

REPORT NUMBER: CAL-94-N07

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

VOLVO GOTHENBURG SWEDEN
1994 VOLVO 850
4-DOOR SEDAN

NHTSA NUMBER: MR5900

CALSPAN TEST NUMBER: 8120-7

MARCH 24, 1994

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



FINAL REPORT

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Prepared: Michael J. Kilgallon
Michael J. Kilgallon, Project Engineer

Approved: Walter E. Levan
Walter E. Levan, Program Manager
Transportation Research/
Physical Sciences Department

FINAL REPORT ACCEPTED BY:

[Signature]
Manager, New Car Assessment Program (NCAP)

JUN 20 1994

Date of Report Acceptance

H. S. Chan
Contracting Officer's Tech. Rep. (COTR)

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16. <i>Abstract</i> A frontal load cell barrier test of a 1994 Volvo 850 4-Door Sedan was performed at the Calspan Advanced Technology Center Crash Test Facility in Buffalo, New York on March 24, 1994. The impact velocity was 56.3 kph and the temperature at the barrier face was 18 °C. The maximum post test vehicle crush was 508 mm. The vehicle was equipped with 3-point restraint device at each of the front outboard seating positions. These restraint were equipped with pre-tensioners. Torso belt load cells were not used for this test. The vehicle was also equipped with supplemental airbags at each of the front outboard seating positions. With regard to FMVSS 208 "Occupant Crash Protection", injury criteria, both the driver and passenger appear to comply with the head, chest and femur requirements.			
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Section 1

PURPOSE AND TEST PROCEDURE

This 56.3 kph frontal barrier impact test is part of the Composite FY 92 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-90-D-02121. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 48.3 kph requirements.

The 56.3 kph frontal barrier impact test was conducted in accordance with the Office of Market Incentives (OMI) Laboratory Indicant Test procedure.

Section 2

SUMMARY OF TEST MR5900

A load cell barrier consisting of 36 load cells was impacted by a 1994 Volvo 850 4-Door Sedan at a velocity of 56.3 kph. The test was performed at the Calspan Corporation Advanced Technology Center on March 24, 1994. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by 1 real-time camera and 16 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

Two Part 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. The ATDs were also instrumented with 6-axis load cells and chest deflection potentiometers. Seat belt load cells were also on the driver's and passenger's lap belt to measure dummy pelvic section loading. The driver ATD (Serial No. 150) and the right-front passenger ATD (Serial No. 245) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C and D.

The 77 channels of data were recorded on a P.C. based data acquisition system. Appendix B contains the vehicle, load cell barrier and dummy response data traces. The restraints were equipped with pre-tensioning devices. To avoid interference with the pre-tensioners belt spool out, belt elongation and torso belt loads were not measured. Chest displacement potentiometers did not record accurately.

The driver's head struck the airbag; the HIC was 433.9. The maximum chest deceleration over 3 milliseconds was 42.8 g's. Femur loads were -6243.2 newtons on the left femur and -6099.5 newtons on the right femur.

The right front passenger's HIC was 421. Maximum chest deceleration over 3 milliseconds was 58.2 g's.. Femur loads were -4863.0 newtons on the left and -4201.1 newtons on the right.

Table 1

GENERAL TEST AND VEHICLE DATA

Vehicle Year/Make/Model/Body Style: 1994 Volvo 850 4-Door Sedan

NHTSA Test No.: MR5900 VIN.: YV1LS5522R2121249

Body Color: Grey Date of Manufacture: 11/93

Date Received: 1/21/94

Odometer Reading: 211 miles

Engine: 5 Cylinders; - C.I.D.; 2.4 Liters; - CC
X Gas; - Diesel; - Turbocharged
- Longitudinal; X Transverse

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

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

Accessories: X A/C; X P/S; X P/B; X P/wdo
X Tilt Wheel; - P/seats; X Cruise Control - Other

Type of Occupant Restraint: 3 -point Continuous Belt System with pre-tensioning devices. Driver and Right front passenger airbags as supplemental restraint devices.

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 248.2 kPa, Rear 248.2 kPa

Recommended Tire Size: P195/60 15 VR

Recommended Cold Tire Pressure: Front 248.2 kPa, Rear 248.2 kPa

Tires on Vehicle: P195/60 R15 Manufacturer: Michelin

Number of Occupants: 2 Front; 3 Rear; - 3rd Seat; 5 TOTAL

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

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

Vehicle Capacity Weight (VCW) = 422 kgs. (A)

No. of Occupants x 68 kgs. = 340 kgs. (B)

Rated Cargo and Luggage Weight (RCLW) A-B = 82 kgs.

GVWR 1896 kgs. GAWR: Front 1016 kgs. Rear 898 kgs.

Table 1

GENERAL TEST AND VEHICLE DATA (cont'd)WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with maximum fluids) = UDW:

Right Front =	<u>449</u>	kgs.	Right Rear =	<u>272</u>	kgs.
Left Front =	<u>445</u>	kgs.	Left Rear =	<u>304</u>	kgs.
TOTAL FRONT WEIGHT =	<u>894</u>	kgs.	(	<u>60.8</u>	% of Total Vehicle Weight)
TOTAL REAR WEIGHT =	<u>576</u>	kgs.	(	<u>39.2</u>	% of Total Vehicle Weight)
TOTAL DELIVERED WEIGHT =	<u>1470</u>	kgs.			

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight	<u>1470</u>	kgs.
VCW = Vehicle Capacity Weight	<u>422</u>	kgs.
DSC = Designated Seating Capacity	<u>5</u>	
RCLW = VCW - 68 (DSC) =	<u>82</u>	kgs.
Target Test Weight = UDW + RCLW + (2 dummies x 74.4 kgs./ dummy)		
Target Test Weight =	<u>1701</u>	kgs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 82 KGS CARGO:

Right Front =	<u>490</u>	kgs.	Right Rear =	<u>358</u>	kgs.
Left Front =	<u>490</u>	kgs.	Left Rear =	<u>363</u>	kgs.
TOTAL FRONT WEIGHT =	<u>980</u>	kgs.	(	<u>57.6</u>	% of Total Vehicle Weight)
TOTAL REAR WEIGHT =	<u>721</u>	kgs.	(	<u>42.4</u>	% of Total Vehicle Weight)
TOTAL TEST WEIGHT =	<u>1701</u>	kgs.			
Weight of ballast secured in vehicle trunk area =	<u>45</u>	kgs.			

VEHICLE ATTITUDE (all dimensions in mm):

Delivered Attitude:	RF	<u>664</u>	LF	<u>661</u>	RR	<u>662</u>	LR	<u>661</u>
Test Attitude:	RF	<u>655</u>	LF	<u>650</u>	RR	<u>615</u>	LR	<u>610</u>
Wheel Base:	<u>2662</u>	mm.;	C.G. =	<u>1129</u>	mm. rearward of front wheel C/L			
Remarks:	<u>70 liters of stoddard solution was placed in the fuel tank.</u>							

Table 1

GENERAL TEST AND VEHICLE DATA (cont'd)POST -IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0°

Date of Test: March 24, 1994 Time of Test: 12:00

Ambient Temperature: 18 ° C at impact area

Temperature in Occupant Compartment: 21 ° C

Windshield Molding Temperature: 21 ° C

Required Impact Velocity Range: 55.5 to 57.1 kph

Impact Velocity: primary = 56.3 kph, secondary = 56.3 kph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 1321 mm

Exiting Speed Trap: 305 mm

VEHICLE REBOUND AND CRUSH (mm):

Vehicle Length:	Pre-test = R	<u>4615</u>	C _L	<u>4666</u>	L	<u>4610</u>
	Post-test = R	<u>4165</u>	C _L	<u>4158</u>	L	<u>4166</u>
	Crush = R	<u>450</u>	C _L	<u>508</u>	L	<u>444</u>

Distance from front of test vehicle to point of impact:

R 472 mm C_L 476 mm L 490 mm

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Airbag</u>	<u>Airbag</u>
Chest	<u>Airbag</u>	<u>Airbag</u>
Abdomen	<u>No Contact</u>	<u>Airbag</u>
Left Knee	<u>Lower Dashpanel</u>	<u>Glove Box Door</u>
Right Knee	<u>Lower Dashpanel</u>	<u>Glove Box Door</u>

Table 1

GENERAL TEST AND VEHICLE DATA (cont'd)

	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Door Opening	<u>operable</u>	<u>operable</u>	<u>operable</u>	<u>operable</u>
<u>Seat Movement</u>	<u>Front</u>		<u>Rear</u>	
	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Seat Back Failure	<u>None</u>	<u>None</u>	<u>N/A</u>	<u>N./A</u>
Seat Shift (mm.)	<u>0.0</u>	<u>60 mm forward</u>	<u>N/A</u>	<u>N/A</u>
<u>Glazing Damage</u>				
Backlight/Windshield:	<u>Windshield sustain minor stress fractures but remained intact.</u>			
Other Notable Impact Effects:	<u>None</u>			

Section 3

OCCUPANT AND VEHICLE INFORMATION

I. DATA

1. Dummy Injury Criteria Data Summary
2. Dummy Positioning Data
3. Seat Belt Performance Assessment Data
4. Camera Locations
5. Vehicle Target Locations
6. Load Cell Barrier Data
7. Vehicle Accelerometer Data
8. Test Vehicle Measurements

Table 2

DUMMY INJURY CRITERIA VALUESNHTSA No.: MR5900 Vehicle: 1994 Volvo 850 4-Door Sedan

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-48.7	-6.1	19.5	50.0
Position #2 - Passenger	-46.9	-22.3	21.6	48.7

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R*
Position #1 - Driver	-43.4	6.8	8.1	42.8
Position #2 - Passenger	-63.8	8.6	11.8	58.2

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

	MAXIMUM FORCE - FEMUR LOAD (nwt)	
	LEFT FEMUR	RIGHT FEMUR
Position #1 - Driver	-6243.2	-6099.5
Position #2 - Passenger	-4863.0	-4201.1

	MAXIMUM FORCE - SEAT BELT LOADS (nwt)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	N/A	N/A	6176.7
Position #2 - Passenger	N/A	6895.7	N/A

	HEAD INJURY CRITERIA (HIC)			
	HIC**	t ₁ (mSec)	t ₂ (mSec)	Average Acceleration t ₁ to t ₂
Position #1 - Driver	433.9	49.44	85.32	42.95
Position #2 - Passenger	421.0	43.56	79.44	42.44

** HIC is as defined in FMVSS 208. The maximum time interval from t₁ to t₂ is 36 milliseconds.

Table 3

HYBRID III NECK AND CHEST DATA SHEETVehicle Year/Make/Model/Body Style: 1994 Volvo 850 4-Door SedanVehicle NHTSA No.: MR5900Test Date: March 24, 1994

MAXIMUM VALUES	DRIVER DUMMY ID # : 150	PASSENGER DUMMY ID # : 245
Neck Load X (nwt)	N/A	-763.5
Neck Load Y (nwt)	N/A	-286.0
Neck Load Z (nwt)	1692.6	1286.2
Neck Moment X (nwt-m)	N/A	39.1
Neck Moment Y (nwt-m)	46.4	50.9
Neck Moment Z (nwt-m)	-7.5	-13.0
Chest Deflection X (mm.)	N/A	N/A
Time of Max. Occurrence (msec)	N/A	N/A

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

Figure 1

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS

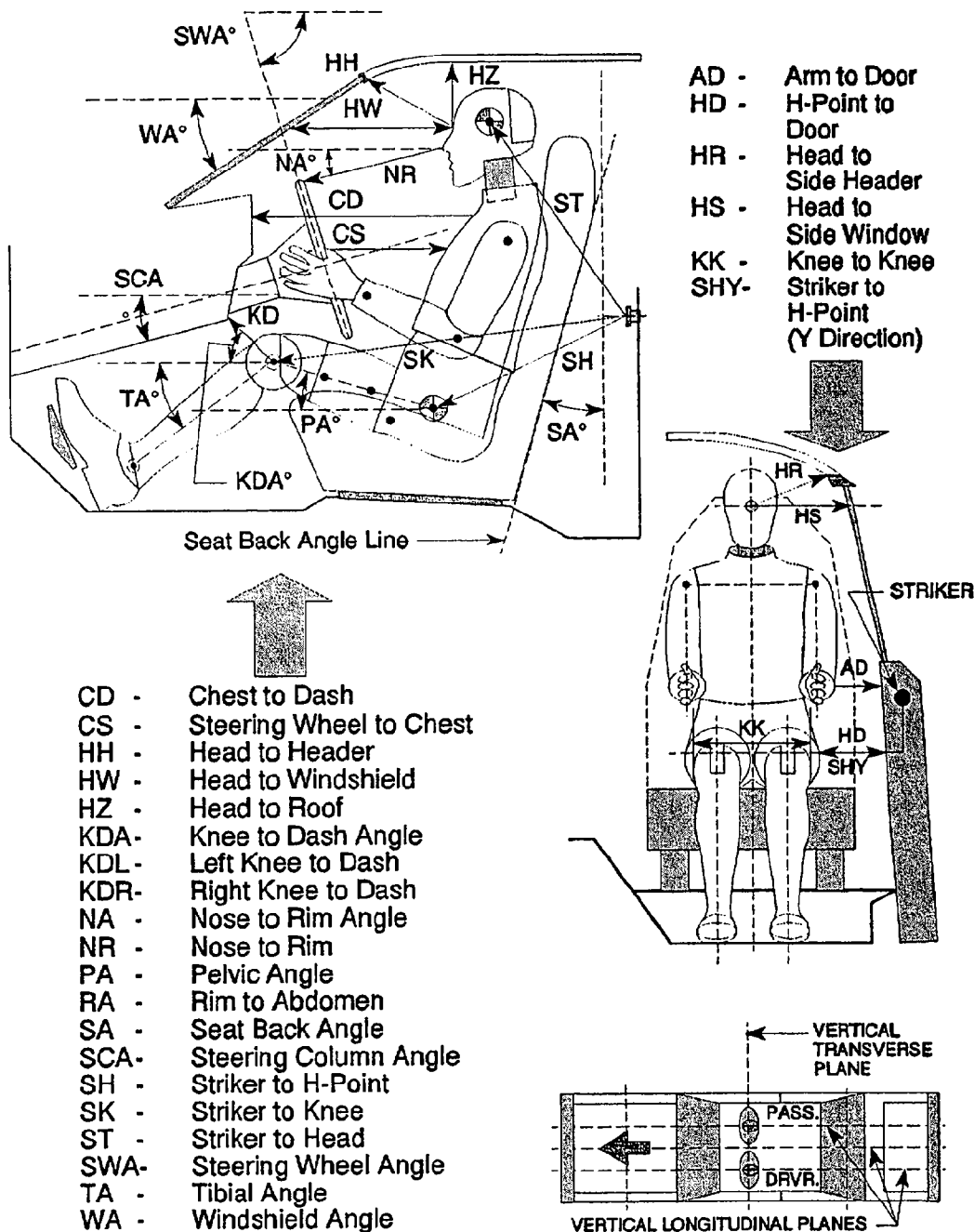


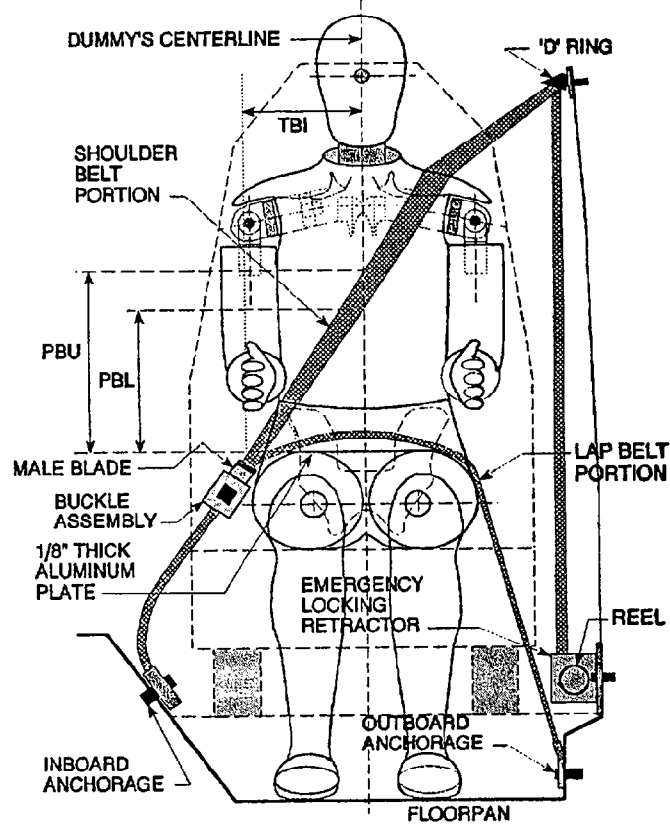
Table 4
FRONT SEAT OCCUPANT MEASUREMENTS

	DRIVER (Serial # 150)			PASS. (Serial # 245)		
WA°	30°			30°		
SWA°	23.5°			N/A		
SCA°	66.5°			N/A		
SA°	18° as specified by the manufacture			18° as specified by the manufacture		
HZ	190			200		
HH	330			325		
HW	588			530		
HR	260			240		
NR	355	Angle	10°	N/A		
CD	520			540		
CS	272			N/A		
RA	760			N/A		
KDL	175	Angle (KDA)	30°	190		
KDR	205			175	Angle (KDA)	33°
PA°	23°			24°		
TA°	43°			45°		
KK	355			300		
ST	406	Angle	28°	394	Angle	25°
SK	673	Angle	107°	673	Angle	105°
SH	356	Angle	140°	368	Angle	135°
SHY	240			210		
HS	270			270		
HD	143			135		
AD	140			130		

Figure 2

SEAT BELT POSITIONING DATA

SEAT BELT POSITIONING DATA



FRONT VIEW OF DUMMY

	DRIVER DUMMY (mm)	PASSENGER DUMMY (mm)
PBU -- Top surface of alum. plate to upper edge	305	305
PBL-- Top surface of alum. plate to belt lower edge	225	230
<u>LAP BELT TENSION</u>	-	-
<u>SHOULDER BELT TENSION</u>	.9 kgs	.9kgs

Table 5

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

<u>BELT LENGTH DATA:</u>	<u>Driver</u>	<u>Passenger</u>
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	<u>1470</u>	<u>1470</u>
Shoulder belt length as measured on Part 572 Dummy.	<u>870</u>	<u>870</u>
Lap belt length as measured on Part 572 Dummy.	<u>600</u>	<u>600</u>
<u>SHOULDER BELT SPOOL-OFF DATA:</u>		
As determined by film analysis.	<u>N/A</u>	<u>N/A</u>
As determined mechanically.	<u>58 mm</u>	<u>58 mm</u>
<u>BELT STRETCH DATA:</u>		
Measured mechanically.	<u>0.0 mm/M</u>	<u>0.0 mm/M</u>

NOTE: To avoid interference with the pre-tensioner devices electronic transducers we not placed on the belts.

Figure 3

CAMERA POSITIONS FOR FRONTAL BARRIER IMPACTS

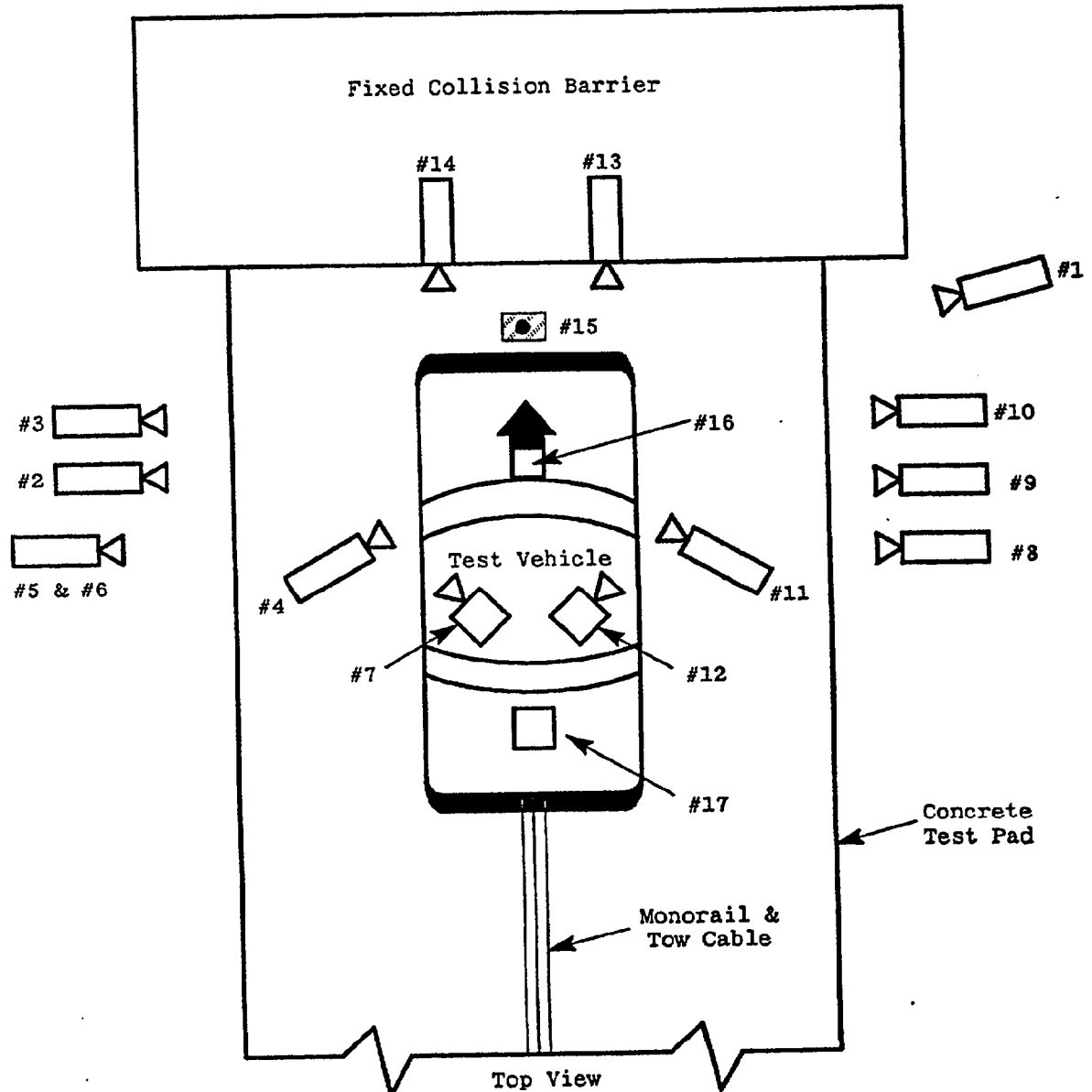


Table 6
HIGH-SPEED CAMERA LOCATIONS

Test No.		MR5900		Vehicle:		1994 Volvo 850 4-Door Sedan		
CAMERA NO.	VIEW	CAMERA POSITIONS (MM.)*			ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Camera	-	-	-	-	-	-	24
2	Overall Left Side	5893	1626	1041	-4	5432	13	1030
3	Left Side View	8026	1092	1041	-2	7565	25	1020
4	Driver and Interior View	2896	2769	1829	-22	2435	13	1060
5	Steering Column (Bottom)	7010	1880	1168	-5	6549	25	910
6	Steering Column (Top)	7010	1880	1778	-10	6549	25	940
7	Left Belt	-	-	-	-	-	8	N/A
8	Overall Right Side	6045	1880	1041	-4	5584	13	1000
9	Right Side View	7823	1372	1041	0	7362	25	1090
10	Right Passenger View	7671	1905	1422	-3	7210	35	970
11	Passenger and Interior View	2794	2591	1854	-21	2333	13	850
12	Right Belt	-	-	-	-	-	8	830
13	Passenger Front View	560	127	1778	-35	-	13	1020
14	Driver Front View	560	127	1778	-35	-	13	1030
15	Windshield View	0	0	3050	-45	-	13	1100
16	Pit View of Engine	0	500	-3050	90	-	13	710
17	Pit View of Fuel Tank	0	3430	-3050	90	-	13	710

*X = film plane to monorail centerline ** = referenced to horizontal plane

Y = film plane to impact location N.T. indicates No Timing

Z = film plane to ground

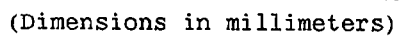
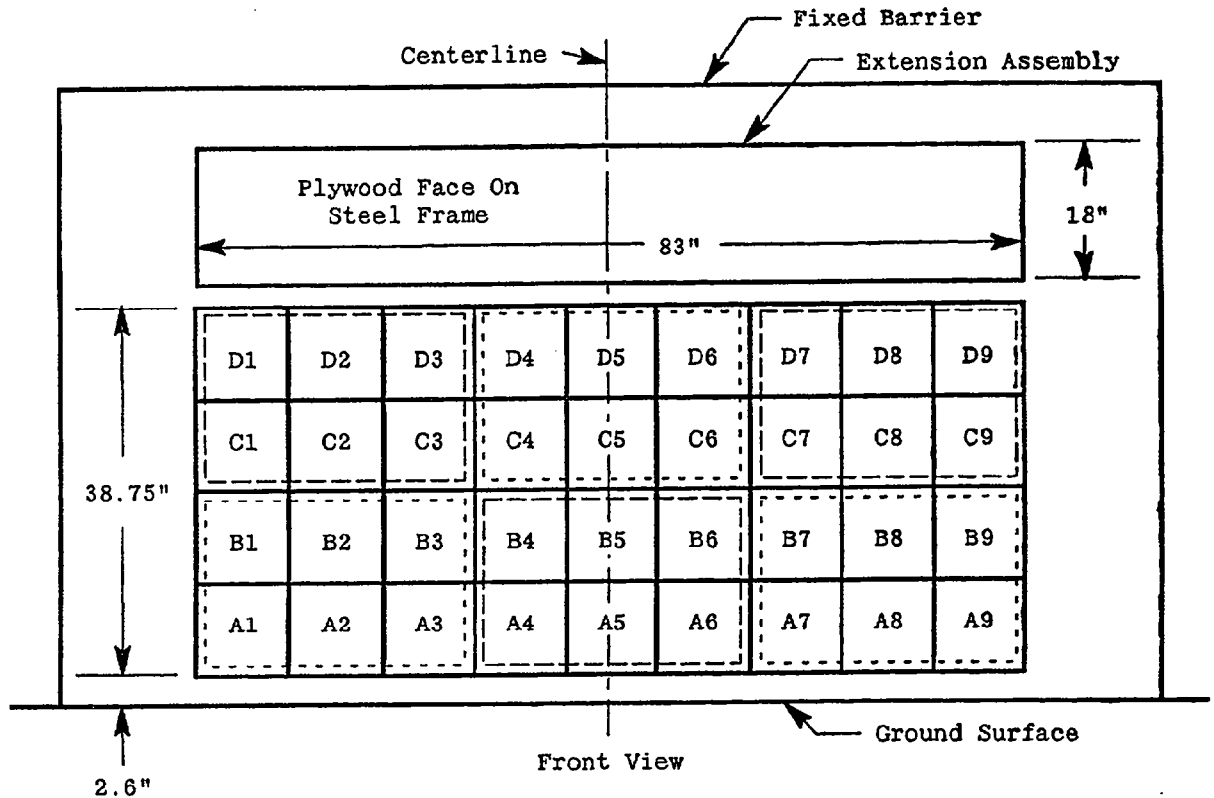


Figure 5

LOAD CELL LOCATIONS ON FIXED BARRIER

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



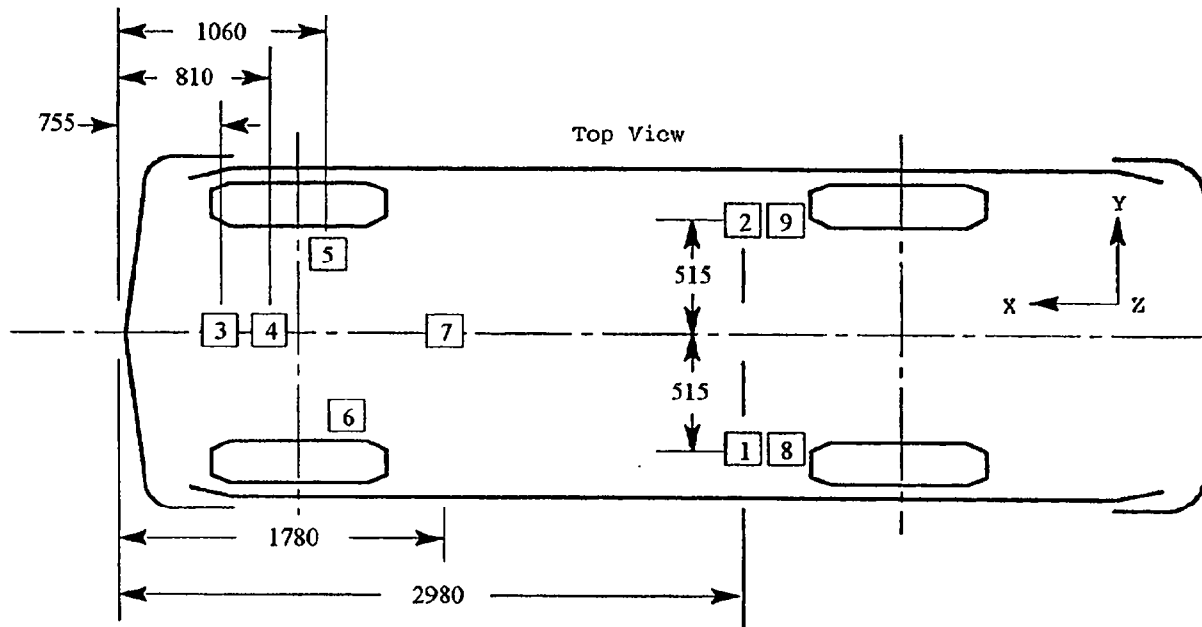
6 GROUPS OF 6 LOAD CELLS EACH

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

The following data is presented in Appendix B:

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

Figure 6

VEHICLE ACCELEROMETER LOCATIONS

All dimensions are in millimeters

ACCELEROMETER NUMBER*	ACCELEROMETER LOCATION	LOCATION		
		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	Left Rear Seat Crossmember	✓		
9	Right Rear Seat Crossmember	✓		

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

Figure 7

TEST VEHICLE MEASUREMENTS

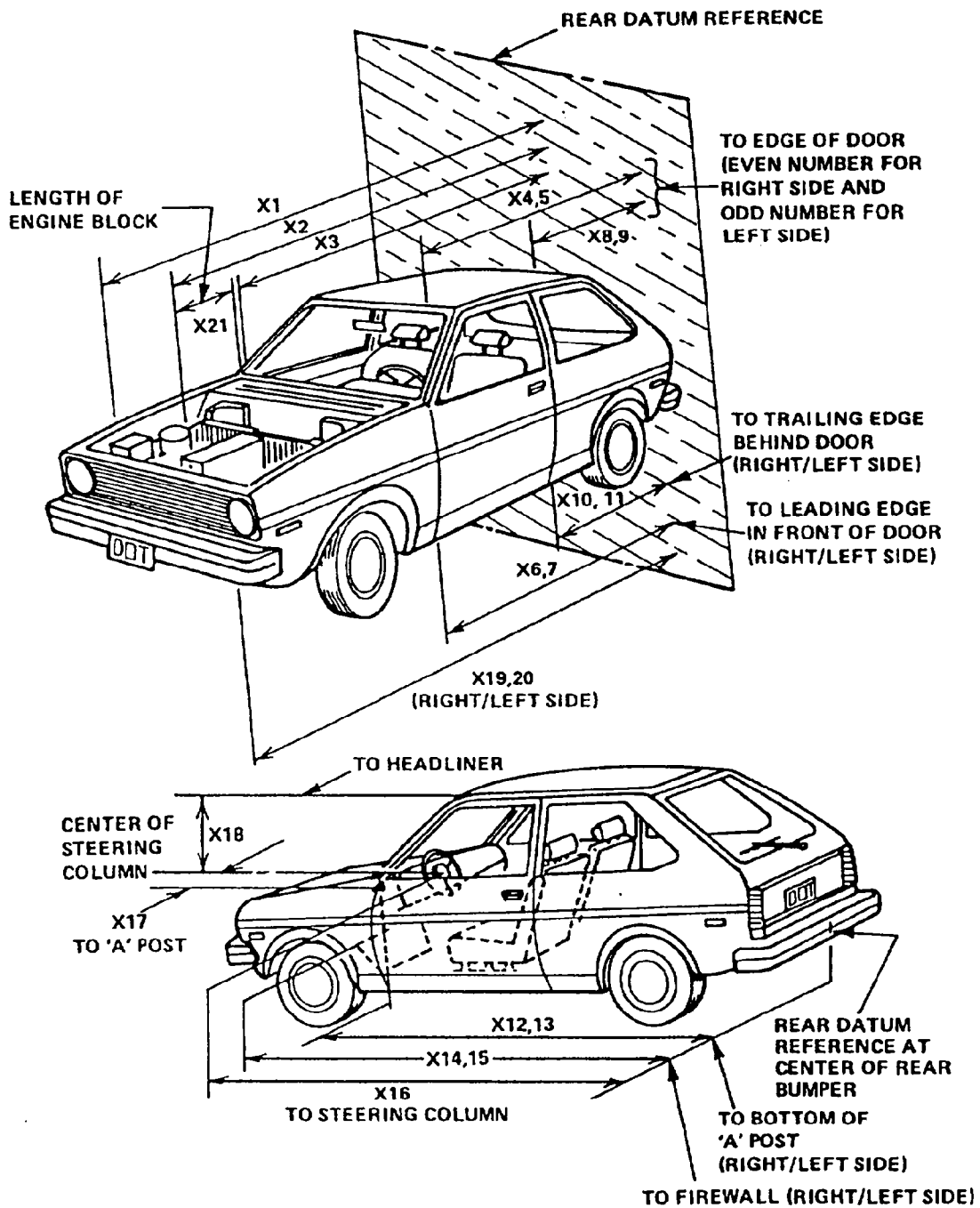


Table 7

VEHICLE MEASUREMENTS

No.		All Dimensions in mm		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	4666	4158	508
X2	Rear Surface of Vehicle to Front of Engine	4044	3810	234
X3	Rear Surface of Vehicle to Firewall	3518	3485	33
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	3132	3129	3
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	3129	3132	-3
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	3132	3122	10
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	3129	3119	10
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	2088	2096	-8
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	2088	2100	-12
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	2116	2103	13
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	2113	2108	5
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	3078	3078	0
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	3073	3073	0
X14	Rear Surface of Vehicle to Firewall, Right Side	3498	3421	77
X15	Rear Surface of Vehicle to Firewall, Left Side	3526	3467	59
X16	Rear Surface of Vehicle to Steering Column	2692	2715	-23
X17	Center of Steering Column to "A" Post	429	427	2
X18	Center of Steering Column to Headliner	427	381	46
X19	Rear Surface of Vehicle to Right Side of Front Bumper	4615	4165	450
X20	Rear Surface of Vehicle to Left Side of Front Bumper	4610	4166	444
X21	Length of Engine Block	597	597	0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	3017	2997	20
CD	Rear Surface of Vehicle to Center of Dash Panel	2896	2870	26
LD	Rear Surface of Vehicle to Left Side of Dash Panel	2929	2918	11

Table 8

ACCIDENT INVESTIGATION DIVISION DATA
FOR 56.3 KPH FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: 1994 Volvo 850 4-Door Sedan

Vehicle NHTSA No.: MR5900 VIN: YV1LS5522R2121249

Model Year: 1994 Build Date: 11/93 Test Date: 3/24/94

Vehicle Size Category: Full Size Test Weight: 1701 Kgs

Vehicle Wheelbase: 2662 mm; Front Overhang: 1384 mm; Overall Width: 1750 mm

Collision Deformation Classification (CDC) Code: 12FDEW2

Crush Depth Dimensions:

C1 = 419 mm

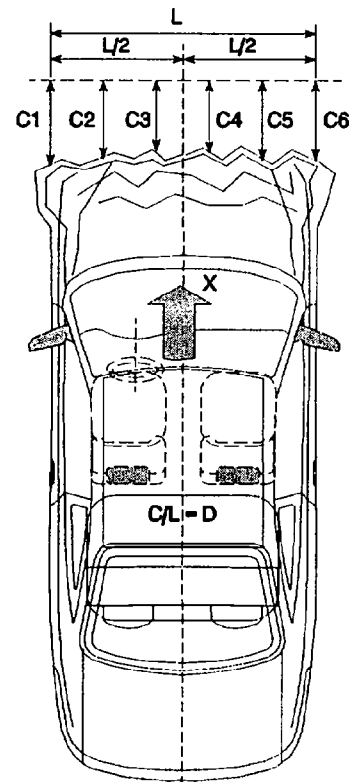
C2 = 457 mm

C3 = 488 mm

C4 = 498 mm

C5 = 465 mm

C6 = 432 mm



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

Length of Damaged Region: L = 1750 mm

Section 4

SUMMARY OF RESULTS OF FMVSS 212, 219 (Partial) AND 301

"Windshield Mounting" FMVSS No. 212 Data

"Windshield Zone Intrusion" FMVSS No. 219 Data

"Fuel System Integrity" FMVSS No. 301

Figure 8

FMVSS NO. 212 - "WINDSHIELD MOUNTING" DATA

DETAILS OF WINDSHIELD MOUNTING SUCH AS RETENTION METHOD, TRIM TYPE, ETC.:

Windshield is bonded in place and covered with 18 mm. molding.

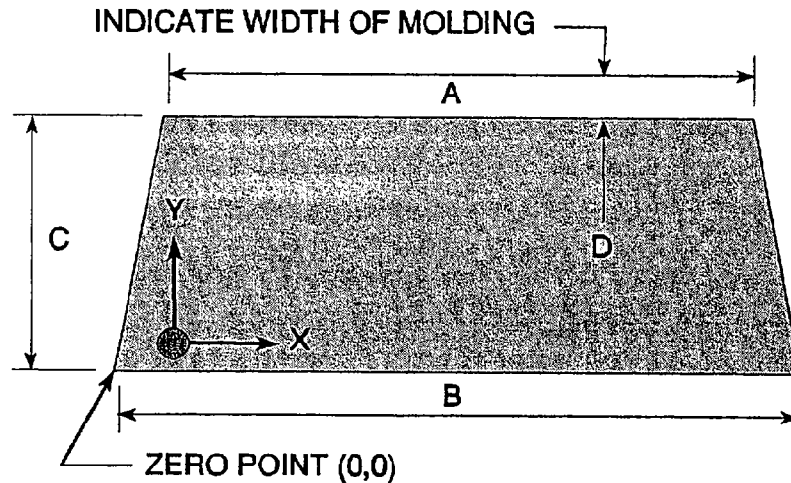
FMVSS 212 REQUIREMENTS:

The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of the windshield for vehicles equipped with automatic restraint systems for front occupants.

FMVSS 212 TEST DATA

	WINDSHIELD PERIPHERY		
	PRE-TEST (mm)	POST-TEST(mm)	% OF RETENTION
RIGHT SIDE	2197.5	2197.5	100
LEFT SIDE	2197.5	2197.5	100
TOTAL	4395.0	4395.0	100

AREA OF RETENTION FAILURE:



DIMENSIONS	
A	1290
B	1605
C	750
D	18

FRONT VIEW OF WINDSHIELD

FAILURE DETAILS: None

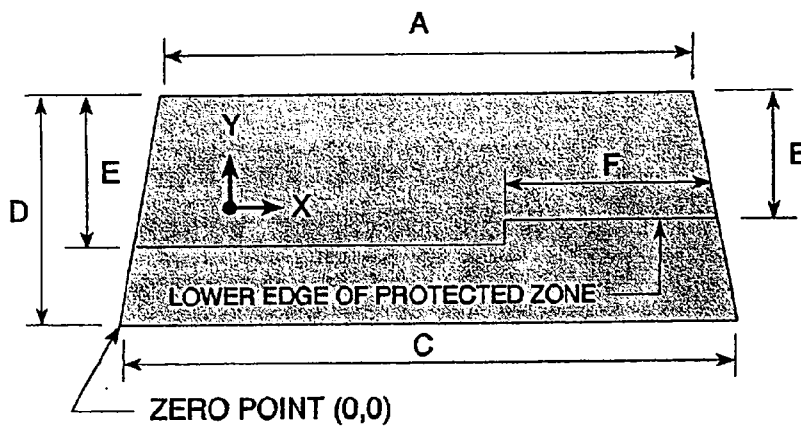
Figure 9

FMVSS NO. 219 (PARTIAL) - "WINDSHIELD ZONE INTRUSION" DATA

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" diameter rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. The locus of points is drawn on the inner surface of the windshield contacted by the sphere across the width of the instrument panel. From the outermost contactable points extend the locus line horizontally to the edges of the windshield, then draw a line on the inner surface of the windshield below and 1/2" distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection of this line onto the outer surface of the windshield.

FMVSS 219 TEST DATA: (Dimensions in mm)



DIMENSIONS	
A	1290
B	405
C	1605
D	750
E	450
F	675

FRONT VIEW OF WINDSHIELD

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4": None

(Show location of penetration on the above sketch)

COORDINATES		
	X	Y
1.		
2.		
3.		
4.		

FMVSS NO. 301-75 "FUEL SYSTEM INTEGRITY" POST IMPACT TEST DATA

TEST DATE: March 24, 1994

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

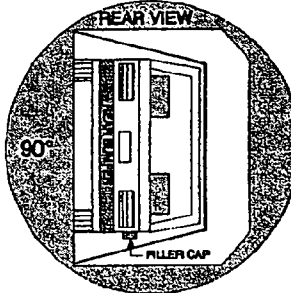
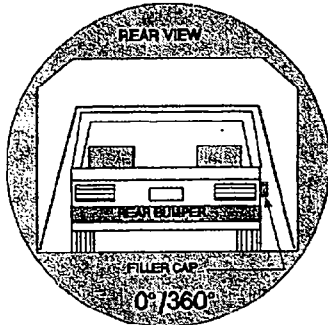
FUEL SPILLAGE MEASUREMENT:

1. From impact until vehicle motion ceases
2. For 5 minute period after vehicle motion ceases
3. For next 25 minutes

ACTUAL	MAX ALLOWED
0	1 oz.
0	5 oz.
0	1 oz./min

SOLVENT SPILLAGE DETAILS: None

Table 10

FMVSS NO. 301 STATIC ROLLOVER DATA SHEETTEST PHASE:Vehicle NHTSA ID No.
MR5900I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90 deg. Rotation Time
(Spec. Range = 1 to 3 minutes)2

minutes

50

seconds

FMVSS 301 Position Hold Time +

5

minutes

00

seconds

TOTAL7

minutes

50

seconds

Next whole minute interval

8

minutes

00

seconds

II. FMVSS 301 REQUIREMENTS:(1) Time Period

First 5 min. from onset of rotation	6th min.	7th min.	8th min. if reqd.
-------------------------------------	----------	----------	-------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE: None

0	0	0	0
---	---	---	---

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

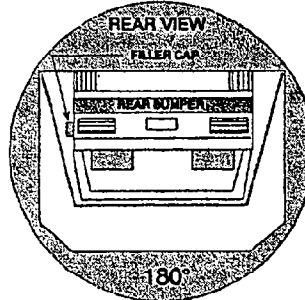
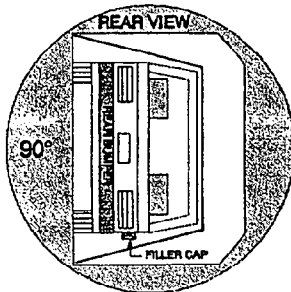
IV. SOLVENT SPILLAGE LOCATION(S): None

Table 10

FMVSS NO. 301 STATIC ROLLOVER DATA SHEETTEST PHASE:

Vehicle NHTSA ID No. _____

MR5900

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90 deg. Rotation Time
(Spec. Range = 1 to 3 minutes)

2

minutes

50

seconds

FMVSS 301 Position Hold Time +

5

minutes

00

seconds

TOTAL7

minutes

50

seconds

Next whole minute interval

8

minutes

00

seconds

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min. from onset of rotation	6th min.	7th min.	8th min. if reqd.
-------------------------------------	----------	----------	-------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

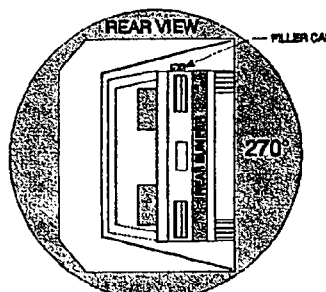
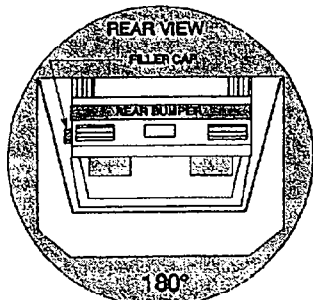
III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

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

IV. SOLVENT SPILLAGE LOCATION(S): None

Table 10

FMVSS NO. 301 STATIC ROLLOVER DATA SHEETTEST PHASE:Vehicle NHTSA ID No.
MR5900I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90 deg. Rotation Time
(Spec. Range = 1 to 3 minutes)2 minutes 50 seconds

_FMVSS 301 Position Hold Time +

5 minutes 00 seconds**TOTAL**7 minutes 50 seconds

Next whole minute interval

8 minutes 00 secondsII. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min. from onset of rotation	6th min.	7th min.	8th min. if reqd.
-------------------------------------	----------	----------	-------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

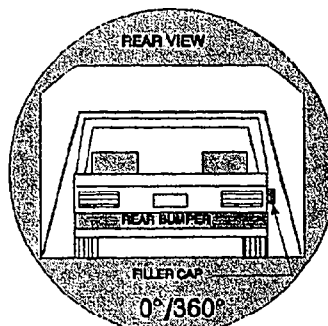
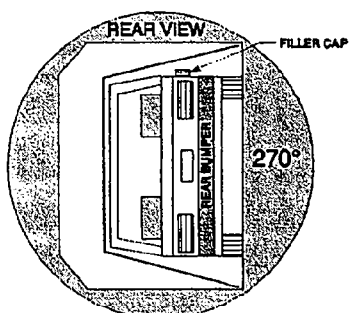
III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

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

IV. SOLVENT SPILLAGE LOCATION(S): None

Table 10

FMVSS NO. 301 STATIC ROLLOVER DATA SHEETTEST PHASE:Vehicle NHTSA ID No.
MR5900I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90 deg. Rotation Time
(Spec. Range = 1 to 3 minutes)2

minutes

50

seconds

FMVSS 301 Position Hold Time +

5

minutes

00

seconds

TOTAL7

minutes

50

seconds

Next whole minute interval

8

minutes

00

seconds

II. FMVSS 301 REQUIREMENTS:(1) Time Period

First 5 min. from onset of rotation	6th min.	7th min.	8th min. if reqd.
-------------------------------------	----------	----------	-------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	0
---	---	---	---

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

IV. SOLVENT SPILLAGE LOCATION(S): None

Appendix A
PHOTOGRAPHS

PHOTOGRAPHS

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A-30	PRE-TEST DRIVER HEAD LOCATION	A-32
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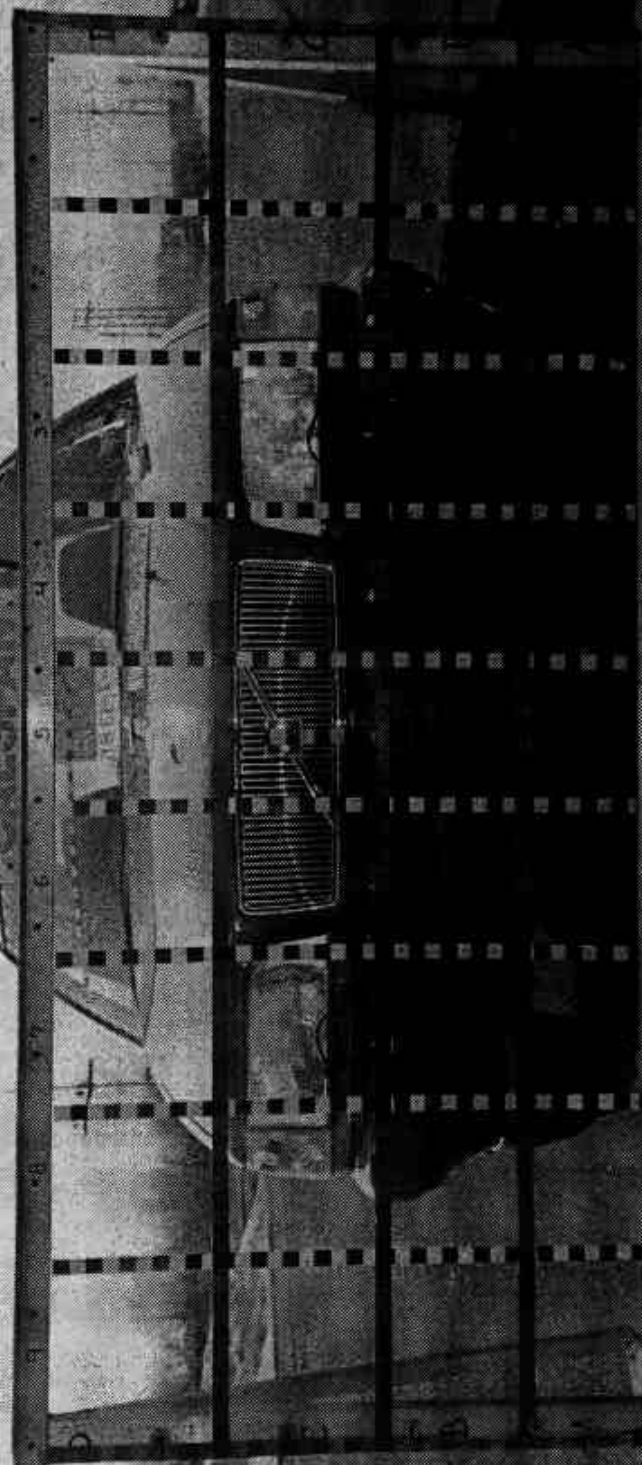


