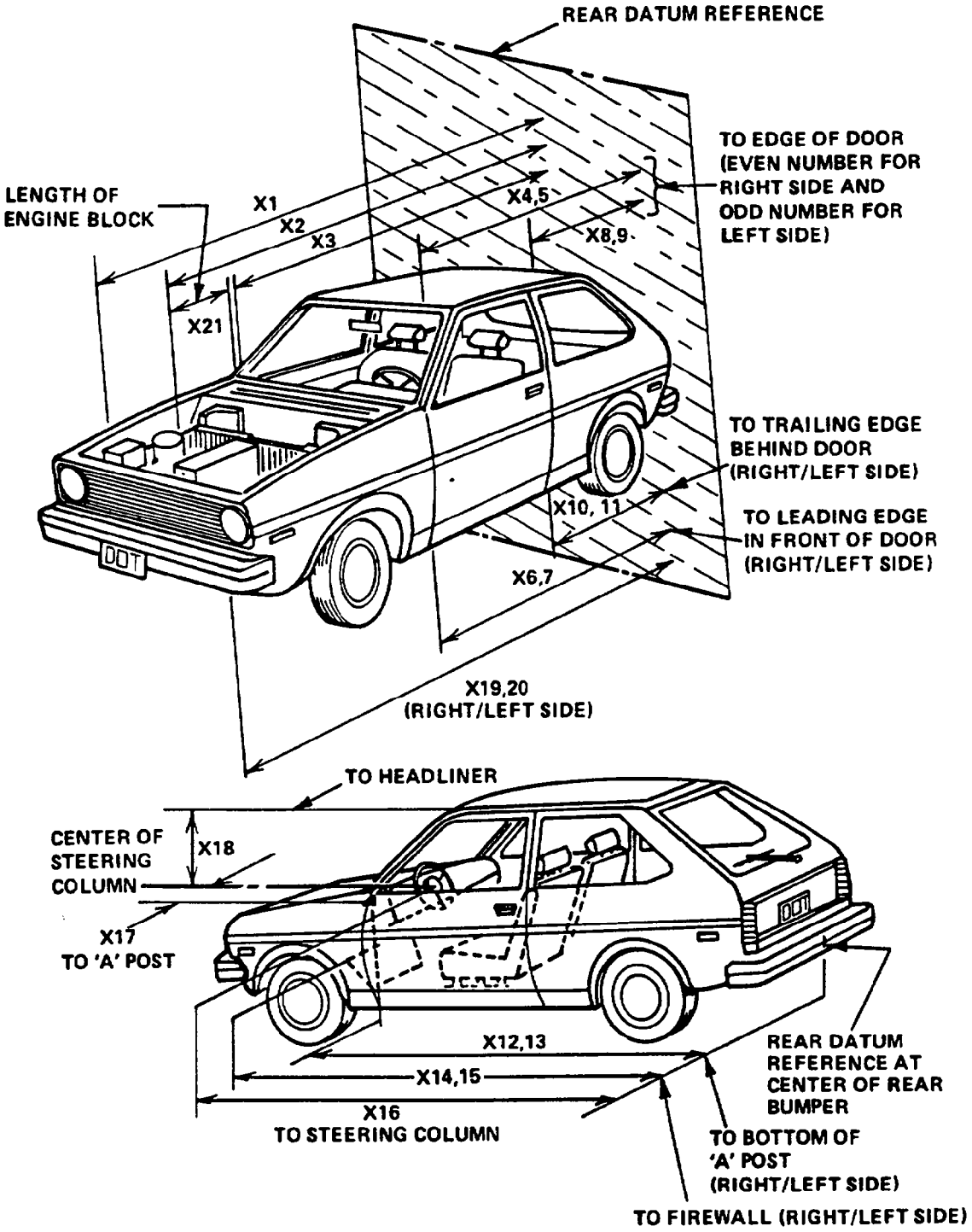


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Table 5

VEHICLE MEASUREMENTS

No.		All Dimensions in Inches		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	176.8	153.2	23.6
X2	Rear Surface of Vehicle to Front of Engine	151.1	141.2	9.9
X3	Rear Surface of Vehicle to Firewall	129.6	128.6	1.0
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	117.9	118.8	-0.9
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	118.2	118.2	0.0
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	117.5	117.9	-0.4
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	117.9	118.2	-0.3
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	68.3	68.0	0.3
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	68.7	68.2	0.5
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	71.4	71.9	-0.5
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	71.4	71.5	-0.1
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	117.4	117.9	-0.5
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	117.6	118.3	-0.7
X14	Rear Surface of Vehicle to Firewall, Right Side	129.7	128.0	1.7
X15	Rear Surface of Vehicle to Firewall, Left Side	129.8	128.0	1.8
X16	Rear Surface of Vehicle to Steering Column	102.9	101.0	1.9
X17	Center of Steering Column to "A" Post	16.5	16.4	0.1
X18	Center of Steering Column to Headliner	15.5	14.3	1.2
X19	Rear Surface of Vehicle to Right Side of Front Bumper	173.7	156.0	17.7
X20	Rear Surface of Vehicle to Left Side of Front Bumper	173.7	155.1	18.6
X21	Length of Engine Block	16.0	16.0	0.0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	111.0	109.5	1.5
CD	Rear Surface of Vehicle to Center of Dash Panel	112.4	108.0	4.4
LD	Rear Surface of Vehicle to Left Side of Dash Panel	110.5	109.6	0.9

Appendix A

PHOTOGRAPHS

PHOTOGRAPHS

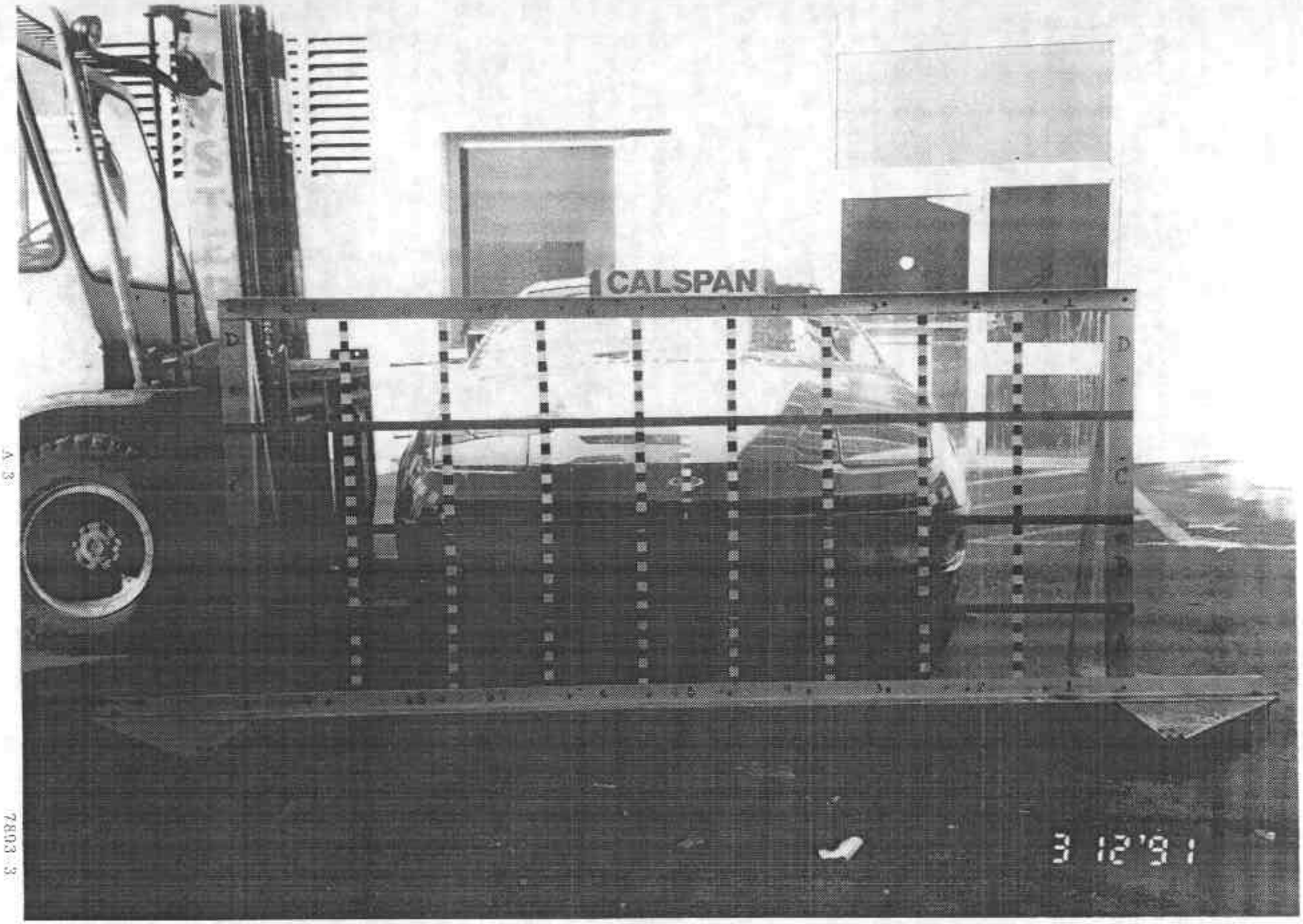


Figure A-1 LOAD CELL LOCATIONS

Figure A-2 PRE-TEST FRONT VIEW

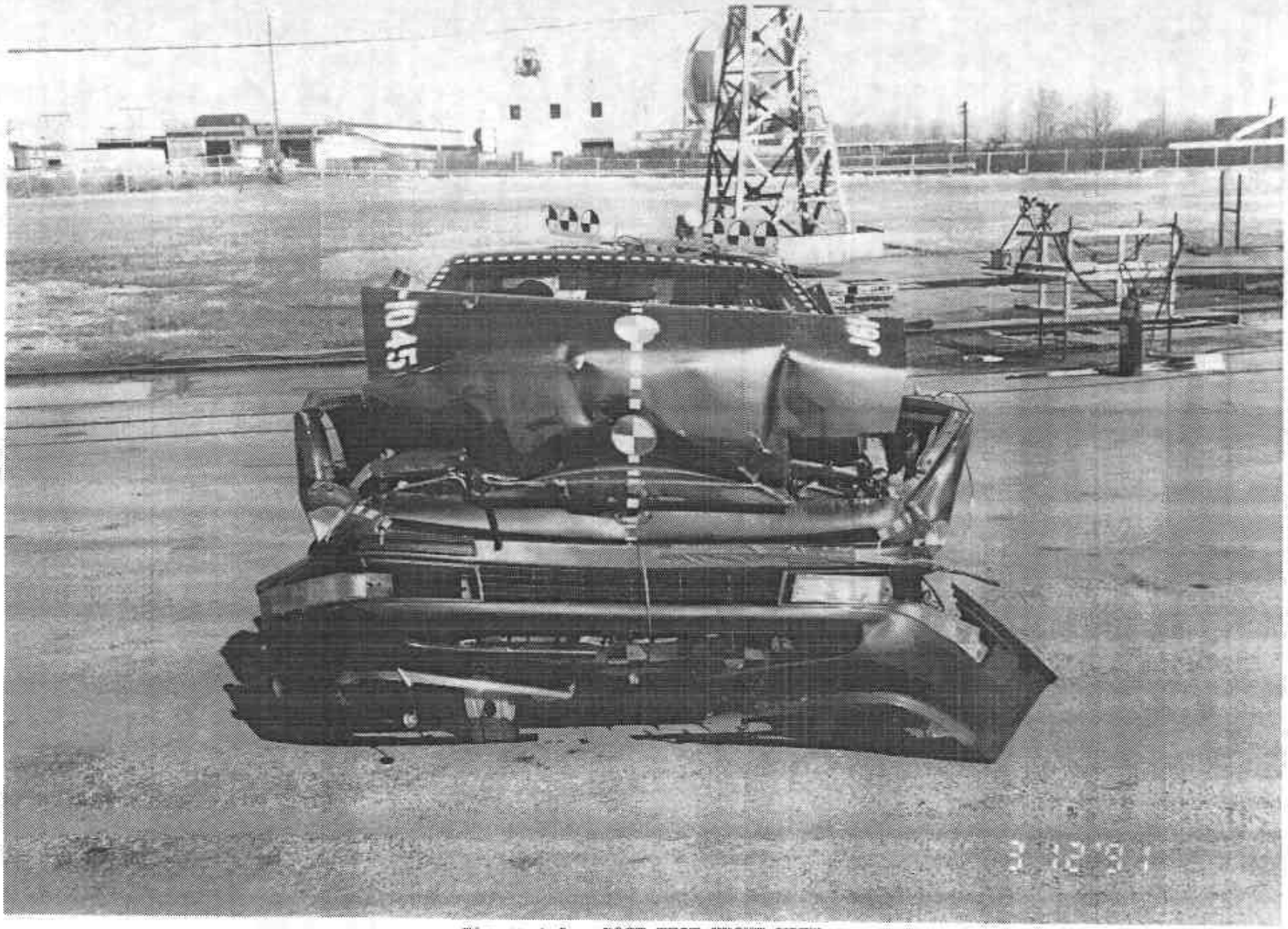


Figure A-3 POST TEST FRONT VIEW

Figure A-4 PRE-TEST LEFT SIDE VIEW

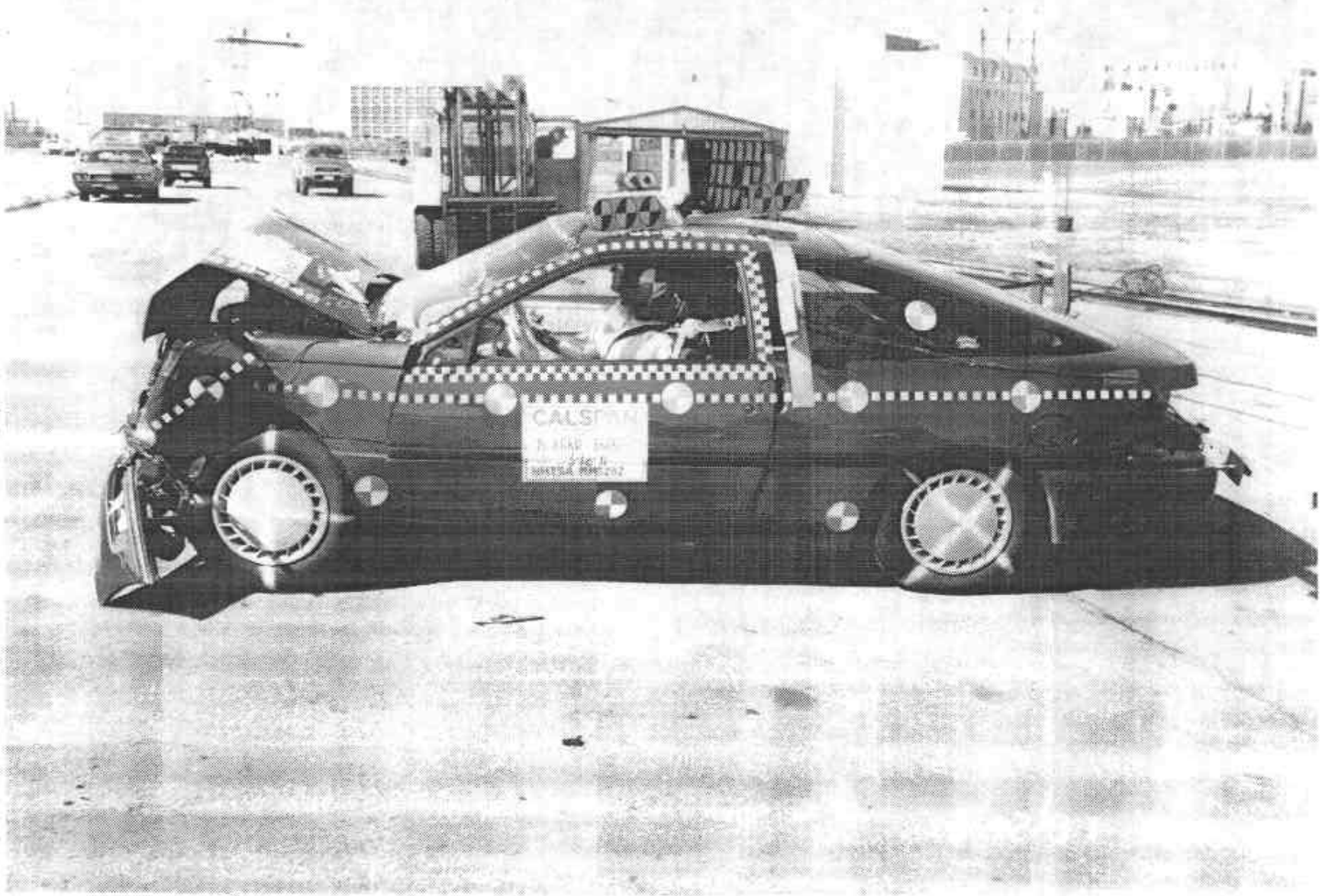


Figure A-5 POST TEST LEFT SIDE VIEW

Figure A-6 PRE-TEST RIGHT SIDE VIEW

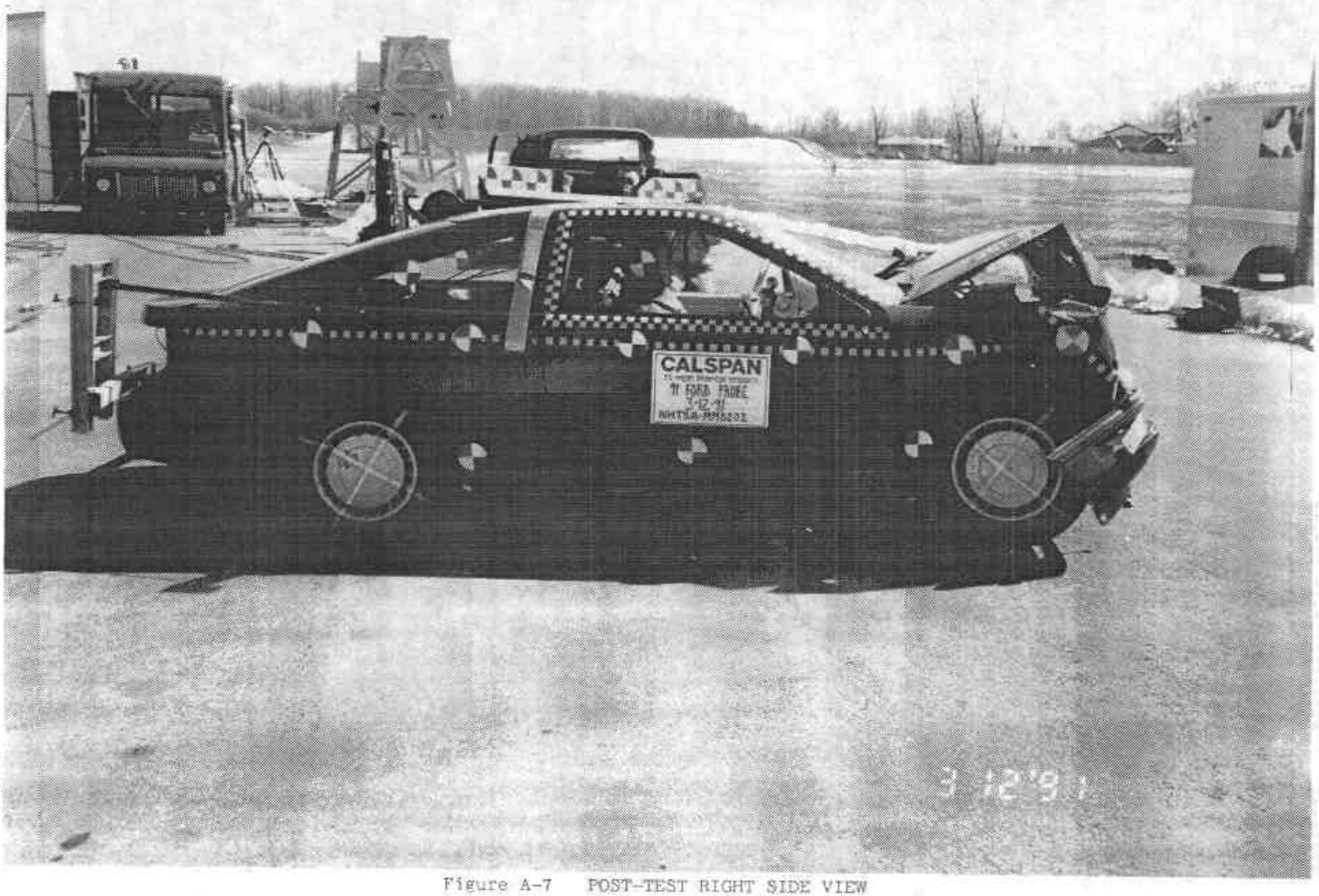


Figure A-7 POST-TEST RIGHT SIDE VIEW

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

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

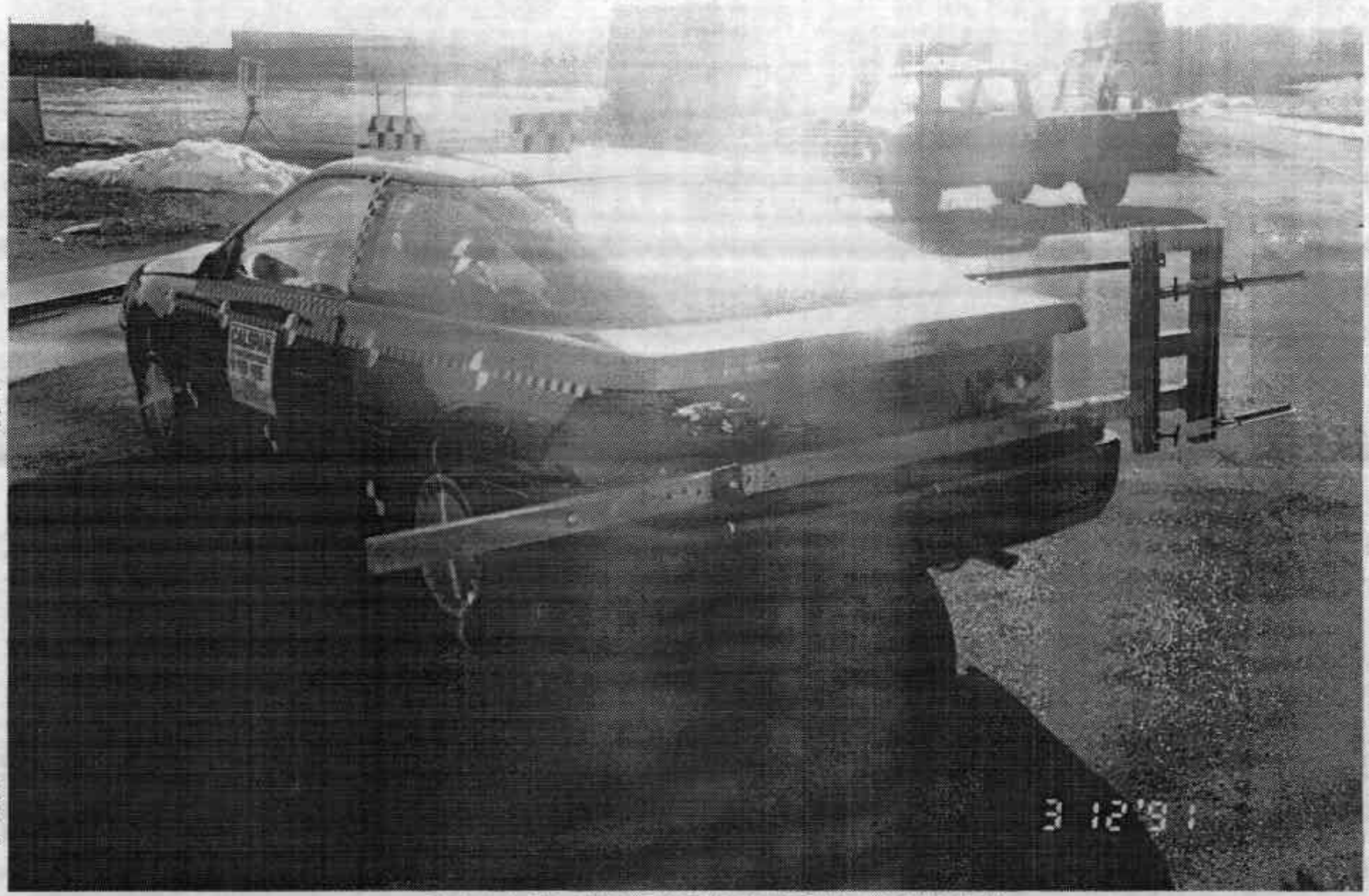


Figure A-10 PRE-TEST LEFT REAR THREE-QUARTER VIEW

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

Figure A-12 PRE-TEST WINDSHIELD VIEW

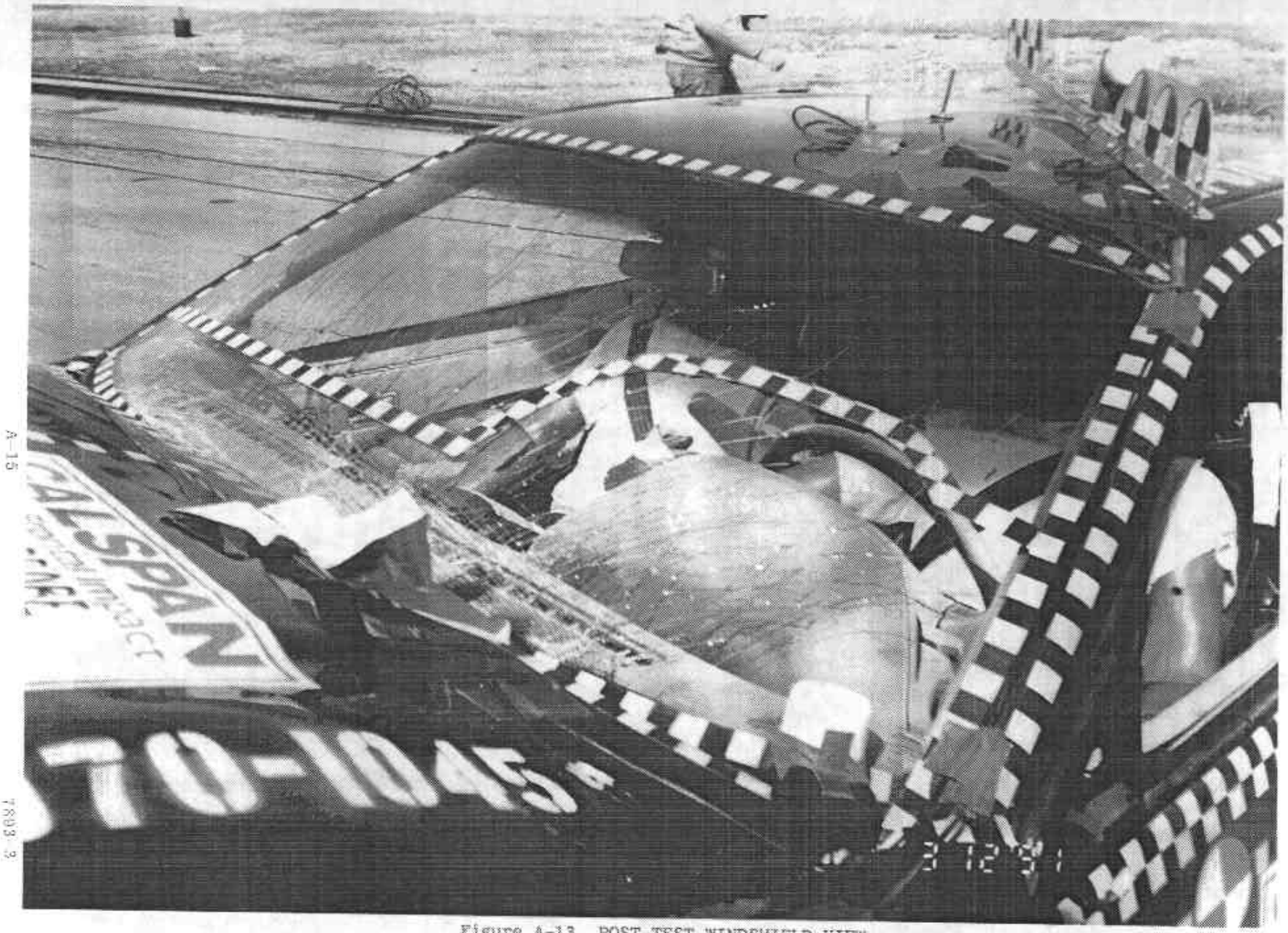
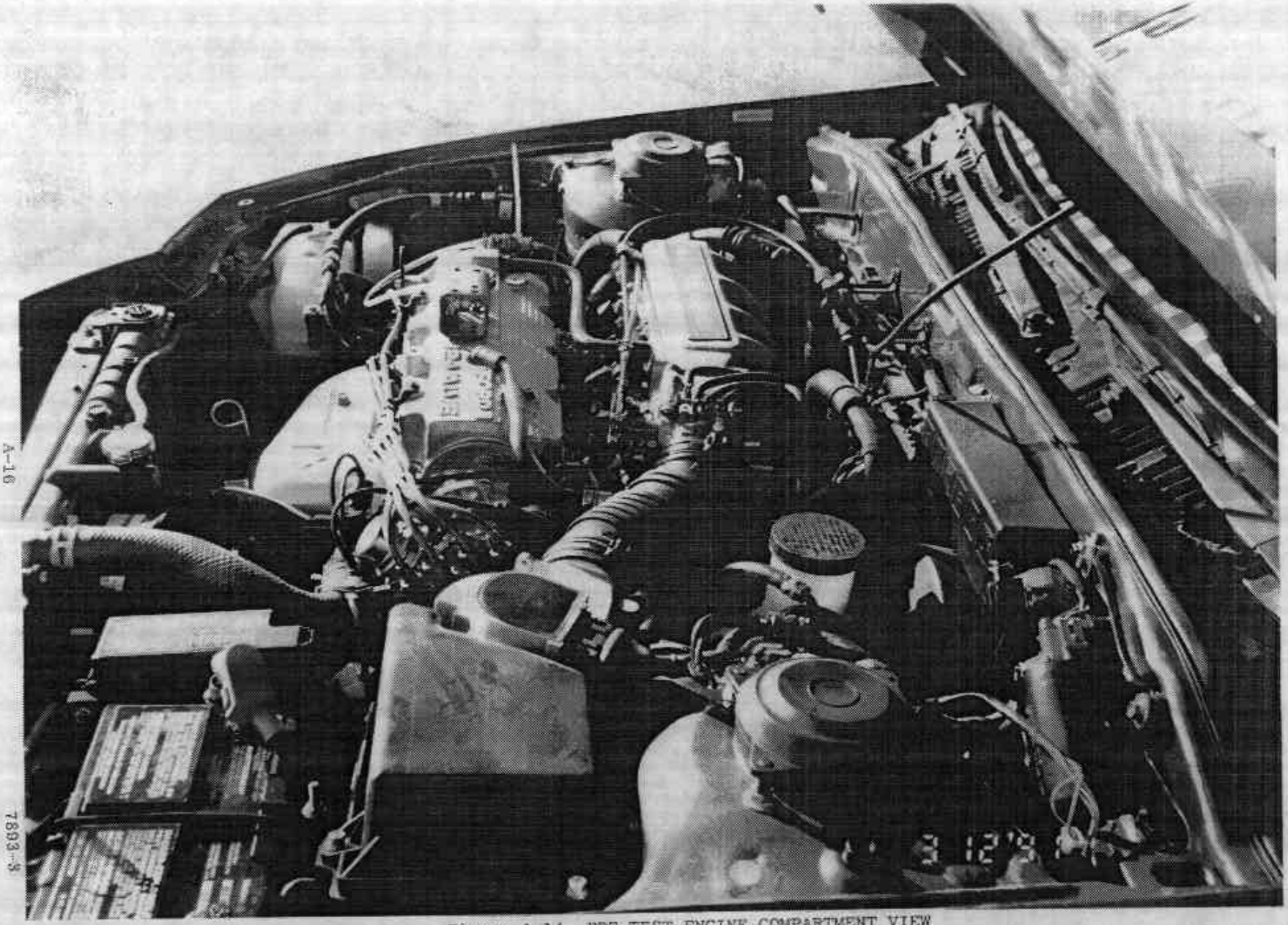


