

V2274

REPORT NUMBER: 301-CAL-95-21

**SAFETY COMPLIANCE TESTING FOR FMVSS 301
FUEL SYSTEM INTEGRITY**

**MAZDA MOTOR CORPORATION
1995 MAZDA PROTEGE
4-DOOR SEDAN**

NHTSA NUMBER: CS5405

CALSPAN TEST NUMBER: 8247-21

**CALSPAN CORPORATION
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April 20, 1995

FINAL REPORT

PREPARED FOR:

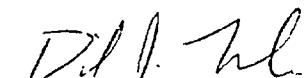
**U. S. Department of Transportation
National Highway Traffic Safety Administration
ENFORCEMENT
Office of Vehicle Safety Compliance
400 Seventh Street, S. W.
Room No. 6115 (NEF-30)
Washington, DC 20590**

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Section 1

PURPOSE OF COMPLIANCE TEST

This 30 mph rear moving barrier impact test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 301 Compliance Test Program conducted for the National Highway Traffic Safety Administration (NHTSA) by Calspan Advanced Technology Center under Contract No. DTNH22-94-C-01136. The purpose of this test was to determine if the subject vehicle, a 1995 Mazda Protege 4-Door Sedan, meets the performance requirements of FMVSS No. 301, "Fuel System Integrity." This compliance test was conducted using the requirements found in the OVSC Laboratory Test Procedure No. TP-301-01, dated March 28, 1994.

Section 2

COMPLIANCE TEST RESULTS SUMMARY

A 2890 pound 1995 Mazda Protege 4-Door Sedan was impacted from the rear by a 3959 pound moving barrier at a velocity of 29.5 mph. The test was performed by the Calspan Corporation Advanced Technology Center on April 20, 1995.

One instrumented Part 572 E and one non-instrumented Part 572 B, 50th percentile male Anthropomorphic Test Device (ATD) were placed in the driver and right-front passenger seating positions respectively. Additional ballast (24 pounds) was secured in the vehicle cargo area.

Average longitudinal crush was 15.4 inches. Pre- and post-test photographs of the vehicle can be found in appendix A.

The 12.4 gallon fuel tank was filled to 92.5 percent capacity with orange Stoddard fluid prior to the impact. After the impact, there was no fluid leakage for the first 30 minutes nor during any phase of the rollover test. The vehicle appeared to comply with all the requirements of FMVSS No. 301 "Fuel System Integrity." Section 3 presents the results of these tests.

The crash event was recorded by one real-time and eight high-speed cameras. Camera locations and other pertinent camera information are found on pages 3-9 and 3-10 of this report.

Table 1

CRASH TEST SUMMARY

Vehicle NHTSA No.: CS5405 Test Mode: 30 mph Rear Barrier
Test Date: April 20, 1995 Time: 14:58 Temperature : 57 °F
Vehicle Make/Model/Body Style: 1995 Mazda Protege 4-Door Sedan
Vehicle Test Weight: 2890 lbs Impact Velocity: 29.5 mph
Static Crush: Left Side = 15.2 inches
Right Side = 15.5 inches
Centerline = 15.5 inches
Average Crush: 15.4 inches

TYPE OF FRONT OCCUPANT RESTRAINT SYSTEM INSTALLED IN TEST VEHICLE:Driver's DSP: Airbag, 3-point belt systemRight Passenger's DSP: Airbag, 3-point belt systemVISIBLE DUMMY CONTACT POINTS:Driver: Back of head with headrest.Passenger: Back of head with headrest.DOOR OPENING DATA:Closed/Operable - Left FrontClosed/Operable - Right FrontStoddard Solvent Spillage from Vehicle's Fuel System: None

Remarks: The rear window shattered and both seatbacks moved to the full rearward position during the impact. Both
seatback recline mechanisms remained operable after the impact.

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATATEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1995 Mazda Protege 4-Door Sedan

NHTSA No.: CS5405 ; VIN: JM1BA141XS0125816 ; Color: Sand

Engine Data: 4 cylinders; - CID; 1.5 Liters; - cc

Placement: X Longitudinal or In-Line; - Transverse of Lateral

Transmission Data: 4 speeds; - Manual; X Automatic; X Overdrive

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

Major Options: - A/C; - Pwr.Strg.; X Pwr. Brakes

- Pwr. Windows; - Pwr. Door Locks; X Tilt Wheel

Date Received: 1/3/95 ; Odometer Reading 00044 miles

Selling Dealer: Hall's Mazda

& Address: 6179 Transit Road, Lockport, NY 14094

DATA FROM TIRE VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: Mazda Motor Corporation

Date of Manufacture: 9/14/94

GVWR: 3485 lbs.; GAWR: 1875 lbs. FRONT; 1630 lbs. REAR

DATA FROM TIRE PLACARD:

Location of Placard on Vehicle: Driver door

Tire Pressure with Maximum Capacity Vehicle Load: 32 psi FRONT 32 psi REAR

Recommended Tire Size: P175/70 R13 82S

* Recommended Cold Tire Pressure: 32 psi FRONT; 32 psi REAR

Size of Tires on Test Vehicle: P175/70 R13 82S

Type of Spare Tire: Temporary

Vehicle Capacity Data:

Type of Front Seats:	<u>-</u>	Bench;	<u>X</u>	Bucket;	<u>-</u>	Split Bench
Number of Occupants:	<u>2</u>	Front;	<u>3</u>	Rear;	<u>5</u>	Total
Vehicle Capacity Weight (VCW) =			<u>850</u>			lbs.
No. of Occupants x 150 lbs. =			<u>750</u>			lbs.
Rated Cargo/Luggage Weight (RCLW) =			<u>100</u>			lbs.

*Tire pressure used for test

Table 2

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

Right Front	=	749	lbs.	Right Rear	=	467	lbs.
Left Front	=	771	lbs.	Left Rear	=	473	lbs.
TOTAL FRONT	=	1,520	lbs.	TOTAL REAR	=	940	lbs.
TOTAL DELIVERED WEIGHT	=	2,460	lbs.				
% of Total Front of Vehicle Weight	=	62		% of Total Rear Weight	=	38	%

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight	=	2,460	lbs.
Rated Cargo/Luggage Weight (RCLW)	=	100	lbs.
Weight of 2 p.572 Dummies, 167 & 164 lbs	=	331	lbs.
TARGET TEST WEIGHT	=	2,891	lbs.

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 99 POUNDS OF CARGO WEIGHT:

Right Front	=	878	lbs.	Right Rear	=	540	lbs.
Left Front	=	929	lbs.	Left Rear	=	543	lbs.
TOTAL FRONT	=	1,807	lbs.	TOTAL REAR	=	1,083	lbs.
TOTAL TEST WEIGHT	=	2,890	lbs.				
% of Total Front Weight	=	63	%	% of Total Rear Weight	=	37	%

* Weight of Ballast Secured in Vehicle Trunk Area = 24 lbs.

Type of Ballast: Lead shot

Method of Securing Ballast: Placed in well behind rear seatback cushion.

Vehicle Components Removed for Weight Reduction: None

VEHICLE ATTITUDE (all dimension in inches):

AS DELIVERED:	RF	26.1	LF	26.2	RR	26.5	LR	26.3
AS TESTED:	RF	24.6	LF	24.3	RR	25.7	LR	25.4
Vehicle's Wheel Base:		102.6	in.					
Location of Vehicle's C.G.:		38	inches rearward of front wheel center.					

FUEL SYSTEM DATA:

Fuel System Capacity From Owner's Manual	=	13.2	gallons
Usable Capacity Figure Furnished by COTR	=	12.4	gallons
Test Volume Range (91 to 94% of Usable Capacity)	=	11.3	to 11.7 gallons
ACTUAL TEST VOLUME=		11.5	gallons (with entire fuel system filled)

* Ballast weight includes the RCLW, the weight of drained vehicle fluids and the weight of any removed vehicle components less the weight of onboard instrumentation, cameras, and hardware.

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont.)FUEL SYSTEM DATA (continued):

Test Fluid Type:	Stoddard solution
Test Fluid Specific Gravity:	0.764
Test Fluid Kinematic Viscosity:	0.96 centistokes
Test Fluid Color:	Orange ("red" is preferred)
Type of Vehicle Fuel Pump:	Electronic
Electric Fuel Pump Operation with Ignition Switch ON and Engine OFF - Fuel pump operates.	
Details of Fuel System:	Fuel filler is located on the left side of the vehicle aft of the rear axle. fuel lines are located on the left side of the vehicle underbody.

Table 3

POST IMPACT DATATYPE OF TEST:

Type of Test: Rear Barrier Impact Angle: 0°
 Test Date: April 20, 1995 Time: 14:58 Temperature: 57 °F
 Vehicle NHTSA No.: CS5405
 Required Impact Velocity Range: 28.9 to 29.9 mph

BARRIER IMPACT VELOCITY: (Speed traps within 5 feet of impact plane.)

Trap No. 1 = 29.5 mph; Trap No. 2 = 29.5 mph
 Average Impact Speed = 29.5 mph

VEHICLE STATIC CRUSH: (For frontal and rear impacts only.)

Vehicle Length:

Pre-Test	Right =	<u>172.3</u>	; C/L =	<u>174.8</u>	; Left =	<u>172.0</u>
Post-Test	Right =	<u>156.8</u>	; C/L =	<u>159.3</u>	; Left =	<u>156.8</u>
Crush	Right =	<u>15.5</u>	; C/L =	<u>15.5</u>	; Left =	<u>15.2</u>
AVERAGE	=	<u>15.4</u>	inches			

Section 3
COMPLIANCE TEST DATA

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION
(FOR REAR IMPACTS ONLY)

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS

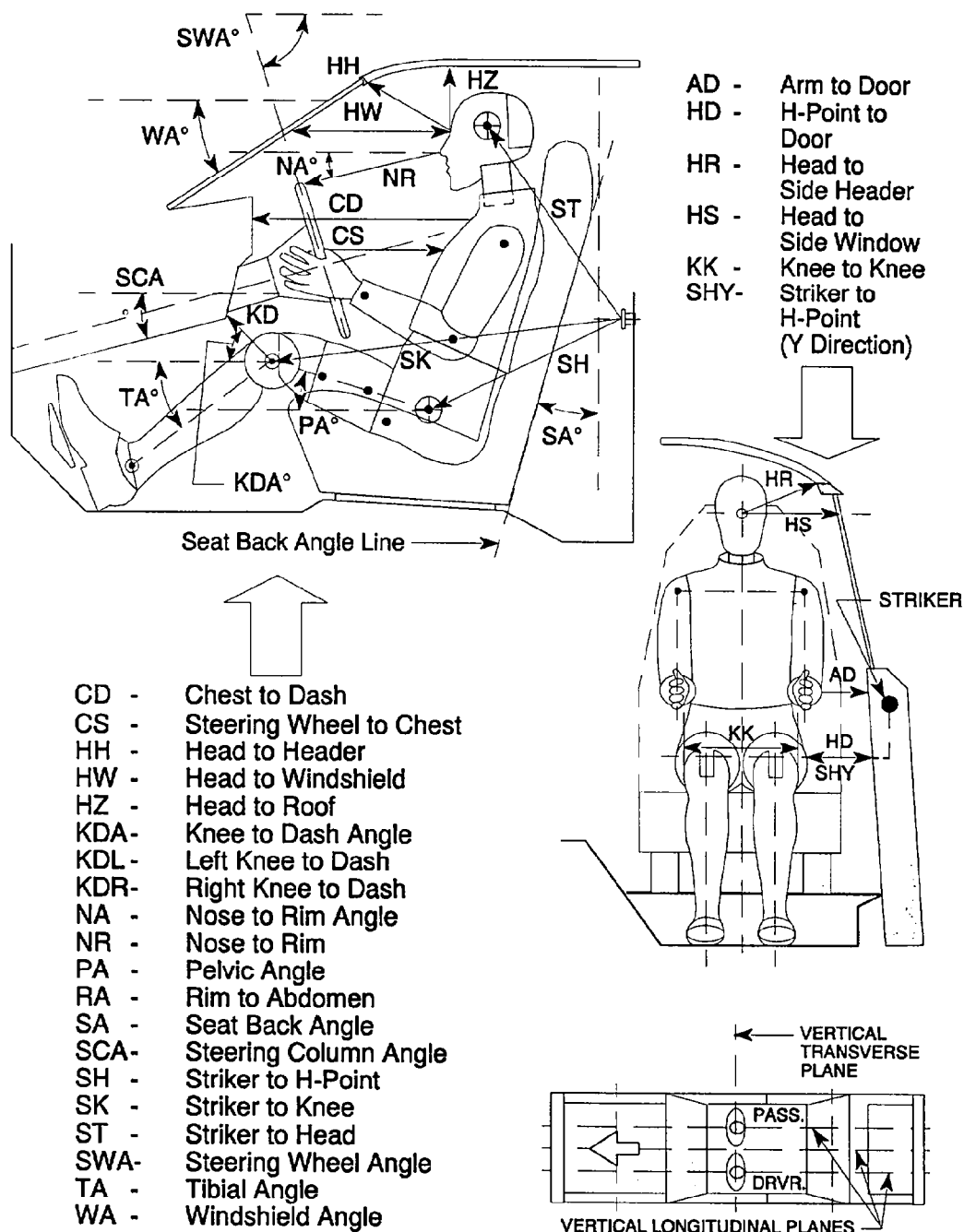


Table 4

FRONT SEAT OCCUPANT MEASUREMENTS
(FOR REAR IMPACT ONLY)

	DRIVER (Serial #366)
WA°	29 deg.
SWA°	74 deg.
SCA°	16 deg.
SA°	21 deg.
HZ	7.1
HH	10.4
HW	20.2
HR	8.8
NR	13.2 Angle -14 deg.
CD	19.5
CS	10.8
RA	6.9
KDL	6.1 Angle (KDA) 40 deg.
KDR	6.4
PA°	22 deg.
TA°	-38 deg.
KK	11.6
ST	21.9 Angle 70 deg.
SK	24.8 Angle -6 deg.
SH	9.6 Angle -32 deg.
SHY	9.2
HS	13.1
HD	7.3
AD	5.4

Table 5
FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

FMVSS NO. 301

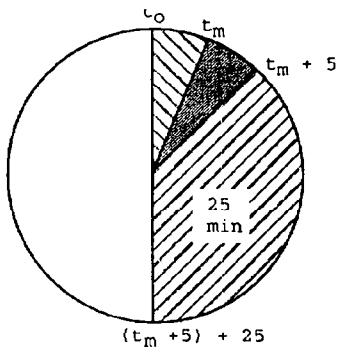
TEST VEHICLE NHTSA NO.: CS5405 TEST DATE: April 20, 1995
Vehicle Mfgr./Make/Model: 1995 Mazda Protege 4-Door Sedan

Test vehicle fuel tank filled to 91% to 94% of manufacturer's "usable" capacity and with electric fuel pump operating (if it will operate without engine operation). Part 572 test dummies located at each front designated seating position.

TEST VEHICLE IMPACT TYPE:

- Frontal (30 mph)
- Oblique (30 mph) with - ° barrier face first
contacting -
(driver/passenger) side
- X Rear Moving Barrier (30 mph)
- Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT:



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

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

SOLVENT SPILLAGE DETAILS:

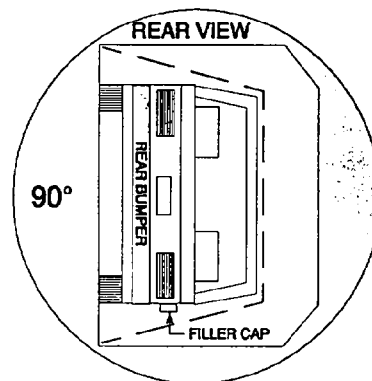
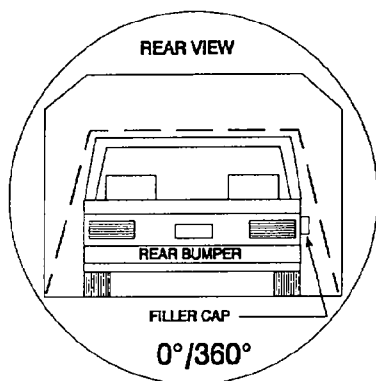
None

Table 6

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE :
0-90 Deg.

Vehicle NHTSA ID No. :
CS5405



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	2	minutes	01	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	7	minutes	01	seconds
Next whole minute interval	8	minutes		

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

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

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

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

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

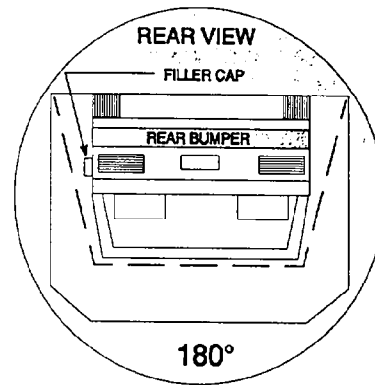
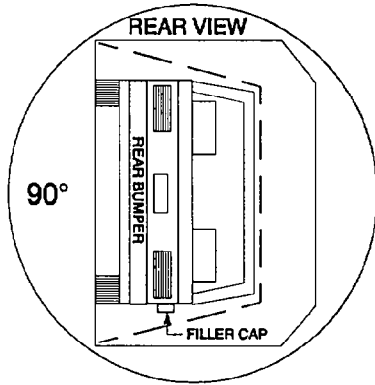
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 6
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE :
90-180 Deg.

Vehicle NHTSA ID No. :
CS5405



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	58	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	58	seconds
	7	minutes		
Next whole minute interval				

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

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

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A
---	---	---	-----

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

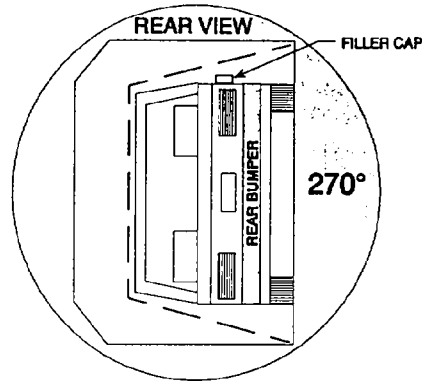
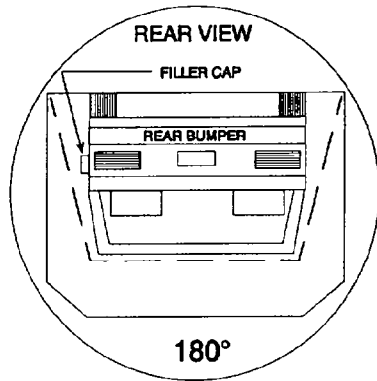
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 6
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE :
180-270 Deg.

Vehicle NHTSA ID No. :
CS5405



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	2	minutes	01	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	7	minutes	01	seconds
Next whole minute interval	8	minutes		

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

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

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

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

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

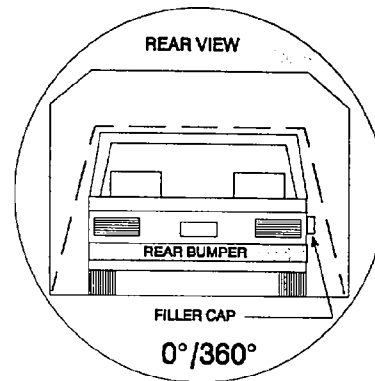
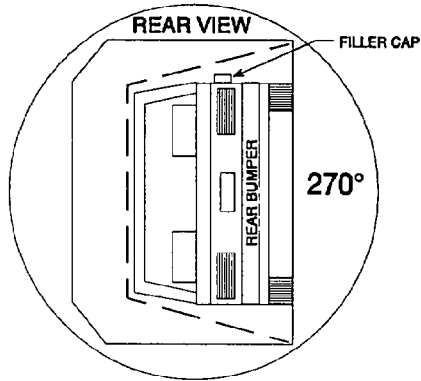
IV. SOLVENT SPILLAGE LOCATION(S):

None

Table 6
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE :
270-360 Deg.

Vehicle NHTSA ID No. :
CS5405



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	1	minutes	54	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	6	minutes	54	seconds
Next whole minute interval	7	minutes		

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

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

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A
---	---	---	-----

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

IV. SOLVENT SPILLAGE LOCATION(S):

None

Figure 2

CAMERA POSITIONS FOR REAR IMPACTS

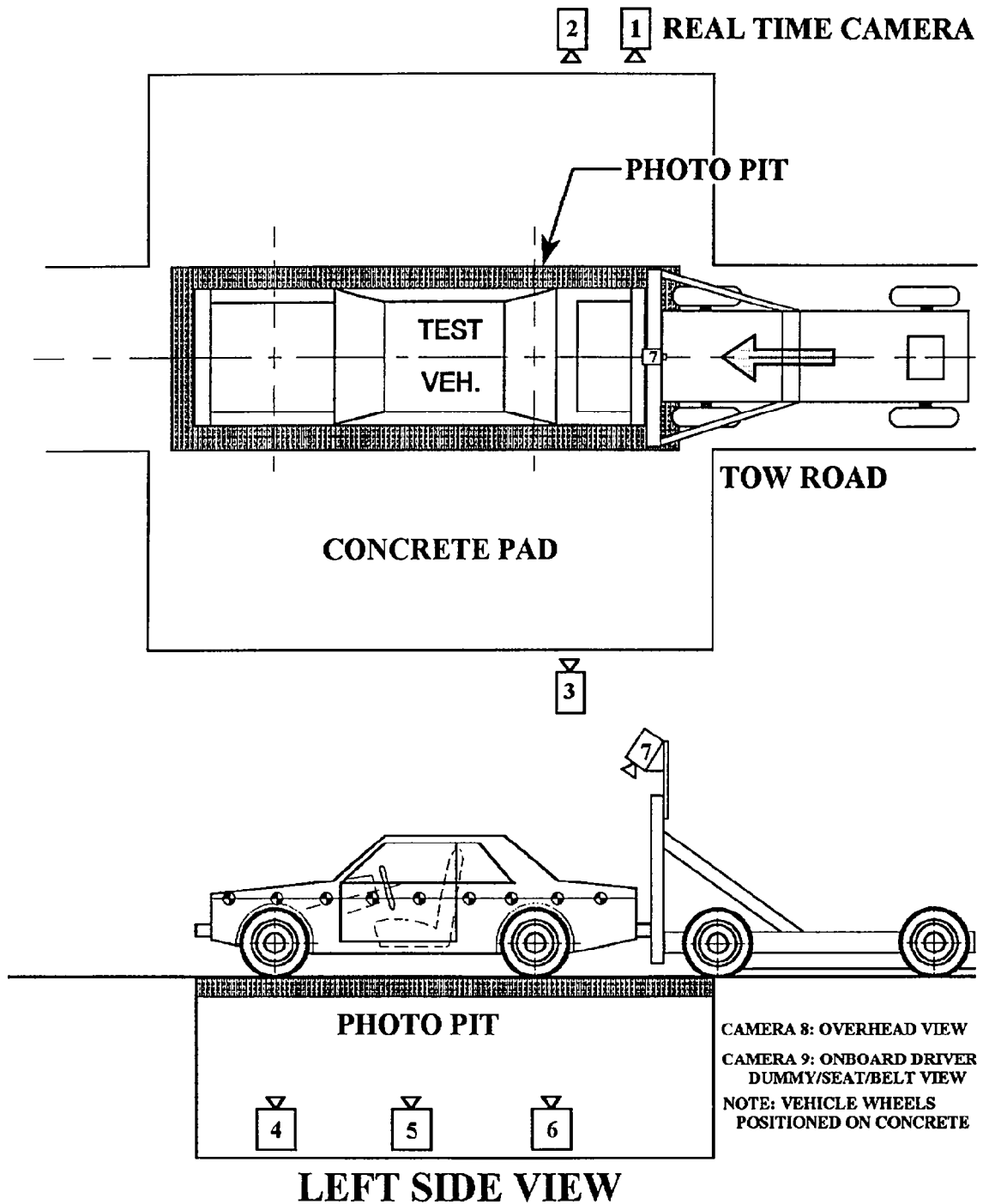


Table 7

HIGH-SPEED CAMERA LOCATIONSNHTSA No. : CS5405 Vehicle : 1995 Mazda Protege 4-Door Sedan

CAMERA NO.	VIEW	CAMERA POSITIONS (inches)*			ANGLE** (degrees)	LENS (mm)	SPEED (fps)
		X	Y	Z			
1	Real-Time Camera	-	-	-	-	-	24
2	Right Side View	-311	0	43	0	13	804
3	Left Side View	418	67	43	0	25	836
4	Vehicle Front Underbody View	0	-108	-77	90	13	746
5	Vehicle Mid-Section Underbody View	0	-52	-77	90	13	990
6	Vehicle Rear Underbody View	0	-20	-77	90	13	780
7	Moving Barrier View	0	0	99	-105	13	850
8	Overhead Overall View	-20	0	386	-90	13	850
9	Onboard Driver Dummy/Seat/Belt View	-	-	-	-	8	660

* X = film plane to monorail centerline (+ to left of rail)

Y = film plane to impact location (+ ahead of impact location)

Z = film plane to ground (+ above ground)

** = referenced to horizontal plane

Appendix A
PHOTOGRAPHS

LIST OF PHOTOGRAPHS

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Figure A-1 PRE-TEST FRONT VIEW



