

V1771

REPORT NUMBER: CAL-93-N05

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

TOYOTA MOTOR CORPORATION
1993 TOYOTA COROLLA
4-DOOR SEDAN

NHTSA NUMBER: MP5100

CALSPAN TEST NUMBER: 8058-1

OCTOBER 21, 1992

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



FINAL REPORT

PREPARED FOR:

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National Highway Traffic Safety Administration
Office of Market Incentives
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Prepared: Michael J. Kilgallon
Michael J. Kilgallon, Project Engineer

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

FINAL REPORT ACCEPTED BY:

Stuart Jay Seigel
Manager, New Car Assessment Program (NCAP)

Date of Report Acceptance

Stuart Jay Seigel for CHAN
Contracting Officer's Tech. Rep. (COTR)

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Date of Report Acceptance

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16. Abstract A frontal load cell barrier test of a 1993 Toyota Corolla 4-Door Sedan was performed at Calspan Advanced Technology Center crash test facility in Buffalo, New York, on October 21, 1992. The impact velocity was 56.3 kph and the temperature at the barrier face was 9°C. The maximum post-test vehicle crush was 518 mm. The test vehicle was equipped with a 3-point restraint system in the front seating positions. The vehicle was also equipped with a driver side airbag. With regard to FMVSS 208 "Occupant Crash Protection," injury criteria, the driver appears to exceed the maximum specified chest resultant of 60 g's over 3 milliseconds.					
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Section 1
PURPOSE AND TEST PROCEDURE

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

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

Section 2

SUMMARY OF TEST NUMBER MP5100

A load cell barrier consisting of 36 load cells was impacted by a 1993 Toyota Corolla 4-Door Sedan at a velocity of 56.3 kph. The test was performed at the Calspan Corporation Advanced Technology Center on October 21, 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 16 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.

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. 245) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C and D.

The 81 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 - Belt Elongation did not record accurately.

The driver's head struck the airbag; the HIC was 521.7. The maximum chest deceleration over 3 milliseconds was 62.0 g's and maximum chest deflection was 29.1 mm. Femur loads were -5372.9 newtons on the left femur and -5699.8 newtons on right femur.

The right front passenger's HIC was 770.8. Maximum chest deceleration over 3 milliseconds was 45.4 g's and maximum chest deflection was 41.5 mm. Femur loads were -3401.0 newtons on the left and -4253.2 newtons on the right.

Table 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Year/Make/Model/Body Style: 1993 Toyota Corolla 4-Door Sedan

NHTSA Test No.: MP5100 VIN.: JT2AE04E2P0003724

Body Color: Red Date of Manufacture: 6/92

Engine: 4 Cylinders; - C.I.D.; 1.6 Liters; - CC
X Gas; - Diesel; - Turbocharged
- Longitudinal; X Transverse

Transmission: 3 Speed; - Manual; X Automatic; - Overdrive

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

Date Received: 10/5/92 Odometer Reading: 38.6 km

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

Type of Occupant Restraint: 3-point restraint system with a supplemental driver side airbag

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 300 kPa, Rear 300 kPa

Recommended Tire Size: 175/65R14

Recommended Cold Tire Pressure: Front 200 kPa, Rear 200 kPa

Tires on Vehicle: 175/65R14; 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

Vehicle Capacity Weight (VCW) = 385 kgs (A)

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

Rated Cargo and Luggage
Weight (RCLW) A-B = 45 kgs

GVWR 1588 kgs GAWR: Front 835 kgs Rear 762 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 = 317 kgs Right Rear = 190 kgs
 Left Front = 349 kgs Left Rear = 181 kgs
 TOTAL FRONT WEIGHT = 666 kgs (64 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 371 kgs (36 % of Total Vehicle Weight)
 TOTAL DELIVERED WEIGHT = 1037 kgs

CALCULATION FOR TARGET TEST WEIGHT:

UDW = Unloaded Delivered Weight (1037 kgs)
 VCW = Vehicle Capacity Weight (385 kgs)
 DSC = Designated Seating Capacity (5)
 RCLW = VCW - 68 (DSC) = 45 kgs
 Target Test Weight = UDW + RCLW + (2 dummies x 74 kgs/dummy)
 Target Test Weight = 1230 kgs

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 44 KILOGRAMS CARGO:

Right Front = 331 kgs Right Rear = 290 kgs
 Left Front = 345 kgs Left Rear = 263 kgs
 TOTAL FRONT WEIGHT = 676 kgs (55 % of Total Vehicle Weight)
 TOTAL REAR WEIGHT = 553 kgs (45 % of Total Vehicle Weight)
 TOTAL TEST WEIGHT = 1229 kgs
 Weight of ballast secured in vehicle trunk area = 0 kgs

VEHICLE ATTITUDE (all dimensions in millimeters):

Delivered Attitude: RF 651 LF 654 RR 648 LR 651
 Test Attitude: RF 625 LF 635 RR 571 LR 584
 Wheel Base: 2466 mm.; C.G. = 1110 mm. rearward of front wheel C/L
 Remarks: 46 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: October 21, 1992 Time of Test: 12:12
 Ambient Temperature: 9 °C at impact area
 Temperature in Occupant Compartment: 21 °C
 Windshield Molding Temperature: 21 °C
 Required Impact Velocity Range: 55.5 to 57.1 kph
 Impact Velocity: primary = 56.3 kph, secondary = 56.3 kph
 Distance From Front Bumper to Barrier Face When
 Entering Speed Trap: 1320 mm
 Exiting Speed Trap: 304 mm

VEHICLE REBOUND AND CRUSH:

Vehicle Length: Pre-test = R 4310 mm C_L 4378 mm L 4310 mm
 Post-test = R 3792 mm C_L 3867 mm L 3852 mm
 Crush = R 518 mm C_L 511 mm L 458 mm

Distance from front of test vehicle to point of impact:

R 405 mm C_L 374 mm L 412 mm

VISIBLE DUMMY CONTACT POINTS:

	<u>Driver</u>	<u>Passenger</u>
Head	<u>Airbag</u>	<u>Upper dash panel</u>
Chest	<u>Airbag</u>	<u>No contact</u>
Abdomen	<u>No contact</u>	<u>No contact</u>
Left Knee	<u>Lower dash panel</u>	<u>Glove box door</u>
Right Knee	<u>Lower dash panel</u>	<u>Glove box door</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 (mm)	<u>0.0</u>	<u>0.0</u>

Glazing Damage

Backlight/Windshield Windshield sustained stress fractures but remained intact.

Other Notable Impact Effects: _____

Section 3
OMI FINAL DATA

Occupant and Vehicle Information

I. OMI DATA

1. Dummy Injury Criteria Data Summary
2. Dummy Positioning Data
3. Seat Belt Performance Assessment Data
4. Camera Locations
5. Vehicle Target Locations

II. OVR DATA

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

Table 2
DUMMY INJURY CRITERIA VALUES

NHTSA No.: MP5100 Vehicle: 1993 Toyota Corolla 4-Door Sedan

	MAXIMUM HEAD ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	-51.6	30.7	24.6	57.1
Position #2 - Passenger	-66.7	-7.8	60.2	76.0

	MAXIMUM CHEST ACCELERATION (g's)			
	X	Y	Z	R
Position #1 - Driver	65.0	9.1	17.1	62.0
Position #2 - Passenger	-46.5	-9.2	-9.6	45.4

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

	MAXIMUM FORCE - FEMUR LOAD (nwt)	
	LEFT FEMUR	RIGHT FEMUR
Position #1 - Driver	-5372.9	-5699.8
Position #2 - Passenger	-3401.0	-4253.2

	MAXIMUM FORCE - SEAT BELT LOADS (nwt)		
	SHOULDER STRAP UPPER BELT LOAD	LAP STRAP RIGHT BELT LOAD	LAP STRAP LEFT BELT LOAD
Position #1 - Driver	5787.5	-	2280.9
Position #2 - Passenger	8372.9	3078.1	-

	HEAD INJURY CRITERIA (HIC)			
	HIC	t ₁ (SEC)	t ₂ (SEC)	Average Acceleration t ₁ TO t ₂
Position #1 - Driver	521.7	0.04788	0.08376	46.2
Position #2 - Passenger	770.8	0.06852	0.10440	54.1

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 Toyota Corolla 4-Door Sedan

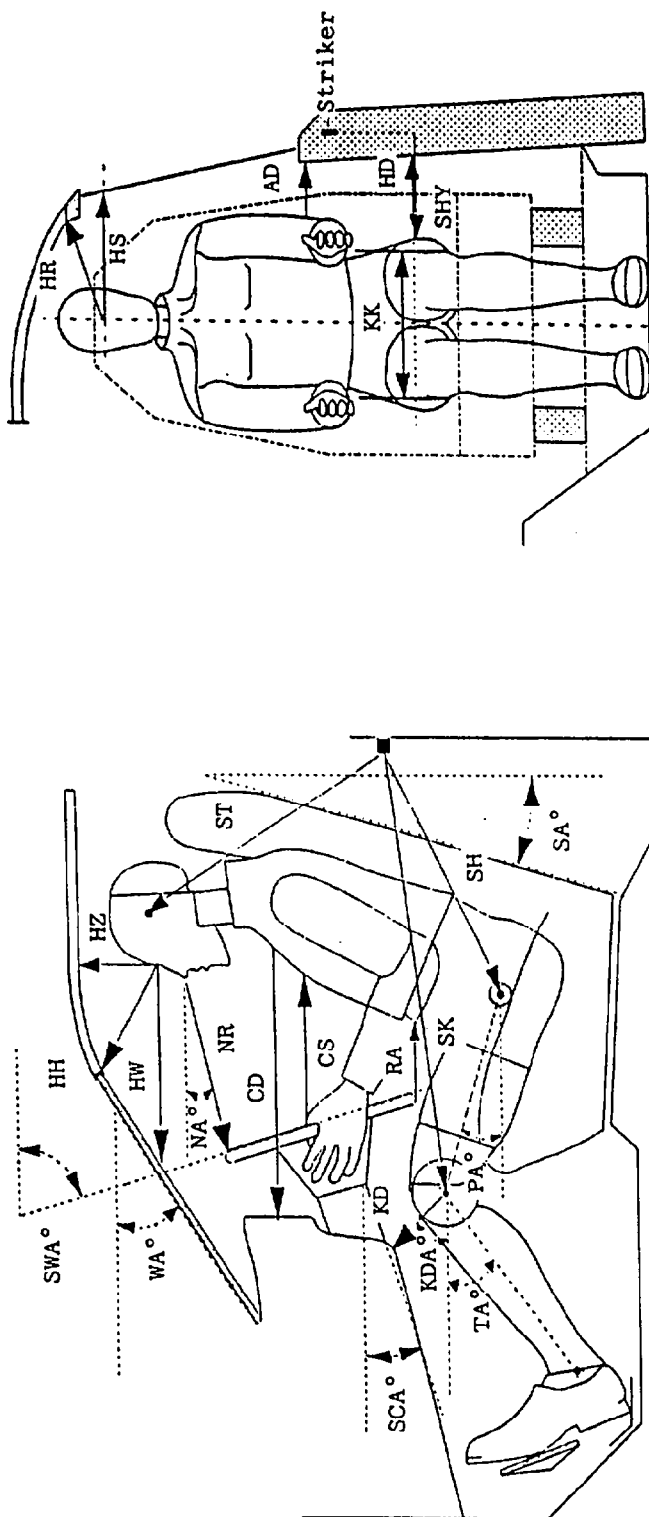
Vehicle NHTSA No.: MP5100 Test Date: October 21, 1992

MAXIMUM VALUES	DRIVER DUMMY ID # <u>45</u>	PASSENGER DUMMY ID # <u>245</u>
Neck Load X (nwt)	-295.0	1469.2
Neck Load Y (nwt)	-278.8	-278.2
Neck Load Z (nwt)	2219.7	2516.1
Neck Moment X (nwt-m)	-40.5	21.9
Neck Moment Y (nwt-m)	-30.0	51.6
Neck Moment Z (nwt-m)	-20.6	11.9
Chest Deflection X (mm)	29.1	41.5
Time of Max. Occurrence (msec)	62.3	84.4

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

Figure 1

DUMMY MEASUREMENTS FOR FRONT SEAT PASSENGERS

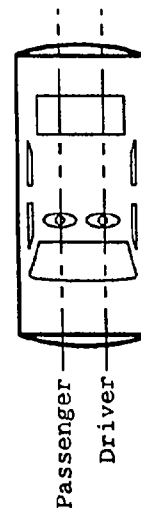


HH - Head to Header
 HW - Head to Windshield
 HZ - Head to Roof
 NR - Nose to Rim
 CS - Steering Wheel to Chest
 CD - Chest to Dash
 RA - Rime to Abdomen
 KDL/KDR - Knee to Dash
 KDA - Knee to Dash Angle
 SH - Striker to H-Point

SK - Striker to Knee
 ST - Striker to Head
 NA - Nose to Rim Angle
 TA - Tibial Angle
 PA - Pelvic Angle
 SA - Seat Back Angle
 SCA - Steering Column Angle
 SWA - Steering Wheel Angle
 WA - Windshield Angle

HR - Head to Side Header
 HS - Head to Side Window
 AD - Arm to Door
 HD - H-Point to Door
 SHY - Striker to H-Point (Y Dir.)
 KK - Knee to Knee

Vertical Longitudinal Planes



Passenger
 Driver

Vertical Transverse Plane

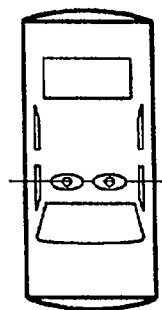


Table 4
FRONT SEAT OCCUPANT MEASUREMENTS

	DRIVER (Serial #45)	PASS (Serial #245)
WA°	30°	
SWA°	64°	N/A
SCA°	26°	N/A
SA°	See Note	See Note
HZ	188 mm	172 mm
HH	308 mm	302 mm
HW	505 mm	482 mm
HR	213 mm	198 mm
NR	384 mm Angle 10°	N/A
CD	508 mm	524 mm
CS	282 mm	N/A
RA	164 mm	N/A
KDL	90 mm Angle (KDA) 51°	100 mm
KDR	85 mm	90 mm Angle (KDA) 49°
PA°	25°	25°
TA°	39°	41°
KK	270 mm	265 mm
ST	503 mm Angle 13°	495 mm Angle 10°
SK	579 mm Angle 105°	572 mm Angle 98°
SH	236 mm Angle 130°	224 mm Angle 130°
SHY	230 mm	220 mm
HS	237 mm	225 mm
HD	174 mm	176 mm
AD	104 mm	91 mm

Note: Seat back was positioned according to manufacturer specifications

Table 5

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

SHOULDER BELT SPOOL-OFF DATA:

As determined by film analysis.	<u>51 mm</u>	<u>63 mm</u>
As determined mechanically.	<u>49 mm</u>	<u>52 mm</u>

BELT STRETCH DATA:

Measured electronically between shoulder belt load cell and the "D" ring.	<u>N/A</u>	<u>109 mm/m</u>
Measured mechanically	<u>0.0 mm/m</u>	<u>120 mm/m</u>

Figure 2
CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera Information Shown on Table 4

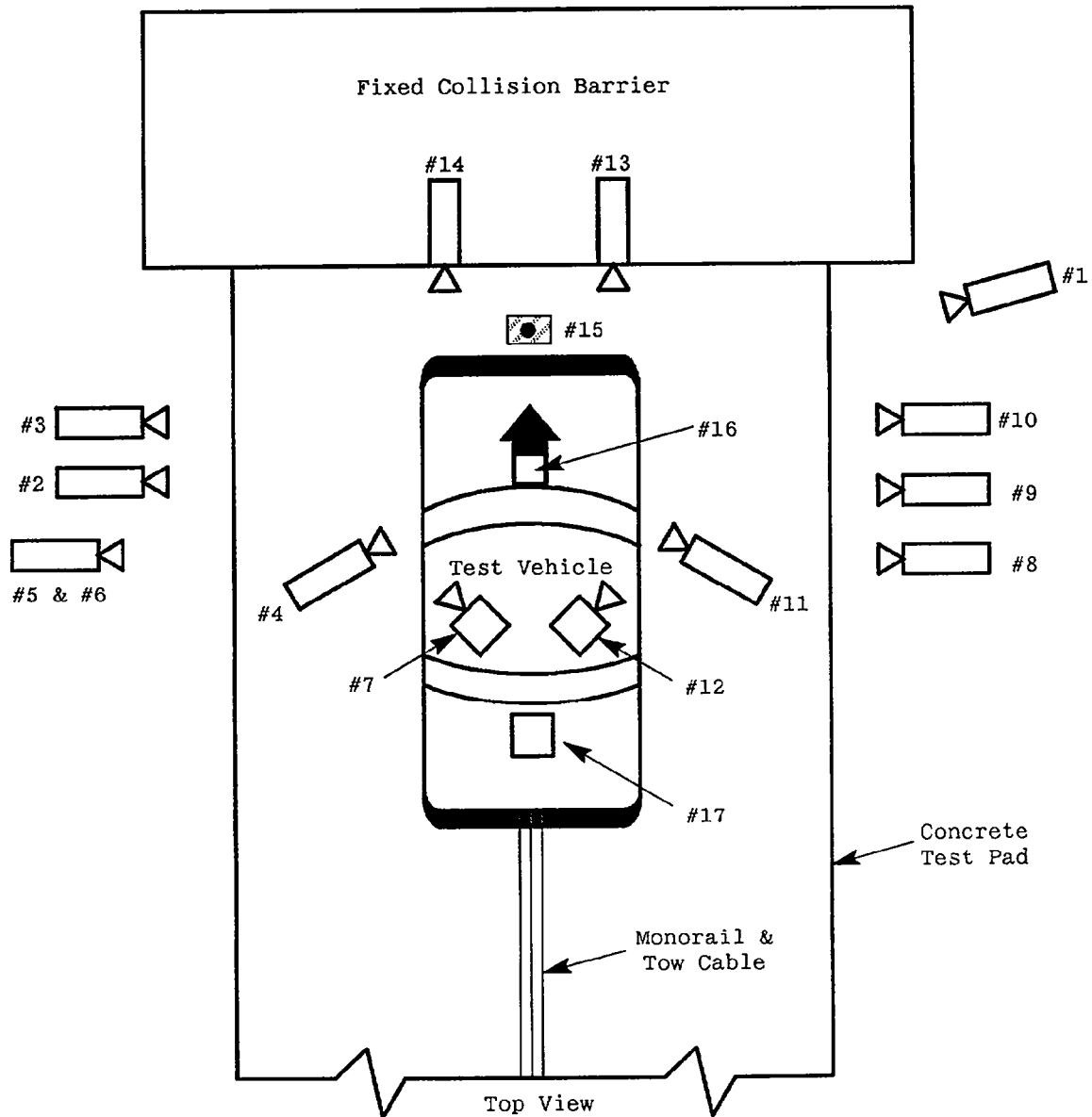


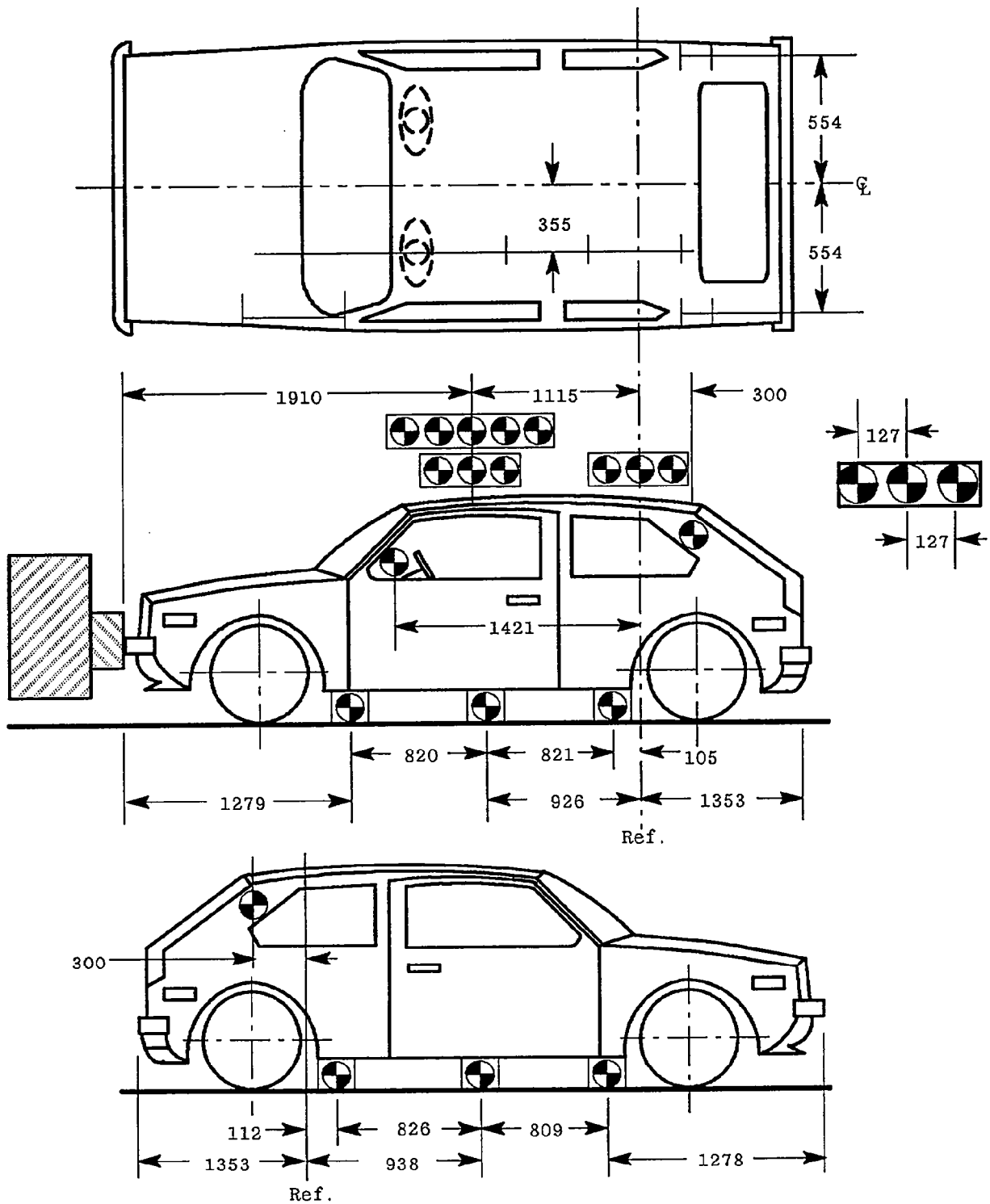
Table 6

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	5969	1524	1067	-4	5538	13	550
3	Left Side View	7493	1067	1092	-4	7062	25	610
4	Driver and Interior View	2718	2515	1600	-15	2287	13	570
5	Steering Column (Bottom)	6553	1753	1168	-5	6122	25	580
6	Steering Column (Top)	6553	1753	1778	-10	6122	25	570
7	Left Belt	-	-	-	-	-	8	620
8	Overall Right Side	5715	1702	1067	-4	5284	13	490
9	Right Side View	7442	1245	1041	-2	7011	25	590
10	Right Passenger View	7518	1676	1473	-5	7087	35	550
11	Passenger and Interior View	2794	2464	1600	-17	2363	13	570
12	Right Belt	-	-	-	-	-	8	610
13	Passenger Front View	5334	0	1930	-35	-	13	620
14	Driver Front View	5334	0	1930	-34	-	13	600
15	Windshield View	0	0	3048	-50	-	13	610
16	Pit View of Engine	0	1090	-3048	90	-	13	780
17	Pit View of Fuel Tank	0	3280	-3048	90	-	13	930

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

Figure 3
VEHICLE TARGET LOCATIONS

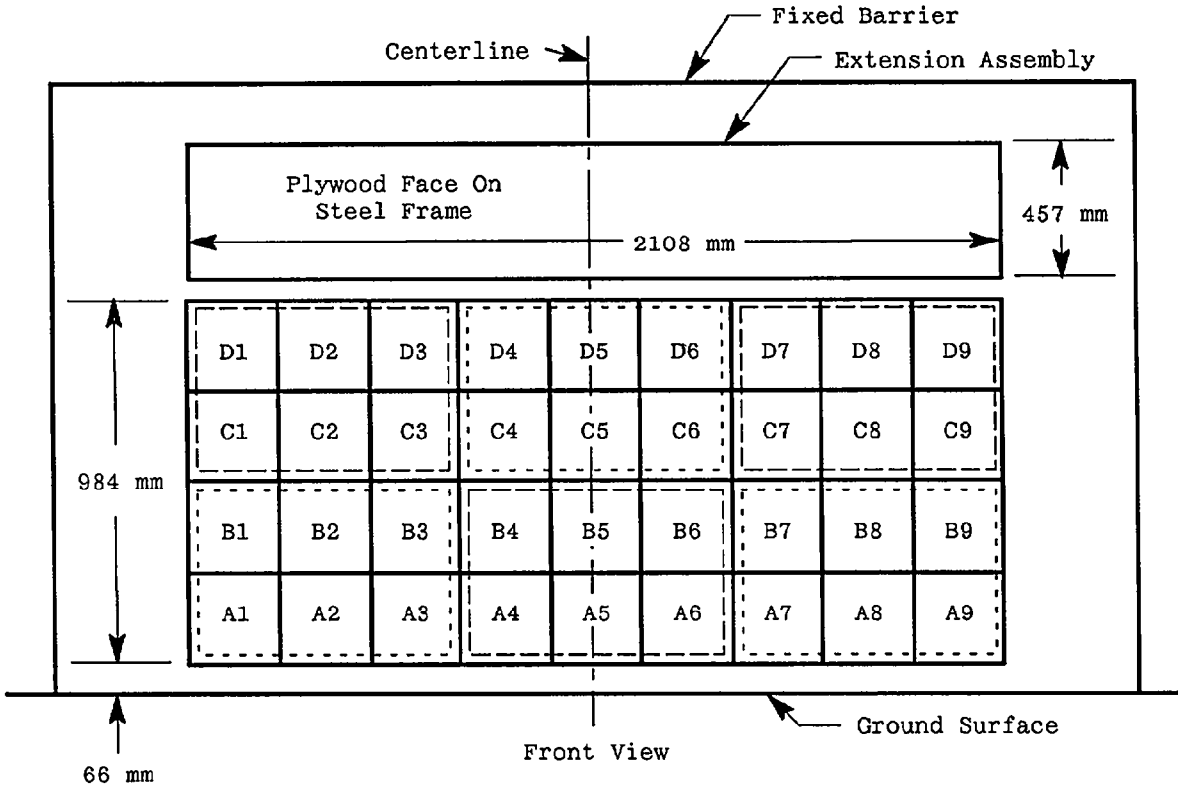


(Dimensions in millimeters)

Figure 4

LOAD CELL LOCATIONS ON FIXED BARRIER

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



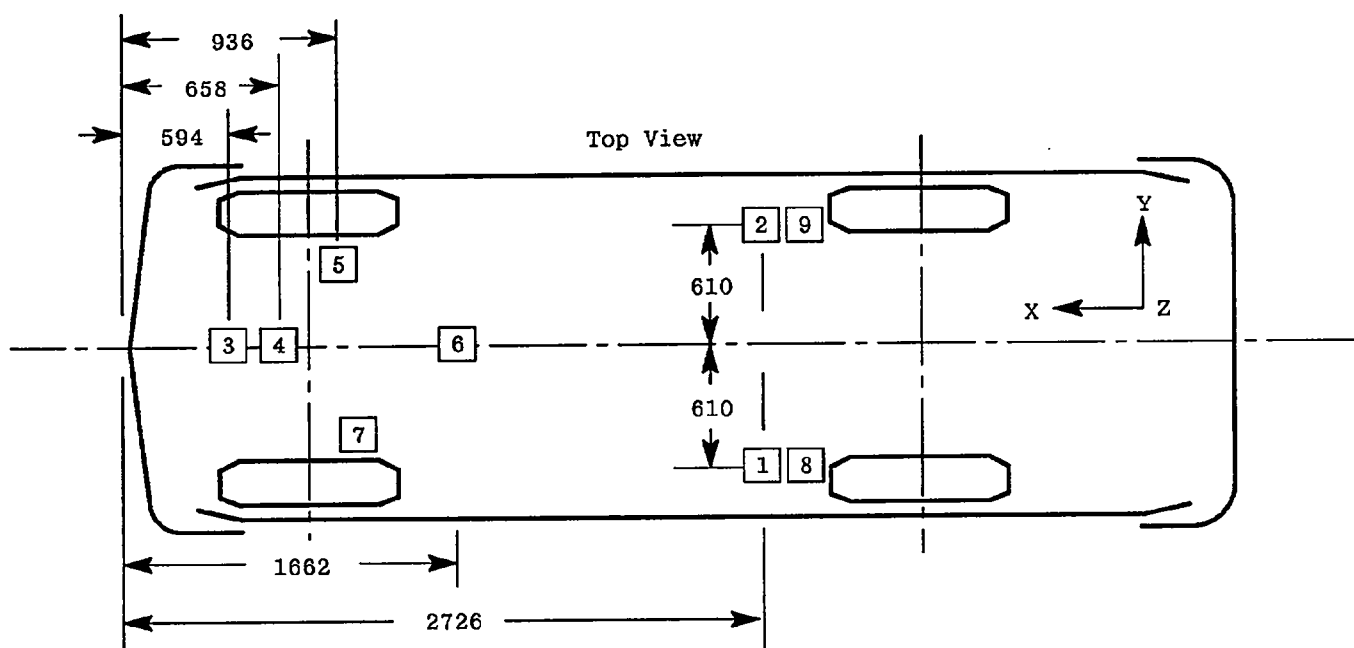
6 GROUPS OF 6 LOAD CELLS EACH

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 5
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	✓		
9	Right Rear Seat Crossmember	✓		

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

Figure 6
TEST VEHICLE MEASUREMENTS

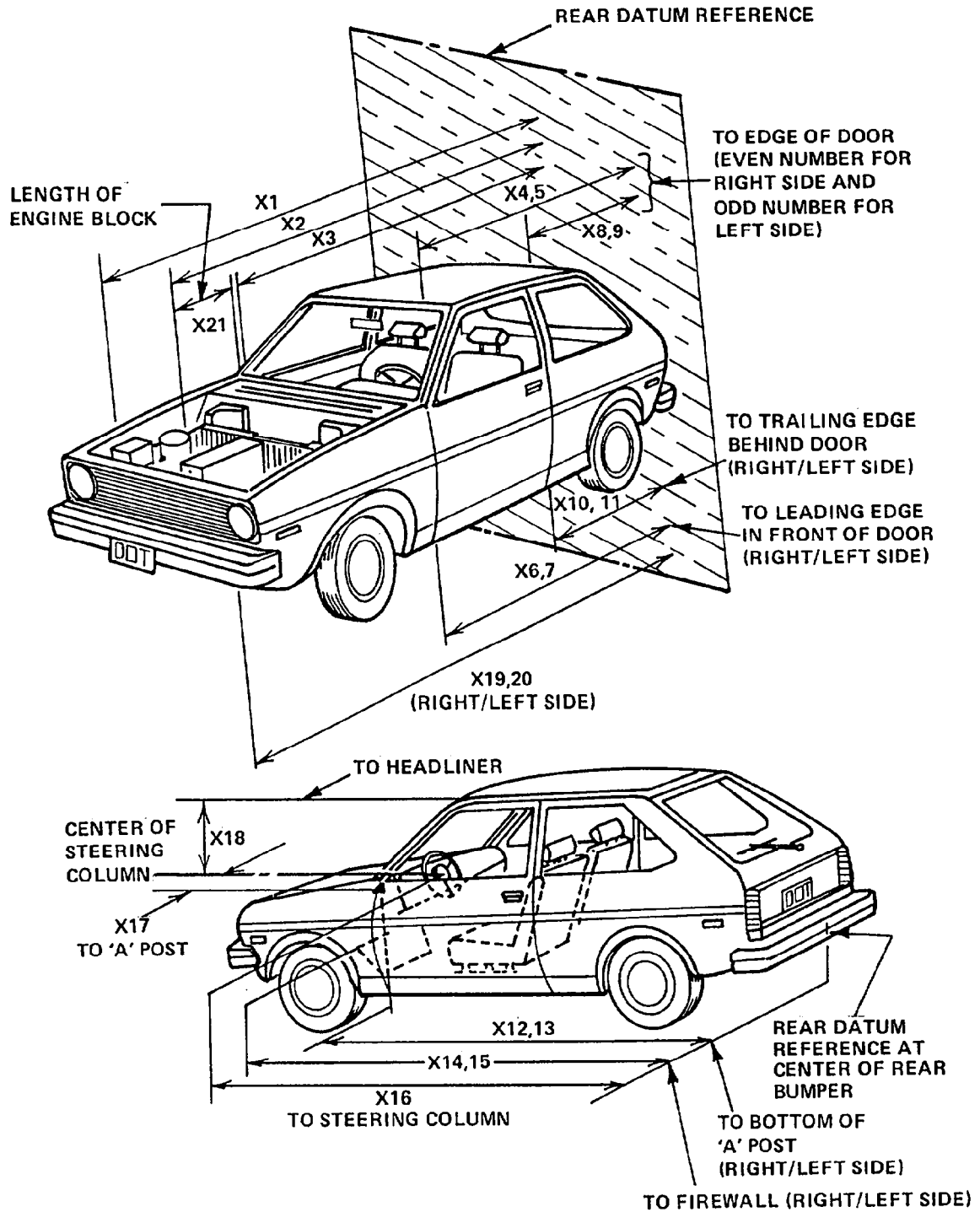


Table 7

VEHICLE MEASUREMENTS

No.		All Dimensions in Millimeters		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	4378	3867	511
X2	Rear Surface of Vehicle to Front of Engine	3820	3575	245
X3	Rear Surface of Vehicle to Firewall	3312	3160	152
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	2992	2982	10
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	2985	2985	0
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	3000	2982	18
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	2995	2988	7
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	2013	2000	13
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	2010	2013	-3
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	2010	2000	10
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	2005	2000	5
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	2980	2972	8
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	2986	2980	6
X14	Rear Surface of Vehicle to Firewall, Right Side	3250	3150	100
X15	Rear Surface of Vehicle to Firewall, Left Side	3260	3155	105
X16	Rear Surface of Vehicle to Steering Column	2590	2610	-20
X17	Center of Steering Column to "A" Post	395	400	-5
X18	Center of Steering Column to Headliner	400	330	70
X19	Rear Surface of Vehicle to Right Side of Front Bumper	4310	3792	518
X20	Rear Surface of Vehicle to Left Side of Front Bumper	4310	3852	458
X21	Length of Engine Block	410	410	0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	2765	2740	25
CD	Rear Surface of Vehicle to Center of Dash Panel	2740	2710	30
LD	Rear Surface of Vehicle to Left Side of Dash Panel	2692	2740	52

ACCIDENT INVESTIGATION DIVISION DATA
FOR 35 MPH FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: 1993 Toyota Corolla 4-Door Sedan

Vehicle NHTSA No.: MP5100; Vin: JT2AE04E2P0003724

Model Year: 1993; Build Date: 6/92; Test Date: 10/21/92

Vehicle Size Category: Compact; Test Weight: 1229 kgs

Vehicle Wheelbase: 2466 mm; Front Overhang: 1279 mm; Overall Width: 1685 mm

Collision Deformation Classification (CDC) Code: 12FDEW3

Crush Depth C1= 435 mm

Dimensions: C2= 476 mm

C3= 495 mm

C4= 512 mm

C5= 519 mm

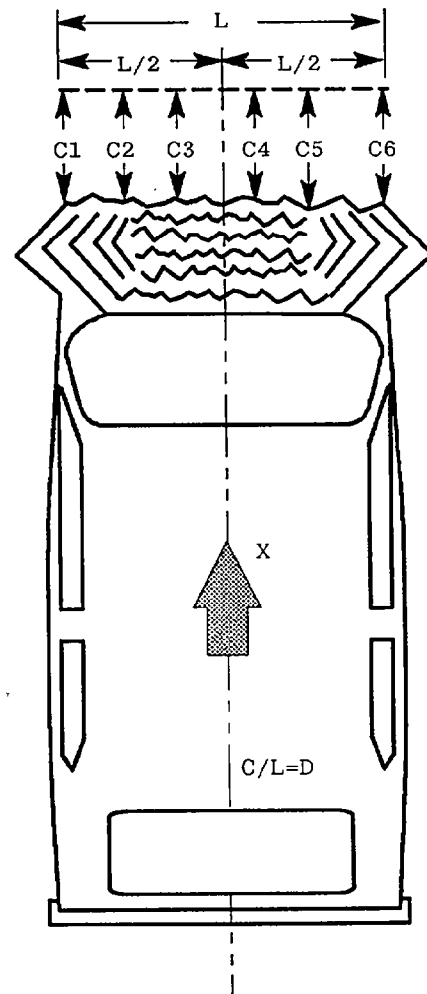
C6= 495 mm

Midpoint of
Damage:

D= Vehicle Centerline
(Longitud.)

Length of Damaged
Region:

L= 1685 mm



Appendix A

PHOTOGRAPHS

PHOTOGRAPHS

<u>Figure</u>	<u>Title</u>	<u>Page</u>
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A-13	POST-TEST WINDSHIELD VIEW	A-15
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A-16	POST-TEST FRONT UNDERBODY VIEW	A-18
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A-21	PRE-TEST DRIVER POSITION VIEW	A-23
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A-27	PRE-TEST PASSENGER AND INTERIOR VIEW	A-29
A-28	POST-TEST PASSENGER AND INTERIOR VIEW	A-30
A-29	IMPACT VIEW	A-31

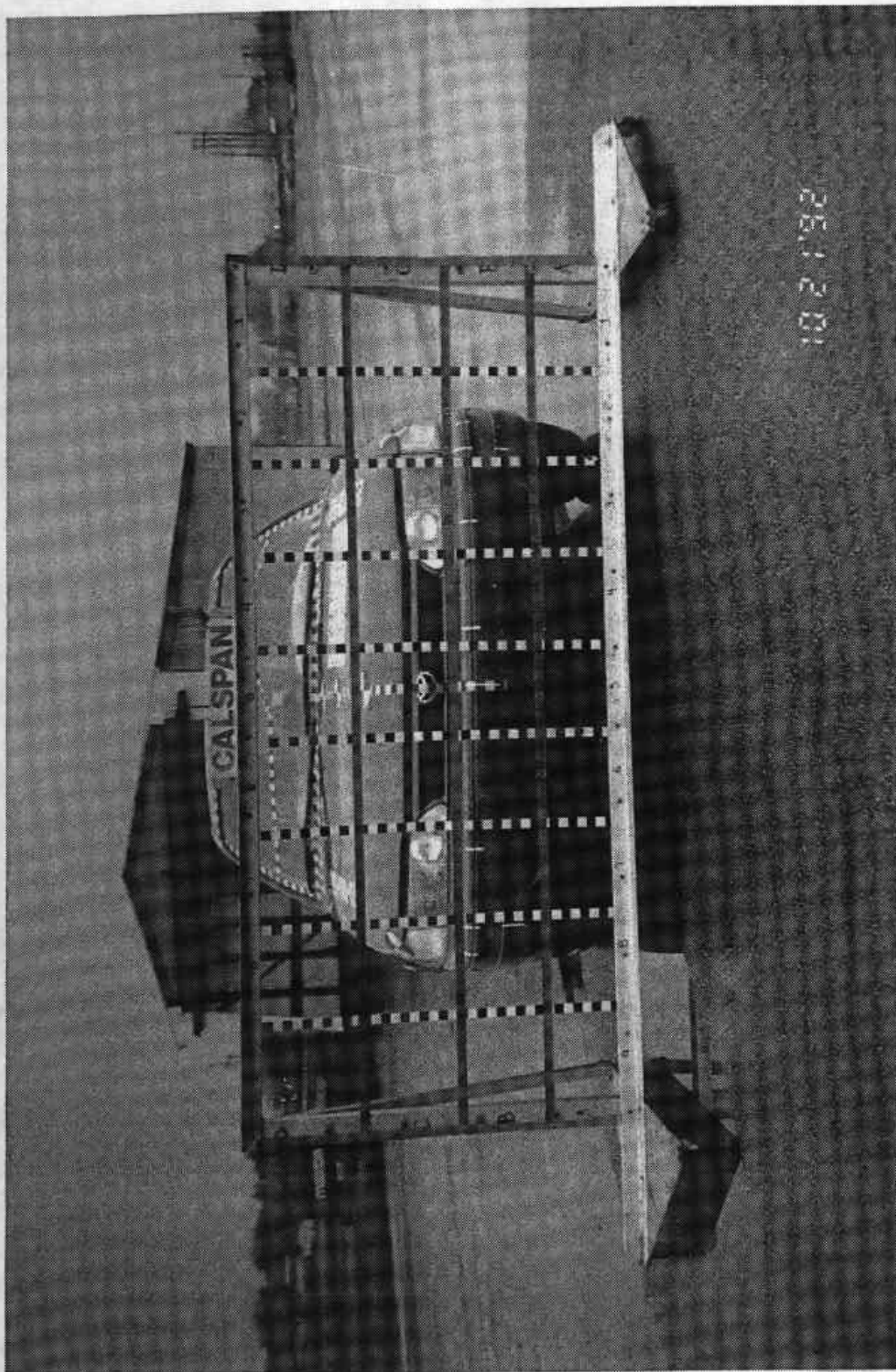


Figure A-1 LOAD CELL LOCATIONS



2312 B

Figure A-2 PRE-TEST FRONT VIEW

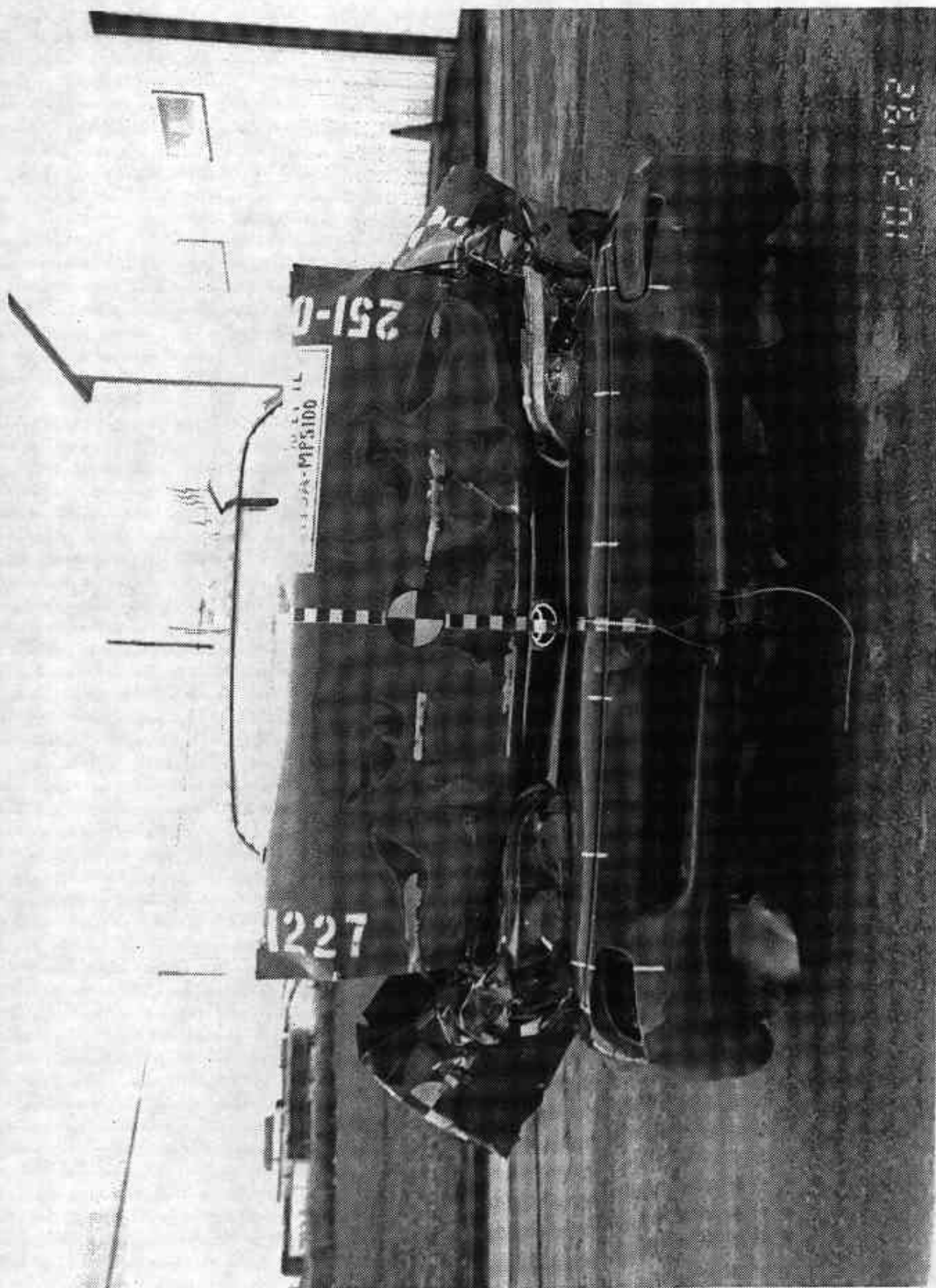


Figure A-3 POST TEST FRONT VIEW

A-5

8058-1

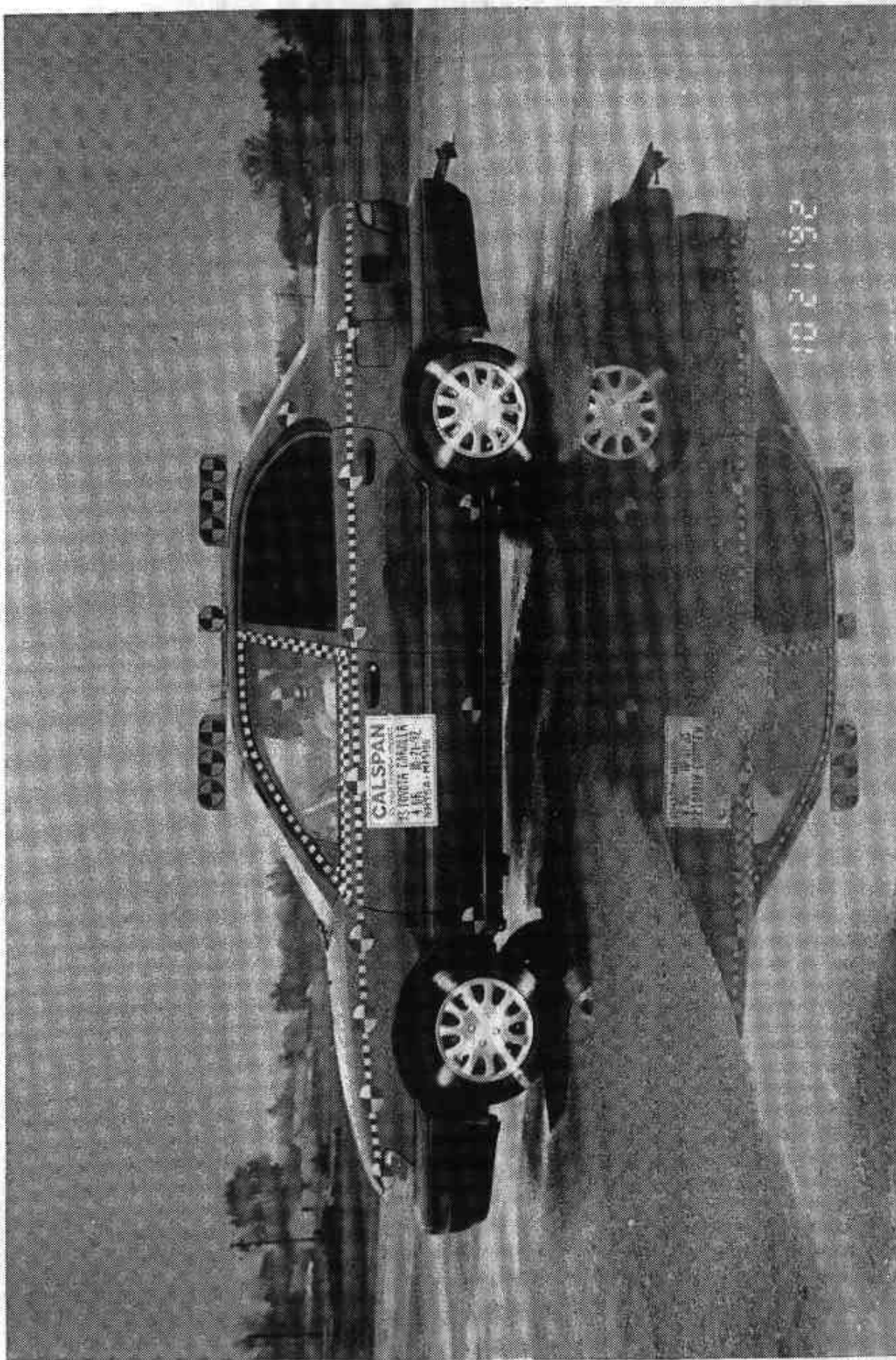


Figure A-4 PRE-TEST LEFT SIDE VIEW

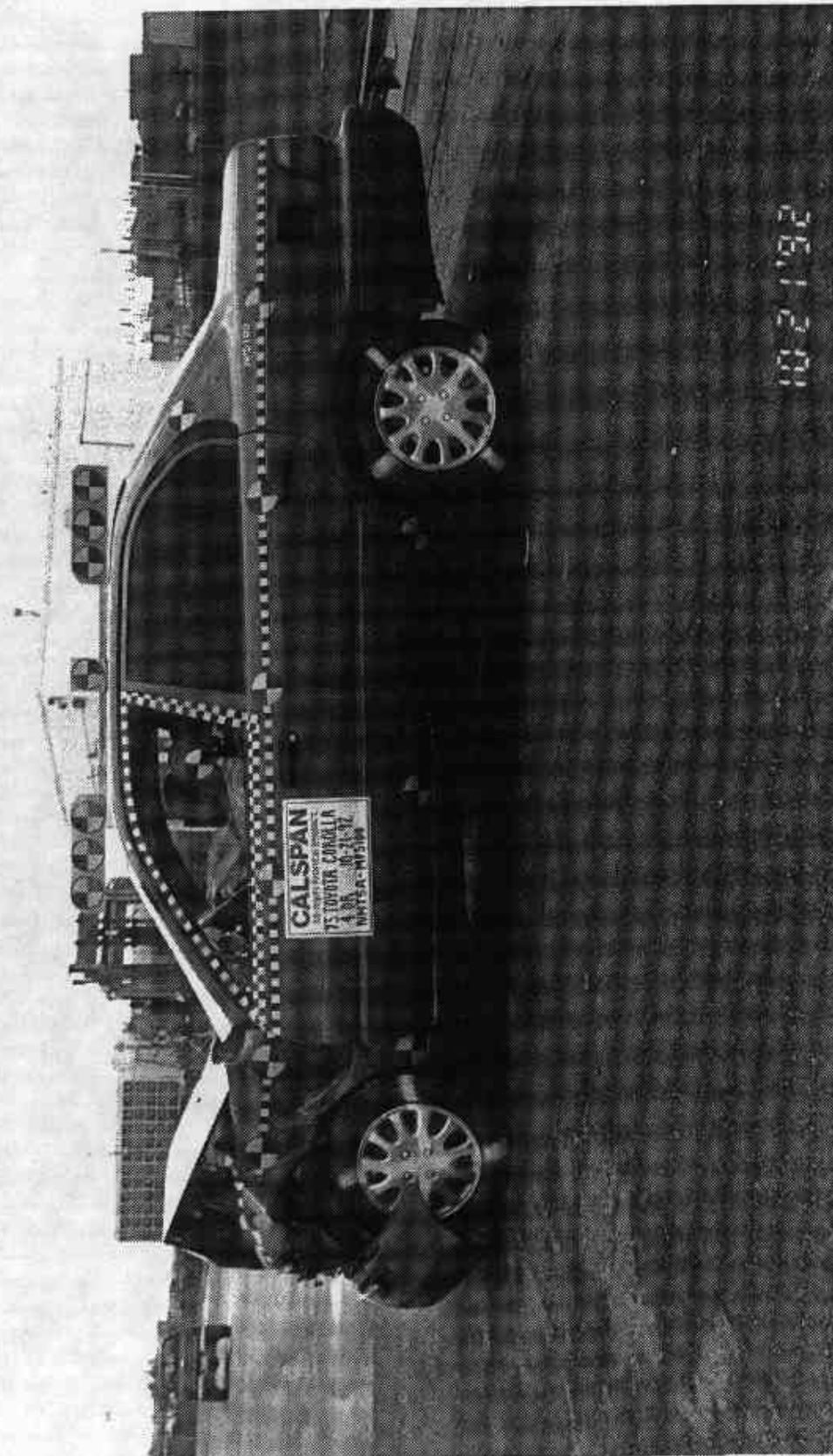


Figure A-5 POST TEST LEFT SIDE VIEW

A-7

8058-1

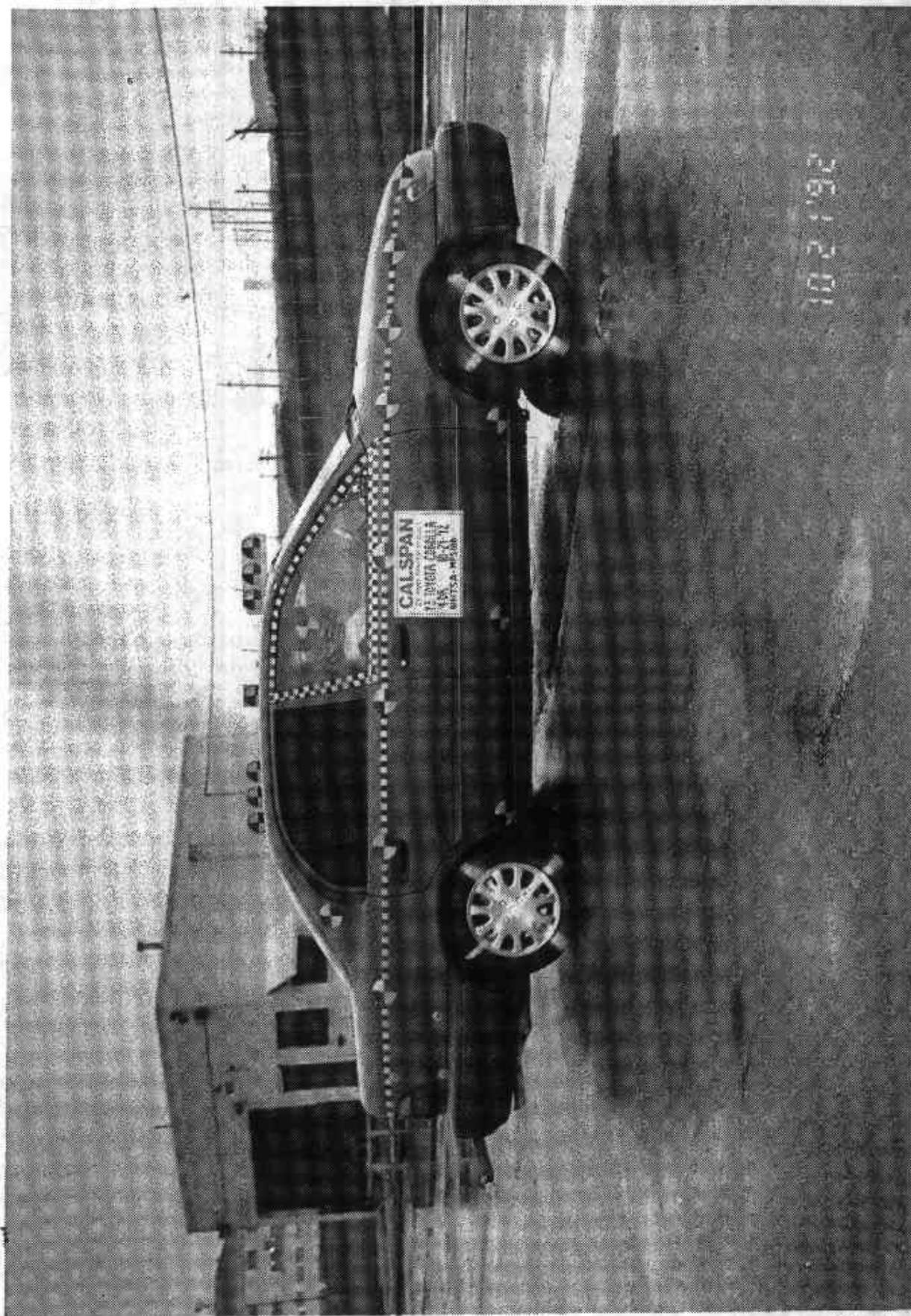


Figure A-6 PRE-TEST RIGHT SIDE VIEW



Figure A-7 POST-TEST RIGHT SIDE VIEW

A-9

8058-1



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

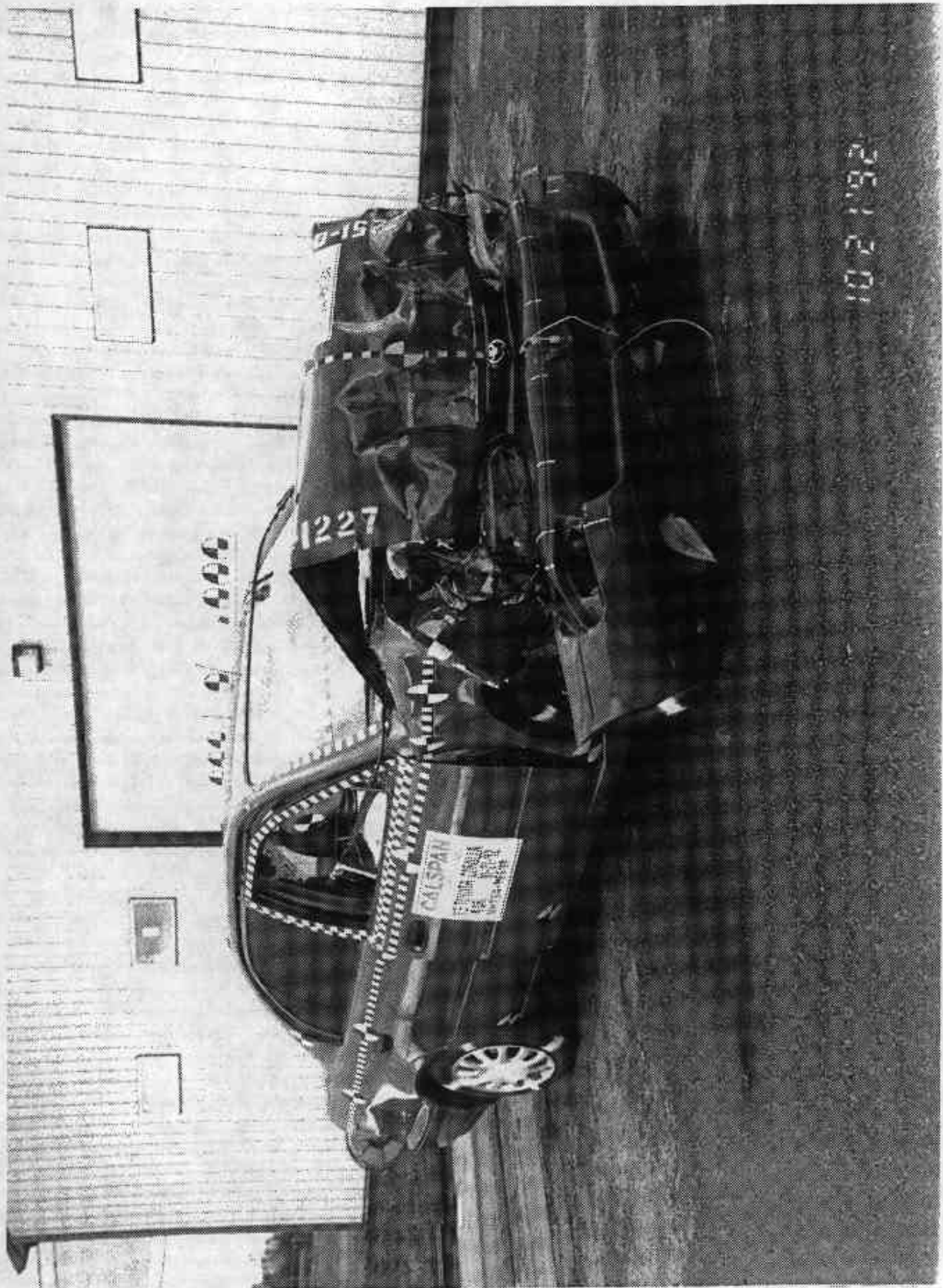
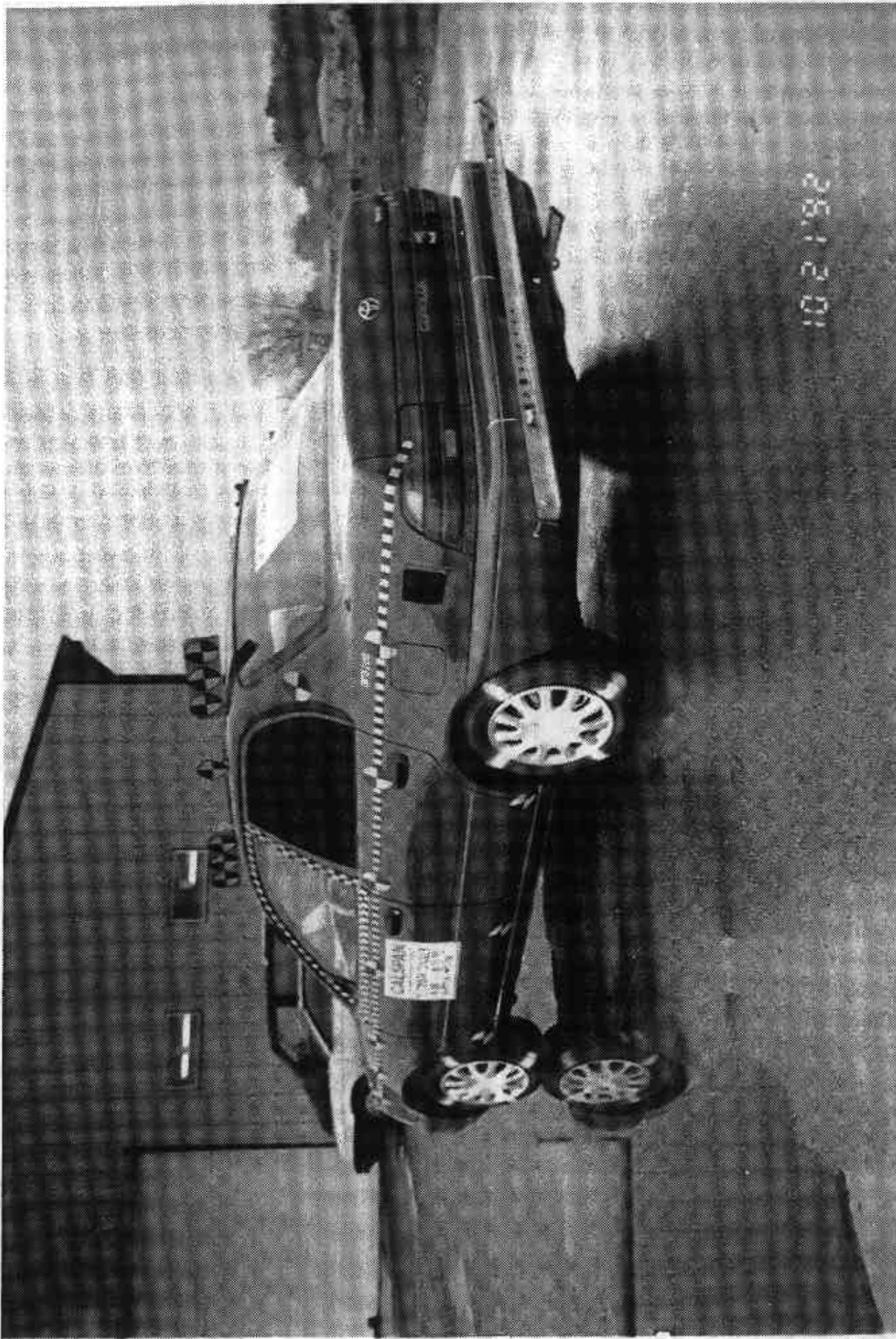


