V1868

REPORT NUMBER: CAL-92-02

OFFICE OF MARKET INCENTIVES
SIDE IMPACT PROTECTION STUDY
PASSENGER CARS

1992 FORD CROWN VICTORIA
4-DOOR SEDAN

NHTSA NUMBER: MN0206

CALSPAN TEST NUMBER: 8017-2

CALSPAN CORPORATION
ADVANCED TECHNOLOGY CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225

AUGUST 18, 1992

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION
RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION
VOLPE NATIONAL TRANSPORTATION SYSTEMS CENTER
KENDALL SQUARE
CAMBRIDGE, MA 02142

This Test Report was prepared for the U.S. Department of Transportation, Research and Special Programs Administration, under Contract No. DTRS57-90-C-00104.

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Final Report - Side Impact Testing of a 1992 Ford Crown Victoria 4-Door Sedan NHTSA No. MN0206	August 18, 1992
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9. Performing Organization Name and Address: Calspan Corporation Advanced Technology Center, P.O. Box 400, Buffalo, New York 14225	10. Work Unit No.: Y45-2-1206
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16. Abstract

A 34/17 mph 90° Impact (Moving Deformable Barrier) Test was conducted on the subject 1992 Ford Crown Victoria 4-Door Sedan in accordance with the specifications of the Office of Market Incentives Test Procedure. The test was conducted at the Calspan Corporation Advanced Technology Center Crash Test Facility in Buffalo, New York, on August 18, 1992.

The impact velocity of the Moving Deformable Barrier (MDB) was 37.9 mph, and the ambient temperature at the struck side (driver's) of the target vehicle at the time of impact was 75°F. The target vehicle post-test maximum crush was 17.2 inches at level 3.

The test or target vehicle's performance is given below:

	Driver SID	Left Rear SID
Left Upper Rib Acceleration	50.013 g's	48.135 g's
Left Lower Rib Acceleration	58.098 g's	57.966 0g's
Lower Spine Acceleration	80.907 g's	42.415 g's
Thoracic Trauma Index (TTI)	70	50
Pelvis Acceleration	91.923 g's	93.933 g's

The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during side impact event.

17. Key Words	18. Distribution Statement
OMI Side Impact Protection Study Side Impact Dummy (SID)	Copies of this report are available from: National Highway Traffic Safety Admin. Technical Reference Division Docket Section, Room 5108 400 Seventh St., S.W., Washington, DC 20590

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Section 1

PURPOSE AND TEST PROCEDURE

This side impact test is part of the Composite FY92 Side Impact Protection Study Program sponsored by the National Highway Traffic Safety Administration (NHTSA) through the Research and Special Programs Administration, Volpe National Transportation Systems Center under Contract No. DTRS57-90-C-00104. The purpose of this test was to evaluate side impact protection in a 1992 Ford Crown Victoria.

The side impact test was conducted in accordance with the Office of Market Incentive (OMI) Laboratory Indicant Test Procedure.

Section 2

SUMMARY OF SIDE IMPACT TEST Y45-2-1206

A stationary 1992 Ford Crown Victoria 4-Door Sedan was impacted on the left or driver's side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the monorail at a velocity of 37.9 mph on August 18, 1992. The orientation angle of the striking vehicle was 90° counterclockwise with respect to the longitudinal axis of the struck vehicle. Pre- and post-test photographs of the test vehicle, the moving deformable barrier (MDB), and the side impact dummies (SIDs) are shown in Appendix A.

Two restrained Side Impact Dummies (SIDs) were placed in the driver (Pos. #1) and left rear (Pos. #4) designated seating positions according to instructions specified in the OMI Side Impact Protection Laboratory Test Procedure which is dated December 1991. The side impact event was documented by ten high speed cameras. Camera locations and other pertinent camera information can be found in this report.

The SIDs were instrumented with the following accelerometers.

1. Left Upper Rib (LUR) uniaxial accelerometer (Y-direction)
2. Left Lower Rib (LLR) uniaxial accelerometer (Y-direction)
3. Lower Thoracic Spine (T_{12}) uniaxial accelerometer (Y-direction)
4. Head assembly triaxial accelerometer (X,Y,Z-directions)
5. Pelvic (PEV) section uniaxial accelerometer (Y-direction)

A summary of the side impact dummy (SID) configuration and performance verification test data can be found in Appendix C.

A total of 49 channels of data were recorded. Appendix B contains the vehicle and dummy response data traces.

The driver's HIC was 83 and a Thoracic Trauma Index (TTI) of 70 g's. Maximum pelvic Y acceleration was 91.9 g's.

The left rear passenger's HIC was 481 and a TTI of 50 g's. Maximum pelvic Y acceleration was 93.9 g's.

Section 3

SUMMARY OF TEST RESULTS

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 92 Ford Crown Victoria

Vehicle NHTSA No.: MN0206 VIN: 2FACP73W9NX211441

Vehicle Body Color: Red Month & Year of Manufacture: 03/92

Engine Data: 8 cylinders; ____ CID; 4.6 Liters; ____ cc

Placement ✓ Longitudinal; or ____ Lateral

Transmission: ____ speed; ____ Manual; ✓ Automatic; ✓ Overdrive

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

Odometer Reading 10 miles

Options: ✓ A/C; ✓ Power Steering.; ✓ Pwr. Brakes; ✓ Pwr. Windows

DATA FROM TIRE PLACARD:

Tire Pressure (at capacity): 30 psi FRONT

34 psi REAR

Recommended Tire Size: P215/70R15

Tires on Test Vehicle: P215/70R15 ; Manufacturer: Michelin

Vehicle Capacity Data:

Number of Occupants: 3 Front; 3 Rear; ____ 3rd Seat 6 Total

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

Type of Front Seat Back: ____ Fixed; ✓ Adjustable with ✓ Lever

Vehicle Maximum Capacity Loading = 1100 lbs. (A)

No. of Occupants x 150 lbs. = 900 lbs. (B)

Cargo Capacity (A-B) = 200 lbs.

WEIGHT OF TEST VEHICLE WITH MAXIMUM FLUIDS:

Right Front = 1080 lbs. Right Rear = 870 lbs.

Left Front = 1100 lbs. Left Rear = 870 lbs.

TOTAL FRONT = 2180 lbs. TOTAL REAR = 1740 lbs.

% of Total Vehicle Weight = 55.6 %; % of Total Weight = 44.4 %

TOTAL WEIGHT = 3920 lbs.

Table 2

TEST VEHICLE DATA

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Maximum Fluids	=	3920 lbs.
Maximum Cargo Carrying Capacity of Test Vehicle	=	200 lbs.
Weight of 2 Side Impact Dummies (2 x 168 lbs.)	=	336 lbs.
TEST VEHICLE TARGET WEIGHT:	=	4456 lbs.

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO:

Right Front	= 1100 lbs.	Right Rear	= 1090 lbs.
Left Front	= 1160 lbs.	Left Rear	= 1100 lbs.
TOTAL FRONT	= 2260 lbs.	TOTAL REAR	= 2190 lbs.
% of Total Weight	= 50.8 %	% of Total Weight	= 49.2 %

TOTAL TEST WEIGHT = 4450 lbs.

TEST VEHICLE ATTITUDE (all dimensions in inches):

AS DELIVERED:

right front 28.9 left front 29.0 right rear 28.9 left rear 29.0

READY FOR TEST:

right front 28.7 left front 28.6 right rear 27.6 left rear 27.2

Test Vehicle Wheelbase: 114.5 inches

C.G. = 56.3 inches rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side = 208.3 inches

Left Side = 211.8 inches

Centerline = 208.3 inches

Figure 1

PRE-TEST CONDITIONS

VEHICLE IDENTIFICATION:

Vehicle: 1882 Ford Crown Victoria 4-Door Sedan

NHTSA No. MN0206

FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel: 9.1 inches

Total Number of Adjustment Positions or Detents: 19

FRONT SEAT BACK ADJUSTMENT POSITION: 1 latch position rearward of full upright

Seat Back Torso Angle = 23 degrees

SECOND POSITION SEAT:

Total Length of Fore/Aft Adjustment Travel: not adjustable inches

Seat Back Adjustment Position: not adjustable

ADJUSTABLE STEERING COLUMN POSITION:

WINDOW POSITIONS: Left Front closed Left Rear closed
Right Front open Right Rear open
Note: Windows will be in closed position on struck side of test vehicle and in open position on opposite side.

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

12 gallons

LOCATION OF IMPACT POINT ON TEST VEHICLE SIDE TO BE IMPACTED:

Wheelbase: = 114.5 inches

Impact Point is 20.3 inches rearward of front axle centerline (which is 37 inches forward of the wheelbase midpoint)

Table 3

CRASH TEST SUMMARY FOR TEST VEHICLE

VEHICLE IDENTIFICATION:

Vehicle Year/Make/Model: 1992 Ford Crown Victoria

Body Style: 4-door sedan VIN: 2FACP73W9NX211441

NHTSA No.: MN0206 Test Date: August 18, 1992

Overall Length = 211.8 inches; Overall Width = 77.8 inches

TEST WEIGHT:

Left Front =	1160 lbs.	Left Rear =	1100 lbs.
Right Front =	1100 lbs.	Right Rear =	1090 lbs.
TOTAL FRONT =	2260 lbs.	TOTAL REAR =	2190 lbs.

TOTAL VEHICLE WEIGHT 4450 lbs.

Wheelbase = 114.5 inches

Longitudinal C.G. from Center of Front Axle = 56.3 inches

Impact Angle with Respect to Impactor = 90 degrees

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (12.5 in. above ground) = 10.9 inches
2. LEVEL 2 (22.3 in. above ground) = 17.2 inches
3. LEVEL 3 (25.3 in. above ground) = 16.5 inches
4. LEVEL 4 (38.5 in. above ground) = 14.4 inches
5. LEVEL 5 (53.3 in. above ground) = 8.3 inches

Maximum Post-Test Intrusion = 17.2 inches

OCCUPANTS:	Front Passenger	Rear Passenger
Type of Dummy	SID	SID
Restraints Used	3-point manual seat belt	3-point manual seat belt

INSTRUMENTATION:

Number of Vehicle Data Channels: = 49

Number of Cameras: Onboard = 3

Offboard = 7

TOTAL = 10

Table 4

CRASH TEST SUMMARY FOR SIDE IMPACTOR

POSITION OF IMPACT (MDB) ON MONORAIL:

Crabbed 27° to left

MDB DETAILS:

Overall Width of Framework Carriage	=	49.25 inches
Overall Length of MDB (incl. honeycomb impact face)	=	162 inches
Wheelbase of Framework Carriage	=	102 inches
Tread of Framework Carriage (Front & Rear)	=	74 inches
C.G. Location Rearward of Front Axle	=	39.6 inches

MDB WEIGHT:

Left Front	=	990 lbs.	Left Rear	=	510 lbs.
Right Front	=	840 lbs.	Right Rear	=	620 lbs.
TOTAL FRONT	=	1830 lbs.	TOTAL REAR	=	1130 lbs.

TOTAL MDB WEIGHT 2960 lbs.

Impact Angle (MDB C/L to Target Vehicle C/L) = 90° degrees

Impact Speed = 37.9 mph

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

1. Row A at Bumper Level	=	6.8 inches
2. Row B at Mid-Stack Level	=	3.9 inches
3. Row C at Top of Stack Level	=	5.4 inches

INSTRUMENTATION:

Number of MDB Data Channels = 5

Table 5

POST-TEST OBSERVATIONS

TEST VEHICLE: 1992 Ford Crown Victoria NHTSA No. MN0206

VISIBLE DUMMY CONTACT POINTS:

	LEFT FRONT SID	LEFT REAR SID
Head	torso belt	left "C" pillar
Chest	left front door	left rear door
Abdomen	arm rest	arm rest
Left Knee	left front door	left rear door
Right Knee	-	-

DOOR OPENING:

	LEFT SIDE	RIGHT SIDE
Front	closed	closed
Rear	closed	closed

MDB DISTANCE FROM TARGET IMPACT POINT: 0.1" forward

ARM REST LOCATIONS:

Front: contacted abdomen

Rear: contacted abdomen

SEAT MOVEMENT:

left front in board arm rest fell down into position during test

GLAZING DAMAGE:

windshield cracked, left side door windows broken

PILLAR FAILURE:

none

SILL SEPARATION:

none

OTHER NOTABLE IMPACT EFFECTS:

None

Section 4

OCCUPANT AND VEHICLE INFORMATION

Table 6

SIDE IMPACT DUMMY (SID) TEST DATA SUMMARY

Vehicle: 1992 Ford Crown Victoria Test Date: August 18, 1992

	Front Dummy ID #171				Rear Dummy ID #186			
	Pos. Direct.		Neg. Direct		Pos. Direct.		Neg. Direct	
	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
HEAD ACCELERATIONS:								
Longitudinal X	8	184	-13	81	21	65	-36	59
Lateral ..... Y	34	48	-10	178	149	56	-8	46
Vertical ..... Z	21	171	-8	38	20	56	*	
RESULTANT ..... R	36	49			*			
HIC	83				481	**		
RIB ACCELERATIONS:								
Upper Rib Lateral .... Y	50	39	-9	94	48	45	-5	141
Upper Rib Lateral .. Y(R)	57	39	-12	94	45	46	-5	149
Lower Rib Lateral .... Y	58	40	-7	95	58	44	-9	88
Lower Rib Lateral .. Y(R)	63	39	-17	95	53	44	-9	96
SPINE ACCELERATIONS:								
Lower Lateral ..... Y	81	42	-18	99	42	44	-19	69
Lower Lateral ..... Y(R)	82	41	-18	99	42	44	-18	69
PELVIC ACCELERATIONS:								
Lateral ..... Y	92	38	-27	91	94	39	-16	84
Lateral ..... Y(R)	93	38	-28	91	96	39	-15	83

* Data at 42 msec is questioanble.

** Calculated without questionable Z data at 42 msec.

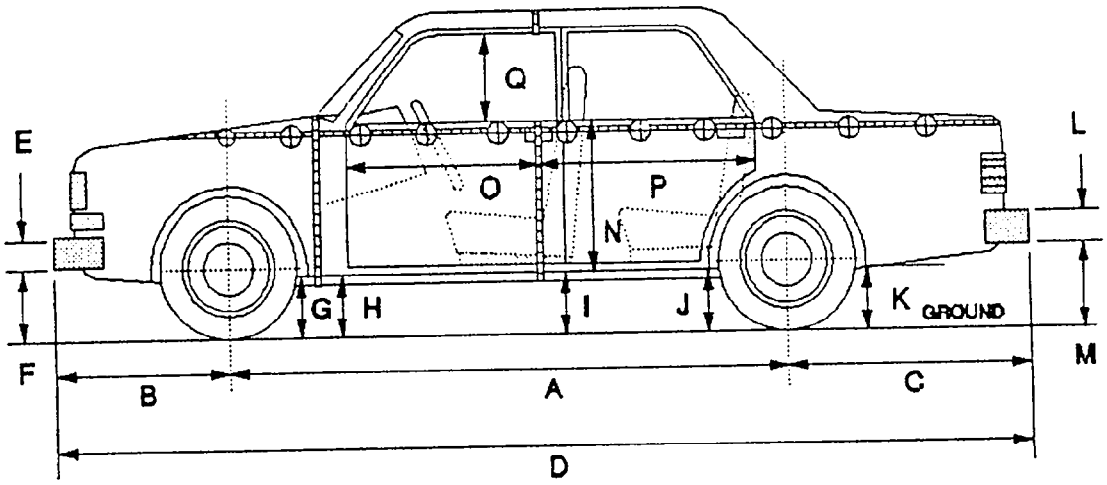
REFERENCE: Positive Direction – Longitudinal (X) = forward
Lateral (Y) = to right
Vertical (Z) = up

Negative Direction – Longitudinal (X) = rearward
Lateral (Y) = to left
Vertical (Z) = down

Note: Y(R) denotes redundant Y direction accelerometer.

Figure 2

PRE- AND POST-TEST MEASUREMENTS



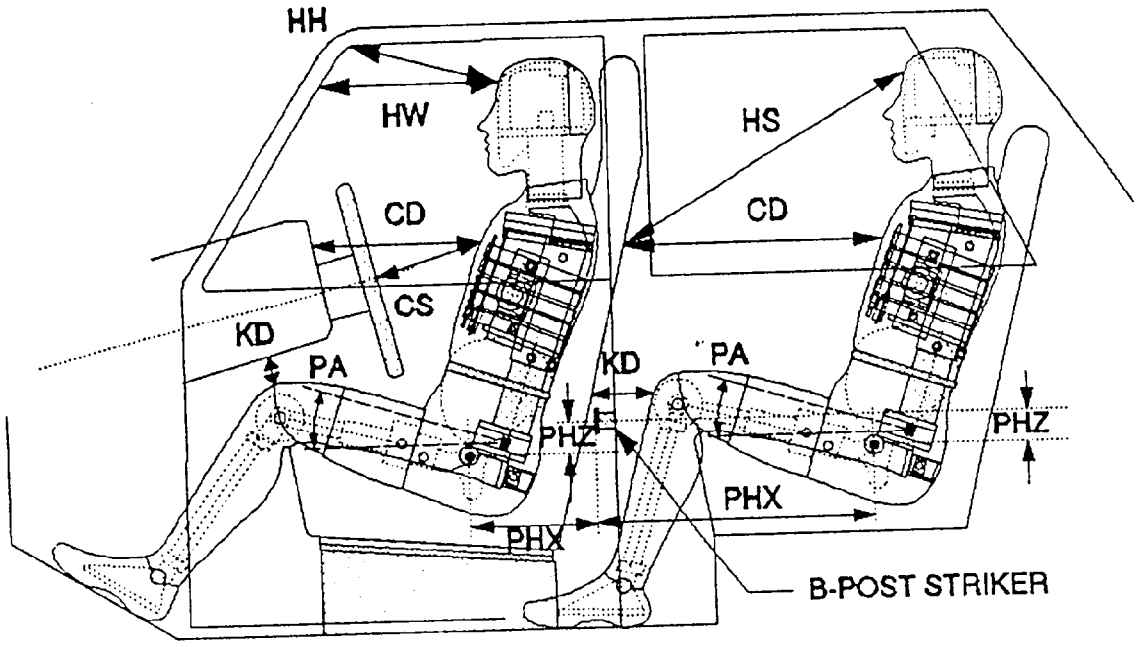
LEFT SIDE VIEW

NOTE: All dimensions are in inches

	PRE-TEST	POST-TEST	Δ CHANGE
A	114.5	116.2	-1.7
B	42.3	39.5	2.8
C	55.2	51.8	3.4
D	211.8	210.3	1.5
E	10.0	10.0	0.0
F	11.9	12.3	-0.4
G	8.8	8.9	-0.1
H	8.8	8.9	-0.1
I	9.4	8.4	1.0
J	9.5	8.6	0.9
K	12.8	13.8	-1.0
L	10.5	10.5	0.0
M	15.0	17.2	-2.2
N	28.5	25.0	3.5
O	28.0	27.5	0.5
P	54.0	46.5	7.5
Q	17.3	17.3	0.0

Figure 3

SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS



LEFT SIDE VIEW

	H-Point from Target	
	Vertical	Horizontal
Driver	0.1 below	0.1 rearward
Left Rear Passenger	0.1 below	0.1 rearward

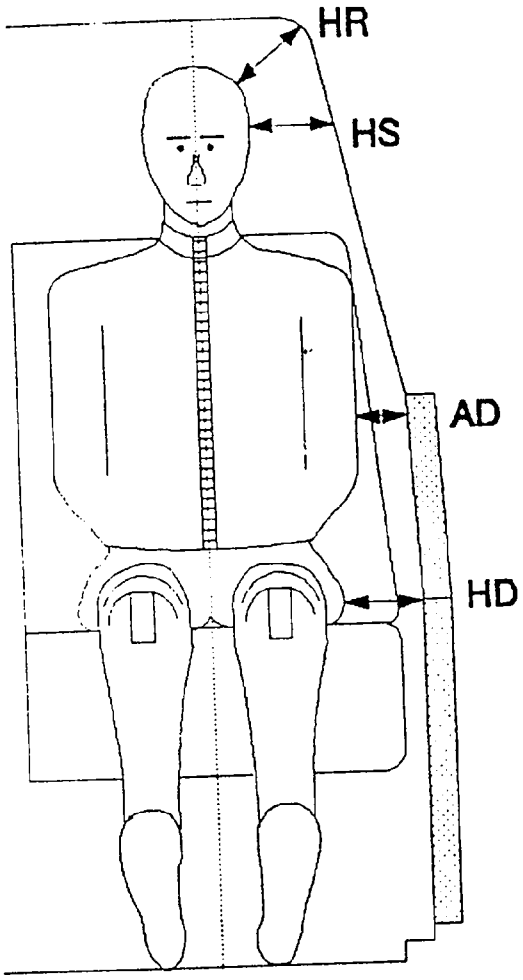
NOTE: All dimensions are in inches

	DRIVER ID #171	LEFT REAR PASSENGER ID #186
HH	16.6	-
HW	23.9	-
HS	-	27.8
CD	23.2	19.2
CS	13.7	-
KDL	2.7	7.1
KDR	2.5	6.8
PA	21.5	22.0
PHX	7.3	7.7
PHZ	4.5	11.2

Note: 2-door vehicle shown. Rear dummy PHX & PHZ measurements for 4-door vehicle would use the C-post striker as a reference point.

Figure 4

SIDE IMPACT DUMMY (SID) LATERAL CLEARANCE DIMENSIONS

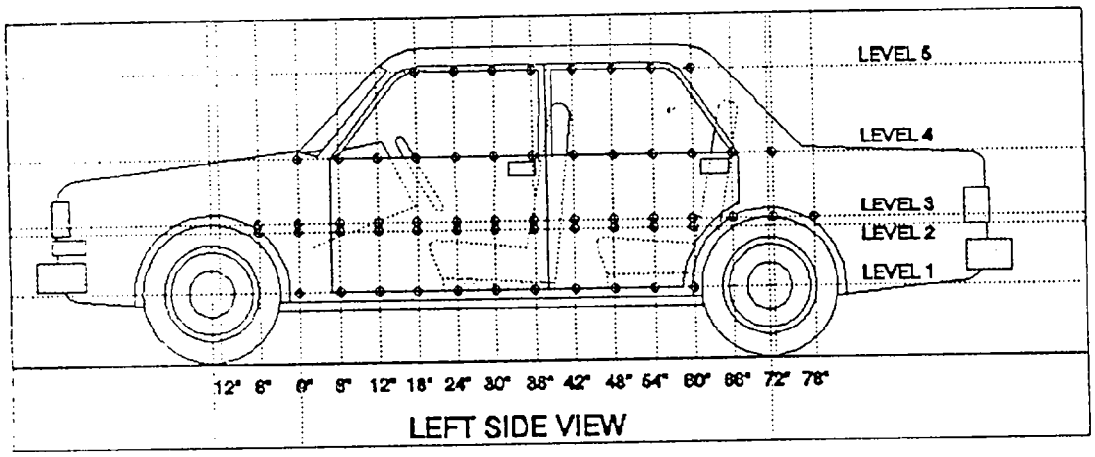


NOTE: All dimensions are in inches

	DRIVER ID #171	LEFT REAR PASSENGER ID #186
HR	6.8	6.5
HS	11.5	7.6 to "C" pillar
AD	5.1	4.4
HD	7.8	7.2

Figure 5

VEHICLE SIDE MEASUREMENT



Measurements Along the Vertical 30" Line Shown Above:

	30" Side Profile
Level 5 @ Window Top	= 20.5 inches
Level 4 @ Window Sill	= 13.3 inches
Level 3 @ Mid Door	= 9.6 inches
Level 2 @ Occupant H-Point	= 9.5 inches
Level 1 @ Axle Centerline Height (or Sill Top Height	= 12.6 inches

TABLE 7

TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE AND STATIC CRUSH

Test Date: August 18, 1992 Vehicle: '1992 Ford Crown Victoria 4-door sedan

* ENGLISH *
In inches

LOCATION	HEIGHT(in.)		Inches from impact point -6	0	6	12	18	24	30	36	42	48	54	60	66	72
LEVEL 1 Side Sill	12.5	PRE	n/a	12.6	12.6	12.6	12.6	12.6	12.6	12.5	12.6	12.7	12.6	12.8	12.9	13.0
		POST	n/a	14.0	17.6	19.2	19.8	20.2	21.0	21.6	22.2	23.2	23.2	23.3	23.8	20.3
		CRUSH	n/a	n/a	5.0	6.6	7.2	7.6	8.4	9.1	9.6	10.5	10.6	10.5	10.9	7.3
LEVEL 2 H-point	22.3	PRE	n/a	10.2	10.0	9.8	9.6	9.6	9.5	9.5	9.8	9.8	9.8	9.8	9.9	9.9
		POST	n/a	12.0	19.6	21.6	22.4	23.0	23.6	25.3	25.9	26.4	26.6	27.0	26.2	23.3
		CRUSH	n/a	1.8	9.6	11.8	12.8	13.4	14.1	15.8	16.1	16.6	16.8	17.2	16.3	13.4
LEVEL 3 Mid-Door	25.3	PRE	10.6	10.2	10.3	10.0	9.9	9.8	9.6	9.5	9.5	9.5	9.5	9.5	9.5	9.5
		POST	12.5	12.4	19.0	22.0	21.9	22.4	23.0	23.6	24.3	24.8	25.8	26.0	25.6	23.2
		CRUSH	n/a	2.2	8.7	12.0	12.0	12.6	13.4	14.1	14.8	15.3	16.3	16.5	16.1	13.7
LEVEL 4 Window Sill	38.5	PRE	n/a	n/a	14.4	13.6	13.4	13.3	13.3	13.2	13.0	12.8	12.8	12.4	12.3	12.0
		POST	n/a	n/a	17.9	18.6	17.2	19.9	21.0	22.2	23.8	26.0	27.0	26.8	26.4	23.6
		CRUSH	n/a	n/a	3.5	5.0	3.8	6.6	7.7	9.0	10.8	13.2	14.2	14.4	14.1	11.6
LEVEL 5 Window Top	53.3	PRE	n/a	n/a	n/a	n/a	n/a	n/a	20.5	20.5	20.3	20.2	20.2	20.3	20.1	20.1
		POST	n/a	n/a	n/a	n/a	n/a	n/a	23.6	*	*	*	28.5	*	*	*
		CRUSH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8.3	n/a	n/a	n/a

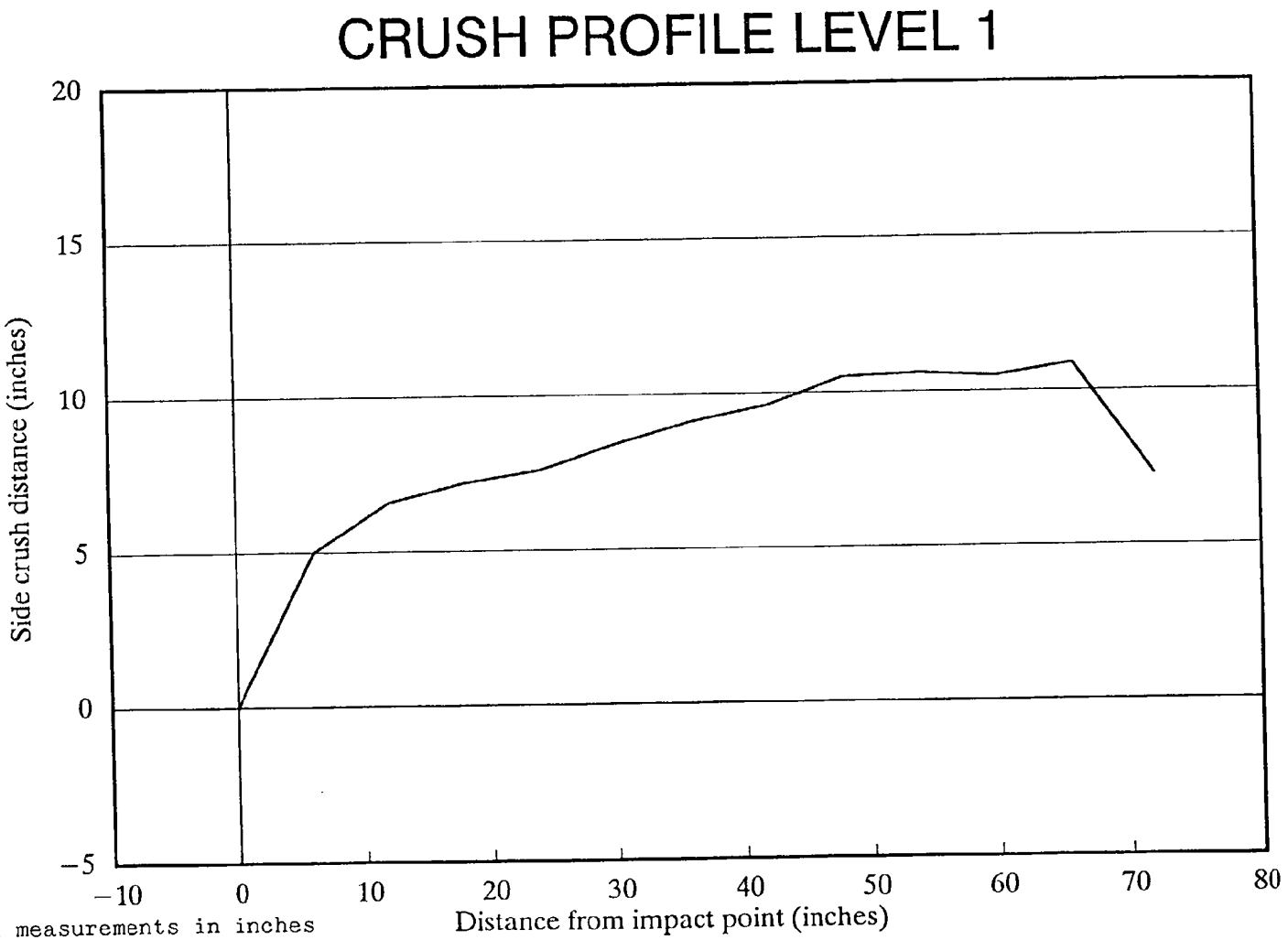
* measured to window glass

Reference plane is parallel to and 48 inches from test vehicle longitudinal centerline
Given dimensions = reference plane to car body

Figure 6

VEHICLE EXTERIOR STATIC CRUSH

12.5 inches above ground level

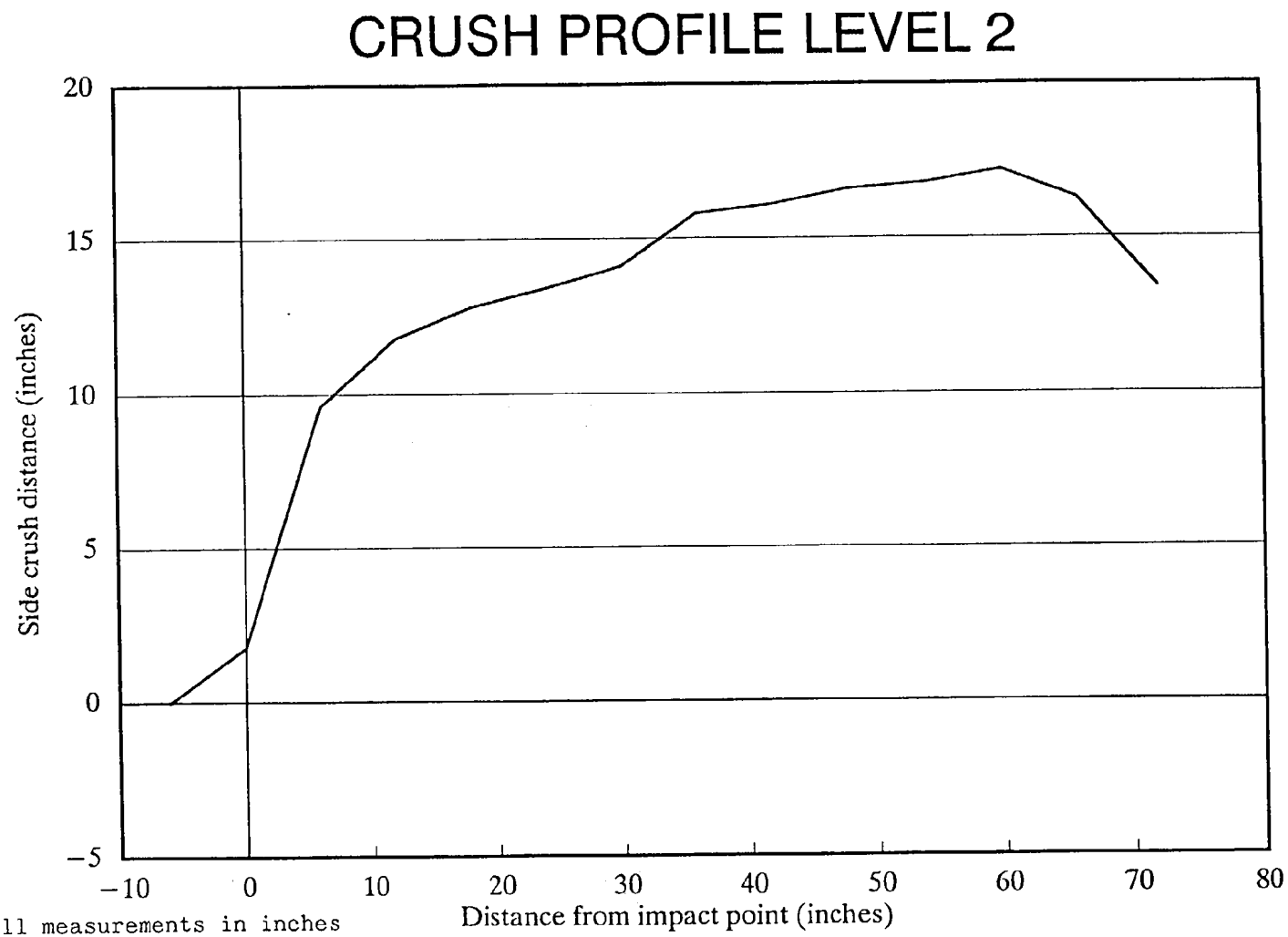


Note: All measurements in inches
Left side of vehicle only

Figure 6

VEHICLE EXTERIOR STATIC CRUSH (cont.)

22.3 inches above ground level

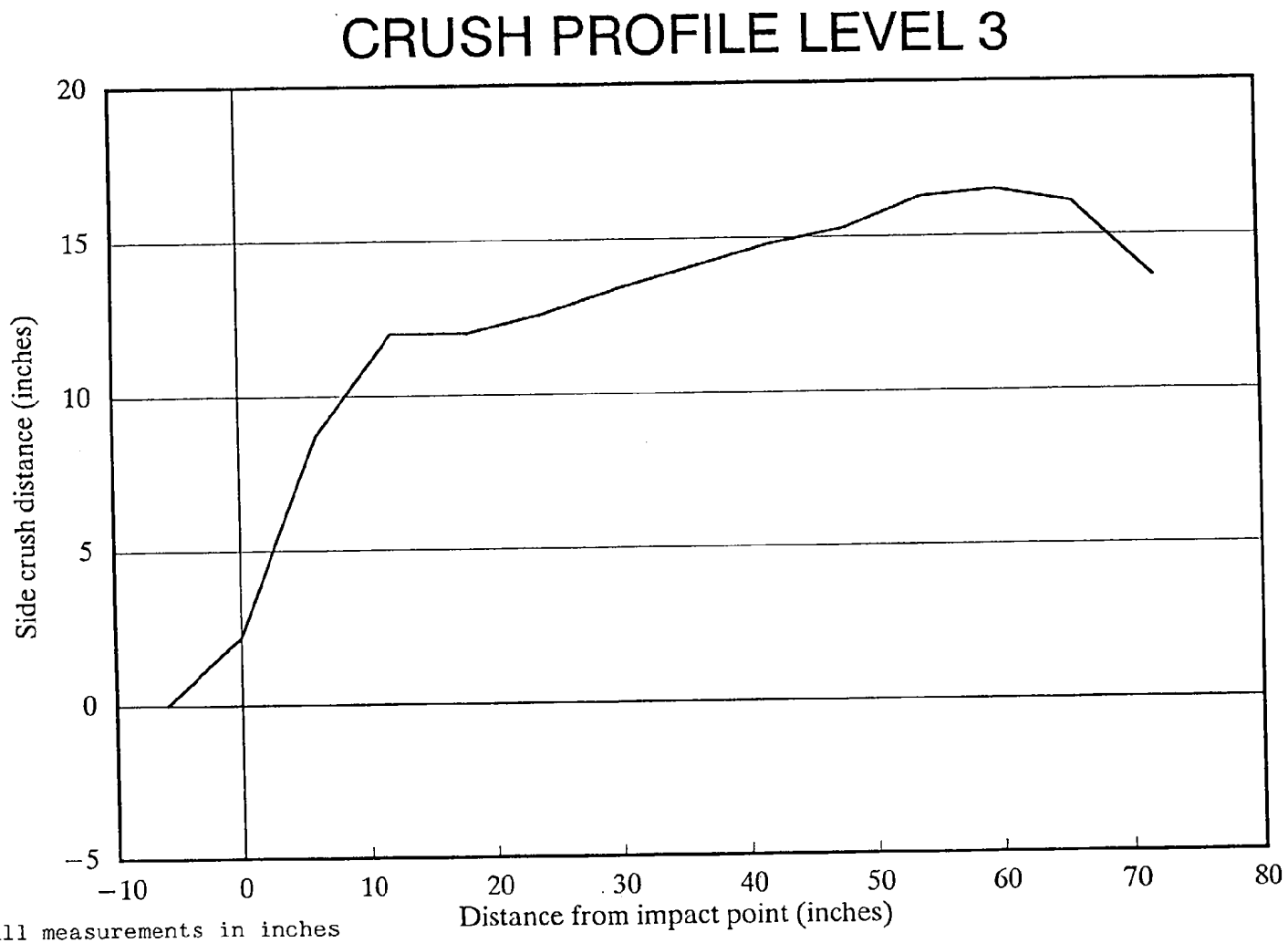


Note: All measurements in inches
Left side of vehicle only

Figure 6

VEHICLE EXTERIOR STATIC CRUSH (cont.)

25.3 inches above ground level

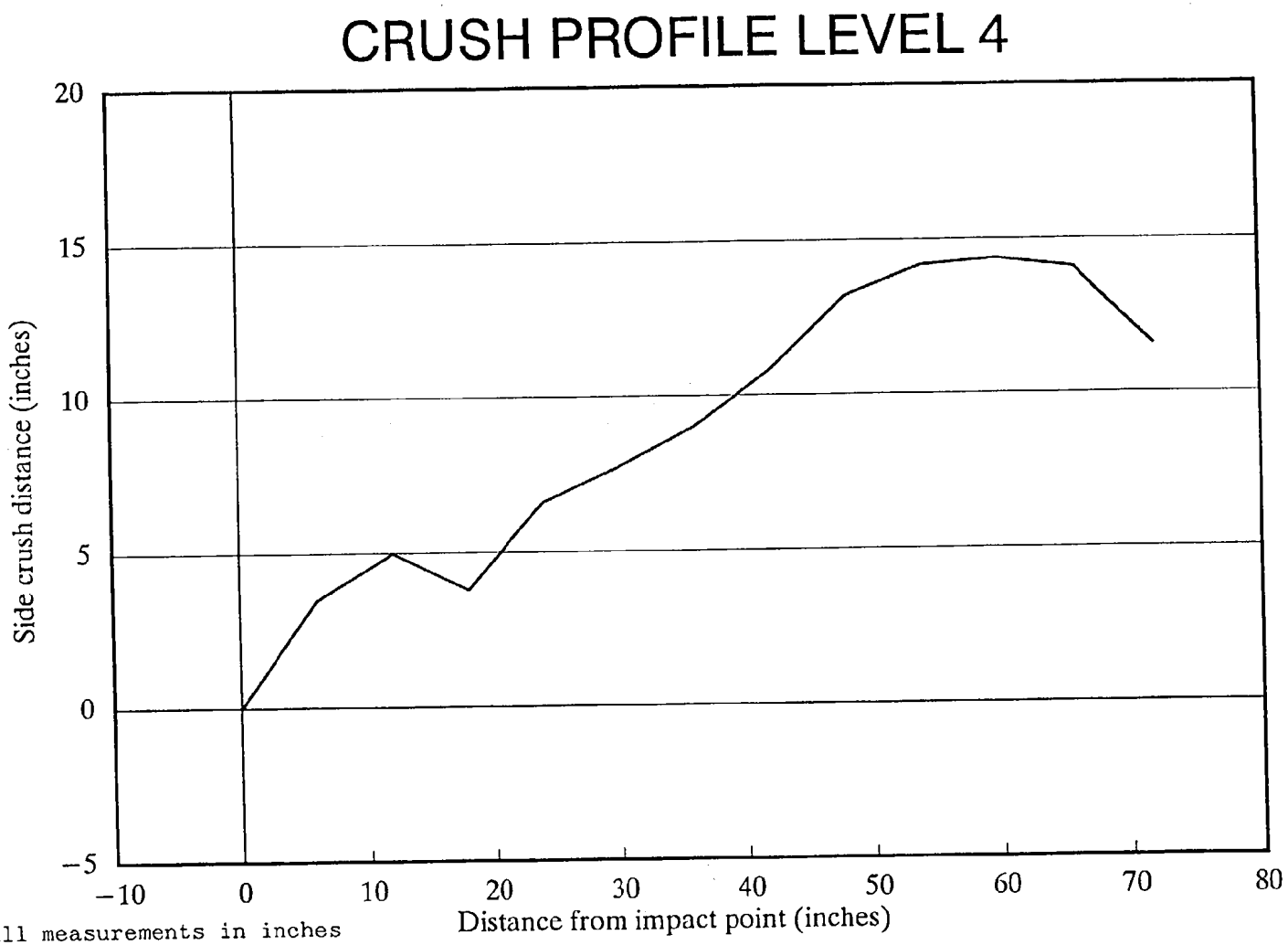


Note: All measurements in inches
Left side of vehicle only

Figure 6

VEHICLE EXTERIOR STATIC CRUSH (cont.)

38.5 inches above ground level

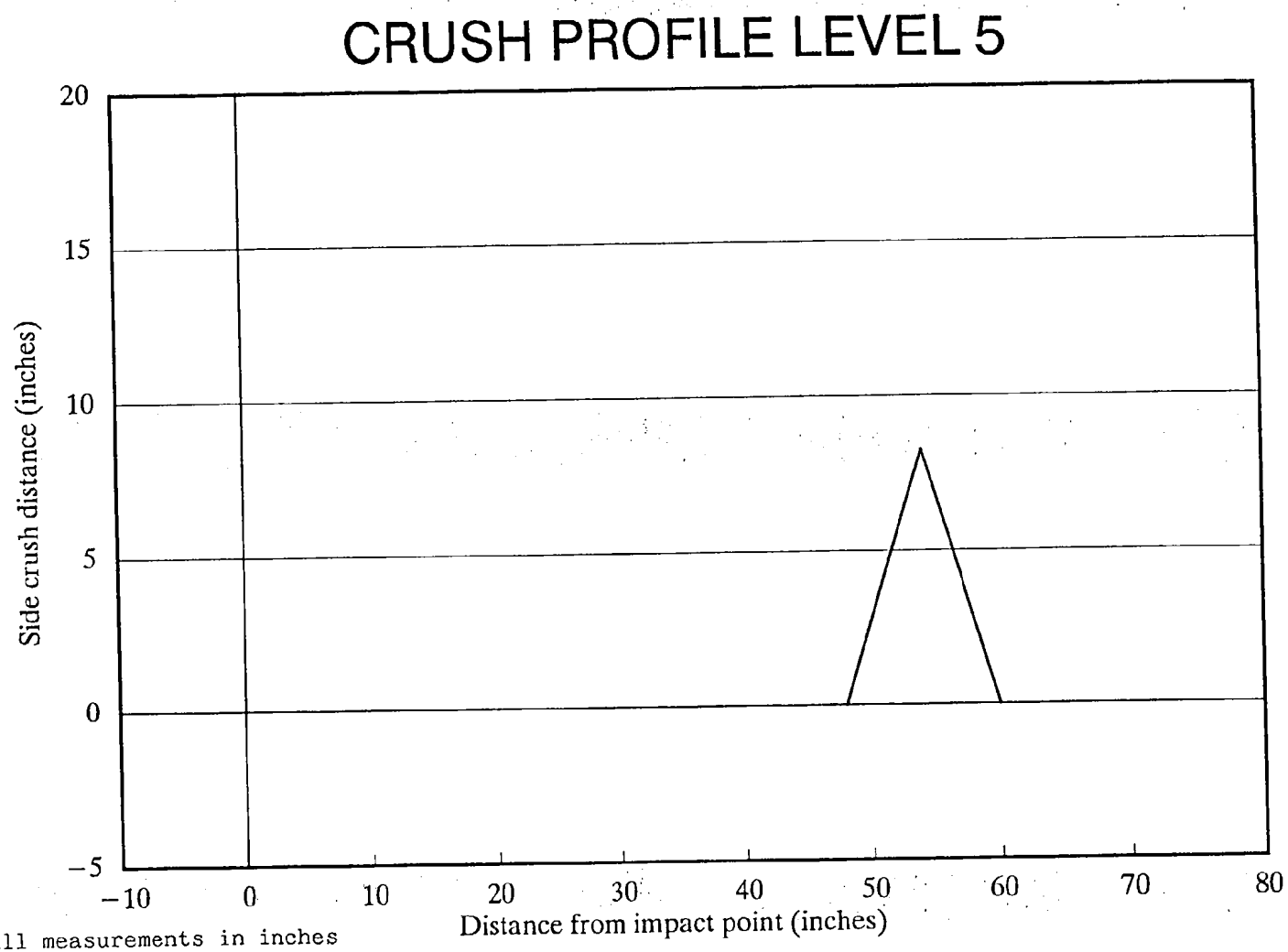


Note: All measurements in inches
Left side of vehicle only

Figure 6

VEHICLE EXTERIOR STATIC CRUSH (cont.)

53.3 inches above ground level



Note: All measurements in inches
Left side of vehicle only

Figure 7

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 1992 Ford Crown Victoria NHTSA No.: MN0206

Test Date: August 18, 1992

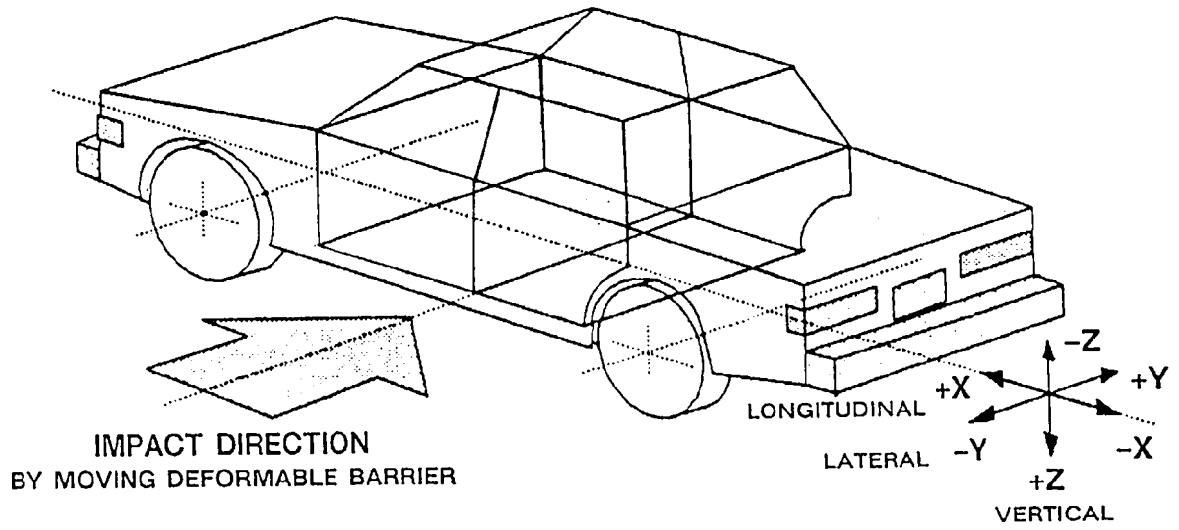


Table 8

EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR

(Grid as looking at MDB from front.)

Test Date: August 18, 1992 Vehicle: 1992 Ford Crown Victoria

		Distances Right of Center									Distances Left of Center							
Location	Height at C_L*	32″	28″	24″	20″	16″	12″	8″	4″	0″	4″	8″	12″	16″	20″	24″	28″	32″
Top of Stack Level	32″	1.0	0.0	-0.1	-0.1	0.3	0.9	0.8	0.4	0.2	0.3	0.4	0.5	0.9	1.3	1.7	3.2	5.4
Mid-Stack Level	22″	2.9	2.0	1.4	1.4	1.1	1.1	1.1	1.3	1.3	1.6	1.9	2.1	2.3	2.6	2.8	3.6	3.9
Bumper Level	17″	4.0	3.9	3.2	3.0	3.1	3.0	3.0	3.1	3.1	3.5	3.7	4.0	4.2	4.0	5.3	6.8	6.0

*Heights measured above ground level.
**Impact side.

Table 9

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

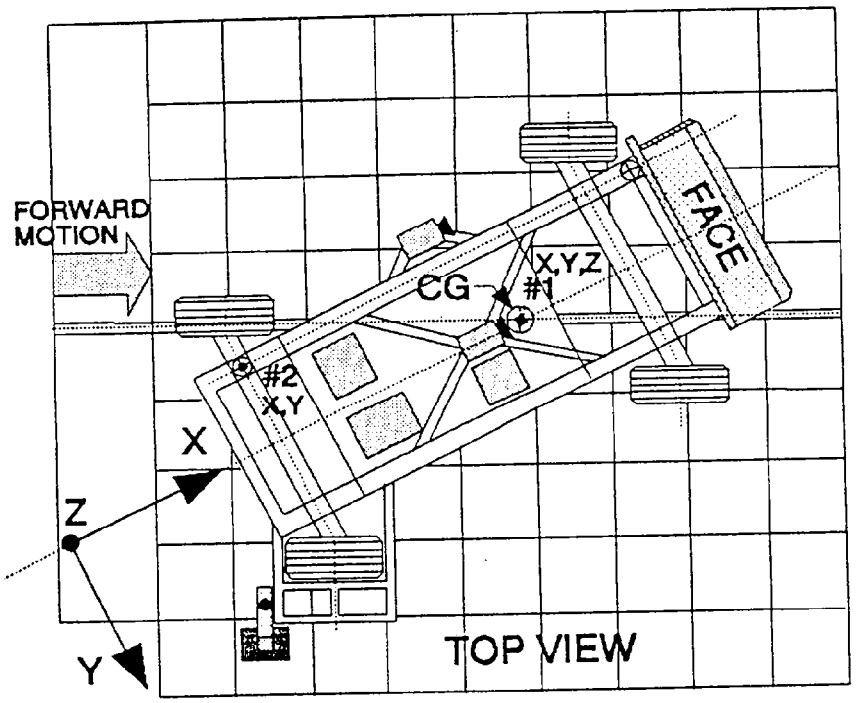
Accel. Time No.	Location	Coordinates (")			Long. (X) Pos./Neg.		Lat. (Y) Pos./Neg.		Vert. (Z) Pos./Neg.		Resultant Pos./Neg.	
		X*	Y*	Z*	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Tim (msec)	Max (g)	(msec)
1	Right Front Sill at Front Seat	132.1	25.0	14.1	11 -9	51 22	6 -24	41 27	17 -13	14 51	26	26
2	Right Rear Sill at Rear Seat	96.1	24.5	13.0	5 -9	5 13	24 -9	16 10	25 -34	13 8	34	8
3	Rear Floorpan Above Axle	52.1	-1.0	32.2	11 -16	40 11	15 -2	4 156	26 -19	29 35	27	30
4	Left Side Sill at Rear Seat	95.8	-24.8	12.9	–	–	69 -32	2 59	–	–	–	–
5	Left Side Sill at Front Seat	132.3	-25.0	14.4	–	–	133 -47	4 9	–	–	–	–
6	Left Front Door on Centerline	121.5	-32.0	23.4	–	–	138 -93	7 31	–	–	–	–
7	Right Rear Occupant Compartment	96.4	12.1	10.4	17 -22	11 6	–	–	–	–	–	–
8	Midrear of Left Front Door	117.4	-32.0	33.4	–	–	129 -63	8 22	–	–	–	–
9	Left Front Door Upper Centerline	121.8	-32.0	37.4	–	–	131 –	13 –	–	–	–	–
10	Midrear of Left Rear Door	85.0	31.5	22.2	–	–	160 -97	8 16	–	–	–	–
11	Left Rear Door Upper Centerline	85.5	31.5	37.0	–	–	101 -82	15 24	–	–	–	–

*Reference: X – Rear Bumper (+ Forward)
Y – Vehicle Centerline (+ To right)
Z – Ground Level (+ Up)

Figure 8

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS

Test Vehicle: 1992 Ford Crown Victoria Test Date: August 18, 1992



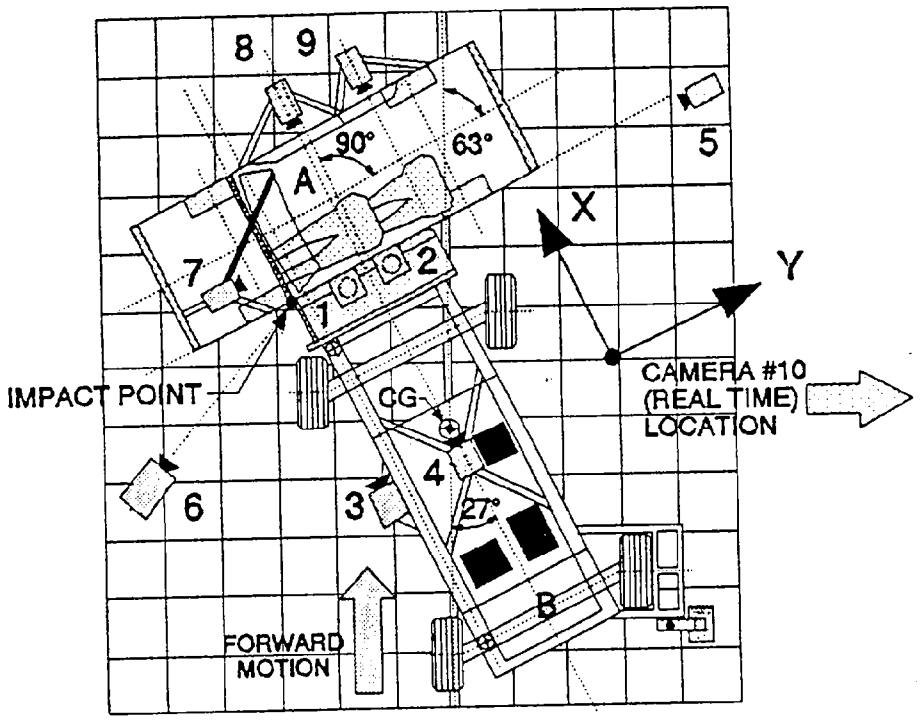
Accel. No.	Location	Coordinates (mm) X*	Y*	Z*	Pos. Direct. Max (g)	Pos. Direct. Time (msec)	Neg. Direct. Max (g)	Neg. Direct. Time (msec)
1	MDB Center of Gravity							
	Longitudinal ... X	73.7	0.8	13.2	1	211	-17	43
	Lateral ..... Y				5	21	-6	15
	Vertical ..... Z				26	53	-21	20
	Resultant ..... R				29	53		
2	Rear Frame Member							
	Longitudinal ... X	15.1	-26.0	25.1		**		**
	Lateral ..... Y				6	15	-2	103

* Reference: X = Rear Bumper (+Forward)
Y = Vehicle Centerline (+ To Right)
Z = Ground Level (+ Up)

**Data Questionable

Figure 9

HIGH SPEED CAMERA LOCATIONS AND DATA



Camera No.	View	Coordinates (mm)			Angle	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Overhead Overall View	78	24	386	-90	13	595
2	Overhead Closeup View of Impact	72	24	386	-90	25	600
3	MDB Onboard Closeup of Impact	–	–	–	–	13	N.T.
4	MDB Onboard View of Dummy	–	–	–	–	8	600
5	Right Side Ground Overall View	0	438	41	-2	13	550
6	Left Side Ground Overall View	-115	-321	41	-1	25	570
7	Test Vehicle Onboard Driver Front View	–	–	–	–	13	605
8	Test Vehicle Onboard Driver Side View	–	–	–	–	8	565
9	Test Vehicle Onboard Passenger Side View	–	–	–	–	8	545
10	Real Time	–	–	–	–	–	24

