V1679

REPORT NUMBER: CAL-92-N09

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

ISUZU MOTORS LIMITED
1992 ISUZU PICKUP

NHTSA NUMBER: MN5700

CALSPAN TEST NUMBER: 7951-3

JANUARY 16, 1992

CALSPAN CORPORATION
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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

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-90-D-02121. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

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MAY 1 1992
Date of Report Acceptance

Contracting Officer's Tech. Rep. (COTR)

MAY 1 1992
Date of Report Acceptance

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
CAL-91-N09		

4. Title and Subtitle	5. Report Date
NHTSA New Car Assessment Program (NCAP) Frontal Barrier Impact Test of a 1992 Isuzu Pickup	January 16, 1992
	6. Performing Organization Code CAL

7. Author(s)	8. Performing Organization Report No.
Michael J. Kilgallon, Project Engineer Walter E. Levan, Program Manager	7951-3

9. Performing Organization Name and Address	10. Work Unit No.
Calspan Advanced Technology Center P.O. Box 400 Buffalo, New York 14225	J85-030-1150
	11. Contract or Grant No. DTNH22-90-D-02121

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
U.S. Department of Transportation National Highway Traffic Safety Administration Office of Market Incentives (NRM-20) 400 Seventh Street, S.W., Washington, DC 20590	Final Report January 1992
	14. Sponsoring Agency Code DOT/NHTSA/RM/OMI

15. Supplementary Notes

16. Abstract

A frontal load cell barrier test on a 1992 Isuzu Pickup was performed at Calspan Advanced Technology Center crash test facility in Buffalo, New York on January 16, 1992.

The impact speed was 35.0 mph and the ambient temperature at the barrier face at the time of impact was 12°F. The maximum post-test vehicle crush was 21.2 inches. The test vehicle was equipped with a 3-point continuous belt system at each of the front outboard seating positions.

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.

17. Key Words	18. Distribution Statement
35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP)	Copies of this report are available from: Technical Reference Division National Highway Traffic Safety Admin. Nassif Building, Room 5108 400 Seventh St., S.W., Washington, DC 20590

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED		

Form DOT F1700.7 (8-69)

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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 MN5700

A load cell barrier consisting of 36 load cells was impacted by a 1992 Isuzu Pickup at a velocity of 35.0 mph. The test was performed at the Calspan Corporation Advanced Technology Center on January 16, 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 15 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

Two Part 572E, 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. 45) was used in previous tests (MN0300 and MN0102). Injury criteria values were not exceeded for this ATD on both tests. The right-front passenger ATD (Serial No. 150) was used in a previous test (MN0102). Injury criteria values were not exceeded for this ATD on that test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 83 channels were recorded on seven 14-channel FM tape recorders. Appendix B contains the vehicle, load cell barrier and dummy response data traces. Accelerometer #2(X), located on the right rear cross-member, did not record accurately. All data traces for this accelerometer (g-level, velocity, and displacement) have been excluded from this report. Accelerometer #9(X), located in the rear trunk, contained questionable data after approximately 21 milliseconds. Velocity and displacement data curves are not included in the test report. Position 1 Upper neck force (Z) contained intermittent data.

The driver's head struck the upper steering wheel rim and steering hub; the HIC was 883.8. The maximum chest deceleration over 3 milliseconds was 59.4

g's with a chest deflection of 1.7 inches. The maximum femur loads were 381.1 pounds on the left femur and 428.9 pounds on the right femur.

The right front passenger's HIC was 831.2 and maximum chest deceleration over 3 milliseconds 46.5 g's. The maximum chest deflection was 1.5 inches. Femur loads were 288.6 pounds and 537.4 pounds on the left and right femur, respectively.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Year/Make/Model/Body Style: 1992 Isuzu Pick-up

NHTSA Test No.: MN5700 VIN.: JAACL11E6N7206837

Body Color: White Date of Manufacture: 8/91

Engine: 4 Cylinders; - C.I.D.; 2.6 Liters; __ CC

X Gas; - Diesel; - Turbocharged

X Longitudinal; - Transverse

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

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

Date Received: 11/5/91 Odometer Reading: 000093

- A/C; X P/S; X P/B; - P/wdo;

- Tilt Wheel - P/seats; - Cruise Control

Type of Occupant Restraint: 3-Point Continuous Belts

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

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

Recommended Tire Size: P195/75R14

Recommended Cold Tire Pressure: Front 29 psi, Rear 35 psi

Tires on Vehicle: P195/75R14; Manufacturer: UNIROYAL

Number of Occupants: 3 Front; - Rear; - 3rd Seat; 3 TOTAL

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

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

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

GVWR 4300 lbs. GAWR: Front 1900 lbs. Rear 2545 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 = 850 lbs. Right Rear = 590 lbs.

Left Front = 790 lbs. Left Rear = 610 lbs.

TOTAL FRONT WEIGHT = 1640 lbs. (57.7 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1200 lbs. (42.3 % of Total Vehicle Weight)

TOTAL DELIVERED WEIGHT = 2840 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered (2840 lbs.)

DSC = Designated Seating Capacity (2)

RCLW = VCW - 150 (DSC) = 300 lbs.

Target Test Weight = UDW + RCLW + (2 dummies x 167 lbs./dummy)

Target Test Weight = 3474 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 286 POUNDS CARGO:

Right Front = 900 lbs. Right Rear = 830 lbs.

Left Front = 870 lbs. Left Rear = 860 lbs.

TOTAL FRONT WEIGHT = 1770 lbs. (51.2 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1690 lbs. (48.8 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 3460 lbs.

Weight of ballast secured in vehicle trunk area = 100 lbs.

VEHICLE ATTITUDE (all dimensions in inches):

Delivered Attitude: RF 29.7" LF 29.4" RR 31.6" LR 31.3"

Test Attitude: RF 29.2" LF 29.0" RR 29.6" LR 29.5"

Wheel Base: 105.6 in.; C.G. = 51.6 in. rearward of front wheel C/L

Remarks: 13.0 Gallons of stoddard solution was placed in 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: January 16, 1992 Time of Test: 13:00

Ambient Temperature: 12°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 = 35.0 mph, secondary = 35.1 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 175.2	C_L	177.4	L	175.1
	Post-test	= R 155.0	C_L	156.2	L	155.7
	Crush	= R 20.2	C_L	21.2	L	19.4

Distance from front of test vehicle to point of impact:

R 18.7 C_L 18.8 L 19.8

VISIBLE DUMMY CONTACT POINTS:

	Driver	Passenger
Head	Upper steering wheel rim and steering wheel hub	Chin with chest
Chest	Lower steering wheel rim	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	Closed-operable	Closed-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 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.: MN5700 Vehicle: 1992 Isuzu Pickup

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-144.8	-19.0	50.2	145.9
Position #2 - Passenger	-60.9	11.8	55.5	63.8

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-63.4	9.4	18.7	59.4
Position #2 - Passenger	-48.0	25.6	-19.5	46.5

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	381.1	428.9
Position #2 - Passenger	288.6	537.4

	MAXIMUM FORCE - SEAT BELT LOADS (lbs.)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	1925.3	-	2145.6
Position #2 - Passenger	2025.1	1721.2	-

	HEAD INJURY CRITERIA (HIC)			
	HIC	t_1 (SEC)	t_2 (SEC)	Average Acceleration t_1 TO t_2
Position #1 - Driver	883.8	.04920	.08508	57.1
Position #2 - Passenger	831.2	.06132	.09720	55.7

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

Table 3

HYBRID III NECK AND CHEST DATA SHEET

Vehicle Year/Make/Model/Body Style: 1992 Isuzu Pickup

Vehicle NHTSA No.: MN5700 Test Date: January 16, 1992

MAXIMUM VALUES	DRIVER DUMMY ID # 45	PASSENGER DUMMY ID # 150
Neck Load X (lbs.)	-640.4	467.4
Neck Load Y (lbs.)	77.0	-195.4
Neck Load Z (lbs.)	1164.4	534.5
Neck Moment X (ft.-lbs.)	-21.7	17.4
Neck Moment Y (ft.-lbs.)	-48.3	100.4
Neck Moment Z (ft.-lbs.)	23.1	-36.4
Chest Deflection X (in.)	1.7	1.5
Time of Max. Occurance (msec)	57.7	62.6

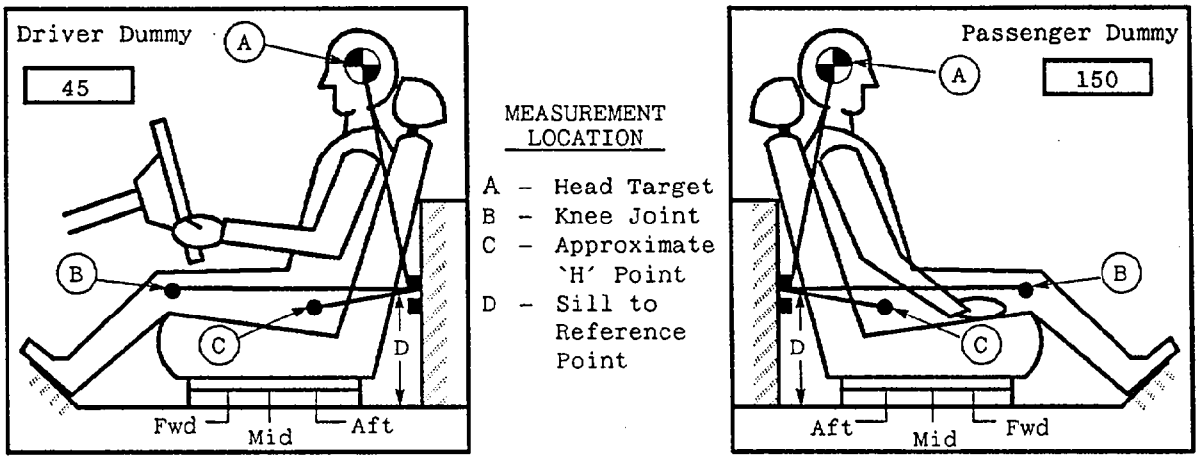
NOTE: All values listed must be occurring during primary impact event.

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION

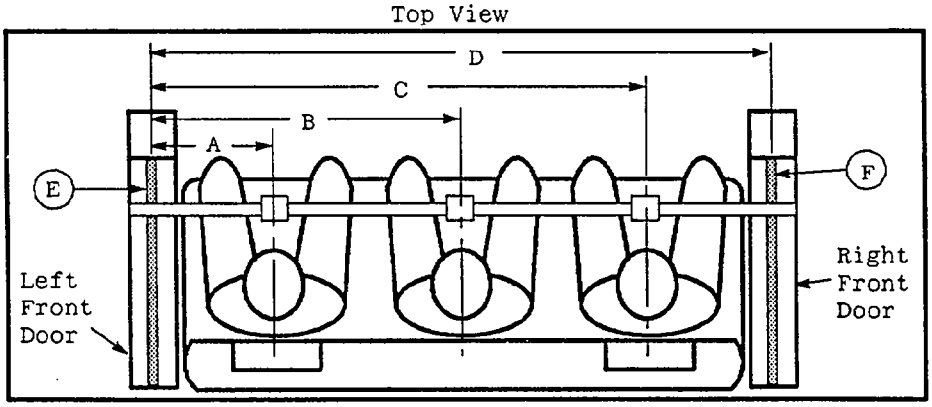
Test No.: MN5700 Vehicle: 1992 Isuzu Pickup

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



Driver Dummy		Passenger Dummy	
A = 23.2 in.	19 Degrees	A = 22.8 in.	16 Degrees
B = 27.8 in.	91 Degrees	B = 28.3 in.	90 Degrees
C = 12.2 in.	108 Degrees	C = 12.2 in.	106 Degrees
D = 14.4 in.		D = 14.4 in.	

Top View



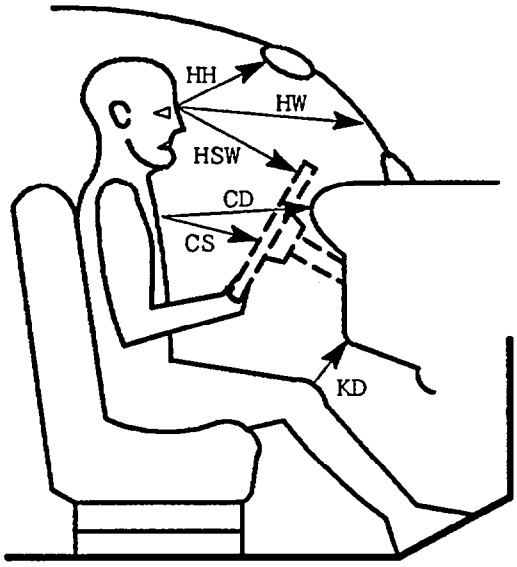
S/N 45 **DUMMY ID** S/N 150

A = Left Door to Driver Centerline	13.3	in.
B = Left Door to Center Passenger Centerline	-	in.
C = Left Door to Right Passenger Centerline	41.3	in.
D = Left Door to Right Door	54.6	in.
E,F = Window Glass Height (Right and Left Must Be Equal)	11.0	in.

Figure 2

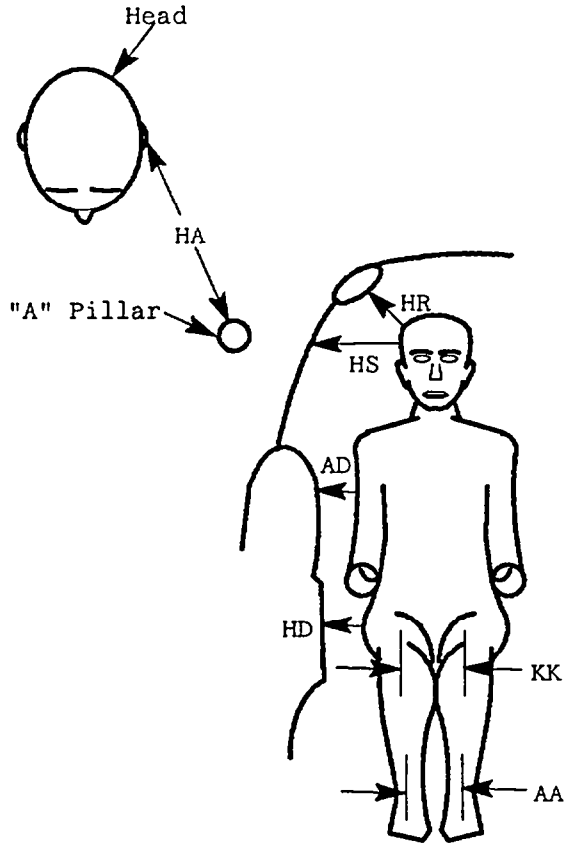
OCCUPANT CLEARANCE DIMENSIONS

	DRIVER	PASSENGER
HH	15.5	15.9
HW	21.3	21.0
CD	20.8	20.5
CS	13.0	-
KDL	3.8	3.8
KDR	4.5	3.9
SA	Fixed	Fixed
TA	25°	25°
HSW	17.0	-



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

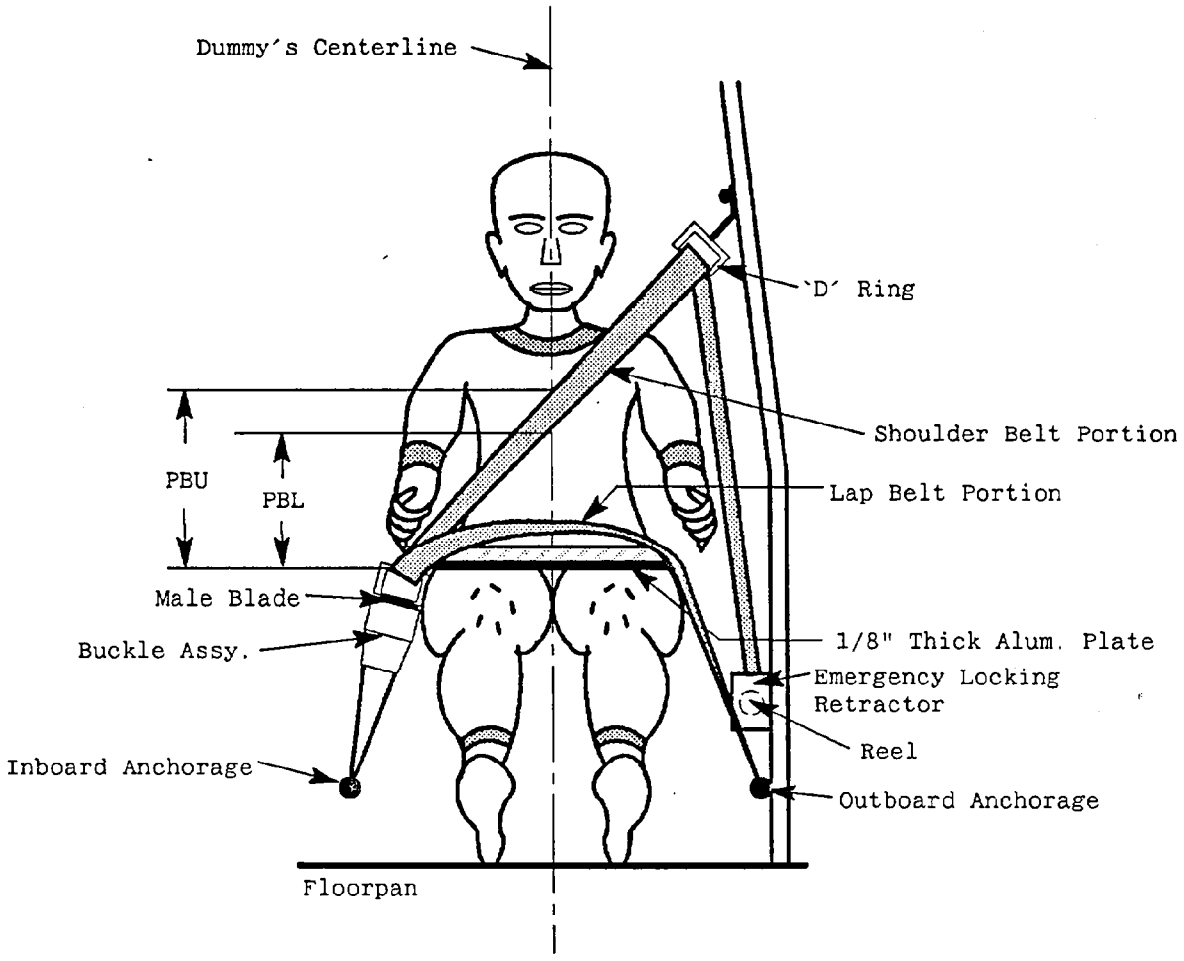
HA = Head Target to "A" Pillar
HR = Head to Side Roof
HS = Head to Side Window
AD = Arm to Door
HD = Hip to Door
KK = Knee to Knee
AA = Ankle to Ankle



	DRIVER	PASSENGER
HR	8.6	8.3
HS	10.1	9.9
AD	3.9	3.3
HD	5.8	5.9
KK	8.1	8.4
HA	22.7	22.0
AA	9.5	8.0

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	13.6	13.6
PBL -- Top surface of alum. plate to belt lower edge	10.1	10.1
LAP BELT TENSION	2 lbs.	2 lbs.
SHOULDER BELT TENSION	-	-

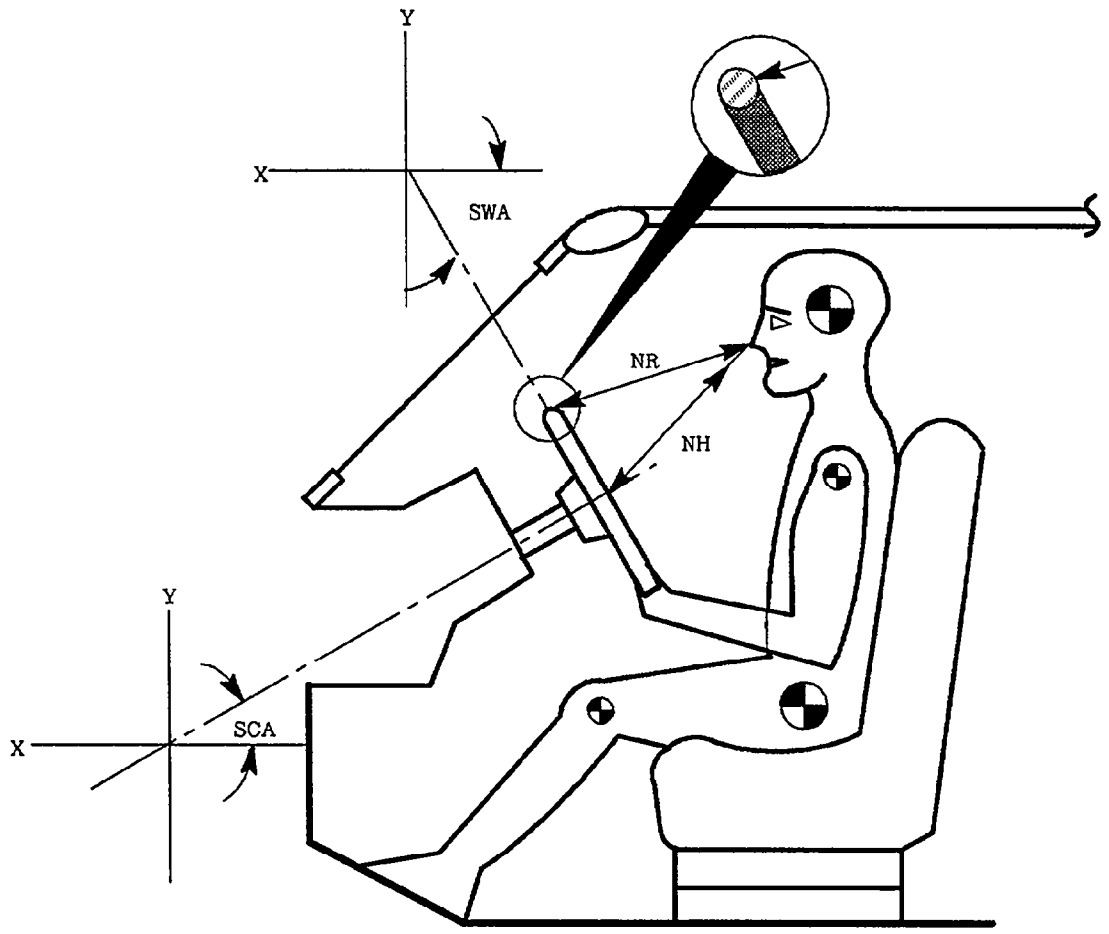
Table 4

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.	94.0 in.	93.9 in.
Shoulder belt length as measured on Part 572 Dummy.	35.7 in.	35.5 in.
Lap belt length as measured on Part 572 Dummy.	32.4 in.	32.7 in.
SHOULDER BELT SPOOL-OFF DATA:		
As determined by film analysis.	5.5 in.	3.0 in.
As determined mechanically.	4.5 in.	1.7 in.
As determined electronically.	3.7 in.	2.9 in.
BELT STRETCH DATA:		
Measured electronically between shoulder belt load cell and the "D" ring.	2.16 in/ft	1.3 in/ft
Measured mechanically	.48 in/ft	.48 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	15.8	Inches
NH -- Distance from tip of dummy's nose to center of steering column hub	16.5	Inches
SCA -- Angle of steering column relative to the horizontal X axis	26	Degrees
SWA -- Angle of steering wheel relative to the horizontal X axis	-64	Degrees

Figure 5

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4

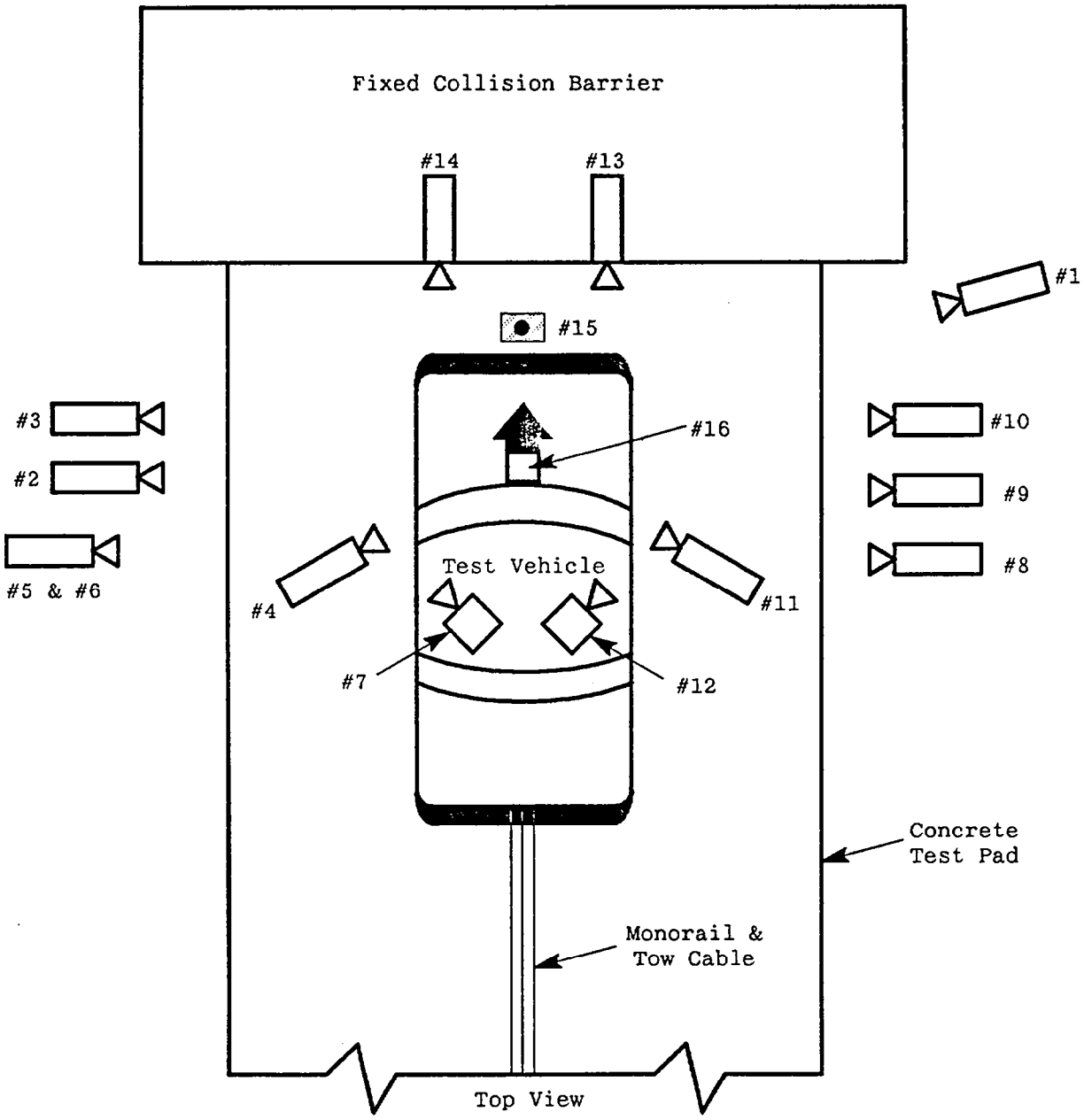


Table 5

HIGH-SPEED CAMERA LOCATIONS

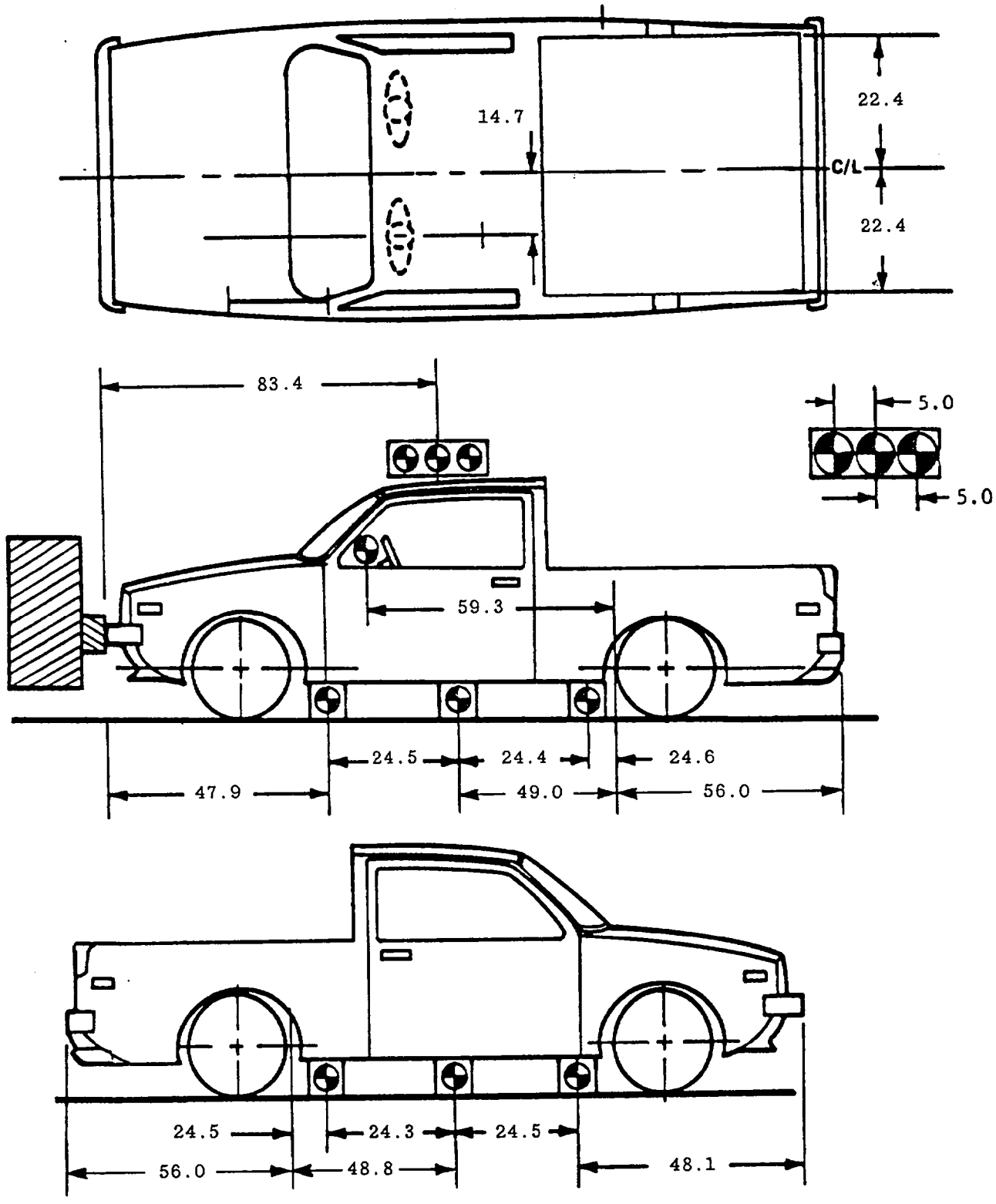
Test No. MN5700 Vehicle: 1992 Isuzu Pickup

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	243	58	41	-7	225	13	550
3	Left Side View	300	31	41	-3	282	25	580
4	Driver and Interior View	113	96	62	-12	95	13	610
5	Steering Column (Bottom)	266	65	46	-3	248	25	510
6	Steering Column (Top)	266	65	70	-9	248	25	500
7	Left Belt	-	-	-	-	-	8	710
8	Overall Right Side	239	61	42	-2	221	13	N.T.
9	Right Side View	263	40	41	-1	245	25	N.T.
10	Right Passenger View	307	49	56	-4	289	35	530
11	Passenger and Interior View	116	99	65	-15	98	25	500
12	Right Belt	-	-	-	-	-	8	630
13	Passenger Front View	24	-5	72	-38	-	13	570
14	Driver Front View	24	-5	72	-36	-	13	540
15	Windshield View	0	0	120	-45	-	13	510
16	Pit View of Engine	0	35	-120	90	-	13	730

*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

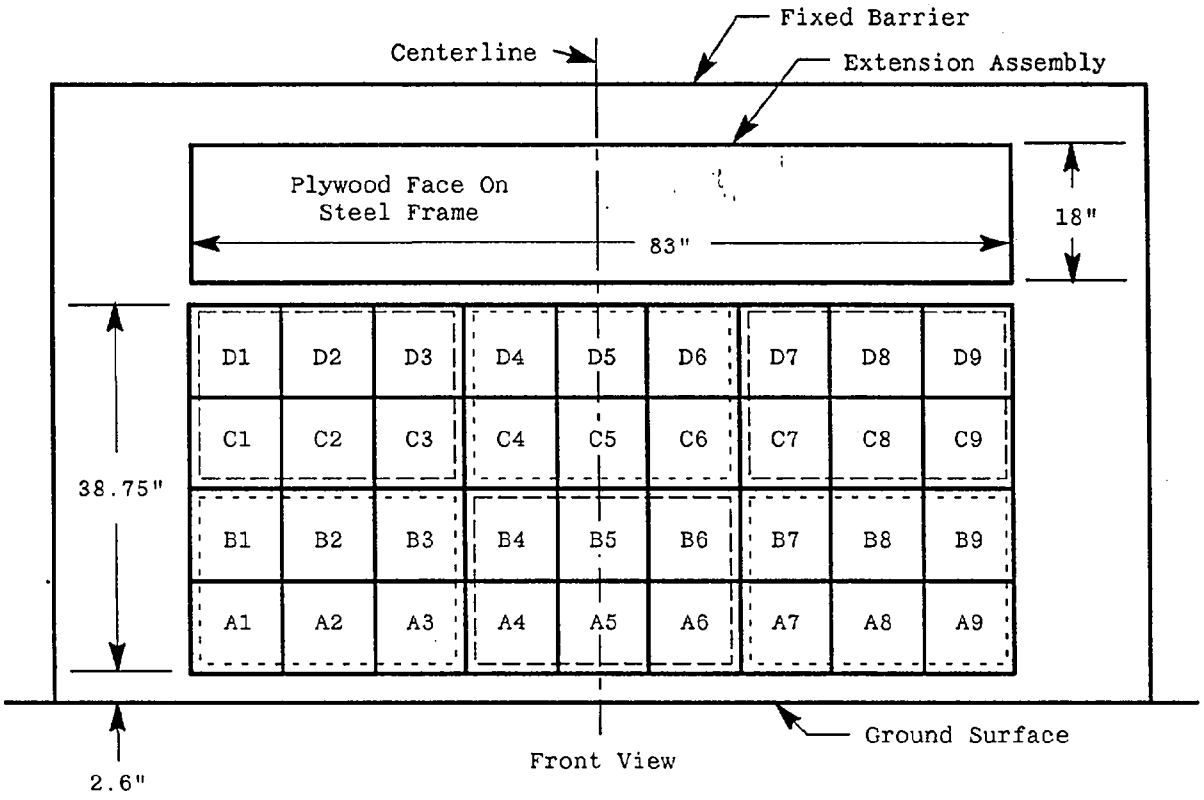


(DIMENSIONS IN INCHES)

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

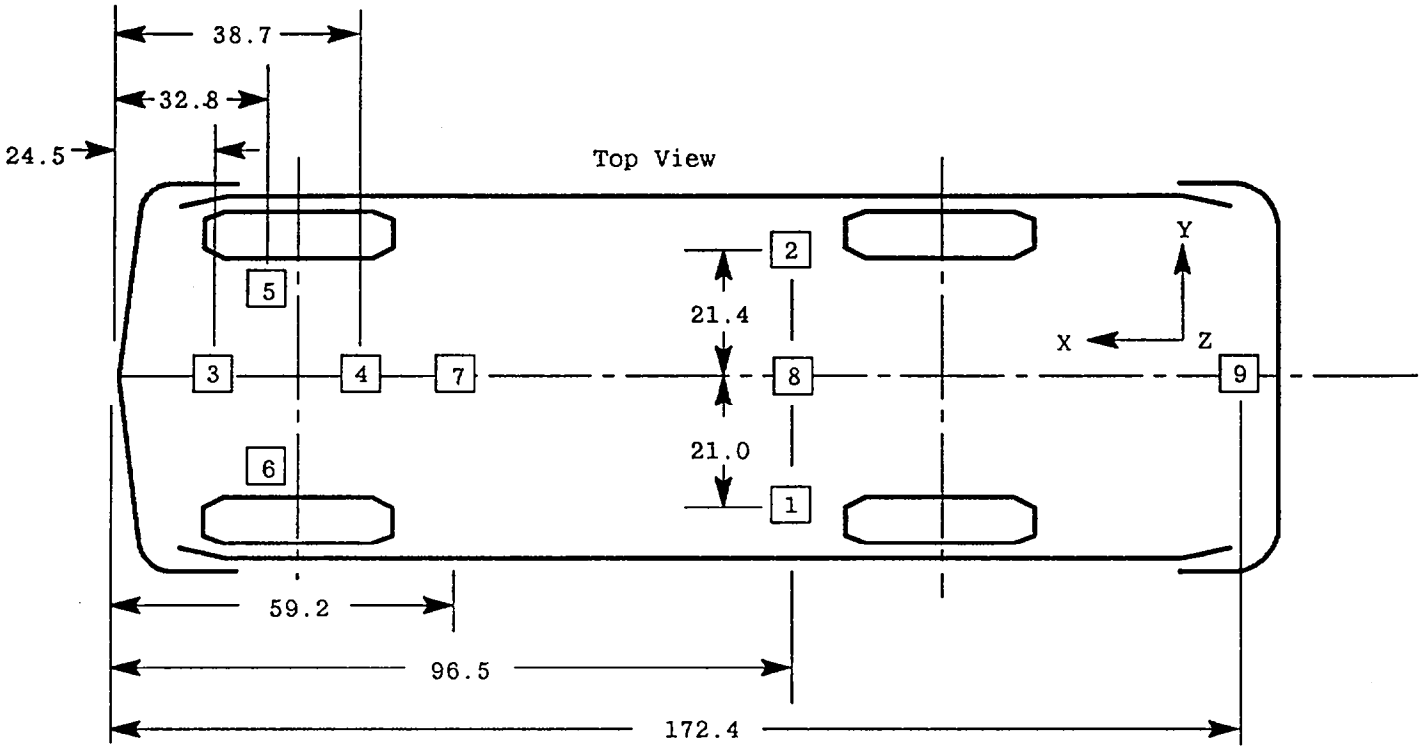
(2) Total or Sum of 36 individual load cells

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

Figure 8

VEHICLE ACCELEROMETER LOCATIONS

(DIMENSIONS IN INCHES)



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

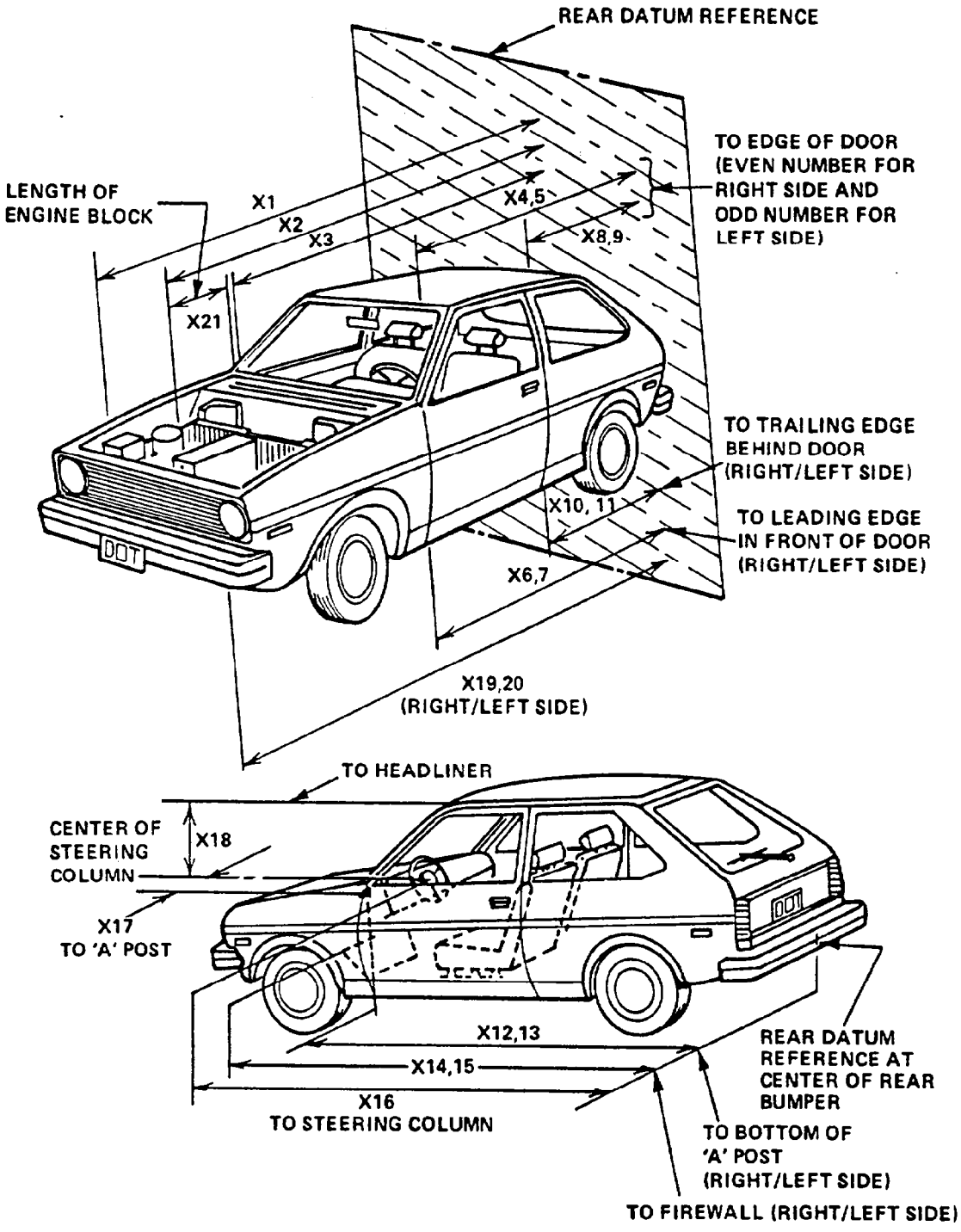


Table 6

VEHICLE MEASUREMENTS

		All Dimensions in Inches		
No.		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	177.4	156.2	21.2
X2	Rear Surface of Vehicle to Front of Engine	158.2	152.0	6.2
X3	Rear Surface of Vehicle to Firewall	138.2	136.2	2.0
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	128.9	127.5	1.4
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	128.5	127.3	1.2
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	128.4	125.8	2.6
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	128.0	125.5	2.5
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	83.8	83.1	0.7
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	83.5	82.6	0.9
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	83.2	81.2	2.0
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	83.1	80.8	2.3
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	128.0	125.0	3.0
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	128.2	125.0	3.2
X14	Rear Surface of Vehicle to Firewall, Right Side	138.1	136.4	1.7
X15	Rear Surface of Vehicle to Firewall, Left Side	138.1	136.5	1.6
X16	Rear Surface of Vehicle to Steering Column	110.6	108.5	2.1
X17	Center of Steering Column to "A" Post	14.6	16.5	-1.9
X18	Center of Steering Column to Headliner	17.5	18.4	-0.9
X19	Rear Surface of Vehicle to Right Side of Front Bumper	175.2	155.0	20.2
X20	Rear Surface of Vehicle to Left Side of Front Bumper	175.1	155.7	19.4
X21	Length of Engine Block	18.5	18.5	0.0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	118.3	117.5	0.8
CD	Rear Surface of Vehicle to Center of Dash Panel	118.3	116.6	1.7
LD	Rear Surface of Vehicle to Left Side of Dash Panel	118.2	116.8	1.4

Appendix A

PHOTOGRAPHS

PHOTOGRAPHS

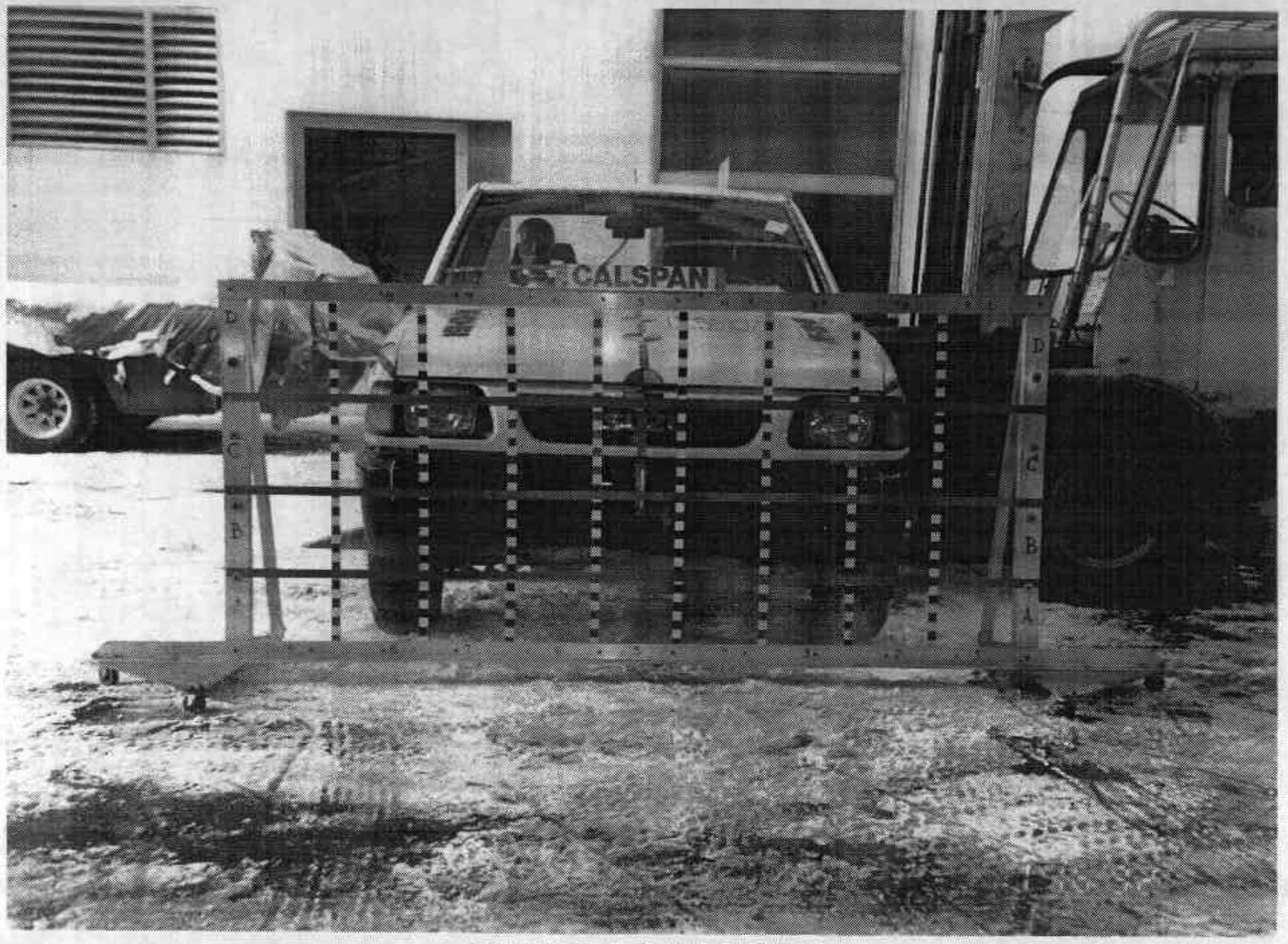


Figure A-1 LOAD CELL LOCATIONS

Figure A-2 PRE-TEST FRONT VIEW

Figure A-3 POST TEST FRONT VIEW

Figure A-4 PRE-TEST LEFT SIDE VIEW

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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

