

V1743

REPORT NUMBER: CAL-93-N02

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

CHRYSLER CORPORATION
1993 JEEP GRAND CHEROKEE
4-DOOR MPV

NHTSA NUMBER: MP0300

CALSPAN TEST NUMBER: 8038-2

AUGUST 27, 1992

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FINAL REPORT

PREPARED FOR:

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National Highway Traffic Safety Administration
Office of Market Incentives
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16. Abstract A frontal load cell barrier test on a 1993 Jeep Grand Cherokee 4-Door MPV was performed at the Calspan Advanced Technology Center crash test facility in Buffalo, New York, on August 27, 1992. The impact velocity was 56.3 kph and the temperature was 28°C. The test vehicle was equipped with a 3-point continuous belt system at each of the front outboard seating positions. The test vehicle was also equipped with a driver side air bag as a supplemental restraint device. With regard to FMVSS 208 "Occupant Crash Protection," injury criteria, both the driver and passenger dummies appear to comply with the head, chest and femur requirements.					
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Section 1

PURPOSE AND TEST PROCEDURE

This 56.3 kph (35 mph) frontal barrier impact test is part of the Composite FY 92 Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-90-D-02121. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 48.3 kph (30 mph) requirements.

The 56.3 kph (35 mph) frontal barrier impact test was conducted in accordance with the Office of Market Incentives (OMI) Laboratory Indicant Test procedure.

Section 2

SUMMARY OF TEST NUMBER MPO300

A load cell barrier consisting of 36 load cells was impacted by a 1993 Jeep Grand Cherokee 4-Door MPV at a velocity of 56.3 kph. The test was performed at the Calspan Corporation Advanced Technology Center on August 27, 1992. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 15 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

Two Part 572, 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. The front bumper was destroyed upon impact. Some of the post-test measurements are not available due to the loss of the front bumper.

Both ATDs were fully instrumented with head and chest triaxial accelerometers and right/left femur load cells. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver ATD (Serial No. 45) and the right-front passenger ATD (Serial No. 150) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C and D.

The 83 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. Position #1 Fz did not record accurately after 60 msec. Barrier load cell C5 did not return to zero.

The driver's head struck the airbag; the HIC was 312.4. The maximum chest deceleration over 3 milliseconds was 56.4 g's and femur loads were -3525.4 and -7320.3 newtons. Chest deflection was 50 mm.

The right front passenger's HIC was 675.8 and maximum chest deceleration over 3 milliseconds was 59.5 g's. Femur loads were -2704.8 and -2646.0 newtons. Chest deflection was 48 mm.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Year/Make/Model/Body Style: 1993 Jeep Grand Cherokee

NHTSA Test No.: MP0300 VIN.: 1J4GZ88SOPC119291

Body Color: Black Date of Manufacture: 5/92

Engine: 6 Cylinders; - C.I.D.; 4 Liters; - CC

X Gas; - Diesel; - Turbocharged

X Longitudinal; - Transverse

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

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

Date Received: 7/29/92 Odometer Reading: 148 km

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

X Tilt Wheel - P/seats; X Cruise Control

Type of Occupant Restraint: 3-point continuous belt system with a
supplemental driver side air bag

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 227 kPa Rear 227 kPa

Recommended Tire Size: P215/75R15

Recommended Cold Tire Pressure: Front 227 kPa Rear 227 kPa

Tires on Vehicle: P215/75R15; Manufacturer: Goodyear

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 X Lever - Rot. Knob

Rated Cargo and Luggage

Weight (RCLW) A-B = 135 kgs

GVWR 1082 kgs GAWR: Front 1237 kgs Rear 1238 kgs

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

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

Right Front = 499 kgs Right Rear = 358 kgs
 Left Front = 467 kgs Left Rear = 376 kgs
 TOTAL FRONT WEIGHT = 966 kgs (57 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 734 kgs (43 % of Total Vehicle Weight)
 TOTAL DELIVERED WEIGHT = 1700 kgs

CALCULATION FOR TARGET TEST WEIGHT:

RCLW = 136 kgs
 Target Test Weight = UDW + RCLW + (2 dummies x 76 kgs/dummy)
 Target Test Weight = 1988 kgs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 130 KILOGRAMS CARGO:

Right Front = 517 kgs Right Rear = 472 kgs
 Left Front = 508 kgs Left Rear = 485 kgs
 TOTAL FRONT WEIGHT = 1025 kgs (52 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 957 kgs (48 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 1982 kgs
 Weight of ballast secured in vehicle trunk area = 36 kgs

VEHICLE ATTITUDE (all dimensions in millimeters):

Delivered Attitude: RF 785 LF 782 RR 805 LR 800
 Test Attitude: RF 777 LF 780 RR 757 LR 764
 Wheel Base: 2713 mm; C.G. = 1302 mm rearward of front wheel C/L
 Remarks: 81 liters of Stoddard solution was placed in the fuel tank

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA (cont'd)

POST-IMPACT DATA:

Type of Test: Frontal Barrier Impact Angle: 0°
 Date of Test: August 27, 1992 Time of Test: 14:30
 Ambient Temperature: 28 °C at impact area
 Temperature in Occupant Compartment: 21 °C
 Windshield Molding Temperature: 21 °C
 Required Impact Velocity Range: 56.2 to 57.8 kph
 Impact Velocity: primary = 56.3 kph, secondary = 56.3 kph
 Distance From Front Bumper to Barrier Face When
 Entering Speed Trap: 1321 millimeters
 Exiting Speed Trap: 305 millimeters

VEHICLE REBOUND AND CRUSH (millimeters) (post-test measurements are not available since the bumper disengaged from the body during impact)

Vehicle Length: Pre-test = R 4437 C_L 4481 L 4437
 Post-test = R N/A C_L N/A L N/A
 Crush = R N/A C_L N/A L N/A

Distance from front of test vehicle to point of impact (estimate since bumper disengaged from body during impact):

R 406 C_L 363 L 432

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Air bag</u>	<u>Slight contact with glove box door. Chin contacted with chest.</u>
Chest	<u>Air bag</u>	<u>No contact</u>
Abdomen	<u>No contact</u>	<u>No contact</u>
Left Knee	<u>Lower dashpanel</u>	<u>Lower dashpanel</u>
Right Knee	<u>Lower dashpanel</u>	<u>Lower dashpanel</u>

Table 1
GENERAL TEST AND VEHICLE PARAMETER 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>Front</u>				
<u>Seat Movement</u>	<u>Left</u>	<u>Right</u>		
Seat Back Failure	<u>None</u>	<u>None</u>		
Seat Shift (in.)	<u>0.0</u>	<u>58 mm</u> <u>rearward</u>		
<u>Glazing Damage</u>				
Backlight/Windshield	<u>Windshield sustained stress fractures but remained intact</u>			
Other Notable Impact Effects:	_____			

Section 3
OMI FINAL DATA

Occupant and Vehicle Information

I. OMI DATA

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

II. OVR DATA

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

Table 2

DUMMY INJURY CRITERIA VALUESNHTSA No.: MP0300 Vehicle: 1993 Jeep Grand Cherokee 4-Door MPV

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-56.4	-7.5	22.1	58.0
Position #2 - Passenger	-45.2	8.7	57.6	64.0

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-56.8	-4.8	-13.2	56.4
Position #2 - Passenger	-64.4	10.1	16.4	59.5

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

	MAXIMUM FORCE - FEMUR LOAD (newtons)	
	LEFT FEMUR	RIGHT FEMUR
Position #1 - Driver	-3525.4	-7320.3
Position #2 - Passenger	-2704.8	-2646.0

	MAXIMUM FORCE - SEAT BELT LOADS (newtons)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	8330.6	-	9177.7
Position #2 - Passenger	9231.5	9159.9	-

	HEAD INJURY CRITERIA (HIC)			
	HIC	t ₁ (SEC)	t ₂ (SEC)	Average Acceleration t ₁ TO t ₂
Position #1 - Driver	312.4	0.04524	0.08112	37.7
Position #2 - Passenger	675.8	0.06204	0.09792	51.3

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 SHEET

Vehicle Year/Make/Model/Body Style: 1993 Jeep Grand Cherokee 4-Door MPV

Vehicle NHTSA No.: MP0300 Test Date: August 27, 1992

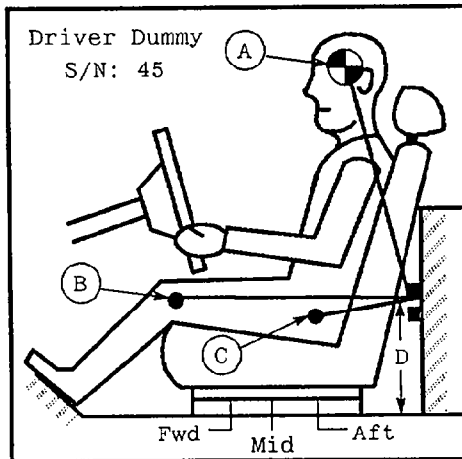
MAXIMUM VALUES	DRIVER DUMMY ID # <u>45</u>	PASSENGER DUMMY ID # <u>150</u>
Neck Load X (newtons)	282.3	1652.6
Neck Load Y (newtons)	-153.7	$\cong$ 300
Neck Load Z (newtons)	N/A	2444.9
Neck Moment X (newtons-meters)	-13.4	-27.5
Neck Moment Y (newtons-meters)	-25.2	-47.8
Neck Moment Z (newtons-meters)	22.3	7.1
Chest Deflection X (mm)	50	48
Time of Max. Occurance (sec)	0.064	0.077

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

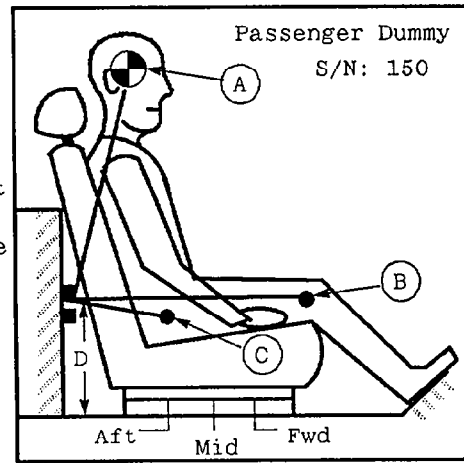
Figure 1
PART 572 DUMMY IN-VEHICLE POSITION

Test No.: MP0300 Vehicle: 1993 Jeep Grand Cherokee 4-Door MPV

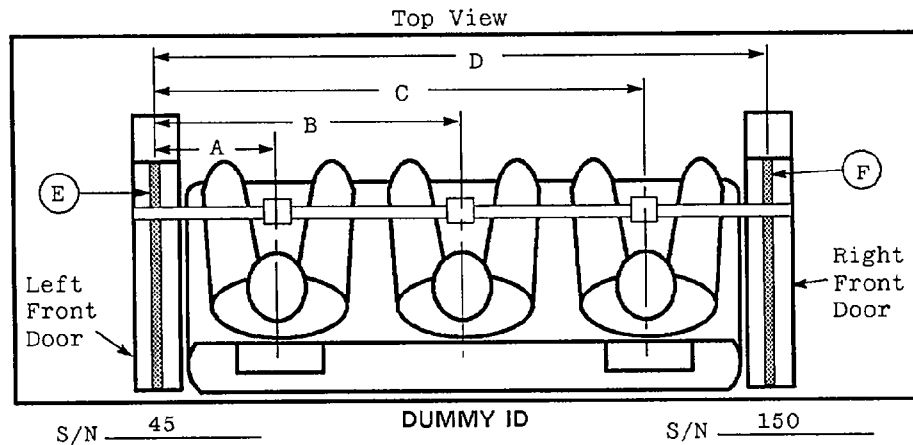
SEAT TYPE: ADJUSTER TYPE: SEAT BACK TYPE:
 Bench X Manual Fixed
 X Bucket Power X Adjustable Reclining
 Split Bench



A = 528 mm 12 Degrees
 B = 617 mm 93 Degrees
 C = 216 mm 122 Degrees
 D = 361 mm



A = 549 mm 11 Degrees
 B = 615 mm 96 Degrees
 C = 216 mm 118 Degrees
 D = 361 mm

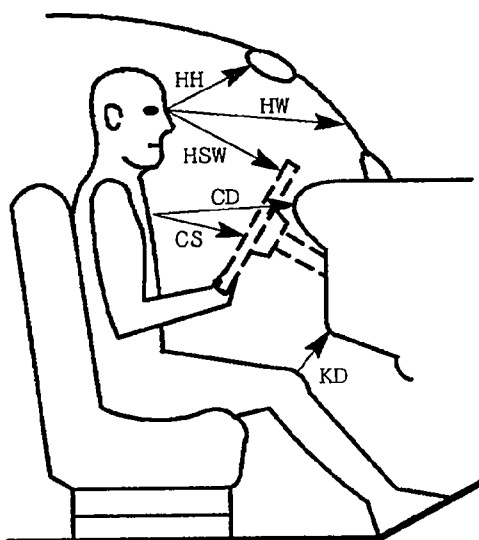


A = Left Door to Driver Centerline 320 mm
 B = Left Door to Center Passenger Centerline mm
 C = Left Door to Right Passenger Centerline 1112 mm
 D = Left Door to Right Door 1443 mm
 E, F = Window Glass Height (Right and Left Must Be Equal) 297 mm

Figure 2

OCCUPANT CLEARANCE DIMENSIONS

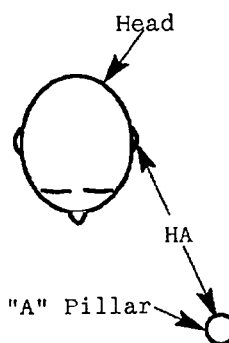
	DRIVER (millimeters)	PASSENGER (millimeters)
HH	391	396
HW	612	577
CD	561	544
CS	295	-
KDL	69	104
KDR	51	112
SA	See Note	See Note
TA	20°	20°
HSW	391	-



Note: Seat back was positioned according to manufacturers specifications

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

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



	DRIVER (millimeters)	PASSENGER (millimeters)
HR	211	208
HS	254	259
AD	86	94
HD	150	142
KK	241	216
HA	559	549
AA	267	183

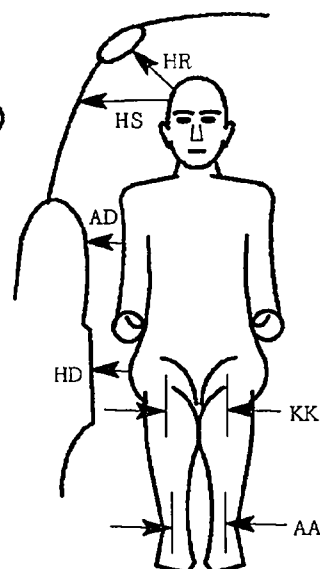
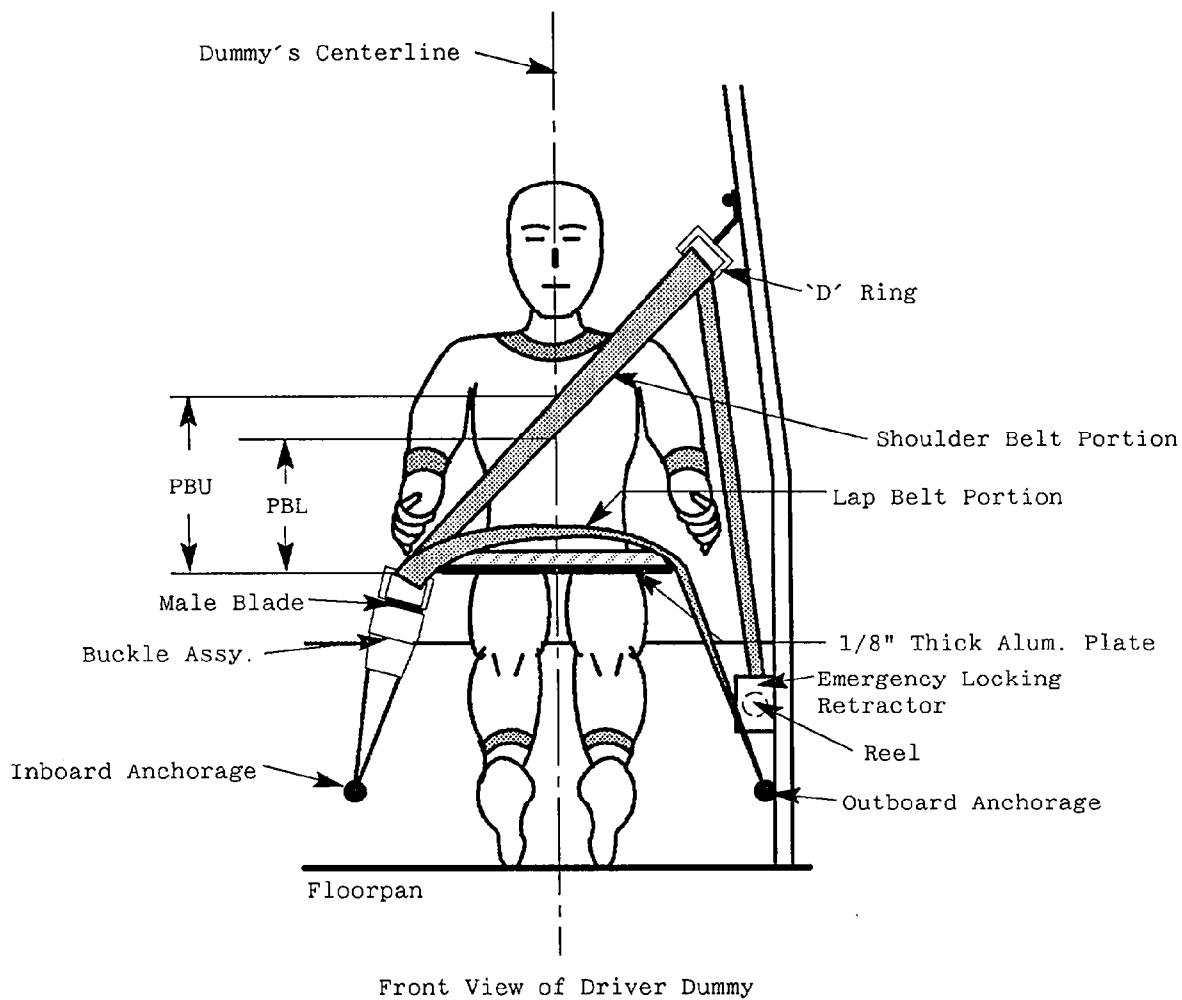


Figure 3
SEAT BELT POSITIONING DATA



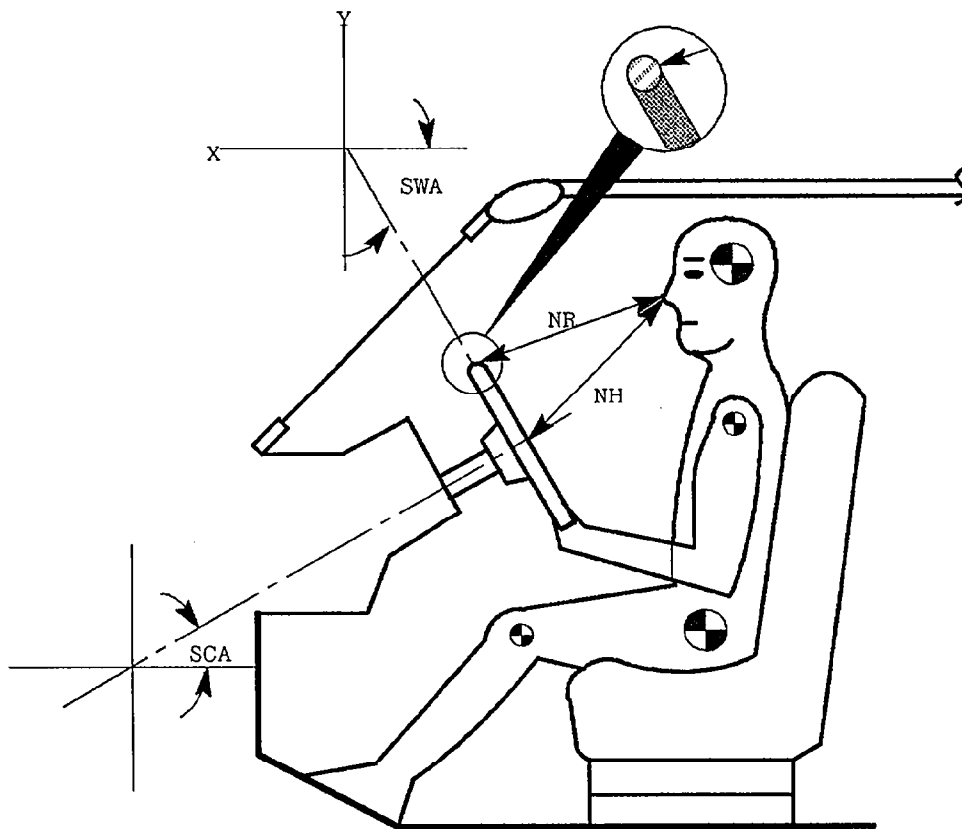
	DRIVER DUMMY (millimeters)	PASSENGER DUMMY (millimeters)
<u>PBU</u> -- Top surface of alum. plate to upper edge	241	249
<u>PBL</u> -- Top surface of alum. plate to belt lower edge	317	325
<u>LAP BELT TENSION</u>	-	
<u>SHOULDER BELT TENSION</u>	0.9 kgs	0.9 kgs

Table 3
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>1956 mm</u>	<u>1968 mm</u>
Shoulder belt length as measured on Part 572 Dummy.	<u>825 mm</u>	<u>838 mm</u>
Lap belt length as measured on Part 572 Dummy.	<u>838 mm</u>	<u>838 mm</u>
<u>SHOULDER BELT SPOOL-OFF DATA:</u>		
As determined by film analysis.	<u>38 mm</u>	<u>63 mm</u>
As determined mechanically.	<u>63.5 mm</u>	<u>76 mm</u>
As determined electronically.	<u>68 mm</u>	<u>96 mm</u>
<u>BELT STRETCH DATA:</u>		
Measured electronically between shoulder belt load cell and the "D" ring.	<u>63 mm/m</u>	<u>41 mm/m</u>
Measured mechanically	<u>0.0 mm/m</u>	<u>53 mm/m</u>

Figure 4

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSEMBLY REFERENCE DIMENSIONS



Left Side View

		MEASUREMENTS	
<u>NR</u>	-- Distance from tip of dummy's nose to Top Rear surface of steering wheel rim	353	mm
<u>NH</u>	-- Distance from tip of dummy's nose to center of steering column hub	363	mm
<u>SCA</u>	-- Angle of steering column relative to the horizontal X axis	24	Degrees
<u>SWA</u>	-- Angle of steering wheel relative to the horizontal X axis	-66	Degrees

SCA was set to manufacturers specifications

Figure 5
CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4

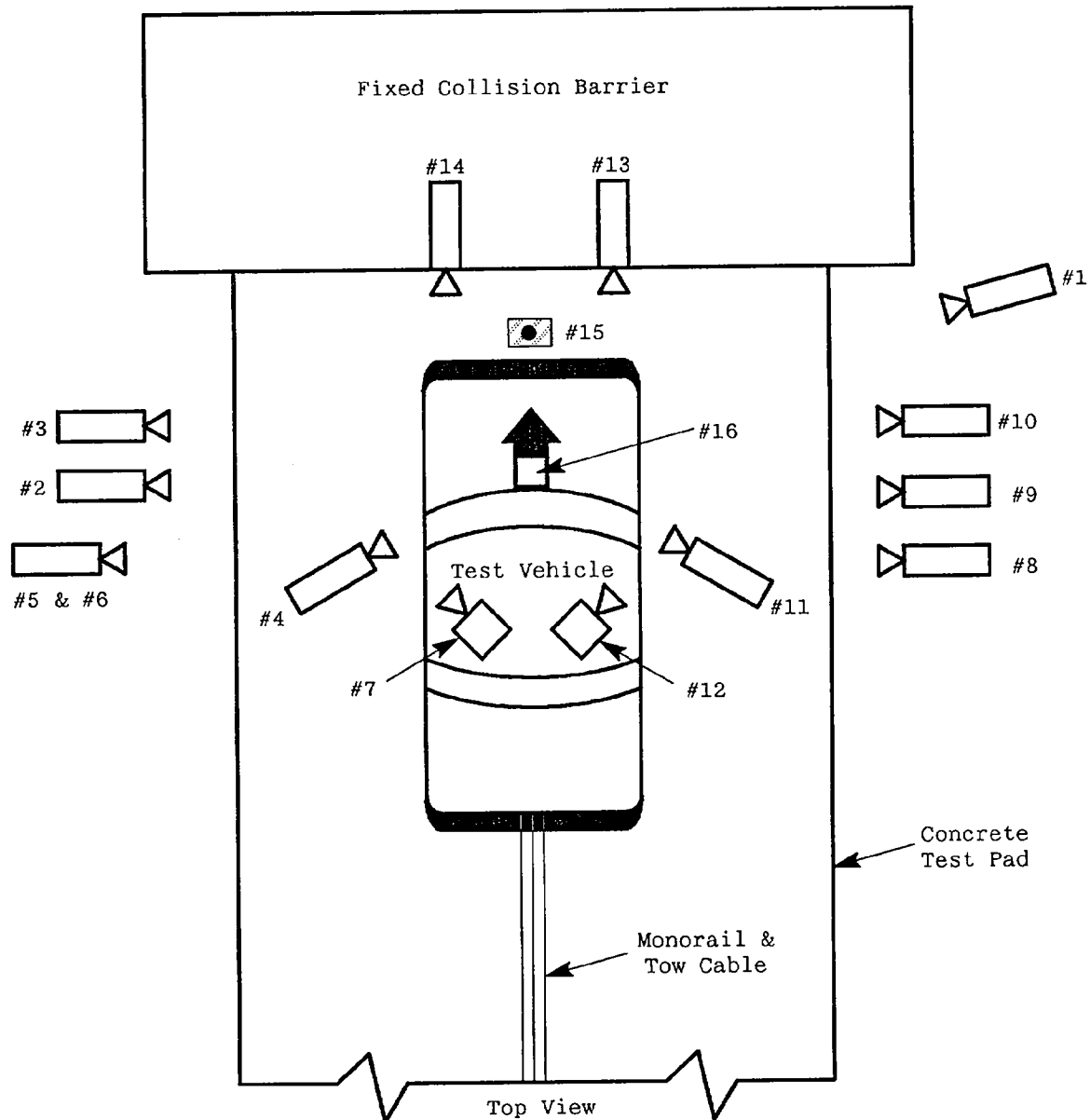


Table 4

HIGH-SPEED CAMERA LOCATIONS

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	6248	1930	1067	-3	5776	13	545
3	Left Side View	8052	1041	1041	-2	7580	25	NT
4	Driver and Interior View	2743	2692	1676	-11	2271	13	610
5	Steering Column (Bottom)	7087	2261	1168	-4	6615	25	565
6	Steering Column (Top)	7087	2261	1778	-8	6615	25	565
7	Left Belt	-	-	-	-	-	8	620
8	Overall Right Side	5994	1727	1067	-3	5522	13	550
9	Right Side View	7747	102	1143	-3	7252	25	570
10	Right Passenger View	7950	1600	1422	-4	7478	35	550
11	Passenger and Interior View	2565	2616	1753	-16	2093	25	545
12	Right Belt	-	-	-	-	-	8	600
13	Passenger Front View	610	-127	1778	-33	-	13	600
14	Driver Front View	610	-127	1778	-33	-	13	605
15	Windshield View	0	0	3048	-50	-	13	600
16	Pit View of Engine	0	1092	-3048	90	-	13	670

*X = film plane to monorail centerline

Y = film plane to impact location

Z = film plan to ground

** = referenced to horizontal plane

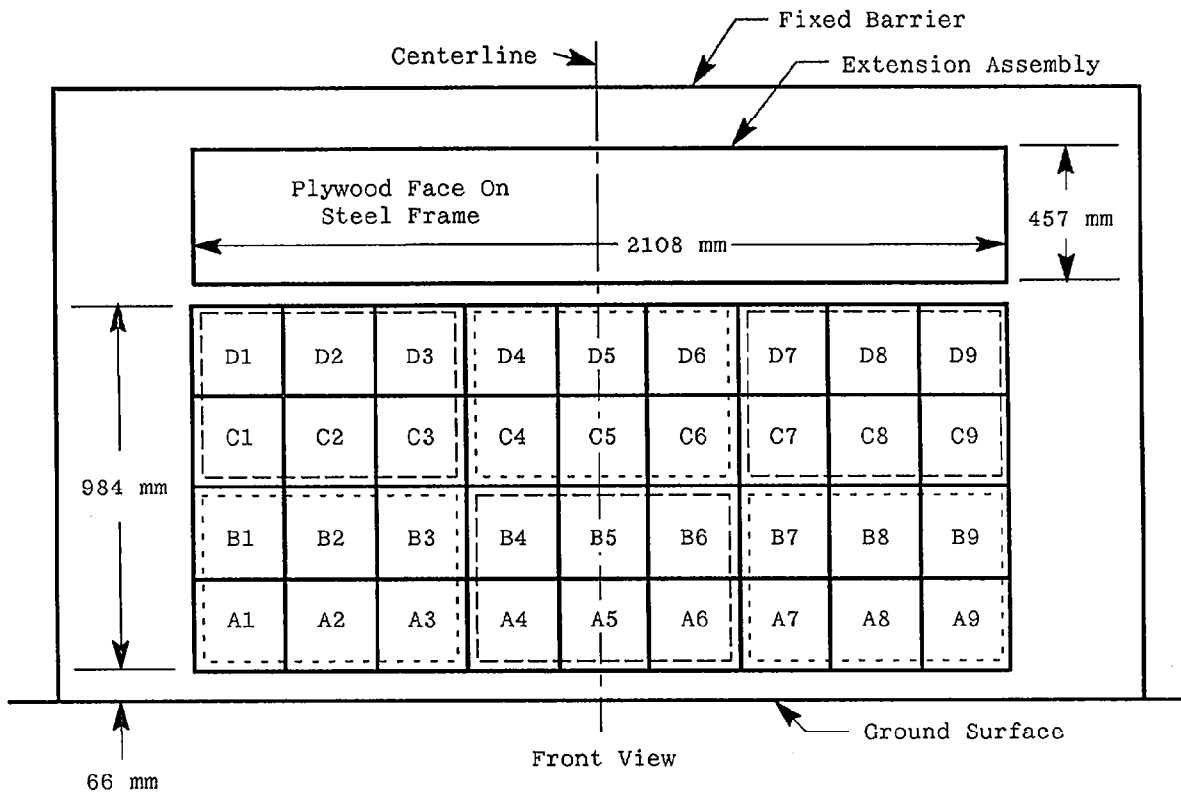
The image contains three technical drawings of a vehicle, likely a station wagon, used for crash testing. The drawings include dimensions and target locations.

- Top View:** Shows the vehicle from above. Dimensions include a width of 2520, a wheel track of 1496, and a wheelbase of 914. A central longitudinal axis is marked with a dashed line. A vertical dimension of 612 is shown on the right side, with a centerline symbol (⌀) indicating the width of the vehicle body.
- Side View:** Shows the vehicle from the side. Dimensions include a total length of 1626, a wheelbase of 914, and a wheel track of 1496. A vertical dimension of 612 is shown on the right side. A target location is marked with a checkered pattern on the roof. A reference point (Ref.) is indicated at the rear of the vehicle.
- Rear View:** Shows the vehicle from the rear. Dimensions include a total width of 1618, a wheel track of 1496, and a wheelbase of 914. A target location is marked with a checkered pattern on the rear window. A reference point (Ref.) is indicated at the rear of the vehicle.

8038-2

Figure 7
LOAD CELL LOCATIONS ON FIXED BARRIER

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



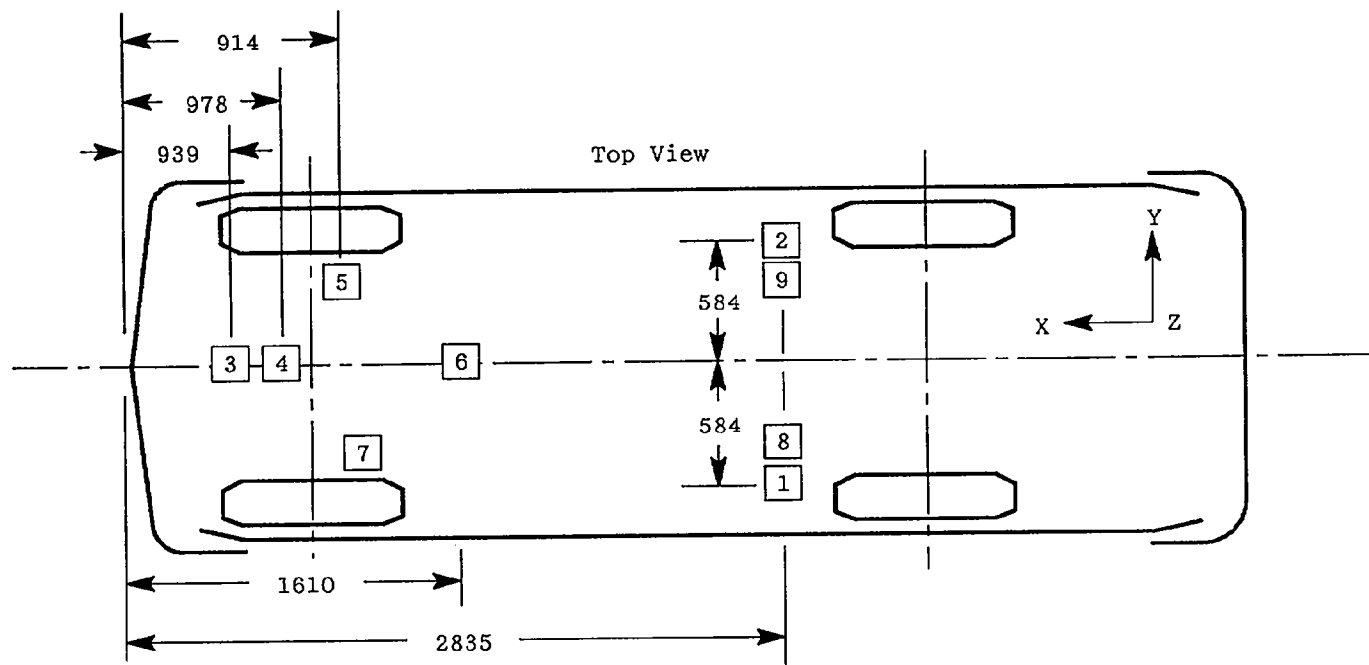
6 GROUPS OF 6 LOAD CELLS EACH

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

The following data is presented in Appendix B:

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

Figure 8
VEHICLE ACCELEROMETER LOCATIONS



All dimensions are in millimeters

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

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

Figure 9
TEST VEHICLE MEASUREMENTS

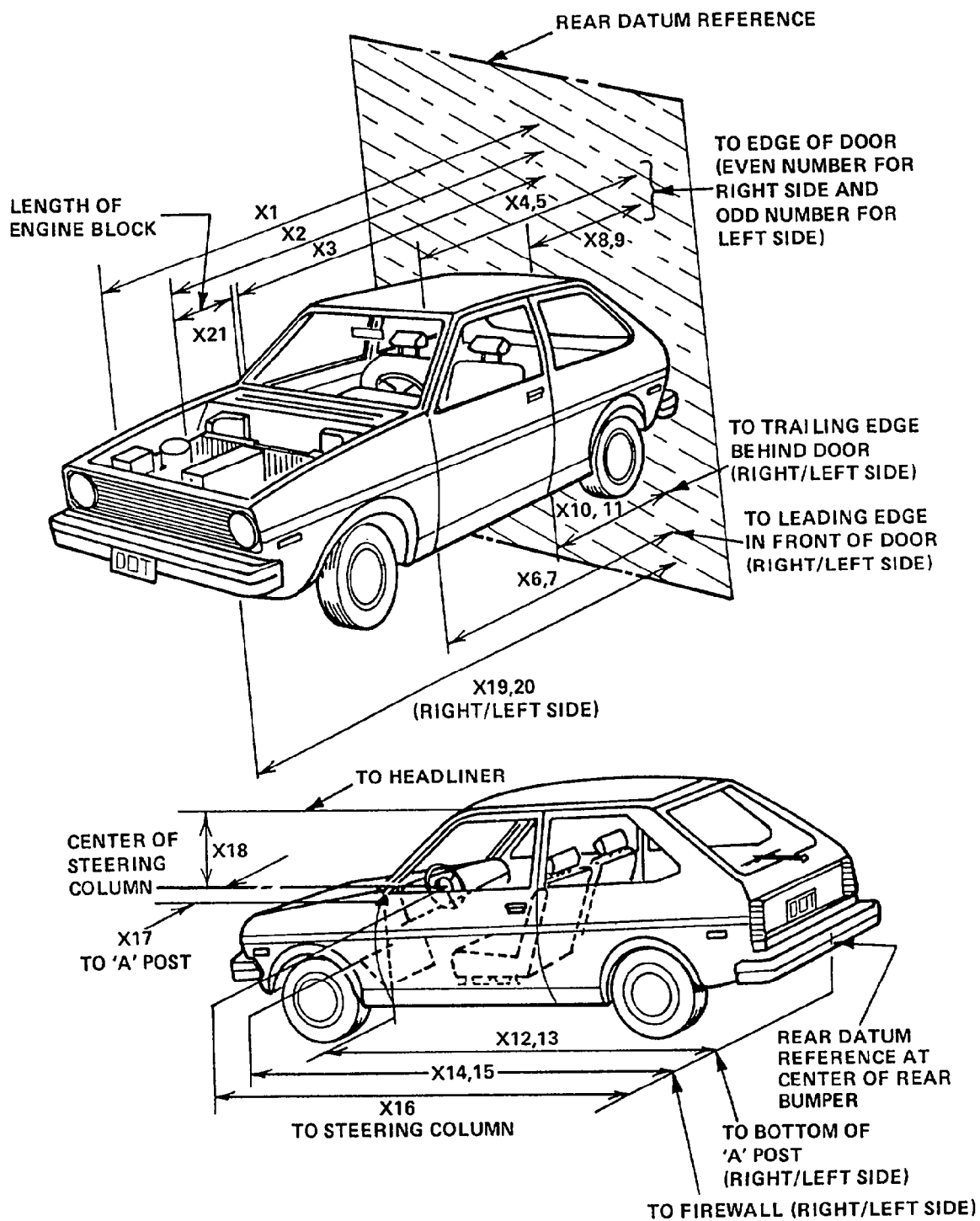


Table 5
VEHICLE MEASUREMENTS

No.		All Dimensions in Millimeters		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	4481	N/A	N/A
X2	Rear Surface of Vehicle to Front of Engine	3955	3675	280
X3	Rear Surface of Vehicle to Firewall	3429	3170	259
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	3099	3081	18
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	3109	3101	8
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	3056	3053	3
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	3068	3058	10
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	2022	2004	18
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	2040	2032	8
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	2001	2001	0
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	2017	2006	11
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	3017	3007	10
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	3043	3030	13
X14	Rear Surface of Vehicle to Firewall, Right Side	3429	3155	274
X15	Rear Surface of Vehicle to Firewall, Left Side	3409	3269	140
X16	Rear Surface of Vehicle to Steering Column	2586	2522	64
X17	Center of Steering Column to "A" Post	401	368	33
X18	Center of Steering Column to Headliner	427	439	-12
X19	Rear Surface of Vehicle to Right Side of Front Bumper	3022	N/A	N/A
X20	Rear Surface of Vehicle to Left Side of Front Bumper	3022	N/A	N/A
X21	Length of Engine Block	660	660	0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	2832	2791	41
CD	Rear Surface of Vehicle to Center of Dash Panel	2878	2705	173
LD	Rear Surface of Vehicle to Left Side of Dash Panel	2832	2784	48

ACCIDENT INVESTIGATION DIVISION DATA
FOR 35 MPH FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: 1993 Jeep Grand Cherokee 4-Door MPV

Vehicle NHTSA No.: MP0300; Vin: 1J4GZ88S0PC119291

Model Year: 1993; Build Date: 5/92; Test Date: 8/27/92

Vehicle Size Category: MPV; Test Weight: 1982 kgs

Vehicle Wheelbase: 2713; Overall Width: 1780

Collision Deformation Classification (CDC) Code: 12FDEW2

Crush Depth C1= 592 millimeters

Dimensions: C2= 607 millimeters

C3= 632 millimeters

C4= 617 millimeters

C5= 610 millimeters

C6= 605 millimeters

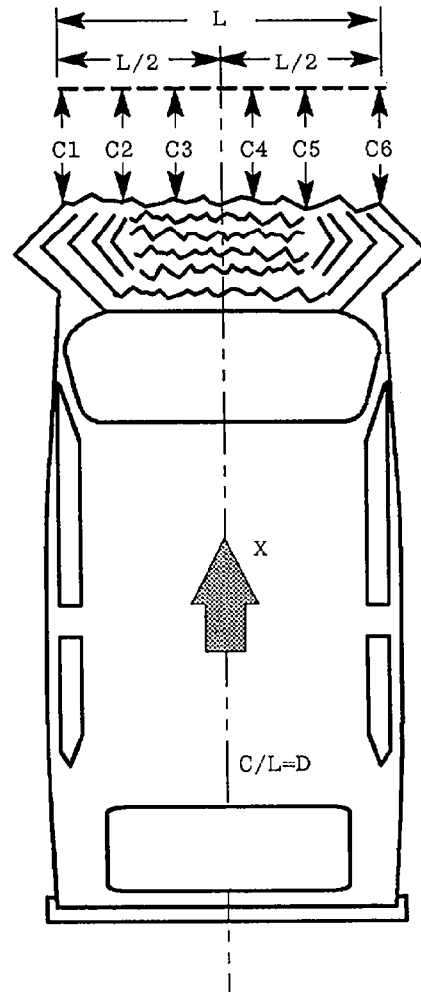
Midpoint of
Damage:

D= Vehicle Centerline
(Longitud.)

Length of Damaged
Region:

L= 1557 millimeters

Note: Post test measurements were calculated
without a front bumper



Appendix A

PHOTOGRAPHS

PHOTOGRAPHS

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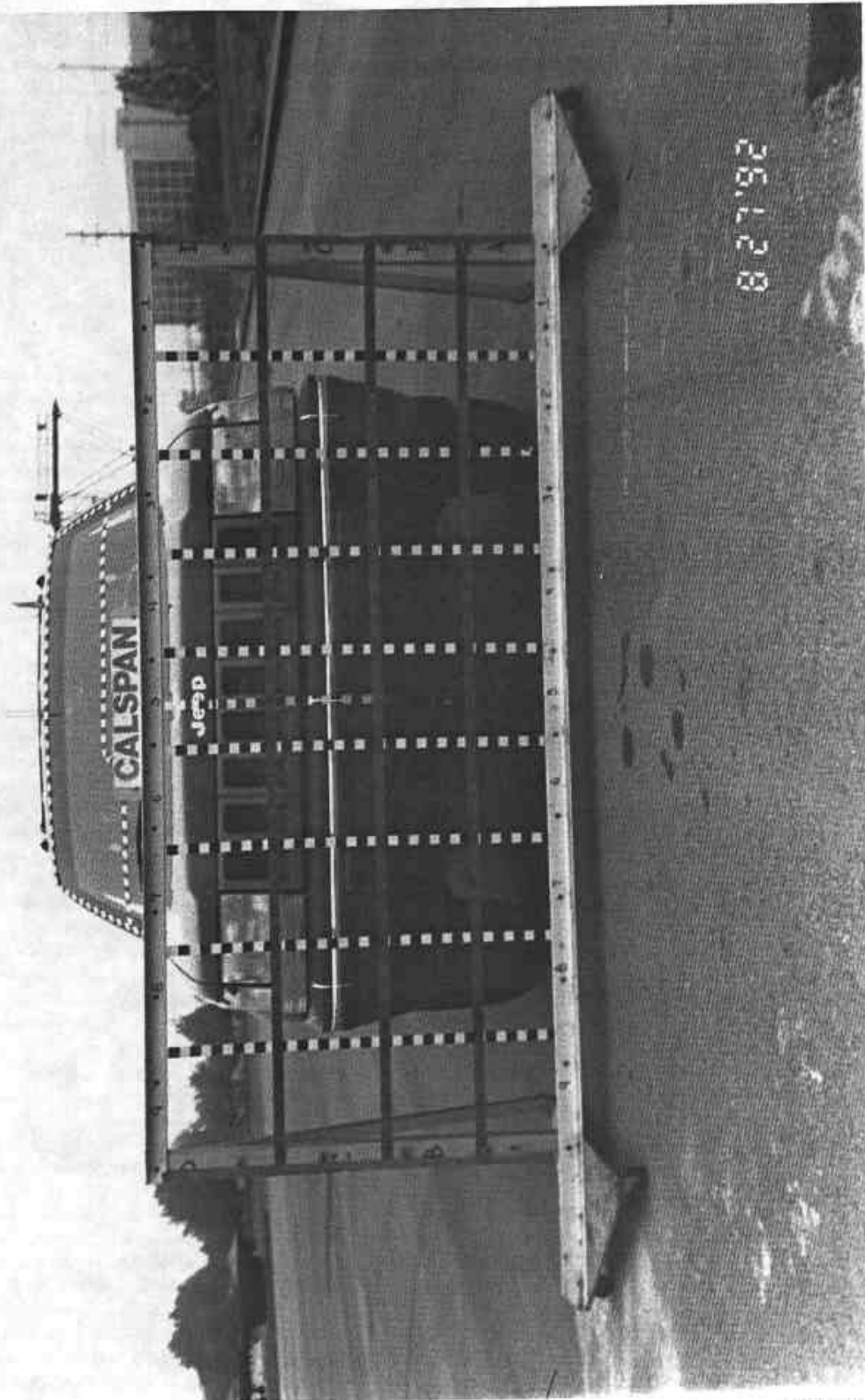
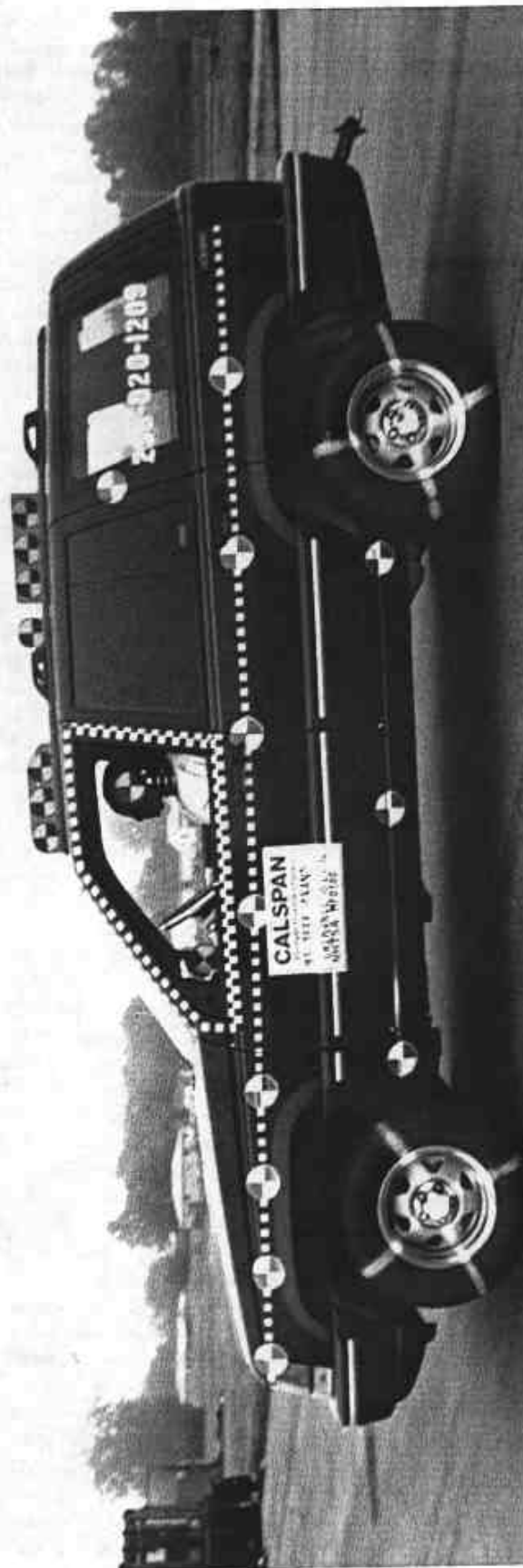


Figure A-1 LOAD CELL LOCATIONS



Figure A-2 PRE-TEST FRONT VIEW

Figure A-3 POST-TEST FRONT VIEW
(Not Available)



827'92

Figure A-4 PRE-TEST LEFT SIDE VIEW

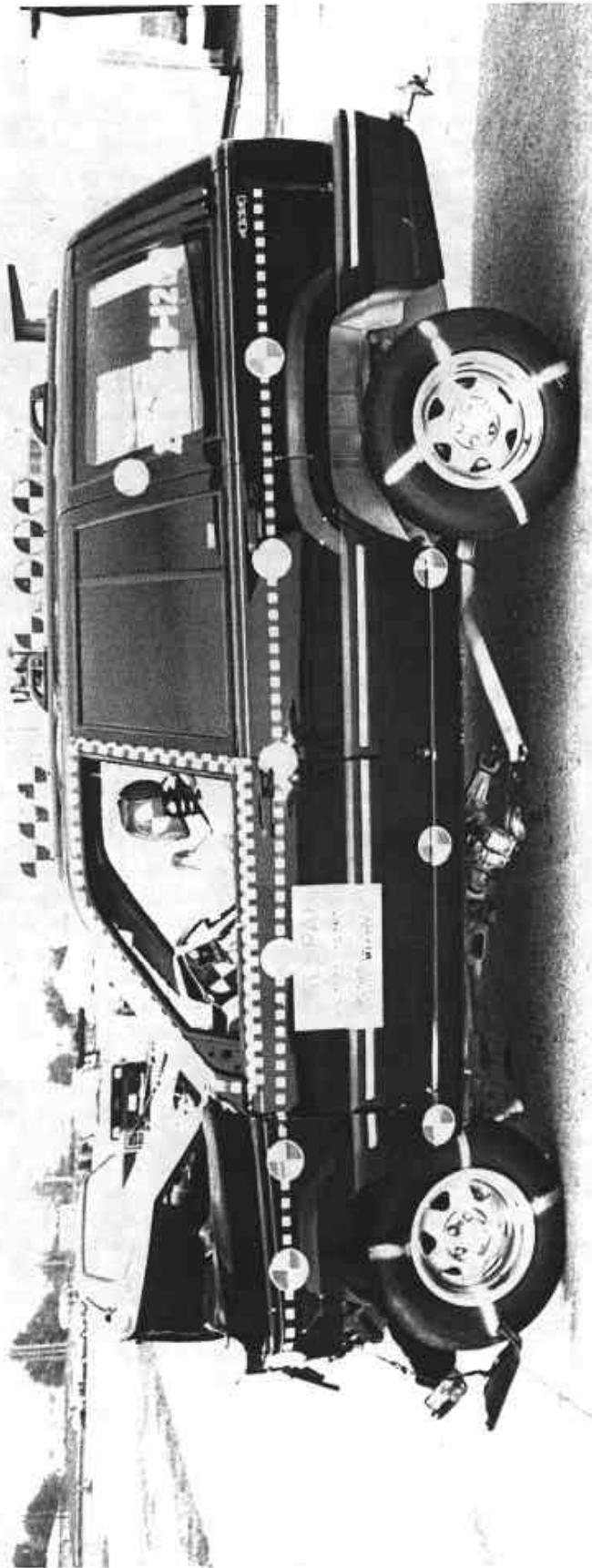


Figure A-5 POST TEST LEFT SIDE VIEW



Figure A-6 PRE-TEST RIGHT SIDE VIEW



Figure A-7 POST-TEST RIGHT SIDE VIEW

Figure A-8 PRE-TEST RIGHT FRONT THREE QUARTER VIEW
(Not Available)



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



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



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

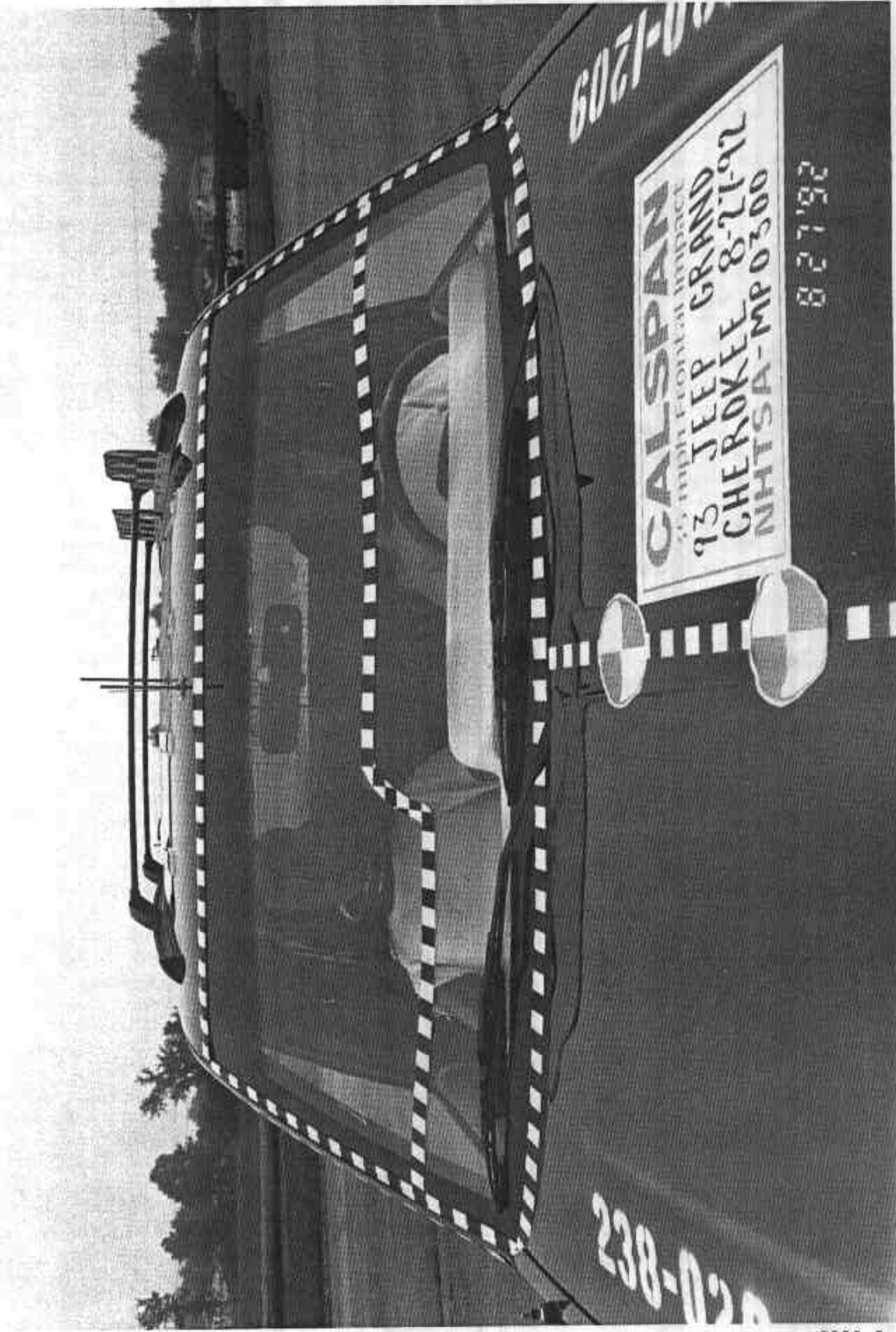


Figure A-12 PRE-TEST WINDSHIELD VIEW

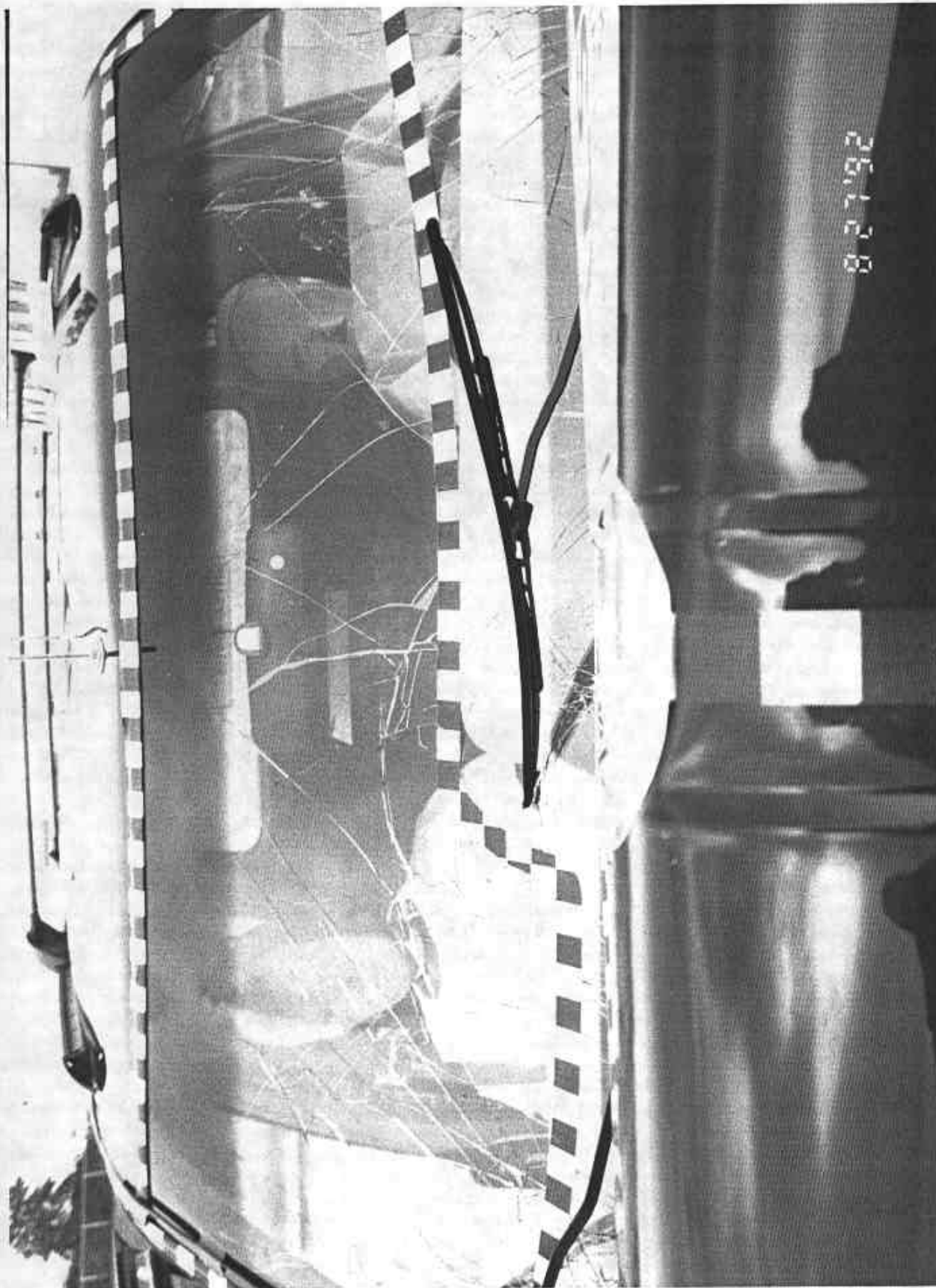
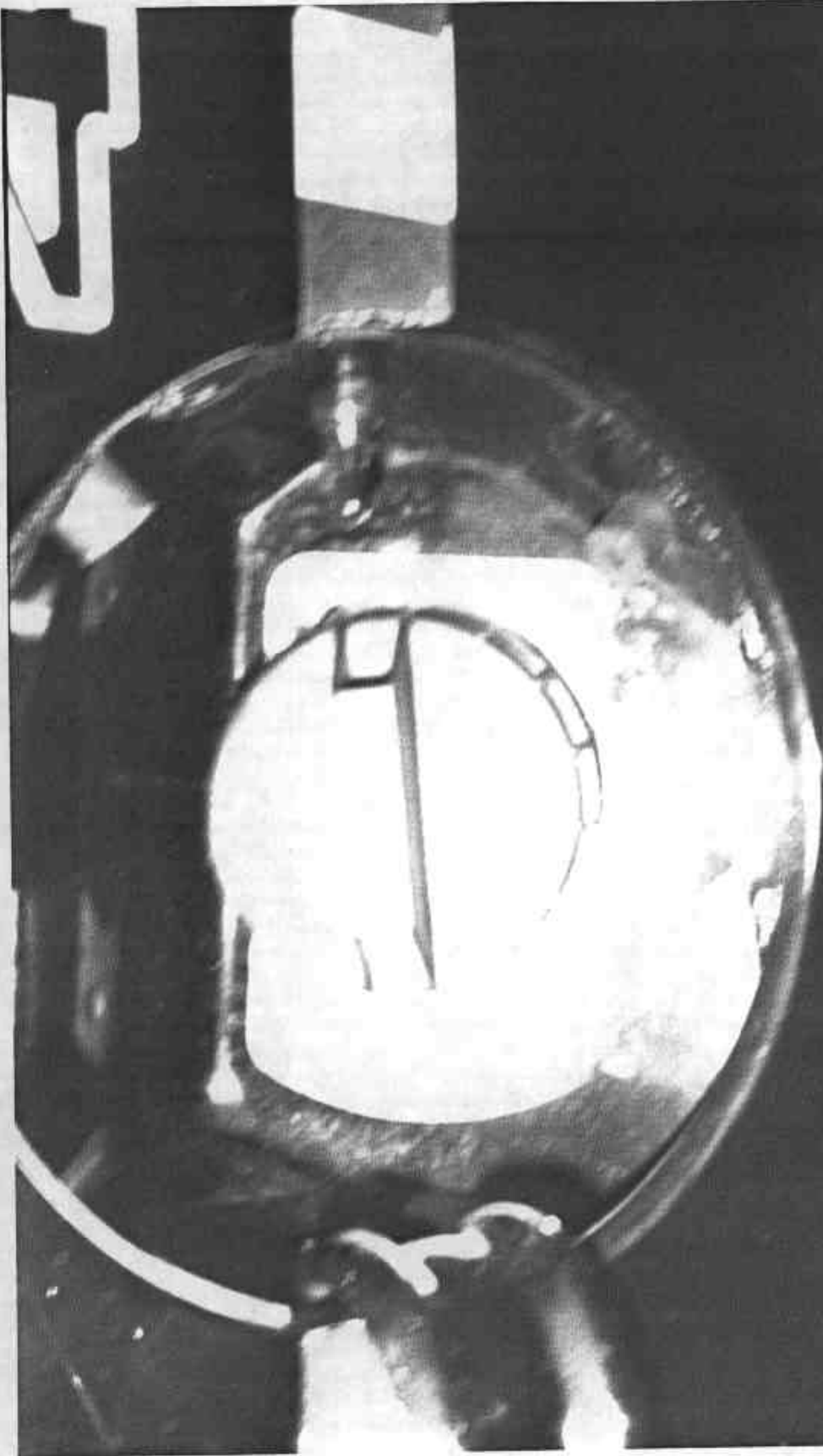