*Reference: (from point of impact)
+X = Forward
+Y = To Right
+Z = Upward

Appendix A

PHOTOGRAPHS

LIST OF PHOTOGRAPHS

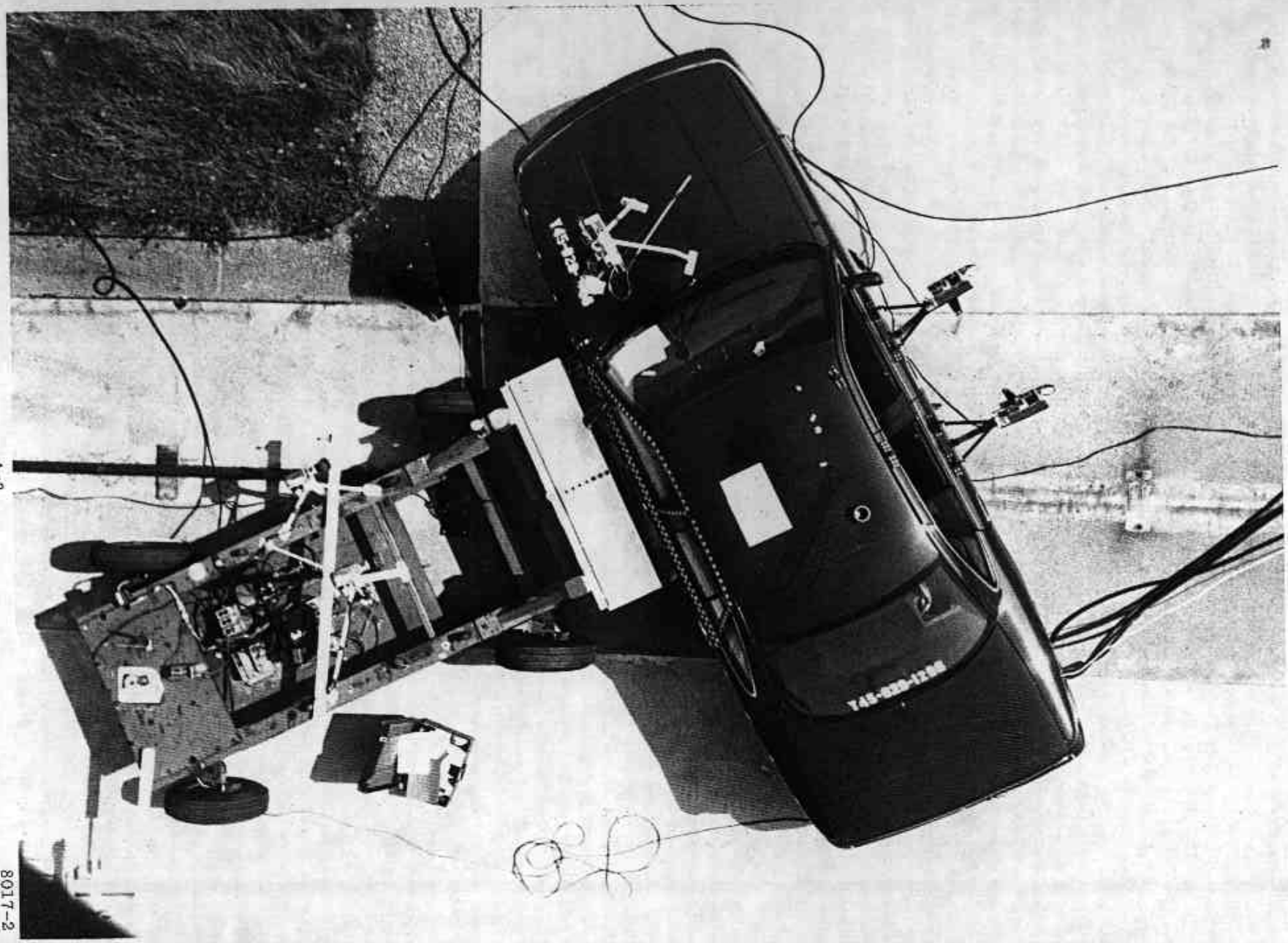


Figure A-1 PRE-TEST OVERHEAD VIEW OF TEST VEHICLE

Figure A-2 POST-TEST OVERHEAD VIEW OF TEST VEHICLE

Figure A-3 PRE-TEST FRONT VIEW OF TEST VEHICLE

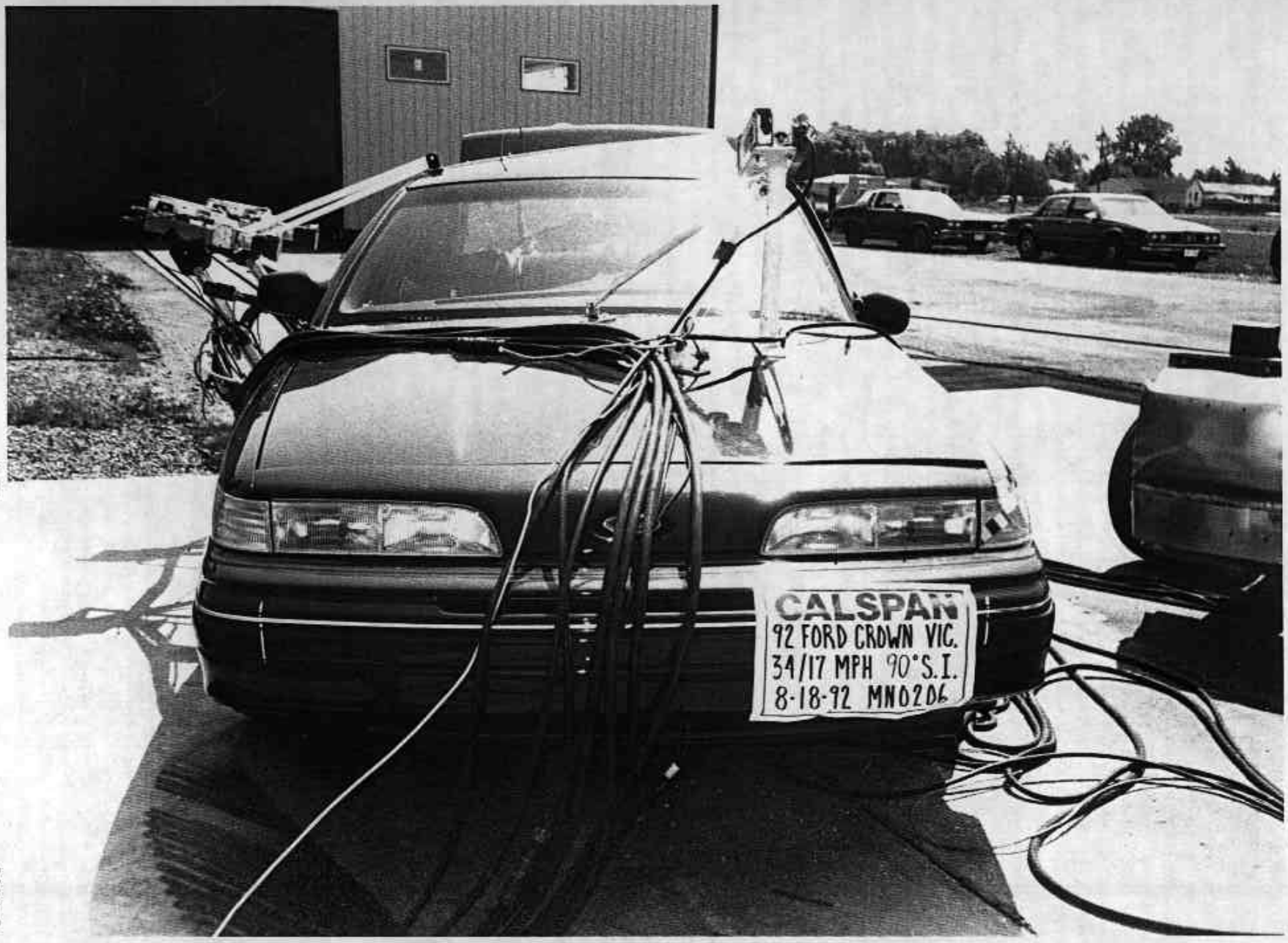


Figure A-4 POST TEST FRONT VIEW OF TEST VEHICLE

8017-2

Figure A-5 PRE-TEST REAR VIEW OF TEST VEHICLE

Figure A-6 POST-TEST REAR VIEW OF TEST VEHICLE

8017-2

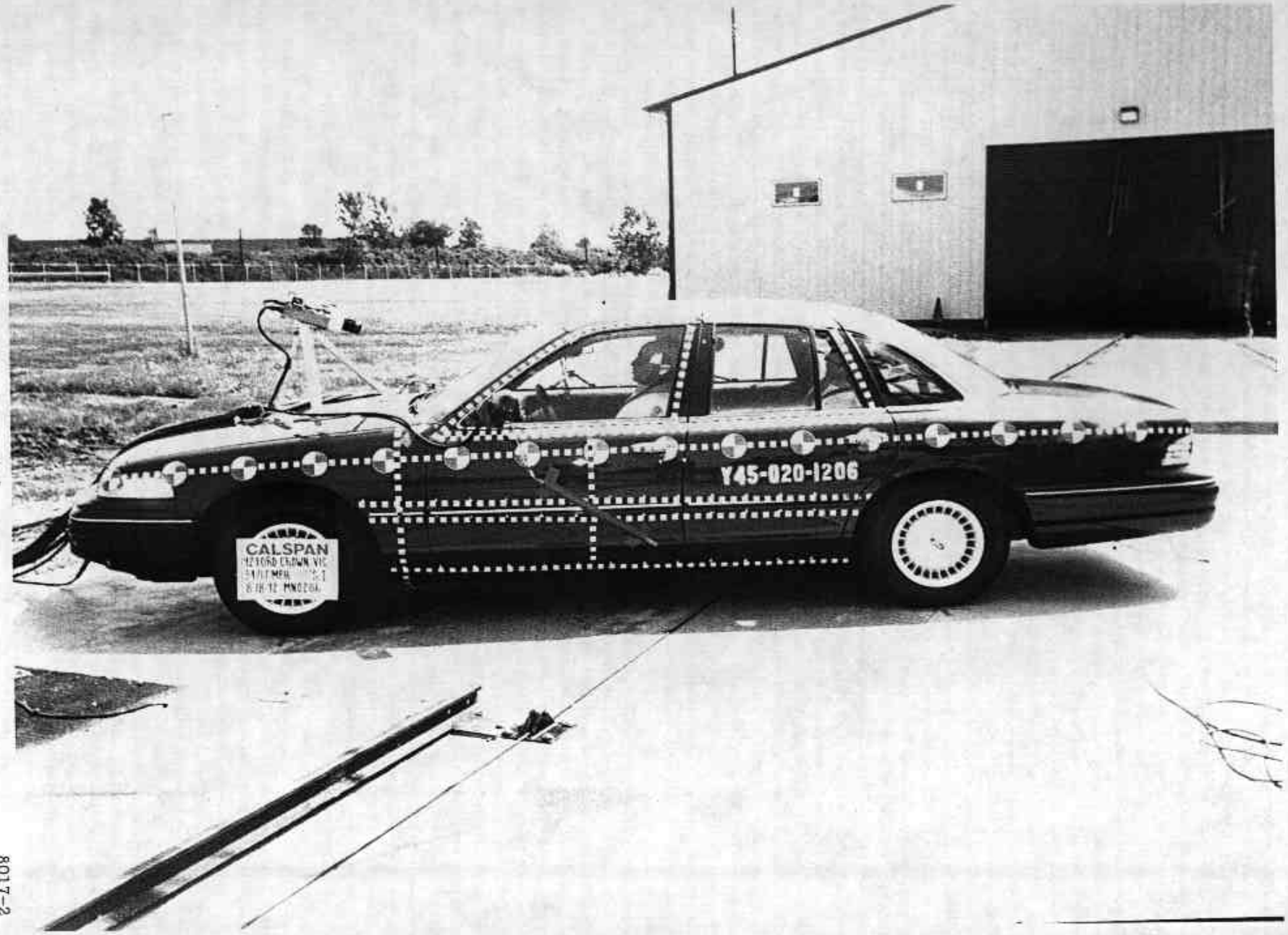


Figure A-7 PRE-TEST LEFT SIDE VIEW OF TEST VEHICLE

Figure A-8 POST-TEST LEFT SIDE VIEW OF TEST VEHICLE

Figure A-9 PRE-TEST MDB AND VEHICLE LEFT SIDE FRONT VIEW

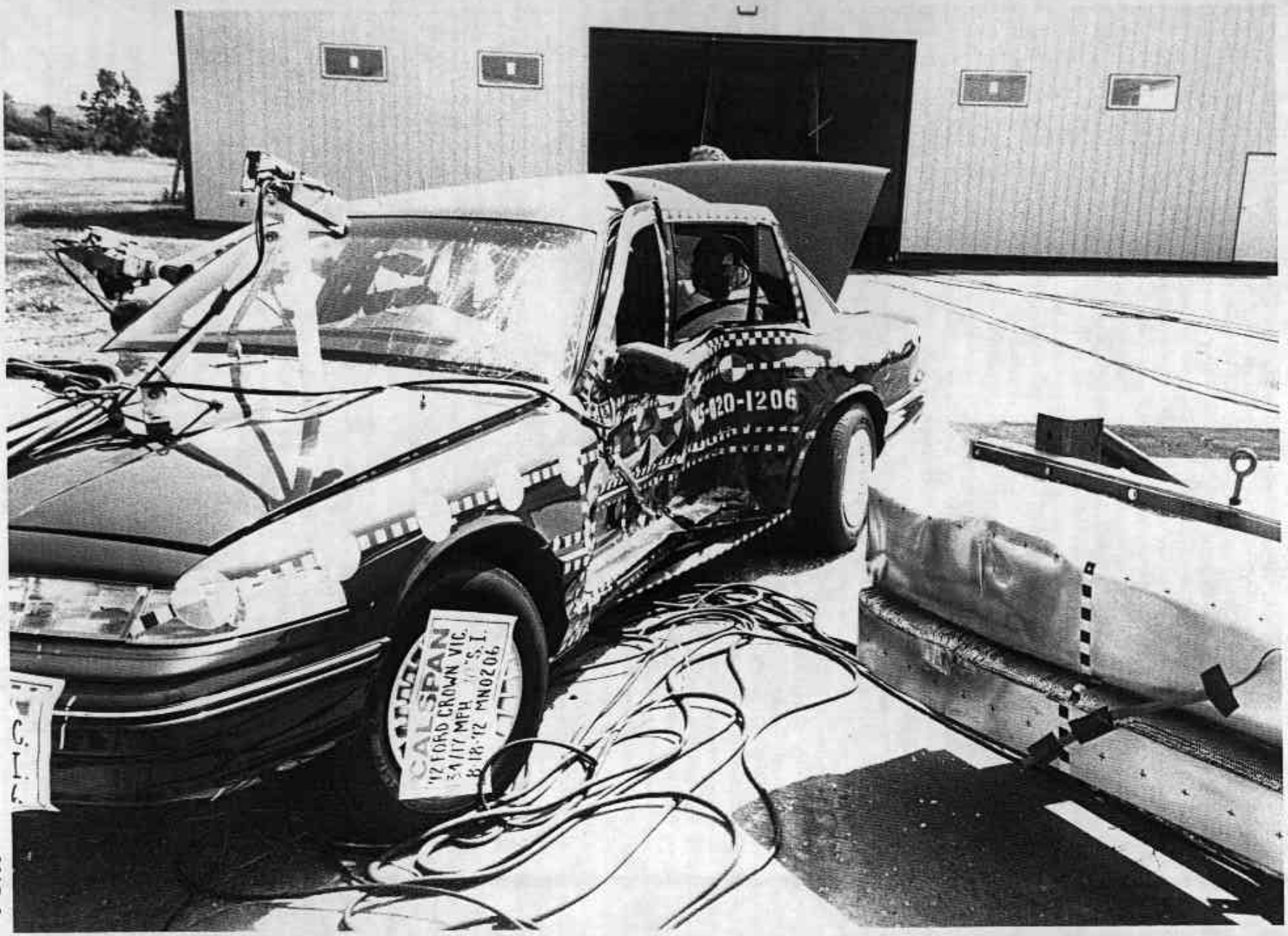


Figure A-10 POST-TEST MDB AND VEHICLE LEFT SIDE FRONT VIEW

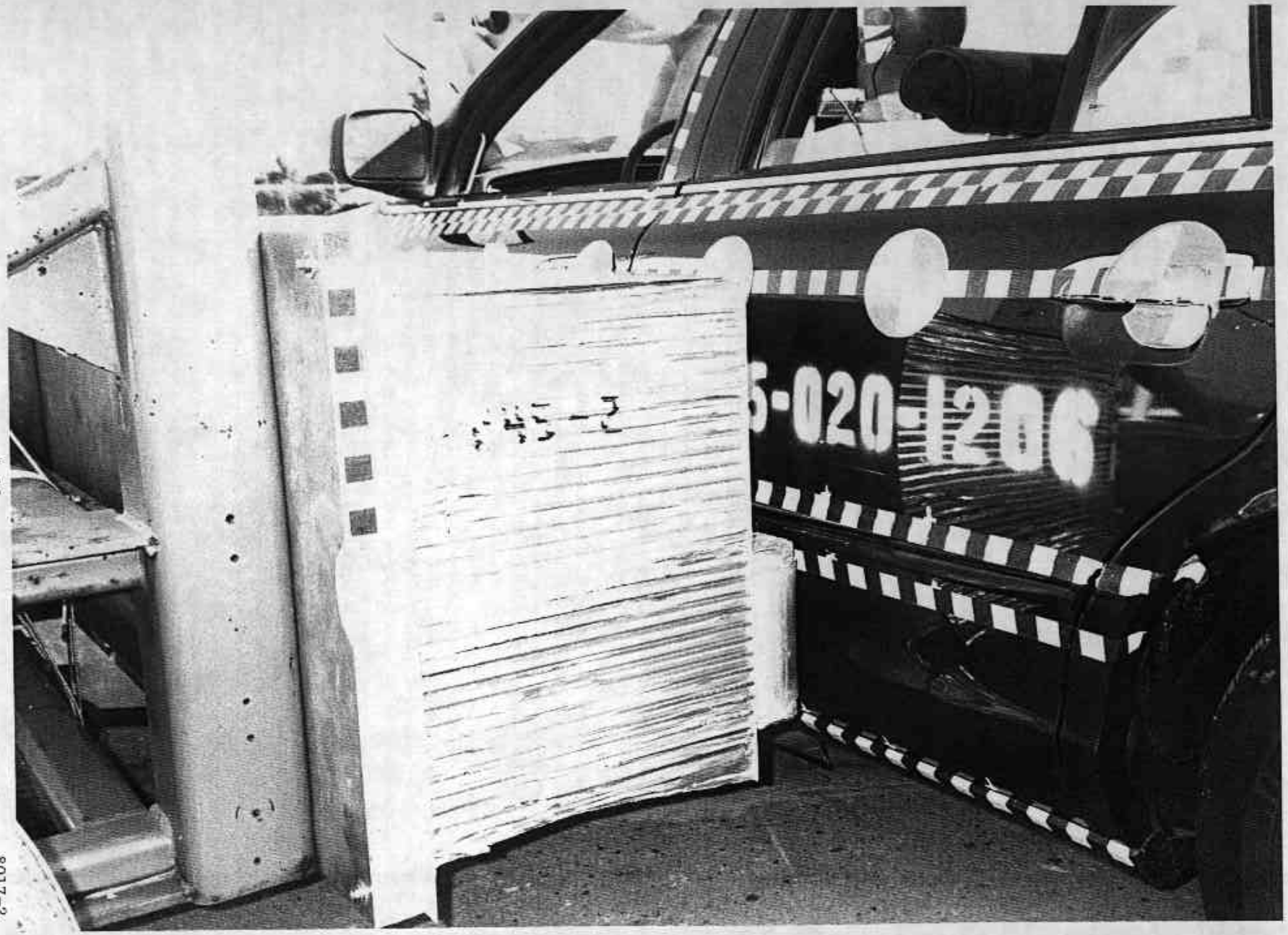
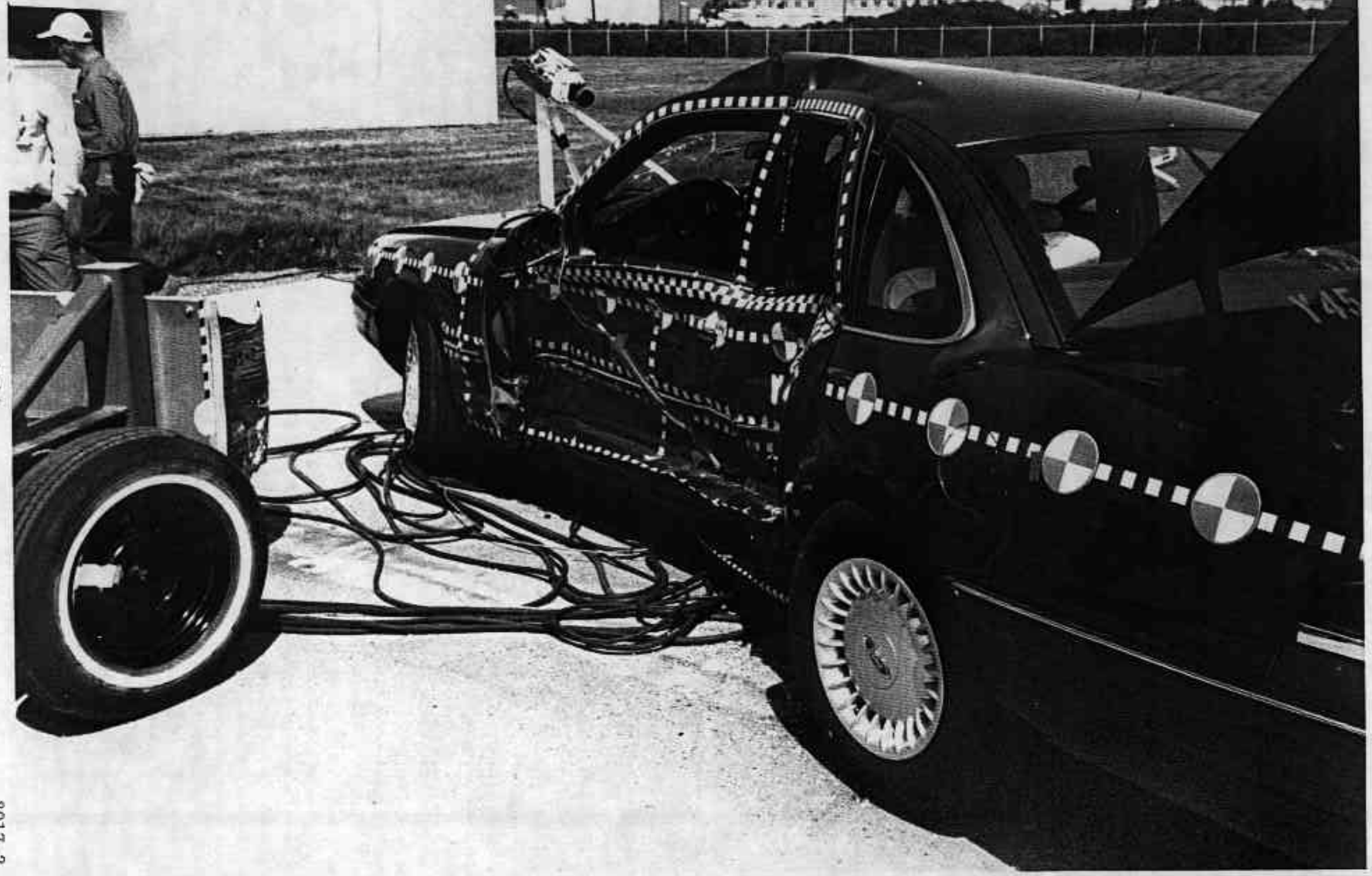


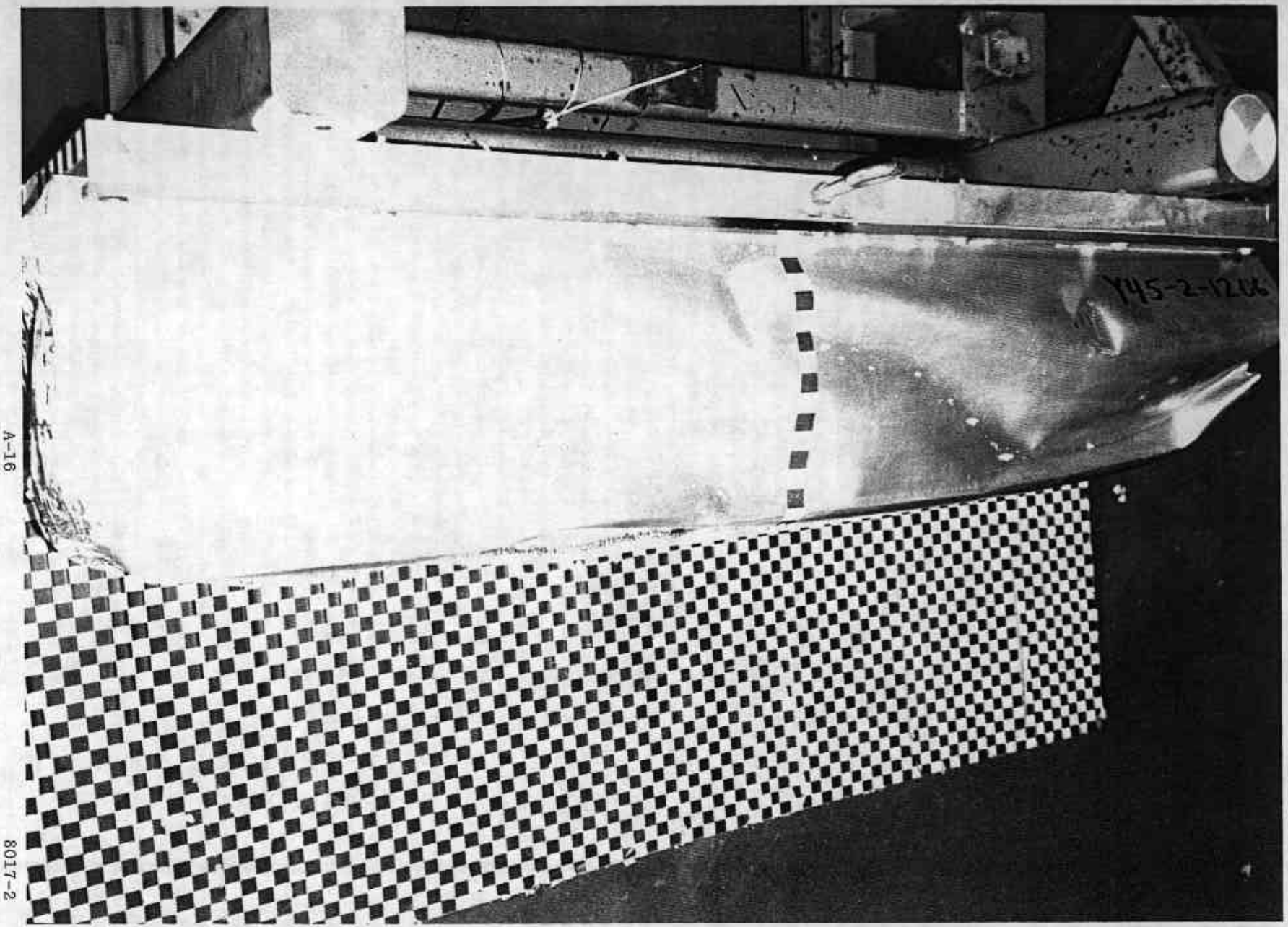
Figure A-11 PRE-TEST MDB AND VEHICLE LEFT SIDE REAR VIEW



8017-2

Figure A-12 POST-TEST MDB AND VEHICLE LEFT SIDE REAR VIEW

Figure A-13 PRE-TEST MDB TOP VIEW



8017-2

Figure A-14 POST-TEST MDB TOP VIEW

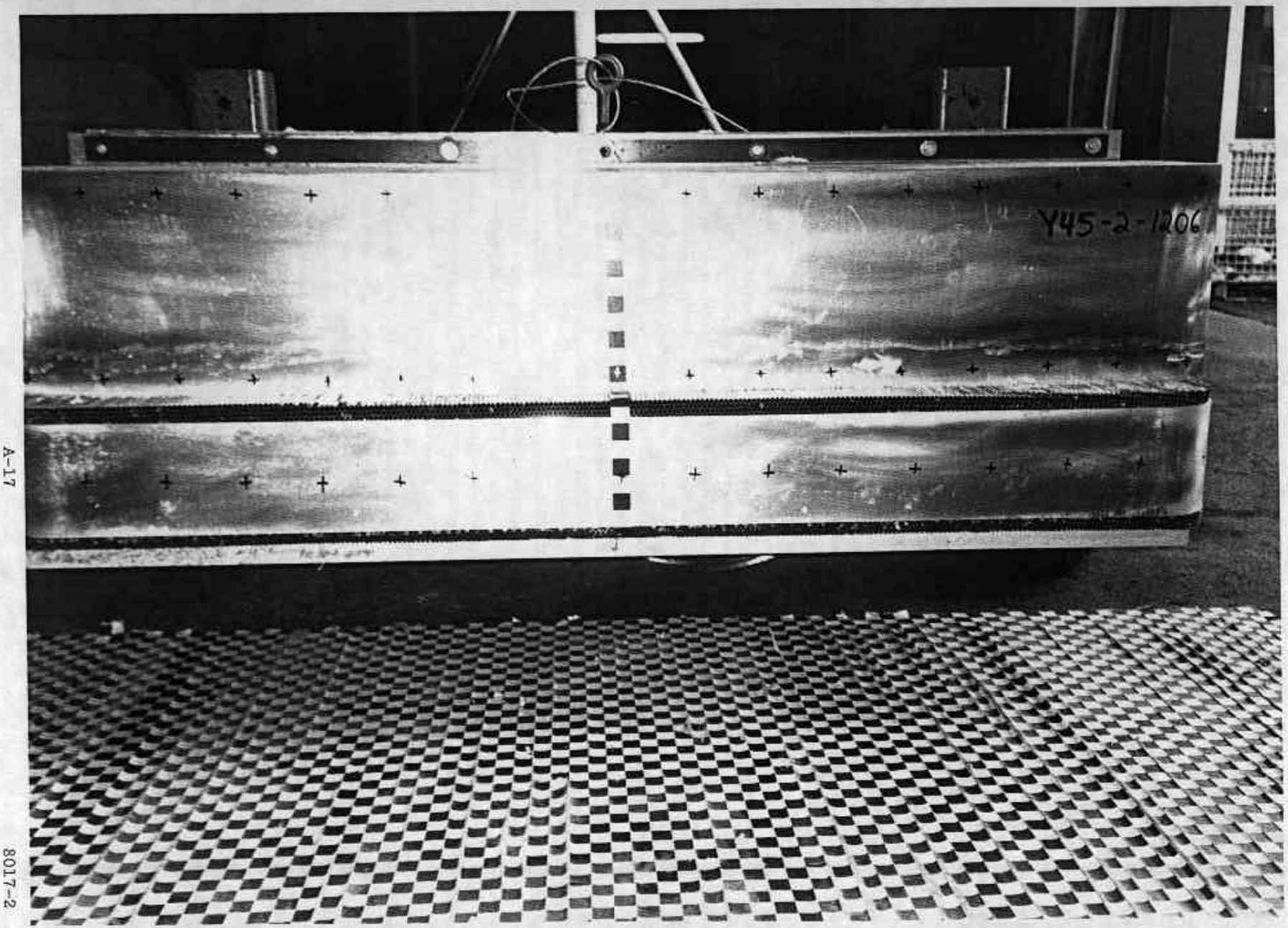


Figure A-15 PRE-TEST MDB FRONT VIEW

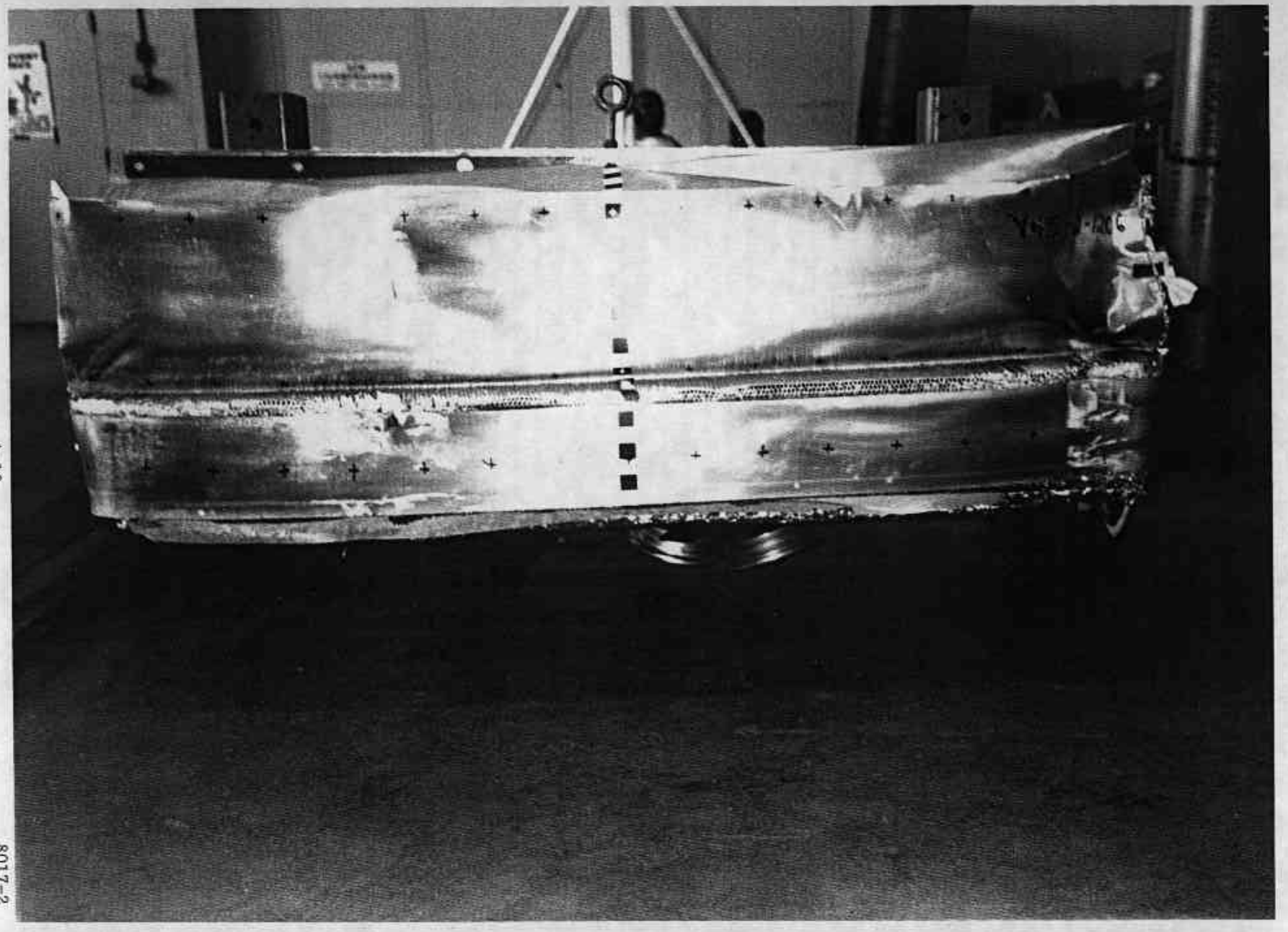


Figure A-16 POST-TEST MDB FRONT VIEW

8017-2

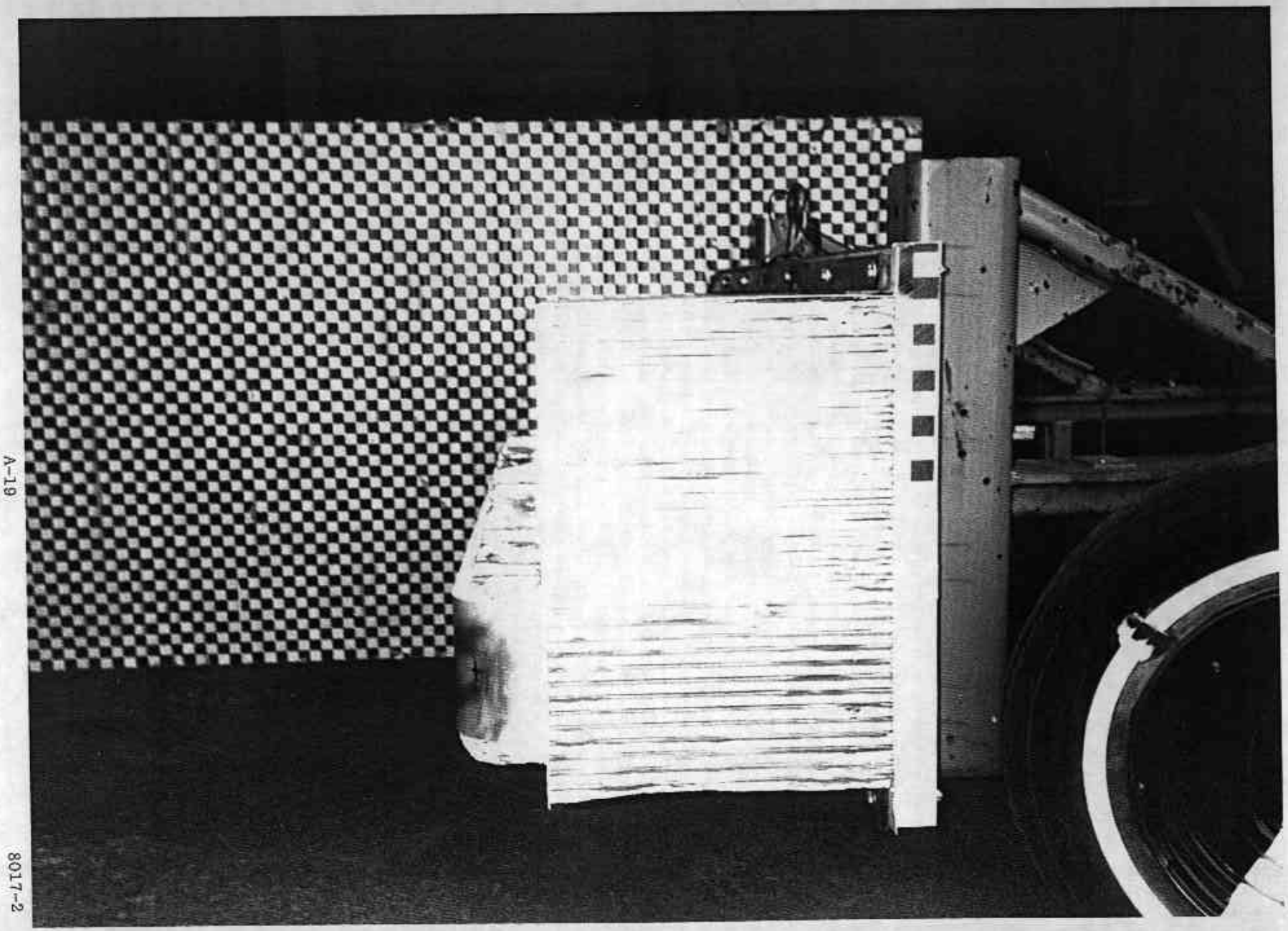


Figure A-17 PRE-TEST MDB LEFT SIDE VIEW

8017-2

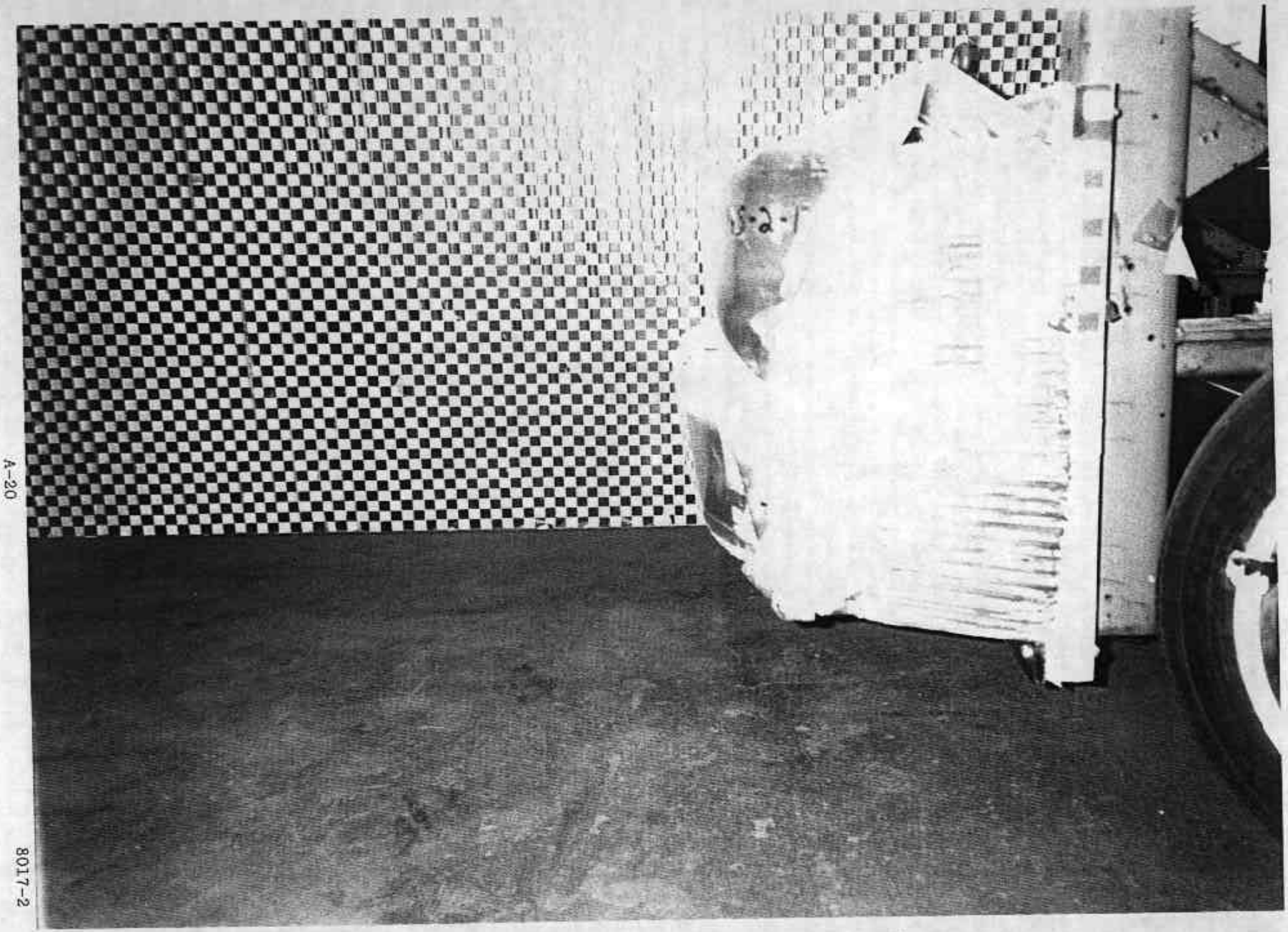


Figure A-18 POST-TEST MDB LEFT SIDE VIEW

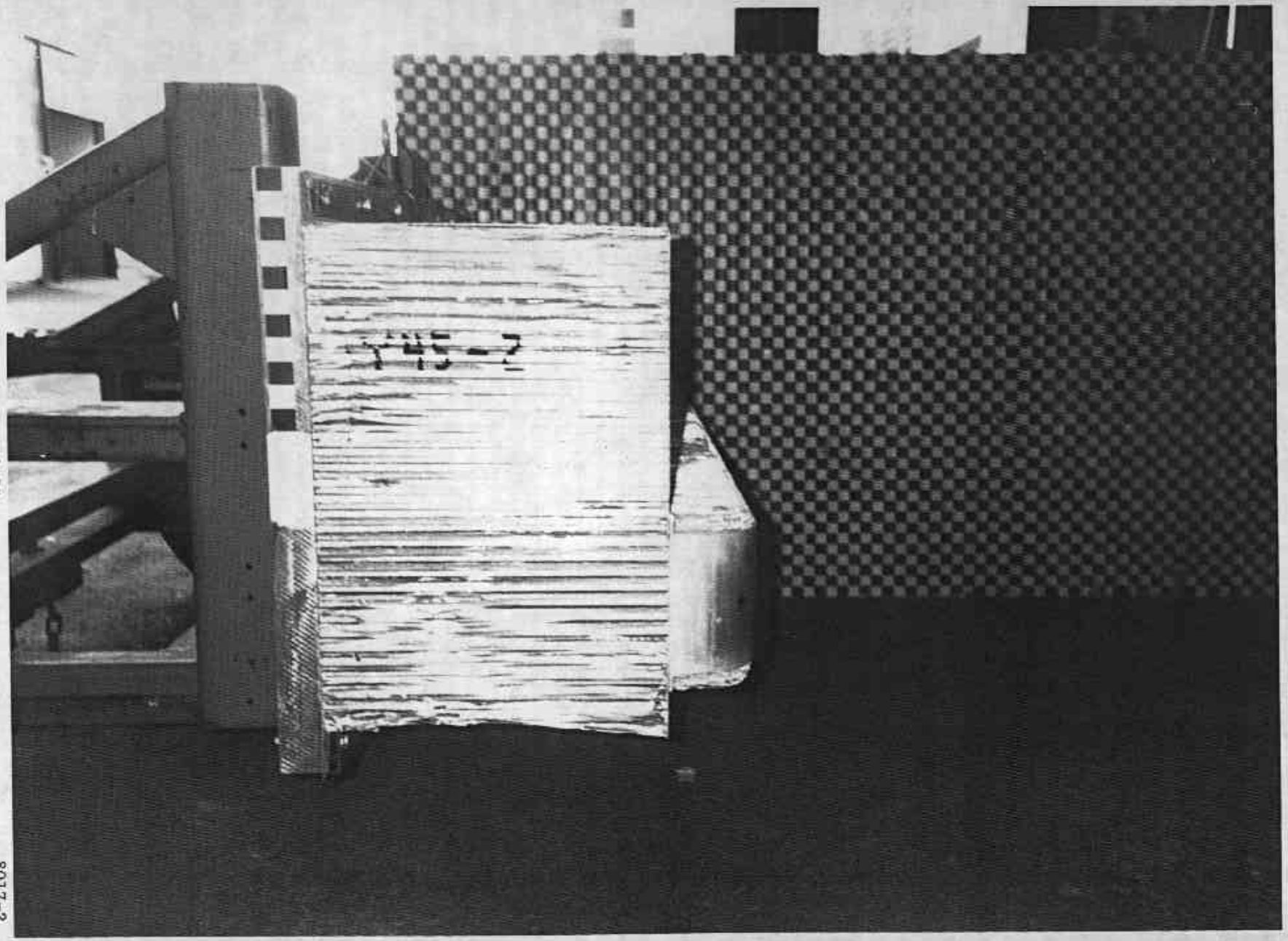


Figure A-19 PRE-TEST MDB RIGHT SIDE VIEW

8017-2

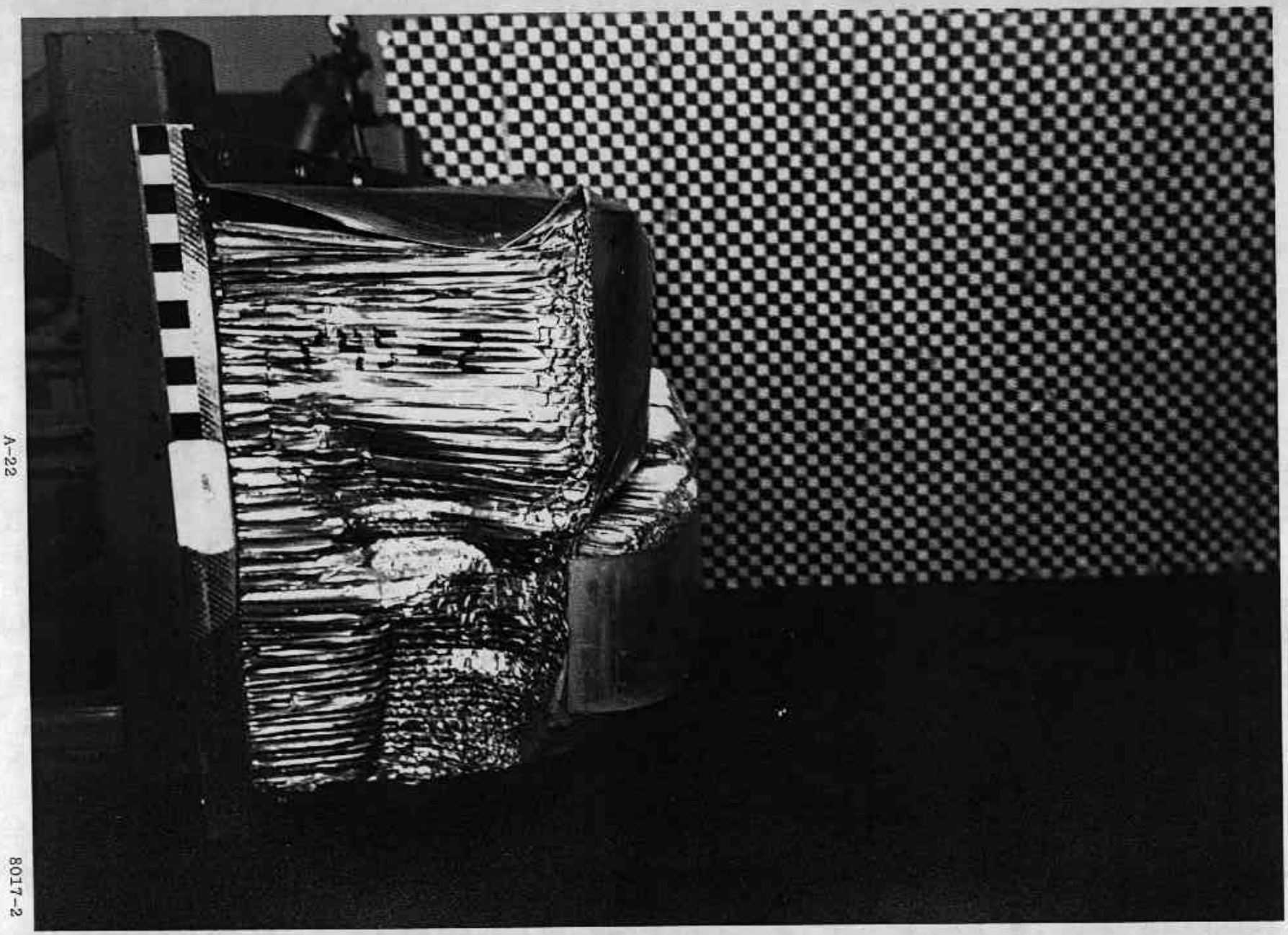


Figure A-20 POST-TEST MDB RIGHT SIDE VIEW

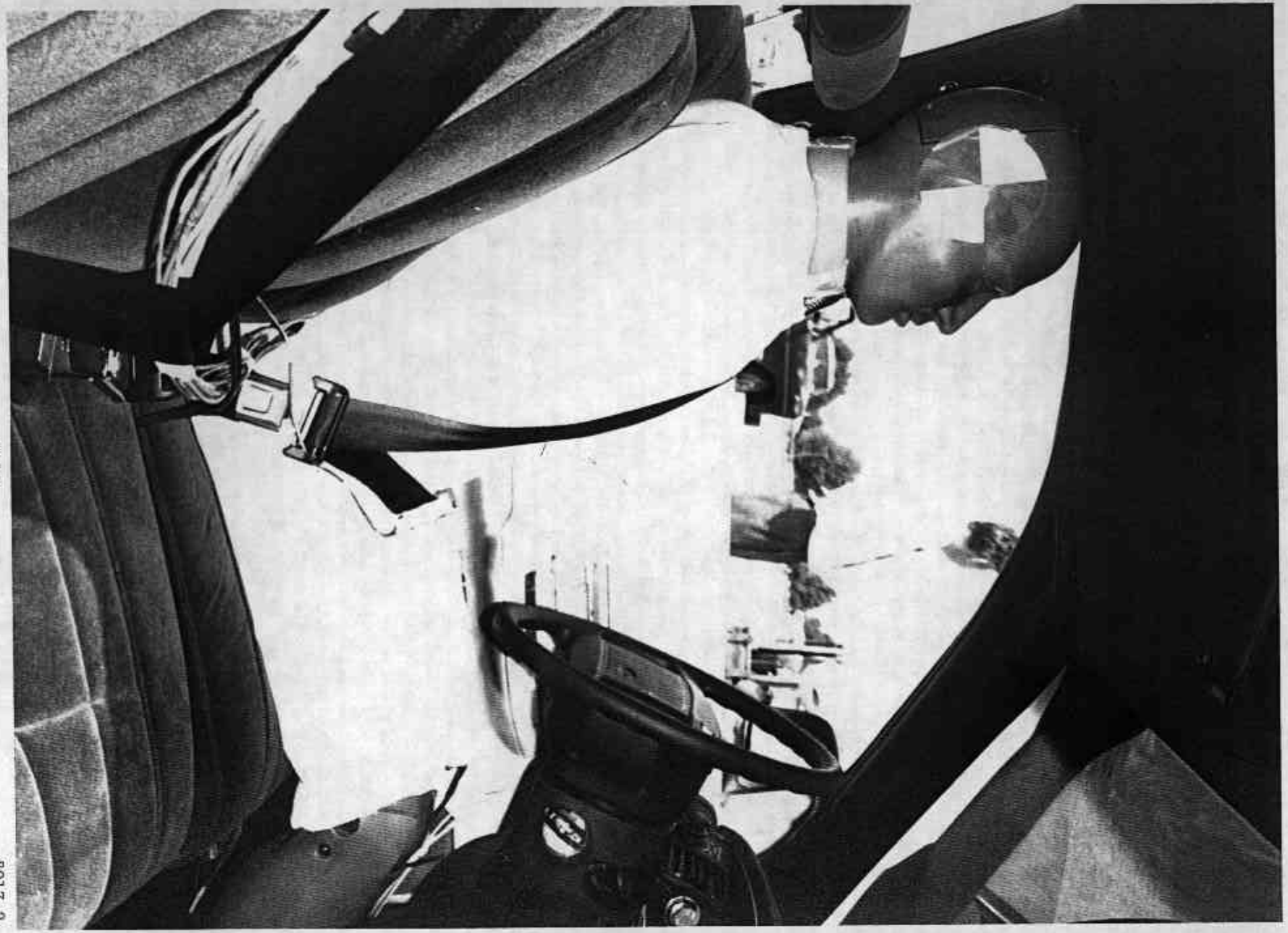


Figure A-21 PRE-TEST POS. #1 DUMMY RIGHT SIDE VIEW

8017-2

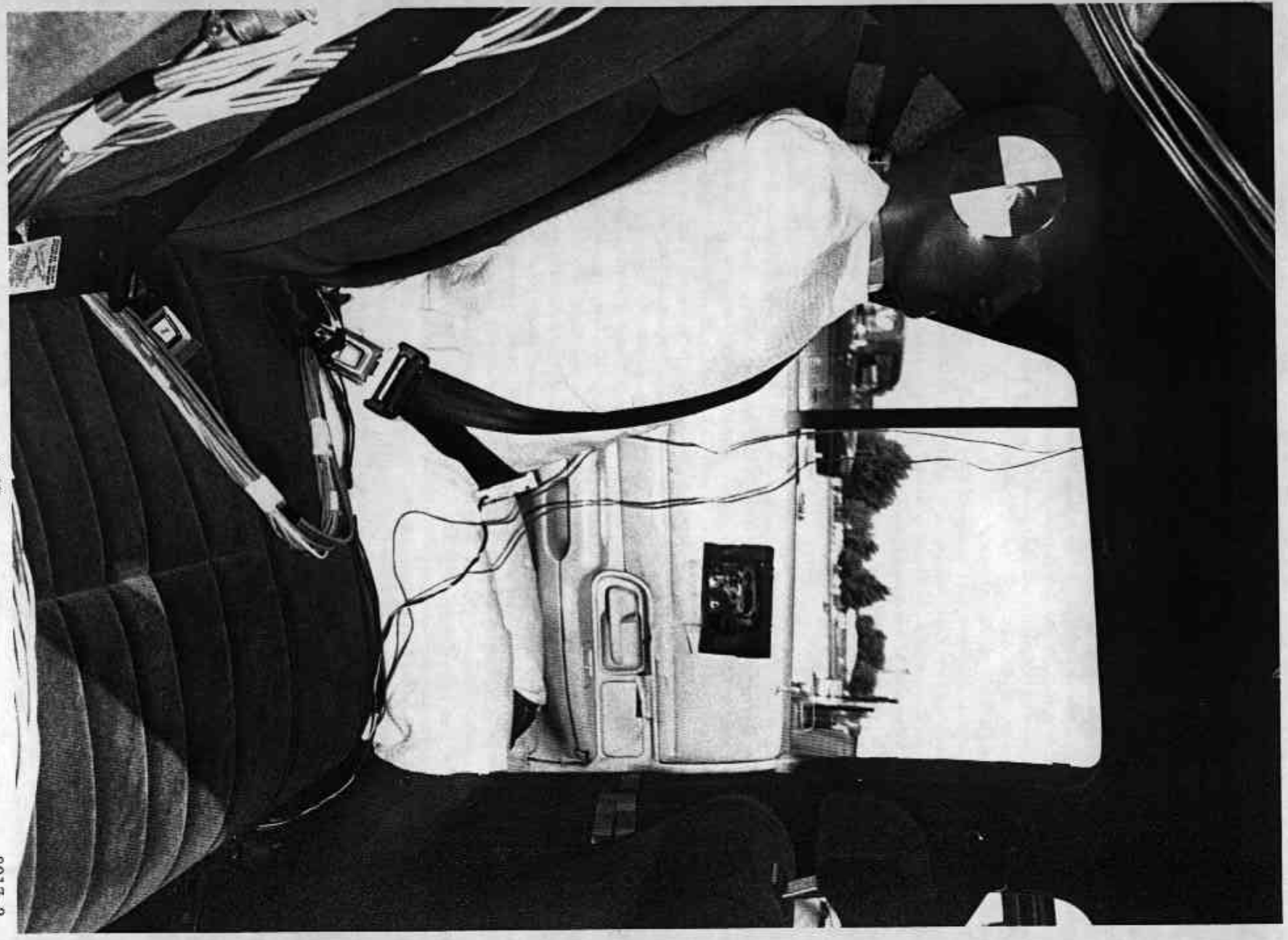
Figure A-22 POST-TEST POS. #1 DUMMY RIGHT SIDE VIEW

A-25

8017-2

Figure A-23 PRE-TEST POS. #1 DUMMY LEFT SIDE VIEW

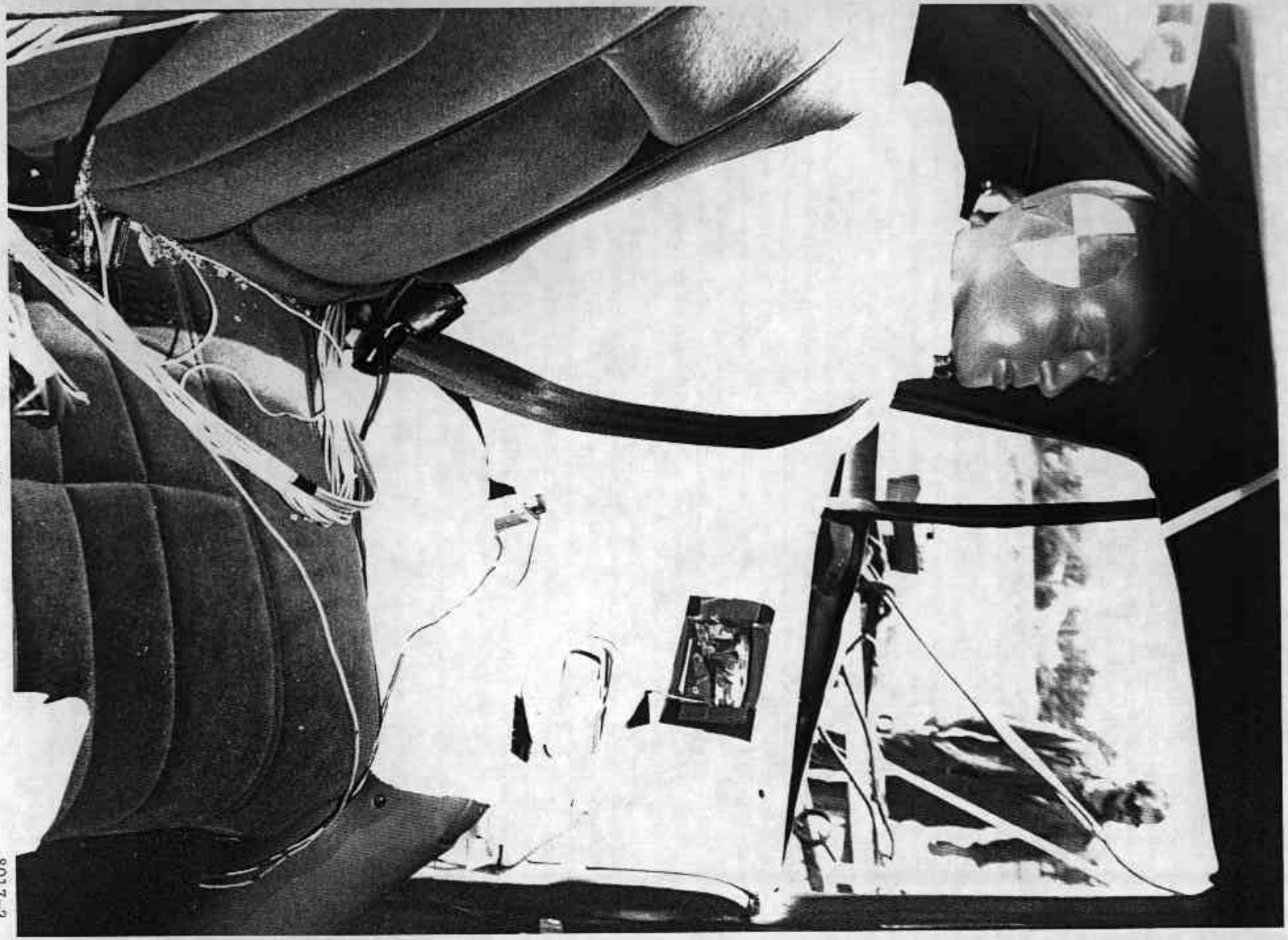
Figure A-24 POST-TEST POS. #1 DUMMY LEFT SIDE VIEW



A-27

8017-2

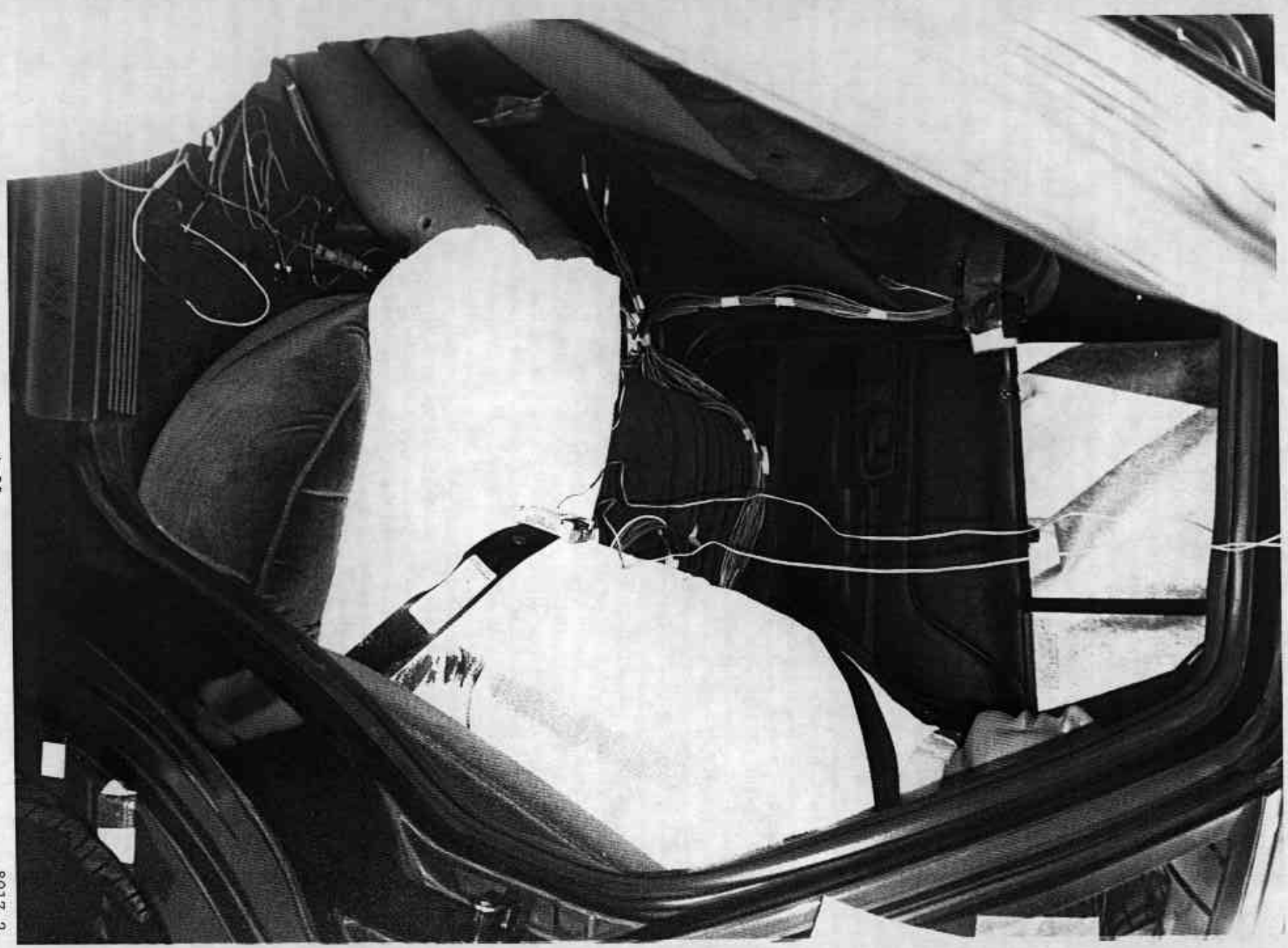
Figure A-25 PRE-TEST POS. #4 DUMMY RIGHT SIDE VIEW



A-28

8017-2

Figure A-26 POST-TEST POS. #4 DUMMY RIGHT SIDE VIEW



8017-2

Figure A-27 PRE-TEST POS. #4 DUMMY LEFT SIDE VIEW

Figure A-28 POST-TEST POS. #4 DUMMY LEFT SIDE VIEW

Figure A-29 TEST VEHICLE'S CERTIFICATION LABEL

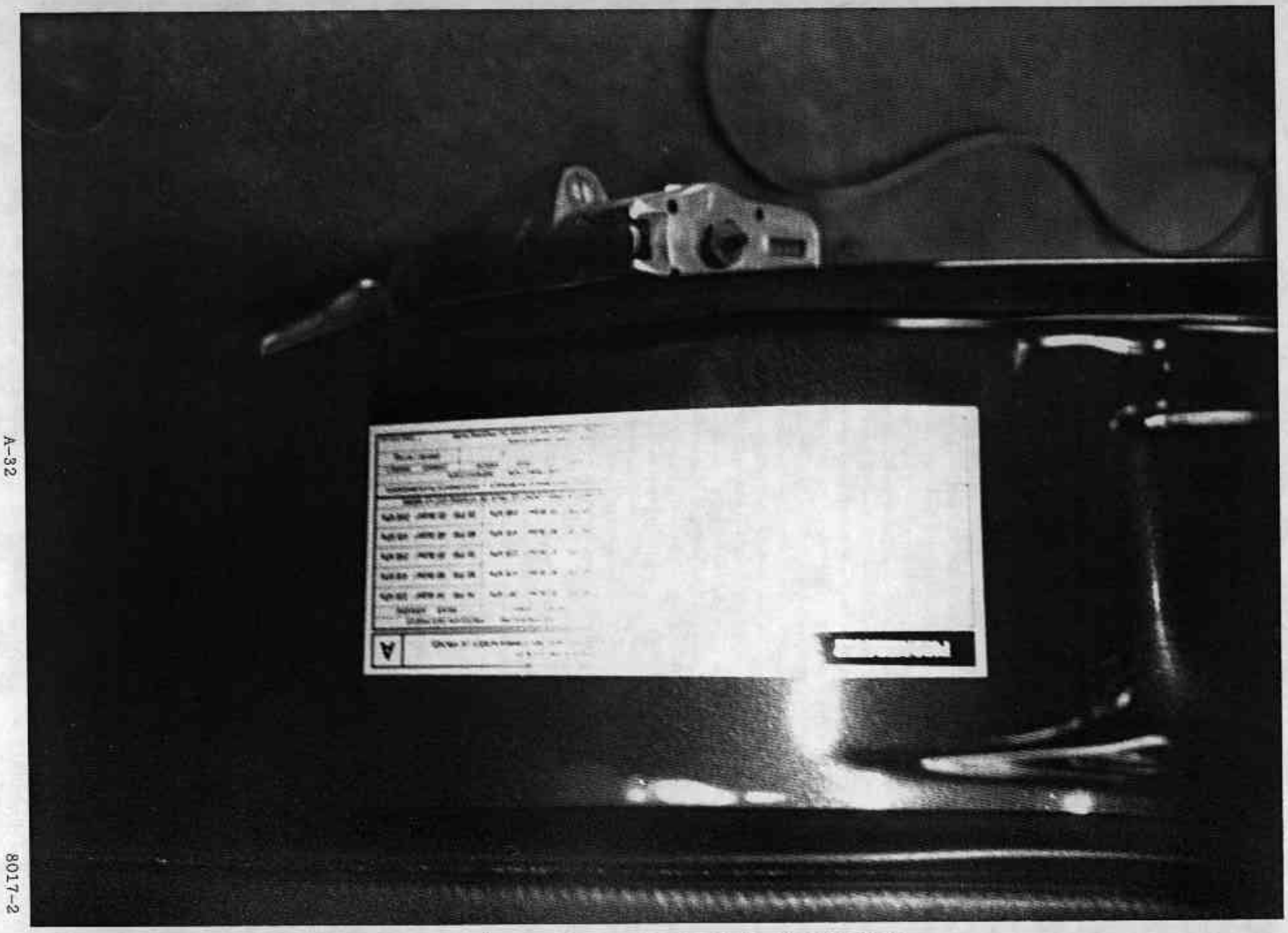


Figure A-30 TEST VEHICLE'S TIRE PLACARD

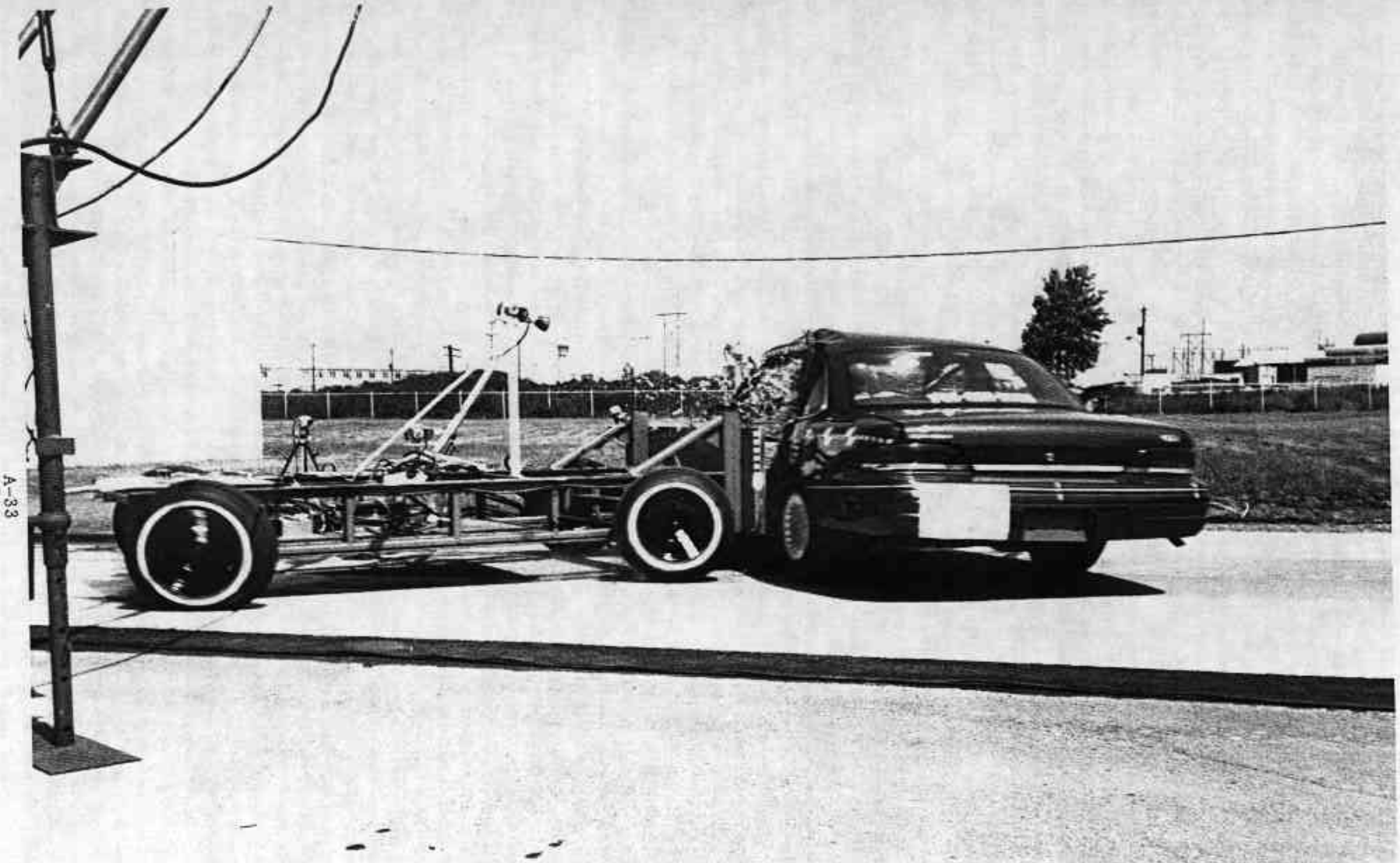


Figure A-31 IMPACT PHOTO

8017-2

Appendix B

DATA PLOTS

All vehicle data and dummy head and chest deflection data were filtered following SAE J211b. Data from the Side Impact Dummies' thorax and pelvis were filtered in the following manner:

a. Filter the data with a 300 Hz SAE Class 180 filter;

b. Subsample the data to a 1600 Hz sampling rate; and

c. Filter the data with a Finite Impulse Response (FIR) filter having the following characteristics:

1.	Passband frequency	100 Hz
2.	Stopband frequency	189 Hz
3.	Stopband gain	-50 dB
4.	Passband ripple	0.0225 dB

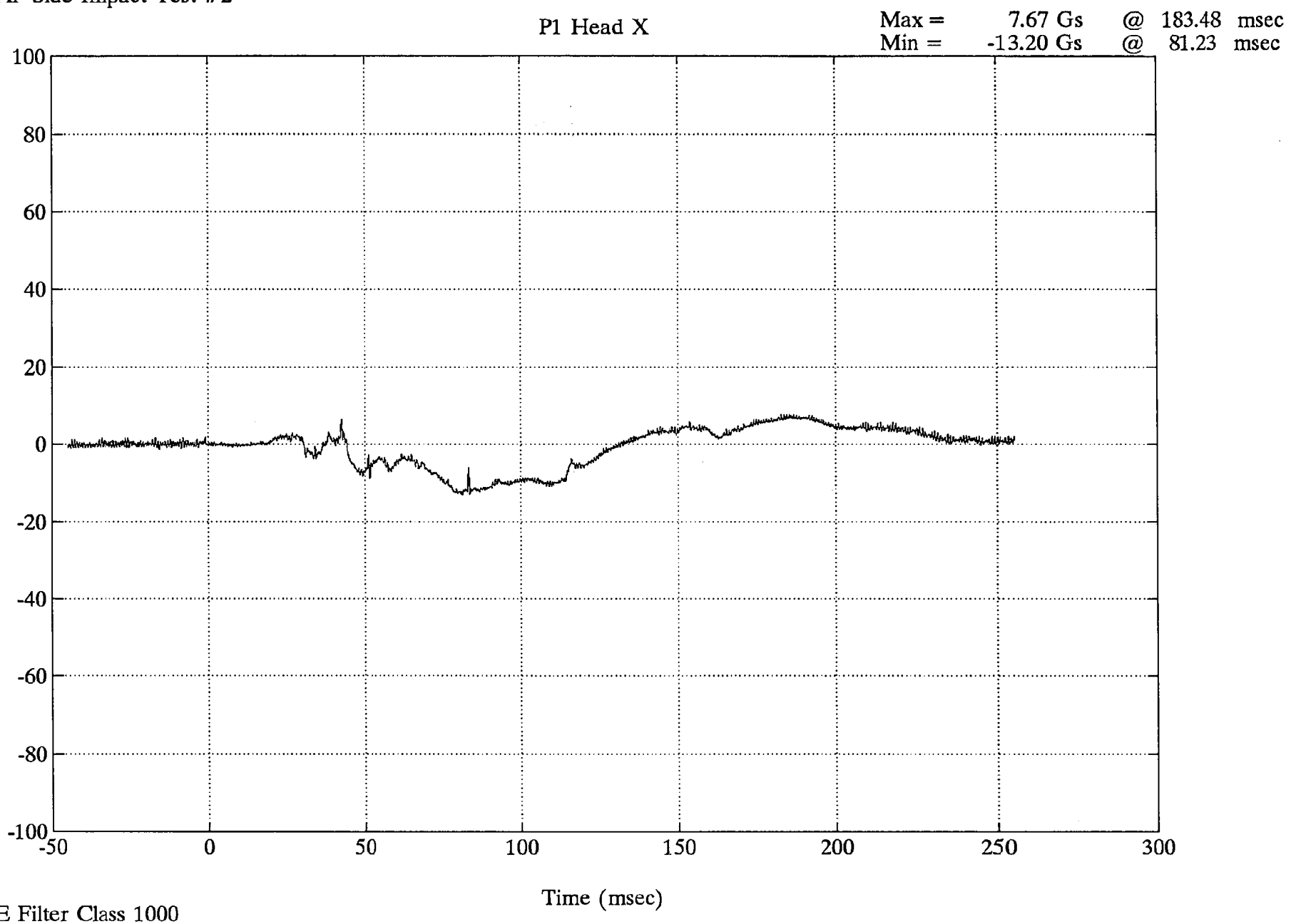
FIR filtered data is so noted in this appendix.