Figure A-1 LOAD CELL LOCATIONS

A-3

8120-7

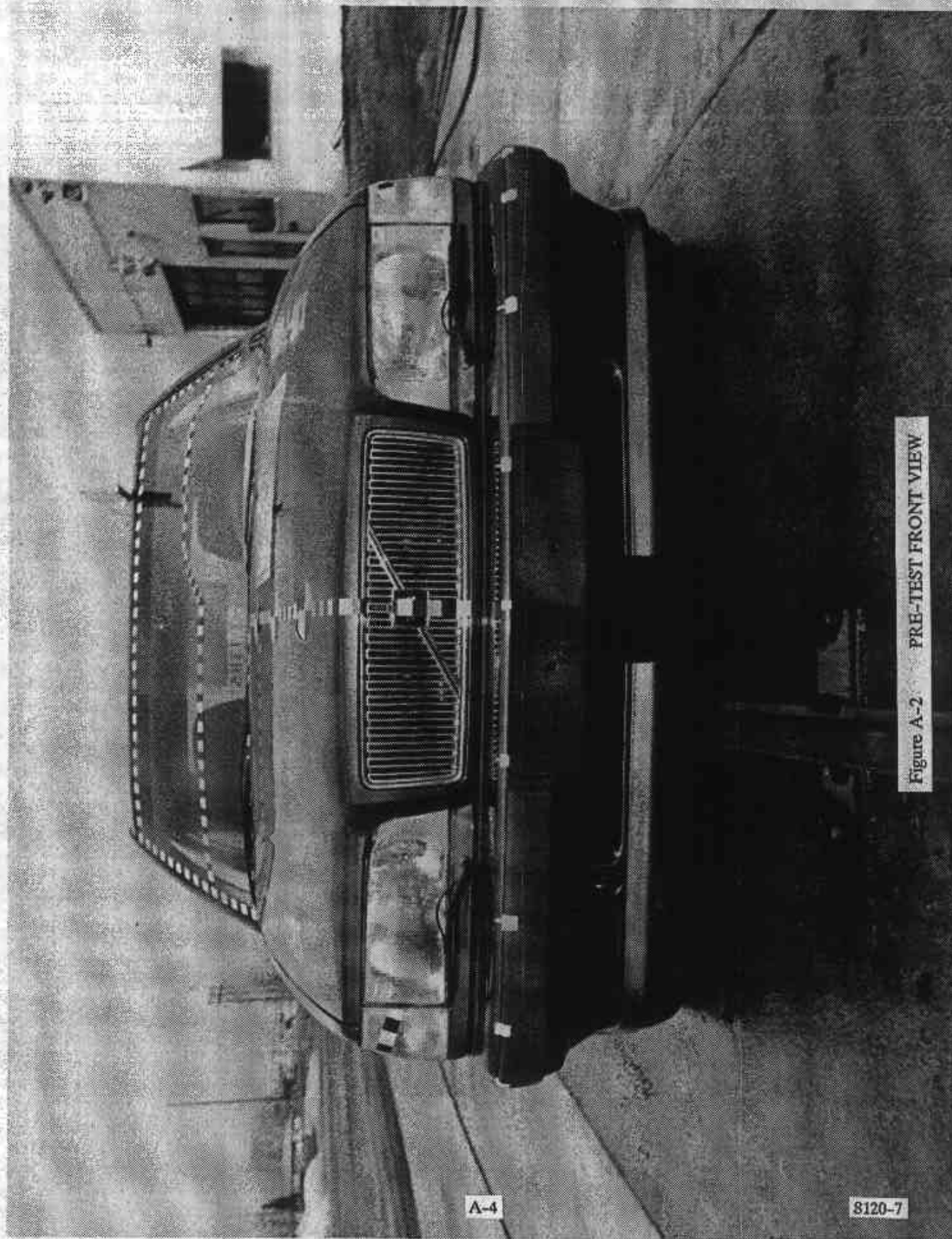


Figure A-2 PRE-TEST FRONT VIEW

A-4

8120-7

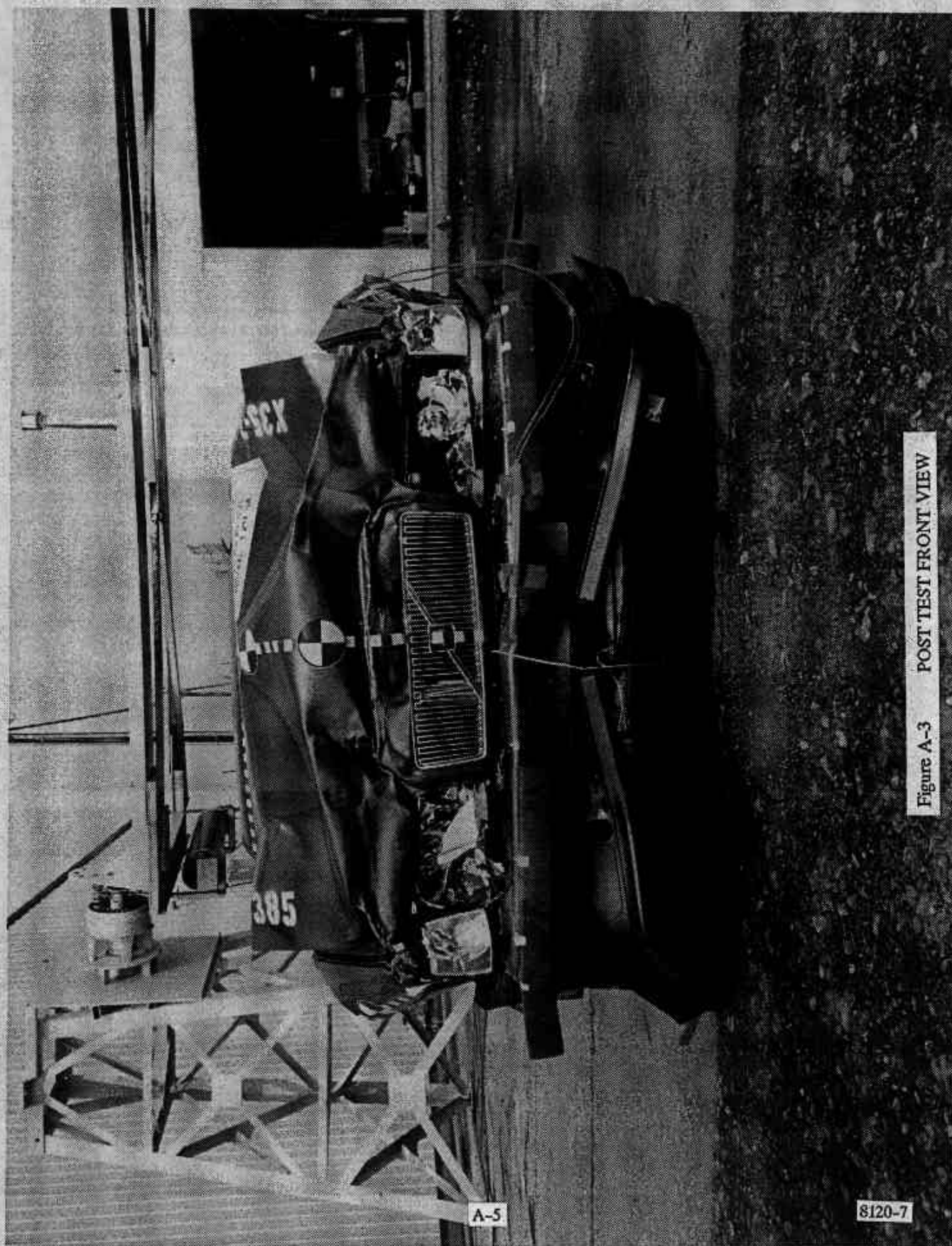


Figure A-3 POST TEST FRONT VIEW

A-5

8120-7

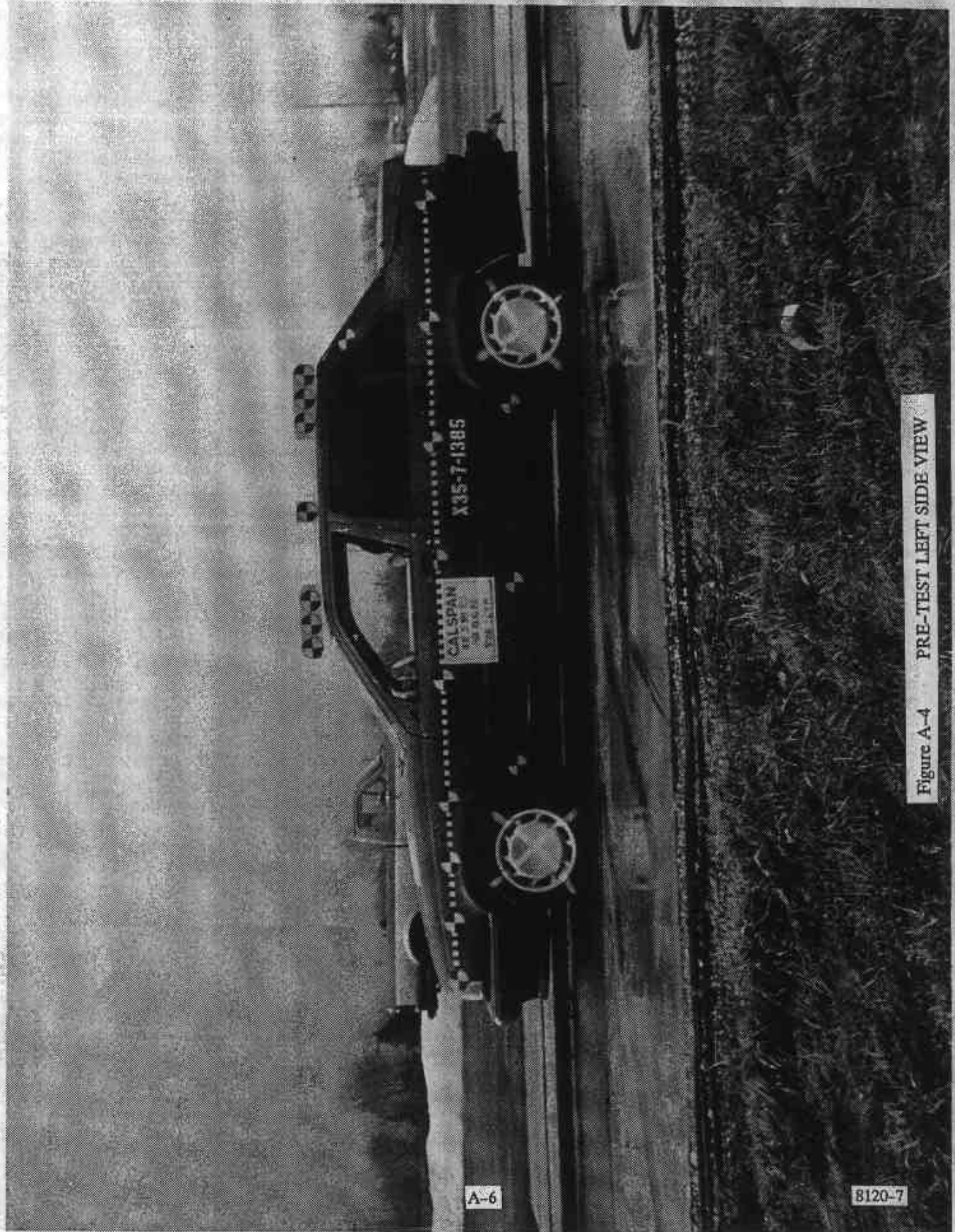


Figure A-4 PRE-TEST LEFT SIDE VIEW

A-6

8120-7

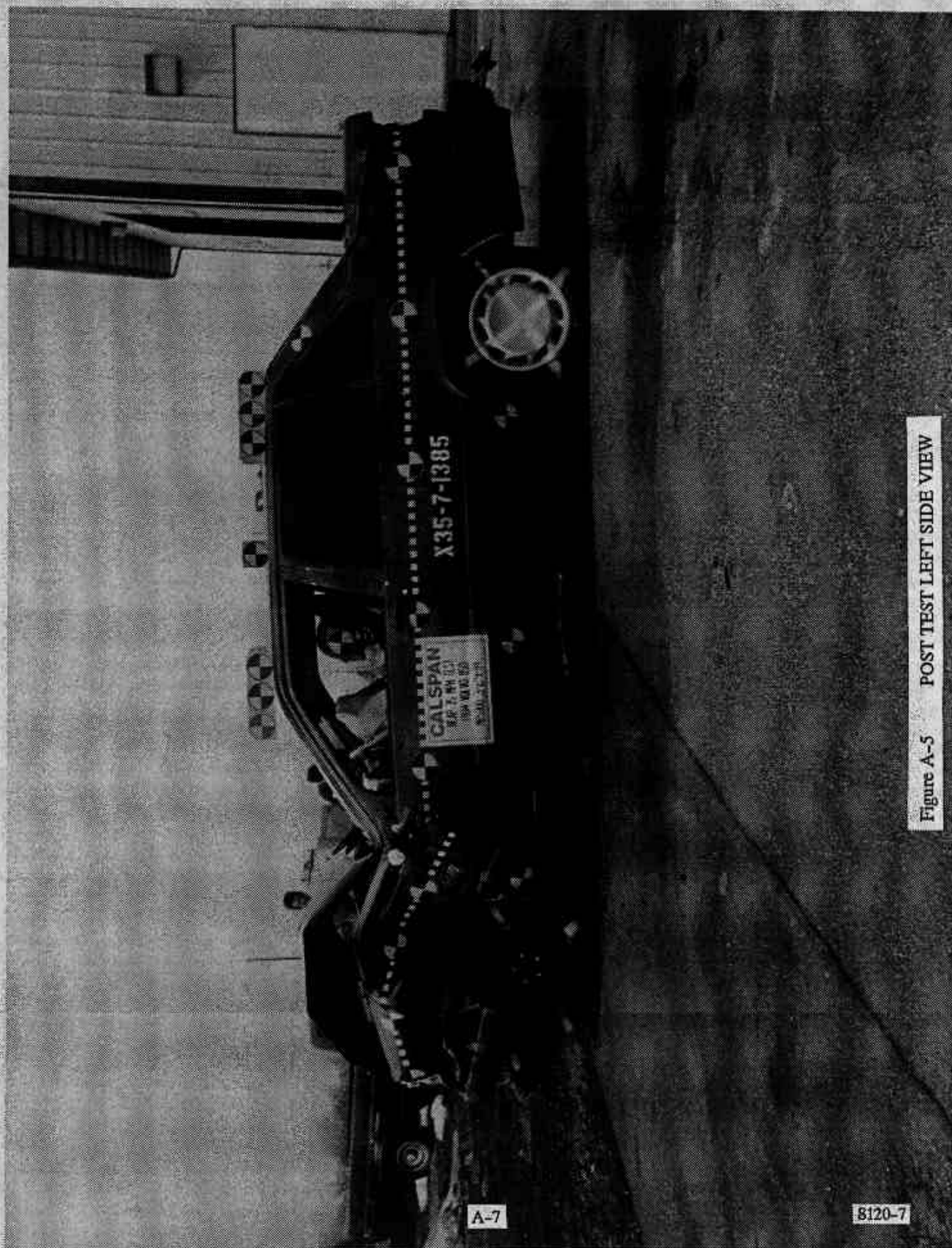


Figure A-5 POST TEST LEFT SIDE VIEW

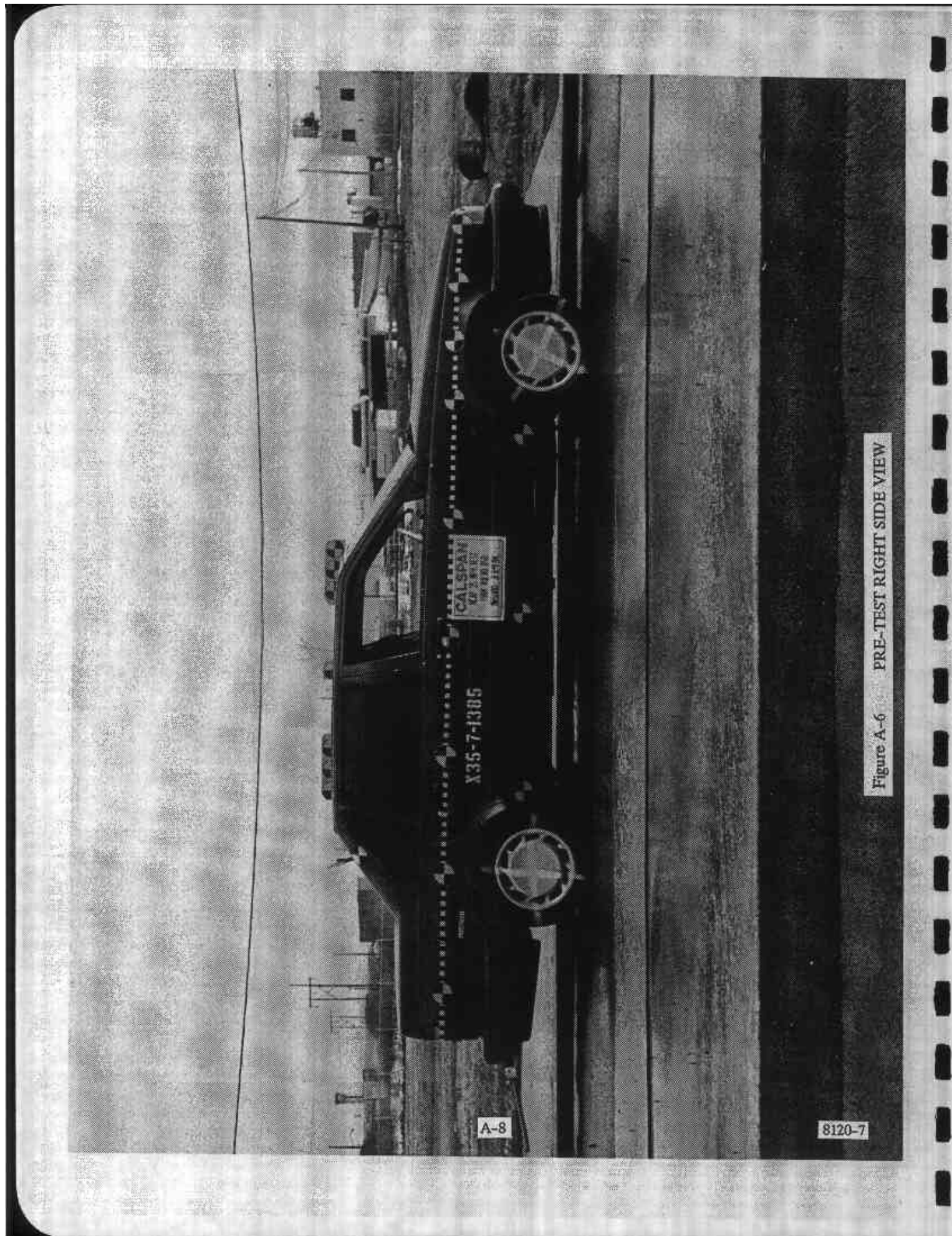


Figure A-6 PRE-TEST RIGHT SIDE VIEW

A-8

8120-7

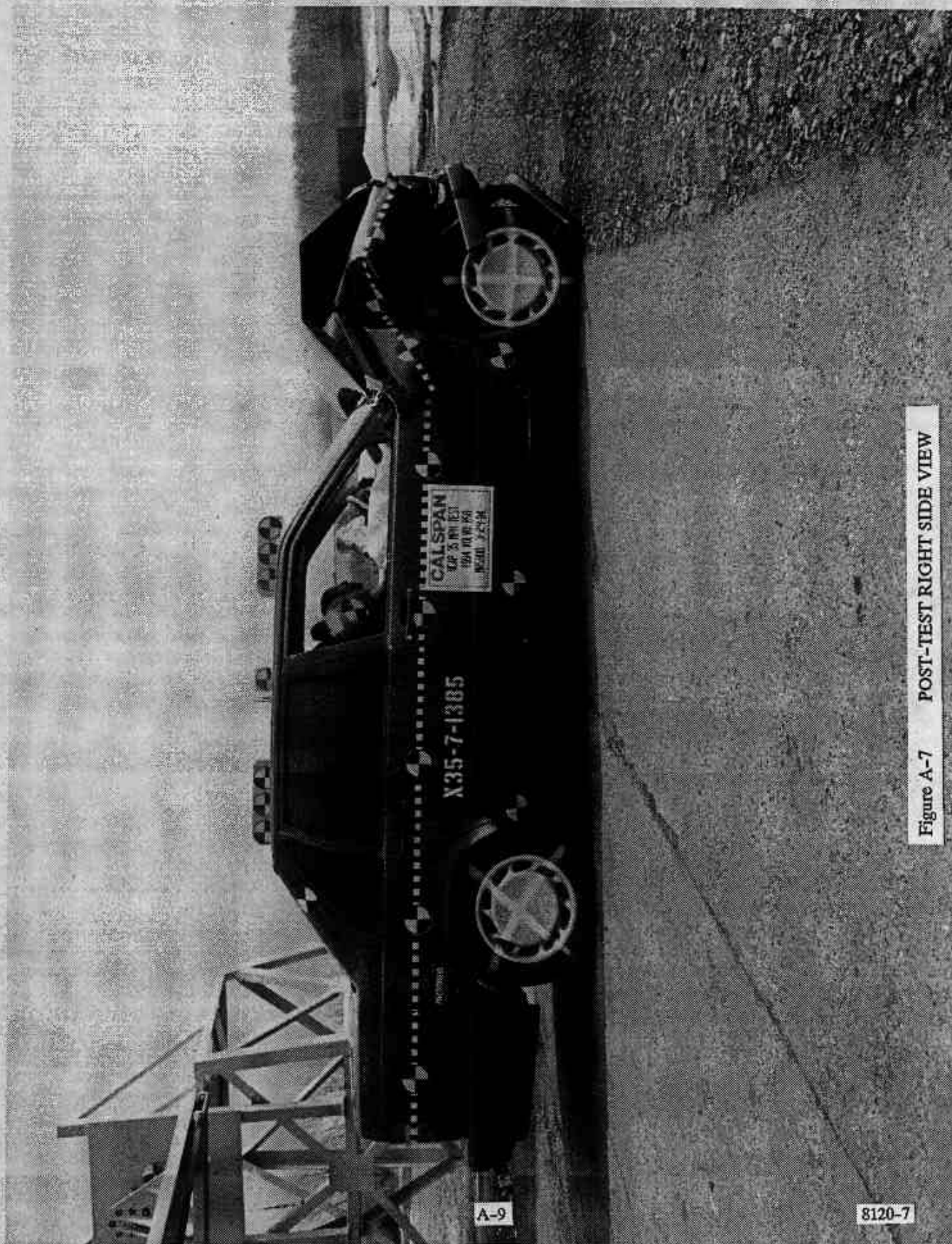


Figure A-7 POST-TEST RIGHT SIDE VIEW

A-9

8120-7

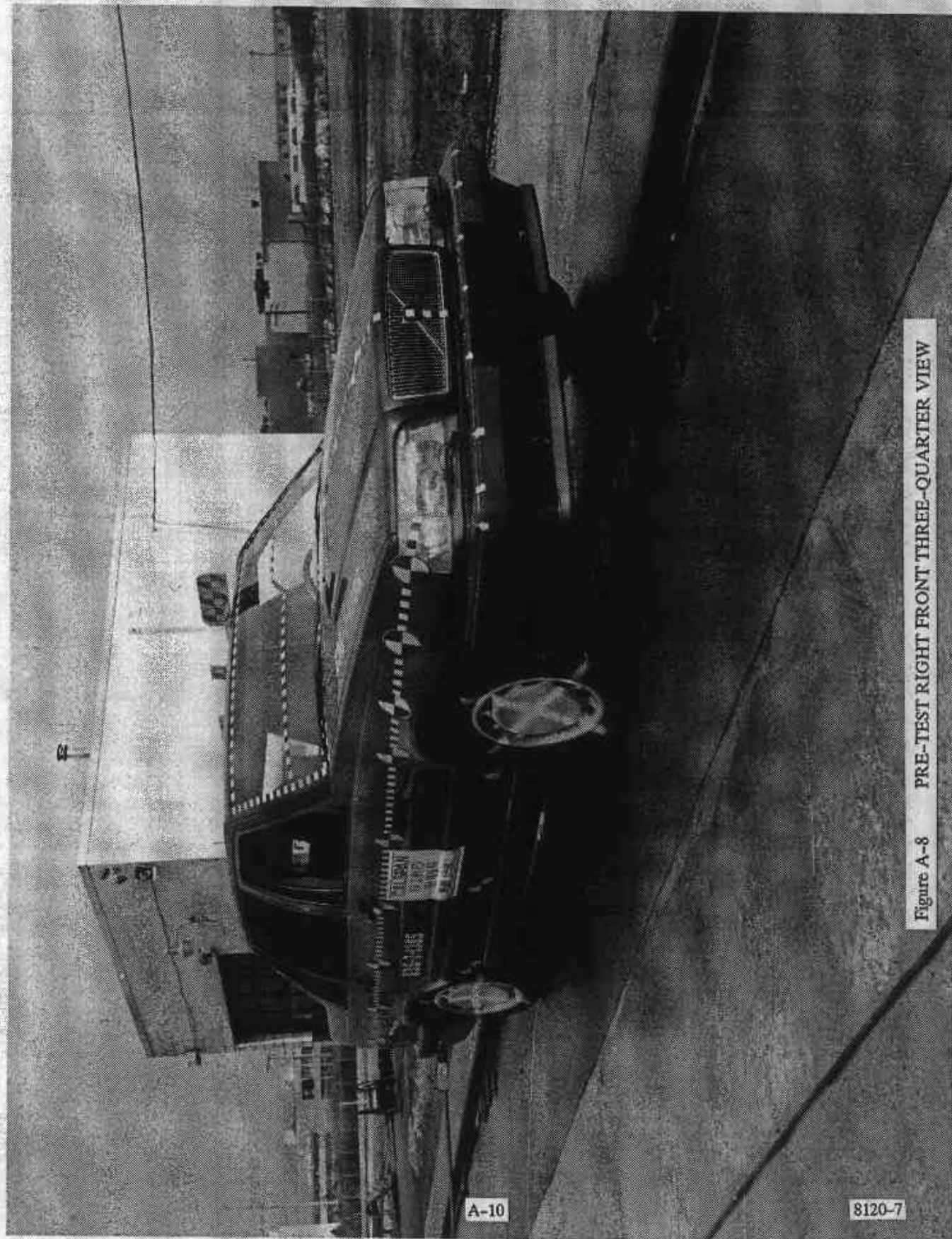


Figure A-8 PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

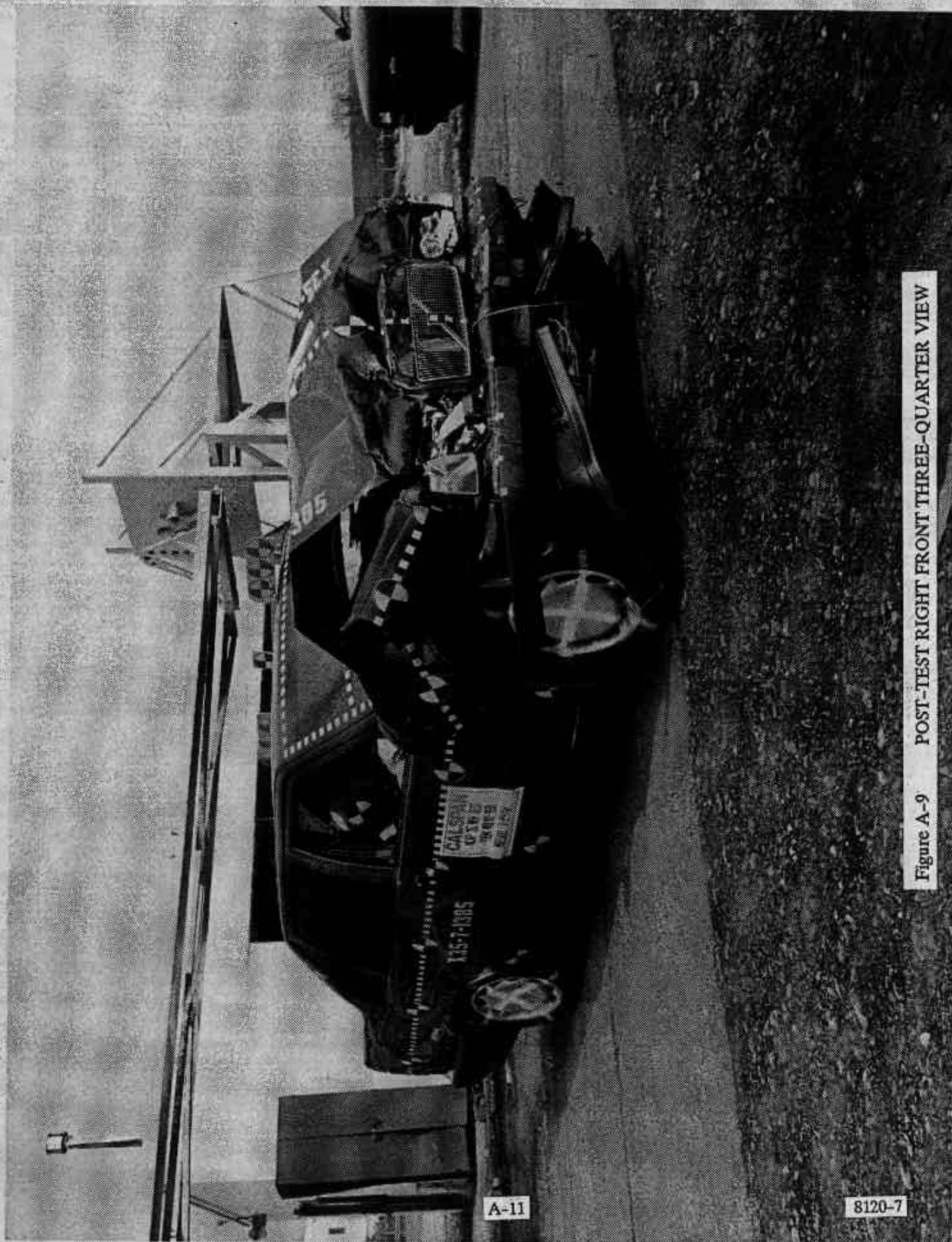


Figure A-9 POST-TEST RIGHT FRONT THREE-QUARTER VIEW



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

A-12

8120-7



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

A-13

8120-7

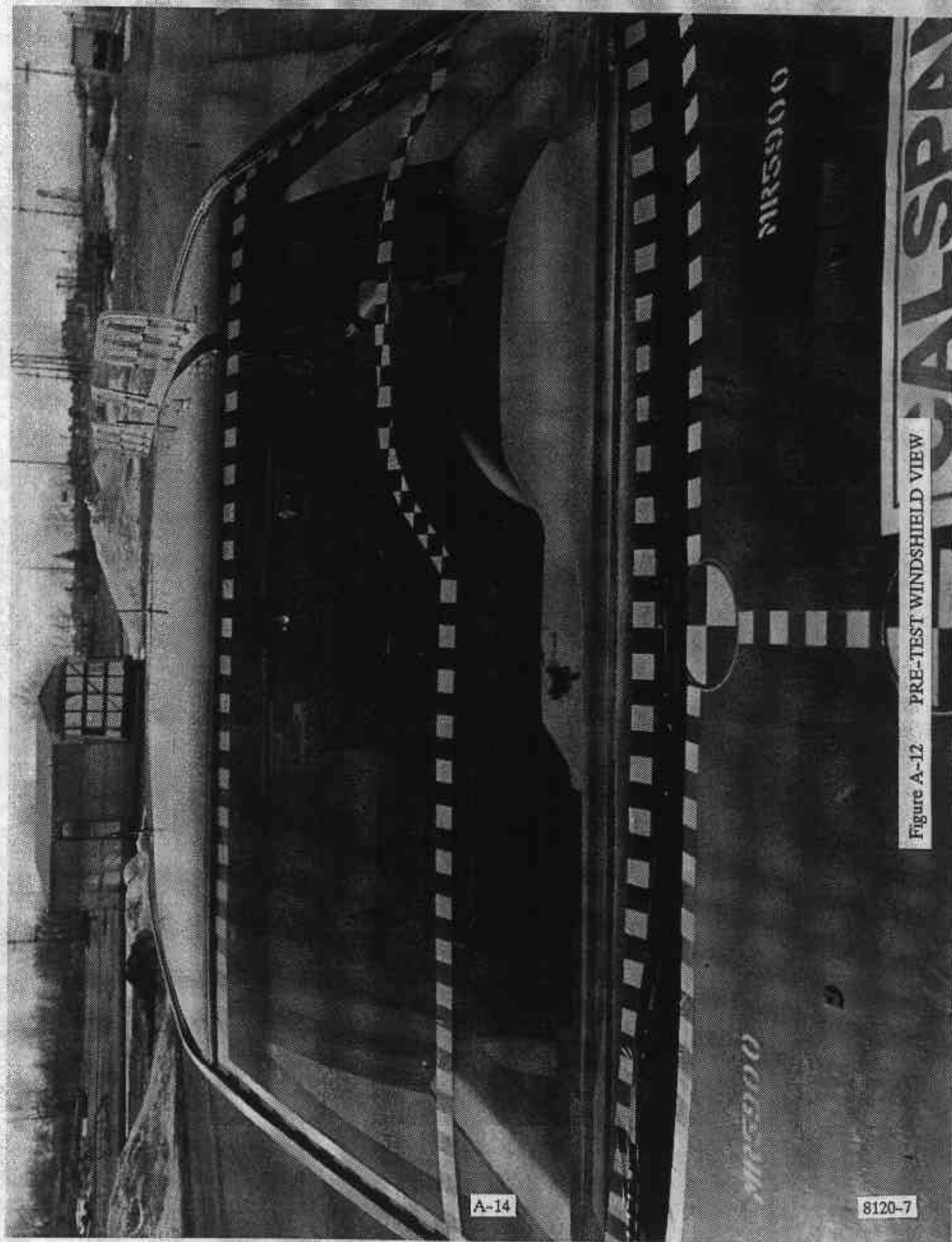


Figure A-12 PRE-TEST WINDSHIELD VIEW

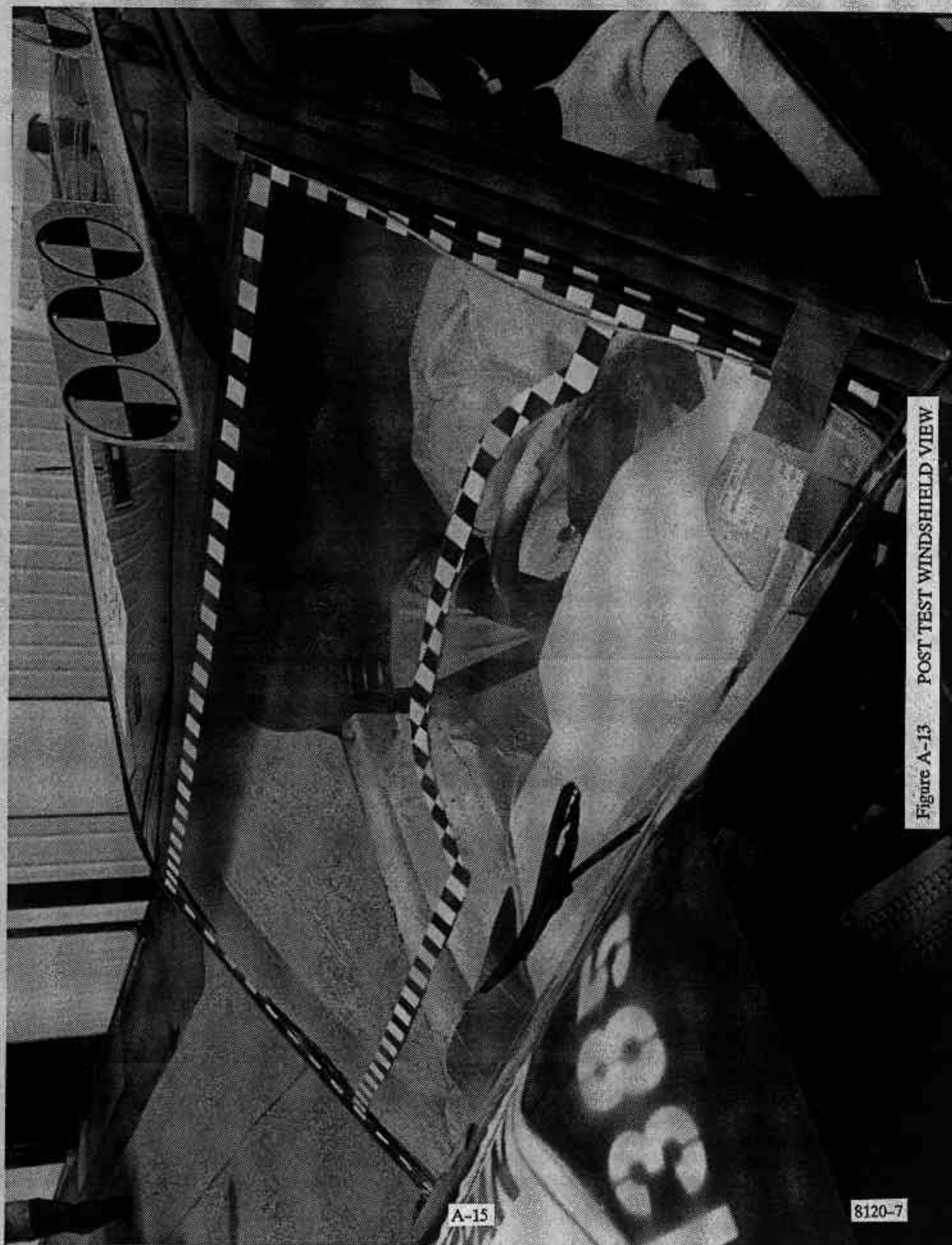


Figure A-13 POST TEST WINDSHIELD VIEW

A-15

8120-7

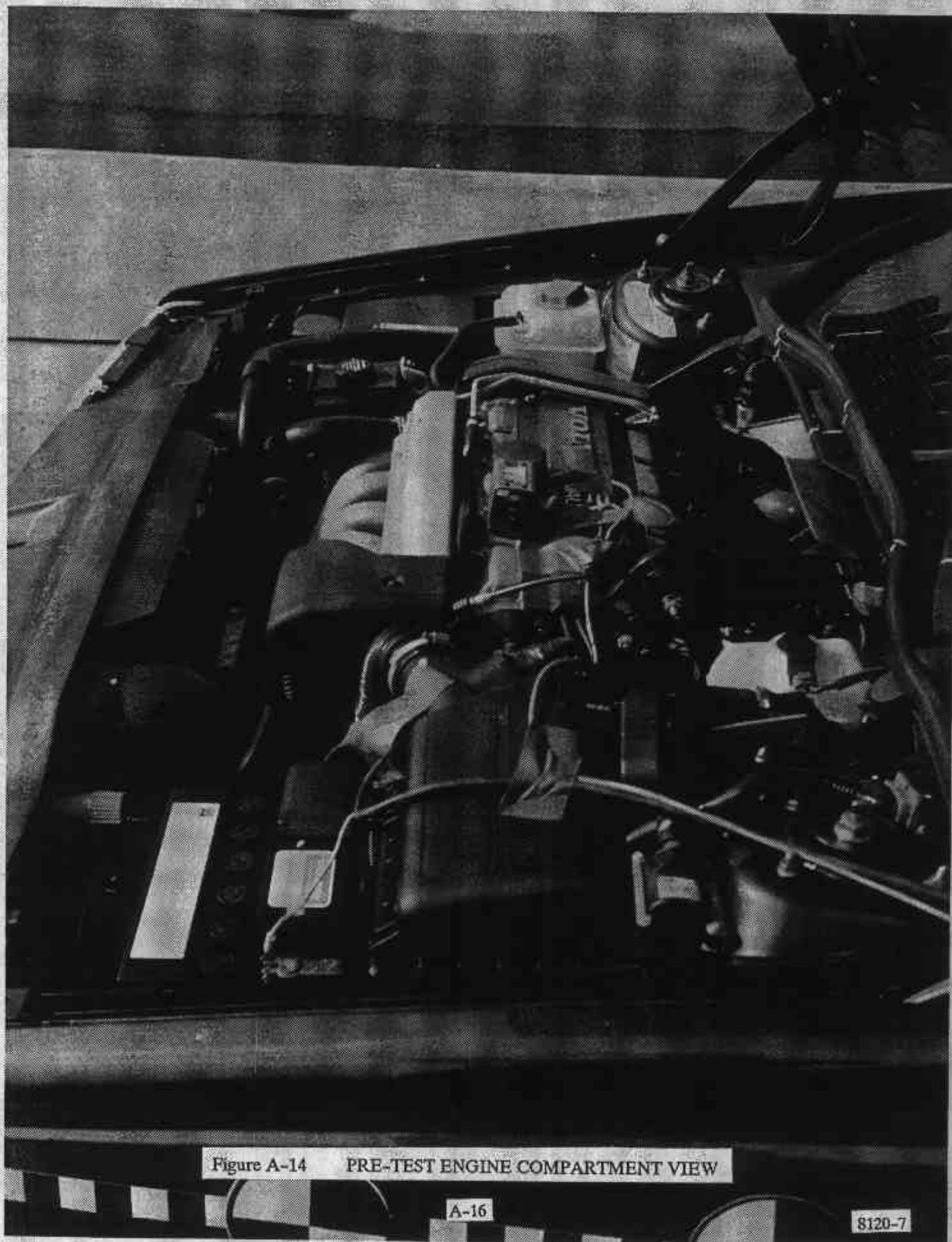


Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

A-16

8120-7

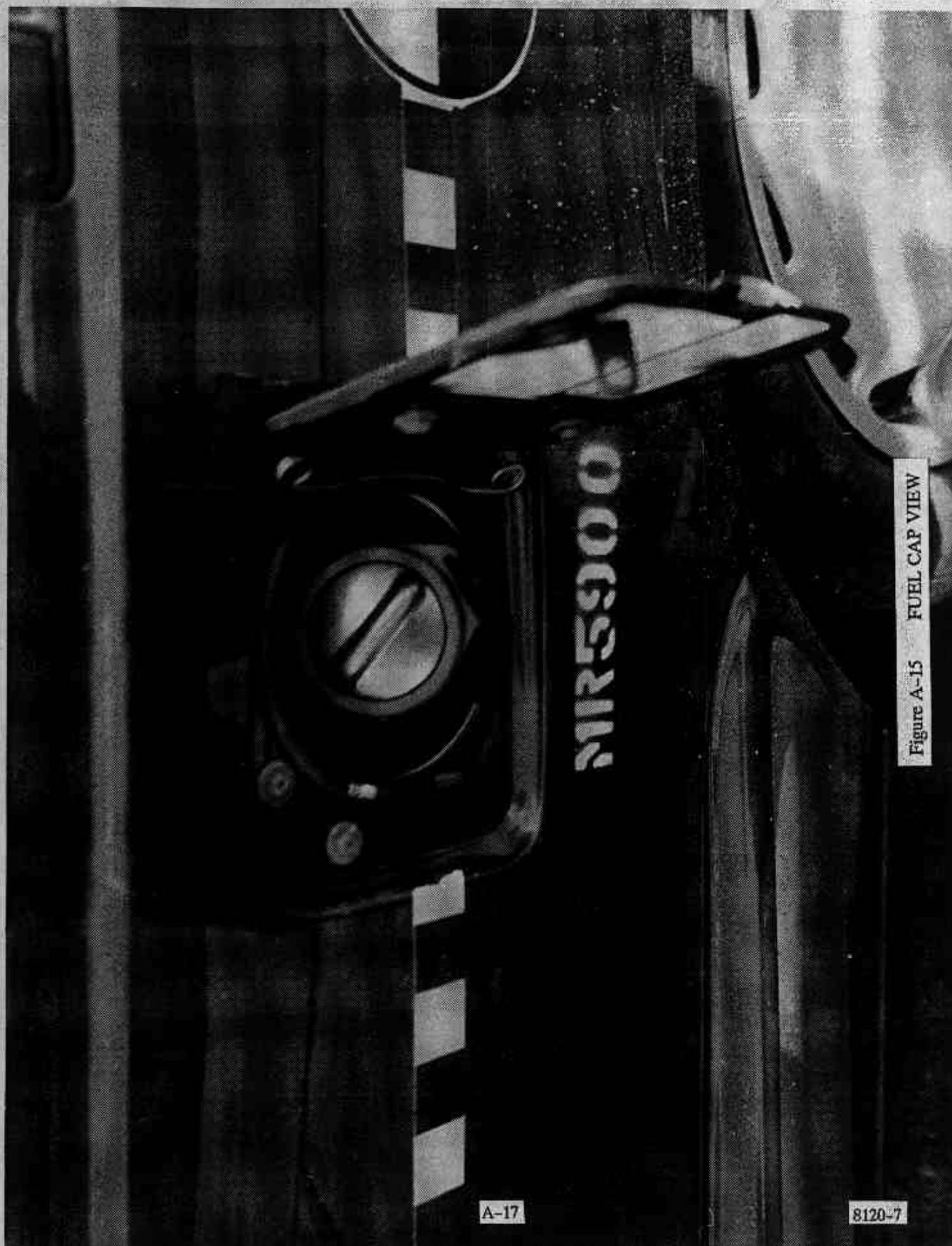


Figure A-15 FUEL CAP VIEW

A-17

8120-7

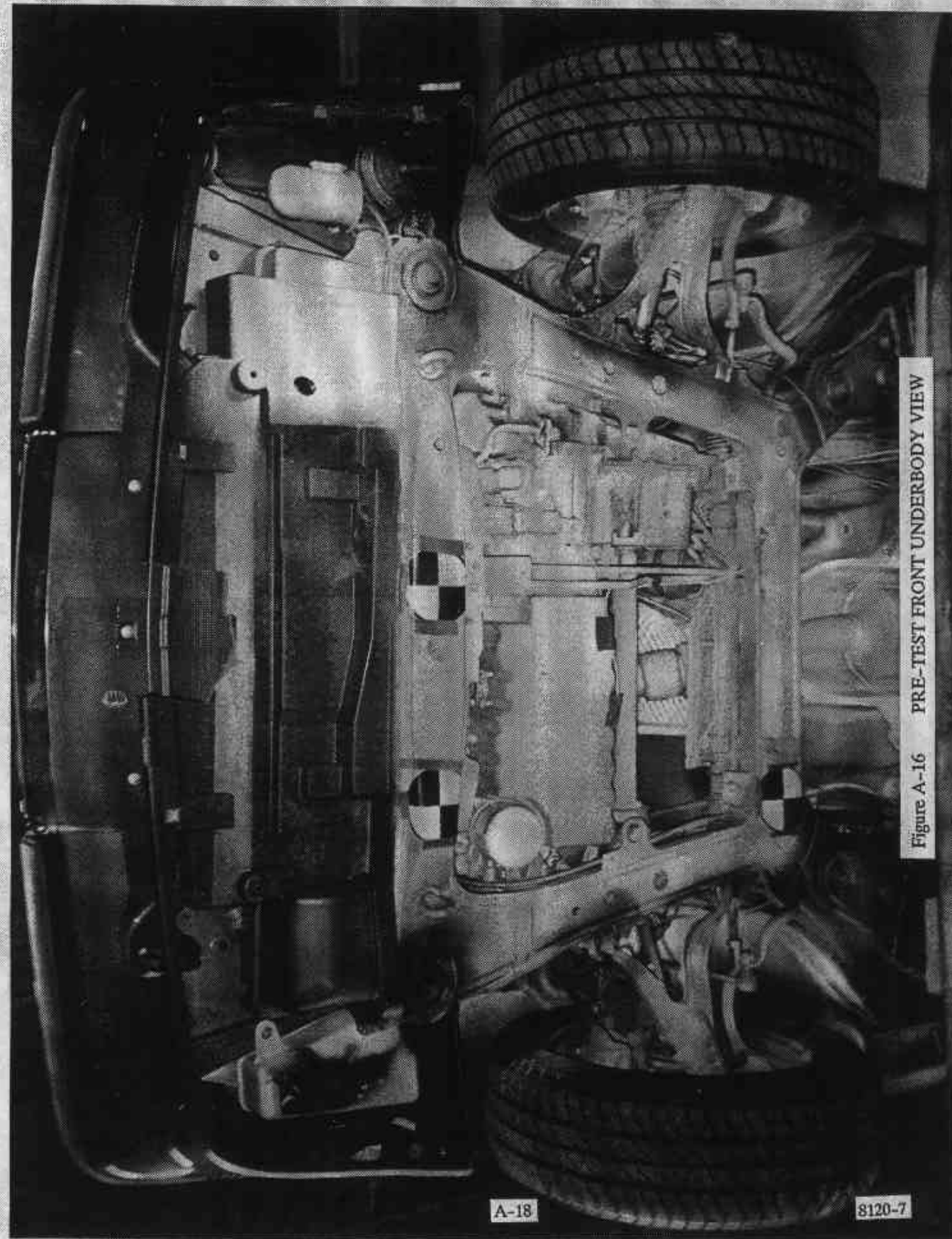


Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

A-18

8120-7

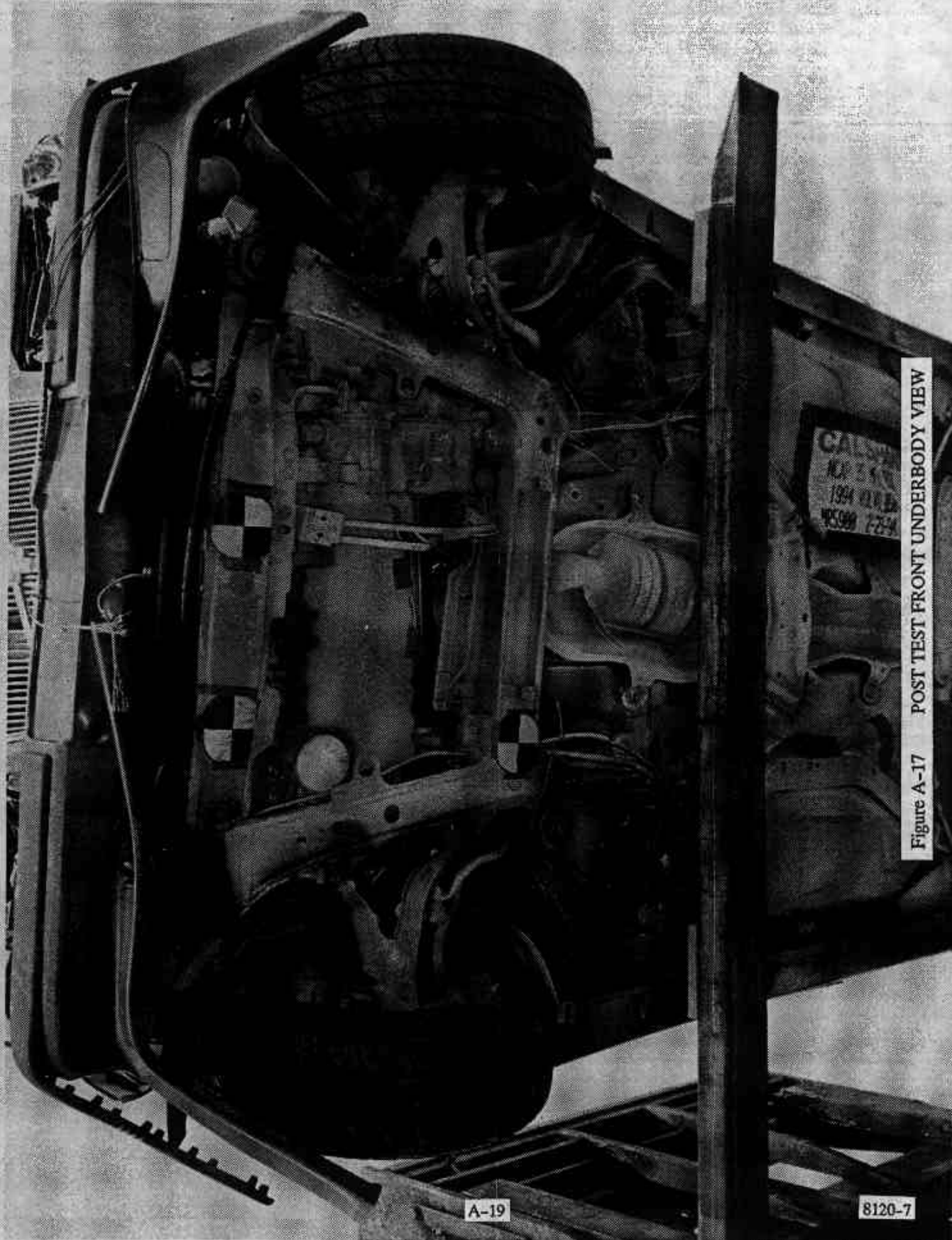


Figure A-17 POST TEST FRONT UNDERBODY VIEW

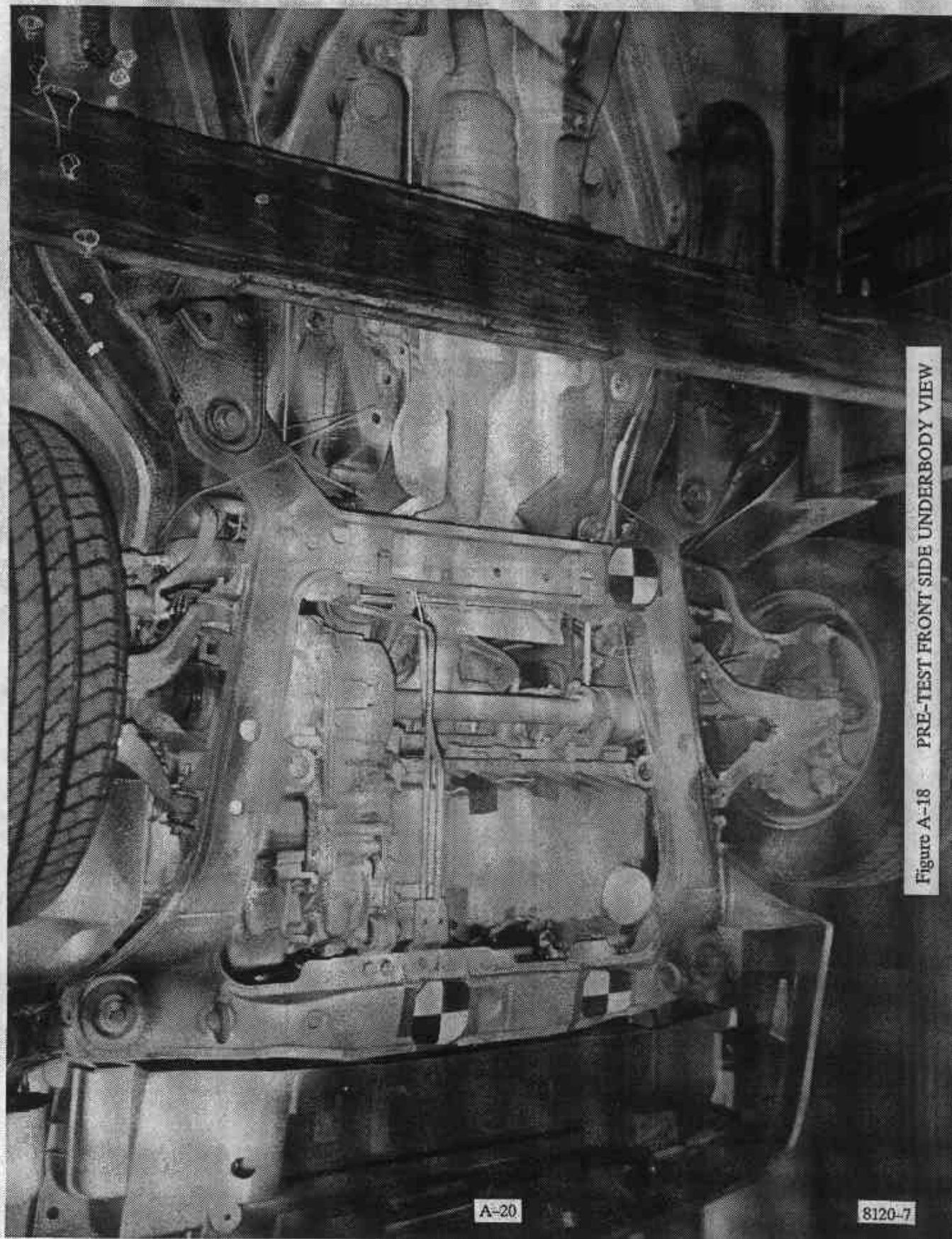
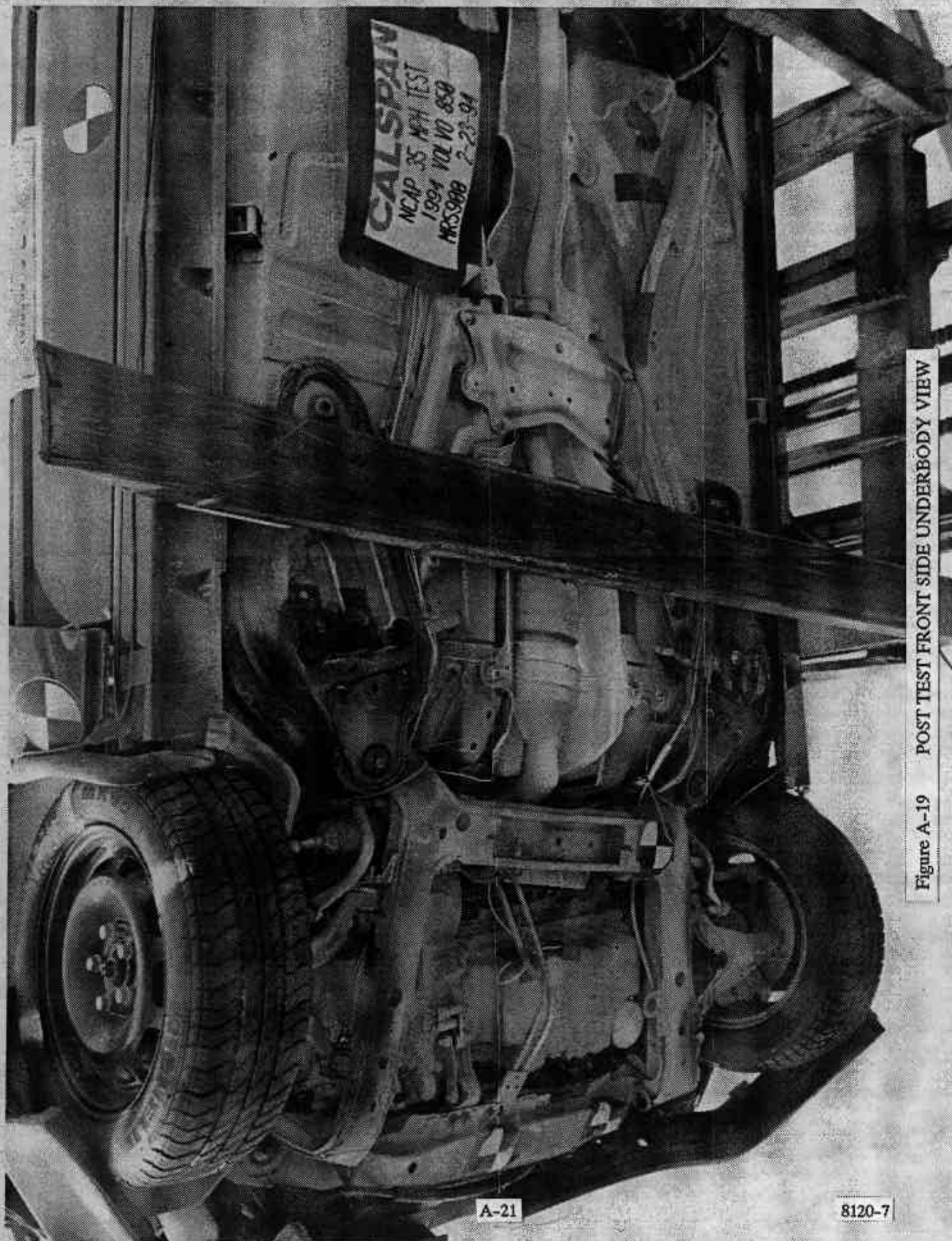


Figure A-18 PRE-TEST FRONT SIDE UNDERBODY VIEW

A-20

8120-7



CALSPAN
NCAP 35 MPH TEST
1994 VOLVO 850
MRS900 2-23-94

Figure A-19 POST TEST FRONT SIDE UNDERBODY VIEW

A-21

8120-7

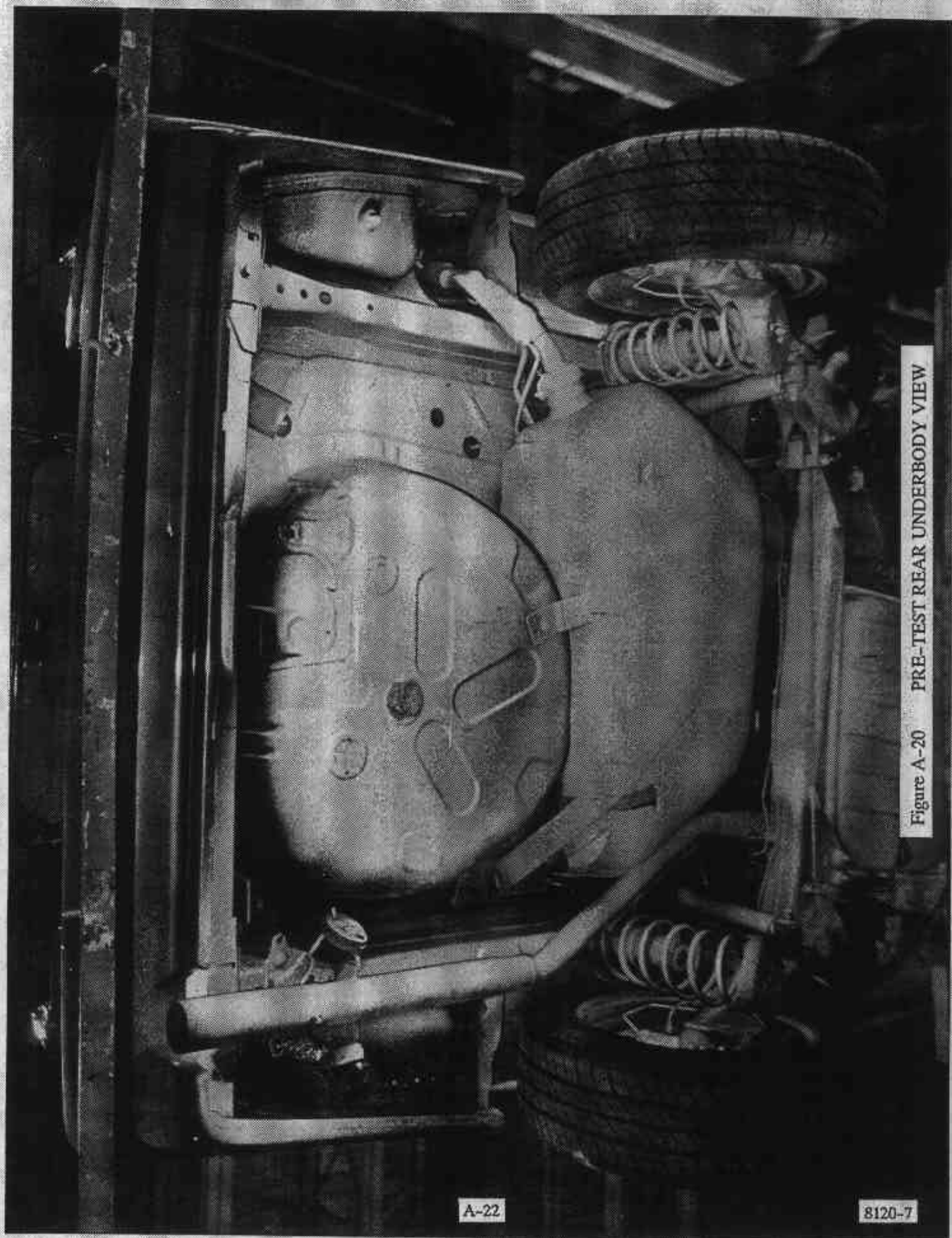


Figure A-20 PRE-TEST REAR UNDERBODY VIEW

A-22

8120-7

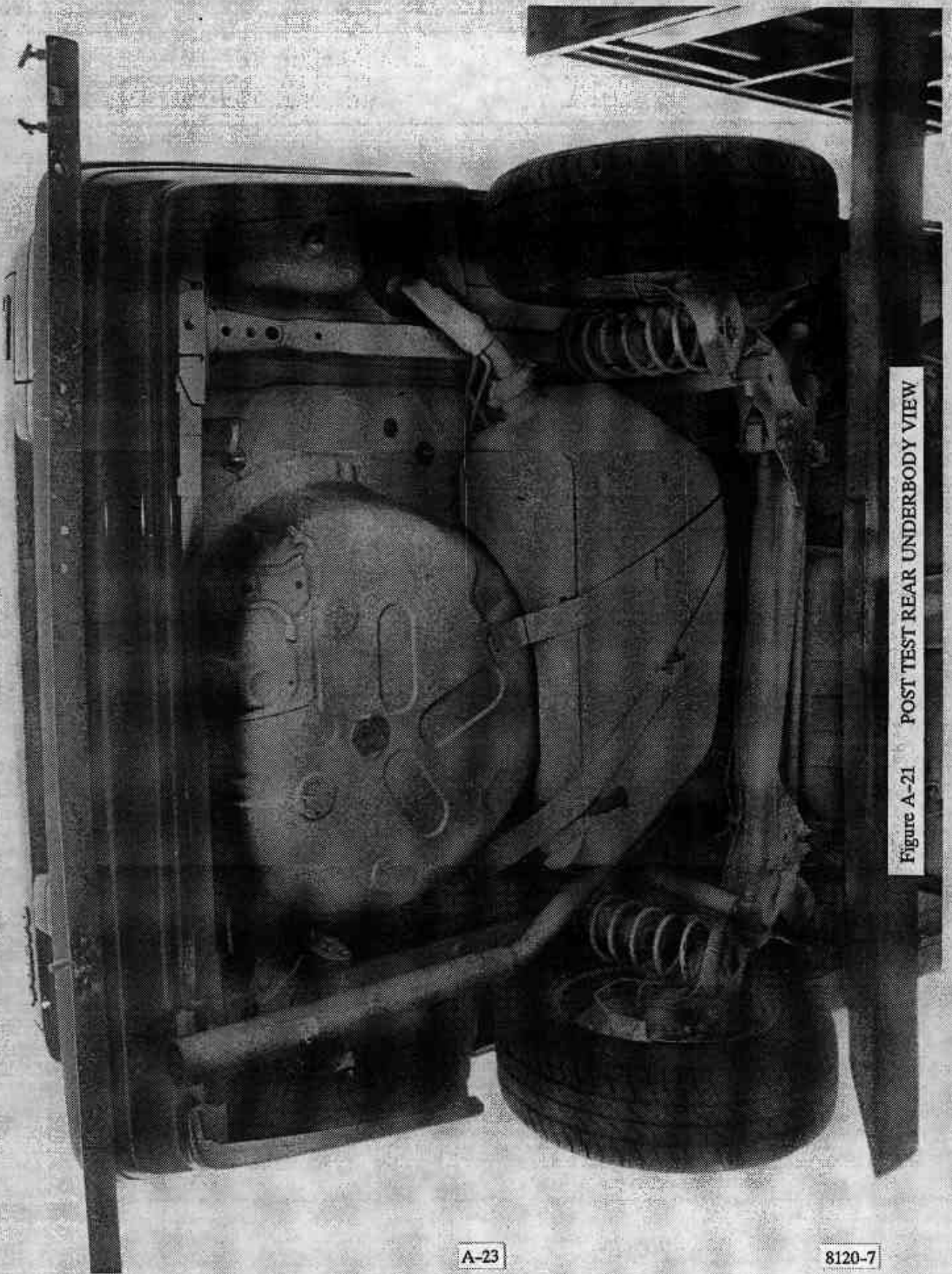


Figure A-21 POST TEST REAR UNDERBODY VIEW



Figure A-22 PRE-TEST DRIVER POSITION VIEW



Figure A-23 POST TEST DRIVER POSITION VIEW

A-25

8120-7

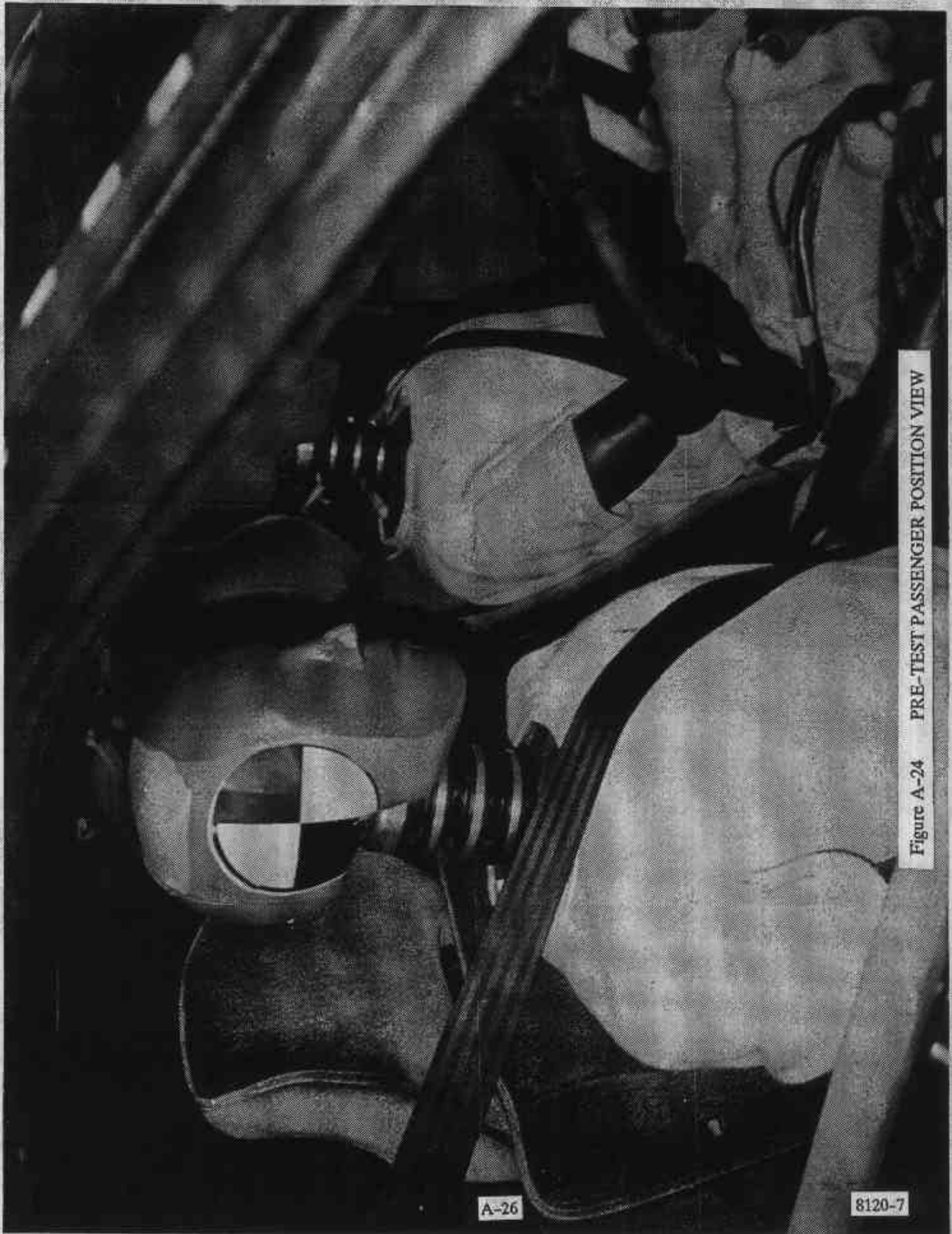


Figure A-24 PRE-TEST PASSENGER POSITION VIEW

A-26

8120-7

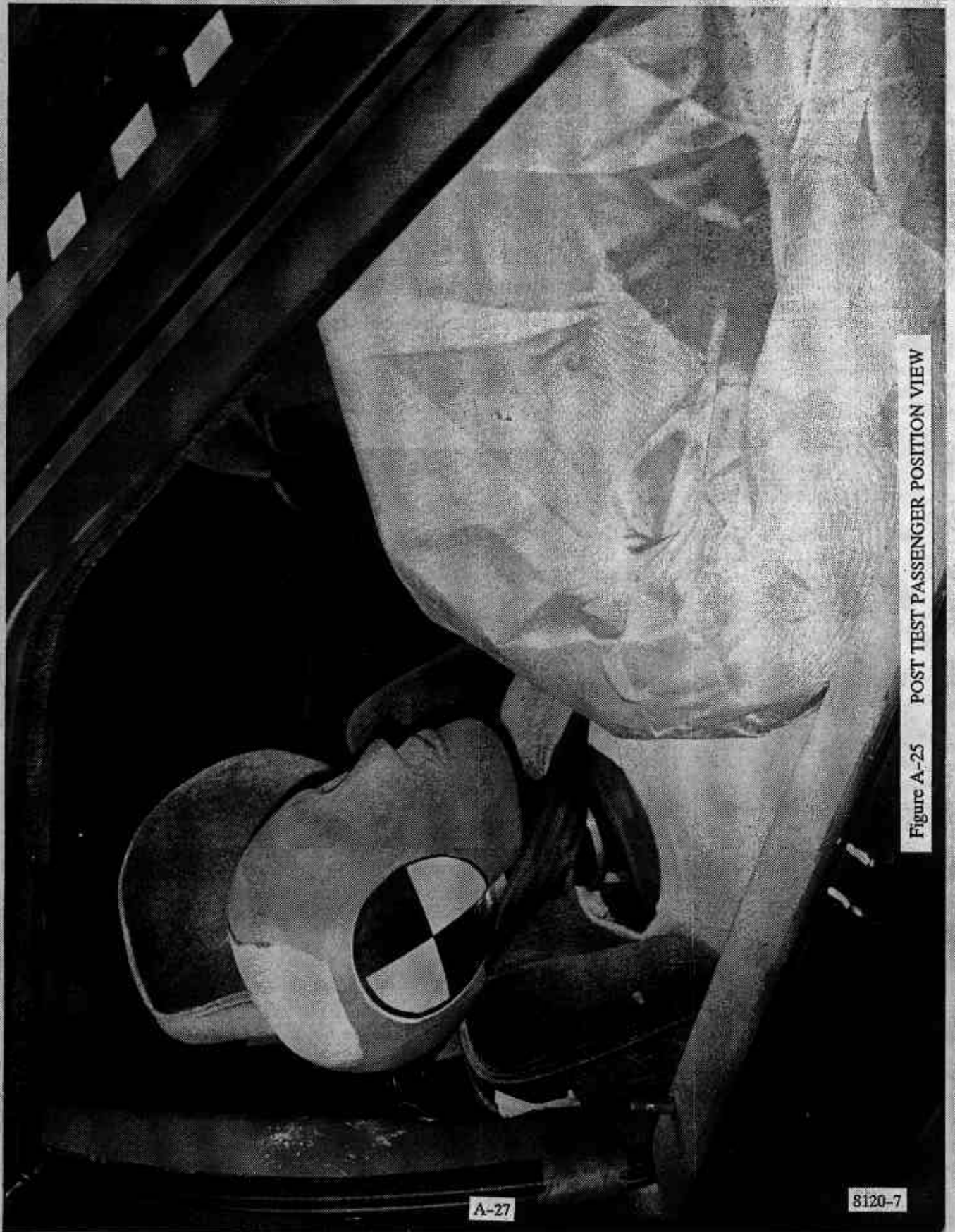


Figure A-25 POST TEST PASSENGER POSITION VIEW

A-27

8120-7



Figure A-26 PRE-TEST DRIVER AND INTERIOR VIEW

A-28

8120-7

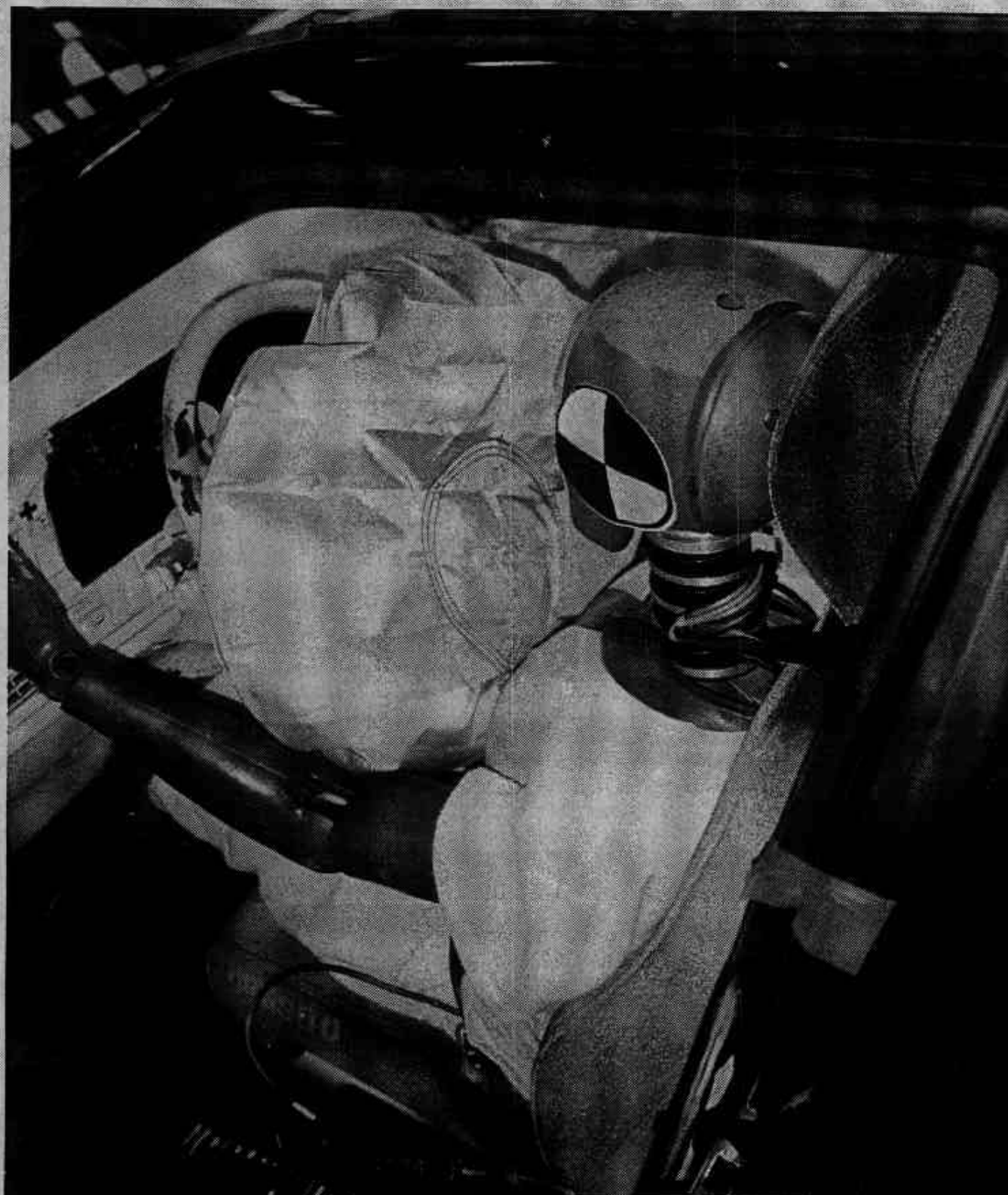


Figure A-27 POST TEST DRIVER AND INTERIOR VIEW

A-29

8120-7



Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW

A-30

8120-7

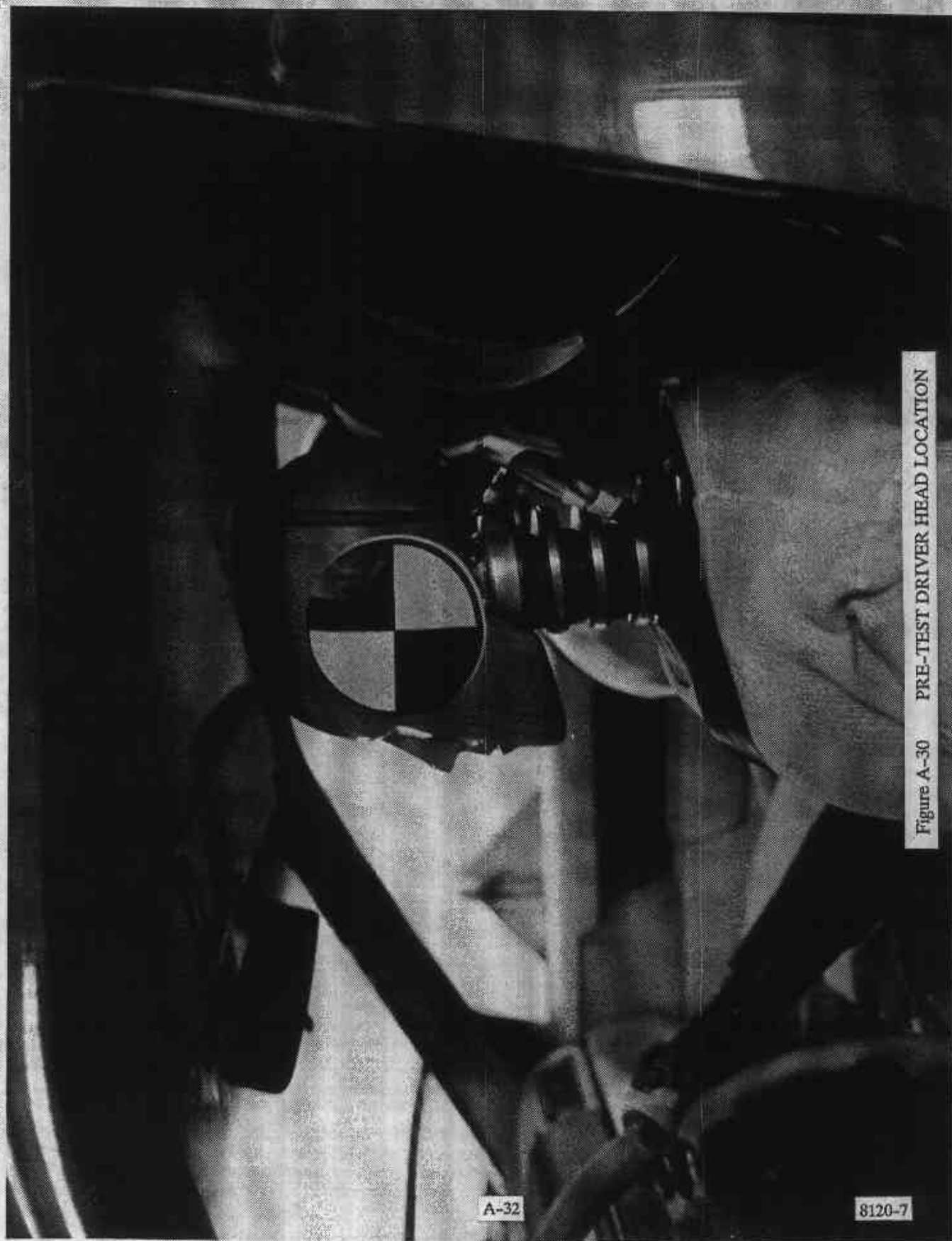


Figure A-29 POST TEST PASSENGER AND INTERIOR VIEW

A-31

8120-7

Figure A-30 PRE-TEST DRIVER HEAD LOCATION



A-32

8120-7

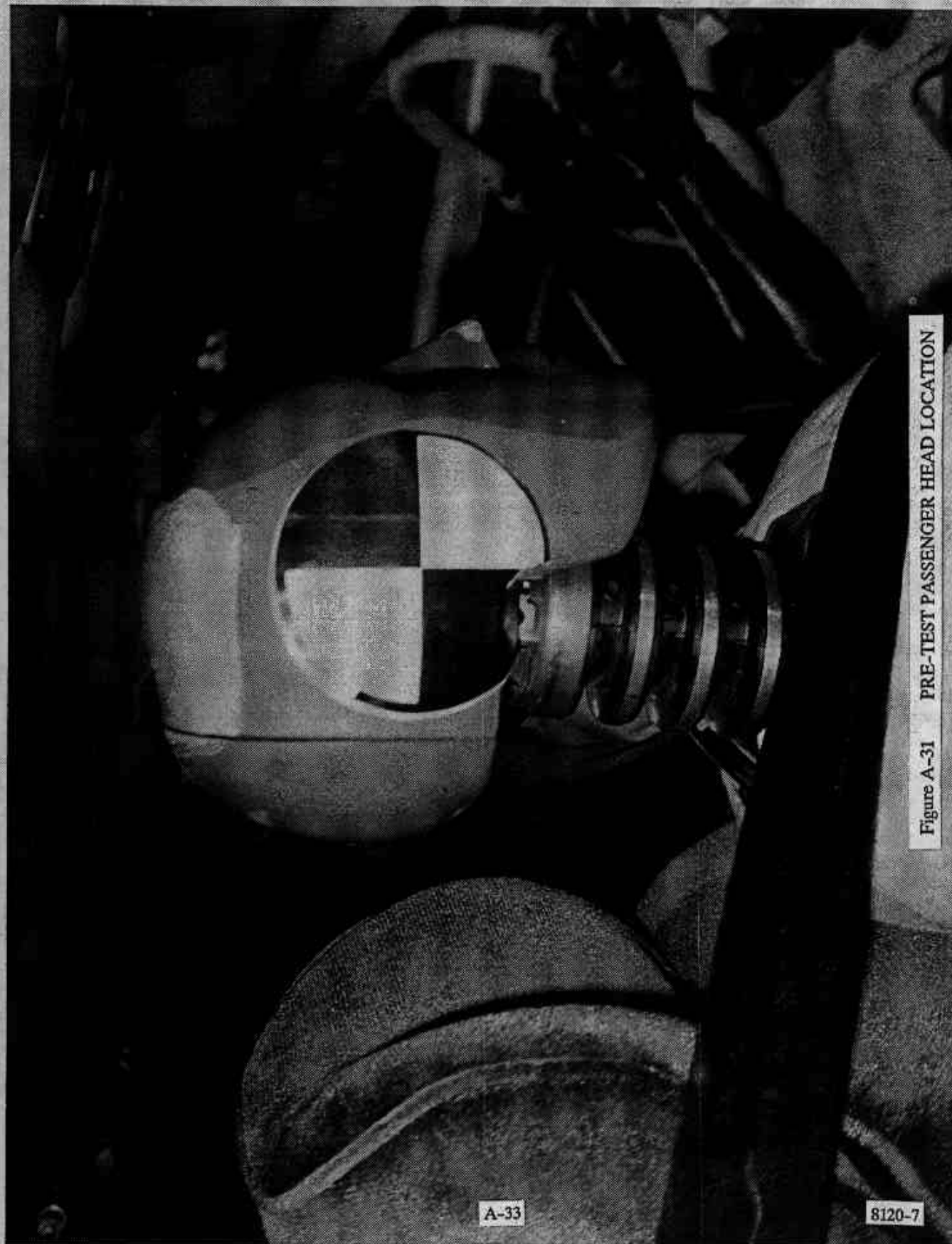


Figure A-31 PRE-TEST PASSENGER HEAD LOCATION

A-33

8120-7

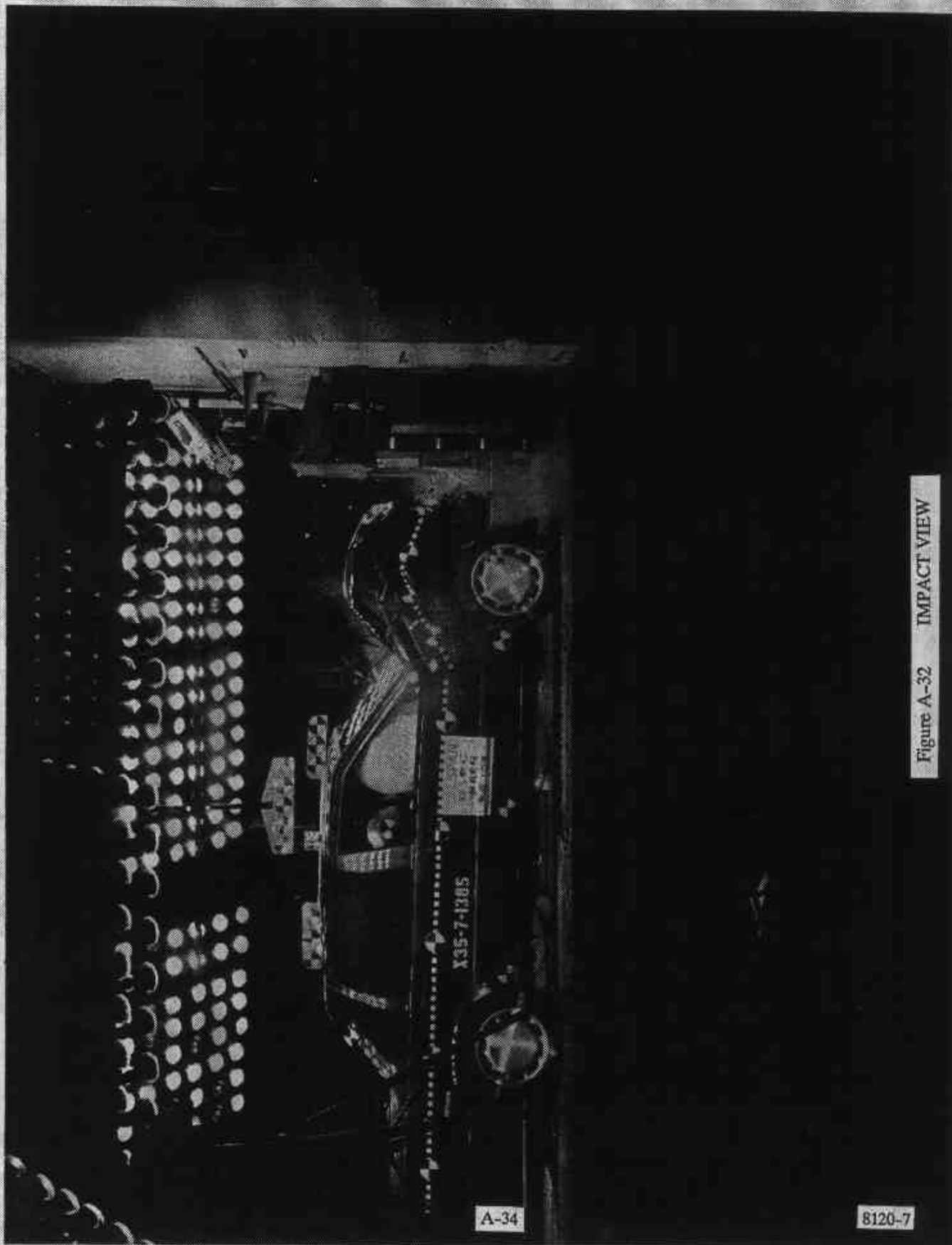


Figure A-32 IMPACT VIEW

A-34

8120-7

Appendix B

VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

TEST NO. MR5900

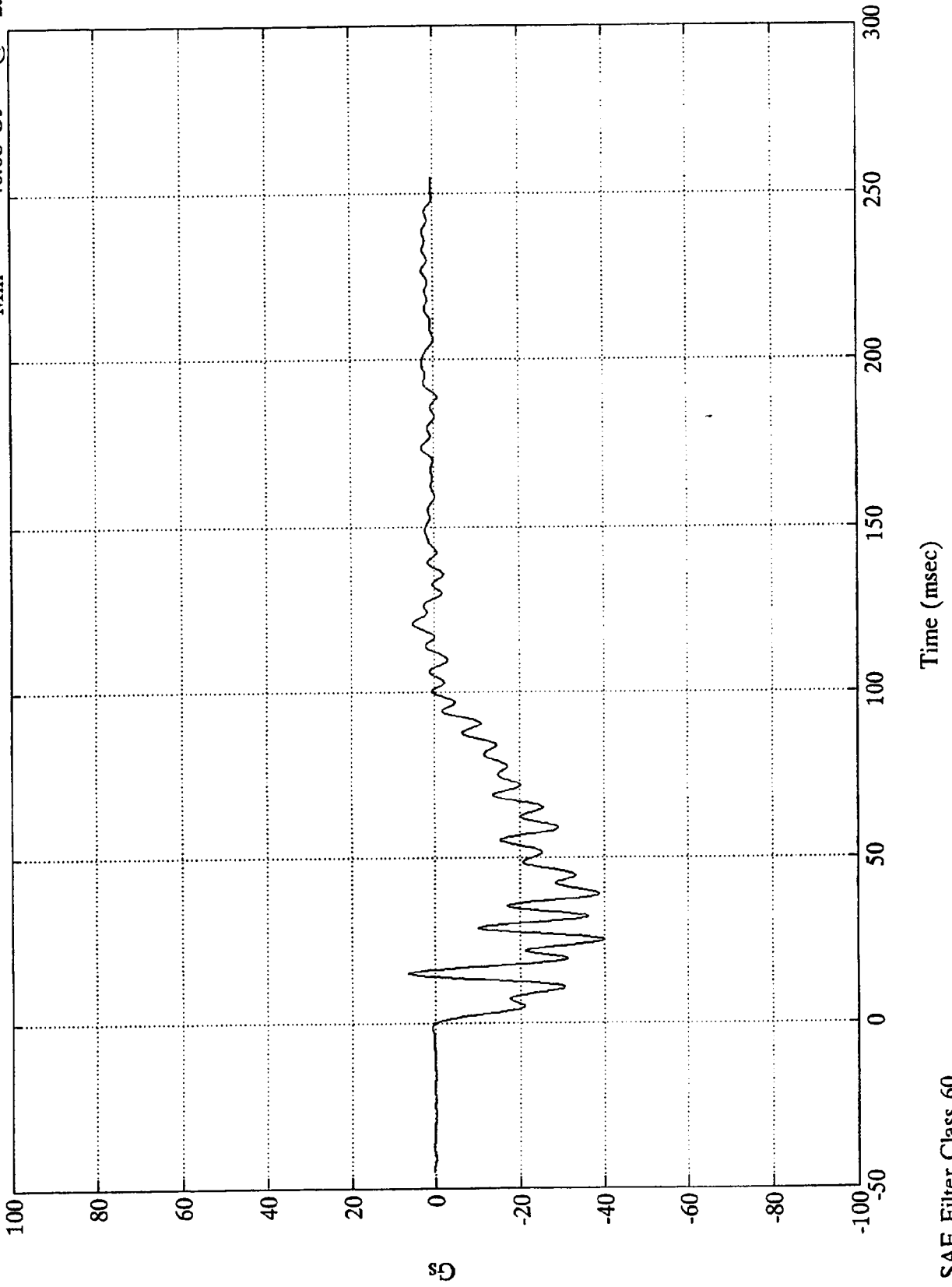
VEHICLE DATA

FILTER CHANNEL CLASS

60

NCAP TEST #7 - 1994 VOLVO 850

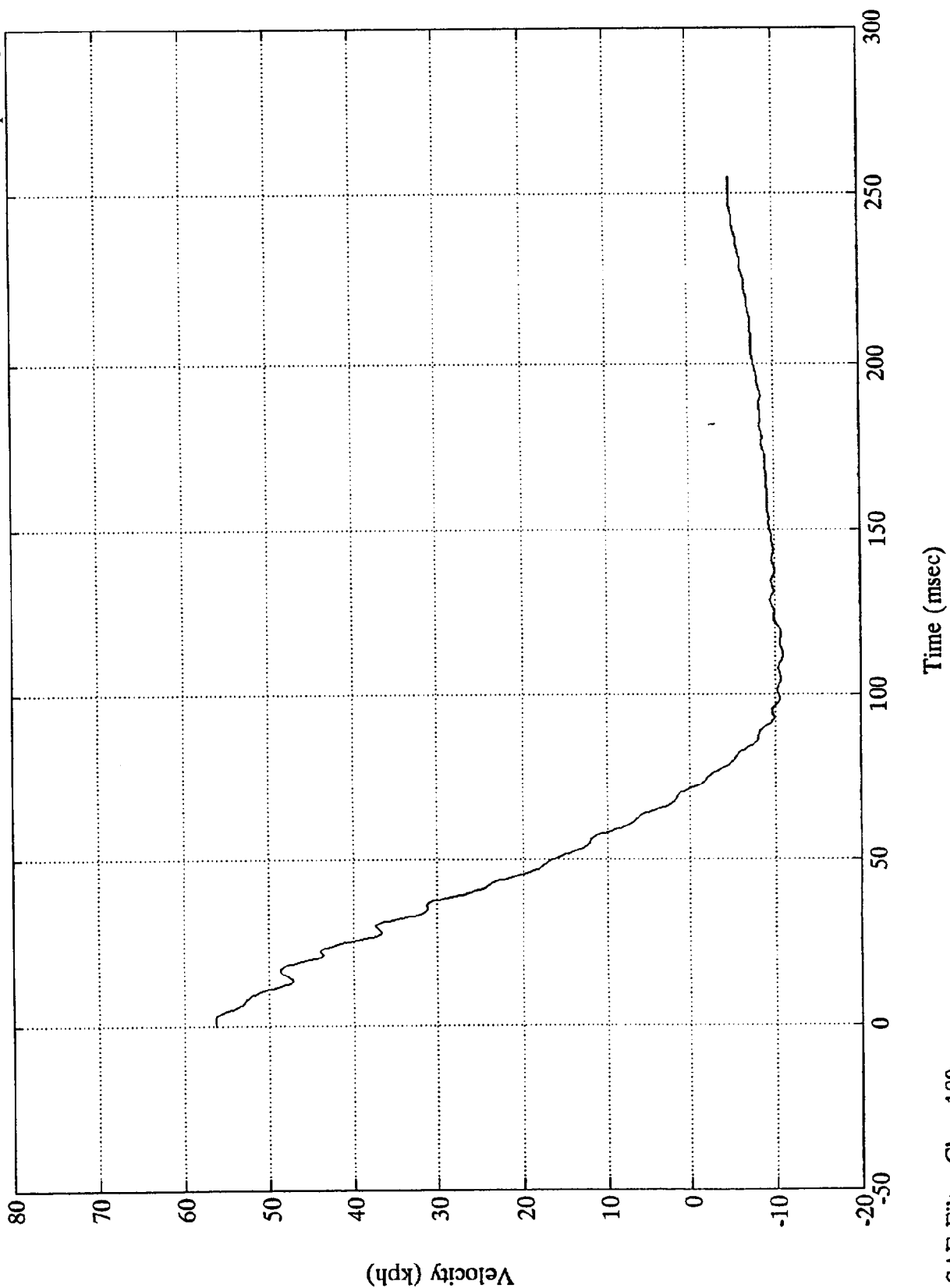
Acc. #1(x) Max = 6.50 Gs @ 15.11 msec
Min = -40.08 Gs @ 25.20 msec



NCAP TEST #7 - 1994 VOLVO 850

Max = 56.33 kph @ 1.43 msec
Min = -10.96 kph @ 112.44 msec

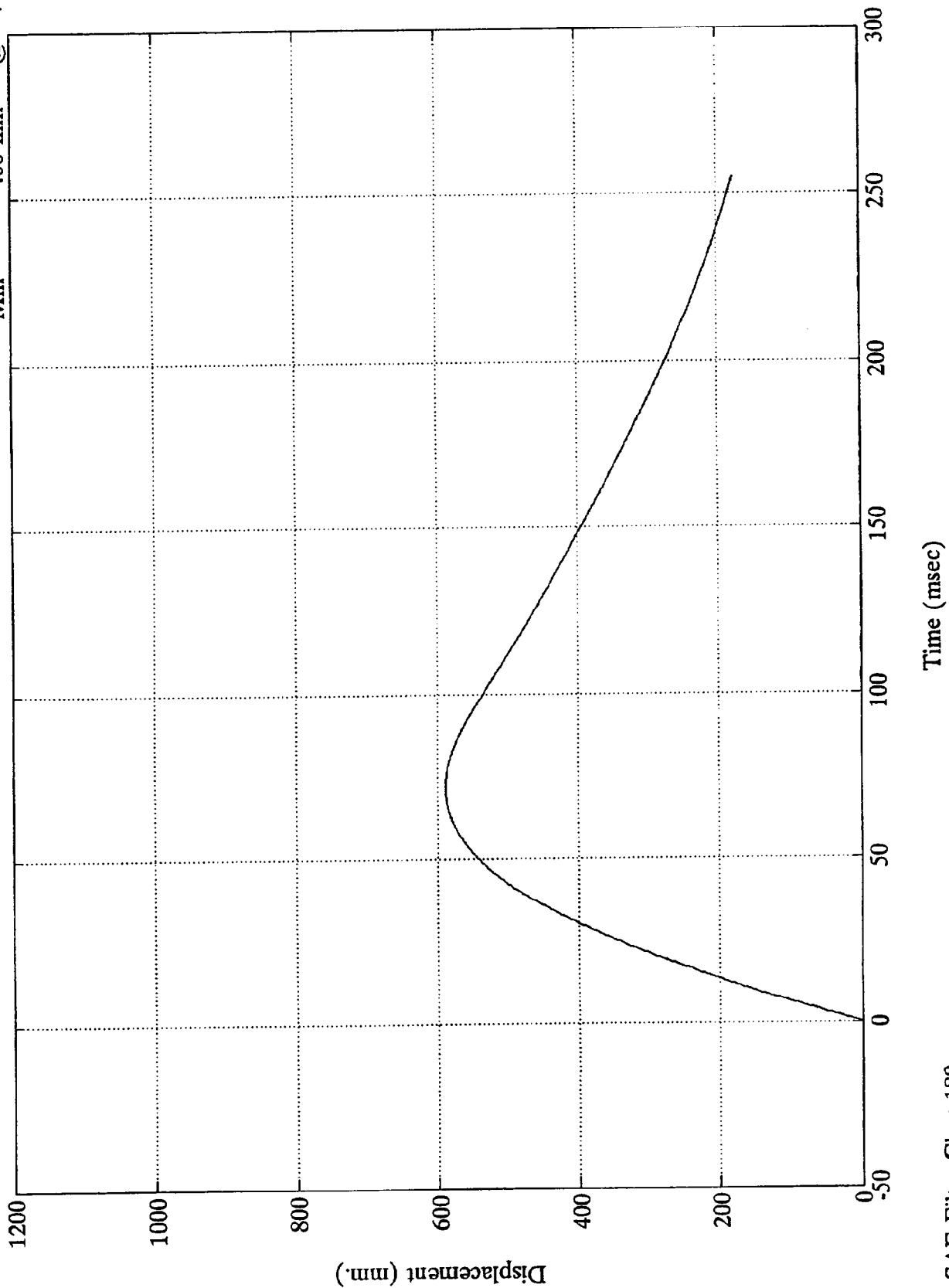
Acc. #1(x)