Figure A-13 POST-TEST WINDSHIELD VIEW



Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW



827'92

Figure A-15 FUEL CAP VIEW

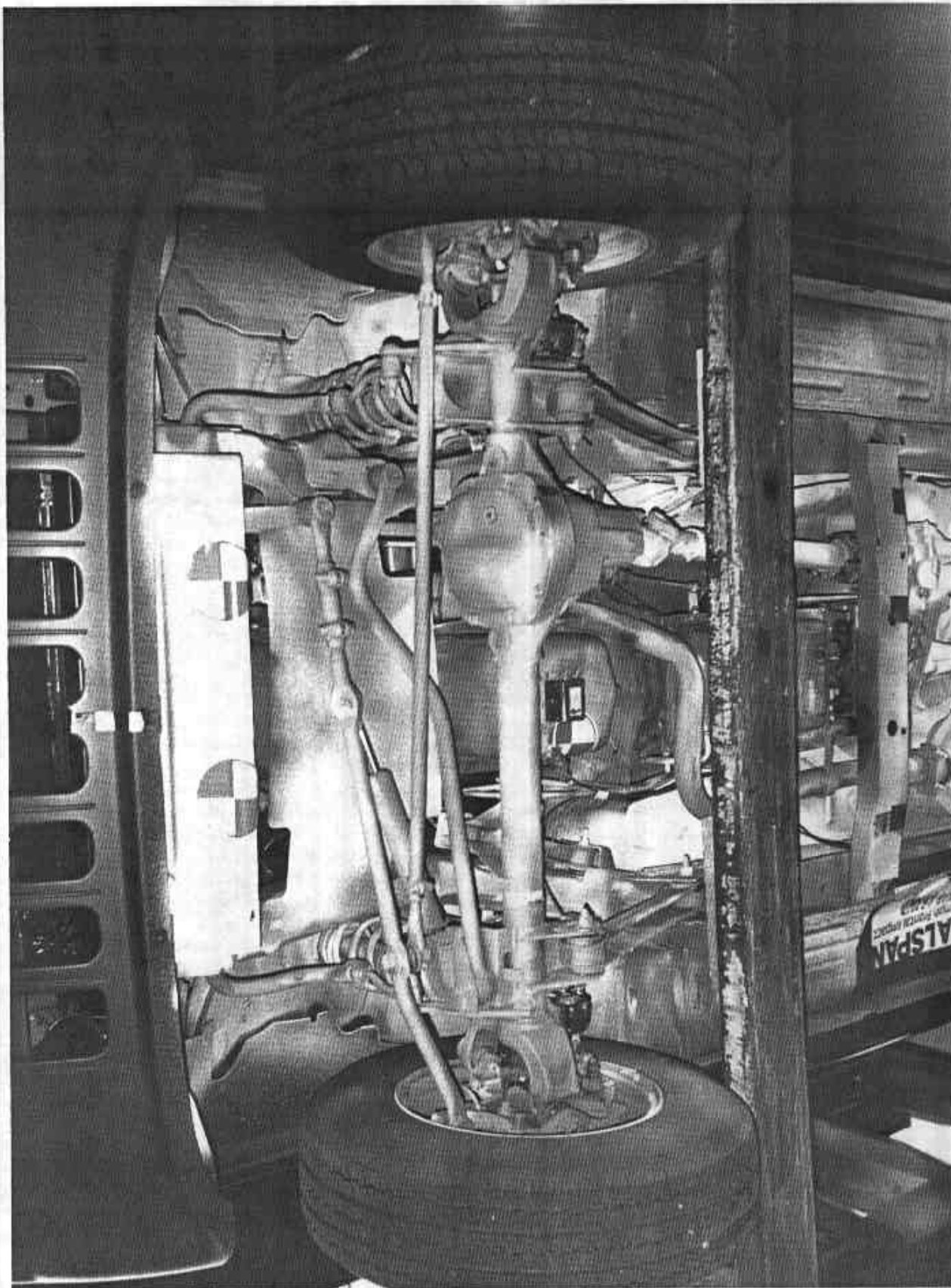


Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

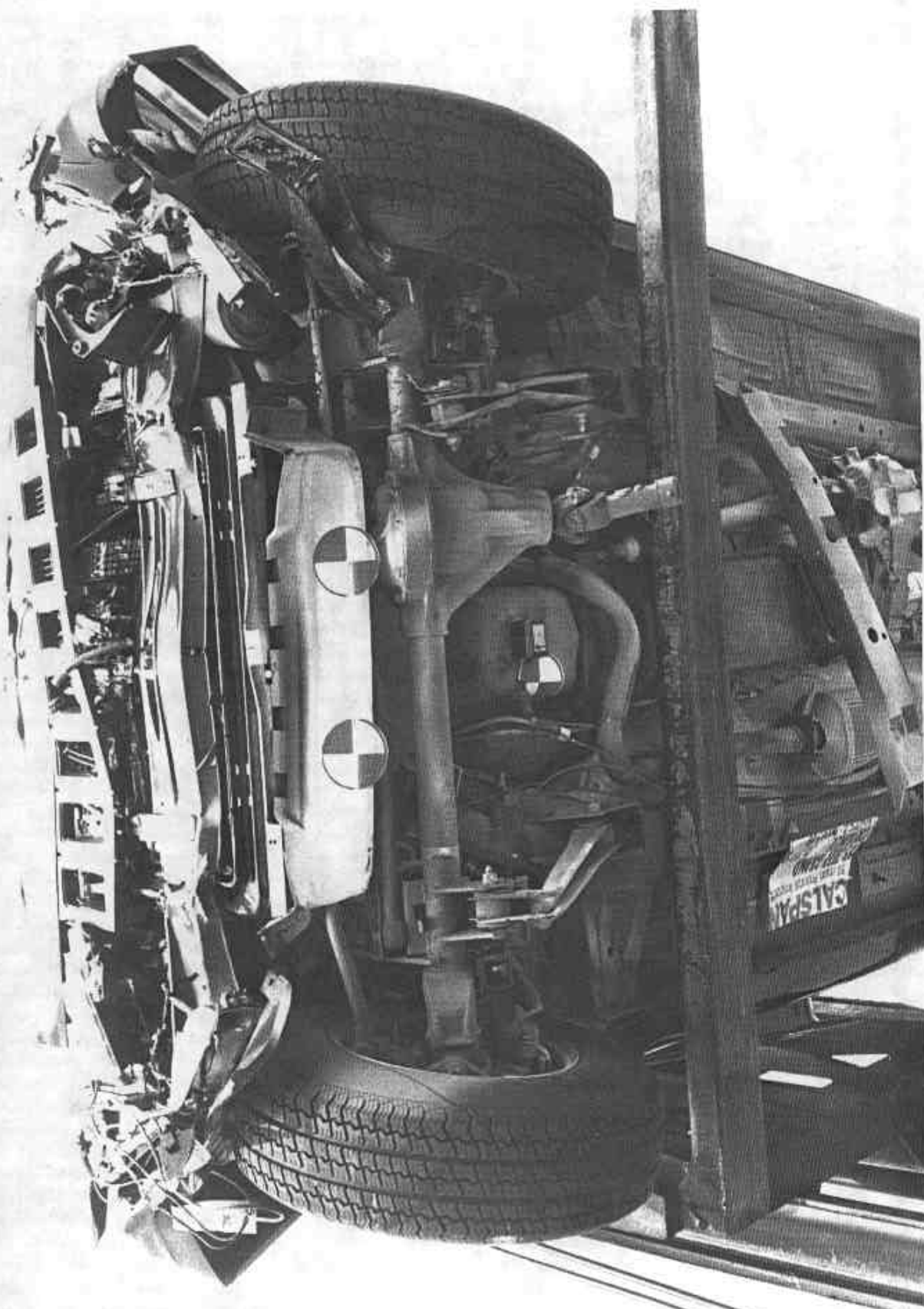


Figure A-17 POST-TEST FRONT UNDERBODY VIEW

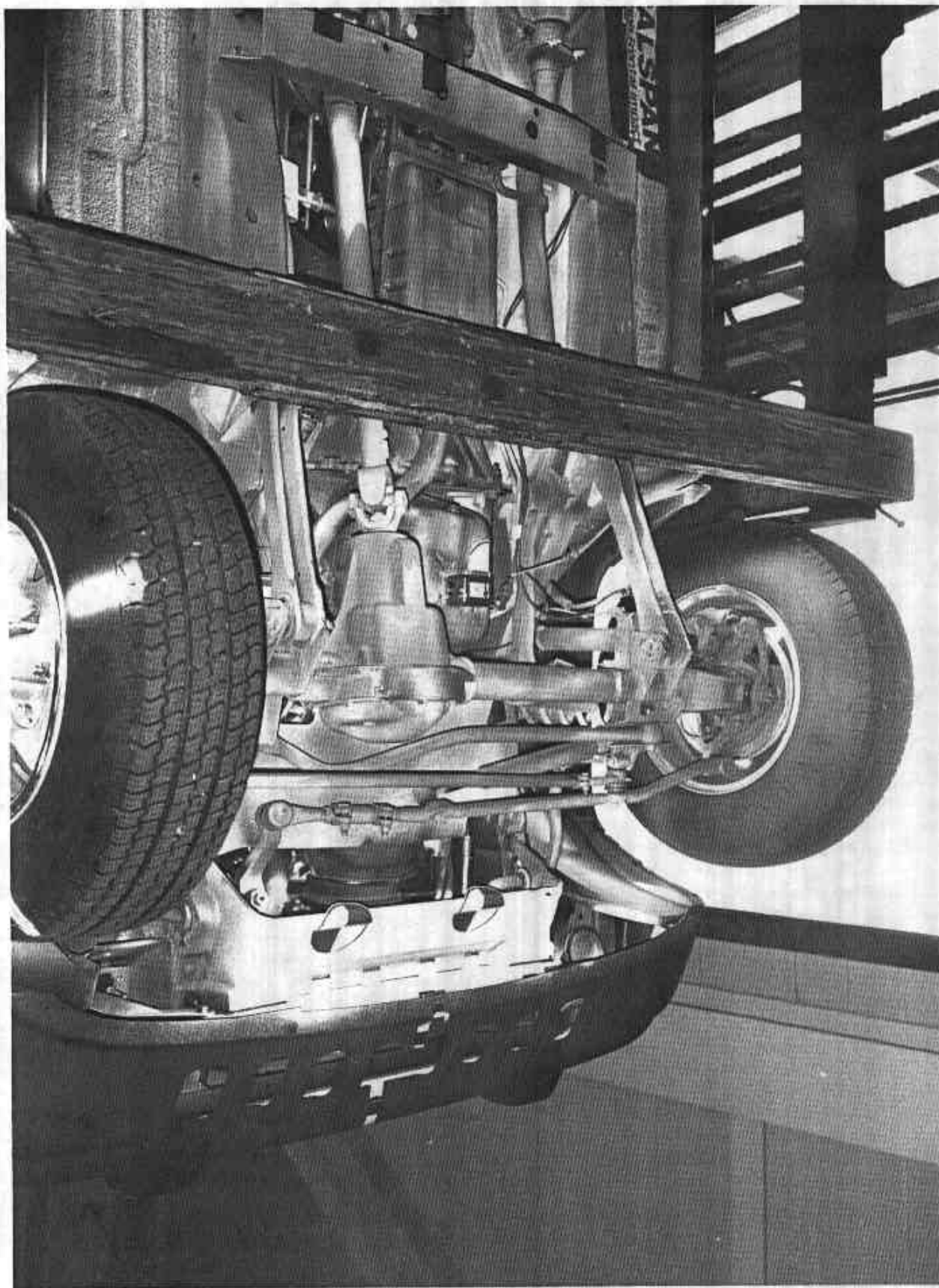


Figure A-18: PRE-TEST FRONT SIDE UNDERBODY VIEW

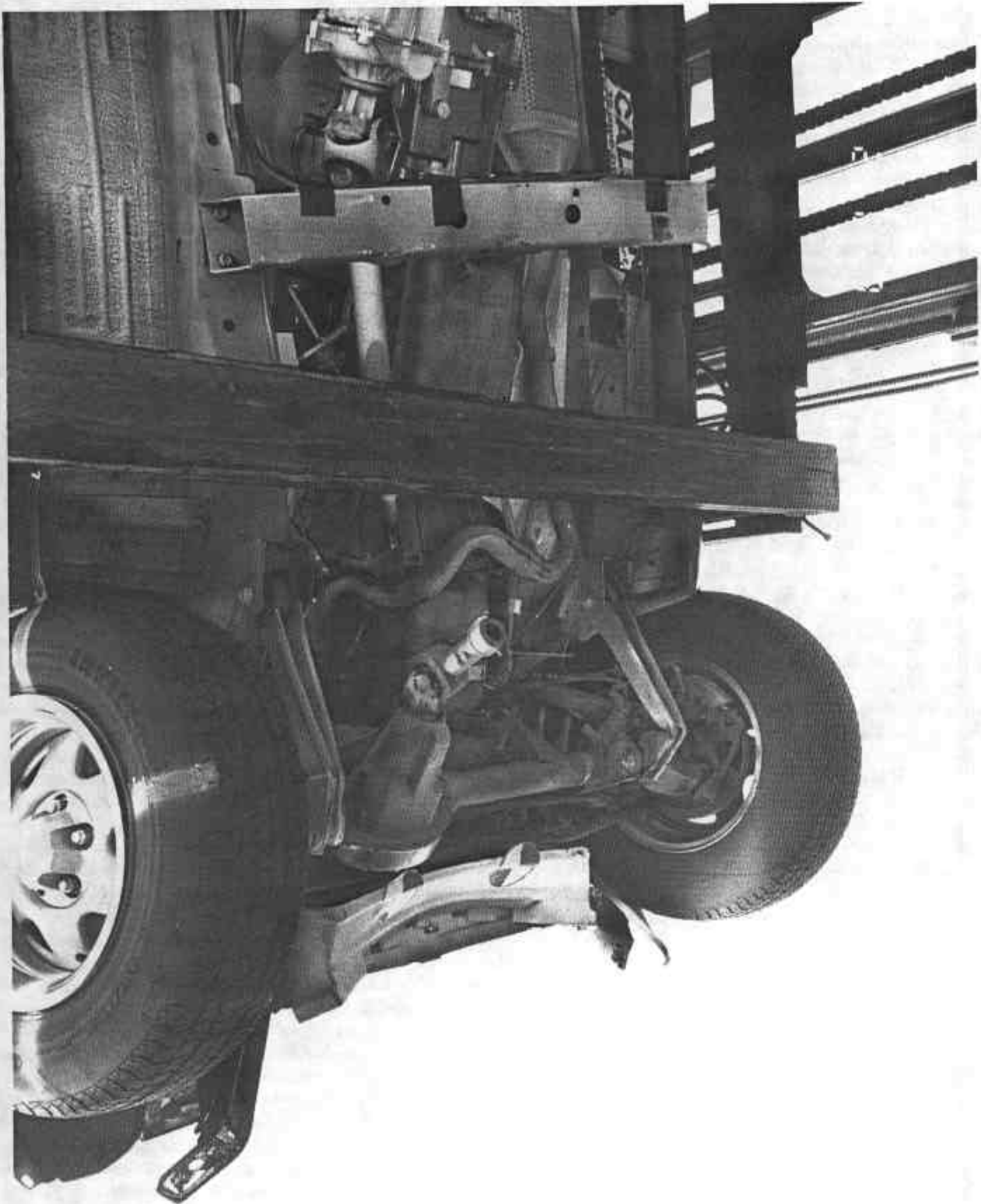


Figure A-19 POST-TEST FRONT SIDE UNDERBODY VIEW

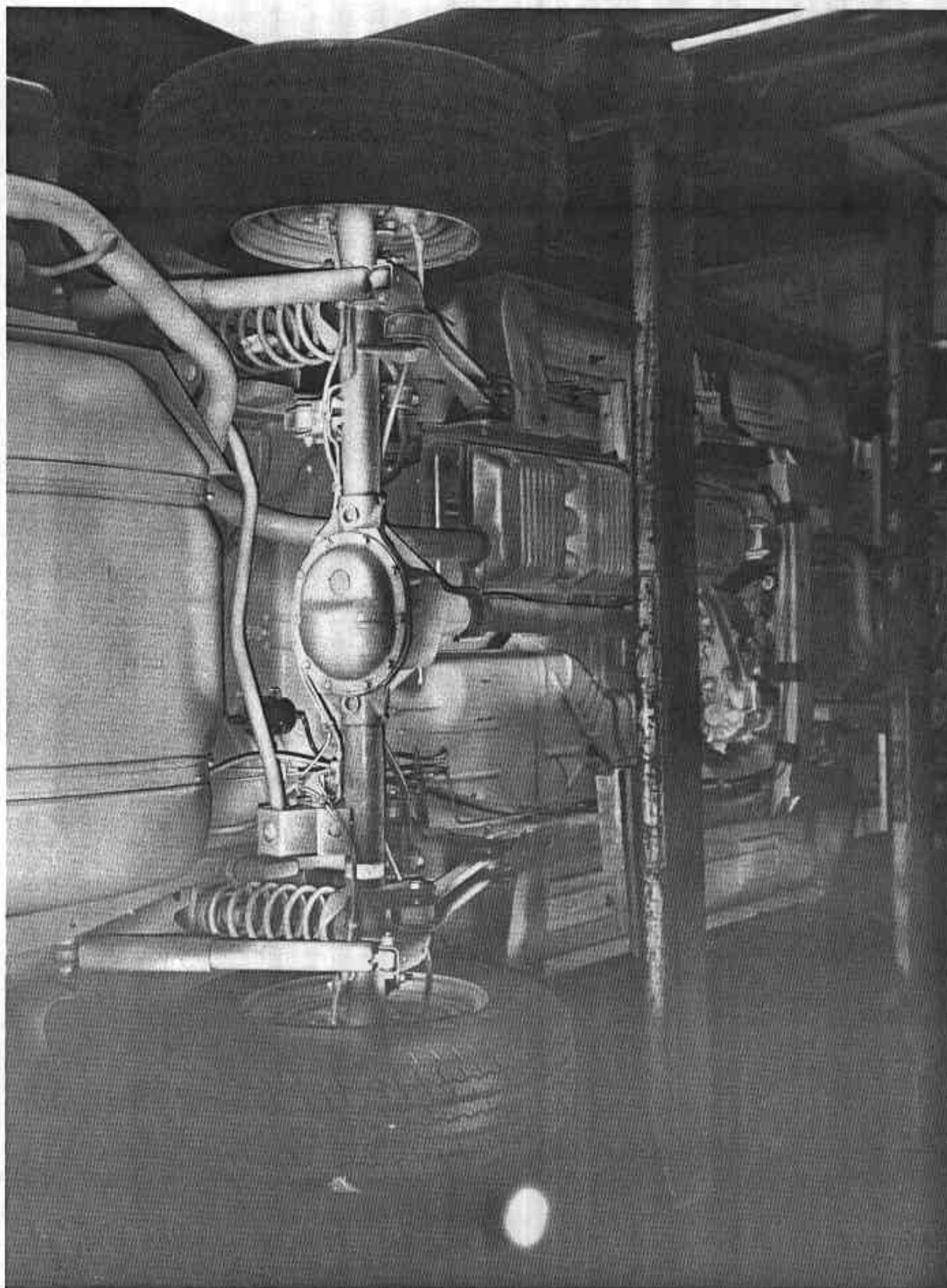


Figure A-20 PRE-TEST REAR UNDERBODY VIEW

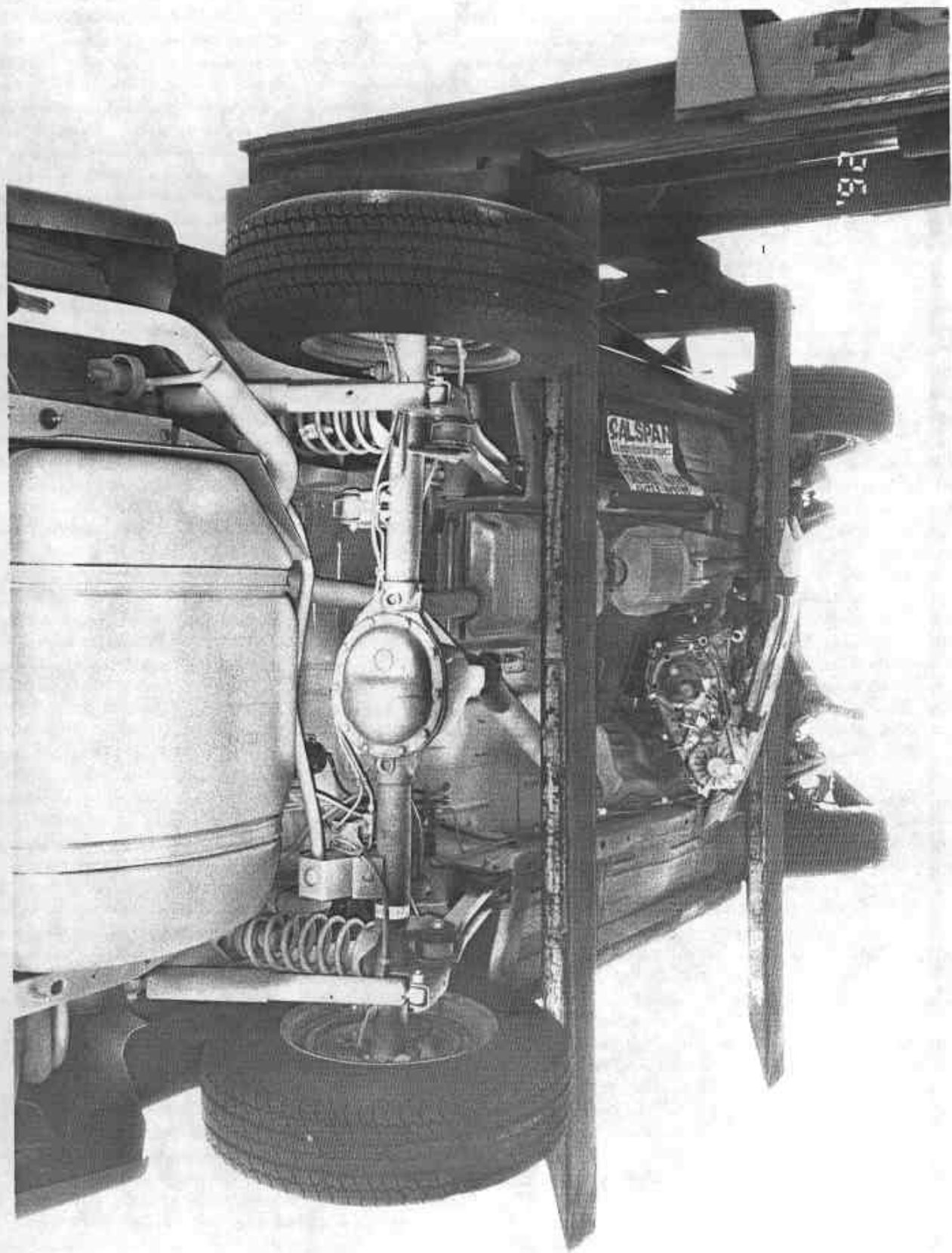


Figure A-21 POST-TEST REAR UNDERBODY VIEW

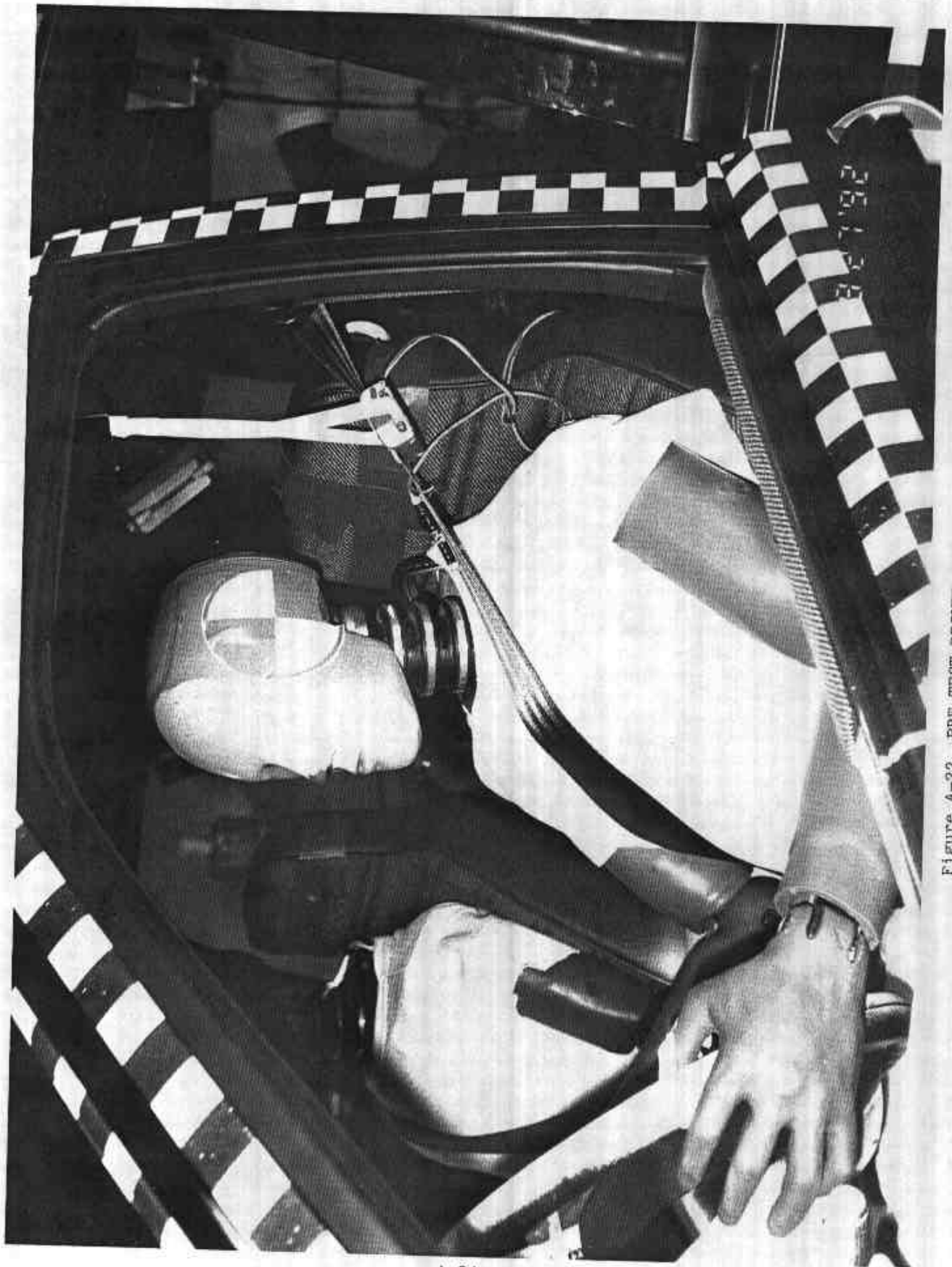


Figure A-22 PRE-TEST DRIVER POSITION VIEW

A-24

8038-2



Figure A-23 POST-TEST DRIVER POSITION VIEW



Figure A-24 PRE-TEST PASSENGER POSITION VIEW



Figure A-25 POST-TEST PASSENGER POSITION VIEW

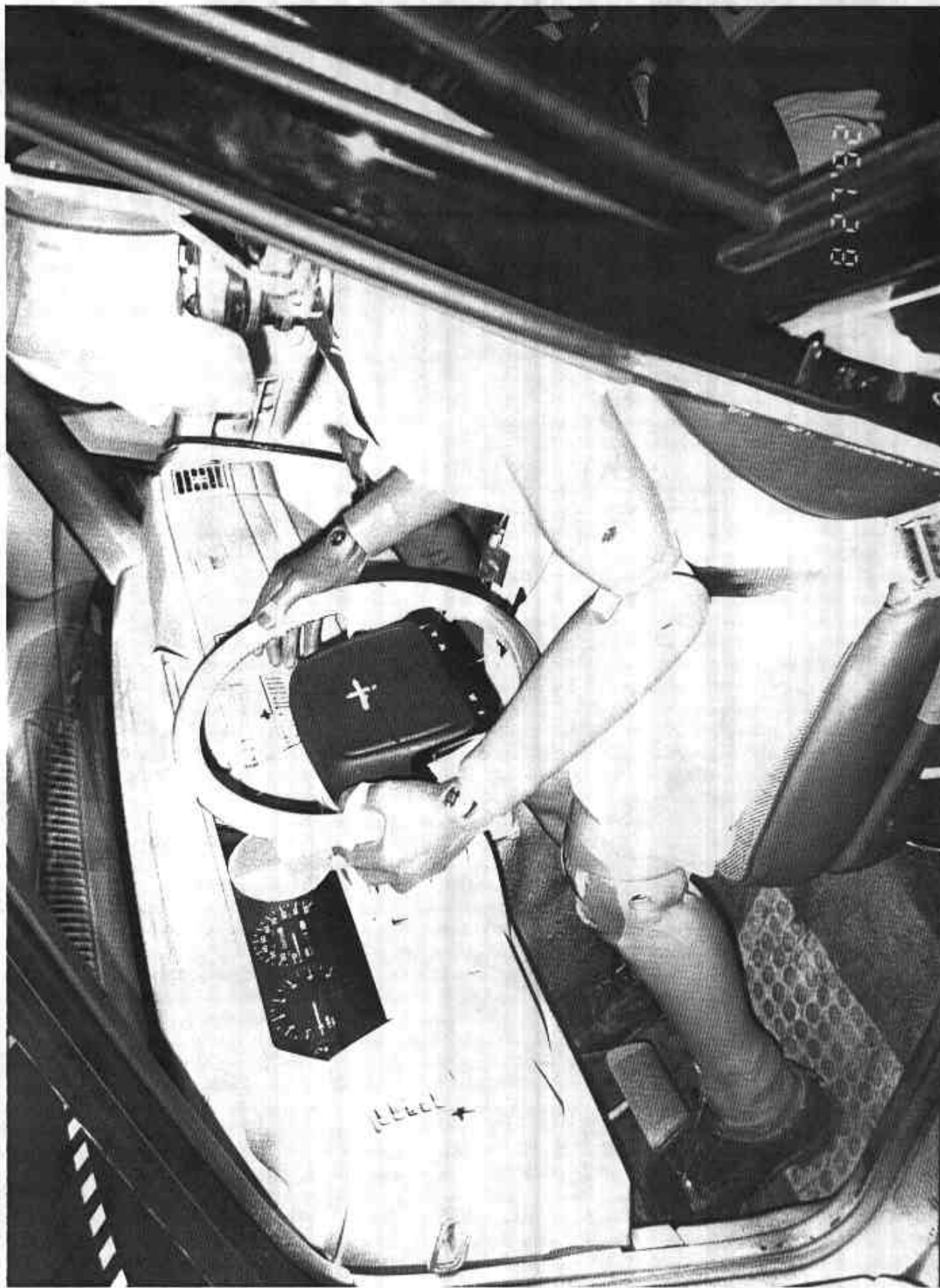


Figure A-26 PRE-TEST DRIVER AND INTERIOR VIEW

A-28

8038-2



Figure A-27 POST-TEST DRIVER AND INTERIOR VIEW

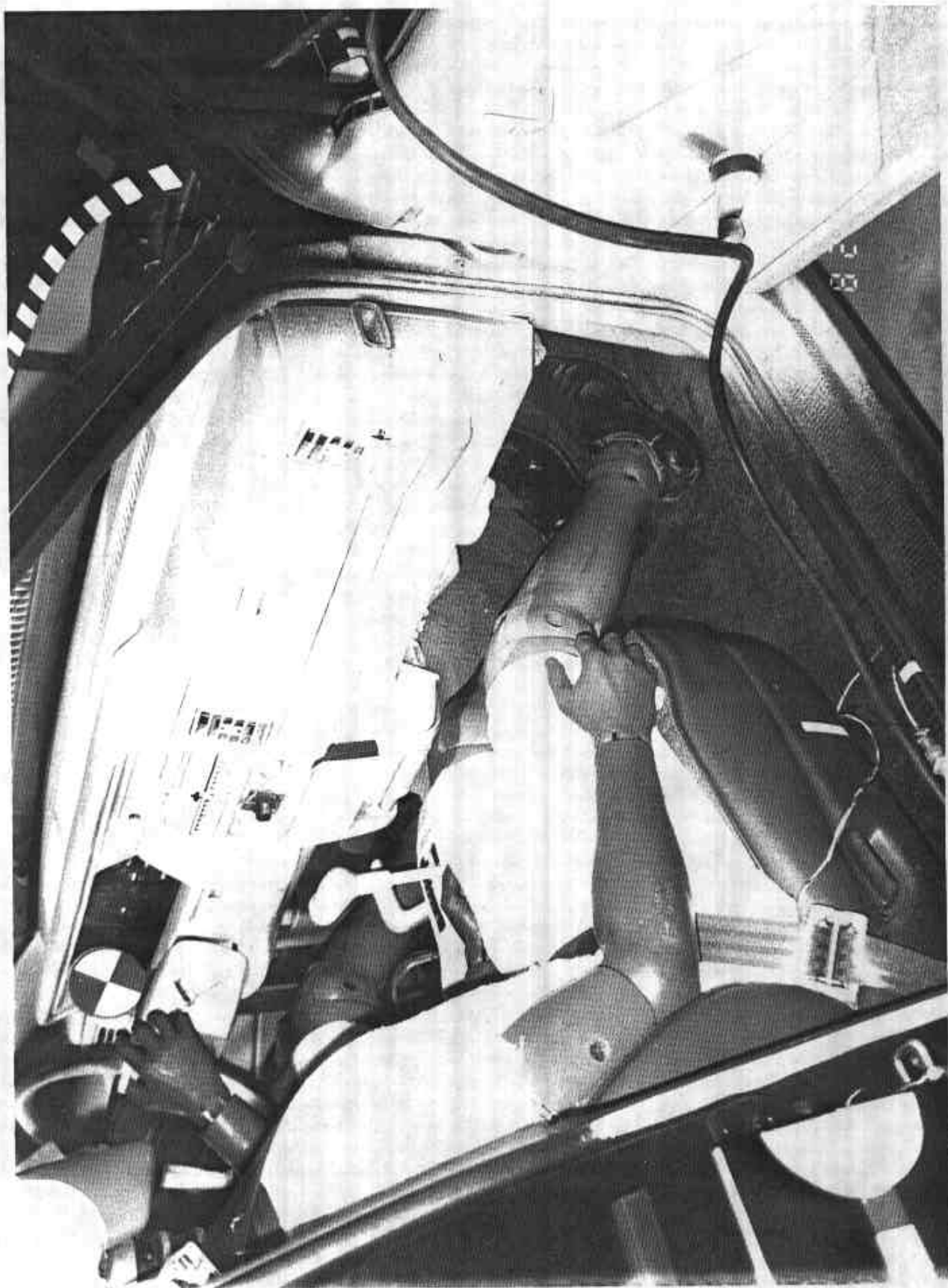
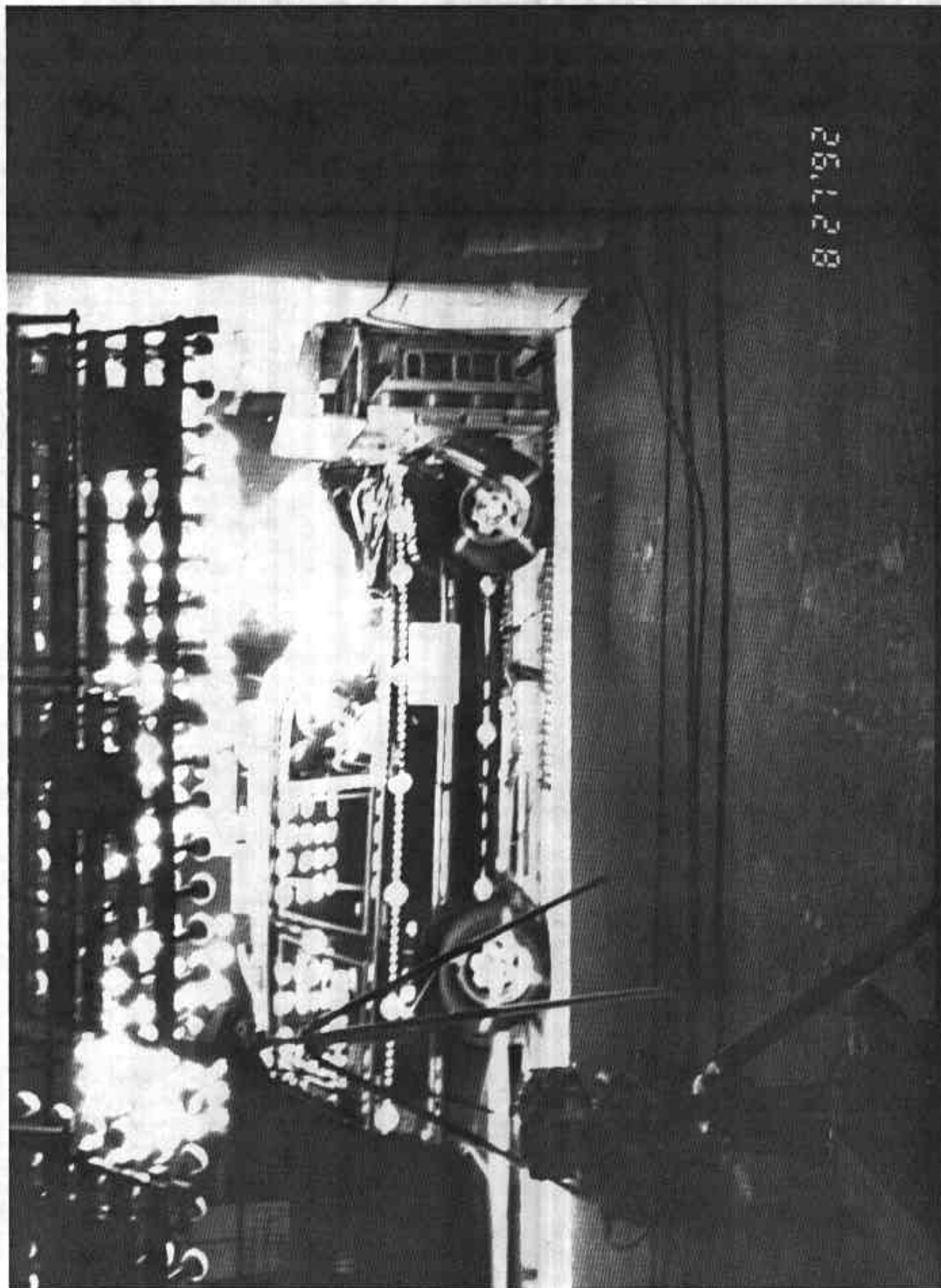


Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW



Figure A-29 POST-TEST PASSENGER AND INTERIOR VIEW



8 27 '92

Figure A-30 IMPACT VIEW

A-32

8038-2

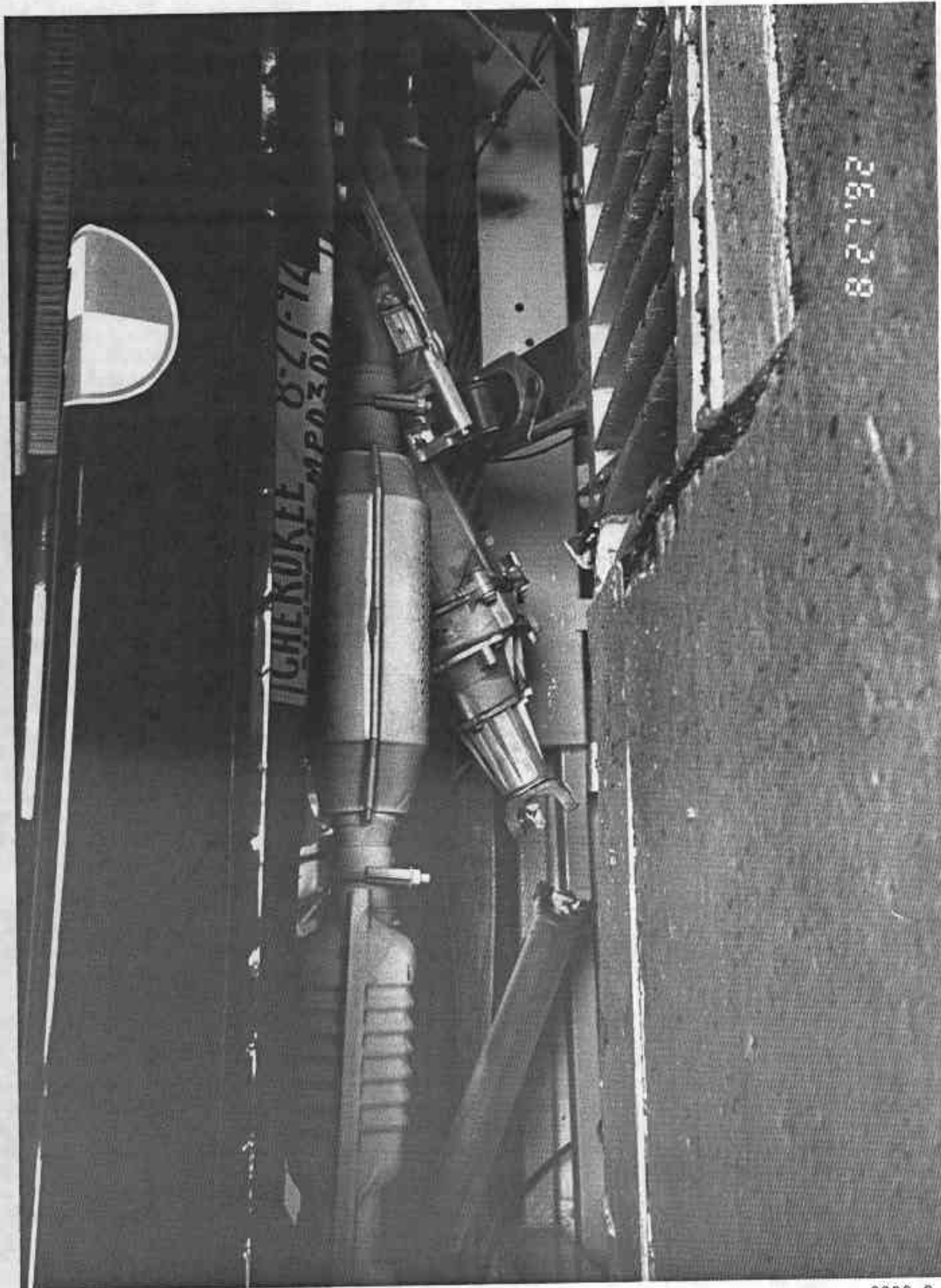


Figure A-31 POST-TEST DRIVESHAFT VIEW

Appendix B

VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

TEST NO. MP0300

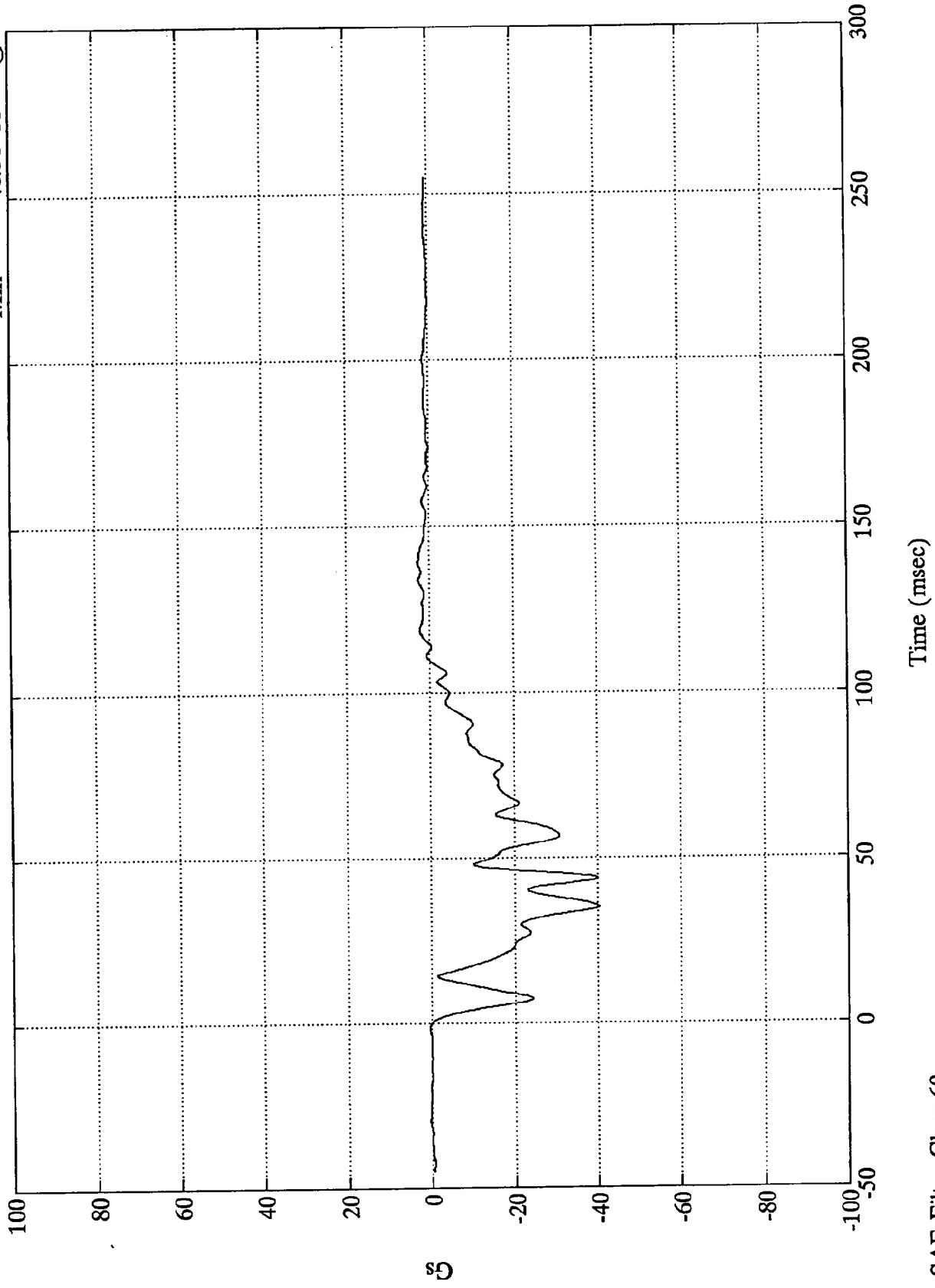
VEHICLE DATA

FILTER CHANNEL CLASS

60

NCAP TEST #2 JEEP CHEROKEE

Acc. #1(x) Max = 2.71 Gs @ 138.84 msec
Min = -40.36 Gs @ 35.15 msec

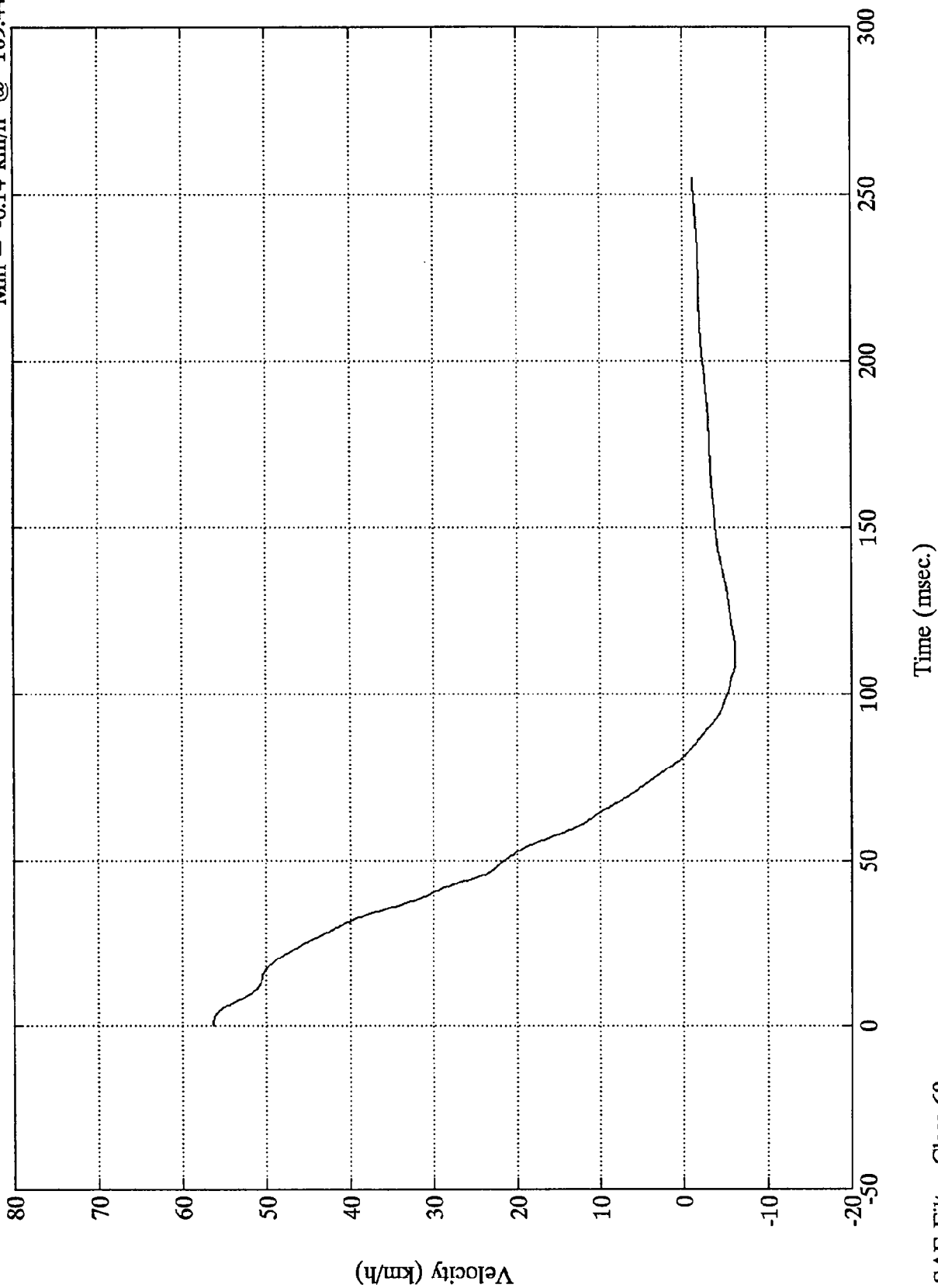


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 56.32 km/h @ 0.48 msec
Min = -6.14 km/h @ 109.44 msec

Acc. #1(x)

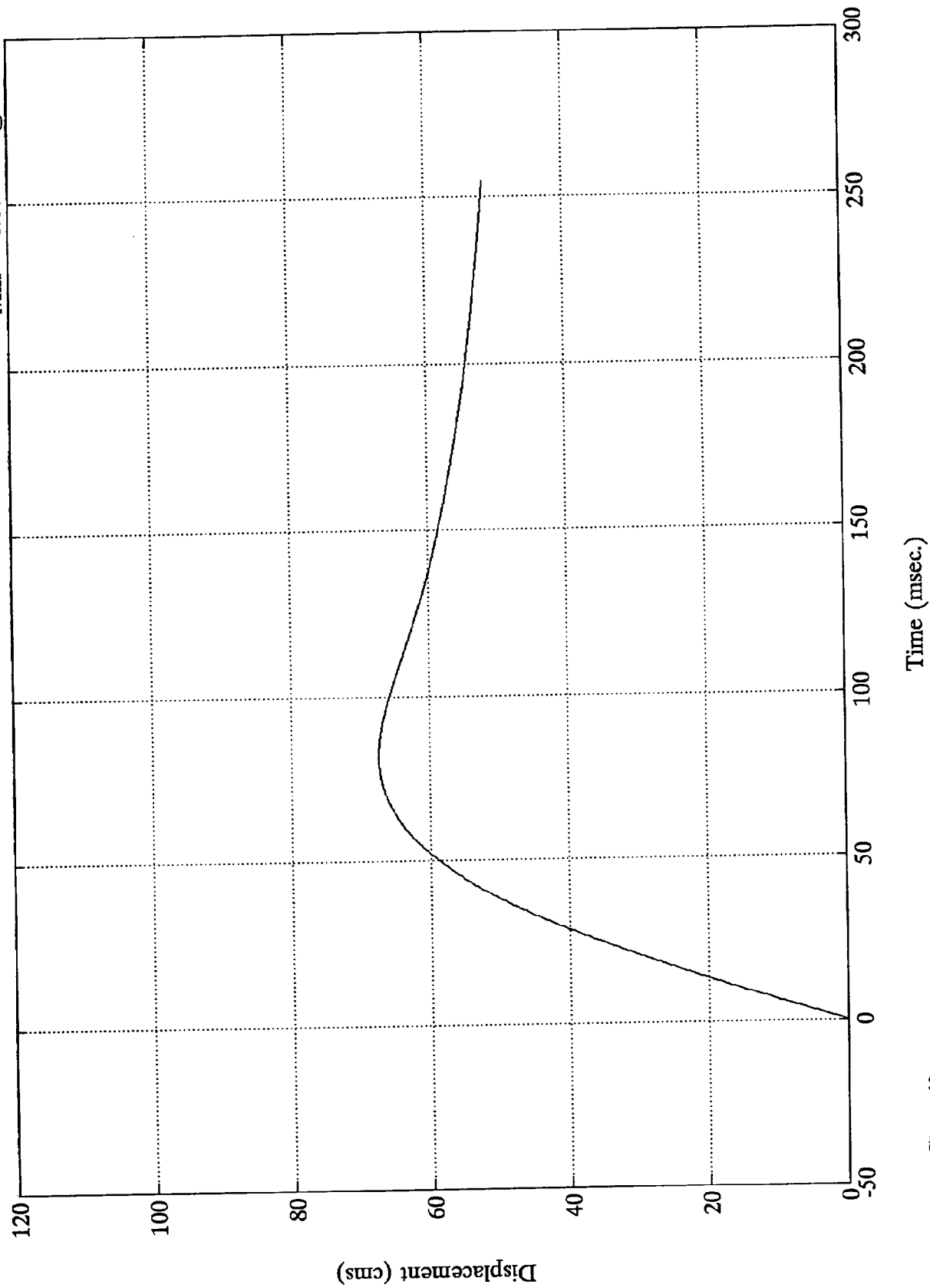


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

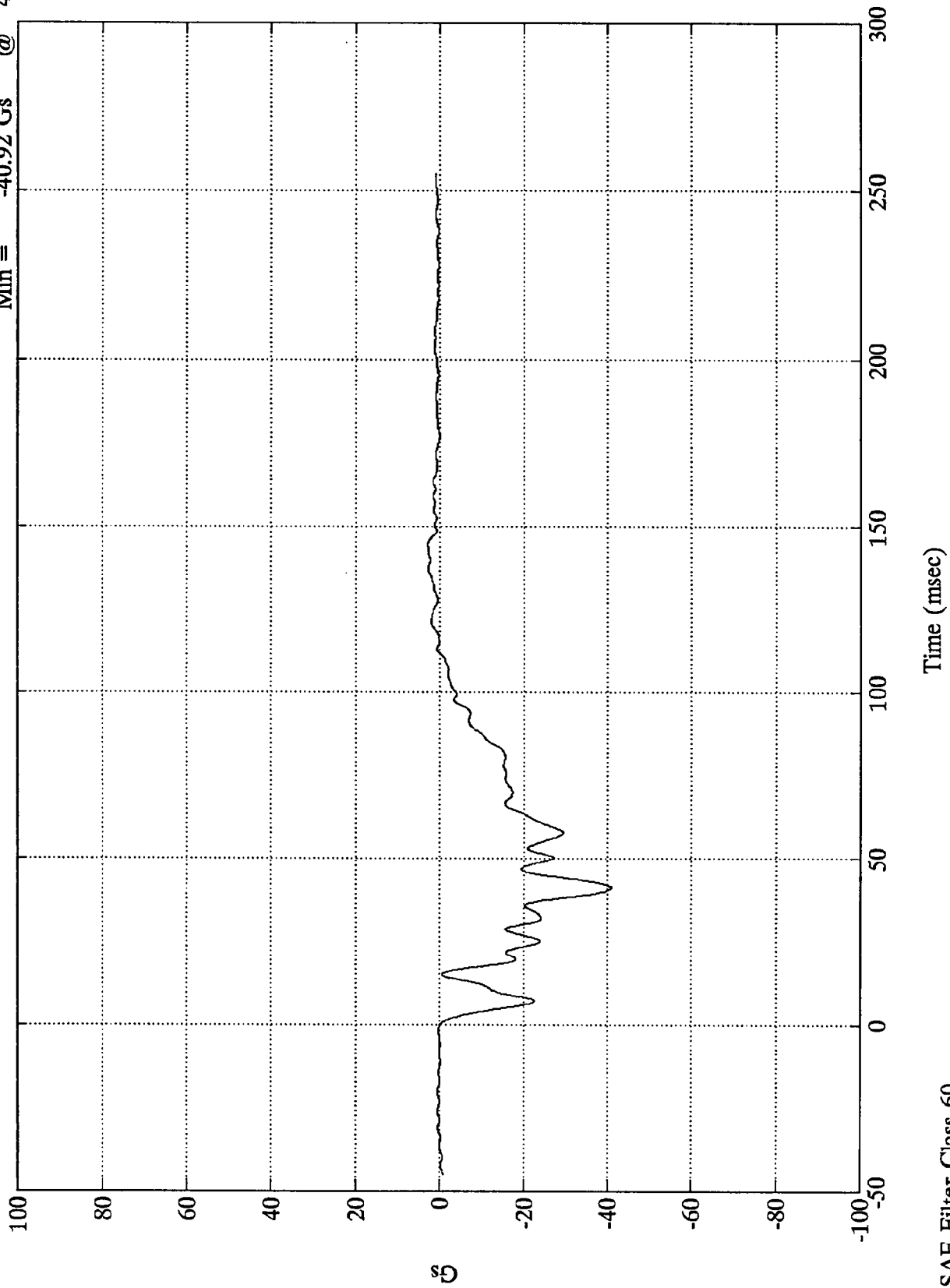
Acc. #1(x)

Max = 67.39 cms @ 81.60 msec
Min = 0.00 cms @ -0.00 msec



NCAP TEST #2 JEEP CHEROKEE

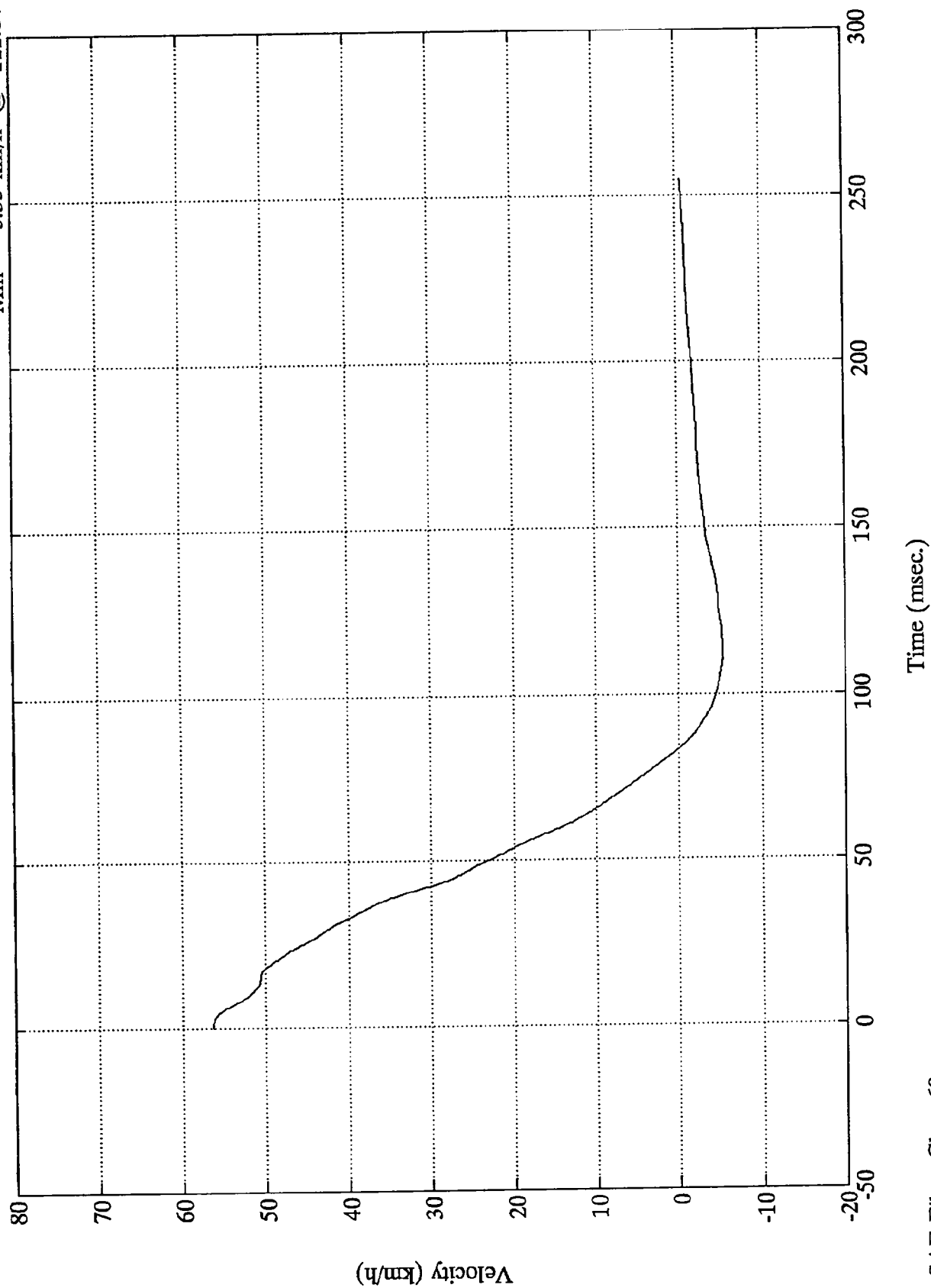
Acc. #2(x) Max = 2.85 Gs @ 144.83 msec
 Min = -40.92 Gs @ 41.15 msec



NCAP TEST #2 JEEP CHEROKEE

Acc. #2(x)

Max = 56.32 km/h @ 0.48 msec
Min = -5.33 km/h @ 111.84 msec

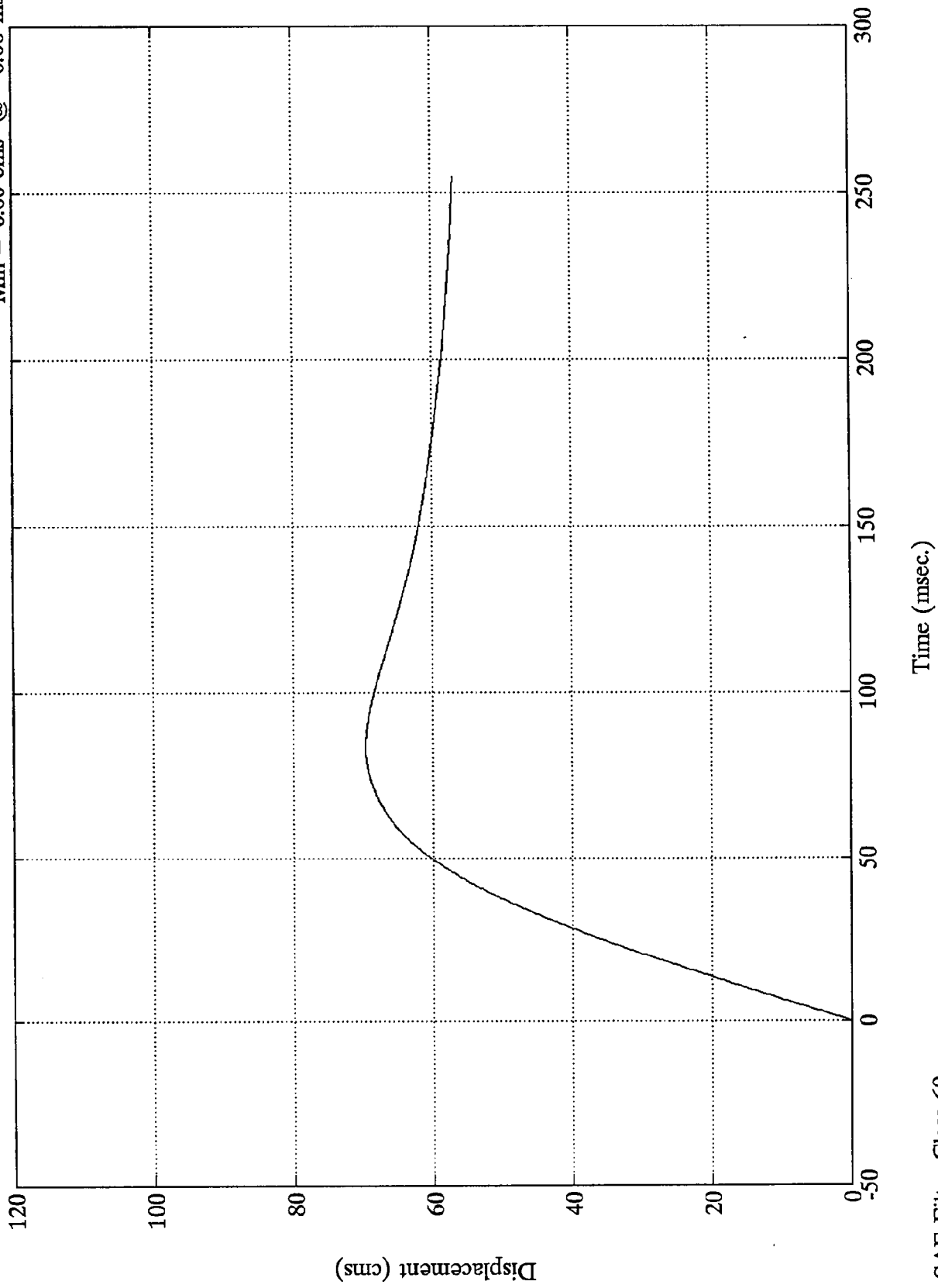


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 69.67 cms @ 84.24 msec
Min = 0.00 cms @ -0.00 msec

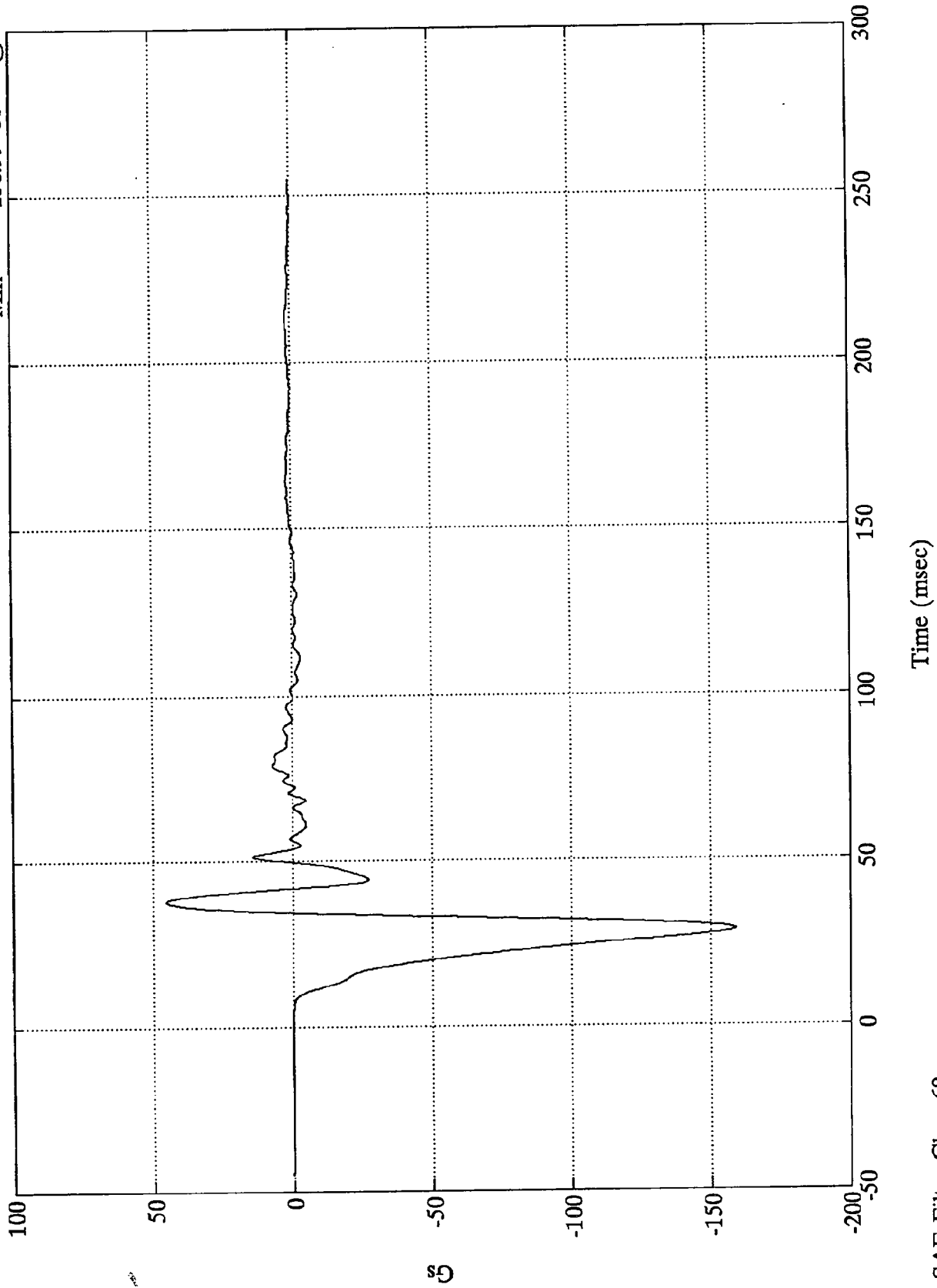
Acc. #2(x)



SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Acc. #3(x) Max = 45.33 Gs @ 37.56 msec
 Min = -158.99 Gs @ 28.55 msec

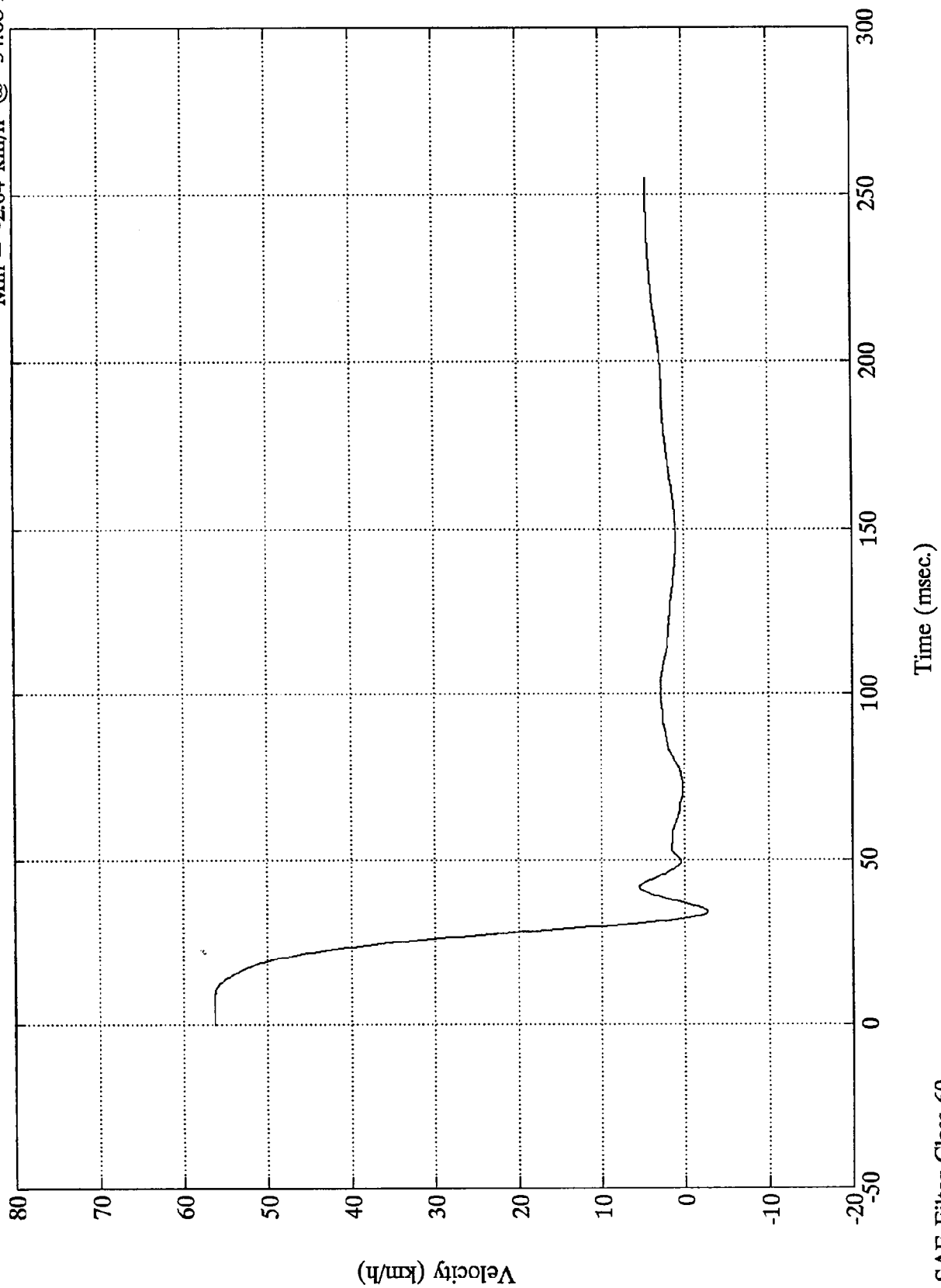


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 56.33 km/h @ 4.80 msec
 Min = -2.64 km/h @ 34.08 msec

Acc. #3(x)

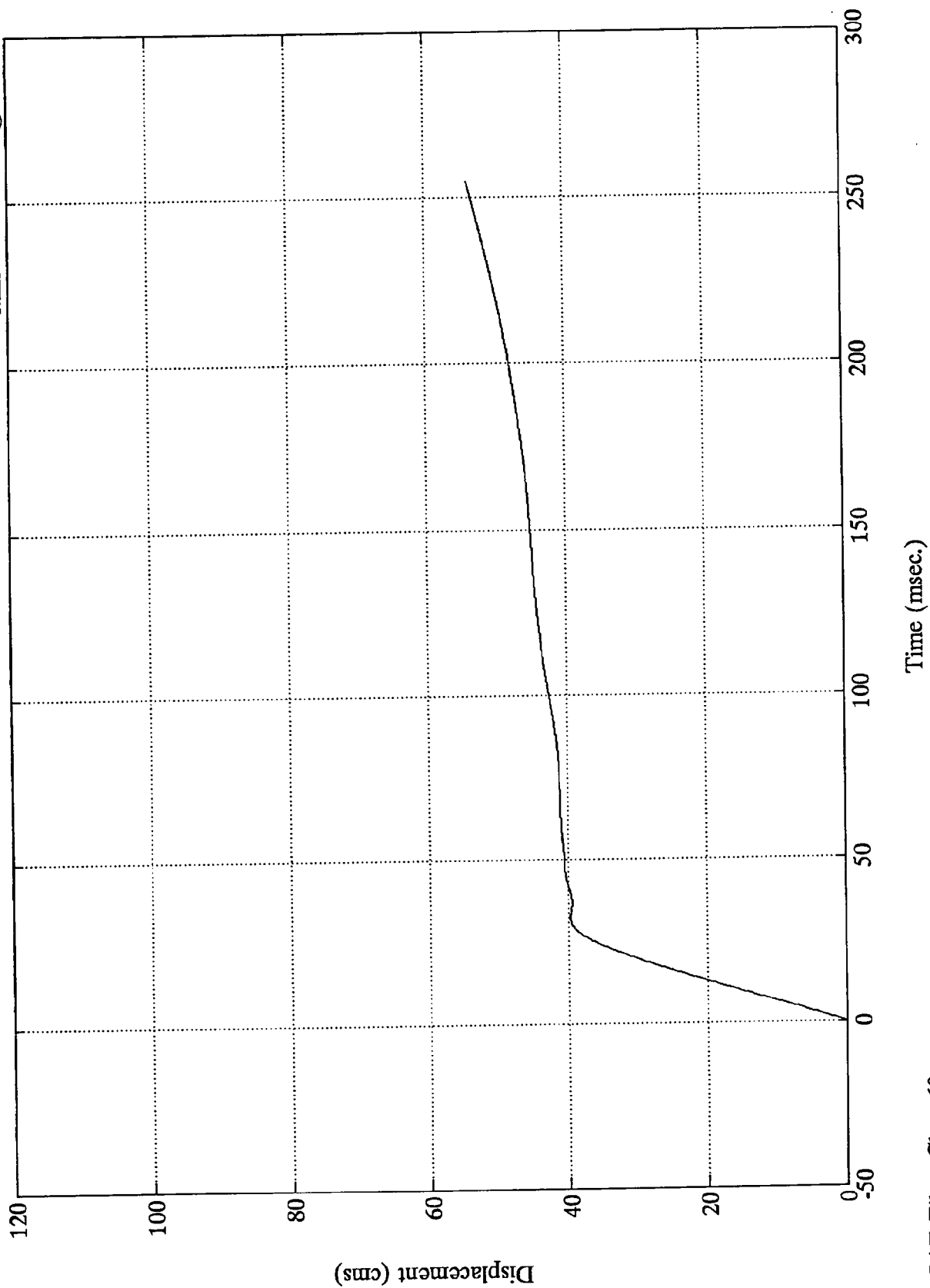


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Acc. #3(x)

Max = 53.82 cms @ 254.88 msec
Min = 0.00 cms @ -0.00 msec

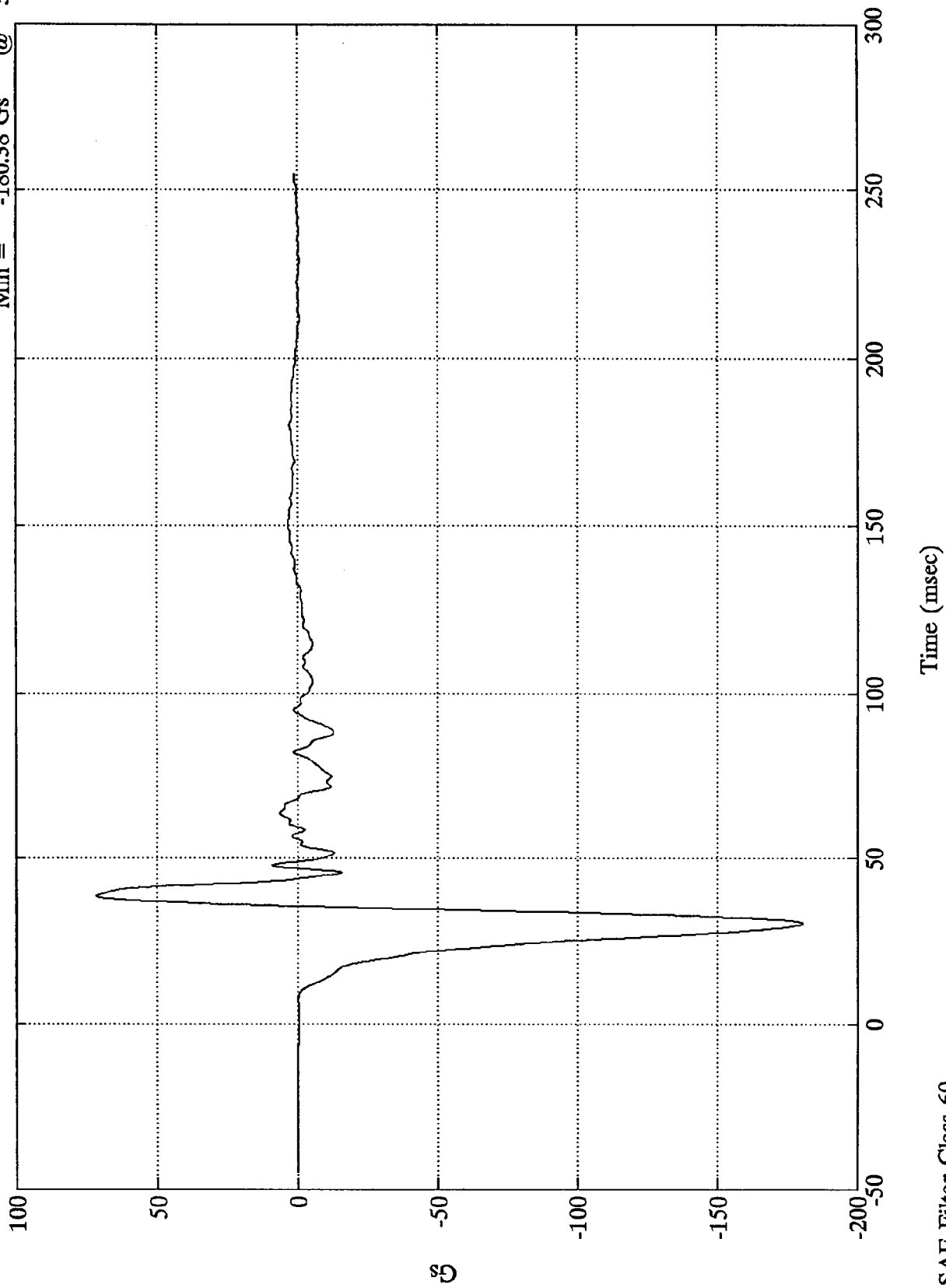


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 71.55 Gs @ 38.27 msec
 Min = -180.38 Gs @ 30.23 msec

Acc. #4(x)

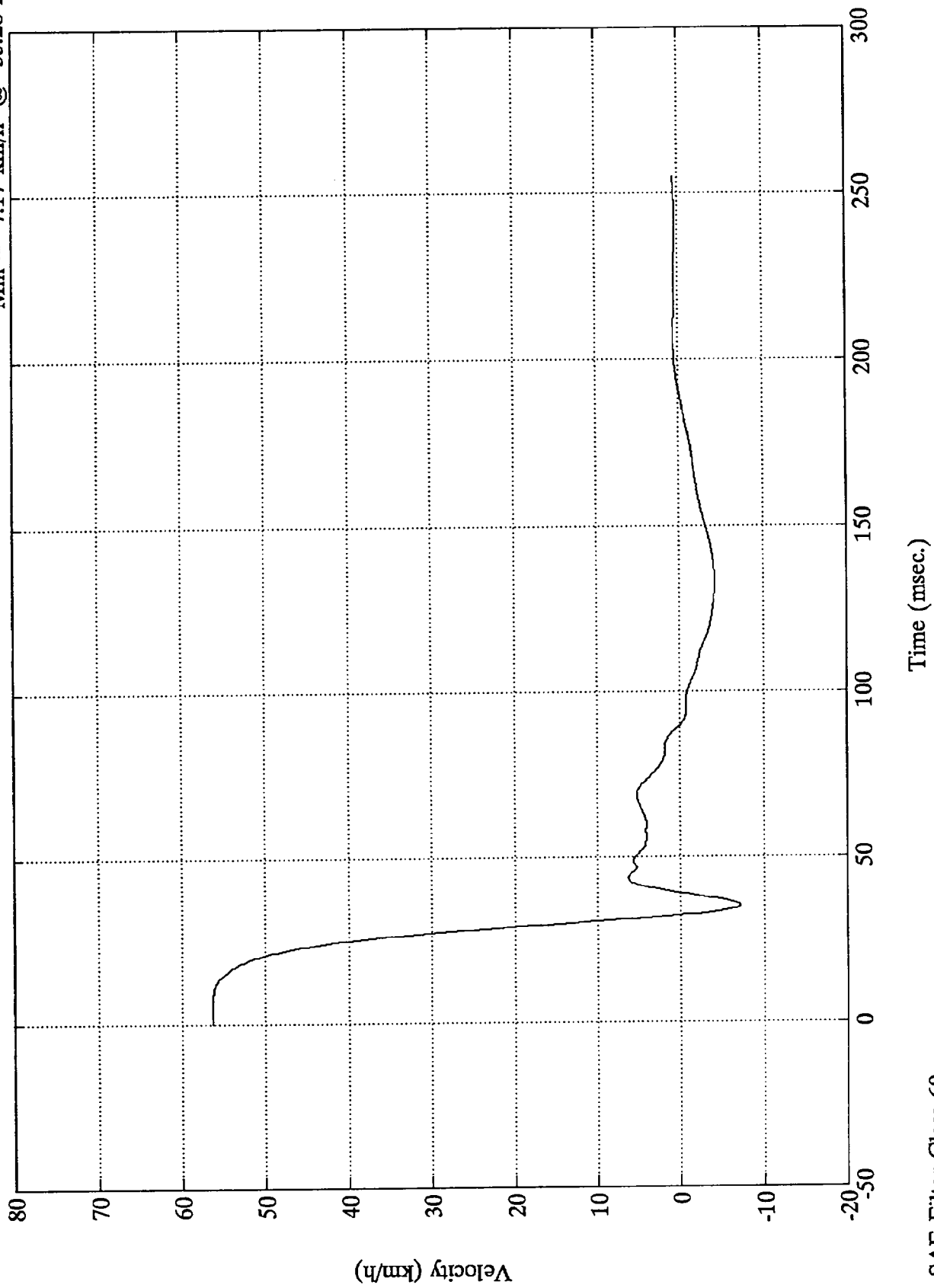


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Acc. #4(x)