DUMMY DATA

P1 - DRIVER

P4 - LEFT REAR PASSENGER

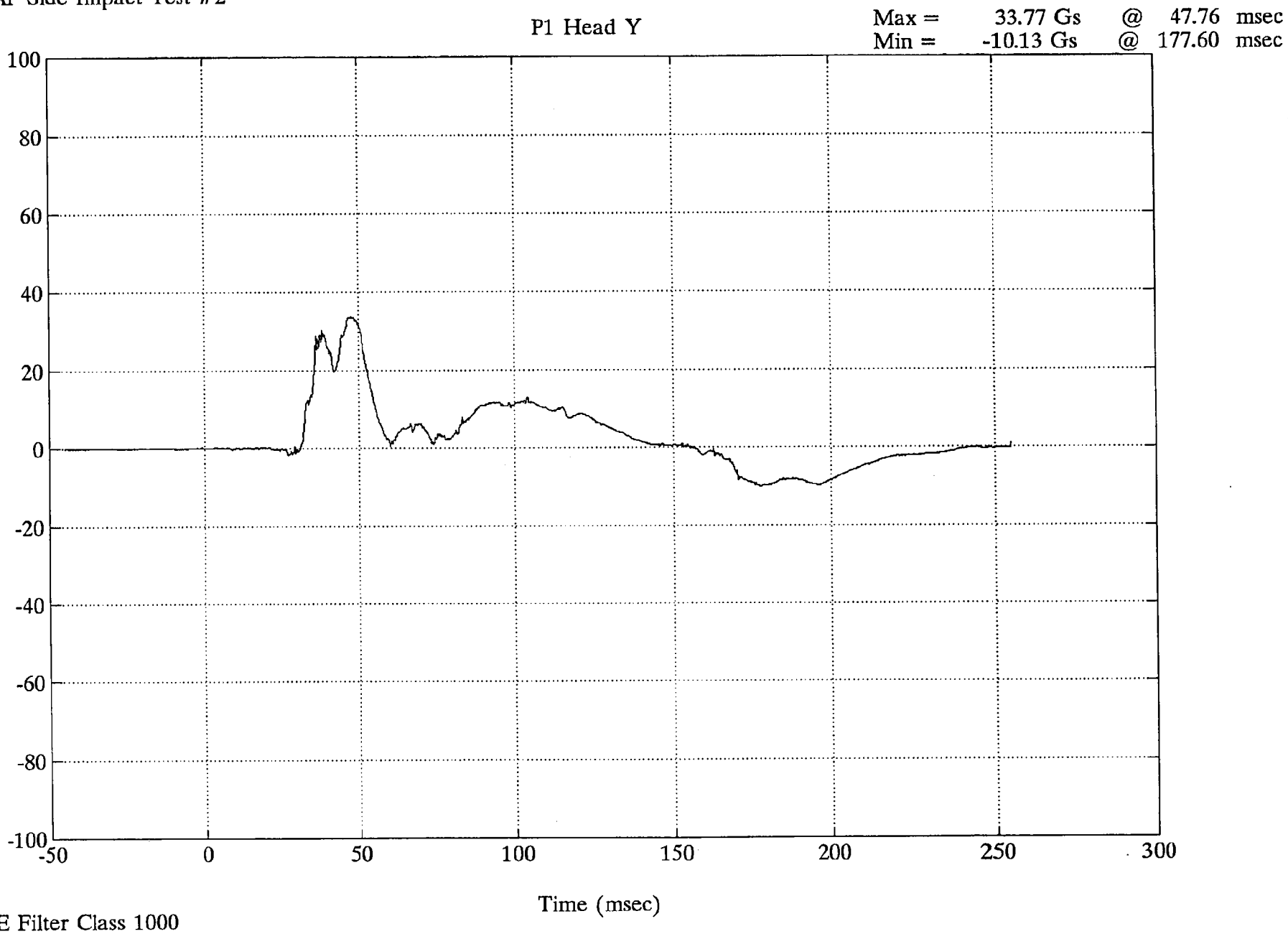
NCAP Side Impact Test #2



SAE Filter Class 1000

8017-2

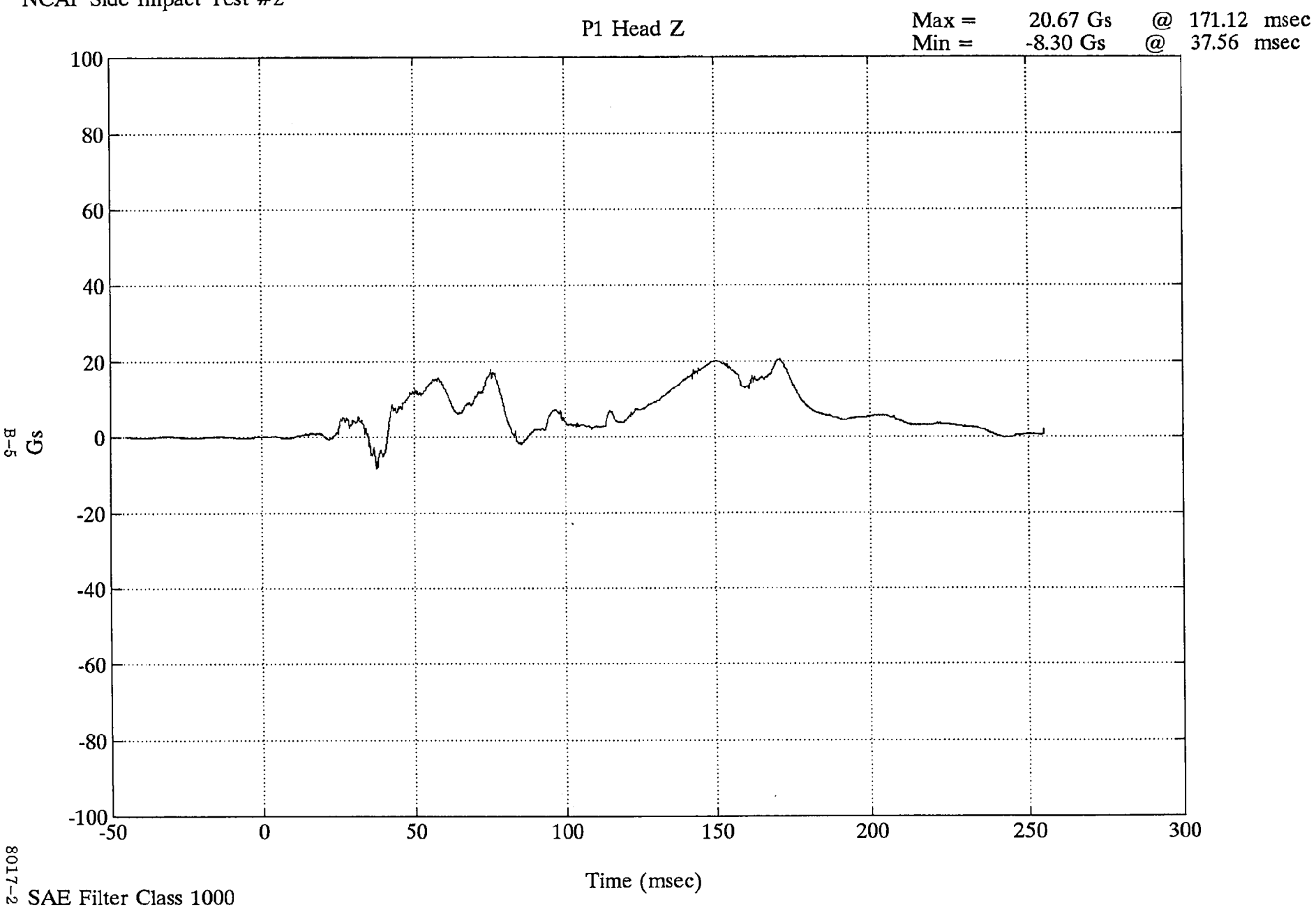
NCAP Side Impact Test #2



B-4

8017-2 SAE Filter Class 1000

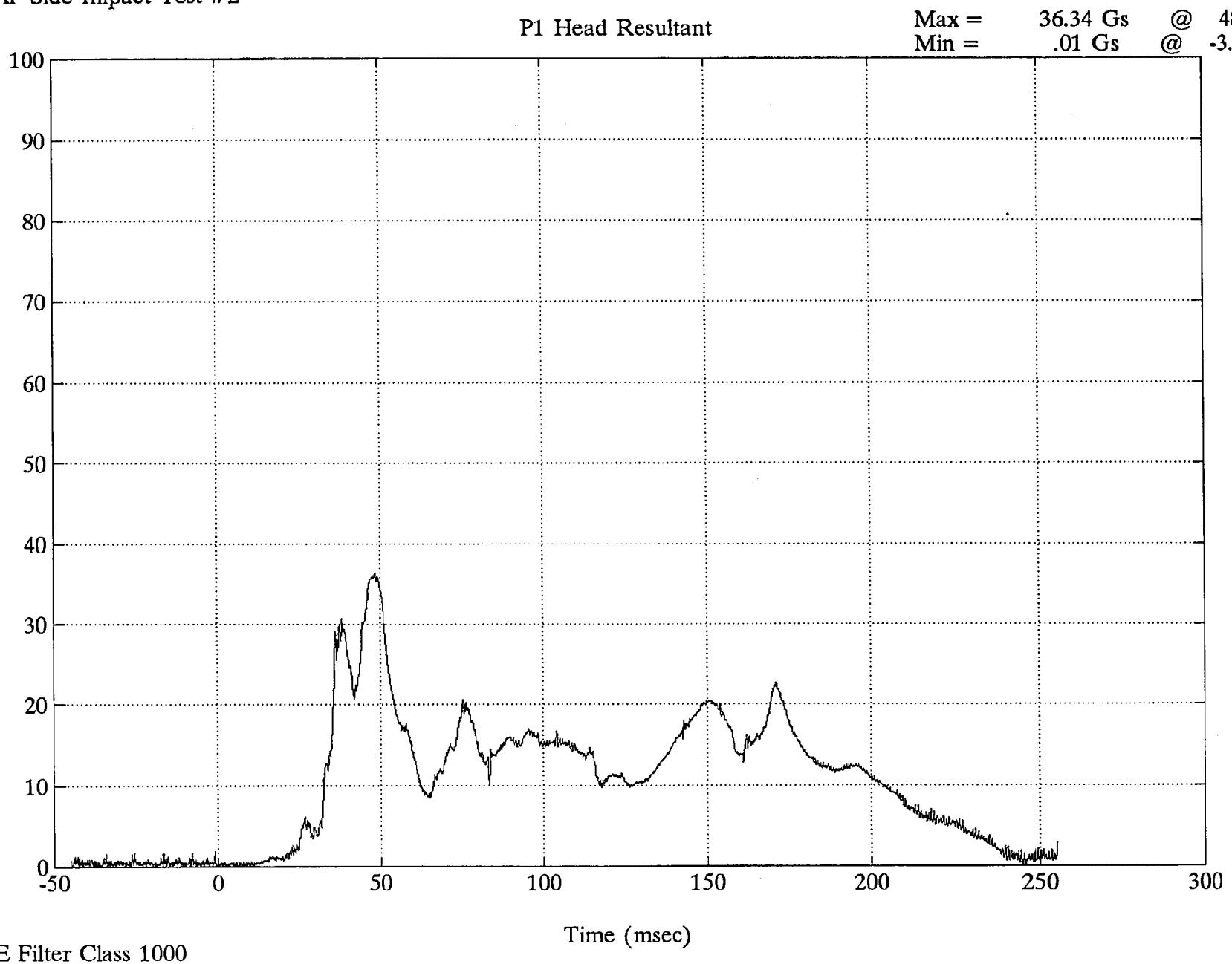
NCAP Side Impact Test #2



B-5

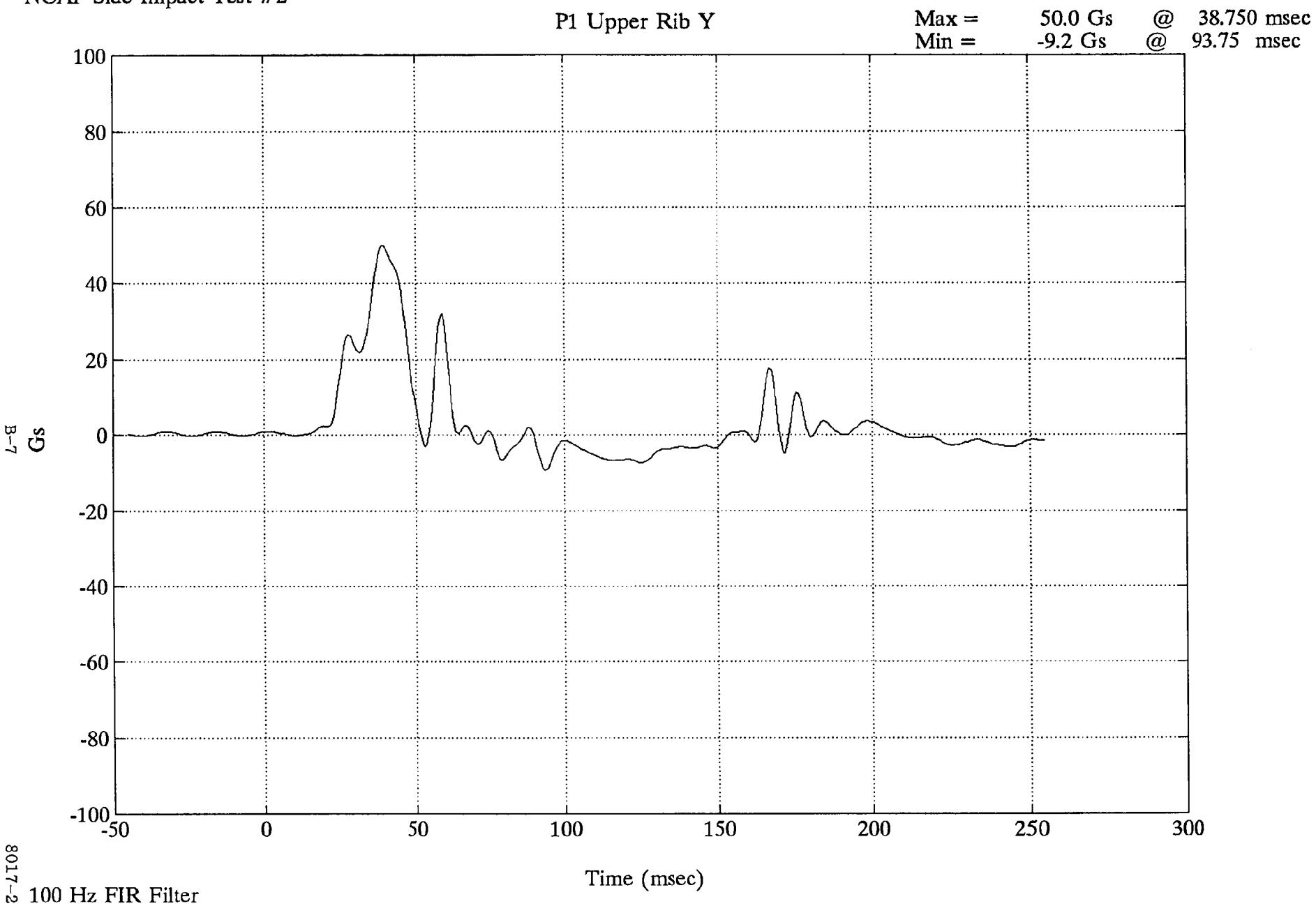
80172-2 SAE Filter Class 1000

NCAP Side Impact Test #2



SAE Filter Class 1000

NCAP Side Impact Test #2



B-7

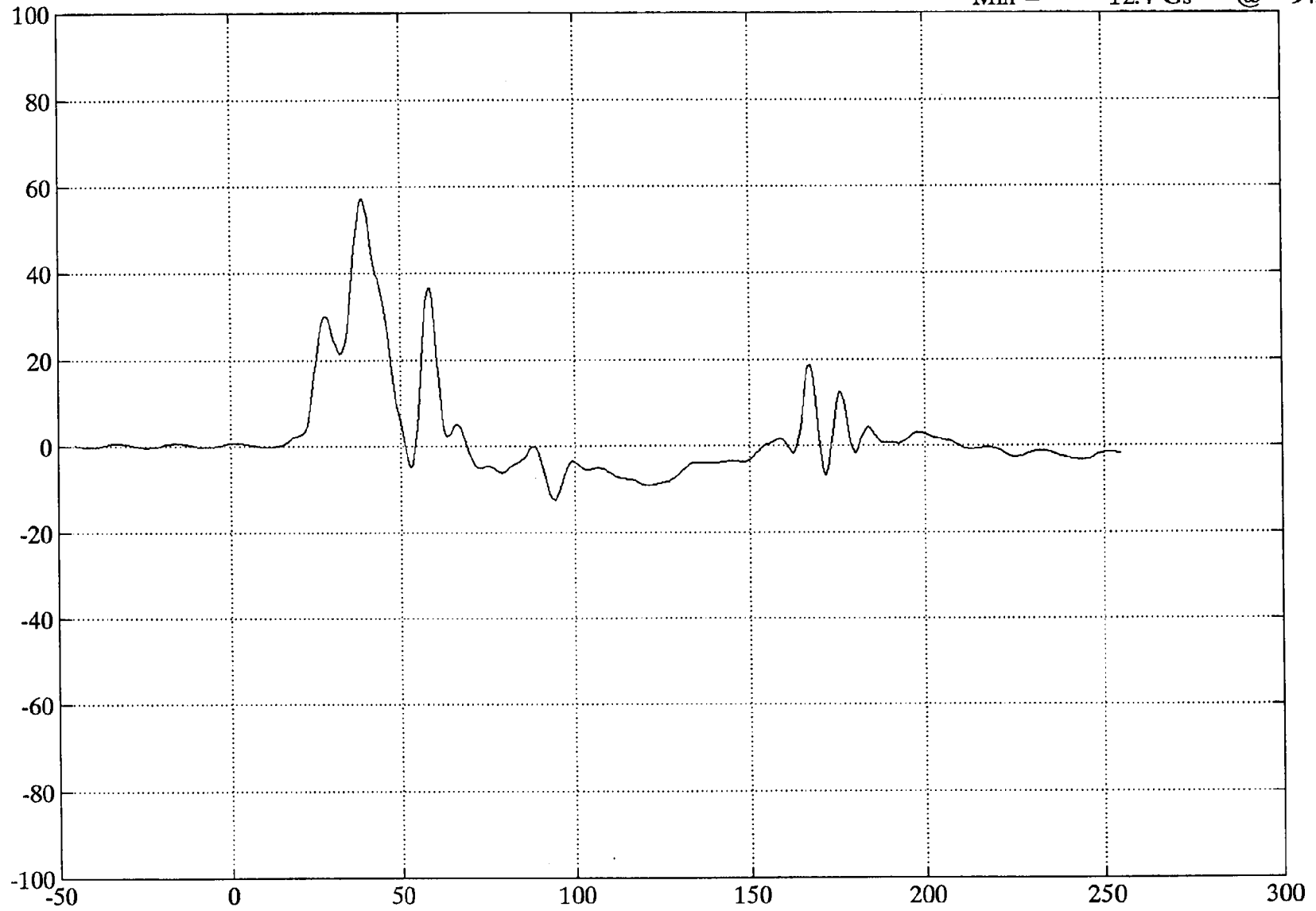
8017-2

100 Hz FIR Filter

NCAP Side Impact Test #2

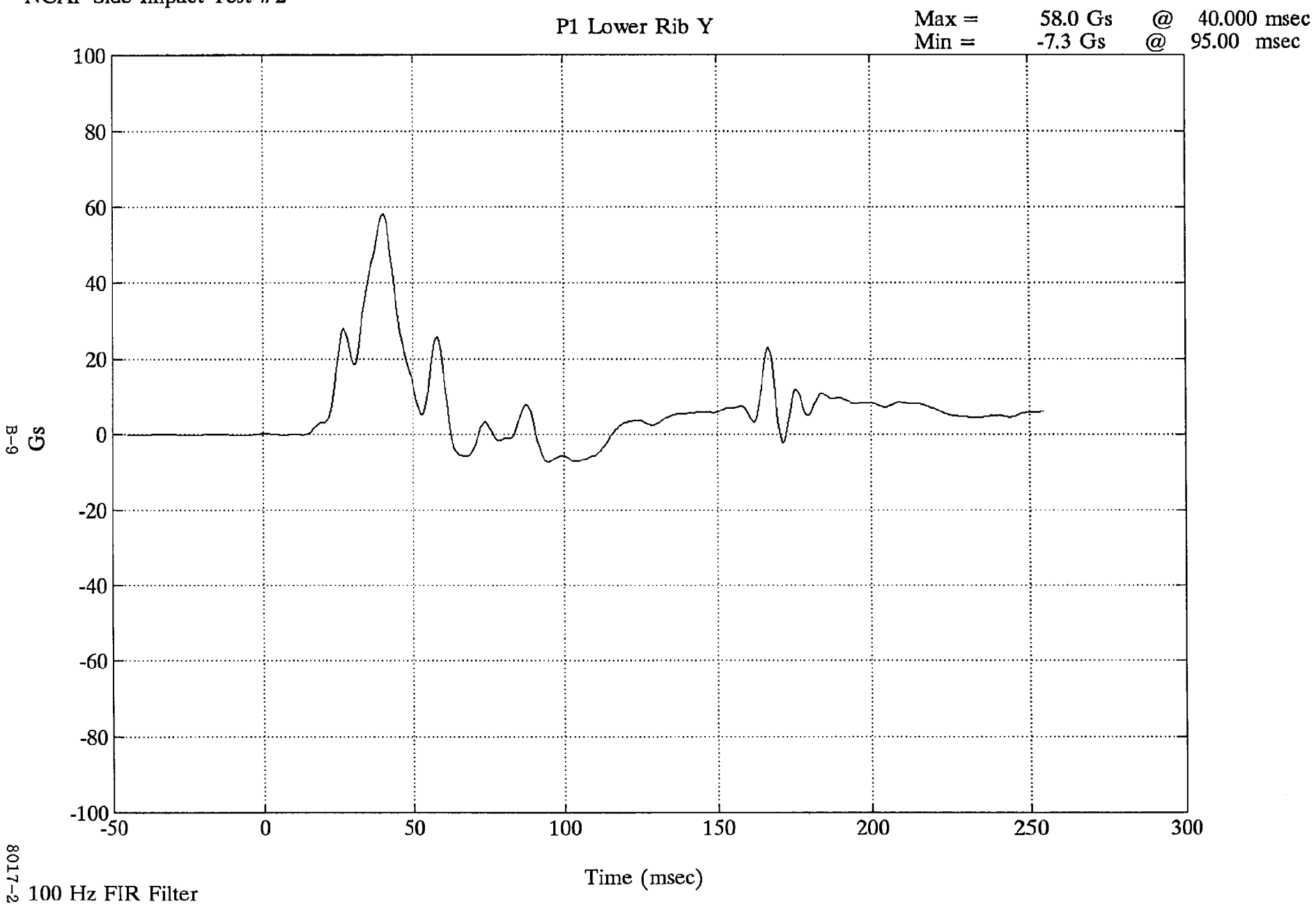
P1 Upper Rib Y(R)

