

V2273

REPORT NUMBER: 301-CAL-95-19

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

**GENERAL MOTORS CORPORATION
1995 CHEVROLET ASTRO
MPV**

NHTSA NUMBER: CS0116

CALSPAN TEST NUMBER: 8247-19

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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**

per 5/15

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16. Abstract Compliance tests were conducted on the subject 1995 Chevrolet Astro MPV in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-301-01 for the determination of FMVSS 301 compliance. Test failures identified were as follows: The test vehicle appeared to comply with all requirements of FMVSS 301 "Fuel System Integrity."					
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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 Chevrolet Astro MPV, 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 4954 pound 1995 Chevrolet Astro MPV 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 (195 pounds) was secured in the vehicle cargo area.

Average longitudinal crush was 11.3 inches. Pre- and post-test photographs of the vehicle can be found in appendix A.

The 26.5 gallon fuel tank was filled to 93.0 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 Pos.1 Pelvic Z accelerometer data was lost during impact.

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.: CS0116 Test Mode: 30 mph Rear Barrier

Test Date: April 20, 1995 Time: 11:34 Temperature : 50.5 °F

Vehicle Make/Model/Body Style: 1995 Chevrolet Astro MPV

Vehicle Test Weight: 4954 lbs Impact Velocity: 29.5 mph

Static Crush: Left Side = 11.2 inches

Right Side = 12.0 inches

Centerline = 10.8 inches

Average Crush: 11.3 inches

TYPE OF FRONT OCCUPANT RESTRAINT SYSTEM INSTALLED IN TEST VEHICLE:

Driver's DSP: Airbag, 3-point belt system

Right Passenger's DSP: 3-point belt system

VISIBLE DUMMY CONTACT POINTS:

Driver: Back of head with top (headrest) of seatback.

Passenger: Back of head with headrest.

DOOR OPENING DATA:

Closed/Operable - Left Front

Closed/Operable - Right Front

Stoddard Solvent Spillage from Vehicle's Fuel System: None

Remarks: Sliding side door: closed/operable. Upper rear hatch unlatched during impact, lower half-doors remained closed. Driver seatback collapsed halfway back and twisted outward. Passenger seatback collapsed to full rear position. Seatback recline mechanisms remained operable.

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATATEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1995 Chevrolet Astro MPV

NHTSA No.: CS0116 ; VIN: 1GNDM19WXS114735 ; Color: Red

Engine Data: 6 cylinders; - CID; 4.3 Liters; - cc

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

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

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

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

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

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

Selling Dealer: West-Herr Chevrolet, Inc.

& Address: P.O. Box 158, Eden, NY 14057

DATA FROM TIRE VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: General Motors Corporation

Date of Manufacture: 8/94

GVWR: 5950 lbs.; GAWR: 2800 lbs. FRONT; 3150 lbs. REAR

DATA FROM TIRE PLACARD:

Location of Placard on Vehicle: Left door B-pillar

Tire Pressure with Maximum Capacity Vehicle Load: 35 psi FRONT 35 psi REAR

Recommended Tire Size: P215/75 R15

* Recommended Cold Tire Pressure: 35 psi FRONT; 35 psi REAR

Size of Tires on Test Vehicle: P215/75 R15

Type of Spare Tire: T145/80 D16

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>6</u>	Rear;	<u>8</u>	Total
Vehicle Capacity Weight (VCW)	=		<u>1622</u>	lbs.		
No. of Occupants x 150 lbs.	=		<u>1,200</u>	lbs.		
** Rated Cargo/Luggage Weight (RCLW)	=		<u>422</u>	lbs.		

*Tire pressure used for test

**If RCLW is greater than 300 lbs., use 300 lbs. in target weight calculation.

Table 2

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

Right Front	=	1102	lbs.	Right Rear	=	1064	lbs.
Left Front	=	1114	lbs.	Left Rear	=	1048	lbs.
TOTAL FRONT	=	2,216	lbs.	TOTAL REAR	=	2,112	lbs.
TOTAL DELIVERED WEIGHT	=	4,328	lbs.				
% of Total Front of Vehicle Weight	=	51	%	% of Total Rear Weight	=	49	%

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight	=	4,328	lbs.
Rated Cargo/Luggage Weight (RCLW)	=	300	lbs.
Weight of 2 p.572 Dummies, 167 & 164 lbs	=	331	lbs.
TARGET TEST WEIGHT	=	4,959	lbs.

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 295 POUNDS OF CARGO WEIGHT:

Right Front	=	1305	lbs.	Right Rear	=	1157	lbs.
Left Front	=	1337	lbs.	Left Rear	=	1155	lbs.
TOTAL FRONT	=	2,642	lbs.	TOTAL REAR	=	2,312	lbs.
TOTAL TEST WEIGHT	=	4,954	lbs.				
% of Total Front Weight	=	53	%	% of Total Rear Weight	=	47	%

* Weight of Ballast Secured in Vehicle Trunk Area = 195 lbs.

Type of Ballast: Lead shot

Method of Securing Ballast: Rear seatbelt anchorages

Vehicle Components Removed for Weight Reduction: None

VEHICLE ATTITUDE (all dimension in inches):

AS DELIVERED:	RF	30.0	LF	30.0	RR	30.5	LR	30.9
AS TESTED:	RF	28.7	LF	28.5	RR	30.2	LR	30.4

Vehicle's Wheel Base: 111.0 in.

Location of Vehicle's C.G.: 51.8 inches rearward of front wheel center.

FUEL SYSTEM DATA:

Fuel System Capacity From Owner's Manual	=	27.0	gallons
Usable Capacity Figure Furnished by COTR	=	26.5	gallons
Test Volume Range (91 to 94% of Usable Capacity)	=	24.1	to 24.9 gallons
ACTUAL TEST VOLUME	=	24.6	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:	Electric	
Electric Fuel Pump Operation with Ignition Switch ON and Engine OFF -		
Fuel pump operated		
Details of Fuel System:	Fuel filler is located on left side of vehicle in front of the rear axle. Fuel lines are located on left side of vehicle underbody.	

Table 3

POST IMPACT DATA

TYPE OF TEST:

Type of Test: Rear Barrier Impact Angle: 0°
 Test Date: April 20, 1995 Time: 11:34 Temperature: 50.5 °F
 Vehicle NHTSA No.: CS0116
 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>183.5</u>	; C/L =	<u>189.0</u>	; Left =	<u>183.3</u>
Post-Test	Right =	<u>172.3</u>	; C/L =	<u>177.0</u>	; Left =	<u>172.5</u>
Crush	Right =	<u>11.2</u>	; C/L =	<u>12.0</u>	; Left =	<u>10.8</u>
AVERAGE	=	<u>11.3</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

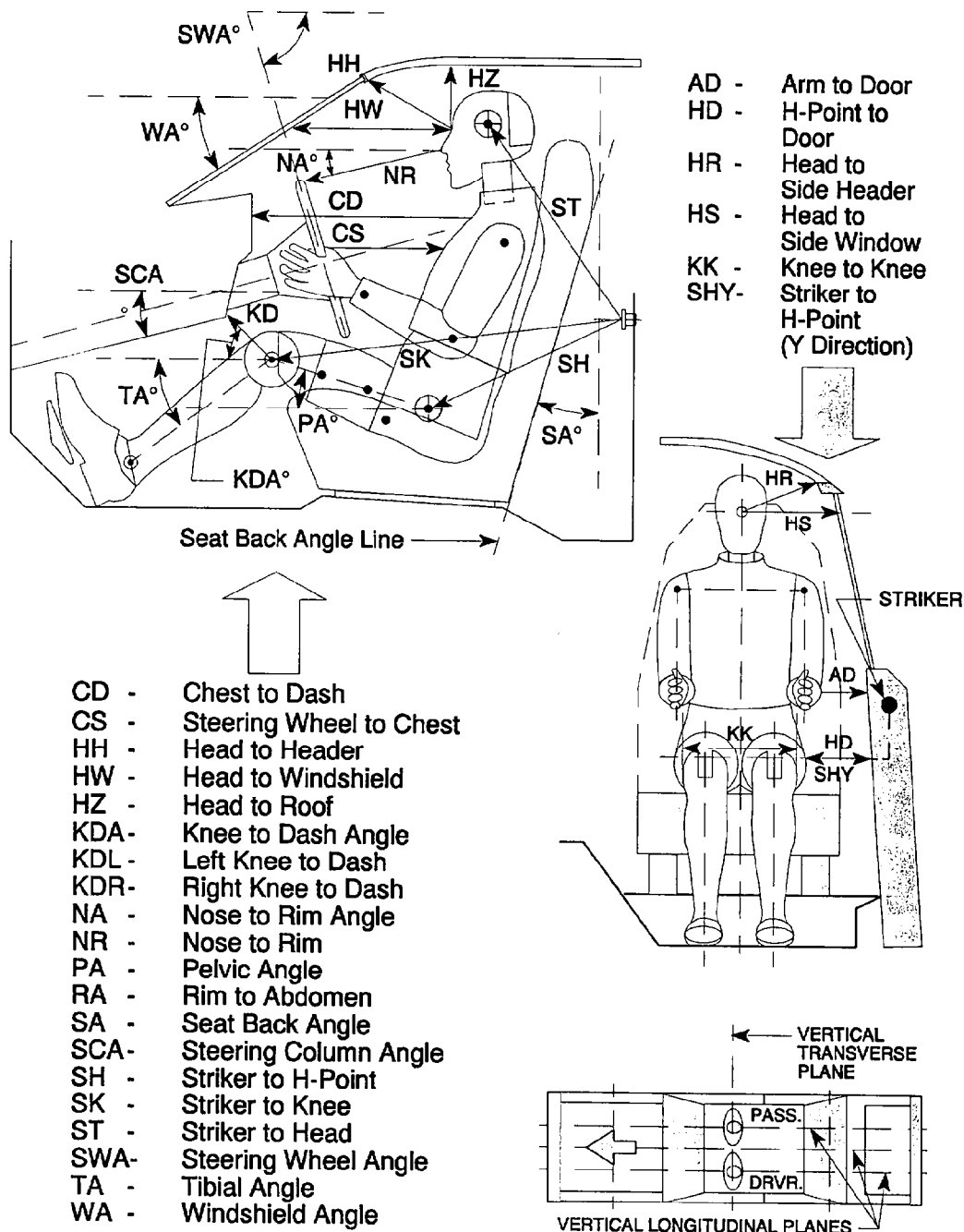


Table 4

FRONT SEAT OCCUPANT MEASUREMENTS
(FOR REAR IMPACT ONLY)

	DRIVER (Serial #366)
WA°	43 deg.
SWA°	74 deg.
SCA°	16 deg.
SA°	22.5 deg.
HZ	9.1
HH	16.7
HW	21.8
HR	10.8
NR	21.1 Angle -15 deg.
CD	20.8
CS	8.8
RA	6.0
KDL	7.1 Angle (KDA) 21 deg.
KDR	7.2
PA°	22 deg.
TA°	-45 deg.
KK	11.0
ST	24.4 Angle 71 deg.
SK	27.3 Angle 0 deg.
SH	11.7 Angle -19 deg.
SHY	9.4
HS	13.5
HD	6.2
AD	4.4

Table 5
FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

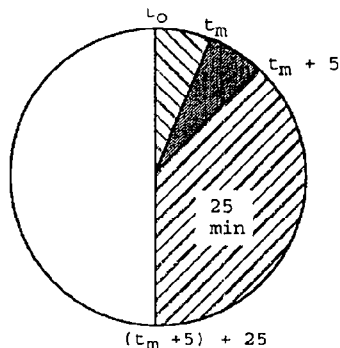
FMVSS NO. 301

TEST VEHICLE NHTSA NO.: CS0116 TEST DATE: April 20, 1995
Vehicle Mfgr./Make/Model: 1995 Chevrolet Astro MPV

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:

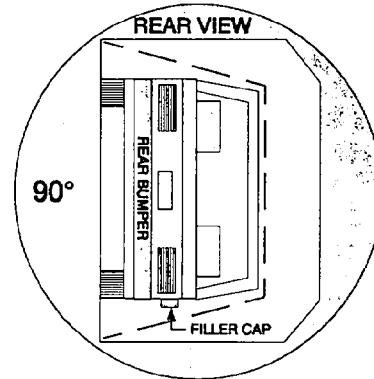
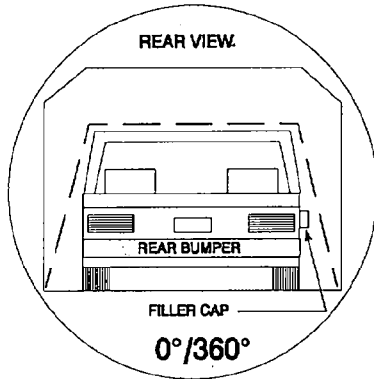
None

Table 6

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE :
0-90 Deg.