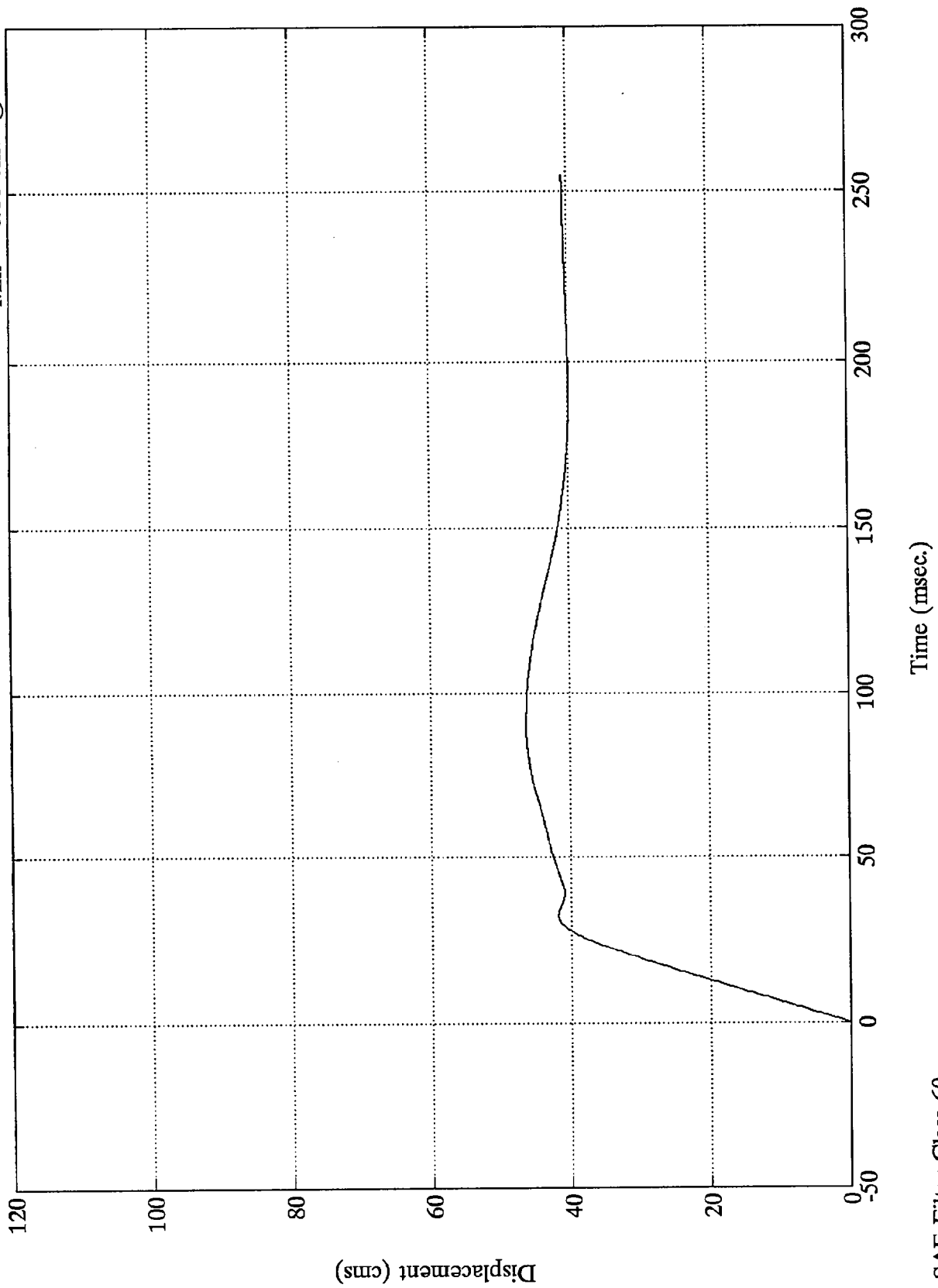
Max = 56.32 km/h @ 0.72 msec
Min = -7.17 km/h @ 35.28 msec



SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

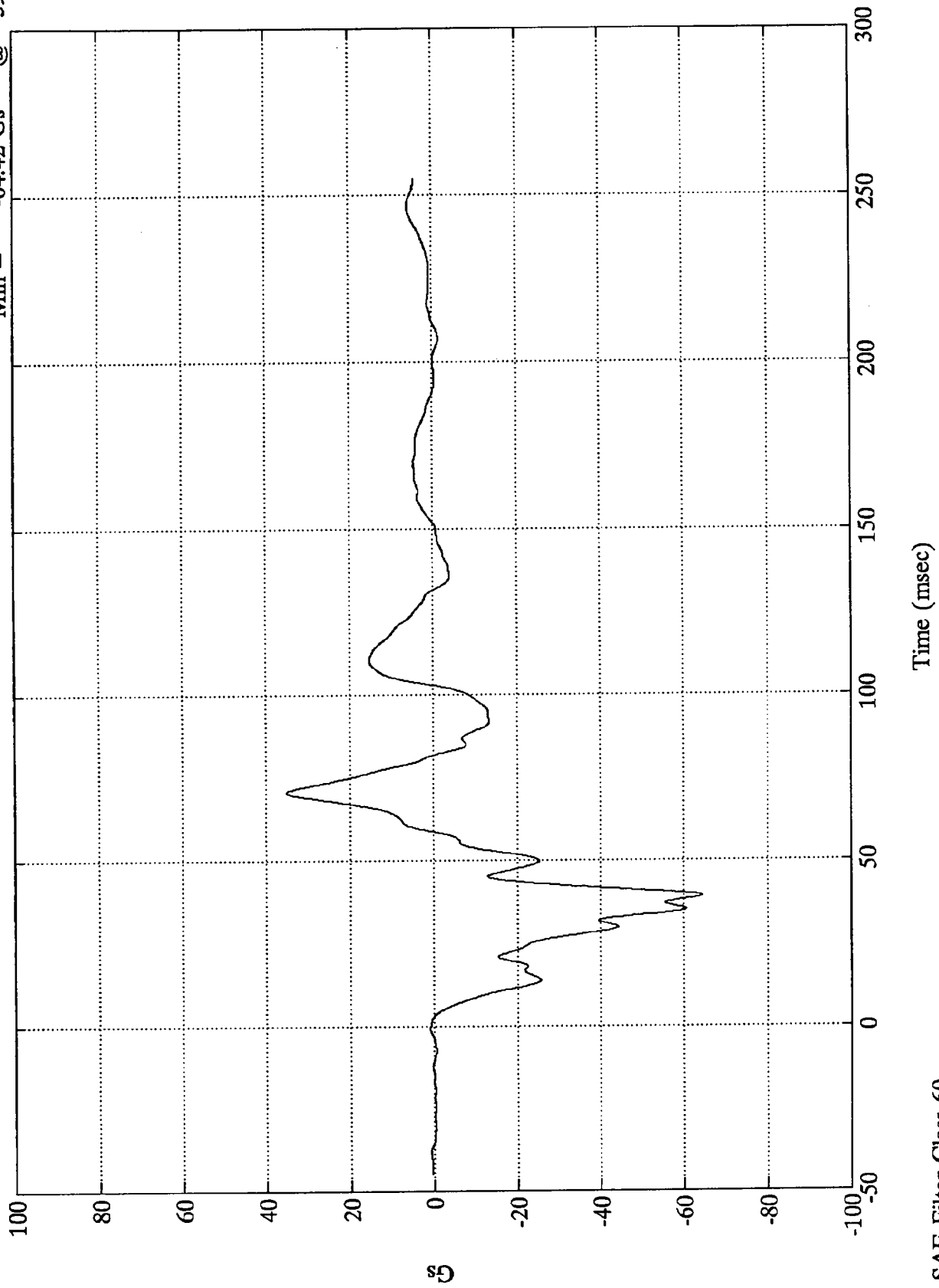
Acc. #4(x)
Max = 46.33 cms @ 91.20 msec
Min = 0.00 cms @ -0.00 msec



SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Acc. #5(x) Max = 35.24 Gs @ 70.55 msec
 Min = -64.42 Gs @ 39.11 msec

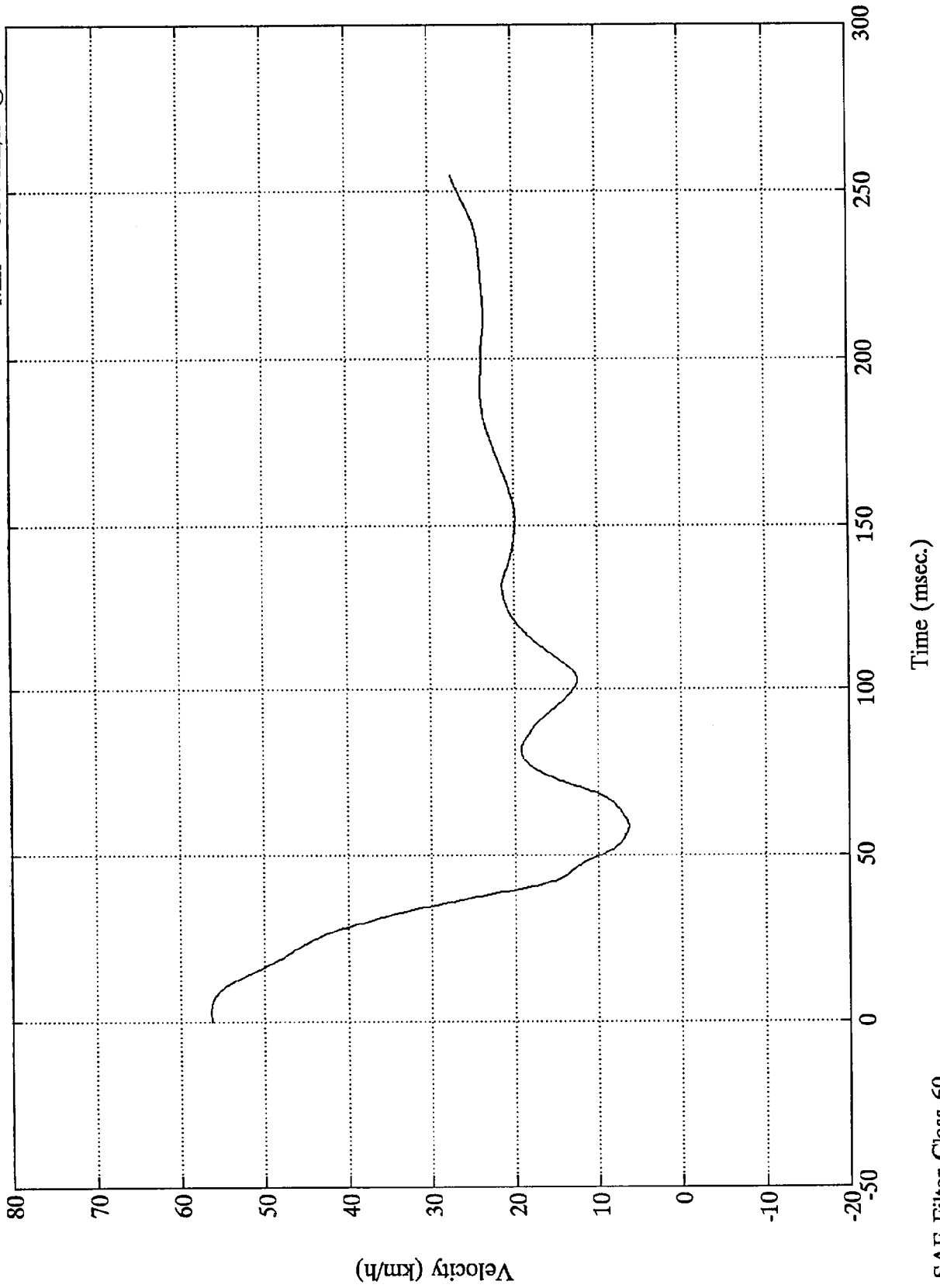


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 56.38 km/h @ 3.36 msec
Min = 6.34 km/h @ 58.56 msec

Acc. #5(x)

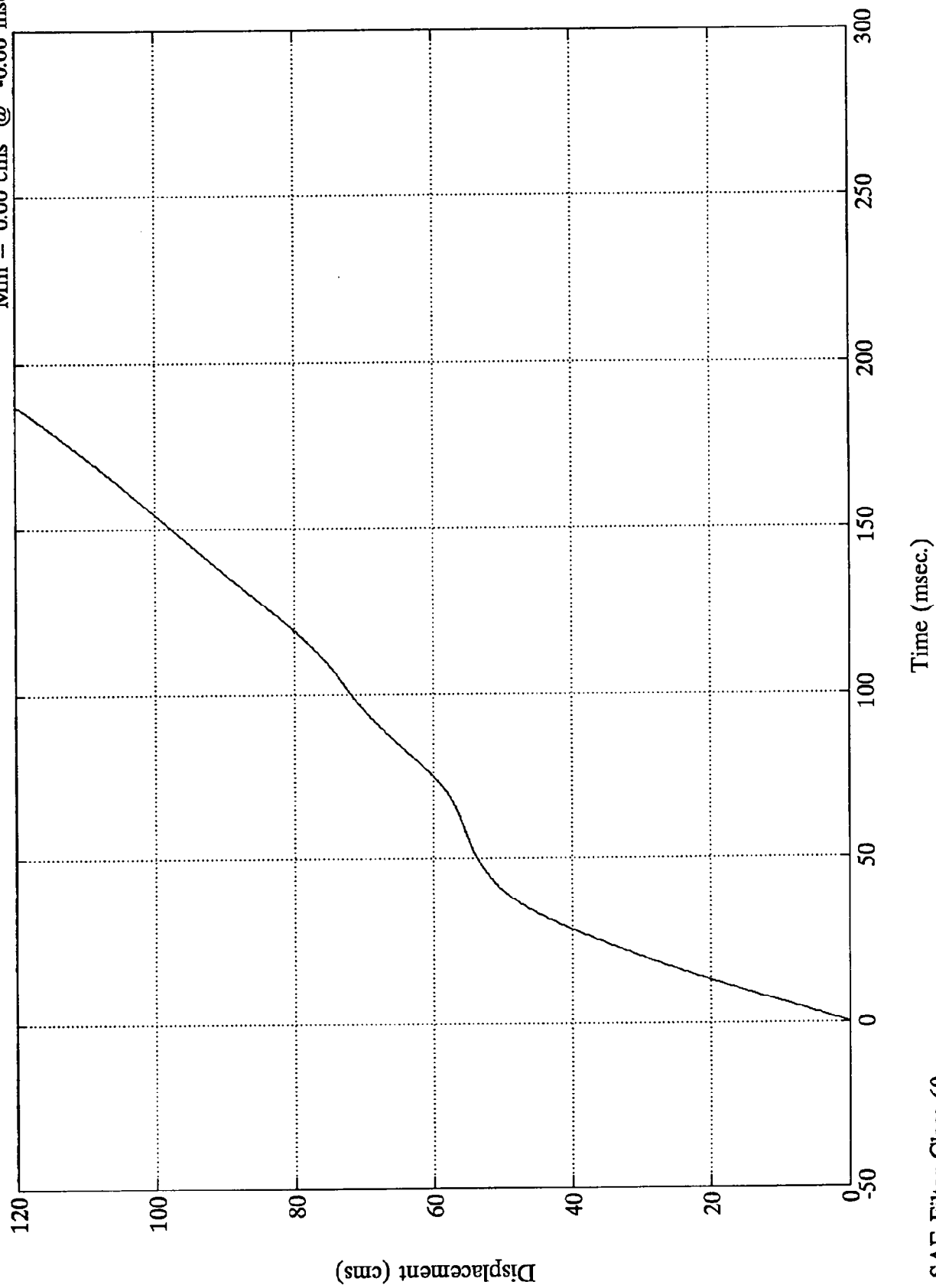


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Acc. #5(x)

Max = 165.58 cms @ 254.88 msec
Min = 0.00 cms @ -0.00 msec

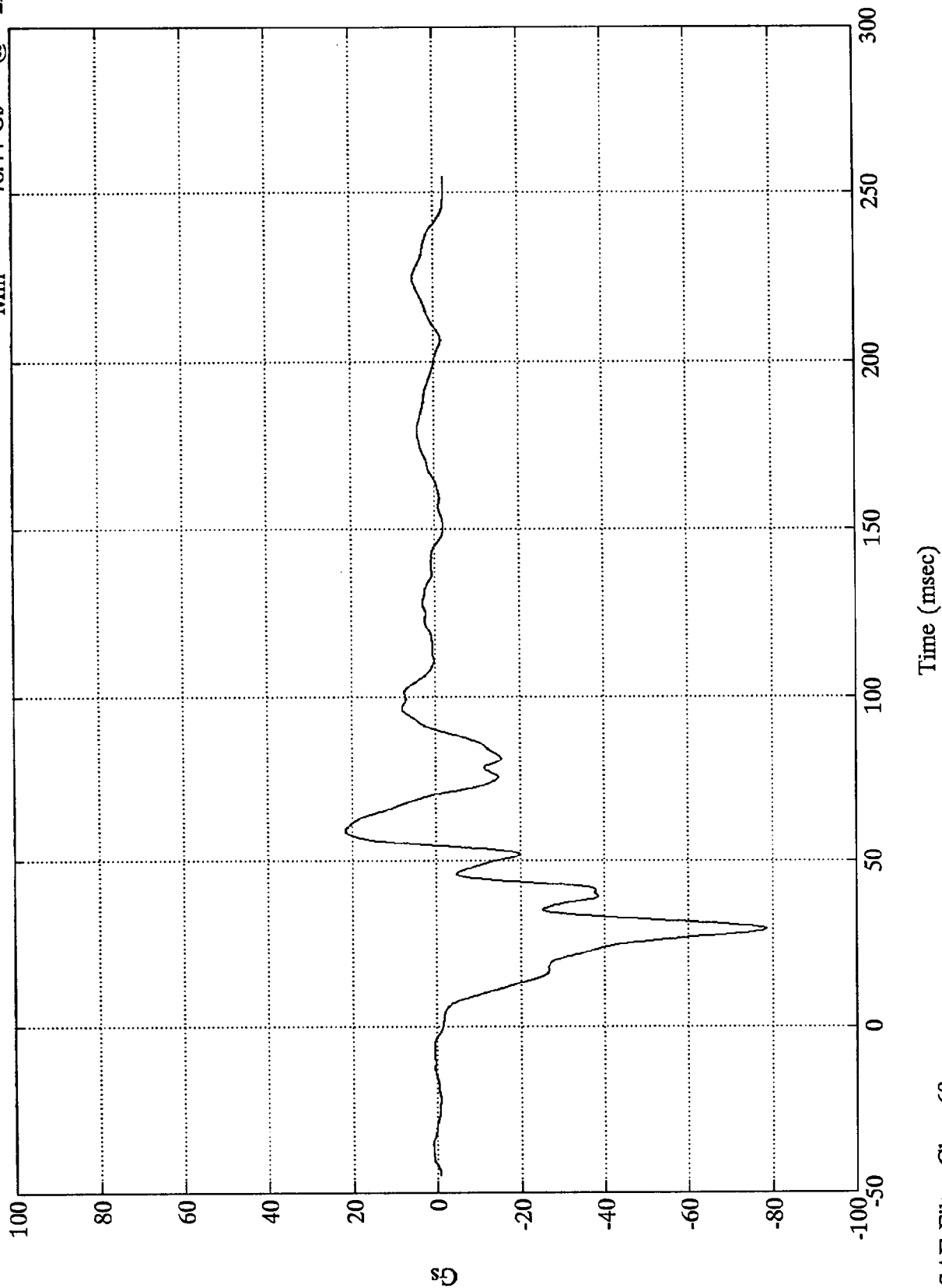


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 21.61 Gs @ 59.40 msec
 Min = -78.44 Gs @ 29.39 msec

Acc. #6(x)

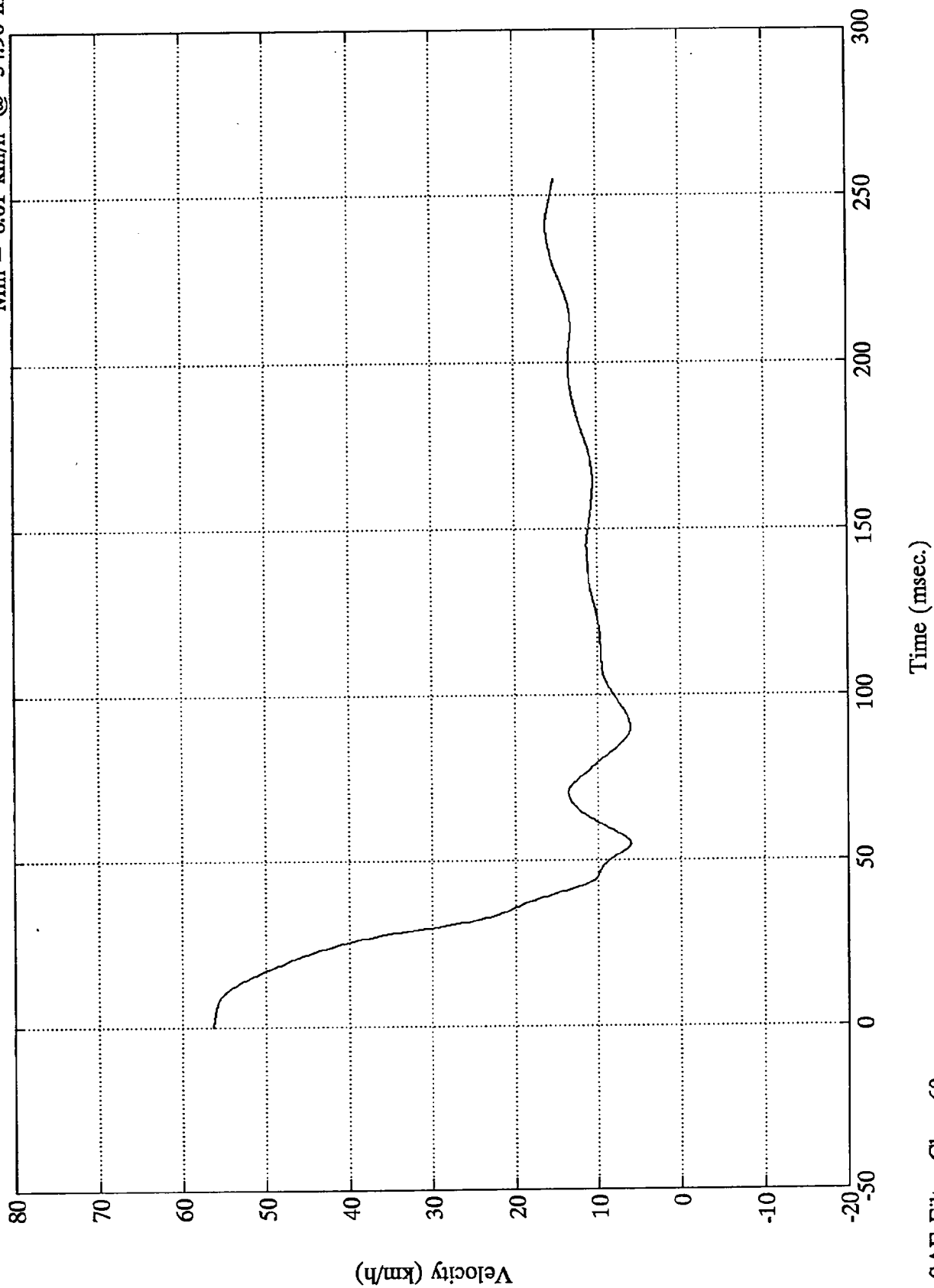


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Acc. #6(x)

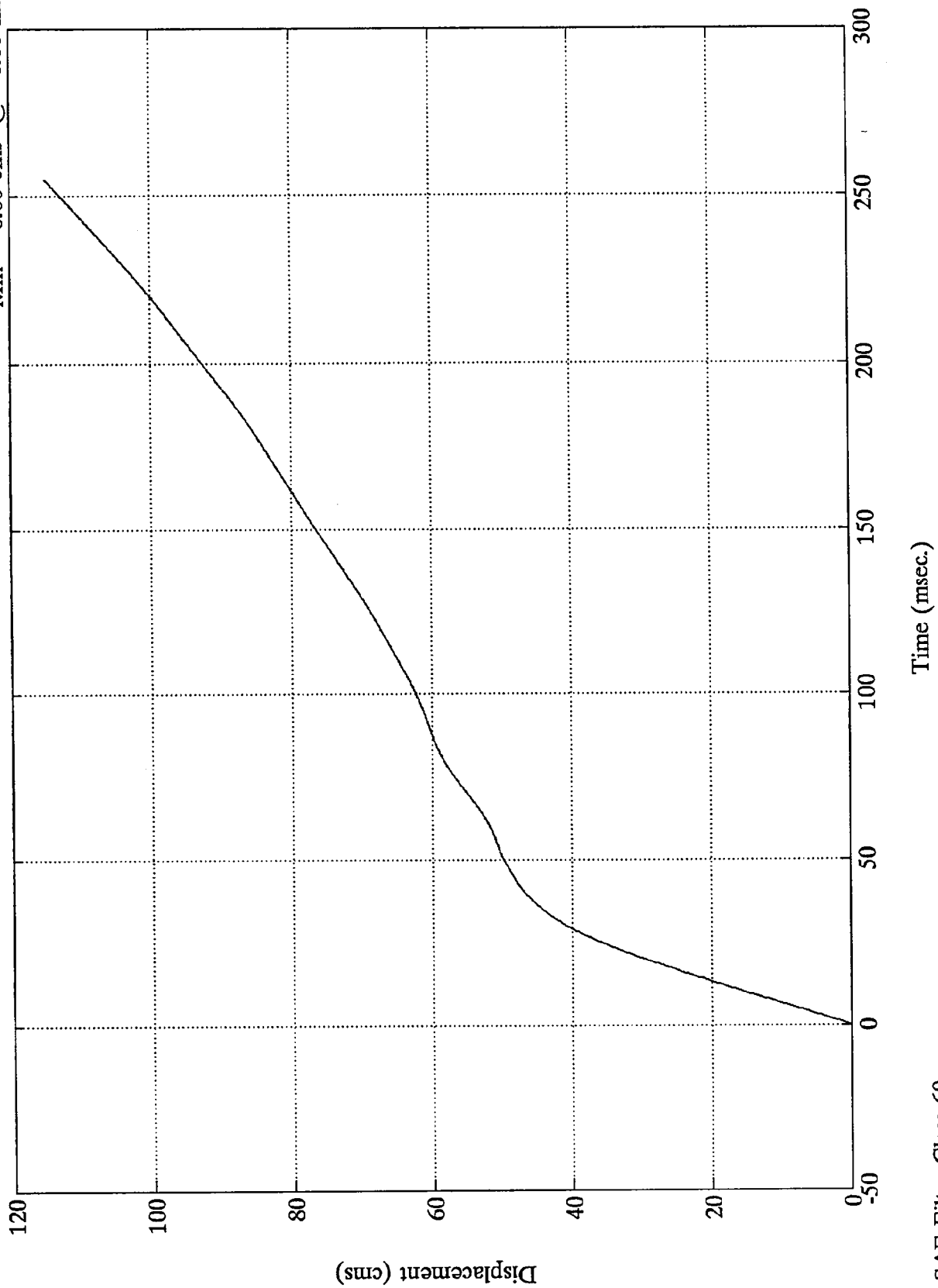
Max = 56.32 km/h @ -0.00 msec
Min = 6.01 km/h @ 54.96 msec



SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

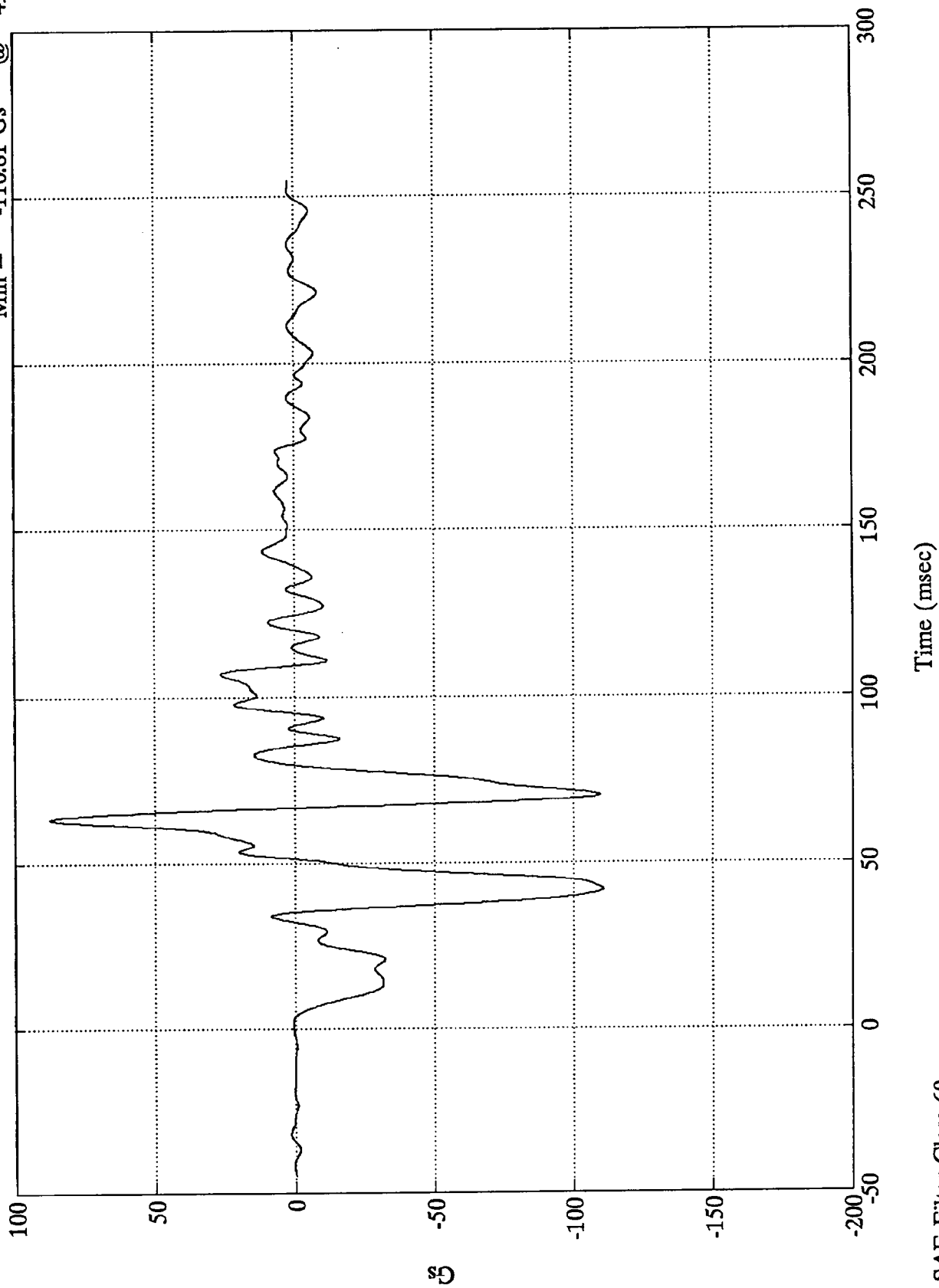
Acc. #6(x)
Max = 114.86 cms @ 254.88 msec
Min = 0.00 cms @ -0.00 msec



SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Acc. #7(x) Max = 87.58 Gs @ 63.35 msec
 Min = -110.81 Gs @ 41.88 msec

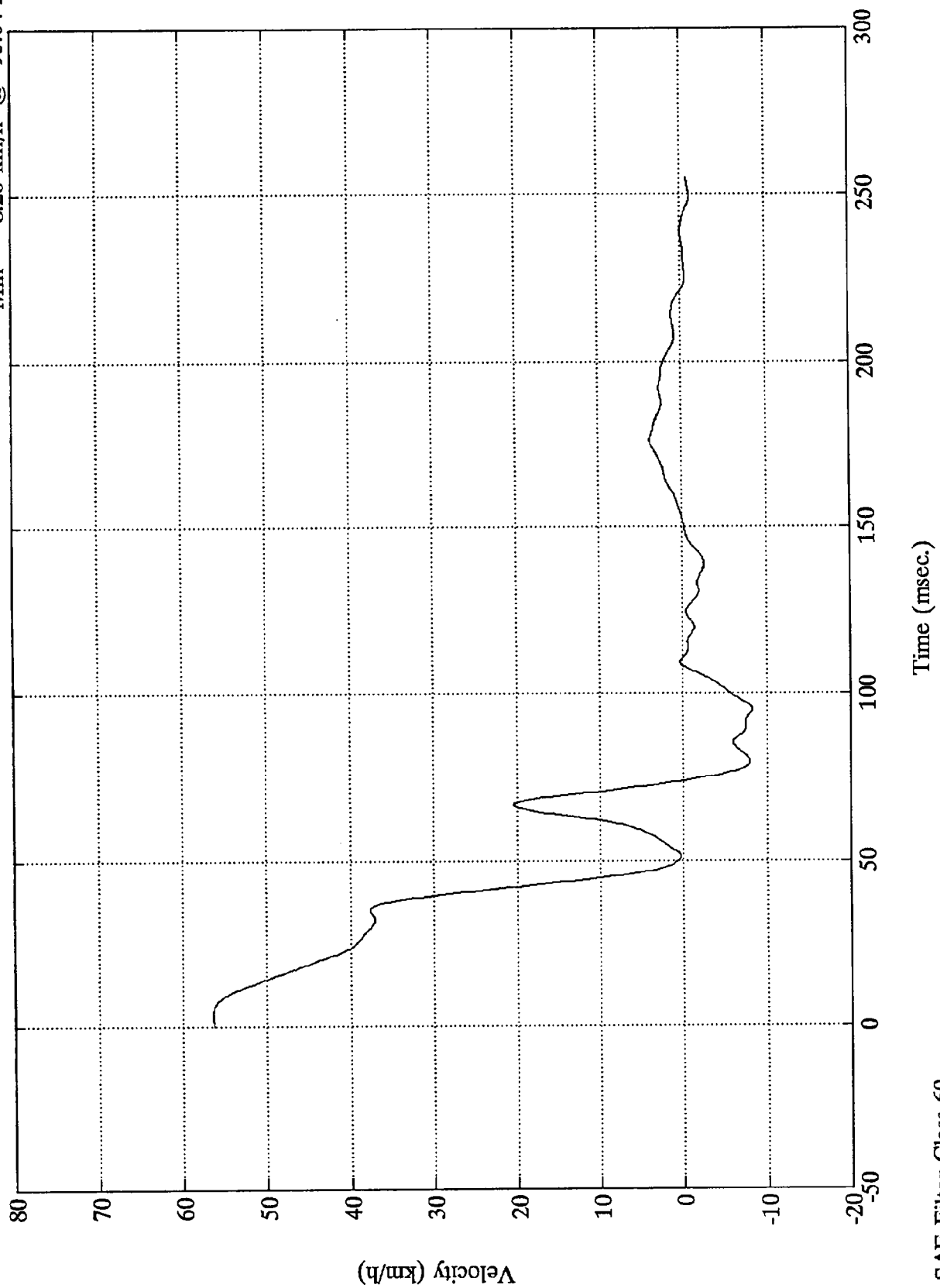


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 56.41 km/h @ 3.84 msec
Min = -8.26 km/h @ 95.04 msec

Acc. #7(x)

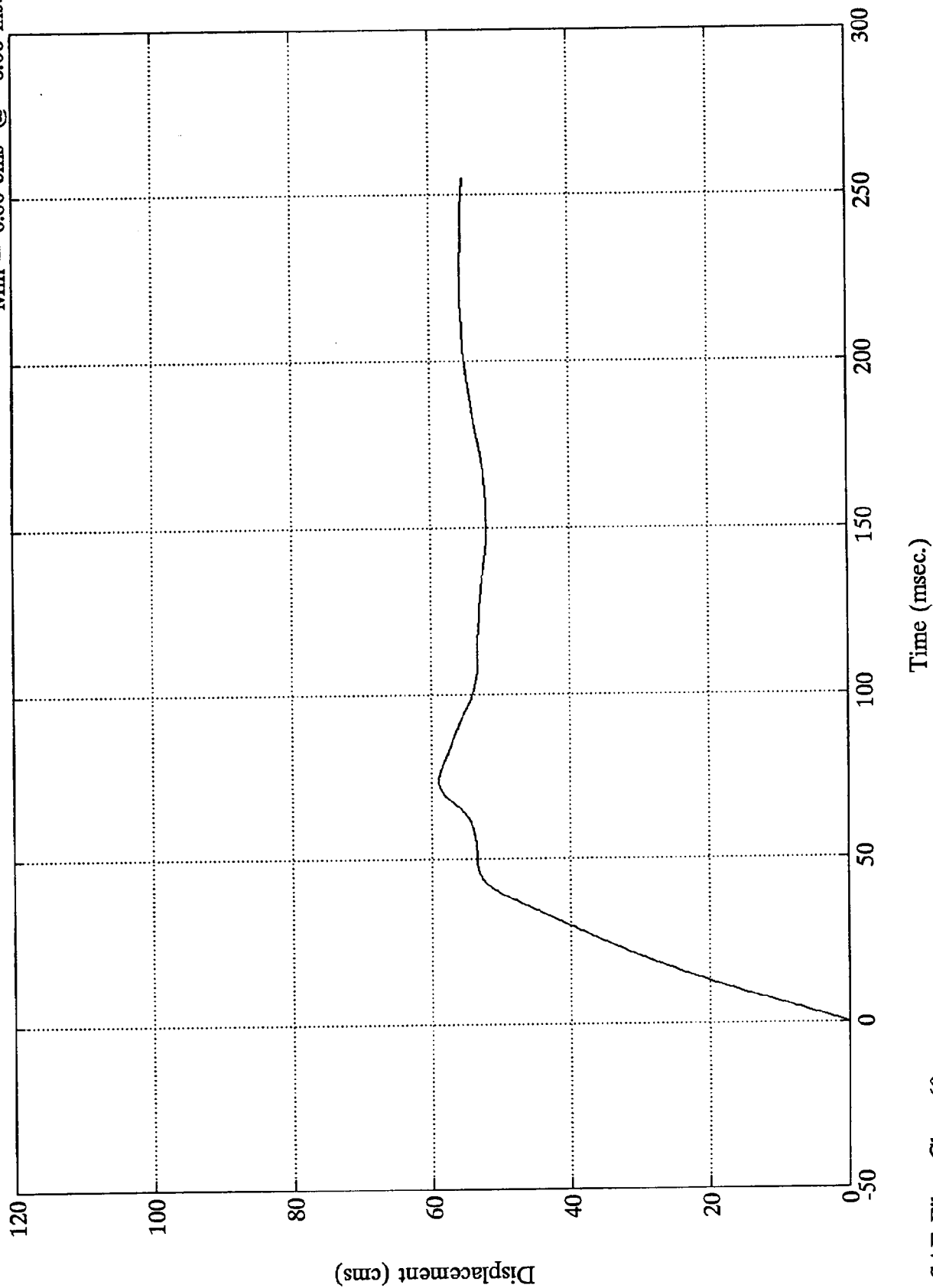


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

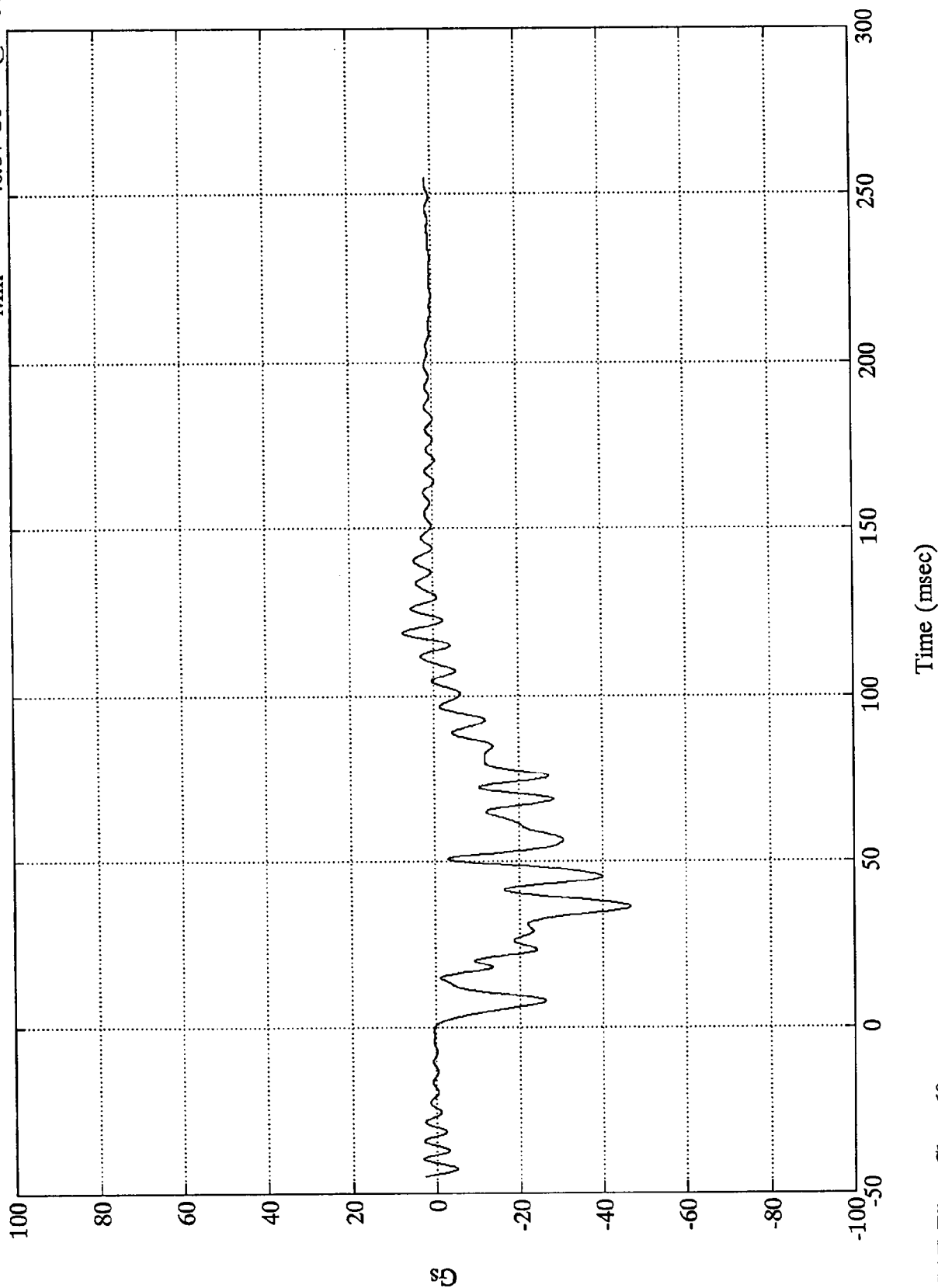
Acc. #7(x)

Max = 58.93 cms @ 74.40 msec
Min = 0.00 cms @ -0.00 msec



NCAP TEST #2 JEEP CHEROKEE

Acc. #8(x) Max = 7.38 Gs @ 118.92 msec
 Min = -46.84 Gs @ 36.00 msec

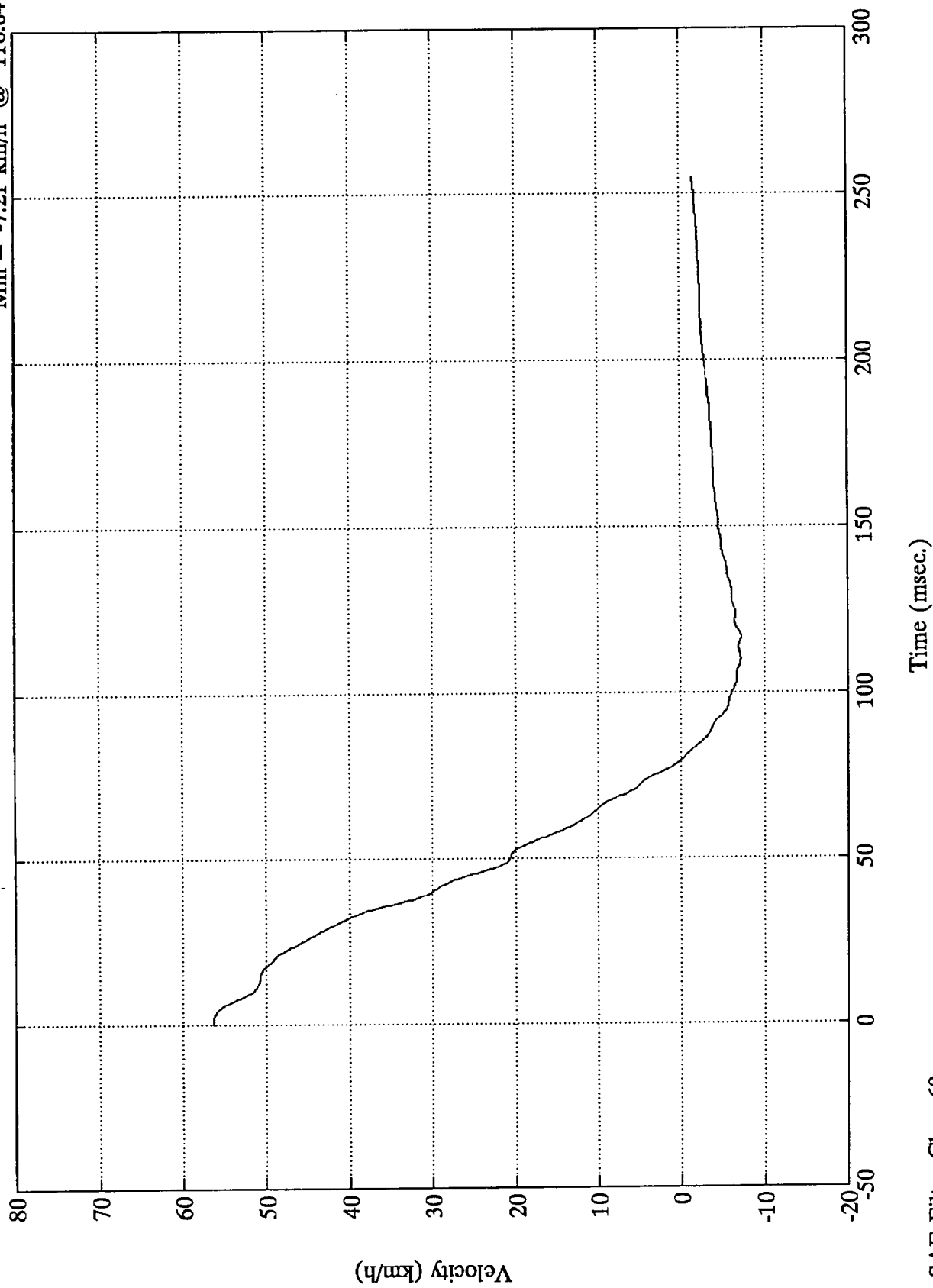


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Acc. #8(x)

Max = 56.33 km/h @ 0.48 msec
Min = -7.21 km/h @ 116.64 msec

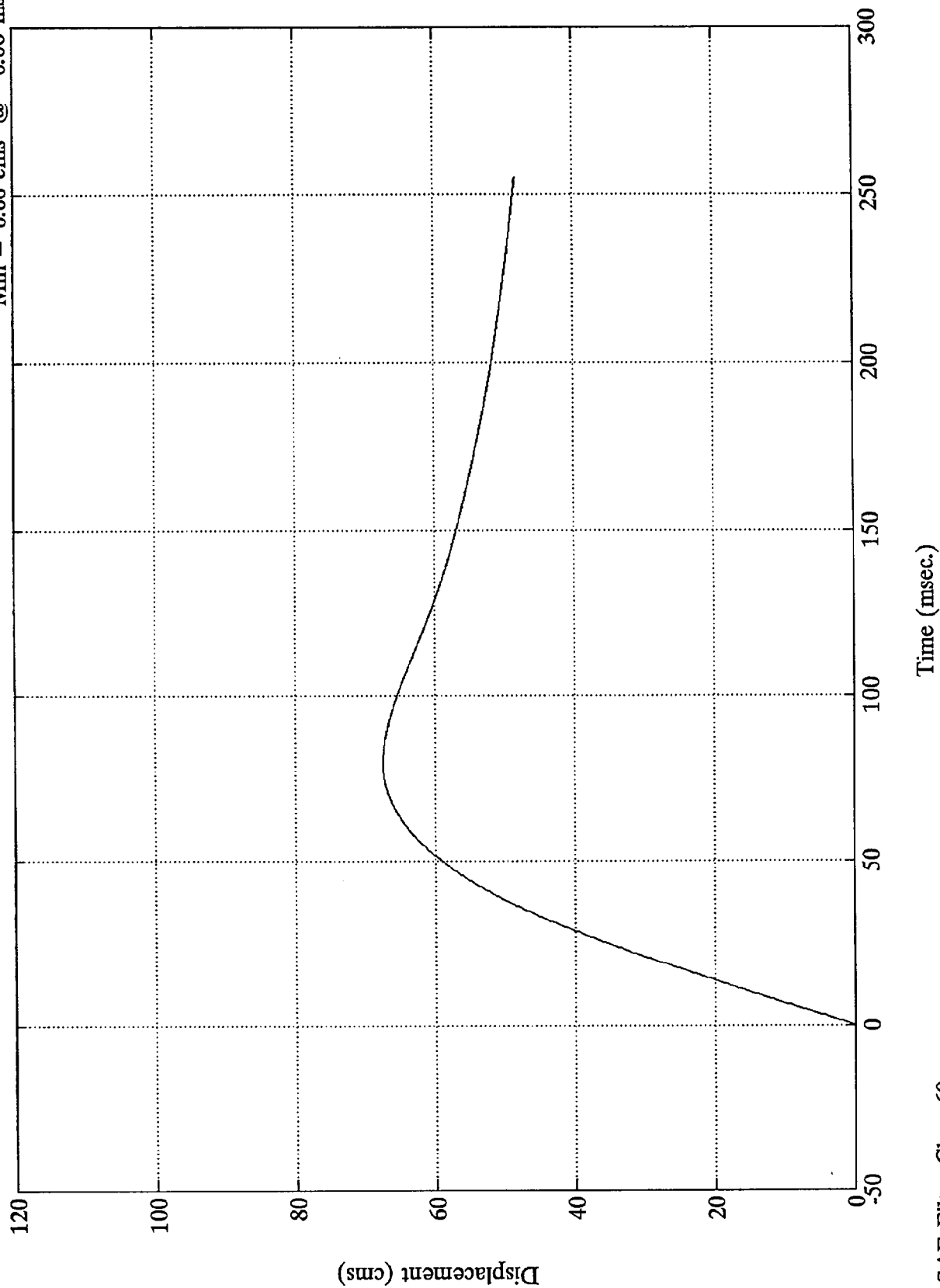


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 67.54 cms @ 79.92 msec
Min = 0.00 cms @ -0.00 msec

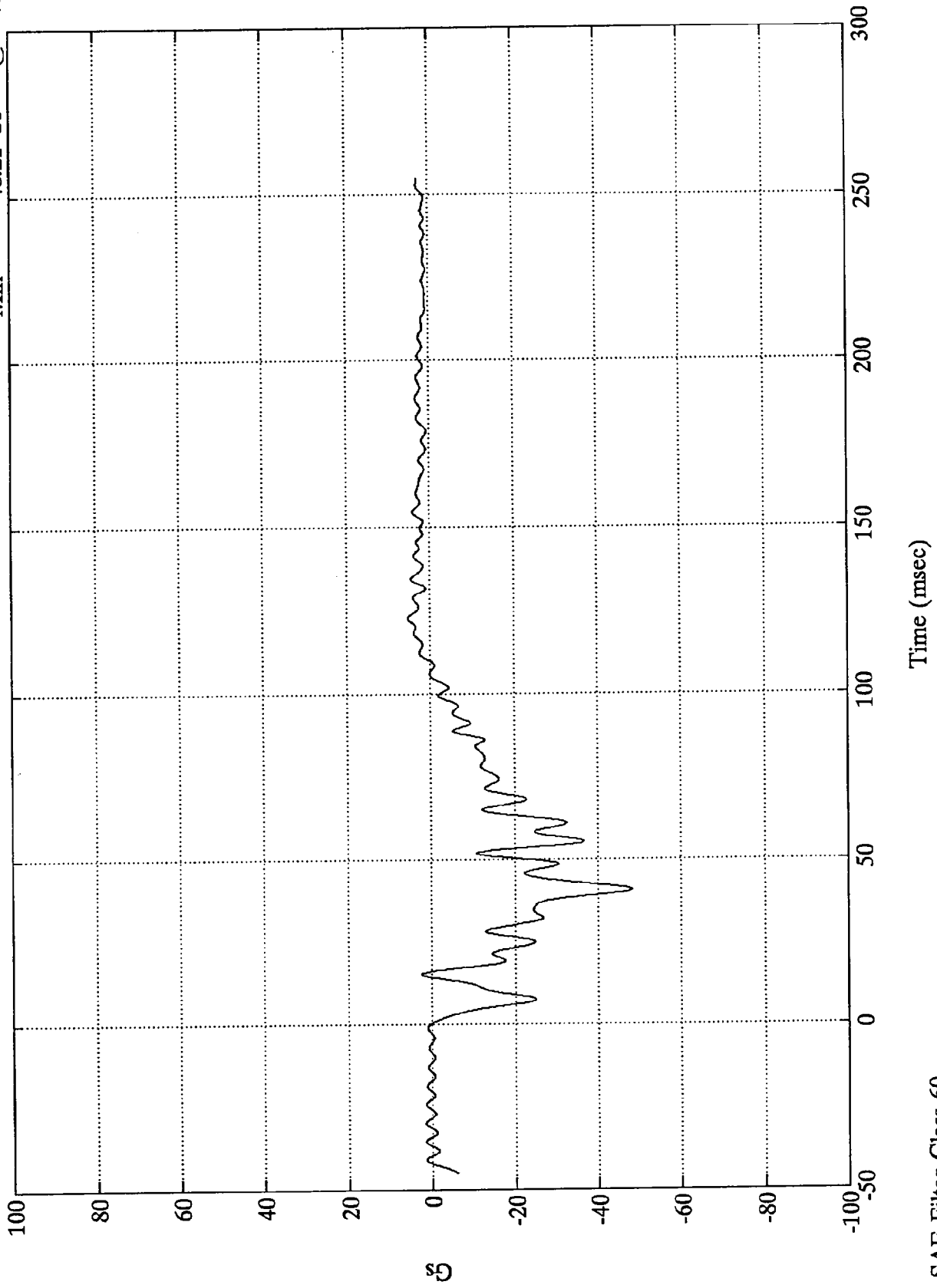
Acc. #8(x)



SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Acc. #9(x) Max = 5.26 Gs @ 122.40 msec
 Min = -48.21 Gs @ 40.68 msec

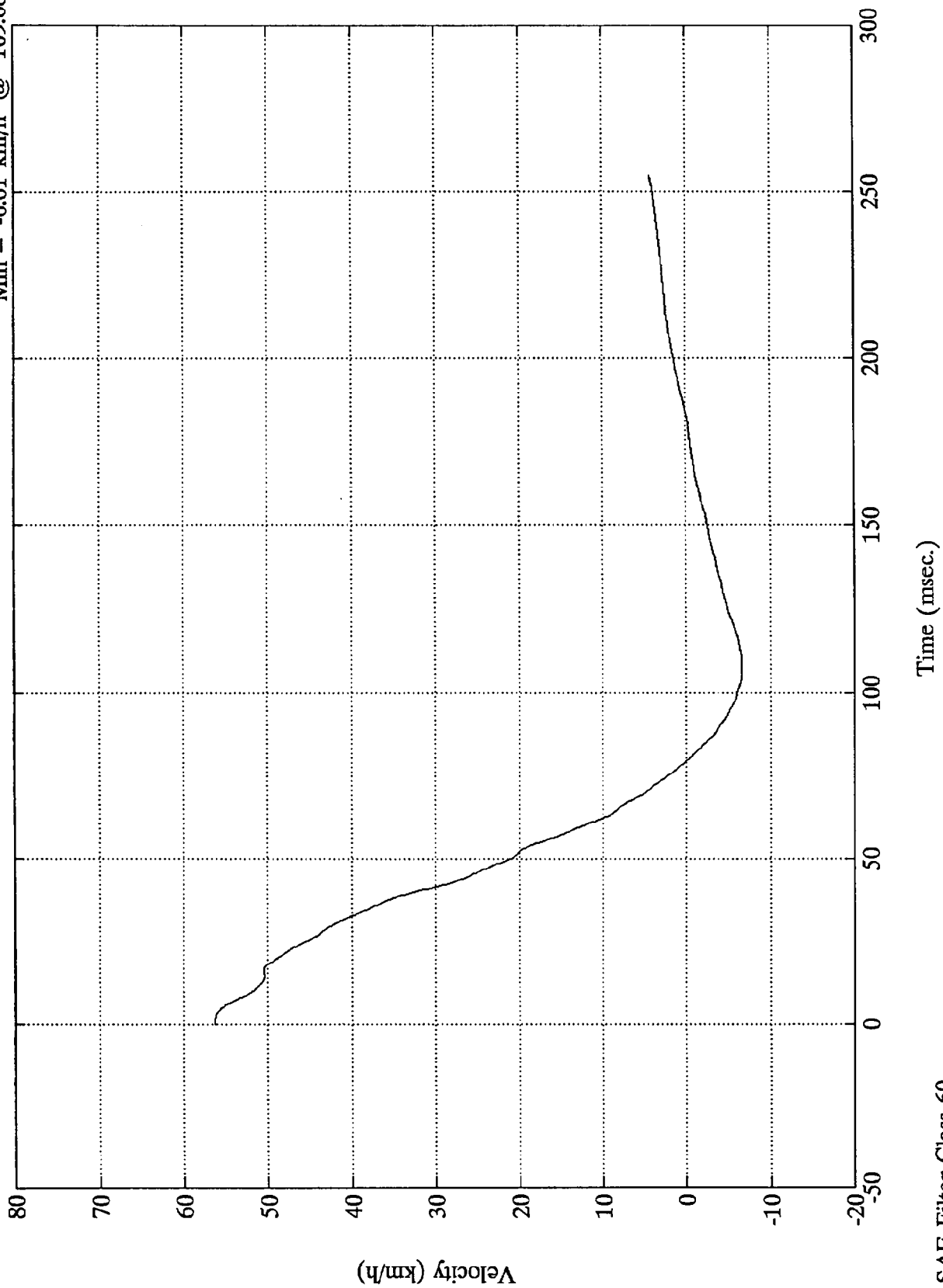


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 56.32 km/h @ 0.72 msec
Min = -6.61 km/h @ 109.68 msec

Acc. #9(x)

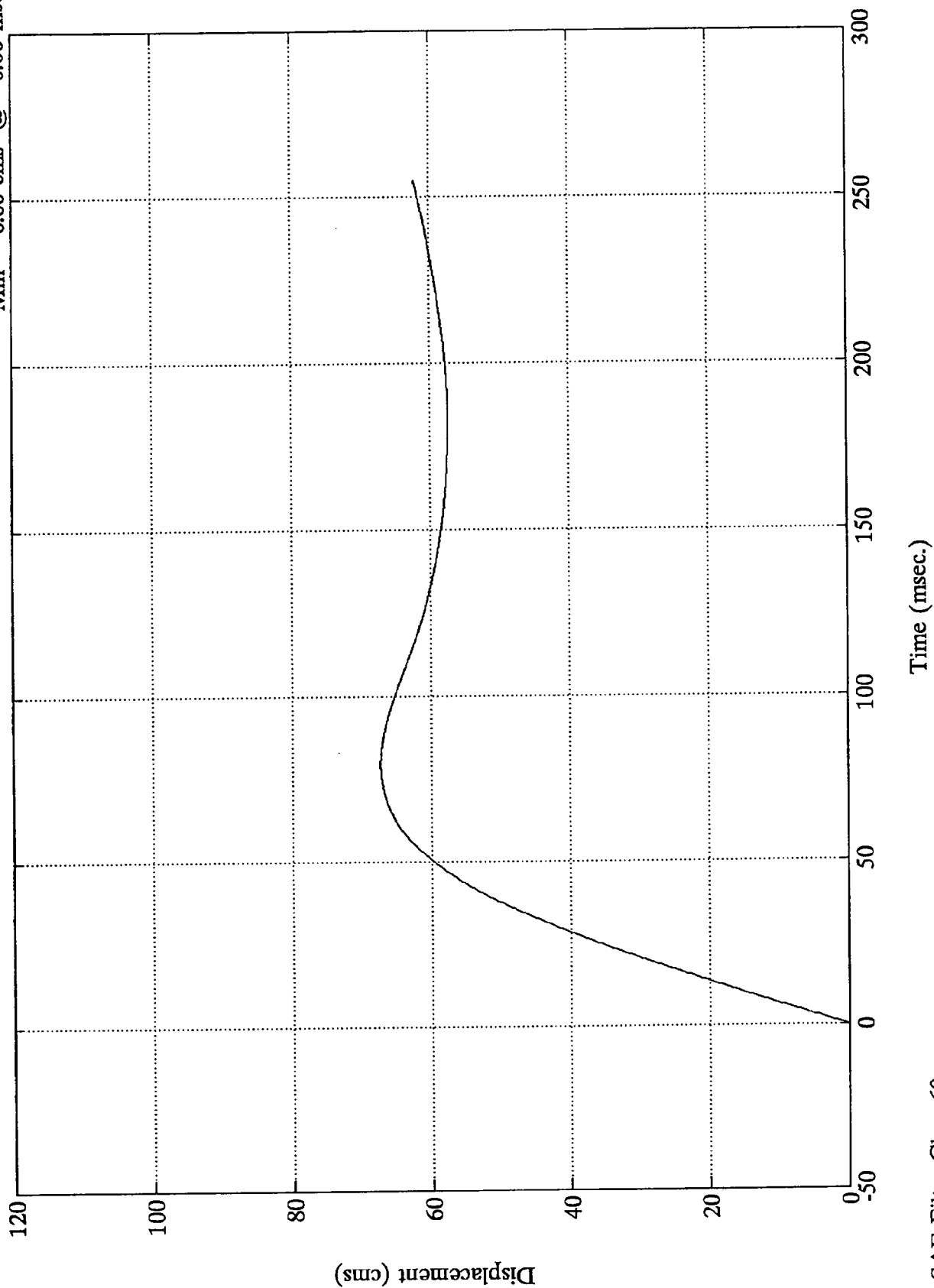


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Acc. #9(x)

Max = 67.34 cms @ 80.64 msec
Min = 0.00 cms @ -0.00 msec



SAE Filter Class 60

TEST NO. MP0300

LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

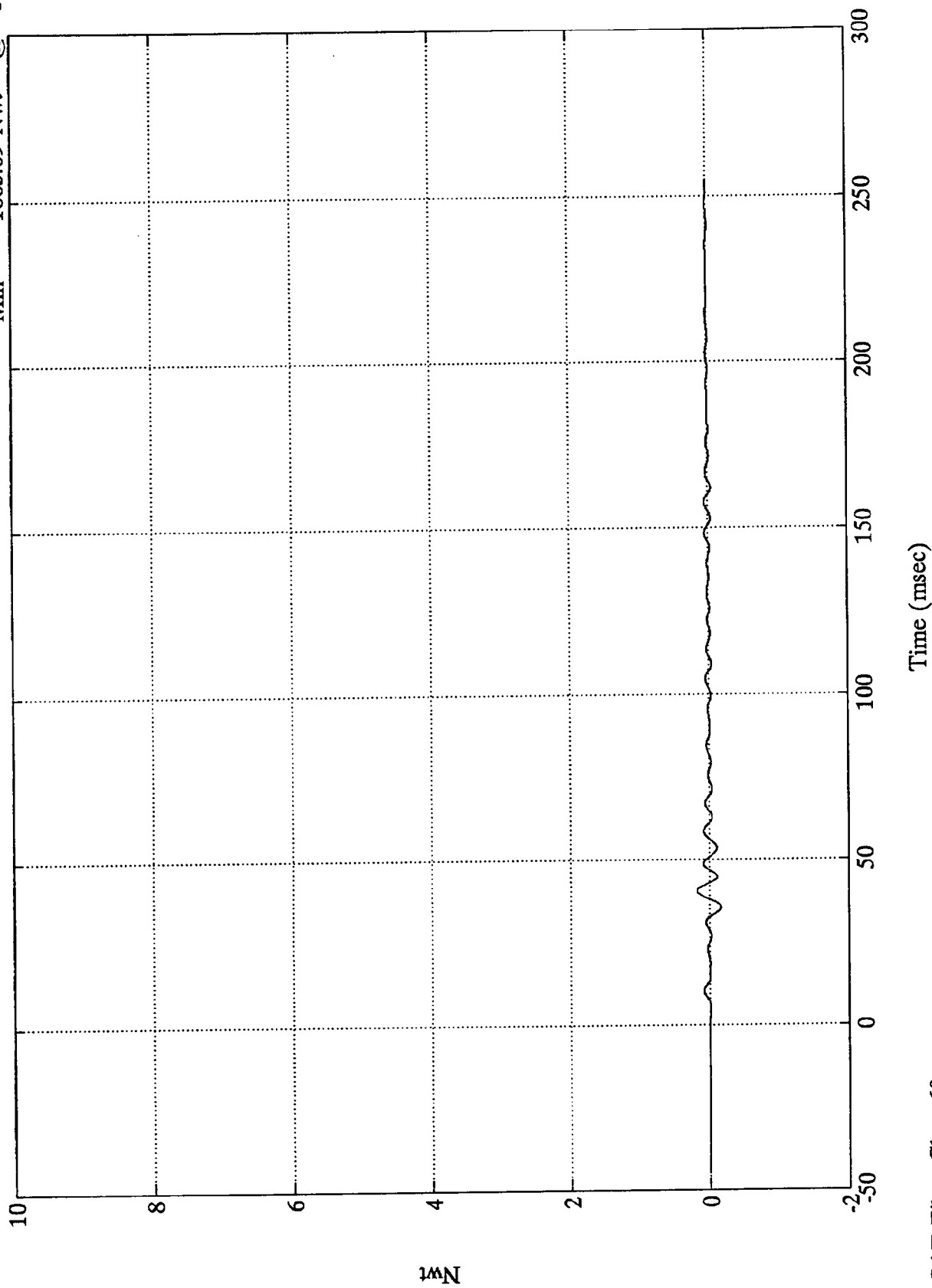
60

NCAP TEST #2 JEEP CHEROKEE

$\times 10^4$

Barrier Load Cell A1

Max = 1806.46 Nwt @ 40.56 msec
Min = -1665.09 Nwt @ 35.63 msec



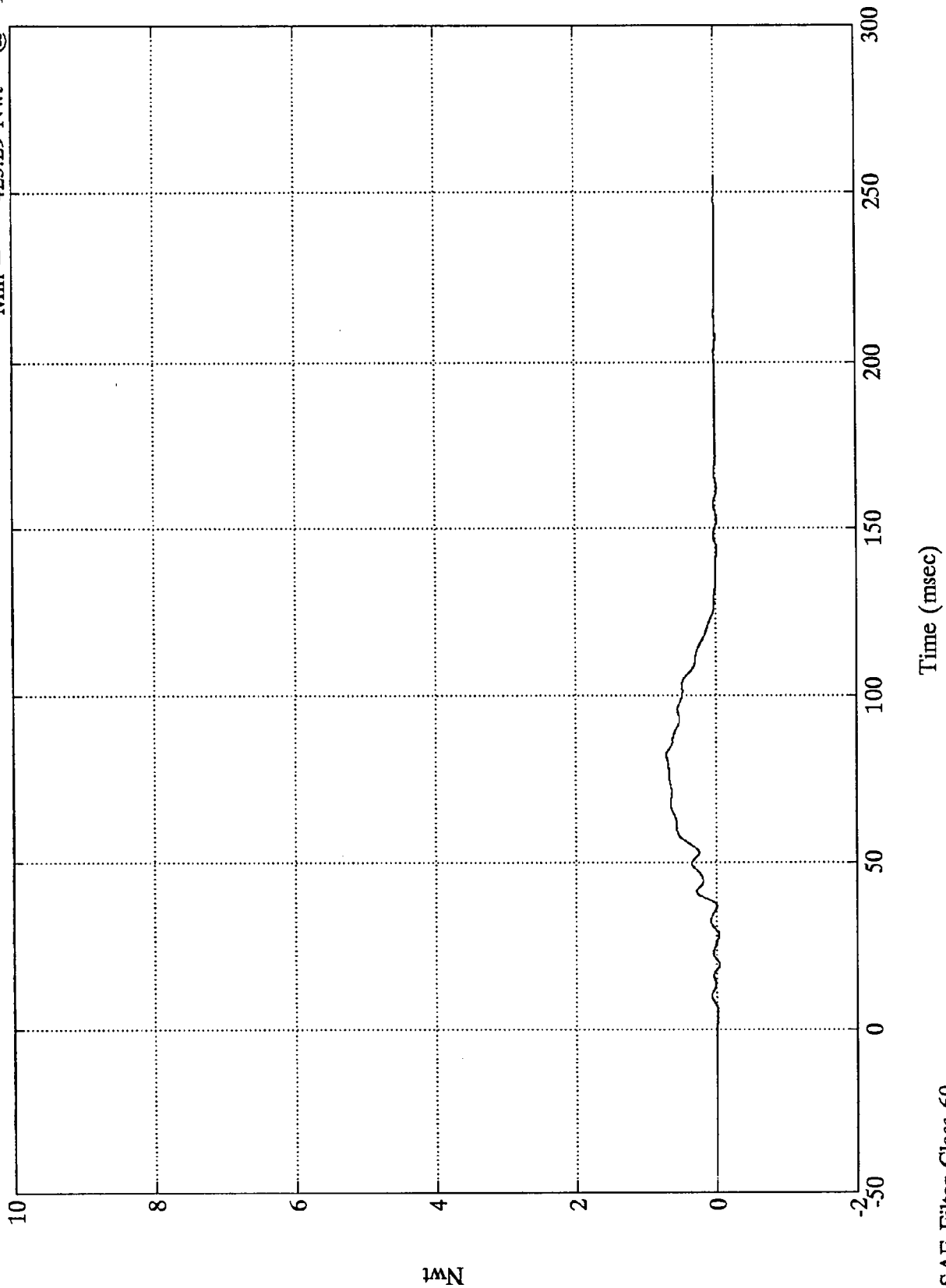
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 7120.79 Nwt @ 82.19 msec
 Min = -425.29 Nwt @ 19.31 msec

Barrier Load Cell A2

$\times 10^4$



Nwt

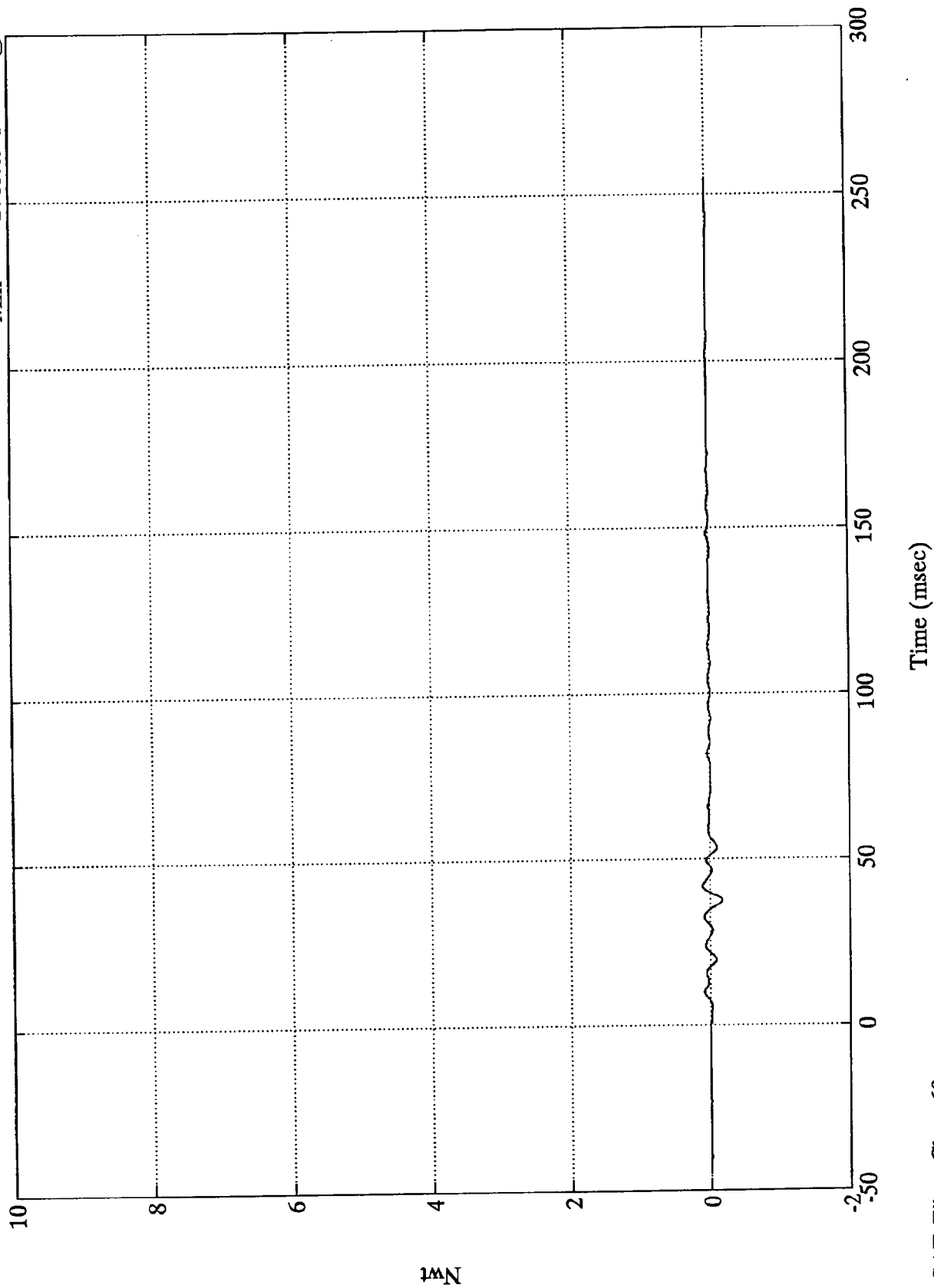
SAE Filter Class 60

Time (msec)