Max = 57.2 Gs @ 38.750 msec
Min = -12.4 Gs @ 94.37 msec



8017-2 100 Hz FIR Filter

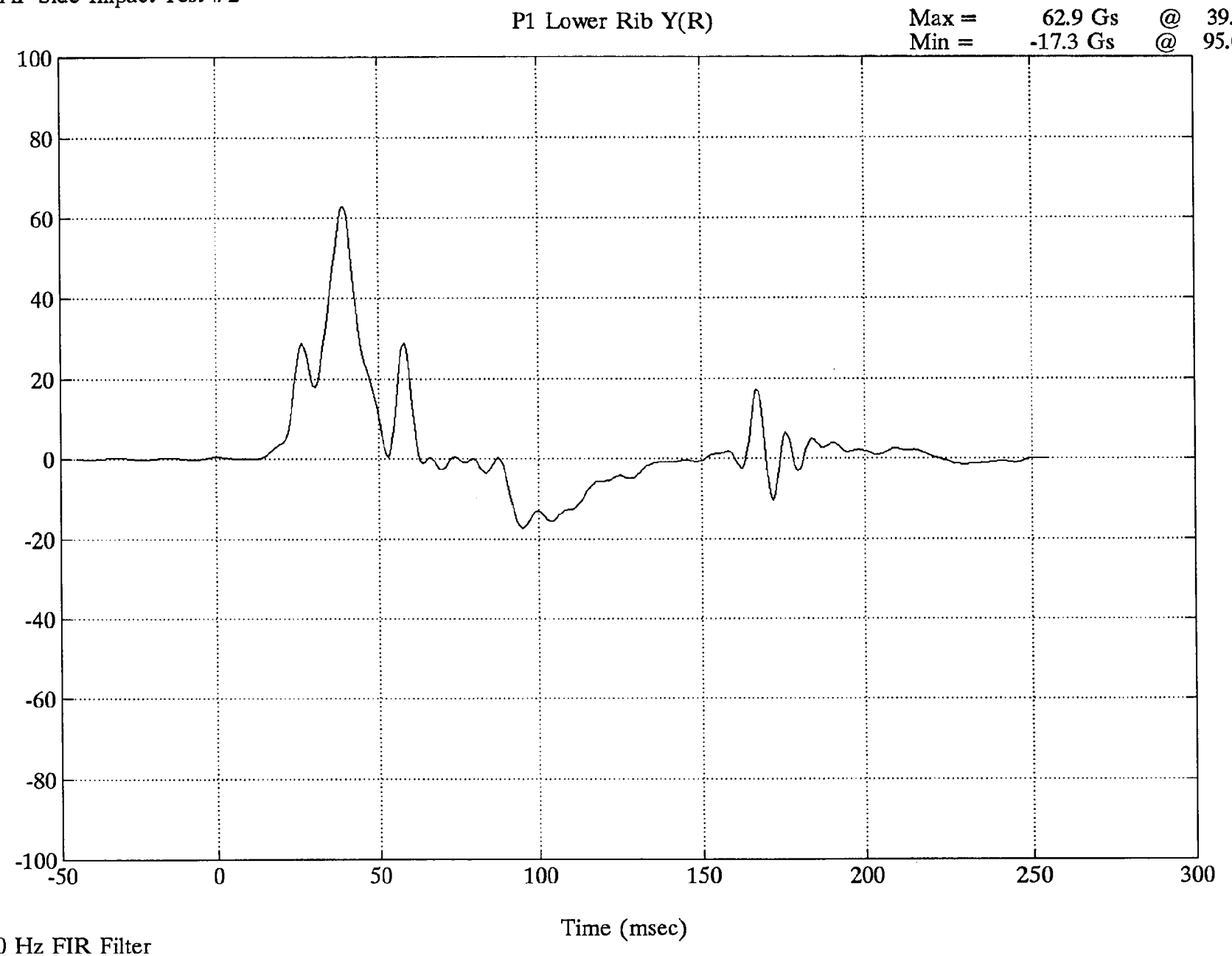
NCAP Side Impact Test #2



8017-2

100 Hz FIR Filter

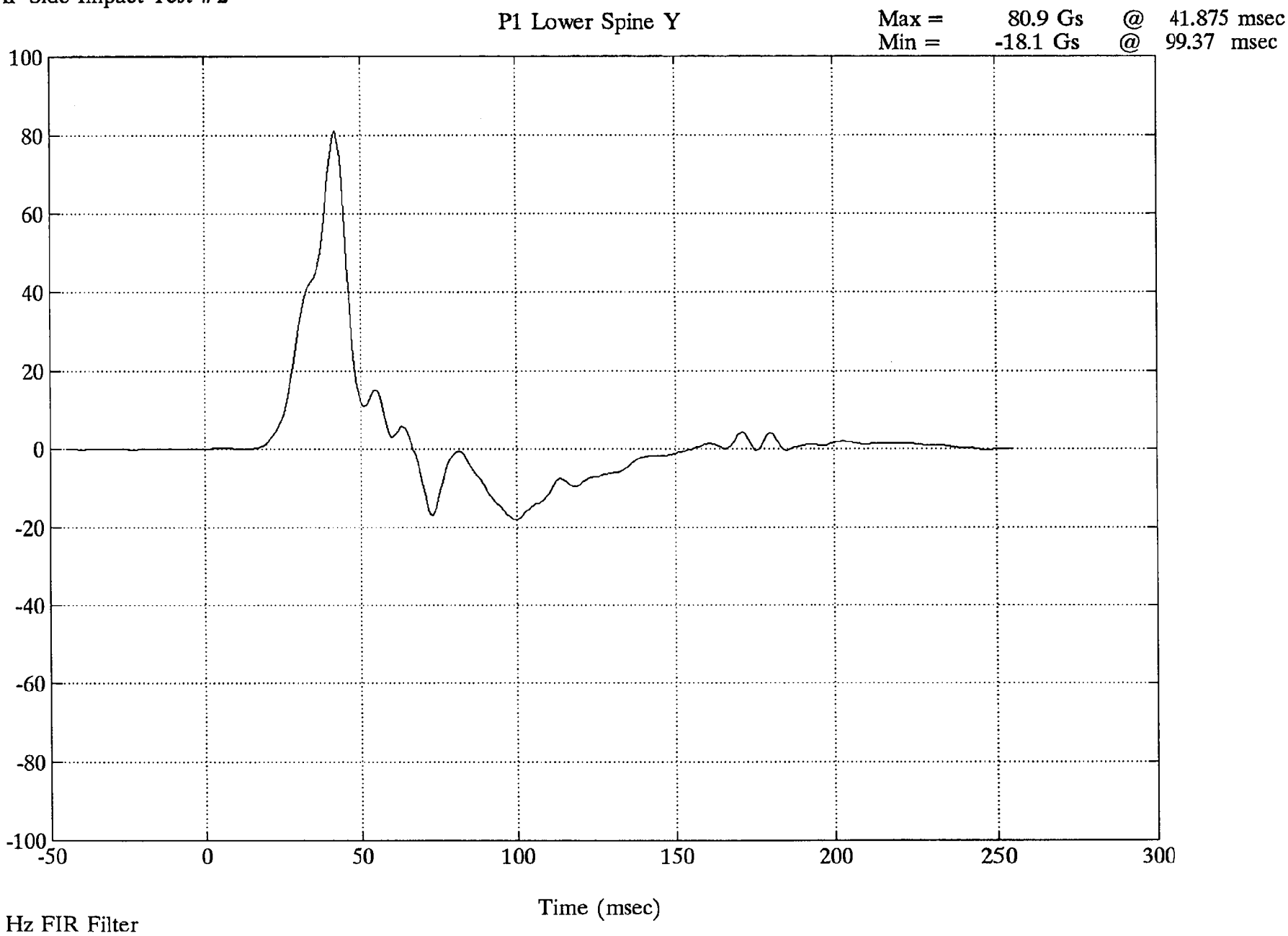
NCAP Side Impact Test #2



B-10

8017-2 100 Hz FIR Filter

NCAP Side Impact Test #2

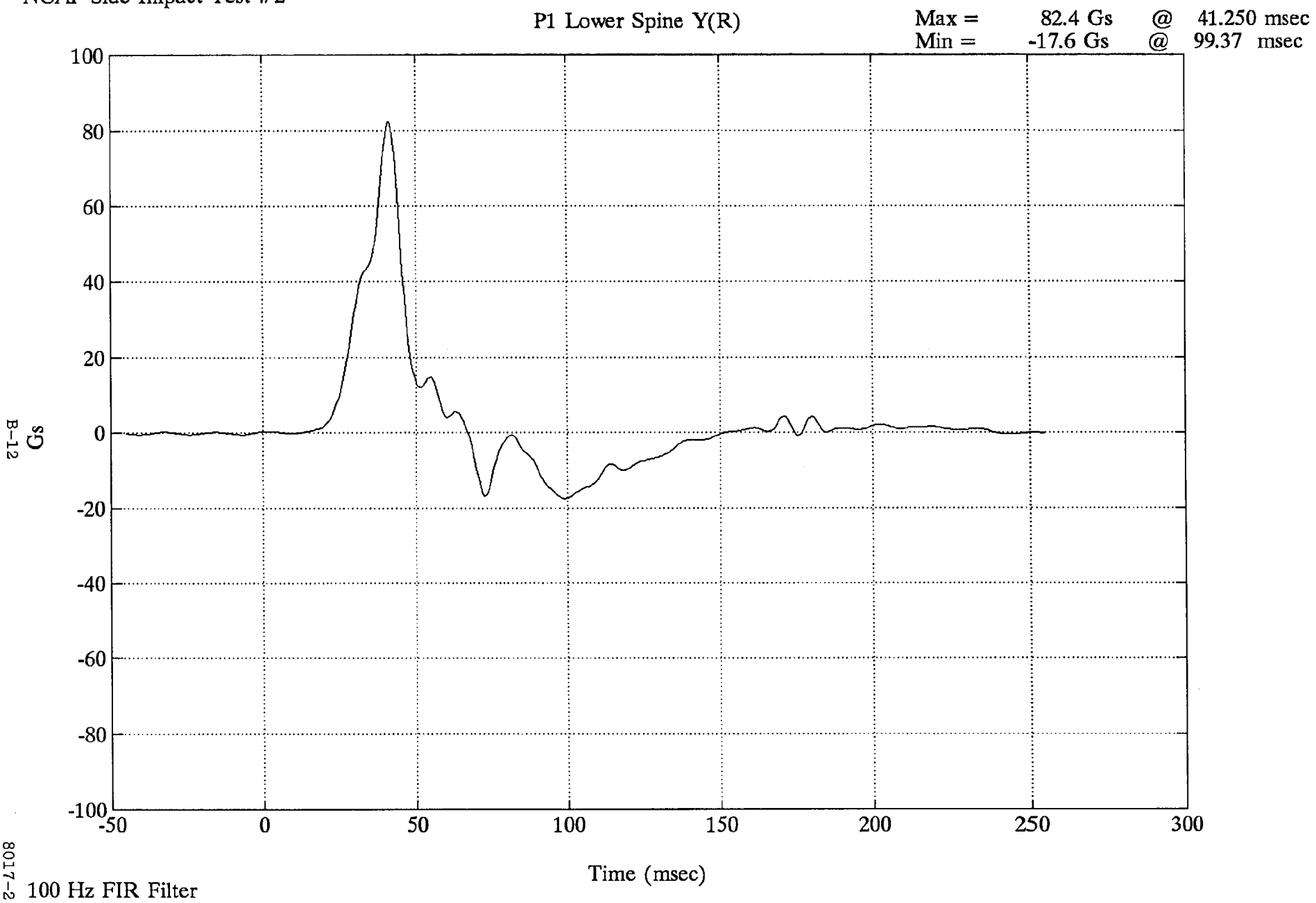


B-11

8017-2

100 Hz FIR Filter

NCAP Side Impact Test #2

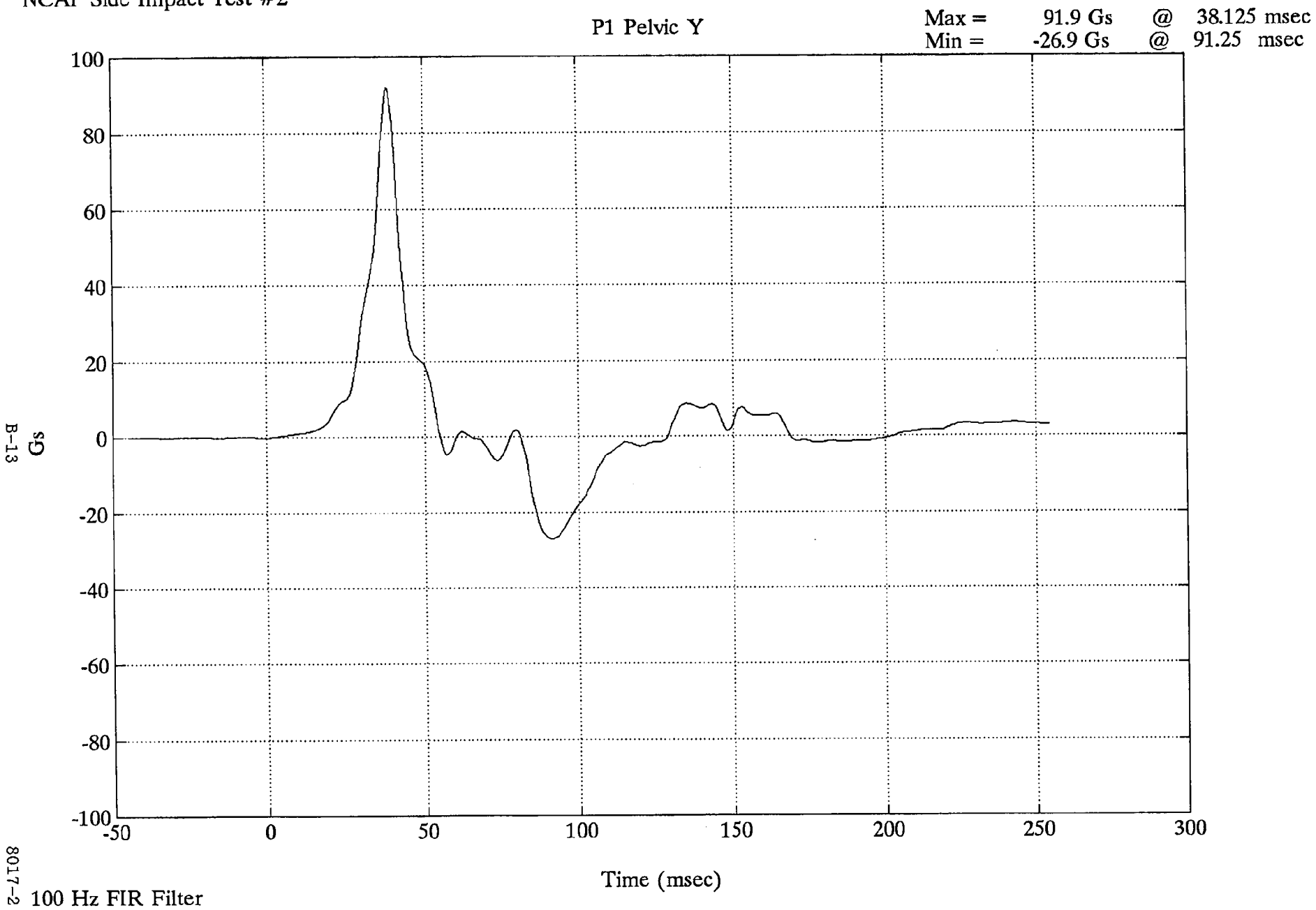


B-12

8017-2

100 Hz FIR Filter

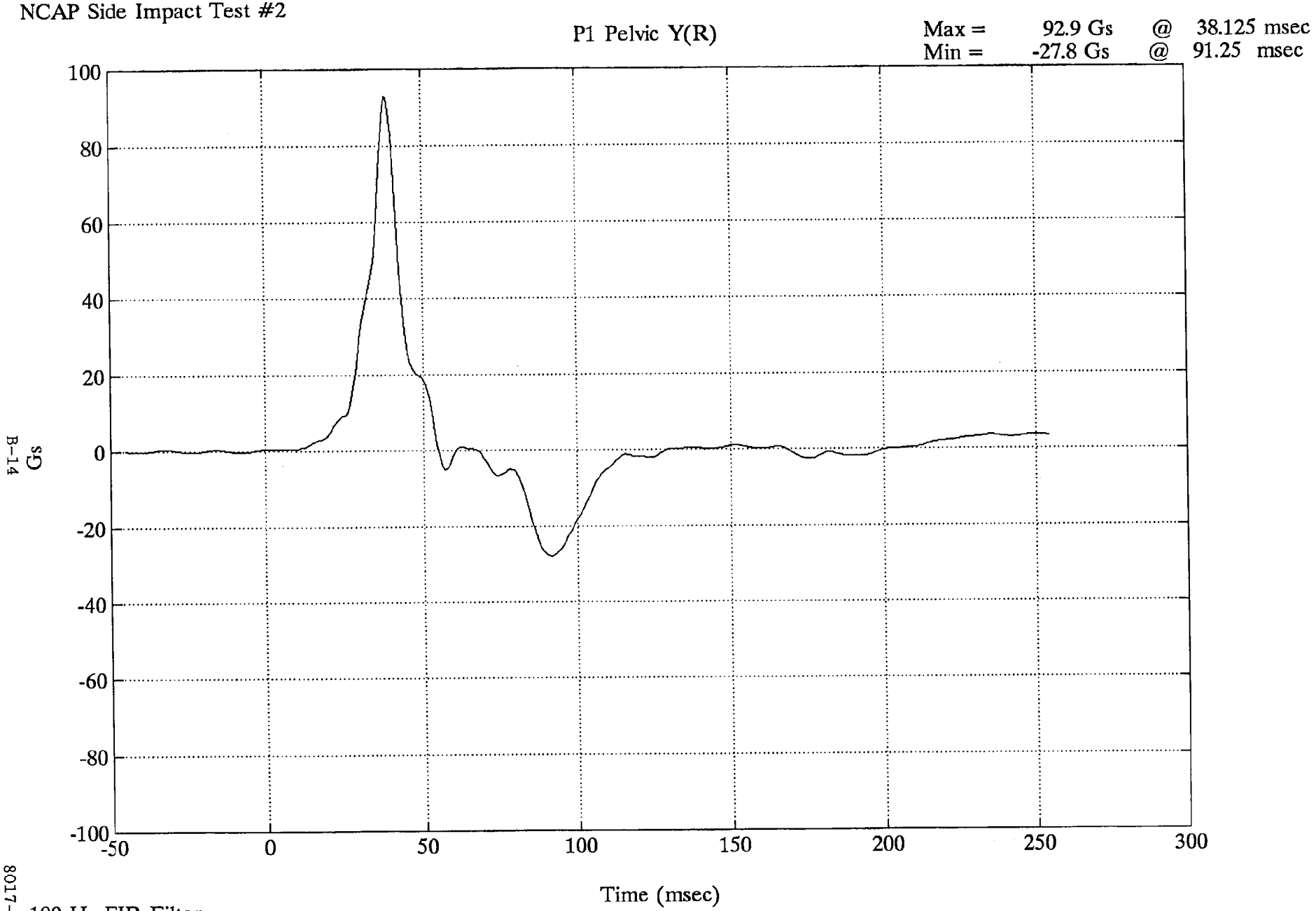
NCAP Side Impact Test #2



B-13

8017-2 100 Hz FIR Filter

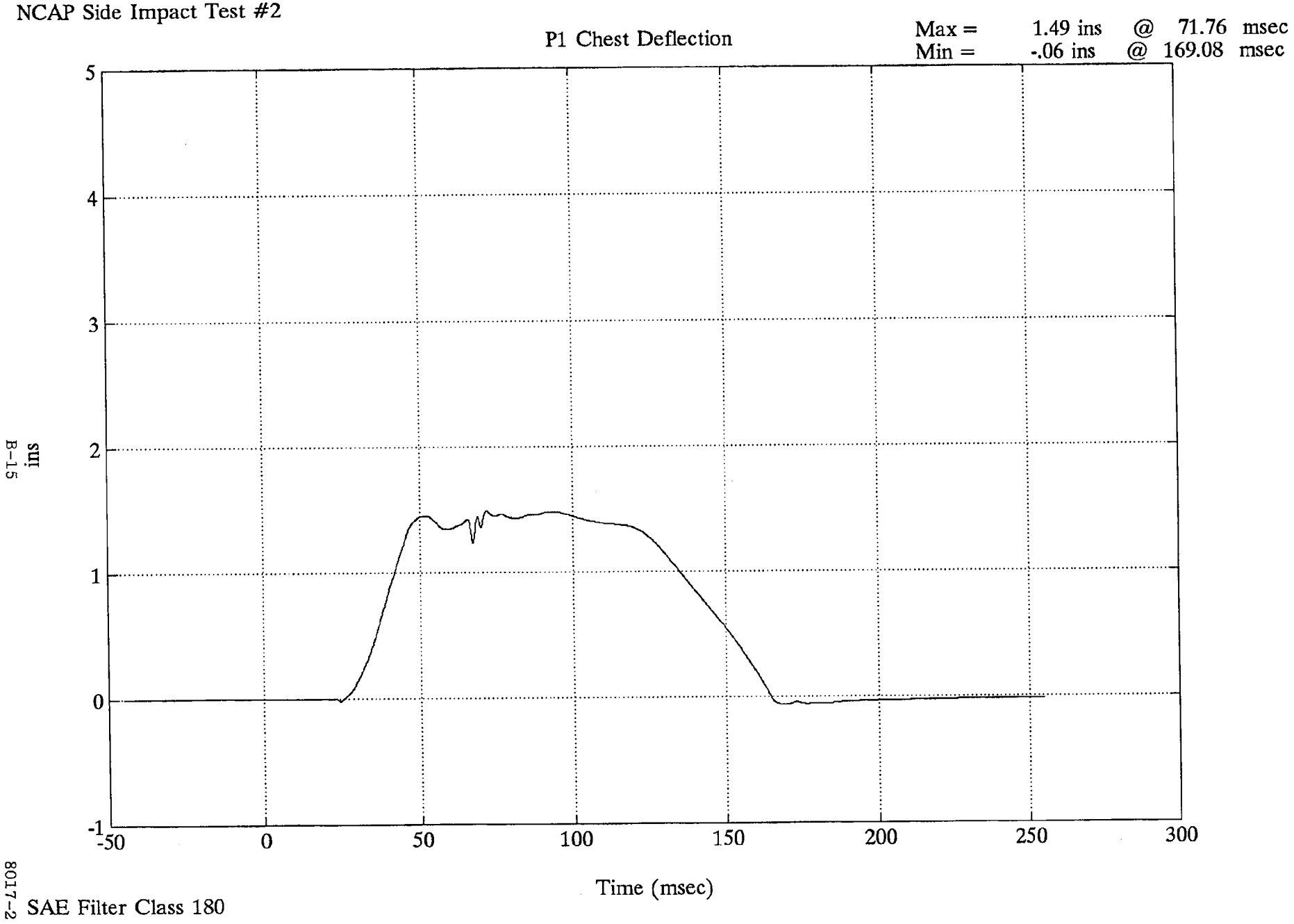
NCAP Side Impact Test #2



B-14

8017-2 100 Hz FIR Filter

NCAP Side Impact Test #2

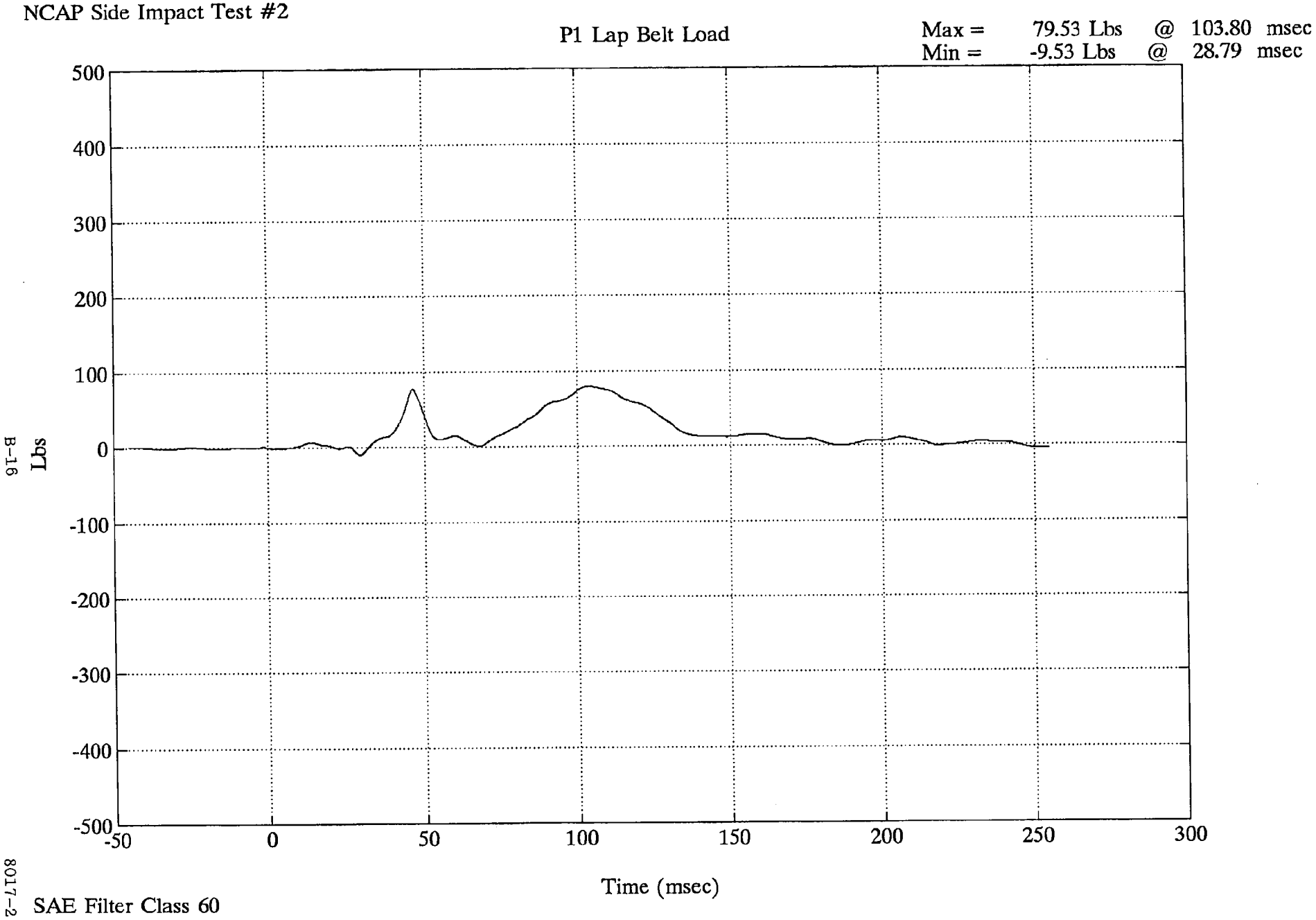


B-15

8017-2

SAE Filter Class 180

NCAP Side Impact Test #2

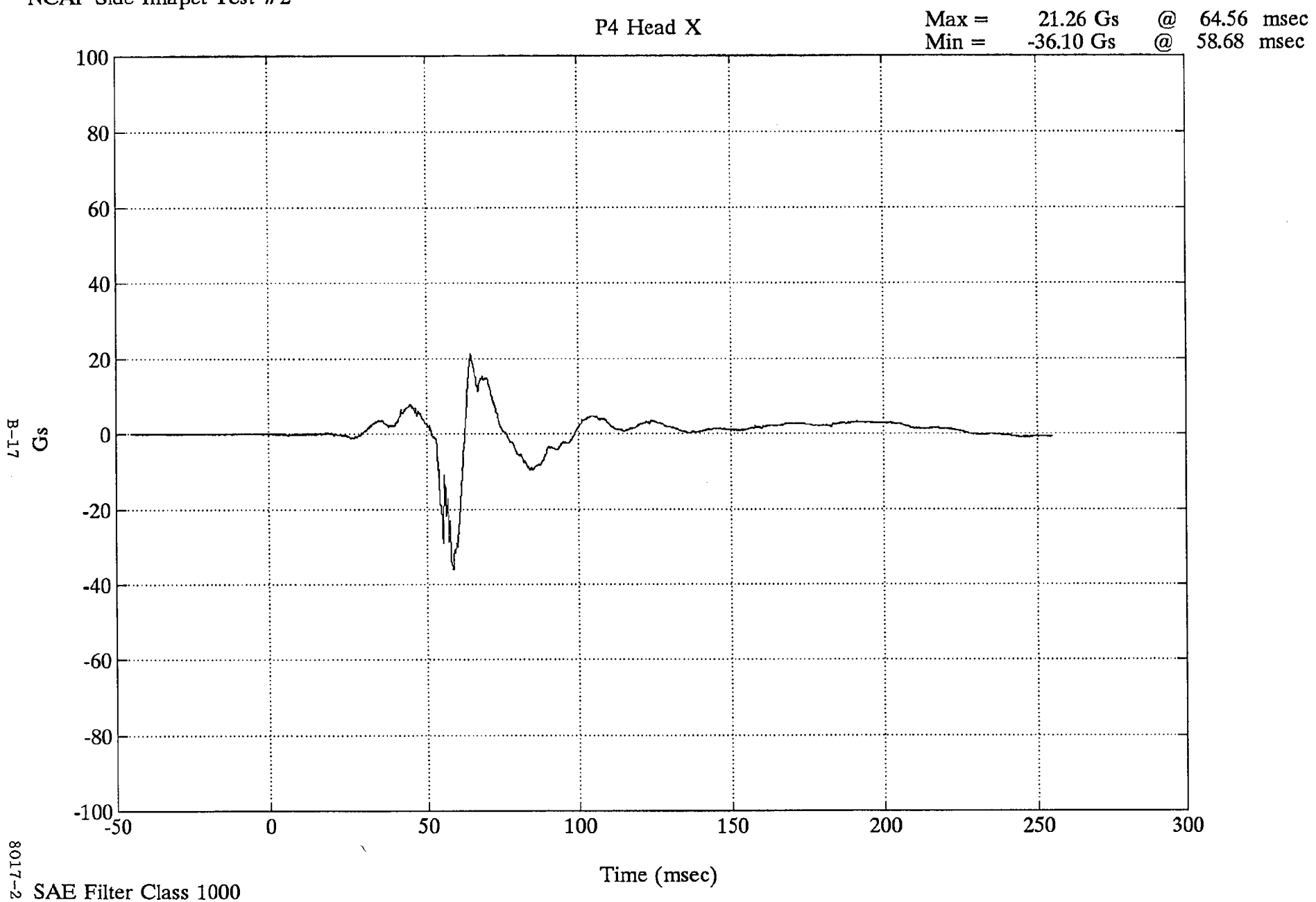


B-16

8017-2

SAE Filter Class 60

NCAP Side Imapct Test #2

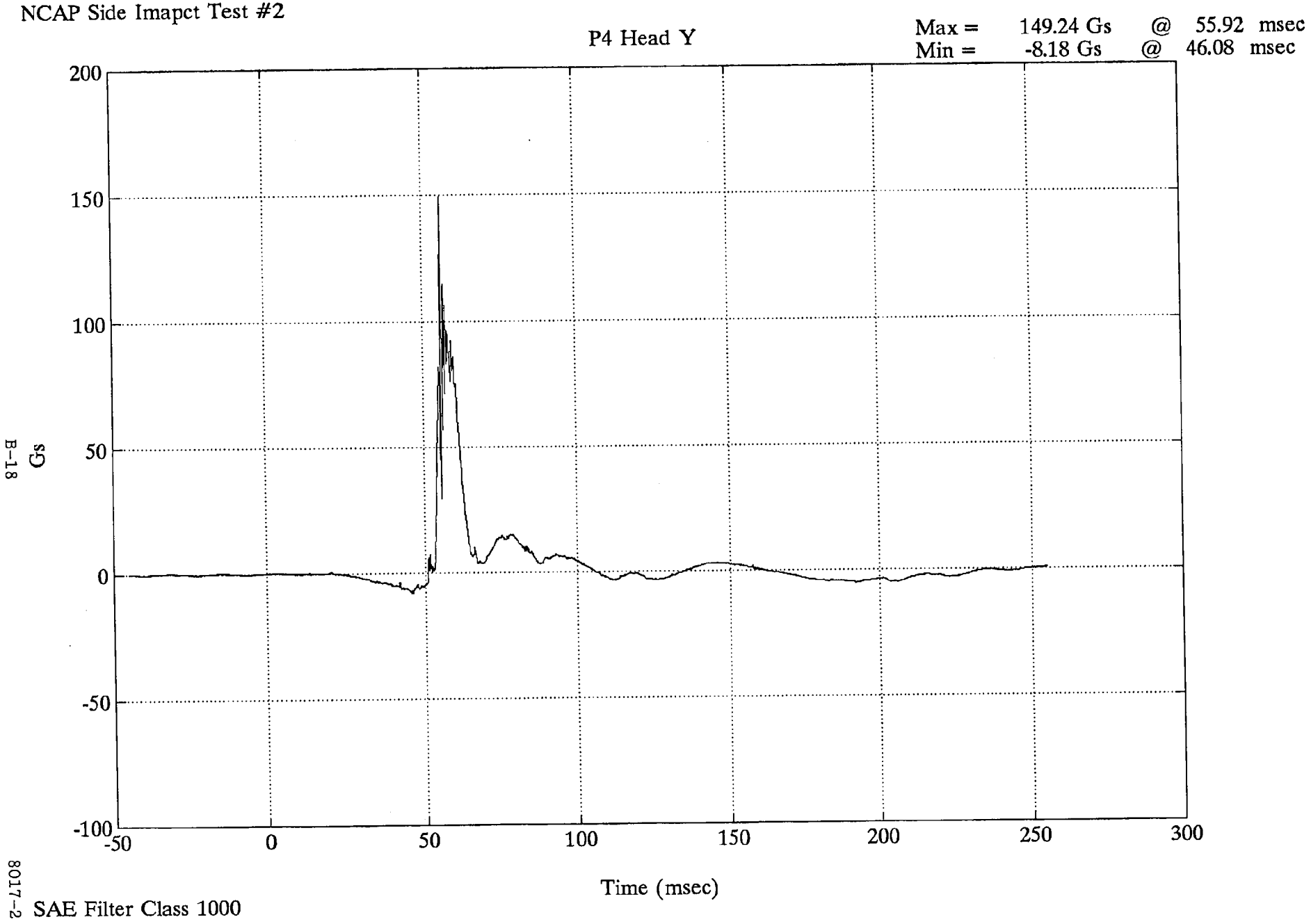


B-17

8017-2

SAE Filter Class 1000

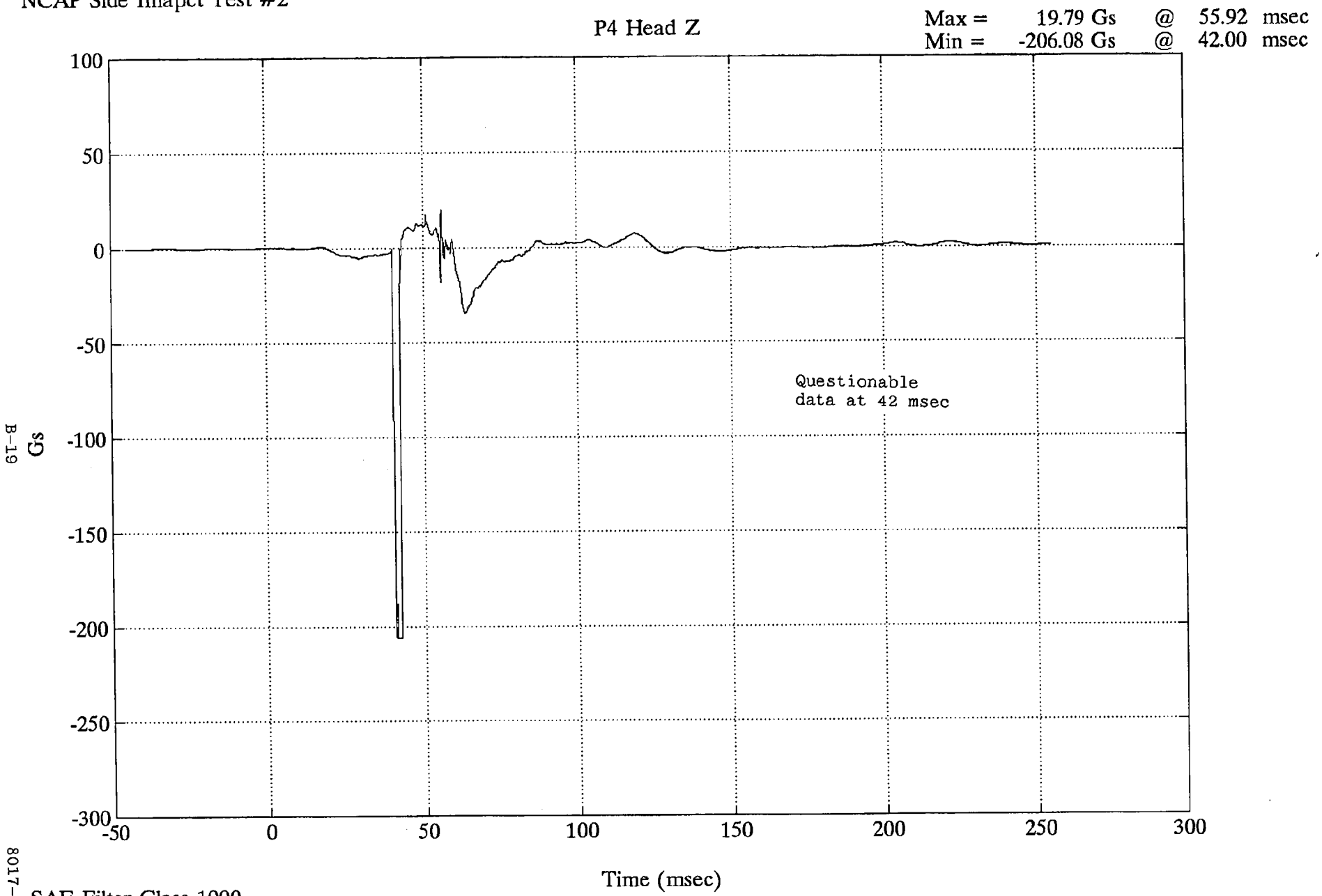
NCAP Side Imapct Test #2



B-18

8017-2 SAE Filter Class 1000

NCAP Side Imapct Test #2

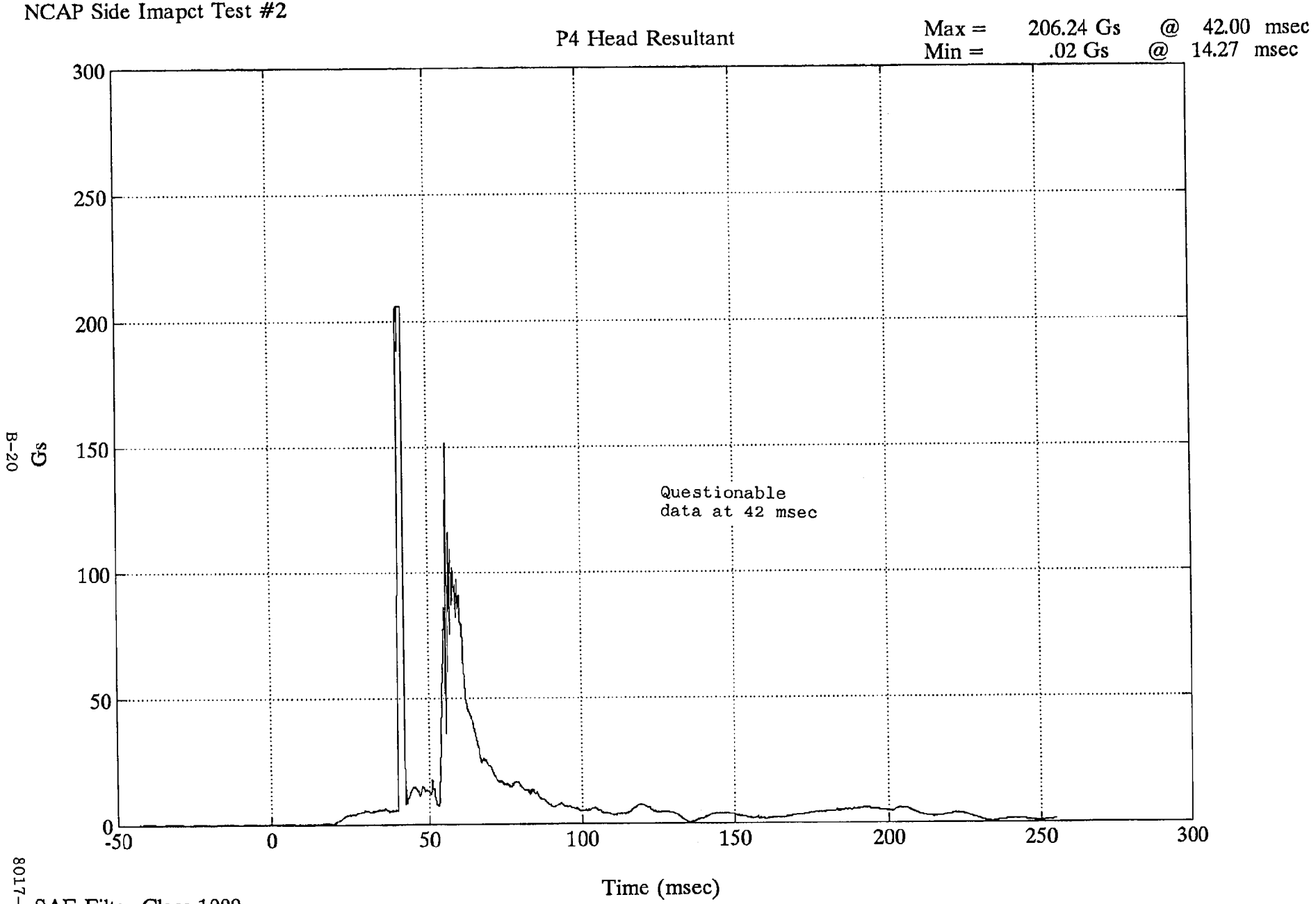


B-19

8017-2

SAE Filter Class 1000

NCAP Side Imapct Test #2



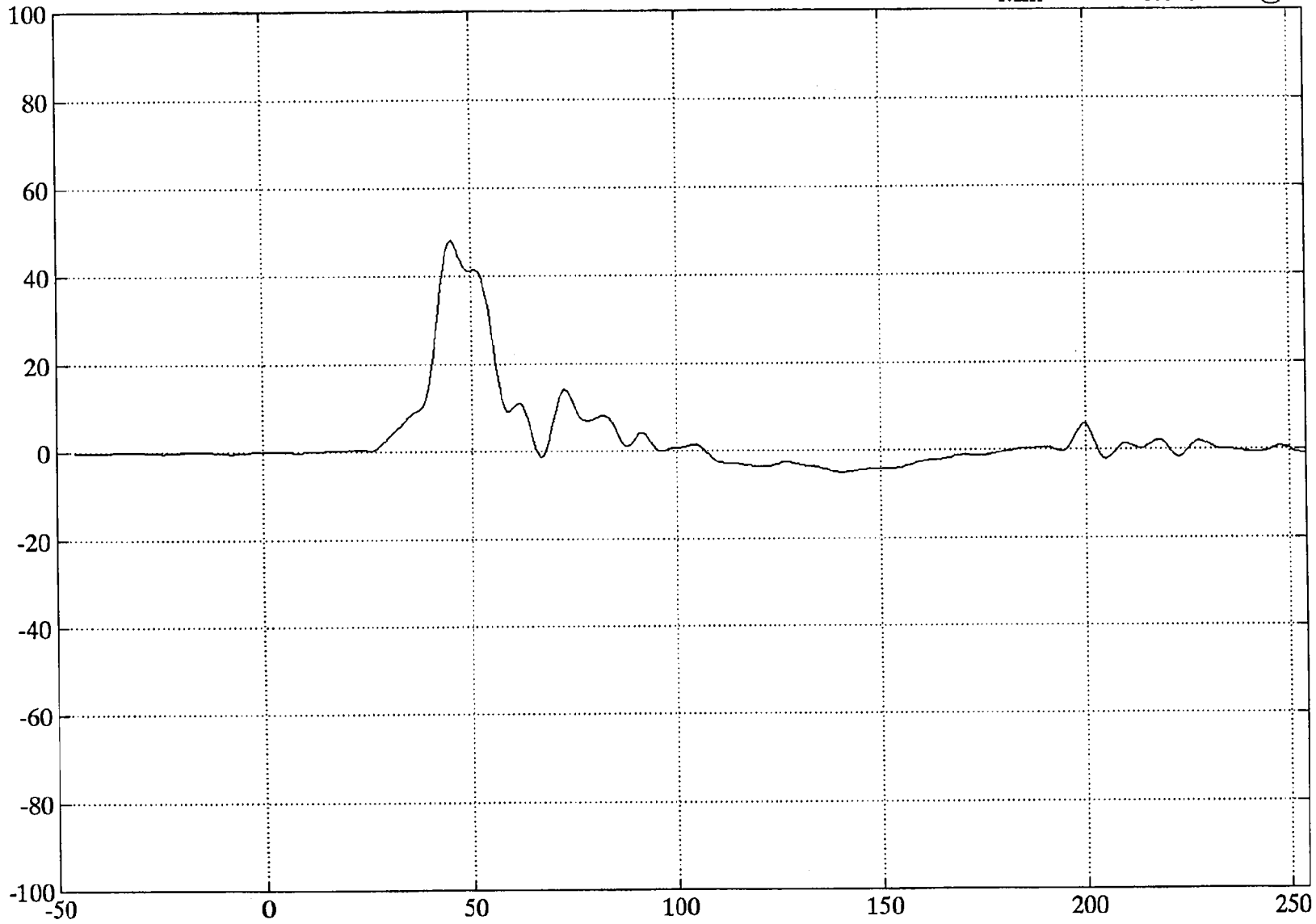
B-20

8017-2 SAE Filter Class 1000

NCAP Side Imapct Test #2

P4 Upper Rib Y

Max = 48.1 Gs @ 45.000 msec
Min = -5.0 Gs @ 140.62 msec

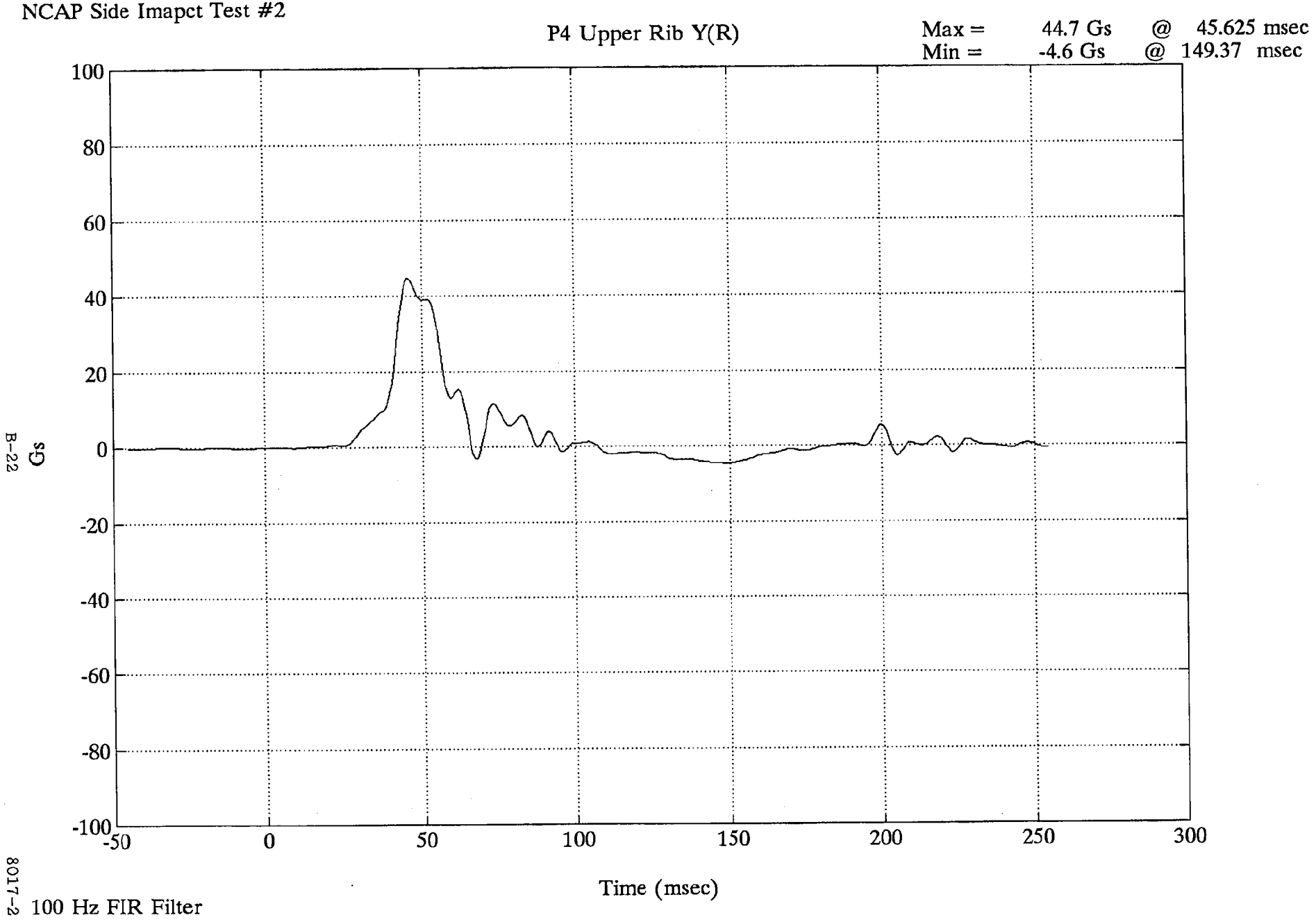


B-21

8017-2

100 Hz FIR Filter

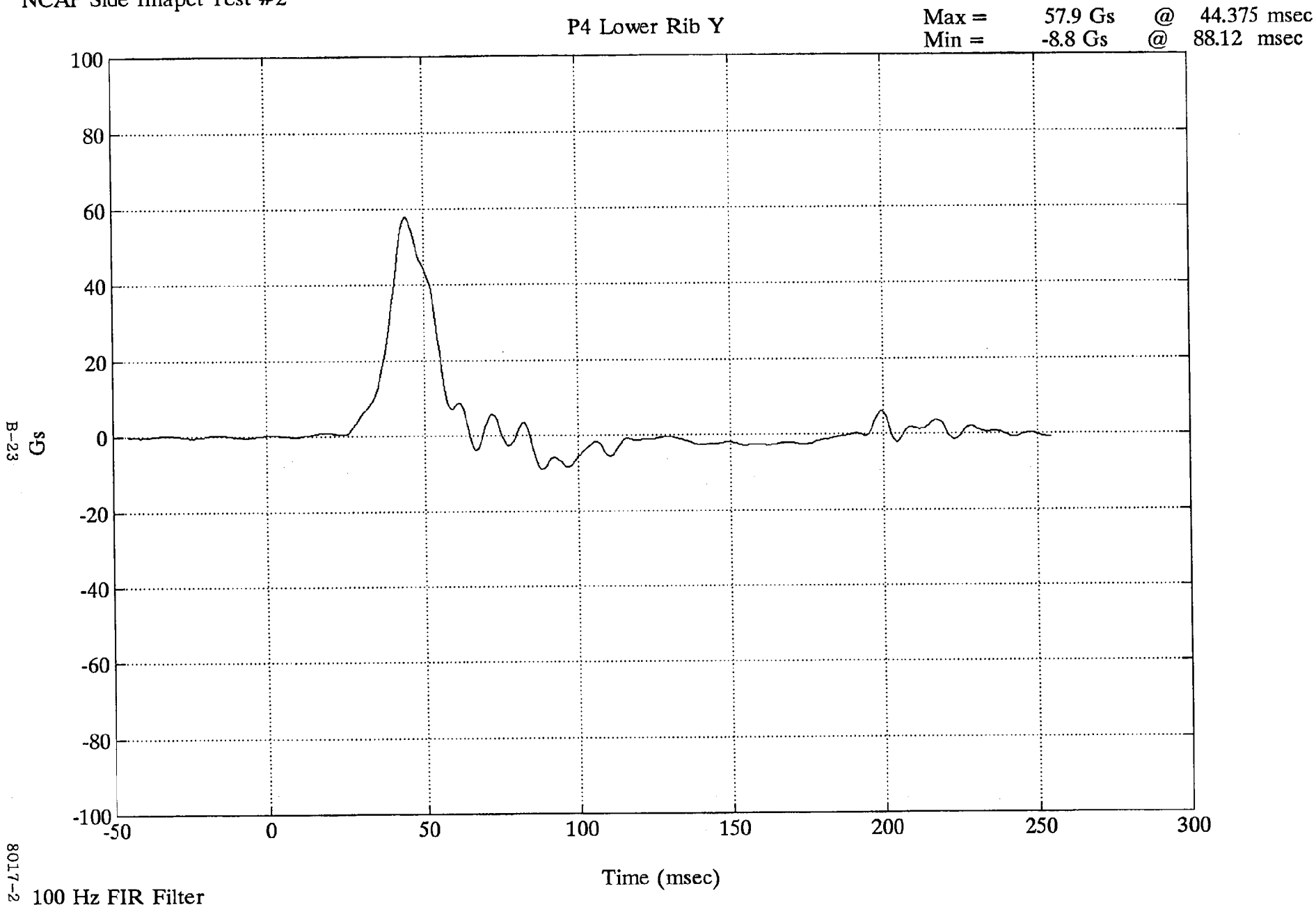
NCAP Side Imapct Test #2



B-22

8017-2 100 Hz FIR Filter

NCAP Side Imapct Test #2

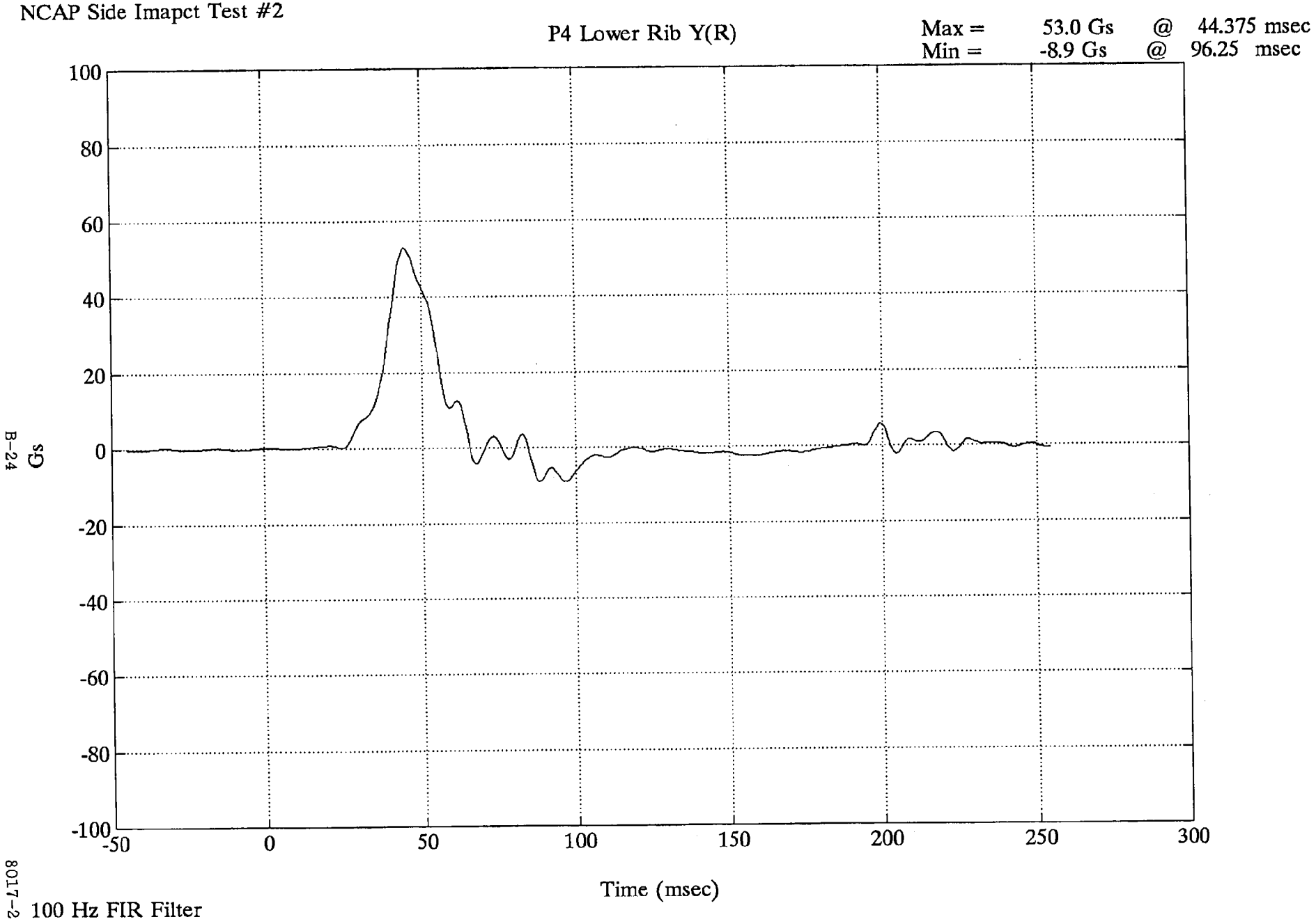


B-23

8017-2

100 Hz FIR Filter

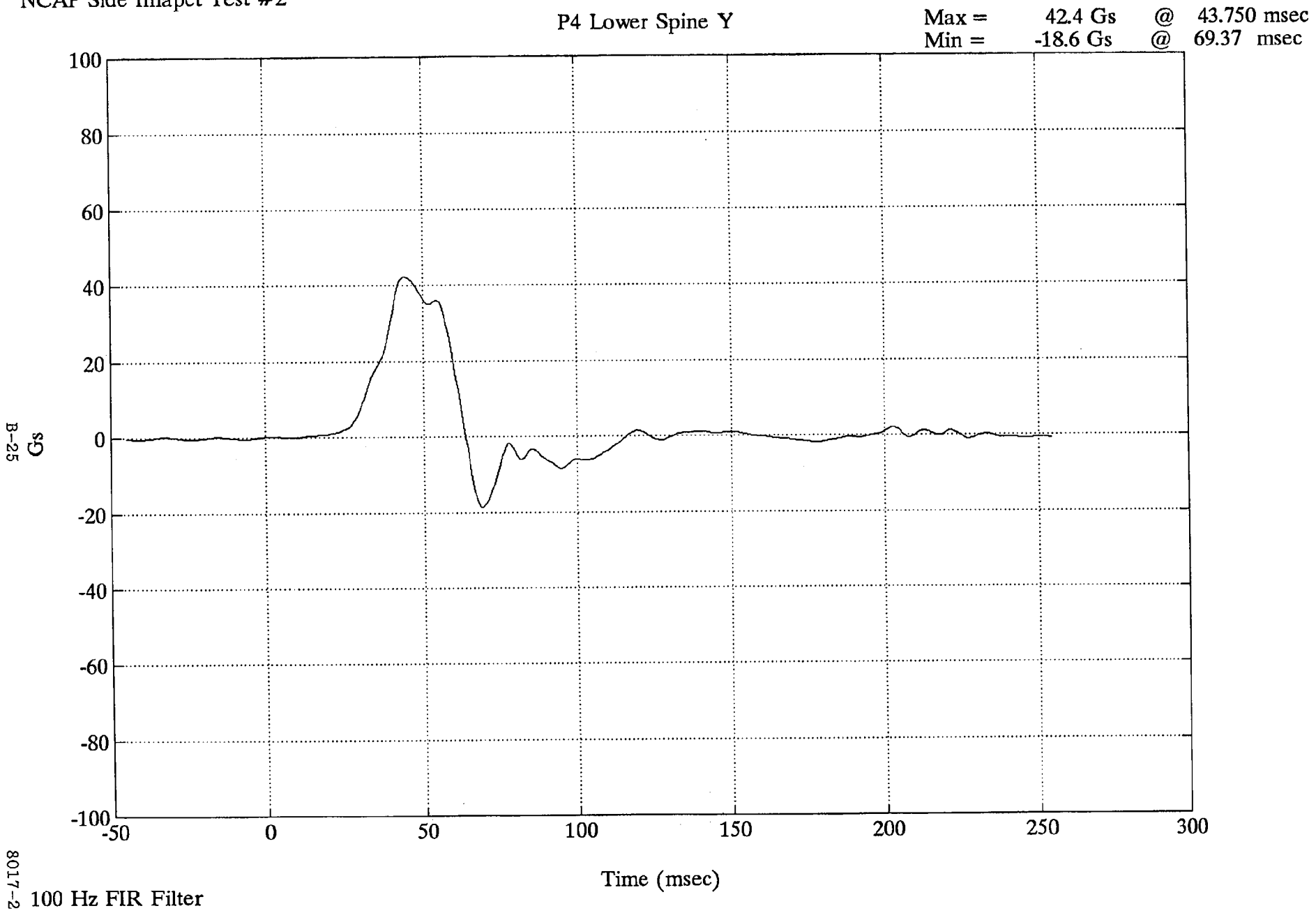
NCAP Side Imapct Test #2



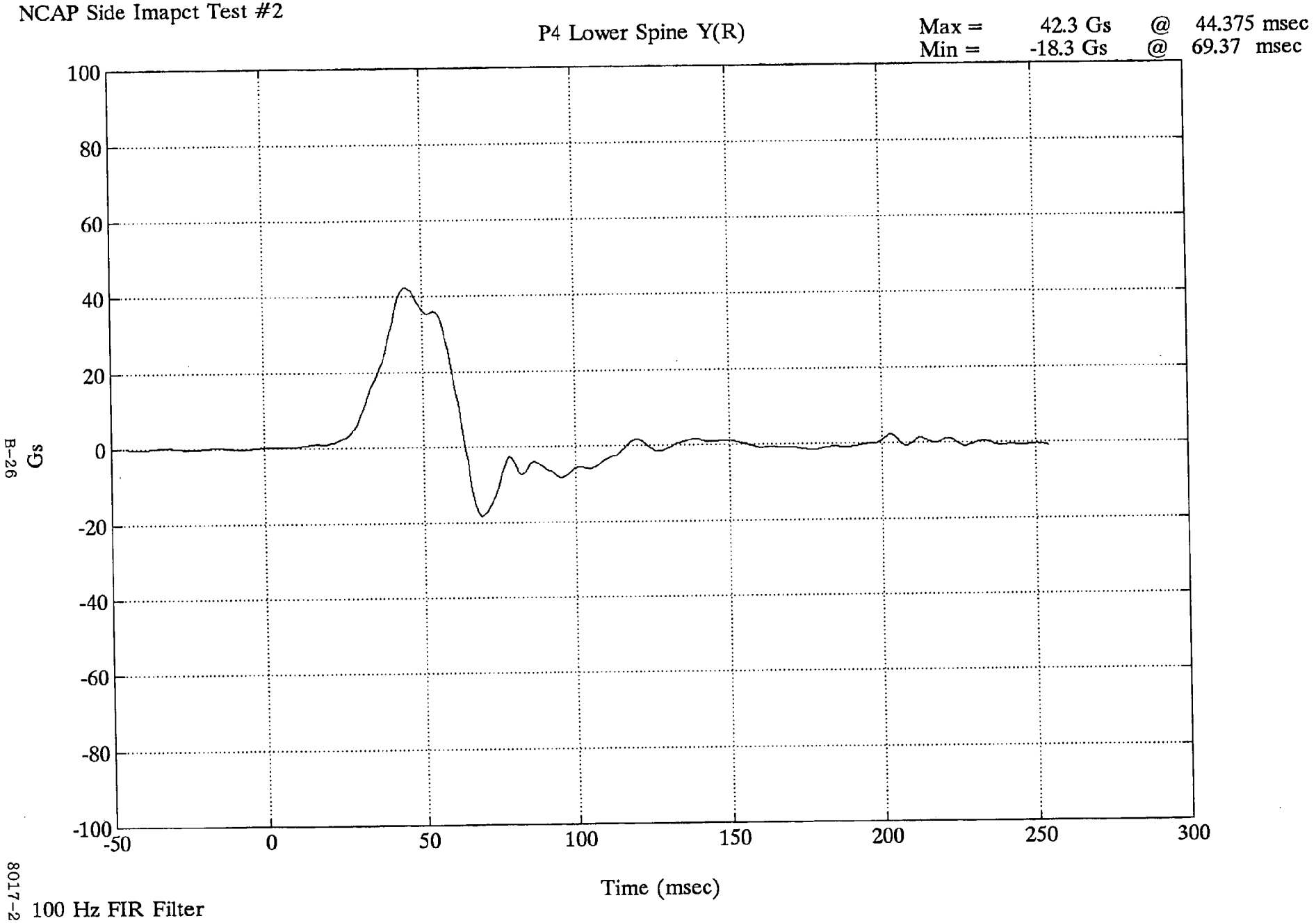
B-24

8017-2 100 Hz FIR Filter

NCAP Side Imapct Test #2



NCAP Side Imapct Test #2



B-26

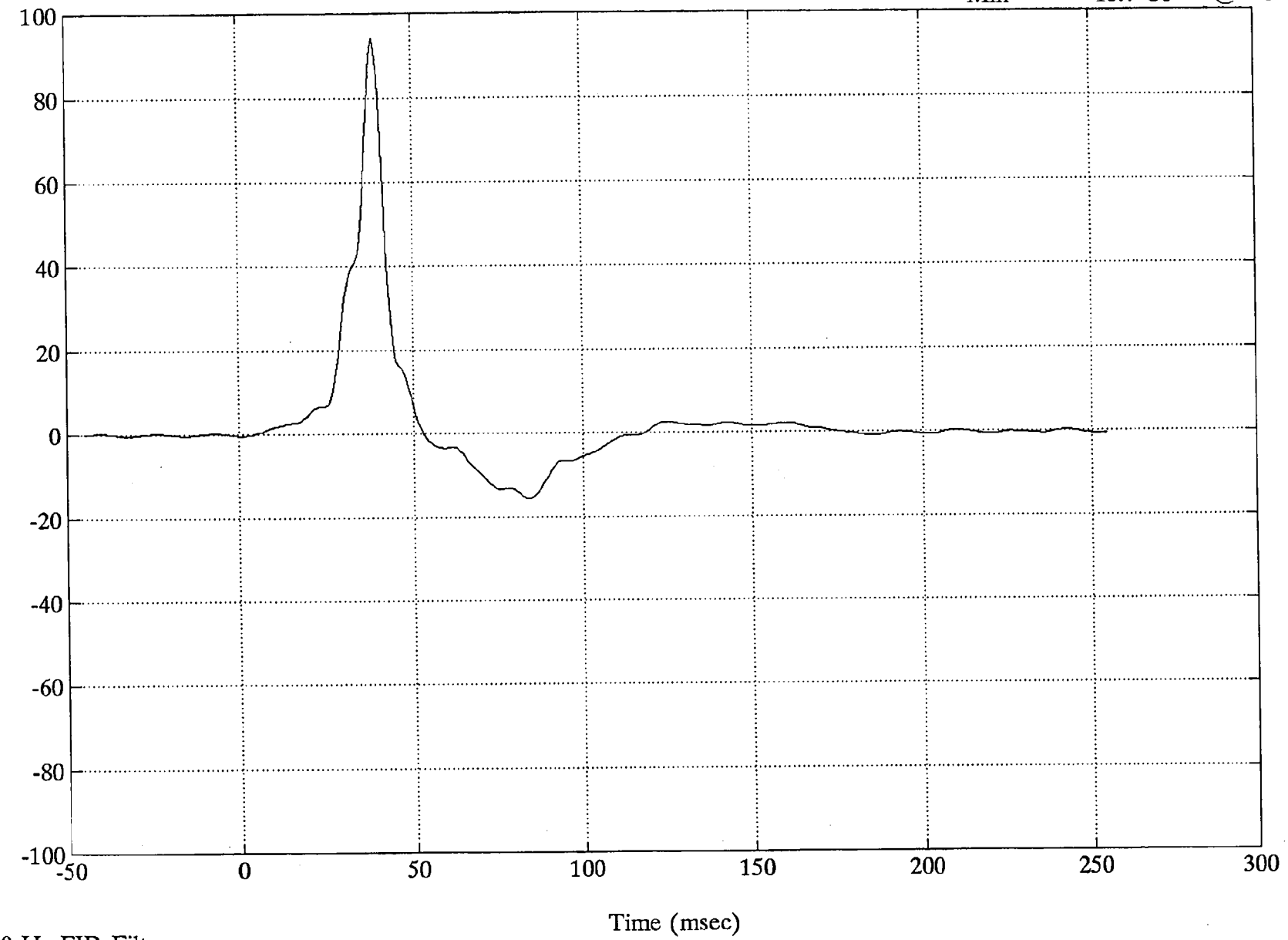
8017-2

100 Hz FIR Filter

NCAP Side Imapct Test #2

P4 Pelvic Y

Max = 93.9 Gs @ 38.750 msec
Min = -15.7 Gs @ 83.75 msec

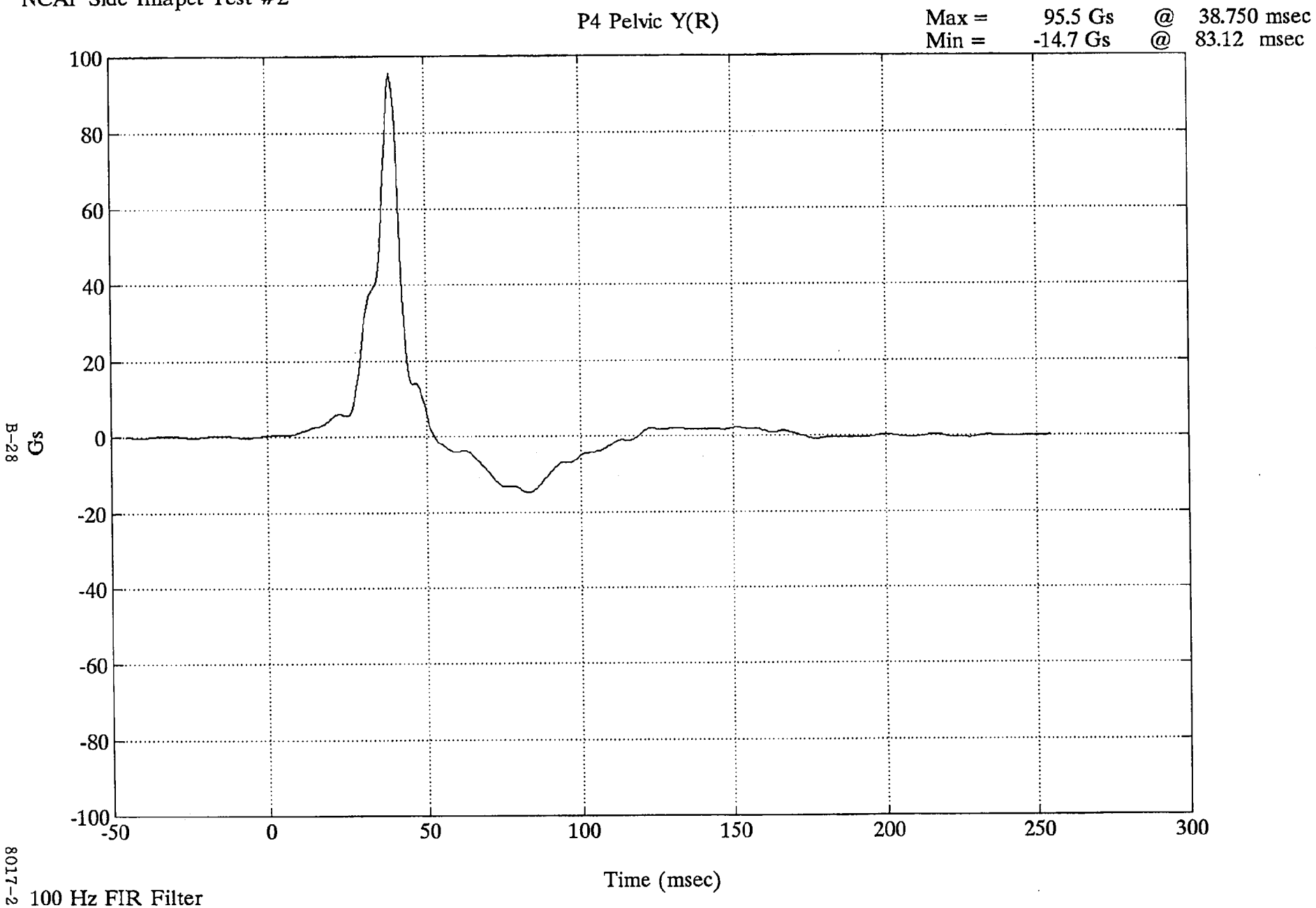


B-27

8017-2

100 Hz FIR Filter

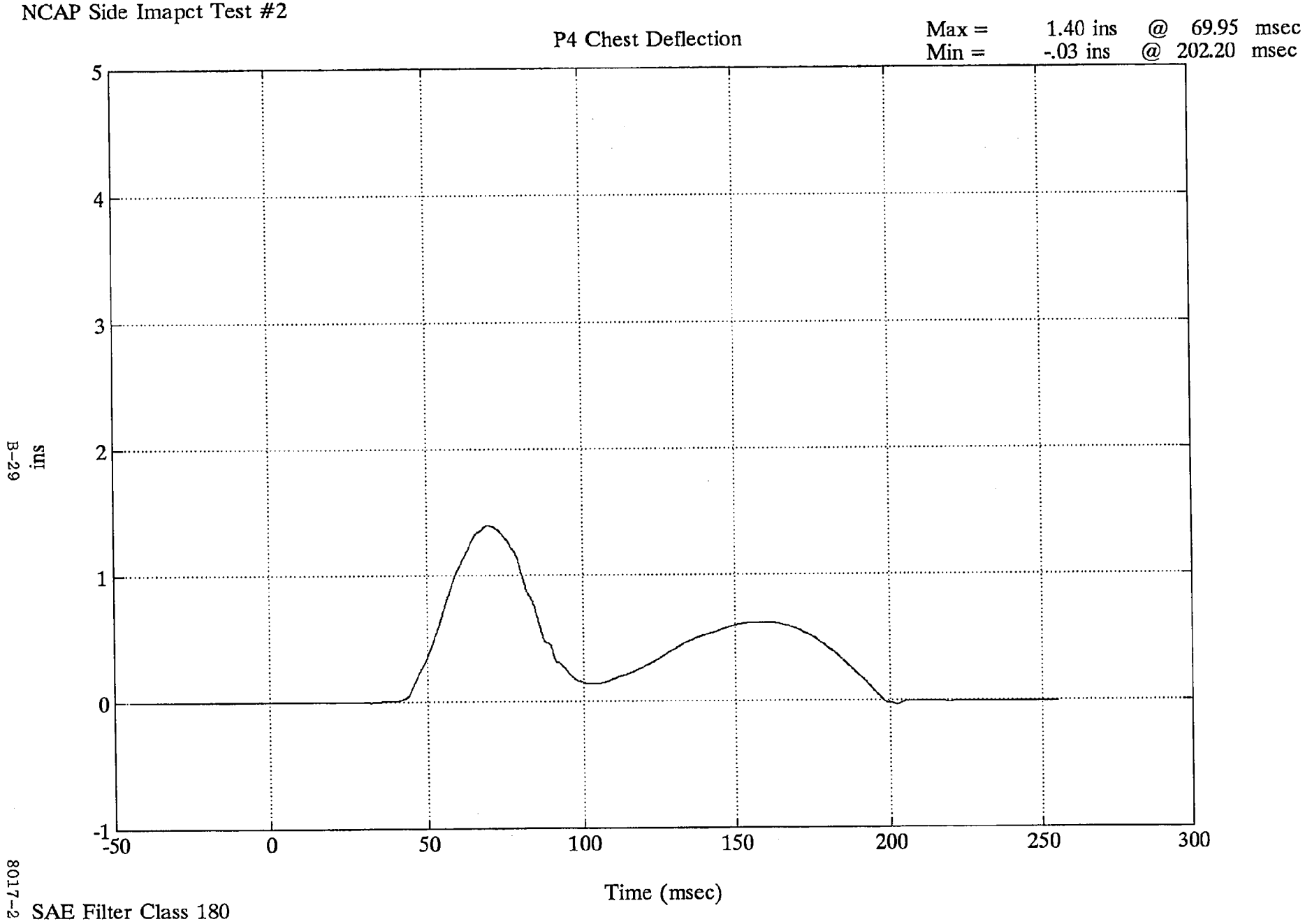
NCAP Side Imapct Test #2



B-28

8017-2 100 Hz FIR Filter

NCAP Side Imapct Test #2

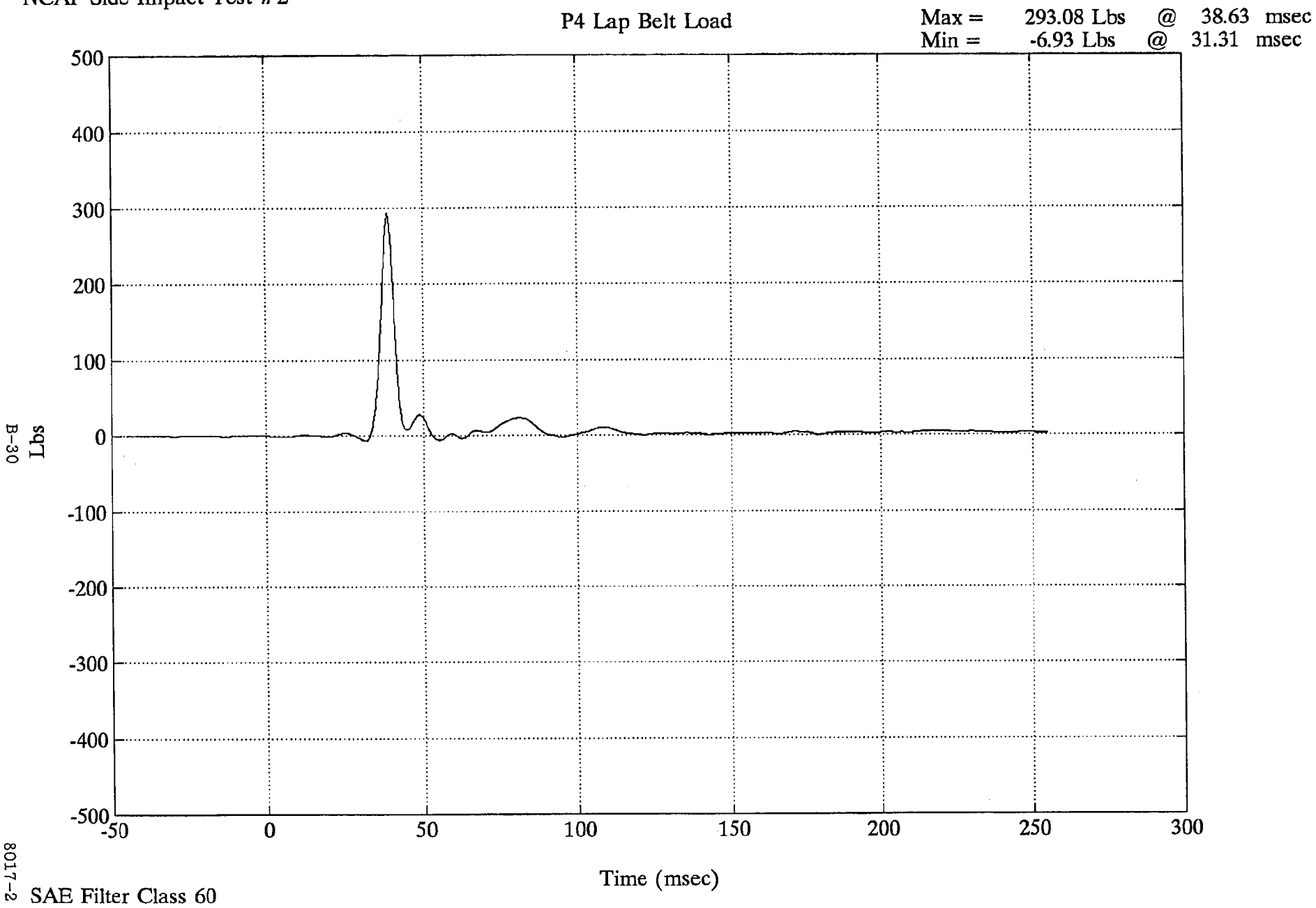


B-29

8017-2

SAE Filter Class 180

NCAP Side Impact Test #2



B-30

8017-2

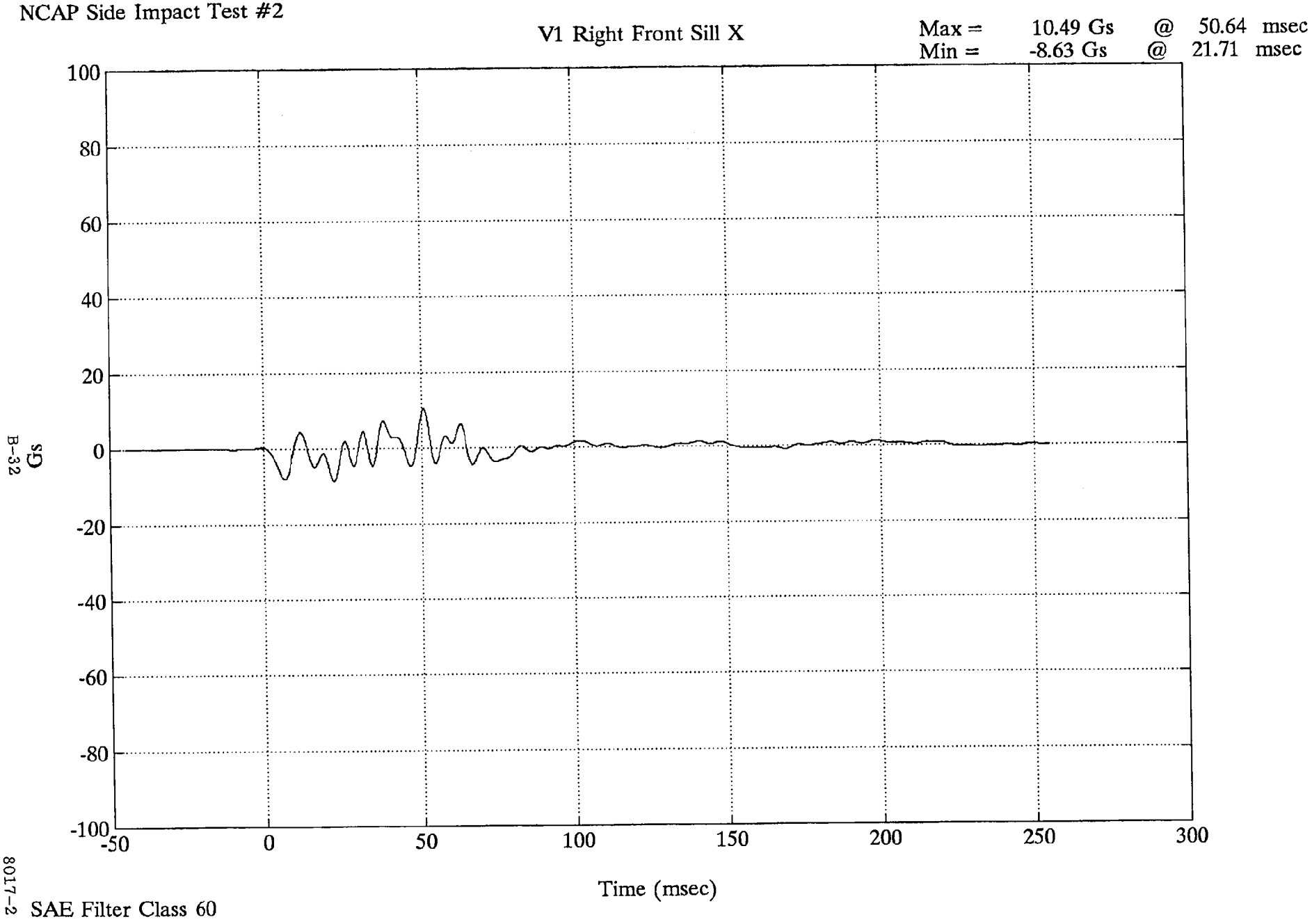
SAE Filter Class 60

VEHICLE AND MDB DATA

V1 - 1992 FORD CROWN VICTORIA

V2 - MDB

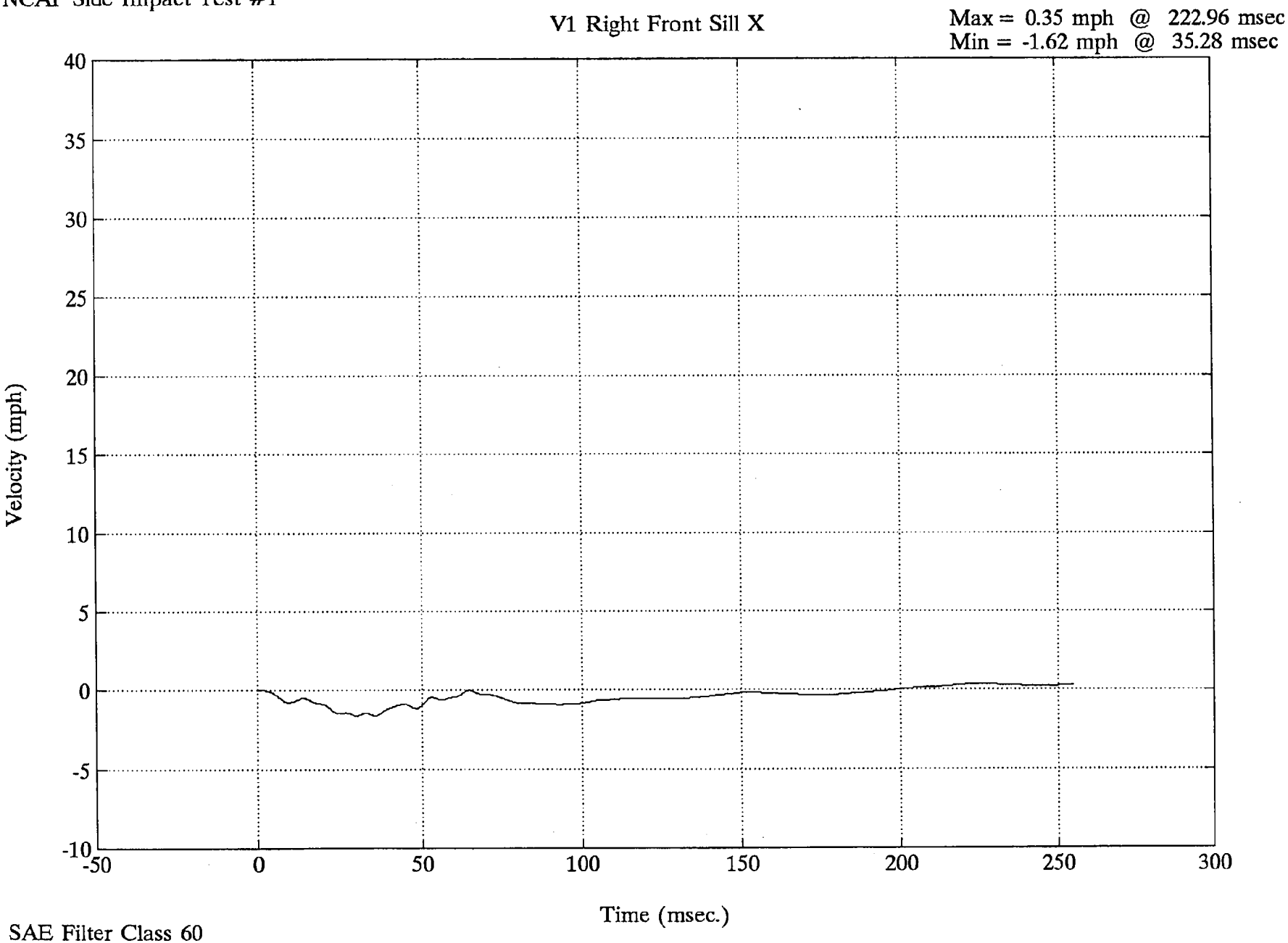
NCAP Side Impact Test #2



B-32

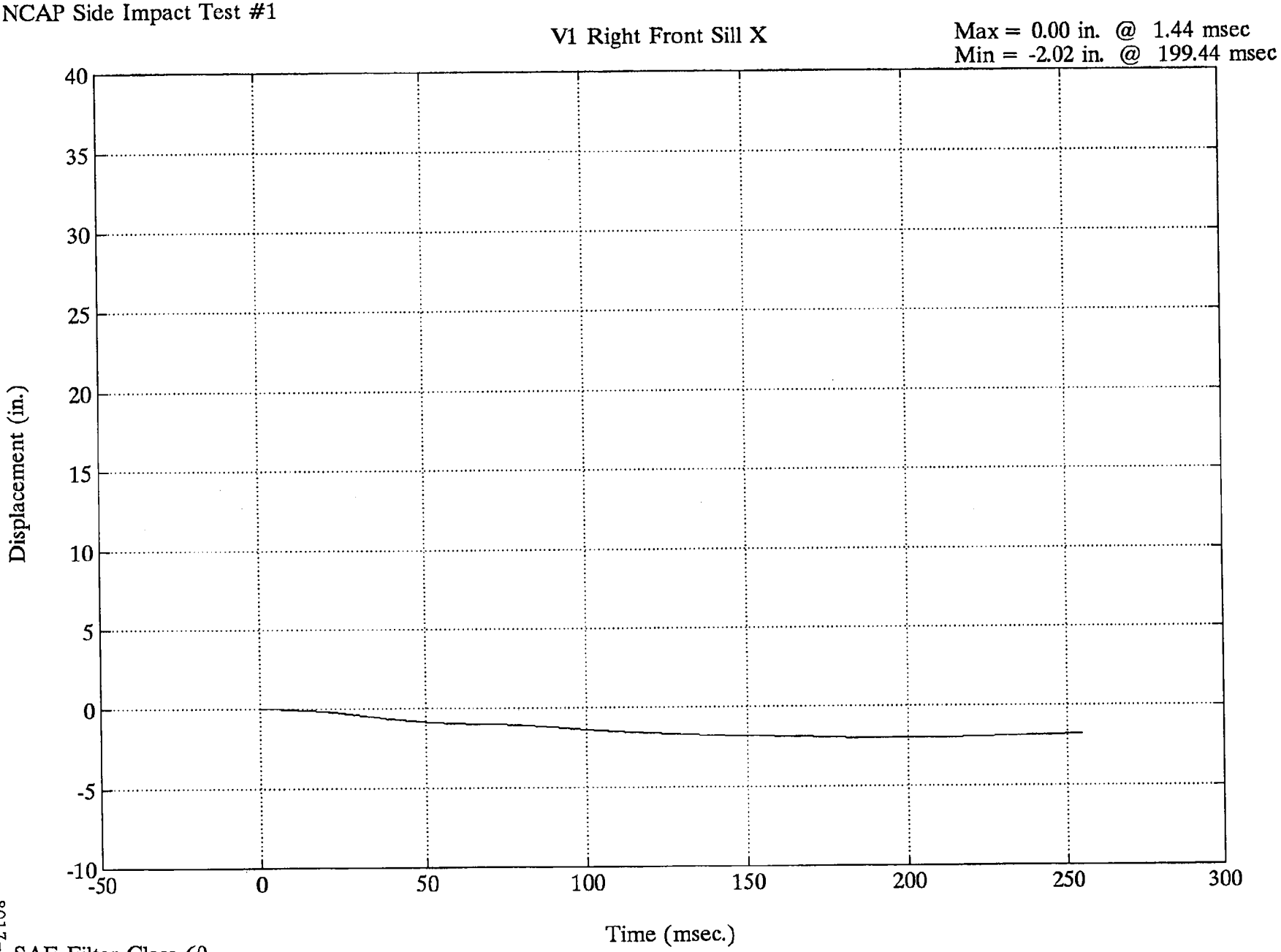
8017-2 SAE Filter Class 60

NCAP Side Impact Test #1



SAE Filter Class 60

NCAP Side Impact Test #1

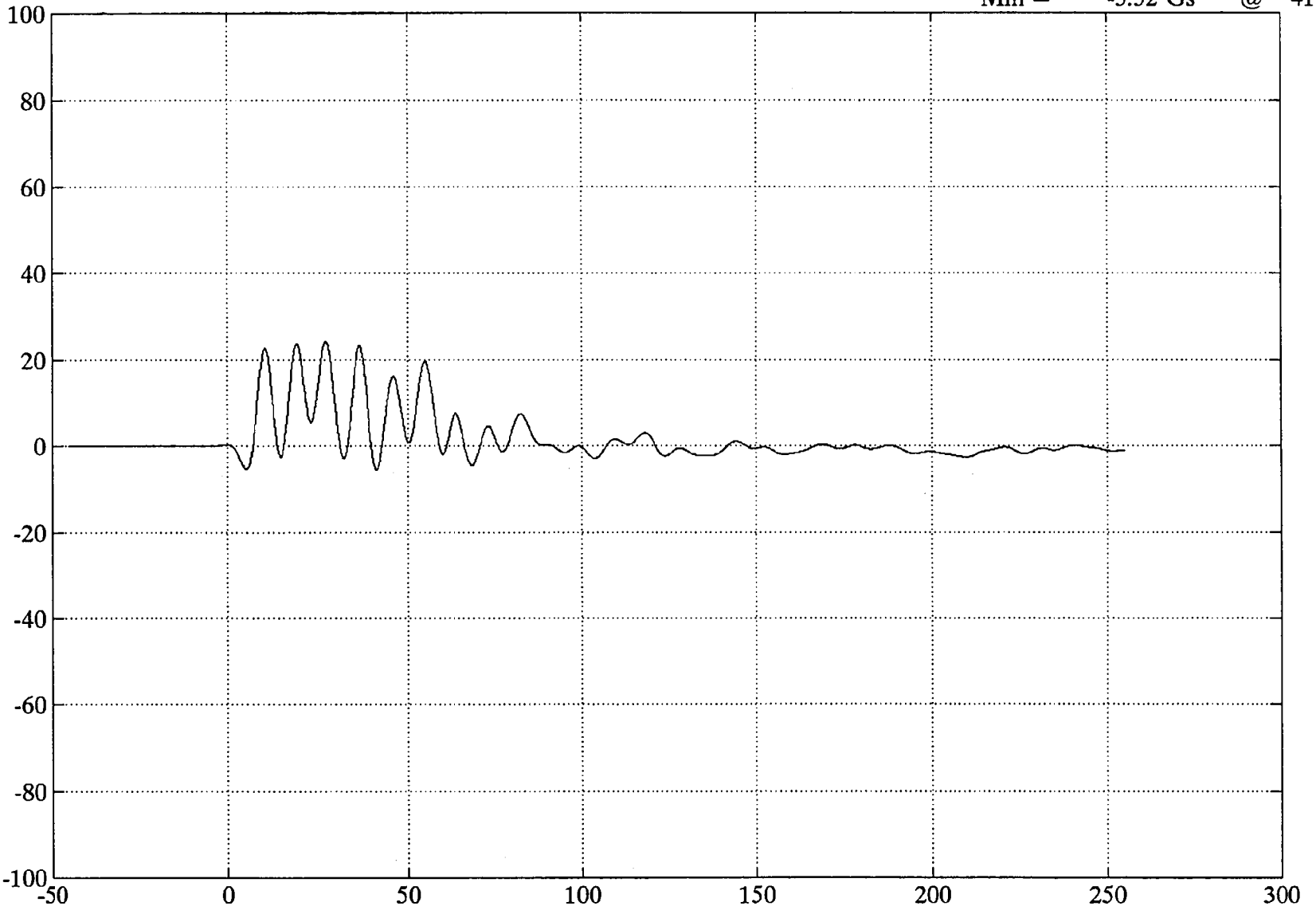


8017-2 SAE Filter Class 60

NCAP S.I. TEST #2 1992 FORD CROWN VICTOR

V1 Right Front Sill Y

Max = 24.23 Gs @ 26.75 msec
Min = -5.52 Gs @ 41.04 msec



B-35

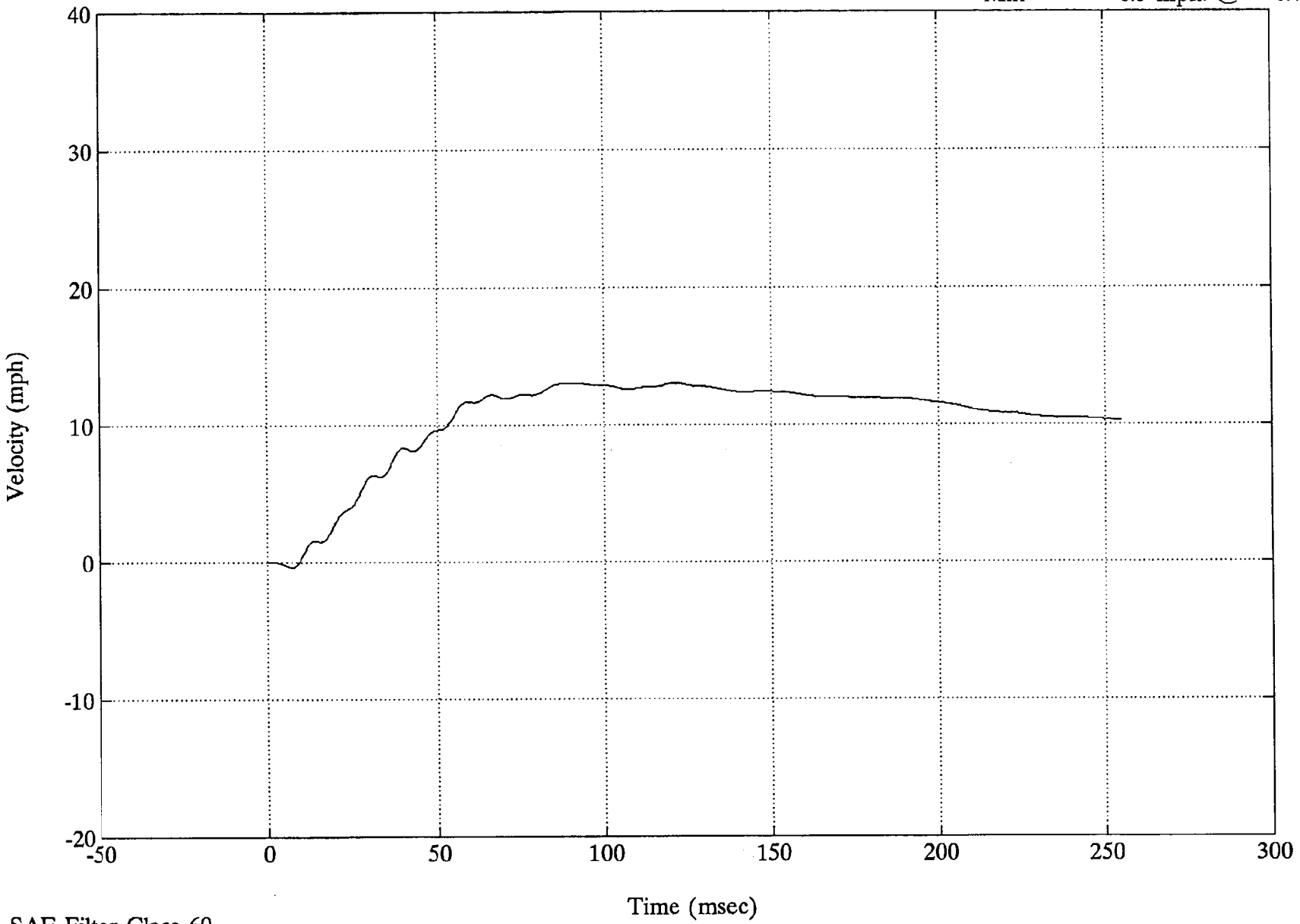
8017-2

SAE Filter Class 60

NCAP S.I. TEST #2 1992 FORD CROWN VICTORIA

V1 Right Front Sill Y

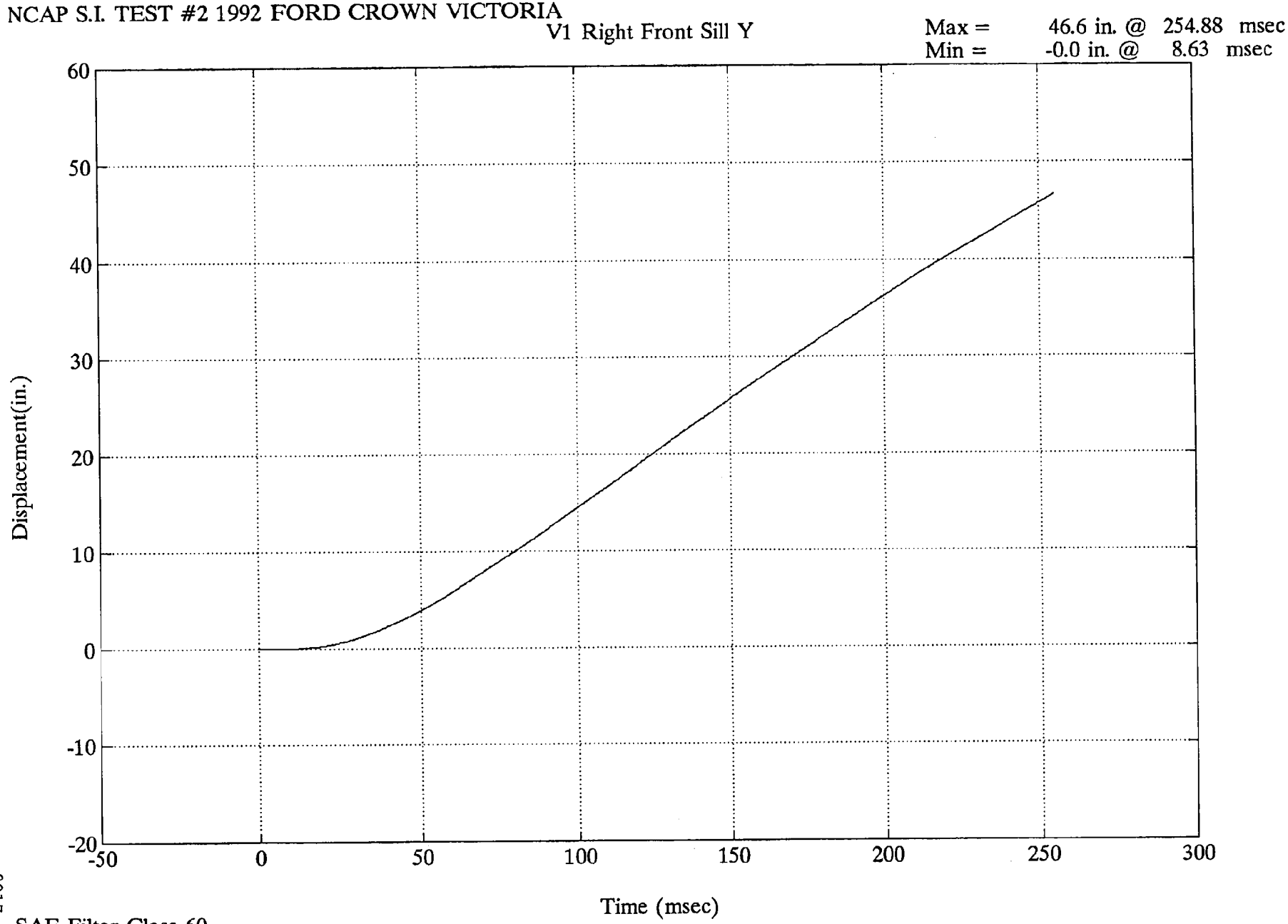
Max = 13.0 mph. @ 121.08 msec
Min = -0.3 mph. @ 6.71 msec