A-12

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

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

7951-3

Figure A-12 PRE-TEST WINDSHIELD VIEW

Figure A-13 POST-TEST WINDSHIELD VIEW

Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

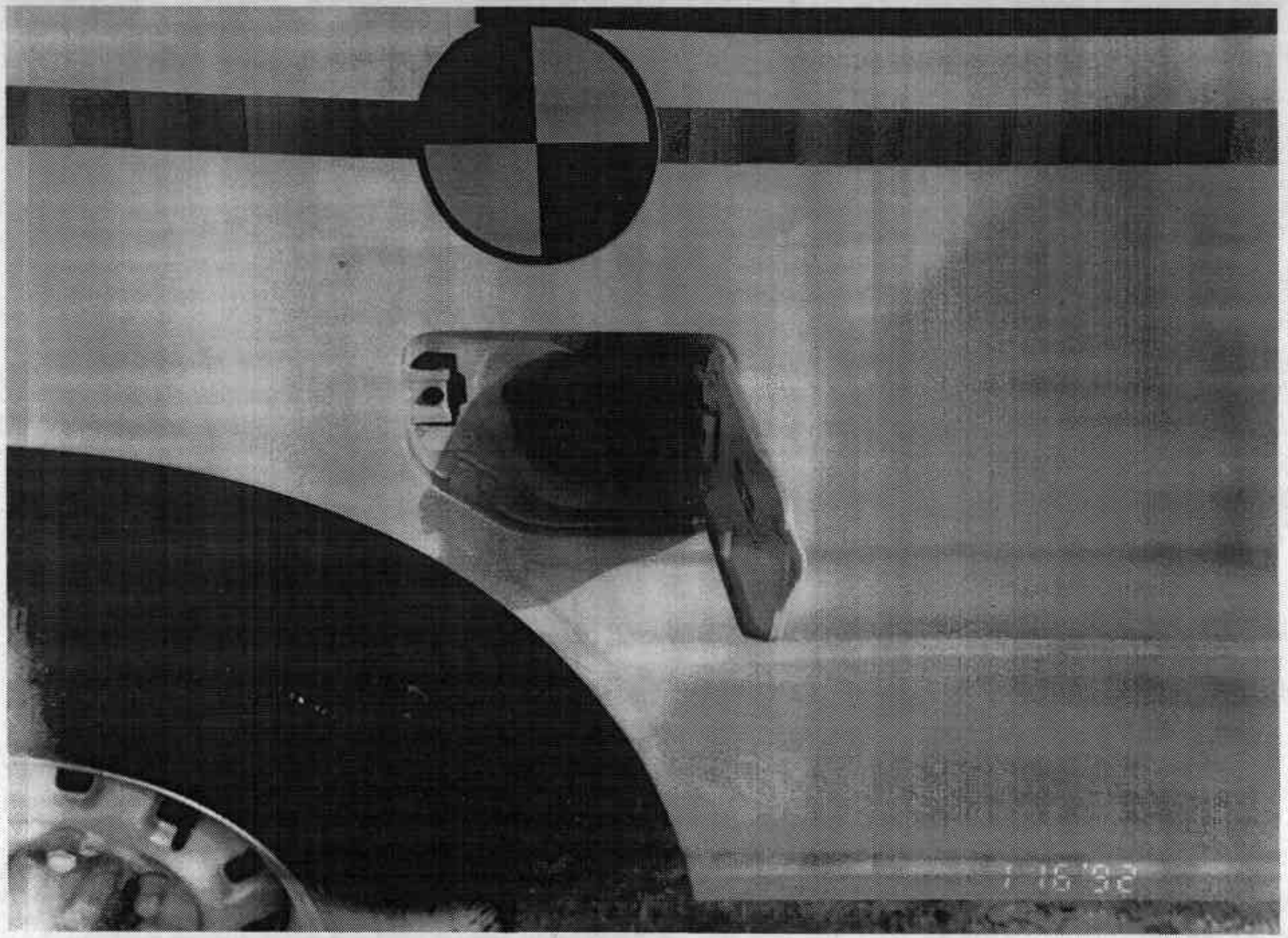


Figure A-15 FUEL CAP VIEW

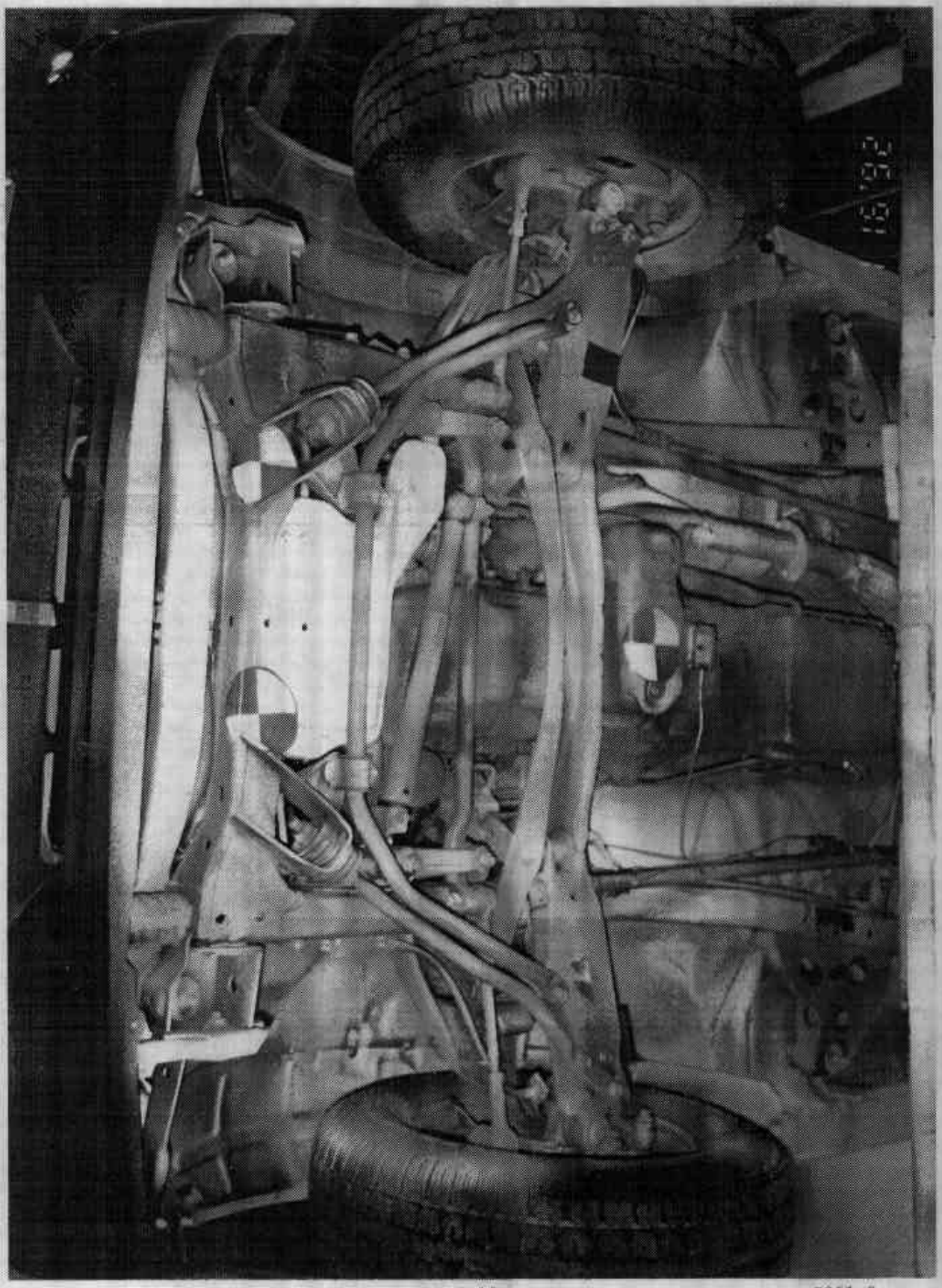


Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

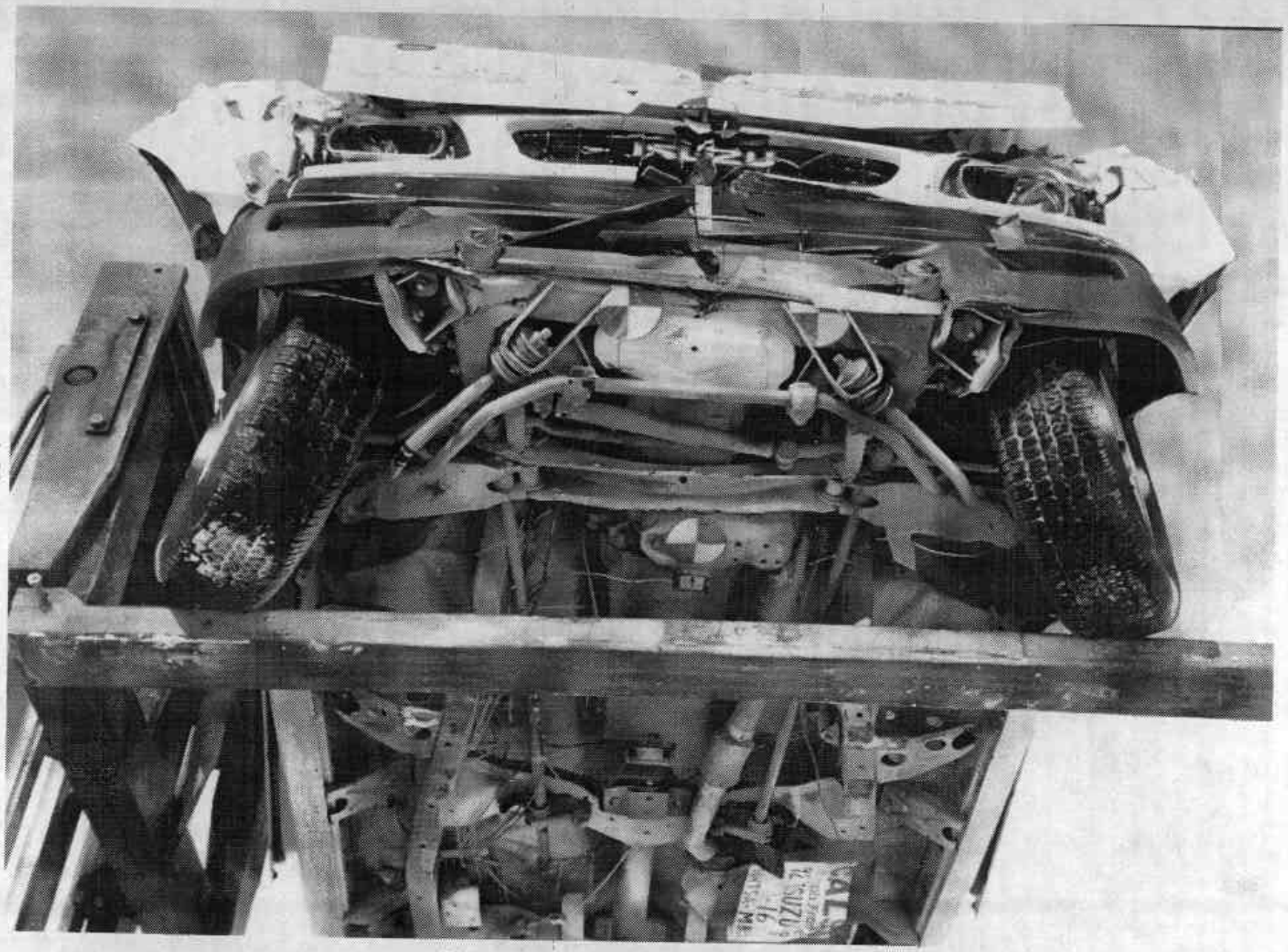


Figure A-17 POST-TEST FRONT UNDERBODY VIEW

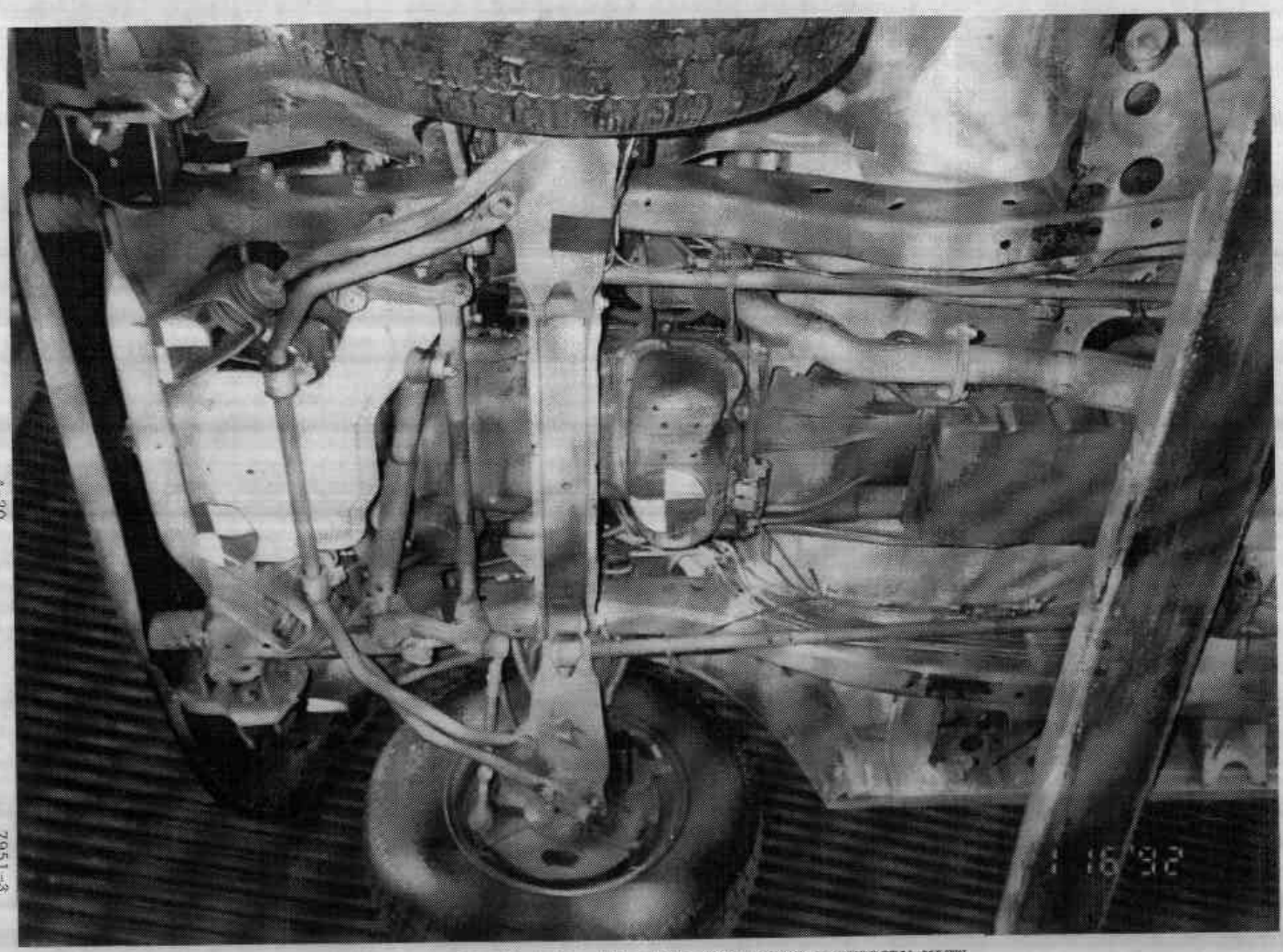


Figure A-18 PRE-TEST FRONT SIDE UNDERBODY VIEW

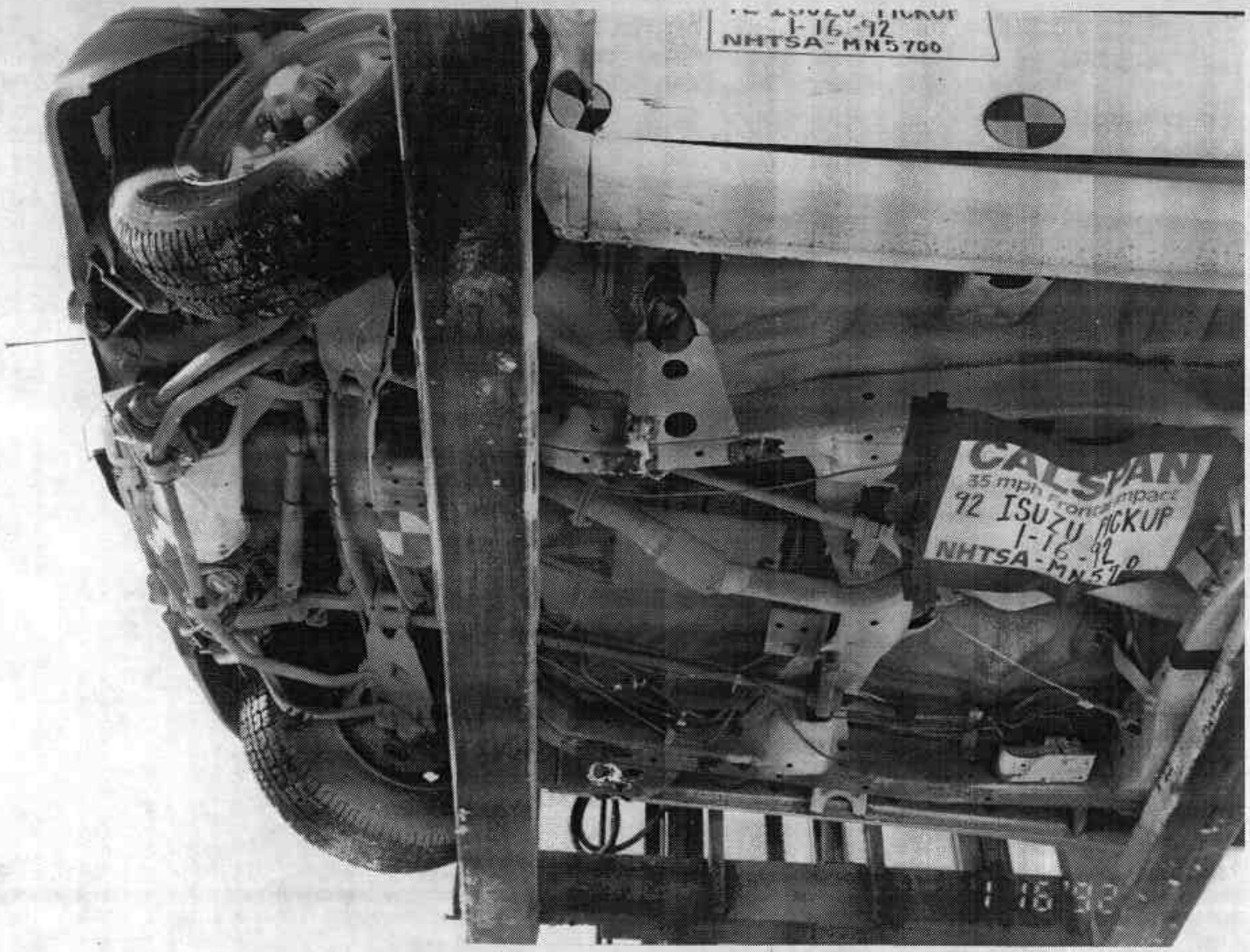


Figure A-19 POST-TEST FRONT SIDE UNDERBODY VIEW

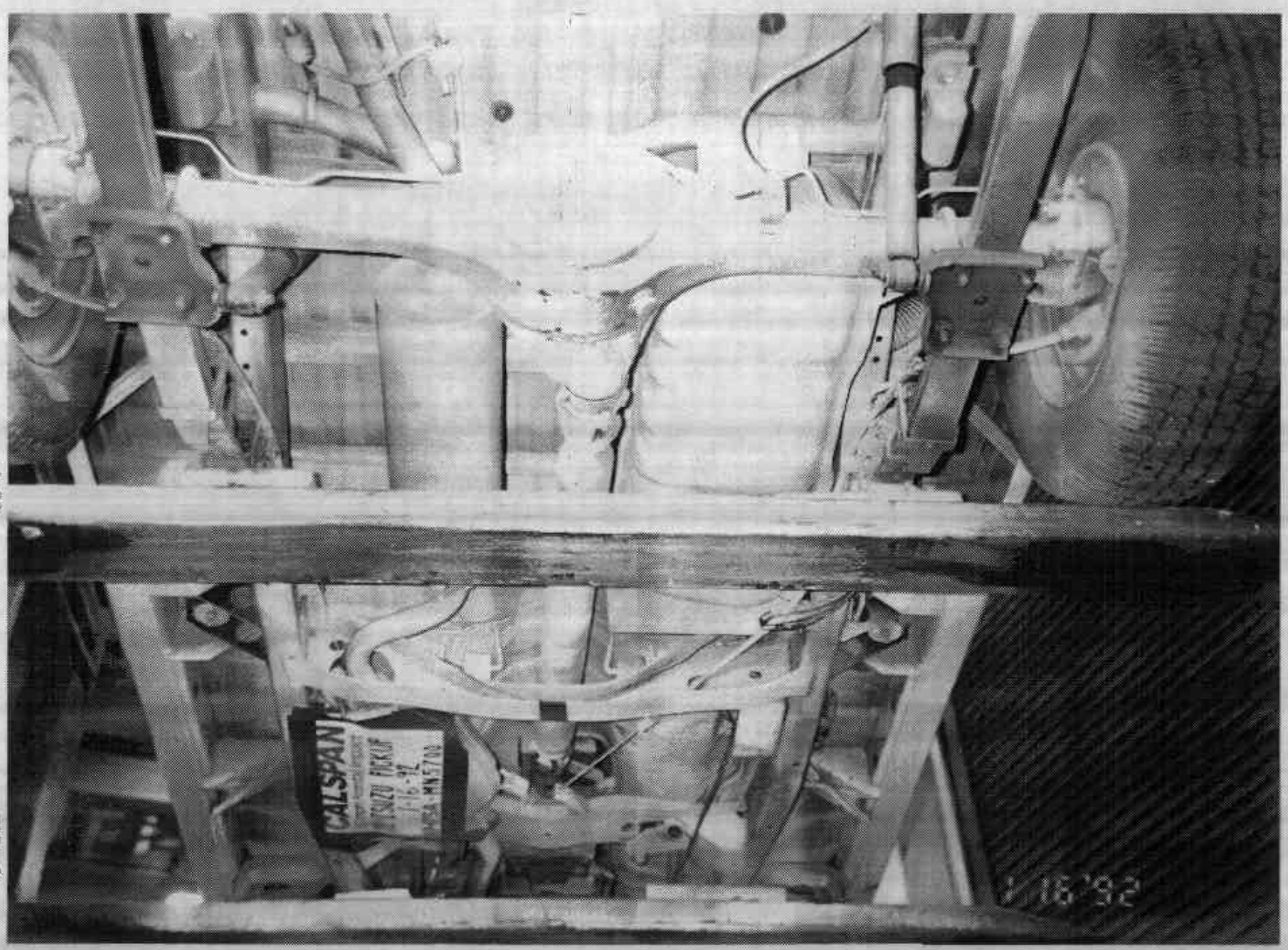


Figure A-20 PRE-TEST REAR UNDERBODY VIEW

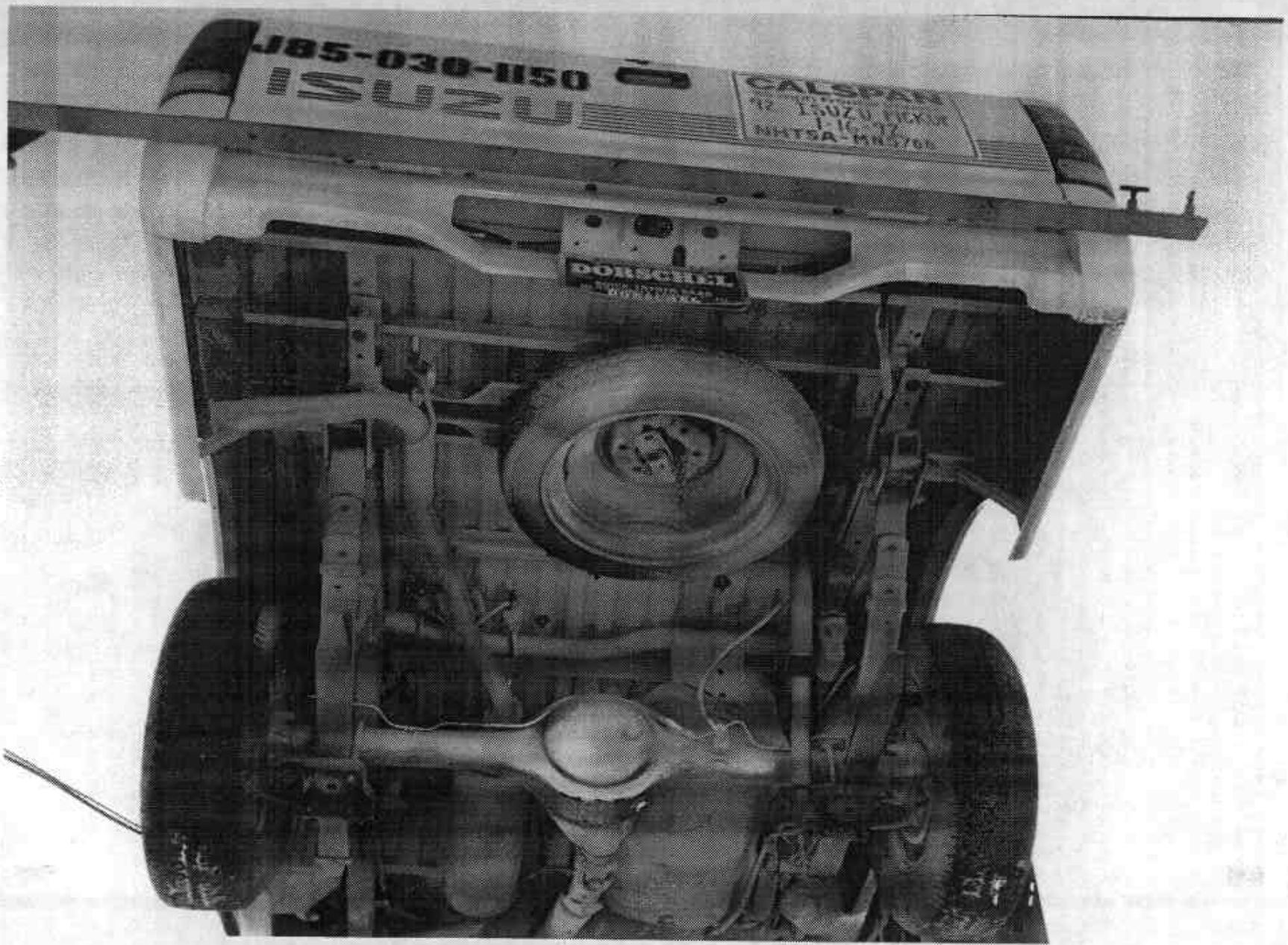


Figure A-21 POST-TEST REAR UNDERBODY VIEW

Figure A-22 PRE-TEST DRIVER POSITION VIEW

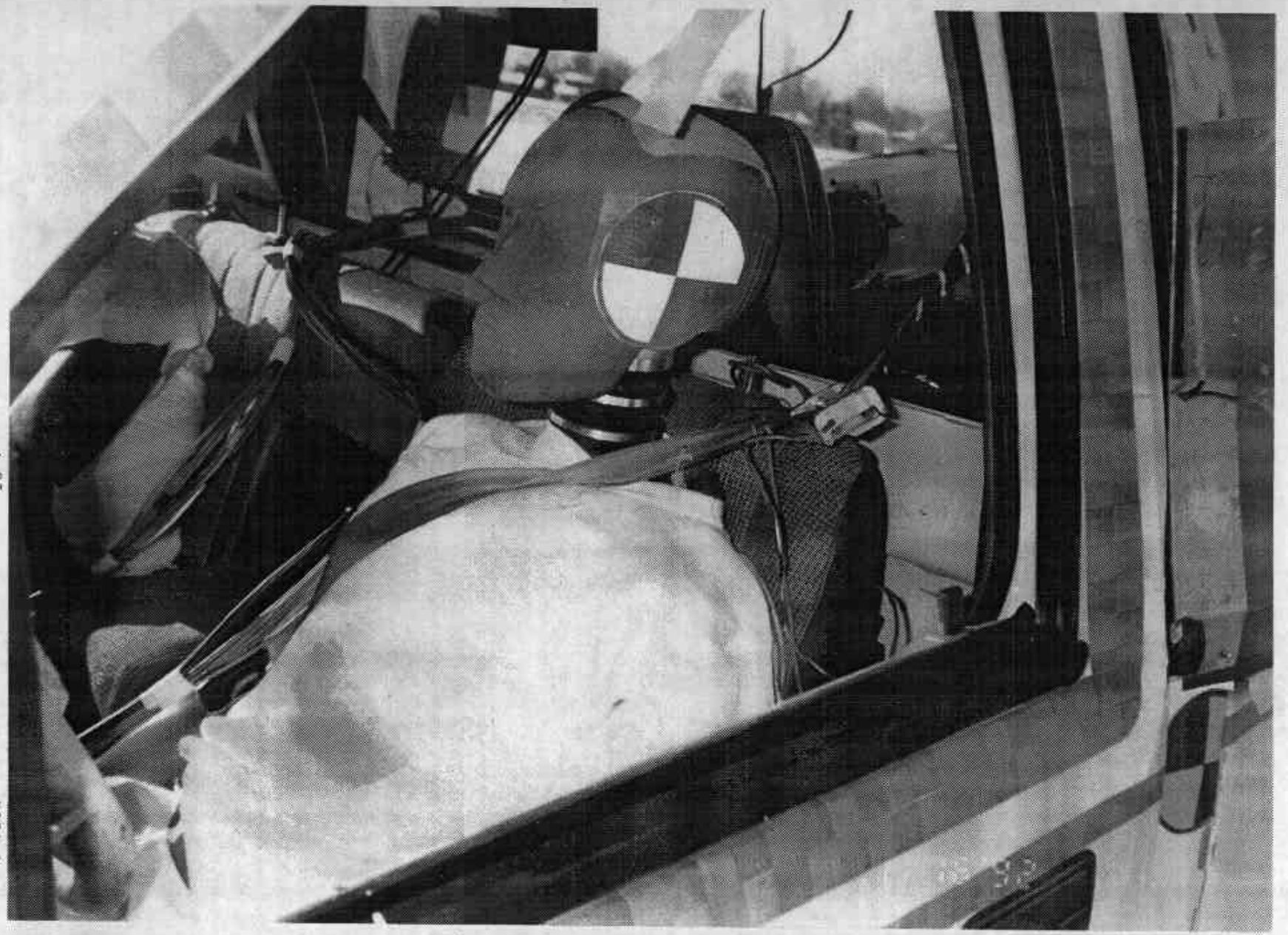


Figure A-23 POST-TEST DRIVER POSITION VIEW

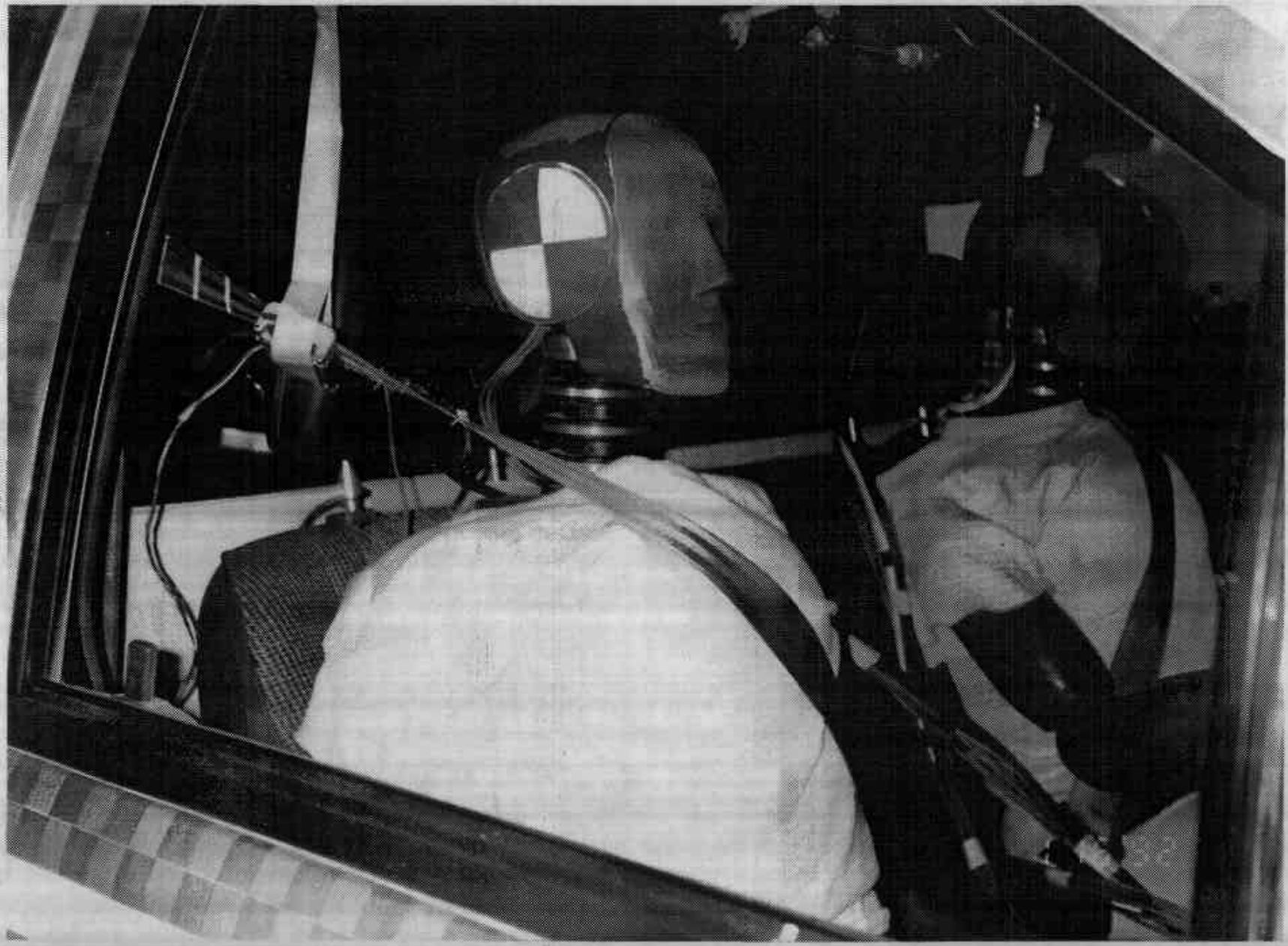


Figure A-24 PRE-TEST PASSENGER POSITION VIEW

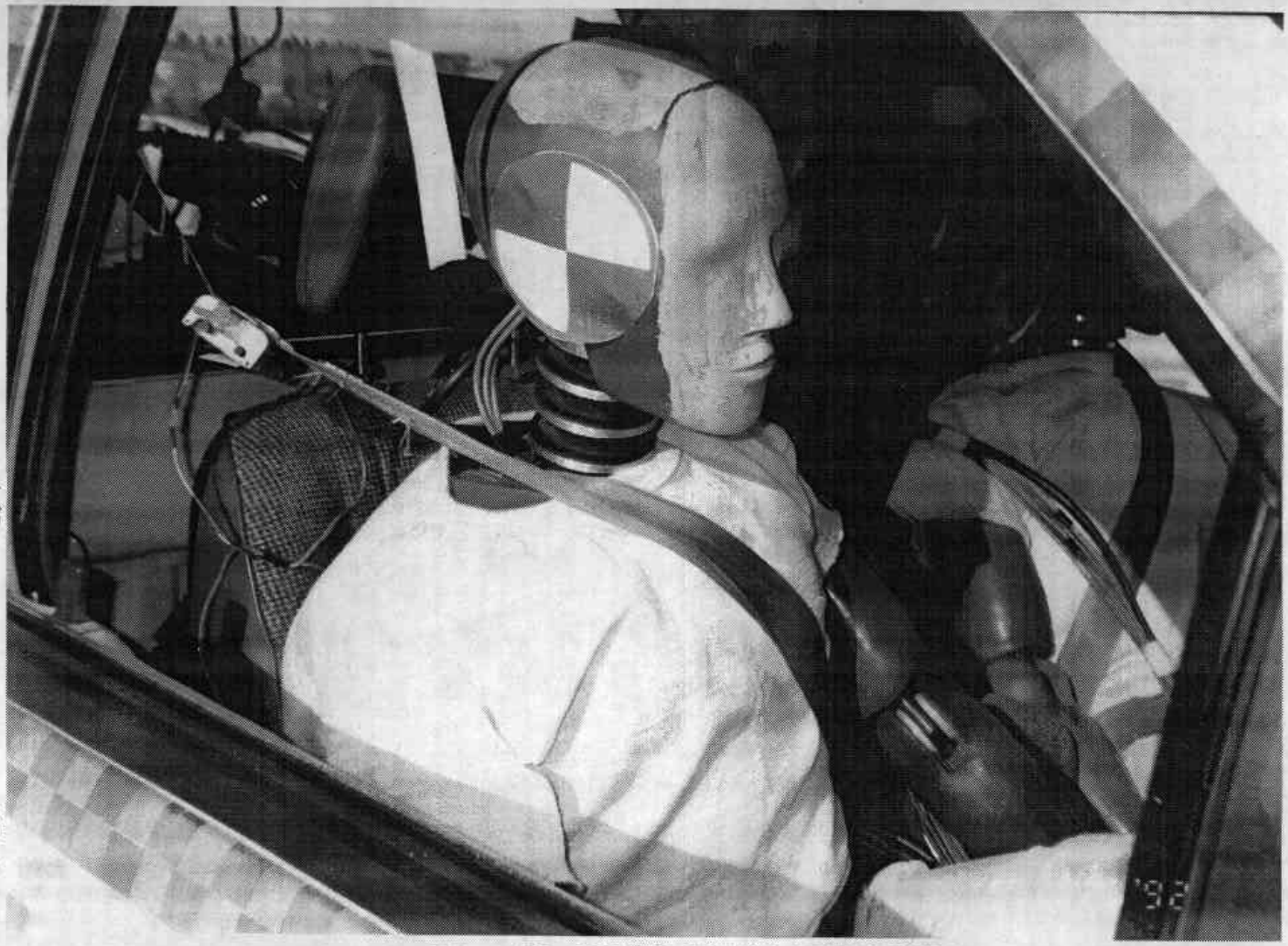


Figure A-25 POST-TEST PASSENGER POSITION VIEW

Figure A-28 PRE-TEST DRIVER AND INTERIOR VIEW

Figure A-27 POST-TEST DRIVER AND INTERIOR VIEW

Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW

Figure A-29 POST-TEST PASSENGER AND INTERIOR VIEW

Figure A-30 IMPACT VIEW

Appendix B

VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

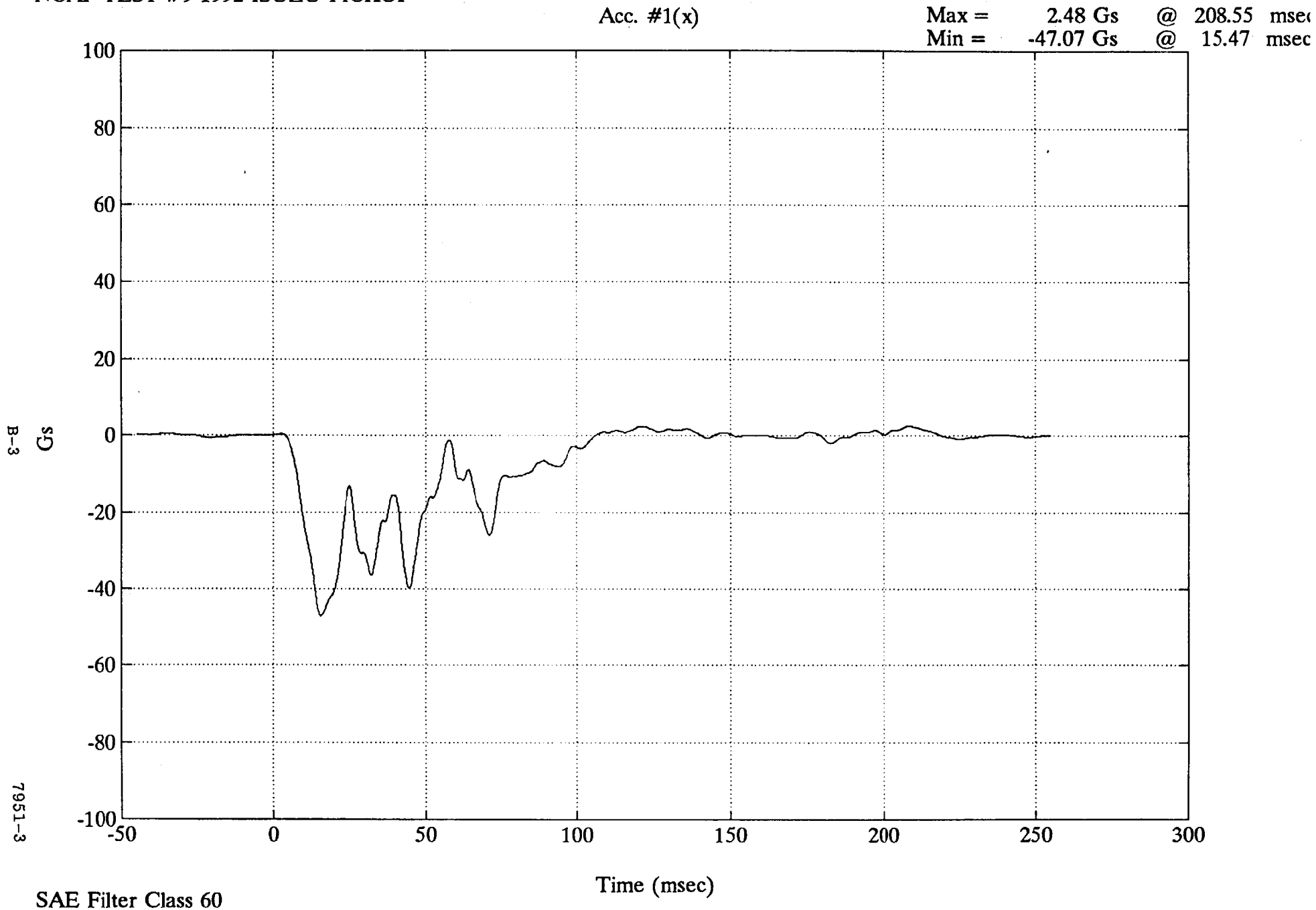
TEST NO. MN5700

VEHICLE DATA

FILTER CHANNEL CLASS

60

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

Acc. #1(x)

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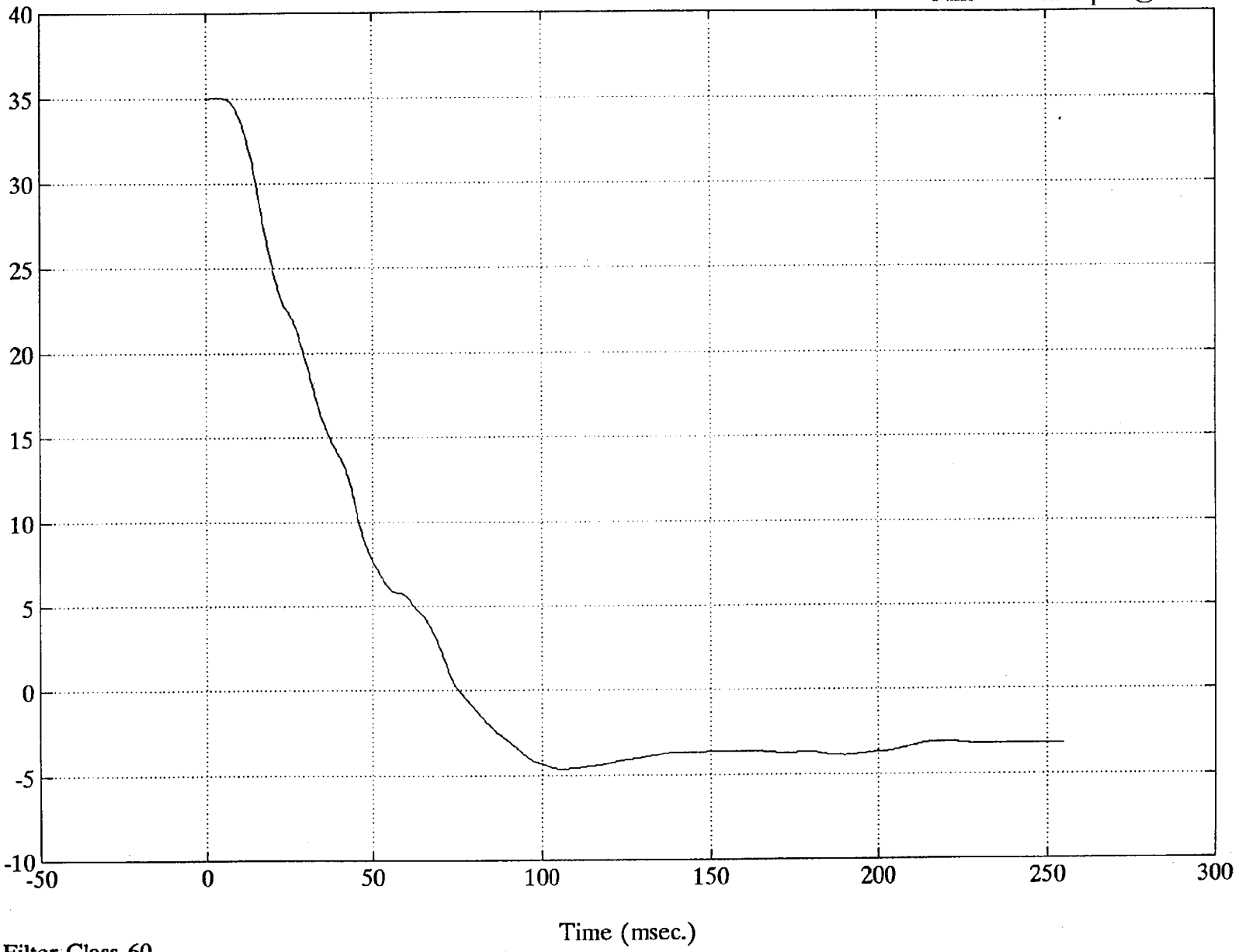
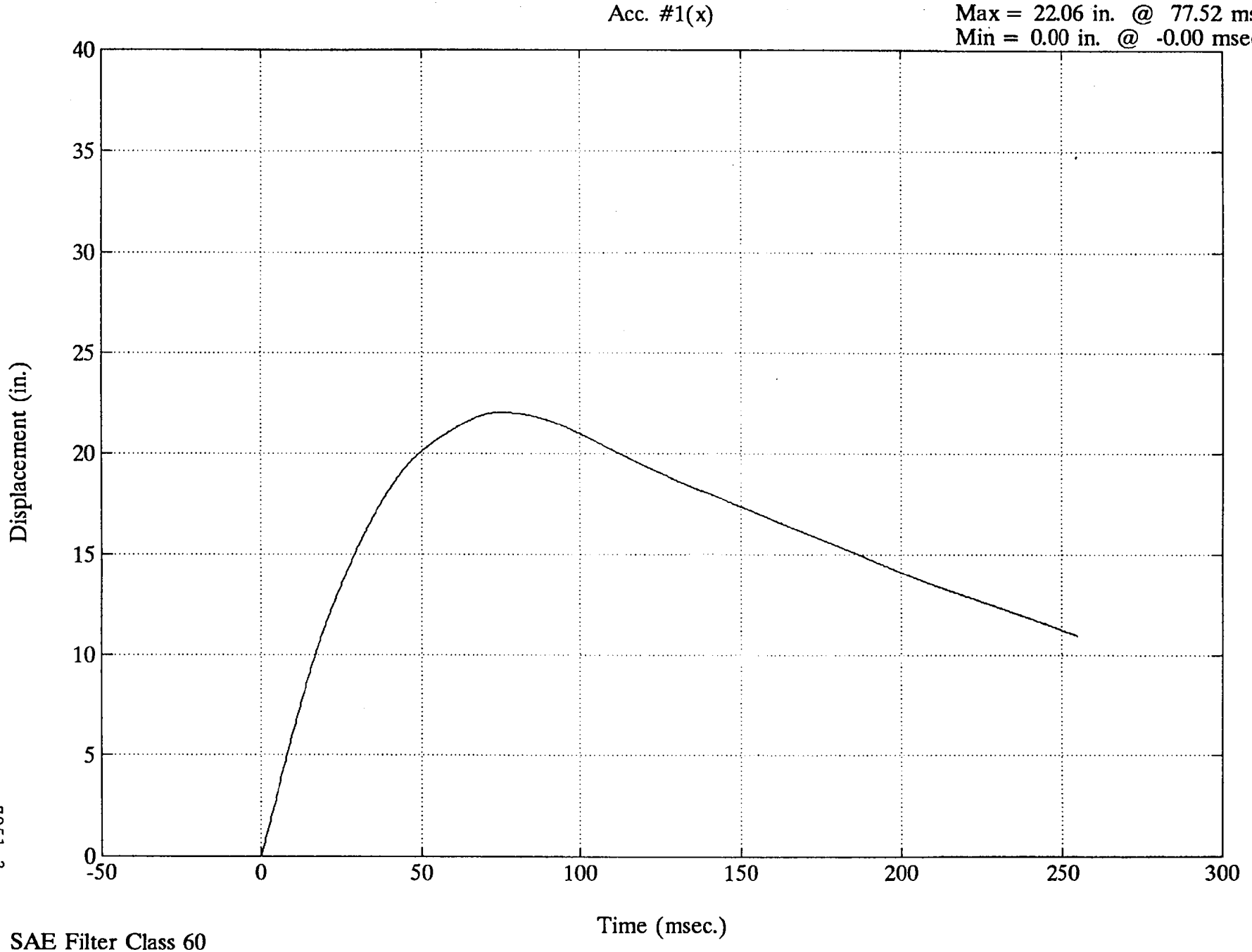
Min = -4.62 mph @ 106.08 msec



SAE Filter Class 60

7951-3

NCAP TEST #9 1992 ISUZU PICKUP

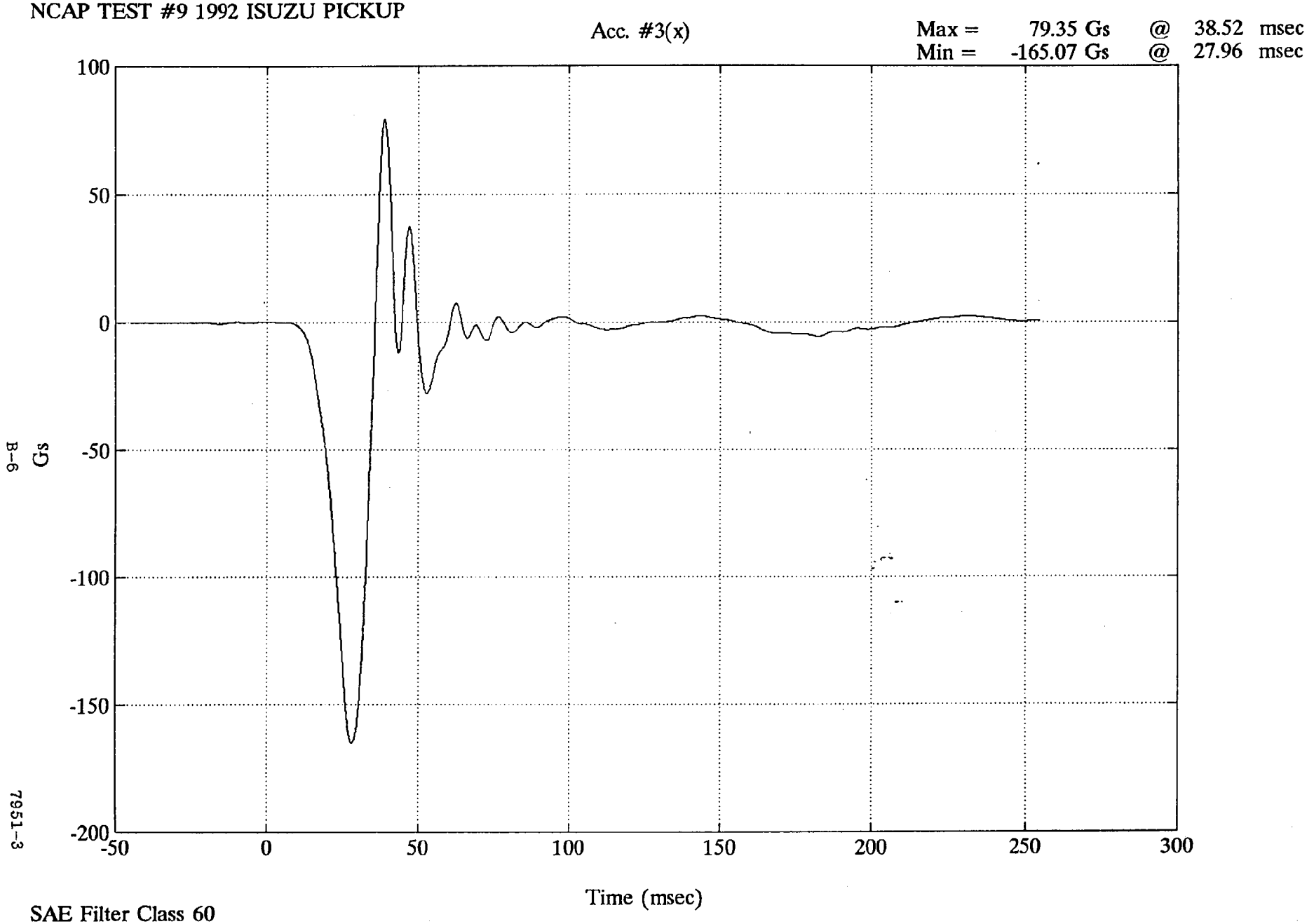


B-5

7951-3

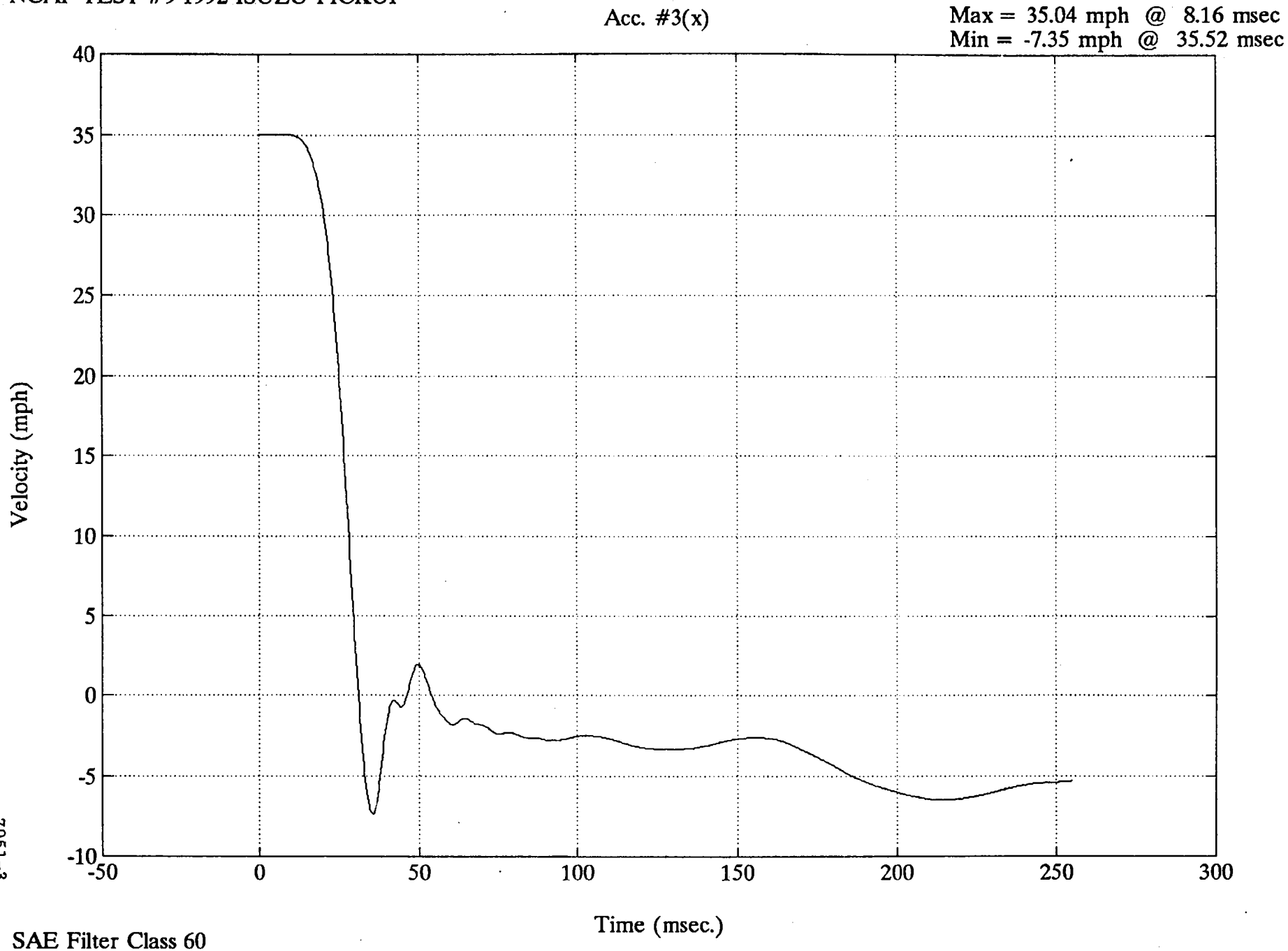
SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

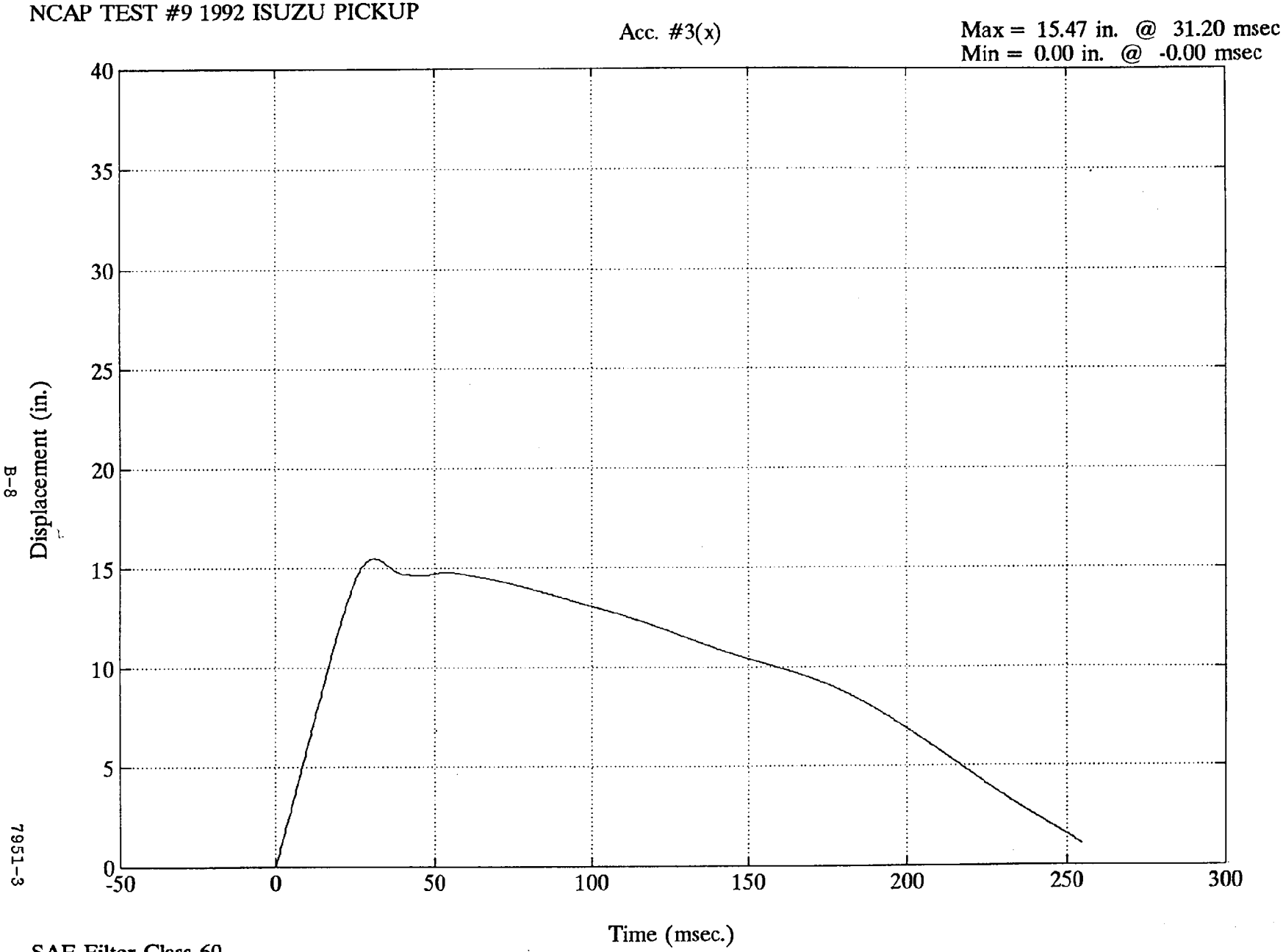
NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

7951-3

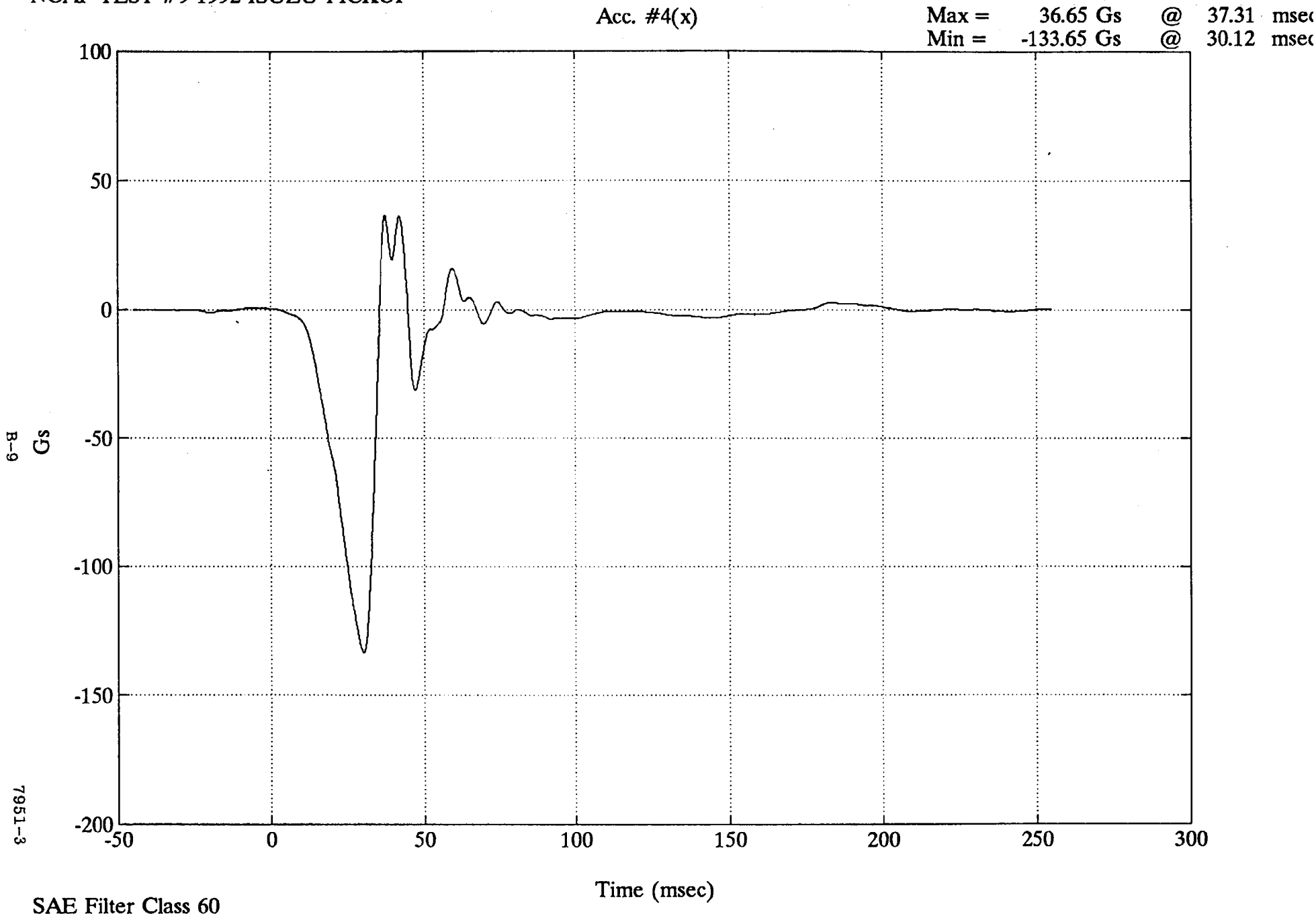
NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

7951-3

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

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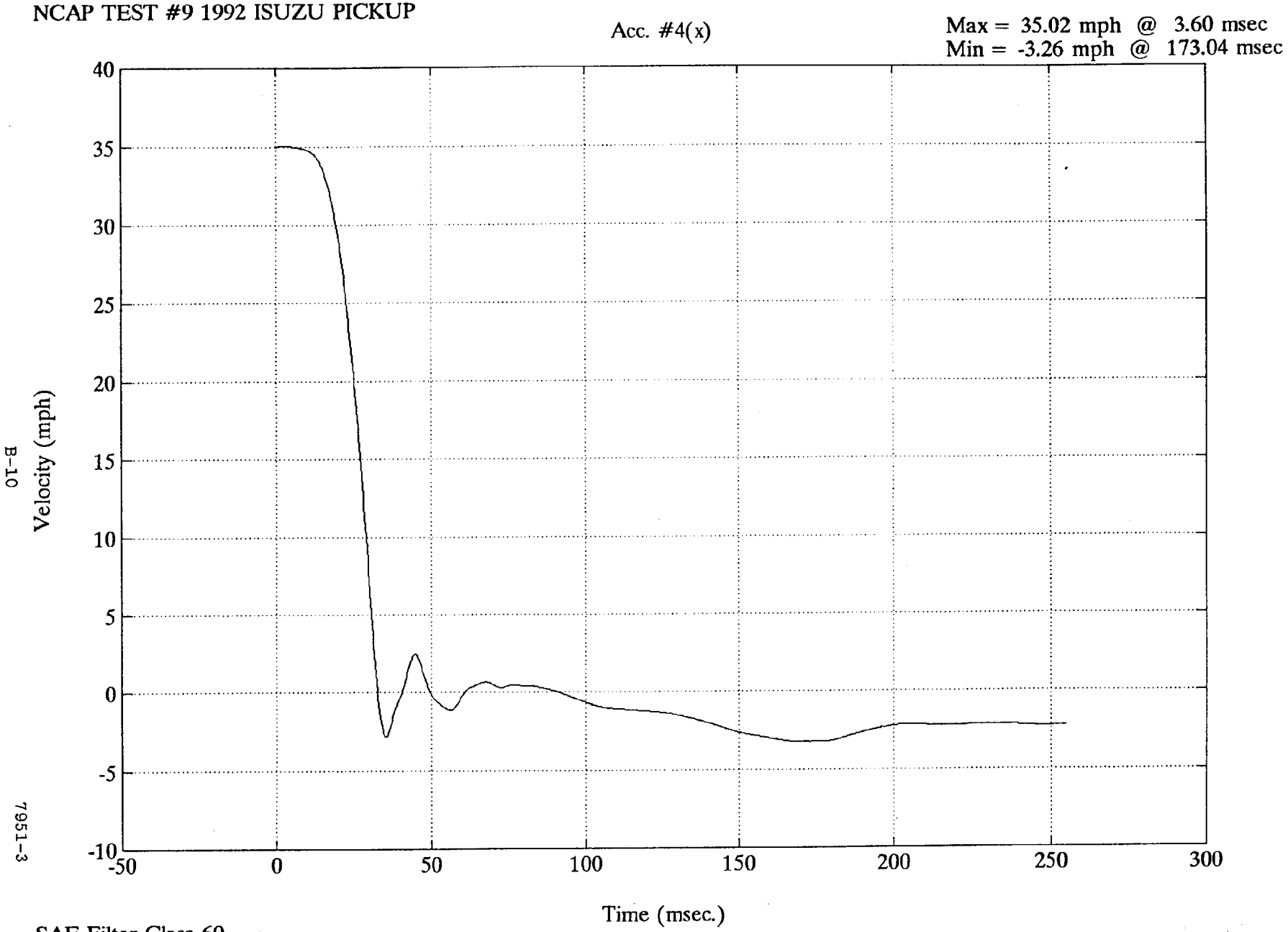

SAE Filter Class 60

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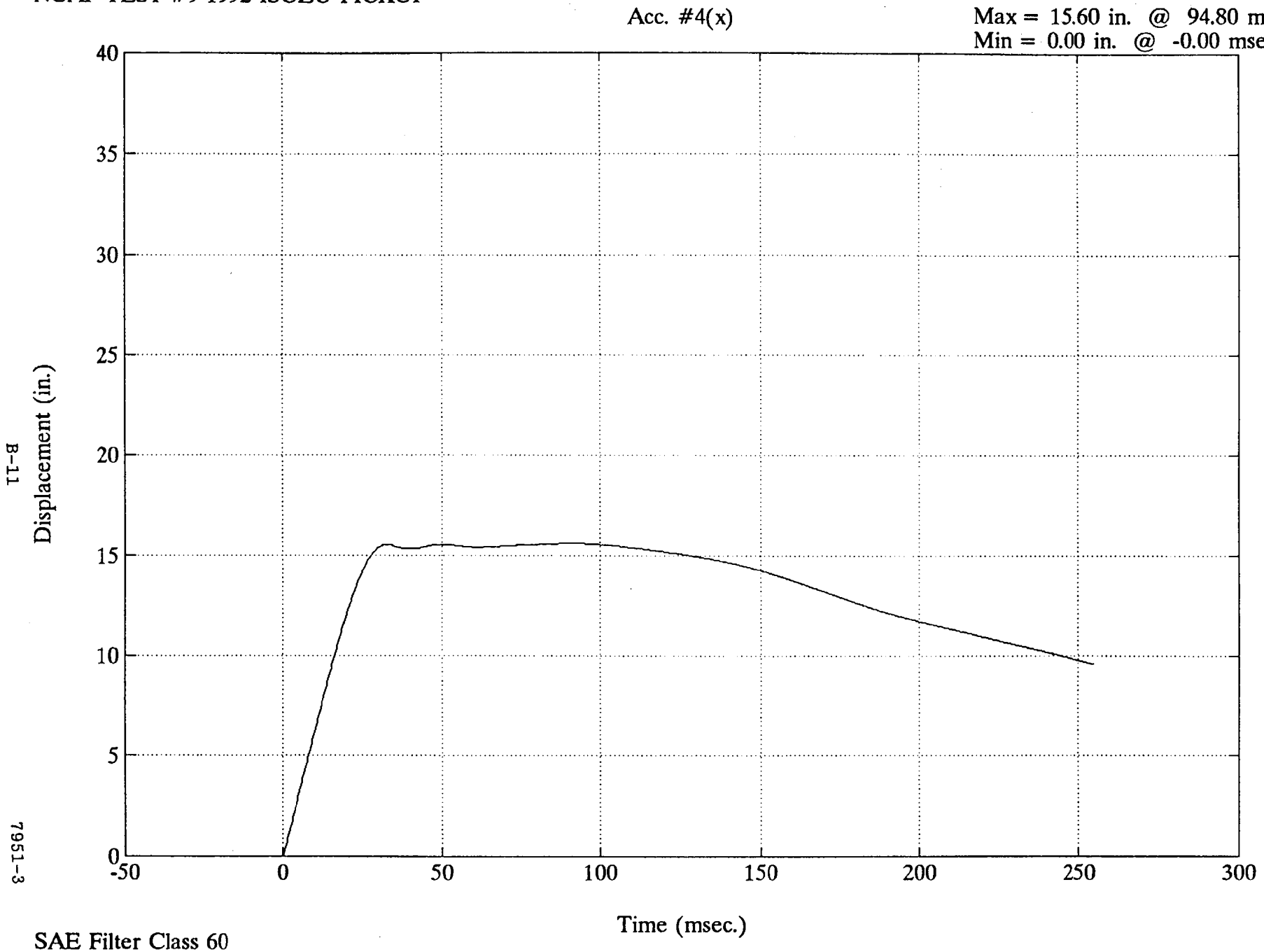
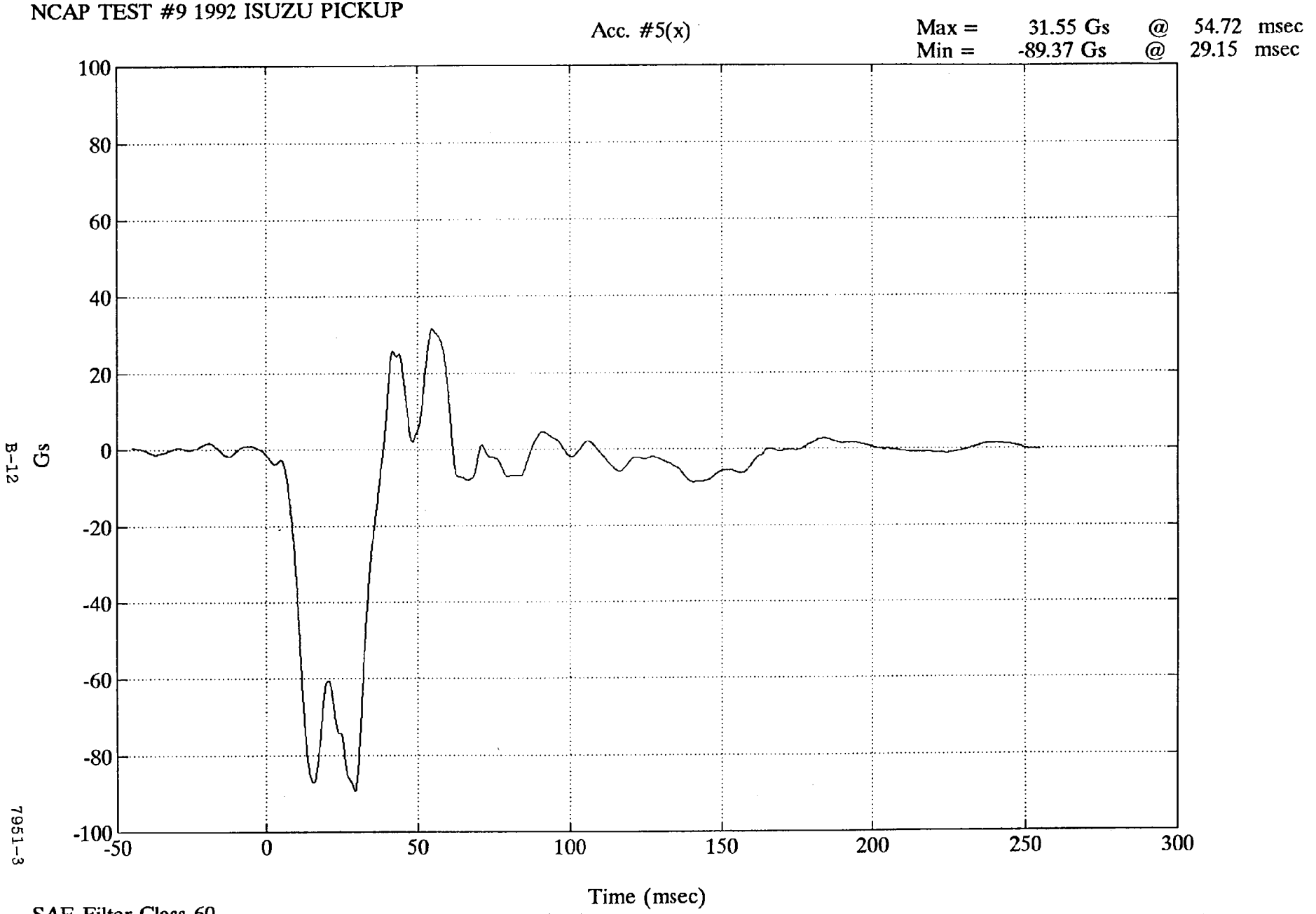


B-11

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

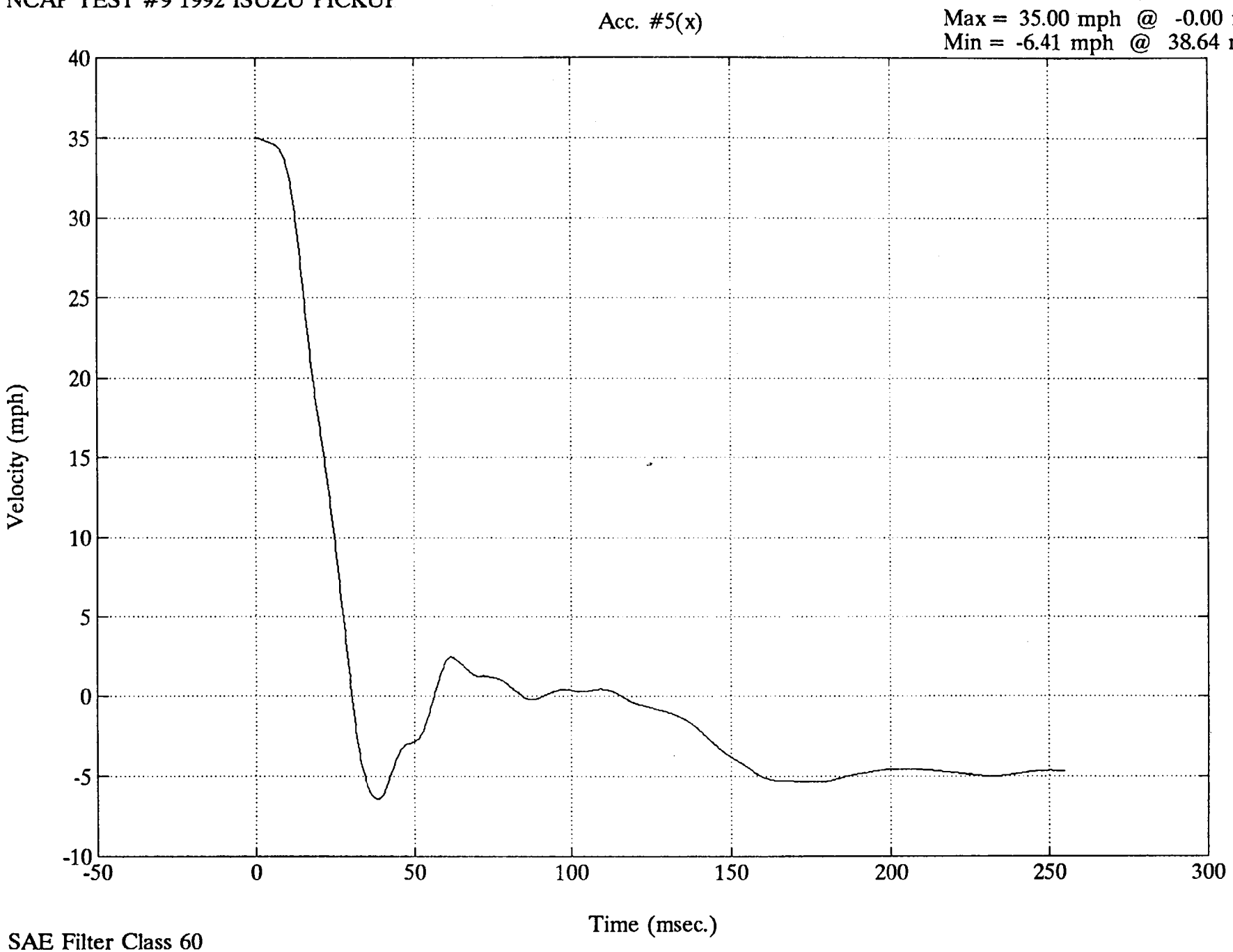


B-12

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

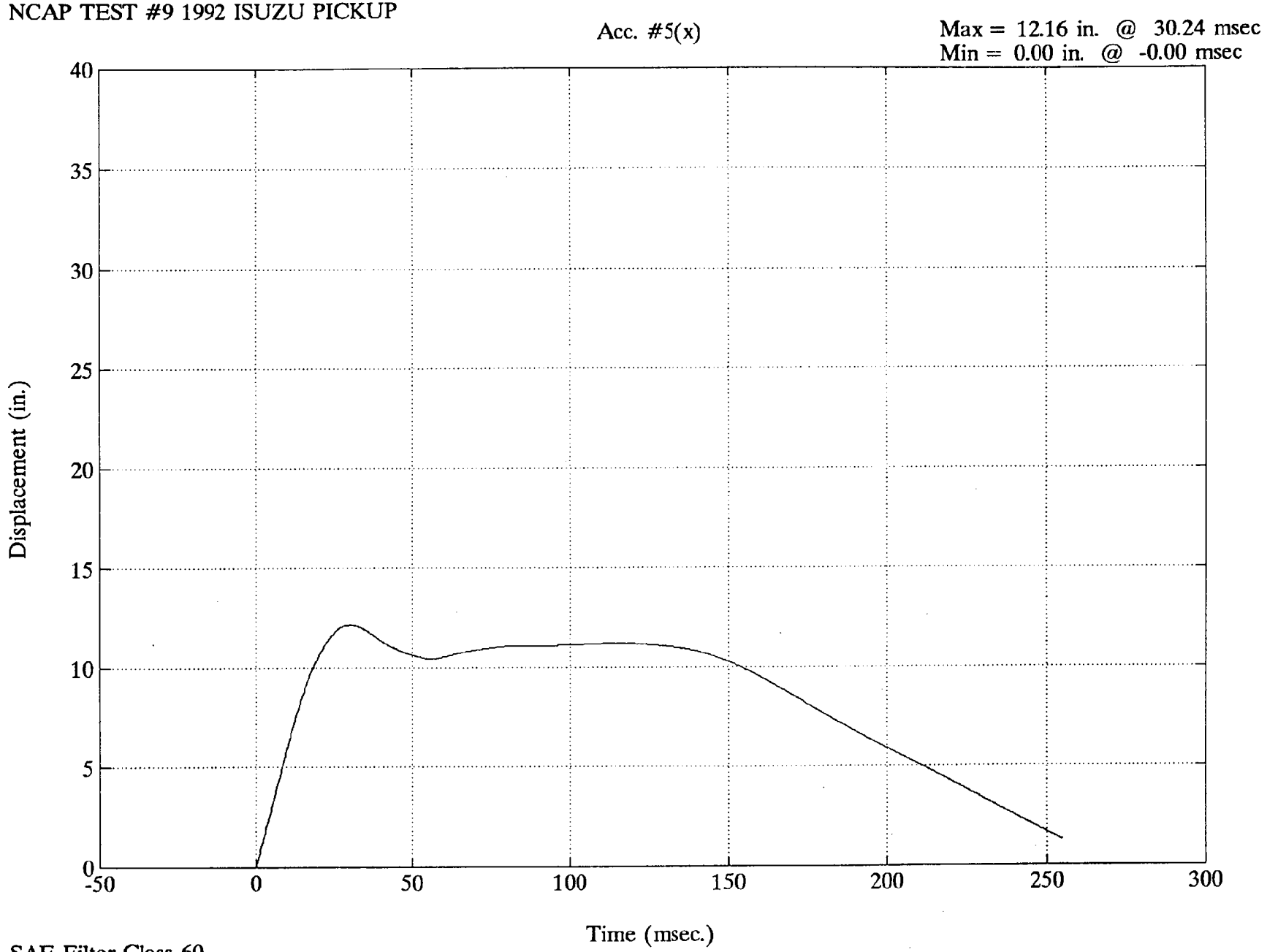


B-13

7951-3

SAE Filter Class 60

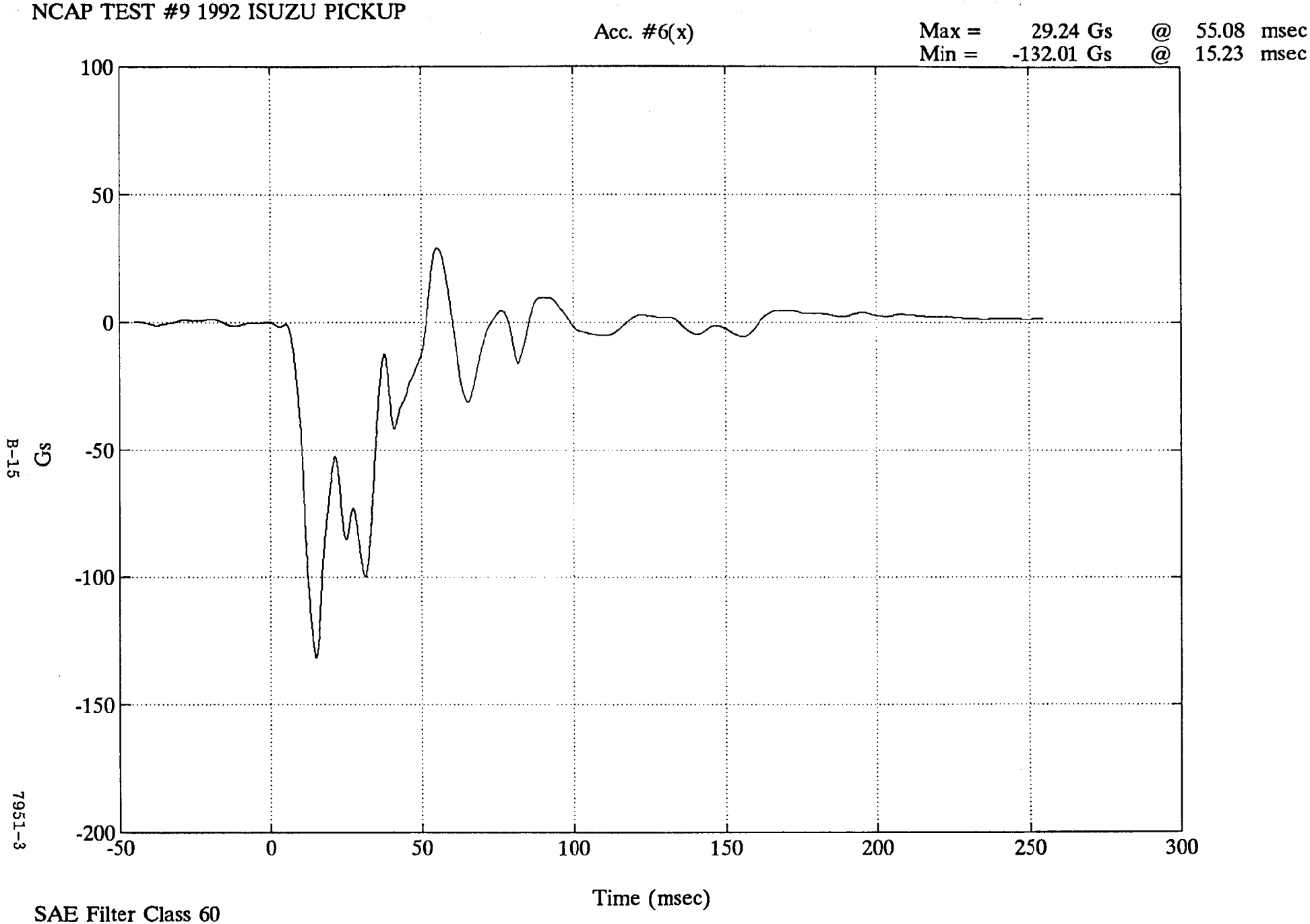
NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