Vehicle NHTSA ID No. :
CS0116

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.

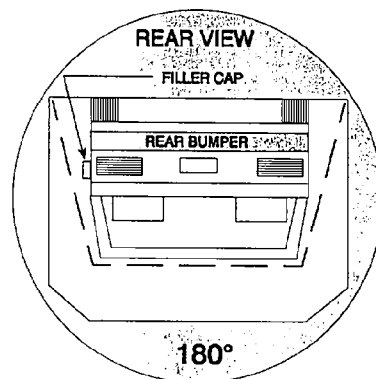
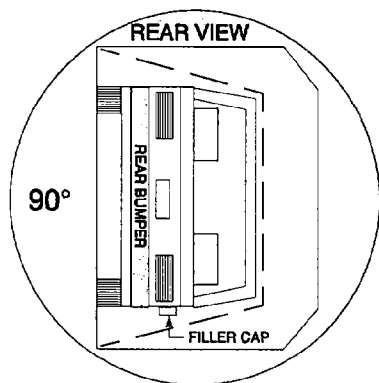
IV. SOLVENT SPILLAGE LOCATION(S):

None

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

TEST PHASE :
90-180 Deg.

Vehicle NHTSA ID No. :
CS0116



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	2	minutes	04	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	7	minutes	04	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.

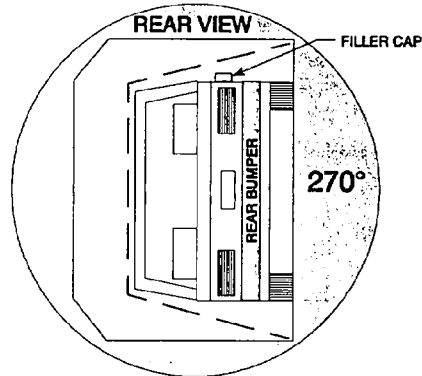
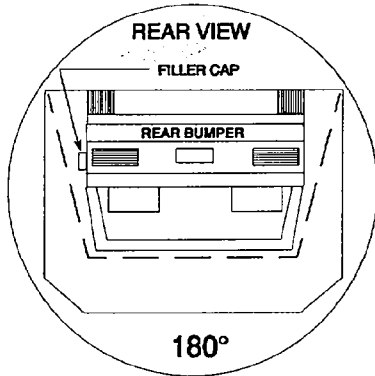
IV. SOLVENT SPILLAGE LOCATION(S):

None

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

TEST PHASE :
180-270 Deg.

Vehicle NHTSA ID No. :
CS0116



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time	2	minutes	14	seconds
(Spec. Range = 1 to 3 minutes)				
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
	7	minutes	14	seconds
TOTAL	8	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	0
---	---	---	---

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

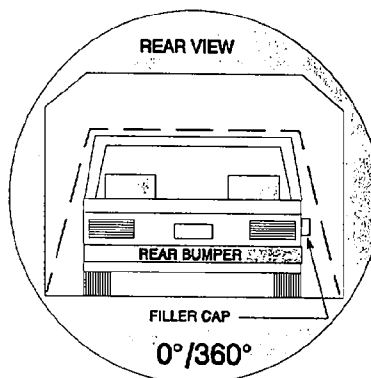
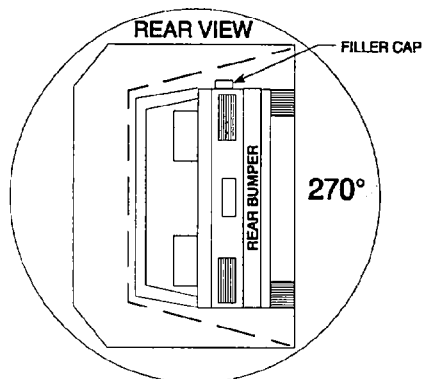
IV. SOLVENT SPILLAGE LOCATION(S):

None

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

TEST PHASE :
270-360 Deg.

Vehicle NHTSA ID No. :
CS0116



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time (Spec. Range = 1 to 3 minutes)	2	minutes	02	seconds
FMVSS 301 Position Hold Time +	5	minutes	00	seconds
TOTAL	7	minutes	02	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

Figure 2

CAMERA POSITIONS FOR REAR IMPACTS

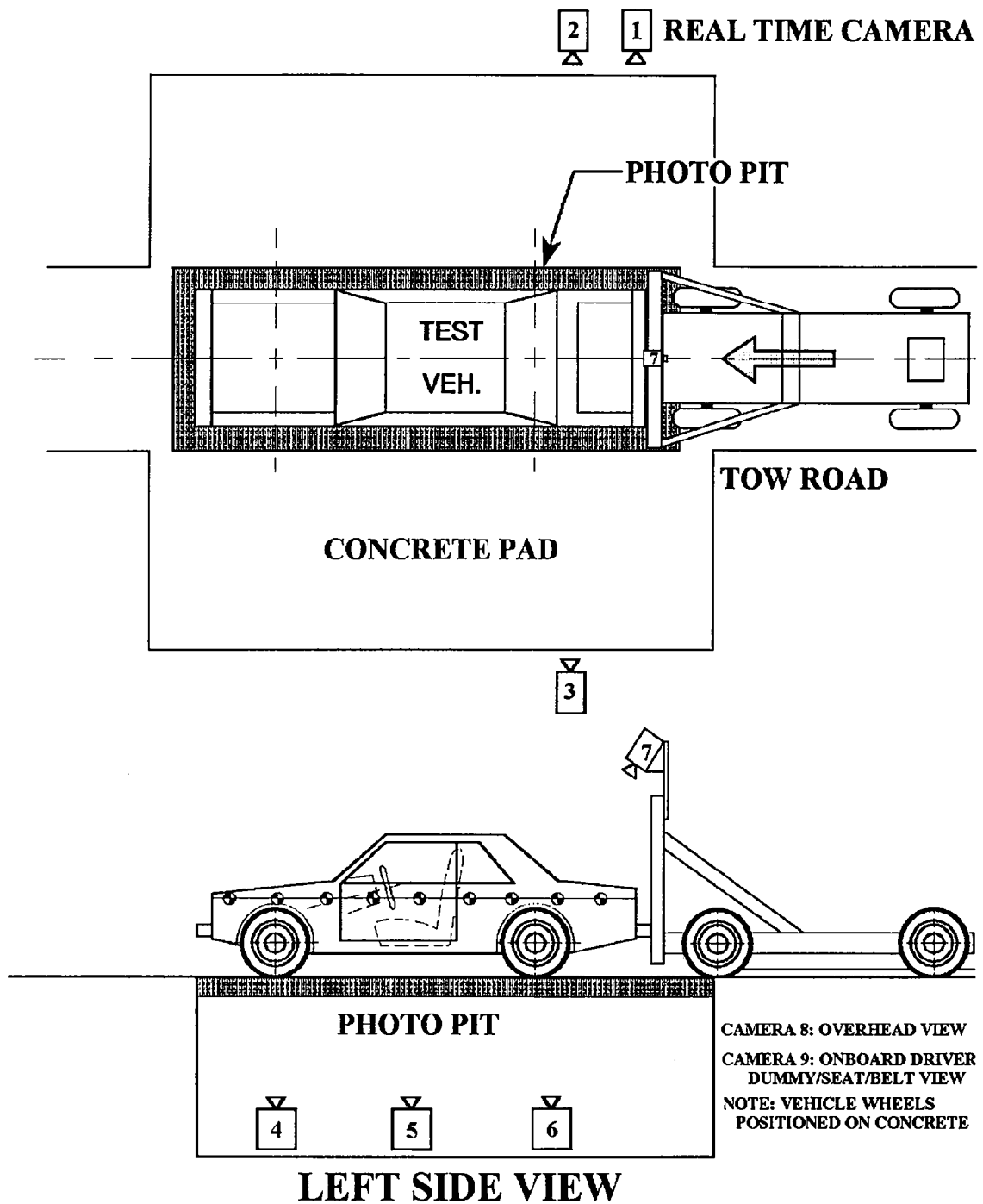


Table 7

HIGH-SPEED CAMERA LOCATIONSNHTSA No. : CS0116 Vehicle : 1995 Chevrolet Astro MPV

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	845
3	Left Side View	418	67	45	0	25	840
4	Vehicle Front Underbody View	0	-128	-77	90	13	750
5	Vehicle Mid-Section Underbody View	0	-70	-77	90	13	930
6	Vehicle Rear Underbody View	0	-26	-77	90	13	785
7	Moving Barrier View	0	0	99	-105	13	680
8	Overhead Overall View	-20	0	386	-90	13	845
9	Onboard Driver Dummy/Seat/Belt View	-	-	-	-	8	-