NCAP TEST #2 JEEP CHEROKEE

Barrier Load Cell A3

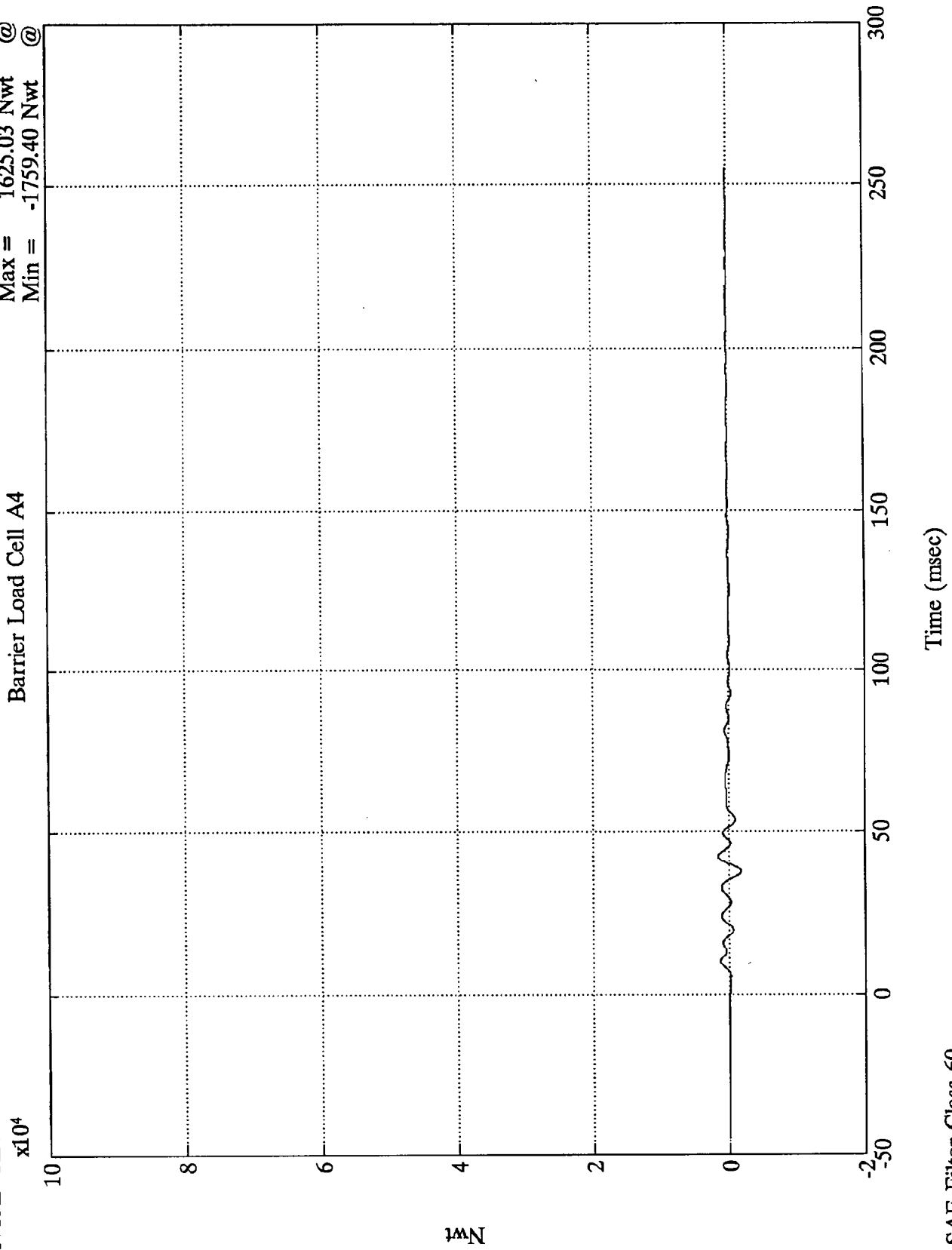
Max = 1080.58 Nwt @ 41.63 msec
 Min = -1763.09 Nwt @ 37.44 msec



SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Barrier Load Cell A4
 Max = 1625.03 Nwt @ 42.00 msec
 Min = -1759.40 Nwt @ 37.56 msec

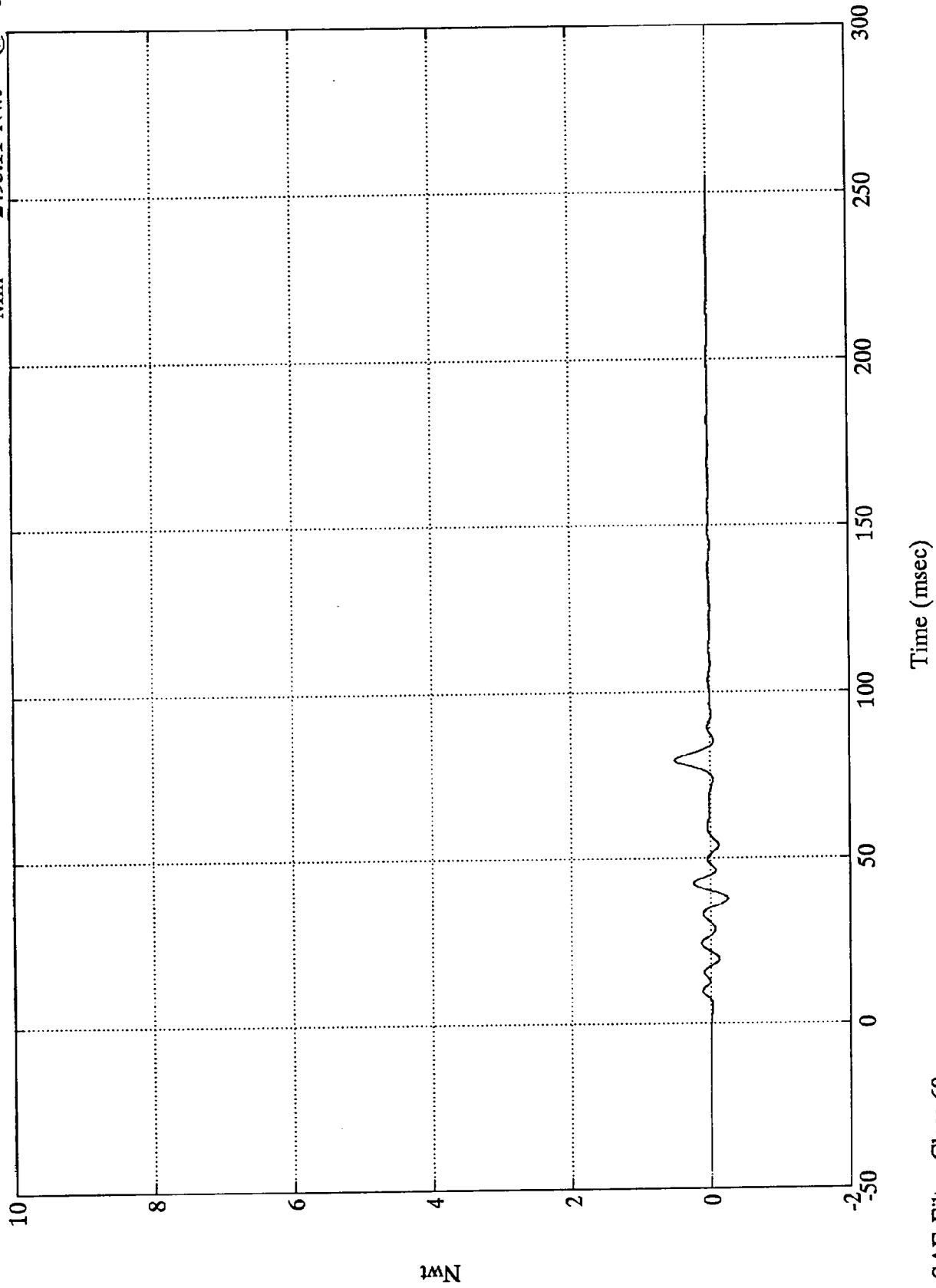


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Barrier Load Cell A5

Max = 5062.74 Nwt @ 79.19 msec
Min = -2495.11 Nwt @ 37.68 msec



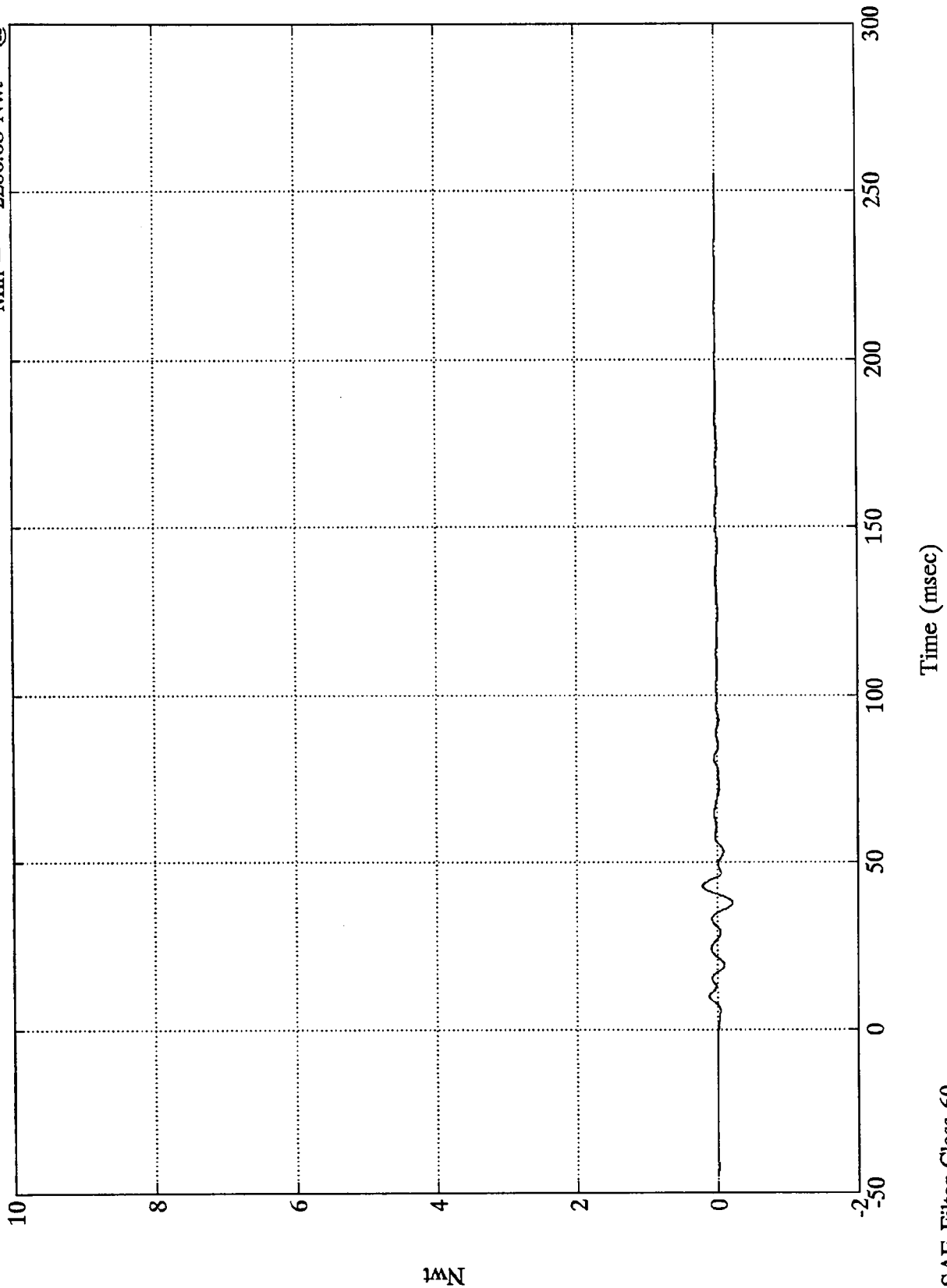
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 2121.14 Nwt @ 42.72 msec
 Min = -2200.08 Nwt @ 37.68 msec

Barrier Load Cell A6

$\times 10^4$



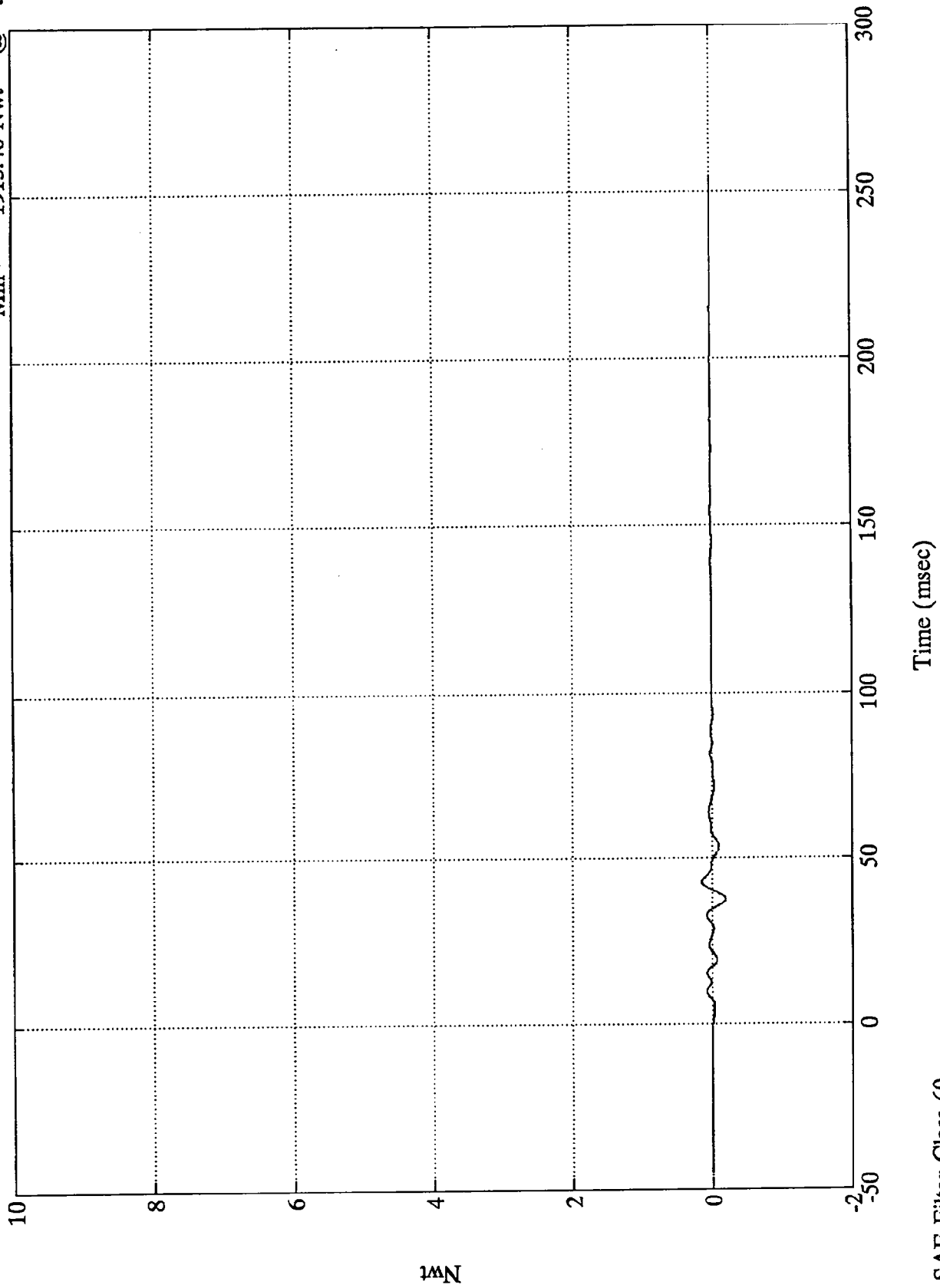
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

$\times 10^4$

Barrier Load Cell A7

Max = 1509.51 Nwt @ 42.72 msec
Min = -1913.40 Nwt @ 37.44 msec



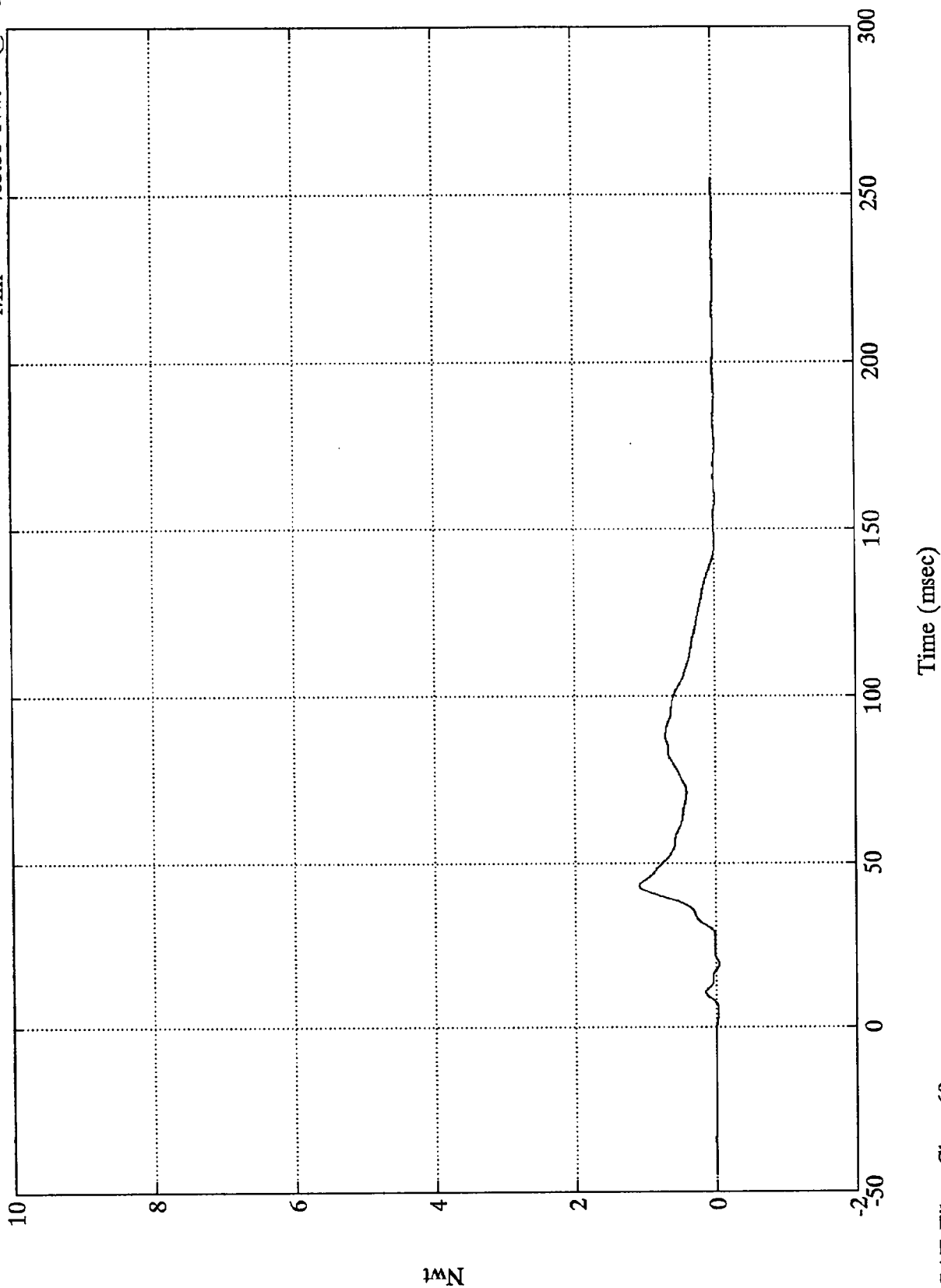
15N

NCAP TEST #2 JEEP CHEROKEE

Max = 10873.97 Nwt @ 43.08 msec
 Min = -403.35 Nwt @ 18.95 msec

Barrier Load Cell A8

$\times 10^4$



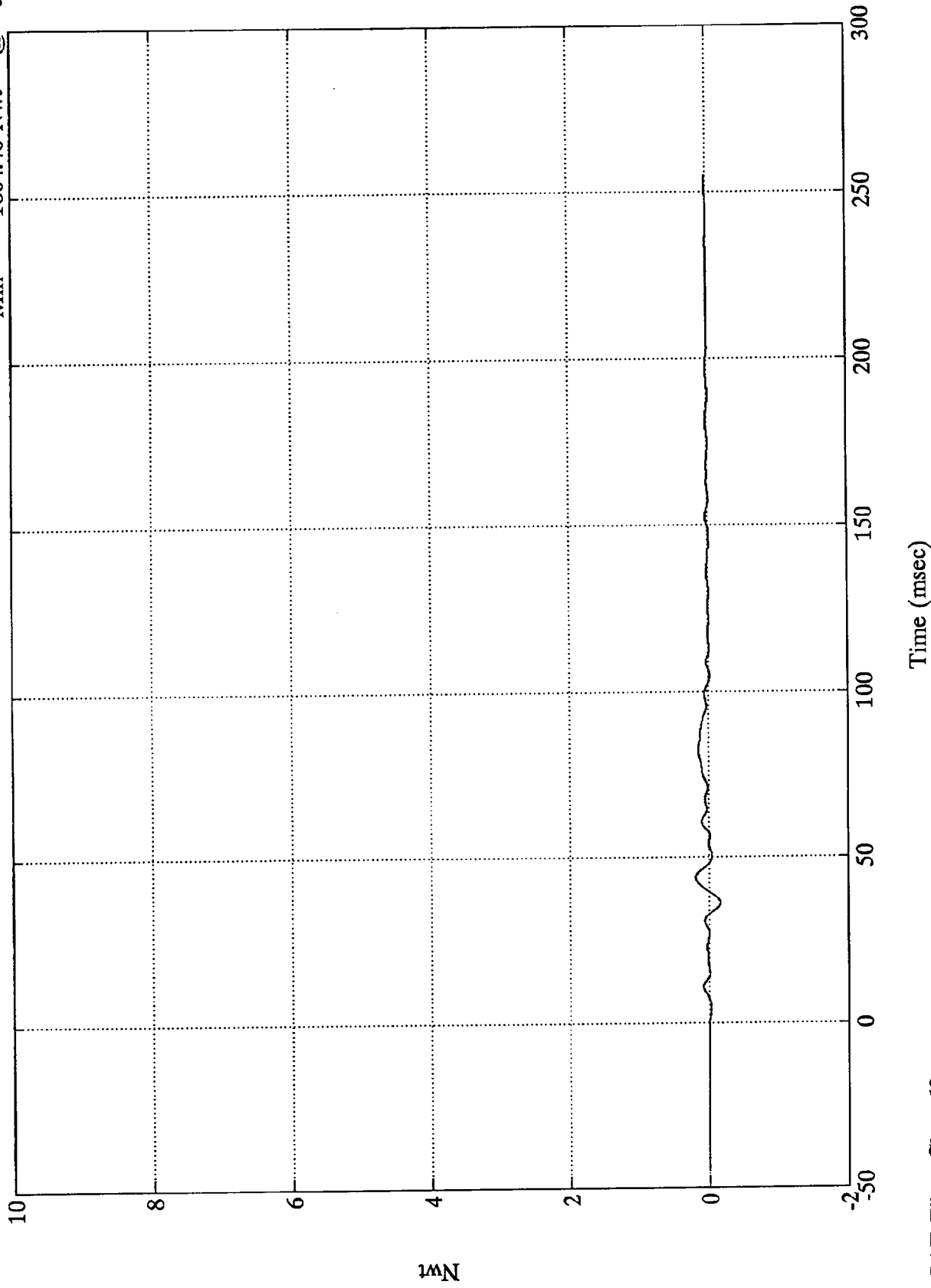
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

$\times 10^4$

Barrier Load Cell A9

Max = 1901.62 Nwt @ 43.79 msec
Min = -1604.46 Nwt @ 35.88 msec

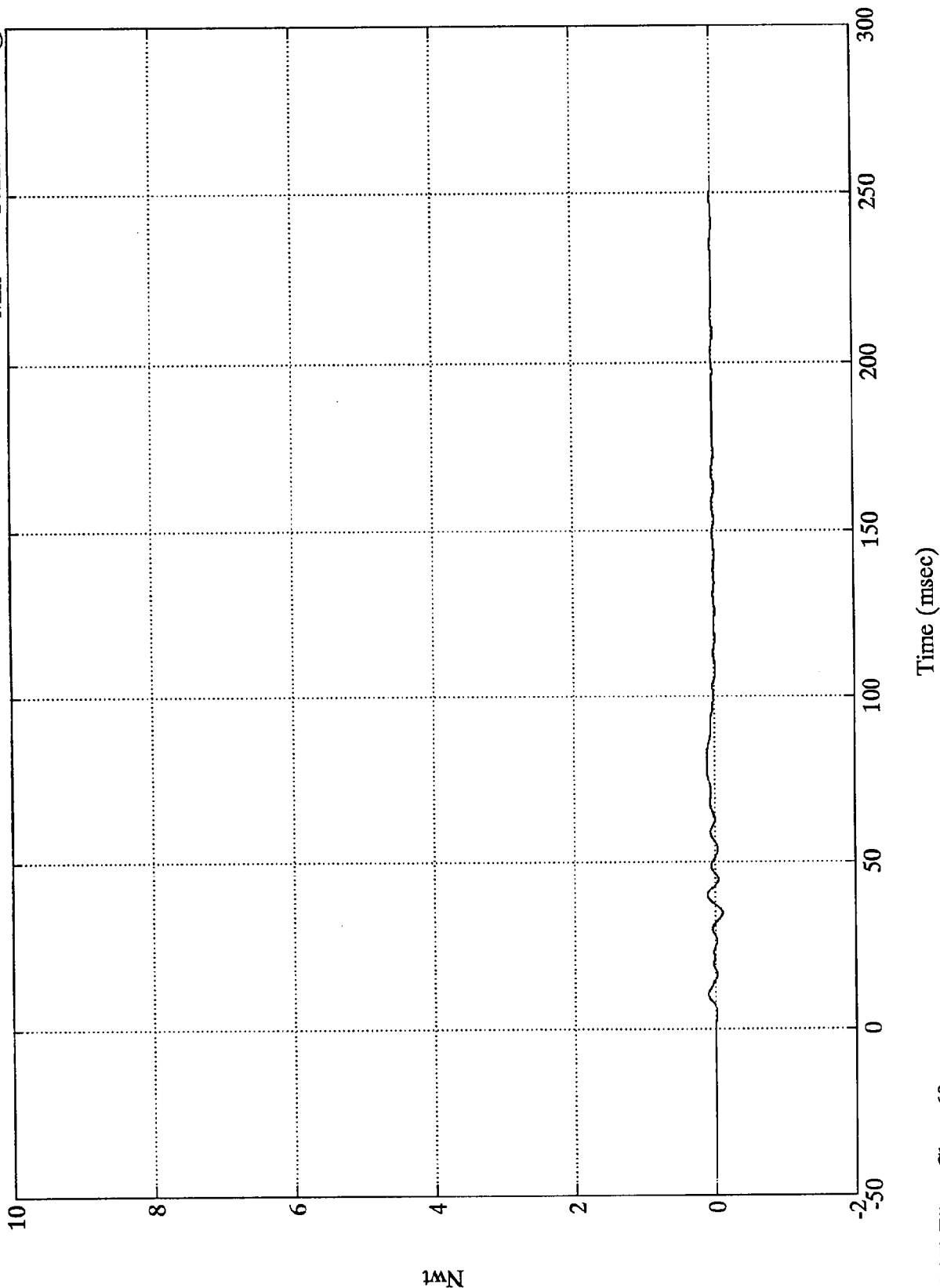


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE
x10⁴

Barrier Load Cell B1

Max = 1125.94 Nwt @ 78.12 msec
Min = -1022.76 Nwt @ 34.55 msec



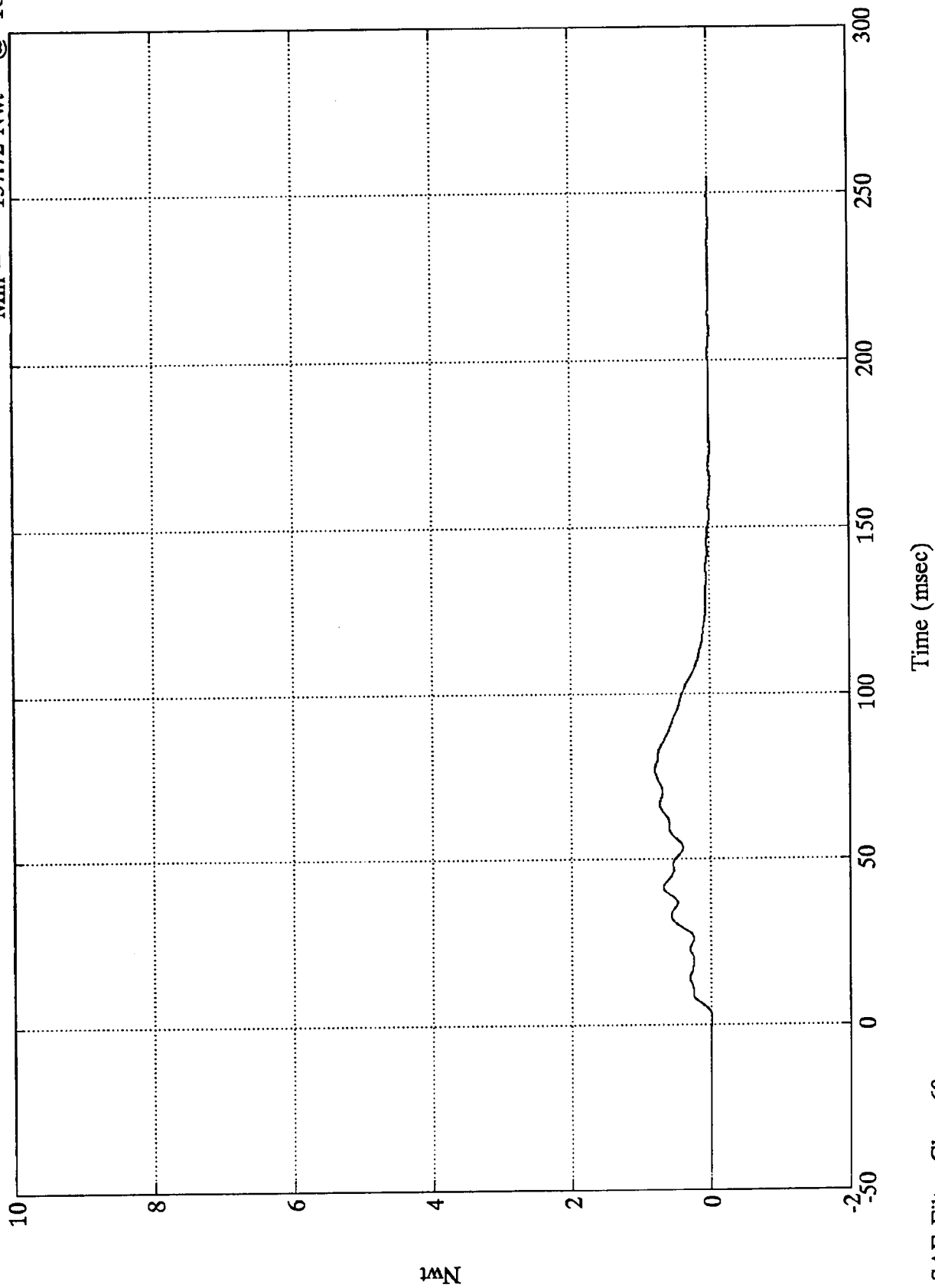
1N

NCAP TEST #2 JEEP CHEROKEE

$\times 10^4$

Barrier Load Cell B2

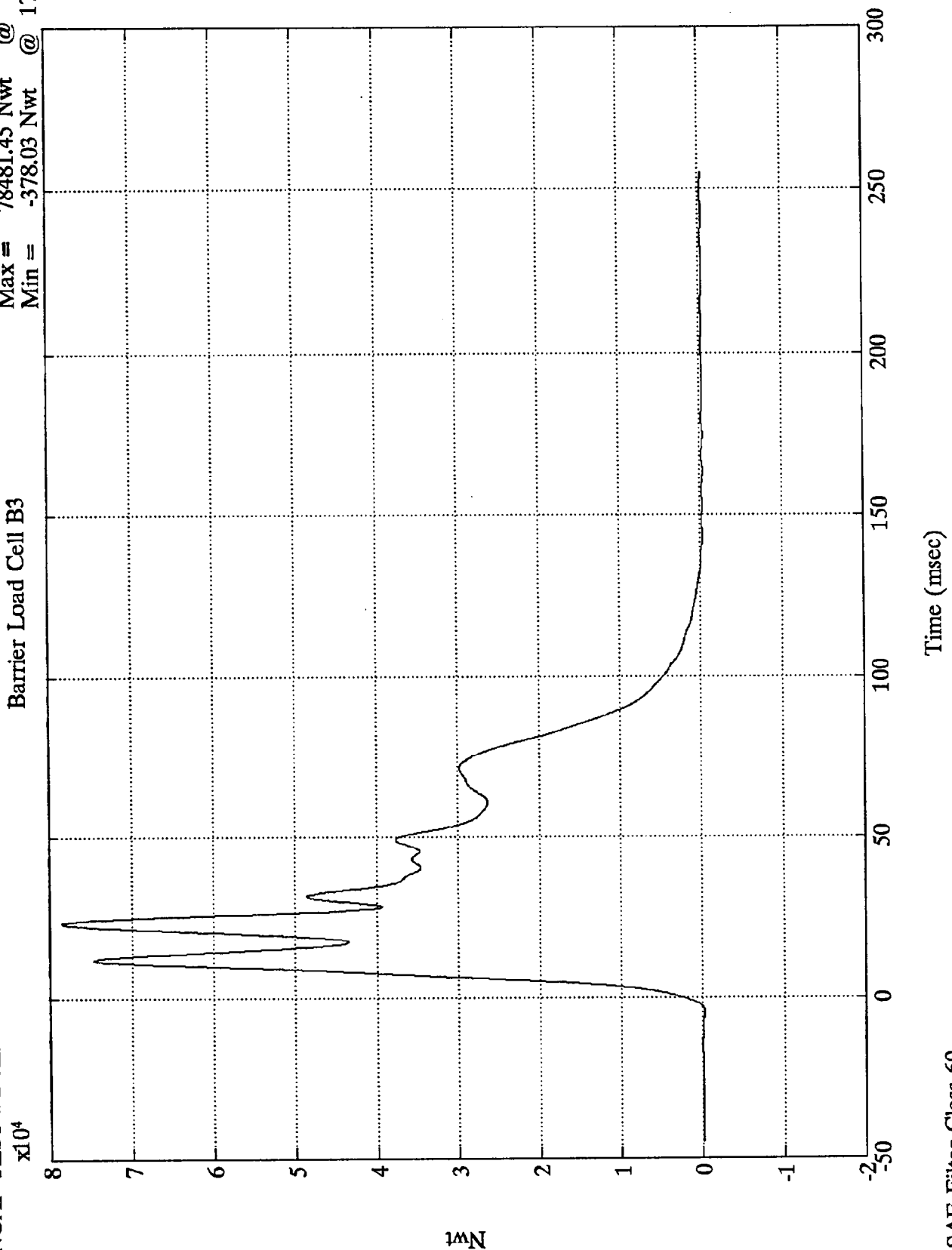
Max = 7927.56 Nwt @ 76.92 msec
Min = -137.72 Nwt @ 163.55 msec



SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Barrier Load Cell B3
 Max = 78481.45 Nwt @ 23.15 msec
 Min = -378.03 Nwt @ 174.60 msec

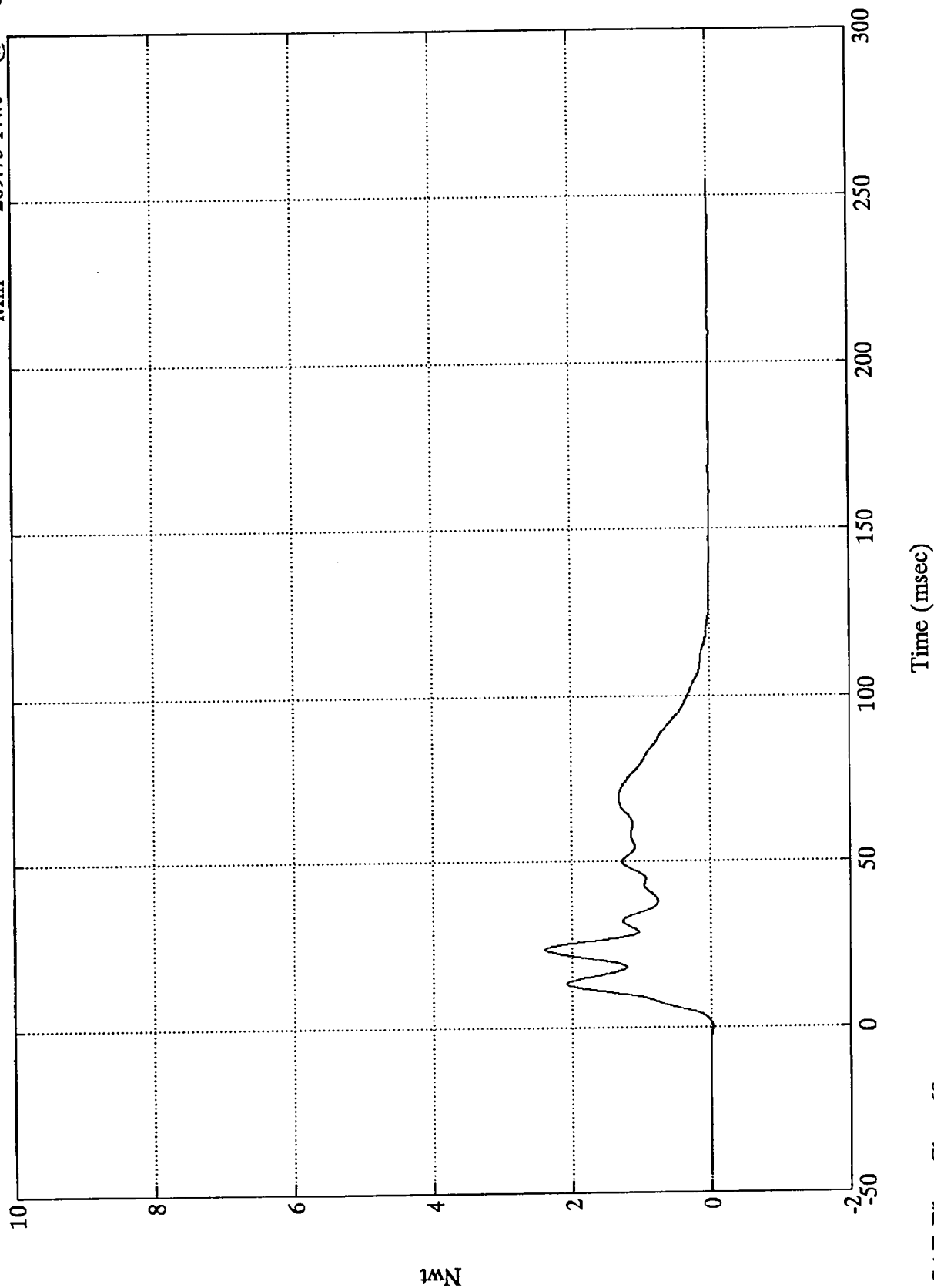


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Barrier Load Cell B4

Max = 23877.53 Nwt @ 23.28 msec
 Min = -209.75 Nwt @ -0.12 msec



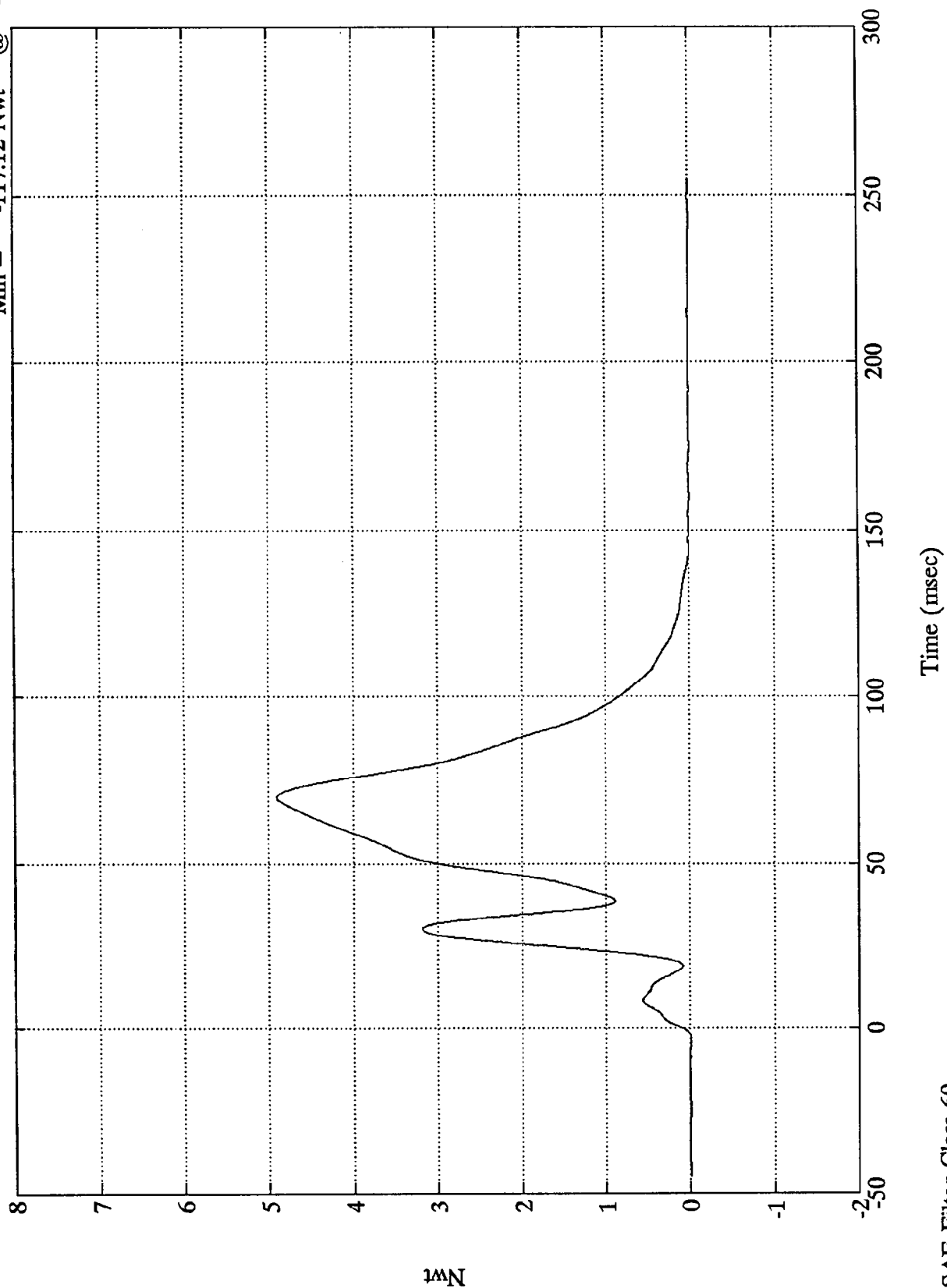
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 49036.45 Nwt @ 70.08 msec
 Min = -117.12 Nwt @ -3.36 msec

Barrier Load Cell B5

x10⁴

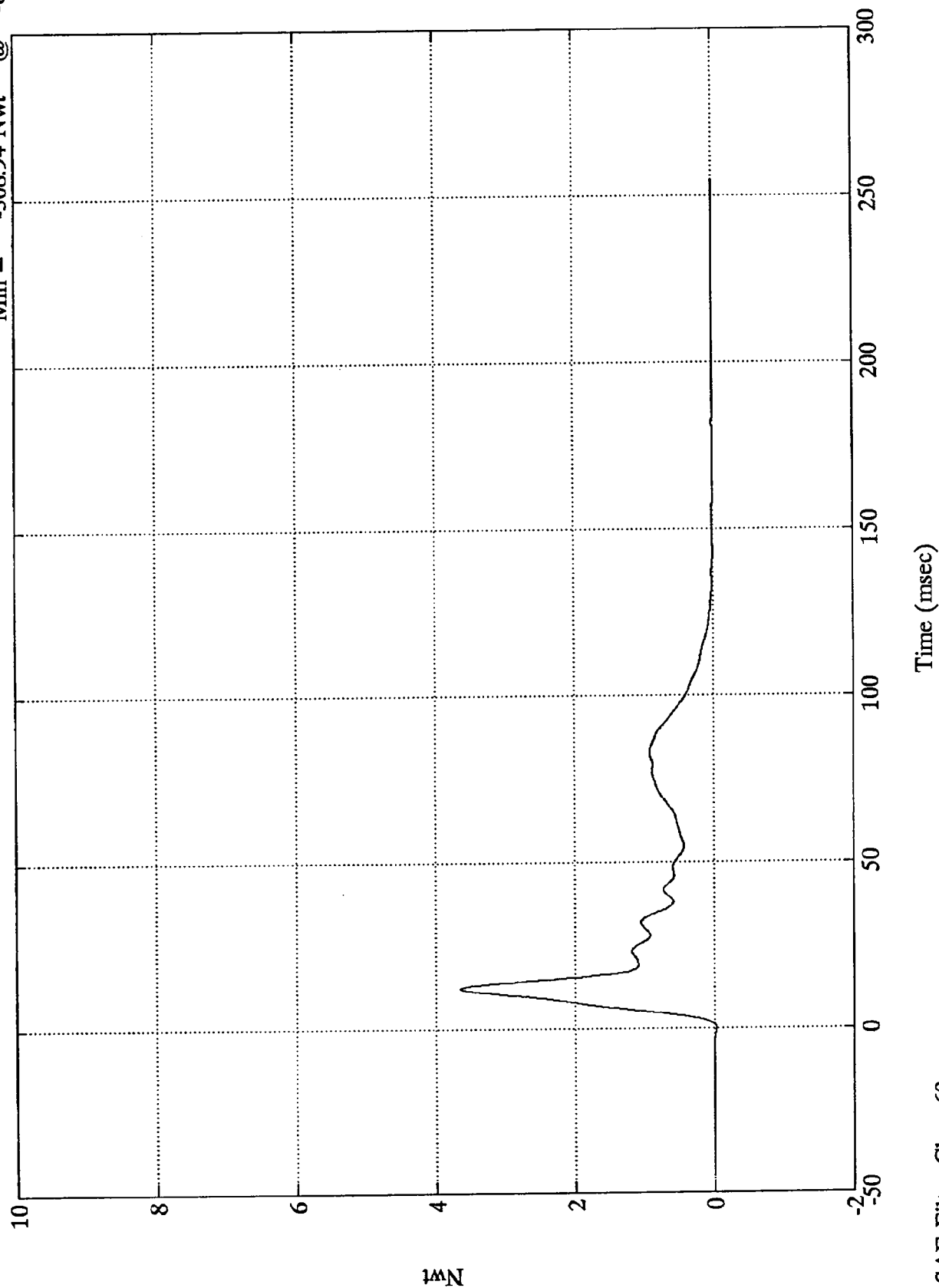


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Barrier Load Cell B6

Max = 36546.29 Nwt @ 12.23 msec
 Min = -308.94 Nwt @ -0.12 msec



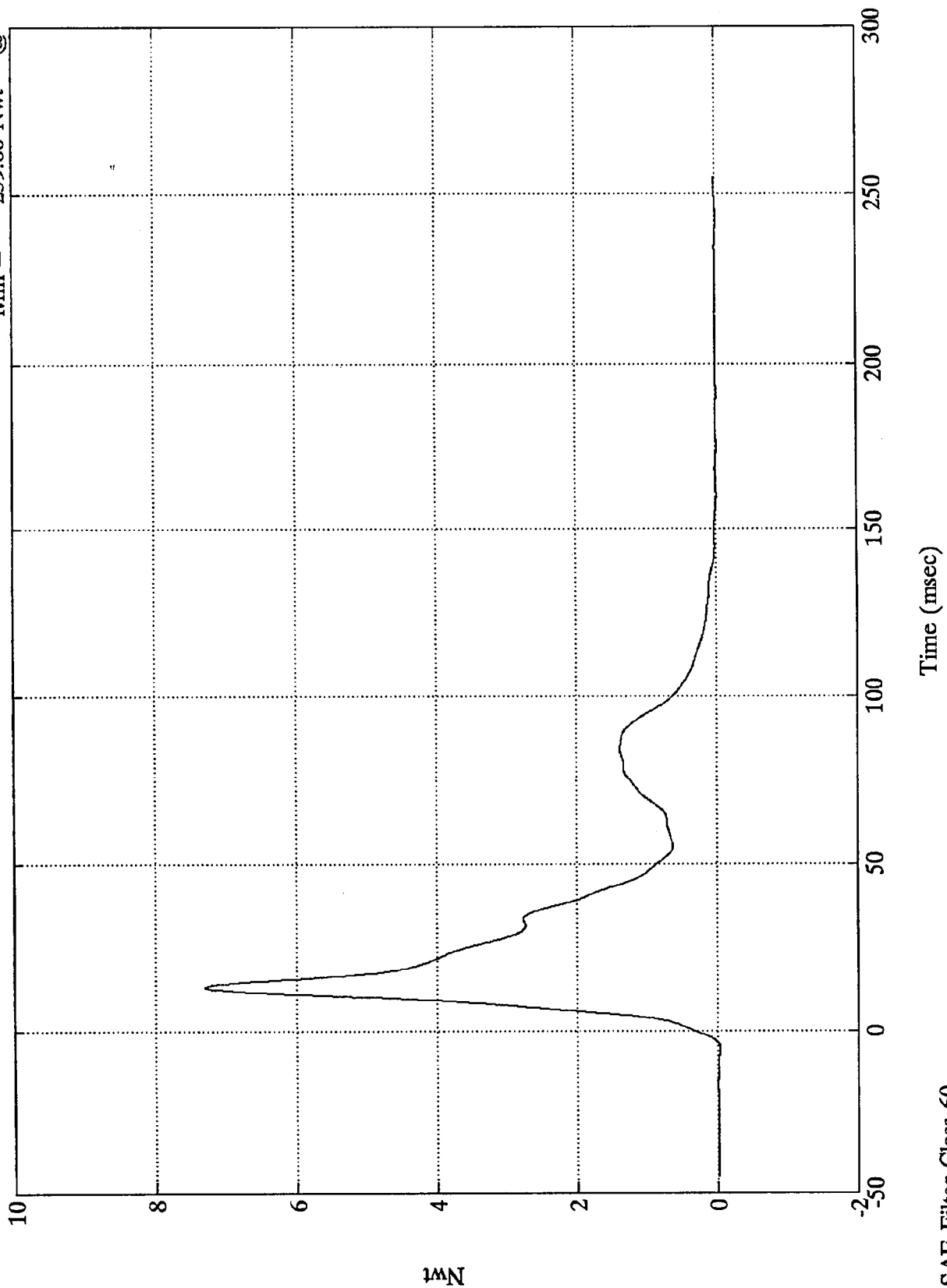
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 73039.77 Nwt @ 13.07 msec
 Min = -259.60 Nwt @ -5.16 msec

Barrier Load Cell B7

$\times 10^4$

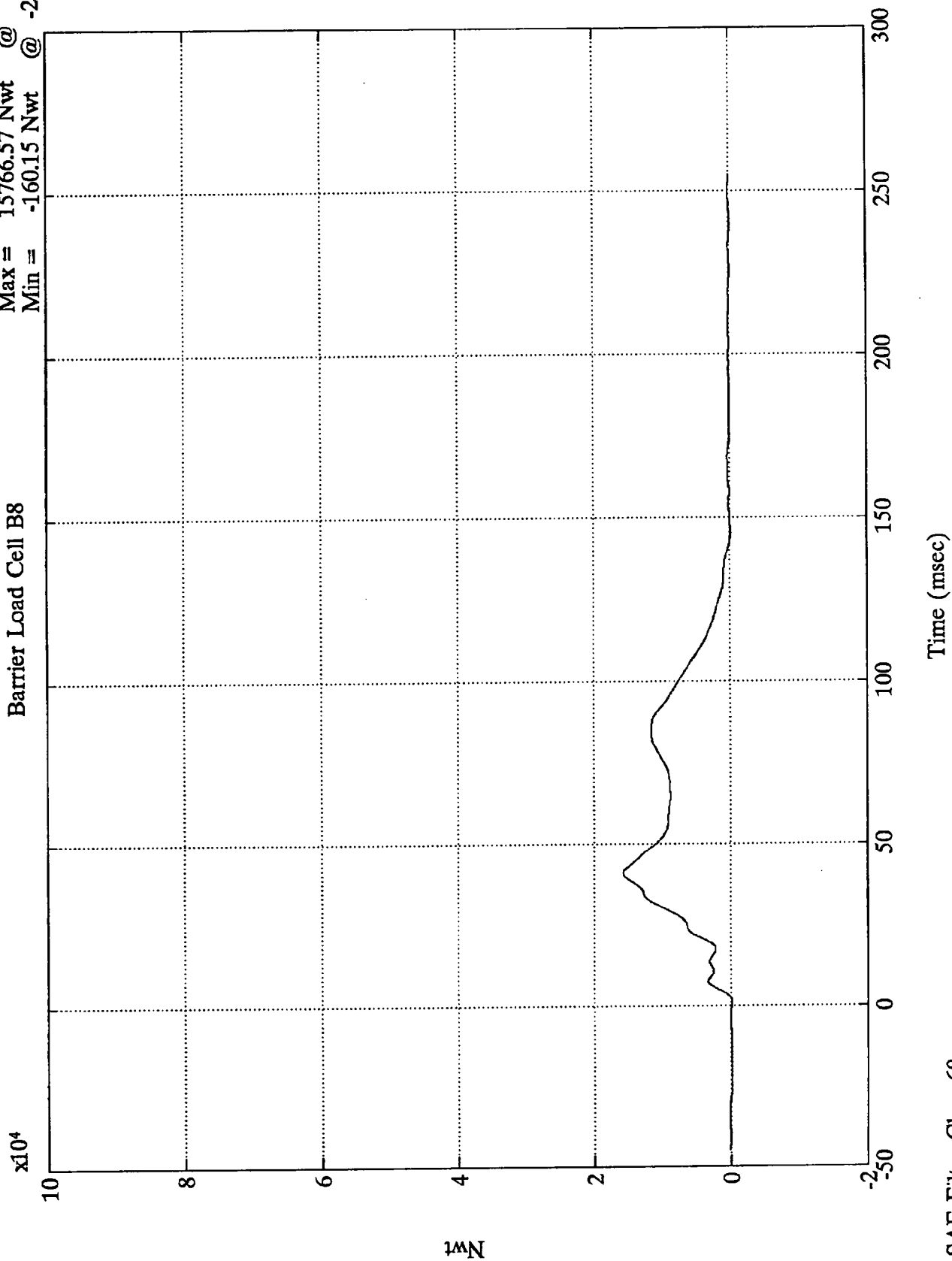


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Barrier Load Cell B8

Max = 15766.57 Nwt @ 41.04 msec
Min = -160.15 Nwt @ -23.40 msec



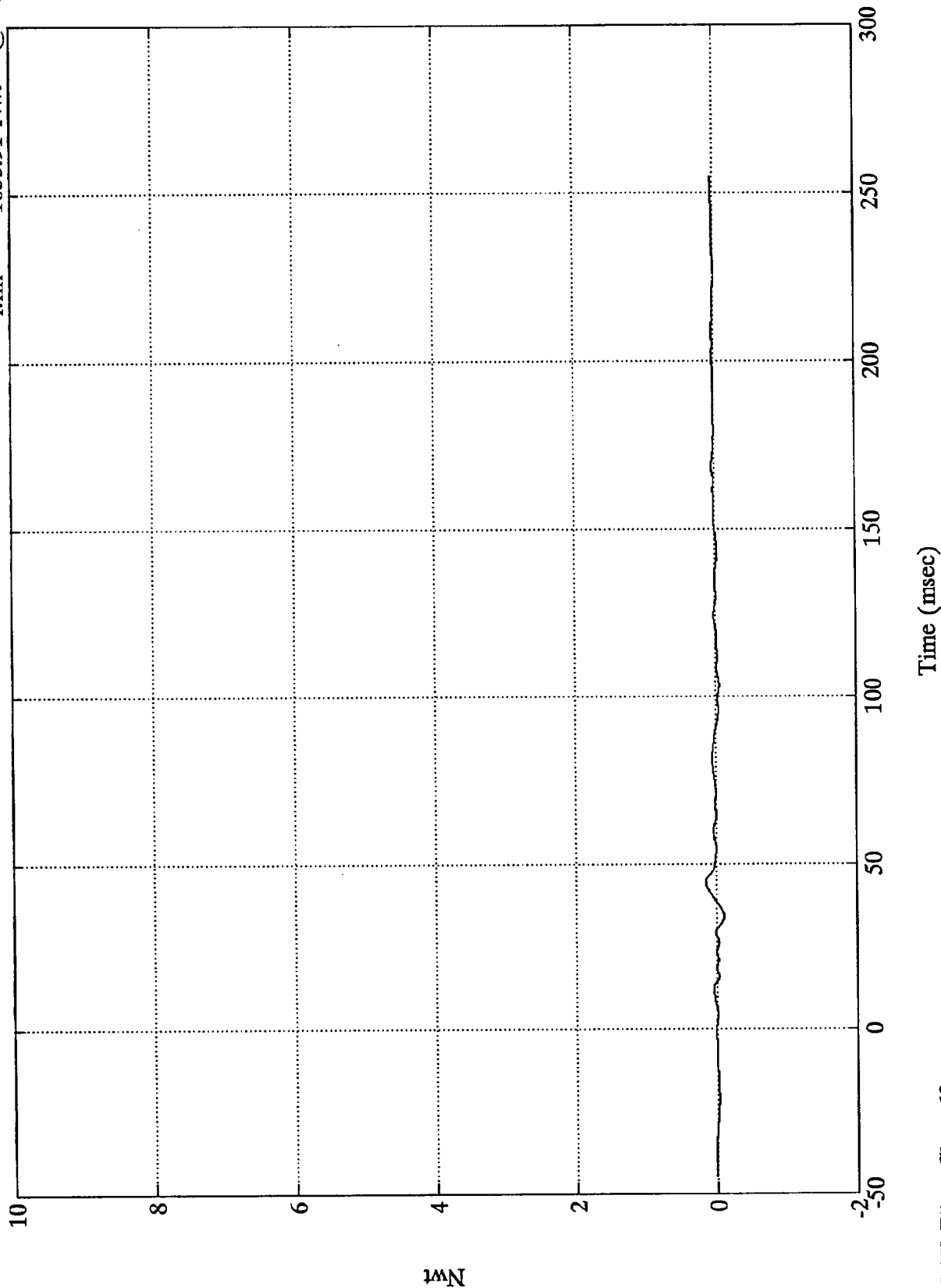
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Barrier Load Cell B9

Max = 1496.58 Nwt @ 44.39 msec
Min = -1053.91 Nwt @ 34.20 msec

x10⁴



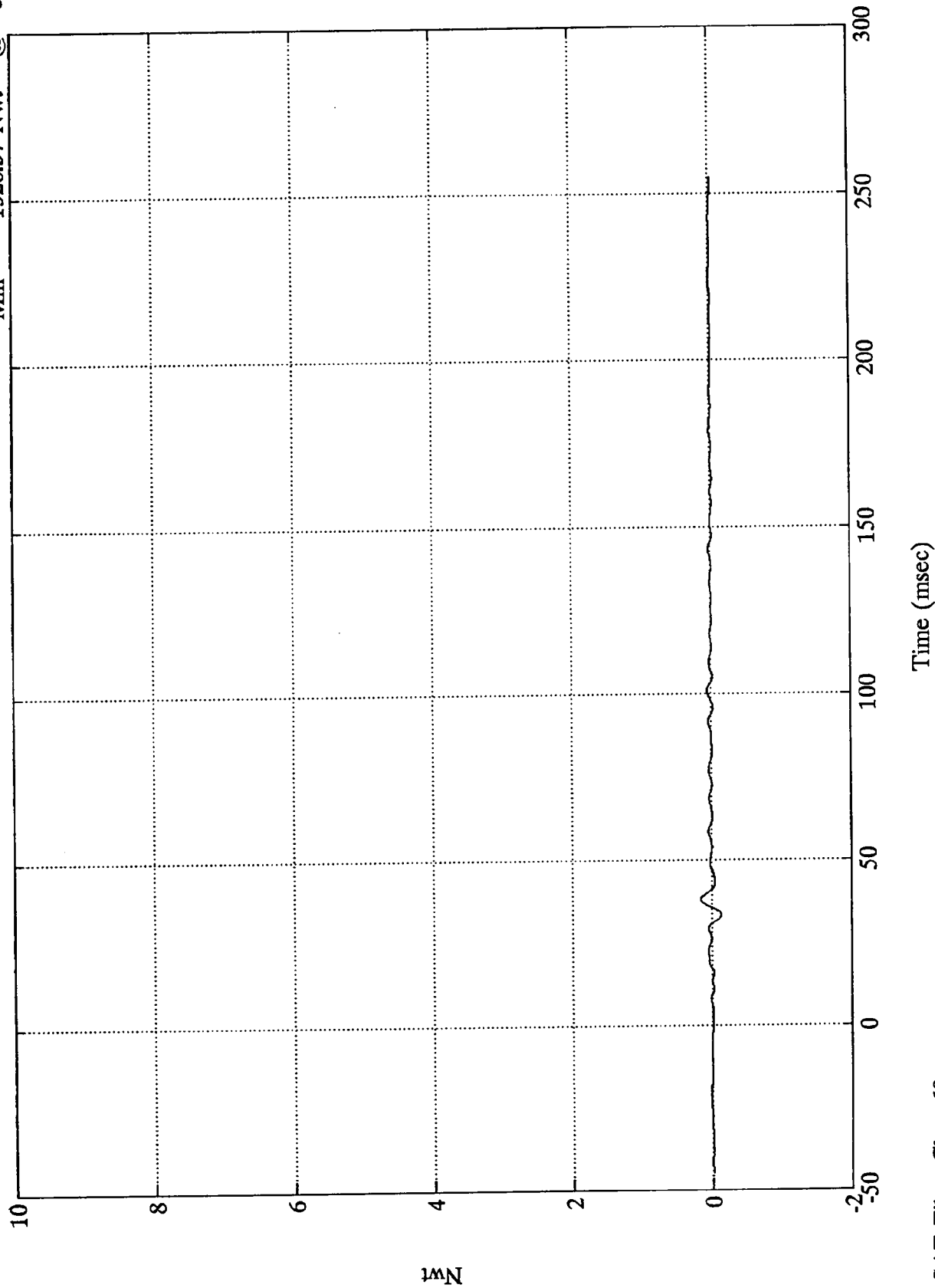
Nwt

SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 1611.93 Nwt @ 37.92 msec
 Min = -1326.37 Nwt @ 33.24 msec

Barrier Load Cell C1



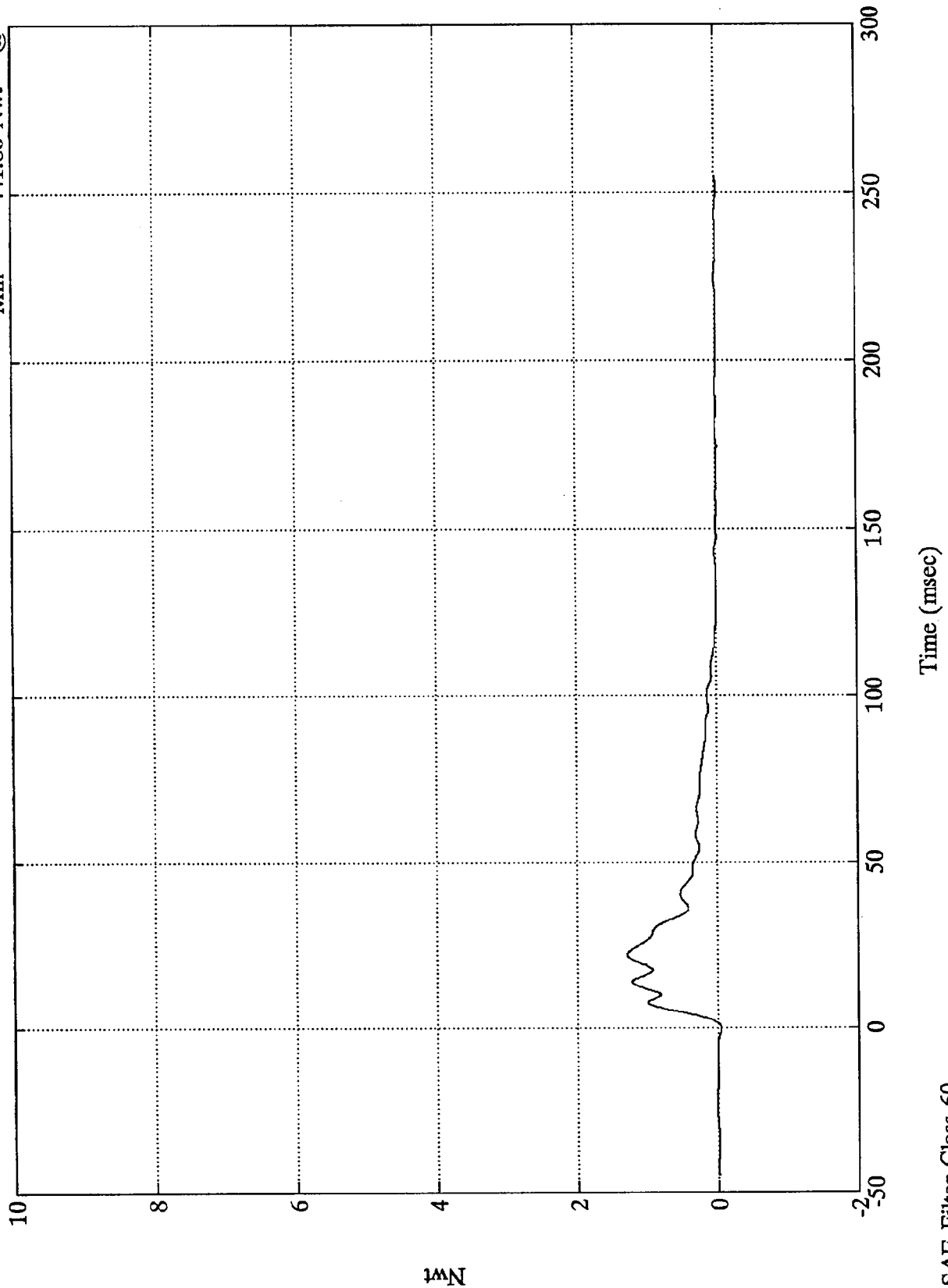
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Barrier Load Cell C2

Max = 12917.64 Nwt @ 22.19 msec
Min = -441.86 Nwt @ -0.36 msec

x10⁴

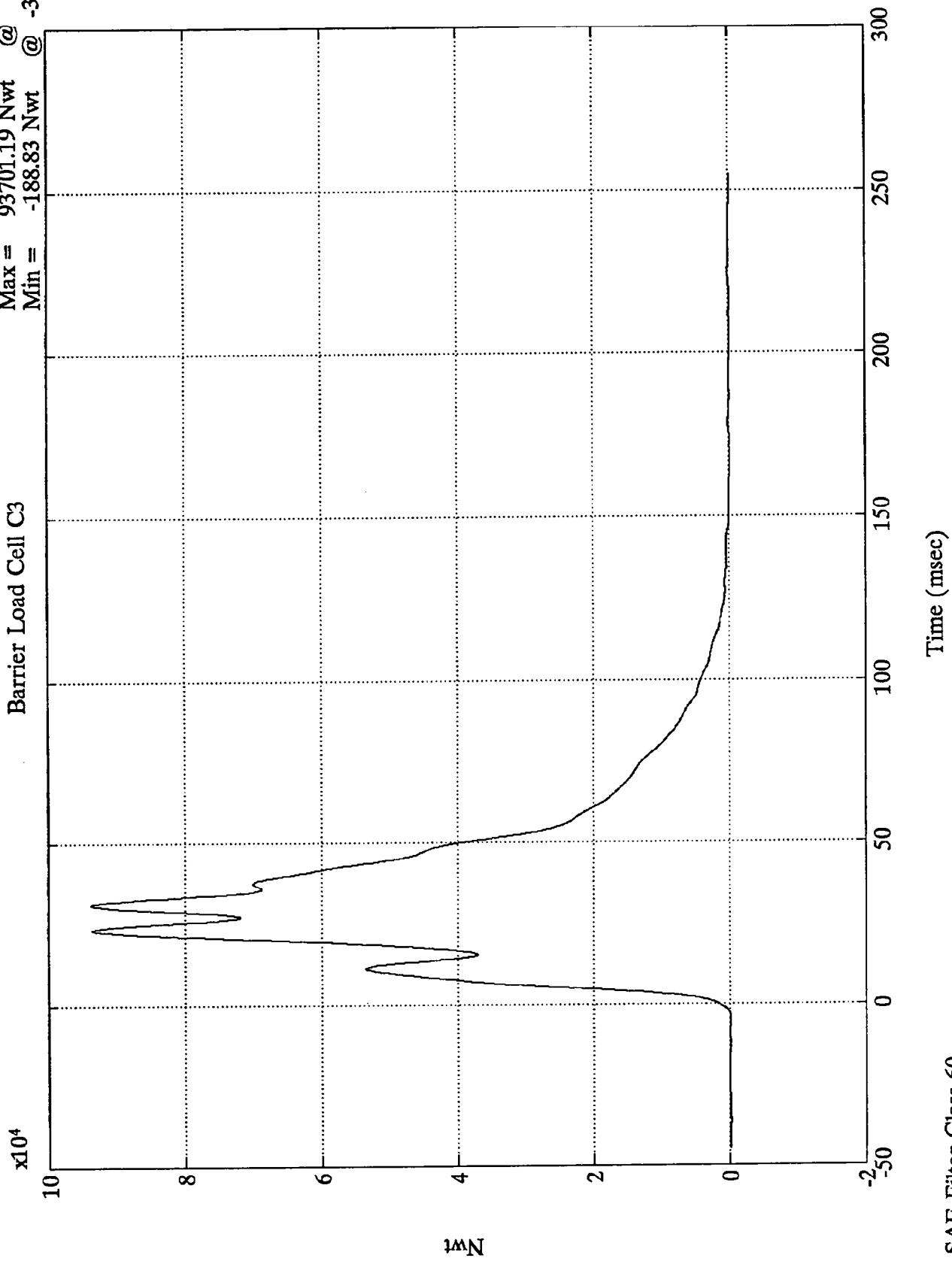


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Barrier Load Cell C3

Max = 93701.19 Nwt @ 30.95 msec
Min = -188.83 Nwt @ -36.24 msec

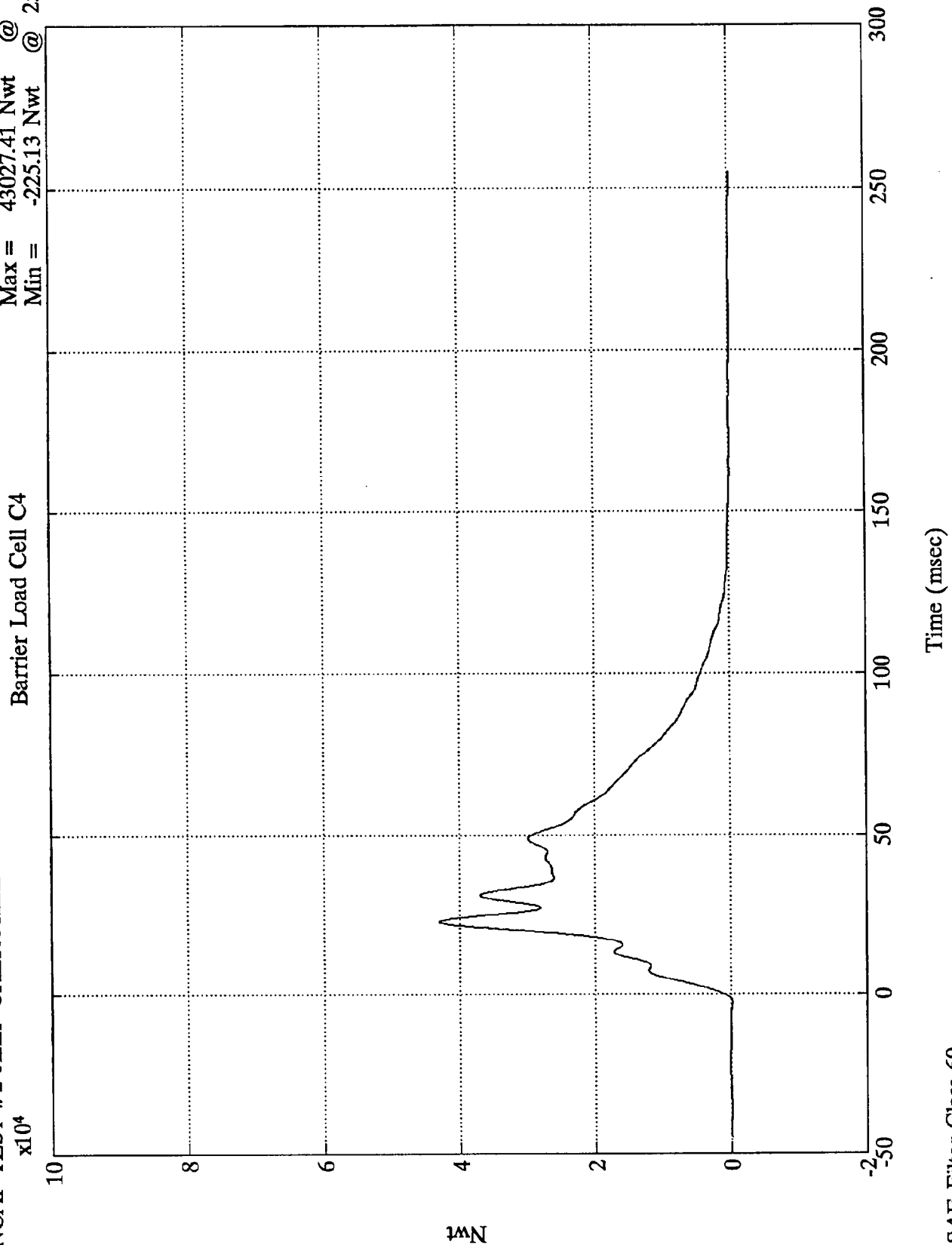


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 43027.41 Nwt @ 22.92 msec
 Min = -225.13 Nwt @ 250.91 msec