SAE Filter Class 60

8017-2

NCAP S.I. TEST #2 1992 FORD CROWN VICTORIA



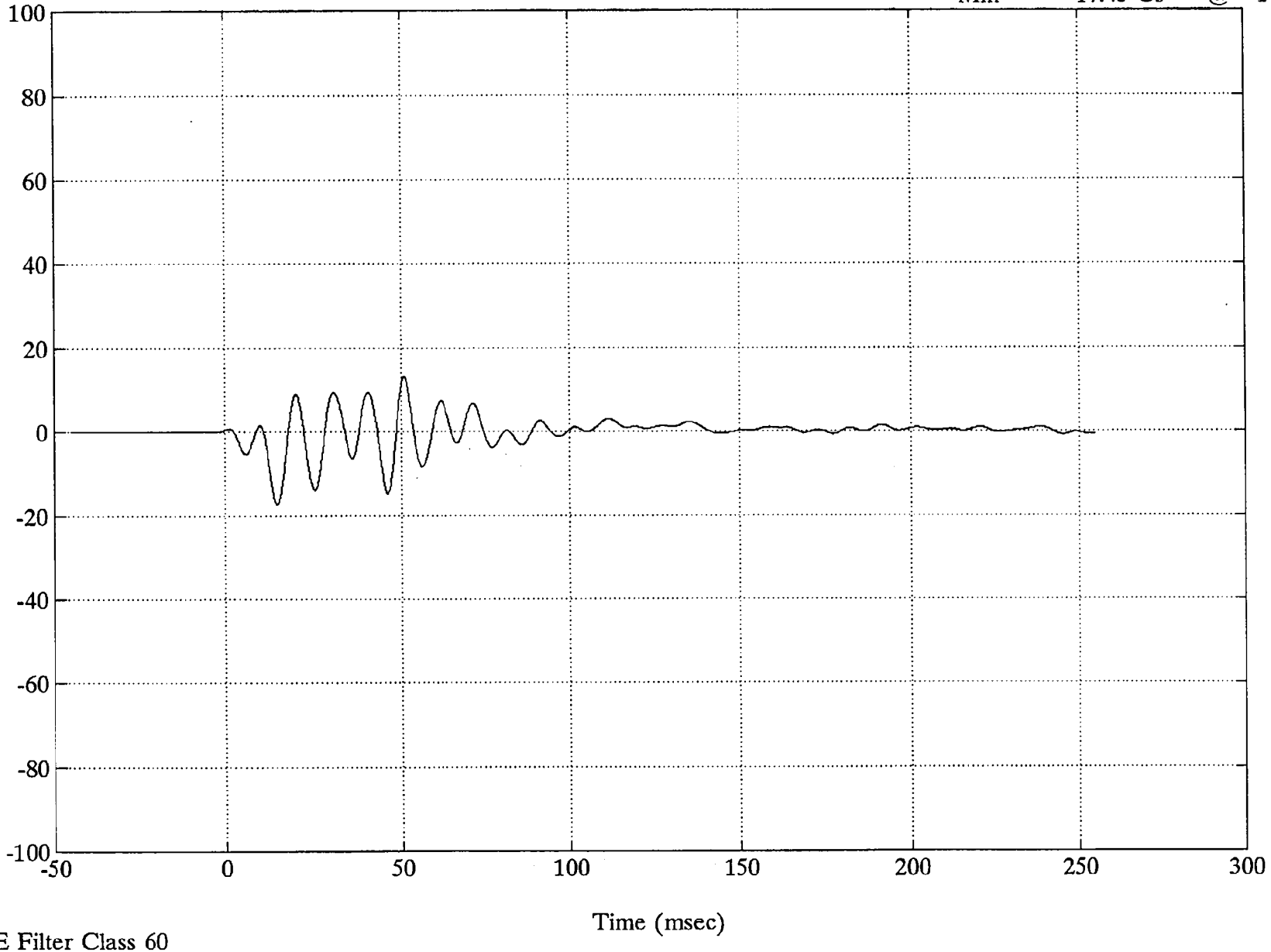
SAE Filter Class 60

8017-2

NCAP S.I. TEST #2 1992 FORD CROWN VICTOR

V1 Right Front Sill Z

Max = 13.24 Gs @ 50.88 msec
Min = -17.43 Gs @ 14.27 msec



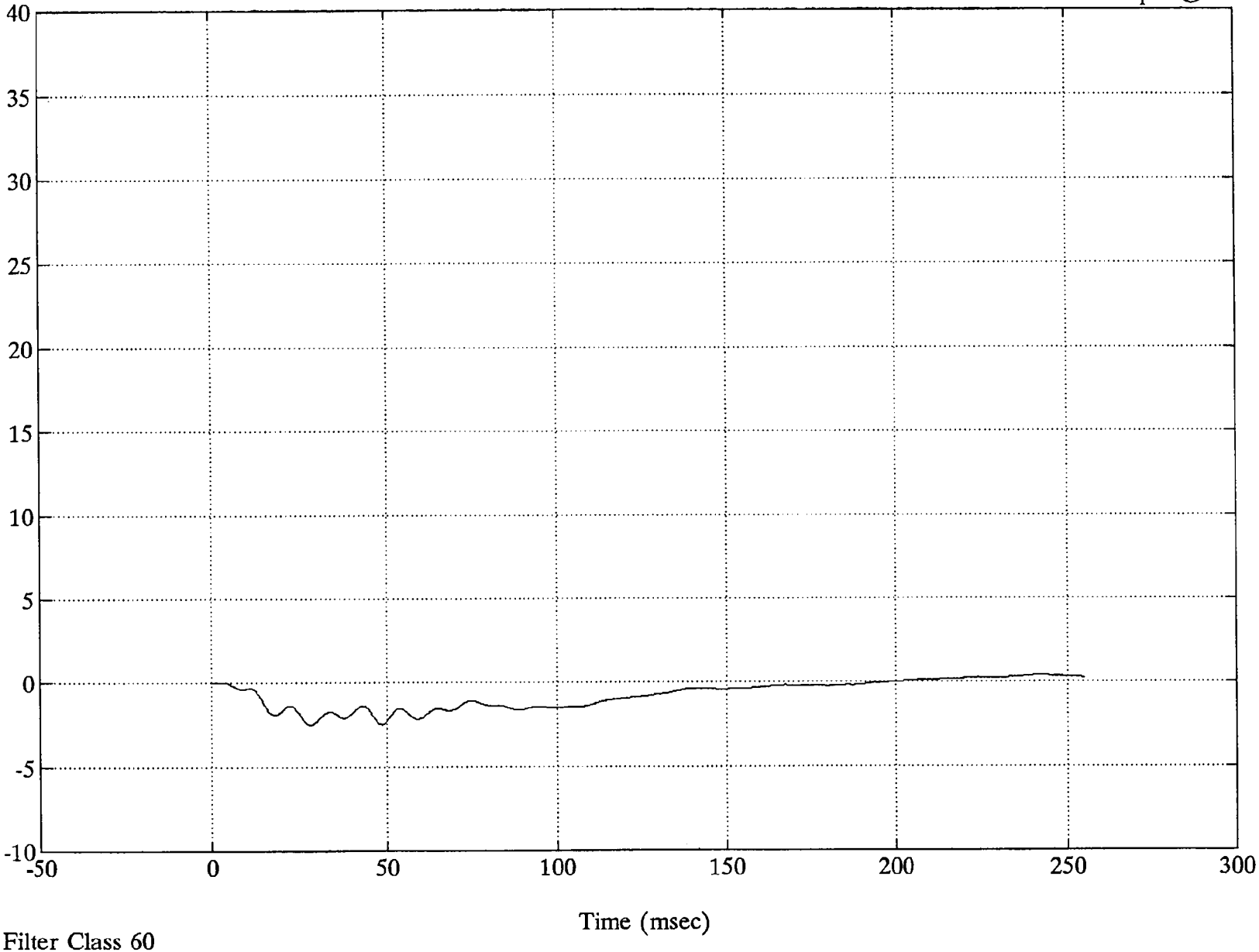
SAE Filter Class 60

8017-2

NCAP S.I. TEST #2 1992 FORD CROWN VICTORIA

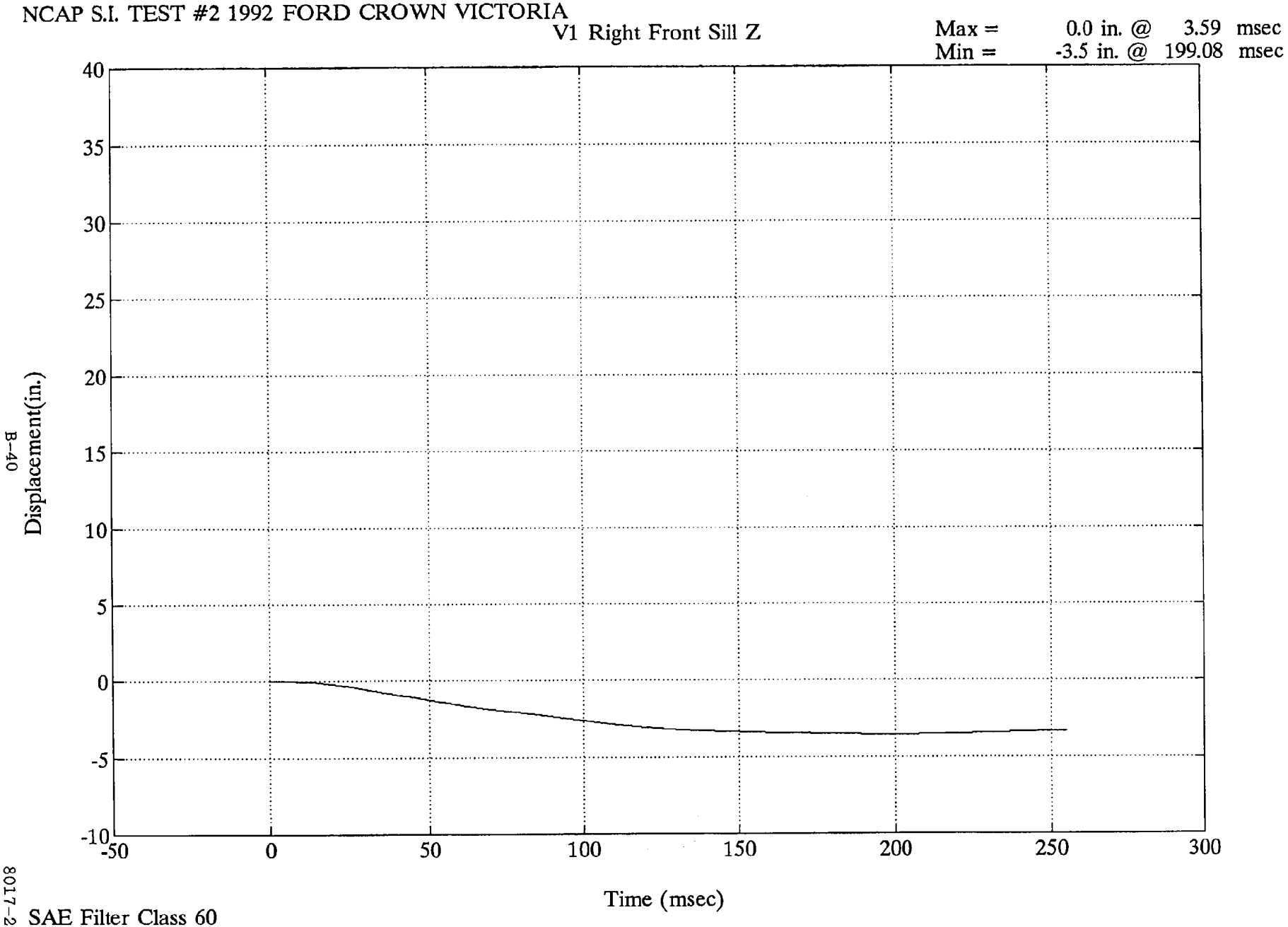
V1 Right Front Sill Z

Max = 0.3 mph. @ 242.16 msec
Min = -2.5 mph. @ 27.59 msec



SAE Filter Class 60

NCAP S.I. TEST #2 1992 FORD CROWN VICTORIA

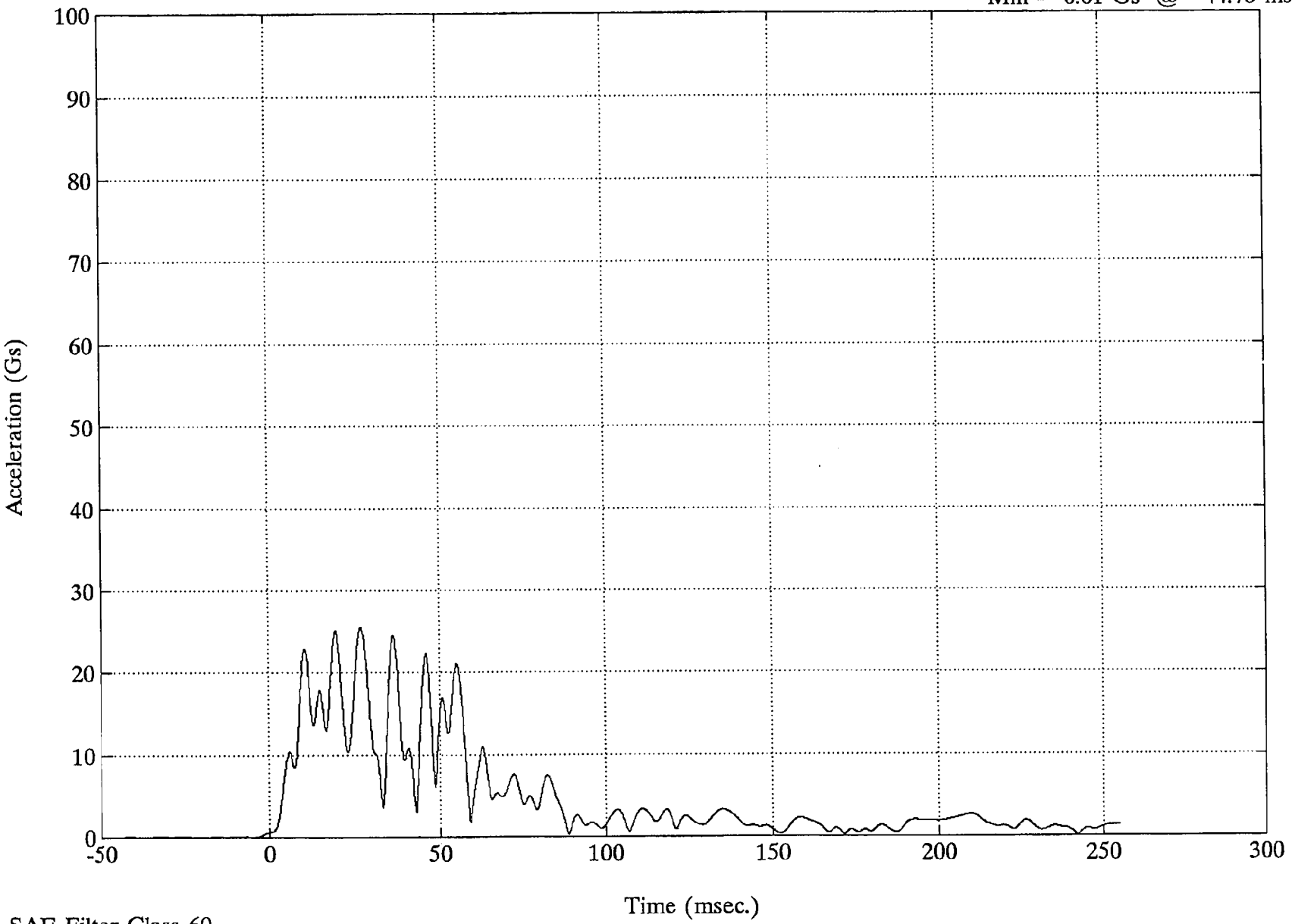


8017-2 SAE Filter Class 60

NCAP S.I. TEST #2 1992 FORD CROWN VICTORIA

V1 Right Front Sill Res.

Max = 25.51 Gs @ 26.28 msec
Min = 0.01 Gs @ -44.76 msec

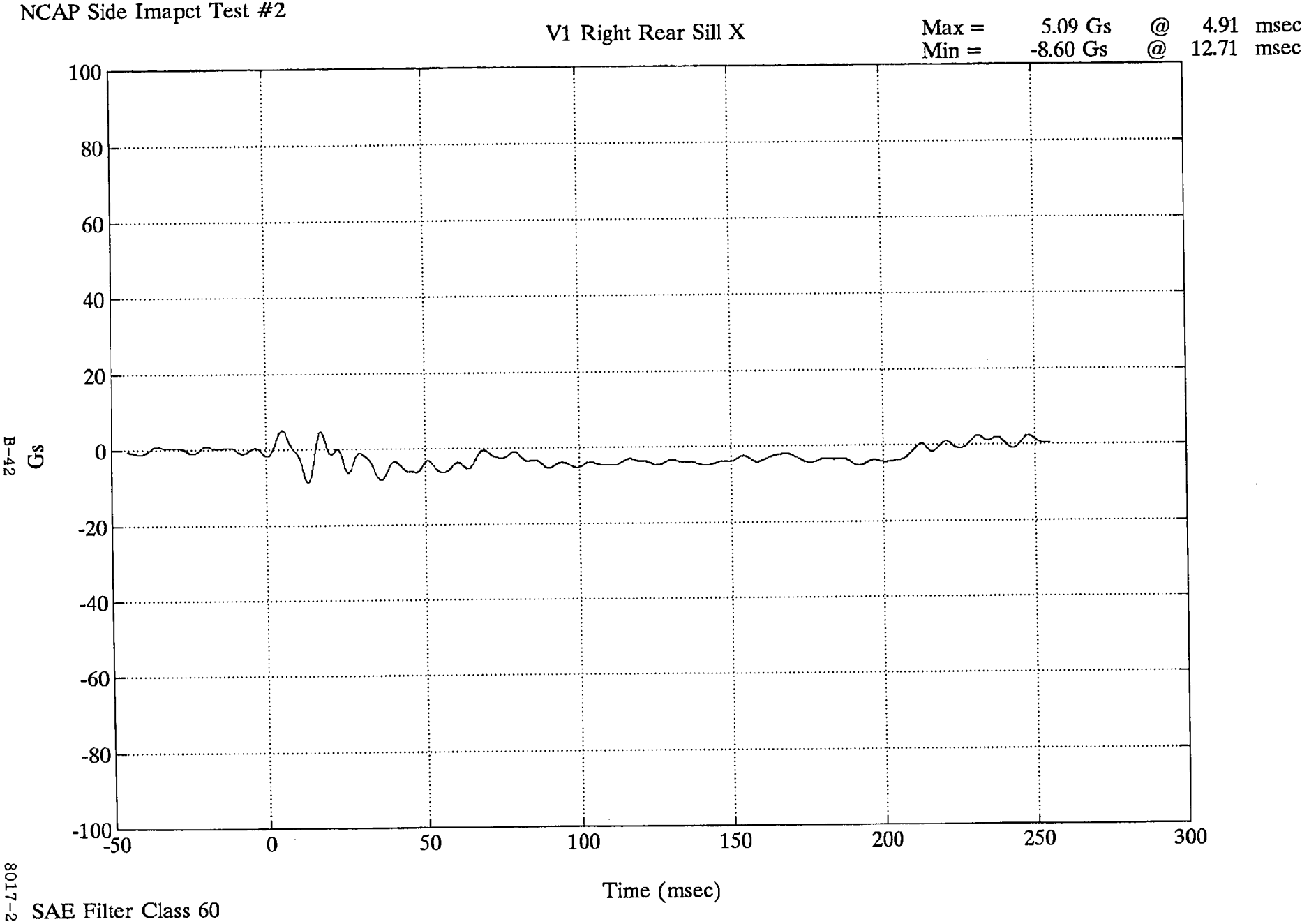


B-41

8017-2

SAE Filter Class 60

NCAP Side Imapct Test #2

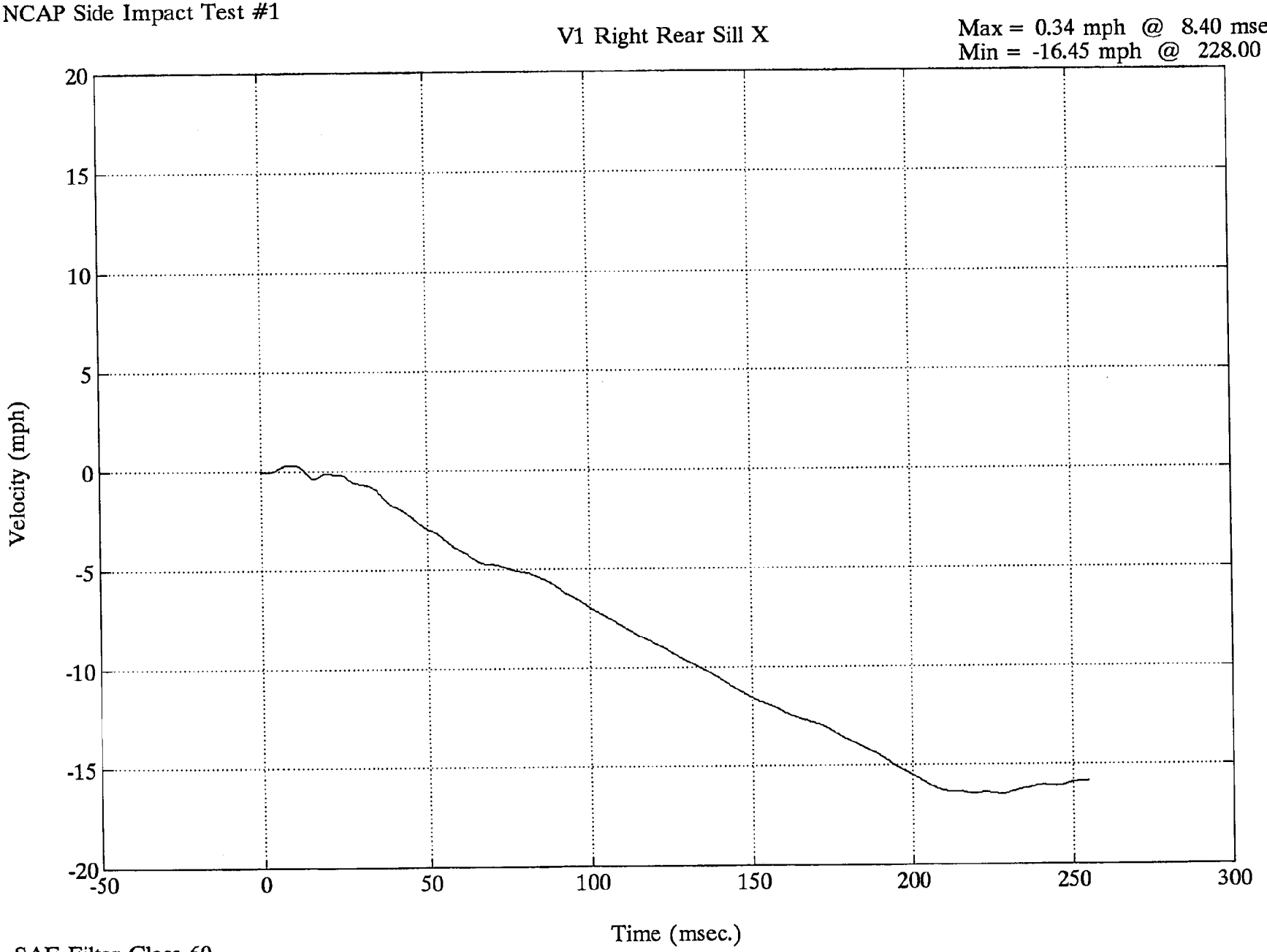


B-42

8017-2

SAE Filter Class 60

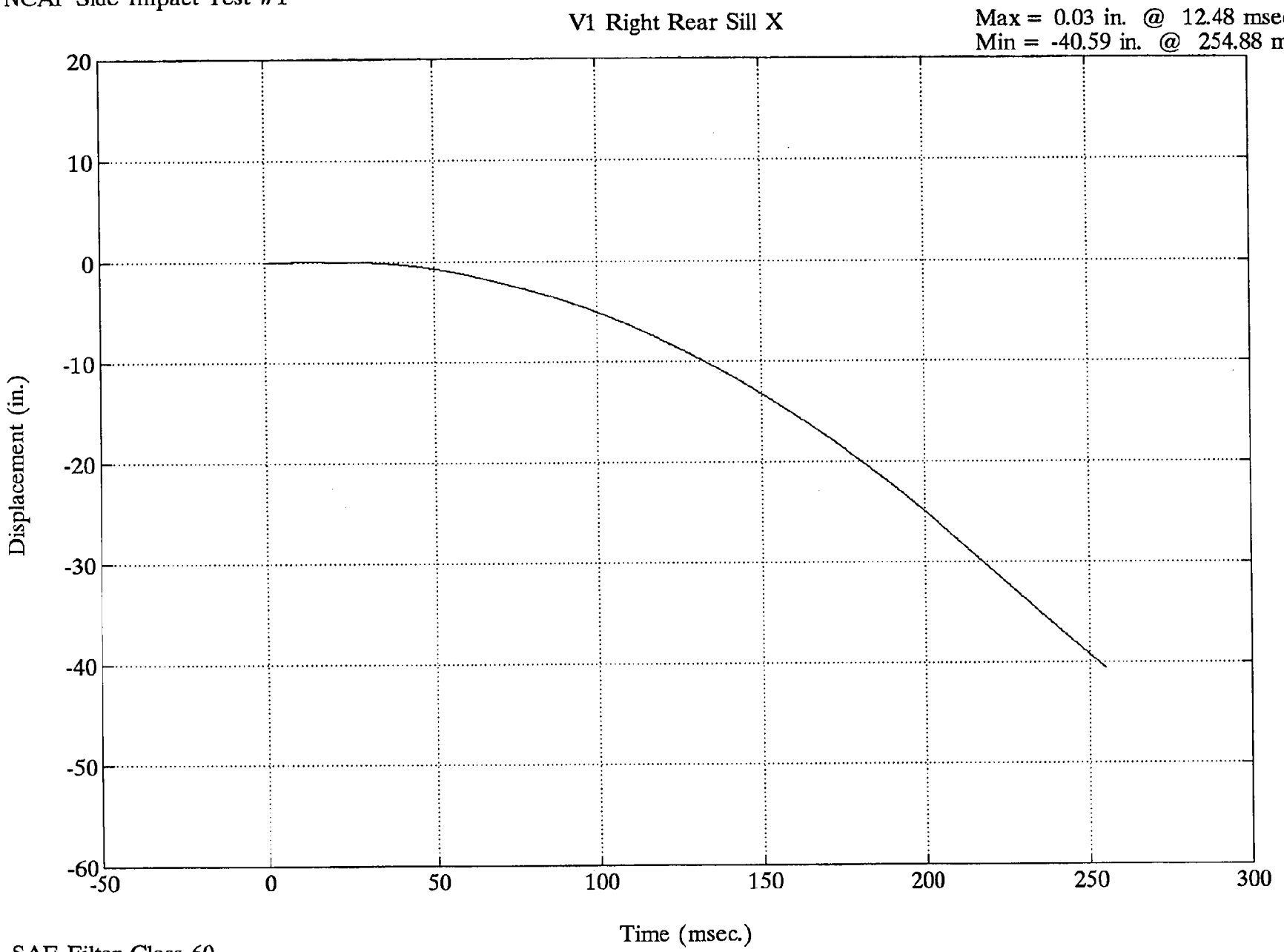
NCAP Side Impact Test #1



SAE Filter Class 60

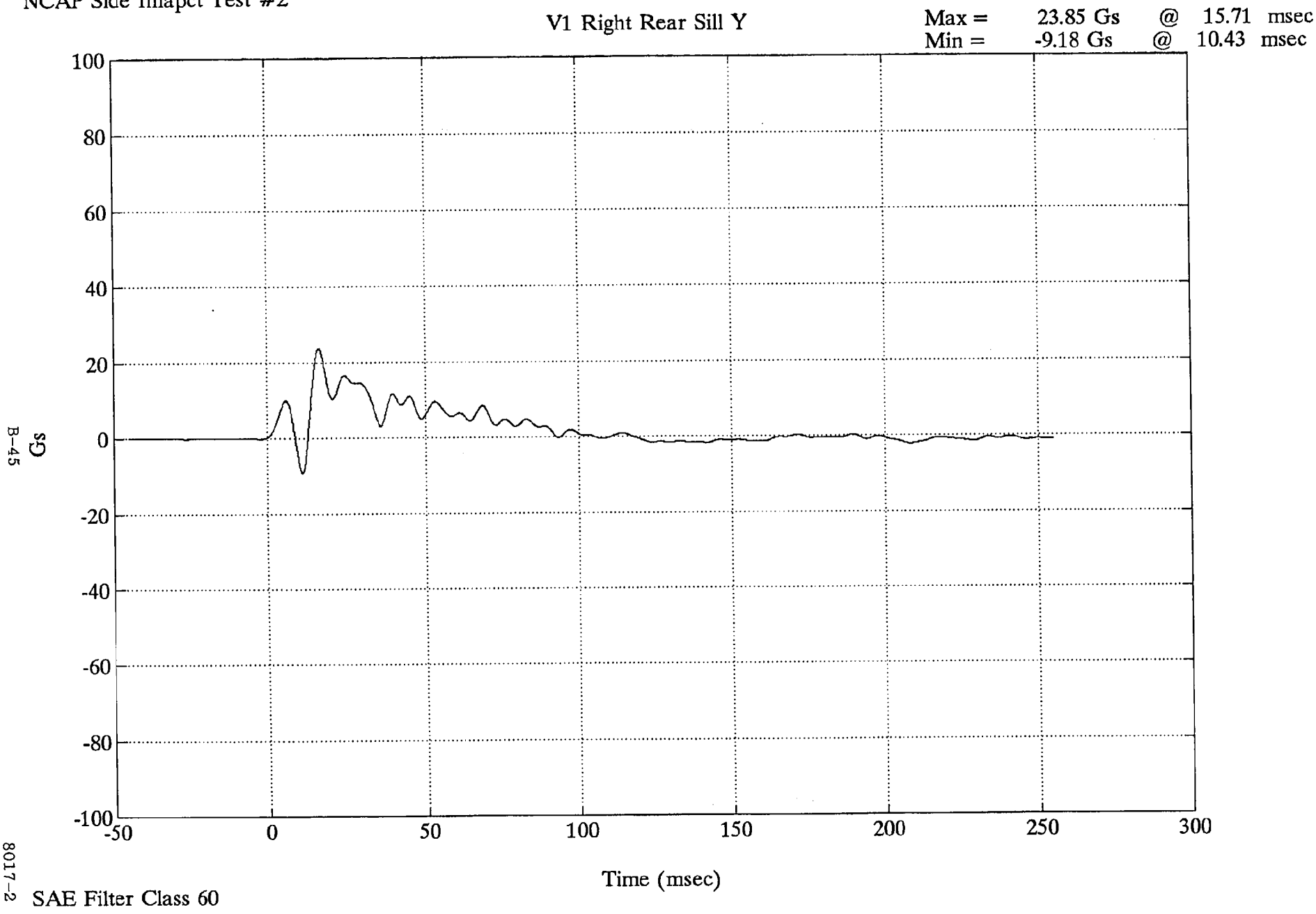
8017-2

NCAP Side Impact Test #1



SAE Filter Class 60

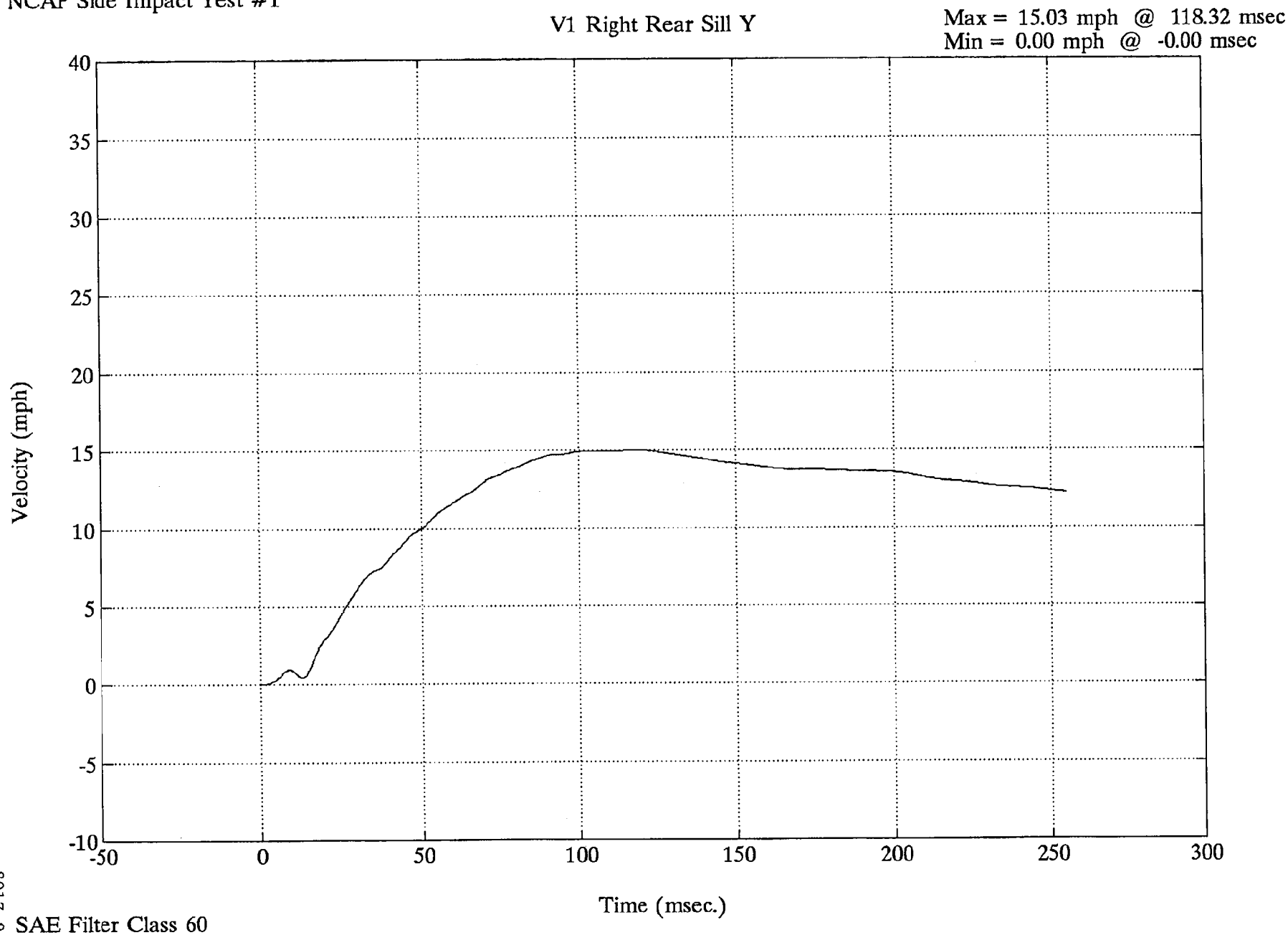
NCAP Side Imapct Test #2



SAE Filter Class 60

8017-2

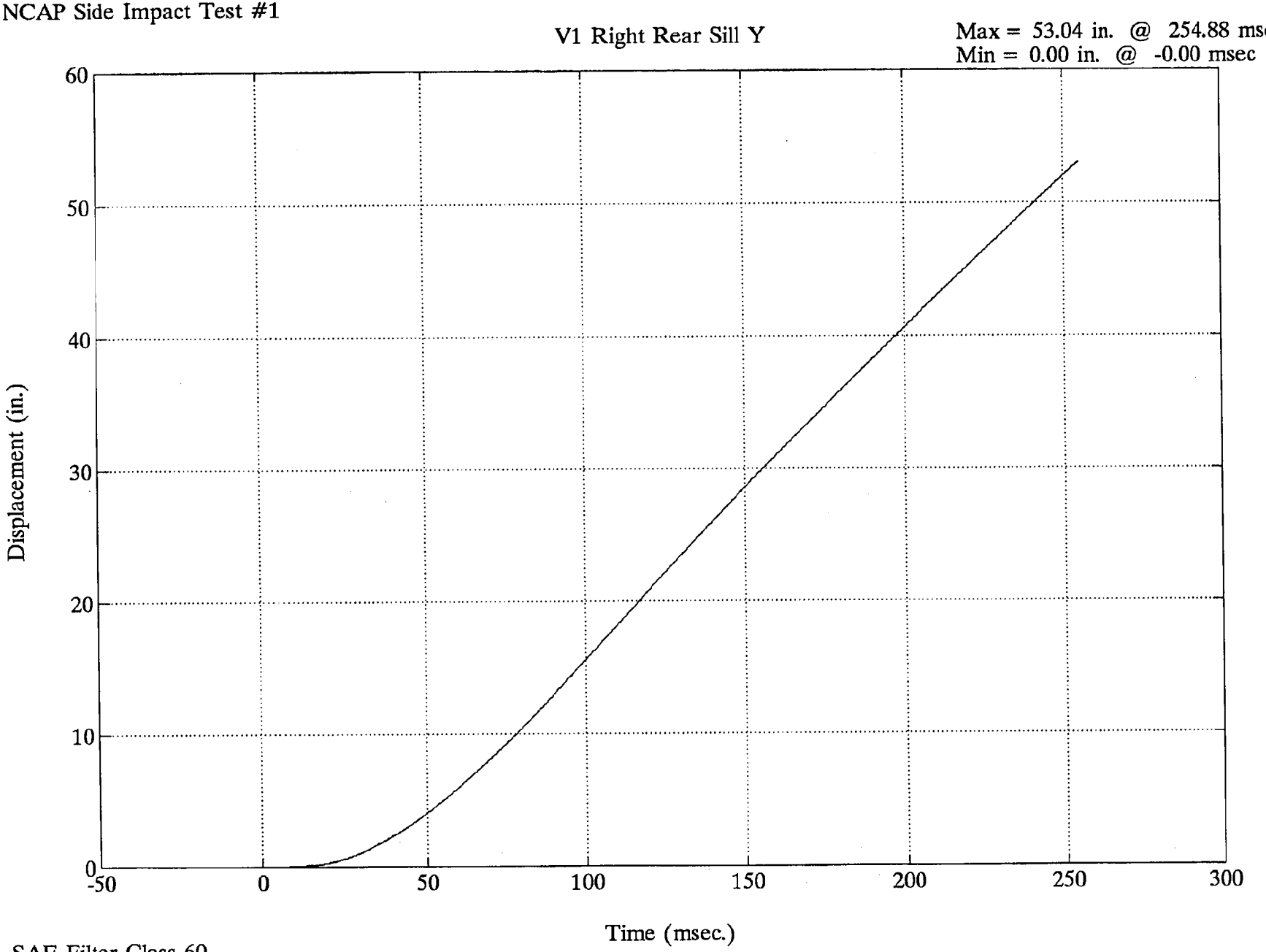
NCAP Side Impact Test #1



SAE Filter Class 60

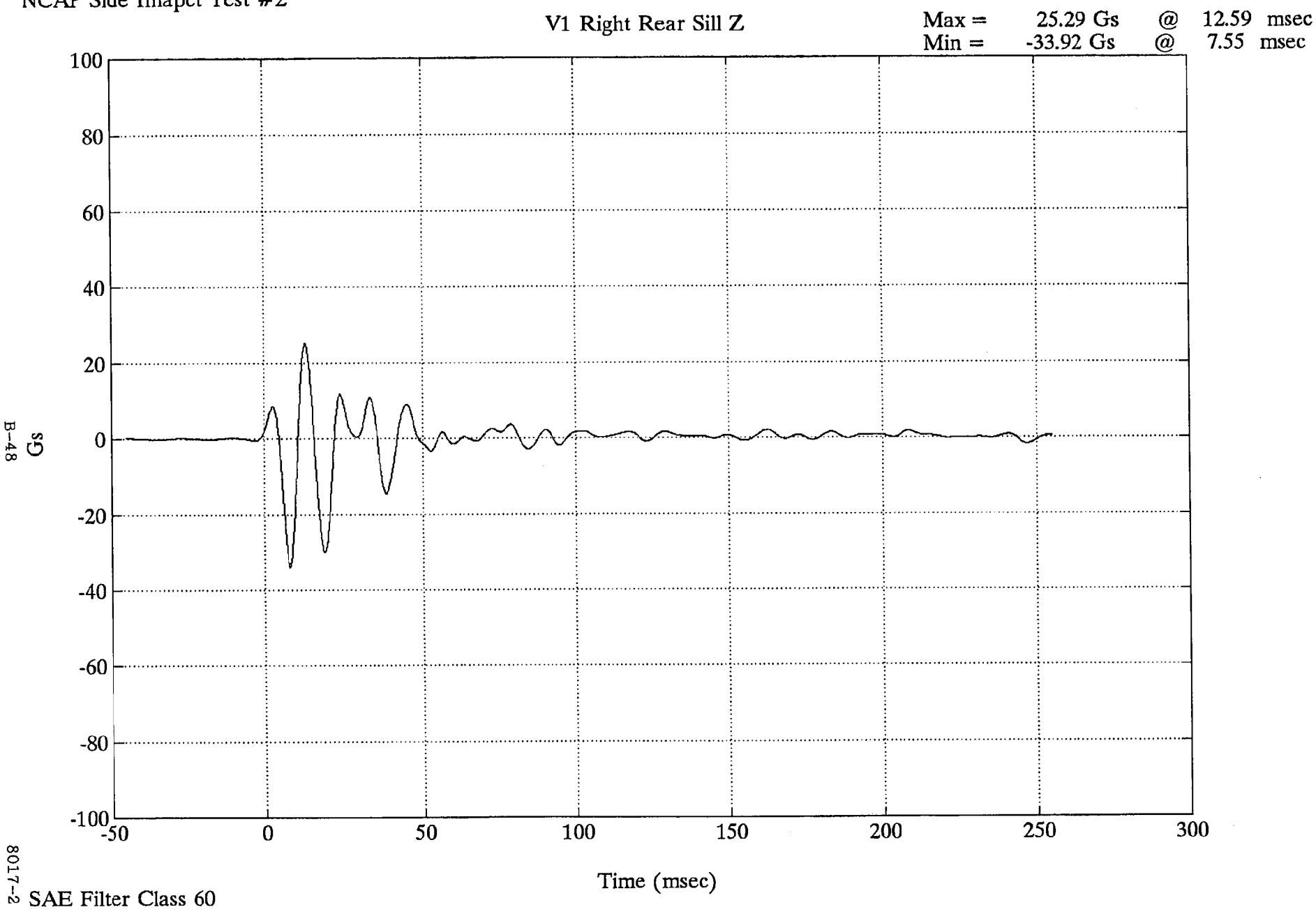
8017-2

NCAP Side Impact Test #1



SAE Filter Class 60

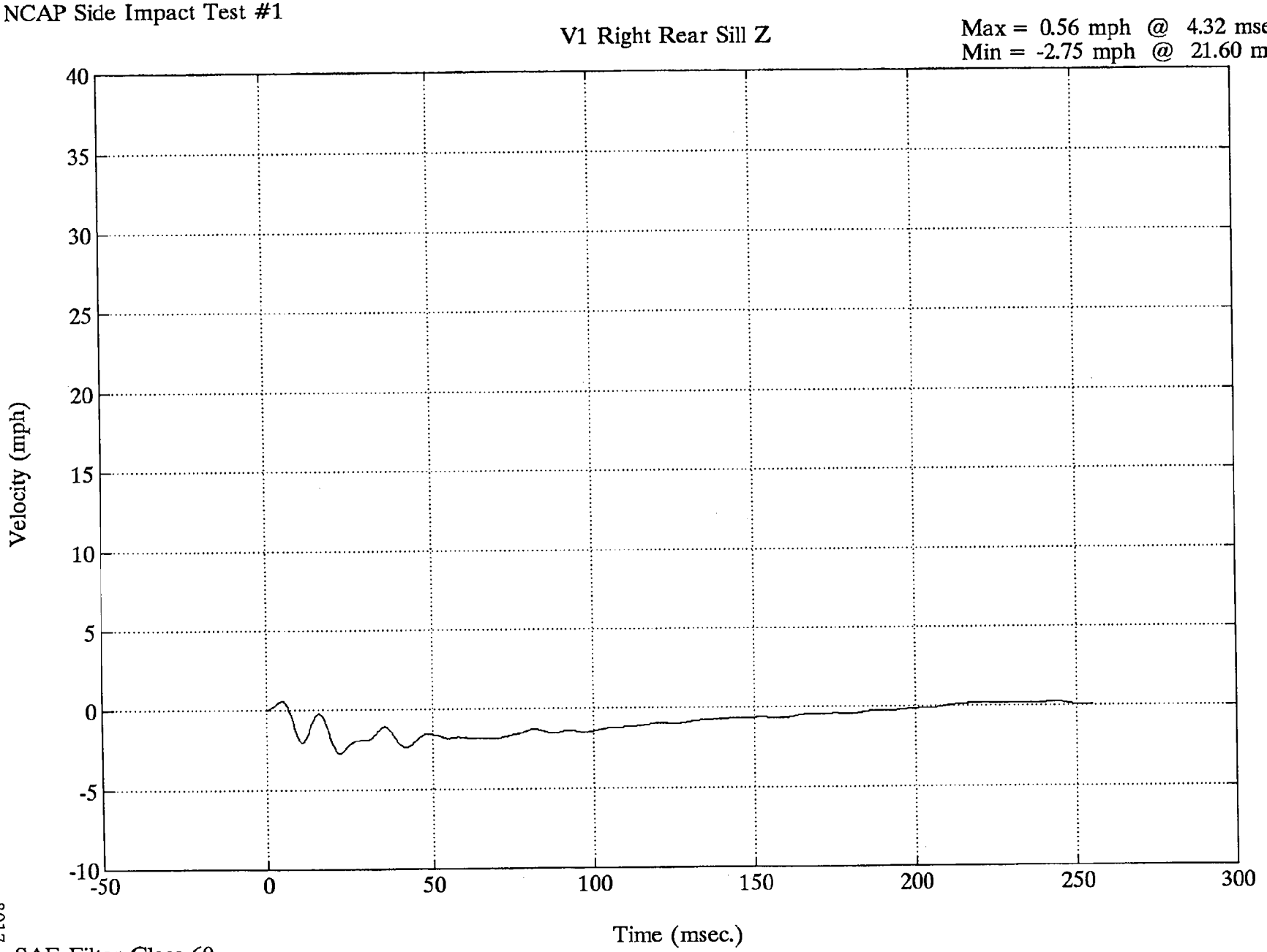
NCAP Side Imapct Test #2



B-48

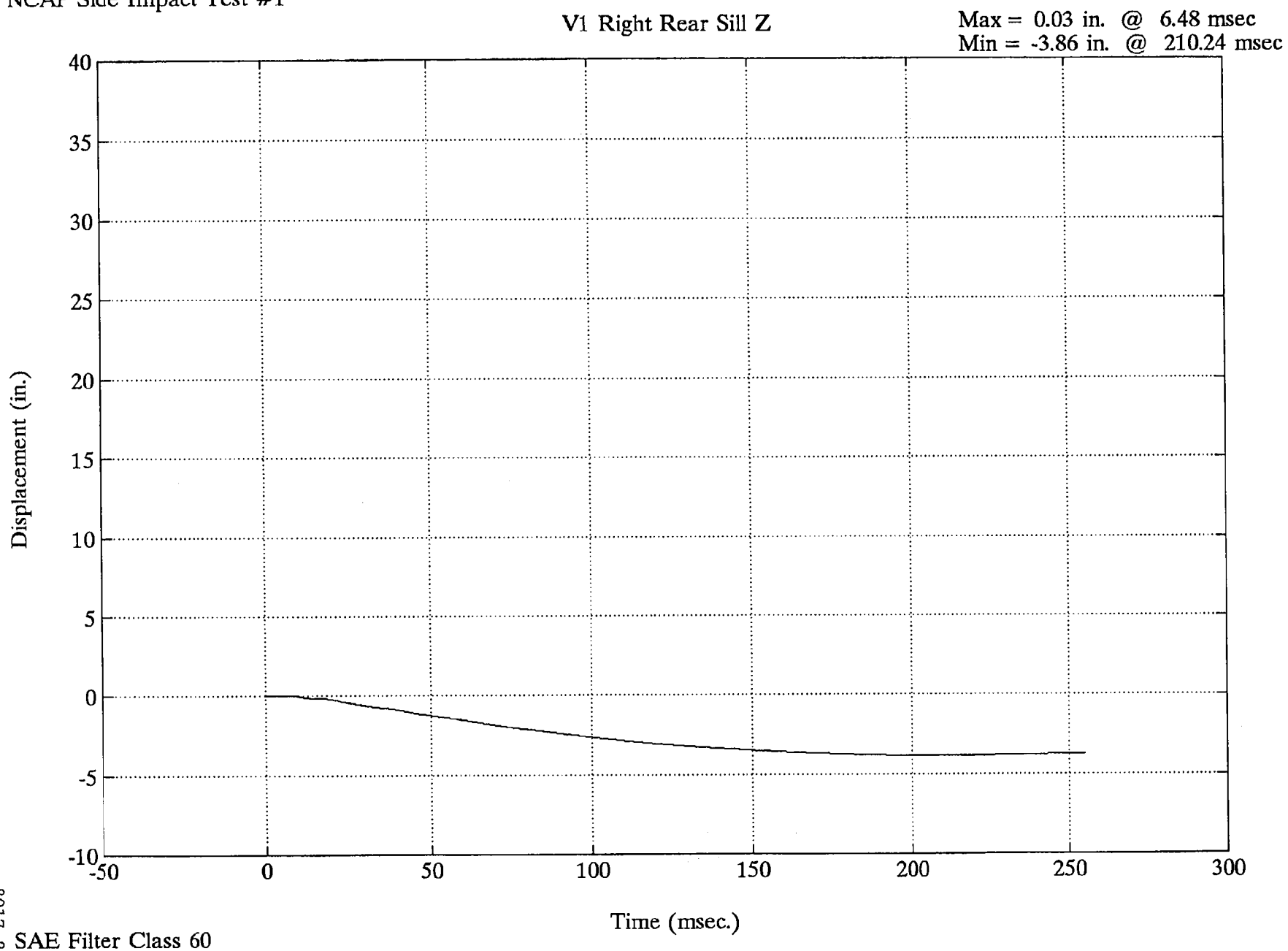
8017-2 SAE Filter Class 60

NCAP Side Impact Test #1



8017-2 SAE Filter Class 60

NCAP Side Impact Test #1



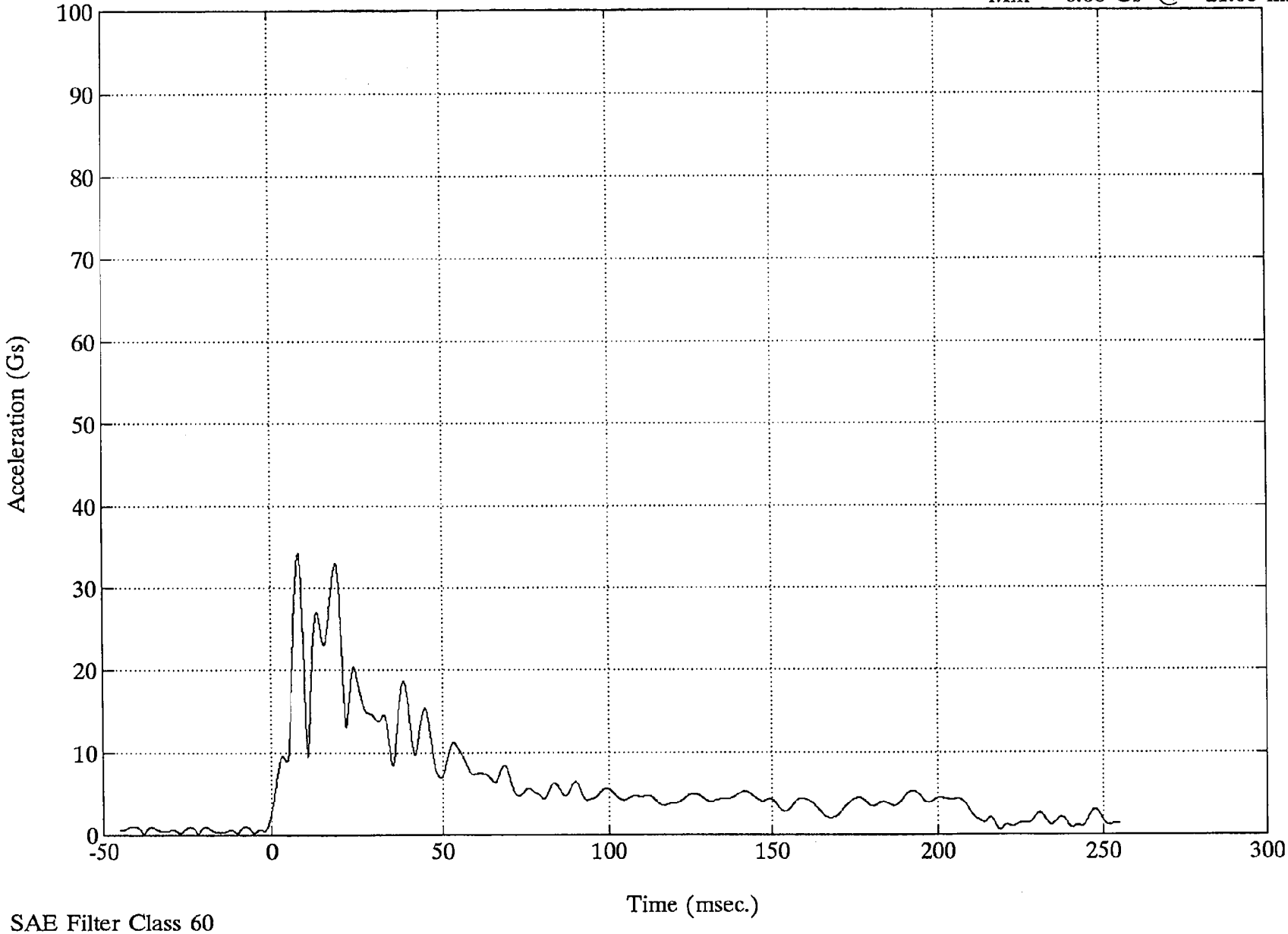
B-50

8017-2 SAE Filter Class 60

NCAP S.I. TEST #2 1992 FORD CROWN VICTORIA

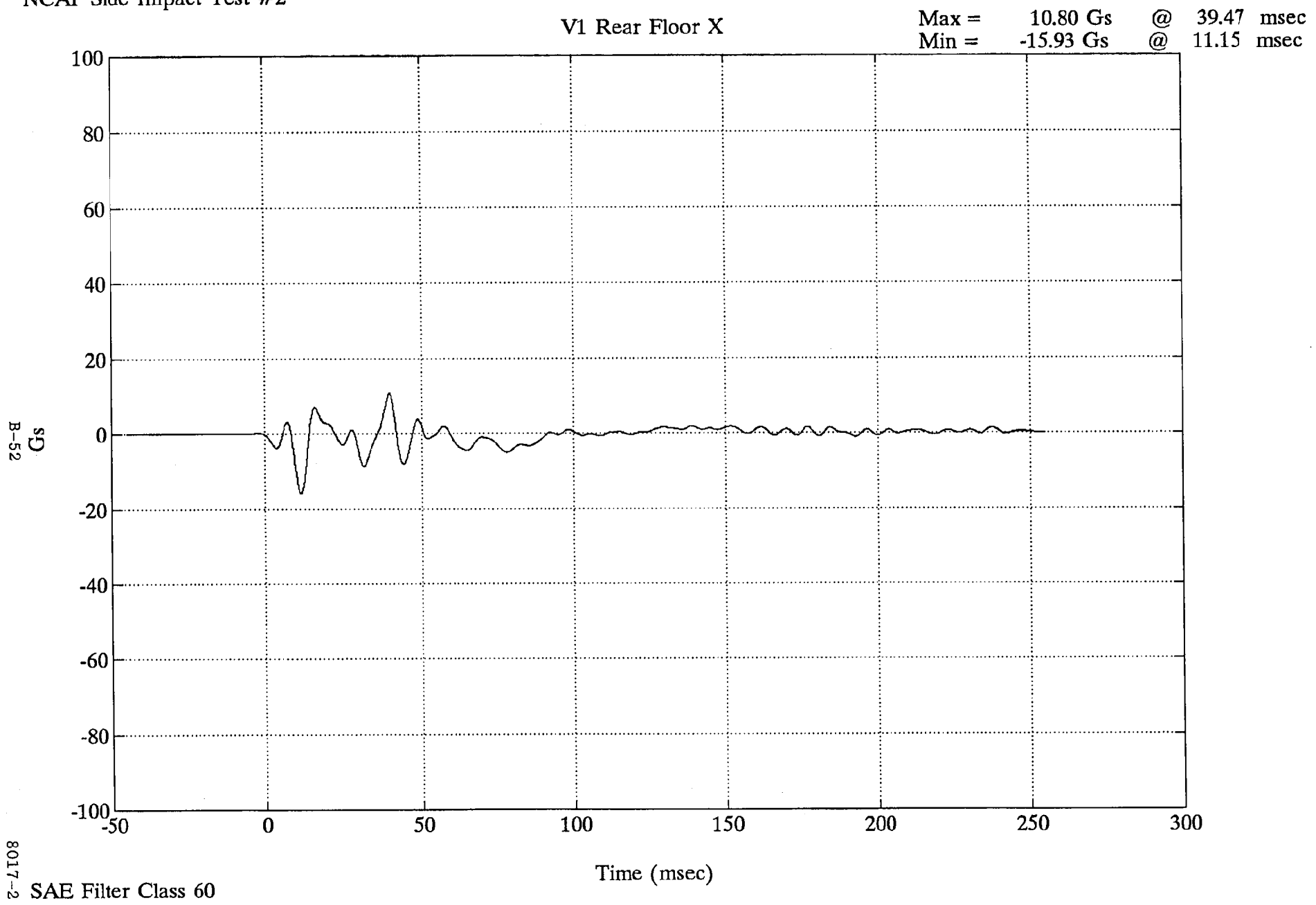
V1 Right Rear Sill Res.