Figure A-13 POST-TEST WINDSHIELD VIEW



A-16

7803-3

Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

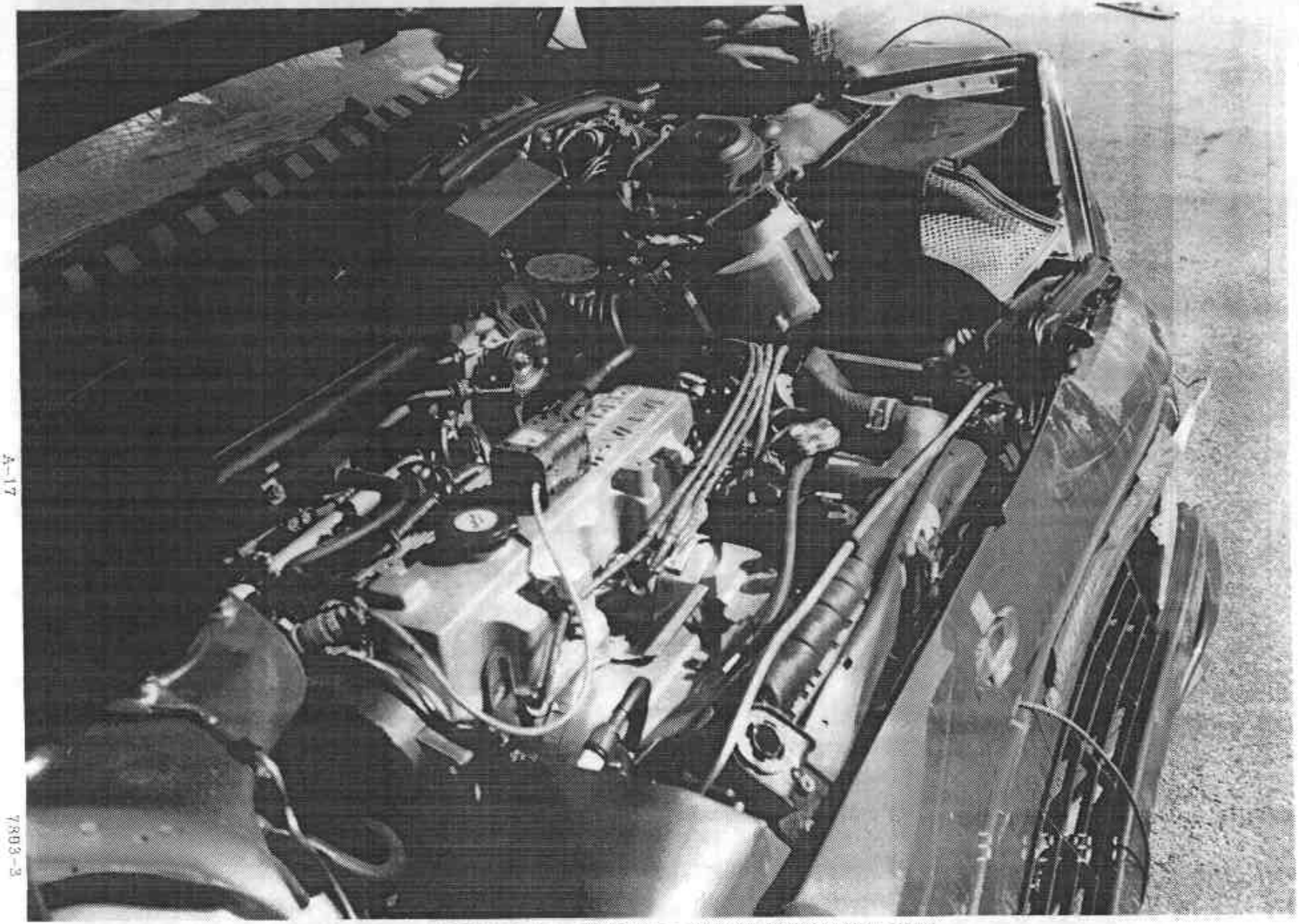


Figure A-15 POST-TEST ENGINE COMPARTMENT VIEW

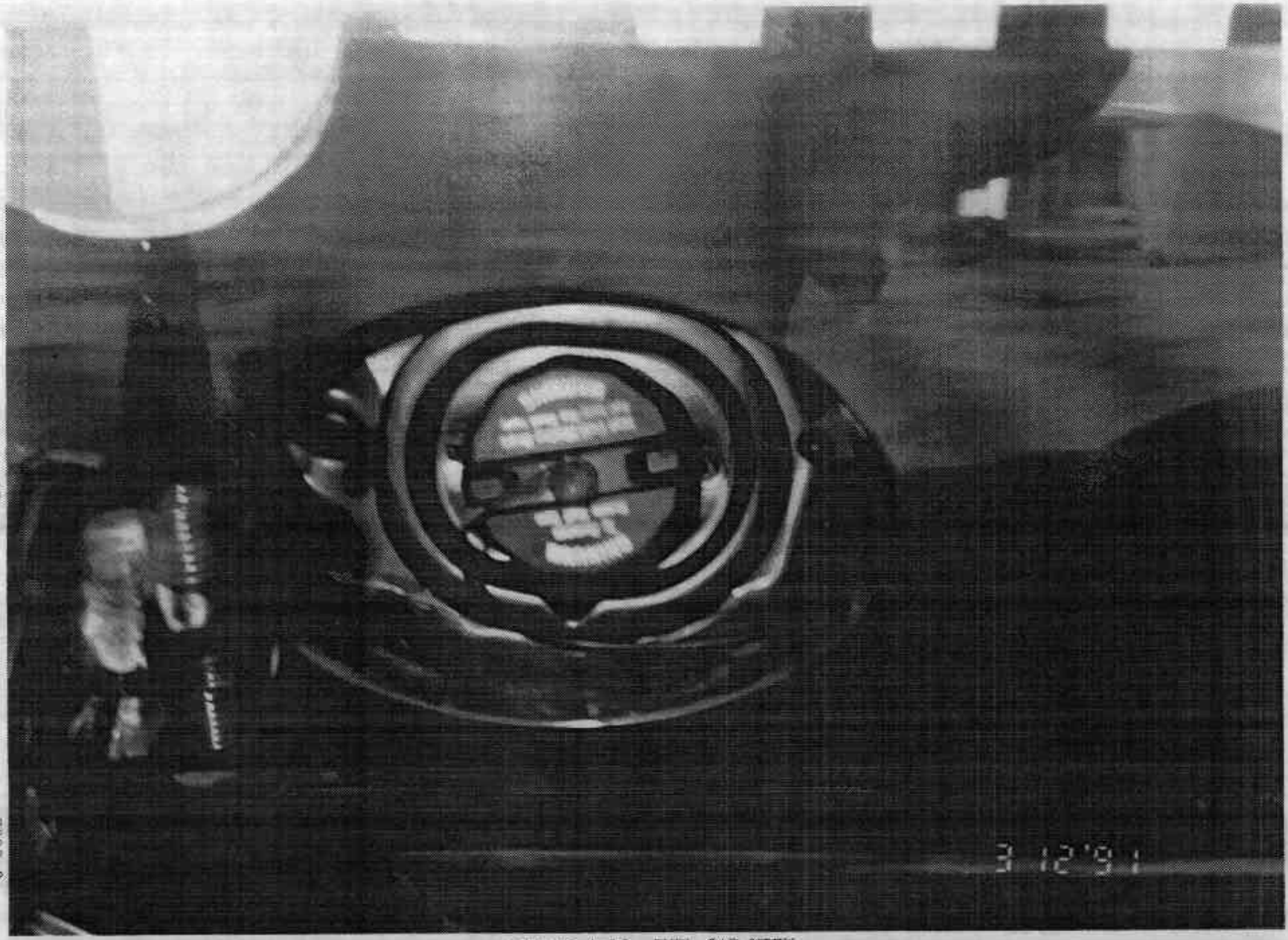


Figure A-16 FUEL CAP VIEW

7893-3

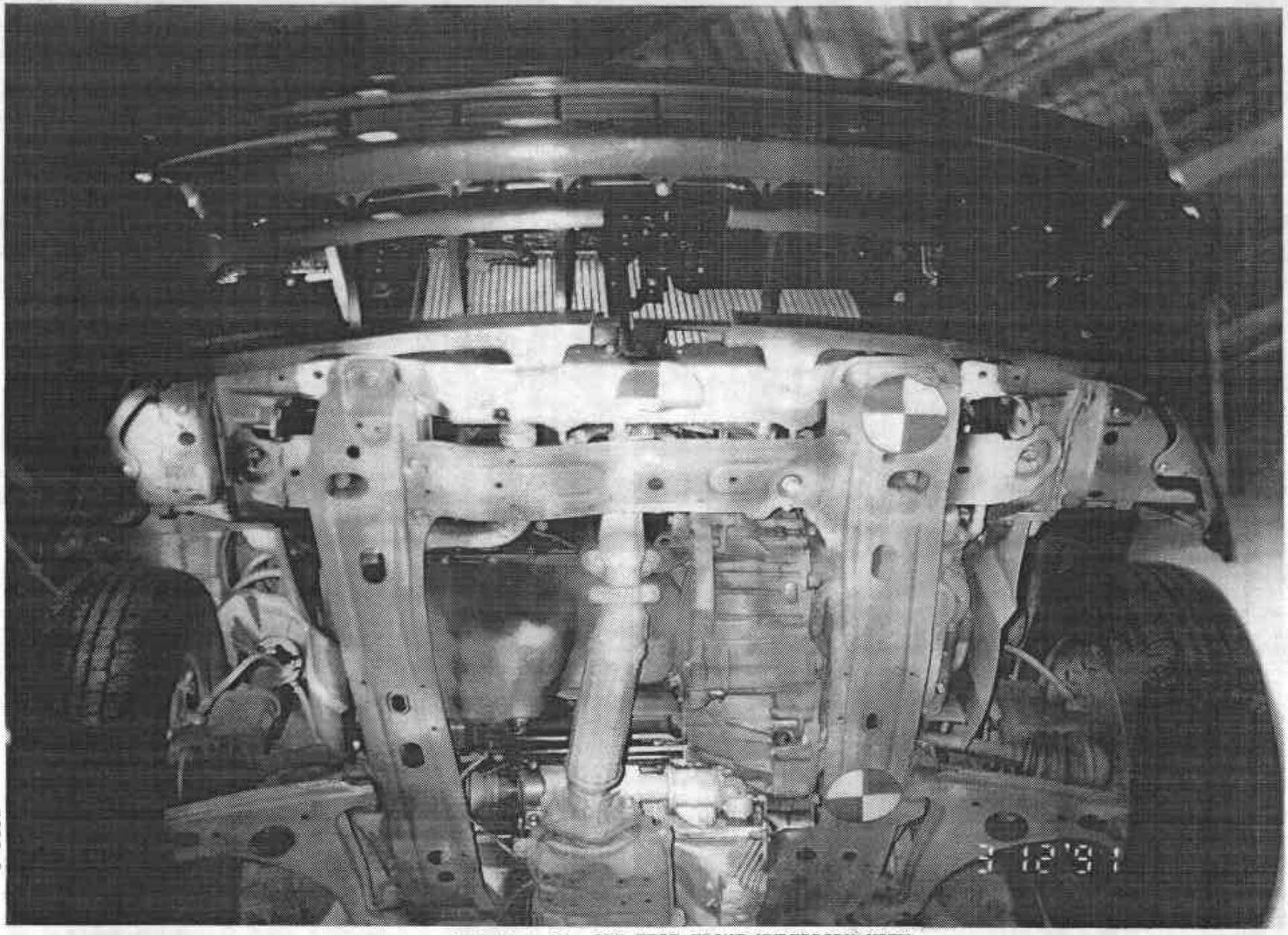


Figure A-17 PRE-TEST FRONT UNDERBODY VIEW

7893-3

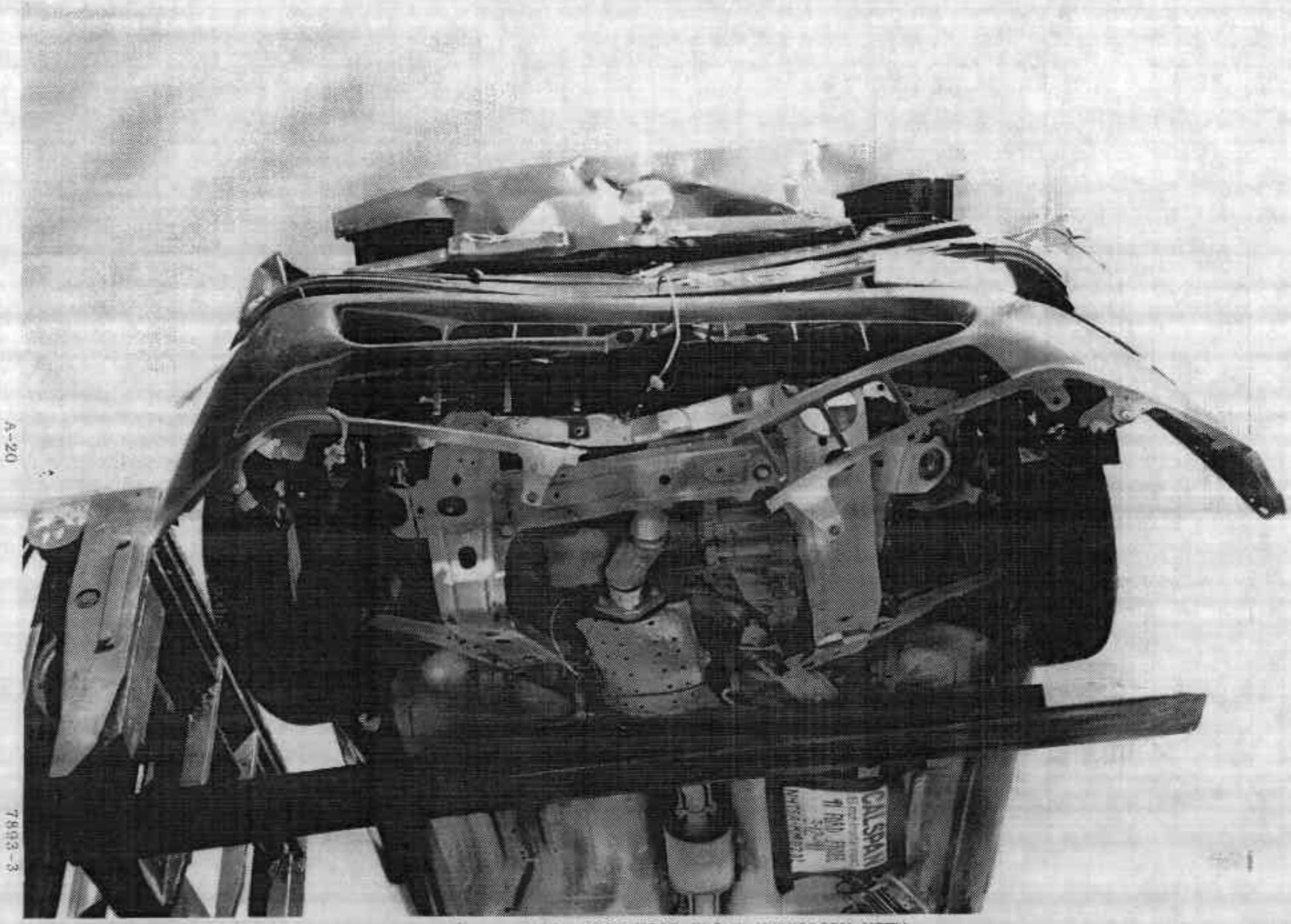


Figure A-18 POST-TEST FRONT UNDERBODY VIEW

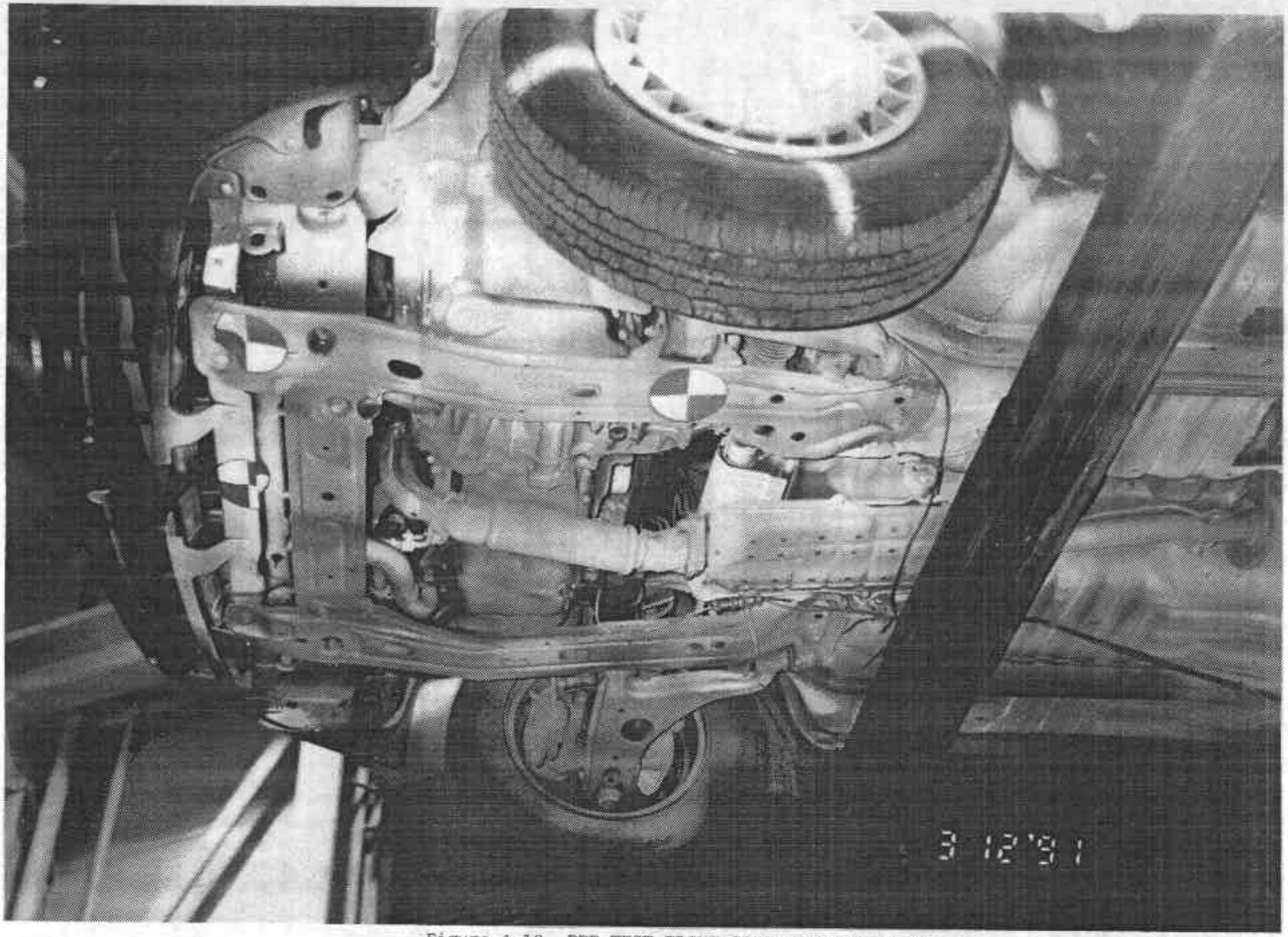


Figure A-19 PRE-TEST FRONT SIDE UNDERBODY VIEW

Figure A-20 POST-TEST FRONT SIDE UNDERBODY VIEW

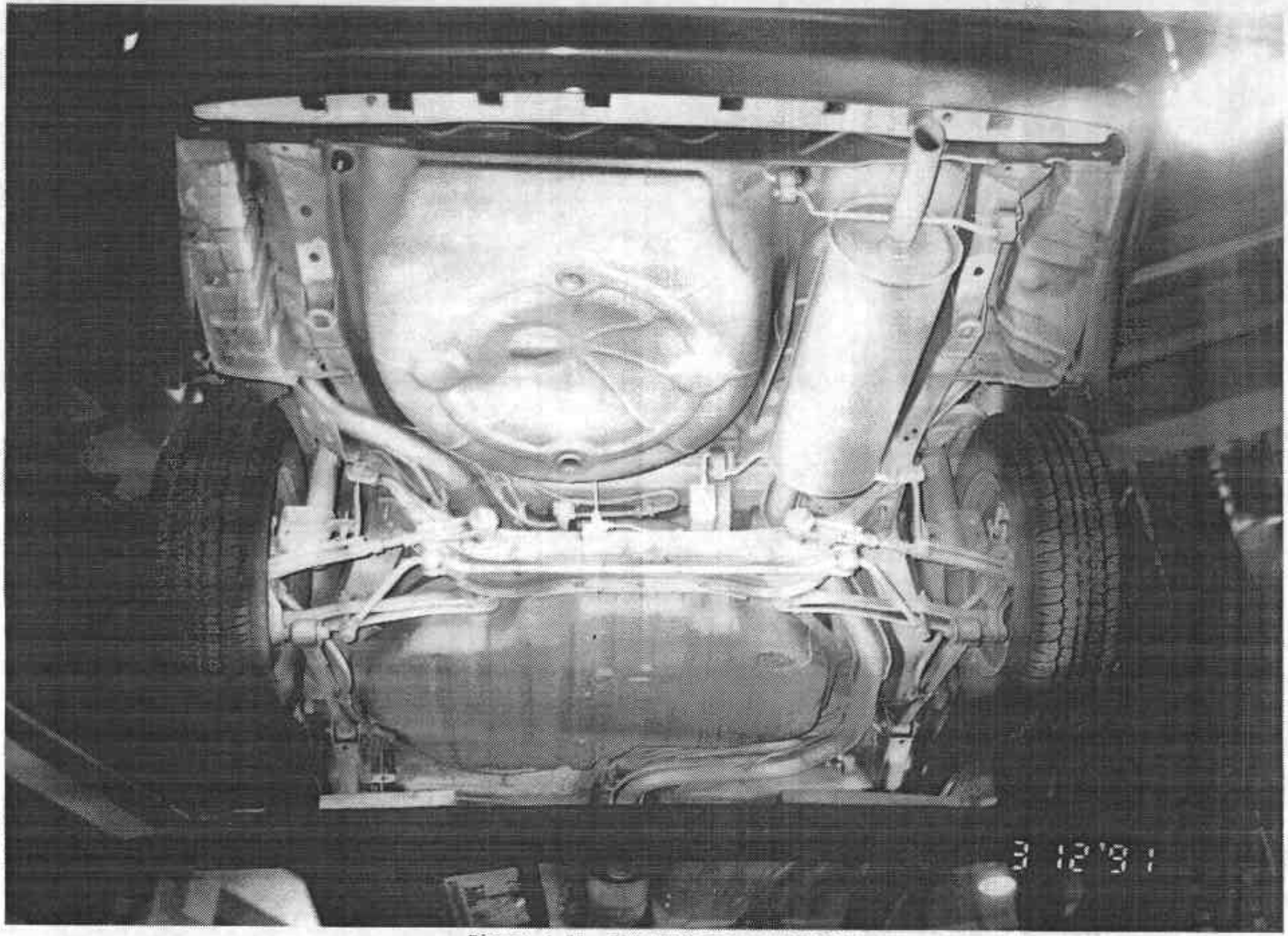


Figure A-21 PRE-TEST REAR UNDERBODY VIEW

7893-3

Figure A-22 POST-TEST REAR UNDERBODY VIEW

Figure A-23 PRE-TEST DRIVER POSITION VIEW

Figure A-24 POST-TEST DRIVER POSITION VIEW

Figure A-25 PRE-TEST PASSENGER POSITION VIEW

Figure A-26 POST-TEST PASSENGER POSITION VIEW

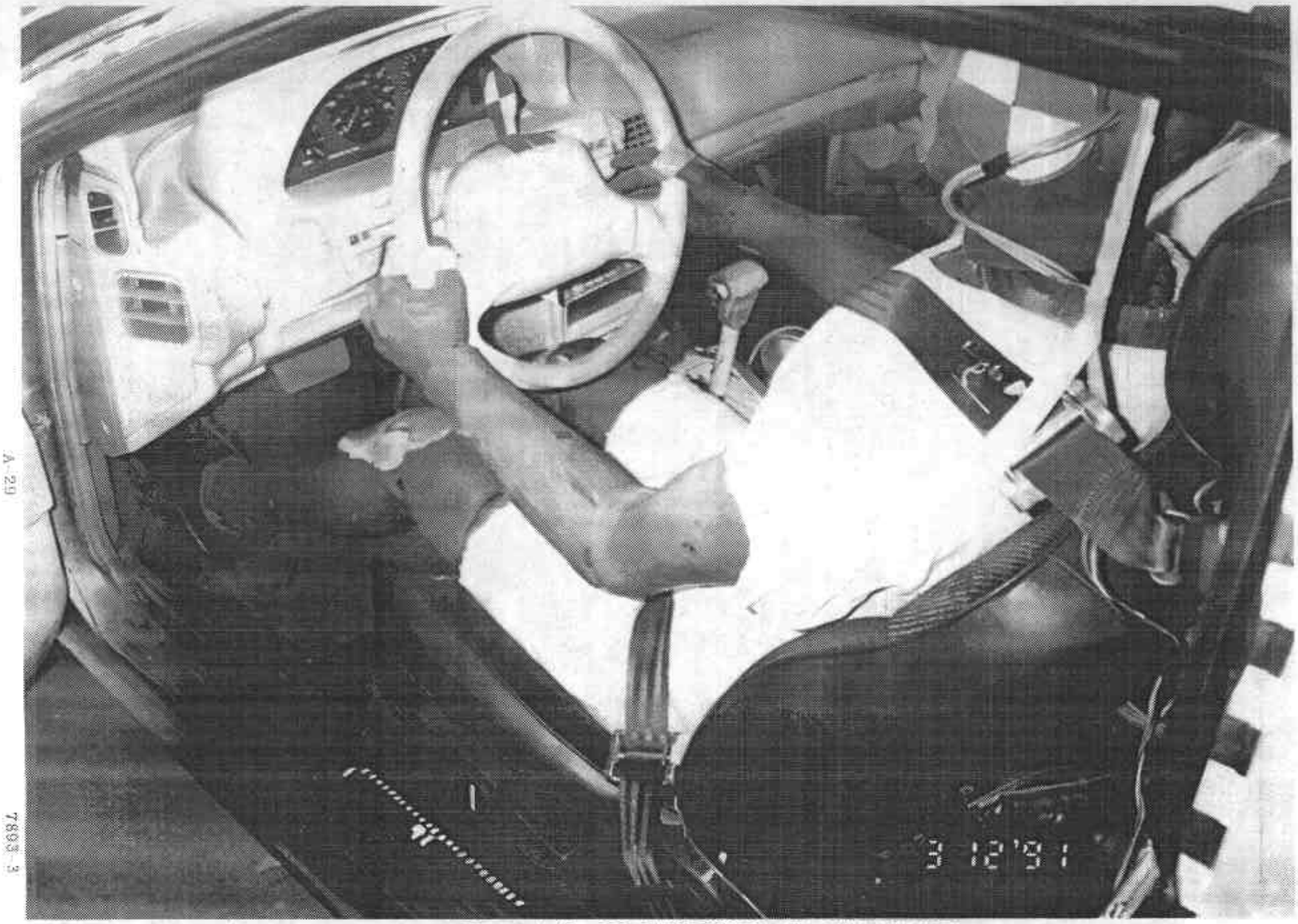


Figure A-27 PRE-TEST DRIVER AND INTERIOR VIEW

Figure A-28 POST-TEST DRIVER AND INTERIOR VIEW

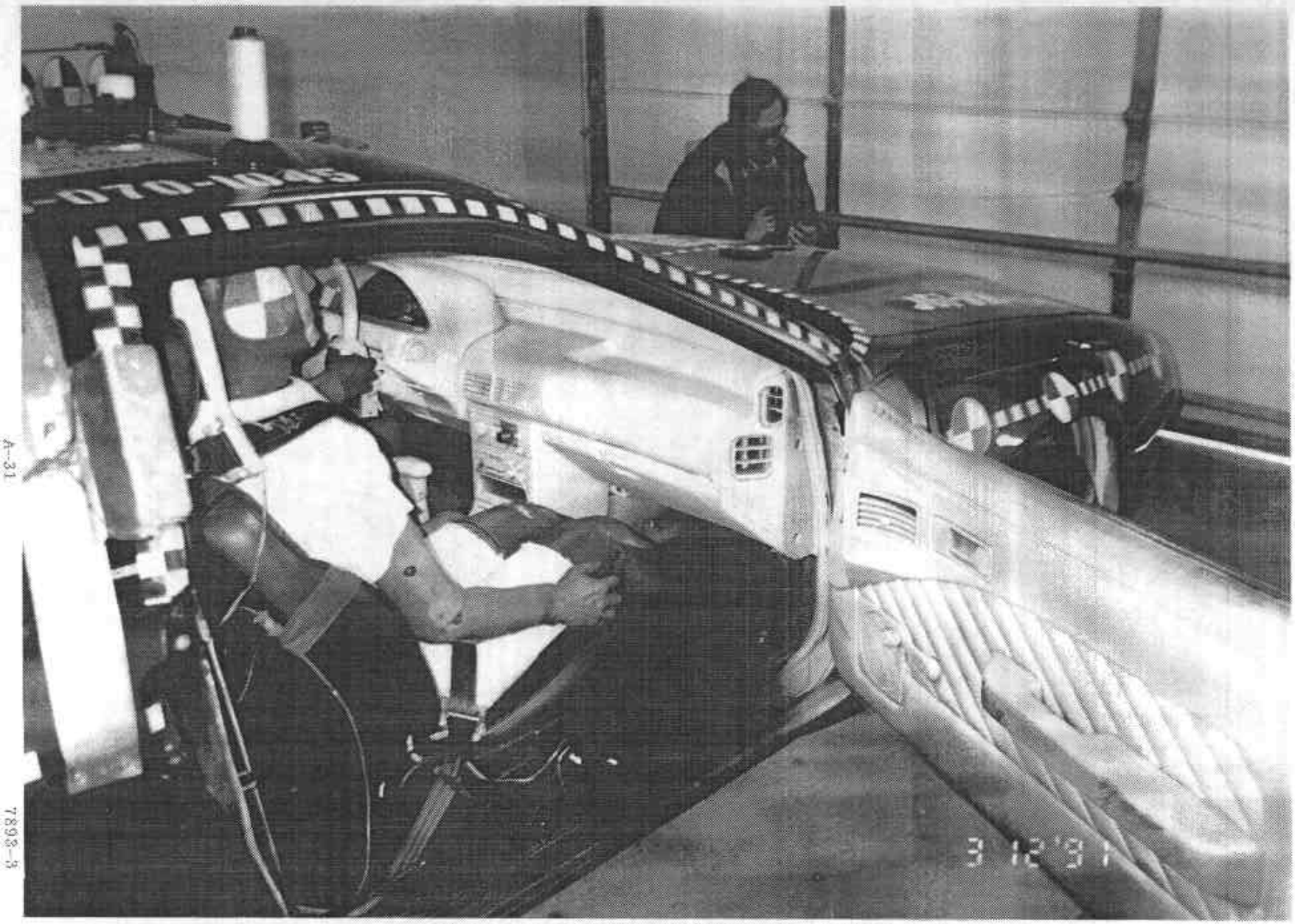


Figure A-29 PRE-TEST PASSENGER AND INTERIOR VIEW

Figure A-30 POST-TEST PASSENGER AND INTERIOR VIEW

Figure A-31 IMPACT VIEW

Appendix B

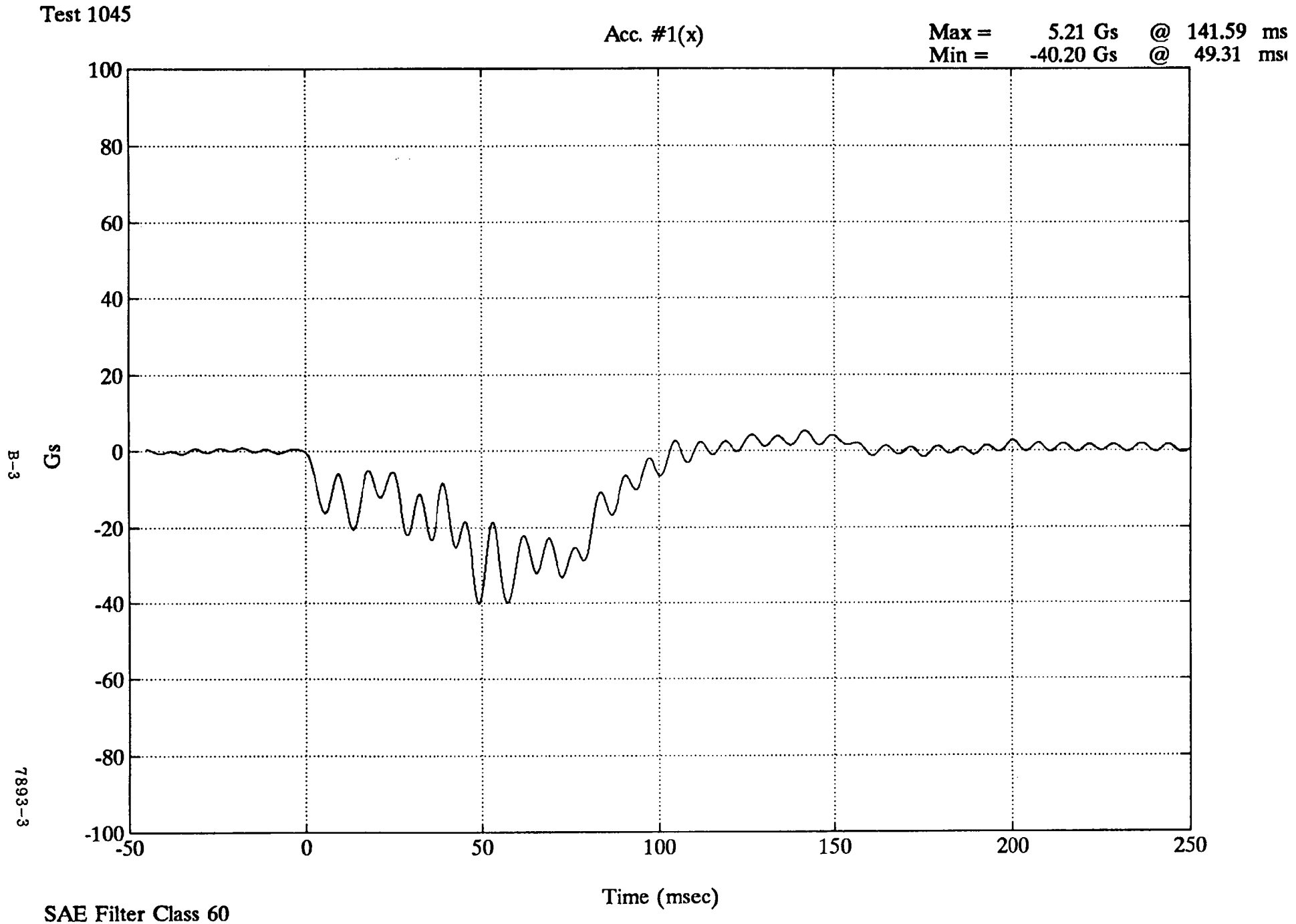
VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

TEST NO. MM0202

VEHICLE DATA

FILTER CHANNEL CLASS

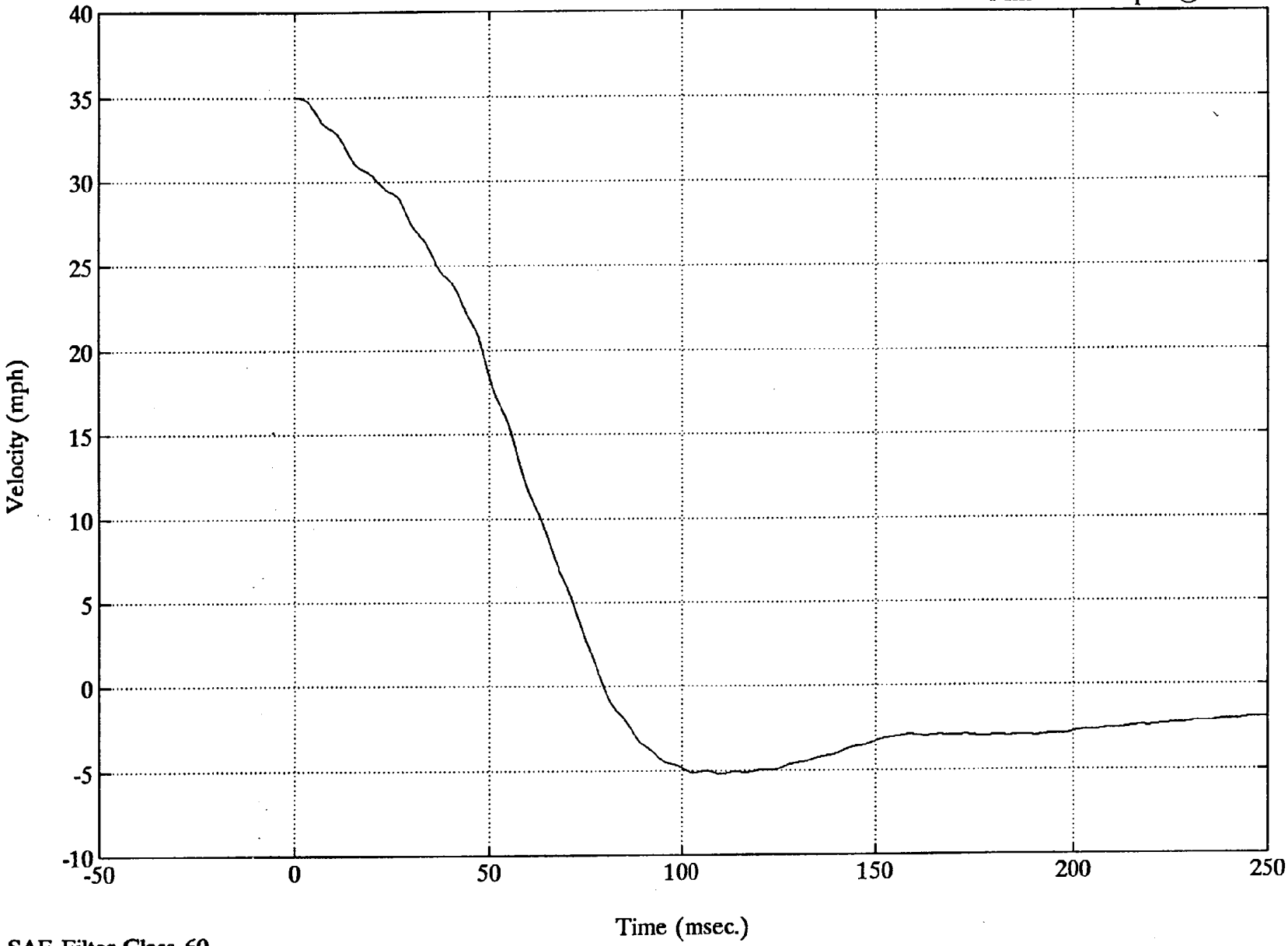
60


Test 1045
Acc. #1(x)
Max = 5.21 Gs @ 141.59 ms
Min = -40.20 Gs @ 49.31 ms
100
80
60
40
20
0
-20
-40
-60
-80
-100
Gs
-50
0
50
100
150
200
250
Time (msec)
SAE Filter Class 60
B-3
7893-3

Test 1045

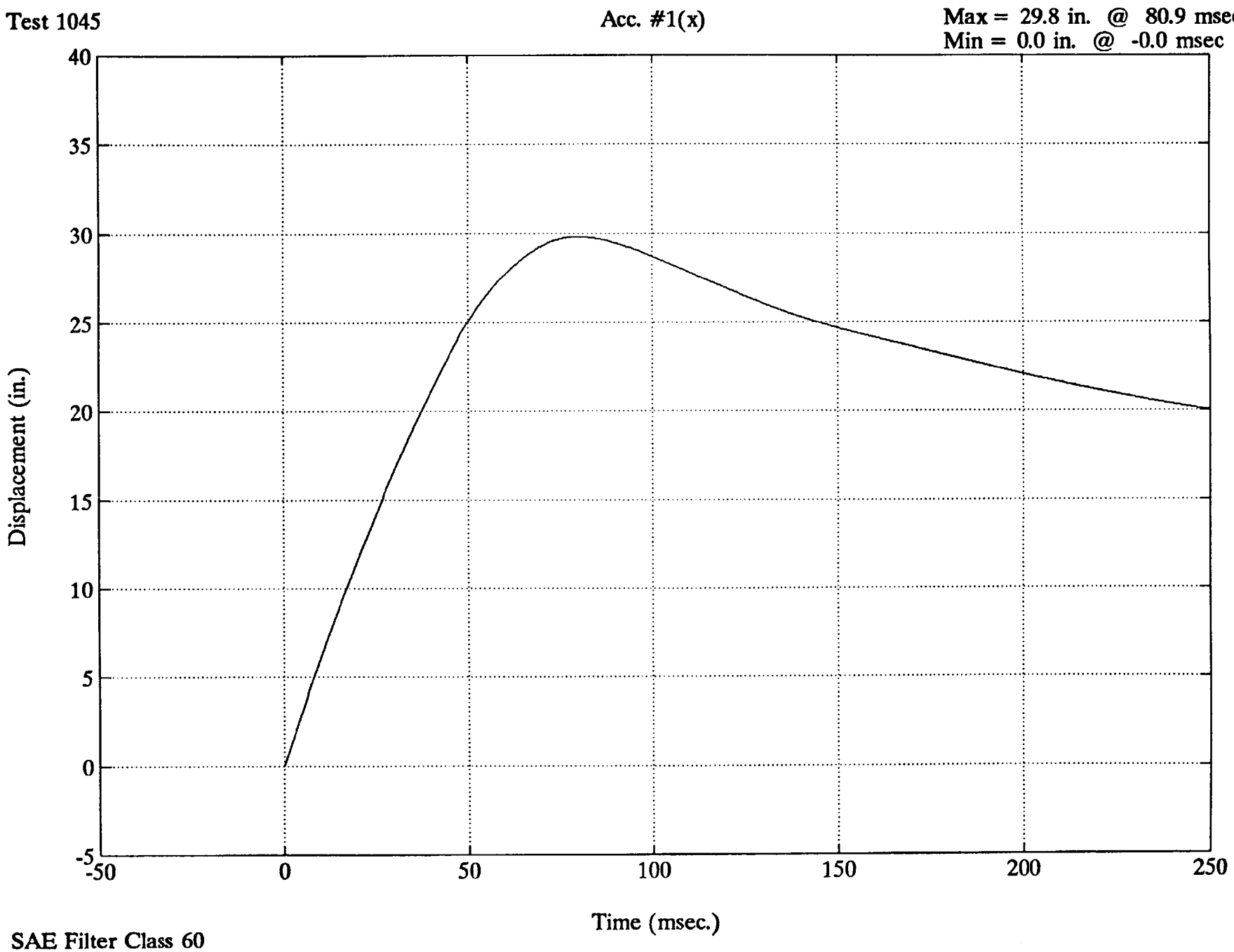
Acc. #1(x)

Max = 35.0 mph @ 0.2 msec
Min = -5.2 mph @ 110.2 msec

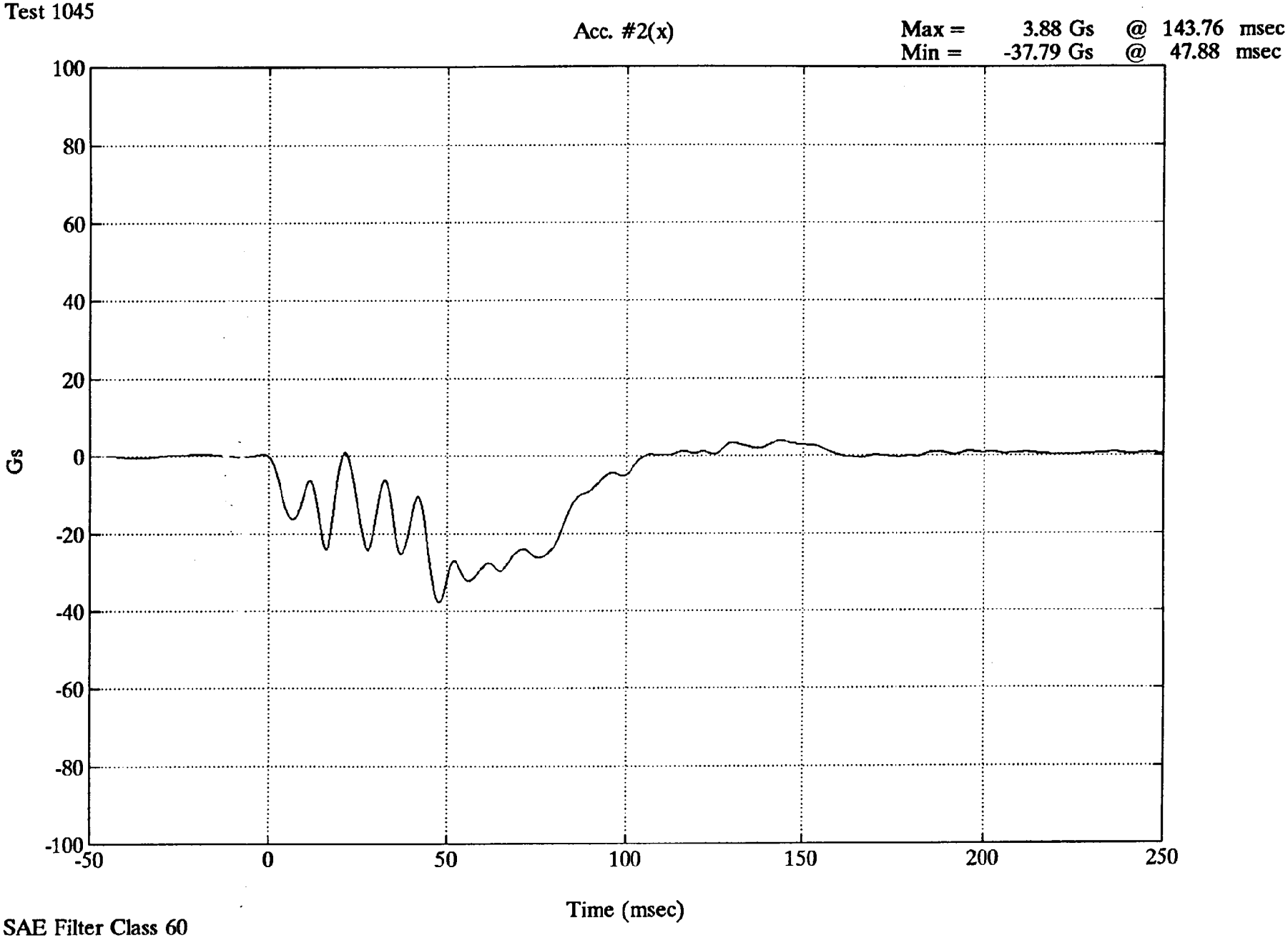


SAE Filter Class 60

7893-3


Test 1045
Acc. #1(x)
Max = 29.8 in. @ 80.9 msec
Min = 0.0 in. @ -0.0 msec
Displacement (in.)
40
35
30
25
20
15
10
5
0
-5
-50
0
50
100
150
200
250
Time (msec.)
SAE Filter Class 60

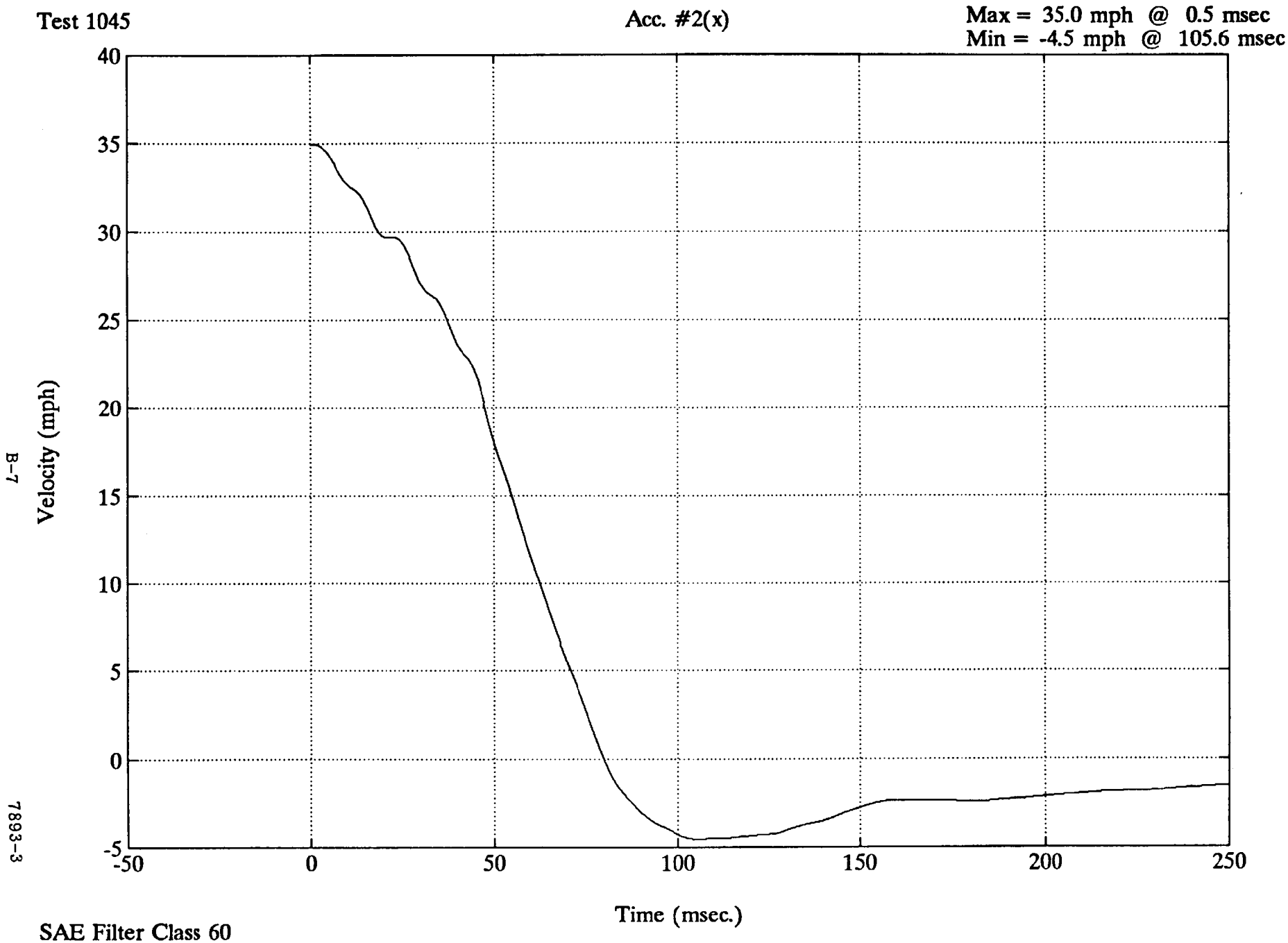
Test 1045

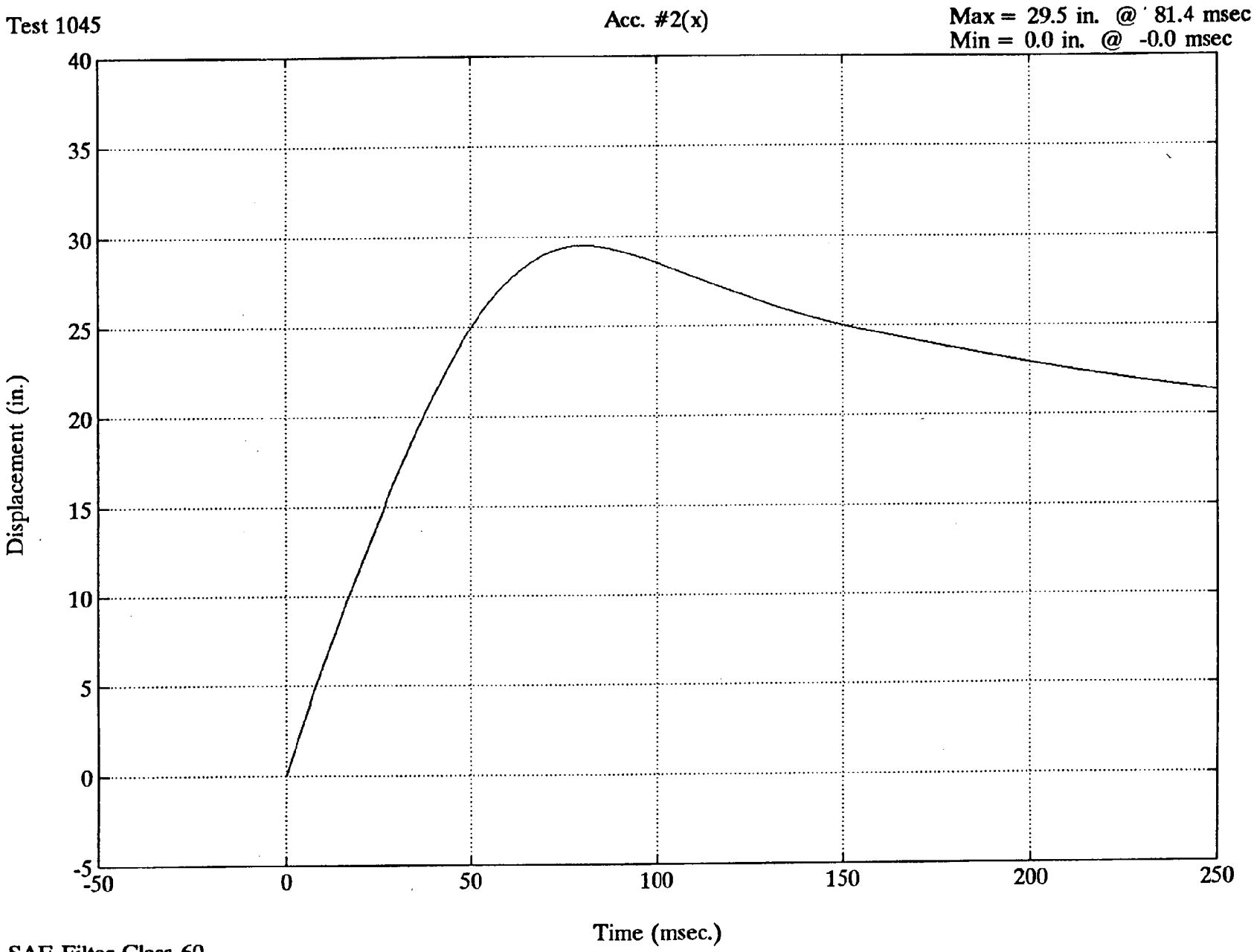


SAE Filter Class 60

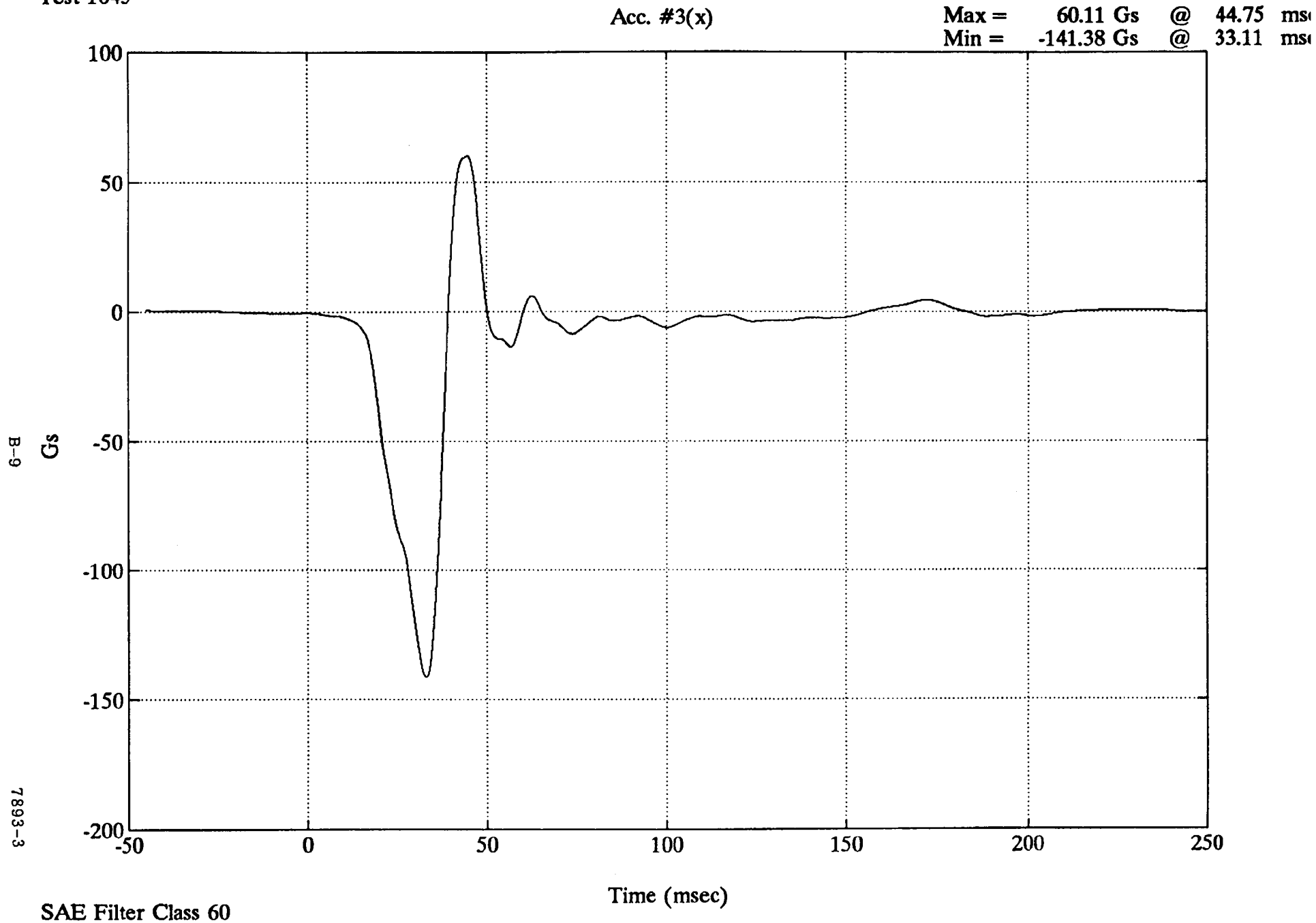
B-6

7893-3


Test 1045
Acc. #2(x)
Max = 35.0 mph @ 0.5 msec
Min = -4.5 mph @ 105.6 msec
Velocity (mph)
40
35
30
25
20
15
10
5
0
-5
-50
0
50
100
150
200
250
Time (msec.)
SAE Filter Class 60
B-7
7893-3

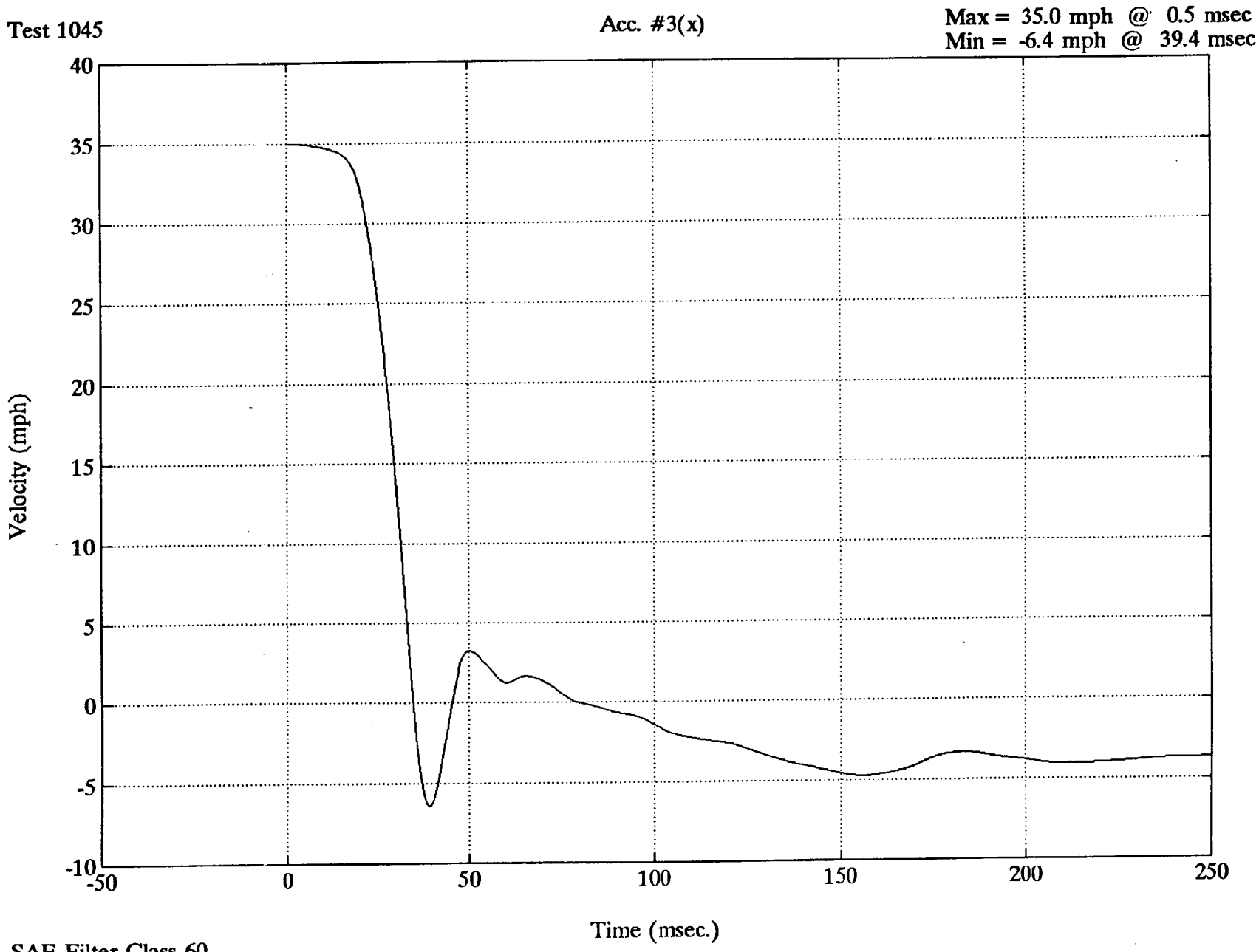

Test 1045
Acc. #2(x)
Max = 29.5 in. @ 81.4 msec
Min = 0.0 in. @ -0.0 msec
Displacement (in.)
40
35
30
25
20
15
10
5
0
-5
-50
0
50
100
150
200
250
Time (msec.)
SAE Filter Class 60

Test 1045



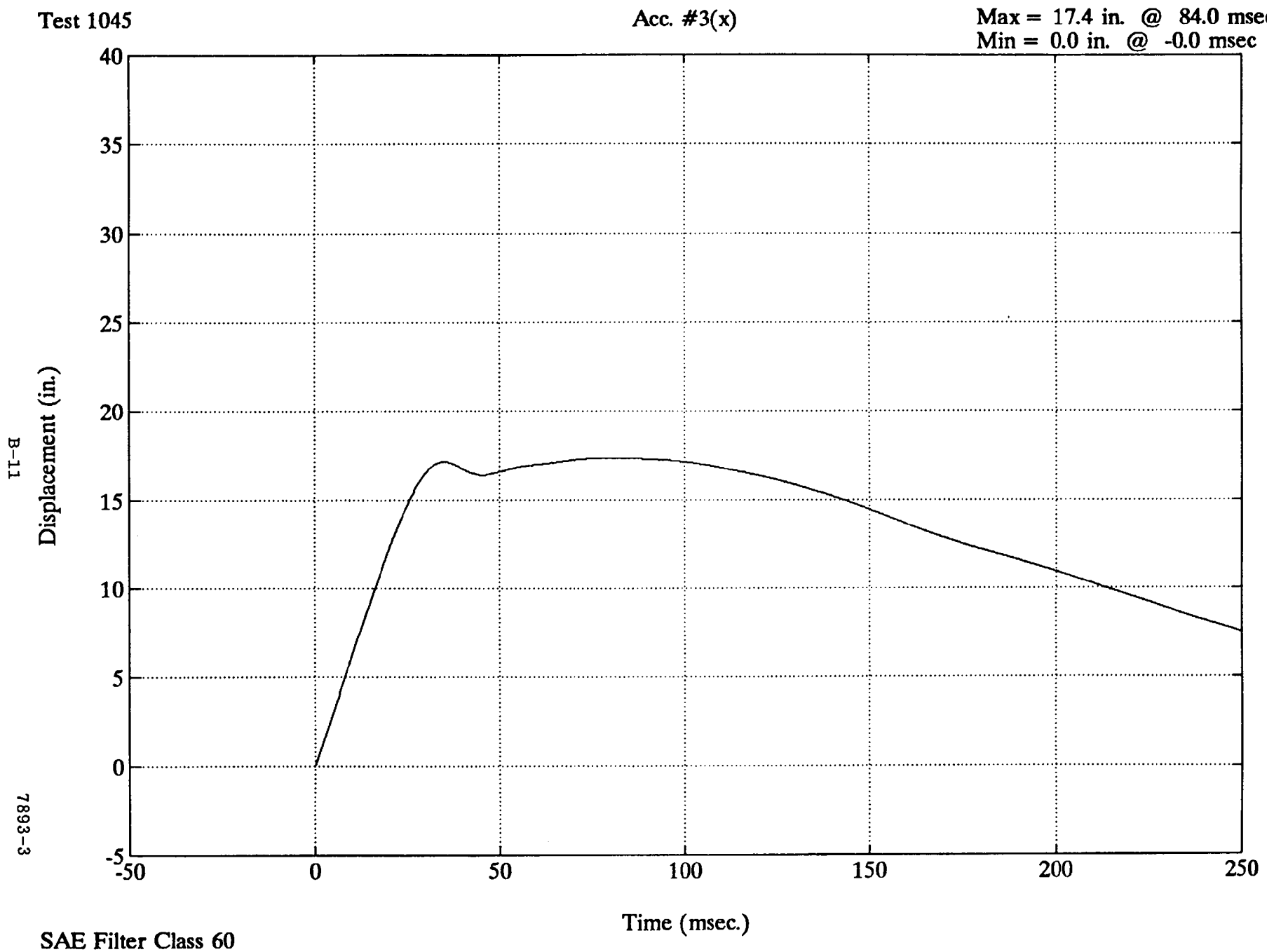
SAE Filter Class 60

7893-3

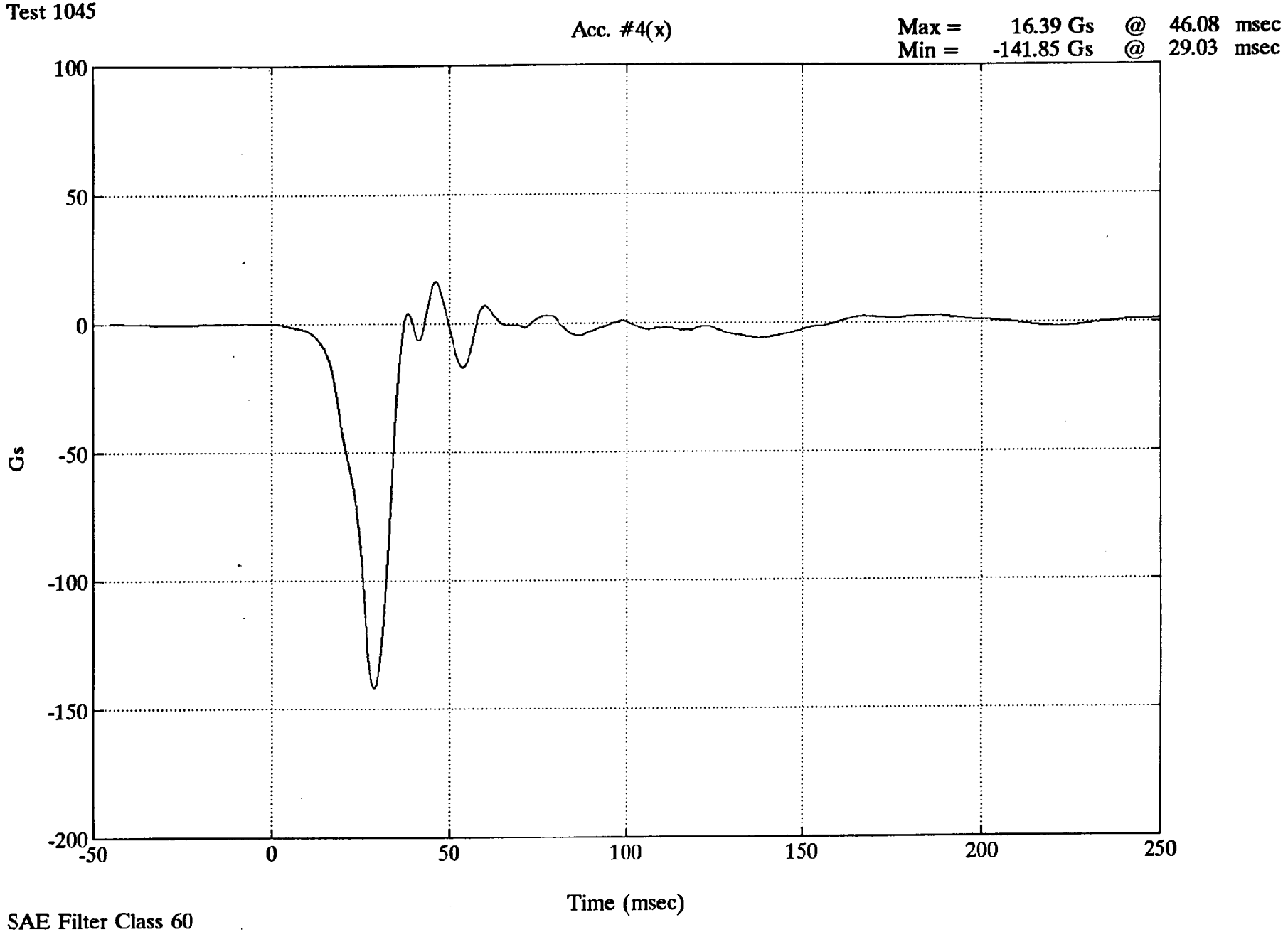


SAE Filter Class 60

7893-3

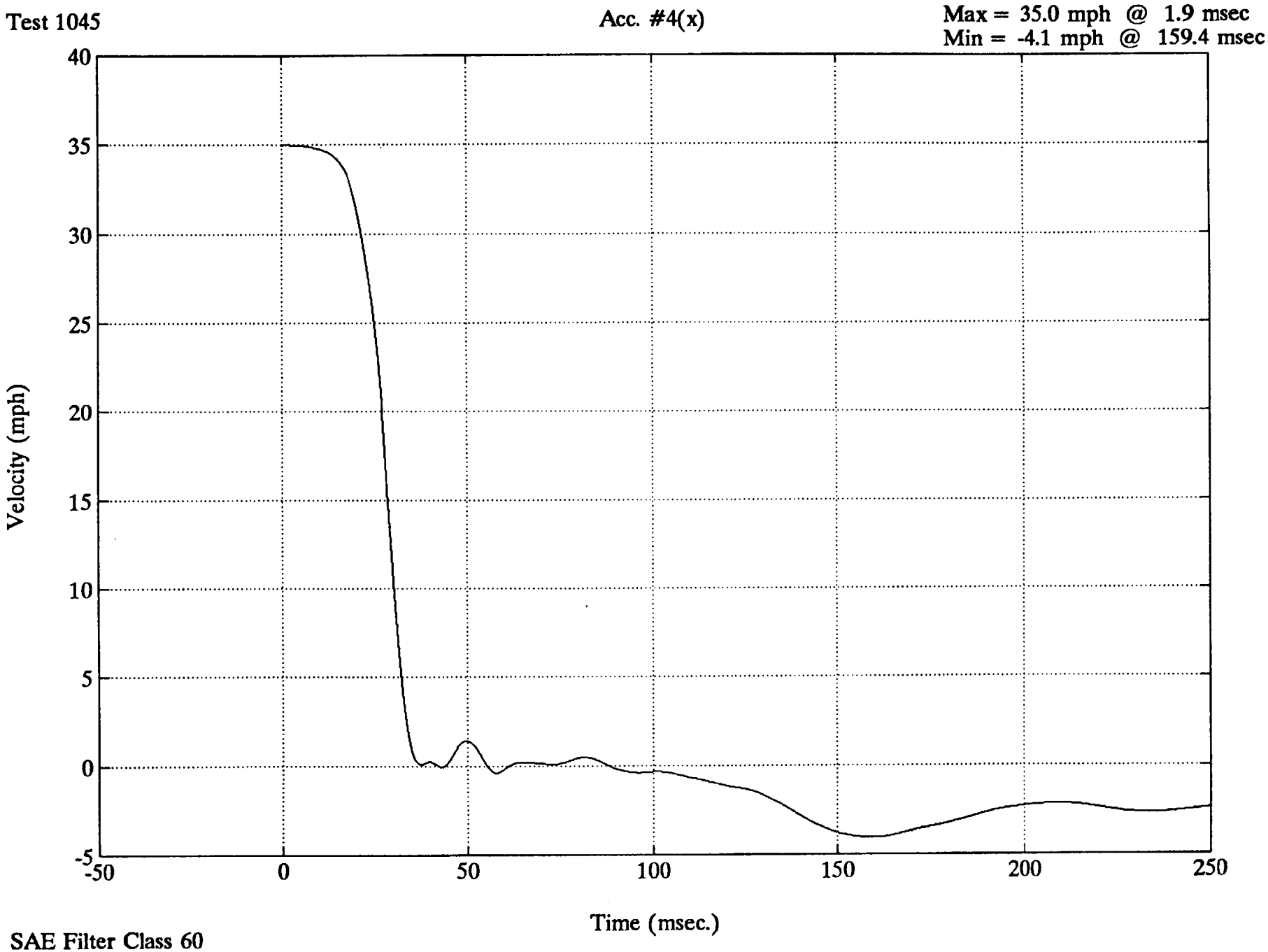

Test 1045
Acc. #3(x)
Max = 17.4 in. @ 84.0 msec
Min = 0.0 in. @ -0.0 msec
Displacement (in.)
Time (msec.)
40
35
30
25
20
15
10
5
0
-5
-50
0
50
100
150
200
250
B-11
7893-3
SAE Filter Class 60

Test 1045

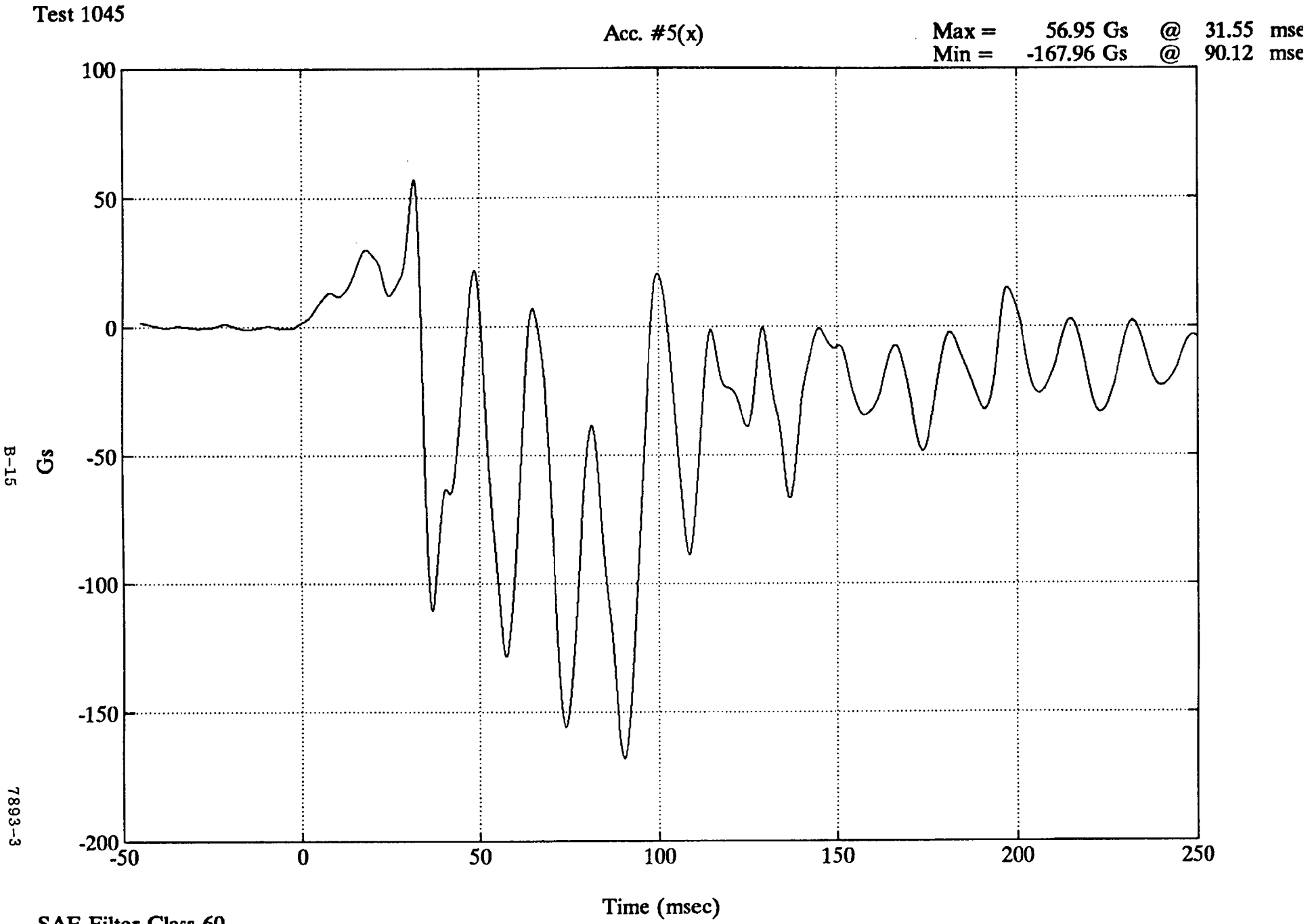


SAE Filter Class 60

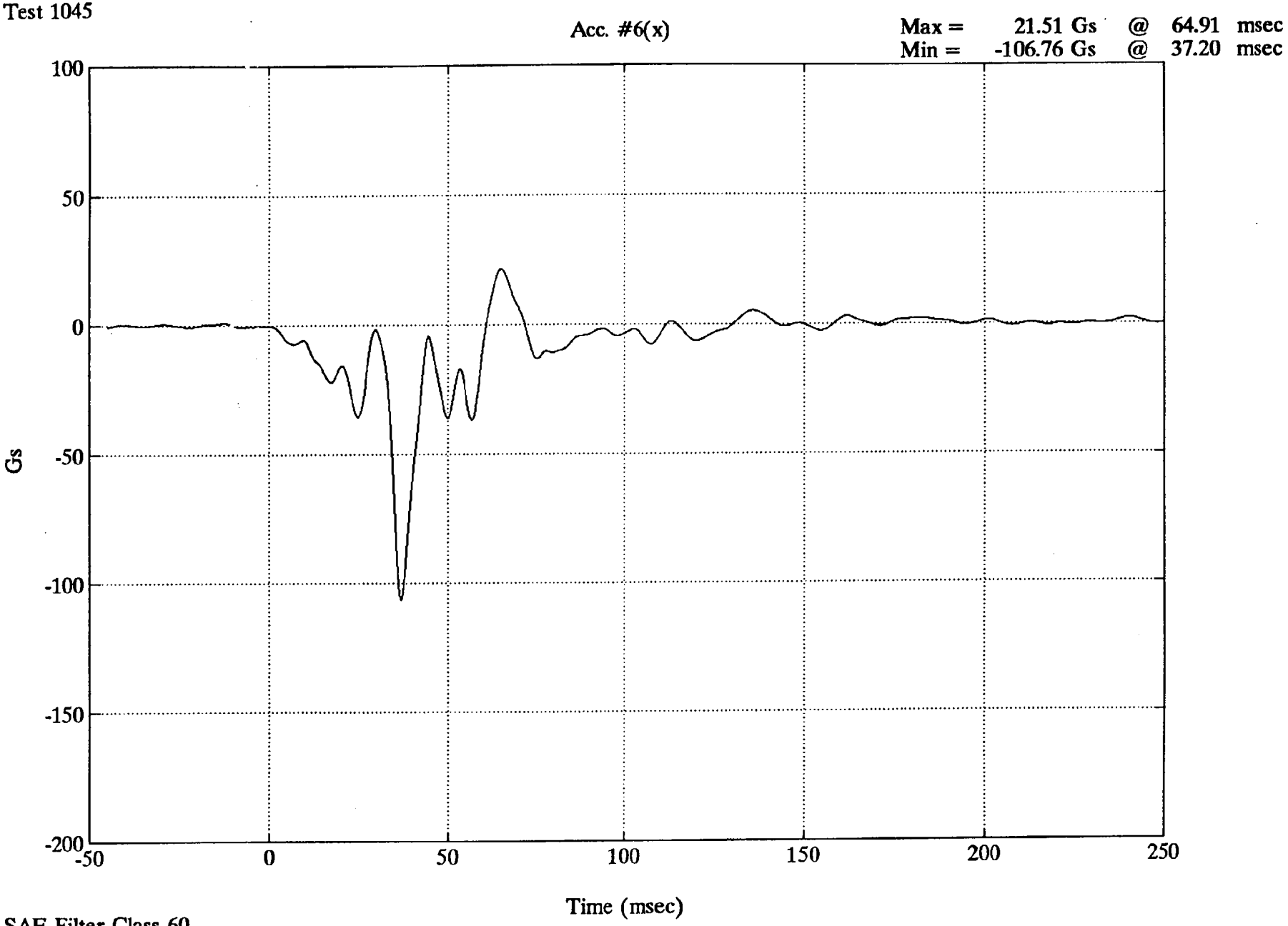
7893-3


Test 1045
Acc. #4(x)
Max = 35.0 mph @ 1.9 msec
Min = -4.1 mph @ 159.4 msec
Velocity (mph)
40
35
30
25
20
15
10
5
0
-5
-50
0
50
100
150
200
250
Time (msec.)
SAE Filter Class 60
B-13
7893-3