* X = film plant 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

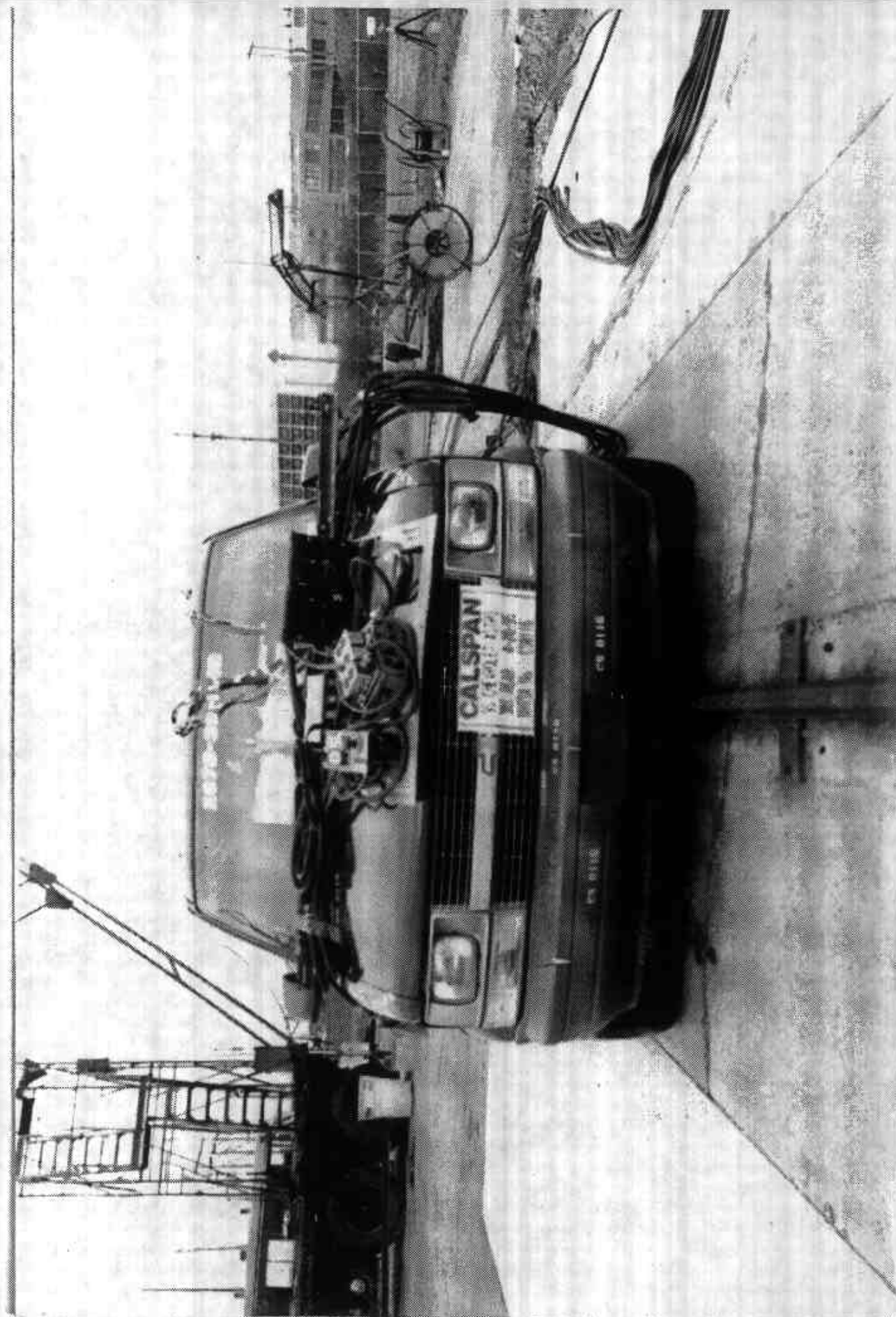


Figure A-2 POST-TEST FRONT VIEW

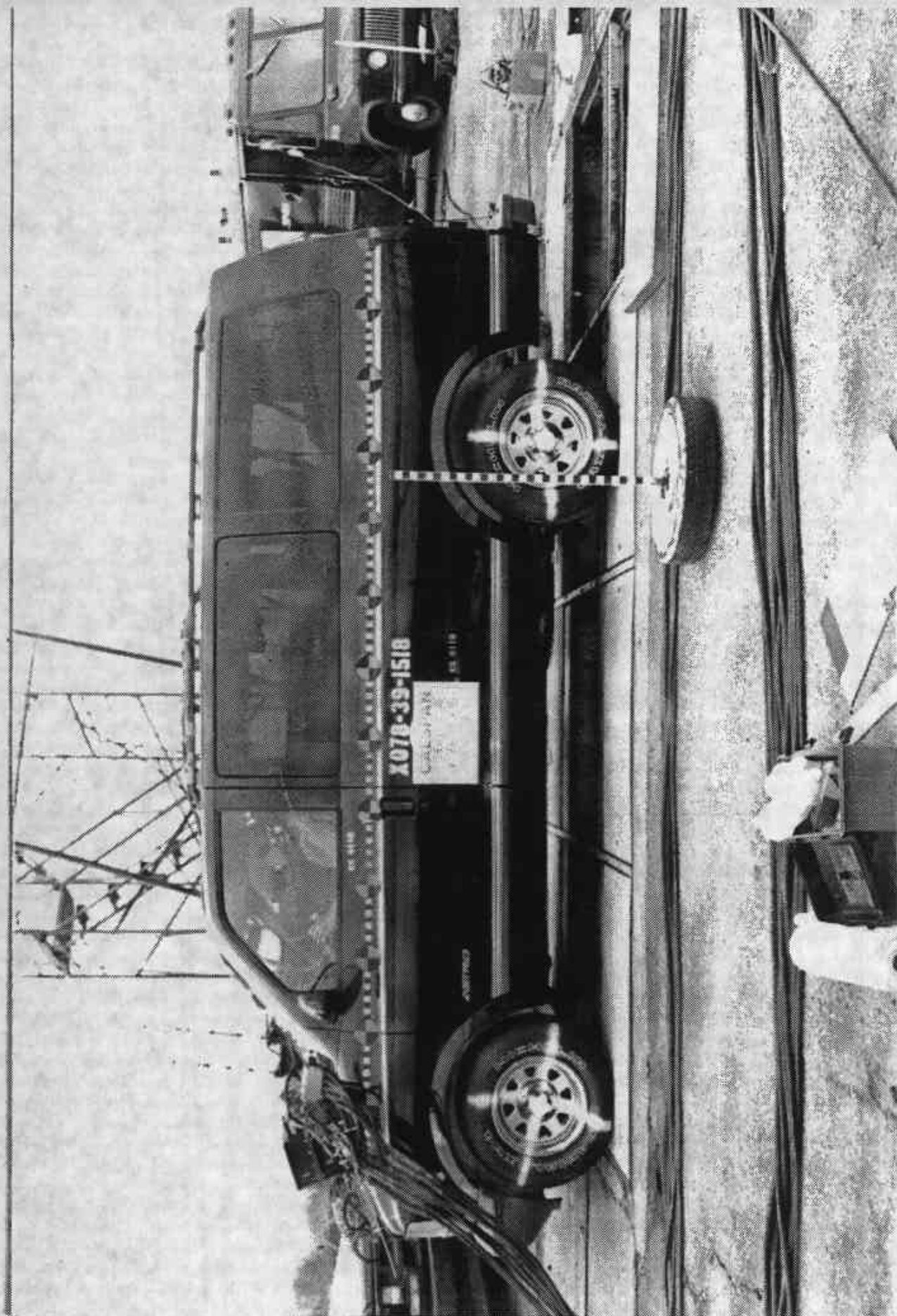


Figure A-3 PRE-TEST LEFT SIDE VIEW

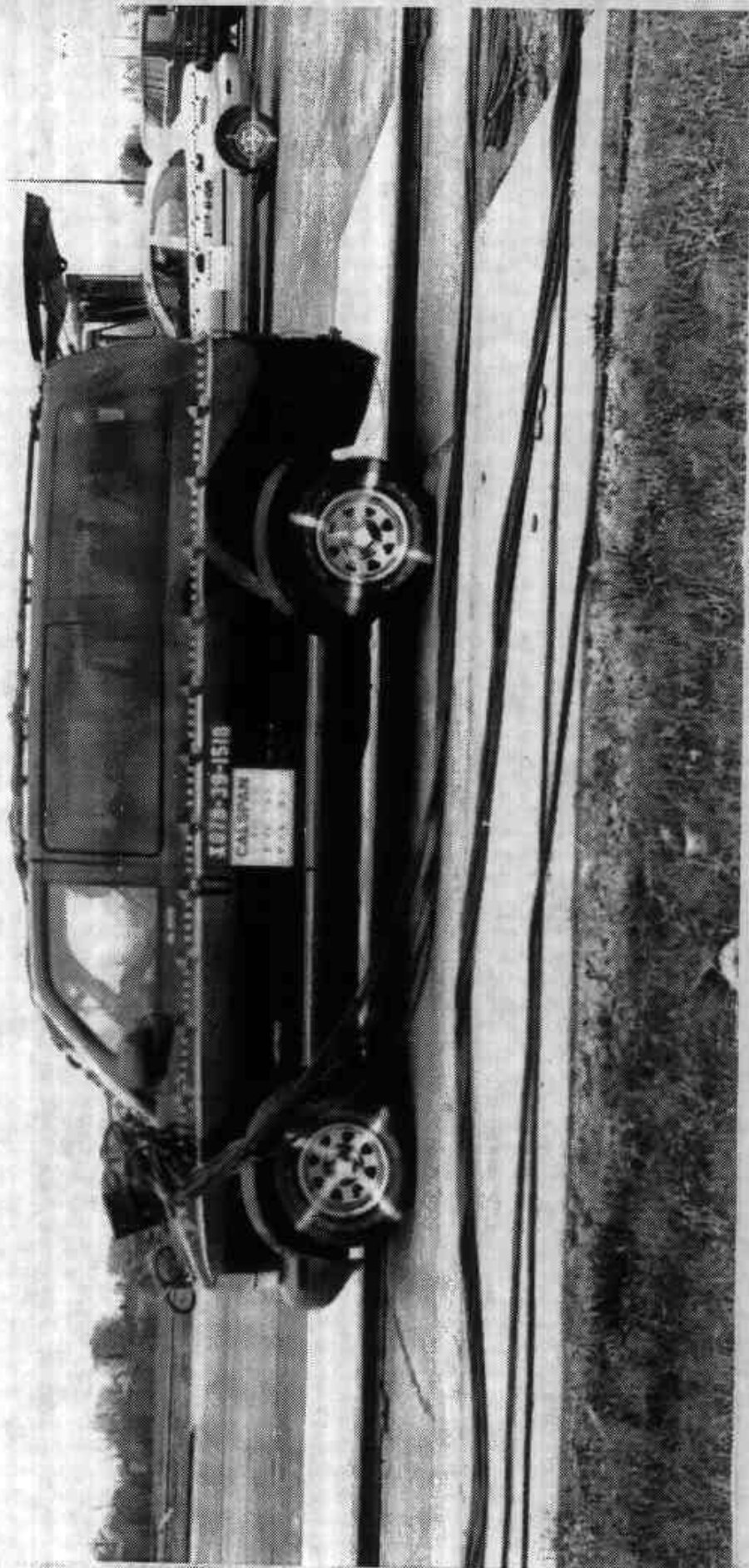


Figure A-4 POST-TEST LEFT SIDE VIEW

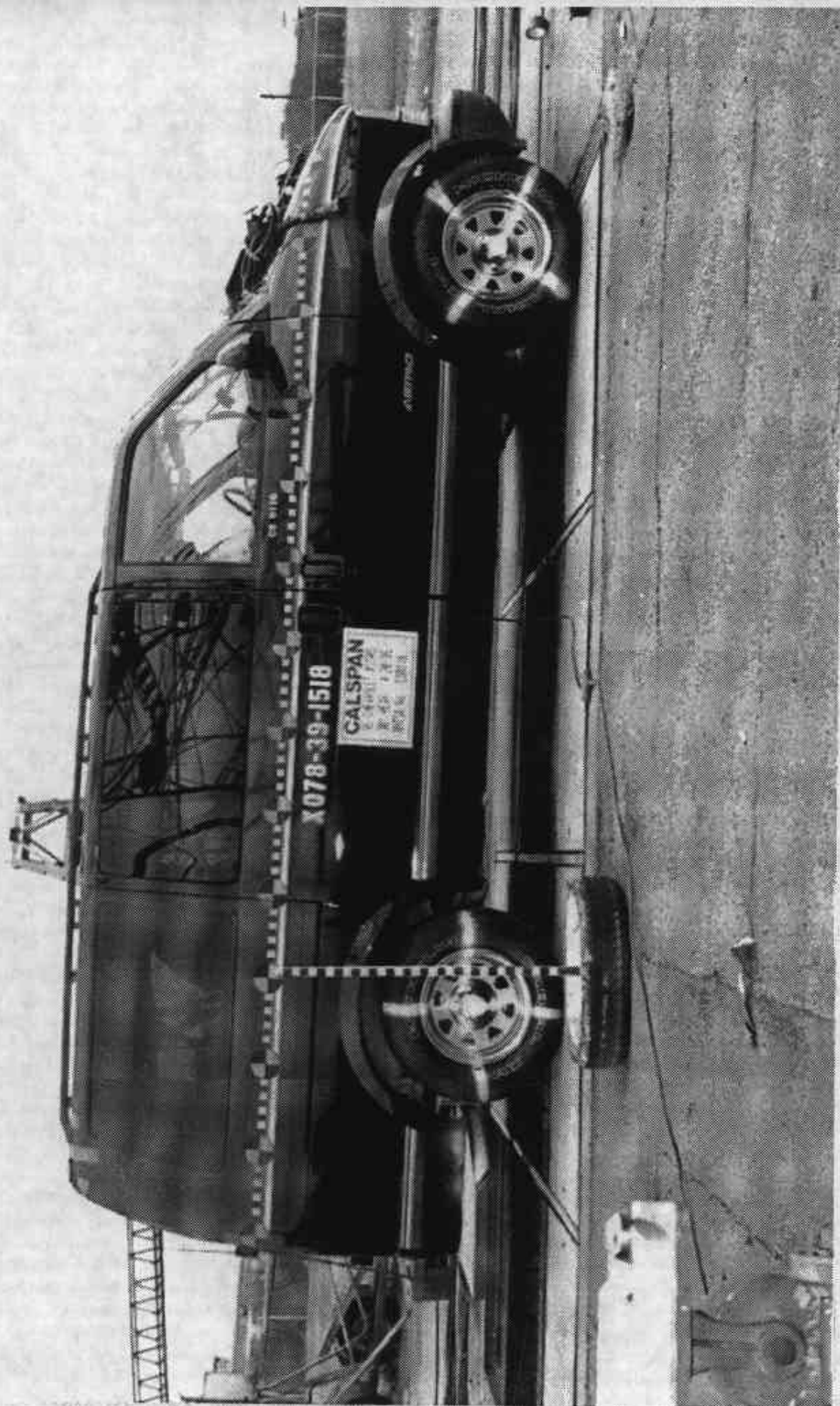


Figure A-5 PRE-TEST RIGHT SIDE VIEW