Figure A-9 POST-TEST RIGHT FRONT THREE-QUARTER VIEW

A-11

8058-1



102192

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



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

A-13

8058-1

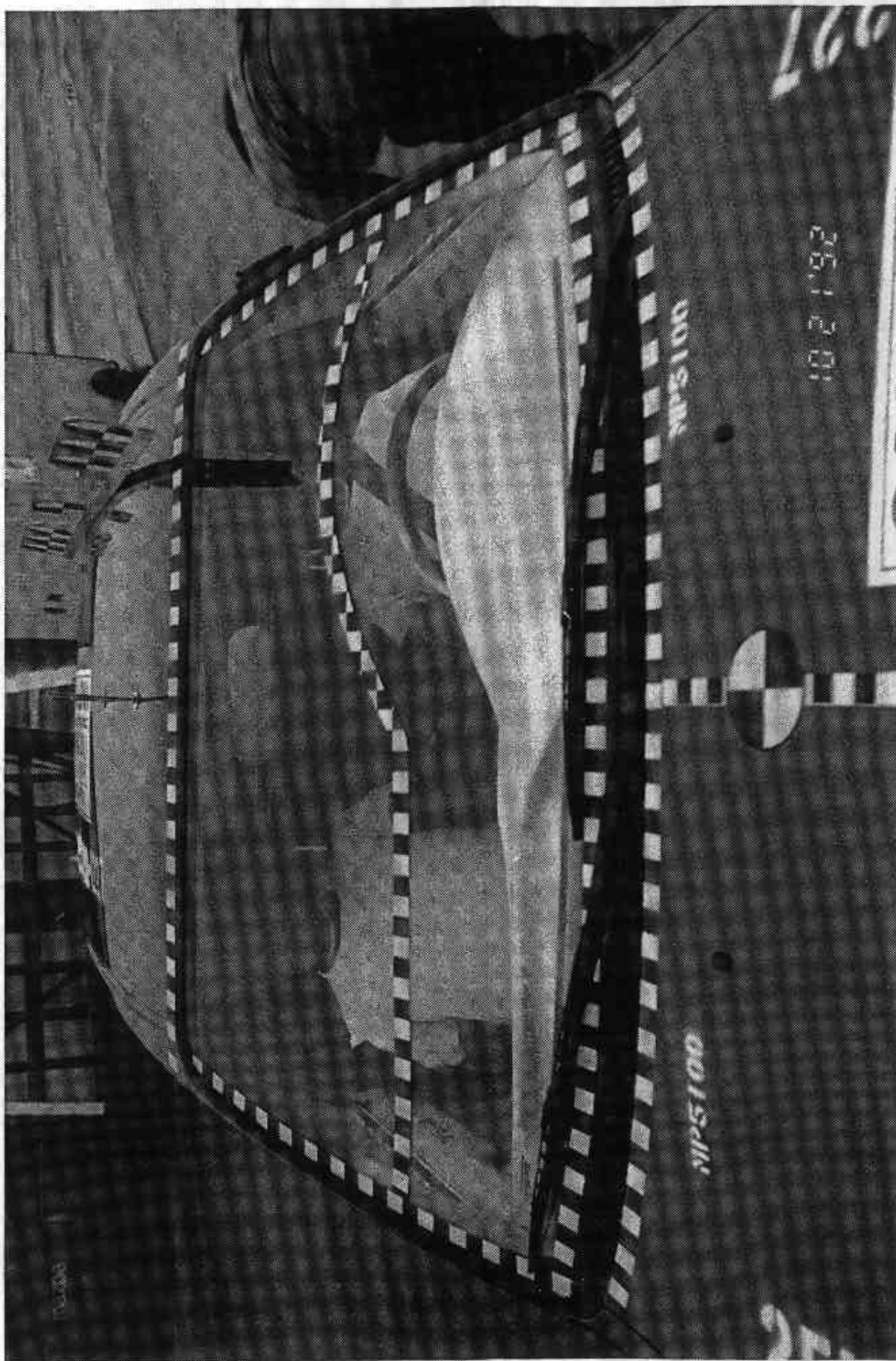


Figure A-12 PRE-TEST WINDSHIELD VIEW

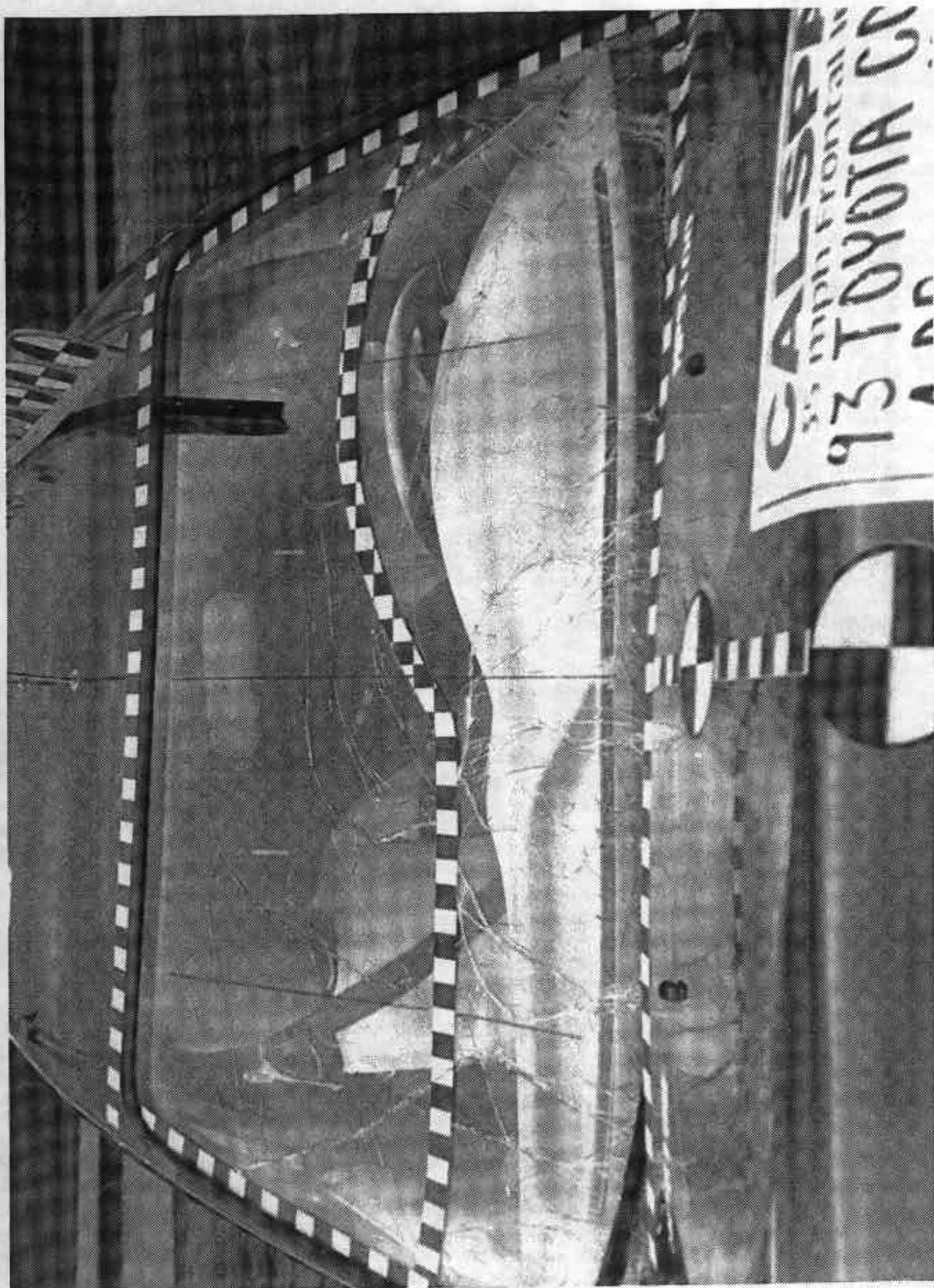


Figure A-13 POST-TEST WINDSHIELD VIEW

A-15

8058-1

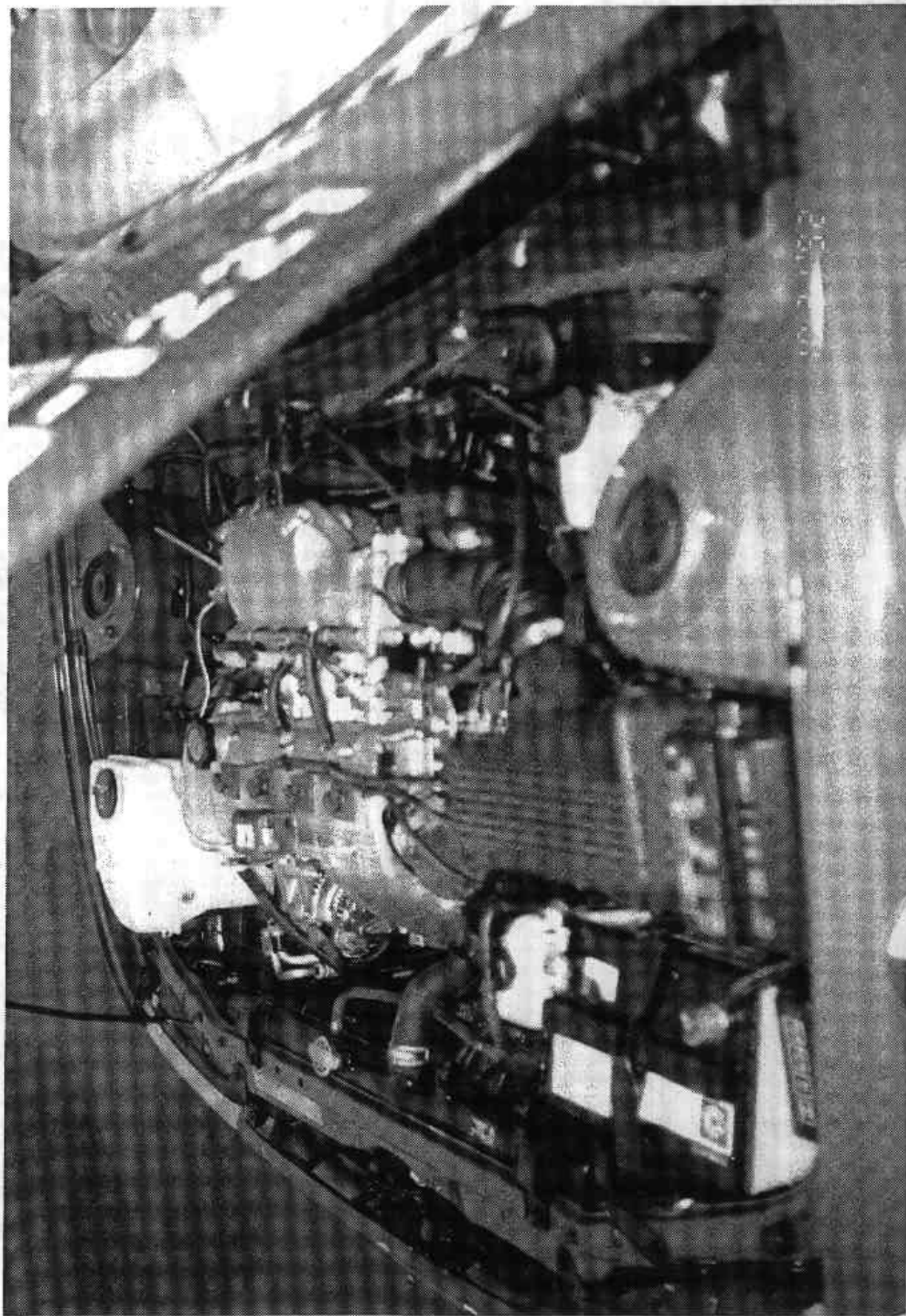


Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

A-16

8058-1

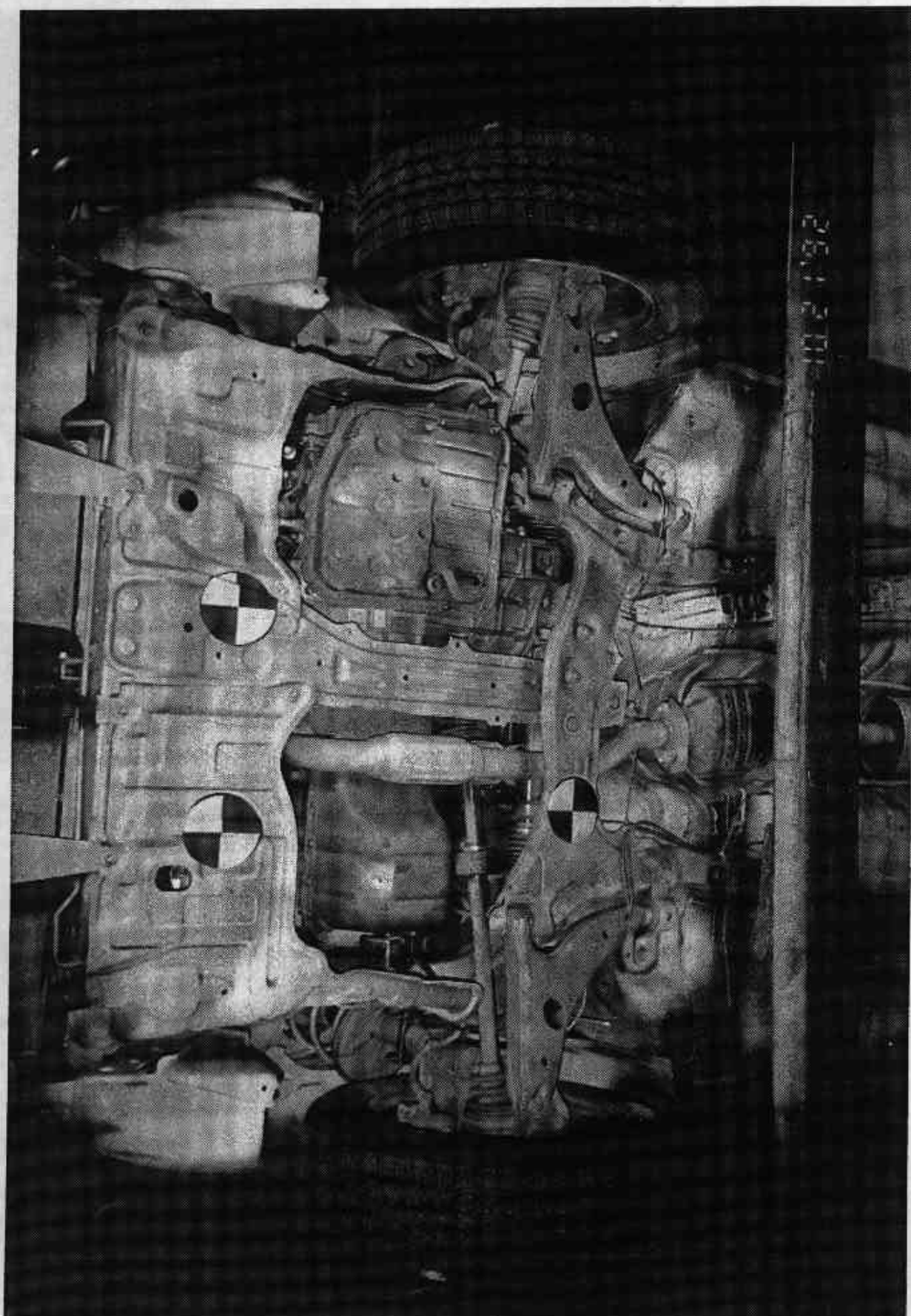


Figure A-15 PRE-TEST FRONT UNDERBODY VIEW

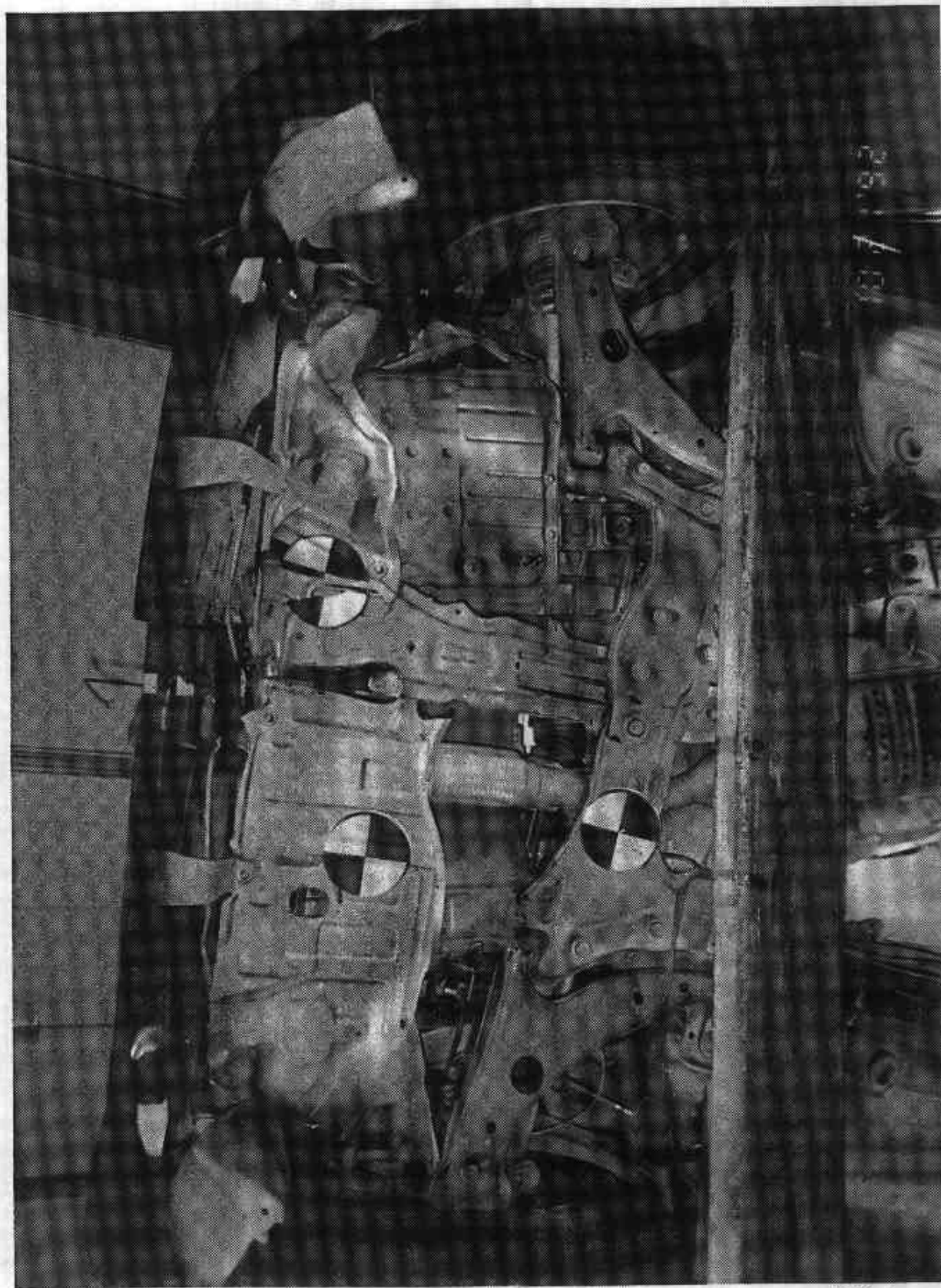


Figure A-16 POST-TEST FRONT UNDERBODY VIEW

A-18

8058-1

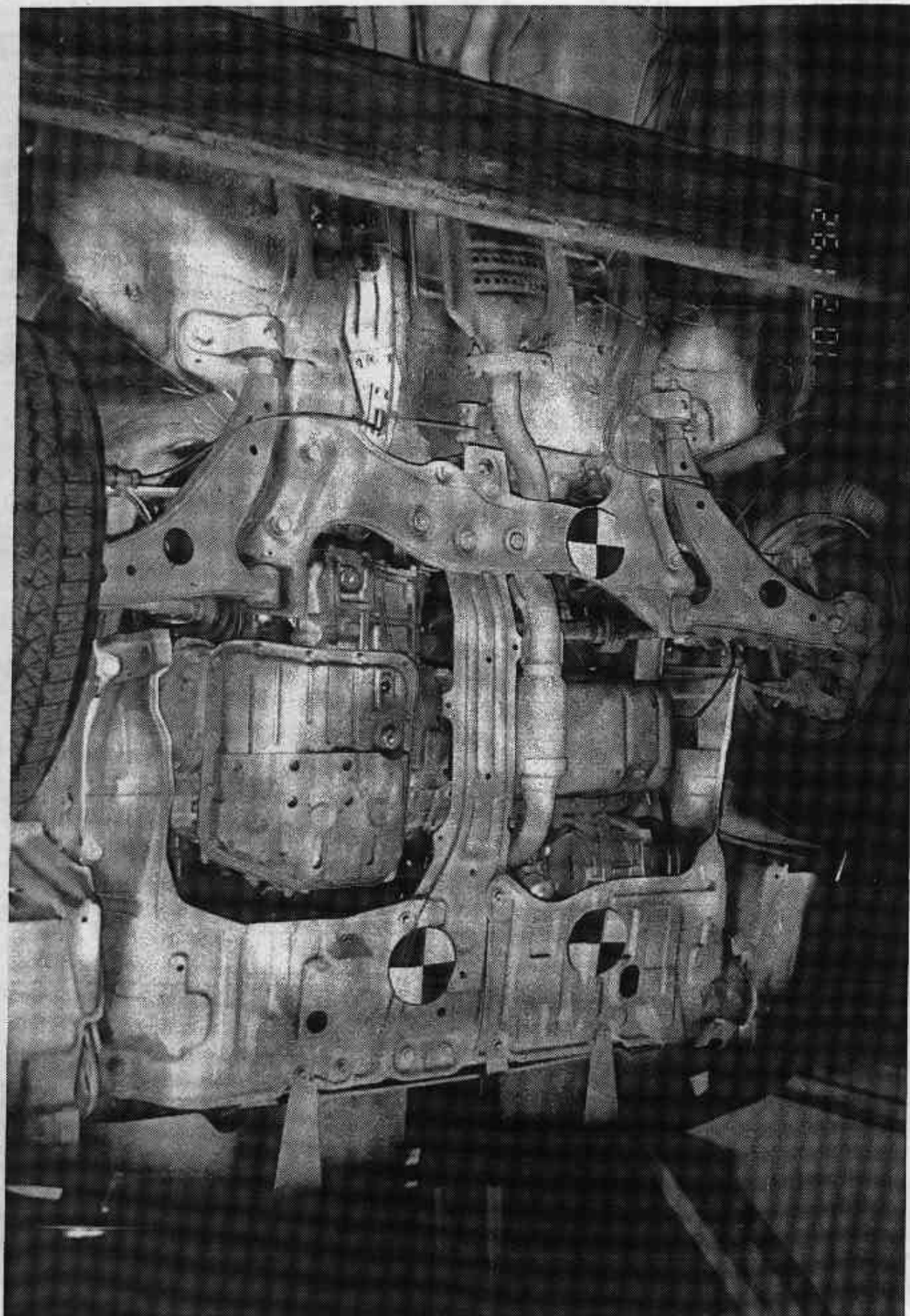


Figure A-17 PRE-TEST FRONT SIDE UNDERBODY VIEW

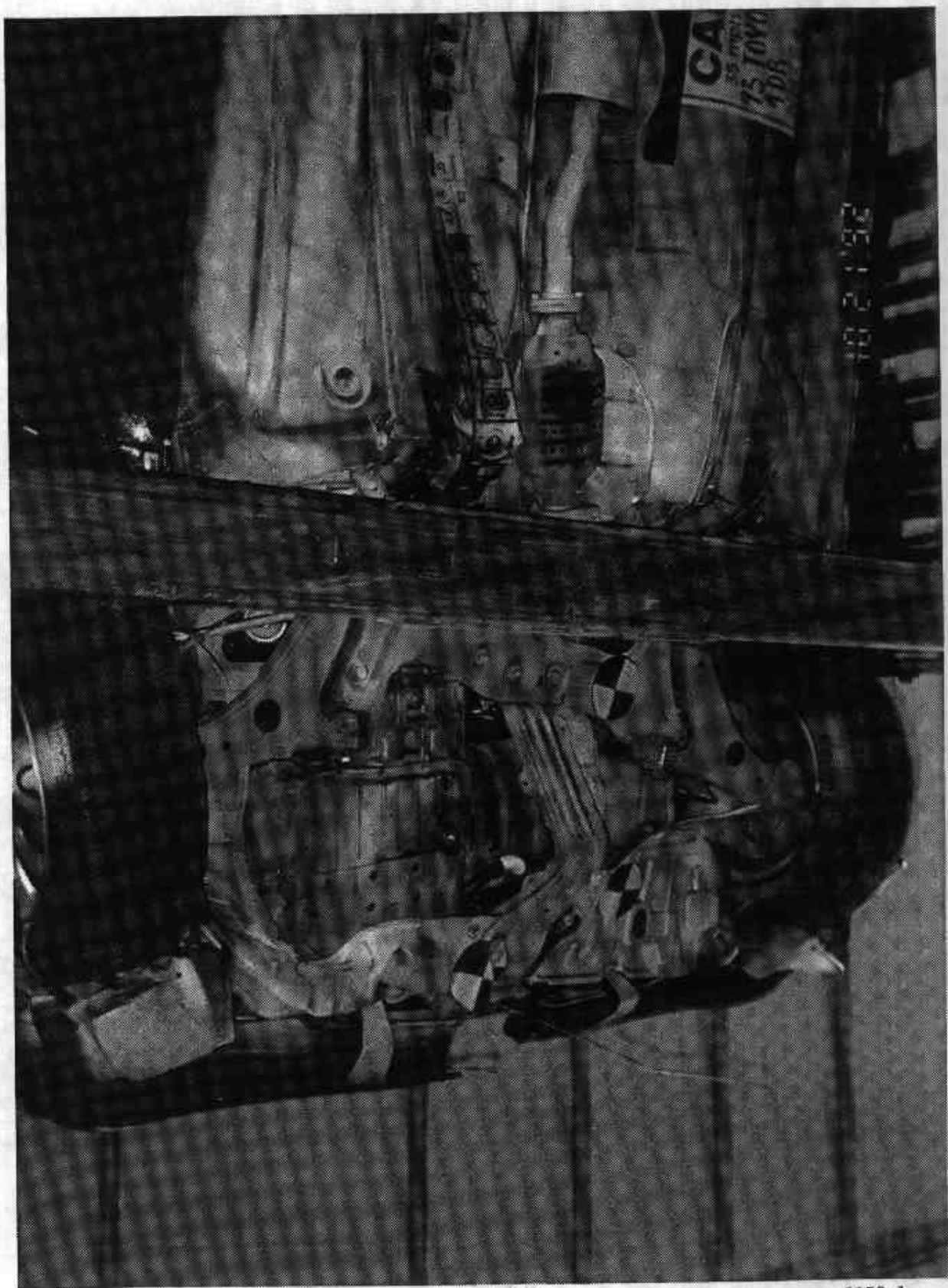


Figure A-18 POST-TEST FRONT SIDE UNDERBODY VIEW

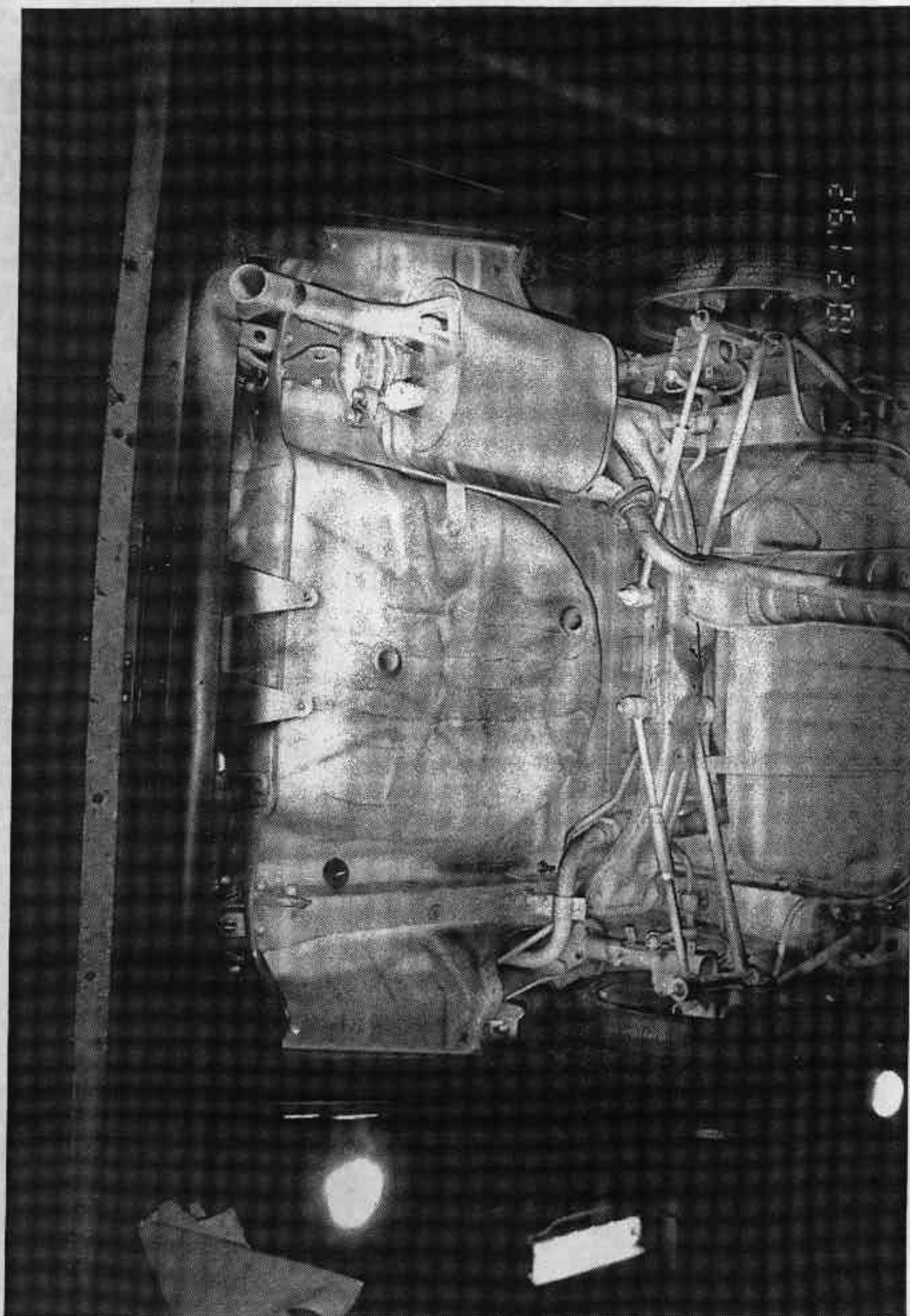


Figure A-19 PRE-TEST REAR UNDERBODY VIEW

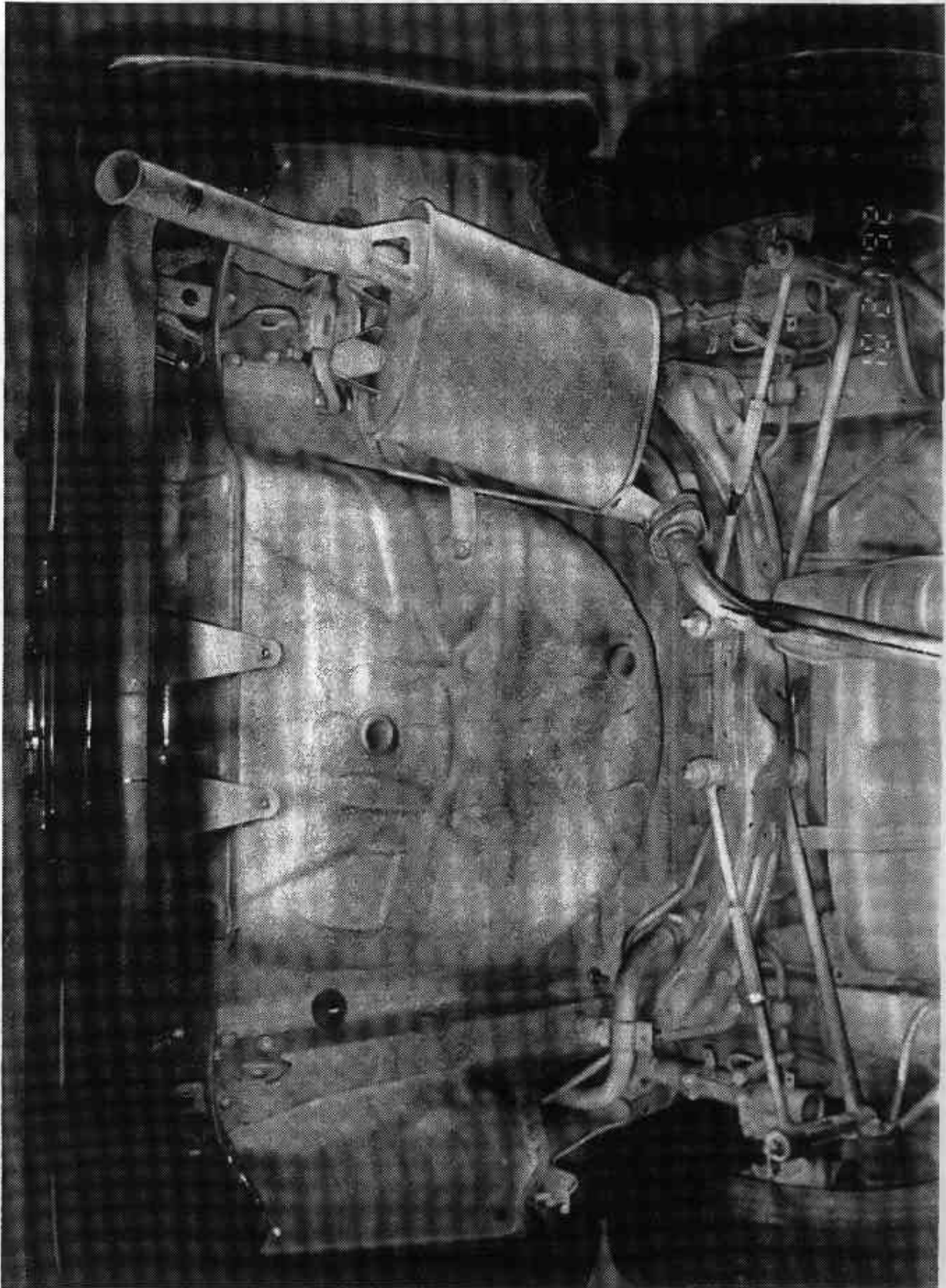


Figure A-20 POST-TEST REAR UNDERBODY VIEW

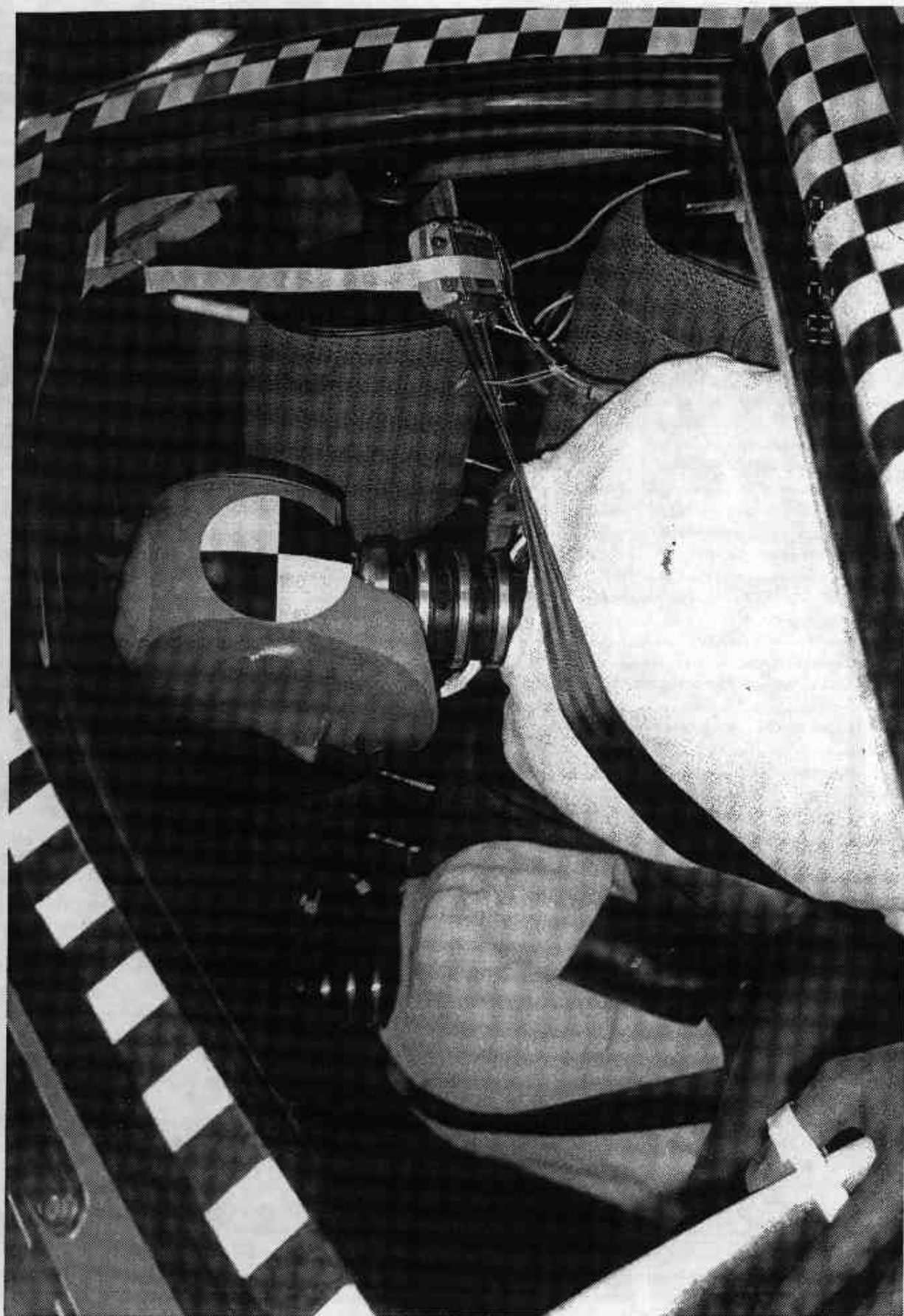


Figure A-21 PRE-TEST DRIVER POSITION VIEW

A-23

8058-1

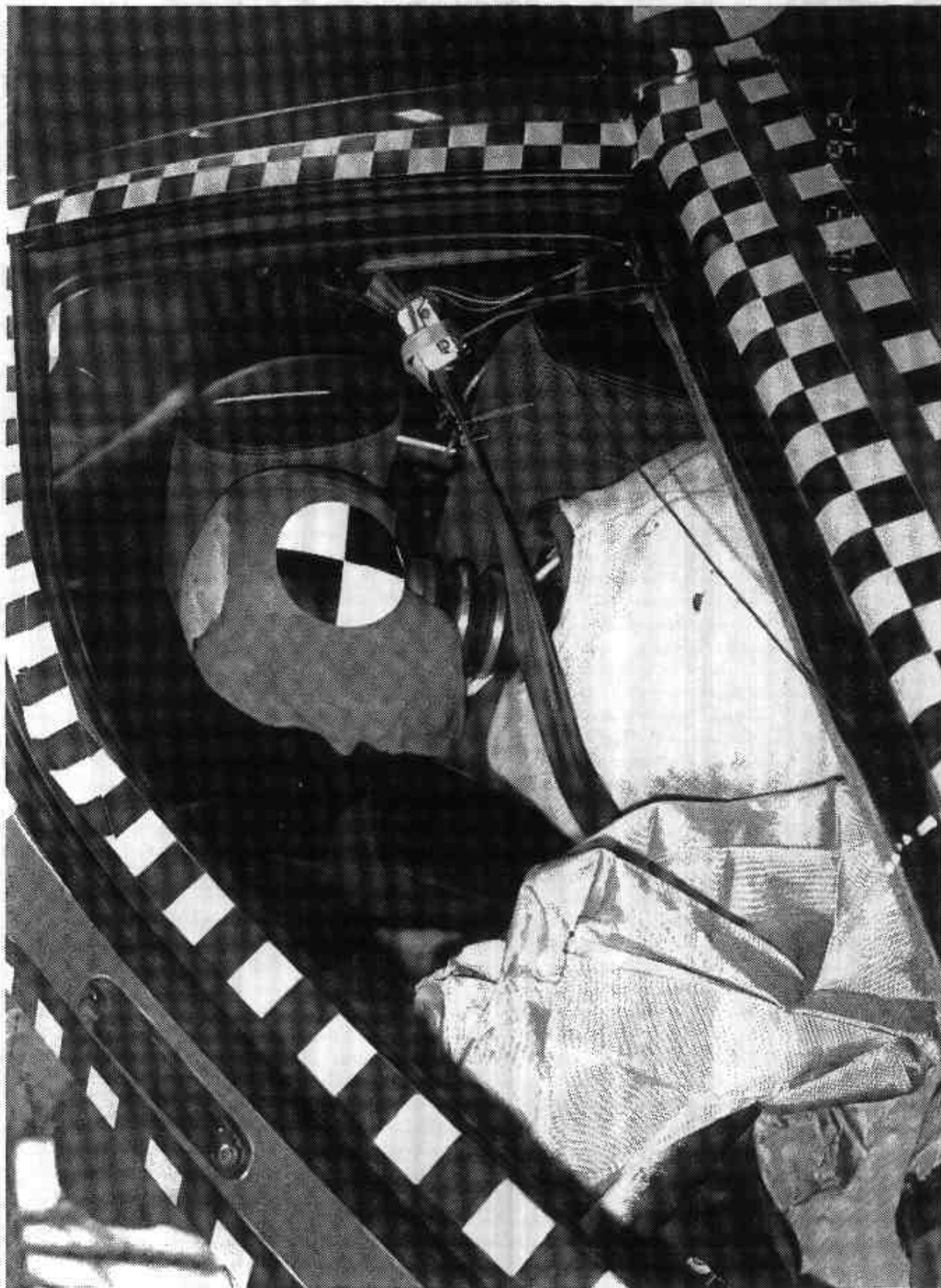


Figure A-22 POST-TEST DRIVER POSITION VIEW

A-24

8058-1

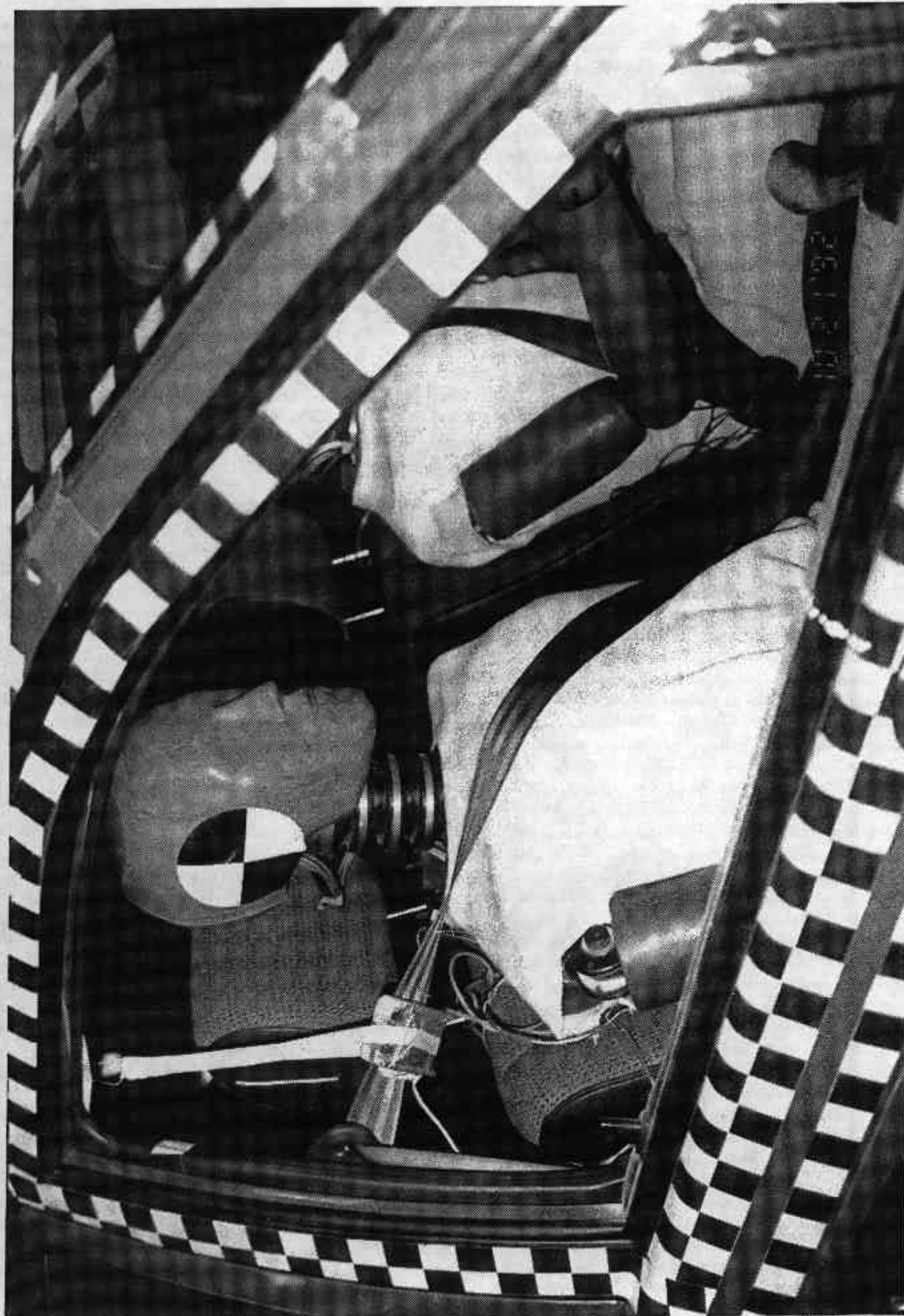


Figure A-23 PRE-TEST PASSENGER POSITION VIEW

A-25

8058-1

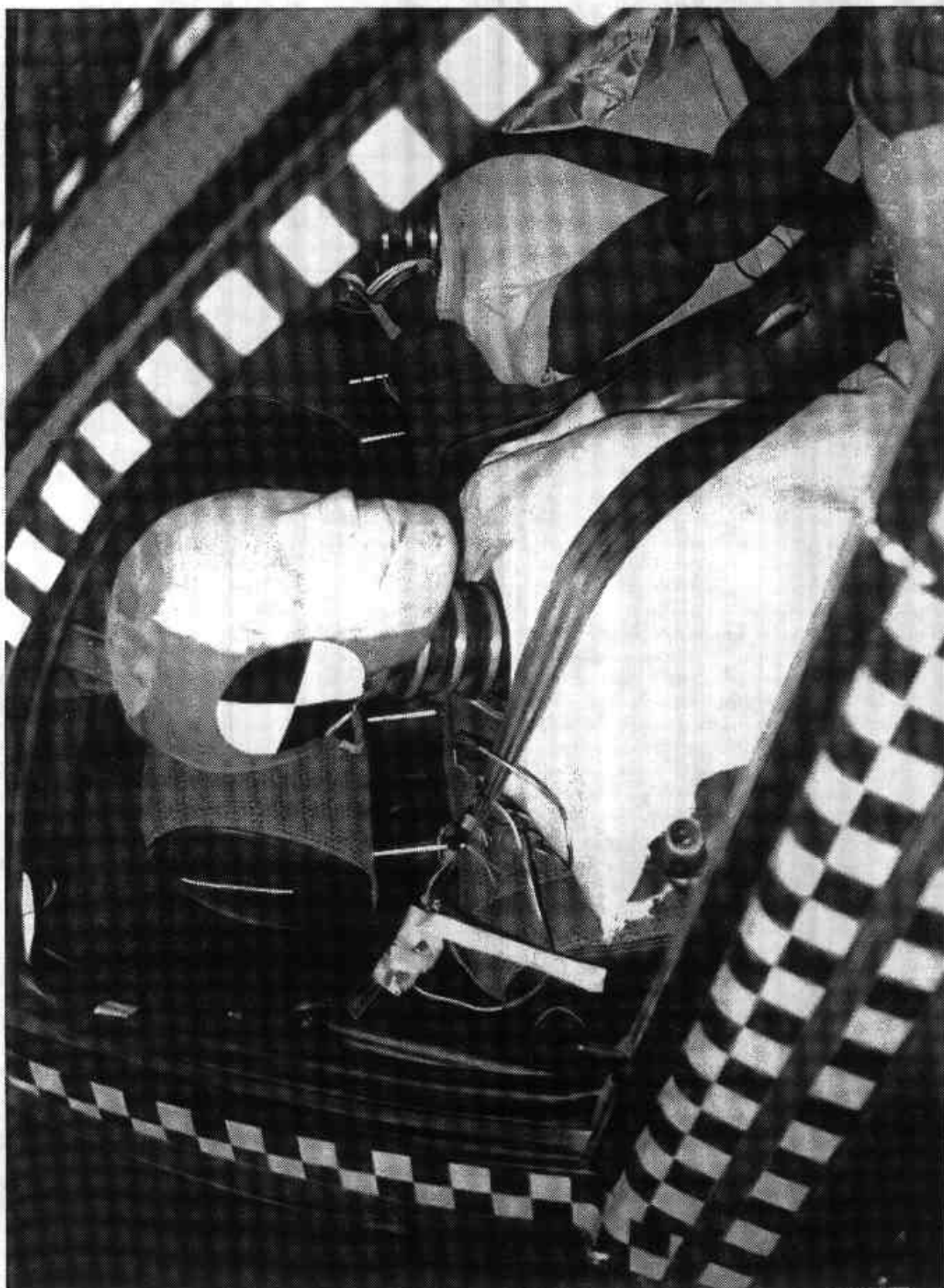


Figure A-24 POST-TEST PASSENGER POSITION VIEW



Figure A-25 PRE-TEST DRIVER AND INTERIOR VIEW



Figure A-26 POST-TEST DRIVER AND INTERIOR VIEW



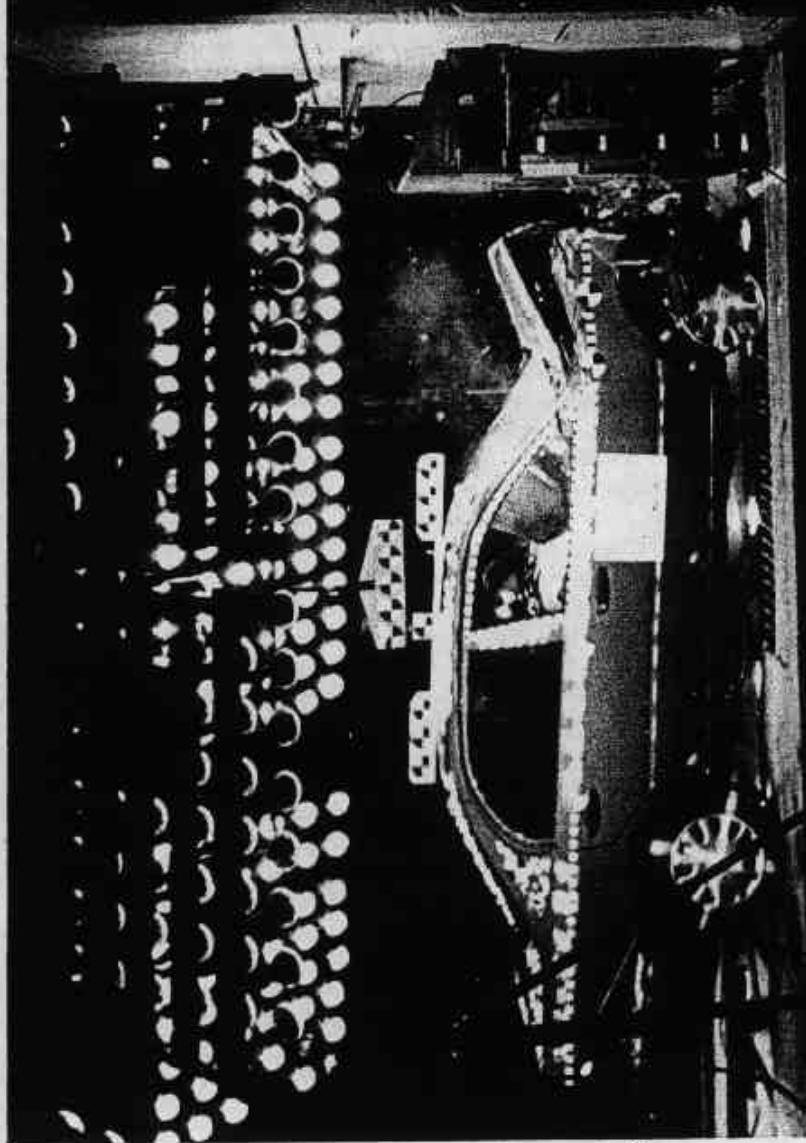
Figure A-27 PRE-TEST PASSENGER AND INTERIOR VIEW



Figure A-28 POST-TEST PASSENGER AND INTERIOR VIEW

A-30

8058-1



251 001

Figure A-29 IMPACT VIEW

A-31

8058-1

Appendix B

VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

TEST NO. MP5100

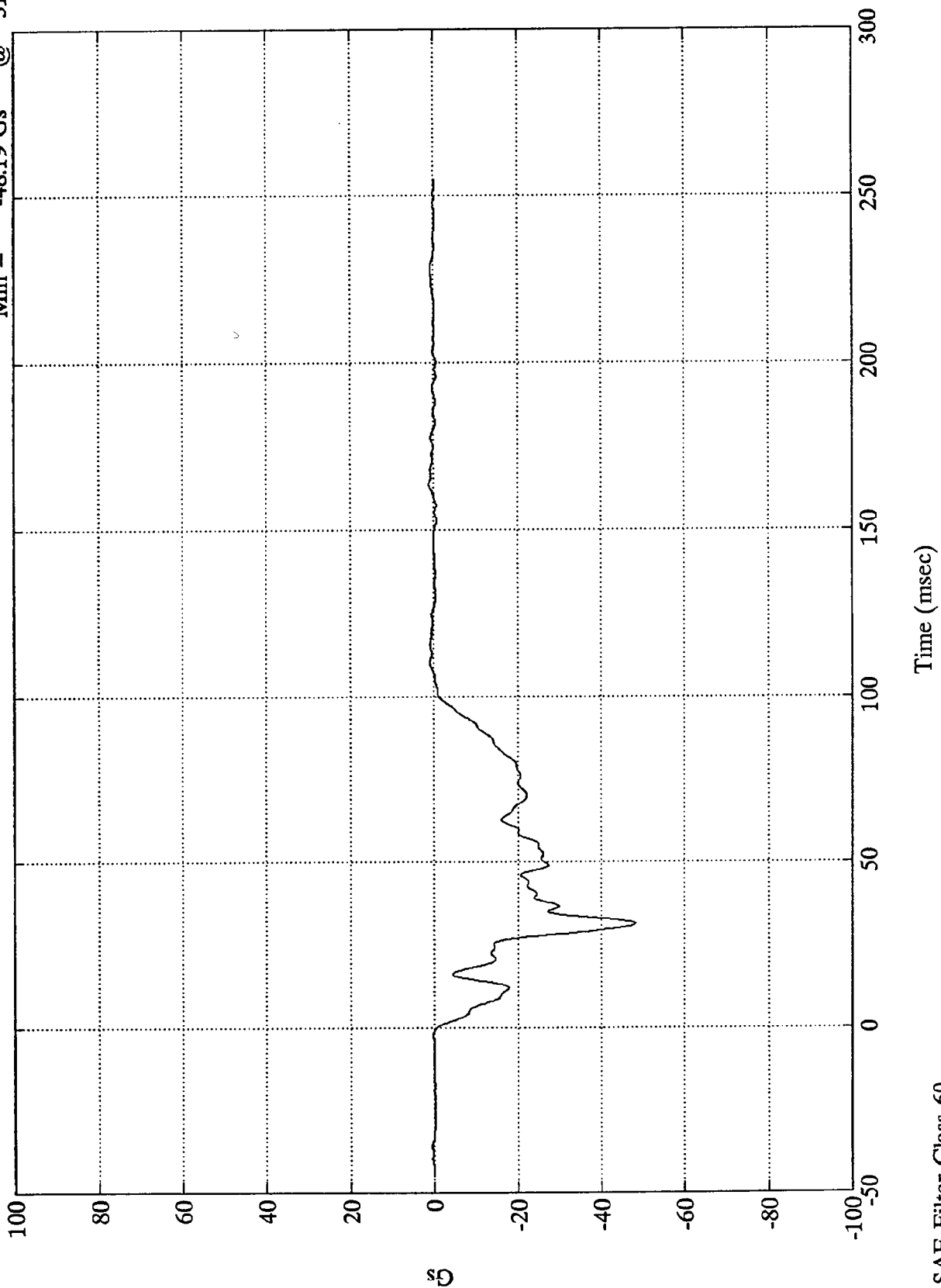
VEHICLE DATA

FILTER CHANNEL CLASS

60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #1(x) Max = 1.11 Gs @ 163.55 msec
Min = -48.19 Gs @ 31.19 msec



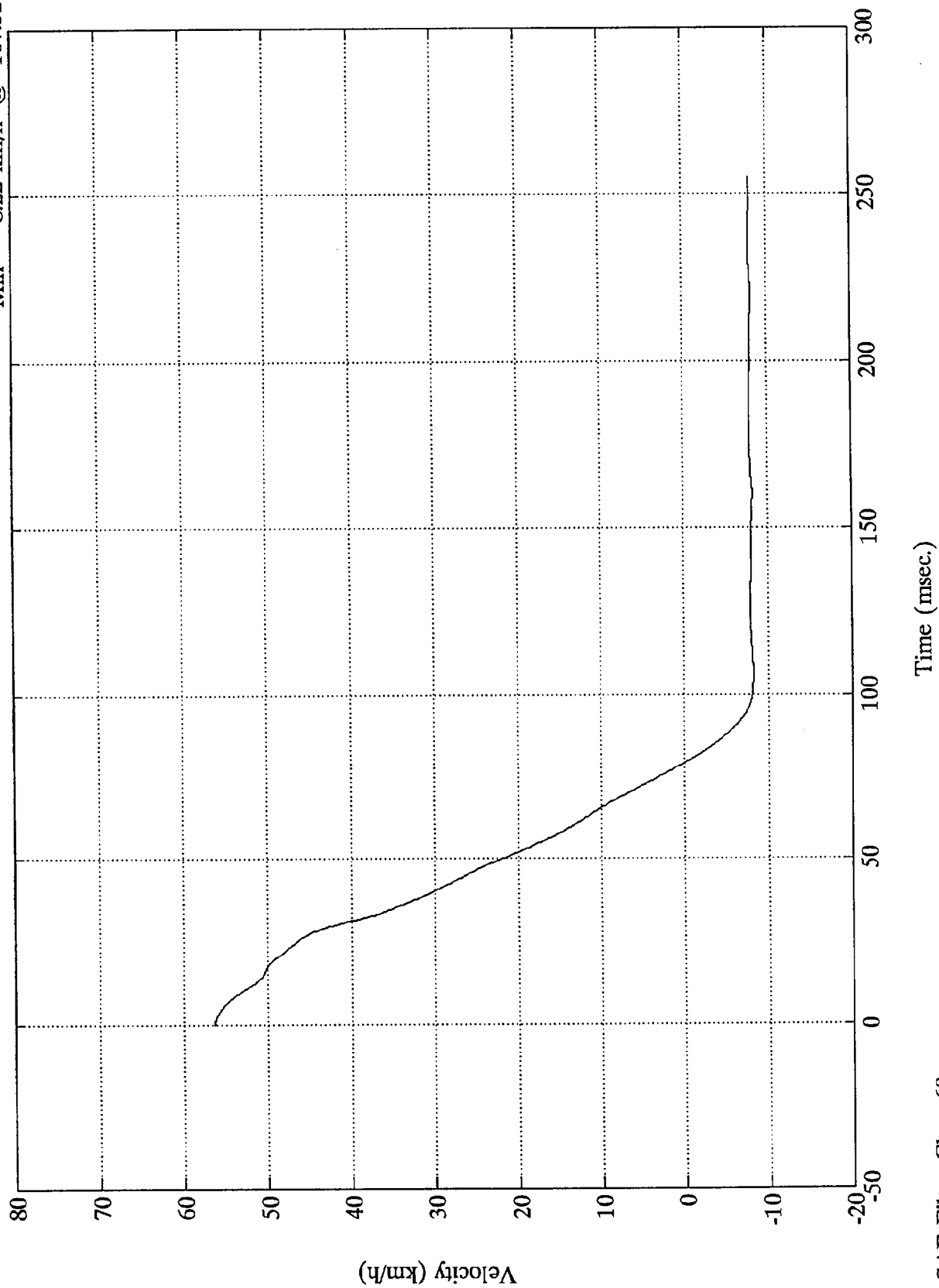
B-3

8058-1

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

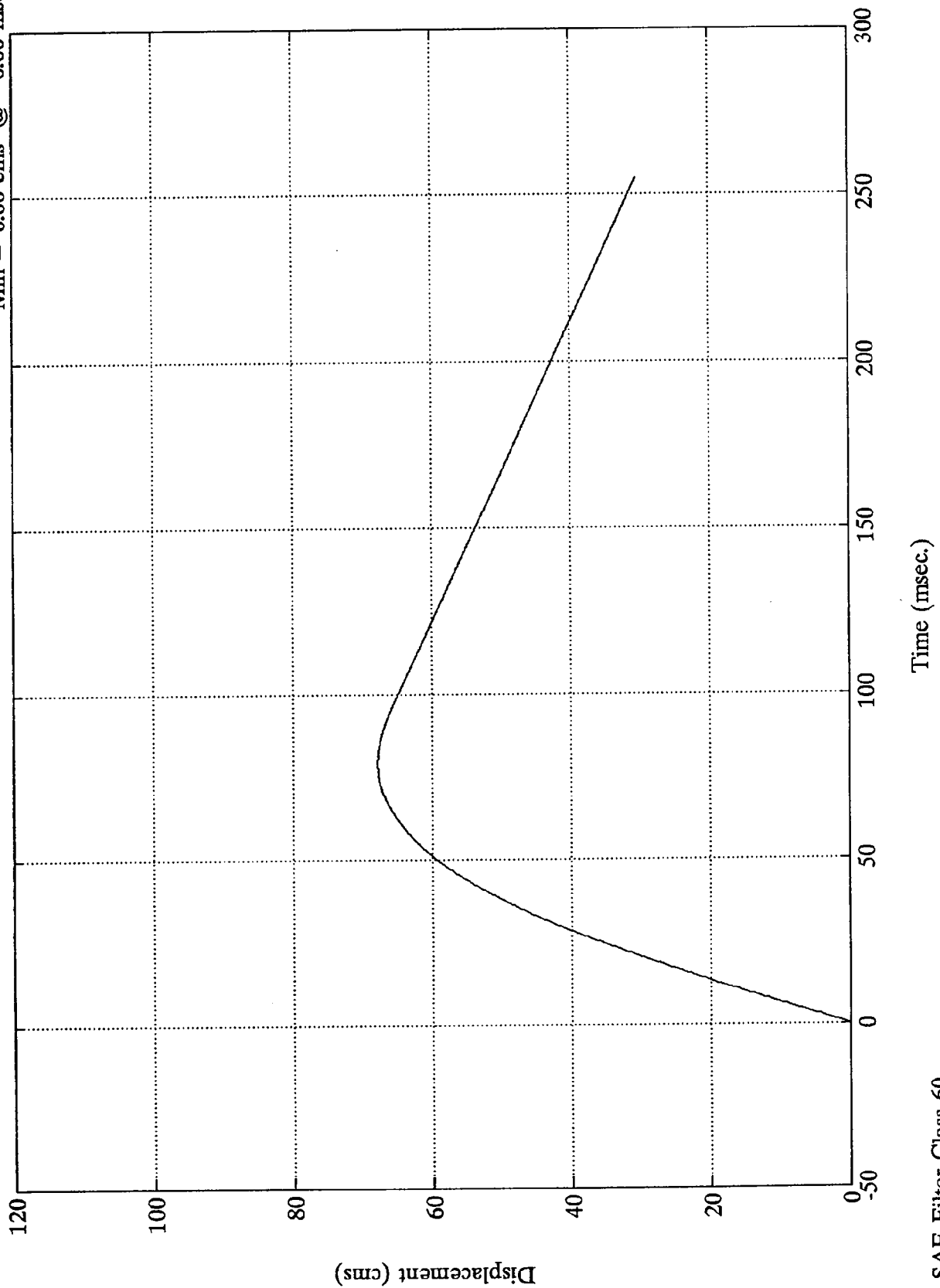
Acc. #1(x)
 Max = 56.32 km/h @ 0.24 msec
 Min = -8.22 km/h @ 107.52 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #1(x)

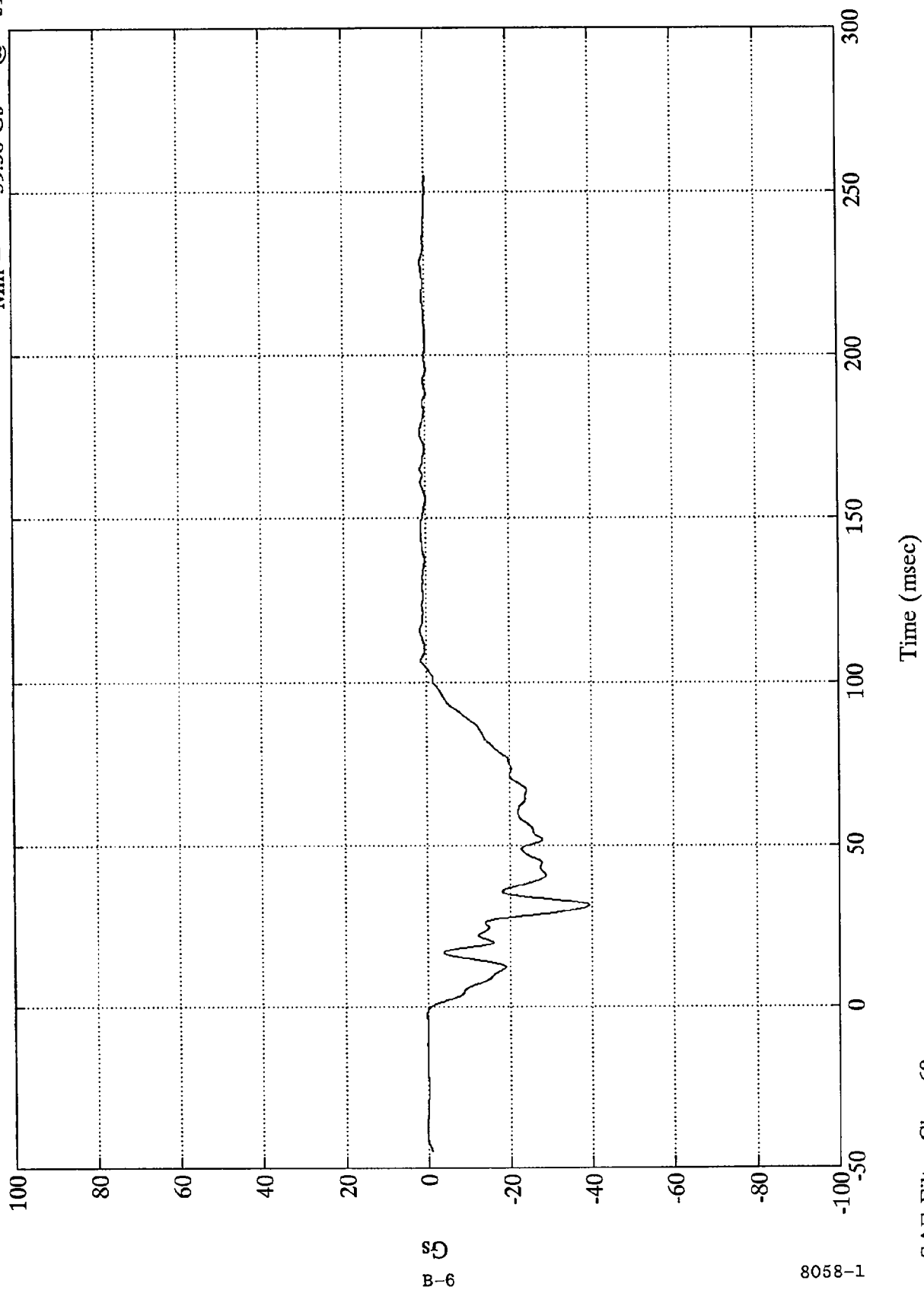
Max = 67.89 cms @ 80.40 msec
Min = 0.00 cms @ -0.00 msec



SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #2(x) Max = 1.61 Gs @ 115.91 msec
Min = -39.36 Gs @ 31.31 msec



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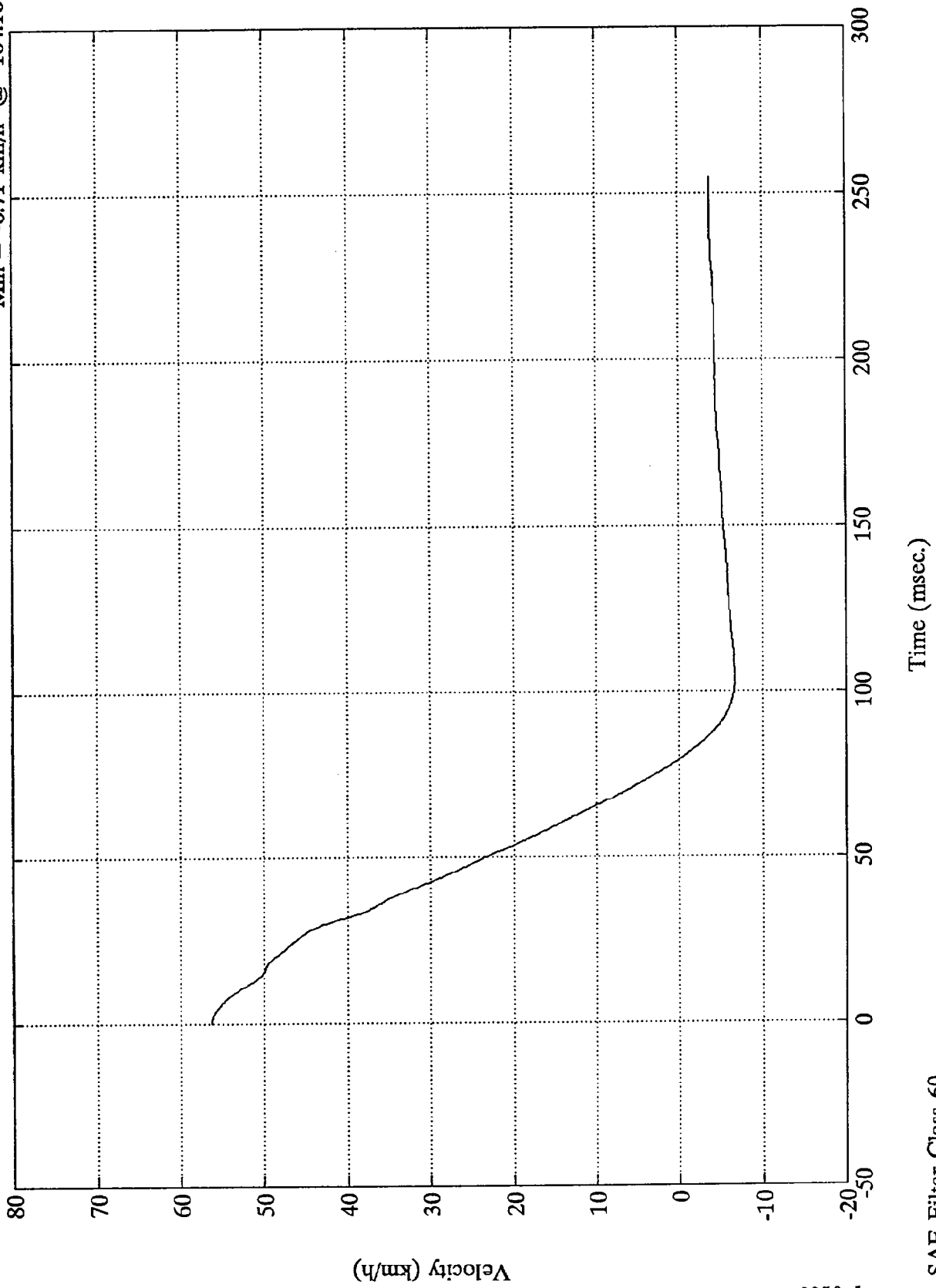
8058-1

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 56.32 km/h @ -0.00 msec
Min = -6.71 km/h @ 104.16 msec

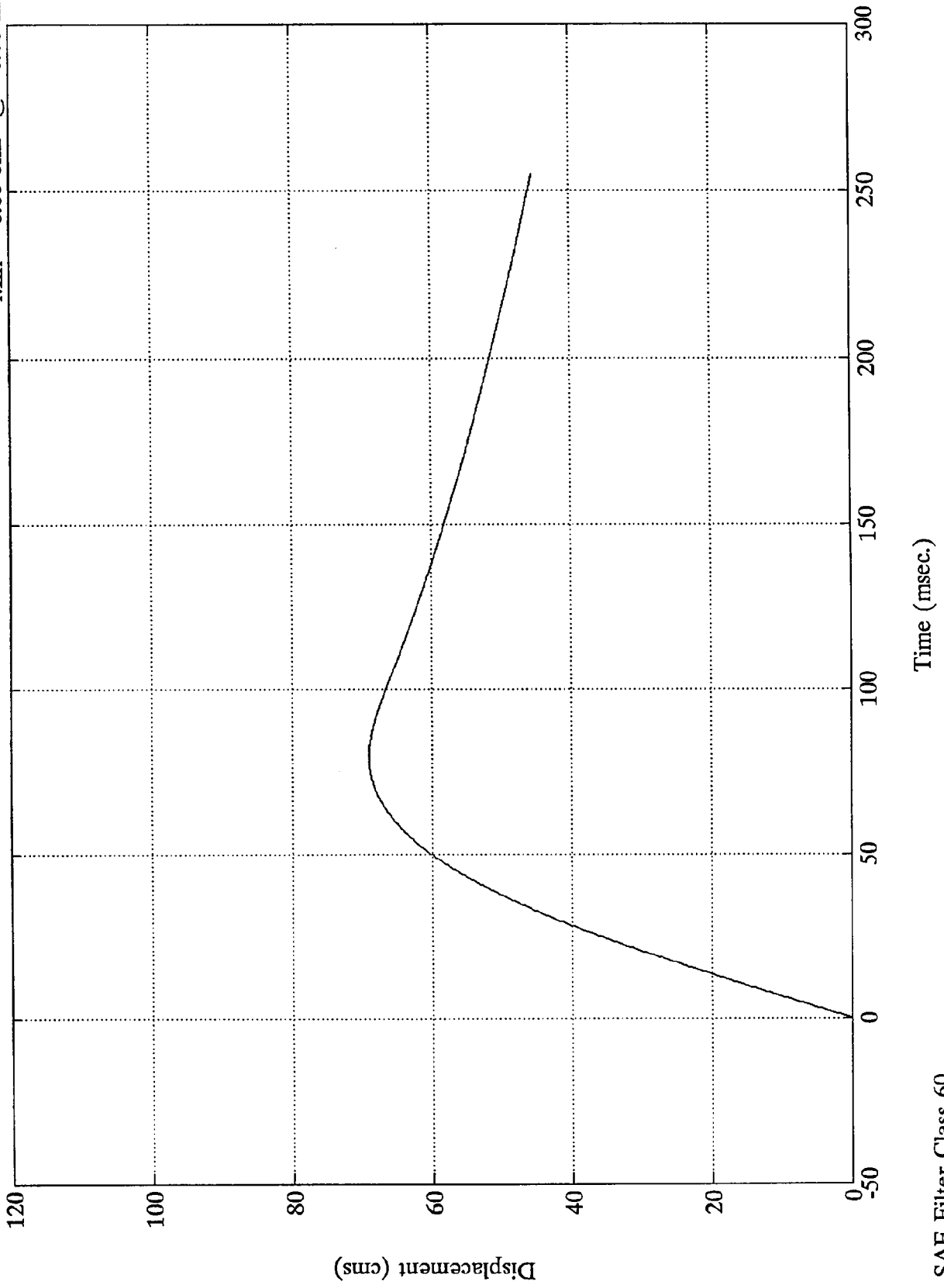
Acc. #2(x)



NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #2(x)

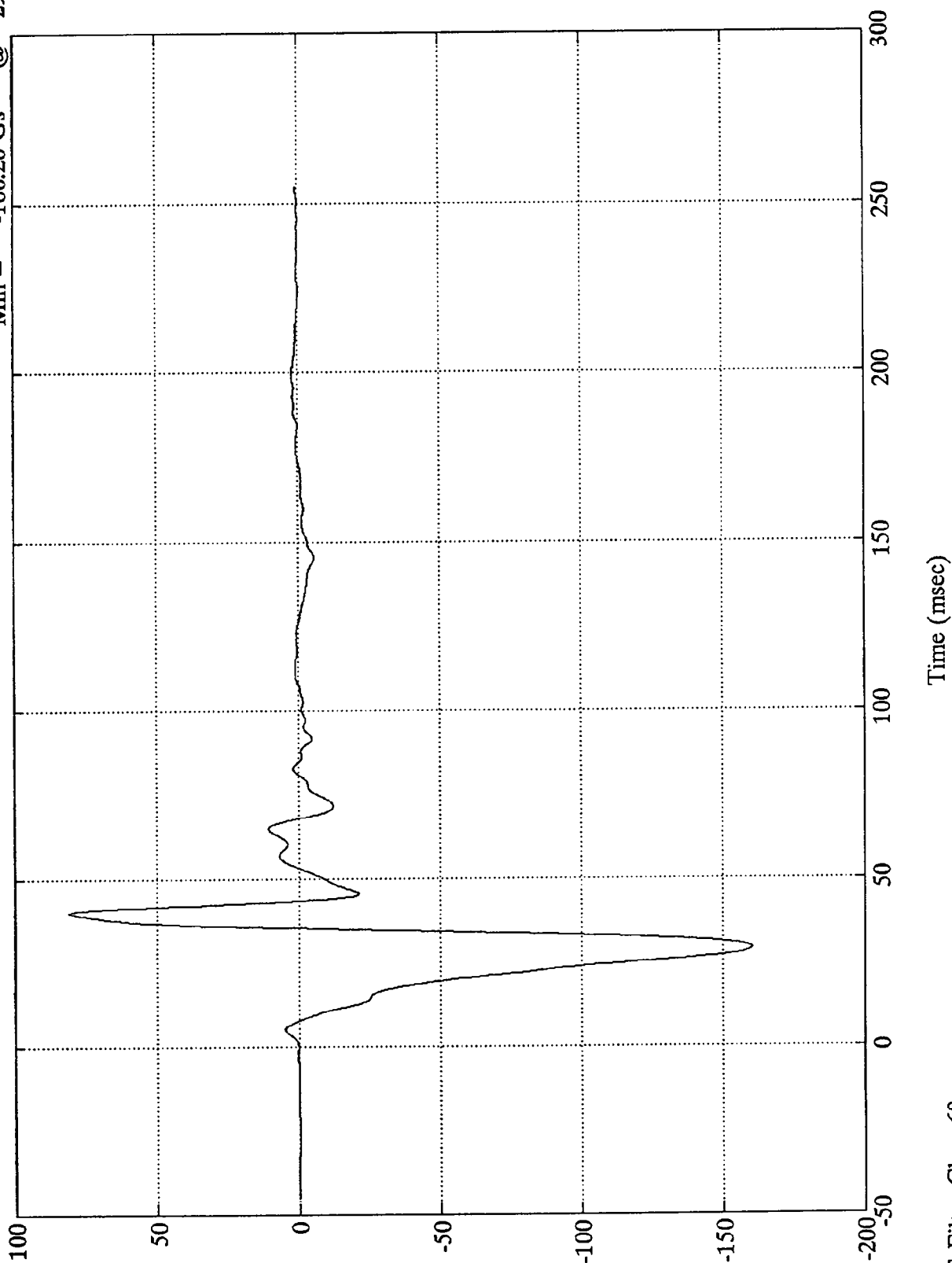
Max = 69.06 cms @ 80.40 msec
Min = 0.00 cms @ -0.00 msec



SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

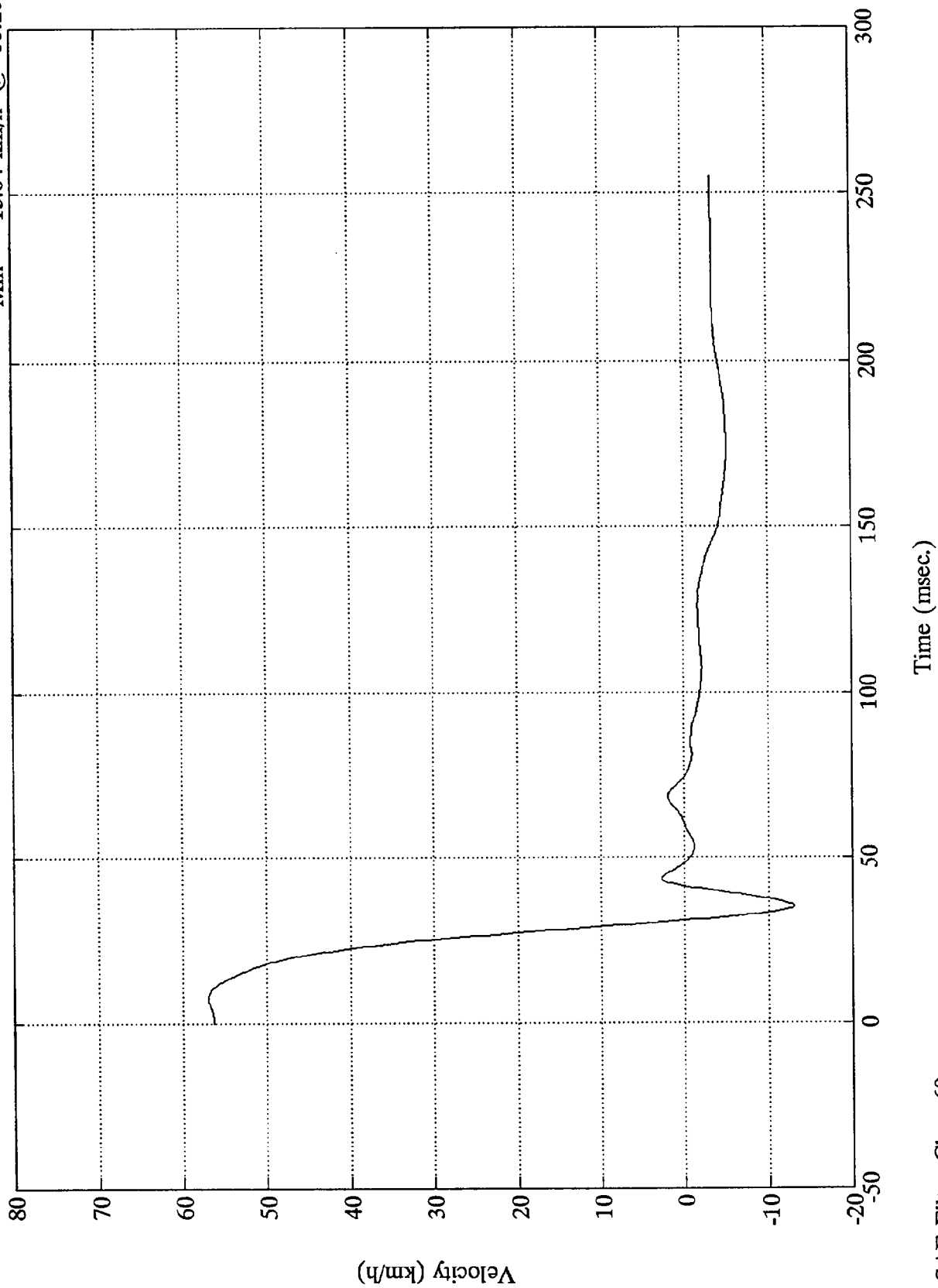
Acc. #3(x) Max = 81.21 Gs @ 39.95 msec
 Min = -160.20 Gs @ 29.03 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #3(x)

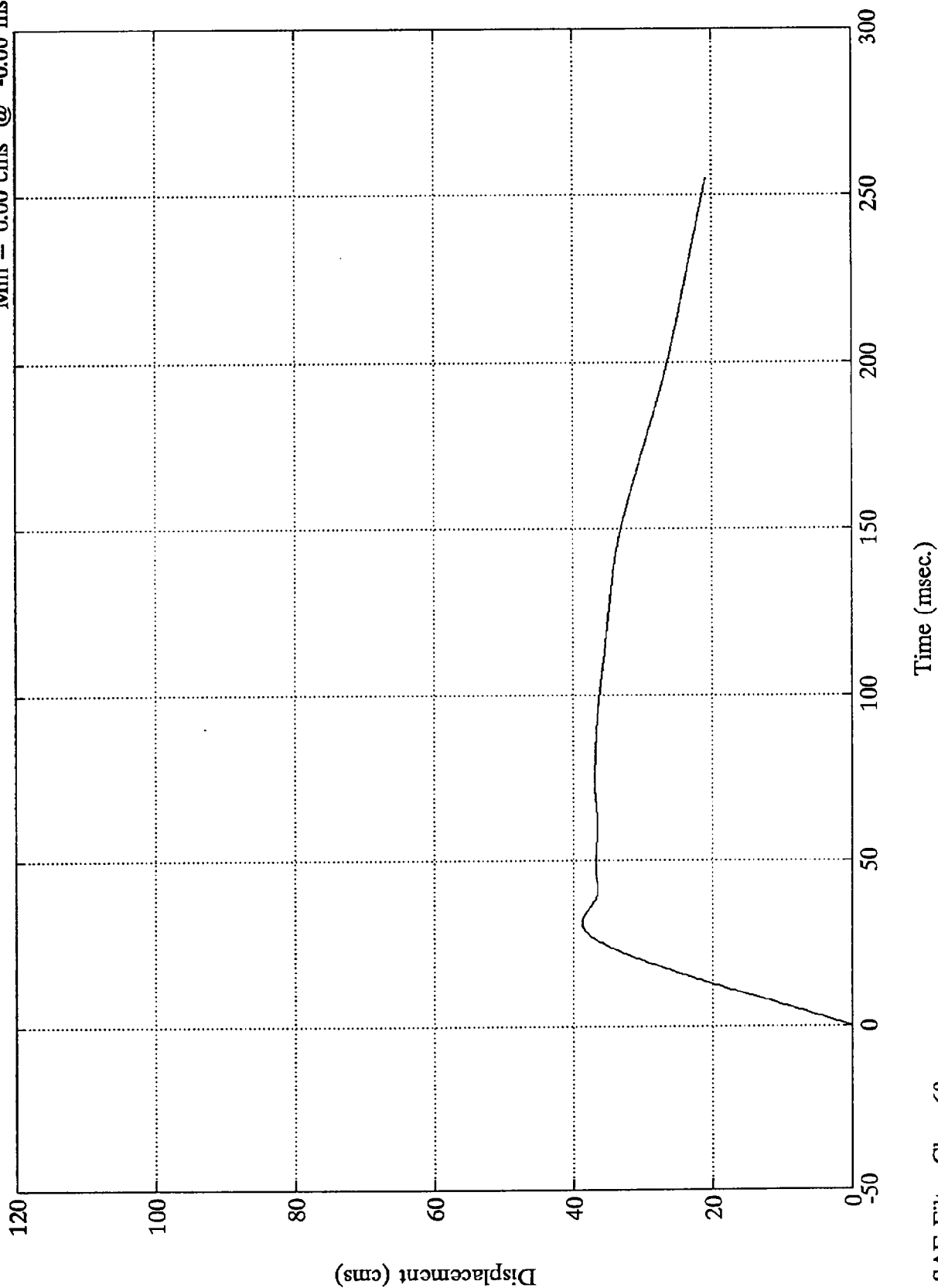
Max = 56.97 km/h @ 7.68 msec
Min = -13.04 km/h @ 35.28 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

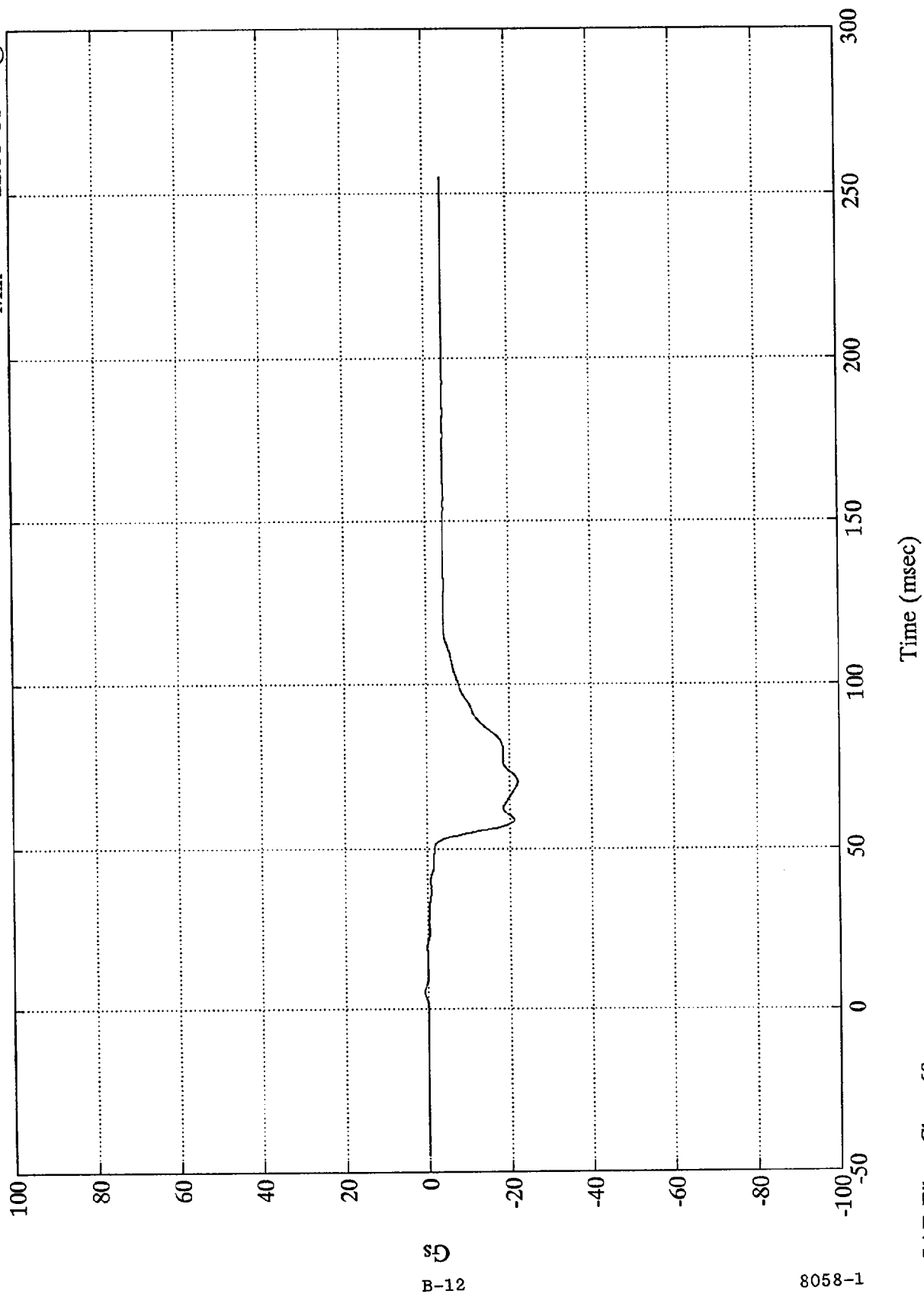
Max = 38.74 cms @ 30.96 msec
Min = 0.00 cms @ -0.00 msec

Acc. #3(x)



NCAP TEST #5 - 1993 TOYOTA COROLLA

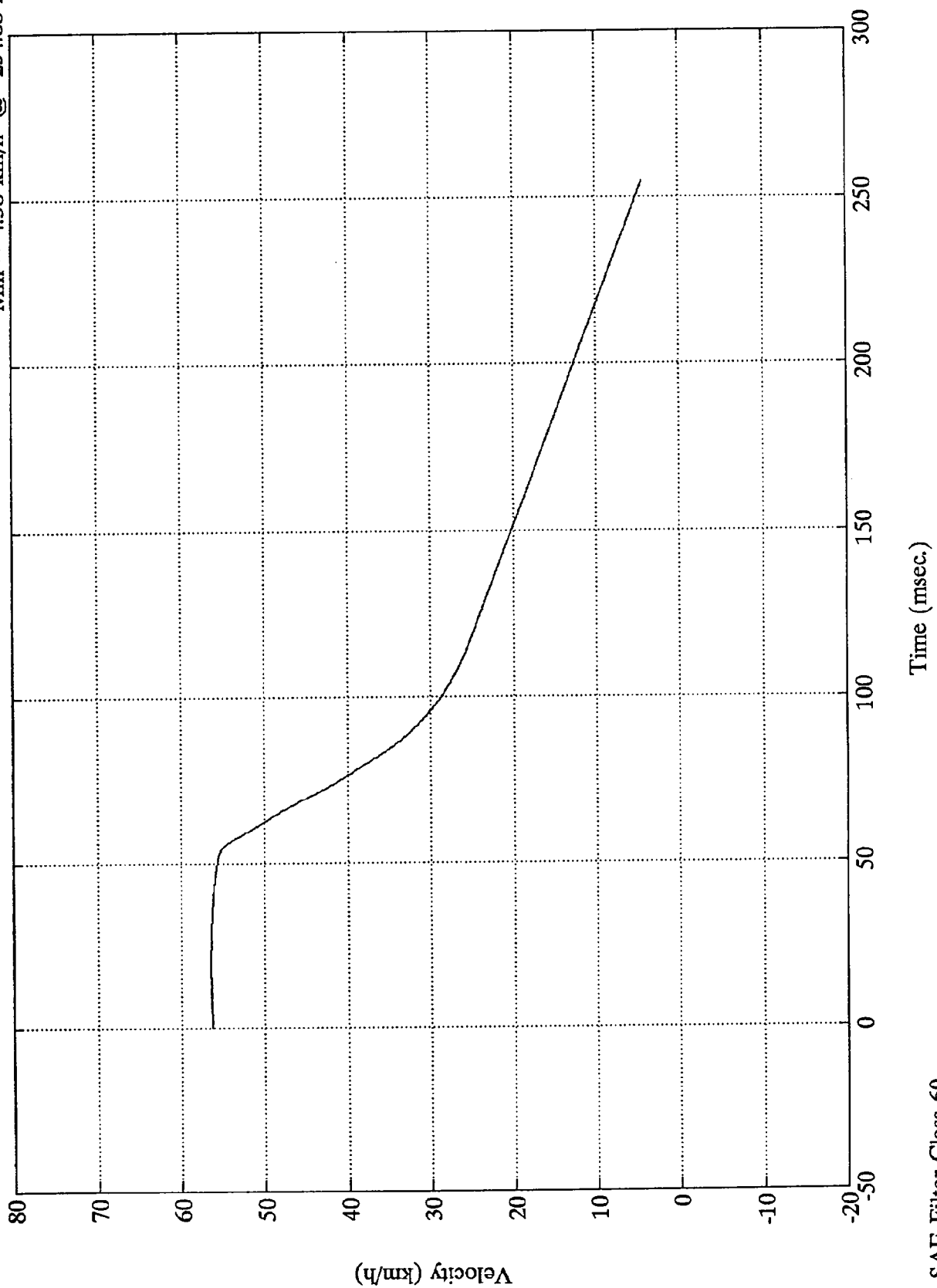
Acc. #4(x) Max = .91 Gs @ 5.27 msec
 Min = -22.08 Gs @ 70.31 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #4(x)

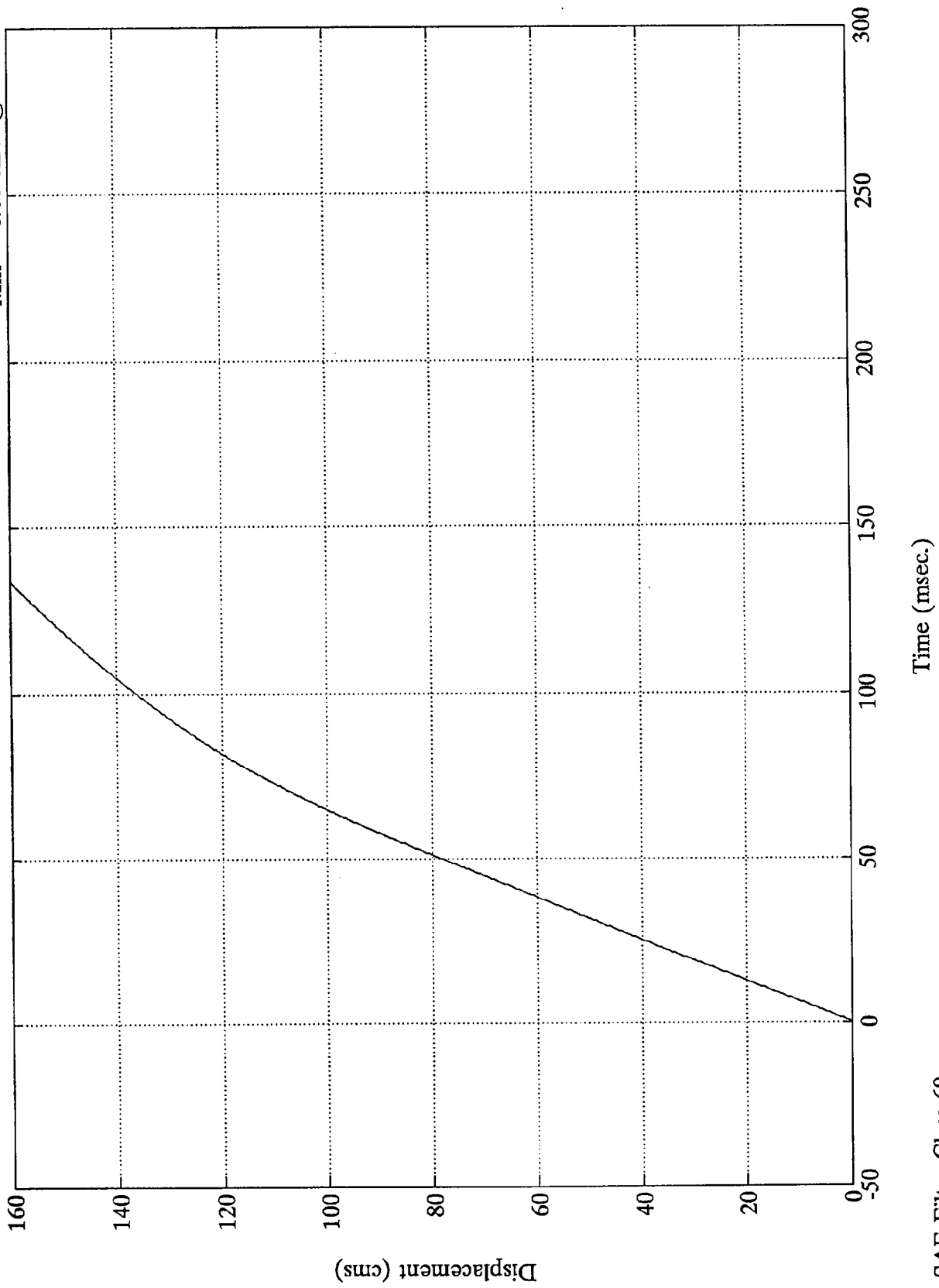
Max = 56.50 km/h @ 21.60 msec
Min = 4.38 km/h @ 254.88 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 205.38 cms @ 254.88 msec
Min = 0.00 cms @ -0.00 msec

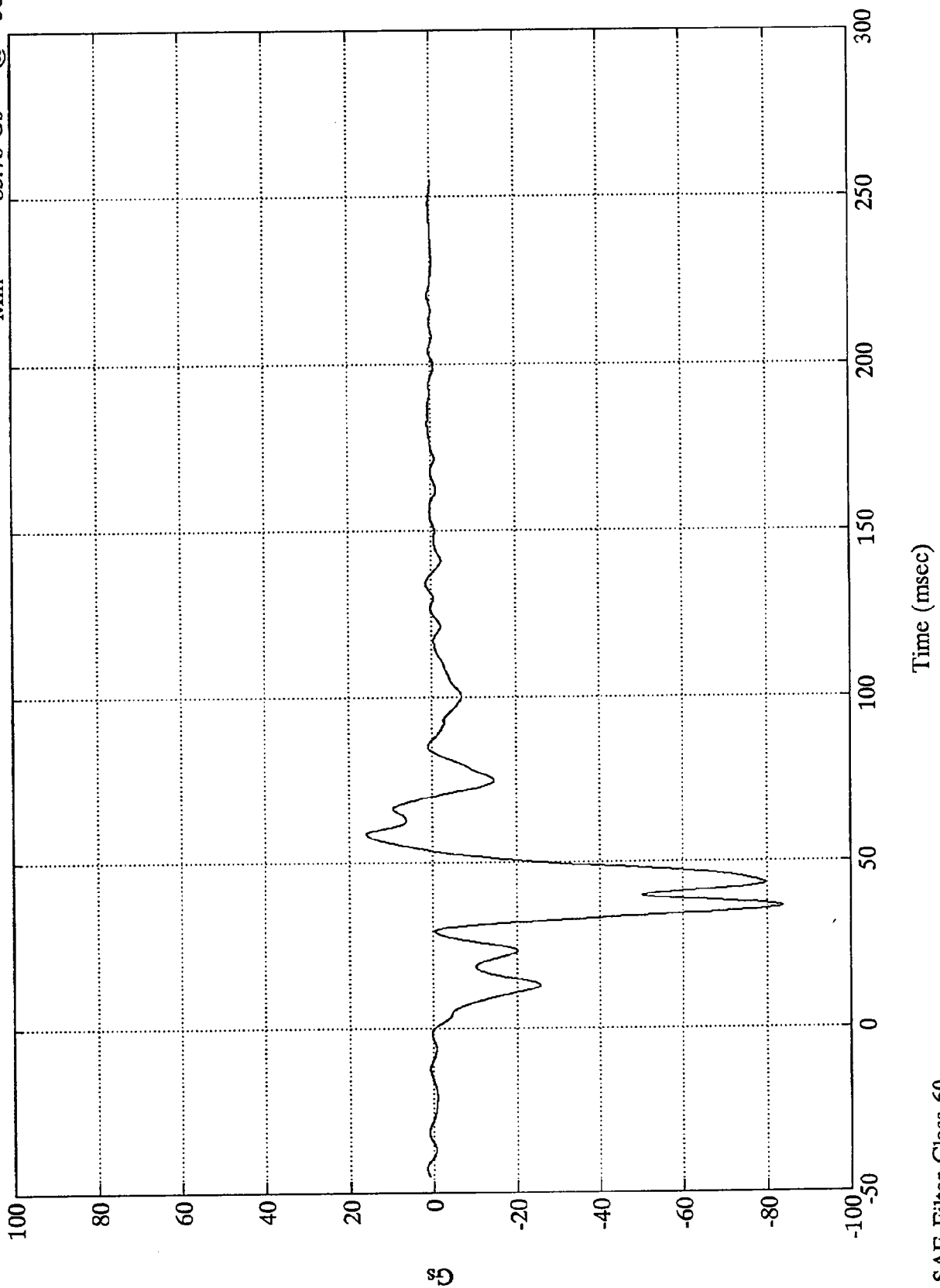
Acc. #4(x)



SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #5(x) Max = 15.86 Gs @ 58.31 msec
Min = -83.76 Gs @ 36.36 msec



B-15

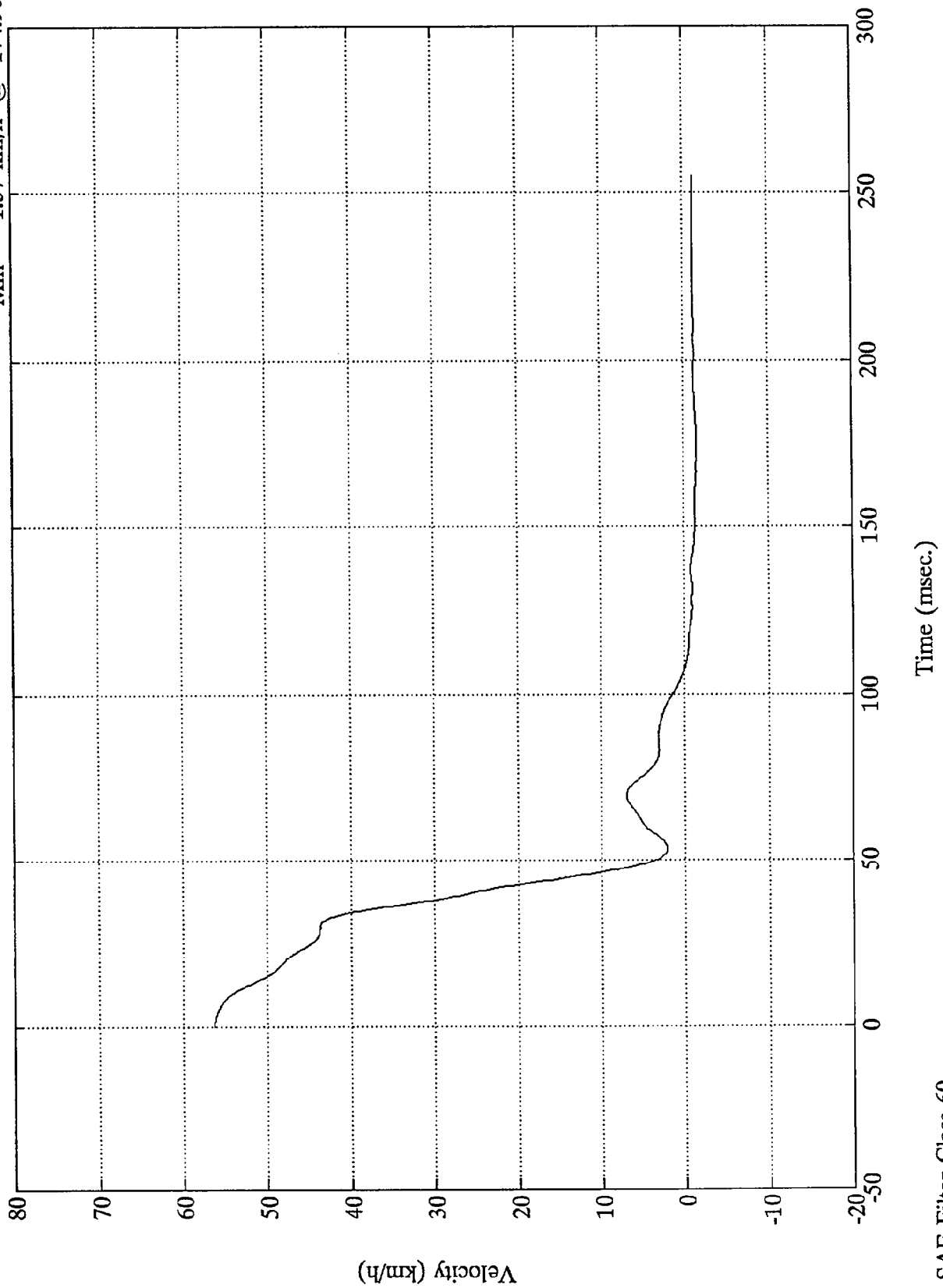
8058-1

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #5(x)

Max = 56.32 km/h @ 0.24 msec
Min = -1.57 km/h @ 174.96 msec

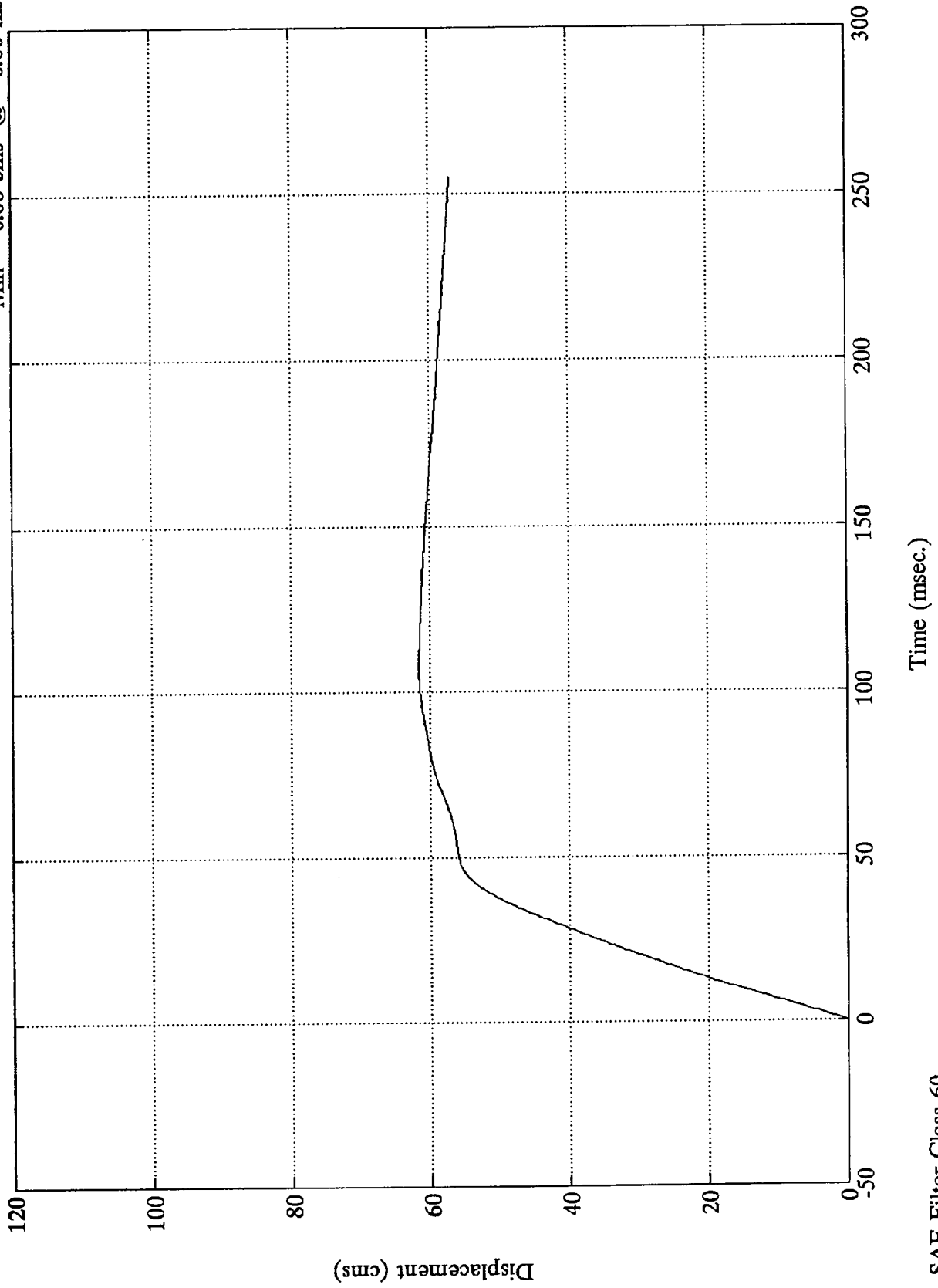


SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #5(x)

Max = 61.60 cms @ 109.92 msec
Min = 0.00 cms @ -0.00 msec

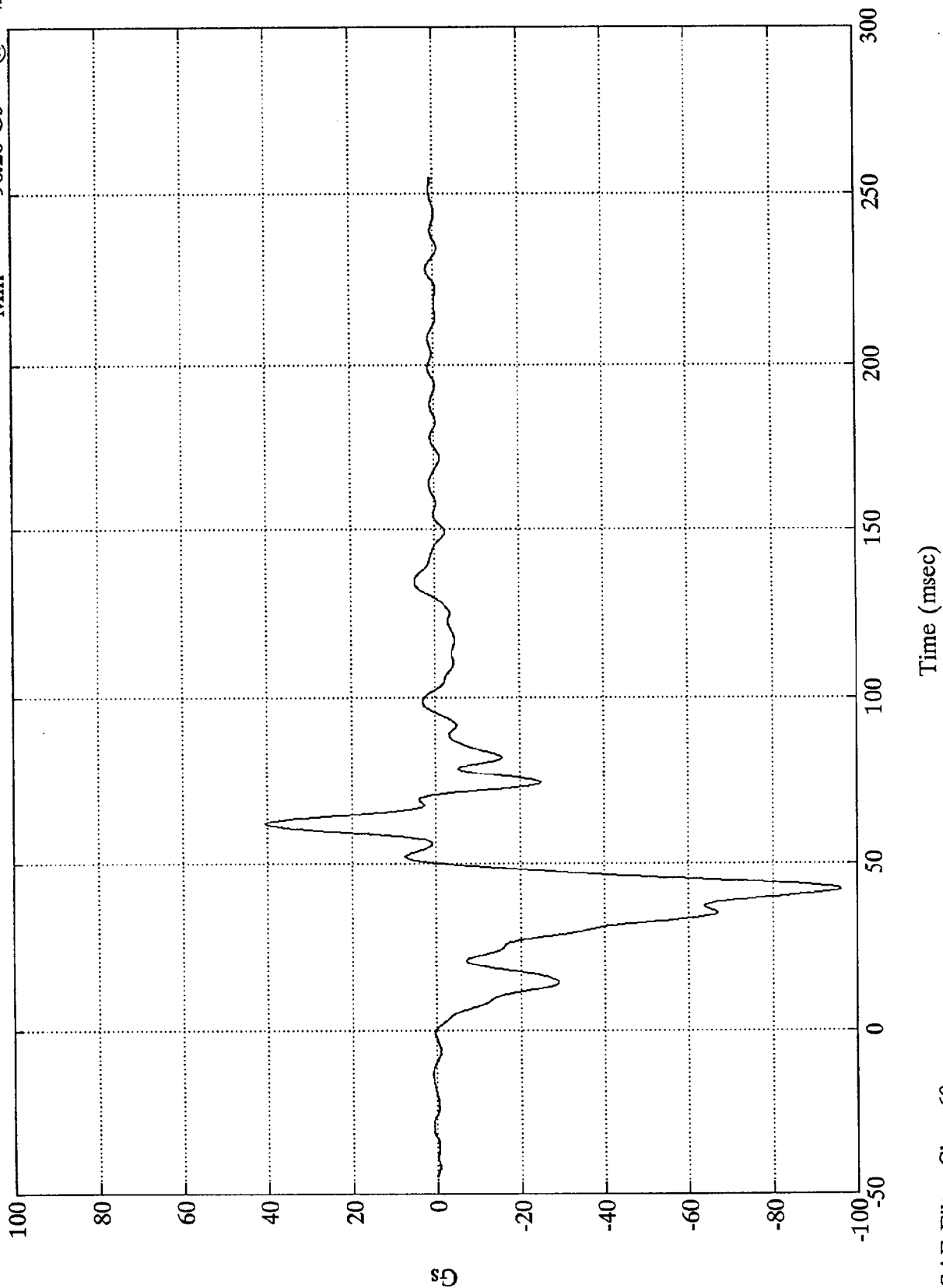


SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 40.42 Gs @ 61.79 msec
 Min = -96.26 Gs @ 42.11 msec

Acc. #6(x)



B-18

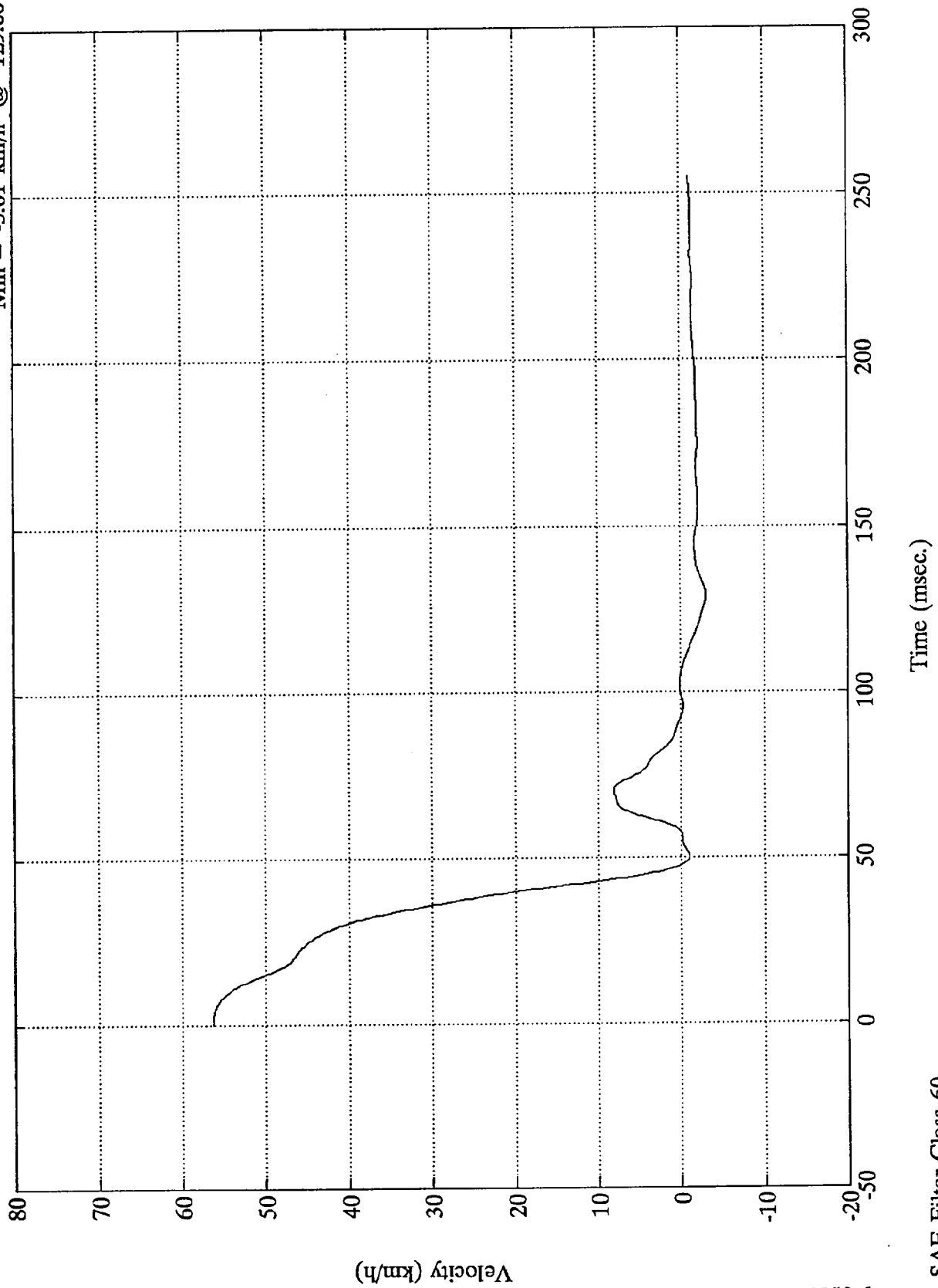
8058-1

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #6(x)

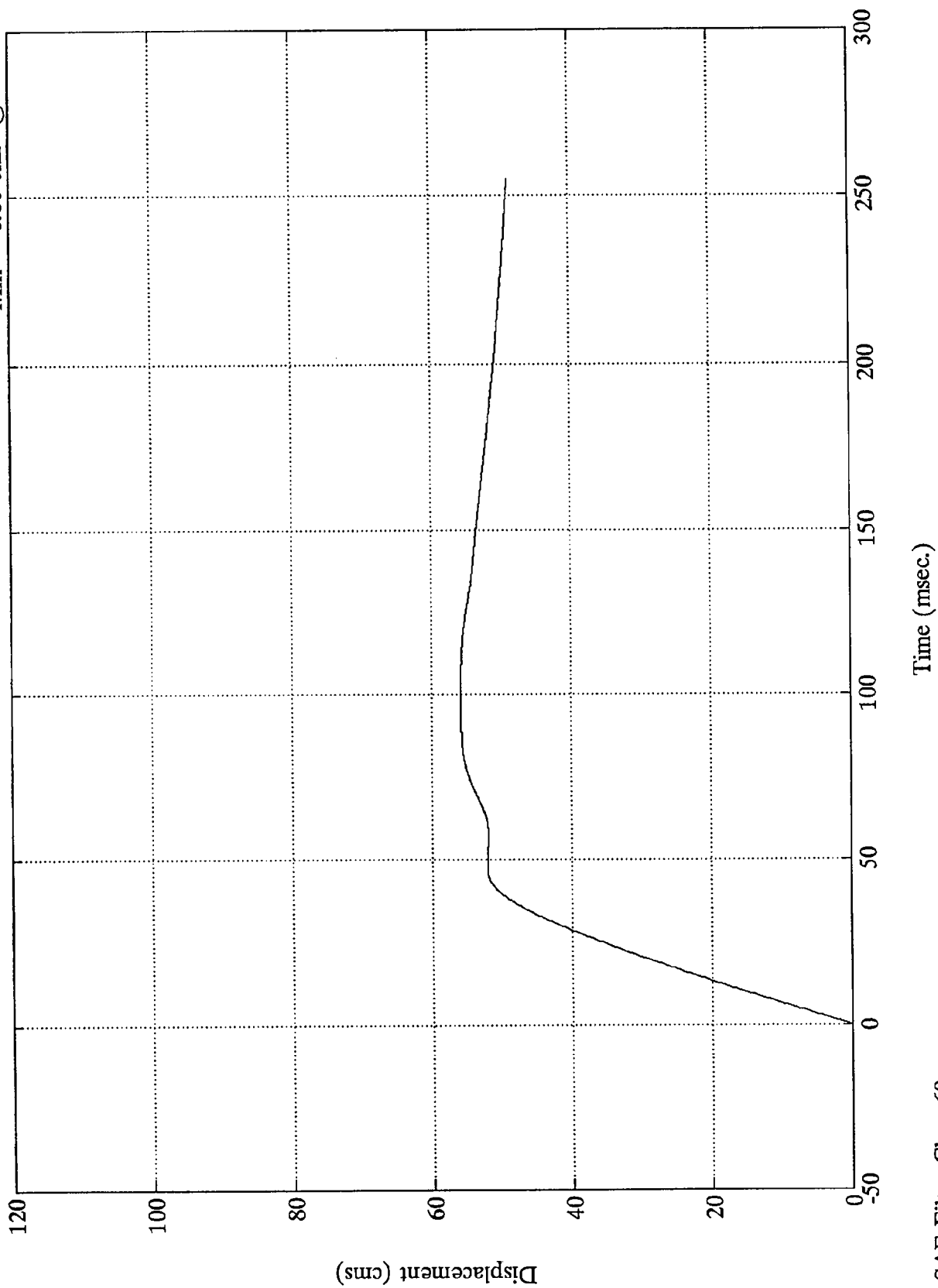
Max = 56.32 km/h @ 1.20 msec
Min = -3.01 km/h @ 129.60 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #6(x)

Max = 55.83 cms @ 94.32 msec
Min = 0.00 cms @ -0.00 msec

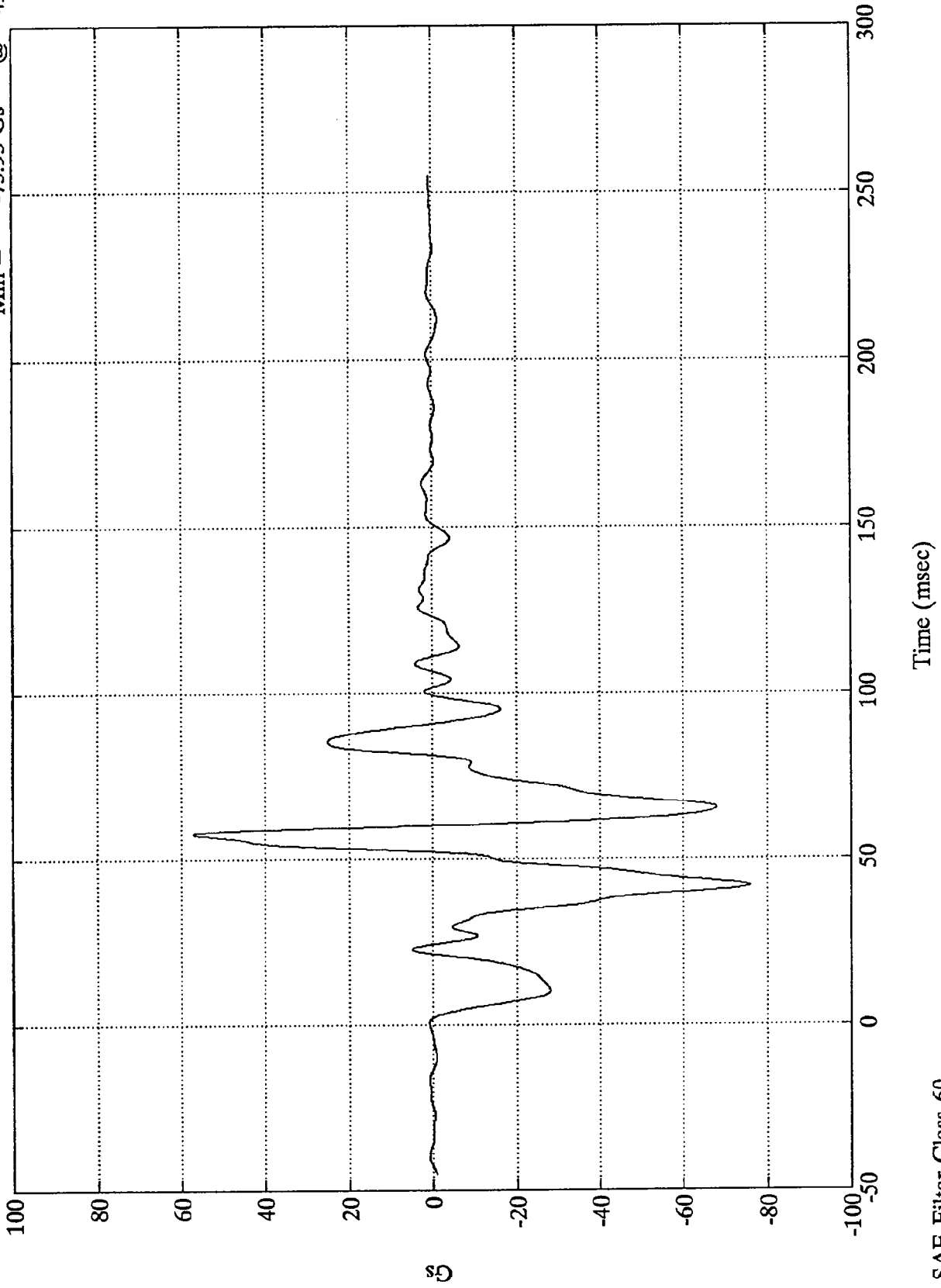


SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 57.10 Gs @ 57.60 msec
Min = -75.93 Gs @ 41.76 msec

Acc. #7(x)



B-21

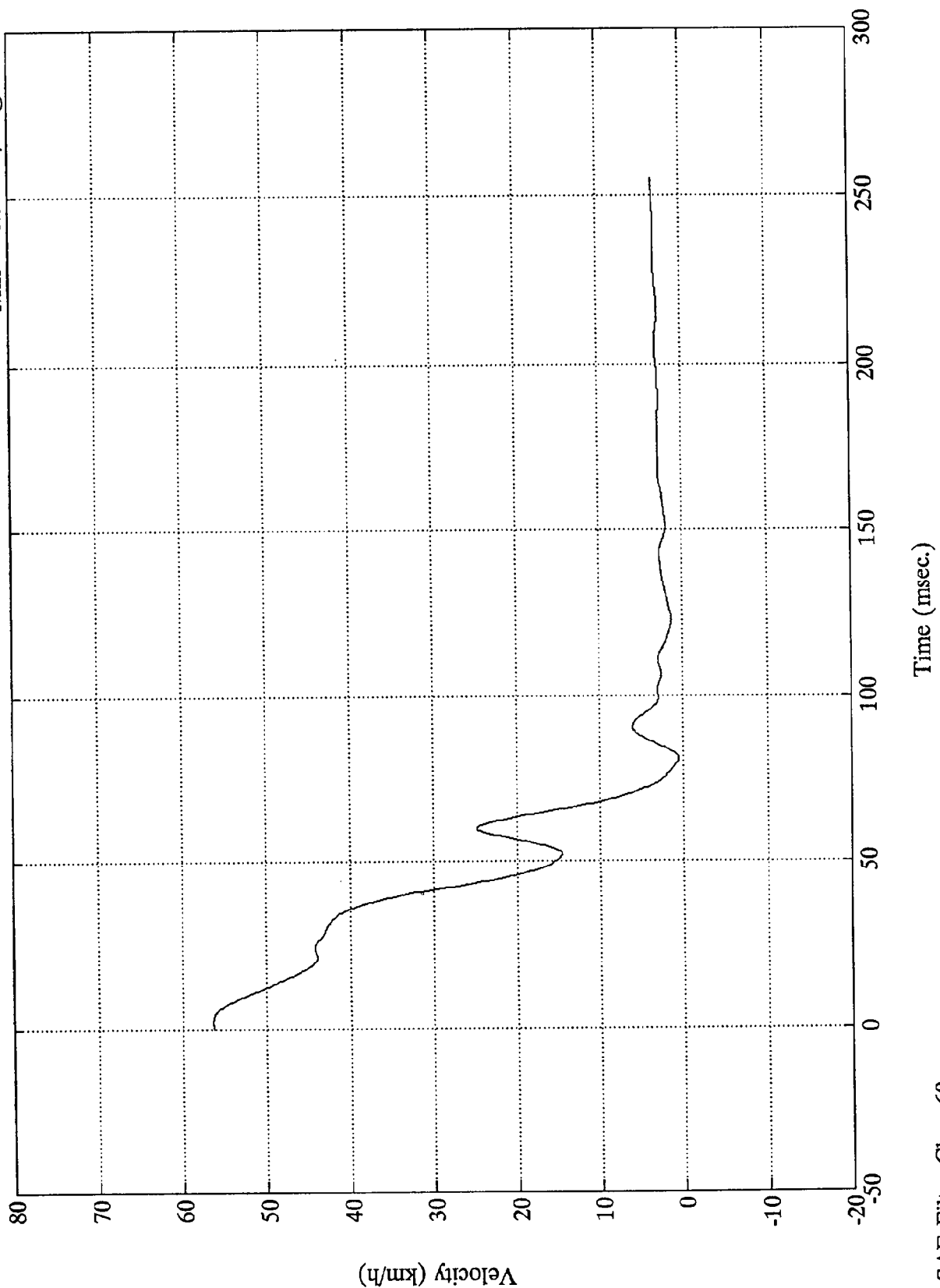
8058-1

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #7(x)

Max = 56.37 km/h @ 2.40 msec
Min = 0.55 km/h @ 81.12 msec

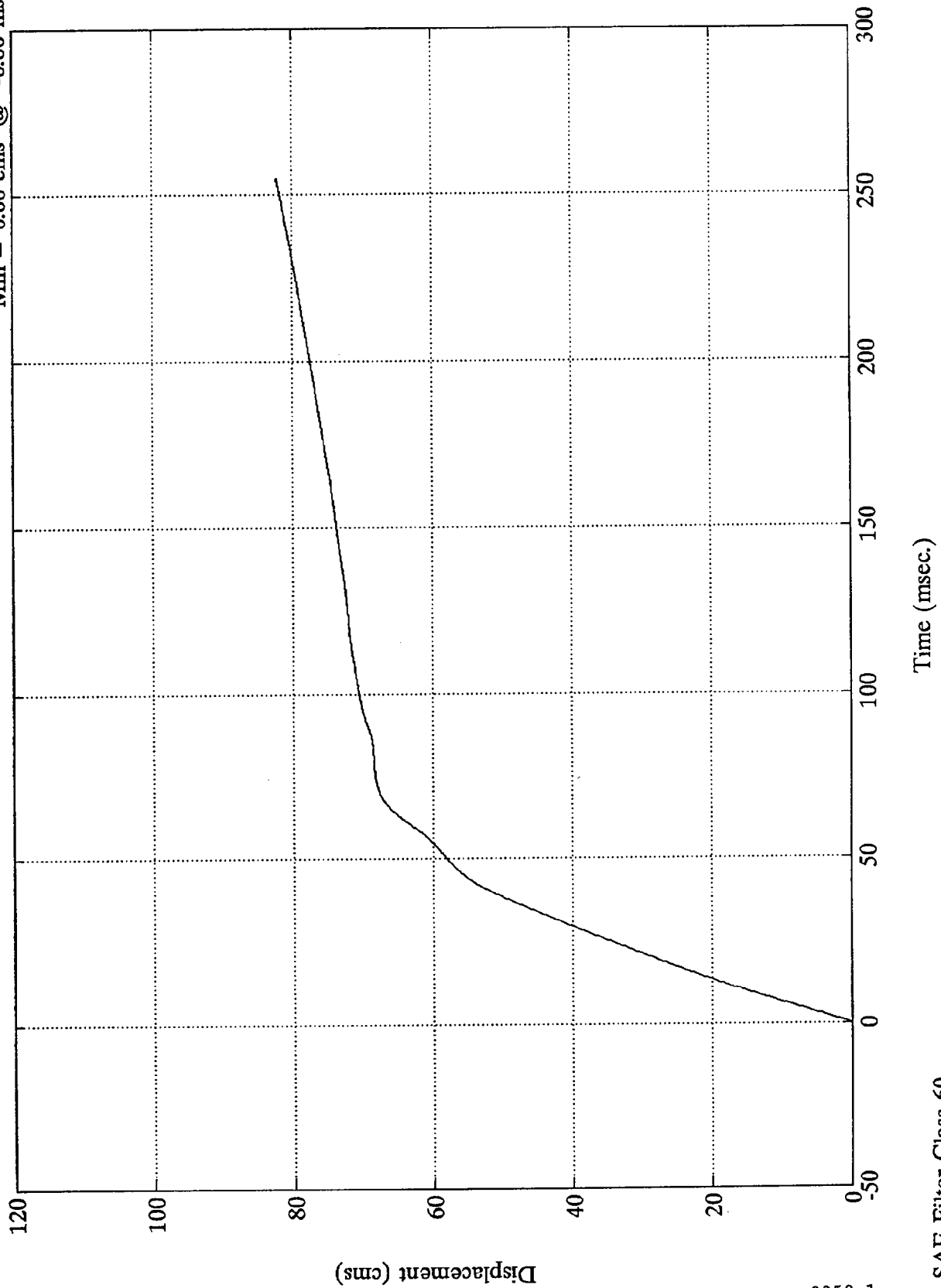


SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #7(x)

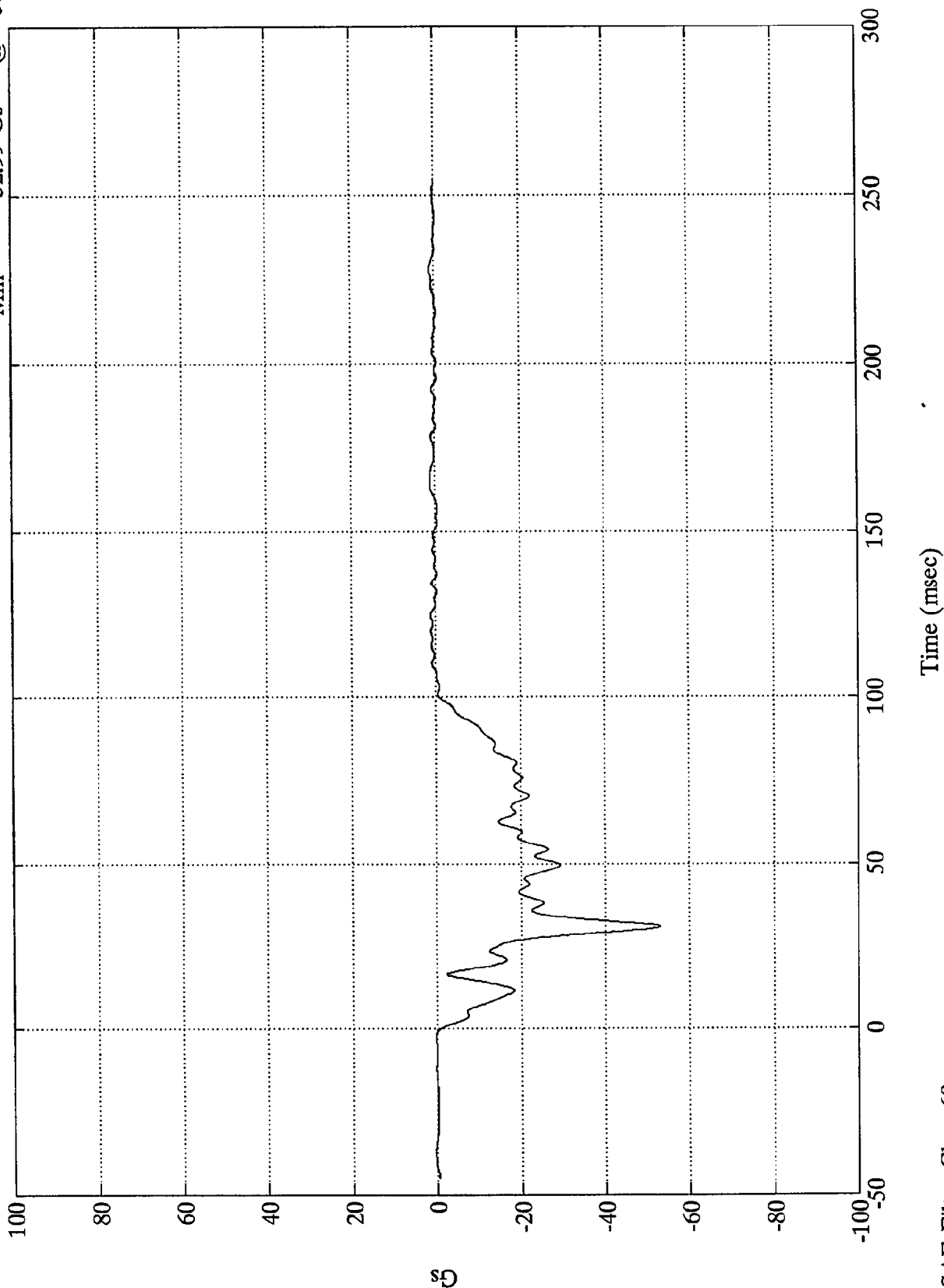
Max = 82.19 cms @ 254.88 msec
Min = 0.00 cms @ -0.00 msec



SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

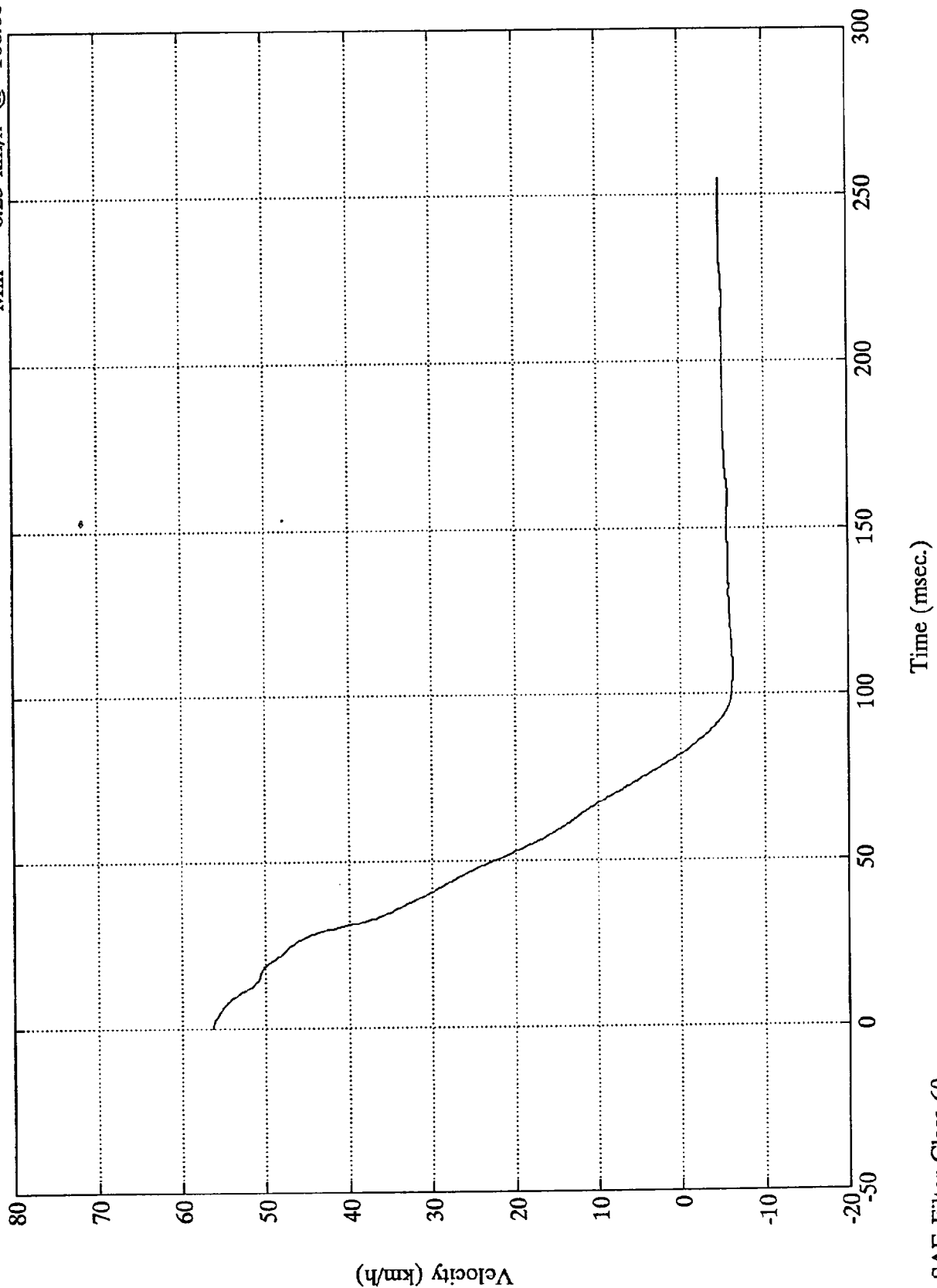
Acc. #8(x) Max = 1.23 Gs @ 163.80 msec
Min = -52.99 Gs @ 30.60 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 56.32 km/h @ -0.00 msec
Min = -6.23 km/h @ 108.00 msec

Acc. #8(x)

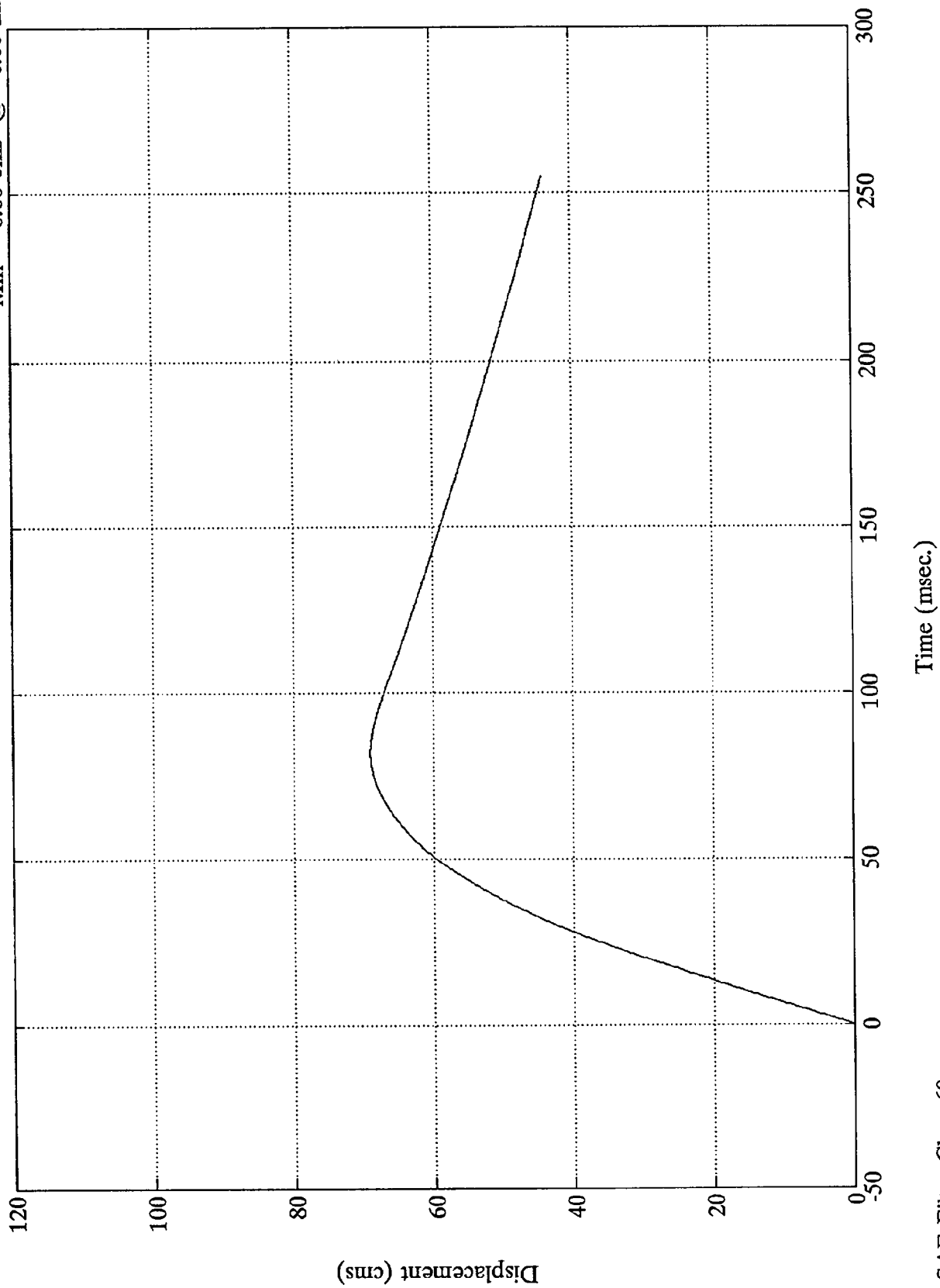


SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #8(x)

Max = 69.09 cms @ 82.80 msec
Min = 0.00 cms @ -0.00 msec

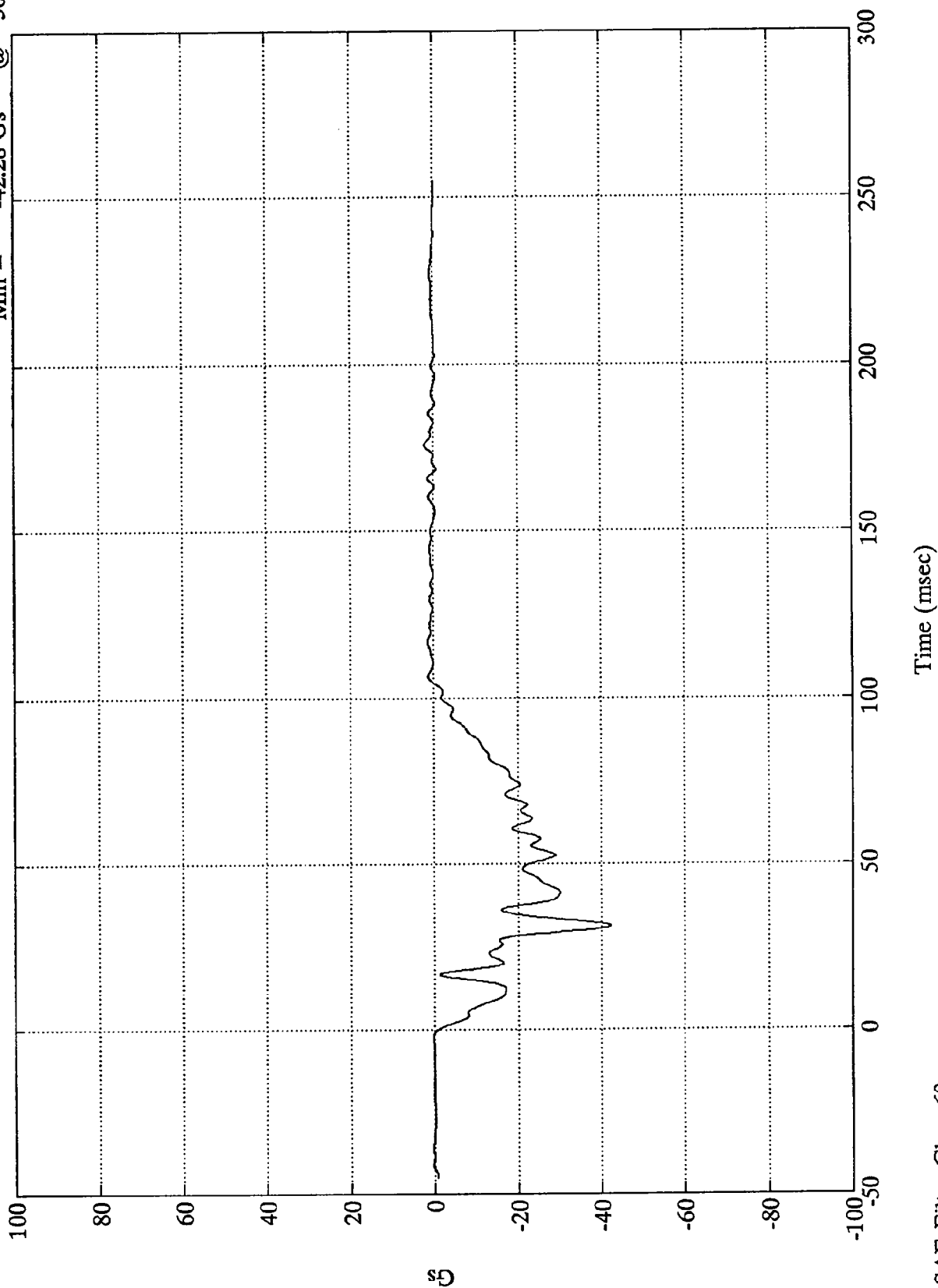


SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #9(x)

Max = 2.18 Gs @ 175.56 msec
Min = -42.28 Gs @ 30.95 msec



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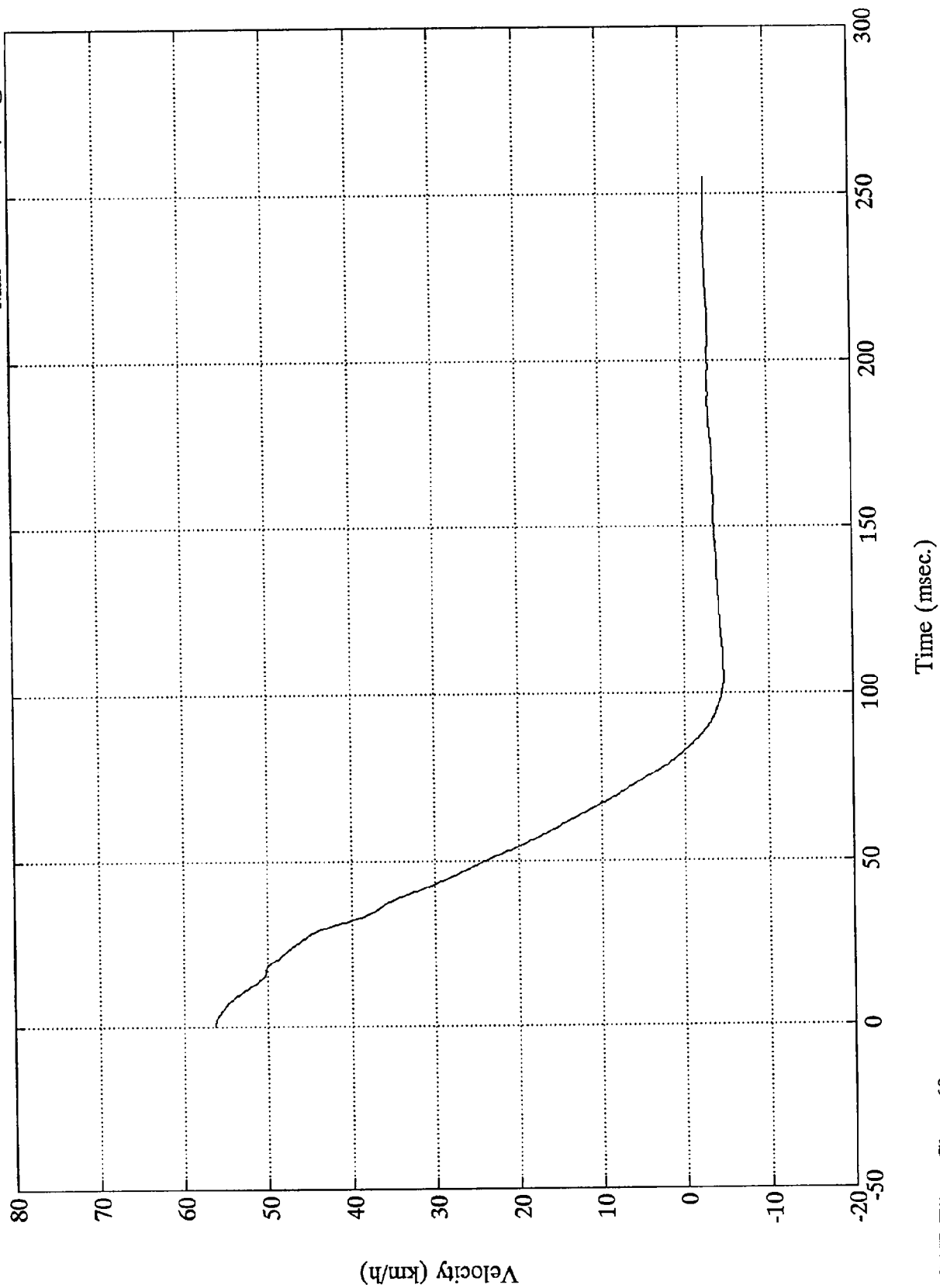
8058-1

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #9(x)