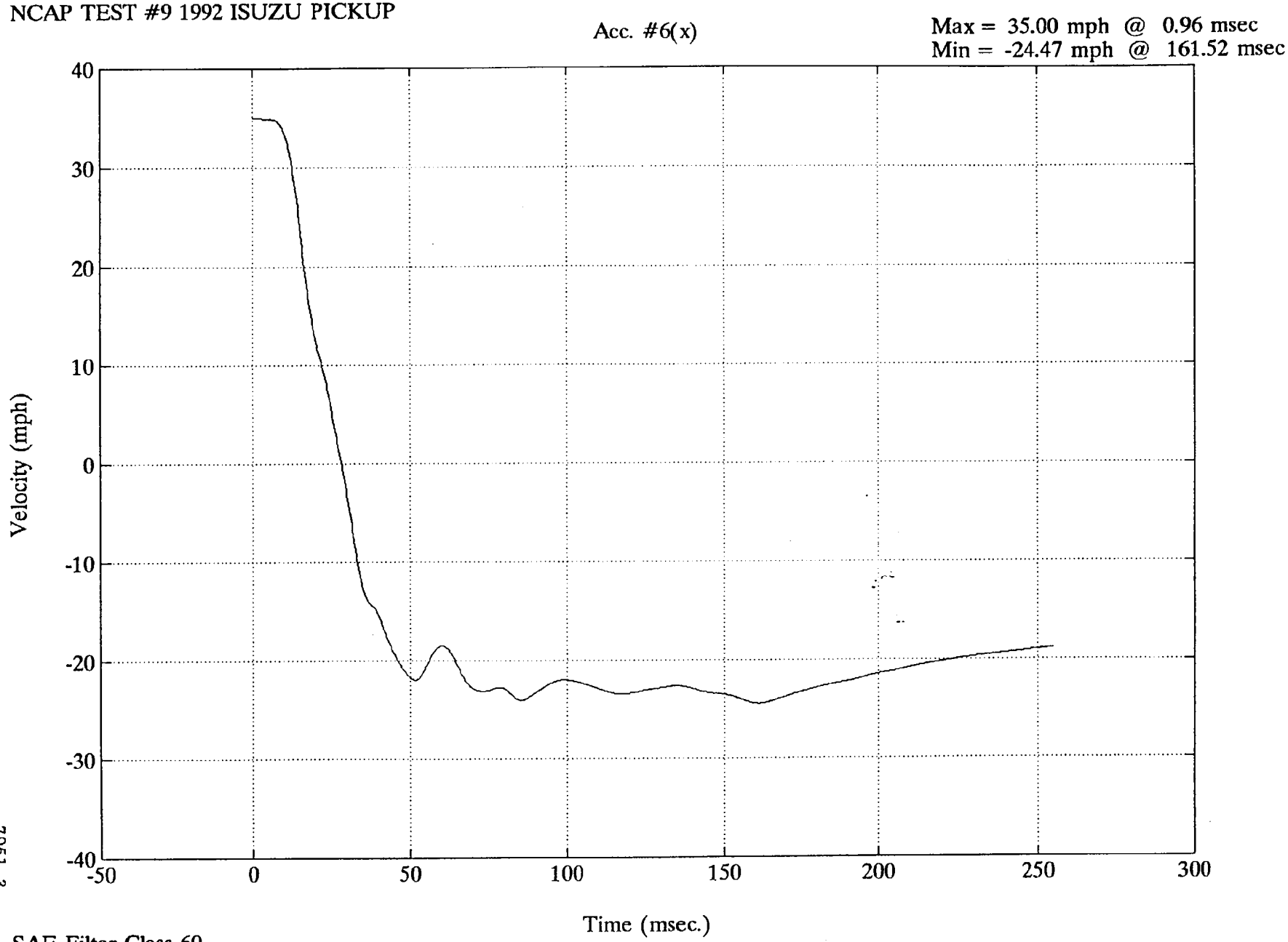
7951-3

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

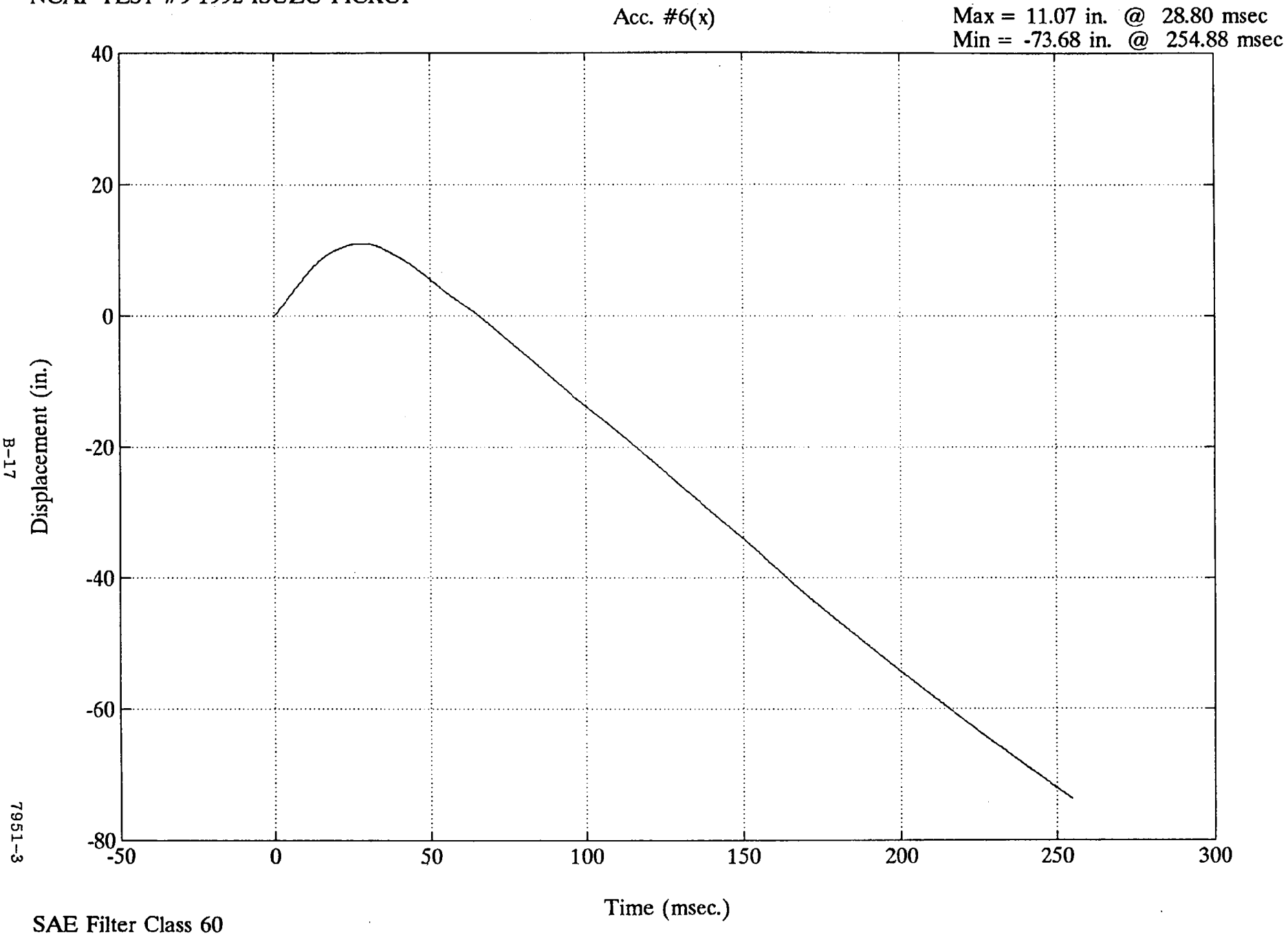
NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

7951-3

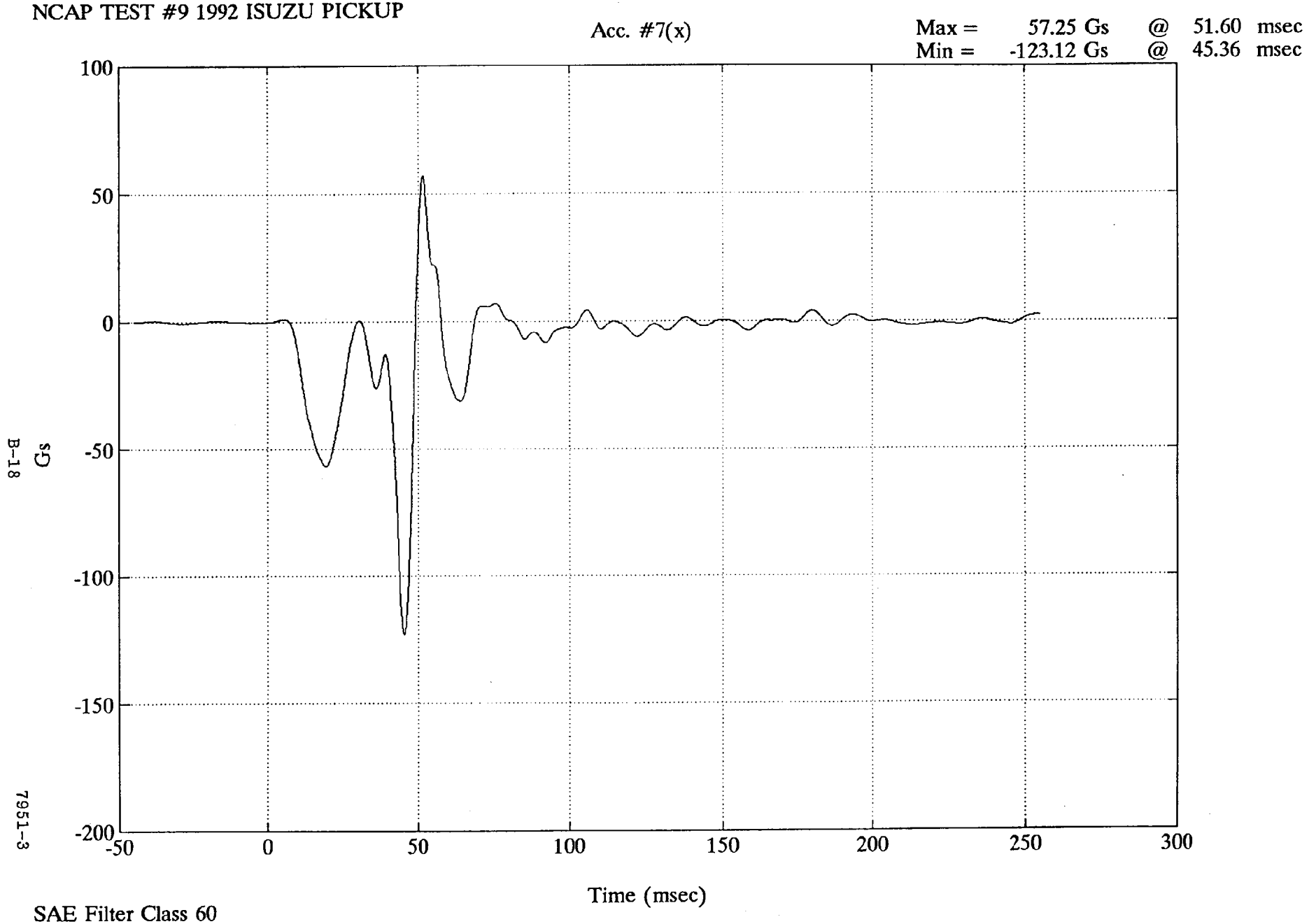
NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

7951-3

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

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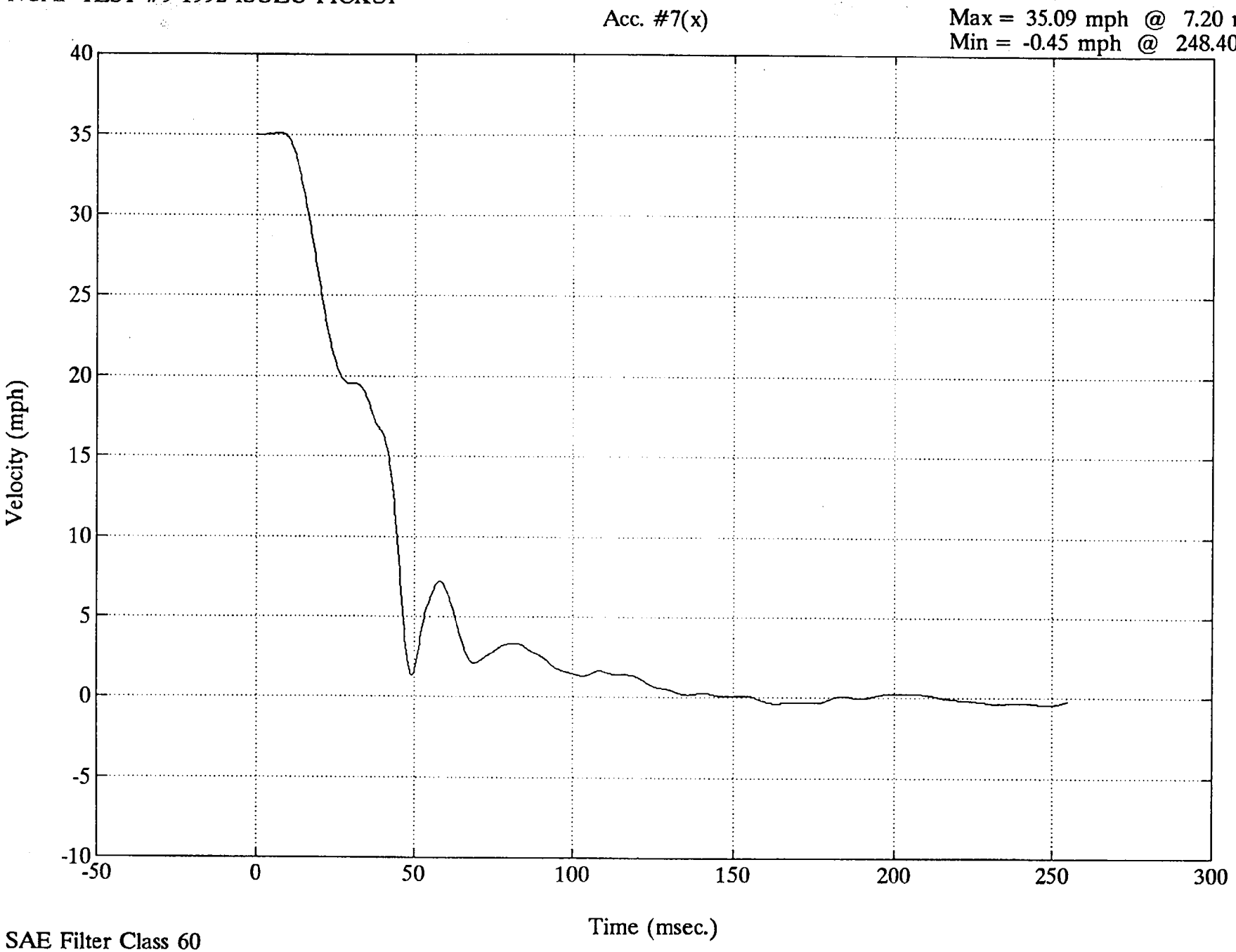
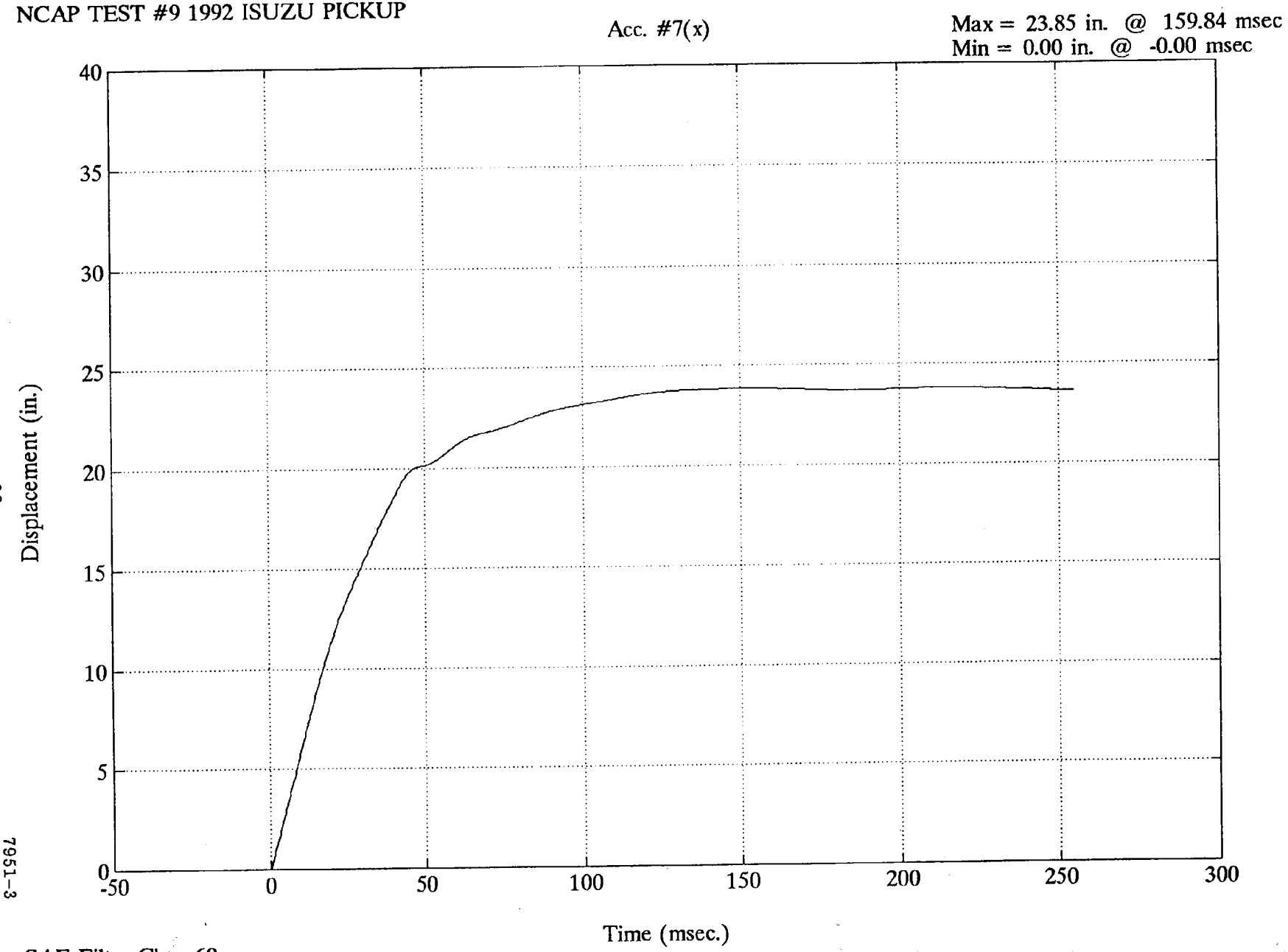


SAE Filter Class 60

7951-3

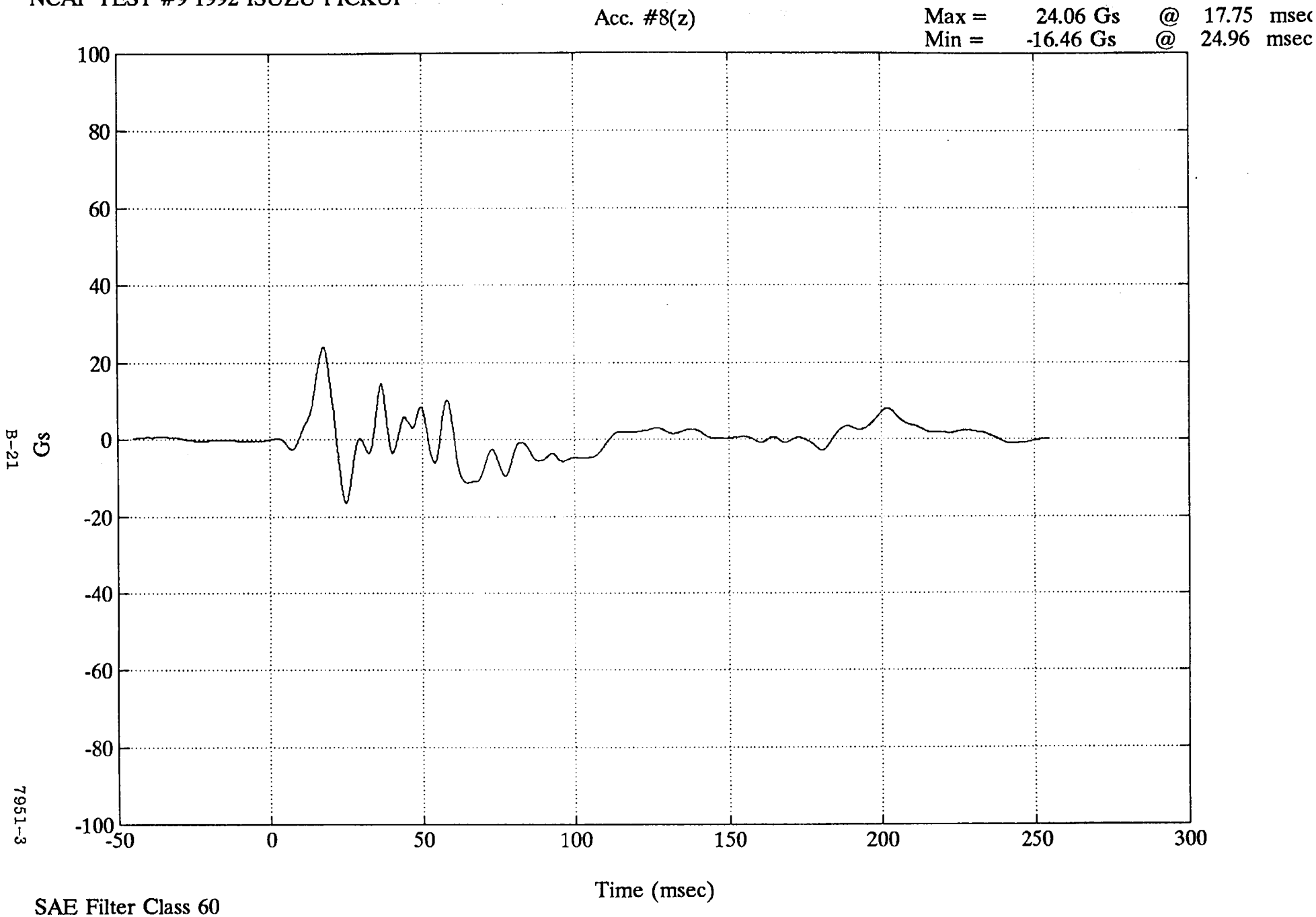
NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

7951-3

NCAP TEST #9 1992 ISUZU PICKUP

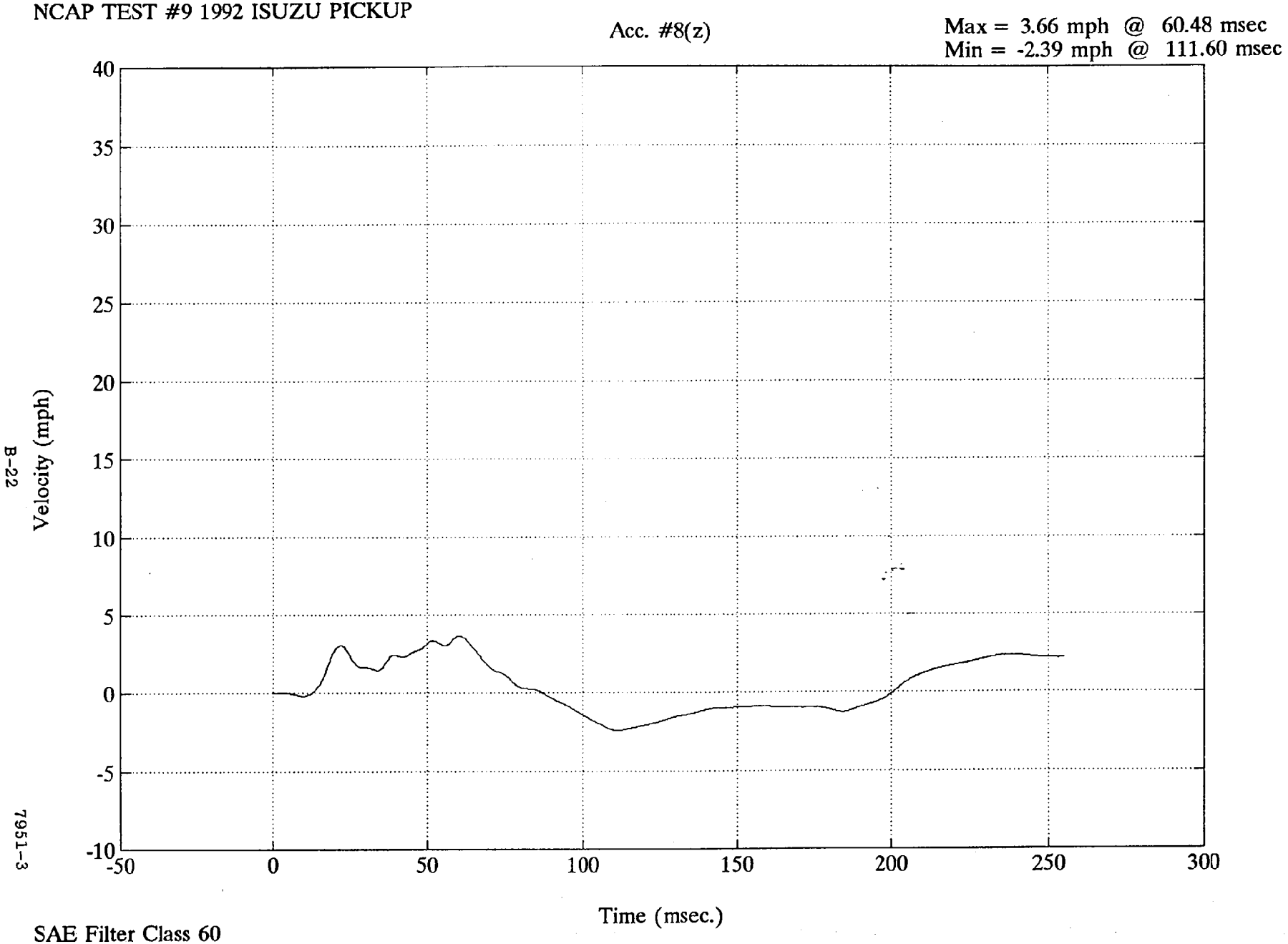


B-21

7951-3

SAE Filter Class 60

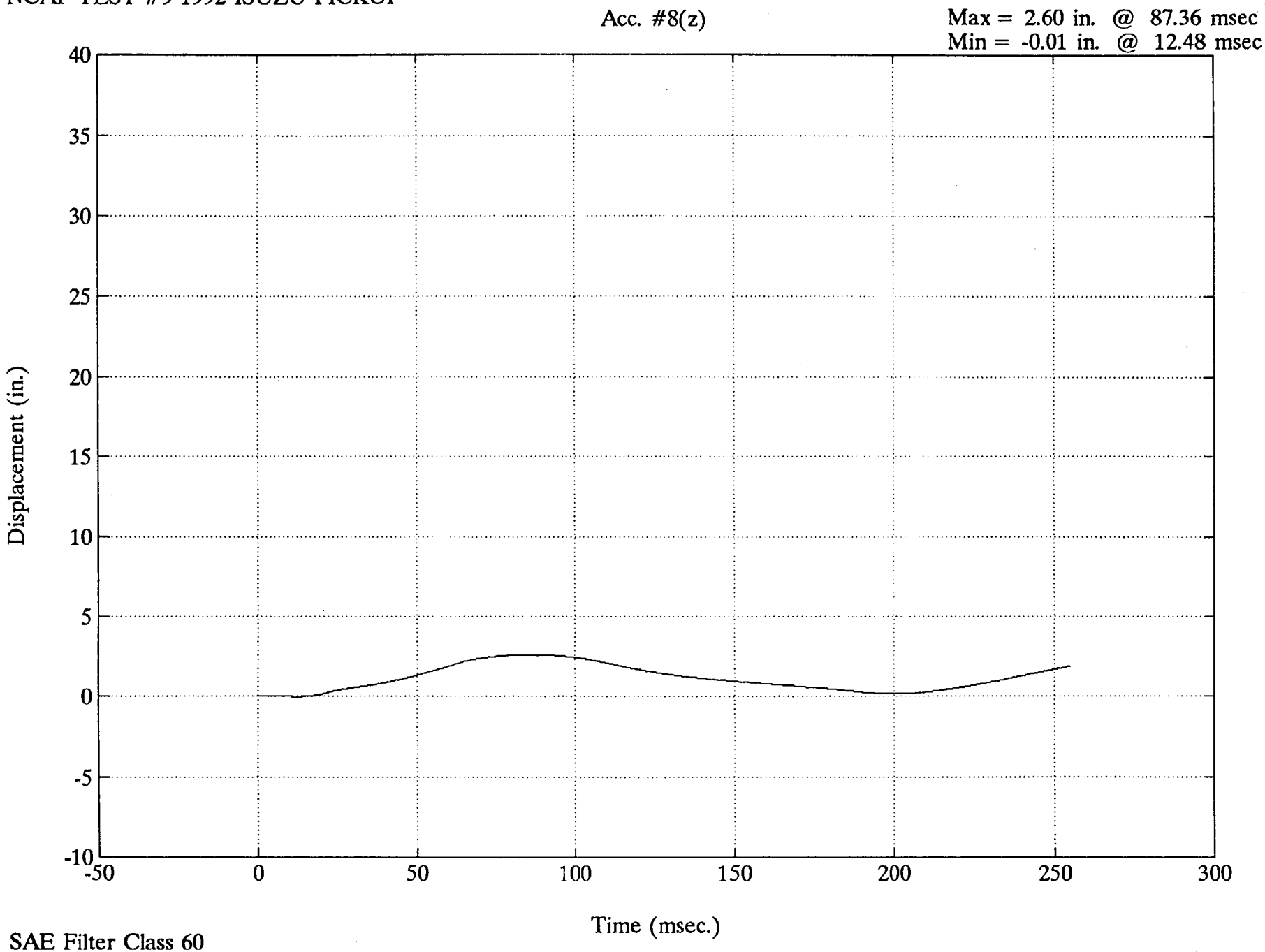
NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

7951-3

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

7951-3

NCAP TEST #9 1992 ISUZU PICKUP

Acc. #9(z)

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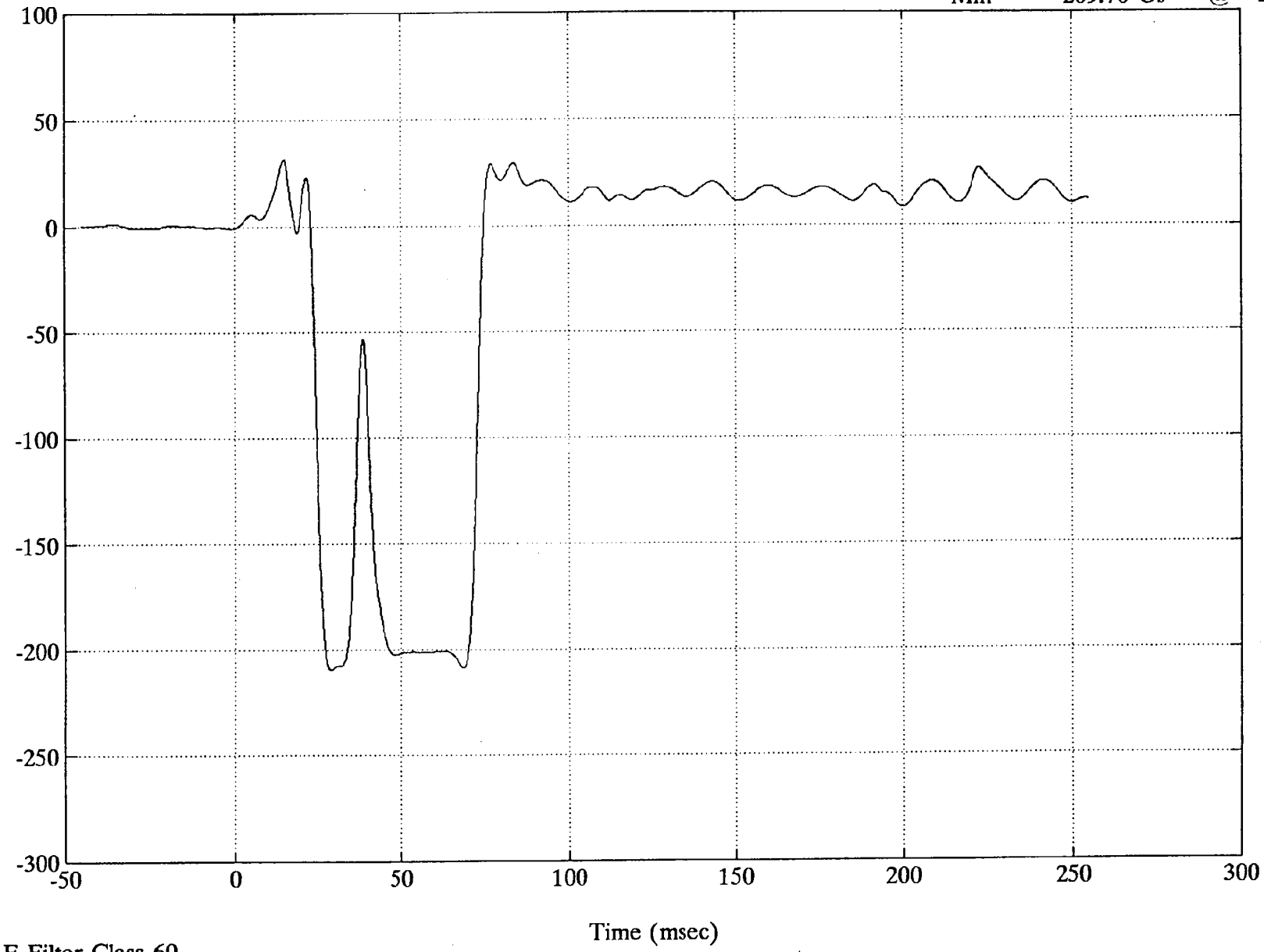


B-24

7951-3

SAE Filter Class 60

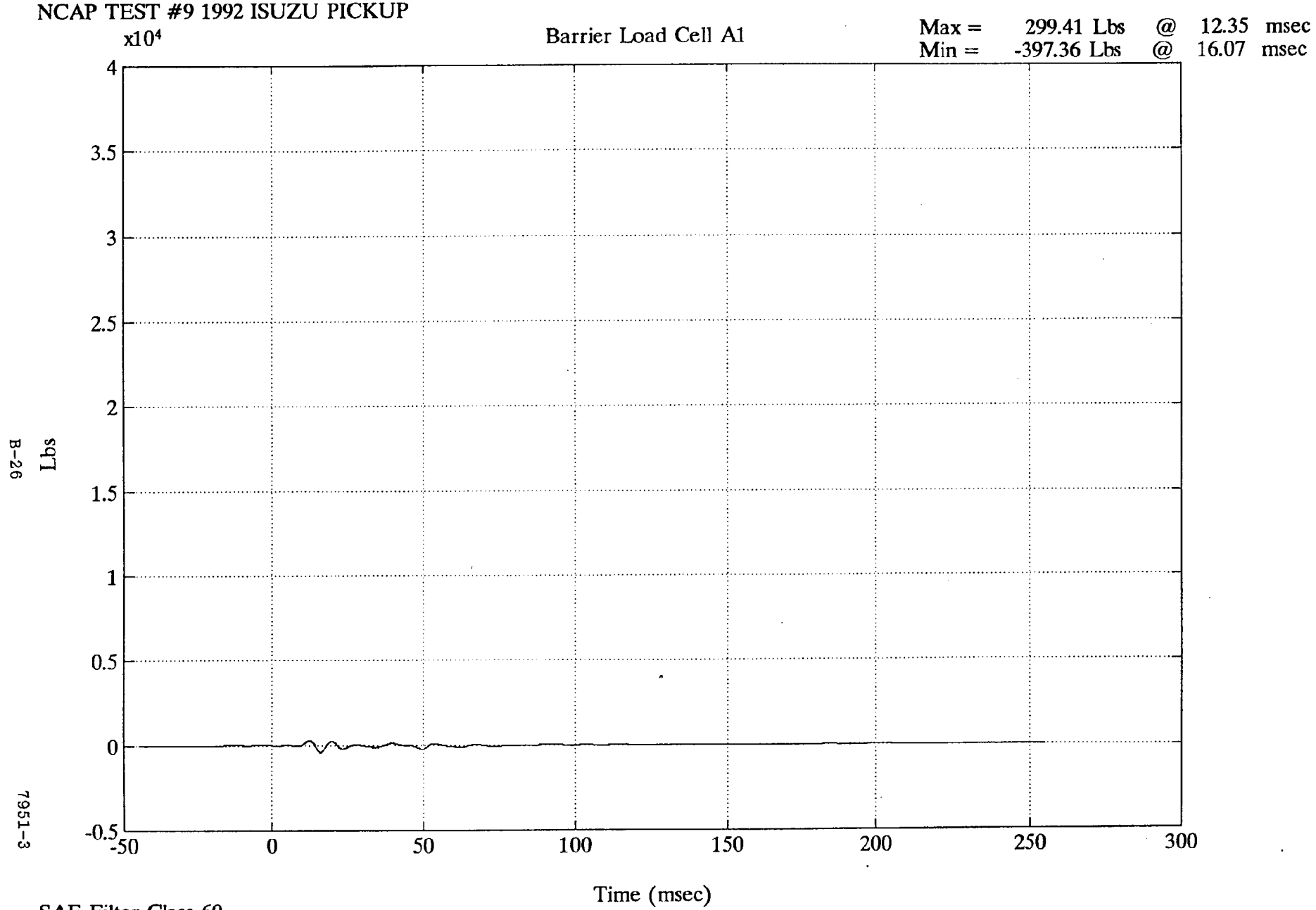
TEST NO. MN5700

LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

60

NCAP TEST #9 1992 ISUZU PICKUP



B-26

7951-3

SAE Filter Class 60

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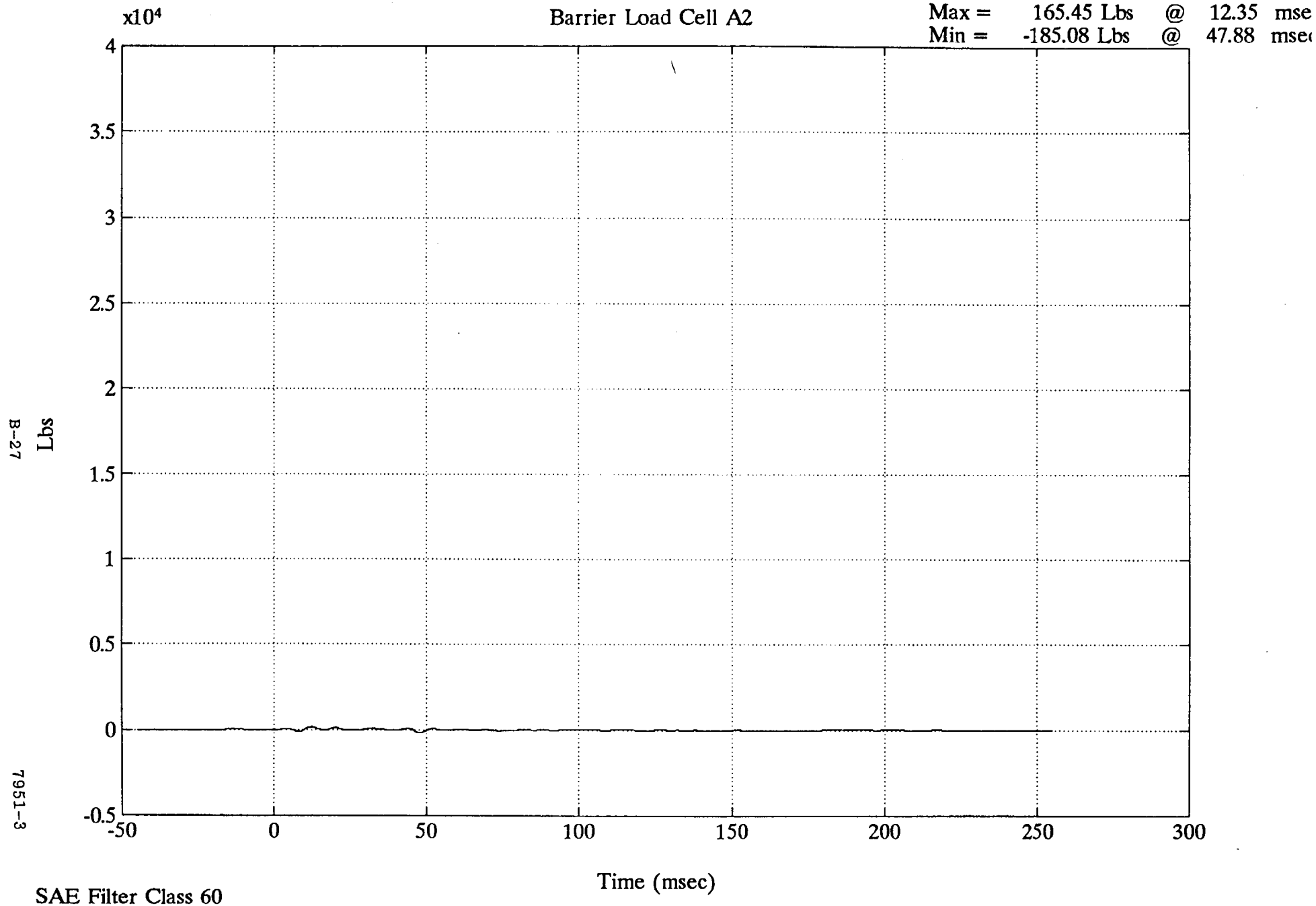

B-27

7951-3

SAE Filter Class 60

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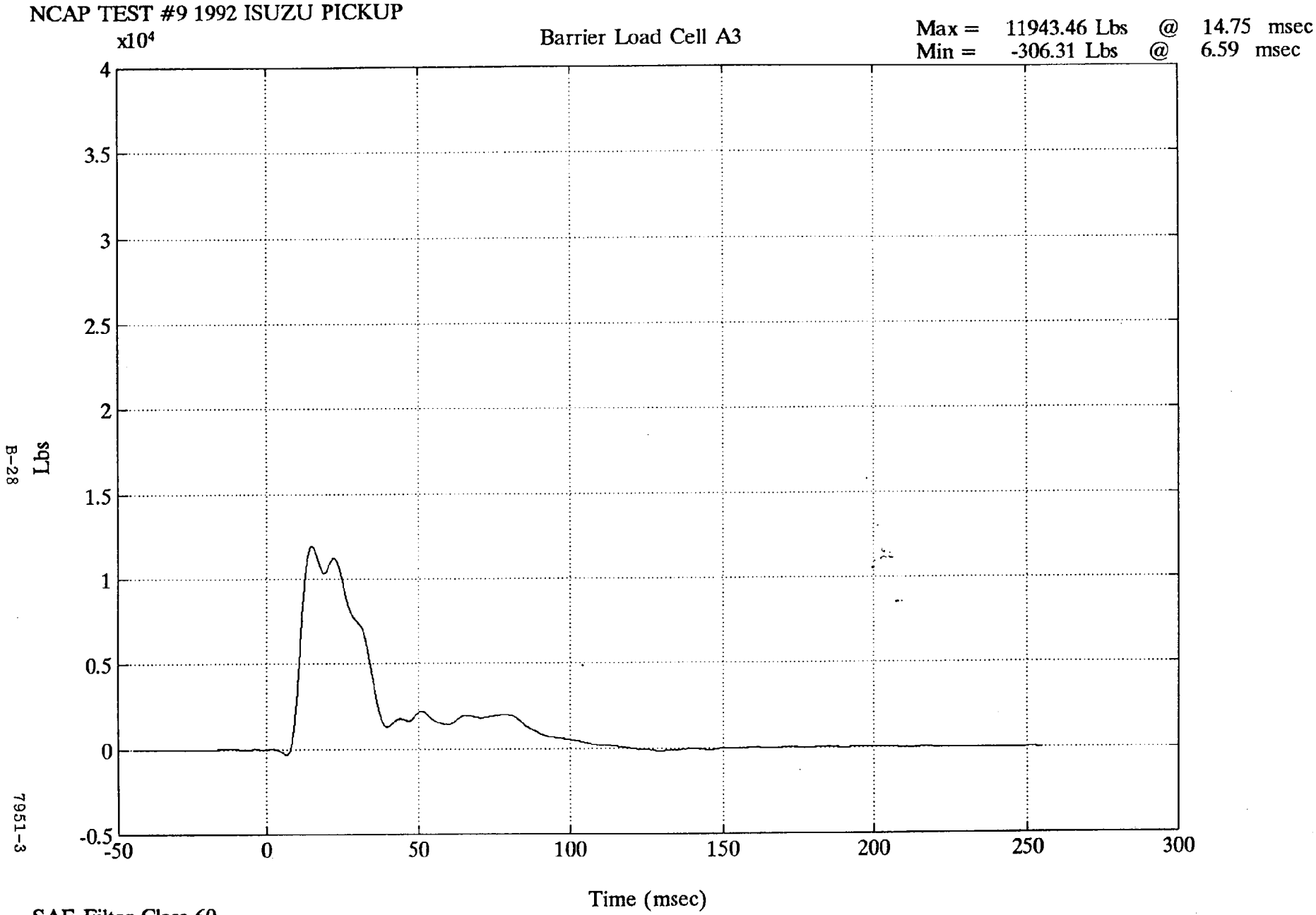
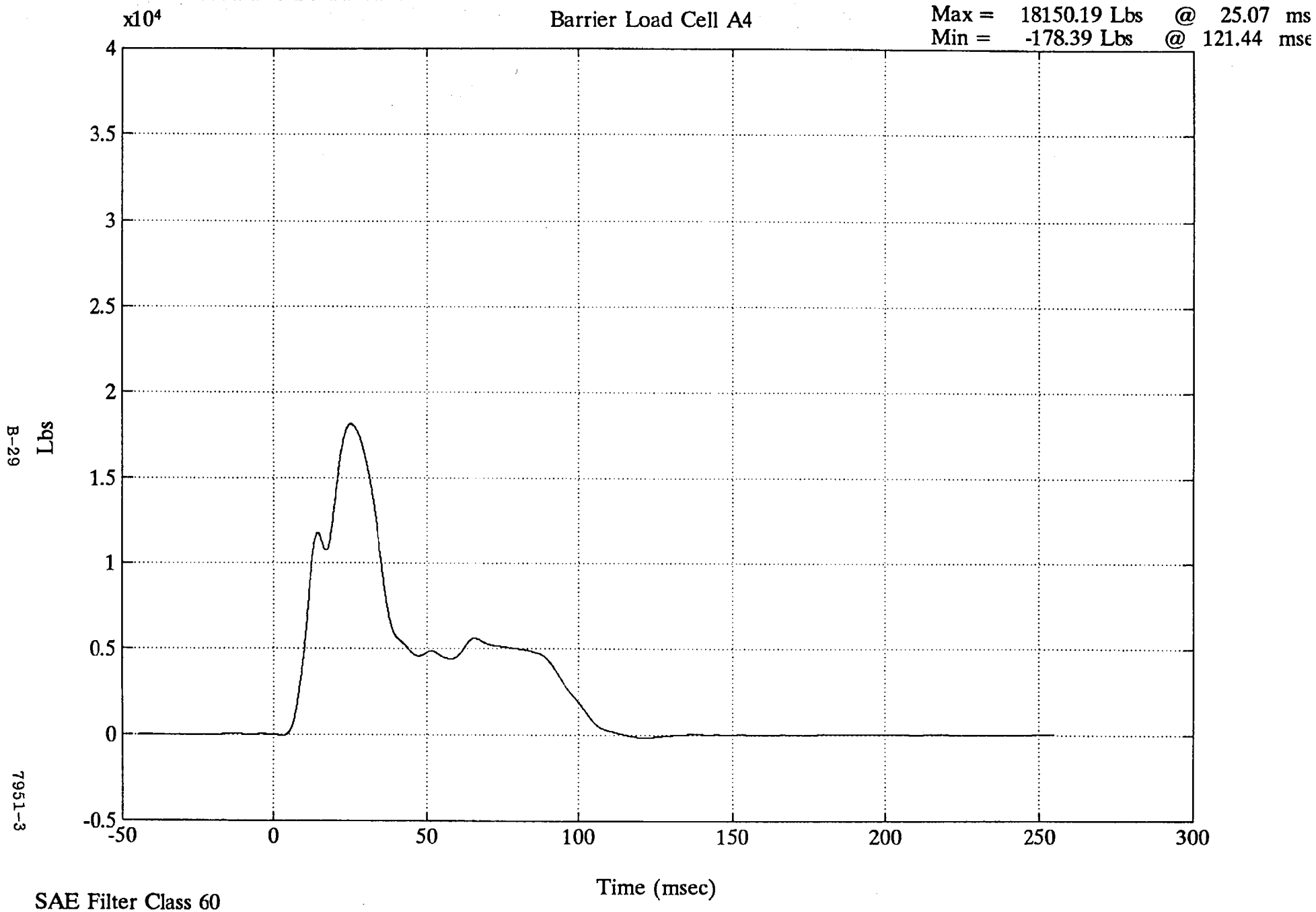


SAE Filter Class 60

7951-3

NCAP TEST #9 1992 ISUZU PICKUP

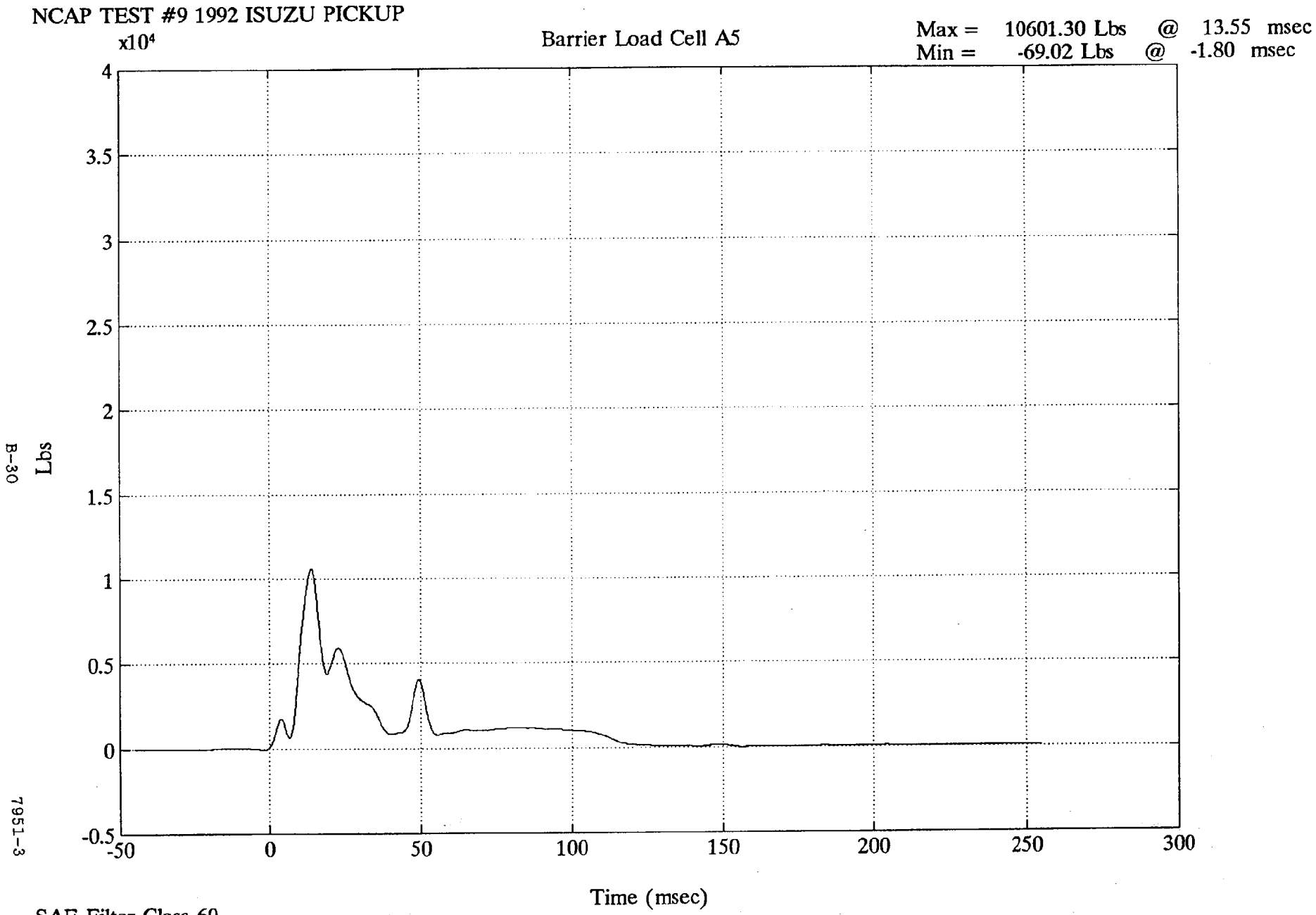


B-29

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

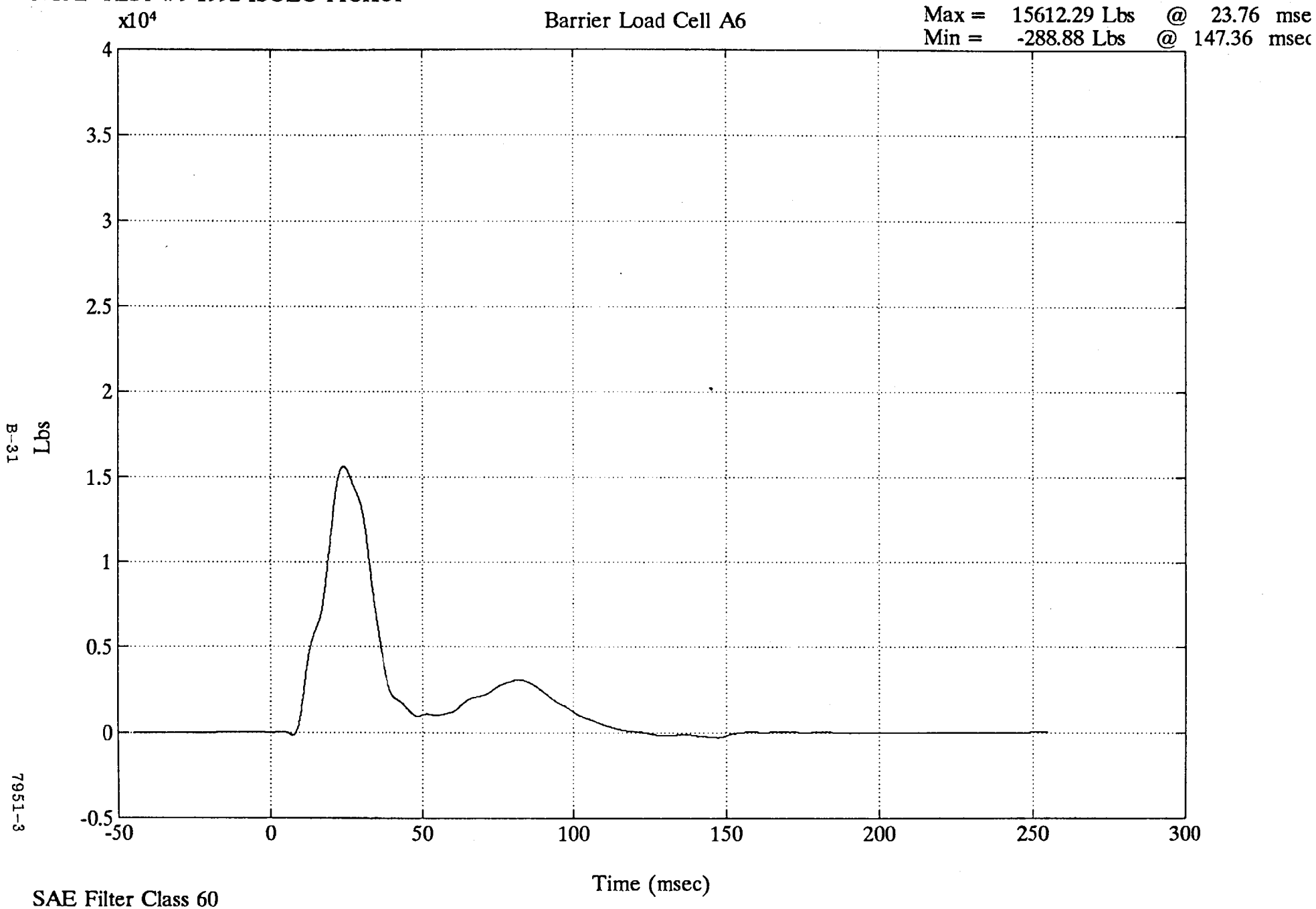


B-30

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

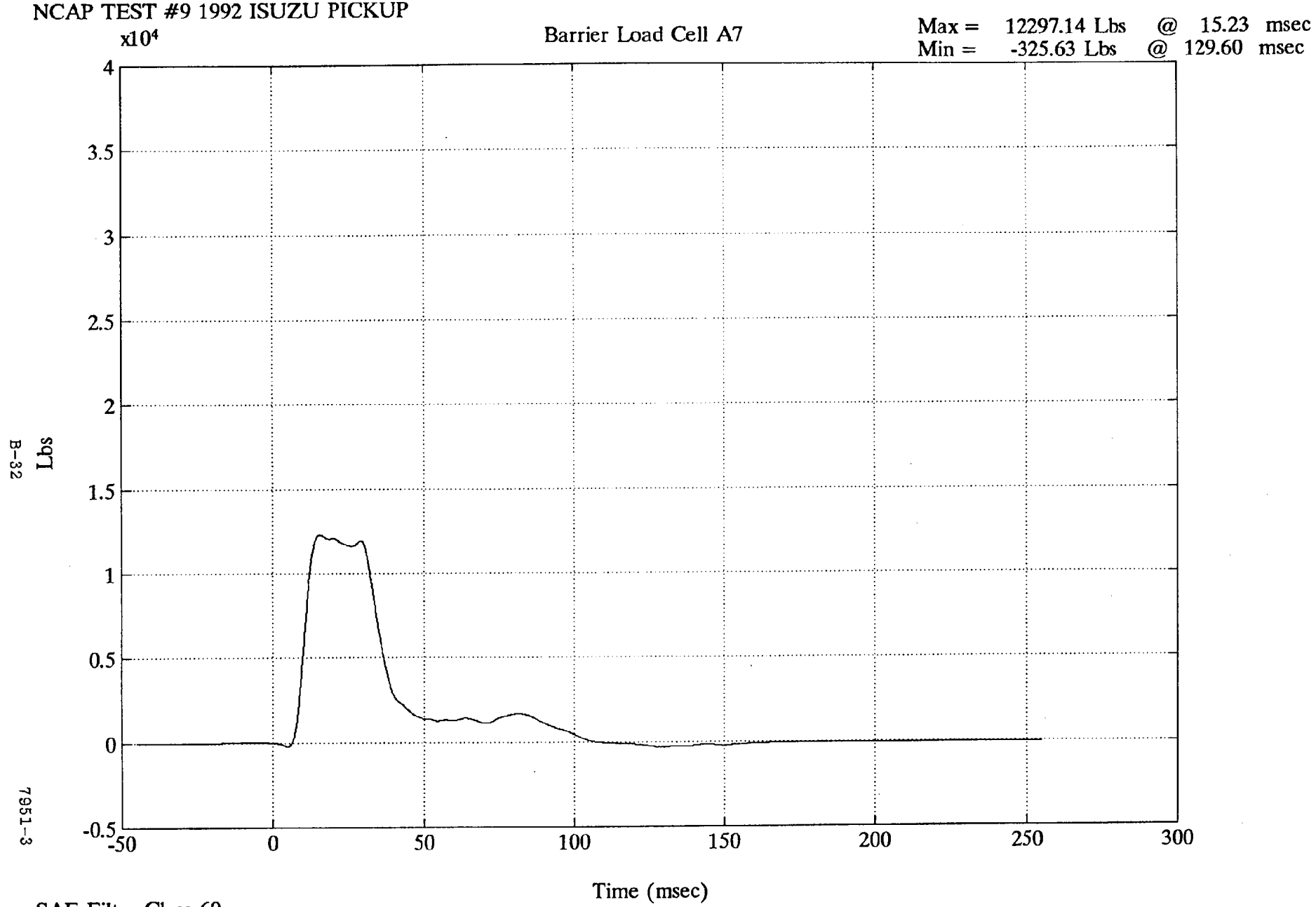


B-31

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

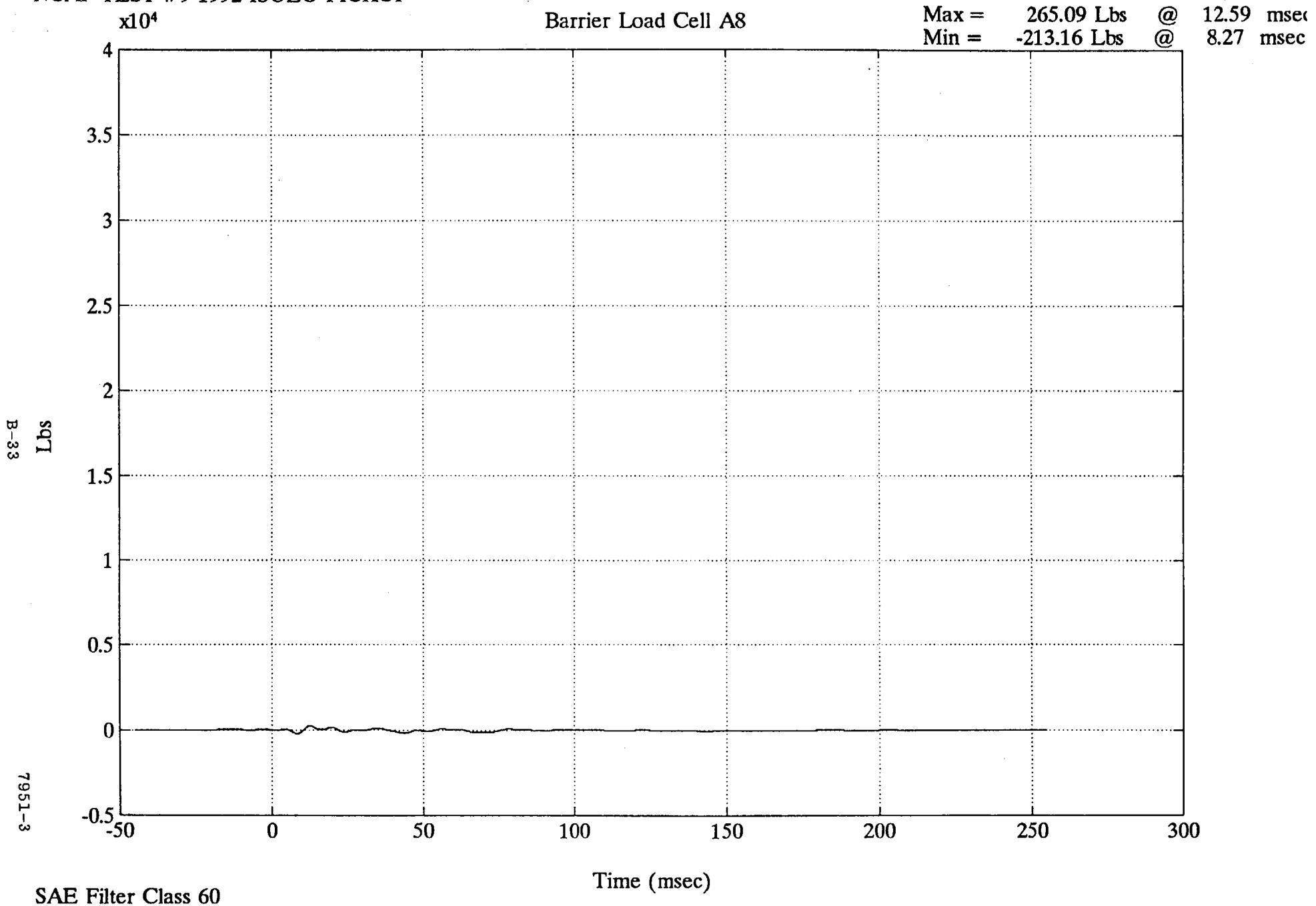


B-32

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

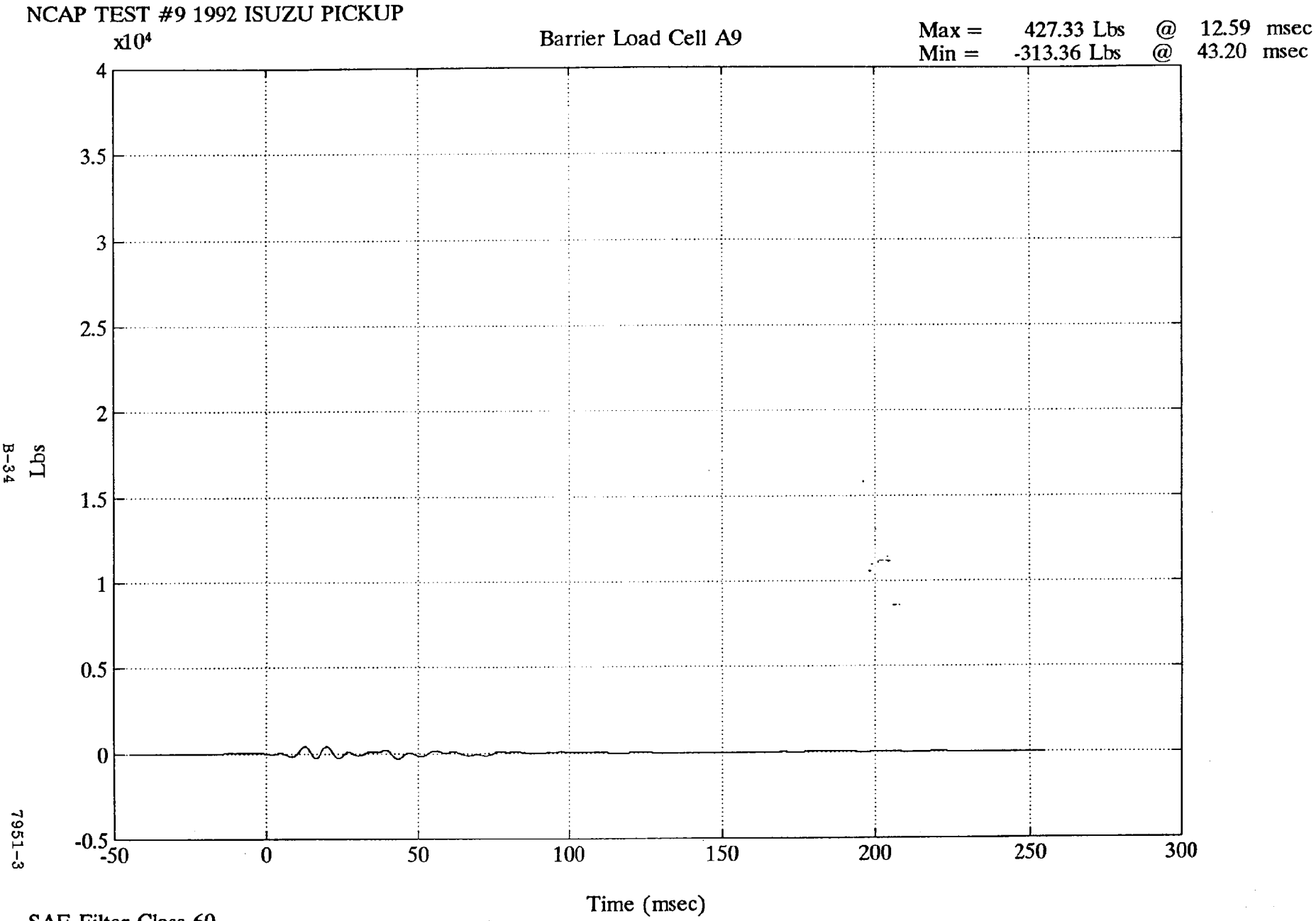


B-33

7951-3

SAE Filter Class 60

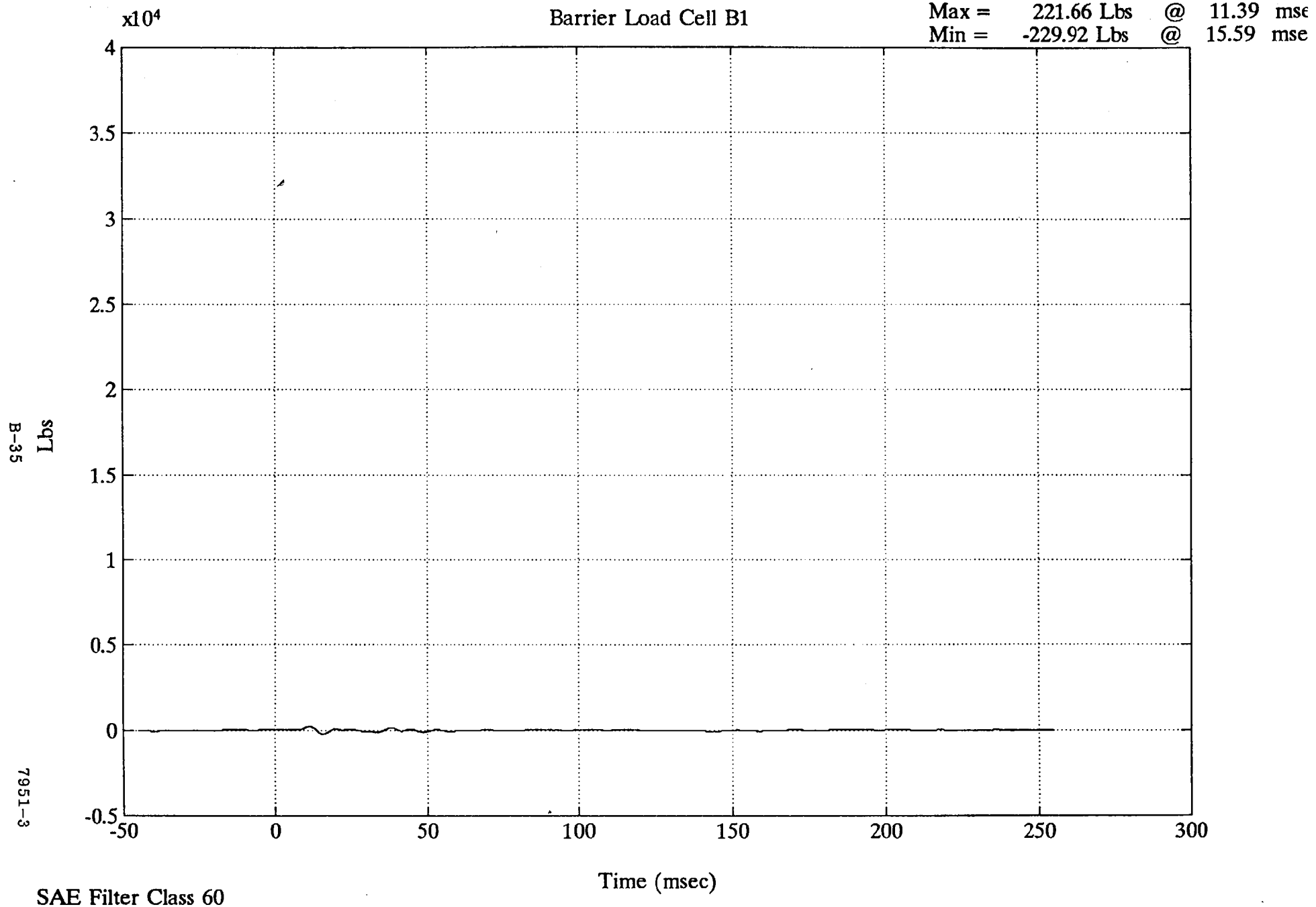
NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