SAE Filter Class 180

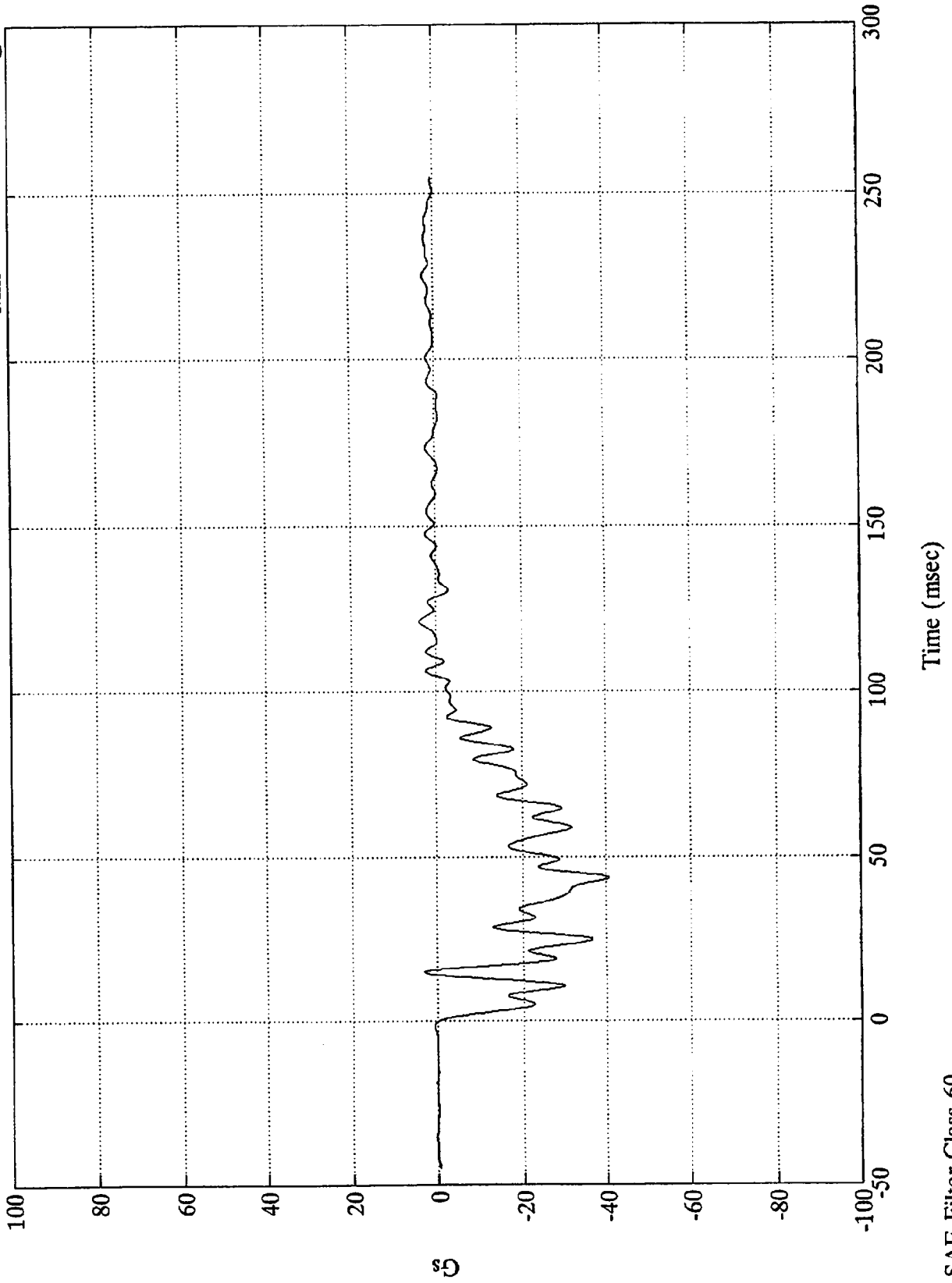
NCAP TEST #7 - 1994 VOLVO 850

Acc. #1(x) Max = 589.61 mm @ 71.52 msec
Min = .00 mm @ -44.88 msec



NCAP TEST #7 - 1994 VOLVO 850

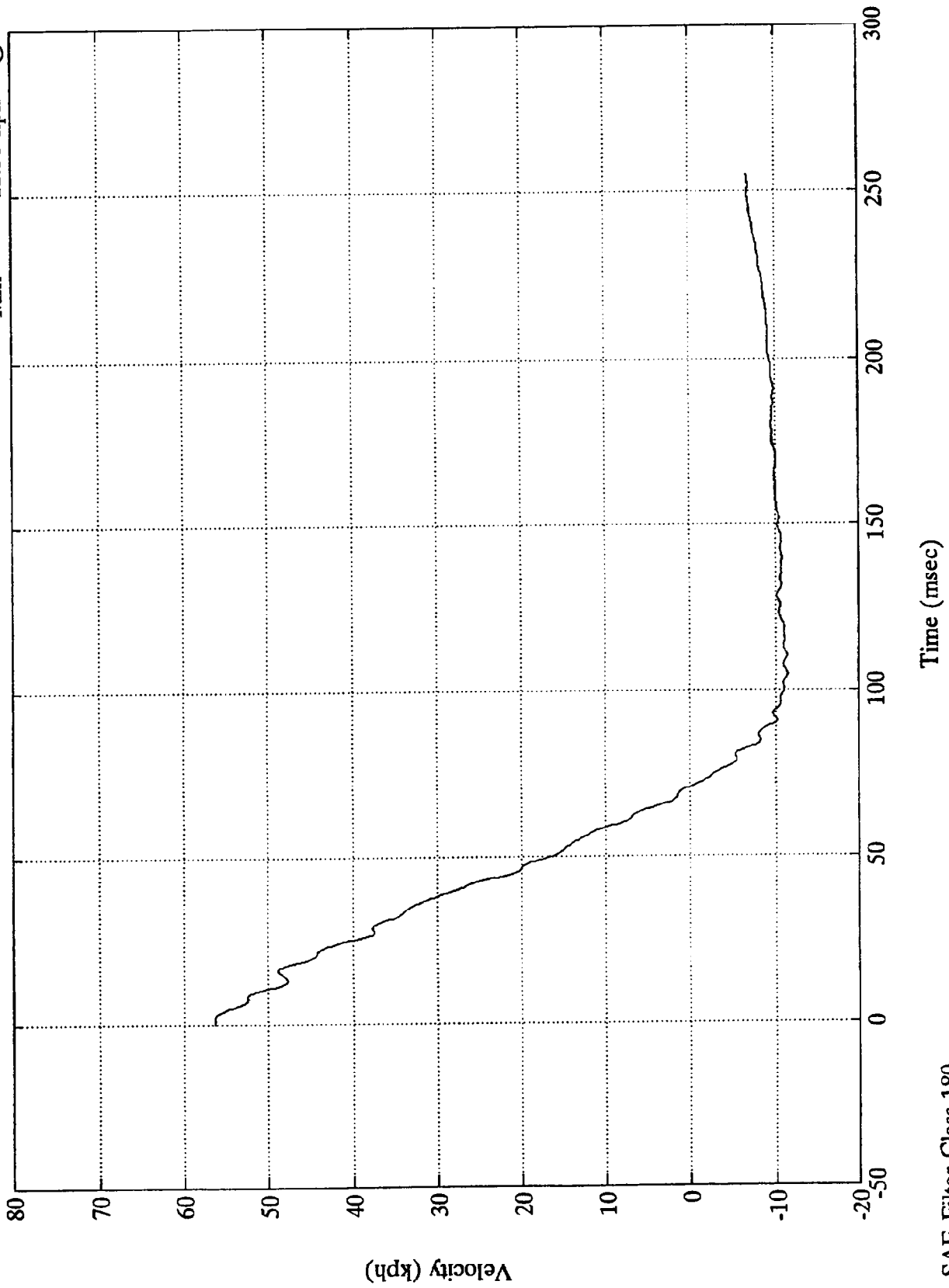
Acc. #2(x) Max = 3.98 Gs @ 120.96 msec
Min = -40.80 Gs @ 43.56 msec



SAE Filter Class 60

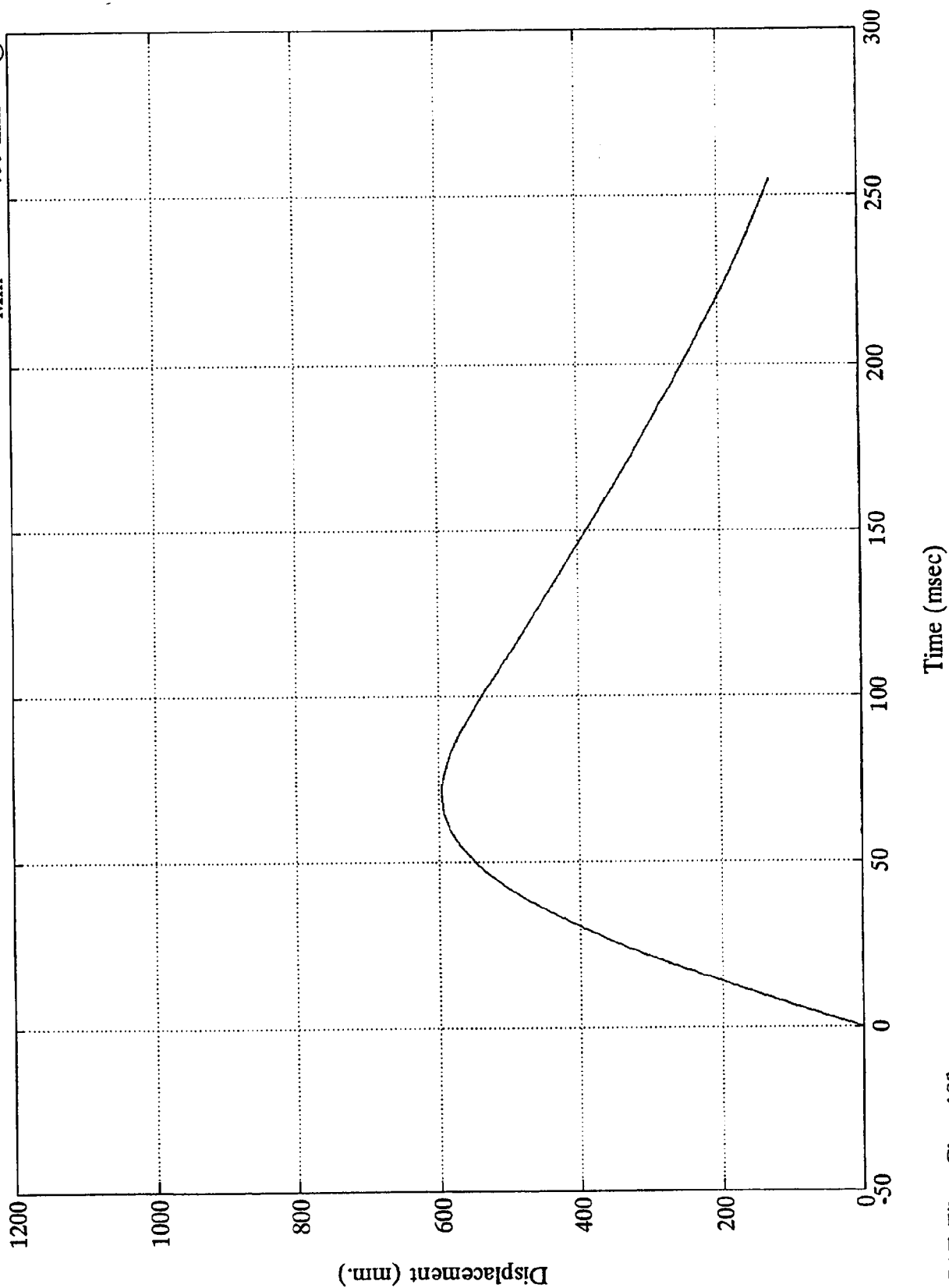
NCAP TEST #7 - 1994 VOLVO 850

Acc. #2(x)
Max = 56.33 kph @ -0.00 msec
Min = -11.56 kph @ 104.88 msec



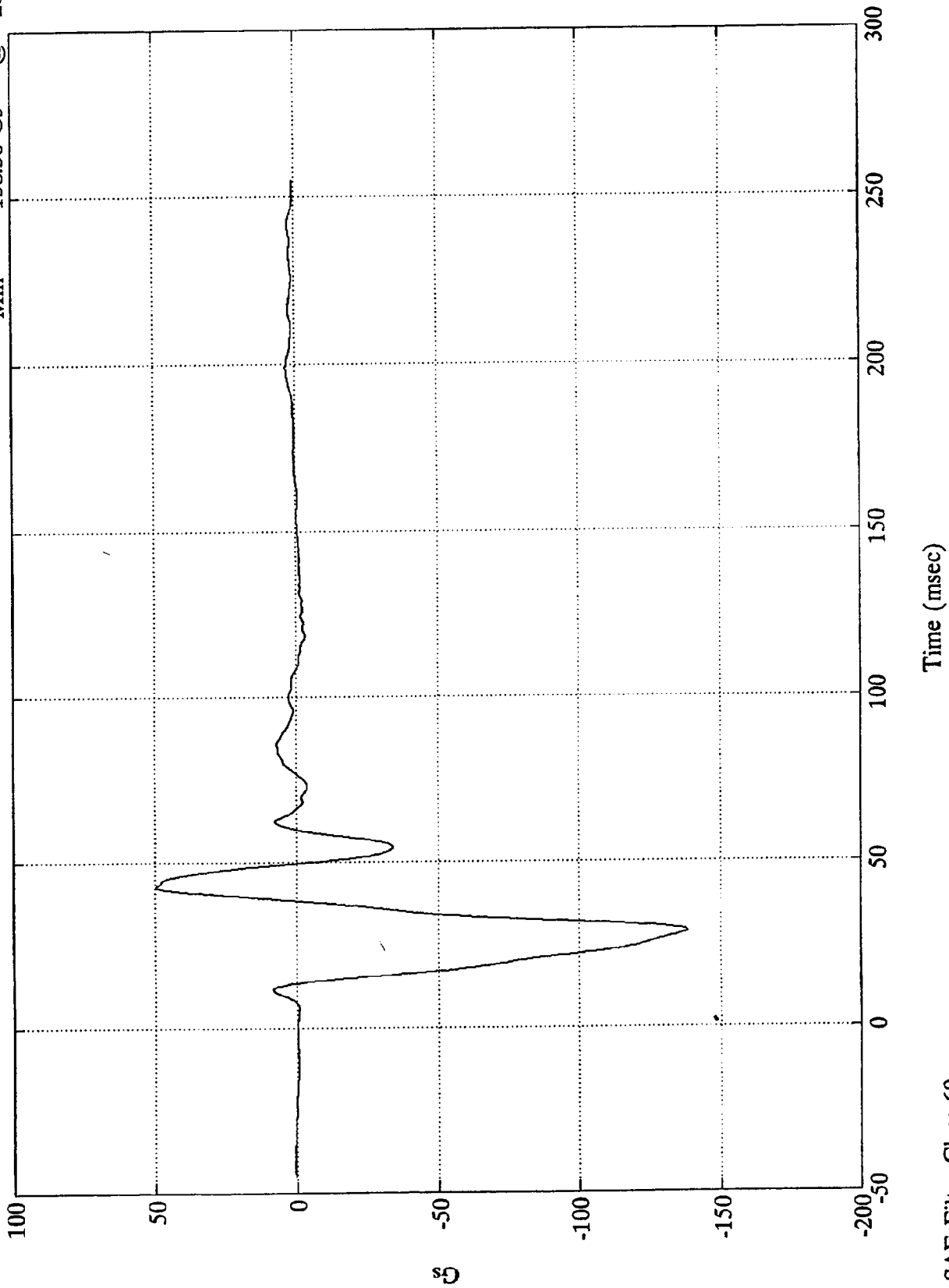
NCAP TEST #7 - 1994 VOLVO 850

Acc. #2(x) Max = 596.27 mm @ 70.92 msec
Min = .00 mm @ -44.88 msec



NCAP TEST #7 - 1994 VOLVO 850

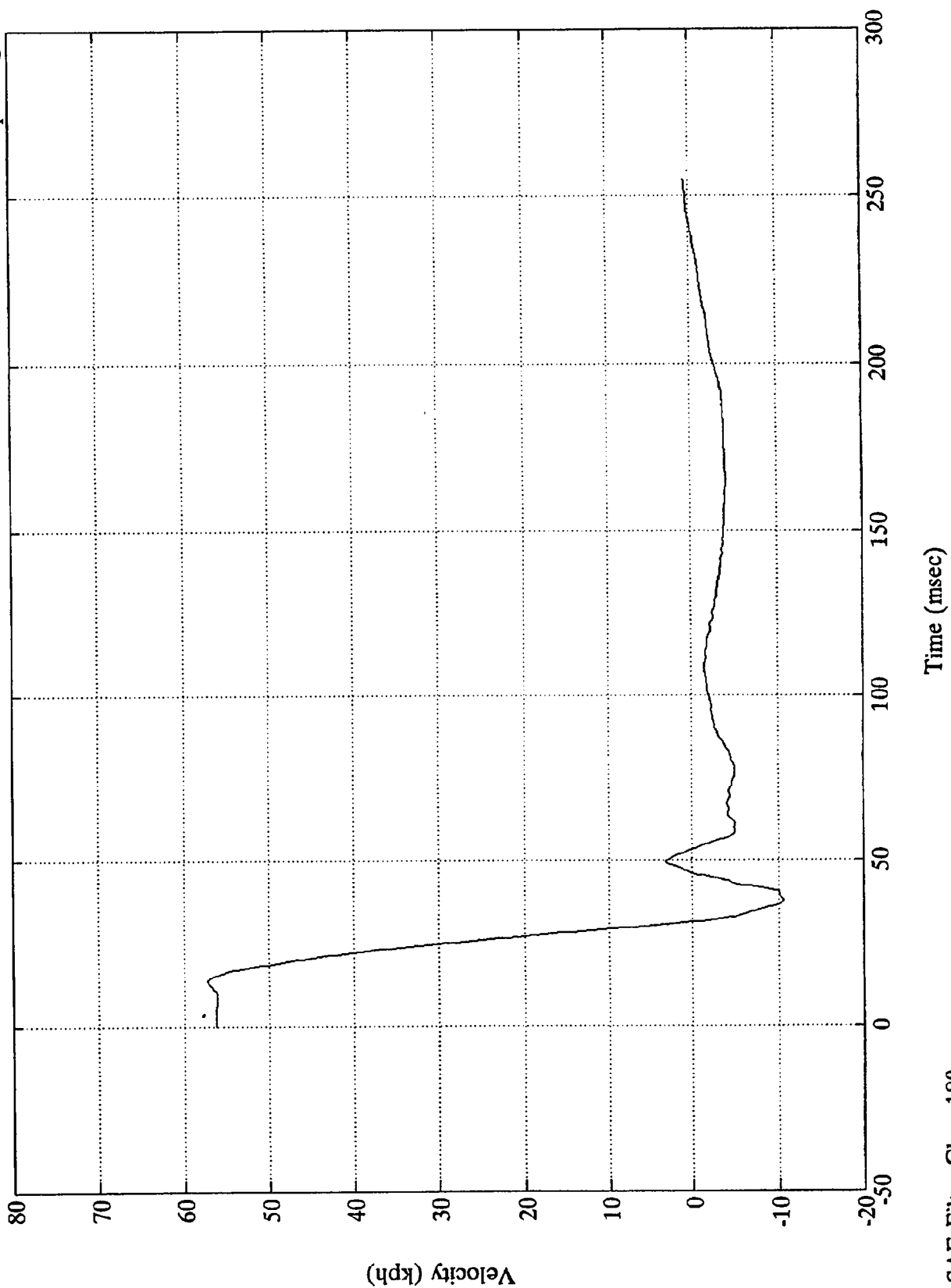
Acc. #3(x) Max = 49.66 Gs @ 42.47 msec
Min = -138.30 Gs @ 28.79 msec



NCAP TEST #7 - 1994 VOLVO 850

Max = 57.30 kph @ 13.55 msec
Min = -10.63 kph @ 37.68 msec

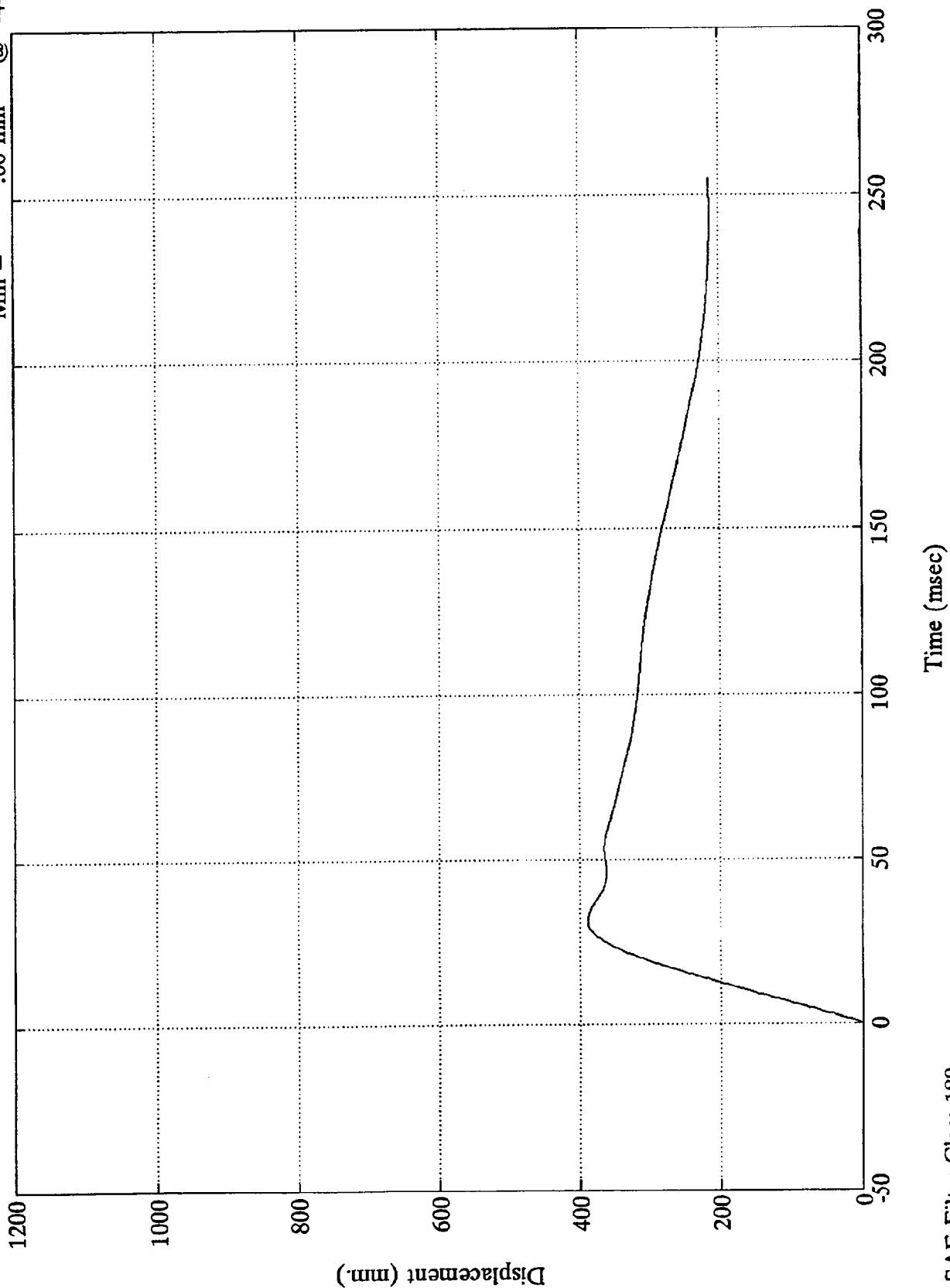
Acc. #3(x)



NCAP TEST #7 - 1994 VOLVO 850

Max = 388.54 mm @ 31.20 msec
Min = .00 mm @ -44.88 msec

Acc. #3(x)

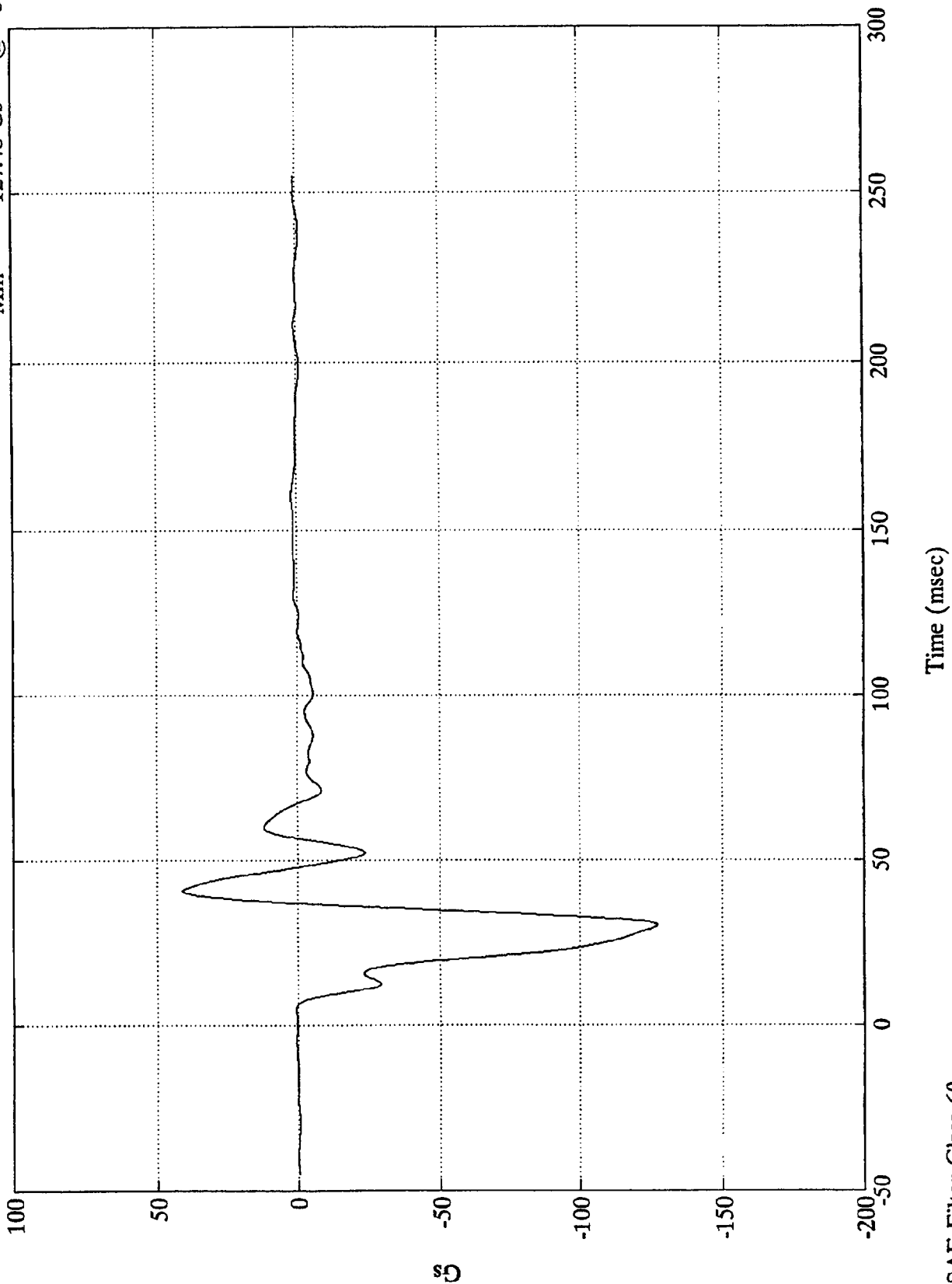


SAE Filter Class 180

NCAP TEST #7 - 1994 VOLVO 850

Acc. #4(x)

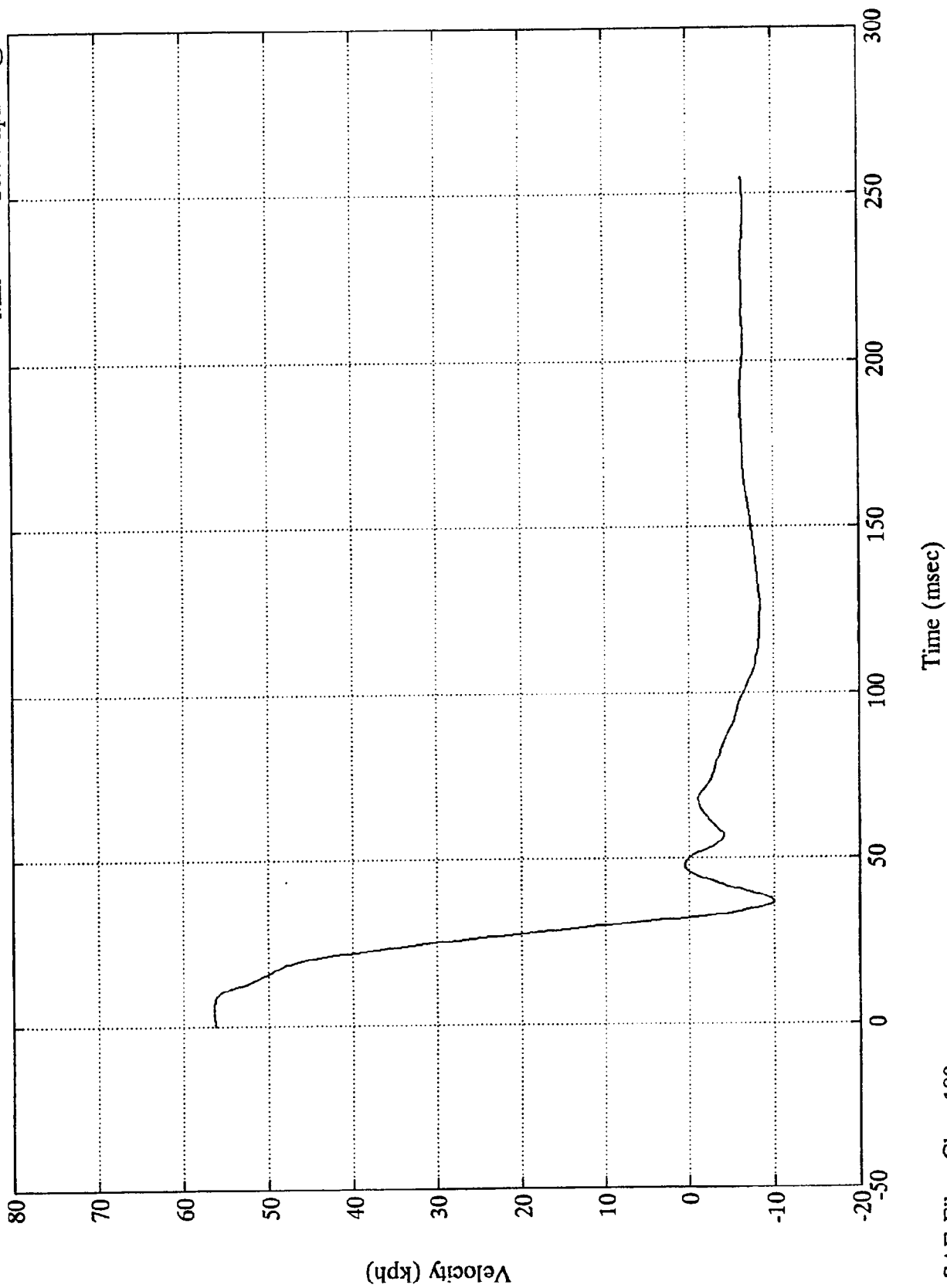
Max = 40.91 Gs @ 40.56 msec
Min = -127.48 Gs @ 30.12 msec



SAE Filter Class 60

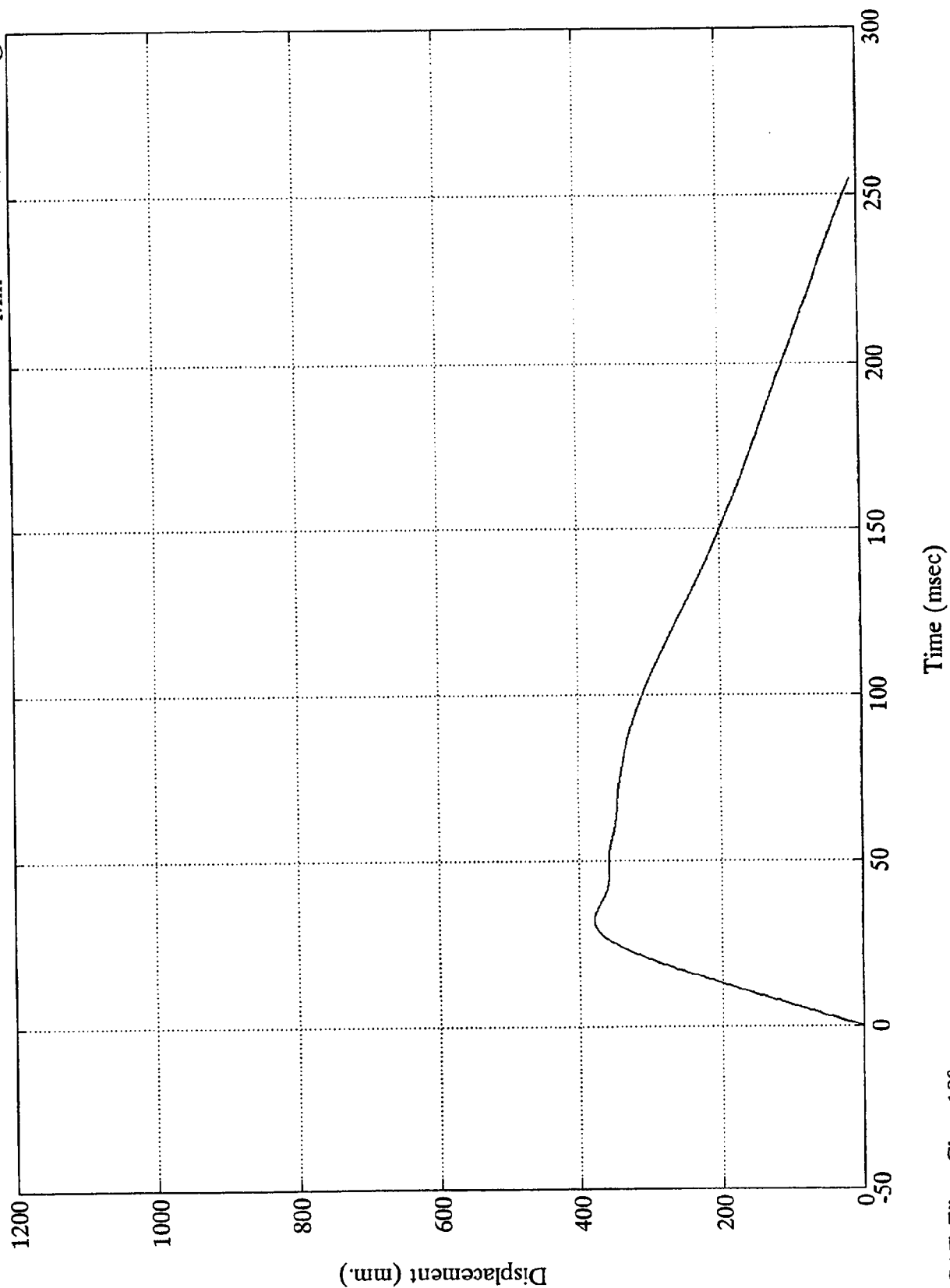
NCAP TEST #7 - 1994 VOLVO 850

Acc. #4(x) Max = 56.37 kph @ 4.67 msec
Min = -10.04 kph @ 36.60 msec



NCAP TEST #7 - 1994 VOLVO 850

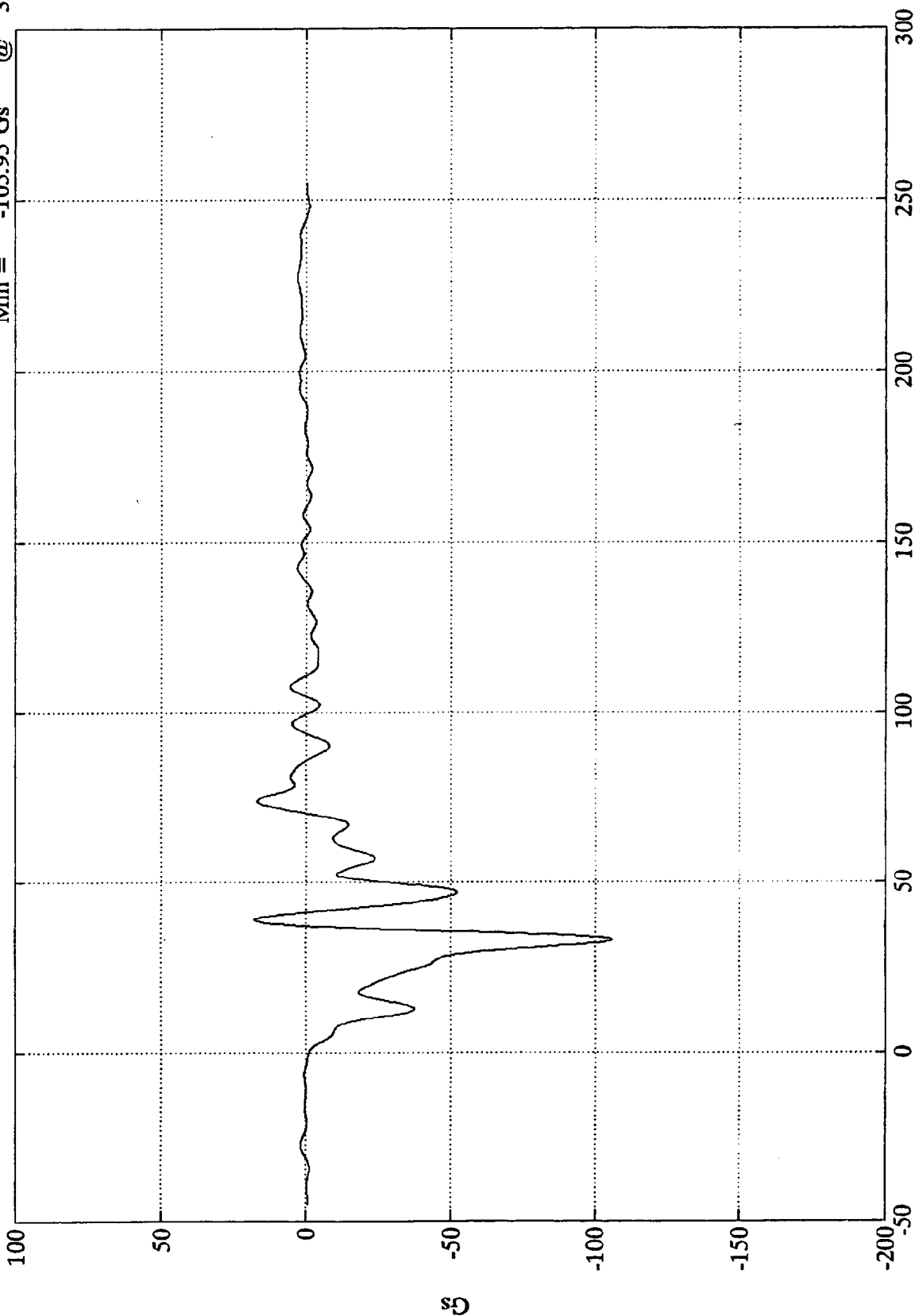
Acc. #4(x) Max = 379.27 mm @ 31.80 msec
Min = .00 mm @ -44.88 msec



NCAP TEST #7 - 1994 VOLVO 850

Acc. #5(x)

Max = 18.04 Gs @ 38.88 msec
Min = -105.95 Gs @ 32.88 msec



Time (msec)

SAE Filter Class 60

Gs

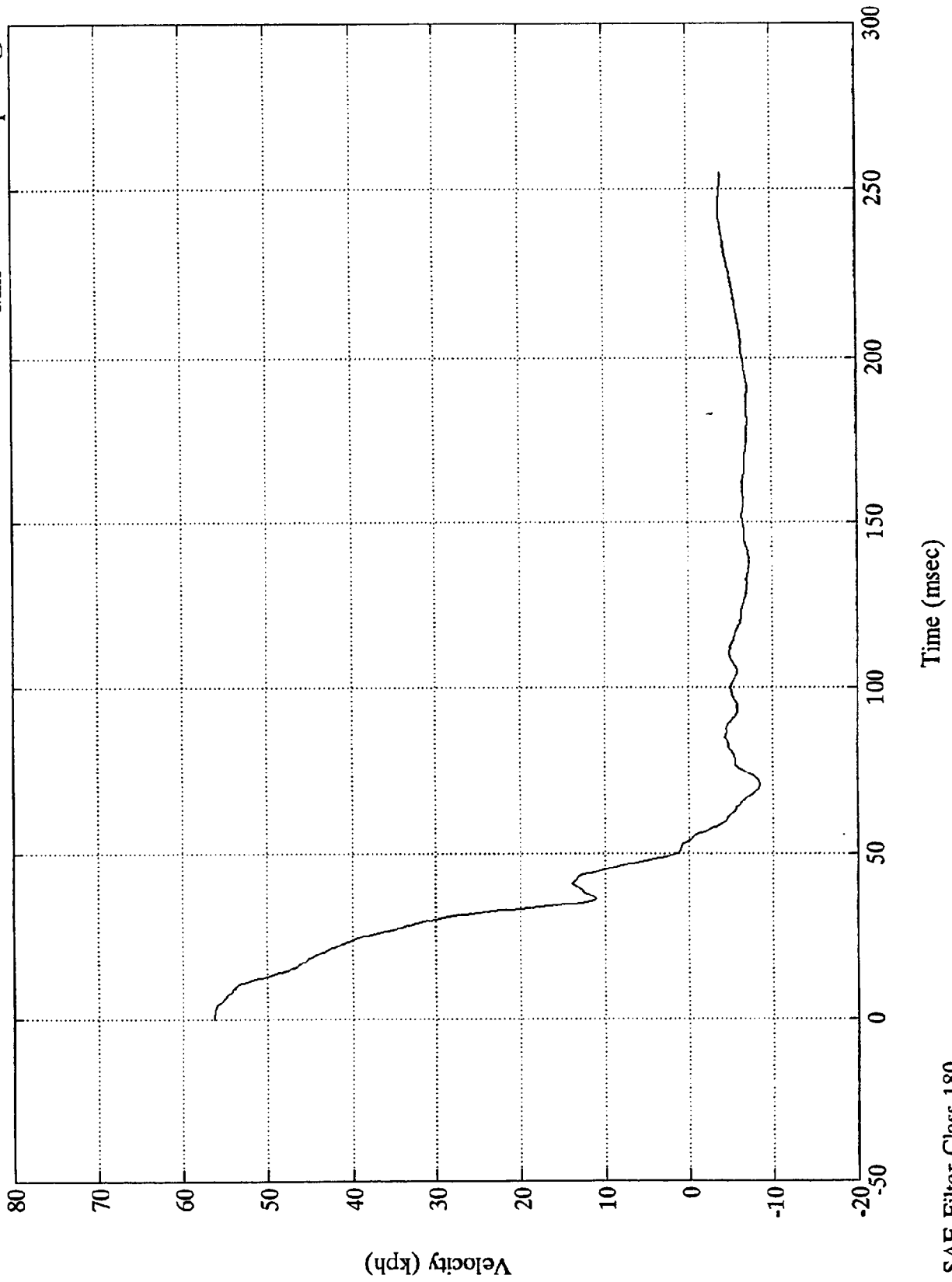
B-15

8120-7

NCAP TEST #7 - 1994 VOLVO 850

Max = 56.33 kph @ -0.00 msec
Min = -8.44 kph @ 70.56 msec

Acc. #5(x)

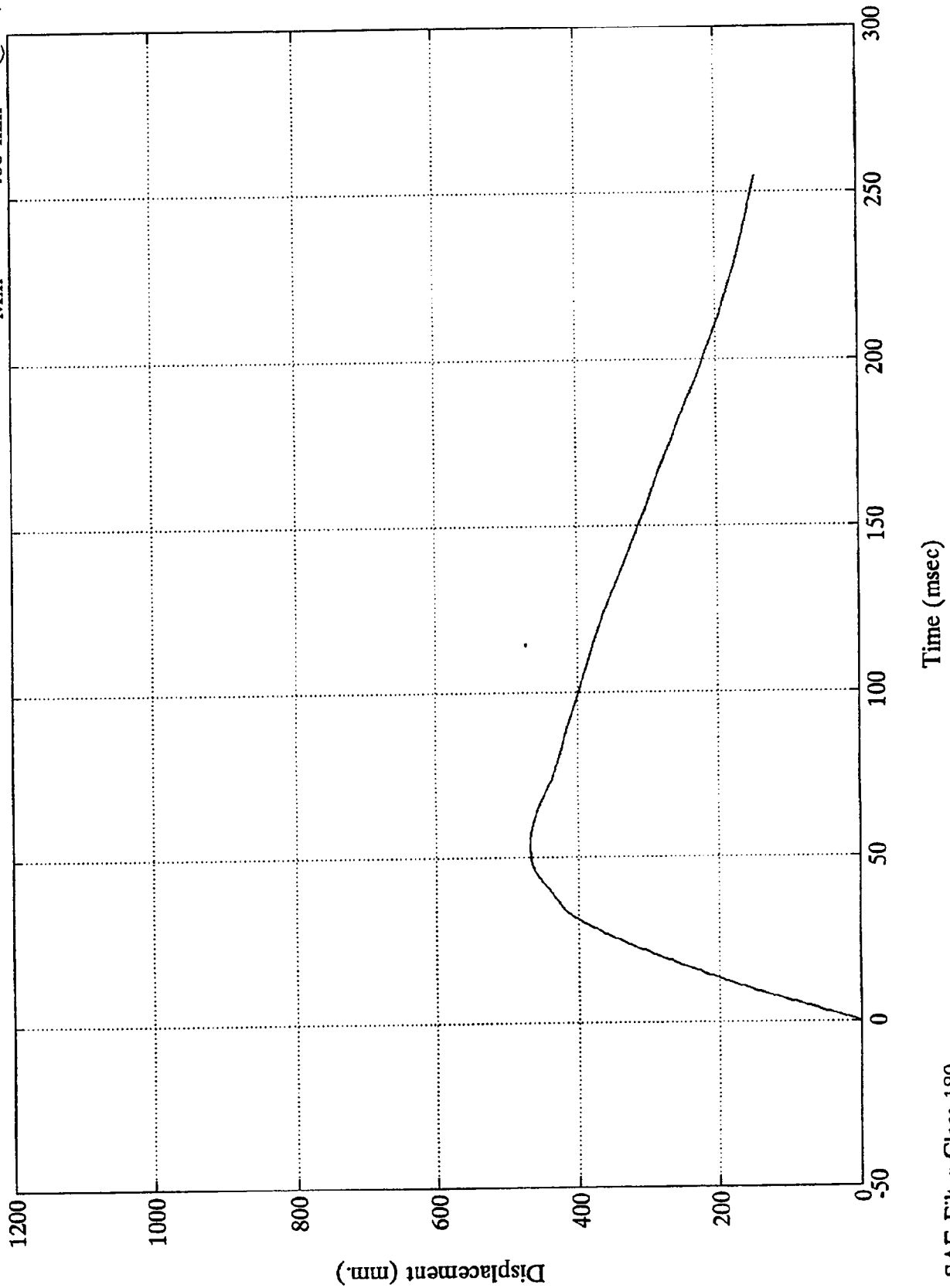


SAE Filter Class 180

NCAP TEST #7 - 1994 VOLVO 850

Max = 466.96 mm @ 54.00 msec
Min = .00 mm @ -44.88 msec

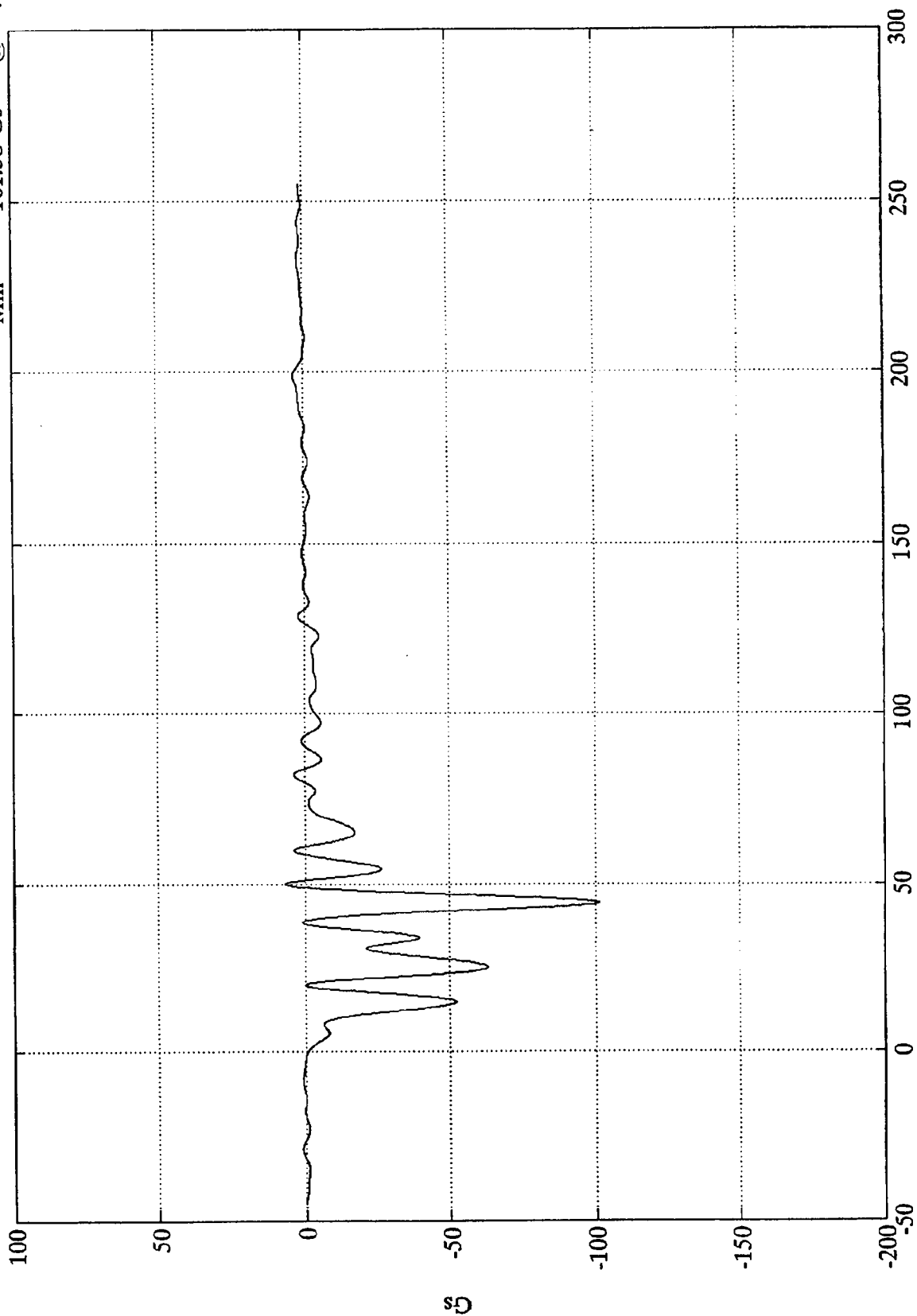
Acc. #5(x)



NCAP TEST #7 - 1994 VOLVO 850

Max = 7.09 Gs @ 50.16 msec
Min = -101.38 Gs @ 44.39 msec

Acc. #6(x)



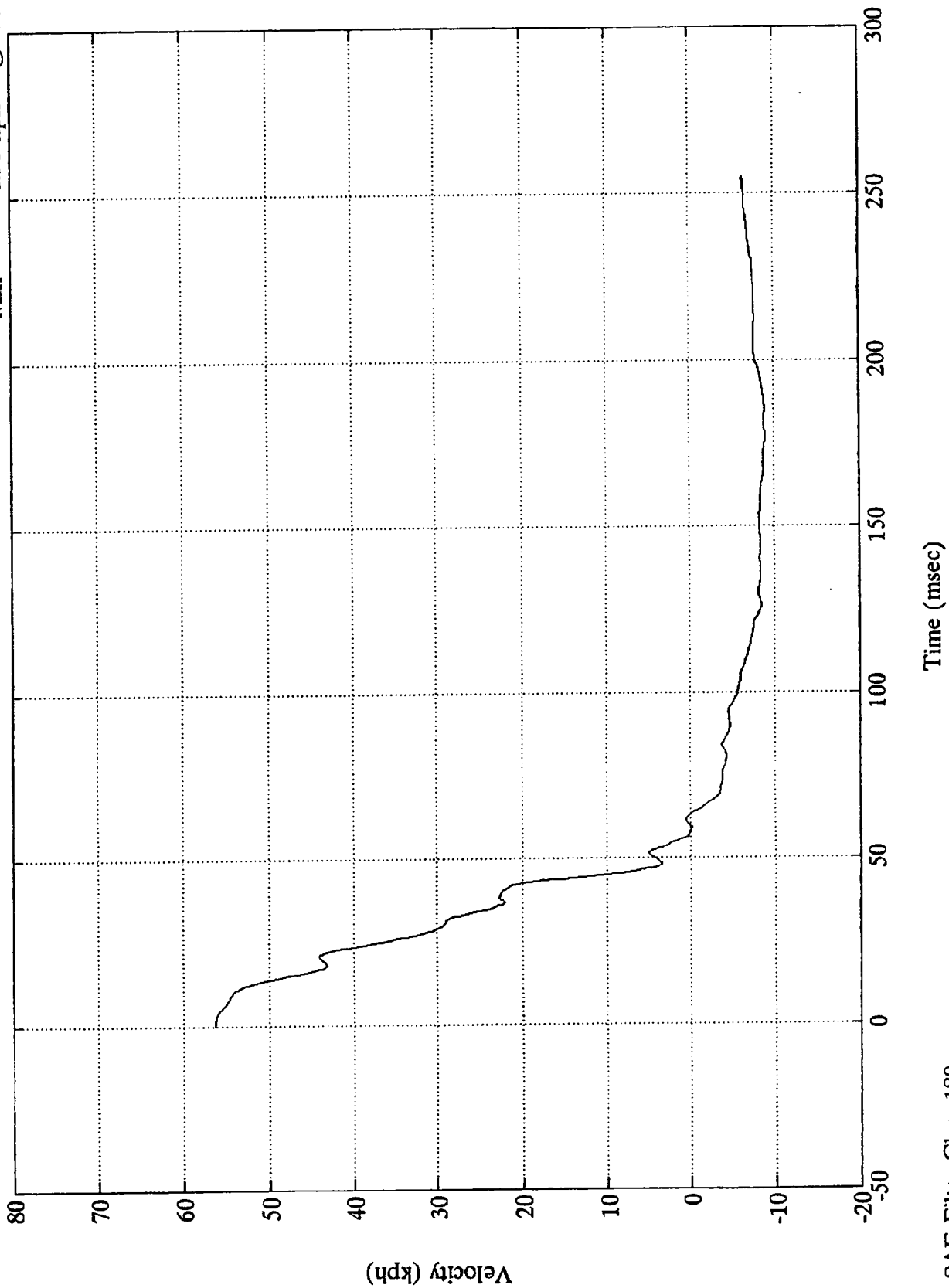
Time (msec)

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Max = 56.33 kph @ -0.00 msec
Min = -8.90 kph @ 176.88 msec

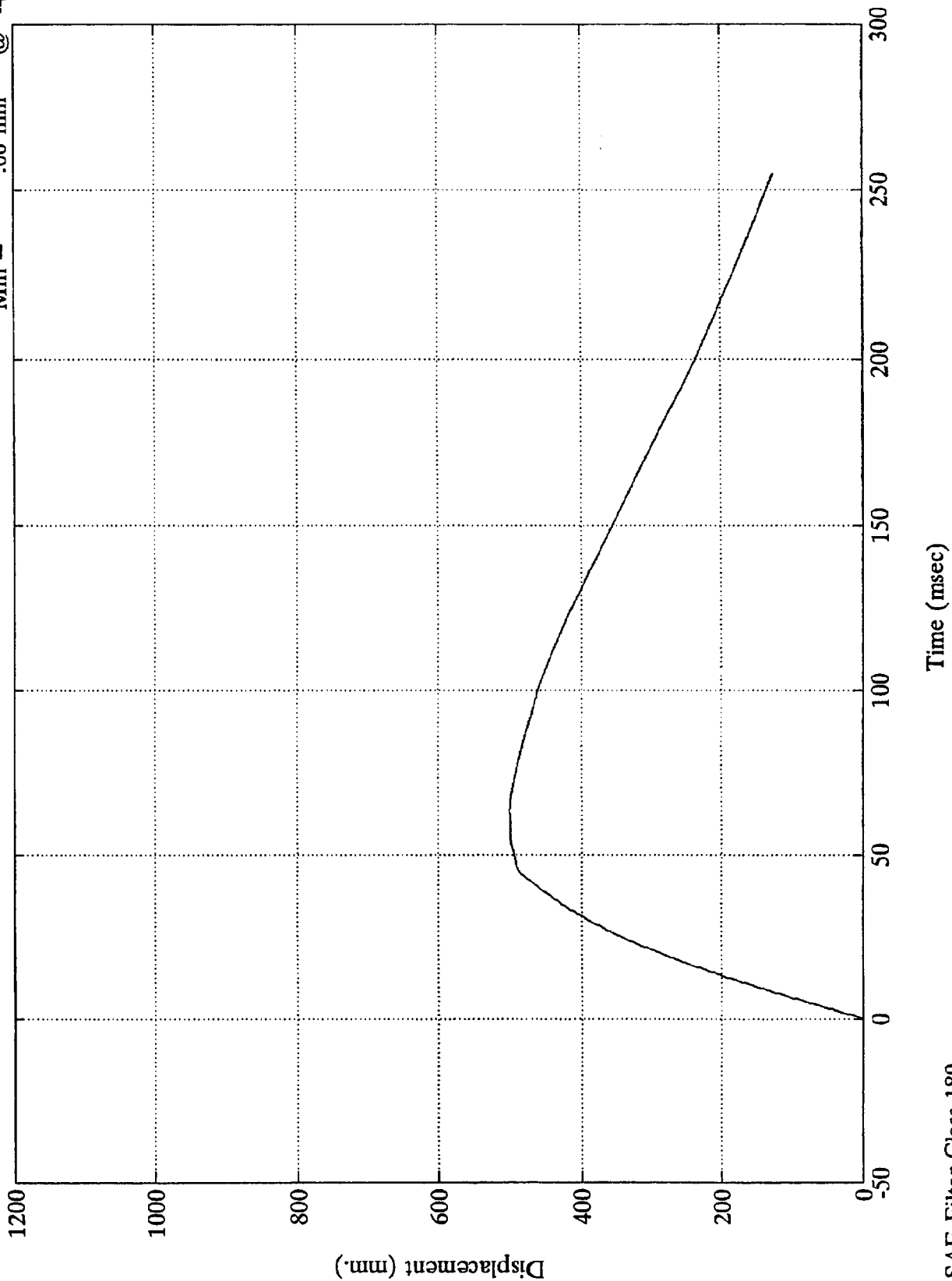
Acc. #6(x)



NCAP TEST #7 - 1994 VOLVO 850

Max = 500.18 mm @ 63.23 msec
 Min = .00 mm @ -44.88 msec

Acc. #6(x)

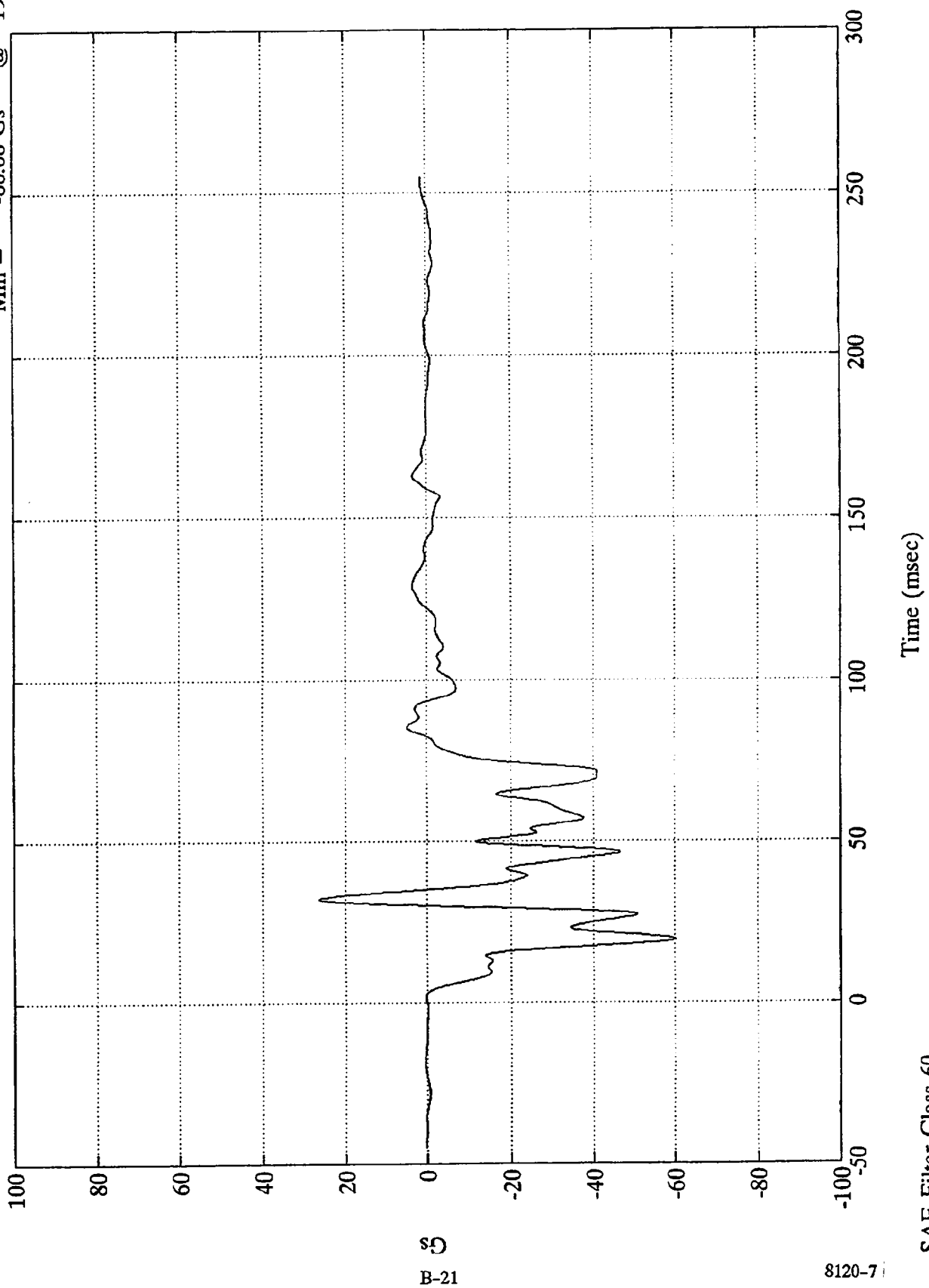


SAE Filter Class 180

NCAP TEST #7 - 1994 VOLVO 850

Acc. #7(x)

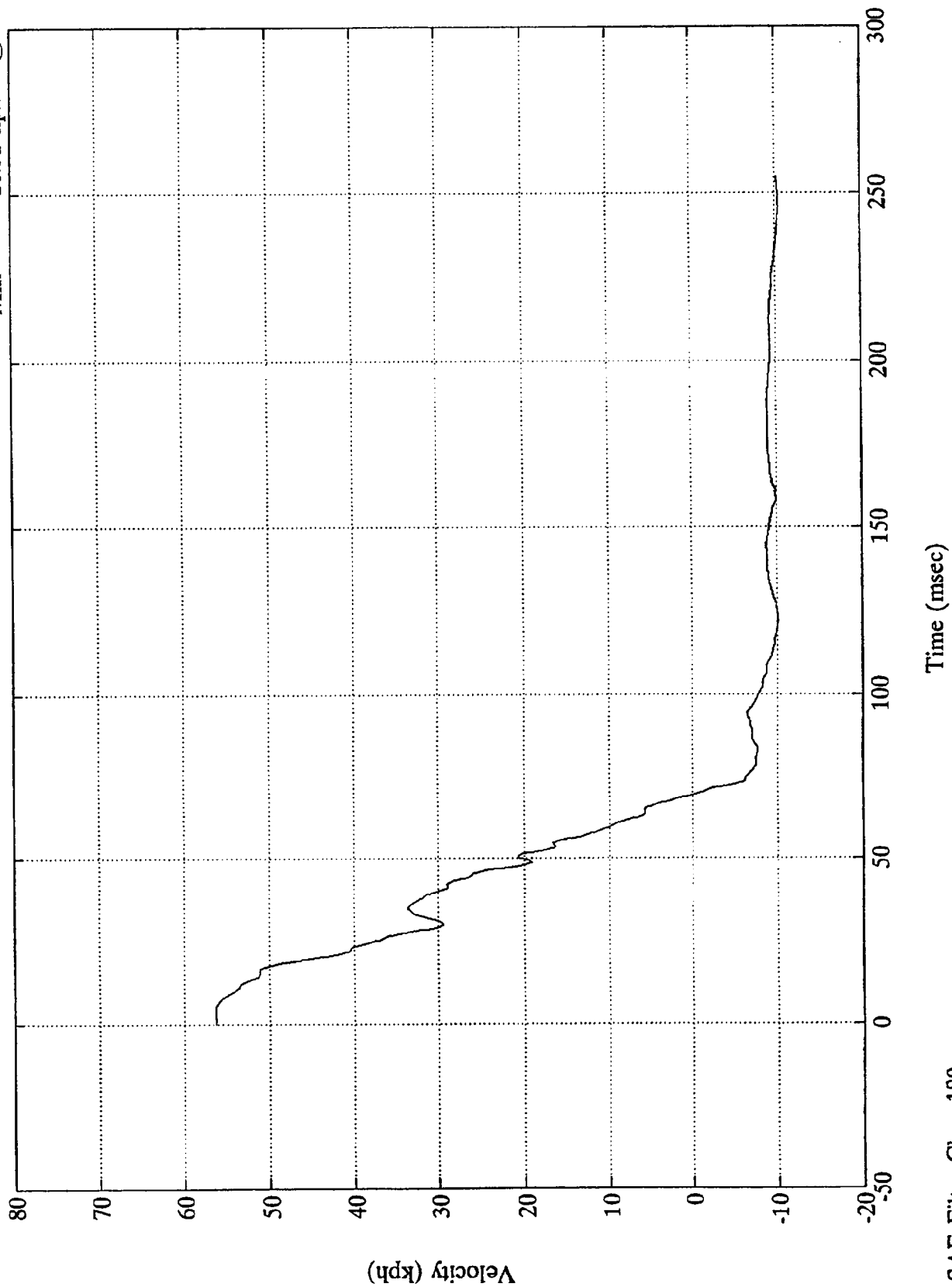
Max = 26.37 Gs @ 32.28 msec
Min = -60.06 Gs @ 19.55 msec



NCAP TEST #7 - 1994 VOLVO 850

Max = 56.33 kph @ 3.71 msec
Min = -10.51 kph @ 246.12 msec

Acc. #7(x)

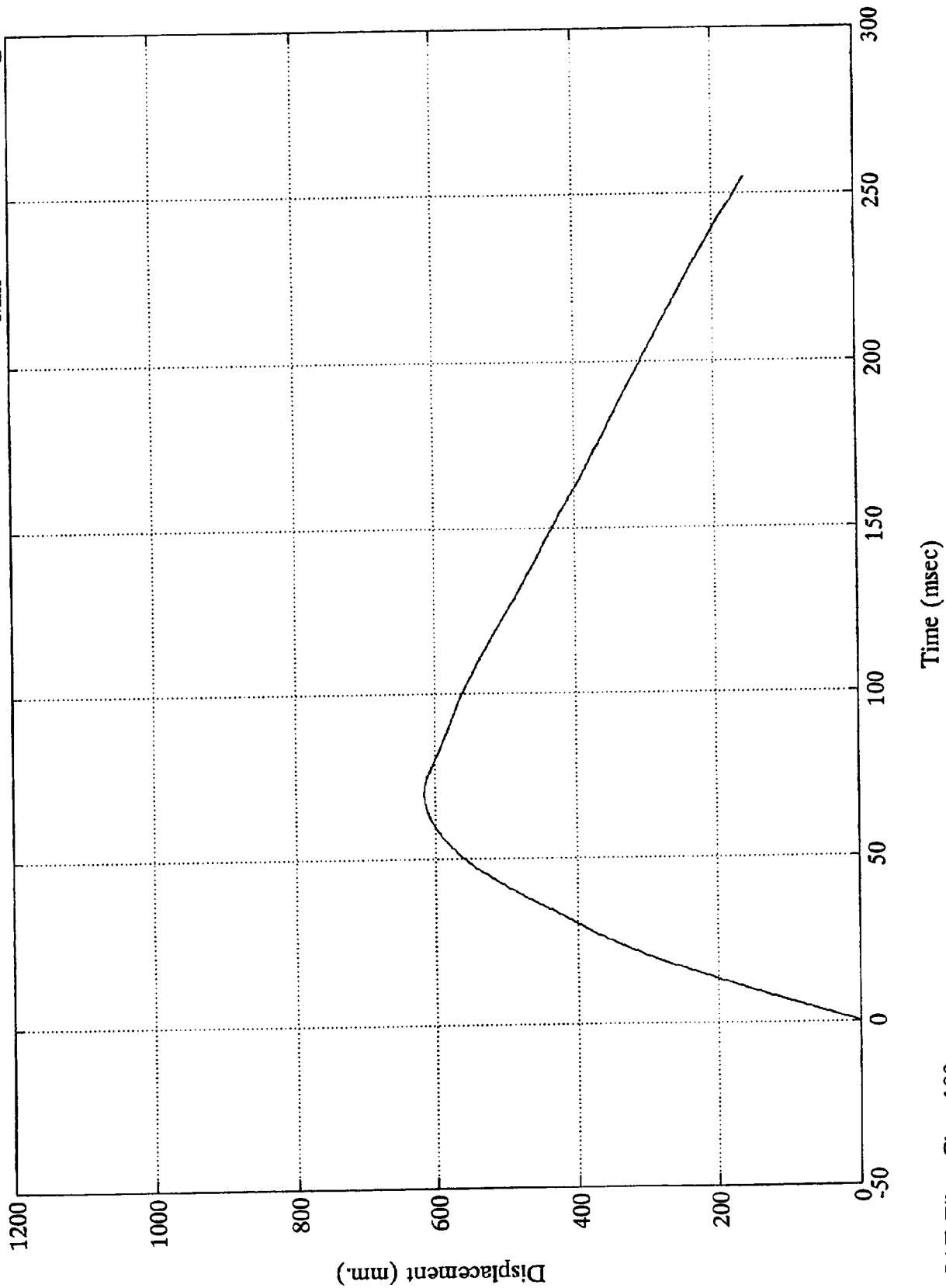


8120-7

NCAP TEST #7 - 1994 VOLVO 850

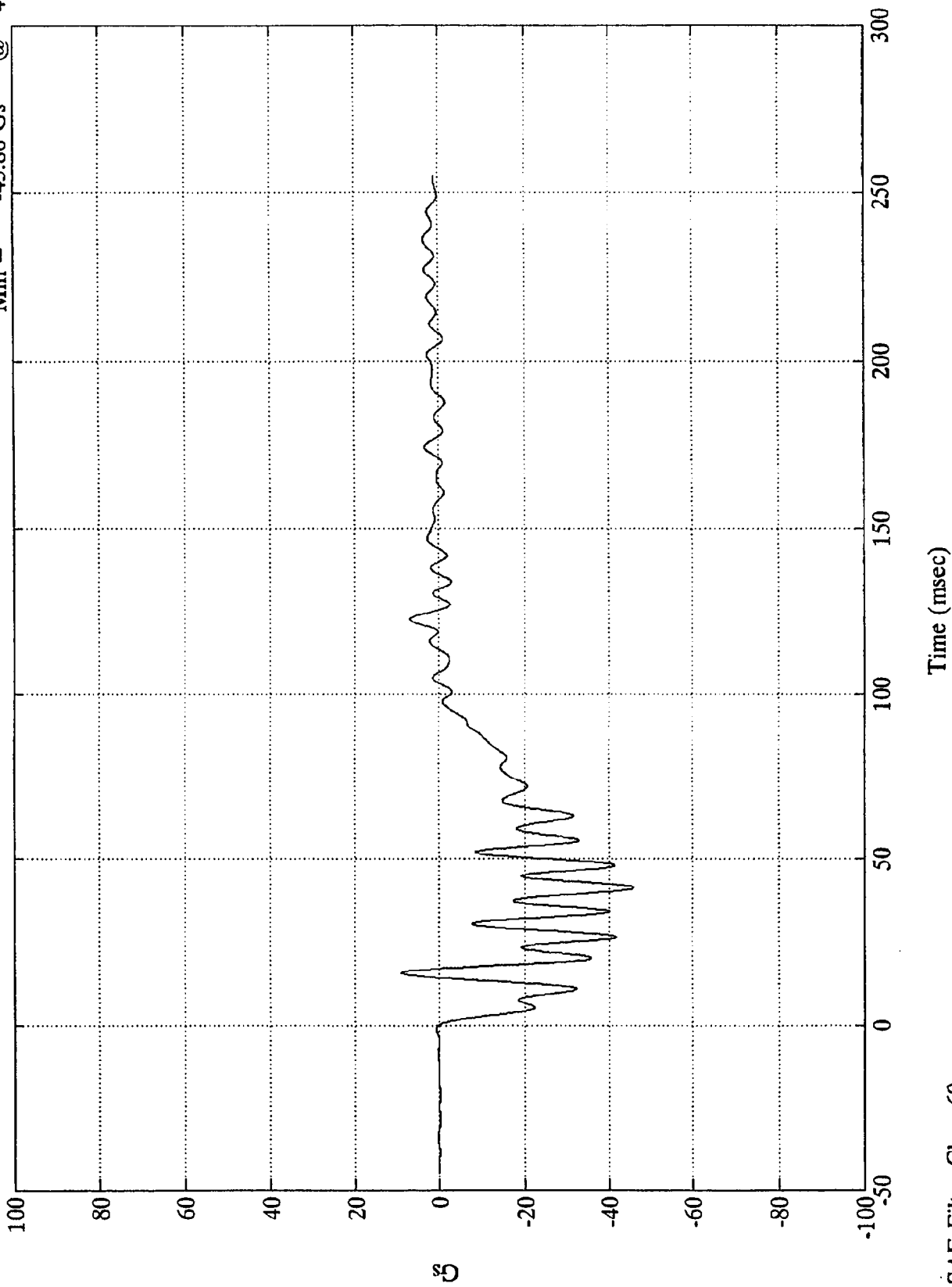
Max = 615.86 mm @ 69.72 msec
Min = .00 mm @ -44.88 msec

Acc. #7(x)