Max = 56.32 km/h @ -0.00 msec
Min = -4.69 km/h @ 104.40 msec

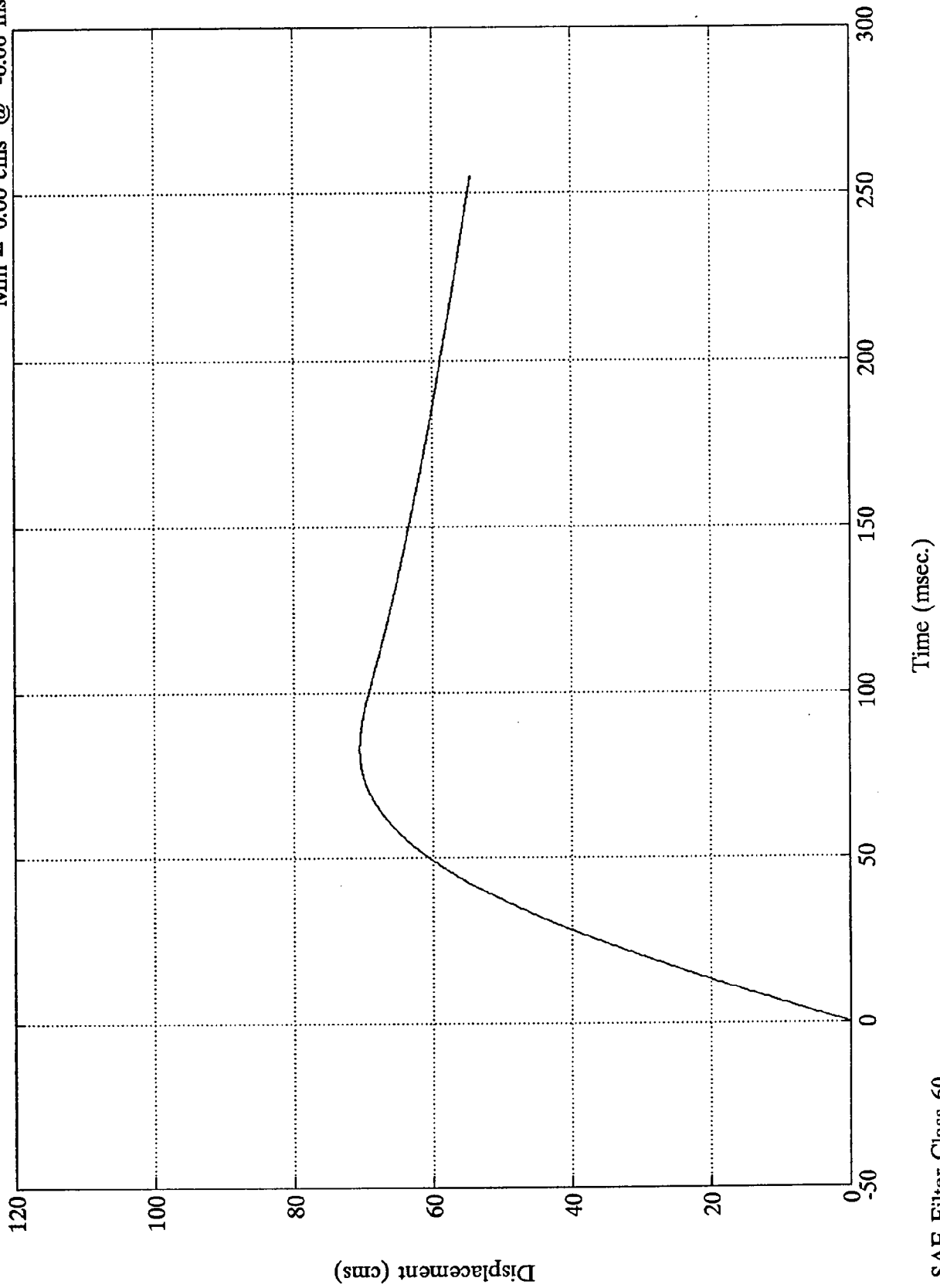


SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Acc. #9(x)

Max = 70.56 cms @ 83.76 msec
Min = 0.00 cms @ -0.00 msec



SAE Filter Class 60

TEST NO. MP5100

LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

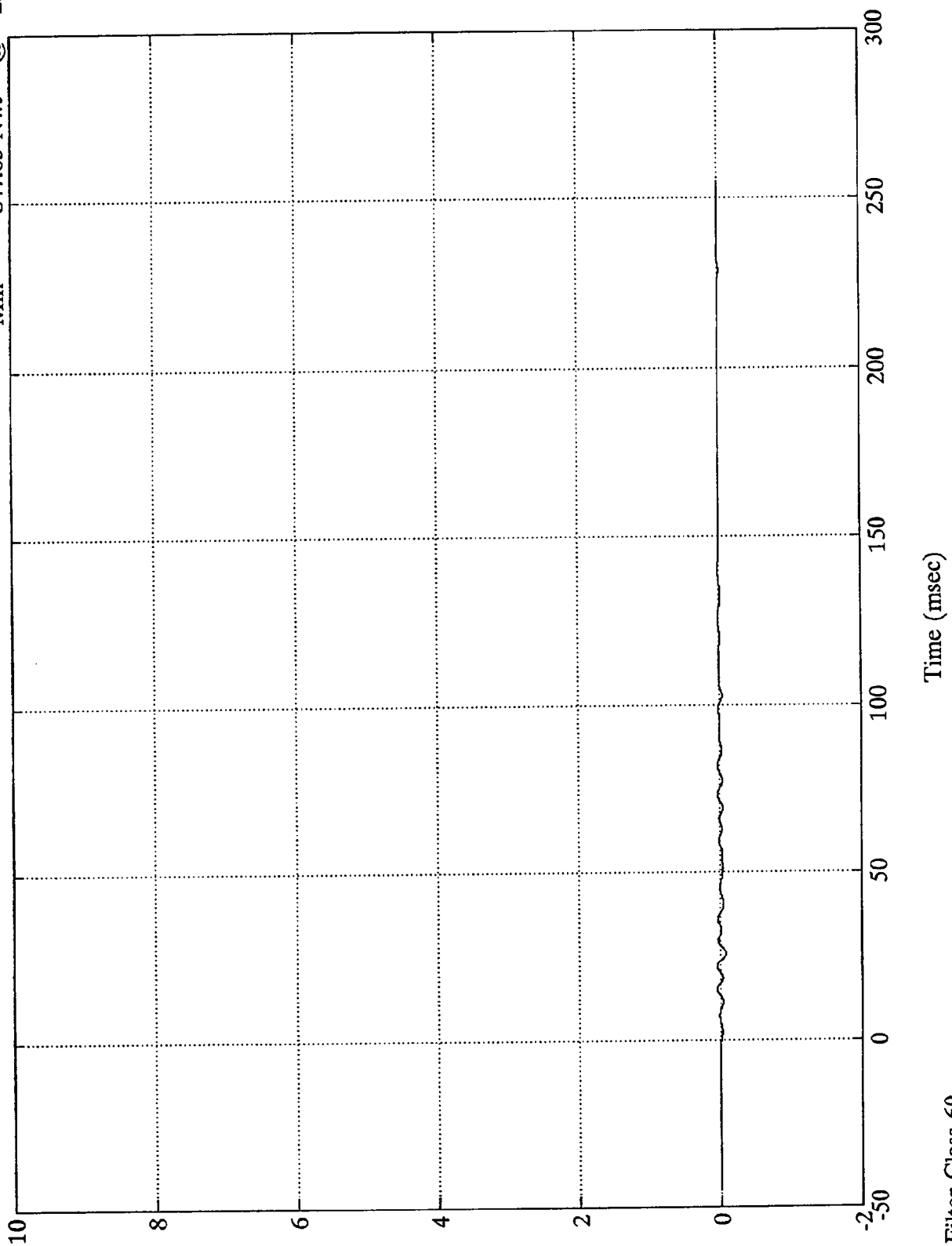
60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 469.59 Nwt @ 15.11 msec
Min = -847.65 Nwt @ 25.55 msec

Barrier Load Cell A1

x10⁴



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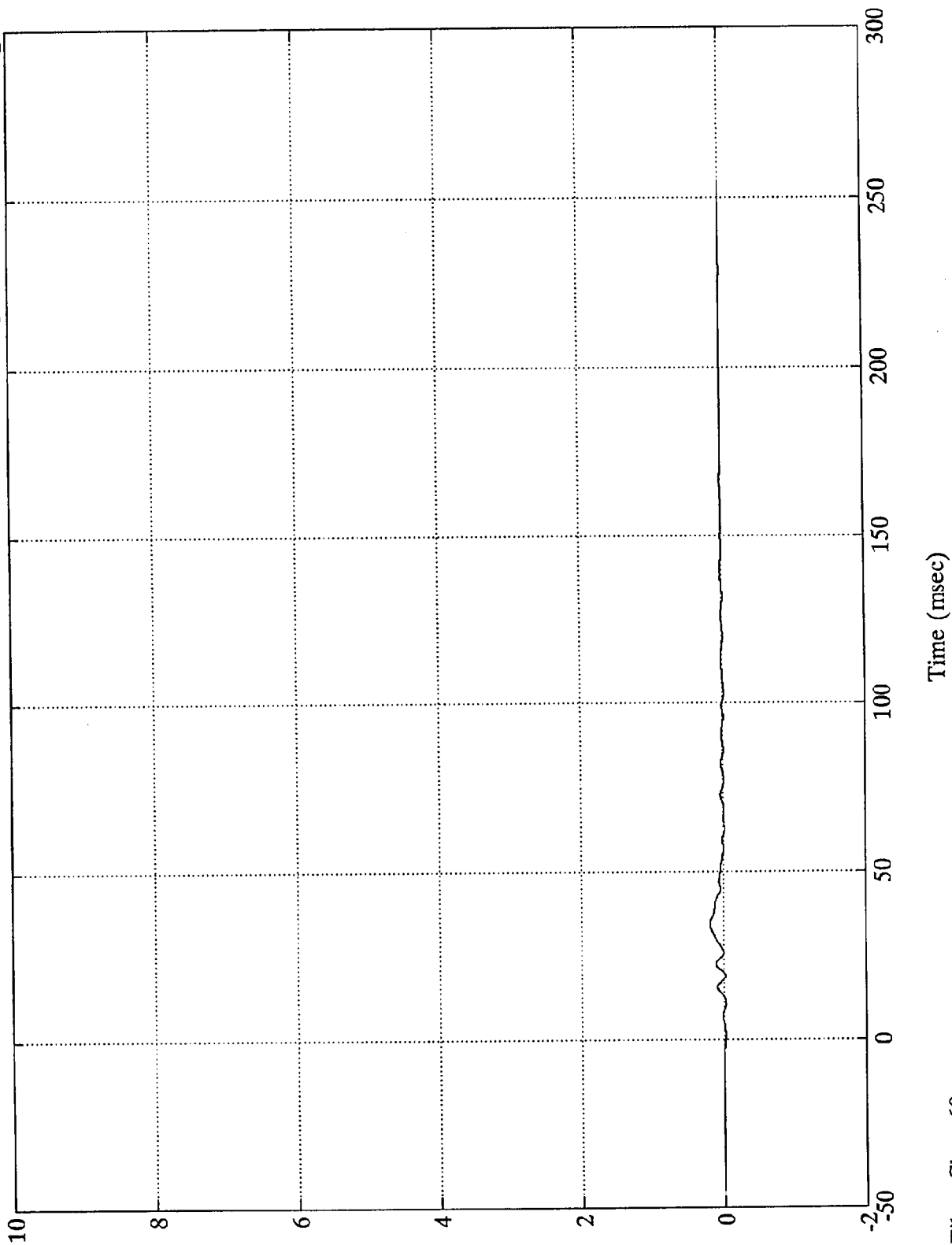
8058-1

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell A2

Max = 1914.29 Nwt @ 34.07 msec
 Min = -313.20 Nwt @ 10.79 msec

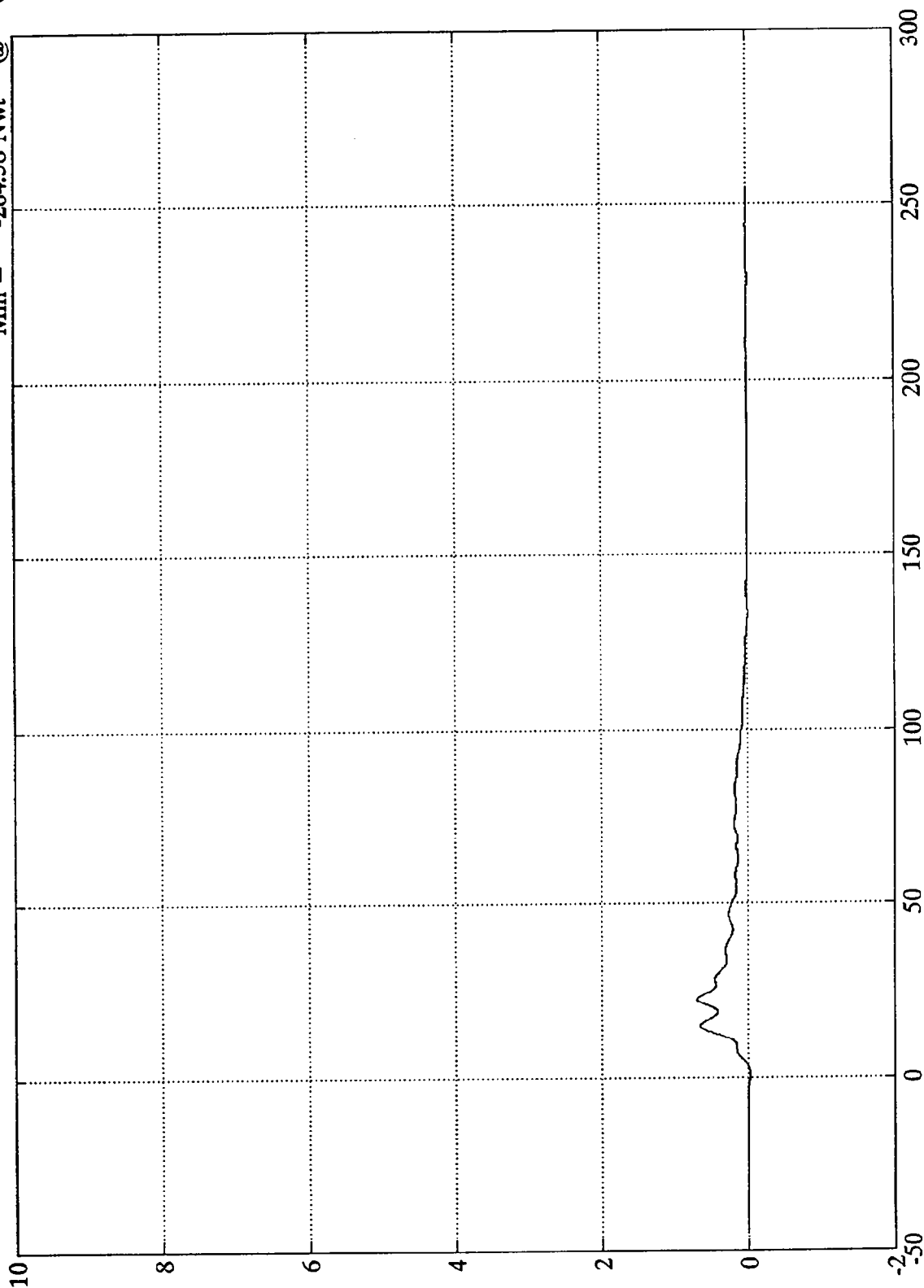


NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 7007.38 Nwt @ 22.31 msec
 Min = -284.58 Nwt @ 0.47 msec

Barrier Load Cell A3

x10⁴



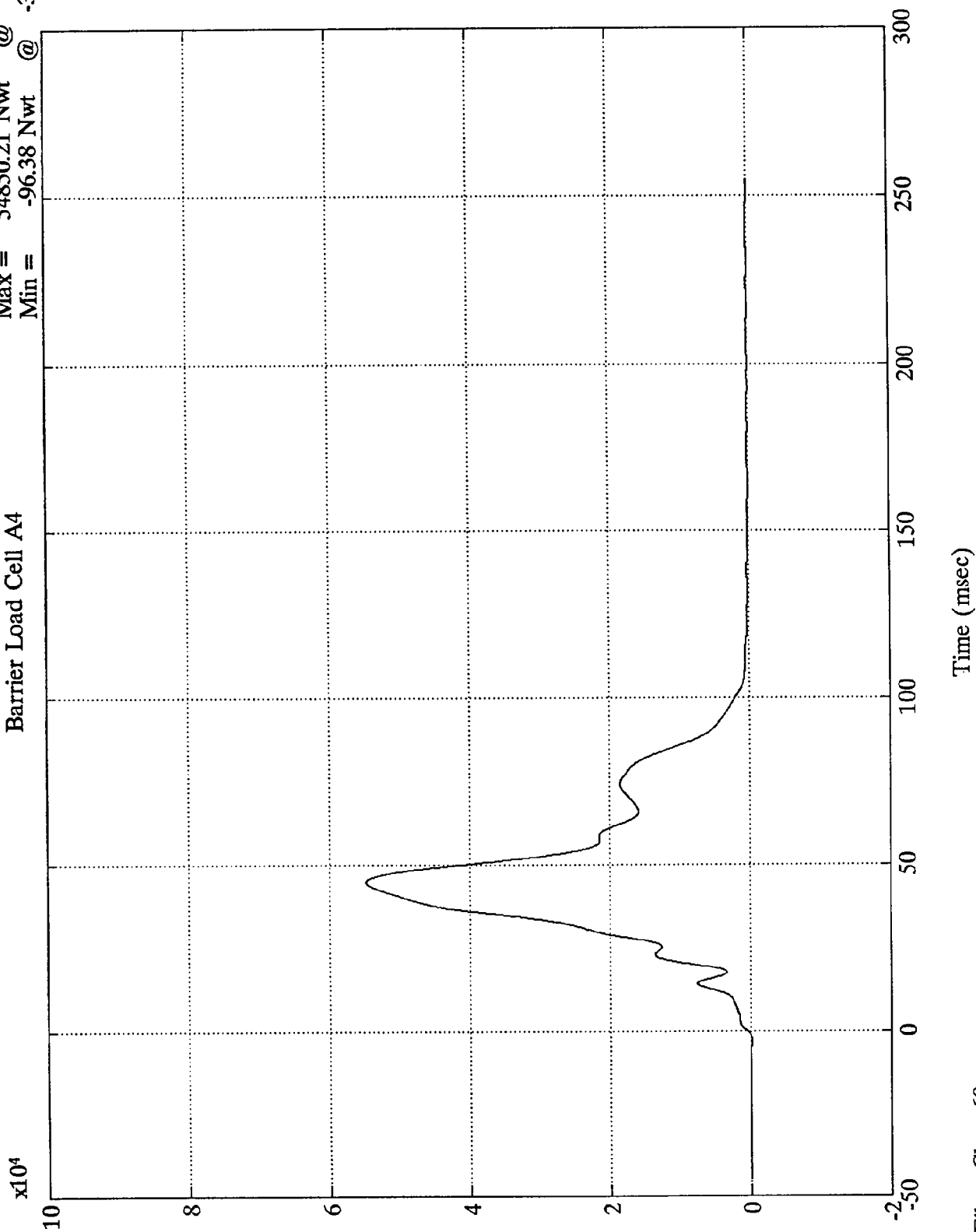
Time (msec)

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

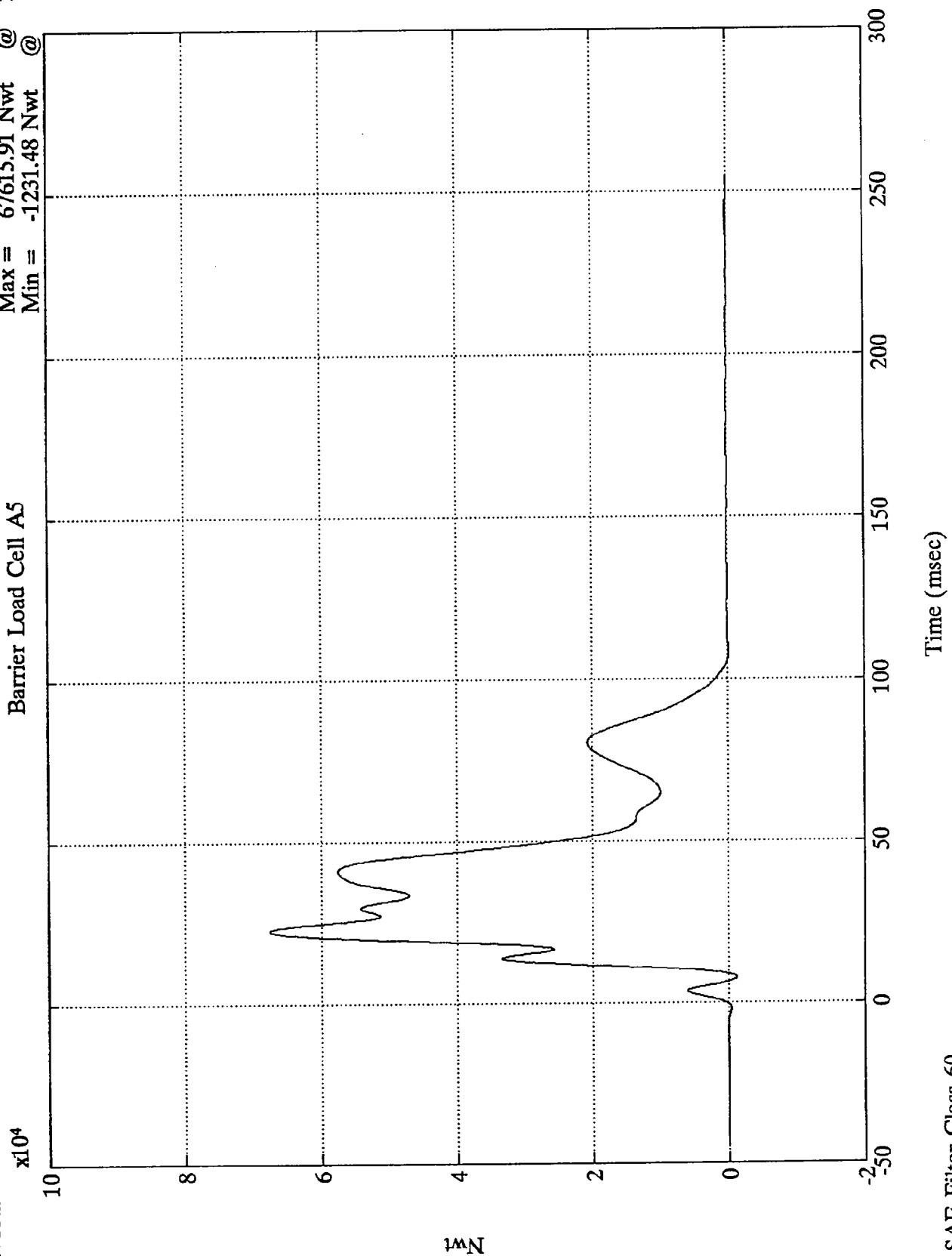
Barrier Load Cell A4

Max = 54850.21 Nwt @ 44.63 msec
 Min = -96.38 Nwt @ -3.00 msec



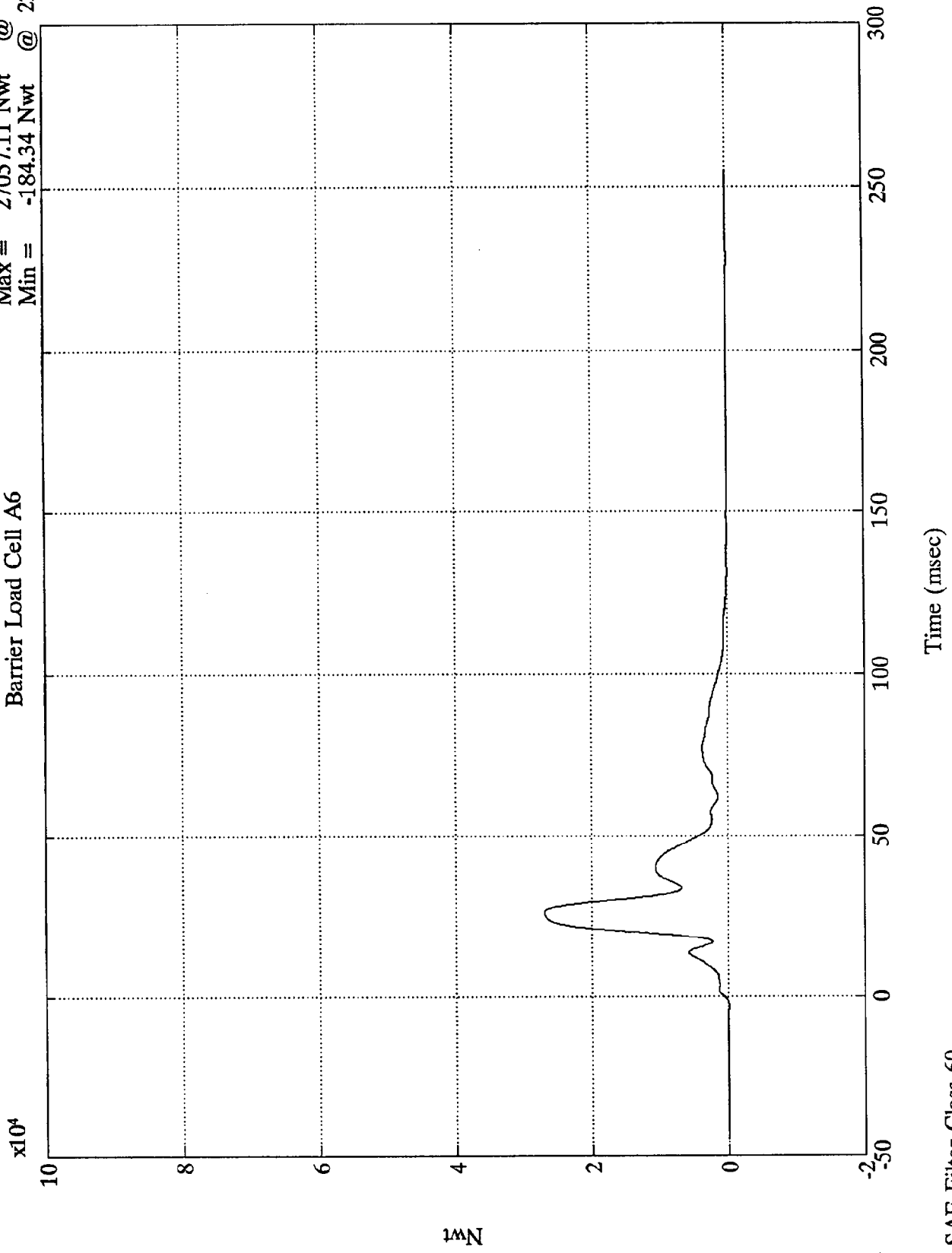
NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell A5
 Max = 67615.91 Nwt @ 22.43 msec
 Min = -1231.48 Nwt @ 7.55 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

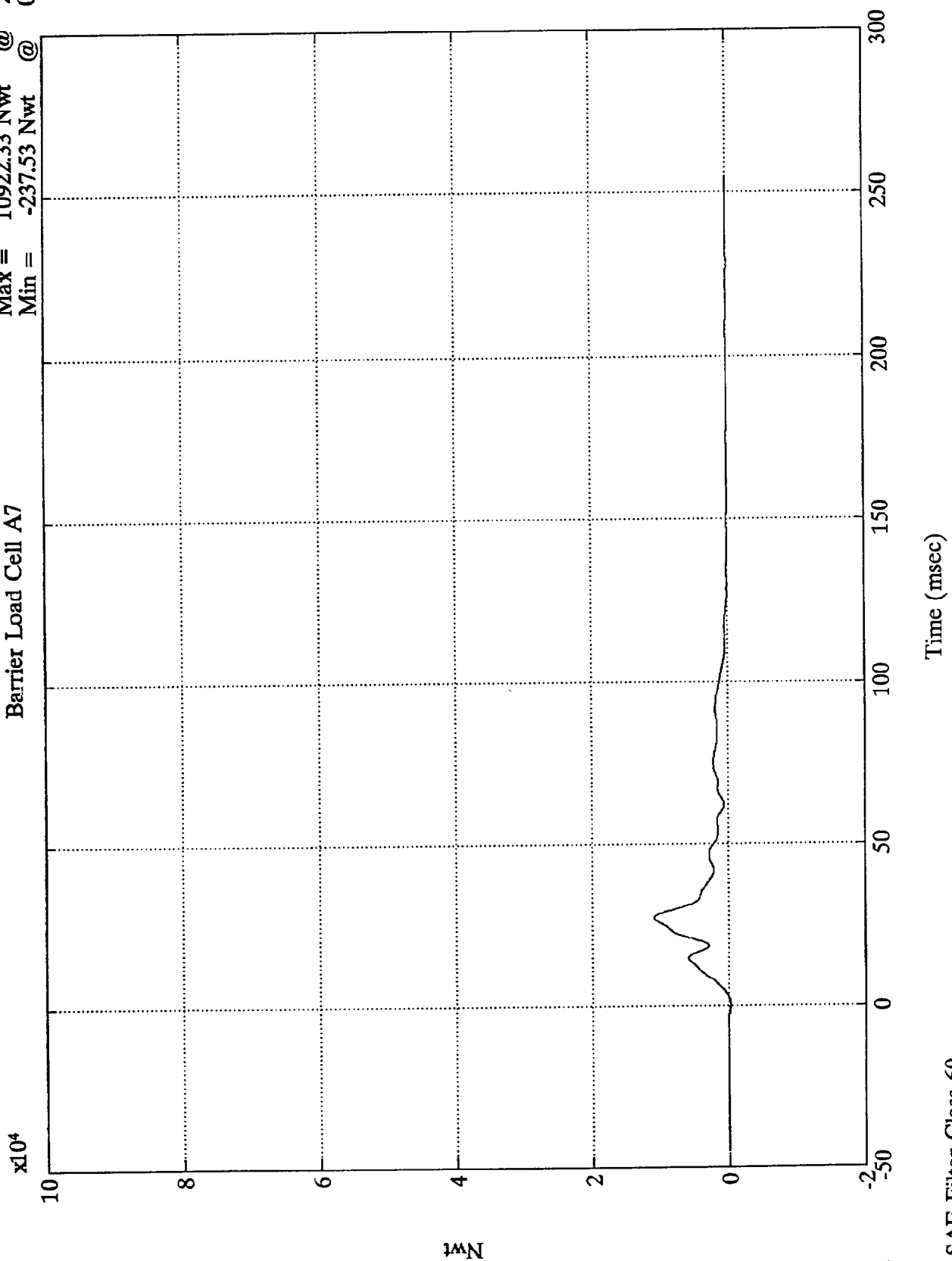
Barrier Load Cell A6
Max = 27057.11 Nwt @ 26.27 msec
Min = -184.34 Nwt @ 228.36 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 10922.33 Nwt @ 27.36 msec
Min = -237.53 Nwt @ 0.11 msec

Barrier Load Cell A7



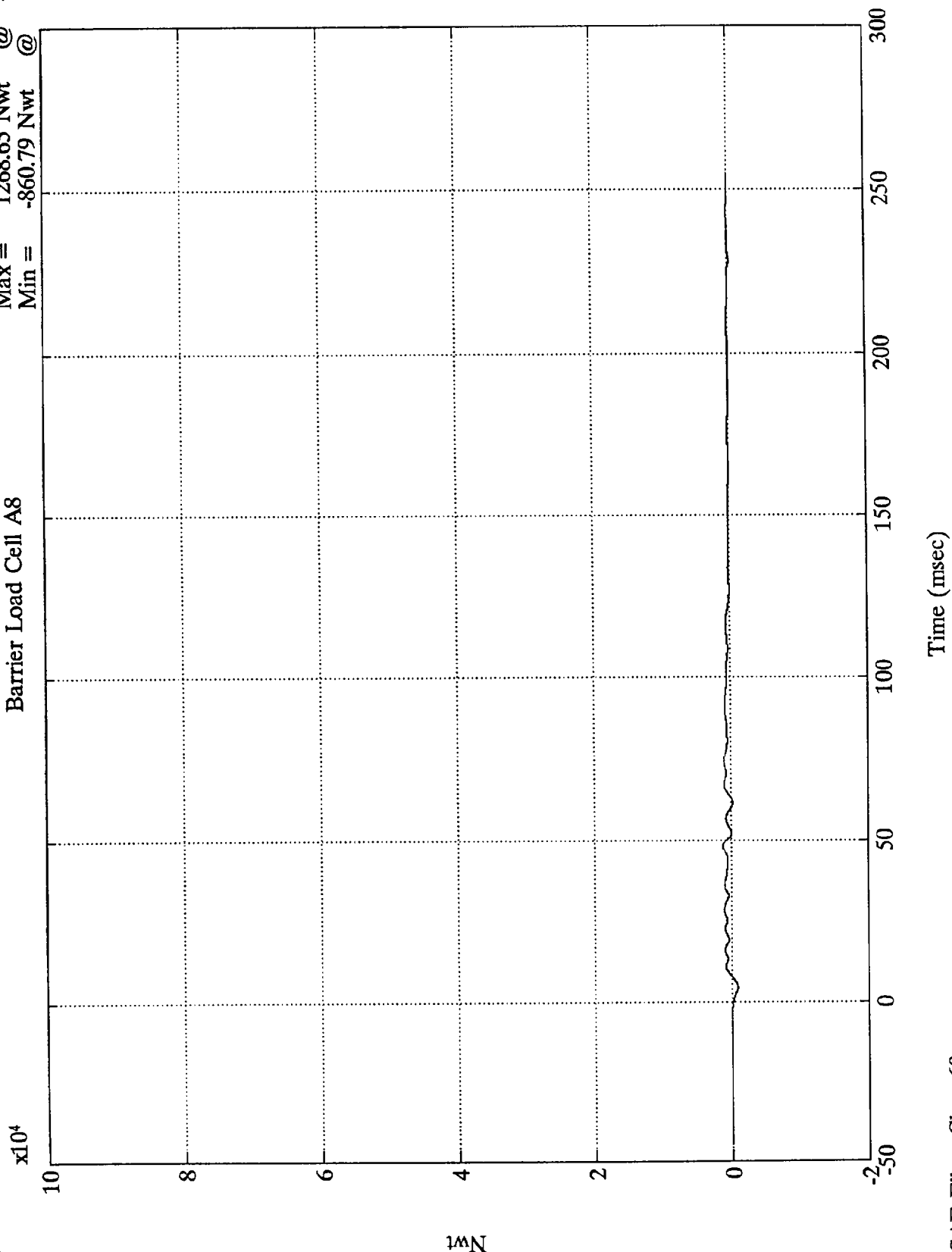
B-37

8058-1

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell A8
Max = 1268.65 Nwt @ 48.11 msec
Min = -860.79 Nwt @ 4.31 msec

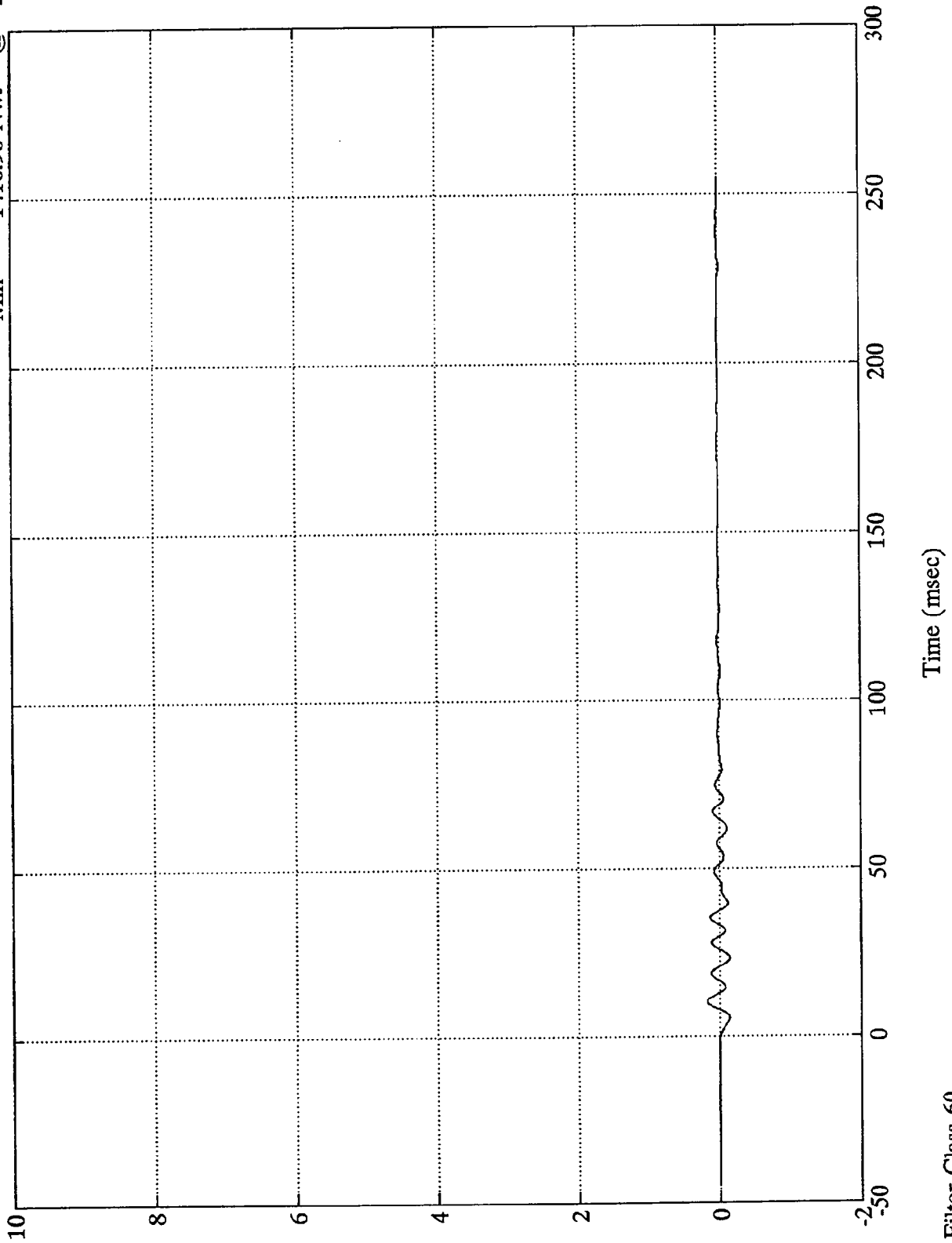


NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 1812.62 Nwt @ 10.19 msec
Min = -1410.90 Nwt @ 23.28 msec

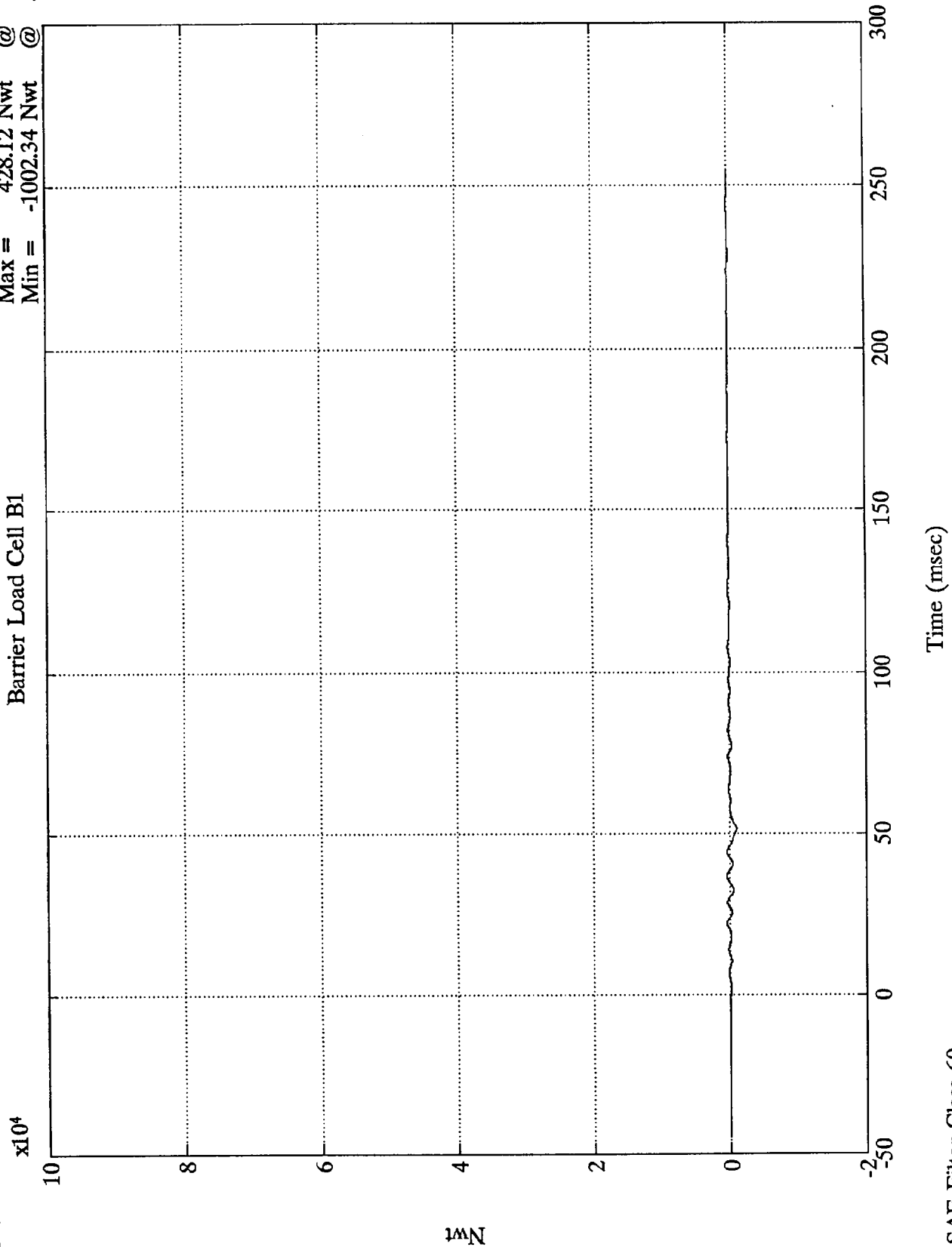
Barrier Load Cell A9

x10⁴



NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell B1
Max = 428.12 Nwt @ 22.56 msec
Min = -1002.34 Nwt @ 51.47 msec



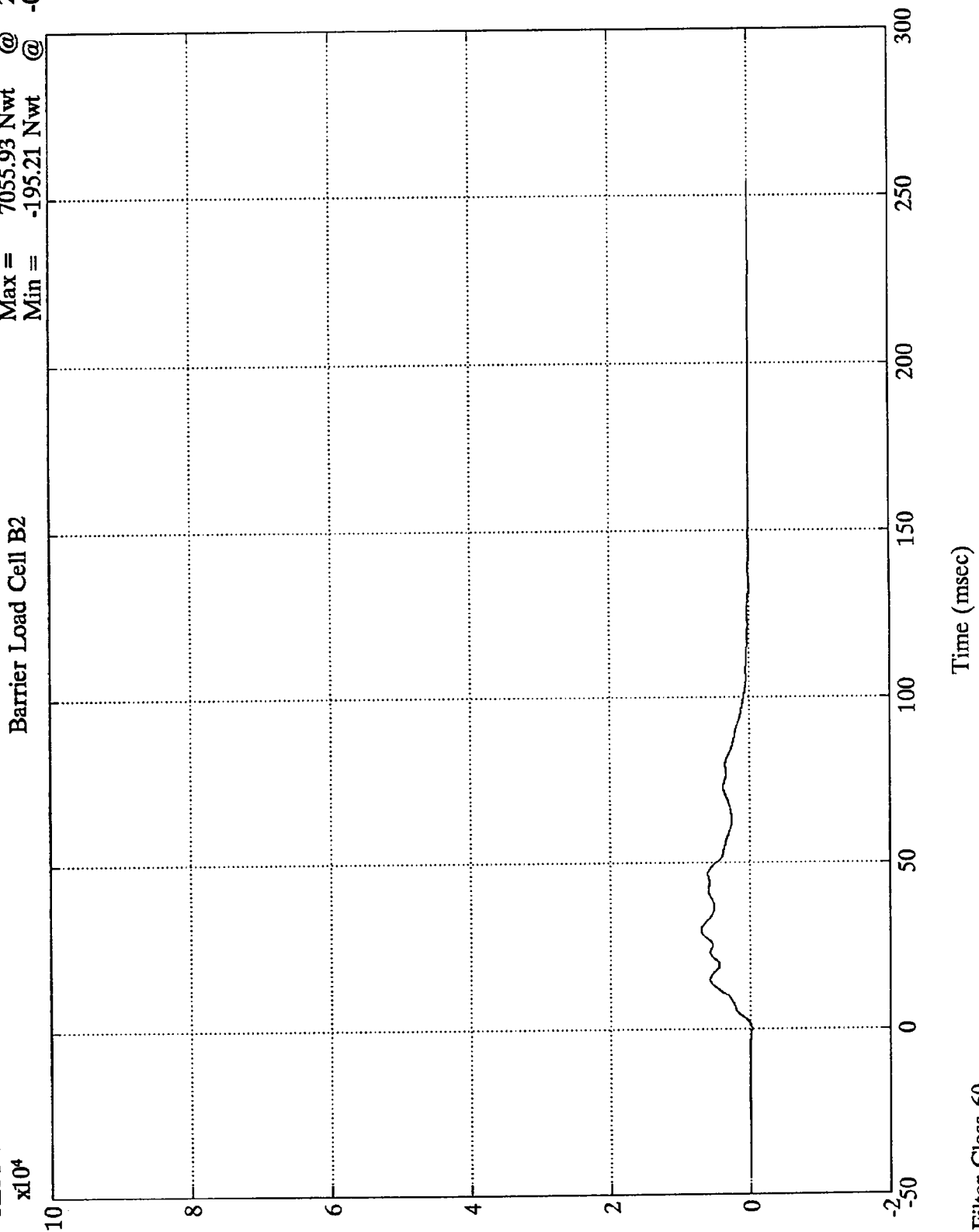
B-40

8058-1

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell B2
Max = 7055.93 Nwt @ 29.51 msec
Min = -195.21 Nwt @ -0.12 msec



1Nwt
B-41

8058-1

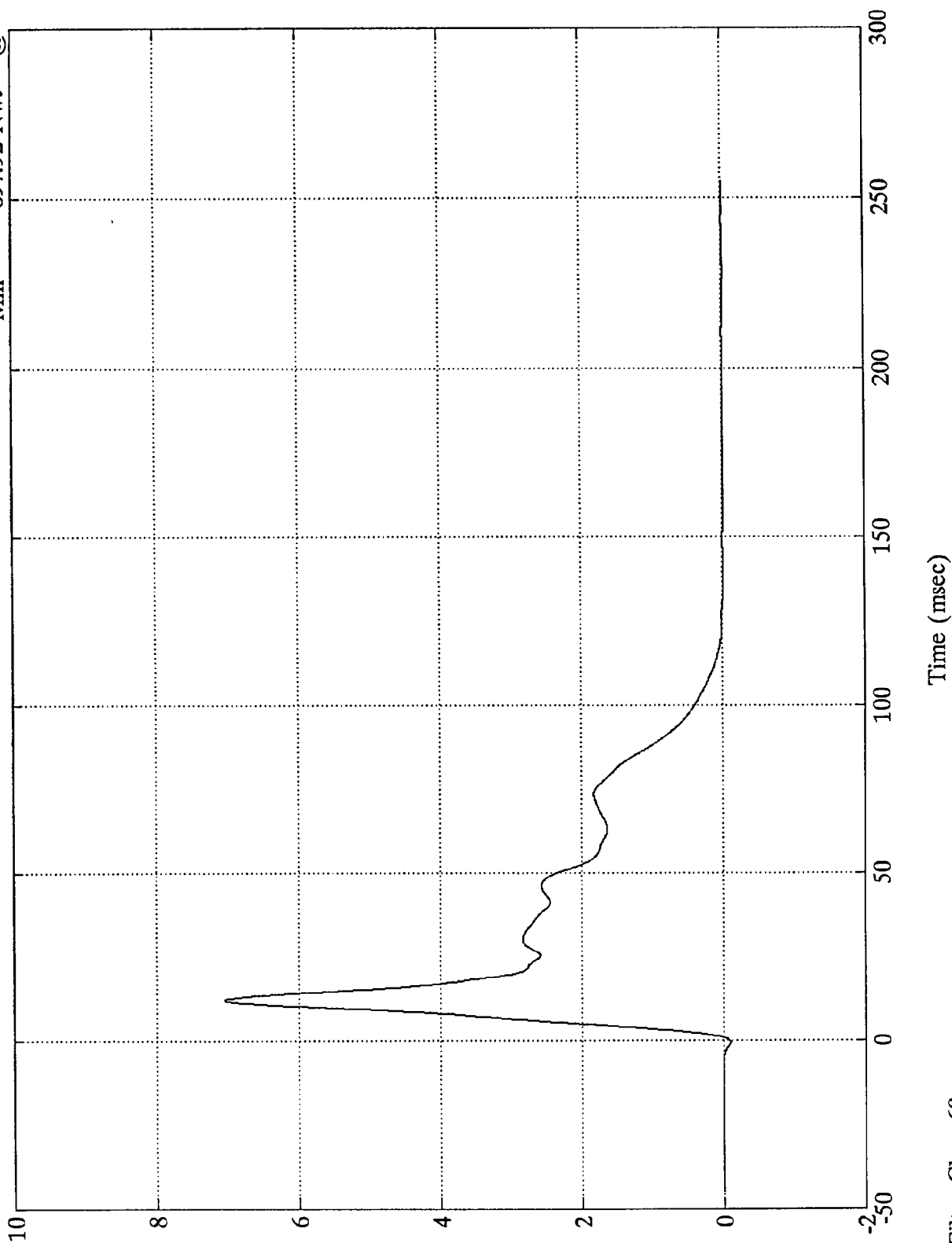
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 70506.60 Nwt @ 11.87 msec
 Min = -897.92 Nwt @ -0.72 msec

Barrier Load Cell B3

x10⁴

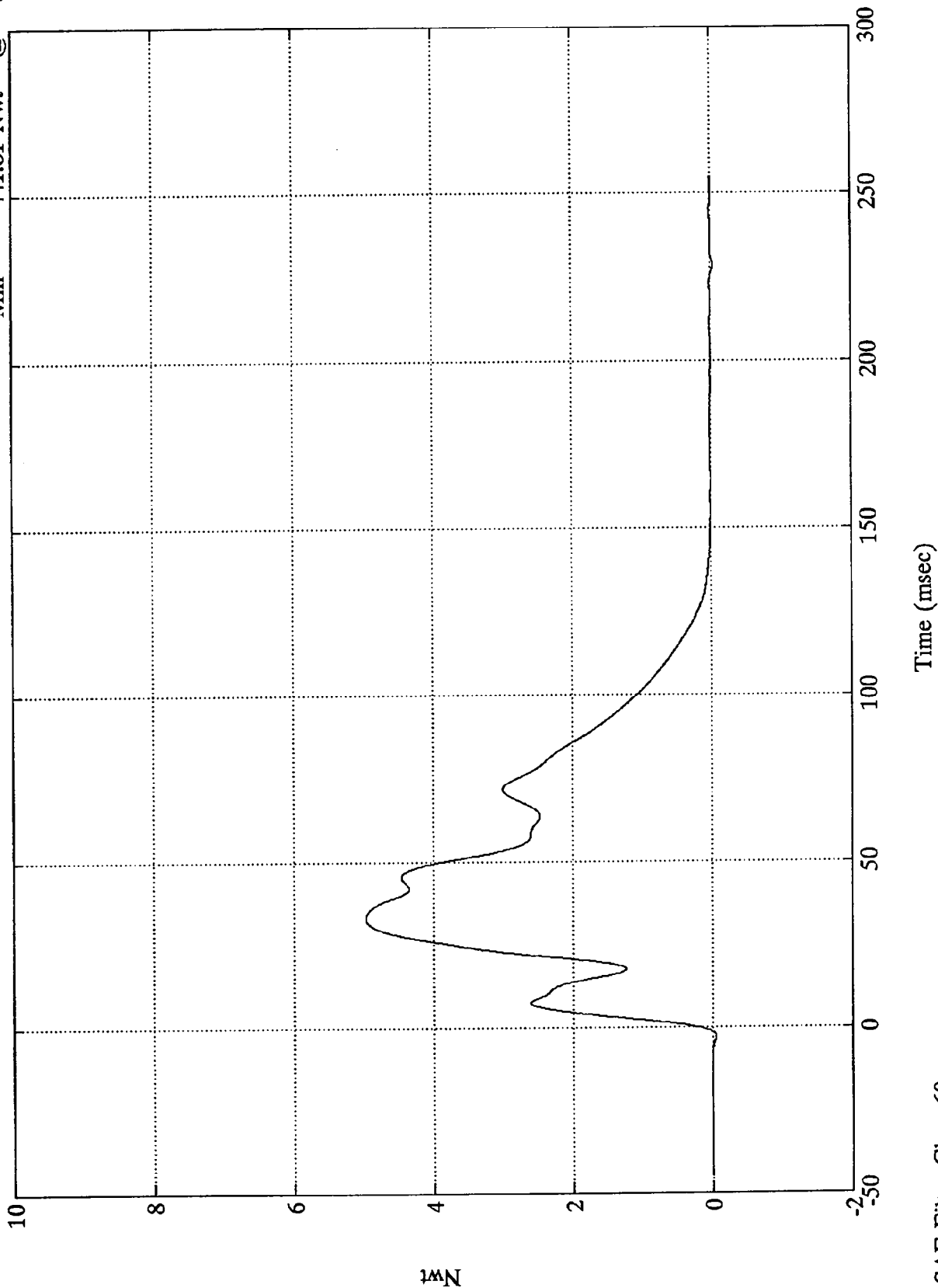


NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 49740.33 Nwt @ 33.11 msec
Min = -441.81 Nwt @ -3.00 msec

Barrier Load Cell B4

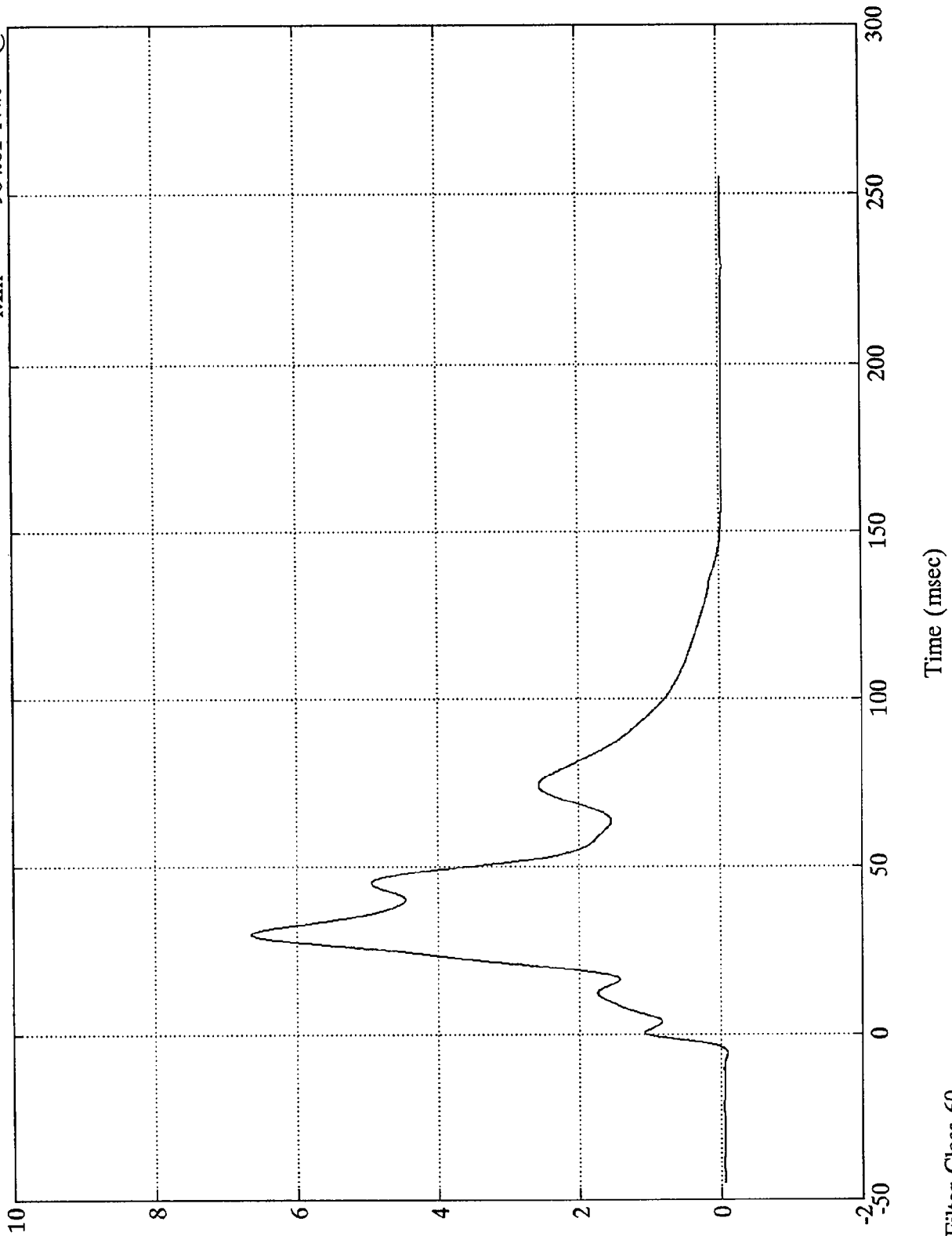
$\times 10^4$



NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 66492.63 Nwt @ 30.00 msec
Min = -904.61 Nwt @ -5.76 msec

Barrier Load Cell B5



11N
B-44

8058-1

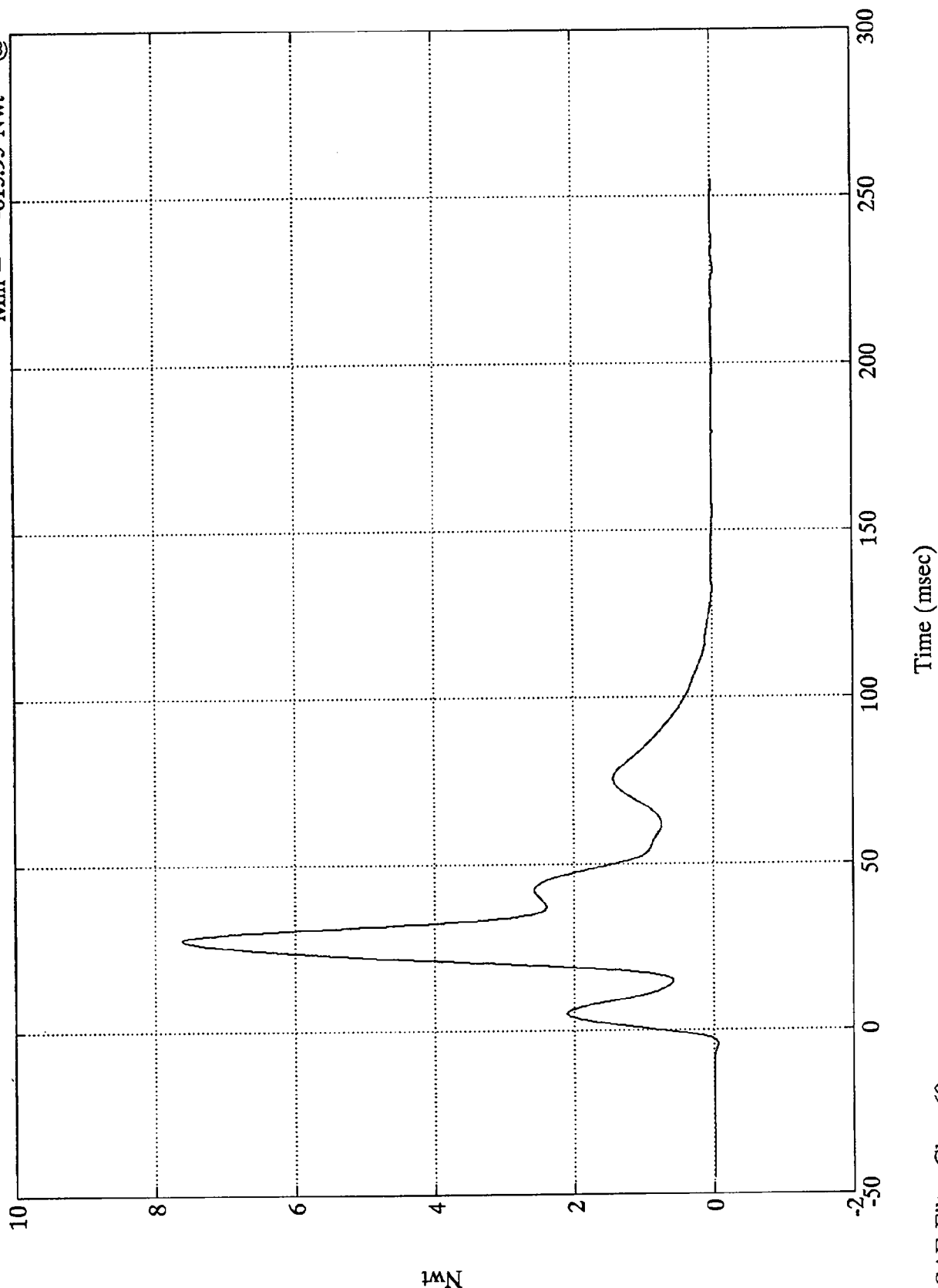
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 76133.49 Nwt @ 27.36 msec
Min = -613.95 Nwt @ -4.56 msec

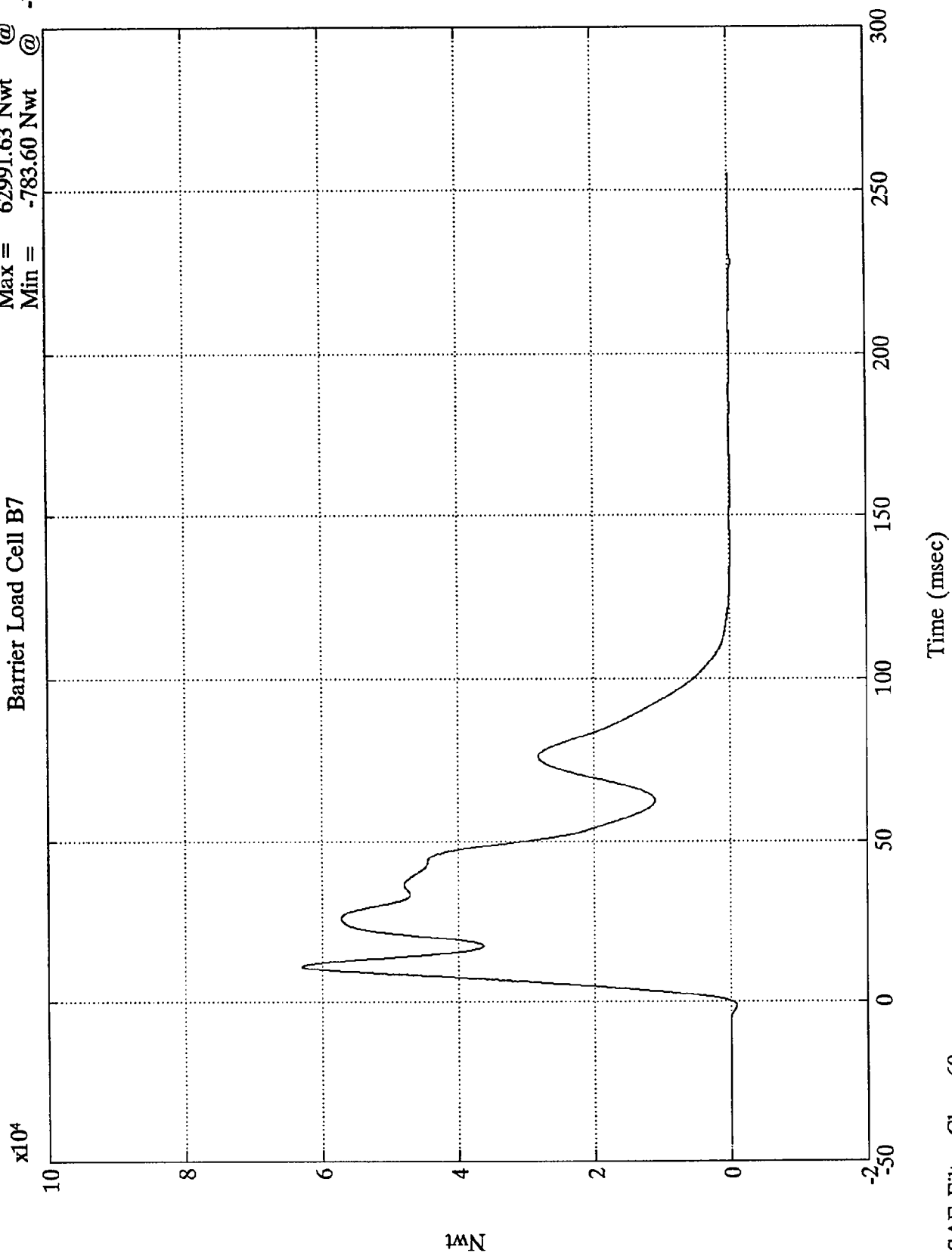
Barrier Load Cell B6

$\times 10^4$



NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell B7
Max = 62991.63 Nwt @ 10.79 msec
Min = -783.60 Nwt @ -1.56 msec



B-46

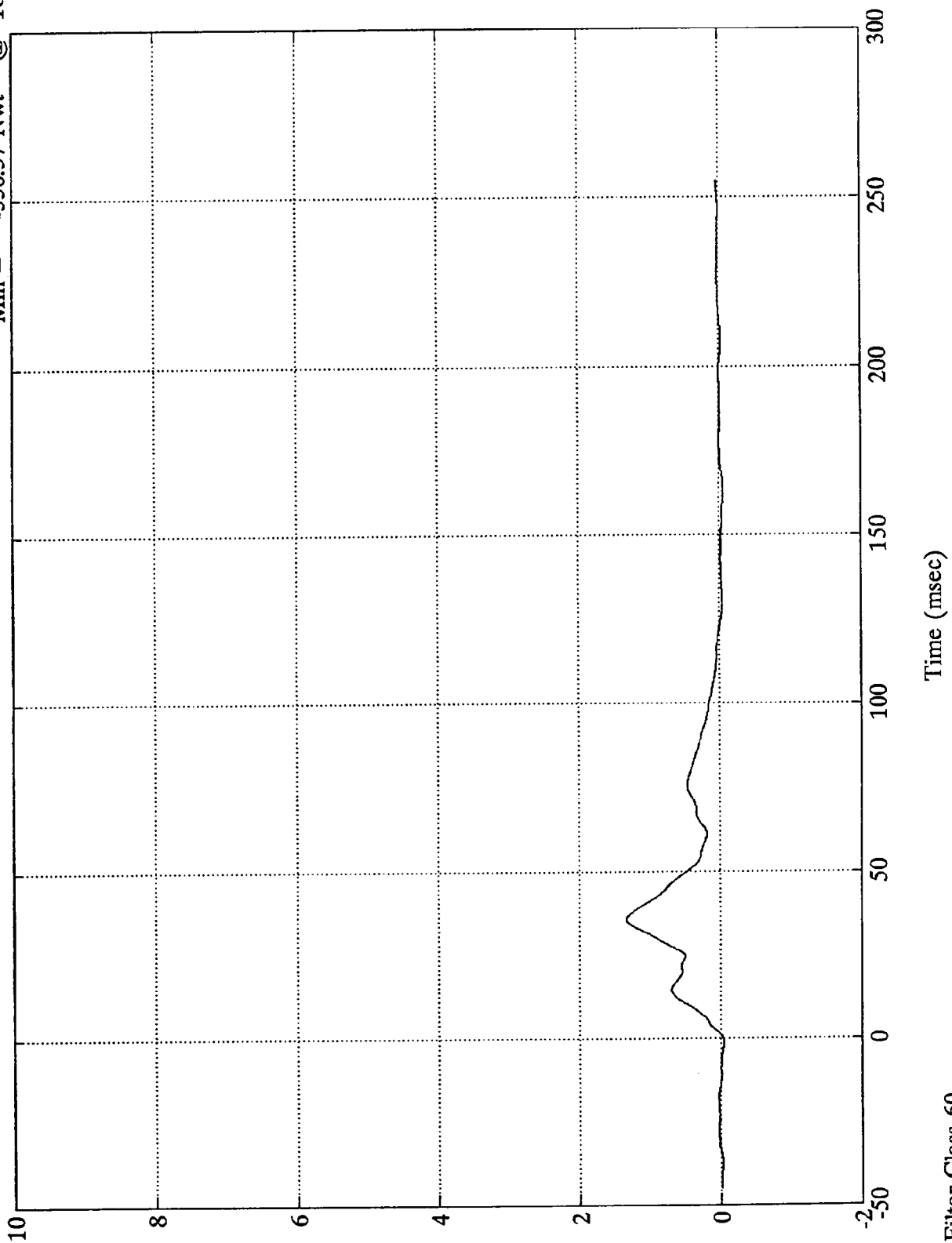
8058-1

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell B8
Max = 13316.96 Nwt @ 35.63 msec
Min = -550.37 Nwt @ 164.03 msec

$\times 10^4$



13N
B-47

8058-1

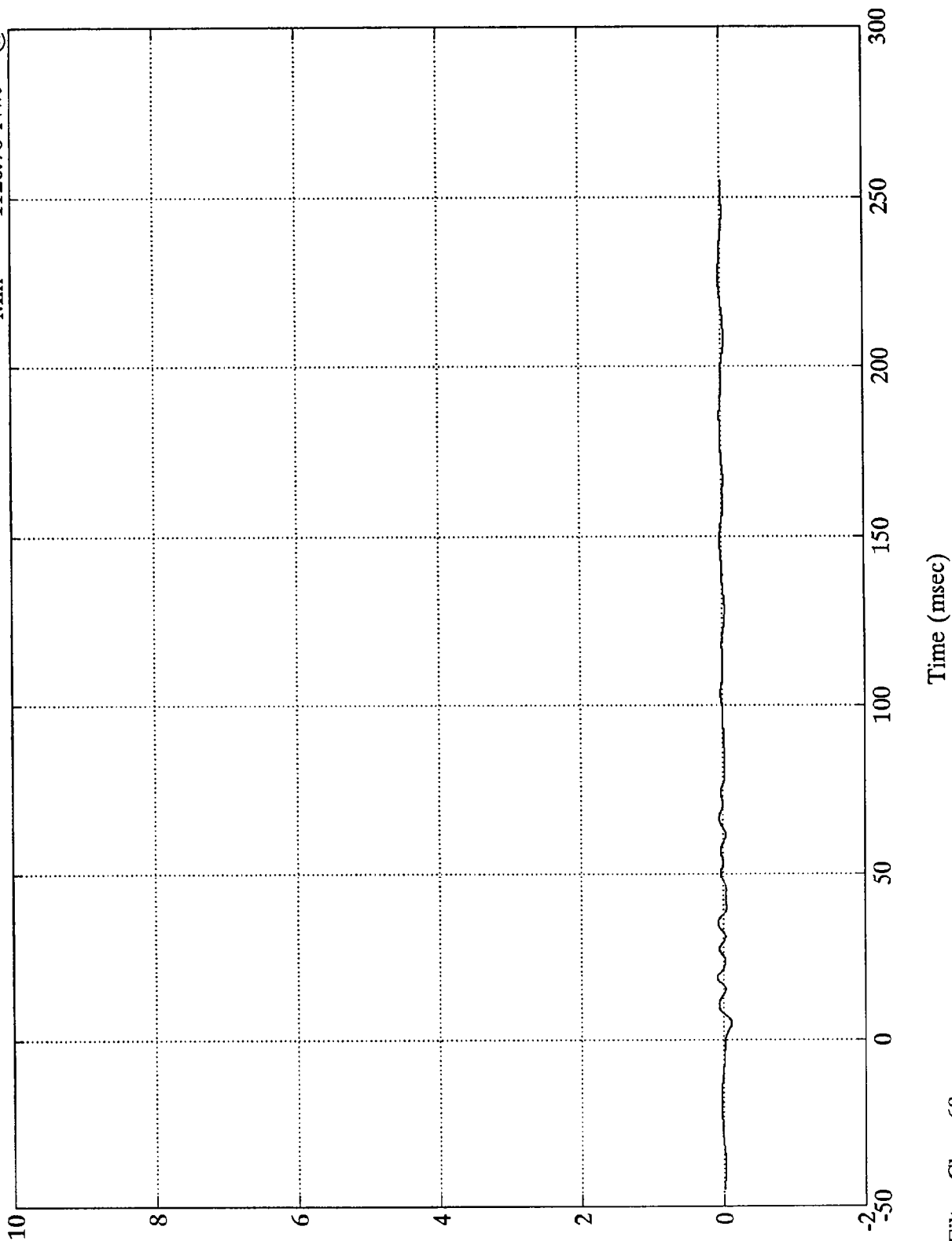
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 829.04 Nwt @ 18.60 msec
 Min = -1120.76 Nwt @ 4.91 msec