Figure A-2 POST-TEST FRONT VIEW

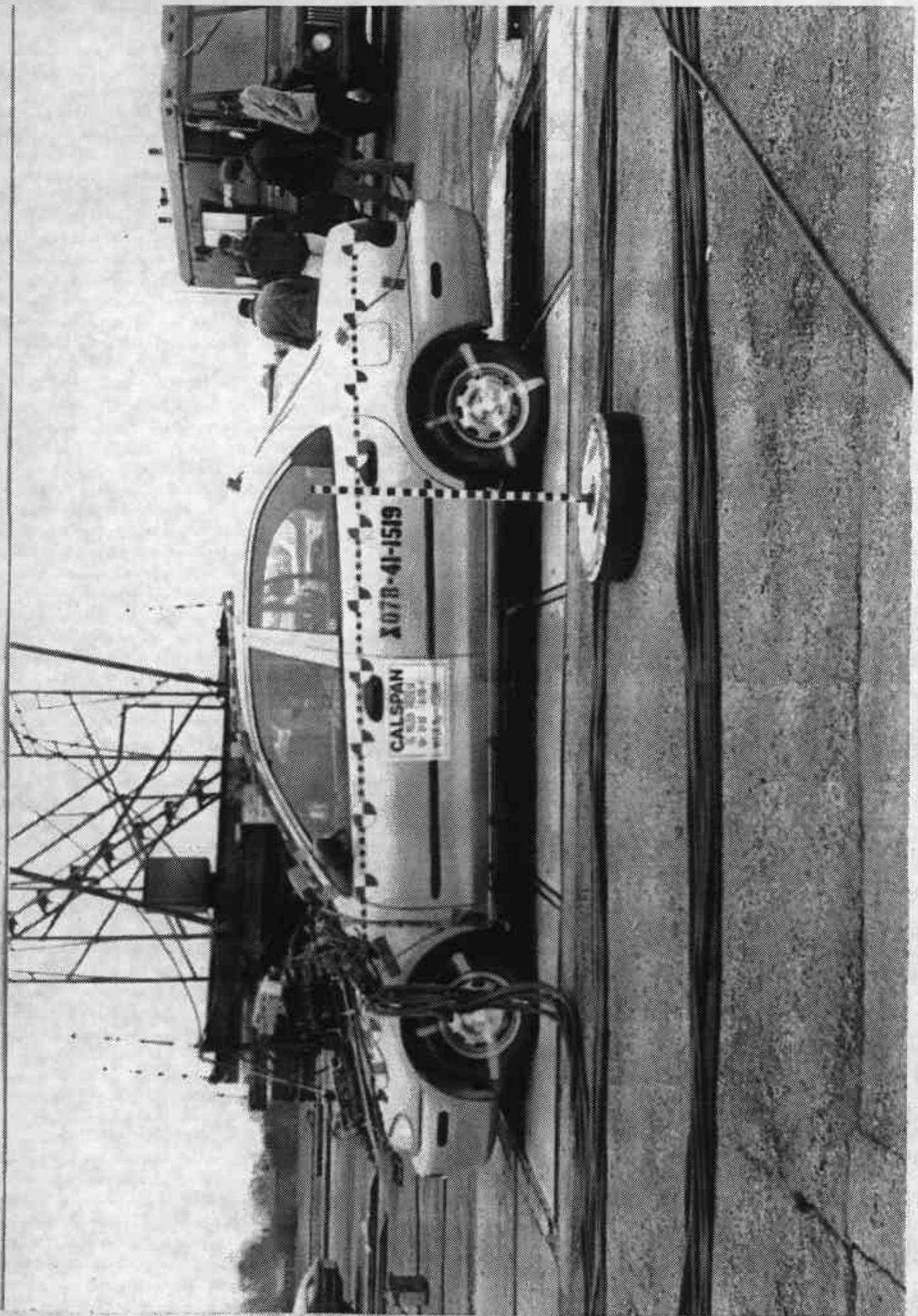


Figure A-3 PRE-TEST LEFT SIDE VIEW

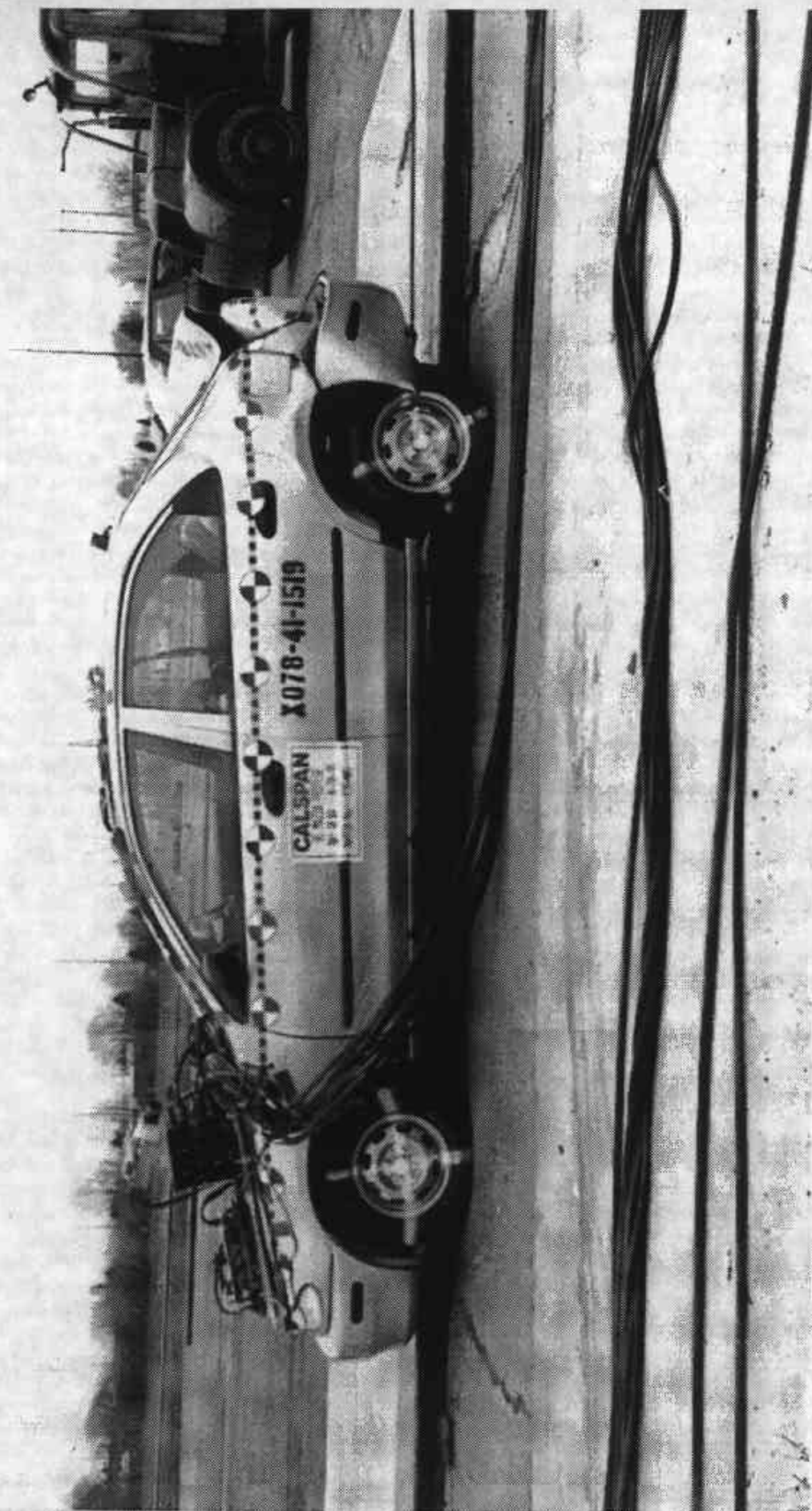


Figure A-4 POST-TEST LEFT SIDE VIEW

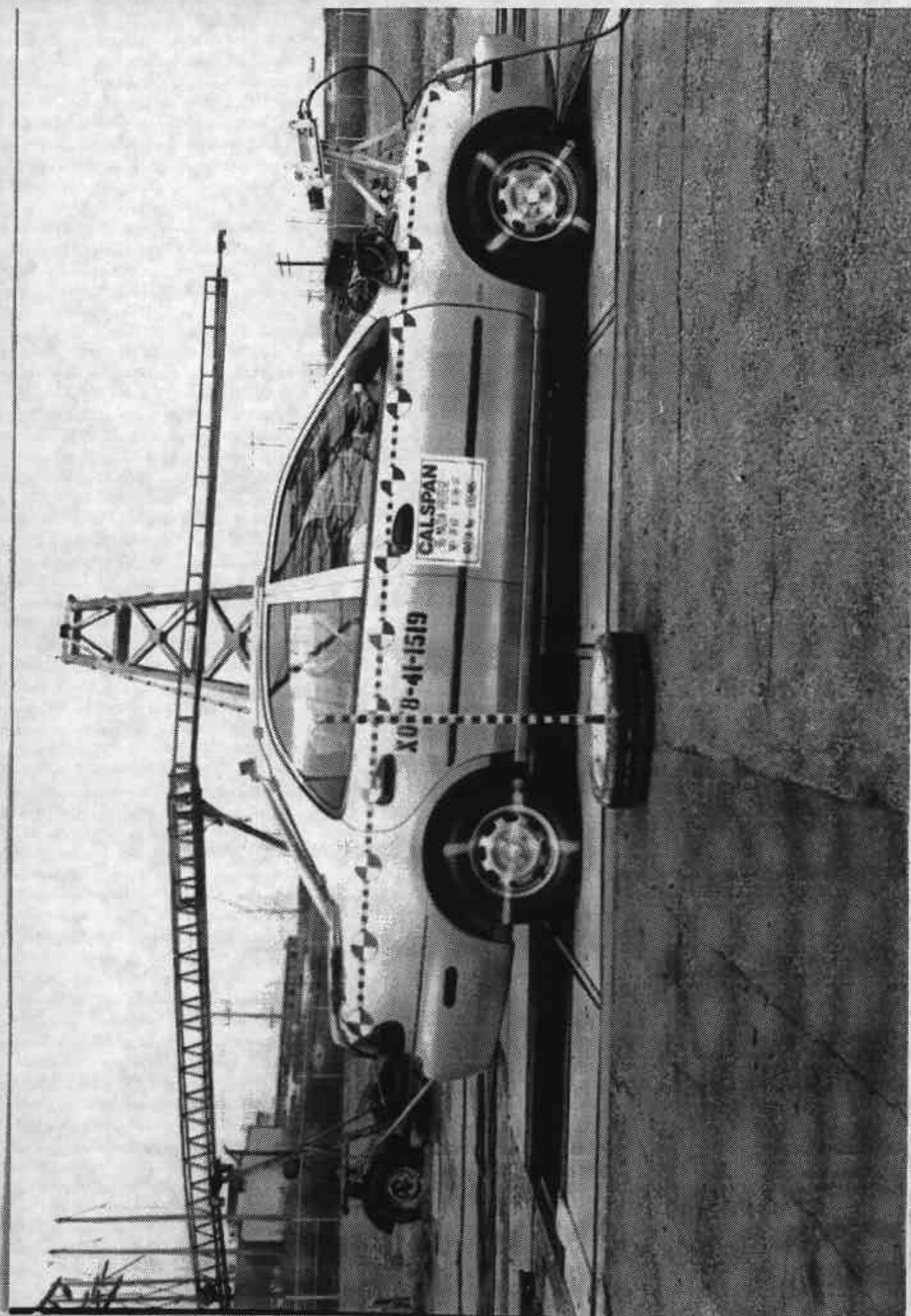


Figure A-5 PRE-TEST RIGHT SIDE VIEW

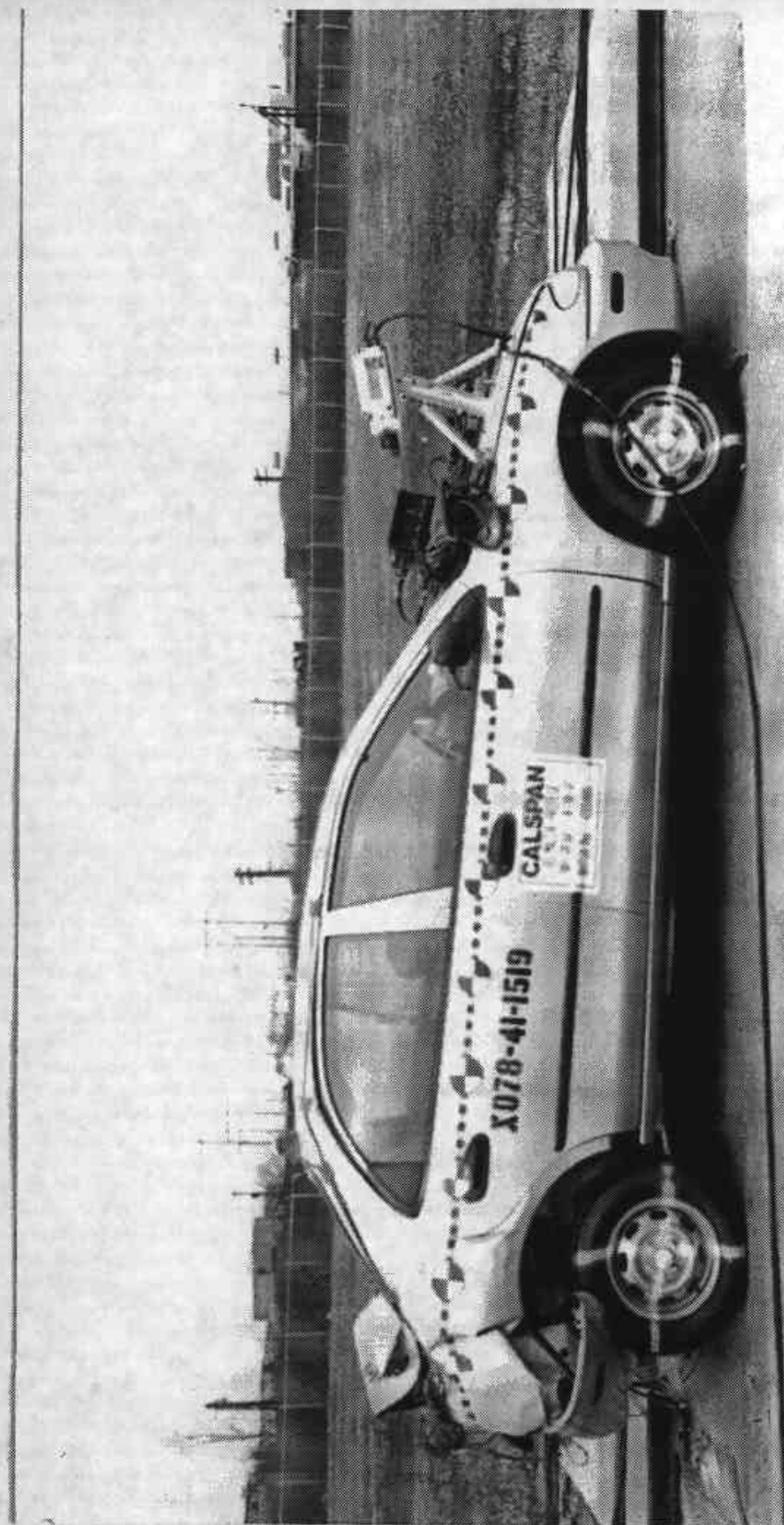


Figure A-6 POST-TEST RIGHT SIDE VIEW

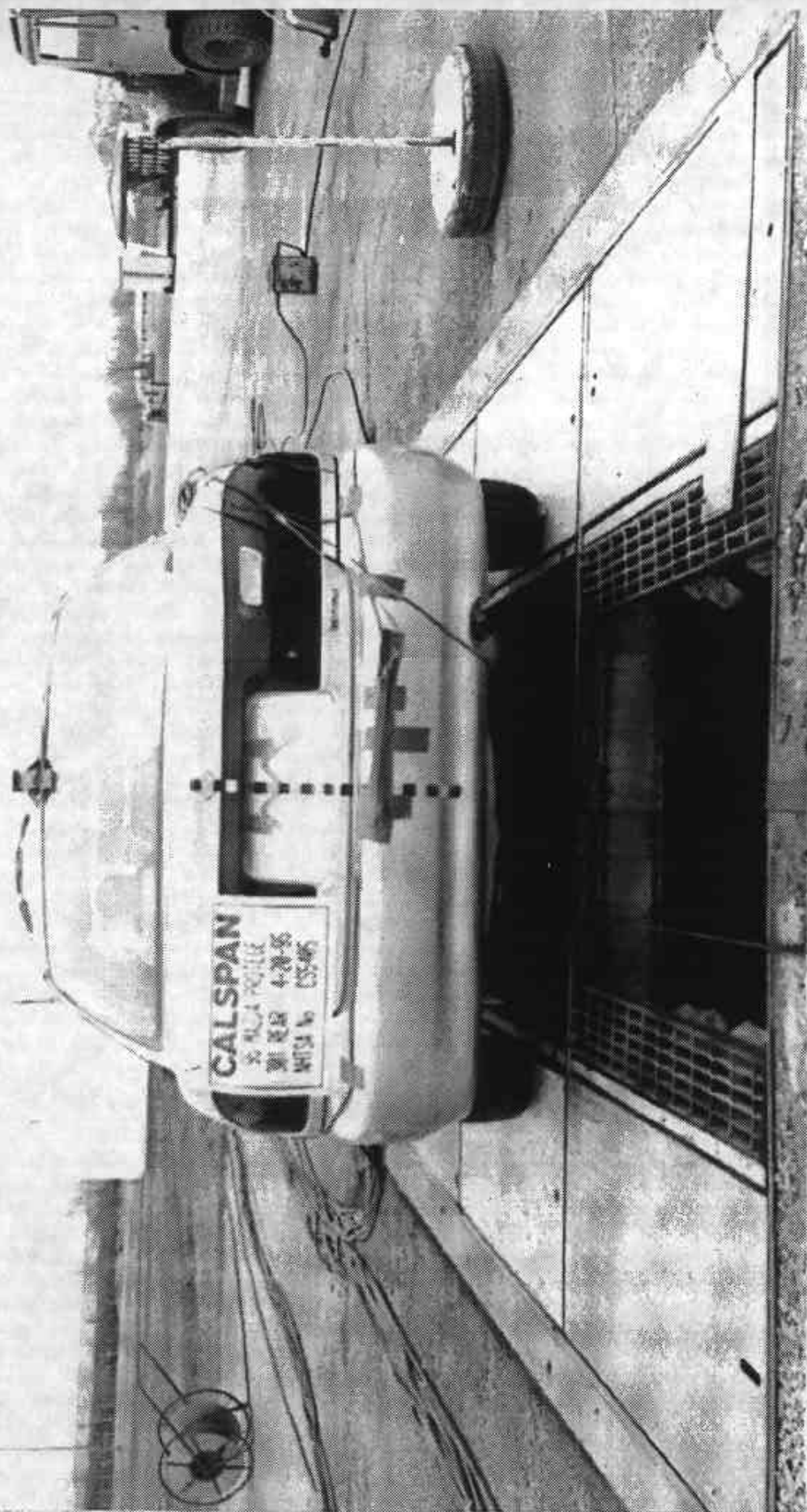


Figure A-7 PRE-TEST REAR VIEW

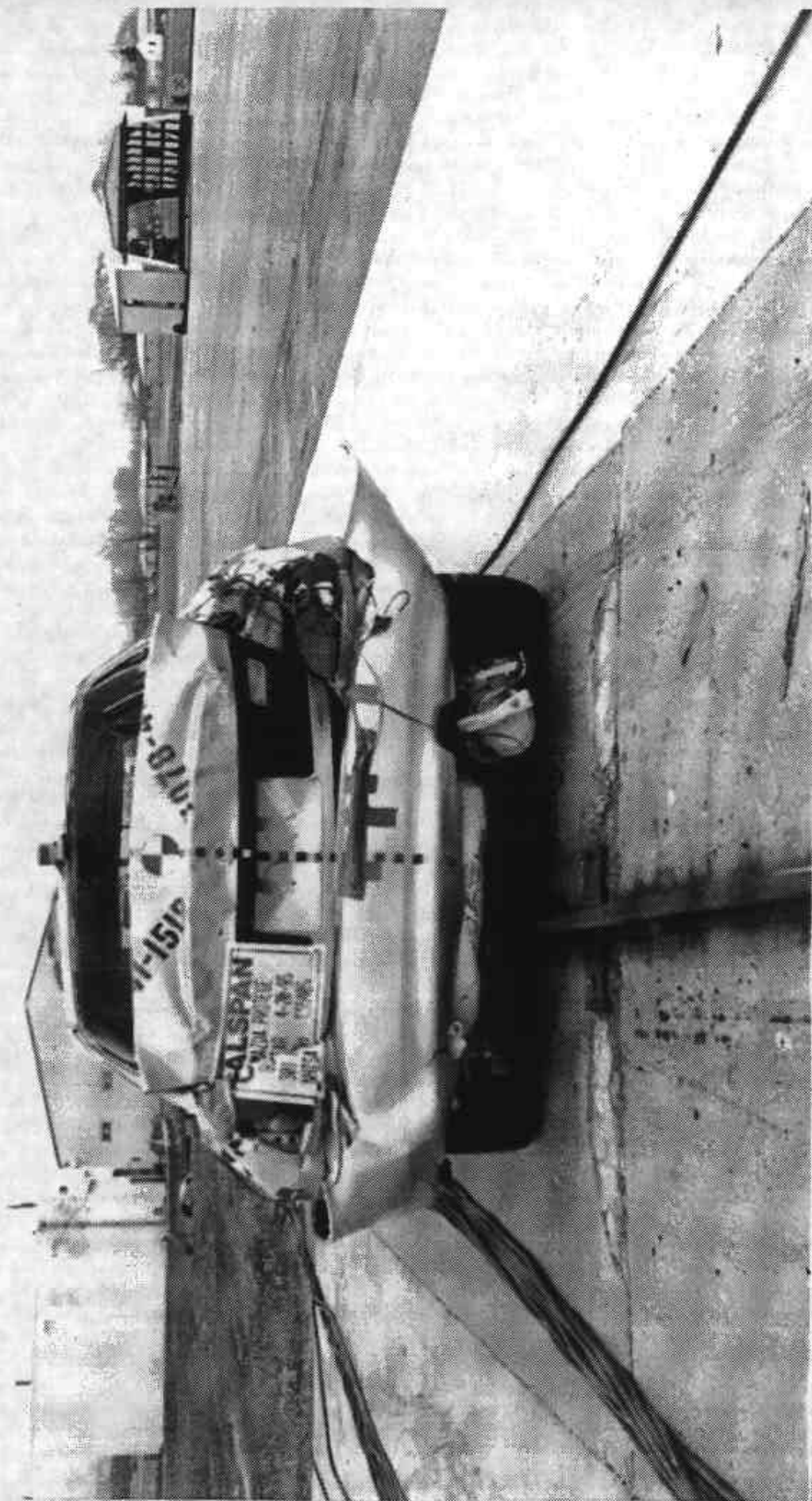


Figure A-8 POST-TEST REAR VIEW

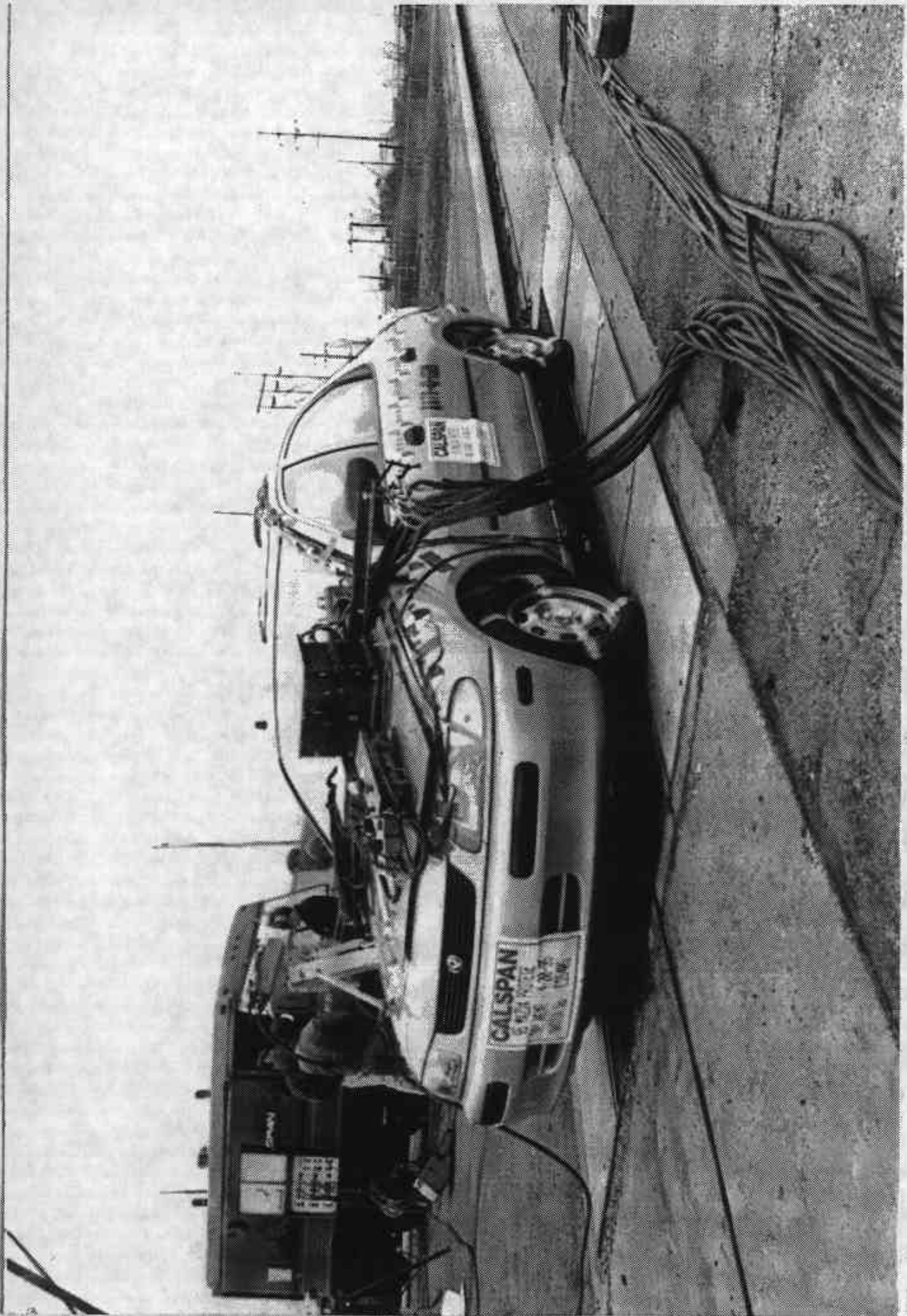


Figure A-9 PRE-TEST LEFT FRONT THREE-QUARTER VIEW



Figure A-10 POST-TEST LEFT FRONT THREE-QUARTER VIEW

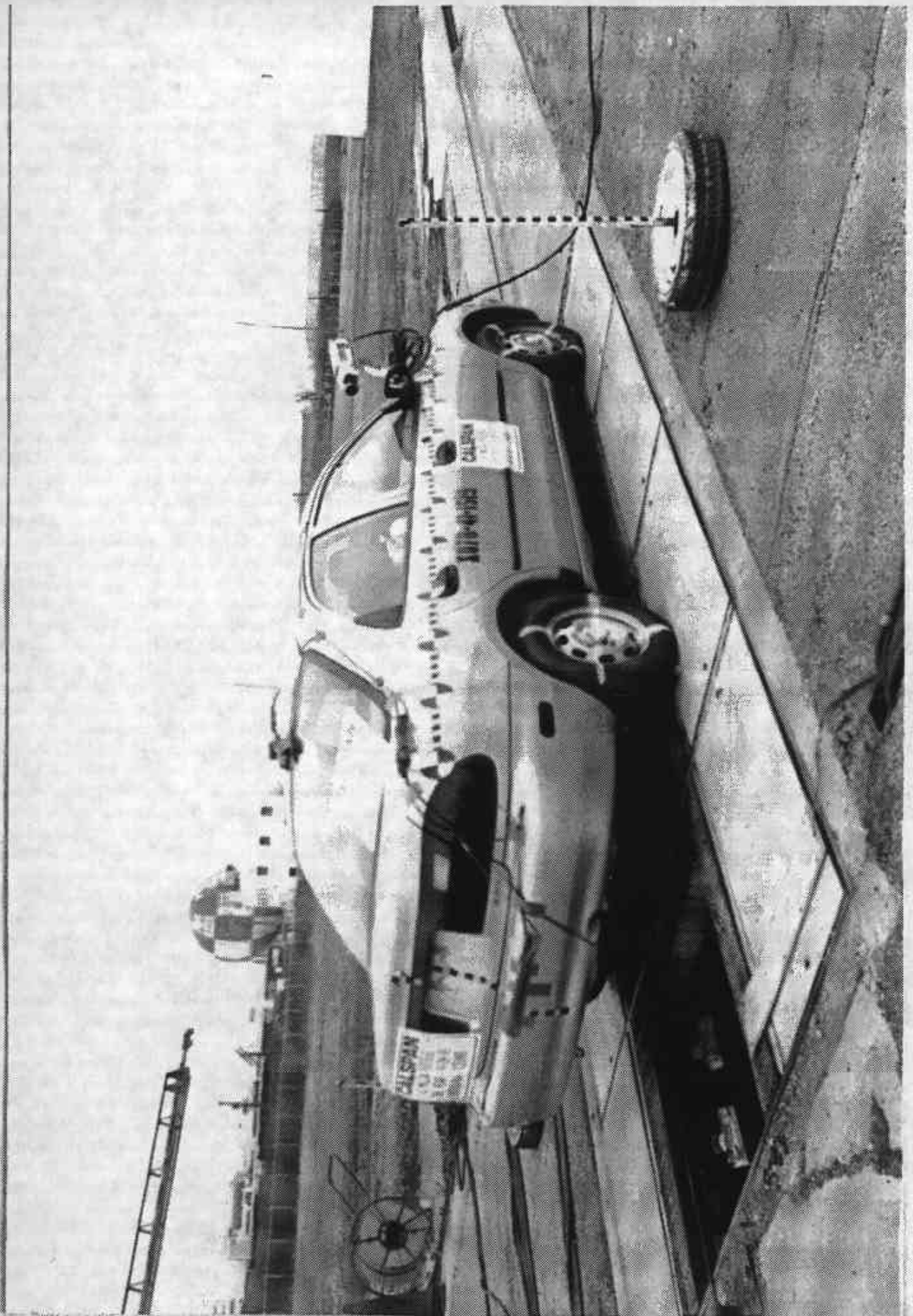


Figure A-11 PRE-TEST RIGHT REAR THREE-QUARTER VIEW

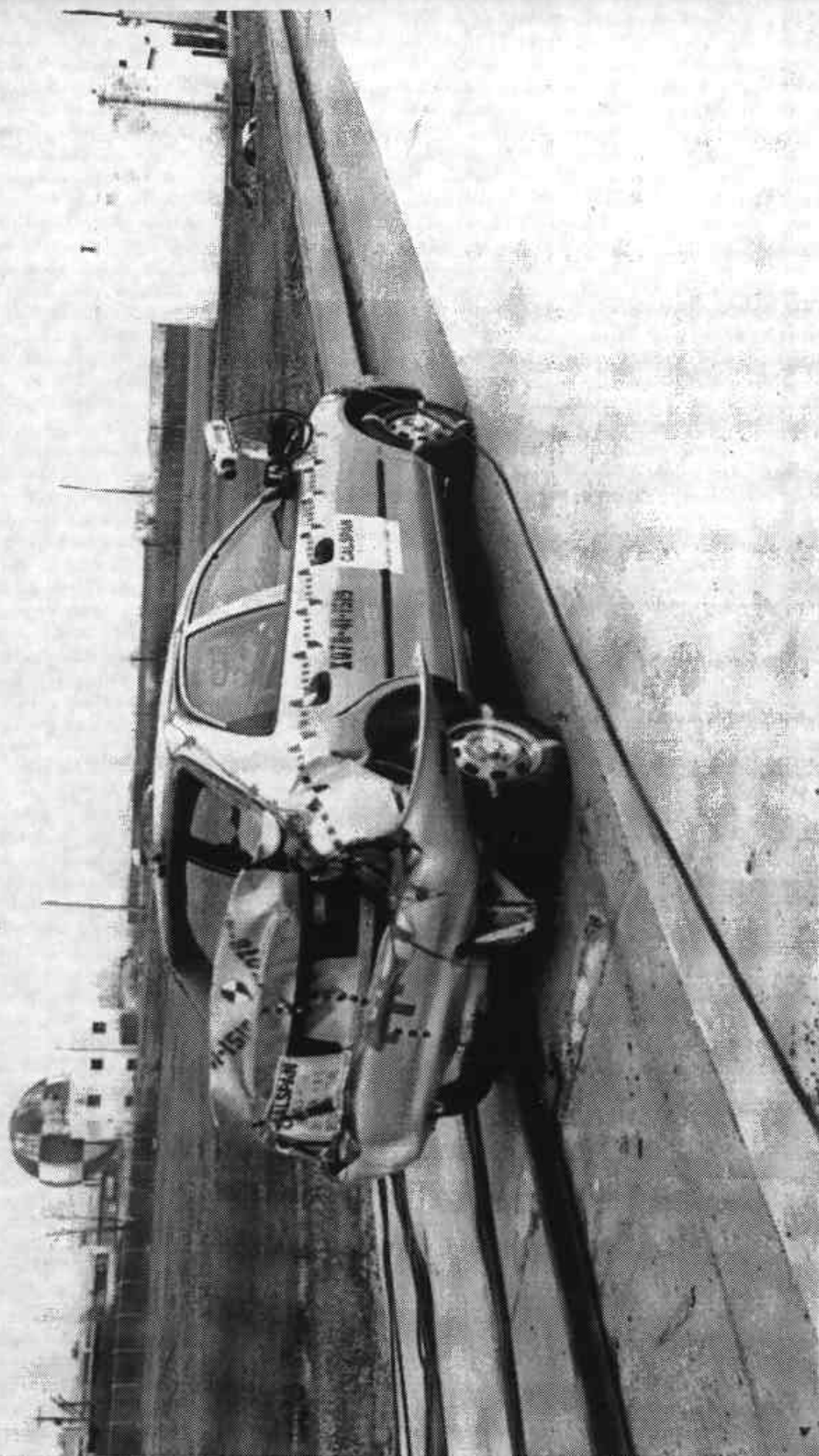


Figure A-12 POST-TEST RIGHT REAR THREE-QUARTER VIEW

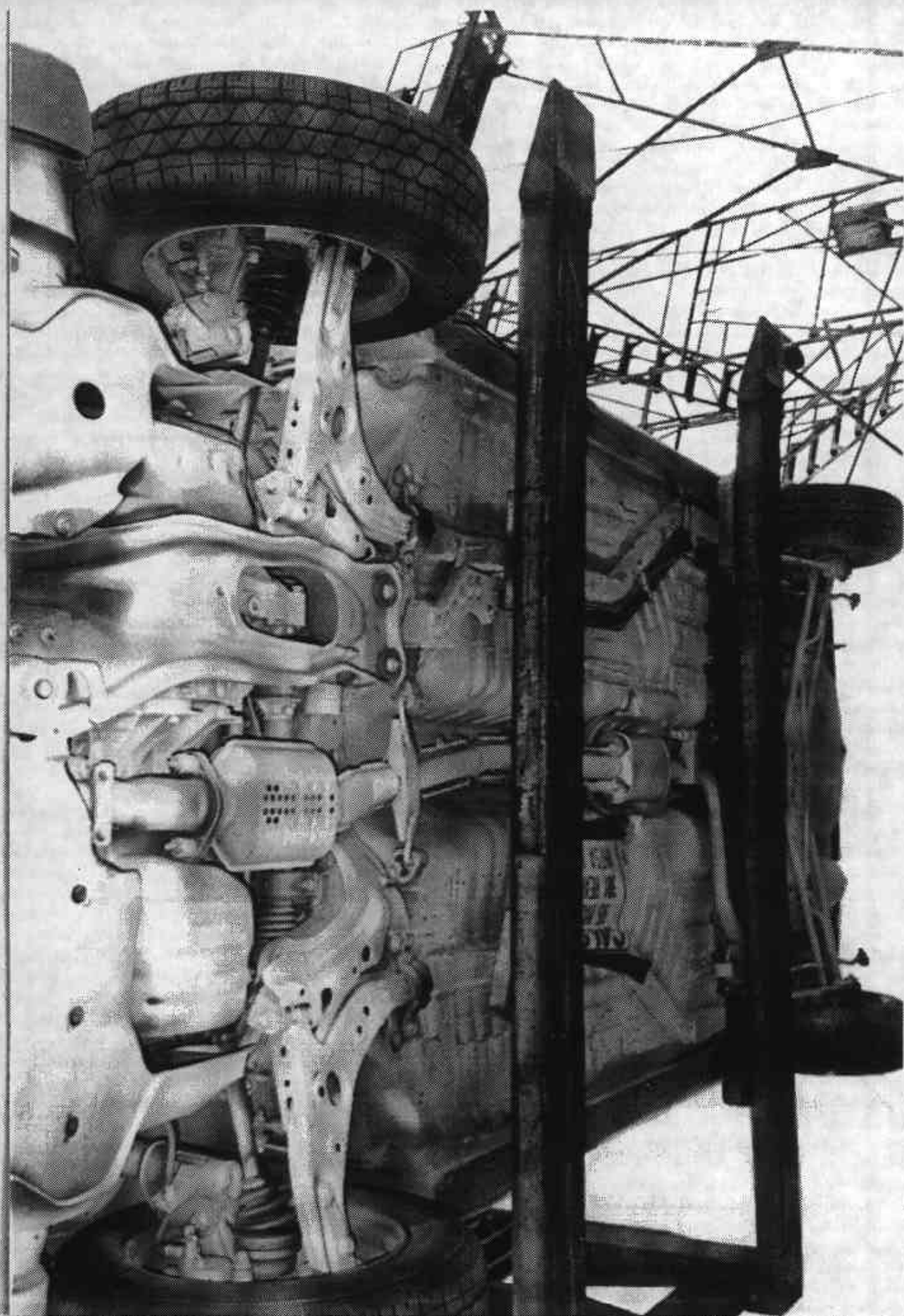


Figure A-13 PRE-TEST FRONT UNDERBODY VIEW

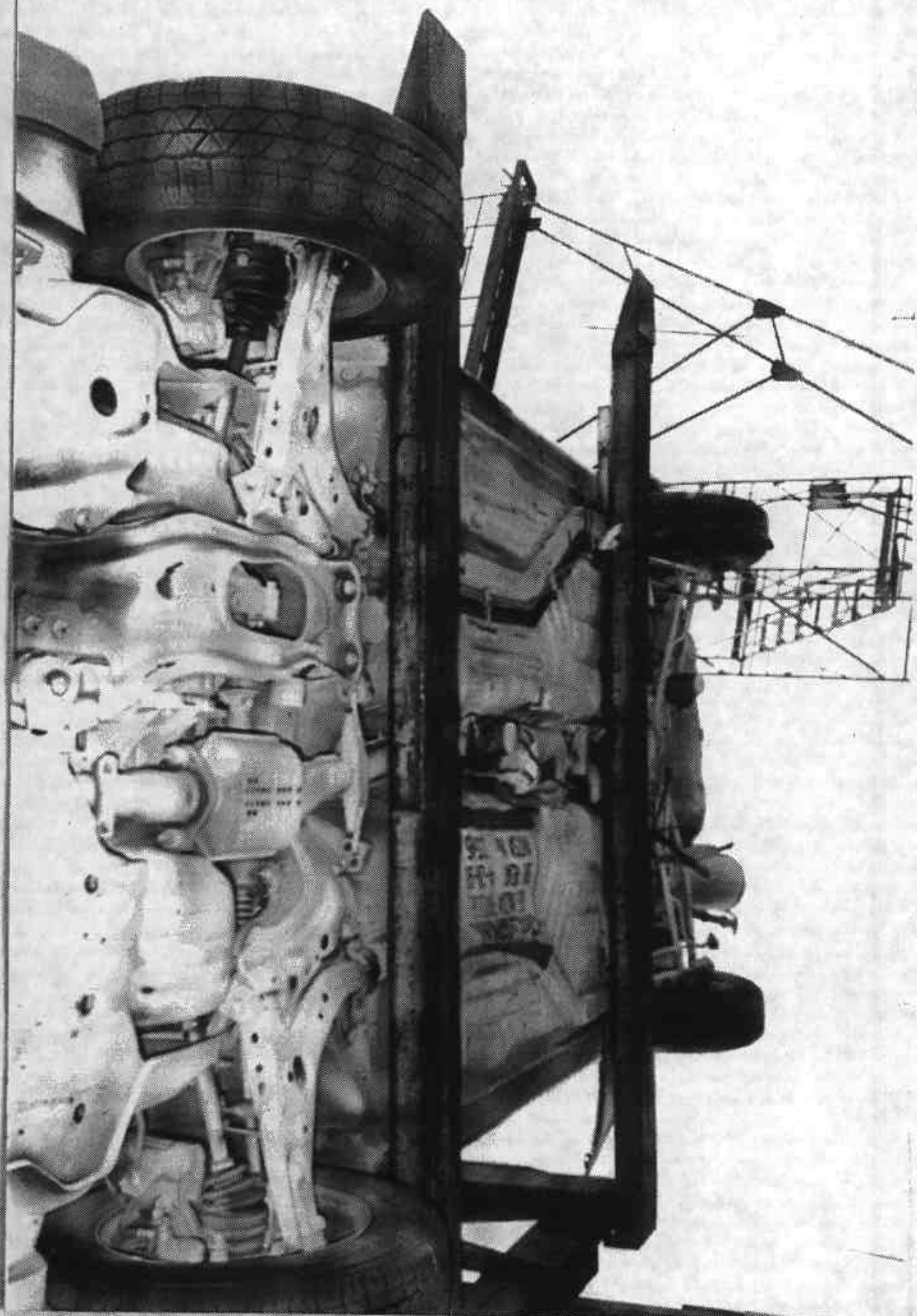


Figure A-14 POST-TEST FRONT UNDERBODY VIEW

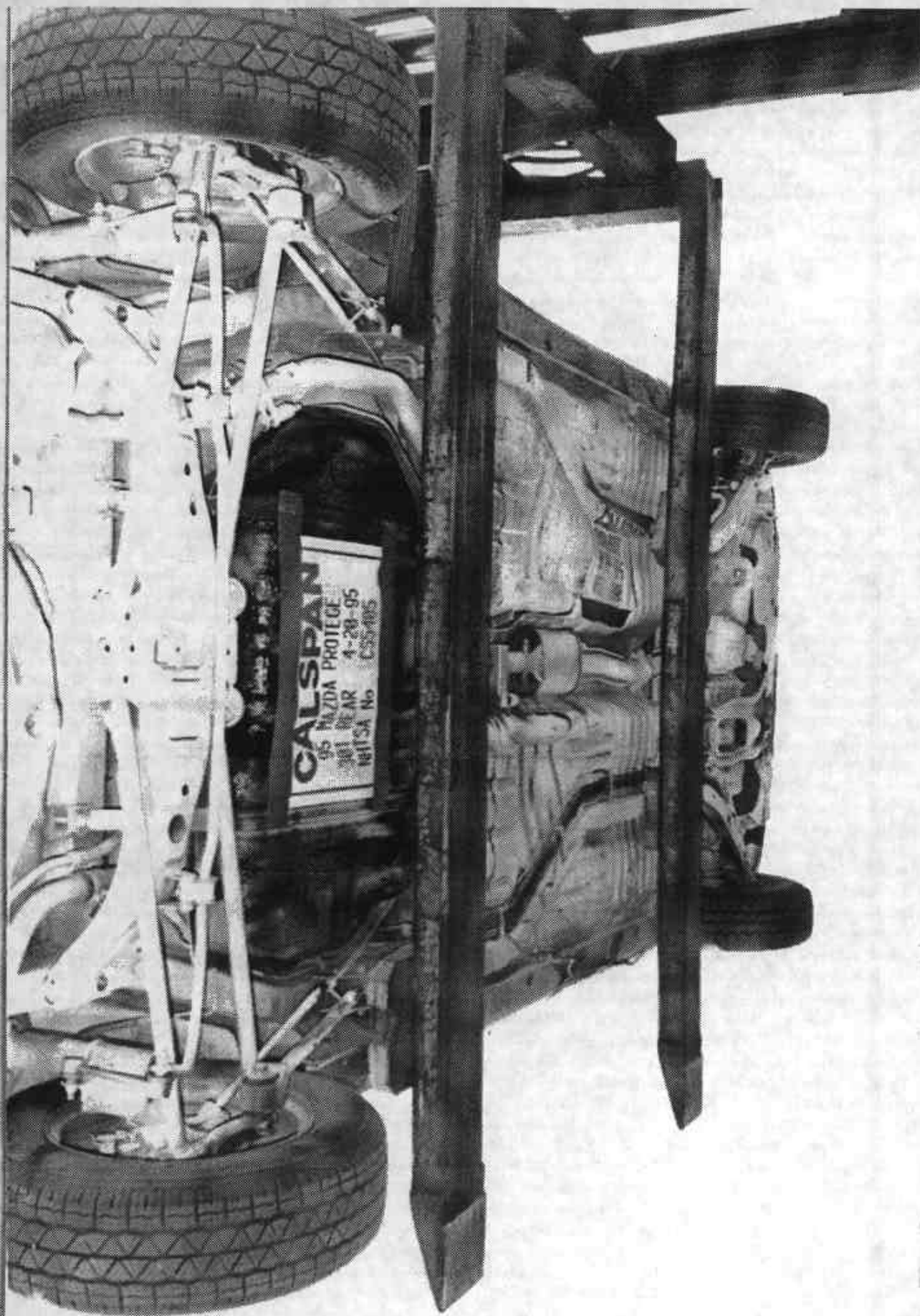


Figure A-15 PRE-TEST REAR UNDERBODY VIEW

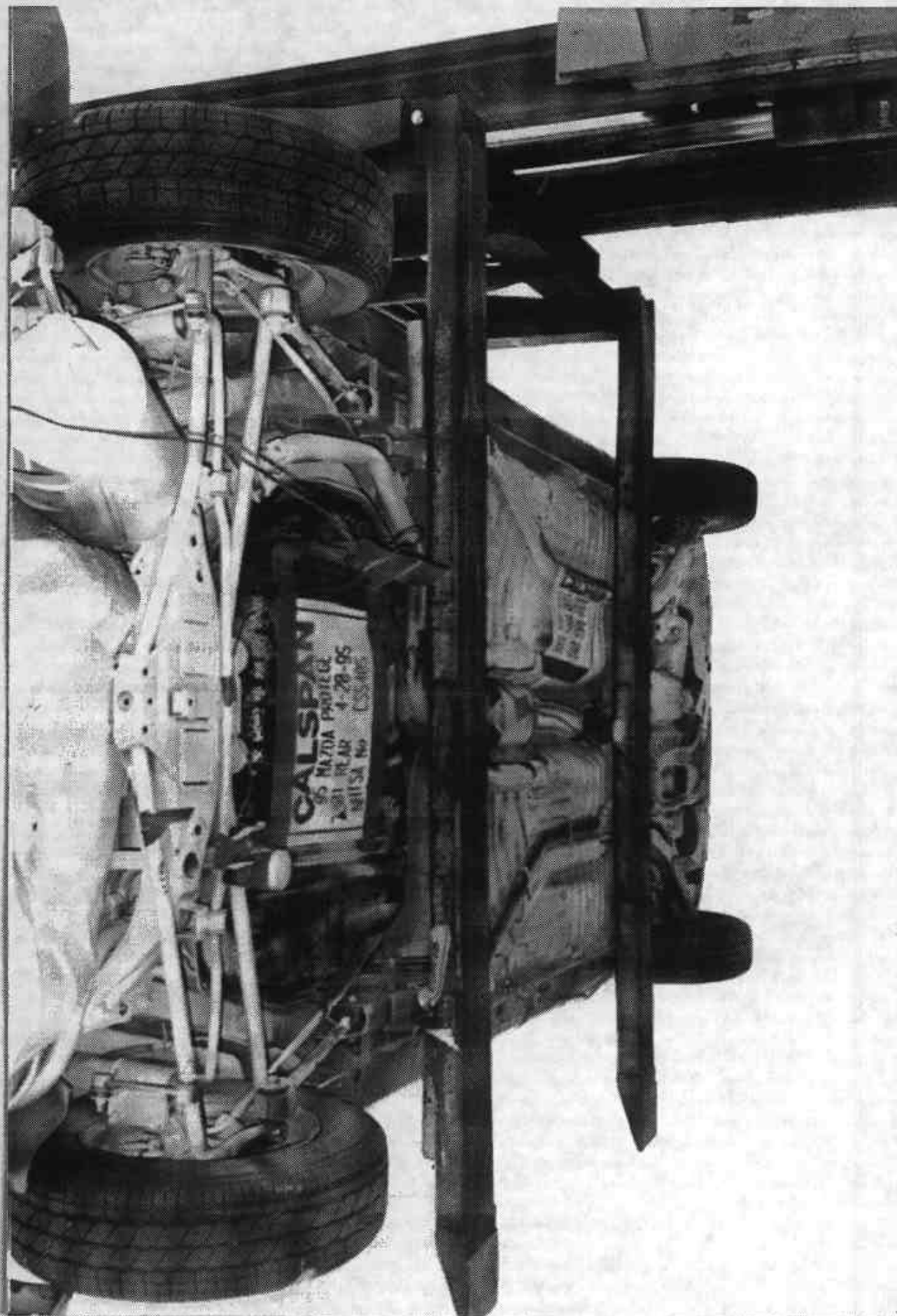