Barrier Load Cell C4

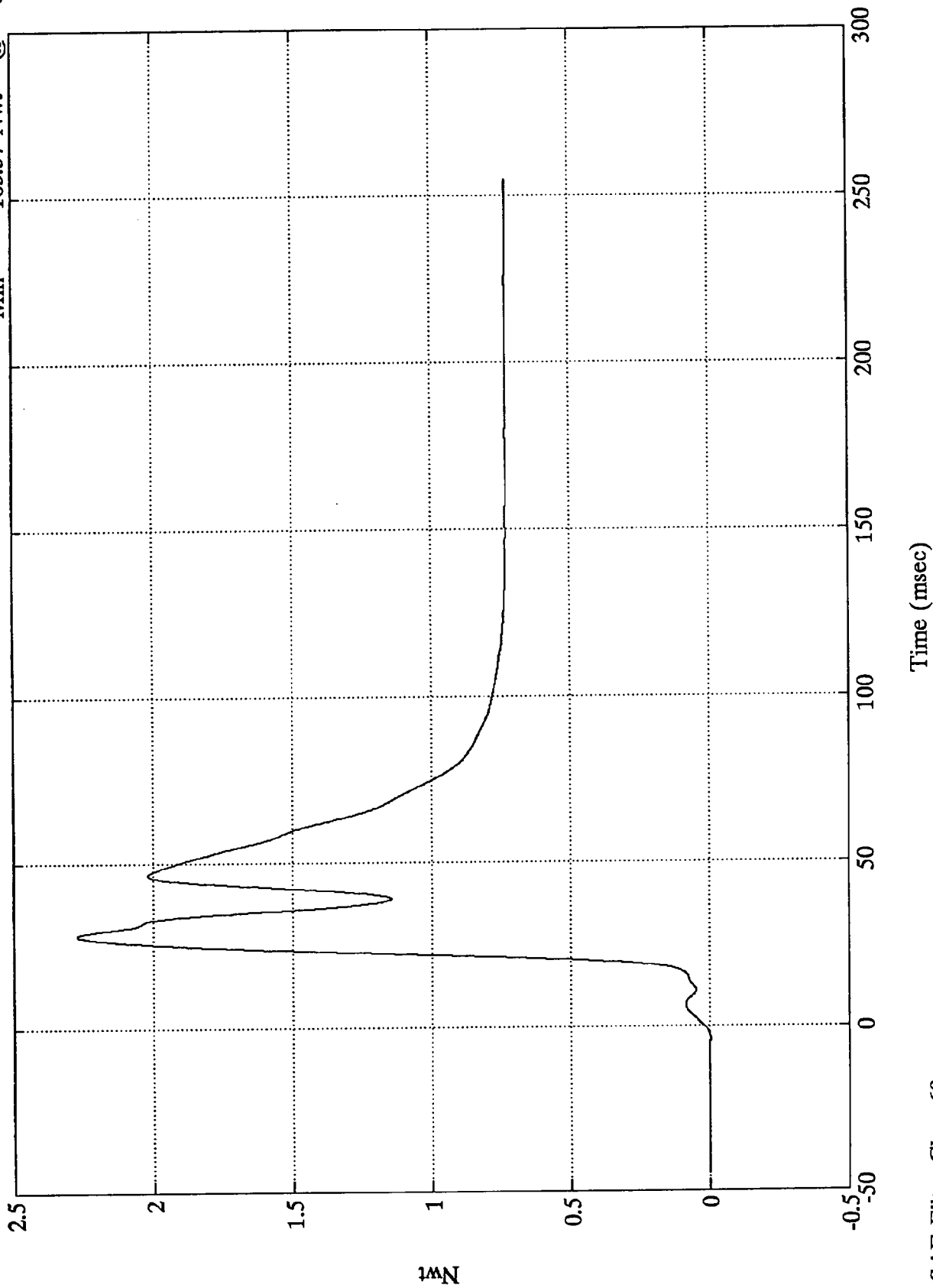


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Barrier Load Cell C5

Max = 227280.39 Nwt @ 27.96 msec
Min = -163.57 Nwt @ -3.84 msec



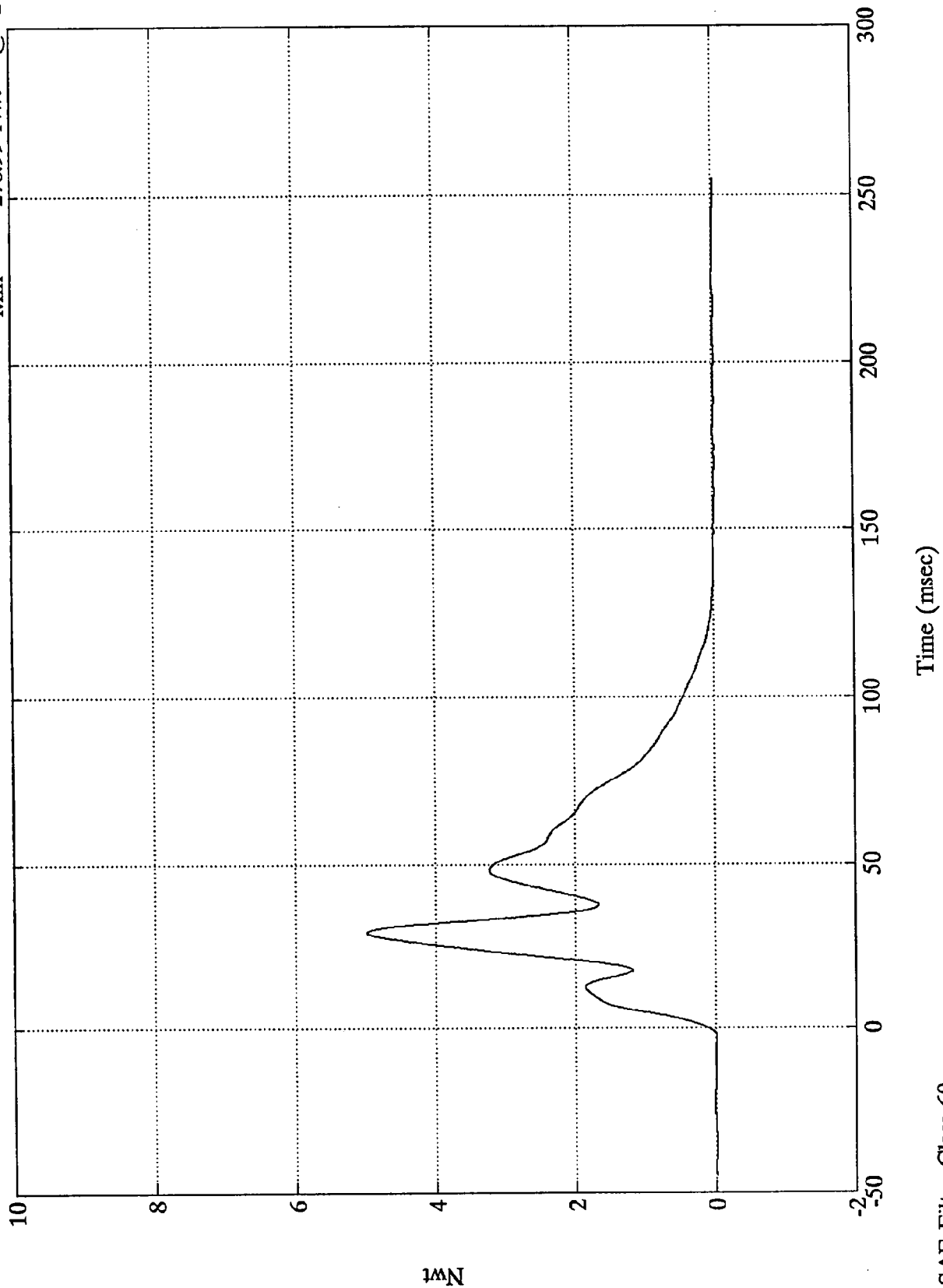
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

$\times 10^4$

Max = 49832.27 Nwt @ 29.39 msec
Min = -278.99 Nwt @ 201.72 msec

Barrier Load Cell C6



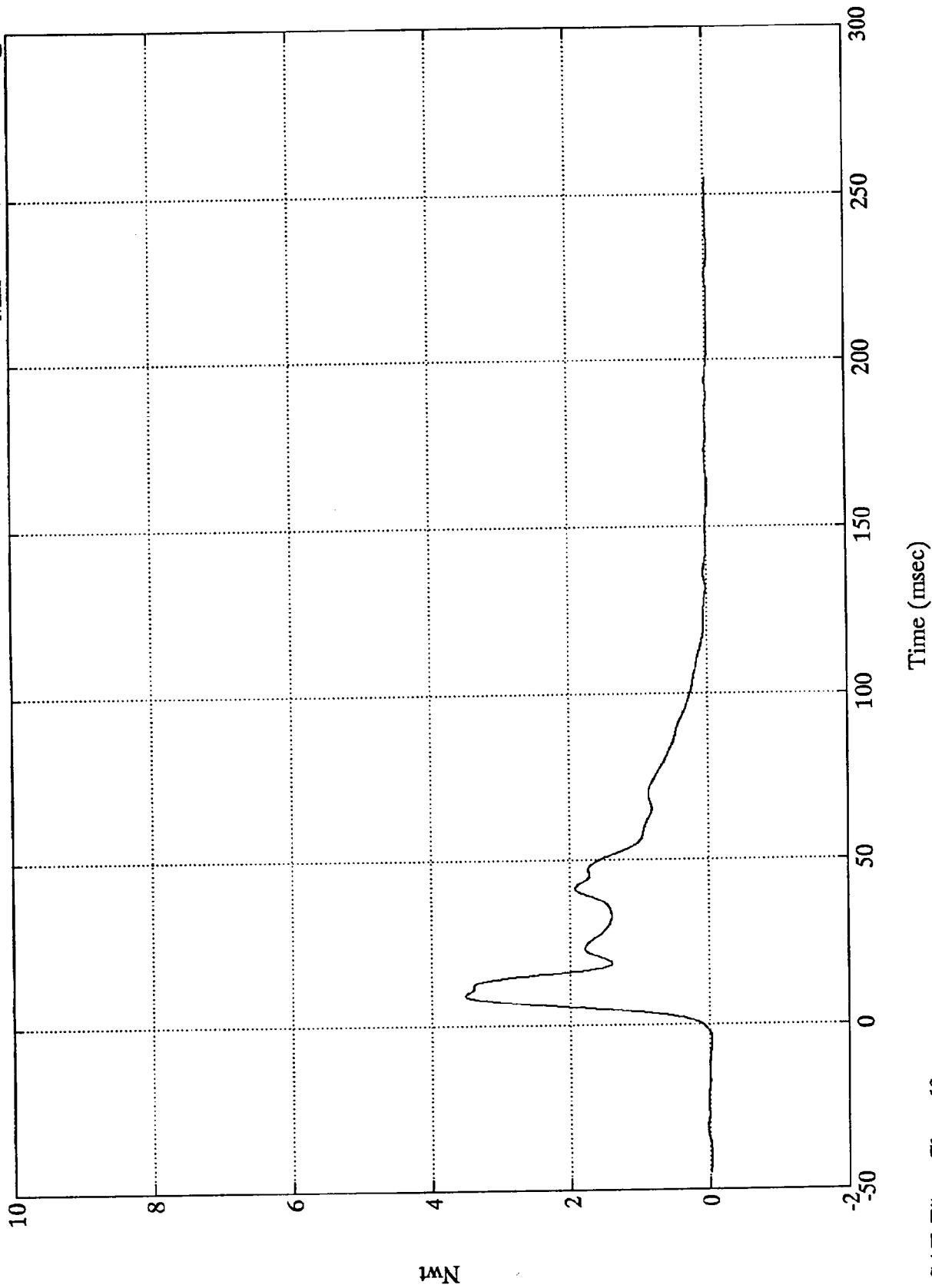
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

$\times 10^4$

Barrier Load Cell C7

Max = 35133.36 Nwt @ 9.23 msec
Min = -403.50 Nwt @ 232.92 msec



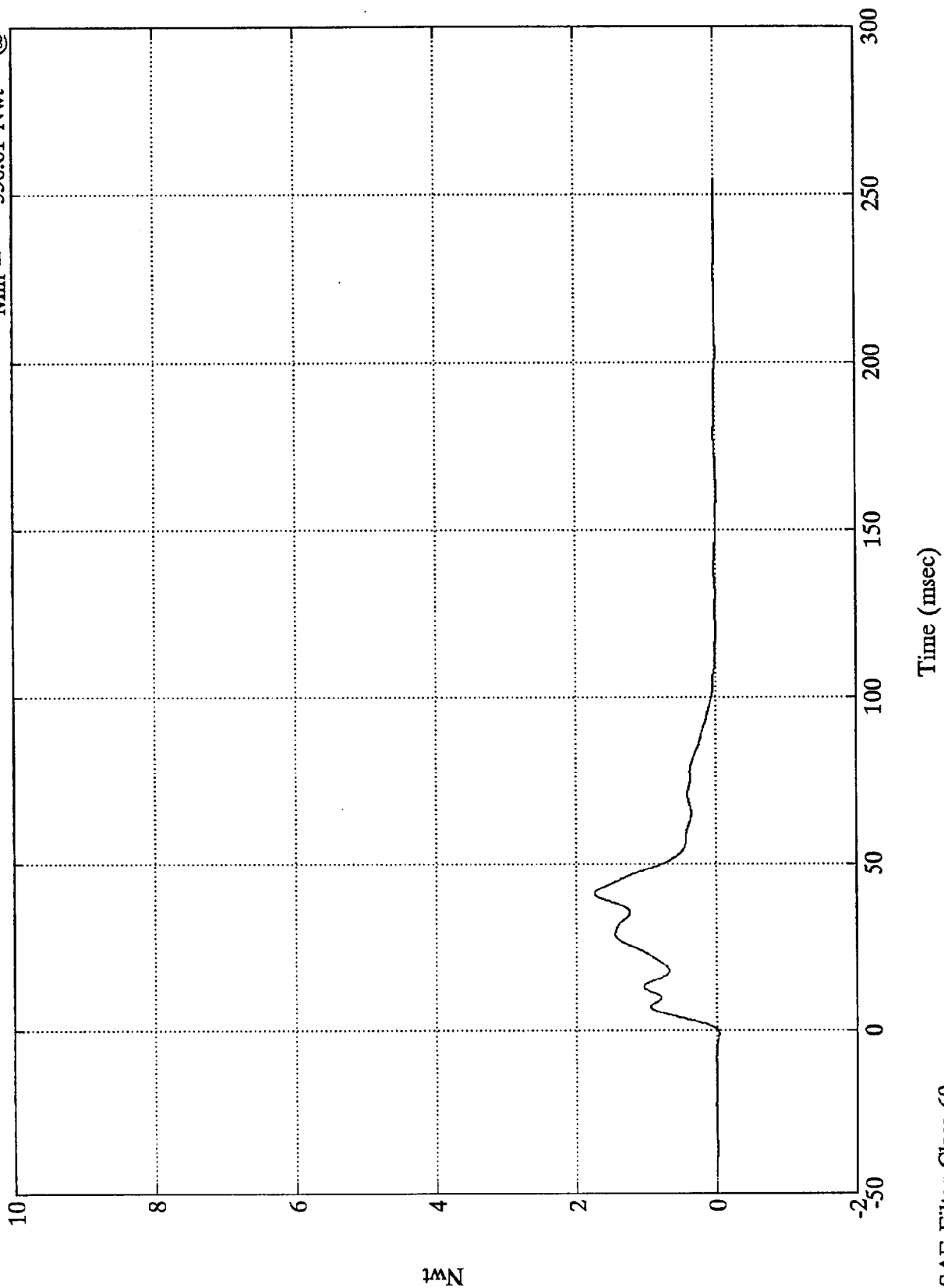
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 17361.66 Nwt @ 41.15 msec
 Min = -330.01 Nwt @ -1.20 msec

Barrier Load Cell C8

x10⁴



SAE Filter Class 60

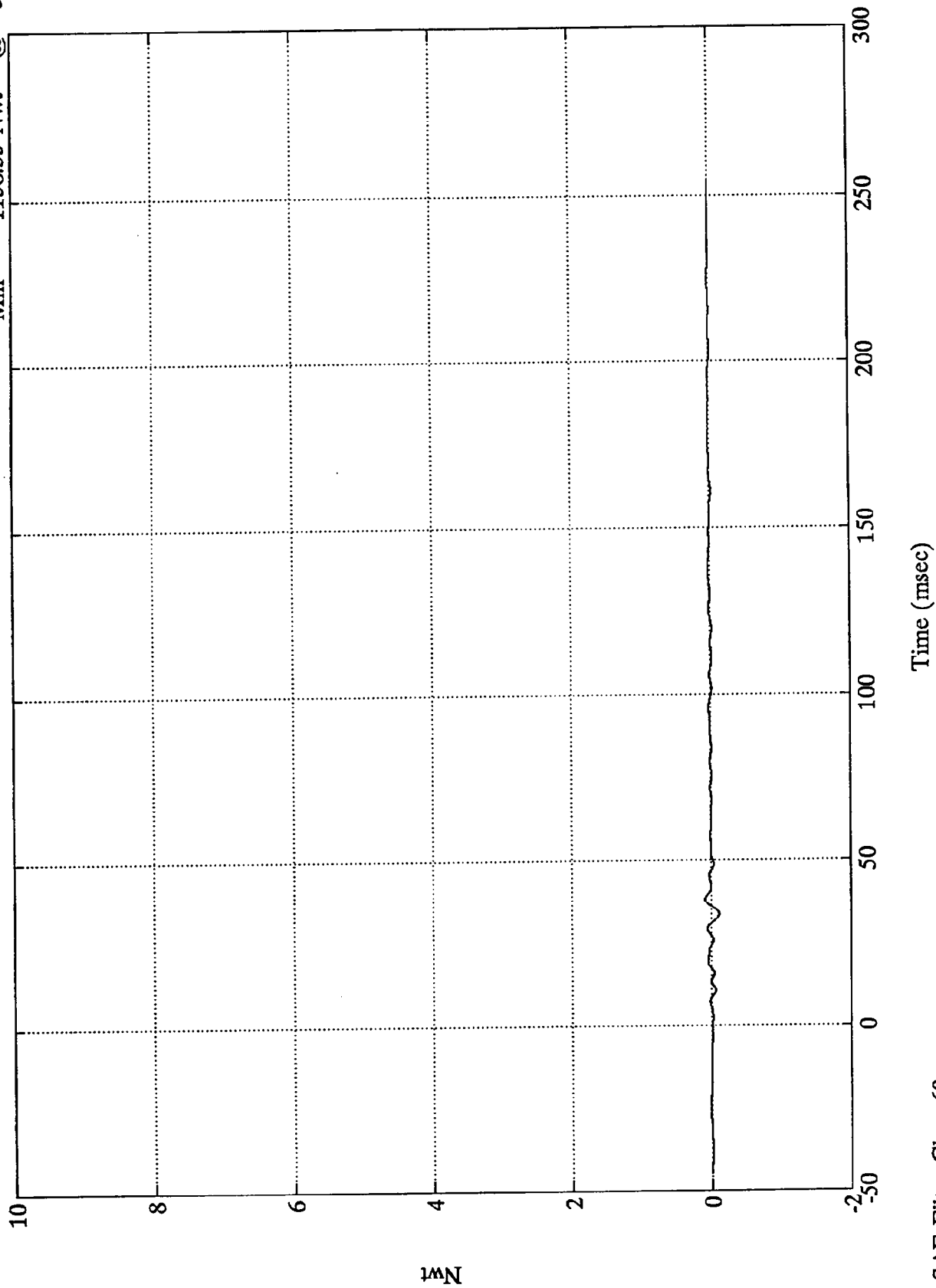
NCAP TEST #2 JEEP CHEROKEE

Max = 38.04 msec
Min = 33.47 msec

Barrier Load Cell C9 @ 940.37 Nwt @ -1158.35 Nwt

Barrier Load Cell C9

$\times 10^4$



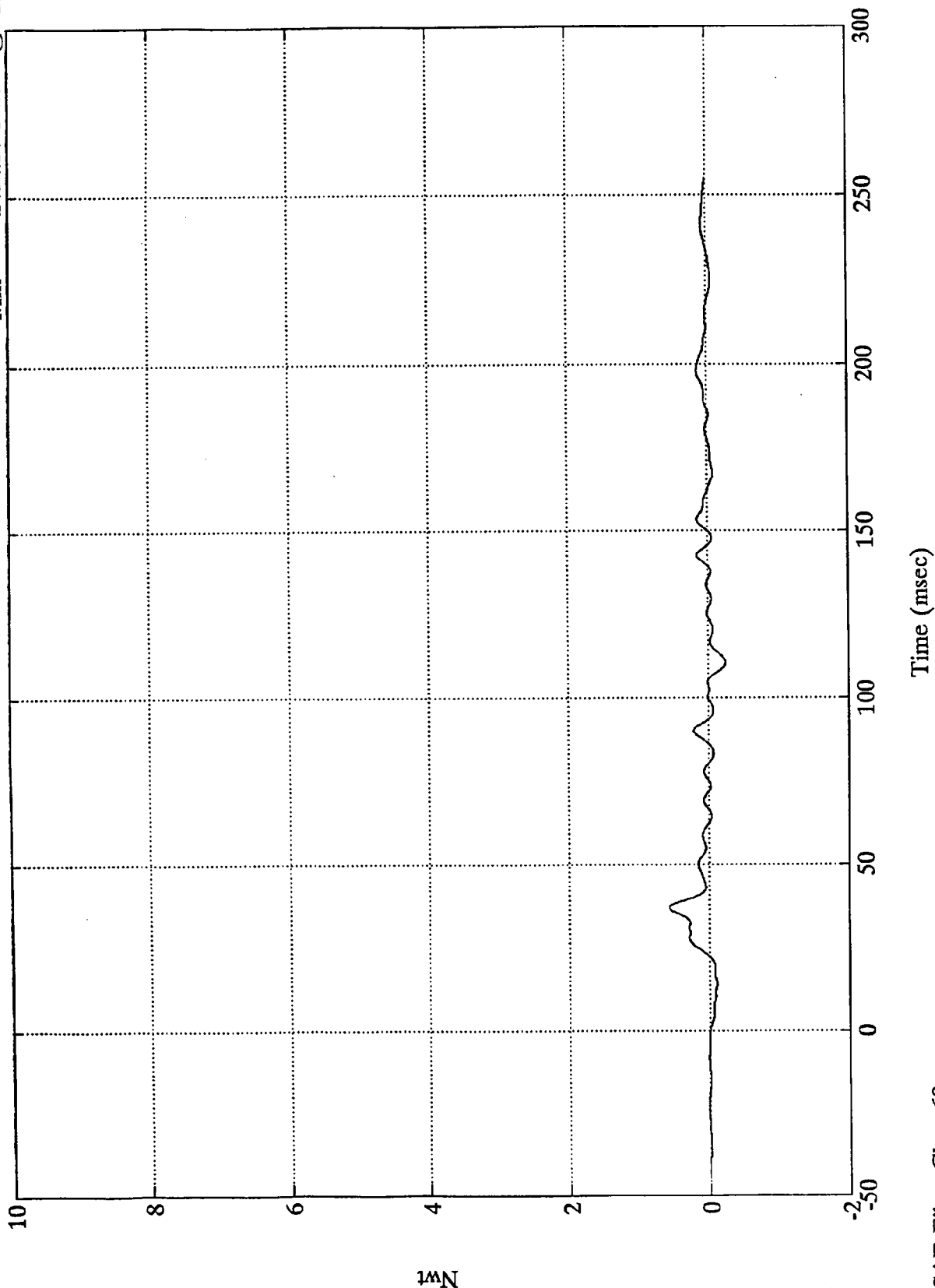
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Barrier Load Cell D1

Max = 5693.56 Nwt @ 36.95 msec
 Min = -2434.37 Nwt @ 110.52 msec

$\times 10^4$

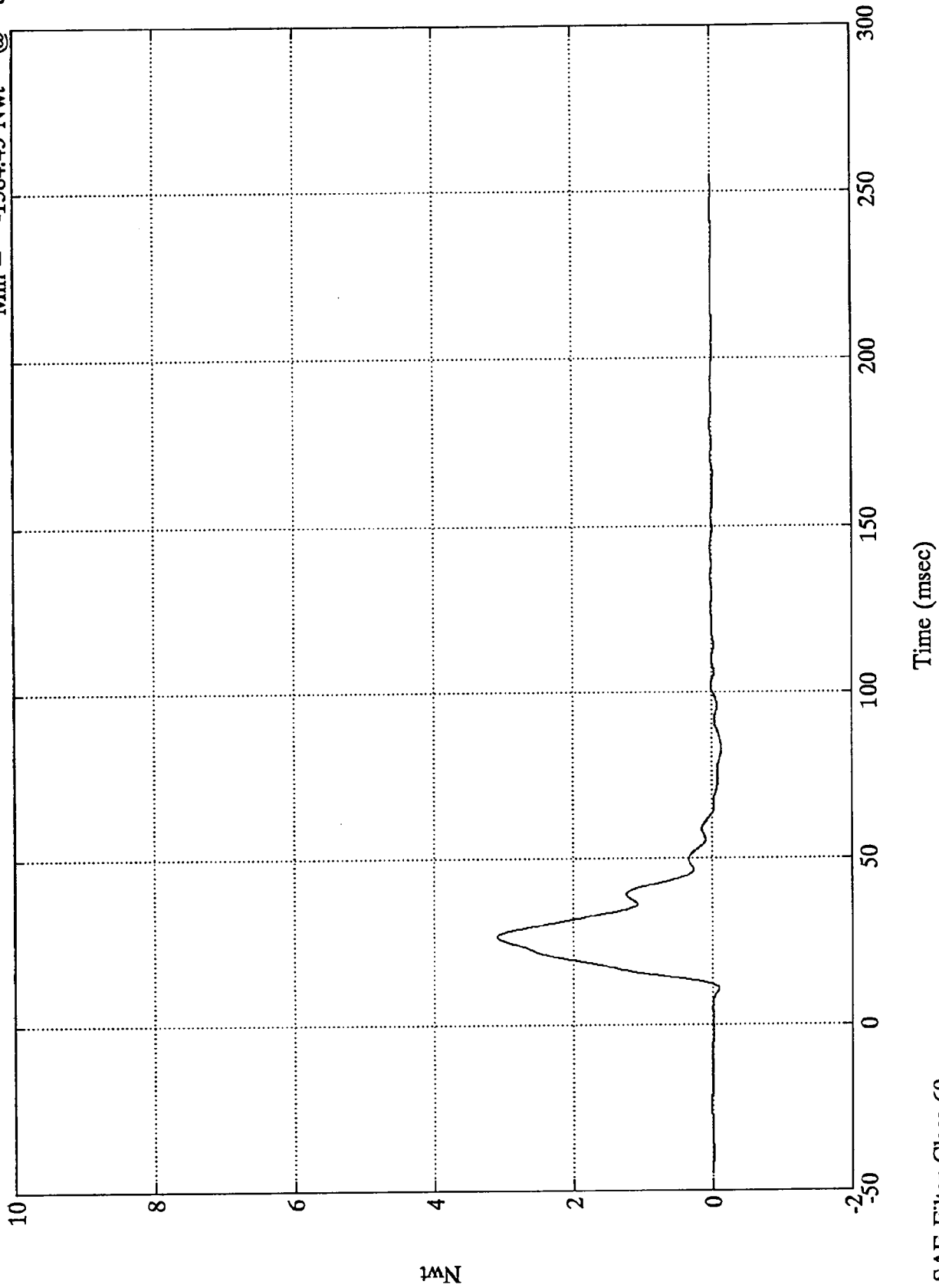


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 30918.03 Nwt @ 26.51 msec
 Min = -1384.43 Nwt @ 82.91 msec

Barrier Load Cell D2



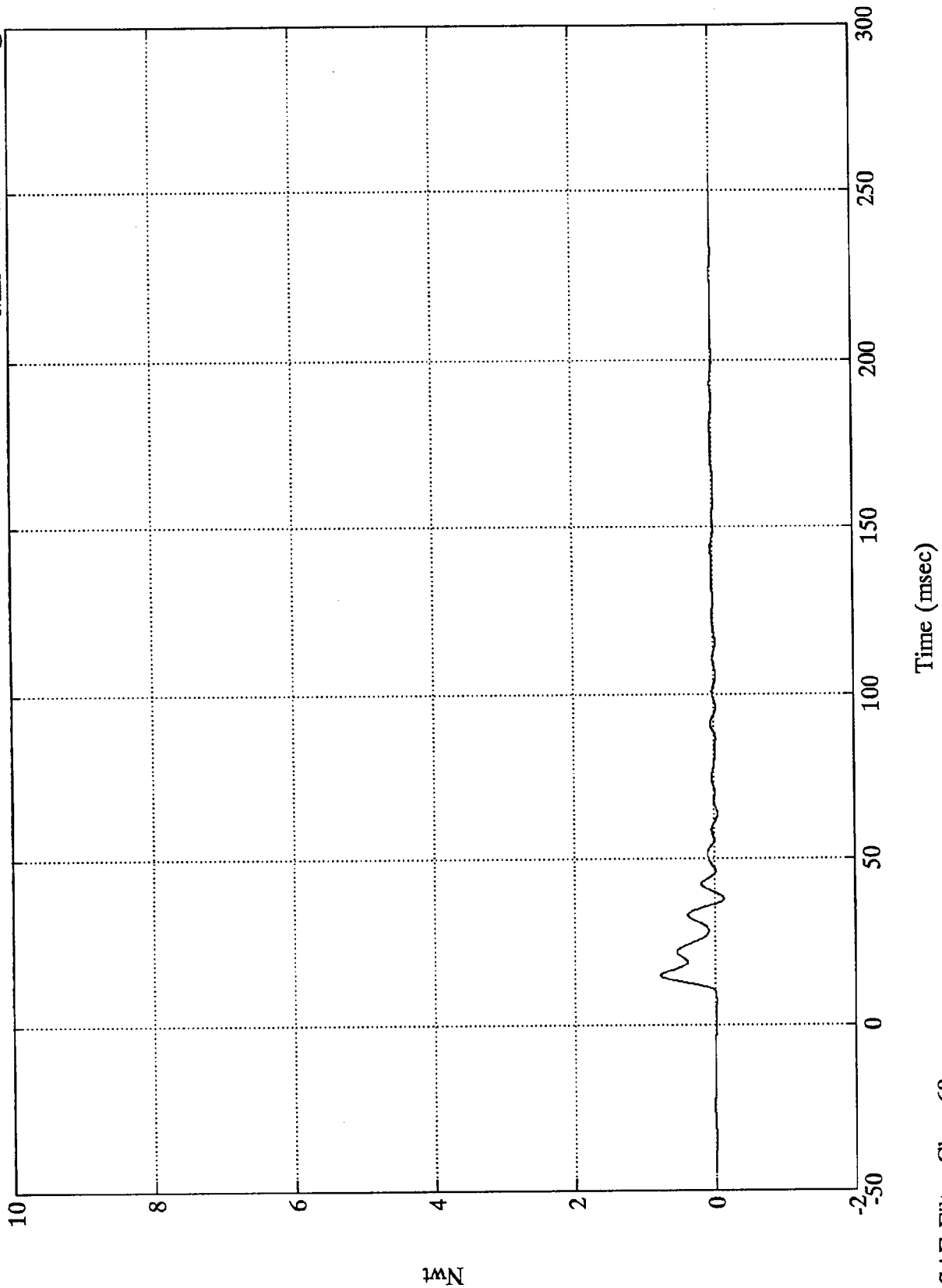
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

$\times 10^4$

Barrier Load Cell D3

Max = 7780.62 Nwt @ 14.63 msec
Min = -1278.45 Nwt @ 37.79 msec

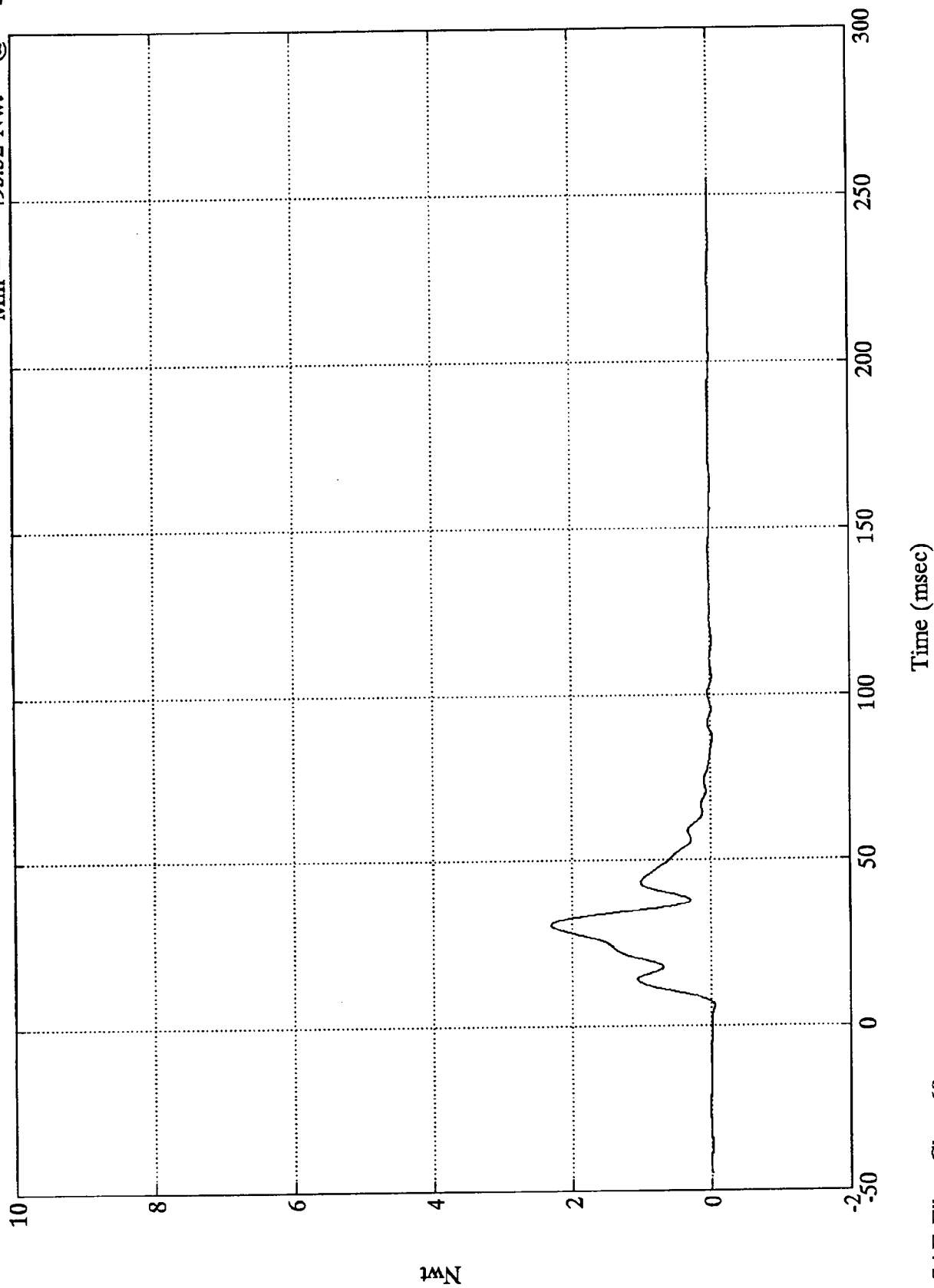


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Barrier Load Cell D4

Max = 23009.77 Nwt @ 30.47 msec
Min = -495.52 Nwt @ 5.99 msec



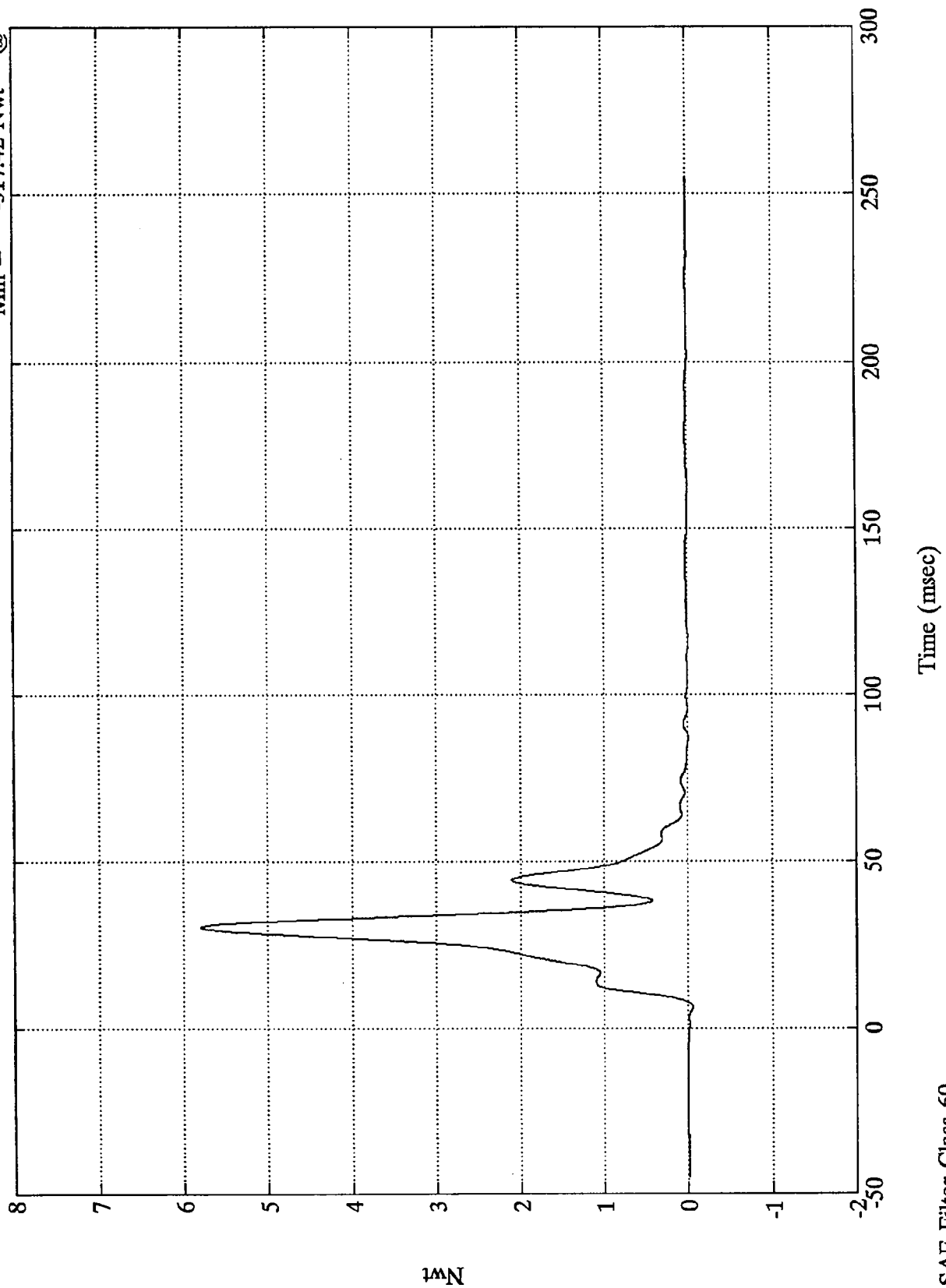
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 57932.61 Nwt @ 30.23 msec
 Min = -517.42 Nwt @ 6.23 msec

Barrier Load Cell D5

$\times 10^4$

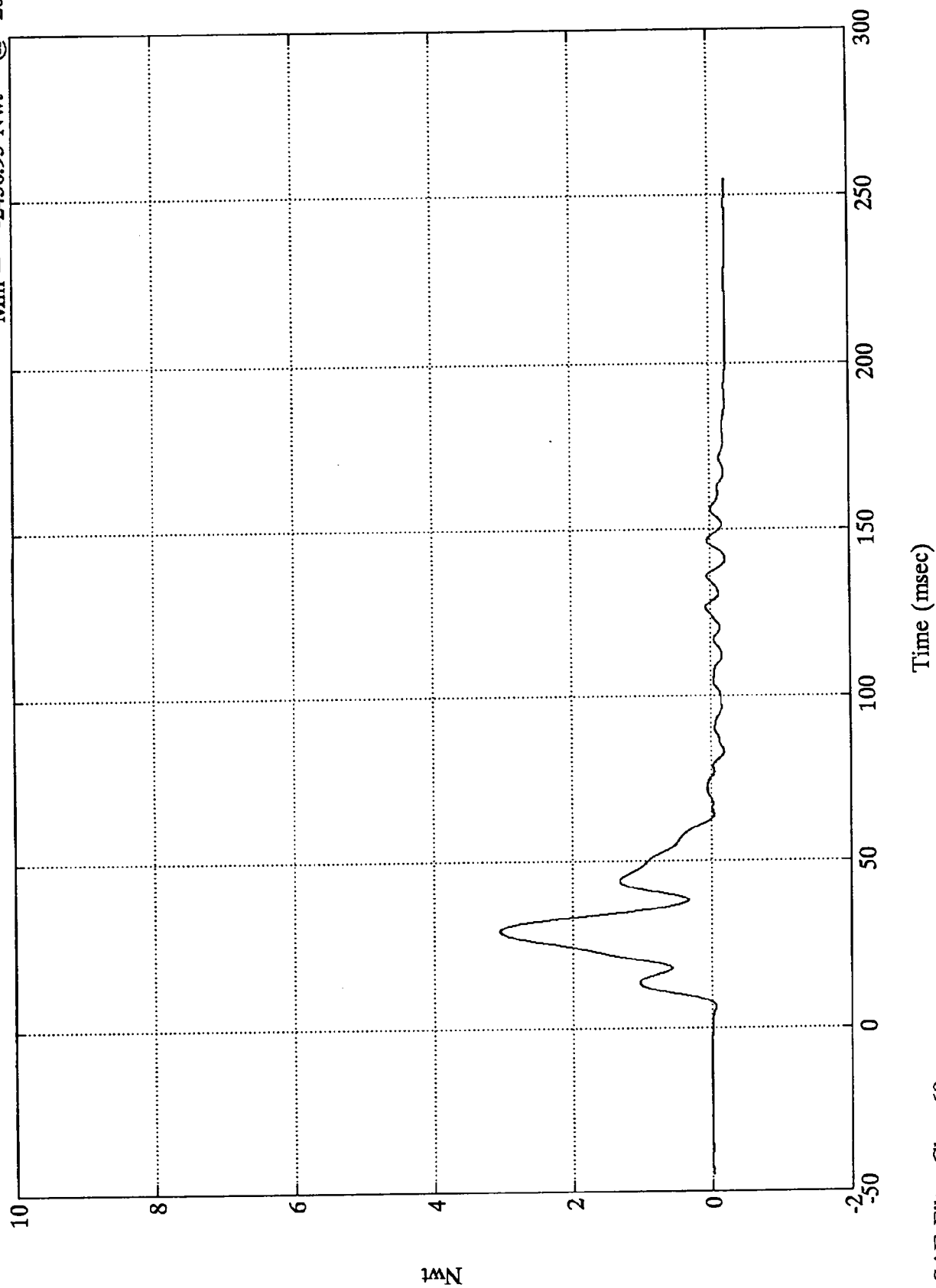


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Barrier Load Cell D6

Max = 30456.60 Nwt @ 29.03 msec
Min = -2436.93 Nwt @ 202.32 msec



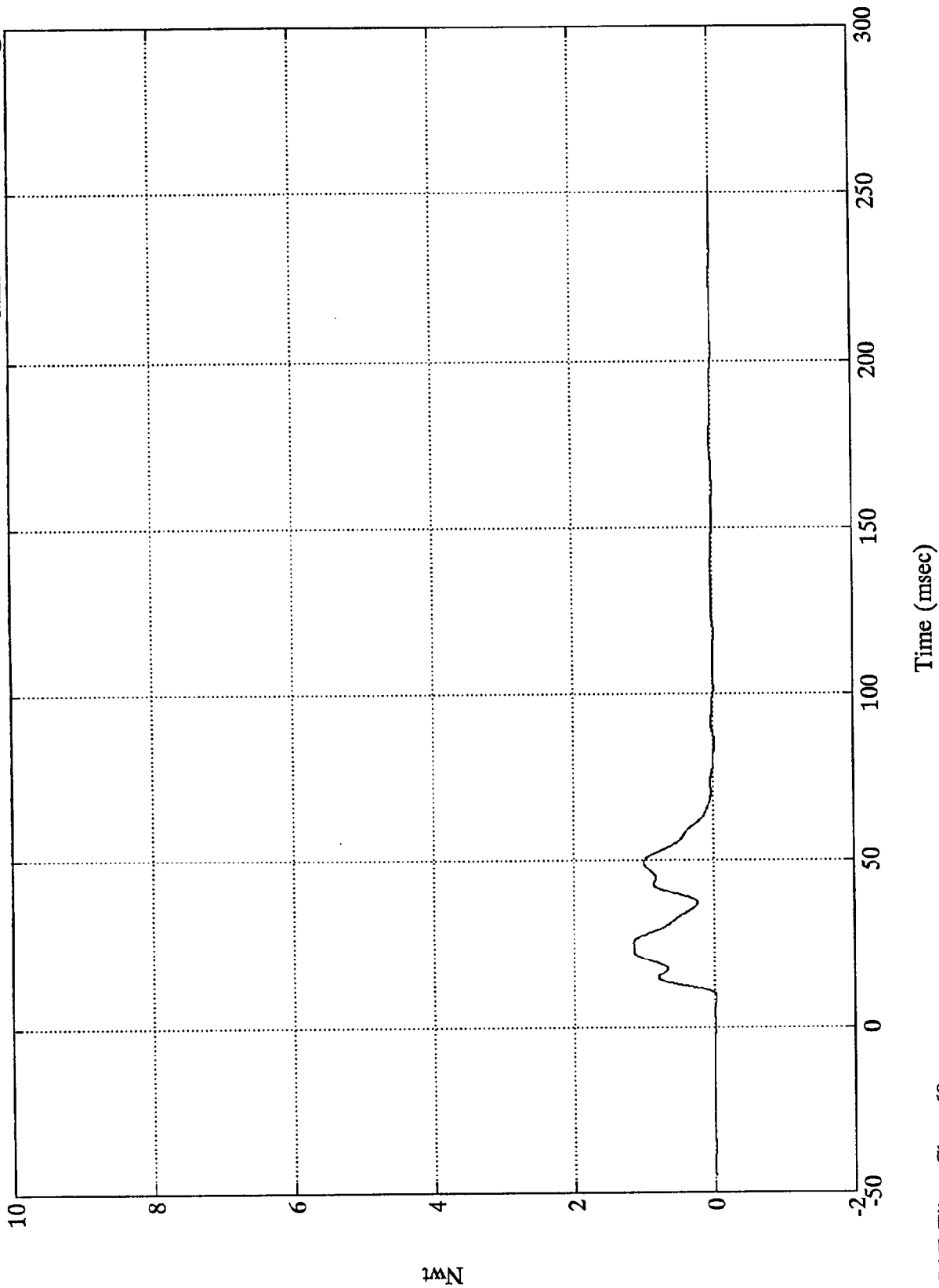
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 11496.52 Nwt @ 25.07 msec
 Min = -307.59 Nwt @ 8.87 msec

Barrier Load Cell D7

x10⁴

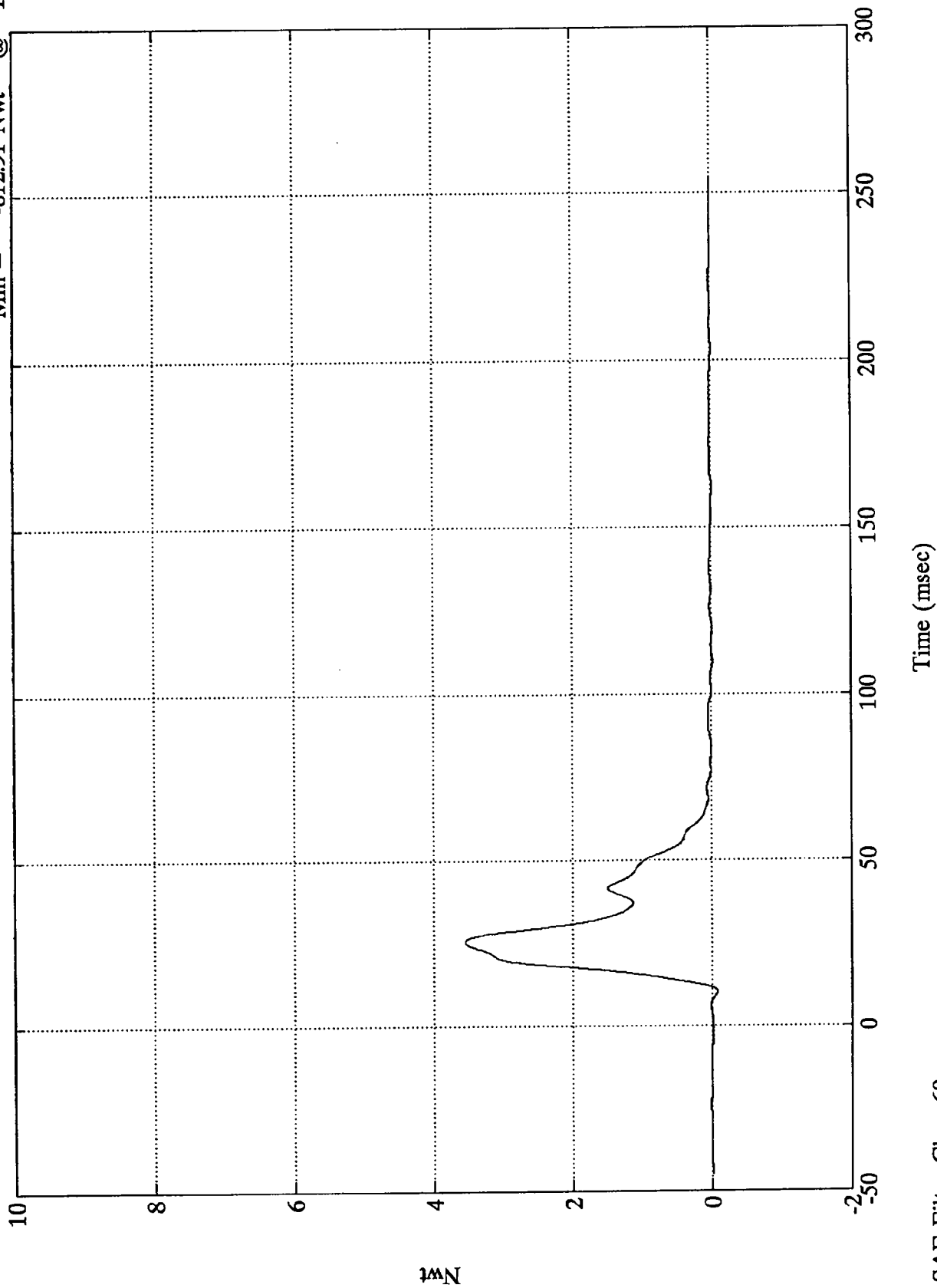


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Barrier Load Cell D8

Max = 35472.03 Nwt @ 25.68 msec
 Min = -812.91 Nwt @ 10.19 msec



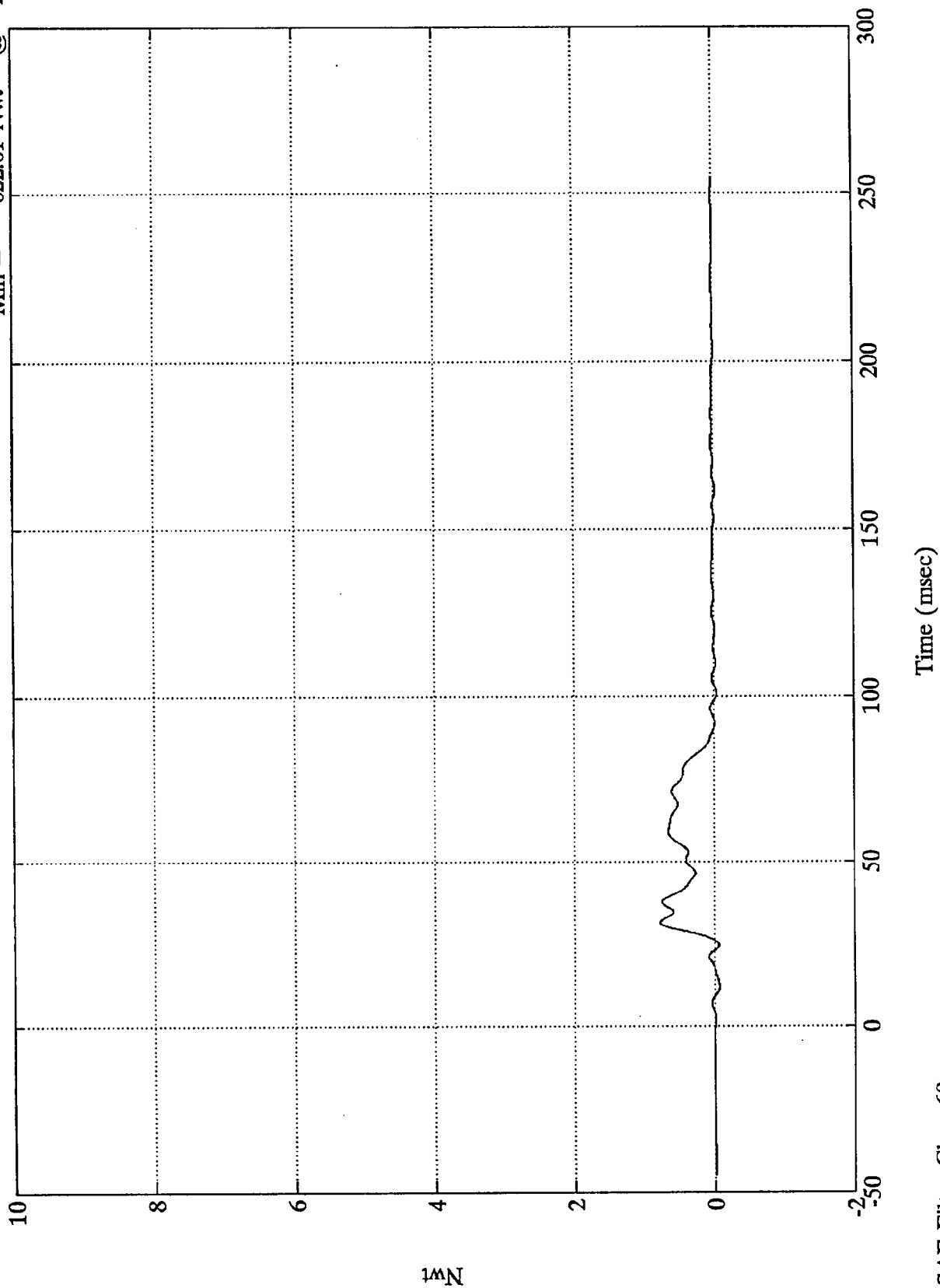
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

$\times 10^4$

Barrier Load Cell D9

Max = 7807.34 Nwt @ 31.44 msec
Min = -622.01 Nwt @ 11.75 msec

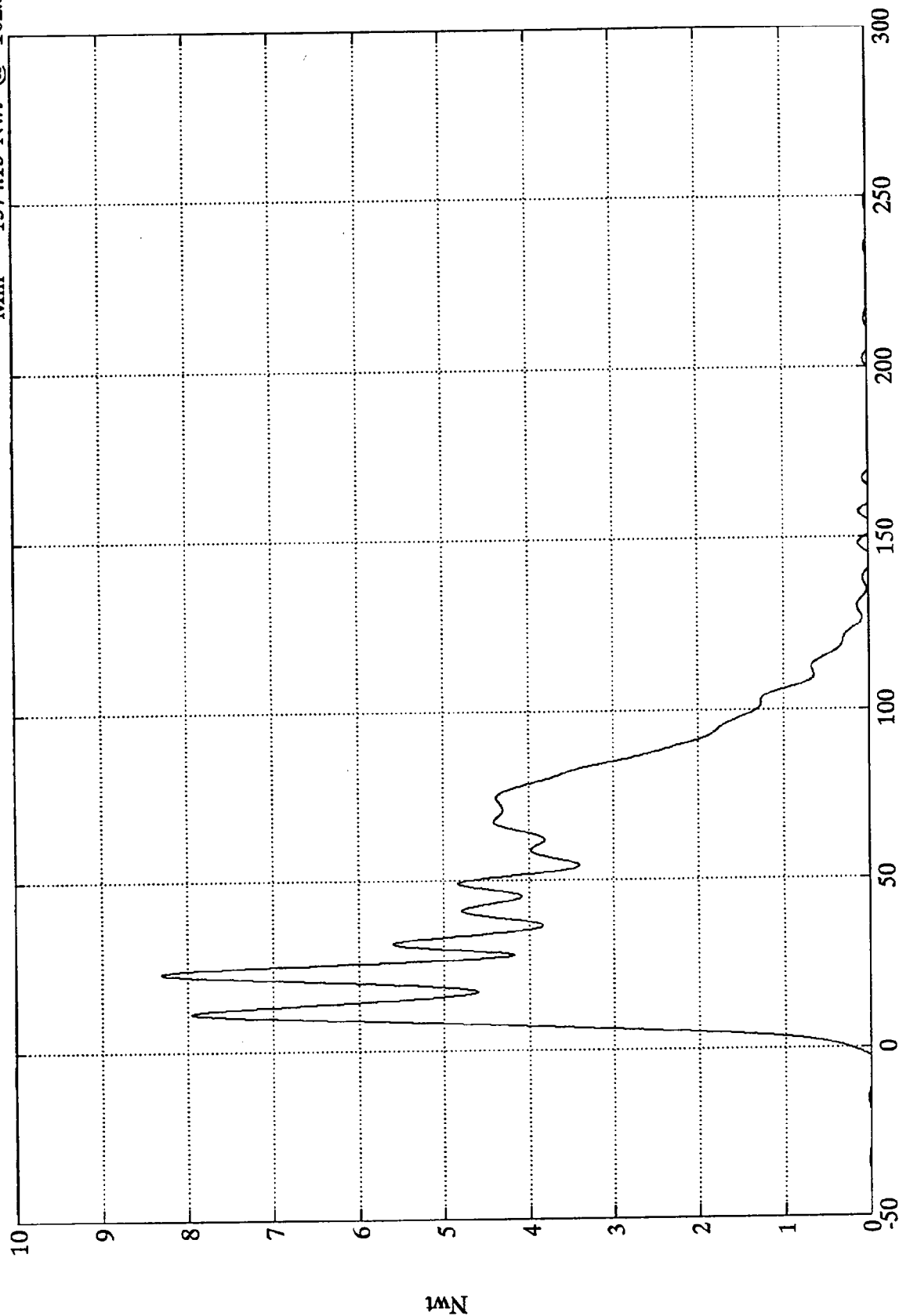


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 83018.90 Nwt @ 23.16 msec
Min = -1374.15 Nwt @ 162.36 msec

Group 1 Load Cell Sum



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

Time (msec)

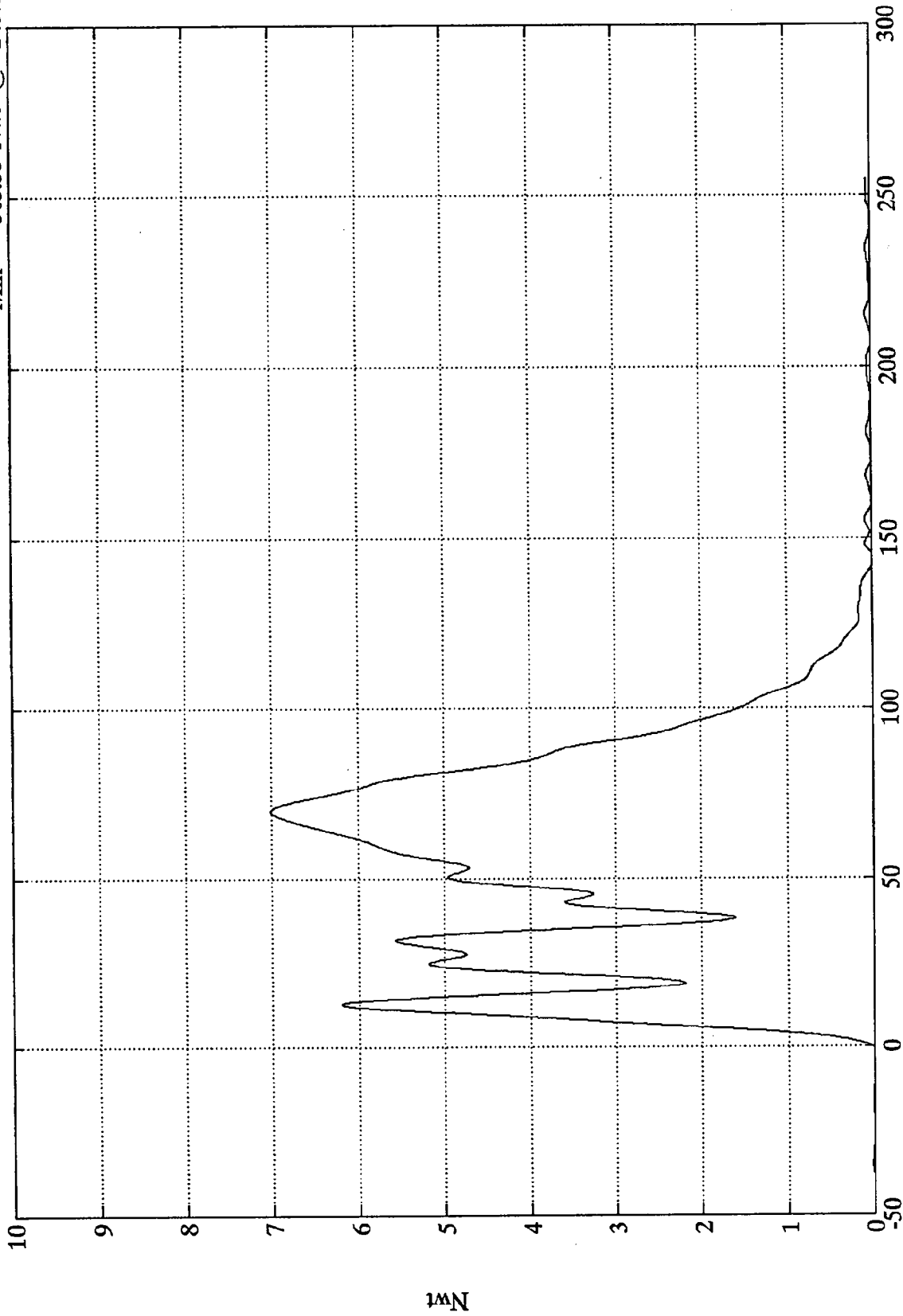
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

$\times 10^4$

Group 2 Load Cell Sum

Max = 70104.70 Nwt @ 69.96 msec
Min = -305.53 Nwt @ 143.88 msec



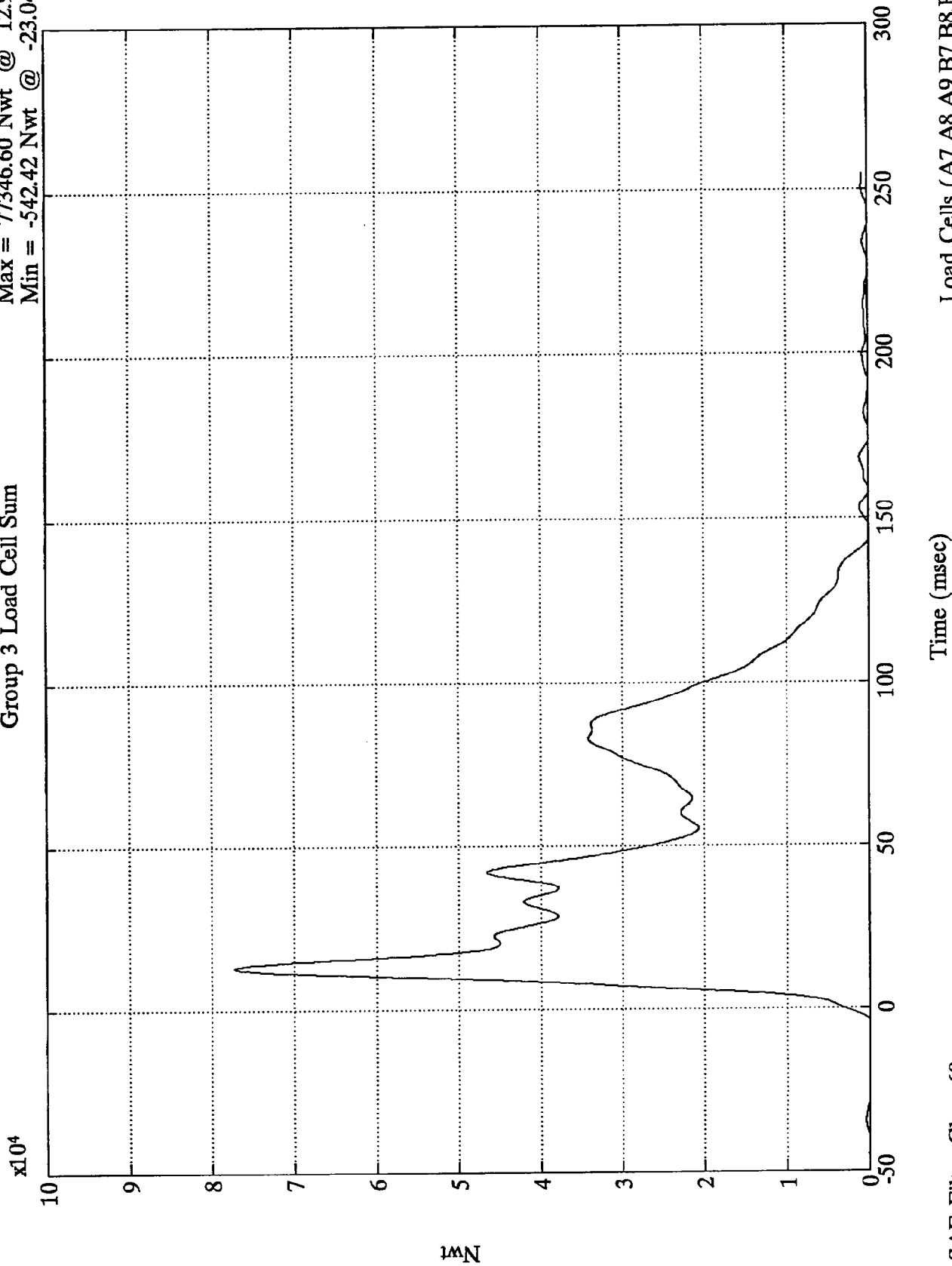
SAE Filter Class 60

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

NCAP TEST #2 JEEP CHEROKEE

Group 3 Load Cell Sum

Max = 77346.60 Nwt @ 12.96 msec
Min = -542.42 Nwt @ -23.04 msec



SAE Filter Class 60

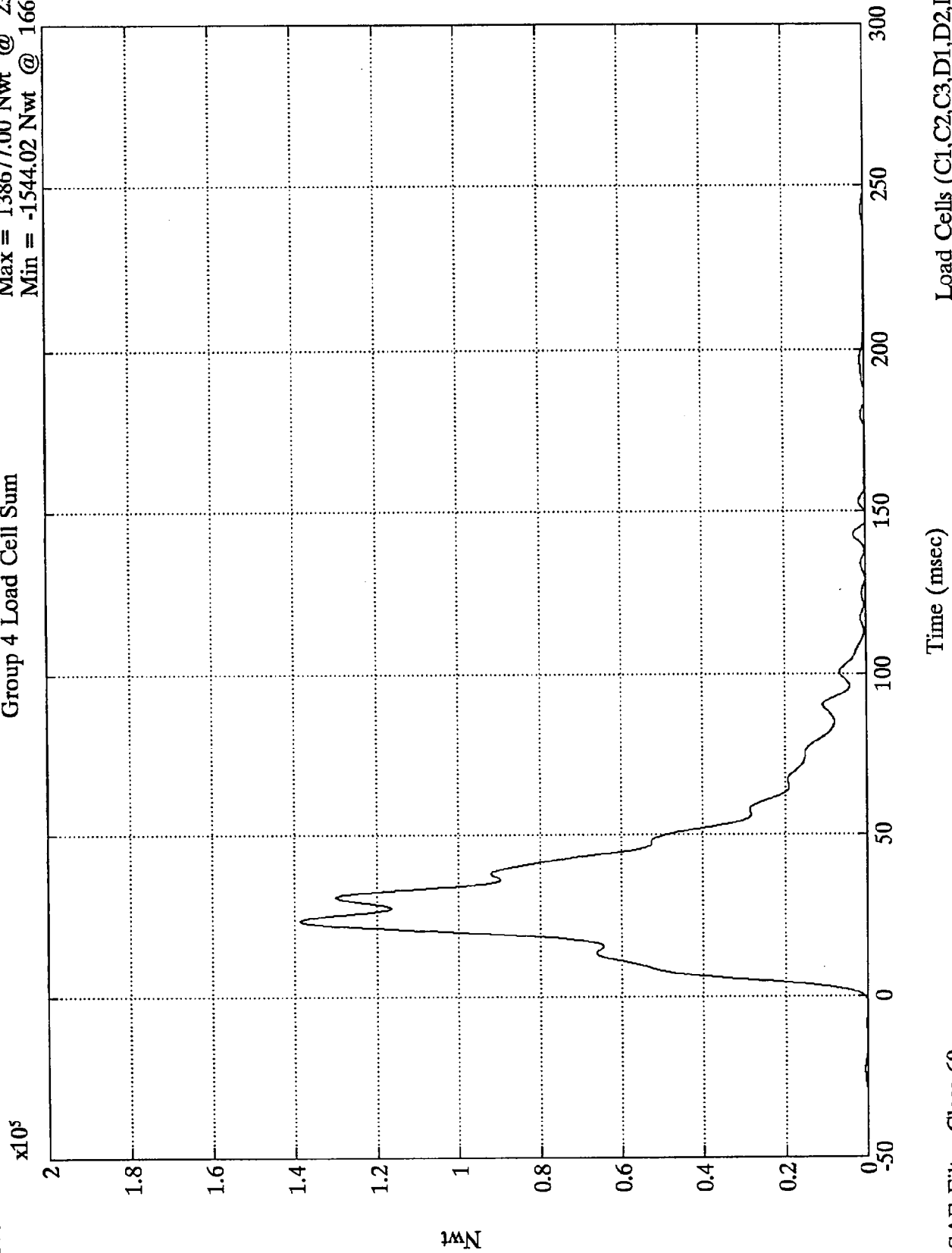
Time (msec)

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

NCAP TEST #2 JEEP CHEROKEE

Group 4 Load Cell Sum

Max = 138677.00 Nwt @ 23.28 msec
Min = -1544.02 Nwt @ 166.08 msec

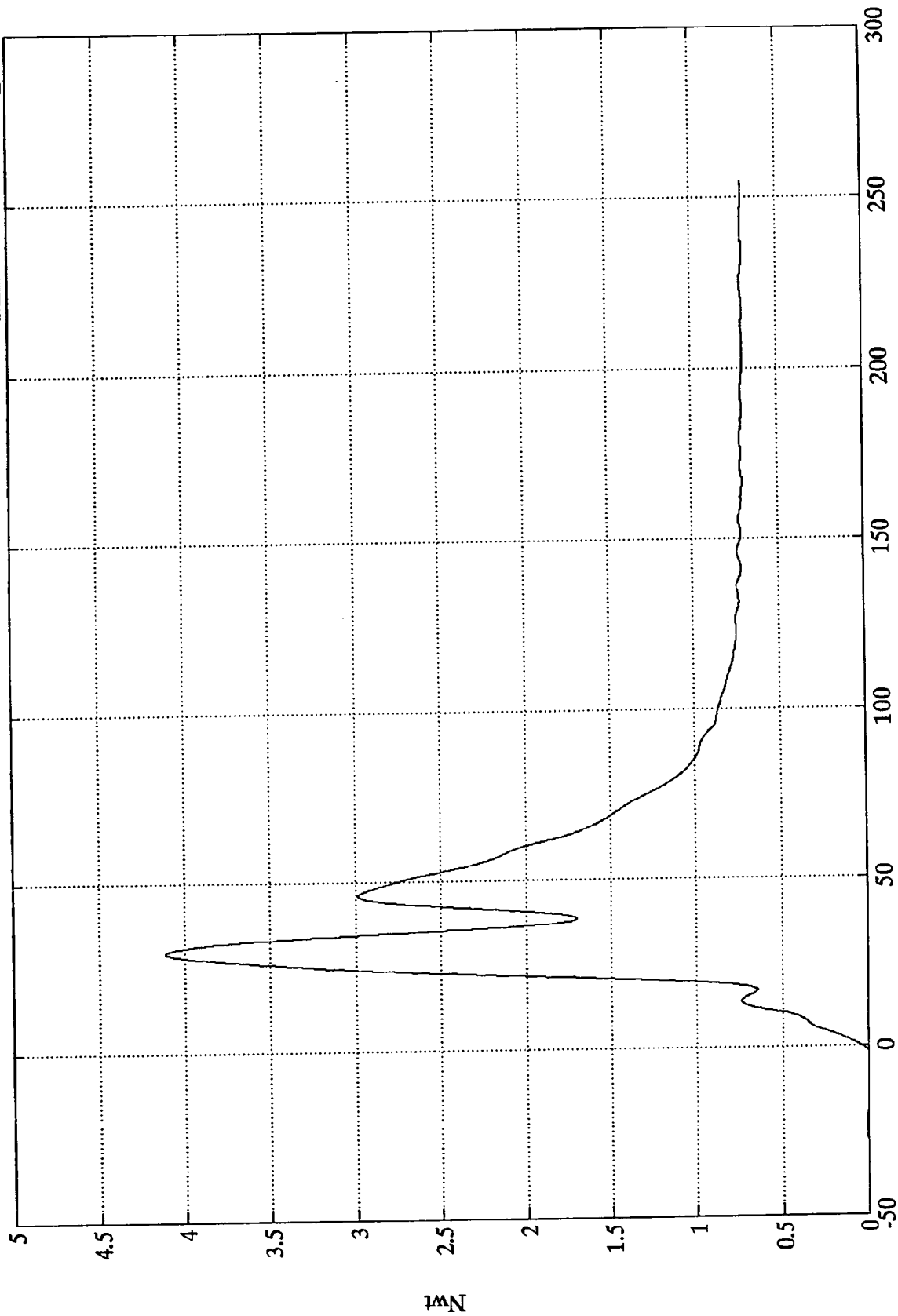


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Group 5 Load Cell Sum

Max = 411156.00 Nwt @ 29.28 msec
Min = -630.18 Nwt @ -3.36 msec



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

Time (msec)