Barrier Load Cell B9

x10⁴



1wN
 B-48

8058-1

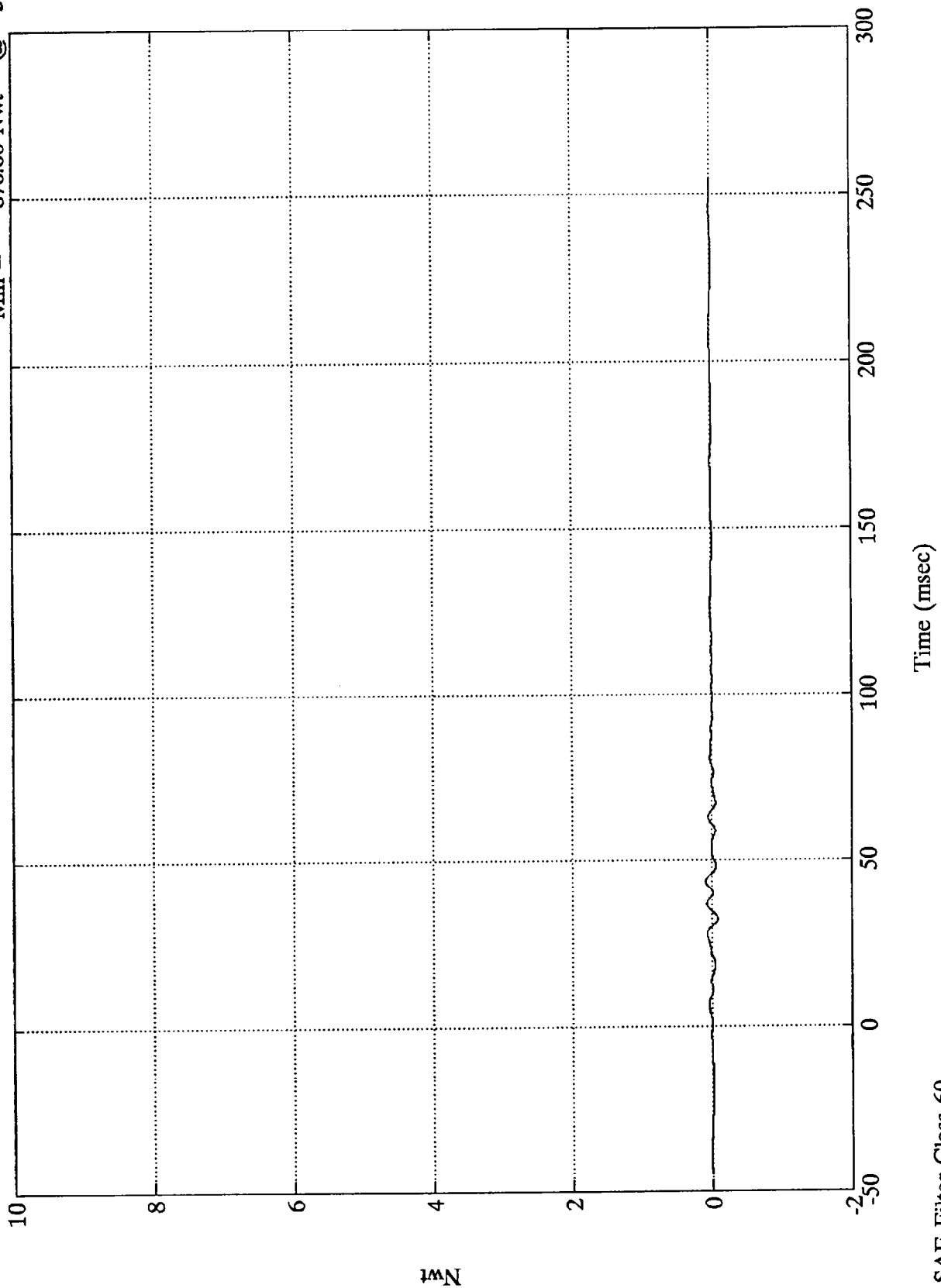
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell C1

Max = 965.79 Nwt @ 43.43 msec
Min = -870.60 Nwt @ 32.15 msec

$\times 10^4$



1wN
B-49

8058-1

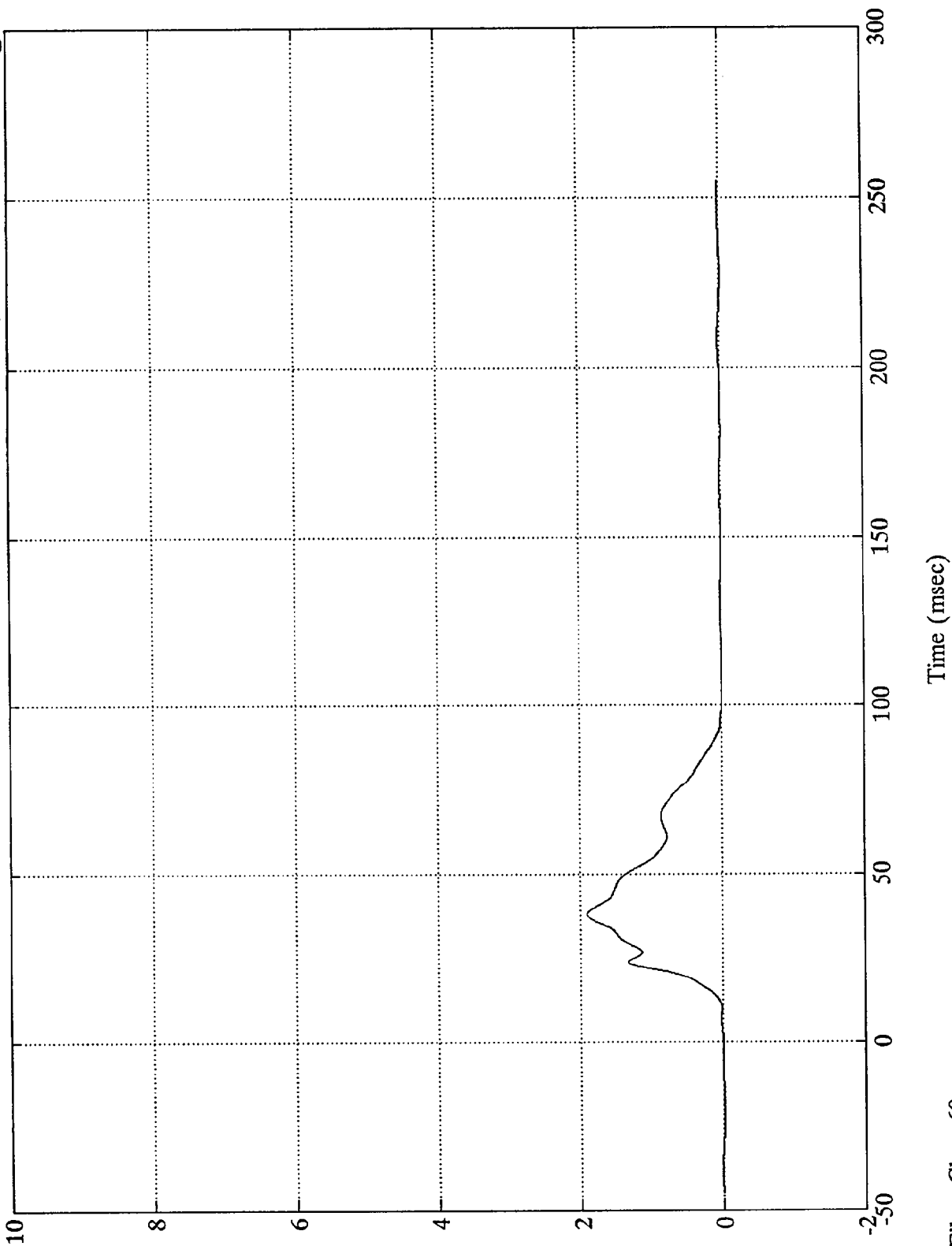
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 19064.44 Nwt @ 38.15 msec
Min = -155.30 Nwt @ -18.96 msec

Barrier Load Cell C2

x10⁴



10⁴ N
B-50

8058-1

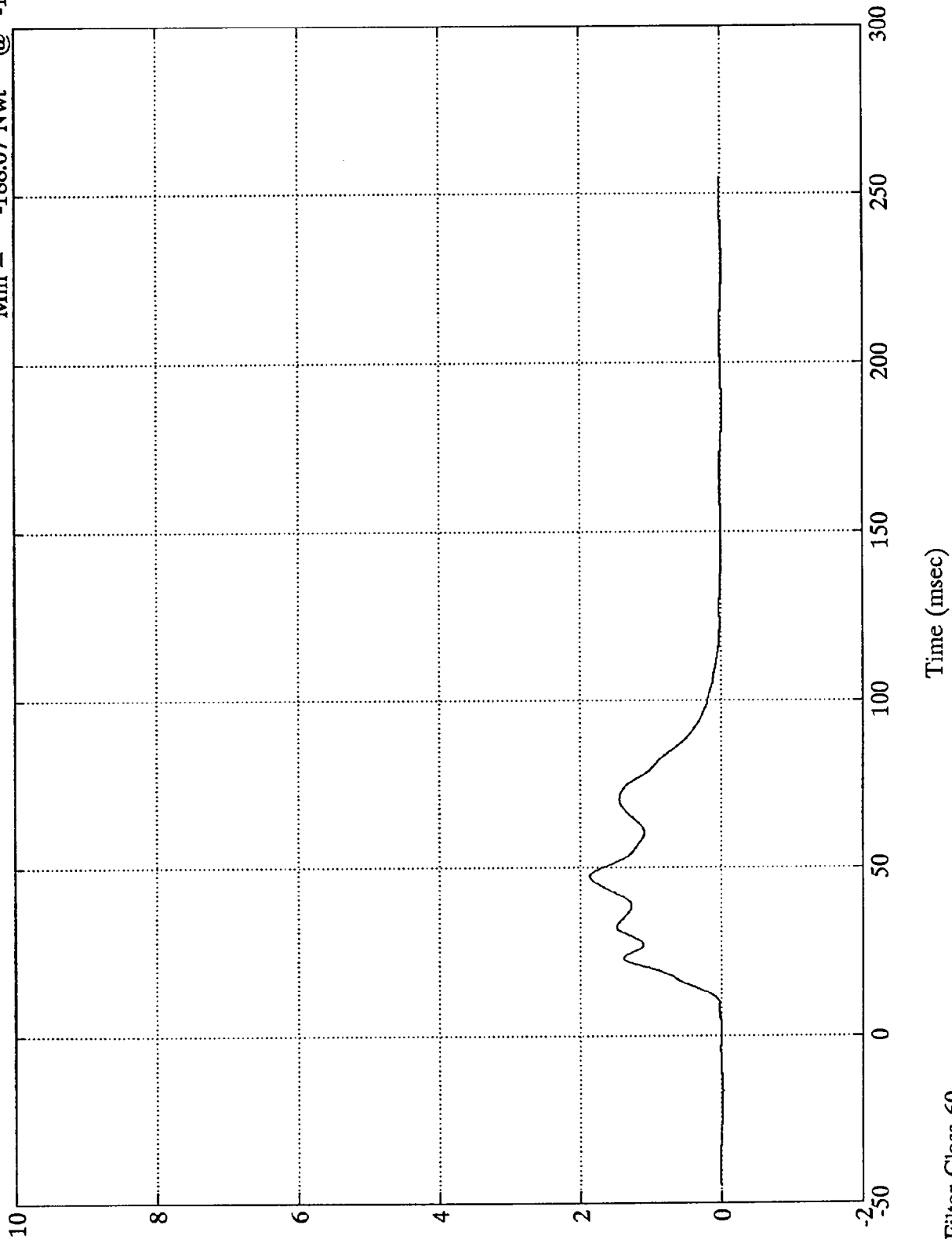
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 18631.99 Nwt @ 47.40 msec
Min = -188.07 Nwt @ -16.68 msec

Barrier Load Cell C3

$\times 10^4$



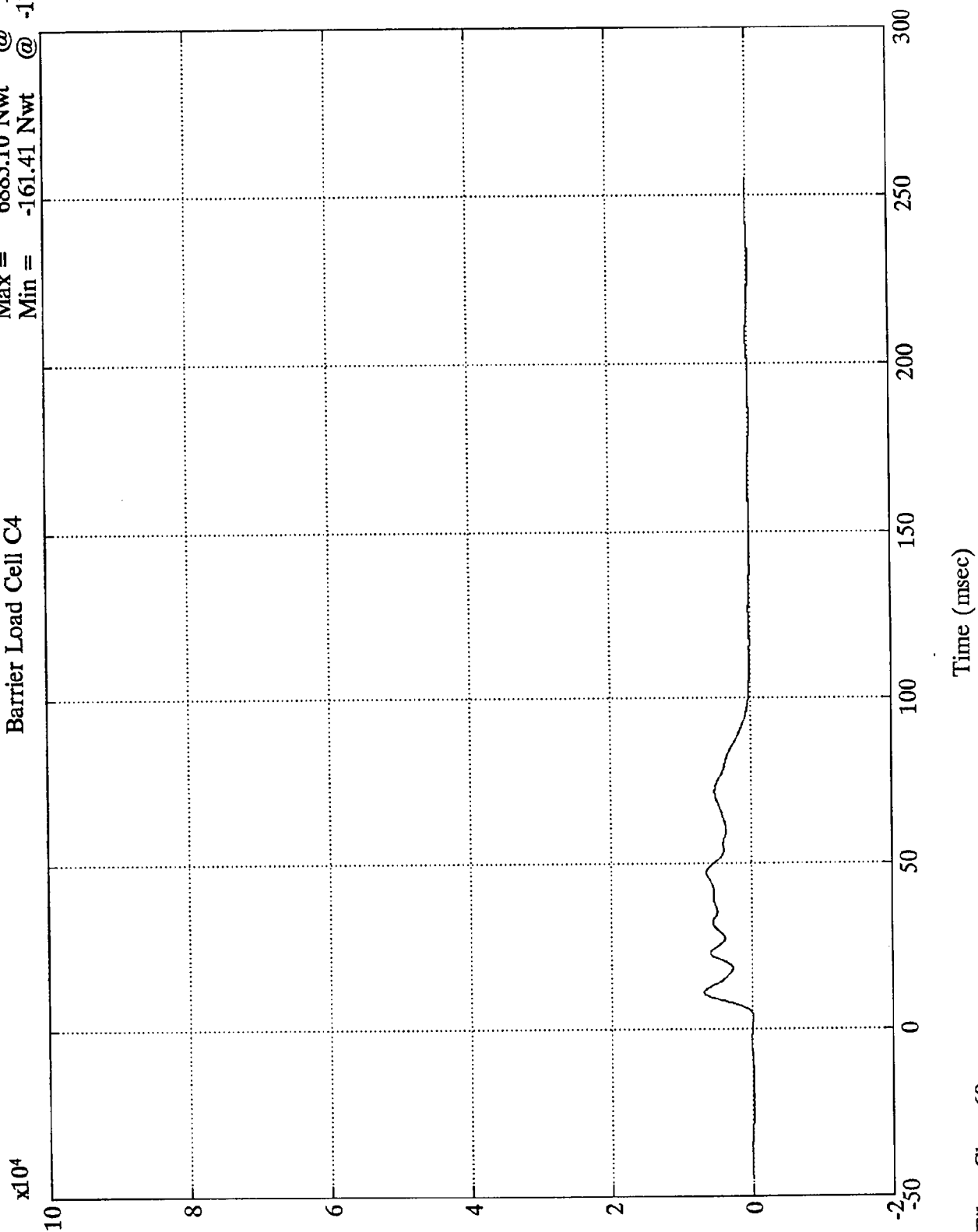
1wN
B-51

8058-1

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell C4
Max = 6885.10 Nwt @ 10.91 msec
Min = -161.41 Nwt @ -17.88 msec

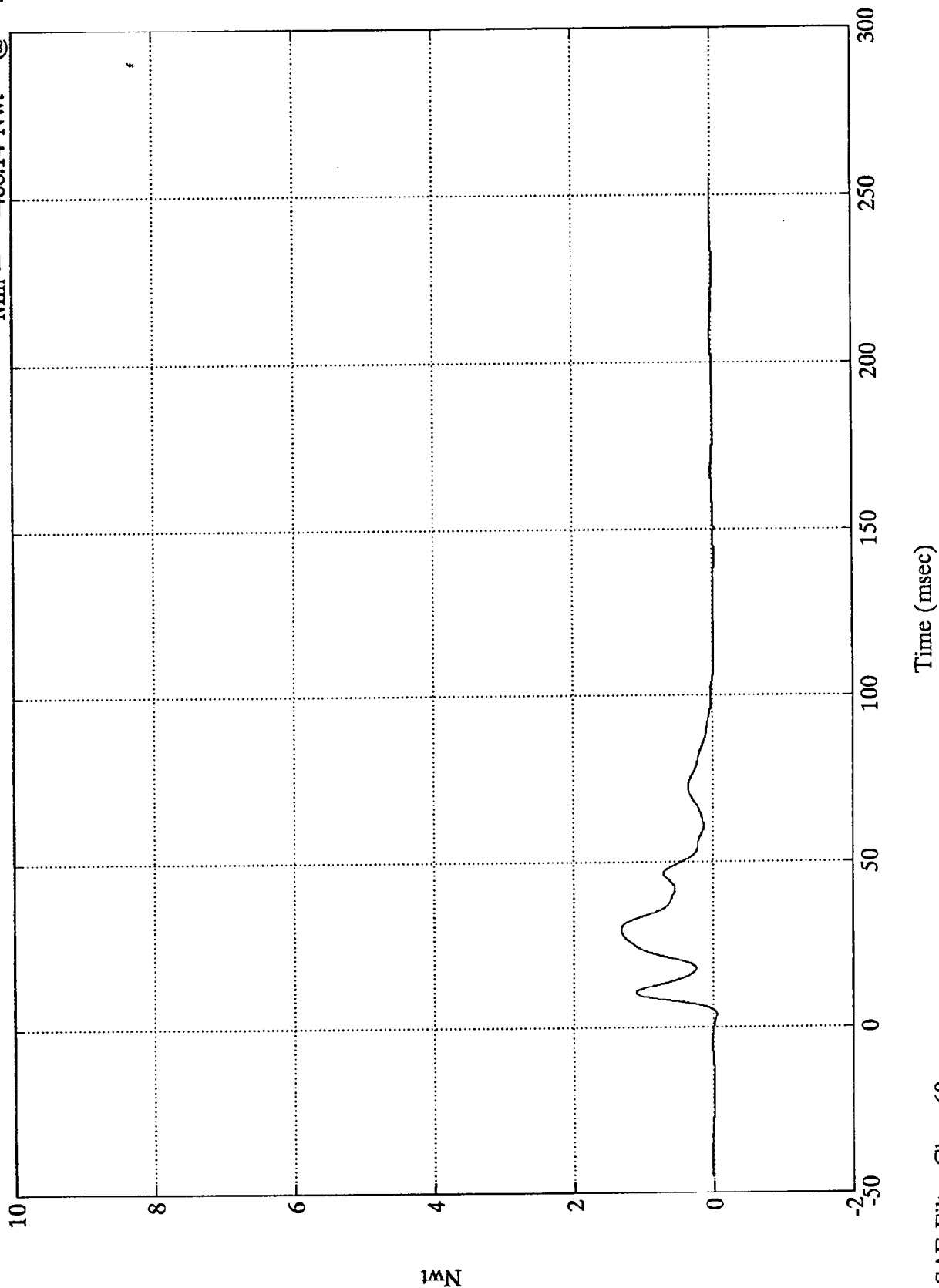


NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 13212.80 Nwt @ 29.63 msec
Min = -488.14 Nwt @ 3.71 msec

Barrier Load Cell C5

$\times 10^4$

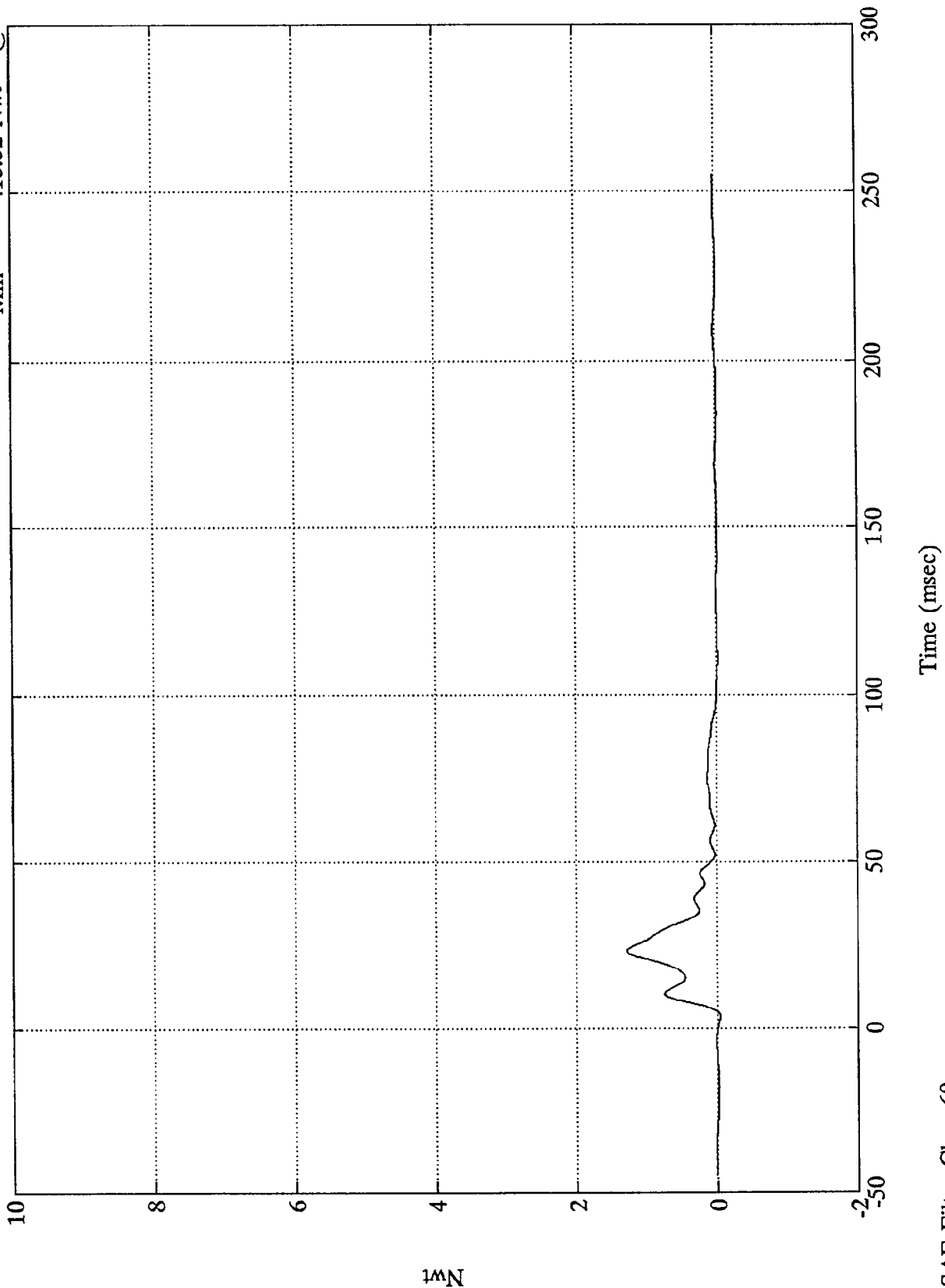


NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 12855.94 Nwt @ 23.52 msec
Min = -415.52 Nwt @ 3.47 msec

Barrier Load Cell C6

$\times 10^4$

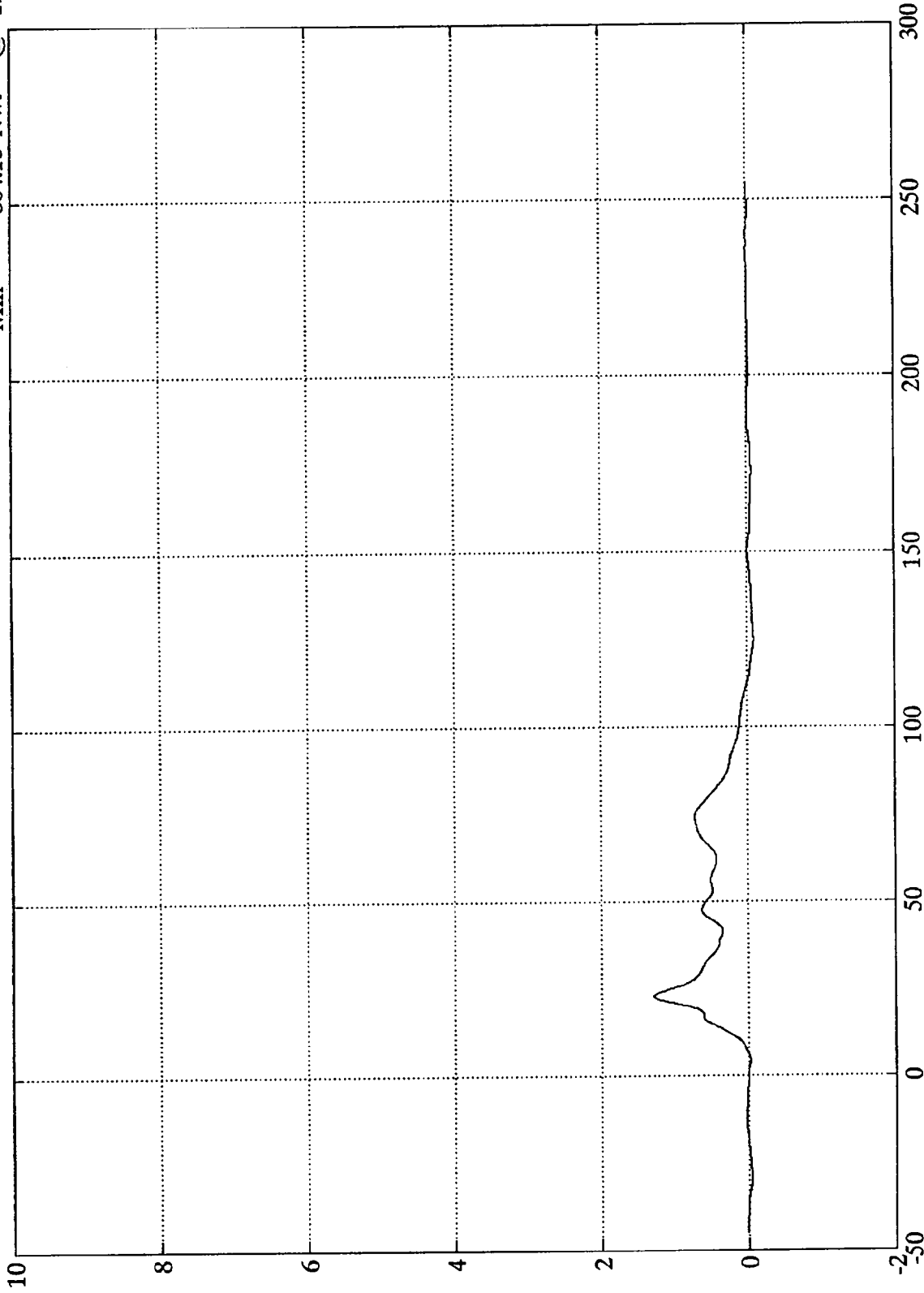


NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell C7

Max = 12889.95 Nwt @ 22.80 msec
Min = -864.15 Nwt @ 124.92 msec

$\times 10^4$



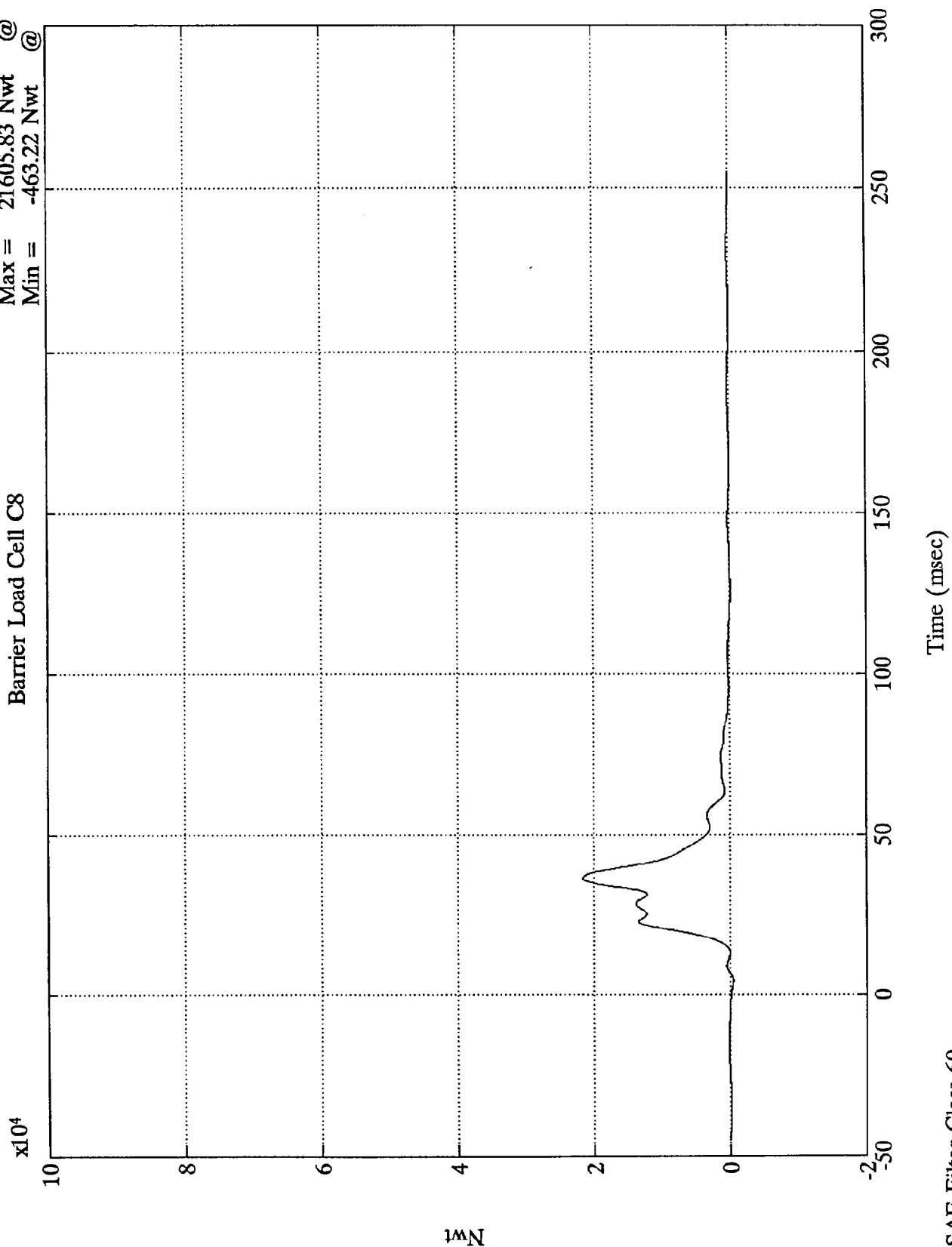
Time (msec)

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell C8

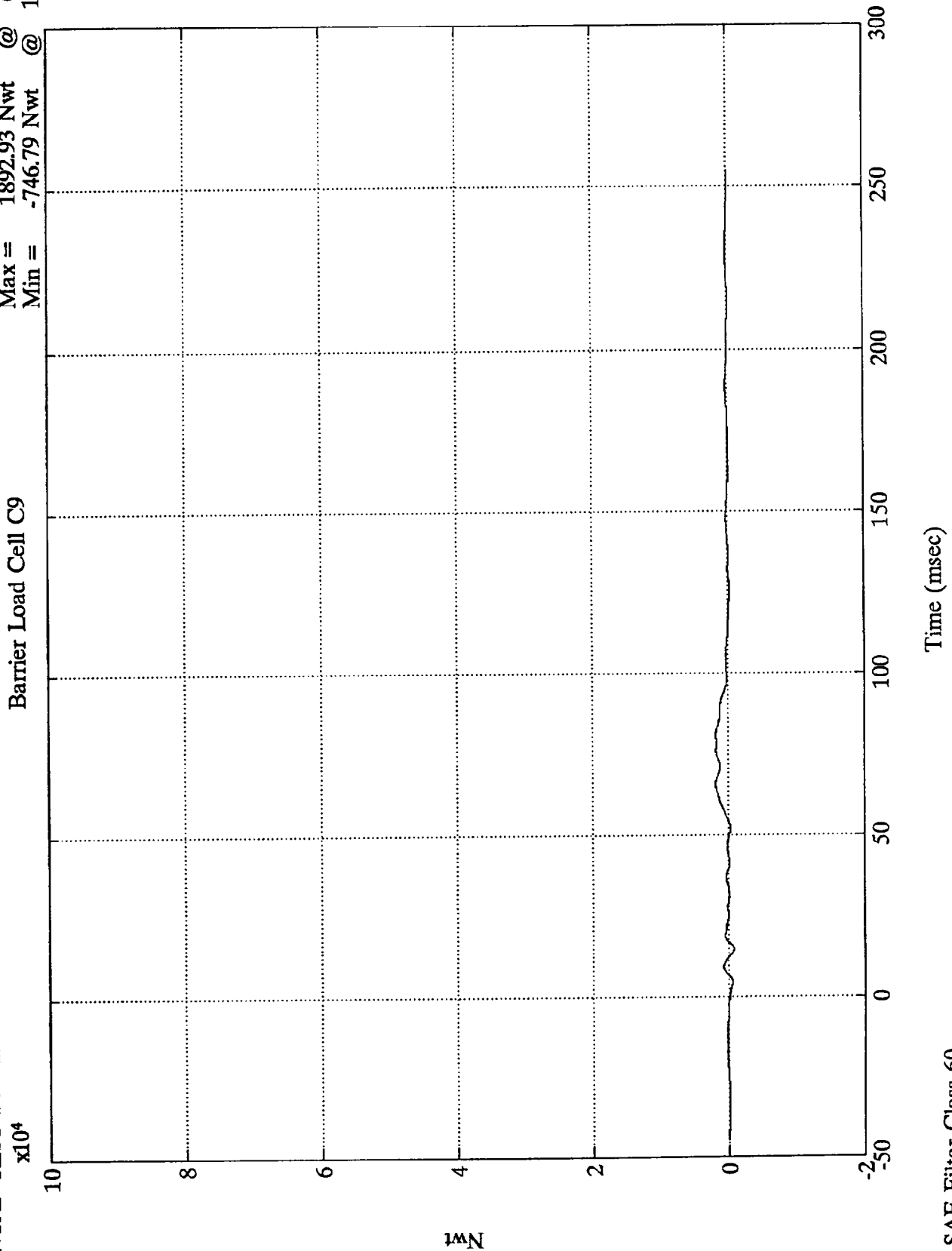
Max = 21605.83 Nwt @ 36.24 msec
Min = -463.22 Nwt @ 4.07 msec



SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell C9
Max = 1892.93 Nwt @ 65.40 msec
Min = -746.79 Nwt @ 14.88 msec

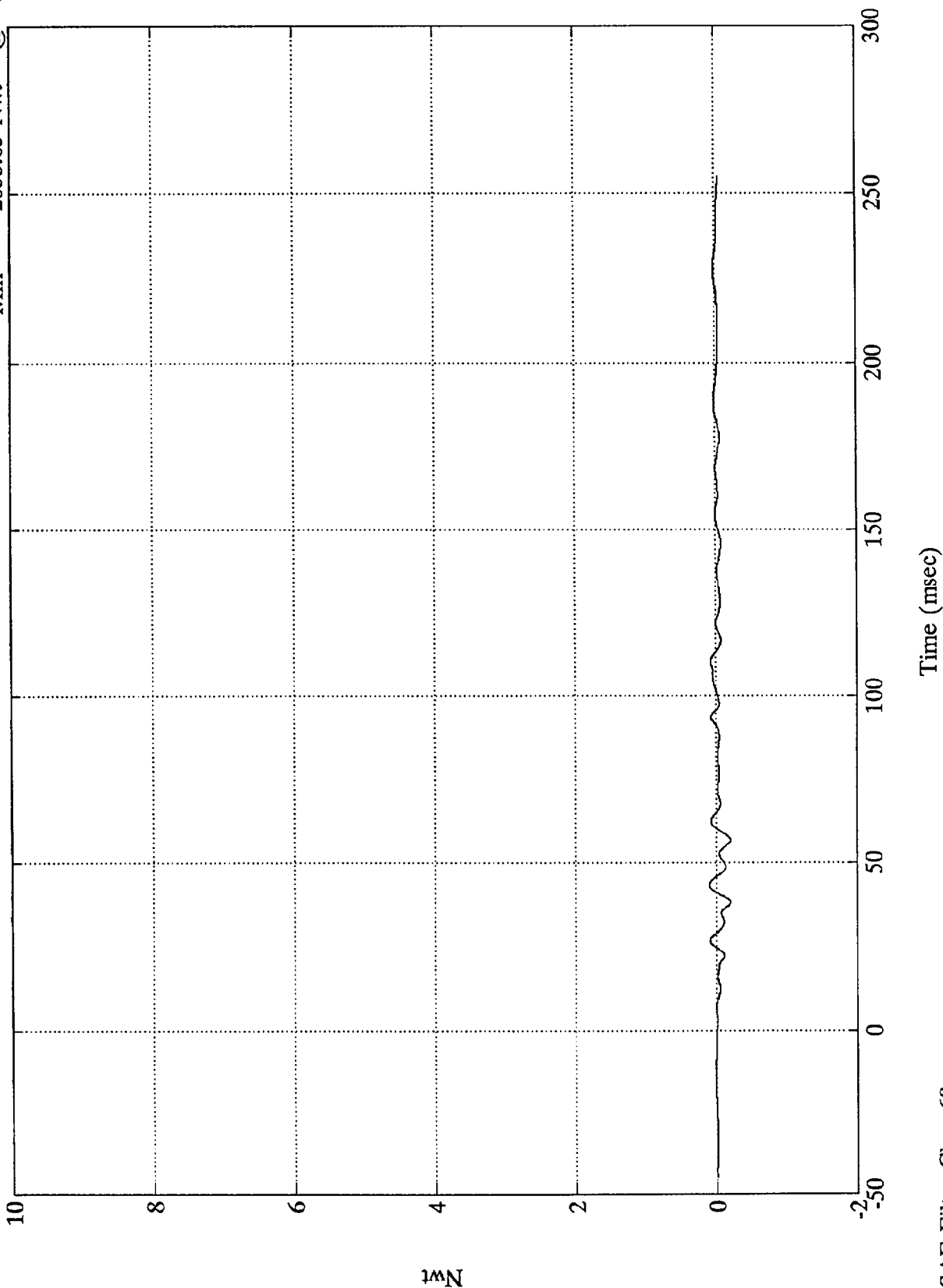


NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 999.20 Nwt @ 43.08 msec
 Min = -2053.65 Nwt @ 37.92 msec

Barrier Load Cell D1

x10⁴

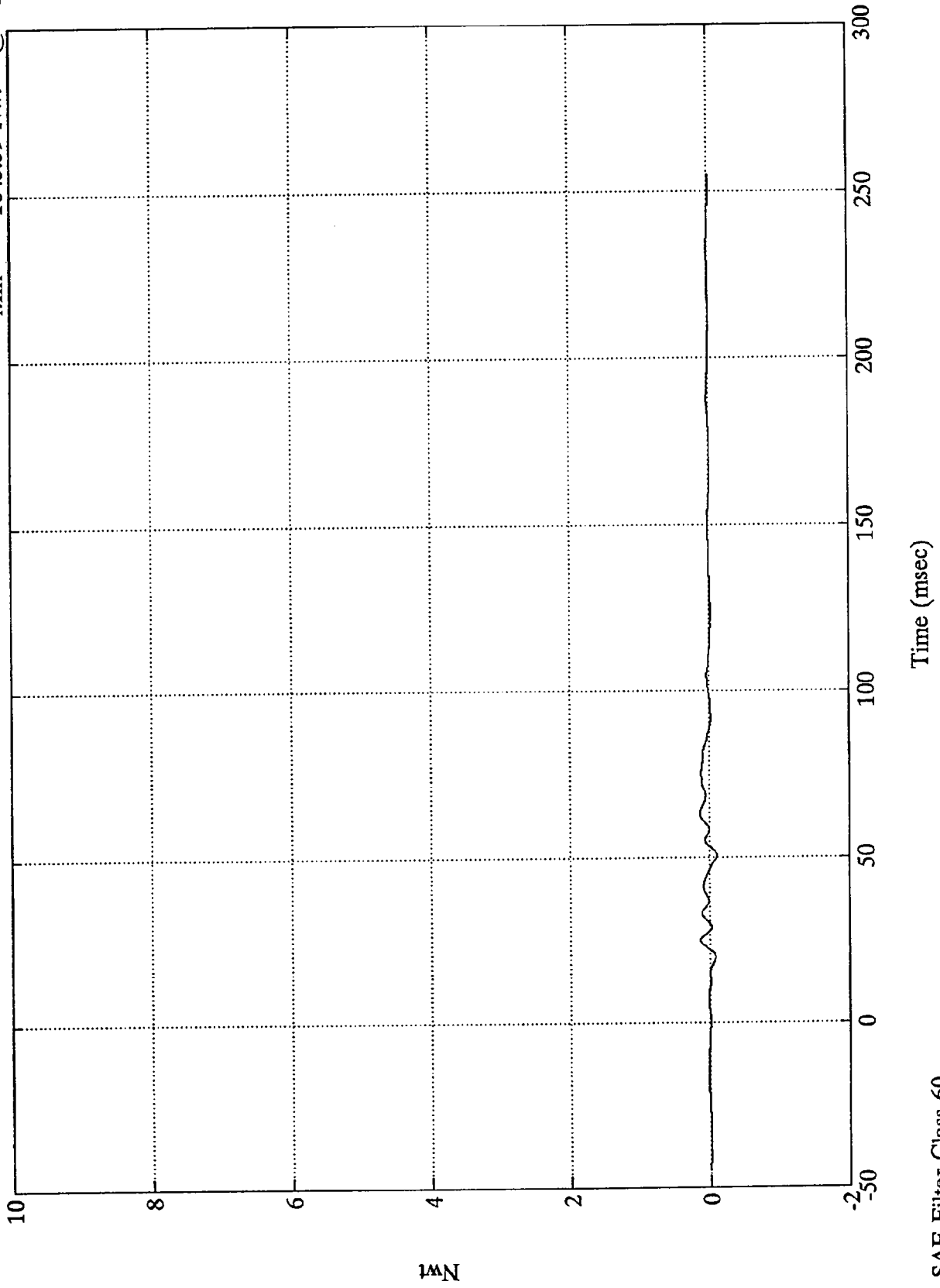


NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell D2

Max = 1403.71 Nwt @ 63.00 msec
Min = -1045.59 Nwt @ 50.64 msec

$\times 10^4$



B-59

8058-1

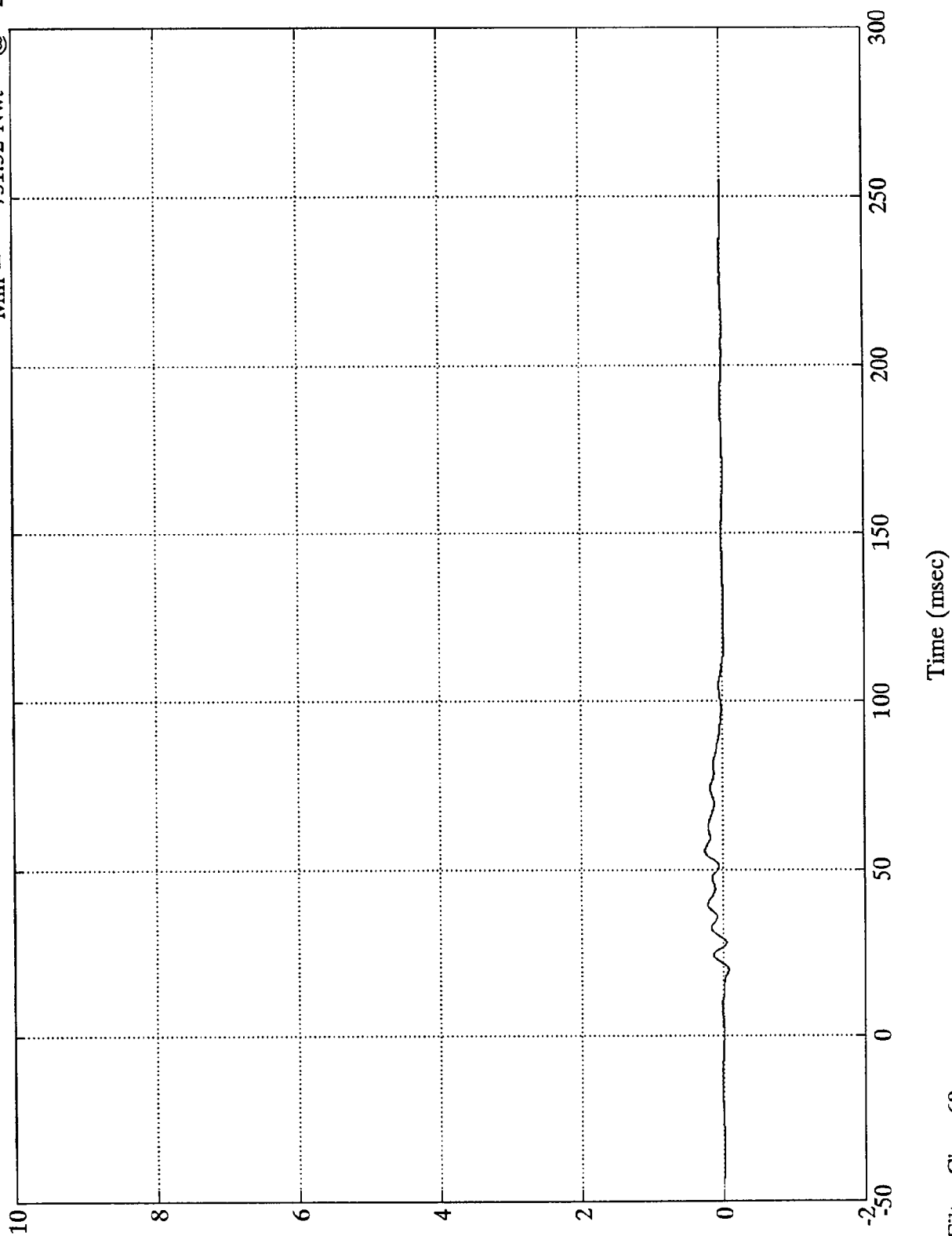
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell D3

Max = 2528.91 Nwt @ 55.80 msec
 Min = -751.52 Nwt @ 20.03 msec

x10⁴



B-60

8058-1

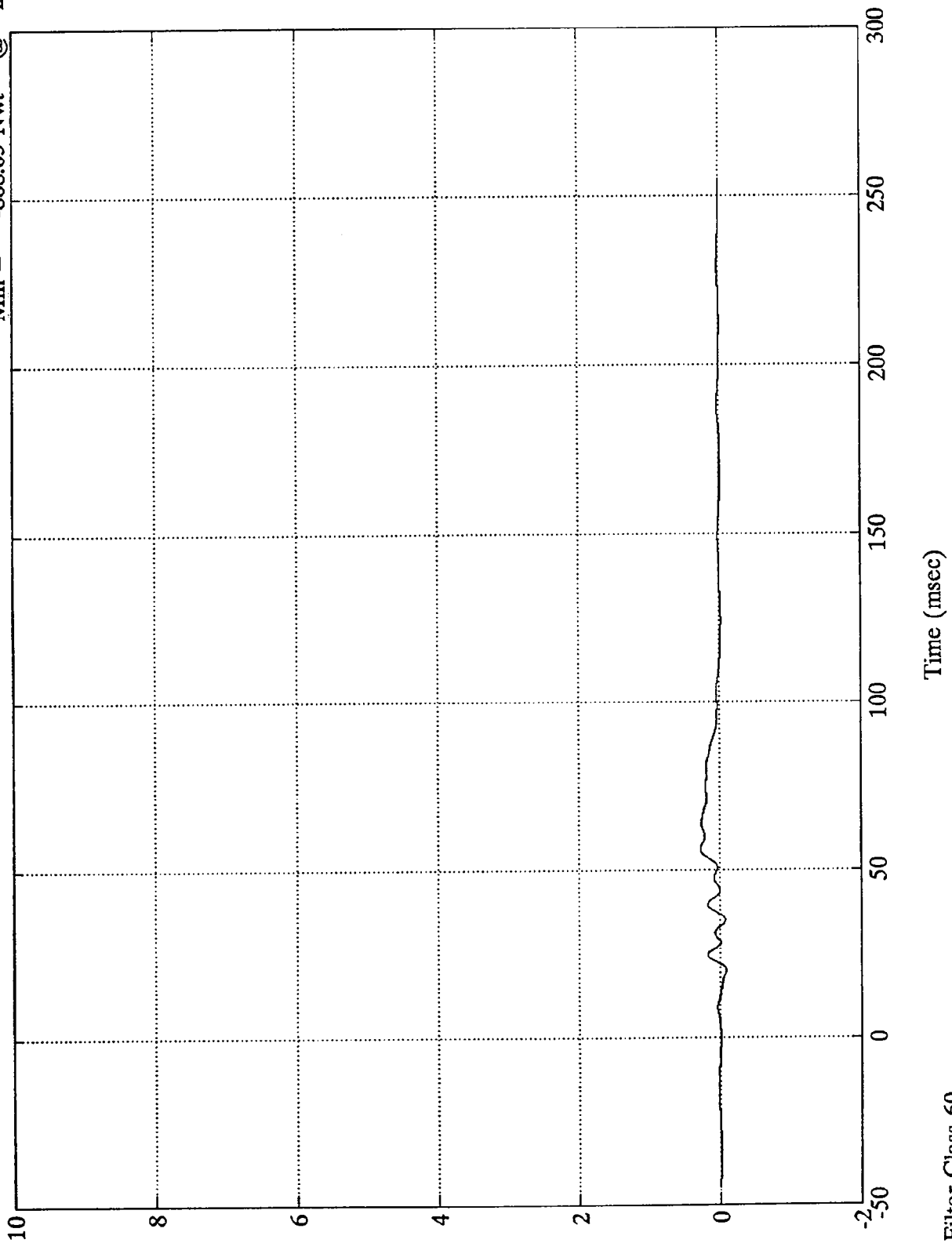
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell D4

Max = 2744.33 Nwt @ 56.04 msec
Min = -868.05 Nwt @ 20.03 msec

$\times 10^4$



1111
B-61

8058-1

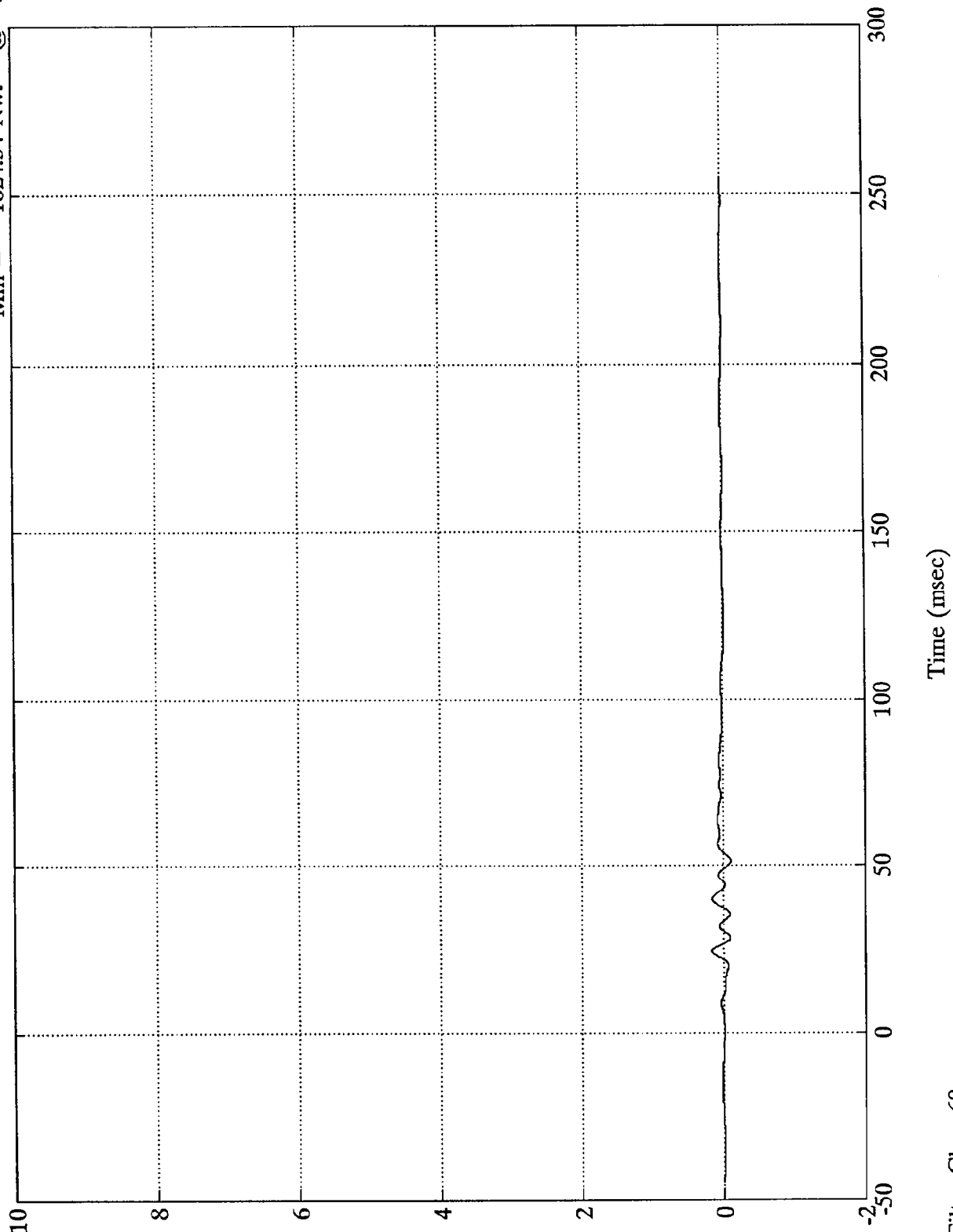
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 1700.42 Nwt @ 24.35 msec
 Min = -1024.34 Nwt @ 51.36 msec

Barrier Load Cell D5

x10⁴



17N
 B-62

8058-1

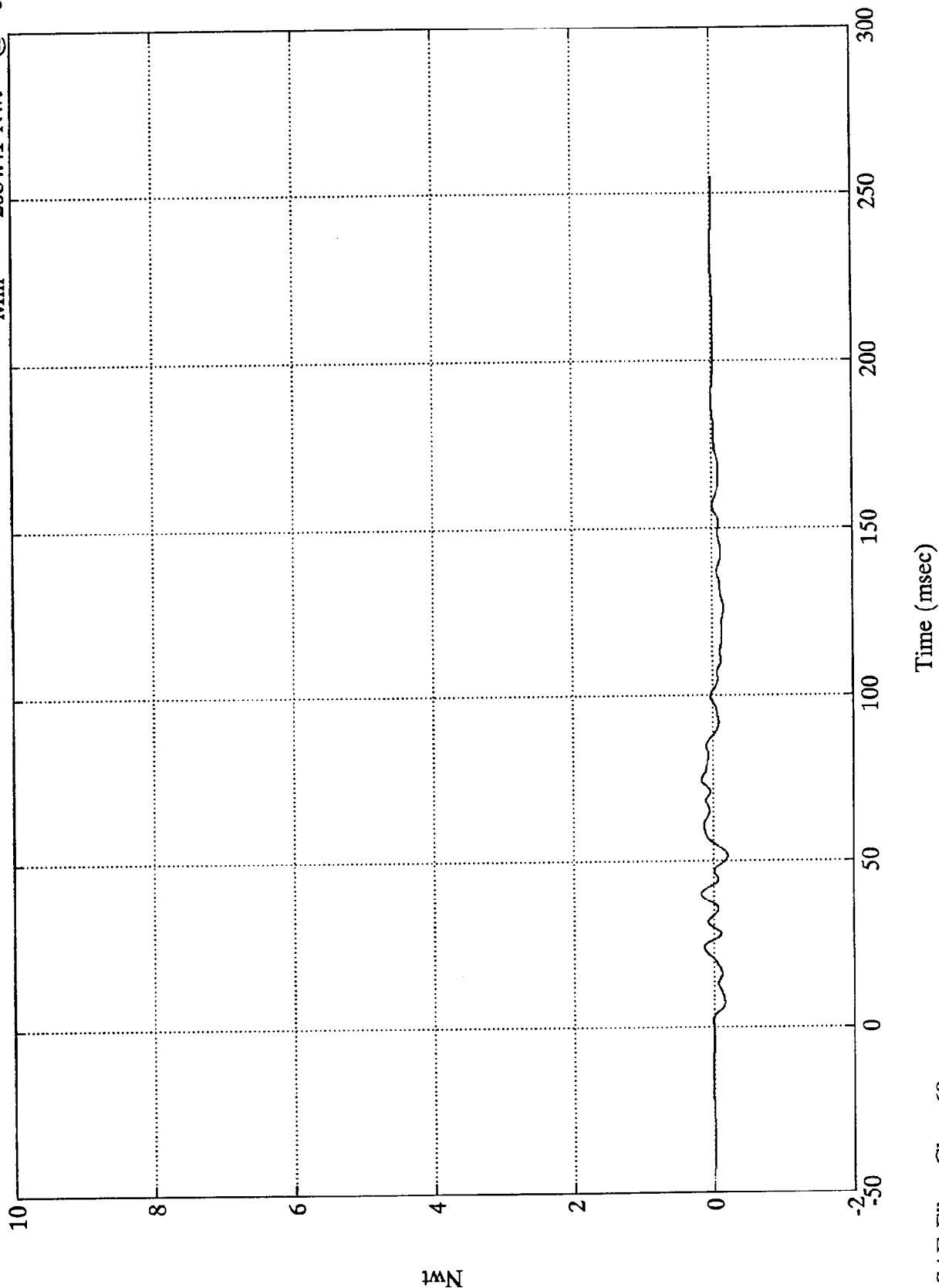
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell D6

Max = 1784.54 Nwt @ 39.95 msec
 Min = -2084.41 Nwt @ 51.47 msec

$\times 10^4$

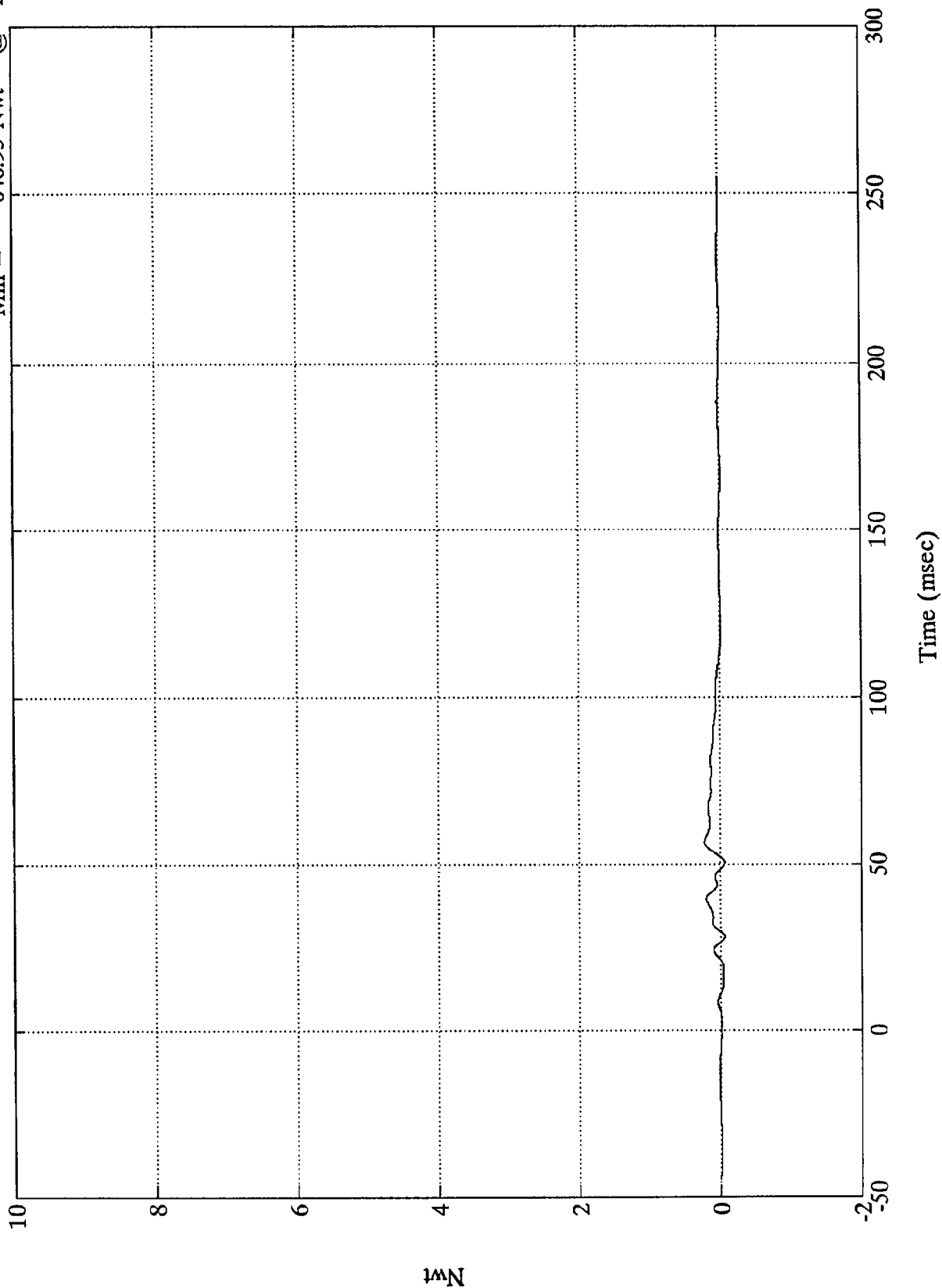


NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 2230.74 Nwt @ 56.52 msec
 Min = -640.95 Nwt @ 28.07 msec

Barrier Load Cell D7

x10⁴



SAE Filter Class 60

1wN

B-64

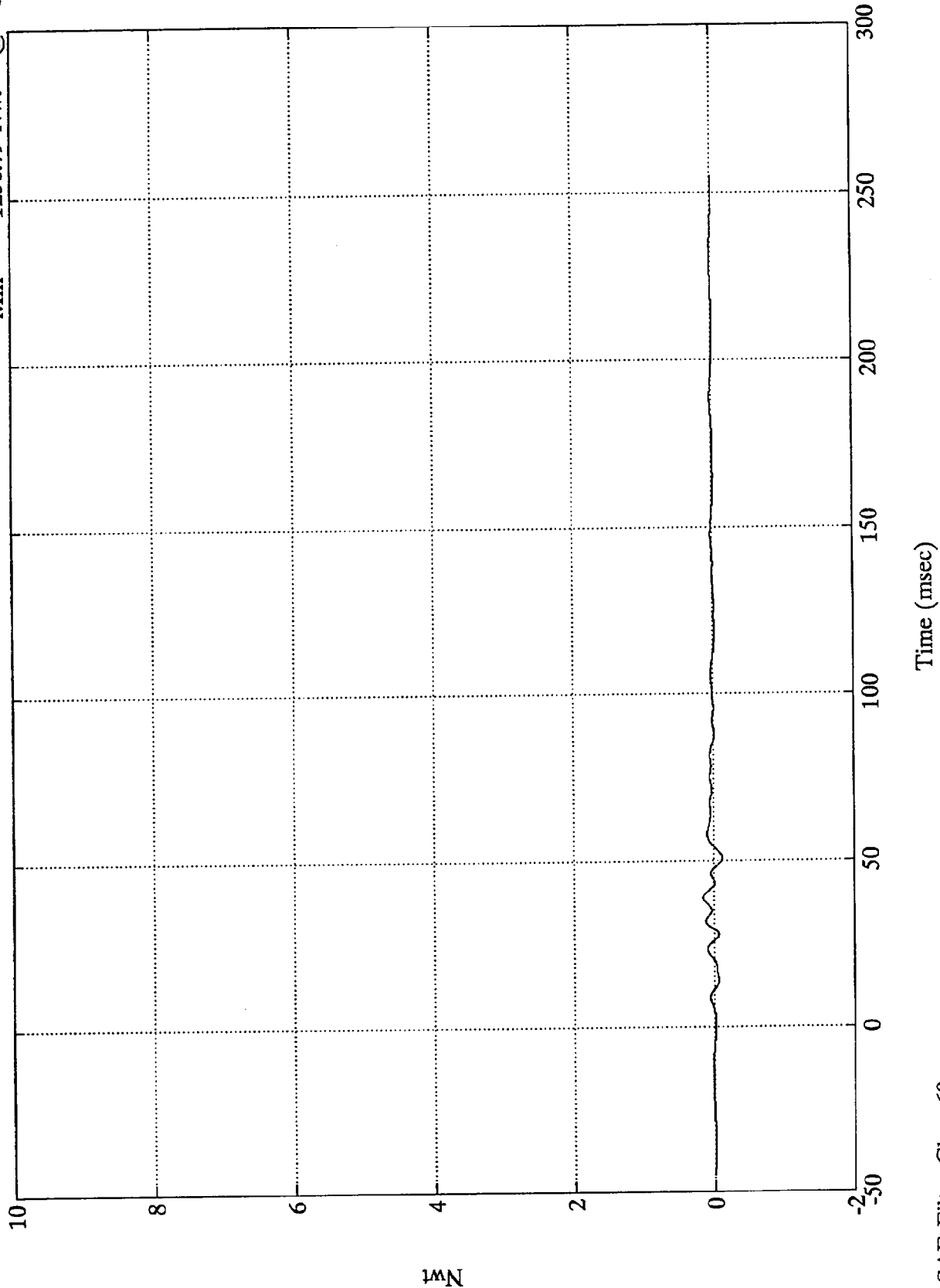
8058-1

NCAP TEST #5 - 1993 TOYOTA COROLLA

Barrier Load Cell D8

Max = 1567.04 Nwt @ 38.75 msec
Min = -1250.79 Nwt @ 50.76 msec

$\times 10^4$



B-65

8058-1

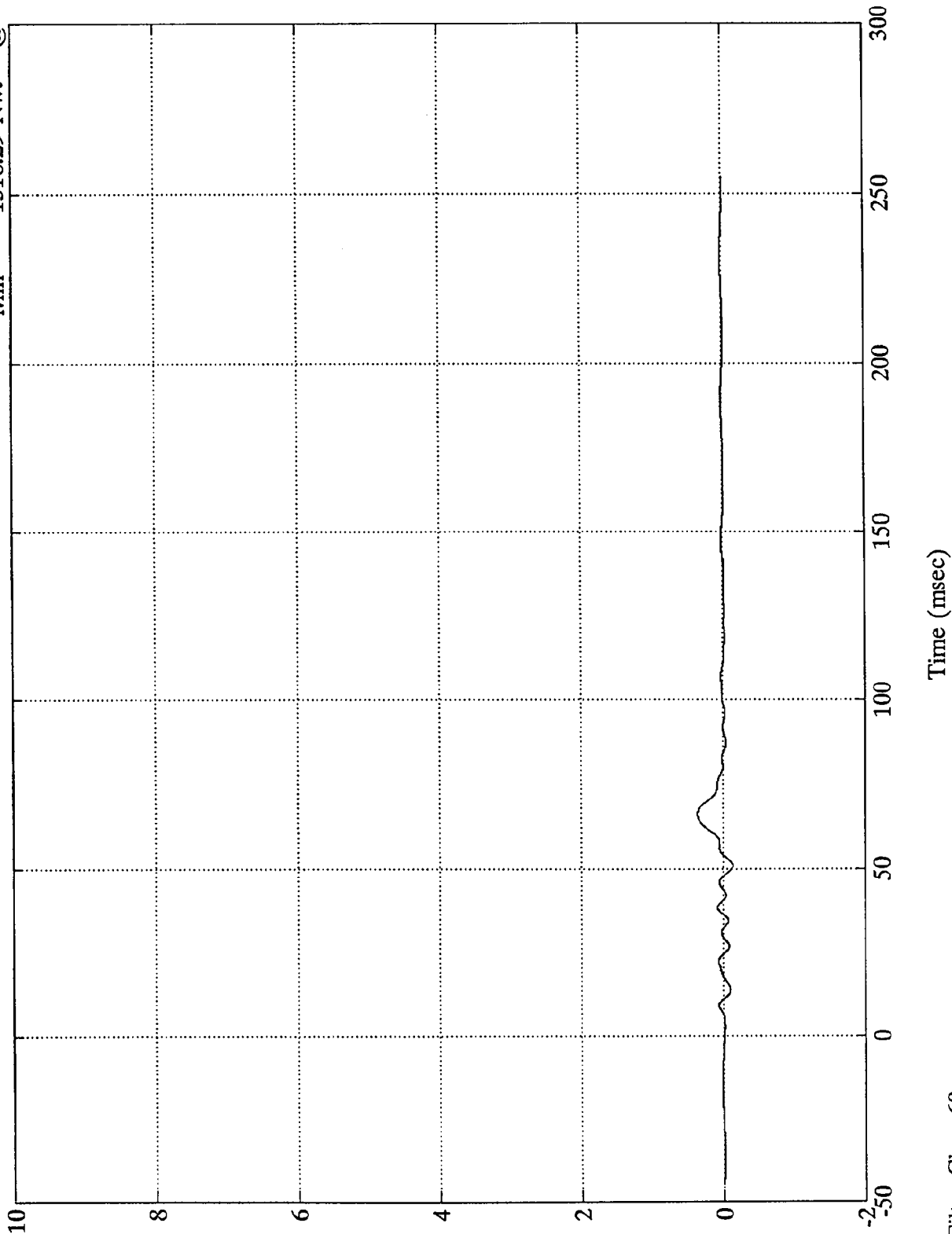
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 3603.75 Nwt @ 65.87 msec
 Min = -1318.29 Nwt @ 51.00 msec

Barrier Load Cell D9

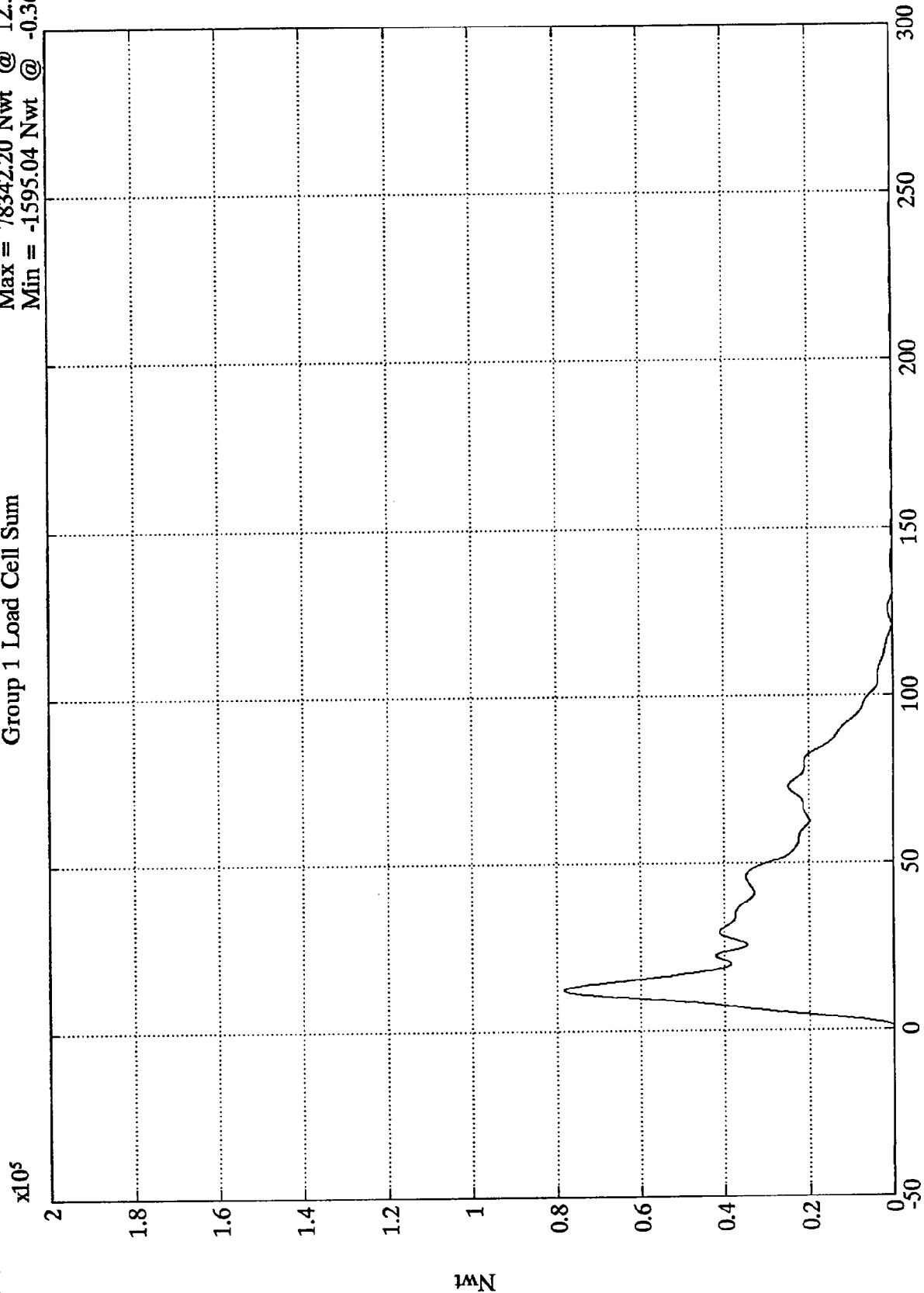
x10⁴



NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 78342.20 Nwt @ 12.36 msec
Min = -1595.04 Nwt @ -0.36 msec