Figure A-6 POST-TEST RIGHT SIDE VIEW

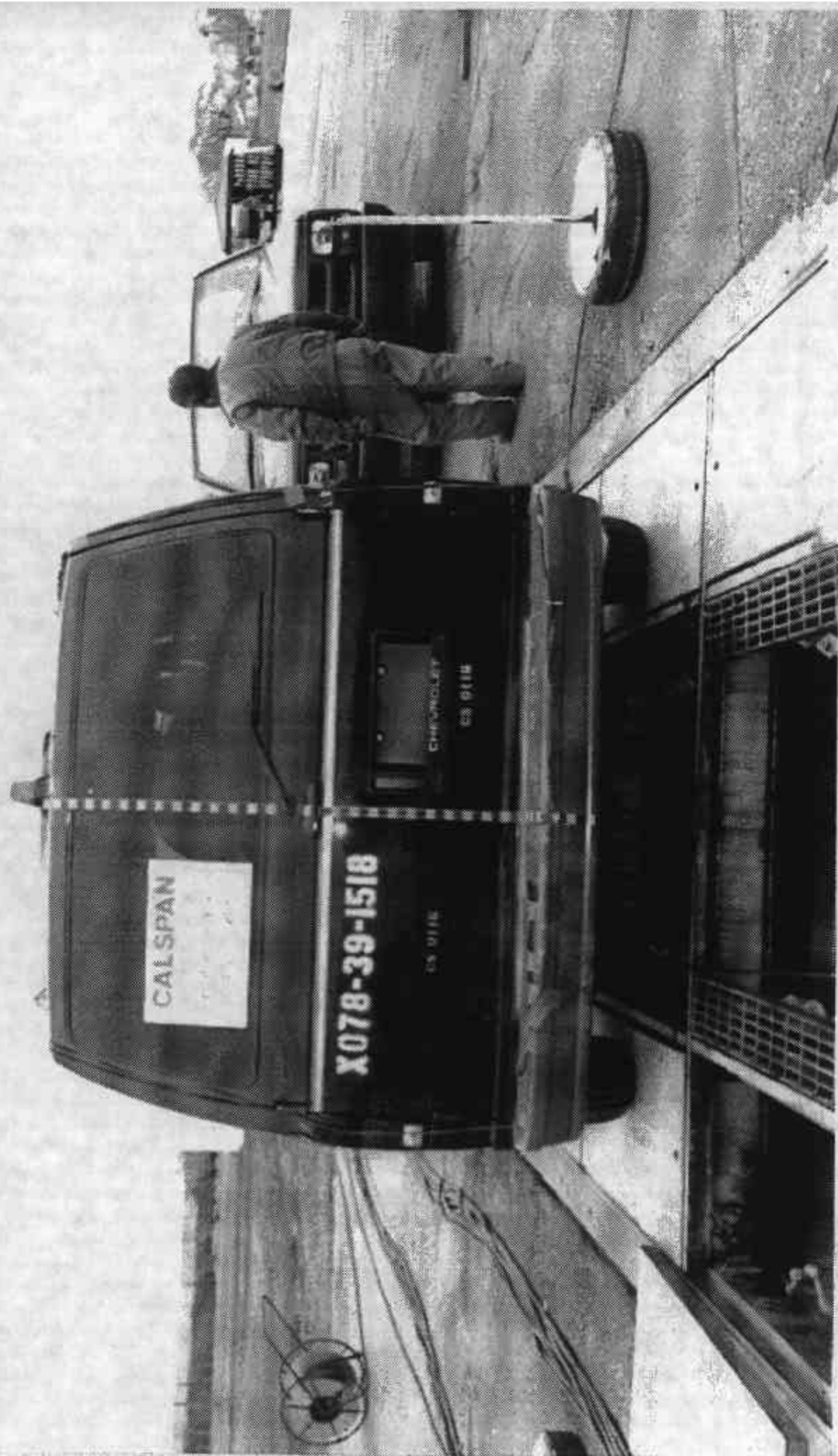


Figure A-7 PRE-TEST REAR VIEW



Figure A-8 POST-TEST REAR VIEW

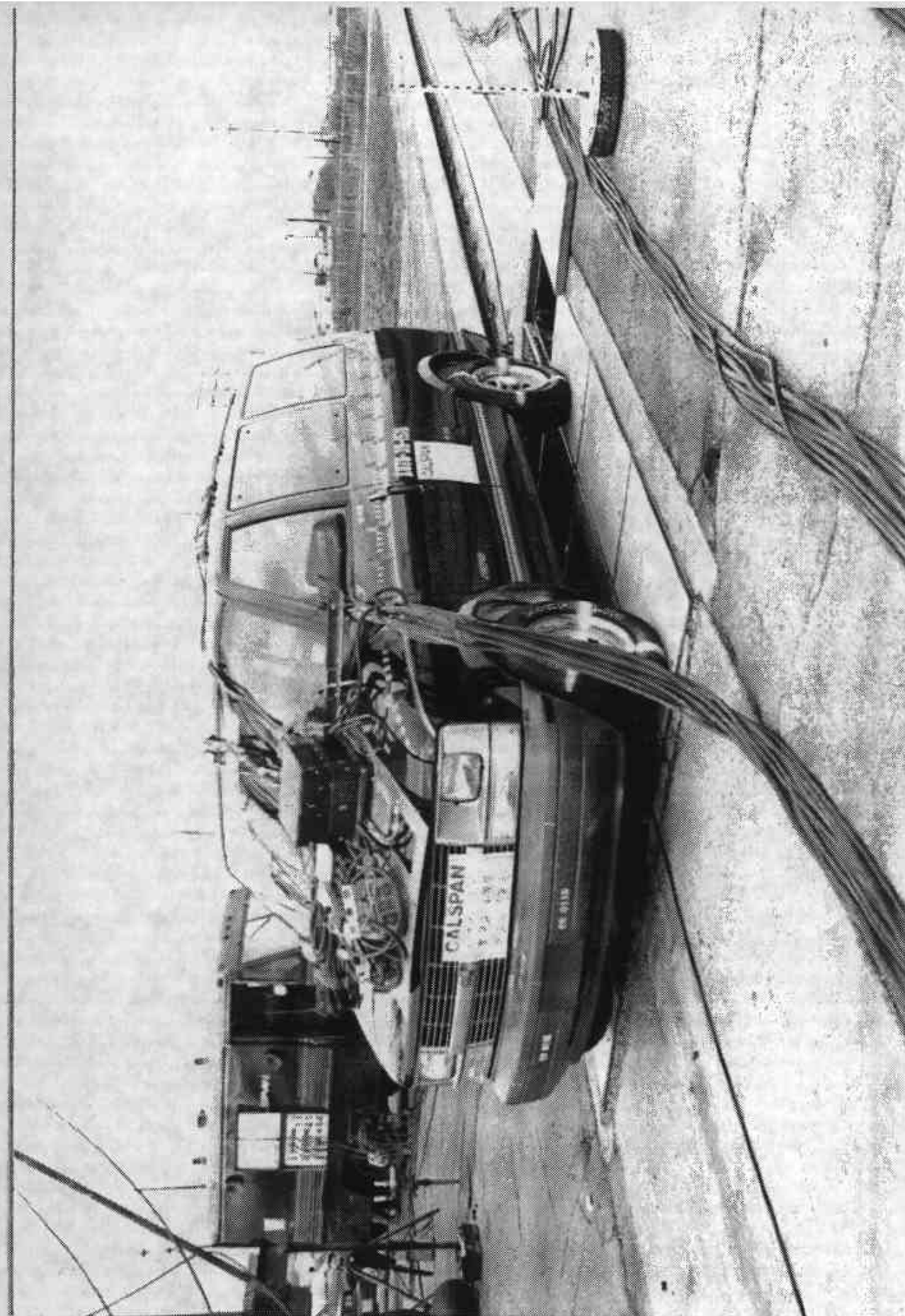


Figure A-9 PRE-TEST LEFT FRONT THREE-QUARTER VIEW

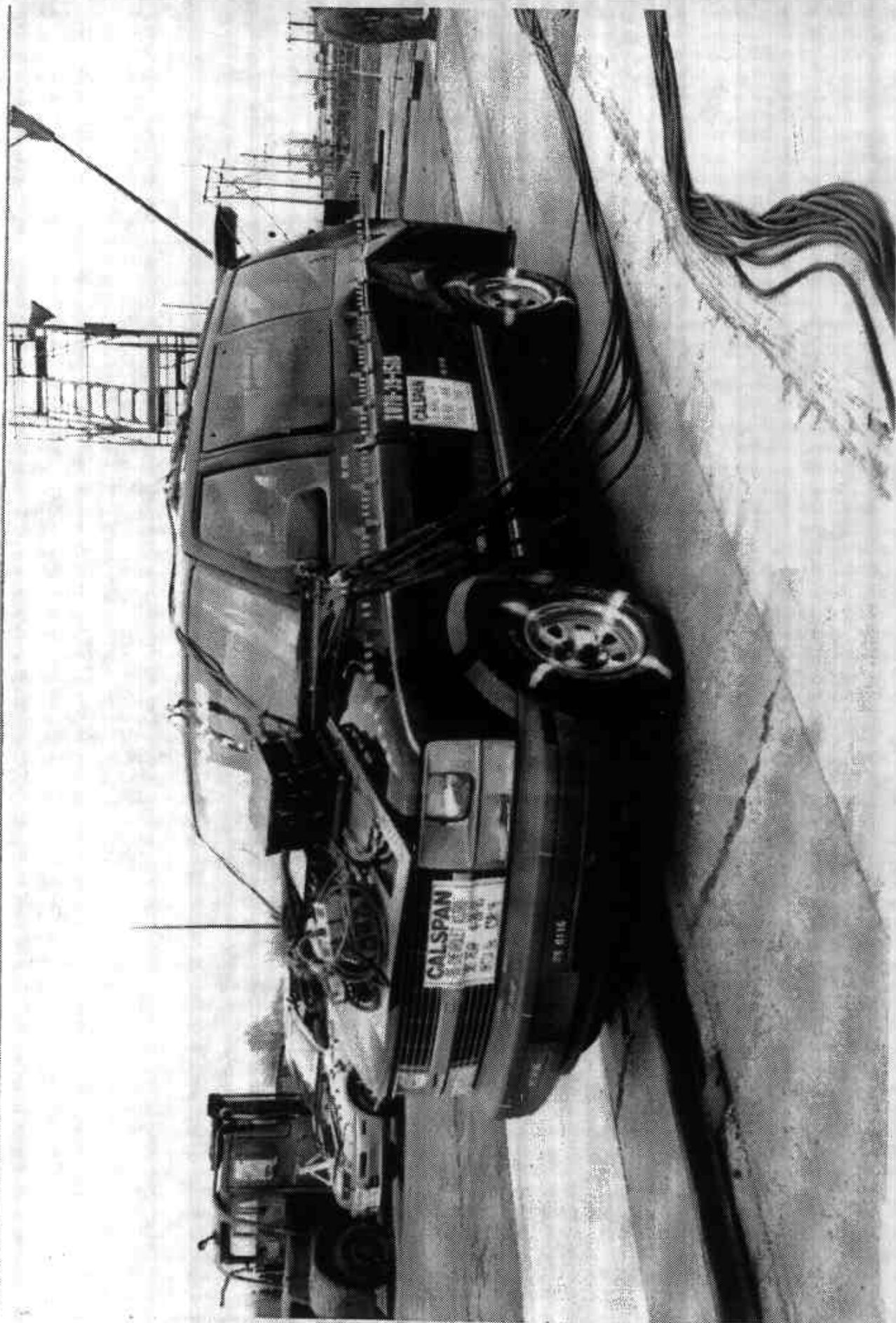


Figure A-10 POST-TEST LEFT FRONT THREE-QUARTER VIEW



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