NCAP TEST #7 - 1994 VOLVO 850

Acc. #8(x)
 Max = 8.90 Gs @ 15.59 msec
 Min = -45.86 Gs @ 41.04 msec



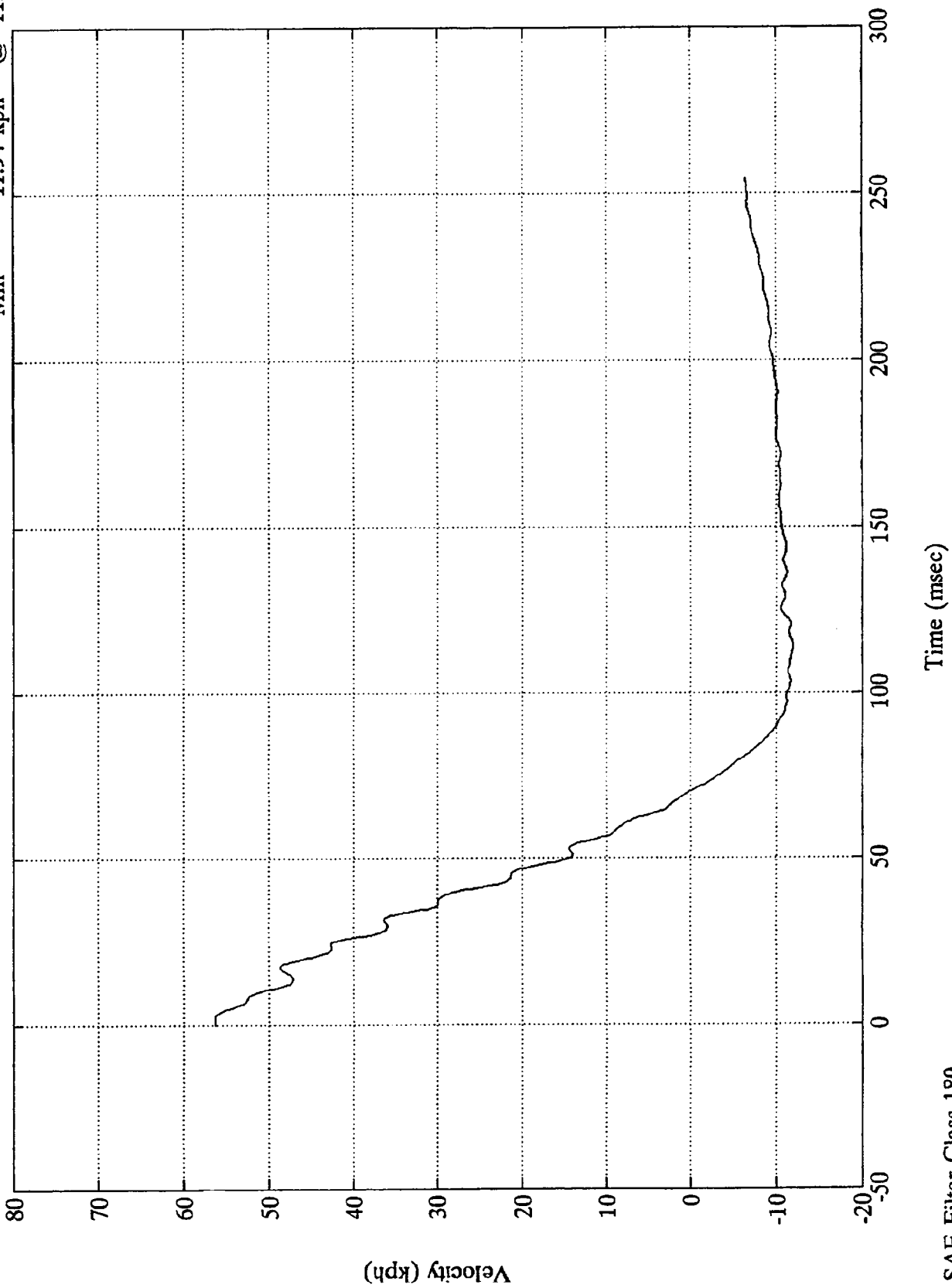
B-24

8120-7

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

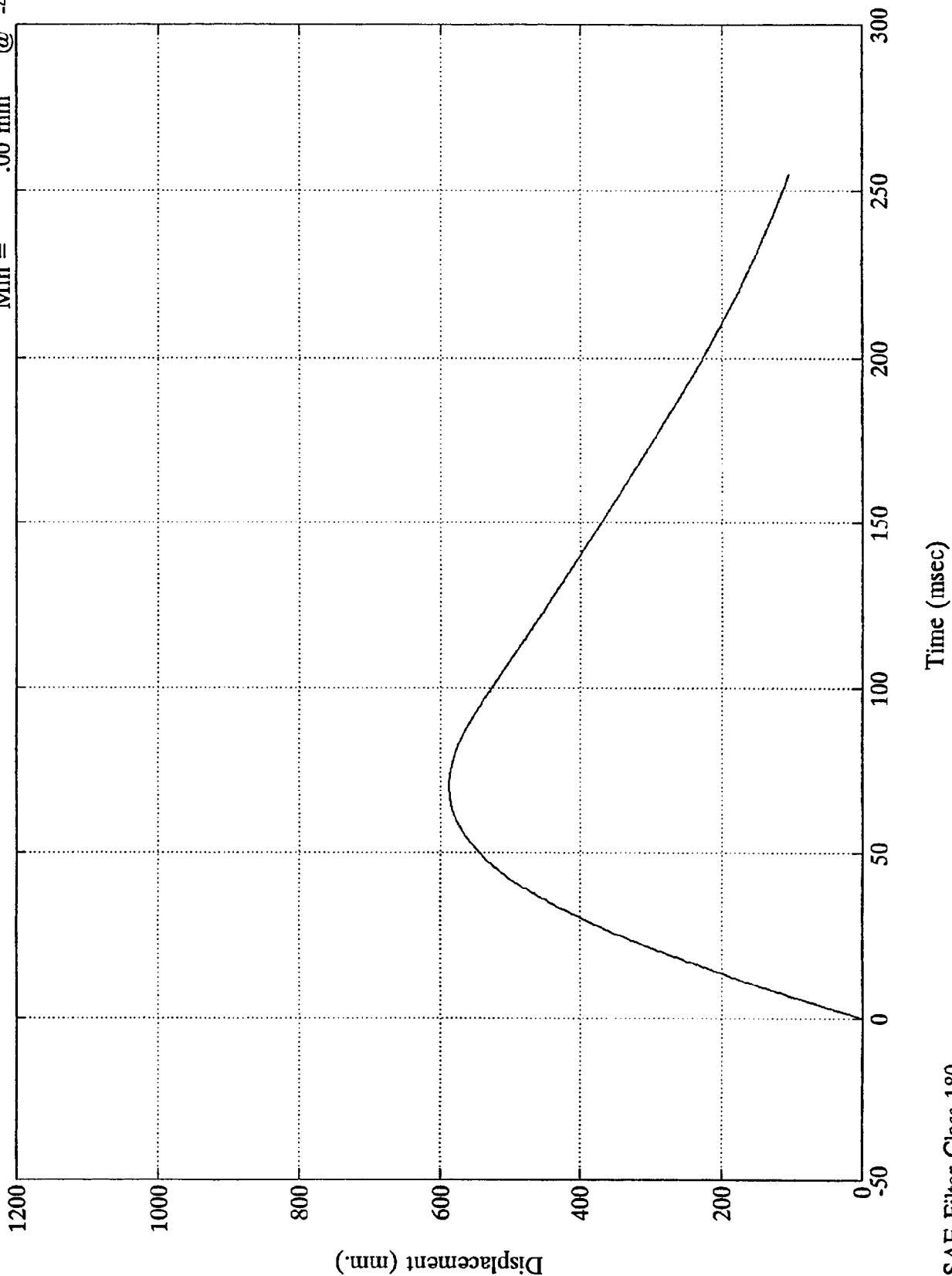
Acc. #8(x) Max = 56.33 kph @ 1.67 msec
Min = -11.94 kph @ 113.40 msec



NCAP TEST #7 - 1994 VOLVO 850

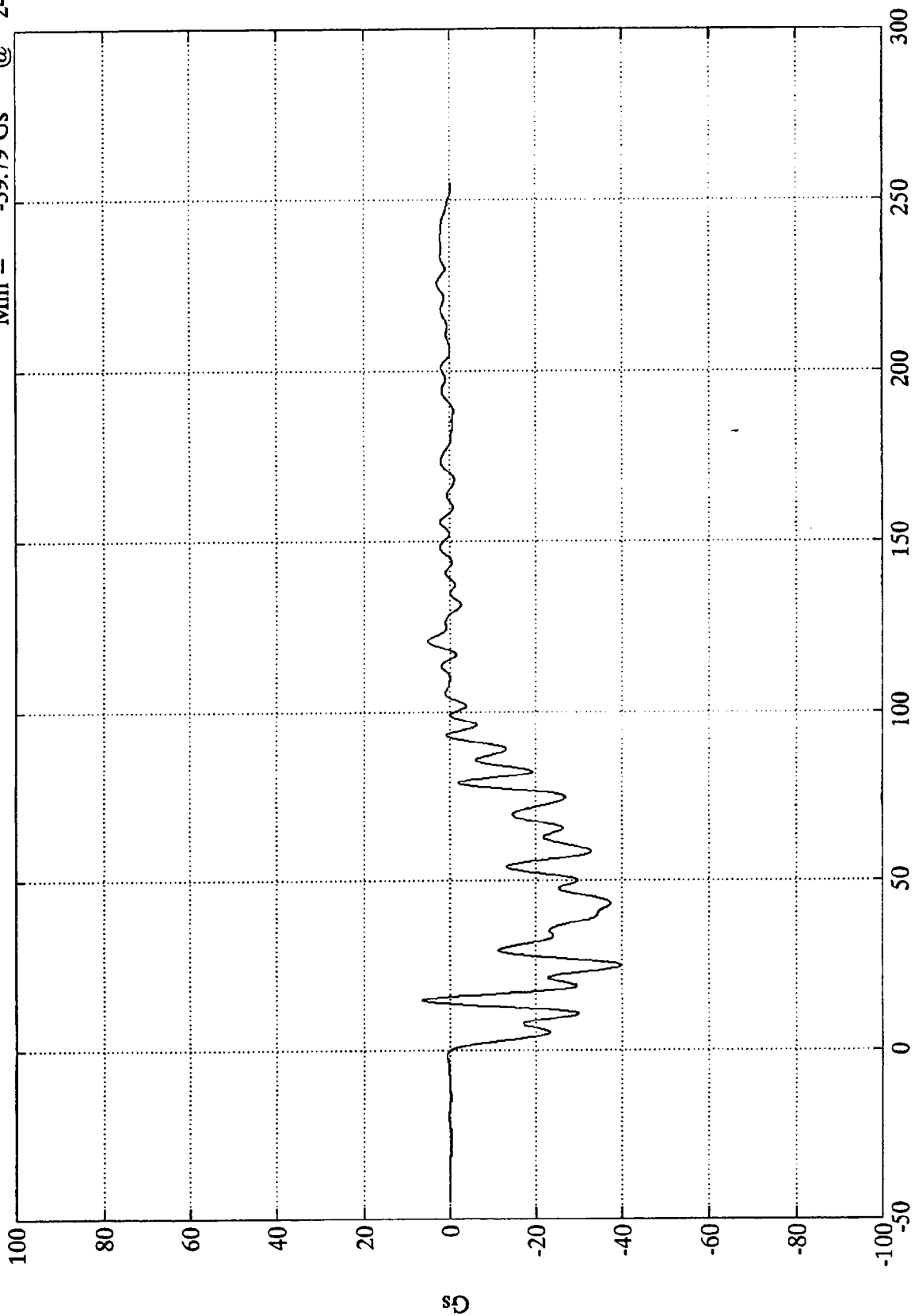
Acc. #8(x)

Max = 587.80 mm @ 70.44 msec
Min = .00 mm @ -44.88 msec



NCAP TEST #7 - 1994 VOLVO 850

Acc. #9(x) Max = 6.57 Gs @ 14.88 msec
Min = -39.79 Gs @ 24.96 msec



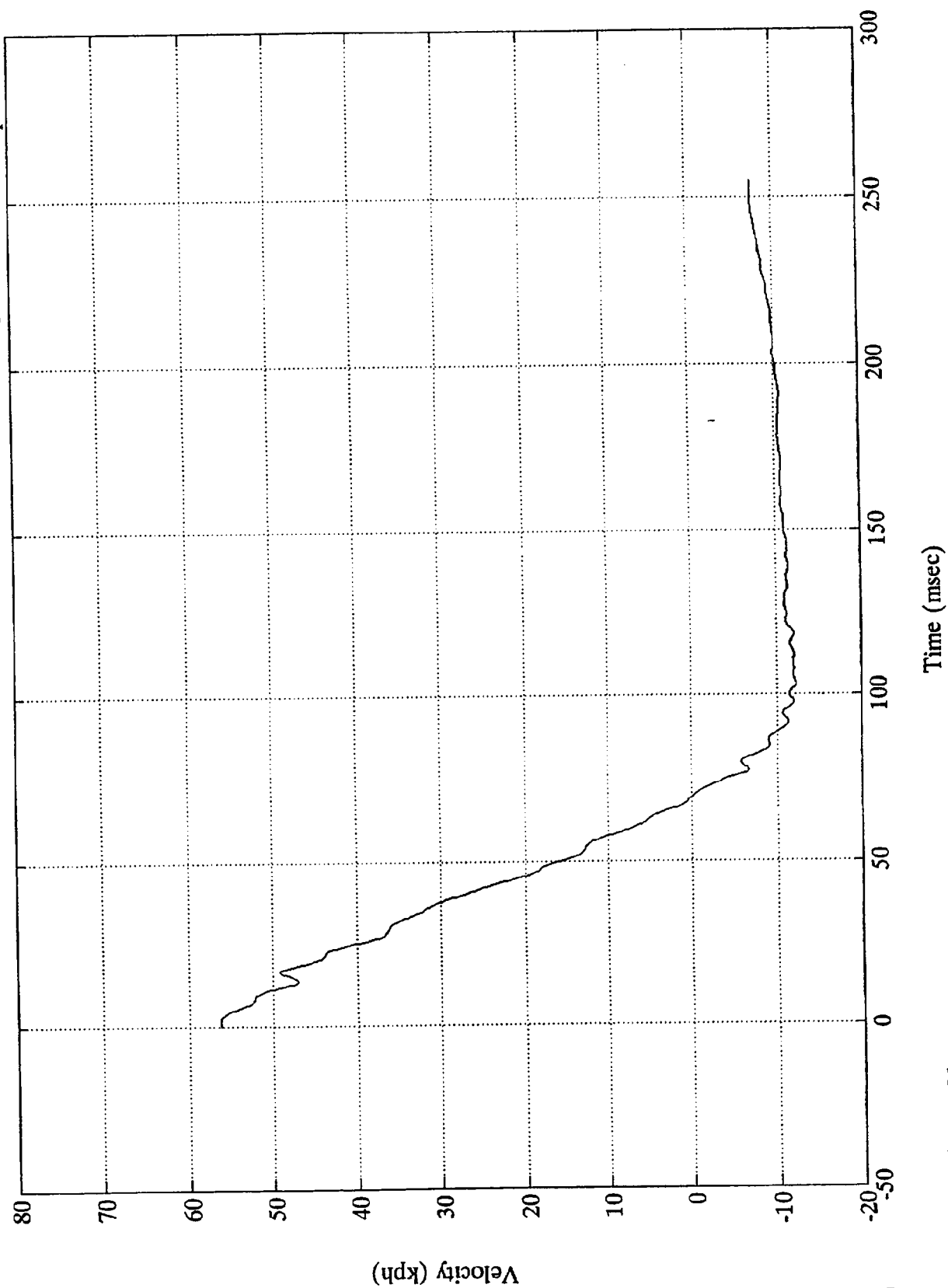
Time (msec)

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

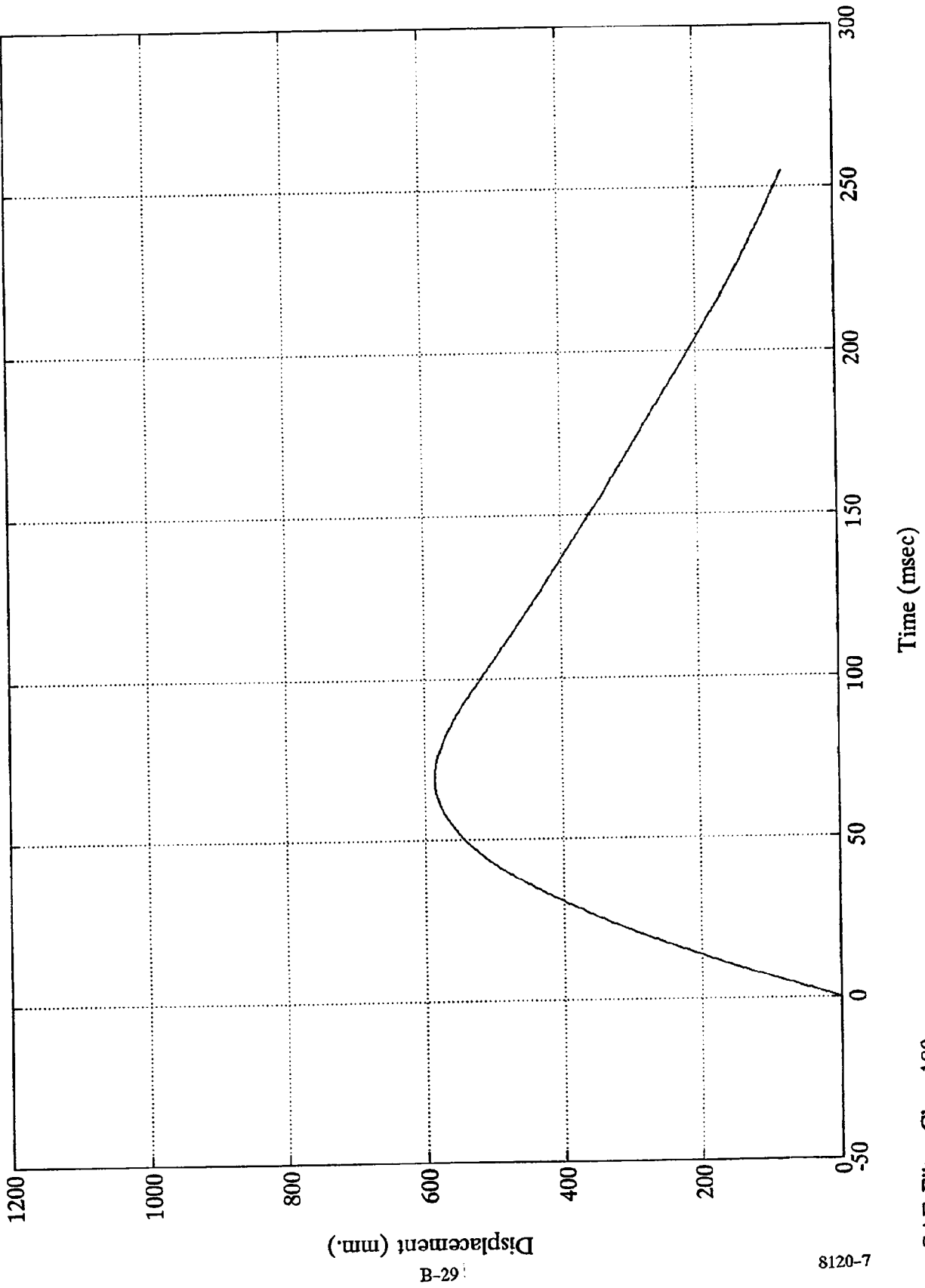
Acc. #9(x)

Max = 56.33 kph @ -0.00 msec
Min = -12.26 kph @ 103.20 msec



NCAP TEST #7 - 1994 VOLVO 850

Acc. #9(x) Max = 585.50 mm @ 69.24 msec
Min = .00 mm @ -44.88 msec



62-B-29

8120-7

SAE Filter Class 180

TEST NO. MR5900

LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

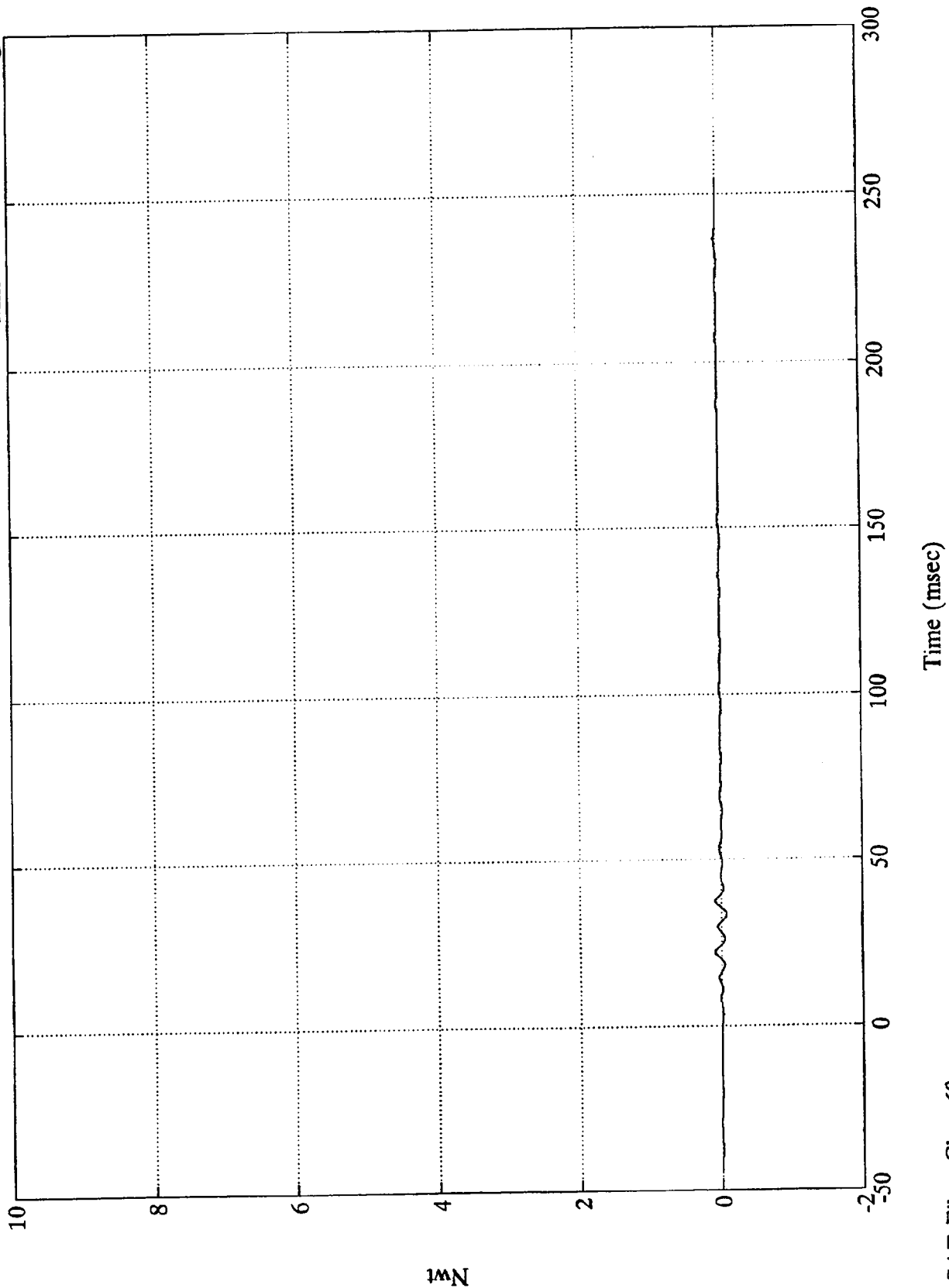
60

NCAP TEST #7 - 1994 VOLVO 850

Barrier Load Cell A1

Max = 821.41 Nwt @ 21.95 msec
Min = -821.63 Nwt @ 33.11 msec

$\times 10^4$



SAE Filter Class 60

Nwt

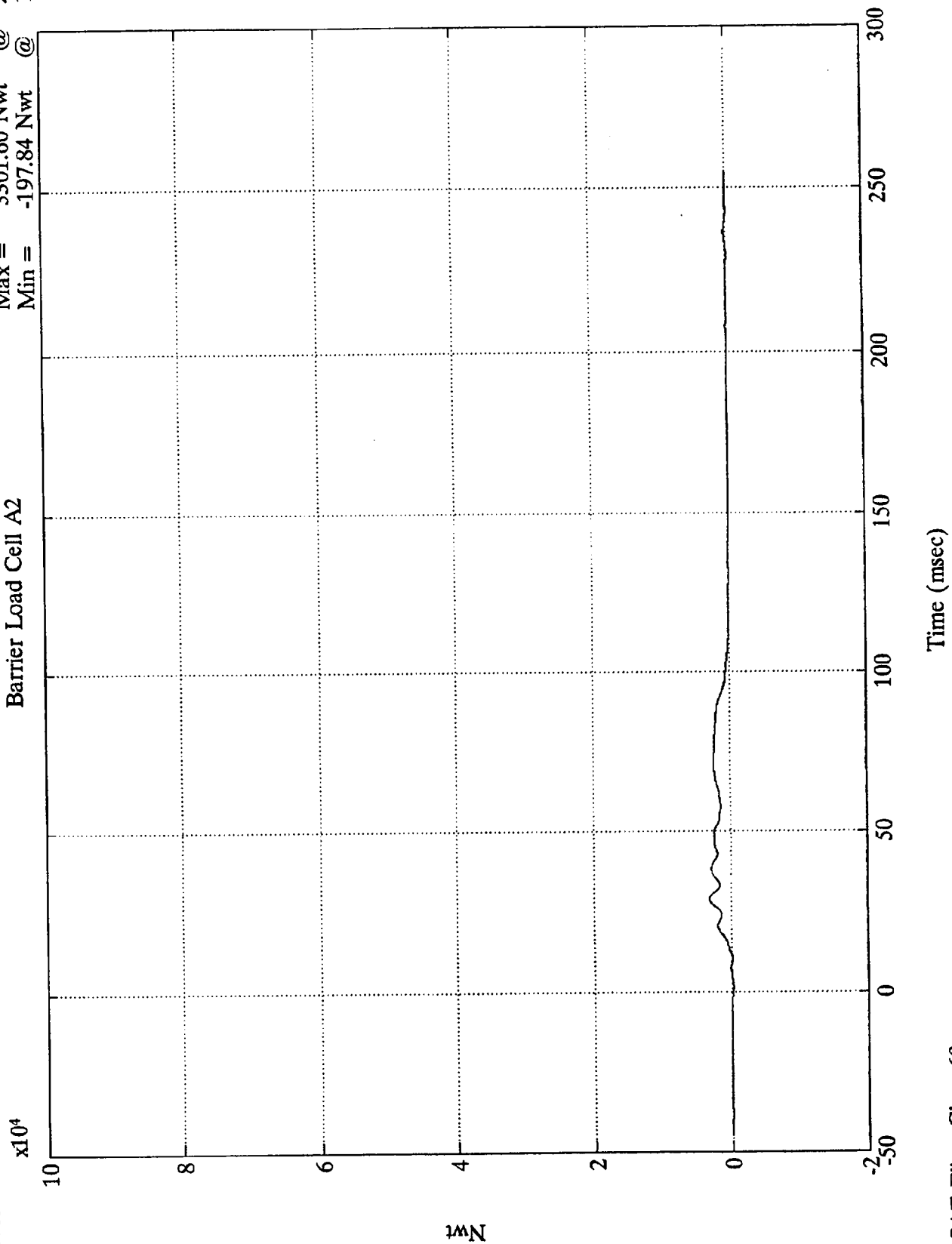
B-31

8120-7

NCAP TEST #7 - 1994 VOLVO 850

Barrier Load Cell A2

Max = 3301.60 Nwt @ 28.79 msec
Min = -197.84 Nwt @ 1.31 msec



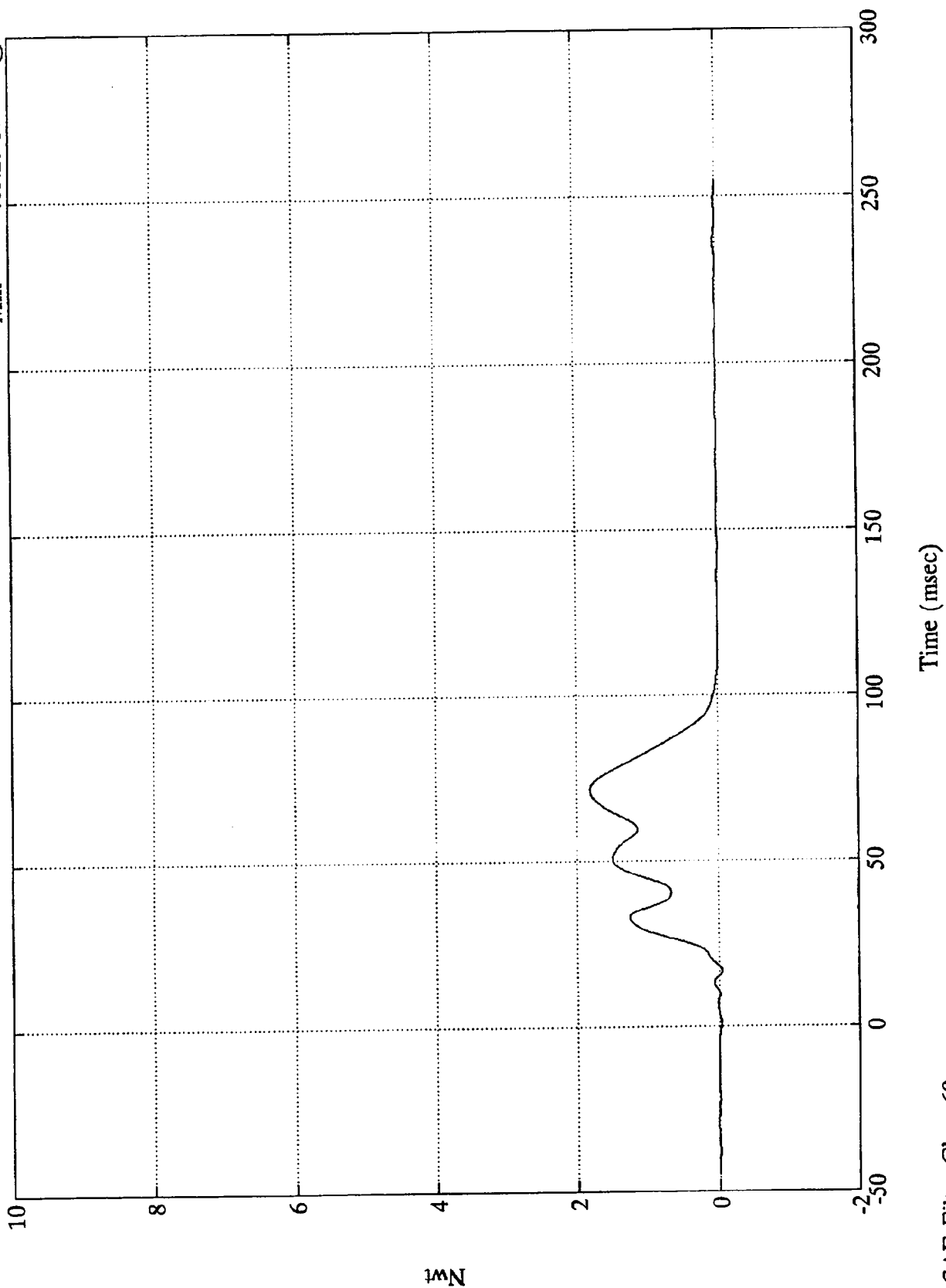
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Barrier Load Cell A3

Max = 18037.53 Nwt @ 71.52 msec
Min = -405.25 Nwt @ 16.79 msec

$\times 10^4$



Nwt

B-33

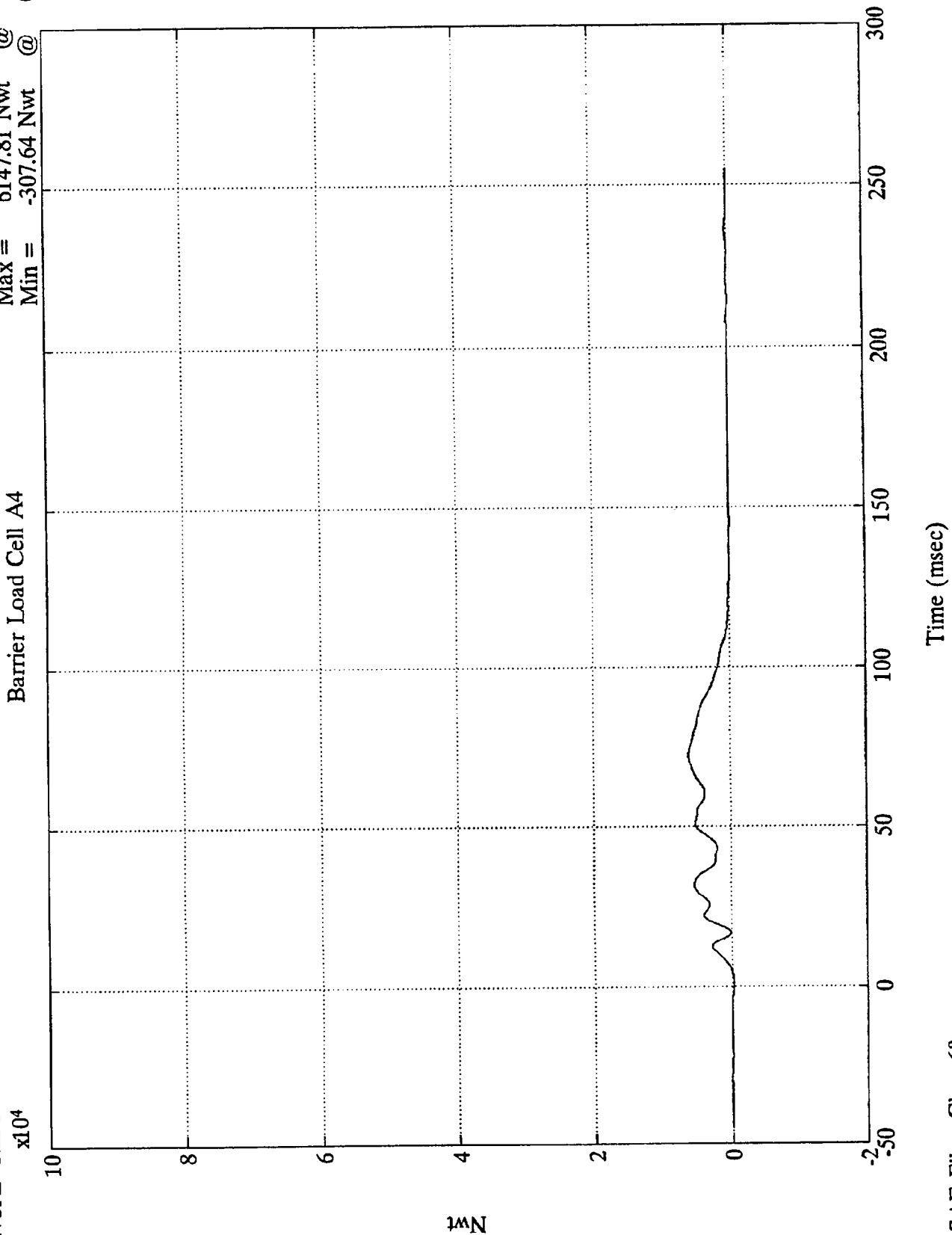
8120-7

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Barrier Load Cell A4

Max = 6147.81 Nwt @ 72.59 msec
Min = -307.64 Nwt @ 0.59 msec



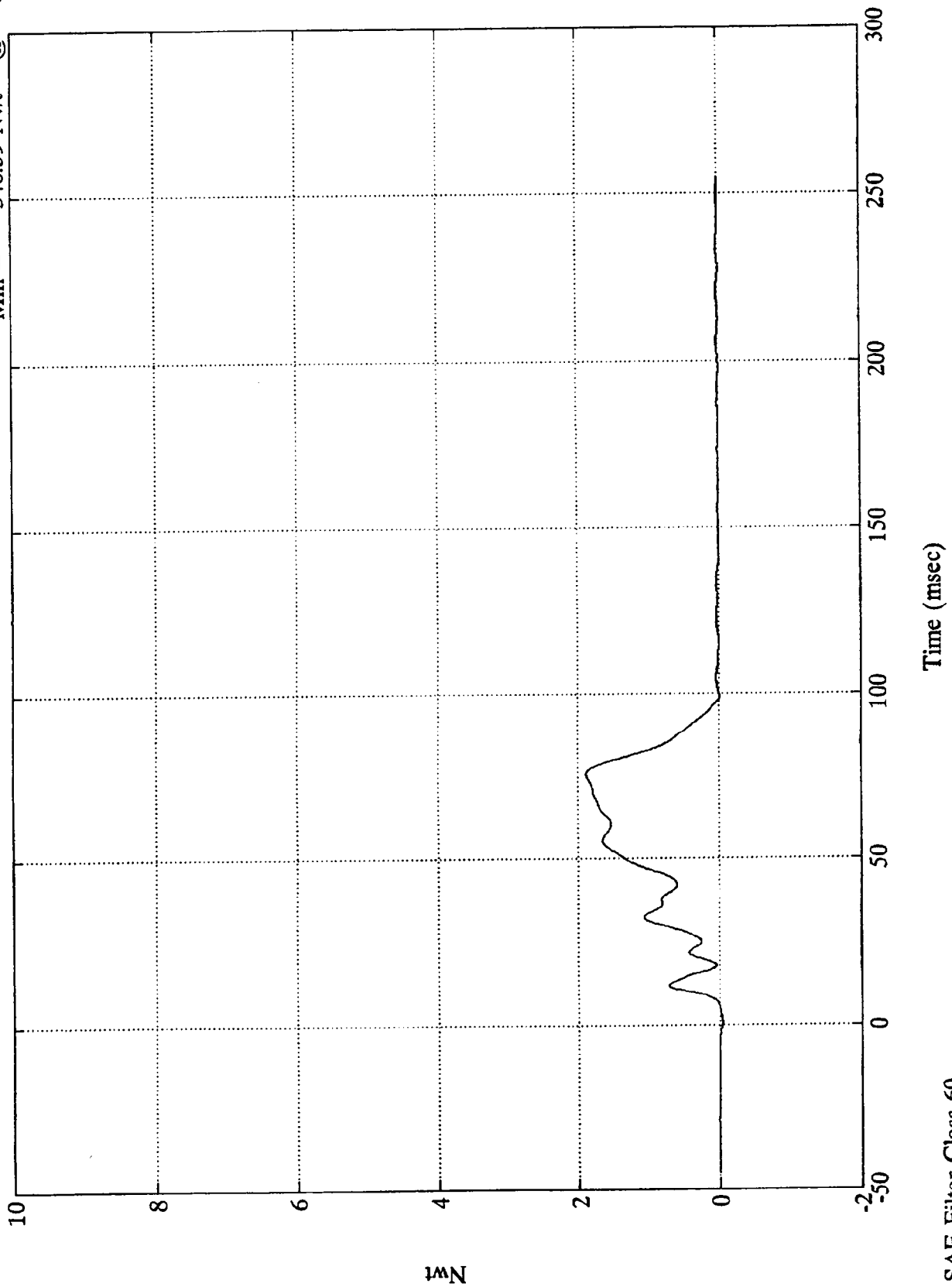
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

$\times 10^4$

Barrier Load Cell A5

Max = 18882.46 Nwt @ 75.47 msec
Min = -340.59 Nwt @ 0.59 msec



1Nwt

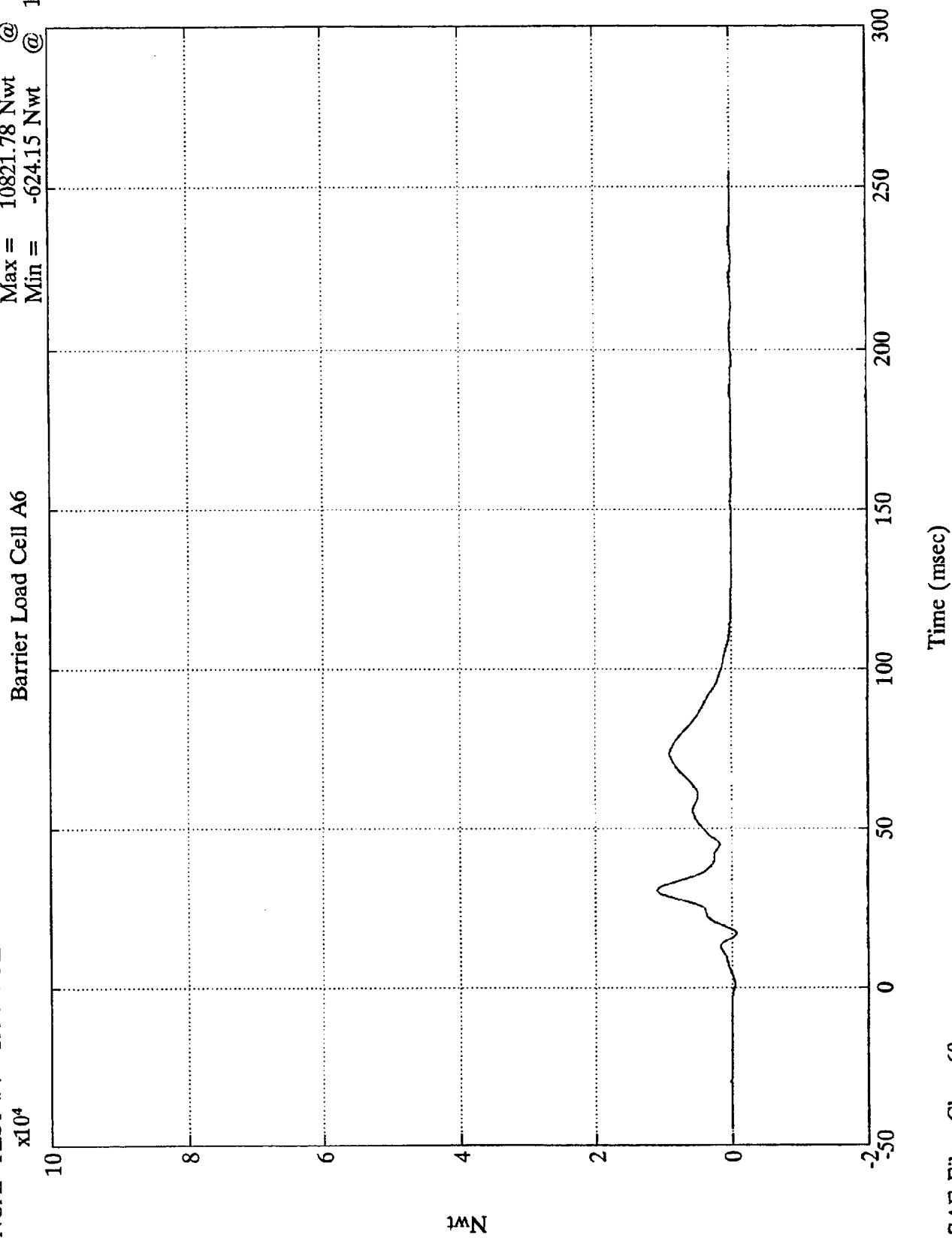
B-35

8120-7

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Barrier Load Cell A6
Max = 10821.78 Nwt @ 30.23 msec
Min = -624.15 Nwt @ 16.79 msec

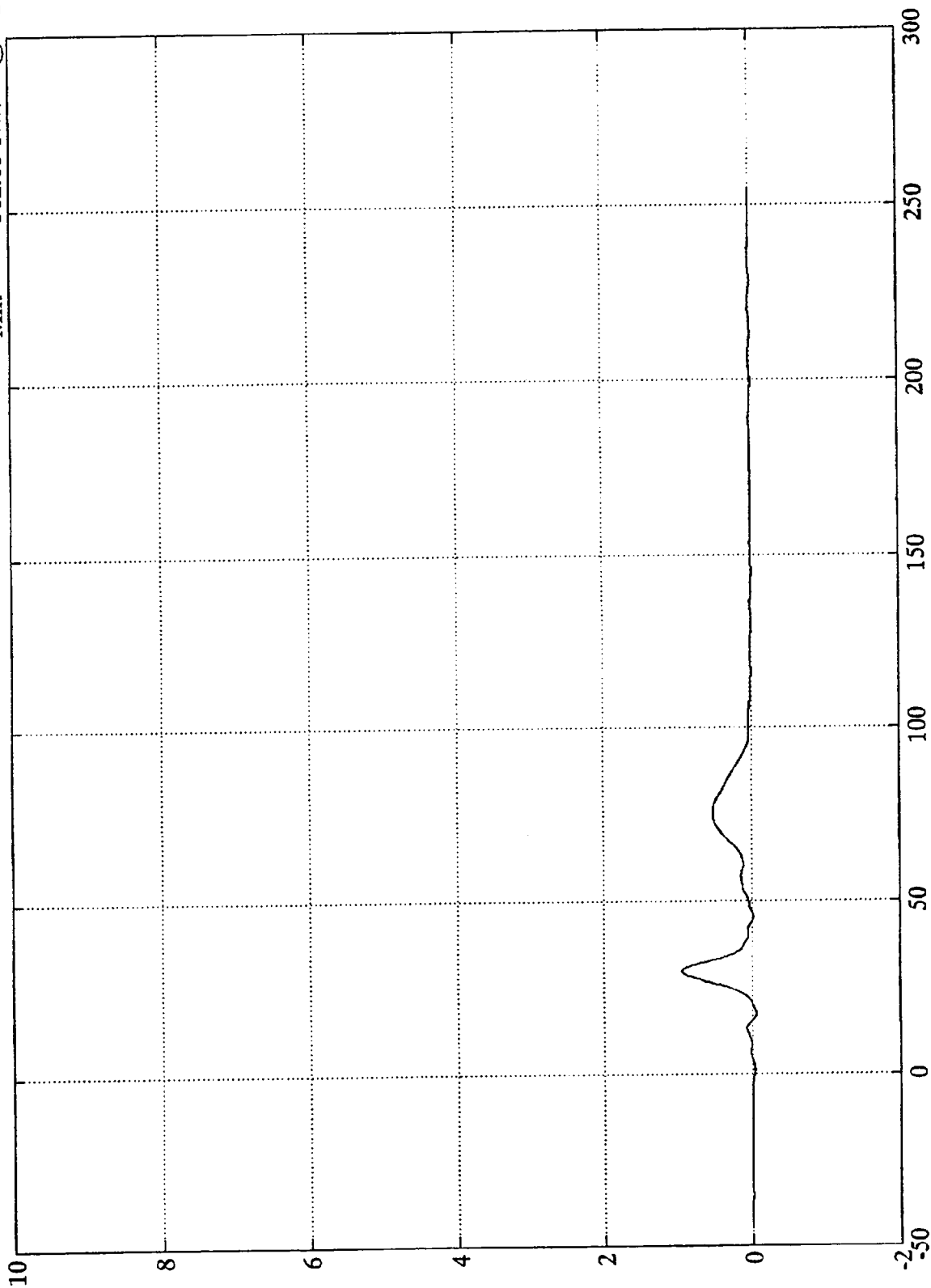


NCAP TEST #7 - 1994 VOLVO 850

$\times 10^4$

Barrier Load Cell A7

Max = 9372.21 Nwt @ 29.63 msec
Min = -502.68 Nwt @ 17.27 msec



B-37

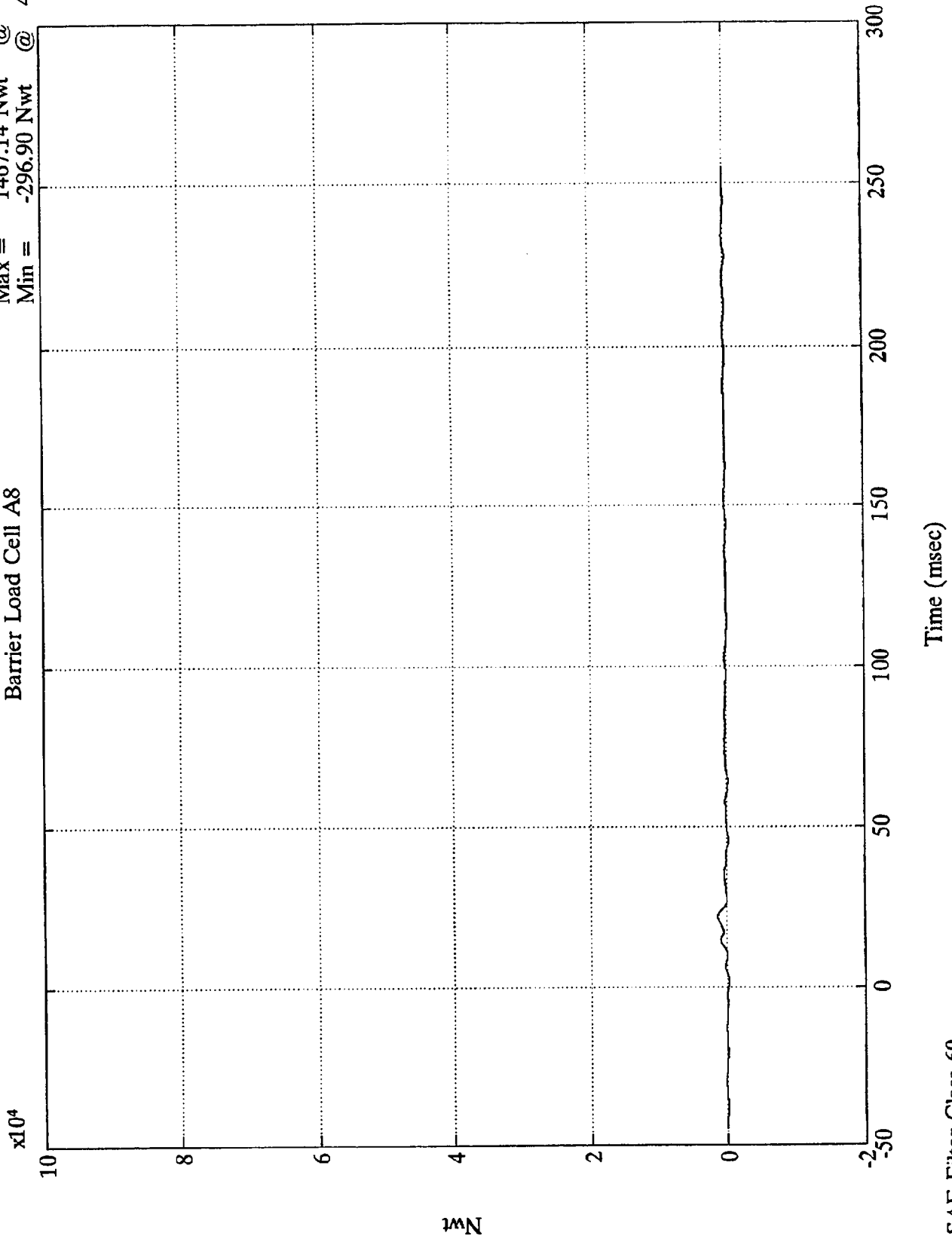
8120-7

Time (msec)

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Barrier Load Cell A8
Max = 1467.14 Nwt @ 22.07 msec
Min = -296.90 Nwt @ 45.60 msec

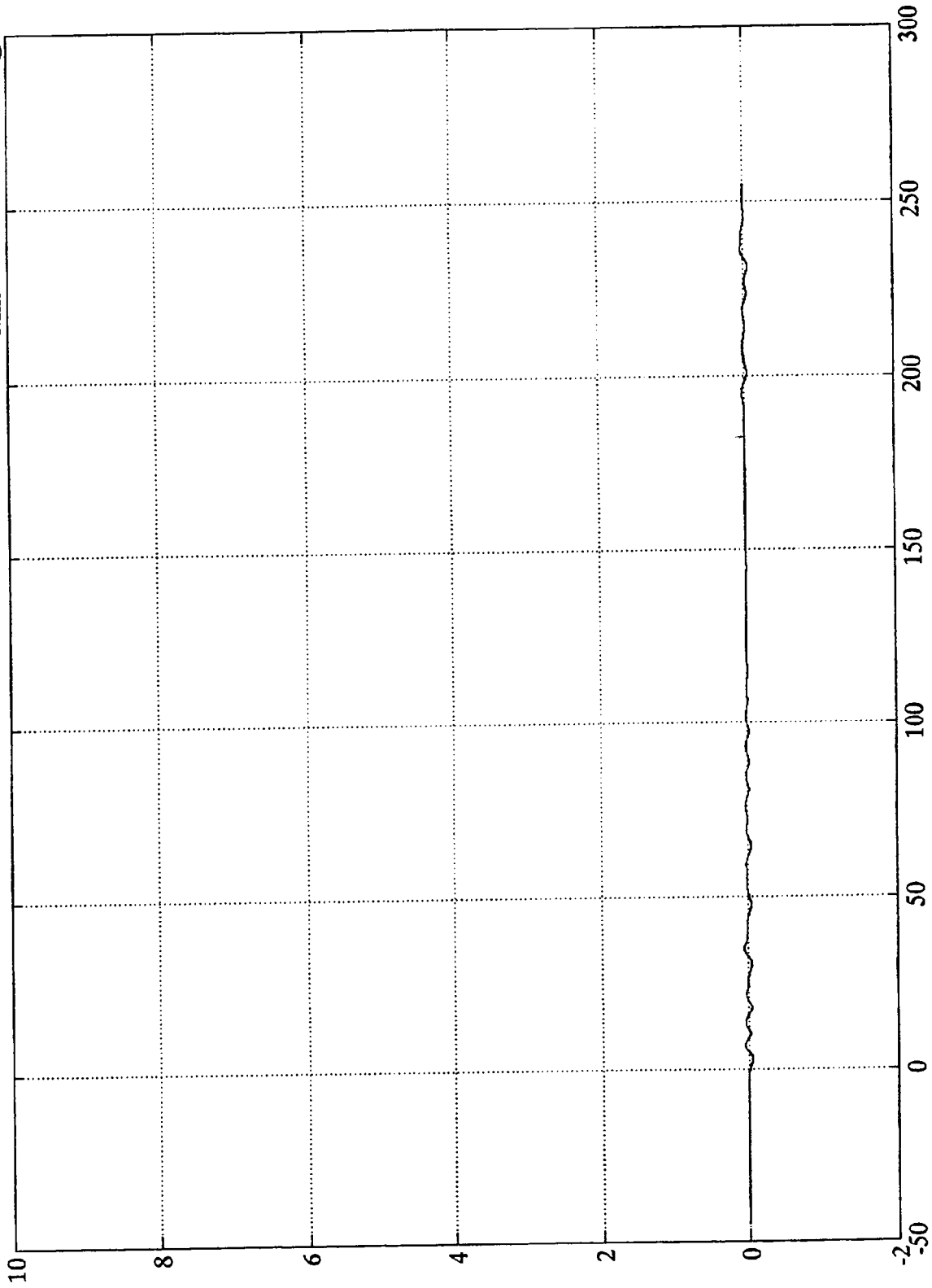


NCAP TEST #7 - 1994 VOLVO 850

$\times 10^4$

Barrier Load Cell A9

Max = 558.75 Nwt @ 34.79 msec
Min = -570.46 Nwt @ 231.12 msec

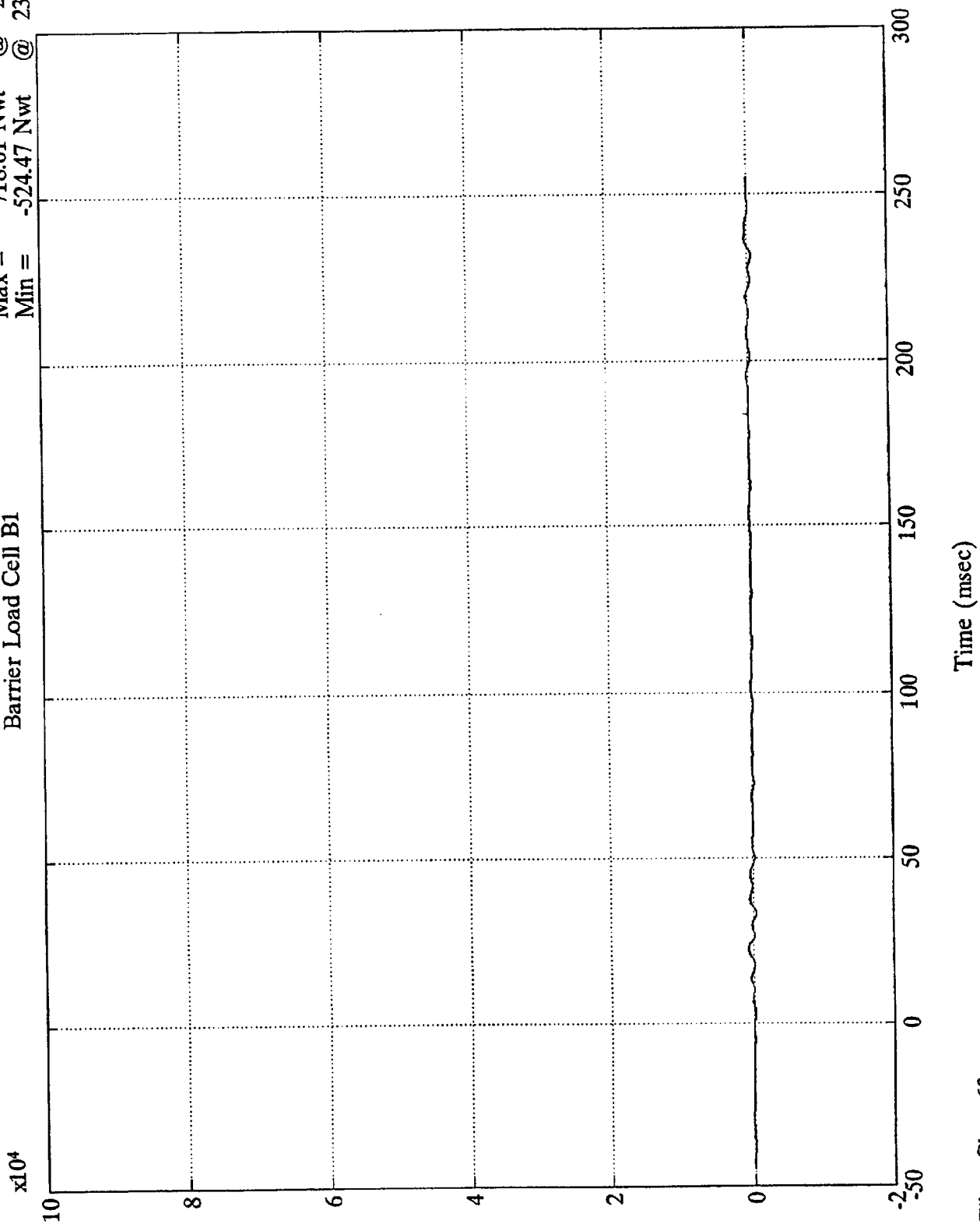


Time (msec)

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Barrier Load Cell B1
Max = 718.01 Nwt @ 22.68 msec
Min = -524.47 Nwt @ 231.24 msec



B-40

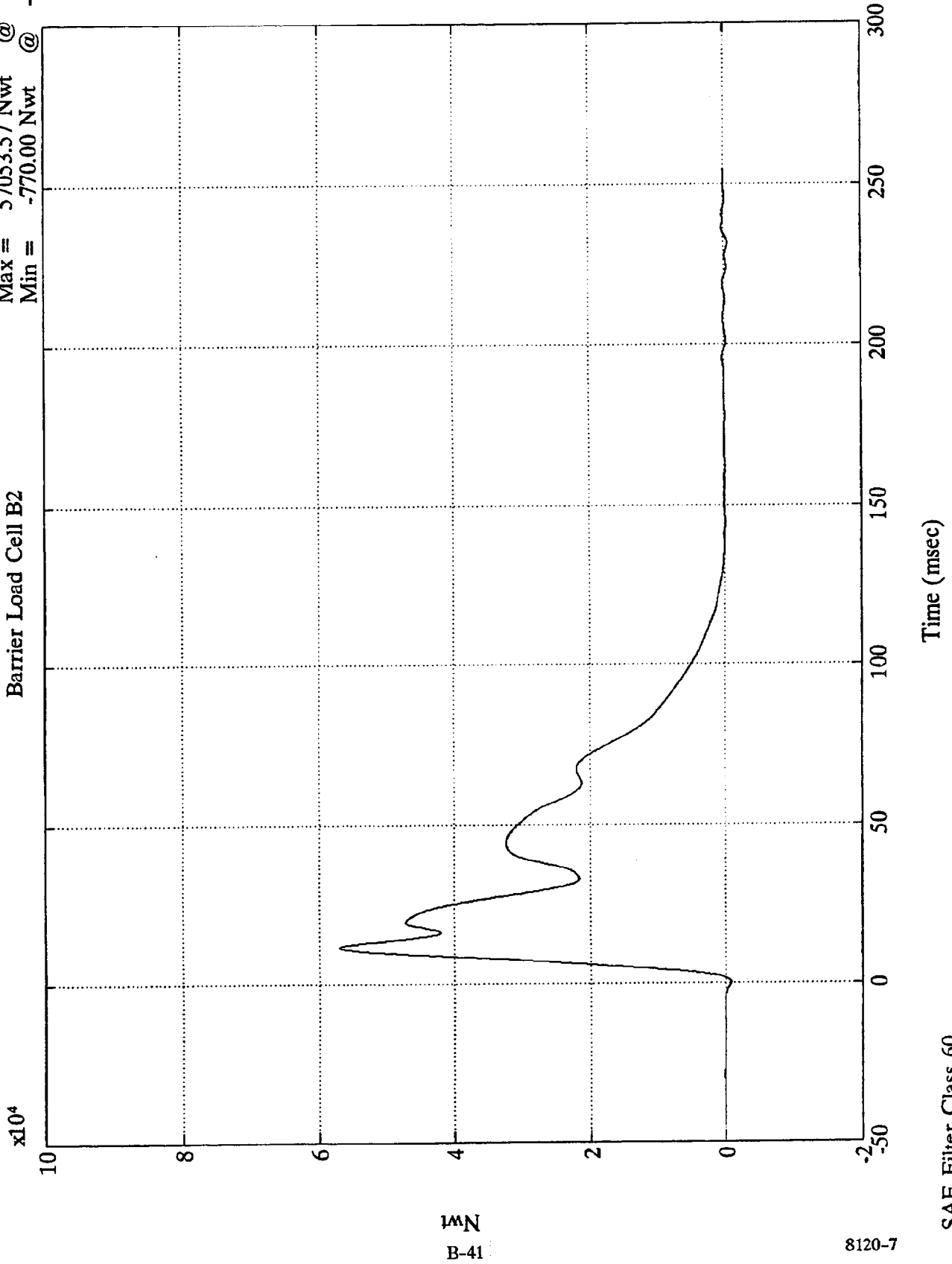
8120-7

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Max = 57053.57 Nwt @ 11.63 msec
Min = -770.00 Nwt @ -0.00 msec

Barrier Load Cell B2



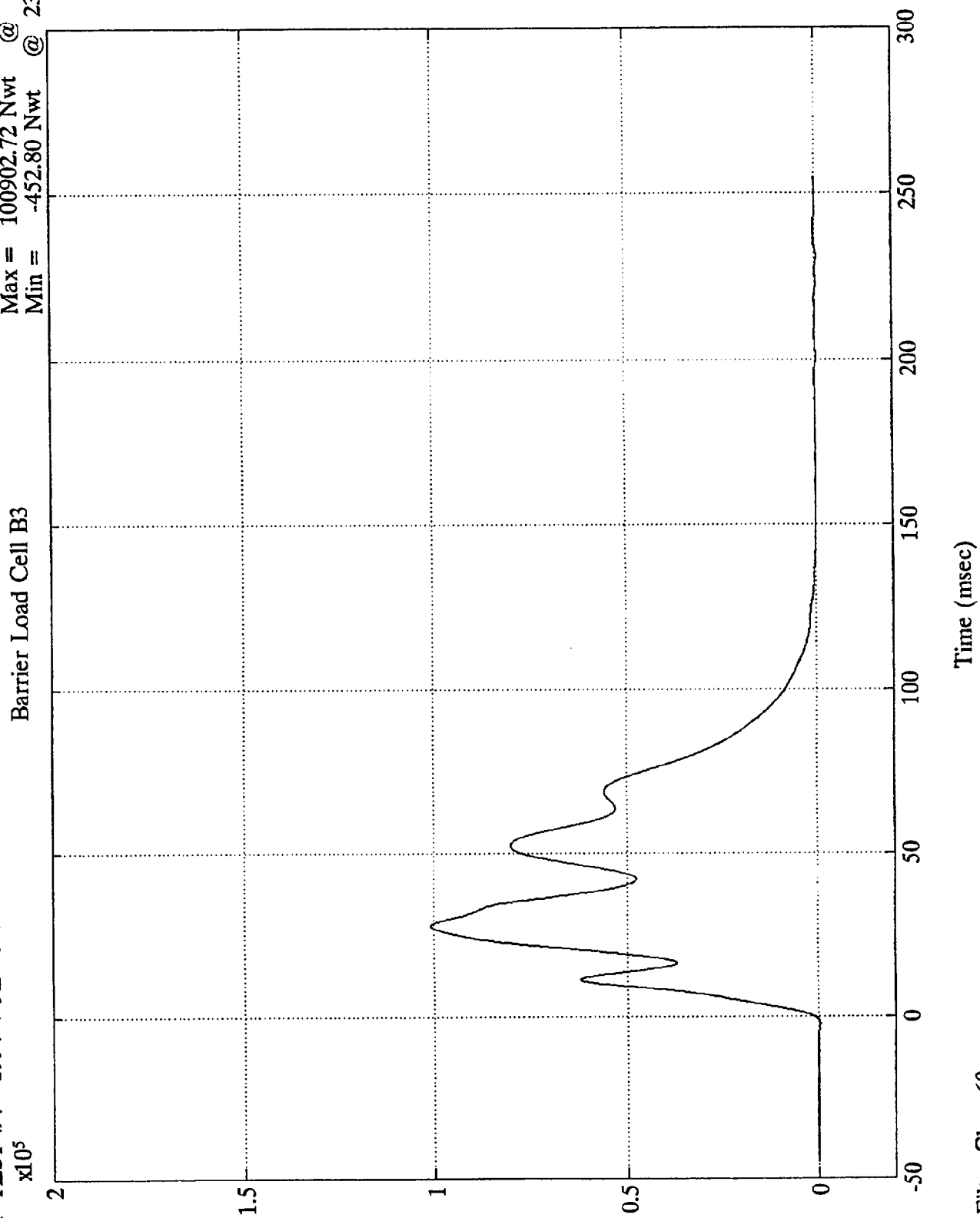
1MN
B-41

8120-7

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Barrier Load Cell B3
Max = 100902.72 Nwt @ 27.60 msec
Min = -452.80 Nwt @ 231.00 msec



10N
B-42

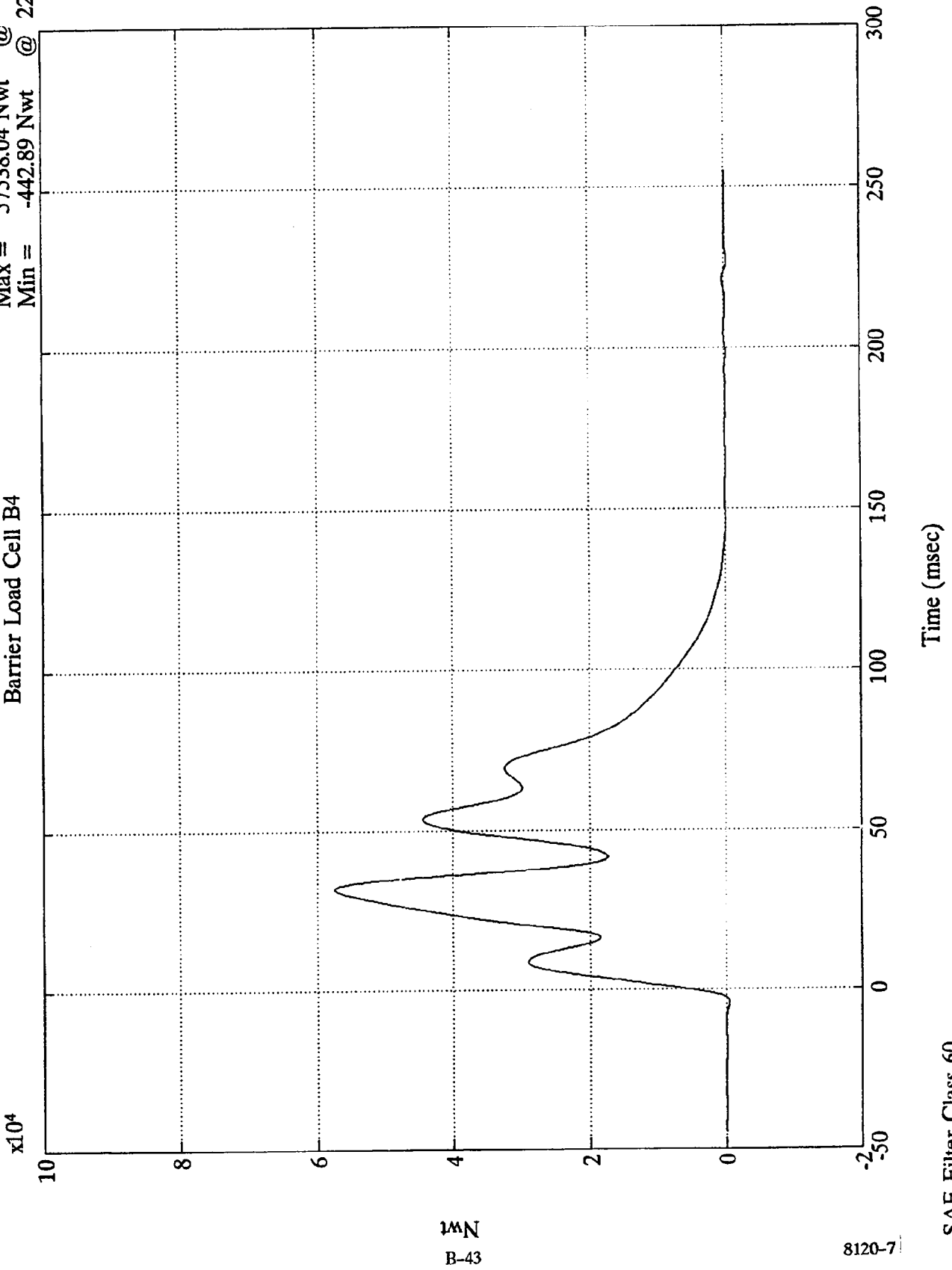
8120-7

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Barrier Load Cell B4

Max = 57538.04 Nwt @ 31.67 msec
Min = -442.89 Nwt @ 227.04 msec



1MN
B-43

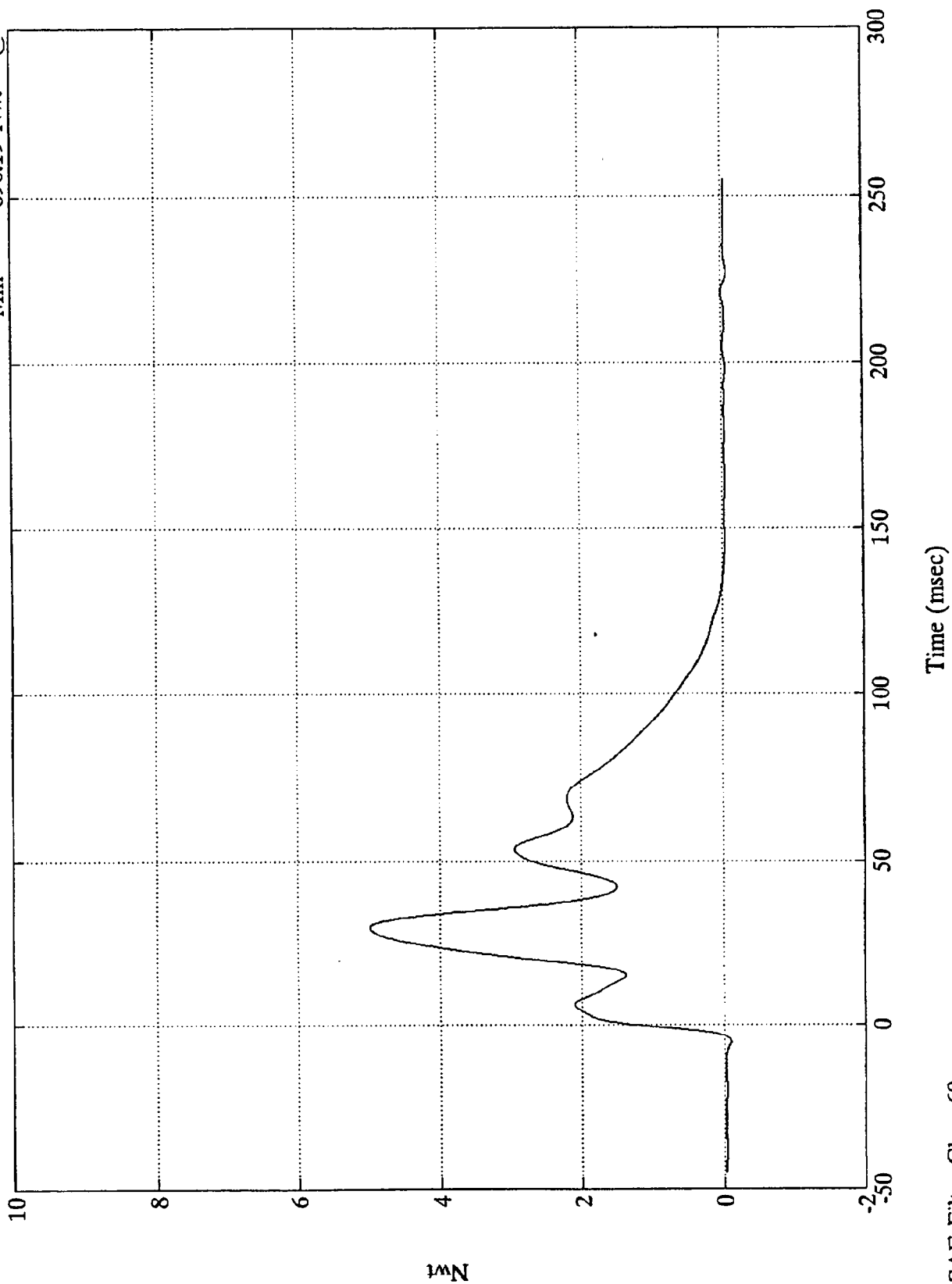
8120-7

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Barrier Load Cell B5

Max = 49867.96 Nwt @ 29.88 msec
Min = -890.19 Nwt @ -5.04 msec



13N
B-44

8120-7

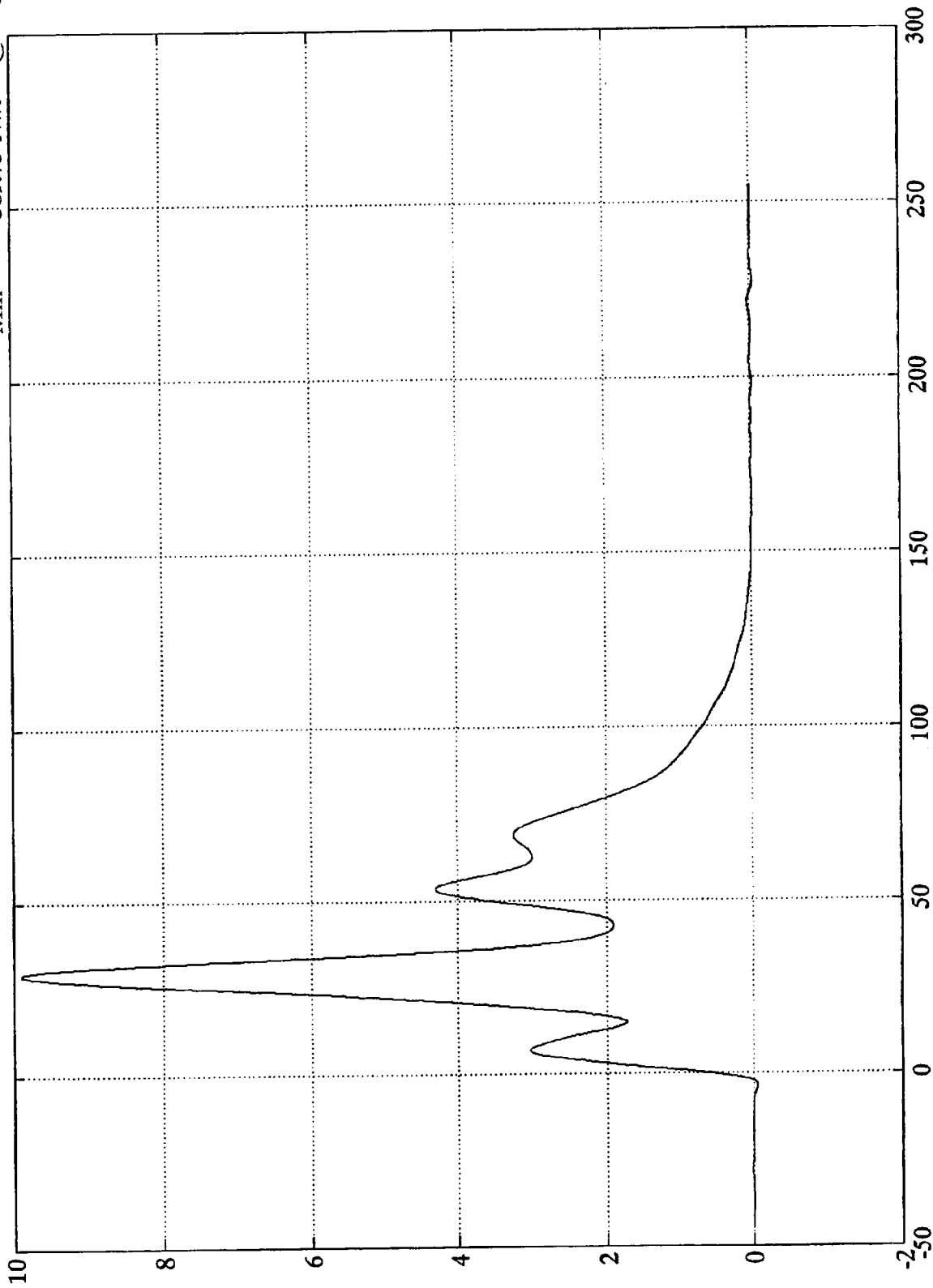
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Barrier Load Cell B6