Group 1 Load Cell Sum



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

Time (msec)

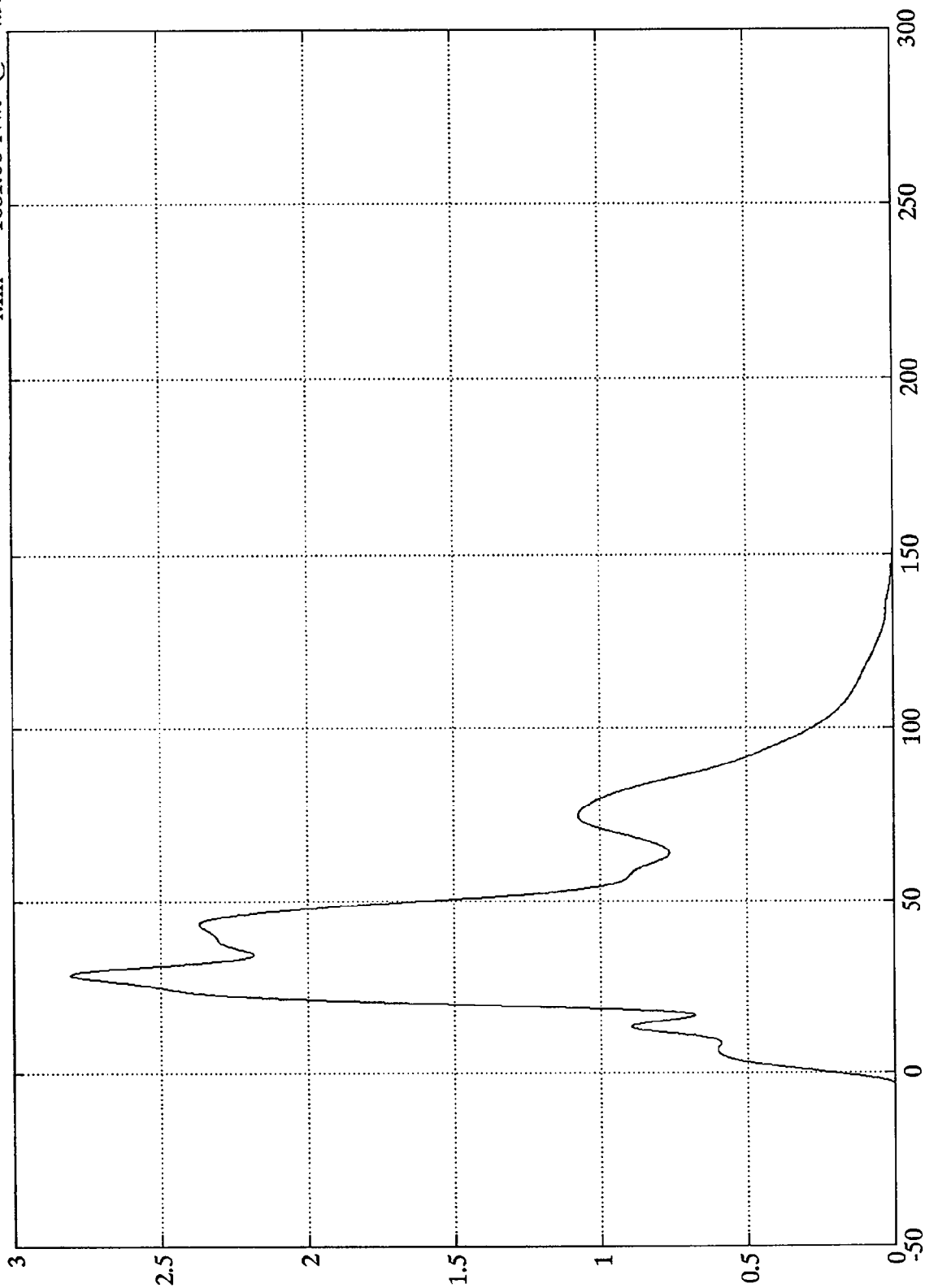
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Group 2 Load Cell Sum

Max = 280866.00 Nwt @ 28.68 msec
Min = -1681.66 Nwt @ -4.92 msec

$\times 10^5$



Time (msec)

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

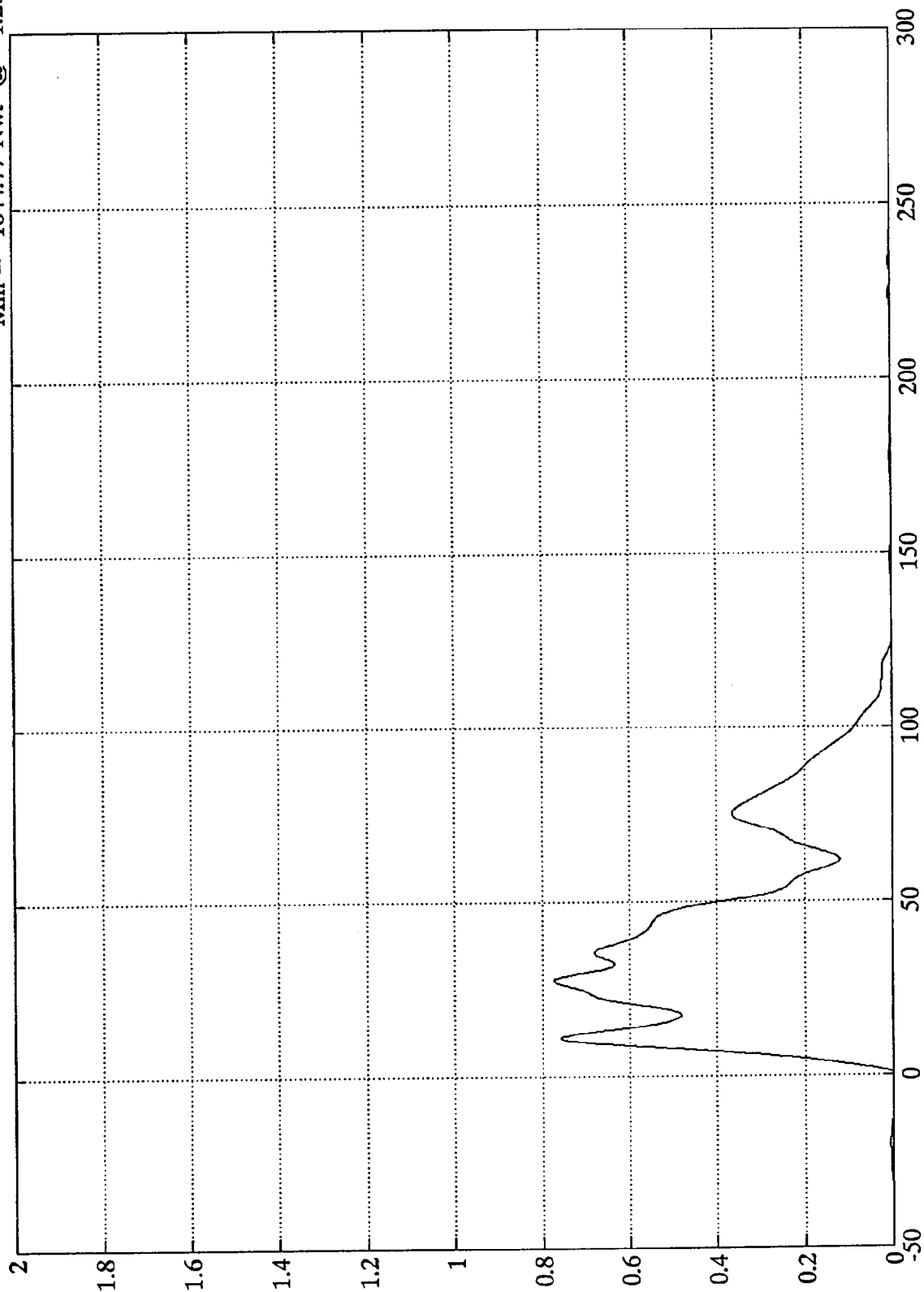
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Group 3 Load Cell Sum

Max = 77235.90 Nwt @ 27.60 msec
Min = -1644.77 Nwt @ -1.20 msec

$\times 10^5$



Time (msec)

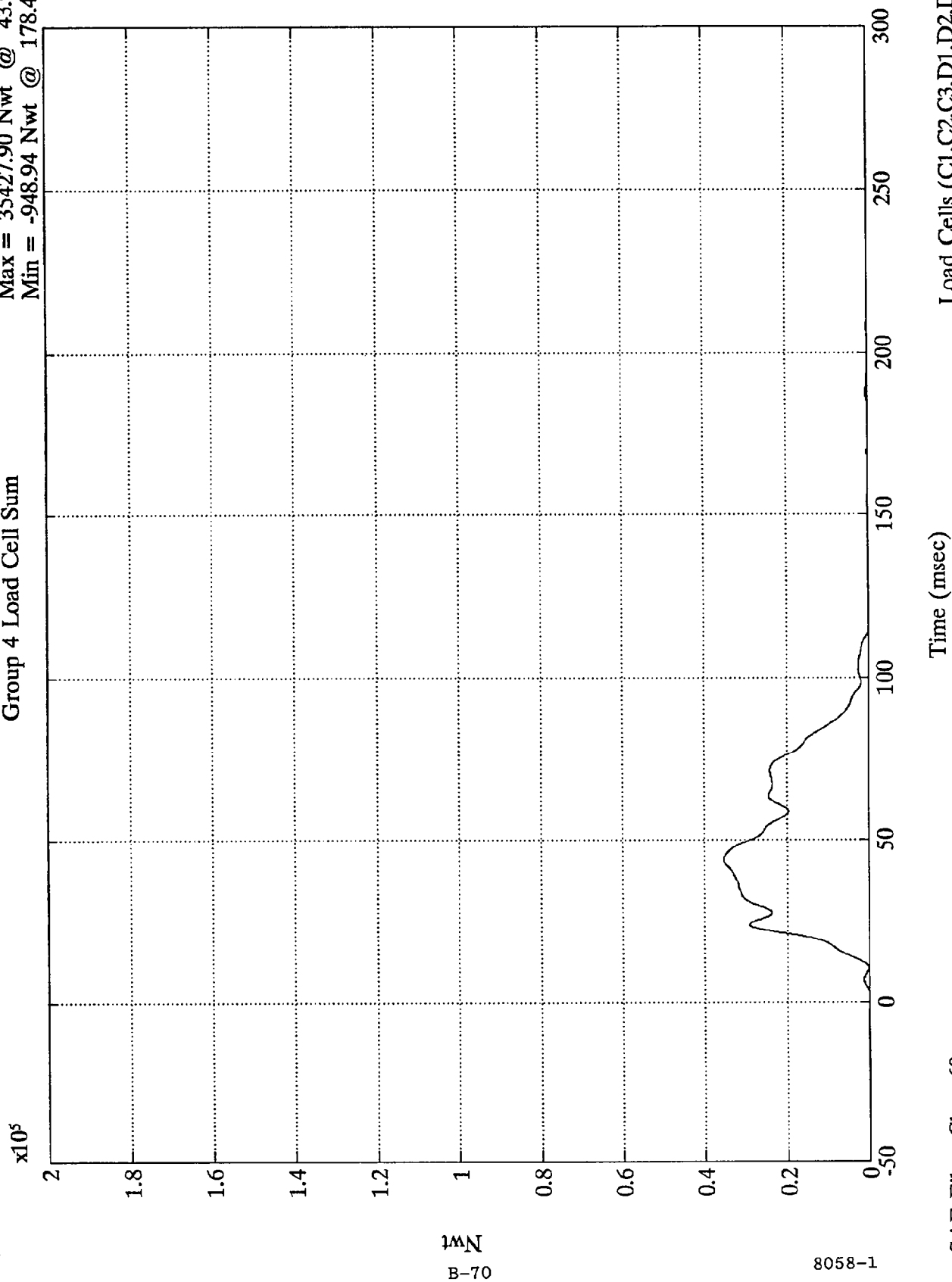
Load Cells (A7,A8,A9,B7,B8,B9)

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 35427.90 Nwt @ 43.92 msec
Min = -948.94 Nwt @ 178.44 msec

Group 4 Load Cell Sum



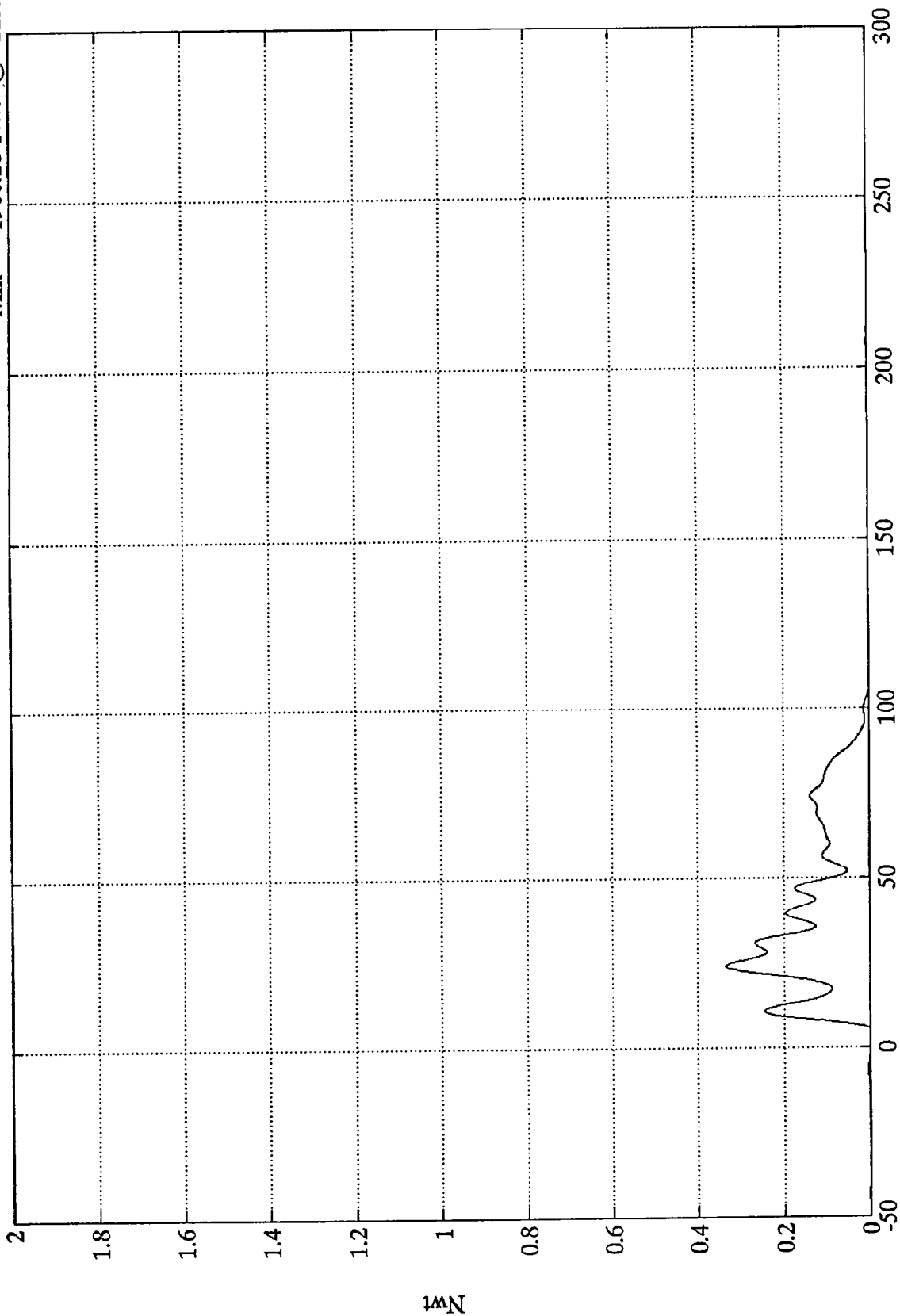
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 33537.60 Nwt @ 24.12 msec
 Min = -1906.18 Nwt @ 123.24 msec

Group 5 Load Cell Sum

$\times 10^5$



Time (msec)

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

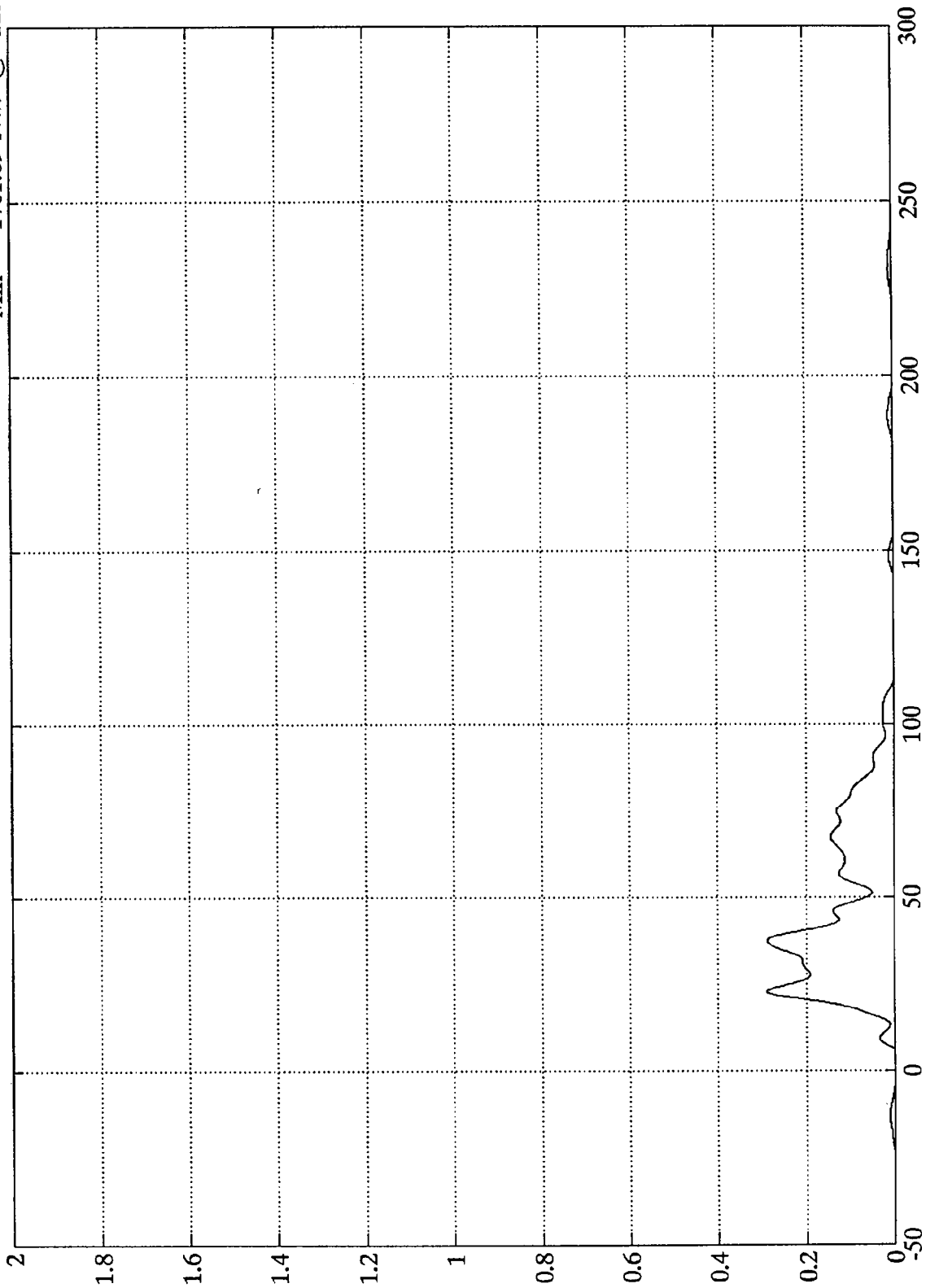
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Group 6 Load Cell Sum

Max = 28925.80 Nwt @ 22.92 msec
Min = -1761.89 Nwt @ 125.76 msec

$\times 10^5$



Time (msec)

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

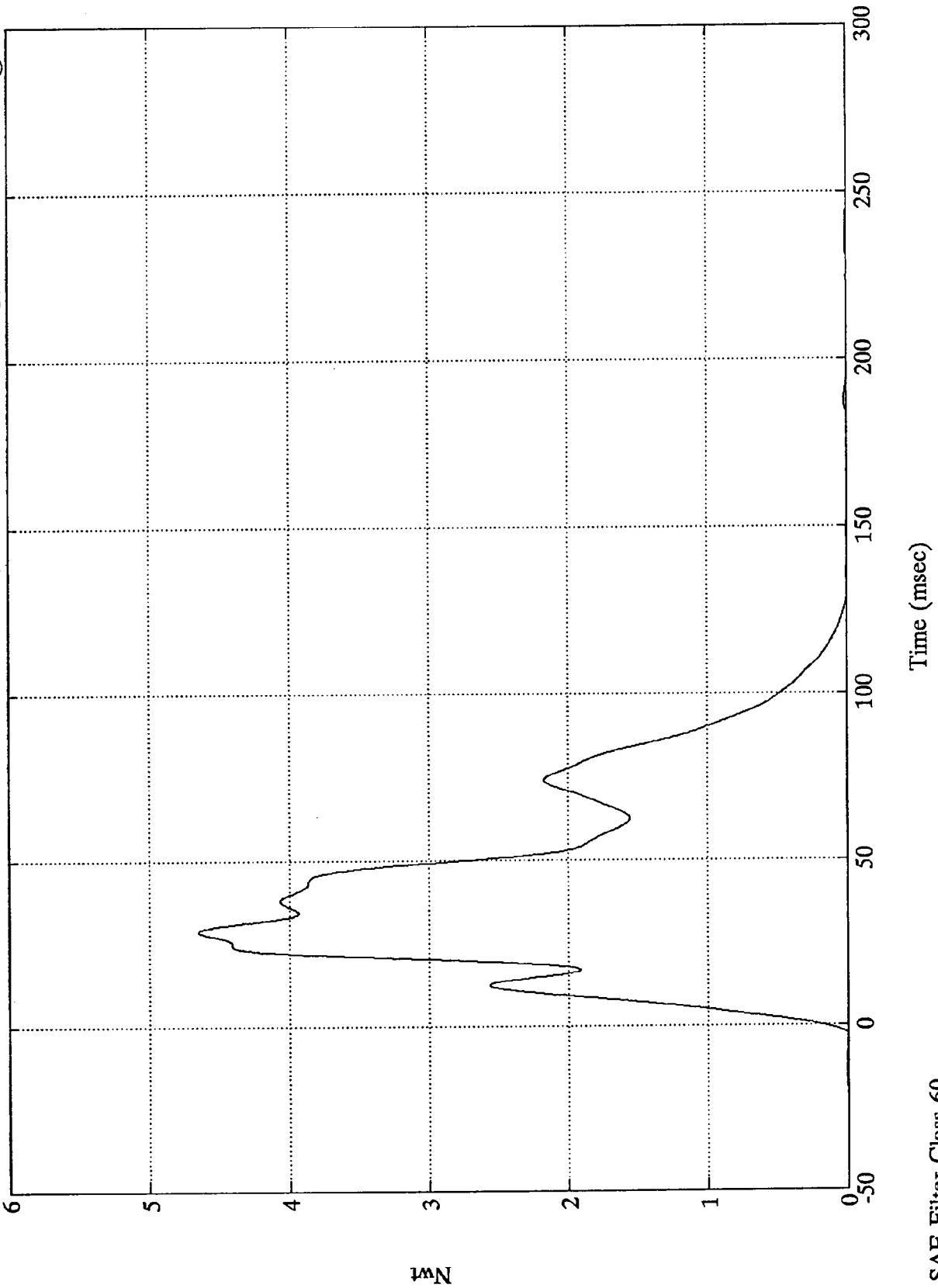
SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 465266.00 Nwt @ 28.80 msec
Min = -3336.12 Nwt @ 165.12 msec

Total Load Cell Sum

$\times 10^5$



Nwt

B-73

8058-1

SAE Filter Class 60

TEST NO. MP5100

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: TRACK
RUN #: 1227
SERIES #: 5

TEST DATE: 21 Oct 1992
TEST TIME: 12:12:40
BOARD: a

TITLE: NCAP TEST #5 - 1993 TOYOTA COROLLA

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM	
			AMP	msec	AMP	msec
1	Pos. 1 Head X	Gs	16.4	161.2	-51.6	69.5
2	Pos. 1 Head Y	Gs	30.7	75.4	-7.6	31.9
3	Pos. 1 Head Z	Gs	24.6	59.8	-15.6	78.6
4	Pos. 1 Left Femur	Nwt	280.2	37.9	-5372.9	50.3
5	Pos. 1 Chest X	Gs	6.3	184.7	-65.1	62.4
6	Pos. 1 Chest Y	Gs	9.1	45.8	-3.7	43.2
7	Pos. 1 Chest Z	Gs	17.1	58.7	-9.8	96.5
8	Pos. 1 Right Femur	Nwt	224.0	100.7	-5699.8	59.5
9	Pos. 2 Head X	Gs	22.5	5.5	-66.7	95.8
10	Pos. 2 Head Y	Gs	9.2	228.4	-7.8	96.1
11	Pos. 2 Head Z	Gs	60.2	82.0	-1.3	5.9
12	Pos. 2 Left Femur	Nwt	663.4	72.1	-3401.0	46.7
13	Pos. 2 Chest X	Gs	46.5	68.5	-3.1	254.2
14	Pos. 2 Chest Y	Gs	5.3	83.8	-9.2	92.4
15	Pos. 2 Chest Z	Gs	5.5	114.0	-9.6	49.7
16	Pos. 2 Right Femur	Nwt	261.4	6.1	-4253.2	71.8
17	Pos. 1 Head Resultant	Gs	57.1	70.2	.1	-15.4
18	Pos. 1 Chest Resultant	Gs	66.2	62.4	.0	-42.0
19	Pos. 2 Head Resultant	Gs	76.0	95.6	.0	-19.4
20	Pos. 2 Chest Resultant	Gs	46.9	68.5	.0	-18.8

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

hic: 521.67
t1 = 47.880 msec
t2 = 83.760 msec
Average G's Over Hic Duration = 46.24

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

hic: 770.81
t1 = 68.520 msec
t2 = 104.400 msec
Average G's Over Hic Duration = 54.06

CLIP SUMMARY: Pos. 1 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 62.042 G's
Tstart = 61.0800 ms
Tend = 64.2000 ms
CSI = 589.277

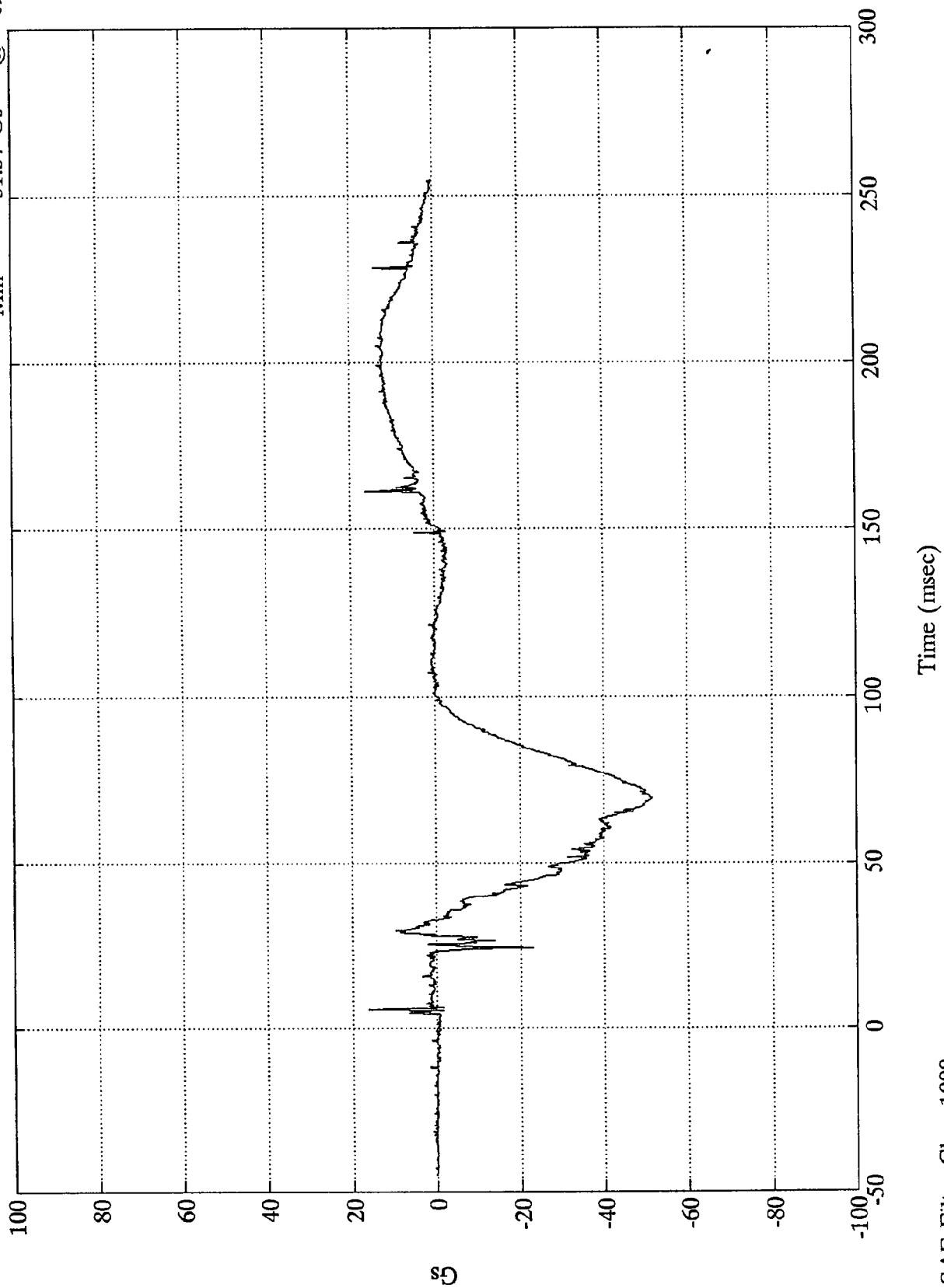
CLIP SUMMARY: Pos. 2 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 45.430 G's
Tstart = 67.5600 ms
Tend = 70.6800 ms
CSI = 405.227

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Head X

Max = 16.42 Gs @ 161.16 msec
Min = -51.57 Gs @ 69.48 msec



B-76

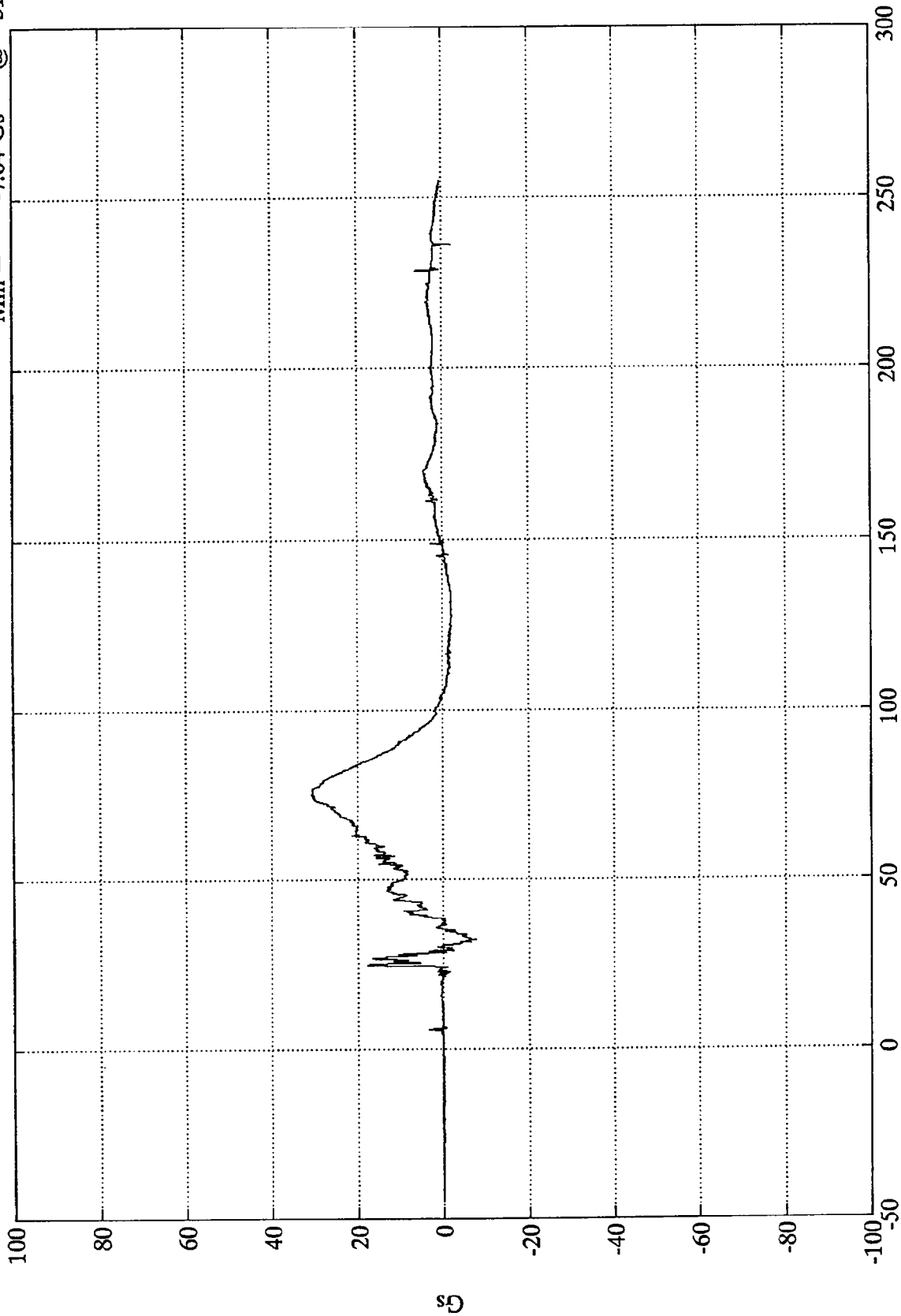
8058-1

SAE Filter Class 1000

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Head Y

Max = 30.74 Gs @ 75.36 msec
Min = -7.64 Gs @ 31.92 msec



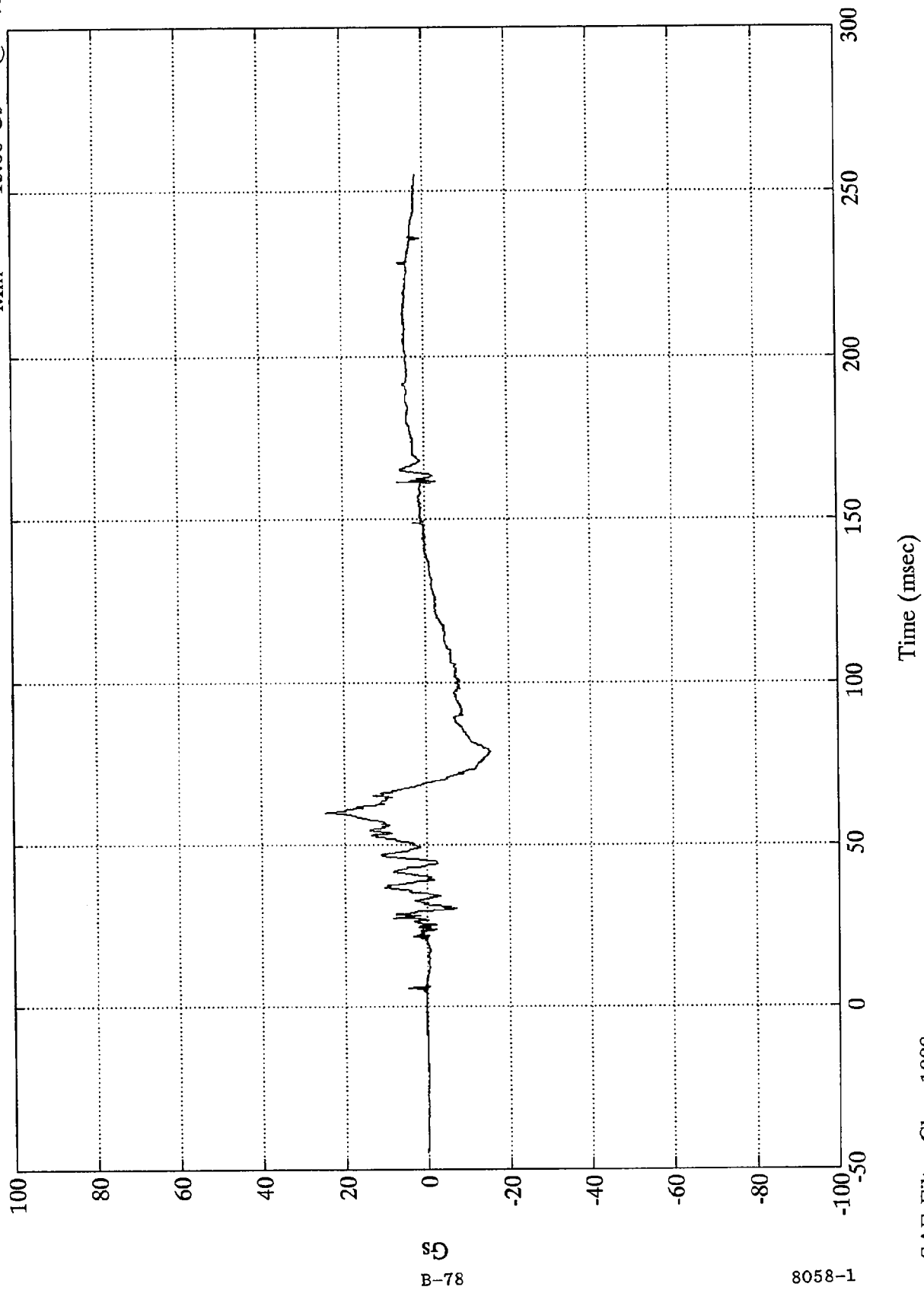
Time (msec)

SAE Filter Class 1000

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Head Z

Max =	24.57 Gs	@	59.76 msec
Min =	-15.60 Gs	@	78.60 msec



Gs
B-78

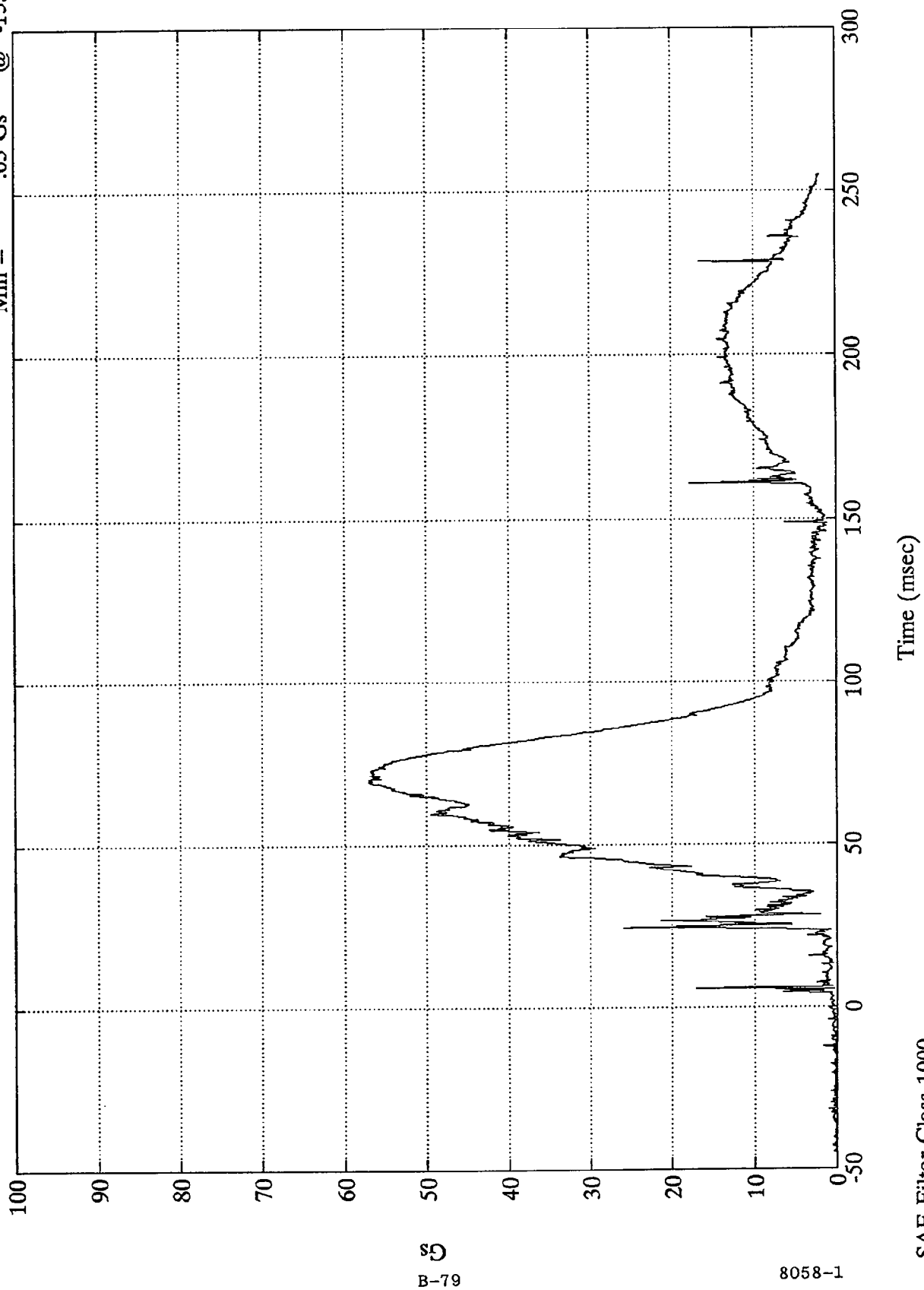
8058-1

SAE Filter Class 1000

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Head Resultant

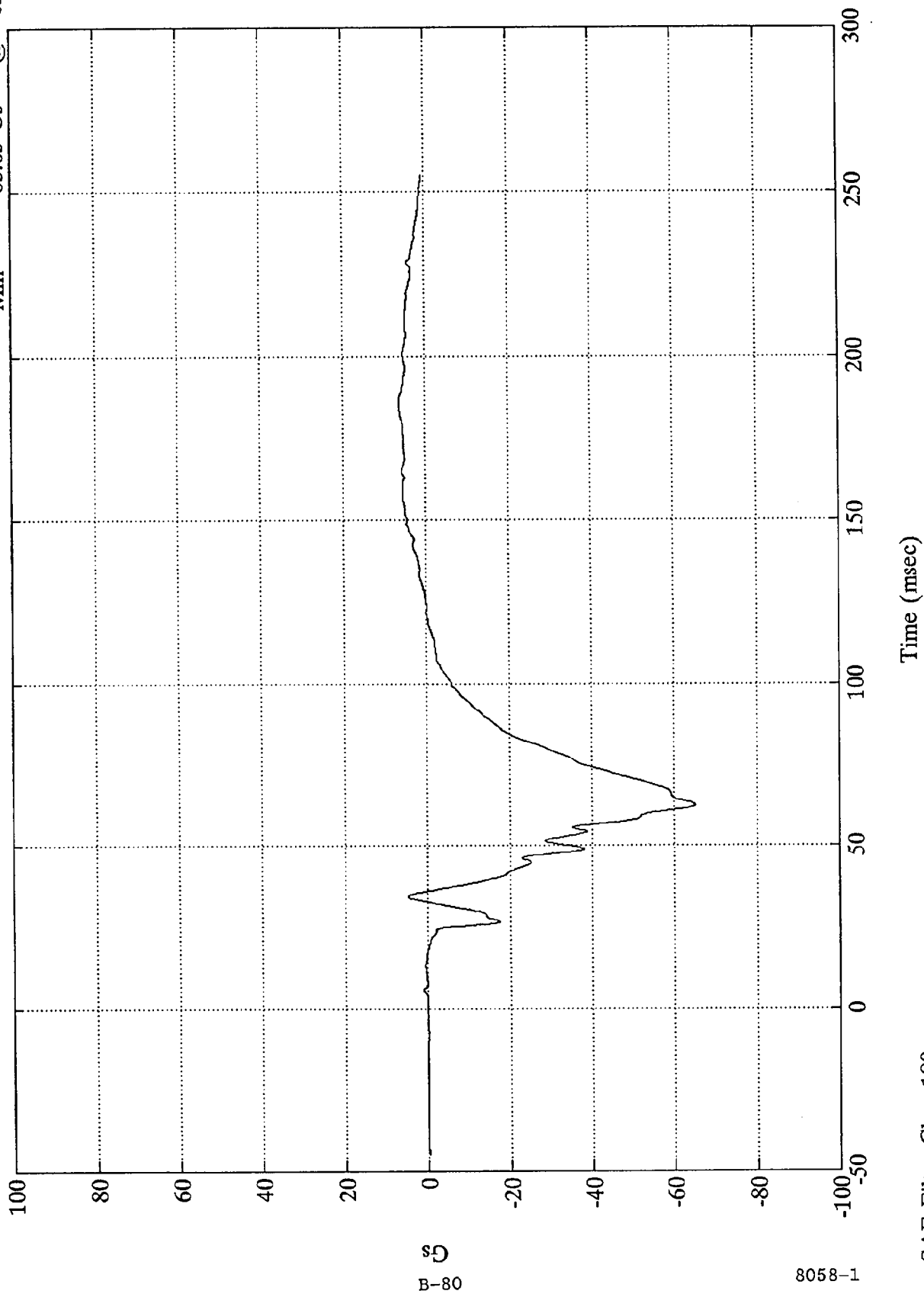
Max = 57.06 Gs @ 70.20 msec
Min = .05 Gs @ -15.36 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 6.34 Gs @ 184.67 msec
Min = -65.05 Gs @ 62.40 msec

Pos. 1 Chest X



B-80

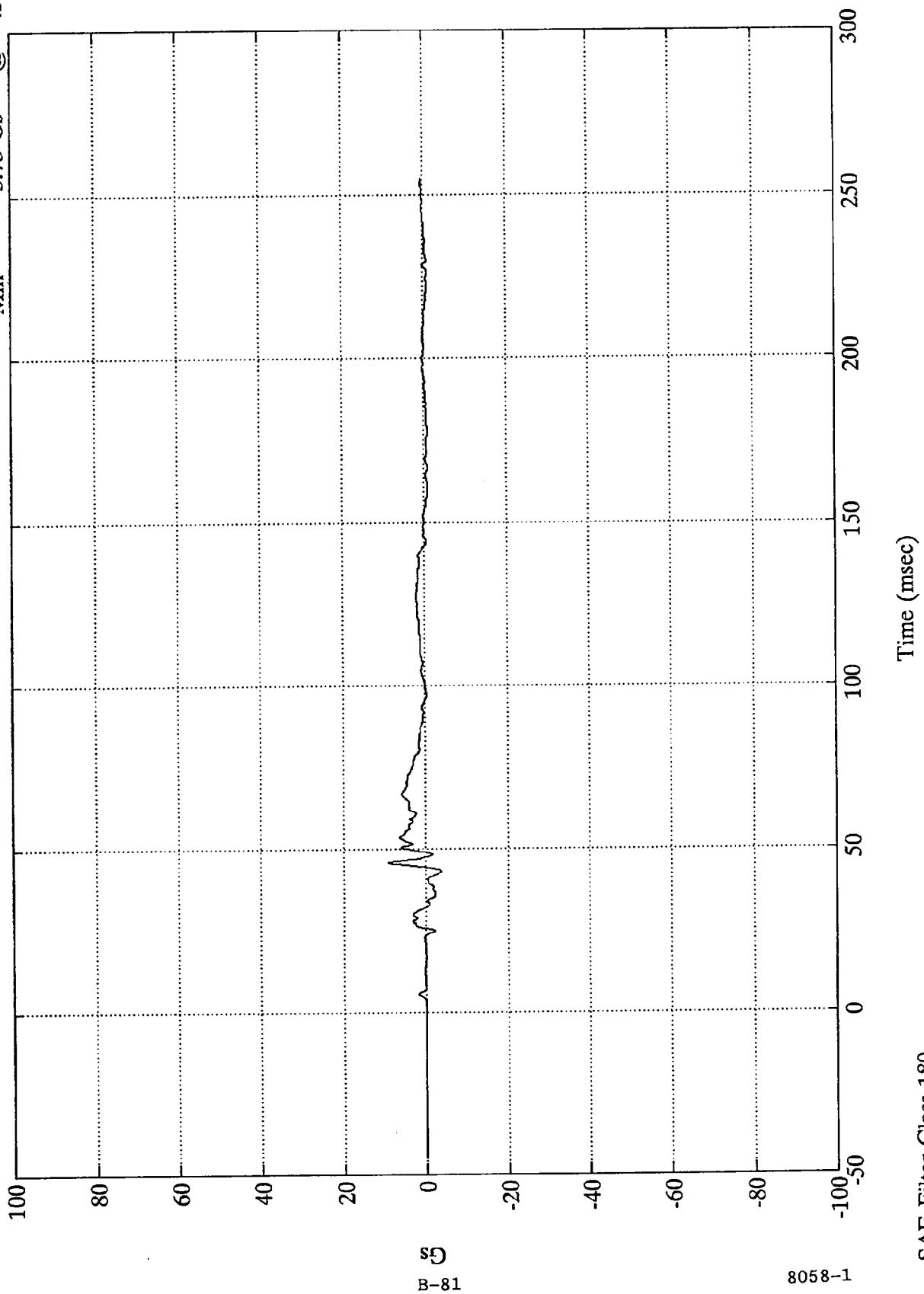
8058-1

SAE Filter Class 180

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Chest Y

Max = 9.13 Gs @ 45.84 msec
Min = -3.73 Gs @ 43.20 msec



B-81

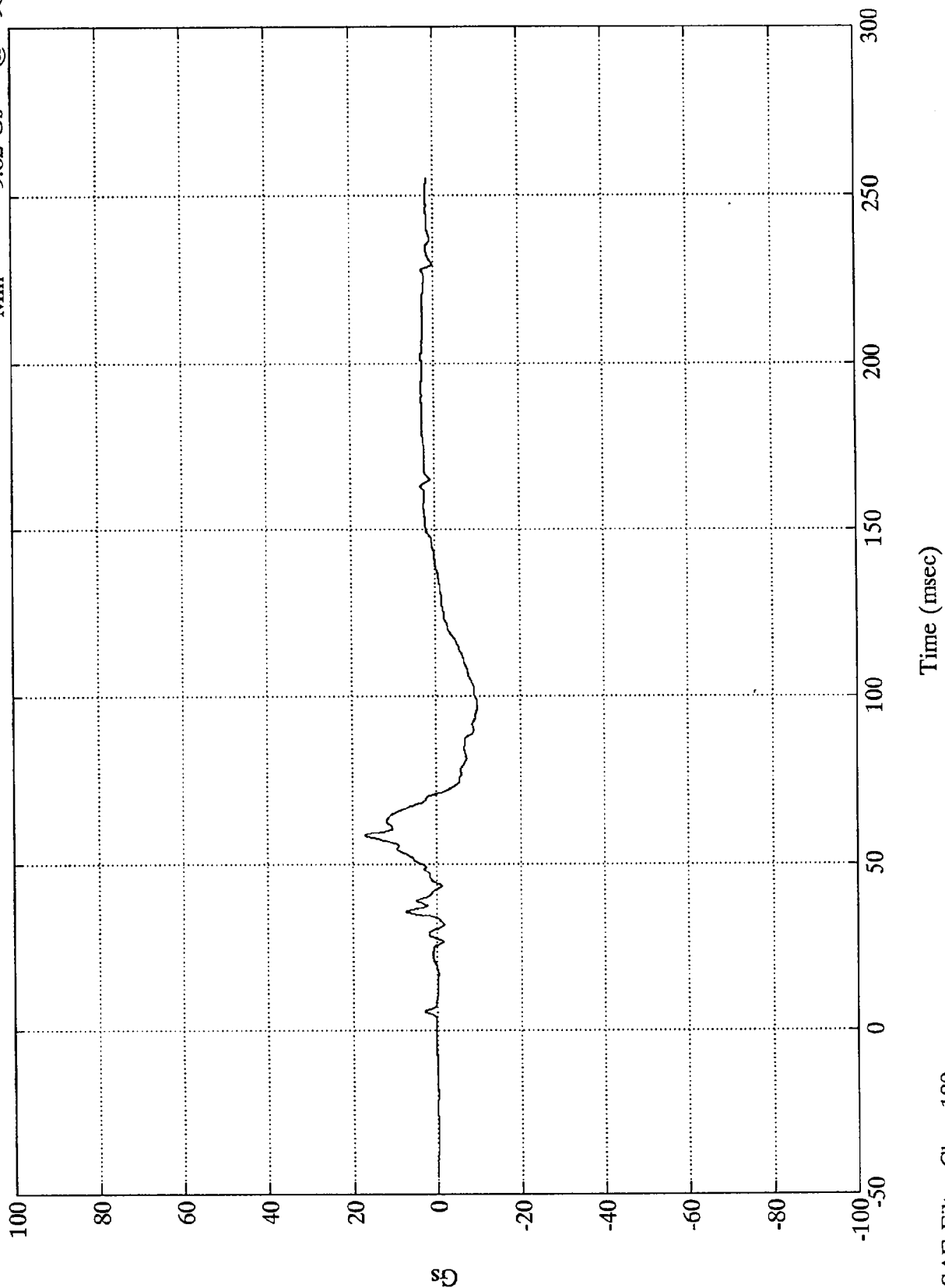
8058-1

SAE Filter Class 180

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Chest Z

Max = 17.11 Gs @ 58.68 msec
Min = -9.82 Gs @ 96.48 msec



B-82

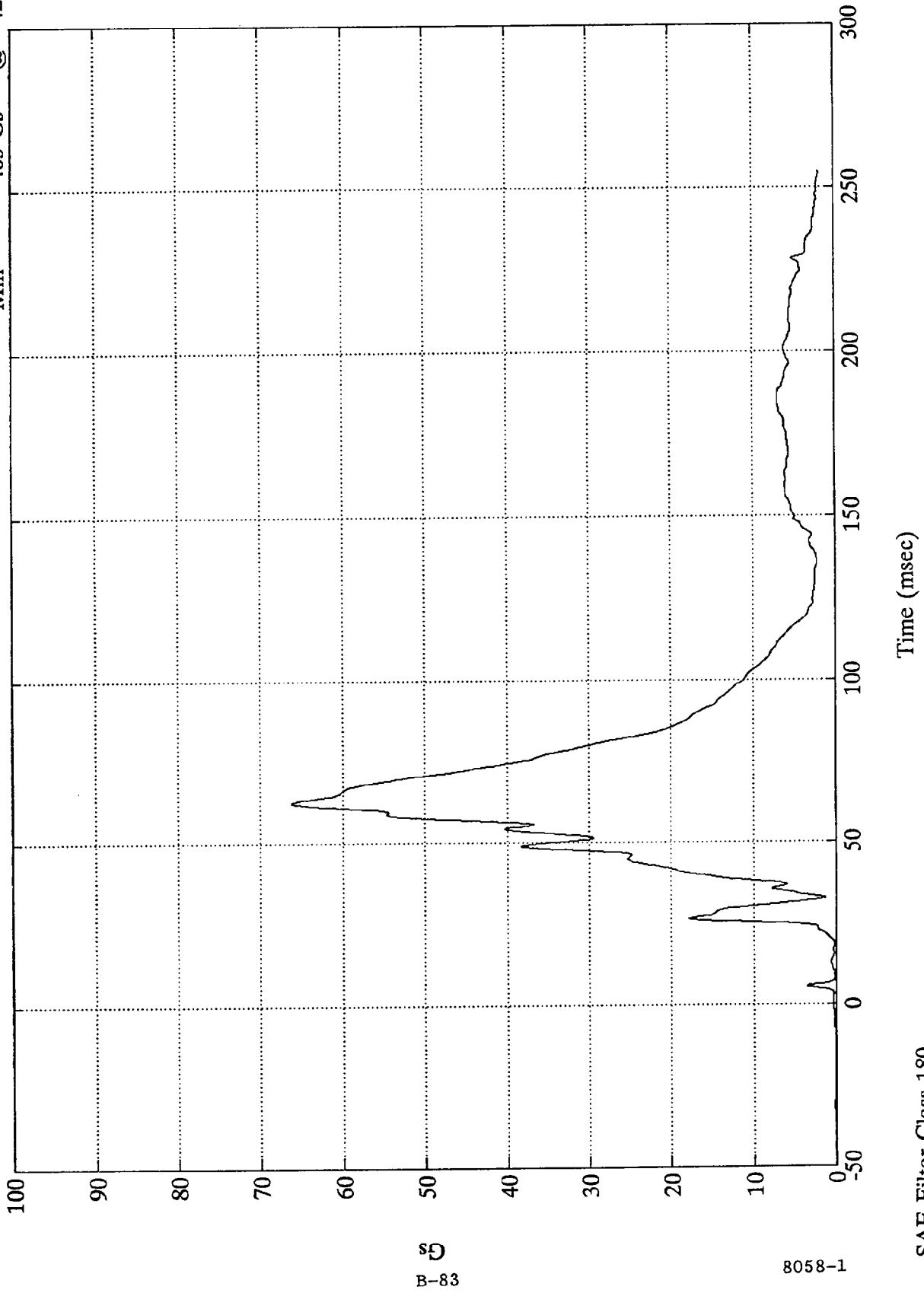
8058-1

SAE Filter Class 180

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Chest Resultant

Max = 66.23 Gs @ 62.40 msec
Min = .05 Gs @ -42.00 msec



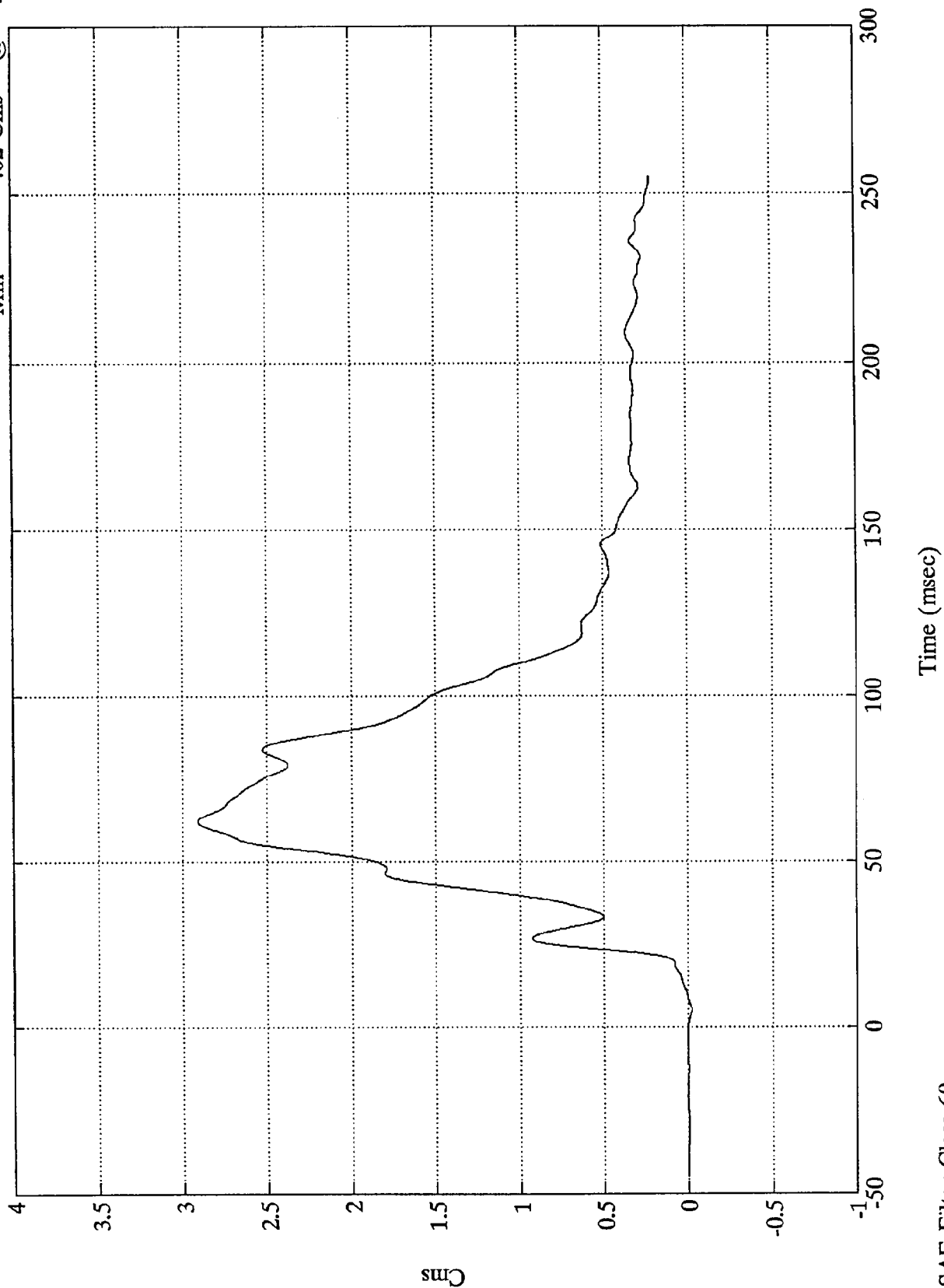
B-83
Gs

8058-1

SAE Filter Class 180

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Chest Disp. Max = 2.91 Cms @ 62.27 msec
Min = -.02 Cms @ 5.03 msec



B-84

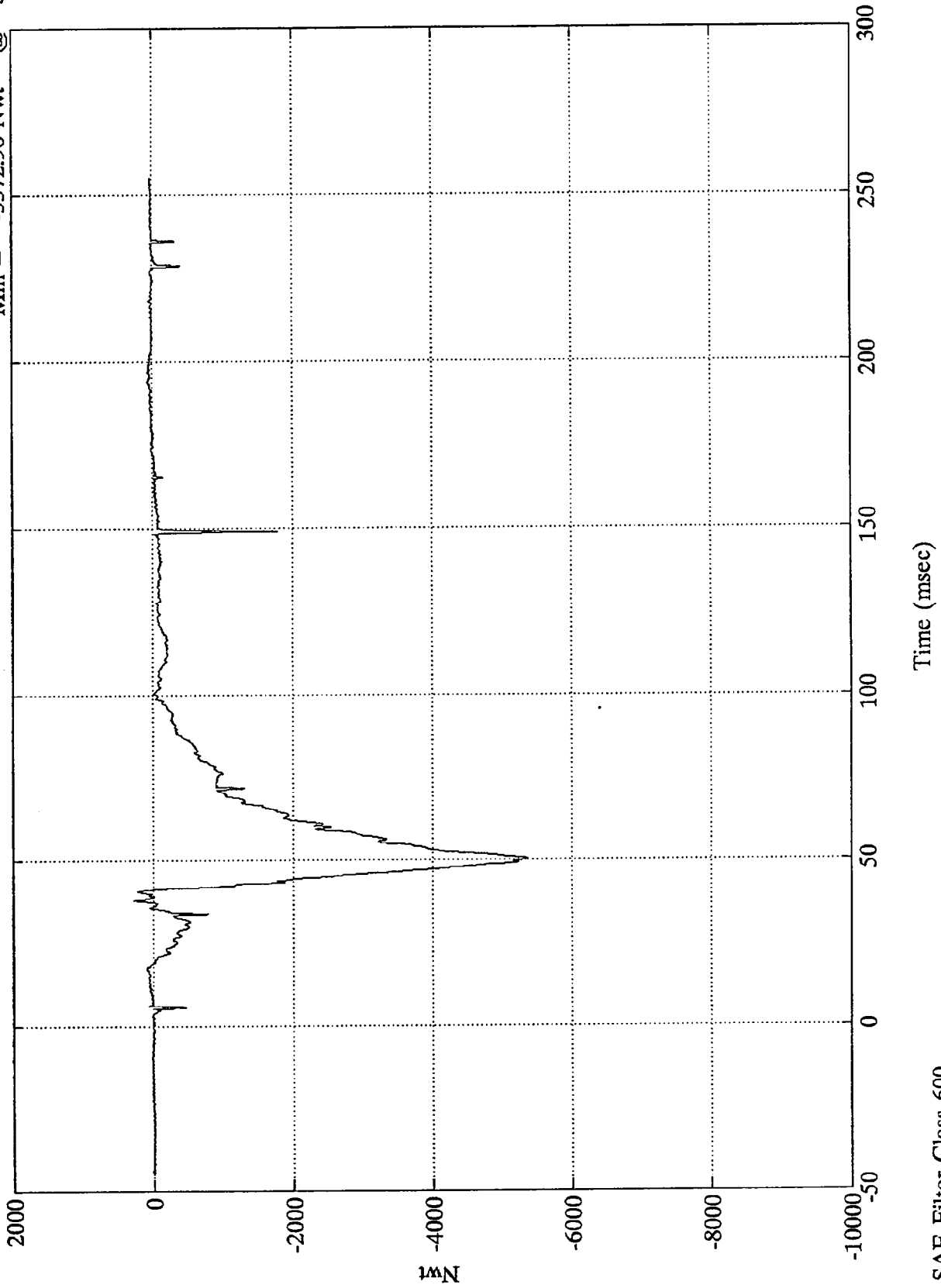
8058-1

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Left Femur

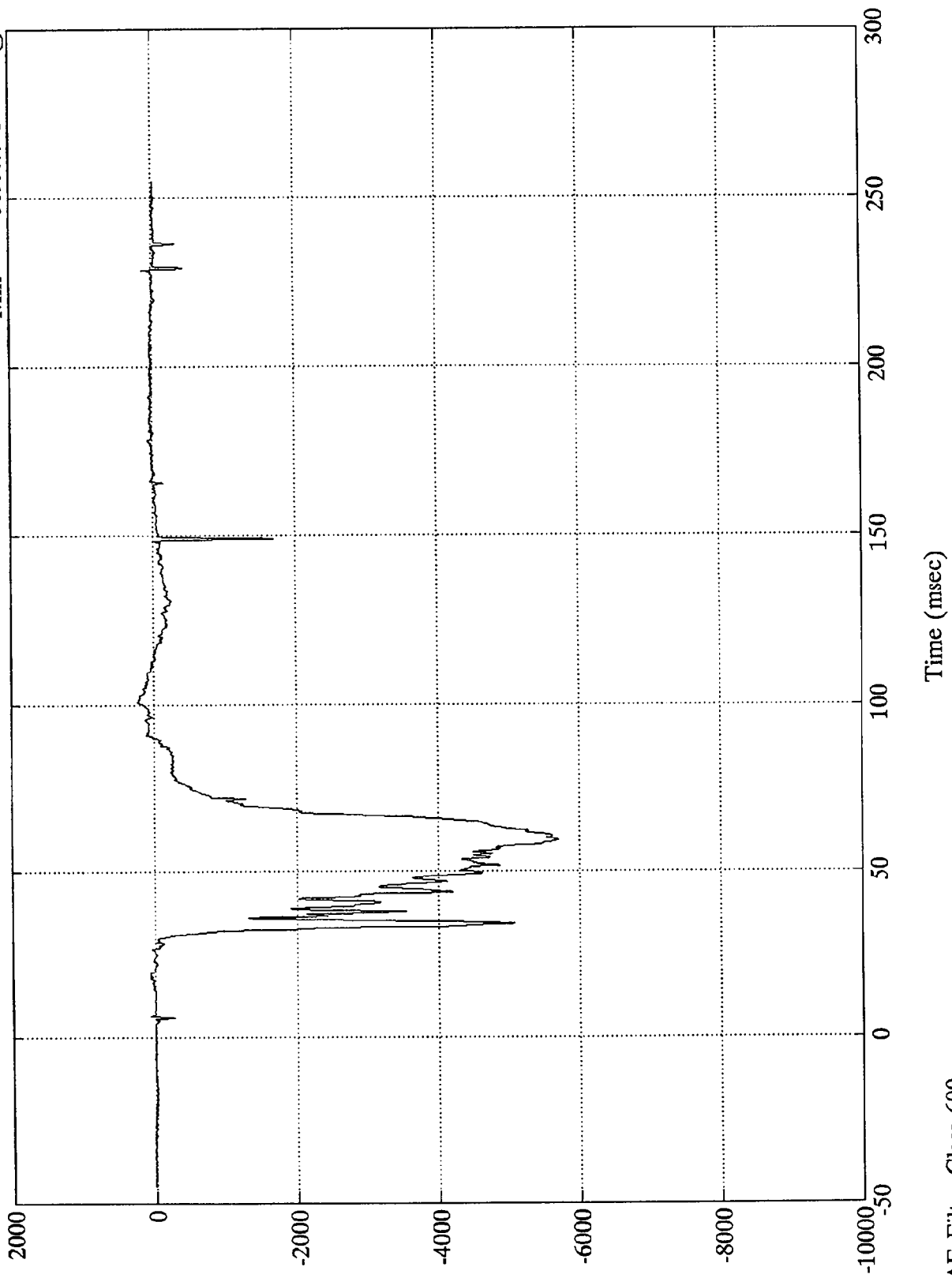
Max = 280.21 Nwt @ 37.92 msec
Min = -5372.90 Nwt @ 50.28 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Right Femur