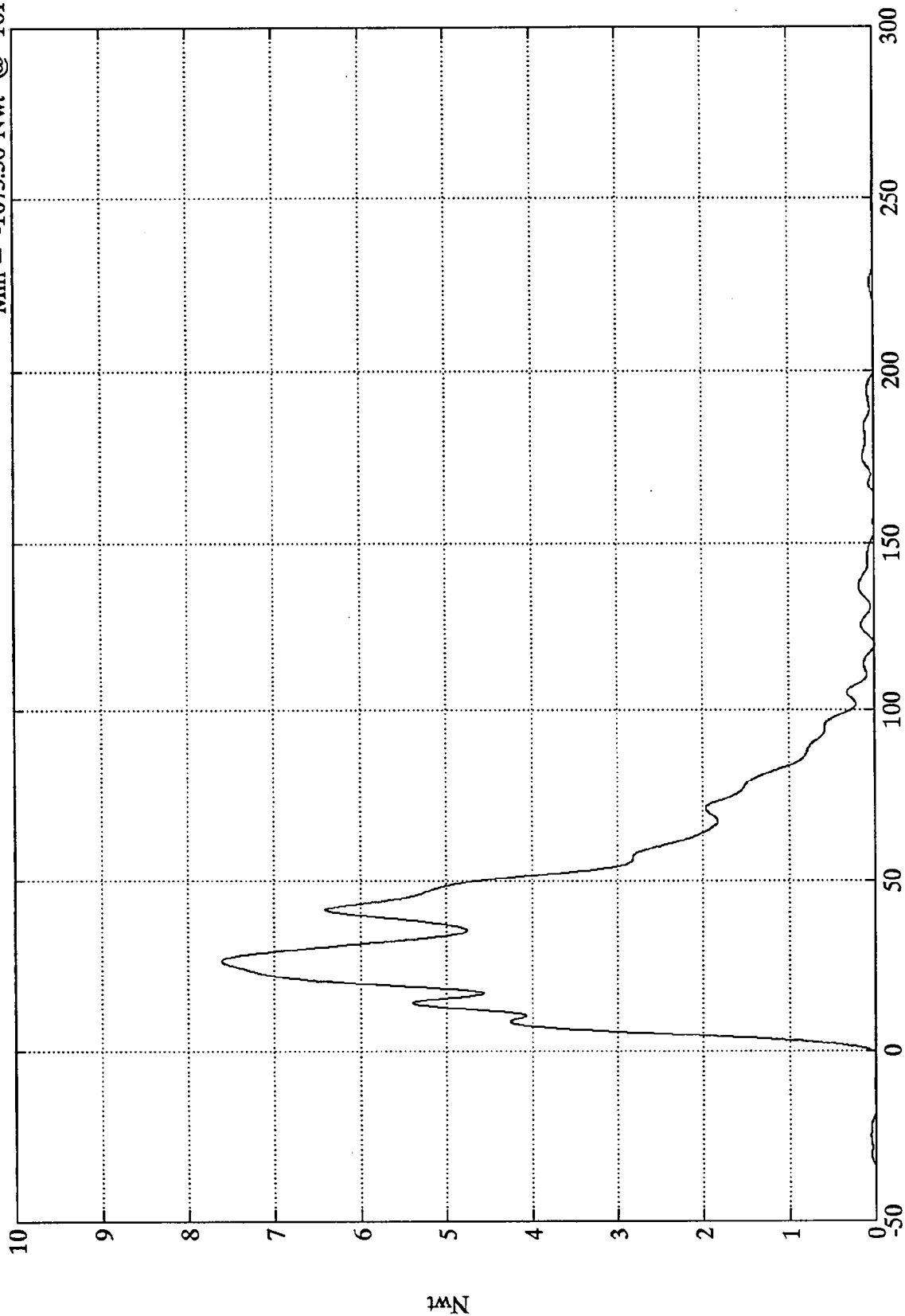
SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 76093.10 Nwt @ 26.40 msec
Min = -1073.36 Nwt @ 161.64 msec

Group 6 Load Cell Sum

$\times 10^4$



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

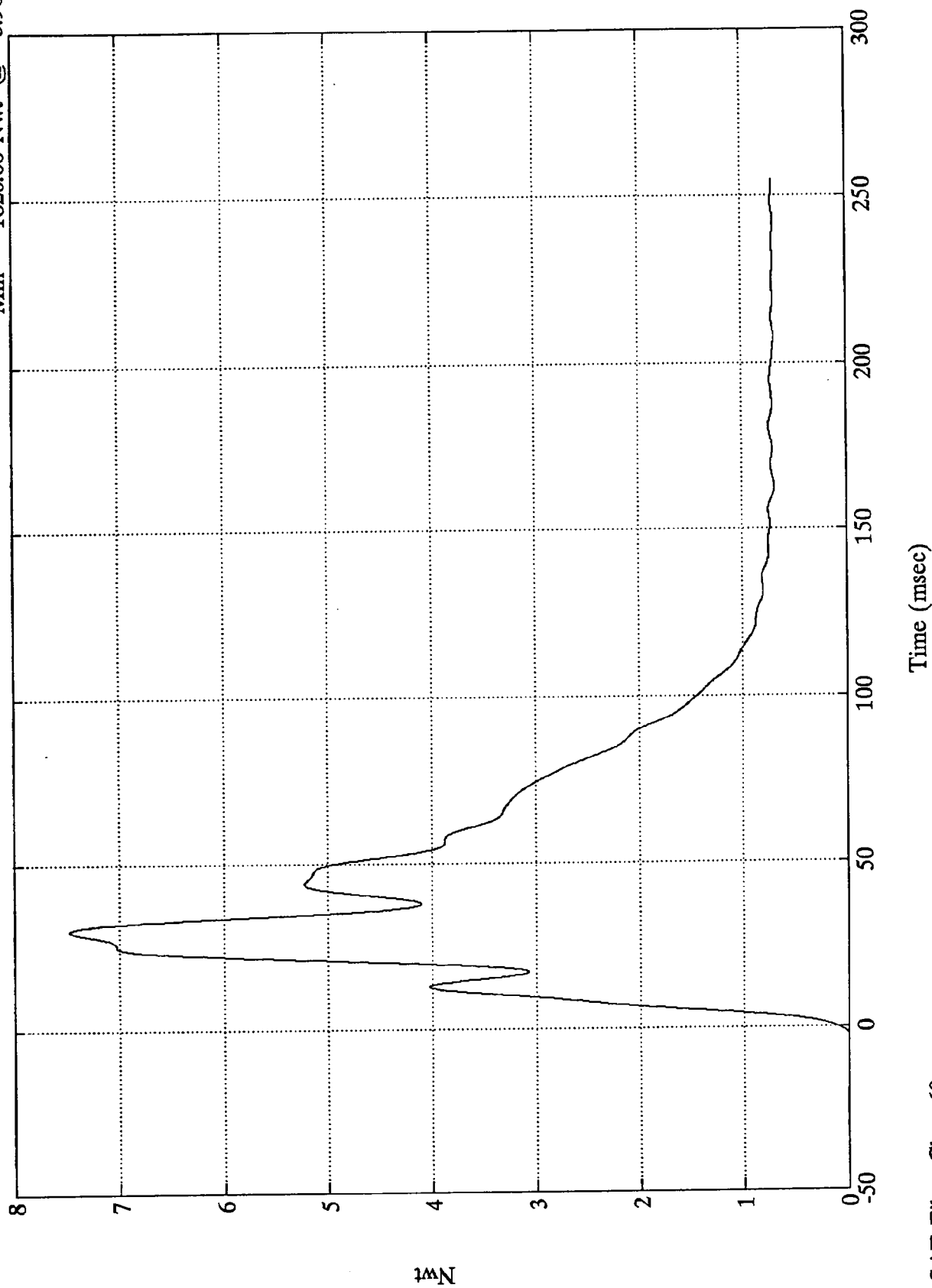
Time (msec)

SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 747402.00 Nwt @ 30.12 msec
 Min = -1820.66 Nwt @ -3.96 msec

Total Load Cell Sum



SAE Filter Class 60

TEST NO. MP0300

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

FACILITY: TEST
RUN #: 2
SERIES #: 1

TEST DATE: 27 Aug 1992
TEST TIME: 14:29:33
BOARD: a

TITLE: NCAP TEST #2 JEEP CHEROKEE

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	Pos. 1 Head X	Gs	16.2	54.2	-56.4	62.0	1000.0
2	Pos. 1 Head Y	Gs	4.3	49.2	-7.5	82.0	1000.0
3	Pos. 1 Head Z	Gs	22.1	42.5	-14.9	95.5	1000.0
4	Pos. 1 Left Femur	New	199.9	190.8	-3525.4	58.7	600.0
5	Pos. 1 Chest X	Gs	3.7	160.3	-56.8	58.6	180.0
6	Pos. 1 Chest Y	Gs	3.8	82.2	-4.8	54.8	180.0
7	Pos. 1 Chest Z	Gs	11.2	41.3	-13.2	105.5	180.0
8	Pos. 1 Right Femur	New	190.1	124.2	-7320.3	55.6	600.0
9	Pos. 2 Head X	Gs	3.9	182.5	-45.2	110.4	1000.0
10	Pos. 2 Head Y	Gs	8.7	88.9	-3.8	47.4	1000.0
11	Pos. 2 Head Z	Gs	57.6	71.0	-.2	-11.9	1000.0
12	Pos. 2 Left Femur	New	976.6	46.1	-2704.8	51.6	600.0
13	Pos. 2 Chest X	Gs	.5	250.8	-64.4	68.5	180.0
14	Pos. 2 Chest Y	Gs	10.1	81.7	-9.6	75.5	180.0
15	Pos. 2 Chest Z	Gs	16.4	75.4	-15.9	107.5	180.0
16	Pos. 2 Right Femur	New	715.6	45.0	-2646.1	54.5	600.0
17	Pos. 1 Head Resultant	Gs	58.0	62.0	.0	-19.0	1000.0
18	Pos. 1 Chest Resultant	Gs	56.9	58.3	.0	-27.5	180.0
19	Pos. 2 Head Resultant	Gs	64.0	71.4	.0	-8.8	1000.0
20	Pos. 2 Chest Resultant	Gs	64.8	68.4	.0	-25.3	180.0

CLIP SUMMARY: Pos. 1 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 56.453 G's
Tstart = 57.7200 ms
Tend = 60.7200 ms
CSI = 480.581

CLIP SUMMARY: Pos. 2 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 59.529 G's
Tstart = 67.2000 ms
Tend = 70.3200 ms
CSI = 504.165

36 ms Fixed Duration HIC SUMMARY: Pos. 1 Head Resultant

hic: 312.42
t1 = 45.240 msec
t2 = 81.120 msec
Average G's Over Hic Duration = 37.67

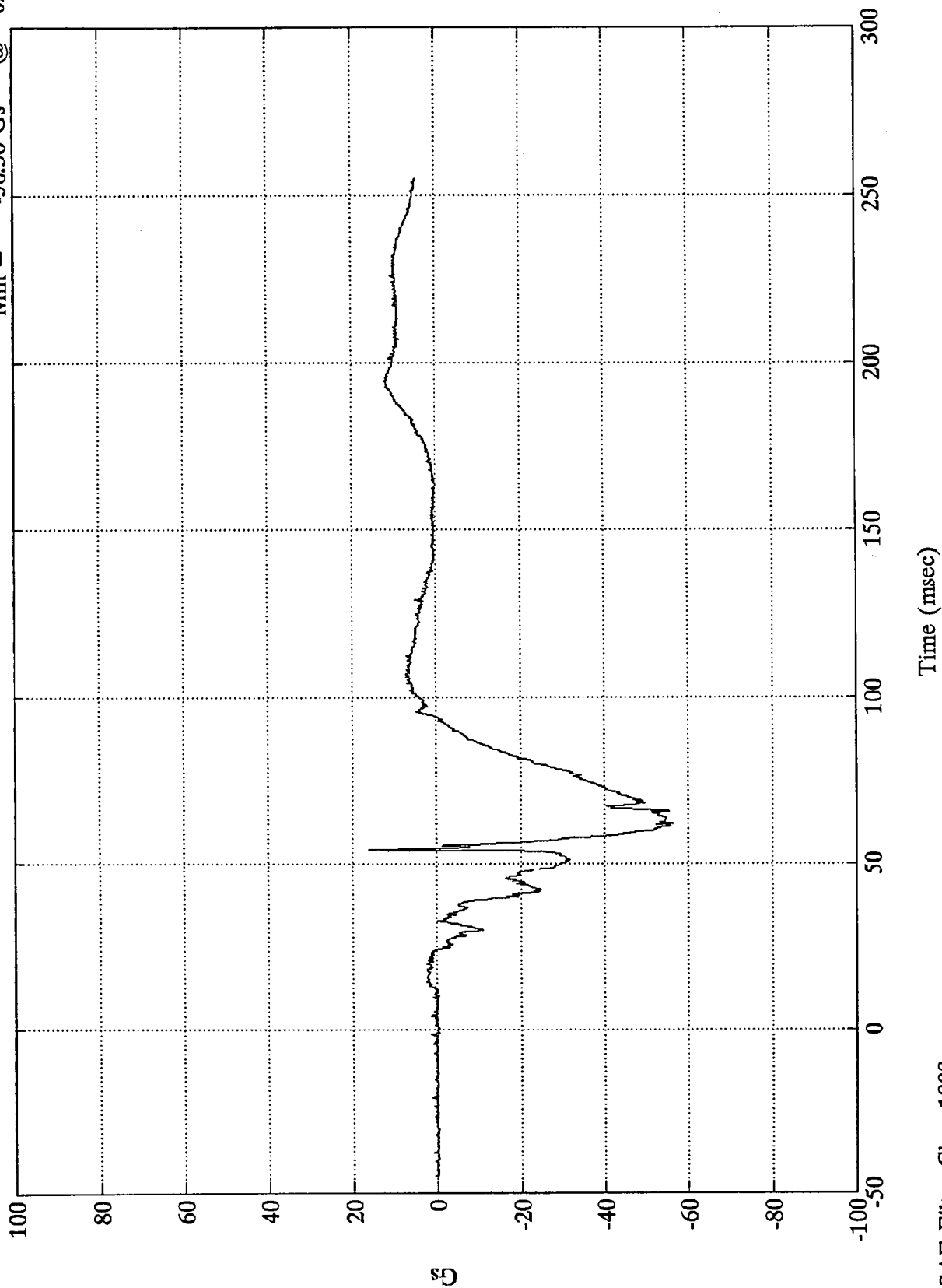
36 ms Fixed Duration HIC SUMMARY: Pos. 2 Head Resultant

hic: 675.76
t1 = 62.040 msec
t2 = 97.920 msec
Average G's Over Hic Duration = 51.28

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Head X

Max = 16.22 Gs @ 54.23 msec
Min = -56.36 Gs @ 62.04 msec

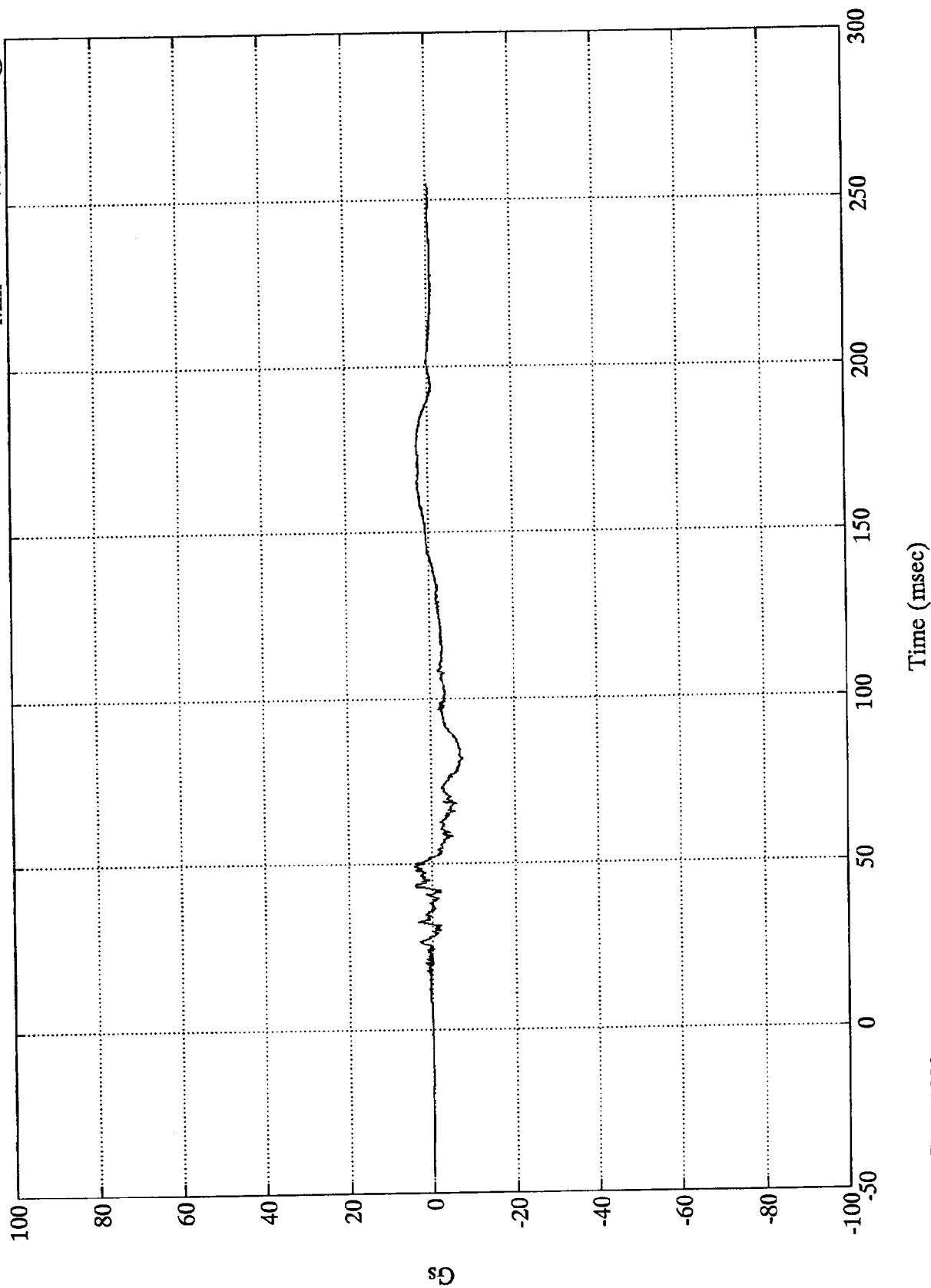


SAE Filter Class 1000

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Head Y

Max = 4.26 Gs @ 49.20 msec
Min = -7.49 Gs @ 81.95 msec

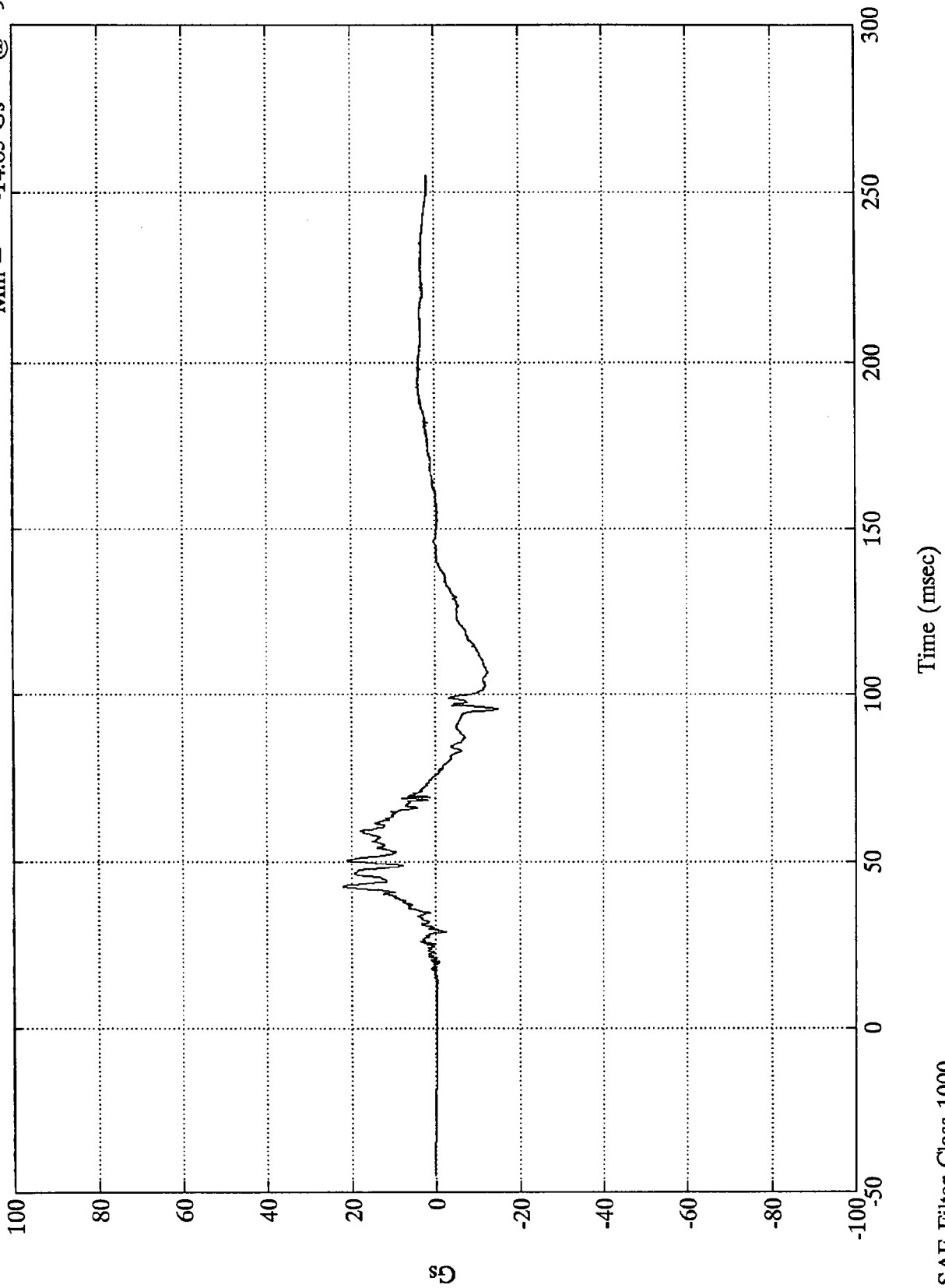


SAE Filter Class 1000

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Head Z

Max = 22.06 Gs @ 42.47 msec
Min = -14.85 Gs @ 95.52 msec

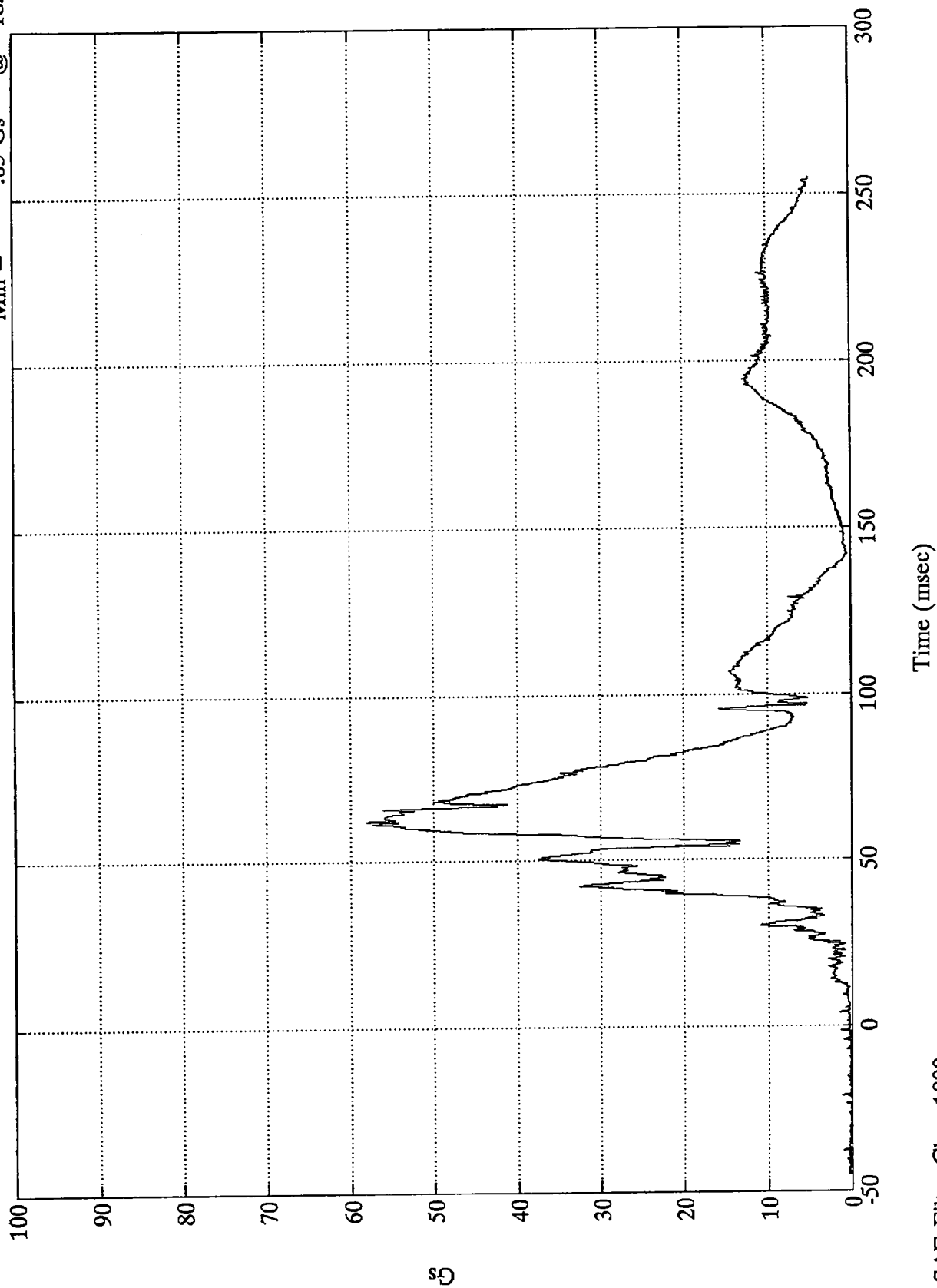


SAE Filter Class 1000

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Head Resultant

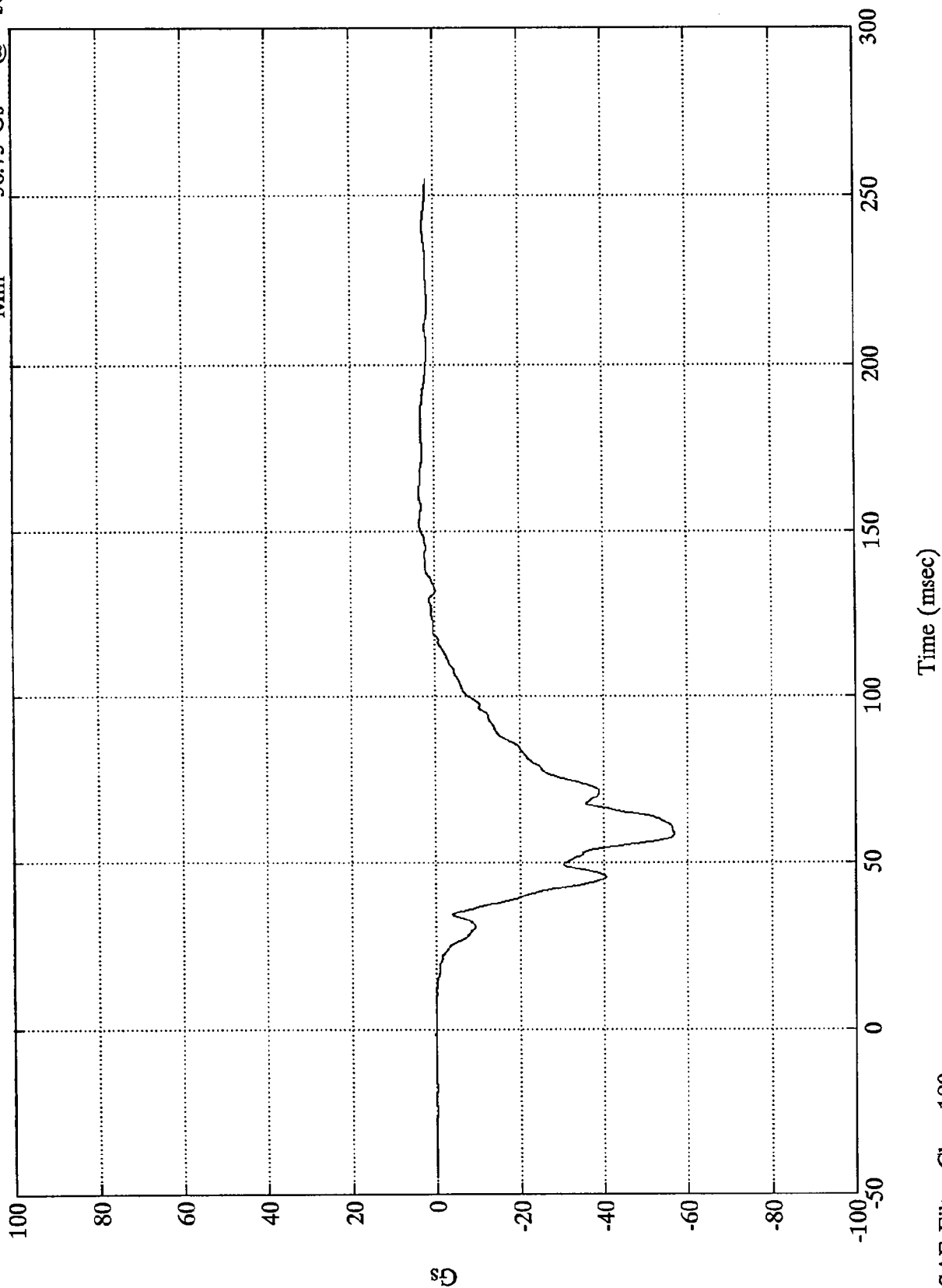
Max = 58.01 Gs @ 62.04 msec
Min = .03 Gs @ -18.96 msec



SAE Filter Class 1000

NCAP TEST #2 JEEP CHEROKEE

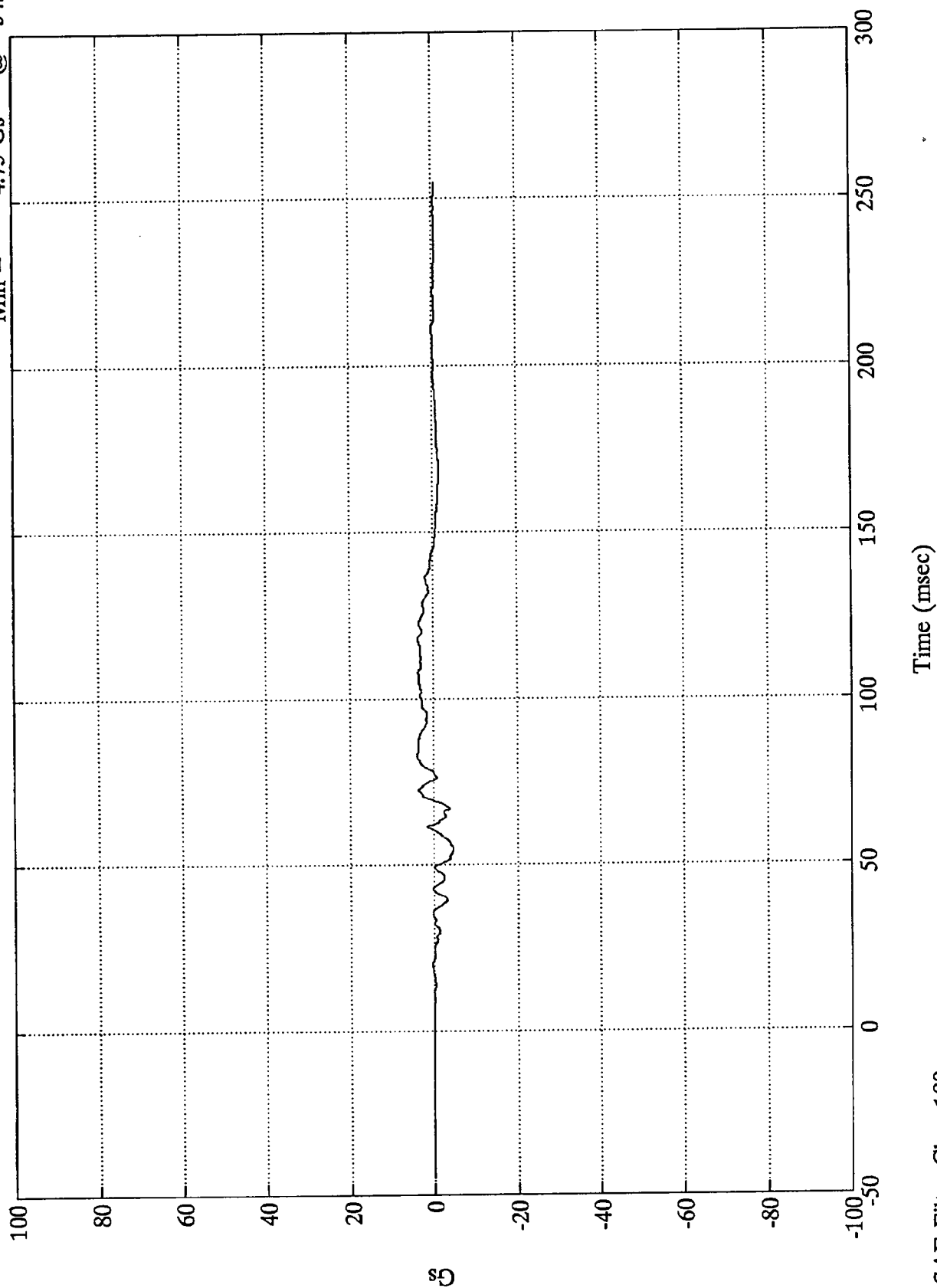
Pos. 1 Chest X Max = 3.67 Gs @ 160.31 msec
Min = -56.75 Gs @ 58.56 msec



SAE Filter Class 180

NCAP TEST #2 JEEP CHEROKEE

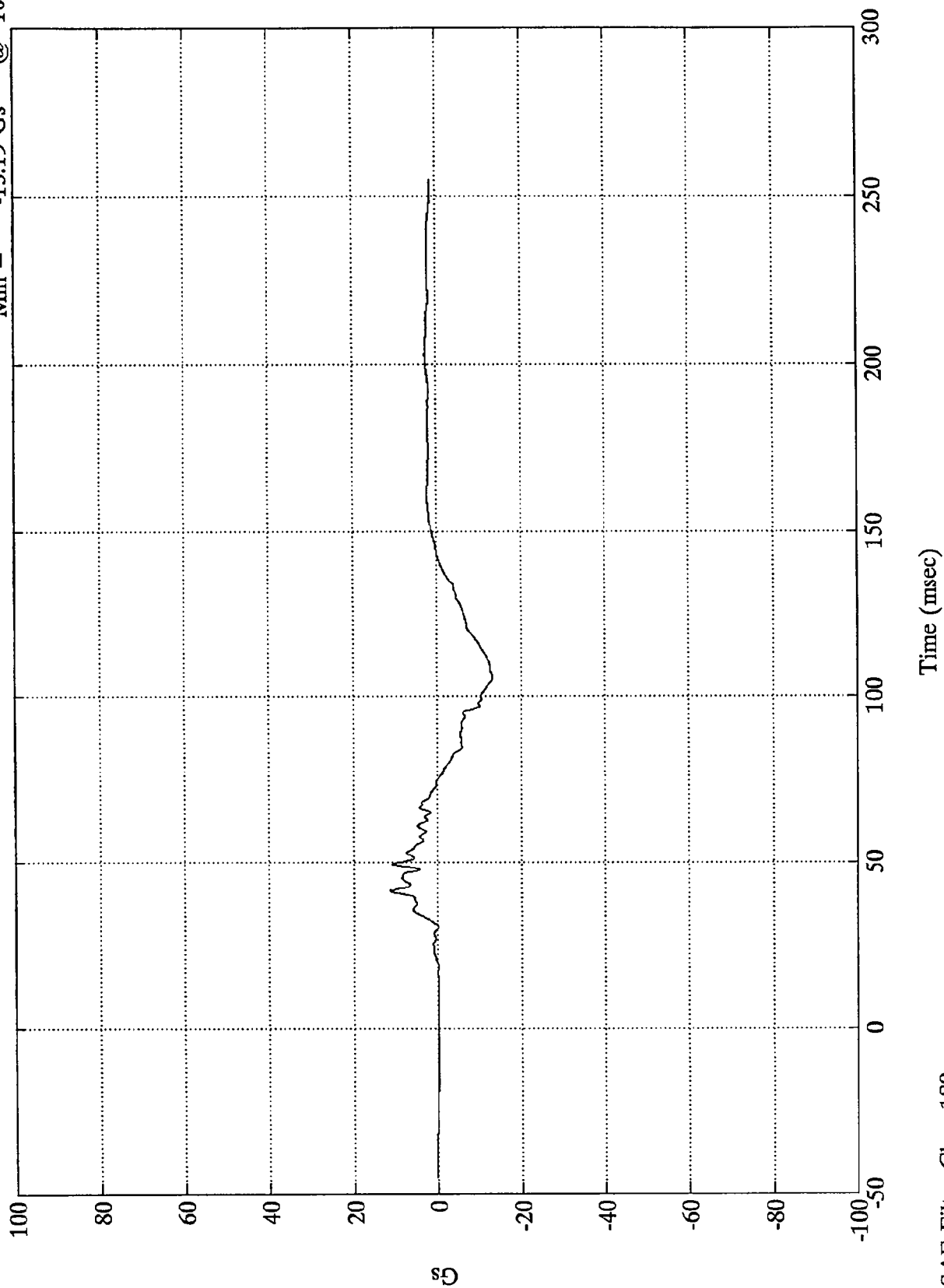
Pos. 1 Chest Y Max = 3.79 Gs @ 82.19 msec
 Min = -4.75 Gs @ 54.84 msec



SAE Filter Class 180

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Chest Z
 Max = 11.25 Gs @ 41.28 msec
 Min = -13.19 Gs @ 105.48 msec

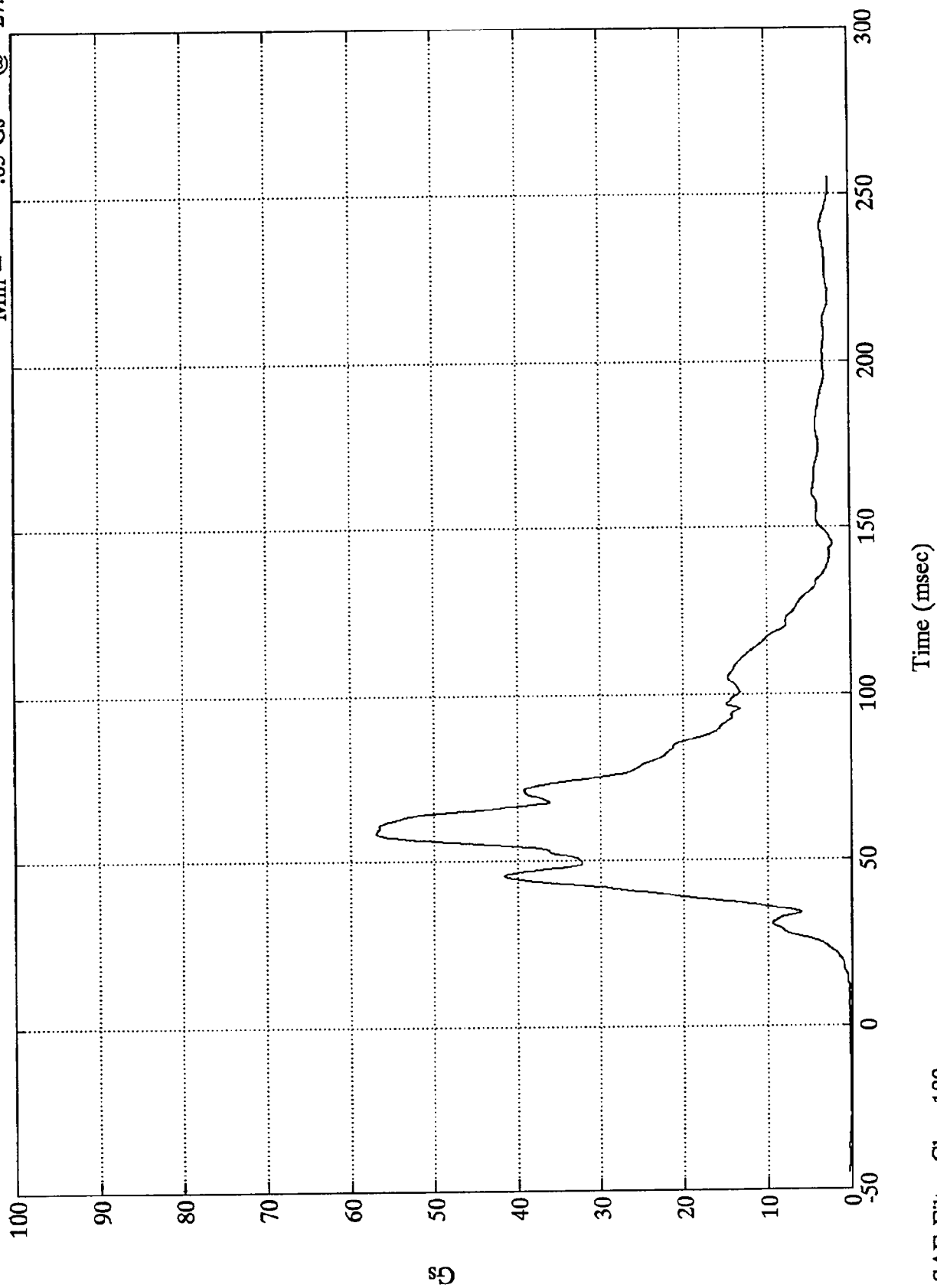


SAE Filter Class 180

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Chest Resultant

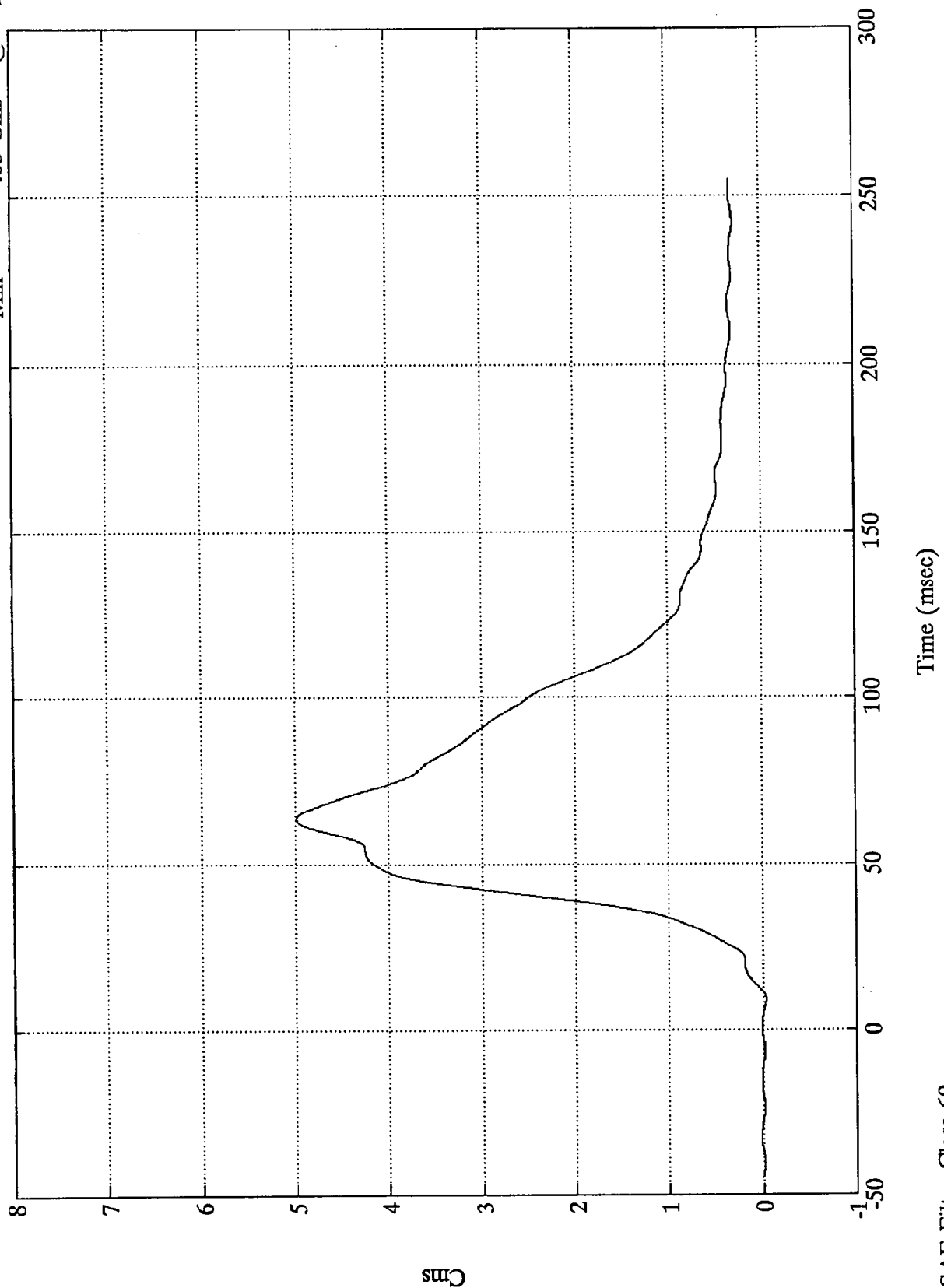
Max = 56.91 Gs @ 58.31 msec
Min = .05 Gs @ -27.48 msec



SAE Filter Class 180

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Chest Disp. Max = 4.99 Cms @ 63.84 msec
 Min = -.03 Cms @ 9.00 msec

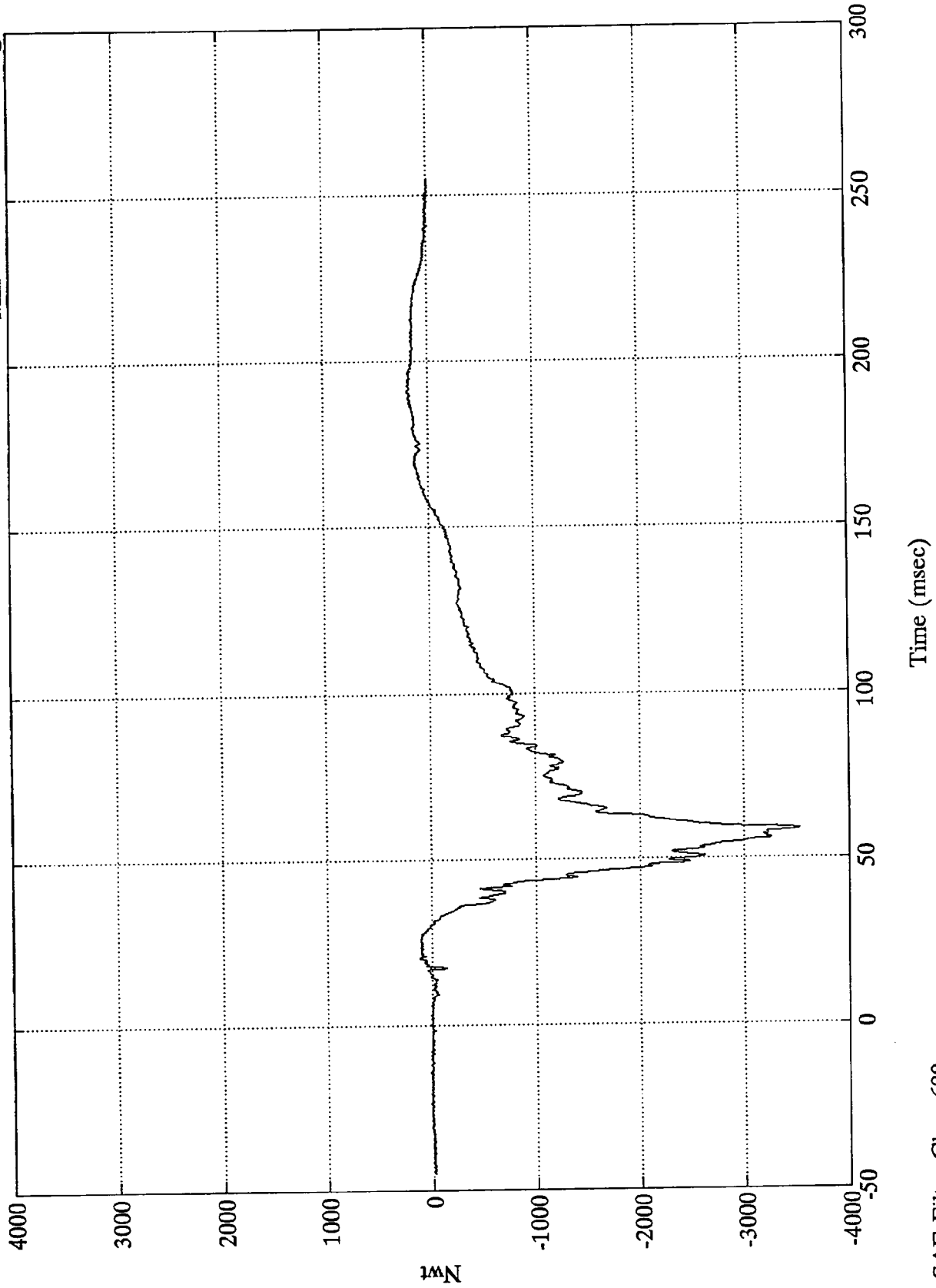


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Left Femur

Max = 199.88 Nwt @ 190.80 msec
Min = -3525.36 Nwt @ 58.68 msec

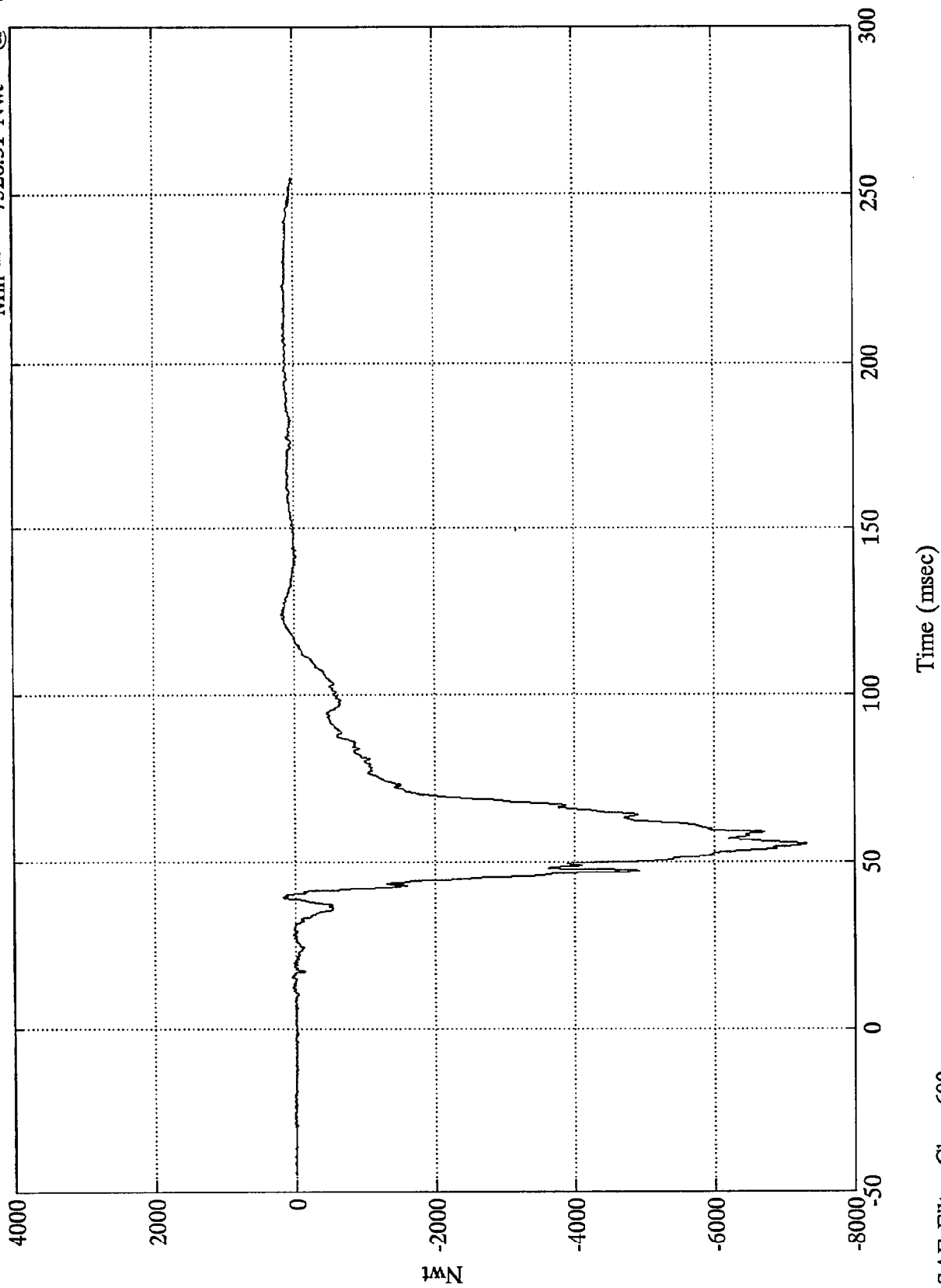


SAE Filter Class 600

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Right Femur

Max = 190.08 Nwt @ 124.20 msec
Min = -7320.31 Nwt @ 55.56 msec

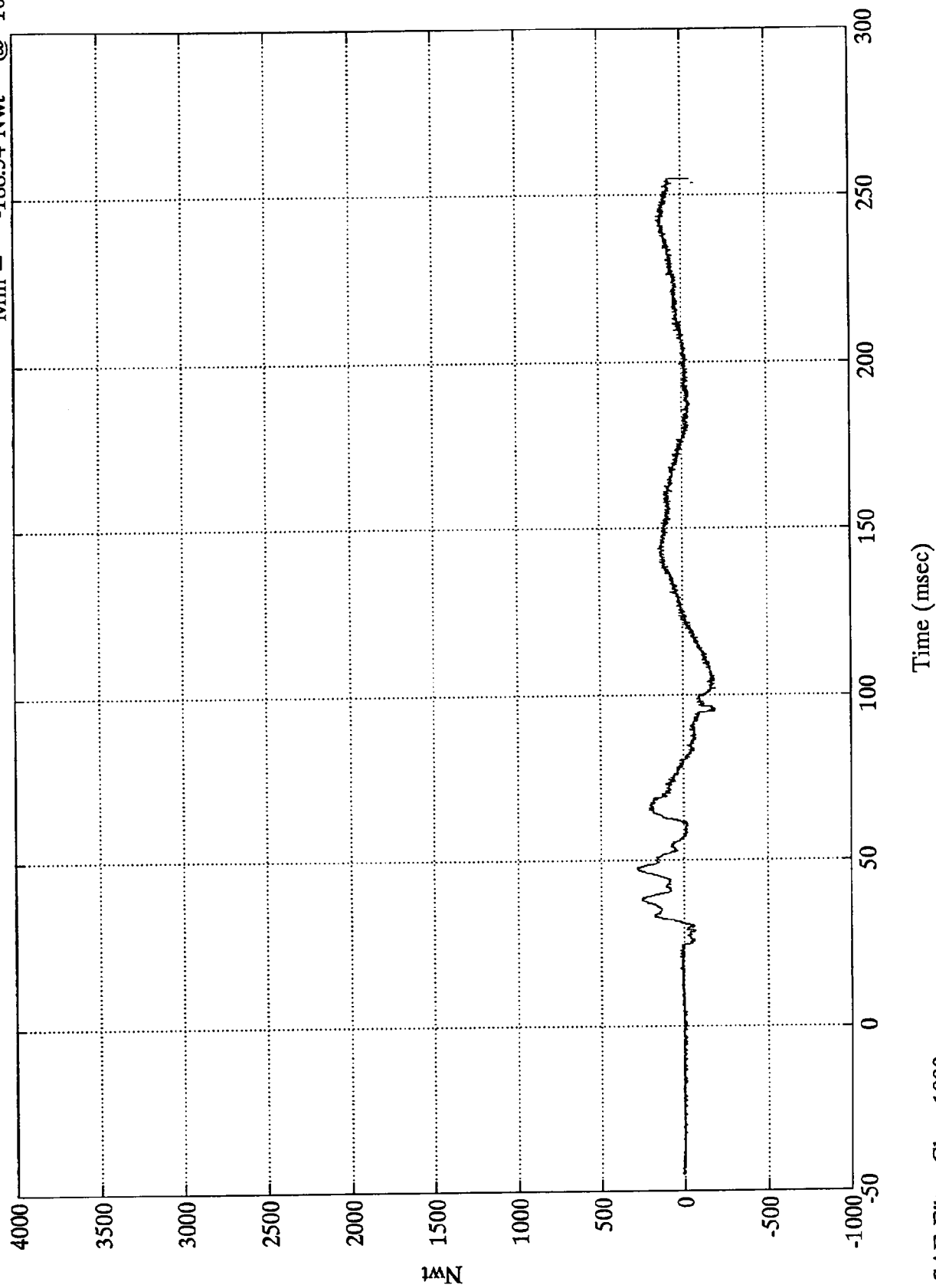


SAE Filter Class 600

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Upper Neck Fx

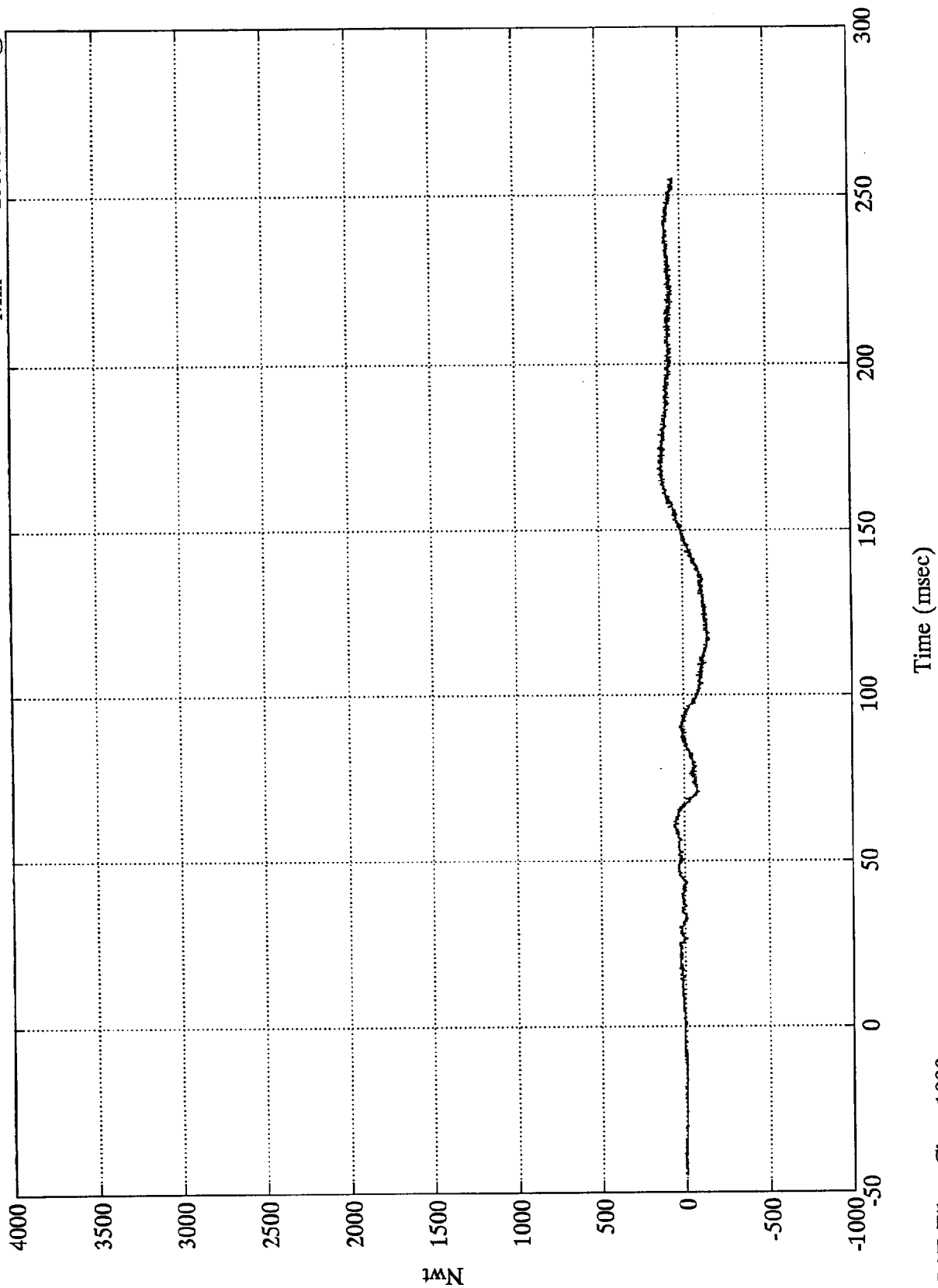
Max = 282.28 Nwt @ 47.63 msec
Min = -188.54 Nwt @ 101.87 msec



SAE Filter Class 1000

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Upper Neck Fy
 Max = 141.55 Nwt @ 168.36 msec
 Min = -153.69 Nwt @ 118.80 msec

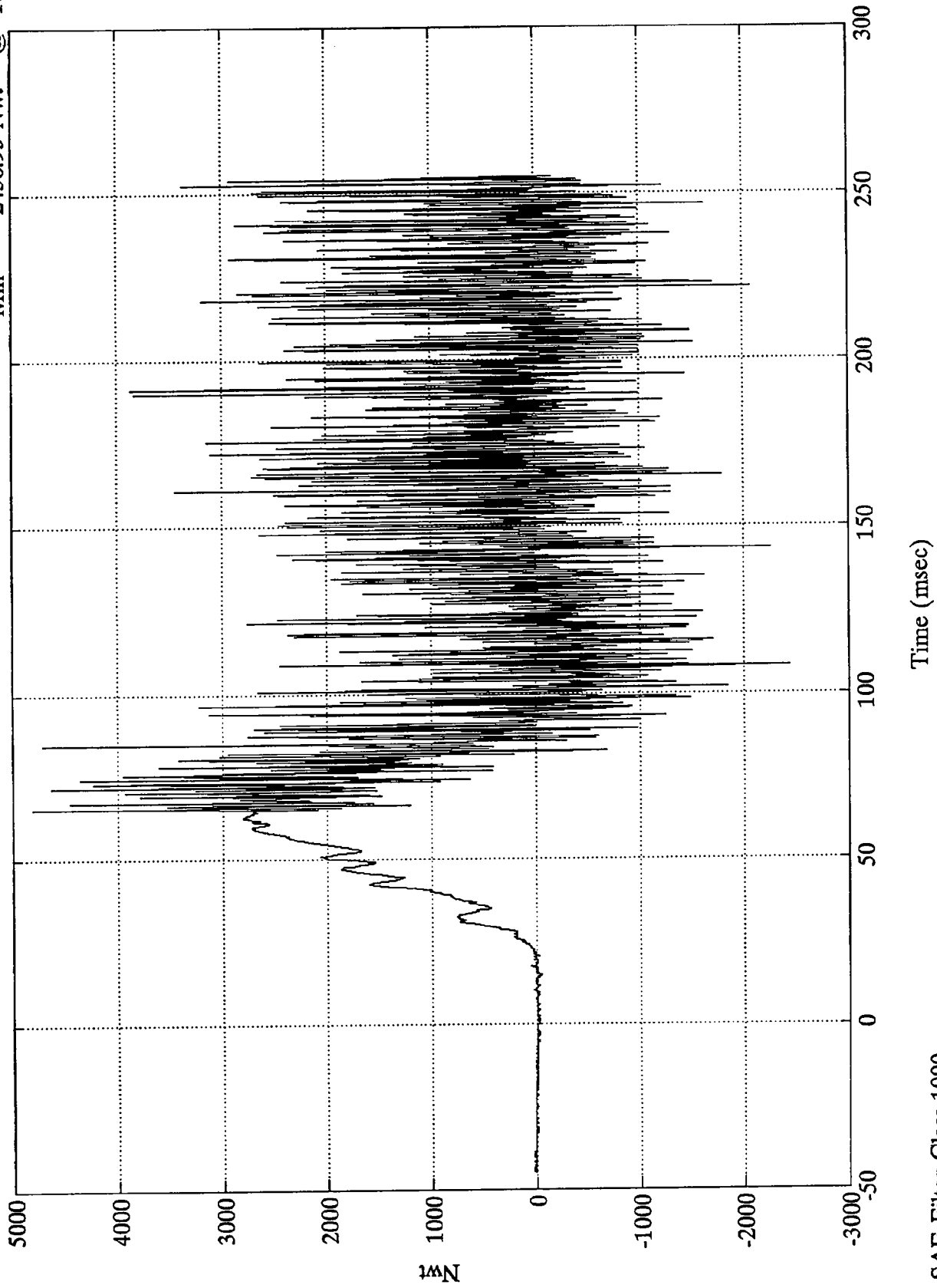


SAE Filter Class 1000

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Upper Neck Fz

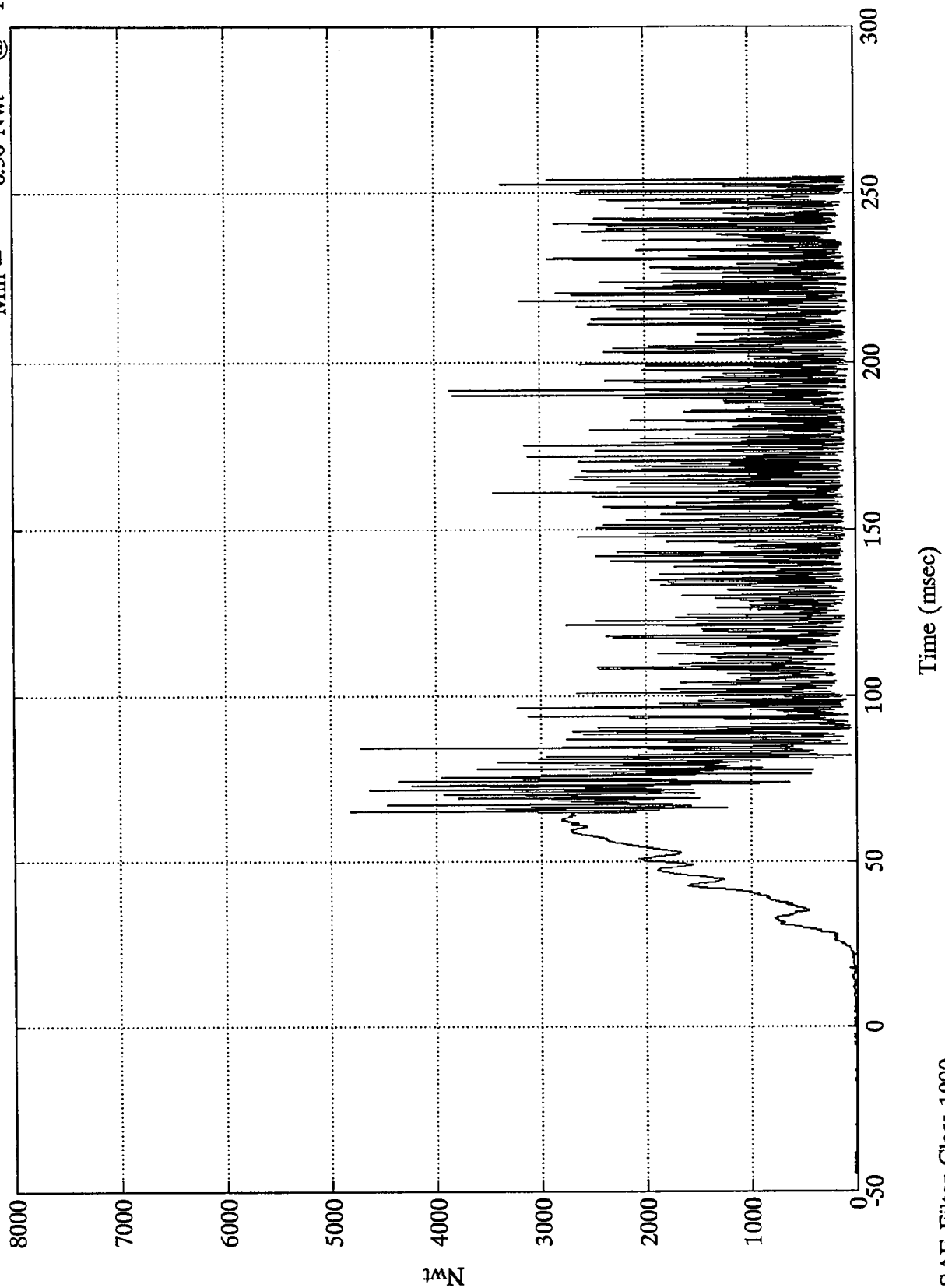
Max = 4811.30 Nwt @ 65.40 msec
Min = -2436.93 Nwt @ 108.00 msec



NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Neck Force Res.