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

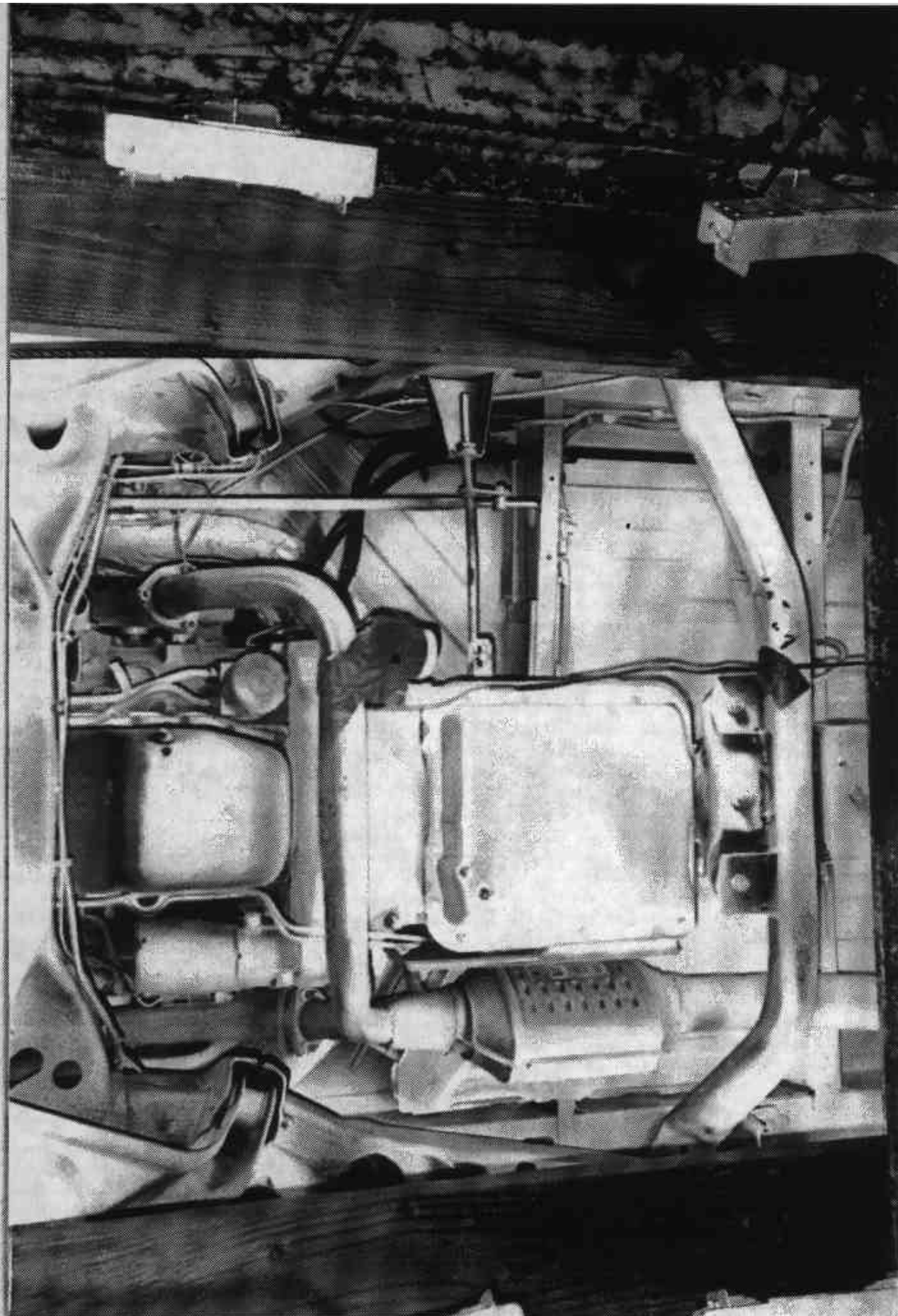


Figure A-13 PRE-TEST FRONT UNDERBODY VIEW

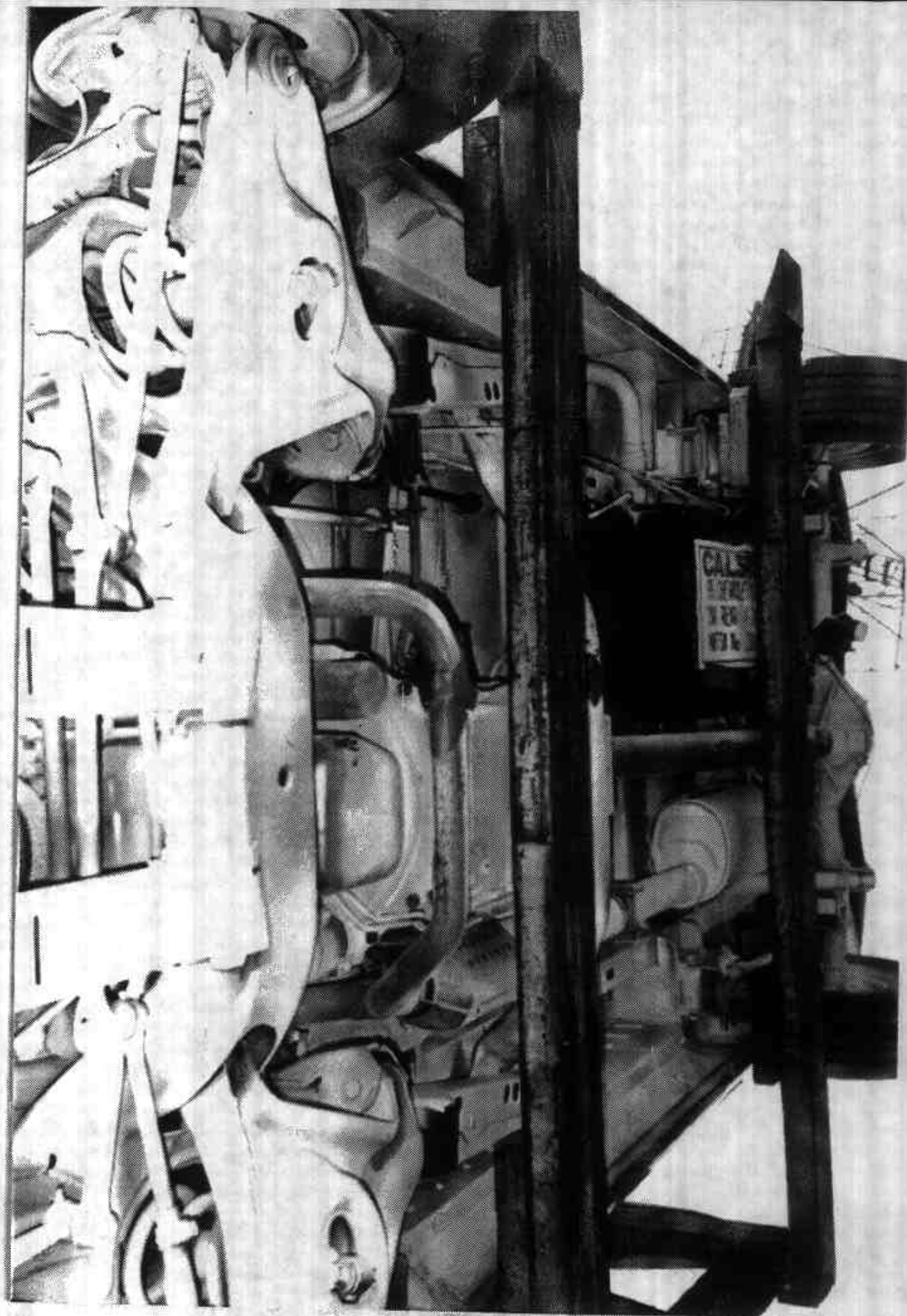


Figure A-14 POST-TEST FRONT UNDERBODY VIEW

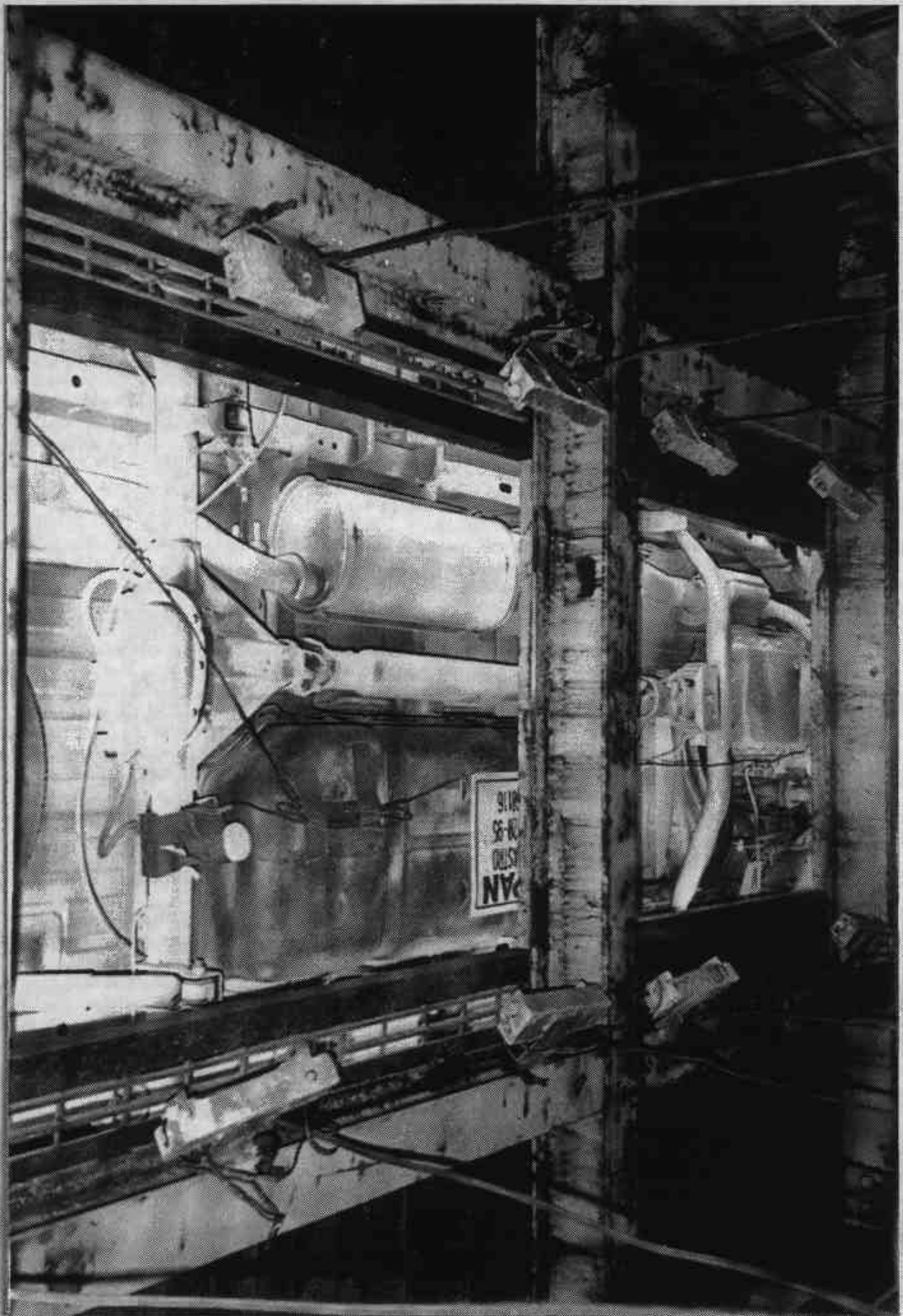


Figure A-15 PRE-TEST REAR UNDERBODY VIEW

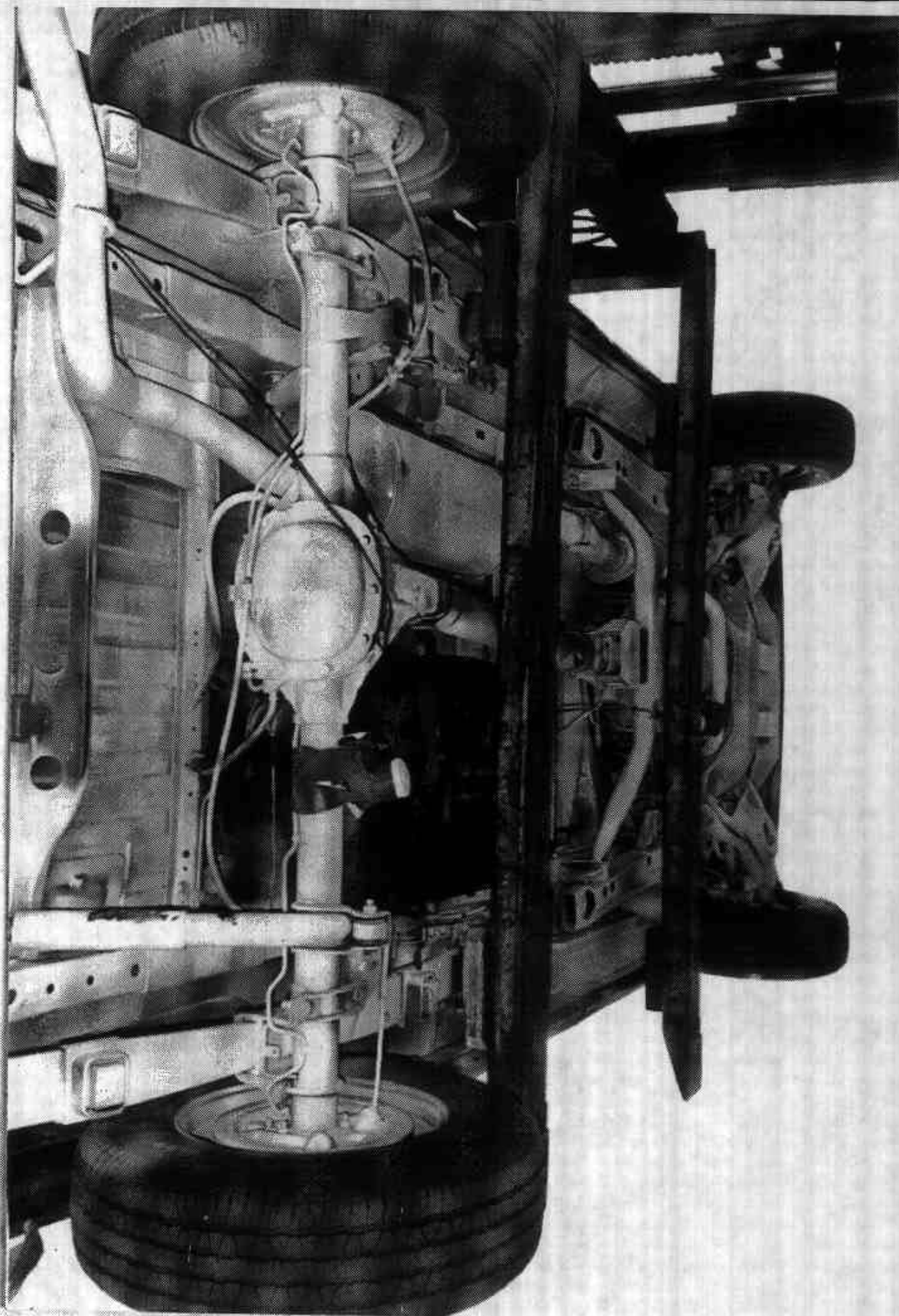


Figure A-16 POST-TEST REAR UNDERBODY VIEW

MFD BY GENERAL MOTORS CORP		08/94	
GVWR	GAWR FRT	GAWR RR	
5950/2599	2800/1270	3150/1429	LB/KG
THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.			
IGNOM19WXSBI14735		M.P.V.	
MODEL:W11006	SPEED	PAYLOAD=1594/723	
MPAS	TIRE SIZE	RTG	RIM
FRT	P215/75R15	S	15X61/2JJ
RR	P215/75R15	S	15X61/2JJ
SPA	T145/80D16	M	16X4F
SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION		PSI/KPA (COLD)	
		35/240	
		35/240	
		60/420	