Max = 224.03 Nwt @ 100.68 msec
 Min = -5699.79 Nwt @ 59.52 msec

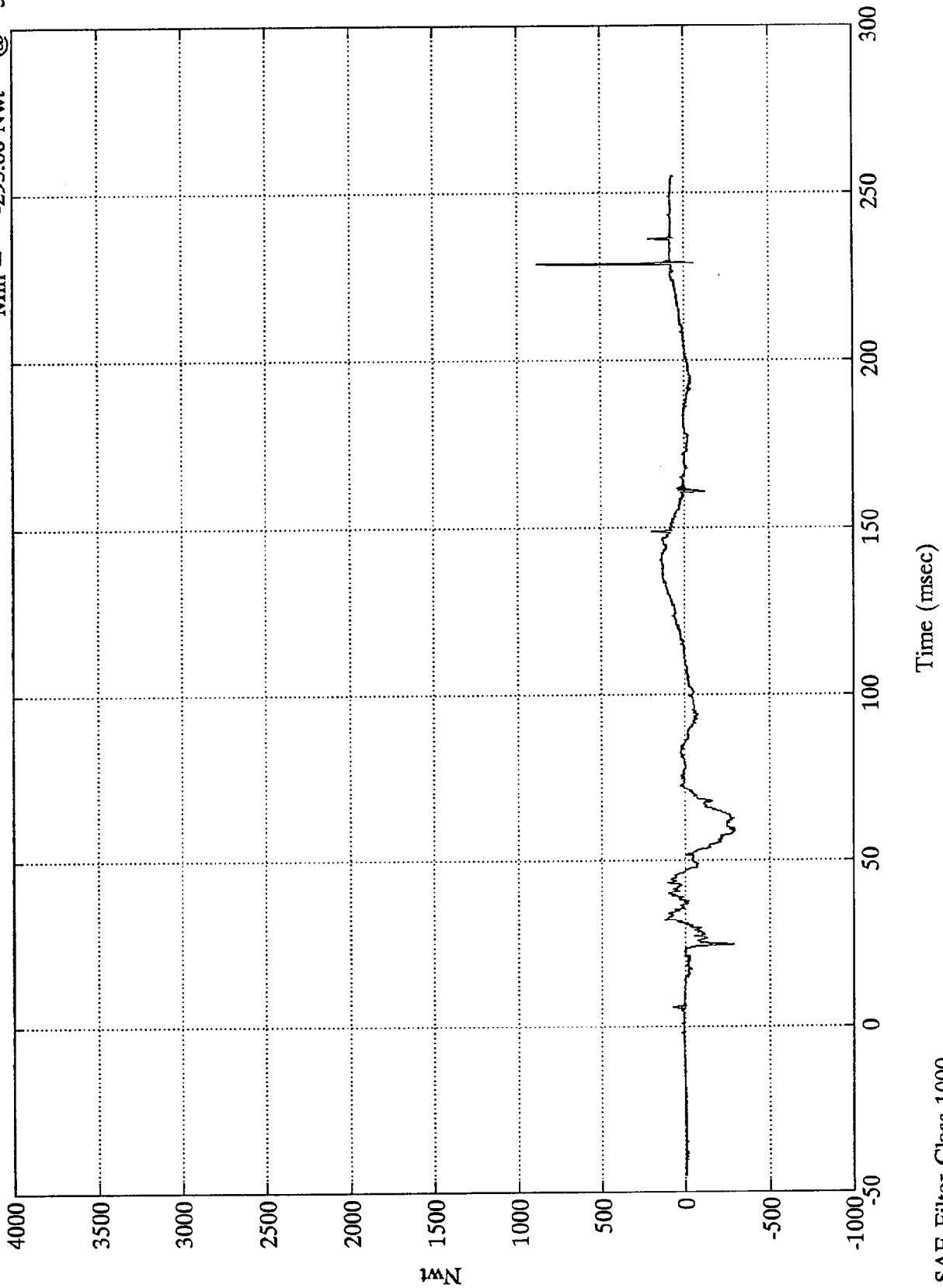


SAE Filter Class 600

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Upper Neck Fx

Max = 880.55 Nwt @ 228.48 msec
Min = -295.00 Nwt @ 59.52 msec



B-87

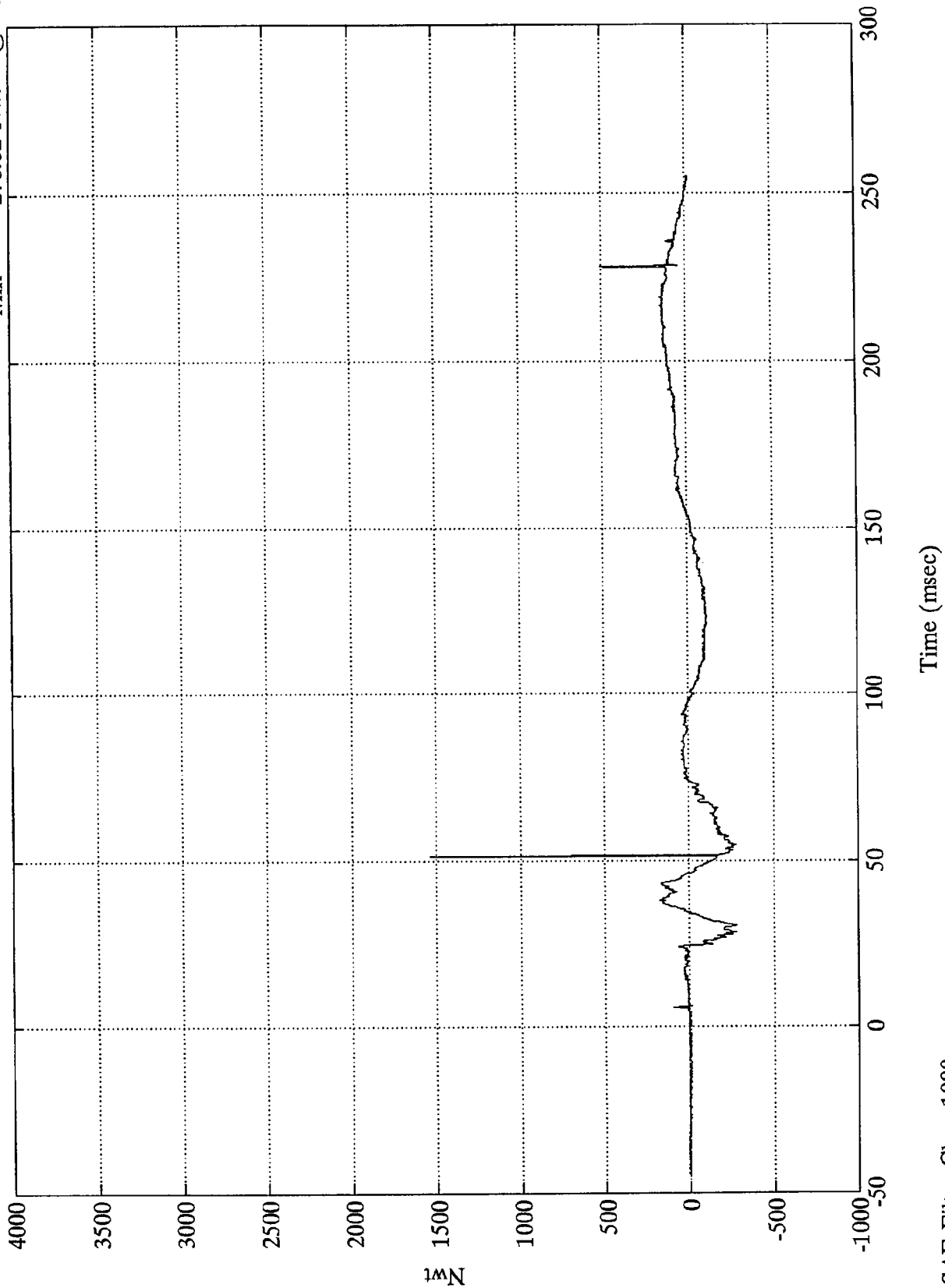
8058-1

SAE Filter Class 1000

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Upper Neck Fy

Max = 1532.63 Nwt @ 51.47 msec
Min = -278.82 Nwt @ 54.84 msec



B-88

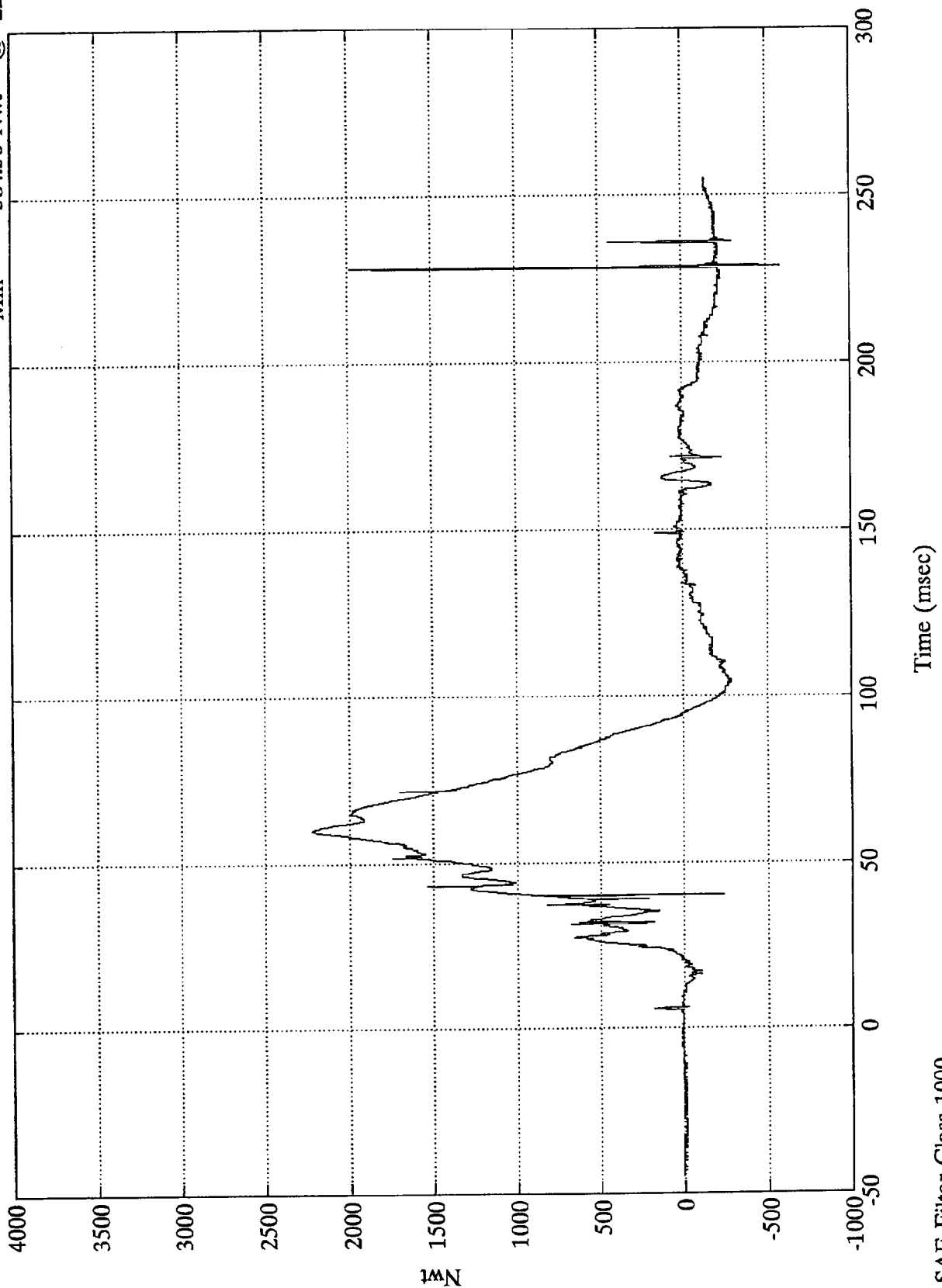
8058-1

SAE Filter Class 1000

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Upper Neck Fz

Max = 2219.75 Nwt @ 60.24 msec
Min = -584.50 Nwt @ 228.84 msec



B-89

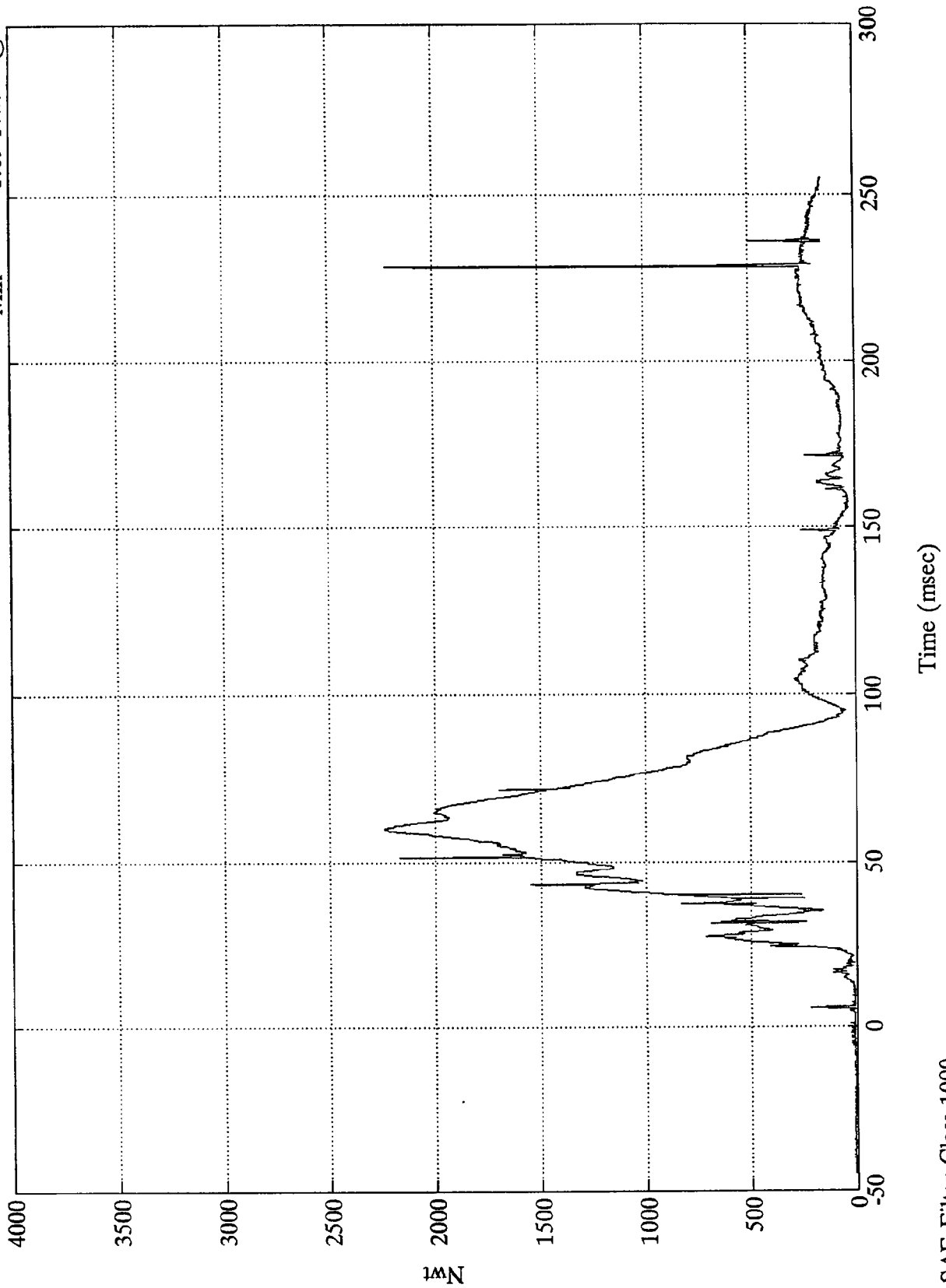
8058-1

SAE Filter Class 1000

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Neck Force Res.

Max = 2241.28 Nwt @ 60.00 msec
Min = 5.09 Nwt @ -9.72 msec



B-90

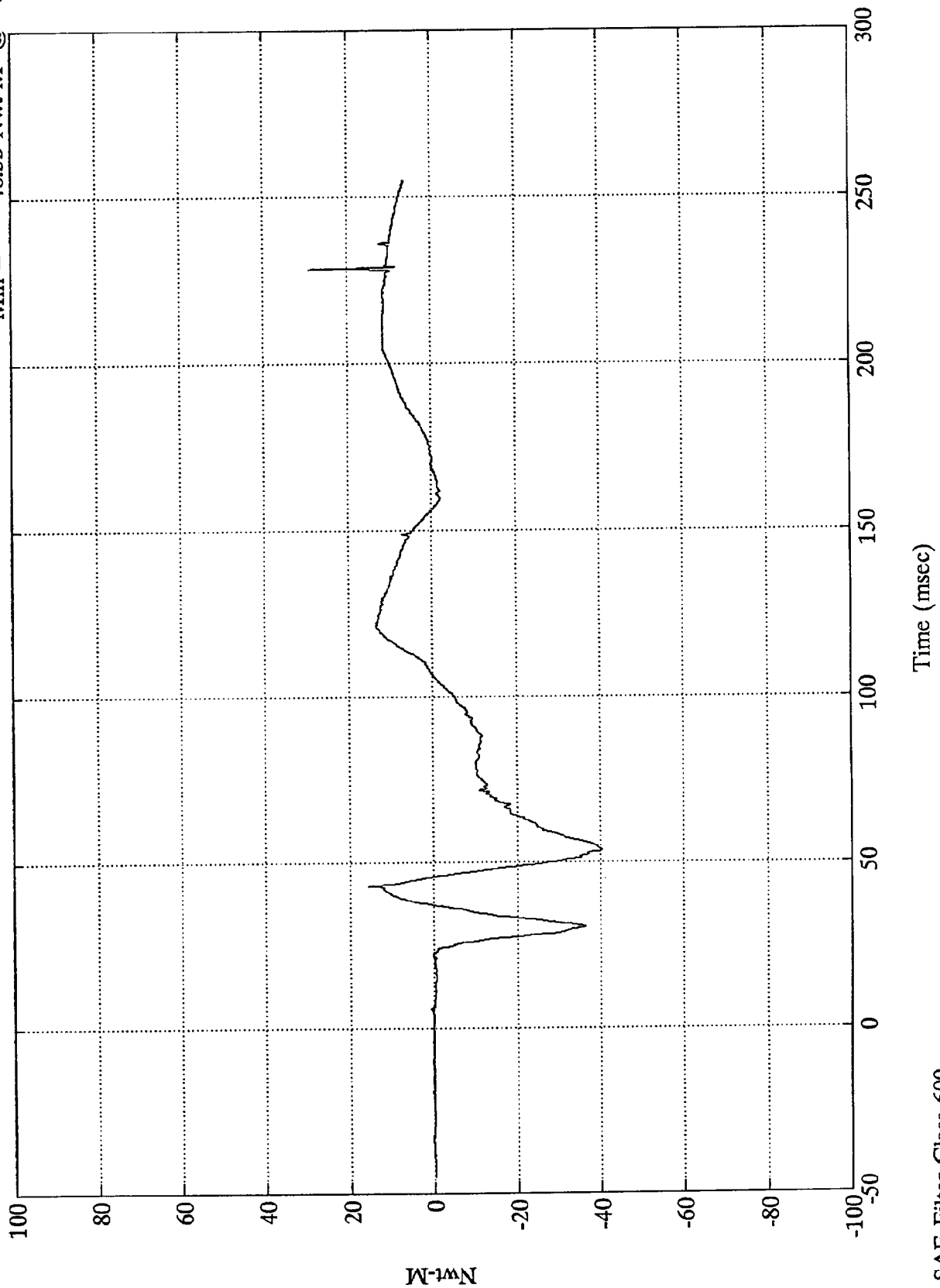
8058-1

SAE Filter Class 1000

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Upper Neck Mx

Max = 29.21 Nwt-M @ 228.36 msec
Min = -40.53 Nwt-M @ 53.52 msec



B-91

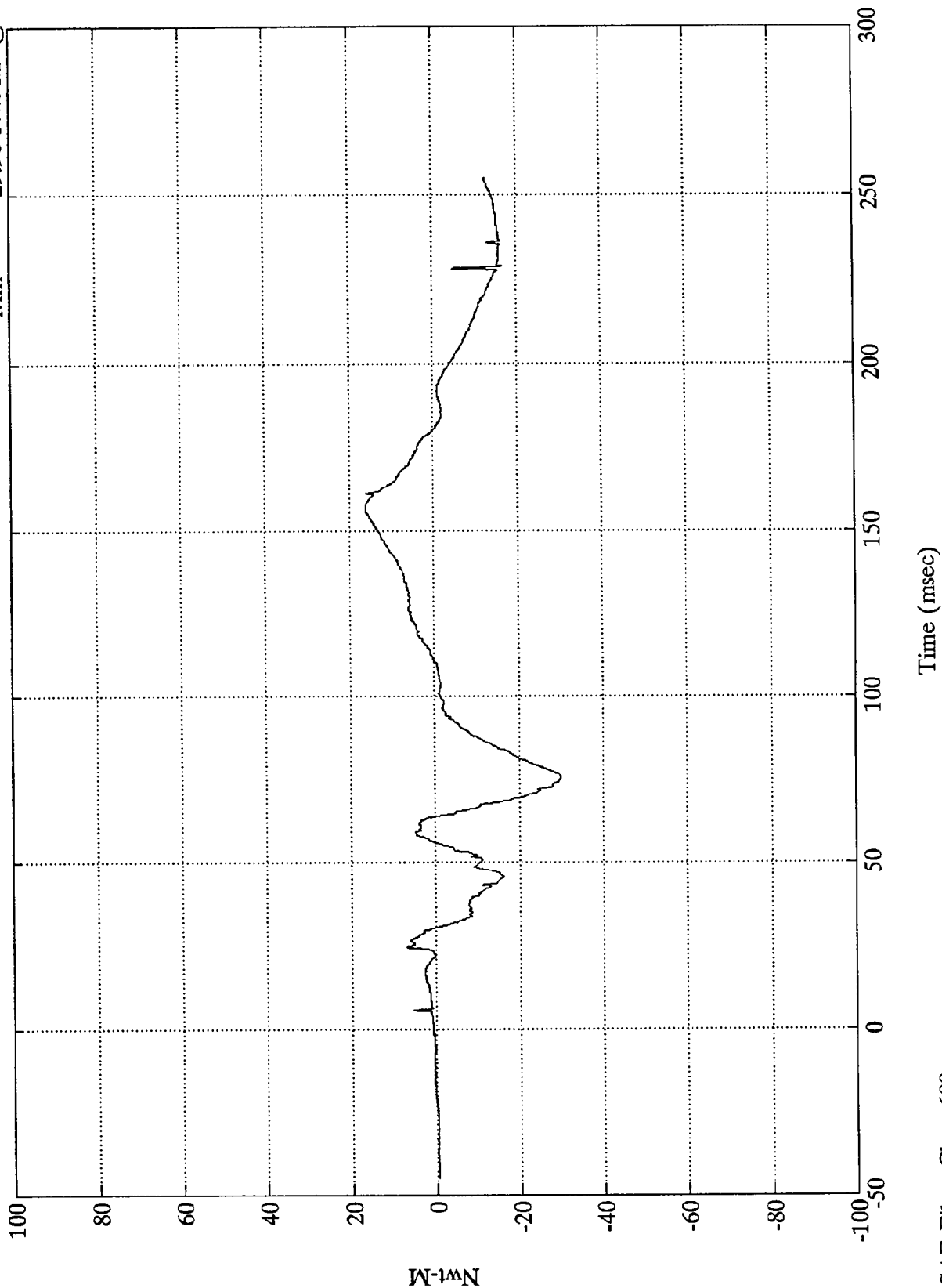
8058-1

SAE Filter Class 600

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Upper Neck My

Max = 16.12 Nwt-M @ 157.56 msec
Min = -29.96 Nwt-M @ 75.23 msec



B-92

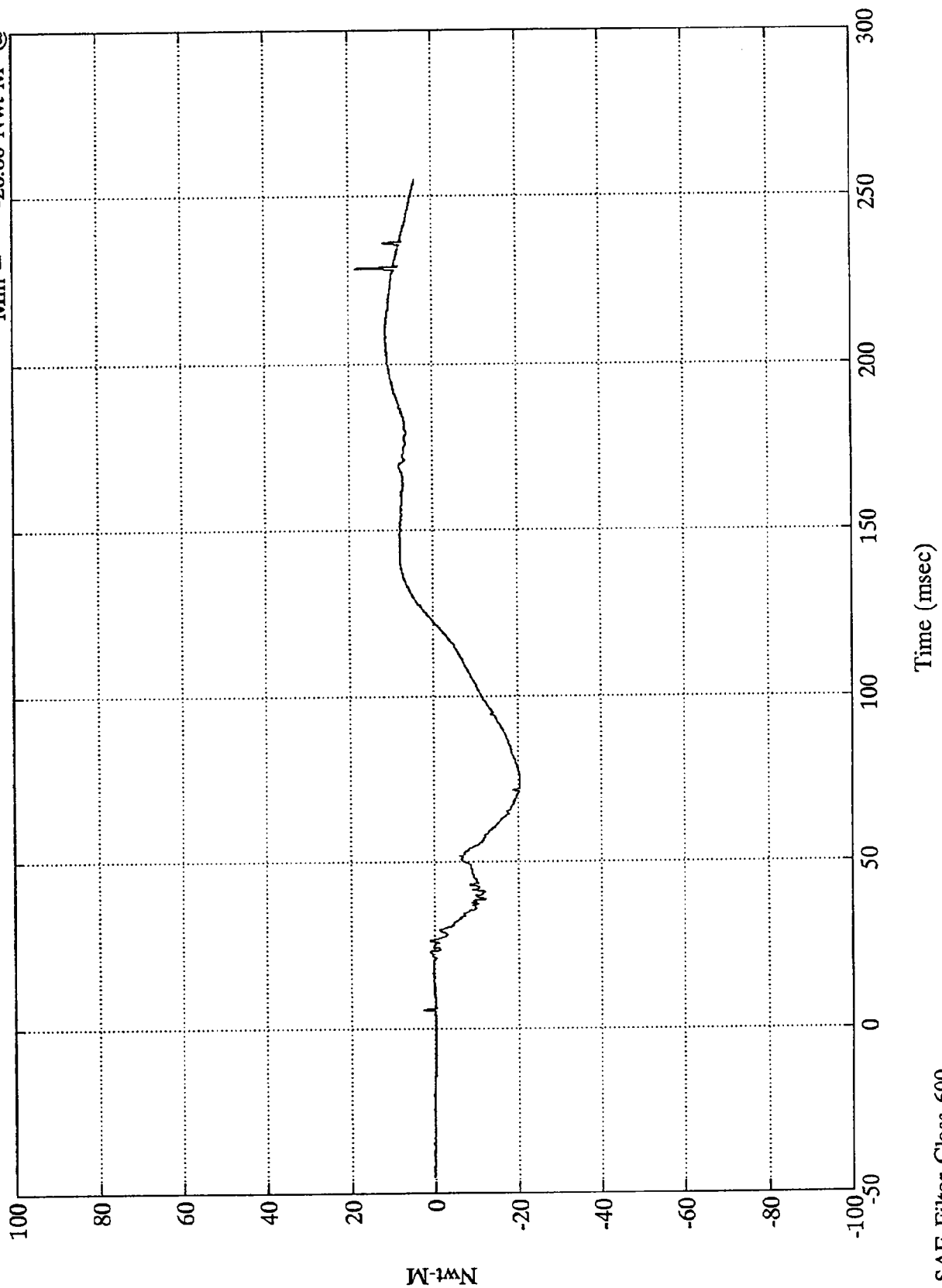
8058-1

SAE Filter Class 600

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Upper Neck Mz

Max = 18.45 Nwt-M @ 228.36 msec
Min = -20.60 Nwt-M @ 73.31 msec



B-93

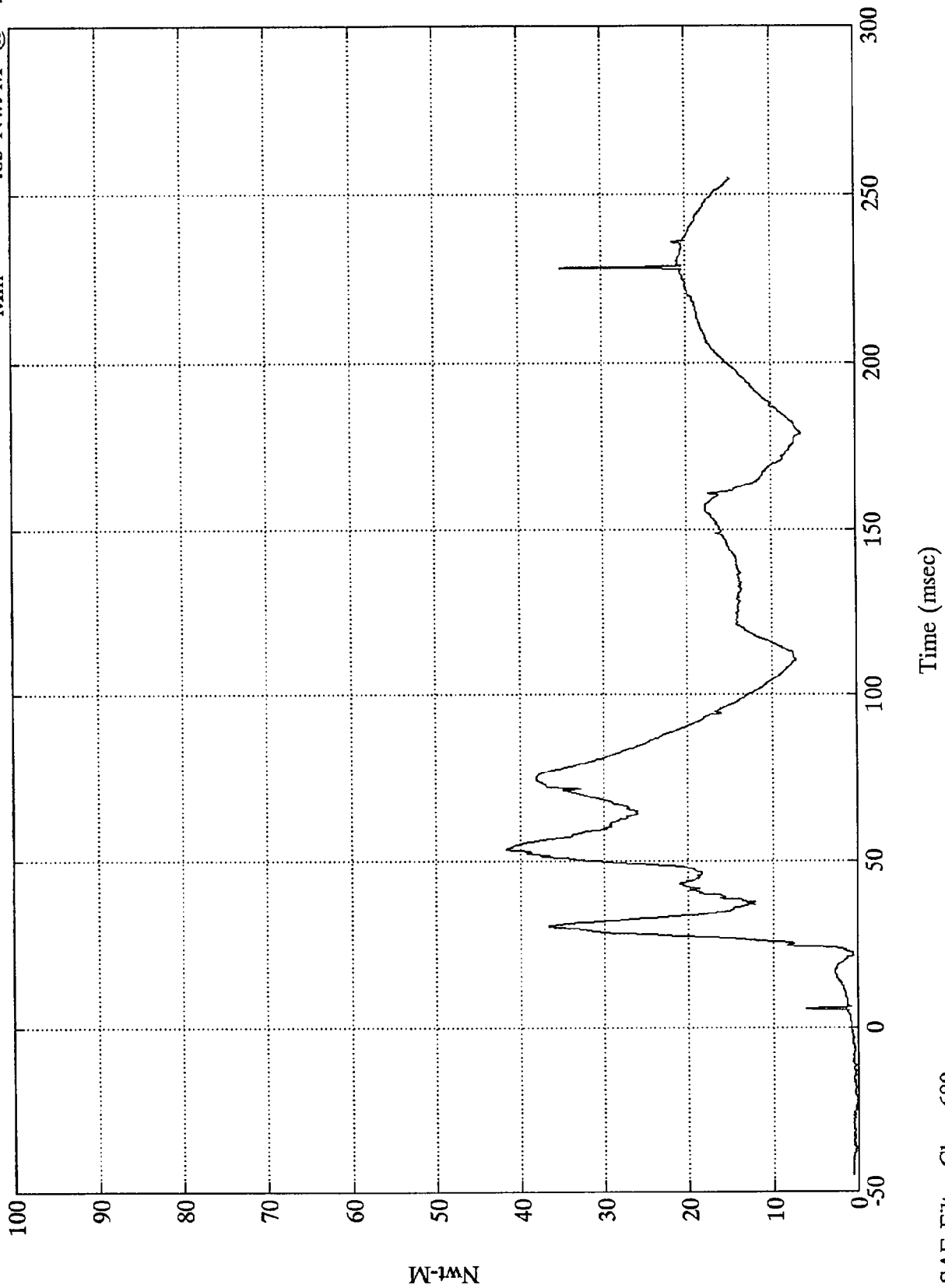
8058-1

SAE Filter Class 600

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Neck Moment Res.

Max = 41.62 Nwt-M @ 53.52 msec
Min = .05 Nwt-M @ -22.44 msec



B-94
Nwt-M

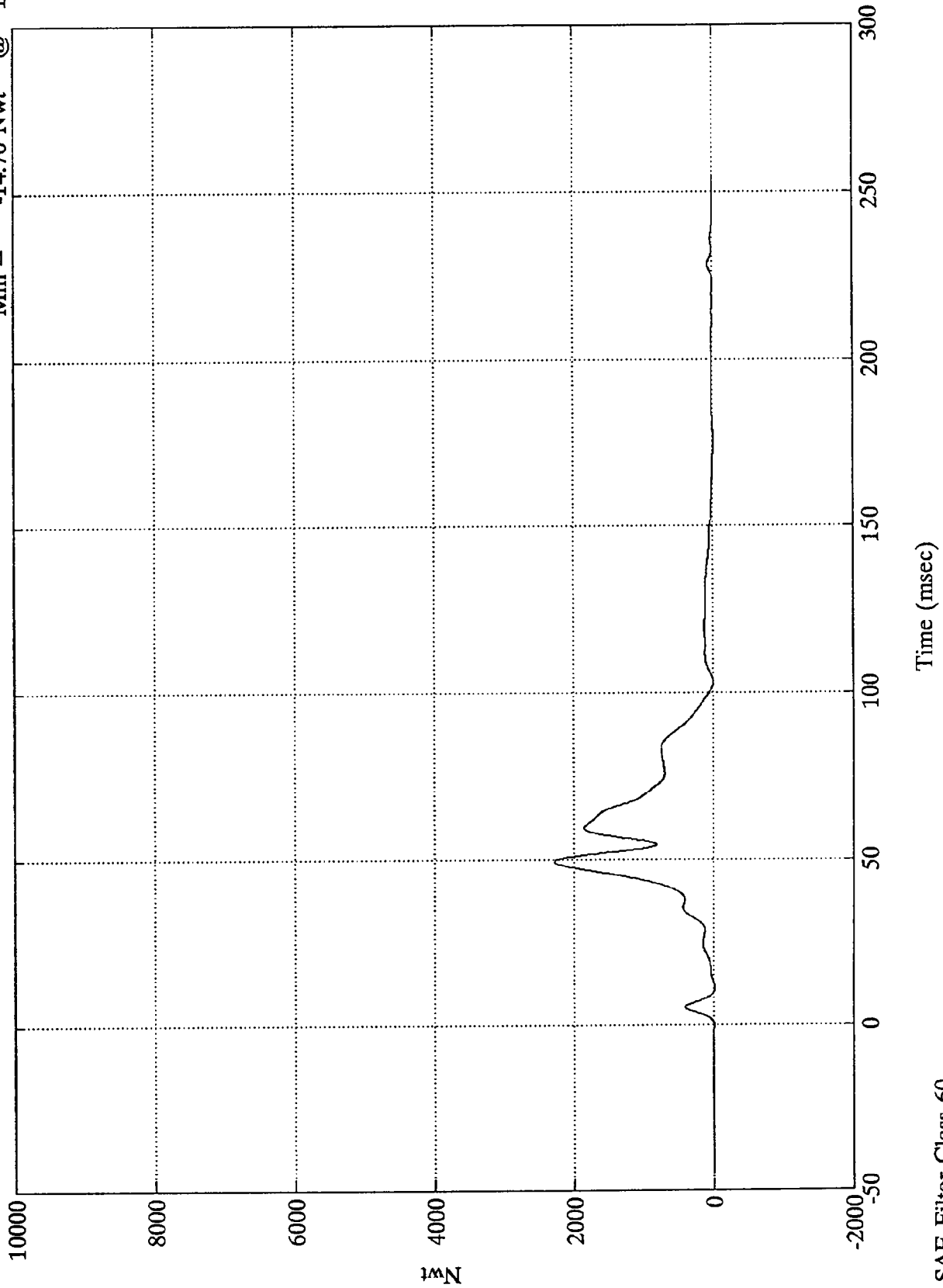
8058-1

SAE Filter Class 600

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Left Belt Load

Max = 2280.89 Nwt @ 49.43 msec
Min = -14.70 Nwt @ 10.79 msec



B-95

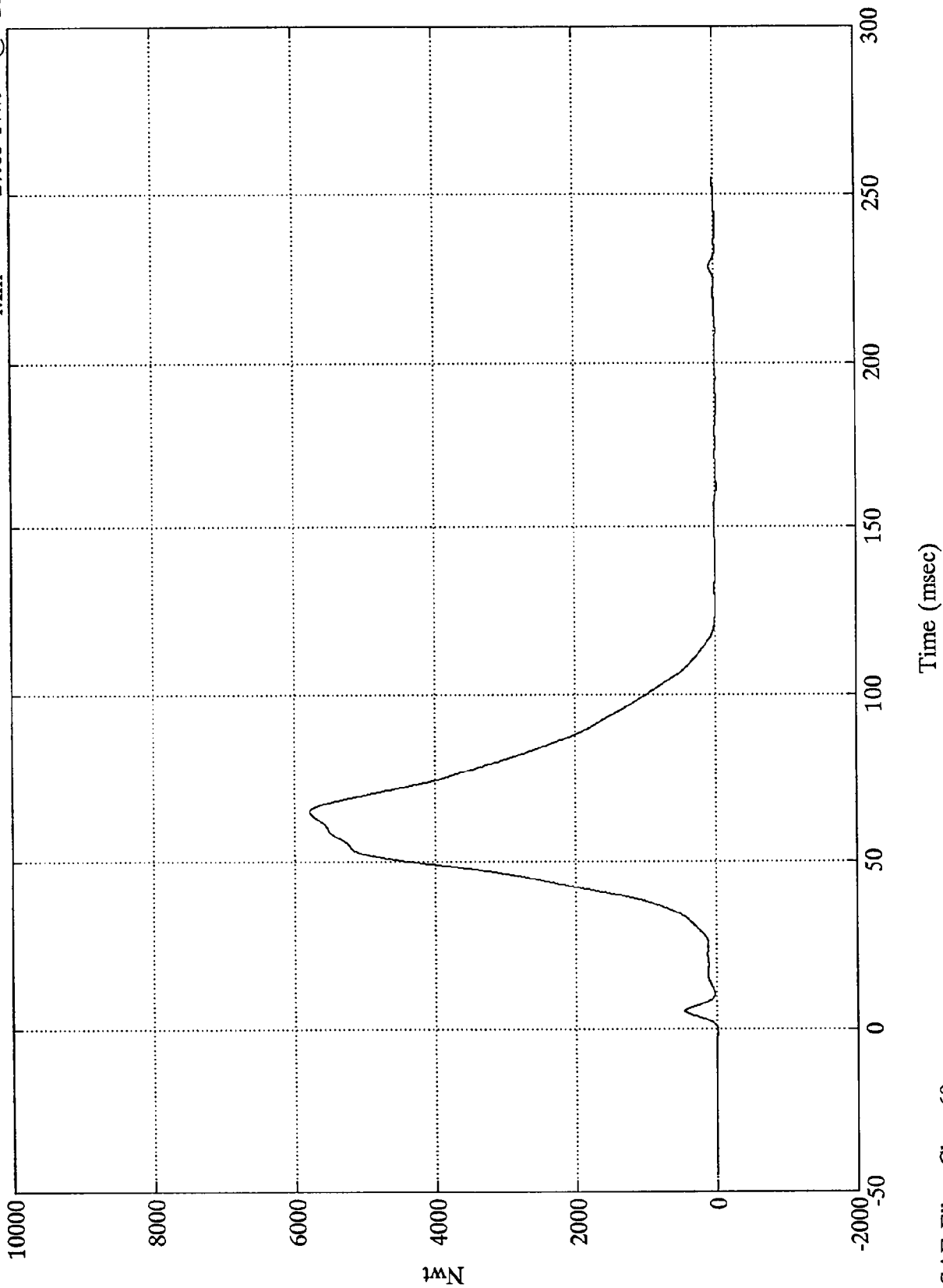
8058-1

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 1 Torso Belt Load

Max = 5787.46 Nwt @ 64.91 msec
Min = -27.05 Nwt @ 187.32 msec



B-96

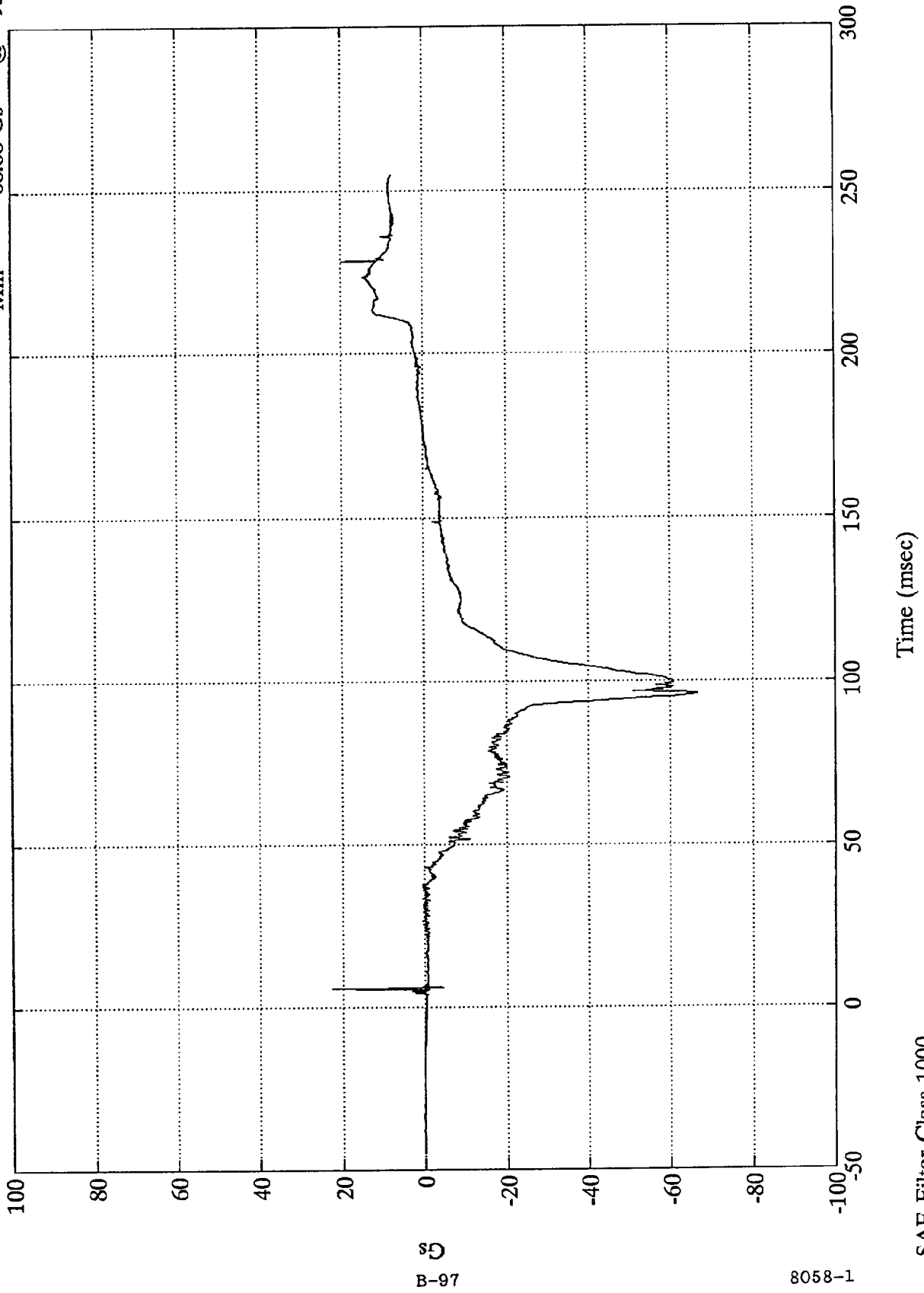
8058-1

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Head X

Max = 22.53 Gs @ 5.51 msec
Min = -66.68 Gs @ 95.76 msec



B-97
Gs

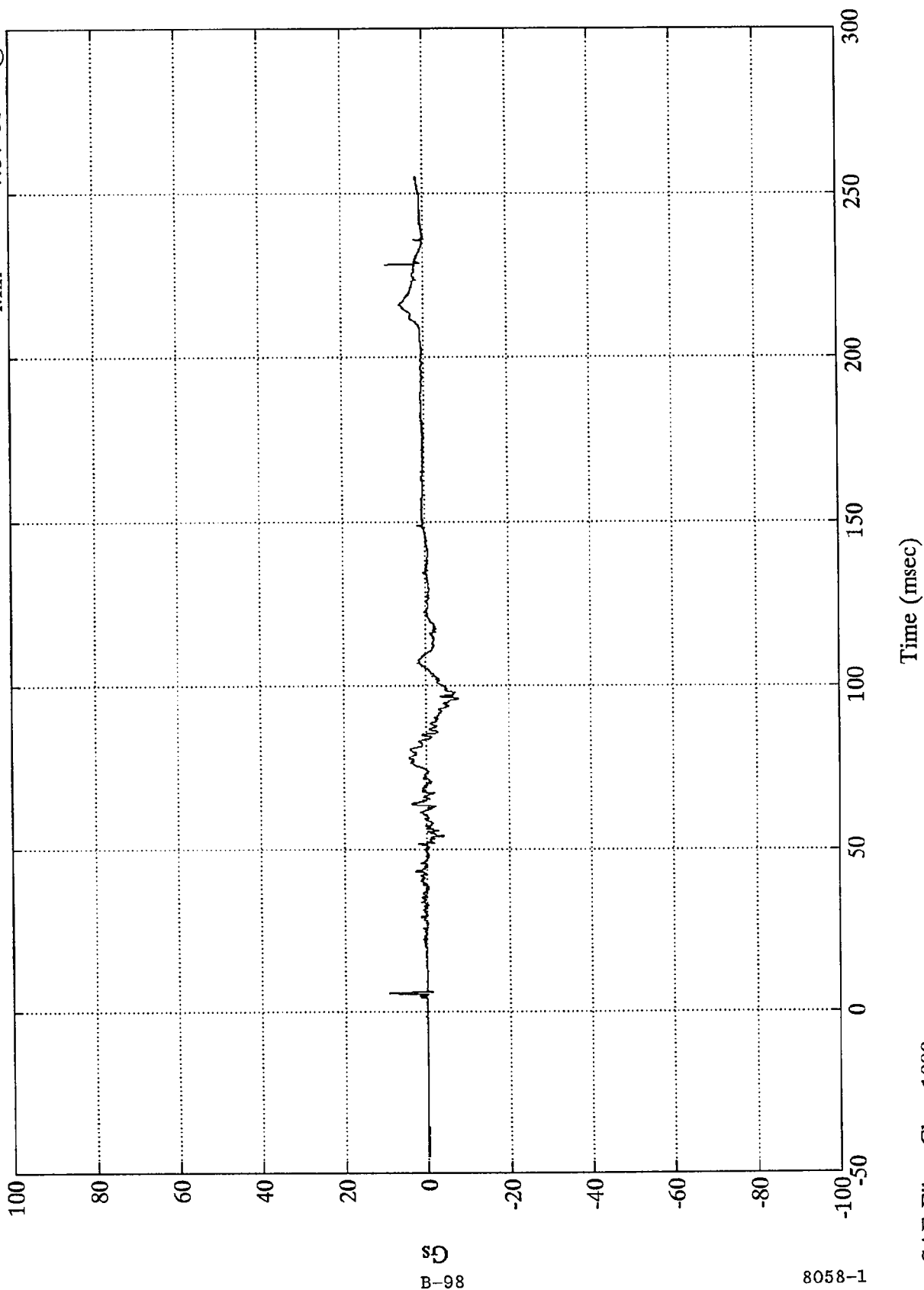
8058-1

SAE Filter Class 1000

NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 9.19 Gs @ 228.36 msec
Min = -7.84 Gs @ 96.12 msec

Pos. 2 Head Y

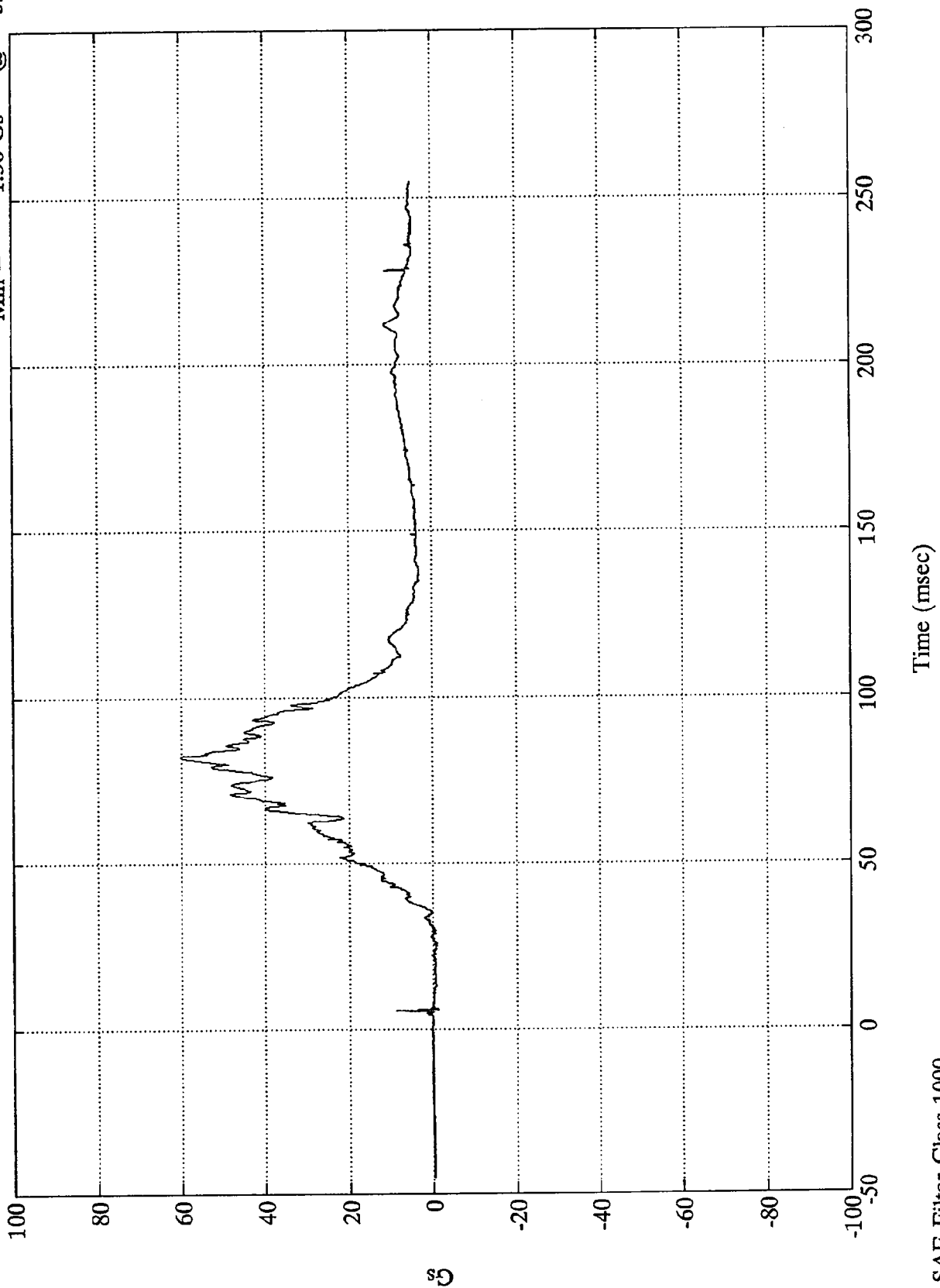


8058-1
B-98

SAE Filter Class 1000

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Head Z
Max = 60.25 Gs @ 81.95 msec
Min = -1.30 Gs @ 5.87 msec



B-99

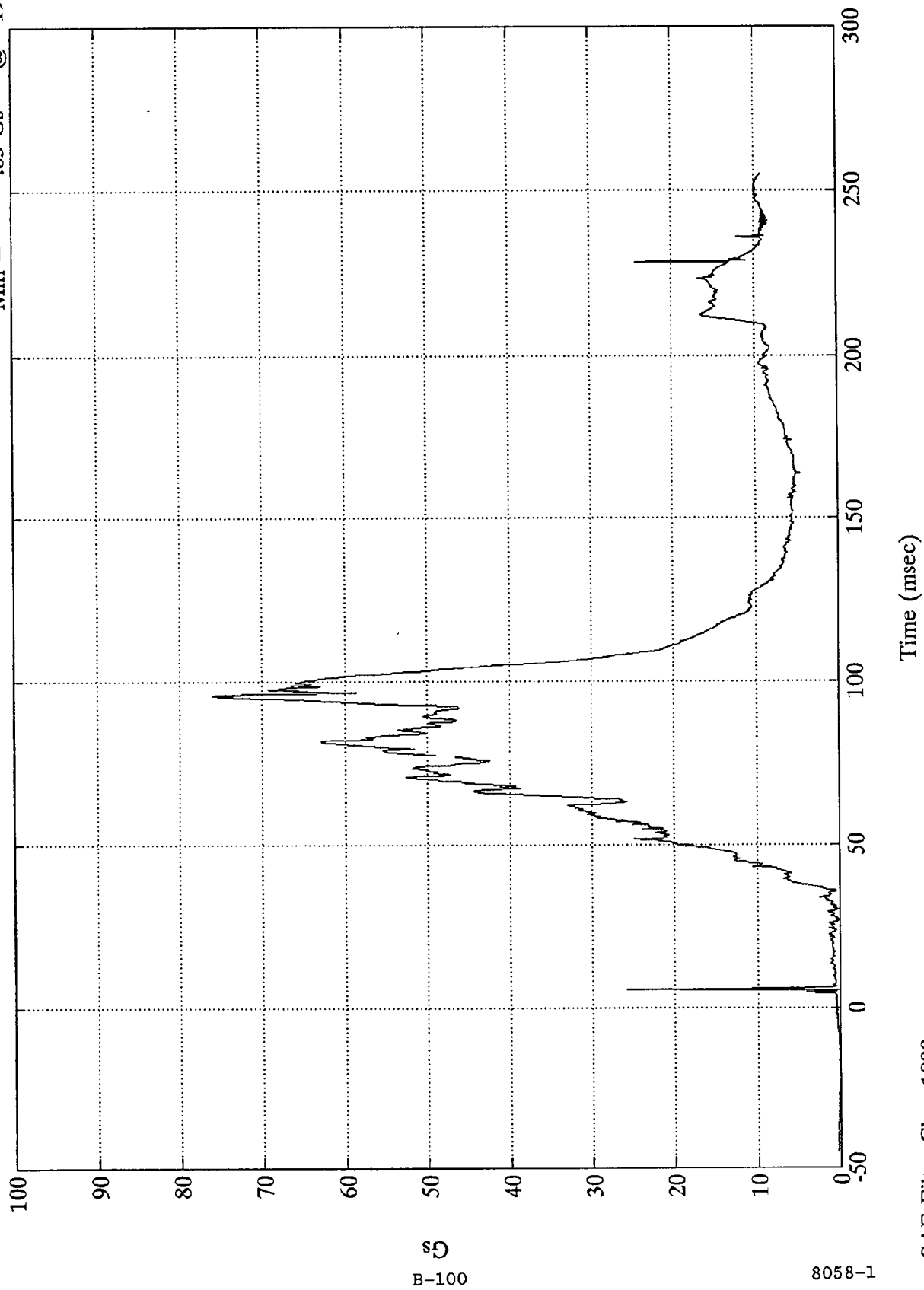
8058-1

SAE Filter Class 1000

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Head Resultant

Max = 75.99 Gs @ 95.64 msec
Min = .03 Gs @ -19.44 msec

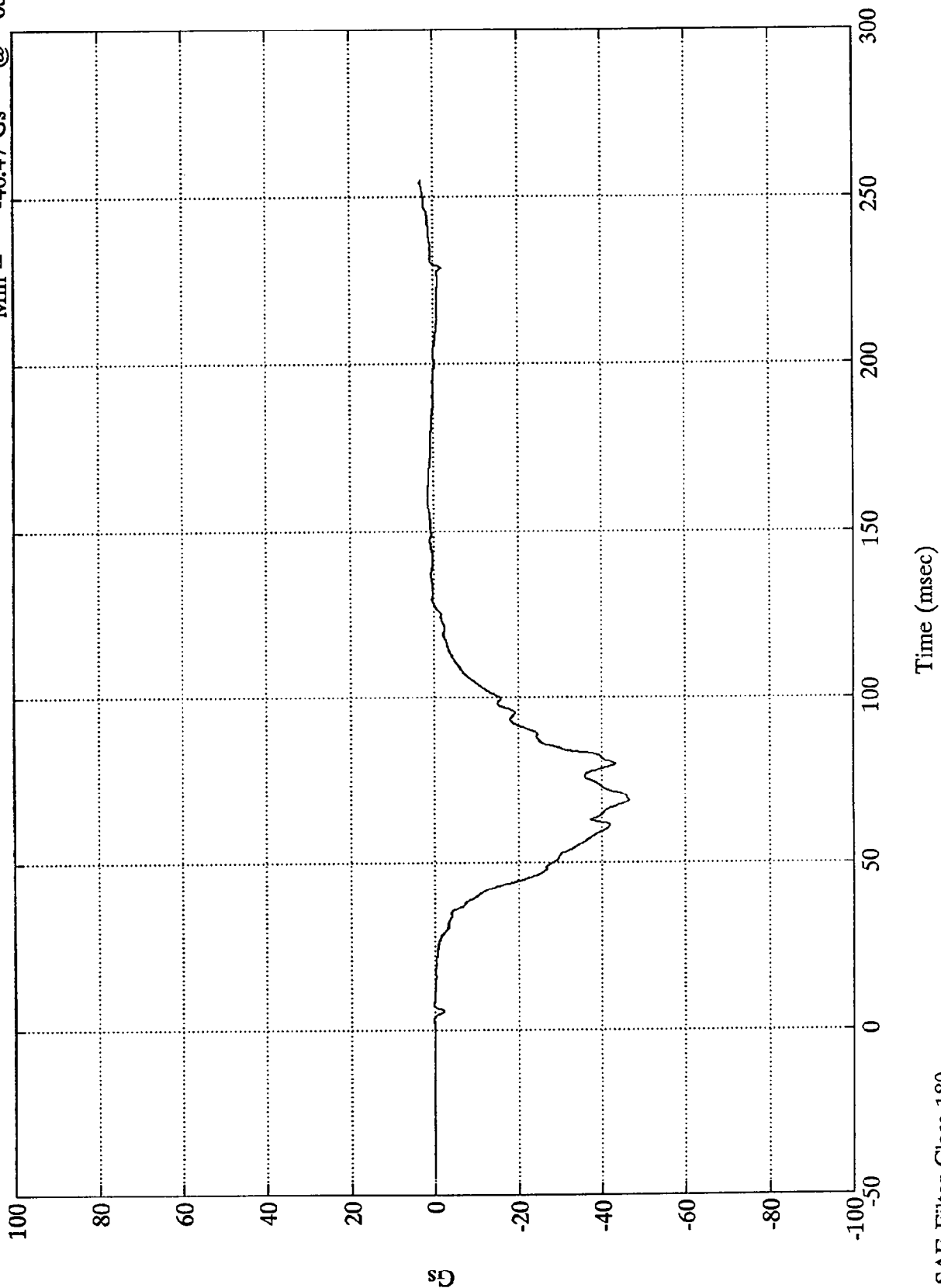


SAE Filter Class 1000

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Chest X

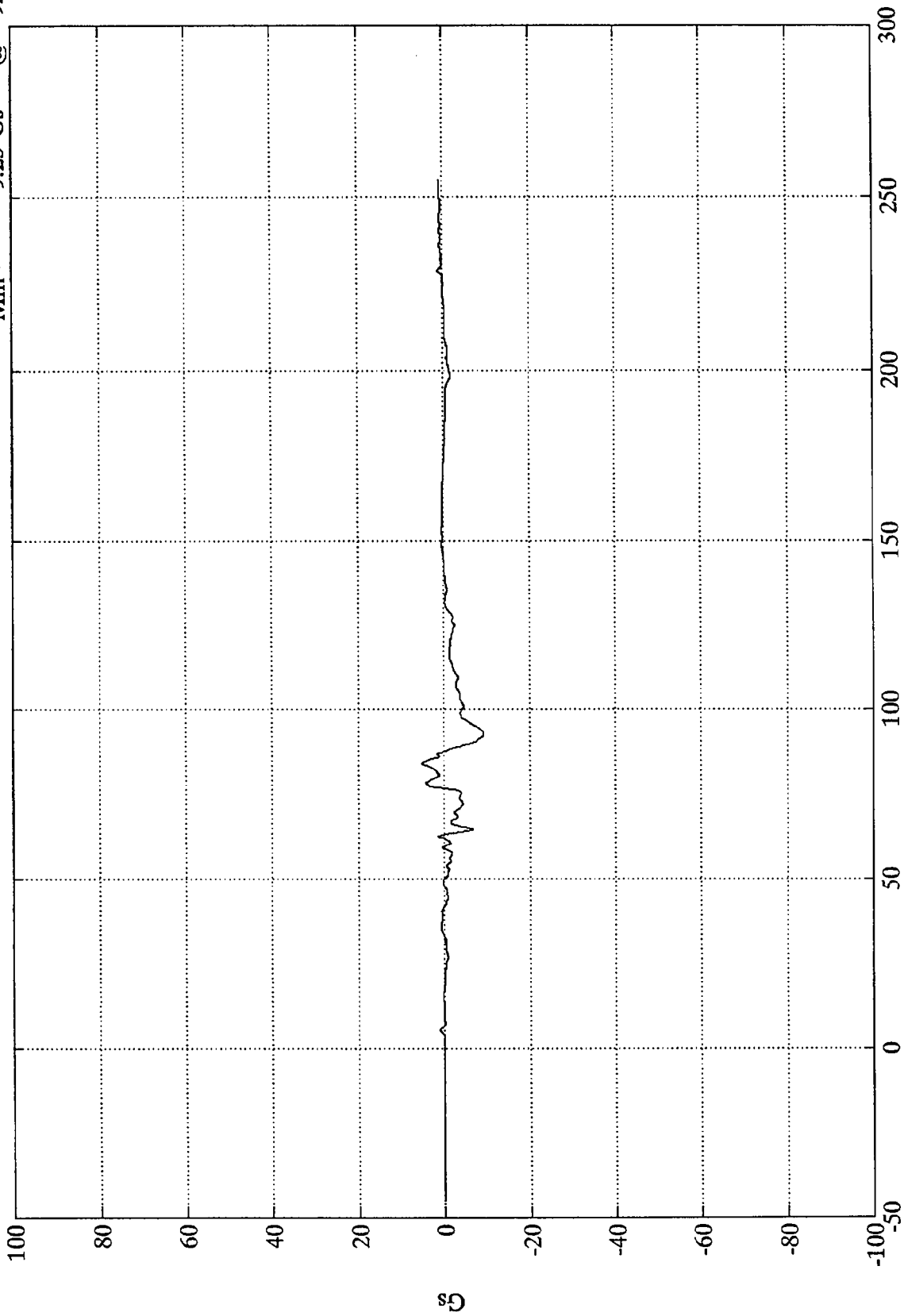
Max = 3.05 Gs @ 254.16 msec
Min = -46.47 Gs @ 68.52 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

Max = 5.25 Gs @ 83.76 msec
Min = -9.23 Gs @ 92.40 msec

Pos. 2 Chest Y

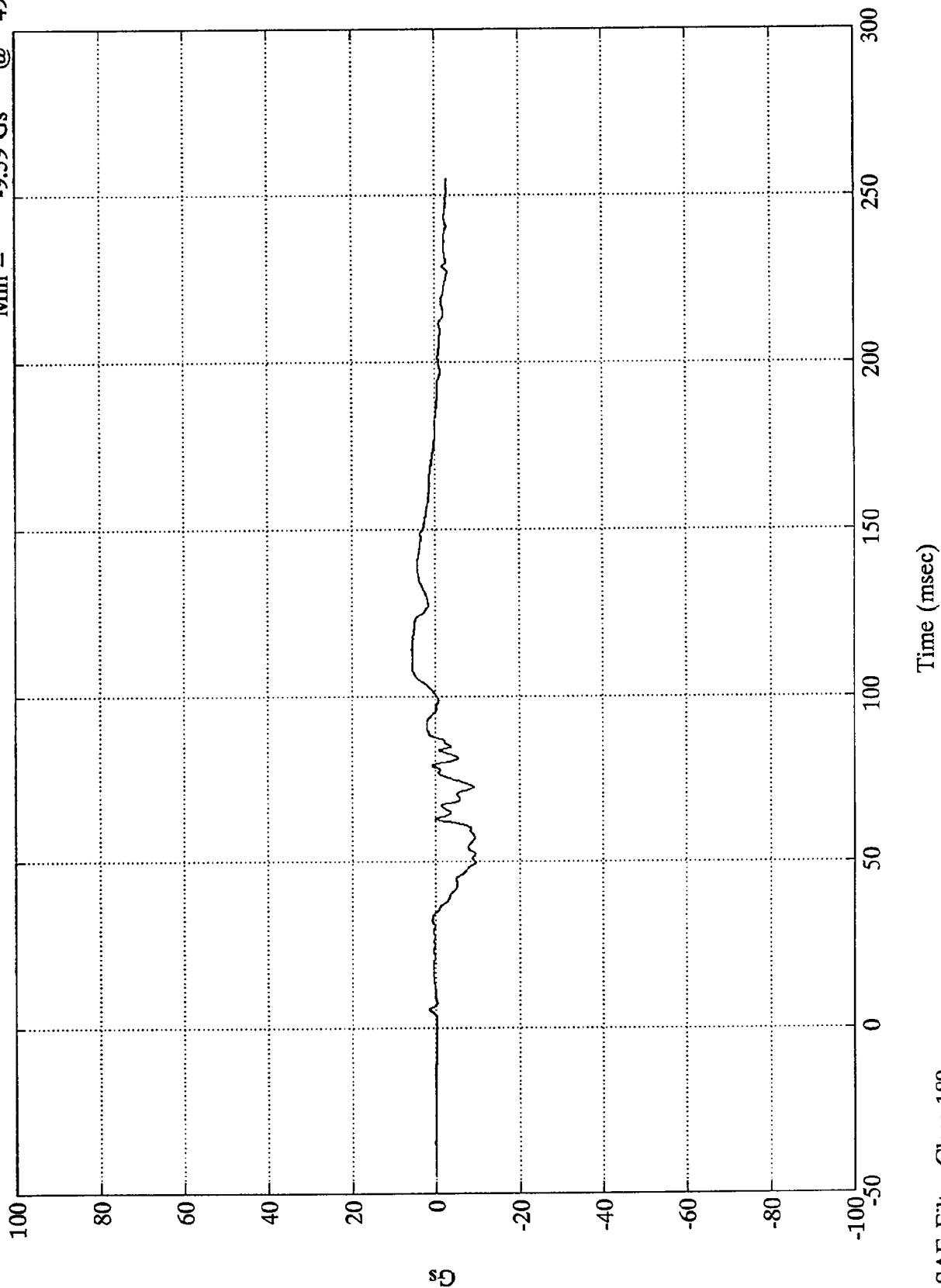


Time (msec)

SAE Filter Class 180

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Chest Z
Max = 5.51 Gs @ 114.00 msec
Min = -9.59 Gs @ 49.68 msec



B-103

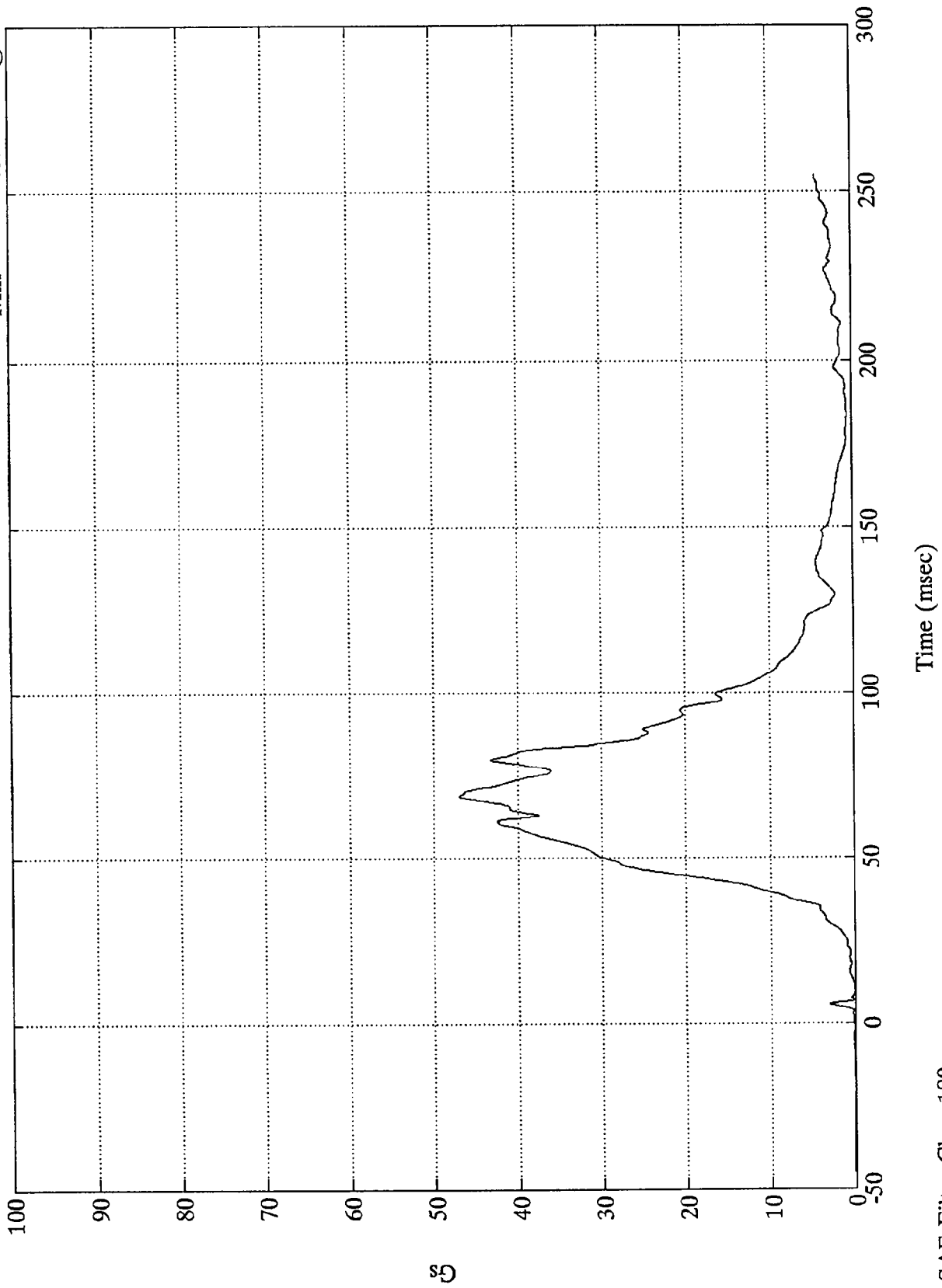
8058-1

SAE Filter Class 180

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Chest Resultant

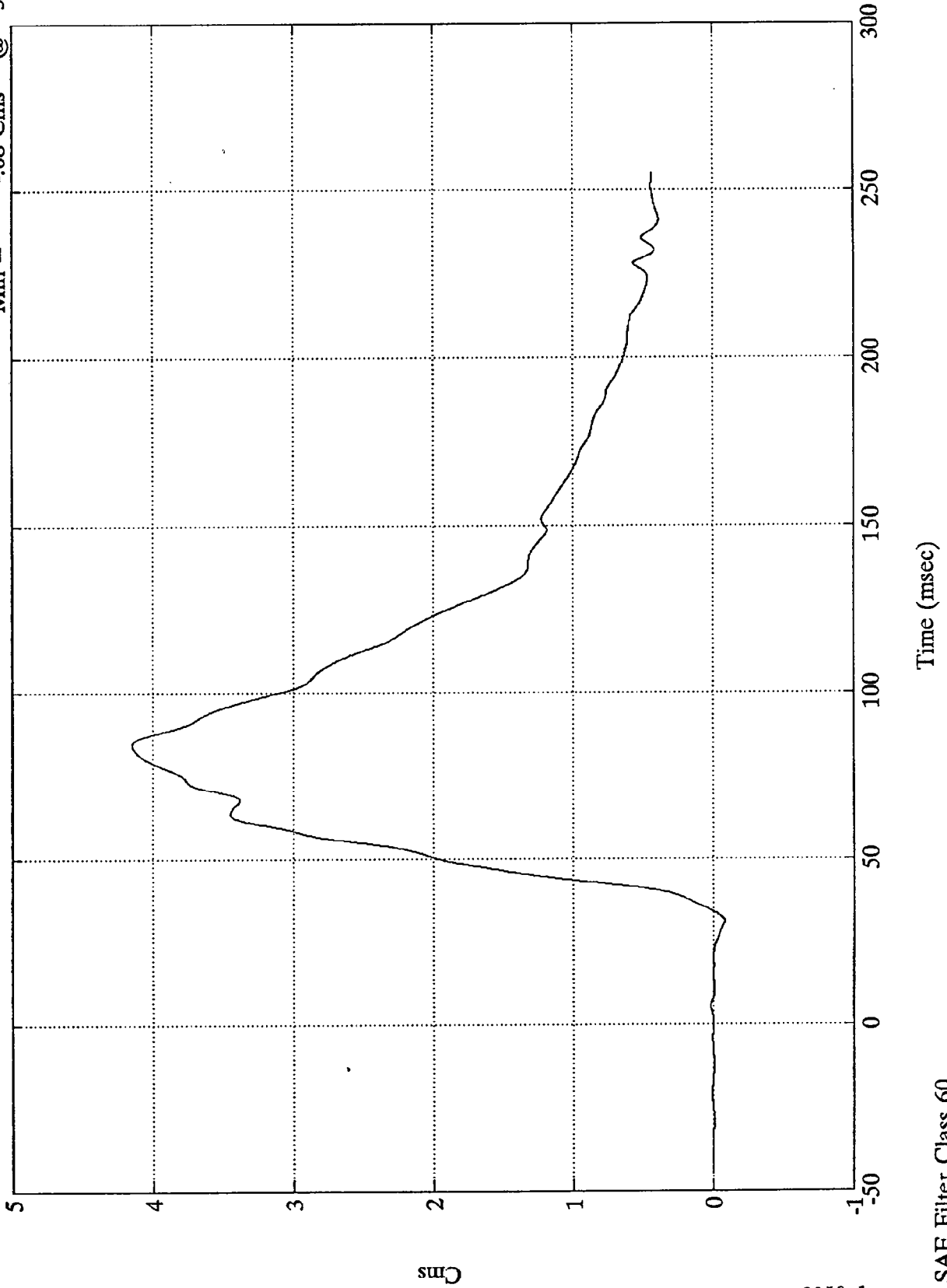
Max = 46.94 Gs @ 68.52 msec
Min = .05 Gs @ -18.84 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Chest Disp.