Figure A-16 POST-TEST REAR UNDERBODY VIEW

MFD. BY MAZDA MOTOR CORPORATION

DATE	GVWR	CURB WT	CURB RR
09/94	3485 LB	1875 LB	1630 LB
	1580 KG	850 KG	740 KG

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY
BUMPER AND THEFT PREVENTION
STANDARD IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE

JM1BA141XS0125816 PASSENGER



BODY COLOR CODE: 4F

MADE IN JAPAN

Figure A-17 CERTIFICATION PLACARD

VEHICLE CAPACITY WEIGHT

CAPACITÉ PORTÉE DU VÉHICULE

385kg (850lbs)

(BC1D)

SEATING CAPACITY

NOMBRE DE PLACES

FRONT SEAT } -----2

SIÈGE AVANT }

REAR SEAT } -----3

SIÈGE ARRIÈRE }

TOTAL -----5

TIRE INFLATION PRESSURE	FRONT/AV.	REAR/AR.
PRESSION DE GONFLAGE DES	2.2(32)	2.2(32)
PNEUS kg/cm ² (p.s.i., lb/po ²)		

TIRE SIZE

TAILLE DES PNEUS

P175/70R13 82S

Figure A-18 TIRE PLACARD

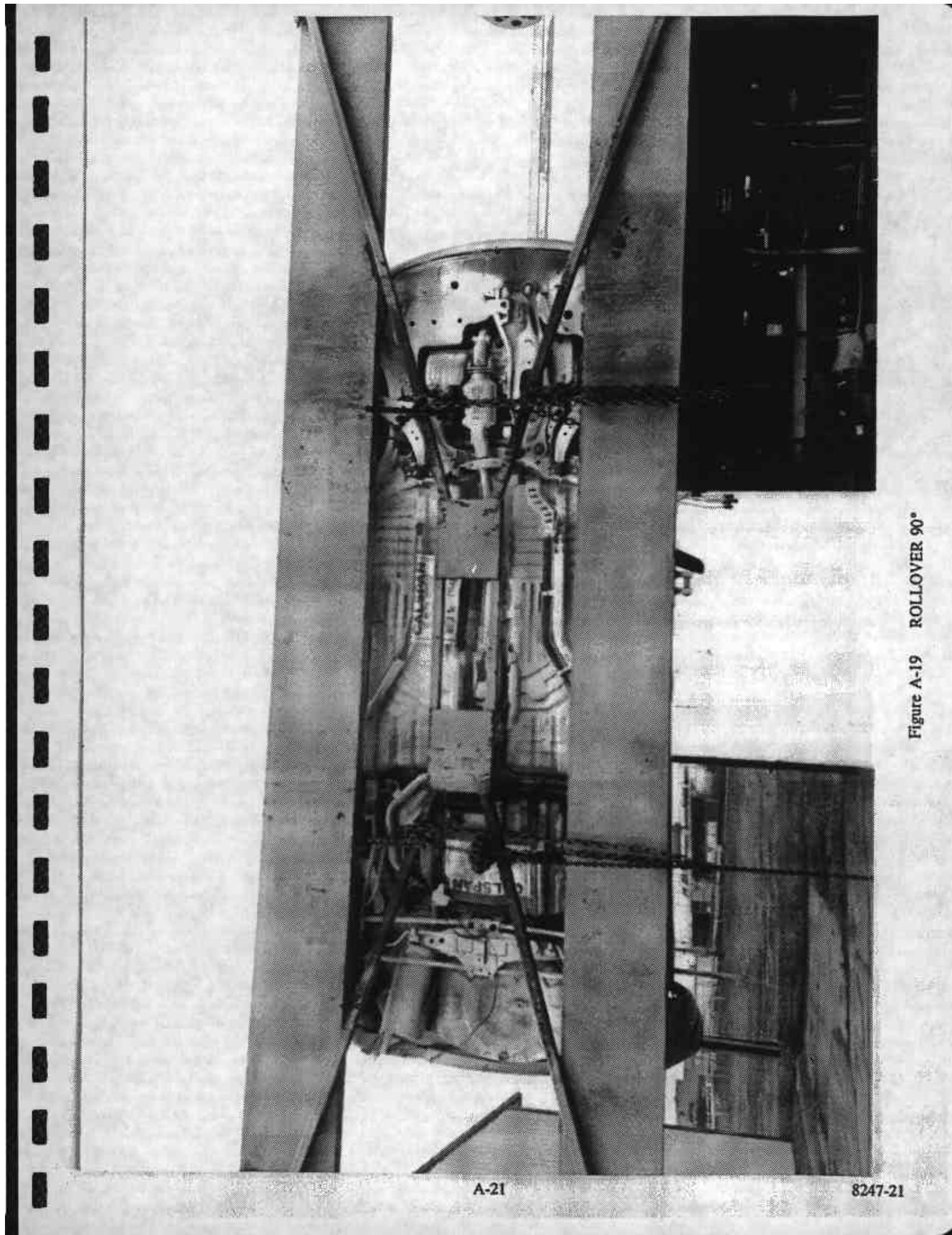


Figure A-19 ROLLOVER 90°

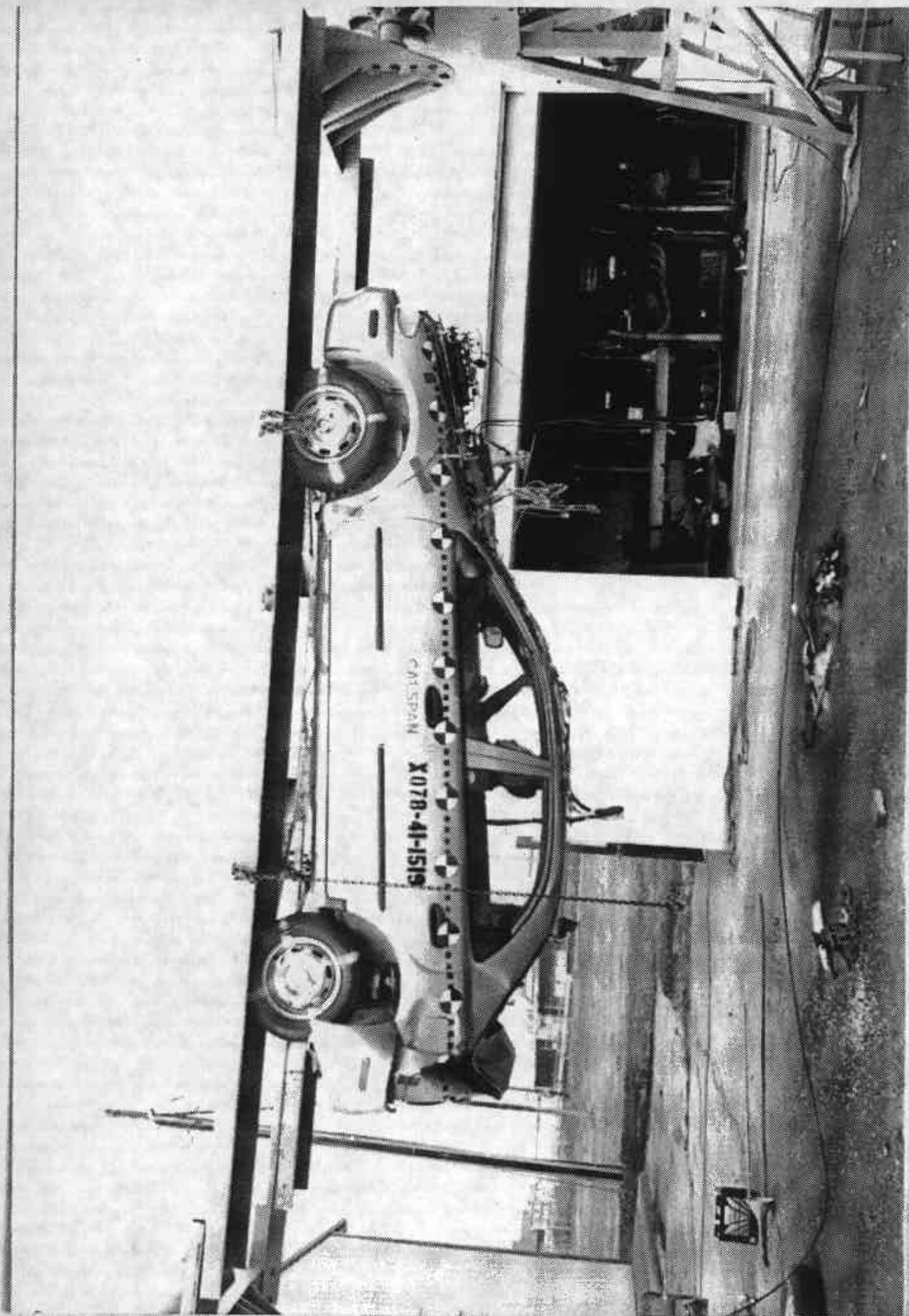


Figure A-20 ROLLOVER 180°

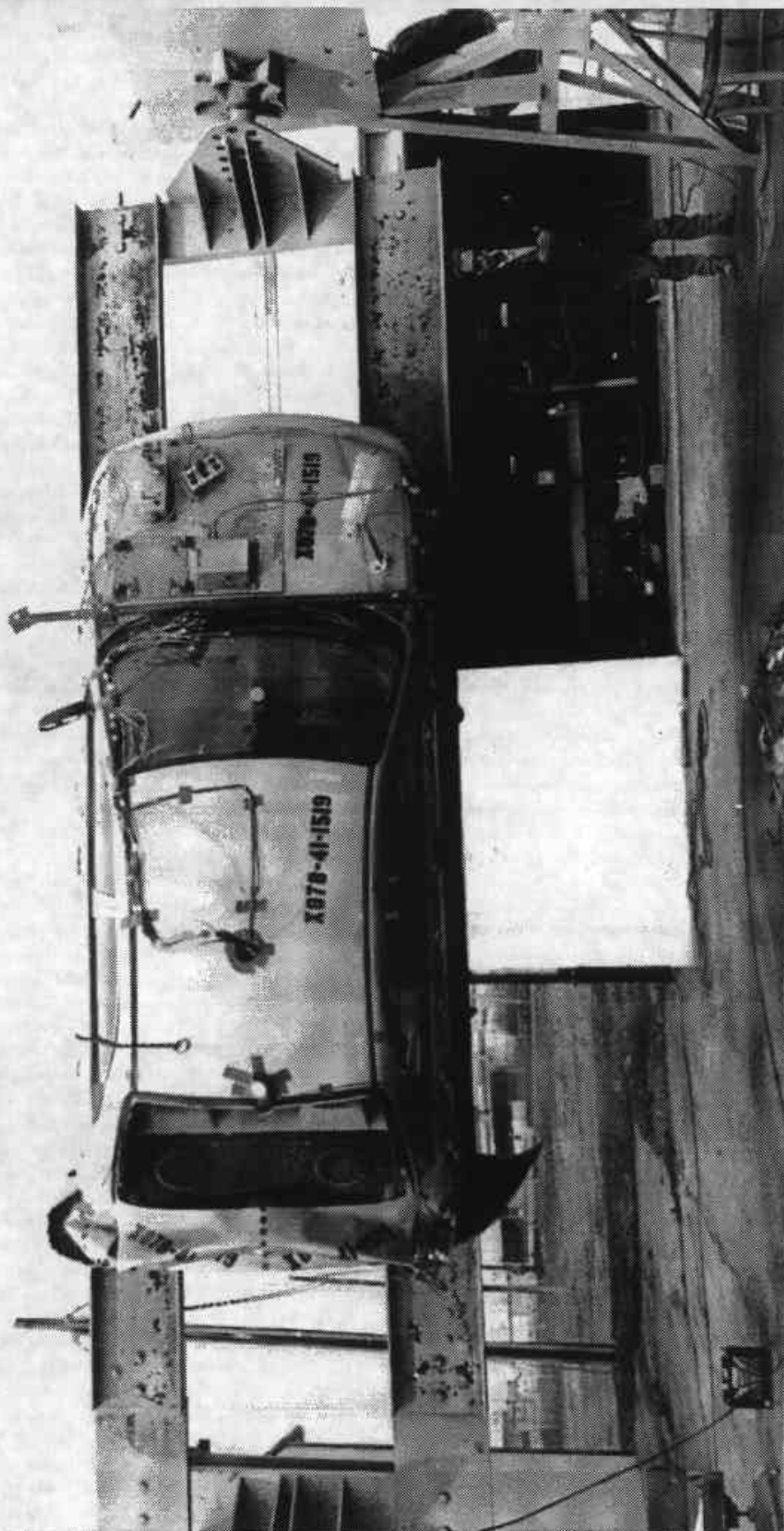


Figure A-21 ROLLOVER 270°

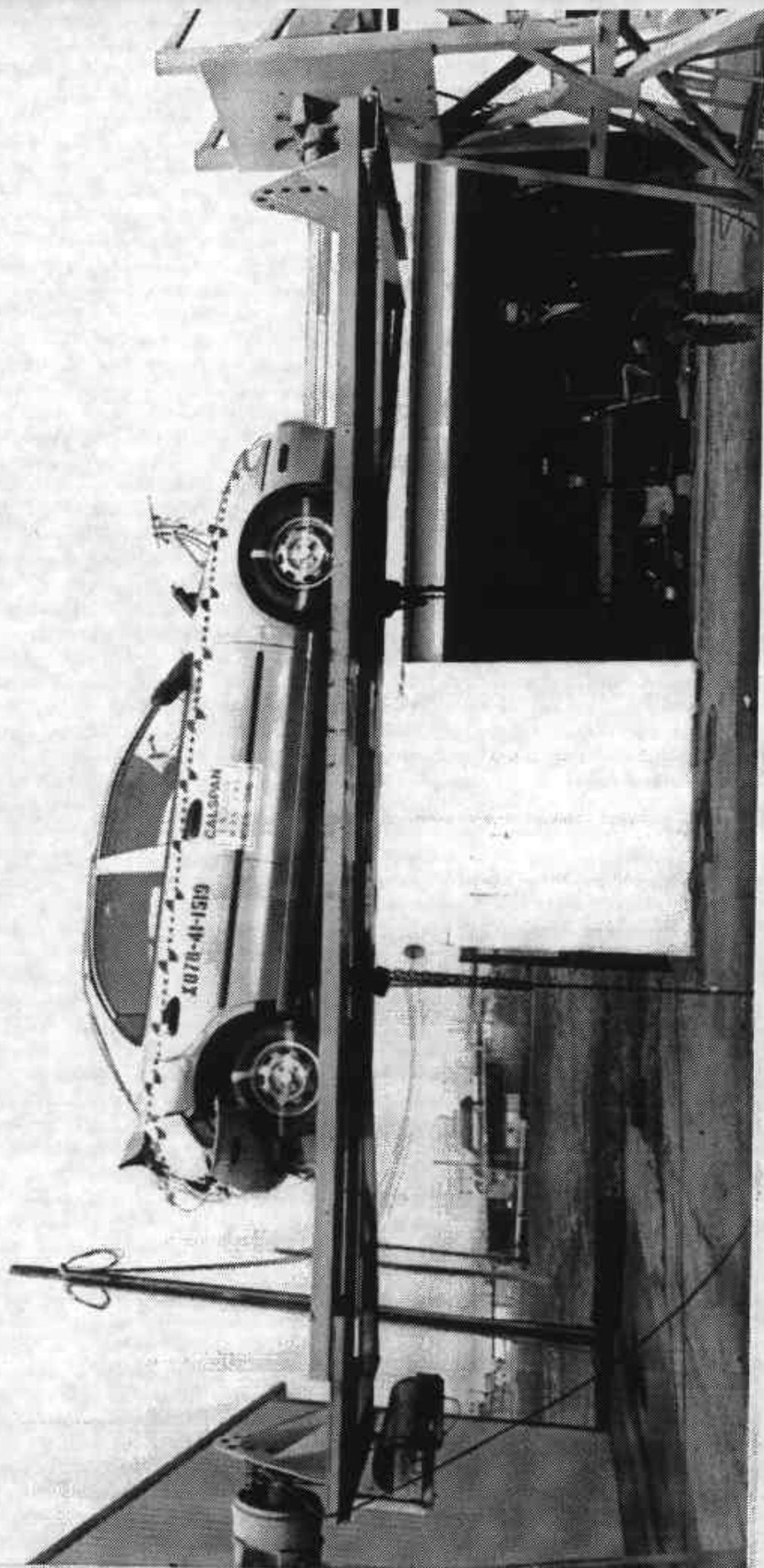


Figure A-22 ROLLOVER 360°

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

(REAR IMPACT ONLY)