7951-3

NCAP TEST #9 1992 ISUZU PICKUP

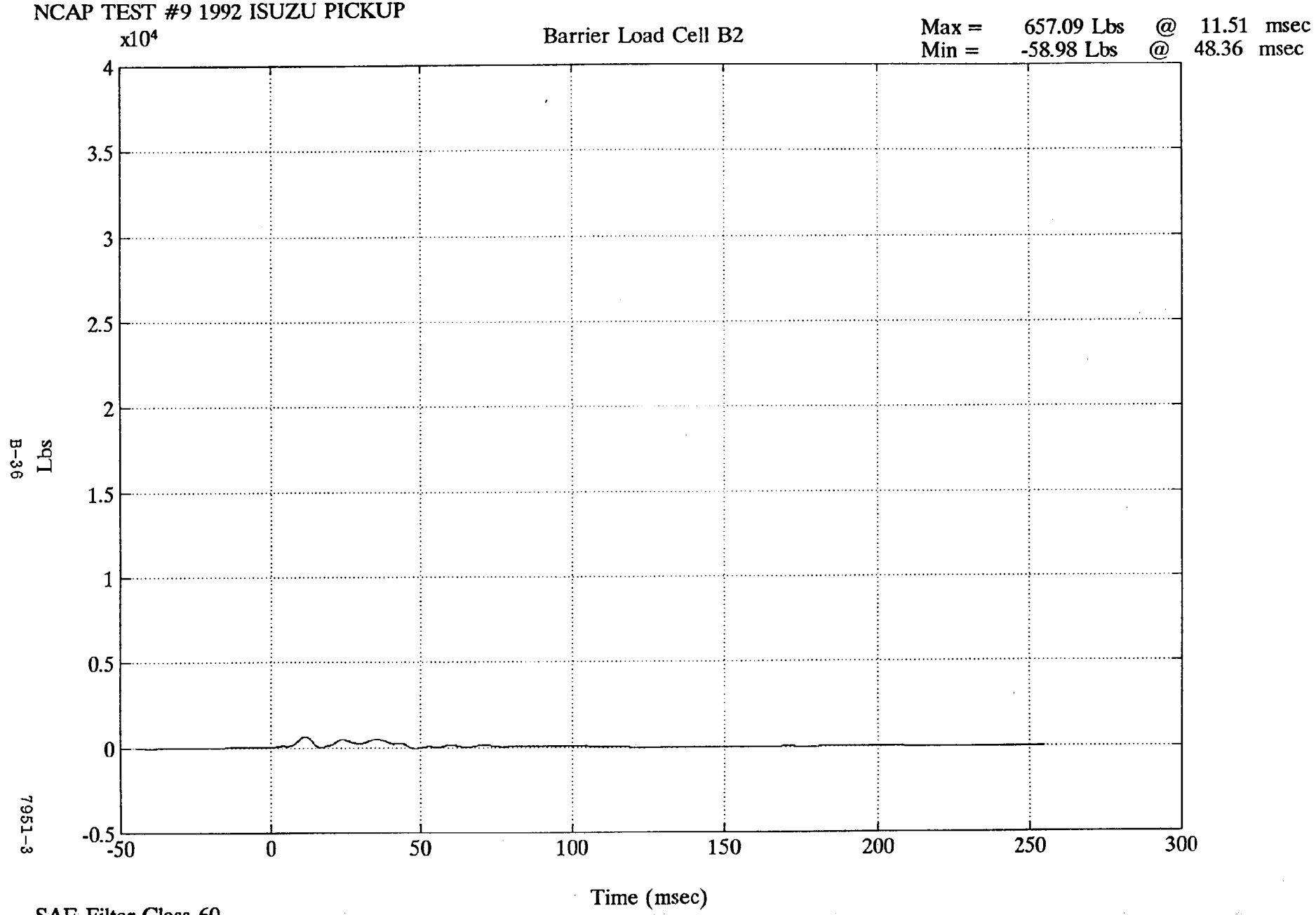


B-35

7951-3

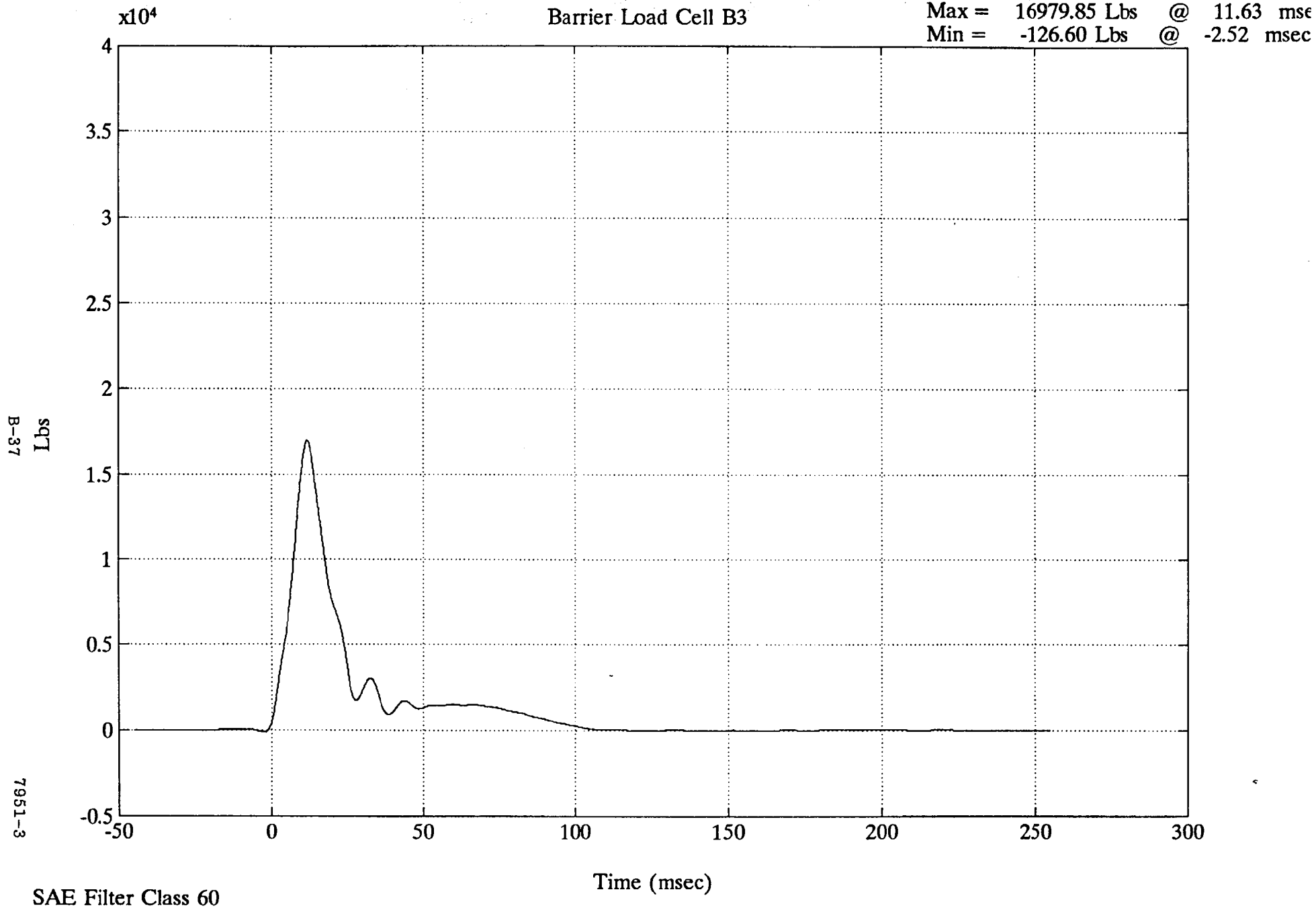
SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

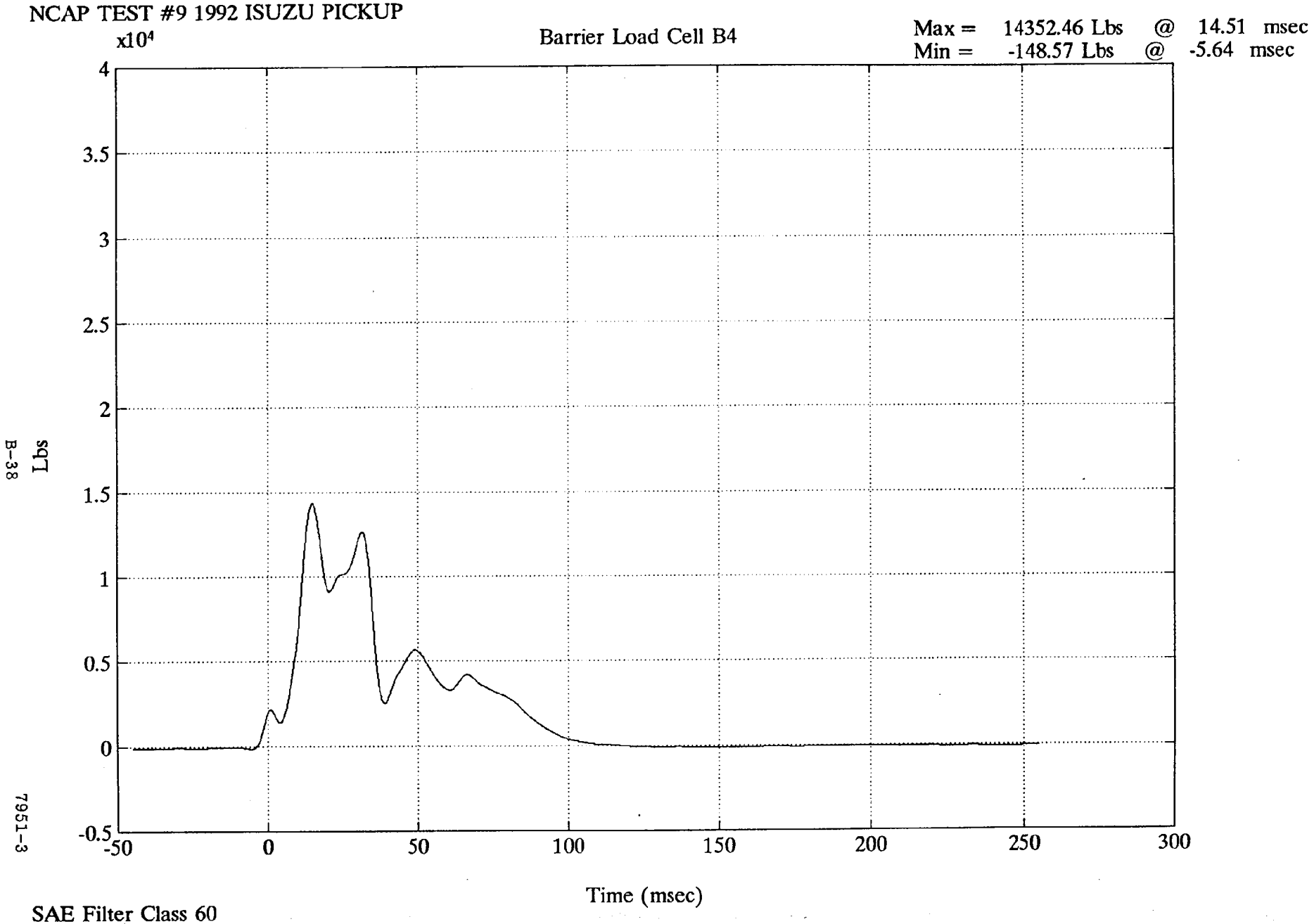


B-37

7951-3

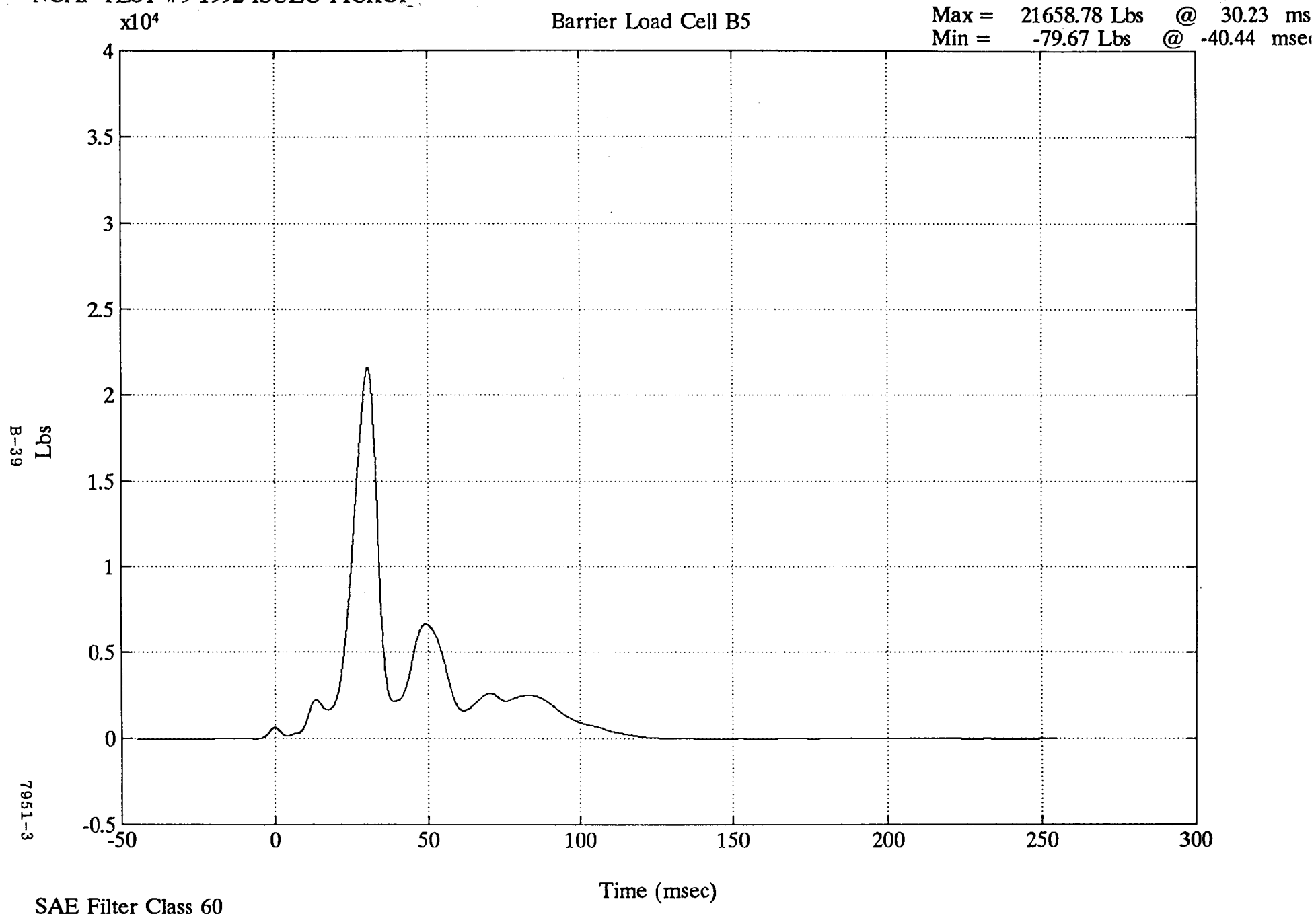
SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

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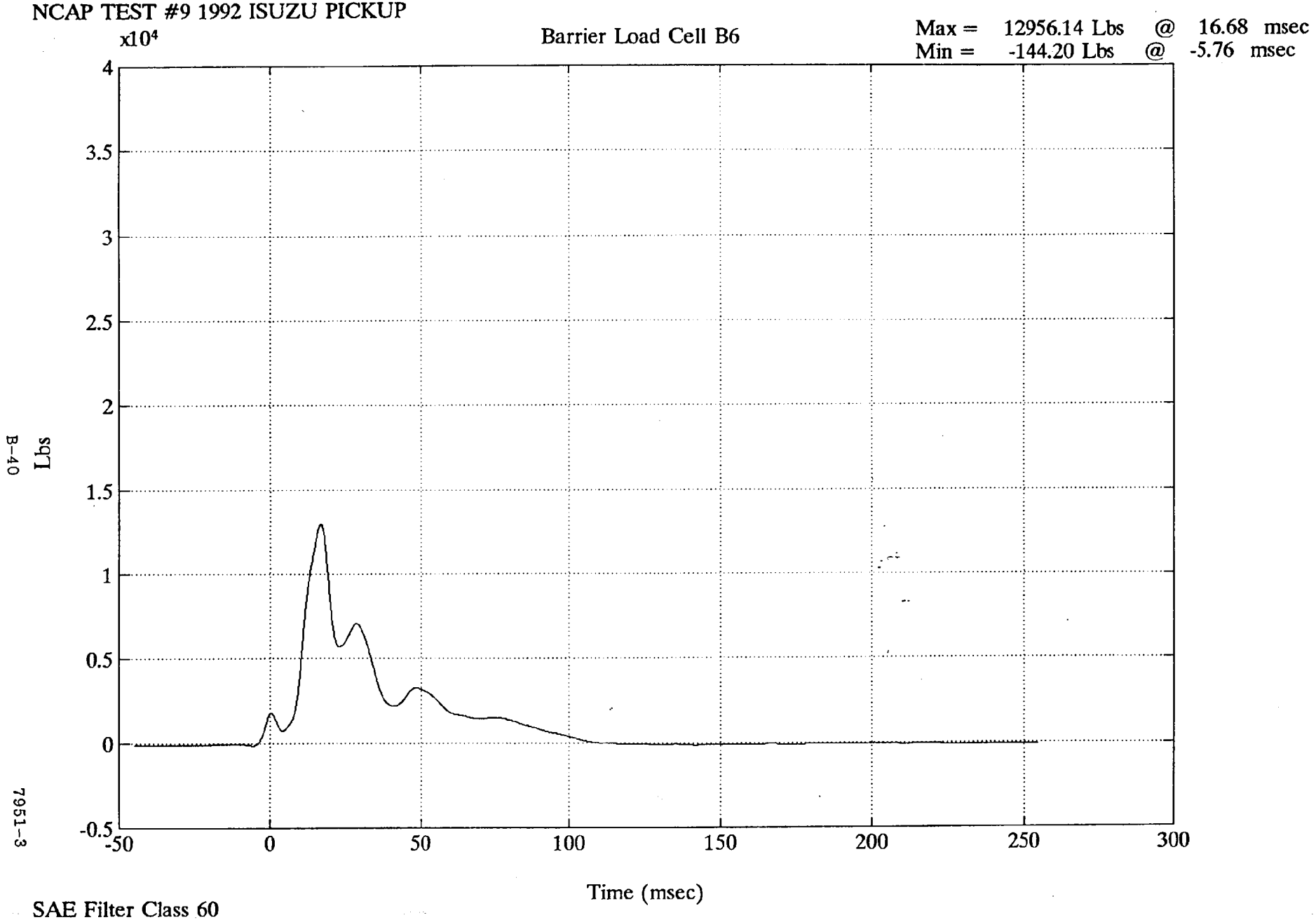
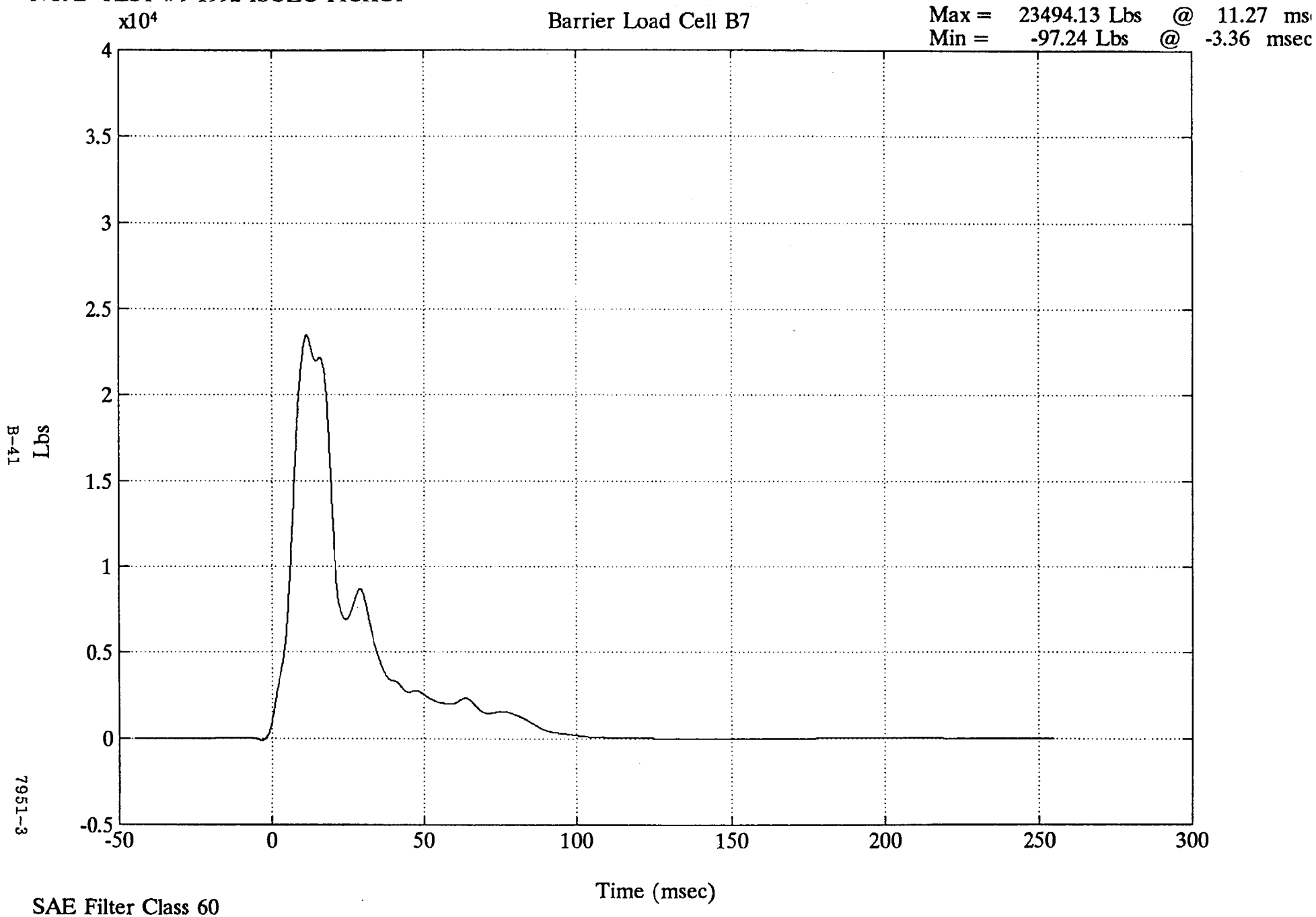


B-40

7951-3

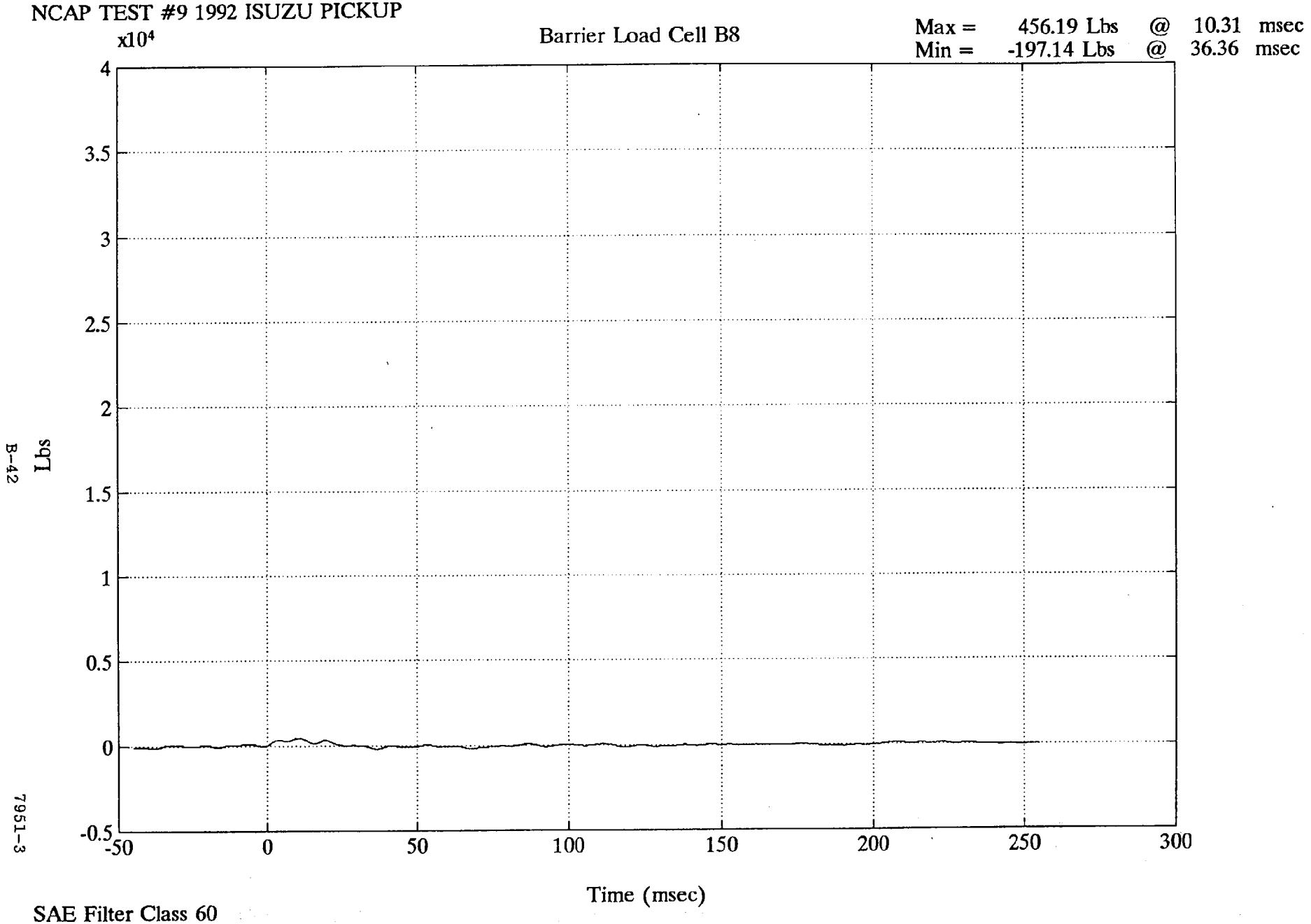
SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

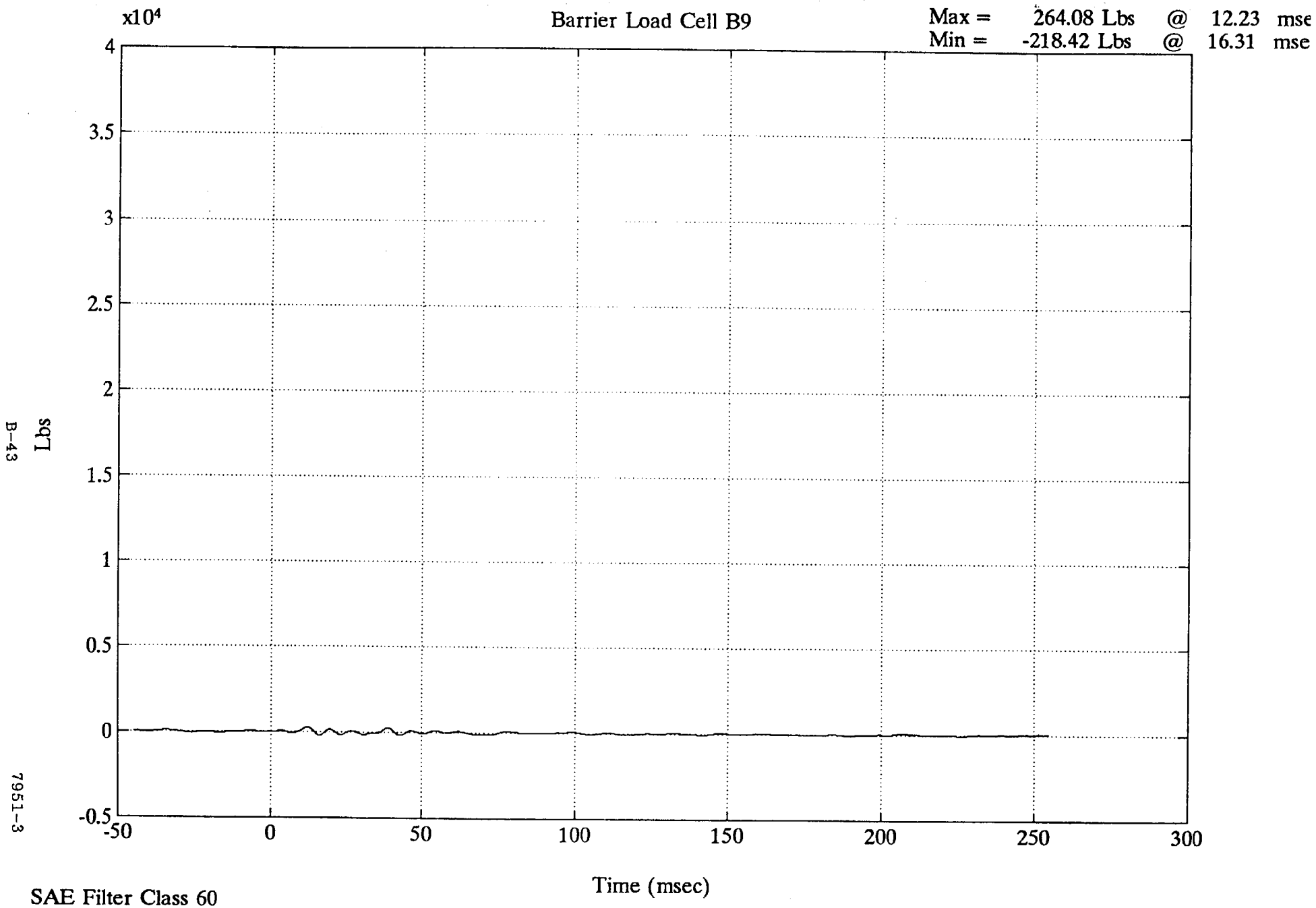


B-42

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

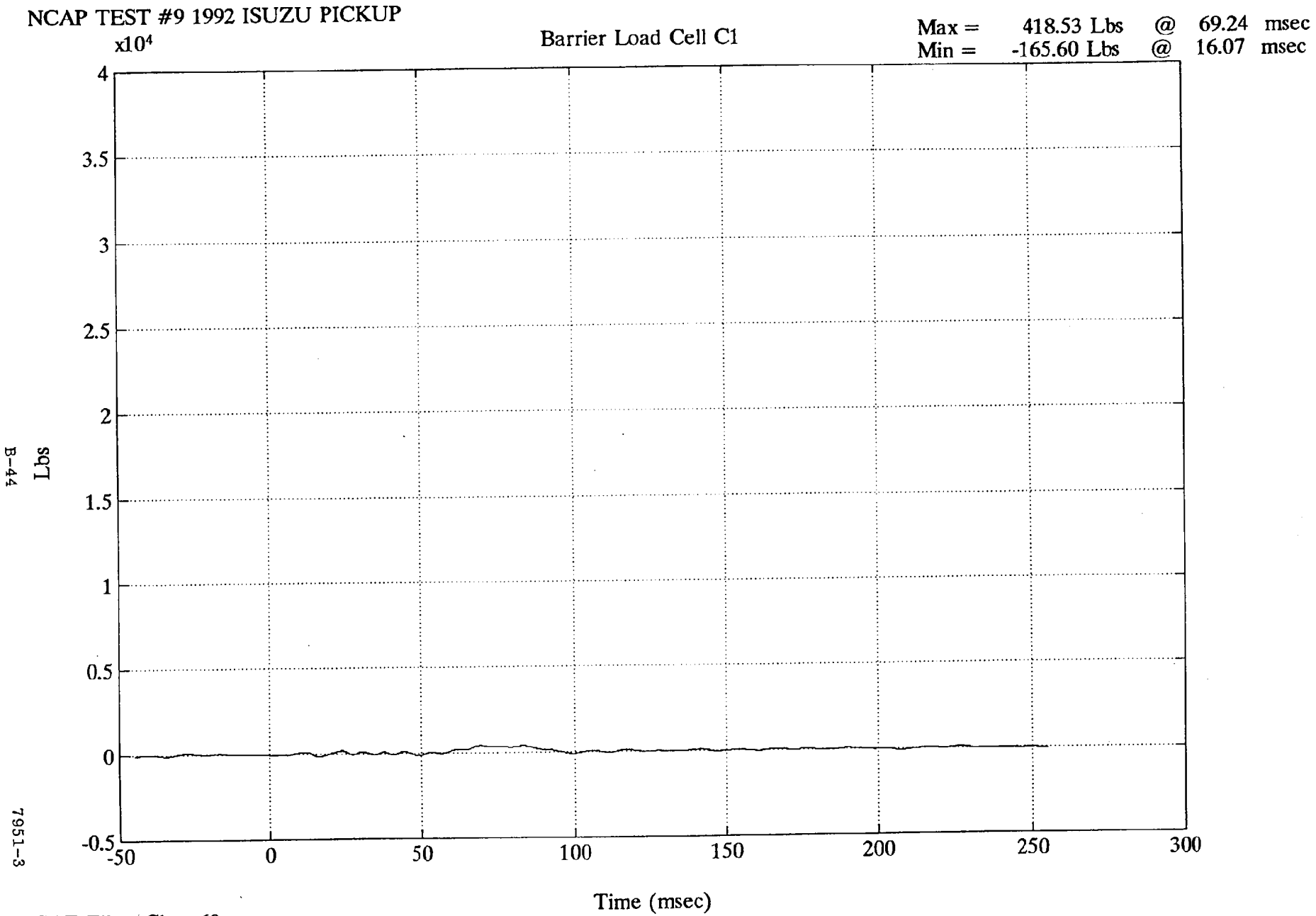


B-43

7951-3

SAE Filter Class 60

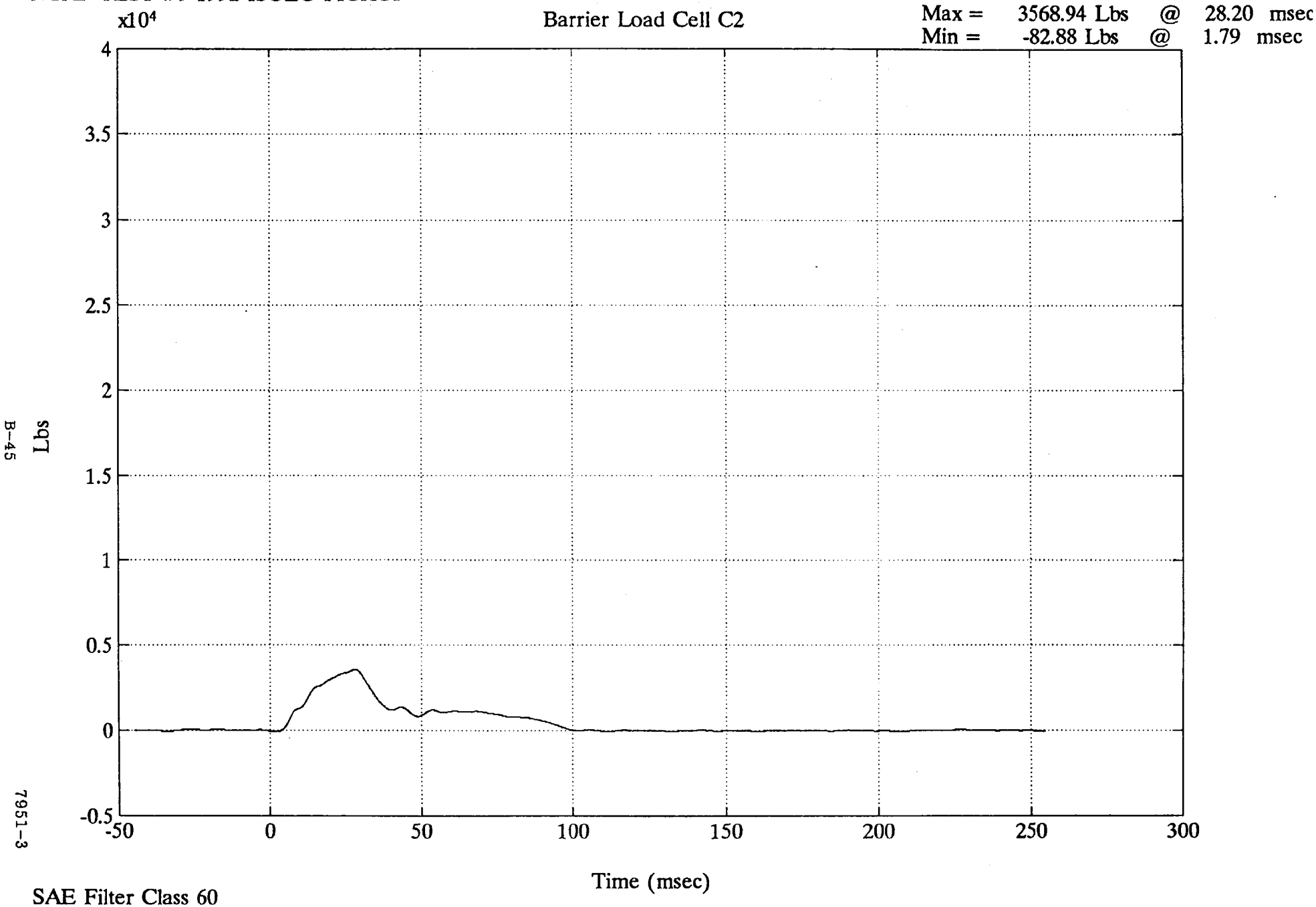
NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

7951-3

NCAP TEST #9 1992 ISUZU PICKUP

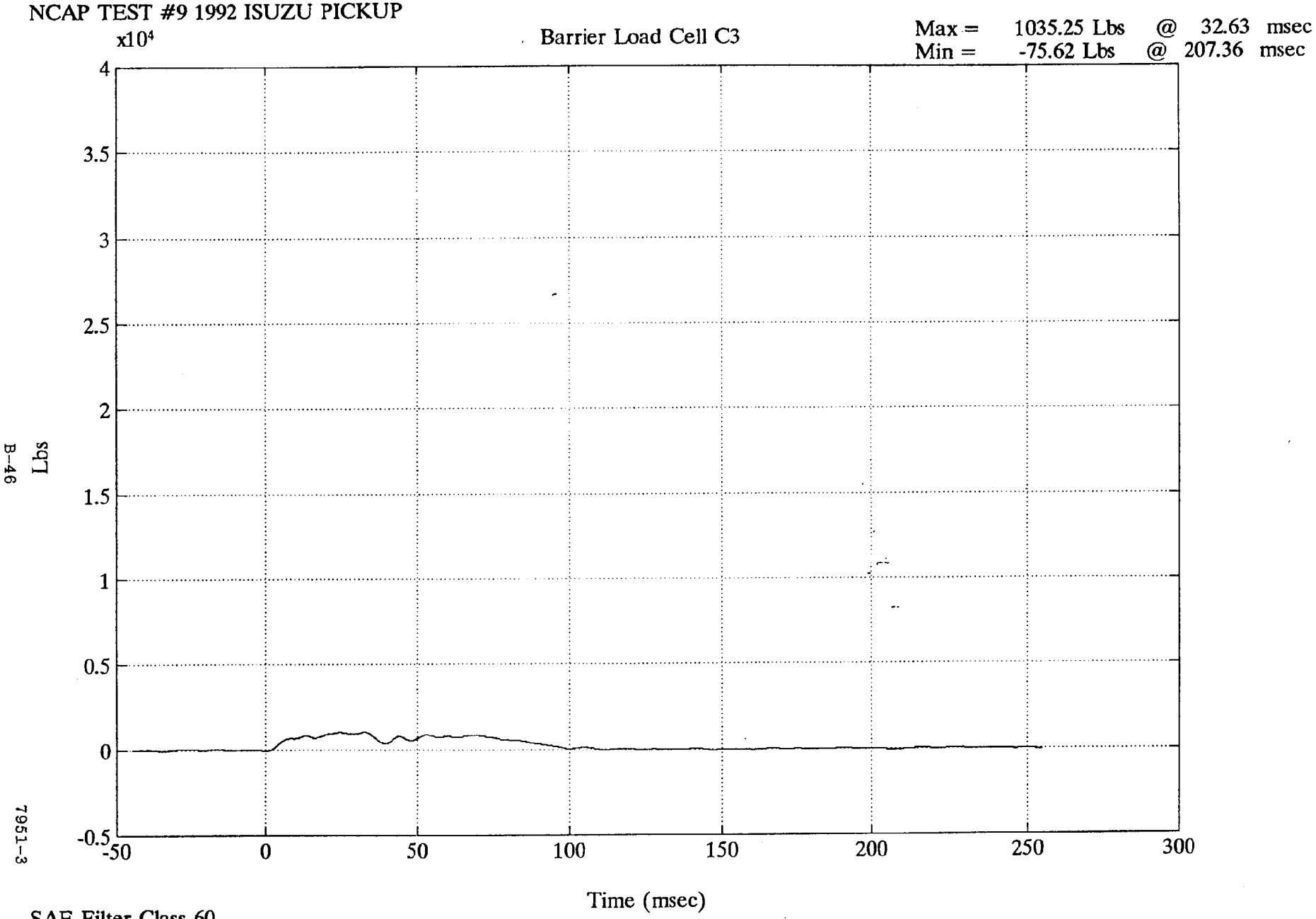


B-45

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

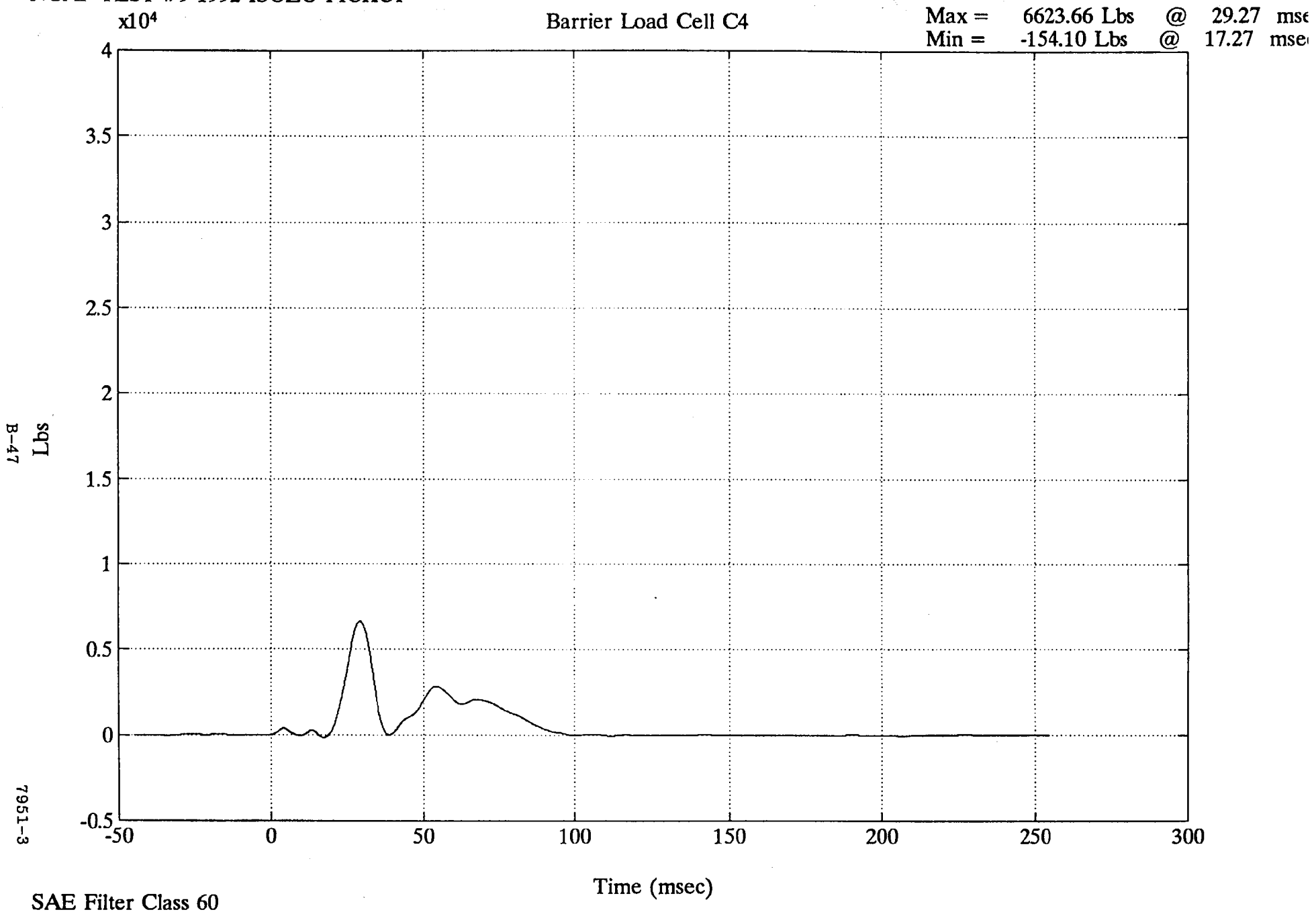


B-46

7951-3

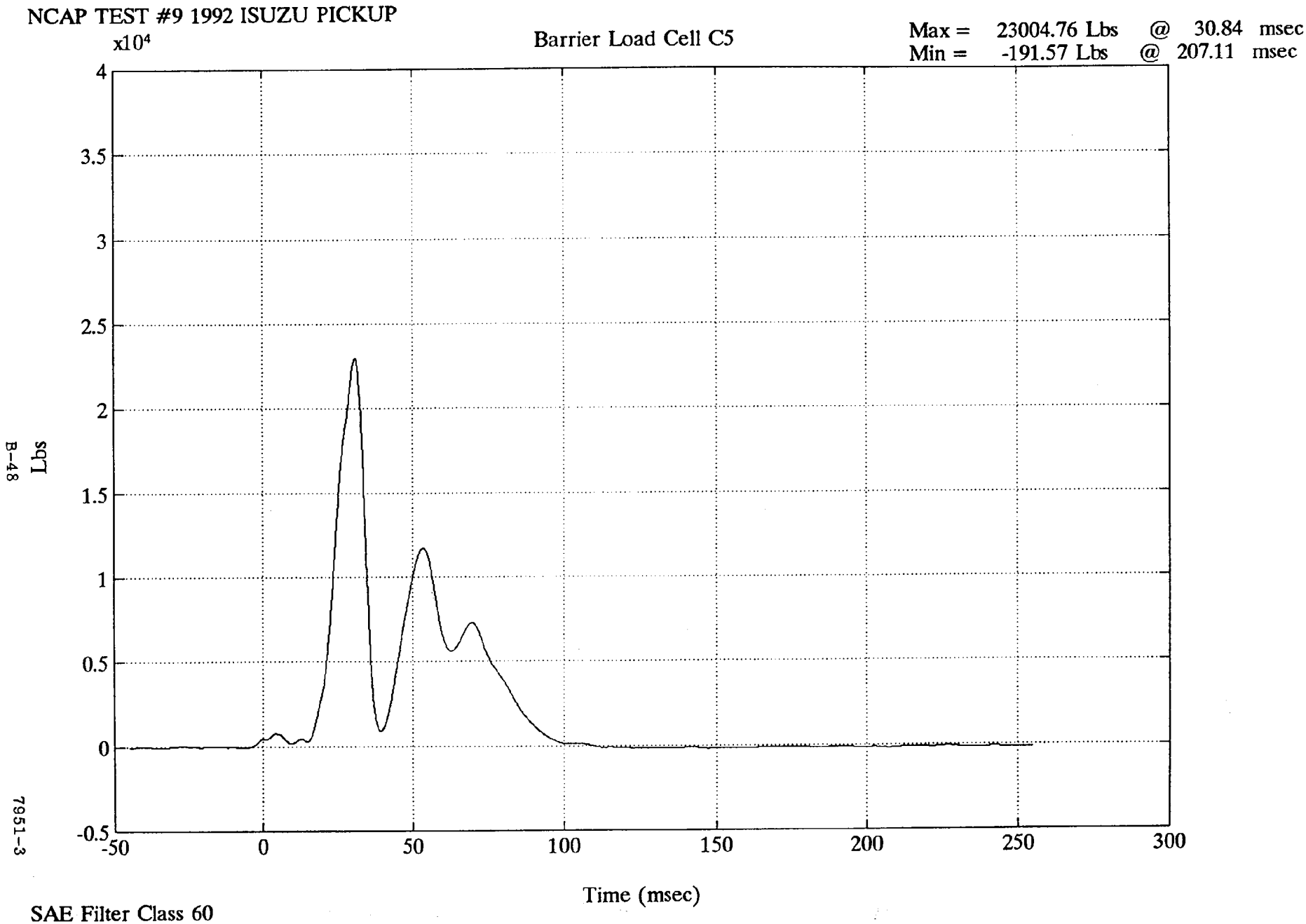
SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP



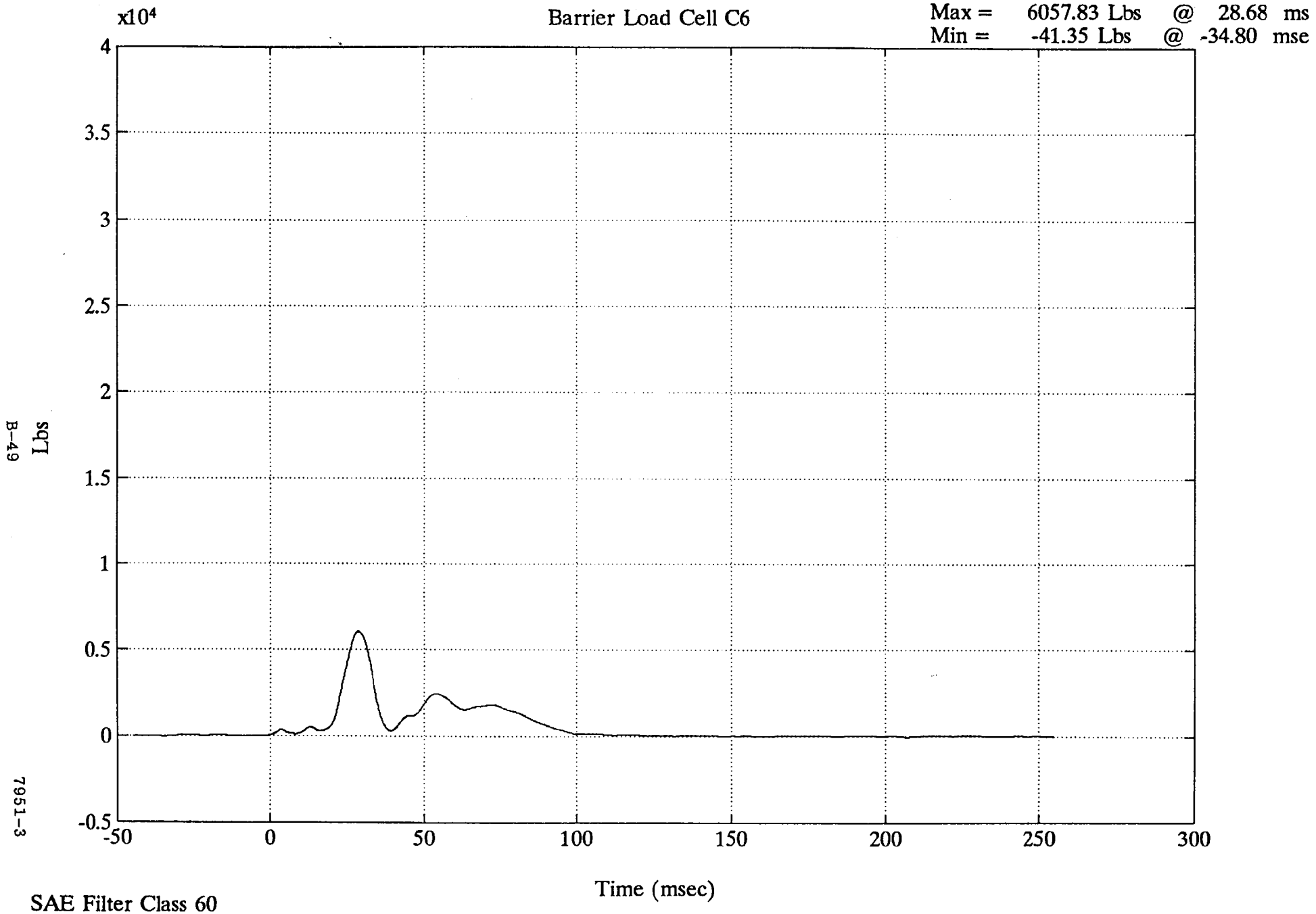
SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

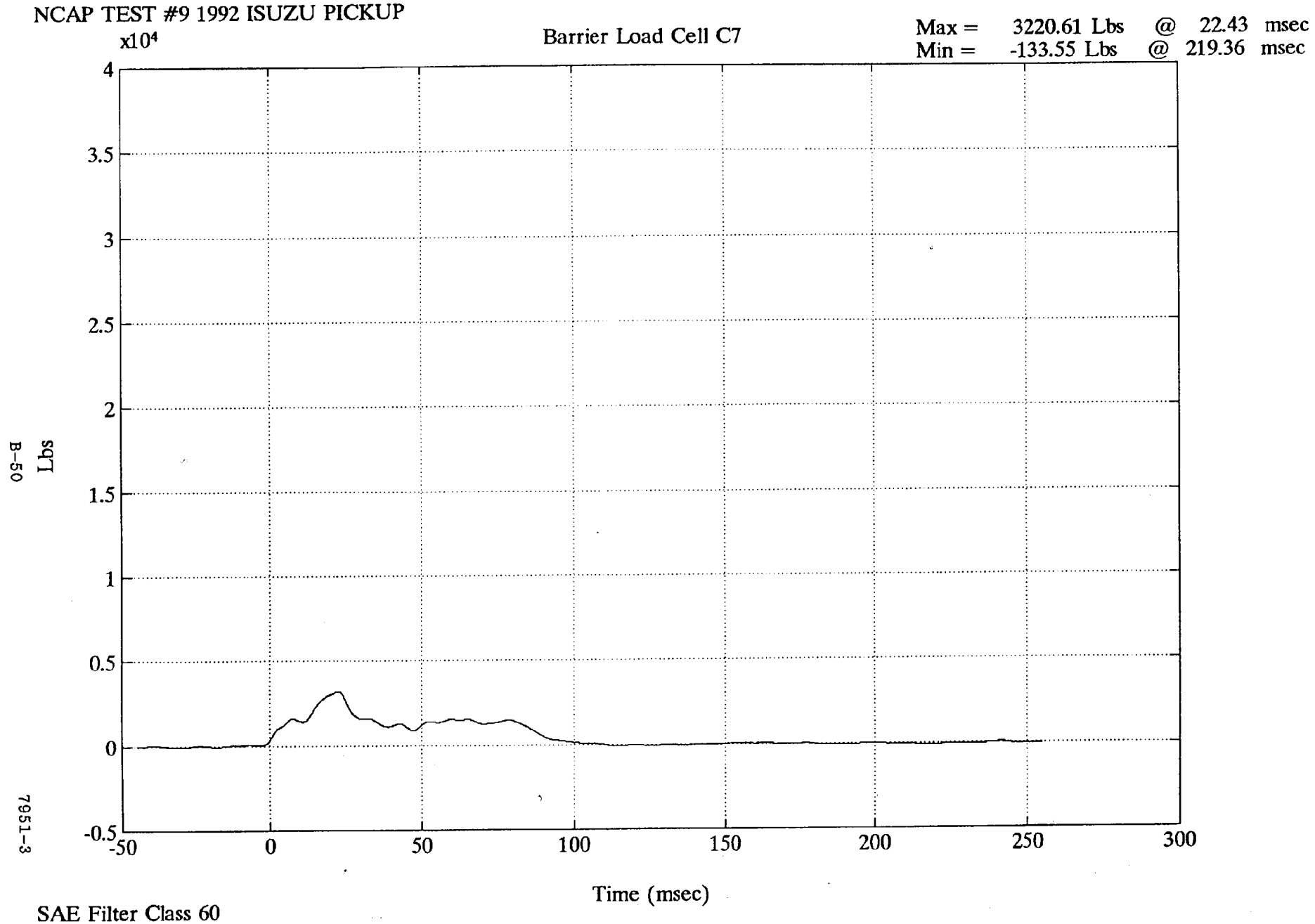


B-49

7951-3

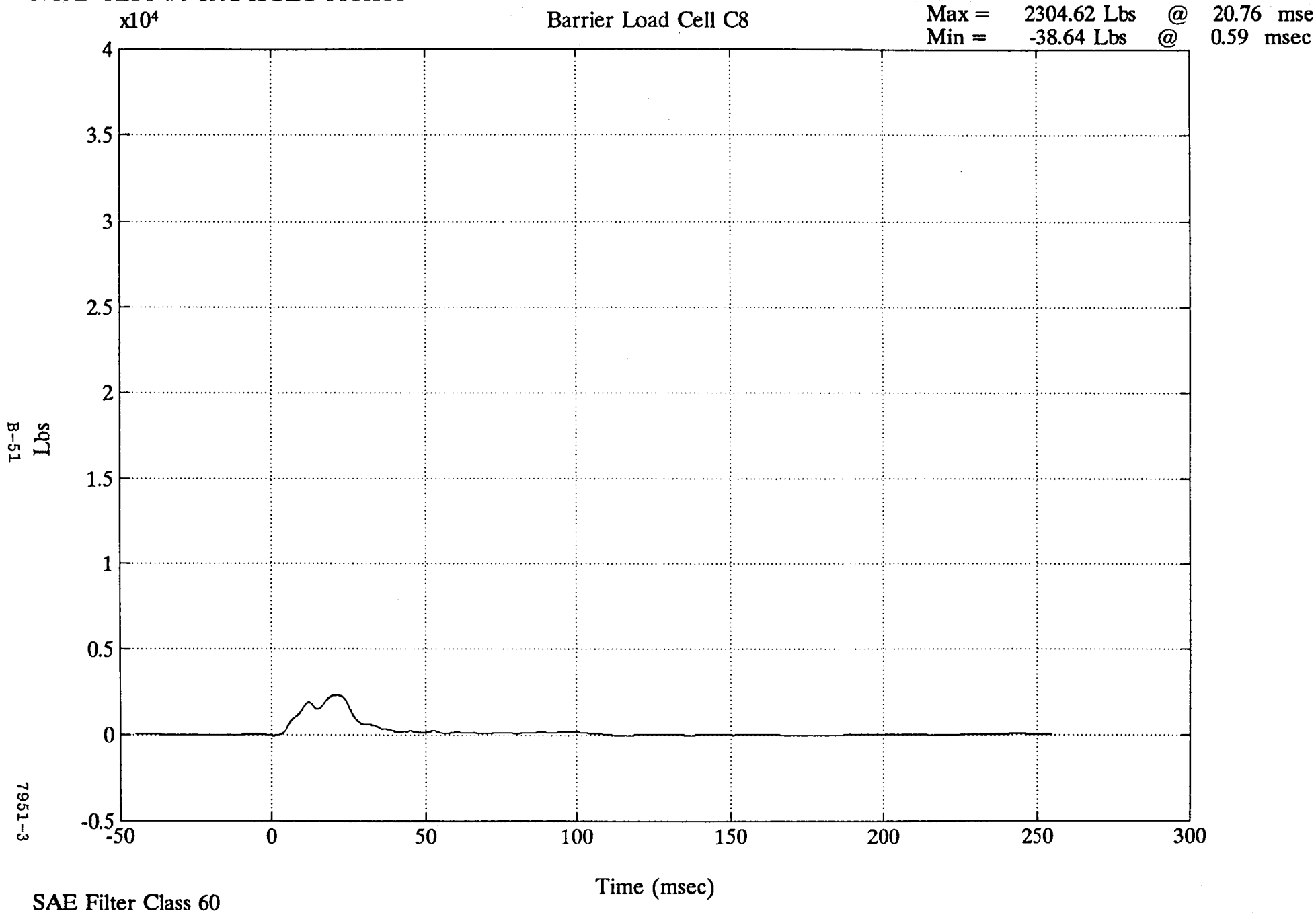
SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