Max = 34.24 Gs @ 7.56 msec
Min = 0.06 Gs @ -21.60 msec



SAE Filter Class 60

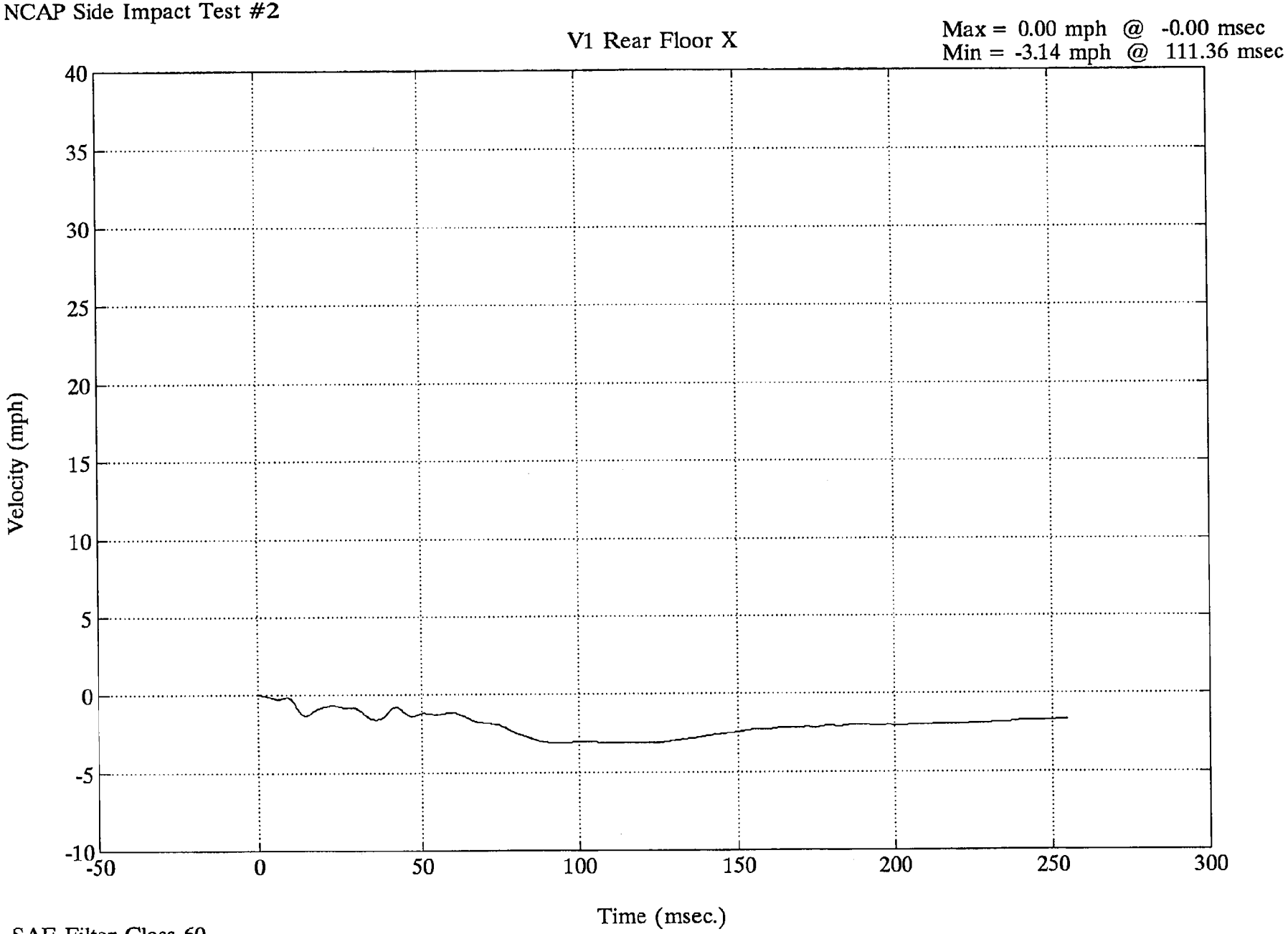
NCAP Side Impact Test #2



B-52

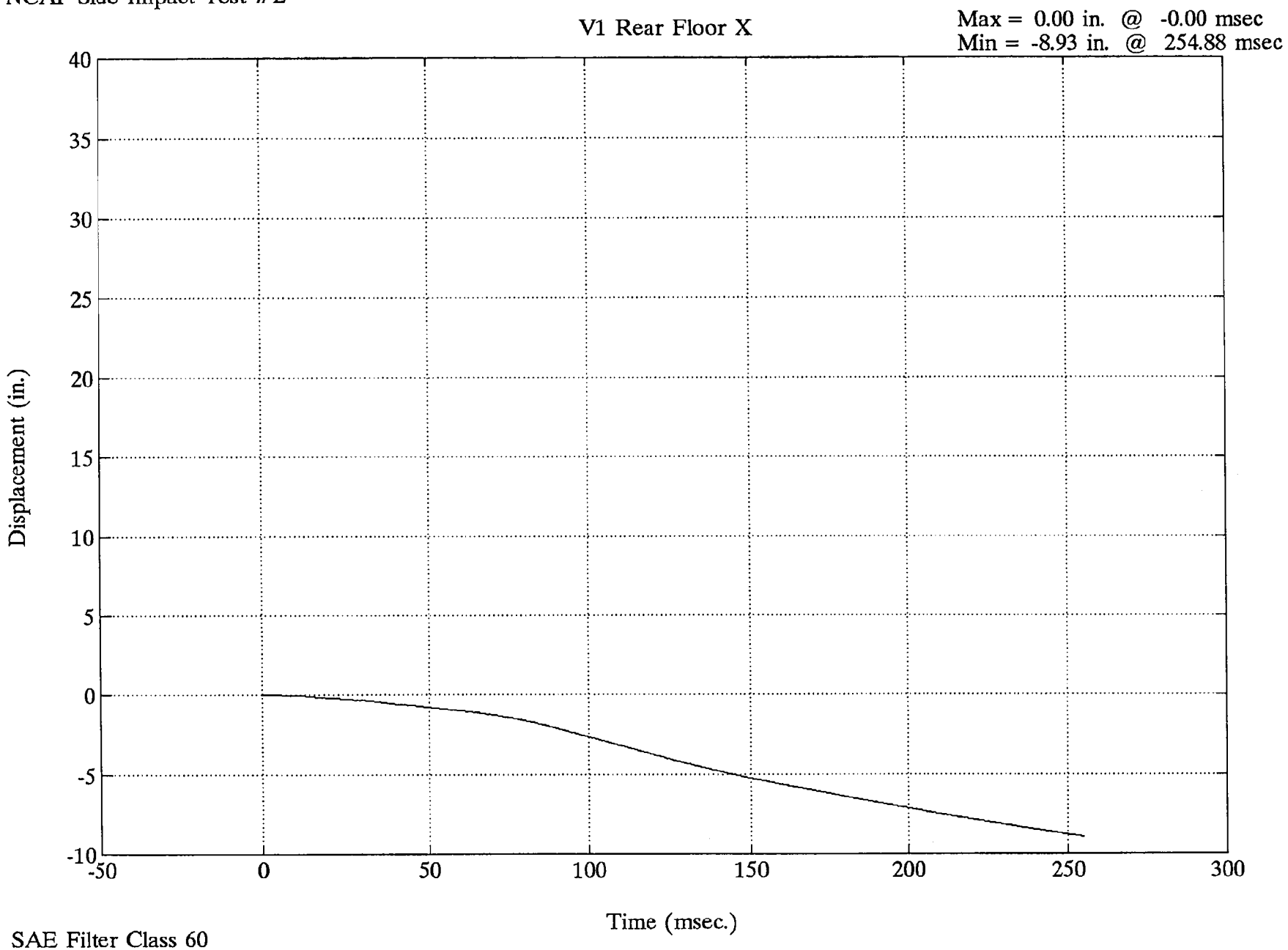
8017-2 SAE Filter Class 60

NCAP Side Impact Test #2



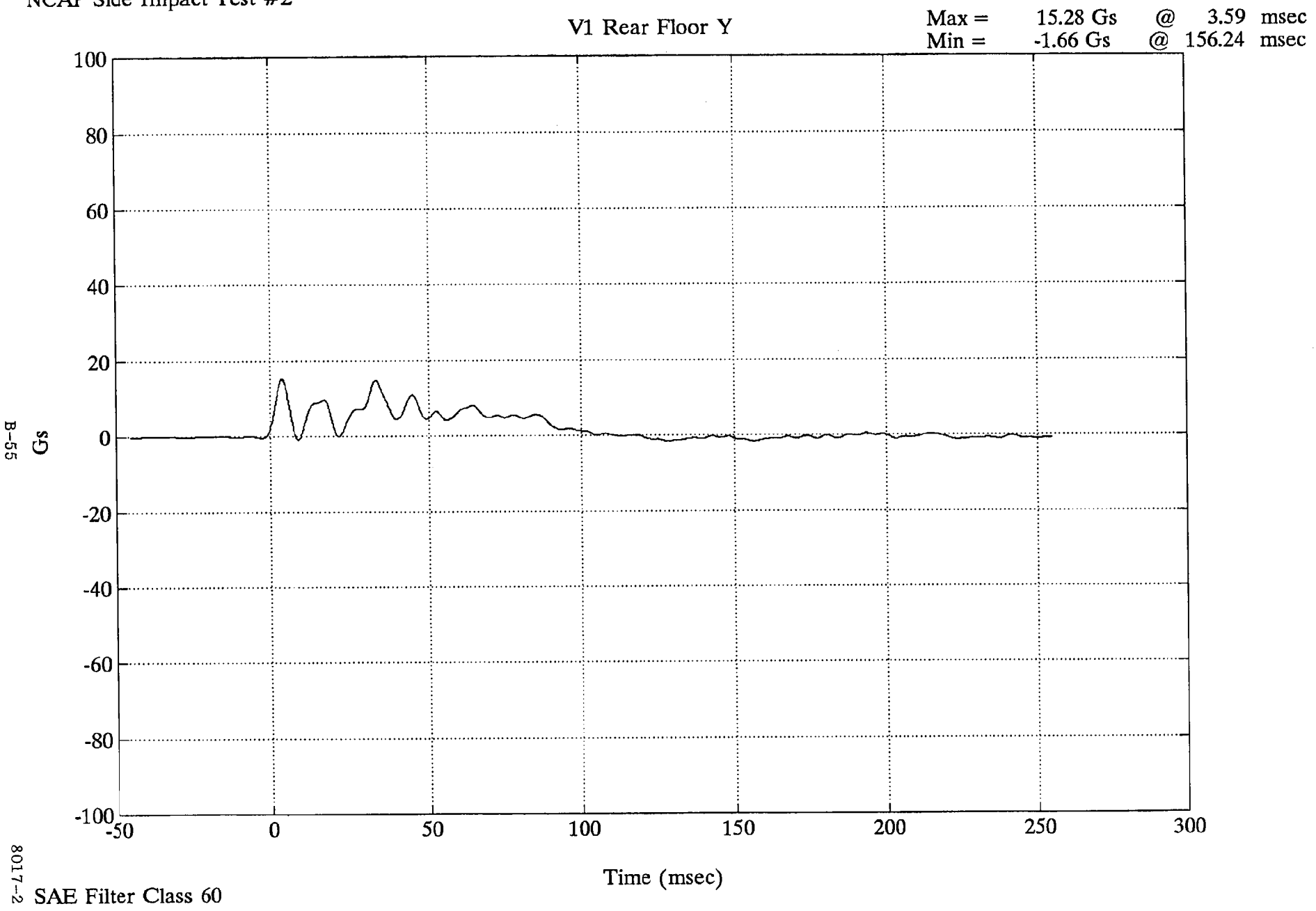
SAE Filter Class 60

NCAP Side Impact Test #2



SAE Filter Class 60

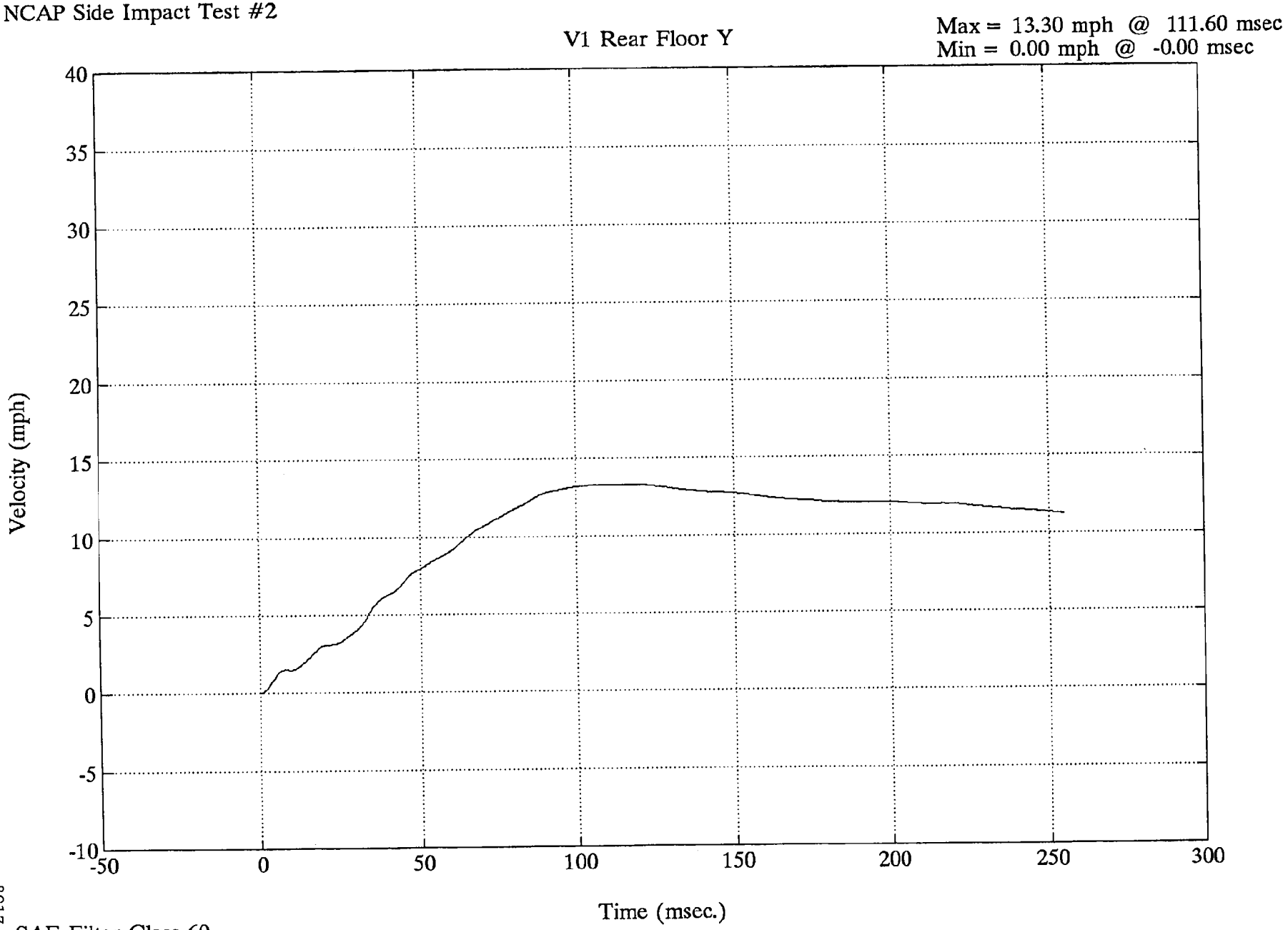
NCAP Side Impact Test #2



SAE Filter Class 60

8017-2

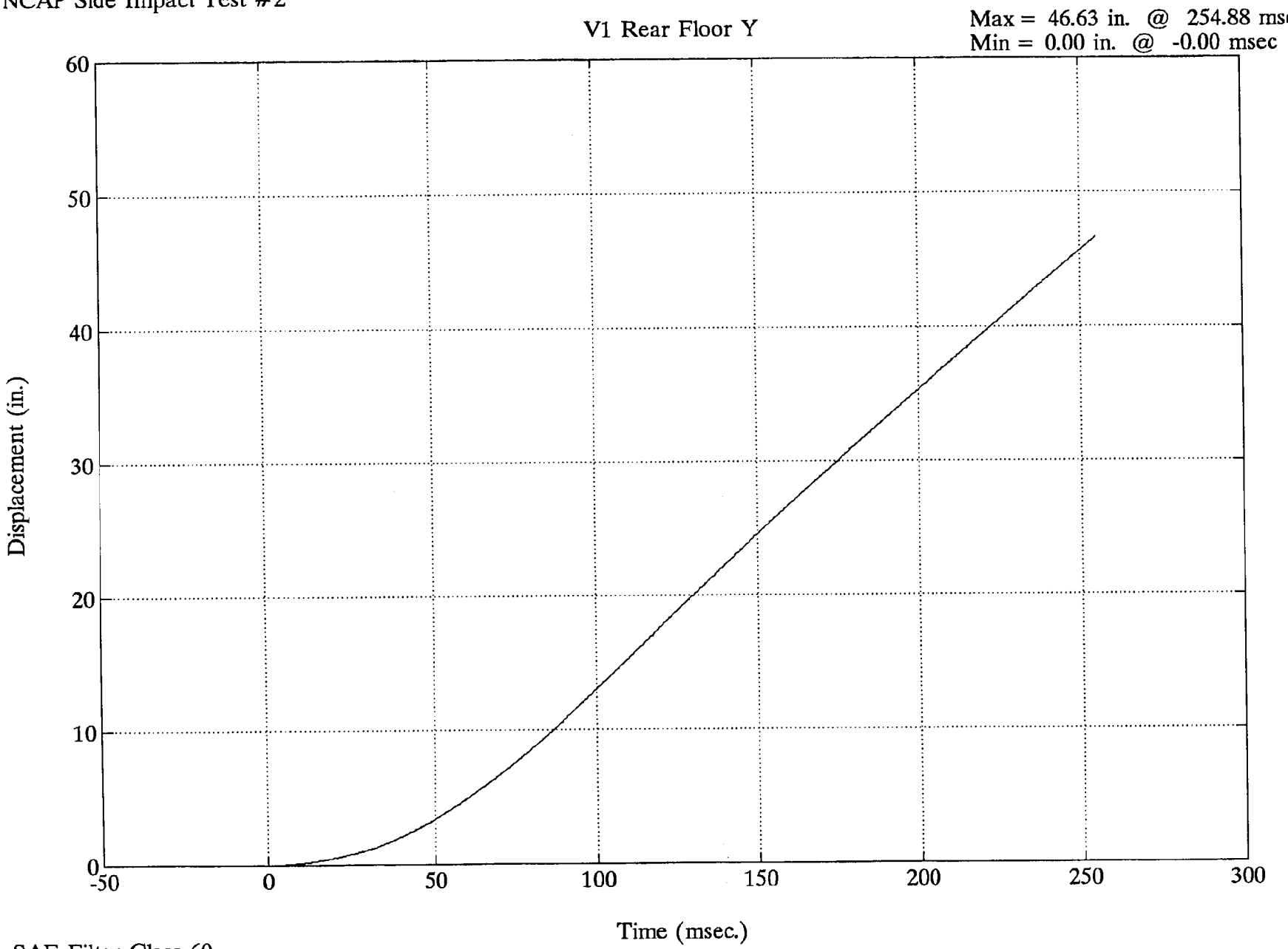
NCAP Side Impact Test #2



B-56

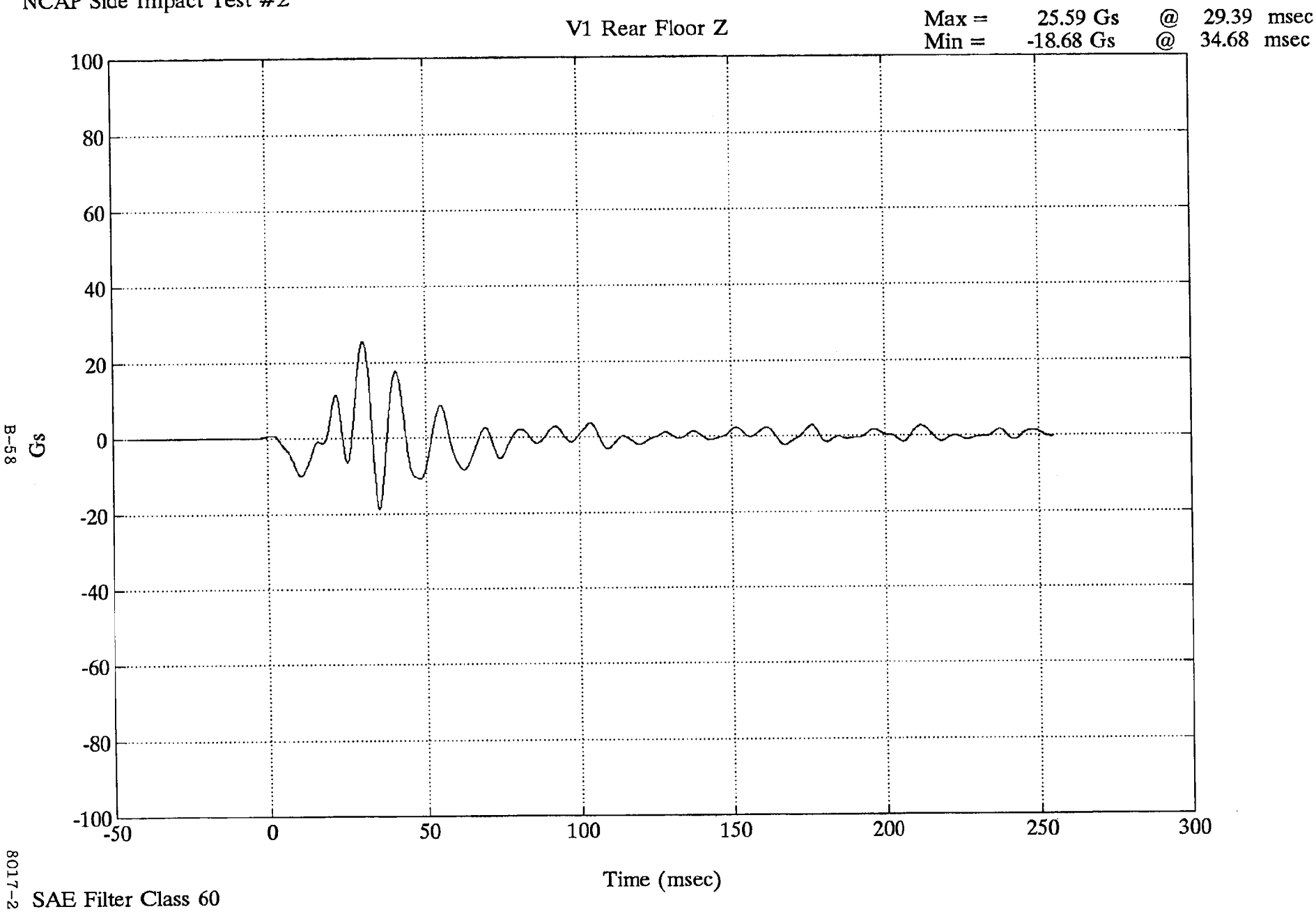
8017-2 SAE Filter Class 60

NCAP Side Impact Test #2



SAE Filter Class 60

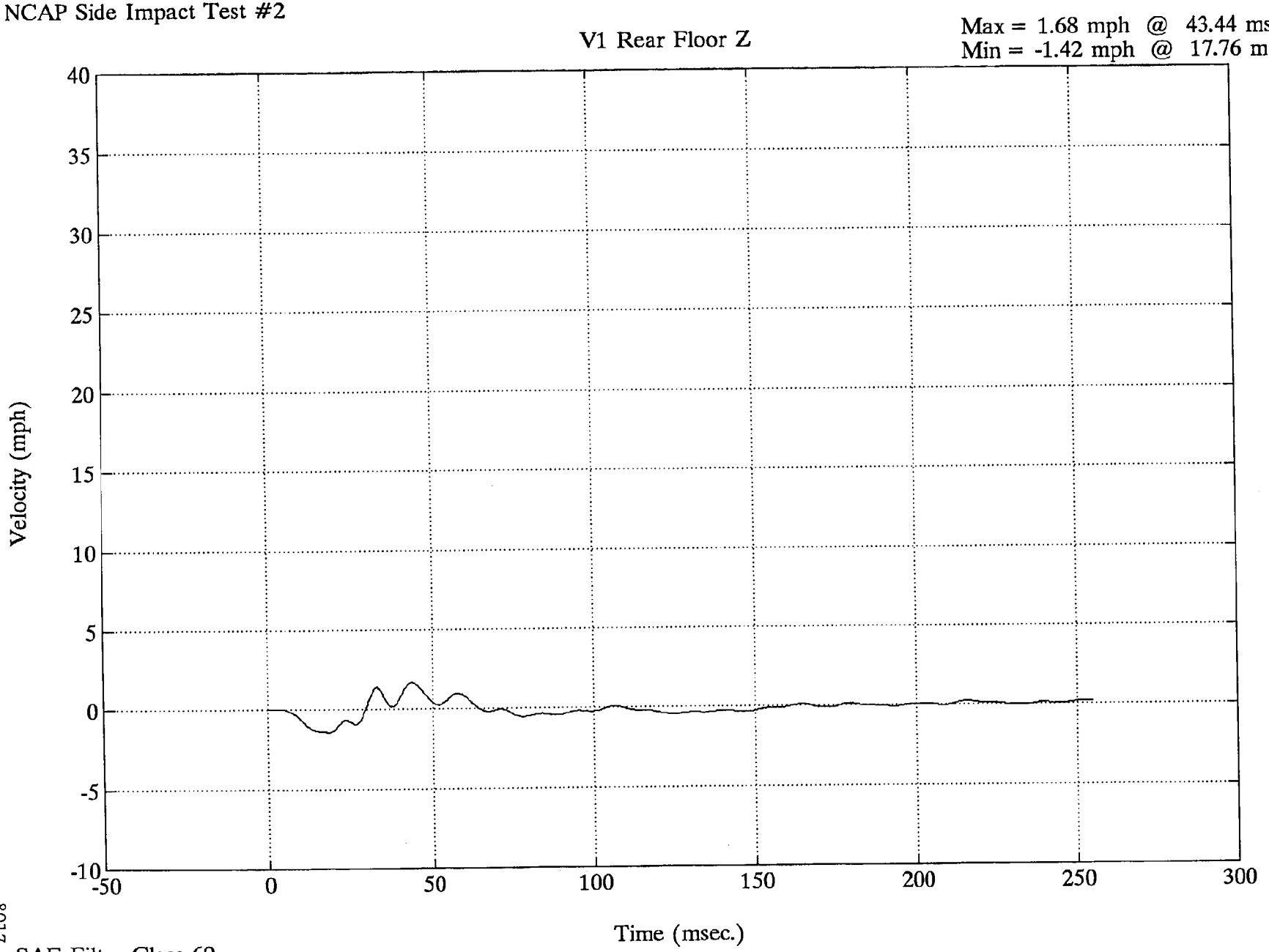
NCAP Side Impact Test #2



SAE Filter Class 60

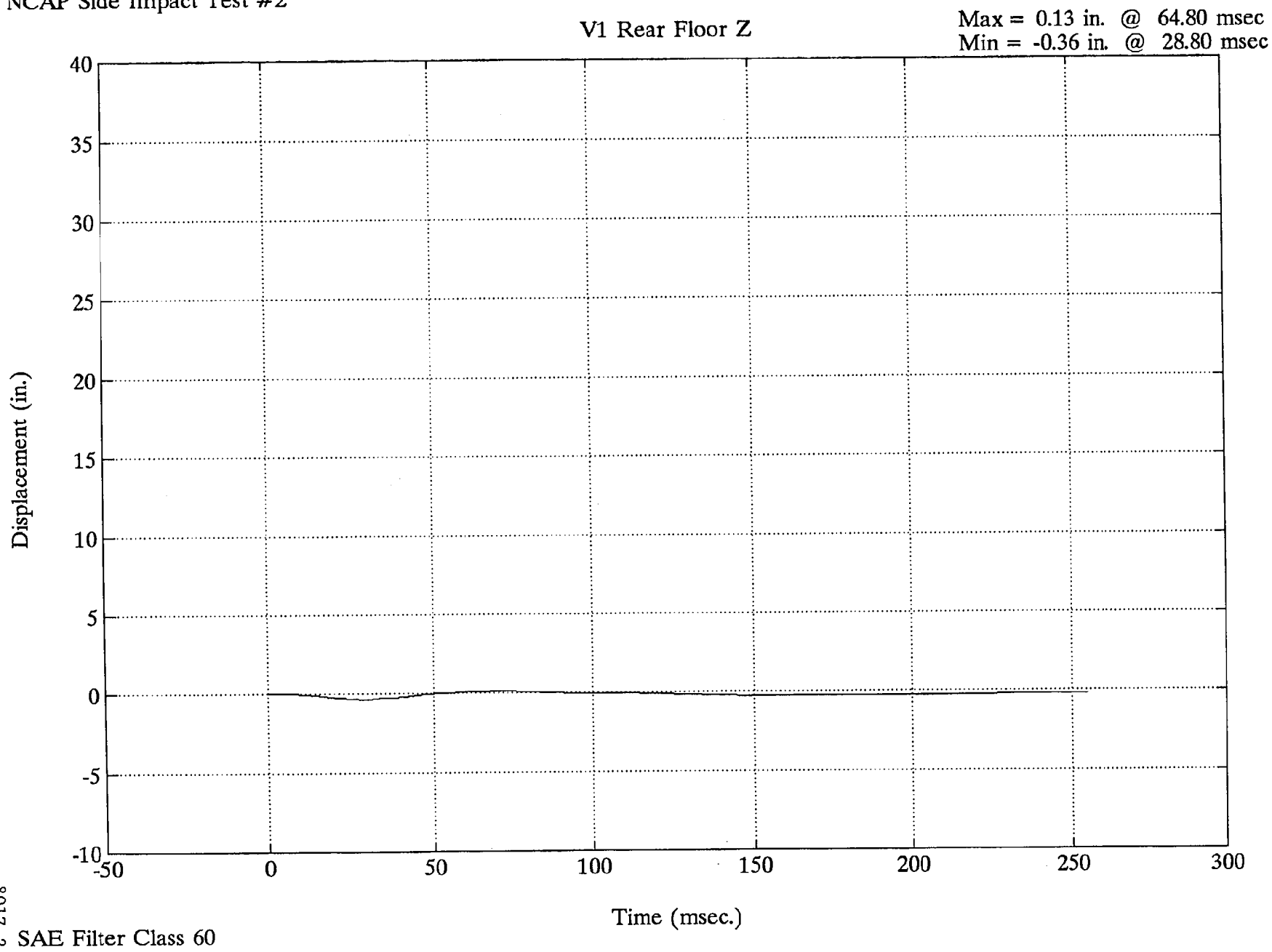
8017-2

NCAP Side Impact Test #2



8017-2 SAE Filter Class 60

NCAP Side Impact Test #2



B-60

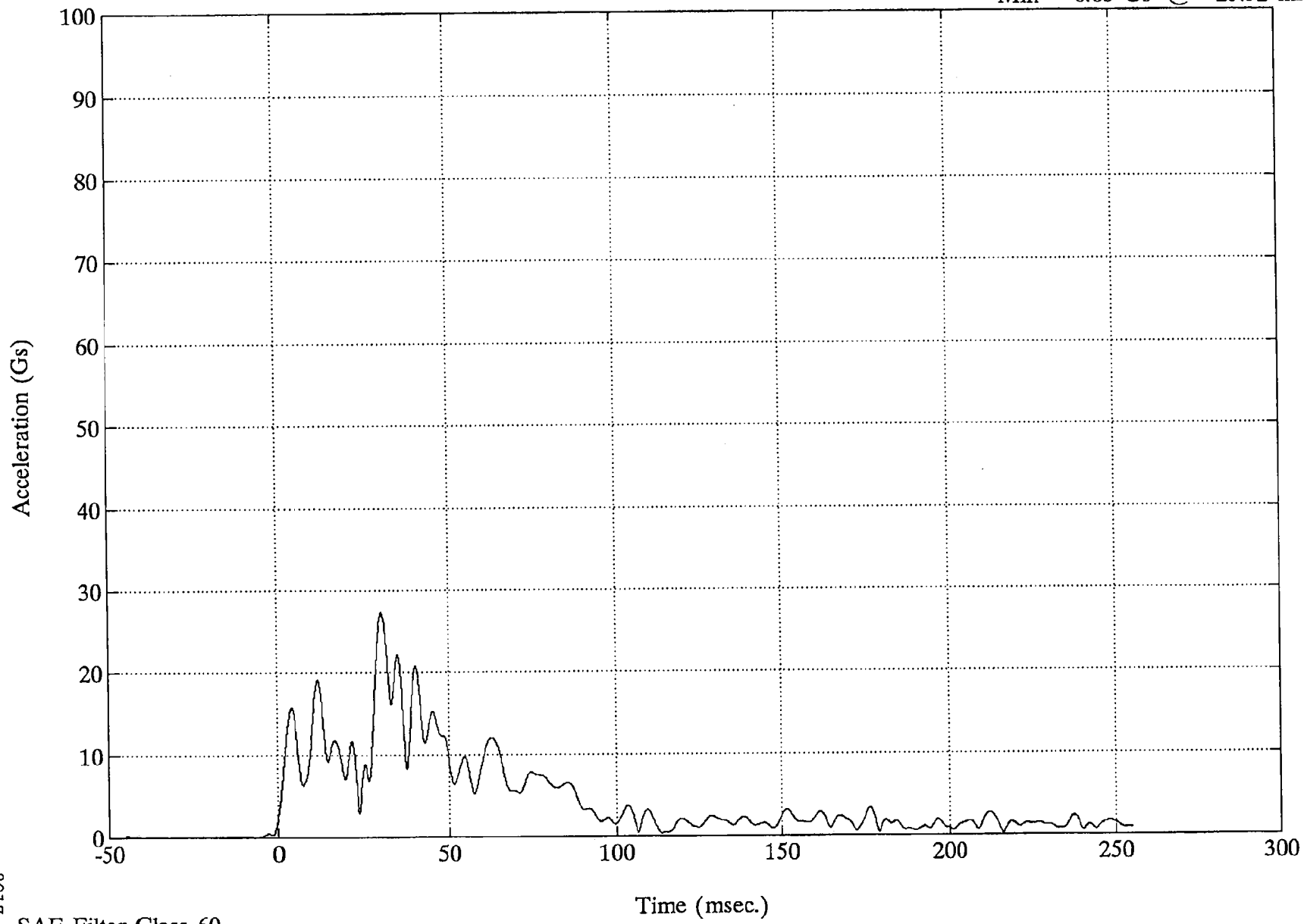
8017-2

SAE Filter Class 60

NCAP S.I. TEST #2 1992 FORD CROWN VICTORIA

V1 Rear Floor Res.