Test 1045
Acc. #4(x)
Max = 17.0 in. @ 91.2 msec
Min = 0.0 in. @ -0.0 msec
Displacement (in.)
40
35
30
25
20
15
10
5
0
-5
-50
0
50
100
150
200
250
Time (msec.)
SAE Filter Class 60
7893-3


Test 1045
Acc. #5(x)
Max = 56.95 Gs @ 31.55 mse
Min = -167.96 Gs @ 90.12 mse
100
50
0
-50
-100
-150
-200
Gs
-50
0
50
100
150
200
250
Time (msec)
SAE Filter Class 60
B-15
7893-3

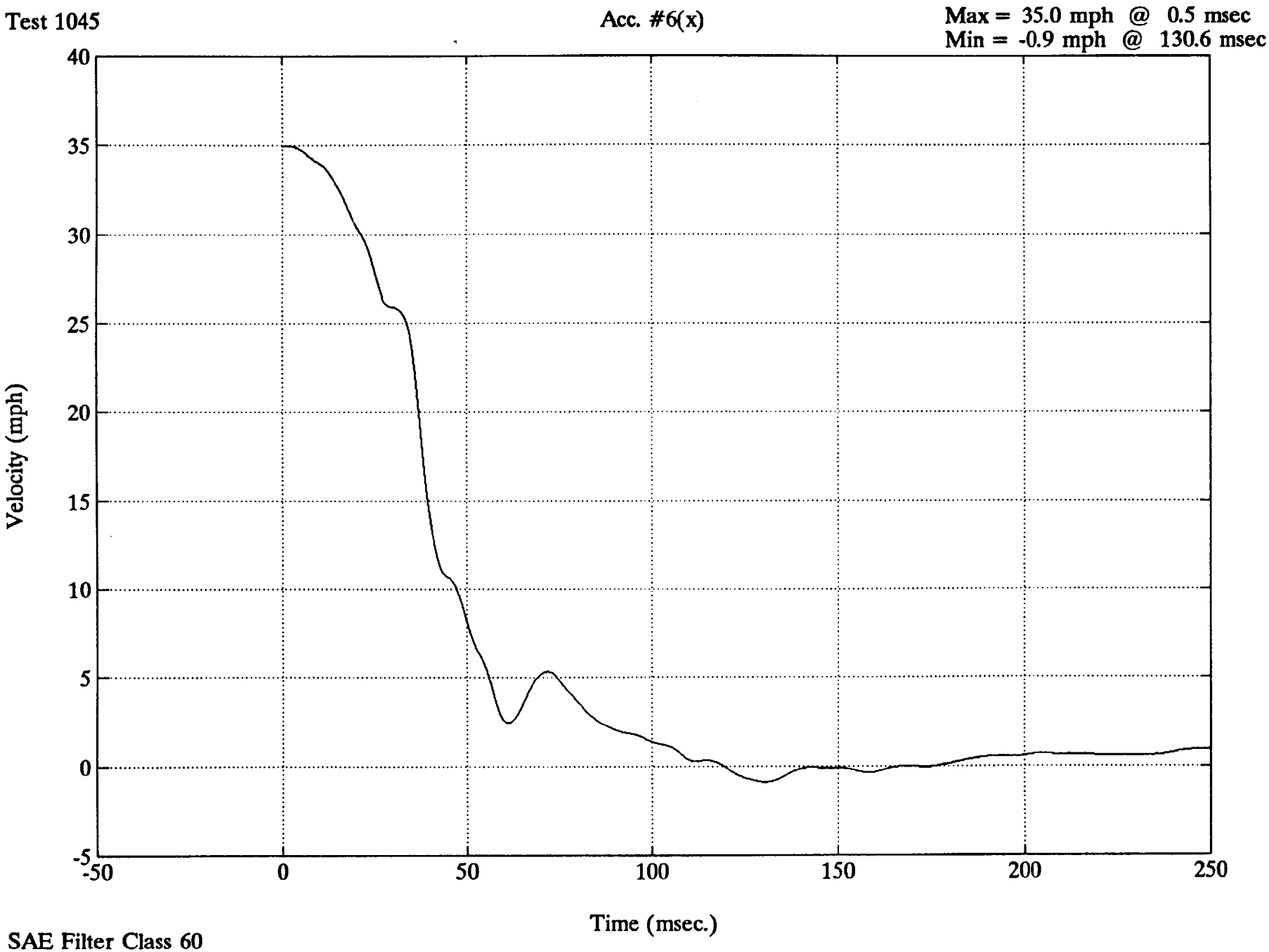
Test 1045



SAE Filter Class 60

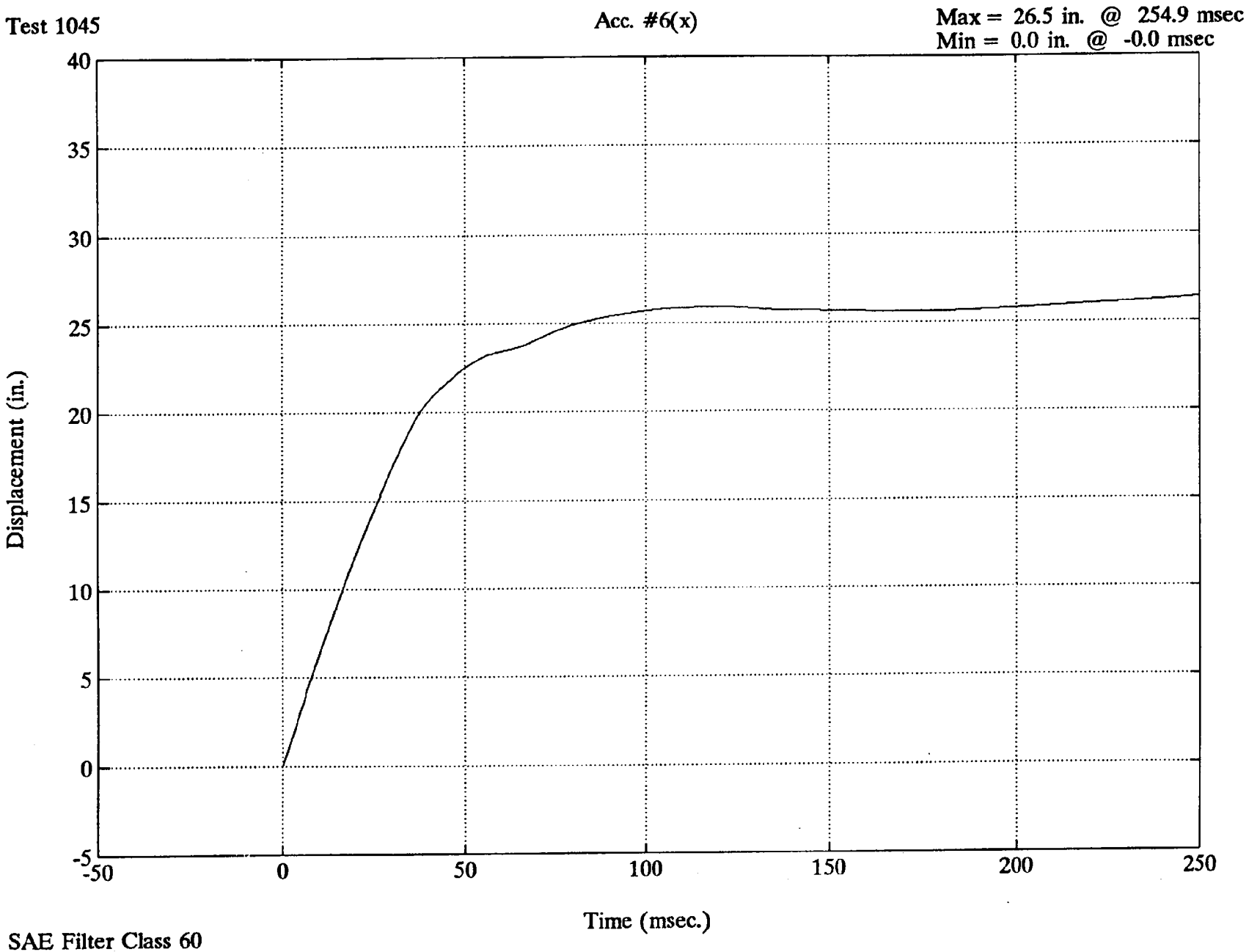
B-16

7893-3



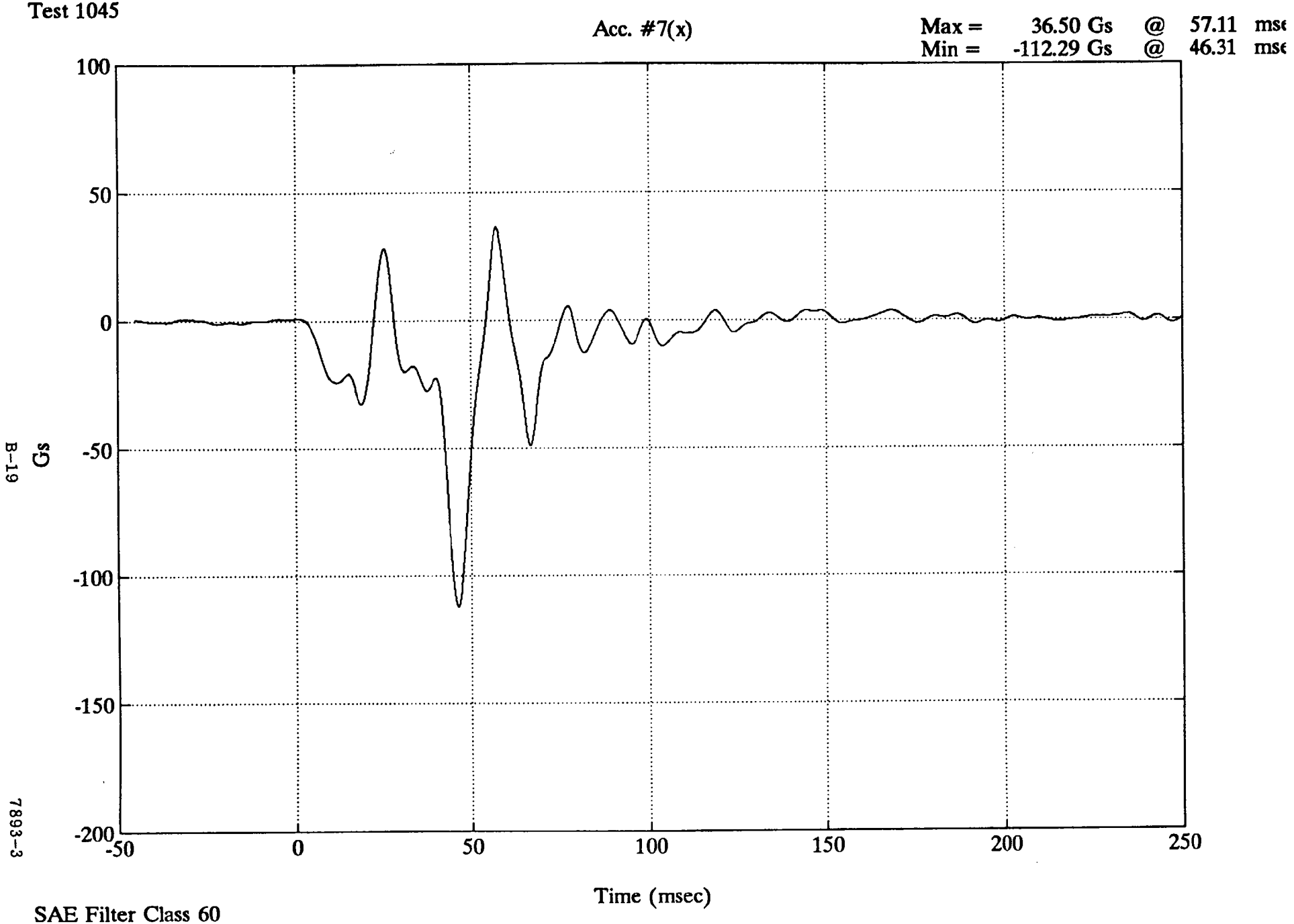
SAE Filter Class 60

7893-3



SAE Filter Class 60

Test 1045



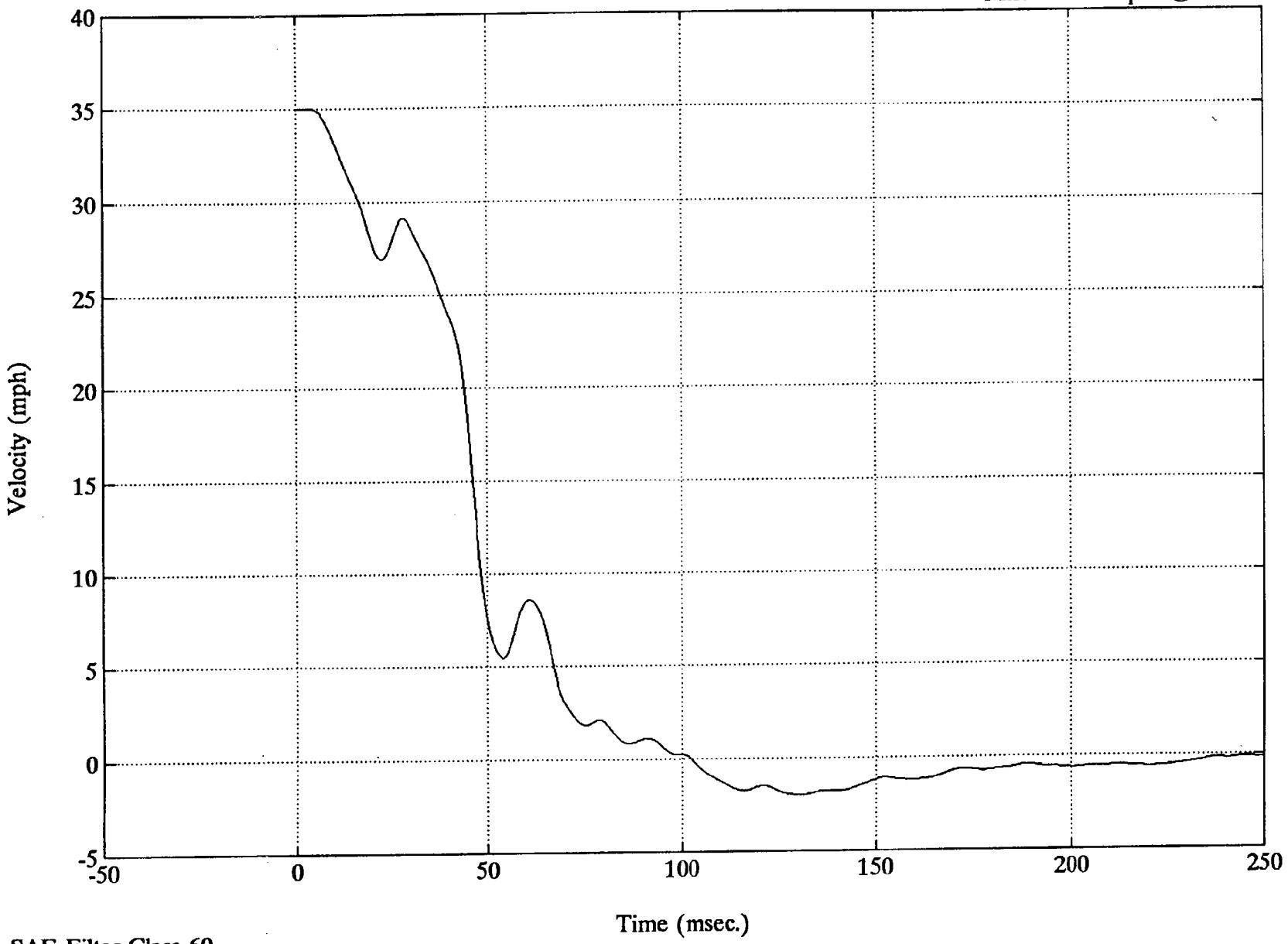
SAE Filter Class 60

7893-3

Test 1045

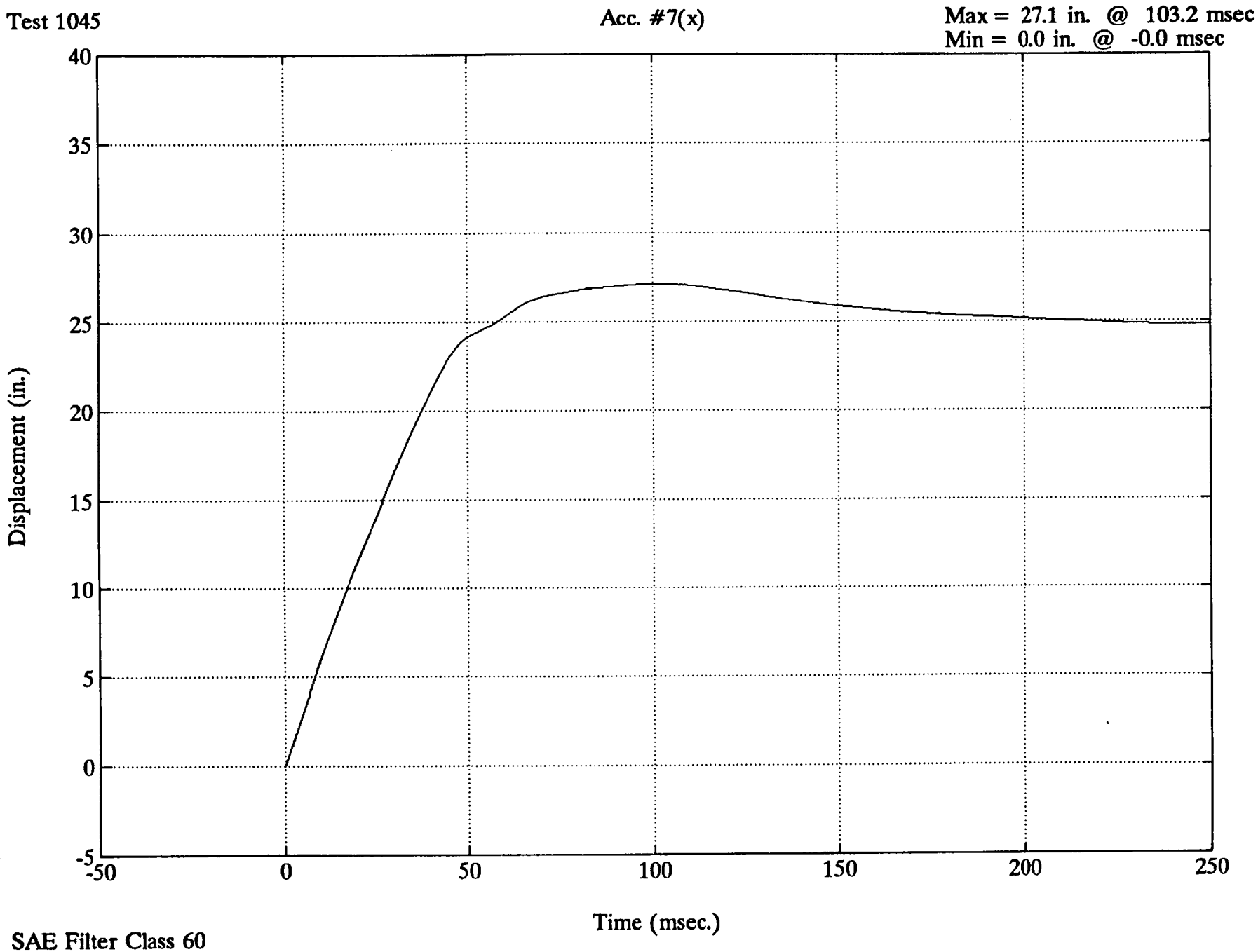
Acc. #7(x)

Max = 35.0 mph @ 3.4 msec
Min = -2.0 mph @ 131.0 msec

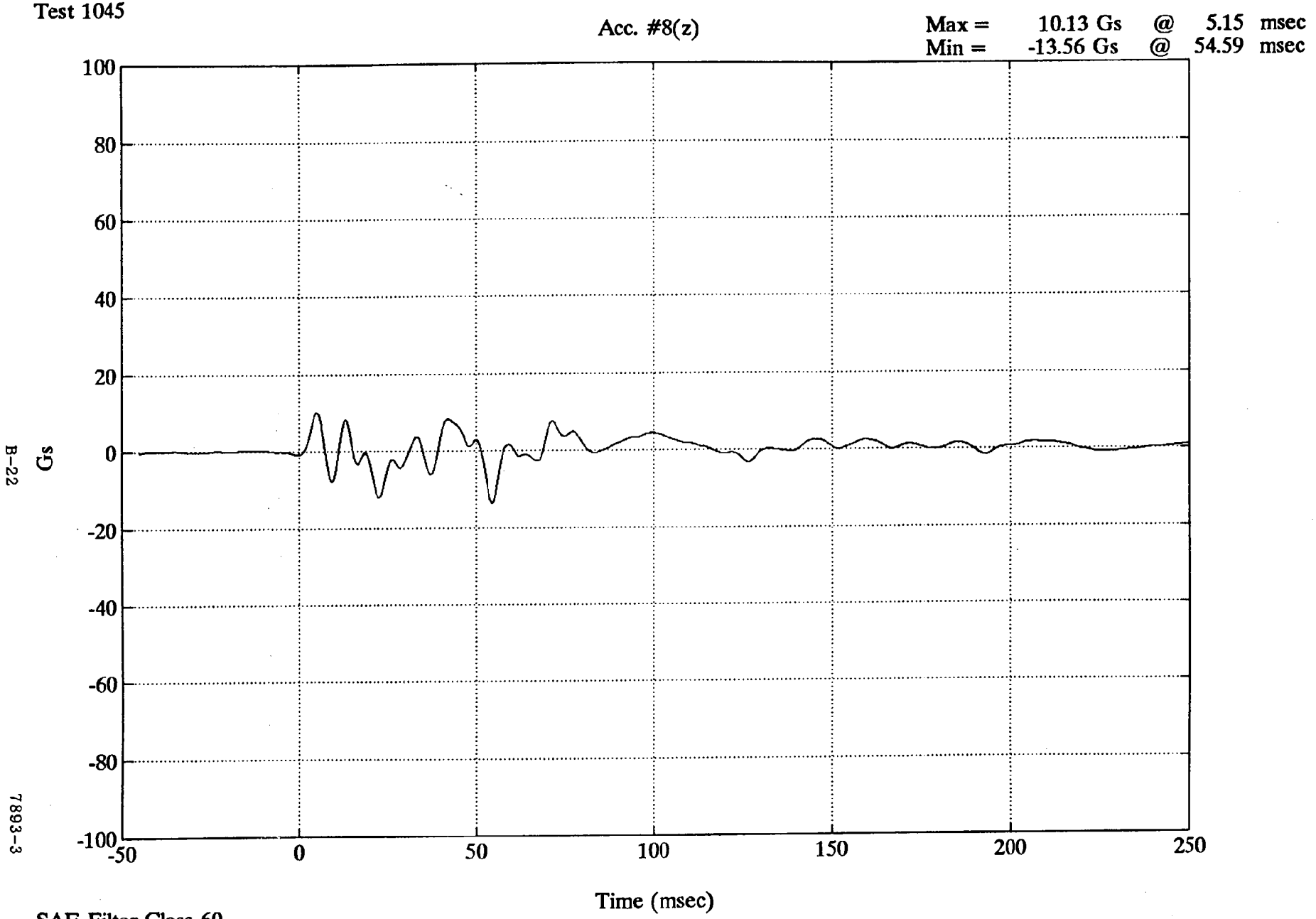


SAE Filter Class 60

7893-3

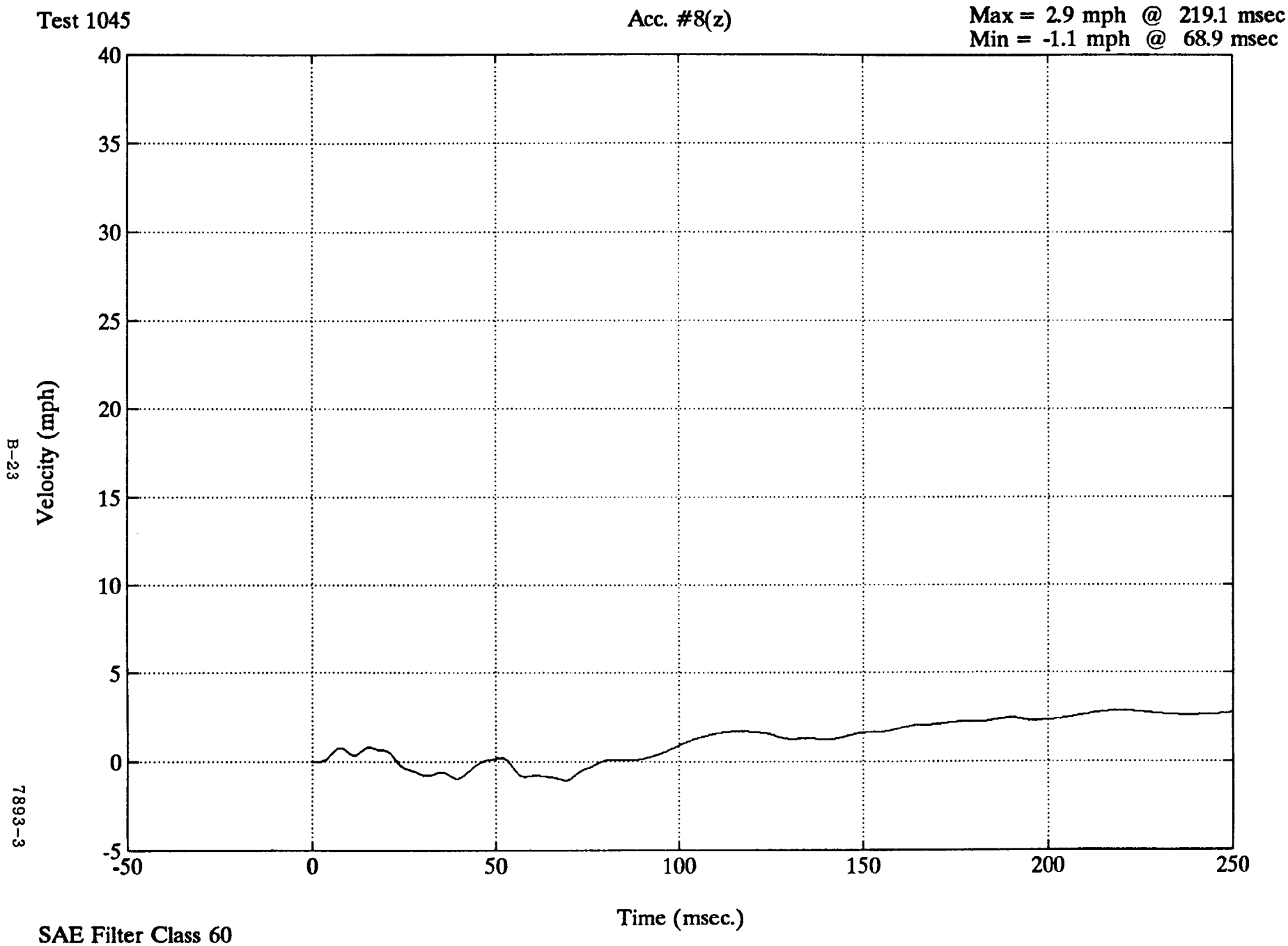

Test 1045
Acc. #7(x)
Max = 27.1 in. @ 103.2 msec
Min = 0.0 in. @ -0.0 msec
Displacement (in.)
40
35
30
25
20
15
10
5
0
-5
-50
0
50
100
150
200
250
Time (msec.)
SAE Filter Class 60
B-21
7893-3

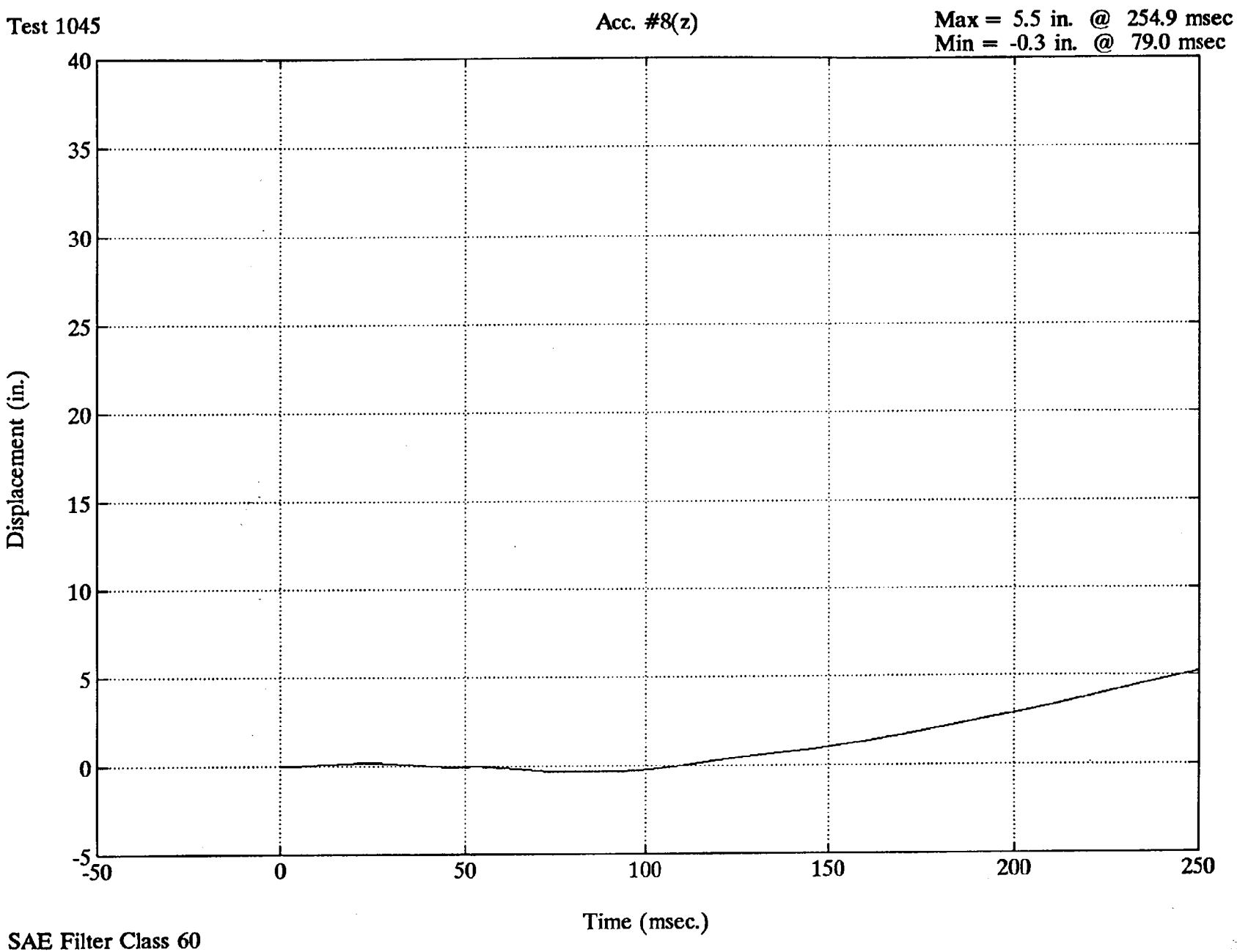
Test 1045

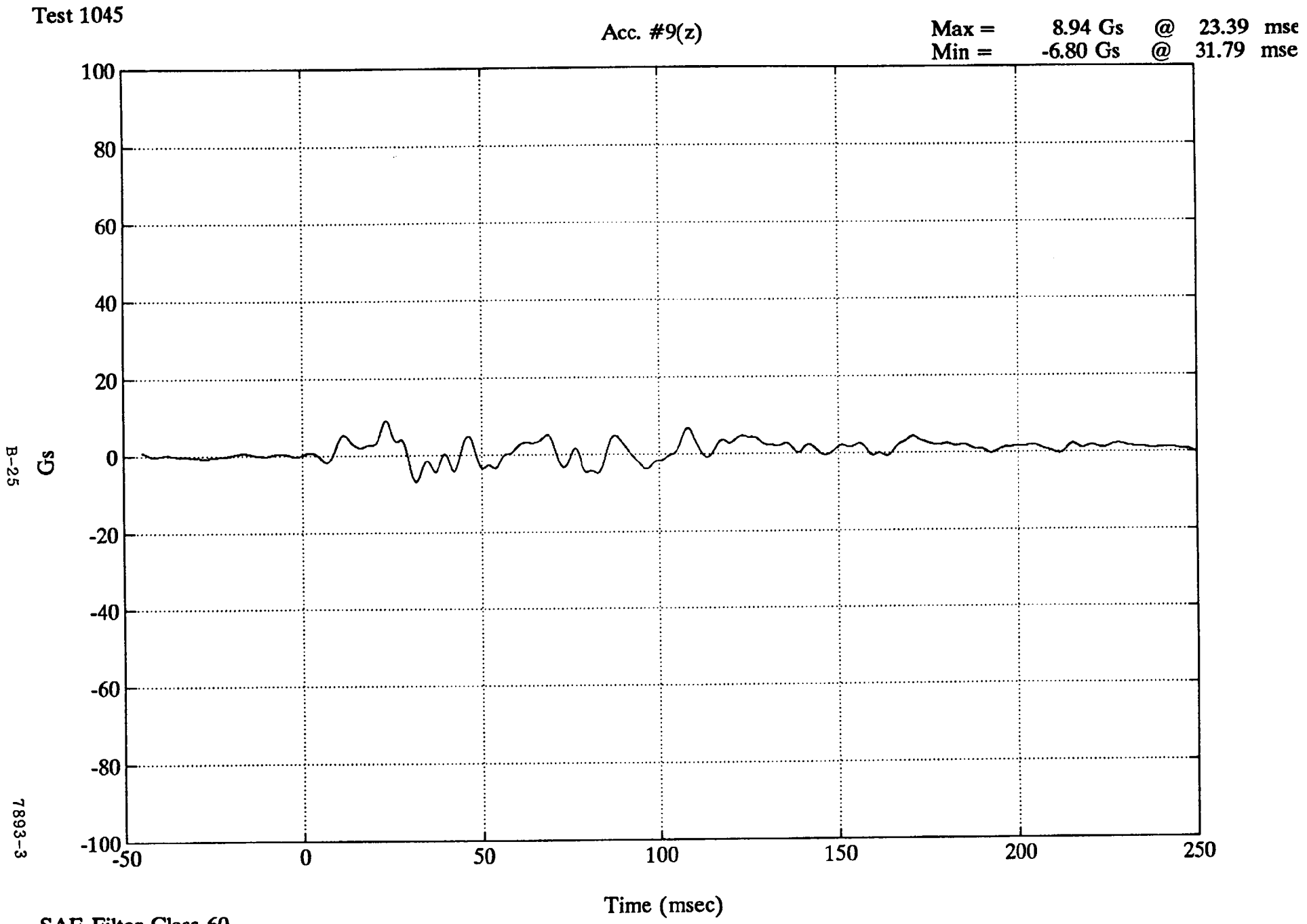


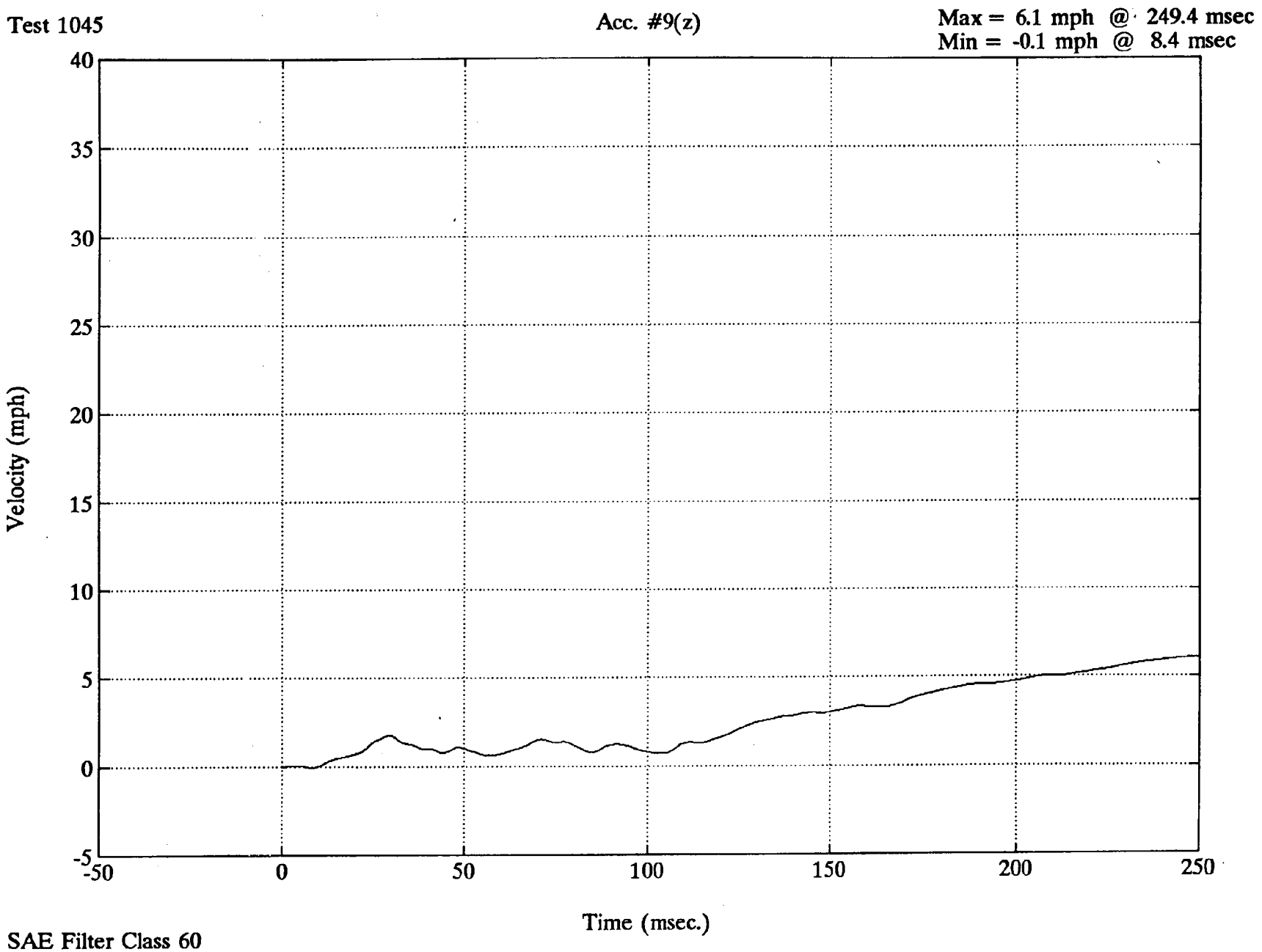
SAE Filter Class 60

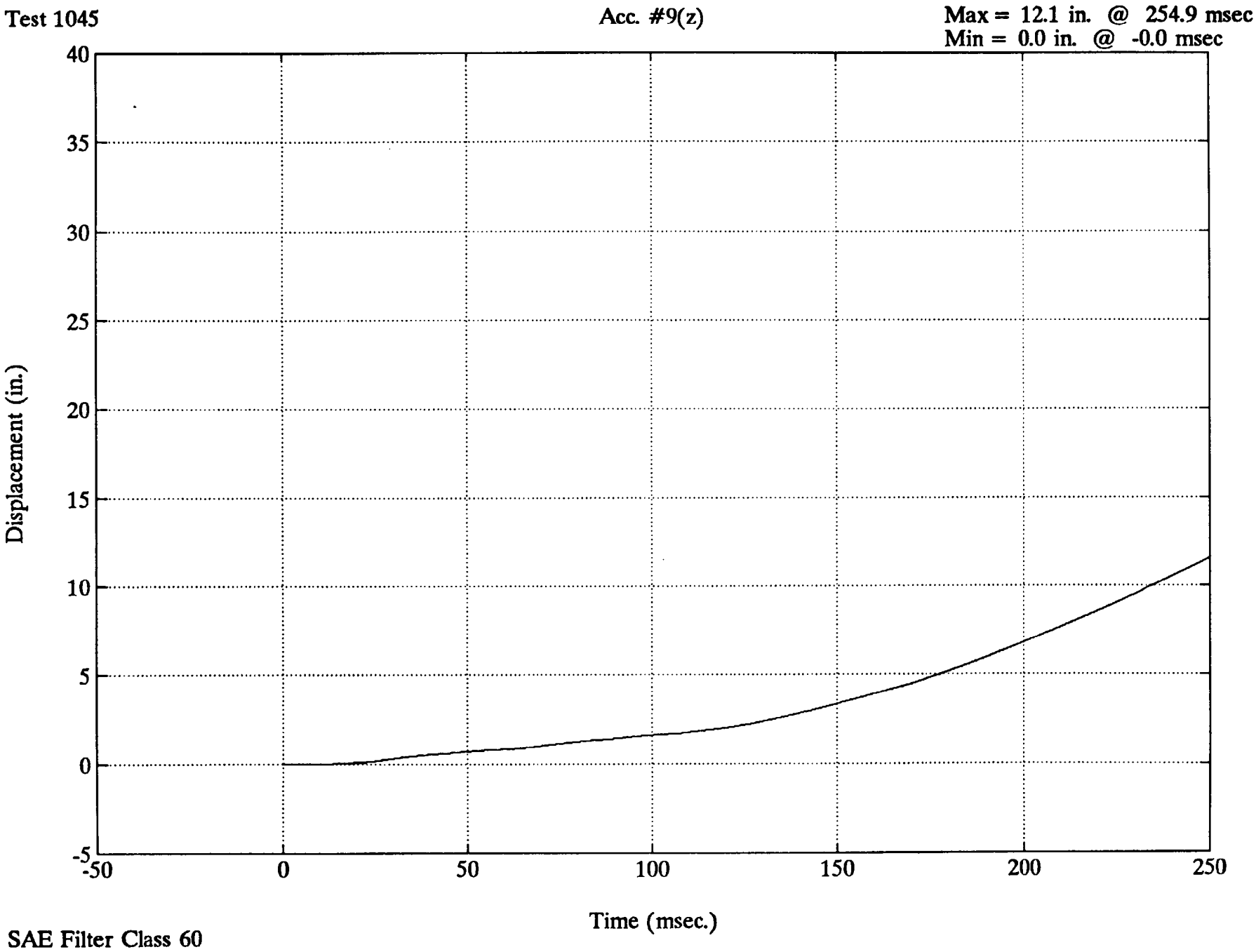
7893-3


Test 1045
Acc. #8(z)
Max = 2.9 mph @ 219.1 msec
Min = -1.1 mph @ 68.9 msec
Velocity (mph)
40
35
30
25
20
15
10
5
0
-5
-50
0
50
100
150
200
250
Time (msec.)
SAE Filter Class 60
B-23
7893-3


Test 1045
Acc. #8(z)
Max = 5.5 in. @ 254.9 msec
Min = -0.3 in. @ 79.0 msec
Displacement (in.)
40
35
30
25
20
15
10
5
0
-5
-50
0
50
100
150
200
250
Time (msec.)
SAE Filter Class 60
7893-3


Test 1045
Acc. #9(z)
Max = 8.94 Gs @ 23.39 mse
Min = -6.80 Gs @ 31.79 mse
100
80
60
40
20
0
-20
-40
-60
-80
-100
Gs
-50
0
50
100
150
200
250
Time (msec)
B-25
7893-3
SAE Filter Class 60


Test 1045
Acc. #9(z)
Max = 6.1 mph @ 249.4 msec
Min = -0.1 mph @ 8.4 msec
Velocity (mph)
40
35
30
25
20
15
10
5
0
-5
-50
0
50
100
150
200
250
Time (msec.)
SAE Filter Class 60
B-26
7893-3