FACILITY: TRACK TEST DATE: 20 Apr 1995
 RUN #: 1519 TEST TIME: 13:48:53
 SERIES #: 1 BOARD: a

TITLE: 301 Rear 30 MPH-1995 Mazda Protege

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER
			AMP	msec	AMP	msec	CLASS
1	Pos. 1 Head X	Gs	21.2	136.9	-1.8	57.1	1000.0
2	Pos. 1 Head Y	Gs	.5	83.9	-2.0	150.8	1000.0
3	Pos. 1 Head Z	Gs	18.9	121.9	.0	6.7	1000.0
4	Pos. 1 Chest Disp.	Ins	.0	177.8	.0	141.4	180.0
5	Pos. 1 Chest X	Gs	9.3	76.8	-1.3	135.5	180.0
6	Pos. 1 Chest Y	Gs	1.9	69.5	-2.1	98.5	180.0
7	Pos. 1 Chest Z	Gs	5.4	58.0	-.6	226.6	180.0
8	Pos. 1 Lap Belt	lbs	77.1	163.2	-11.2	35.8	60.0
9	Pos. 1 Pelvic X	Gs	19.4	46.9	-4.2	157.1	1000.0
10	Pos. 1 Pelvic Y	Gs	2.8	67.7	-1.5	105.7	1000.0
11	Pos. 1 Pelvic Z	Gs	6.2	44.5	-1.0	136.8	1000.0
12	Left Rear Crossmember X	Gs	35.6	6.4	-17.3	11.0	60.0
13	Pos. 1 Upper Neck Fx	lbs	34.0	140.9	-17.1	65.0	1000.0
14	Pos. 1 Upper Neck Fy	lbs	6.6	218.3	-8.8	274.3	1000.0
15	Pos. 1 Upper Neck Fz	lbs	280.6	130.1	-3.3	6.8	1000.0
16	Right Rear Crossmember X	Gs	32.0	5.6	-14.9	16.3	60.0
17	Pos. 1 Head Resultant	Gs	25.2	133.8	.0	6.7	1000.0
18	Pos. 1 Chest Resultant	Gs	10.4	56.0	.0	-70.4	180.0
19	Pos. 1 Pelvic Resultant	Gs	20.3	46.9	.0	4.4	1000.0
20	Pos. 1 Neck Force Res.	lbs	280.9	130.1	.7	7.1	1000.0

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

hic: 77.82
 t1 = 109.320 msec
 t2 = 145.320 msec
 Average G's Over Hic Duration = 21.57

CLIP SUMMARY: Pos. 1 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 10.158 G's
 Tstart = 54.8400 ms
 Tend = 57.9600 ms
 CSI = 23.964

FACILITY: TRACK

TEST DATE: 20 Apr 1995

RUN #: 1519

TEST TIME: 13:48:53

SERIES #: 1

BOARD: b

TITLE: 301 Rear 30 MPH-1995 Mazda Protege

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	Pos. 1 Upper Neck Mx	ft-lbs	2.1	93.2	-2.8	143.8	600.0
2	Pos. 1 Upper Neck My	ft-lbs	7.9	73.6	-14.9	127.7	600.0
3	Pos. 1 Upper Neck Mz	ft-lbs	7.7	71.5	-3.0	148.9	600.0
4	Upper Seatback X	Gs	31.4	9.0	-28.1	16.2	60.0
5	Lower Seatback X	Gs	34.5	7.9	-19.9	14.3	60.0
6	Pos. 1 Belt Spoolout	Ins	.0	-48.4	-3.9	358.4	60.0
17	Pos. 1 Neck Moment Res.	ft-lbs	15.1	127.7	.0	-83.8	600.0

TEST NO. CS5405

VEHICLE

SAE FILTER CHANNEL CLASS

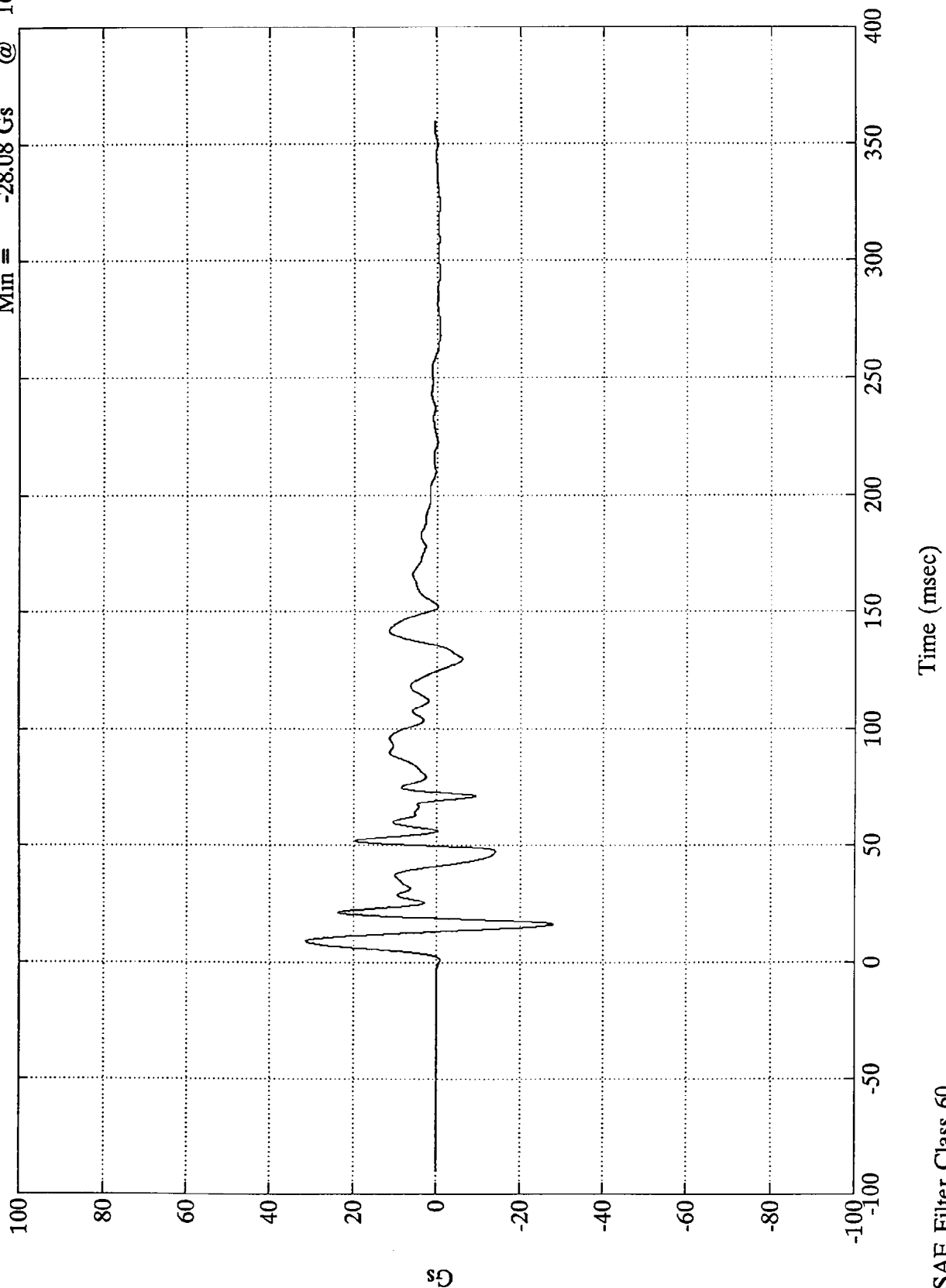
60

Note: Angular seatback position is measured in degrees of rotation from the initial (design) position.

301 Rear 30 MPH-1995 Mazda Protege

Upper Seatback X

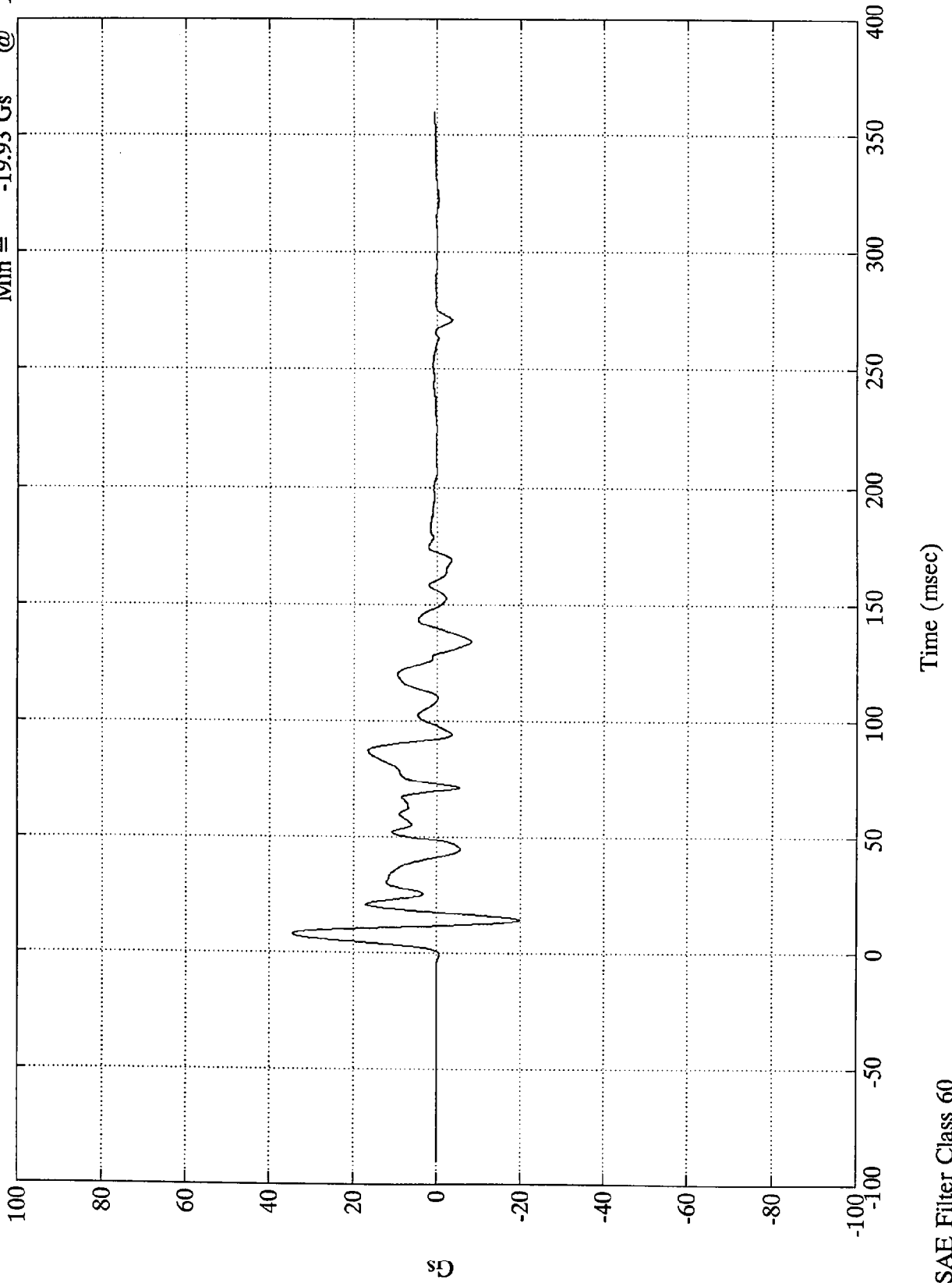
Max = 31.37 Gs @ 8.99 msec
Min = -28.08 Gs @ 16.19 msec