Figure A-17 CERTIFICATION PLACARD

NOT APPLICABLE

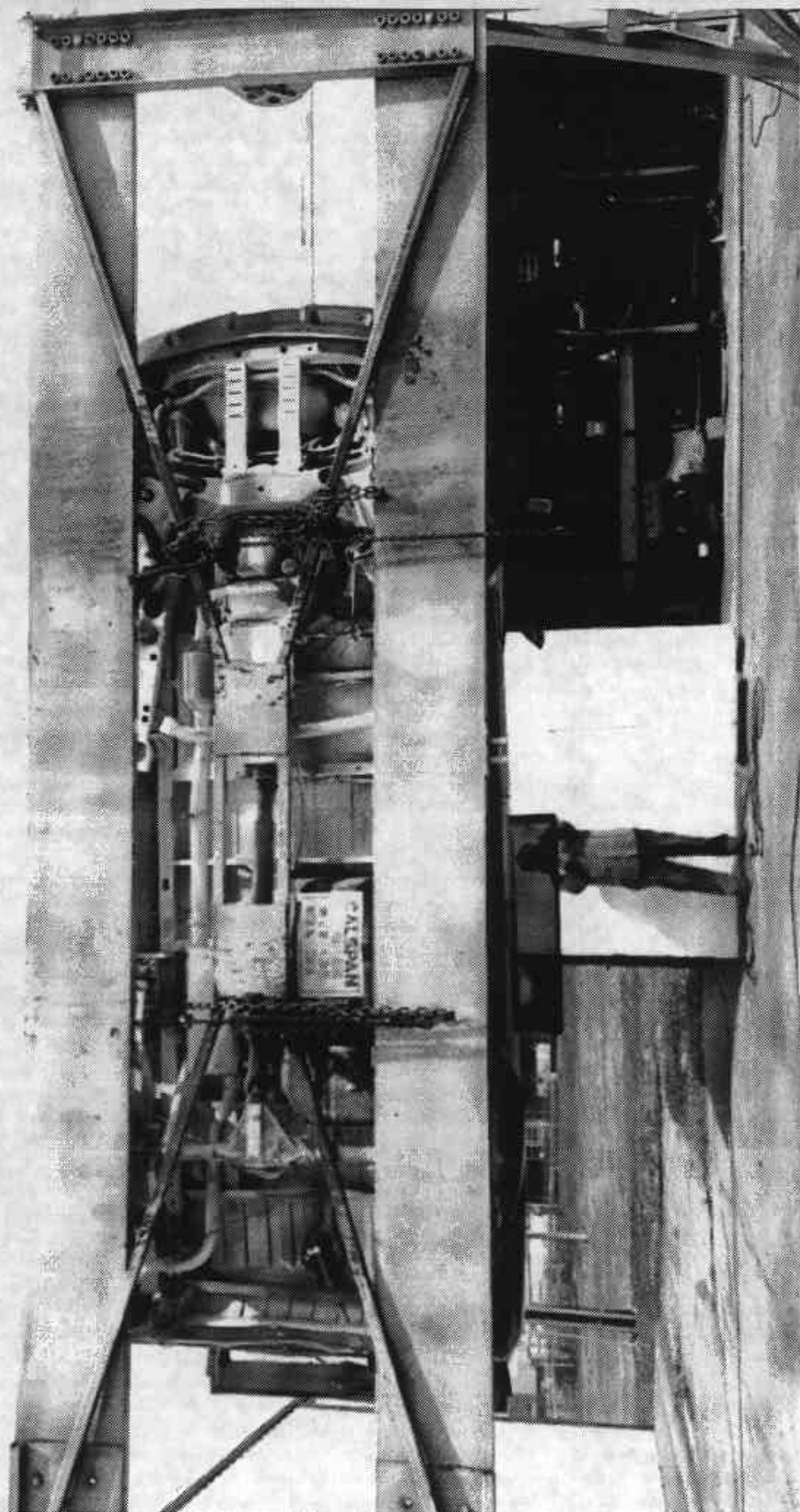


Figure A-19 ROLLOVER 90°

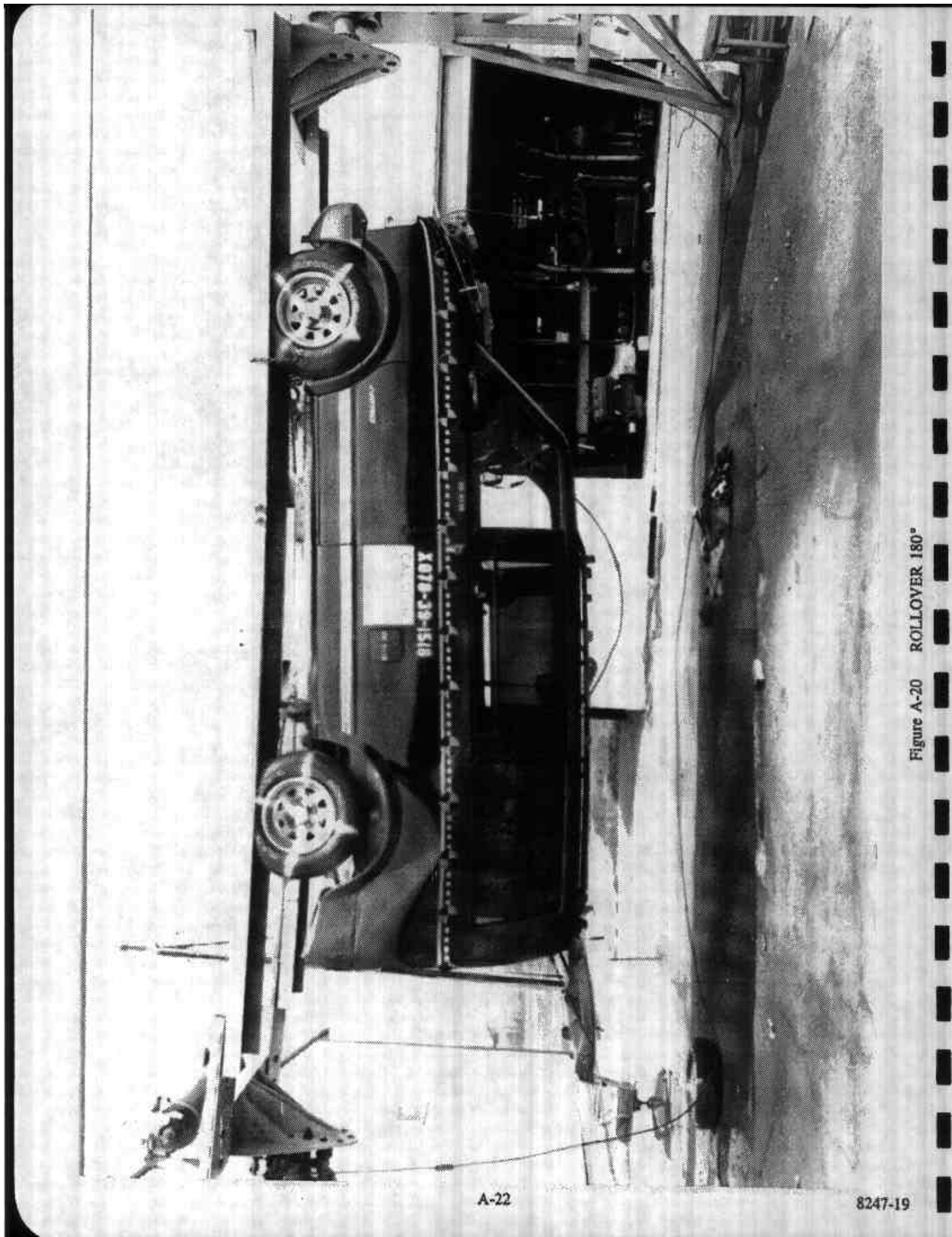


Figure A-20 ROLLOVER 180°

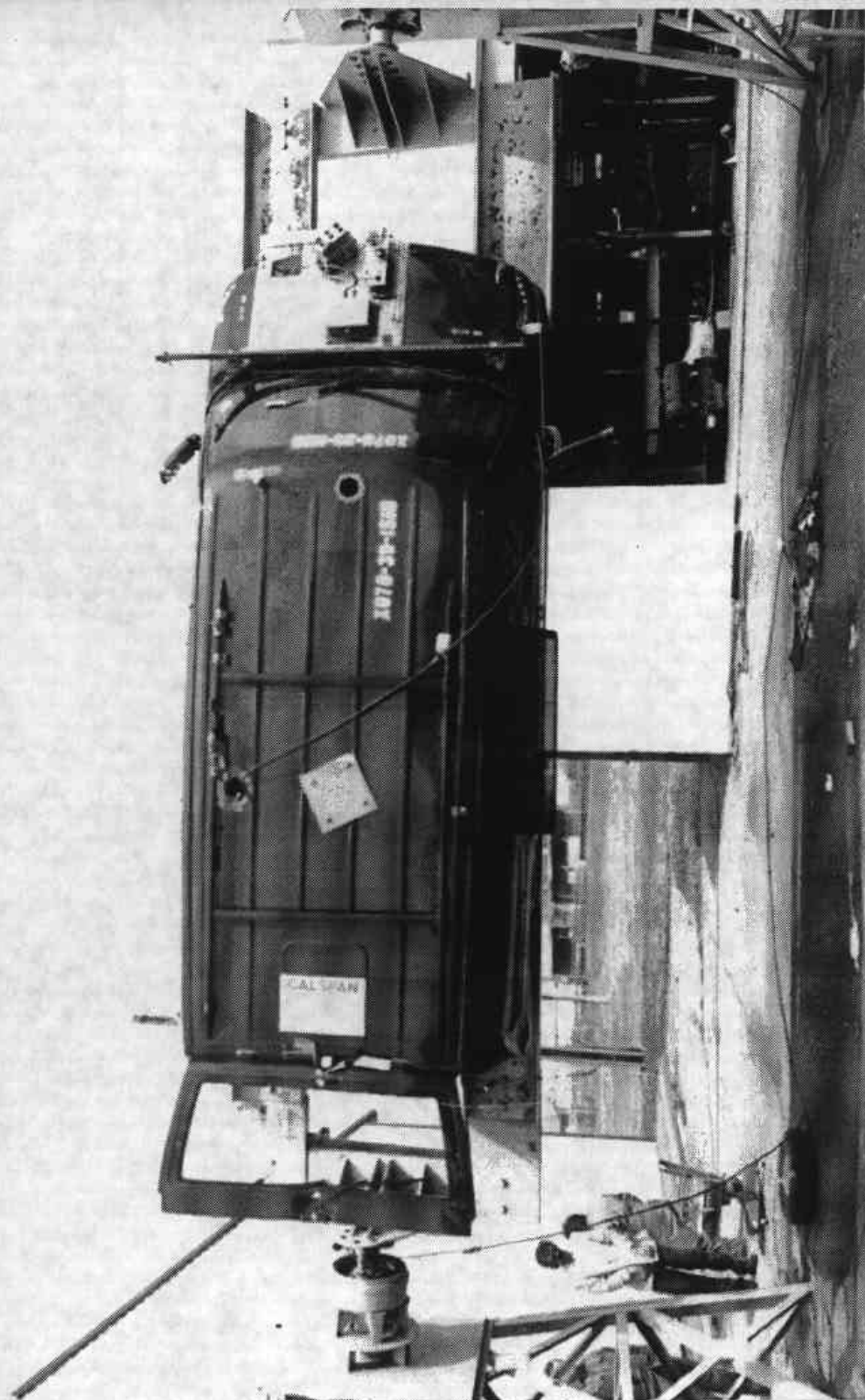


Figure A-21 ROLLOVER 270°

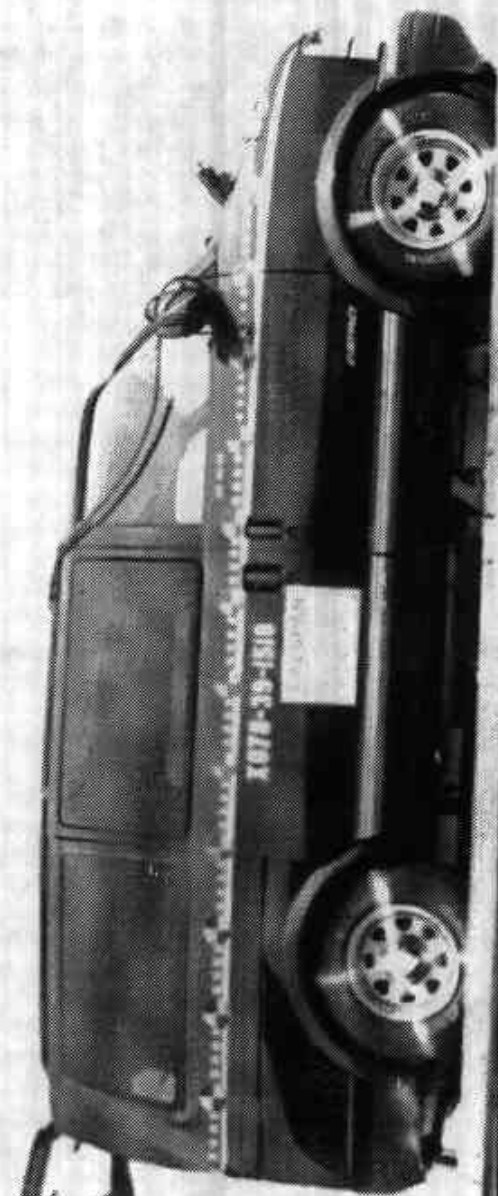


Figure A-22 ROLLOVER 360°

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

(REAR IMPACT ONLY)

Note: The Pos. 1 Pelvic Z accelerometer data was lost on impact.

FACILITY: TAPE TEST DATE: 21 Apr 1995
 RUN #: 1518 TEST TIME: 10:33:03
 SERIES #: 1 BOARD: a

TITLE: 301 Rear 30 MPH-1995 Chevrolet Astro Van

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	Pos. 1 Head X	Gs	37.3	124.4	-15.5	-63.4	1000.0
2	Pos. 1 Head Y	Gs	9.7	119.4	-2.1	-6.4	1000.0
3	Pos. 1 Head Z	Gs	21.7	118.9	-3.1	45.2	1000.0
4	Pos. 1 Chest Disp.	Ins	.0	151.3	.0	133.8	180.0
5	Pos. 1 Chest X	Gs	14.0	88.8	-3.5	126.1	180.0
6	Pos. 1 Chest Y	Gs	2.5	151.2	-1.2	126.5	180.0
7	Pos. 1 Chest Z	Gs	6.4	59.0	-2.2	120.1	180.0
8	Pos. 1 Lap Belt	lbs	29.5	115.9	-55.9	275.0	60.0
9	Pos. 1 Pelvic X	Gs	17.2	58.7	-3.9	142.3	1000.0
10	Pos. 1 Pelvic Y	Gs	6.8	184.2	-7.4	-6.4	1000.0
11	Pos. 1 Pelvic Z	Gs	2076.0	233.2	-3185.6	177.2	1000.0
12	Pos. 1 Belt Spoolout	Ins	.1	-5.8	-4.8	220.8	60.0
17	Pos. 1 Head Resultant	Gs	40.1	123.5	.1	-14.4	1000.0
18	Pos. 1 Chest Resultant	Gs	14.3	88.7	.0	-15.6	180.0
19	Pos. 1 Pelvic Resultant	Gs	3185.6	177.2	28.6	335.5	1000.0
20	Pos. 1 Neck Force Res.		.0	.0	.0	.0	1000.0

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

hic: 123.51
 t1 = 101.040 msec
 t2 = 136.920 msec
 Average G's Over Hic Duration = 25.99

CLIP SUMMARY: Pos. 1 Chest Resultant

Peak Resultant (3 ms CLIPPED DURATION) = 13.704 G's
 Tstart = 86.7600 ms
 Tend = 89.8800 ms
 CSI = 20.659

FACILITY: TAPE TEST DATE: 21 Apr 1995
 RUN #: 1518 TEST TIME: 10:39:23
 SERIES #: 1 BOARD: b

TITLE: 301 Rear 30 MPH-1995 Chevrolet Astro Van

CHANNEL NUMBER	DESCRIPTION	ENGR UNIT	MAXIMUM		MINIMUM		FILTER CLASS
			AMP	msec	AMP	msec	
1	Pos. 1 Upper Neck Fx	lbs	359.7	-79.3	-87.4	286.3	1000.0
2	Pos. 1 Upper Neck Fy	lbs	43.9	158.8	-50.5	275.9	1000.0
3	Pos. 1 Upper Neck Fz	lbs	533.6	124.3	-212.1	183.0	1000.0
4	Right Rear Crossmember X	Gs	23.3	18.7	-5.1	265.6	60.0
5	Pos. 1 Upper Neck Mx	ft-lbs	12.9	175.3	-5.8	284.8	600.0
6	Pos. 1 Upper Neck My	ft-lbs	9.6	92.0	-22.3	120.1	600.0
7	Pos. 1 Upper Neck Mz	ft-lbs	12.0	158.8	-10.1	275.3	600.0
8	Upper Seatback X	Gs	32.4	74.4	-24.9	91.4	60.0
9	Lower Seatback X	Gs	24.4	21.2	-7.6	93.5	60.0
10	Left Rear Crossmember X	Gs	20.1	18.8	-12.6	275.3	60.0
17	Pos. 1 Neck Force Res.	lbs	534.4	124.3	1.0	12.0	1000.0
18	Pos. 1 Neck Moment Res.	ft-lbs	24.1	121.2	.0	-67.6	600.0