SAE Filter Class 60

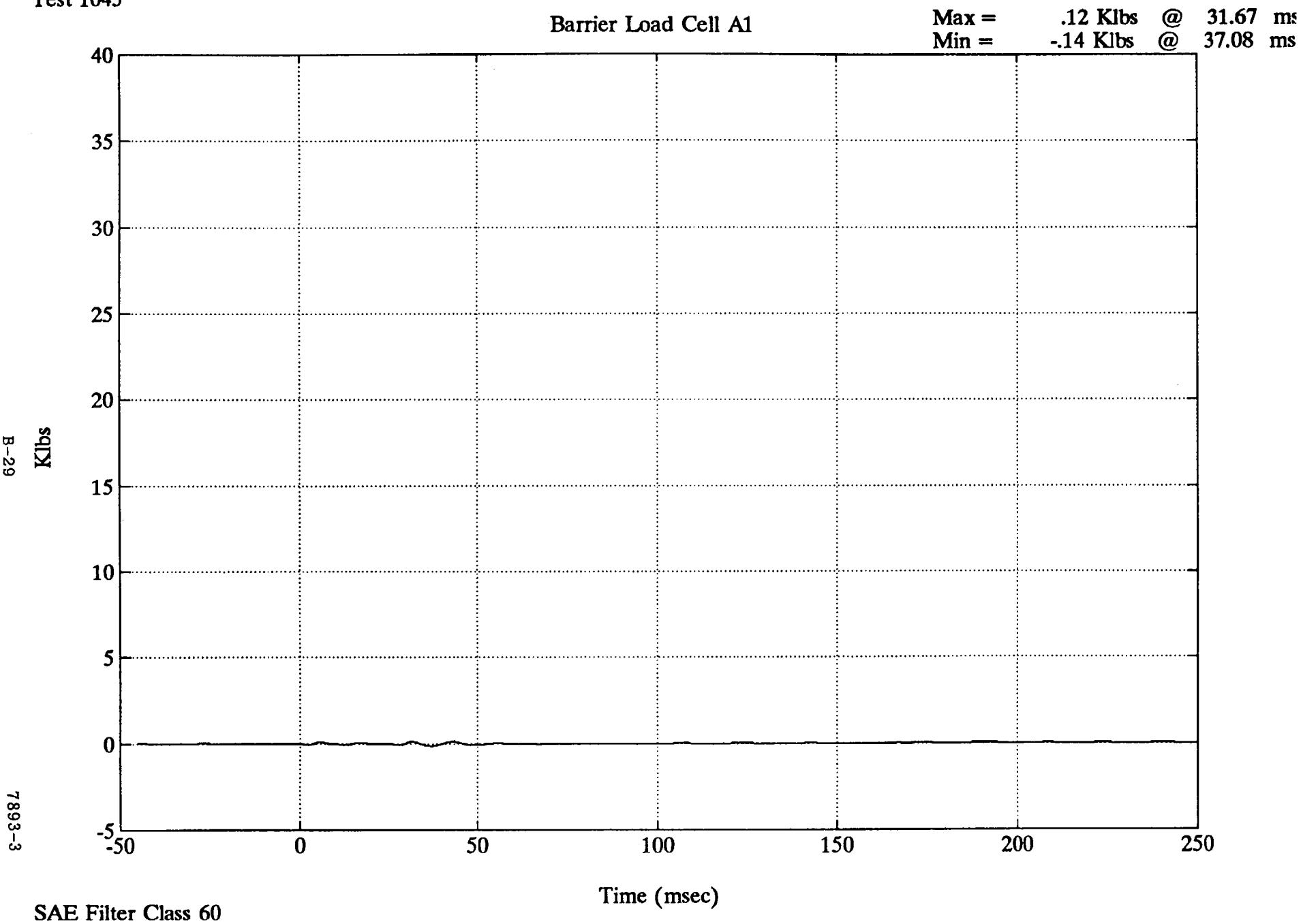
TEST NO. MM0202

LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

60

Test 1045

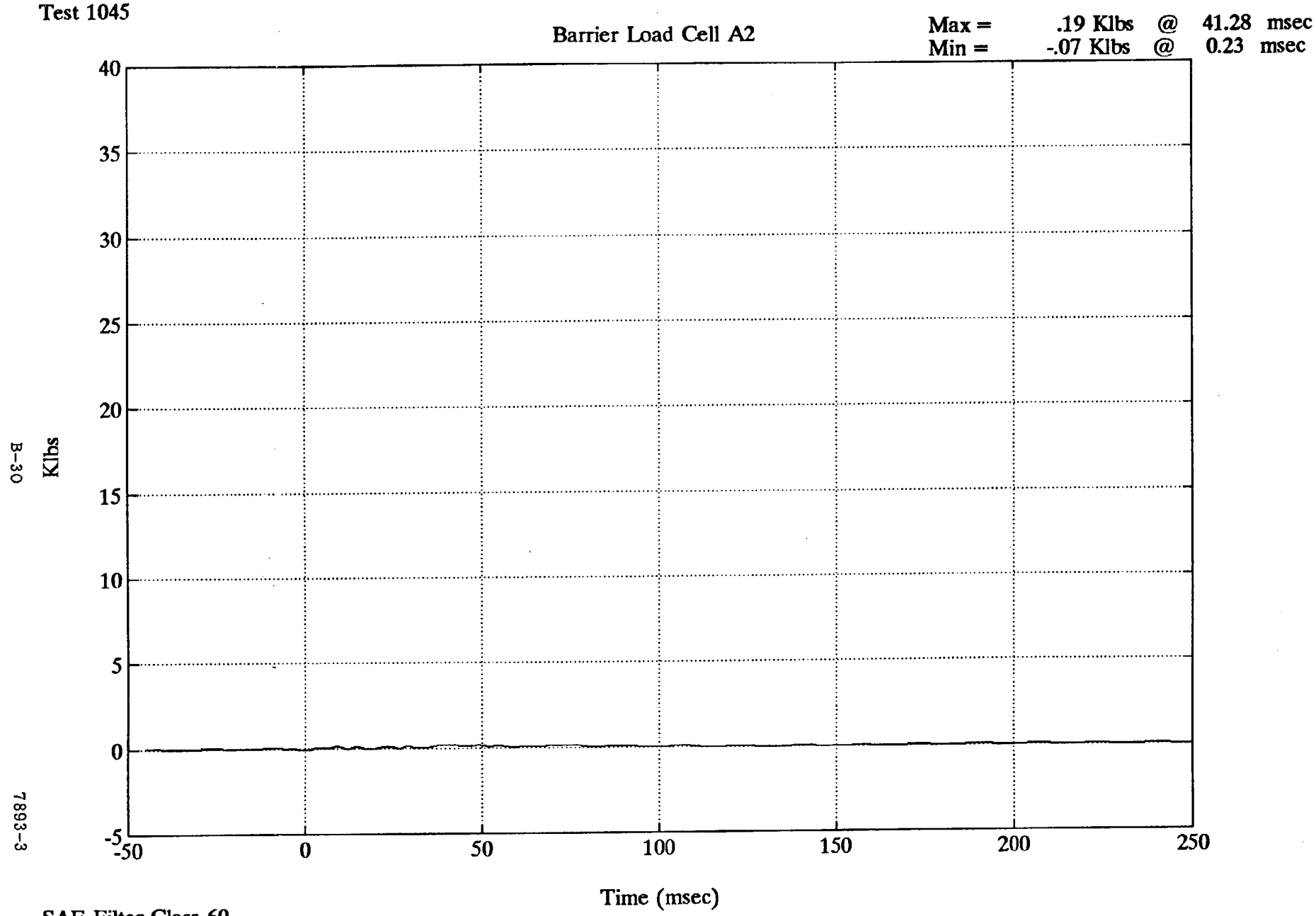


B-29

7893-3

SAE Filter Class 60

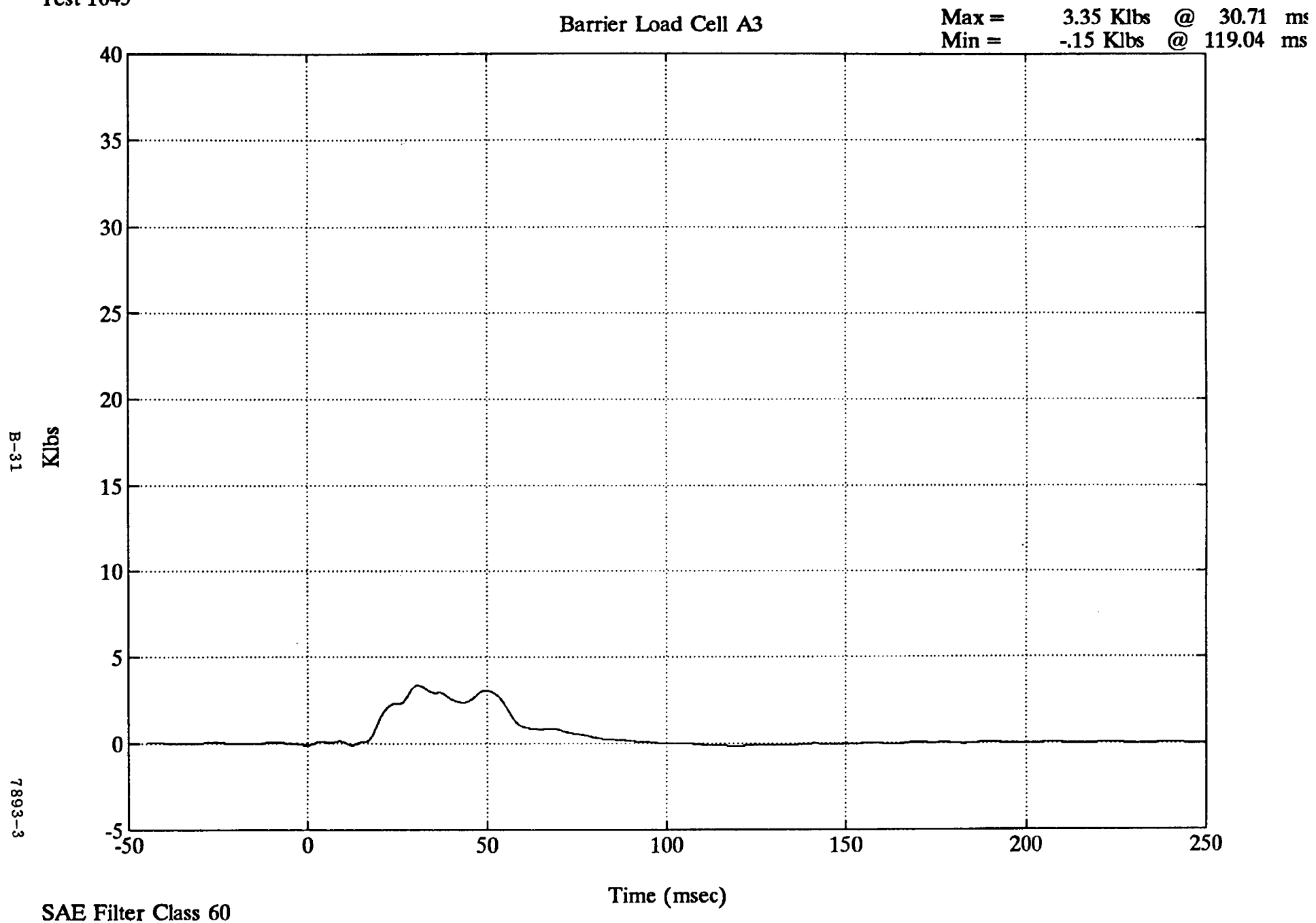
Test 1045



SAE Filter Class 60

7893-3

Test 1045

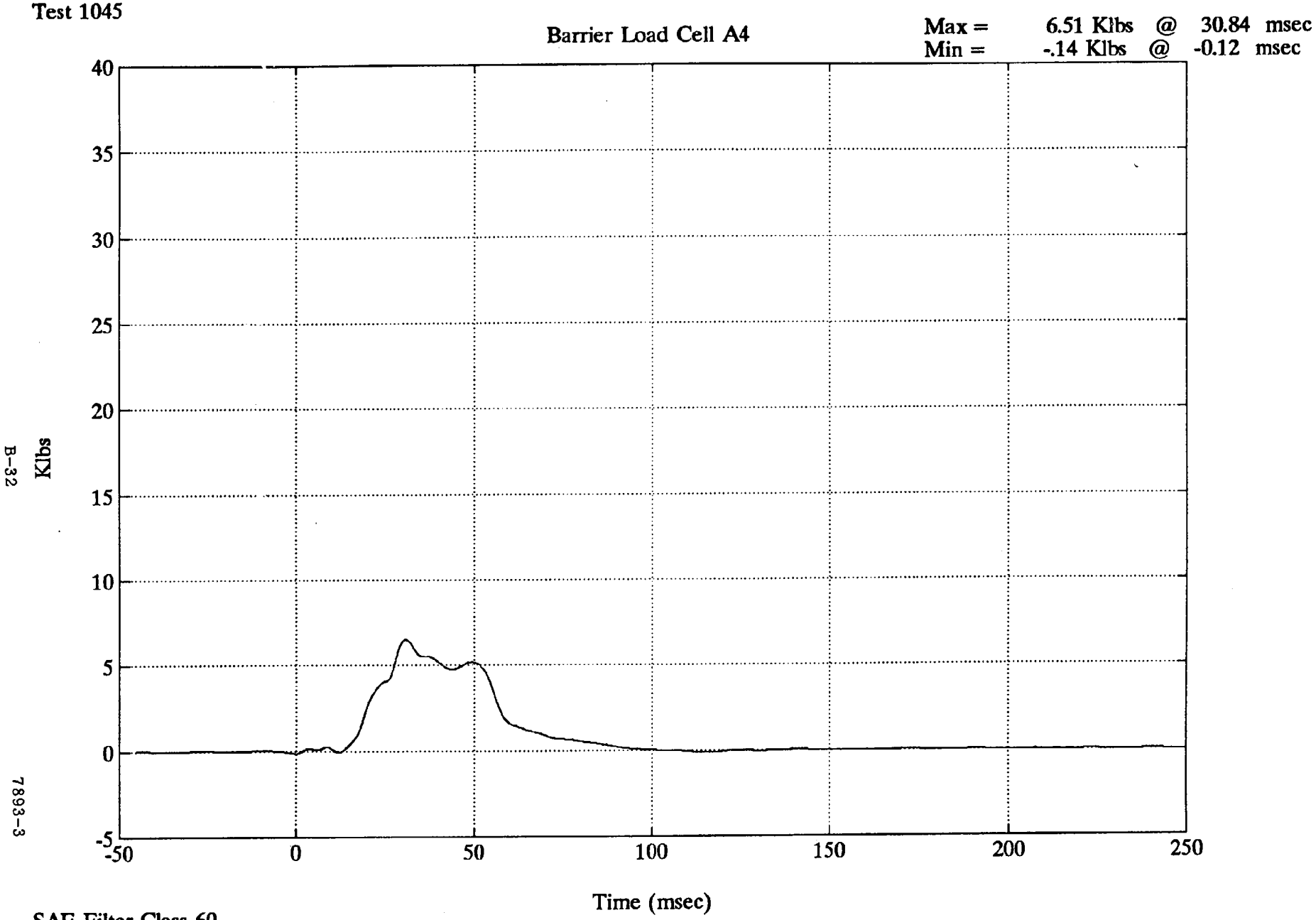


SAE Filter Class 60

B-31

7893-3

Test 1045

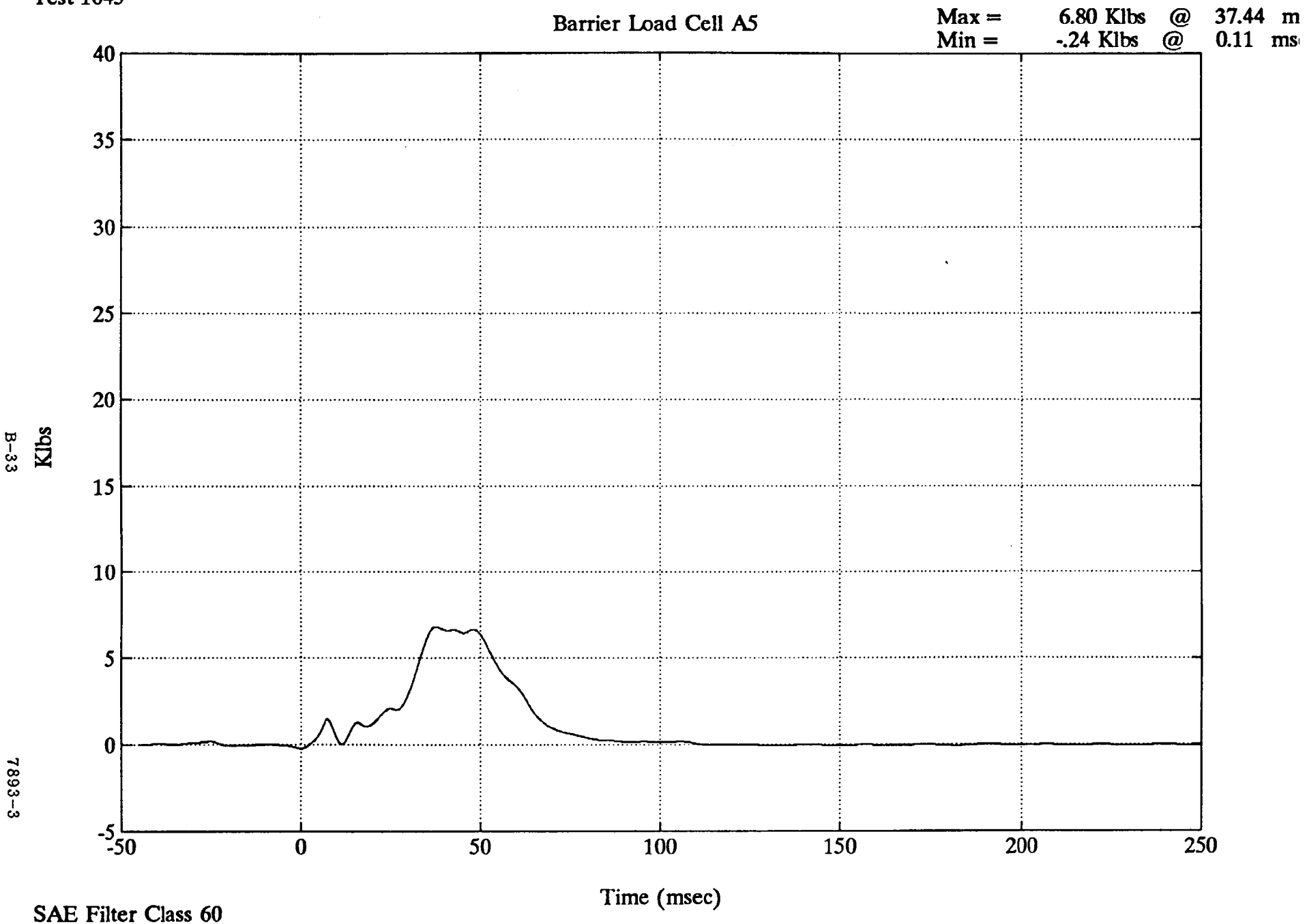


B-32

7893-3

SAE Filter Class 60

Test 1045

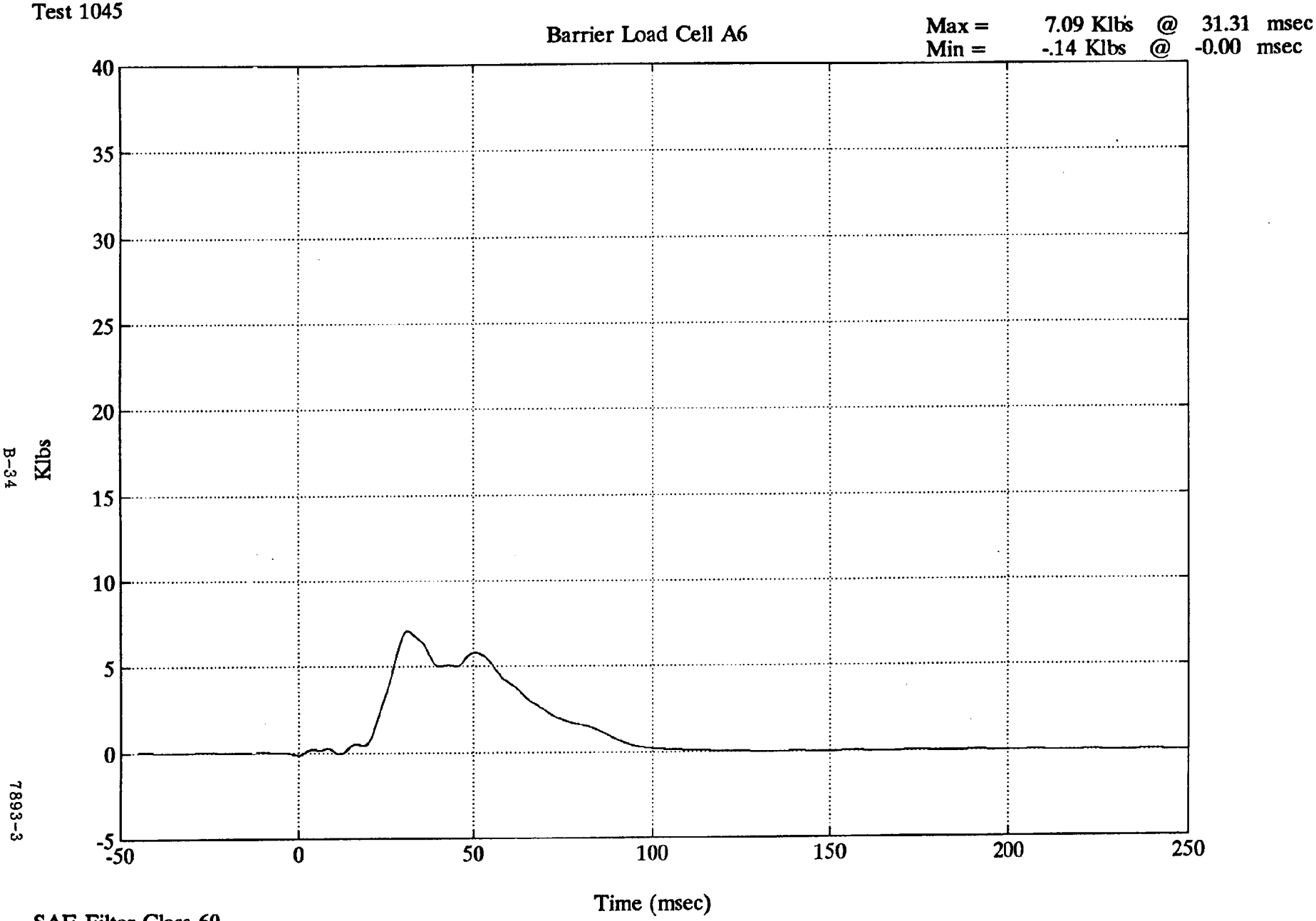


B-33

7893-3

SAE Filter Class 60

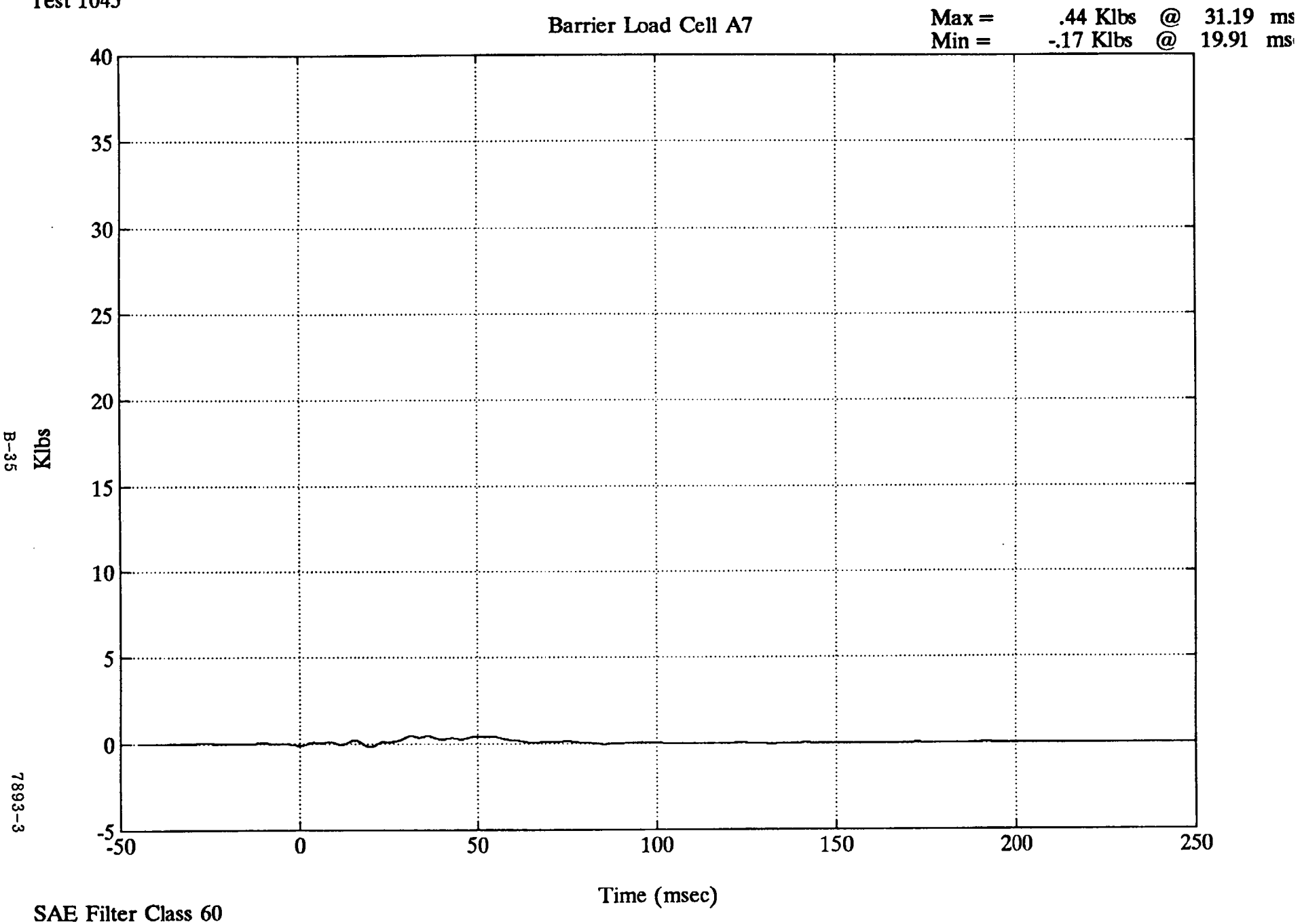
Test 1045



SAE Filter Class 60

7893-3

Test 1045

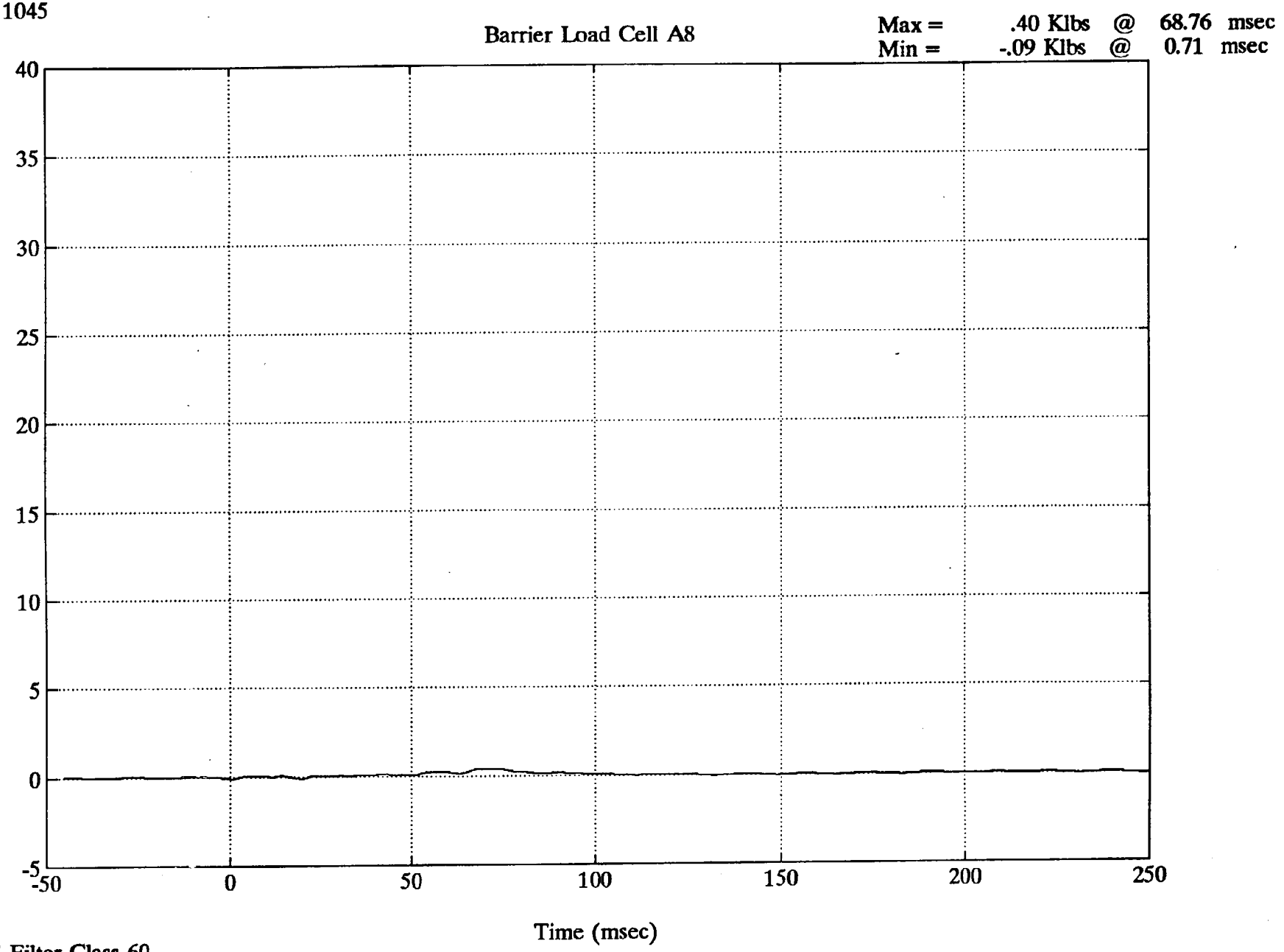


B-35

7893-3

SAE Filter Class 60

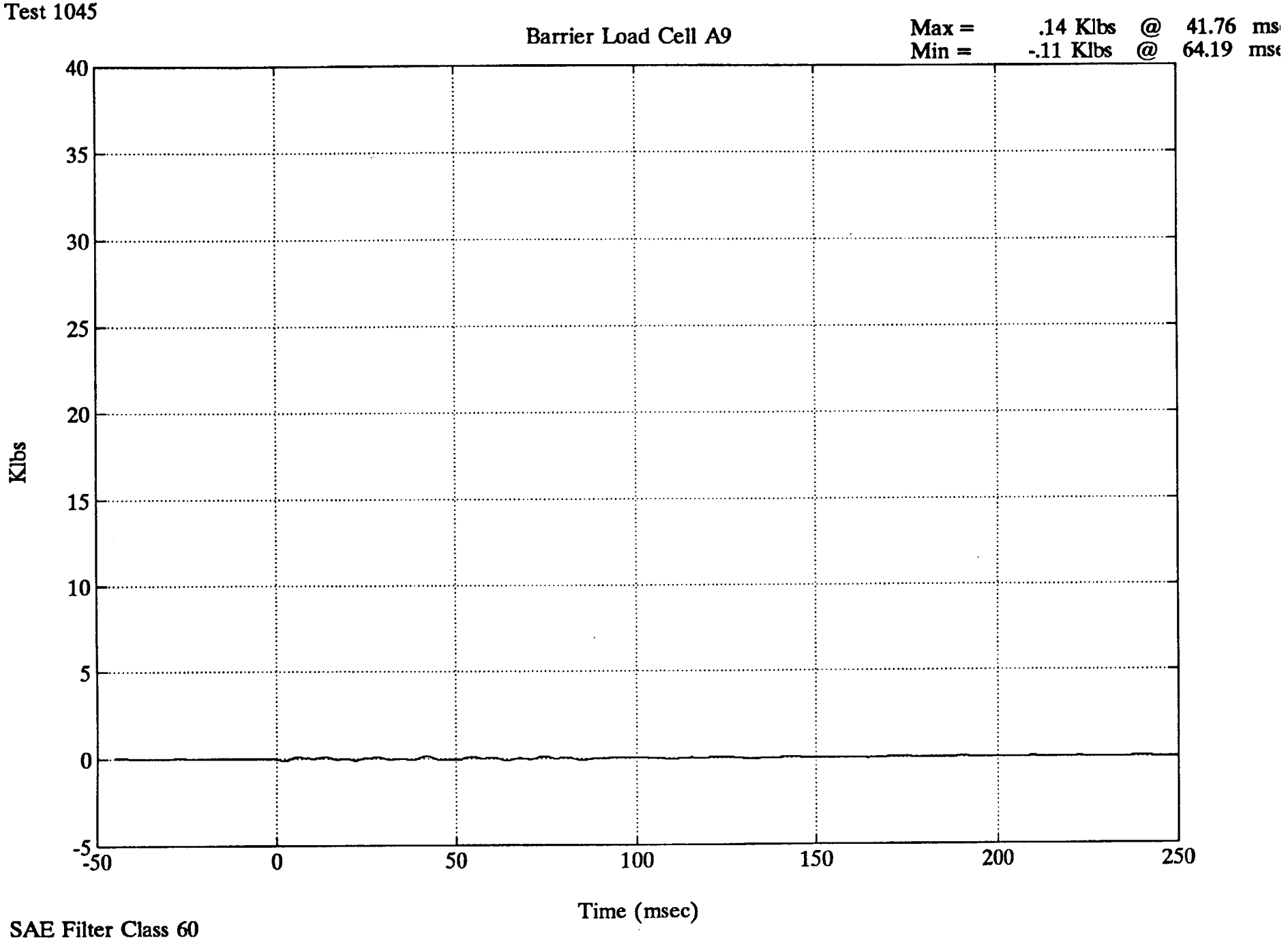
Test 1045



SAE Filter Class 60

7893-3

Test 1045

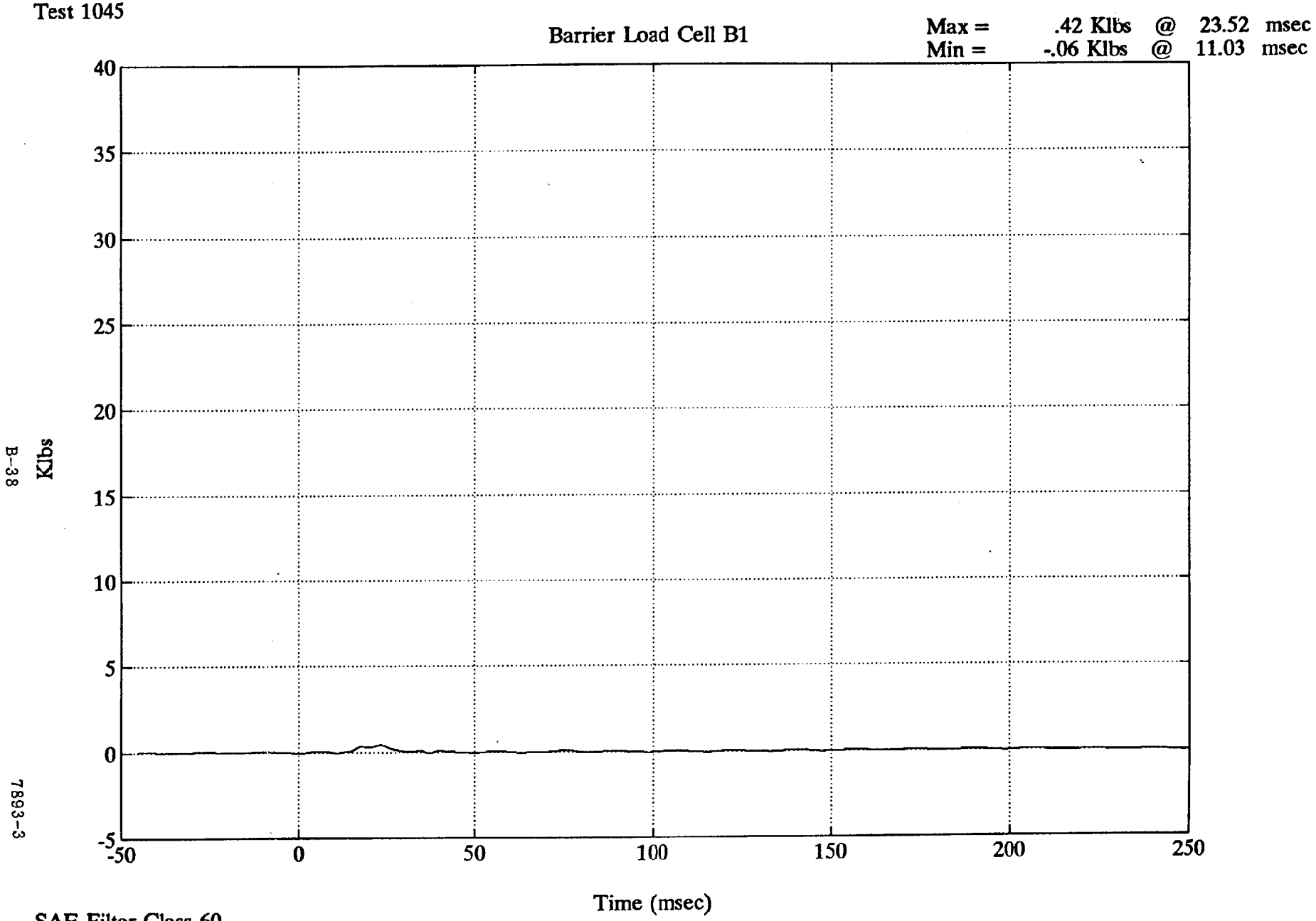


SAE Filter Class 60

B-37

7893-3

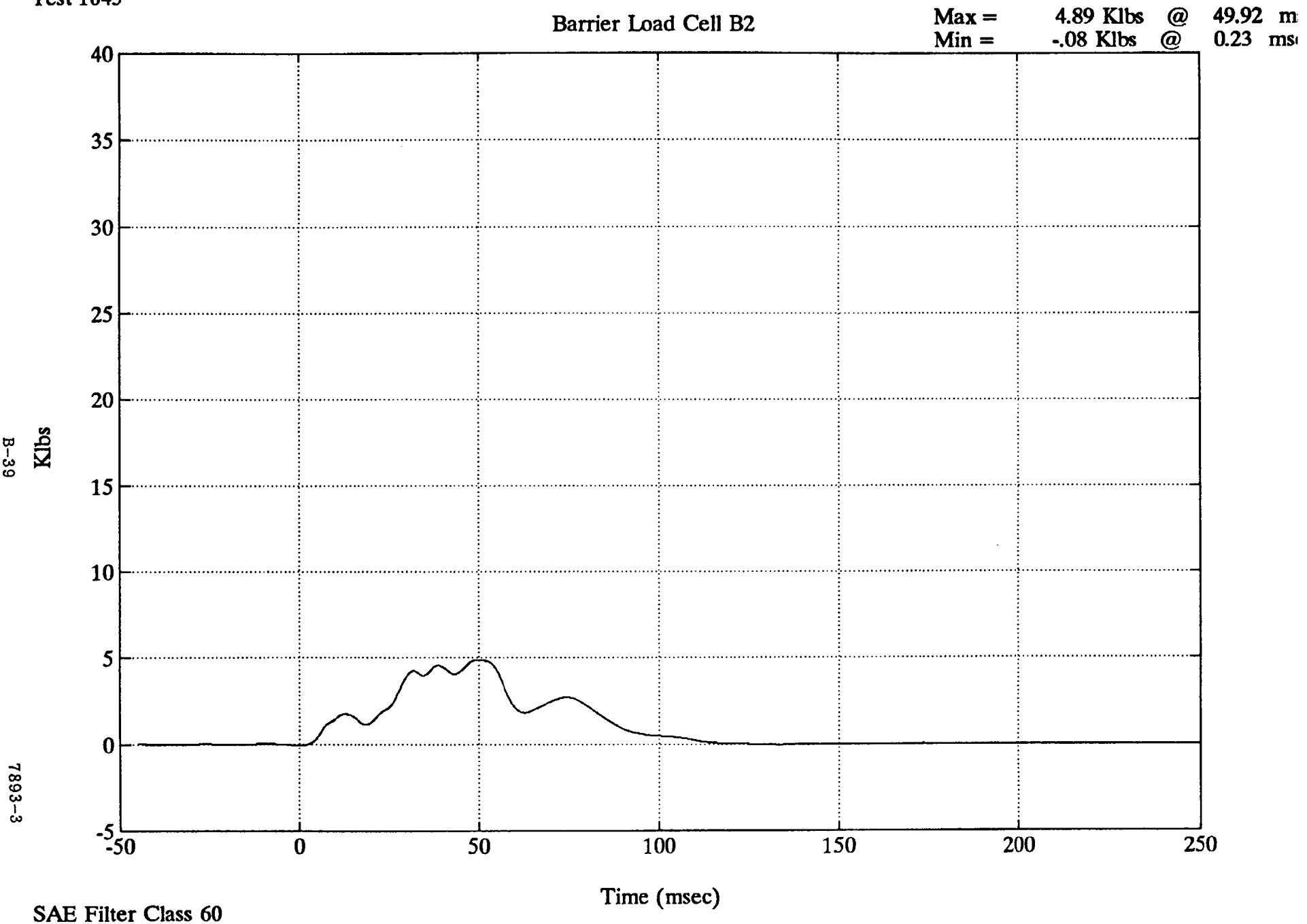
Test 1045



SAE Filter Class 60

7893-3

Test 1045

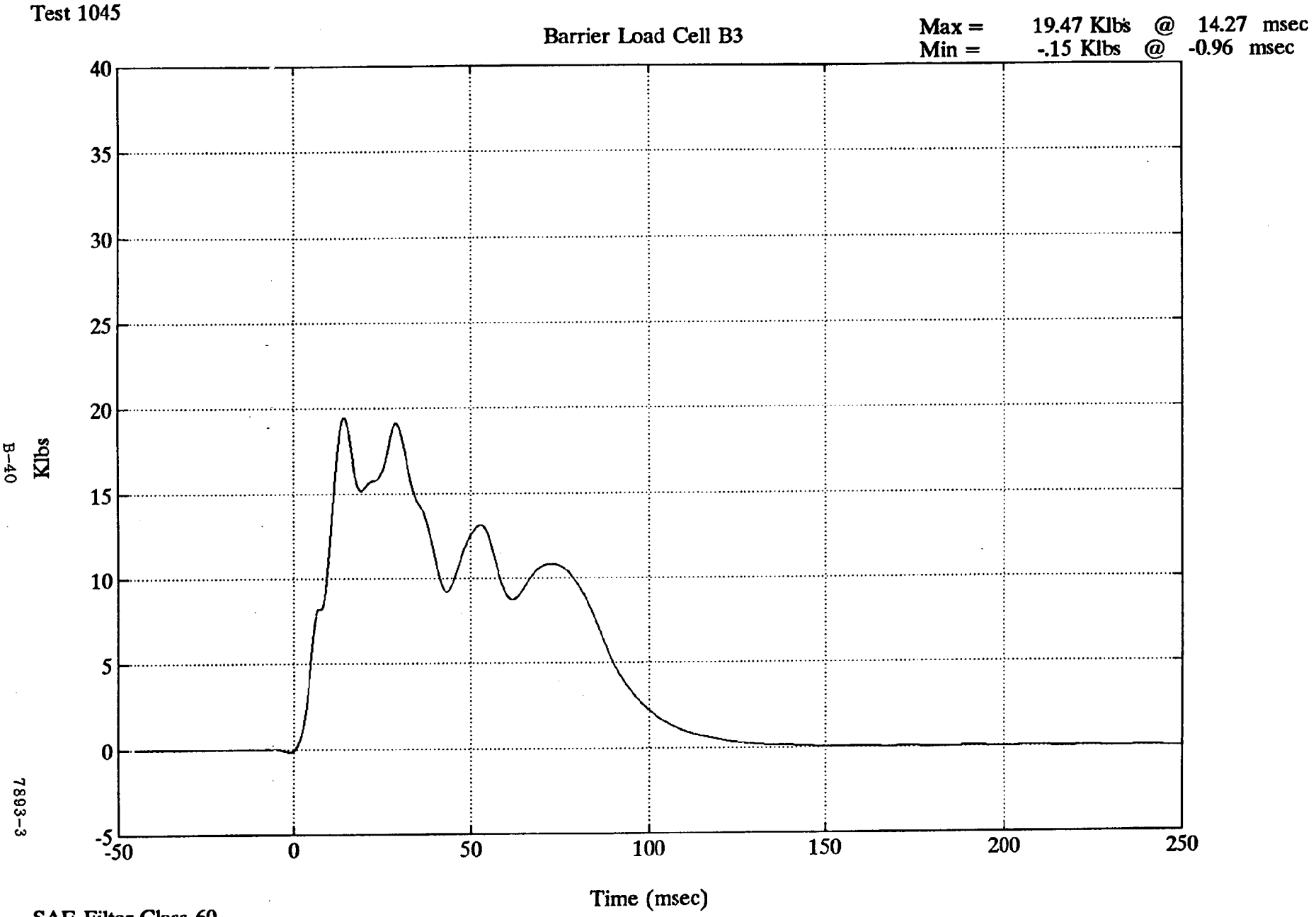


SAE Filter Class 60

B-39

7893-3

Test 1045

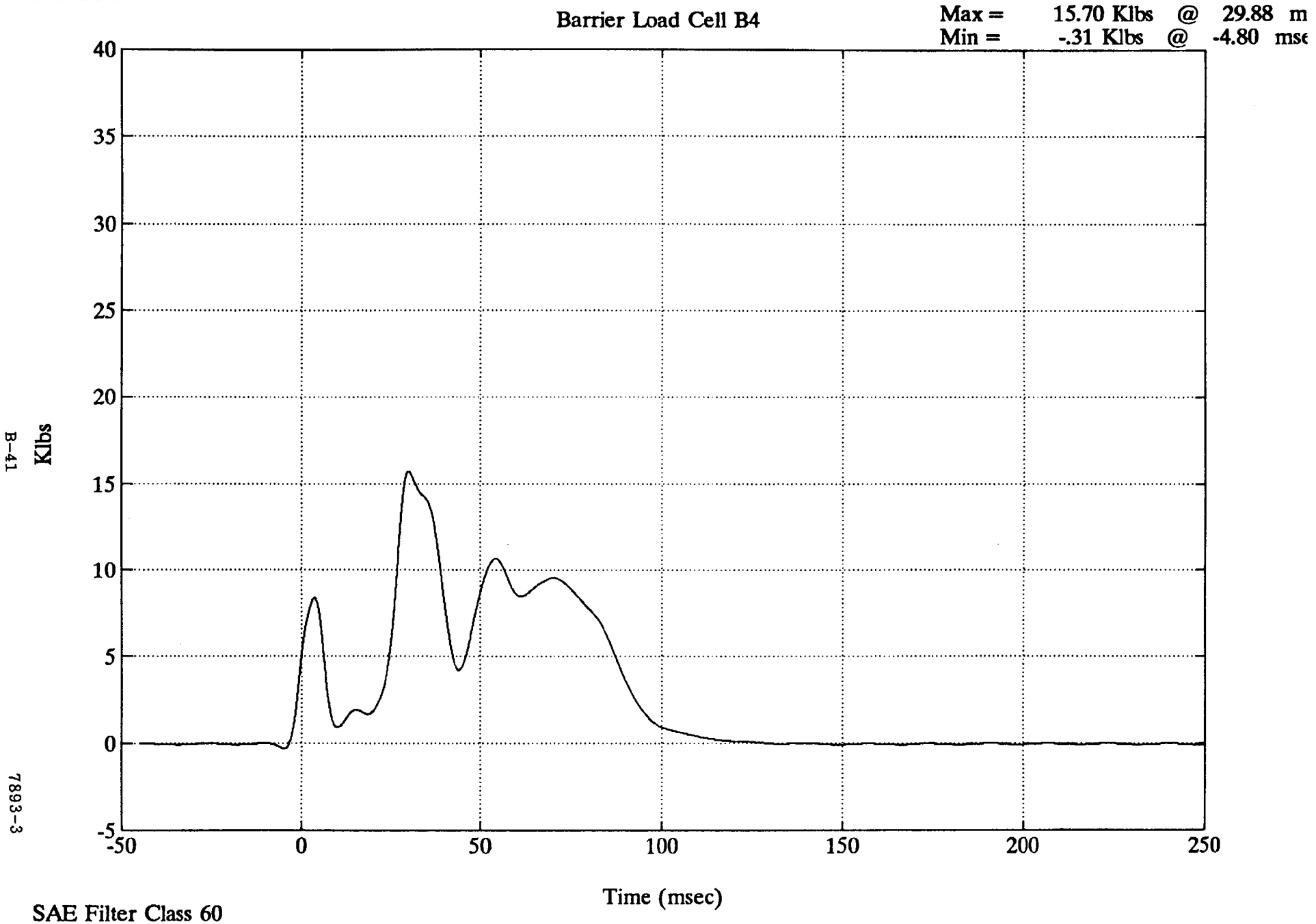


B-40

7893-3

SAE Filter Class 60

Test 1045

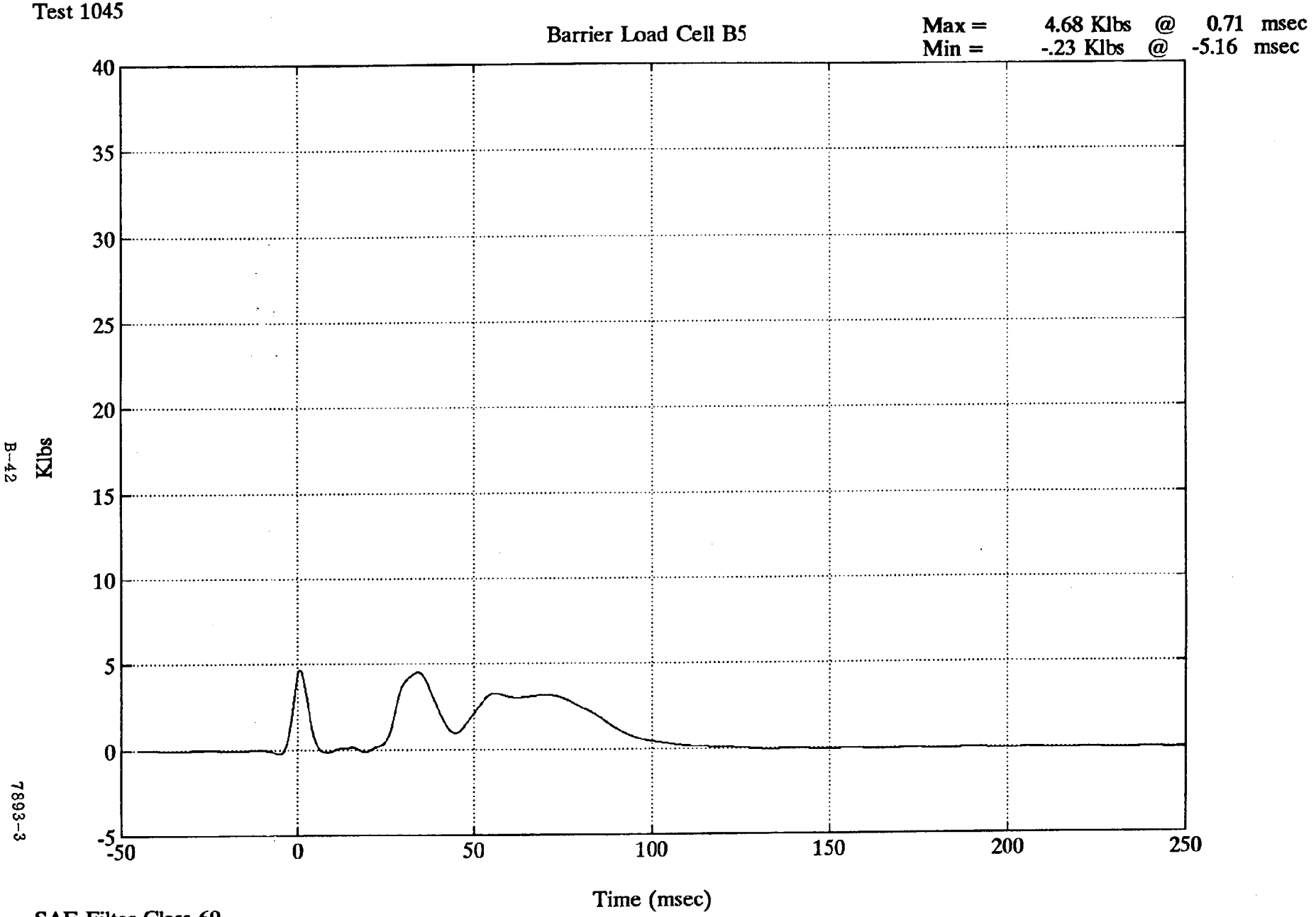


B-41

7893-3

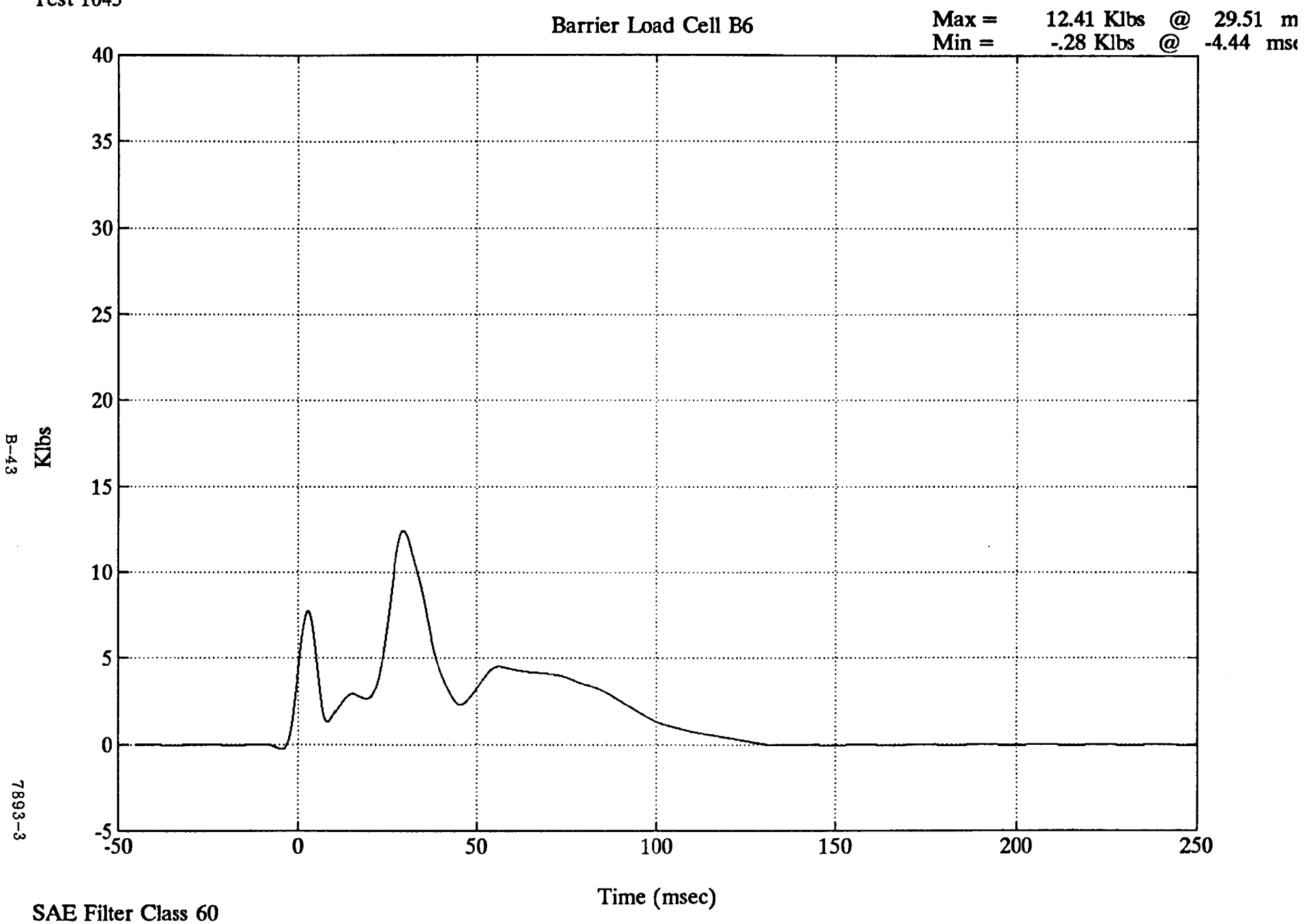
SAE Filter Class 60

Test 1045



SAE Filter Class 60

Test 1045

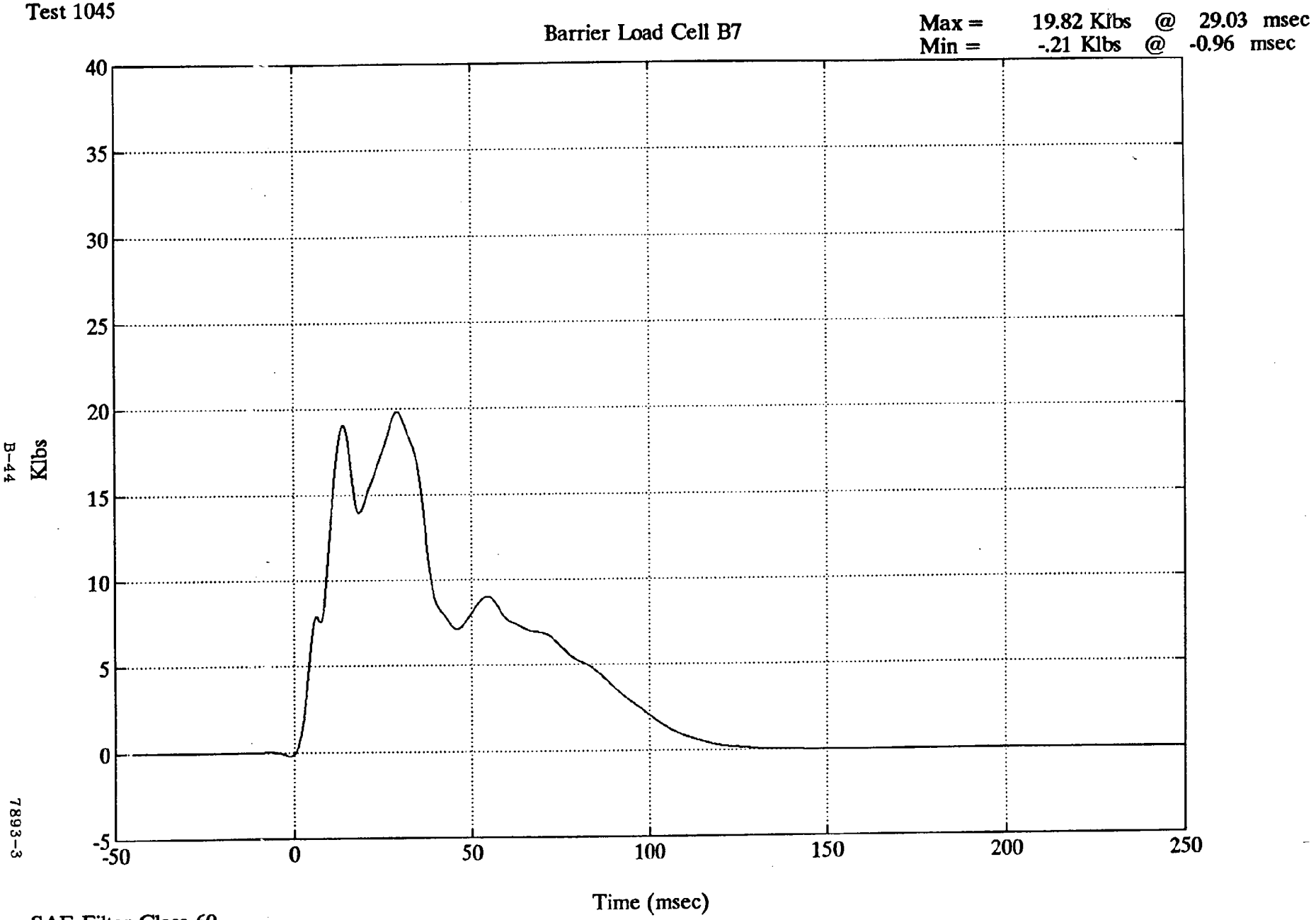


B-43

7893-3

SAE Filter Class 60

Test 1045

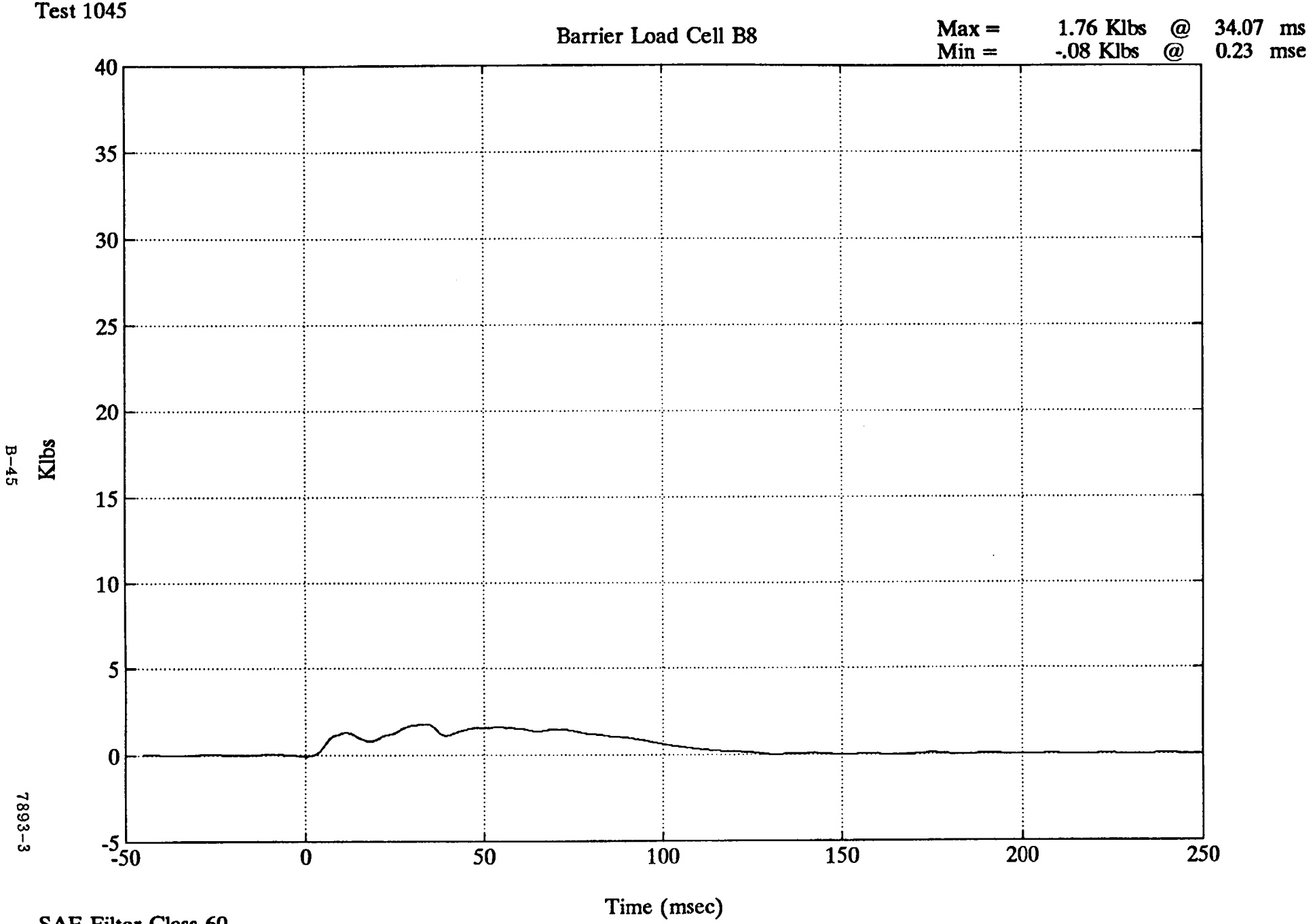


B-44

7893-3

SAE Filter Class 60

Test 1045

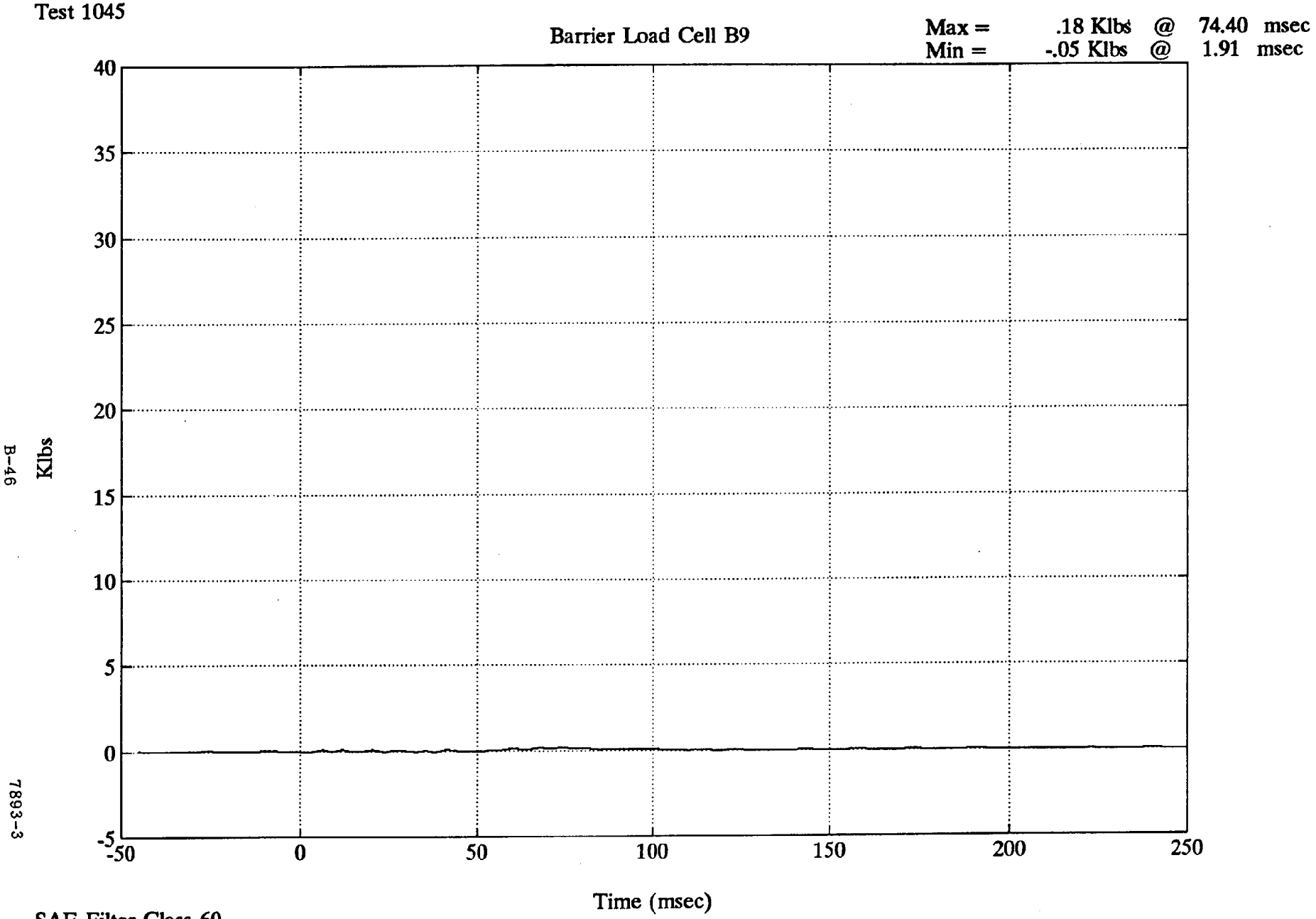


B-45

7893-3

SAE Filter Class 60

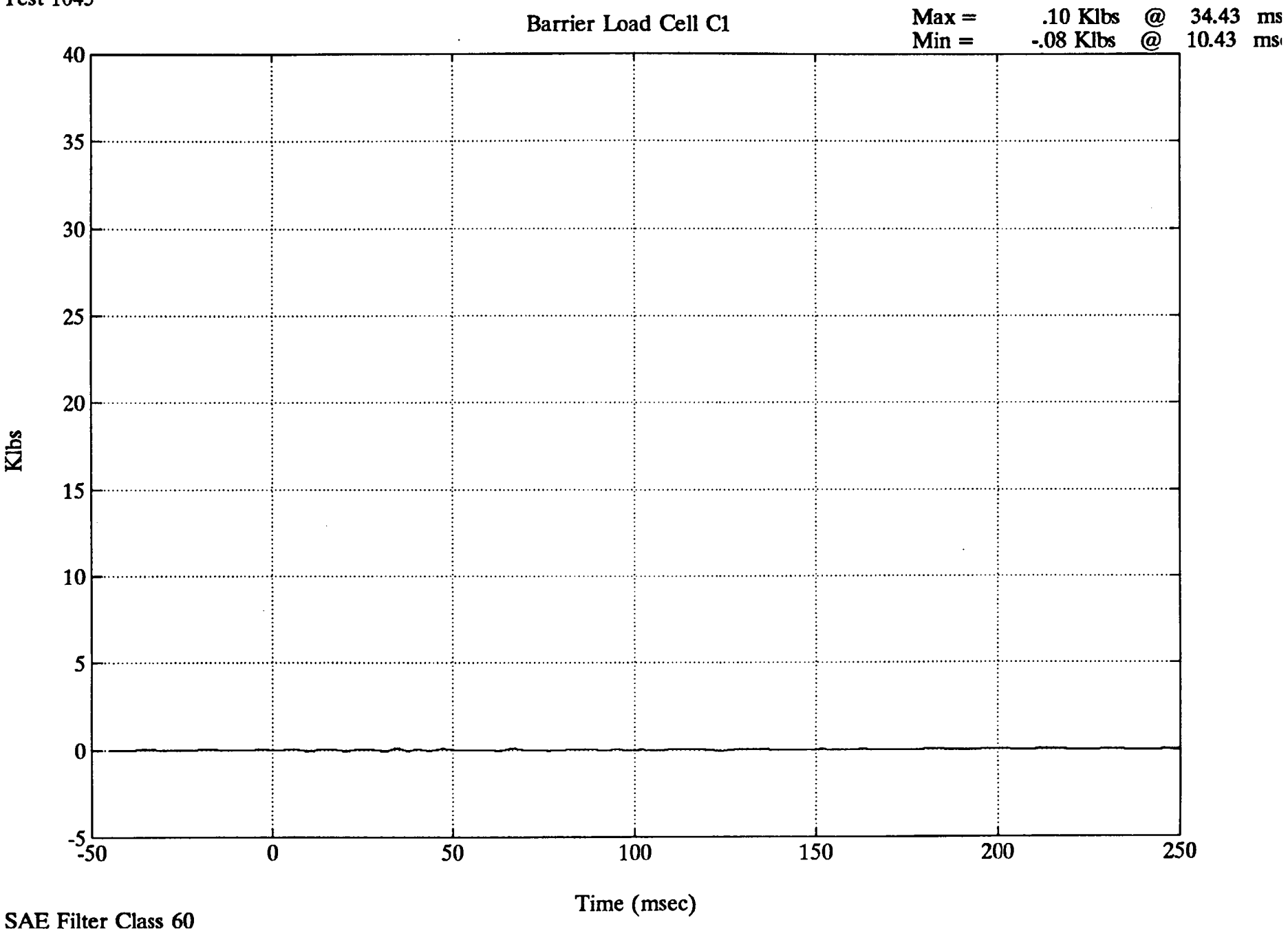
Test 1045



SAE Filter Class 60

7893-3

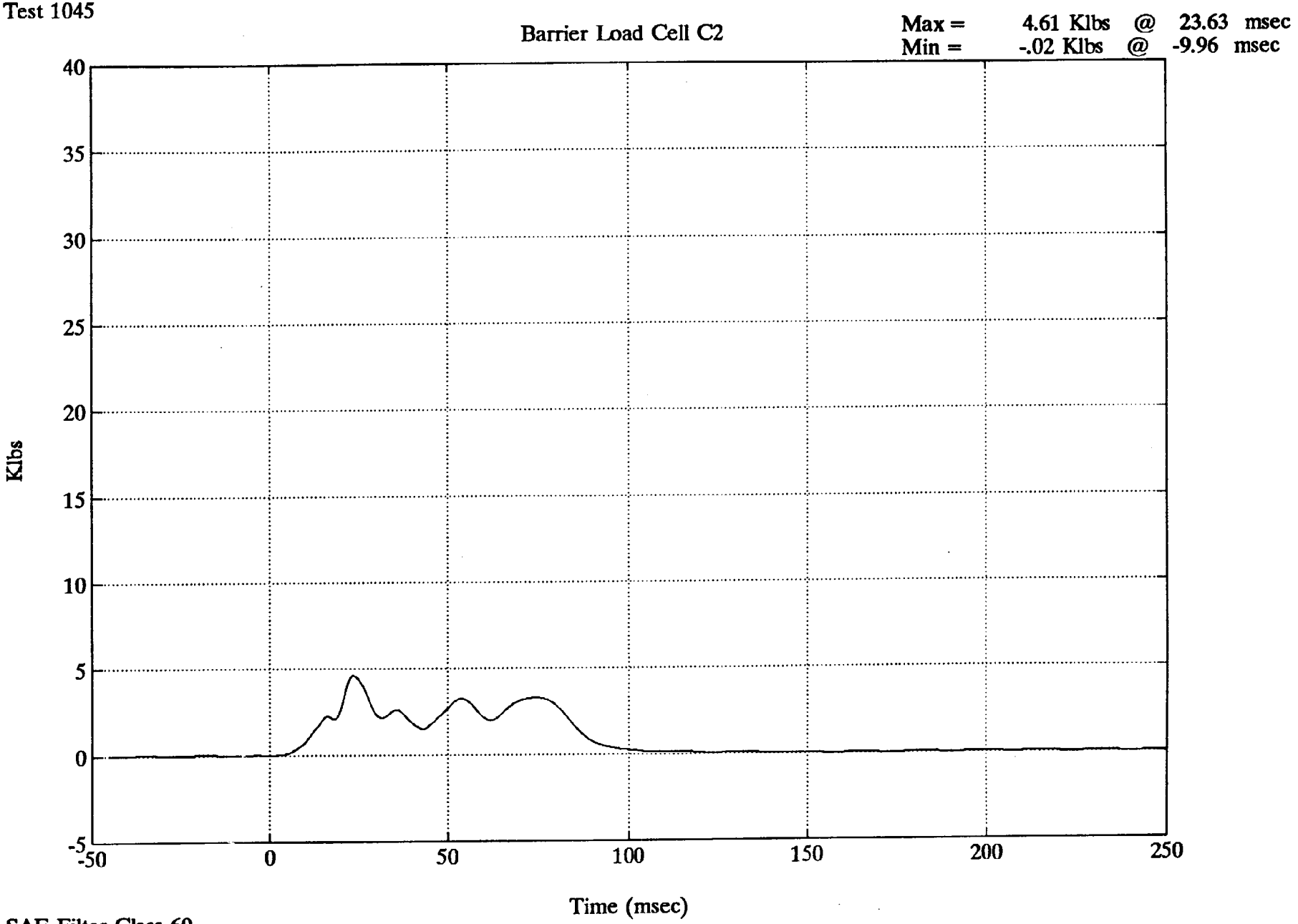