Max = 4815.75 Nwt @ 65.40 msec
Min = 6.36 Nwt @ -10.32 msec

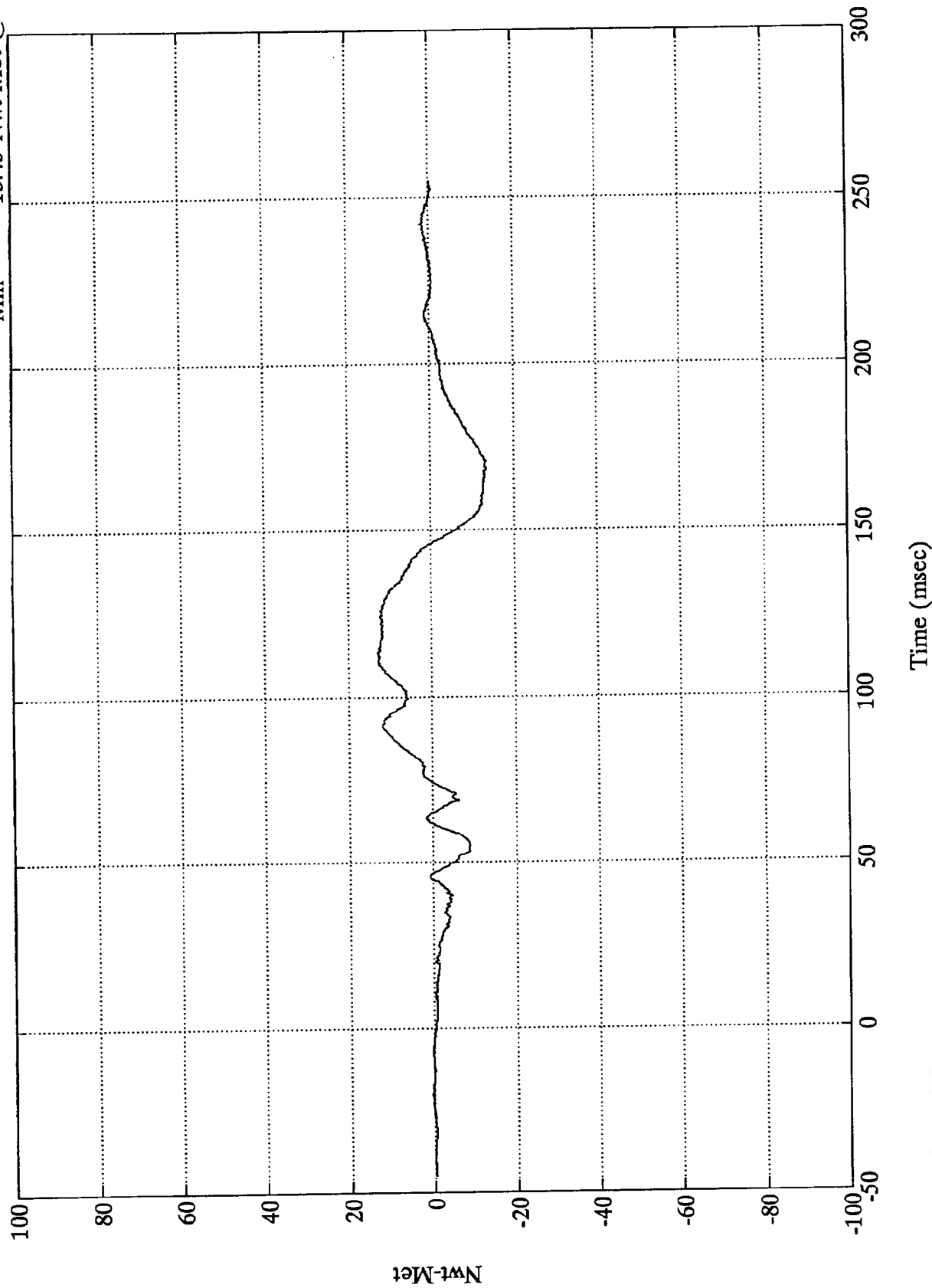


SAE Filter Class 1000

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Upper Neck Mx

Max = 12.99 Nwt-Met @ 113.04 msec
Min = -13.45 Nwt-Met @ 168.36 msec

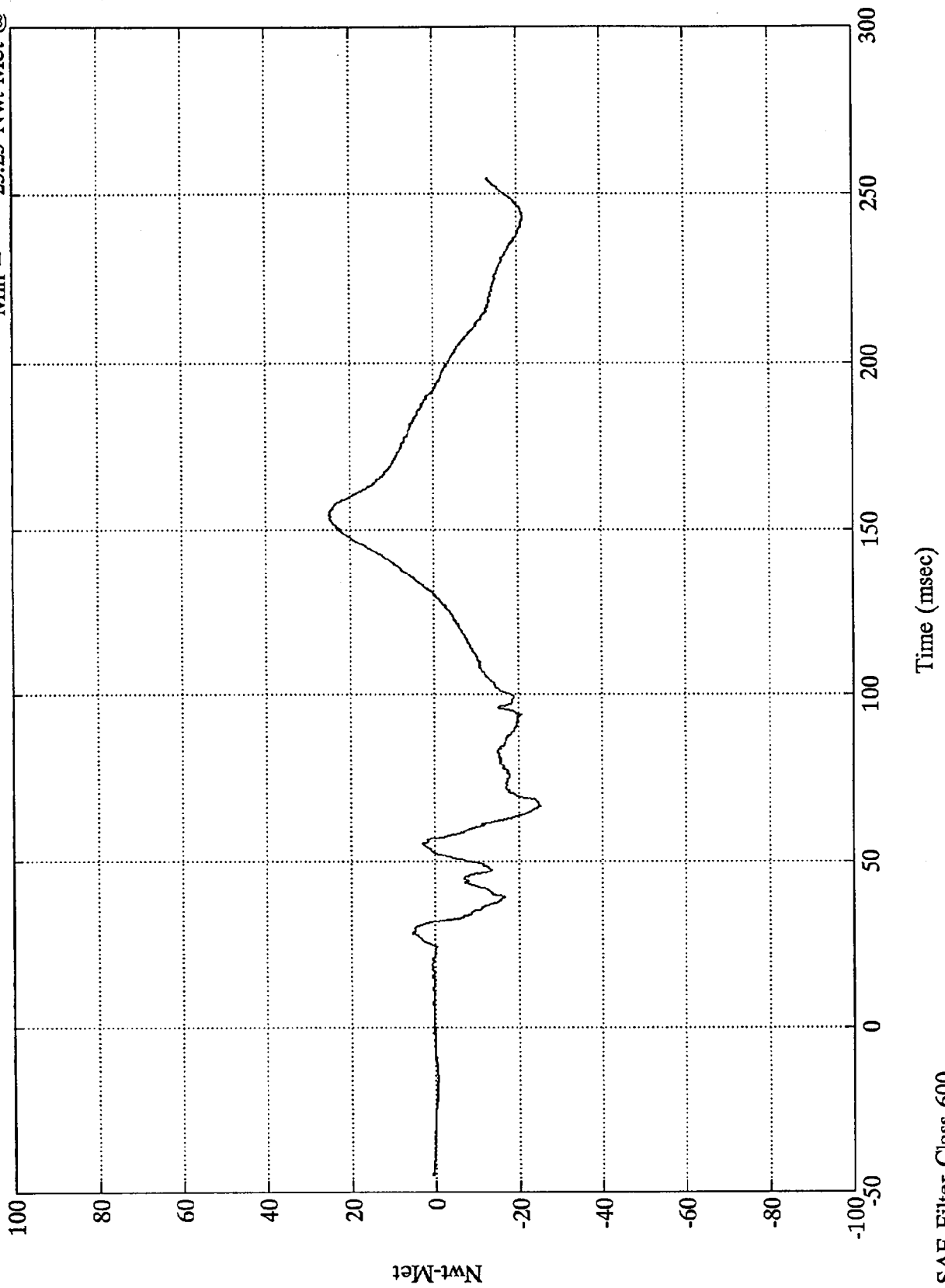


SAE Filter Class 600

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Upper Neck My

Max = 24.98 Nwt-Met @ 154.67 msec
Min = -25.25 Nwt-Met @ 66.72 msec

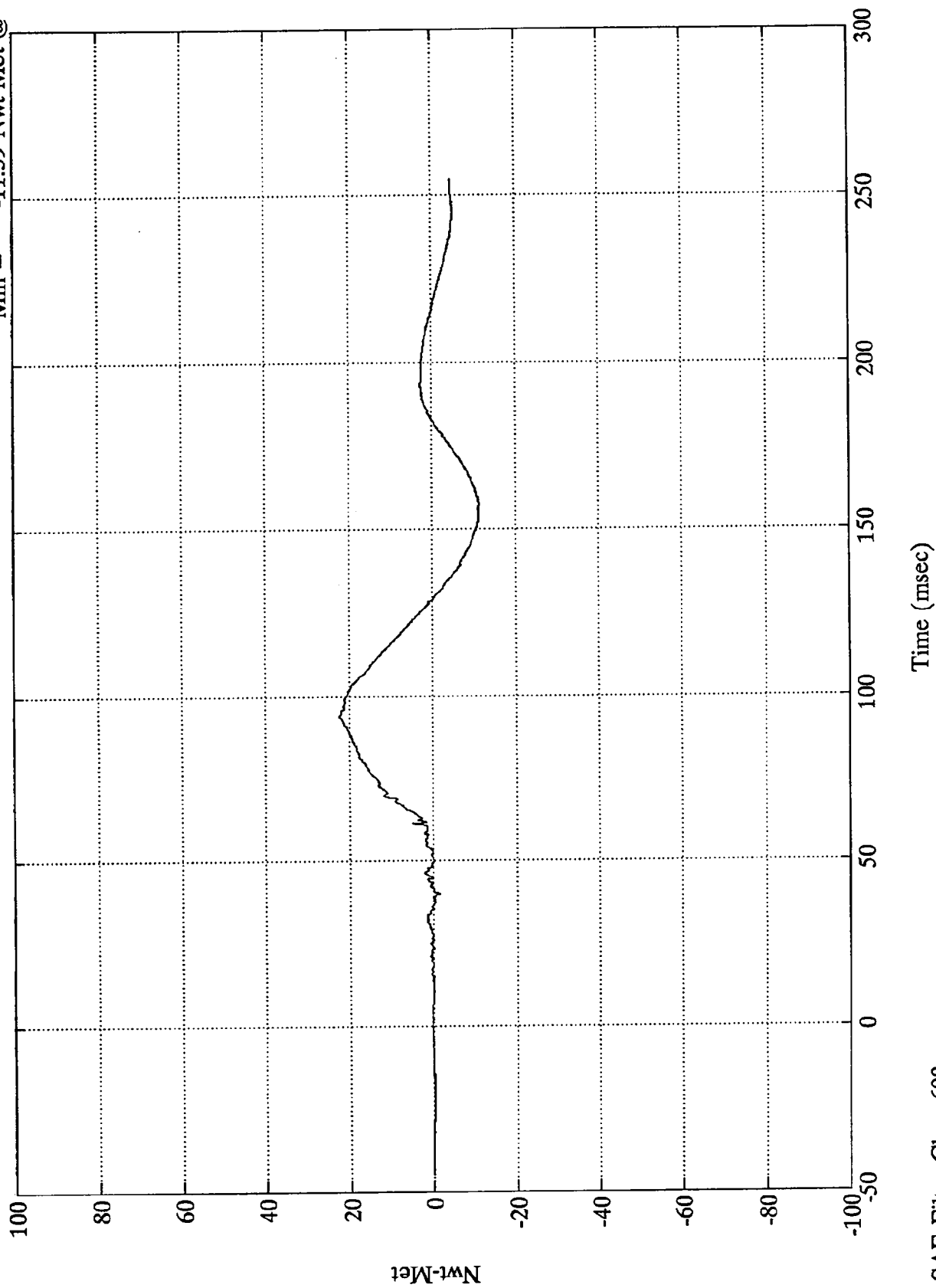


SAE Filter Class 600

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Upper Neck Mz

Max = 22.30 Nwt-Met @ 93.60 msec
Min = -11.39 Nwt-Met @ 157.56 msec

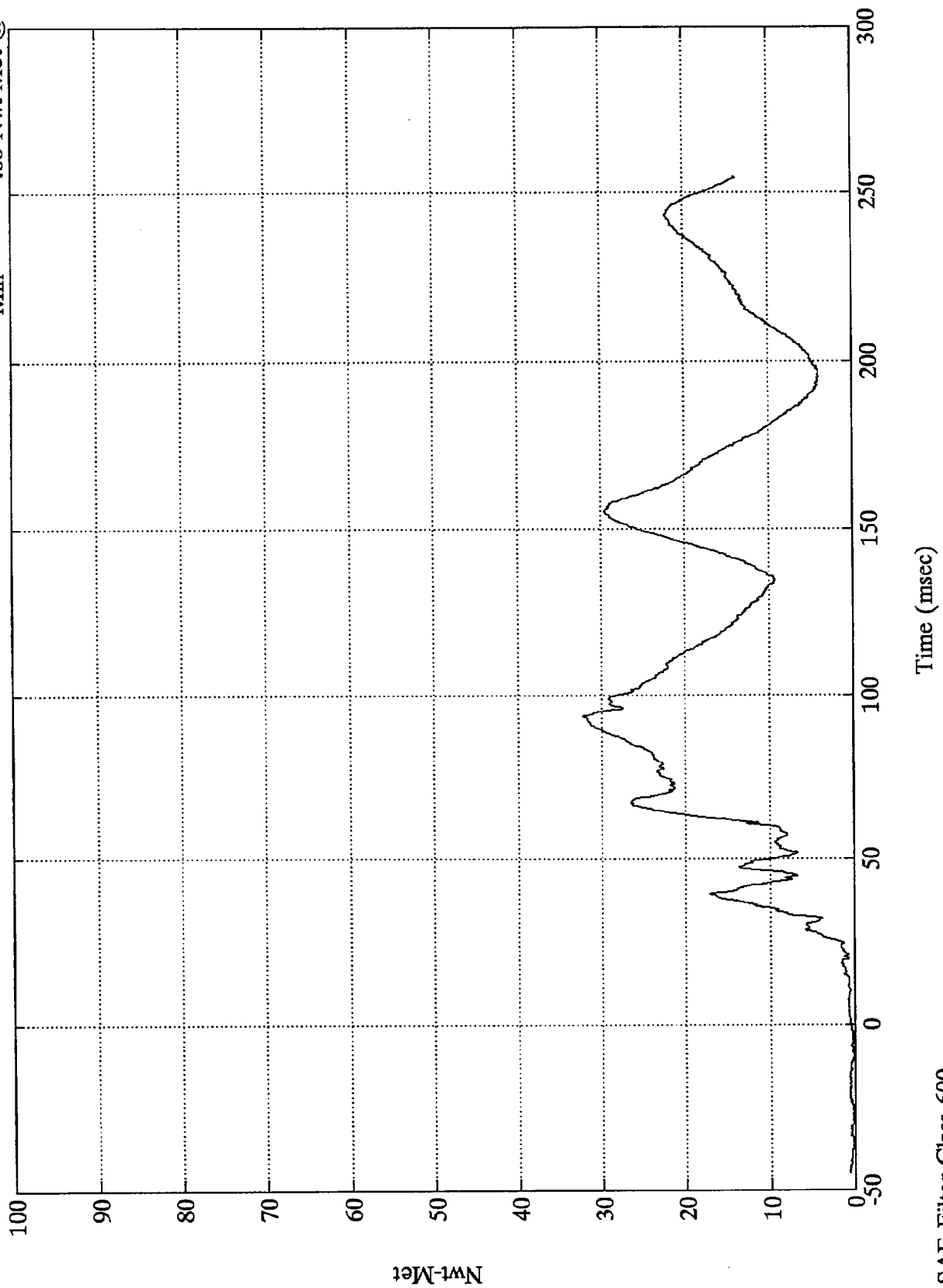


SAE Filter Class 600

NCAP TEST #2 JEEP CHEROKEE

Max = 32.20 Nwt-Met @ 93.72 msec
Min = .06 Nwt-Met @ -9.84 msec

Pos. 1 Neck Moment Res.

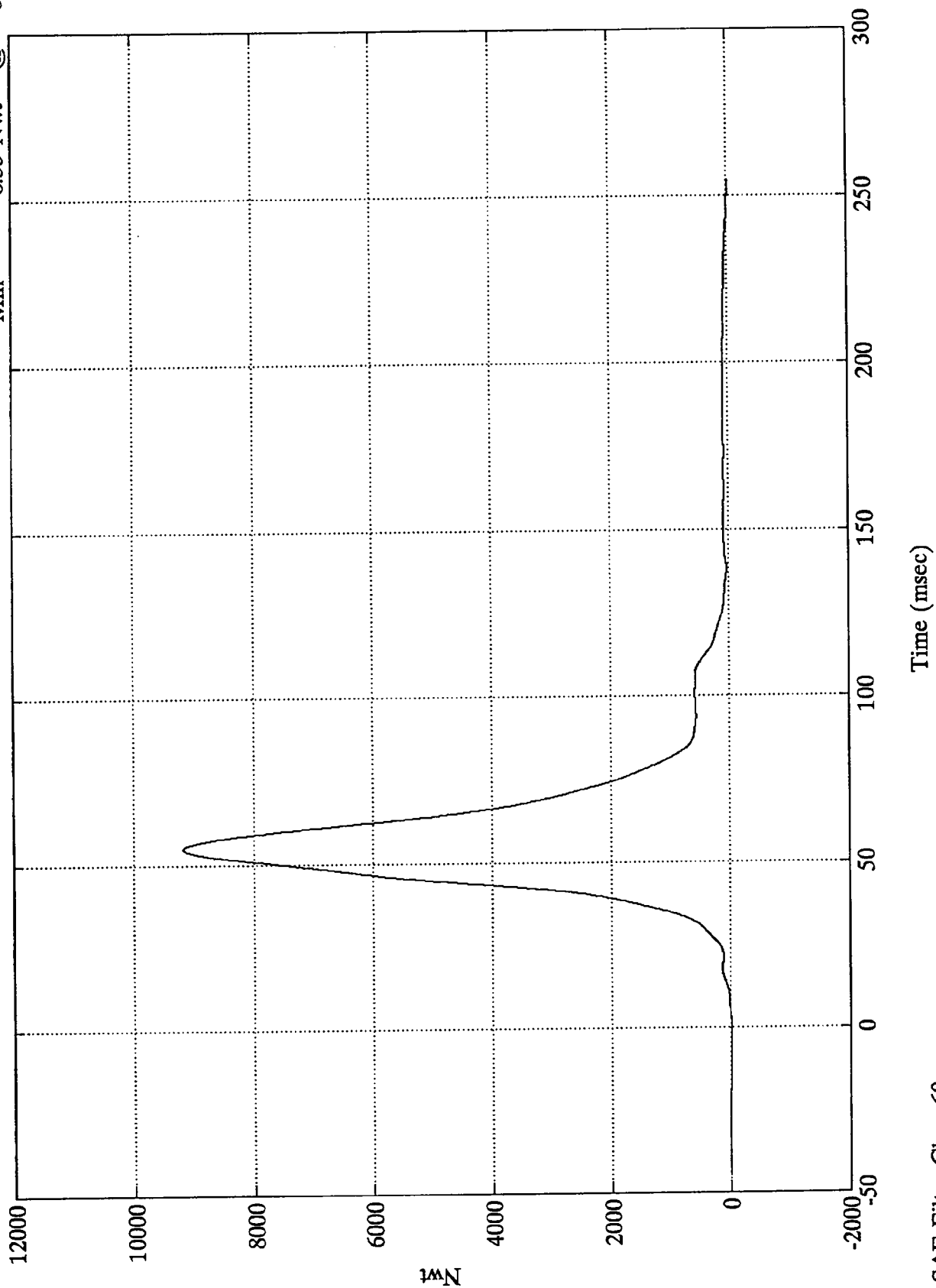


SAE Filter Class 600

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Left Belt Load

Max = 9177.69 Nwt @ 55.08 msec
Min = -6.55 Nwt @ 0.23 msec

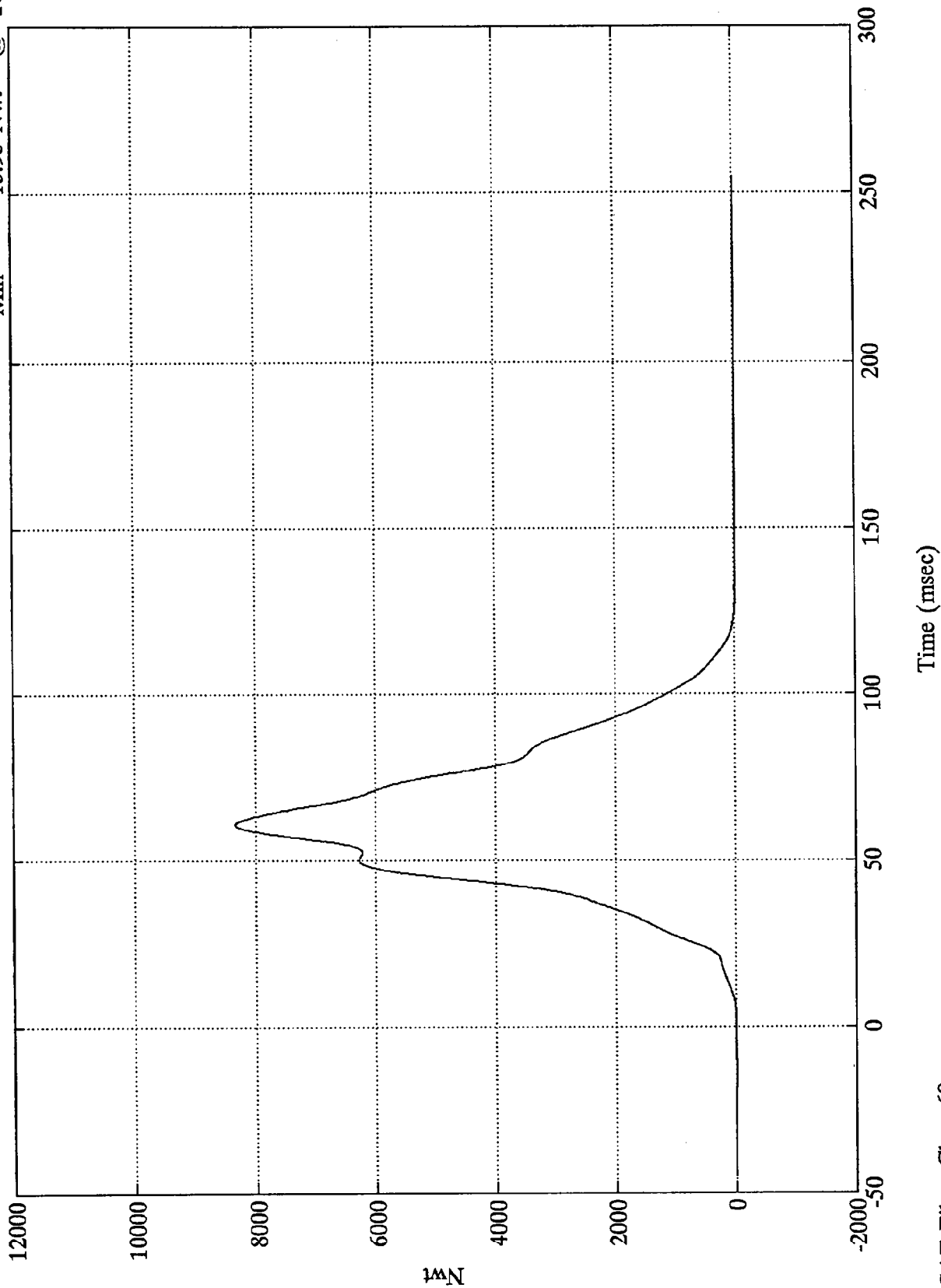


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Torso Belt Load

Max = 8330.64 Nwt @ 60.84 msec
Min = -15.95 Nwt @ 163.20 msec

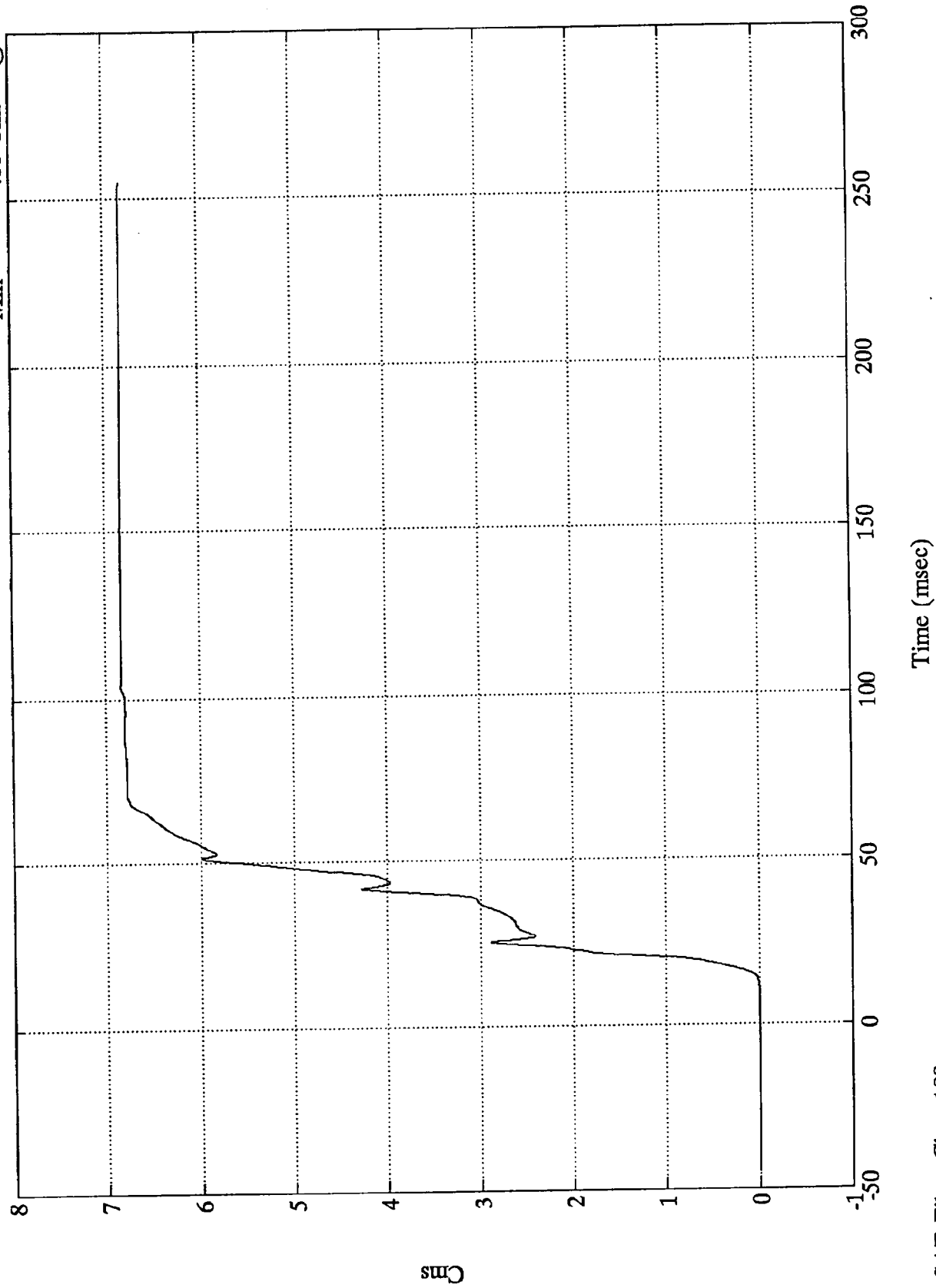


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

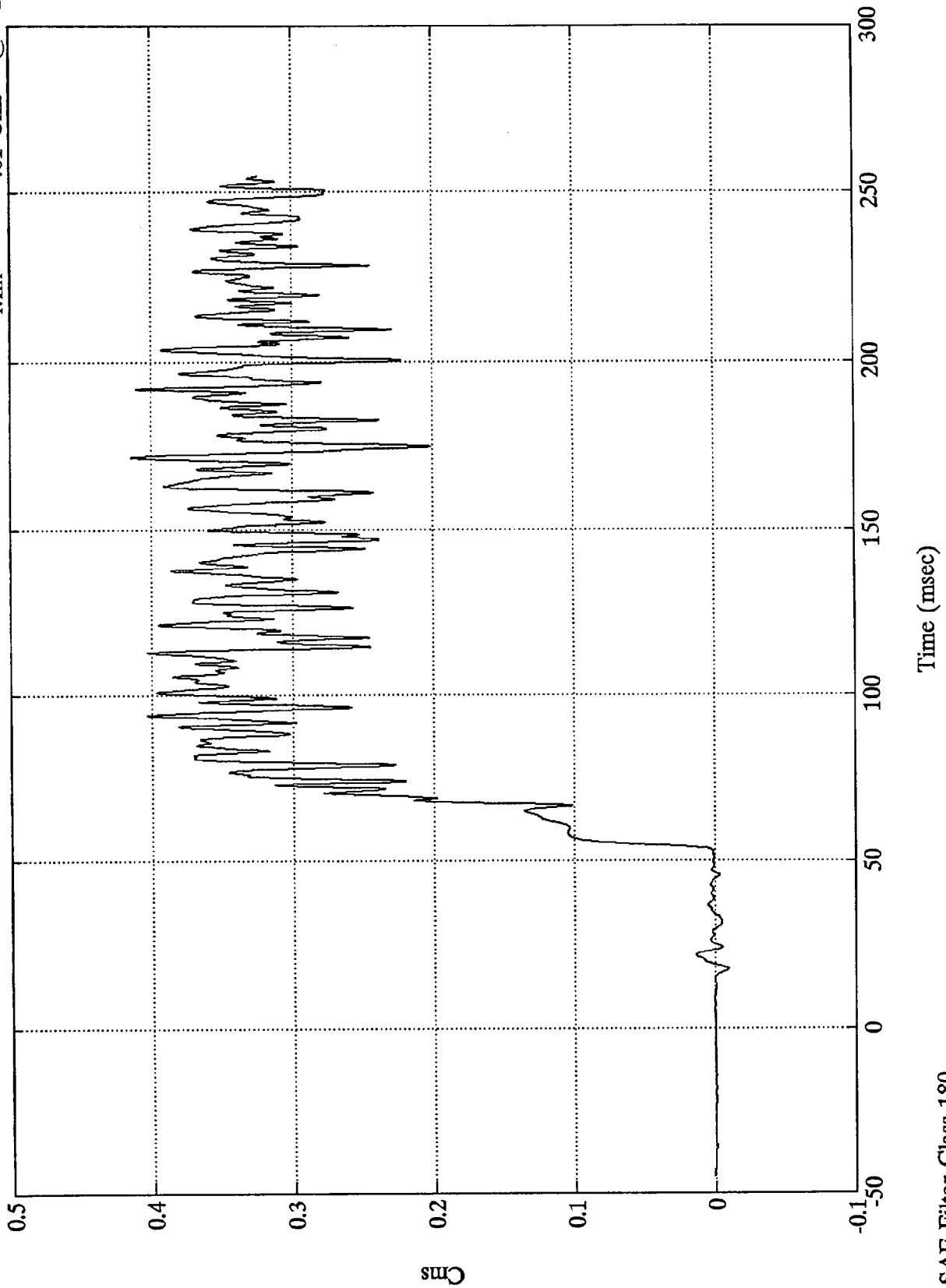
Pos. 1 Belt Spool Out

Max = 6.84 Cms @ 103.55 msec
Min = -.00 Cms @ 9.23 msec



NCAP TEST #2 JEEP CHEROKEE

Pos. 1 Belt Elongation Max = .41 Cms @ 171.60 msec
 Min = -.01 Cms @ 17.51 msec

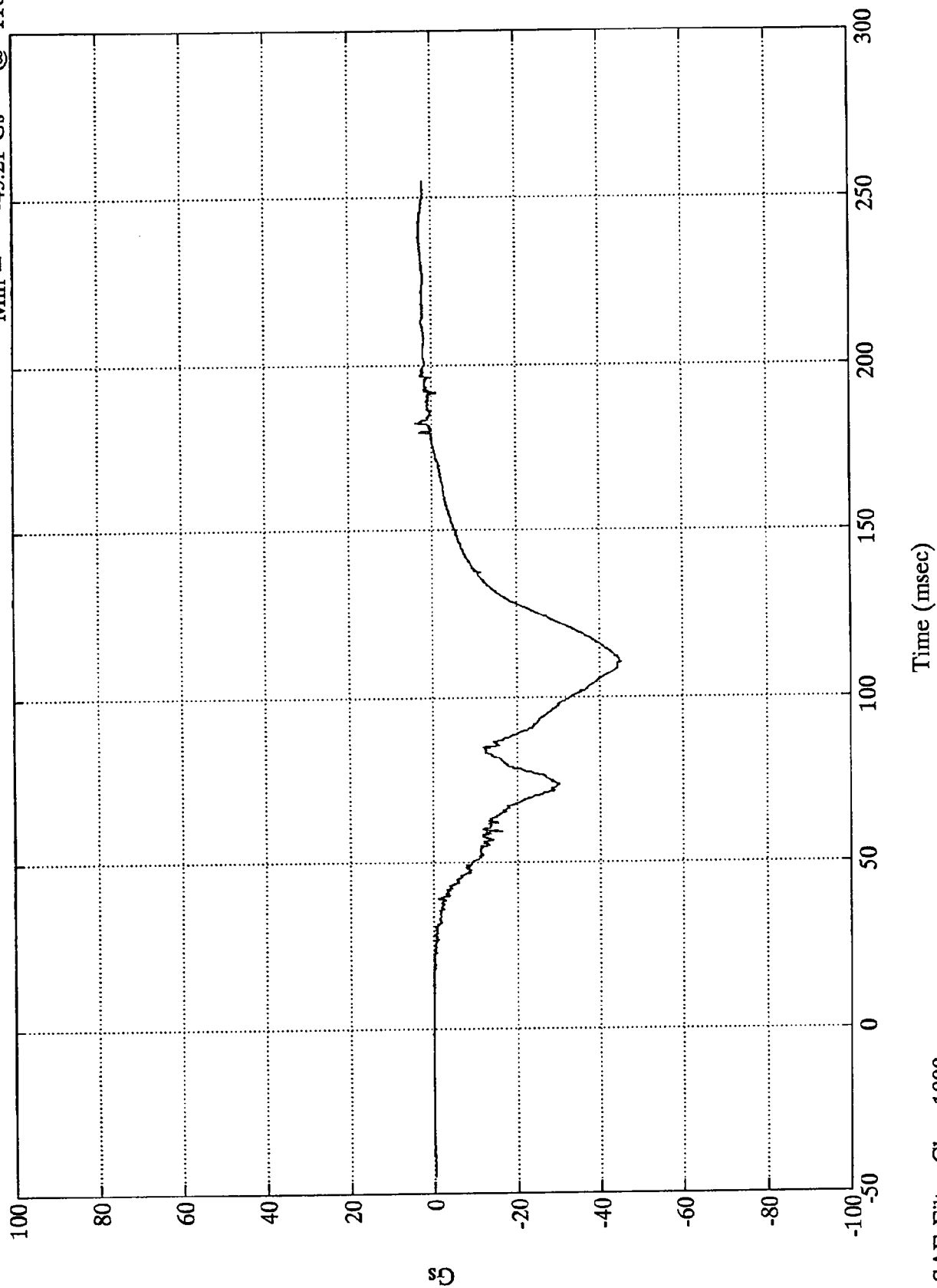


SAE Filter Class 180

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Head X

Max = 3.89 Gs @ 182.52 msec
Min = -45.21 Gs @ 110.40 msec

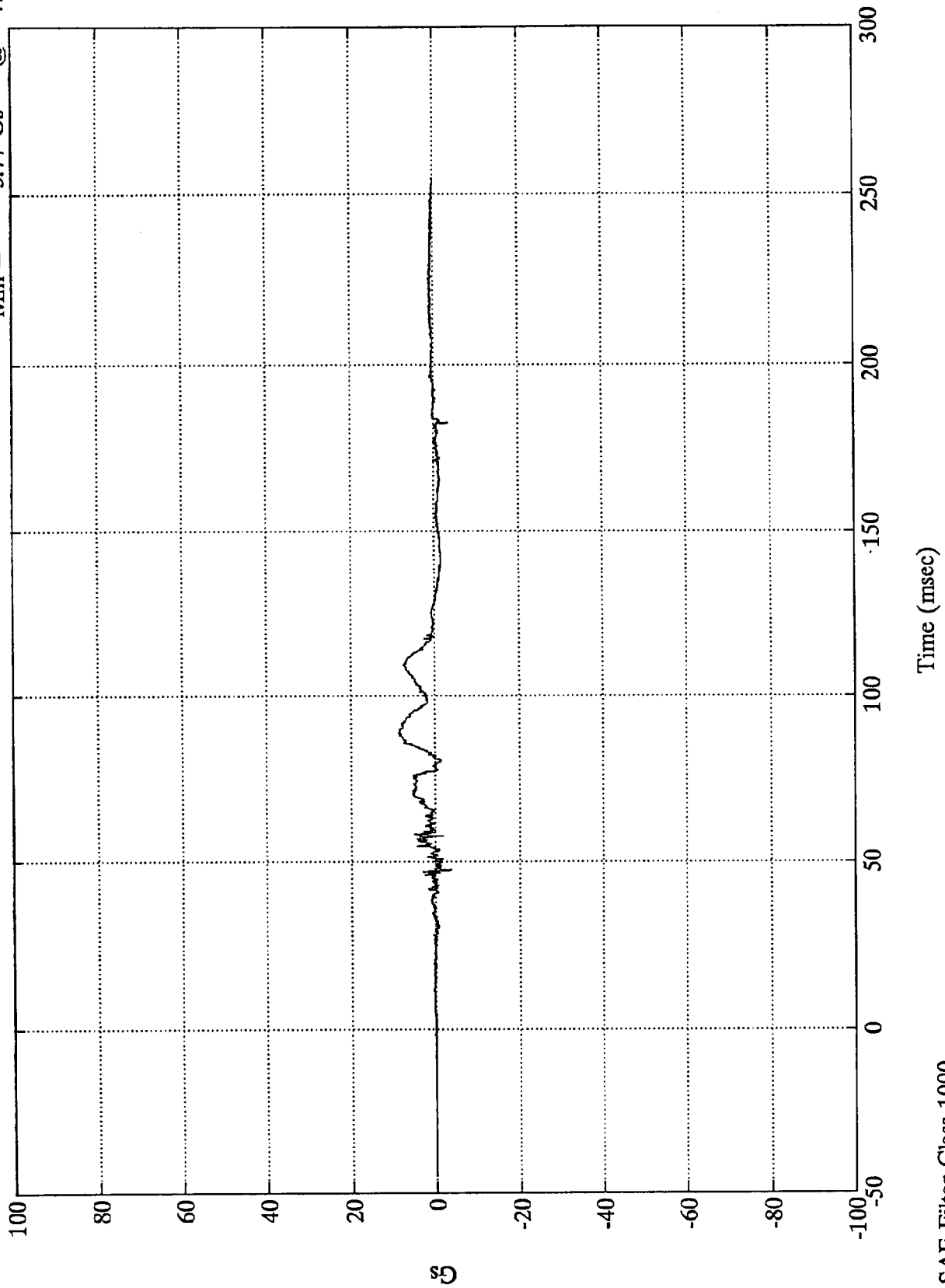


SAE Filter Class 1000

NCAP TEST #2 JEEP CHEROKEE

Max = 8.69 Gs @ 88.92 msec
 Min = -3.77 Gs @ 47.40 msec

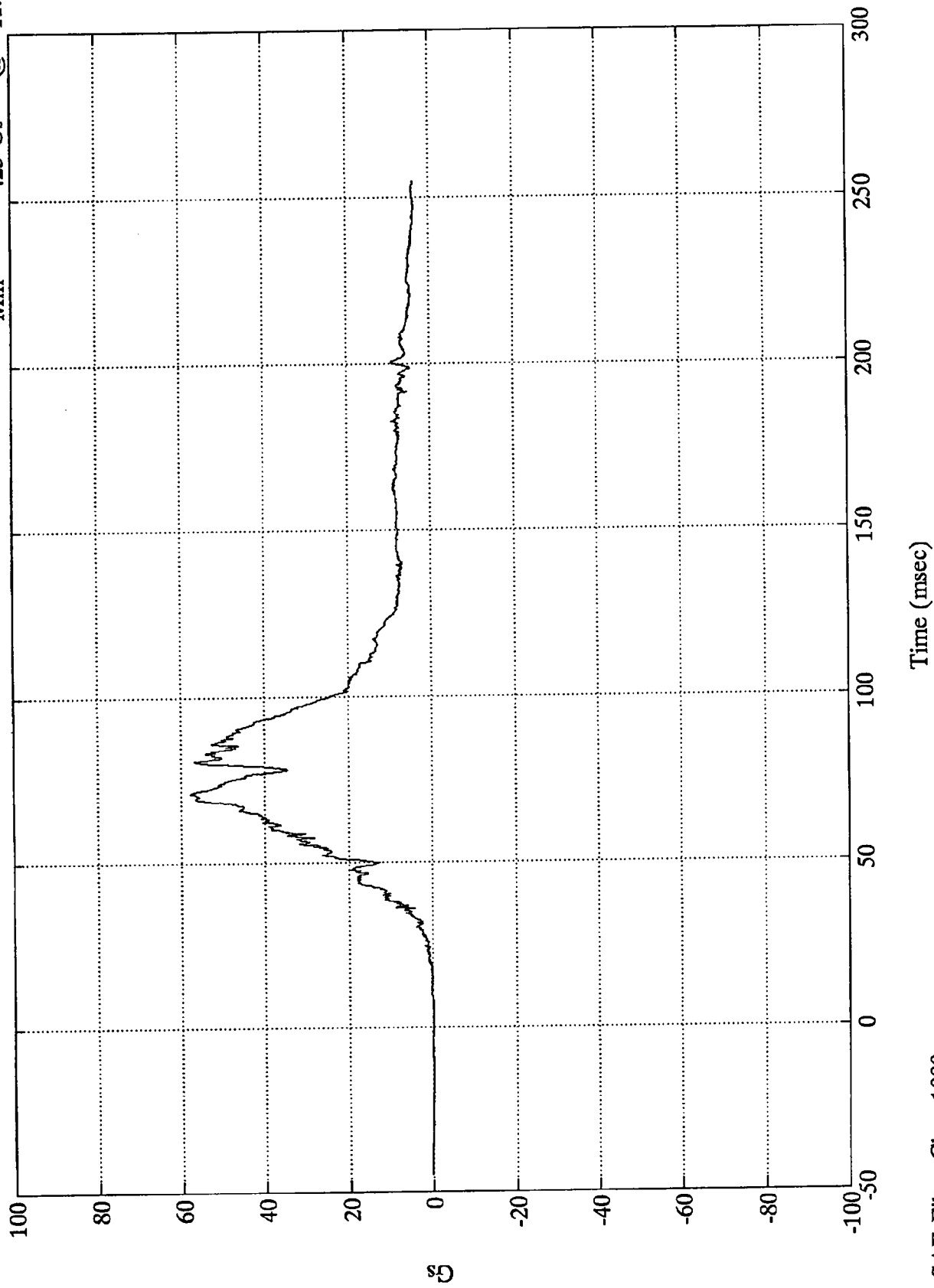
Pos. 2 Head Y



NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Head Z

Max = 57.64 Gs @ 71.04 msec
Min = -23 Gs @ -11.88 msec

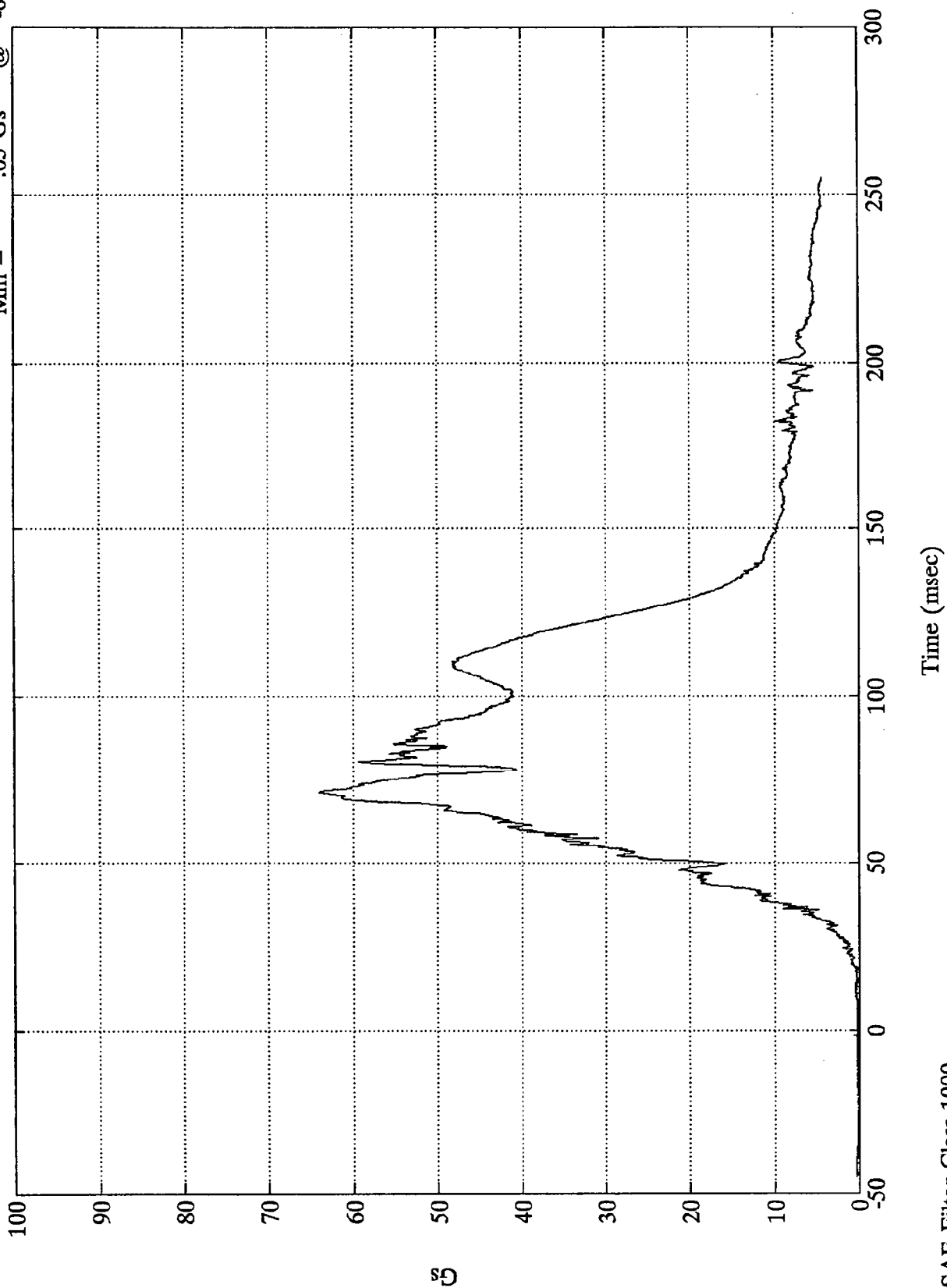


SAE Filter Class 1000

Gs

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Head Resultant
 Max = 64.02 Gs @ 71.40 msec
 Min = .05 Gs @ -8.76 msec



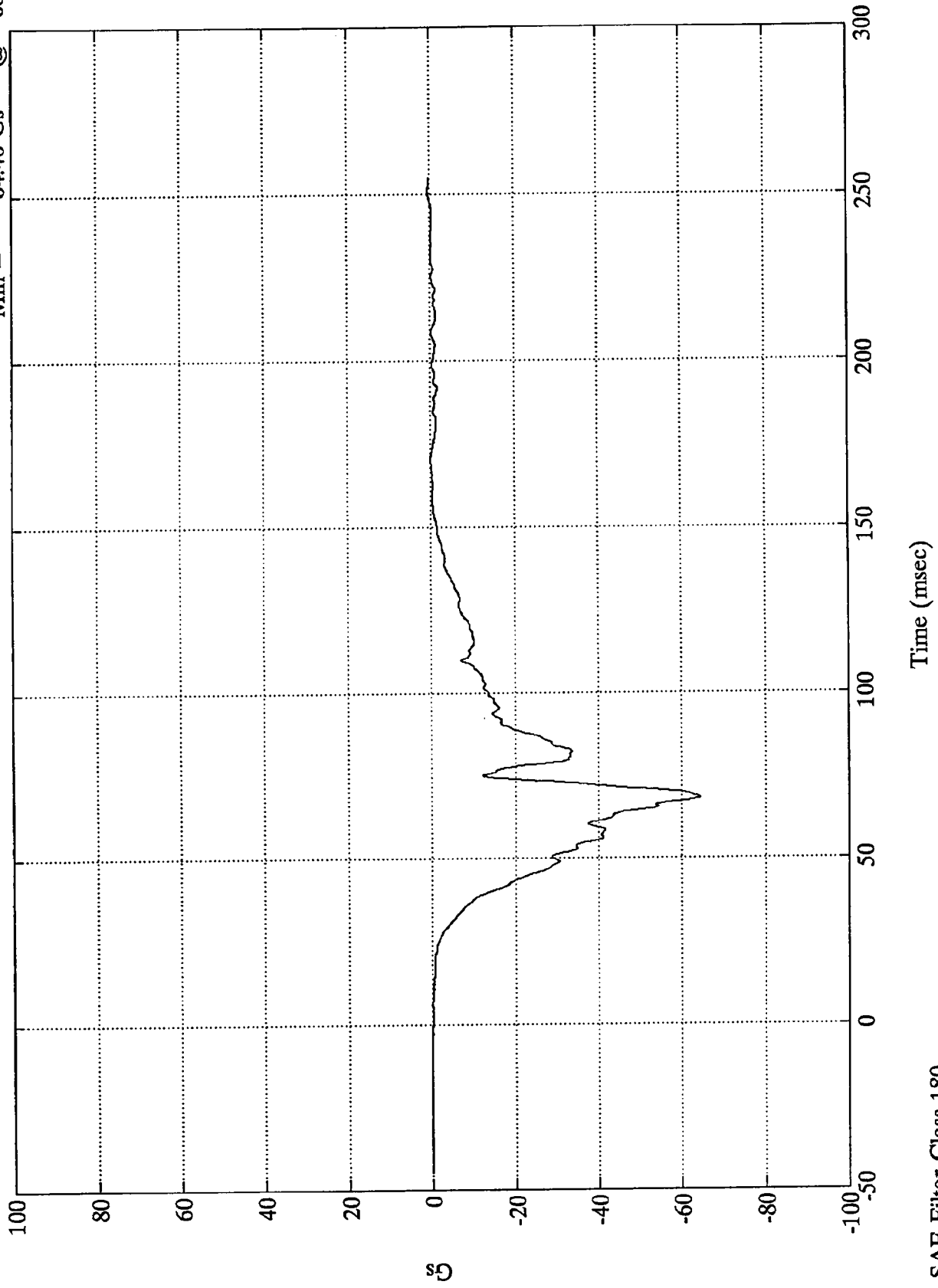
Gs

SAE Filter Class 1000

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Chest X

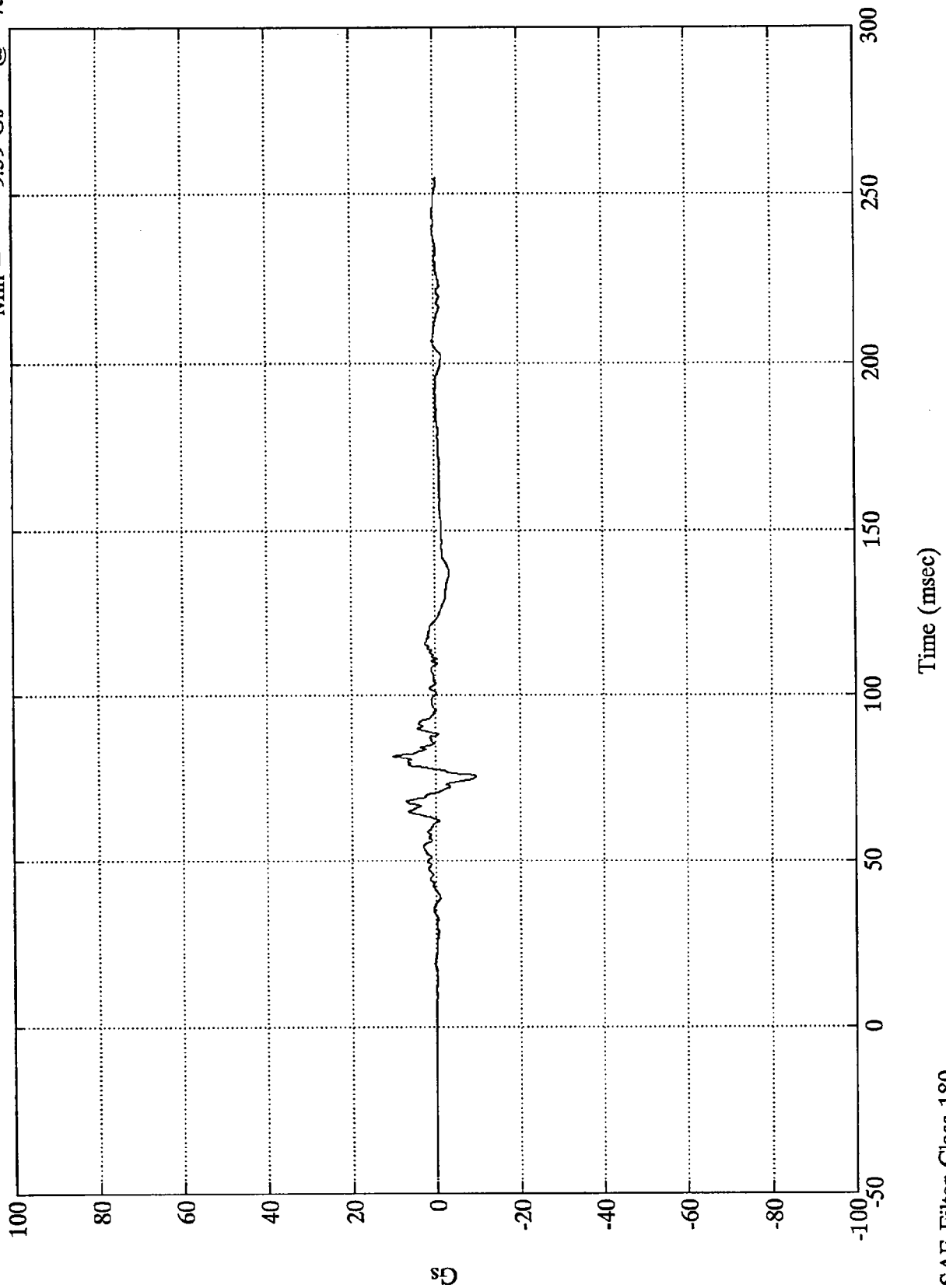
Max = .47 Gs @ 250.80 msec
Min = -64.40 Gs @ 68.52 msec



NCAP TEST #2 JEEP CHEROKEE

Max = 10.10 Gs @ 81.72 msec
 Min = -9.59 Gs @ 75.47 msec

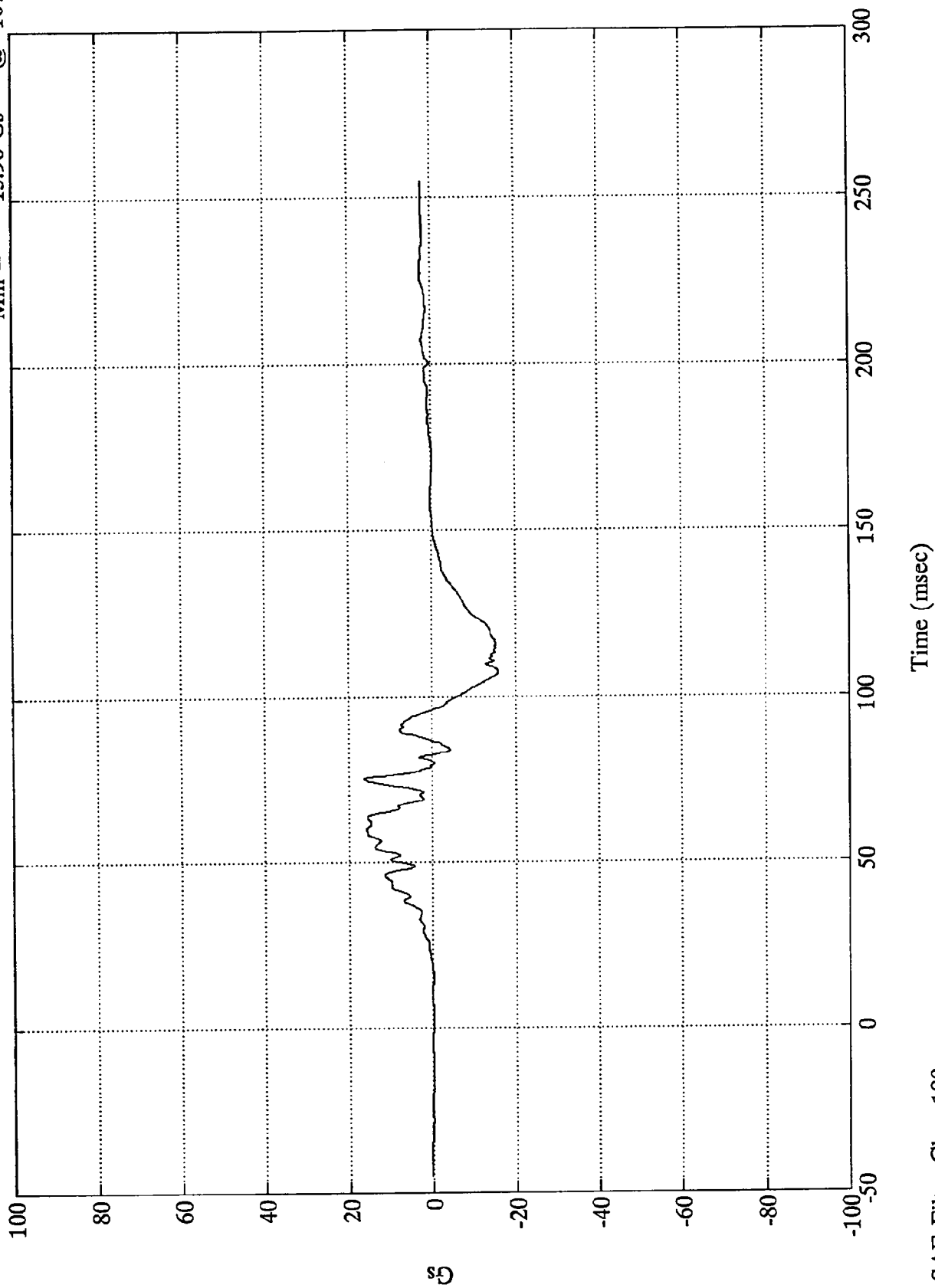
Pos. 2 Chest Y



SAE Filter Class 180

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Chest Z
Max = 16.41 Gs @ 75.36 msec
Min = -15.90 Gs @ 107.51 msec

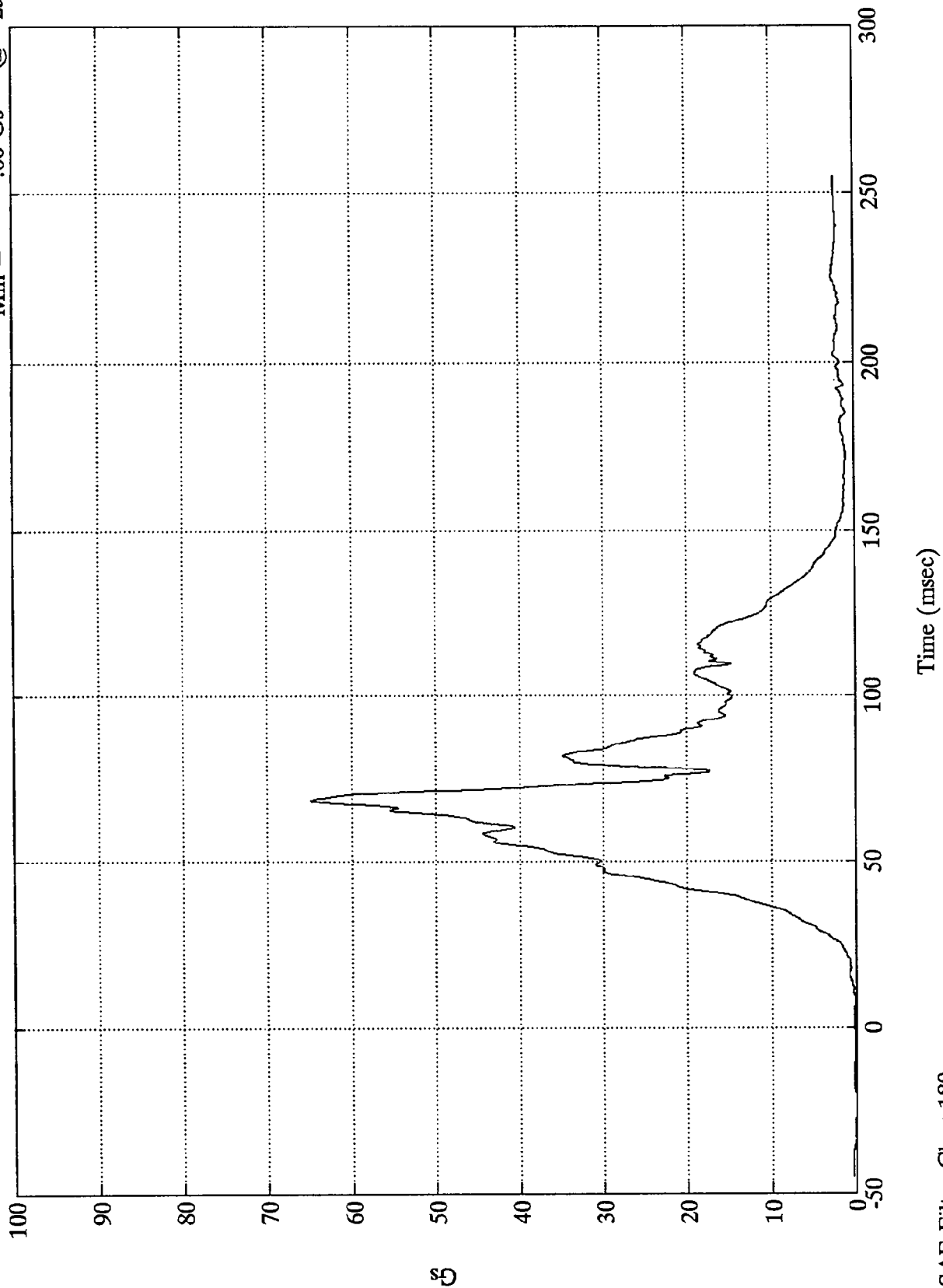


SAE Filter Class 180

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Chest Resultant

Max = 64.84 Gs @ 68.40 msec
Min = .00 Gs @ -25.32 msec

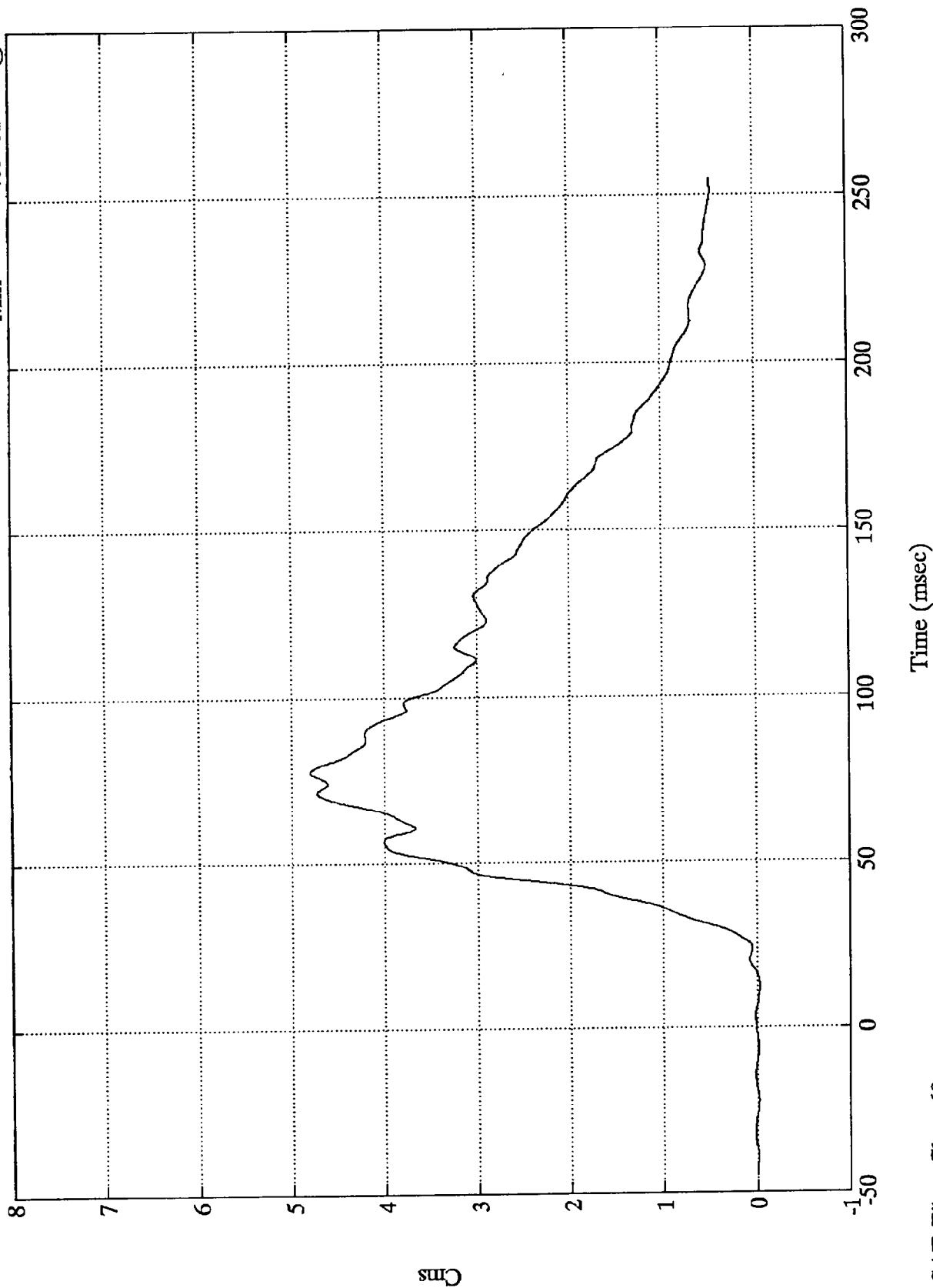


SAE Filter Class 180

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Chest Disp.

Max = 4.80 Cms @ 77.64 msec
Min = -.03 Cms @ 11.99 msec

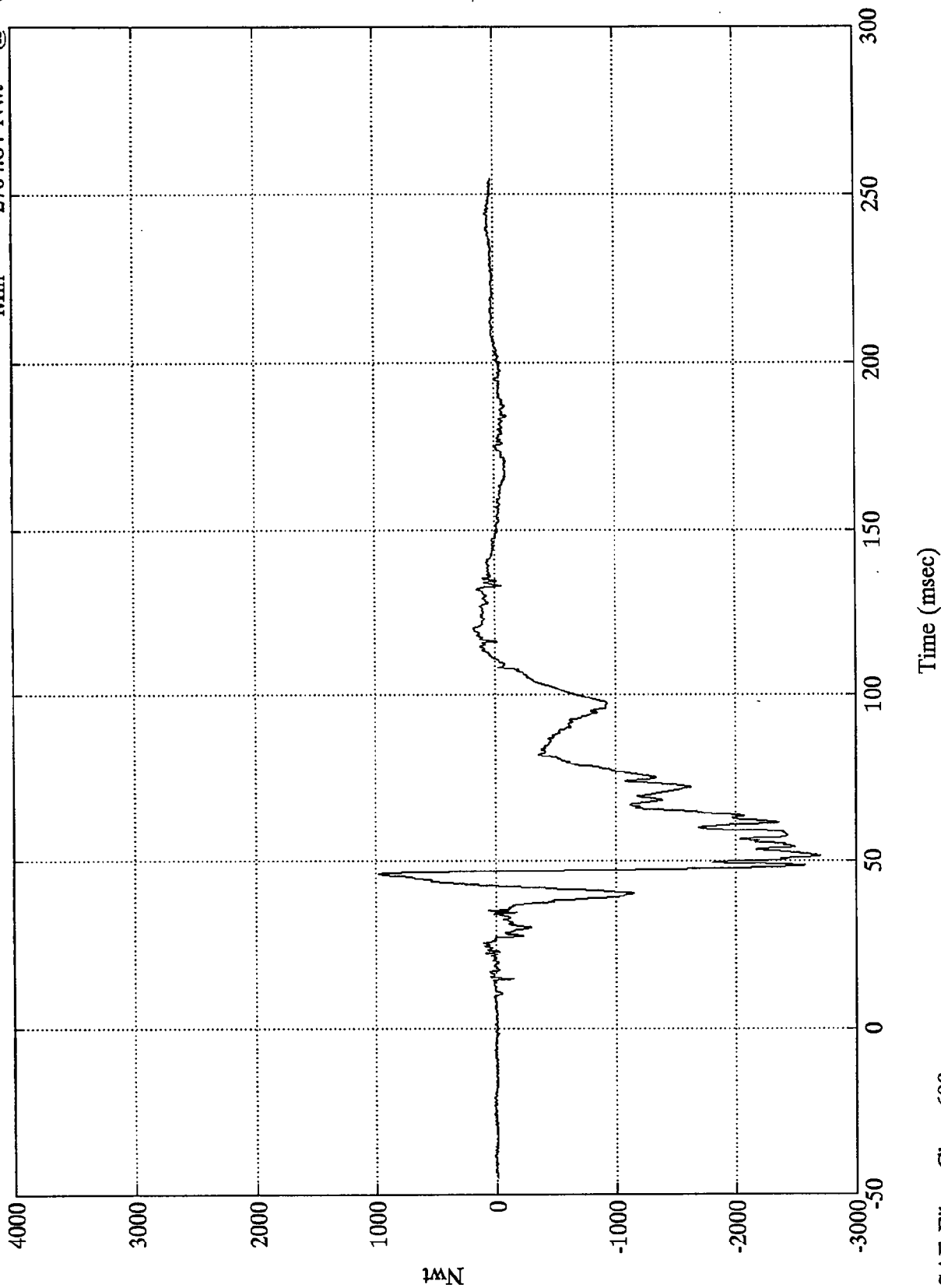


SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

Max = 976.62 Nwt @ 46.08 msec
 Min = -2704.84 Nwt @ 51.60 msec

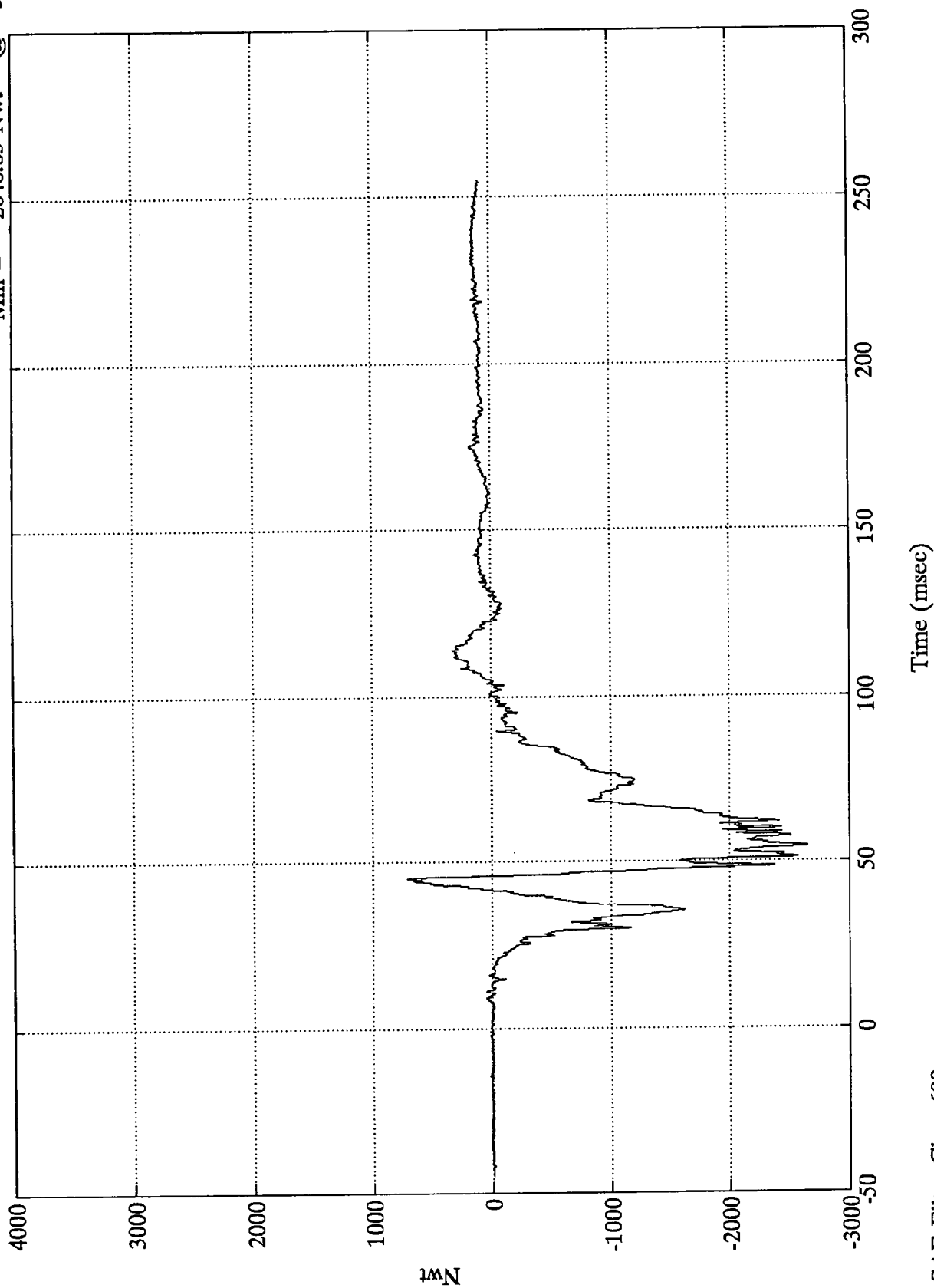
Pos. 2 Left Femur



SAE Filter Class 600

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Right Femur Max = 715.61 Nwt @ 45.00 msec
 Min = -2646.05 Nwt @ 54.47 msec

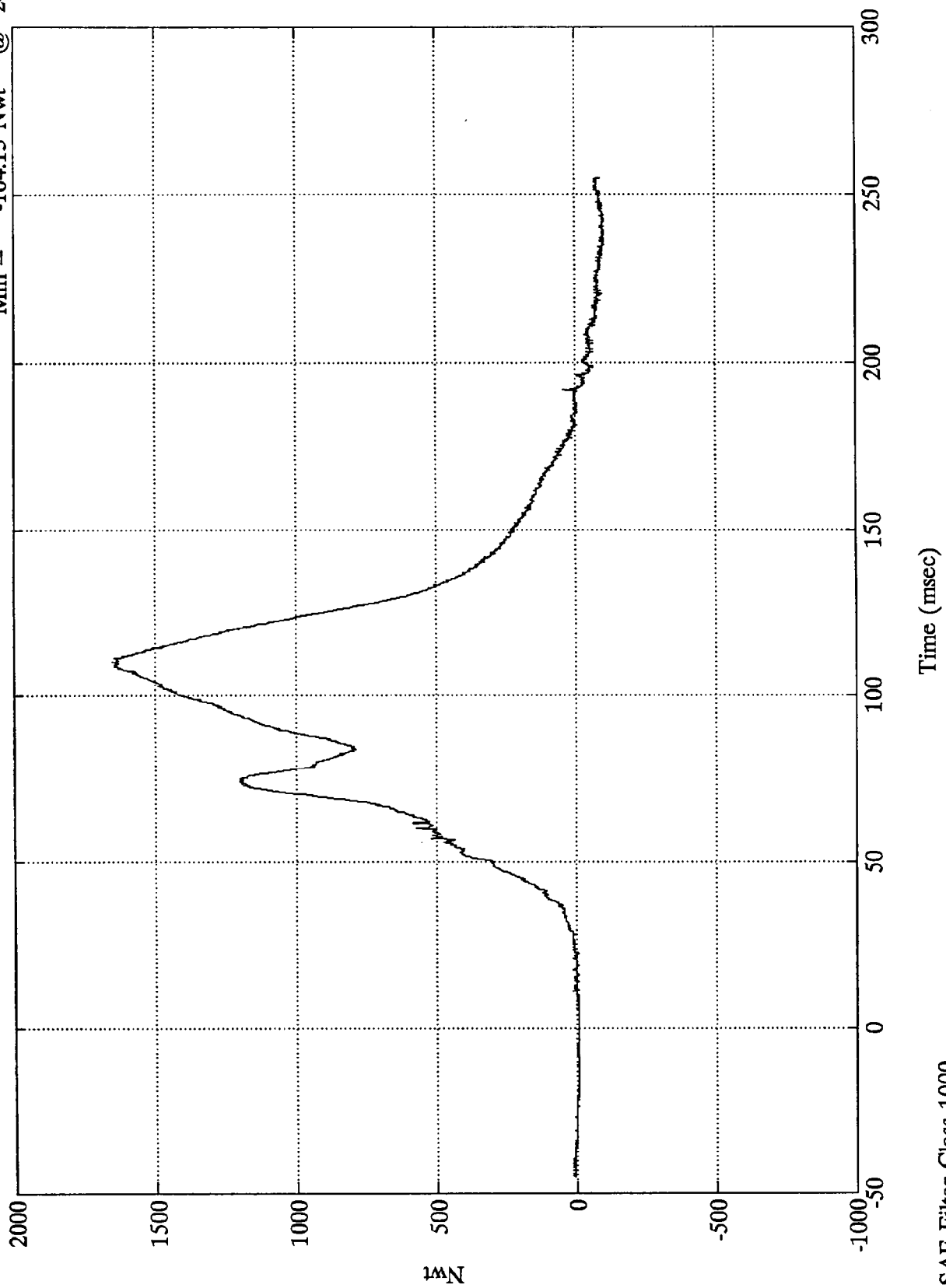


SAE Filter Class 600

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Upper Neck Fx

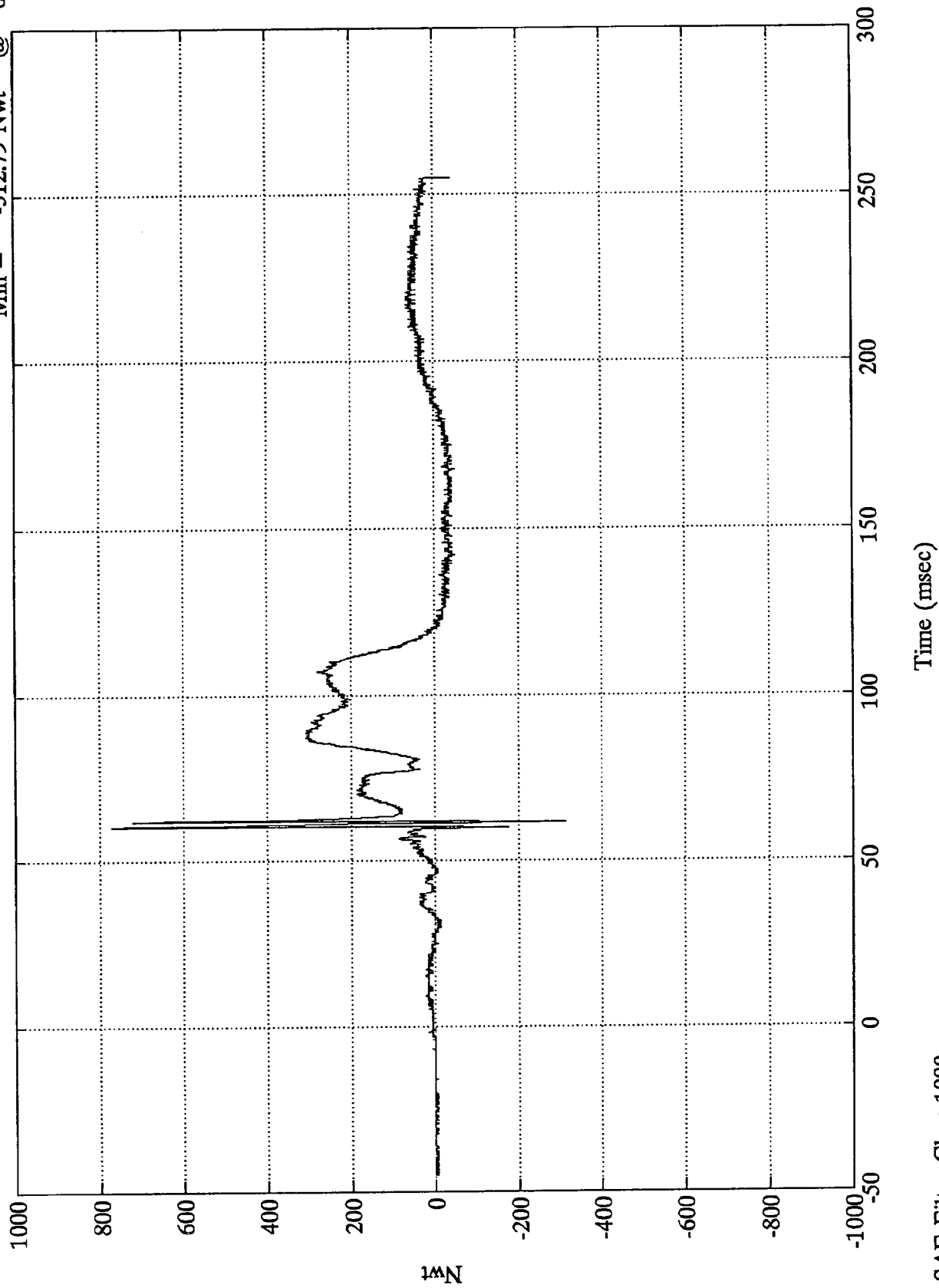
Max = 1652.59 Nwt @ 110.04 msec
Min = -104.13 Nwt @ 243.72 msec



NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Upper Neck Fy

Max = 770.65 Nwt @ 60.36 msec
Min = -312.79 Nwt @ 61.68 msec

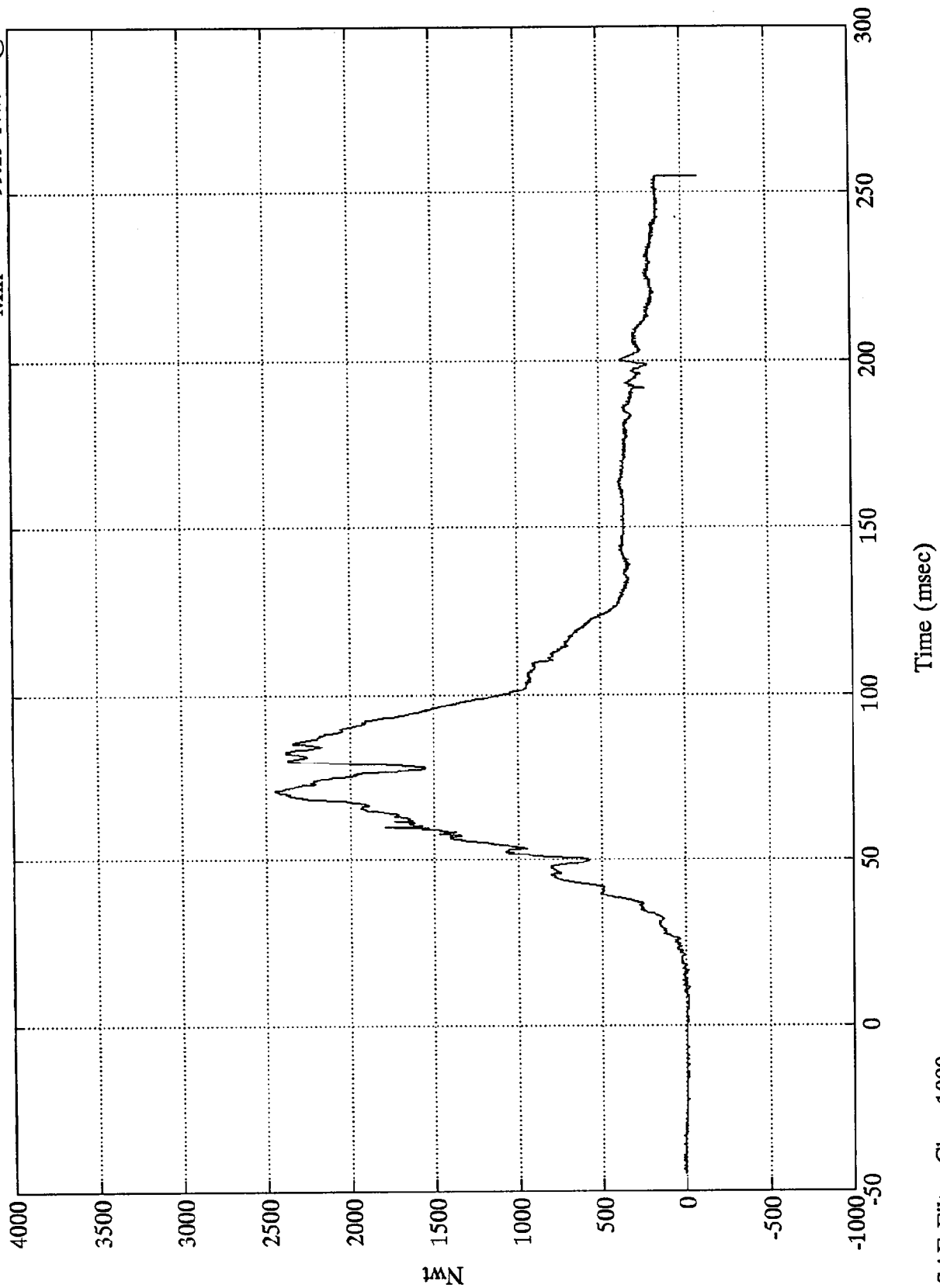


SAE Filter Class 1000

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Upper Neck Fz

Max = 2444.96 Nwt @ 71.16 msec
Min = -99.19 Nwt @ 254.88 msec

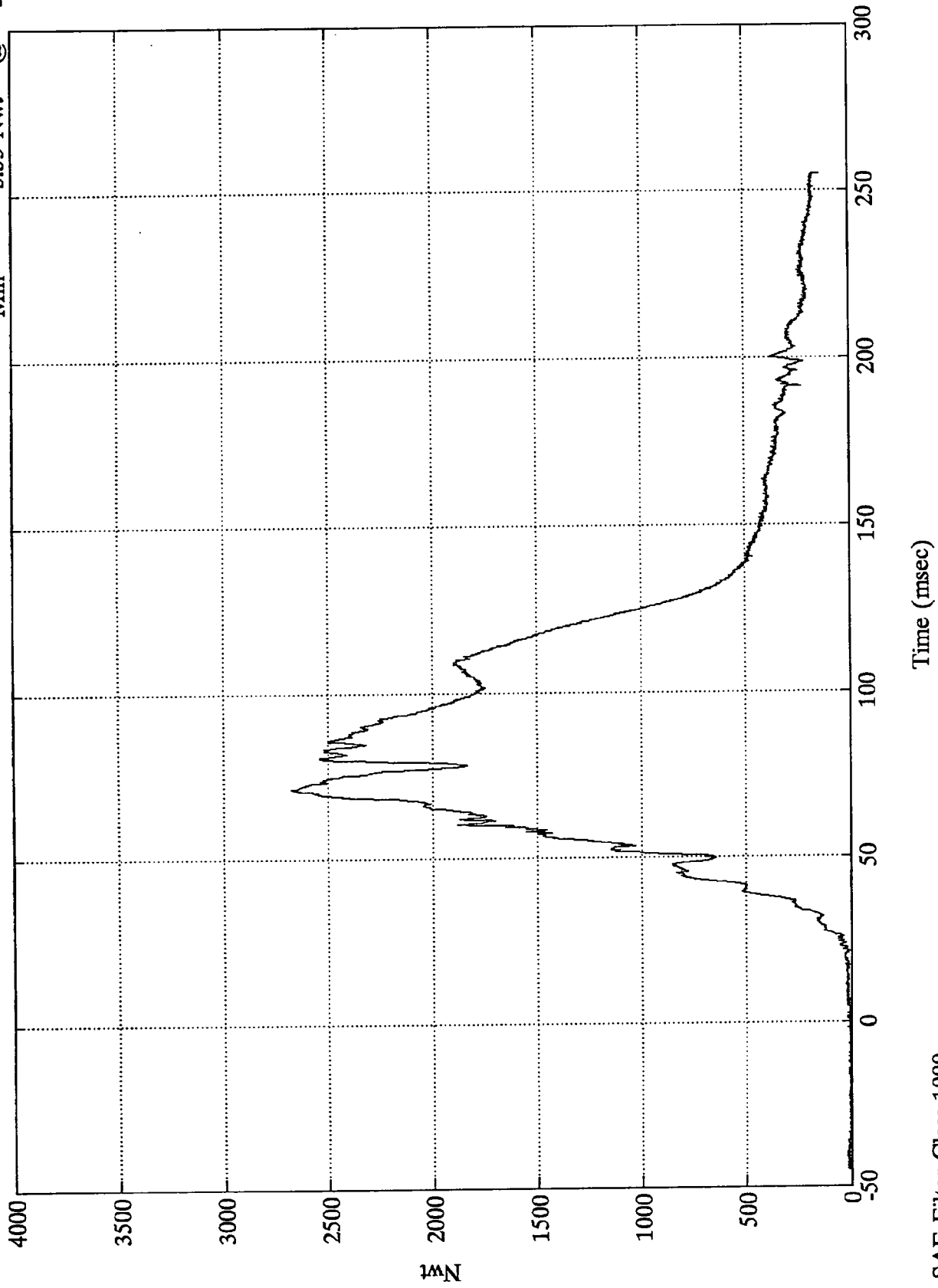


SAE Filter Class 1000

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Neck Force Res.