301 Rear 30 MPH-1995 Mazda Protege

Max = 34.48 Gs @ 7.91 msec
Min = -19.93 Gs @ 14.27 msec

Lower Seatback X

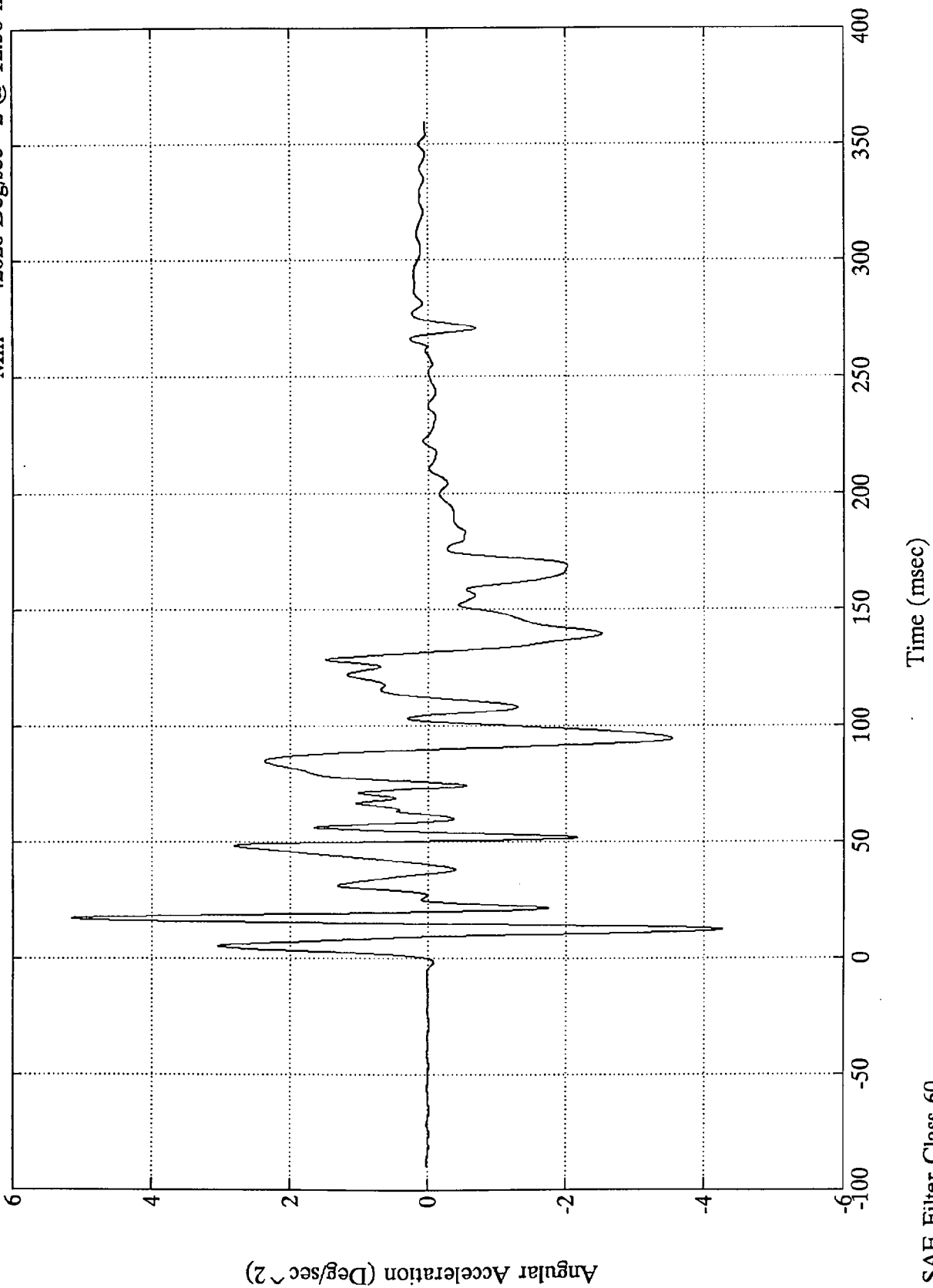


301 Rear 30 MPH-1995 Mazda Protege

Max = 51560 Deg/sec² @ 17.04 msec
Min = -42620 Deg/sec² @ 12.36 msec

Seatab Angular Acceleration

x10⁴

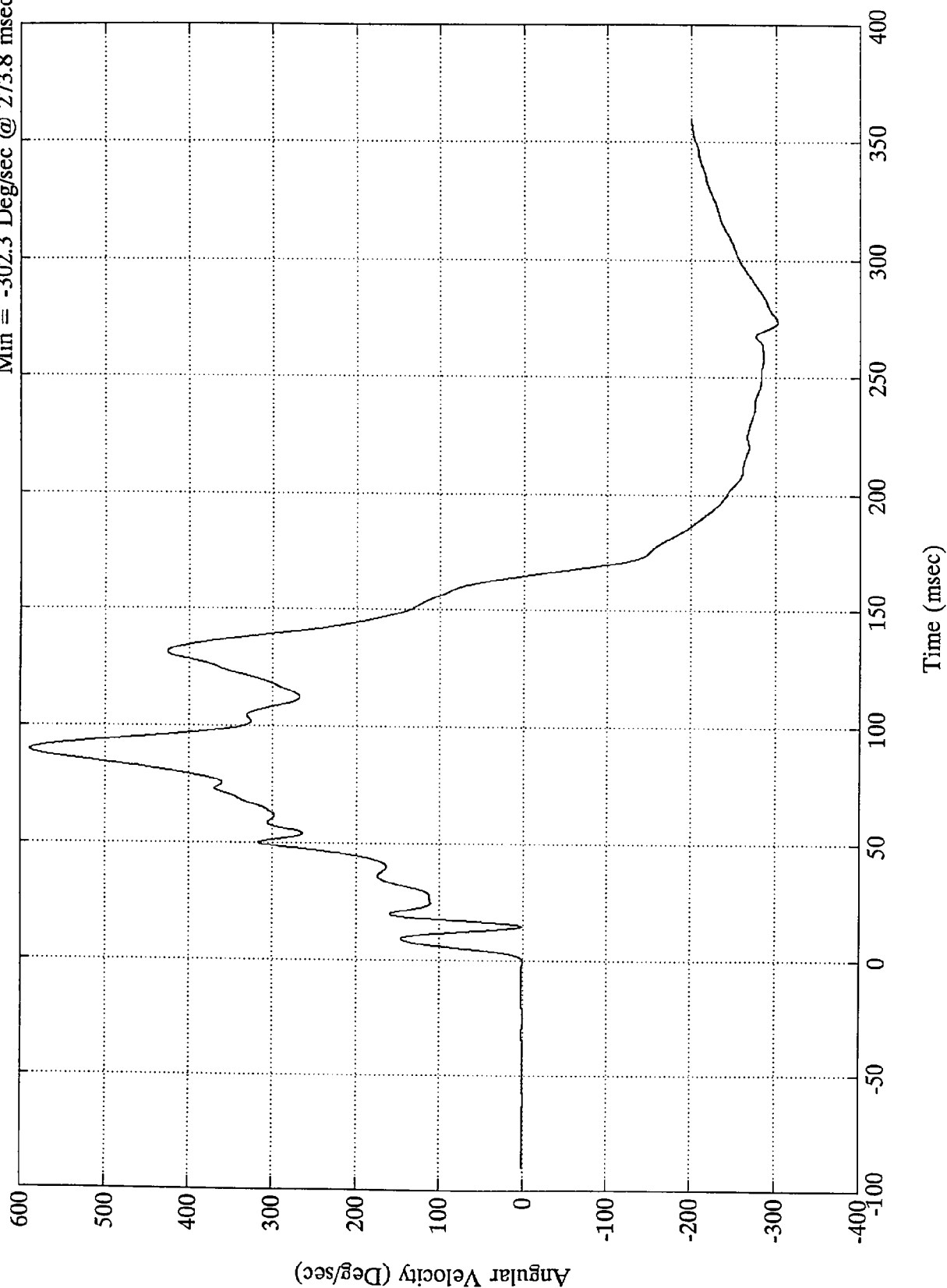


SAE Filter Class 60

301 Rear 30 MPH-1995 Mazda Protege

Max = 588.6 Deg/sec @ 89.76 msec
Min = -302.3 Deg/sec @ 273.8 msec

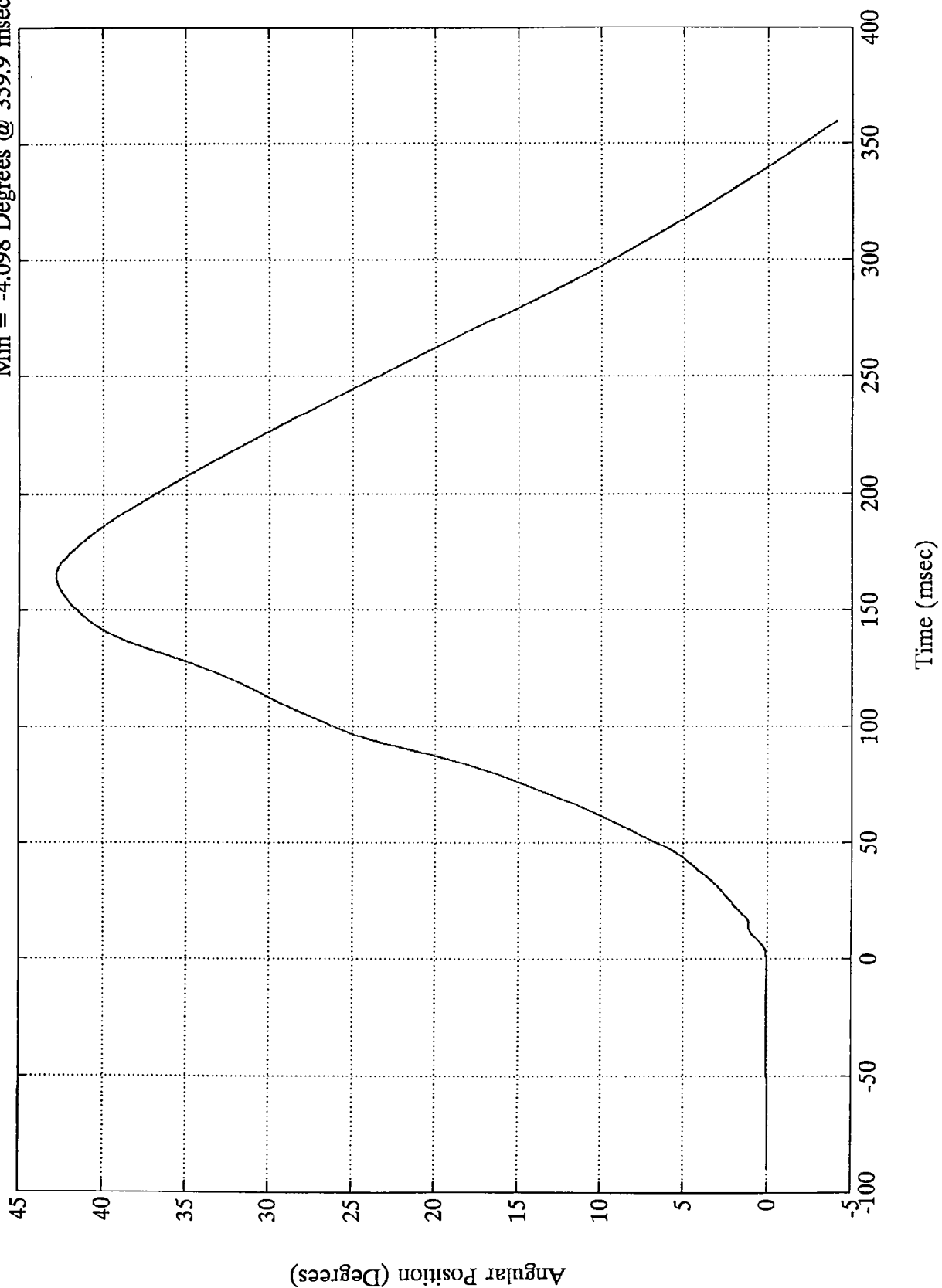
Seatback Angular Velocity



301 Rear 30 MPH-1995 Mazda Protege

Max = 42.79 Degrees @ 165 msec
Min = -4.098 Degrees @ 359.9 msec

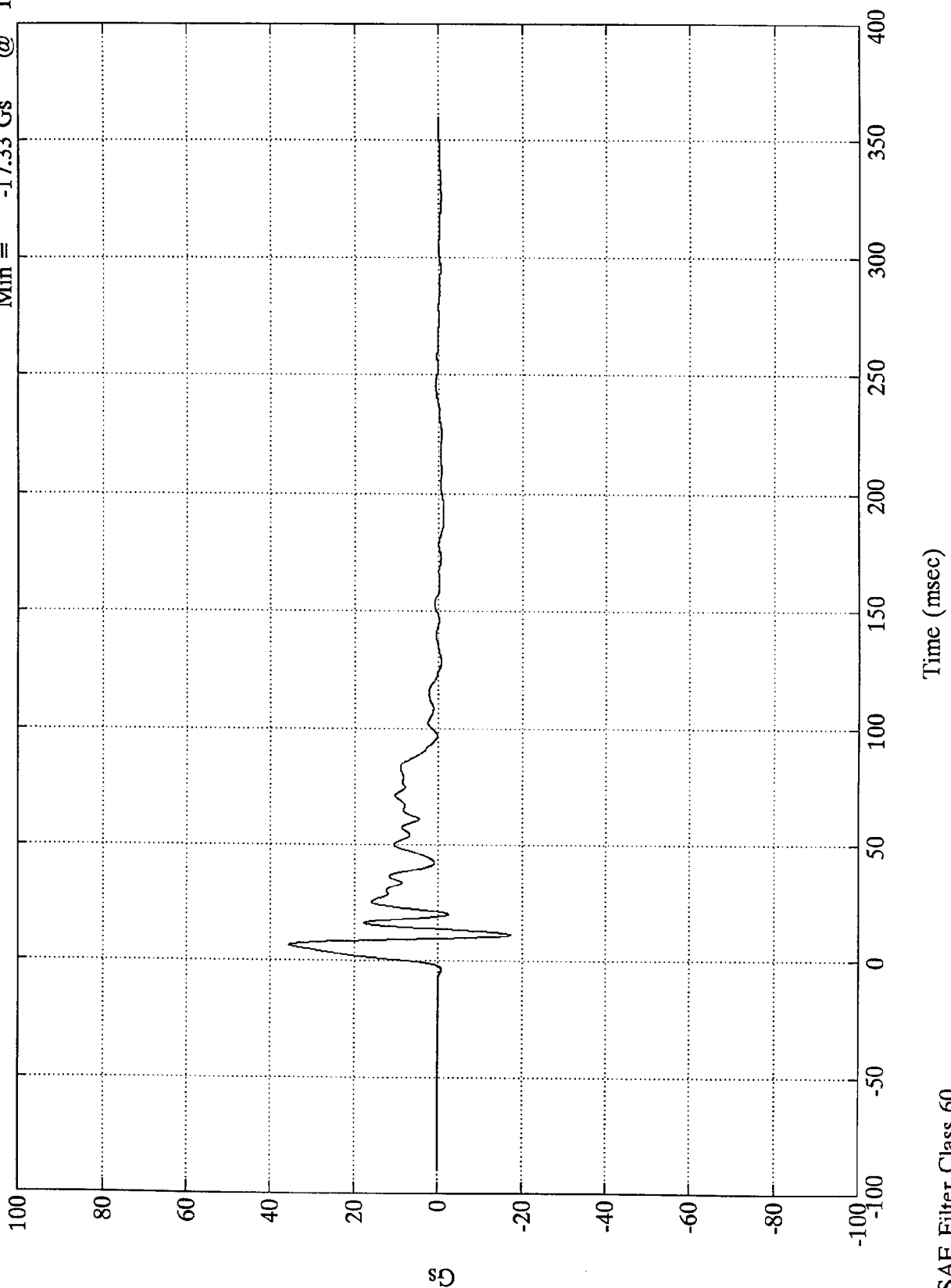
Seatback Angular Position



301 Rear 30 MPH-1995 Mazda Protege

Max = 35.62 Gs @ 6.35 msec
Min = -17.33 Gs @ 11.03 msec

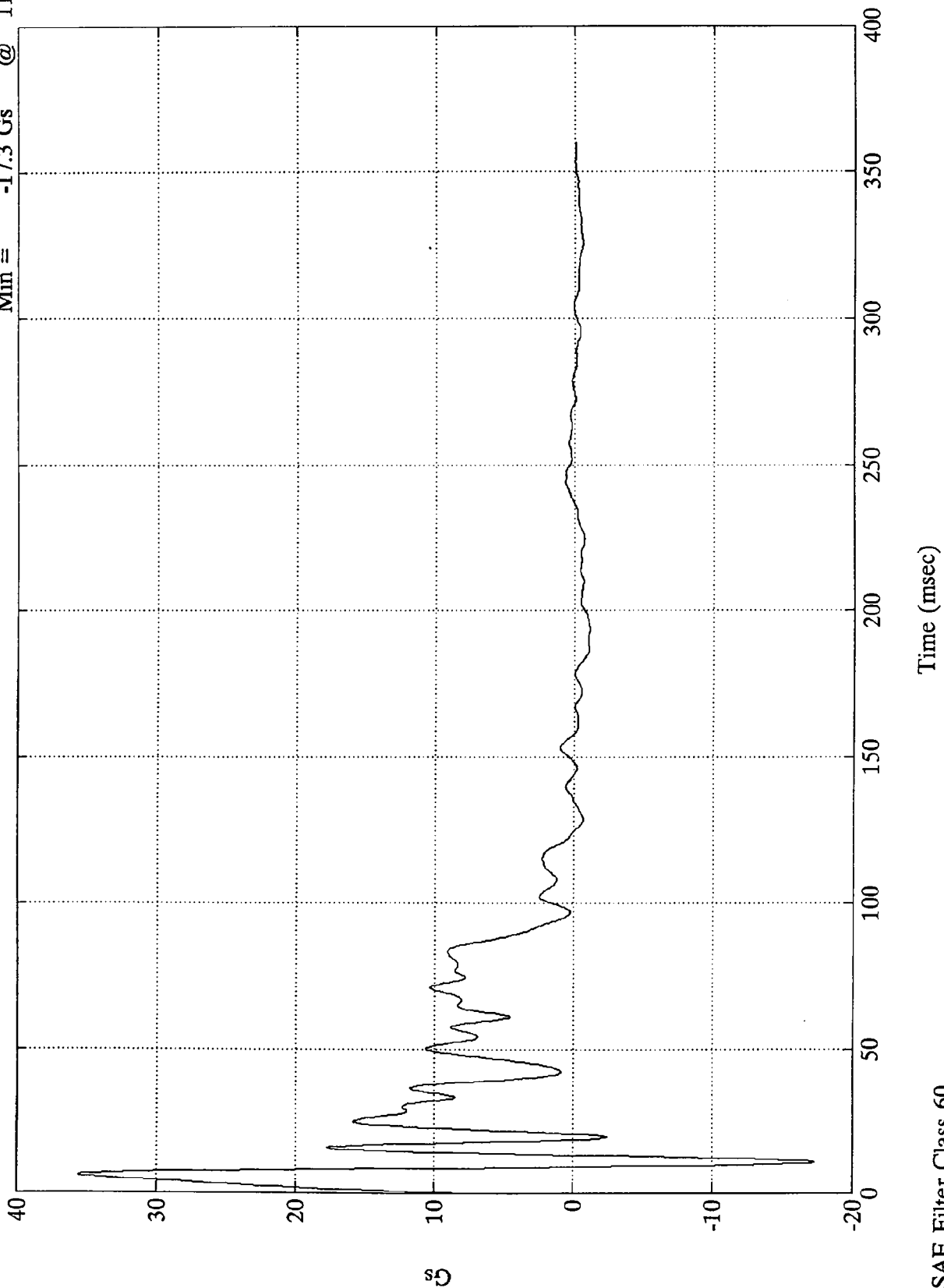
Left Rear Crossmember X



SAE Filter Class 60

301 Rear 30 MPH-1995 Mazda Protege

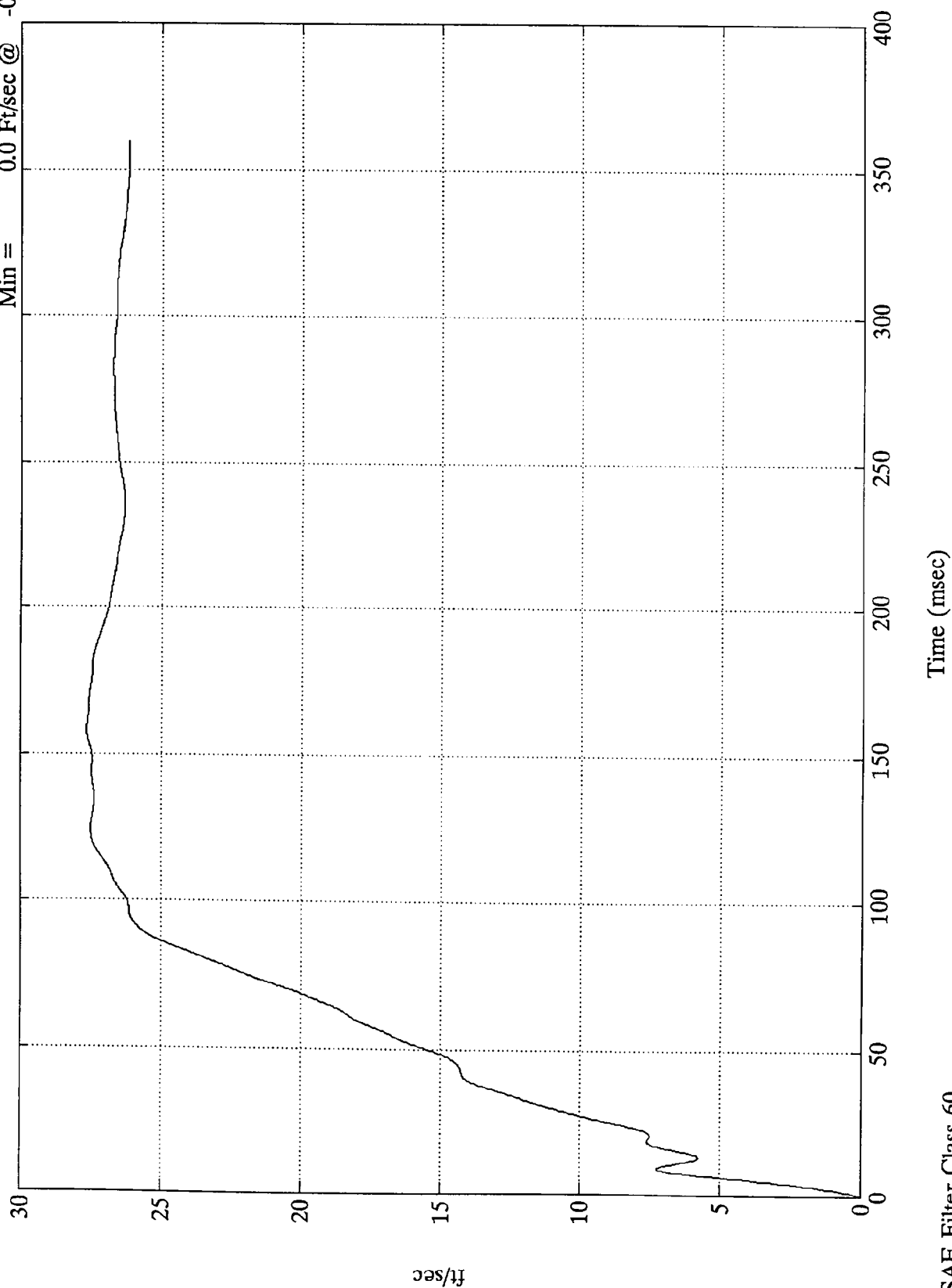
Left Rear Crossmember X
Max = 35.6 Gs @ 6.35 msec
Min = -17.3 Gs @ 11.03 msec



301 Rear 30 MPH-1995 Mazda Protege

1st Integral Left Rear Crossmember X

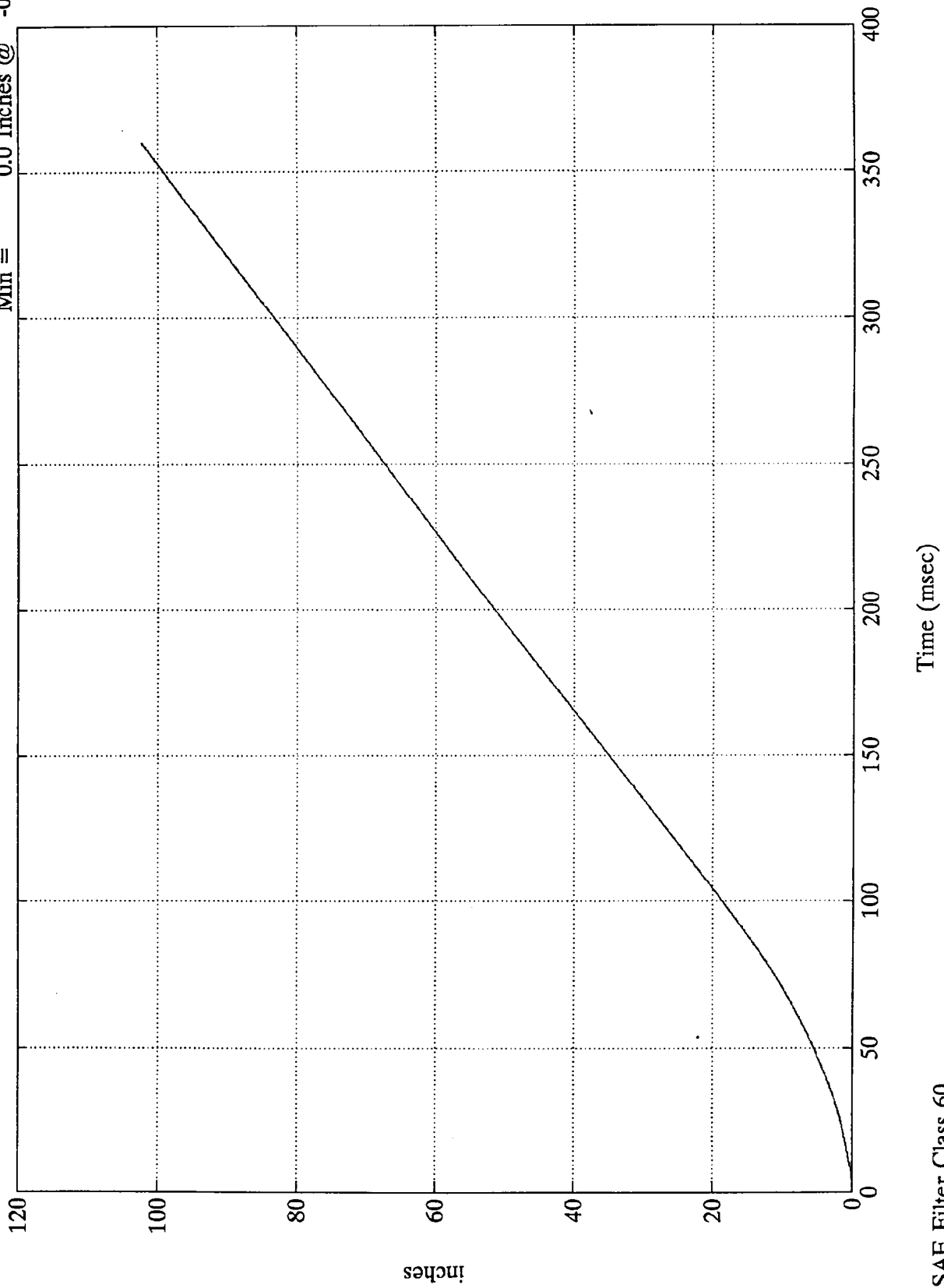
Max = 27.6 Ft/sec @ 157.80 msec
Min = 0.0 Ft/sec @ -0.00 msec



301 Rear 30 MPH-1995 Mazda Protege

2nd Integral Left Rear Crossmember X

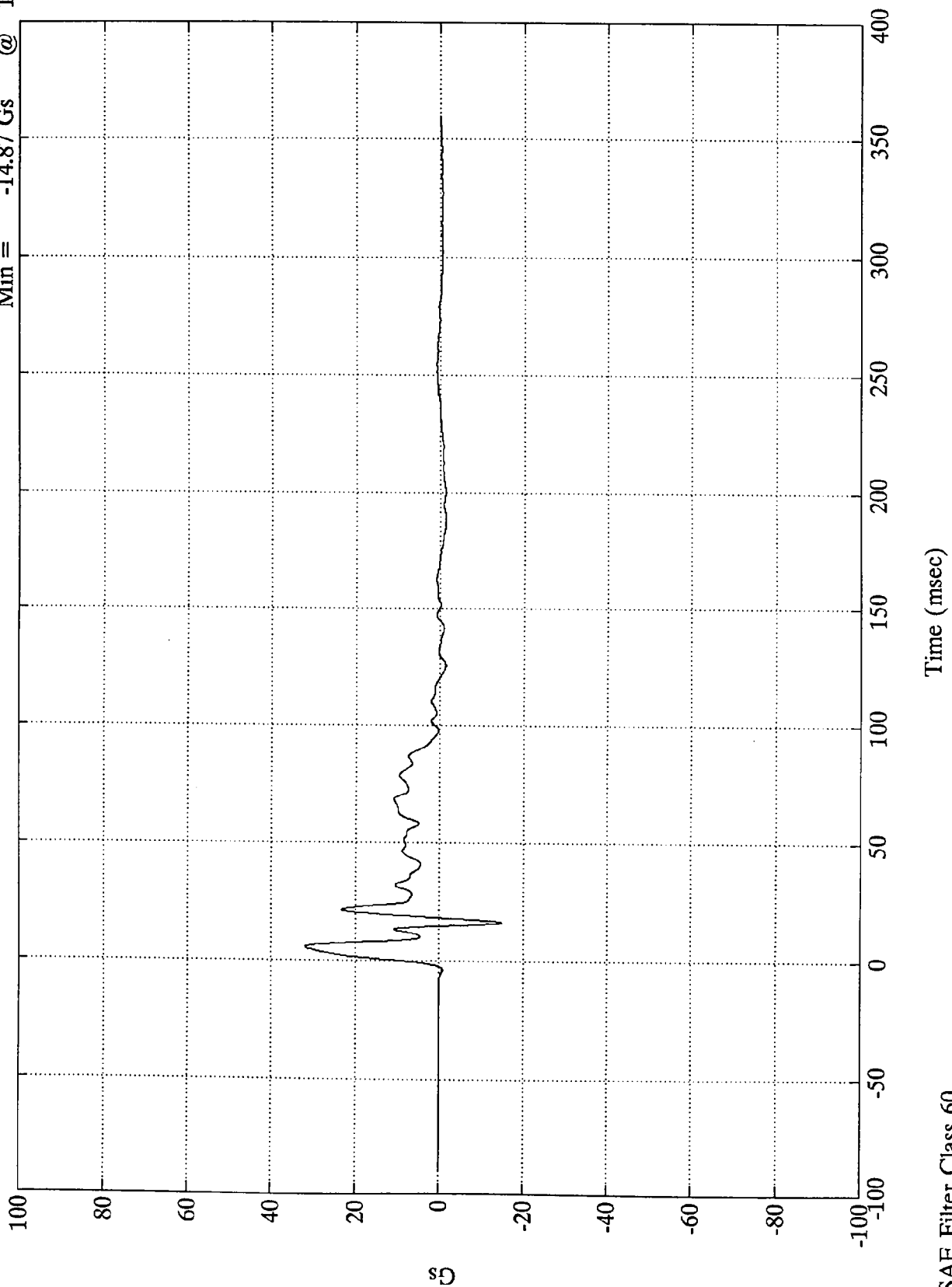
Max = 102.3 Inches @ 359.88 msec
Min = 0.0 Inches @ -0.00 msec



301 Rear 30 MPH-1995 Mazda Protege

Max = 31.98 Gs @ 5.63 msec
 Min = -14.87 Gs @ 16.31 msec

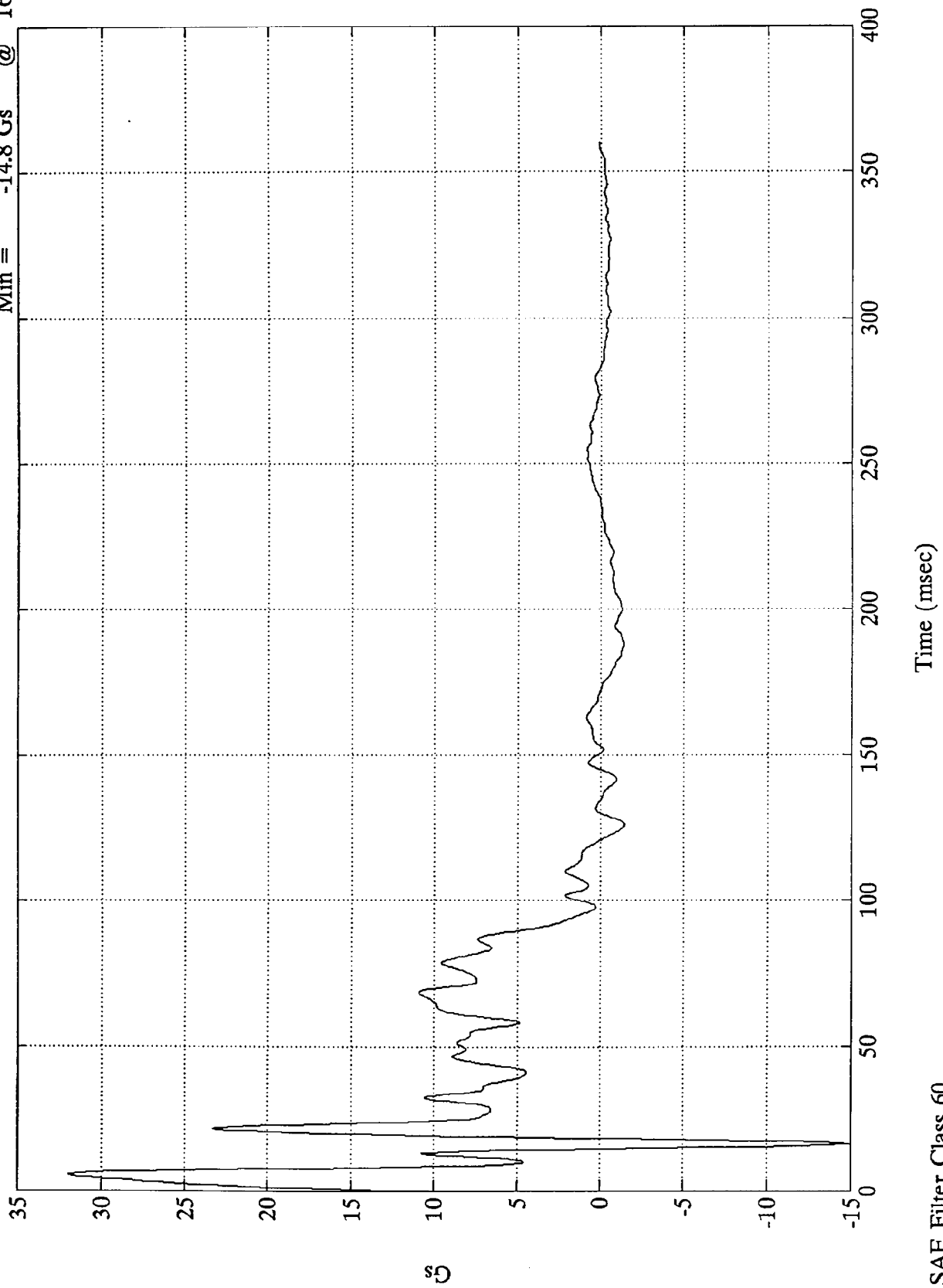
Right Rear Crossmember X



SAE Filter Class 60

301 Rear 30 MPH-1995 Mazda Protege

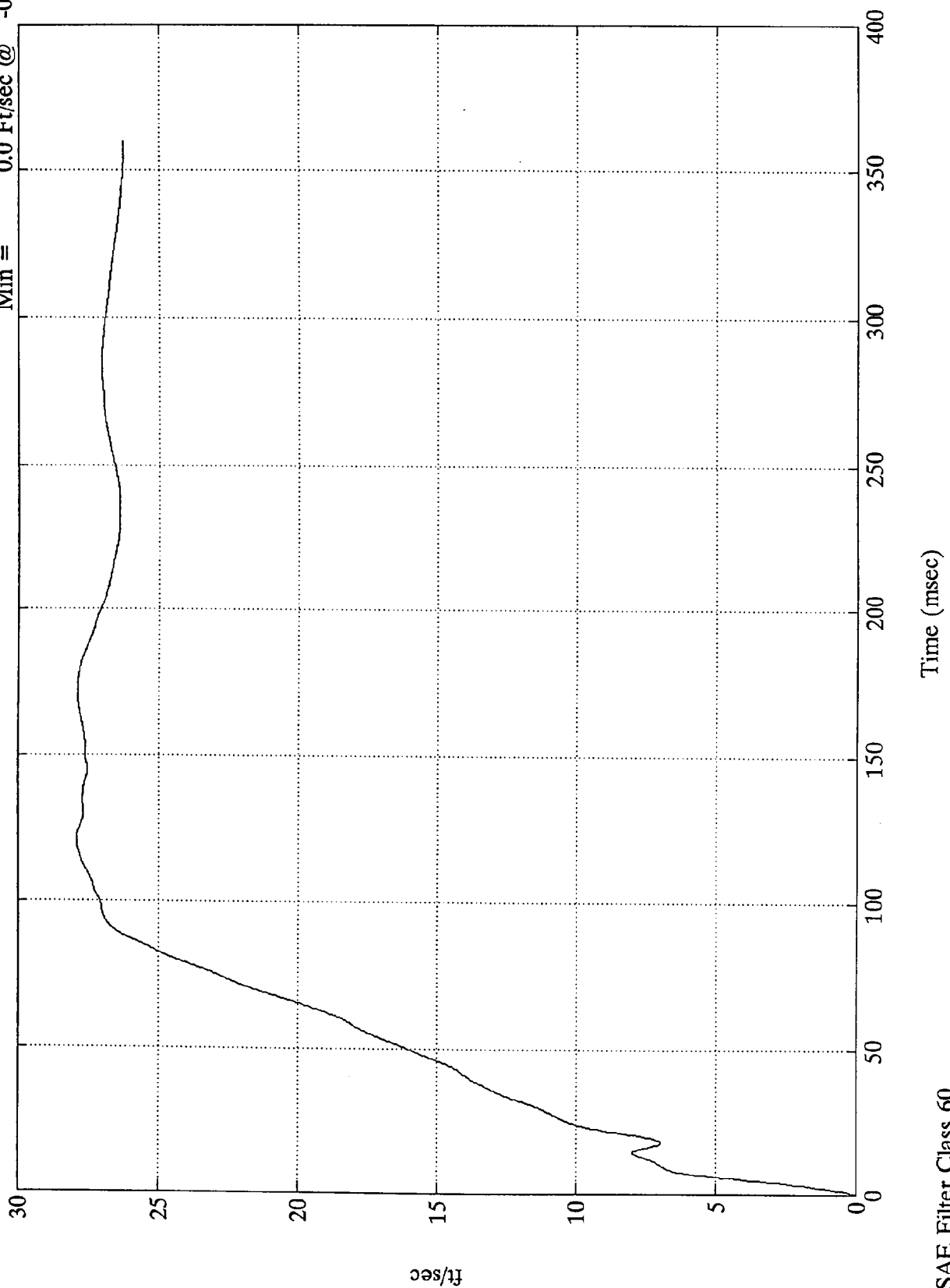
Right Rear Crossmember X
Max = 31.9 Gs @ 5.63 msec
Min = -14.8 Gs @ 16.31 msec



301 Rear 30 MPH-1995 Mazda Protege

1st Integral Right Rear Crossmember X

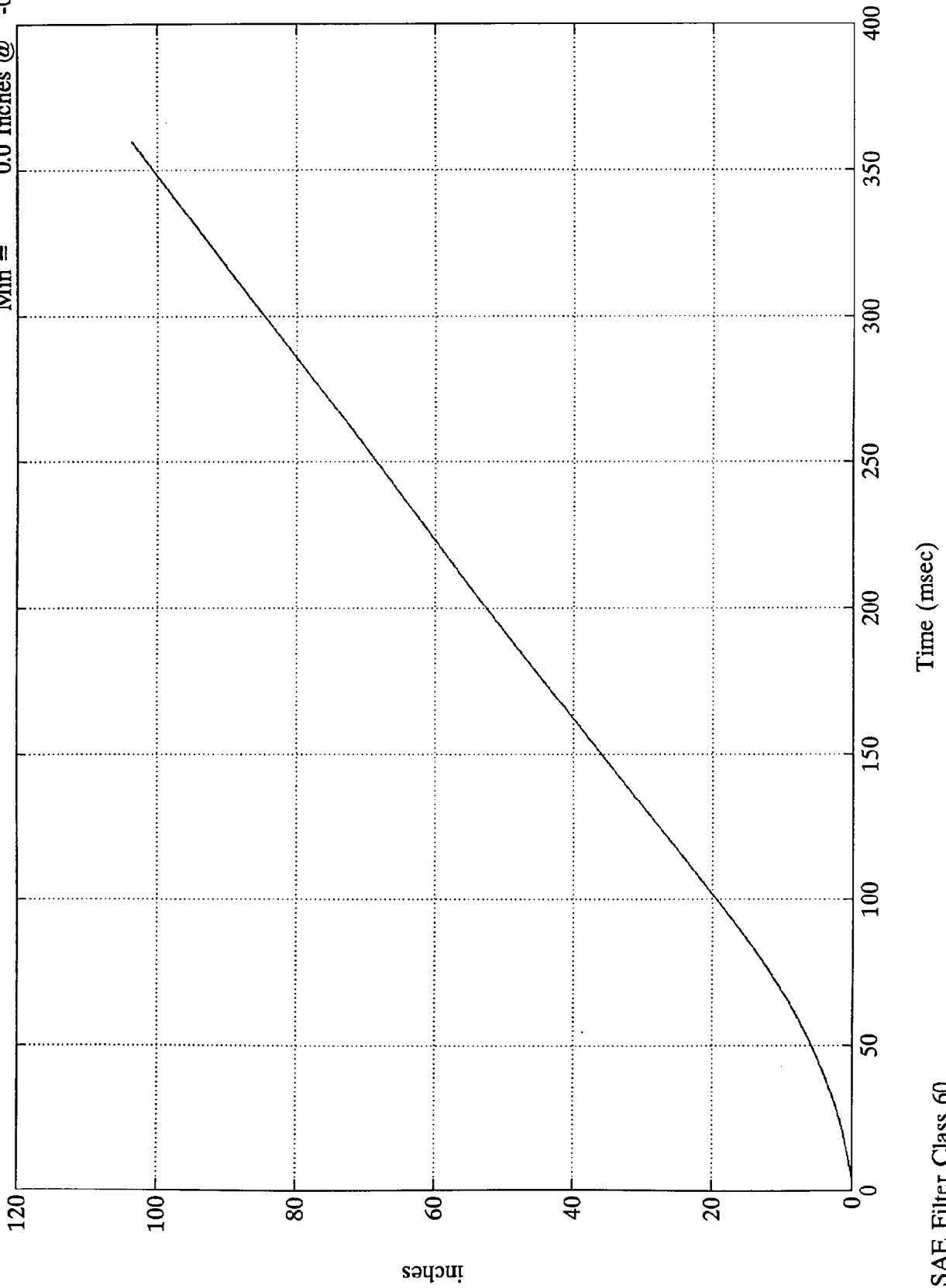
Max = 27.9 Ft/sec @ 120.84 msec
Min = 0.0 Ft/sec @ -0.00 msec