Test 1045



SAE Filter Class 60

7893-3

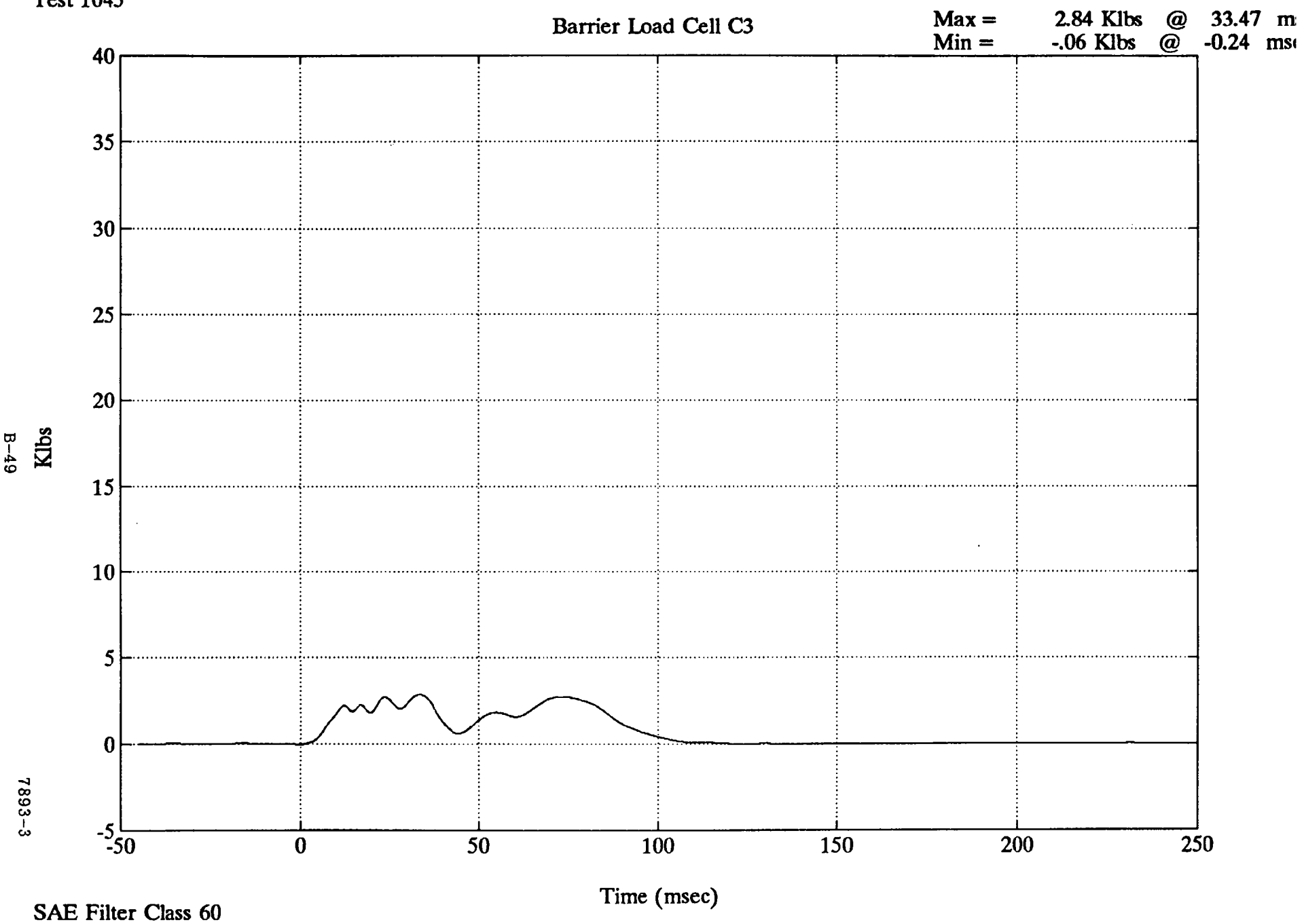
Test 1045



SAE Filter Class 60

7893-3

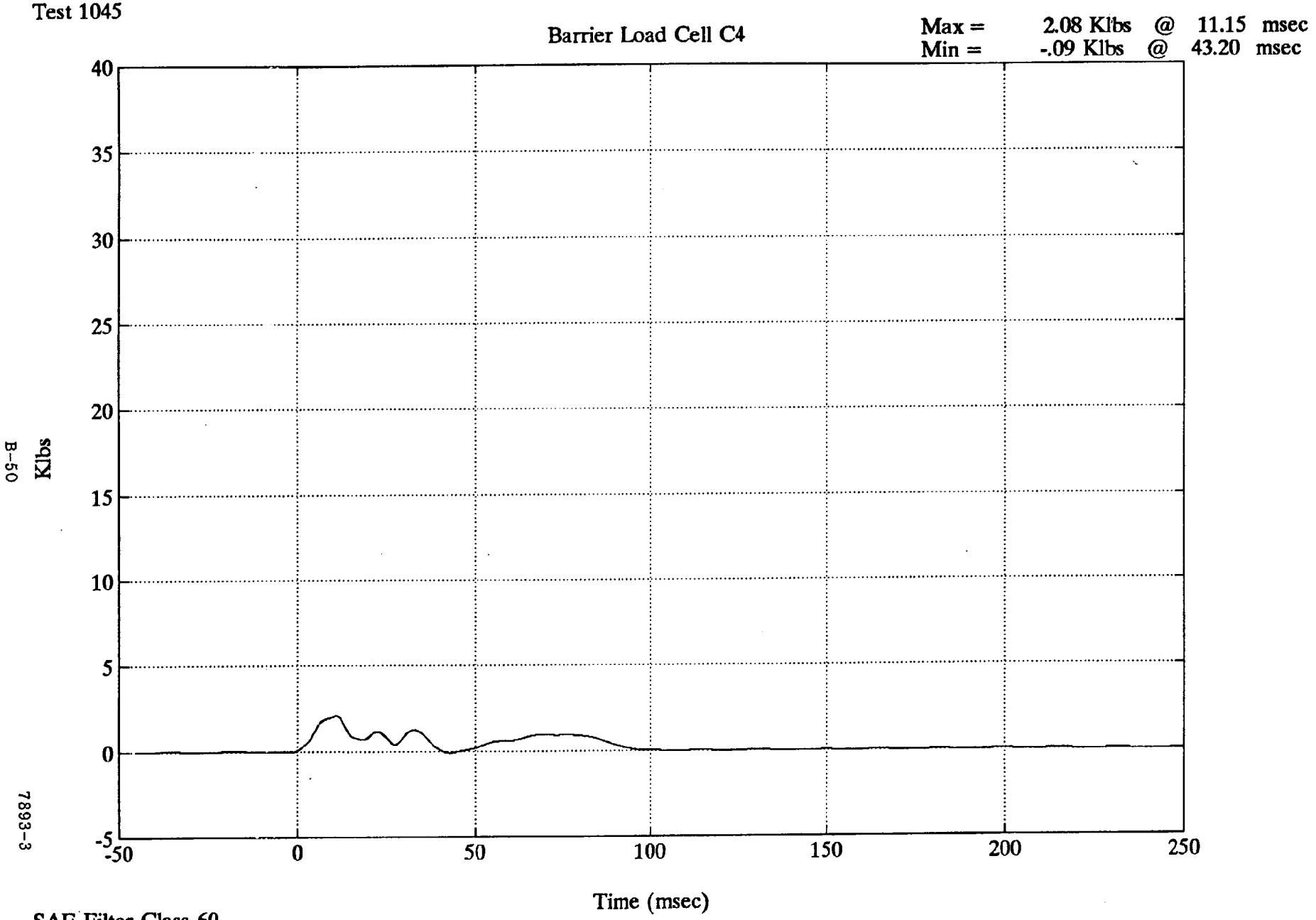
Test 1045



SAE Filter Class 60

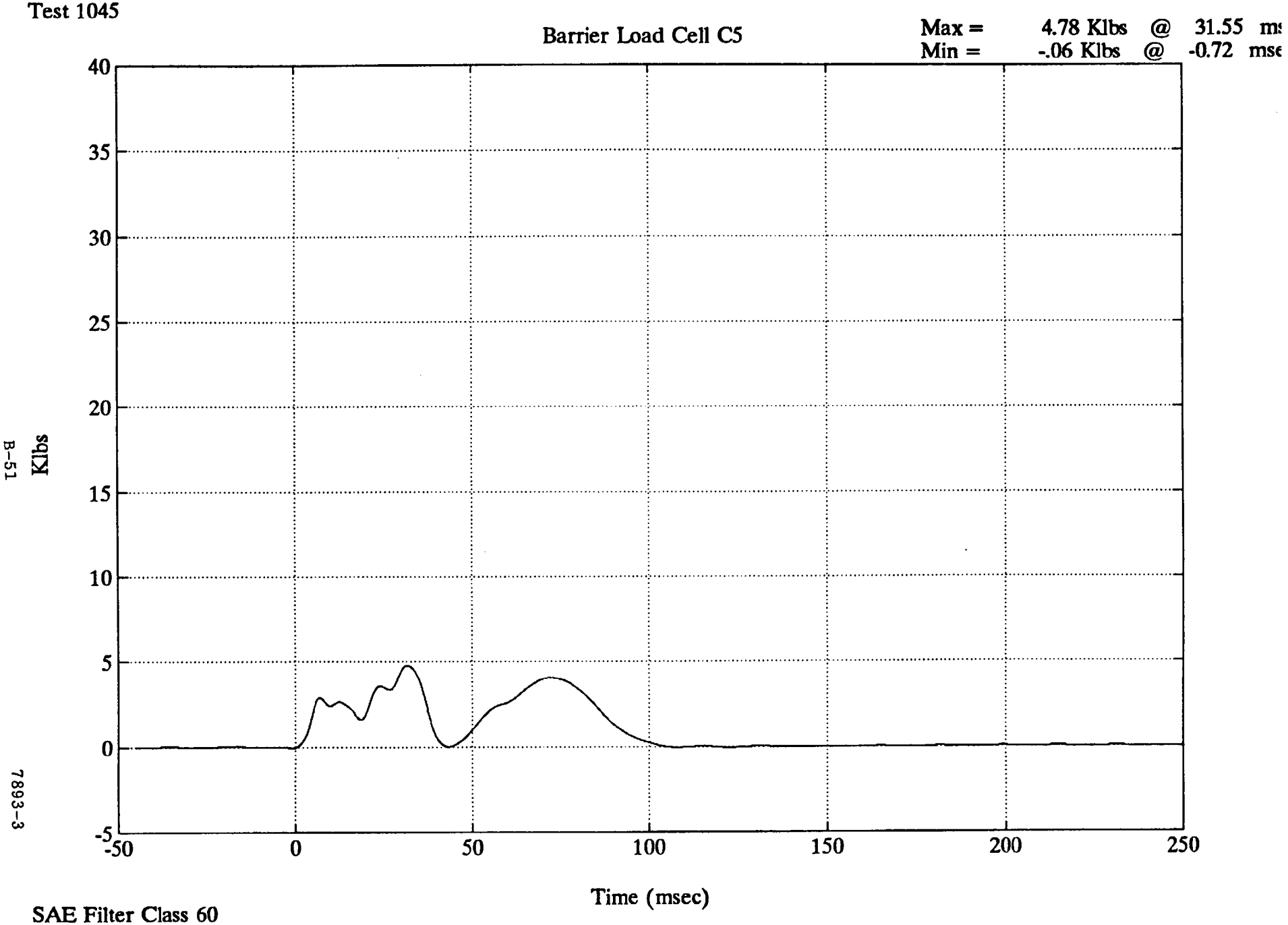
7893-3

Test 1045



SAE Filter Class 60

Test 1045

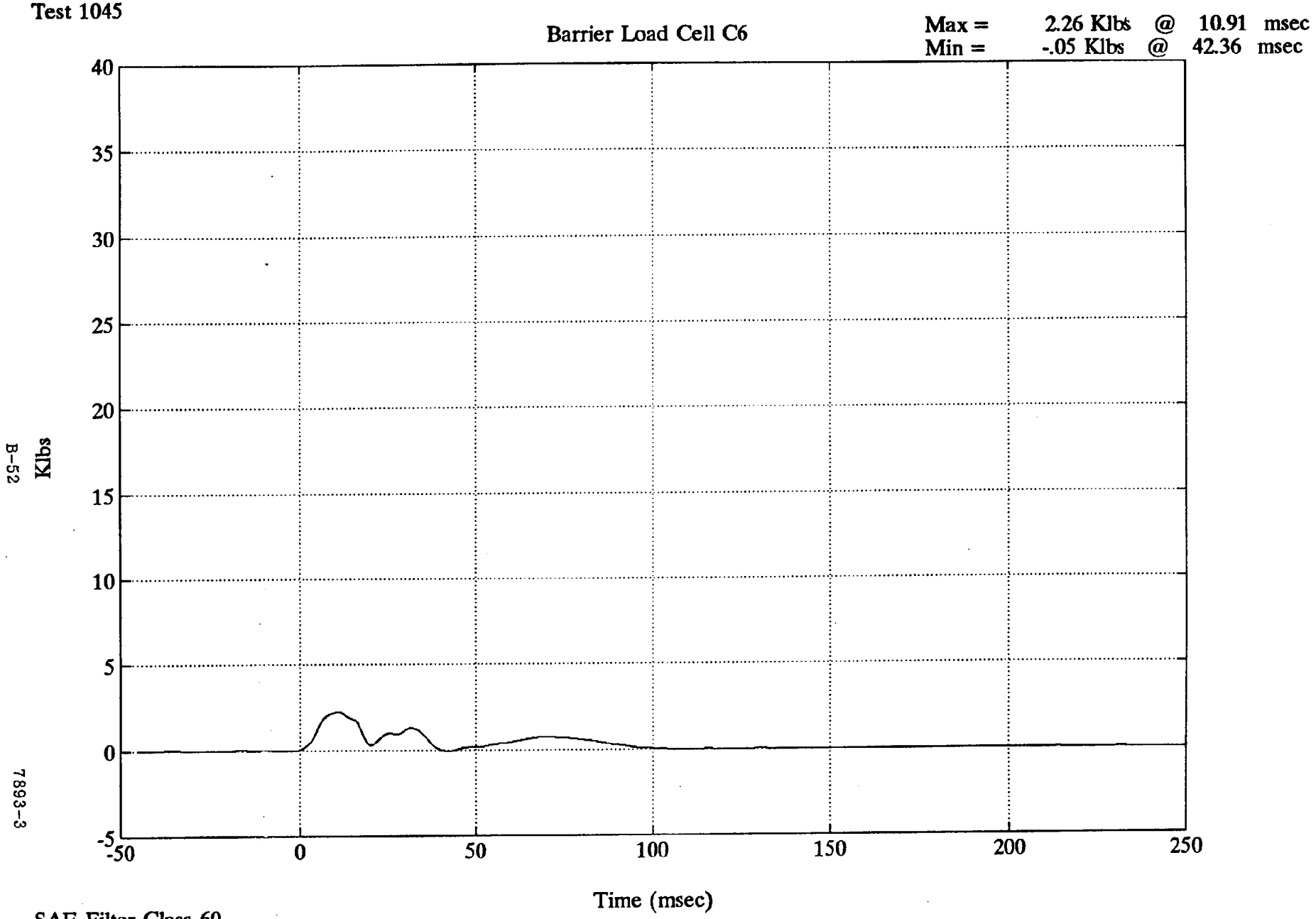


B-51

7893-3

SAE Filter Class 60

Test 1045

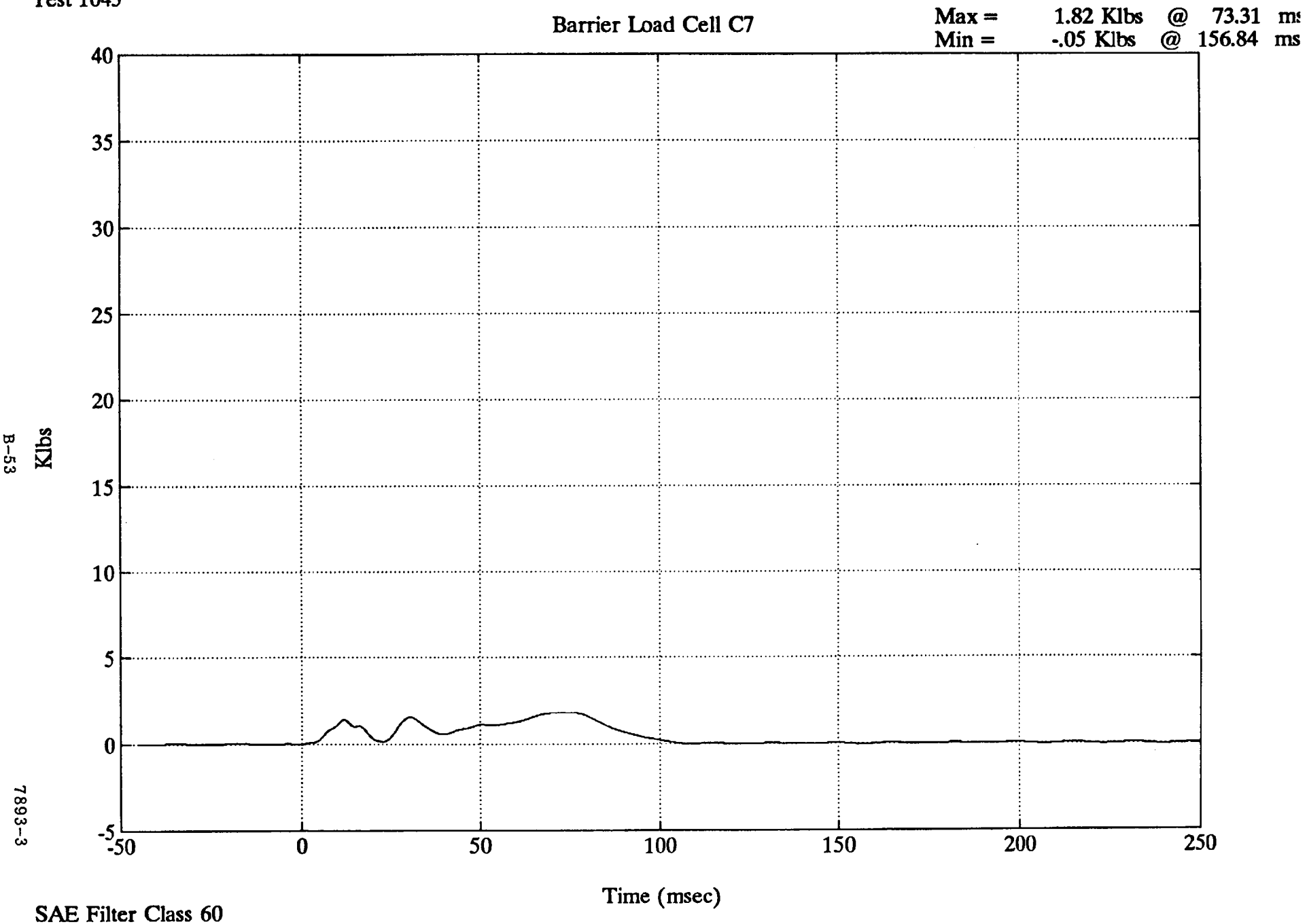


B-52

7893-3

SAE Filter Class 60

Test 1045

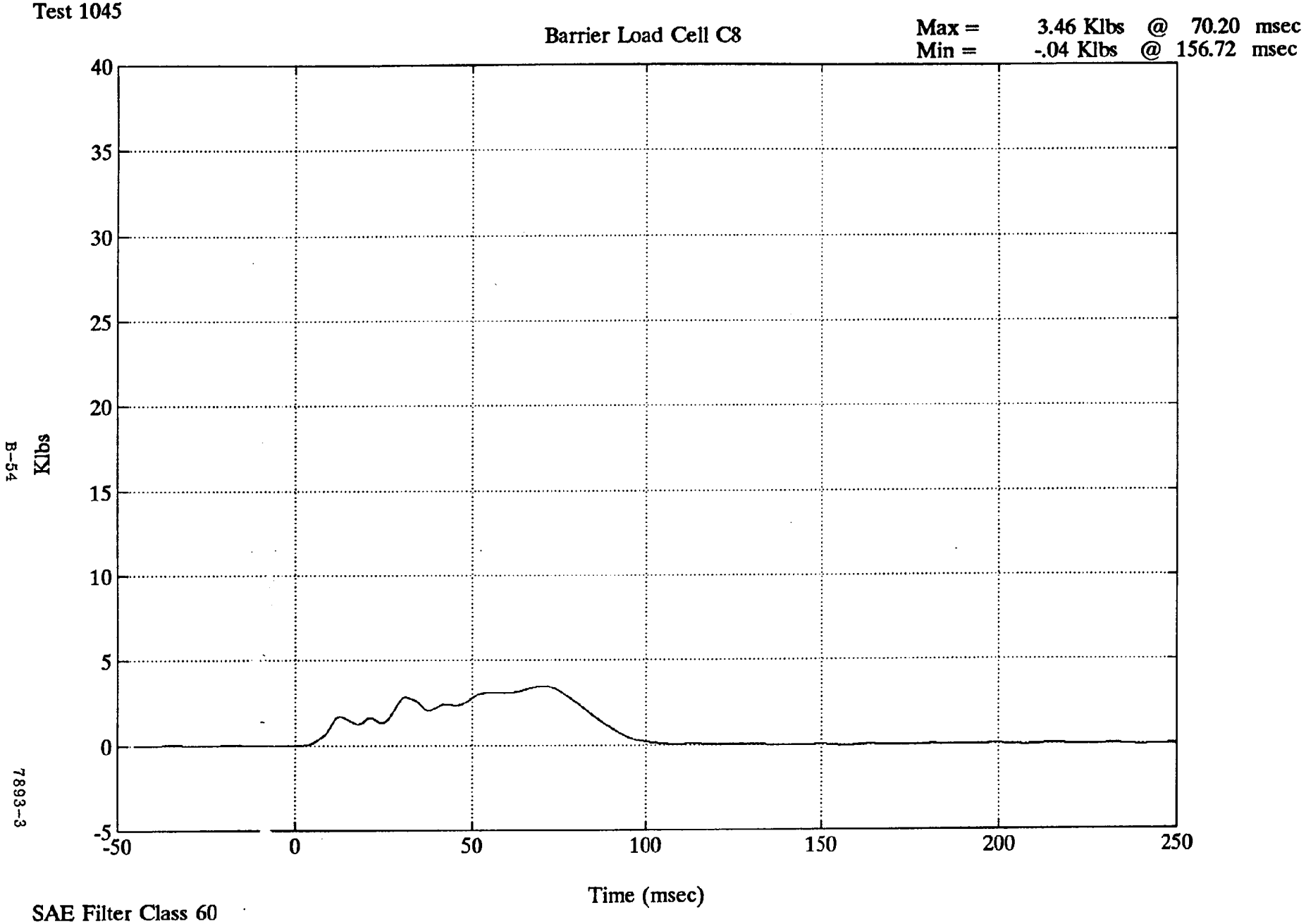


SAE Filter Class 60

B-53

7893-3

Test 1045

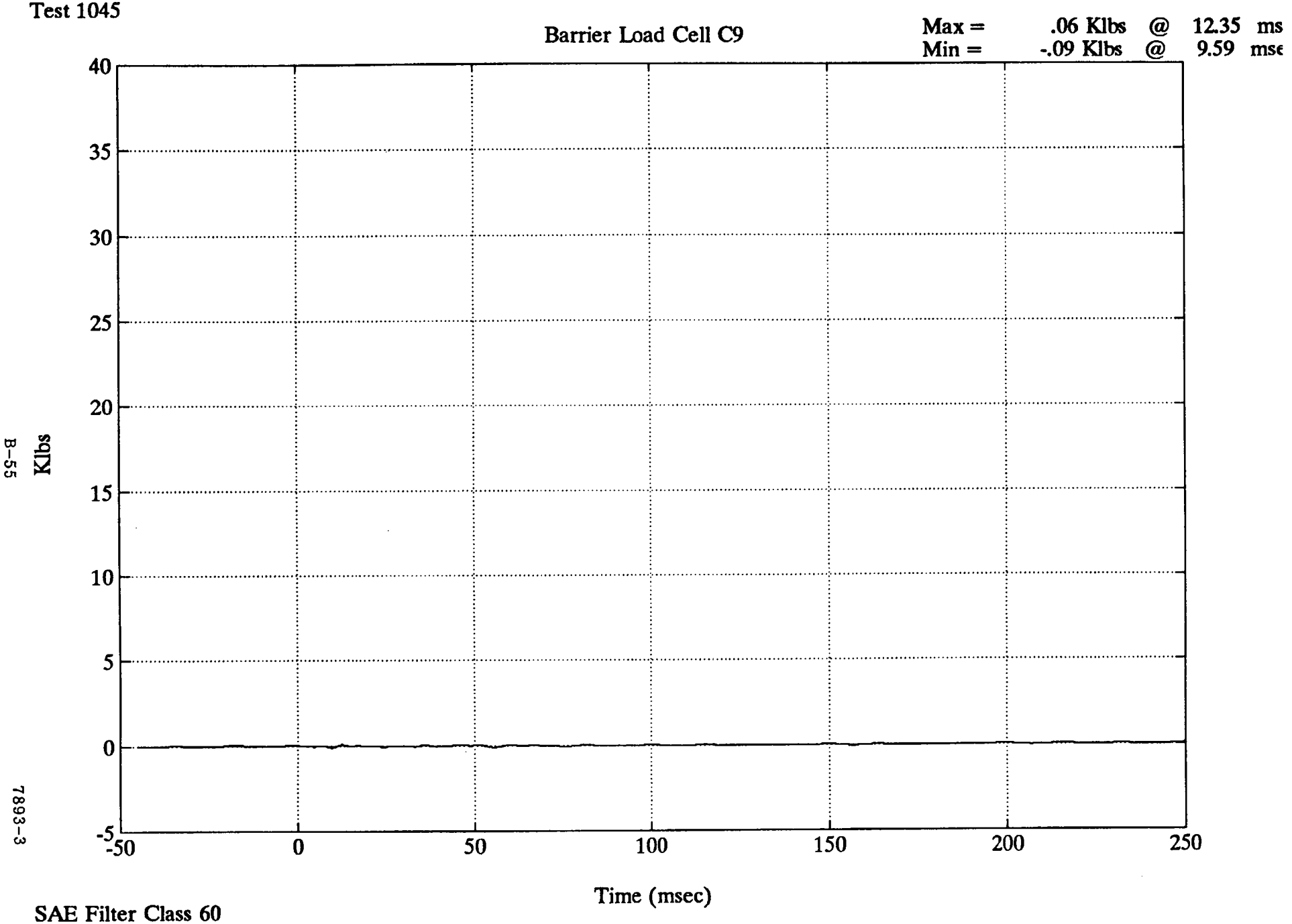


B-54

7893-3

SAE Filter Class 60

Test 1045

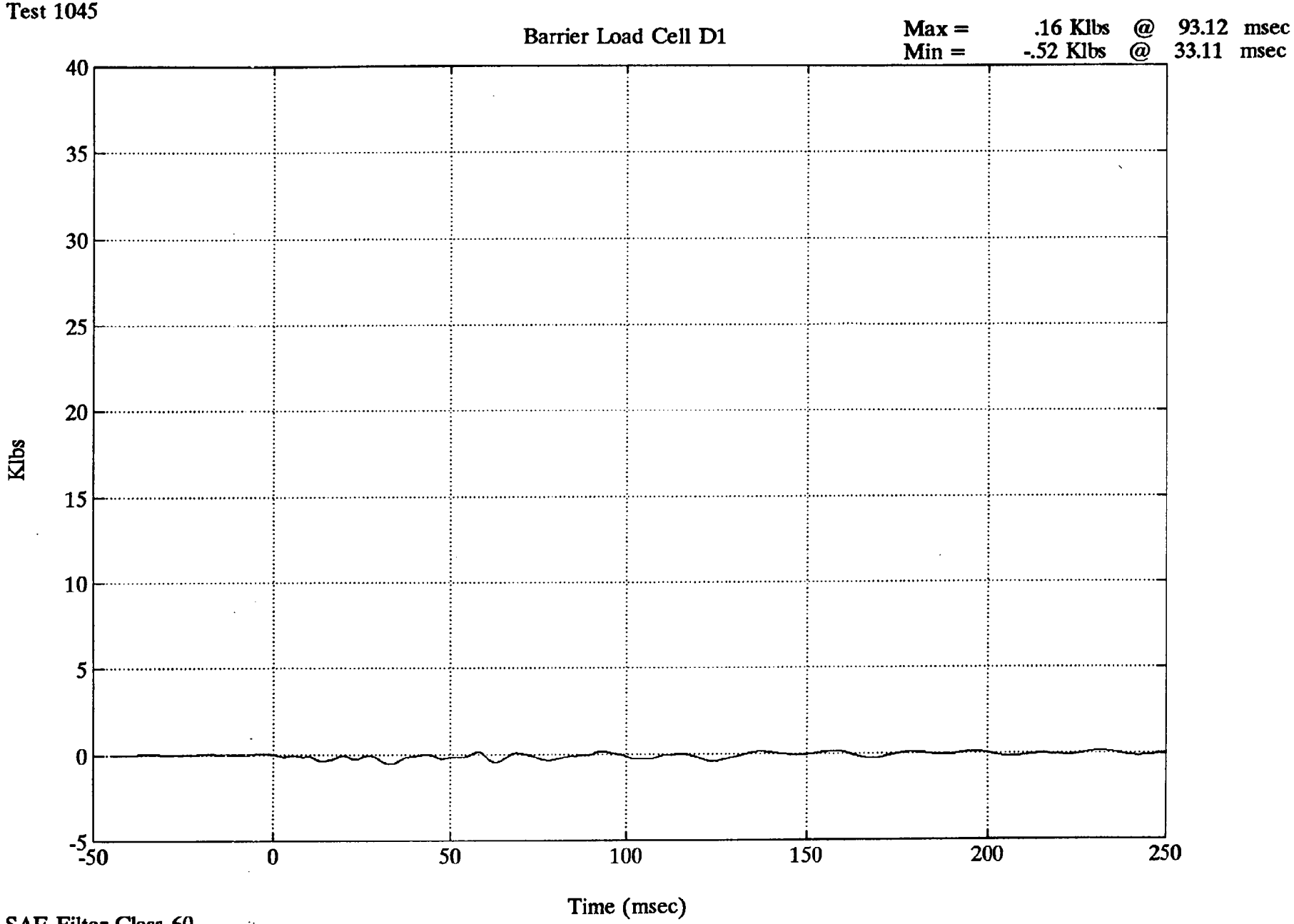


SAE Filter Class 60

B-55

7893-3

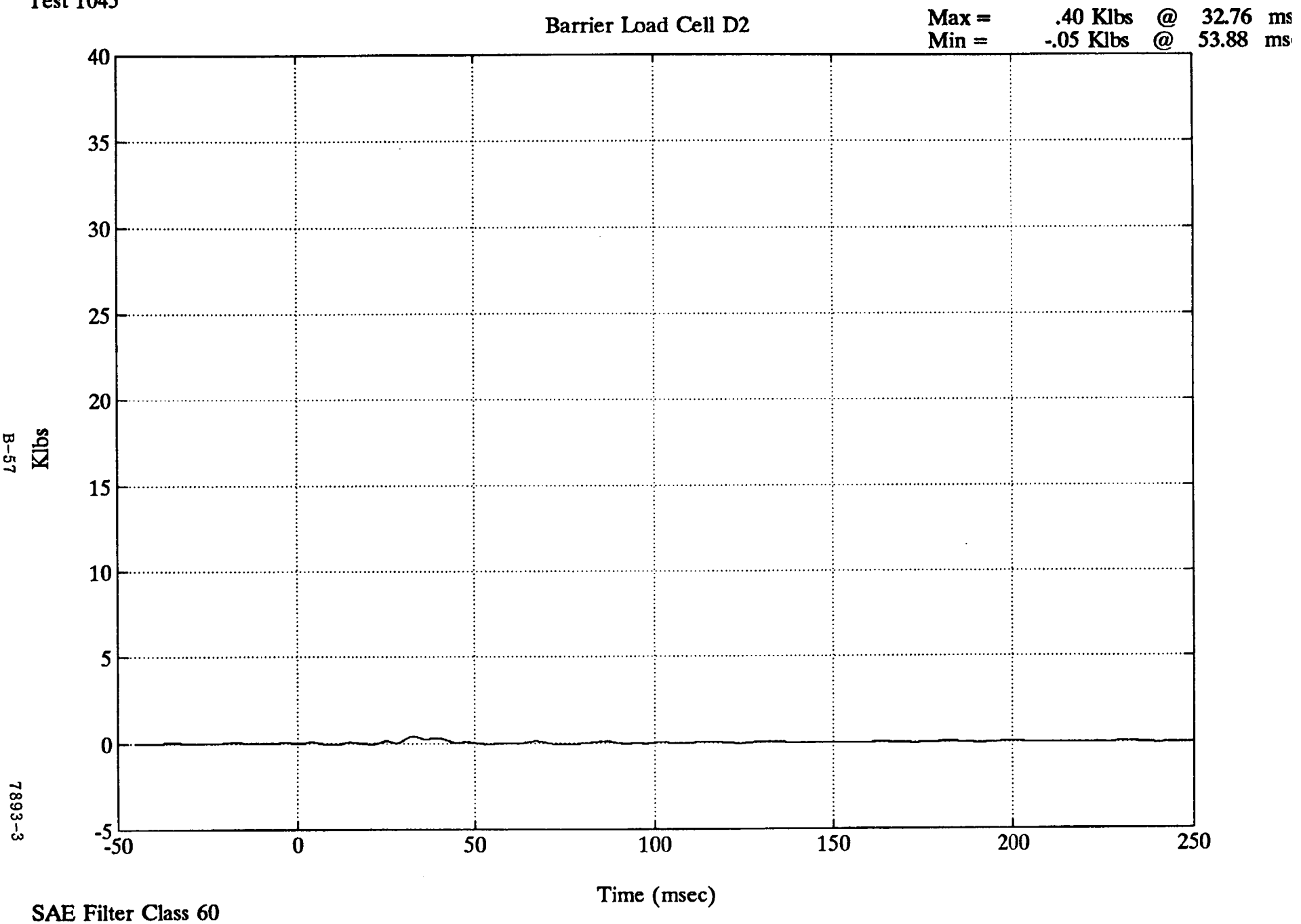
Test 1045



SAE Filter Class 60

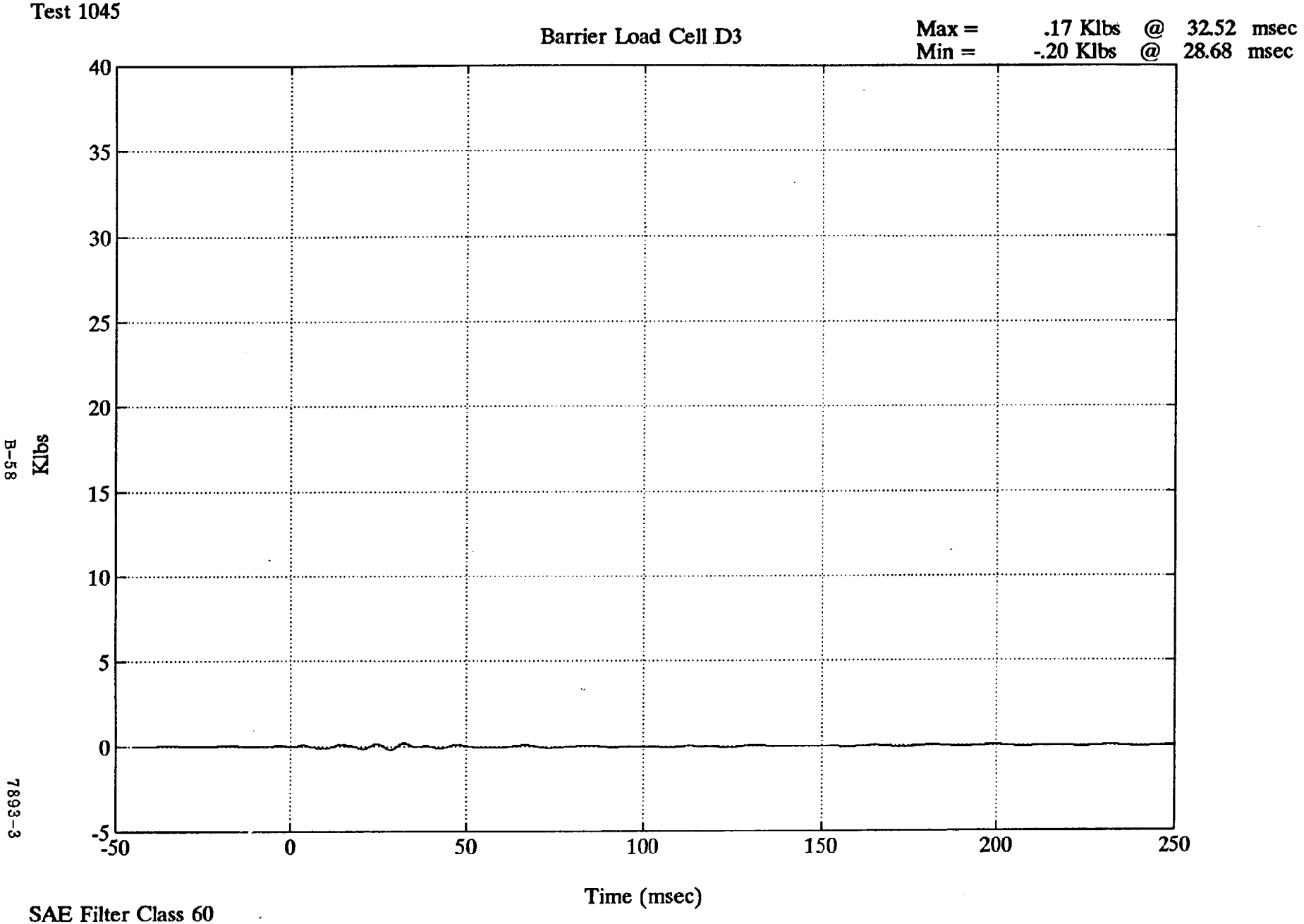
7893-3

Test 1045



SAE Filter Class 60

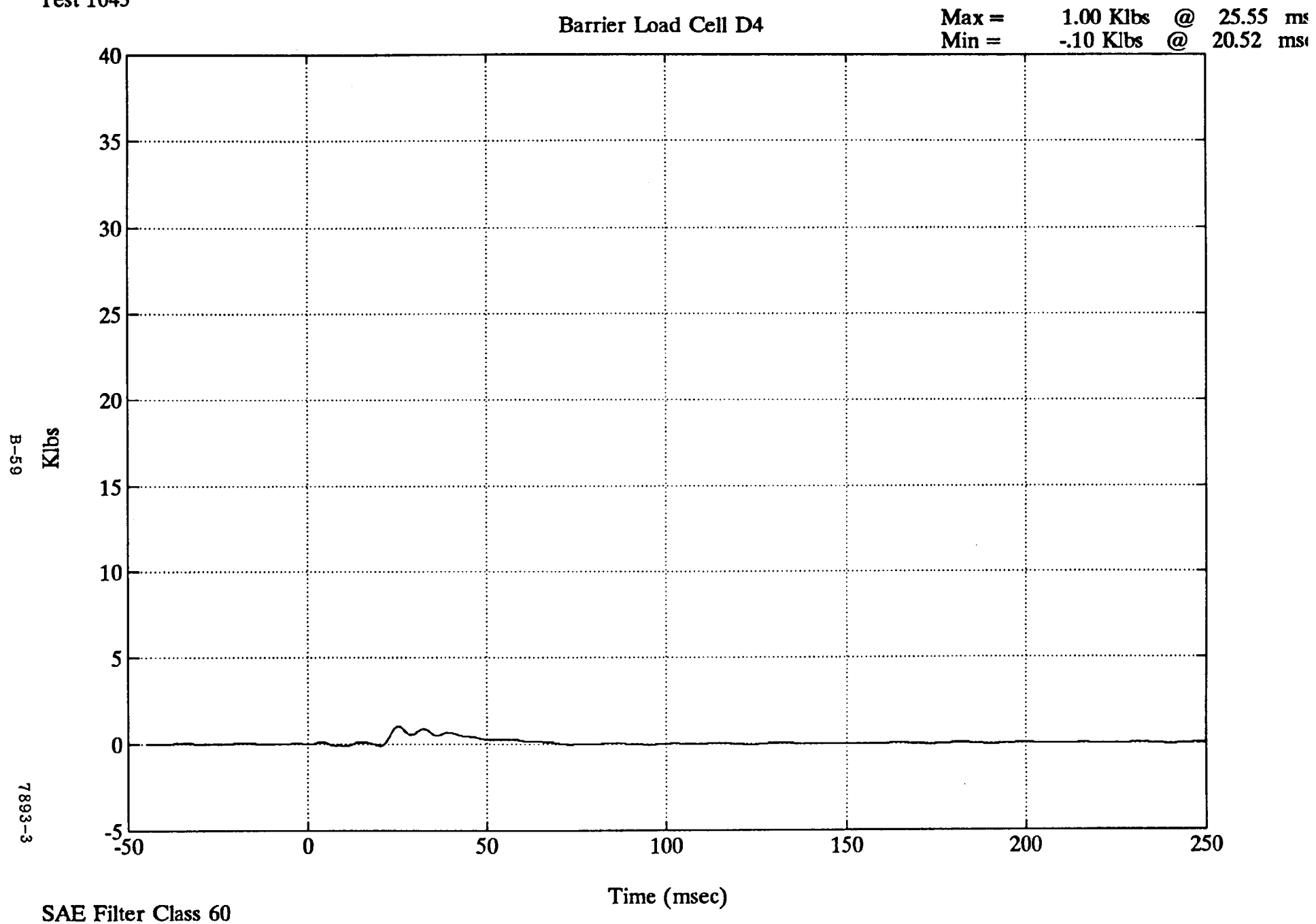
Test 1045



SAE Filter Class 60

7893-3

Test 1045

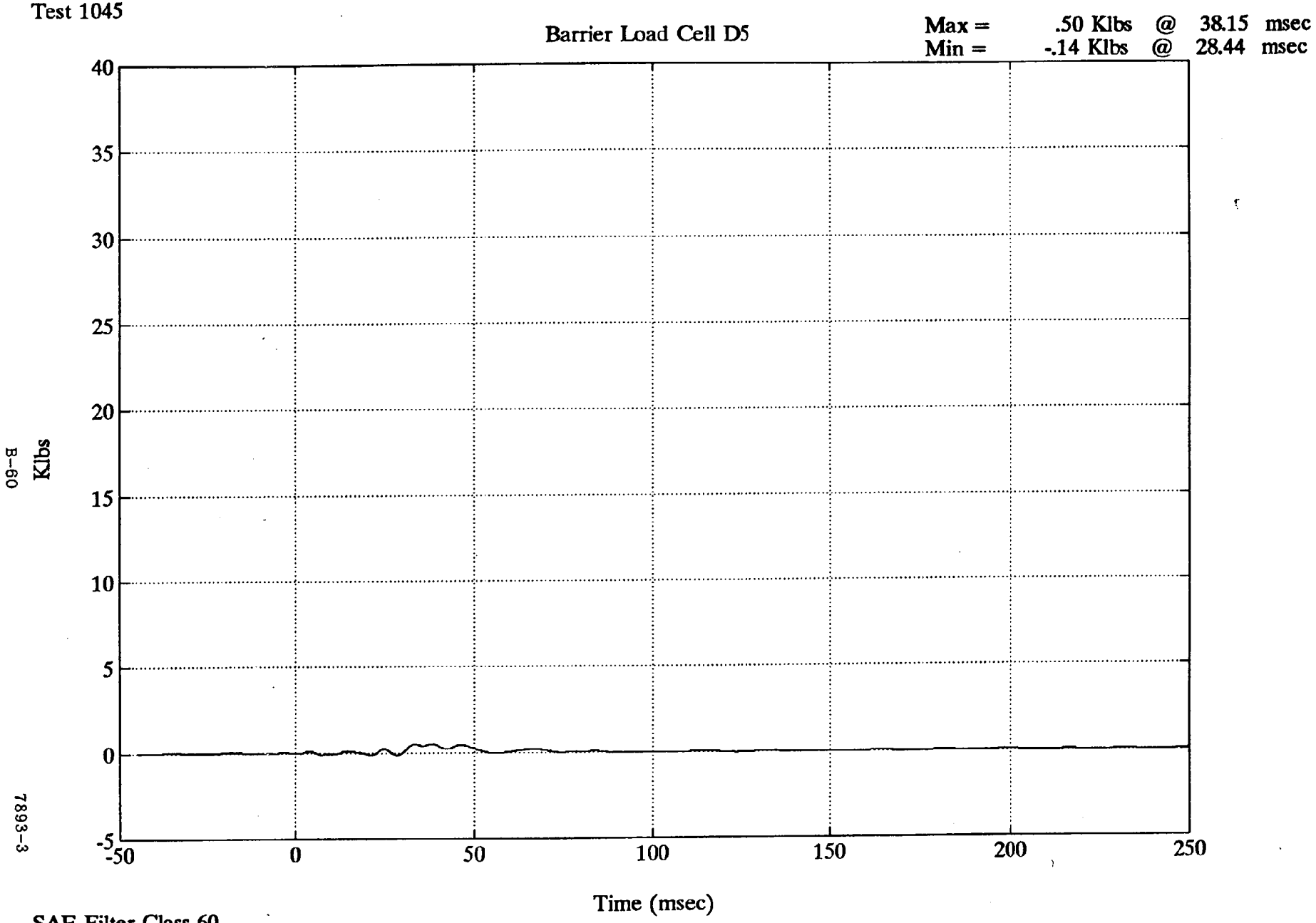


B-59

7893-3

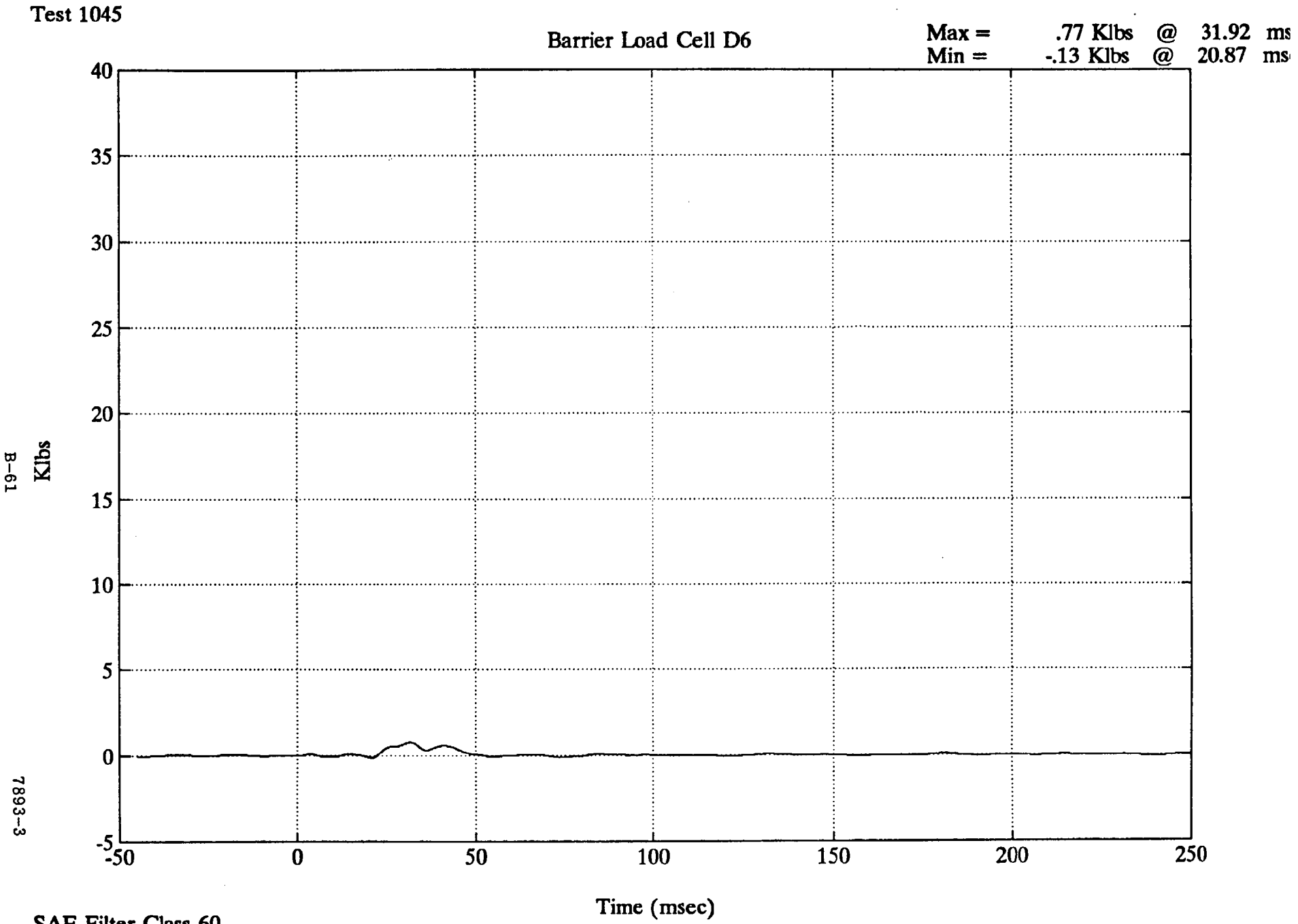
SAE Filter Class 60

Test 1045



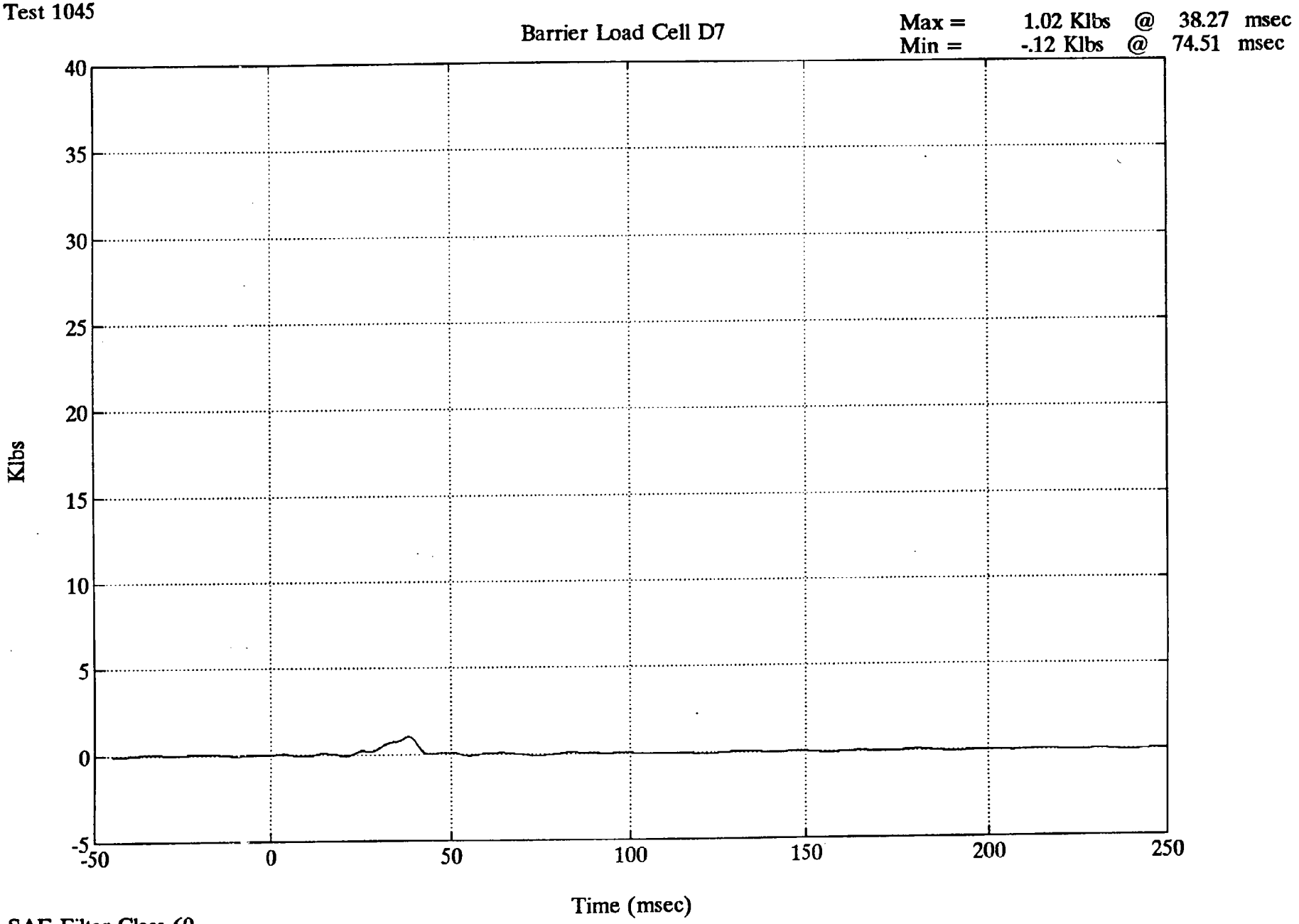
SAE Filter Class 60

Test 1045



SAE Filter Class 60

Test 1045

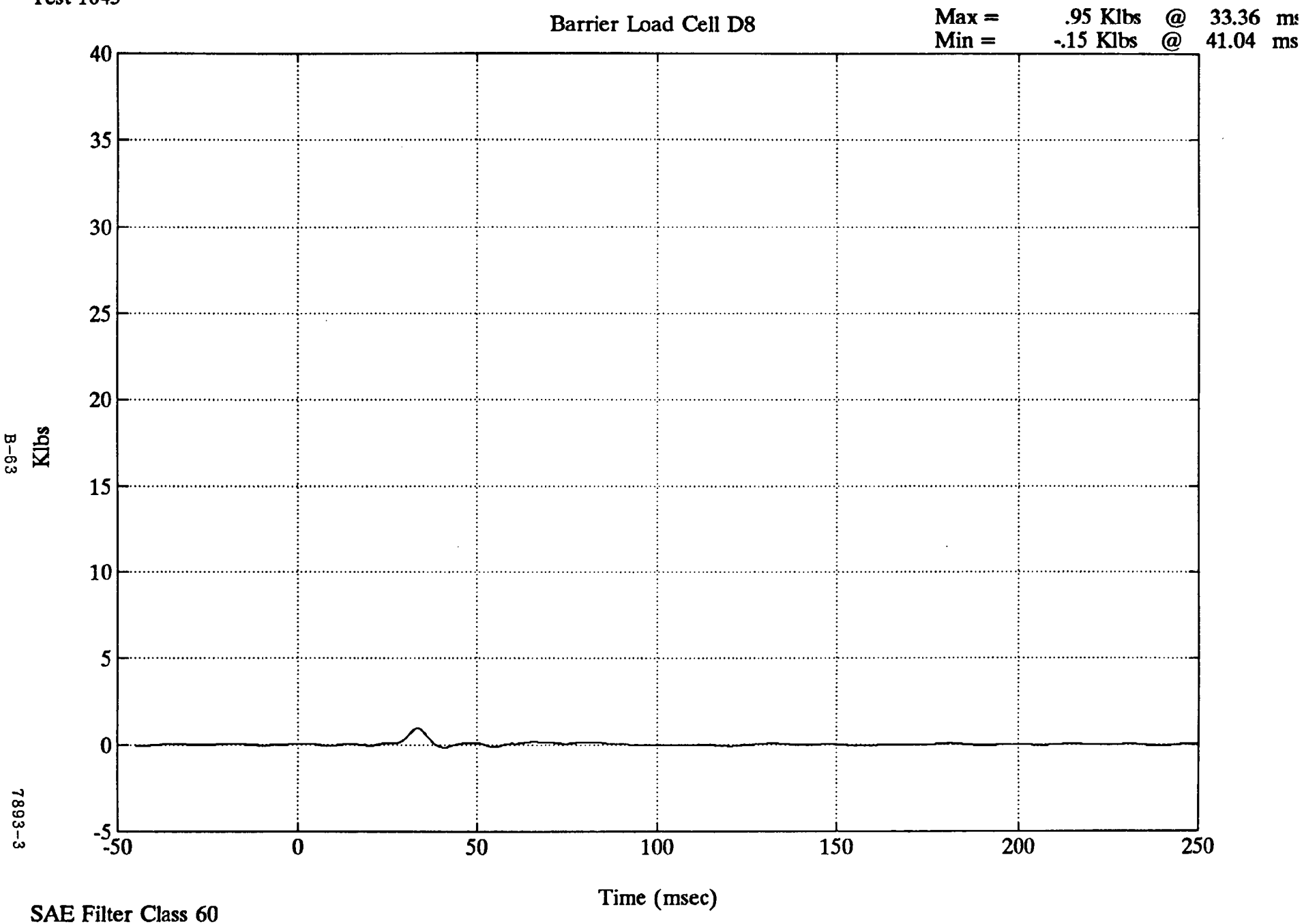


SAE Filter Class 60

B-62

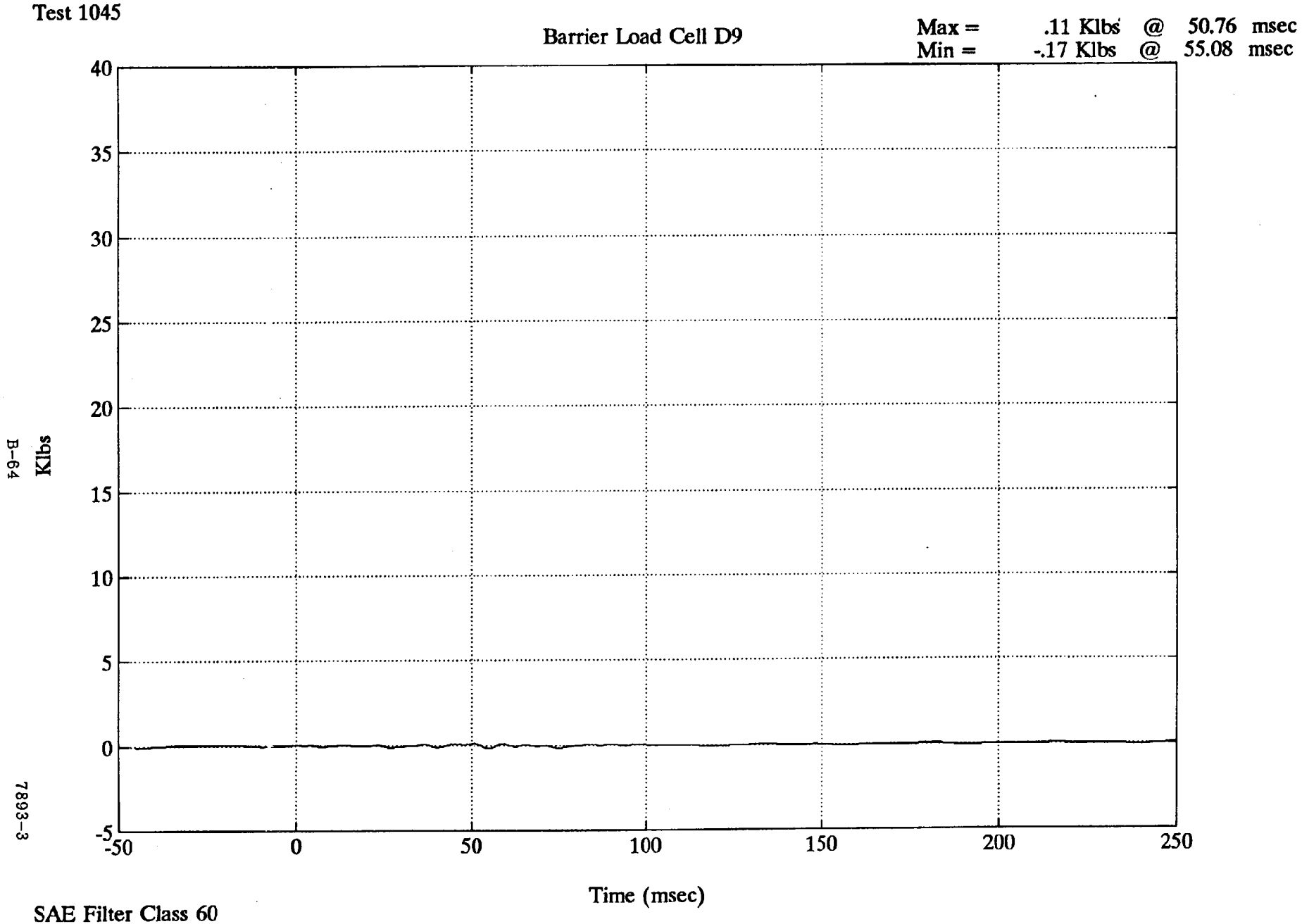
7893-3

Test 1045

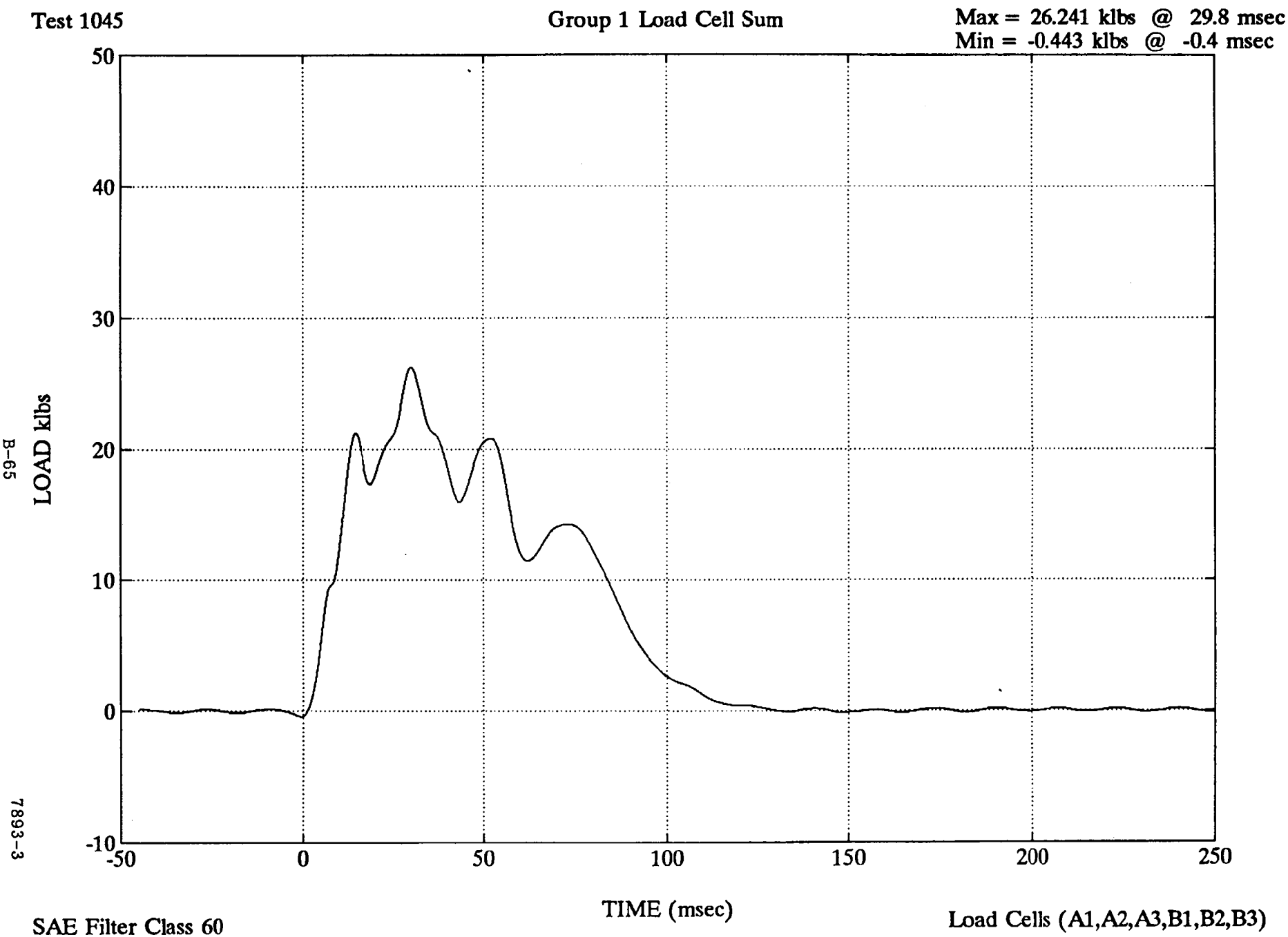


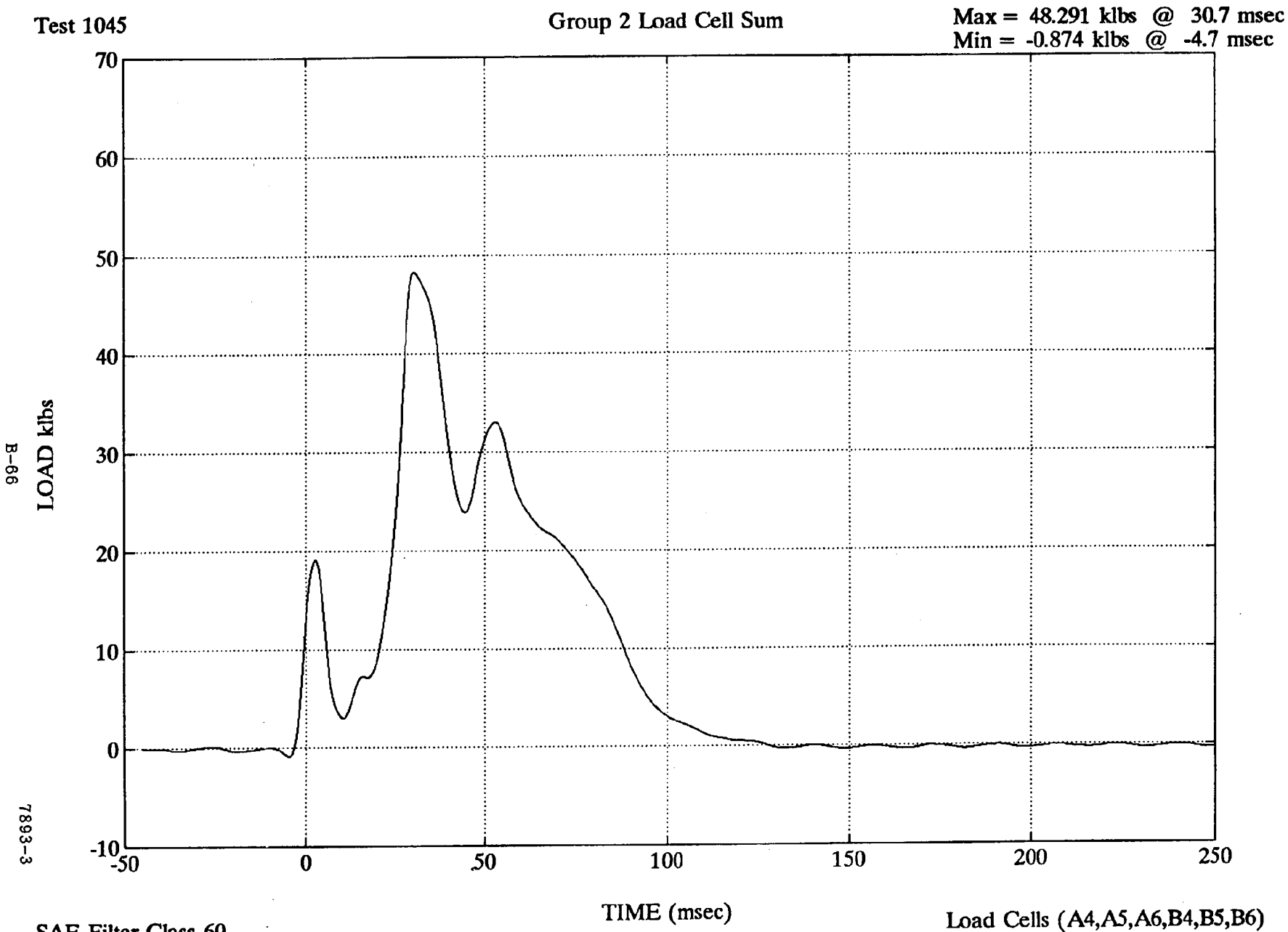
SAE Filter Class 60

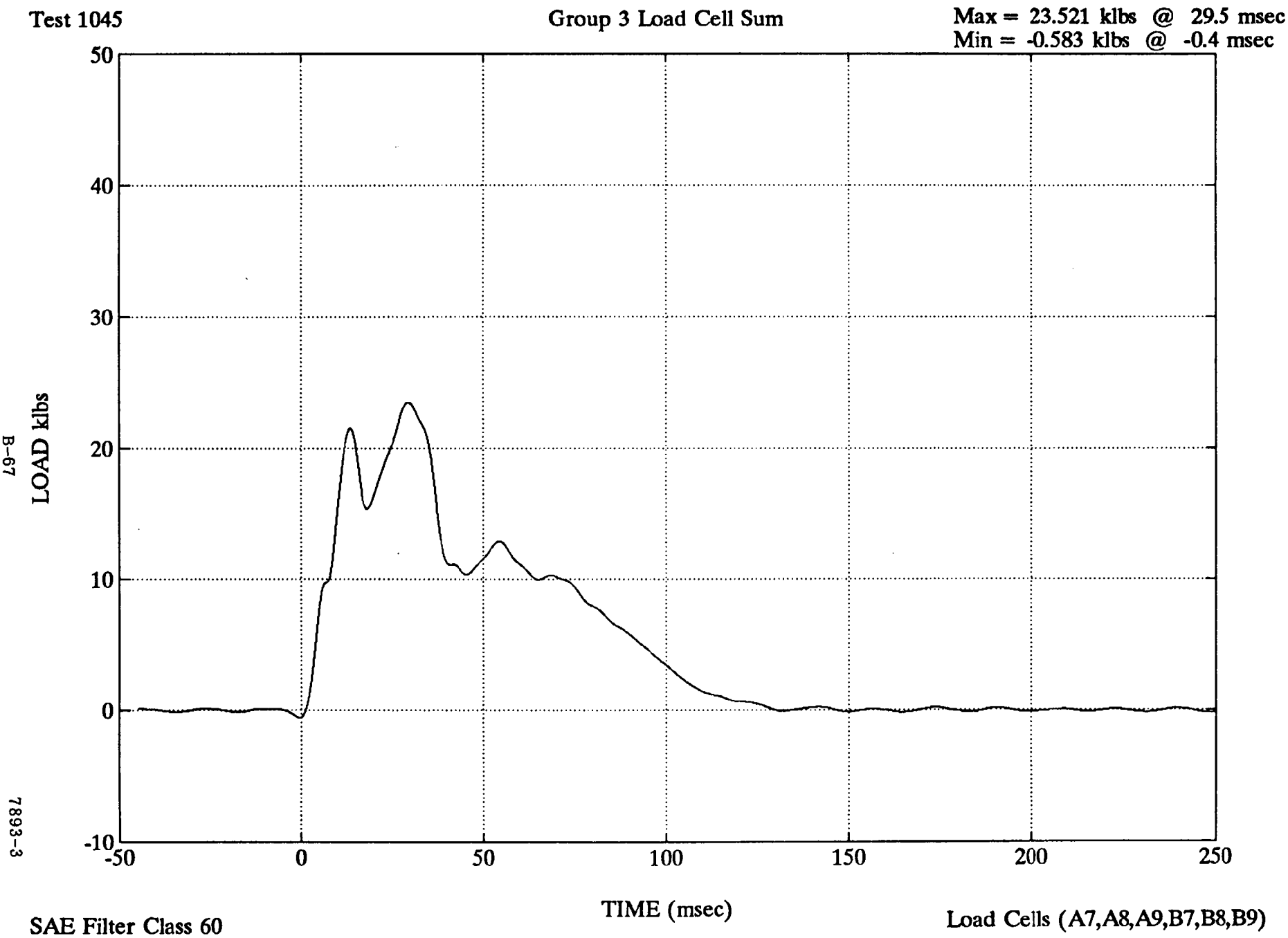
Test 1045

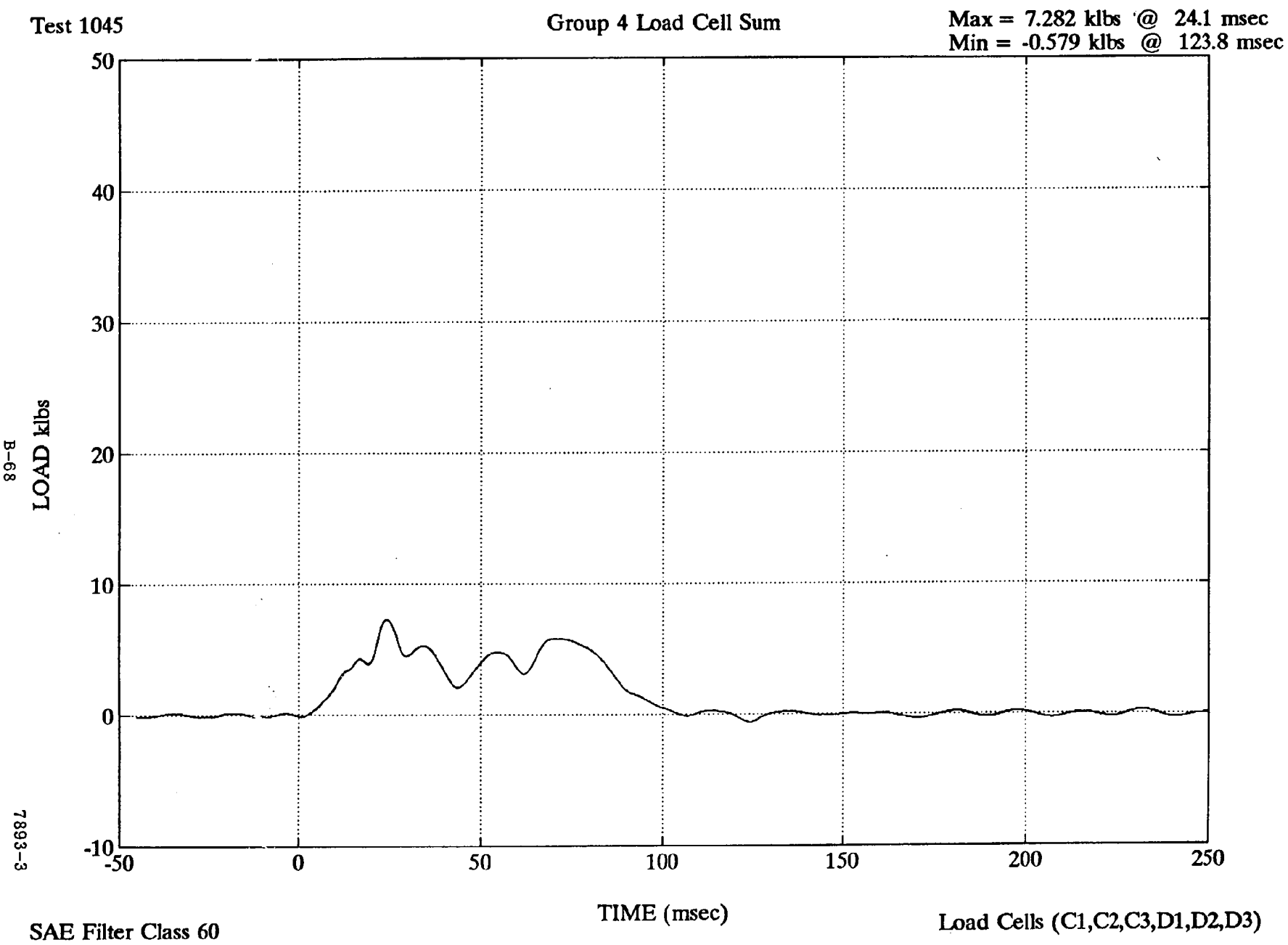


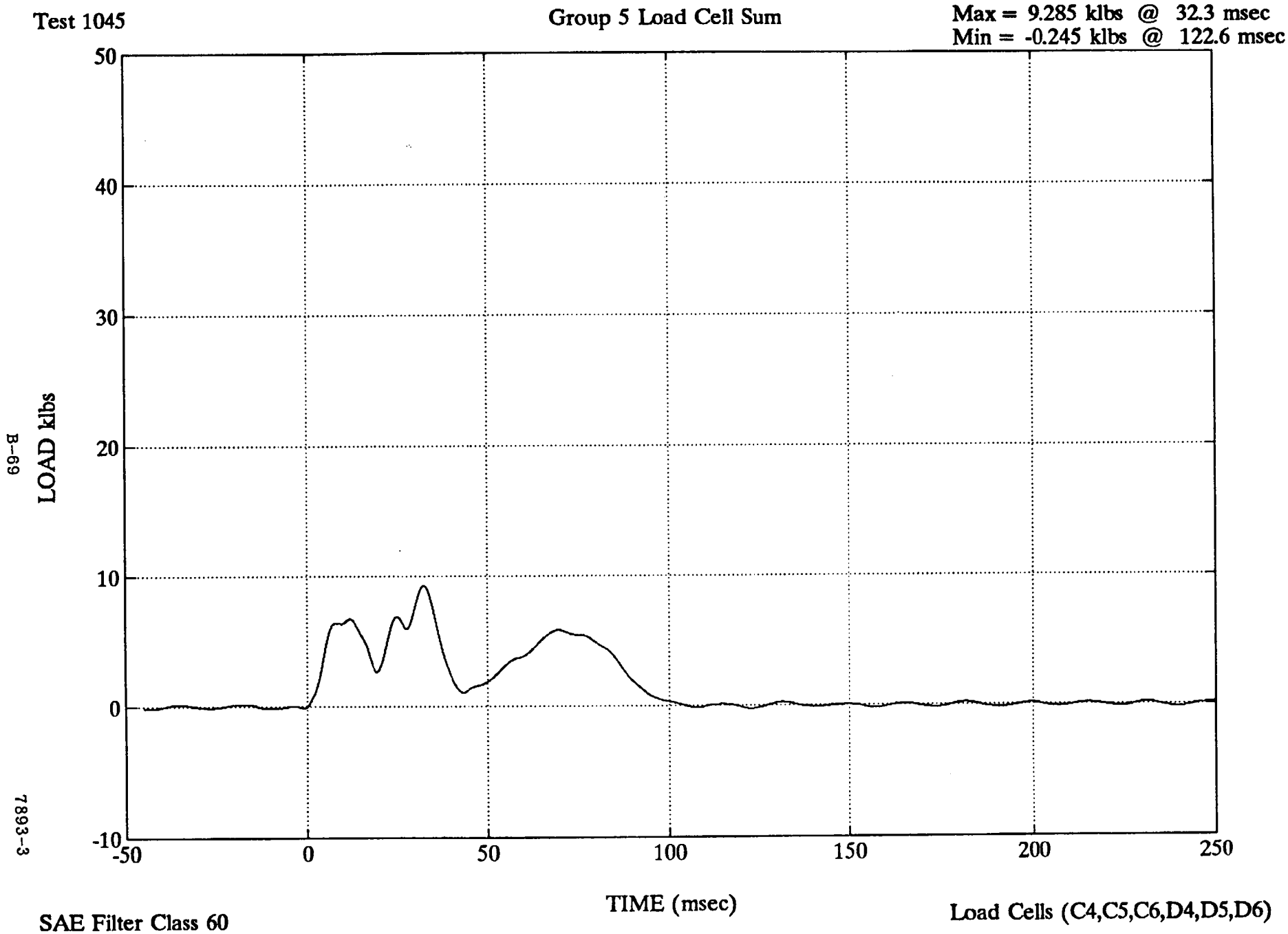
SAE Filter Class 60

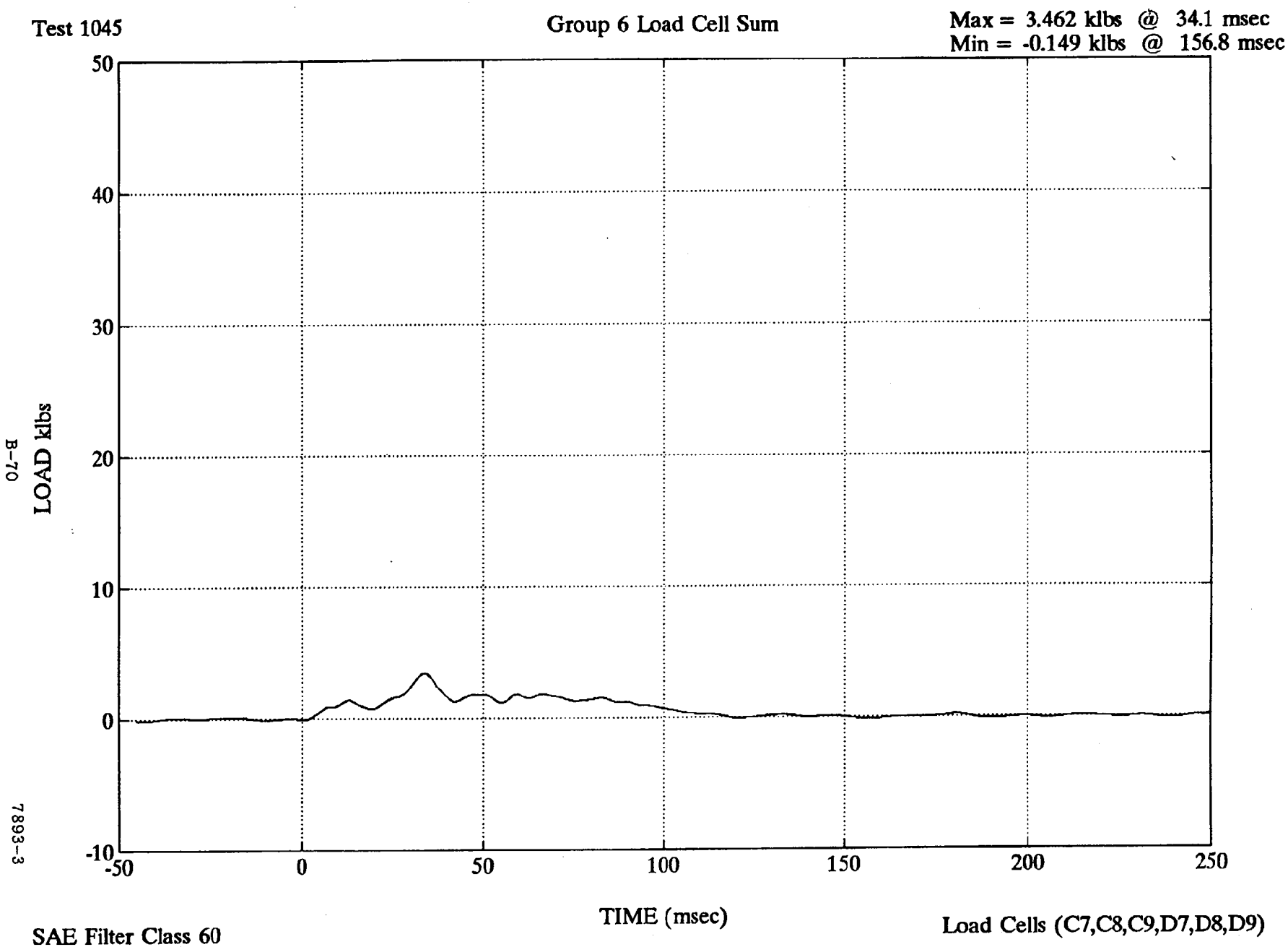

Test 1045
Group 1 Load Cell Sum
Max = 26.241 klbs @ 29.8 msec
Min = -0.443 klbs @ -0.4 msec