Max = 2675.07 Nwt @ 71.16 msec
Min = 3.53 Nwt @ -5.28 msec

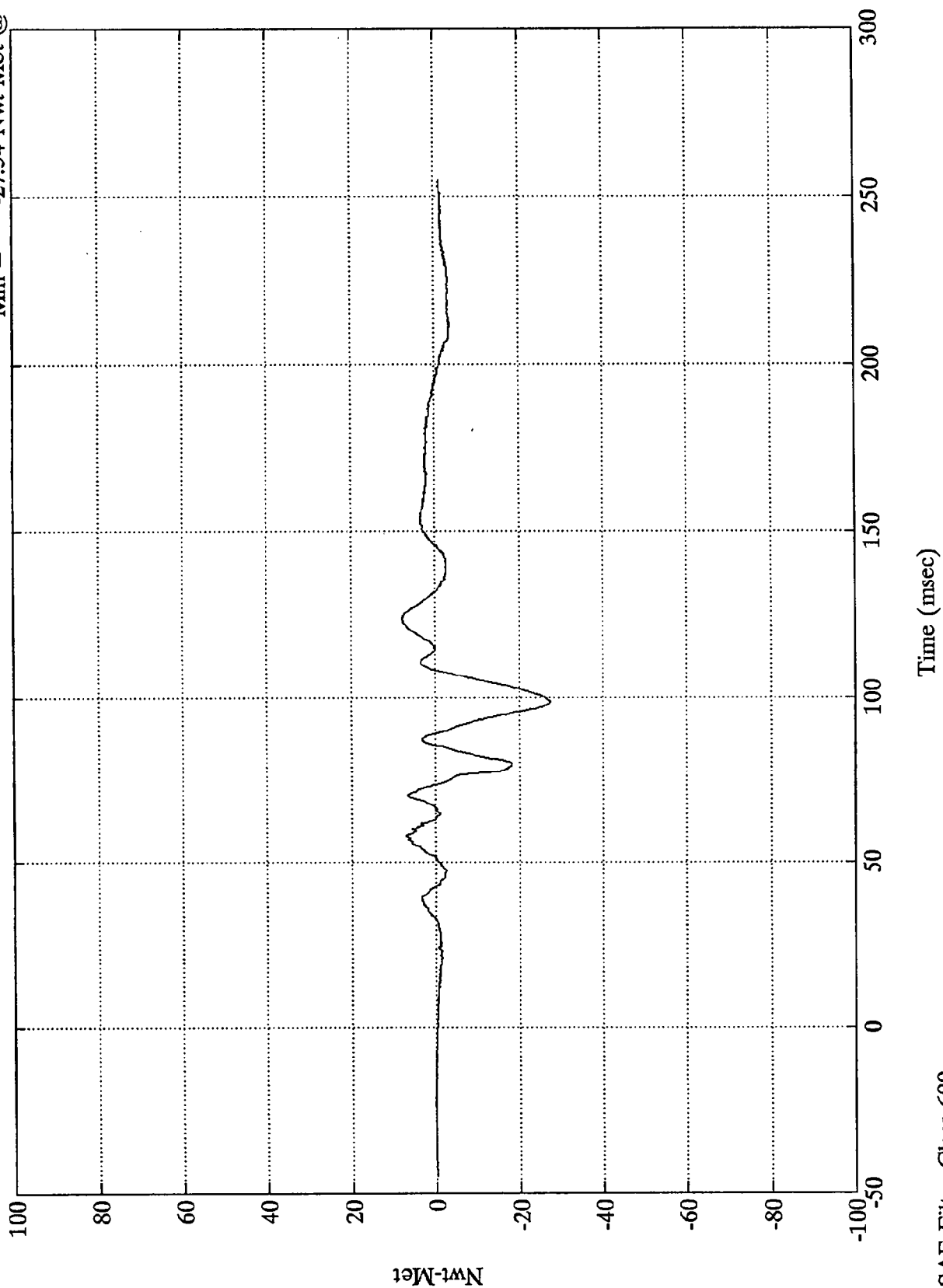


SAE Filter Class 1000

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Upper Neck Mx

Max = 7.87 Nwt-Met @ 123.60 msec
Min = -27.54 Nwt-Met @ 98.63 msec

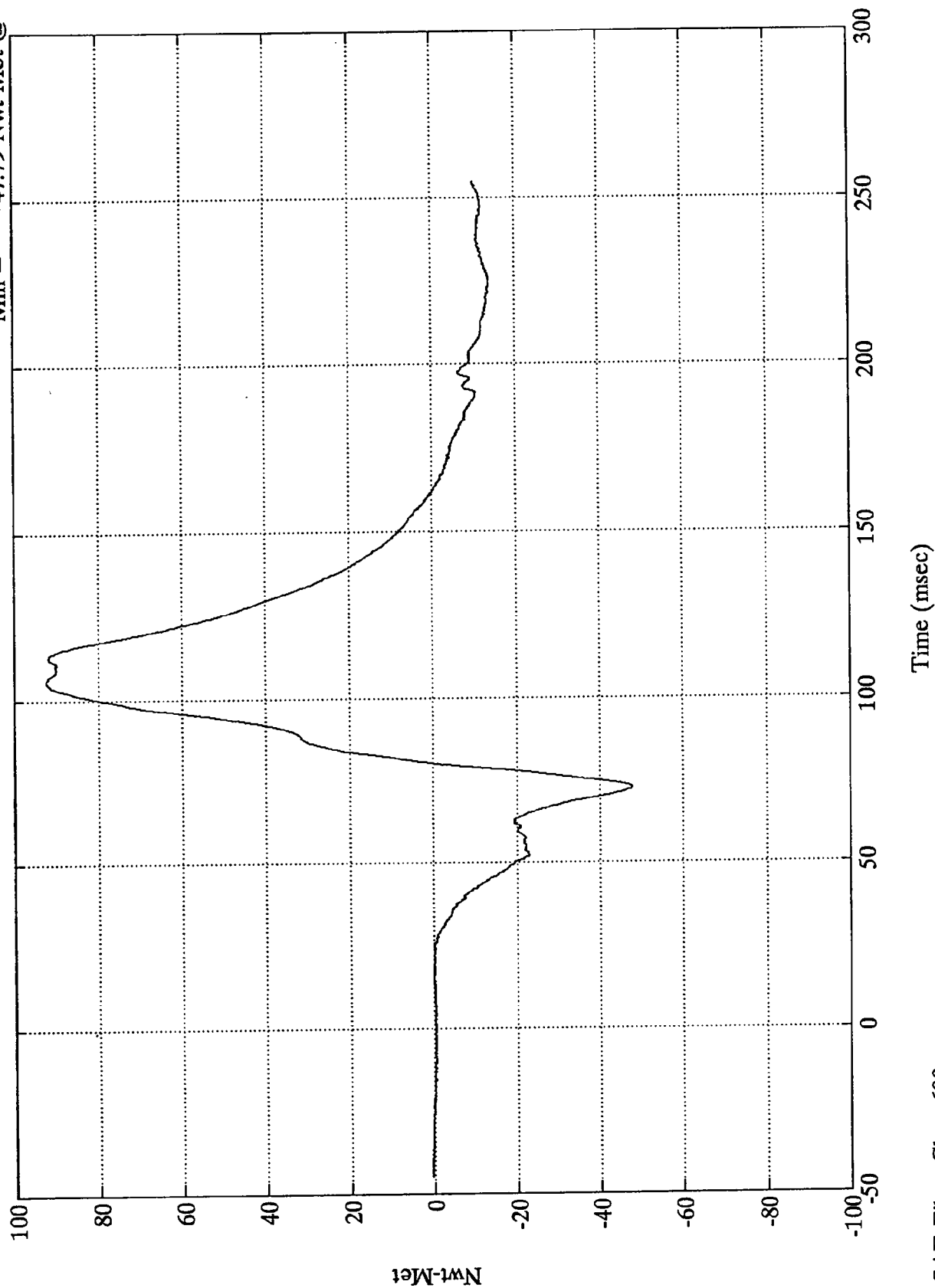


SAE Filter Class 600

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Upper Neck My

Max = 92.52 Nwt-Met @ 105.36 msec
Min = -47.79 Nwt-Met @ 72.83 msec

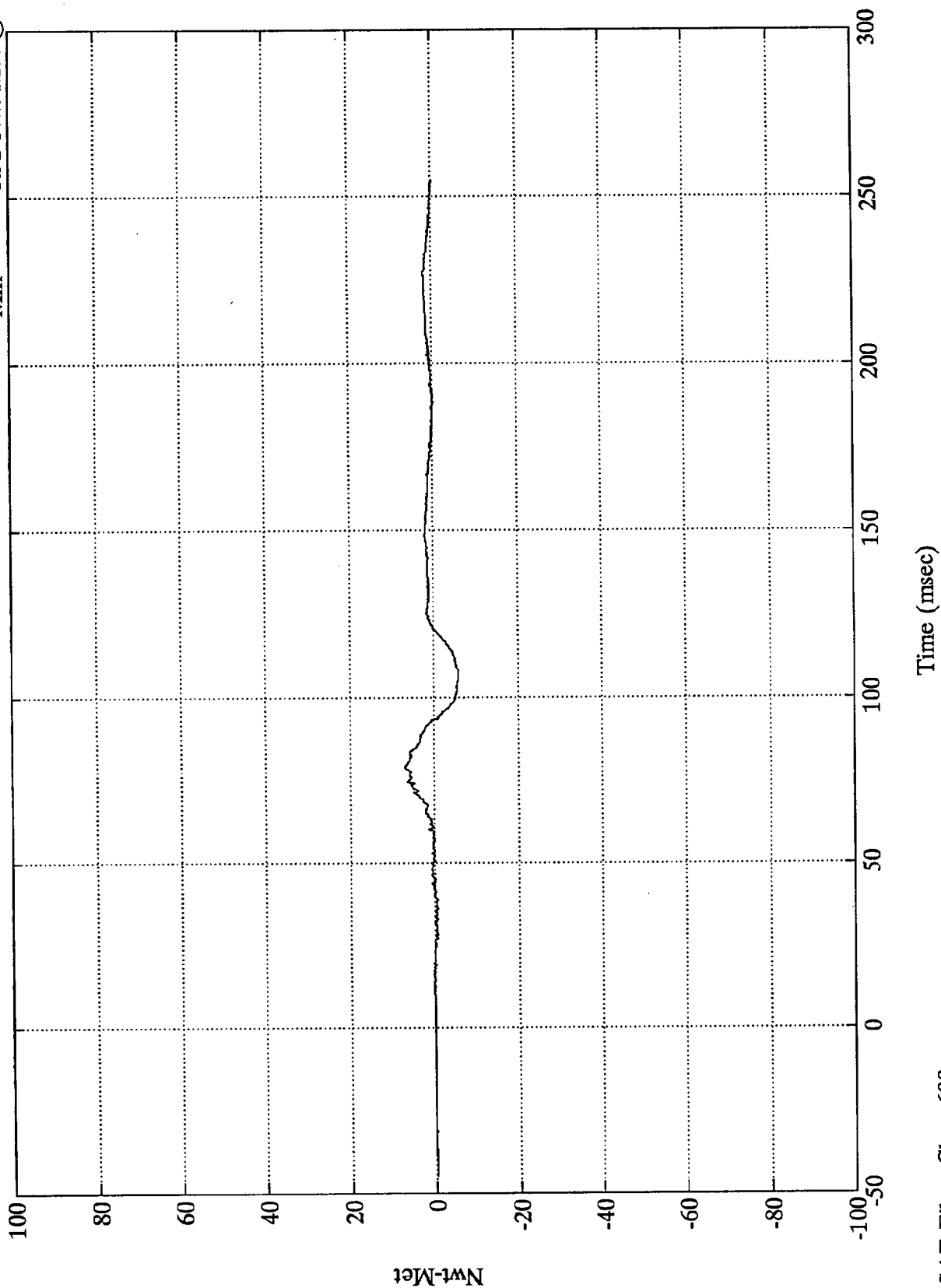


SAE Filter Class 600

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Upper Neck Mz

Max = 7.07 Nwt-Met @ 78.84 msec
Min = -5.91 Nwt-Met @ 108.00 msec

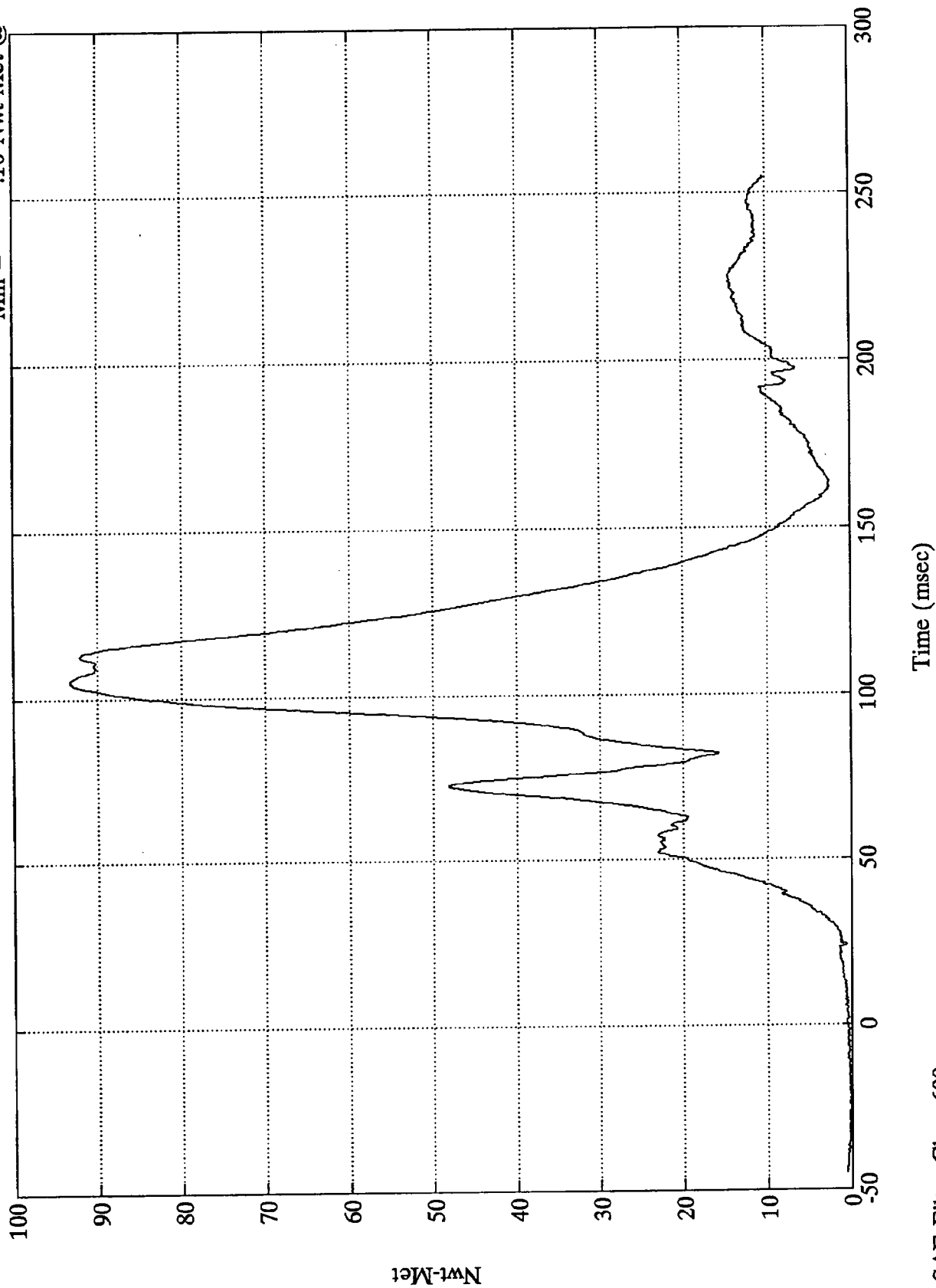


SAE Filter Class 600

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Neck Moment Res.

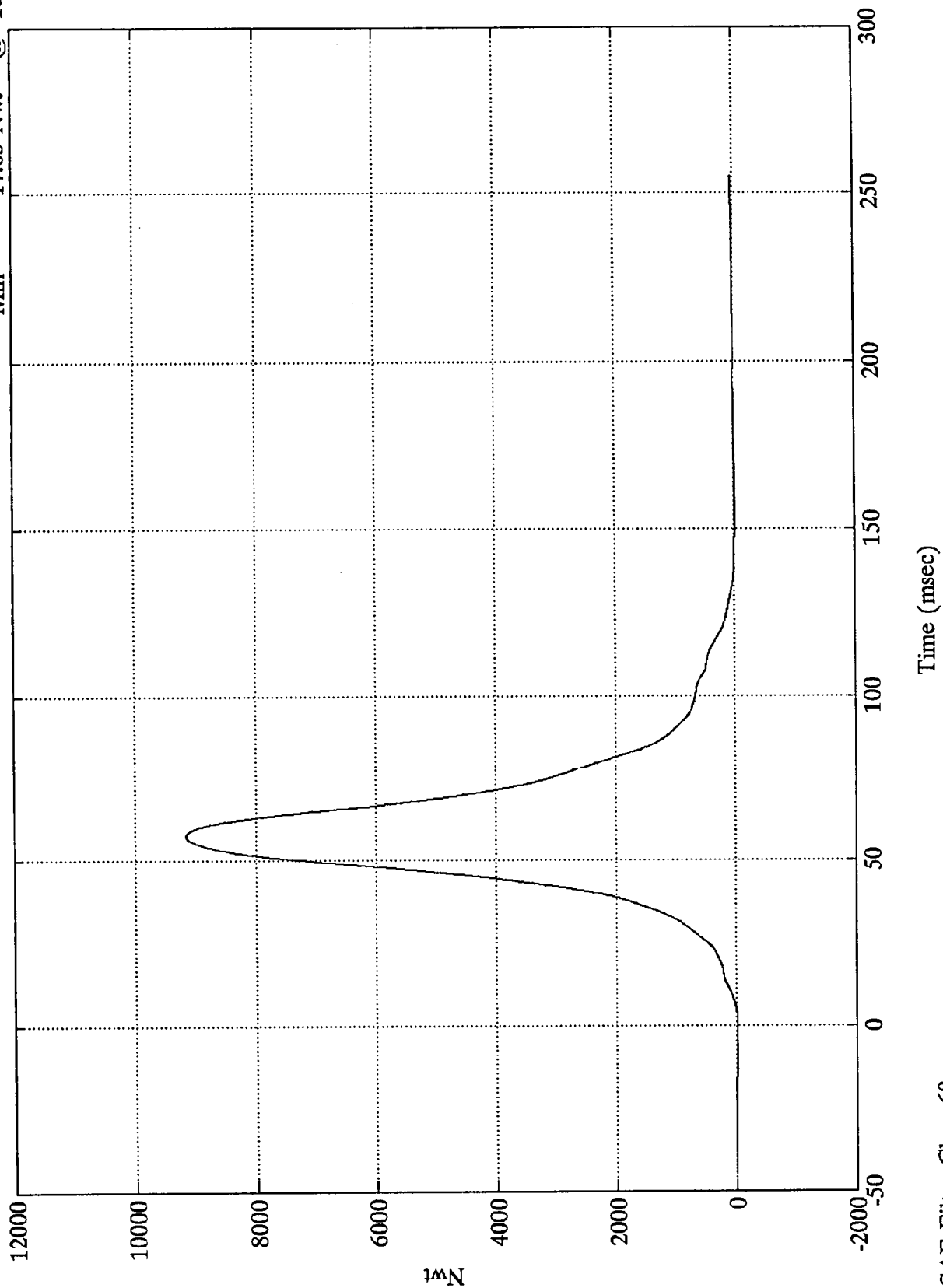
Max = 93.23 Nwt-Met @ 105.24 msec
Min = .10 Nwt-Met @ -25.20 msec



NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Right Belt Load

Max = 9159.98 Nwt @ 57.60 msec
Min = -17.05 Nwt @ 158.88 msec



Nwt

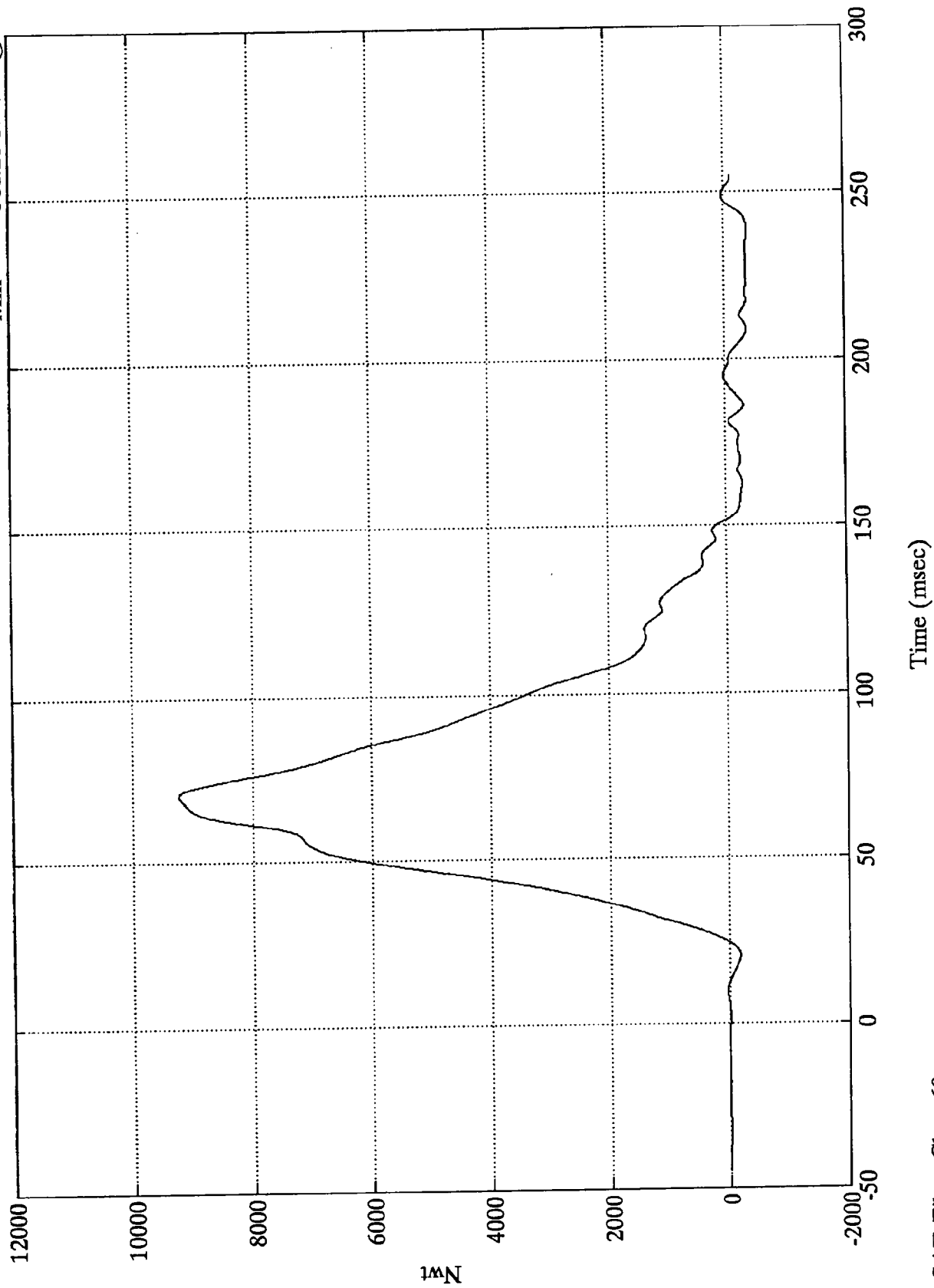
SAE Filter Class 60

Time (msec)

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Torso Belt Load

Max = 9231.51 Nwt @ 70.55 msec
Min = -368.20 Nwt @ 238.80 msec

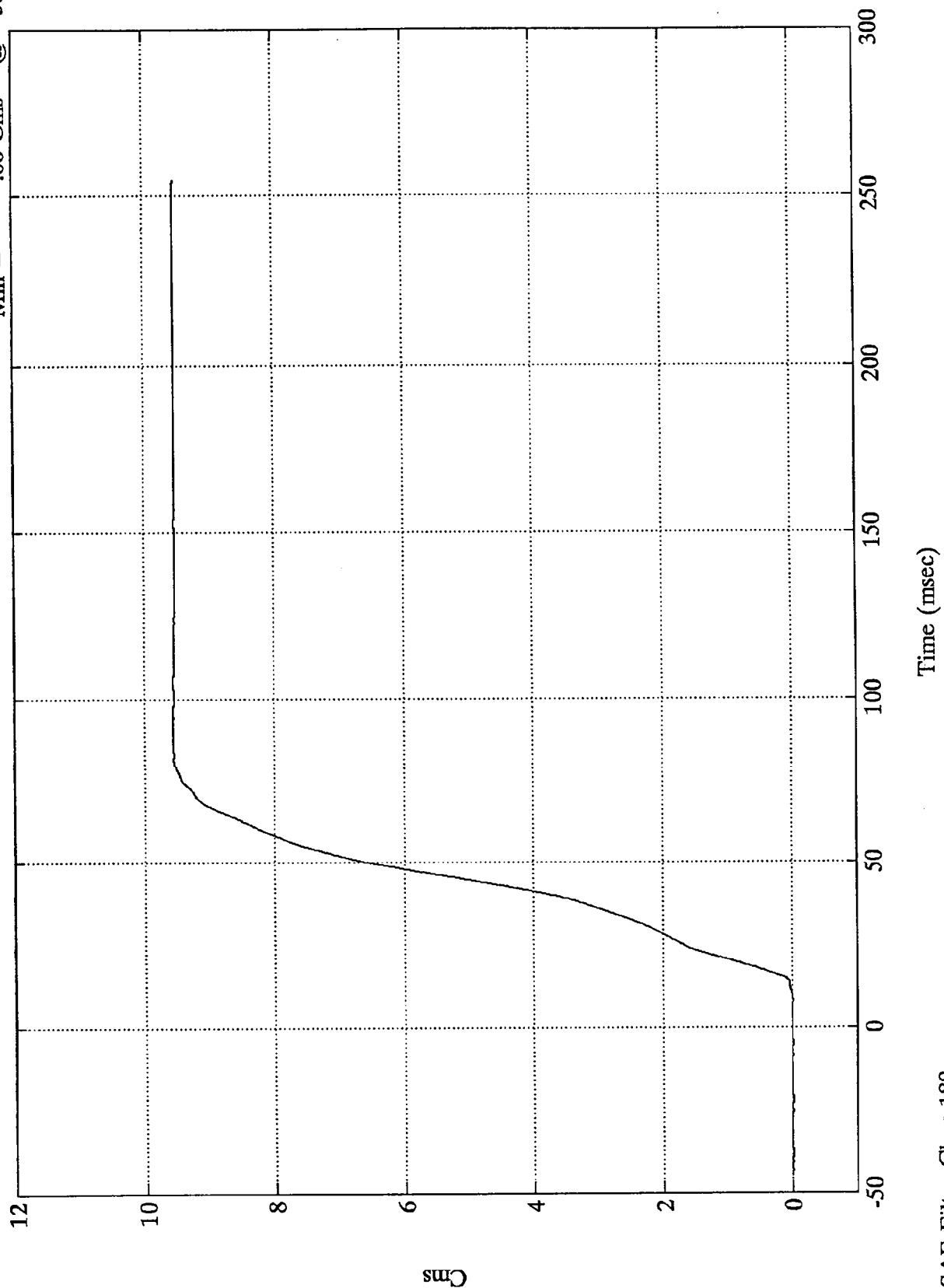


Nwt

SAE Filter Class 60

NCAP TEST #2 JEEP CHEROKEE

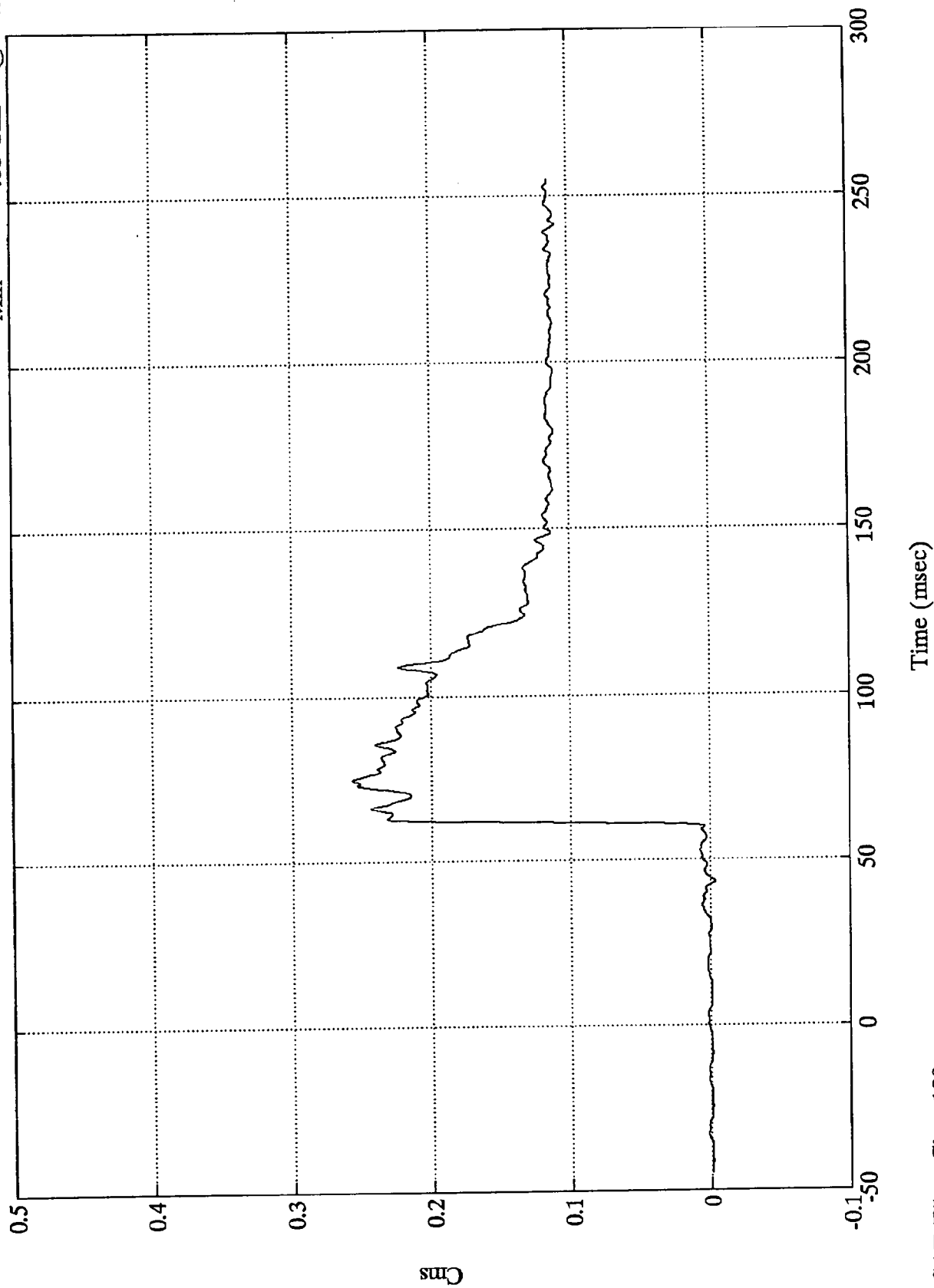
Pos. 2 Belt Spool Out Max = 9.56 Cms @ 86.40 msec
Min = -.00 Cms @ -38.28 msec

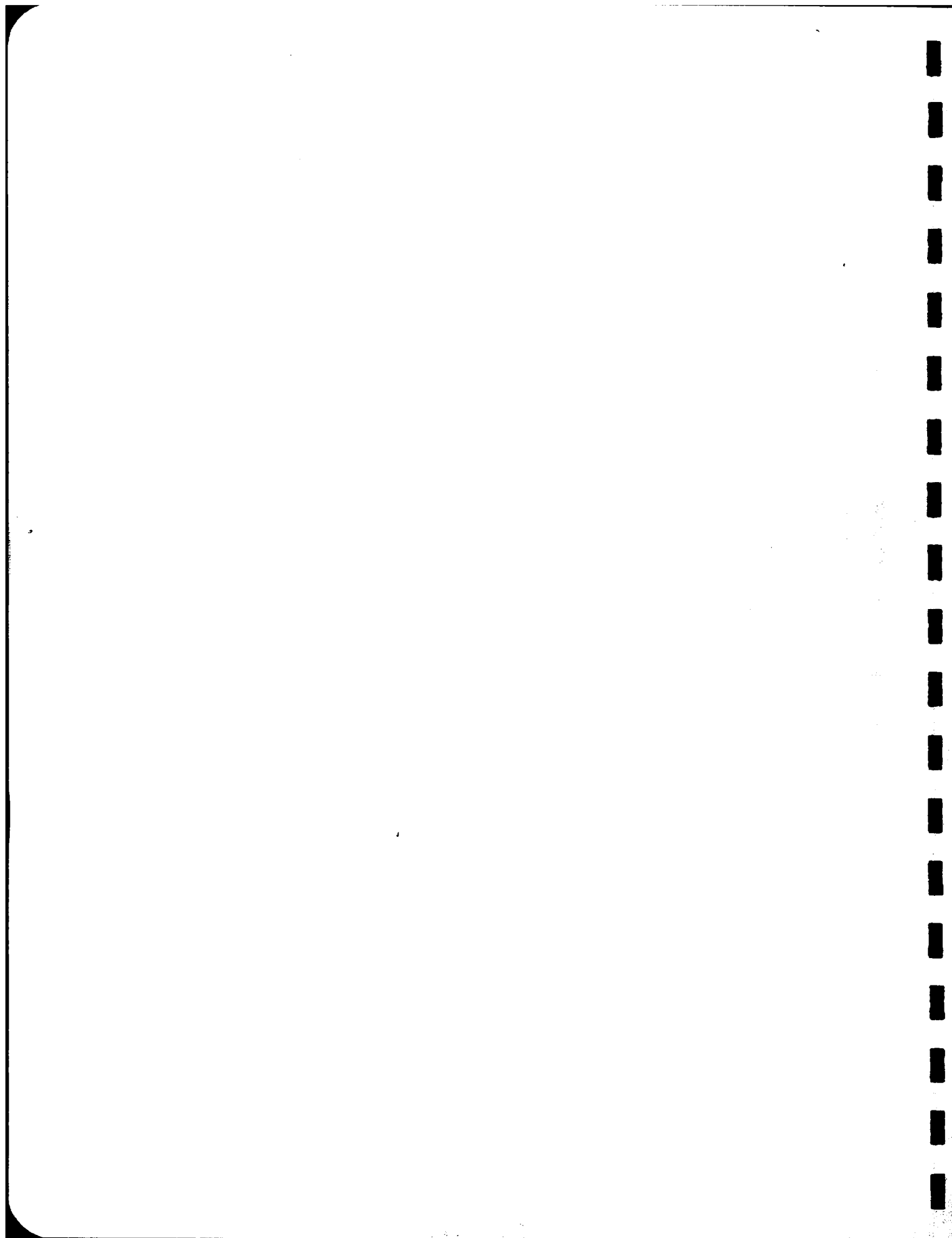


SAE Filter Class 180

NCAP TEST #2 JEEP CHEROKEE

Pos. 2 Belt Elongation Max = .26 Cms @ 75.00 msec
Min = -.00 Cms @ 43.31 msec





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.

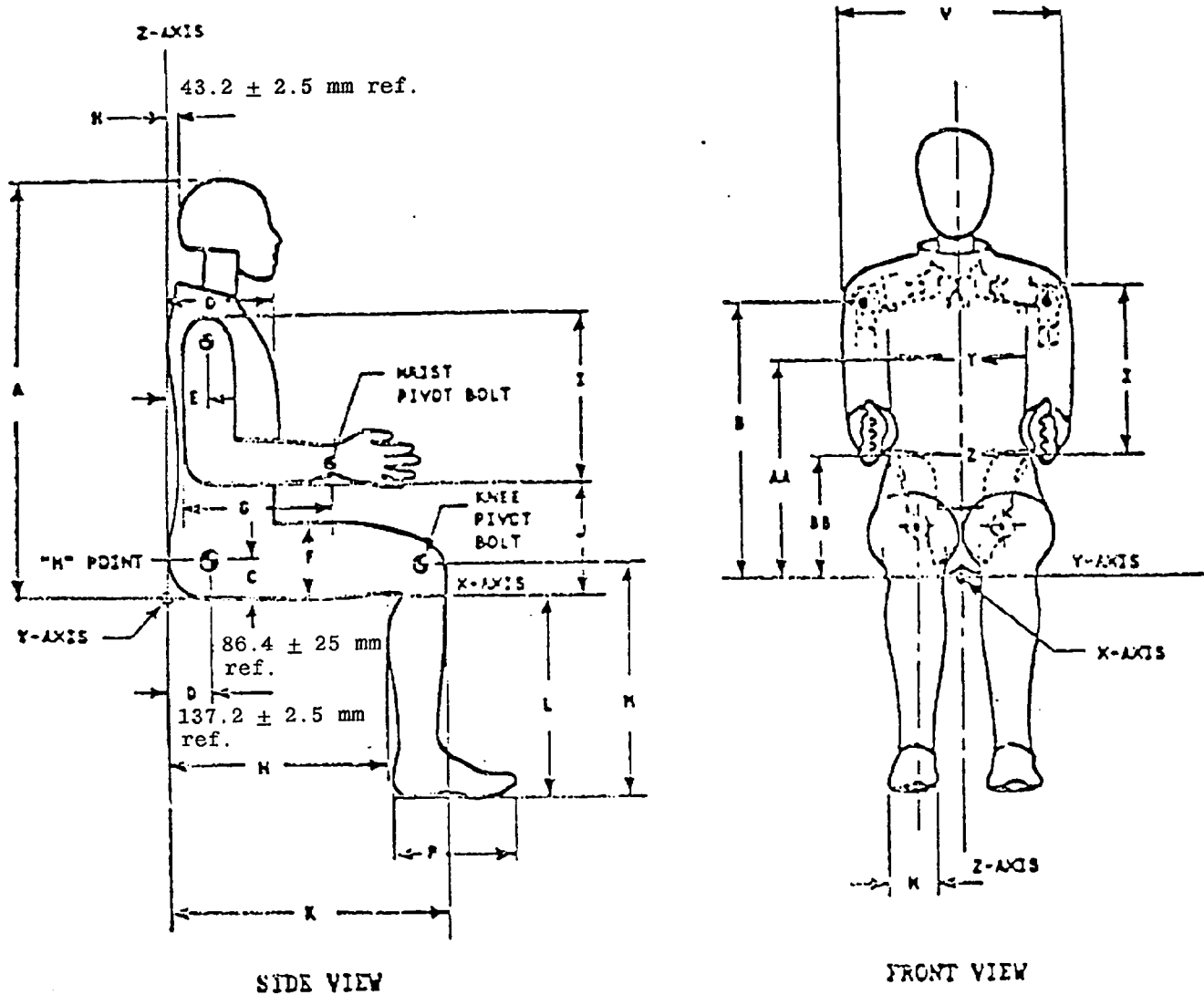
Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Date</u>
45	8-20-92
150	8-20-92

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 45 HUMANOID

DUMMY SERIAL NO. 45

DATE: 8-21-92

TEMPERATURE		20.6 DEG. C
RELATIVE HUMIDITY		45 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)	429-434 mm	432 mm
LOCATION FOR WAIST CIRCUMFERENCE (BB)	226-231 mm	229 mm
CHEST CIRCUMFERENCE (Y)	970-1001 mm	1001 mm
WAIST CIRCUMFERENCE (Z)	815-866 mm	866 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	879 mm
THIGH CLEARANCE (F)	140-155 mm	147 mm
BUTTOCK KNEE LENGTH (K)	580-605 mm	601 mm
BUTTOCK POPLITAL LENGTH (N)	452-477 mm	475 mm
POPLITEAL LENGTH (L)	430-455 mm	447 mm
KNEE PIVOT HEIGHT (M)	485-501 mm	488 mm
FOOT LENGTH (P)	252-267 mm	259 mm
FOOT BREADTH (W)	91-107 mm	102 mm
SHOULDER PIVOT FROM BACKLINE (E)	84-94 mm	94 mm
SHOULDER BREADTH (V)	422-437 mm	427 mm
SHOULDER PIVOT HEIGHT (B)	505-521 mm	510 mm
ELBOW REST HEIGHT (J)	190-211 mm	196 mm
SHOULDER-ELBOW LENGTH (I)	330-345 mm	338 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 : 8-5-92

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 45 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	21 DEG. C
RELATIVE HUMIDITY	10% - 70%	45 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	247.5 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	5.1 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 : 8-19-92

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 45 CAL NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5-22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY		10% - 70%	44 %
IMPACT VELOCITY		24.8 - 25.7 KPH	24.8 KPH
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	23.33 G'S
	20 MS	17.60 - 22.60 G'S	21.57 G'S
	30 MS	12.50 - 18.50 G'S	16.75 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	16.75 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	40.63 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	74.06 DEG.
	TIME	57 - 64 MS	60.75 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88 - 108 N-M	99.2 N-M
	TIME	47 - 58 MS	54.63 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	122.13 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	103.25 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

NECK EXTENSION TEST

HYBRID III

DATE : 8-19-92

AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 45 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5 - 22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY		10% - 70%	43 %
IMPACT VELOCITY		21.4 - 22.3 KPH	21.9 KPH
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G'S	18.48 G'S
	20 MS	14.00 - 19.00 G'S	18.20 G'S
	30 MS	11.00 - 16.00 G'S	15.96 G'S
MAX PENDULUM G'S ABOVE 30 MS		22 G'S MAX	15.96 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		38 - 46 MS	41.25 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	94.69 DEG.
	TIME	72 - 82 MS	74.63 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-80.0/-52.9 N-M	-76.3 N-M
	TIME	65 - 79 MS	70.00 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	153.75 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	130.50 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
THORAX IMPACT TEST
HYBRID III

DATE : 8-20-92

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN 45

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%	45 %
PENDULUM VELOCITY	23.7 - 24.6 KPH	23.7 KPH
MAXIMUM DEFLECTION	64 - 73 mm	64.7 mm
MAXIMUM RESISTIVE FORCE	4804 - 5538 NEWTONS	5515 NEWTONS
INTERNAL HYSTERESIS	69% - 85%	71.6 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 7-31-92

KNEE: LEFT

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 45 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	46 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.7 KPH
PEAK KNEE IMPACT FORCE	4430 - 6965 N	4813 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 7-31-92

KNEE: RIGHT

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 45 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	20.6 DEG. C
RELATIVE HUMIDITY	10% - 70%	46 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.7 KPH
PEAK KNEE IMPACT FORCE	4430 - 6965 N	4942 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY I.D. NUMBER: 45

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	ER74	3/92	9/92
ENDEVCO	A57G	3/92	9/92
ENDEVCO	A84J	3/92	9/92
ENDEVCO	A27F	3/92	9/92
ENDEVCO	A39J	3/92	9/92
ENDEVCO	A33F	3/92	9/92
GSE	951	5/92	11/92
GSE	952	5/92	11/92

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	7/92	1/93
CEC	A161	7/92	1/93
TRANS- DUCER INC	20051	7/92	1/93
BLH	72952	7/92	1/93
CIC	567-11	7/92	1/93

HYBRID III EXTERNAL DIMENSIONS**S/N 150 HUMANOID****DUMMY SERIAL NO. 150****DATE: 8-21-92**

TEMPERATURE		20.5 DEG. C
RELATIVE HUMIDITY		45 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)	429-434 mm	432 mm
LOCATION FOR WAIST CIRCUMFERENCE (BB)	226-231 mm	229 mm
CHEST CIRCUMFERENCE (Y)	970-1001 mm	998 mm
WAIST CIRCUMFERENCE (Z)	815-866 mm	864 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	881 mm
THIGH CLEARANCE (F)	140-155 mm	142 mm
BUTTOCK KNEE LENGTH (K)	580-605 mm	592 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	338 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 : 8/7/92

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 150 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	45 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	261.2 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	1.5 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 : 8-19-92

AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

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%	43 %
IMPACT VELOCITY		24.8 - 25.7 KPH	25.0 KPH
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	23.67 G'S
	20 MS	17.60 - 22.60 G'S	21.74 G'S
	30 MS	12.50 - 18.50 G'S	17.62 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	17.62 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	39.13 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	74.77 DEG.
	TIME	57 - 64 MS	59.5 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88 - 108 N-M	107.2 N-M
	TIME	47 - 58 MS	53.88 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	107.2 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	98.13 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
NECK EXTENSION TEST

HYBRID III

DATE : 8-19-92

AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN:150 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5 - 22.2 DEG. C	21 DEG. C
RELATIVE HUMIDITY		10% - 70%	43 %
IMPACT VELOCITY		21.4 - 22.3 KPH	21.9 KPH
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G'S	18.47 G'S
	20 MS	14.00 - 19.00 G'S	18.46 G'S
	30 MS	11.00 - 16.00 G'S	16.0 G'S
MAX PENDULUM G'S ABOVE 30 MS		22 G'S MAX	16.0 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		38 - 46 MS	39.5 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	94.99 DEG.
	TIME	72 - 82 MS	72.63 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-80.0/-52.9 N-M	-79.4 N-M
	TIME	65 - 79 MS	68.63 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	149.75 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	128.63 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKIEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
THORAX IMPACT TEST
HYBRID III

DATE : 8-20-92

CALSPAN SEQUENTIAL NUMBER 1

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%	43 %
PENDULUM VELOCITY	23.7 - 24.6 KPH	23.7 KPH
MAXIMUM DEFLECTION	64 - 73 mm	65.0 mm
MAXIMUM RESISTIVE FORCE	4804 - 5538 NEWTONS	5471 NEWTONS
INTERNAL HYSTERESIS	69% - 85%	74.4 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 7-31-92

KNEE: LEFT

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 150 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	48 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.7 KPH
PEAK KNEE IMPACT FORCE	4430 - 6965 N	4991 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
KNEE IMPACT TEST
HYBRID III

DATE : 7-31-92

KNEE: RIGHT

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 150 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	48 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.7 KPH
PEAK KNEE IMPACT FORCE	4430 - 6965 N	5235 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	A12C	3/92	9/92
ENDEVCO	A60C	3/92	9/92
ENDEVCO	A84G	3/92	9/92
ENDEVCO	EM94	3/92	9/92
ENDEVCO	A83G	3/92	9/92
ENDEVCO	A30G	3/92	9/92
GSE	954	5/92	11/92
GSE	955	5/92	11/92

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	7/92	1/93
CEC	A161	7/92	1/93
TRANS- DUCER INC	20051	7/92	1/93
BLH	72952	7/92	1/93
CIC	567-11	7/92	1/93



Appendix D

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(6 Month Calibration Minimum)

DRIVER DUMMY	Serial #	Manufacturer	Calibration	
			Last	Next
Head X Y Z	FR74	ENDEVCO	3/92	9/92
	A57G	ENDEVCO	3/92	9/92
	A84J	ENDEVCO	3/92	9/92
Chest X Y Z	A27F	ENDEVCO	3/92	9/92
	A39J	ENDEVCO	3/92	9/92
	A33F	ENDEVCO	3/92	9/92
Right Femur Load Cell	952	GSE	5/92	11/92
Left Femur Load Cell	951	GSE	5/92	11/92
Neck Load Cell X Y Z	269	DENTON	8/91	2/92
	269	DENTON	8/91	2/92
	269	DENTON	8/91	2/92
Neck Moment X Y Z	269	DENTON	8/91	2/92
	269	DENTON	8/91	2/92
	269	DENTON	8/91	2/92
Chest Deflection Gauge Hybrid III Use Only	45	HUMANOID	7/92	1/93
Lap Belt Load Cells	123	LEBOW	5/92	11/92
Shoulder Belt Load Cells	127	LEBOW	5/92	11/92
Spool-Out Potentiometer	32	SERVONIC INST.	8/92	2/93
Belt Stretch Transducer	E1	CALSPAN	8/92	2/93

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(6 Month Calibration Minimum)

PASSENGER DUMMY	Serial #	Manufacturer	Calibration	
			Last	Next
Head	X	ENDEVCO	3/92	9/92
	Y	ENDEVCO	3/92	9/92
	Z	ENDEVCO	3/92	9/92
Chest	X	ENDEVCO	3/92	9/92
	Y	ENDEVCO	3/92	9/92
	Z	ENDEVCO	3/92	9/92
Right Femur Load Cell	955	GSE	5/92	11/92
Left Femur Load Cell	954	GSE	5/92	11/92
Neck Load Cell	X	DENTON	7/91	1/92
	Y	DENTON	7/91	1/92
	Z	DENTON	7/91	1/92
Neck Moment	X	DENTON	7/91	1/92
	Y	DENTON	7/91	1/92
	Z	DENTON	7/91	1/92
Chest Deflection Gauge Hybrid III Use Only	150	HUMANOID	7/92	1/93
Lap Belt Load Cells	133	LEBOW	5/92	11/92
Shoulder Belt Load Cells	135	LEBOW	5/92	11/92
Spool-Out Potentiometer	22	SERVONIC INST.	8/92	2/93
Belt Stretch Transducer	E2	CALSPAN	8/92	2/93

INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS
(6 Month Calibration Minimum)

	Serial #	Manufacturer	Calibration	
			Last	Next
Left Seat Rear Crossmember	A69	CEC	6/92	12/92
Right Rear Seat Crossmember	A70	CEC	8/92	2/93
Top of Engine	A156	CEC	4/92	10/92
Bottom of Engine	A176	CEC	6/92	12/92
Left Disc Brake Caliper	A177	CEC	4/92	10/92
Right Disc Brake Caliper	A175	CEC	4/92	10/92
Instrument Panel	A142	CEC	8/92	2/93
Left Seat Crossmember Redundant	A181	CEC	5/92	11/92
Right Seat Crossmember Redundant	A152	CEC	4/92	10/92

Appendix E

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

Operate the system by holding the keyring transmitter close to either side of the vehicle and pointing it at the receiver. The receiver is in the Dome Lamp assembly or in the middle of the overhead console. Press the finger pad to lock or unlock the doors.

NOTE: *You may have to press the finger pad twice to lock or unlock the doors if you have used the outside key lock, manual lock button or power lock switch on the door prior to activating the transmitter.*

The indicator light glows when the unit is operating to show that the transmitter batteries are OK. Battery life is approximately one year. Replace the batteries in the transmitter with two CR2016 3-volt batteries. Batteries must be installed correctly.

The polarity, "+" or "-", is engraved on the case.

Note: *The transmitter can be damaged if struck sharply. Do not drop or throw keys with transmitter attached.*

Each transmitter/receiver has a unit number in the battery case and on the front of the receiver behind the cover. Record this number and keep it in a safe place in the event you lose your transmitter.

ILLUMINATED ENTRY

All interior lamps will illuminate the vehicle when the doors are unlocked using the Keyless Entry transmitter or when a door is opened. These lamps will stay on for approximately 30 seconds or until the engine is started.

SECURITY ALARM SYSTEM

This system monitors the vehicle doors, hood, liftgate and ignition for unauthorized operation. When the alarm is activated, the system provides both audible and visual signals. The horn will sound for three minutes and the headlamps and tail-lamps will flash for an additional 15 minutes. The engine will not run until the system is disarmed.

To Set the Alarm — The alarm will set when you use the power door locks or Keyless Entry transmitter to lock the doors and liftgate. After the illuminated entry system times out (approximately 30 seconds), the "Security" light on the instrument panel will flash to signal that the system is arming. If the light stays on continuously during this period, check to see if the hood is properly

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closed. The light should stop flashing after about 15 seconds to indicate the alarm is set.

Note: *If the "Security" light stays on continuously during vehicle operation, have the system checked by your dealer.*

To Disarm the System — Use the Keyless Entry transmitter or the key to turn the door or liftgate locks to the "Unlock" position. If something has triggered the system in your absence, the horn will sound three times when you unlock the doors. Check the vehicle for tampering.

The Security Alarm System is designed to protect your vehicle, however, you can create conditions where the system will malfunction. If you remain in the vehicle and lock the doors with either the power locks

or the transmitter, the alarm will sound when you pull the door handle to exit. You may also accidentally disarm the system by opening the liftgate with the door key and closing the liftgate. The liftgate will be locked but the Security Alarm will not arm.

The alarm system will be activated when the battery is connected after servicing the vehicle. All exterior lights will flash and the ignition will be locked. Turning the door lock cylinders with the key or using the keyless entry system will deactivate the alarm.

OCCUPANT RESTRAINTS

One of the most important safety features in your vehicle is the restraint system. This system includes the front and rear seat belts, and the driver's side airbag. Your seat belts

can also be used to hold infant and child restraint systems if you will be carrying children too small for adult-size belts.

Please pay close attention to the information in this section. It tells you how to use your restraint system properly to keep you and your passengers as safe as possible.

WARNING! *In a collision, you and your passengers can suffer much greater injuries if you are not properly buckled up. You can strike parts of the inside of your vehicle or other passengers, or you can be thrown out of the vehicle. Always be sure you and others in your vehicle are buckled up properly.*

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Buckle up even though you are an excellent driver, even on short trips. Someone on the road may be a poor driver and cause a collision which includes you. This can happen far away from home or on your own street.

Research has shown that seat belts save lives. And they can reduce the seriousness of injuries in a collision. Some of the worst injuries happen when people are thrown from the vehicle. Seat belts provide protection against that, and they reduce the risk of injury caused by striking the inside of the vehicle. **Everyone** in a motor vehicle needs to be buckled up **all the time**.

UNIBELTS

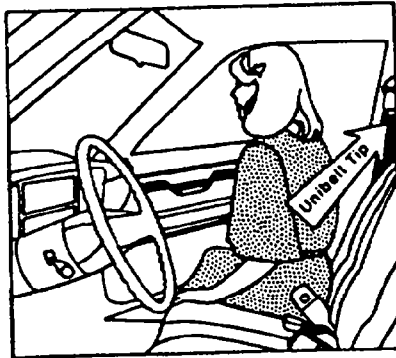
The seats next to the front and rear doors of your vehicle are equipped with UNIBELTS.

Each unibelt is a combined lap/shoulder belt system. The belt webbing retractor will lock only during very sudden stops or impacts. This feature allows the shoulder part of the belt to move freely with you under normal conditions. But in a collision, the belt will lock and reduce the risk of your striking the inside of the vehicle or being thrown out.

WARNING! Wearing a seat belt incorrectly is dangerous. Seat belts are designed to go around the large bones of your body. These are the strongest parts of your body and can take the forces of a collision the best. Wearing your belt in the wrong place could make your injuries in a collision much worse. You might suffer internal injuries, or you could even slide out of part of the belt. Follow these instructions to wear your seat belt safely and to keep your passengers safe, too.

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WARNING! Belting two people into one seat belt can lead to greater injury. People belted together can crash into one another in an accident, hurting one another badly. Never use a unibelt or a lap belt for more than one person, no matter what their size.



1

UNIBELT OPERATING INSTRUCTIONS

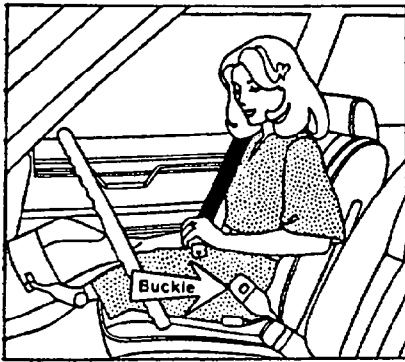
1. Enter the vehicle and close the door. Sit back and adjust the seat.



2

2. The seat belt latch plate is above the back of your seat. Grasp the latch plate and pull out the belt. Slide the latch plate up the webbing as far as necessary to make the belt go around your lap.

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3

3. When the belt is long enough to fit, insert the latch plate into the buckle until you hear a "click."

WARNING! A belt that is buckled into the wrong buckle will not protect you properly. The lap portion could ride too high on your body, possibly causing internal injuries. Always buckle your belt into the buckle nearest you.

A belt that is too loose will not protect you as well. In a sudden stop you could move too far forward, increasing the possibility of injury. Wear your seat belt snugly.

A belt that is worn under your arm is very dangerous. Your body could fall into the inside surfaces of the vehicle in a collision, increasing head and neck injury. And a belt worn under the arm can cause internal injuries.

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Wear the belt over your shoulder so that your strongest bones will take the force in a collision.



4

4. Position the lap belt across your thighs, below your abdomen. To remove slack in the lap portion,

pull up a bit on the shoulder belt, as shown. To loosen the lap belt if it is too tight, tilt the latch plate and pull on the lap belt. A snug belt reduces the risk of sliding under the belt in a collision.

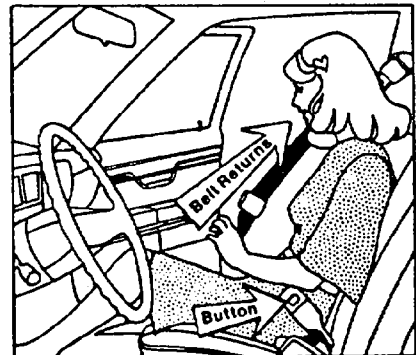


5

5. Position the shoulder belt on your chest so that it is comfortable

and not resting on your neck. The retractor will withdraw any slack in the belt.

WARNING! A twisted belt can't do its job as well. In a collision it could even cut into you. Be sure the belt is straight. If you can't straighten a belt in your vehicle, take it to your dealer and have it fixed.



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6. To release the belt, push the red button marked PRESS on the buckle. The belt will automatically retract to its stowed position. If necessary, slide the latch plate down the webbing to allow it to retract fully.

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SEAT BELTS AND PREGNANT WOMEN

We recommend that pregnant women use seat belts throughout their pregnancy. Keeping the mother safe is the best way to keep the baby safe.

Pregnant women should wear the lap part of the belt across the thighs and as snug across the hips as possible. Keep the belt low so that it does not come across the abdomen. That way the strong bones of the hips will take the force if there is a collision.

REAR CENTER LAP BELTS

The rear center seating position has a lap belt only. To fasten a lap belt, slip the latch plate into the buckle.

To lengthen the lap belt, tilt the latch plate and pull. To remove slack, pull

the loose end of the webbing. Wear the belt snug against the hips. Sit back and erect in the seat, then adjust the belt as tightly as is comfortable.

WARNING! A lap belt worn too loose or too high is dangerous.

A belt worn too loose can allow you to slip down and under the belt in a collision.

A belt that is too high will apply crash forces to the abdomen, not to the stronger hip bones.

In either case, the risk of internal injuries is greater. Wear a lap belt low and snug.

WARNING! A frayed or torn belt could rip apart in a collision and leave you with no protection. Inspect the belt system periodically, checking for cuts, frays, or loose parts. Damaged parts must be replaced immediately. Do not disassemble or modify the system. Seat belt assemblies must be replaced after an accident if they have been damaged (bent retractor, torn webbing, etc.)

SEAT BELT EXTENDER

If a seat belt is too short, even when fully extended, your dealer can provide you with a seat belt extender. This extender should be used only if the existing belt is not long enough. When it is not required, remove the extender and stow it.

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CHILD RESTRAINT

Everyone in your vehicle needs to be buckled up all the time, babies and children, too.

WARNING! In a collision, an unrestrained child, even a tiny baby, can become a missile inside the vehicle. The force required to hold even an infant on your lap could become so great that you could not hold the child, no matter how strong you are. The child and others could be badly injured. Any child riding in your vehicle should be in a proper restraint for the child's size.

All states and Canadian provinces require small children to ride in proper restraint systems. This is the

law, and you can be prosecuted for ignoring it.

Infants and Small Children

There are different sizes and types of restraints for children from newborn size to the bigger child almost large enough for an adult safety belt. Use the restraint that is correct for your child.

Two different child restraint systems are generally available.

- The infant carrier for babies weighing up to 20 lbs. (9 kg.)
- The child seat for small children over 20 lbs.

In addition, some manufacturers make systems that can be used first as an infant carrier, and then converted to a child seat as the child grows.

Here are some tips on getting the most out of your child restraint:

- Before buying any restraint system, make sure that it has a label certifying that it meets Motor Vehicle Safety Standard 213. Chrysler also recommends that before you buy a child restraint, you try it in the vehicle seats where you will use it.
- The restraint must be appropriate for your child's weight and height. Check the label on the restraint for this too.
- If possible, install the restraint in the rear seat. According to accident statistics, children are safer when properly restrained in the rear seats than in the front.
- Carefully follow the instructions that come with the restraint. If you

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install the restraint improperly, it may not work when you need it.

WARNING! *Improper installation can lead to failure of an infant or child restraint. It could come loose in a collision. The child could be badly injured or killed. Follow the manufacturer's directions exactly when installing an infant or child restraint.*

- Infant and child restraints are secured in the vehicle seats by the lap belt or the lap part of the lap/shoulder belt. In the front seat, you may have trouble tightening the belt on the child restraint because the buckle or latch plate interferes with the belt path opening on the restraint. Move the seat forward to reposition the buckle

against the side of the child restraint.

In the center rear seat if the belt can't be tightened, or if by pulling and pushing on the restraint loosens the belt, you may need to do something more. Disconnect the latch plate from the buckle, turn it over, and reconnect it to the buckle. If you still can't make the child restraint secure, try a different seating position.

- Some child seat manufacturers recommend the use of a top anchorage (tether) strap in addition to the lap belt. Your vehicle has tether strap anchorages behind the rear seating positions for use with these child seats. Your dealer can provide you with anchorage hardware and installation instructions.

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Children Too Large For Child Seats

Children who are too large for child seats and who can sit upright by themselves should use the available lap/shoulder belts for best protection.

- Make sure that the child is seated upright in the seat.
- The lap belt should be fastened low on the hips and as snug as possible.
- Check belt fit periodically. A child's squirming or slouching can move the belt out of position.

If the shoulder belt contacts the face or neck, move the child closer to the middle of the vehicle. If this doesn't solve the problem, move the child to the center rear seating position and use the lap belt.

Booster seats that may help overcome this problem are also available for use with lap/shoulder belts. Before buying a booster seat, make sure that it has a label certifying that it meets applicable Motor Vehicle Safety Standards. Make sure it is satisfactory for use in this vehicle.

DRIVER SUPPLEMENTAL RESTRAINT SYSTEM - AIRBAG

This vehicle has an airbag for the driver as a supplement to the seat belt restraint system. The airbag is mounted in the steering wheel. Its job is to inflate in higher speed frontal impacts. It works with the instrument panel knee bolster and the seat belt to provide improved protection for the driver.

- Buckle the child into the seat exactly as the seat manufacturer's directions tell you. The cinching latch plate will keep the belt tight.
- When your infant carrier or child seat is not in use, secure it with the seat belt or remove it from the vehicle. Don't leave it loose in the vehicle. In a sudden stop or collision, it could strike occupants and injure them.

WARNING! *Relying on the airbag alone could lead to more severe injuries. Wear your seat belt even though you have an airbag.*

The seat belt is designed to protect you in many types of collisions. The airbag deploys only in frontal collisions. And it will not deploy in collisions at slow speed. But even in collisions where the airbag does work, you need the seat belt to keep you in the right position for the airbag to protect you properly.

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WARNING! Ignoring the AIRBAG light in your instrument panel could mean you won't have the airbag to protect you in a collision. If the light does not come on, stays on after you start the vehicle, or if it comes on as you drive, have the airbag system checked right away.

The airbag system consists of the following:

- Crash Sensors
- Diagnostic Unit
- AIRBAG Readiness Light
- Airbag/Inflator Unit
- Unique Steering Wheel and Column
- Interconnecting Wiring

- Knee Impact Bolster

How The Airbag System Works

- **Crash Sensors** in the front of the vehicle and in the occupant compartment determine if a frontal impact is severe enough to require the airbag. The sensors will not detect side, rollover, or rear impacts. Switches in the sensors are connected to the diagnostic unit and to the airbag/inflator unit.
- The **Diagnostic Unit** monitors the readiness of the electronic parts of the system whenever the ignition switch is in the START or RUN position. These include all of the items listed above except the knee bolster. The Diagnostic Unit also turns on the AIRBAG light in the instrument panel for 6 to 8 seconds when the ignition is first

turned on, then turns the light off. If it detects a malfunction in any part of the system, it turns on the light either momentarily or continuously.

- The **Airbag/Inflator Unit** is in the center of the steering wheel. When the crash sensors detect an impact requiring the airbag, they signal the inflator unit. A large quantity of non-toxic nitrogen gas is generated to inflate the airbag. The steering wheel hub trim cover separates and folds out of the way as the bag inflates to its full size. The bag fully inflates in about 50 milliseconds. This is about half of the time it takes to blink your eyes. It then quickly deflates by venting the nitrogen gas through holes in the airbag toward the instrument panel. In this way the bag does

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not interfere with your control of the vehicle.

If A Deployment Occurs

The airbag system is designed to deploy when the impact sensors detect a moderate-to-severe frontal collision, and then immediately deflate.

NOTE: A frontal collision that is not severe enough to need airbag protection will not activate the system. This does not mean something is wrong with the airbag system.

If you do have a collision which deploys the airbag, any or all of the following may occur:

- The nylon airbag material may sometimes cause abrasions and/or skin reddening to the driver as the airbag deploys and unfolds itself from the steering

wheel.

The abrasions are similar to friction rope burns or those you might get sliding along a carpet or gymnasium floor. They are not caused by contact with chemicals. They are not permanent and normally heal quickly. However, if you haven't healed significantly within a few days, or if you have any blistering, see your doctor immediately.

- As the airbag deflates you may see some smoke-like particles. The particles are a normal by-product of the process that generates the non-toxic nitrogen gas used for airbag inflation. These airborne particles may irritate the skin, eyes, nose, or throat. If you have skin or eye irritation, rinse

the area with cool water. For nose or throat irritation, move to fresh air. If the irritation continues, see your doctor.

If these particles settle on your clothing, follow the garment manufacturer's instructions for cleaning.

- Your vehicle may be safely driveable after the airbag deploys. If so, you can tuck the deployed airbag inside the opening in the steering wheel hub trim cover to make driving somewhat easier.

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