Max = 99000.55 Nwt @ 29.15 msec
Min = -569.75 Nwt @ -3.84 msec

$\times 10^4$



1W
B-45

8120-7

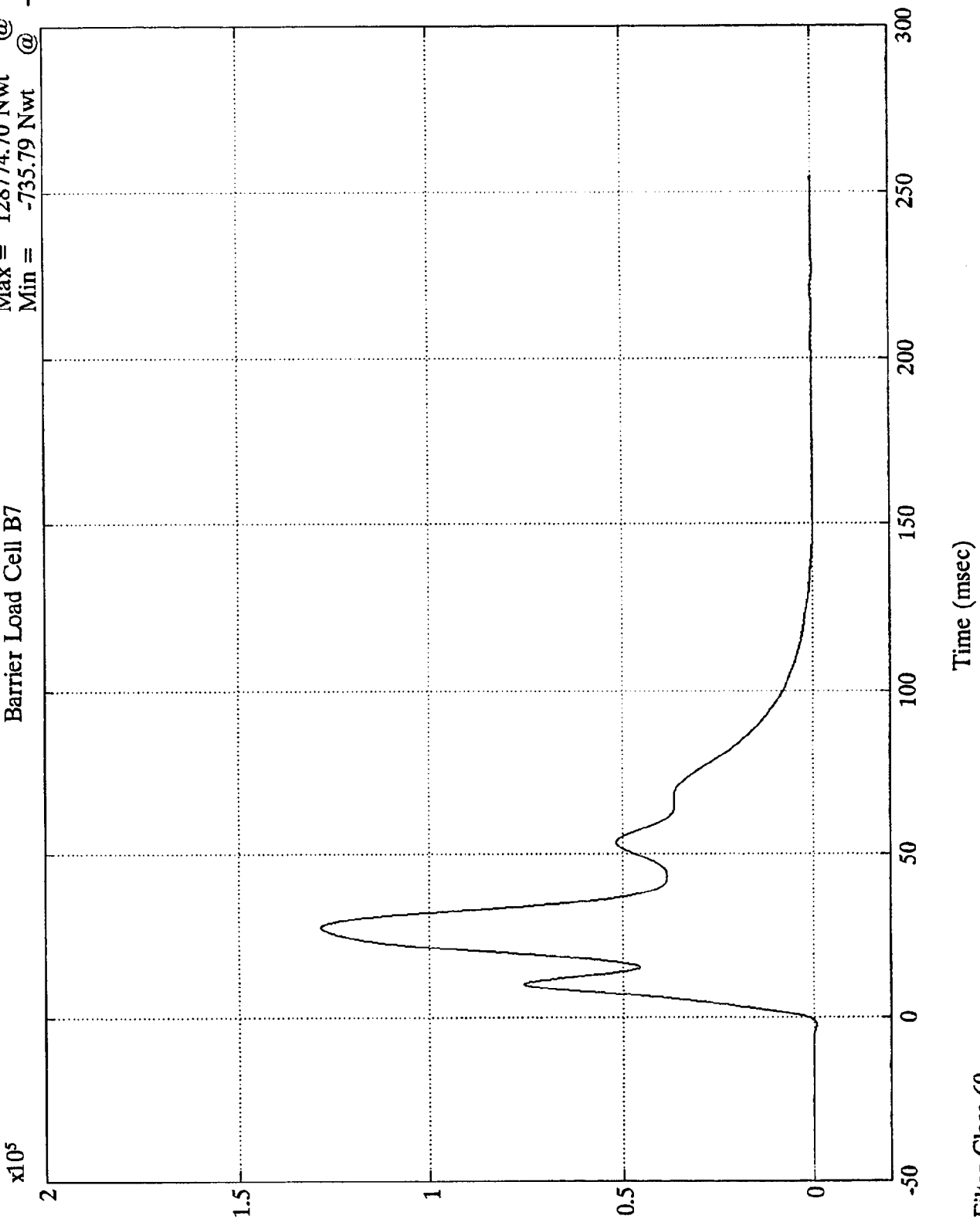
Time (msec)

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Barrier Load Cell B7

Max = 128774.70 Nwt @ 27.48 msec
Min = -735.79 Nwt @ -2.28 msec



1N
B-46

8120-7

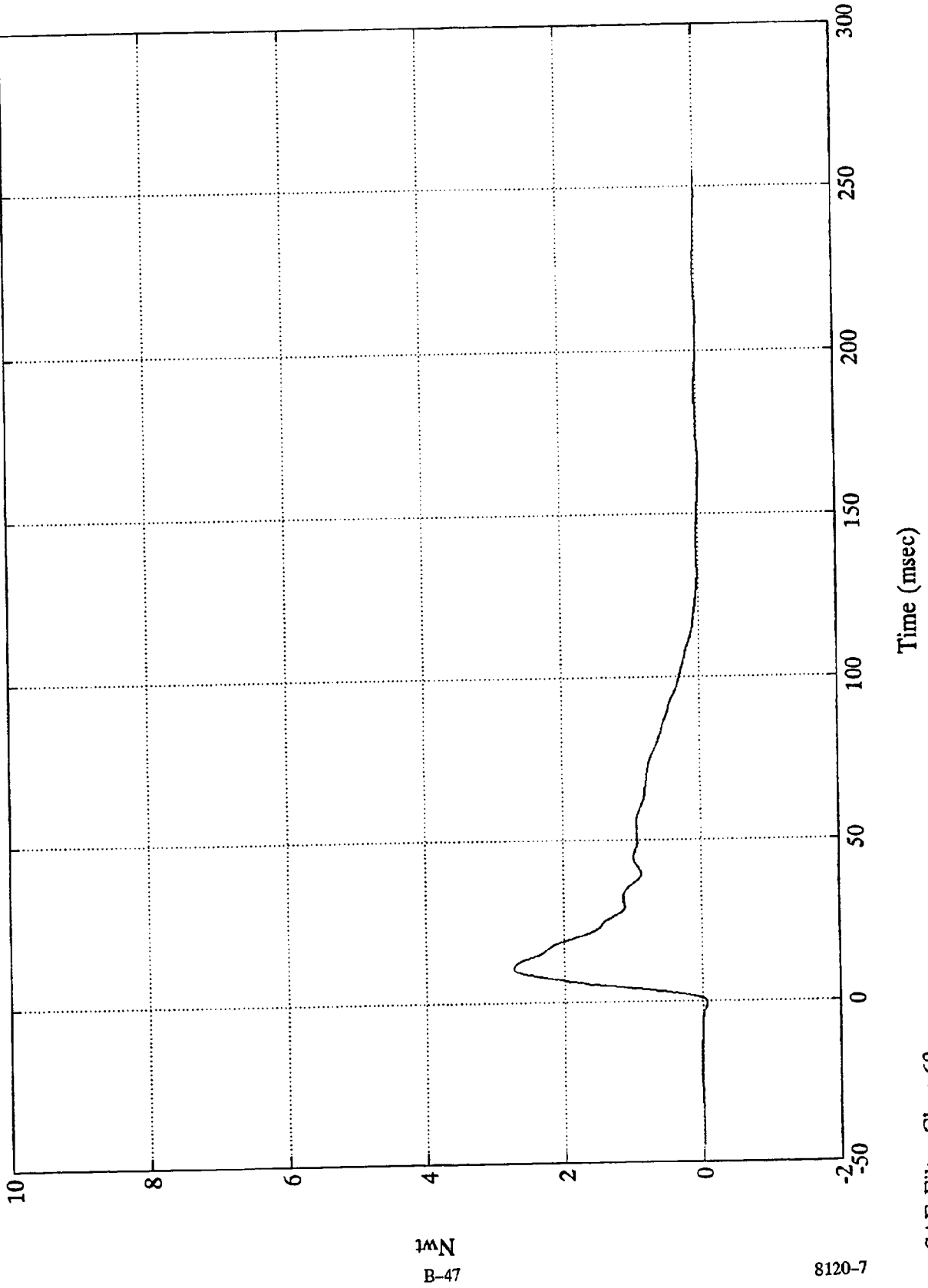
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

$\times 10^4$

Barrier Load Cell B8

Max = 27319.17 Nwt @ 10.43 msec
Min = -711.46 Nwt @ -0.84 msec



1wN
B-47

8120-7

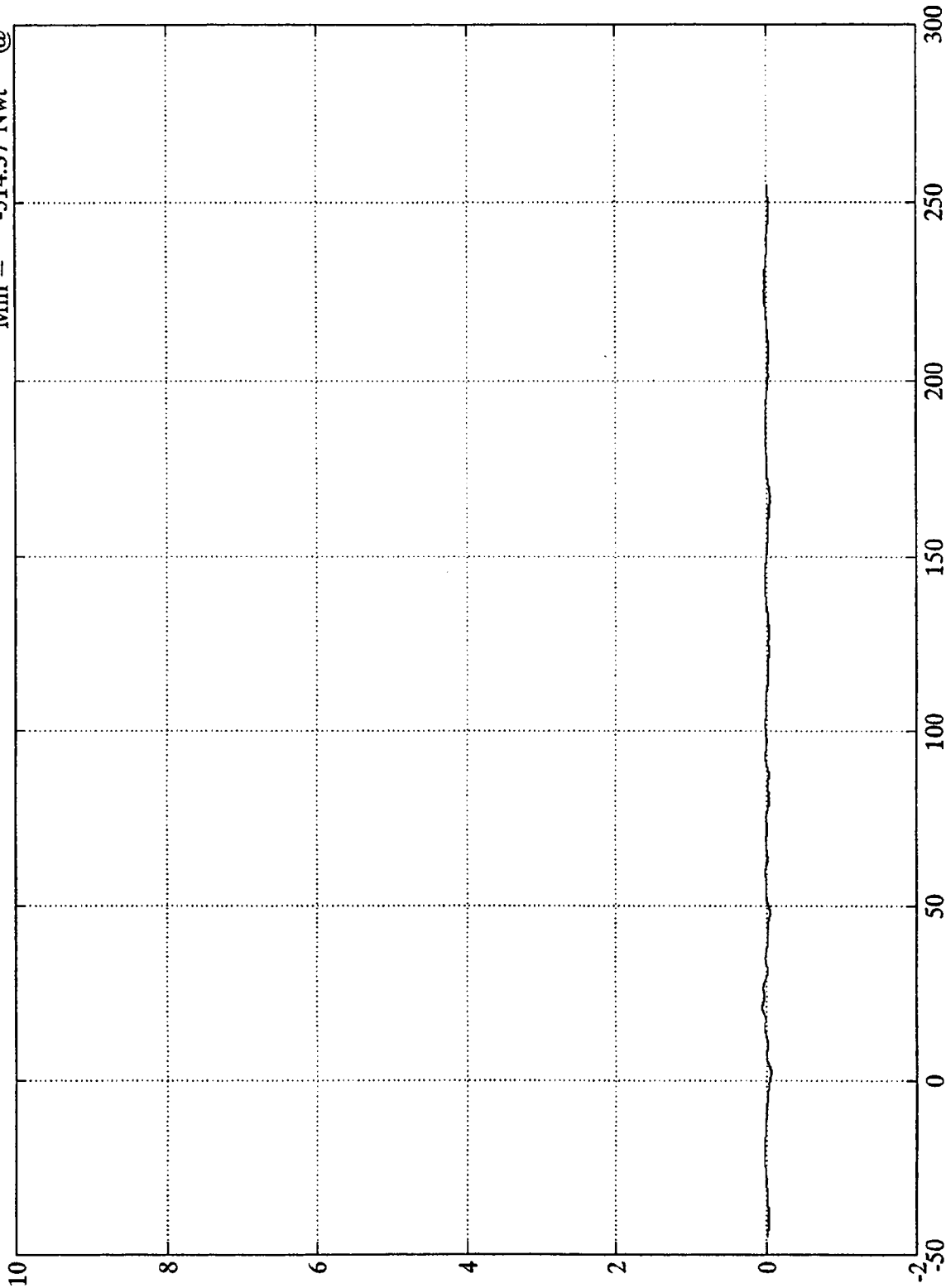
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Max = 660.78 Nwt @ 20.52 msec
 Min = -514.37 Nwt @ 2.03 msec

Barrier Load Cell B9

x10⁴



Time (msec)

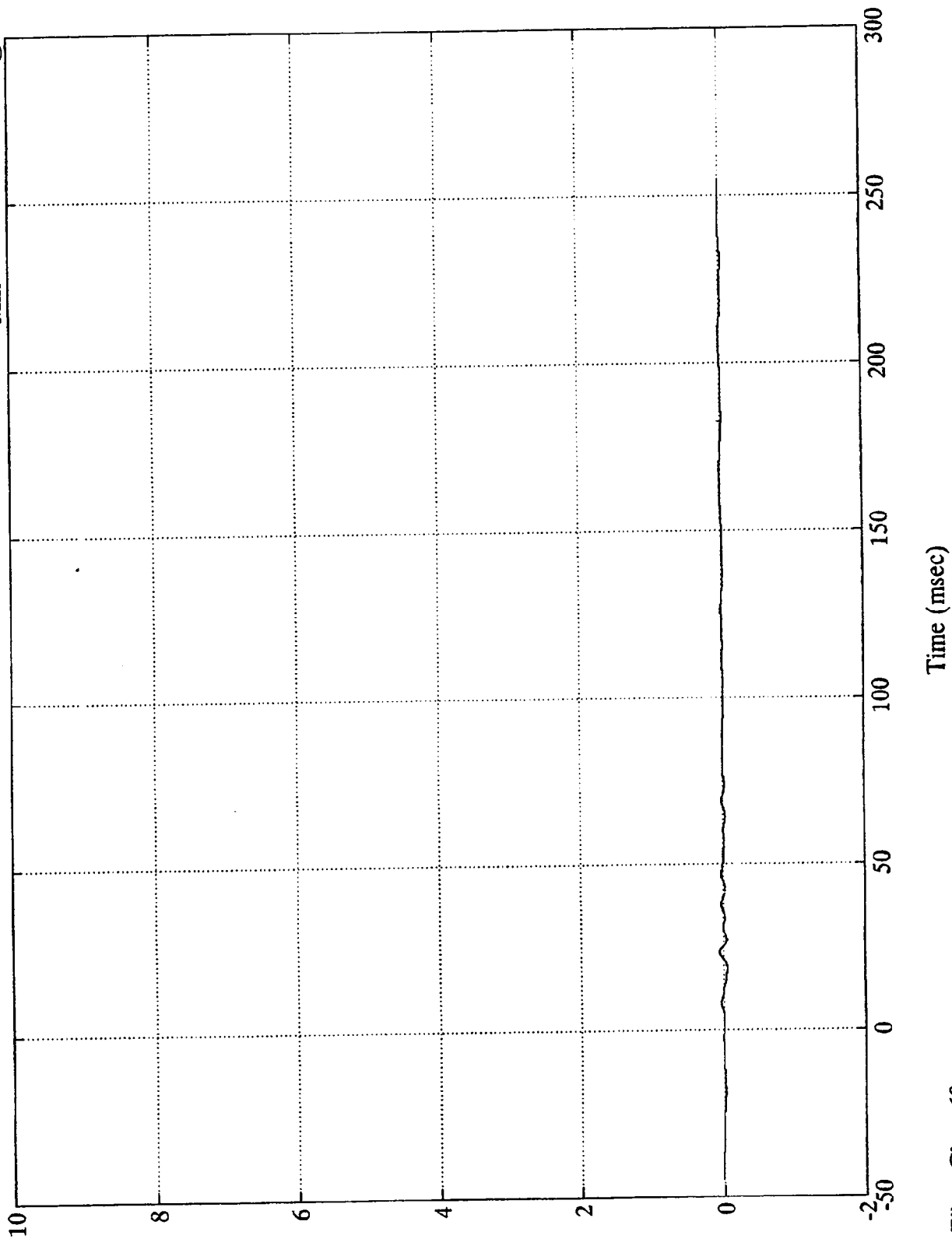
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

$\times 10^4$

Barrier Load Cell C1

Max = 616.73 Nwt @ 23.28 msec
Min = -563.48 Nwt @ 18.47 msec



11N
B-49

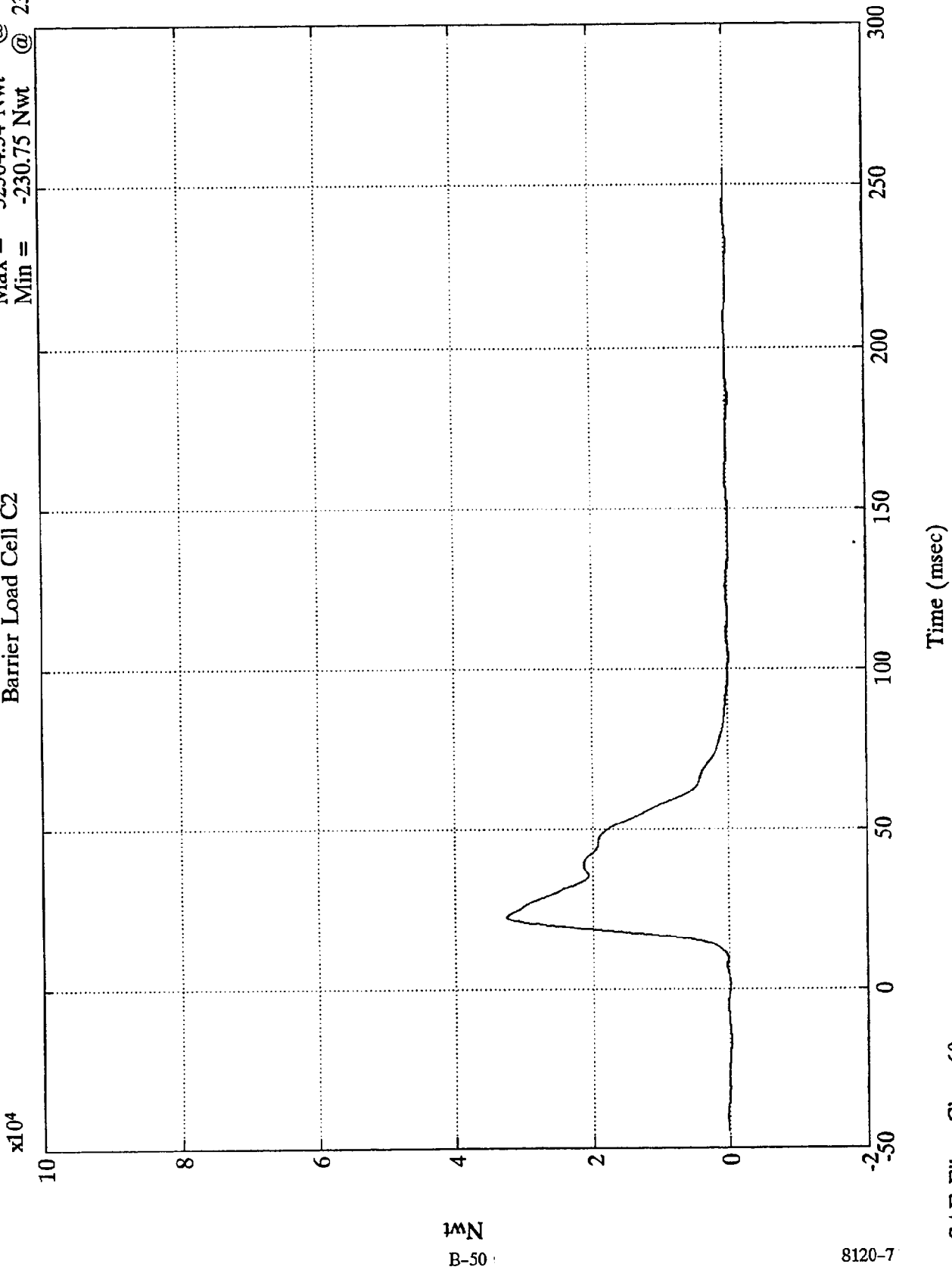
8120-7

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Max = 32504.34 Nwt @ 22.31 msec
Min = -230.75 Nwt @ 231.12 msec

Barrier Load Cell C2



B-50

8120-7

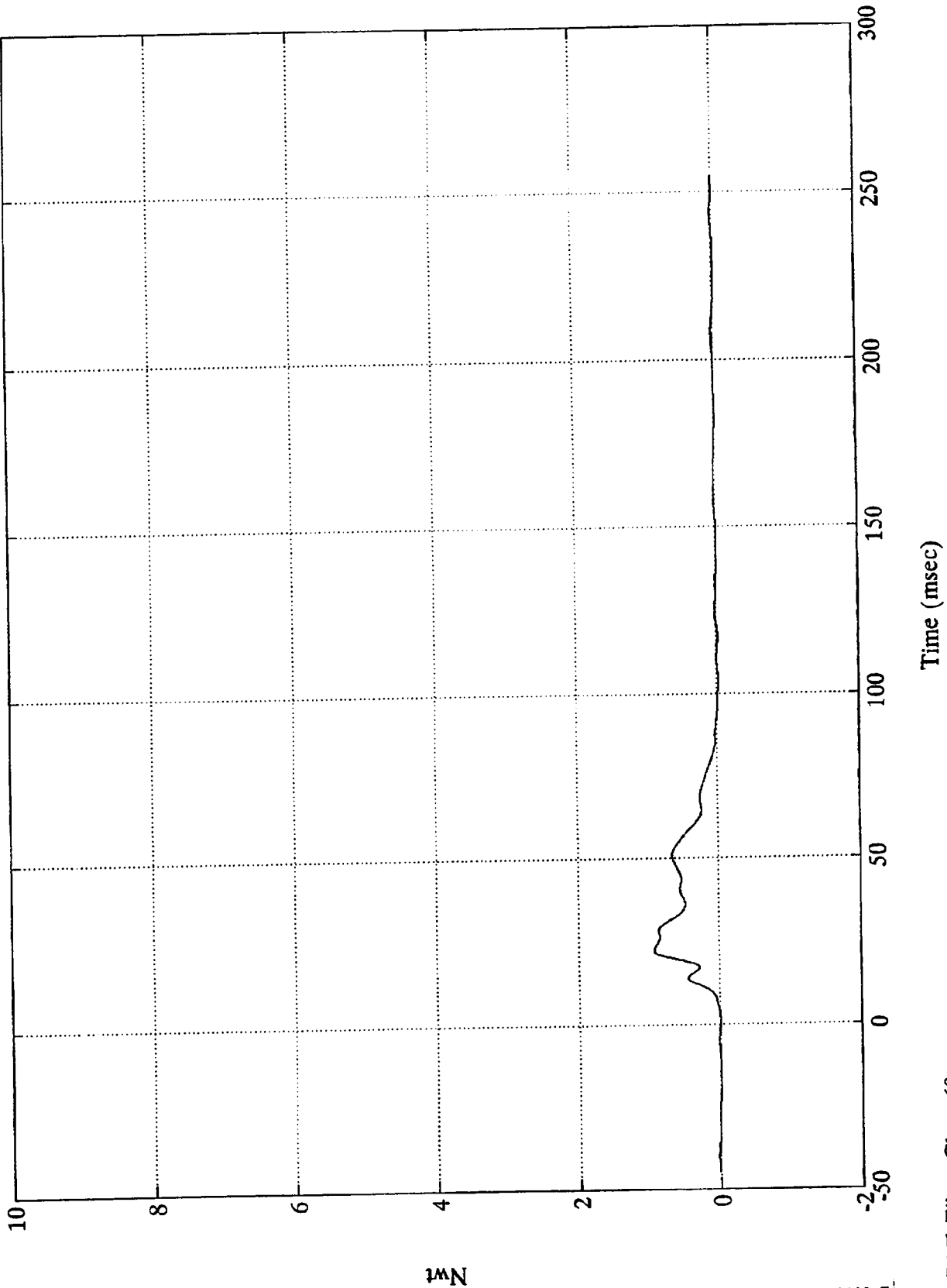
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

$\times 10^4$

Barrier Load Cell C3

Max = 9179.68 Nwt @ 22.43 msec
Min = -253.80 Nwt @ 103.68 msec



Nwt

B-51

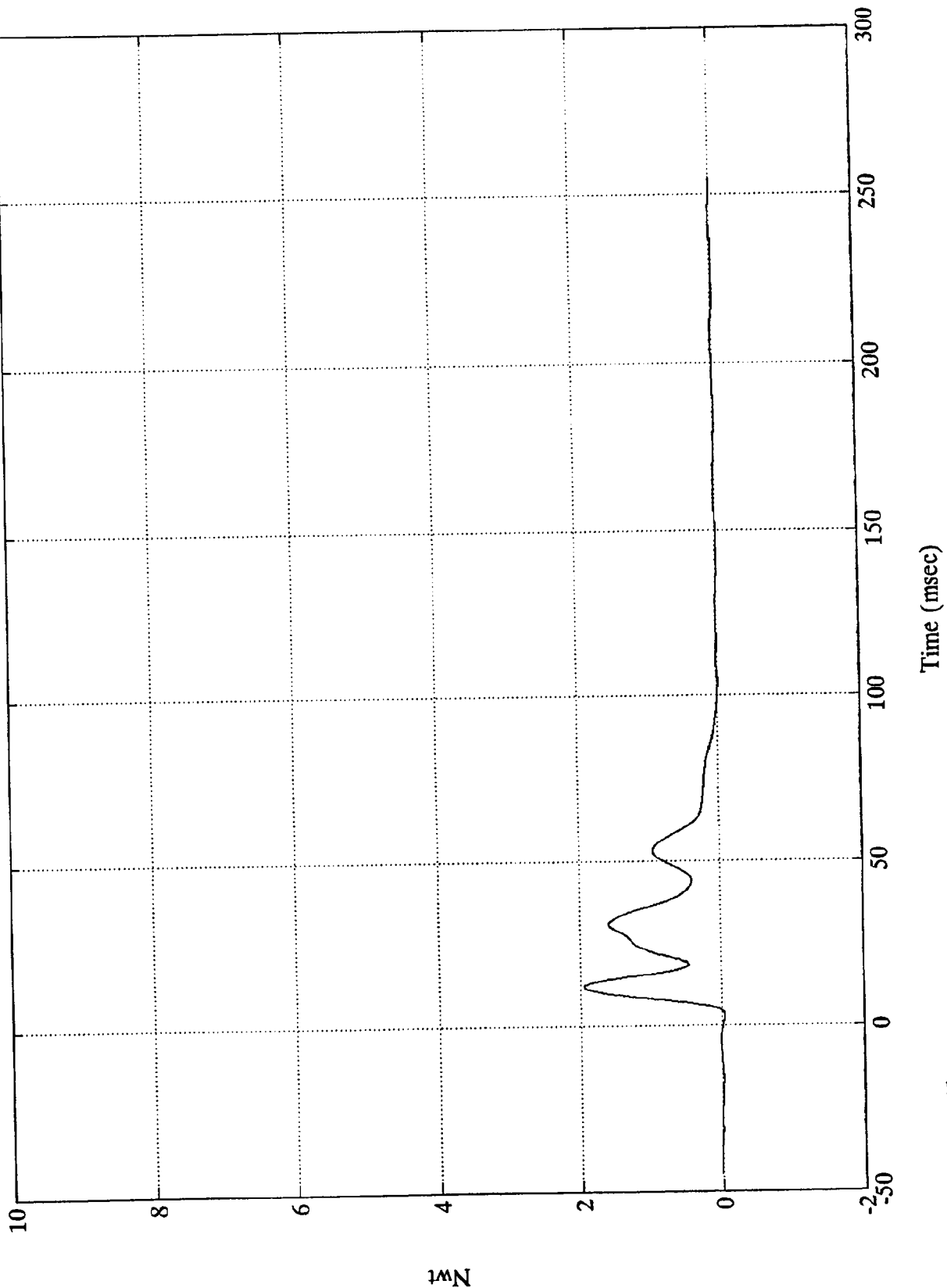
8120-7

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850
x10⁴

Barrier Load Cell C4

Max = 19498.13 Nwt @ 11.75 msec
Min = -443.28 Nwt @ 2.99 msec



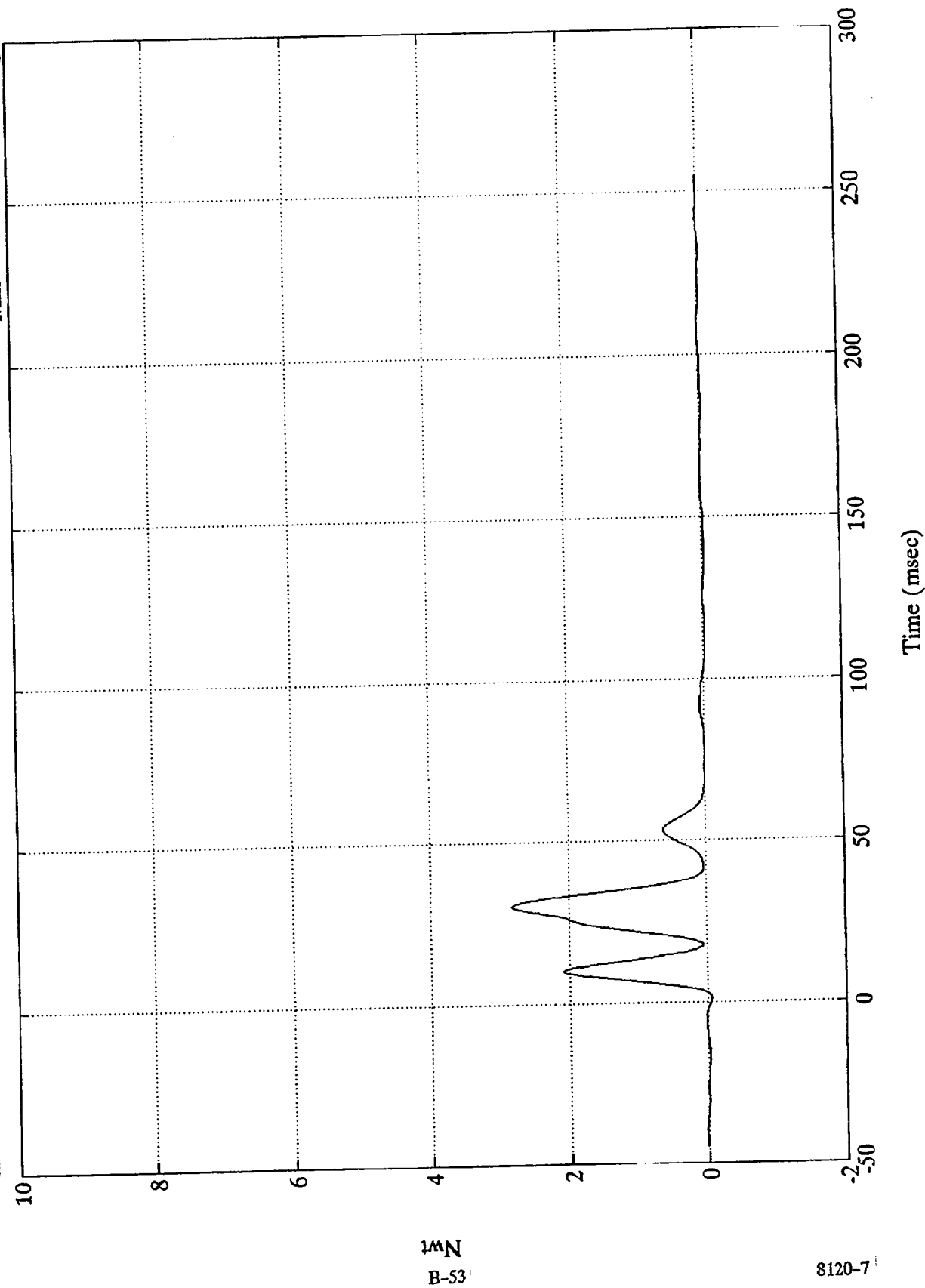
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Max = 28163.93 Nwt @ 30.12 msec
Min = -594.41 Nwt @ 1.07 msec

Barrier Load Cell C5

$\times 10^4$



SAE Filter Class 60

8120-7

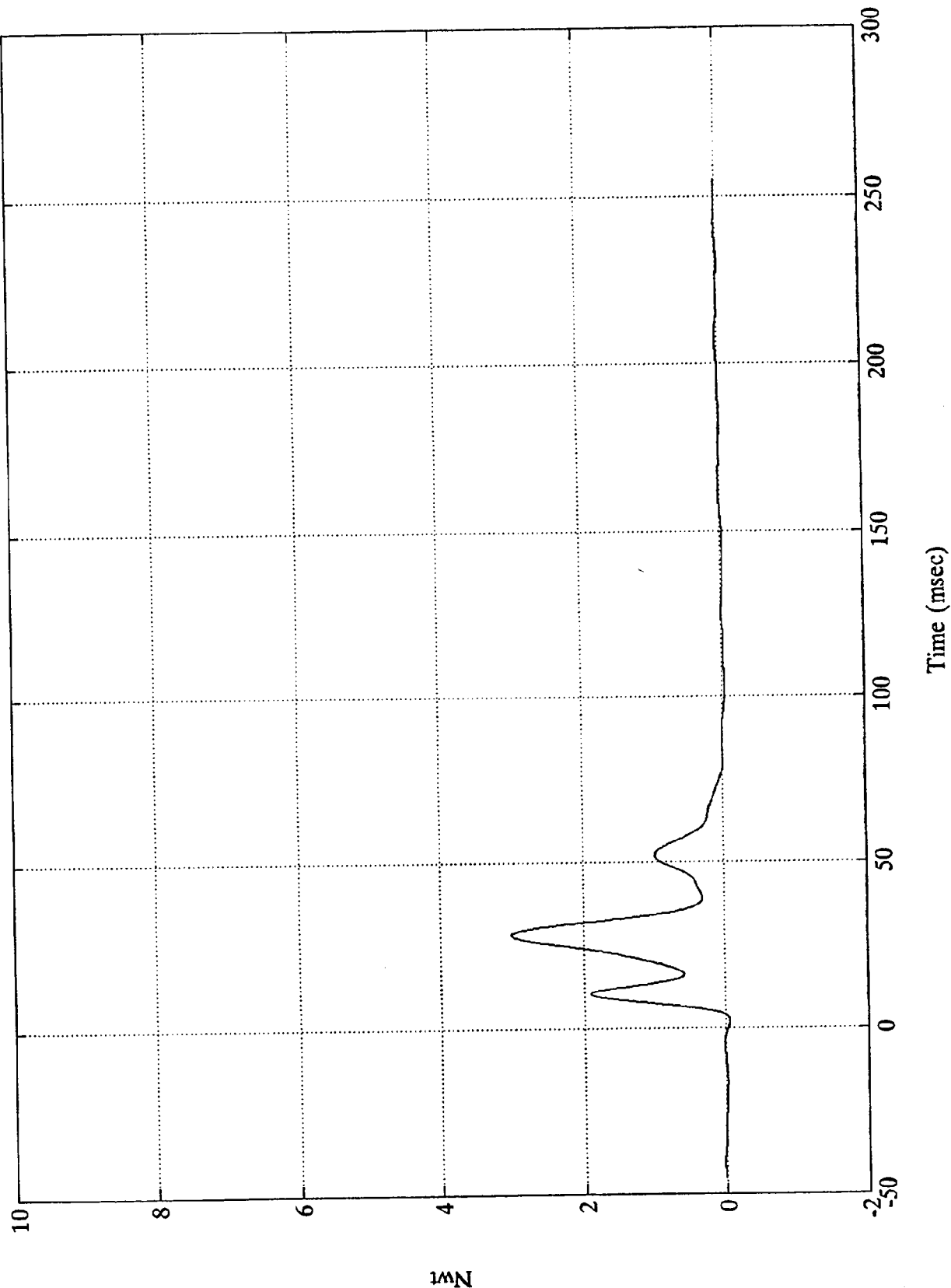
B-53

NCAP TEST #7 - 1994 VOLVO 850

$\times 10^4$

Barrier Load Cell C6

Max = 30077.43 Nwt @ 28.20 msec
Min = -569.92 Nwt @ 2.15 msec



Nwt

B-54

8120-7

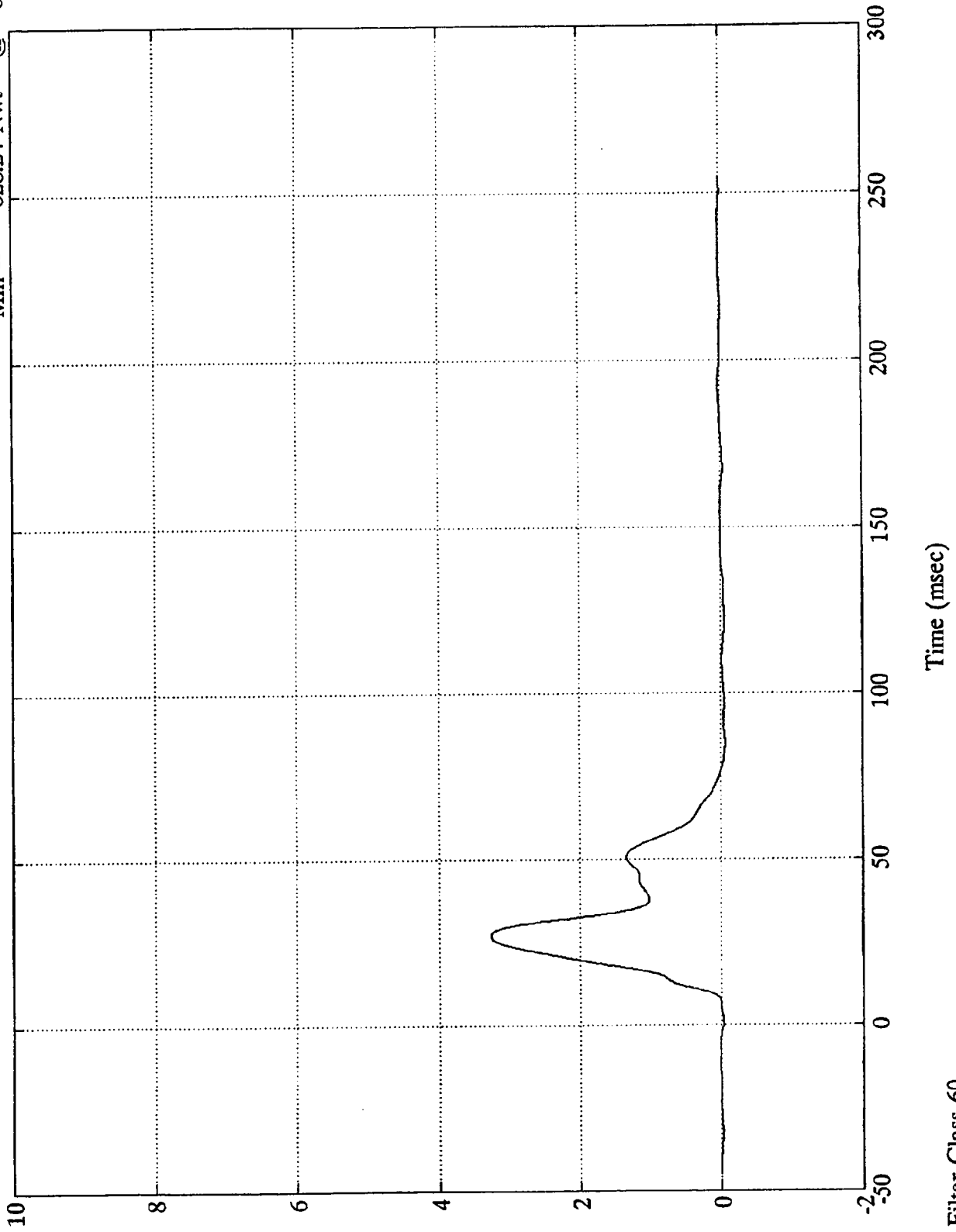
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

$\times 10^4$

Barrier Load Cell C7

Max = 32640.57 Nwt @ 27.00 msec
Min = -628.24 Nwt @ 84.59 msec



10N

B-55

8120-7

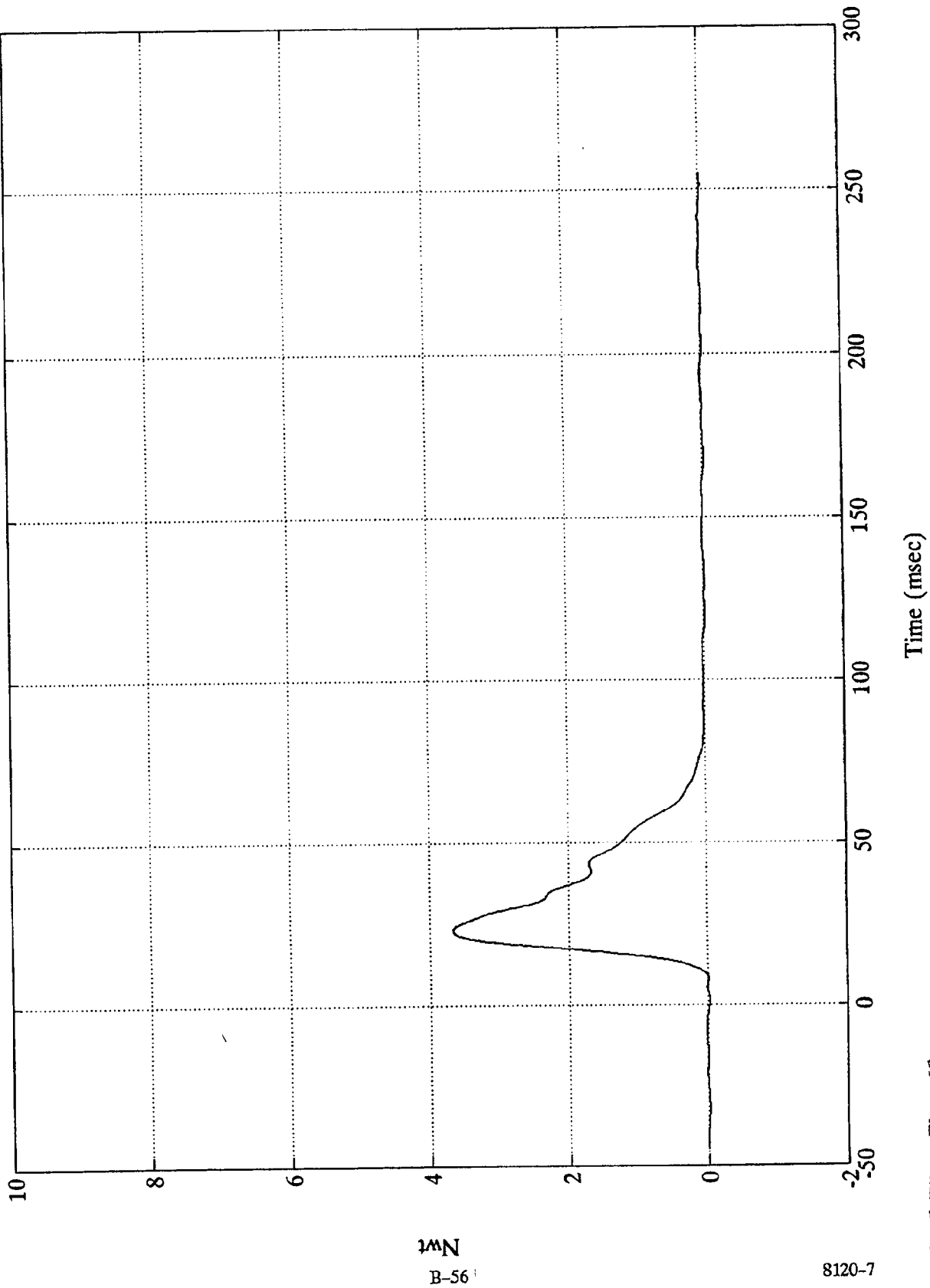
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

$\times 10^4$

Barrier Load Cell C8

Max = 36691.39 Nwt @ 22.92 msec
Min = -283.64 Nwt @ 1.19 msec



B-56

8120-7

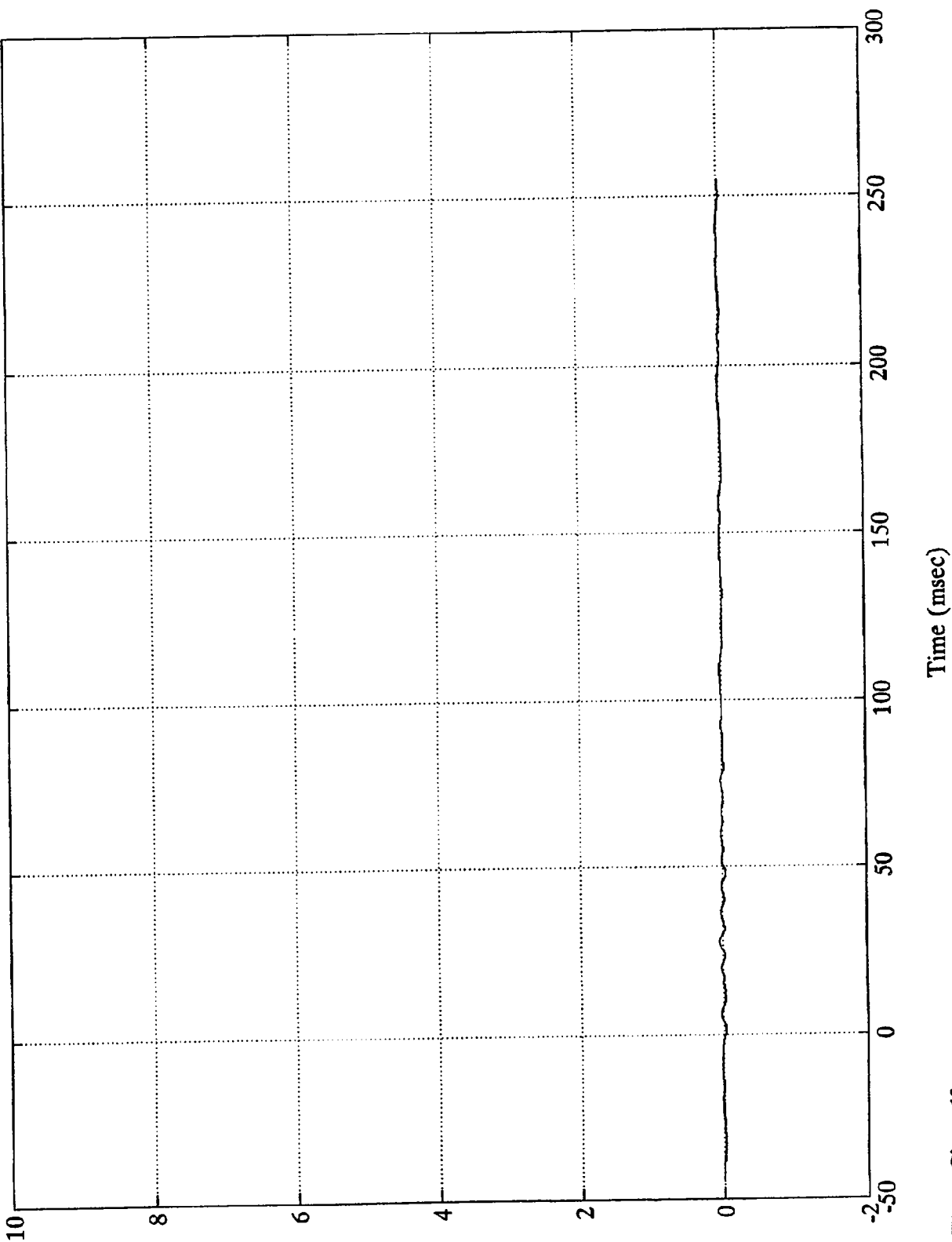
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

$\times 10^4$

Barrier Load Cell C9

Max = 509.30 Nwt @ 27.60 msec
Min = -452.21 Nwt @ 48.00 msec



B-57

8120-7

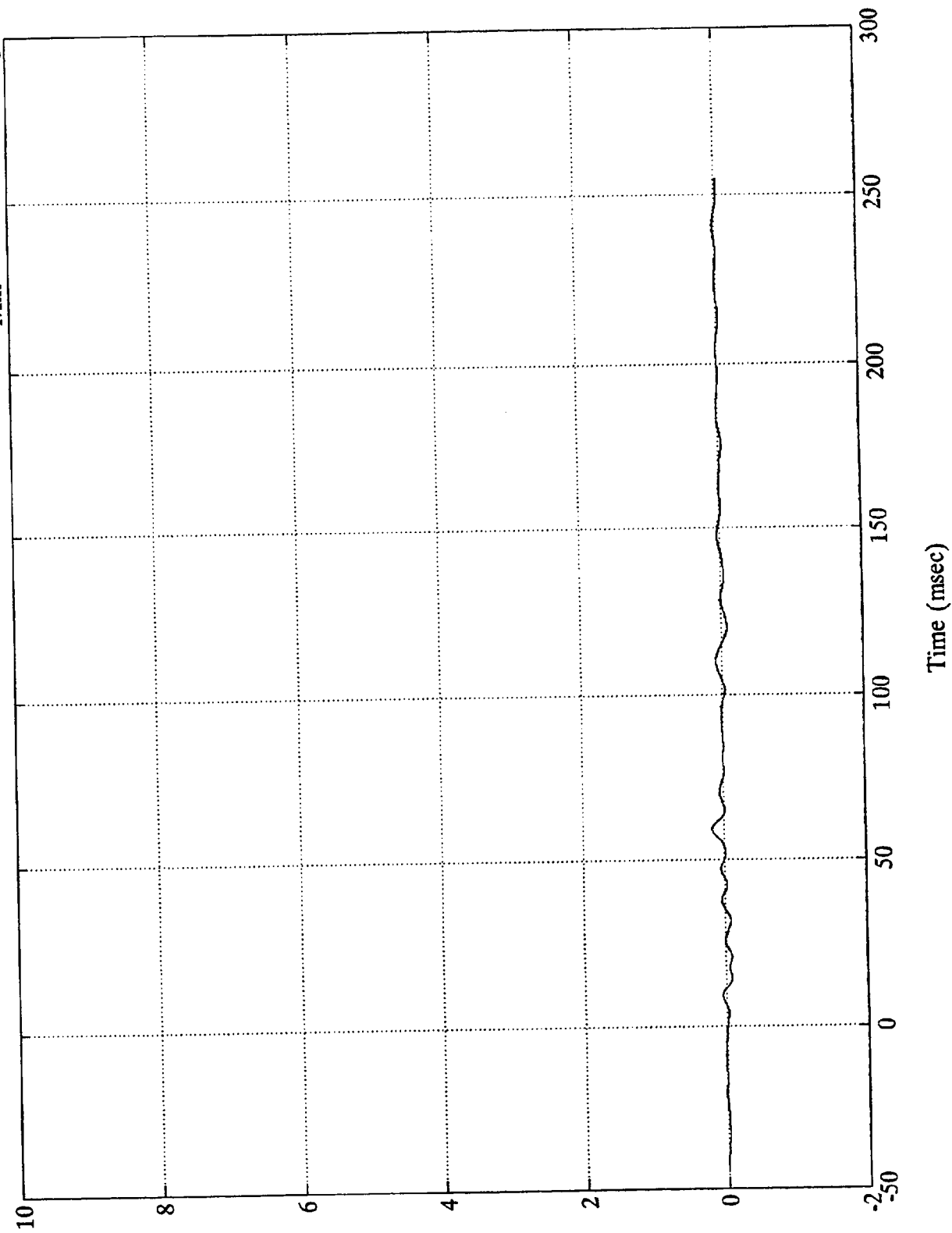
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

$\times 10^4$

Barrier Load Cell D1

Max = 1756.23 Nwt @ 59.15 msec
Min = -882.12 Nwt @ 20.63 msec



B-58

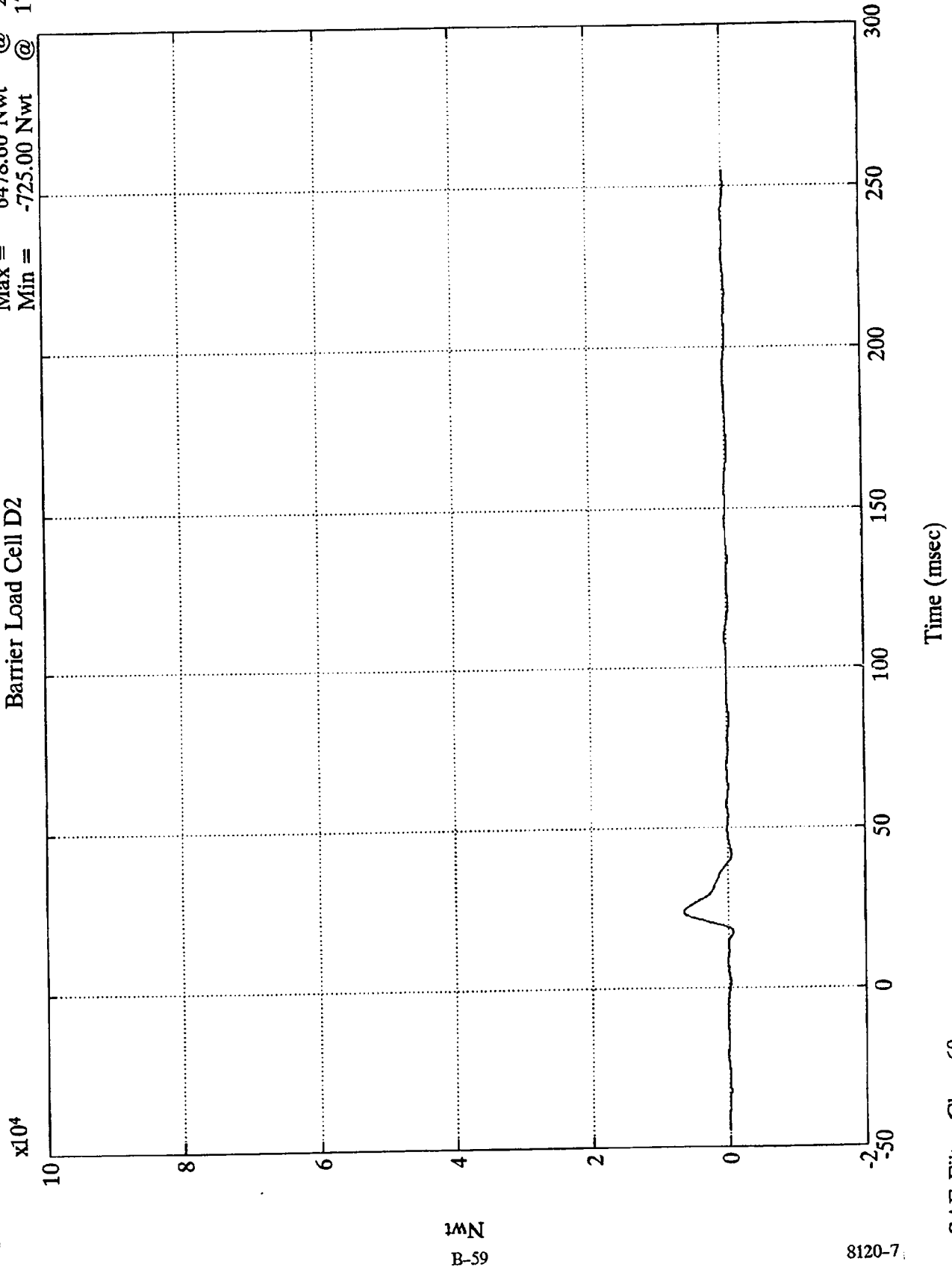
8120-7

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Barrier Load Cell D2

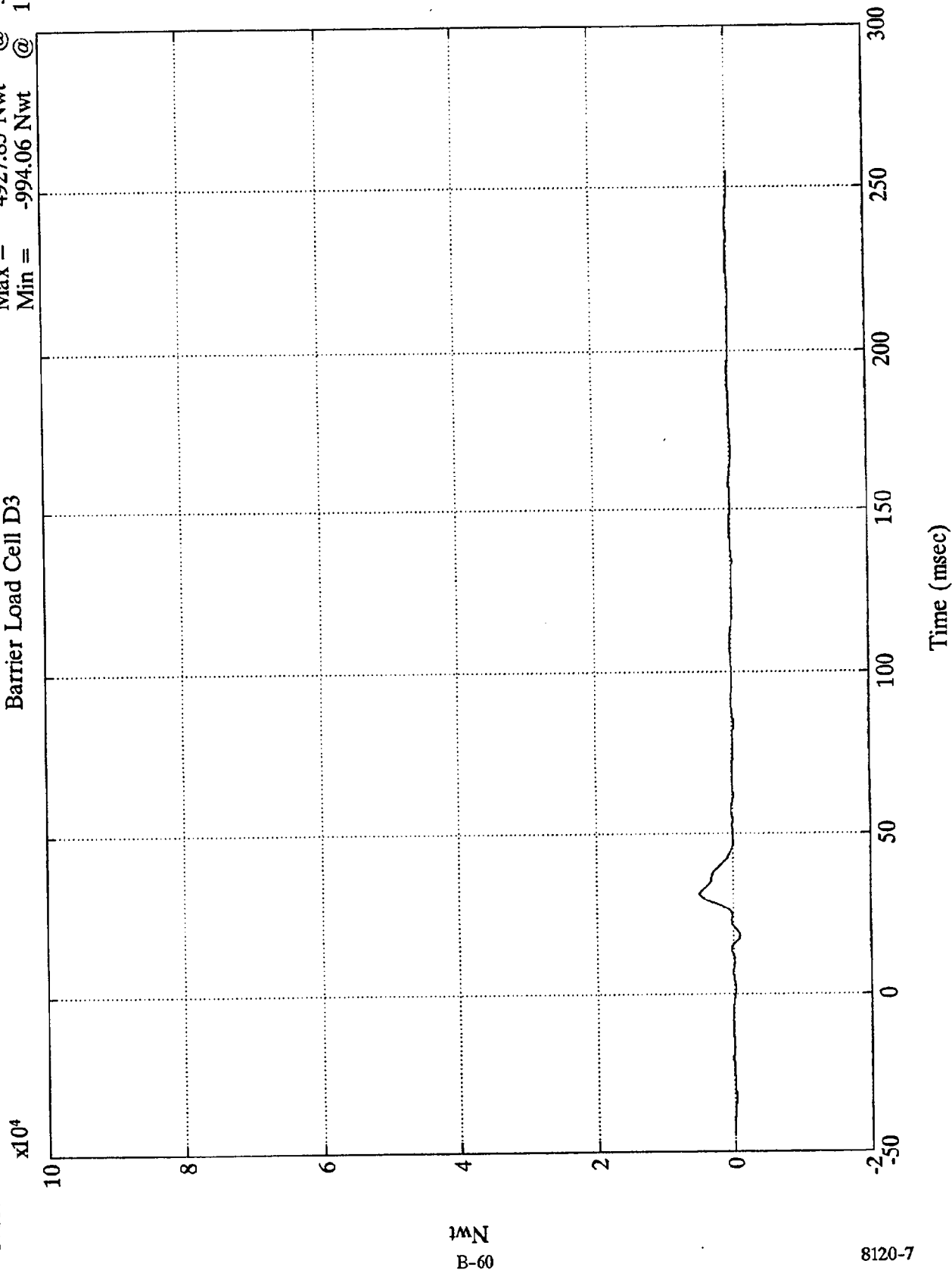
Max = 6478.60 Nwt @ 23.63 msec
Min = -725.00 Nwt @ 17.27 msec



NCAP TEST #7 - 1994 VOLVO 850

Barrier Load Cell D3

Max = 4927.85 Nwt @ 30.84 msec
Min = -994.06 Nwt @ 18.12 msec



SAE Filter Class 60

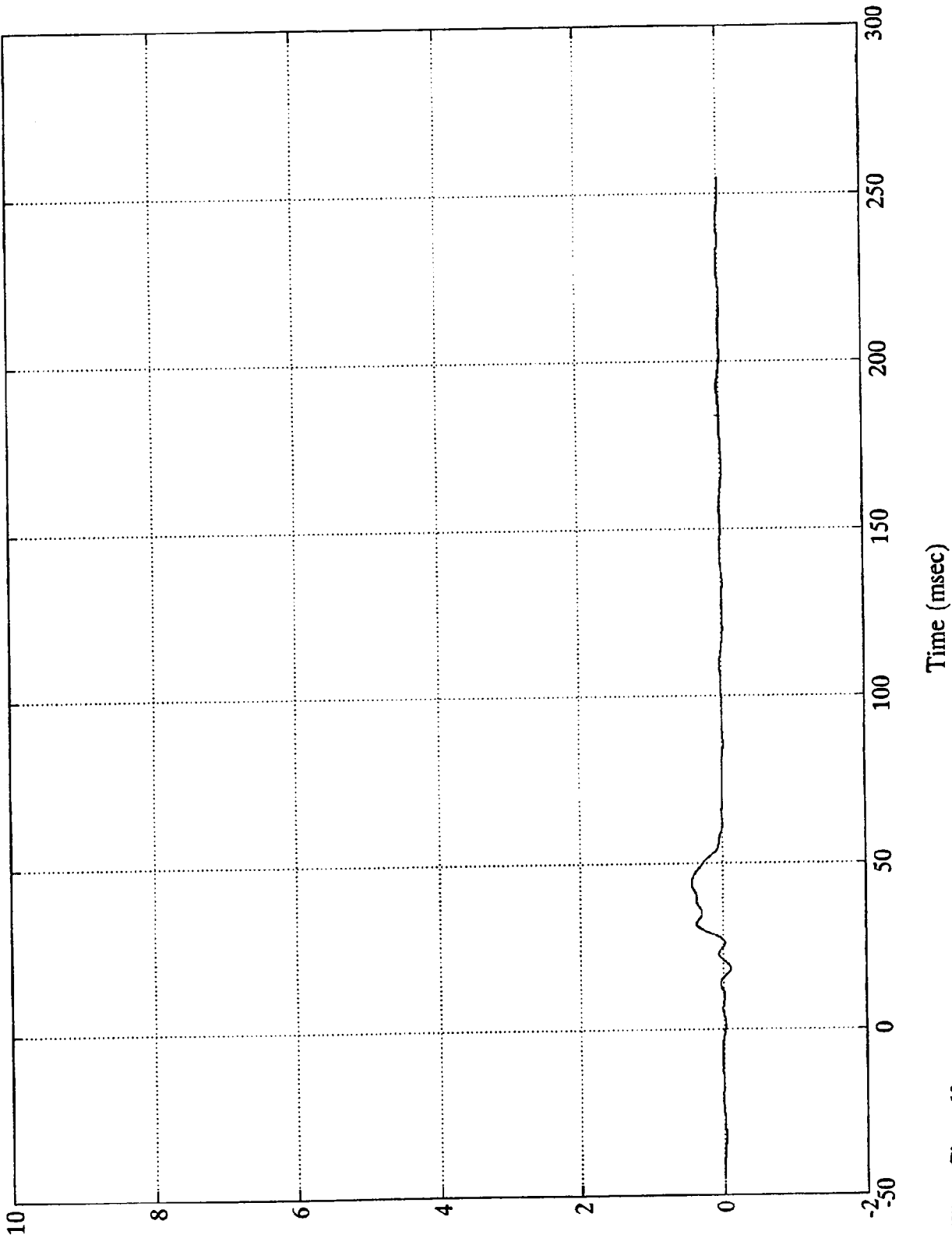
8120-7

NCAP TEST #7 - 1994 VOLVO 850

$\times 10^4$

Barrier Load Cell D4

Max = 4338.57 Nwt @ 44.04 msec
Min = -1070.79 Nwt @ 18.00 msec



1Nwt
B-61

8120-7

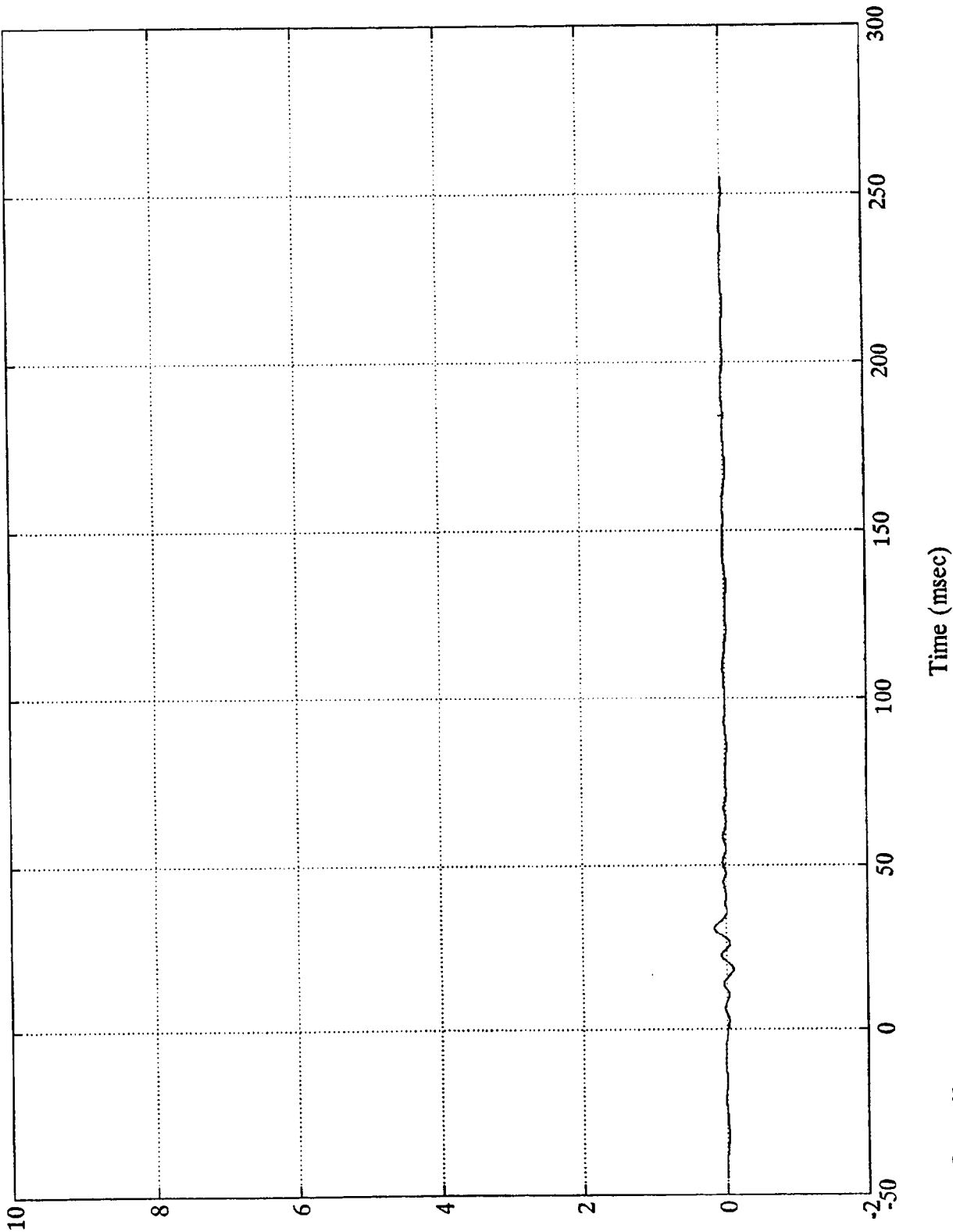
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Max = 1577.13 Nwt @ 30.60 msec
Min = -1030.94 Nwt @ 18.23 msec

Barrier Load Cell D5

$\times 10^4$



11N
B-62

8120-7

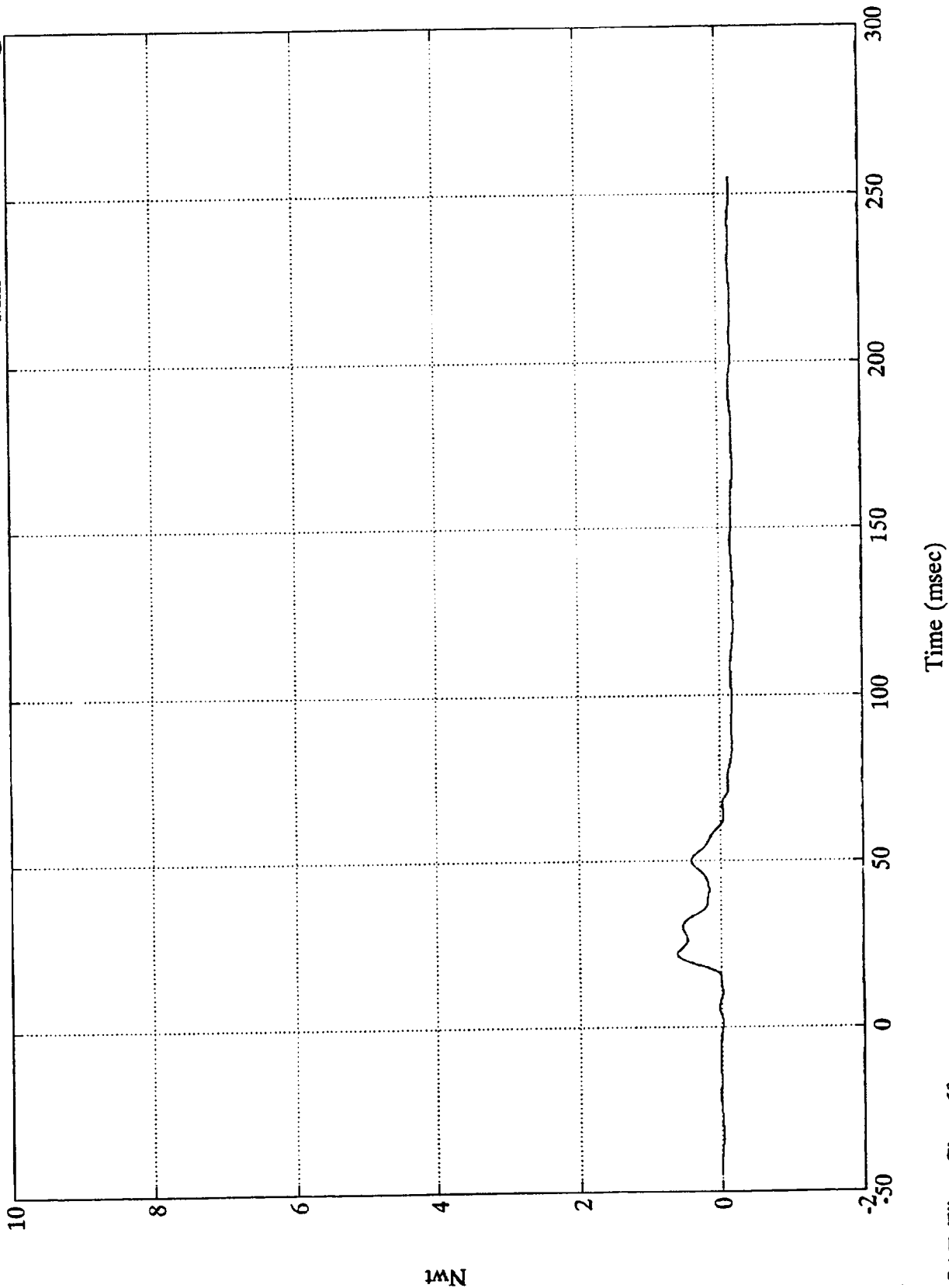
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

$\times 10^4$

Barrier Load Cell D6

Max = 6193.68 Nwt @ 21.95 msec
Min = -2038.01 Nwt @ 167.88 msec



1N
B-63

8120-7

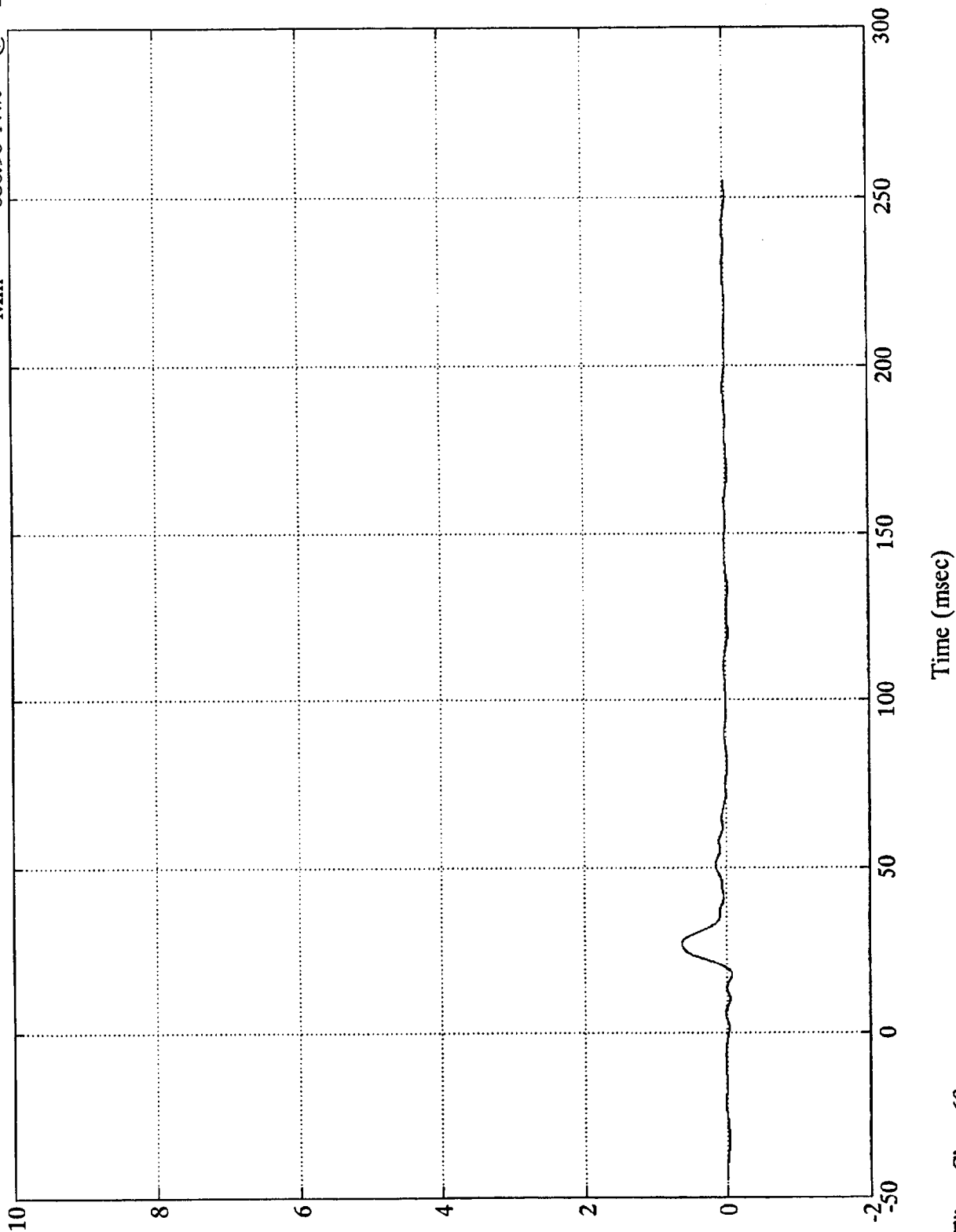
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