50
40
30
20
10
0
-10
LOAD klbs
-50
0
50
100
150
200
250
TIME (msec)
B-95
7893-3
SAE Filter Class 60
Load Cells (A1,A2,A3,B1,B2,B3)

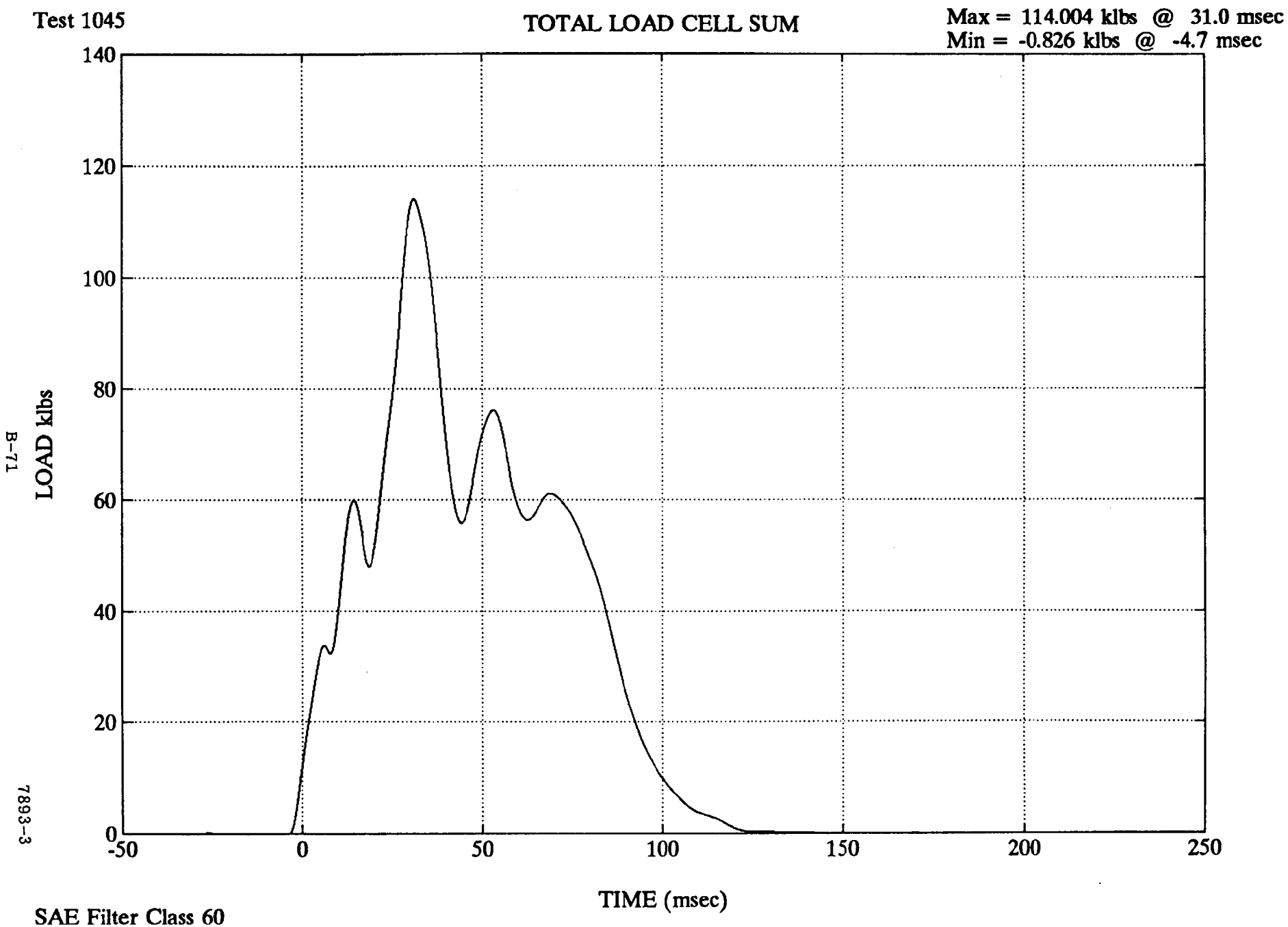

Test 1045
Group 2 Load Cell Sum
Max = 48.291 klbs @ 30.7 msec
Min = -0.874 klbs @ -4.7 msec
70
60
50
40
30
20
10
0
-10
-50
0
50
100
150
200
250
LOAD klbs
TIME (msec)
B-66
7893-3
SAE Filter Class 60
Load Cells (A4,A5,A6,B4,B5,B6)


Test 1045
Group 3 Load Cell Sum
Max = 23.521 klbs @ 29.5 msec
Min = -0.583 klbs @ -0.4 msec
50
40
30
20
10
0
-10
LOAD klbs
-50
0
50
100
150
200
250
TIME (msec)
SAE Filter Class 60
Load Cells (A7,A8,A9,B7,B8,B9)
B-67
7893-3


Test 1045
Group 4 Load Cell Sum
Max = 7.282 klbs @ 24.1 msec
Min = -0.579 klbs @ 123.8 msec
50
40
30
20
10
0
-10
LOAD klbs
-50
0
50
100
150
200
250
TIME (msec)
SAE Filter Class 60
Load Cells (C1,C2,C3,D1,D2,D3)
B-68
7893-3


Test 1045
Group 5 Load Cell Sum
Max = 9.285 klbs @ 32.3 msec
Min = -0.245 klbs @ 122.6 msec
50
40
30
20
10
0
-10
LOAD klbs
B-69
7893-3
-50
0
50
100
150
200
250
TIME (msec)
SAE Filter Class 60
Load Cells (C4,C5,C6,D4,D5,D6)


Test 1045
Group 6 Load Cell Sum
Max = 3.462 klbs @ 34.1 msec
Min = -0.149 klbs @ 156.8 msec
LOAD klbs
50
40
30
20
10
0
-10
-50
0
50
100
150
200
250
TIME (msec)
B-70
7893-3
SAE Filter Class 60
Load Cells (C7,C8,C9,D7,D8,D9)

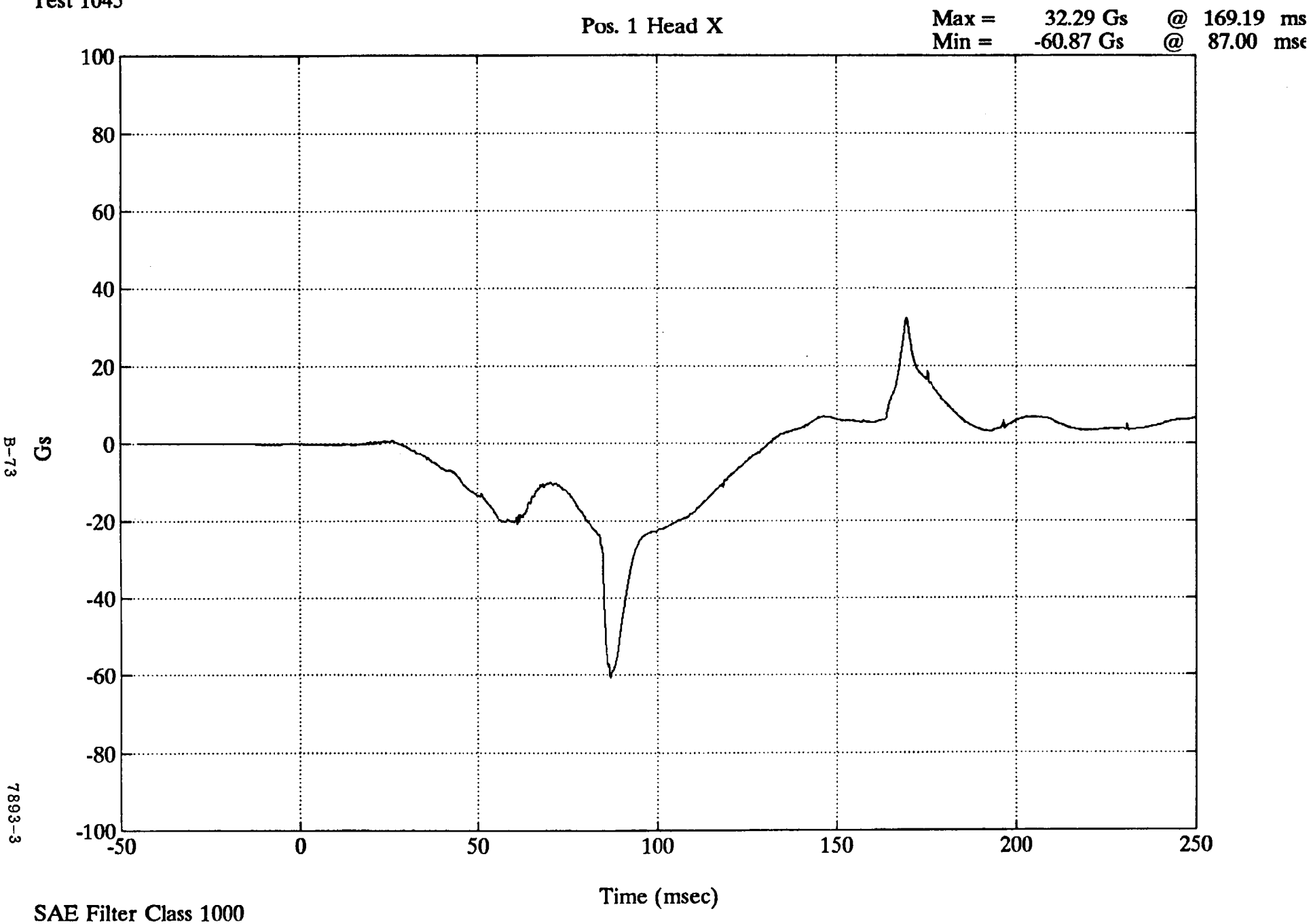

Test 1045
TOTAL LOAD CELL SUM
Max = 114.004 klbs @ 31.0 msec
Min = -0.826 klbs @ -4.7 msec
LOAD klbs
TIME (msec)
140
120
100
80
60
40
20
0
-50
0
50
100
150
200
250
B-71
7893-3
SAE Filter Class 60

TEST NO. MM0202

DUMMY DATA

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

Test 1045



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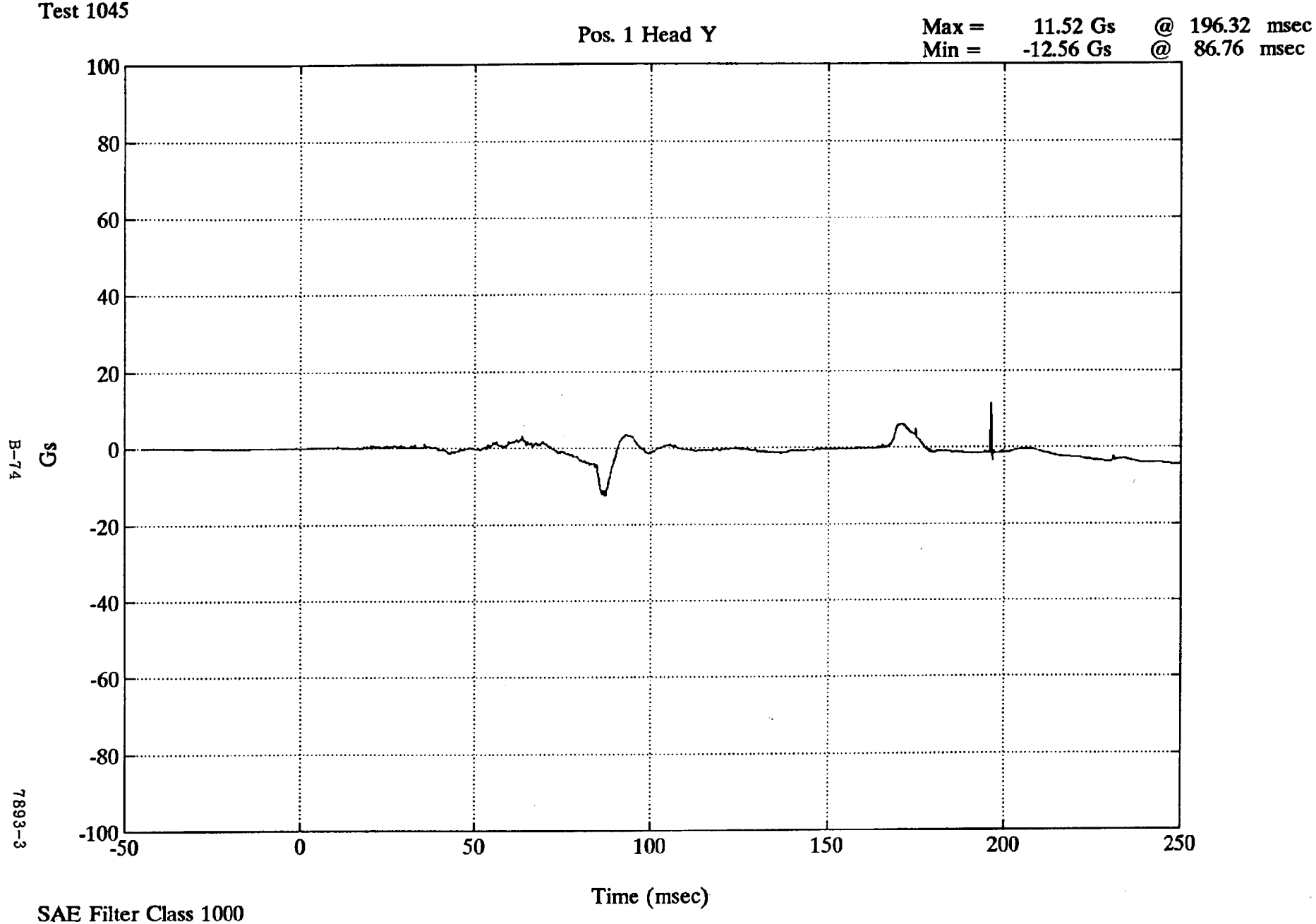
7893-3