Max = 4.15 Cms @ 84.36 msec
Min = -.08 Cms @ 31.07 msec



B-105
Cms

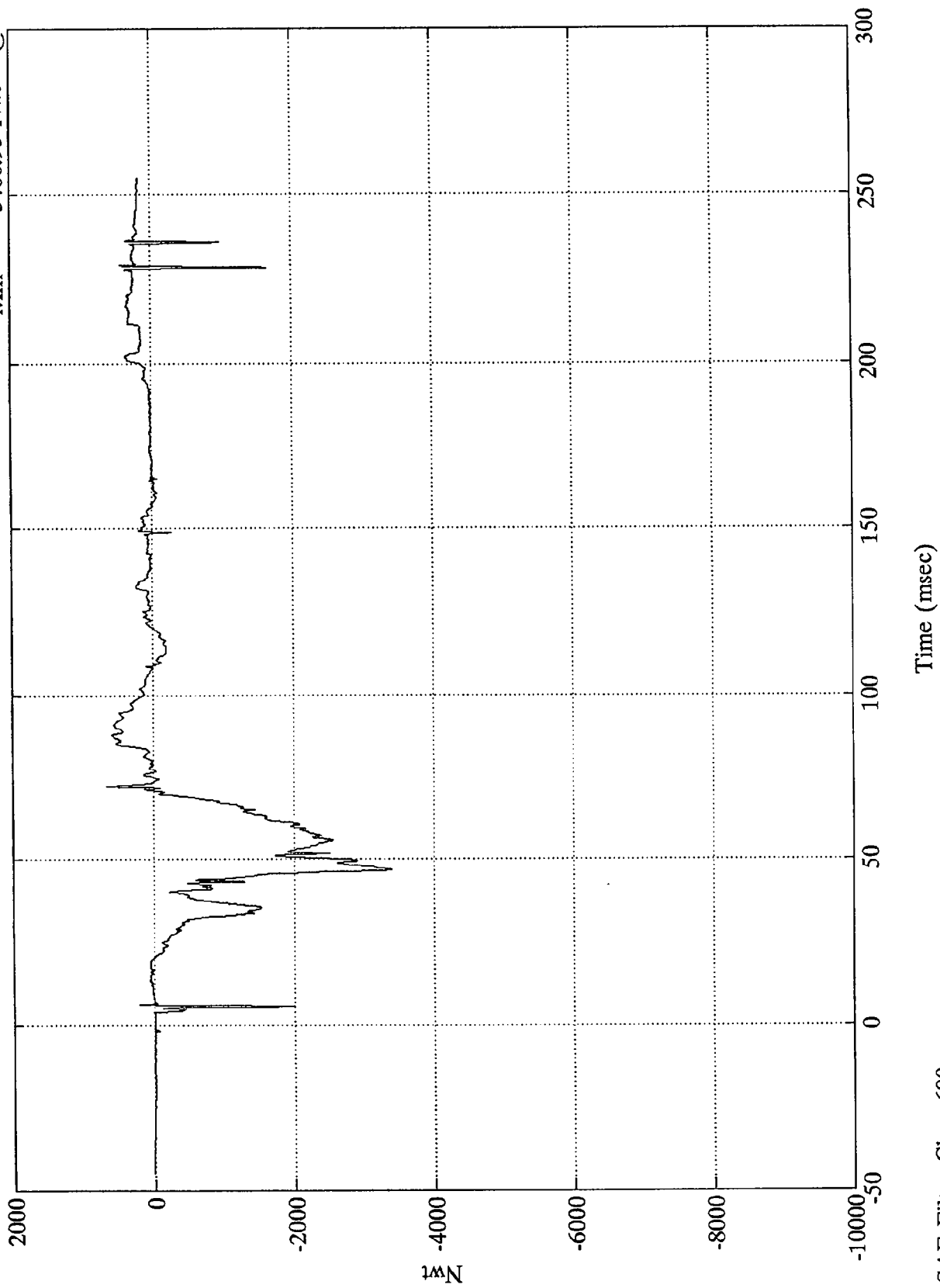
8058-1

SAE Filter Class 60

NCAP TEST #5 - 1993 TOYOTA COROLLA

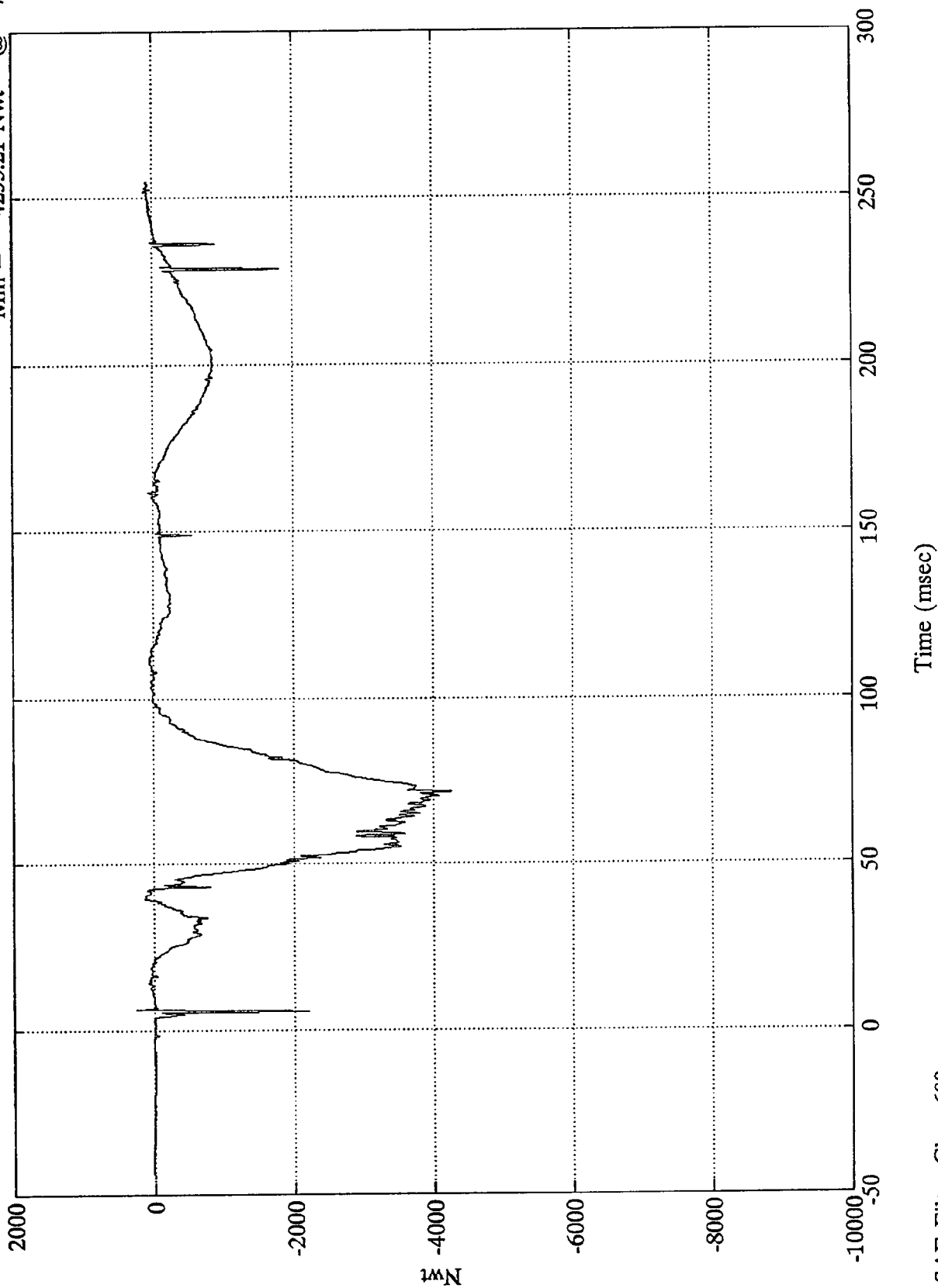
Max = 663.36 Nwt @ 72.12 msec
Min = -3400.95 Nwt @ 46.68 msec

Pos. 2 Left Femur



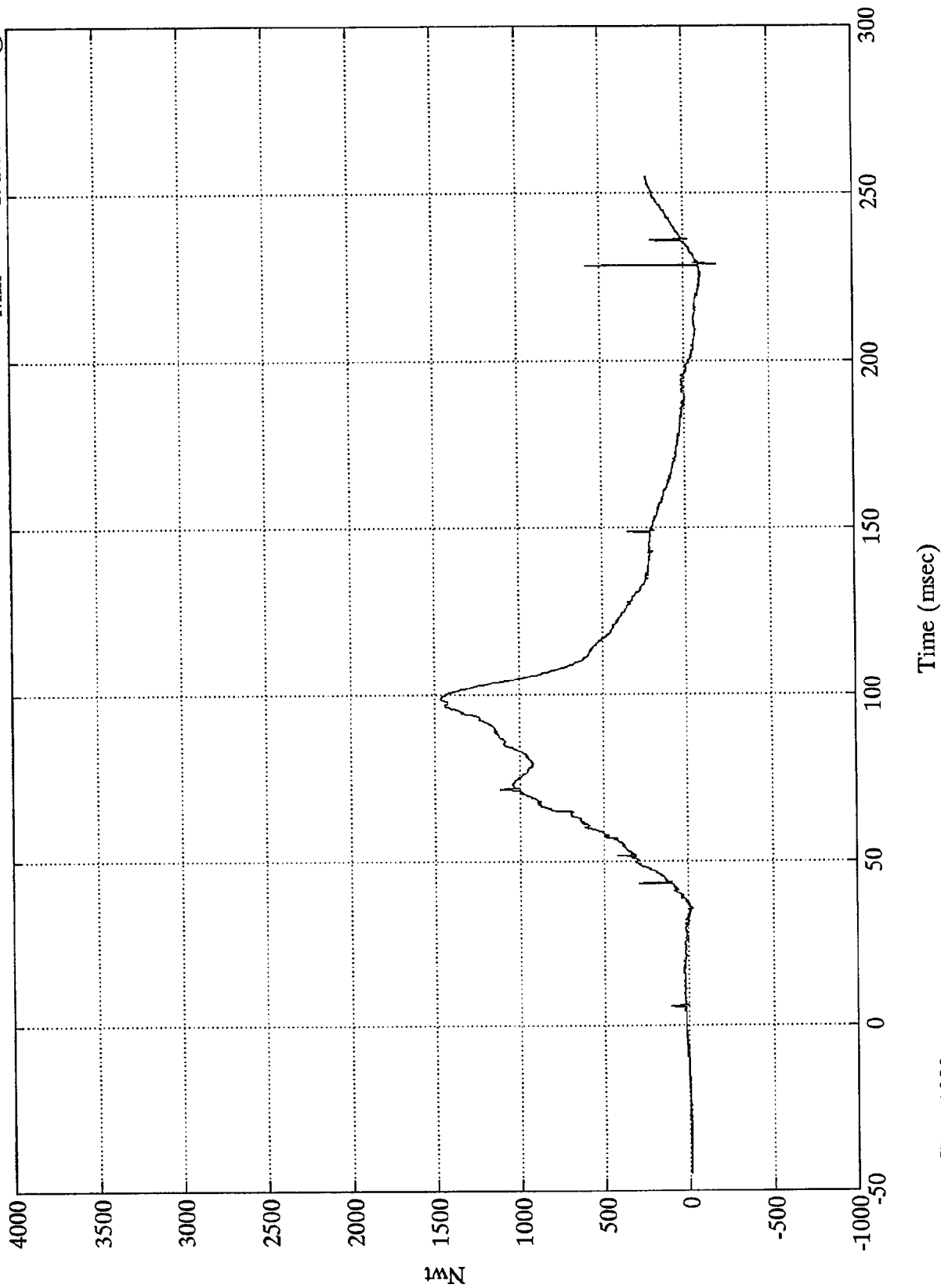
NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Right Femur Max = 261.41 Nwt @ 6.11 msec
Min = -4253.21 Nwt @ 71.76 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

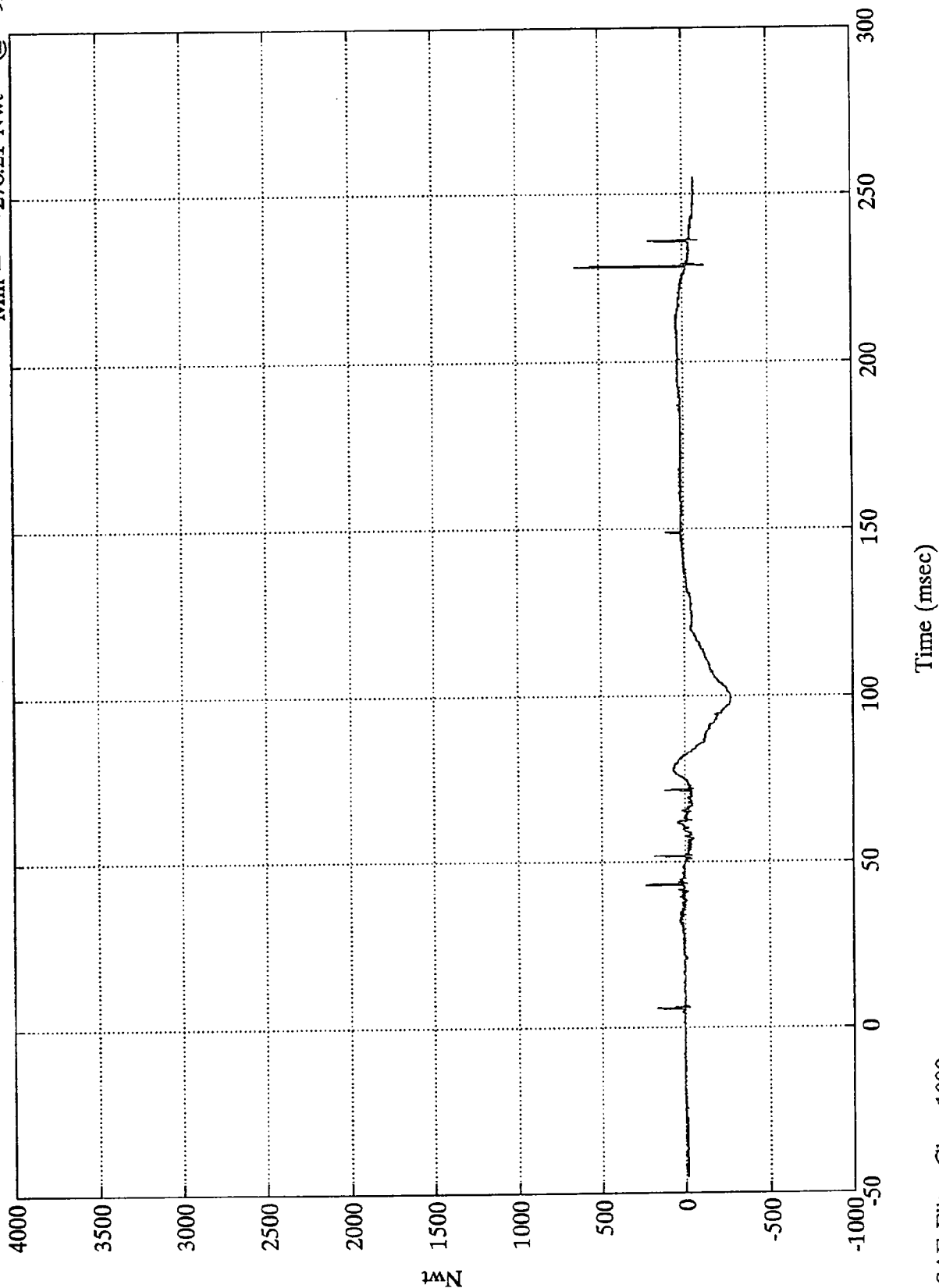
Pos. 2 Upper Neck Fx Max = 1469.21 Nwt @ 98.76 msec
 Min = -191.33 Nwt @ 228.72 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Upper Neck Fy

Max = 646.69 Nwt @ 228.36 msec
Min = -278.21 Nwt @ 99.36 msec



B-109

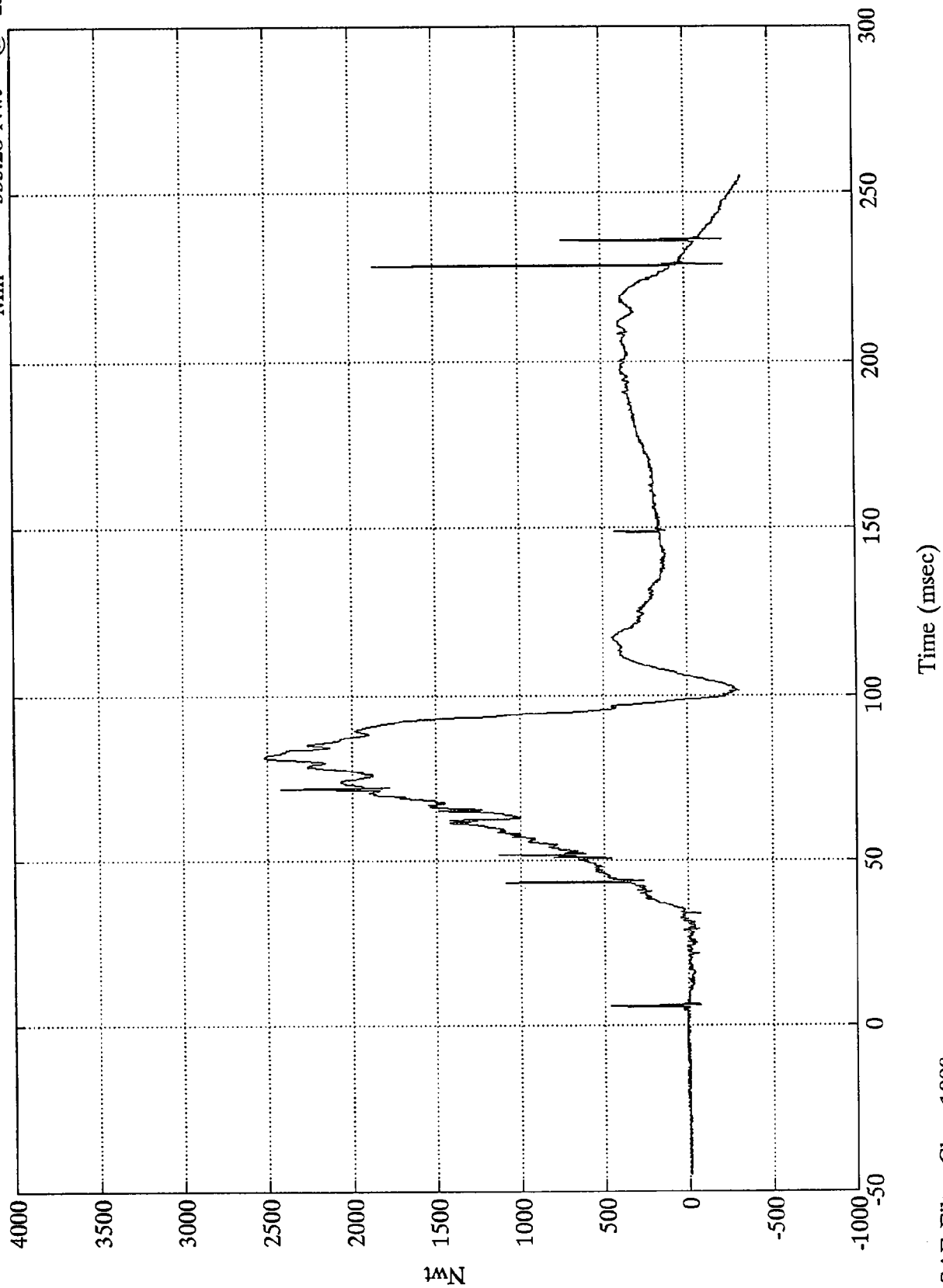
8058-1

SAE Filter Class 1000

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Upper Neck Fz

Max = 2516.12 Nwt @ 81.36 msec
Min = -335.28 Nwt @ 254.88 msec



B-110

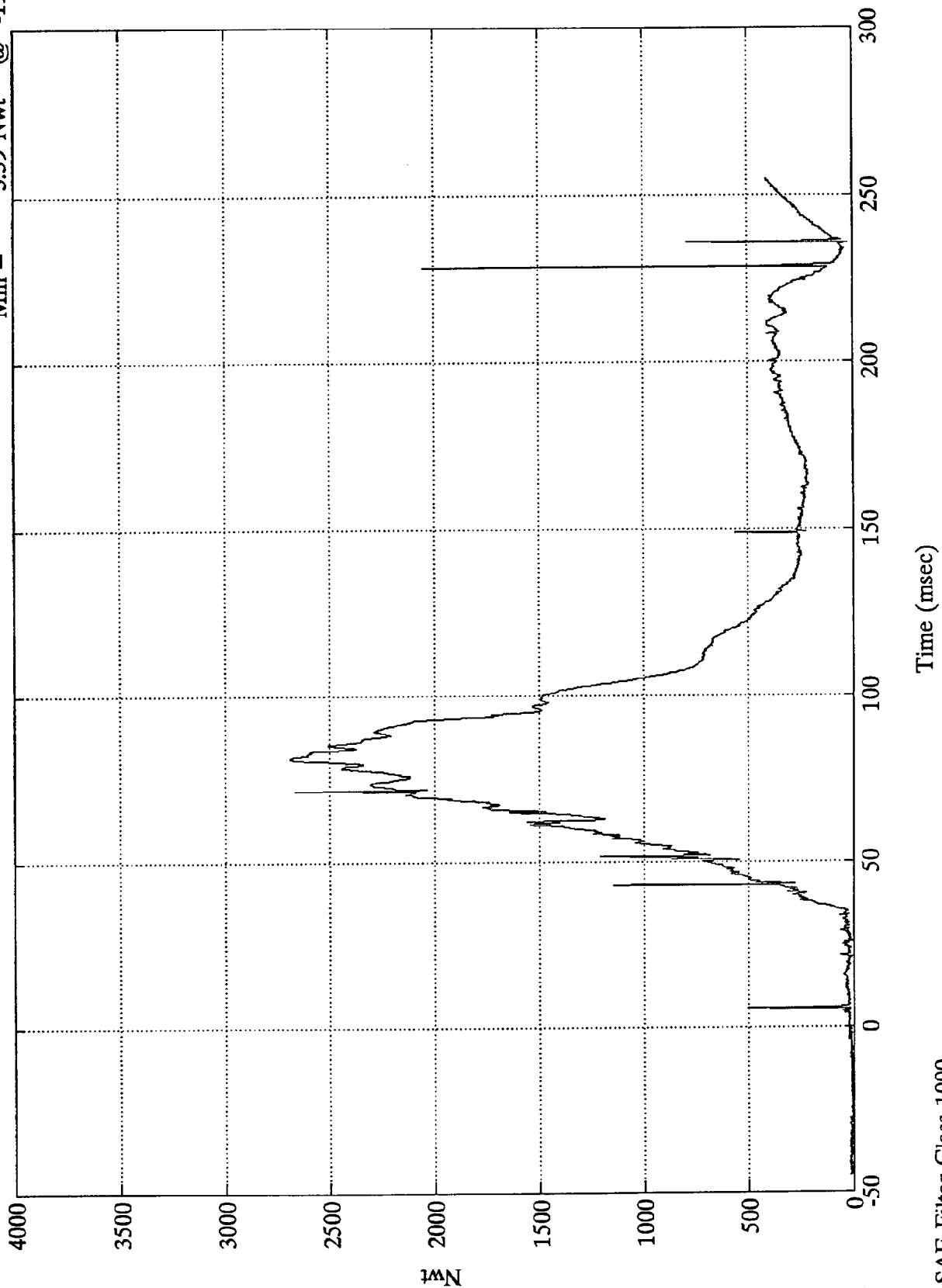
8058-1

SAE Filter Class 1000

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Neck Force Res.

Max = 2690.66 Nwt @ 81.23 msec
Min = 3.39 Nwt @ -19.08 msec



14N
B-111

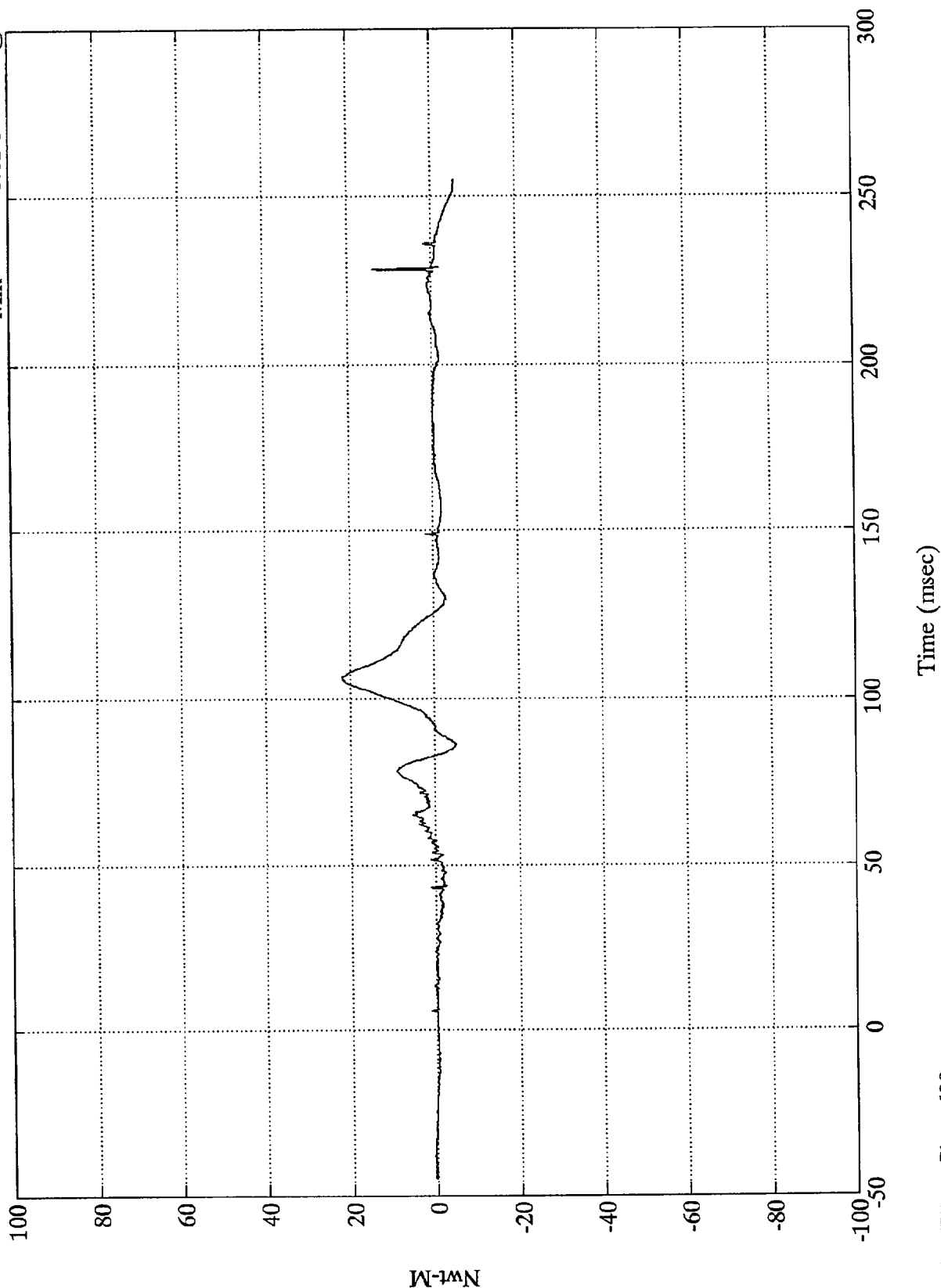
8058-1

SAE Filter Class 1000

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Upper Neck Mx

Max = 21.91 Nwt-M @ 106.55 msec
Min = -5.61 Nwt-M @ 254.04 msec



B-112

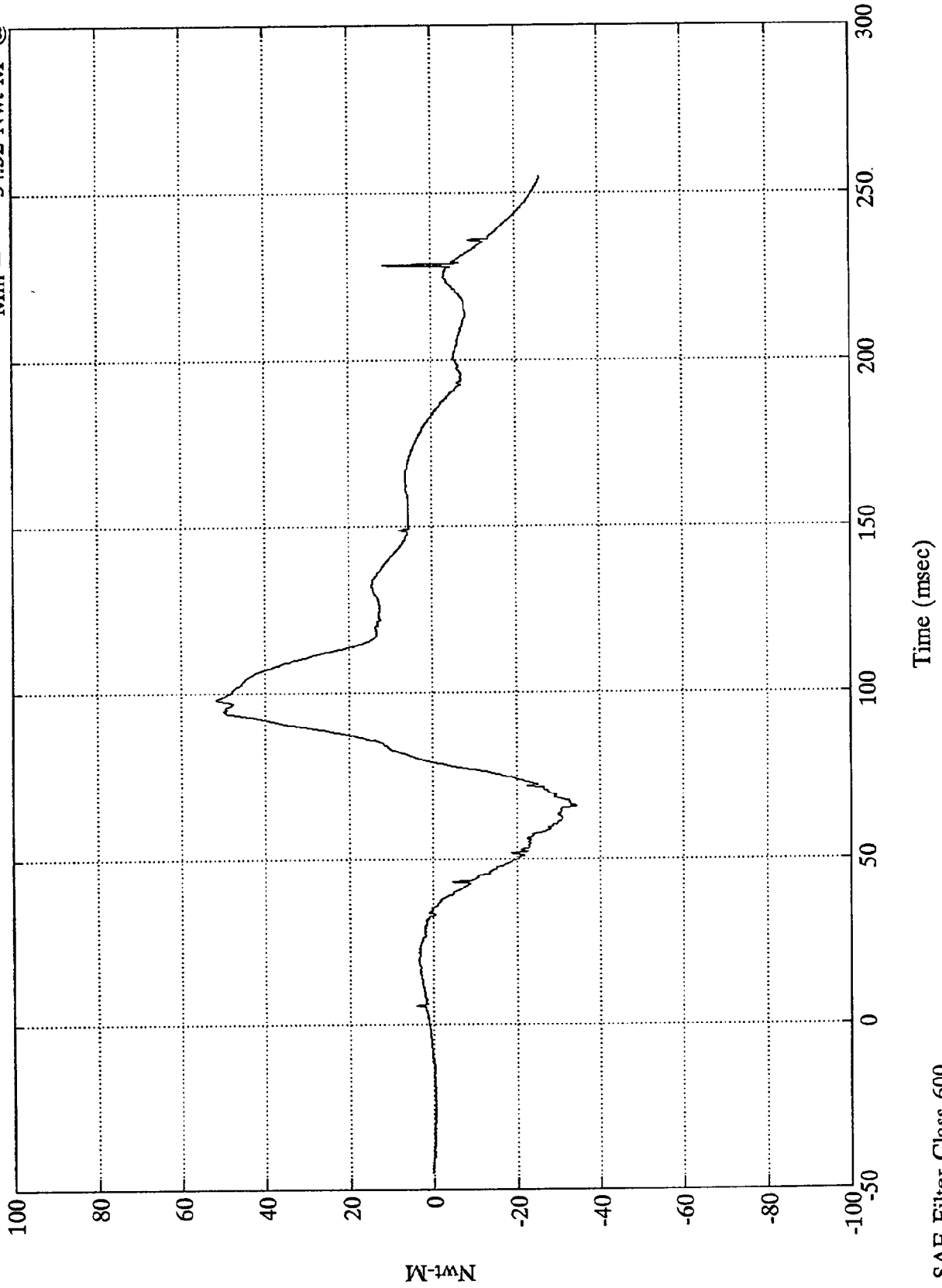
8058-1

SAE Filter Class 600

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Upper Neck My

Max = 51.61 Nwt-M @ 97.80 msec
Min = -34.32 Nwt-M @ 65.52 msec



Nwt-M
B-113

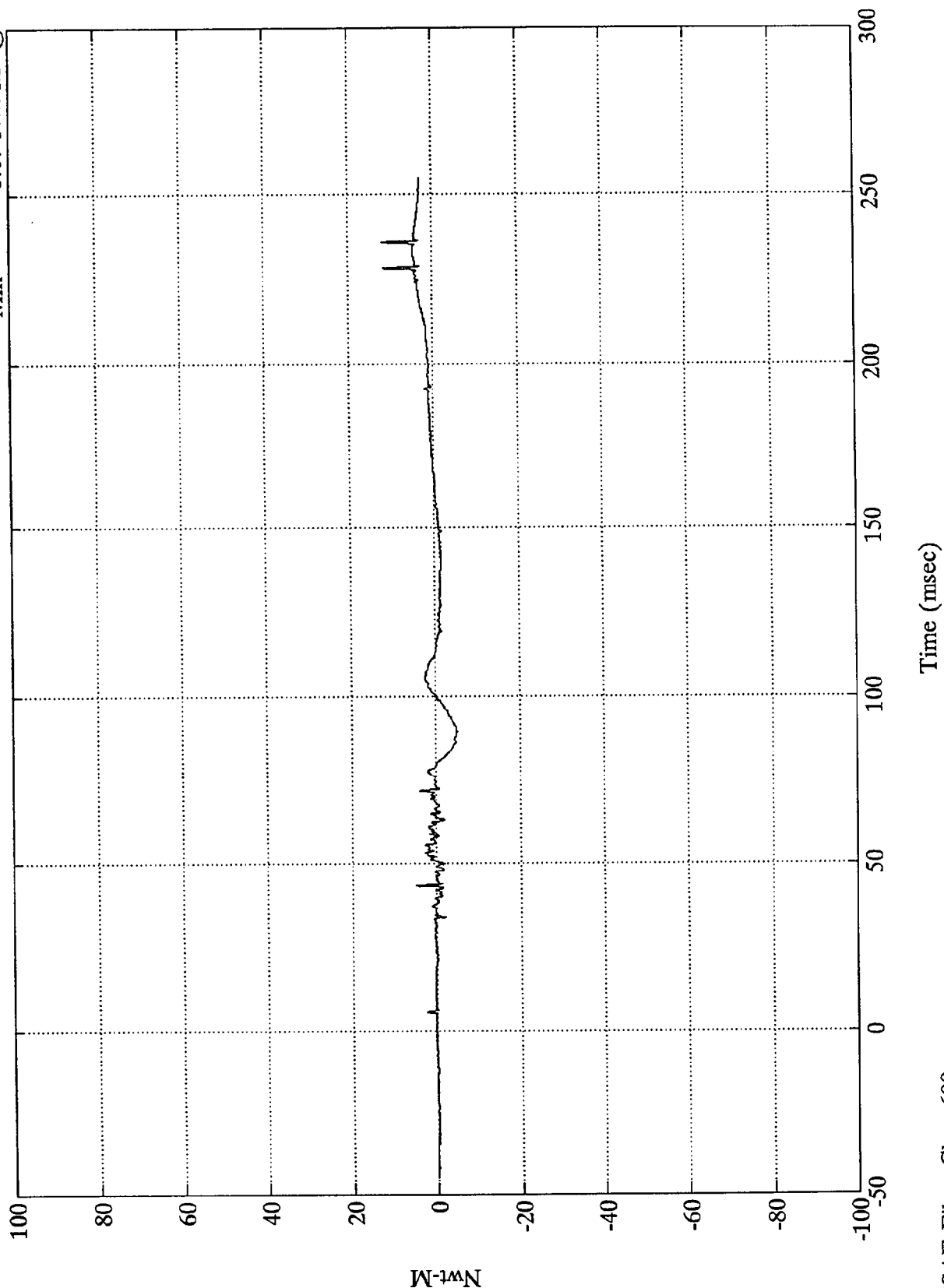
8058-1

SAE Filter Class 600

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Upper Neck Mz

Max = 11.90 Nwt-M @ 235.92 msec
Min = -5.07 Nwt-M @ 89.51 msec



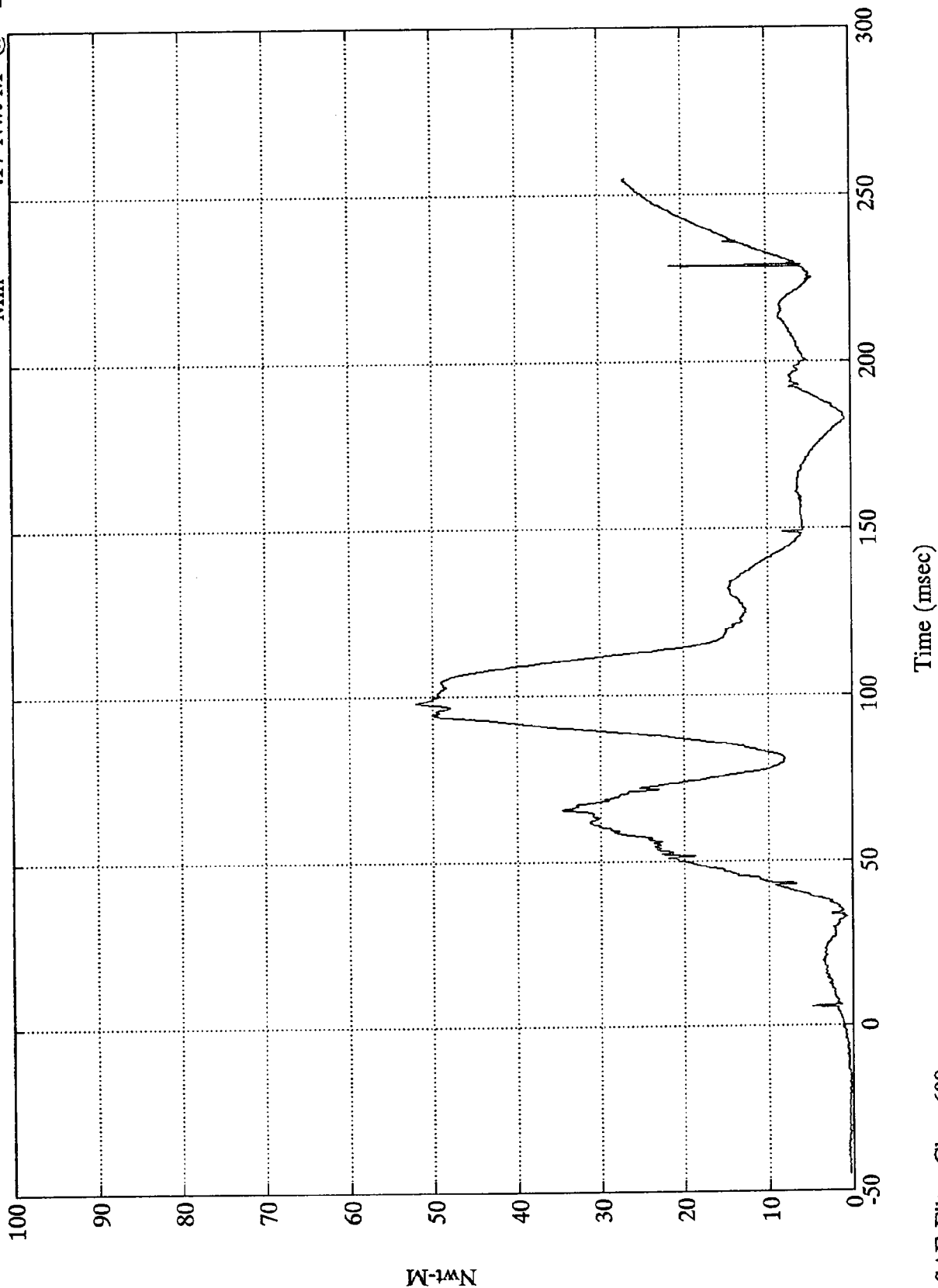
8058-1

SAE Filter Class 600

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Neck Moment Res.

Max = 52.00 Nwt-M @ 97.80 msec
Min = .17 Nwt-M @ -18.60 msec



W-1MN
B-115

8058-1

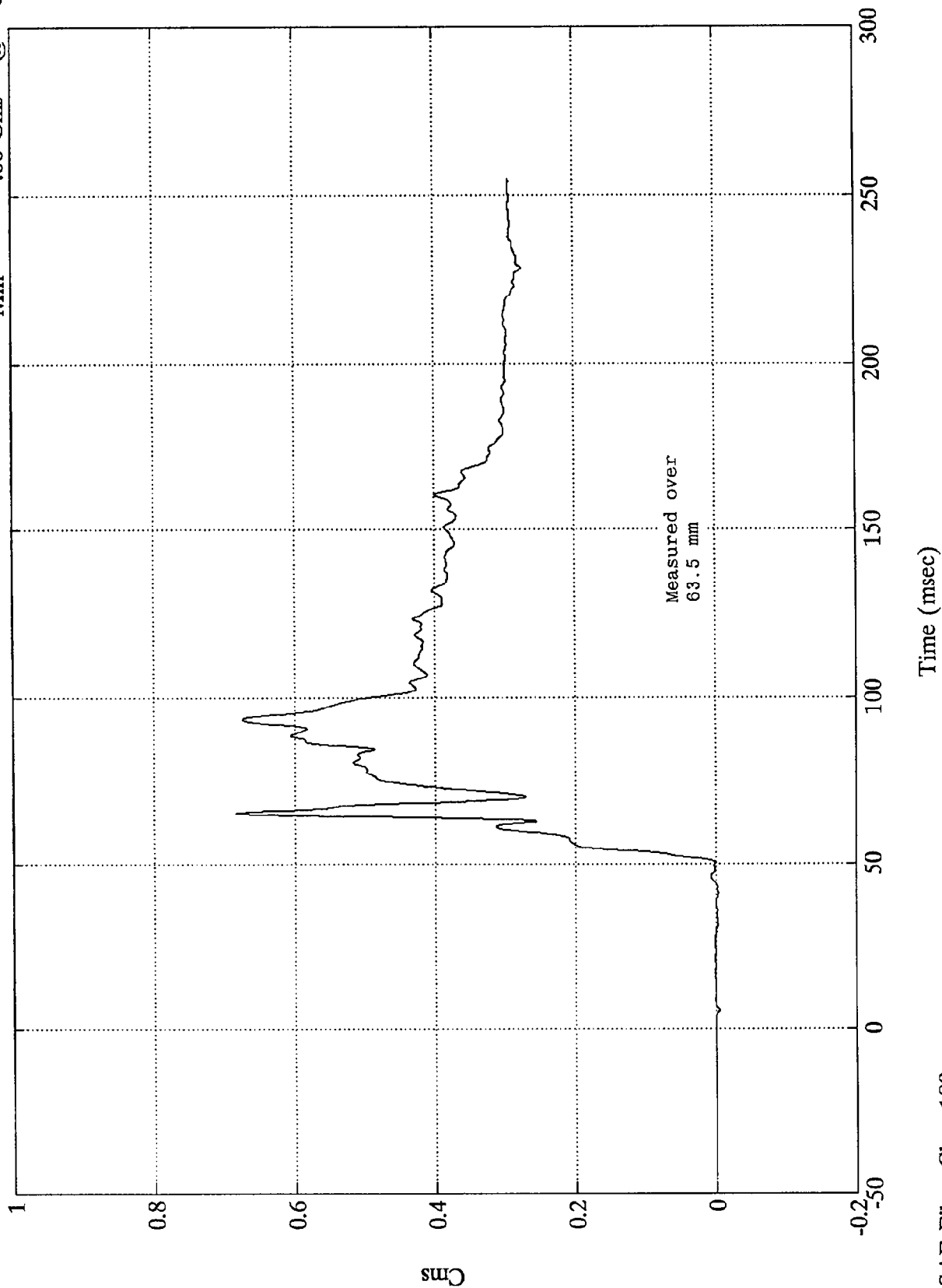
SAE Filter Class 600

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Belt Elongation

Max = .69 Cms
Min = -.00 Cms

@ 65.15 msec
@ 5.51 msec



B-116

8058-1

SAE Filter Class 180

NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Right Belt Load

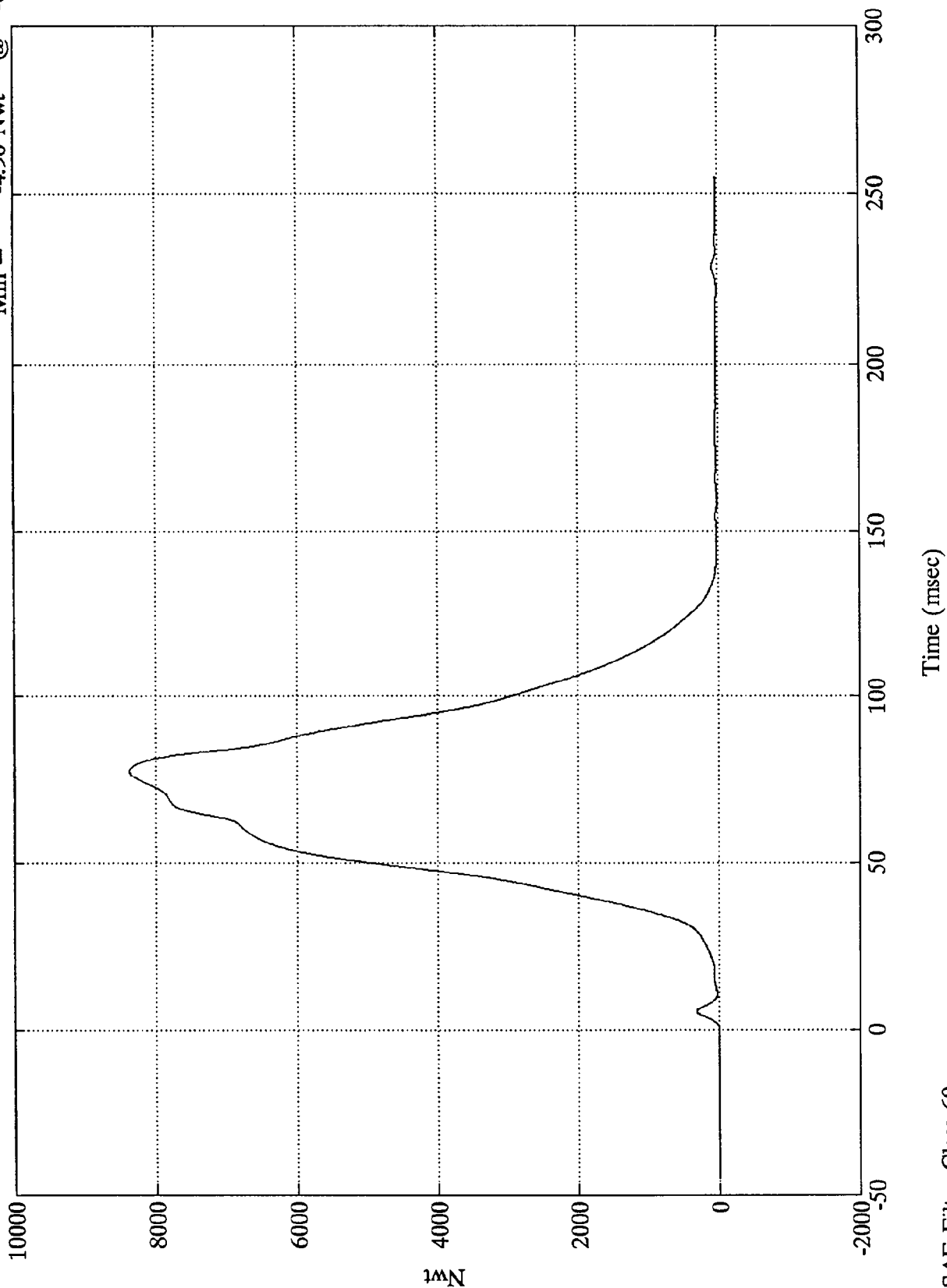
Max = 3078.11 Nwt @ 47.88 msec
Min = -15.07 Nwt @ 134.27 msec



NCAP TEST #5 - 1993 TOYOTA COROLLA

Pos. 2 Torso Belt Load

Max = 8372.94 Nwt @ 77.40 msec
Min = -4.90 Nwt @ -0.24 msec



Appendix C

PART 572E DUMMY CONFIGURATION

AND PERFORMANCE VERIFICATION DATA SHEETS

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

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

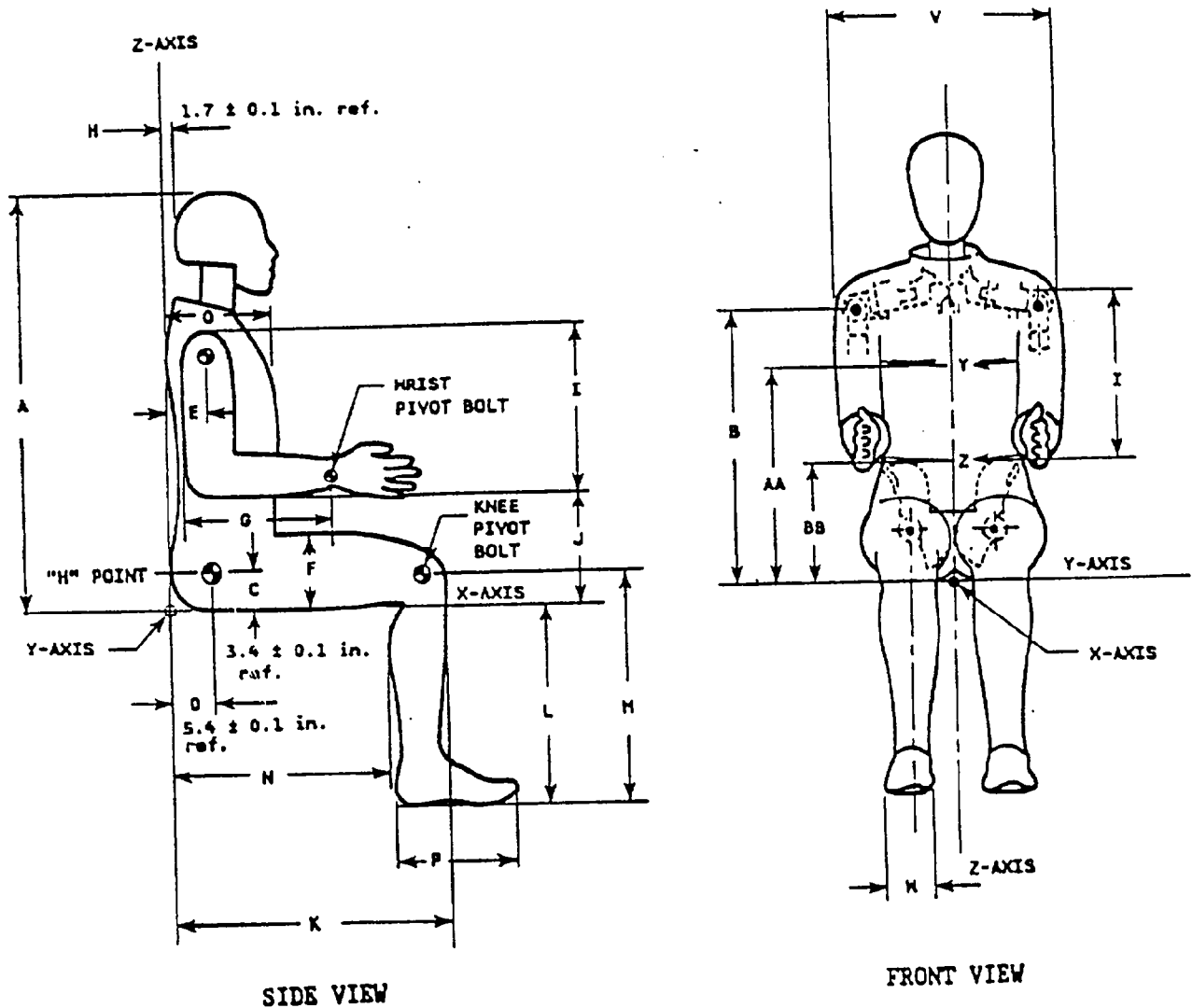
Dummy serial numbers and certification dates are:

<u>Serial No.</u>	<u>Completion Date</u>
45	10/16/92
245	10/16/92

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 7
DUMMY CONFIGURATION DIMENSIONS



NOTE: FIGURE IS REFERENCED TO
THE ERECT SEATED POSITION.
THE CURVED LUMBAR DOES NOT ALLOW
THE BYBRID III TO BE POSITIONED
IN A PERFECT ERECT ATTITUDE.

HYBRID III EXTERNAL DIMENSIONS

S/N 45 HUMANOID

DUMMY SERIAL NO. 45

DATE: 10/16/92

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	228 mm
CHEST CIRCUMFERENCE (Y)	970-1001 mm	1000 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	602 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	487 mm
FOOT LENGTH (P)	252-267 mm	259 mm
FOOT BREADTH (W)	91-107 mm	101 mm
SHOULDER PIVOT FROM BACKLINE (E)	84-94 mm	94 mm
SHOULDER BREADTH (V)	422-437 mm	426 mm
SHOULDER PIVOT HEIGHT (B)	505-521 mm	510 mm
ELBOW REST HEIGHT (J)	190-211 mm	195 mm
SHOULDER-ELBOW LENGTH (I)	330-345 mm	337 mm
BACK OF ELBOW TO WRIST PIVOT (G)	290-305 mm	292 mm

DUMMY MEETS SPECIFICATIONS

TECHNICIAN: IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

HEAD DROP TEST

HYBRID III

DATE : 10/14/92

CALSPAN SEQUENTIAL NUMBER 2

HY3 SN: 45 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	47 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	240.4 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	5.7 G'S
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

NECK FLEXION TEST

HYBRID III

DATE : 10/15/92

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 2

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%	53 %
IMPACT VELOCITY		24.8 - 25.7 KPH	24.9 KPH
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	23.89 G'S
	20 MS	17.60 - 22.60 G'S	22.41 G'S
	30 MS	12.50 - 18.50 G'S	18.46 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	18.46 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	39.13 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	76.33 DEG.
	TIME	57 - 64 MS	58 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88 - 108 N-M	94.9 N-M
	TIME	47 - 58 MS	52.5 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	118 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	99.75 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

NECK EXTENSION TEST

HYBRID III

DATE : 10/15/92

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 2

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%	53 %
IMPACT VELOCITY		21.4 - 22.3 KPH	22 KPH
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G'S	19.98 G'S
	20 MS	14.00 - 19.00 G'S	18.17 G'S
	30 MS	11.00 - 16.00 G'S	15.8 G'S
MAX PENDULUM G'S ABOVE 30 MS		22 G'S MAX	15.8 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		38 - 46 MS	40.38 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	100.21 DEG.
	TIME	72 - 82 MS	72.5 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-80.0/-52.9 N-M	-67.2 N-M
	TIME	65 - 79 MS	67.5 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	152.63 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	121.5 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
THORAX IMPACT TEST
HYBRID III

DATE : 10/16/92

CALSPAN SEQUENTIAL NUMBER 2

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%	52 %
PENDULUM VELOCITY	23.7 - 24.6 KPH	23.7 KPH
MAXIMUM DEFLECTION	64 - 73 mm	64.5 mm
MAXIMUM RESISTIVE FORCE	4804 - 5538 NEWTONS	5475 NEWTONS
INTERNAL HYSTERESIS	69% - 85%	69.1 %

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 10/15/92

KNEE: LEFT

CALSPAN SEQUENTIAL NUMBER 2

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%	51 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.68 KPH
PEAK KNEE IMPACT FORCE	4430 - 6965 N	4746 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

KNEE IMPACT TEST

HYBRID III

DATE : 10/15/92

KNEE: RIGHT

CALSPAN SEQUENTIAL NUMBER 2

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%	51 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.68 KPH
PEAK KNEE IMPACT FORCE	4430 - 6965 N	4773 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	A12C	9/92	3/93
ENDEVCO	A60C	9/92	3/93
ENDEVCO	A84G	9/92	3/93
ENDEVCO	EM94	9/92	3/93
ENDEVCO	A83G	9/92	3/93
ENDEVCO	A30G	9/92	3/93
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 245 HUMANOID

DUMMY SERIAL NO. 245

DATE: 10/16/92

TEMPERATURE		20.5 DEG. C
RELATIVE HUMIDITY		52 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)	429-434 mm	431 mm
LOCATION FOR WAIST CIRCUMFERENCE (BB)	226-231 mm	228 mm
CHEST CIRCUMFERENCE (Y)	970-1001 mm	998 mm
WAIST CIRCUMFERENCE (Z)	815-866 mm	863 mm
CHEST DEPTH (O)	213-229 mm	213 mm
H-POINT HEIGHT (C)	84-89 mm	89 mm
H-POINT FROM SEAT BACK (D)	135-140 mm	137 mm
SKULL CAP TO BACKLINE (H)	41-46 mm	43 mm
TOTAL SITTING HEIGHT (A)	879-889 mm	889 mm
THIGH CLEARANCE (F)	140-155 mm	152 mm
BUTTOCK KNEE LENGTH (K)	580-605 mm	596 mm
BUTTOCK POPLITAL LENGTH (N)	452-477 mm	464 mm
POPLITEAL LENGTH (L)	430-455 mm	447 mm
KNEE PIVOT HEIGHT (M)	485-501 mm	487 mm
FOOT LENGTH (P)	252-267 mm	256 mm
FOOT BREADTH (W)	91-107 mm	96 mm
SHOULDER PIVOT FROM BACKLINE (E)	84-94 mm	89 mm
SHOULDER BREADTH (V)	422-437 mm	426 mm
SHOULDER PIVOT HEIGHT (B)	505-521 mm	518 mm
ELBOW REST HEIGHT (J)	190-211 mm	205 mm
SHOULDER-ELBOW LENGTH (I)	330-345 mm	335 mm
BACK OF ELBOW TO WRIST PIVOT (G)	290-305 mm	294 mm

DUMMY MEETS SPECIFICATIONS

TECHNICIAN: IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

HEAD DROP TEST

HYBRID III

DATE : 8/7/92

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN: 245 HEAD DROP CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	20 DEG. C
RELATIVE HUMIDITY	10% - 70%	45 %
PEAK RESULTANT ACCELERATION	225 - 275 G'S	251.1 G'S
PEAK LATERAL ACCELERATION	15 G'S MAX	10.9 G'S
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT

NECK FLEXION TEST

HYBRID III

DATE : 8/26/92

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN:245 CAL NECK FLEXION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5-22.2 DEG. C	22 DEG. C
RELATIVE HUMIDITY		10% - 70%	50 %
IMPACT VELOCITY		24.8 - 25.7 KPH	25.2 KPH
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G'S	23.31 G'S
	20 MS	17.60 - 22.60 G'S	22.24 G'S
	30 MS	12.50 - 18.50 G'S	16.7 G'S
MAX PENDULUM G'S ABOVE 30 MS		29 G'S MAX	16.7 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		34 - 42 MS	41.5 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	68.41 DEG.
	TIME	57 - 64 MS	58.38 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88 - 108 N-M	98.8 N-M
	TIME	47 - 58 MS	54.75 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	115.75 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	101.88 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
NECK EXTENSION TEST
HYBRID III

DATE : 8/27/92

6 AXIS NECK TRANSDUCER

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN:245 CAL NECK EXTENSION

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.5 - 22.2 DEG. C	21 DEG. C
RELATIVE HUMIDITY		10% - 70%	49 %
IMPACT VELOCITY		21.4 - 22.3 KPH	22.0 KPH
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G'S	17.93 G'S
	20 MS	14.00 - 19.00 G'S	18.15 G'S
	30 MS	11.00 - 16.00 G'S	15.98 G'S
MAX PENDULUM G'S ABOVE 30 MS		22 G'S MAX	15.98 G'S
DECELERATION -TIME CURVE DECAY TIME TO 5 G'S		38 - 46 MS	39.19 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	93.55 DEG.
	TIME	72 - 82 MS	72.38 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	-80.0/-52.9 N-M	-73.3 N-M
	TIME	65 - 79 MS	68.3 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	148.25 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	124.5 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

CALSPAN CORPORATION
TRANSPORTATION RESEARCH DEPARTMENT
THORAX IMPACT TEST
HYBRID III

DATE : 10/6/92

CALSPAN SEQUENTIAL NUMBER 1

HY3 SN 245

H.S. THORAX

CAL

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.5 - 22.2 DEG. C	20.5 DEG. C
RELATIVE HUMIDITY	10% - 70%	40 %
PENDULUM VELOCITY	23.7 - 24.6 KPH	23.9 KPH
MAXIMUM DEFLECTION	64 - 73 mm	64.2 mm
MAXIMUM RESISTIVE FORCE	4804 - 5538 NEWTONS	5484 NEWTONS
INTERNAL HYSTERESIS	69% - 85%	76.1 %

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: 245 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	20 DEG. C
RELATIVE HUMIDITY	10% - 70%	46 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.68 KPH
PEAK KNEE IMPACT FORCE	4430 - 6965 N	5048 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: 245 KNEE 4.9 KGS CAL

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20 - 25 DEG. C	20 DEG. C
RELATIVE HUMIDITY	10% - 70%	46 %
PROBE VELOCITY	7.5 - 7.7 KPH	7.68 KPH
PEAK KNEE IMPACT FORCE	4430 - 6965 N	4764 N
PROBE WEIGHT	4.9 KGS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN IVAN MINKEWICZ

INSTRUMENT CALIBRATION INFORMATION

NHTSA DUMMY I.D. NUMBER: 245

A. DUMMY INSTRUMENTS

1. HEAD ACCELEROMETER

HX LONGITUDINAL

HY LATERAL

HZ VERTICAL

2. CHEST ACCELEROMETER

CX LONGITUDINAL

CY LATERAL

CZ VERTICAL

3. FEMUR LOAD CELLS

LEFT SIDE

RIGHT SIDE

MFG	SERIAL NUMBER	DATE LAST CALIBRATED	DATE OF NEXT CALIBRATION
ENDEVCO	A39J	9/92	3/93
ENDEVCO	A33F	9/92	3/93
ENDEVCO	A27F	9/92	3/93
ENDEVCO	A33A	7/92	1/93
ENDEVCO	A67A	7/92	1/93
ENDEVCO	FB32L	5/92	11/92
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	S/N 45	Serial #	Manufacturer	Calibration	
				Last	Next
Head	X	A12C	ENDEVCO	9/92	3/93
	Y	A60C	ENDEVCO	9/92	3/93
	Z	A84G	ENDEVCO	9/92	3/93
Chest	X	EM94	ENDEVCO	9/92	3/93
	Y	A83G	ENDEVCO	9/92	3/93
	Z	A30G	ENDEVCO	9/92	3/93
Right Femur Load Cell		952	GSE	5/92	11/92
Left Femur Load Cell		951	GSE	5/92	11/92
Neck Load Cell	X	269	DENTON	8/91	2/92
	Y	269	DENTON	8/91	2/92
	Z	269	DENTON	8/91	2/92
Neck Moment	X	269	DENTON	8/91	2/92
	Y	269	DENTON	8/91	2/92
	Z	269	DENTON	8/91	2/92
Chest Deflection Gauge		45	HUMANOID	7/92	1/93
Hybrid III Use Only					
Lap Belt Load Cells		123	LEBOW	5/92	11/92
Shoulder Belt Load Cells		127	LEBOW	5/92	11/92
Belt Stretch Transducer		E1	CALSPAN	8/92	2/93

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(6 Month Calibration Minimum)

PASSENGER DUMMY S/N 245	Serial #	Manufacturer	Calibration	
			Last	Next
Head <u>X</u>	A39J	ENDEVCO	9/92	3/92
	A33F	ENDEVCO	9/92	3/92
	A27F	ENDEVCO	9/92	3/92
Chest <u>X</u>	A33A	ENDEVCO	7/92	1/93
	A67A	ENDEVCO	7/92	1/93
	FB32L	ENDEVCO	5/92	11/92
Right Femur Load Cell	955	GSE	5/92	11/92
Left Femur Load Cell	954	GSE	5/92	11/92
Neck Load Cell <u>X</u>	076	DENTON	7/91	1/92
	076	DENTON	7/91	1/92
	076	DENTON	7/91	1/92
Neck Moment <u>X</u>	076	DENTON	7/91	1/92
	076	DENTON	7/91	1/92
	076	DENTON	7/91	1/92
Chest Deflection Gauge Hybrid III Use Only	245	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
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	A89	CEC	10/92	4/93
Right Rear Seat Crossmember	A69	CEC	6/92	12/92
Top of Engine	A142	CEC	7/92	1/93
Bottom of Engine	A144	CEC	4/92	10/92
Left Disc Brake Caliper	A181	CEC	5/92	11/92
Right Disc Brake Caliper	A44	CEC	7/92	1/93
Instrument Panel	A183	CEC	4/92	10/92
Left Rear Seat Crossmember	A177	CEC	4/92	10/92
Right Rear Seat Crossmember	A73	CEC	7/92	1/93

Appendix E

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

Seat belts—

— Seat belt precautions

Toyota recommends that the driver and passengers in the vehicle be properly restrained at all times with the seat belts provided. Failure to do so could increase the chance of injury and/or the severity of injury in accidents. Baby or small child. Use a child restraint system which fits your vehicle. See "Child restraint" for details.

Child. If a child is too big for a child restraint system, the child should sit in the rear seat and must be restrained with the seat belt. According to accident statistics, the child is safer when properly restrained in the rear seat than in the front seat. Do not allow the child to stand up or kneel on the seat. If the shoulder belt falls across the child's neck or face, move the child to the center position and use the center lap belt.

Pregnant woman. Toyota recommends the use of a seat belt. Ask your doctor for specific recommendations. The lap belt should be worn securely and as low as possible over the hips and not on the waist.

Injured person. Toyota recommends the use of a seat belt. Depending on the injury, however, first check with your doctor.

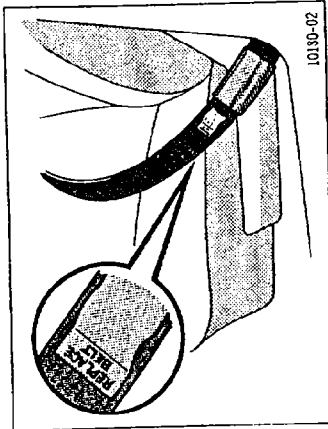
CAUTION: Persons should ride in their seats properly wearing their seat belts whenever the vehicle is moving. Otherwise, they are much more likely to suffer serious bodily injury in the event of sudden braking or a collision.

When using the seat belts, observe the following:

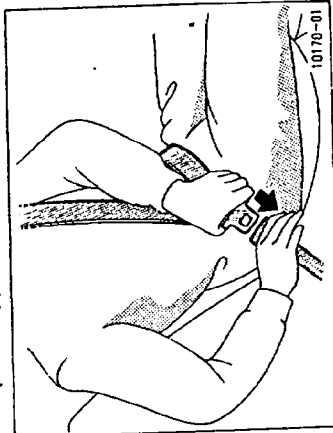
- Use the belt for only one person at a time. Do not use a single belt for two or more people—even children.
- After inserting the tab, make sure that the connection is secure and the belt is not twisted.
- Avoid reclining the seatbacks too much. The seat belts provide maximum protection when the seatbacks are in the upright position. (See the seat adjustment instructions.)
- Be careful not to damage the belt webbing or hardware, and take care that they do not get caught or pinched in the seat or doors.

- Inspect the belt system periodically. Check for cuts, frays, and loose parts. Damaged parts should be replaced. Do not disassemble or modify the system.
- Keep the belts clean and dry. If they need cleaning, use a mild soap solution or lukewarm water. Never use bleach, dye, or abrasive cleaners—they may severely weaken the belts.
- Replace the belt assembly if it has been used in a severe impact. The entire assembly should be replaced even if damage is not obvious.

—3-point type



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



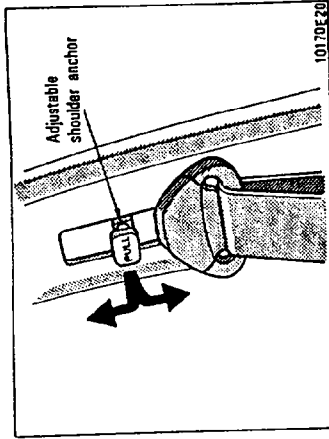
Adjust the seat as needed (front seat only) and sit up straight and well back in the seat. To fasten your belt, pull it out of the retractor and insert the tab into the buckle.

You will hear a click when the tab locks into the buckle.

The seat belt length automatically adjusts to your size and the seat position.

The retractor will lock the belt during a sudden stop or on impact. It also may lock if you lean forward too quickly. A slow, easy motion will allow the belt to extend, and you can move around freely.

If the seat belt cannot be pulled out of the retractor, firmly pull the belt and release it. You will then be able to smoothly pull the belt out of the retractor.



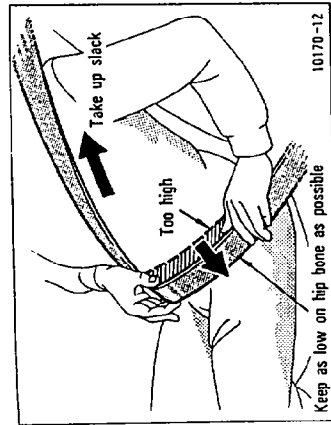
Seat belts with an adjustable shoulder anchor—

Adjust the shoulder anchor position to your size.

To adjust the anchor position, pull the knob out and slide it up or down. Release the knob and make sure the anchor is locked in position.

CAUTION: Always be sure that the belt is positioned across your shoulder, as close to your neck as possible; not on your upper arm or neck. Failure to do so could reduce the amount of protection in an accident and increase the chance of injury.

— 2-point type

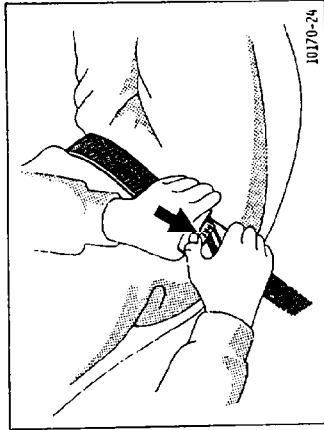


Adjust the position of the lap and shoulder belts.

Position the lap belt as low as possible on your hips—not on your waist, then adjust it to a snug fit by pulling the shoulder portion upward through the latch plate.

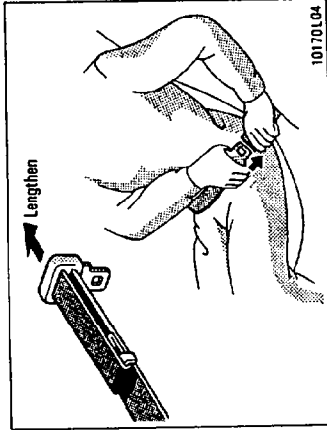
Do not use a shoulder belt that is not a 2-point type. Do not use a shoulder belt that is not a 2-point type. Do not use a shoulder belt that is not a 2-point type.

Do not use a shoulder belt that is not a 2-point type. Do not use a shoulder belt that is not a 2-point type. Do not use a shoulder belt that is not a 2-point type.



To release the belt, press the buckle-release button and allow the belt to retract.

If the belt does not retract smoothly, pull it out and check for kinks or twists. Then make sure that it remains untwisted as it retracts.

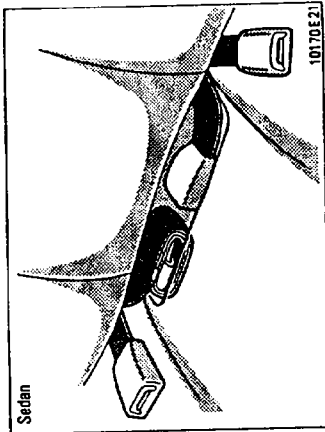


Sit up straight and well back in the seat. To fasten your belt, insert the tab into the buckle.

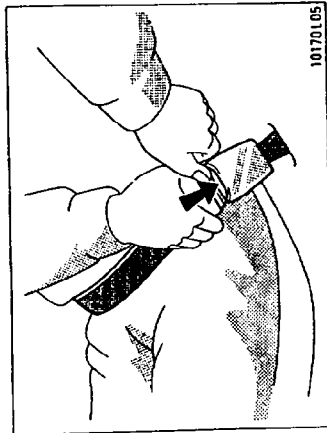
You will hear a click when the tab locks into the buckle.

If the belt is not long enough for you, hold the tab at a right angle to the belt and pull on the tab.

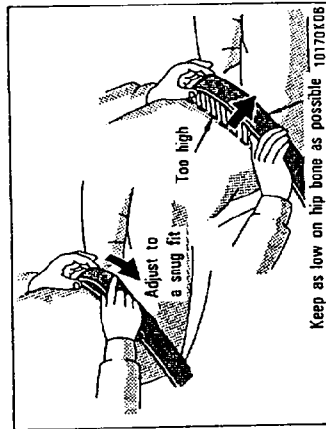
—Stowing the rear center seat belts



The rear seat belts can be stowed when not in use.



To release the belt, press the buckle-release button.

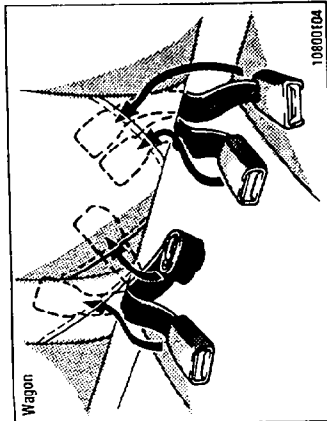


Remove excess length of the belt and adjust the belt position.

To shorten the belt, pull the free end of the belt.

Position the lap belt as low as possible on your hips—not on your waist, then adjust it to a snug fit.

CAUTION: High-positioned lap belt could increase the chance of injury due to sliding under the lap belt during an accident.



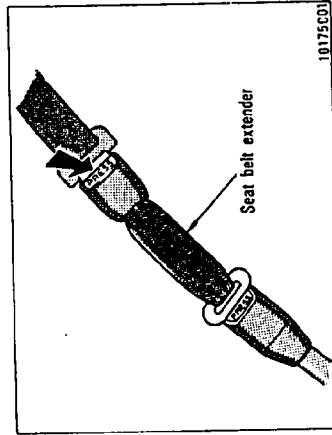
—Seat belt extender

If your seat belt cannot be fastened securely because it is not long enough, a personalized seat belt extender is available from your Toyota dealer free of charge.

Please contact your local Toyota dealer so that the dealer can order the proper required length for the extender. Bring the heaviest coat you expect to wear for proper measurement and selection of length. Additional ordering information is available at your Toyota dealer.

CAUTION When using the seat belt extender, be sure to follow the following instructions. Failure to follow these instructions could result in loss of fastening of the seat belt restraining system in case of vehicle accident, increasing the chance of personal injury.

- 1. Never use the seat belt extender if you can fit in the seat belt without it.
- 2. Remember that the extender is not designed for use in vehicles with different seating positions and at different seating positions than specified.



To connect the extender to the seat belt, insert the tab into the seat belt buckle so that the buckle-release buttons of the extender and the seat belt are located on the same side as shown.

You will hear a click when the tab locks into the buckle.

When releasing the seat belt, press on the buckle-release button on the extender, not on the seat belt. This helps prevent damage to the vehicle interior and extender itself.

When not in use, remove the extender and store in the vehicle for future use.