$\times 10^4$

Barrier Load Cell D7

Max = 6374.00 Nwt @ 26.87 msec
Min = -680.96 Nwt @ 17.63 msec



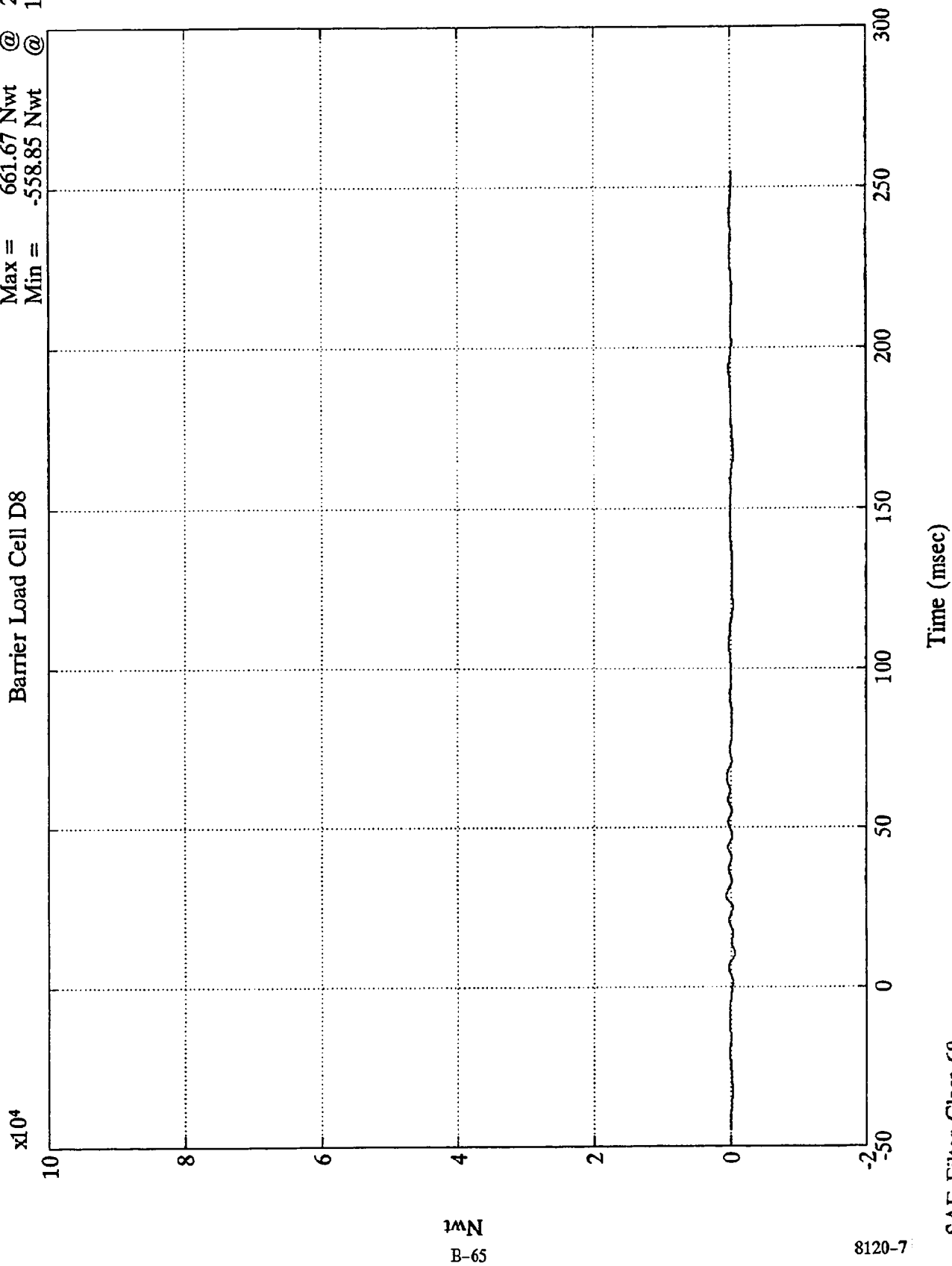
1W
B-64

8120-7

SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

Barrier Load Cell D8
Max = 661.67 Nwt @ 28.44 msec
Min = -558.85 Nwt @ 10.55 msec



B-65

8120-7

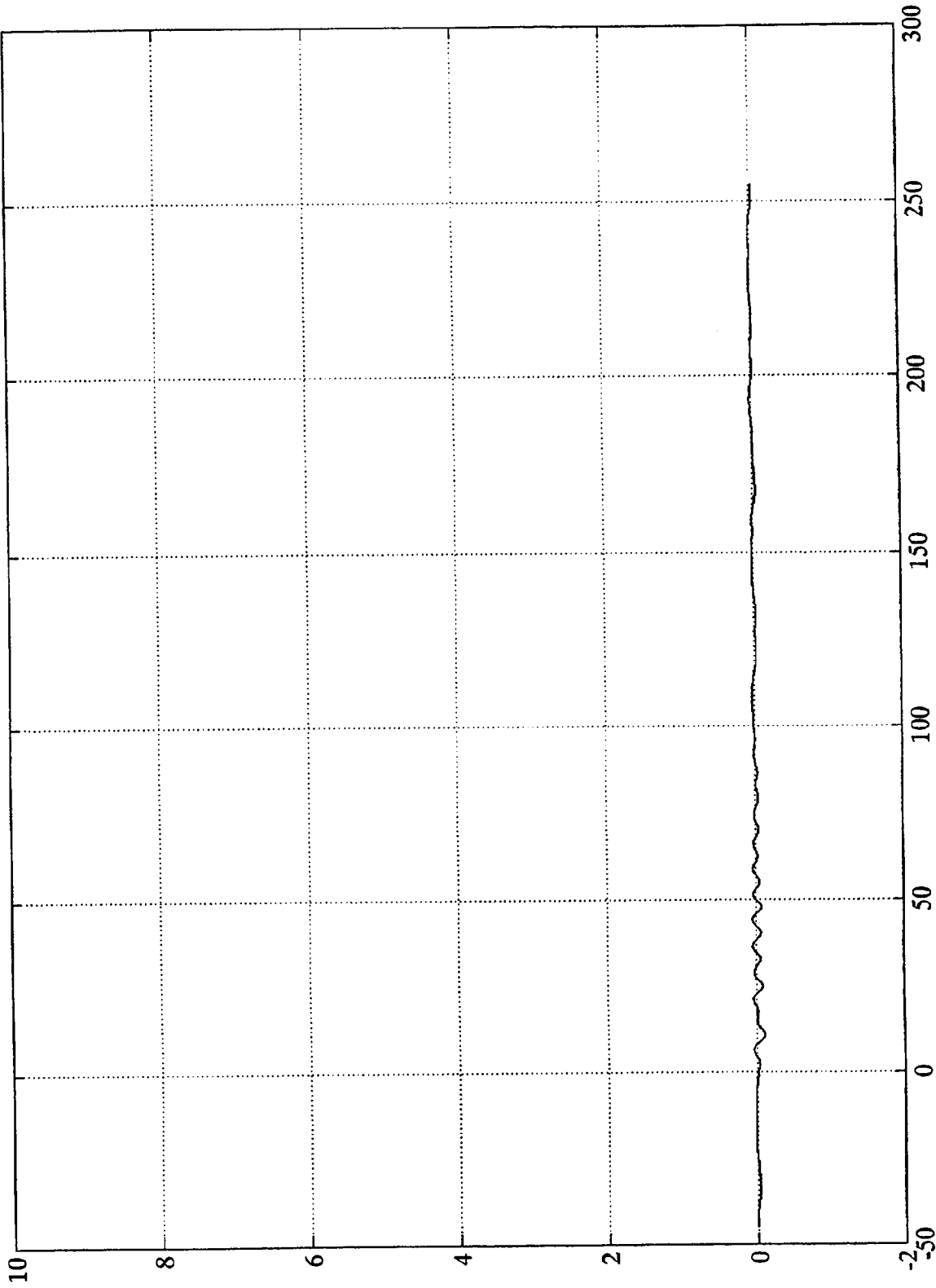
SAE Filter Class 60

NCAP TEST #7 - 1994 VOLVO 850

x10⁴

Barrier Load Cell D9

Max = 505.09 Nwt @ 44.04 msec
Min = -976.08 Nwt @ 10.67 msec



Time (msec)

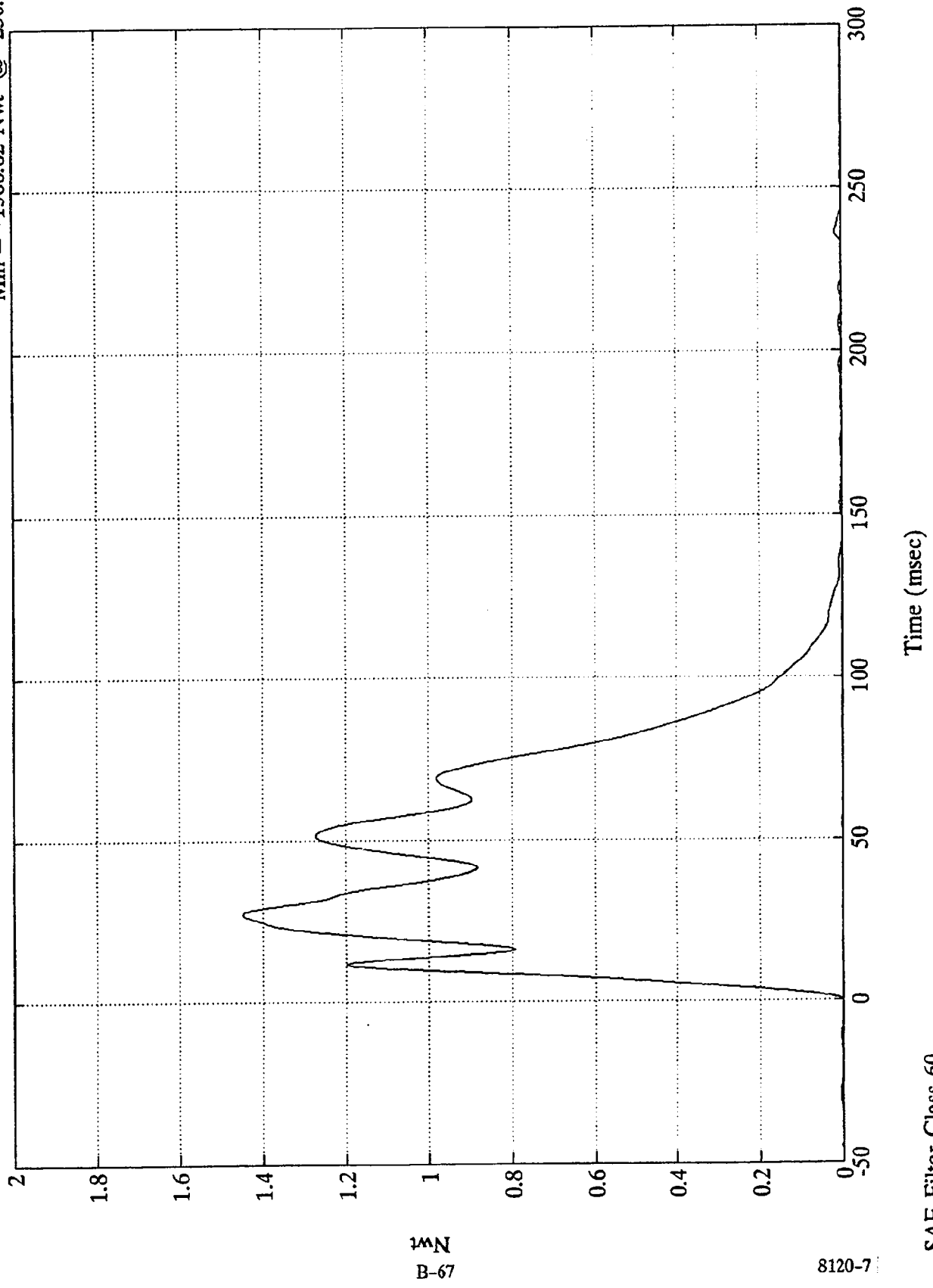
SAE Filter Class 60

TEST #7 - 1994 VOLVO 850

$\times 10^5$

Group 1 Load Cell Sum

Max = 144903.00 Nwt @ 27.48 msec
Min = -1560.62 Nwt @ 230.88 msec



14N
B-67

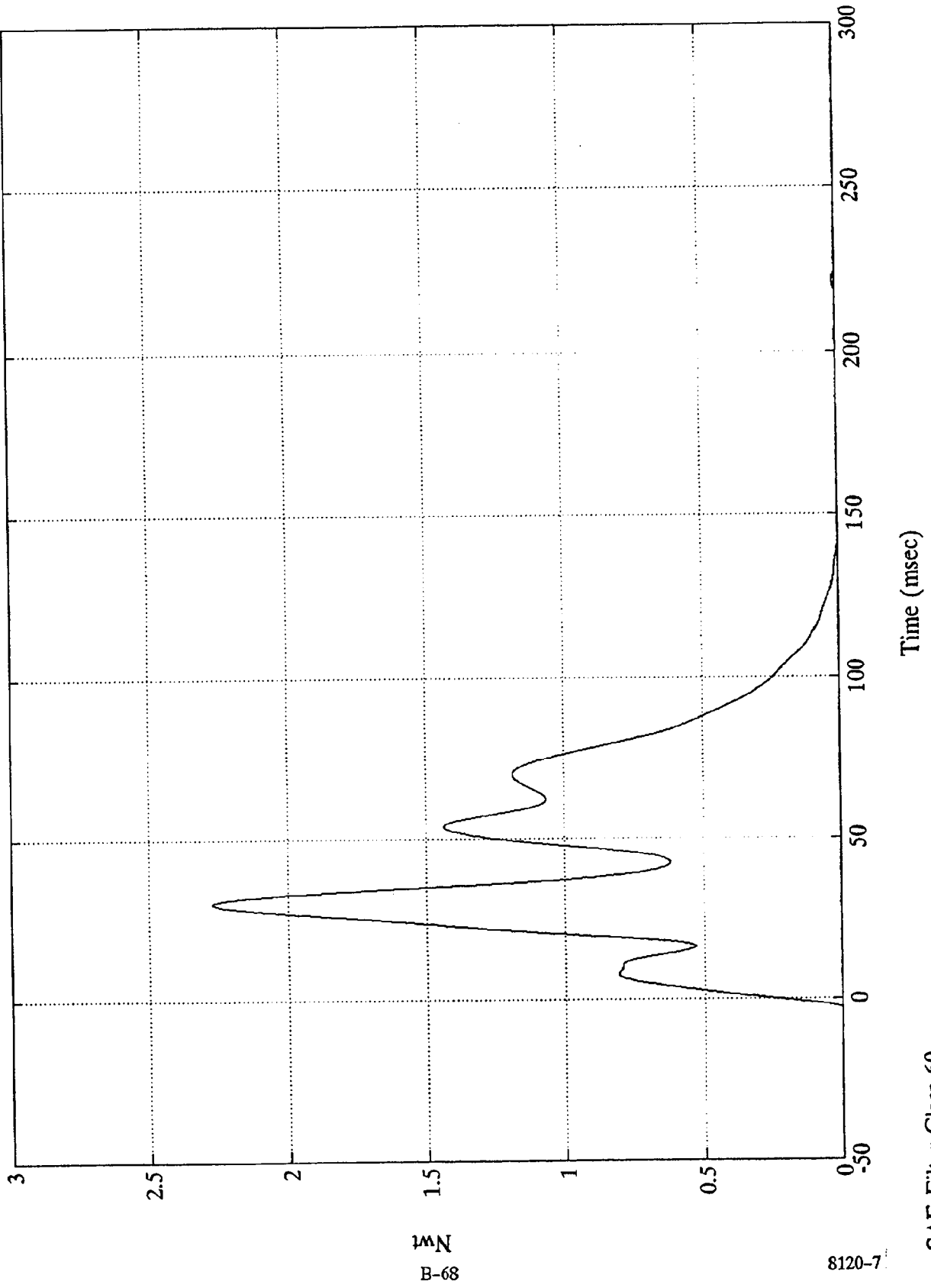
8120-7

SAE Filter Class 60

TEST #7 - 1994 VOLVO 850
x10⁵

Group 2 Load Cell Sum

Max = 227069.00 Nwt @ 30.00 msec
Min = -1905.90 Nwt @ 227.40 msec



B-68

8120-7

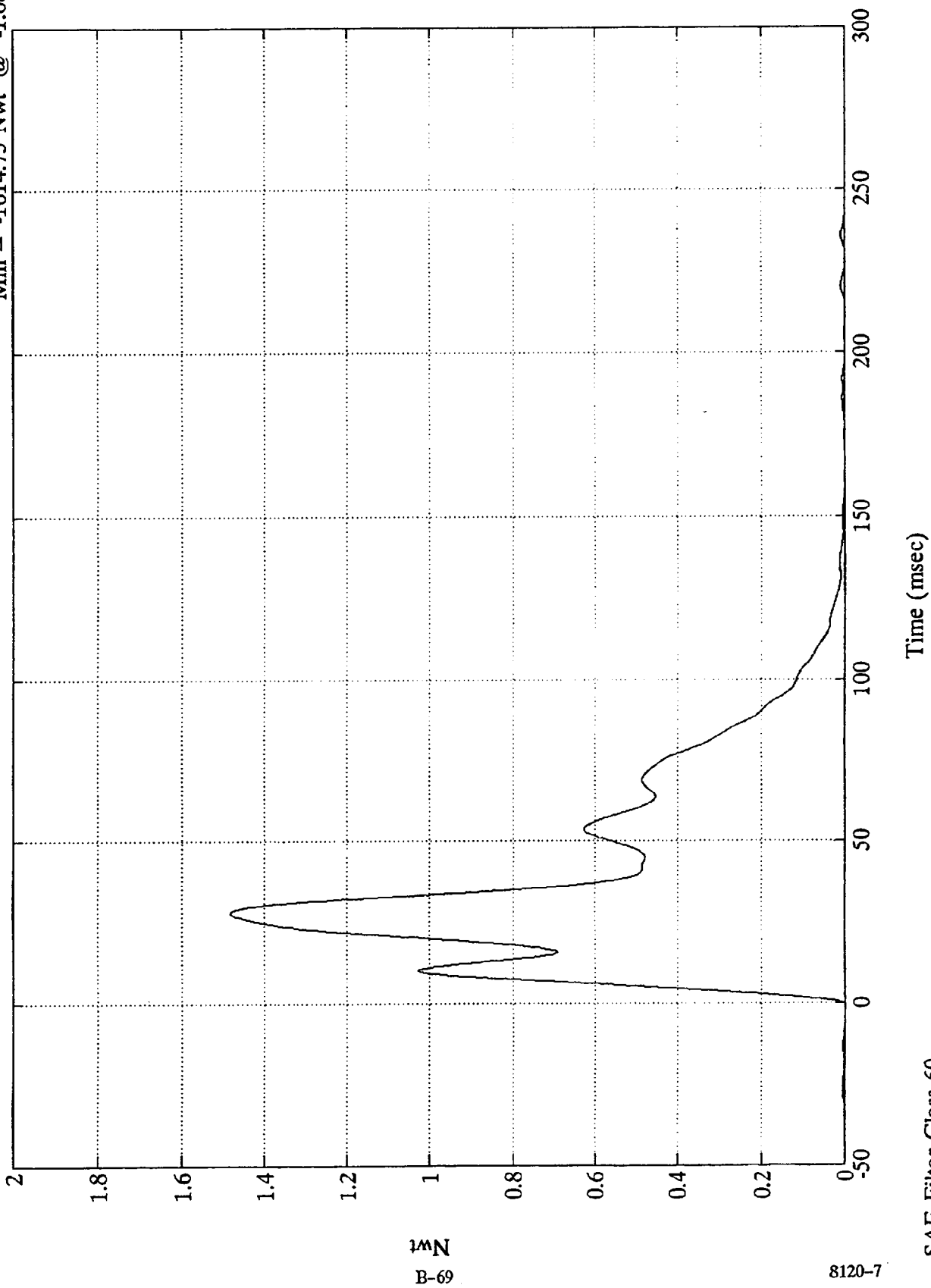
SAE Filter Class 60

TEST #7 - 1994 VOLVO 850

Group 3 Load Cell Sum

Max = 148262.00 Nwt @ 27.72 msec
Min = -1614.75 Nwt @ -1.68 msec

$\times 10^5$



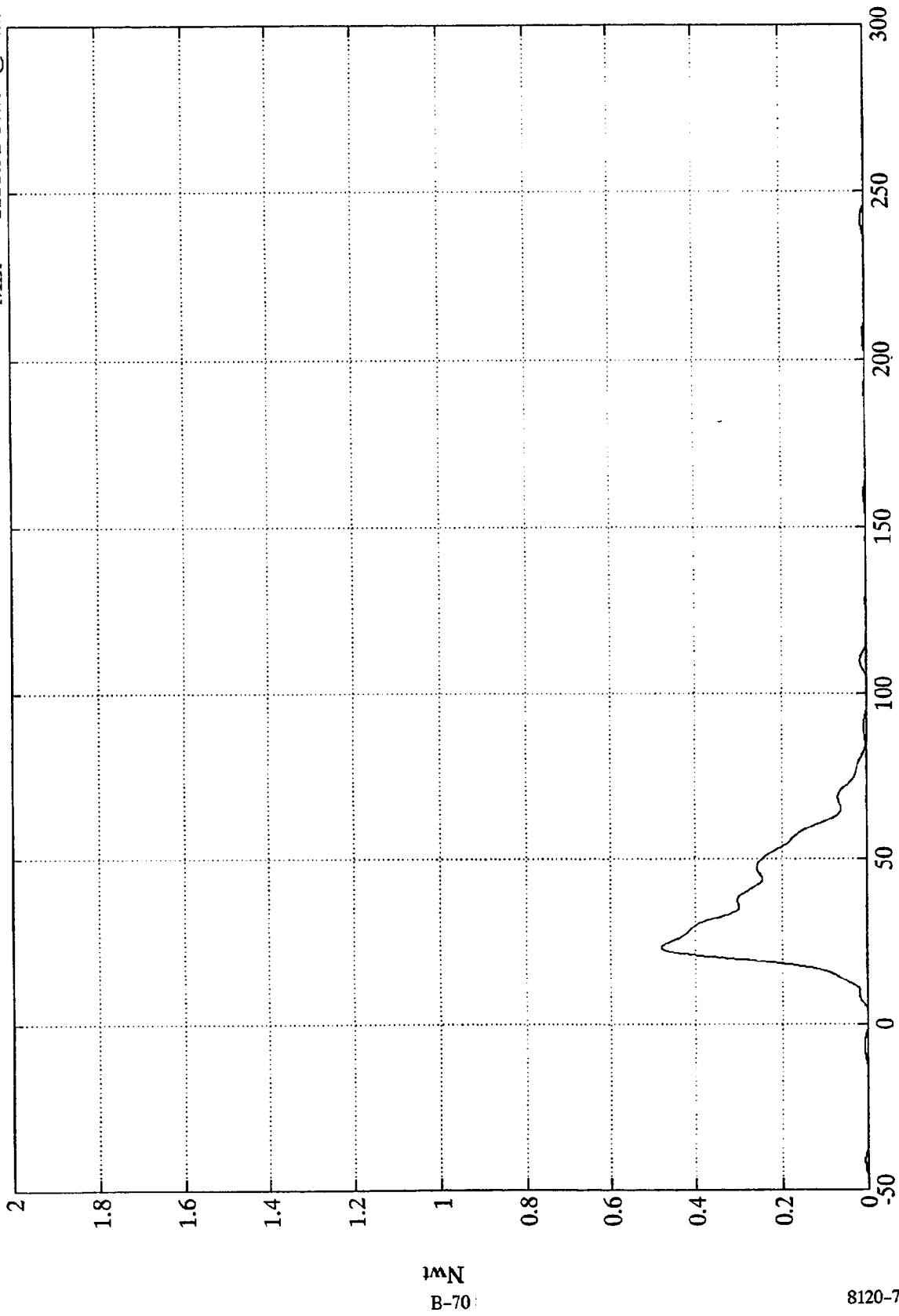
8120-7

TEST #7 - 1994 VOLVO 850

$\times 10^5$

Group 4 Load Cell Sum

Max = 48169.20 Nwt @ 22.92 msec
Min = -1153.91 Nwt @ 118.80 msec



B-70

8120-7

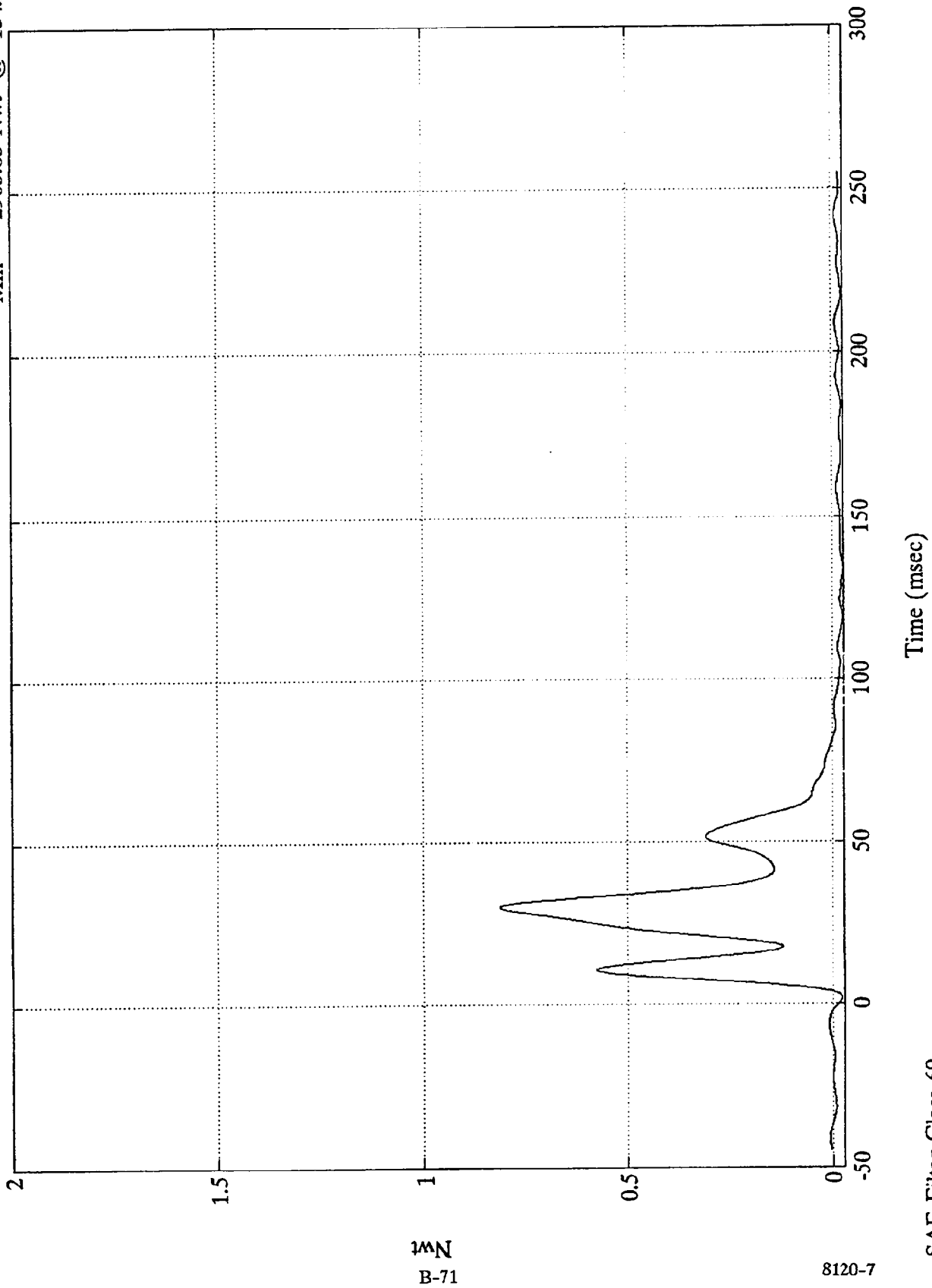
Time (msec)

SAE Filter Class 60

TEST #7 - 1994 VOLVO 850
x10⁵

Group 5 Load Cell Sum

Max = 81286.20 Nwt @ 29.76 msec
Min = -2905.65 Nwt @ 134.28 msec



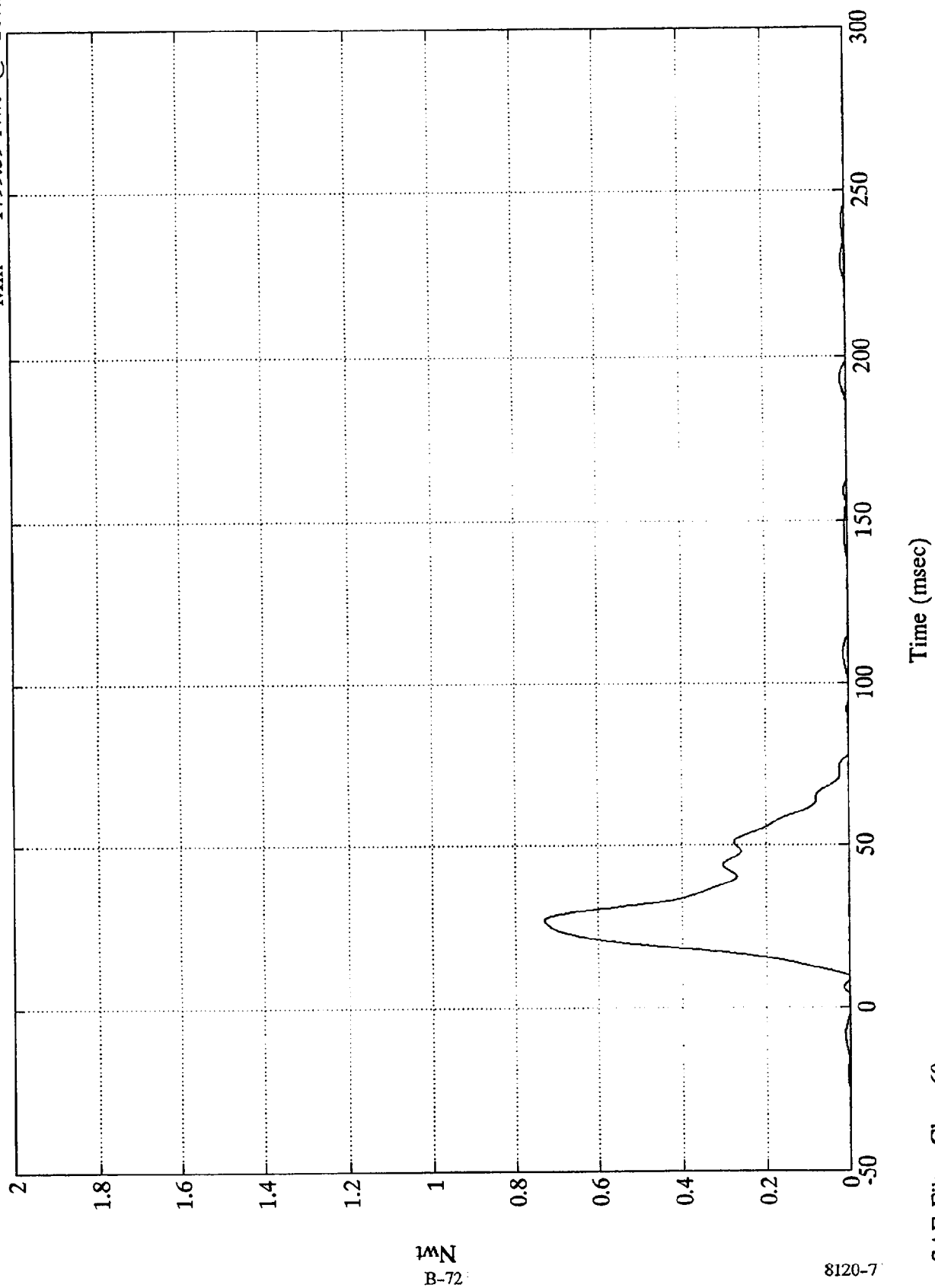
8120-7

SAE Filter Class 60

TEST #7 - 1994 VOLVO 850
x10⁵

Group 6 Load Cell Sum

Max = 72784.20 Nwt @ 26.76 msec
Min = -1799.59 Nwt @ 167.52 msec



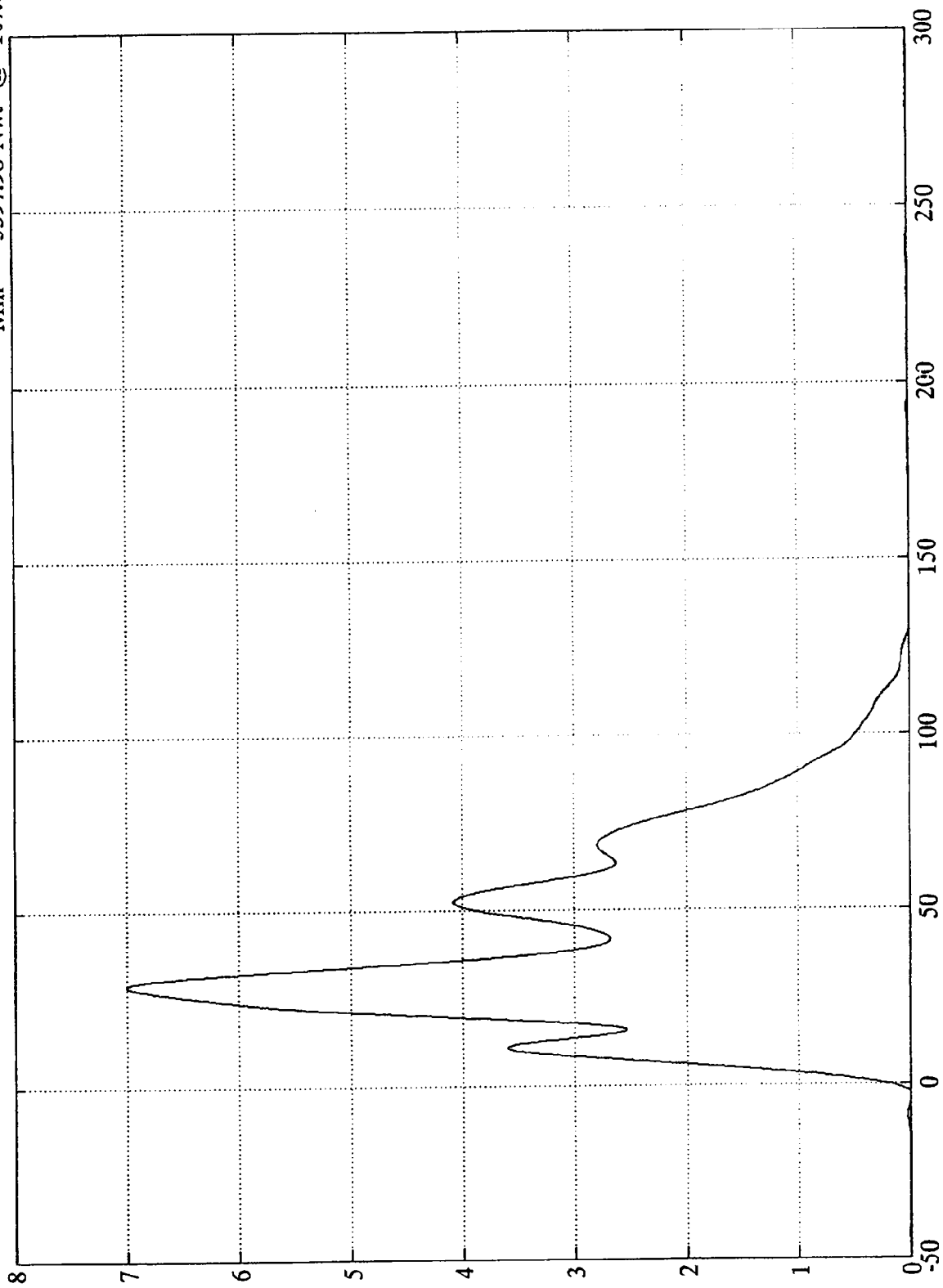
8120-7

SAE Filter Class 60

TEST #7 - 1994 VOLVO 850
x10⁵

Max = 700219.00 Nwt @ 28.80 msec
Min = -5397.98 Nwt @ 167.04 msec

Total Load Cell Sum



Time (msec)

SAE Filter Class 60

TEST NO. MR5900

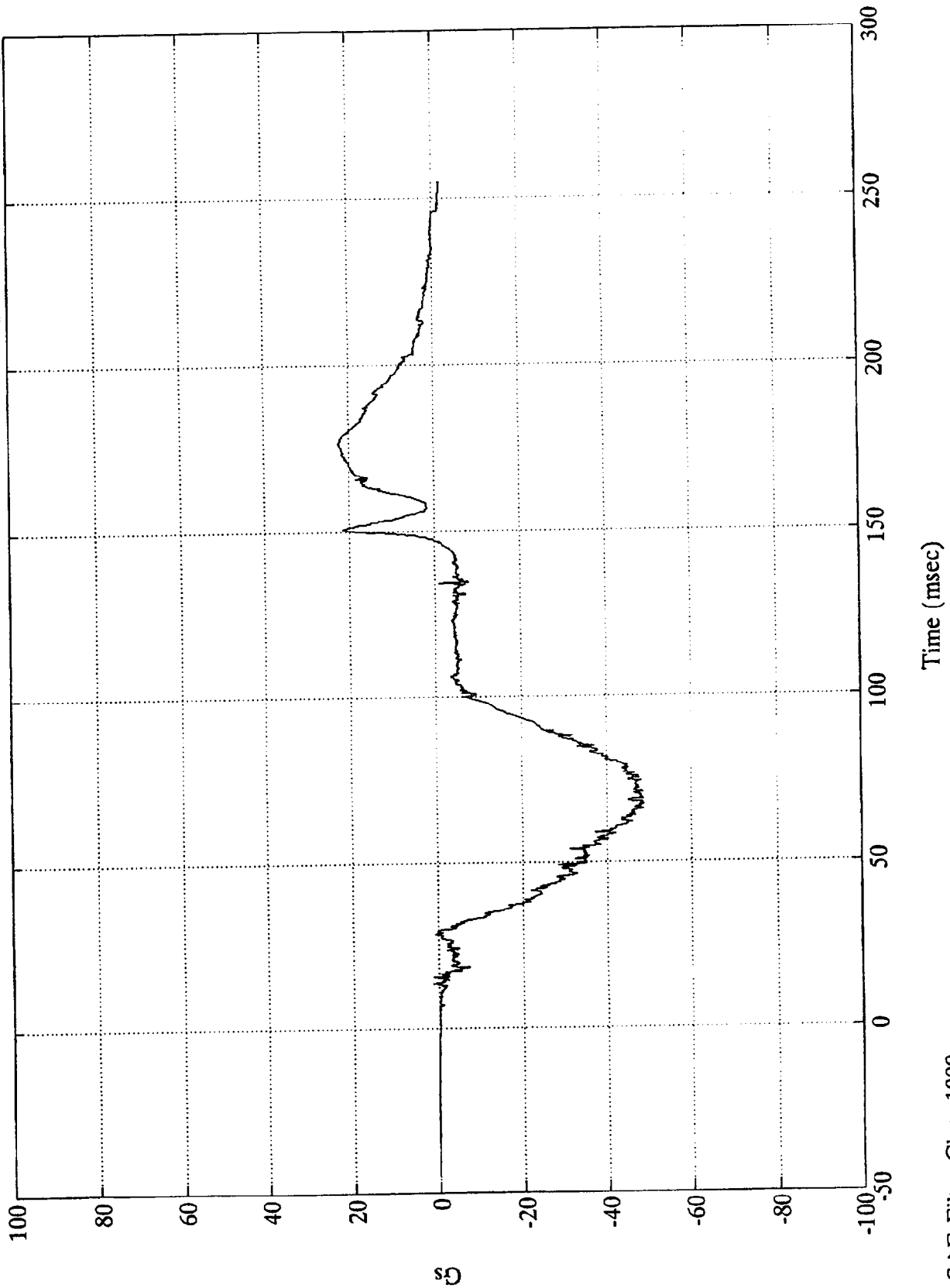
DUMMY DATA

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

NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Head X

Max = 22.51 Gs @ 176.63 msec
Min = -48.73 Gs @ 67.32 msec

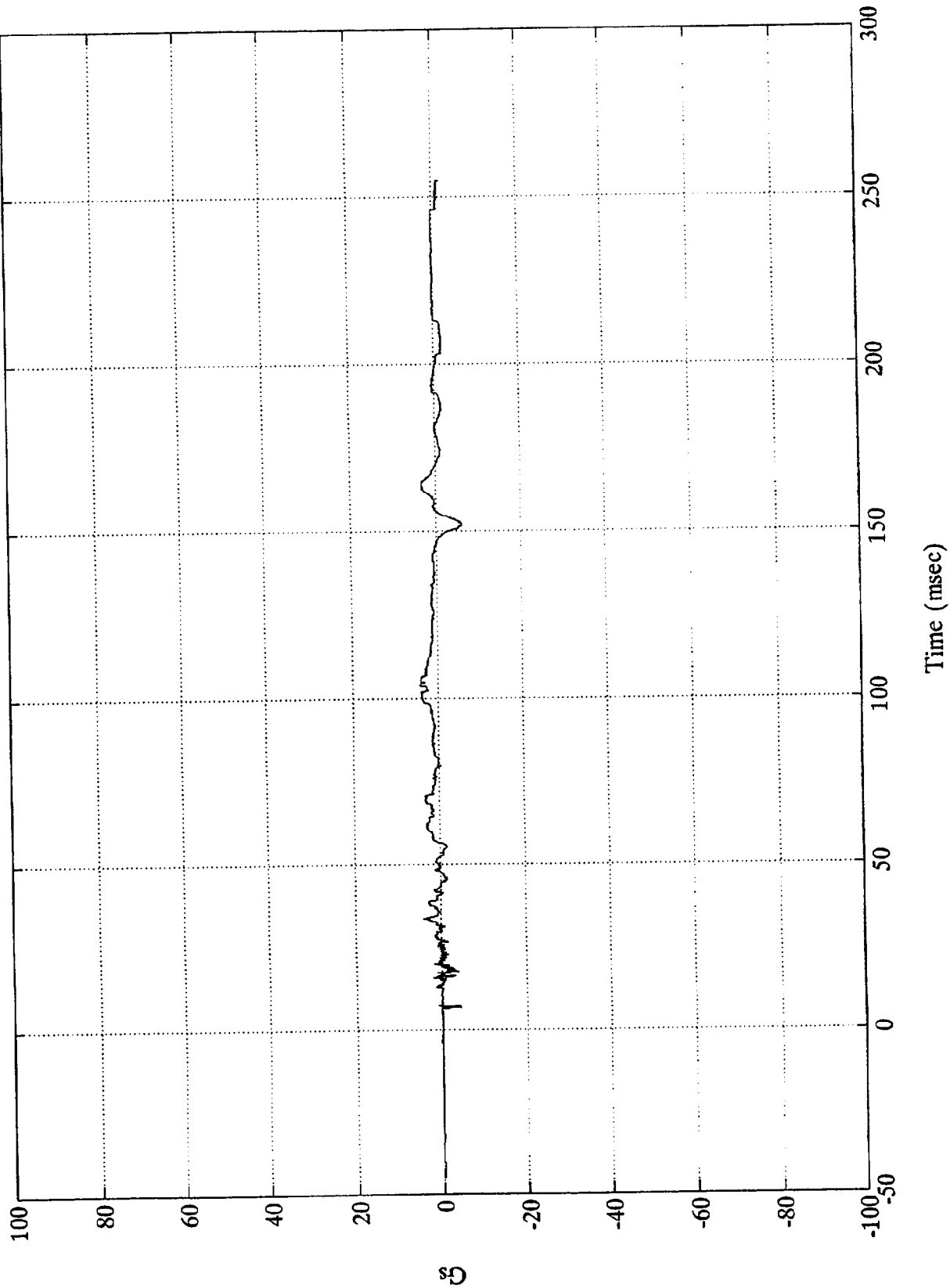


SAE Filter Class 1000

NCAP TEST #7 - 1994 VOLVO 850

Max = 4.24 Gs @ 103.80 msec
Min = -6.12 Gs @ 151.80 msec

Pos. 1 Head Y



SAE Filter Class 1000

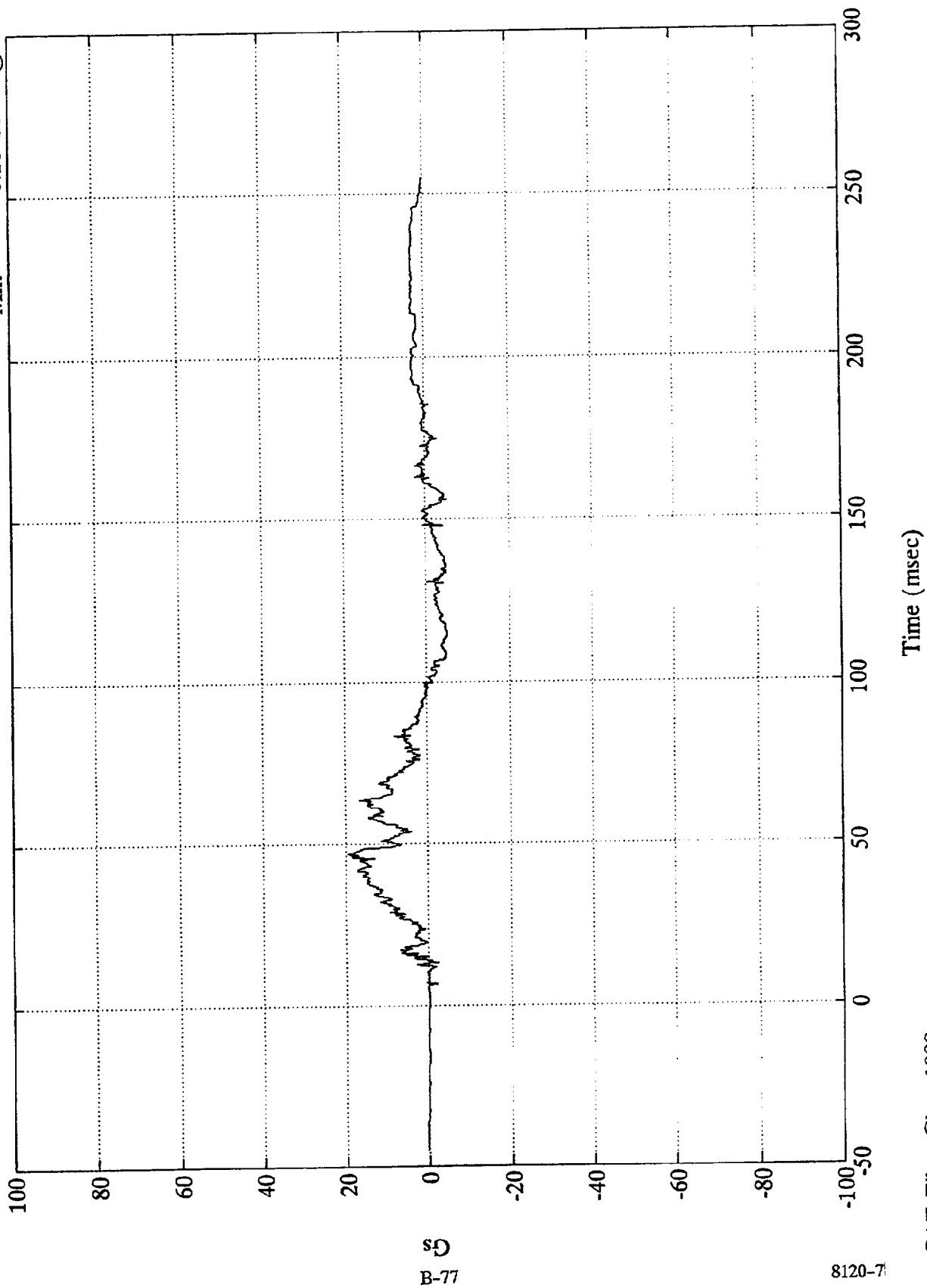
85

B-76

8120-7

NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Head Z
Max = 19.51 Gs @ 46.79 msec
Min = -5.18 Gs @ 156.24 msec



B-77

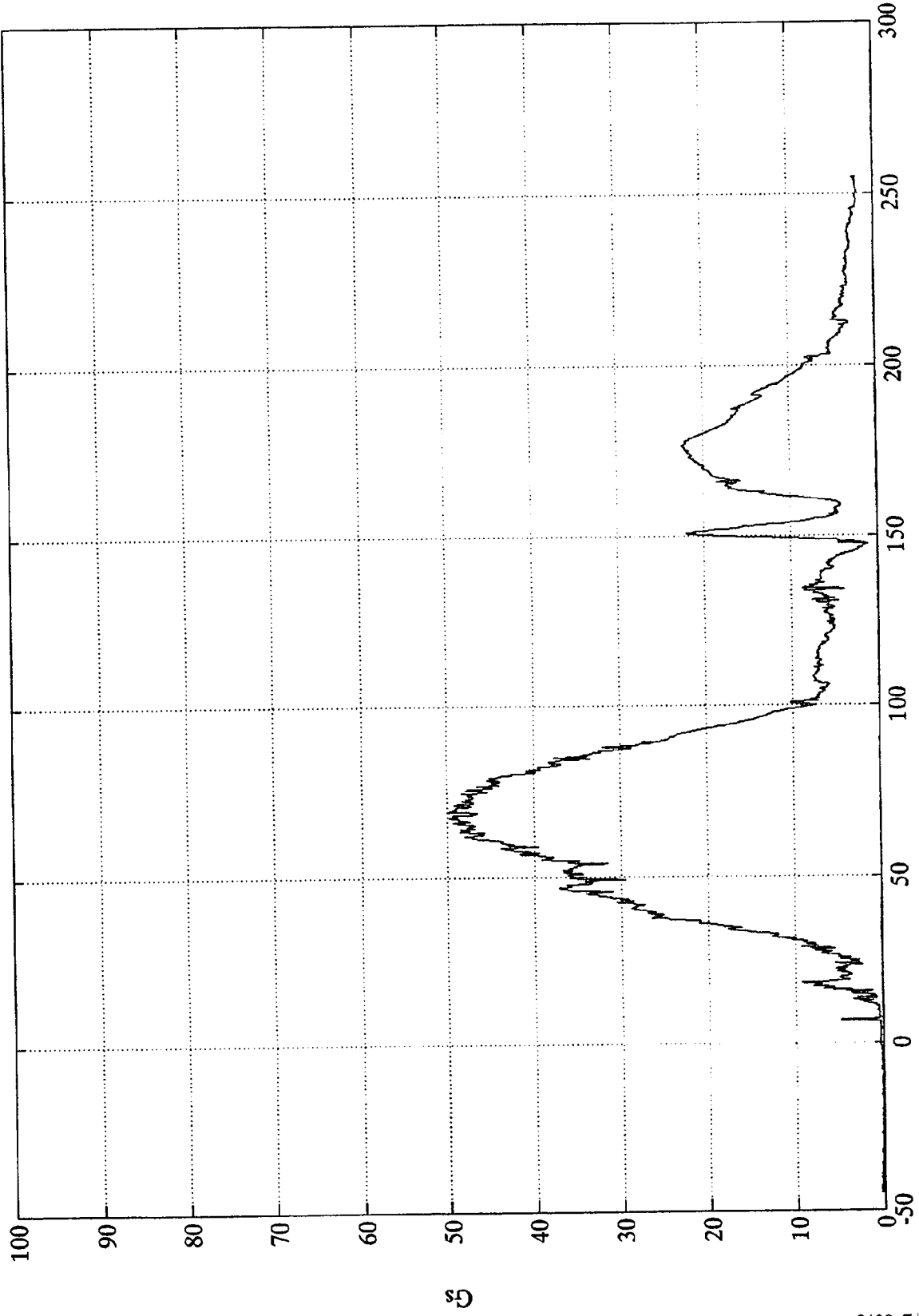
8120-7

SAE Filter Class 1000

NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Head Resultant

Max = 50.00 Gs @ 69.12 msec
Min = .06 Gs @ -6.84 msec

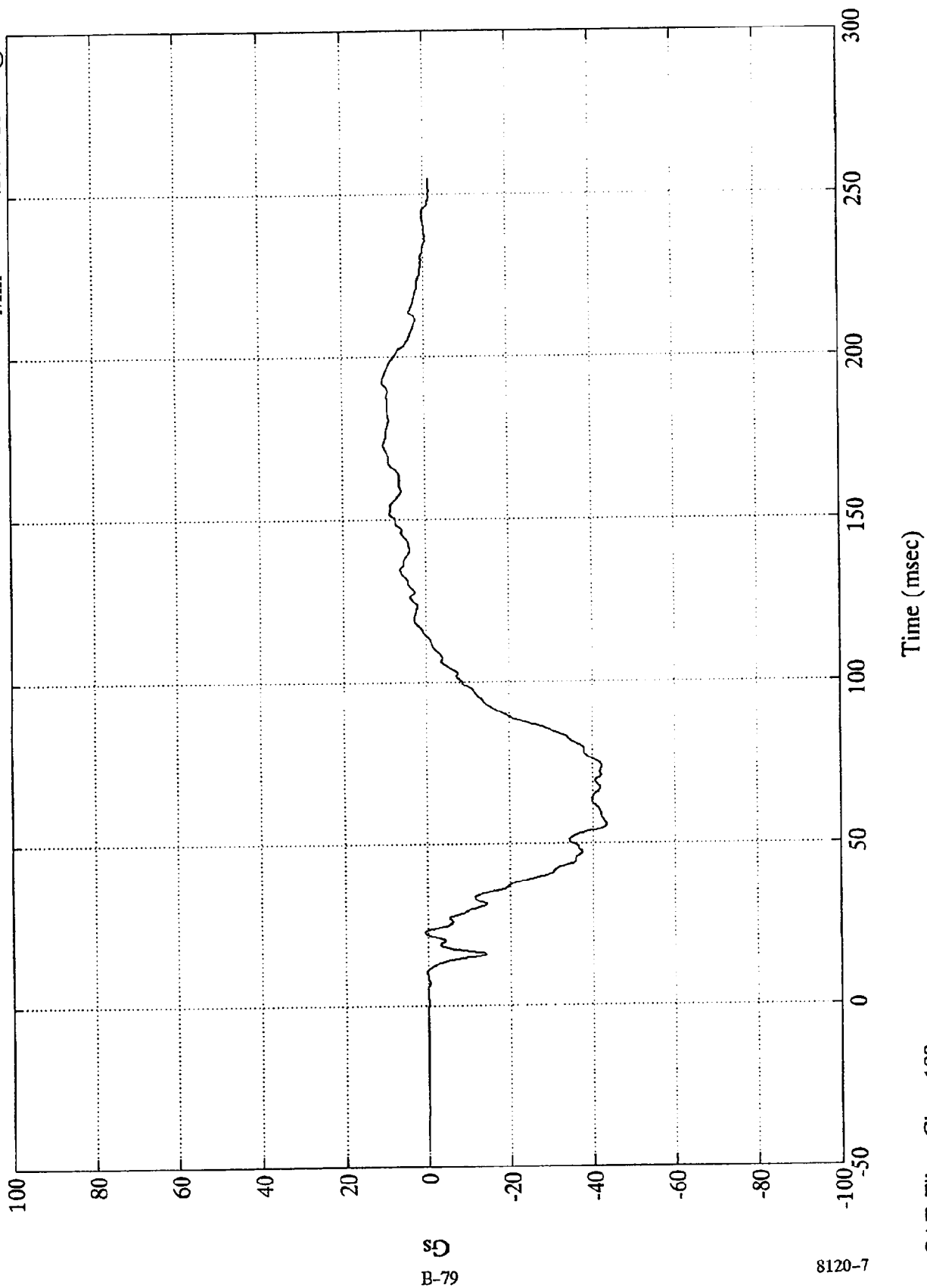


Time (msec)

SAE Filter Class 1000

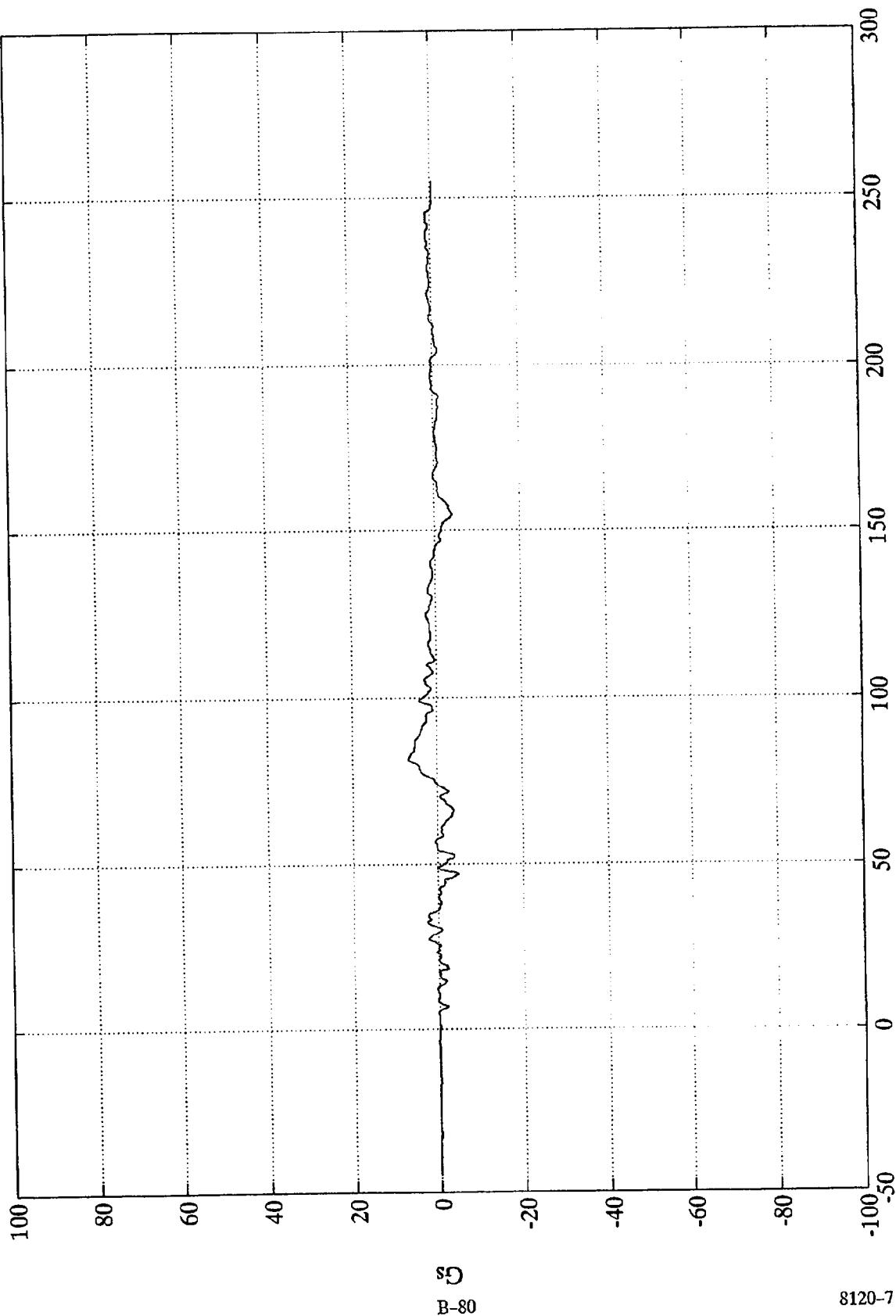
NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Chest X
Max = 10.20 Gs @ 192.48 msec
Min = -43.44 Gs @ 55.80 msec



NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Chest Y
Max = 6.83 Gs @ 81.72 msec
Min = -4.66 Gs @ 47.04 msec



Time (msec)

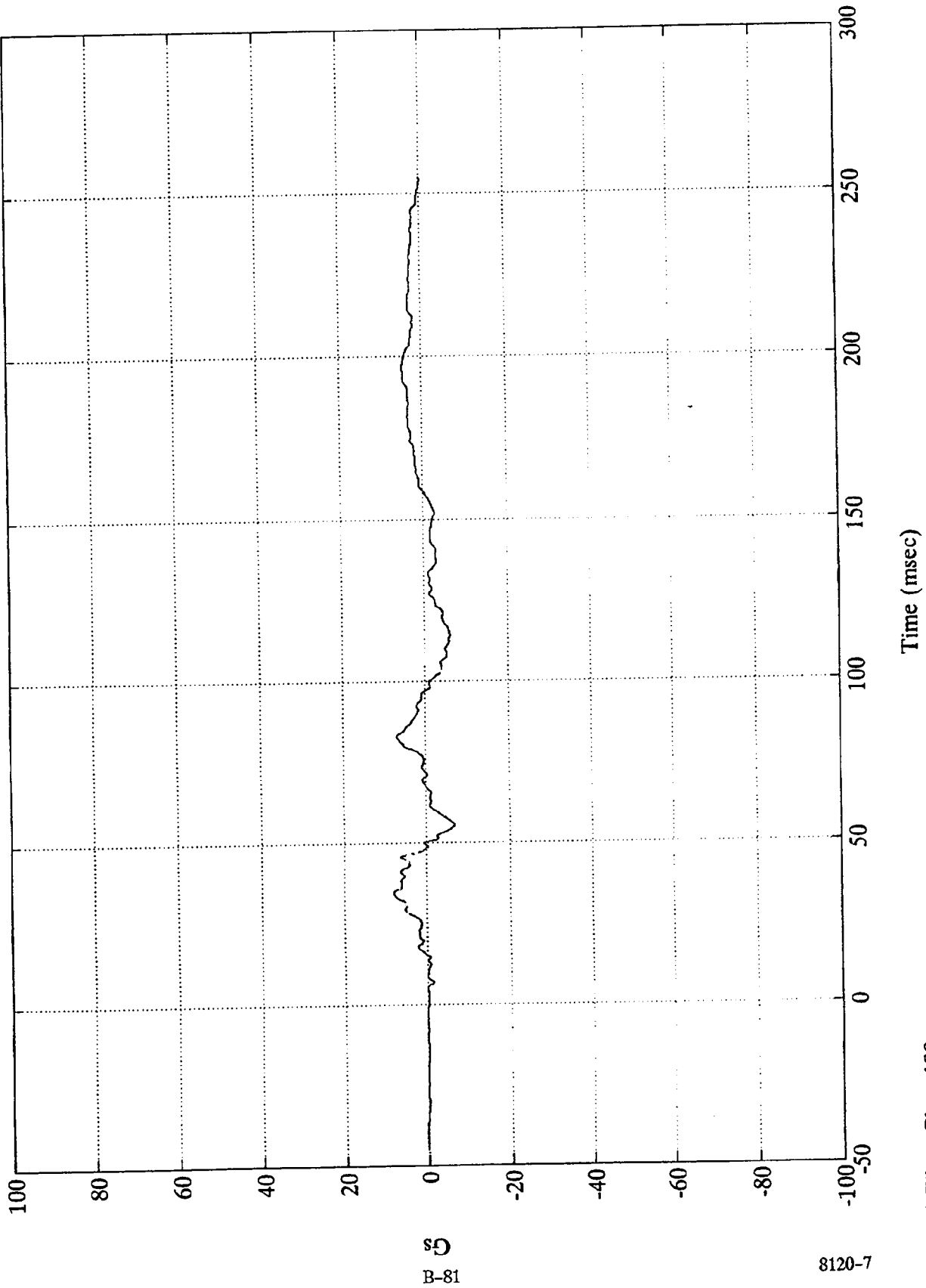
SAE Filter Class 180

8120-71

B-80

NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Chest Z
Max = 8.10 Gs @ 34.31 msec
Min = -6.91 Gs @ 55.44 msec



B-81

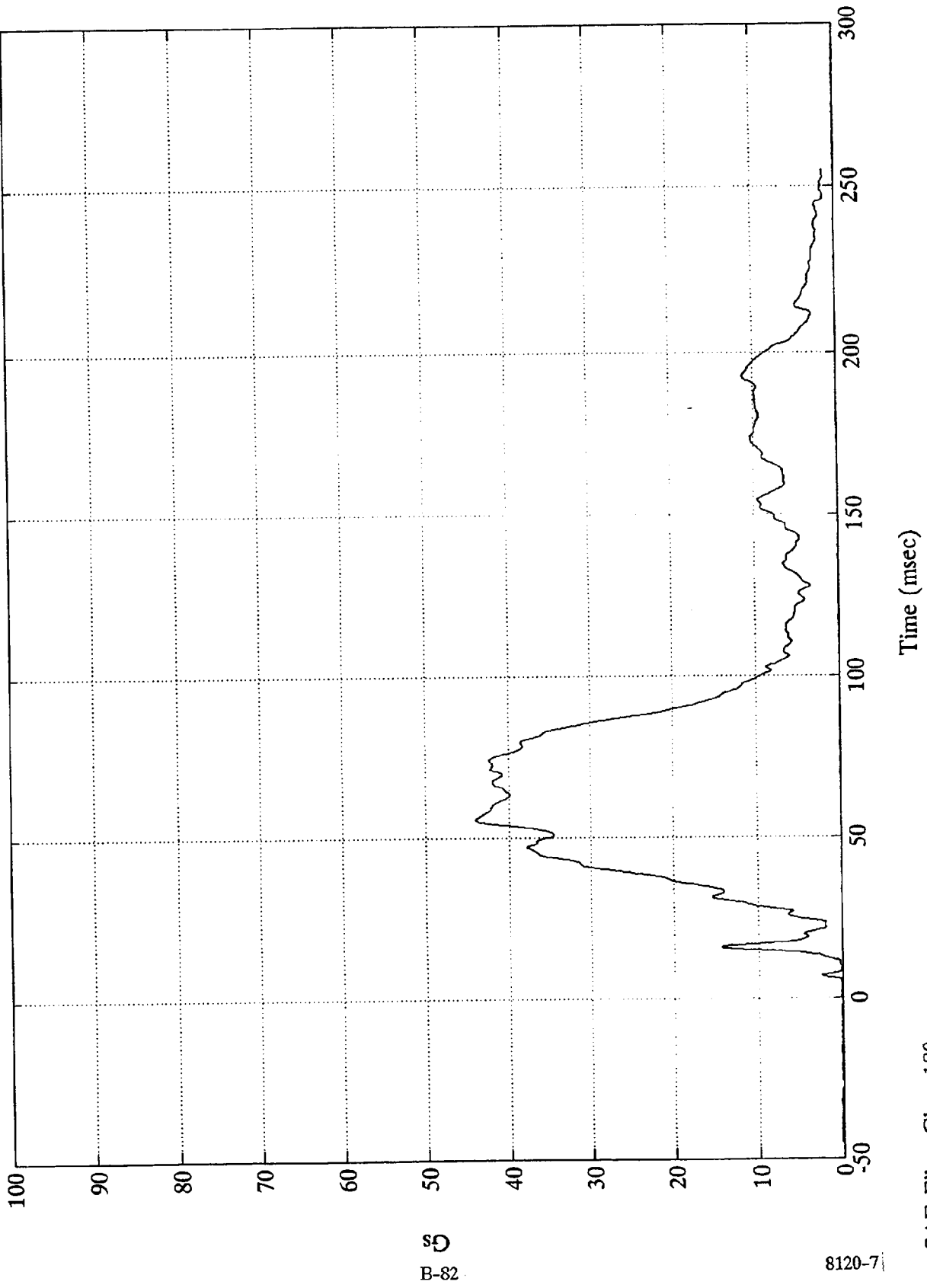
8120-7

SAE Filter Class 180

NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Chest Resultant

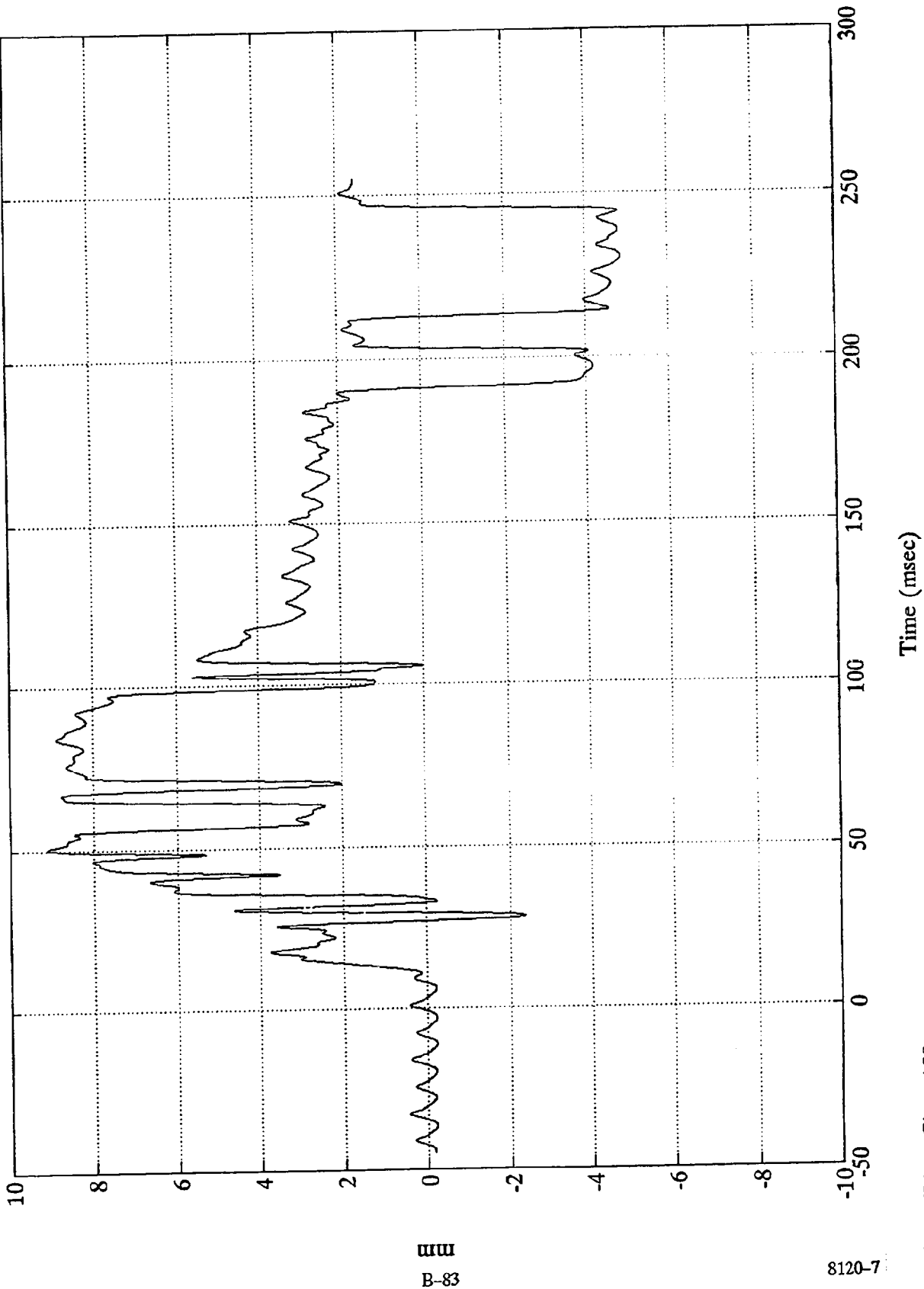
Max = 43.97 Gs @ 55.68 msec
Min = .03 Gs @ -27.72 msec



NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Chest Disp.