SAE Filter Class 1000

Test 1045

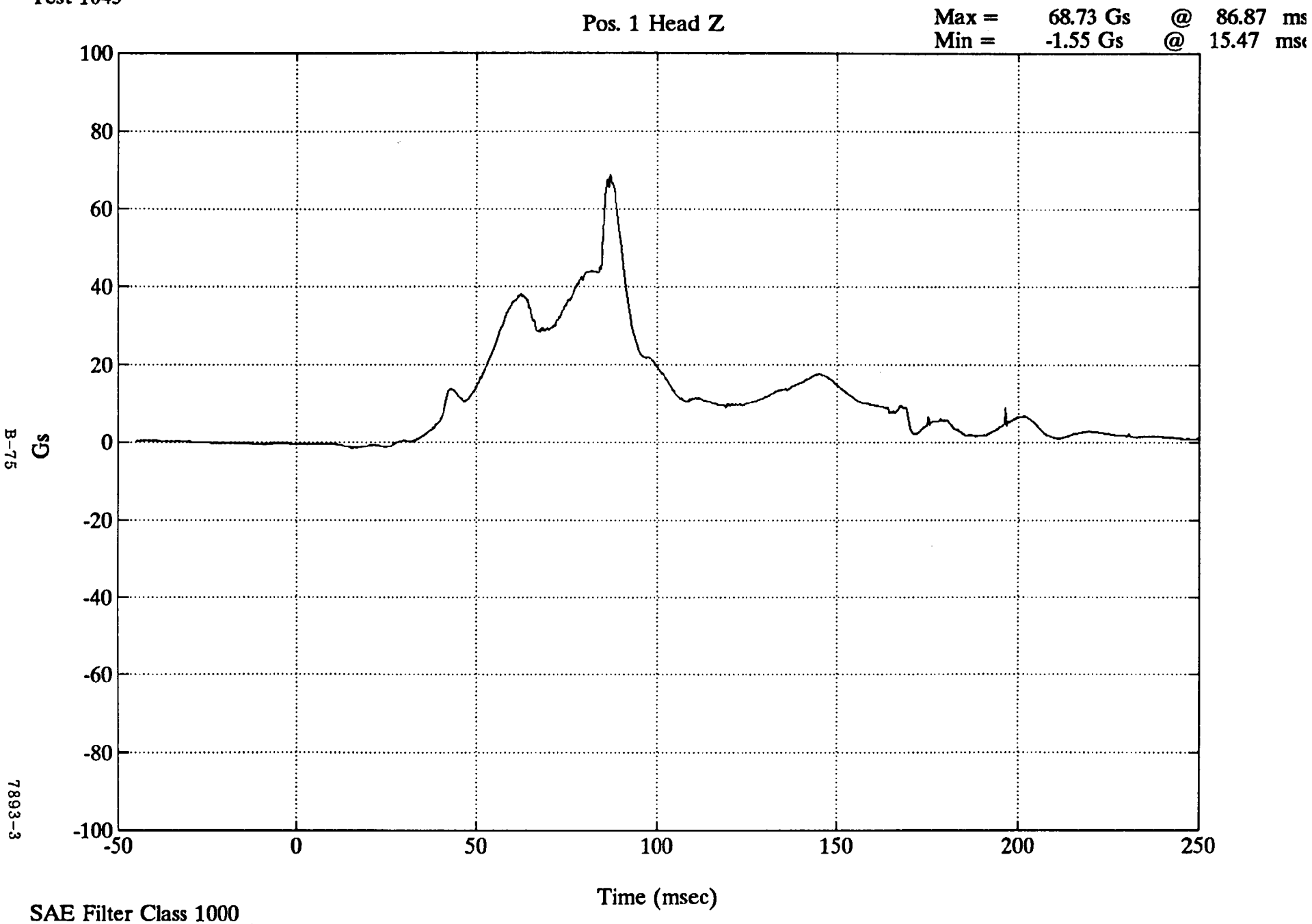


SAE Filter Class 1000

B-74

7893-3

Test 1045

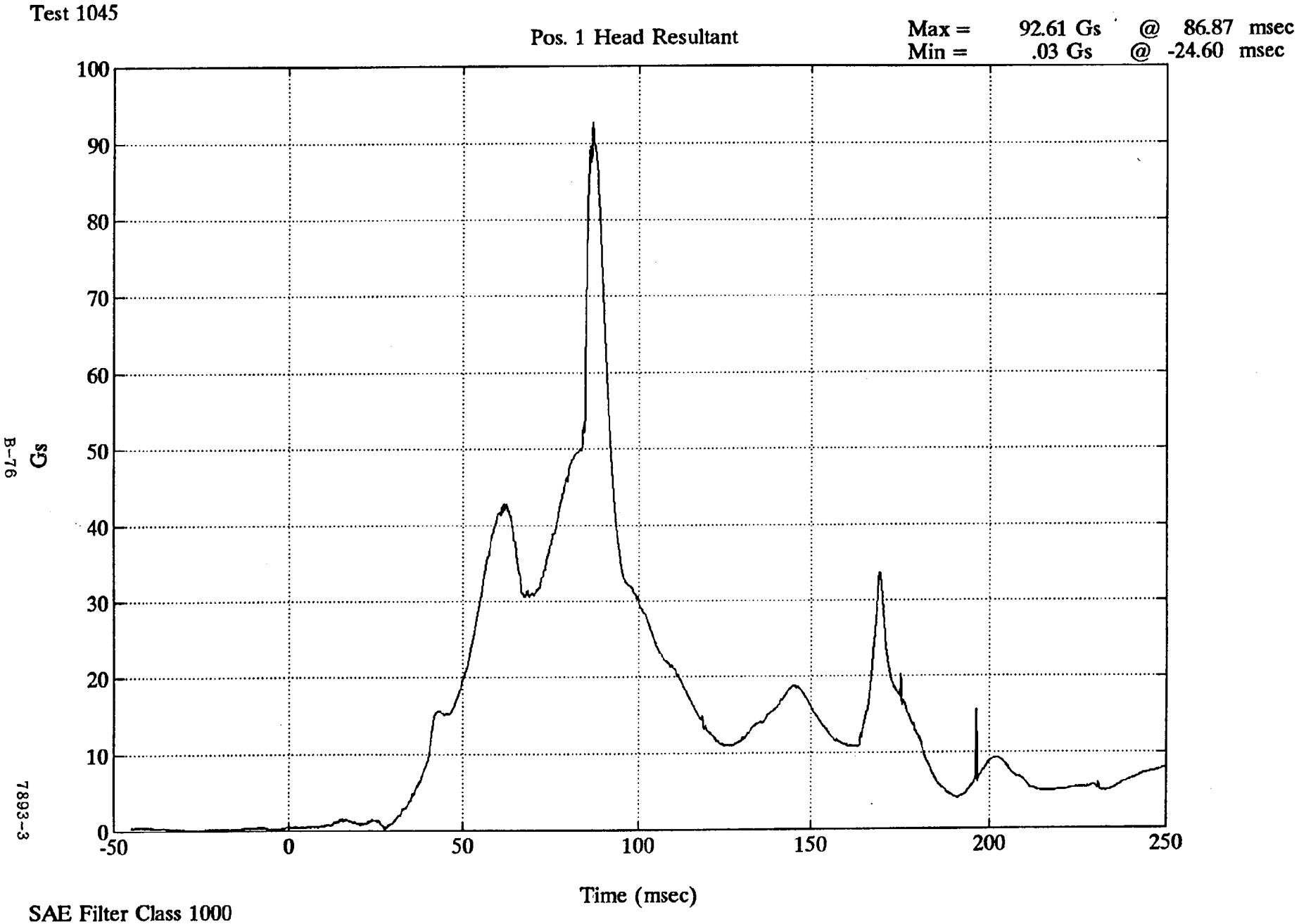


B-75

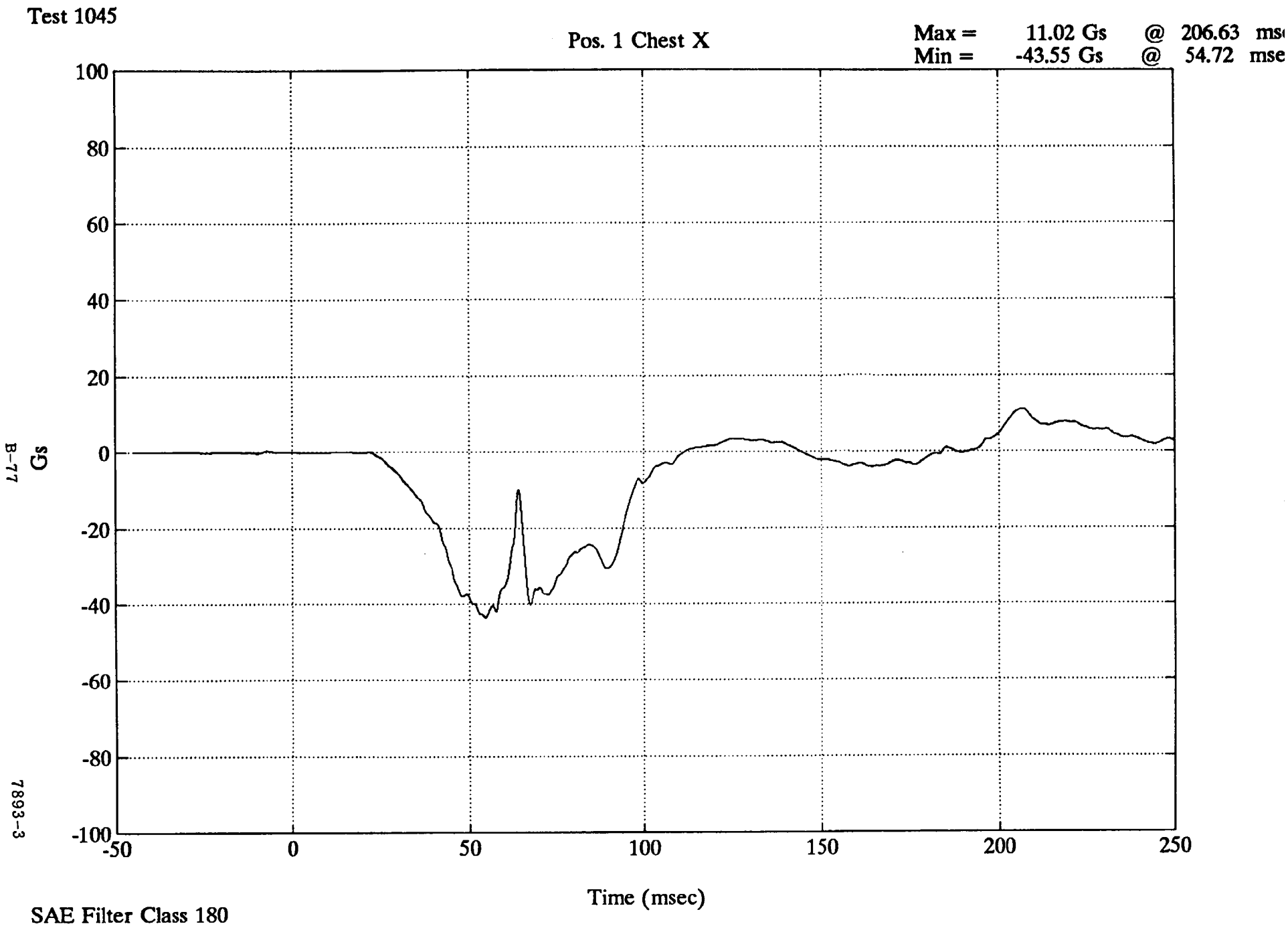
7893-3

SAE Filter Class 1000

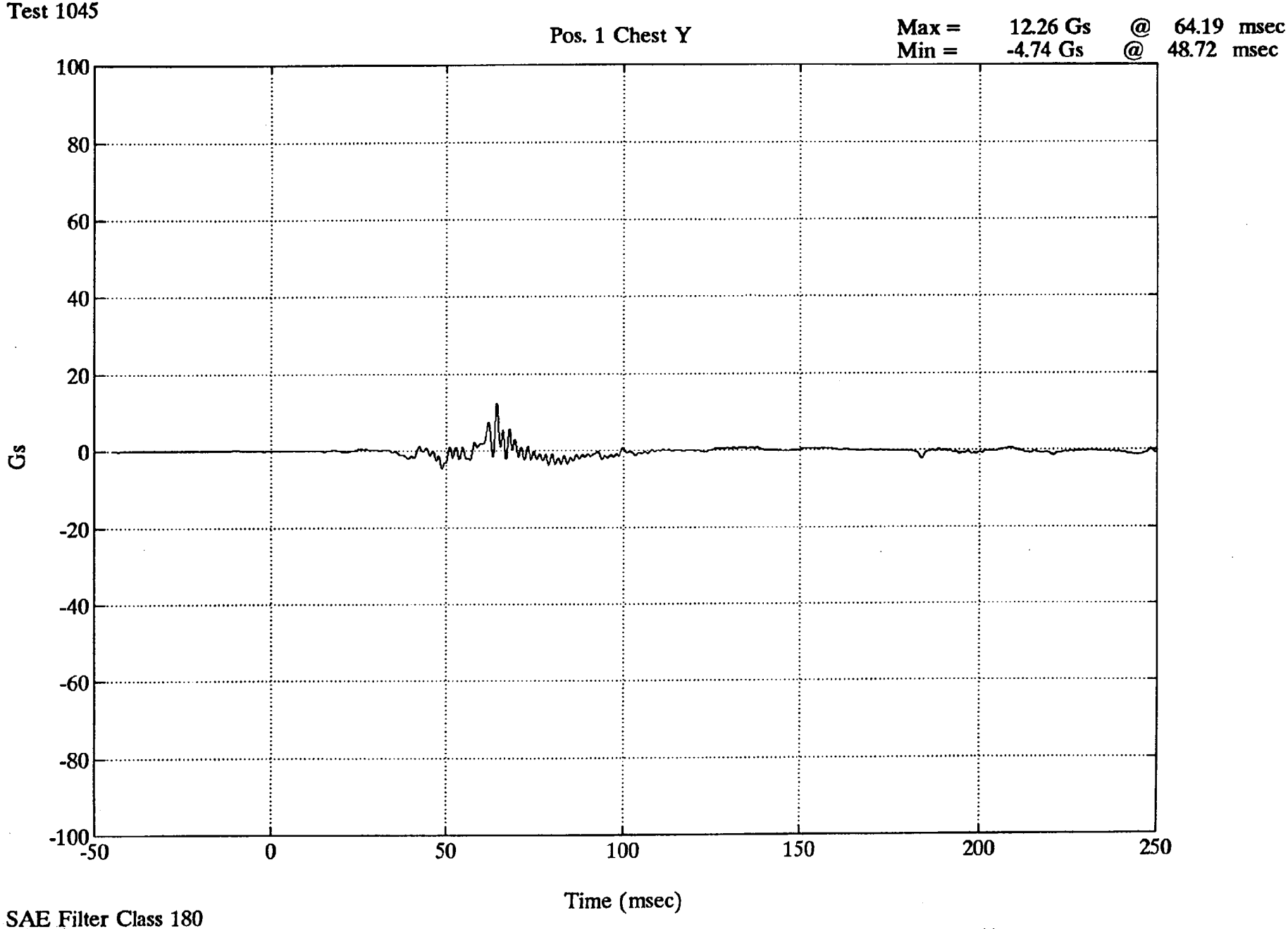
Test 1045



SAE Filter Class 1000


Test 1045
Pos. 1 Chest X
Max = 11.02 Gs @ 206.63 ms
Min = -43.55 Gs @ 54.72 mse
100
80
60
40
20
0
-20
-40
-60
-80
-100
Gs
-50
0
50
100
150
200
250
Time (msec)
SAE Filter Class 180
B-77
7893-3

Test 1045

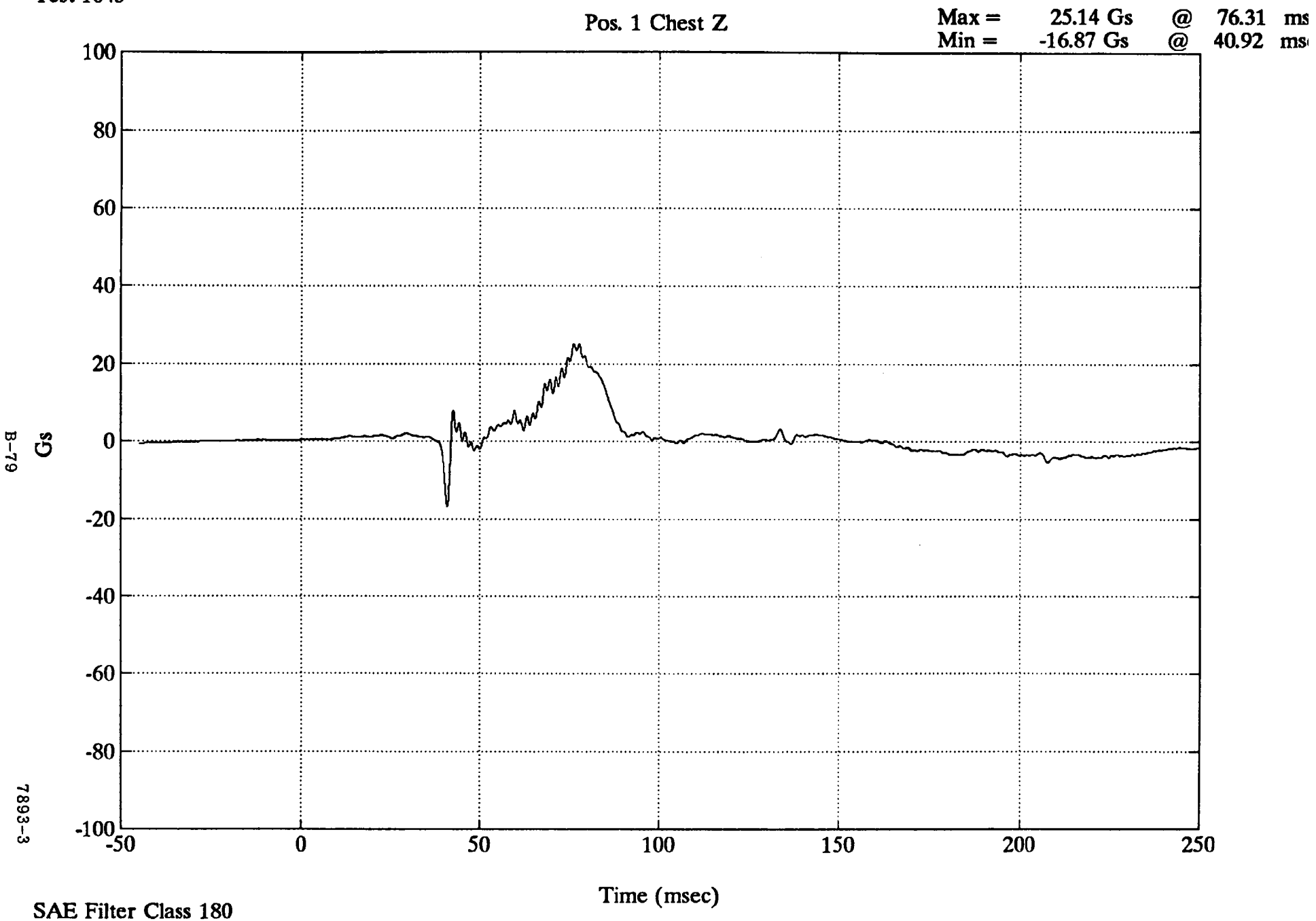


B-78

7893-3

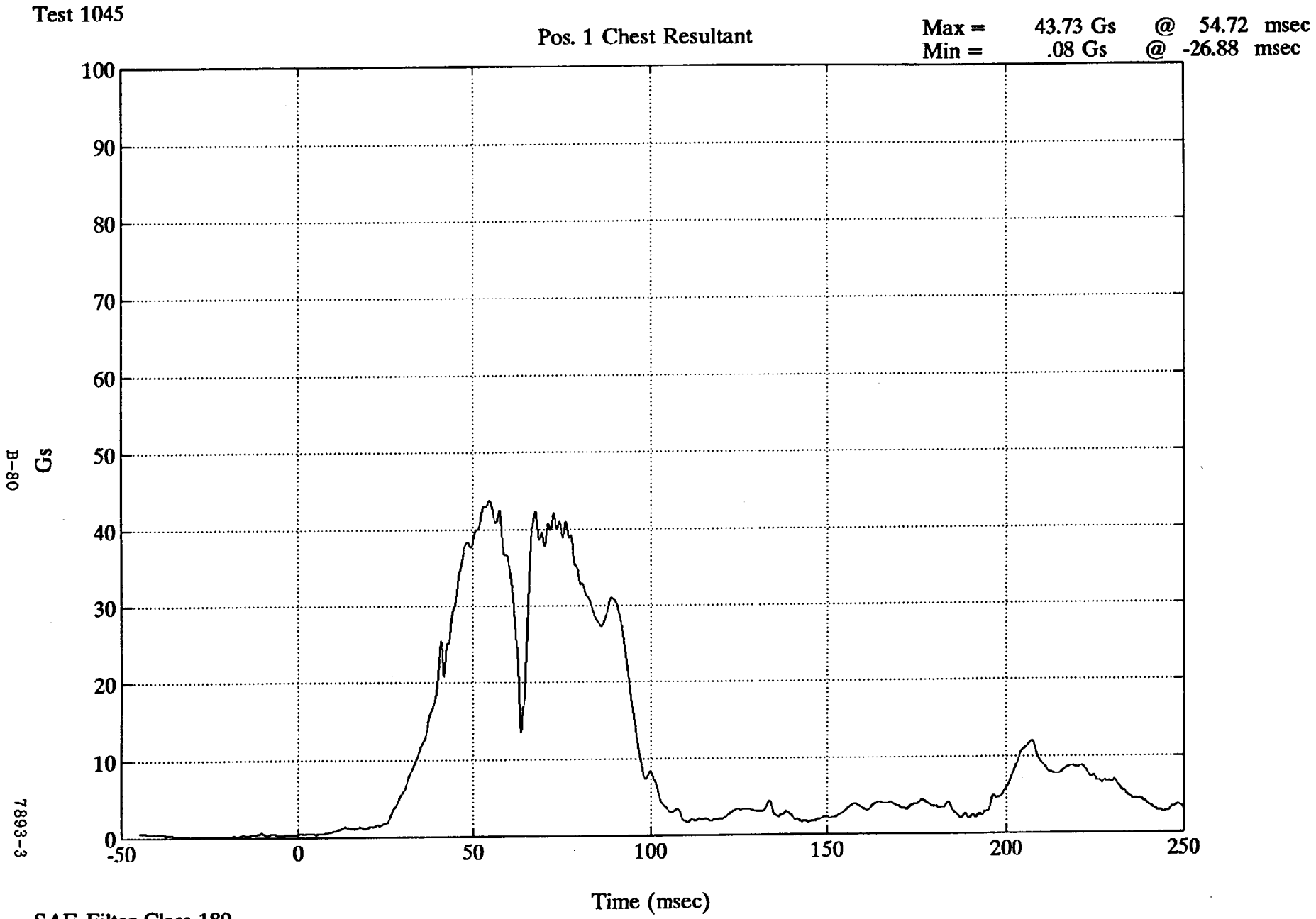
SAE Filter Class 180

Test 1045



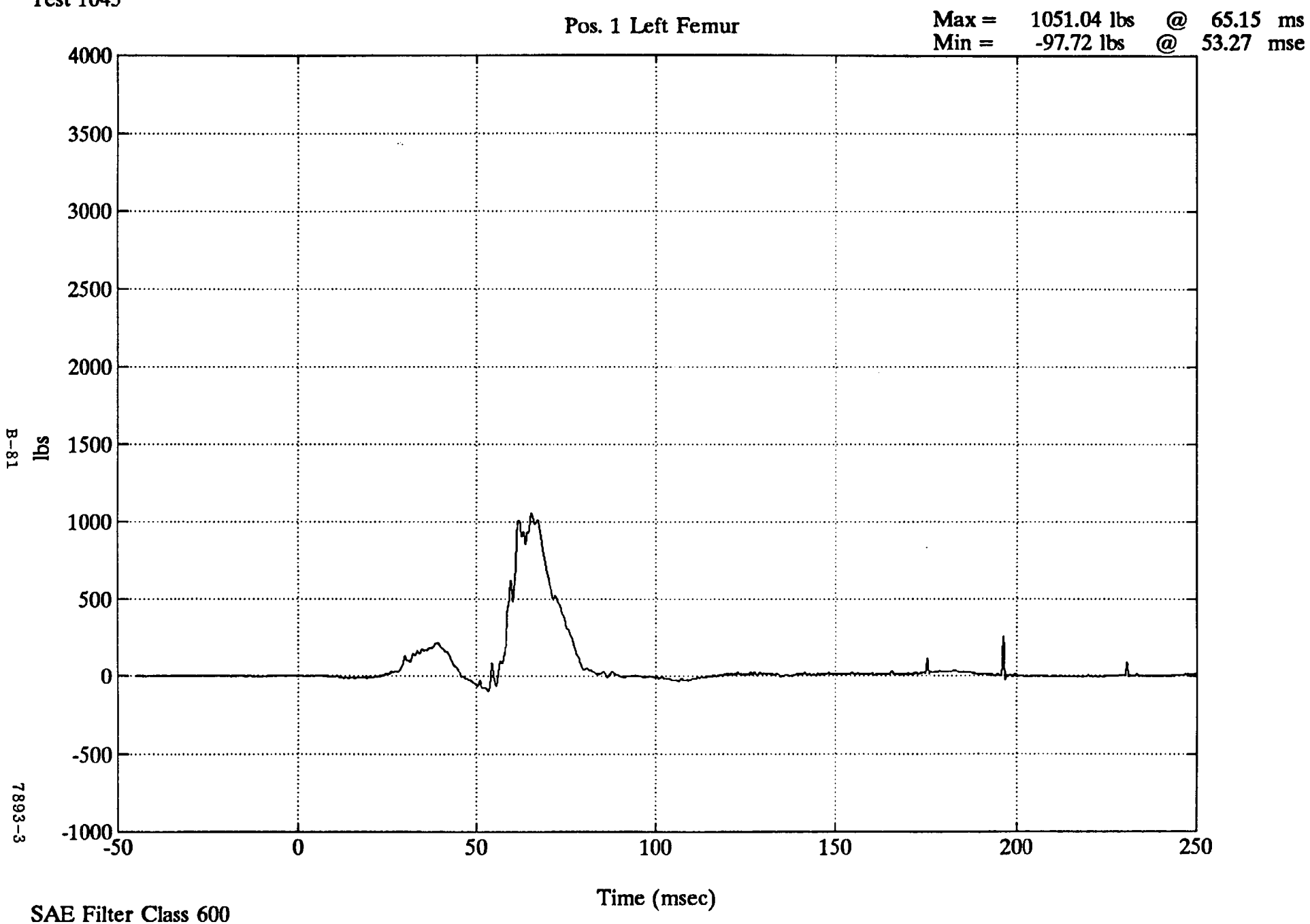
SAE Filter Class 180

Test 1045



SAE Filter Class 180

Test 1045

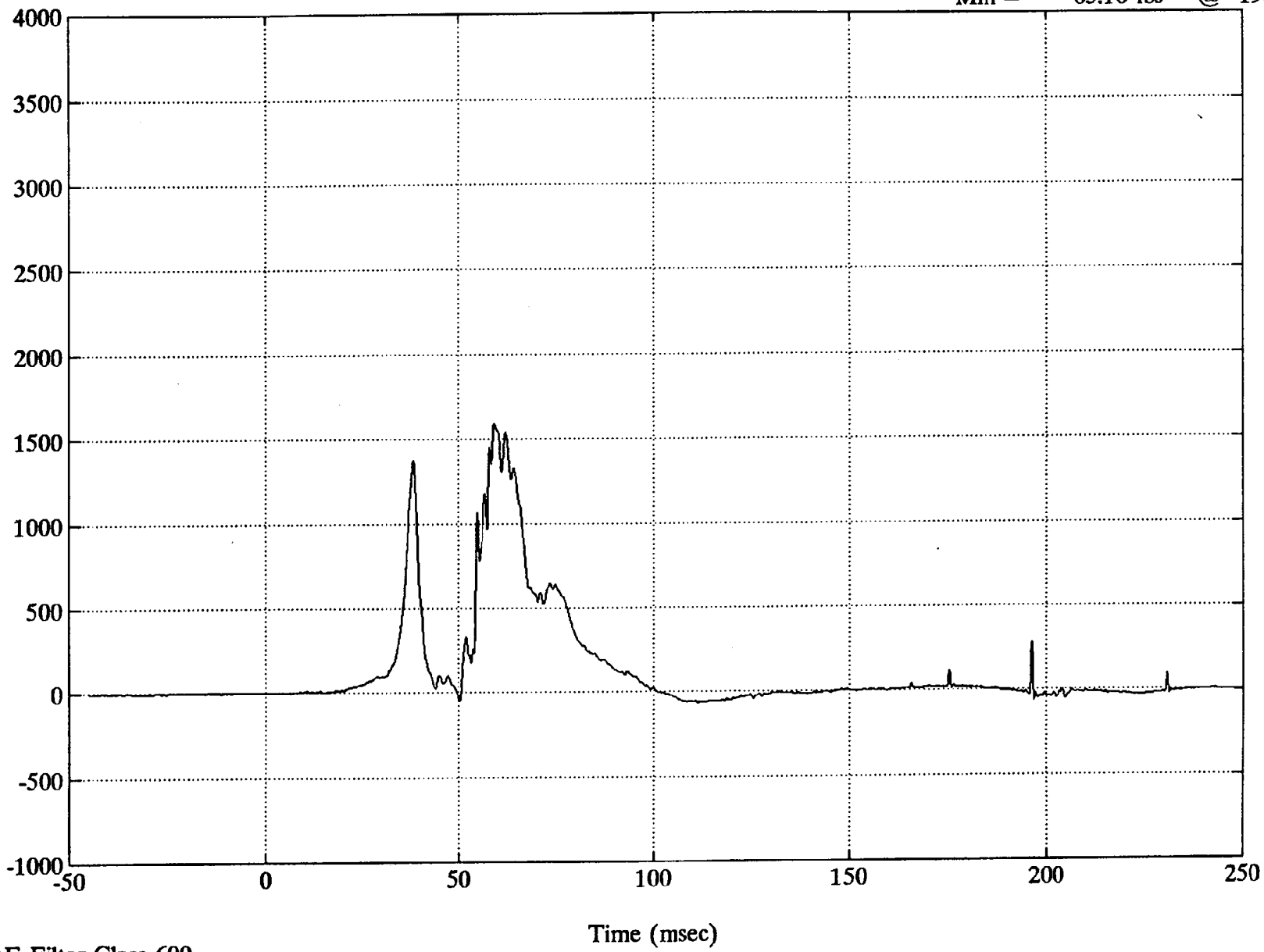


SAE Filter Class 600

Test 1045

Pos. 1 Right Femur

Max = 1591.89 lbs @ 59.52 msec
Min = -65.16 lbs @ 196.80 msec

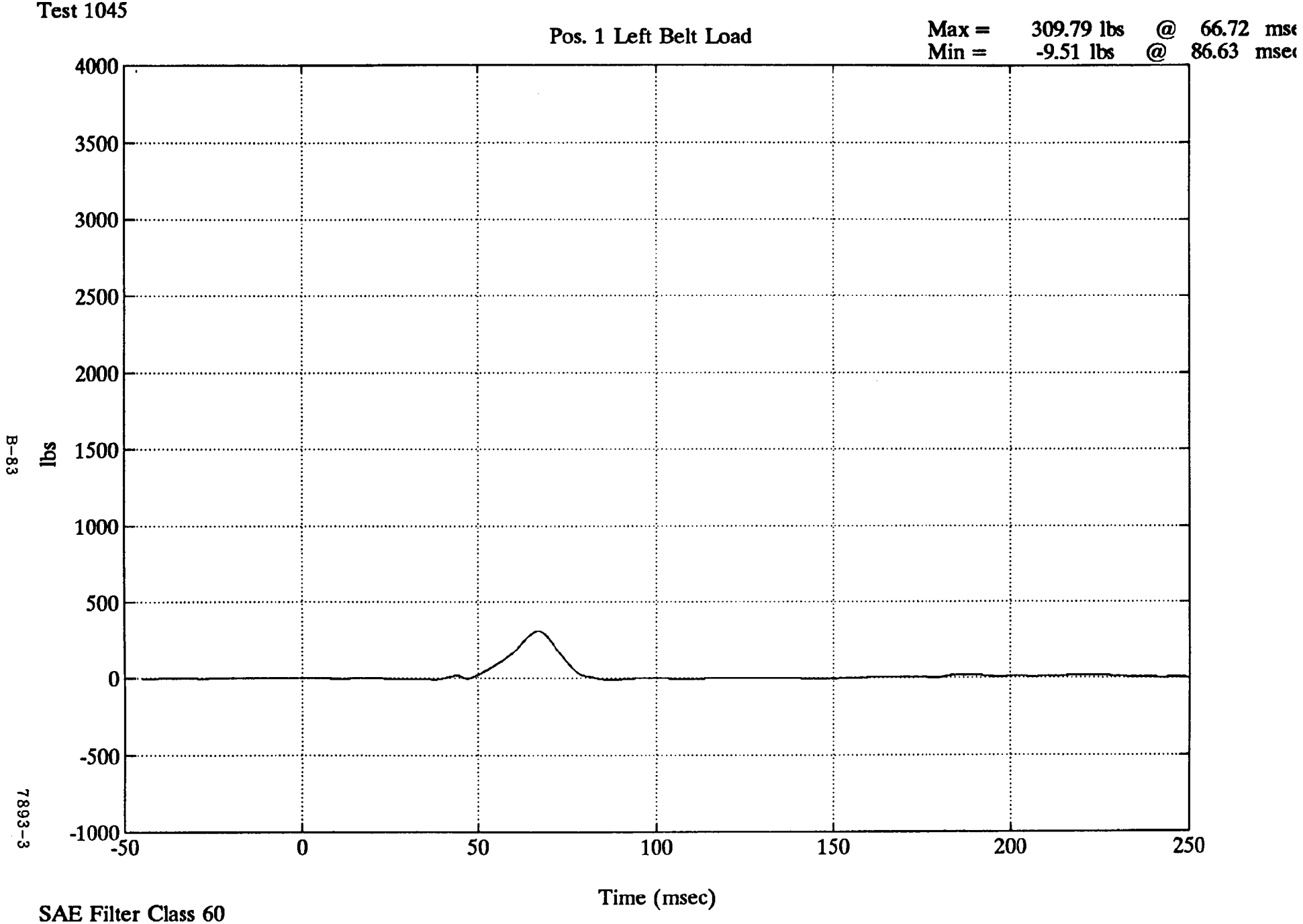


B-82

7893-3

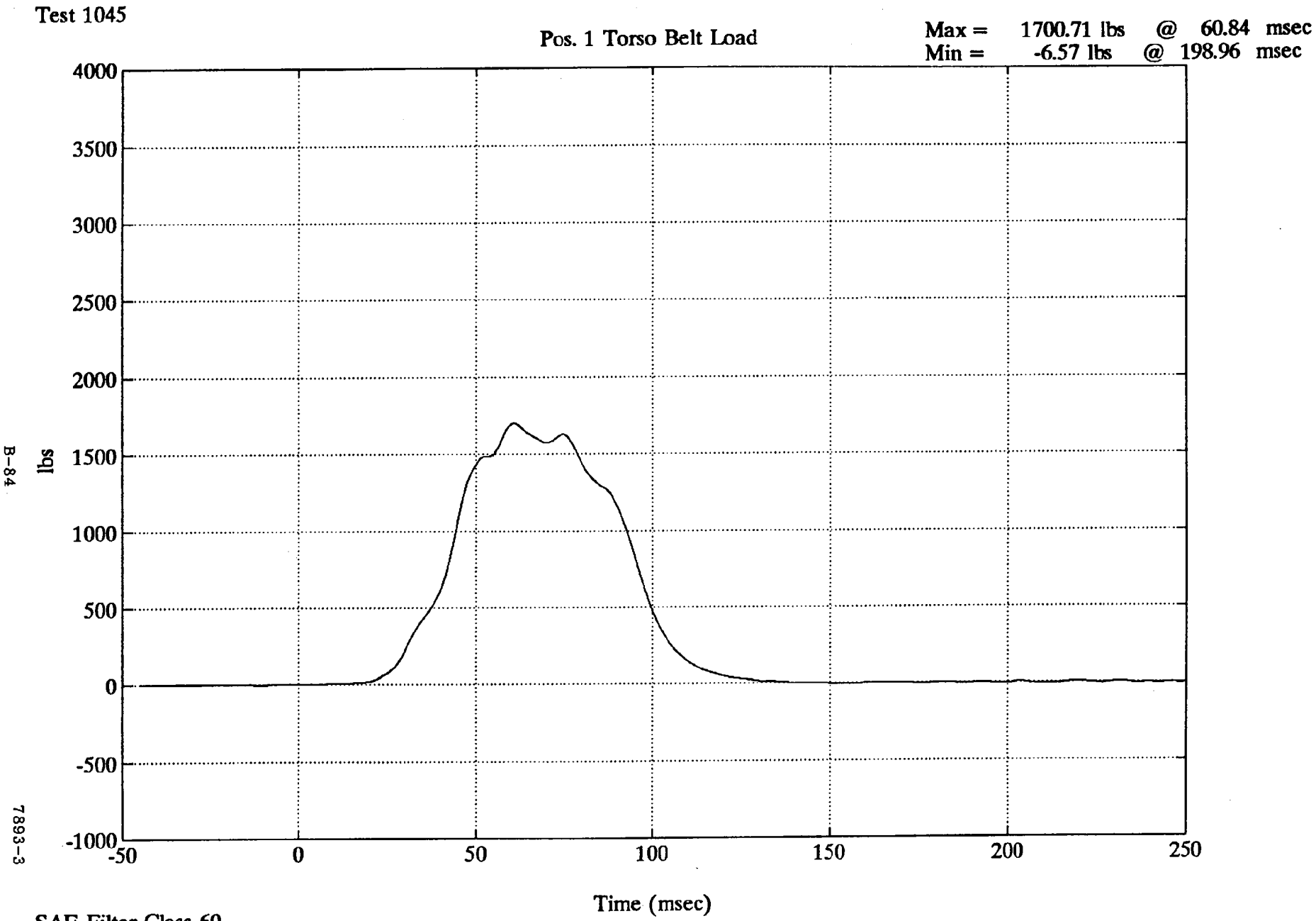
SAE Filter Class 600

Test 1045



SAE Filter Class 60

Test 1045

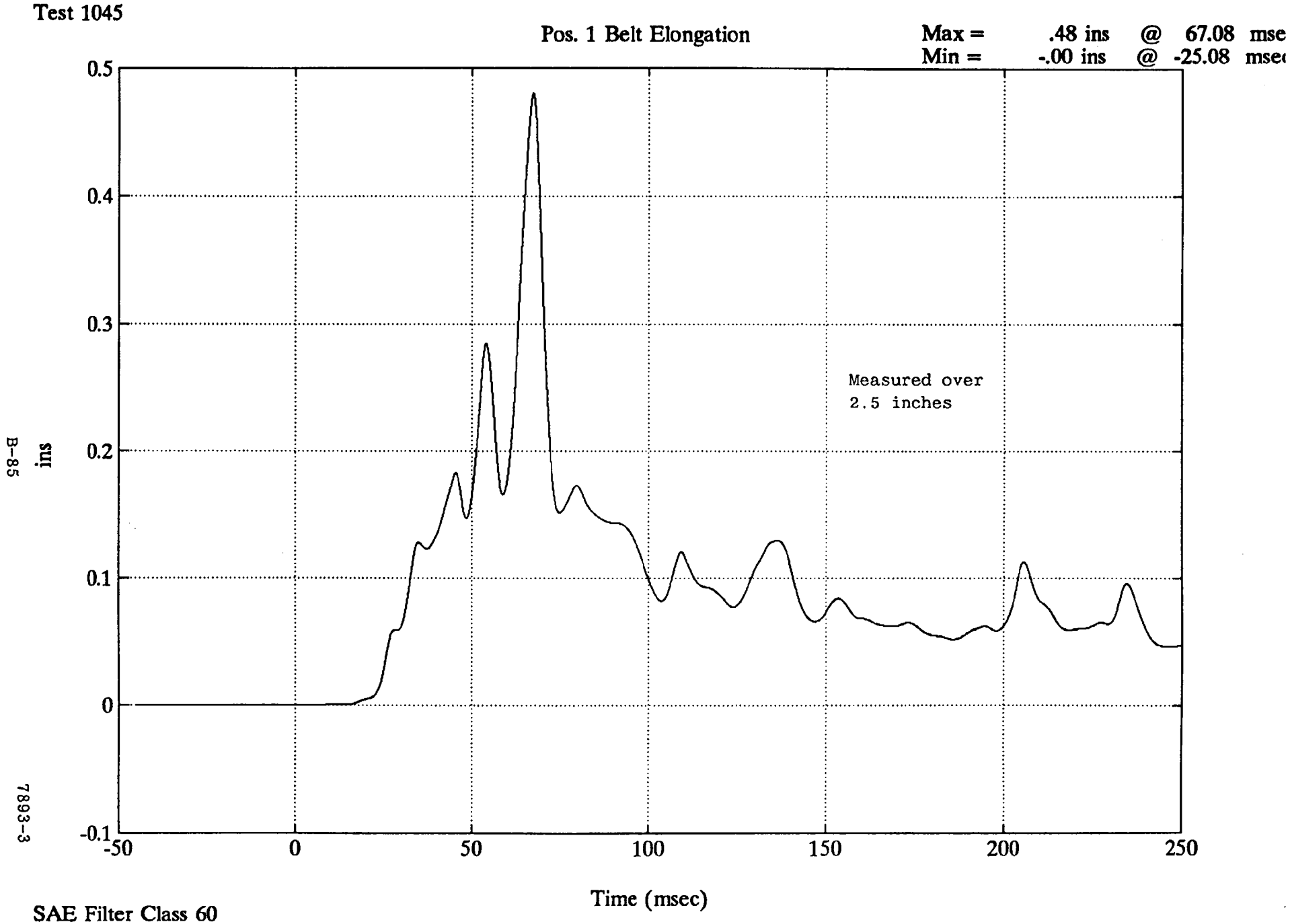


SAE Filter Class 60

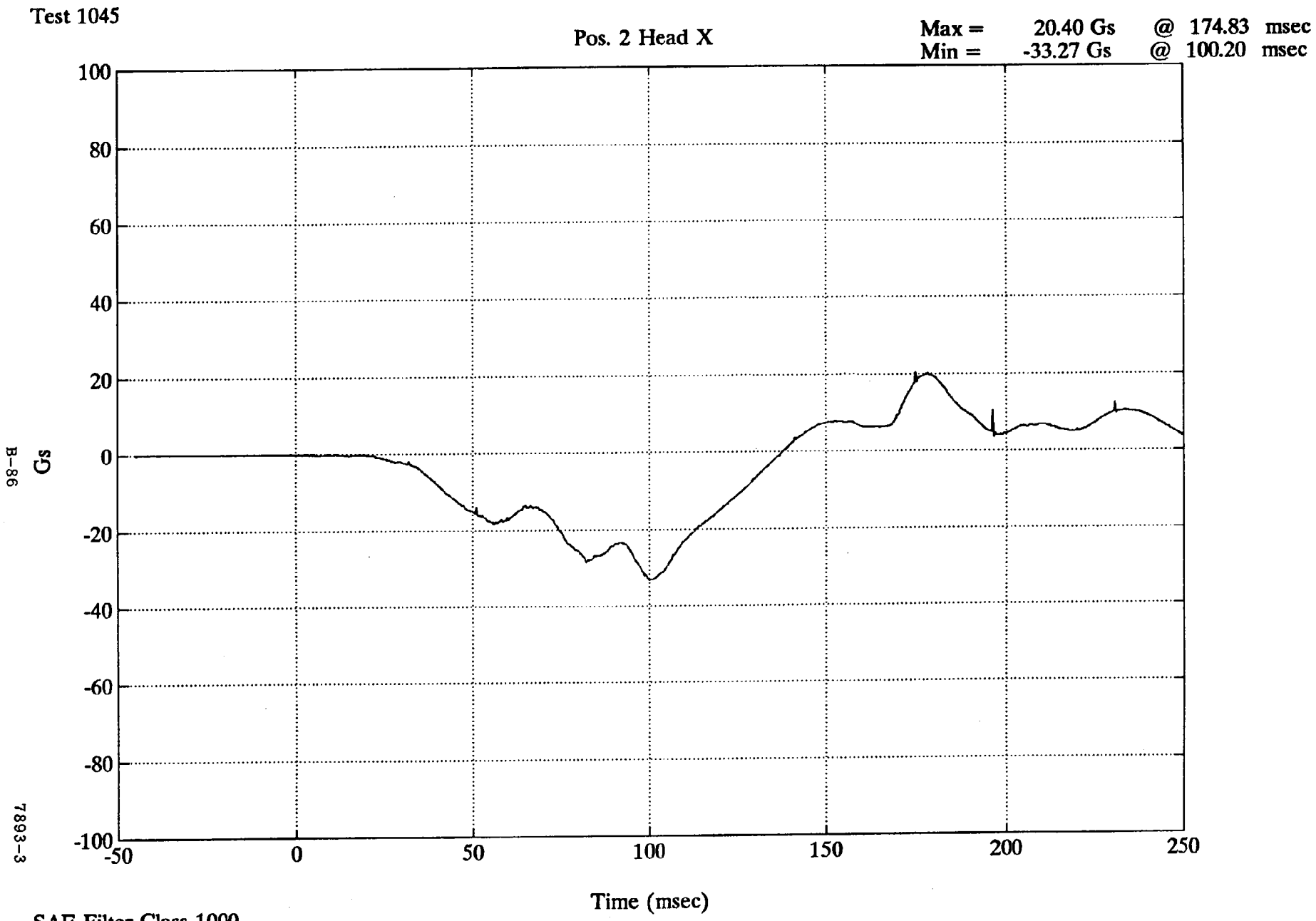
B-84

7893-3

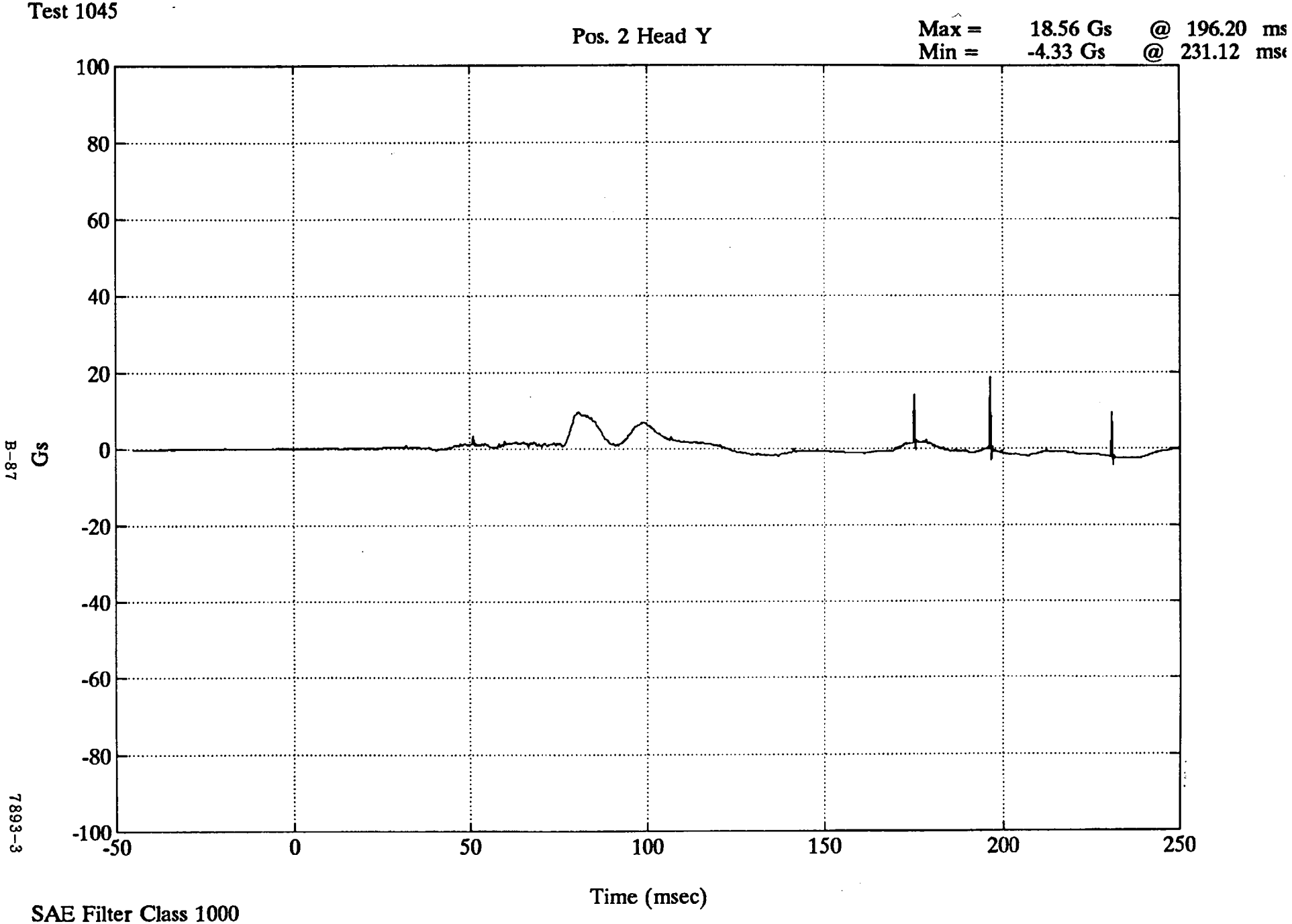
Test 1045



SAE Filter Class 60

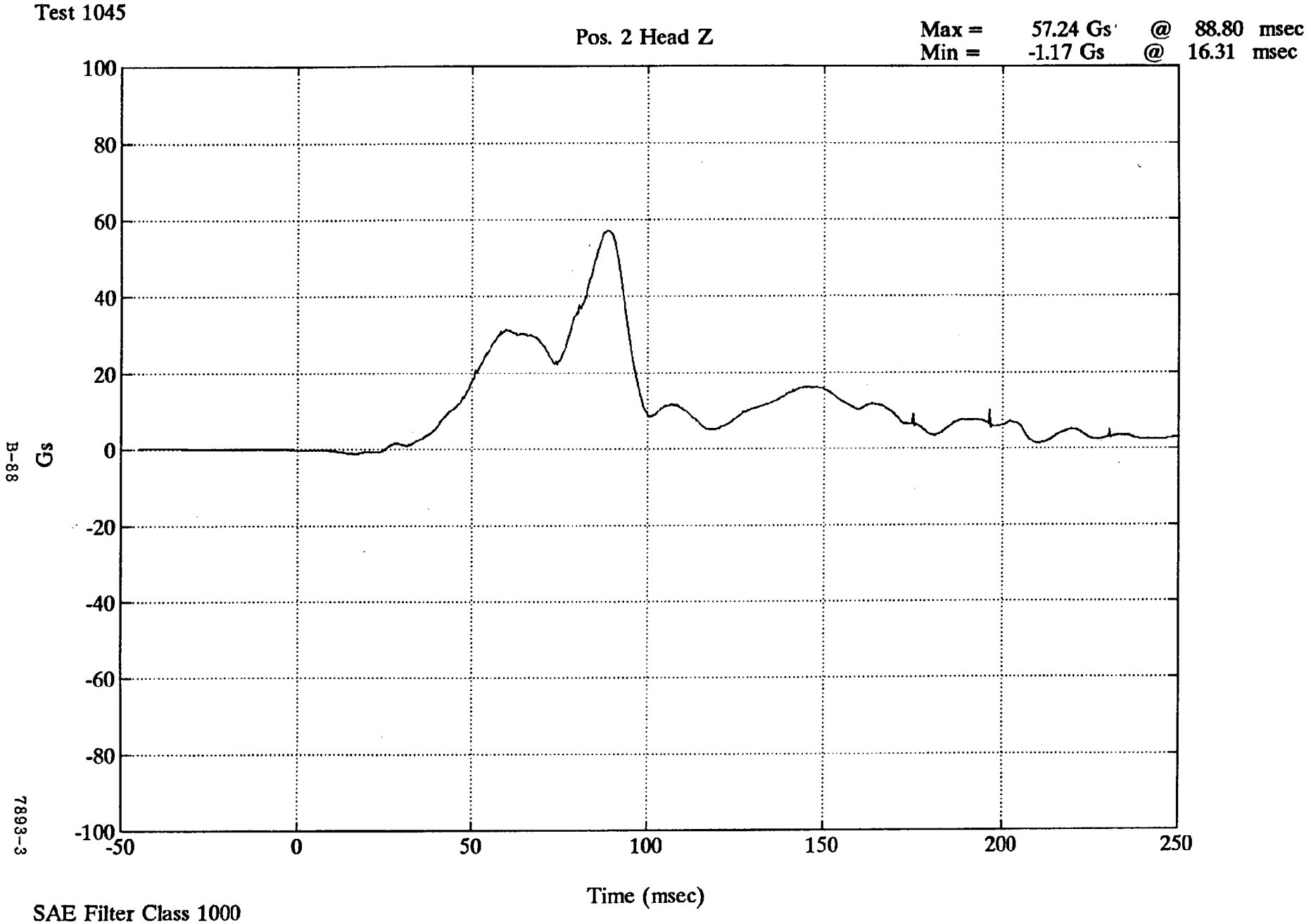

Test 1045
Pos. 2 Head X
Max = 20.40 Gs @ 174.83 msec
Min = -33.27 Gs @ 100.20 msec
100
80
60
40
20
0
-20
-40
-60
-80
-100
Gs
-50
0
50
100
150
200
250
Time (msec)
B-86
7893-3
SAE Filter Class 1000