Max = 27.26 Gs @ 29.64 msec
Min = 0.05 Gs @ -23.52 msec

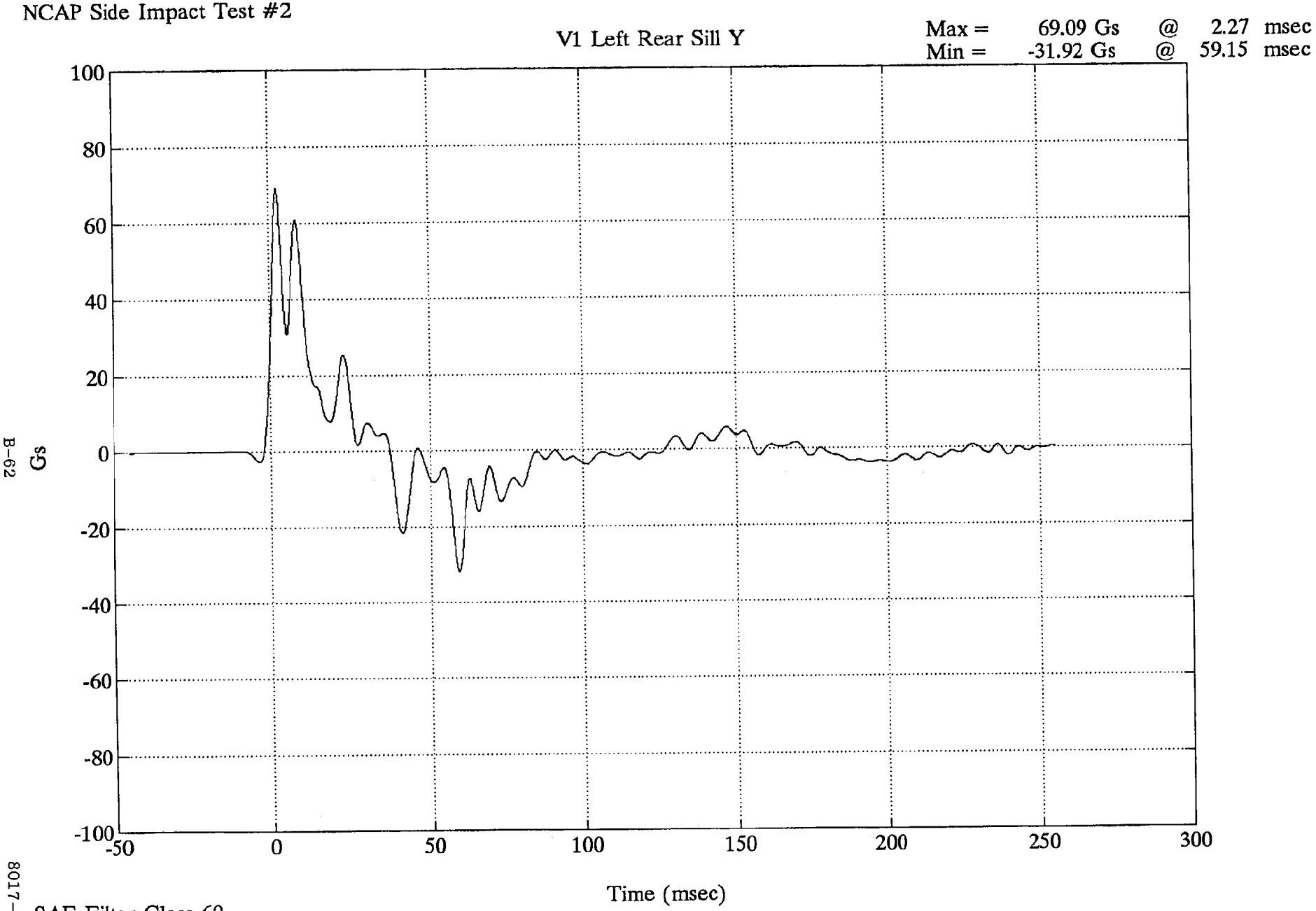


B-61

8017-2

SAE Filter Class 60

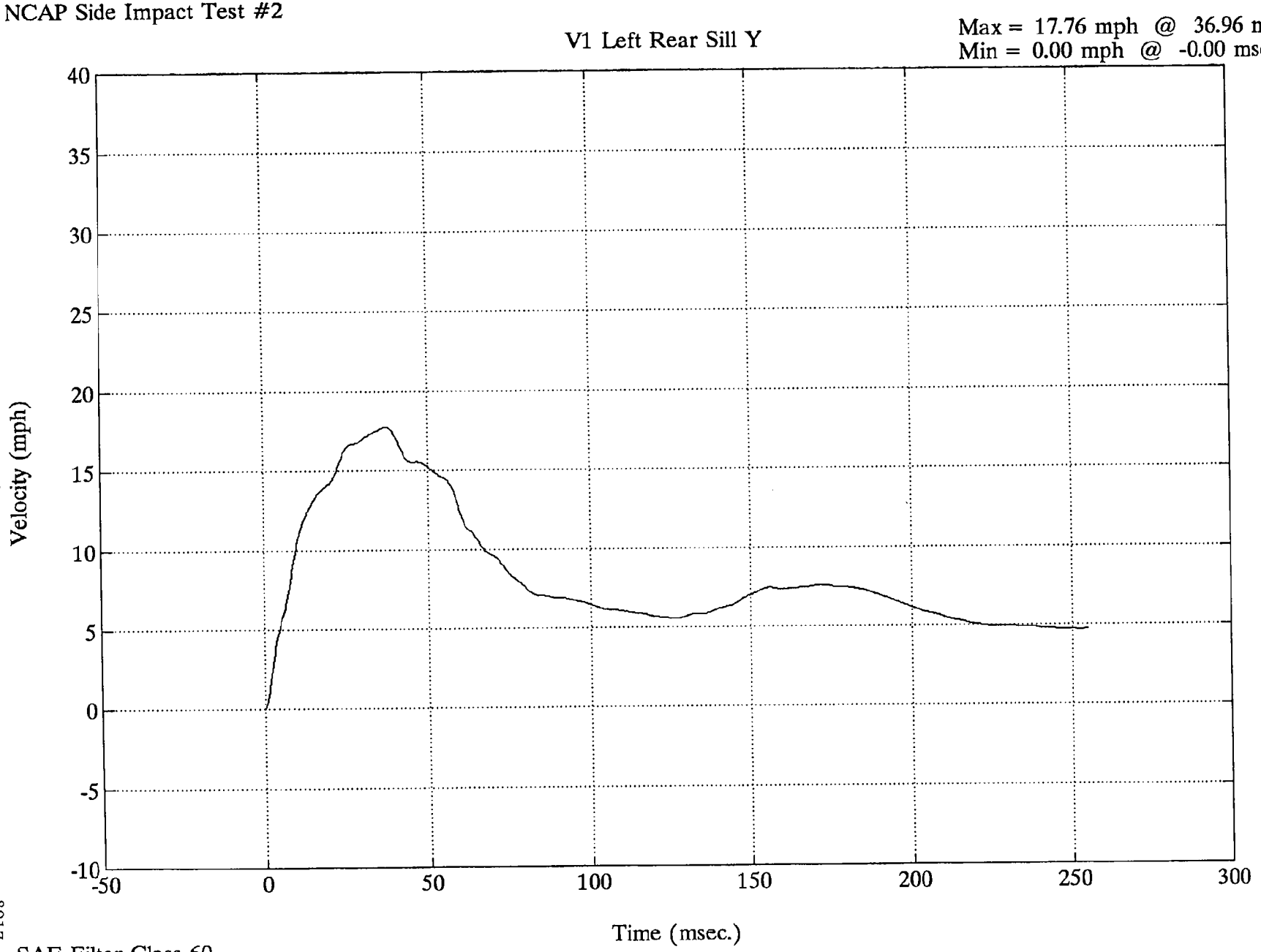
NCAP Side Impact Test #2



SAE Filter Class 60

8017-2

NCAP Side Impact Test #2

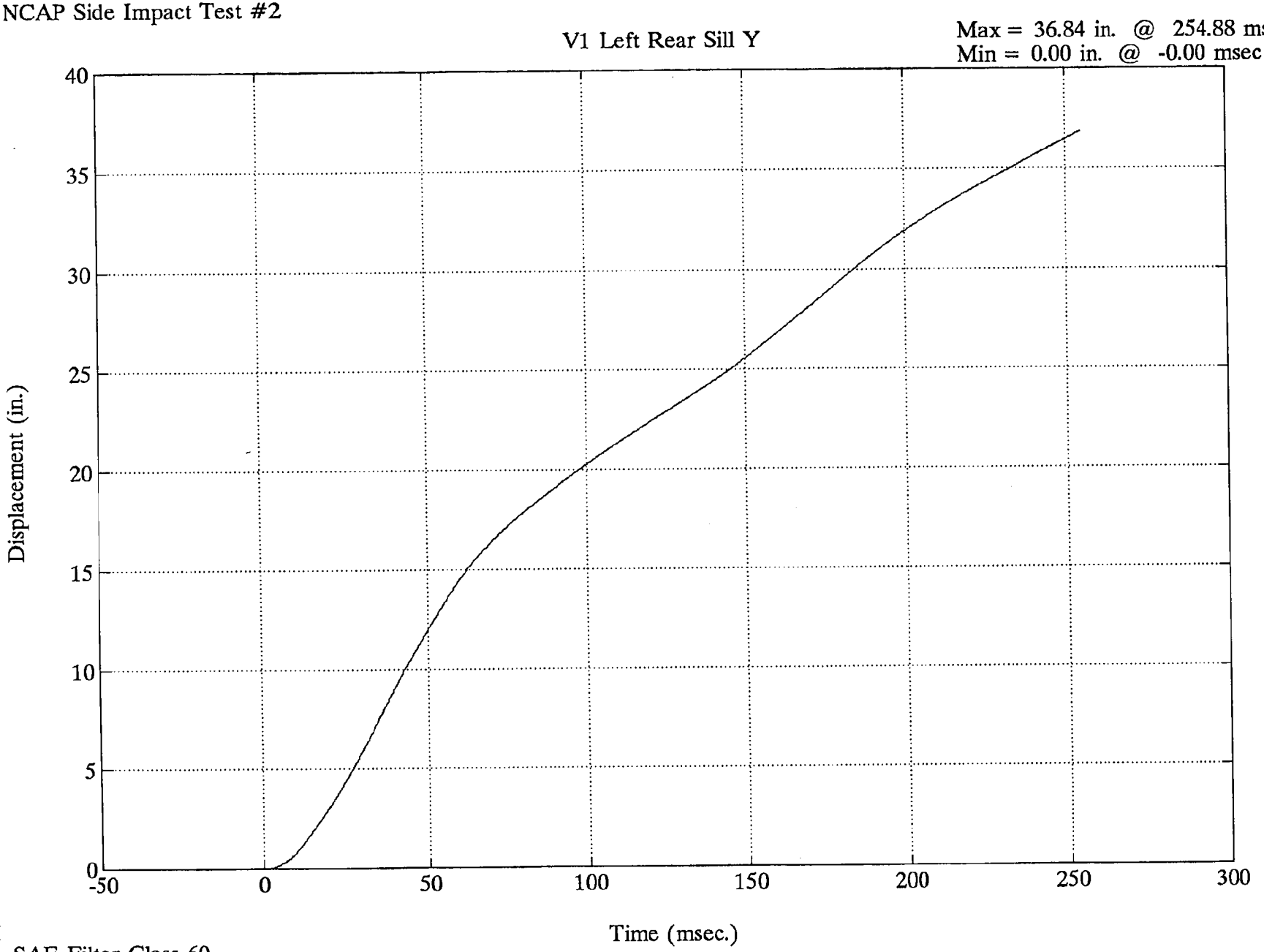


B-63

8017-2

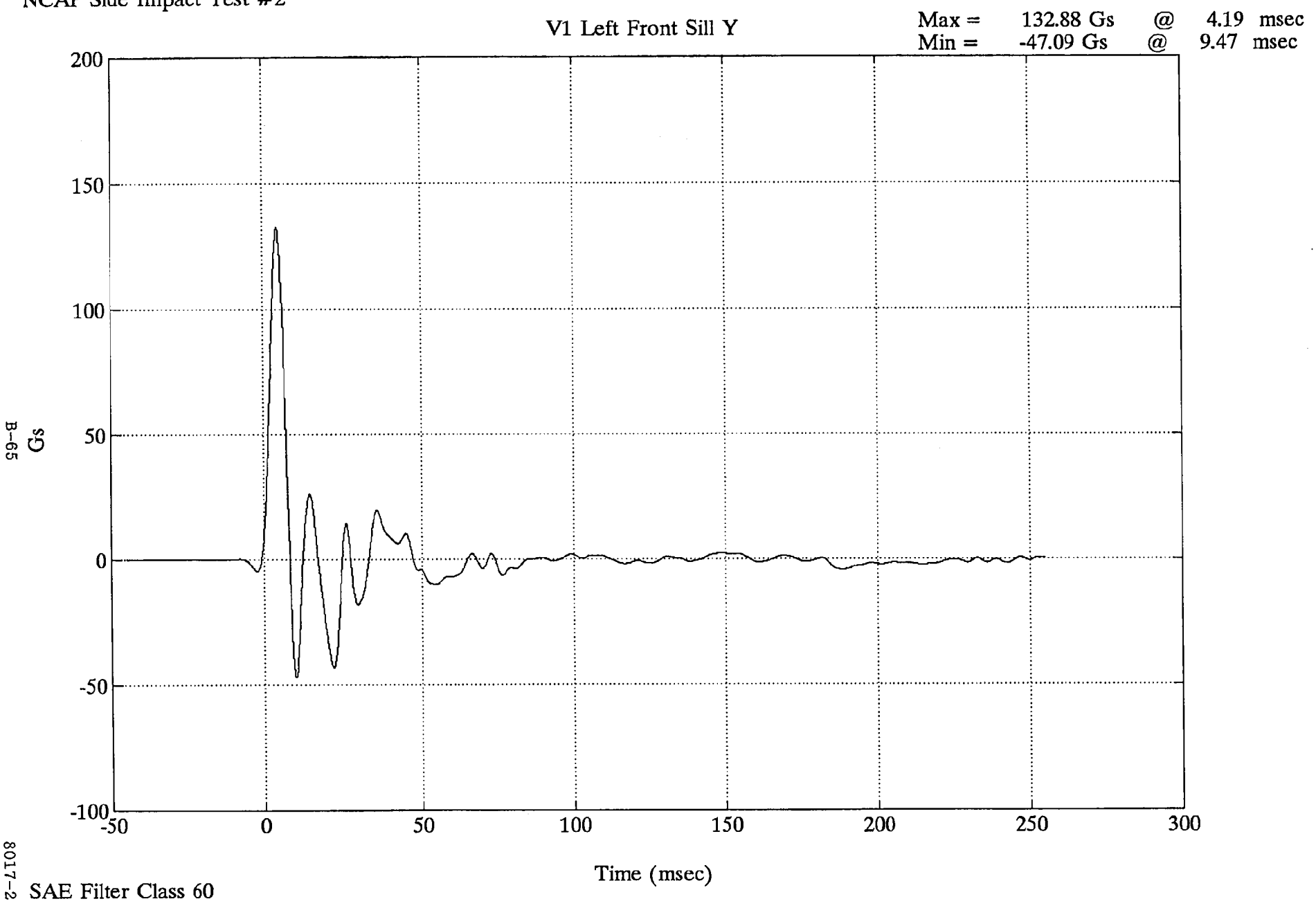
SAE Filter Class 60

NCAP Side Impact Test #2



SAE Filter Class 60

NCAP Side Impact Test #2

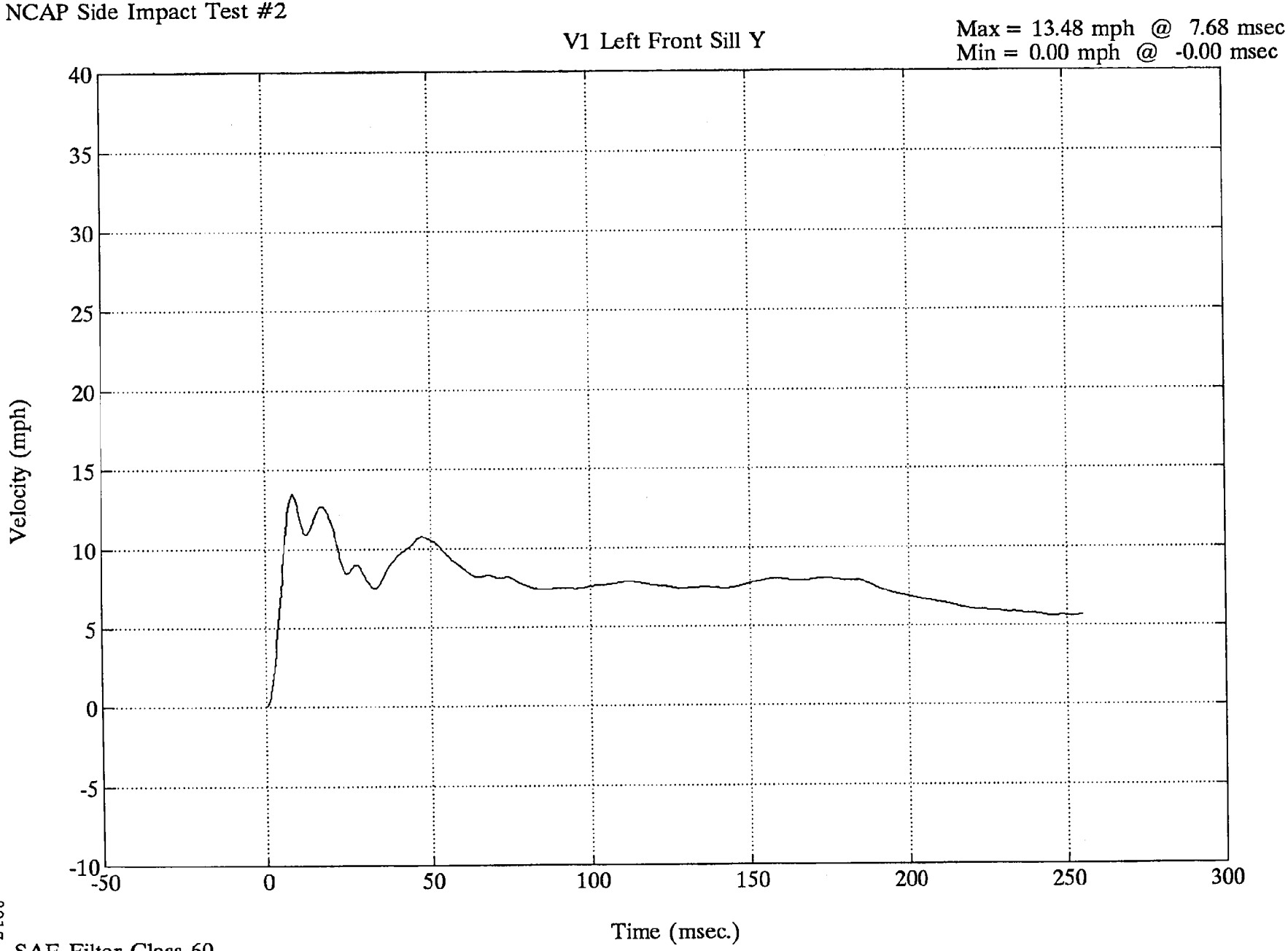


B-65

8017-2

SAE Filter Class 60

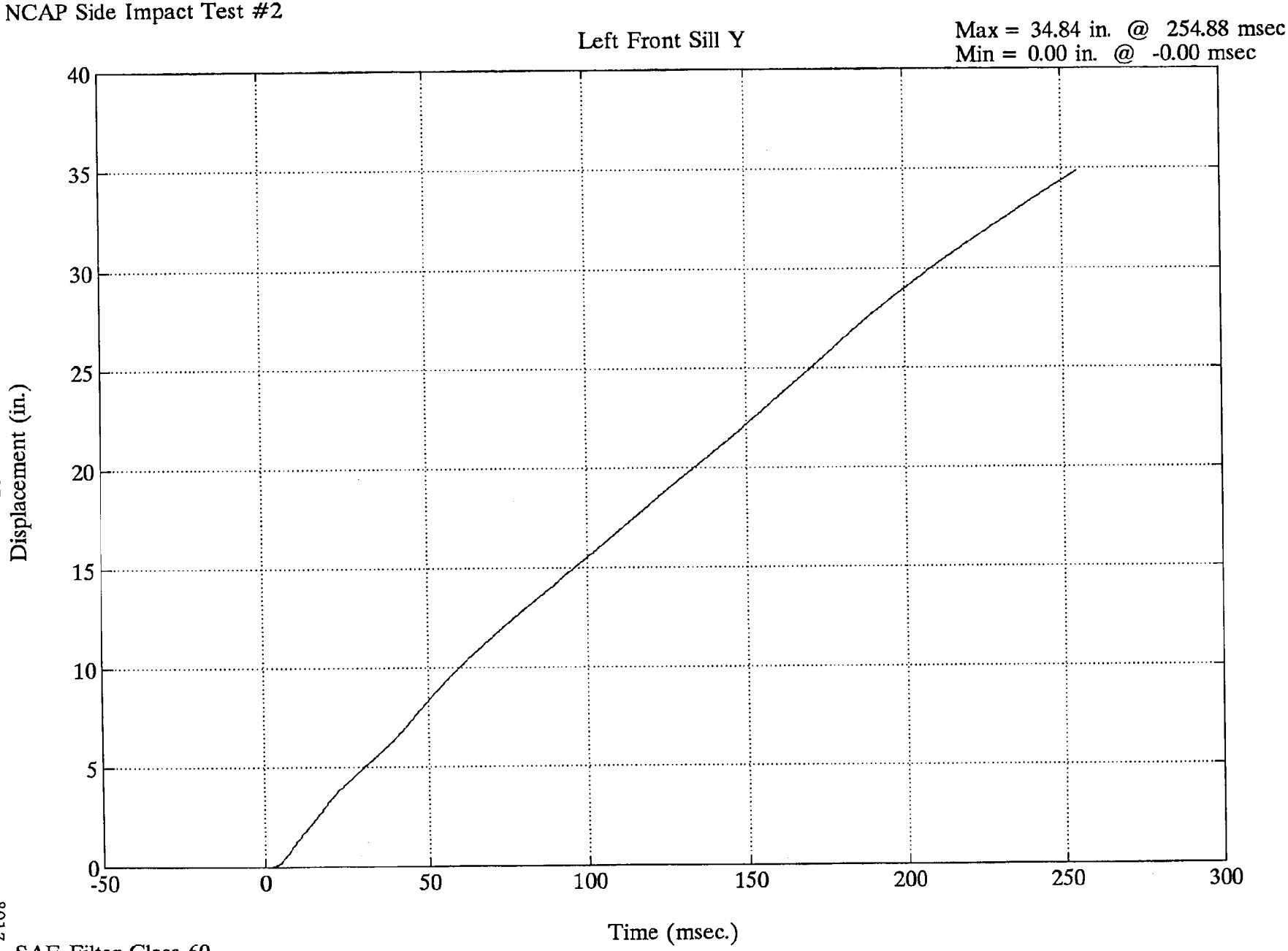
NCAP Side Impact Test #2



B-66

8017-2 SAE Filter Class 60

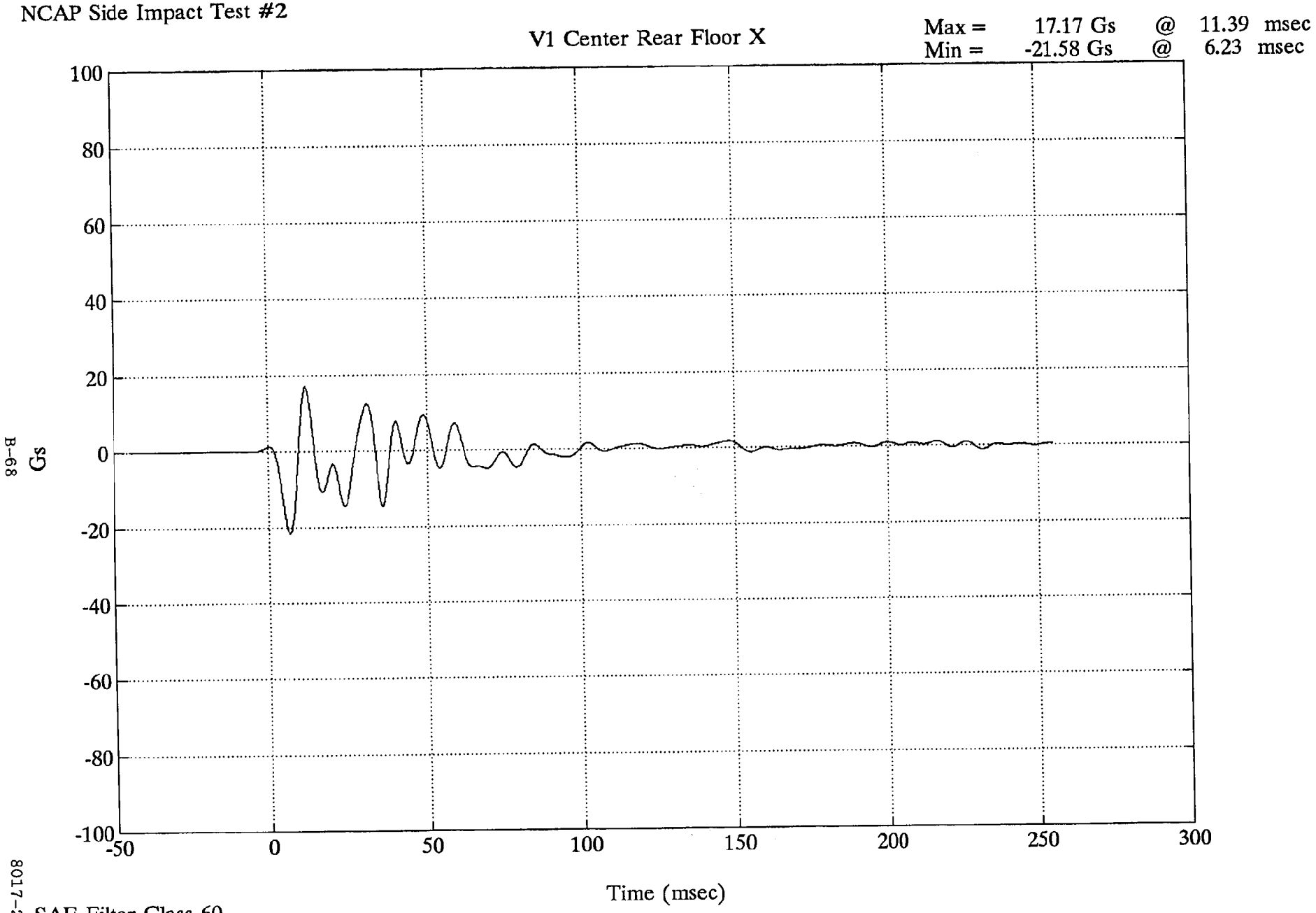
NCAP Side Impact Test #2



SAE Filter Class 60

8017-2

NCAP Side Impact Test #2

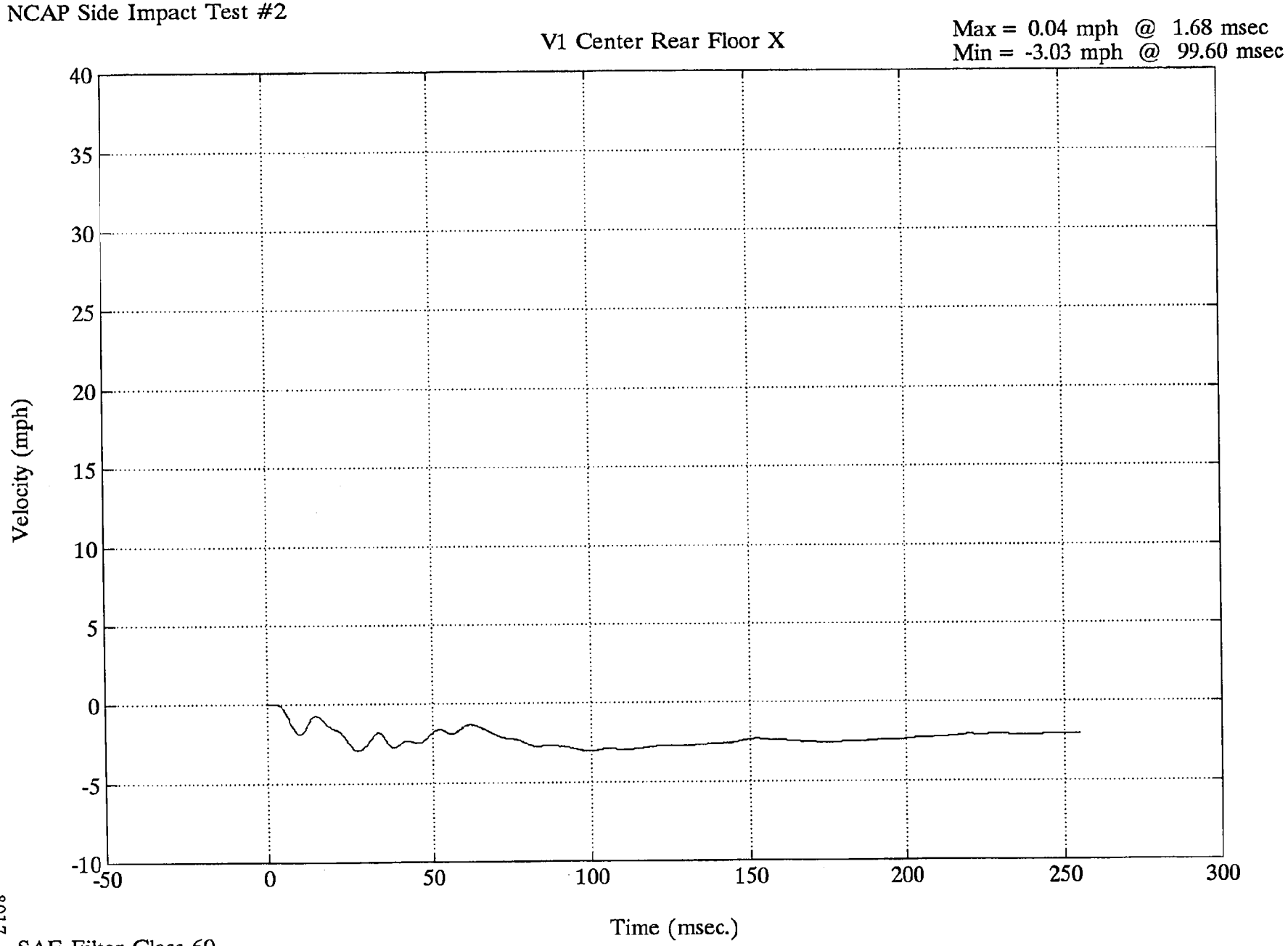


B-68

8017-2

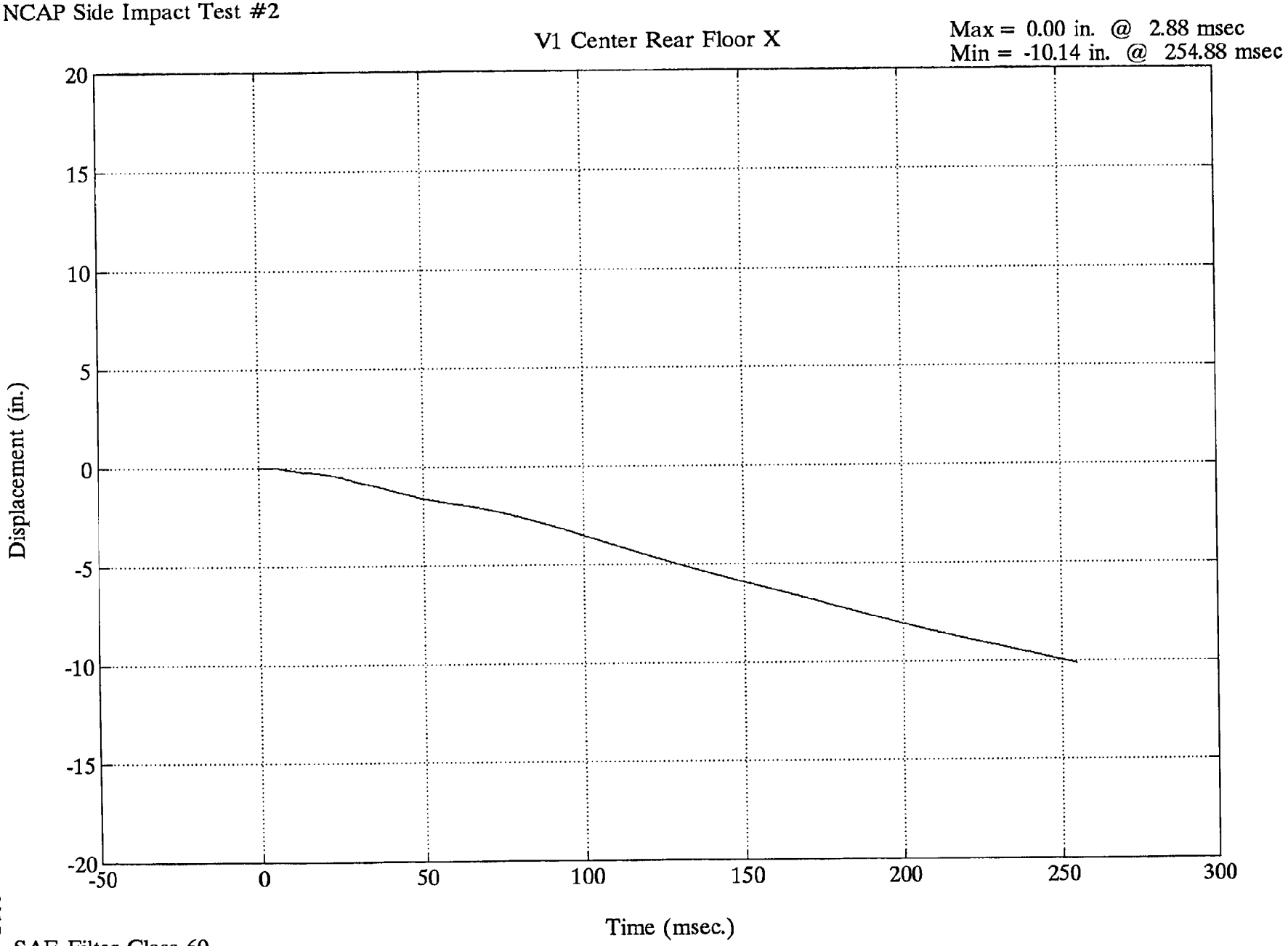
SAE Filter Class 60

NCAP Side Impact Test #2



8017-2 SAE Filter Class 60

NCAP Side Impact Test #2

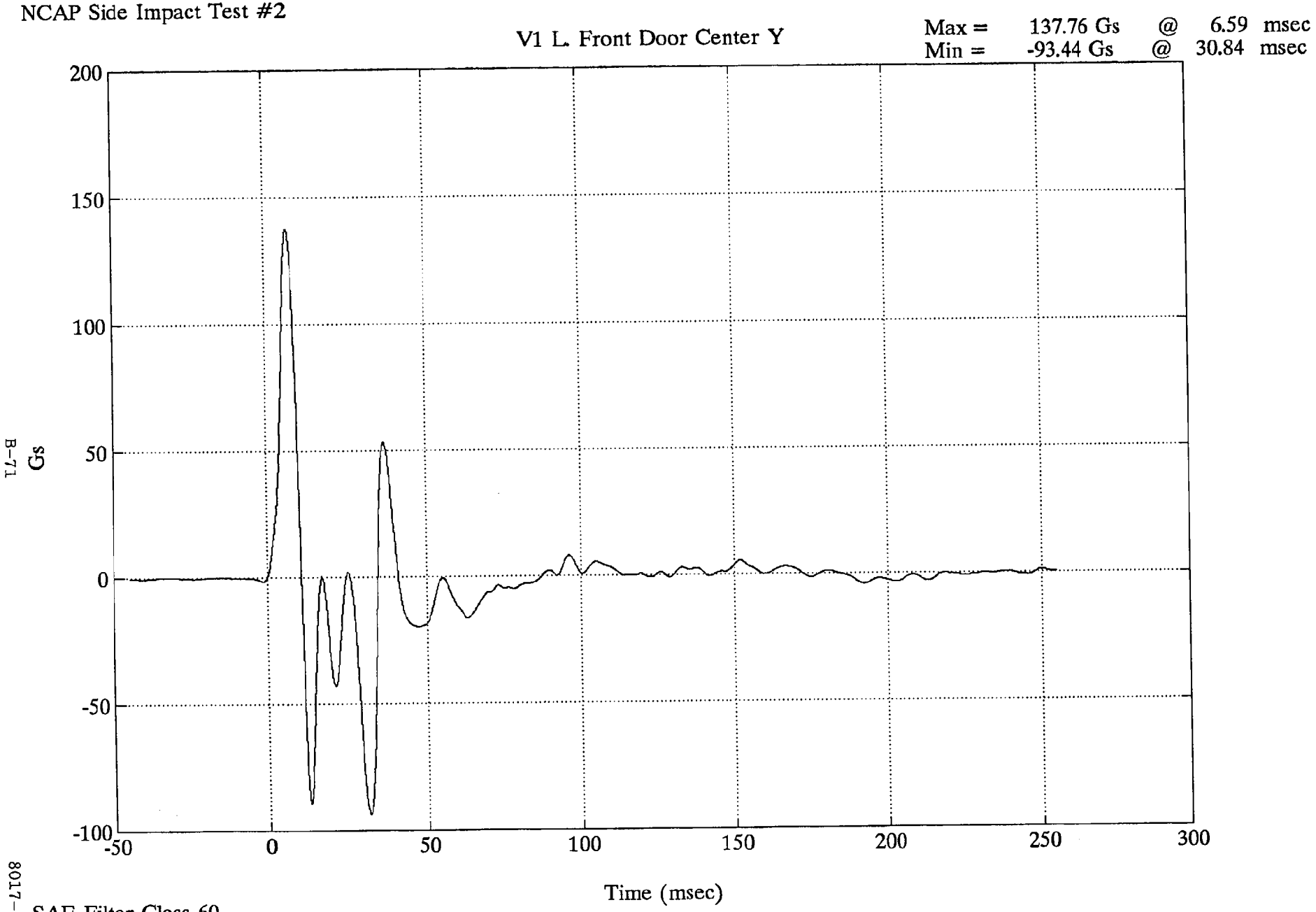


B-70

8017-2

SAE Filter Class 60

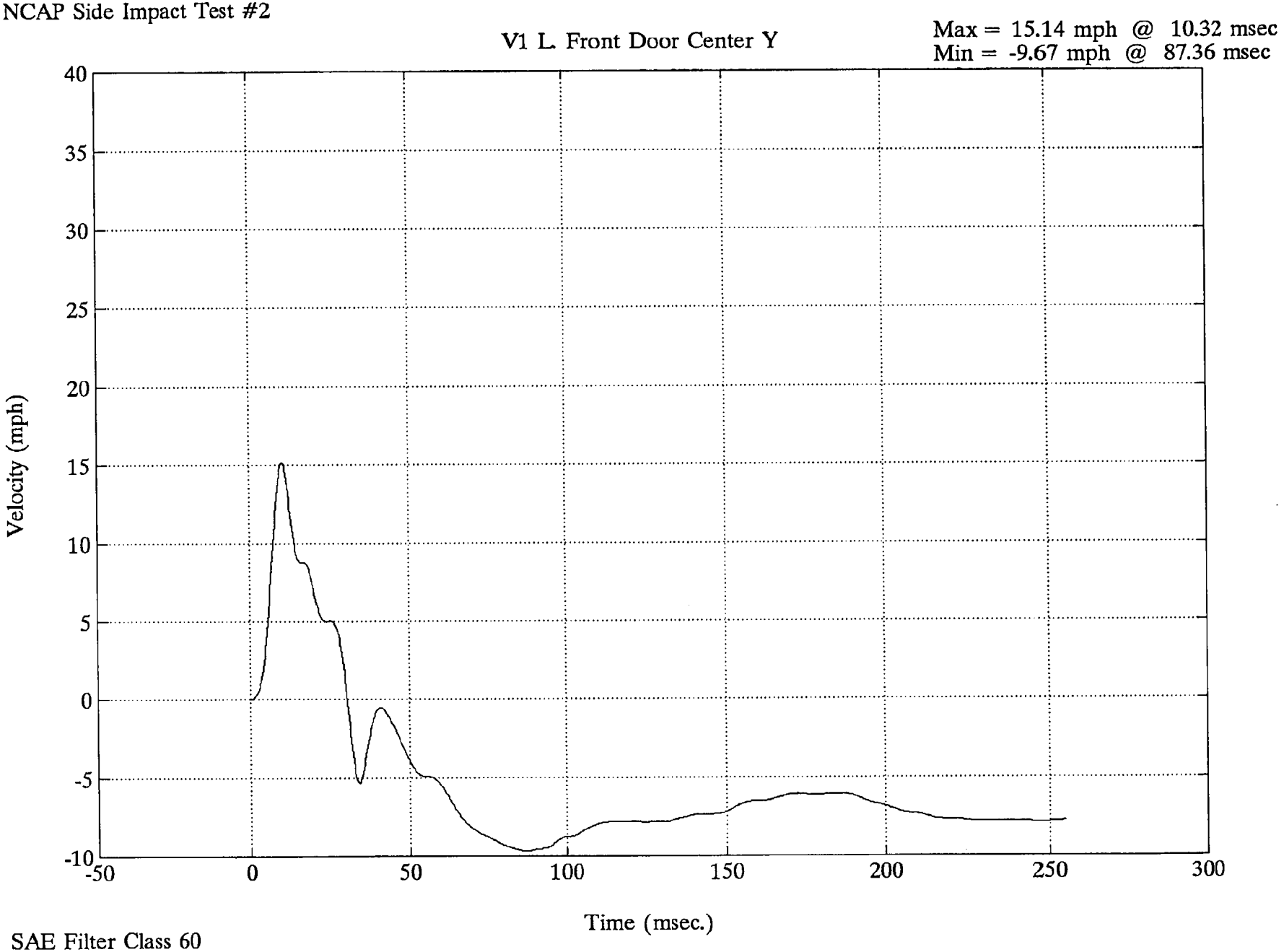
NCAP Side Impact Test #2



B-71

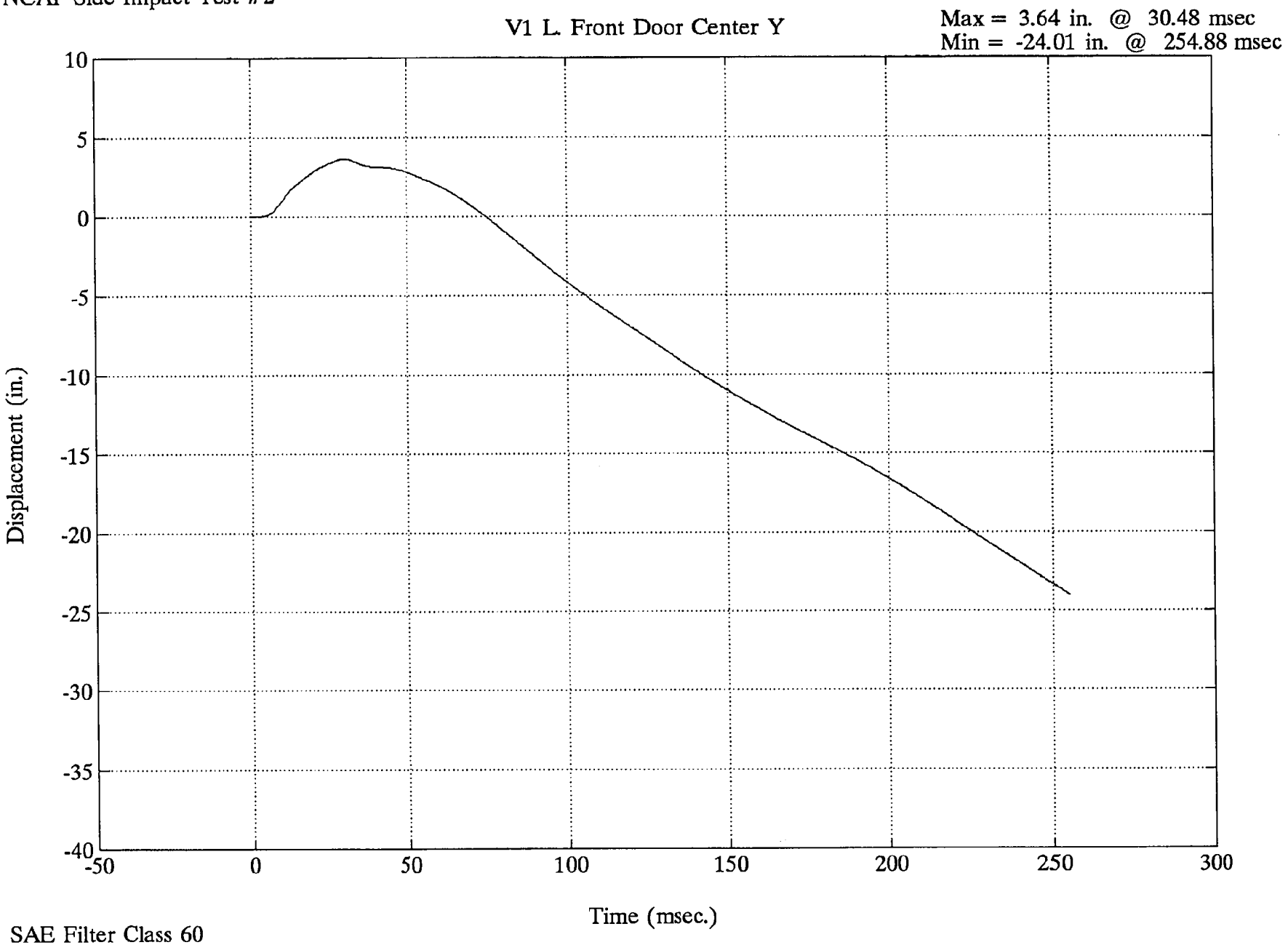
8017-2 SAE Filter Class 60

NCAP Side Impact Test #2



SAE Filter Class 60

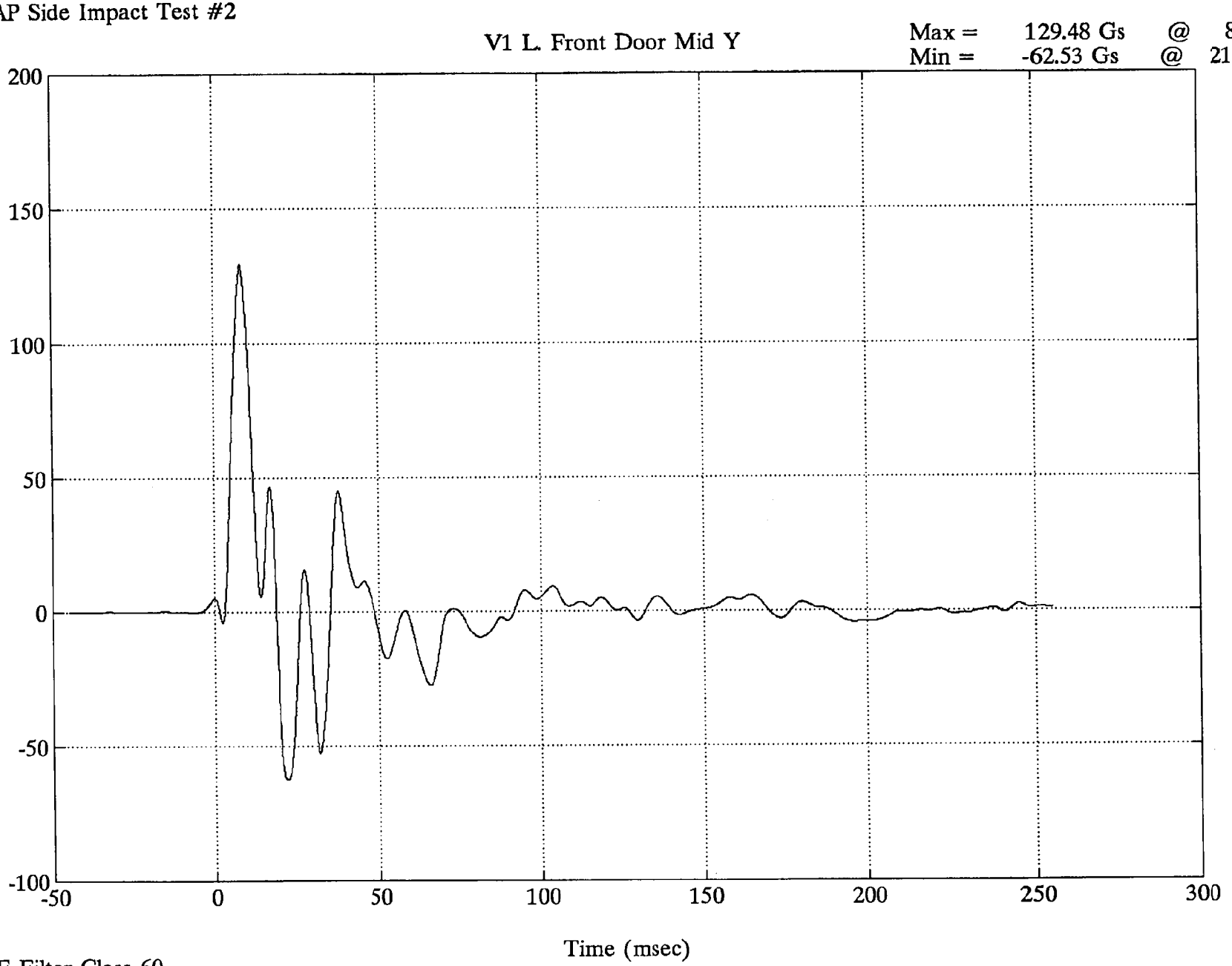
NCAP Side Impact Test #2



SAE Filter Class 60

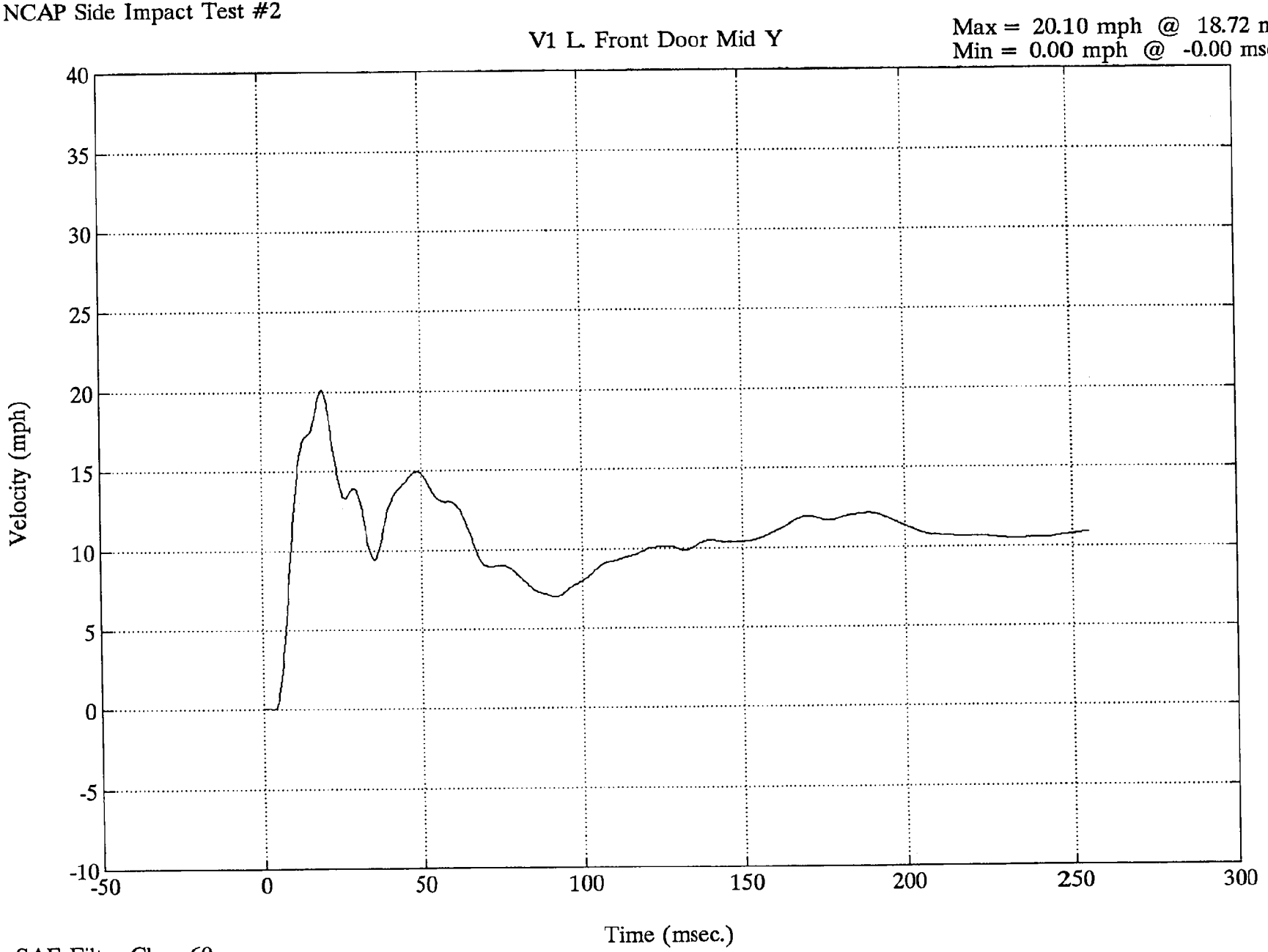
8017-2

NCAP Side Impact Test #2



SAE Filter Class 60

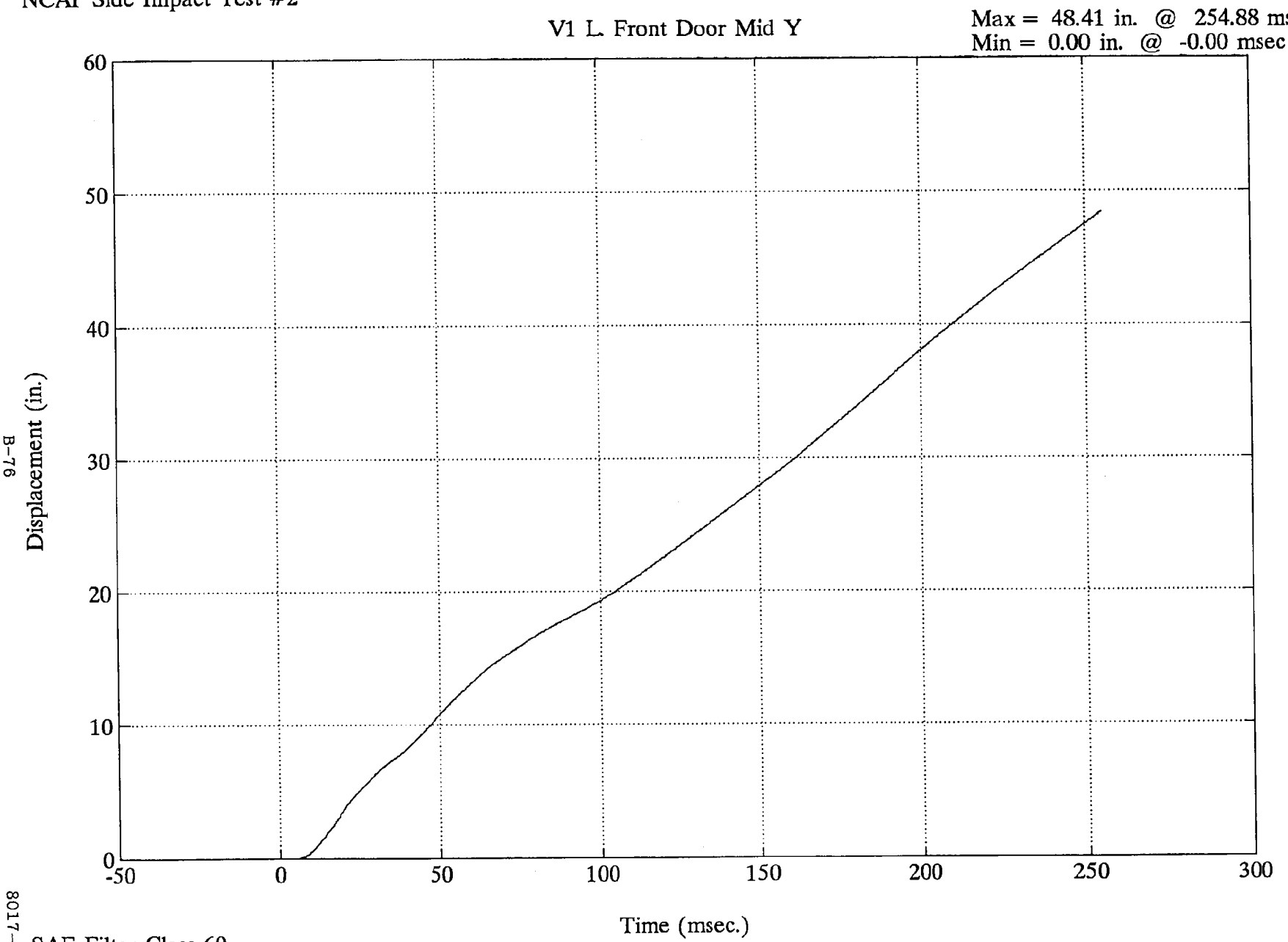
NCAP Side Impact Test #2



SAE Filter Class 60

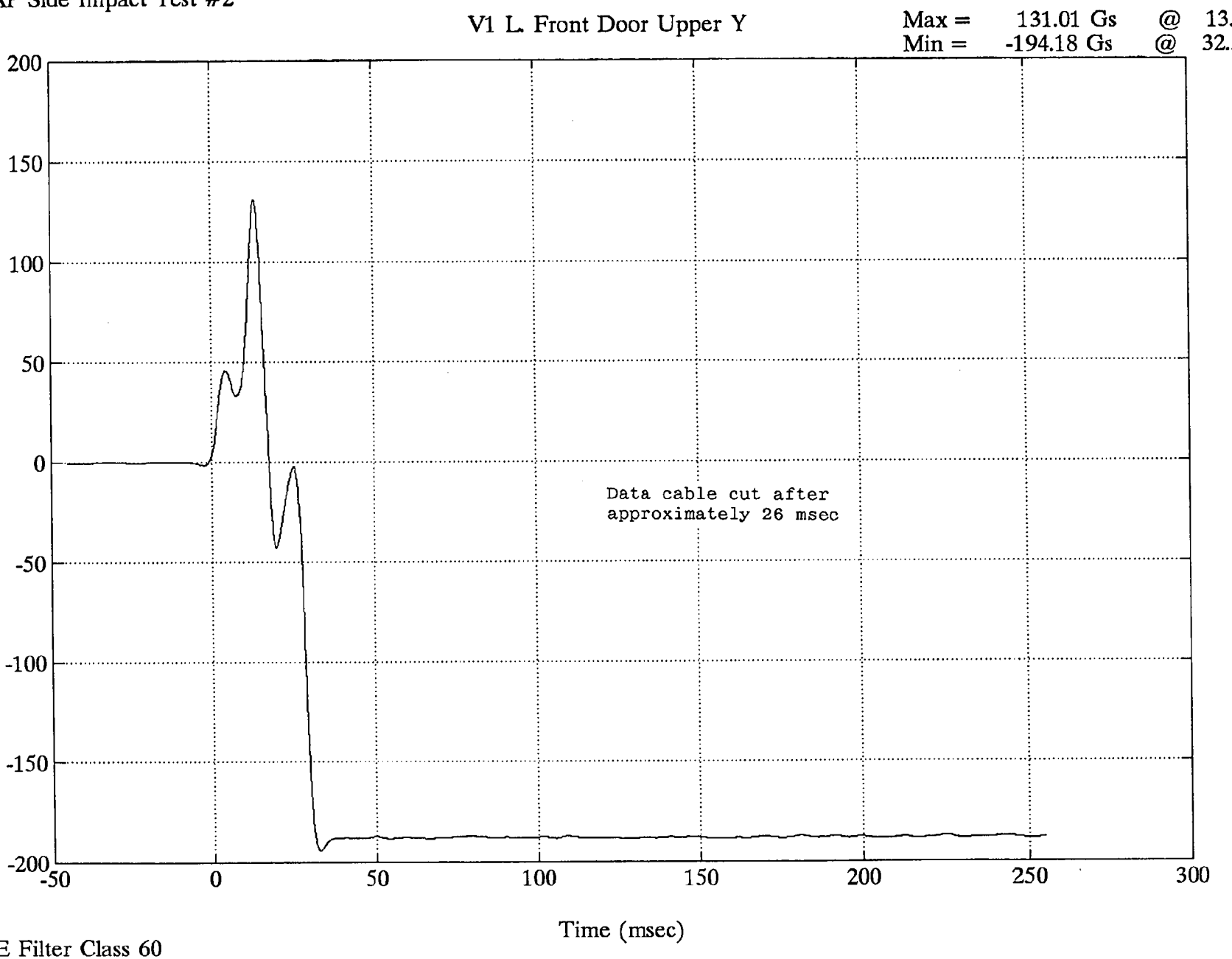
8017-2

NCAP Side Impact Test #2



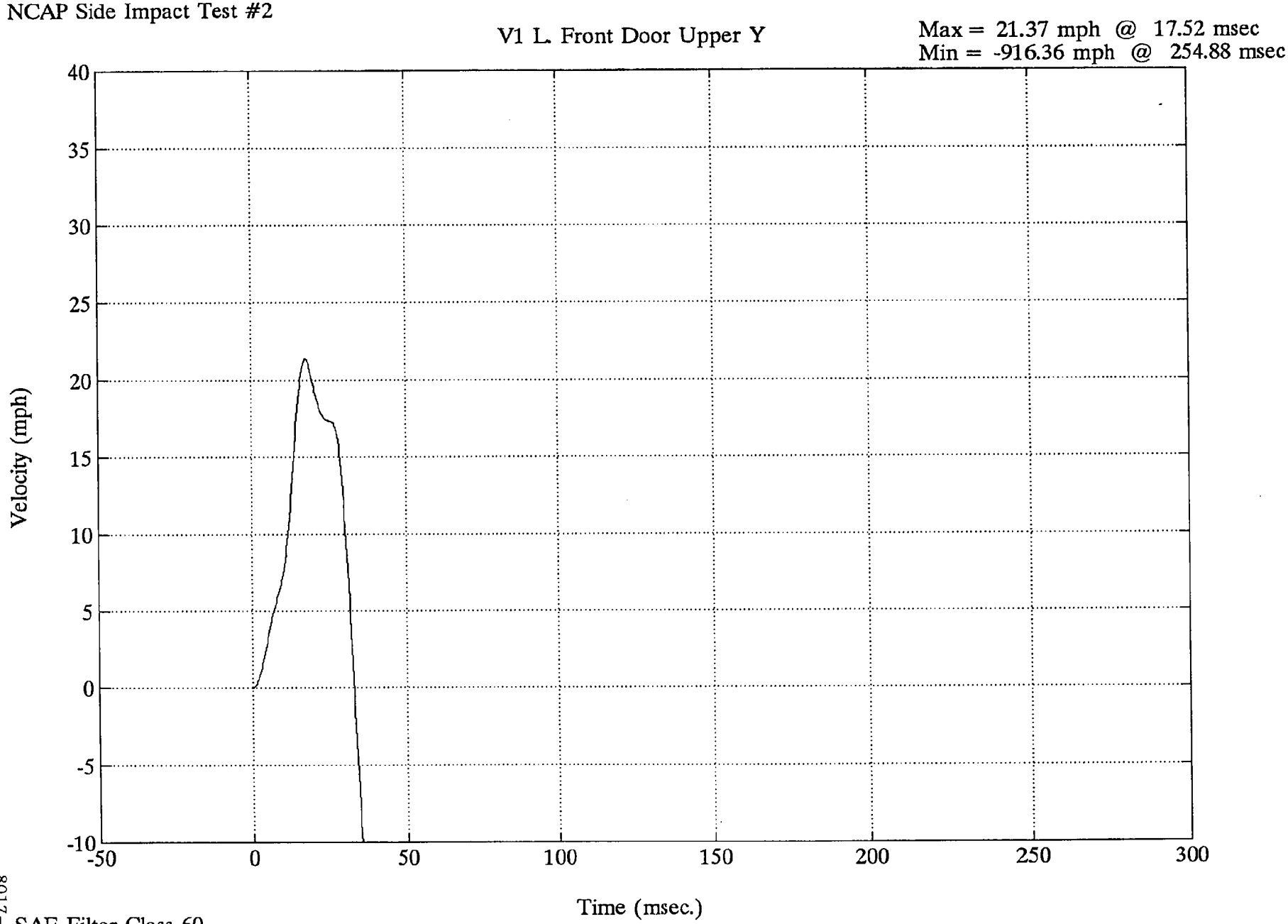
8017-2 SAE Filter Class 60

NCAP Side Impact Test #2



SAE Filter Class 60

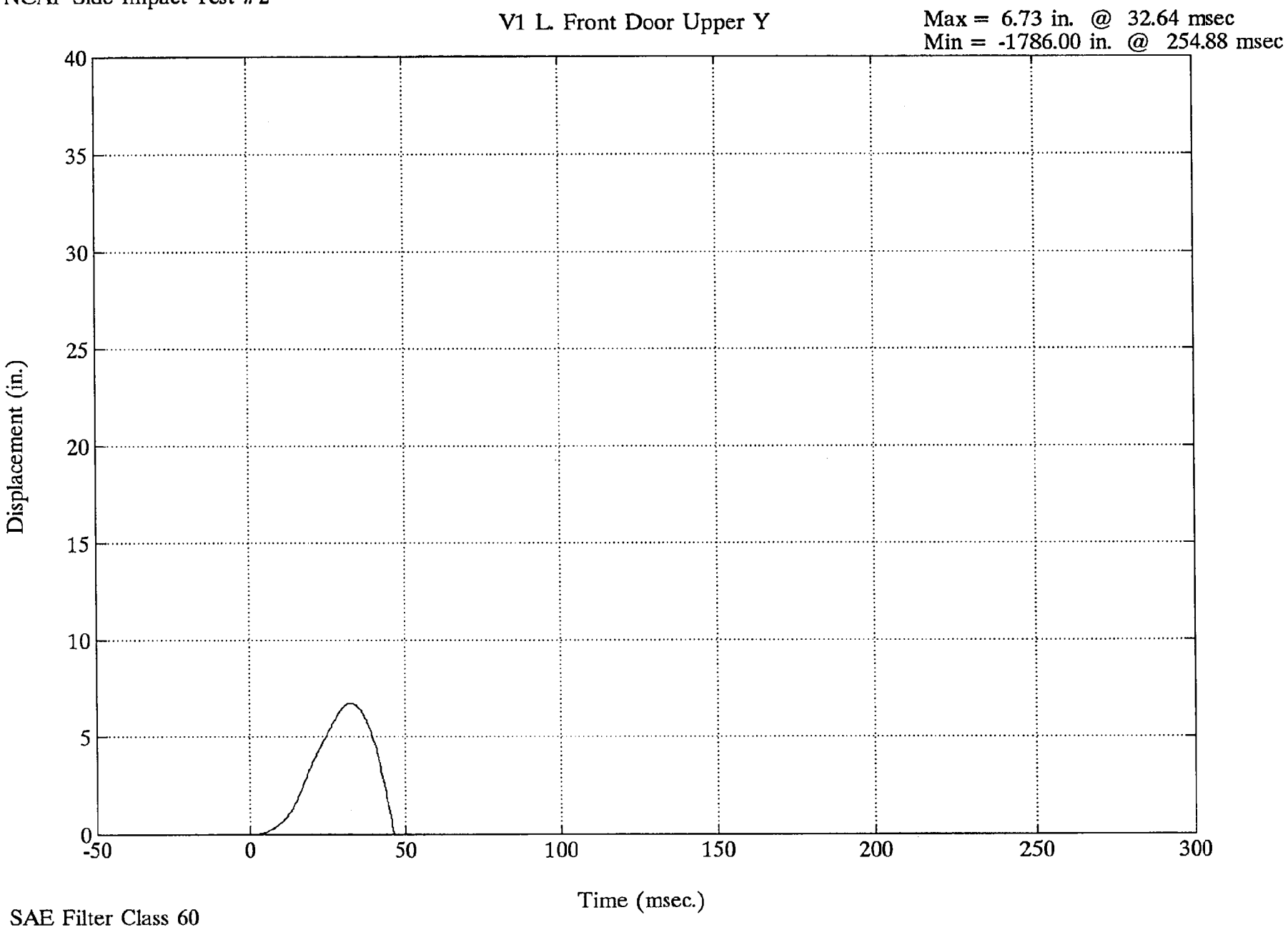
NCAP Side Impact Test #2



SAE Filter Class 60

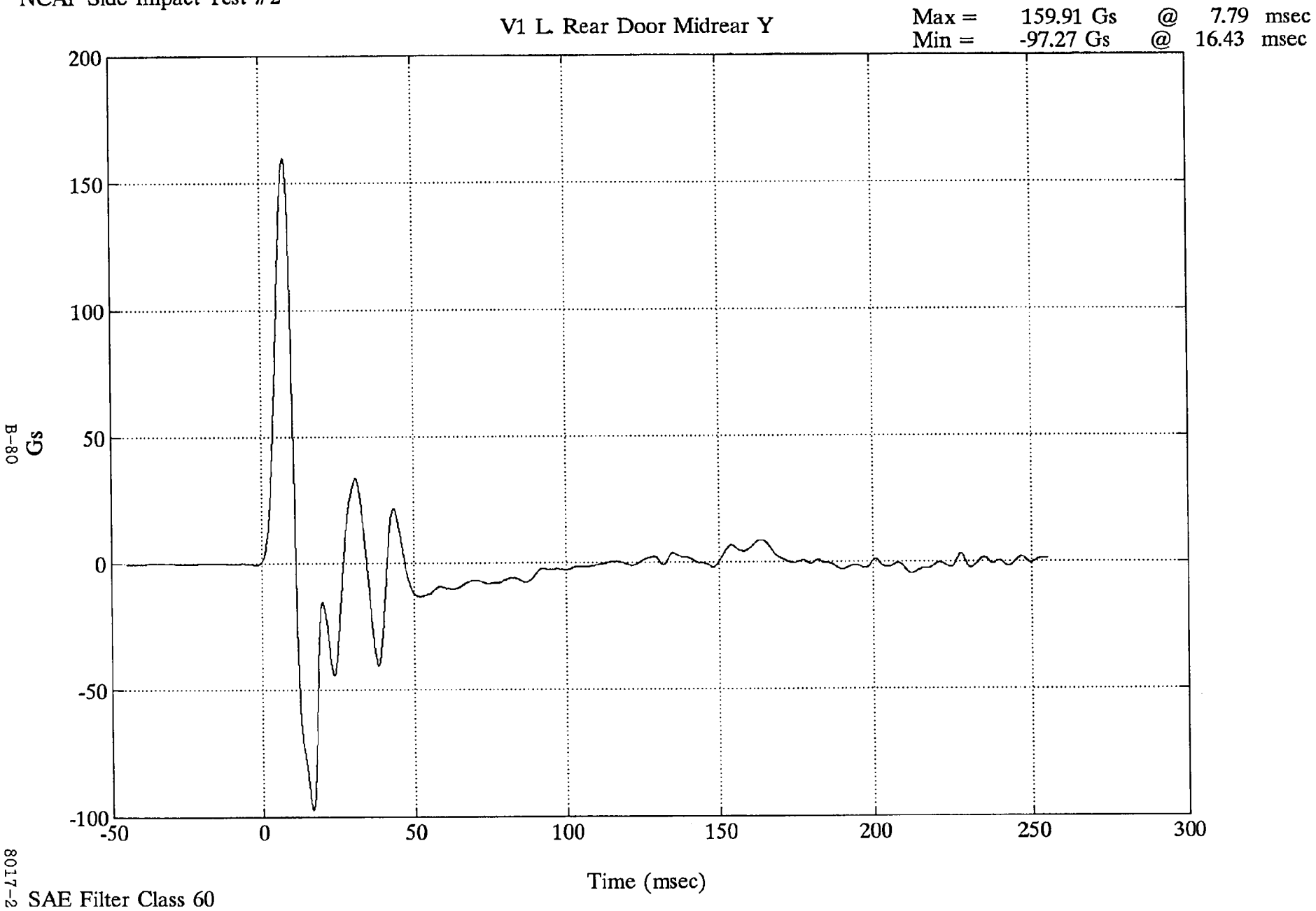
8017-2

NCAP Side Impact Test #2



SAE Filter Class 60

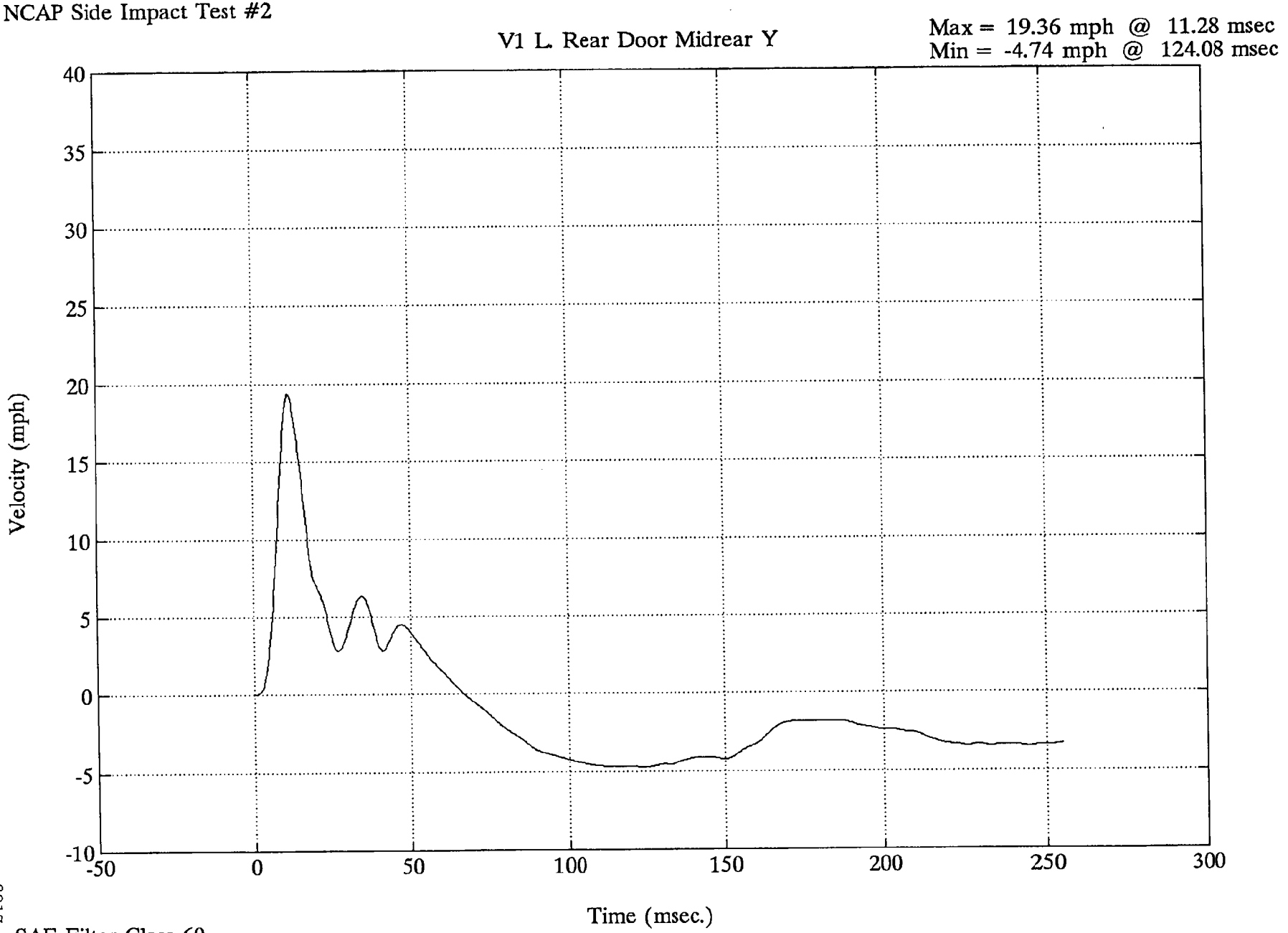
NCAP Side Impact Test #2



B-80

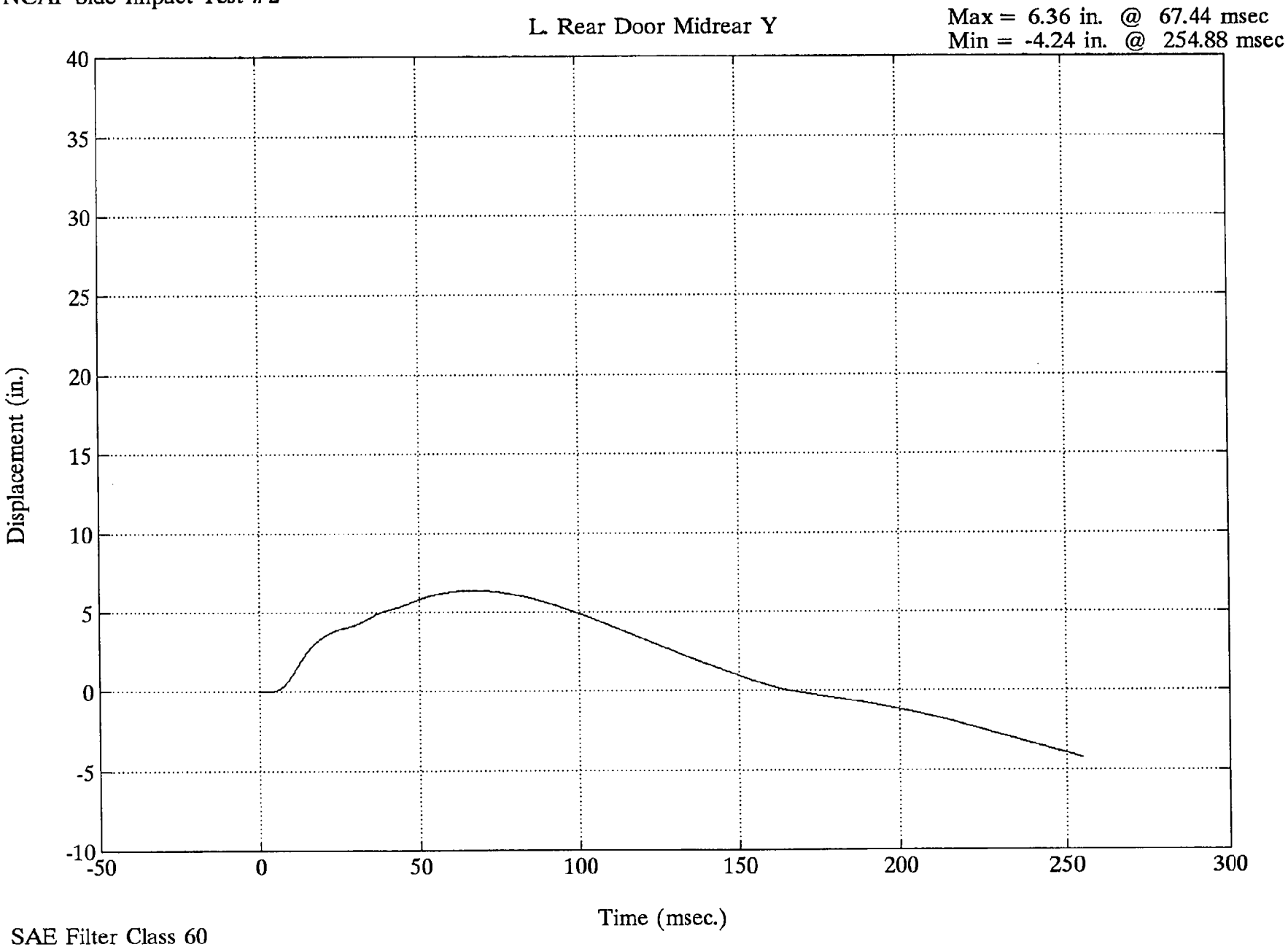
8017-2 SAE Filter Class 60

NCAP Side Impact Test #2



SAE Filter Class 60

NCAP Side Impact Test #2

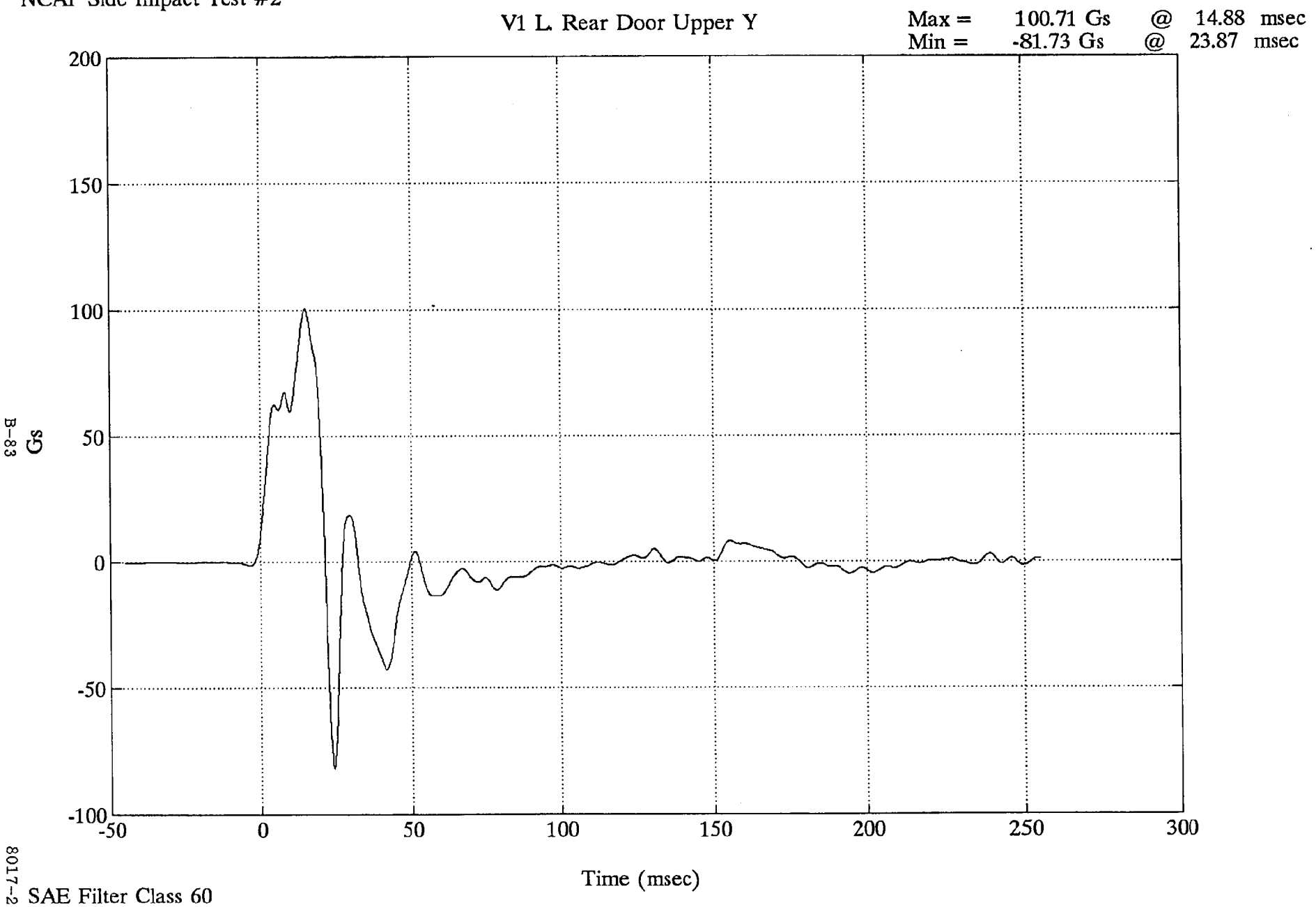


R-89

80172-2

SAE Filter Class 60

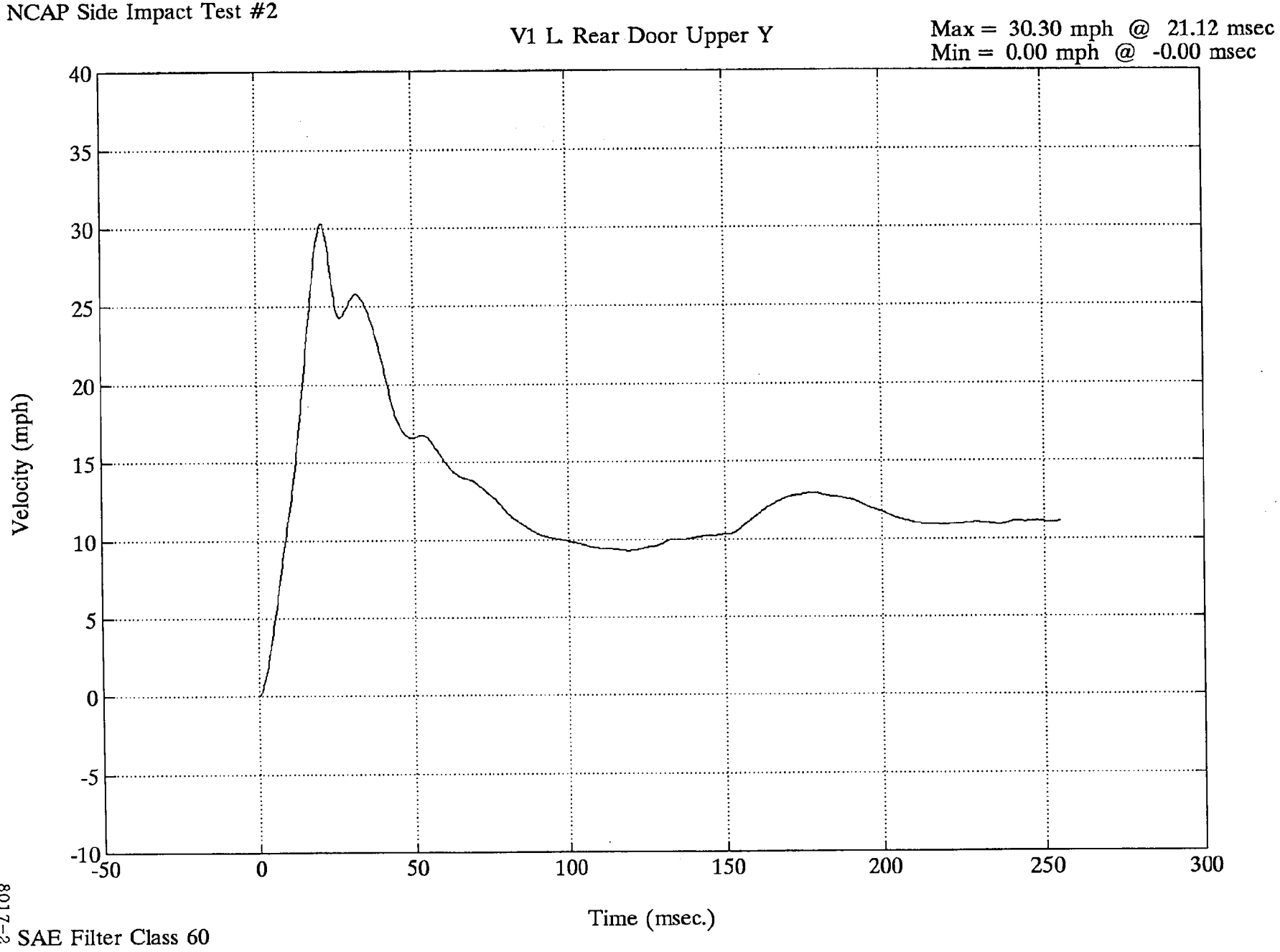
NCAP Side Impact Test #2



B-83

8017-2 SAE Filter Class 60

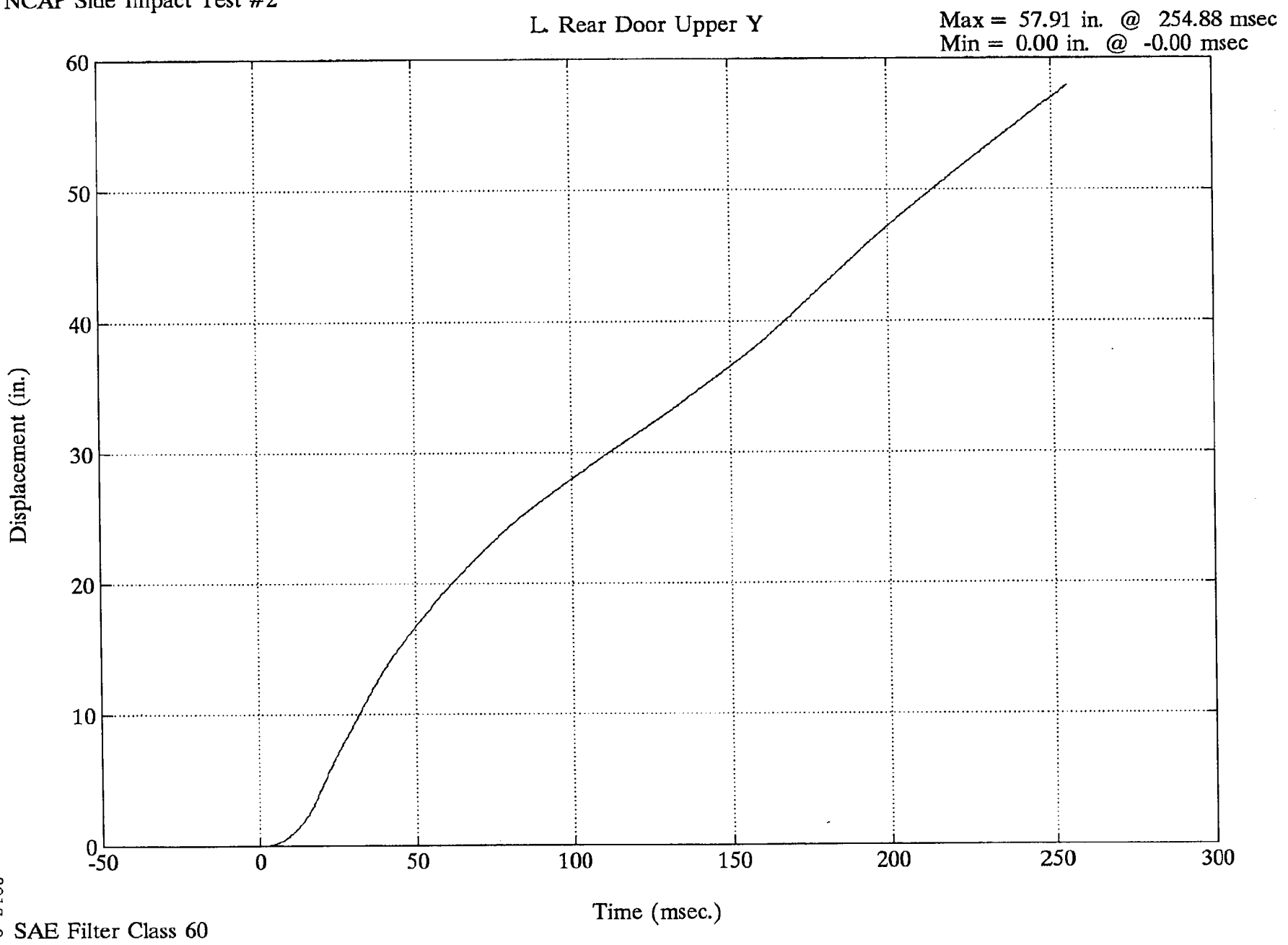
NCAP Side Impact Test #2



SAE Filter Class 60

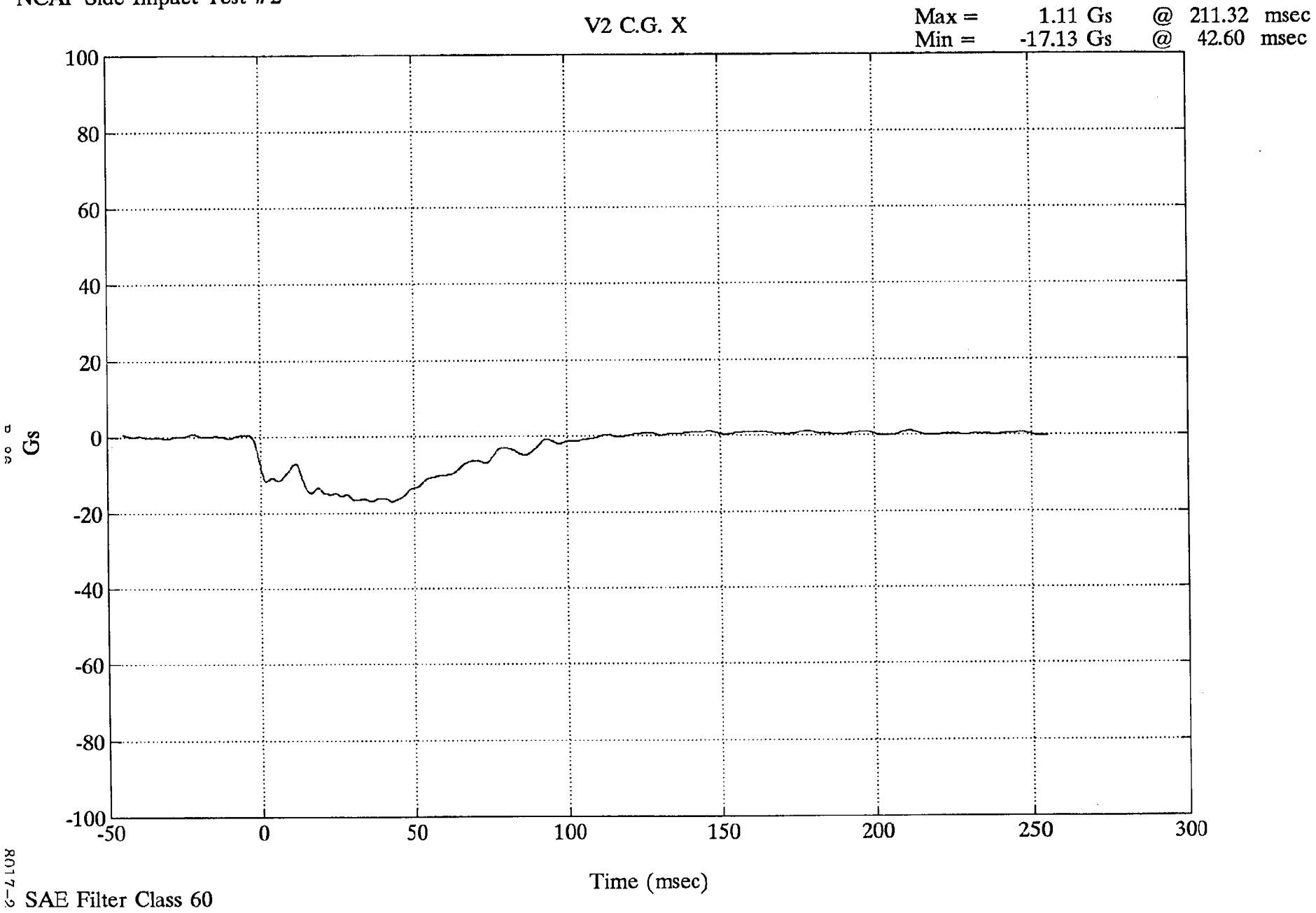
8017-2

NCAP Side Impact Test #2



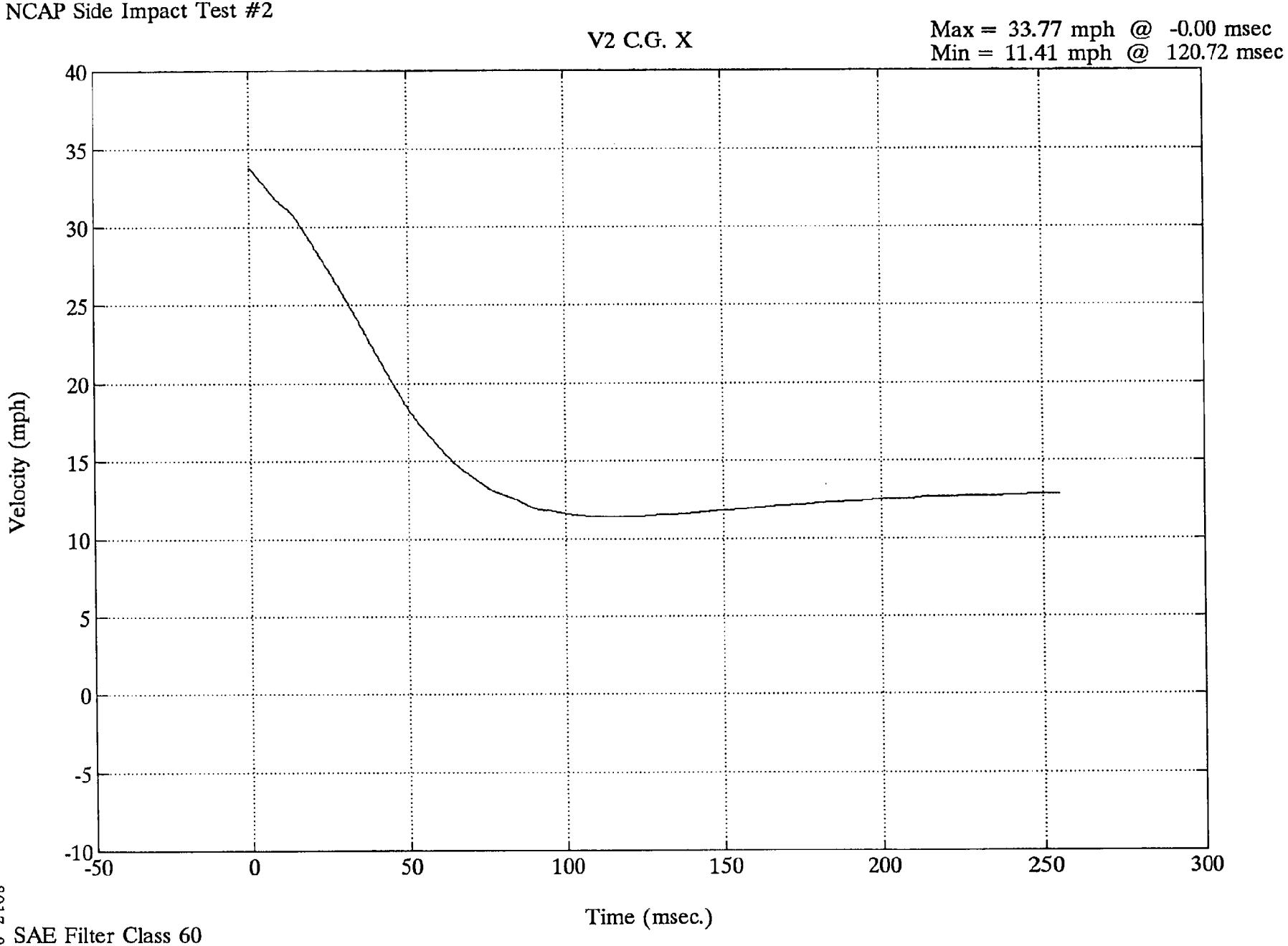
SAE Filter Class 60

NCAP Side Impact Test #2



SAE Filter Class 60

NCAP Side Impact Test #2



SAE Filter Class 60

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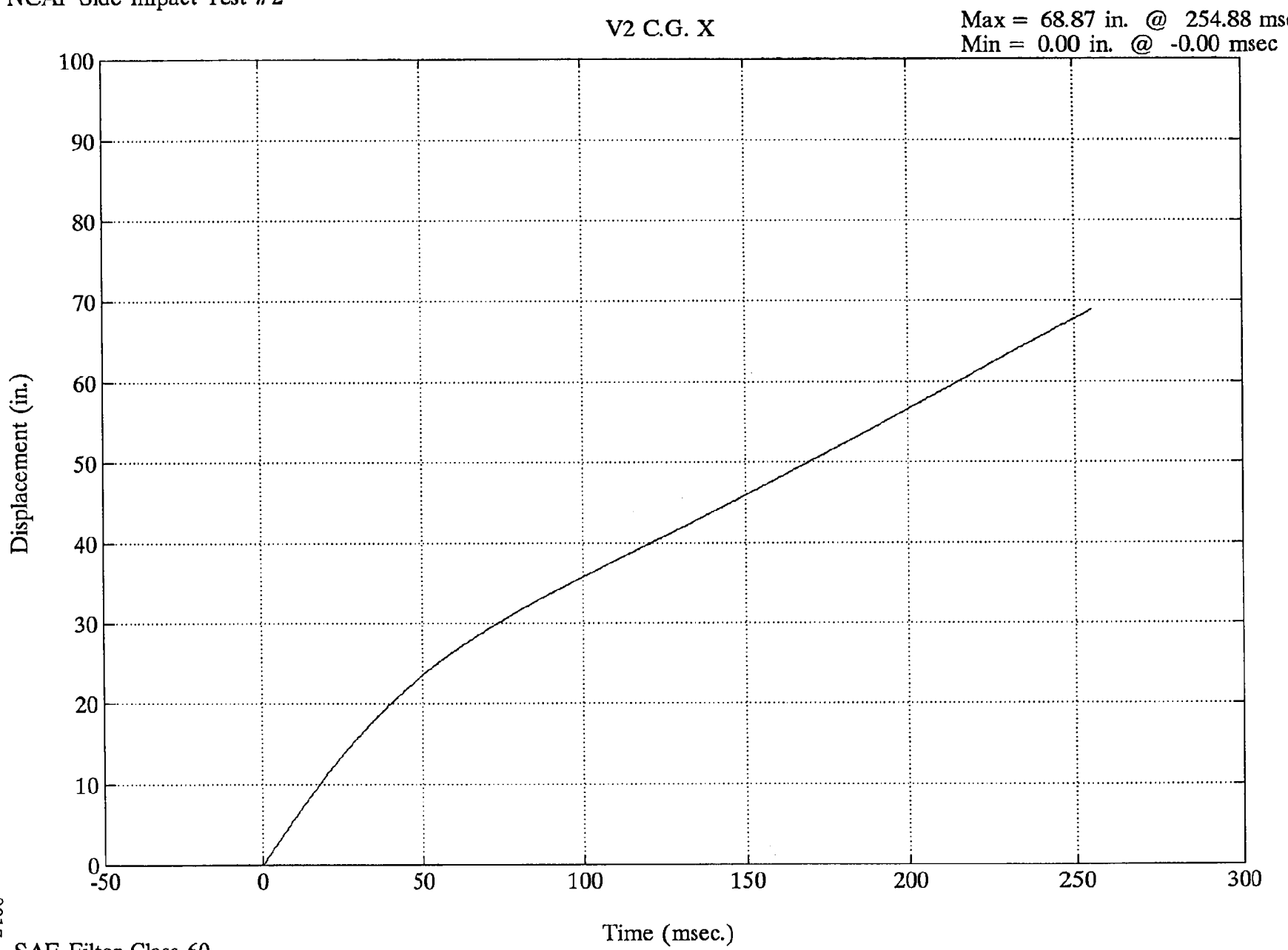
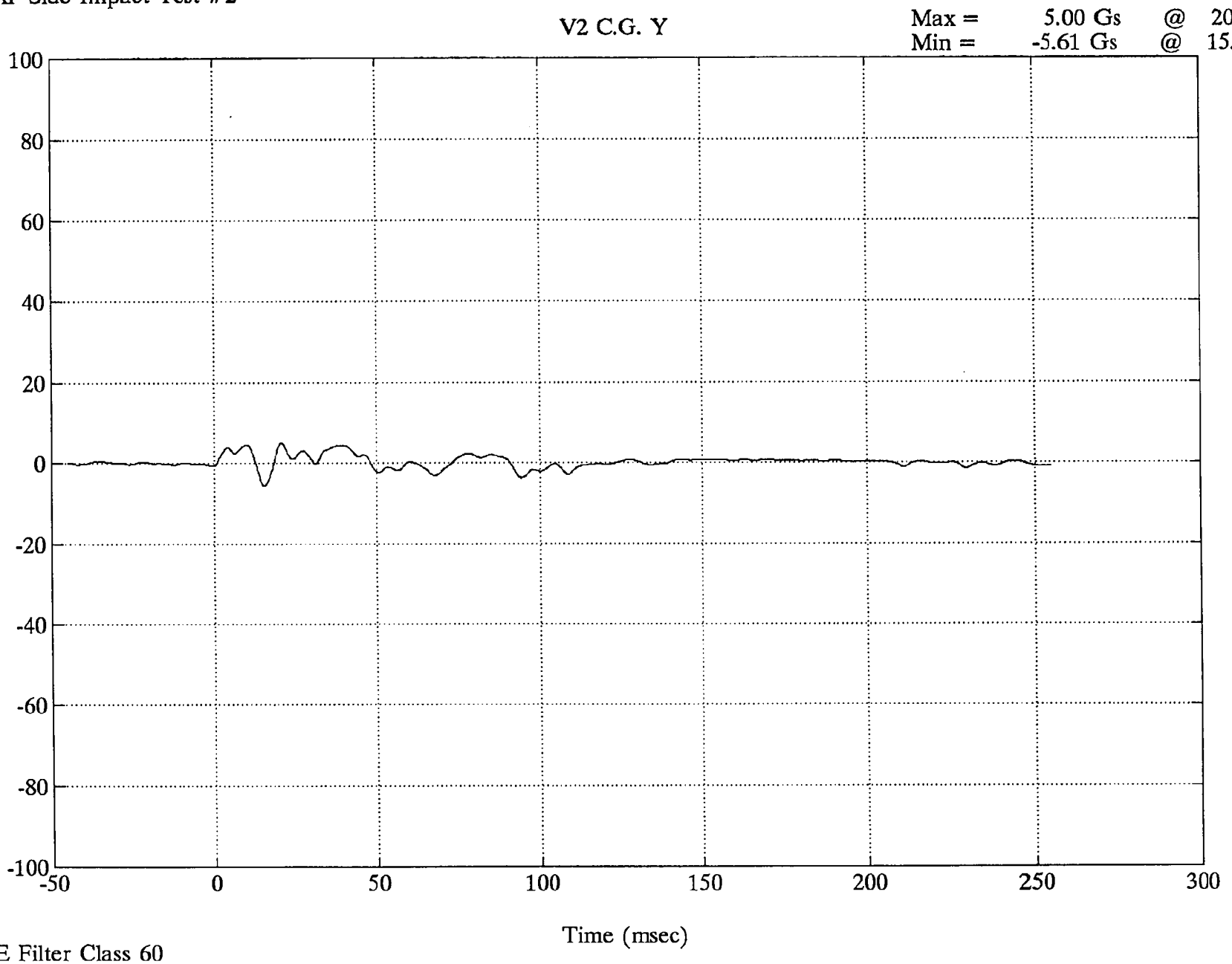


SAE Filter Class 60

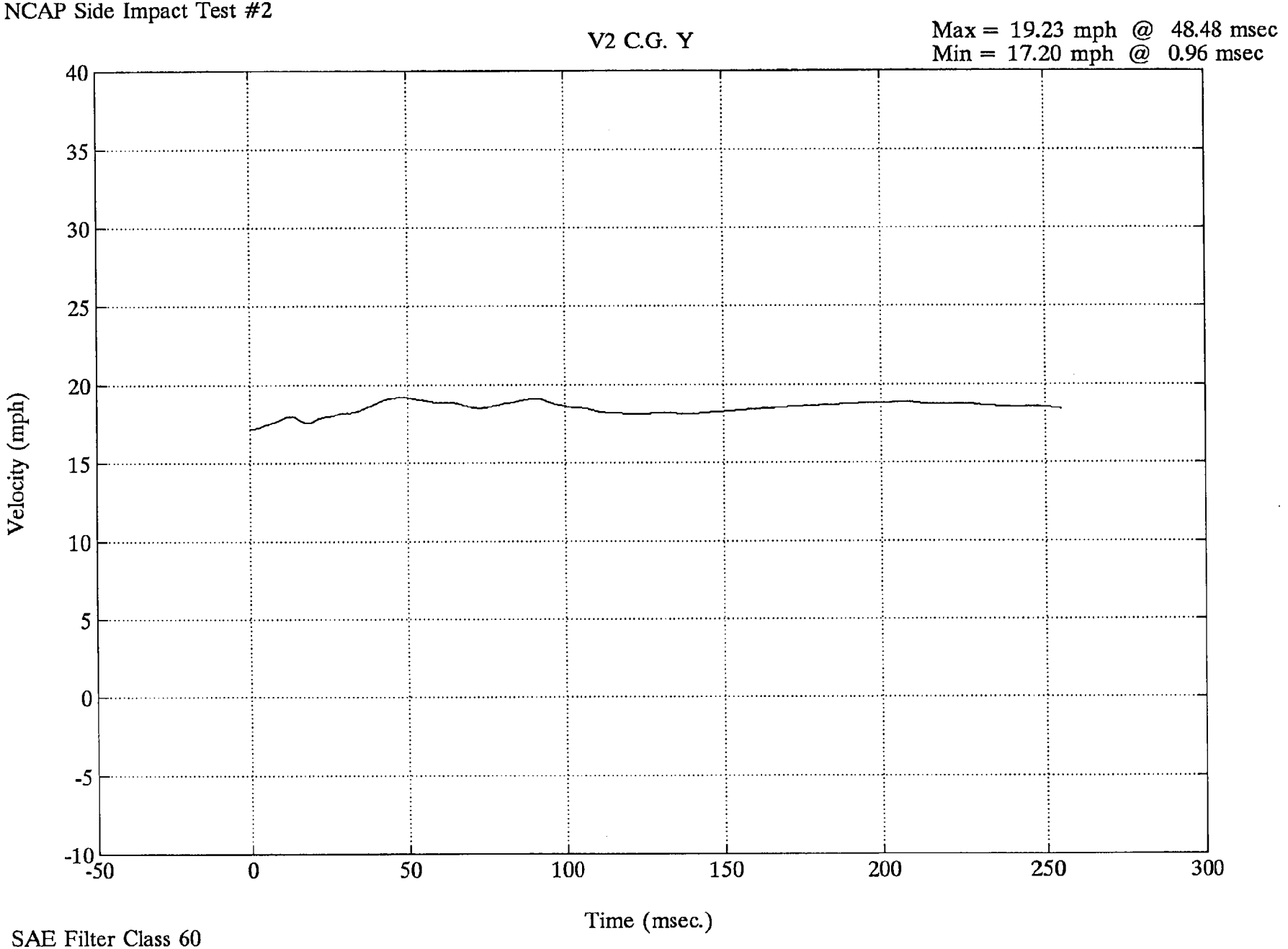
NCAP Side Impact Test #2



B-89

8017-2 SAE Filter Class 60

NCAP Side Impact Test #2

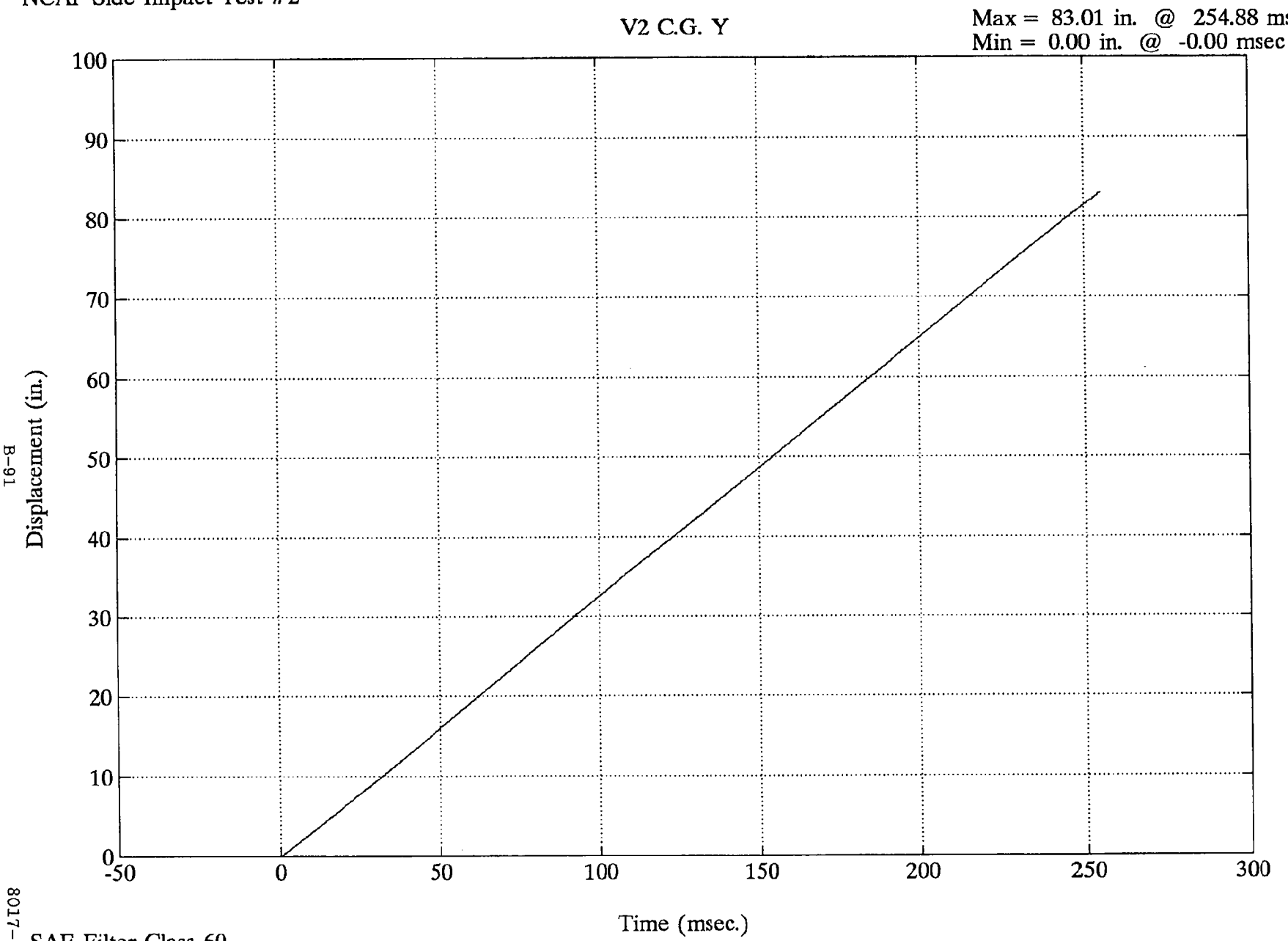


B-90

8017-2

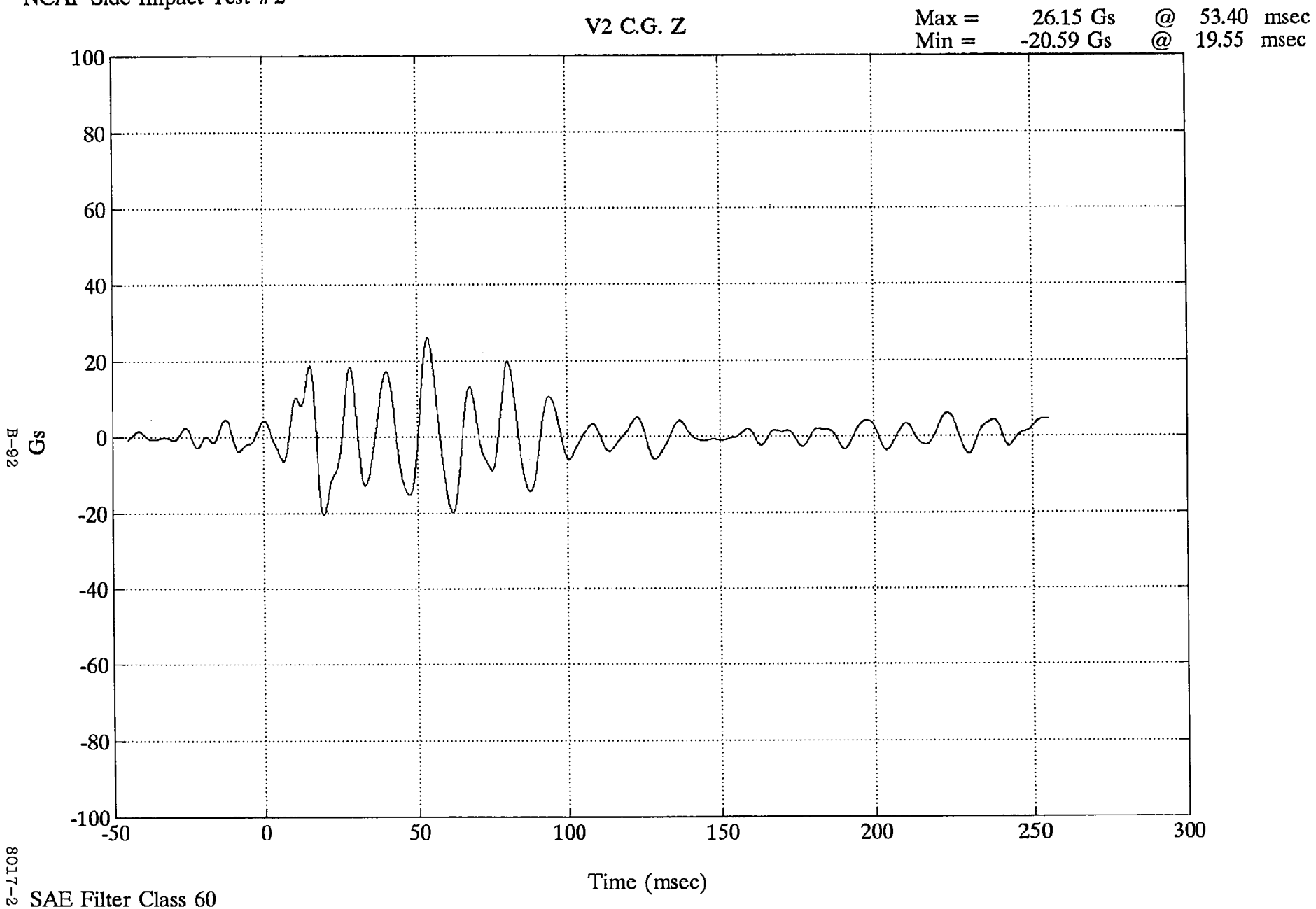
SAE Filter Class 60

NCAP Side Impact Test #2



SAE Filter Class 60

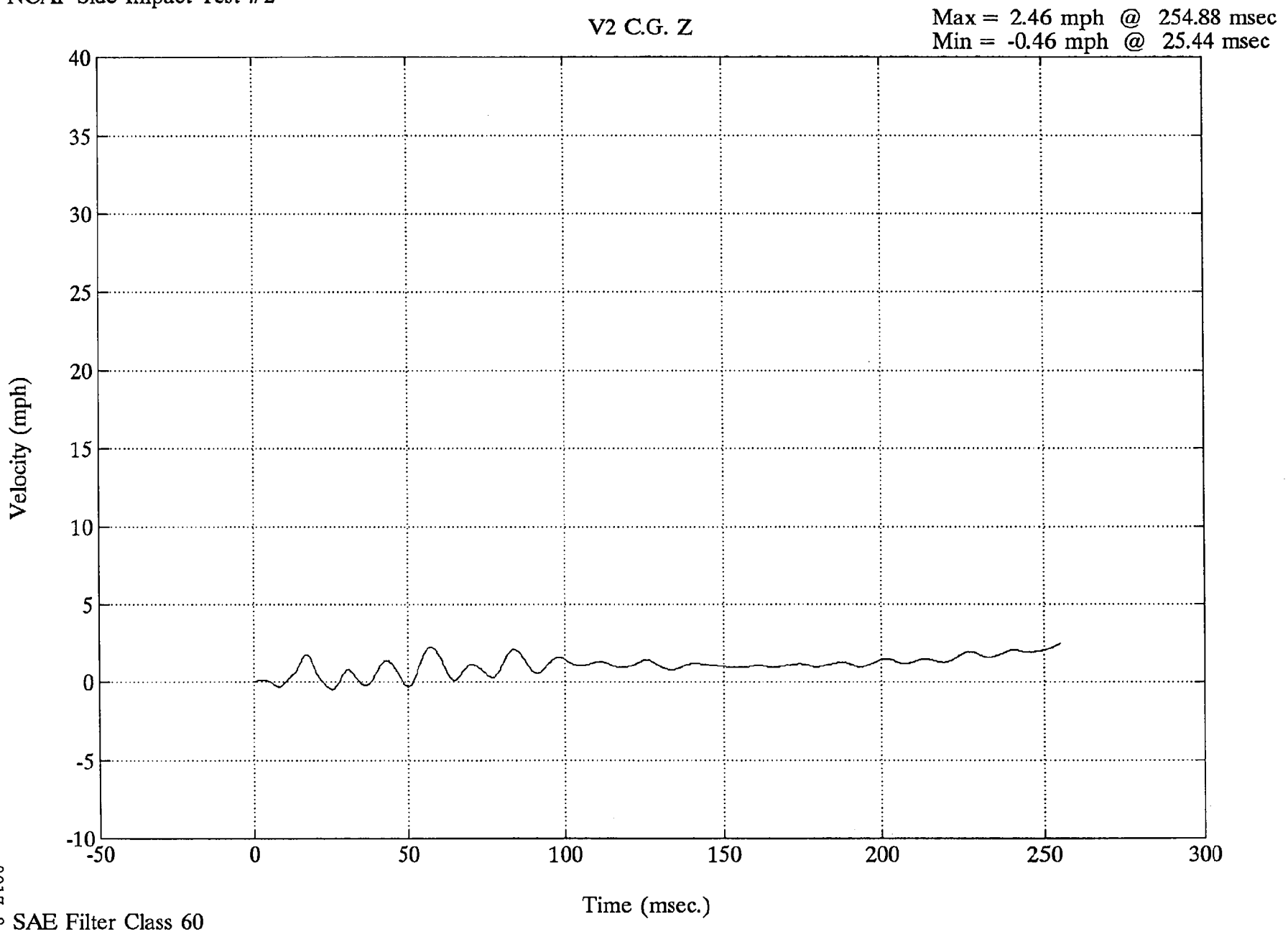
NCAP Side Impact Test #2



B-92

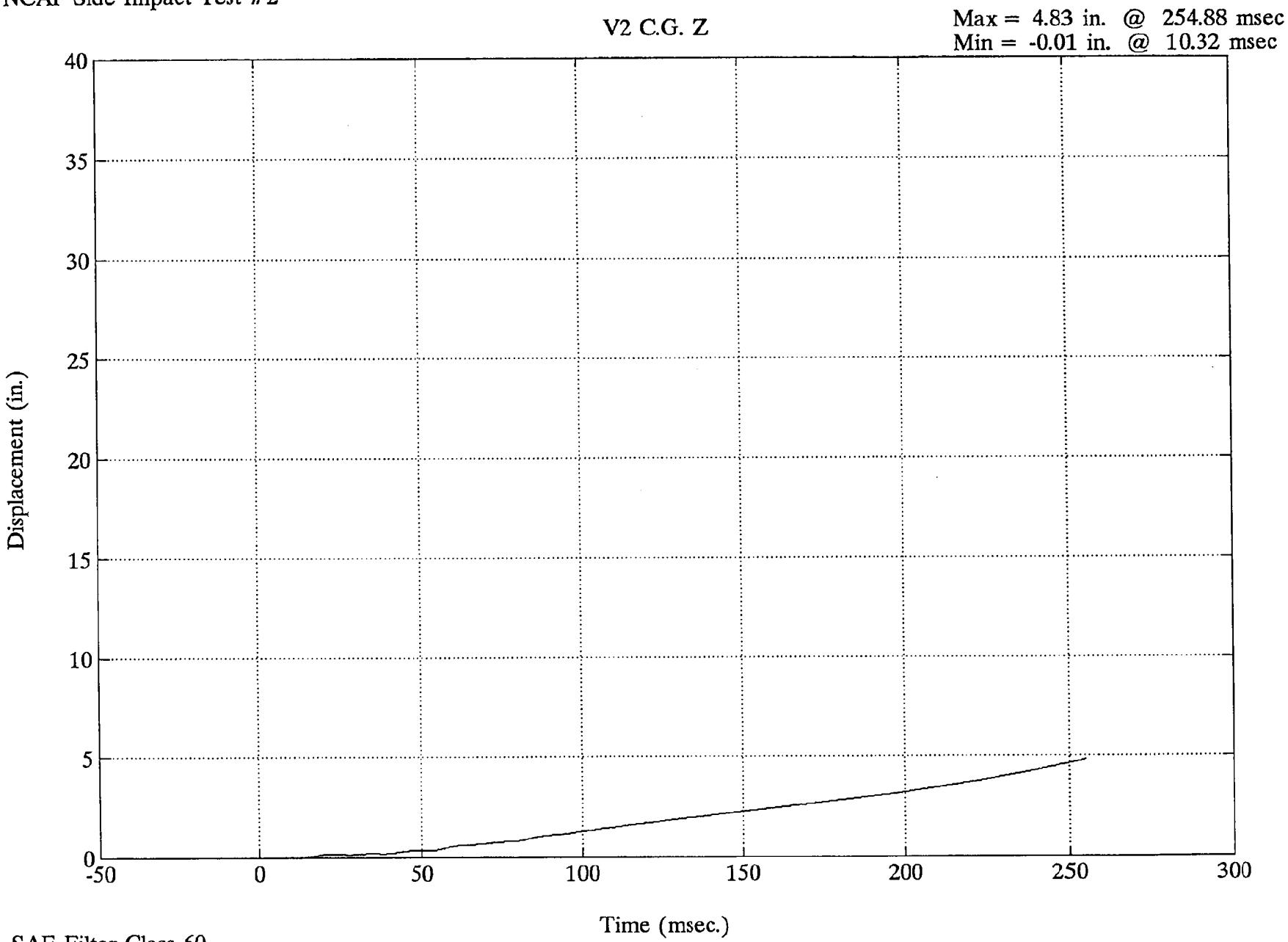
8017-2 SAE Filter Class 60

NCAP Side Impact Test #2



SAE Filter Class 60

NCAP Side Impact Test #2



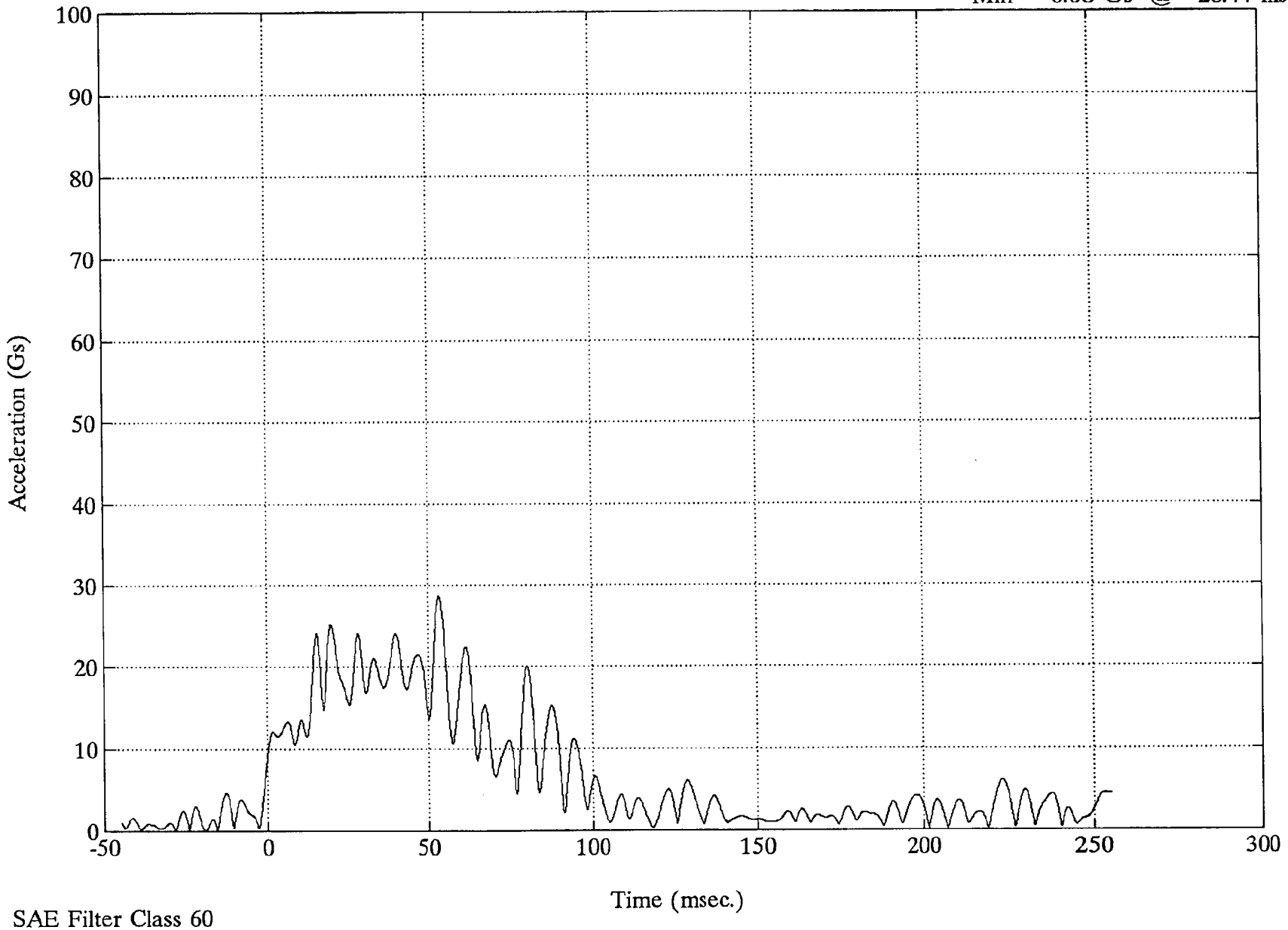
SAE Filter Class 60

8017-2

NCAP S.I. TEST #2 1992 FORD CROWN VICTORIA

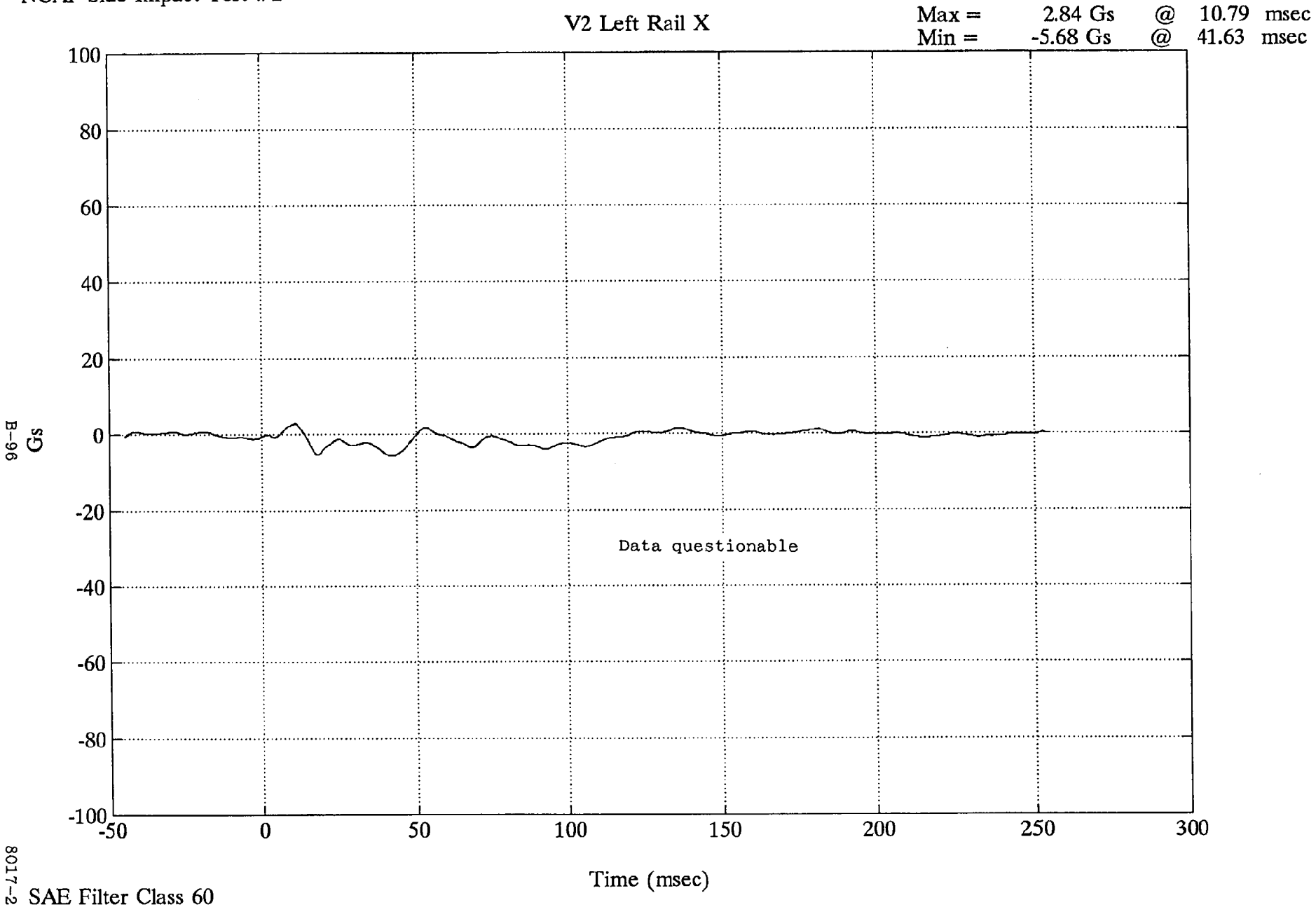
V2 C.G. Resultant

Max = 28.67 Gs @ 53.40 msec
Min = 0.06 Gs @ -28.44 msec



SAE Filter Class 60

NCAP Side Impact Test #2

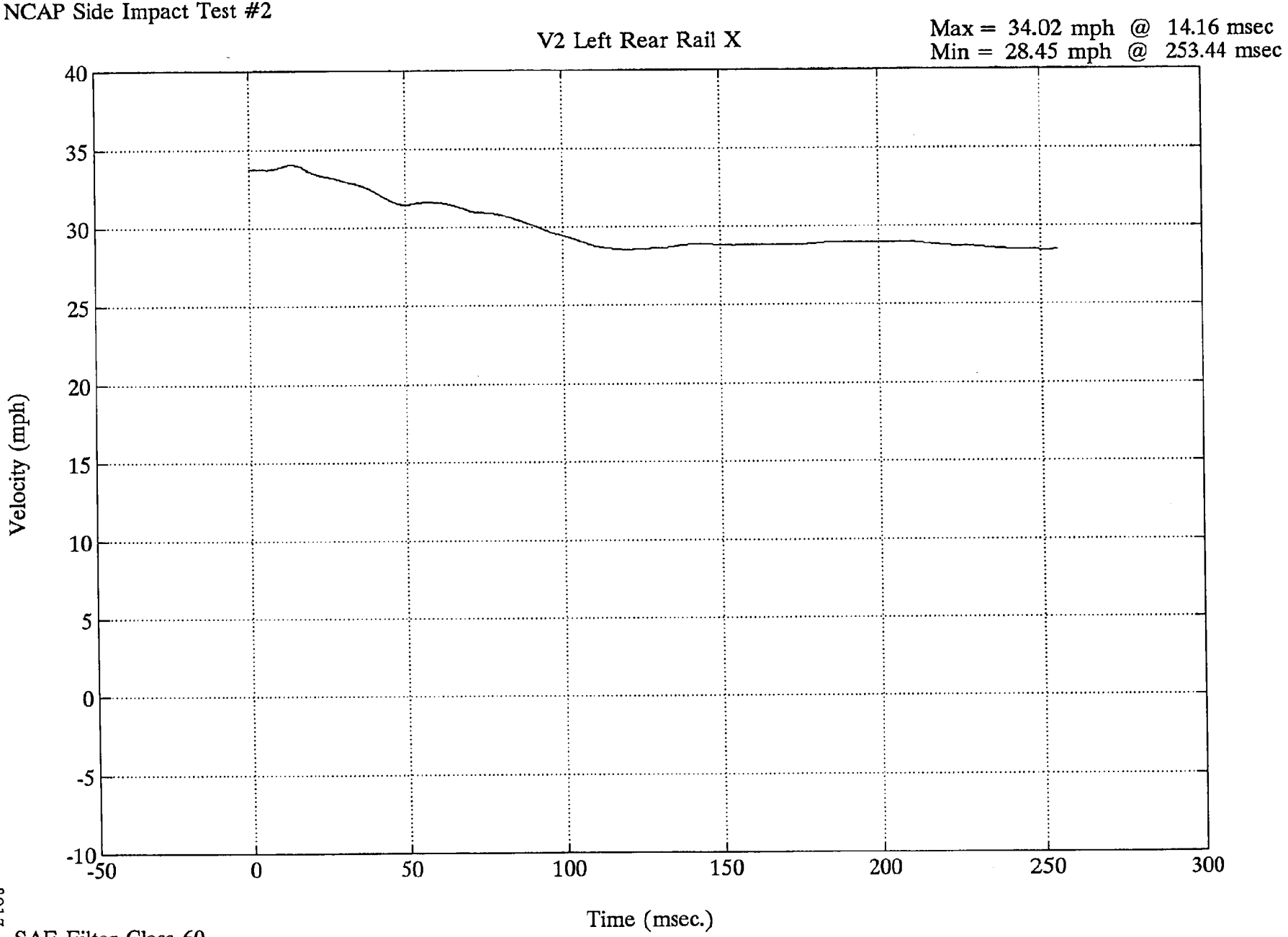


B-96

8017-2