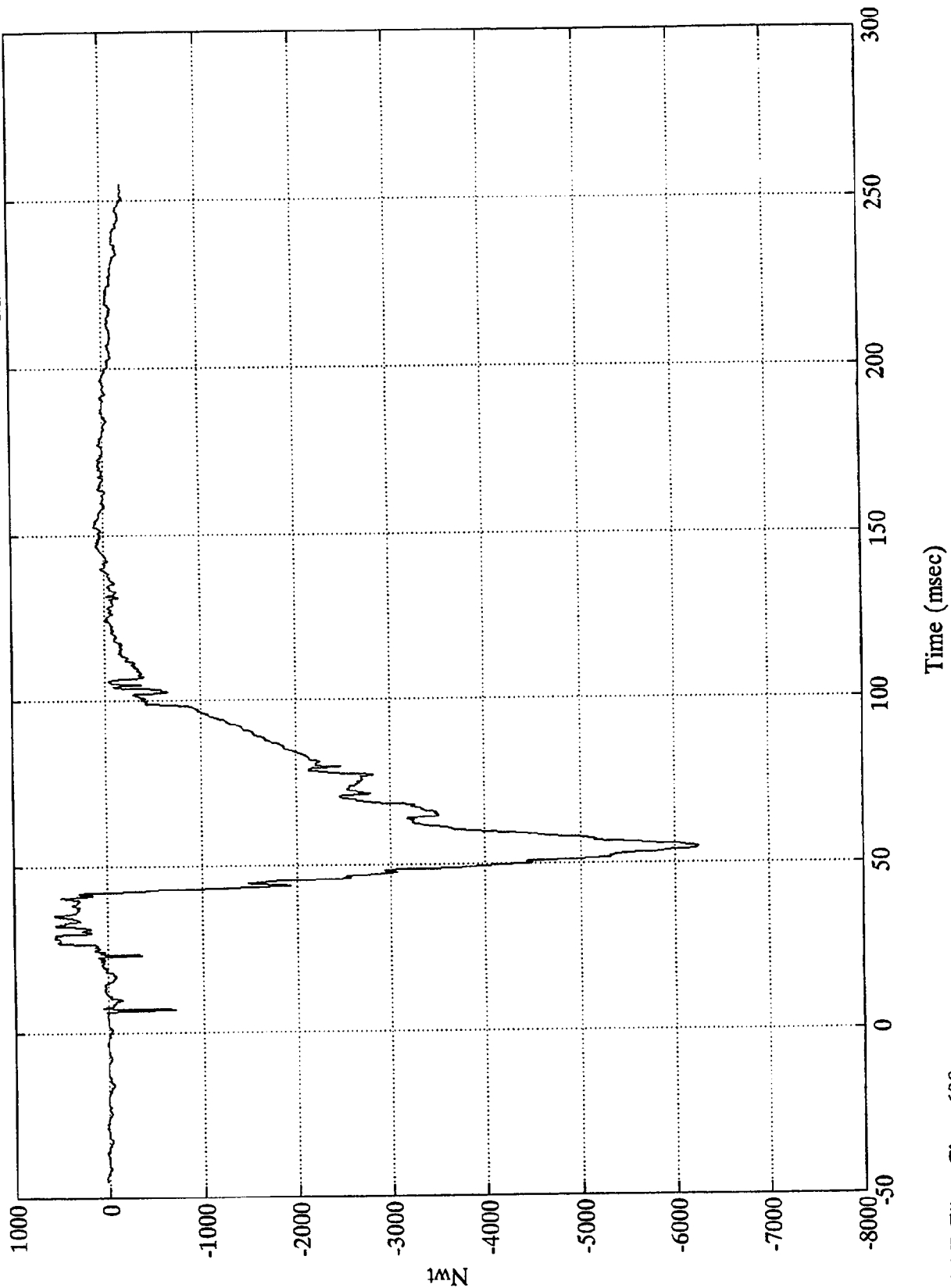
Max = 9.10 mm @ 50.40 msec
Min = -4.86 mm @ 230.40 msec



NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Left Femur

Max = 568.92 Nwt @ 35.03 msec
Min = -6243.25 Nwt @ 54.72 msec



1wN
B-84

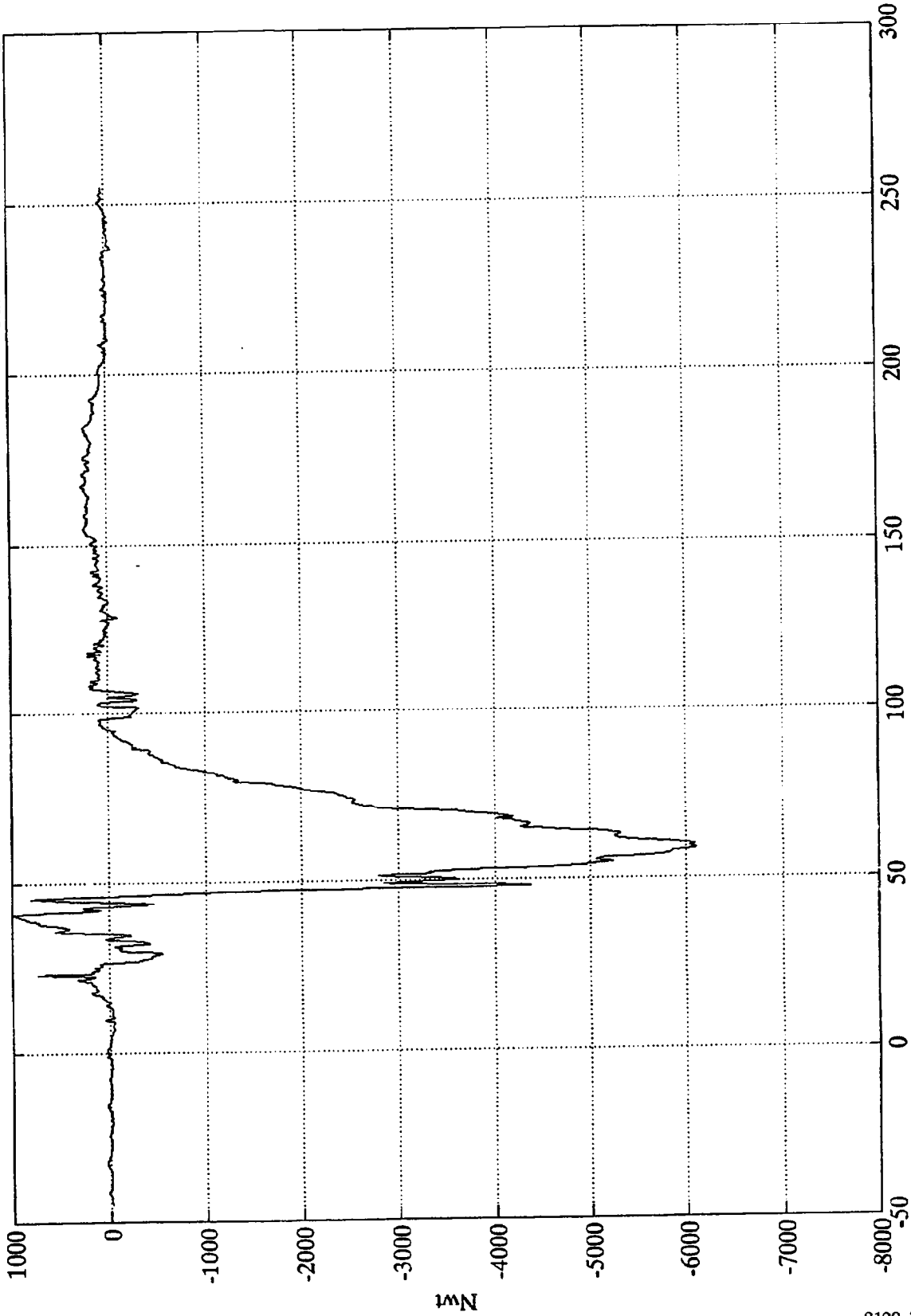
8120-7

SAE Filter Class 600

NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Right Femur

Max = 992.19 Nwt @ 40.80 msec
Min = -6099.46 Nwt @ 58.68 msec



B-85

8120-7

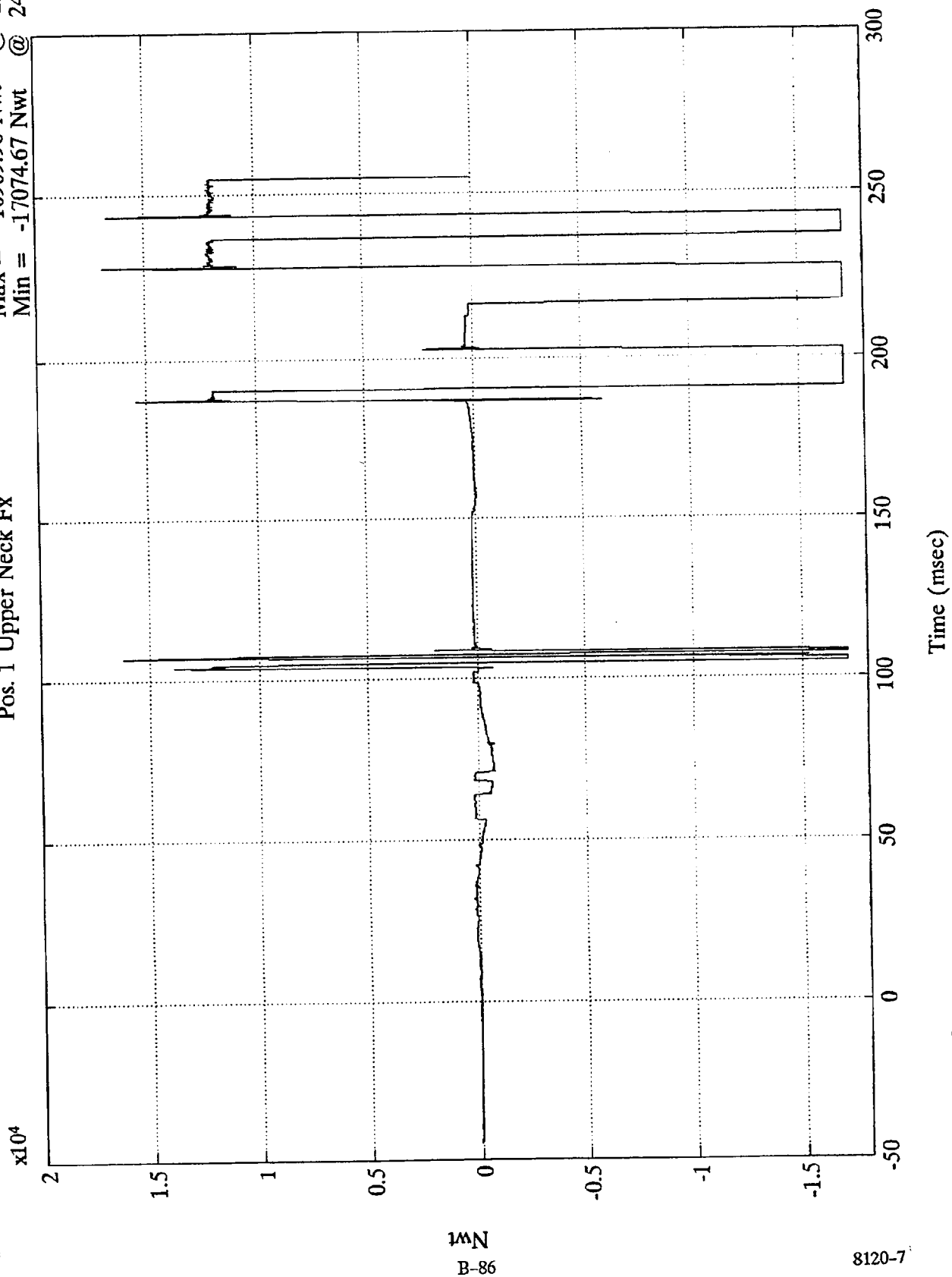
Time (msec)

SAE Filter Class 600

NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Upper Neck Fx

Max = 16909.96 Nwt @ 228.12 msec
Min = -17074.67 Nwt @ 242.88 msec



B-86

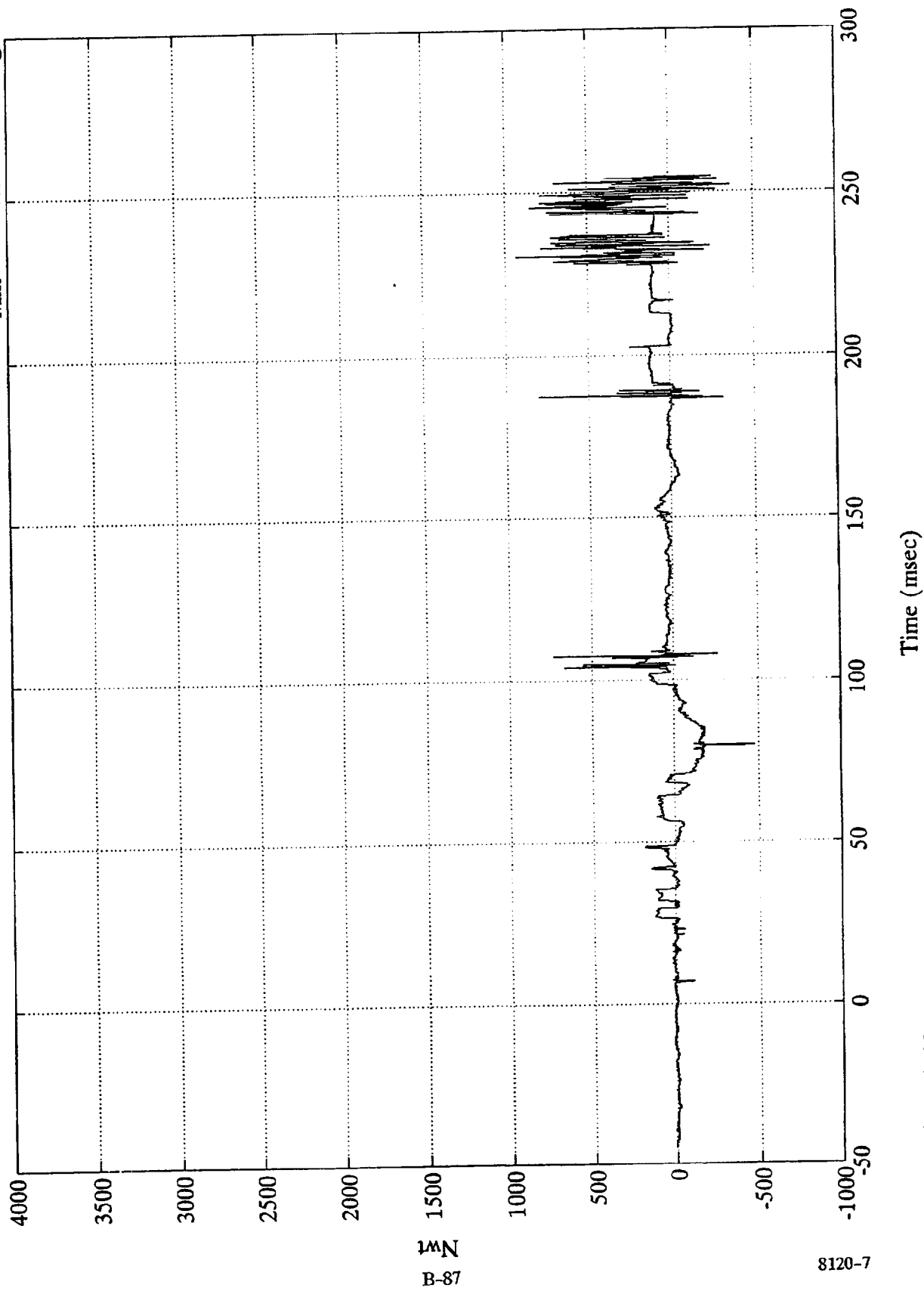
8120-7

SAE Filter Class 1000

NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Upper Neck Fy

Max = 933.73 Nwt @ 230.52 msec
Min = -479.95 Nwt @ 79.68 msec



B-87

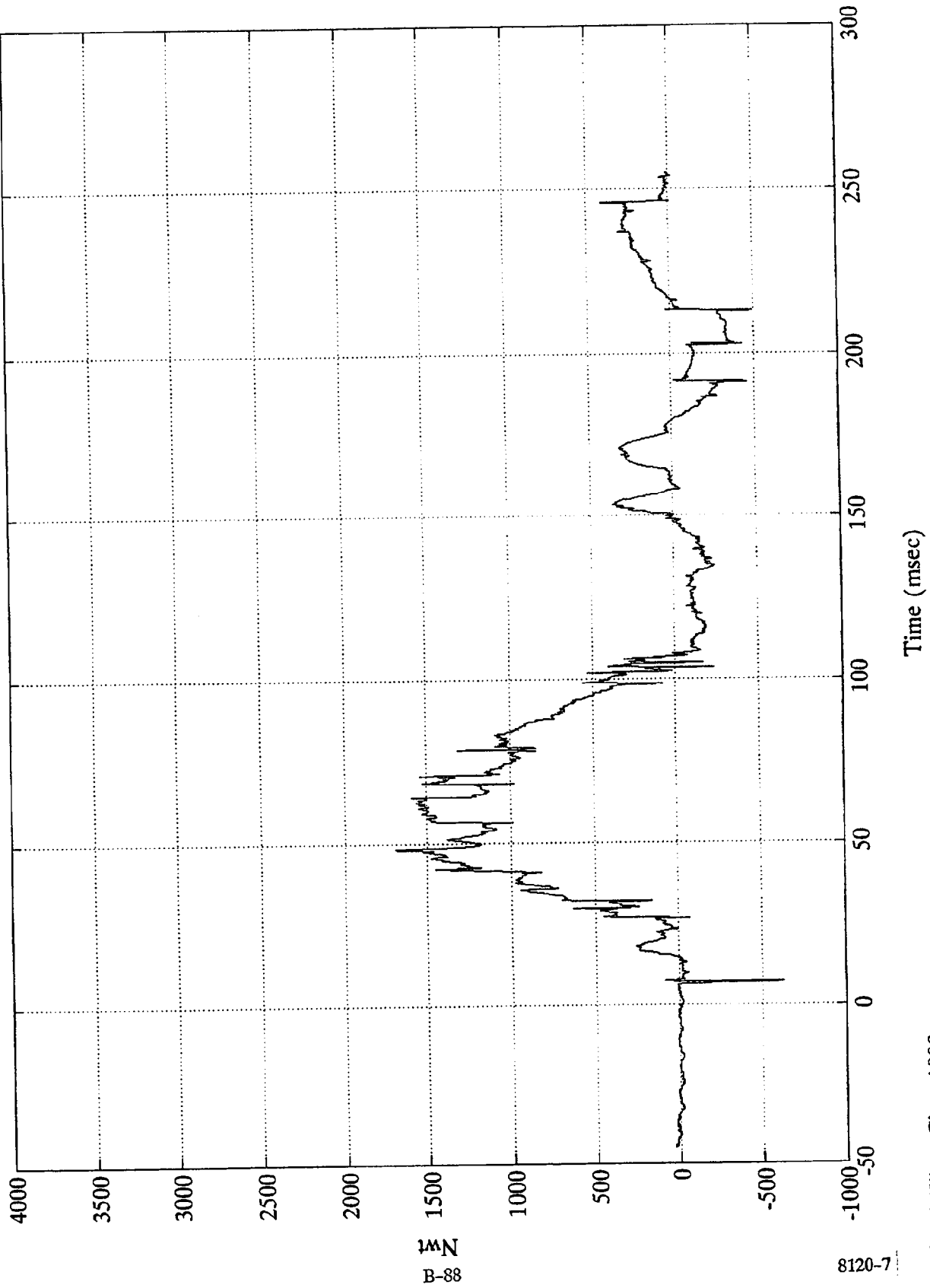
8120-7

SAE Filter Class 1000

NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Upper Neck Fz

Max = 1692.60 Nwt @ 48.24 msec
Min = -628.82 Nwt @ 6.83 msec



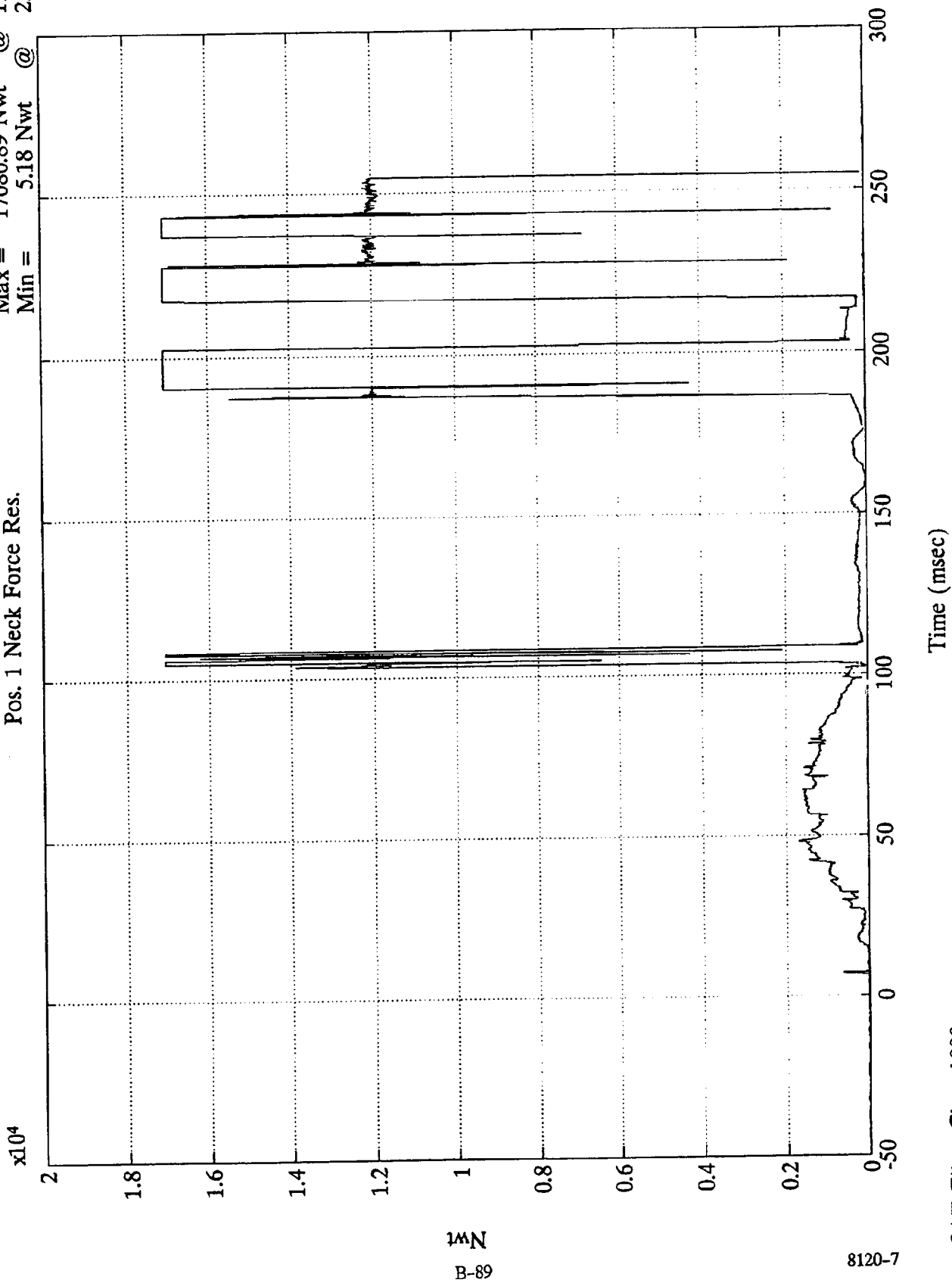
8120-7

SAE Filter Class 1000

NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Neck Force Res.

Max = 17080.89 Nwt @ 191.16 msec
Min = 5.18 Nwt @ 2.27 msec



1N
B-89

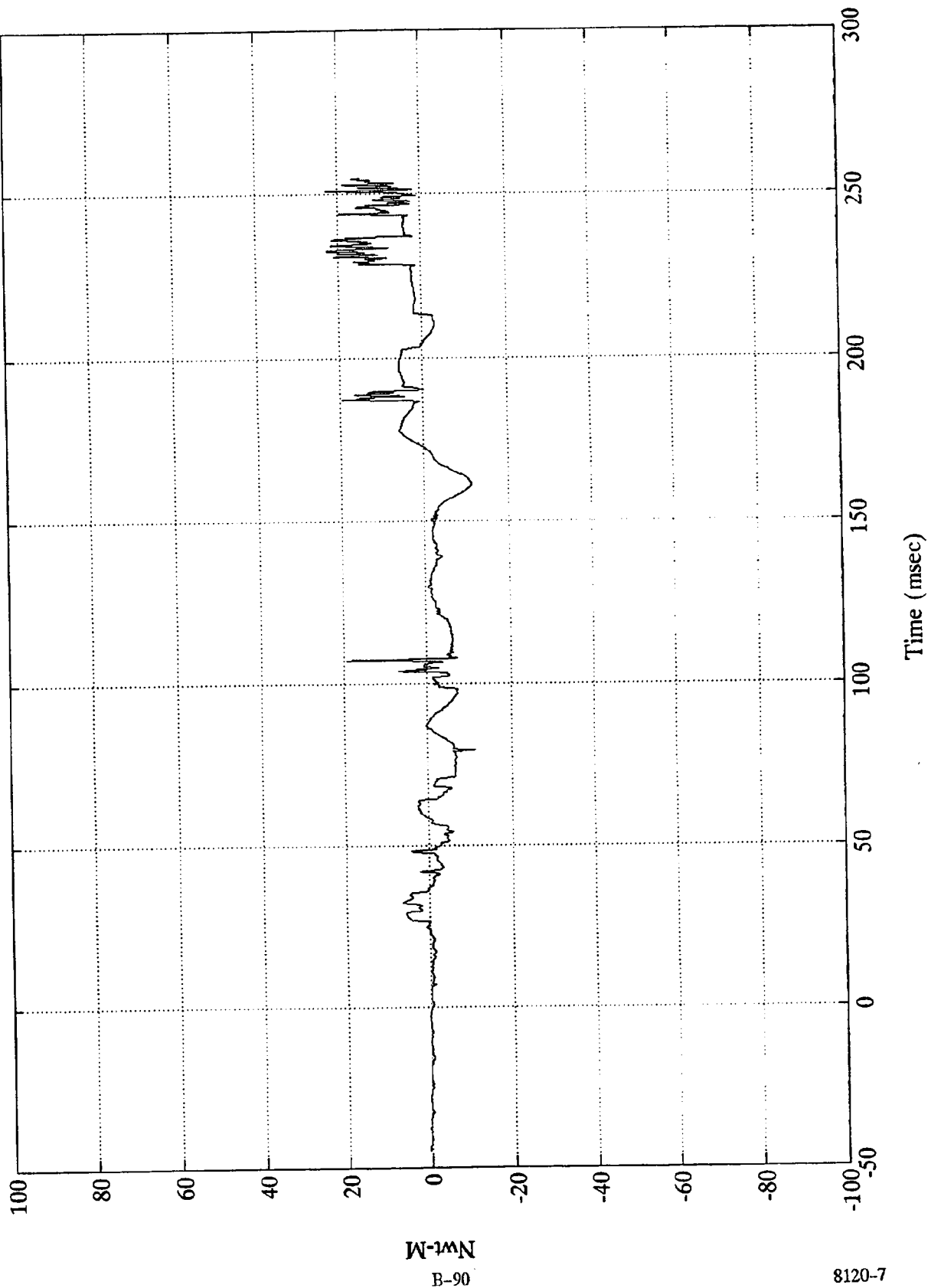
8120-7

SAE Filter Class 1000

NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Upper Neck Mx

Max = 22.91 Nwt-M @ 250.91 msec
Min = -11.30 Nwt-M @ 79.68 msec



SAE Filter Class 600

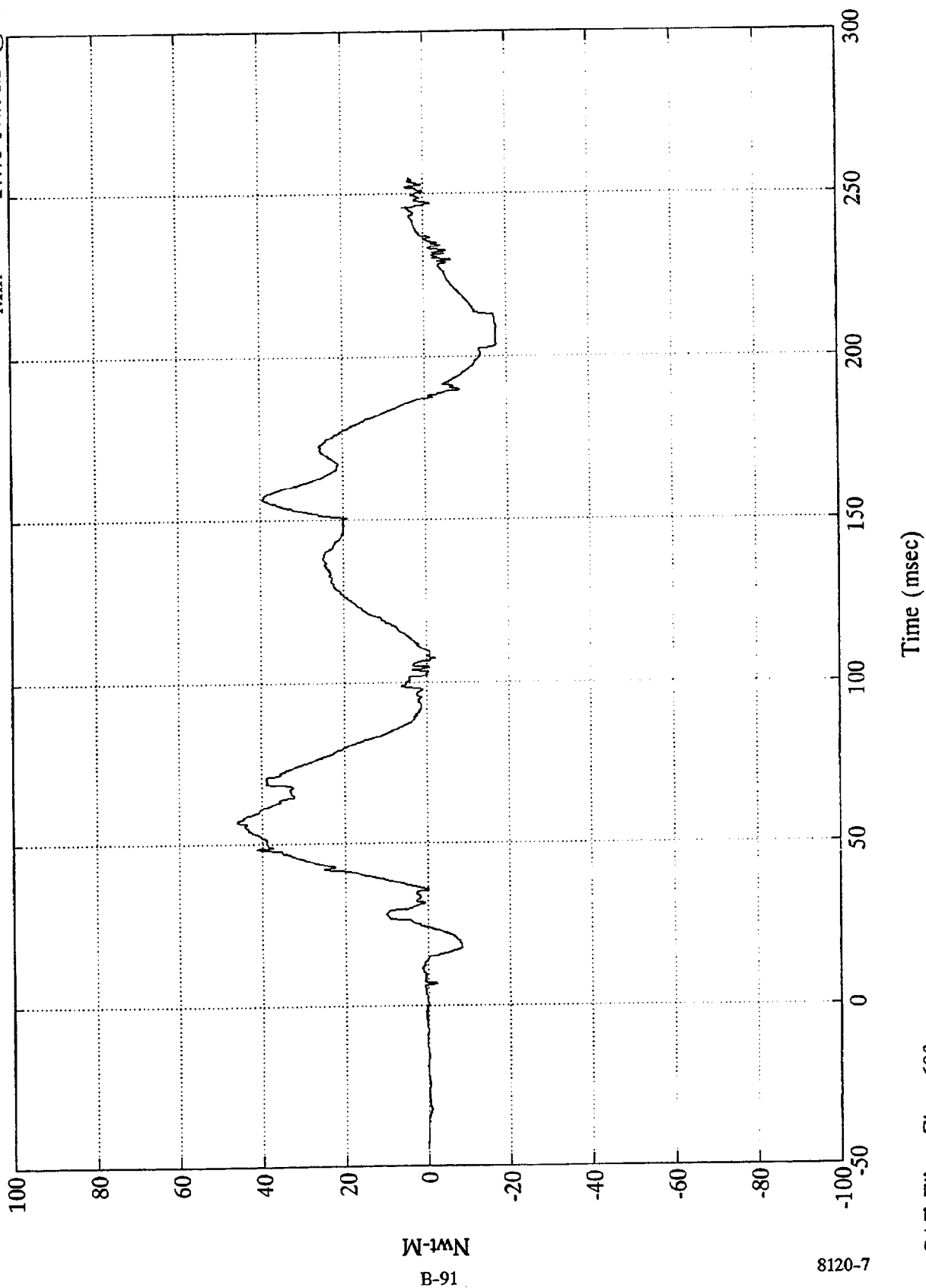
8120-7

B-90

NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Upper Neck My

Max = 46.15 Nwt-M @ 56.63 msec
Min = -17.73 Nwt-M @ 203.39 msec



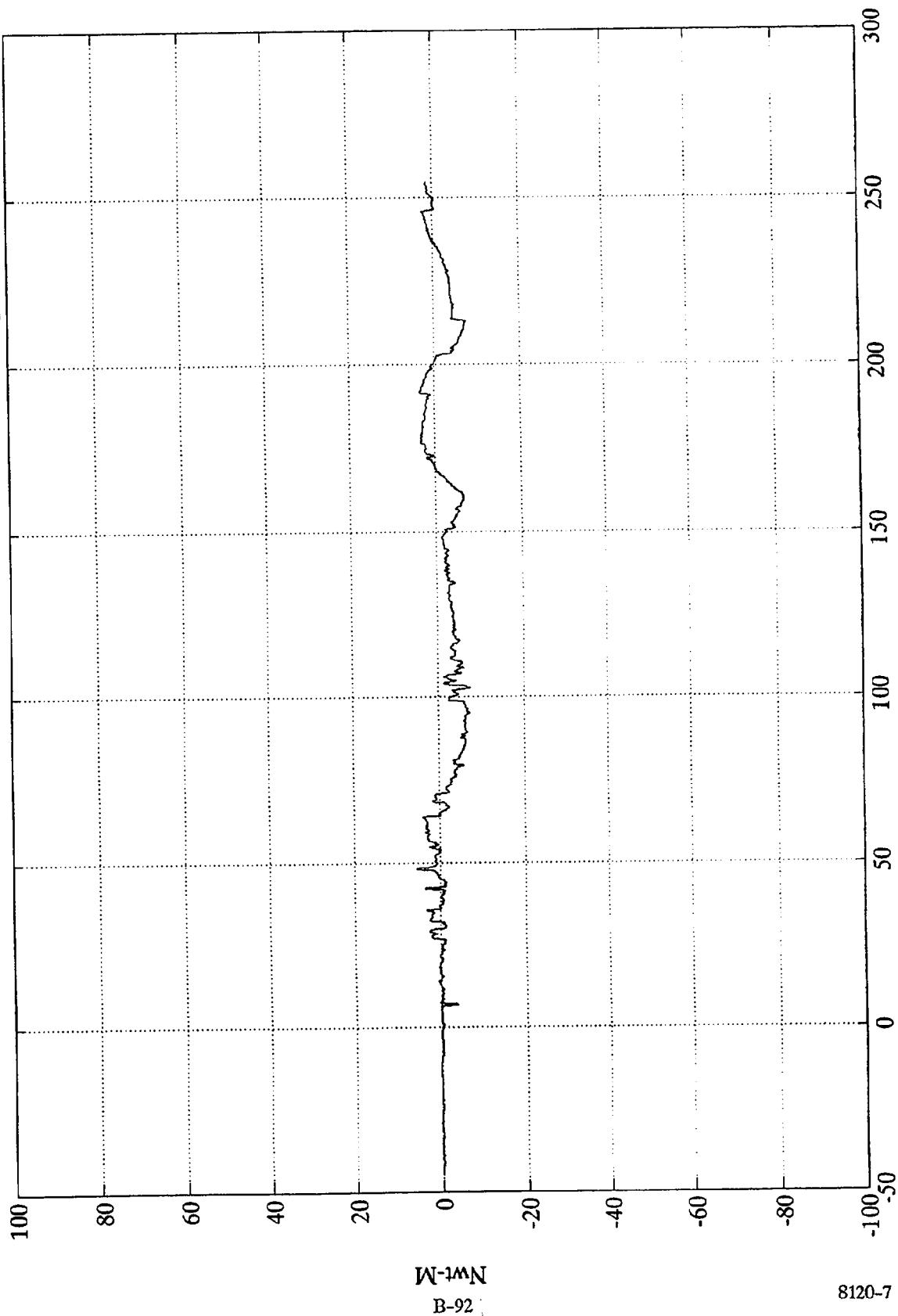
8120-7

SAE Filter Class 600

B-91

NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Upper Neck Mz
Max = 5.50 Nwt-M @ 48.24 msec
Min = -7.49 Nwt-M @ 102.59 msec

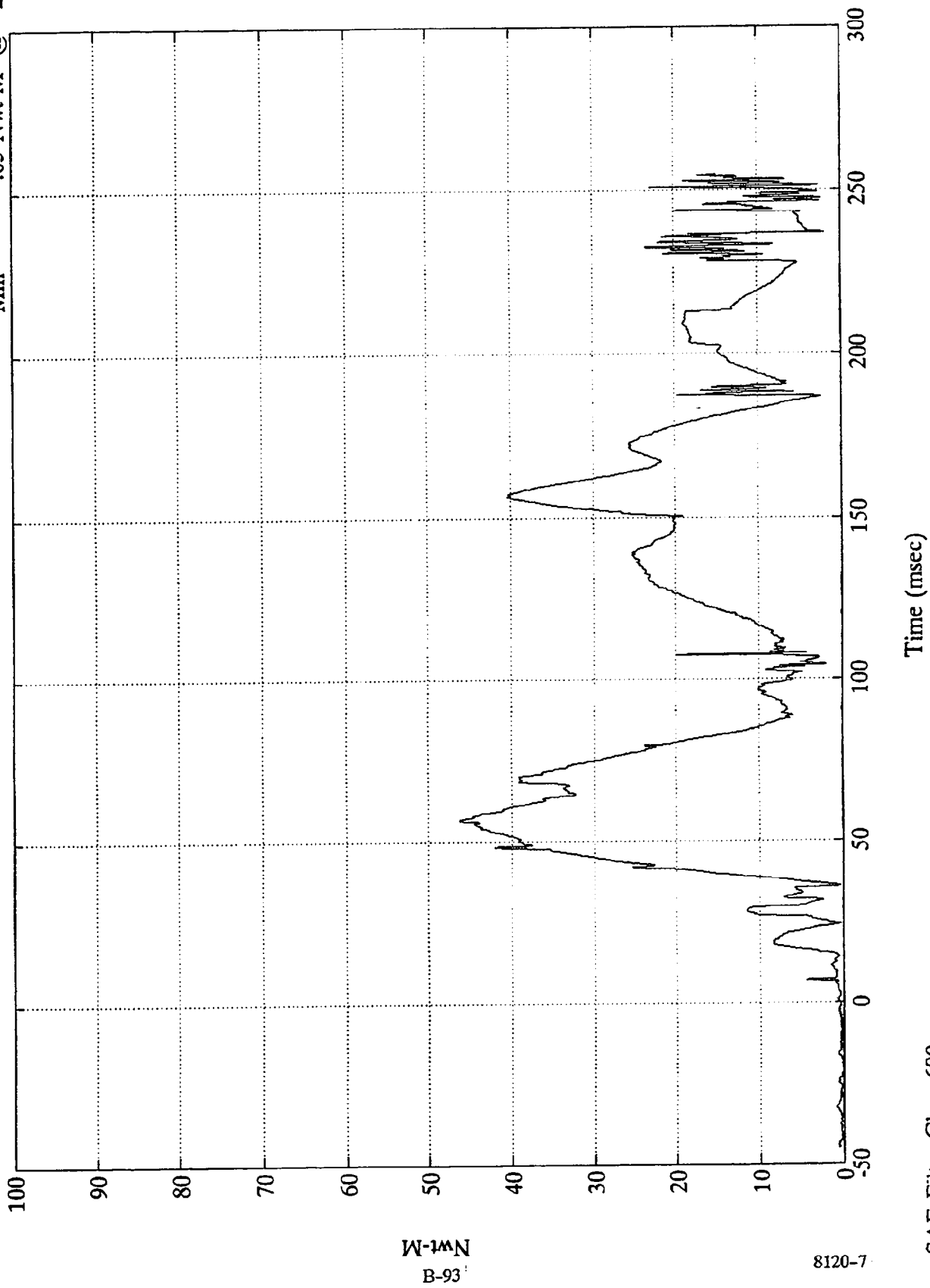


SAE Filter Class 600

NCAP TEST #7 - 1994 VOLVO 850

Pos. 1 Neck Moment Res.

Max = 46.24 Nwt-M @ 56.63 msec
Min = .05 Nwt-M @ -21.60 msec



B-93
W-t-M

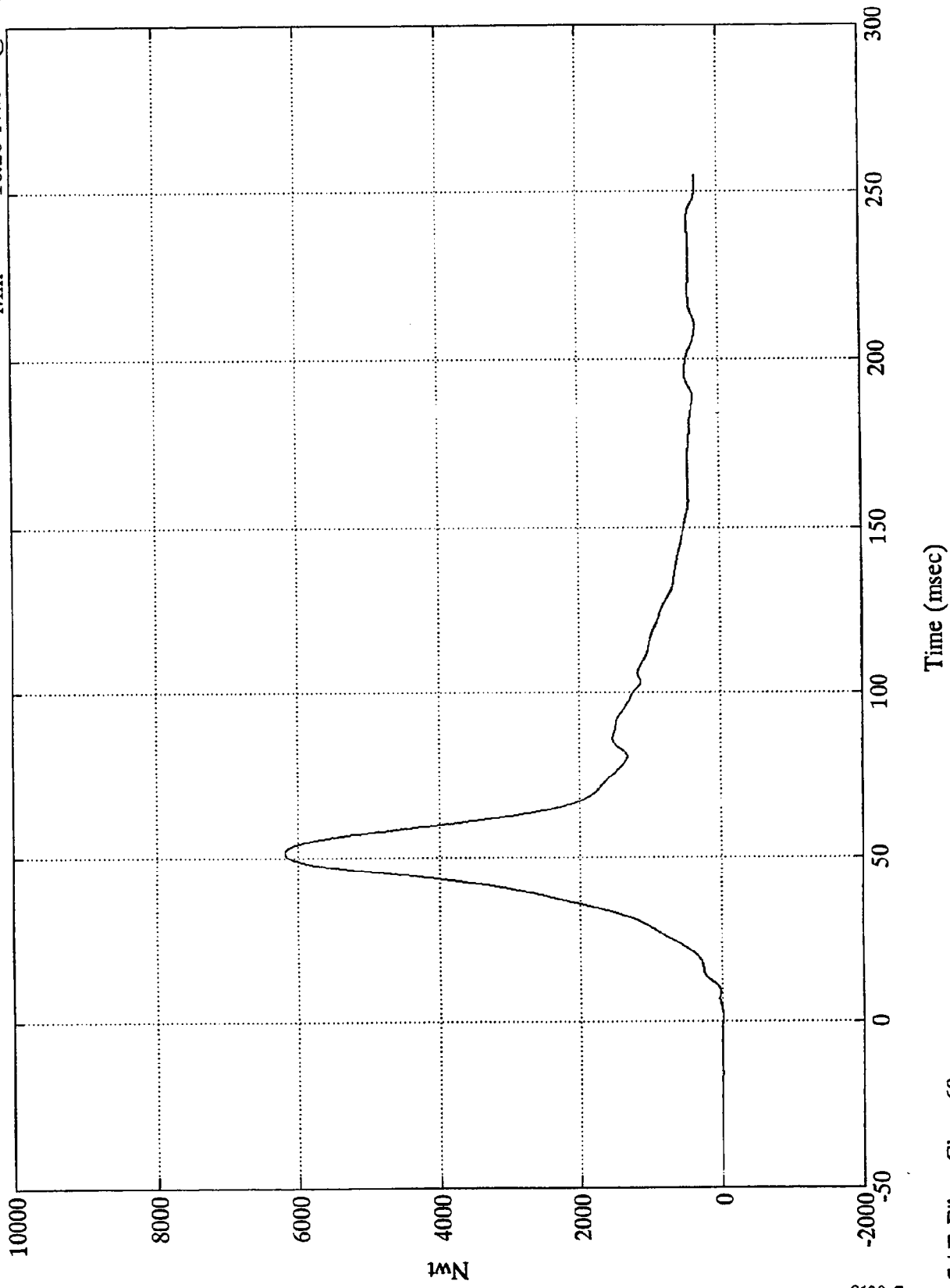
8120-7

SAE Filter Class 600

NCAP TEST #7 - 1994 VOLVO 850

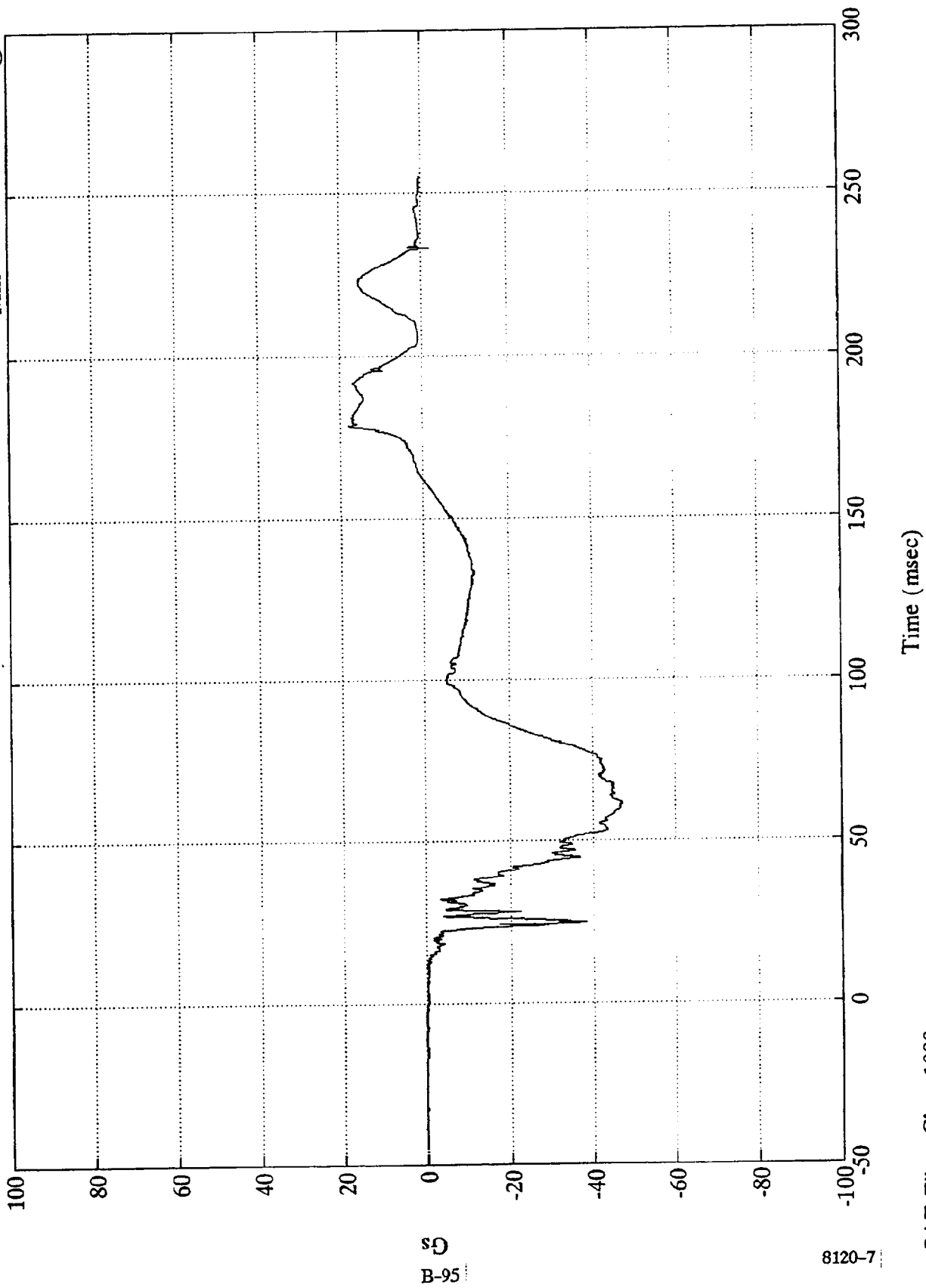
Max = 6176.67 Nwt @ 51.60 msec
Min = -10.26 Nwt @ 1.31 msec

Pos. 1 Left Belt Load



NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Head X
Max = 18.14 Gs @ 178.55 msec
Min = -46.91 Gs @ 61.56 msec

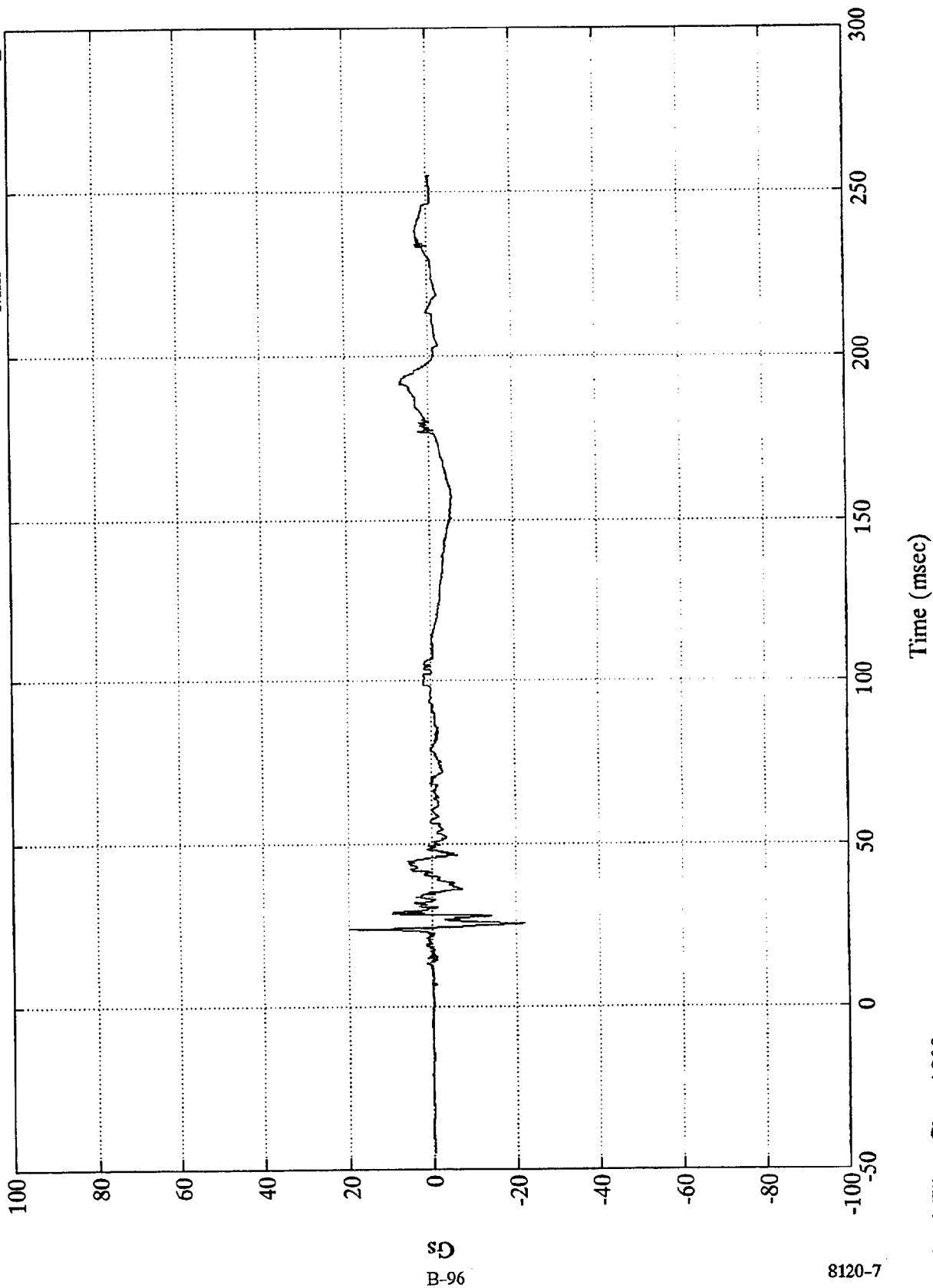


8120-7
B-95

NCAP TEST #7 - 1994 VOLVO 850

Max = 20.03 Gs @ 23.87 msec
Min = -22.30 Gs @ 25.55 msec

Pos. 2 Head Y

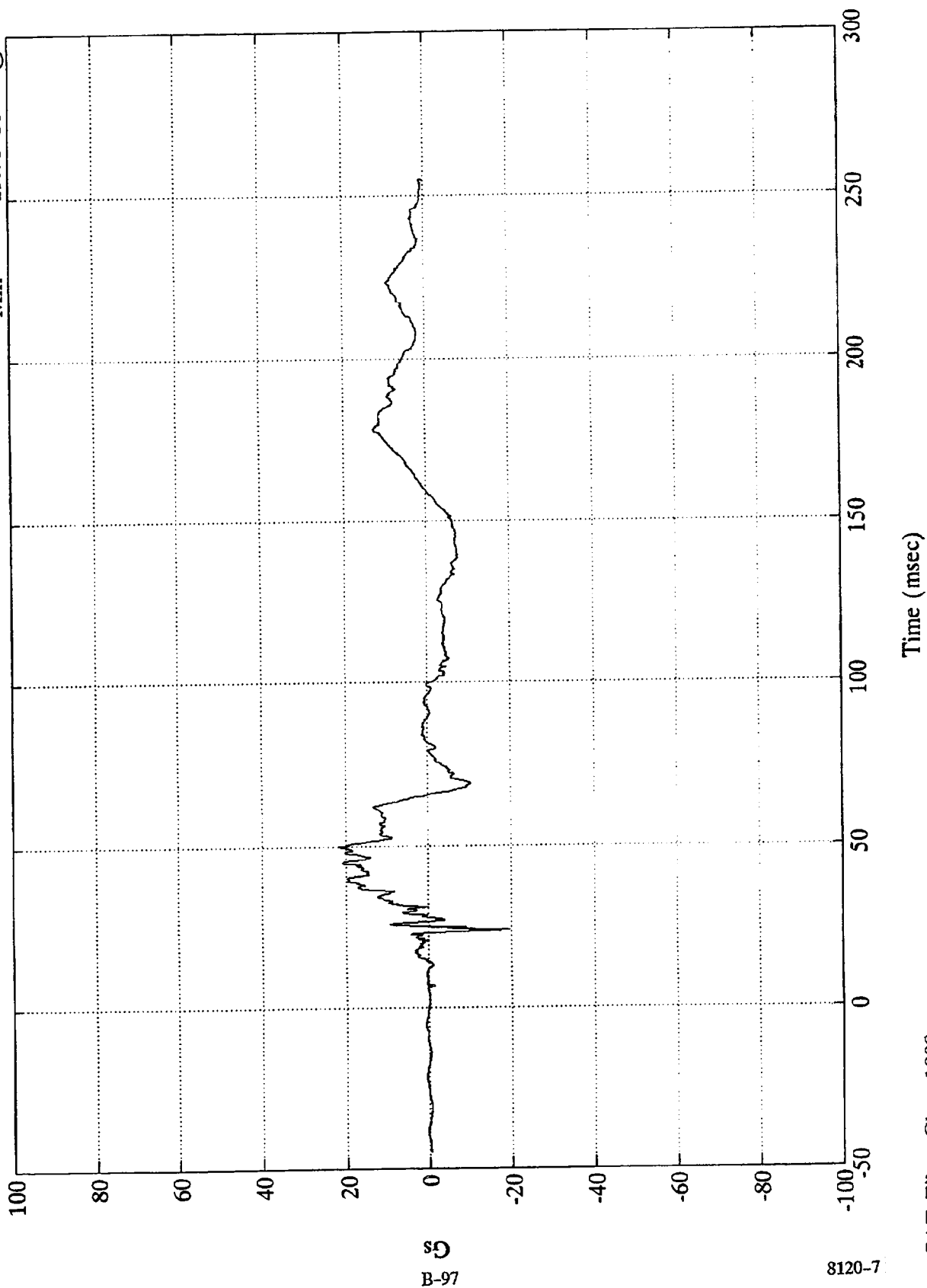


8120-7
B-96

SAE Filter Class 1000

NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Head Z
Max = 21.63 Gs @ 49.92 msec
Min = -19.70 Gs @ 24.11 msec



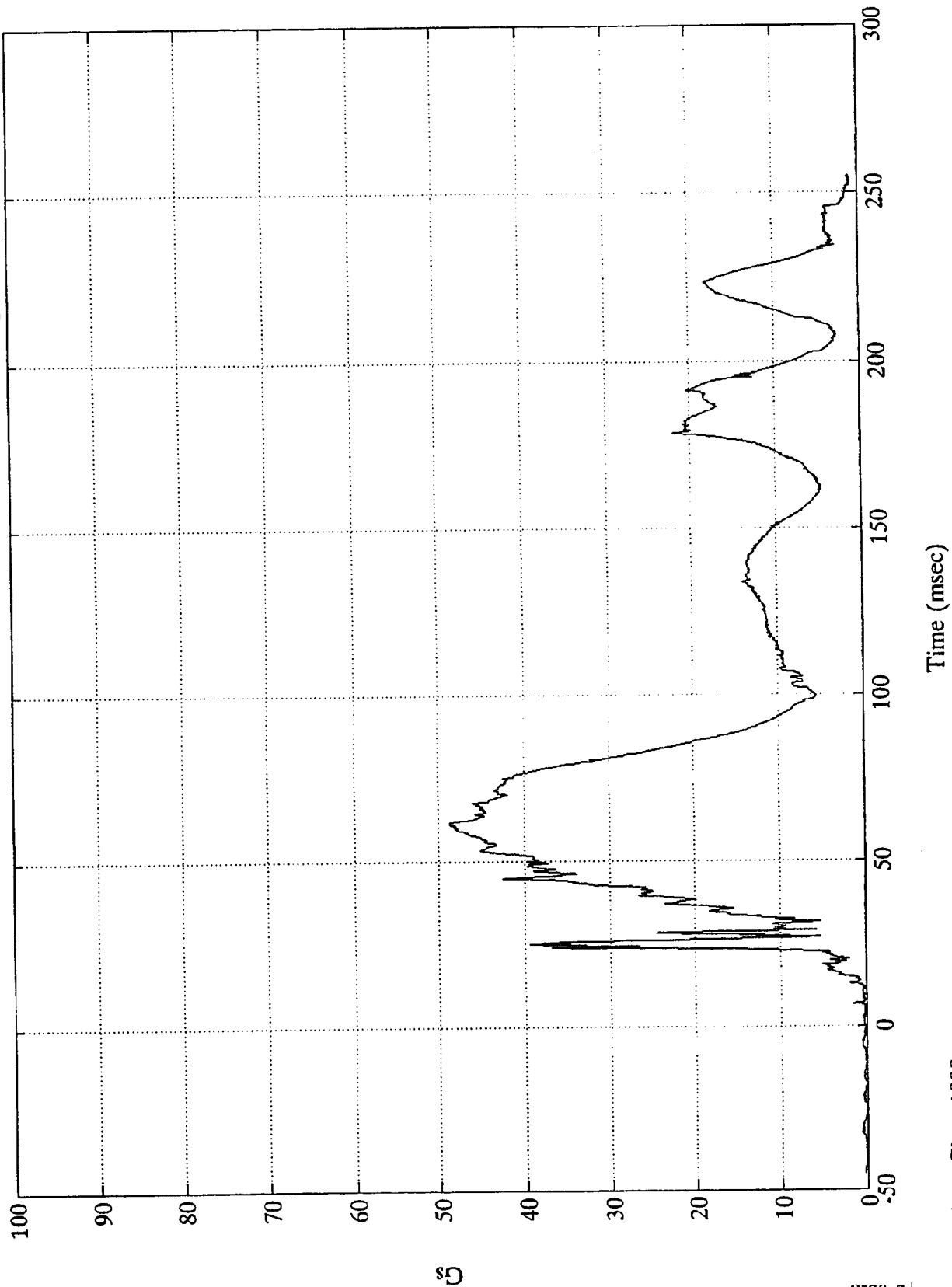
8120-7
B-97

SAE Filter Class 1000

NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Head Resultant

Max = 48.72 Gs @ 61.92 msec
Min = .06 Gs @ -17.52 msec



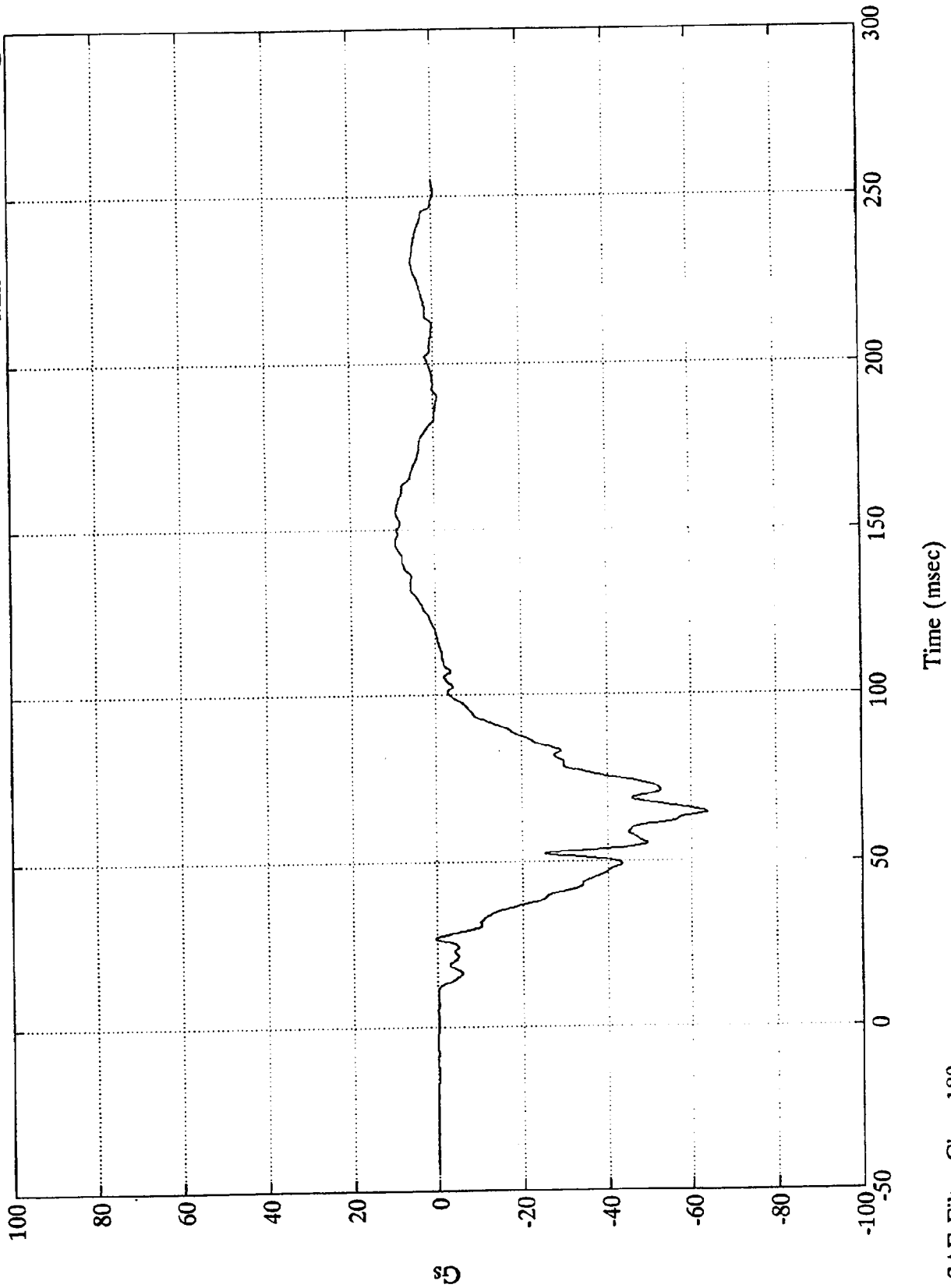
B-98

8120-7

SAE Filter Class 1000

NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Chest X
Max = 9.22 Gs @ 146.40 msec
Min = -63.75 Gs @ 64.44 msec

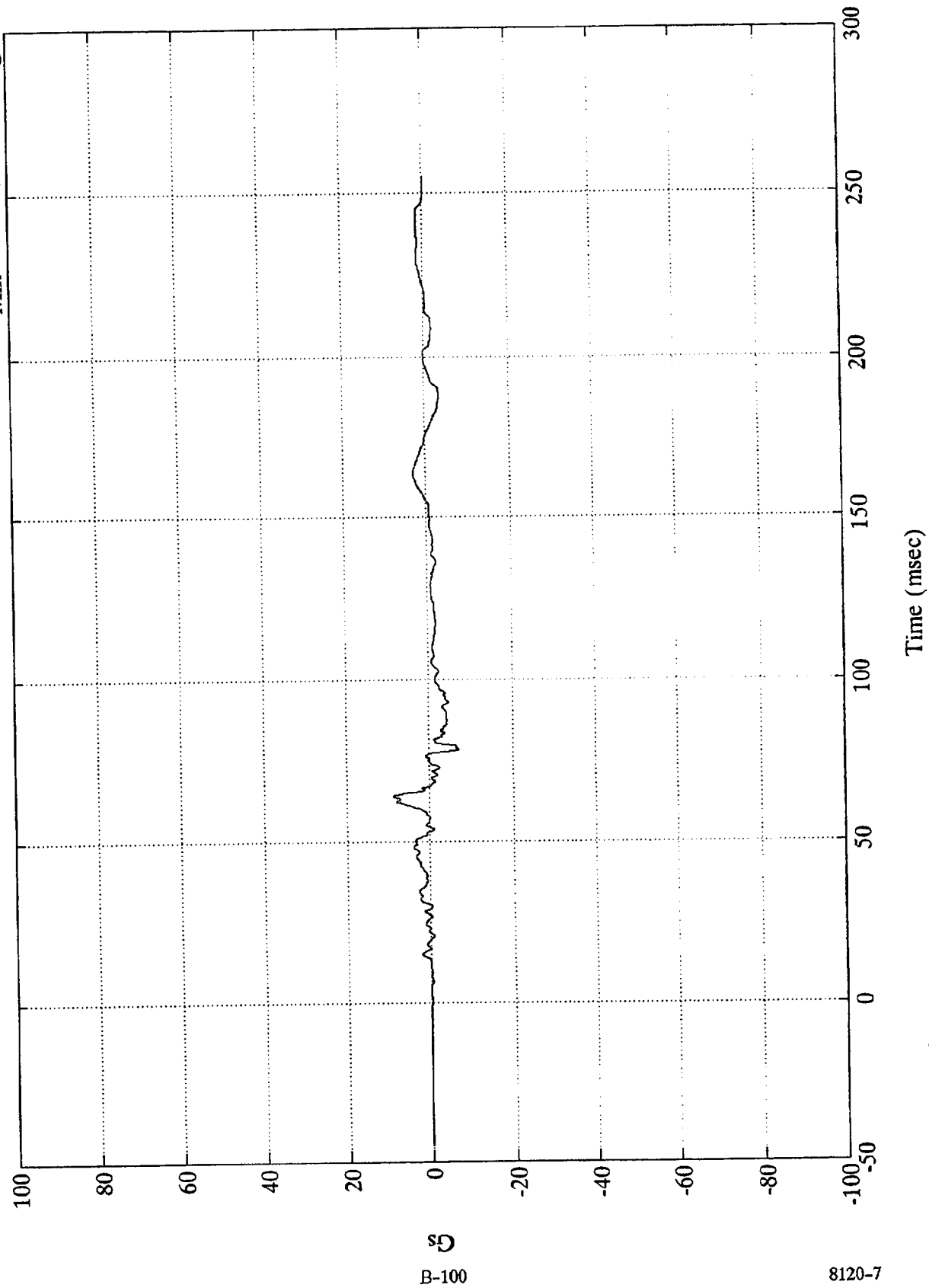


8120-7
B-99

SAE Filter Class 180

NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Chest Y
Max = 8.53 Gs @ 63.84 msec
Min = -7.22 Gs @ 78.48 msec



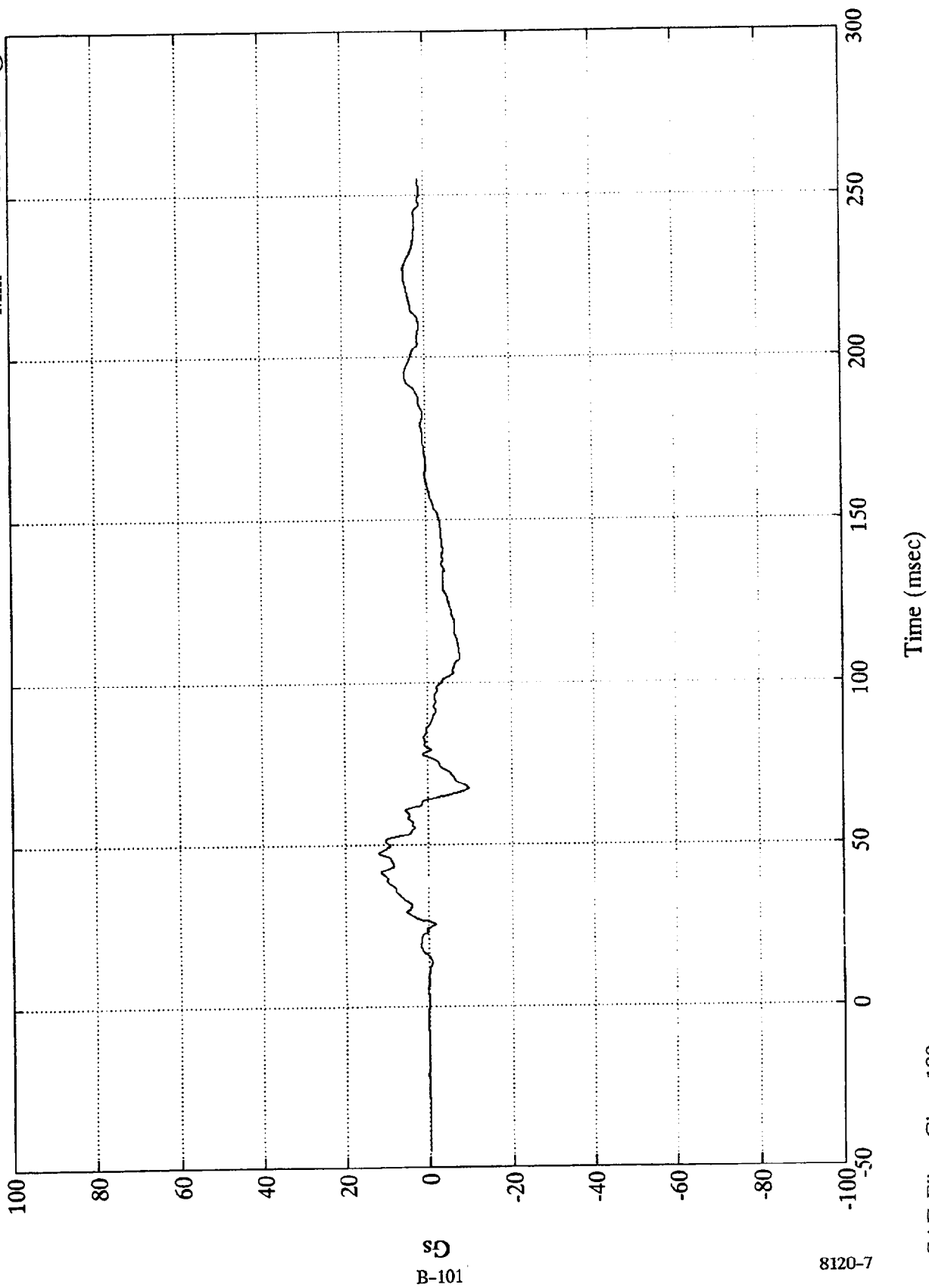
B-100

8120-7

SAE Filter Class 180

NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Chest Z
Max = 11.79 Gs @ 47.40 msec
Min = -9.76 Gs @ 67.56 msec



B-101

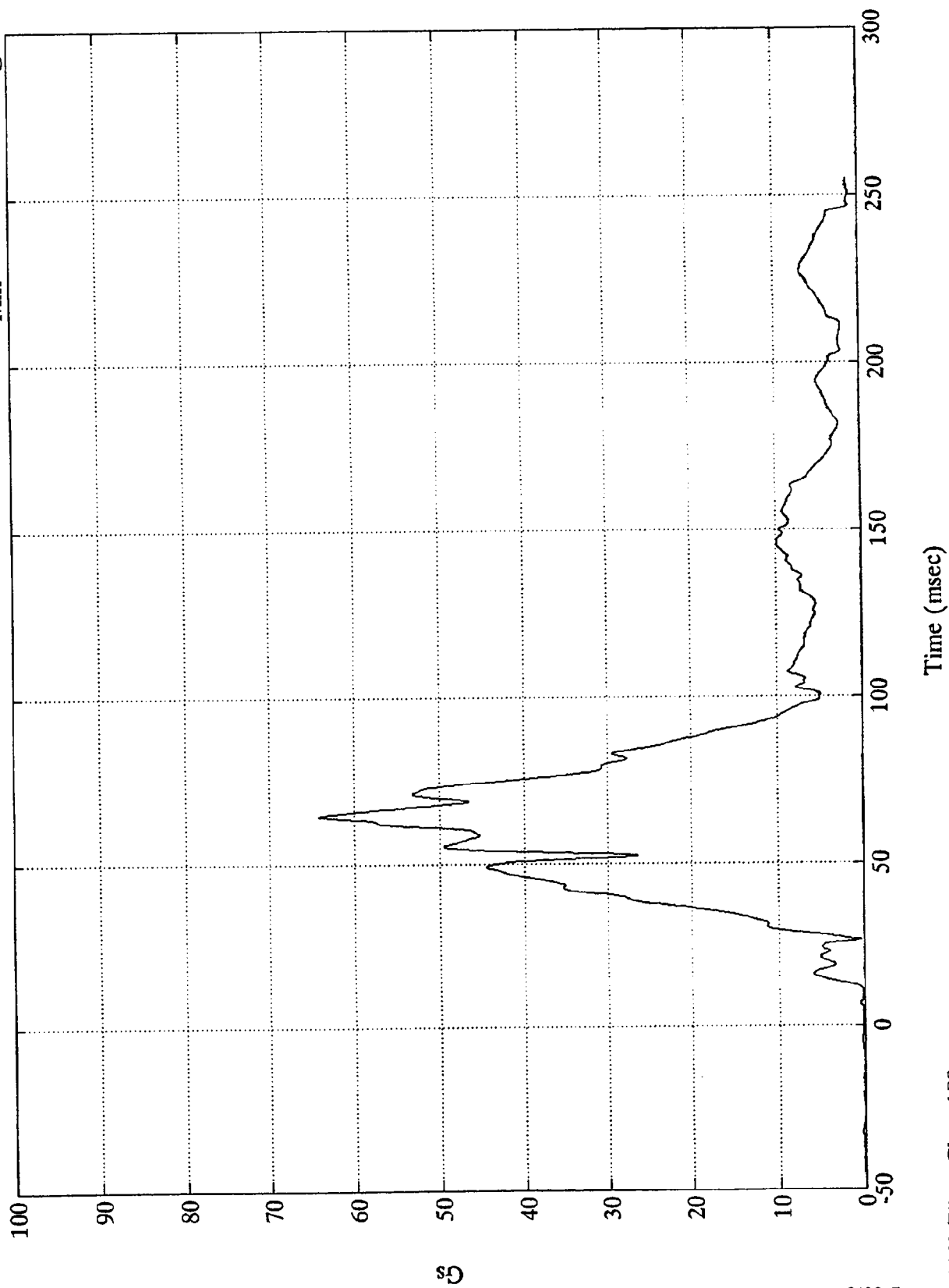
8120-7

SAE Filter Class 180

NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Chest Resultant

Max = 64.18 Gs @ 64.44 msec
Min = .01 Gs @ -25.08 msec



B-102

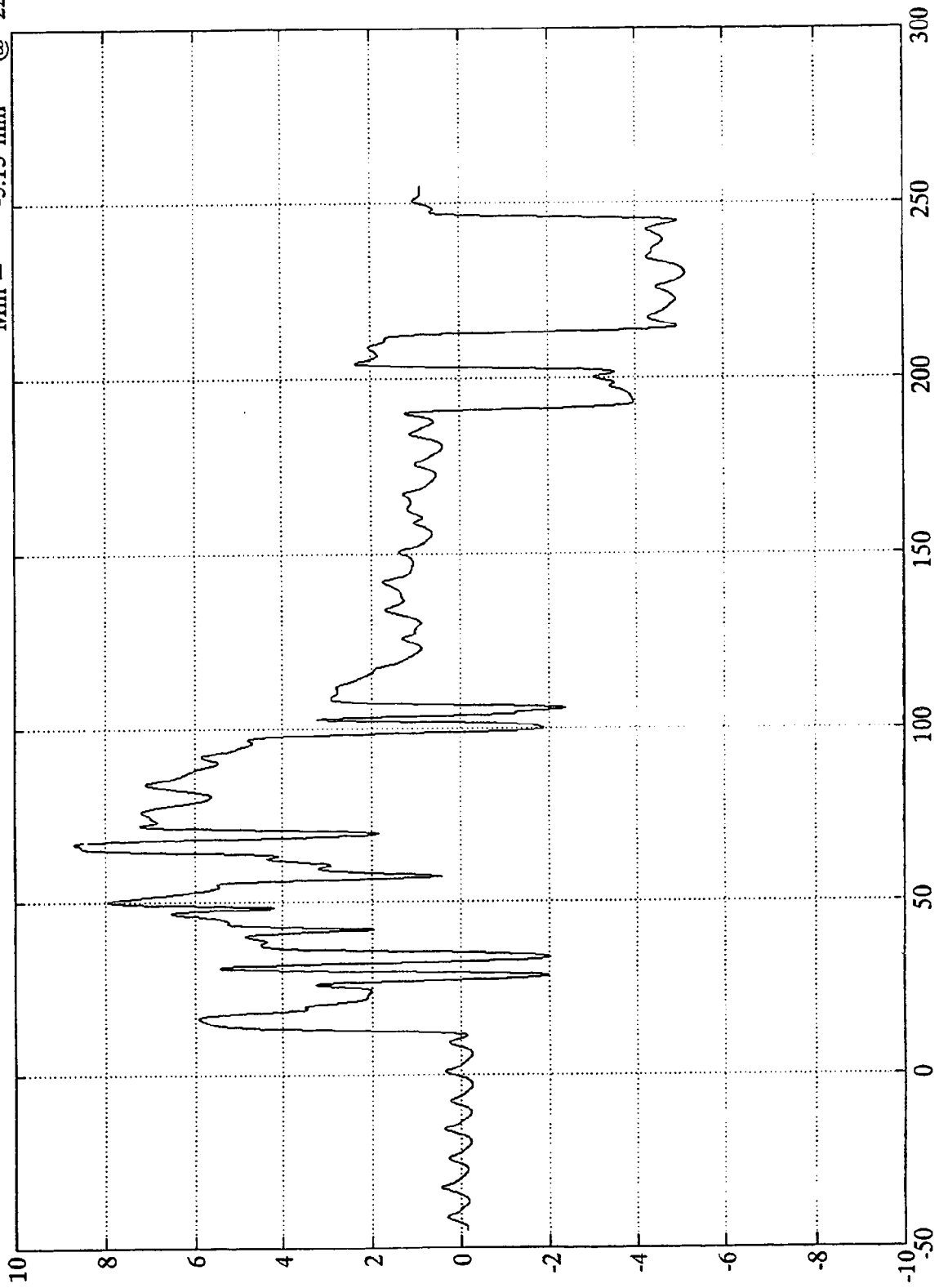
8120-7

SAE Filter Class 180

NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Chest Disp.