Test 1045



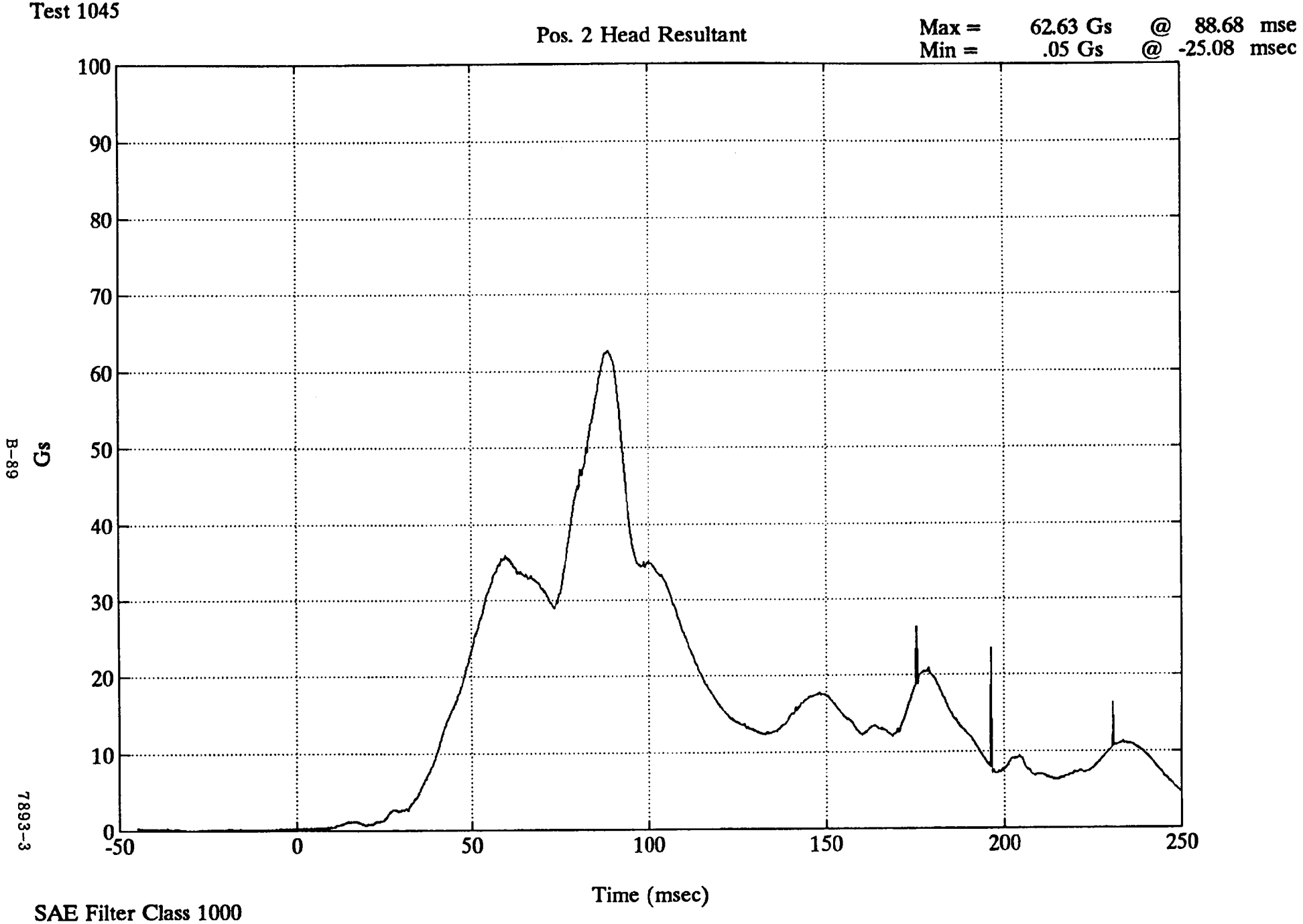
SAE Filter Class 1000

Test 1045



SAE Filter Class 1000

Test 1045

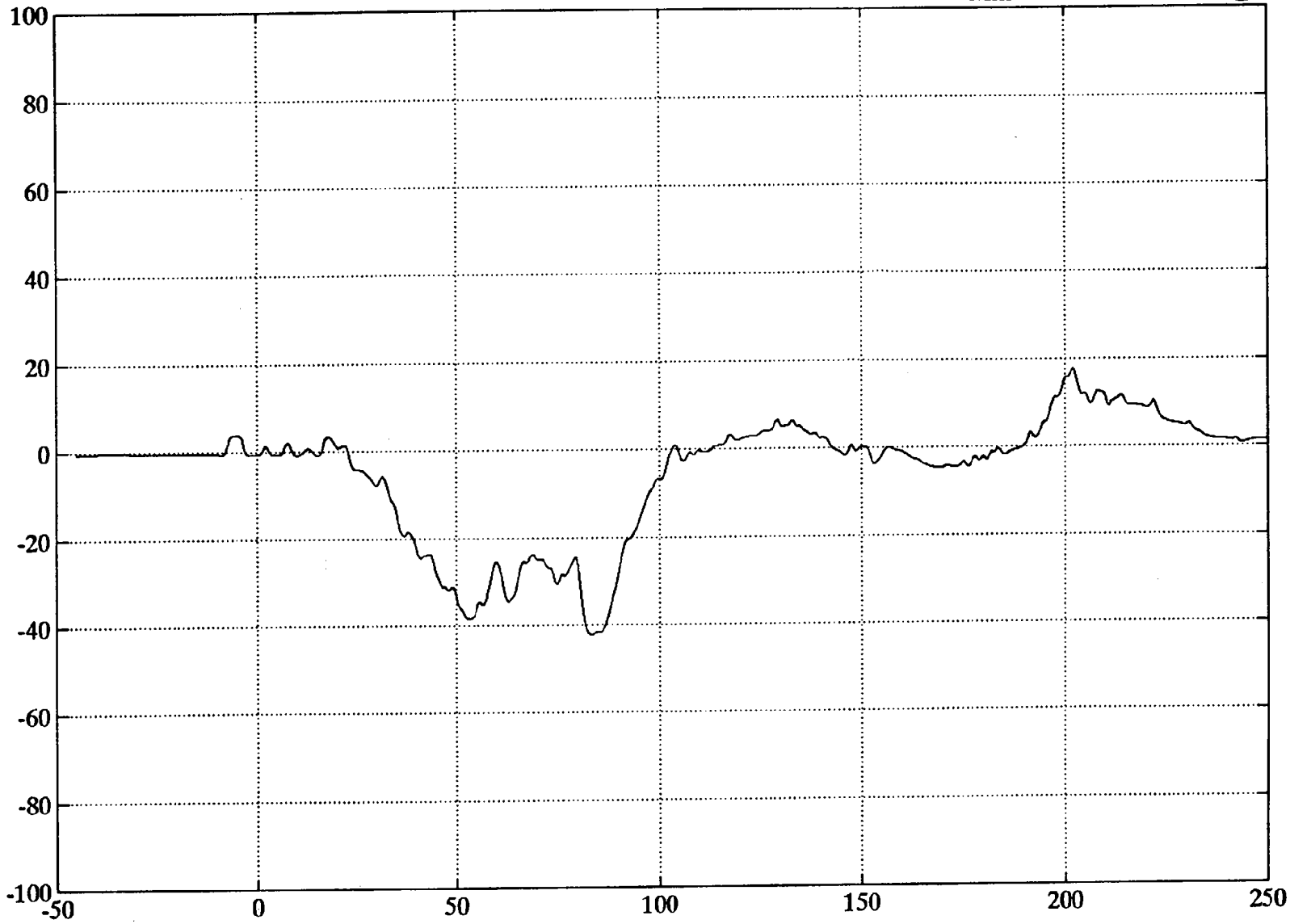


SAE Filter Class 1000

Test 1045

Pos. 2 Chest X

Max = 17.61 Gs @ 202.08 msec
Min = -42.31 Gs @ 83.40 msec

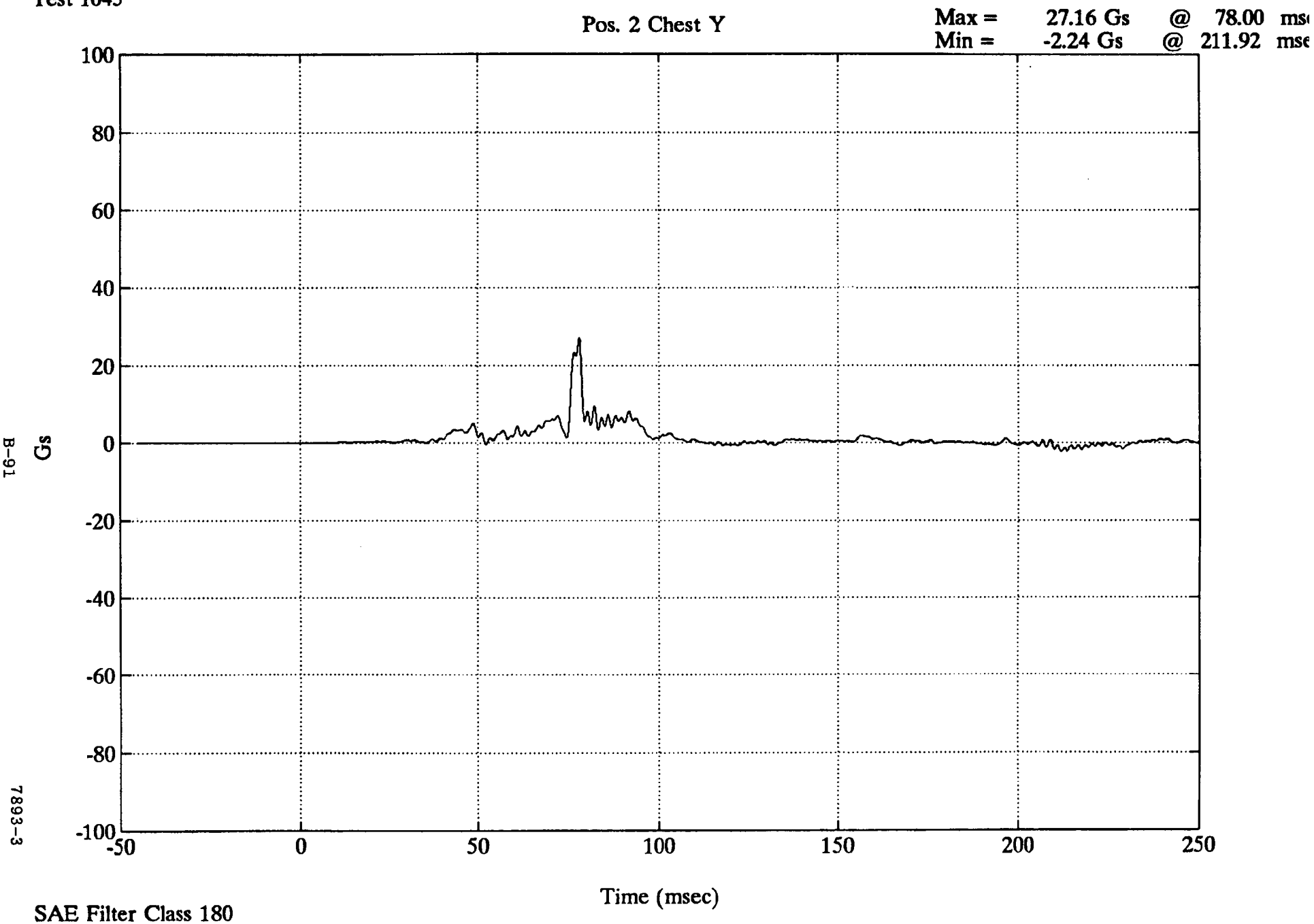


B-90

7893-3

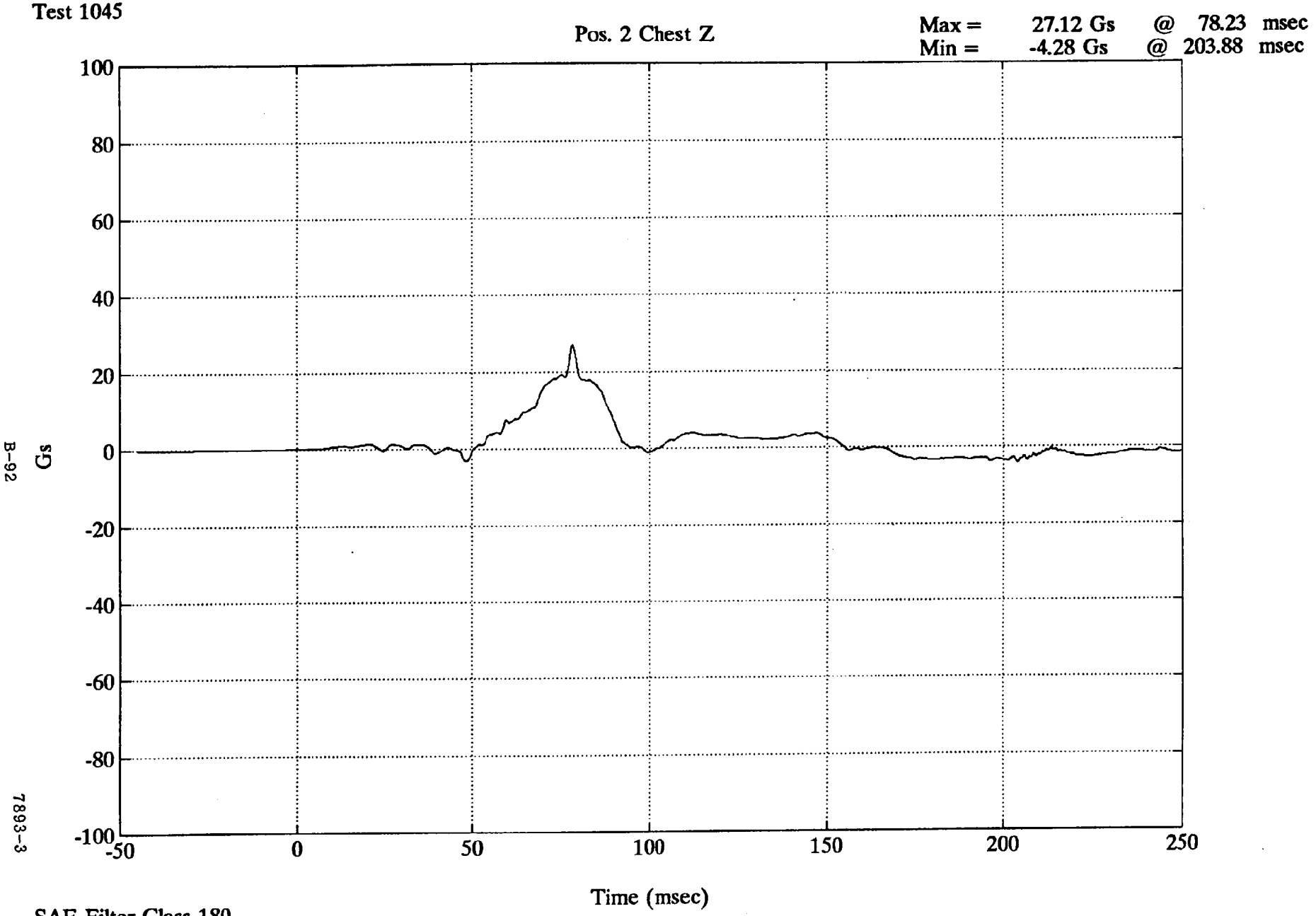
SAE Filter Class 180

Test 1045



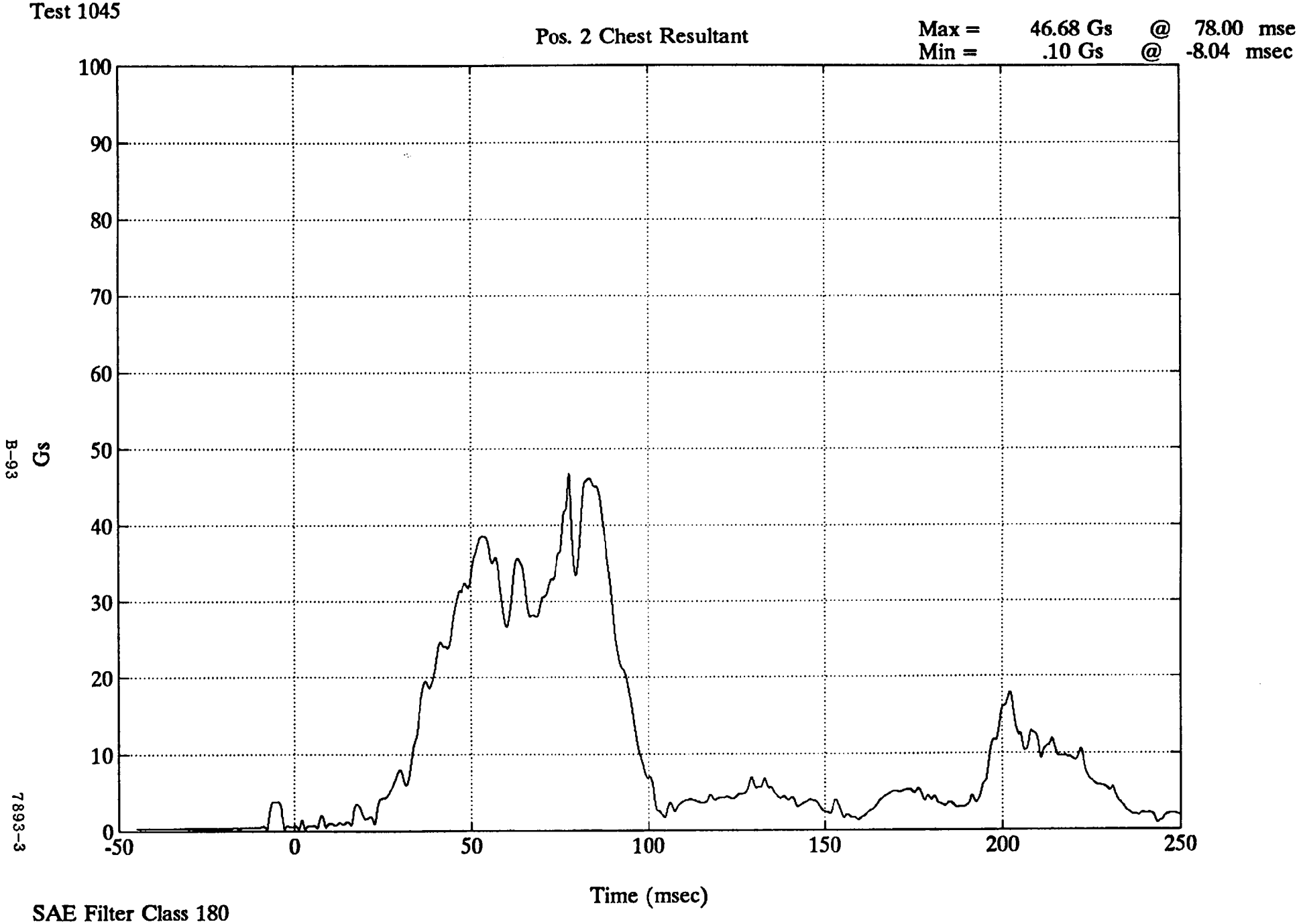
SAE Filter Class 180

Test 1045



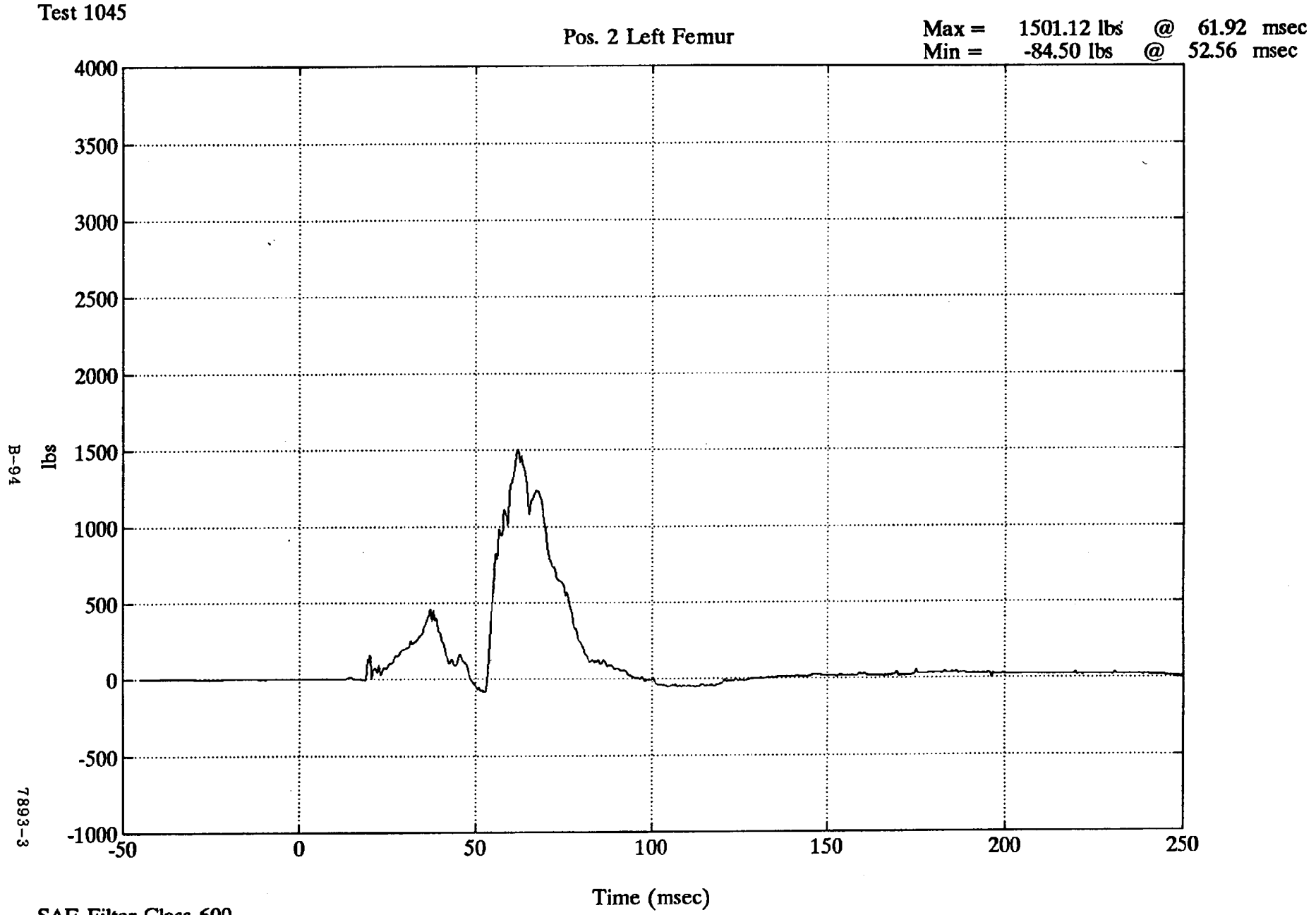
SAE Filter Class 180

Test 1045



SAE Filter Class 180

Test 1045

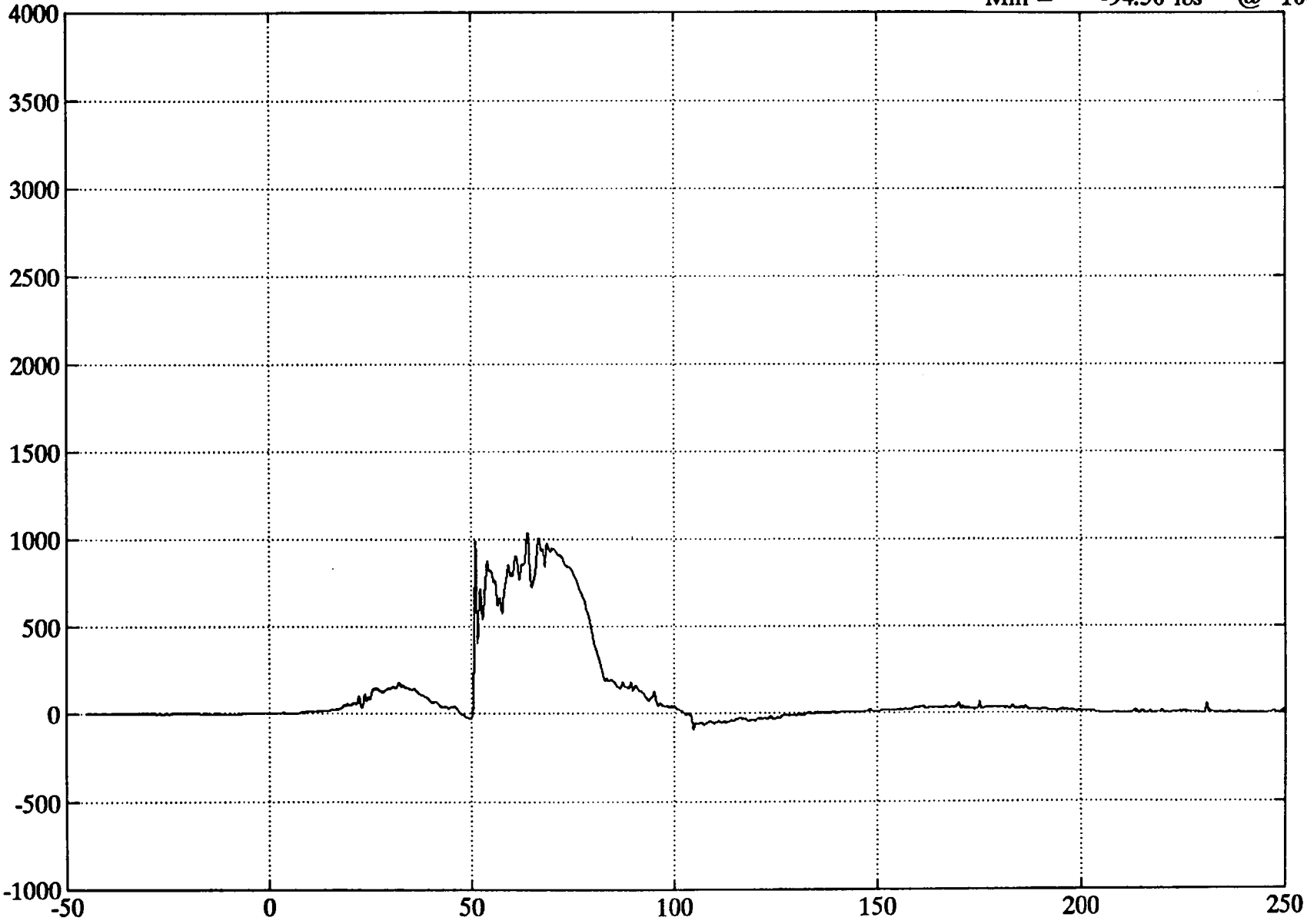


SAE Filter Class 600

Test 1045

Pos. 2 Right Femur

Max = 1033.18 lbs @ 63.72 ms
Min = -94.50 lbs @ 104.88 mse

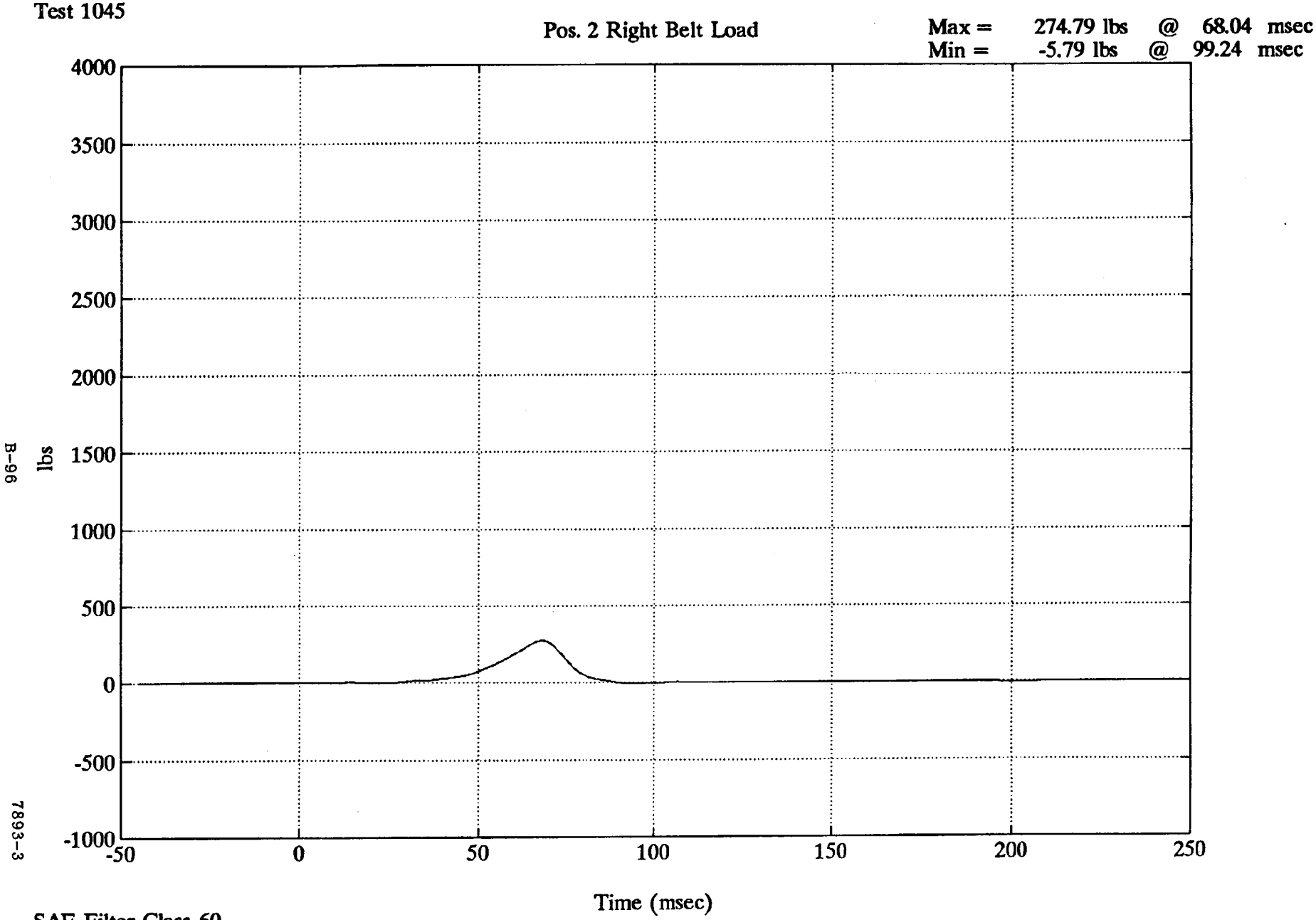


B-95

7893-3

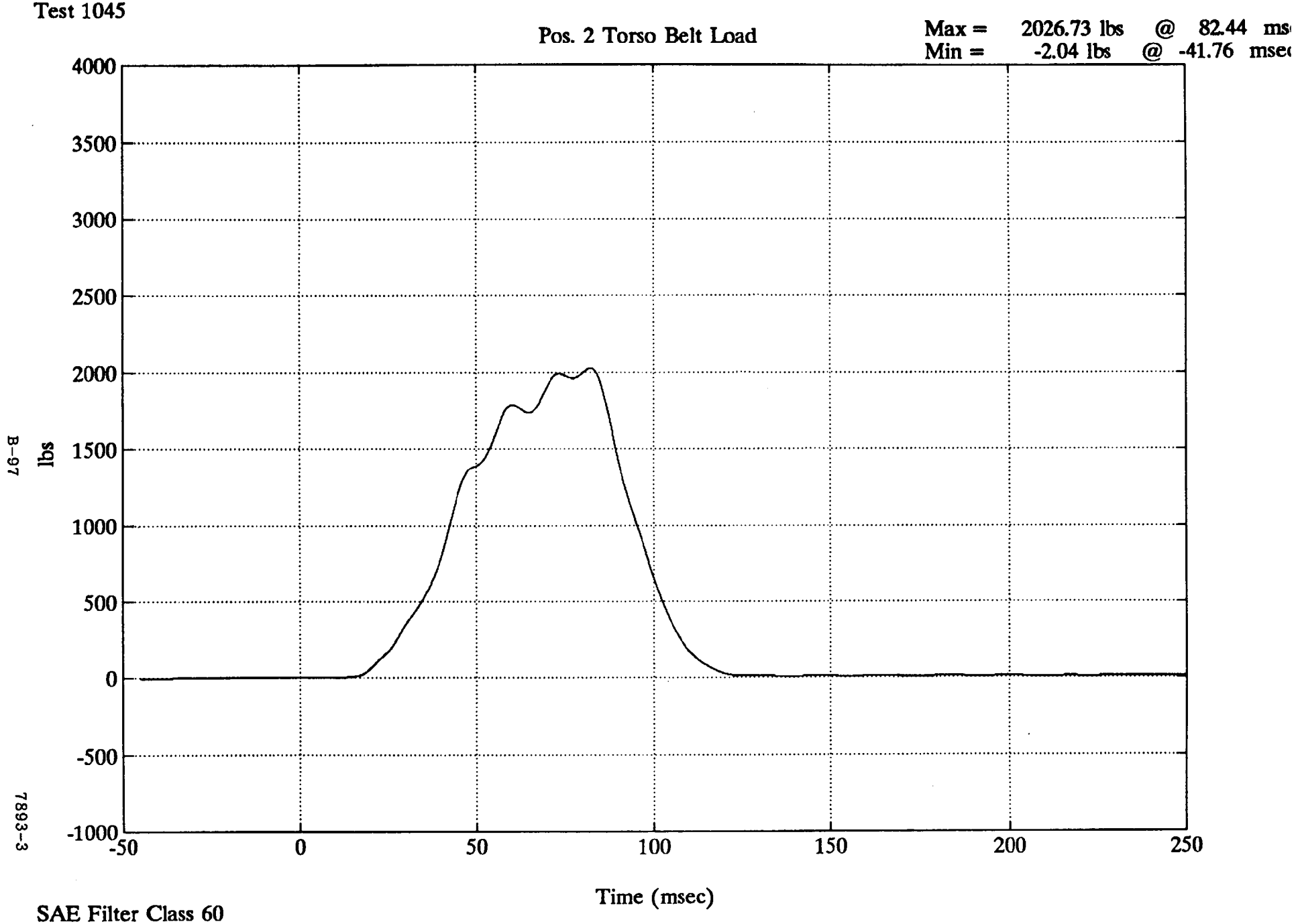
SAE Filter Class 600

Test 1045



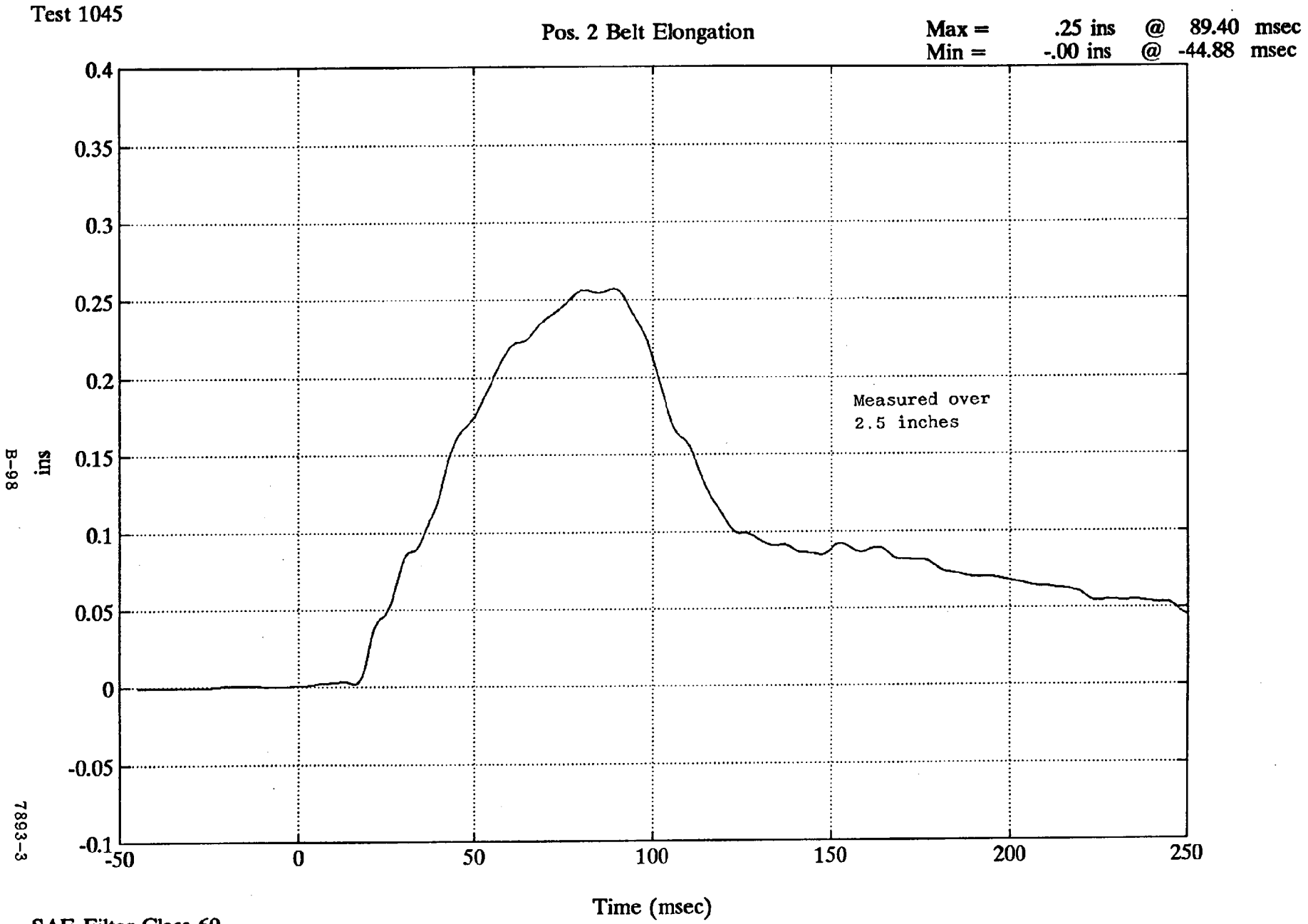
SAE Filter Class 60

Test 1045



SAE Filter Class 60

Test 1045



SAE Filter Class 60

Appendix C

PART 572 B 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:

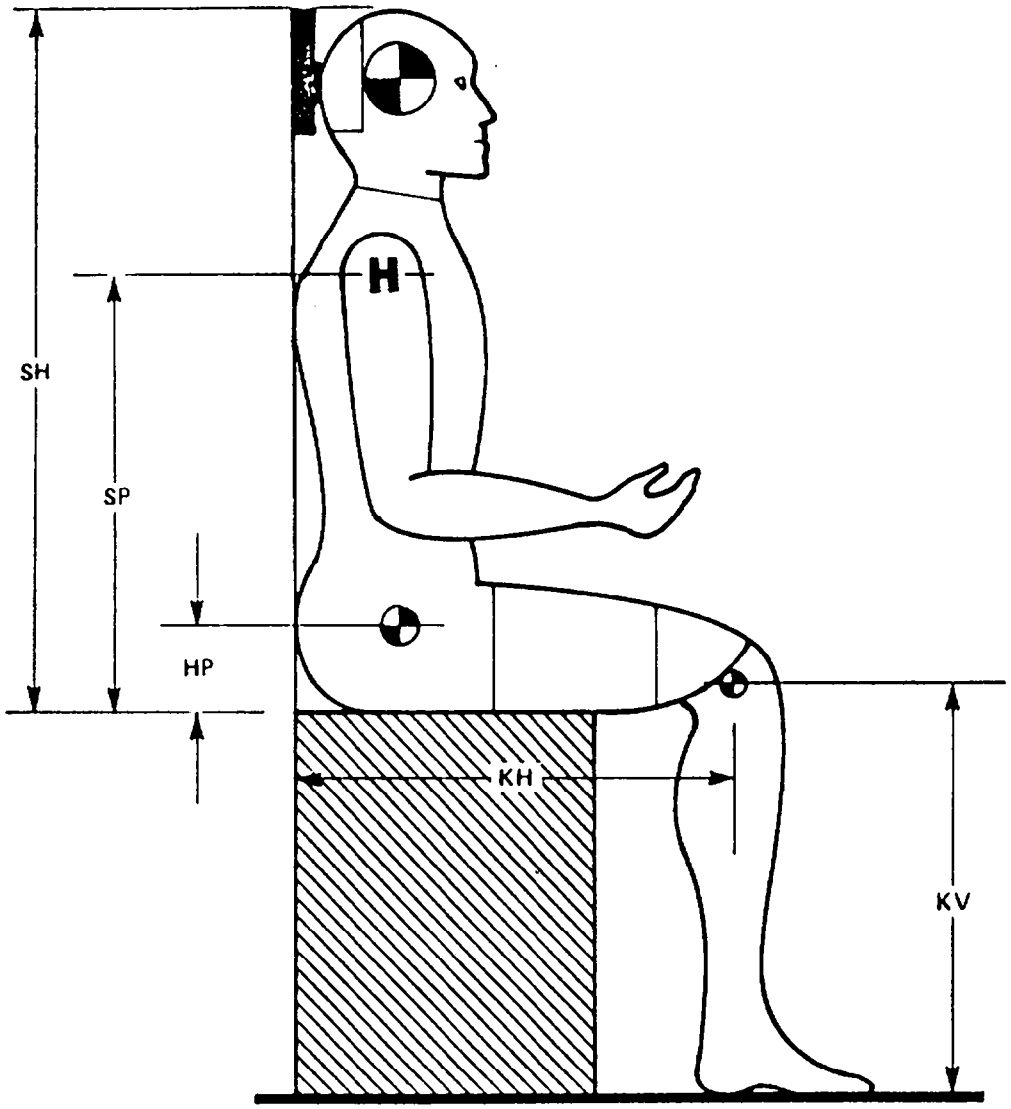
Serial No.	Completion Date
749	9-25-90
320	3-7-90

Electronic Test Equipment

The complement of signal conditioning, recording and display equipment, in conjunction with dummy certification testing, can be found in New Car Assessment and Standards Indicant Testing Final Report No. 6525-V-1.

Figure 10

DUMMY CONFIGURATION DIMENSIONS



PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER.: 749

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXXX	9-25-90	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXX	1	
SH - Seated Height	35.6 to 35.8"	35.6 "	"
SP - Shoulder Pivot Height	21.8 to 22.4"	22.0 "	"
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"	19.5 "	"
SW - Shoulder Width	17.8 to 18.4"	18.1 "	"
HW - Hip Width	14.0 to 15.4"	14.7 "	"

II. PERFORMANCE VERIFICATION DATA:

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION		9-25-90	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		1	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		69-70 deg	deg
VERIFICATION LAB HUMIDITY (10 TO 70 %)		45-50 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	233.9 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.	1.25 ms	ms

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

TECHNICIAN'S NAME: IVAN MINKEWICZ

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 749

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	22.8 fps	
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	23.5 G's	
c. Peak Resultant Head Acceleration		26 G's max.	25.32 G's	
d. Pendulum Decel. (t2-t1)		<= 3 ms.	2.48 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	27.78 ms	
f. Pendulum Decel. (t4-t3)		<= 10 ms.	4.59 ms	
g. Max. Head Rotation		63 to 73 deg.	72.65 deg	
h. Chordal Displacement				
HEAD ROTATION ANGLE				
0 deg.	Time	-2 to 2 ms.	0.0 ms	
	Displ.	-.5 to .5"	0.0 "	
30 deg.	Time	25.6 to 34.4 ms.	29.27 "	
	Displ.	2.1 to 3.1"	3.01 "	
60 deg.	Time	40.3 to 51.7 ms.	43.65 ms	
	Displ.	4.3 to 5.3"	4.69 "	
Maximum	Time	53.2 to 66.8 ms.	56.42 ms	
	Displ.	5.0 to 6.0"	5.15 "	
60 deg.	Time	67.0 to 83.0 ms.	72.79 ms	
	Displ.	4.3 to 5.3"	4.62 "	
30 deg.	Time	85.4 to 104.6 ms.	90.28 ms	
	Displ.	2.1 to 3.1"	2.19 "	
0 deg.	Time	101.0 - 123.0 ms.	106.03 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: 749

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.	27.5 lbs	
b. Force @ 0.75"	36 to 50 lbs.	42 lbs	
c. Force @ 1.0"	50 to 63 lbs.	57.5 lbs	
d. Force @ 1.3"	73 to 88 lbs.	81 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	30 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	43 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	55.5 lbs	
d. Return Angle	12 deg. maximum	9 deg	
5. CHEST IMPACT TESTS:			
A.High Speed			
(1) Probe Speed	21.78-22.22 fps.	21.8 fps	
(2) Peak Deflection	1.7" maximum	1.61 "	
(3) Peak Resistive Force	2250 lbs maximum	2075 lbs	
(4) Internal Hysteresis	50 to 70%	64.1 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	13.9 fps	
(2) Peak Deflection	1.1" maximum	.98 "	
(3) Peak Resistive Force	1450 lbs maximum	1293 lbs	
(4) Internal Hysteresis	50 to 70%	57 %	

TECHNICIAN'S NAME: IVAN MINKEWICZ

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 749

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	
(2) Maximum Force	1850 to 2500 lbs	1926 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	1.75 ms	
B. Right Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	2242 lbs	
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.75 ms	

REMARKS:

TECHNICIAN'S NAME: IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NUMBER _____749_____

DUMMY INSTRUMENT--	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER--				
HX LONGITUDINAL--	ENDEVCO	FY05	9-90	3-91
HY LATERAL--	ENDEVCO	GD98	9-90	3-91
HZ VERTICAL--	ENDEVCO	CD75	9-90	3-91
2. CHEST ACCELEROMETER-				
CX LONGITUDINAL--	CEC	A73	9-90	3-91
CY LATERAL--	ENDEVCO	CE06	9-90	3-91
CZ VERTICAL--	CEC	A44	9-90	3-91
3. FEMUR LOAD CELLS				
RIGHT SIDE	GSE	954	9-90	3-91
LEFT SIDE	GSE	955	9-90	3-91
CALIBRATION LABORATORY INSTRUMENTS--				
1. PENDULUM ACC.--	CEC	A160	11-90	5-91
2. TEST PROBE ACCELEROMETER--	CEC	A161	11-90	5-91
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE--	TRANS-DUCER INC	20051	1-91	7-91
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	BLH	72952	1-91	7-91
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	CIC	567-11	1-91	7-91

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER.: 320

I. CONFIGURATION VERIFICATION DATA

	P. 572 SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION	XXXXXXXXXXXX	3-7-91	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXX	2	
SH - Seated Height	35.6 to 35.8"	35.7 "	"
SP - Shoulder Pivot Height	21.8 to 22.4"	22.0 "	"
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"	19.6 "	"
SW - Shoulder Width	17.8 to 18.4"	18.1 "	"
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		3-7-91	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		2	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		69-70 deg	deg
VERIFICATION LAB HUMIDITY (10 TO 70 %)		29-32 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST			
a. peak resultant accel.	210 to 260 G's	258.5 G's	G's
b. peak lateral accel.	<= 10 G's	3.8 G's	G's
c. Time above 100 G's	0.9 to 1.5 ms.	1.13 ms	ms

* Sequential number beginning with "1" at the start of each fiscal years's 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: 320

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST				
a. Pendulum Speed		21.5 to 25.5 fps.	23.5 fps	
b. Pend. Avg. Decel. over t3 to t2		20 to 24 G's	23.0 G's	
c. Peak Resultant Head Acceleration		26 G's max.	25.81 G's	
d. Pendulum Decel. (t2-t1)		<= 3 ms.	2.73 ms	
e. Pendulum Decel. (t3-t2)		25 to 30 ms.	26.41 ms	
f. Pendulum Decel. (t4-t3)		<= 10 ms.	6.94 ms	
g. Max. Head Rotation		63 to 73 deg.	71.52 deg	
h. Chordal Displacement				
HEAD ROTATION ANGLE				
0 deg.	Time	-2 to 2 ms.	0.0 ms	
	Displ.	-.5 to .5"	0.0 "	
30 deg.	Time	25.6 to 34.4 ms.	29.39 ms	
	Displ.	2.1 to 3.1"	2.85 "	
60 deg.	Time	40.3 to 51.7 ms.	42.66 ms	
	Displ.	4.3 to 5.3"	4.9 "	
Maximum	Time	53.2 to 66.8 ms.	58.04 ms	
	Displ.	5.0 to 6.0"	5.76 "	
60 deg.	Time	67.0 to 83.0 ms.	73.29 ms	
	Displ.	4.3 to 5.3"	4.79 "	
30 deg.	Time	85.4 to 104.6 ms.	90.28 ms	
	Displ.	2.1 to 3.1"	2.12 "	
0 deg.	Time	101.0 - 123.0 ms.	104.41 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: 320

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.	26.5 lbs	
b. Force @ 0.75"	36 to 50 lbs.	40.5 lbs	
c. Force @ 1.0"	50 to 63 lbs.	57.5 lbs	
d. Force @ 1.3"	73 to 88 lbs.	83 lbs	
4. LUMBAR FLEXION TEST:			
a. Force @ 20 deg.	22 to 34 lbs.	27 lbs	
b. Force @ 30 deg.	34 to 46 lbs.	40 lbs	
c. Force @ 40 deg.	46 to 58 lbs.	51 lbs	
d. Return Angle	12 deg. maximum	7 deg	
5. CHEST IMPACT TESTS:			
A.High Speed			
(1) Probe Speed	21.78-22.22 fps.	21.8 fps	
(2) Peak Deflection	1.7" maximum	1.61 "	
(3) Peak Resistive Force	2250 lbs maximum	2130 lbs	
(4) Internal Hysteresis	50 to 70%	57.7 %	
B. Low Speed			
(1) Probe Speed	13.86-14.14 fps.	14.0 fps	
(2) Peak Deflection	1.1" maximum	1.07 "	
(3) Peak Resistive Force	1450 lbs maximum	1325 lbs	
(4) Internal Hysteresis	50 to 70%	56.4 %	

TECHNICIAN'S NAME: IVAN MINKEWICZ

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA (continued)

II. PERFORMANCE VERIFICATION DATA (continued)

NHTSA DUMMY I.D. NUMBER: 320

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	
(2) Maximum Force	1850 to 2500 lbs	1972 lbs	
(3) Time above 1000 lbs.	1.7 ms. minimum	1.875 ms	
B. Right Knee			
(1) Probe Speed	6.76 to 7.04 fps	7.0 fps	
(2) Maximum Force	1850 to 2500 lbs	1969 lbs	
(3) Time Above 1000 lbs.	1.7 ms. minimum	1.875 ms	

REMARKS:

TECHNICIAN'S NAME: IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY ID NUMBER _____320_____

DUMMY INSTRUMENT--	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER--				
HX LONGITUDINAL--	ENDEVCO	CP30	9-90	3-91
HY LATERAL--	ENDEVCO	CX05	9-90	3-91
HZ VERTICAL--	ENDEVCO	DB47	9-90	3-91
2. CHEST ACCELEROMETER-				
CX LONGITUDINAL--	CEC	A74	9-90	3-91
CY LATERAL--	ENDEVCO	FH01	9-90	3-91
CZ VERTICAL--	CEC	A128	9-90	3-91
3. FEMUR LOAD CELLS				
RIGHT SIDE	GSE	951	9-90	3-91
LEFT SIDE	GSE	952	9-90	3-91
CALIBRATION LABORATORY INSTRUMENTS--				
1. PENDULUM ACC.--	CEC	A160	11-90	5-91
2. TEST PROBE ACCELEROMETER--	CEC	A161	11-90	5-91
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE--	TRANS-DUCER INC	20051	1-91	7-91
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	BLH	72952	1-91	7-91
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE--	CIC	567-11	1-91	7-91

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	FY05	ENDEVCO	9-90	3-91
Y	GD98	ENDEVCO	9-90	3-91
Z	CD75	ENDEVCO	9-90	3-91
Chest X	A73	CEC	9-90	3-91
Y	CE06	ENDEVCO	9-90	3-91
Z	A44	CEC	9-90	3-91
Right Femur Load Cell	955	GSE	9-90	3-91
Left Femur Load Cell	954	GSE	9-90	3-91
Neck Load Cell X				
Y				
Z				
Neck Moment X				
Y				
Z				
Chest Deflection Gauge				
Hybrid III Use Only				
Lap Belt Load Cells	123	LEBOW	9-90	3-91
Shoulder Belt Load Cells	127	LEBOW	9-90	3-91
Spool-Out Potentiometer	-	-	-	-
Belt Stretch Transducer	E1	CALSPAN	10-90	4-91

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(6 Month Calibration Minimum)

PASSENGER DUMMY	Serial #	Manufacturer	Calibration Last	Calibration Next
Head X	CP30	ENDEVCO	9-90	3-91
Y	CX05	ENDEVCO	9-90	3-91
Z	DB47	ENDEVCO	9-90	3-91
Chest X	A74	CEC	9-90	3-91
Y	FH01	ENDEVCO	9-90	3-91
Z	A128	CEC	9-90	3-91
Right Femur Load Cell	952	GSE	9-90	3-91
Left Femur Load Cell	951	GSE	9-90	3-91
Neck Load Cell X				
Y				
Z				
Neck Moment X				
Y				
Z				
Chest Deflection Gauge Hybrid III Use Only				
Lap Belt Load Cells	133	LEBOW	9-90	3-91
Shoulder Belt Load Cells	135	LEBOW	9-90	3-91
Spool-Out Potentiometer	-	-	-	-
Belt Stretch Transducer	E3	CALSPAN	10-90	4-91

INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS
(6 Month Calibration Minimum)

	Serial #	Manufacturer	Calibration	
			Last	Next
Left Seat Rear Crossmember	A155	CEC	9-90	3-91
Right Rear Seat Crossmember	A177	CEC	12-90	6-91
Top of Engine	A29	CEC	1-91	7-91
Bottom of Engine	A144	CEC	10-90	4-91
Left Disc Brake Caliper	A68	CEC	10-90	4-91
Right Disc Brake Caliper	A156	CEC	9-90	3-91
Instrument Panel	A179	CEC	12-90	6-91
Center Rear Crossmember Z	A146	CEC	1-91	7-91
Vehicle Rear Z	A164	CEC	9-90	3-91

INSTRUMENT CALIBRATION FOR LABORATORY INSTRUMENTS
(6 Month Calibration Minimum)

	Serial #	Manufacturer	Calibration	
			Last	Next
Neck Bending Pendulum Accel.	A160	CEC	11-90	5-91
Neck Bending Rotary Potentiometer	None	BOURNS	11-90	5-91
Femur Probe Accelerometer	A160	CEC	11-90	5-91
Chest/Thorax Probe Accel.	A161	CEC	11-90	5-91
Lumbar Flexion Force Gauge	20051	TRANSDUCER INC.	1-91	7-91

Appendix E

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

3. If you do not see or smell fuel, push the red reset button on the fuel pump shut off switch down.
4. Turn the ignition key ON for a few seconds, then turn it OFF.
5. Check under the vehicle again for leaking fuel. If you see or smell fuel, do not start your vehicle again. If there is no fuel, you can start your vehicle.

Using Safety Restraints Properly

Safety Belts

The use of safety belts helps to protect 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:

- ❑ LAP AND SHOULDER BELTS – for all occupants.

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.

Use the shoulder belt on the outside shoulder only. Never wear the shoulder belt under the arm. Never swing it around your neck over the inside shoulder. Never use a single belt for more than one person. Failure to follow these precautions could increase the risk and/or severity of injury in an accident.

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.

Never use a single belt for more than one person or across seating positions. 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. Each assembly is designed to be used as a pair.

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

Warning: Always drive and ride with your seat back upright and the lap belt snug 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.

Children should always ride with the seat back in the fully upright position. When the seat back 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.

Safety Belt Maintenance

Check the safety belt systems periodically to make sure that they work properly and are not damaged.

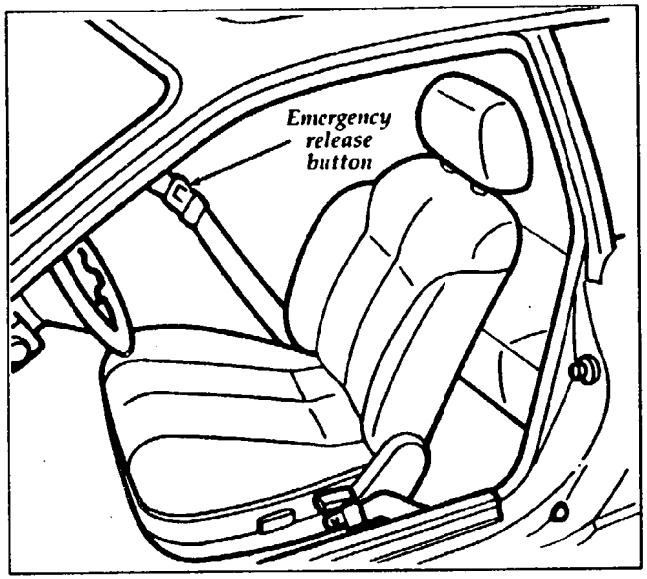
Warning: All safety belt assemblies including retractors and attaching hardware should be inspected after any collision. Ford recommends that all safety belt assemblies used during a collision be replaced unless the collision was minor and a qualified technician finds that the belts do not show damage 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.

Motorized Passive Shoulder Belt Restraint System (Front Seat)

The passive shoulder belt restraint system operates electrically. The automatic shoulder belt, the manual lap belt, and knee bolsters, provide restraint for the front seat occupants.

Warning: The lap safety belt is to be manually buckled by the driver/passenger and should always be worn with the shoulder belt. Be sure the lap belt is on your hips as low as possible.

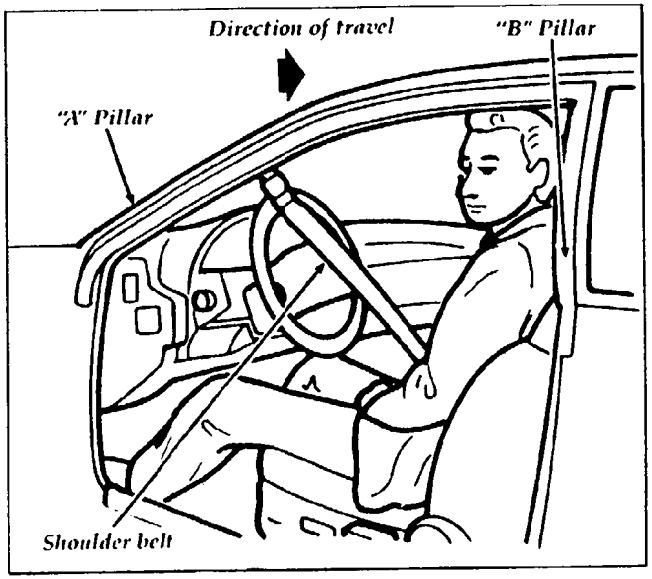
After entering the vehicle and closing the door, check to ensure the shoulder belt is latched to the emergency release buckle. The shoulder belt should remain latched to the release buckle at all times except for emergency situations.



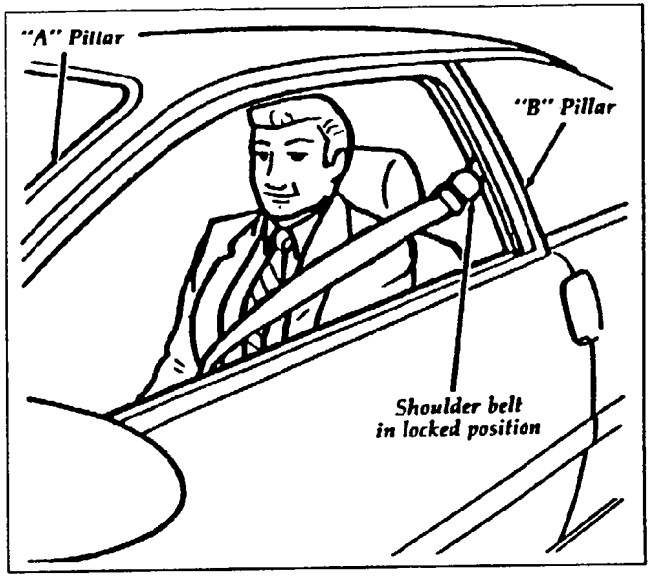
Fastening the shoulder belt to the emergency release buckle

To latch the shoulder belt to the emergency release buckle at the "A" pillar, pull the shoulder belt from the retractor between the seat and console, and buckle it to the emergency release buckle.

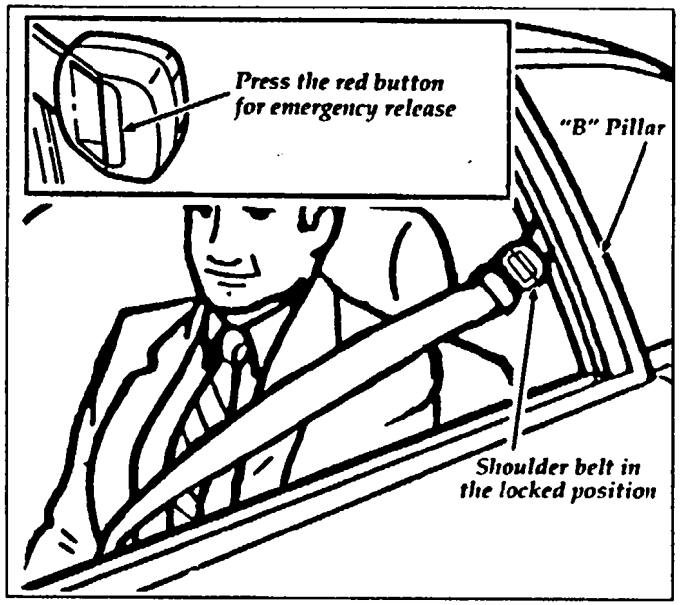
Close your door. Insert the ignition key and turn it to the ON position. A motor will slide the shoulder belt along its track starting at the front "A" pillar and moving rearward to its locked position on the "B" pillar.



Shoulder belt movement (when door is closed)



Shoulder belt in locked position



If either driver or passenger shoulder belt or driver's lap belt is not buckled, when the ignition switch is turned to the ON position, the reminder buzzer will sound for 4 to 8 seconds, and the warning lamp will illuminate until both shoulder belts are buckled.

When the ignition switch is in the ON position and the shoulder belt is moving, the warning lamp will illuminate. When the shoulder belt comes to rest (in the rear position), the warning lamp will go out.

The shoulder belt will automatically adjust itself to allow for comfortable wear and freedom of movement by the occupant. It will lock tight only on extremely hard braking, or hard cornering or impacts of approximately 5 mph (8 km/h) or more.

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. Never use a single belt for more than one person. Failure to follow these precautions could increase the chance and/or severity of injury in an accident. When the ignition is in any position and the door is opened, the shoulder belt will move forward to the "A" pillar. This will allow ample room for exit from the vehicle by the driver or passenger. DO NOT use the belt as an assist handle when entering or exiting the vehicle.

To reduce the risk of sliding under the lap belt during a collision, always drive and ride with seat backs in the upright position. If the lap belt slips above the hip-bone during a collision and applies force directly to the soft areas of the abdomen, it will increase the risk of serious injury. The seat backs and the belts provide best restraint when the seat is upright, the occupant is sitting upright in the seat (not slouching), the lap belt is snug and low on the hips, the shoulder belt is snug against the chest and the knees are straight forward.

Children should always ride with the seat in the fully upright position. When the seat back 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.

Be sure to keep the sun visors away from the side windows when the shoulder belts move along their tracks, to prevent possible damage to the sun visors or shoulder belt system.

Important For Your Safety

Before driving the vehicle, read the label on the back of the sun visor.

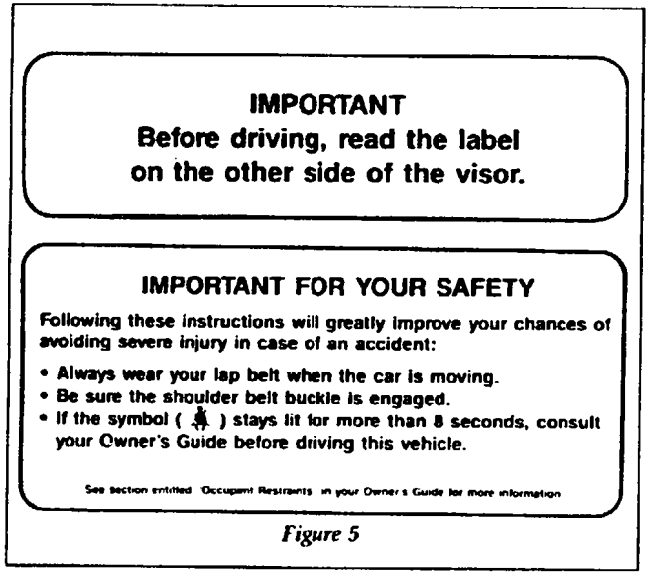


Figure 5

Labels located on the driver's sun visor

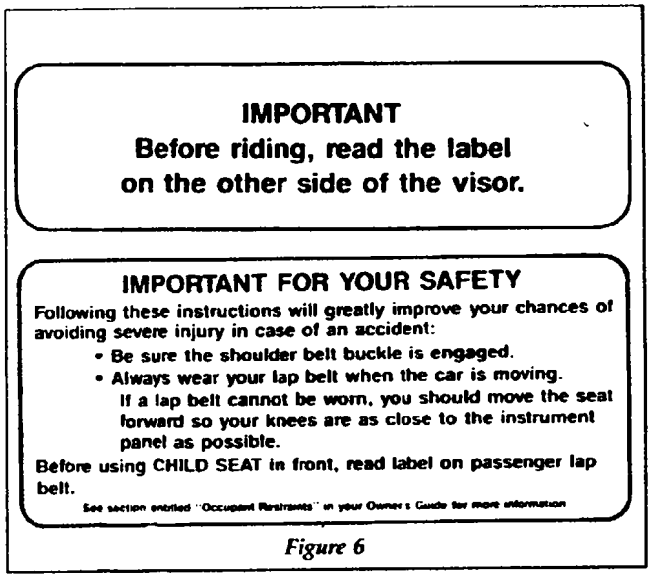


Figure 6

Labels located on the passenger's sun visor