301 Rear 30 MPH-1995 Mazda Protege

2nd Integral Right Rear Crossmember X

Max = 103.7 Inches @ 359.88 msec
Min = 0.0 Inches @ -0.00 msec



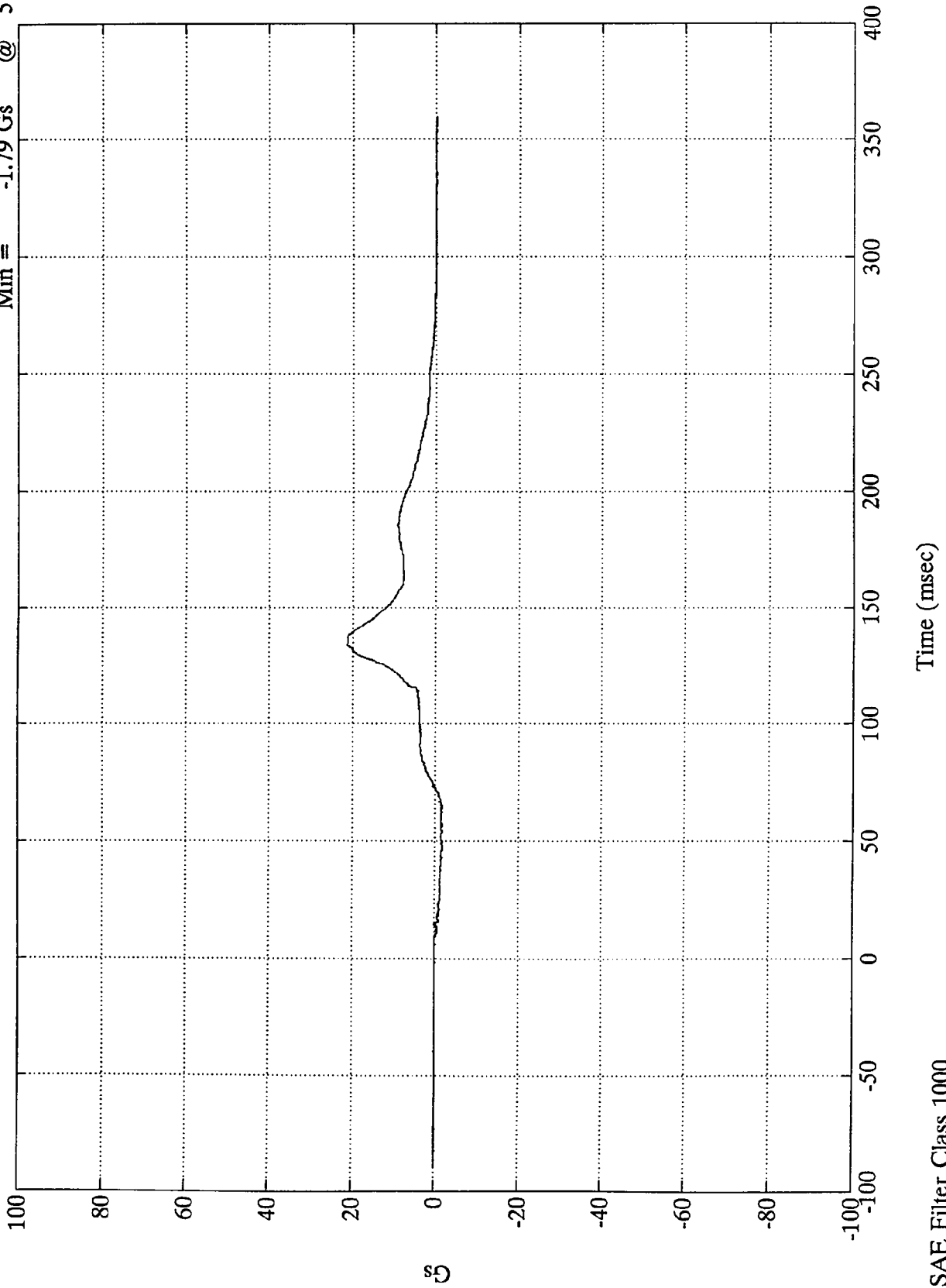
TEST NO. CS5405

DRIVER DUMMY (Pos. 1)	SAE FILTER CHANNEL CLASS
Head Accelerations	1000
Chest Accelerations	180
Pelvic Accelerations	1000
Upper Neck Forces	1000
Upper Neck Moments	600
Belt Forces	60
Belt Spoolout	60

301 Rear 30 MPH-1995 Mazda Protege

Pos. 1 Head X

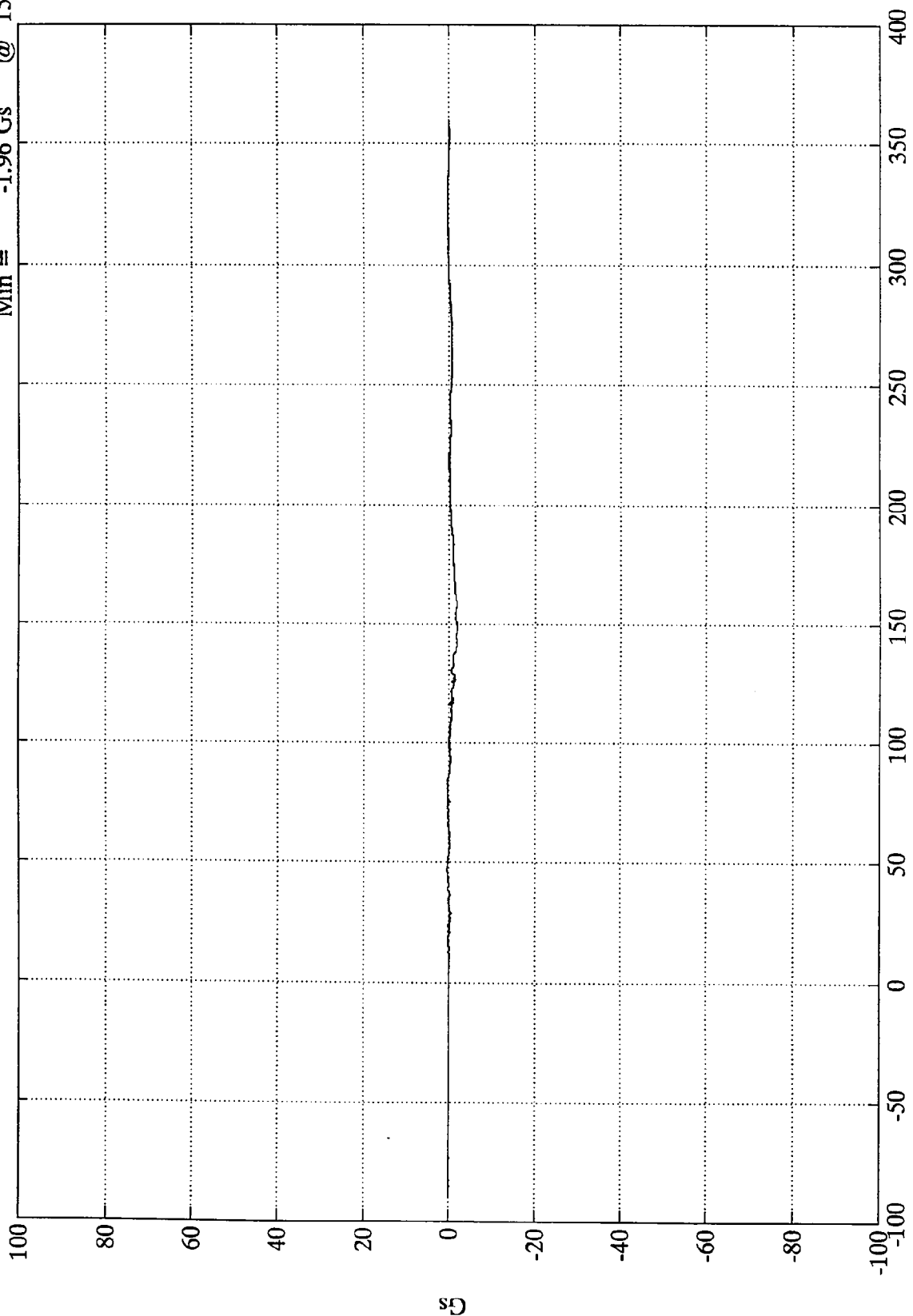
Max = 21.20 Gs @ 136.91 msec
Min = -1.79 Gs @ 57.11 msec



301 Rear 30 MPH-1995 Mazda Protege

Pos. 1 Head Y

Max = .53 Gs @ 83.87 msec
Min = -1.96 Gs @ 150.83 msec



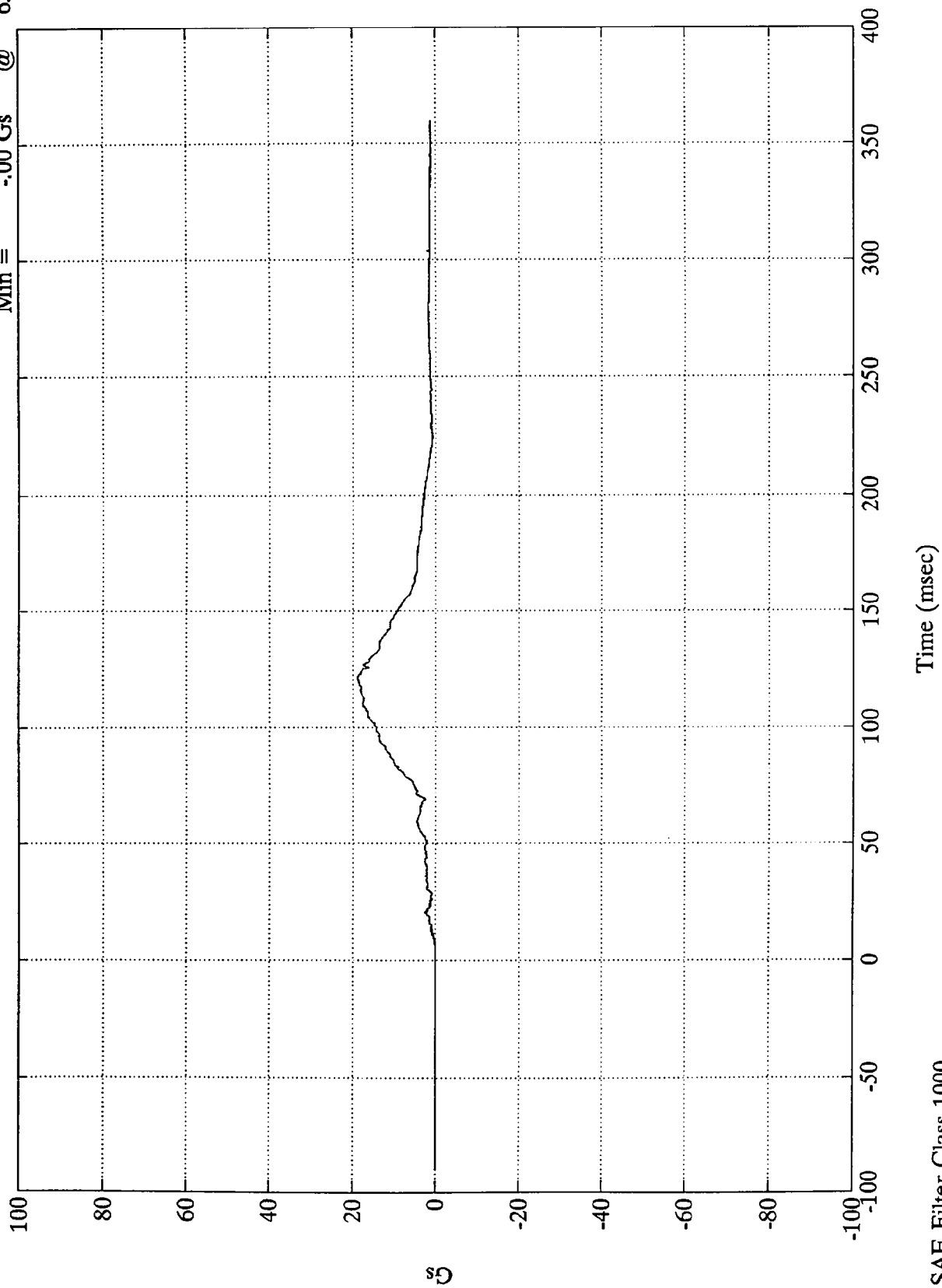
Time (msec)

SAE Filter Class 1000

301 Rear 30 MPH-1995 Mazda Protege

Pos. 1 Head Z

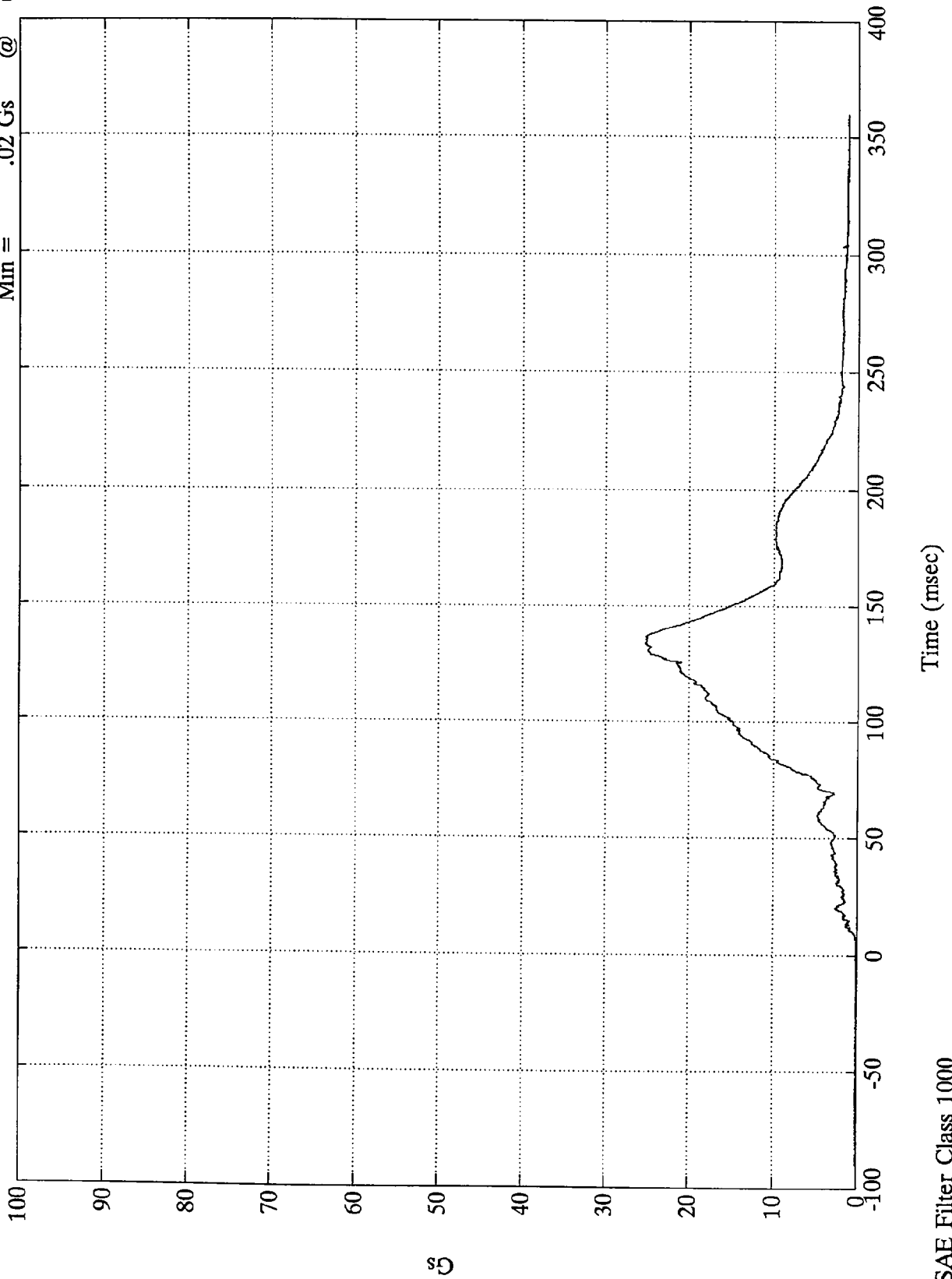
Max = 18.86 Gs @ 121.92 msec
Min = -.00 Gs @ 6.71 msec



301 Rear 30 MPH-1995 Mazda Protege

Pos. 1 Head Resultant

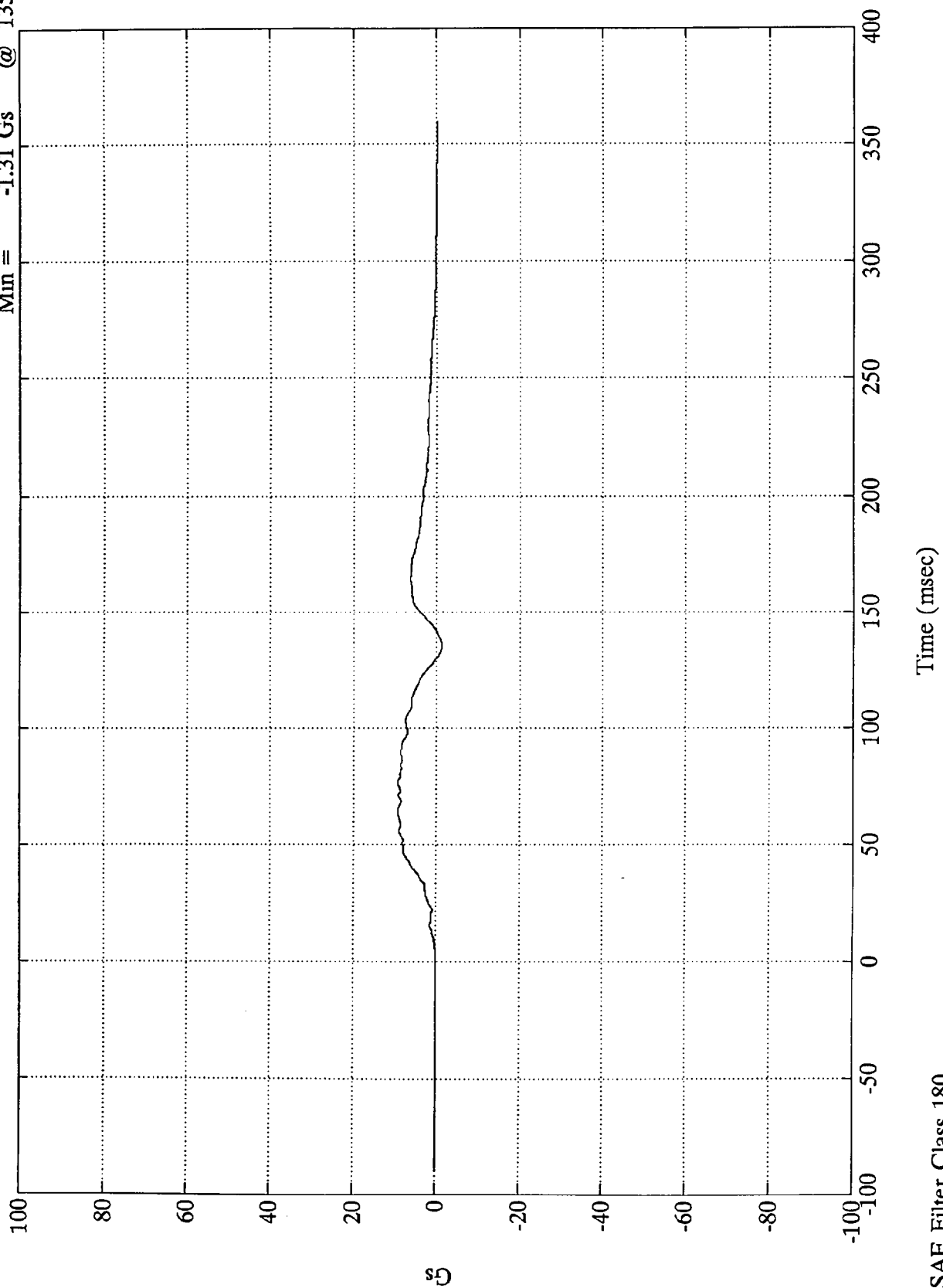
Max = 25.19 Gs @ 133.80 msec
Min = .02 Gs @ 6.71 msec



301 Rear 30 MPH-1995 Mazda Protege

Pos. 1 Chest X

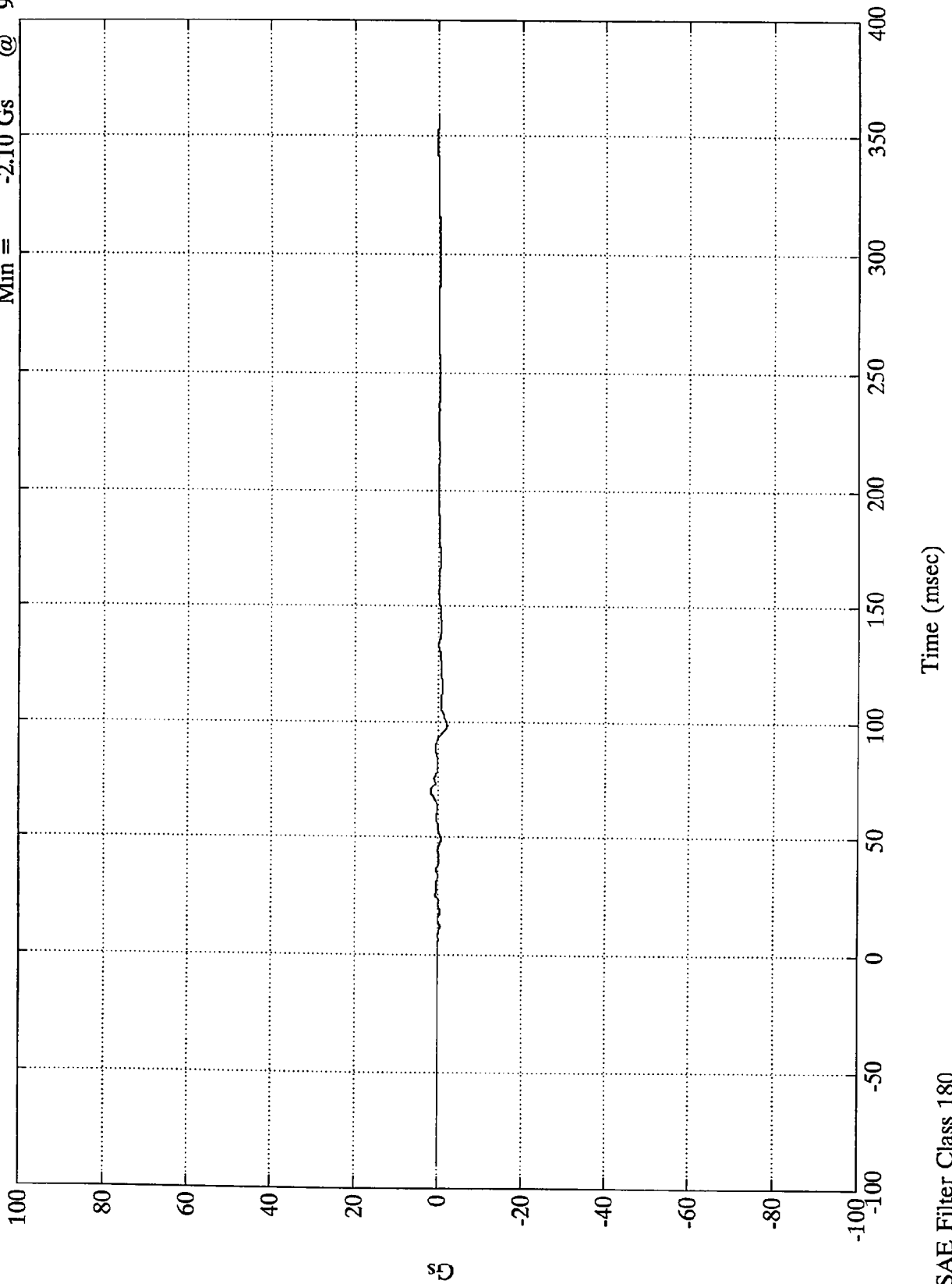
Max = 9.31 Gs @ 76.80 msec
Min = -1.31 Gs @ 135.47 msec



SAE Filter Class 180

301 Rear 30 MPH-1995 Mazda Protege

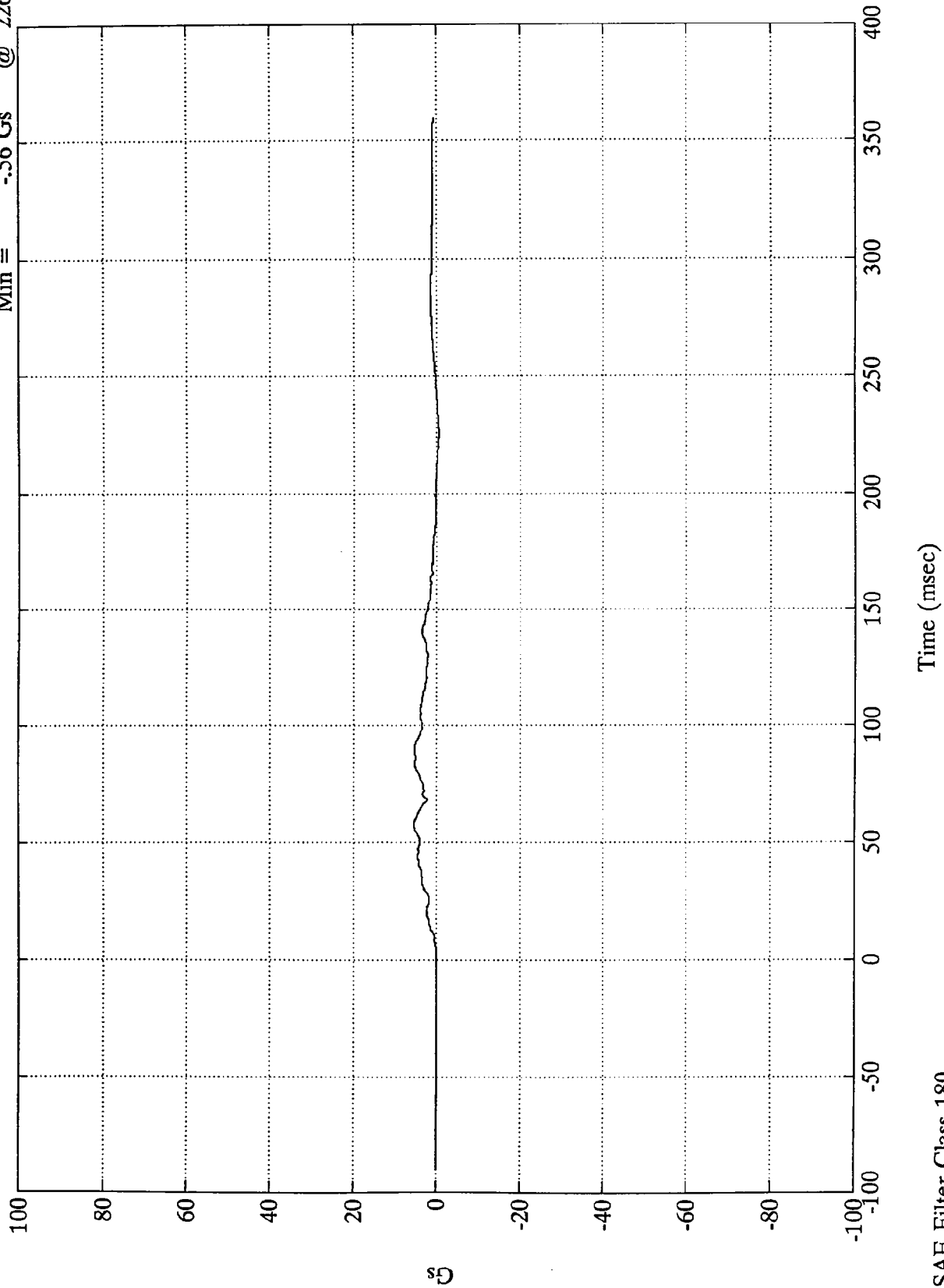
Pos. 1 Chest Y
Max = 1.90 Gs @ 69.48 msec
Min = -2.10 Gs @ 98.52 msec