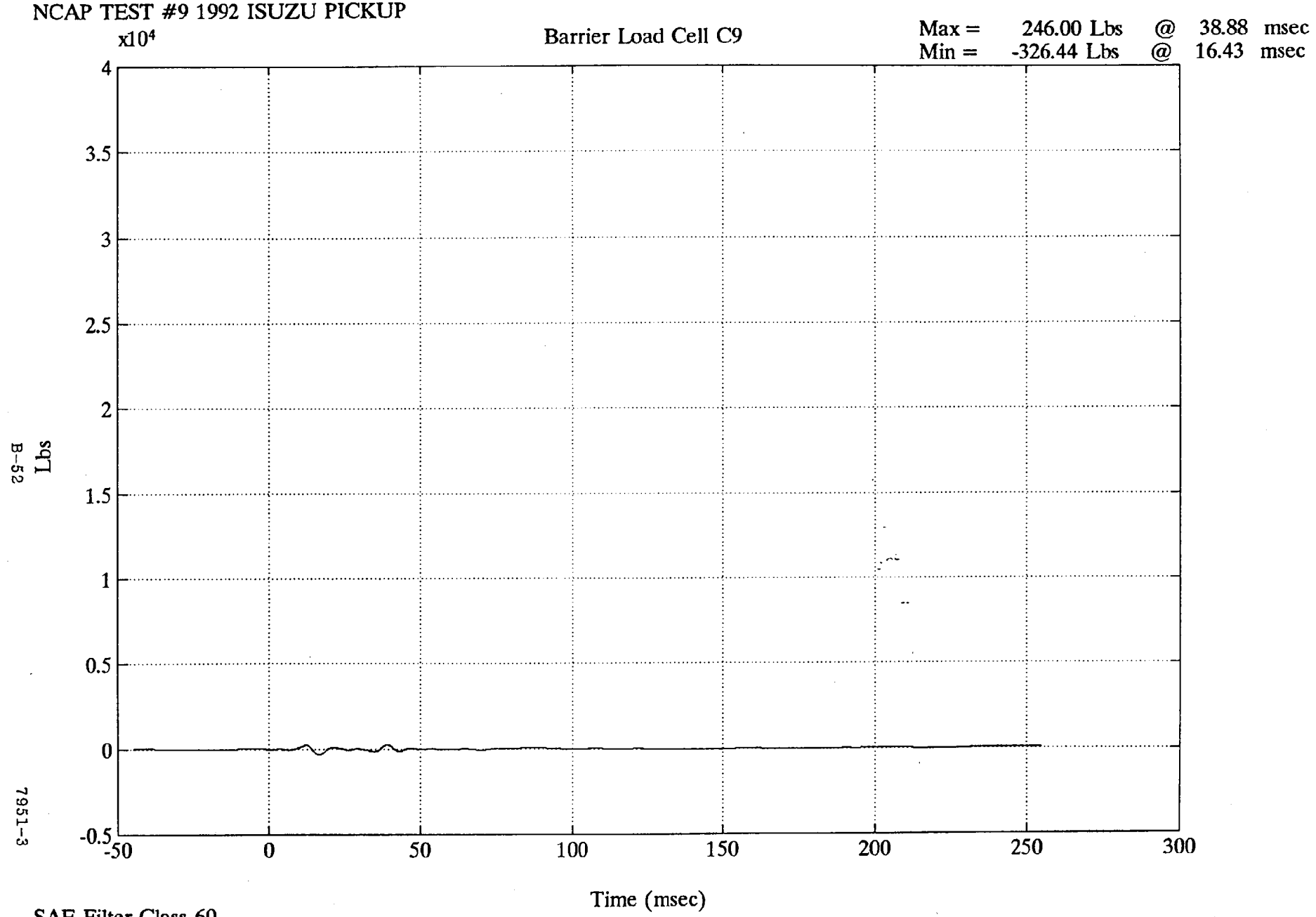


B-51

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

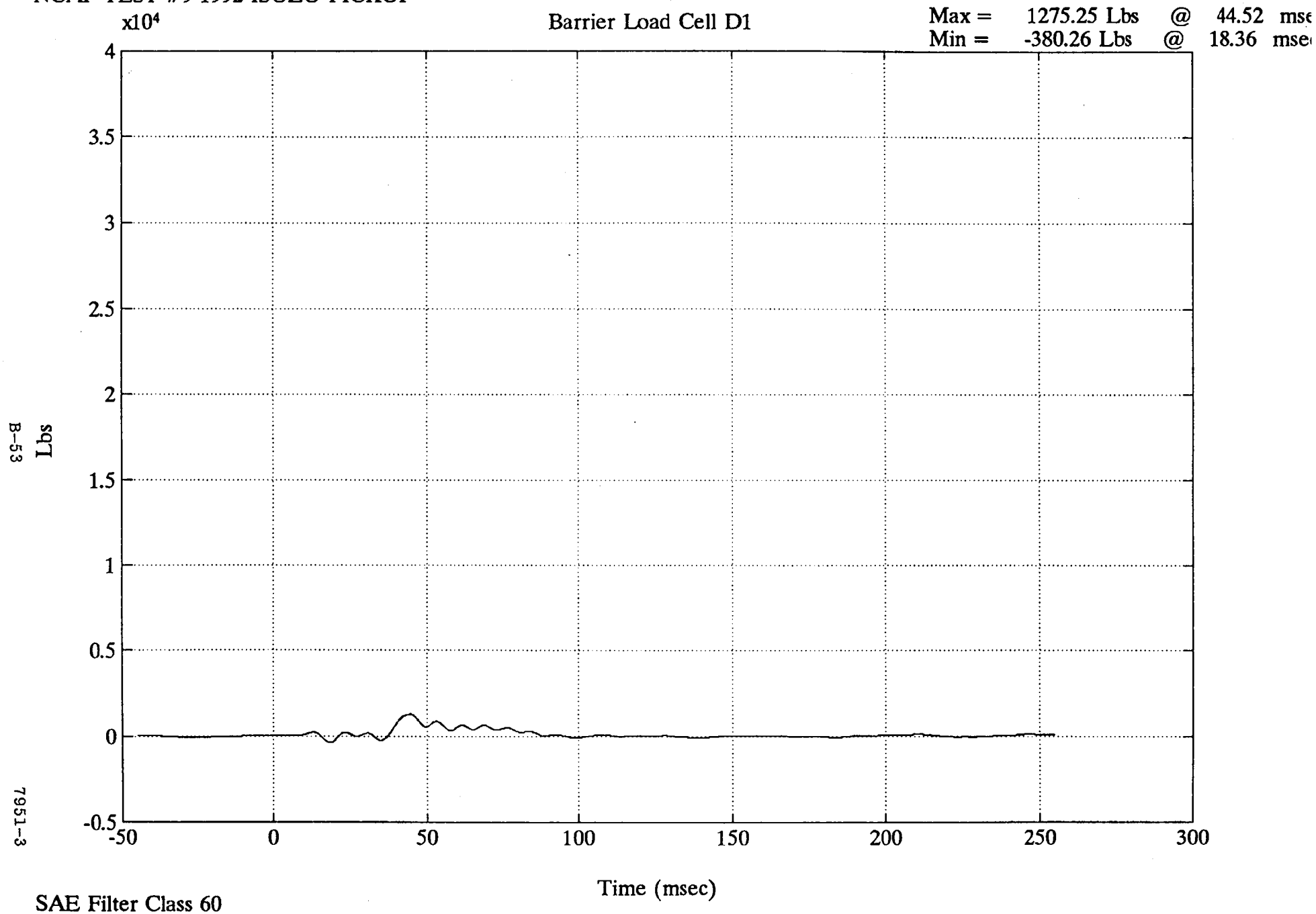


B-52

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

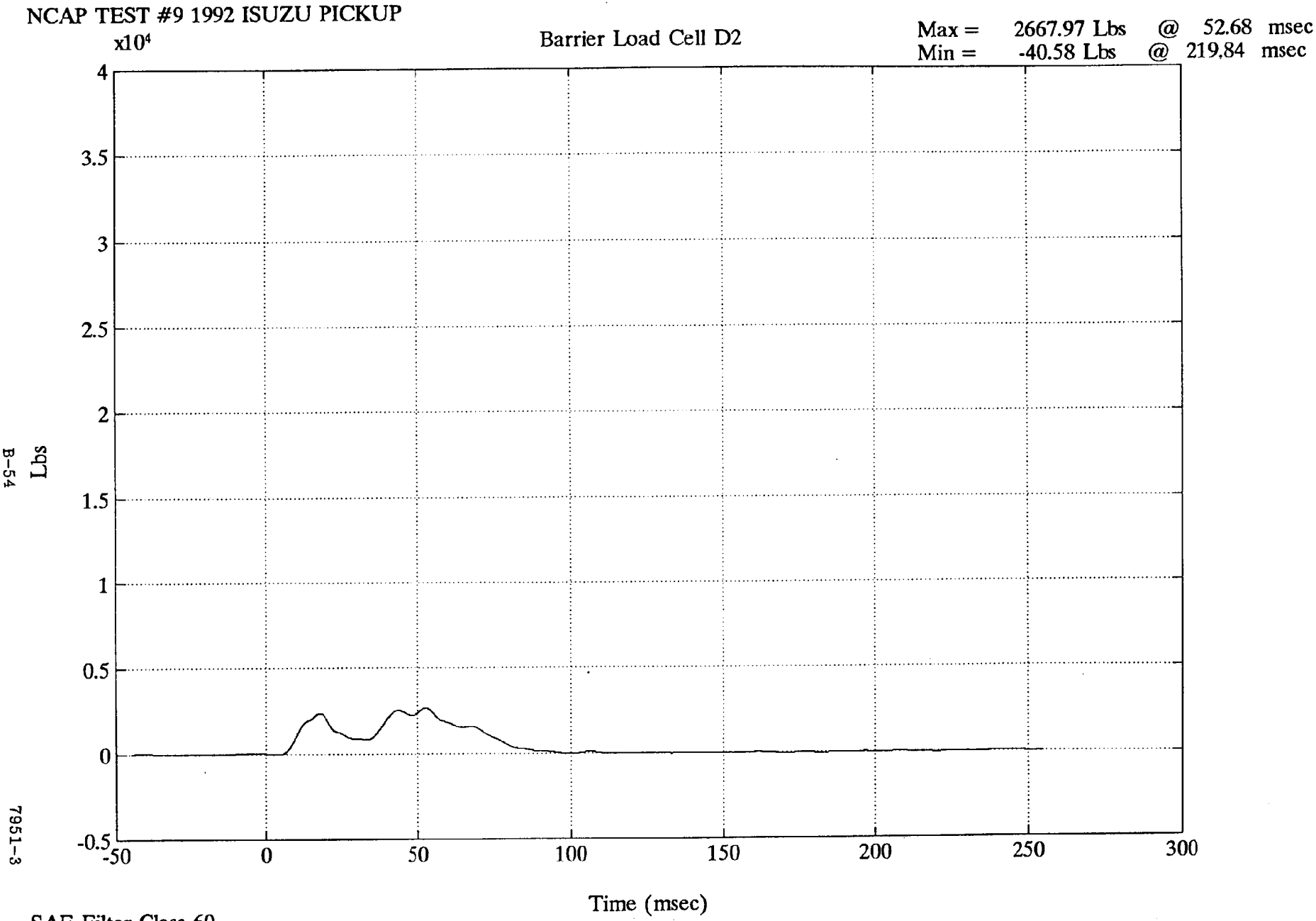


B-53

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

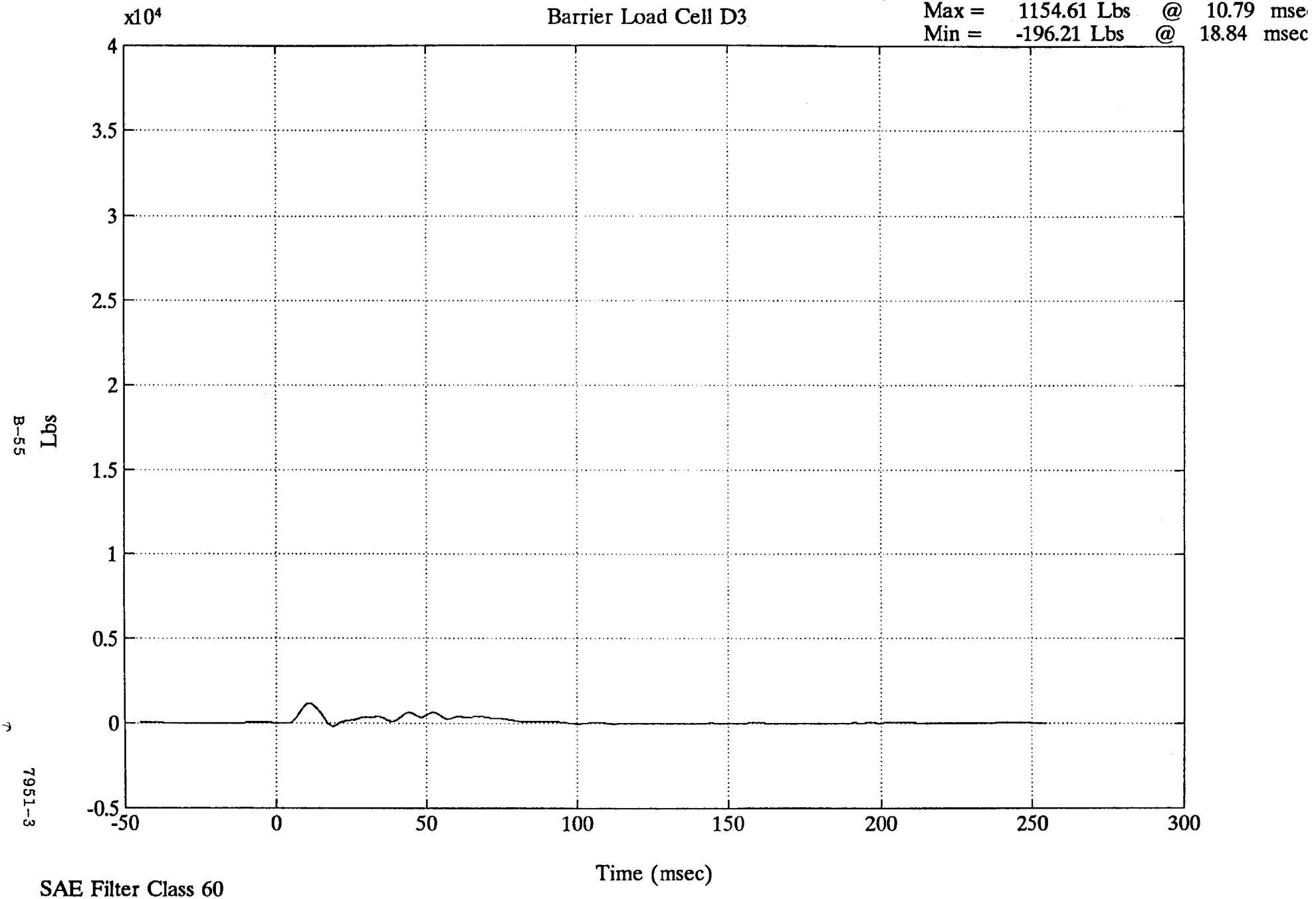


B-54

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

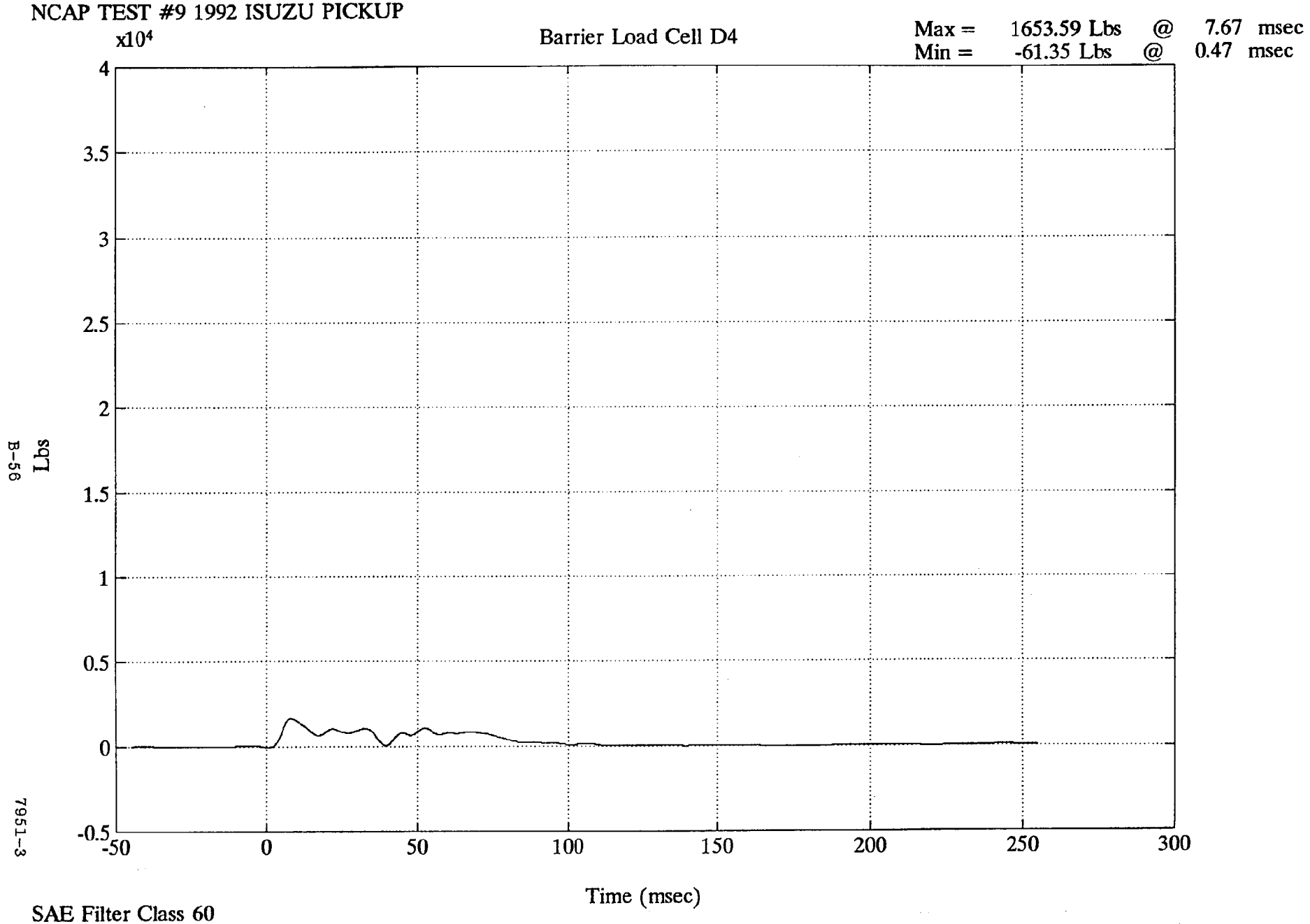


B-55

7951-3

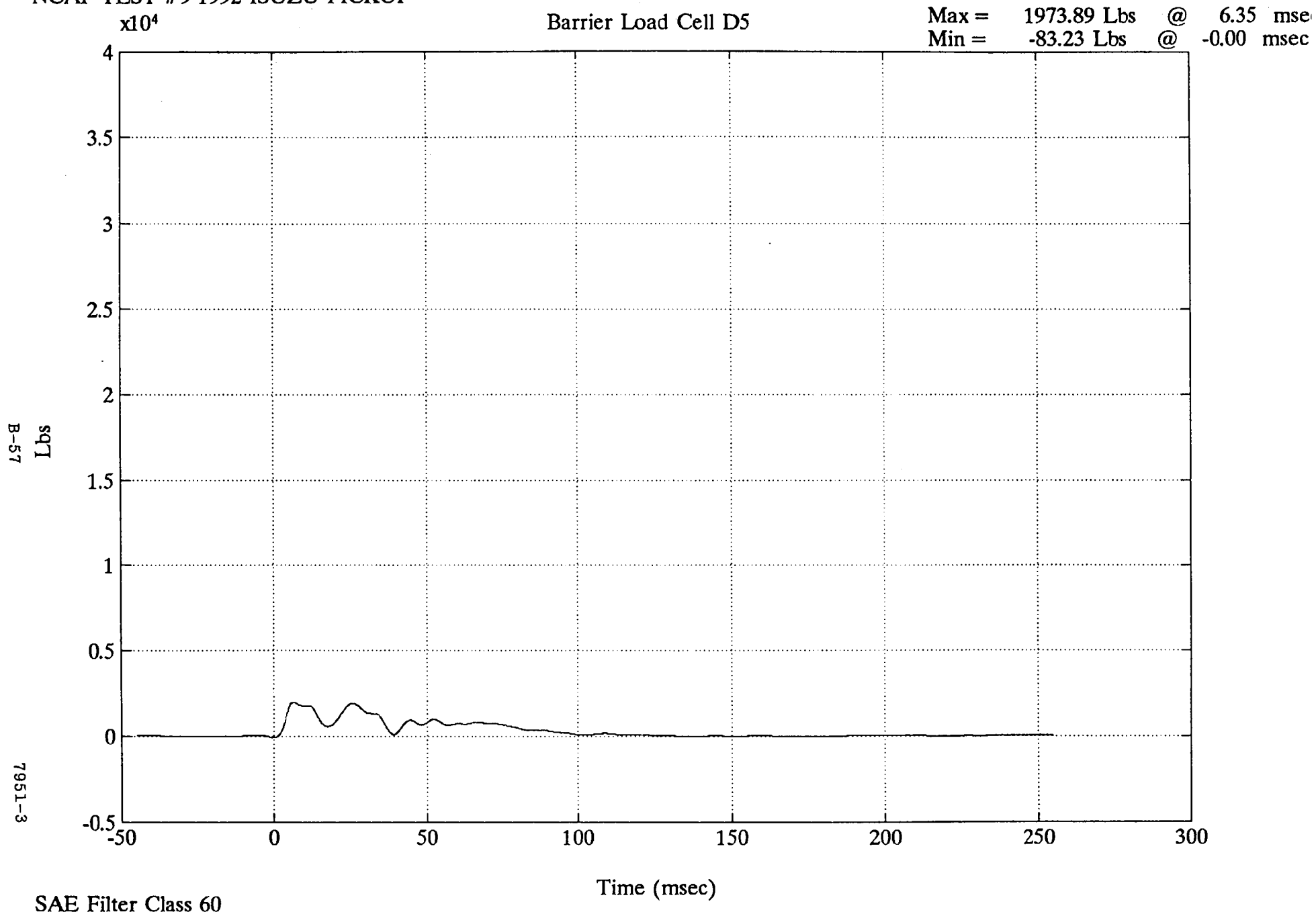
SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

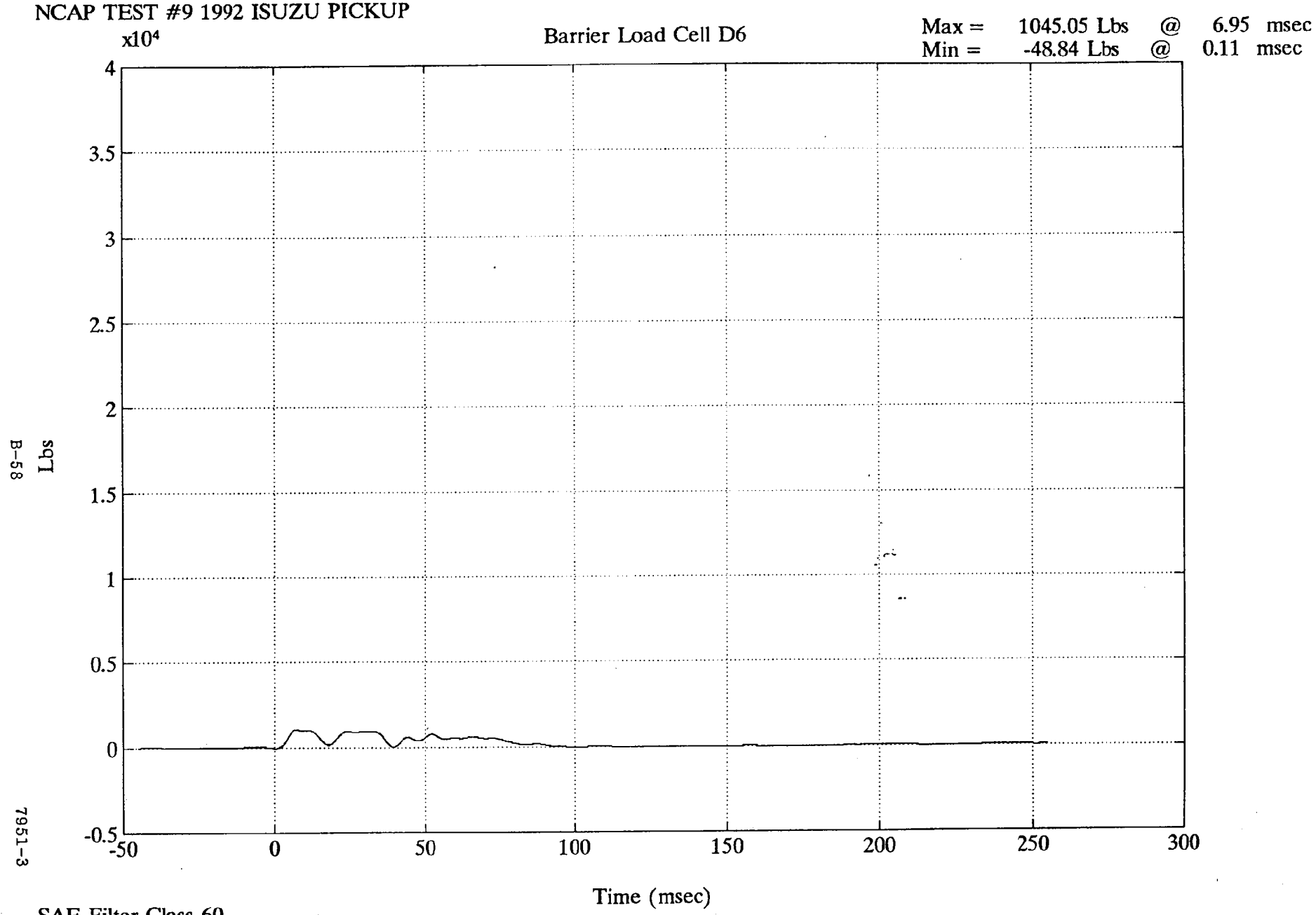
NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

7951-3

NCAP TEST #9 1992 ISUZU PICKUP

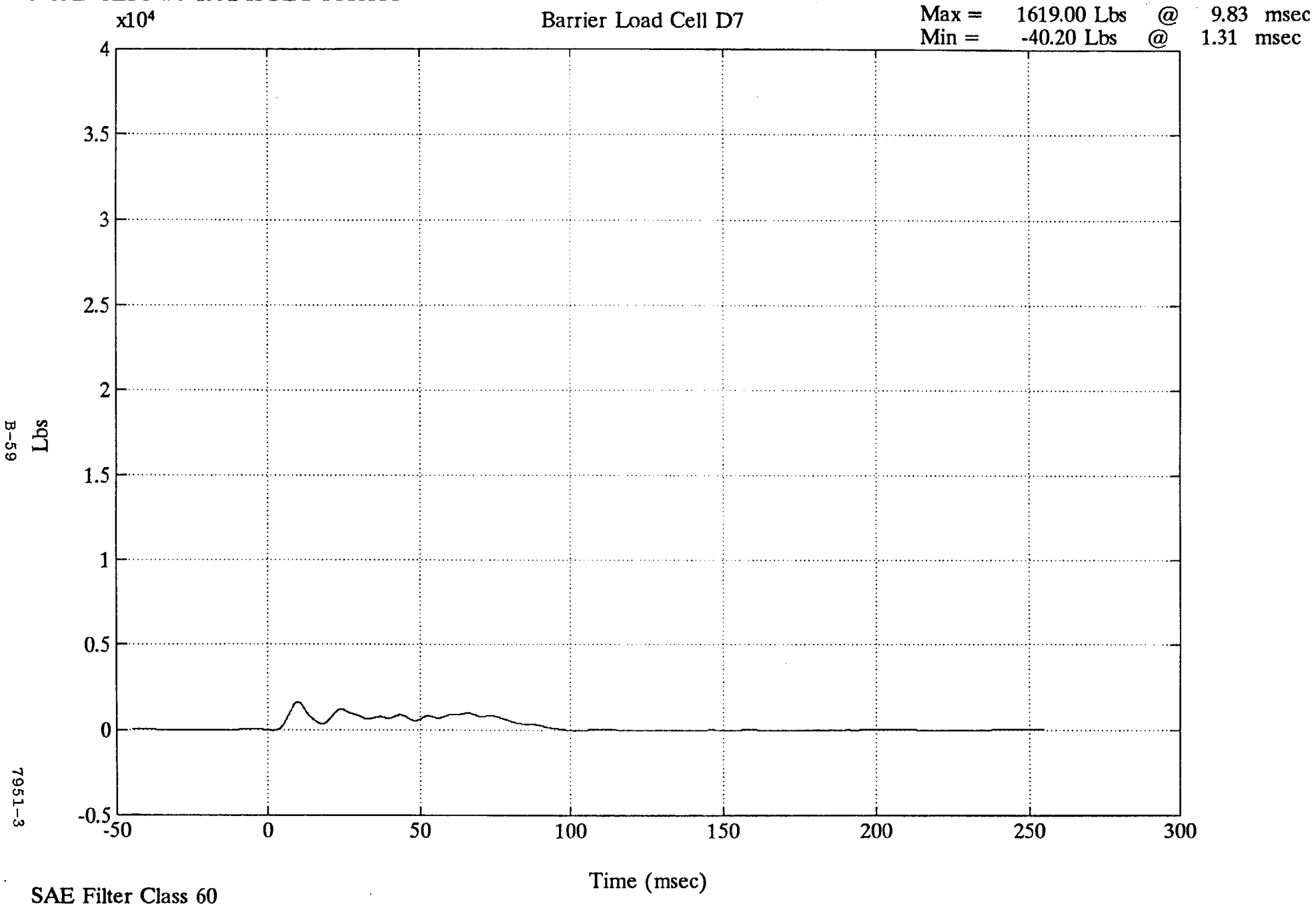


B-58

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

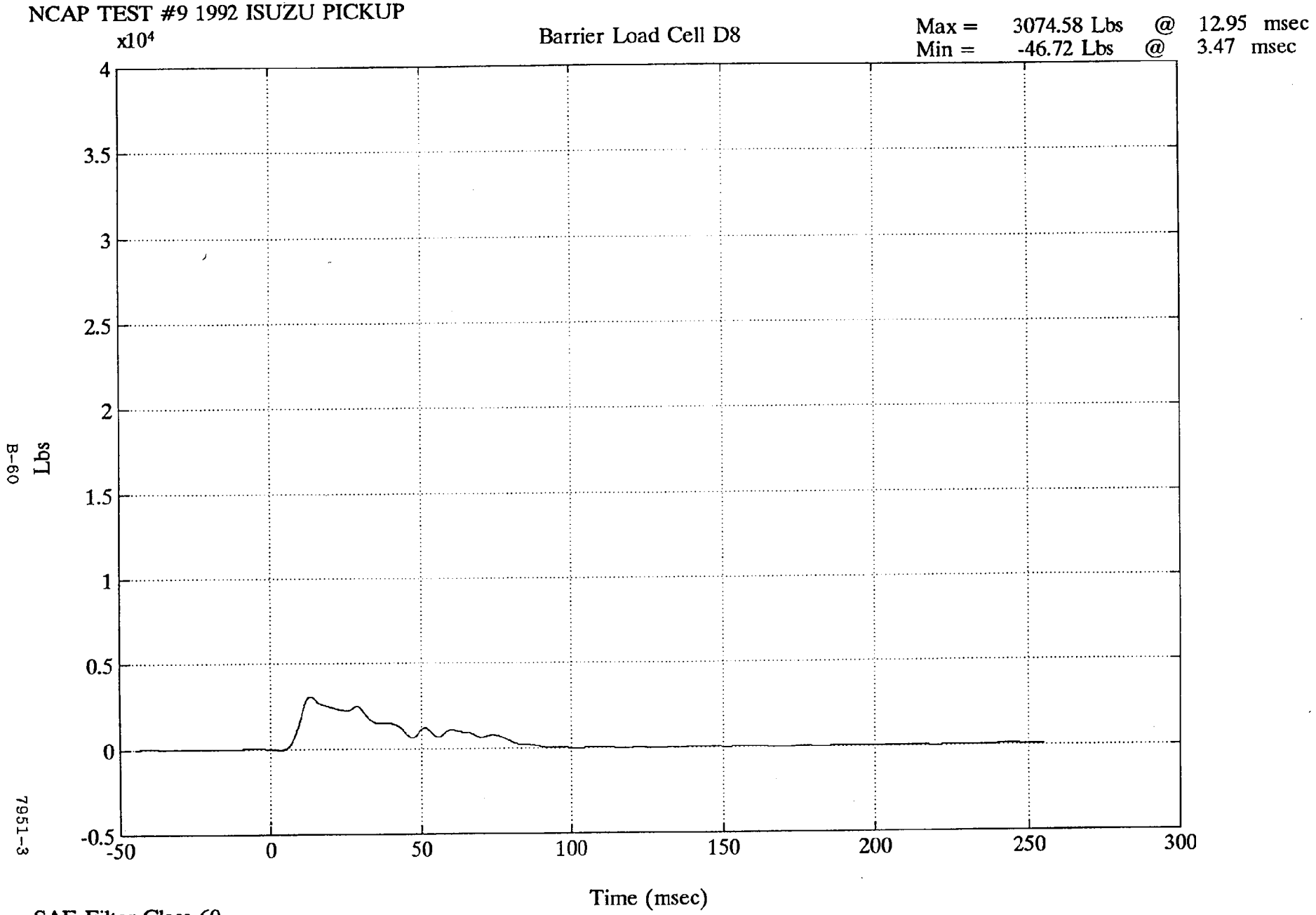


B-59

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

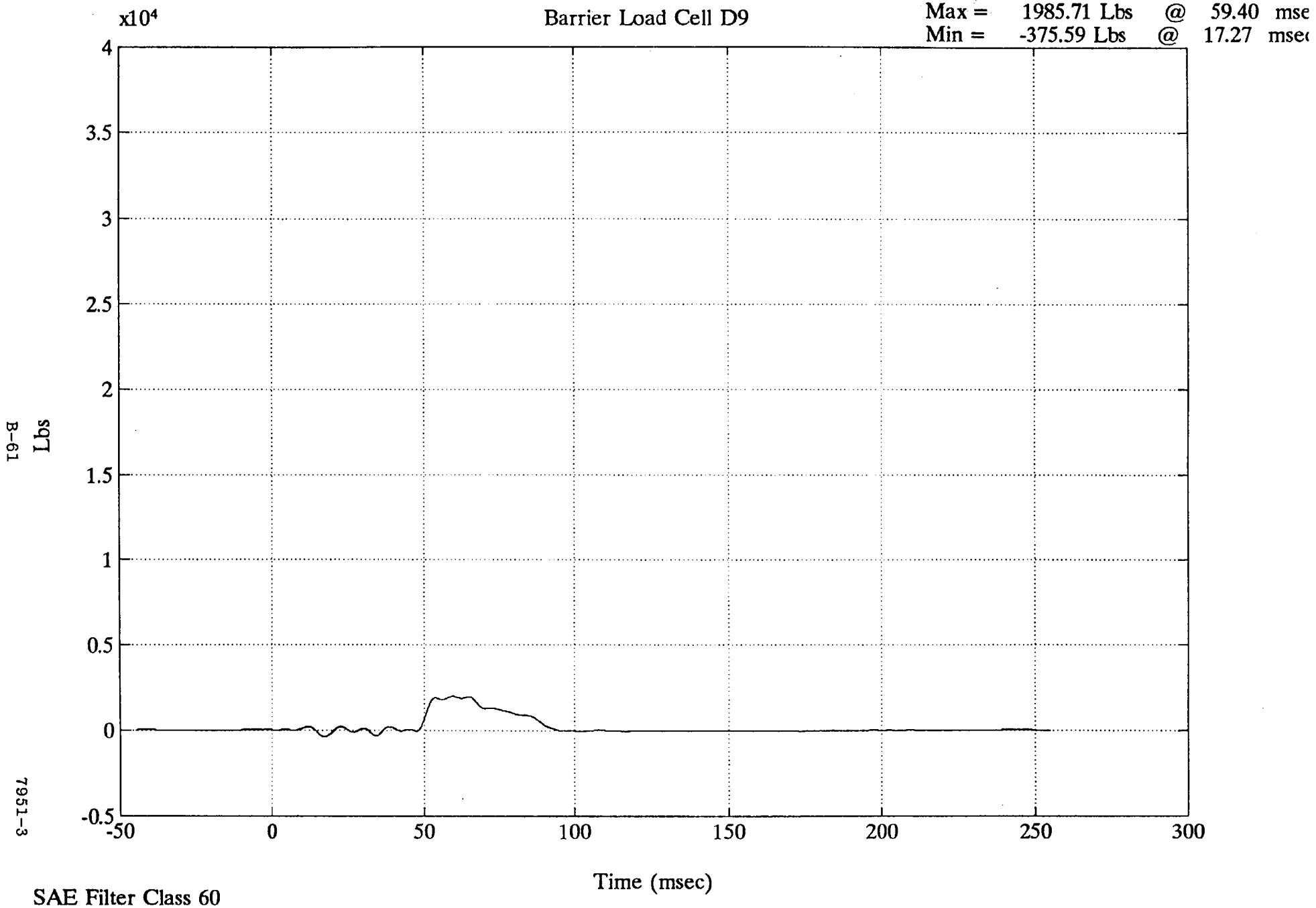


B-60

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

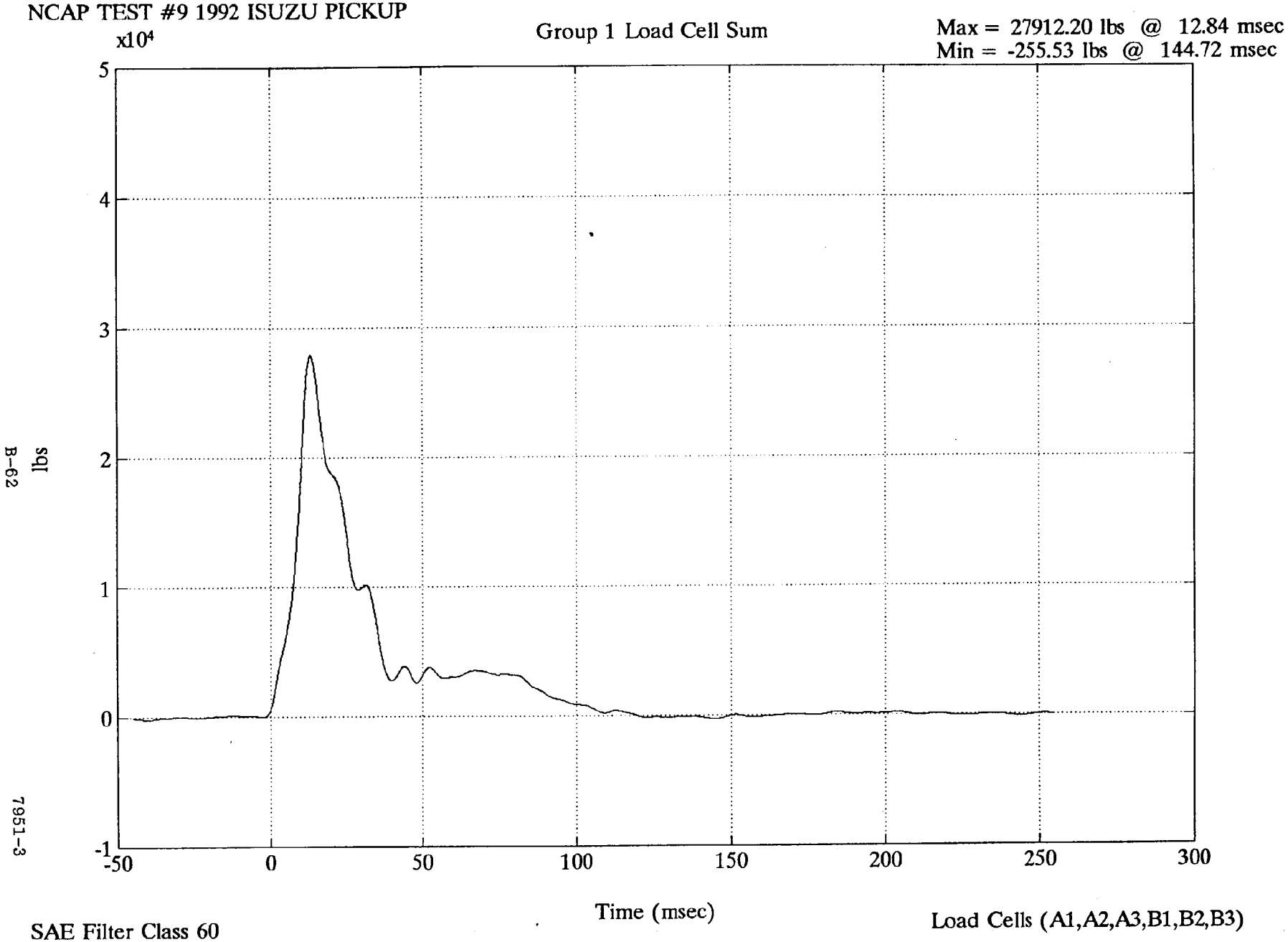


B-61

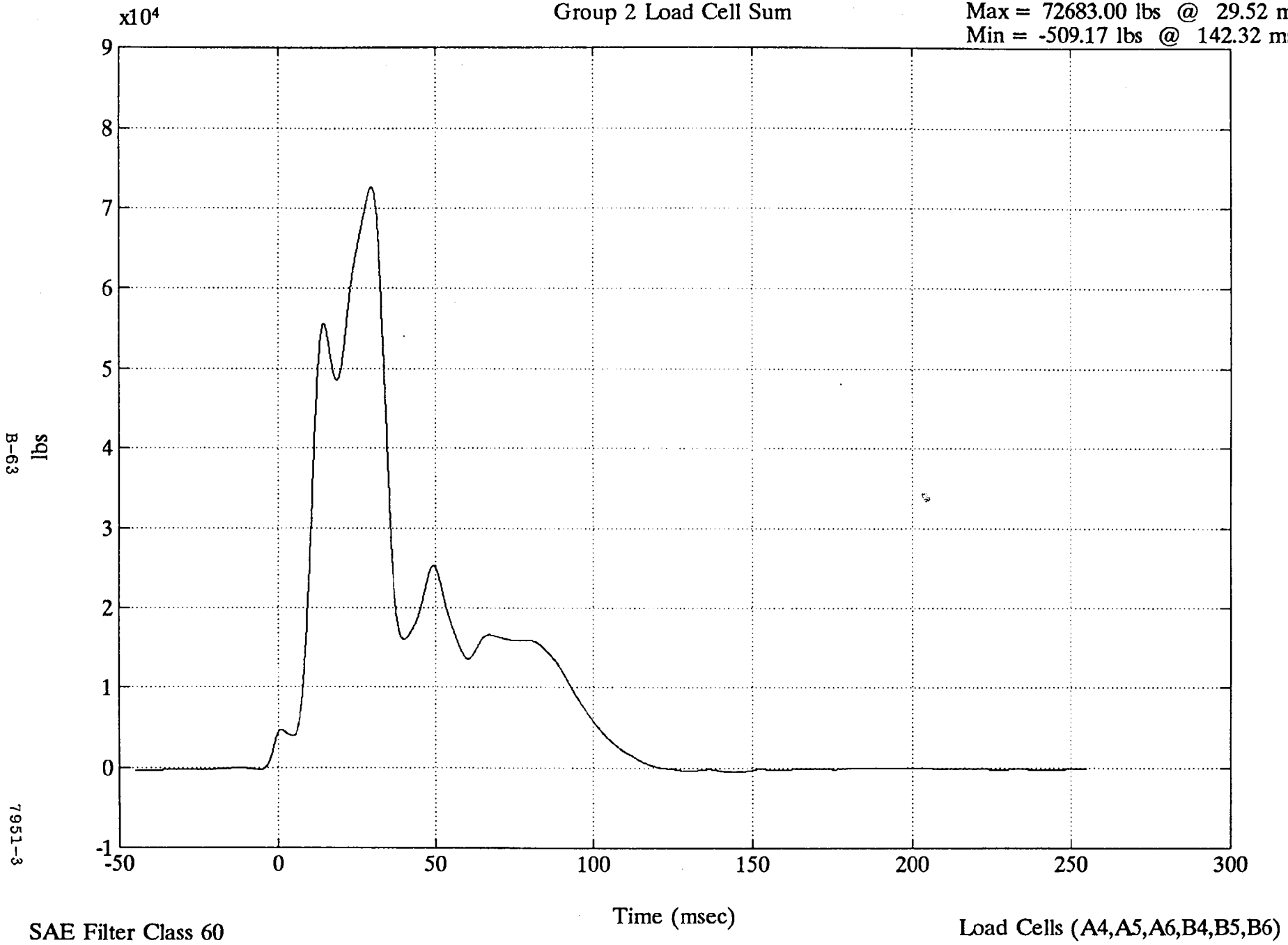
7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP



NCAP TEST #9 1992 ISUZU PICKUP



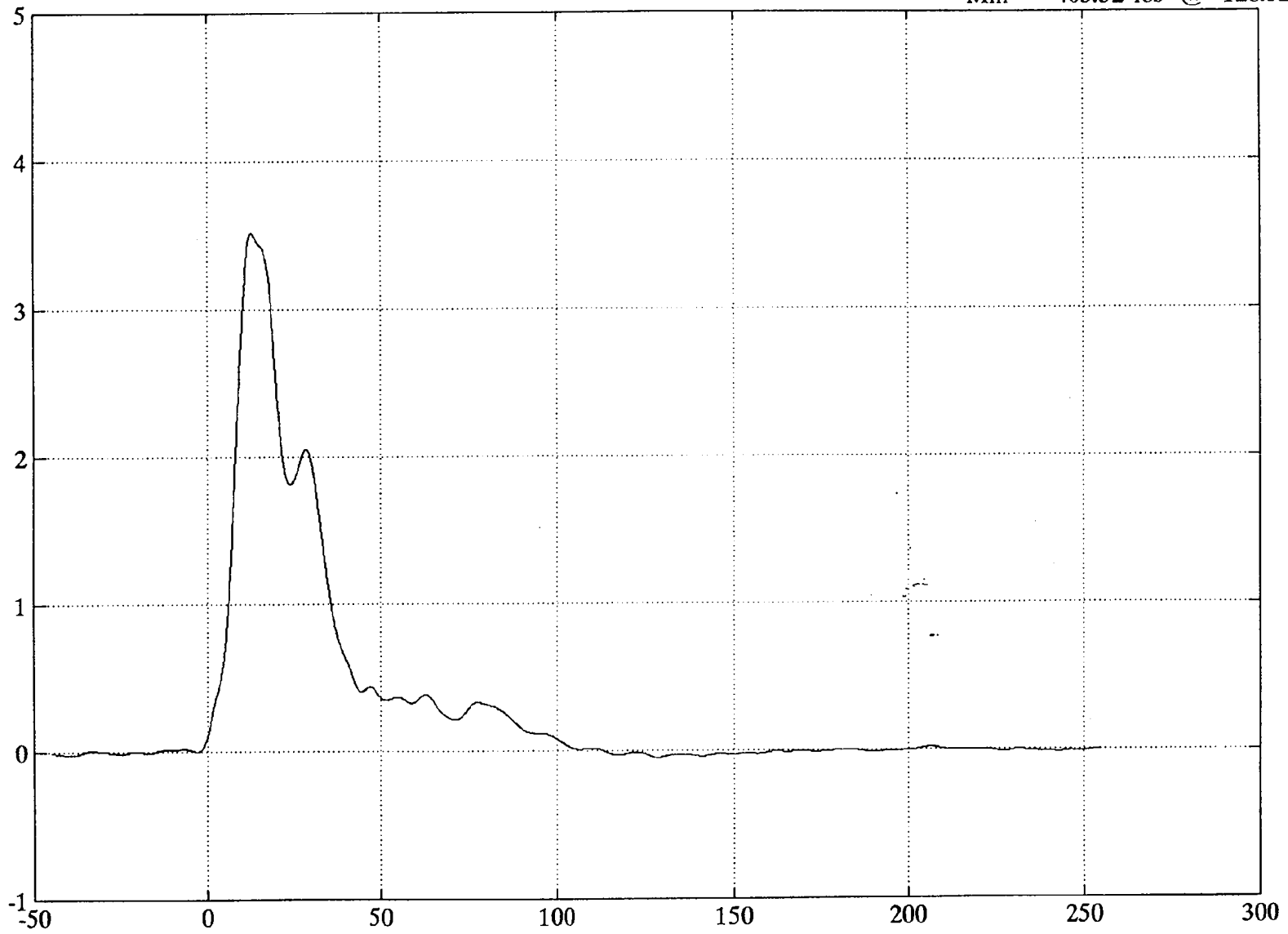
SAE Filter Class 60

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

NCAP TEST #9 1992 ISUZU PICKUP

Group 3 Load Cell Sum

Max = 35169.10 lbs @ 12.72 msec
Min = -463.52 lbs @ 128.52 msec



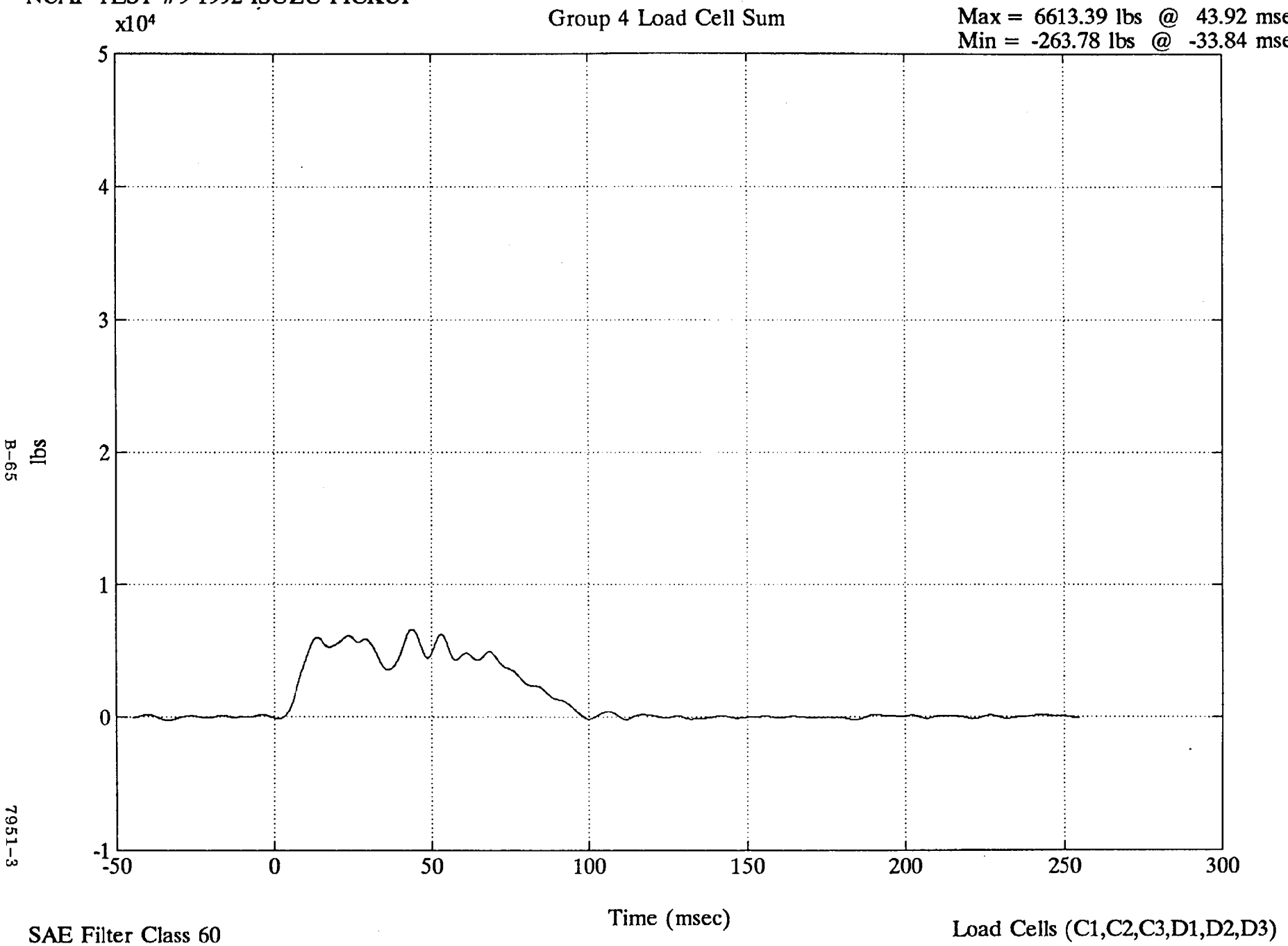
B-64

7951-3

SAE Filter Class 60

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

NCAP TEST #9 1992 ISUZU PICKUP



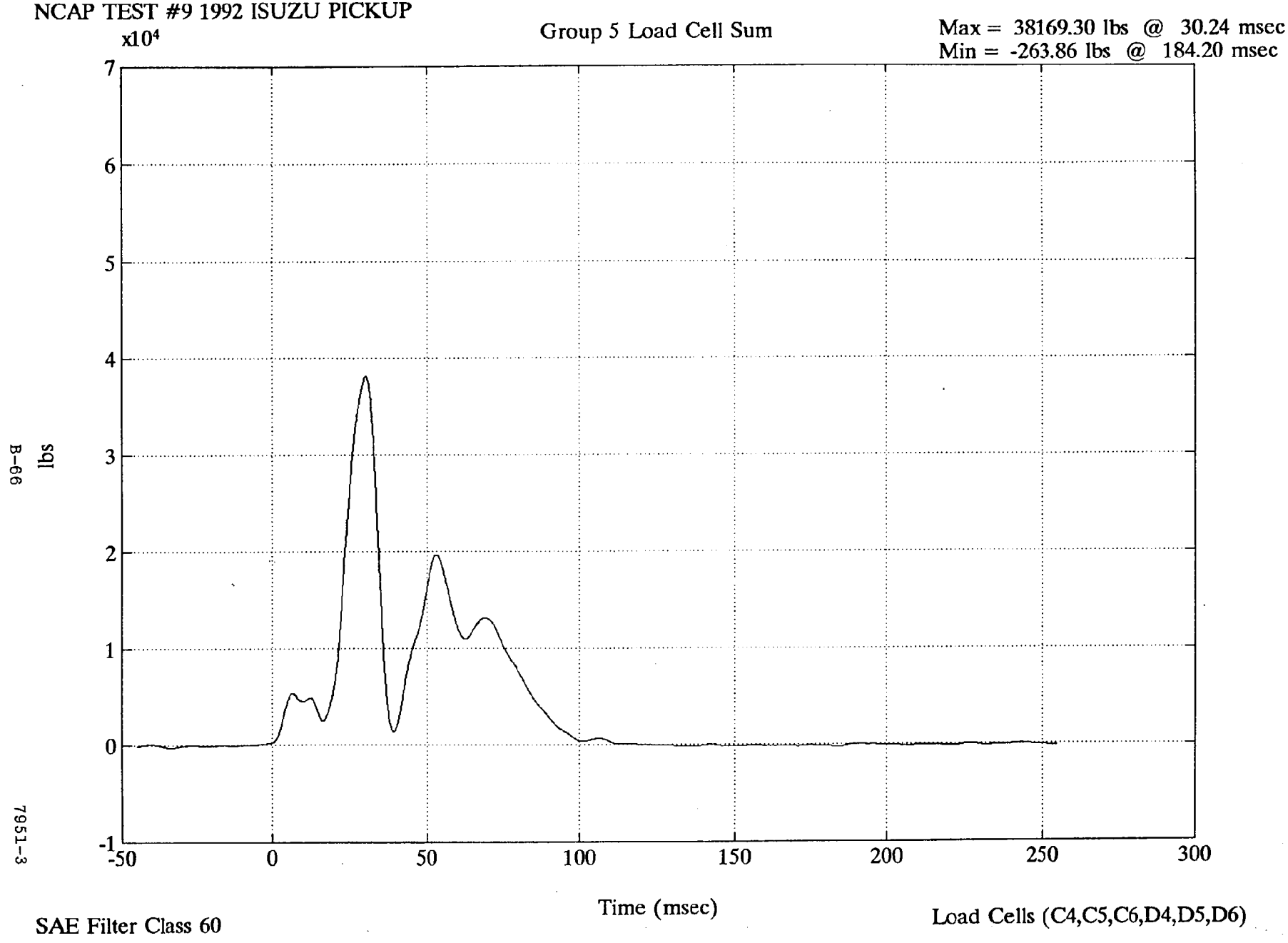
B-65

7951-3

SAE Filter Class 60

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

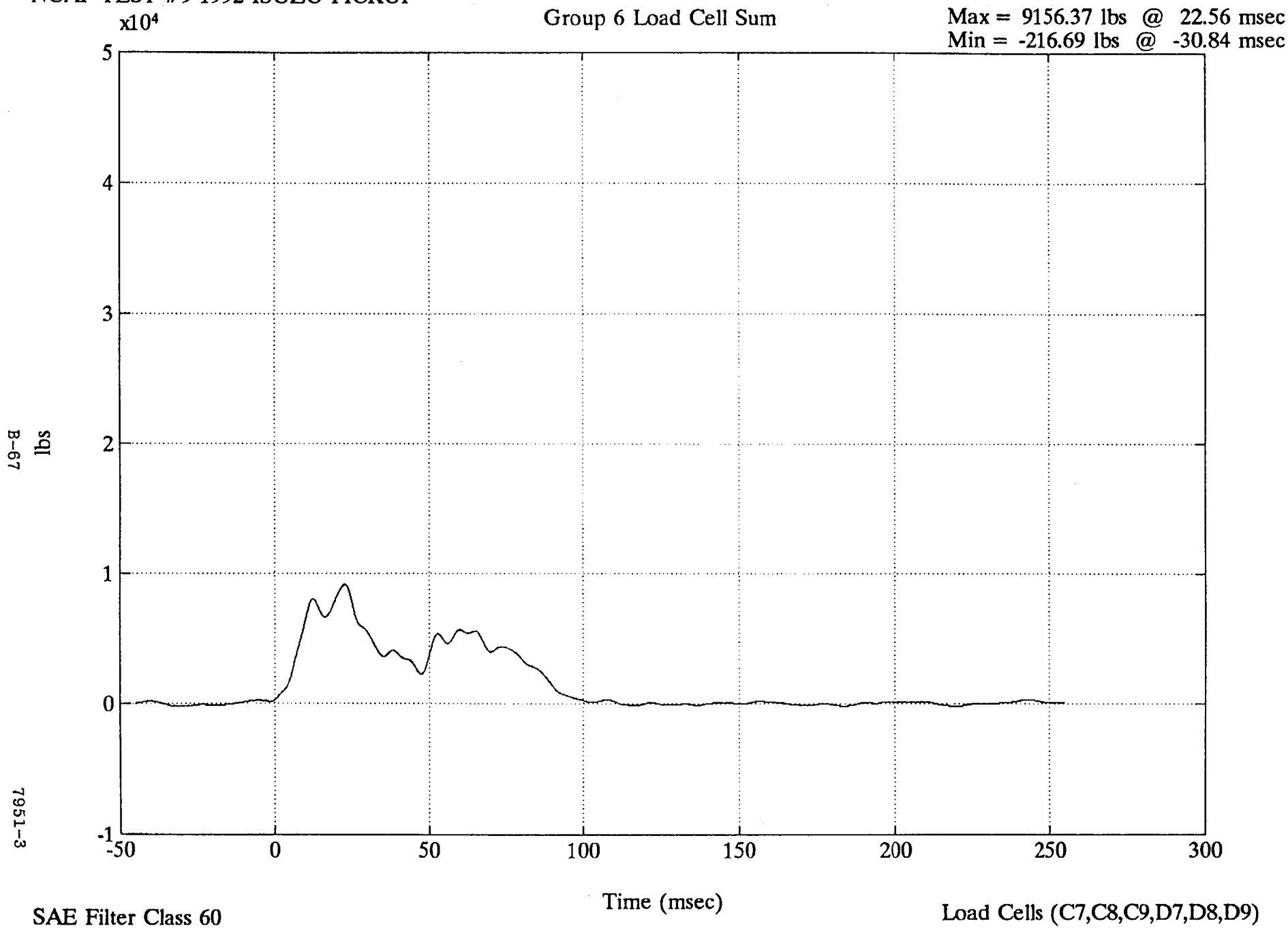
NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

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

NCAP TEST #9 1992 ISUZU PICKUP



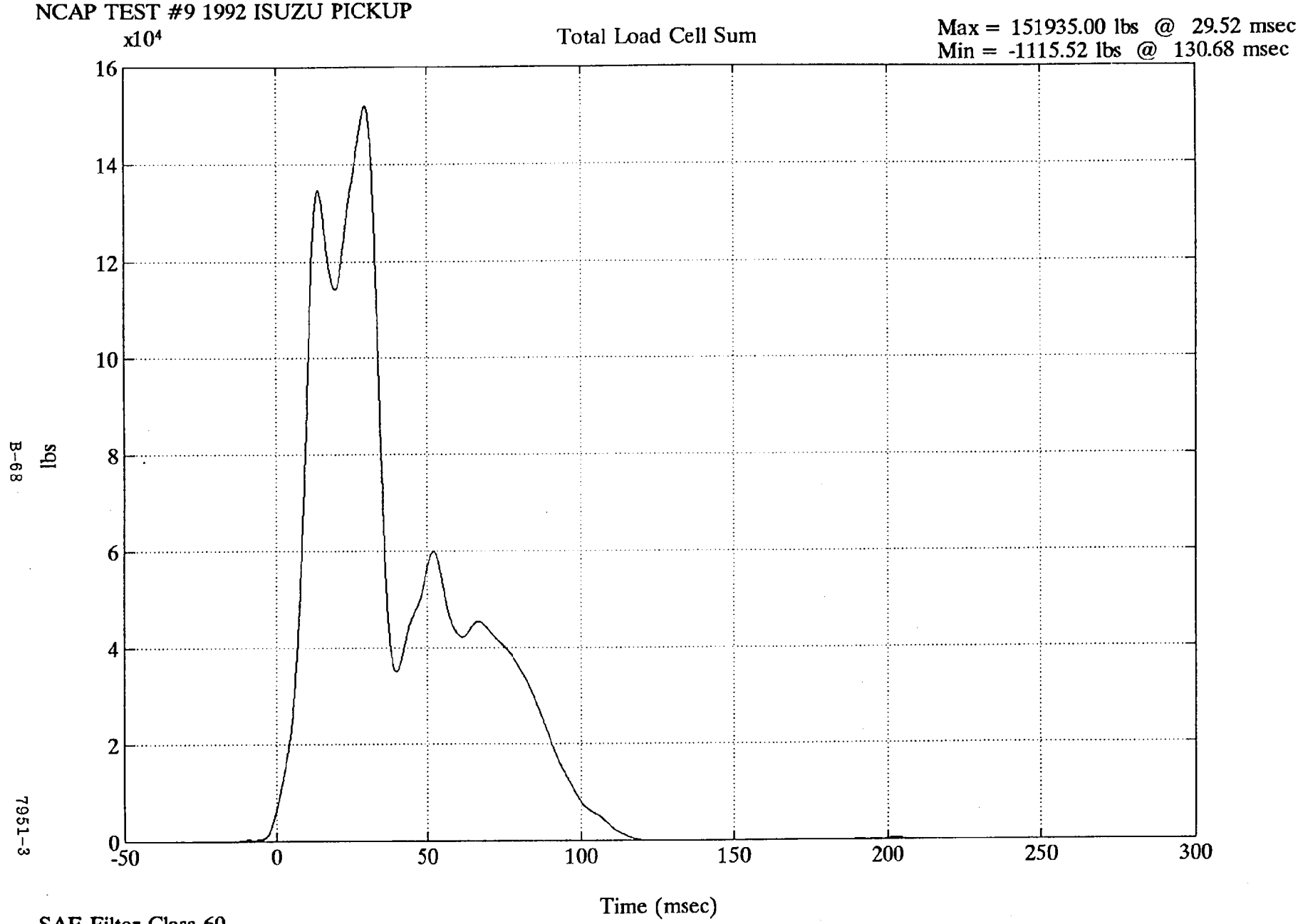
B-67

7951-3

SAE Filter Class 60

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

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

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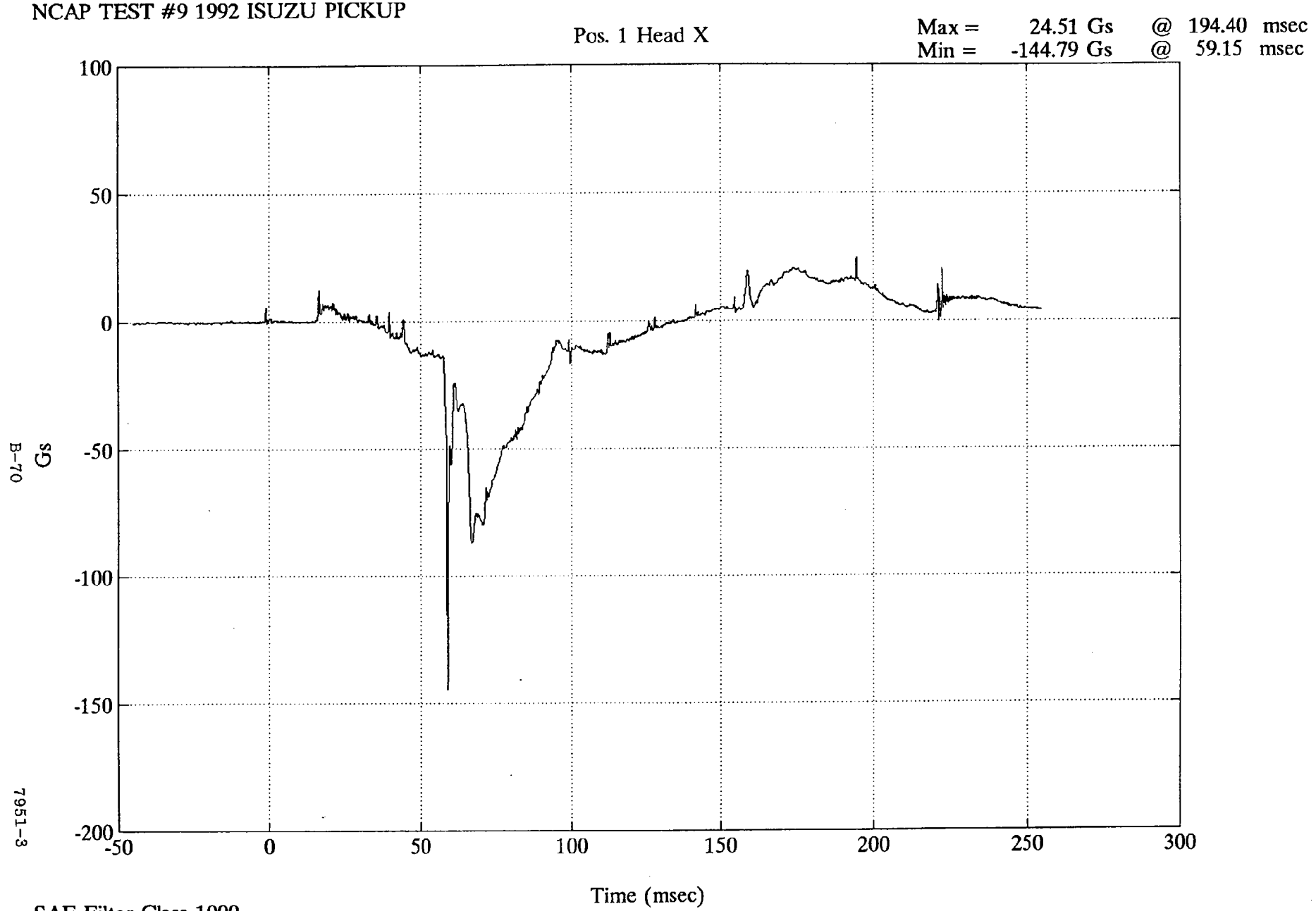
7951-3