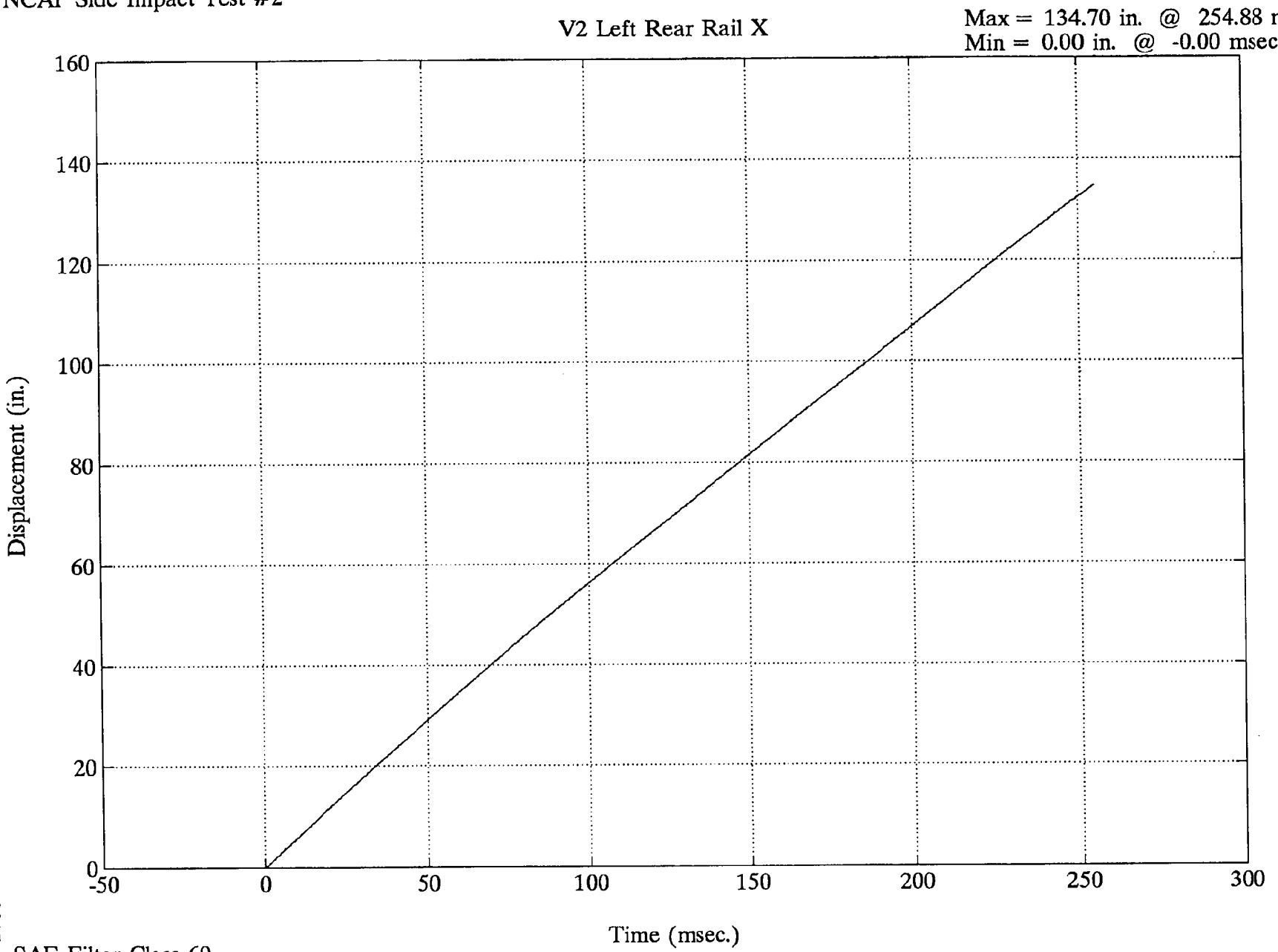
SAE Filter Class 60

NCAP Side Impact Test #2



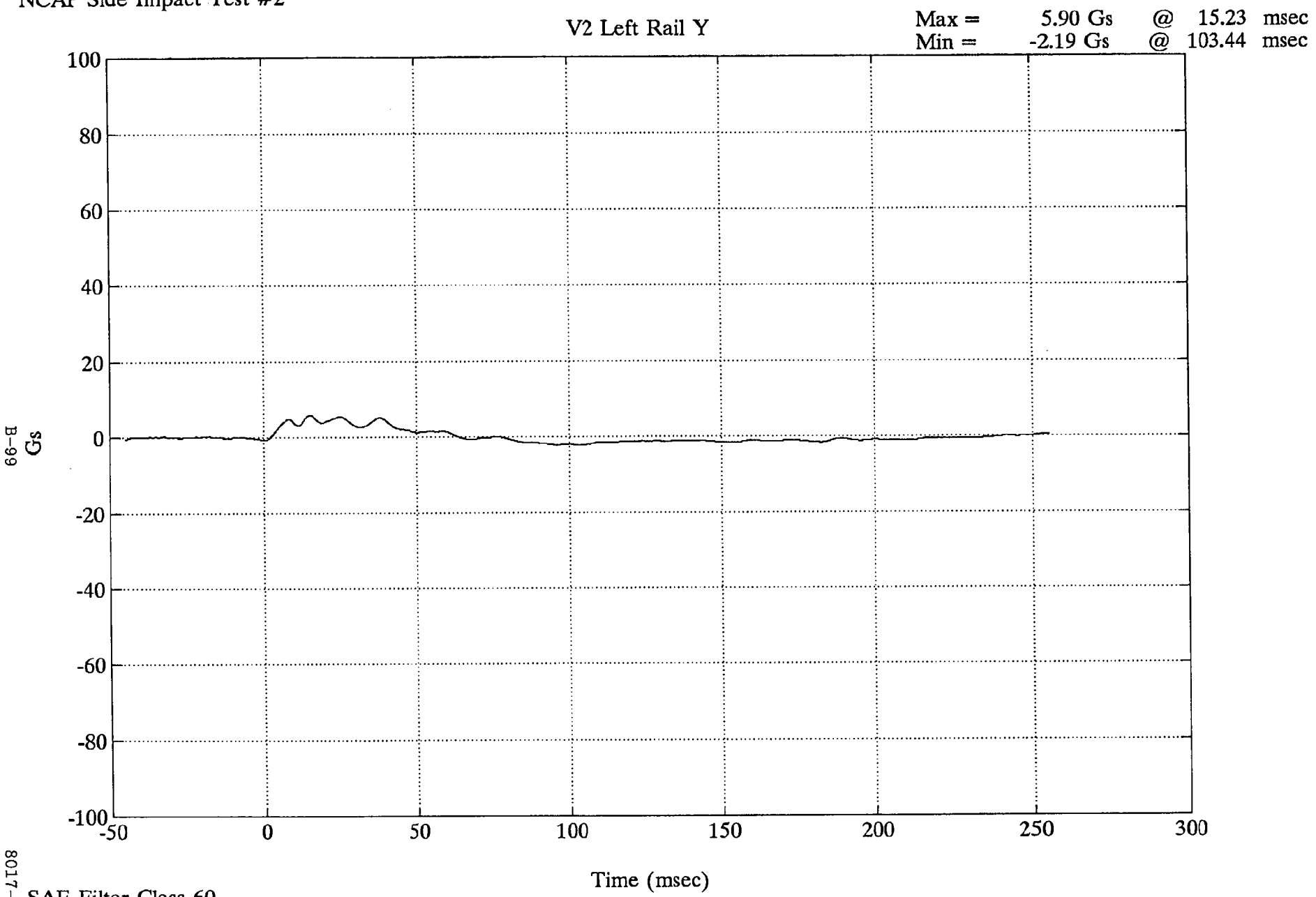
SAE Filter Class 60

NCAP Side Impact Test #2



8017-2 SAE Filter Class 60

NCAP Side Impact Test #2

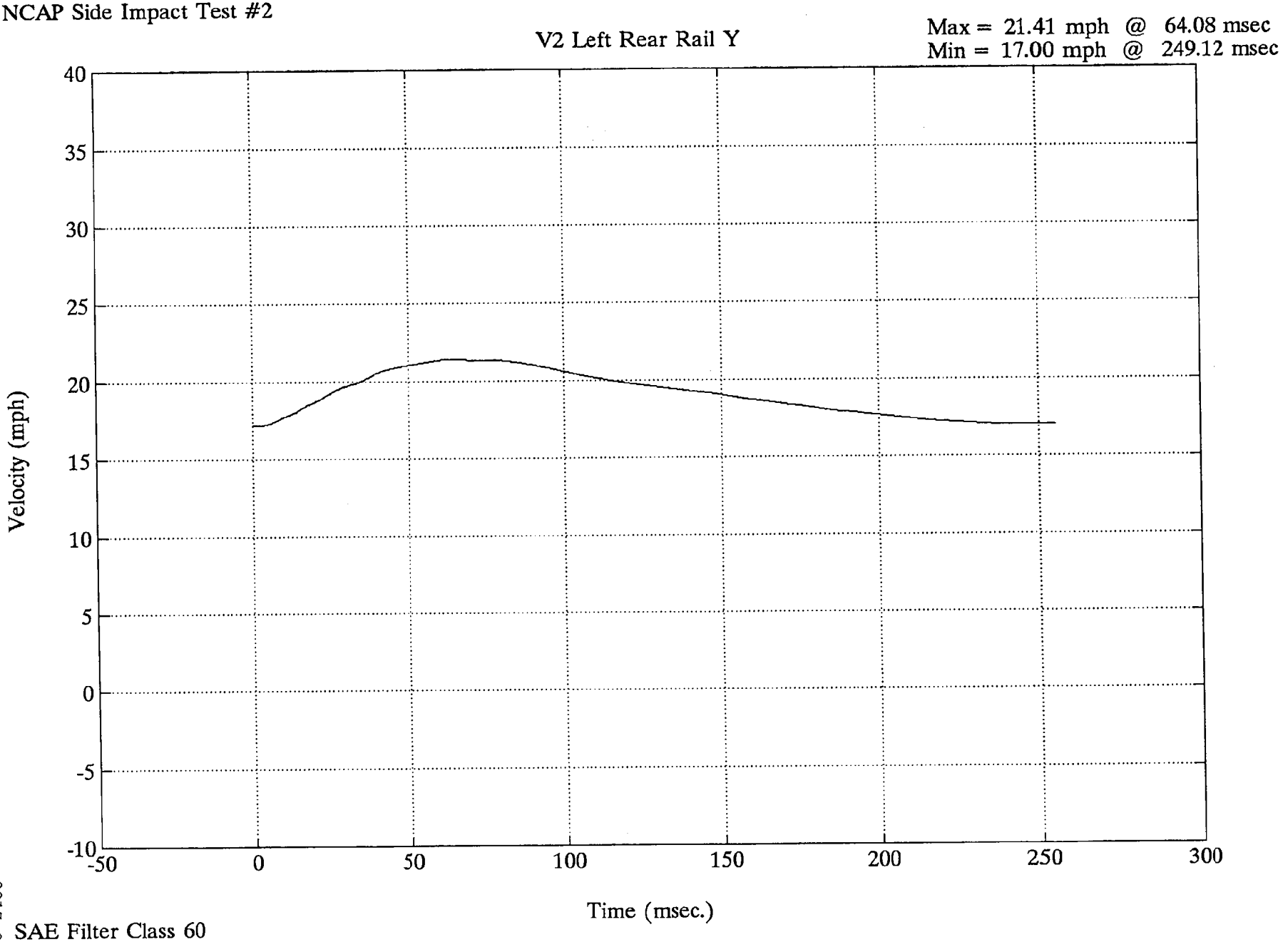


B-99

8017-2

SAE Filter Class 60

NCAP Side Impact Test #2

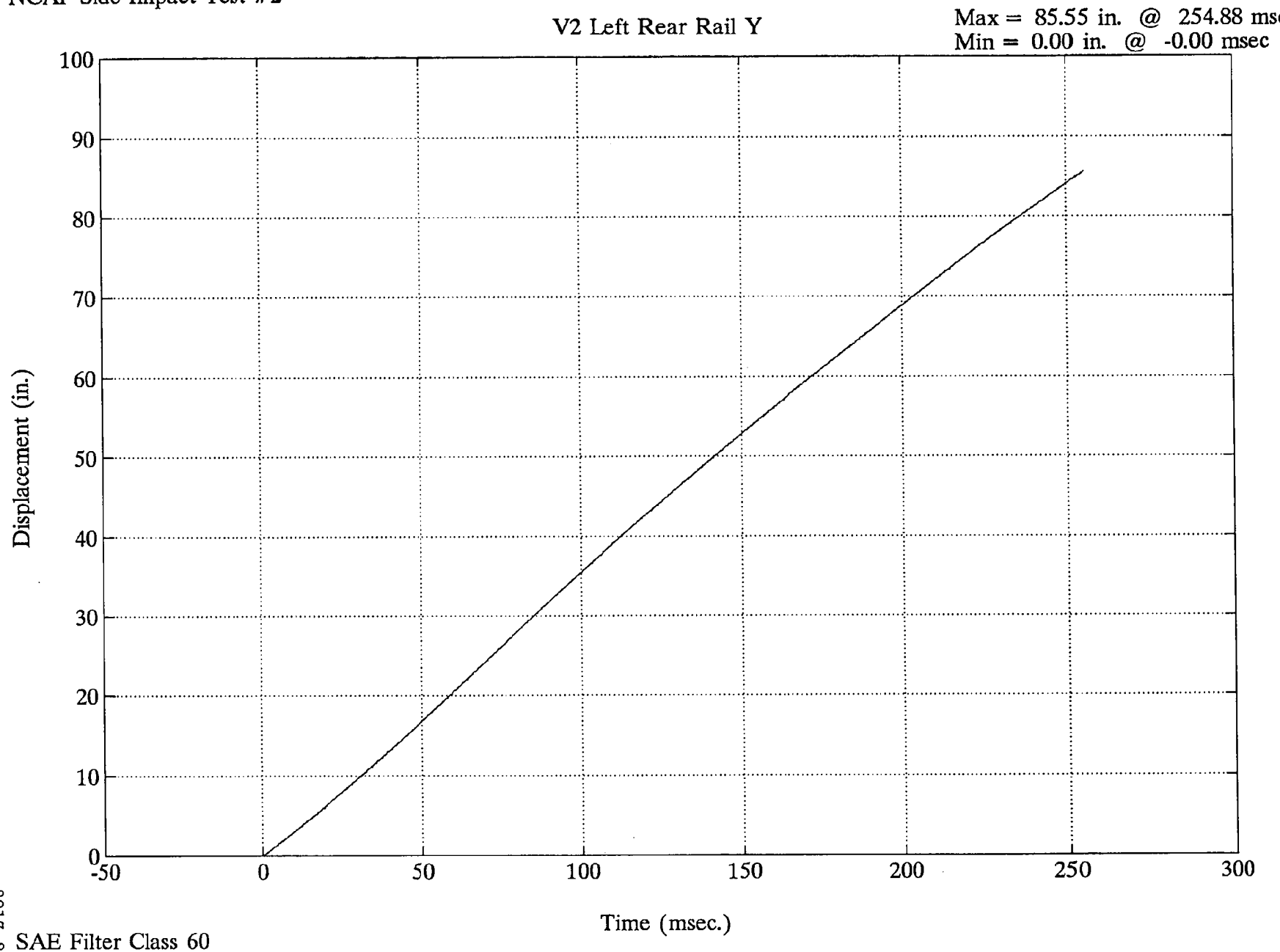


B-100

80177-2

SAE Filter Class 60

NCAP Side Impact Test #2



B-101

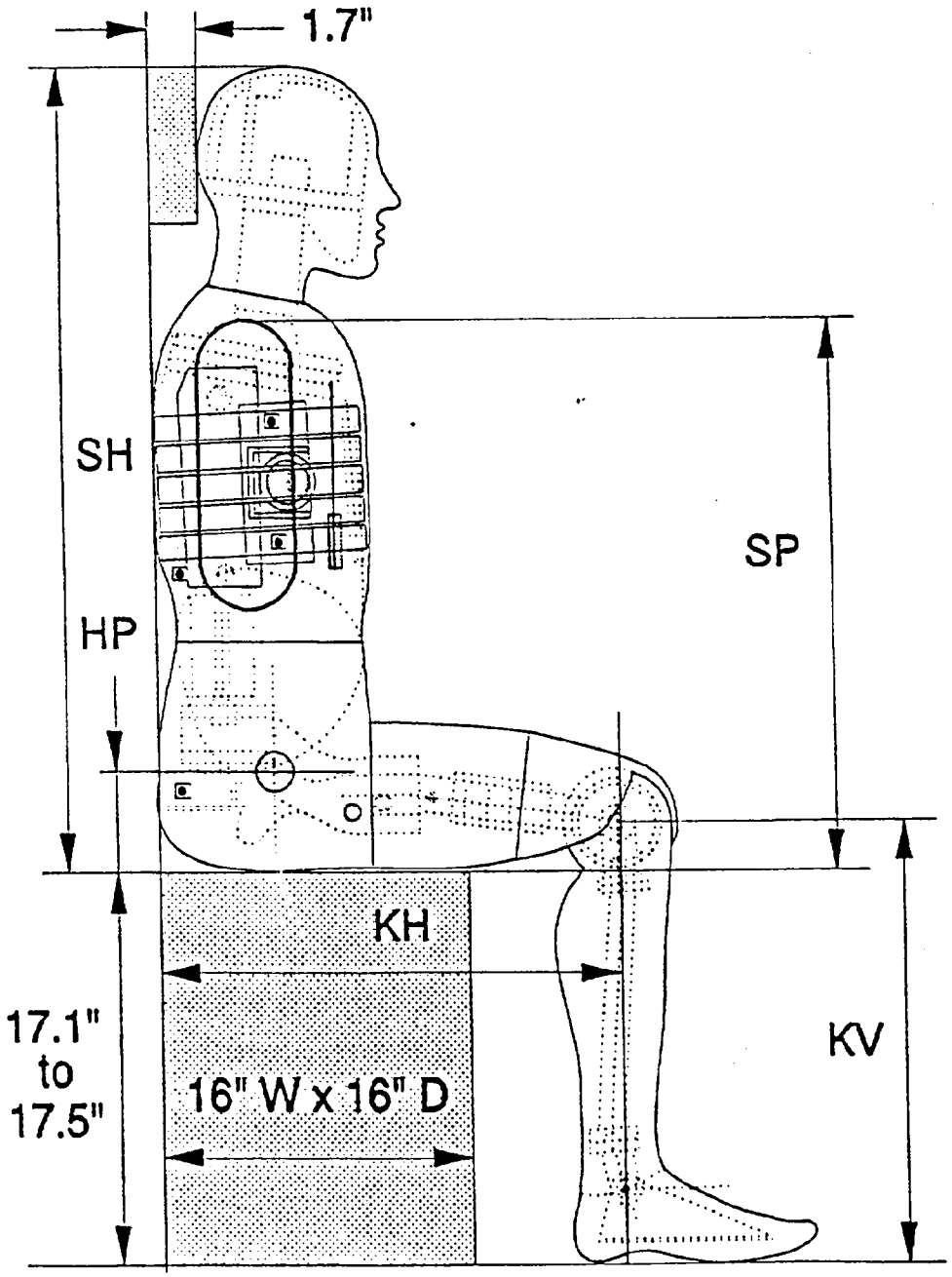
8017-2 SAE Filter Class 60

Appendix C

SID CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Figure 10

DUMMY CONFIGURATION DIMENSIONS



SID CONFIGURATION VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER: 171

	PART 572F SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION		8-13-92	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXX		
SH - Seated Height	35.0 to 35.8"	35.6 "	"
SP - Shoulder Height with Chest Flesh Installed	"	"	"
SP - Shoulder Height with Chest Flesh Removed	"	"	"
HP - Hip Pivot Height	3.9" ref.	3.9 "	"
KH - Knee Pivot from Back Line	20.1 to 20.7"	20.7 "	"
KV - Knee Pivot to Floor	19.3 to 19.9"	19.5 "	"
SW - Shoulder Width	"	"	"
HW - Hip Width	14.0 to 15.4"	14.5 "	"
OW - Overall External Width (At Widest Point)	"	"	"

SEQUENTIAL VERIFICATION NUMBER FOR DUMMY: 1

(Sequential number beginning with "1" at the start of each fiscal year's crash test program)

TECHNICIAN'S NAME: Ivan Minkewicz

SID PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER: 171

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION		8-13-92	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		XXXXXXXXXXXX	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		69 deg	deg
VERIFICATION LAB HUMIDITY (10 TO 70 %)		45 %	%
TEST PARAMETER	SPECIFICATION		
1. PELVIC IMPACT TEST			
a. Pendulum Velocity (ft/s)	13.8 to 14.2	14.1	
b. Pelvic Y acceleration	40 to 60 G's	46.8 G's	G's
2. THORAX IMPACT TEST		8-14-92	
a. Pendulum Velocity (ft/s)	13.8 to 14.2	14.0	
b. Upper Rib Y Accel.	37 to 46 G's	42.6 G's	G's
c. Lower Rib Y Accel.	37 to 46 G's	43.6 G's	G's
b. Lower Spine Y Accel.	15 to 22 G's	19.0 G's	G's

TECHNICIAN'S NAME: Ivan Minkewicz

SID CONFIGURATION VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER: 186

	PART 572F SPECIFICATION	PRE-TEST if required	POST-TEST if required
DATE OF CONFIGURATION VERIFICATION		8-14-92	
VERIFICATION NUMBER FOR DUMMY (*)	XXXXXXXXXXXXX		
SH - Seated Height	35.0 to 35.8"	35.6 "	"
SP - Shoulder Height with Chest Flesh Installed	"	"	"
SP - Shoulder Height with Chest Flesh Removed	"	"	"
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 to Floor	19.3 to 19.9"	19.5 "	"
SW - Shoulder Width	"	"	"
HW - Hip Width	14.0 to 15.4"	14.5 "	"
OW - Overall External Width (At Widest Point)	"	"	"

SEQUENTIAL VERIFICATION NUMBER FOR DUMMY: 1

(Sequential number beginning with "1" at the start of each fiscal year's crash test program)

TECHNICIAN'S NAME: Ivan Minkewicz

SID PERFORMANCE VERIFICATION DATA

NHTSA DUMMY I.D. NUMBER: 186

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION		8-14-92	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY (*)		XXXXXXXXXXXX	
VERIFICATION LAB TEMPERATURE (66 to 78 deg.)		69 deg	deg
VERIFICATION LAB HUMIDITY (10 TO 70 %)		48 %	%
TEST PARAMETER	SPECIFICATION		
1. PELVIC IMPACT TEST a. Pendulum Velocity (ft/s)	13.8 to 14.2	14.1	
b. Pelvic Y acceleration	40 to 60 G's	49.3 G's	G's
2. THORAX IMPACT TEST a. Pendulum Velocity (ft/s)	13.8 to 14.2	8-14-92 69 deg 45% 14.0	
b. Upper Rib Y Accel.	37 to 46 G's	41.8 G's	G's
c. Lower Rib Y Accel.	37 to 46 G's	41.1 G's	G's
b. Lower Spine Y Accel.	15 to 22 G's	19.6 G's	G's

TECHNICIAN'S NAME: Ivan Minkewicz