301 Rear 30 MPH-1995 Mazda Protege

Pos. 1 Chest Z

Max = 5.40 Gs @ 57.95 msec
Min = -.56 Gs @ 226.56 msec

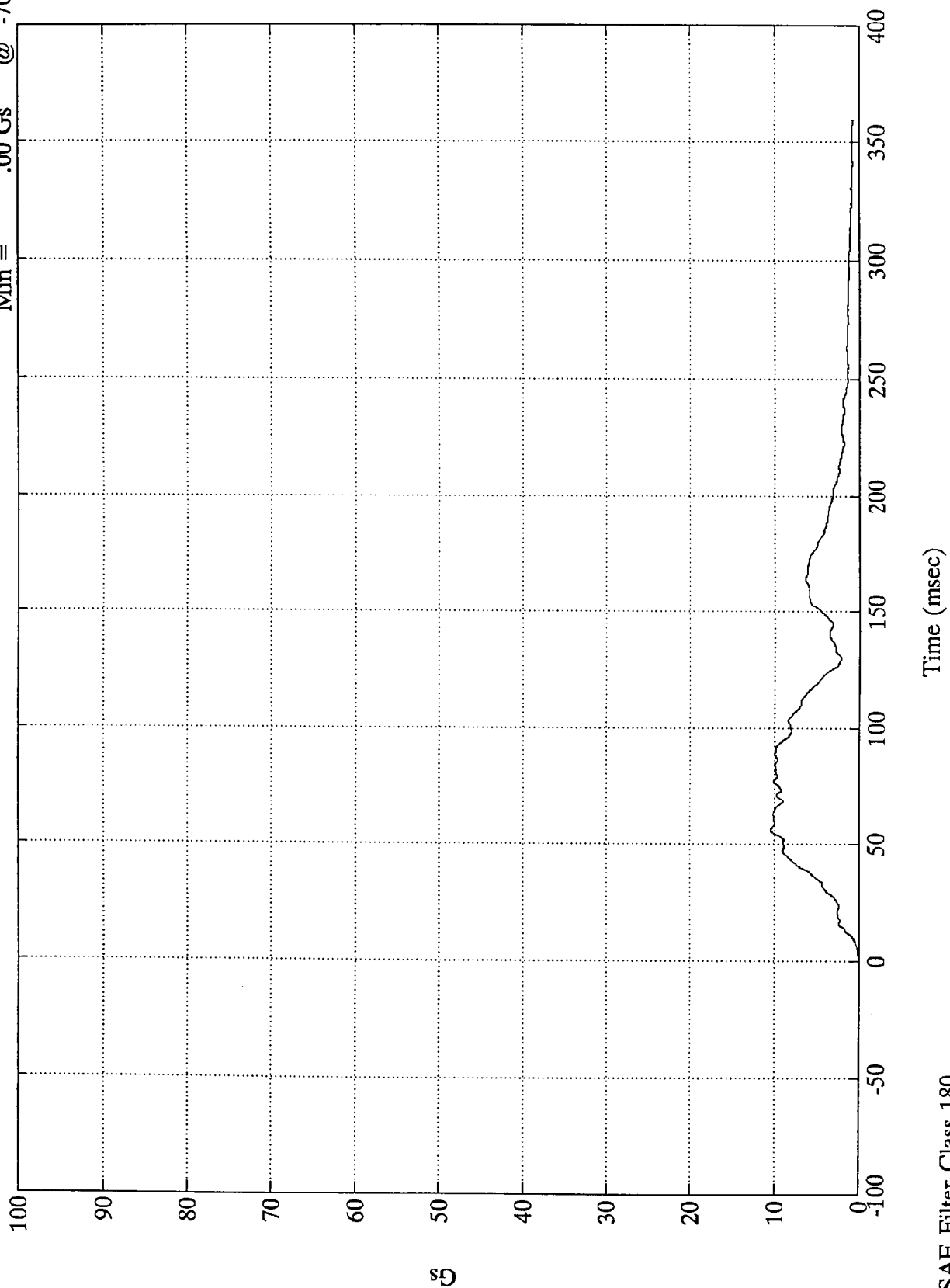


SAE Filter Class 180

301 Rear 30 MPH-1995 Mazda Protege

Max = 10.41 Gs @ 56.04 msec
Min = .00 Gs @ -70.44 msec

Pos. 1 Chest Resultant

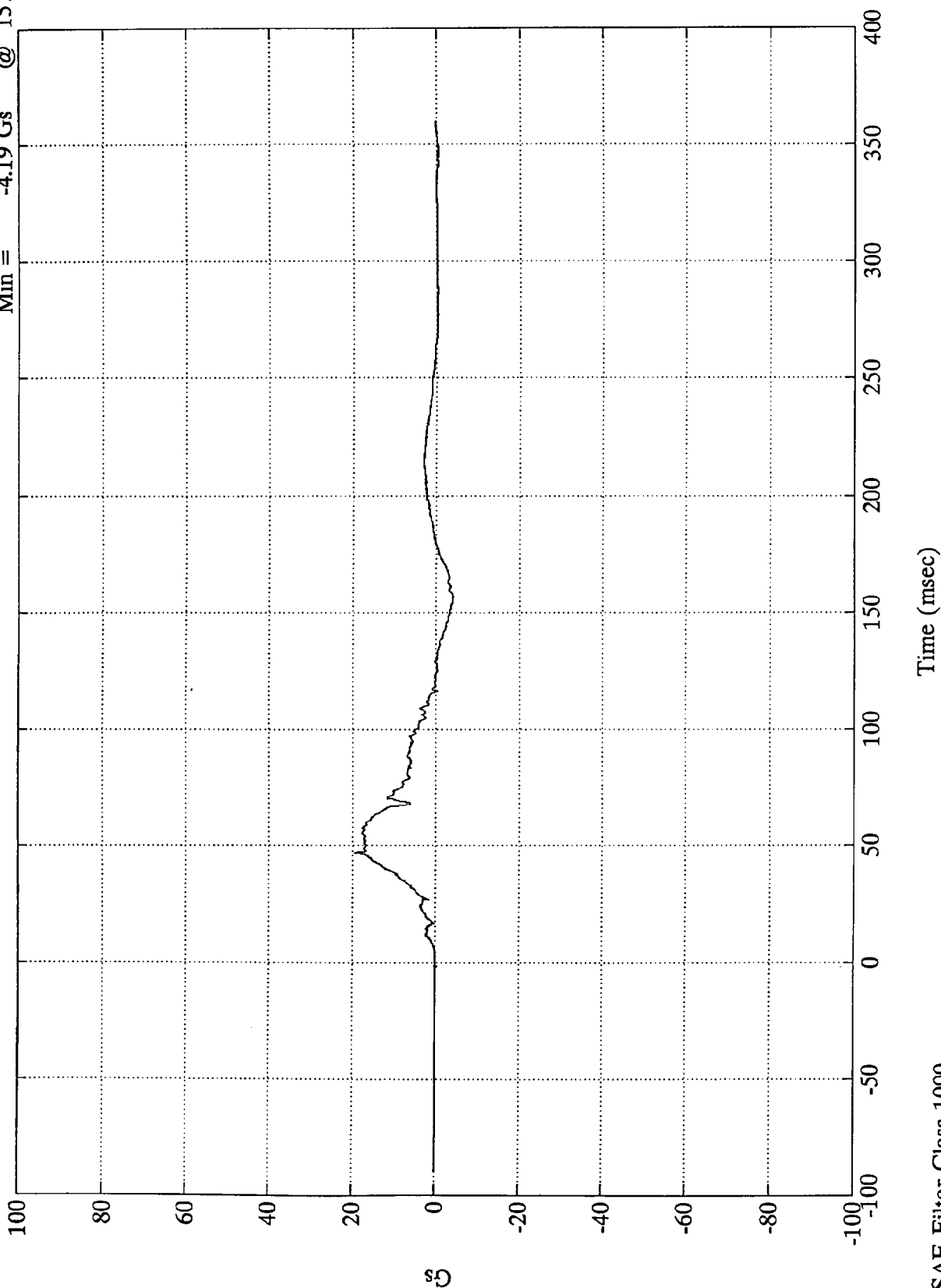


SAE Filter Class 180

301 Rear 30 MPH-1995 Mazda Protege

Max = 19.44 Gs @ 46.92 msec
Min = -4.19 Gs @ 157.08 msec

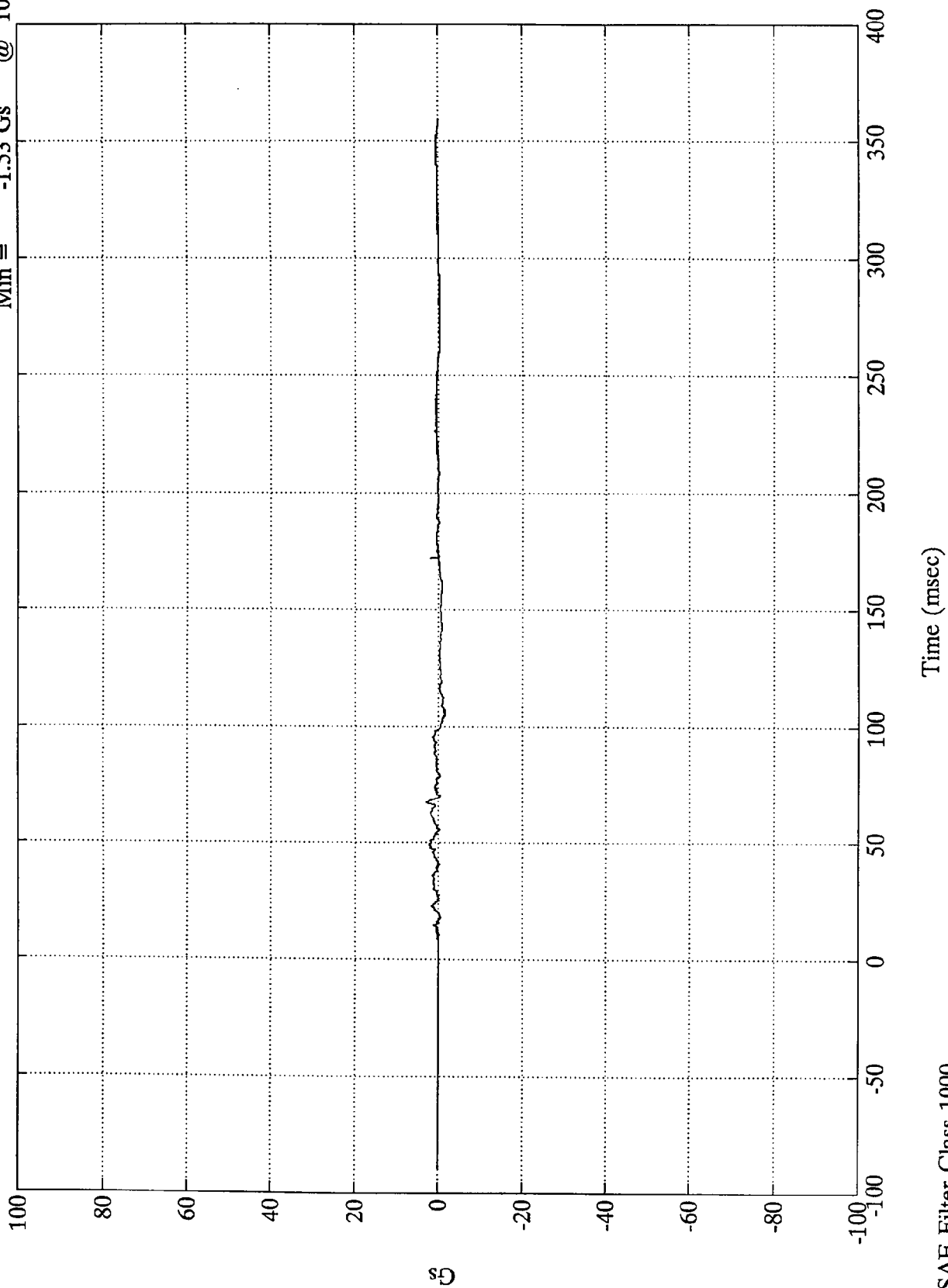
Pos. 1 Pelvic X



301 Rear 30 MPH-1995 Mazda Protege

Max = 2.83 Gs @ 67.68 msec
Min = -1.53 Gs @ 105.72 msec

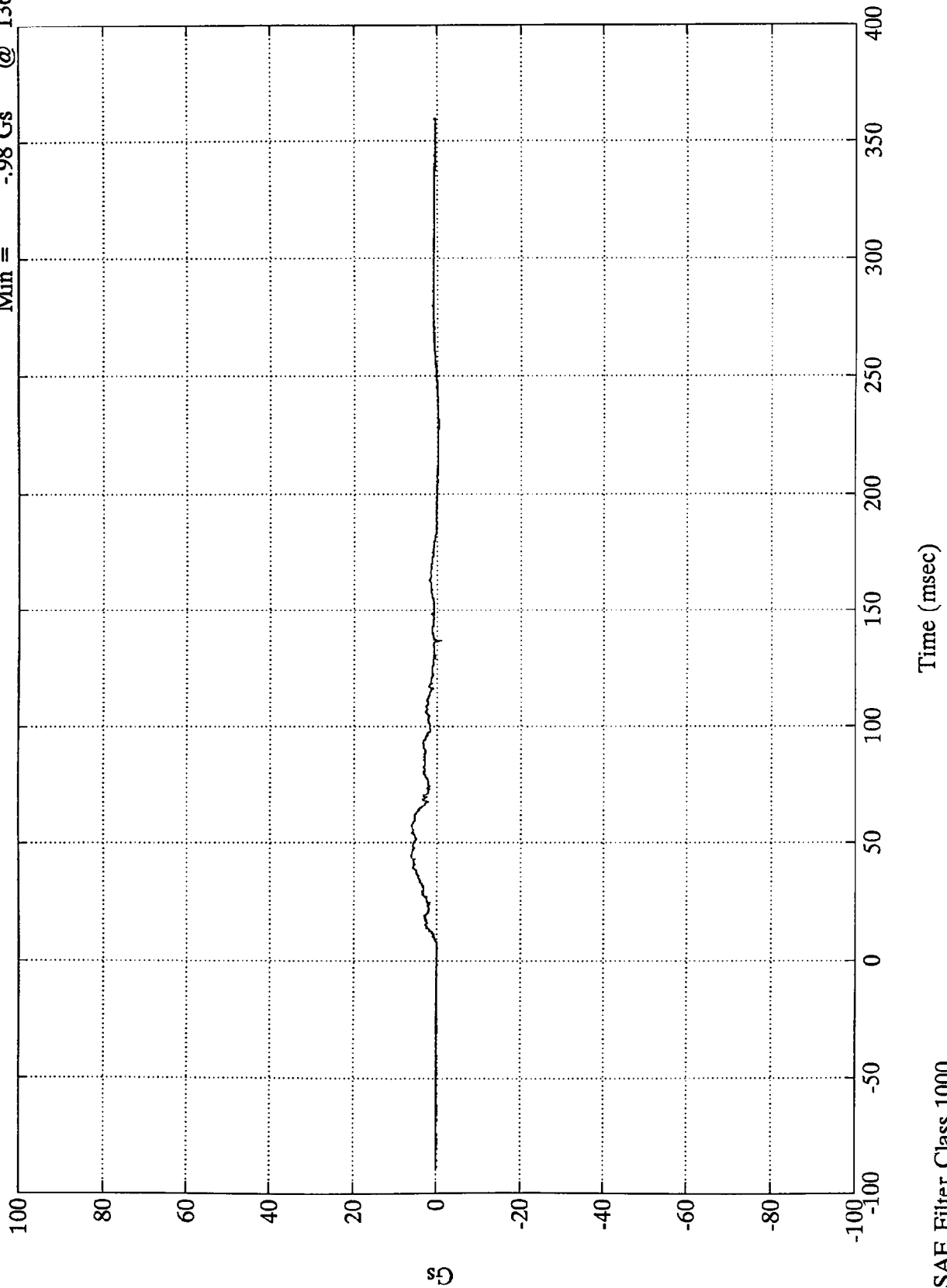
Pos. 1 Pelvic Y



301 Rear 30 MPH-1995 Mazda Protege

Max = 6.20 Gs @ 44.52 msec
Min = -0.98 Gs @ 136.80 msec

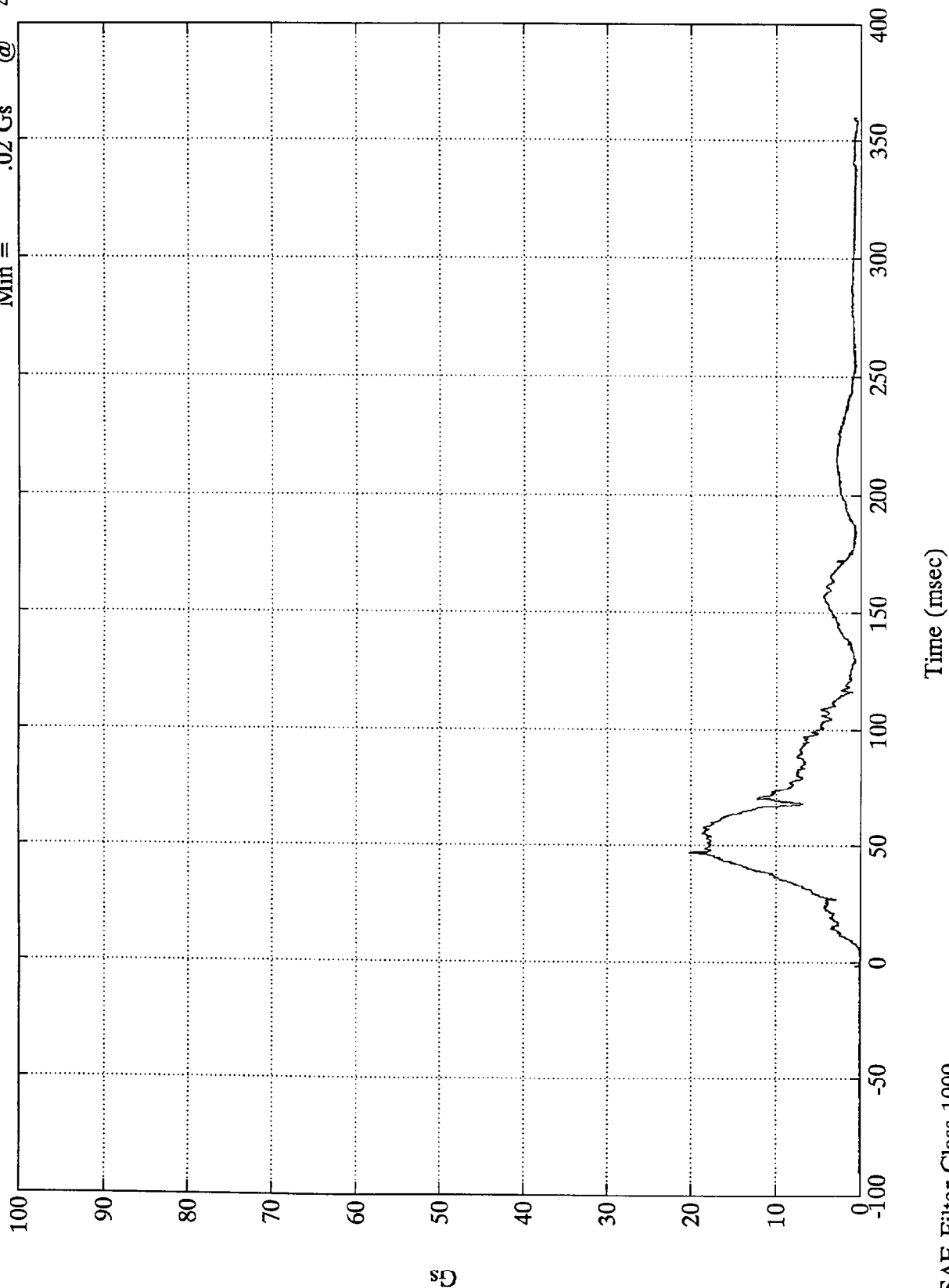
Pos. 1 Pelvic Z



301 Rear 30 MPH-1995 Mazda Protege

Max = 20.26 Gs @ 46.92 msec
Min = .02 Gs @ 4.43 msec

Pos. 1 Pelvic Resultant

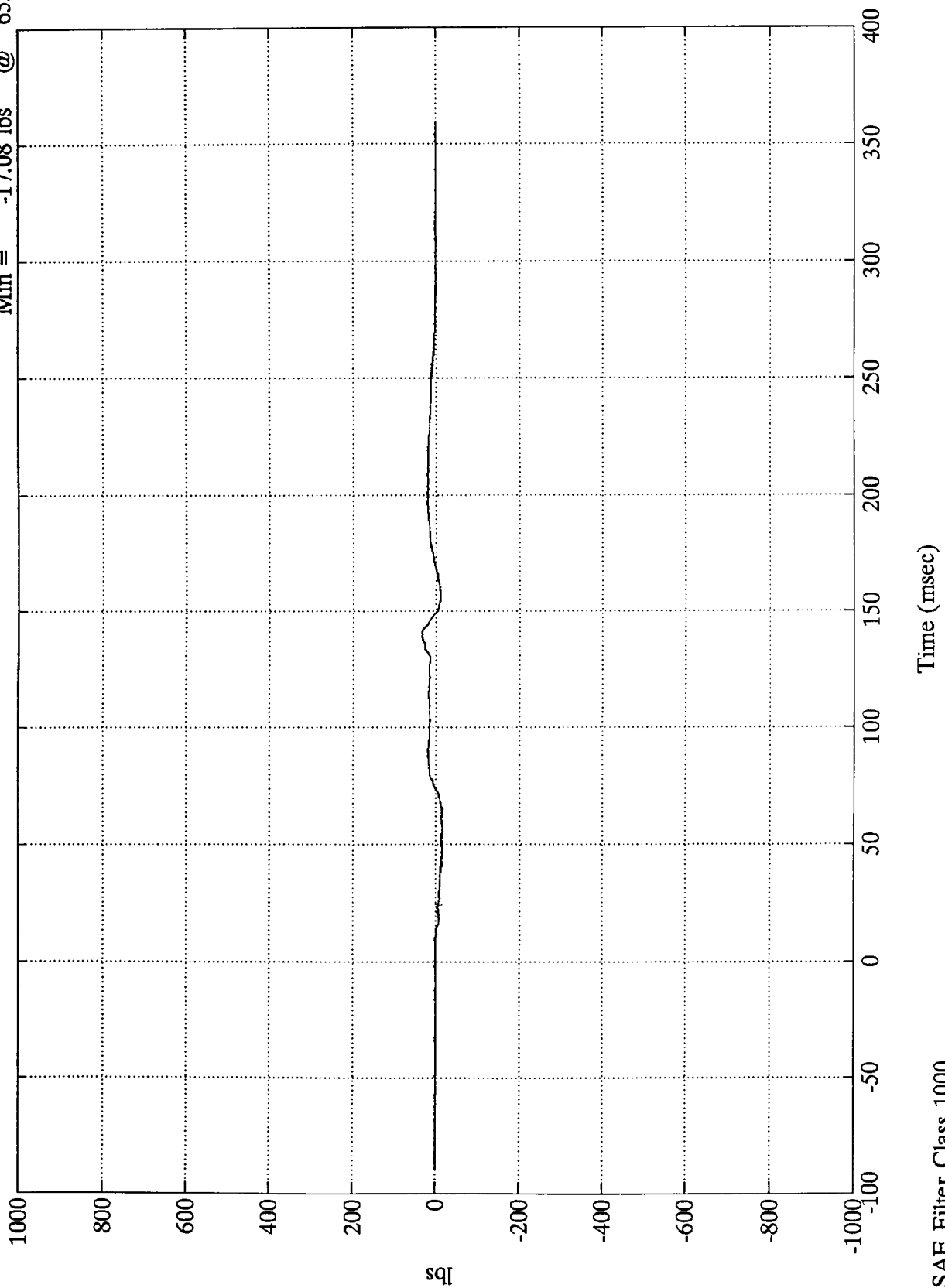


SAE Filter Class 1000

301 Rear 30 MPH-1995 Mazda Protege

Pos. 1 Upper Neck Fx

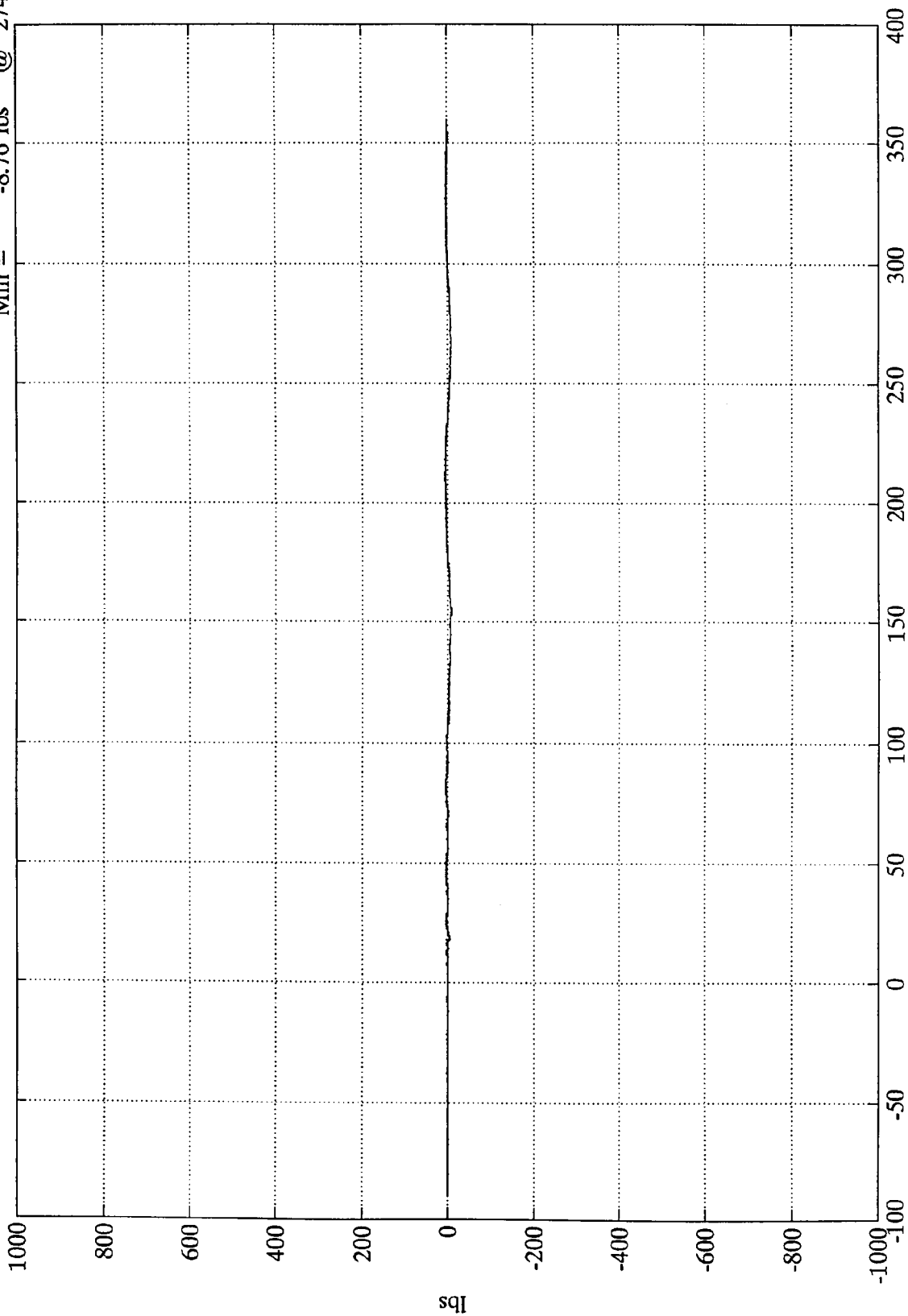
Max = 33.98 lbs @ 140.88 msec
Min = -17.08 lbs @ 65.04 msec



301 Rear 30 MPH-1995 Mazda Protege

Pos. 1 Upper Neck Fy

Max = 6.62 lbs @ 218.27 msec
Min = -8.76 lbs @ 274.32 msec



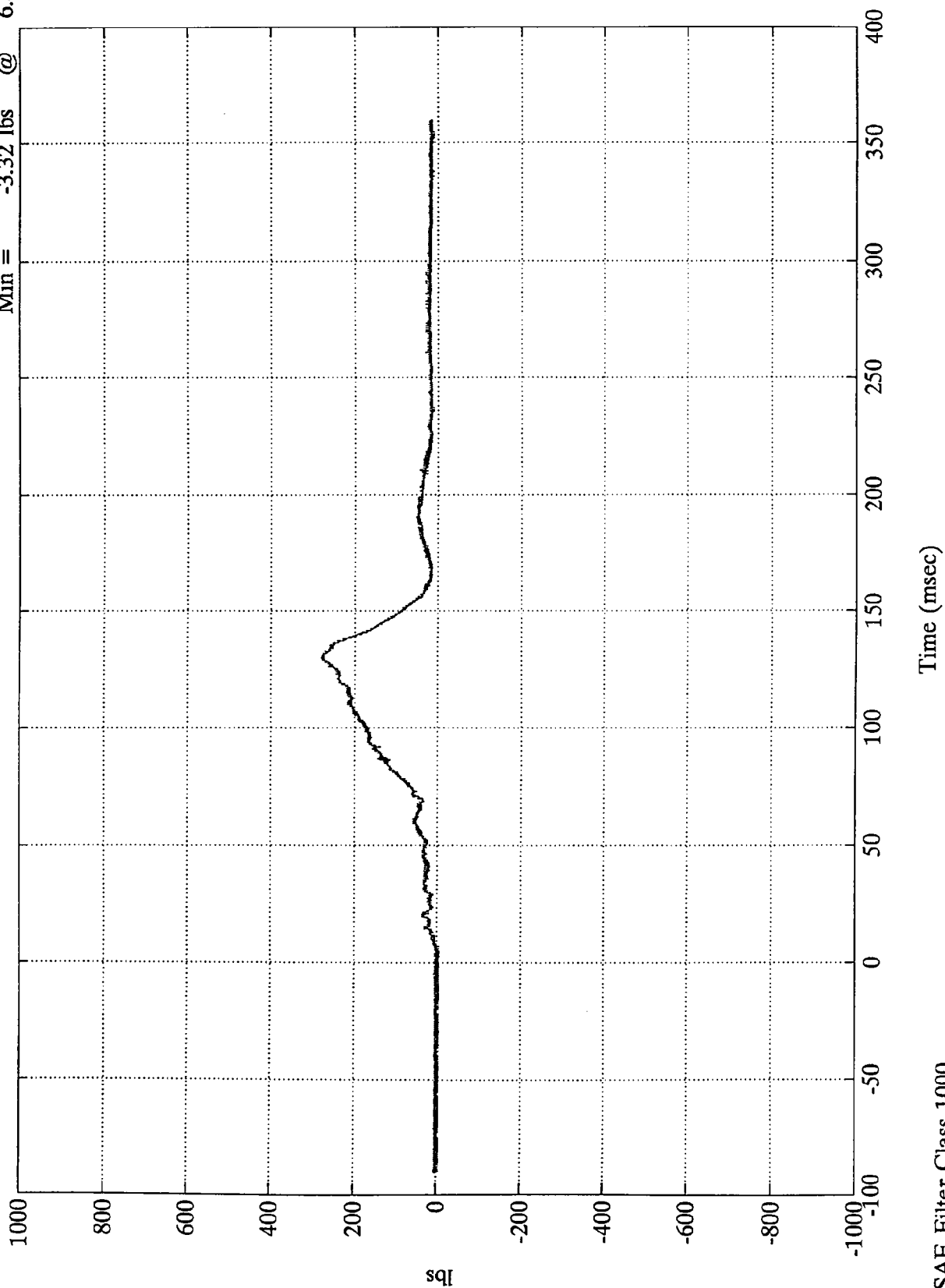
Time (msec)