Max = 8.69 mm @ 66.84 msec
Min = -5.13 mm @ 229.68 msec



Time (msec)

mm
B-103

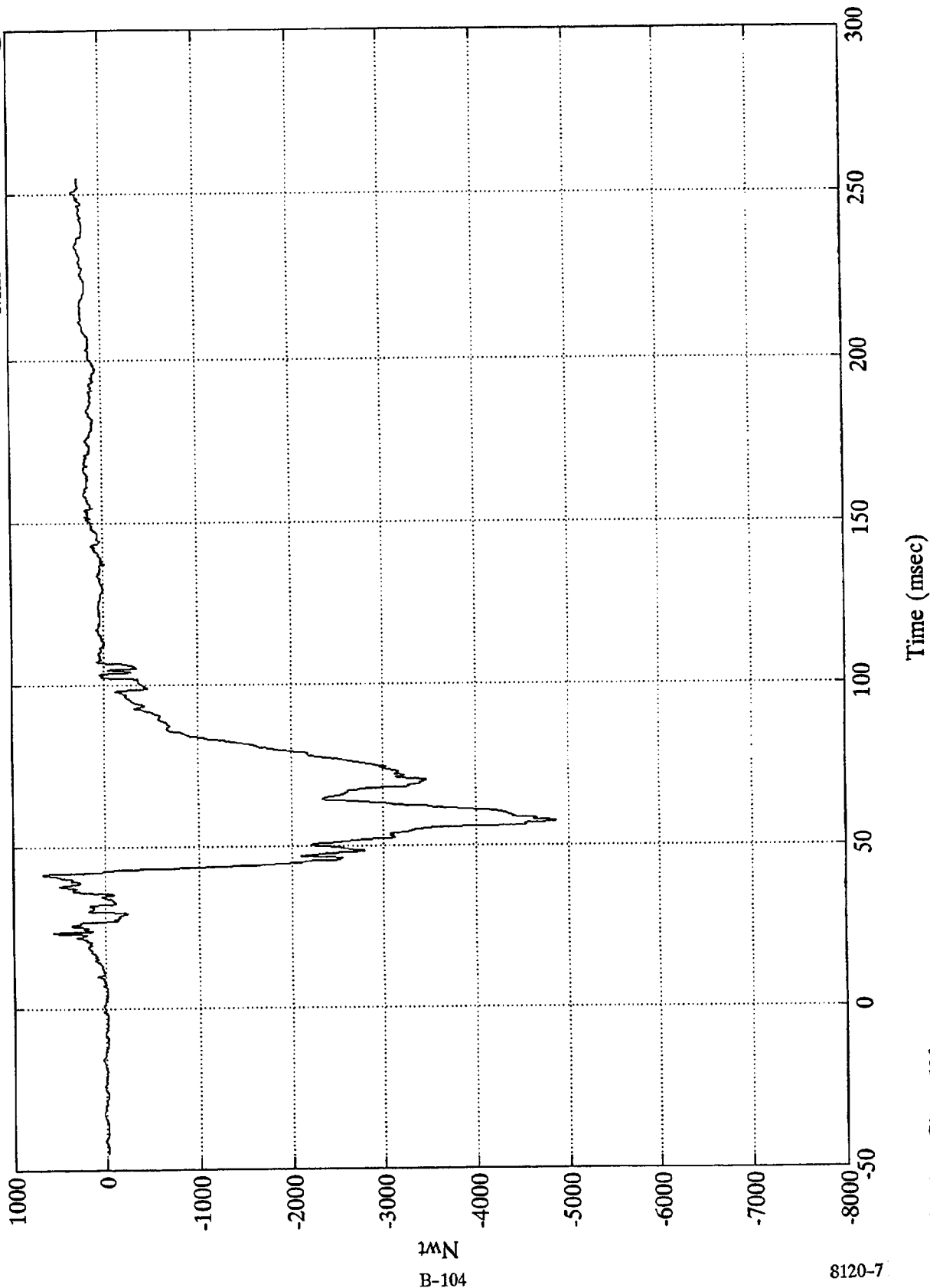
SAE Filter Class 180

8120-7

NCAP TEST #7 - 1994 VOLVO 850

Max = 683.63 Nwt @ 41.15 msec
Min = -4863.01 Nwt @ 57.60 msec

Pos. 2 Left Femur



1mN
B-104

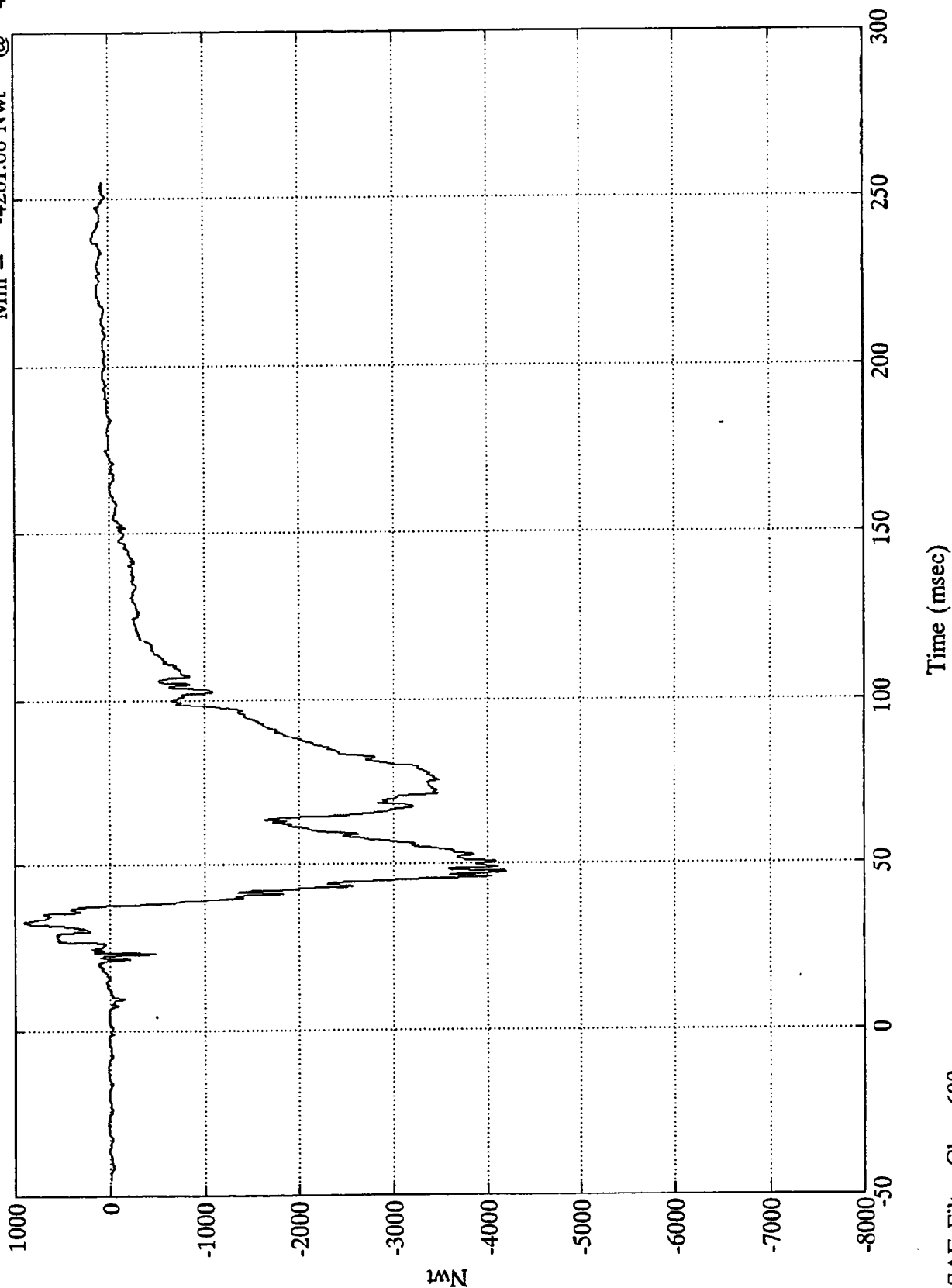
8120-7

SAE Filter Class 600

NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Right Femur

Max = 909.73 Nwt @ 32.63 msec
Min = -4201.06 Nwt @ 47.52 msec

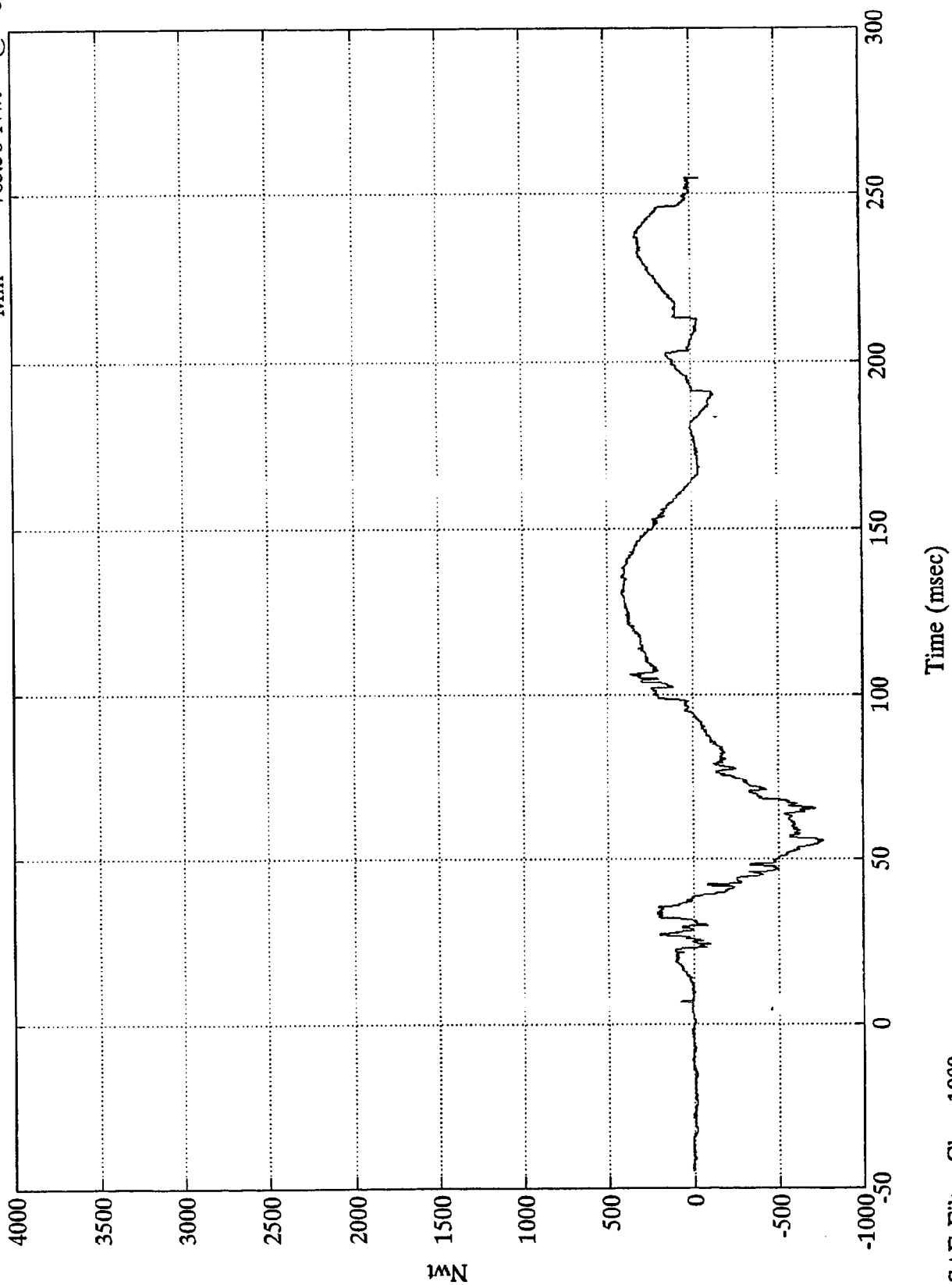


SAE Filter Class 600

NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Upper Neck Fx

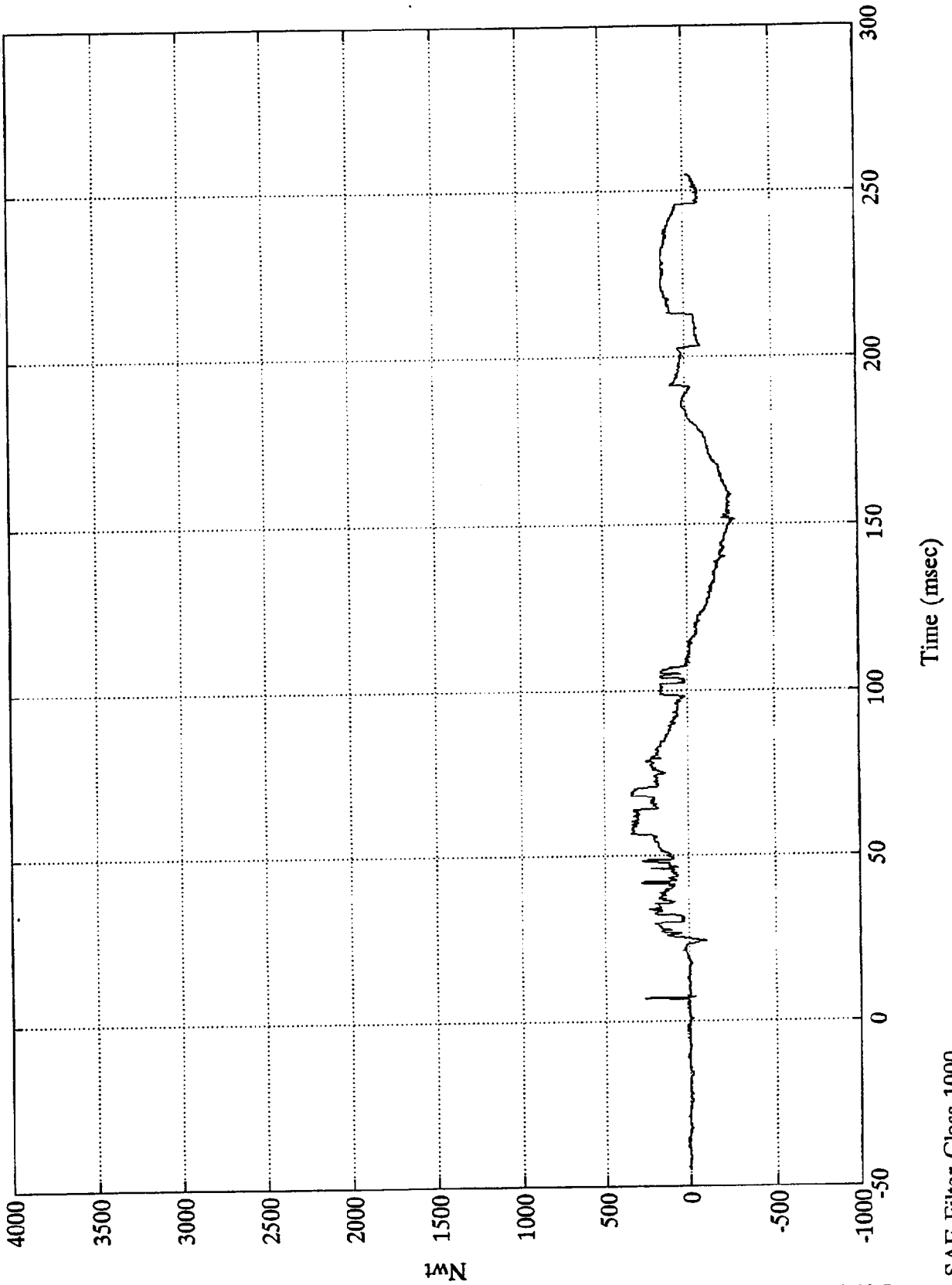
Max = 415.01 Nwt @ 138.24 msec
Min = -763.50 Nwt @ 55.56 msec



NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Upper Neck Fy

Max = 345.42 Nwt @ 68.40 msec
Min = -285.99 Nwt @ 151.44 msec



10N

B-107

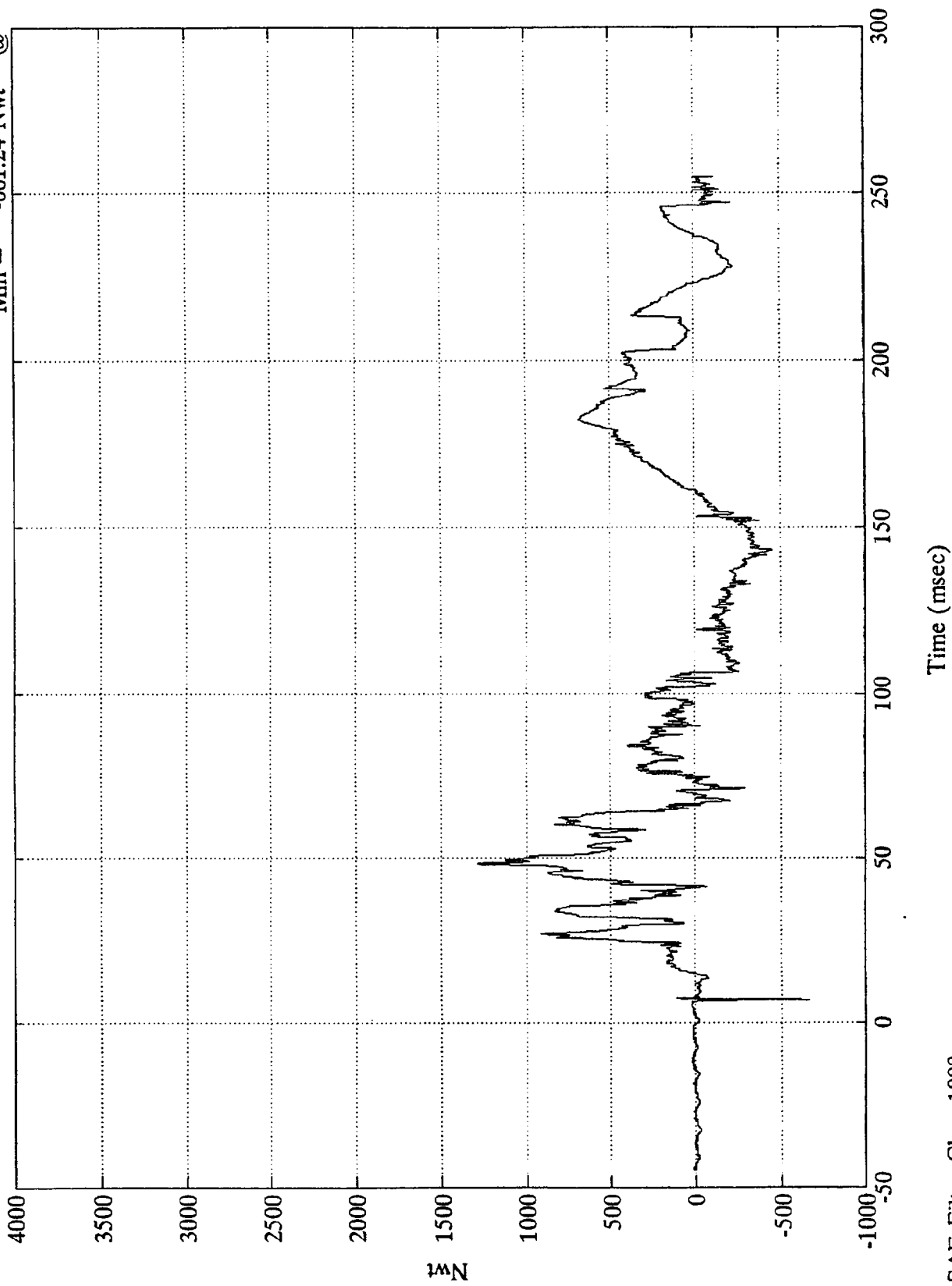
8120-7

SAE Filter Class 1000

NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Upper Neck Fz

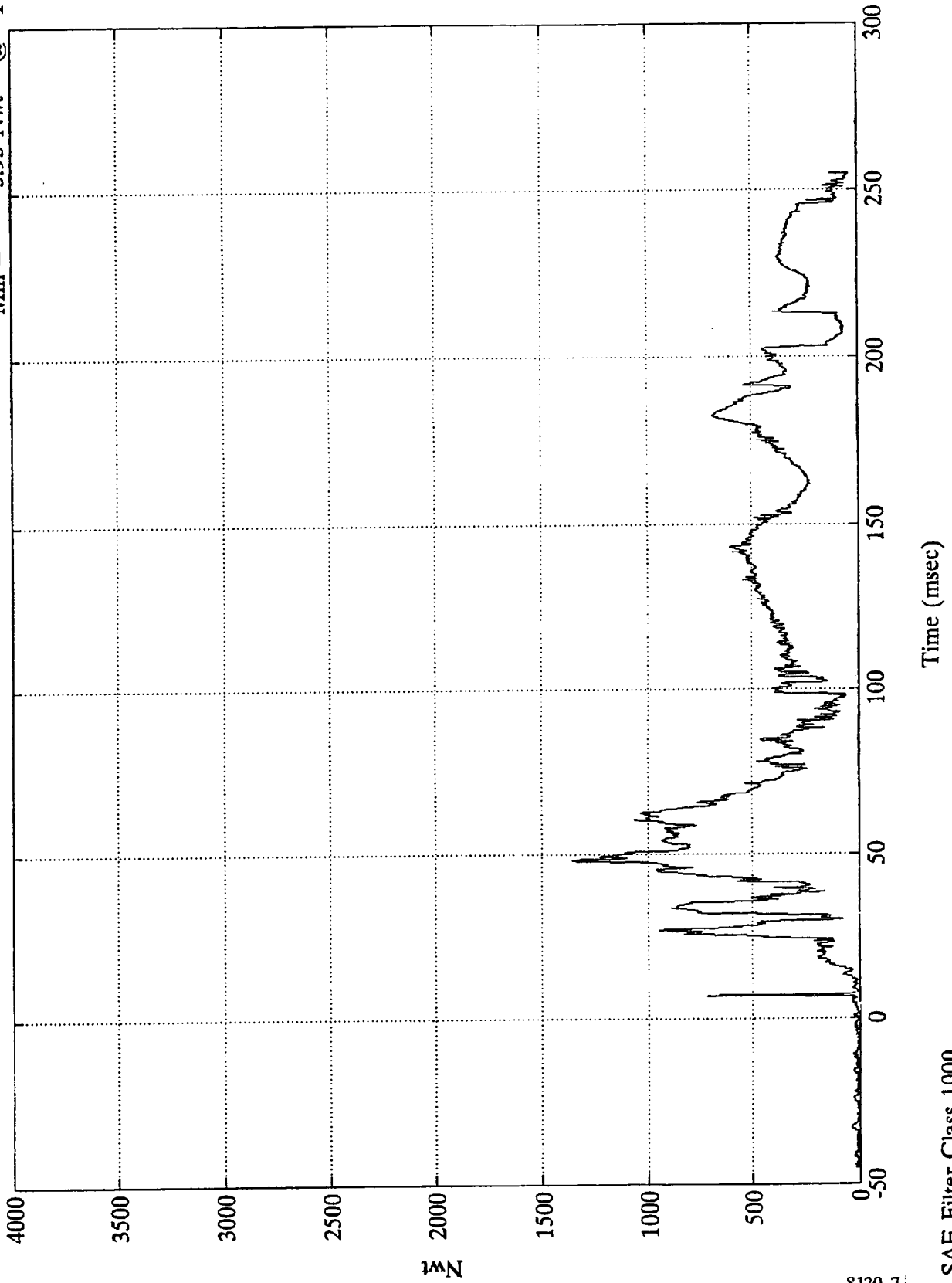
Max = 1286.22 Nwt @ 48.24 msec
Min = -661.24 Nwt @ 6.71 msec



SAE Filter Class 1000

NCAP TEST #7 - 1994 VOLVO 850

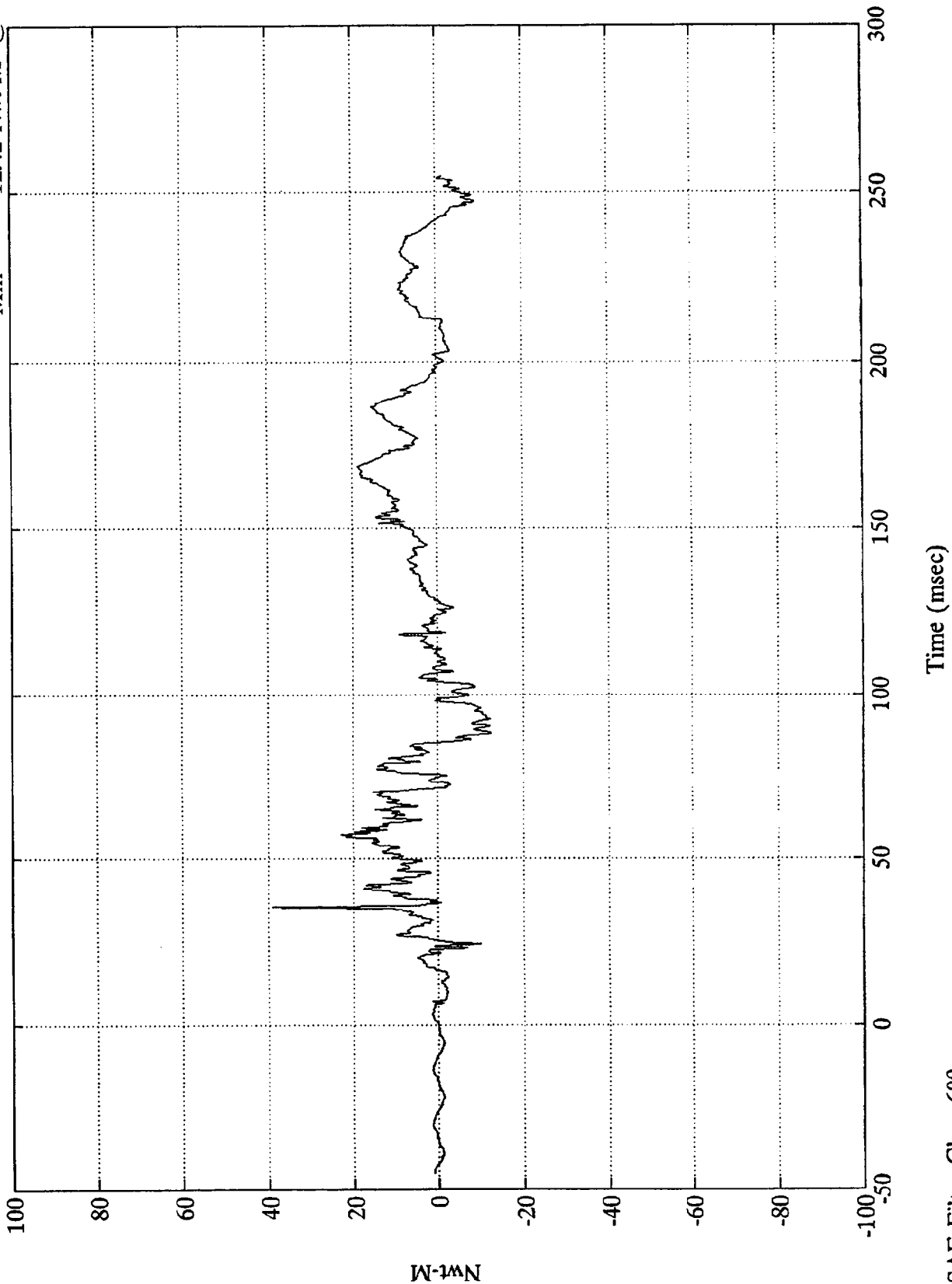
Pos. 2 Neck Force Res.
Max = 1357.11 Nwt @ 48.24 msec
Min = 5.93 Nwt @ -14.28 msec



NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Upper Neck Mx

Max = 39.09 Nwt-M @ 35.15 msec
Min = -12.42 Nwt-M @ 88.31 msec



Nwt-M
B-110

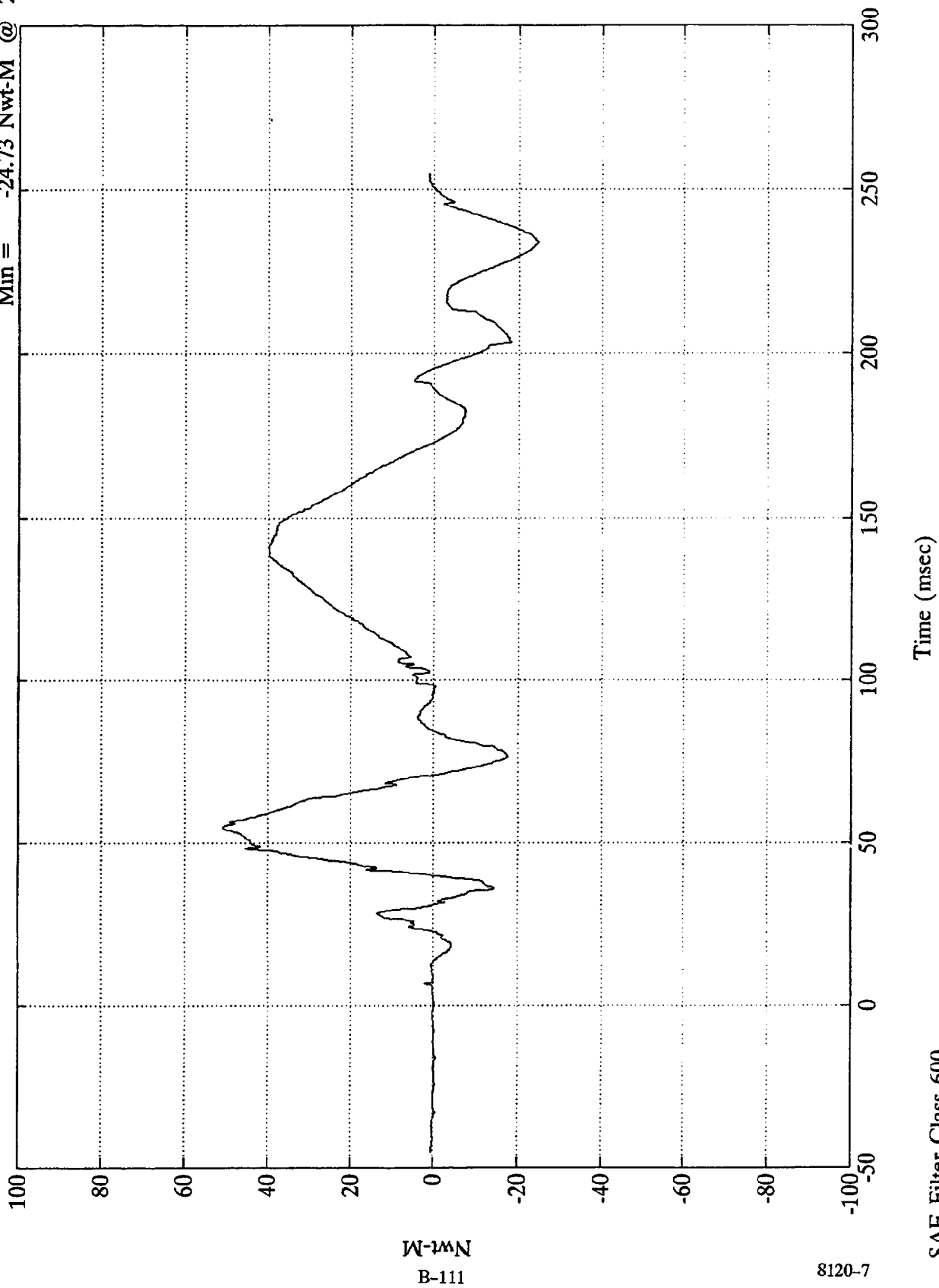
8120-7

SAE Filter Class 600

NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Upper Neck My

Max = 50.89 Nwt-M @ 54.84 msec
Min = -24.73 Nwt-M @ 234.00 msec



111-B
Nwt-M

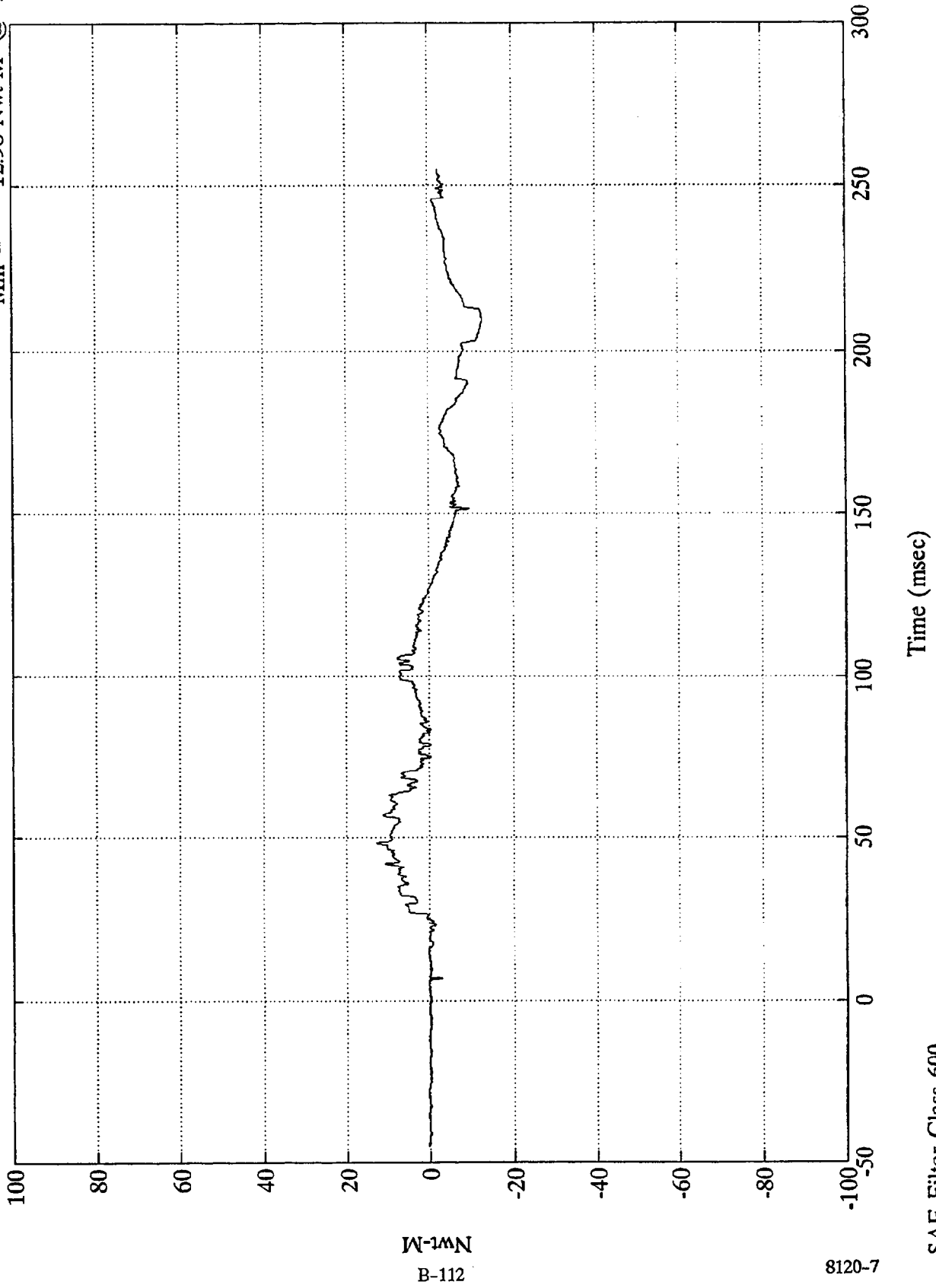
8120-7

SAE Filter Class 600

NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Upper Neck Mz

Max = 12.83 Nwt-M @ 48.24 msec
Min = -12.98 Nwt-M @ 209.16 msec



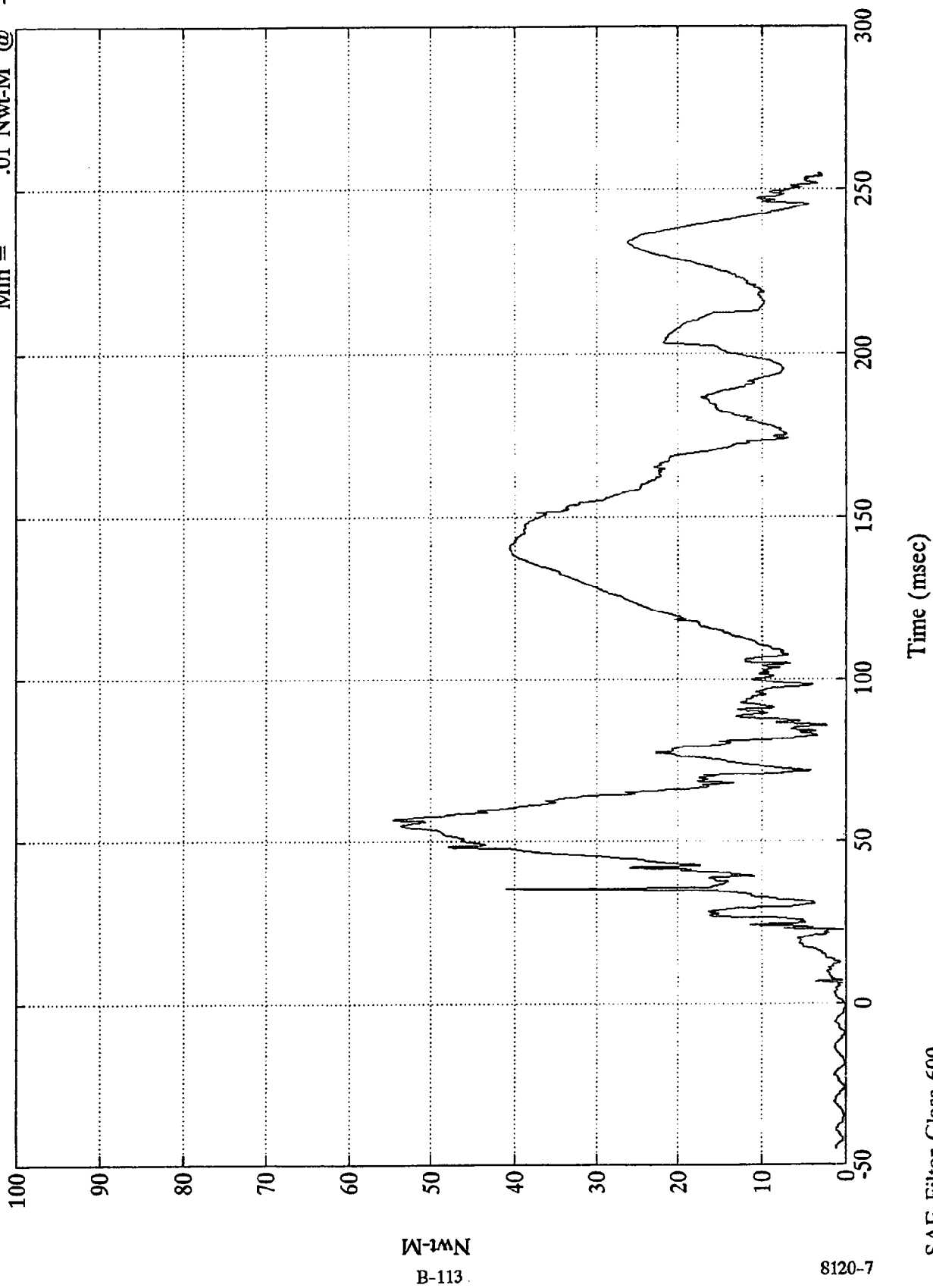
W-1MN
B-112

8120-7

SAE Filter Class 600

NCAP TEST #7 - 1994 VOLVO 850

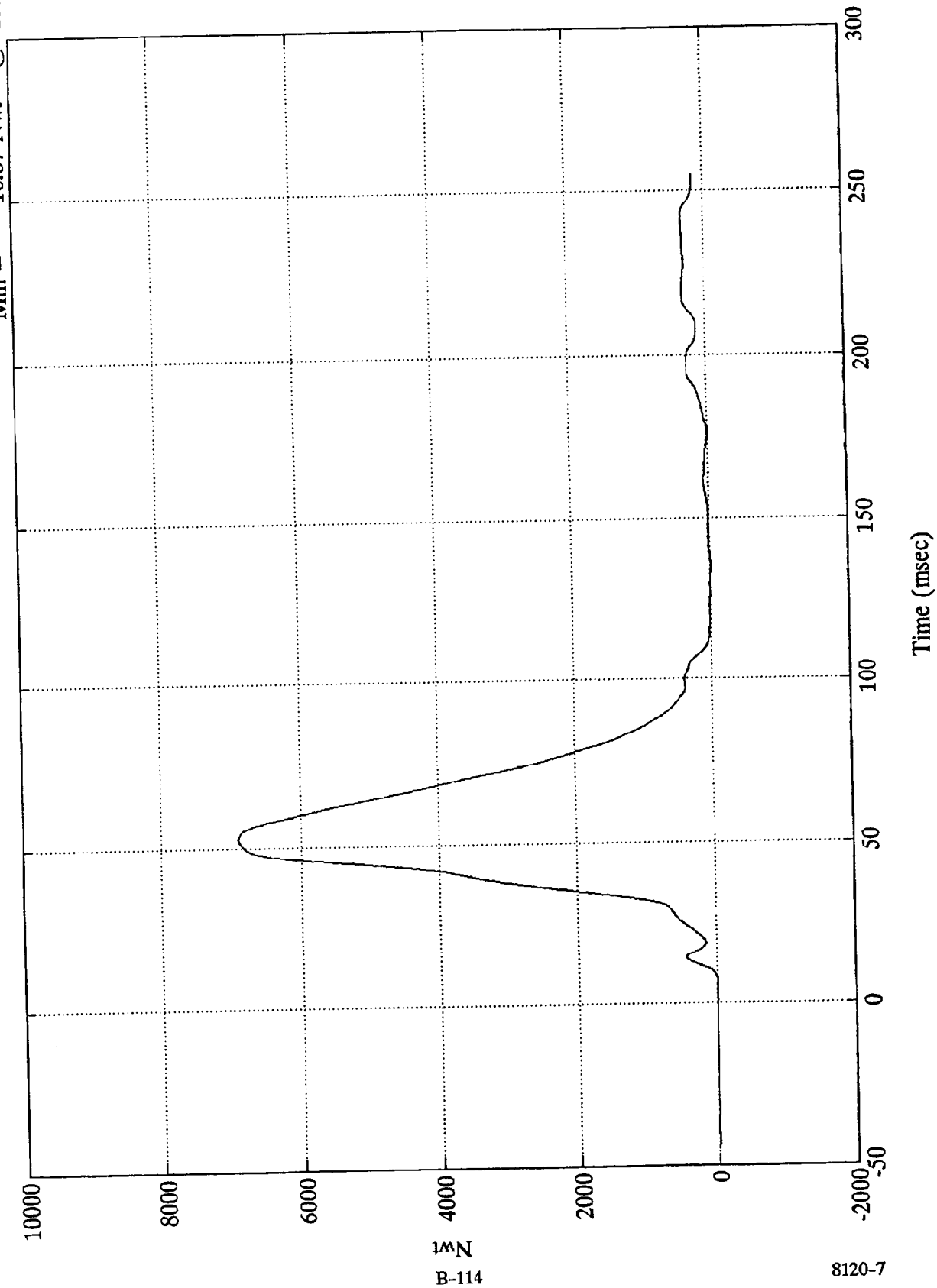
Pos. 2 Neck Moment Res.
Max = 54.67 Nwt-M @ 56.63 msec
Min = .01 Nwt-M @ -0.84 msec



NCAP TEST #7 - 1994 VOLVO 850

Pos. 2 Right Belt Load

Max = 6895.70 Nwt @ 53.04 msec
Min = -10.87 Nwt @ 135.24 msec



1wN
B-114

8120-7

SAE Filter Class 60

Appendix C

PART 572B/E DUMMY CONFIGURATION

AND PERFORMANCE VERIFICATION DATA SHEETS

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

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

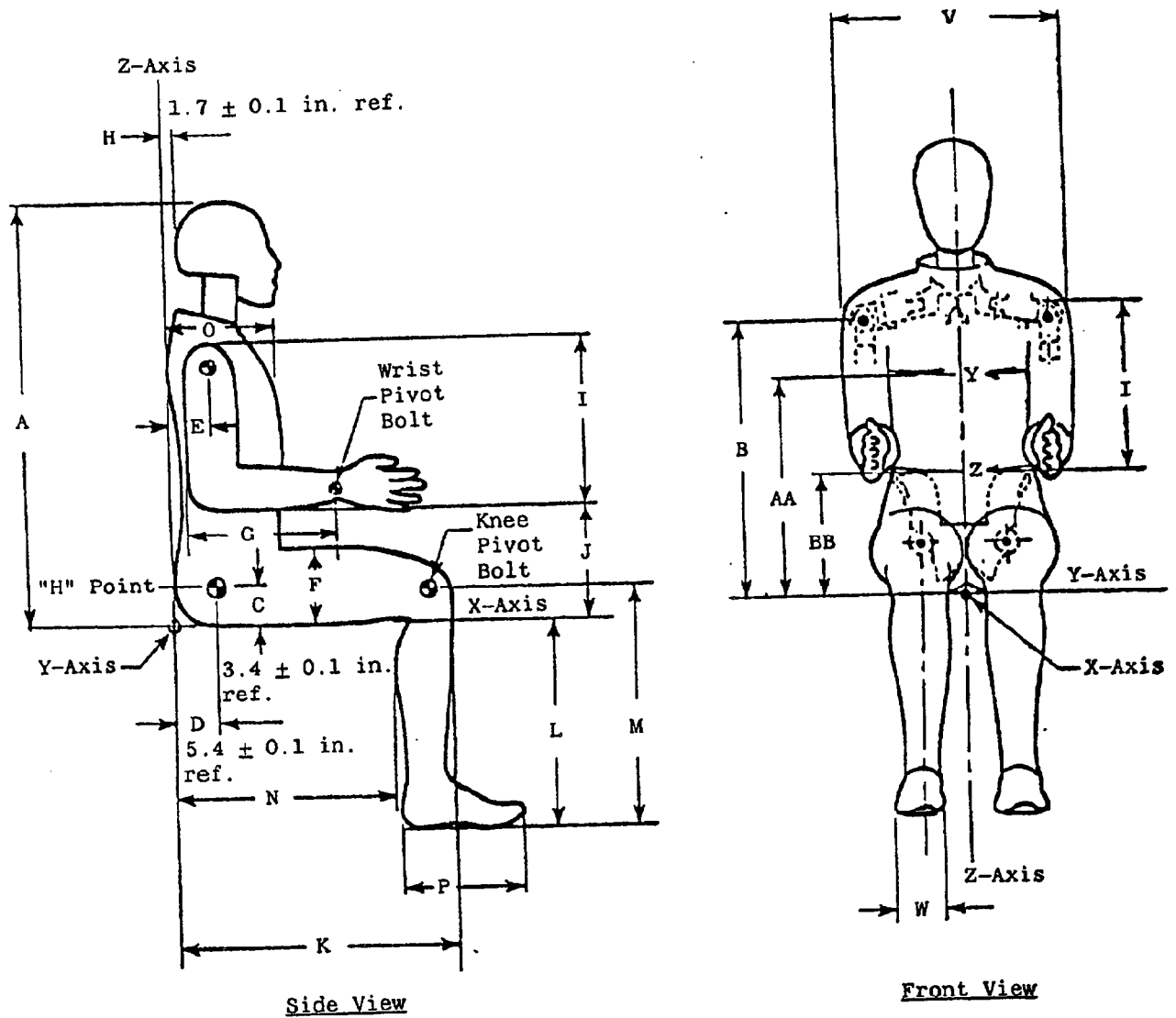
Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Date</u>
150	3/22/94
245	3/22/94

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 Inducant Testing Final Report No. 6525-V-1.

Figure 10
DUMMY CONFIGURATION DIMENSIONS



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 150 HUMANOID

DUMMY SERIAL NO. 150

DATE: 3/22/94

TEMPERATURE		21 DEG. C
RELATIVE HUMIDITY		34 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)	429-434 mm	431 mm
LOCATION FOR WAIST CIRCUMFERENCE (BB)	226-231 mm	228 mm
CHEST CIRCUMFERENCE (Y)	970-1001 mm	998 mm
WAIST CIRCUMFERENCE (Z)	815-866 mm	863 mm
CHEST DEPTH (O)	213-229 mm	213 mm
H-POINT HEIGHT (C)	84-89 mm	88 mm
H-POINT FROM SEAT BACK (D)	135-140 mm	137 mm
SKULL CAP TO BACKLINE (H)	41-46 mm	43 mm
TOTAL SITTING HEIGHT (A)	879-889 mm	881 mm
THIGH CLEARANCE (F)	140-155 mm	142 mm
BUTTOCK KNEE LENGTH (K)	580-605 mm	591 mm
BUTTOCK POPLITAL LENGTH (N)	452-477 mm	470 mm
POPLITEAL LENGTH (L)	430-455 mm	452 mm
KNEE PIVOT HEIGHT (M)	485-501 mm	500 mm
FOOT LENGTH (P)	252-267 mm	259 mm
FOOT BREADTH (W)	91-107 mm	96 mm
SHOULDER PIVOT FROM BACKLINE (E)	84-94 mm	94 mm
SHOULDER BREADTH (V)	422-437 mm	429 mm
SHOULDER PIVOT HEIGHT (B)	505-521 mm	513 mm
ELBOW REST HEIGHT (J)	190-211 mm	208 mm
SHOULDER-ELBOW LENGTH (I)	330-345 mm	337 mm
BACK OF ELBOW TO WRIST PIVOT (G)	290-305 mm	292 mm

DUMMY MEETS SPECIFICATIONS

TECHNICIAN: IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
HEAD DROP TEST
HYBRID III

DATE : 3/3/94

CALSPAN SEQUENTIAL NUMBER 3

HY3 SN: 150 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	19 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	29 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	239.5 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	4.9 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 : 3/22/94

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 3

HY3 SN:150 CAL NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5-22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY		10% - 70%	33 %
IMPACT VELOCITY		24.8 - 25.7 KPH	25.3 KPH
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	23.98 G'S
	20 MS	17.60 - 22.60 G'S	22.24 G'S
	30 MS	12.50 - 18.50 G'S	18.43 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	18.43 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	40.38 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	73.87 DEG.
	TIME	57 - 64 MS	59.5 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88 - 108 N-M	104.7 N-M
	TIME	47 - 58 MS	54.38 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	117.25 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	97.13 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
NECK EXTENSION TEST
HYBRID III

DATE : 3/22/94

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 3

HY3 SN:150 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5 - 22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY		10% - 70%	33 %
IMPACT VELOCITY		21.4 - 22.3 KPH	22.16 KPH
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G'S	17.6 G'S
	20 MS	14.00 - 19.00 G'S	16.79 G'S
	30 MS	11.00 - 16.00 G'S	15.51 G'S
MAX PENDULUM G'S ABOVE 30 MS		22 G'S MAX	15.51 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		38 - 46 MS	43.75 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	88.19 DEG.
	TIME	72 - 82 MS	76.25 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-80.0/-52.9 N-M	-69.74 N-M
	TIME	65 - 79 MS	71.63 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	152.88 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 : 3/1/94

CALSPAN SEQUENTIAL NUMBER 3

HY3 SN 150 H.S. THORAX CAL

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.5 - 22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	26 %
PENDULUM VELOCITY	23.7 - 24.6 KPH	23.7 KPH
MAXIMUM DEFLECTION	64 - 73 mm	64.3 mm
MAXIMUM RESISTIVE FORCE	5160 - 5894 NEWTONS	5831 NEWTONS
INTERNAL HYSTERESIS	69% - 85%	72.1 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 3/3/94

KNEE: LEFT

CALSPAN SEQUENTIAL NUMBER 3

HY3 SN: 150 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	19 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	29 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.68 KPH
PEAK KNEE IMPACT FORCE	4715 - 5782 N	5240 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 3/3/94

KNEE: RIGHT

CALSPAN SEQUENTIAL NUMBER 3

HY3 SN: 1500KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	19 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	29 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.68 KPH
PEAK KNEE IMPACT FORCE	4715 - 5782 N	5088 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY I.D. NUMBER: 150

A. DUMMY INSTRUMENTS

1. HEAD ACCELEROMETER

HX LONGITUDINAL

HY LATERAL

HZ VERTICAL

2. CHEST ACCELEROMETER

CX LONGITUDINAL

CY LATERAL

CZ VERTICAL

3. FEMUR LOAD CELLS

LEFT SIDE

RIGHT SIDE

MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
ENDEVCO	A39J	9/93	3/94
ENDEVCO	AC2R5	9/93	3/94
ENDEVCO	A27F	9/93	3/94
ENDEVCO	A12C	9/93	3/94
ENDEVCO	A60C	9/93	3/94
ENDEVCO	A84G	9/93	3/94
GSE	951	3/94	9/94
GSE	952	3/94	9/94

B. CALIBRATION LABORATORY
INSTRUMENTS

1. PENDULUM ACC.

2. TEST PROBE
ACCELEROMETER

3. LUMBAR FLEXION TEST
PUSH FORCE GAUGE

4. ABDOMINAL COMPRESS.
TEST FORCE GAUGE

5. ABDOMINAL COMPRESS.
TEST FORCE GAUGE

MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
CEC	A160	1/94	7/94
CEC	A161	1/94	7/94
TRANS- DUCER INC	20051	11/93	5/94
BLH	72952	11/93	5/94
CIC	567-11	11/93	5/94

HYBRID III EXTERNAL DIMENSIONS

S/N 245 HUMANOID

DUMMY SERIAL NO. 245

DATE: 3/22/94

TEMPERATURE		20.5 DEG. C
RELATIVE HUMIDITY		35 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)	429-434 mm	431 mm
LOCATION FOR WAIST CIRCUMFERENCE (BB)	226-231 mm	228 mm
CHEST CIRCUMFERENCE (Y)	970-1001 mm	998 mm
WAIST CIRCUMFERENCE (Z)	815-866 mm	863 mm
CHEST DEPTH (O)	213-229 mm	213 mm
H-POINT HEIGHT (C)	84-89 mm	89 mm
H-POINT FROM SEAT BACK (D)	135-140 mm	137 mm
SKULL CAP TO BACKLINE (H)	41-46 mm	43 mm
TOTAL SITTING HEIGHT (A)	879-889 mm	889 mm
THIGH CLEARANCE (F)	140-155 mm	152 mm
BUTTOCK KNEE LENGTH (K)	580-605 mm	596 mm
BUTTOCK POPLITAL LENGTH (N)	452-477 mm	464 mm
POPLITEAL LENGTH (L)	430-455 mm	447 mm
KNEE PIVOT HEIGHT (M)	485-501 mm	487 mm
FOOT LENGTH (P)	252-267 mm	256 mm
FOOT BREADTH (W)	91-107 mm	96 mm
SHOULDER PIVOT FROM BACKLINE (E)	84-94 mm	89 mm
SHOULDER BREADTH (V)	422-437 mm	426 mm
SHOULDER PIVOT HEIGHT (B)	505-521 mm	518 mm
ELBOW REST HEIGHT (J)	190-211 mm	205 mm
SHOULDER-ELBOW LENGTH (I)	330-345 mm	335 mm
BACK OF ELBOW TO WRIST PIVOT (G)	290-305 mm	294 mm

DUMMY MEETS SPECIFICATIONS

TECHNICIAN: IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

HEAD DROP TEST

HYBRID III

DATE : 9/23/93

CALSPAN SEQUENTIAL NUMBER 2

HY3 SN: 245 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	19 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	54 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	237.3 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	3.1 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 : 3/22/94

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 2

HY3 SN:245 CAL NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5-22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY		10% - 70%	34 %
IMPACT VELOCITY		24.8 - 25.7 KPH	25.3 KPH
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	24.87 G'S
	20 MS	17.60 - 22.60 G'S	21.57 G'S
	30 MS	12.50 - 18.50 G'S	18.29 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	18.29 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	41.25 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	67.61 DEG.
	TIME	57 - 64 MS	58.13 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88 - 108 N-M	100.9 N-M
	TIME	47 - 58 MS	54 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	115.88 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	98.63 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

NECK EXTENSION TEST

HYBRID III

DATE : 3/22/94

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 2

HY3 SN:245 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5 - 22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY		10% - 70%	33 %
IMPACT VELOCITY		21.4 - 22.3 KPH	22 KPH
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G'S	17.91 G'S
	20 MS	14.00 - 19.00 G'S	18.12 G'S
	30 MS	11.00 - 16.00 G'S	15.98 G'S
MAX PENDULUM G'S ABOVE 30 MS		22 G'S MAX	15.98 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		38 - 46 MS	44.75 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	89.81 DEG.
	TIME	72 - 82 MS	73 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-80.0/-52.9 N-M	-77.56 N-M
	TIME	65 - 79 MS	68.75 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	147 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	124.5 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
THORAX IMPACT TEST
HYBRID III

DATE : 9/22/93

CALSPAN SEQUENTIAL NUMBER 2

HY3 SN 245 H.S. THORAX CAL

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.5 - 22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	54 %
PENDULUM VELOCITY	23.7 - 24.6 KPH	23.7 KPH
MAXIMUM DEFLECTION	64 - 73 mm	64.26 mm
MAXIMUM RESISTIVE FORCE	5160 - 5894 NEWTONS	5404 NEWTONS
INTERNAL HYSTERESIS	69% - 85%	77.7 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 10/25/93

KNEE: LEFT

CALSPAN SEQUENTIAL NUMBER 2

HY3 SN: 245 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	19 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	40 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.68 KPH
PEAK KNEE IMPACT FORCE	4715 - 5782 N	5191 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 10/25/93

KNEE: RIGHT

CALSPAN SEQUENTIAL NUMBER 2

HY3 SN: 245 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	19 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	40 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.68 KPH
PEAK KNEE IMPACT FORCE	4715 - 5782 N	4879 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY I.D. NUMBER: 245

A. DUMMY INSTRUMENTS

1. HEAD ACCELEROMETER

HX LONGITUDINAL

HY LATERAL

HZ VERTICAL

2. CHEST ACCELEROMETER

CX LONGITUDINAL

CY LATERAL

CZ VERTICAL

3. FEMUR LOAD CELLS

LEFT SIDE

RIGHT SIDE

MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
ENDEVCO	ADMB8	9/93	3/94
ENDEVCO	ADL44	9/93	3/94
ENDEVCO	AC2J3	9/93	3/94
ENDEVCO	ADMB6	1/94	7/94
ENDEVCO	AC209	1/94	7/94
ENDEVCO	ADL98	1/94	7/94
GSE	954	3/94	9/94
GSE	955	3/94	9/94

B. CALIBRATION LABORATORY
INSTRUMENTS

1. PENDULUM ACC.

2. TEST PROBE
ACCELEROMETER

3. LUMBAR FLEXION TEST
PUSH FORCE GAUGE

4. ABDOMINAL COMPRESS.
TEST FORCE GAUGE

5. ABDOMINAL COMPRESS.
TEST FORCE GAUGE

MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
CEC	A160	1/94	7/94
CEC	A161	1/94	7/94
TRANS- DUCER INC	20051	11/93	5/94
BLH	72952	11/93	5/94
CIC	567-11	11/93	5/94

Appendix D

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(6 Month Calibration Minimum)

DRIVER DUMMY	Serial #150	Manufacturer	Calibration	
			Last	Next
Head X Y Z	A39J	ENDEVCO	9-93	3-94
	AC2R5	ENDEVCO	9-93	3-94
	A27F	ENDEVCO	9-93	3-94
Chest X Y Z	A12C	CEC	9-93	3-94
	A60C	ENDEVCO	9-93	3-94
	A84G	CEC	9-93	3-94
Right Femur Load Cell	952	GSE	3-94	9-94
Left Femur Load Cell	951	GSE	3-94	9-94
Neck Load Cell X Y Z	076	DENTON	10-93	4-94
	071	DENTON	10-93	4-94
	076	DENTON	10-93	4-94
Neck Moment X Y Z	076	DENTON	10-93	4-94
	076	DENTON	10-93	4-94
	076	DENTON	10-93	4-94
Chest Deflection Gauge Hybrid III Use Only	150	HUMANOID	2-94	8-94
Lap Belt Load Cells	706	LEBOW	3-94	9-94

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(6 Month Calibration Minimum)

PASSENGER DUMMY	Serial #245	Manufacturer	Calibration	
			Last	Next
Head X	ADMB8	ENDEVCO	9-93	3-94
Y	ADL44	ENDEVCO	9-93	3-94
Z	AC2J3	ENDEVCO	9-93	3-94
Chest X	ADBM6	CEC	1-94	7-94
Y	AC209	ENDEVCO	1-94	7-94
Z	ADL98	CEC	1-94	7-94
Right Femur Load Cell	955	GSE	3-94	9-94
Left Femur Load Cell	954	GSE	3-94	9-94
Neck Load Cell X	269	DENTON	10-93	4-94
Y	269	DENTON	10-93	4-94
Z	269	DENTON	10-93	4-94
Neck Moment X	269	DENTON	10-93	4-94
Y	269	DENTON	10-93	4-94
Z	269	DENTON	10-93	4-94
Chest Deflection Gauge Hybrid III Use Only	245	HUMANOID	2-94	8-94
Lap Belt Load Cells	710	LEBOW	3-94	9-94

INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS
(6 Month Calibration Minimum)

	Serial #	Manufacturer	Calibration	
			Last	Next
Left Seat Rear Crossmember	A73	CEC	9-93	3-94
Right Rear Seat Crossmember	A185	CEC	9-93	3-94
Top of Engine	A152	CEC	10-93	4-94
Bottom of Engine	E01	CEC	3-94	9-94
Left Disc Brake Caliper	A147	CEC	10-93	4-94
Right Disc Brake Caliper	A89	CEC	9-93	3-94
Instrument Panel	A94	CEC	9-93	3-94
Left Rear Crossmember Redundant	A151	CEC	9-93	4-94
Right Rear Crossmember Redundant	A150	CEC	9-93	3-94

Appendix E

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

Occupant safety

Despite our strongest recommendations, and your best intentions, not wearing a seat belt is like believing "it'll never happen to me!". Volvo urges you and all adult occupants of your car to wear seat belts and ensure that children are properly restrained, using an infant, car or booster seat determined by age, weight and height.

Fact: In every state and province, some type of child-restraint legislation has been passed. Additionally, most states have already made it mandatory for occupants of a car to use seatbelts.

So, urging you to "buckle up" is not just our recommendation - legislation in your state or province may mandate seat belt usage. The few seconds it takes to buckle up may one day allow you to say, "It's a good thing I was wearing my seat belt".

Occupant safety

Seat belts	3:2
Volvo SRS	3:4
Child safety	3:8
Occupant safety	3:11
Reporting Safety Defects	3:11

SEATBELTS

3:1

Seat belts

Seat belts

Always fasten the seat belts before you drive or ride.

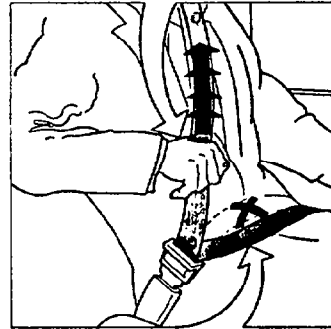
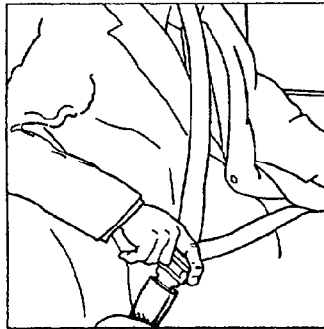
Two lights will be illuminated for 4-8 seconds after the starting (ignition) key is turned to the driving position. One light is located in the instrument panel and one in the console between the front seats.

A chime will sound at the same time if the driver has not fastened his seat belt. The rear seats are provided with self-retracting inertia-reel belts. The front seats are provided with single roller belts with tensioners.

To buckle:

Pull the belt out far enough to insert the latch plate into the receptacle (buckle for rear seats), until a distinct snapping sound is heard. The seat belt retractor is normally "unlocked" and you can move freely, provided that the shoulder belt is not pulled out too far. The retractor will lock up as follows:

- if belt is pulled out rapidly
- during braking and acceleration
- if the vehicle is leaning excessively
- when driving in turns.



Adjusting shoulder belt

Lap portion of the belt should sit low

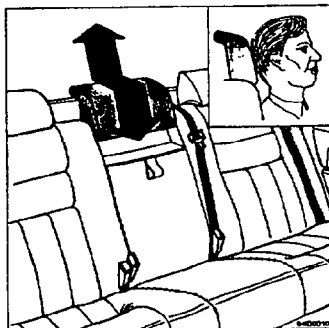
In order for the seat belt to provide maximum protection in the event of an accident, it must be worn correctly. When wearing remember:

- the belt should not be twisted or turned
- the lap belt must be positioned low on the hips (not pressing against the abdomen). Make sure that the shoulder belt is rolled up into its retractor and that the shoulder and lap belts are taut.

Before exiting the car, check that the seat belt retracts fully after being unbuckled. If necessary, guide the belt back into the retractor slot.

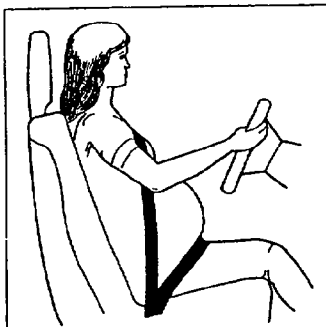
WARNING! Any device used to induce slack into the shoulder belt portion of the three-point belt system will have a detrimental effect on the amount of protection available to you in the event of a collision. The seat back should not be tilted too far back. The shoulder belt must be taut in order to function properly.

3:2



Rear head restraints

The rear head restraints can be adjusted according to the passenger's height. The restraints should be carefully adjusted to support the occupants' heads.



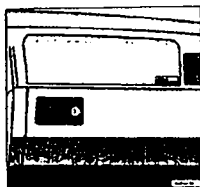
During pregnancy

Pregnant women should always wear seat belts. Remember that the belt should always be positioned in such a way as to avoid any possible pressure on the abdomen. The lap portion of the belt should be located low, as shown in the above illustration.

WARNING! Never use a seat belt for more than one occupant. Never wear the shoulder portion of the belt under the arm, behind the back or otherwise out of position. Such use could cause injury in event of accident. As the seat belts lose much of their strength when exposed to violent stretching, they should be replaced after any collision, even though they may appear to be undamaged. Never repair the belt on your own; have this done by an authorized Volvo dealer only.

3:3

Volvo SRS



Passenger side SRS hatch

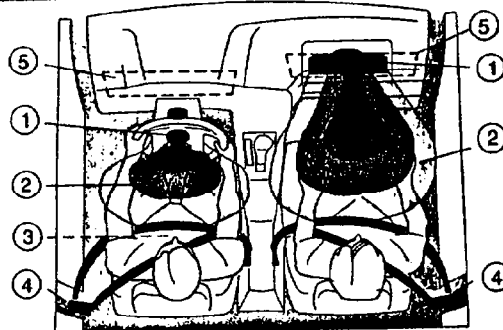
As an enhancement to the three-point seat belt system, your Volvo is equipped with a Supplemental Restraint System (SRS). The Volvo SRS consists of an airbag (2) and knee bolster (5) on both the driver's and passenger's sides and seat belt tensioners in both front door pillars (4). The system is designed to supplement the protection provided by the three-point seat belt system.

The SRS system is indicated by the "SRS" embossed on the steering wheel pad and above the glove compartment, the knee bolsters beneath the steering column and the glove compartment and decals on both sun visors and on the far right side of the dash.

The airbags are folded and located in the center of the steering wheel and above the glove compartment. They are released only during certain frontal or front-angular collisions, depending on the crash severity, angle, speed and object impacted. Both air bags and seat belt tensioners will deploy, even if the passenger seat is not occupied.

WARNING!

As its name implies, SRS is designed to be a SUPPLEMENT to - not a replacement for - the three-point belt system. The airbag is designed not to be released in the event of a side or rear-end collision, or during a rollover situation. For maximum protection, wear seat belts at all times. Be aware that no system can prevent all possible injuries that may occur in an accident.



The airbag system includes gas generators (1) surrounded by the airbags (2) and front seat belt tensioners for both of the front seats (4). To deploy the system, the sensor (3) activates the gas generators causing the airbags to be inflated with nitrogen gas. As the movement of the seats' occupants compresses the airbags, some of the gas is expelled at a controlled rate to provide better cushioning. Both seat belt tensioners also deploy, minimizing any seat belt slack.

The entire process, including inflation and deflation of the airbags, takes approximately two-tenths of a second.

WARNING!

When installing any optional equipment make sure that the SRS system is not damaged. Do not attempt to service any component of the SRS yourself. Attempting to do so may result in serious personal injury. If a problem arises, take your car to the nearest authorized Volvo Dealer for inspection as soon as possible.

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A self-diagnostic system incorporated in the sensor monitors the SRS. If a fault is detected, the "SRS" warning light will illuminate. The light is included in the warning/indicator light cluster in the instrument panel. Normally, the SRS warning lamp should light up when the ignition is switched on and should go out after 10 seconds or when the engine is started. Check that this light is functioning properly every time the car is started.

The following items are monitored by the self-diagnostic system:

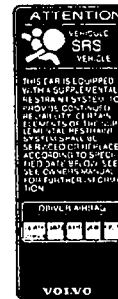
- Sensor unit
- Cable harness
- Gas generator ignitor

WARNING! Never drive an SRS equipped car with your hands on the steering wheel pad / airbag housing.

WARNING! If the SRS warning light stays on after the engine has started or if it comes on while you are driving, drive the car to the nearest authorized Volvo Dealer for inspection as soon as possible.



The above is a sample of the label found on all seat belts equipped with tensioners, located on the front seat belts near the lower anchorage point.



The above is a sample of the decal which can be found on both front door pillars.

There is no maintenance to perform on the SRS yourself. The only periodic maintenance recommended on the SRS is that the air bag modules and front seat belts (including tensioners) should be replaced approximately every ten years and that the other components in the system (wiring, connectors, etc.) should also be inspected at this time. The SRS decal on your car shows the month and year servicing is due. This service must be performed by an authorized Volvo dealer.

Should you have any questions about the SRS system, please contact your authorized Volvo Dealer or the Consumer Affairs Department:

In the U.S.A.:
Volvo Cars of North America
One Volvo Drive,
Rockleigh, New Jersey 07647
800-458-1552

In Canada:
Volvo Canada Ltd.
175 Gordon Baker Road
Willowdale, Ontario M2H 2N7
800-663-8255

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Volvo SRS

WARNING

This car is equipped with a full frontal Supplemental Restraint System with AIRBAGS in front of the driver and front passenger.

- ALL OCCUPANTS MUST BE PROPERLY RESTRAINED. ADULTS USING SEAT BELTS AND CHILDREN USING CHILD RESTRAINT SYSTEMS
- DO NOT INSTALL AND USE ANY CHILD RESTRAINTS IN THE FRONT SEAT



We also recommend that children who have outgrown child restraint systems sit in the rear seat with the seat belt properly fastened. The safest place in the car for children is in the rear seat.

FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY TO THE VEHICLE OCCUPANTS IN AN ACCIDENT.

For further information, see owner's manual.

VOLVO

SRS text at far right of instrument panel

WARNING

This vehicle is equipped with a Supplemental Restraint System (SRS), which includes driver's and front passenger's airbags.

- ALL OCCUPANTS MUST BE PROPERLY RESTRAINED. ADULTS USING SEAT BELTS AND CHILDREN USING CHILD RESTRAINT SYSTEMS
- DO NOT INSTALL AND USE ANY CHILD RESTRAINTS IN THE FRONT SEAT

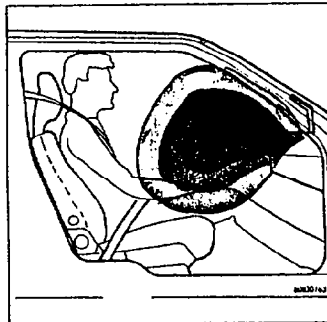
We also recommend that children who have outgrown child restraint systems sit in the rear seat with the seat belt properly fastened. The safest place in the car for children is in the rear seat.

FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY TO THE VEHICLE OCCUPANTS IN AN ACCIDENT.

For further information, see owner's manual.

VOLVO

SRS texts on inside of both sun visors



Passenger side air bag

WARNING! Do not use child safety seats or child booster cushions/backrests in the front passenger's seat. We also recommend that children who have outgrown these devices sit in the rear seat with the seat belt properly fastened.

NOTE: Deployment of SRS components occurs only one time during an accident. In a collision where deployment occurs, both air bags and seat belt tensioners activate. Some noise occurs and a small amount of powder is released. This powder is not harmful and does not indicate fire.

WARNING! (Passenger side air bag)

- Occupants in the front passenger's seat must never sit on the edge of the seat, or leaning toward the instrument panel or otherwise sit out of position. The occupant's back must be as upright as comfort allows and be against the seat back with the seat belt properly fastened.
- Feet must be on the floor, e.g. not on the dash, seat or out of the window.
- Children must never be allowed to stand in front of the passenger seat.
- No objects or accessory equipment, e.g. dash covers, may be placed on, attached to or installed near the SRS hatch (the area above the glove compartment) or the area affected by air bag deployment (see illustration).
- There should be no loose articles, e.g. coffee cups, on the floor, seat or dash area.
- Never try to open the SRS cover on the steering wheel or the passenger side SRS hatch. This should only be done by an authorized Volvo service technician.

When are the airbags deployed ?

The SRS system is designed to deploy only during certain frontal or front-angular collisions, depending on the crash severity, angle, speed and object impacted. The SRS sensor is designed to register both the impact of the collision and the inertial forces generated by it and to determine if the intensity of the collision is sufficient for the airbags to be deployed.

NOTE: The SRS system activates only once in a collision.

If the airbags have been deployed, we recommend the following:

- Have the car towed to an authorized Volvo dealer. Even if it can be driven after an accident we do not recommend driving the car with deployed airbags.
- Have an authorized Volvo dealer replace the SRS system components.
- Use only new, Genuine Volvo Parts when replacing SRS components (airbags, seat belts, tensioners, etc.).

When are the airbags NOT deployed ?

Not all frontal collisions activate the SRS system. If the collision involves a non-rigid object (e.g., a snow drift or bush), or a rigid, fixed object at a low speed, the SRS system will not necessarily deploy. Airbags do not normally deploy in a side impact collision, in a collision from the rear or in a rollover situation. The amount of damage to the bodywork does not reliably indicate if the airbags should have deployed or not.

Can the airbags deploy accidentally ?

The entire SRS system is constructed so that the airbags only inflate in certain collision situations. The SRS system has its own diagnostic unit which continuously monitors and inspects the system.

Make a habit of checking the SRS system warning light when starting and driving the car. Normally, this light will come on when the ignition is switched on and should go out after approximately 10 seconds or

when the engine is started. If this light should stay on or come on while you are driving, drive the car to an authorized Volvo dealer for inspection as soon as possible.

Seat belts - the heart of the Volvo safety system

The heart of the Volvo safety system is the **three-point seat belt!** In order for the SRS system to provide the protection intended, seat belts must be worn at all times by everyone in the car. **The SRS system is a supplement to the seat belts.**

WARNING! If your car has been subjected to flood conditions (e.g., soaked carpeting/standing water on the floor of the vehicle) or if your car has become flood-damaged in any way, do not attempt to start the vehicle or put the key in the ignition before disconnecting the battery (see below). This may cause airbag deployment which could result in serious personal injury. Have the car towed to an authorized Volvo dealer for repairs.

Automatic transmission only:

Before attempting to tow the car, use the following procedure to override the shiftlock system to move the gear selector to the neutral position.

- Disconnect the battery
- Wait at least one minute
- Insert the key in the ignition and turn it to position I
- Press firmly on the shiftlock override button (located near the base of the gear selector).
- While holding the override button down, move the gear selector from the park position.

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