TEST NO. MN5700

DUMMY DATA

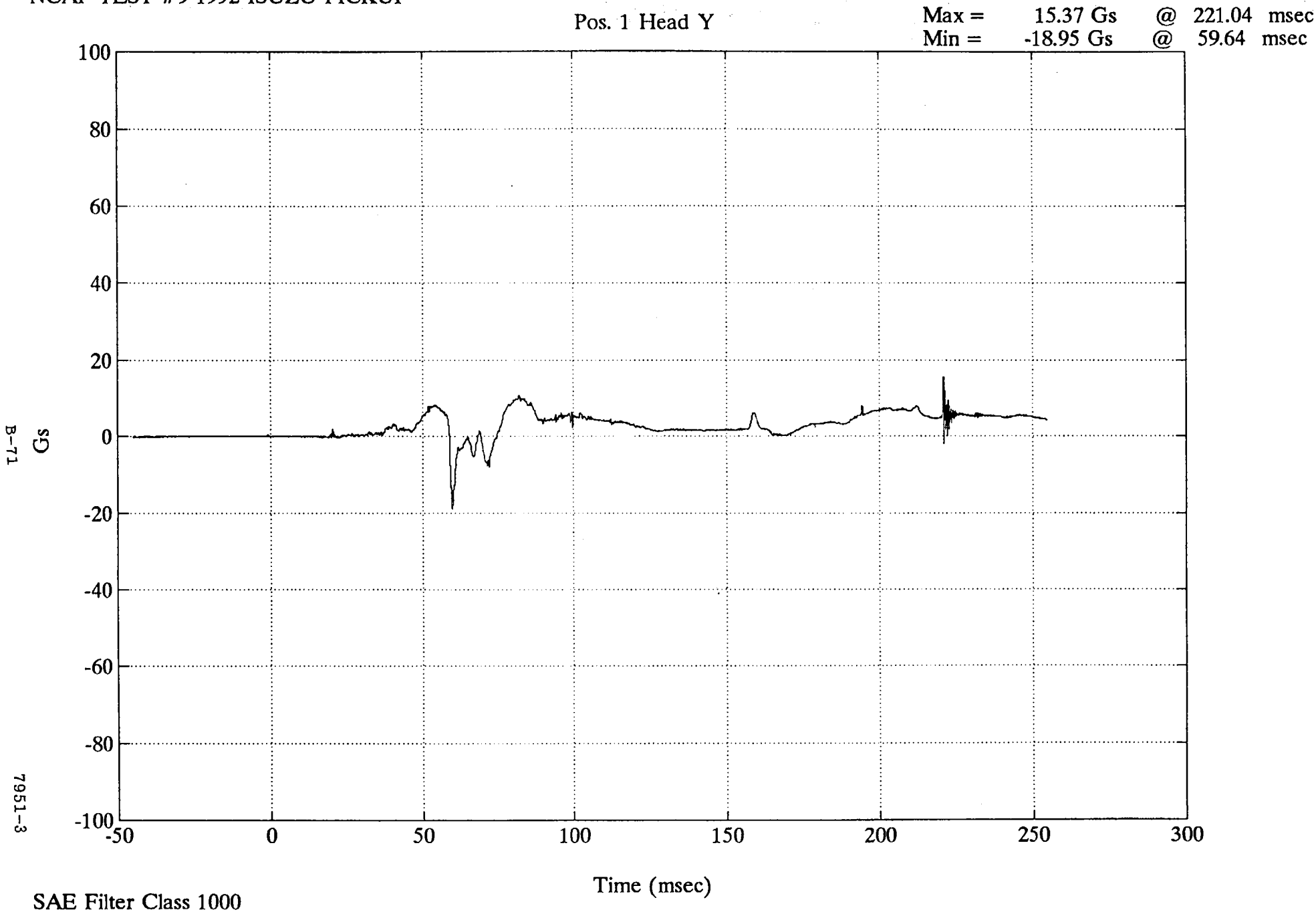
	FILTER CHANNEL CLASS
Head Accelerations	1000
Chest Accelerations	180
Chest Displacements	60
Femur Forces	600
Belt Loads	60
Belt Displacements	180
Neck Forces	1000
Neck Moments	600

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP



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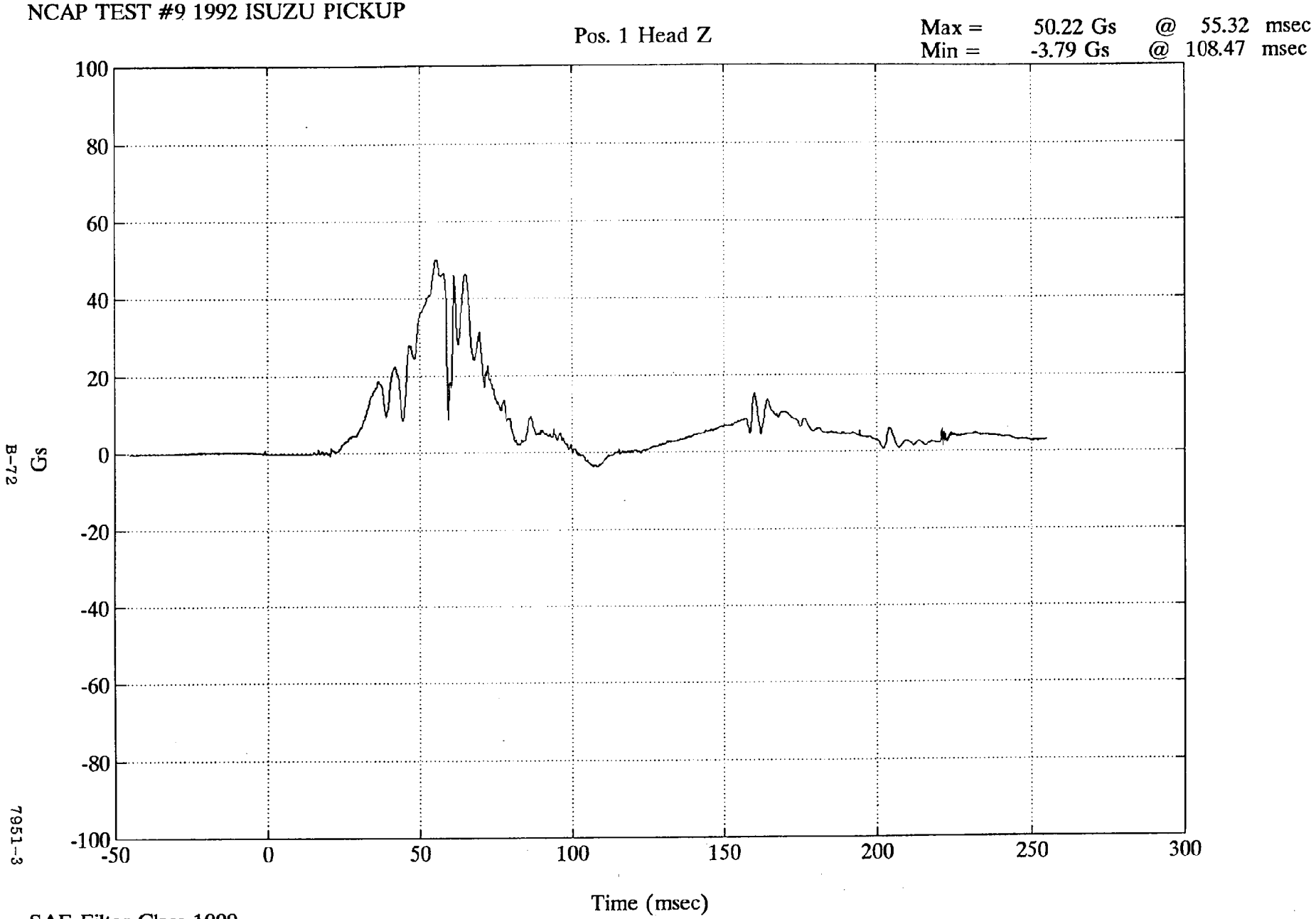
7951-3

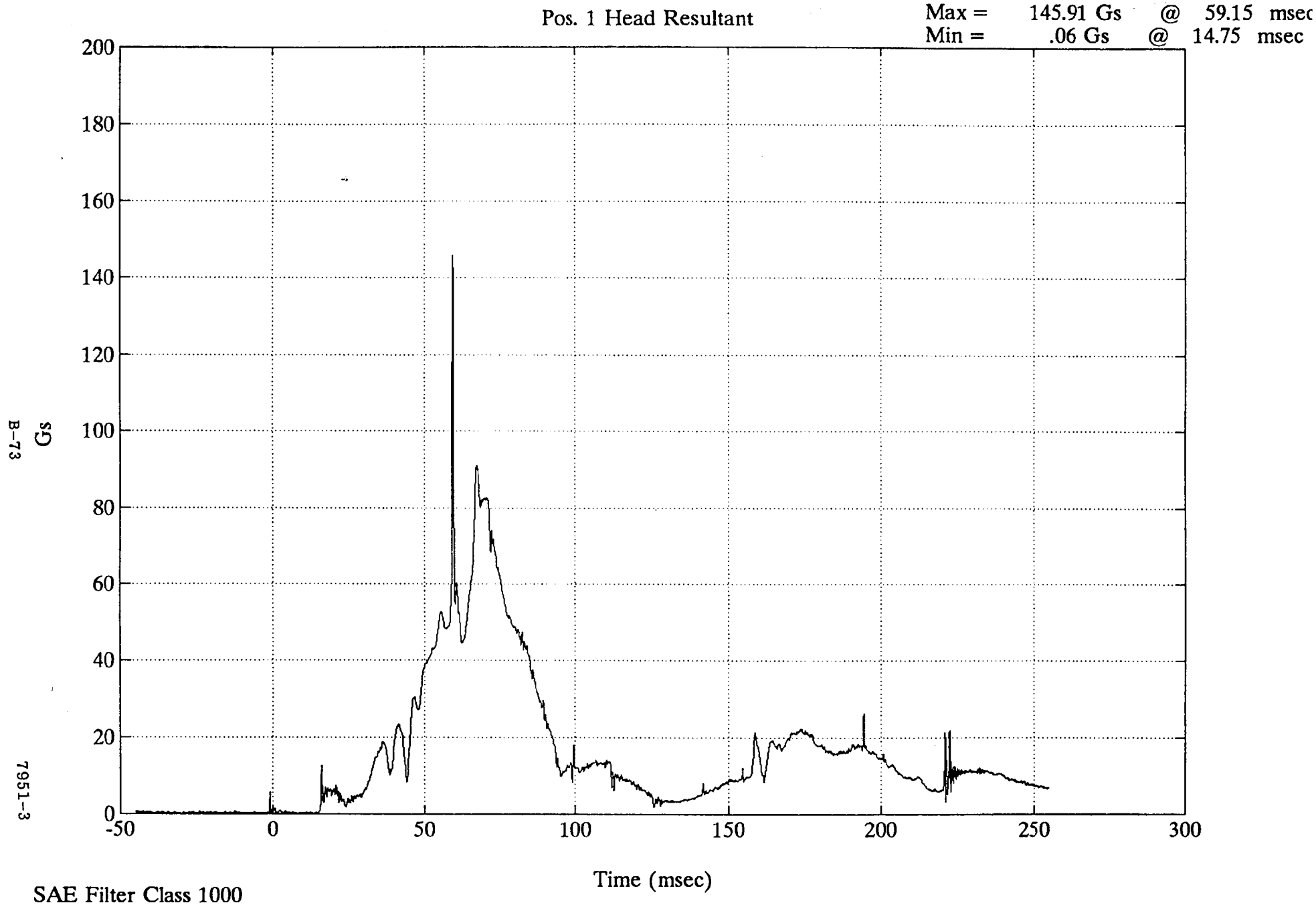
SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP



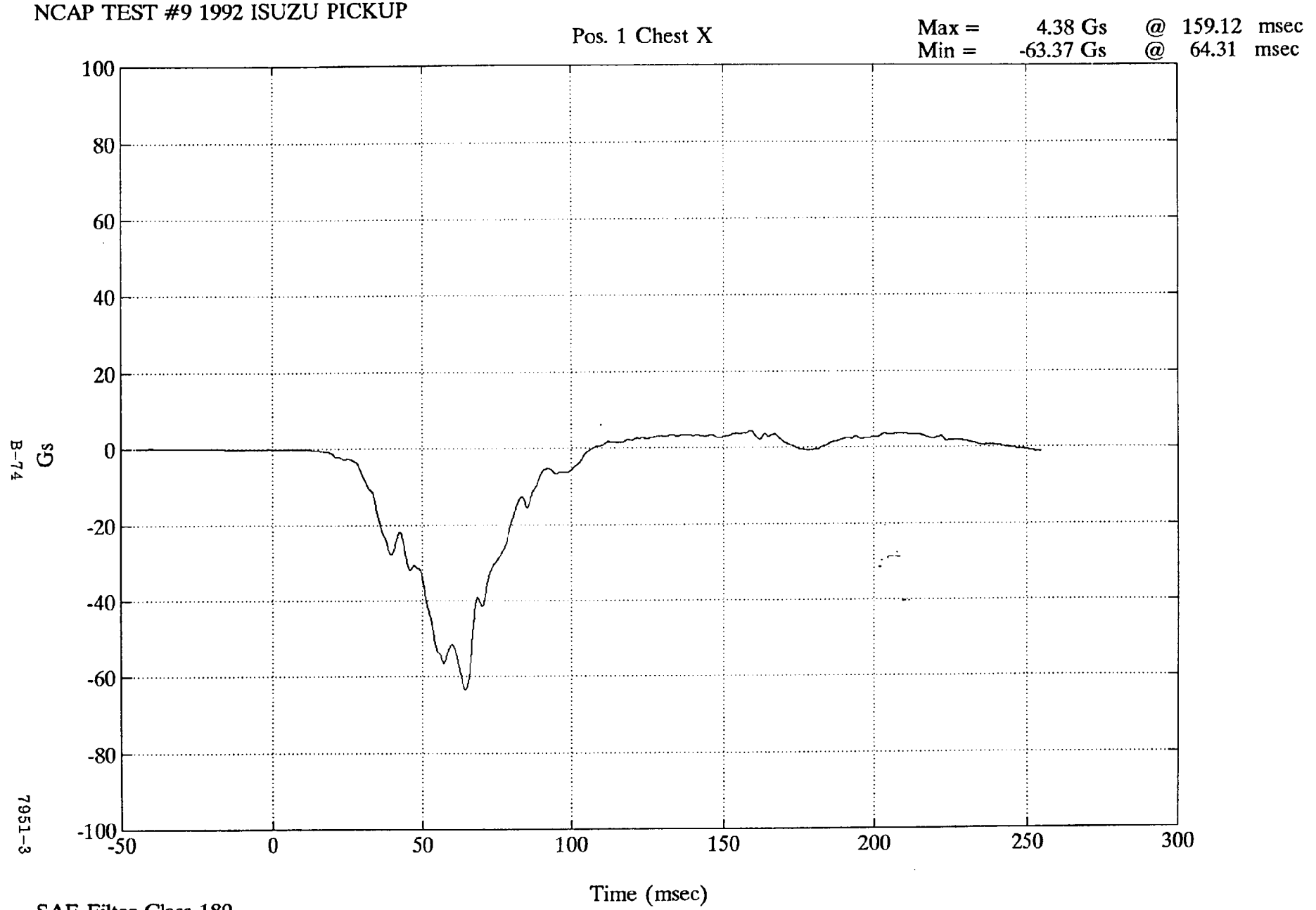
SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP



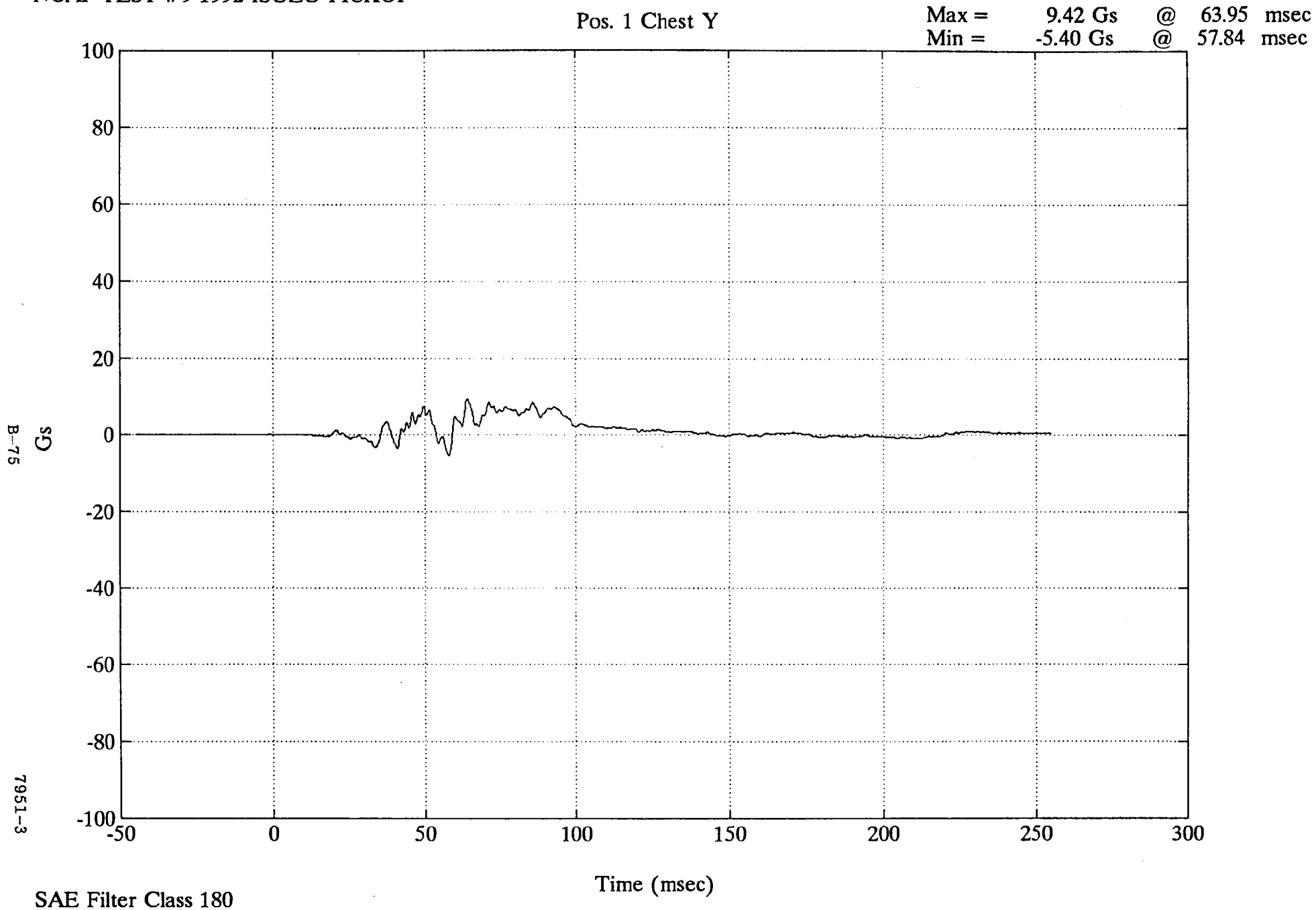
SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 180

NCAP TEST #9 1992 ISUZU PICKUP

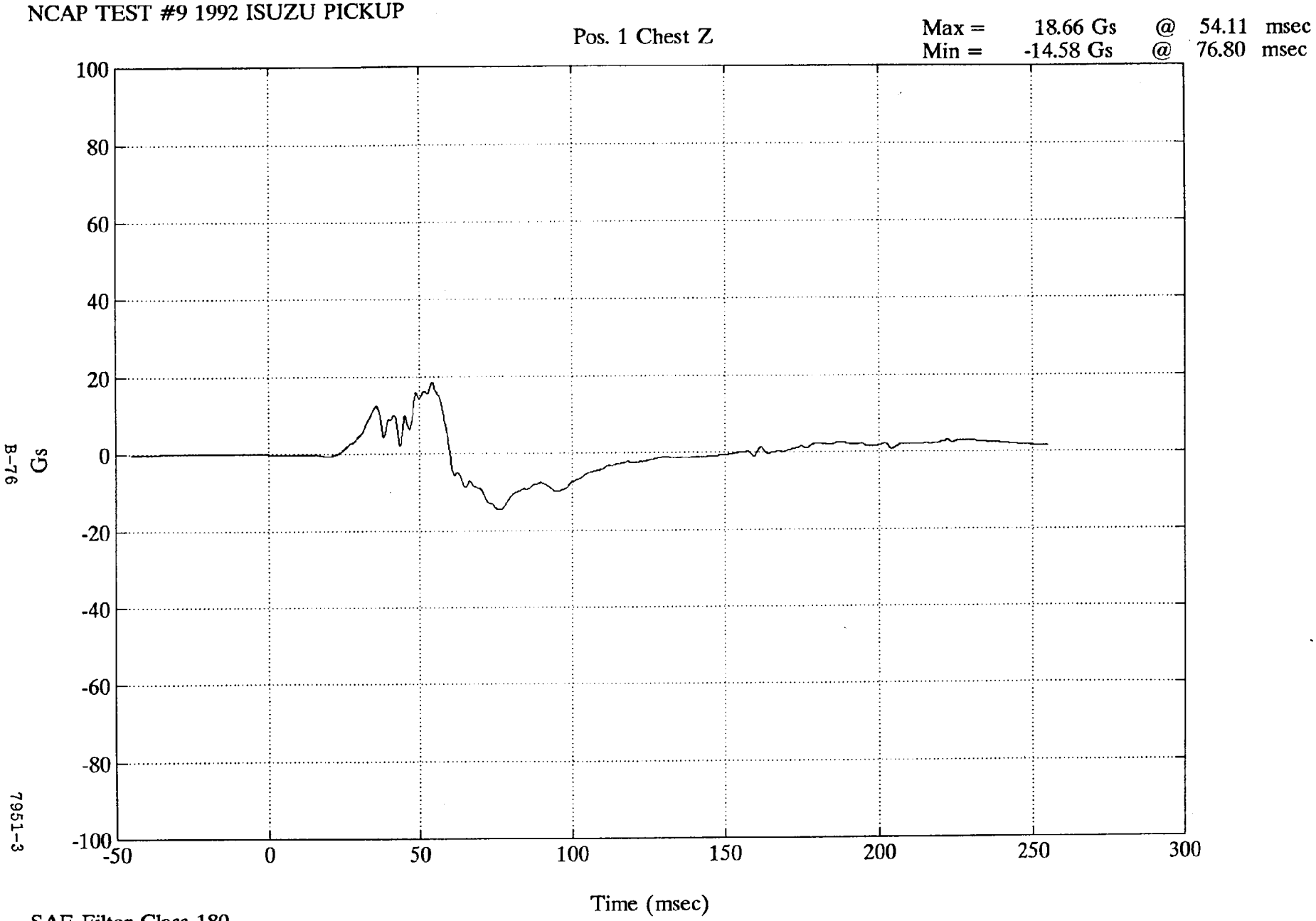


B-75

7951-3

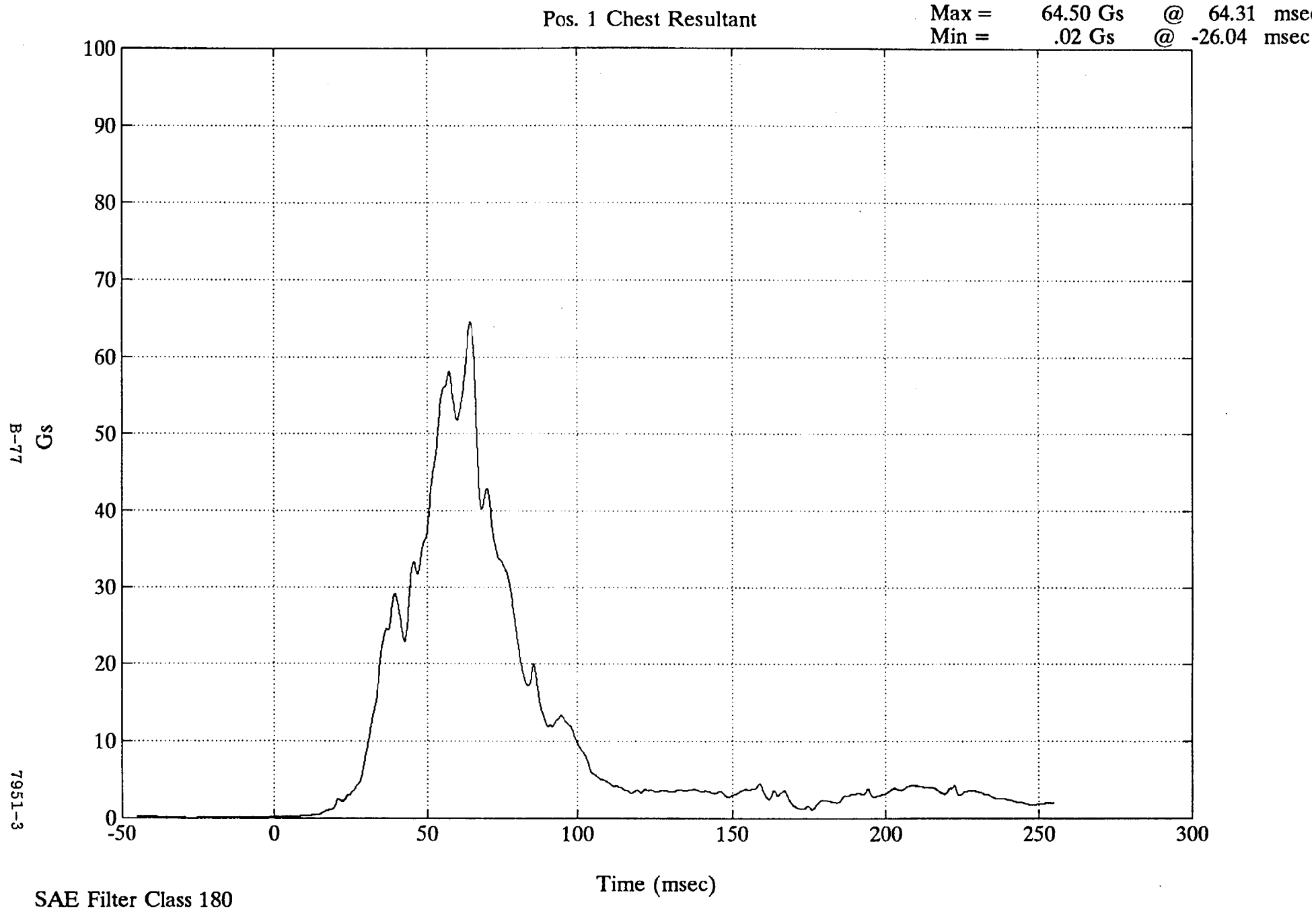
SAE Filter Class 180

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 180

NCAP TEST #9 1992 ISUZU PICKUP

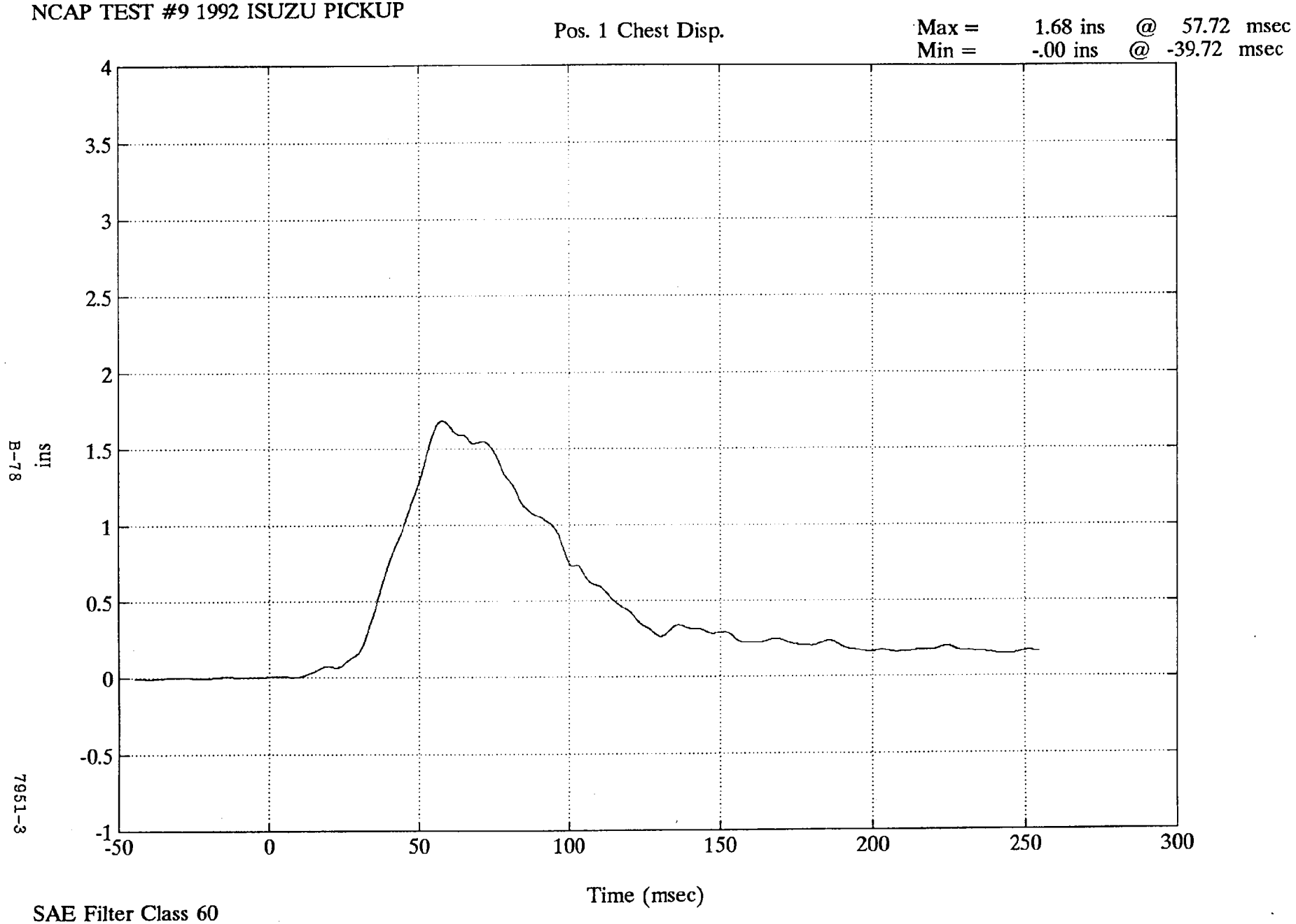


B-77

7951-3

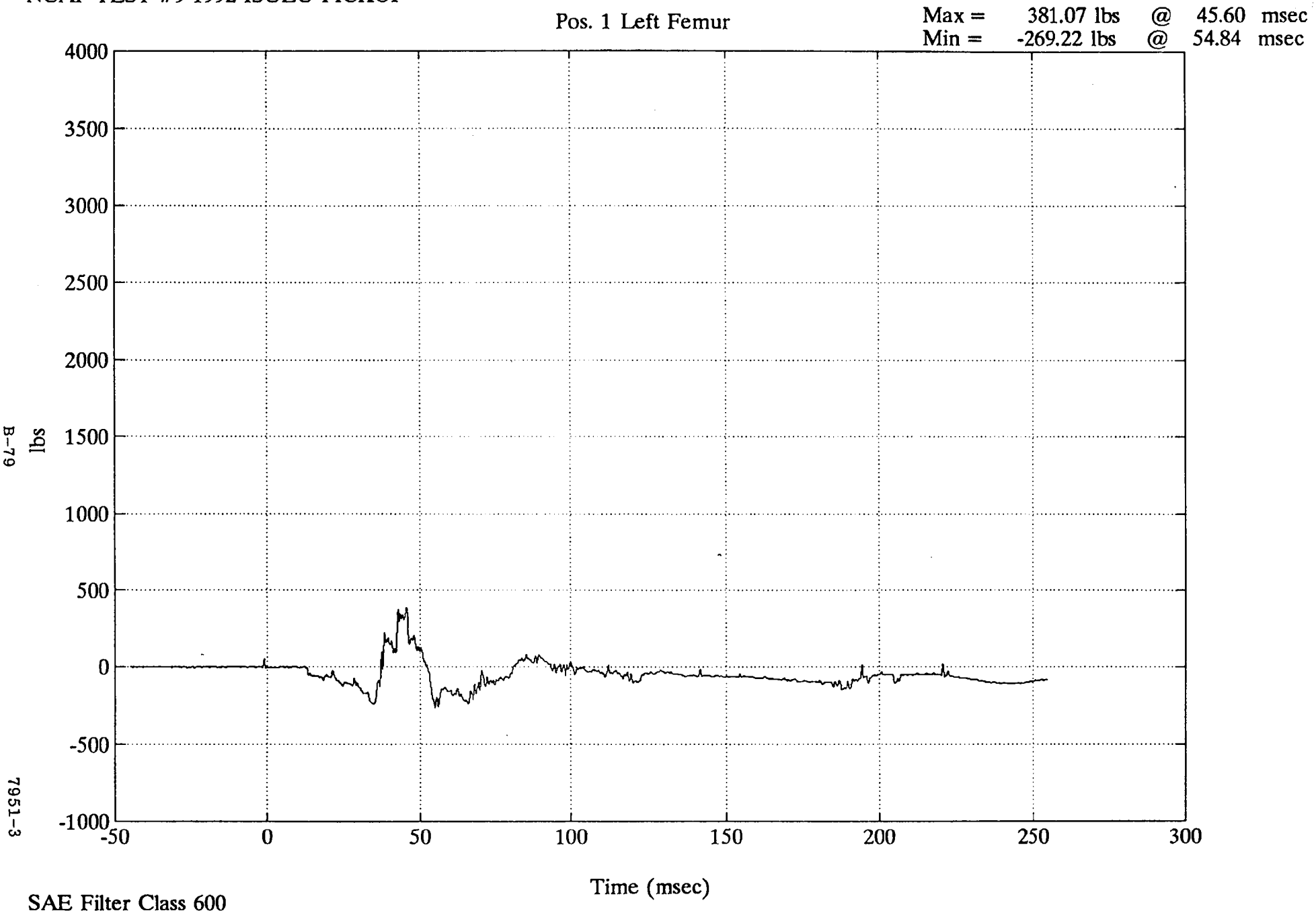
SAE Filter Class 180

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

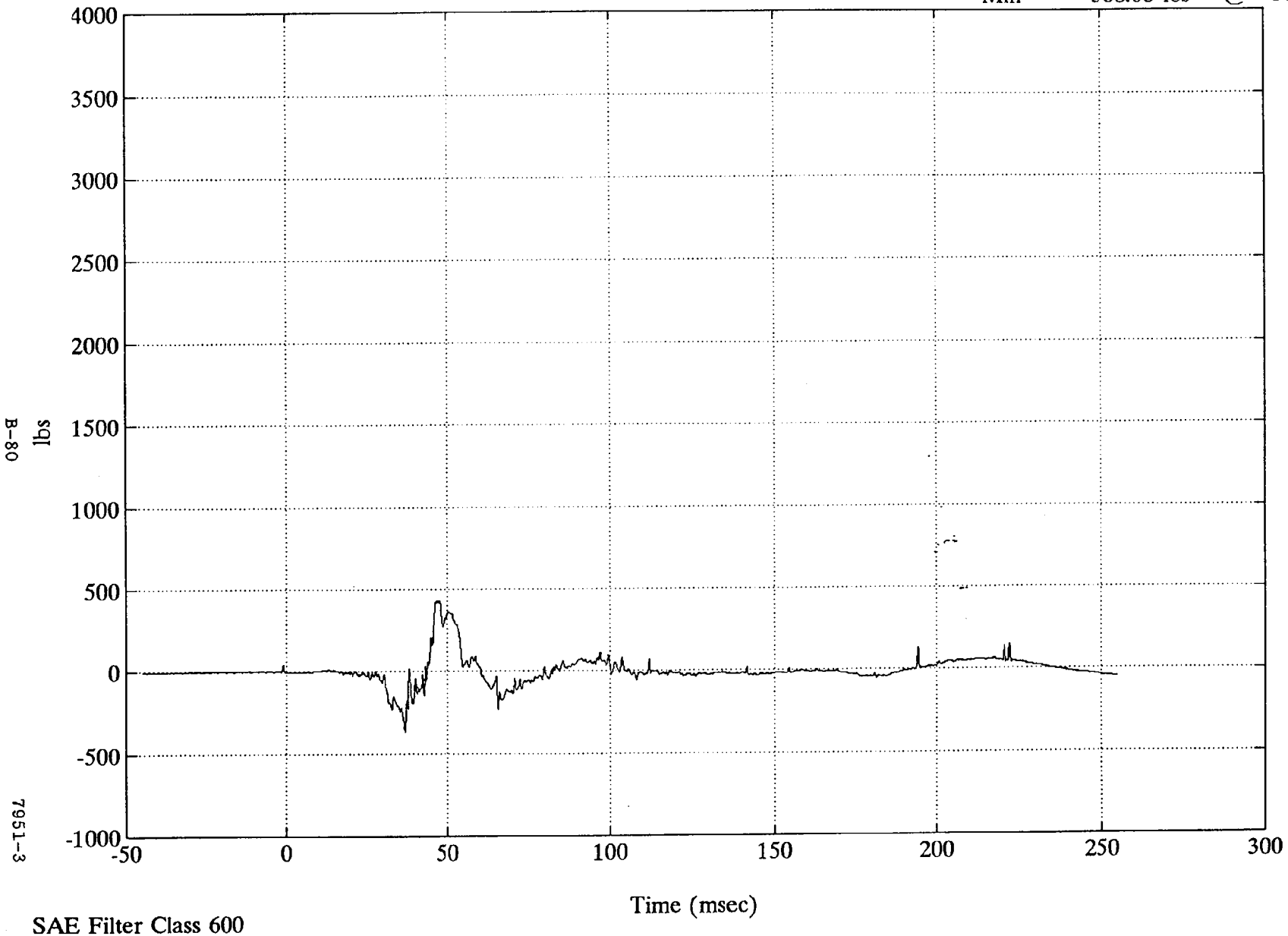


SAE Filter Class 600

NCAP TEST #9 1992 ISUZU PICKUP

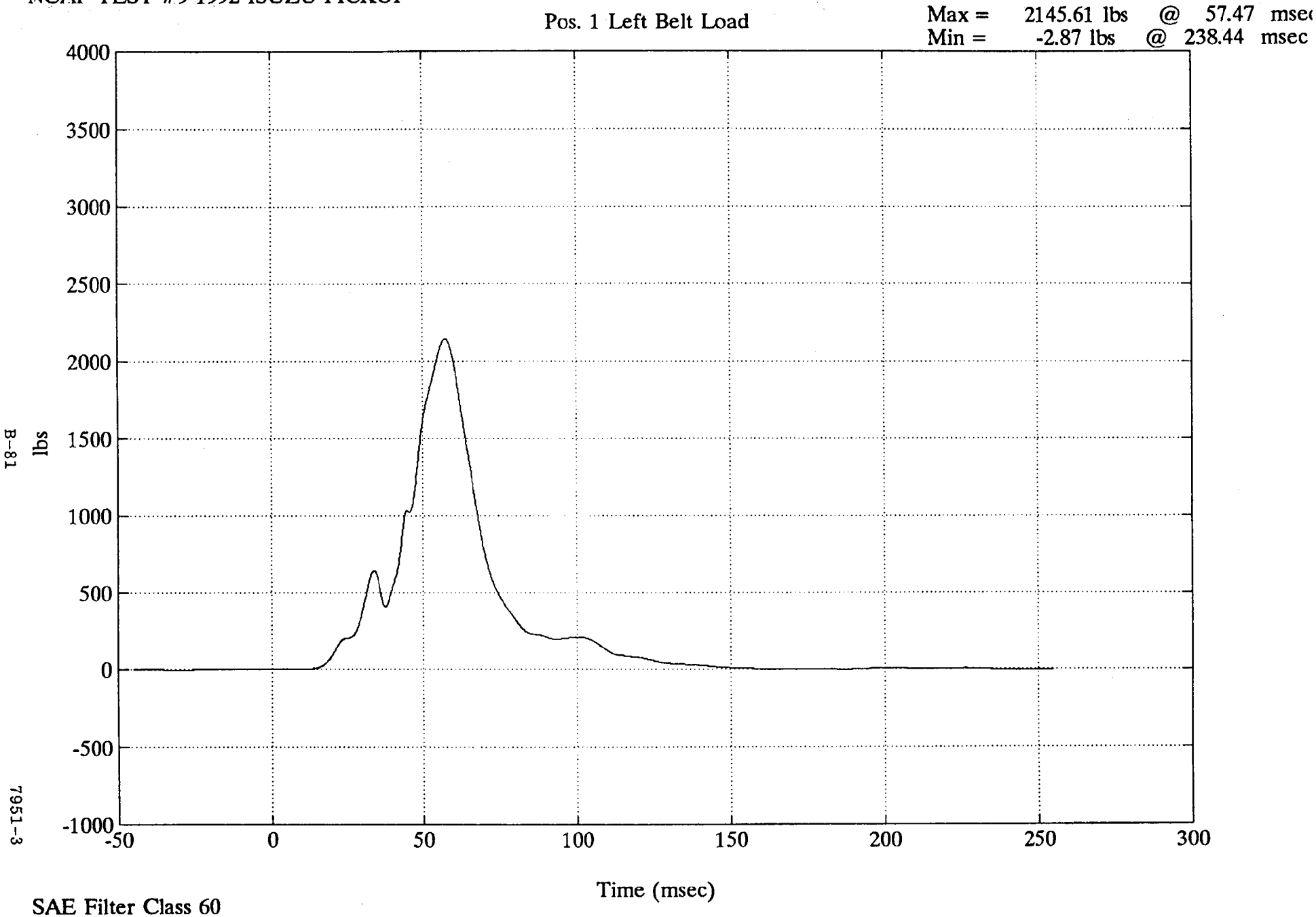
Pos. 1 Right Femur

Max = 428.85 lbs @ 46.68 msec
Min = -368.08 lbs @ 36.72 msec



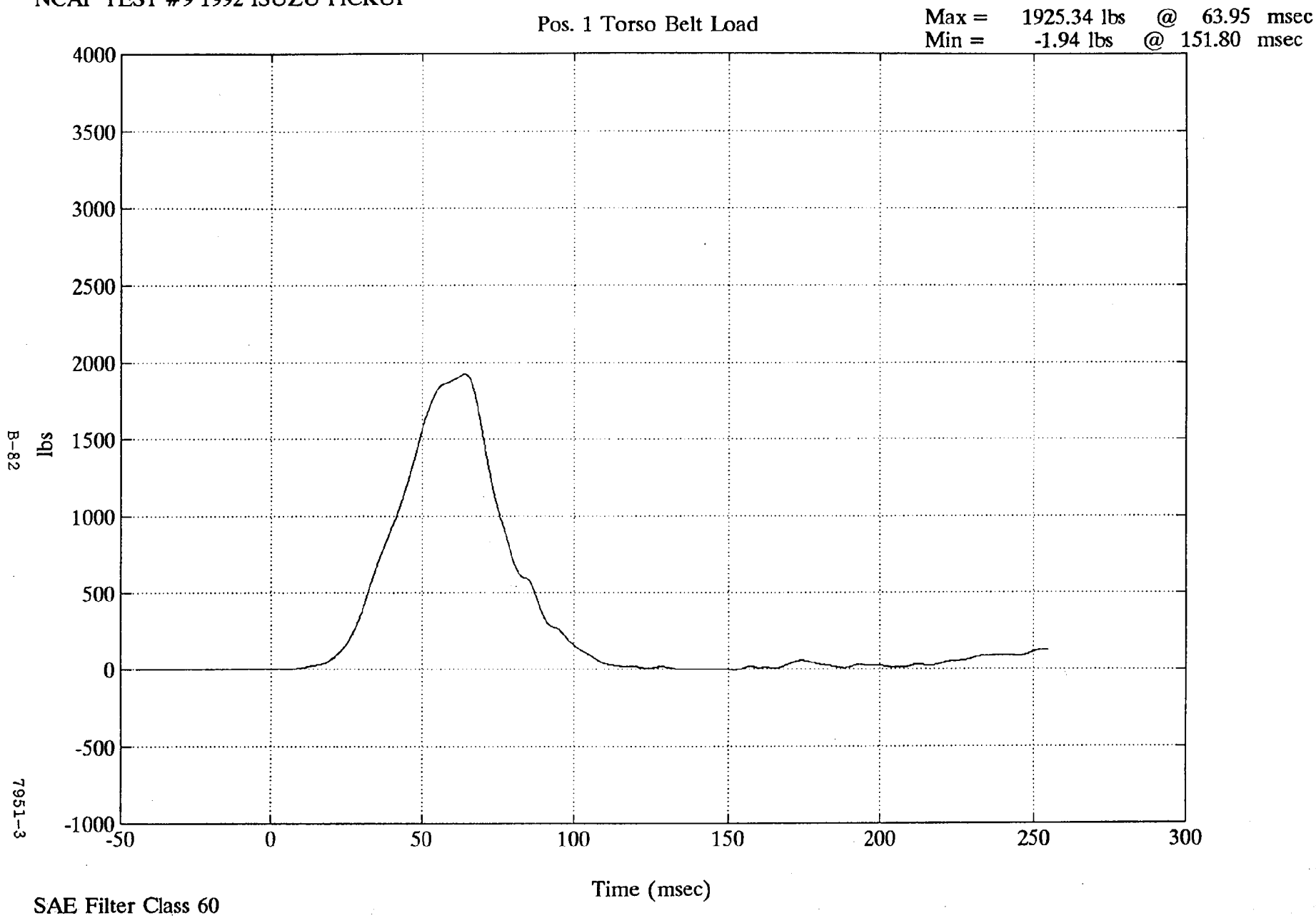
SAE Filter Class 600

NCAP TEST #9 1992 ISUZU PICKUP



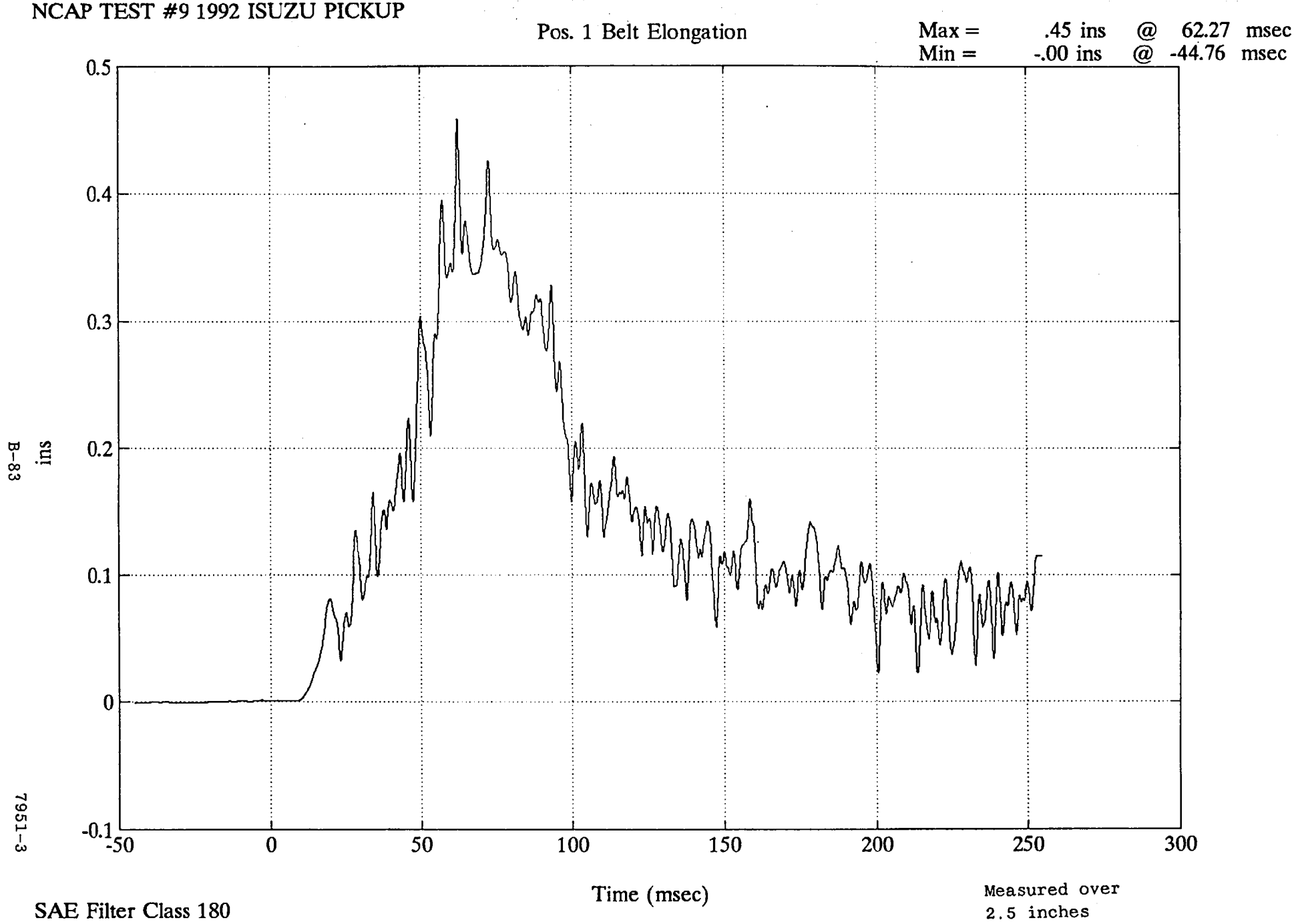
SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 60

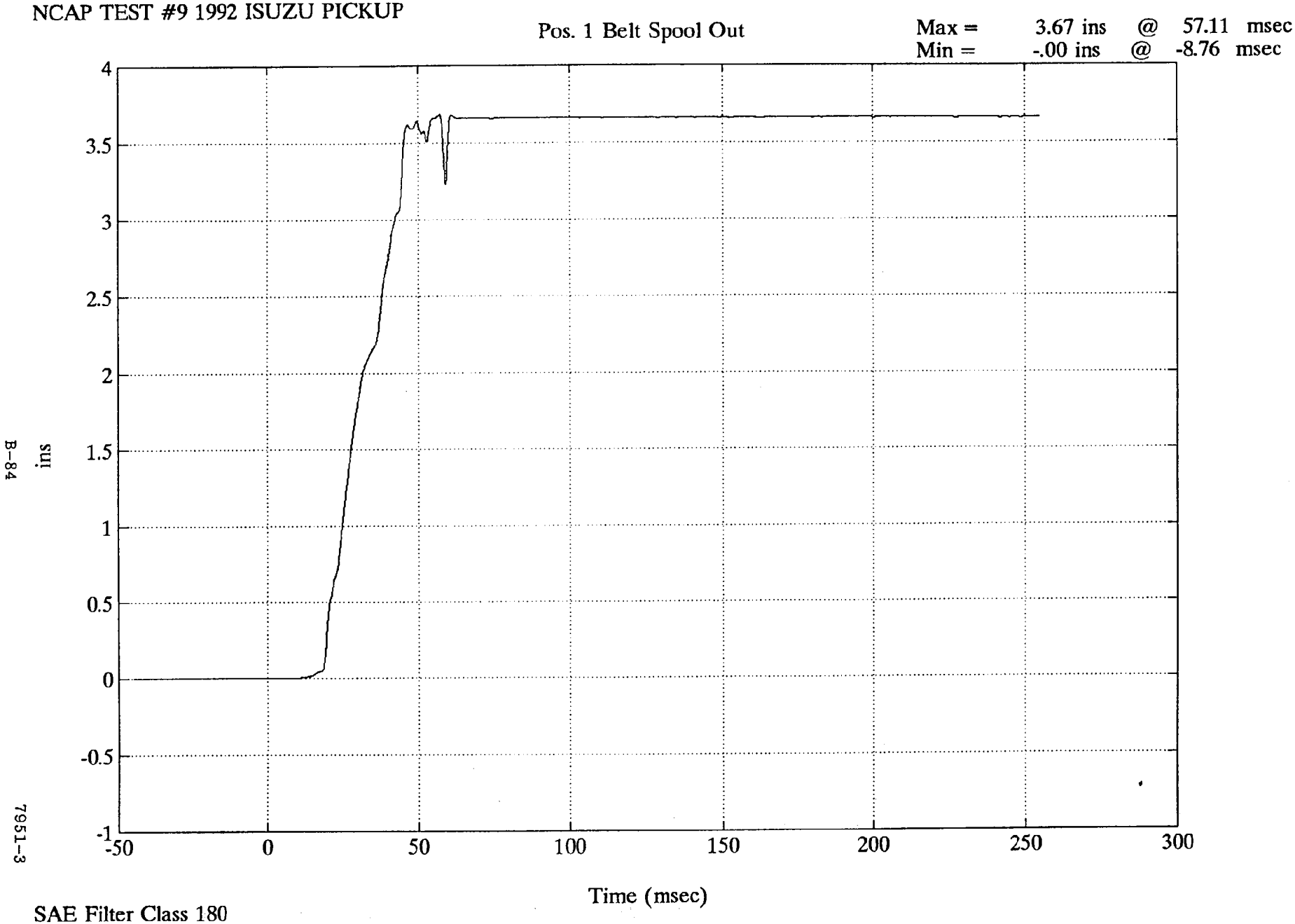
NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 180

Measured over
2.5 inches

NCAP TEST #9 1992 ISUZU PICKUP



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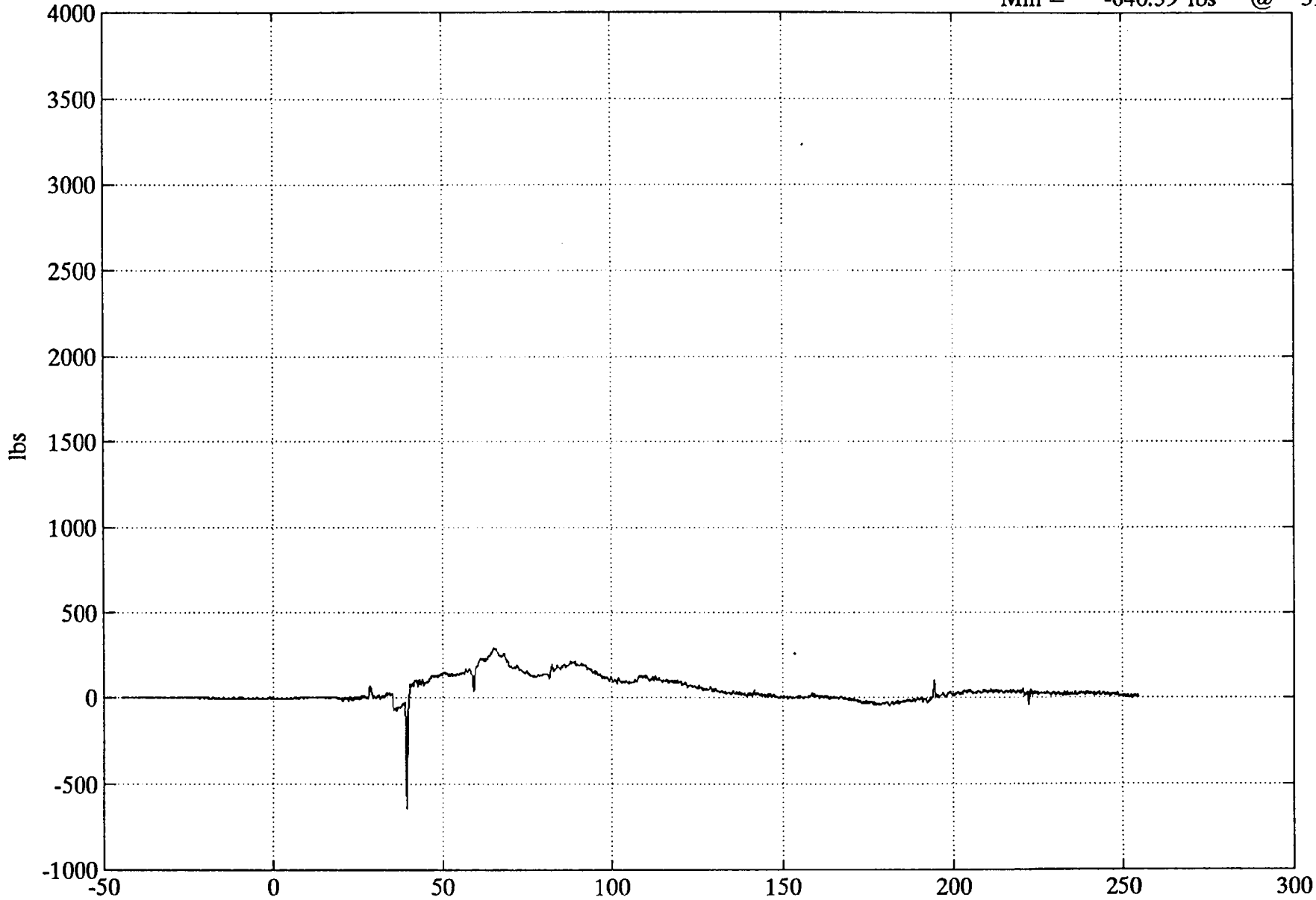
7951-3

SAE Filter Class 180

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 1 Upper Neck Fx

Max = 290.81 lbs @ 65.15 msec
Min = -640.39 lbs @ 39.47 msec



B-85

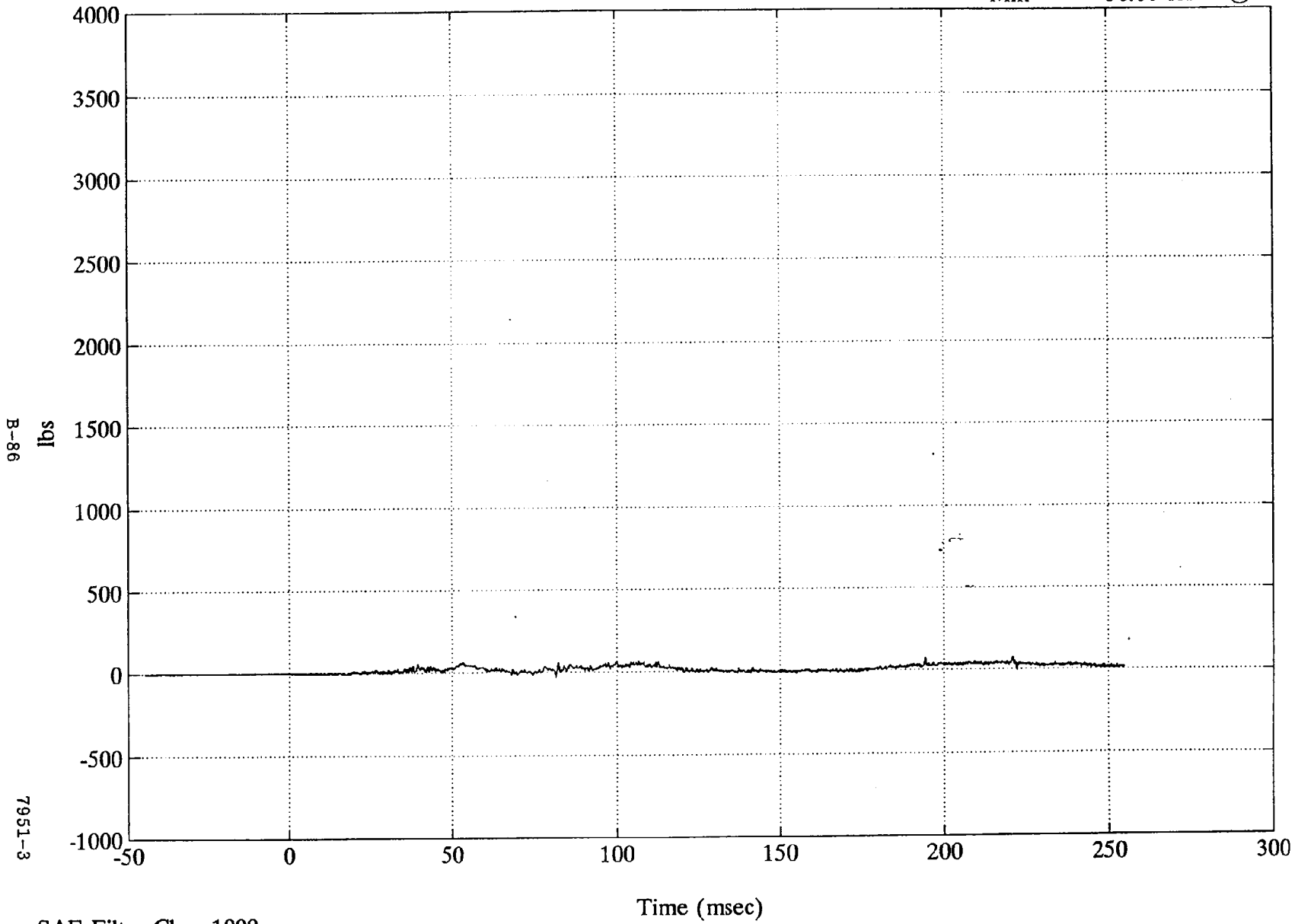
7951-3

SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 1 Upper Neck Fy

Max = 77.01 lbs @ 220.80 msec
Min = -30.06 lbs @ 81.60 msec



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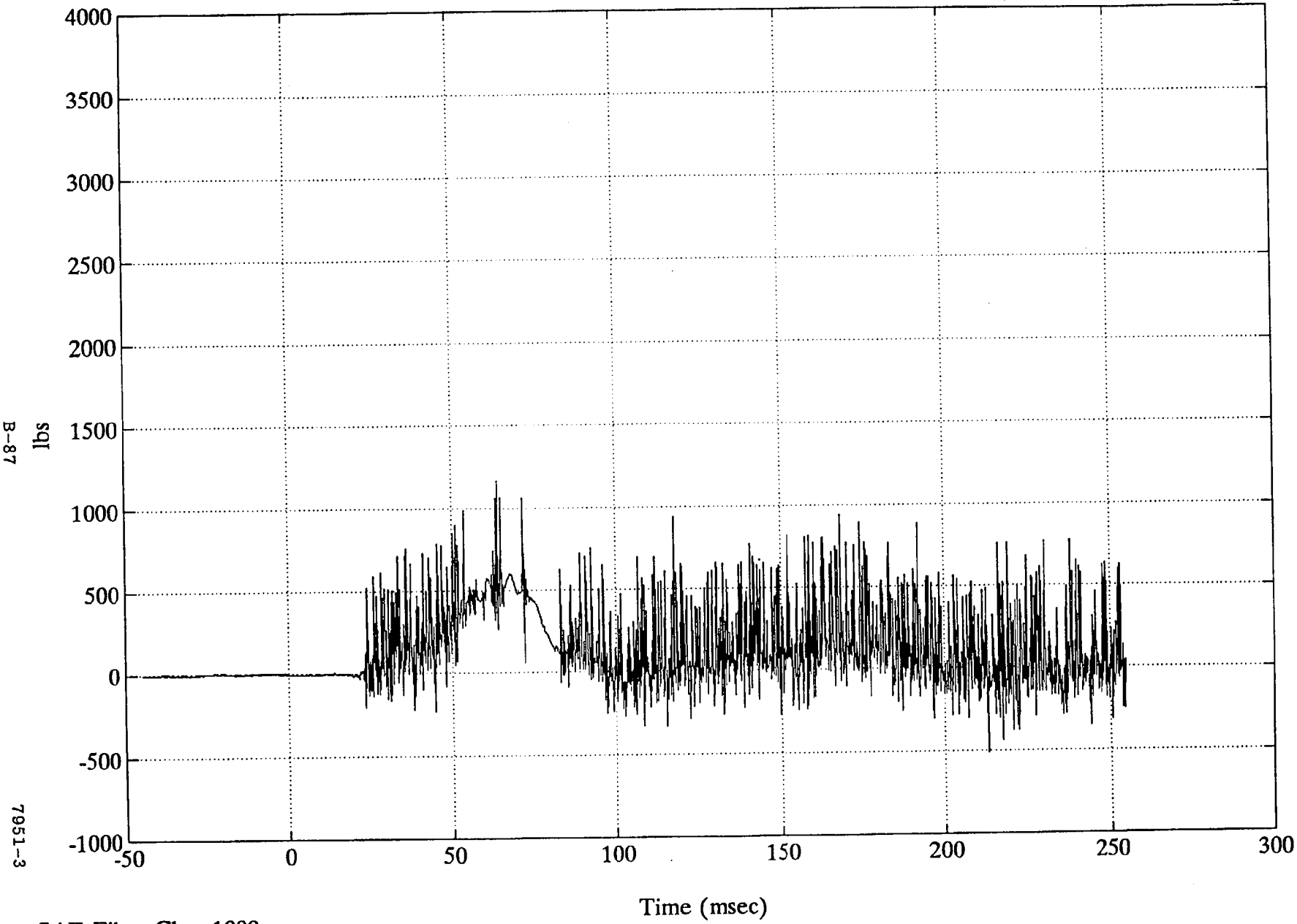
7951-3

SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 1 Upper Neck Fz

Max = 1164.39 lbs @ 63.95 msec
Min = -511.37 lbs @ 212.88 msec

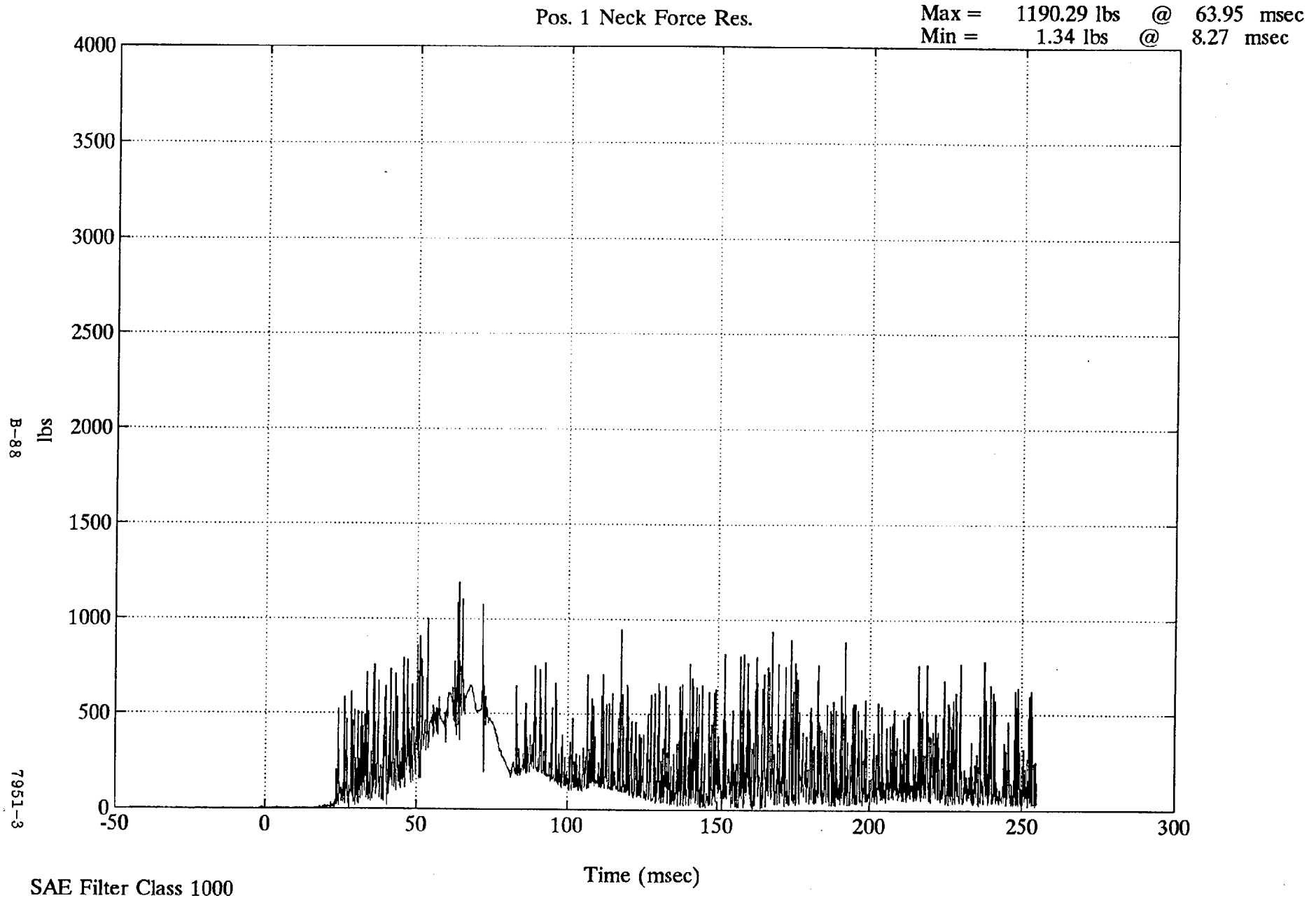


B-87

7951-3

SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP



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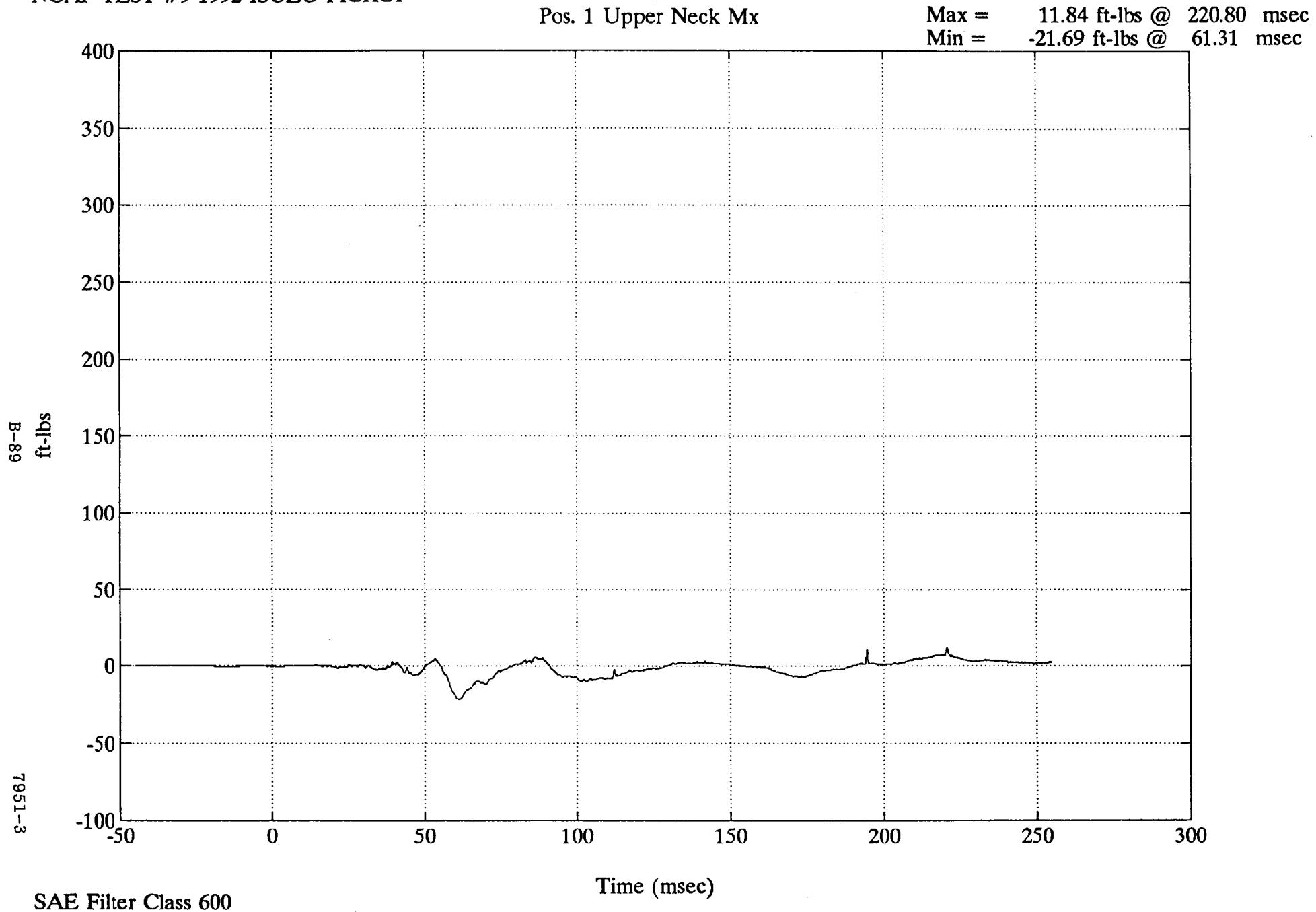
7951-3

SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP

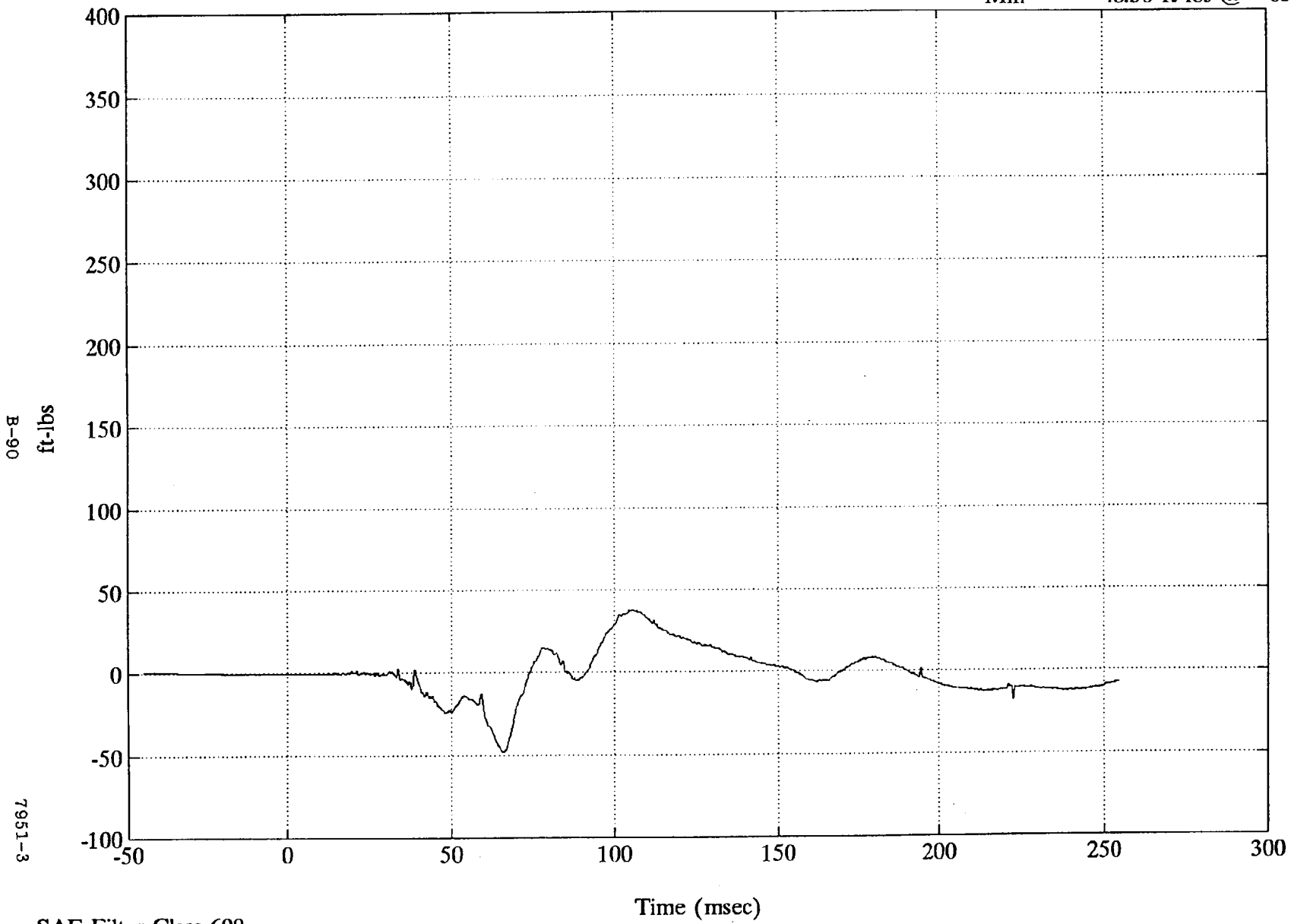


SAE Filter Class 600

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 1 Upper Neck My

Max = 37.91 ft-lbs @ 105.24 msec
Min = -48.30 ft-lbs @ 65.87 msec



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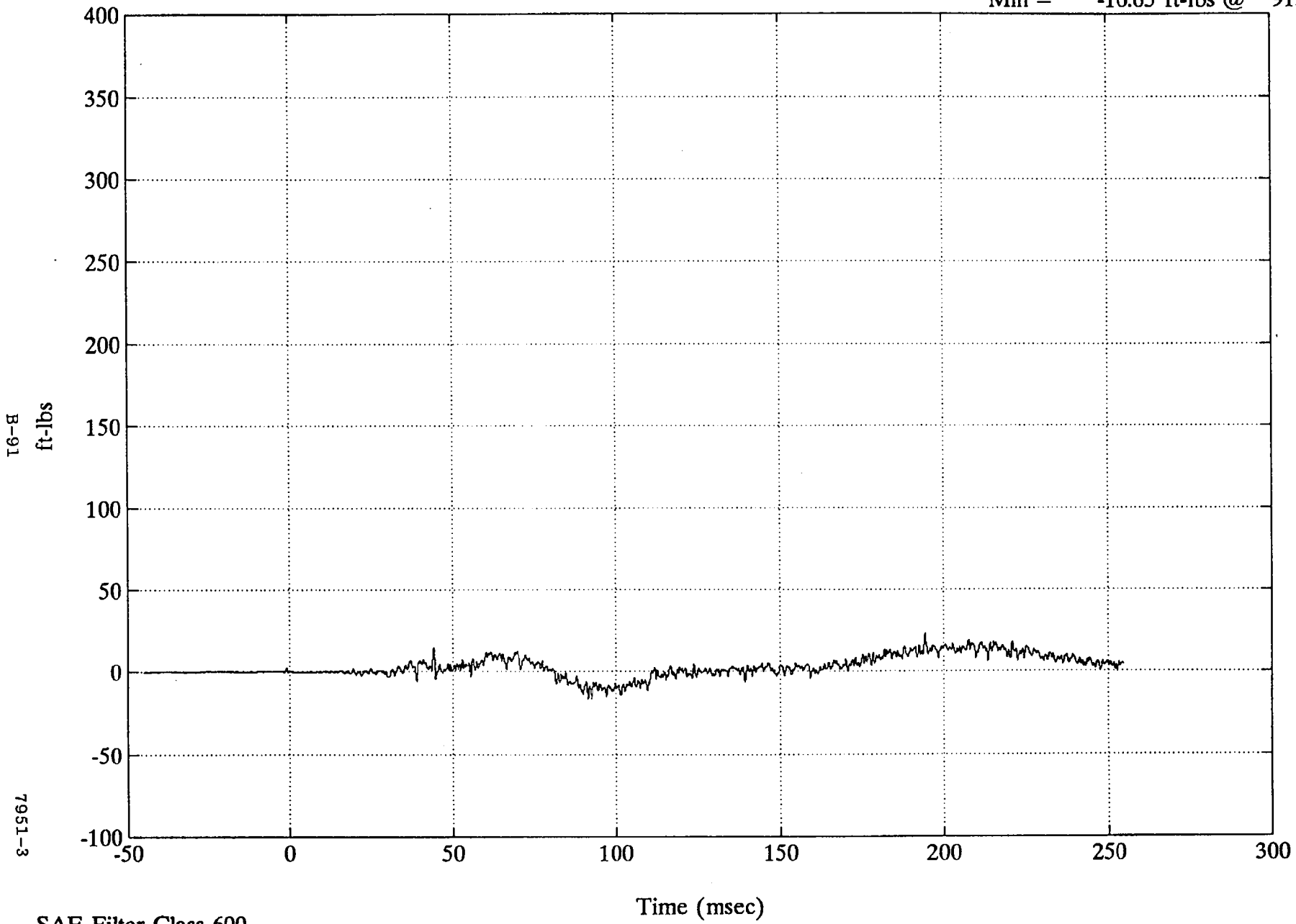
7951-3

SAE Filter Class 600

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 1 Upper Neck Mz

Max = 23.10 ft-lbs @ 194.40 msec
Min = -16.65 ft-lbs @ 91.44 msec

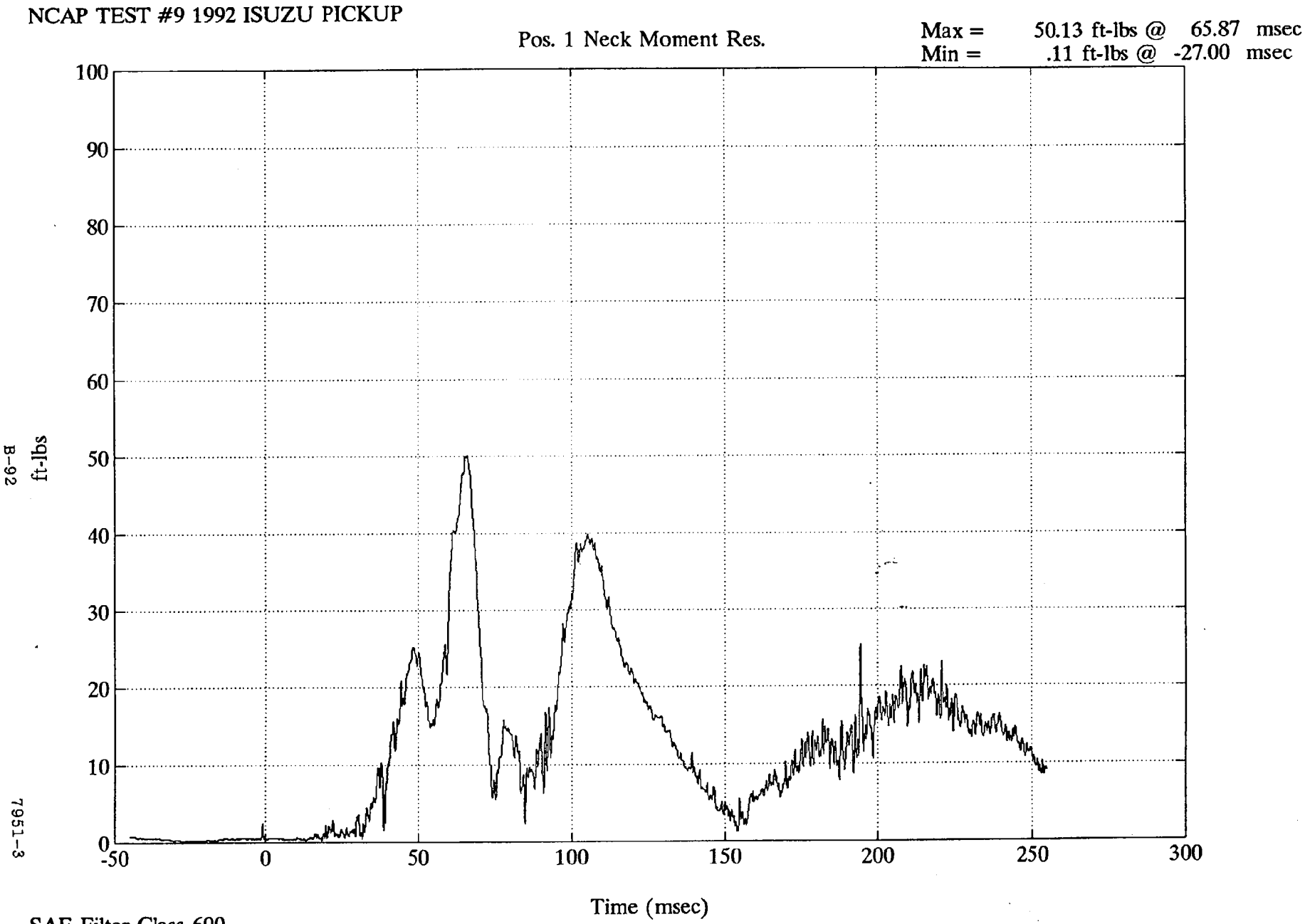


B-91

7951-3

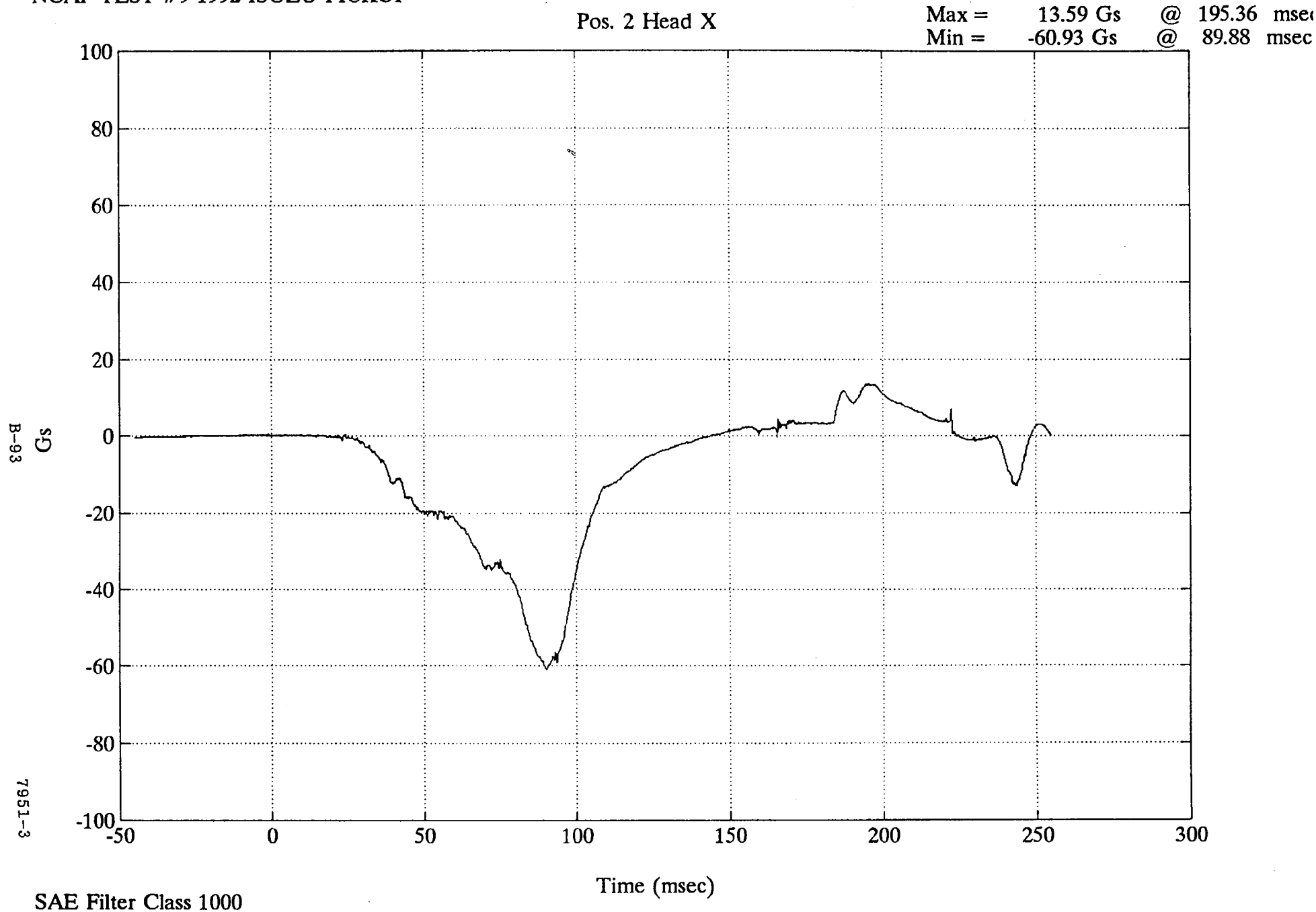
SAE Filter Class 600

NCAP TEST #9 1992 ISUZU PICKUP



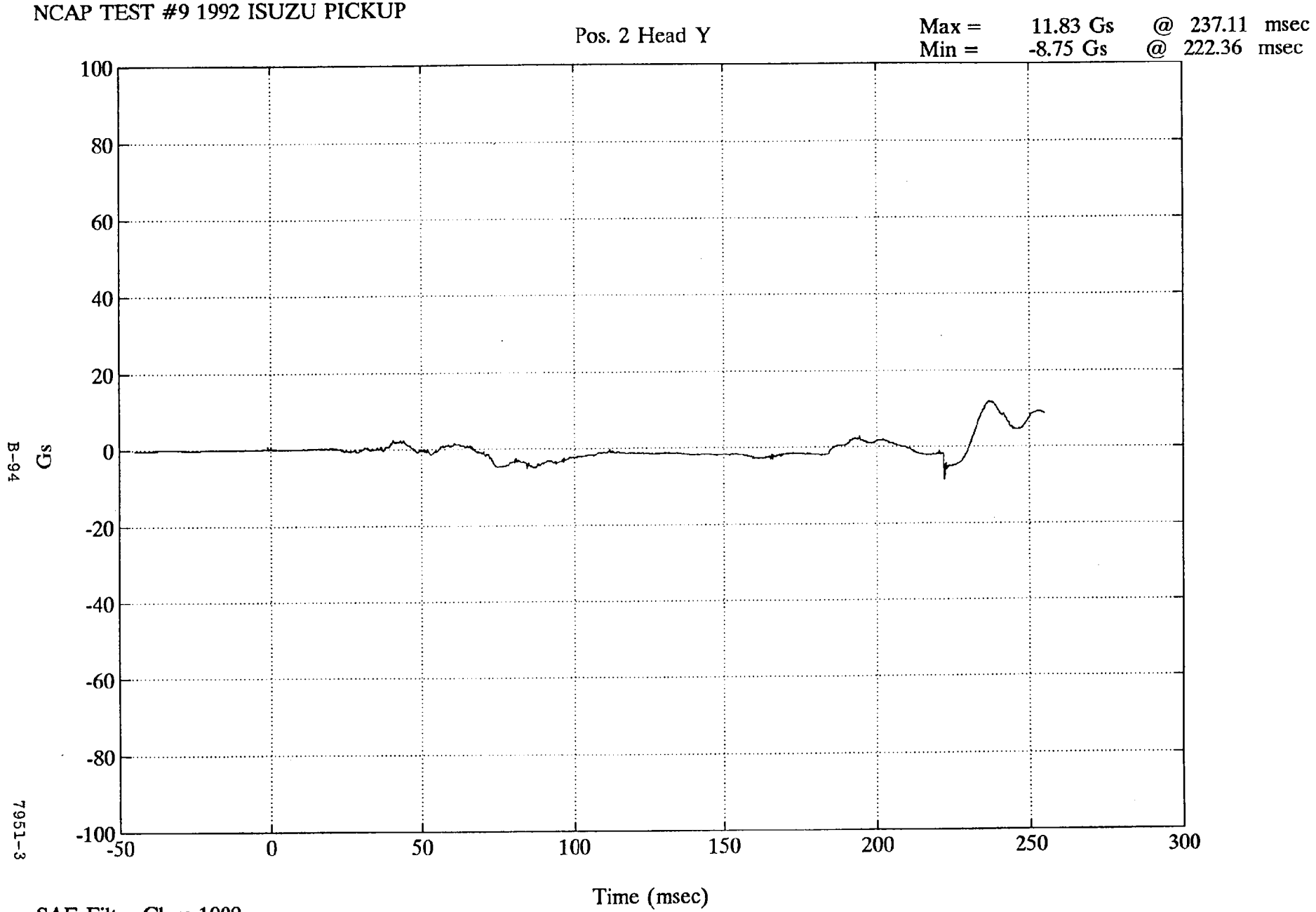
SAE Filter Class 600

NCAP TEST #9 1992 ISUZU PICKUP



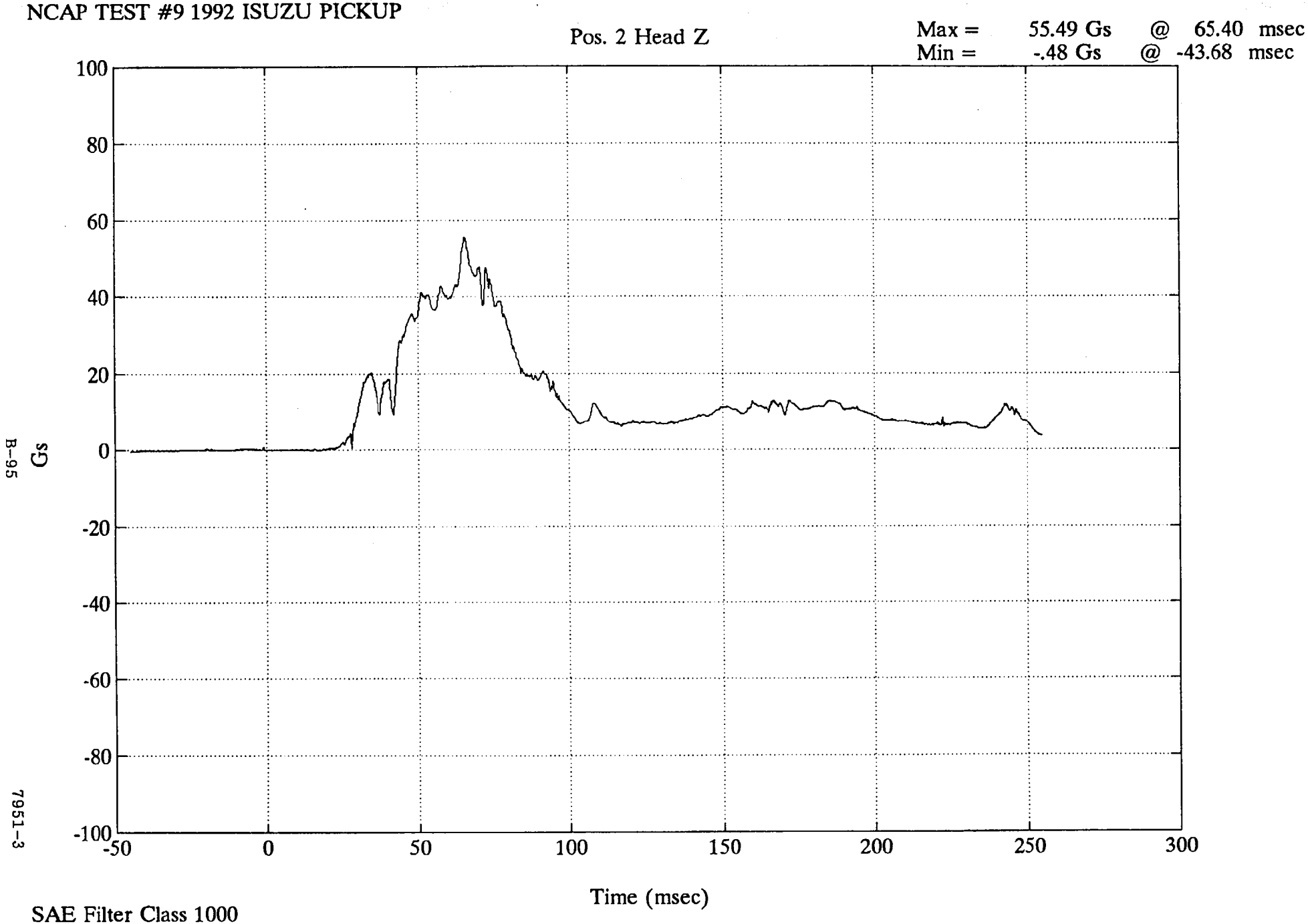
SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP



B-95

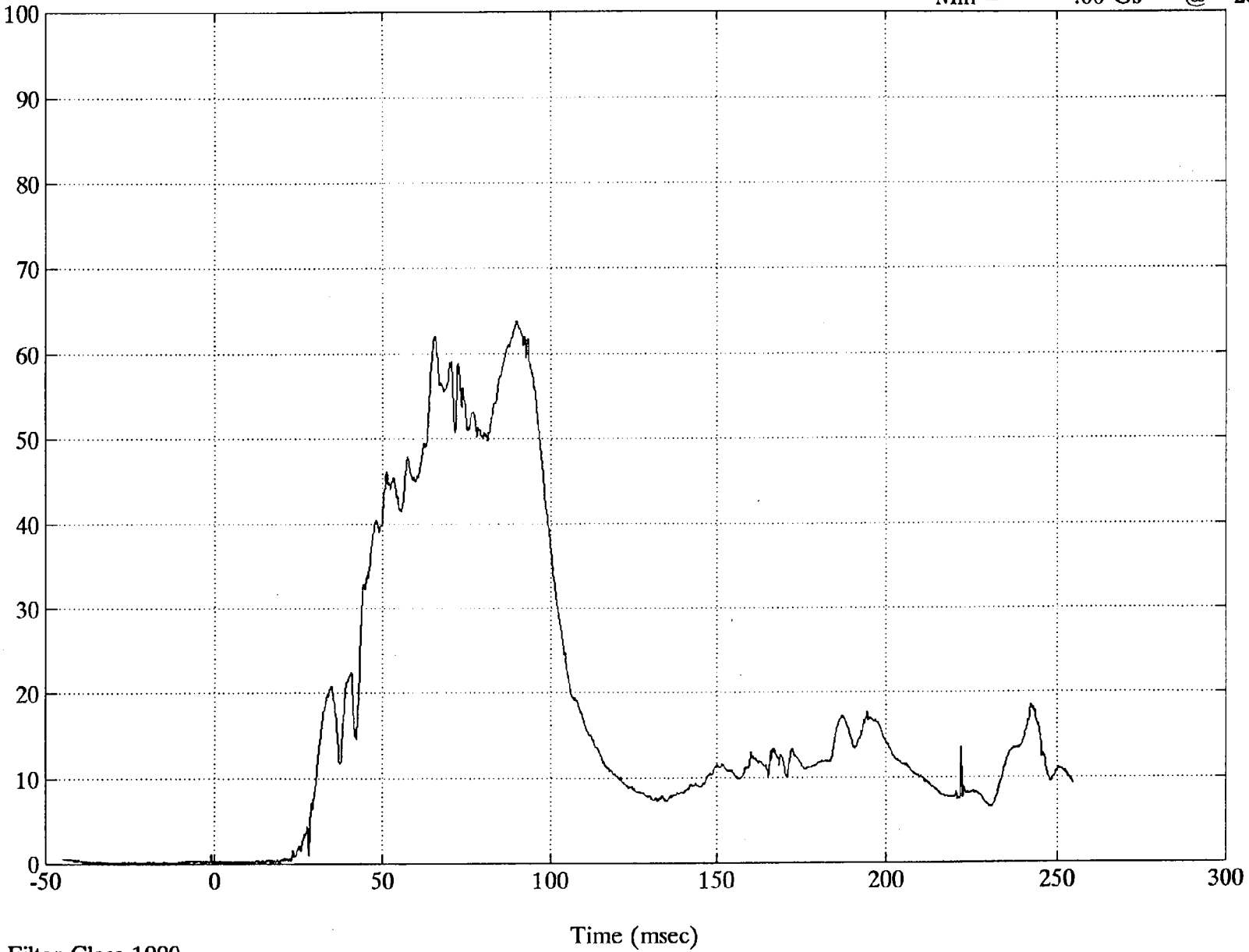
7951-3

SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 2 Head Resultant

Max = 63.80 Gs @ 89.88 msec
Min = .00 Gs @ -28.20 msec

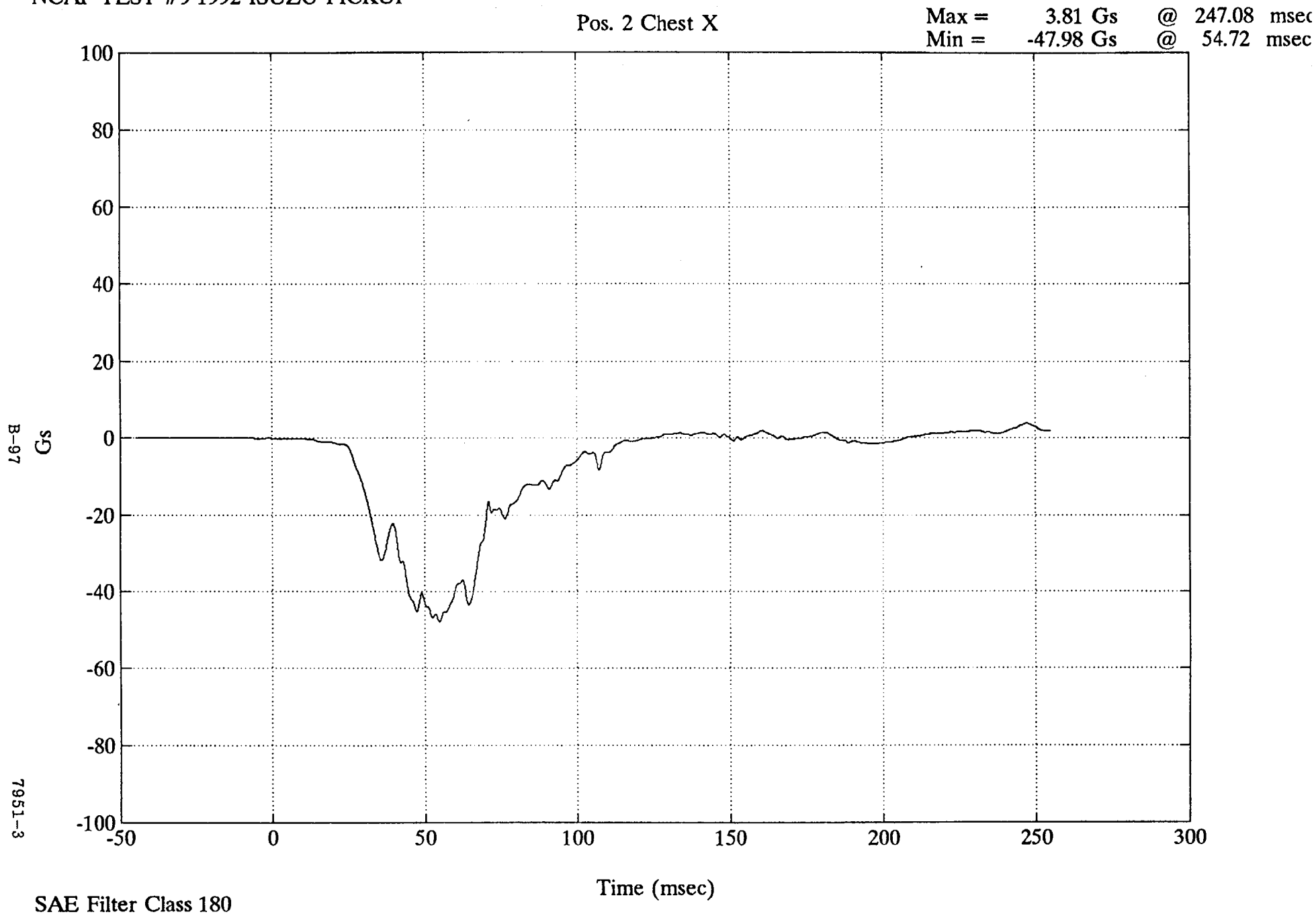


B-96

7951-3

SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP

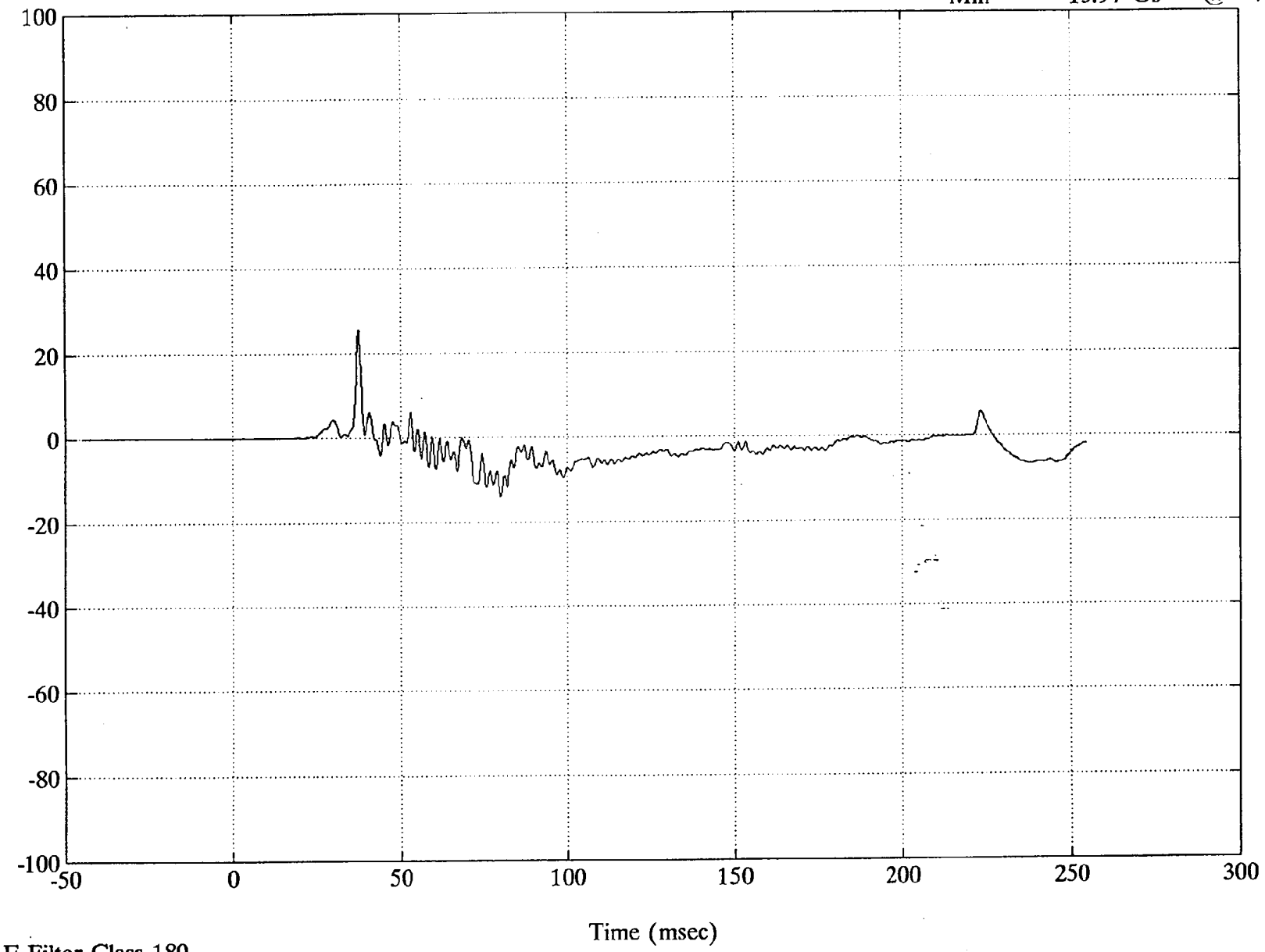


SAE Filter Class 180

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 2 Chest Y

Max = 25.59 Gs @ 37.31 msec
Min = -13.97 Gs @ 79.91 msec



B-98

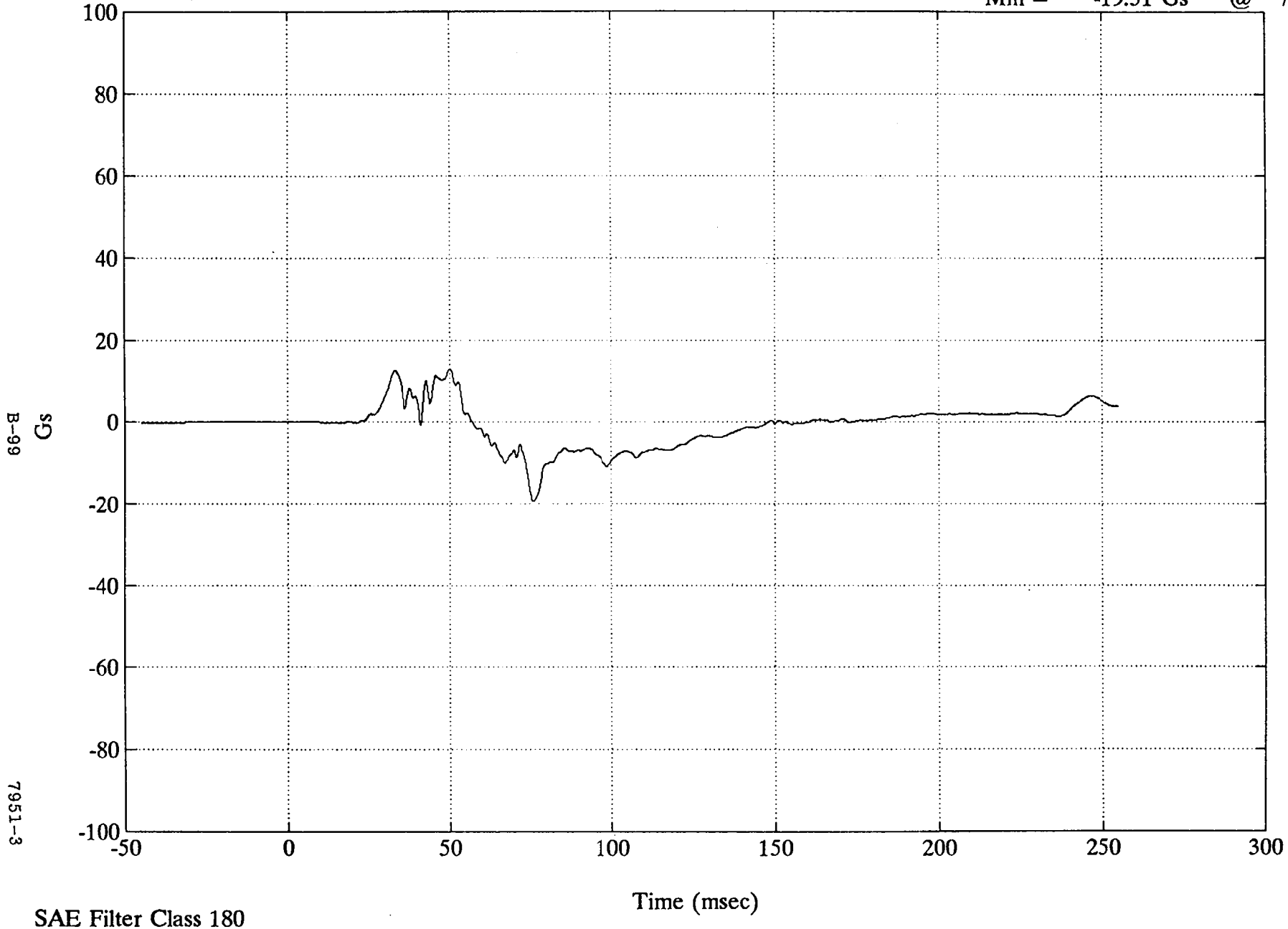
7951-3

SAE Filter Class 180

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 2 Chest Z

Max = 13.02 Gs @ 50.16 msec
Min = -19.51 Gs @ 75.84 msec

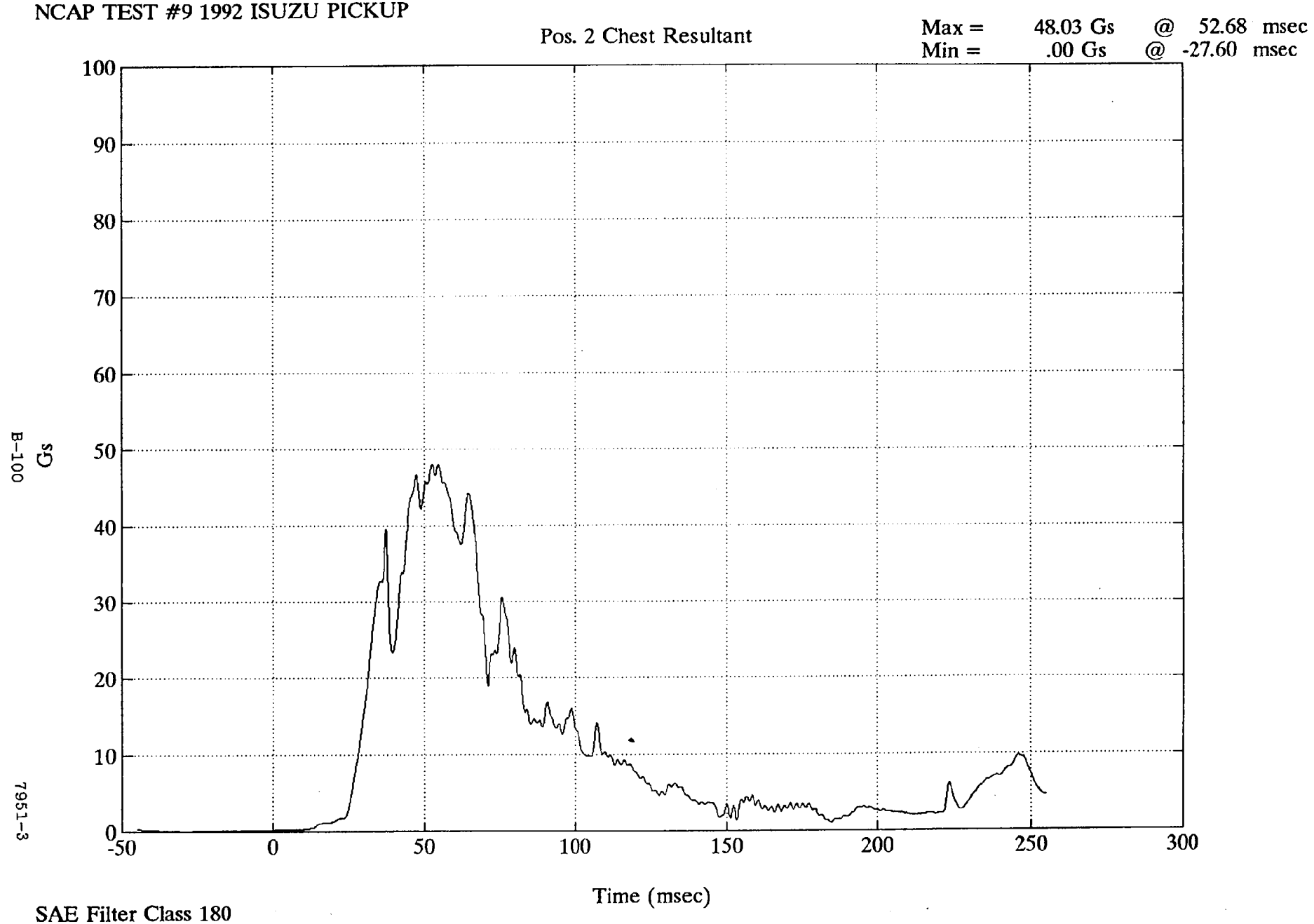


B-99

7951-3

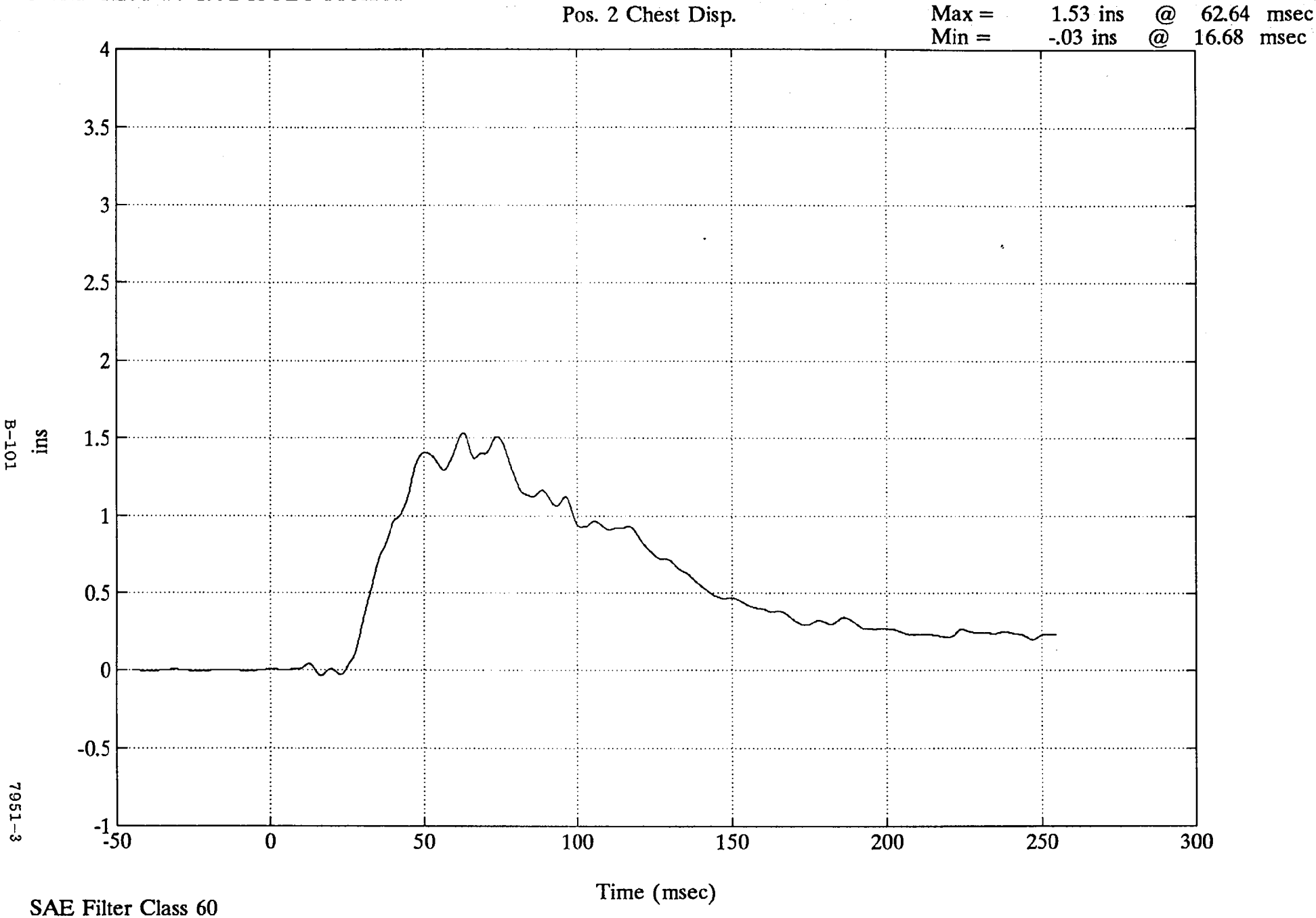
SAE Filter Class 180

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 180

NCAP TEST #9 1992 ISUZU PICKUP

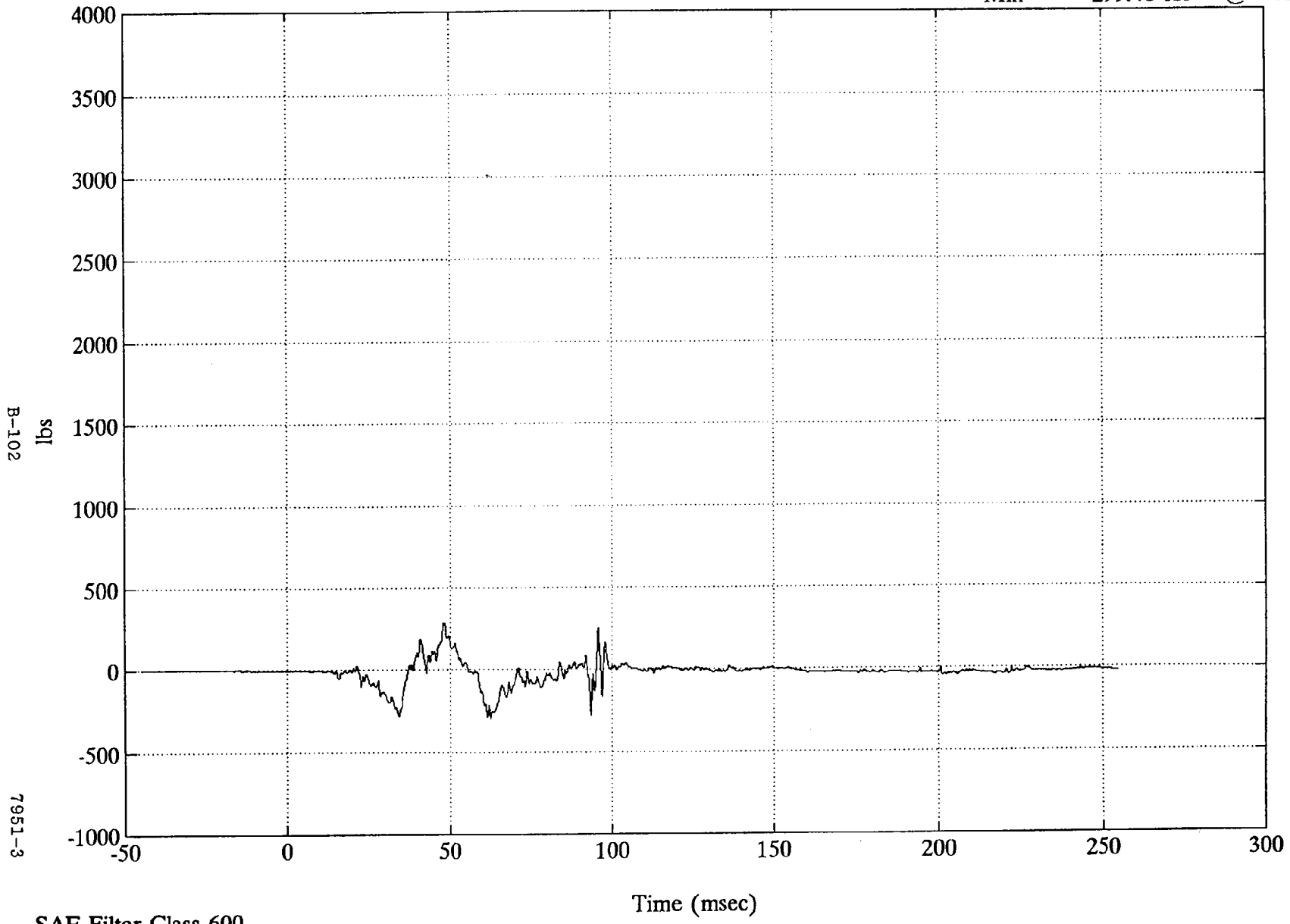


SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 2 Left Femur

Max = 288.58 lbs @ 47.88 msec
Min = -299.48 lbs @ 62.51 msec

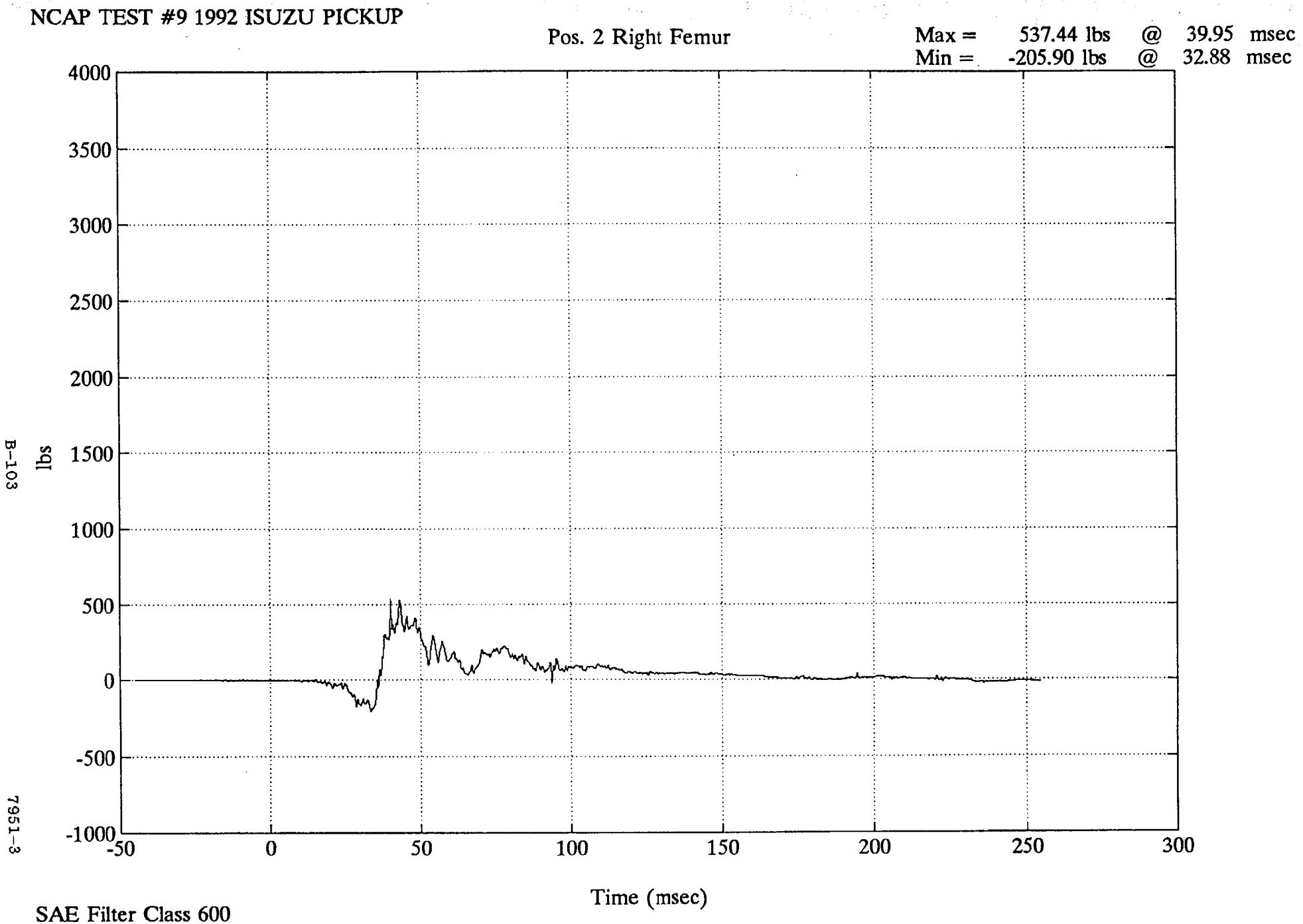


B-102

7951-3

SAE Filter Class 600

NCAP TEST #9 1992 ISUZU PICKUP

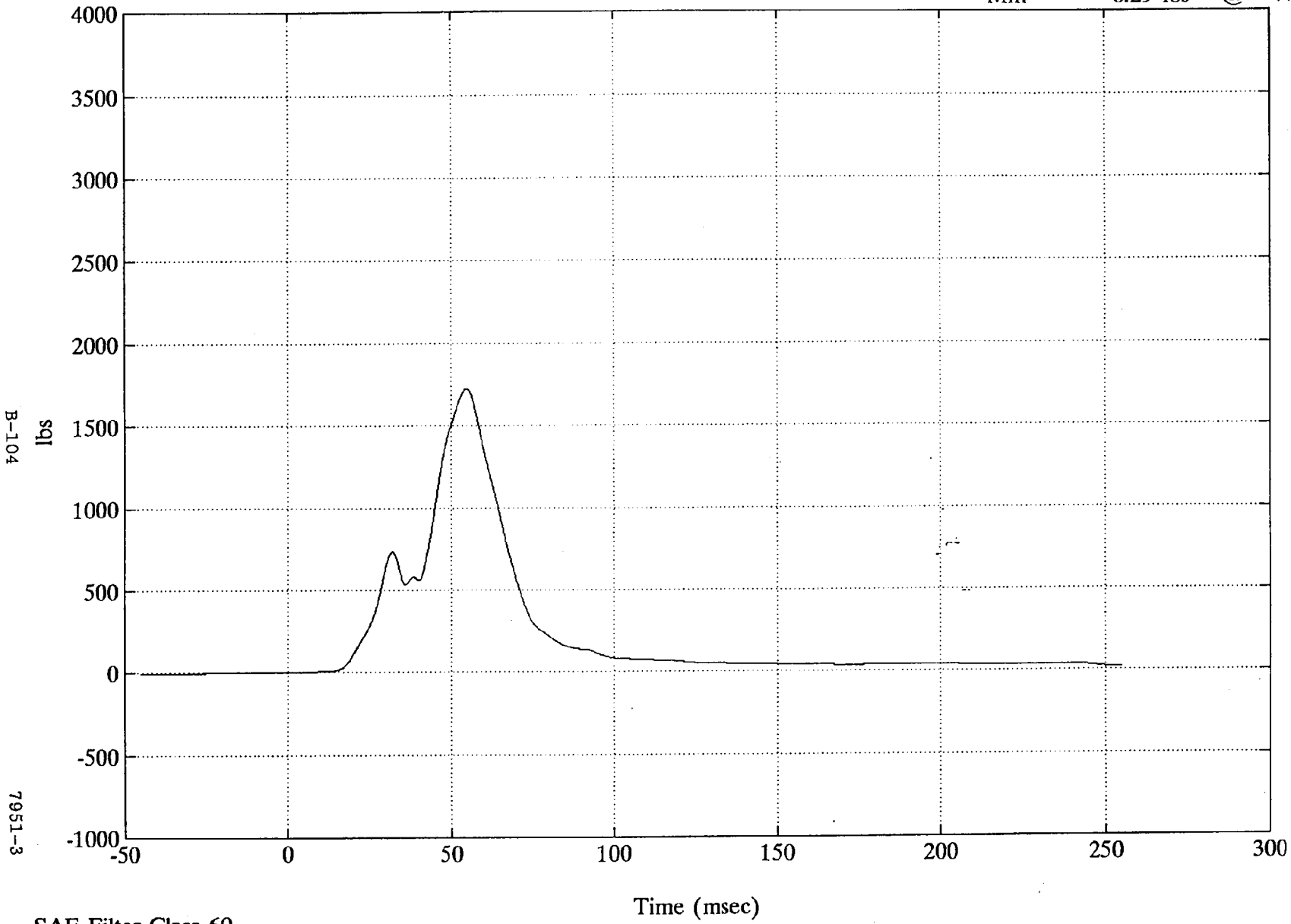


SAE Filter Class 600

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 2 Right Belt Load

Max = 1721.20 lbs @ 54.72 msec
Min = -6.29 lbs @ -44.88 msec

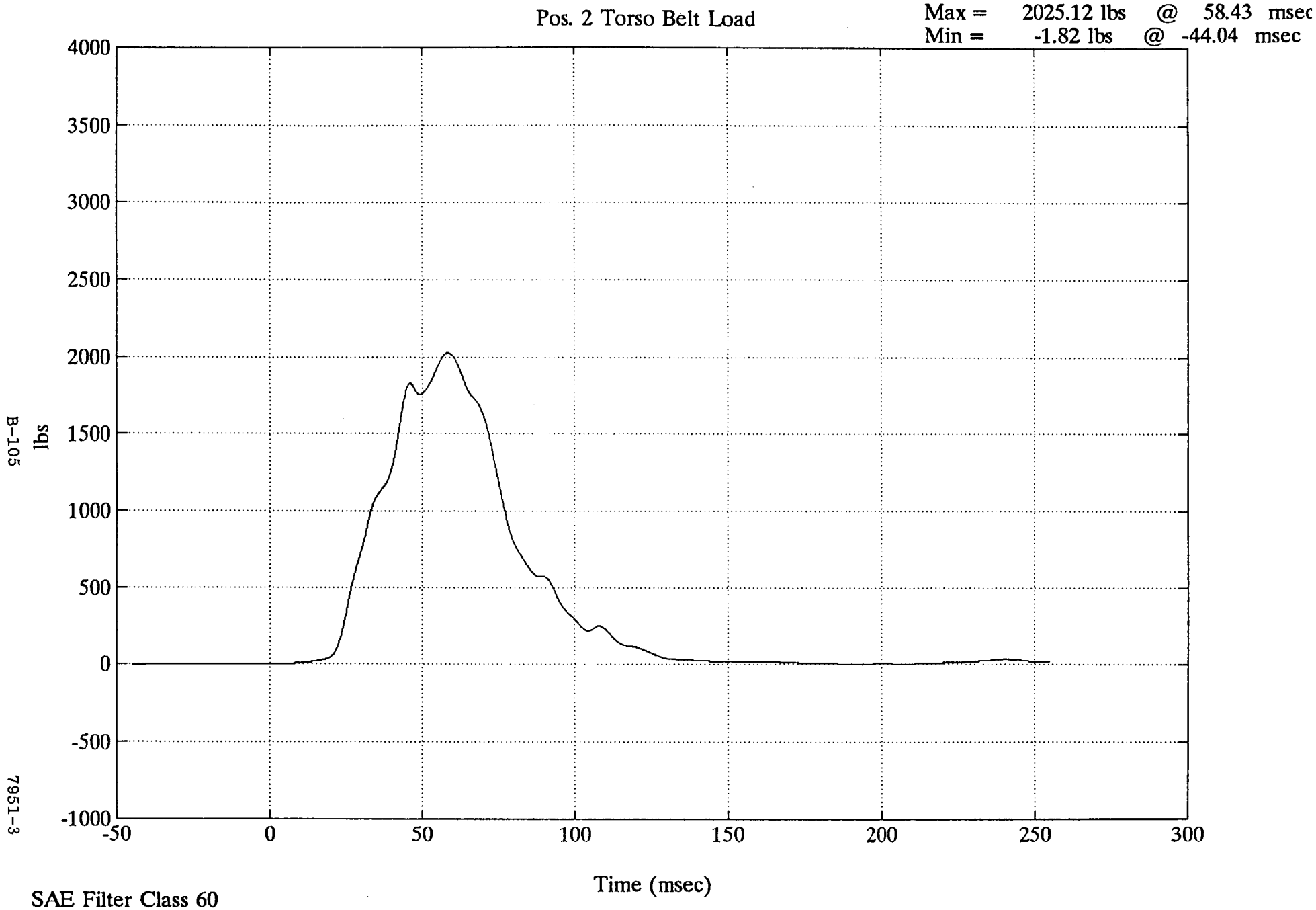


B-104

7951-3

SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

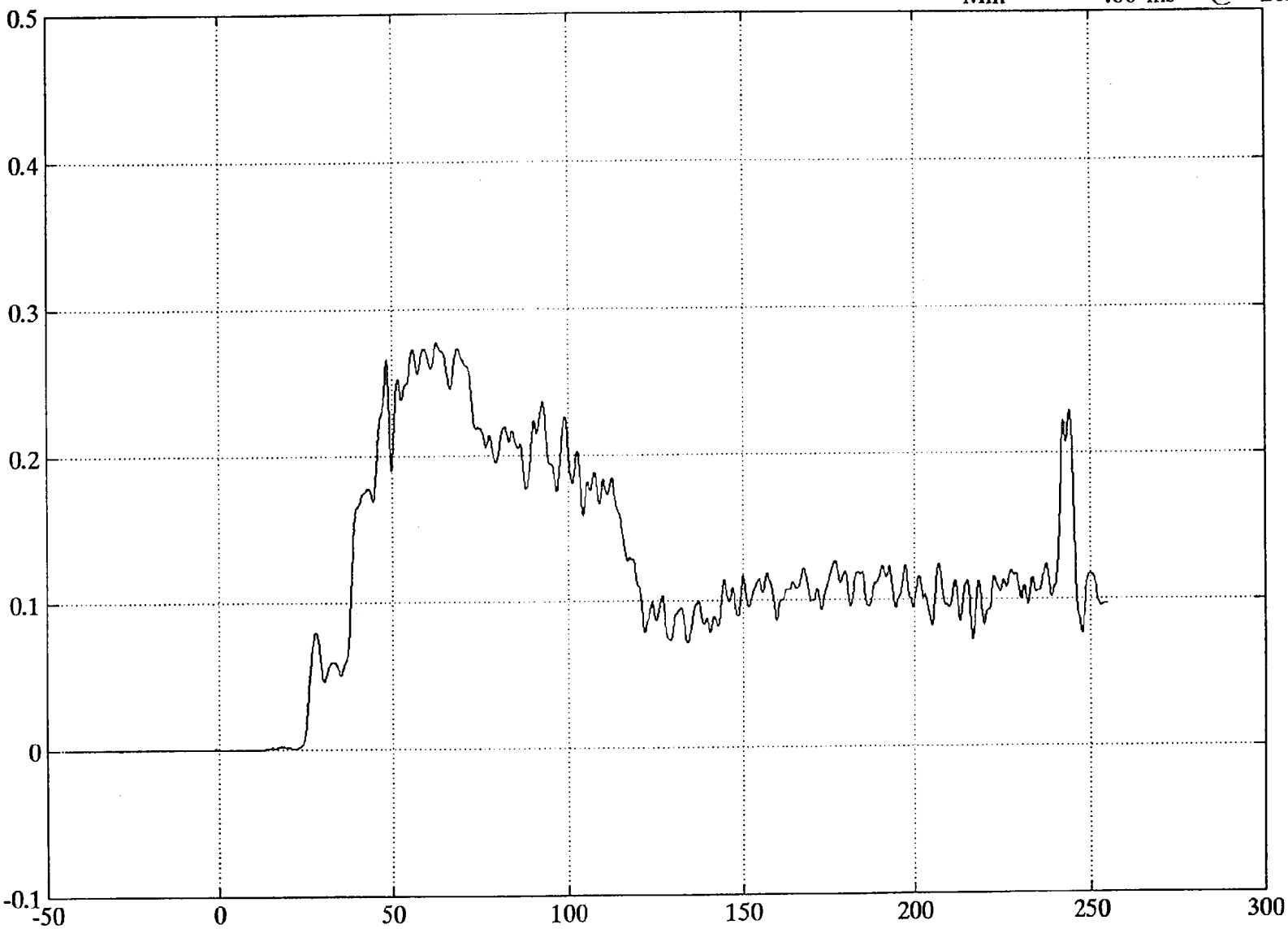


SAE Filter Class 60

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 2 Belt Elongation

Max = .27 ins @ 62.64 msec
Min = -.00 ins @ -28.80 msec



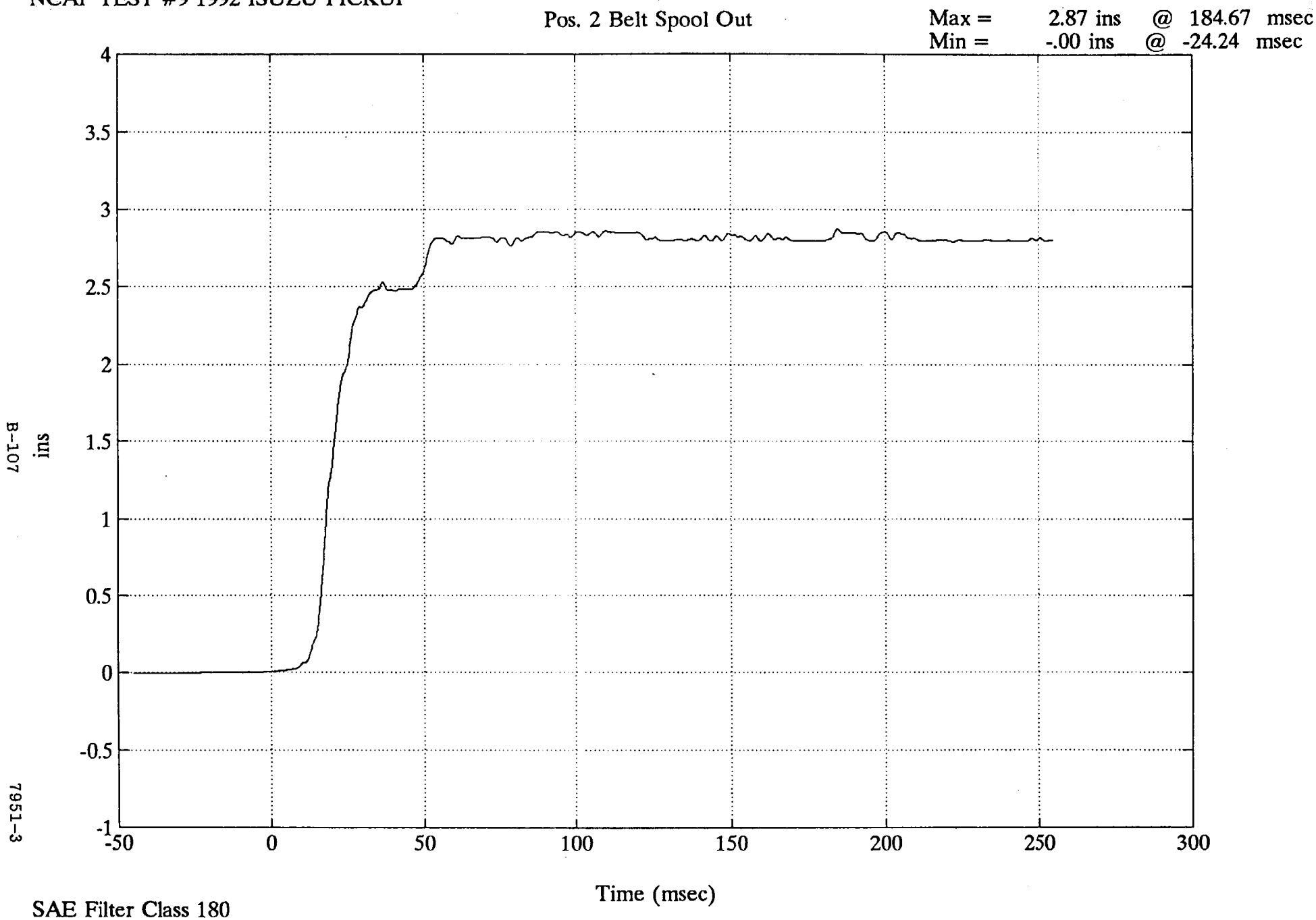
B-106

7951-3

SAE Filter Class 180

Measured over
2.5 inches

NCAP TEST #9 1992 ISUZU PICKUP



B-107

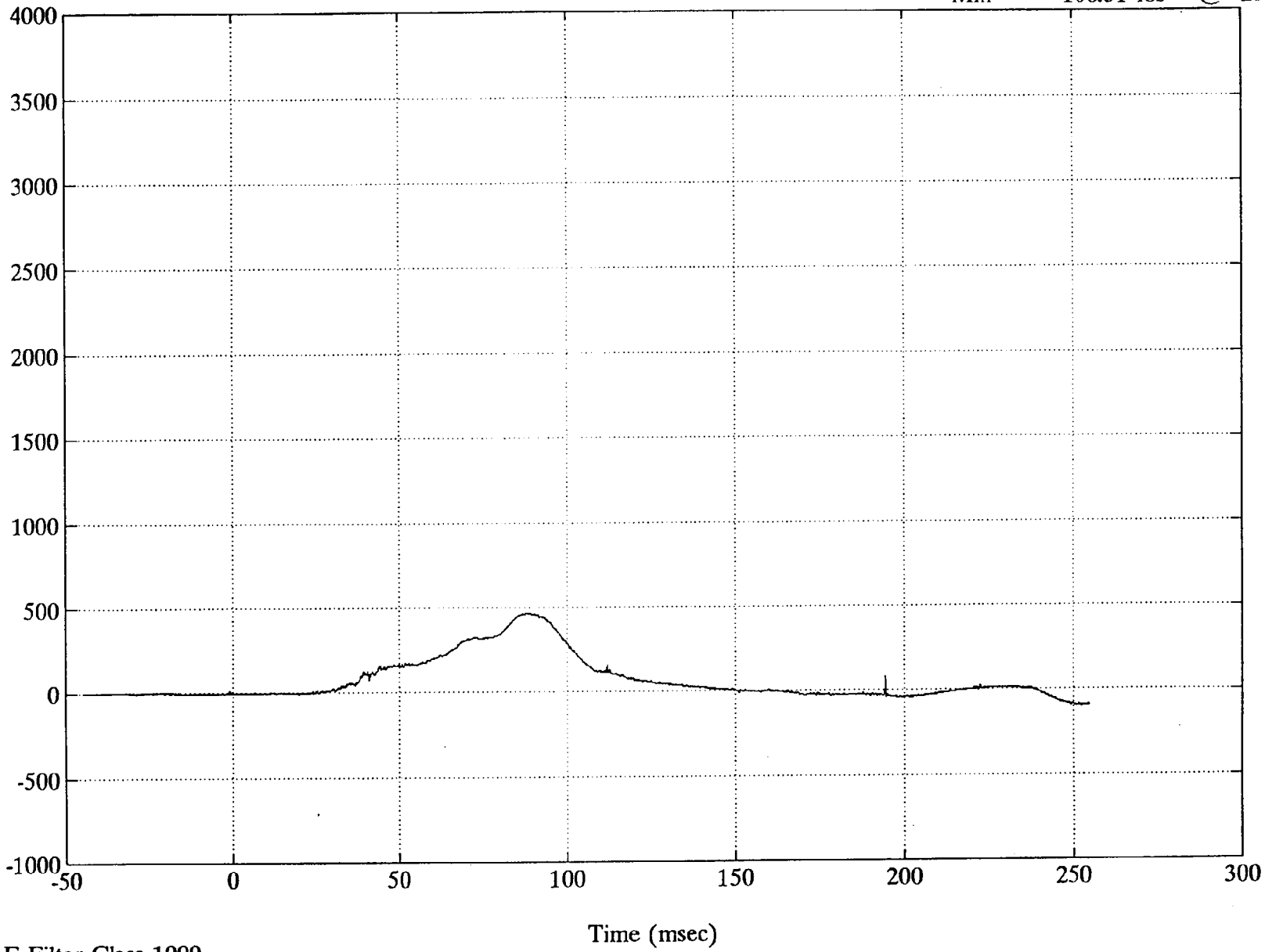
7951-3

SAE Filter Class 180

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 2 Upper Neck Fx

Max = 467.39 lbs @ 87.96 msec
Min = -100.51 lbs @ 252.95 msec



B-108

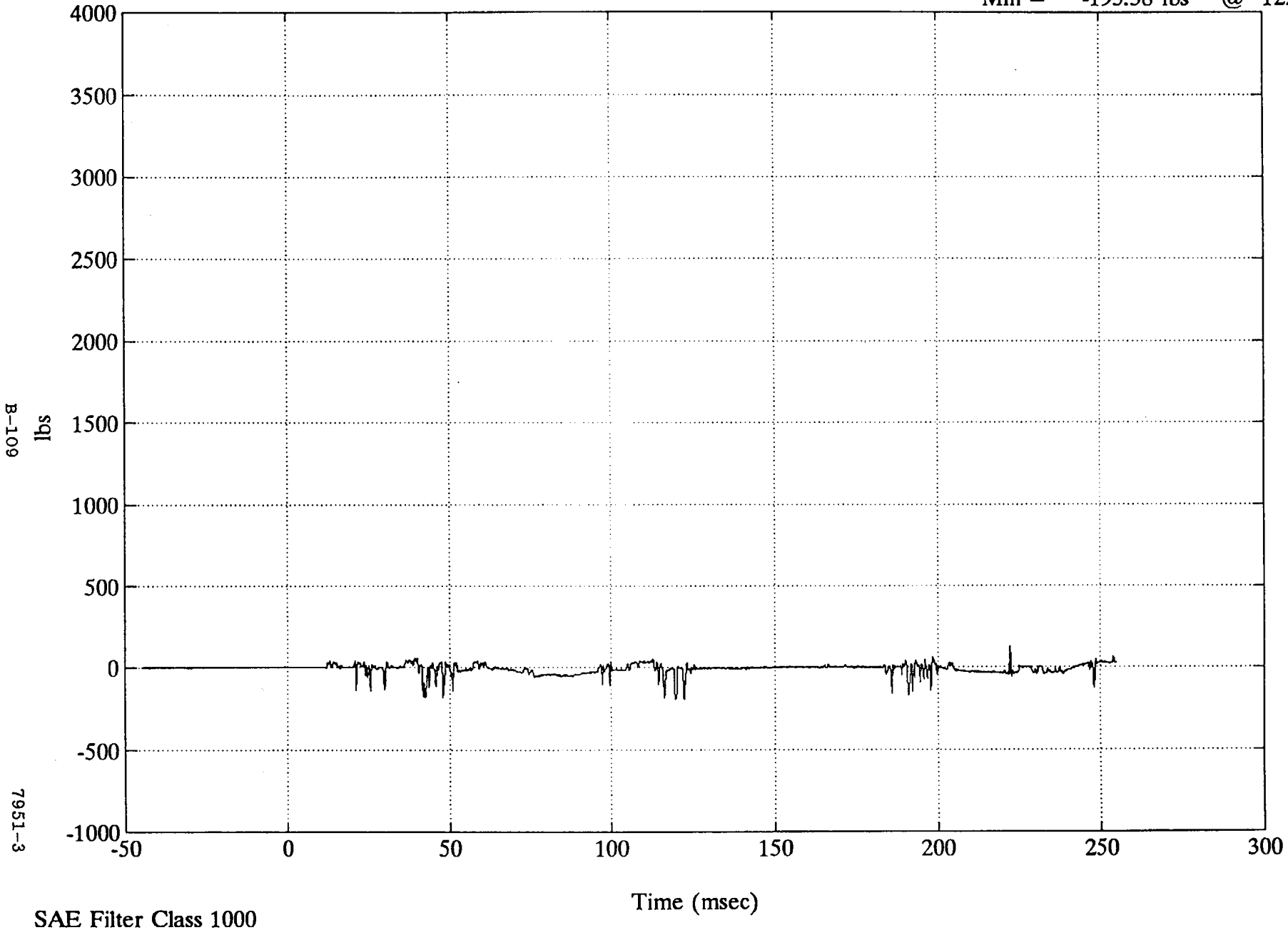
7951-3

SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 2 Upper Neck Fy

Max = 123.00 lbs @ 222.36 msec
Min = -195.38 lbs @ 122.16 msec



B-109

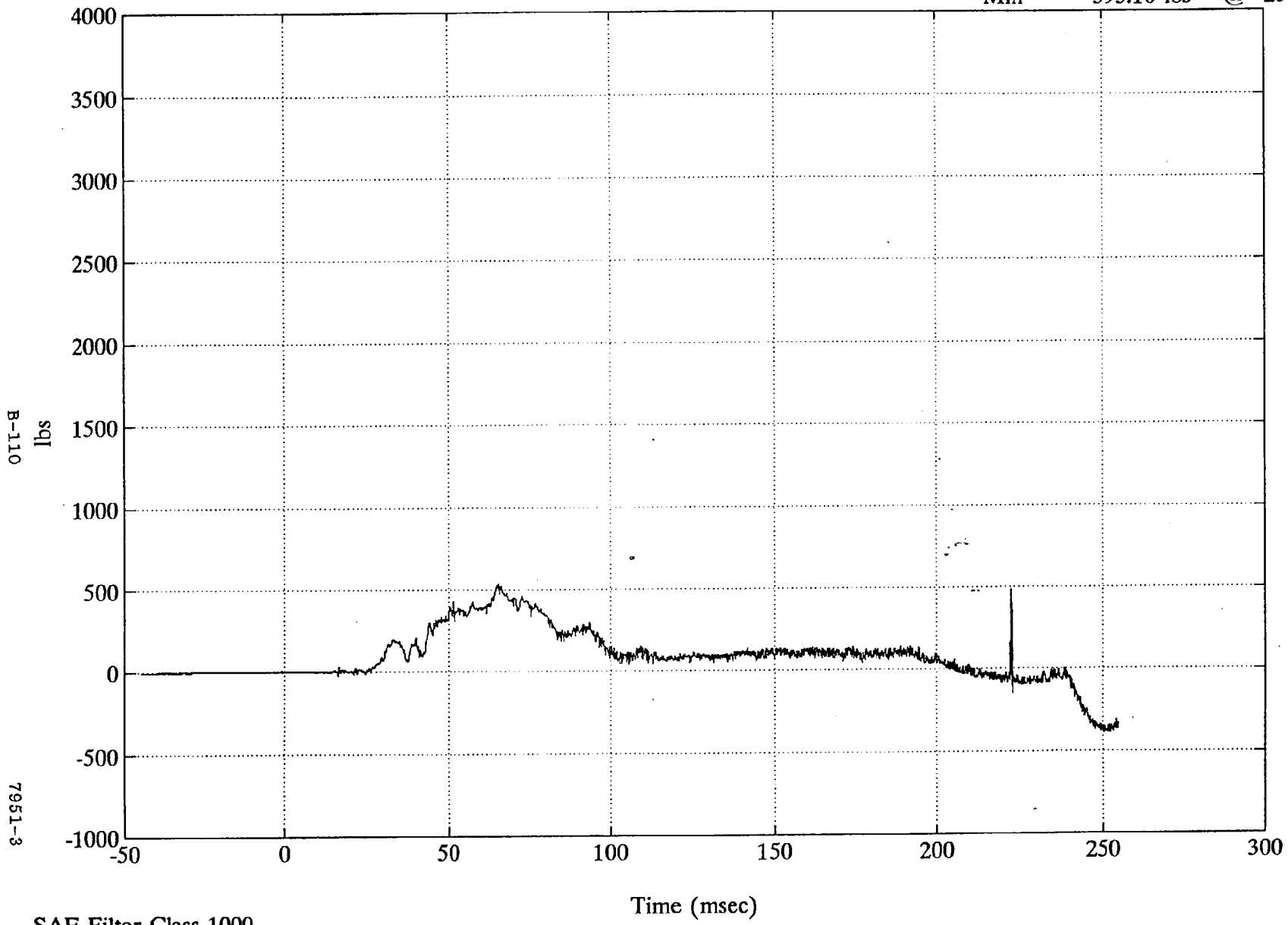
7951-3

SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 2 Upper Neck Fz

Max = 534.46 lbs @ 65.52 msec
Min = -395.10 lbs @ 250.44 msec

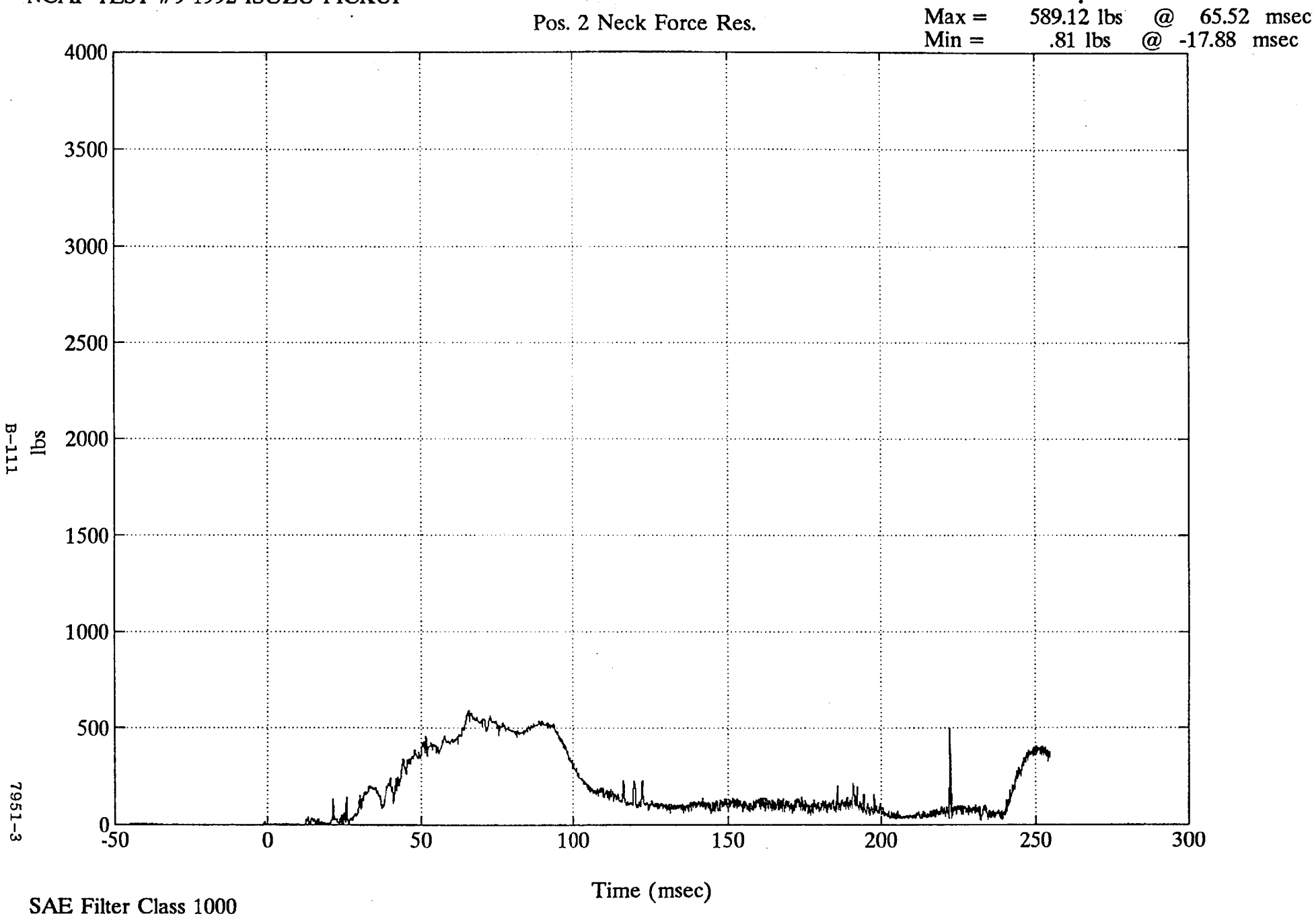


B-110

7951-3

SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP

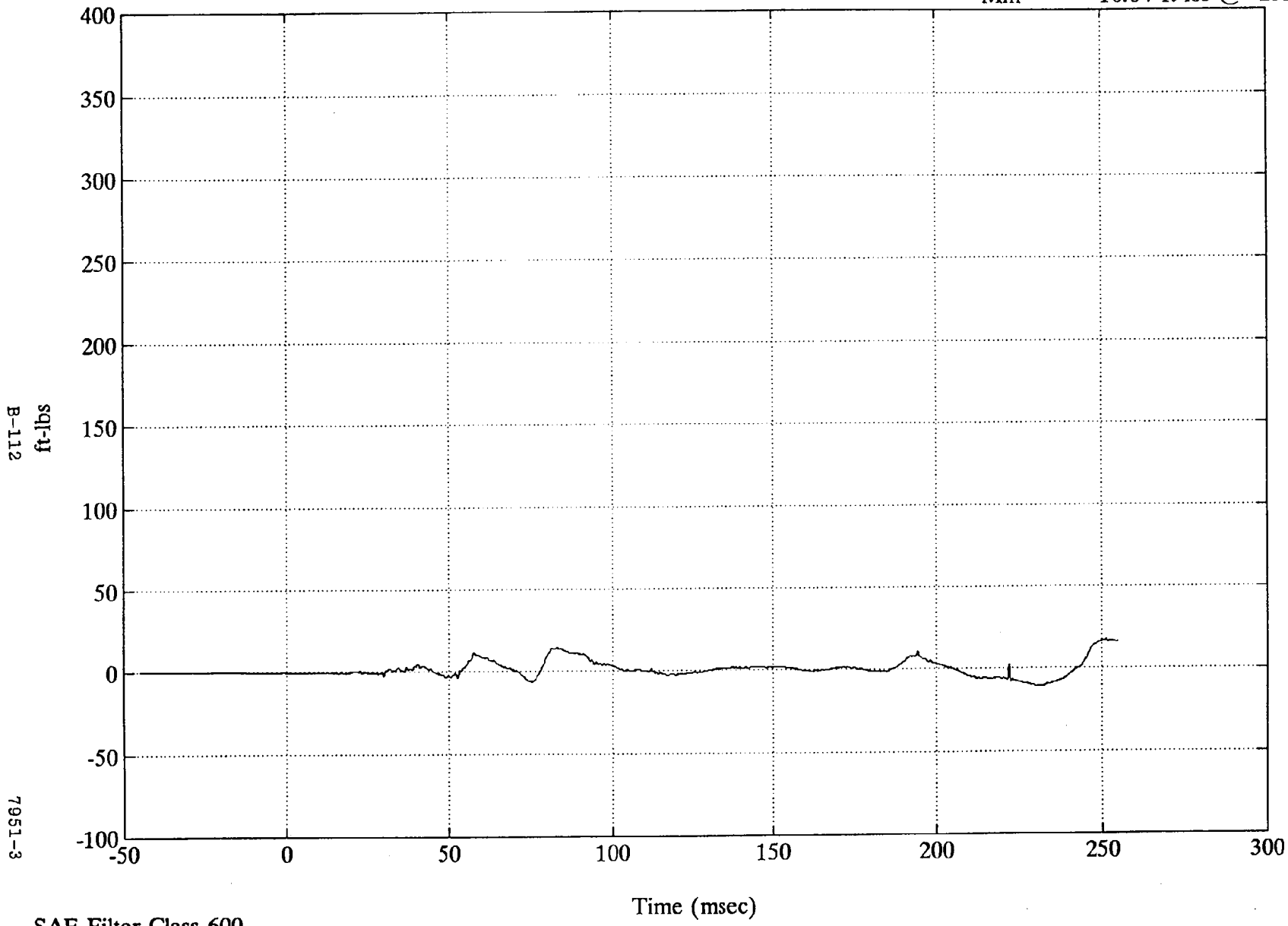


SAE Filter Class 1000

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 2 Upper Neck Mx

Max = 17.36 ft-lbs @ 251.28 msec
Min = -10.64 ft-lbs @ 231.24 msec



B-112

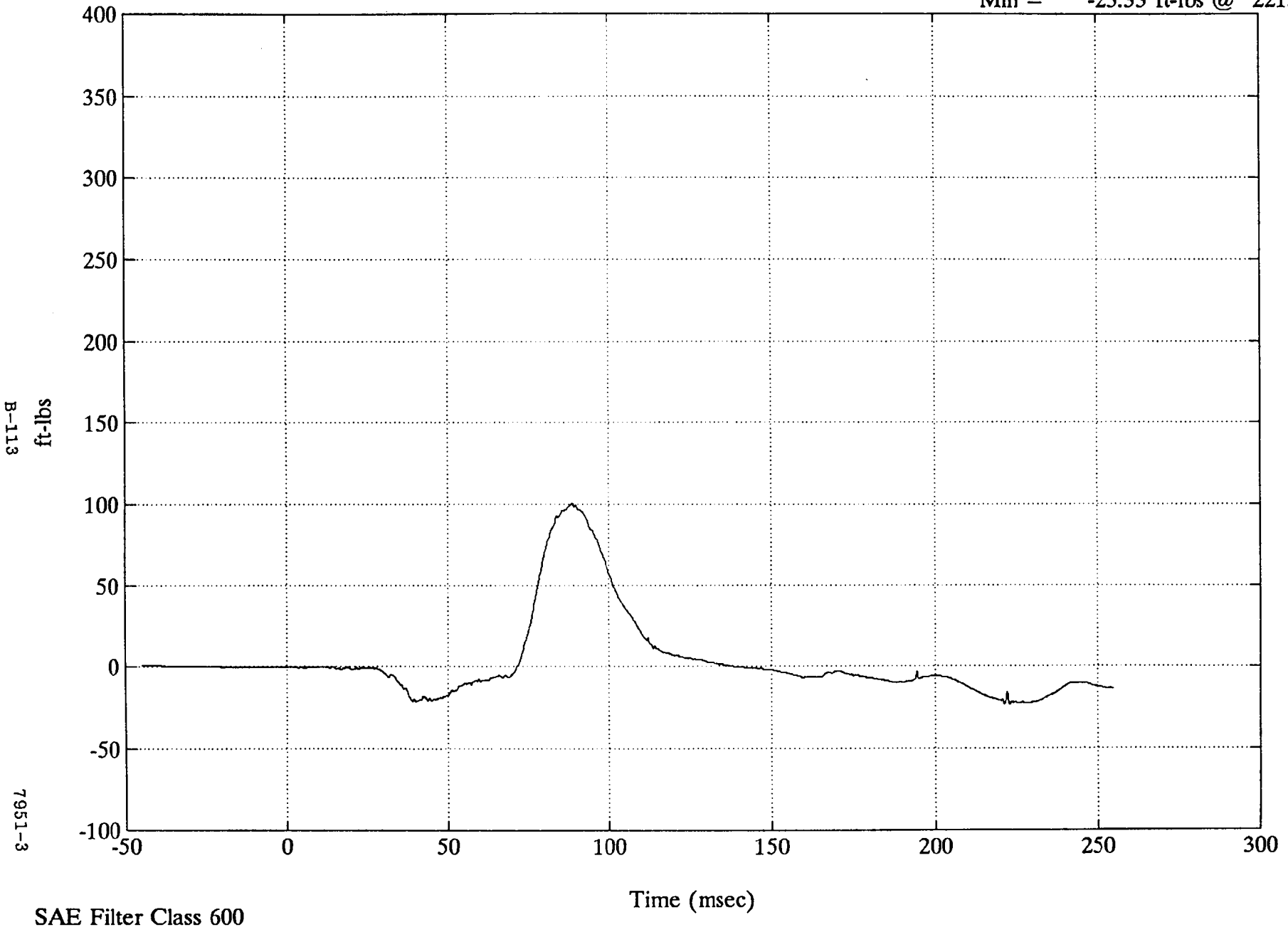
7951-3

SAE Filter Class 600

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 2 Upper Neck My

Max = 100.38 ft-lbs @ 88.31 msec
Min = -23.33 ft-lbs @ 221.40 msec



B-113

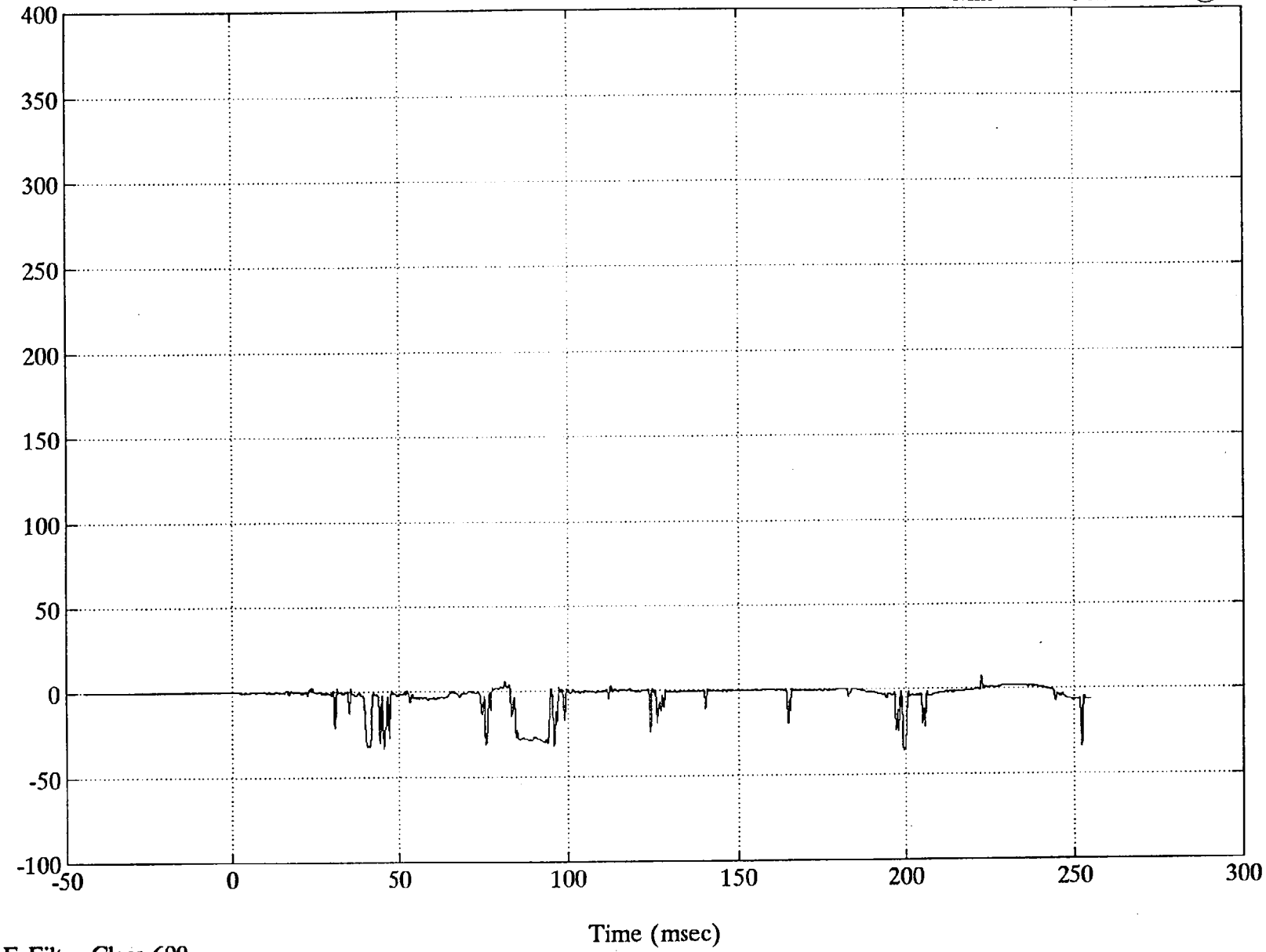
7951-3

SAE Filter Class 600

NCAP TEST #9 1992 ISUZU PICKUP

Pos. 2 Upper Neck Mz

Max = 7.41 ft-lbs @ 222.36 msec
Min = -36.35 ft-lbs @ 199.32 msec

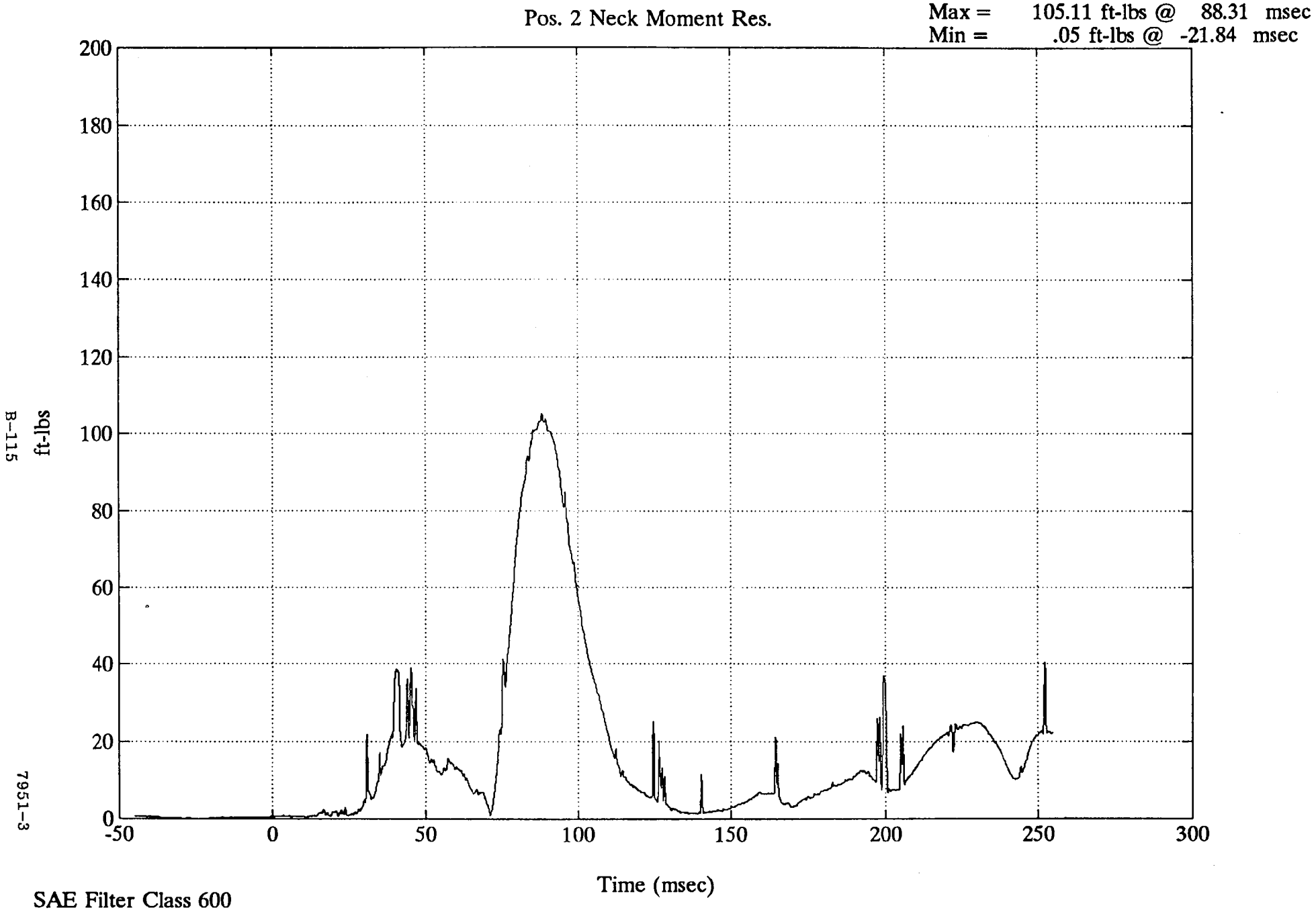


B-114

7951-3

SAE Filter Class 600

NCAP TEST #9 1992 ISUZU PICKUP



SAE Filter Class 600

Appendix C

PART 572E 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:

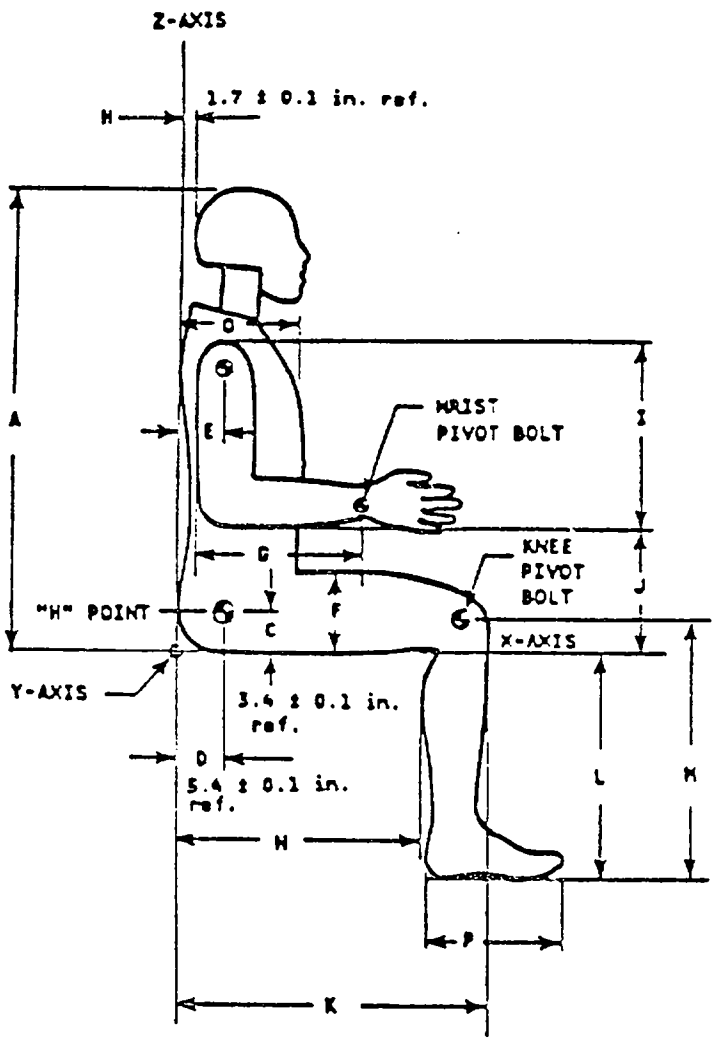
Serial No.	Completion Date
45	11-15-91
150	12-9-91

Electronic Test Equipment

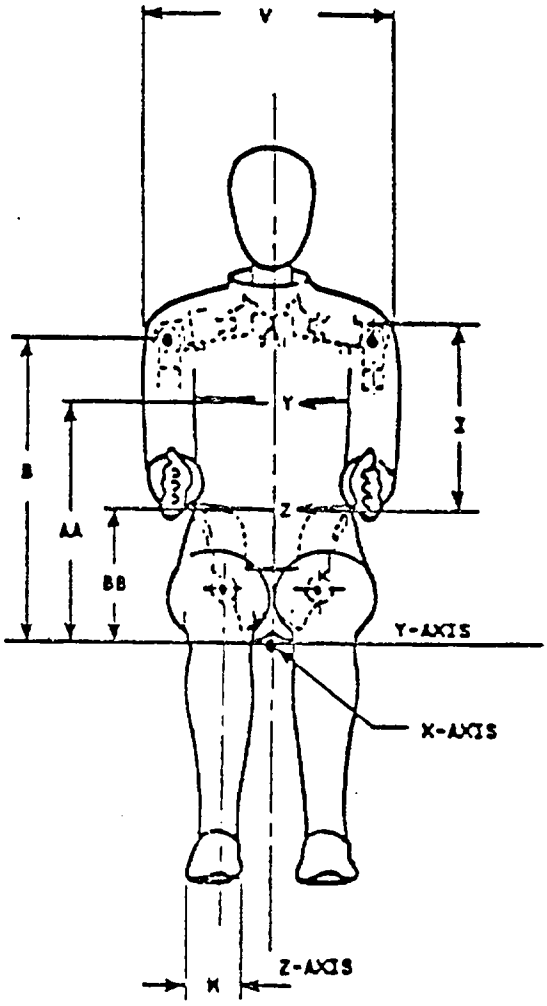
The complement of signal conditioning, recording and display equipment, in conjunction with dummy certification testing, can be found in New Car Assessment and Standards Indicant Testing Final Report No. 6525-V-1.

Figure 10

DUMMY CONFIGURATION DIMENSIONS



SIDE VIEW



FRONT VIEW

Note: Figure is referenced to the erect seated position. The curved lumbar does not allow the Hybrid III to be positioned in a perfect erect attitude.

HYBRID III EXTERNAL DIMENSIONS

S/N HUMANOID

DUMMY SERIAL NO. 45 DATE: 11-15-91

TEMPERATURE		70 DEG. F
RELATIVE HUMIDITY		50 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)	16.9-17.1 IN	17.1 IN
LOCATION FOR WAIST CIRCUMFERENCE (BB)	8.9-9.1 IN	9.0 IN
CHEST CIRCUMFERENCE (Y)	38.2-39.4 IN	38.6 IN
WAIST CIRCUMFERENCE (Z)	32.1-34.1 IN	32.9 IN
CHEST DEPTH (O)	8.4-9.0 IN	8.7 IN
H-POINT HEIGHT (C)	3.3-3.5 IN	3.4 IN
H-POINT FROM SEAT BACK (D)	5.3-5.5 IN	5.4 IN
SKULL CAP TO BACKLINE (H)	1.6-1.8 IN	1.7 IN
TOTAL SITTING HEIGHT (A)	34.6-35.0 IN	34.9 IN
THIGH CLEARANCE (F)	5.5-6.1 IN	5.7 IN
BUTTOCK KNEE LENGTH (K)	22.8-23.8 IN	23.5 IN
BUTTOCK POPLITAL LENGTH (N)	17.8-18.8 IN	18.0 IN
POPLITEAL LENGTH (L)	16.9-17.9 IN	17.4 IN
KNEE PIVOT HEIGHT (M)	19.1-19.7 IN	19.4 IN
FOOT LENGTH (P)	9.9-10.5 IN	10.3 IN
FOOT BREADTH (W)	3.6-4.2 IN	4.1 IN
SHOULDER PIVOT FROM BACKLINE (E)	3.3-3.7 IN	3.5 IN
SHOULDER BREADTH (V)	16.6-17.2 IN	16.8 IN
SHOULDER PIVOT HEIGTH (B)	19.9-20.5 IN	20.1 IN
ELBOW REST HEIGHT (J)	7.5-8.3 IN	8.0 IN
SHOULDER-ELBOW LENGTH (I)	13.0-13.6 IN	13.2 IN
BACK OF ELBOW TO WRIST PIVOT (G)	11.4-12.0 IN	11.8 IN

DUMMY MEETS SPECIFICATIONS

TECHNICIAN: IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

HEAD DROP TEST

HYBRID III

DATE : 11-15-91

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN: 45 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	68 - 78 DEG. F	69 DEG. F
RELATIVE HUMIDITY	10% - 70%	39 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	251.1 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	7.3 G'S
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

NECK FLEXION TEST

HYBRID III

DATE : 11-15-91 6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN: 45 CAL NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	71 DEG. F
RELATIVE HUMIDITY		10% - 70%	38 %
IMPACT VELOCITY		22.60 - 23.40 FPS	22.9 FPS
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	23.31 G'S
	20 MS	17.60 - 22.60 G'S	22.31 G'S
	30 MS	12.50 - 18.50 G'S	17.77 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	17.77 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	39.63 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	76.23 DEG.
	TIME	57 - 64 MS	61 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	65 - 80 FT.-LBS.	77.1 FT.-LBS.
	TIME	47 - 58 MS	54.38 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	121.88 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	99.63 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

NECK EXTENSION TEST

HYBRID III

DATE : 11-15-91 6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN: 45 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	71 DEG. F
RELATIVE HUMIDITY		10% - 70%	38 %
IMPACT VELOCITY		19.50 - 20.30 FPS	20.2 FPS
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G'S	17.23 G'S
	20 MS	14.00 - 19.00 G'S	18.06 G'S
	30 MS	11.00 - 16.00 G'S	15.86 G'S
MAX PENDULUM G'S ABOVE 30 MS		22 G'S MAX	15.86 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		38 - 46 MS	43.88 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	95.16 DEG.
	TIME	72 - 82 MS	75.63 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-59.0/-39.0 FT.-LBS.	-57.03 FT.-LBS.
	TIME	65 - 79 MS	70.25 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	154.13 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	131.63 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

THORAX IMPACT TEST

HYBRID III

DATE : 11-15-91

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN 45 H.S. THORAX CAL

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	71 DEG. F
RELATIVE HUMIDITY	10% - 70%	37 %
PENDULUM VELOCITY	21.6 - 22.4 FT/SEC	21.6 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 INCHES	2.55 INCHES
MAXIMUM RESISTIVE FORCE	1080 - 1245 POUNDS	1228 POUNDS
INTERNAL HYSTERESIS	69% - 85%	69.7 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 11-15-91 KNEE: RIGHT

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN: 45 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	68 - 78 DEG. F	69 DEG. F
RELATIVE HUMIDITY	10% - 70%	44 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	996 - 1566 LBS.	1068 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 11-15-91 KNEE: LEFT

CALSPAN SEQUENTIAL NUMBER 1 HY3 SN: 45 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	68 - 78 DEG. F	69 DEG. F
RELATIVE HUMIDITY	10% - 70%	44 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	996 - 1566 LBS.	1107 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY I.D. NUMBER: 45

A. DUMMY INSTRUMENTS

	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER				
HX LONGITUDINAL	ENDEVCO	CS75	10/91	4/92
HY LATERAL	ENDEVCO	CY89	10/91	4/92
HZ VERTICAL	ENDEVCO	CE76	10/91	4/92
2. CHEST ACCELEROMETER				
CX LONGITUDINAL	CEC	A147	10/91	4/92
CY LATERAL	ENDEVCO	CJ54	10/91	4/92
CZ VERTICAL	CEC	A148	10/91	4/92
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	12/91	6/92
2. TEST PROBE ACCELEROMETER	CEC	A161	12/91	6/92
3. LUMBAR FLEXION TEST PUSH FORCE GAUGE	TRANS-DUCER INC	20051	1/92	7/92
4. ABDOMINAL COMPRESS. TEST FORCE GAUGE	BLH	72952	1/92	7/92
5. ABDOMINAL COMPRESS. TEST FORCE GAUGE	CIC	567-11	1/92	7/92

HYBRID III EXTERNAL DIMENSIONS

S/N HUMANOID

DUMMY SERIAL NO. 150 DATE: 12-9-90

TEMPERATURE		70 DEG. F
RELATIVE HUMIDITY		50 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)	16.9-17.1 IN	17.0 IN
LOCATION FOR WAIST CIRCUMFERENCE (BB)	8.9-9.1 IN	9.0 IN
CHEST CIRCUMFERENCE (Y)	38.2-39.4 IN	38.9 IN
WAIST CIRCUMFERENCE (Z)	32.1-34.1 IN	33.1 IN
CHEST DEPTH (O)	8.4-9.0 IN	8.7 IN
H-POINT HEIGHT (C)	3.3-3.5 IN	3.4 IN
H-POINT FROM SEAT BACK (D)	5.3-5.5 IN	5.5 IN
SKULL CAP TO BACKLINE (H)	1.6-1.8 IN	1.6 IN
TOTAL SITTING HEIGHT (A)	34.6-35.0 IN	34.7 IN
THIGH CLEARANCE (F)	5.5-6.1 IN	5.9 IN
BUTTOCK KNEE LENGTH (K)	22.8-23.8 IN	23.1 IN
BUTTOCK POPLITAL LENGTH (N)	17.8-18.8 IN	18.2 IN
POPLITEAL LENGTH (L)	16.9-17.9 IN	17.5 IN
KNEE PIVOT HEIGHT (M)	19.1-19.7 IN	19.4 IN
FOOT LENGTH (P)	9.9-10.5 IN	10.1 IN
FOOT BREADTH (W)	3.6-4.2 IN	4.1 IN
SHOULDER PIVOT FROM BACKLINE (E)	3.3-3.7 IN	3.5 IN
SHOULDER BREADTH (V)	16.6-17.2 IN	16.7 IN
SHOULDER PIVOT HEIGTH (B)	19.9-20.5 IN	20.1 IN
ELBOW REST HEIGHT (J)	7.5-8.3 IN	8.2 IN
SHOULDER-ELBOW LENGTH (I)	13.0-13.6 IN	13.4 IN
BACK OF ELBOW TO WRIST PIVOT (G)	11.4-12.0 IN	11.8 IN

DUMMY MEETS SPECIFICATIONS

TECHNICIAN: IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

HEAD DROP TEST

HYBRID III

DATE : 12/5/91

CALSPAN SEQUENTIAL NUMBER 2 HY3 SN: 150 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	68 - 78 DEG. F	69 DEG. F
RELATIVE HUMIDITY	10% - 70%	27 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	268 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	2.7 G'S
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

NECK FLEXION TEST

HYBRID III

DATE : 12/9/91 6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 2 HY3 SN:150 CAL NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	69 DEG. F
RELATIVE HUMIDITY		10% - 70%	42 %
IMPACT VELOCITY		22.60 - 23.40 FPS	22.8 FPS
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	24.76 G'S
	20 MS	17.60 - 22.60 G'S	22.19 G'S
	30 MS	12.50 - 18.50 G'S	17.93 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	17.93 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	41.0 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	74.22 DEG.
	TIME	57 - 64 MS	58.5 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	65 - 80 FT.-LBS.	74.56 FT.-LBS.
	TIME	47 - 58 MS	54.25 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	113.88 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	100.0 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

NECK EXTENSION TEST

HYBRID III

DATE : 12/9/91 6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 2 HY3 SN:150 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	69 DEG. F
RELATIVE HUMIDITY		10% - 70%	40 %
IMPACT VELOCITY		19.50 - 20.30 FPS	20.2 FPS
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G'S	18.96 G'S
	20 MS	14.00 - 19.00 G'S	18.12 G'S
	30 MS	11.00 - 16.00 G'S	14.66 G'S
MAX PENDULUM G'S ABOVE 30 MS		22 G'S MAX	14.66 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		38 - 46 MS	45.25 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	97.48 DEG.
	TIME	72 - 82 MS	73.25 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-59.0/-39.0 FT.-LBS.	-58.77 FT.-LBS.
	TIME	65 - 79 MS	68.63 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	147.25 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	131.25 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

THORAX IMPACT TEST

HYBRID III

DATE : 12/3/91

CALSPAN SEQUENTIAL NUMBER 2 HY3 SN 150 H.S. THORAX CAL

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	69 DEG. F
RELATIVE HUMIDITY	10% - 70%	36 %
PENDULUM VELOCITY	21.6 - 22.4 FT/SEC	21.6 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 INCHES	2.57 INCHES
MAXIMUM RESISTIVE FORCE	1080 - 1245 POUNDS	1226 POUNDS
INTERNAL HYSTERESIS	69% - 85%	72.7 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 12/9/91 KNEE: RIGHT

CALSPAN SEQUENTIAL NUMBER 2 HY3 SN: 150 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	68 - 78 DEG. F	69 DEG. F
RELATIVE HUMIDITY	10% - 70%	40 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	996 - 1566 LBS.	1129 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION

TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 12/9/91 KNEE: LEFT

CALSPAN SEQUENTIAL NUMBER 2 HY3 SN: 150 KNEE 11LB. CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	68 - 78 DEG. F	69 DEG. F
RELATIVE HUMIDITY	10% - 70%	40 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	7.0 FT/SEC
PEAK KNEE IMPACT FORCE	996 - 1566 LBS.	1067 LBS.
PROBE WEIGHT	11 LBS.	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY I.D. NUMBER: 150

A. DUMMY INSTRUMENTS

	MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
1. HEAD ACCELEROMETER				
HX LONGITUDINAL	ENDEVCO	ER72	10/91	4/92
HY LATERAL	ENDEVCO	GD54	10/91	4/92
HZ VERTICAL	ENDEVCO	CK11	10/91	4/92
2. CHEST ACCELEROMETER				
CX LONGITUDINAL	CEC	A145	10/91	4/92
CY LATERAL	ENDEVCO	FL04	10/91	4/92
CZ VERTICAL	CEC	A149	10/91	4/92
3. FEMUR LOAD CELLS				
LEFT SIDE	GSE	548	11/91	5/92
RIGHT SIDE	GSE	549	11/91	5/92

B. CALIBRATION LABORATORY INSTRUMENTS

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

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	C575	ENDEVCO	10/91	4/92
Y	CY89	ENDEVCO	10/91	4/92
Z	CE76	ENDEVCO	10/91	4/92
Chest X	A147	CEC	10/91	4/92
Y	CJ54	ENDEVCO	10/91	4/92
Z	A148	CEC	10/91	4/92
Right Femur Load Cell	312	GSE	11/91	5/92
Left Femur Load Cell	311	GSE	11/91	5/92
Neck Load Cell X	269	DENTON	6/91	12/91
Y	269	DENTON	6/91	12/91
Z	269	DENTON	6/91	12/91
Neck Moment X	269	DENTON	6/91	12/91
Y	269	DENTON	6/91	12/91
Z	269	DENTON	6/91	12/91
Chest Deflection Gauge Hybrid III Use Only	45	HUMANOID	10/91	4/92
Lap Belt Load Cells	123	LEBOW	11/91	5/92
Shoulder Belt Load Cells	127	LEBOW	11/91	5/92
Spool-Out Potentiometer	22	SERVONIC INST.	10/91	4/92
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	ER72	ENDEVCO	10/91	4/92
Y	CD54	ENDEVCO	10/91	4/92
Z	CK11	ENDEVCO	10/91	4/92
Chest X	A145	CEC	10/91	4/92
Y	FL04	ENDEVCO	10/91	4/92
Z	A149	CEC	10/91	4/92
Right Femur Load Cell	549	GSE	11/91	5/92
Left Femur Load Cell	548	GSE	11/91	5/92
Neck Load Cell X	076	DENTON	7/91	1/92
Y	076	DENTON	7/91	1/92
Z	076	DENTON	7/91	1/92
Neck Moment X	076	DENTON	7/91	1/92
Y	076	DENTON	7/91	1/92
Z	076	DENTON	7/91	1/92
Chest Deflection Gauge	150	HUMANOID	10/91	4/92
Hybrid III Use Only				
Lap Belt Load Cells	133	LEBOW	11/91	5/92
Shoulder Belt Load Cells	135	LEBOW	11/91	5/92
Spool-Out Potentiometer	32	SERVONIC INST.	10/91	4/92
Belt Stretch Transducer	E3	CALSPAN	10/91	4/92

INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS
(6 Month Calibration Minimum)

	Serial #	Manufacturer	Calibration Last	Calibration Next
Left Seat Rear Crossmember	A144	CEC	10/91	4/92
Right Rear Seat Crossmember	A186	CEC	9/91	3/92
Top of Engine	A115	CEC	11/91	5/92
Bottom of Engine	A181	CEC	10/91	4/92
Left Disc Brake Caliper	A52	CEC	10/91	4/92
Right Disc Brake Caliper	A187	CEC	9/91	3/92
Instrument Panel	A164	CEC	10/91	4/92
Center Rear Crossmember Z	A177	CEC	10/91	4/92
Vehicle Rear Z	A188	CEC	11/91	5/92

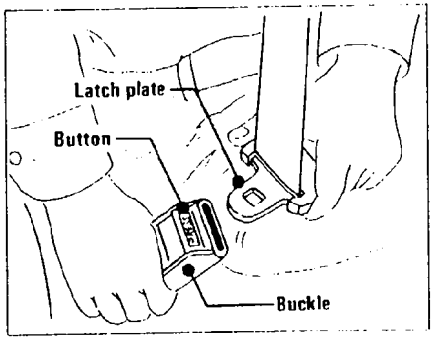
INSTRUMENT CALIBRATION FOR LABORATORY INSTRUMENTS
(6 Month Calibration Minimum)

	Serial #	Manufacturer	Calibration	
			Last	Next
Neck Bending Pendulum Accel.	A160	CEC	12/91	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

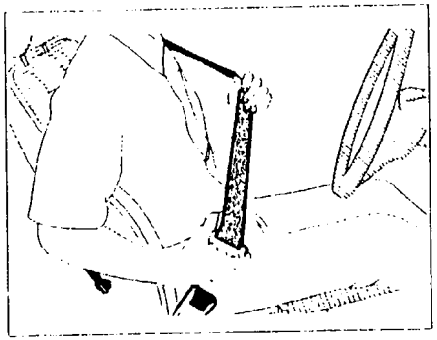
VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

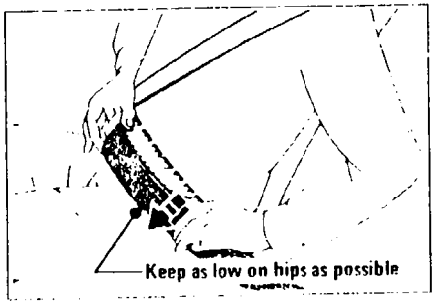
G FRONT SEAT LAP/ SHOULDER BELT



To lessen the chance of injury and/or the severity of injury in accidents or sudden stops, driver and passengers should be properly restrained at all times, using the seat belts provided. (See the following pages for the use of restraints by children and pregnant women.) A seat belt is provided at each position designed for occupant seating. Thus, the seat in this vehicle is equipped with seat belts for two (bucket seat) or three occupants (bench seat).

- Adjust the front seat as needed and sit up straight and well back in the seat.
- Take hold of the seat belt latch plate and pull the lap/shoulder belt webbing across the body. At the same time, slide the latch plate along the belt until it reaches the buckle. Push the latch plate into the buckle until it clicks.





- Position the "lap" portion of the belt across the lap as LOW ON THE HIPS as possible. Then, adjust to a SNUG FIT by holding the "shoulder" portion of the front seat belt and pulling it UPWARD through the latch plate until the lap portion is snug across the lap. This reduces the risk of sliding under the belt during an accident.

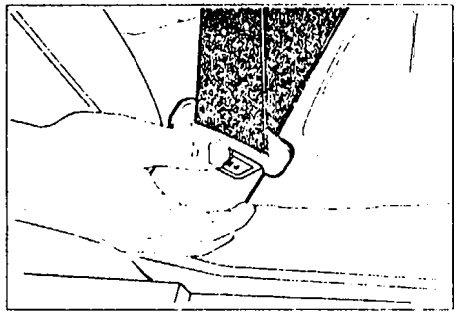
WARNING

- *A snug fit with the lap belt positioned low on the hips is necessary to lessen the chance of injury and/or the degree of injury in an accident. This spreads the force of the lap belt over the hip bone instead of across the abdomen.*
- *Never use the same seat belt for more than one person at a time. A seat belt worn by more than one person will not provide adequate protection in the event of a collision.*
- *Never wear twisted seat belts.*
- *Be very careful not to damage seat belts or seat belt buckles by pinching them in the seat or the door.*
- *Too much slack could increase the amount of injury because the belt would not be able to properly restrain you in an accident. DO NOT wear shoulder belt under the arm or out of position. Such use*

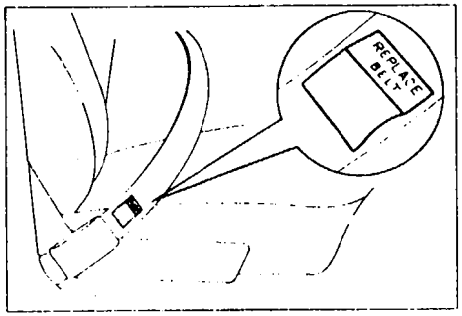
could increase the chance of injury and/or the degree of injury in an accident.

NOTE

- *The retractor will lock the belt only during a sudden stop or on impact.*
- *At other times you can move around freely.*



To unfasten the belts, push in the button at the top of the buckle.
When no longer in use, seat belts can be stowed by letting them rewind into their retractors.

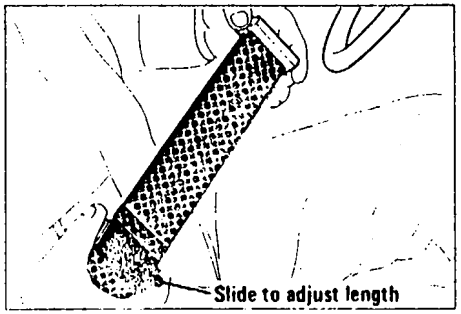


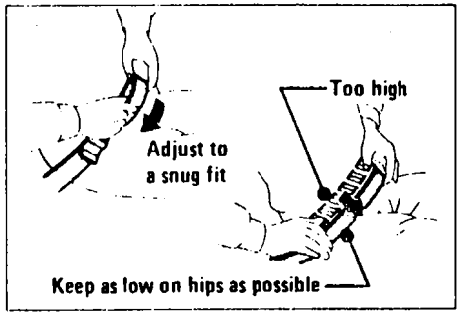
- Replace the seat belt if the warning label under the sleeve can be seen. The warning label "REPLACE BELT" will appear if the belt receives a severe impact or other force.

CENTER SEAT BELT (Bench seat and Jump seat only)

- To lengthen a lap belt, place the latch plate at right angles to the belt webbing and pull on the latch plate: the belt should then slide easily through the latch plate.

Remove excess length of the belt and adjust the belt position.
To shorten the belt, pull the free end of the belt.





NOTE

Position the lap belt as low as possible on your hips – not on your waist, then adjust it to a snug fit. Failure to do so could increase the chance of injury due to sliding under the lap belt during an accident.