SAE Filter Class 1000

301 Rear 30 MPH-1995 Mazda Protege

Pos. 1 Upper Neck Fz

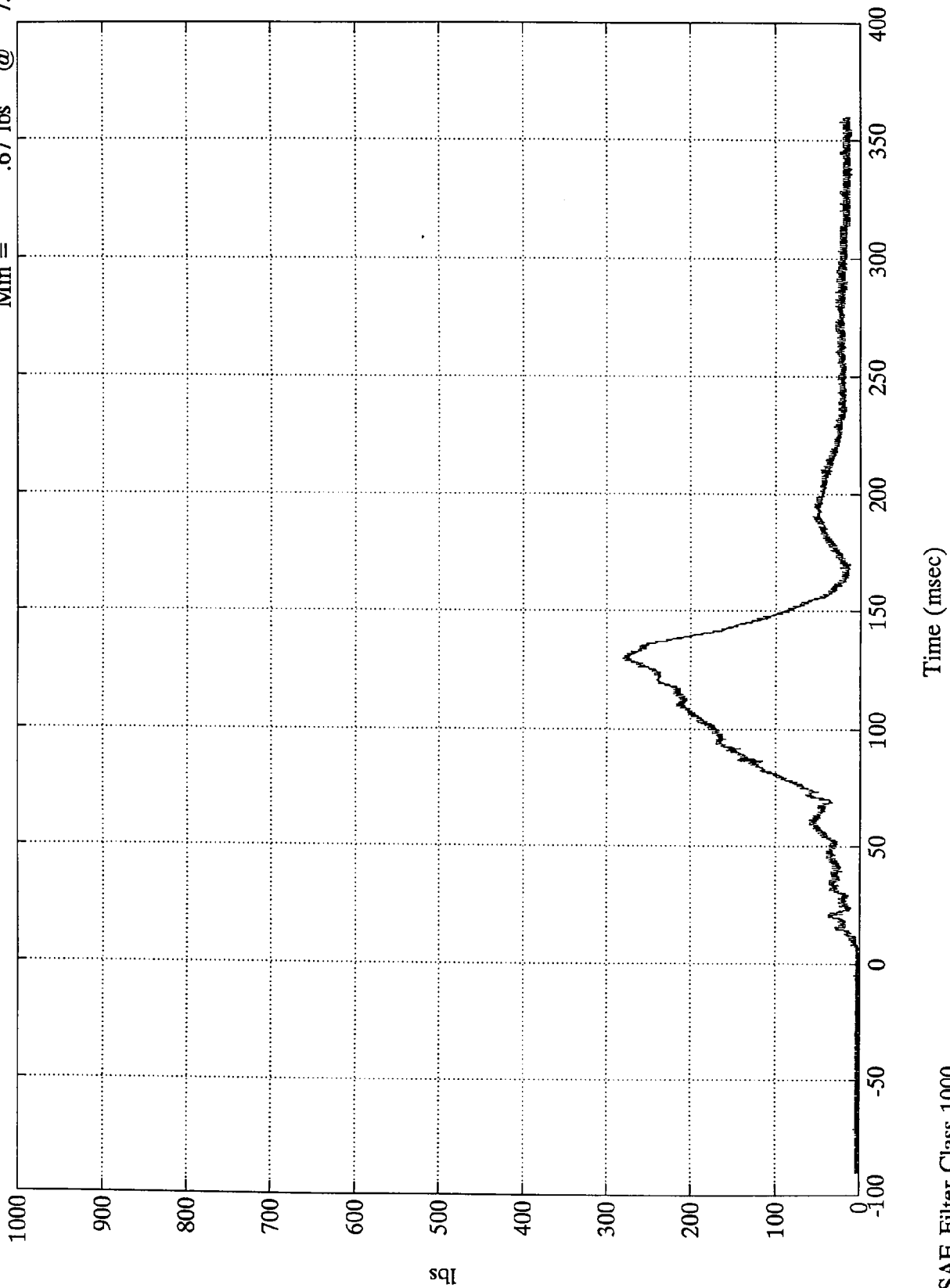
Max = 280.60 lbs @ 130.08 msec
Min = -3.32 lbs @ 6.83 msec



301 Rear 30 MPH-1995 Mazda Protege

Pos. 1 Neck Force Res.

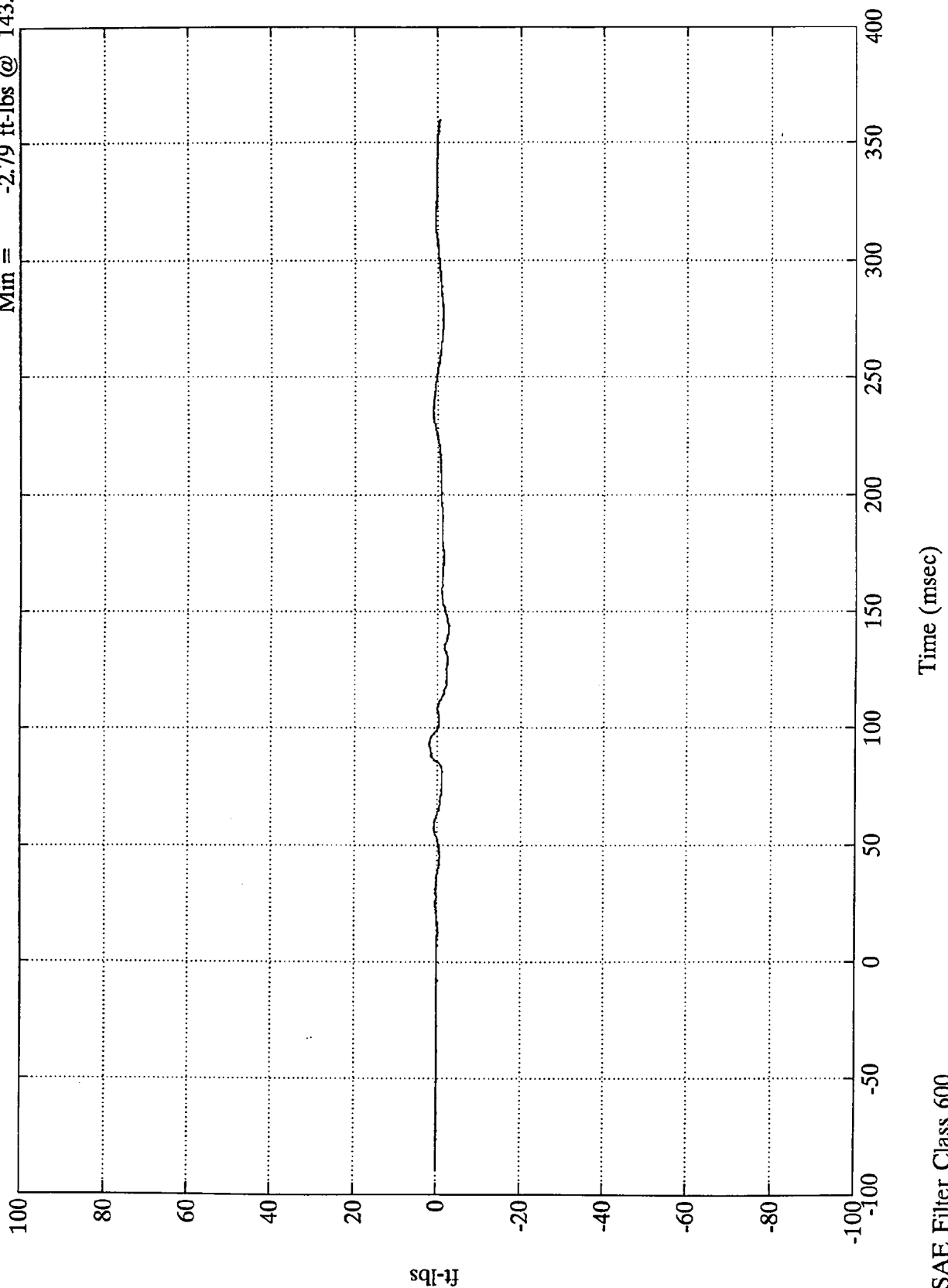
Max = 280.92 lbs @ 130.08 msec
Min = .67 lbs @ 7.07 msec



301 Rear 30 MPH-1995 Mazda Protege

Pos. 1 Upper Neck Mx

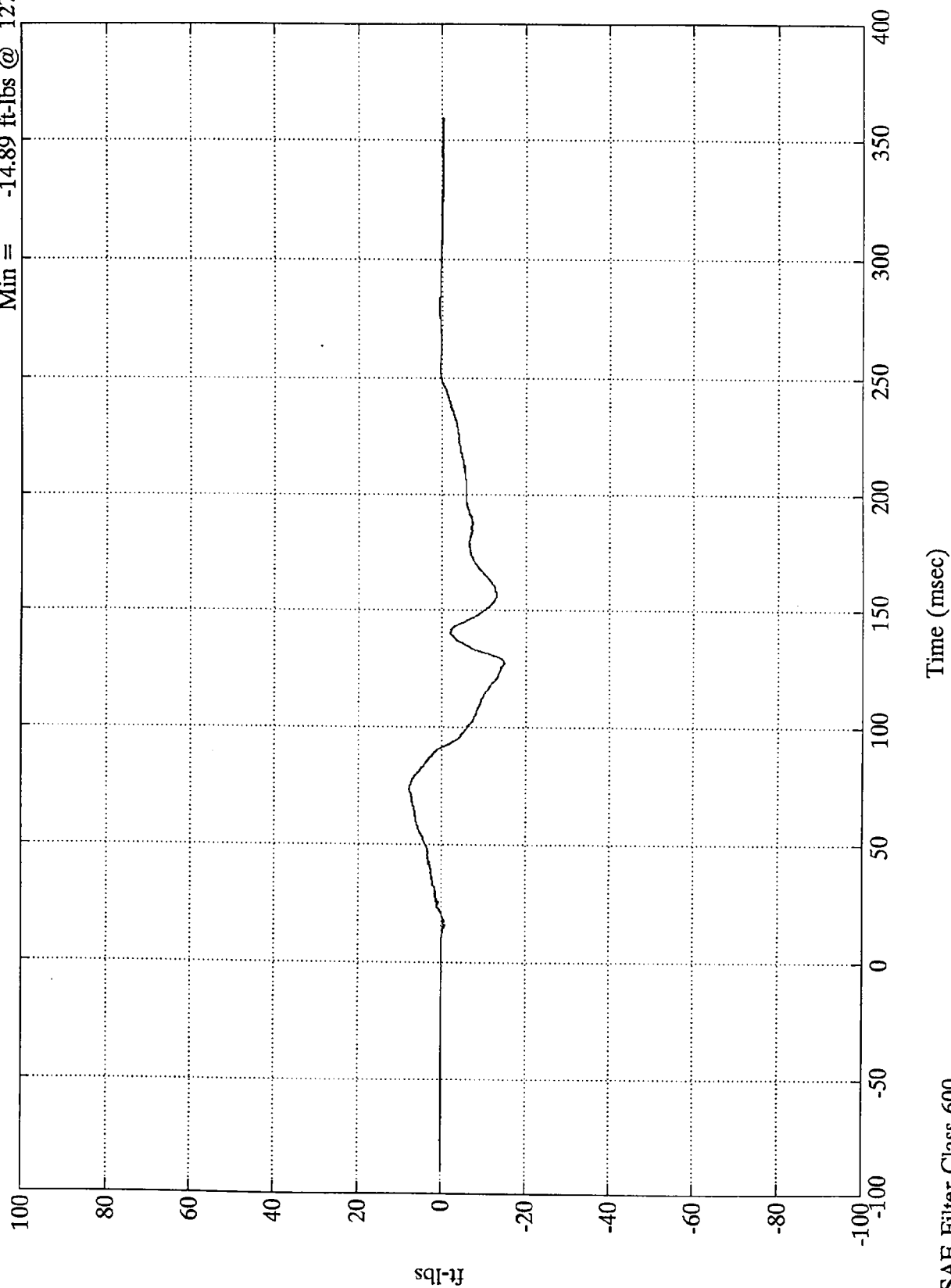
Max = 2.10 ft-lbs @ 93.23 msec
Min = -2.79 ft-lbs @ 143.76 msec



301 Rear 30 MPH-1995 Mazda Protege

Pos. 1 Upper Neck My

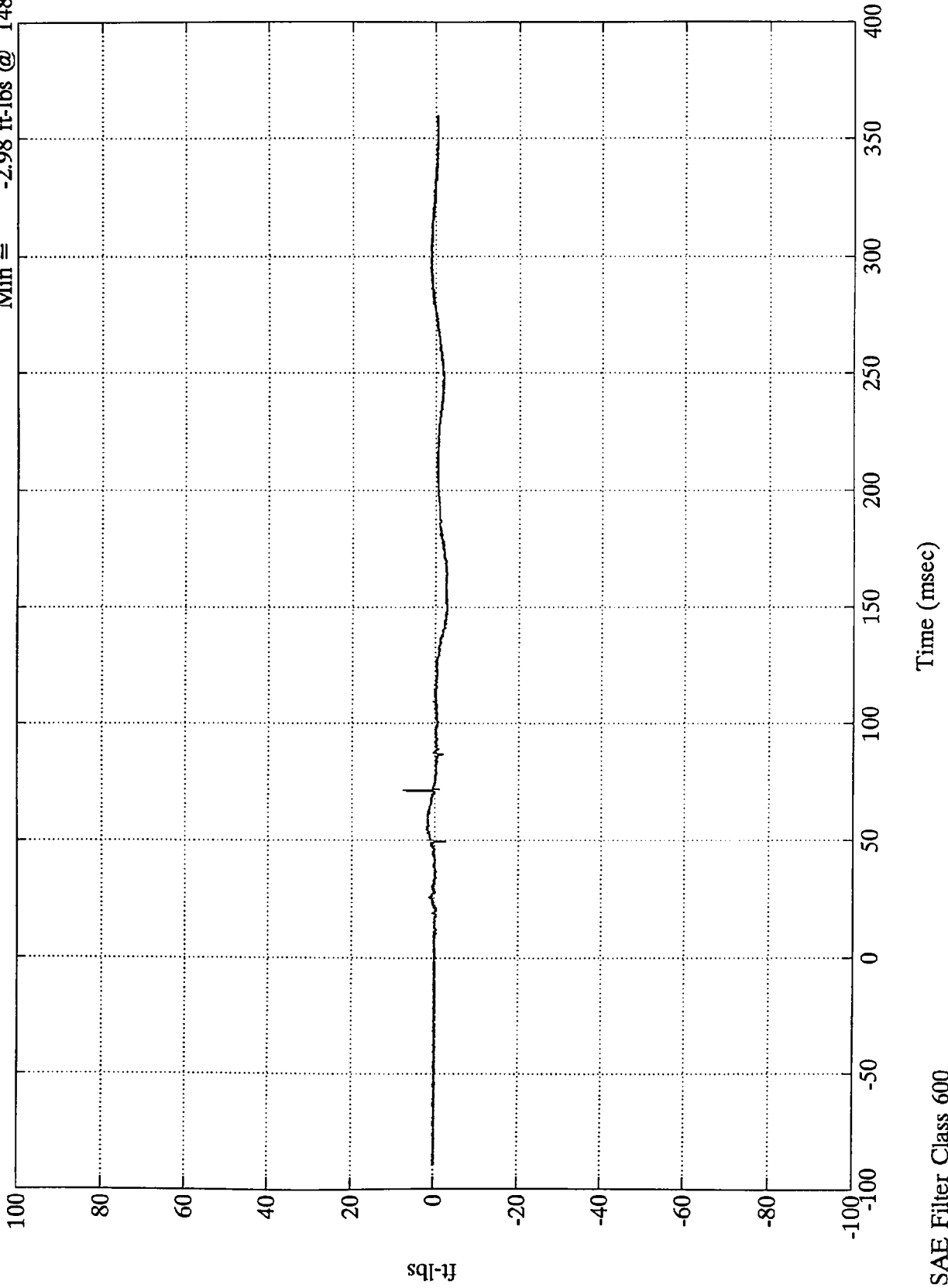
Max = 7.92 ft-lbs @ 73.55 msec
Min = -14.89 ft-lbs @ 127.68 msec



301 Rear 30 MPH-1995 Mazda Protege

Pos. 1 Upper Neck Mz

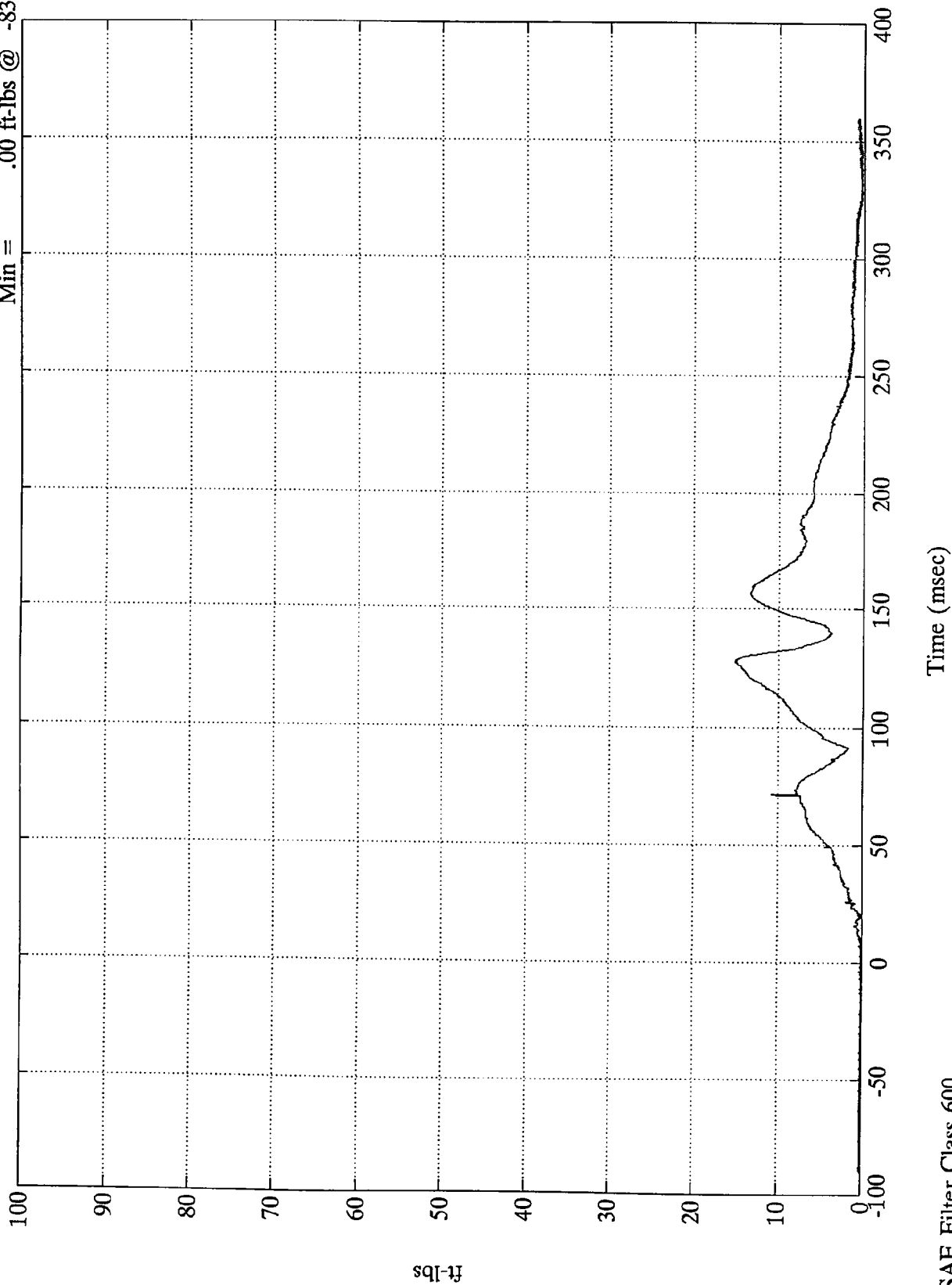
Max = 7.71 ft-lbs @ 71.52 msec
Min = -2.98 ft-lbs @ 148.91 msec



301 Rear 30 MPH-1995 Mazda Protege

Max = 15.07 ft-lbs @ 127.68 msec
Min = .00 ft-lbs @ -83.76 msec

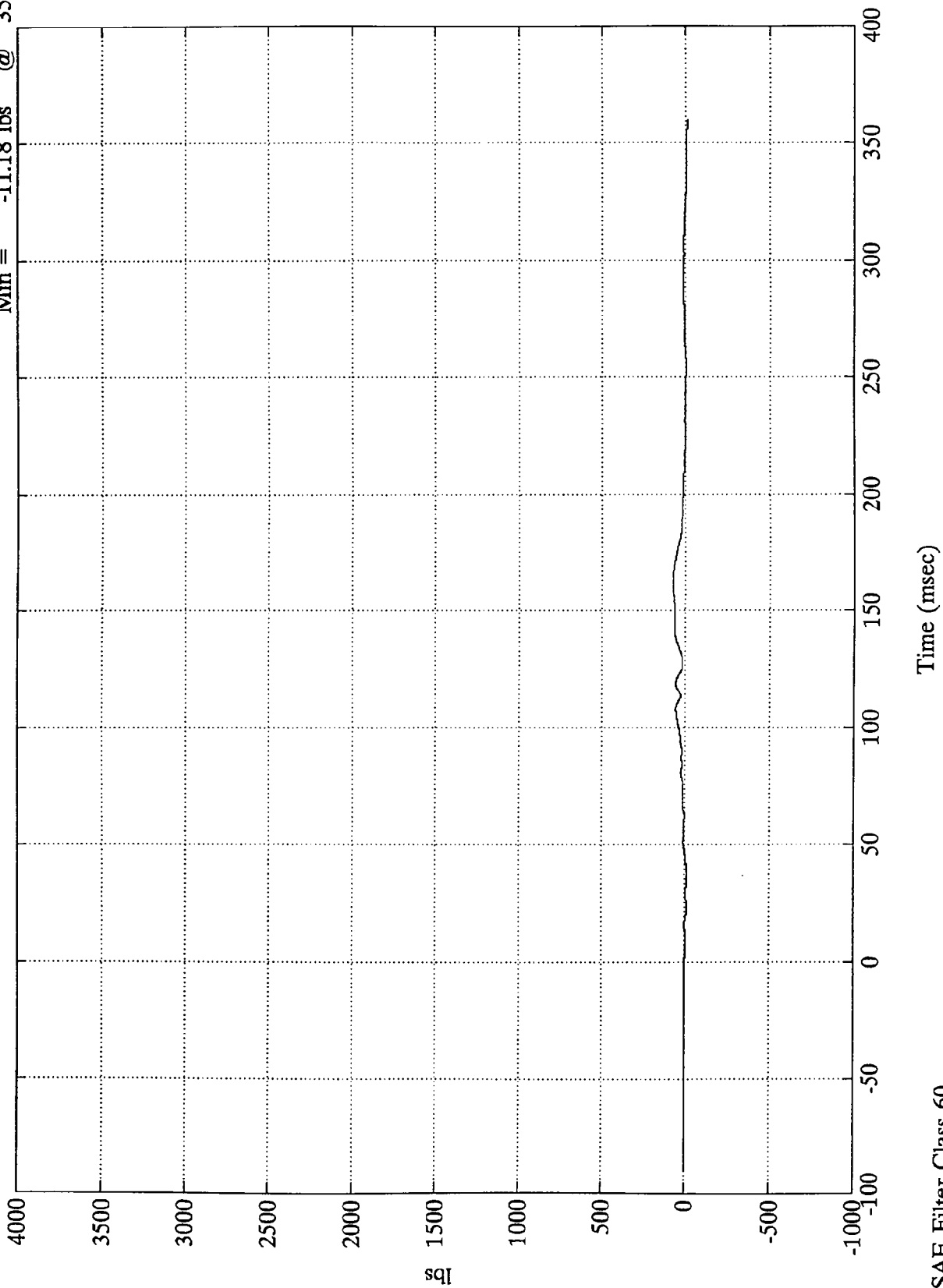
Pos. 1 Neck Moment Res.



301 Rear 30 MPH-1995 Mazda Protege

Pos. 1 Lap Belt

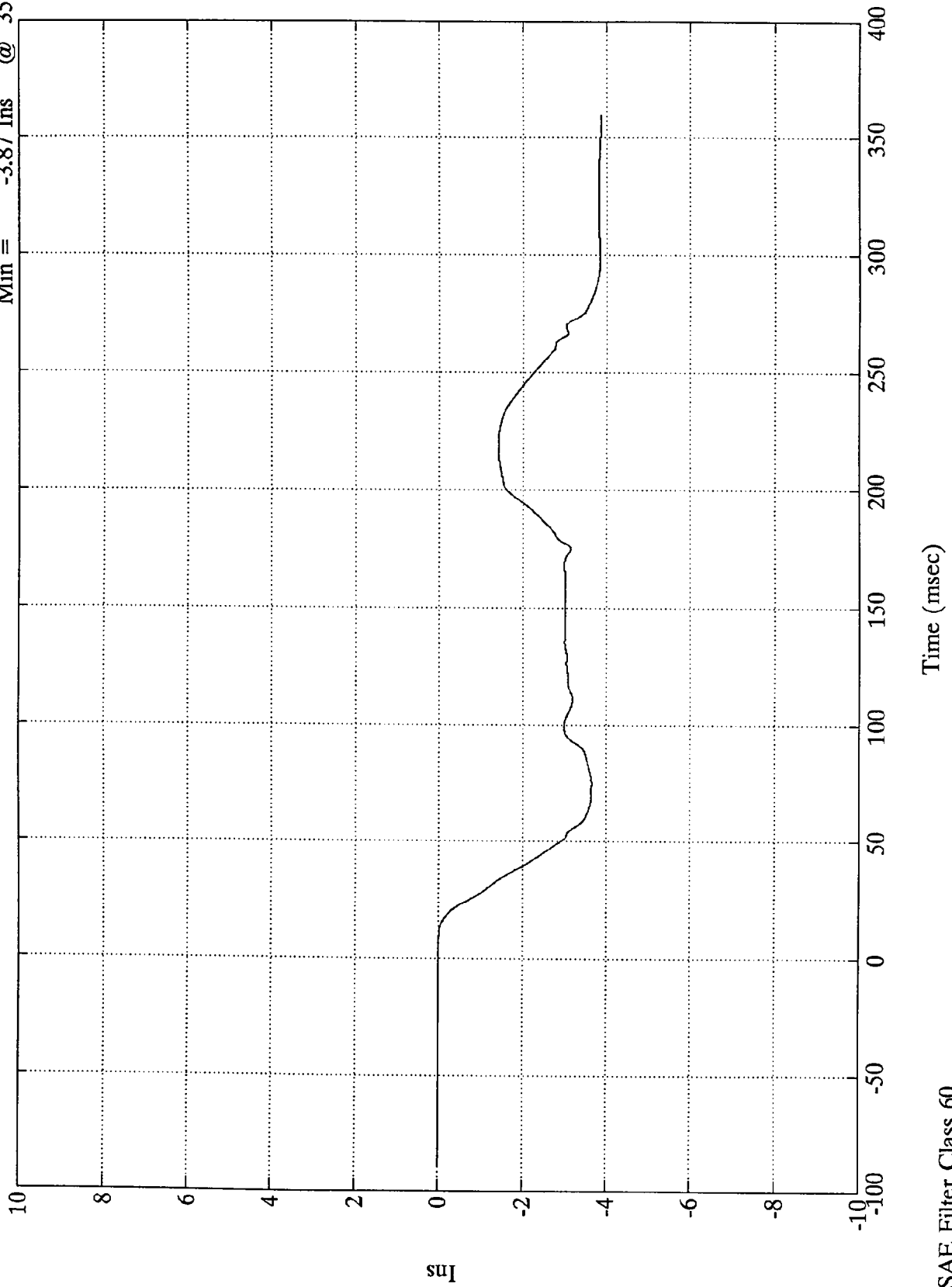
Max = 77.09 lbs @ 163.20 msec
Min = -11.18 lbs @ 35.76 msec



301 Rear 30 MPH-1995 Mazda Protege

Max = .00 Ins @ -48.36 msec
Min = -3.87 Ins @ 358.44 msec

Pos. 1 Belt Spoolout



SAE Filter Class 60