TEST NO. CS0116

VEHICLE

SAE FILTER CHANNEL CLASS

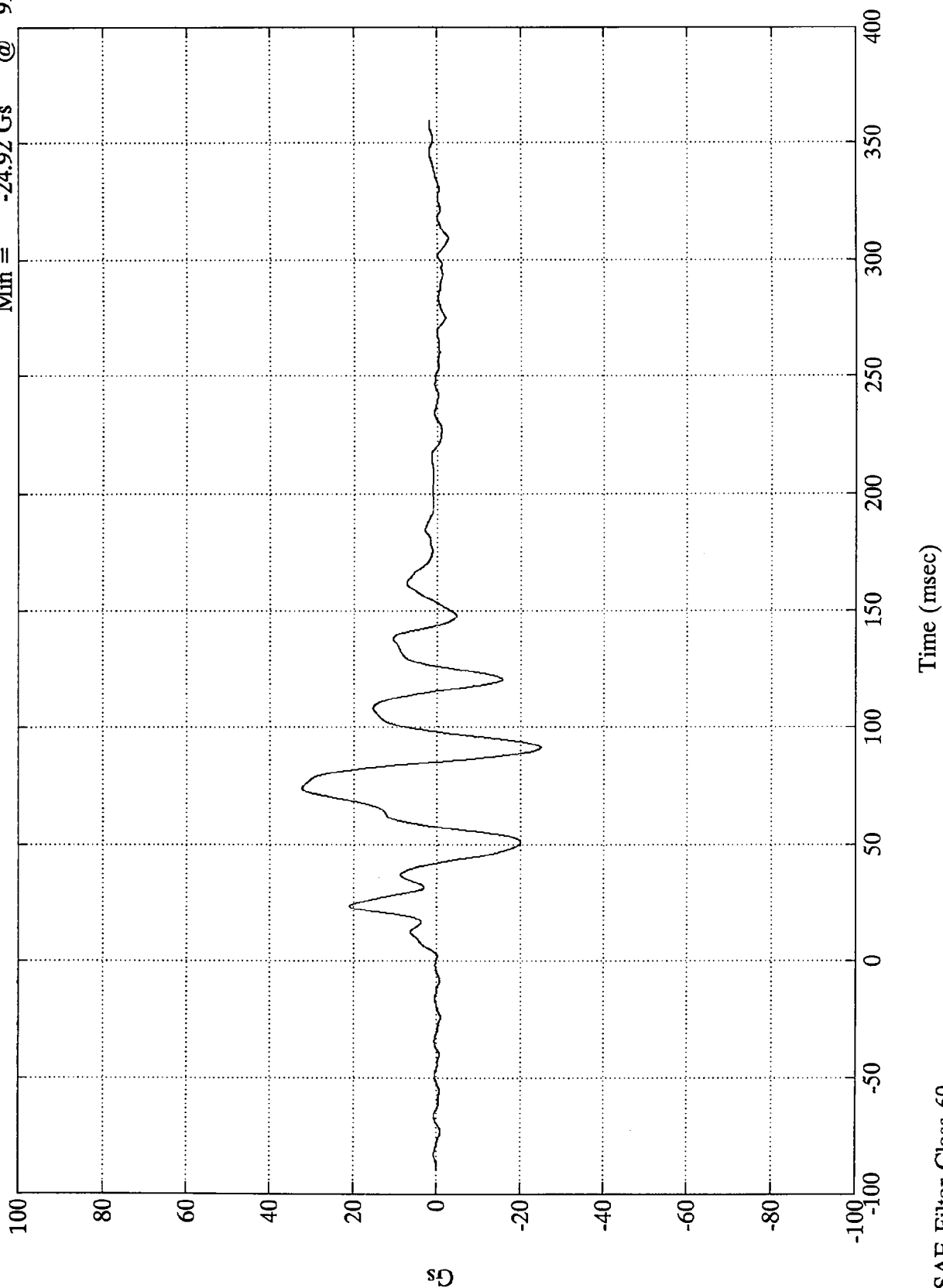
60

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

301 Rear 30 MPH-1995 Chevrolet Astro Van

Upper Seatback X

Max = 32.39 Gs @ 74.40 msec
Min = -24.92 Gs @ 91.44 msec

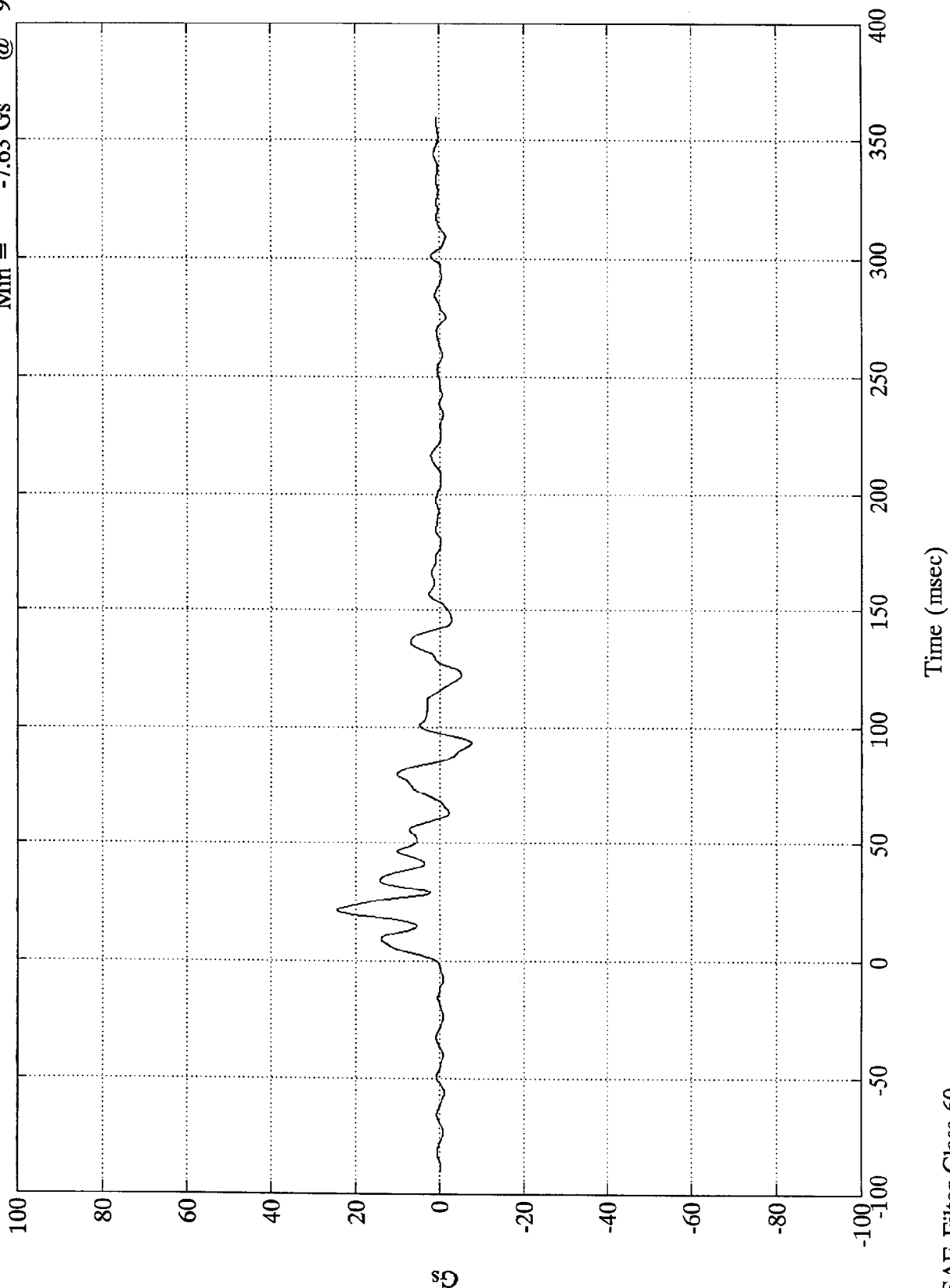


SAE Filter Class 60

301 Rear 30 MPH-1995 Chevrolet Astro Van

Lower Seatback X

Max = 24.40 Gs @ 21.23 msec
Min = -7.63 Gs @ 93.47 msec

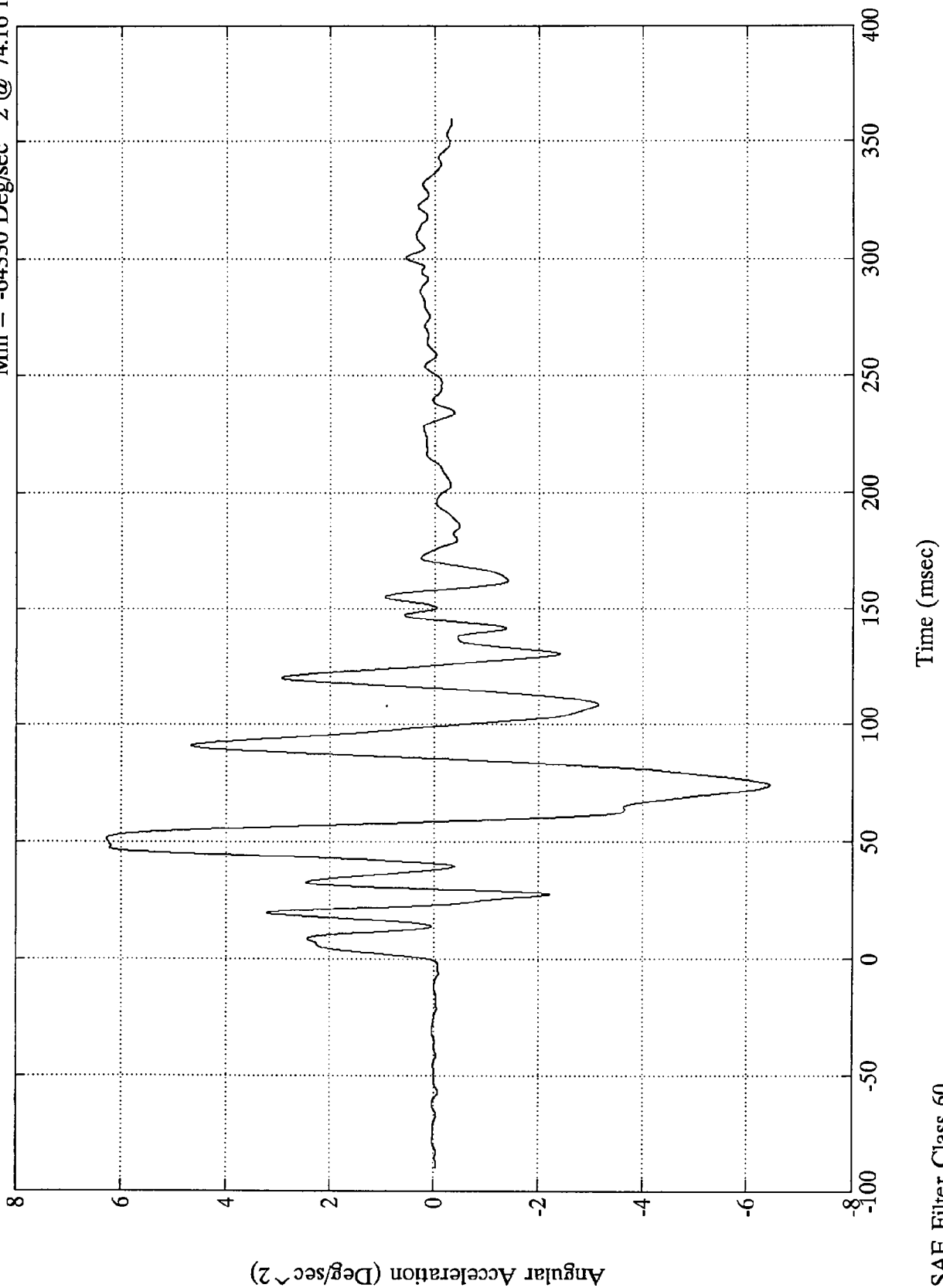


301 Rear 30 MPH-1995 Chevrolet Astro

Max = 62800 Deg/sec² @ 51.6 msec
Min = -64330 Deg/sec² @ 74.16 msec

Seatback Angular Acceleration

x10⁴

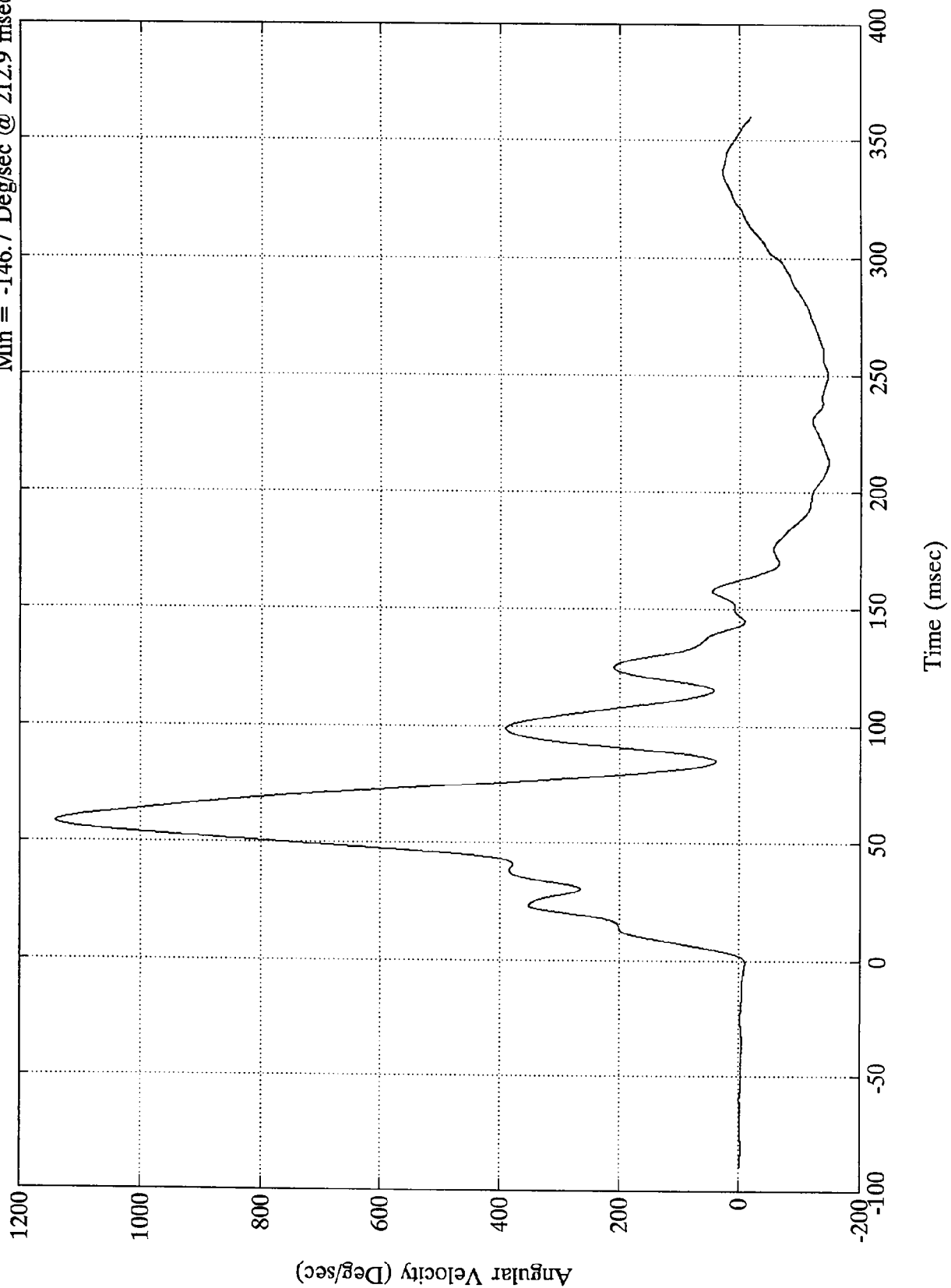


SAE Filter Class 60

301 Rear 30 MPH-1995 Chevrolet Astro

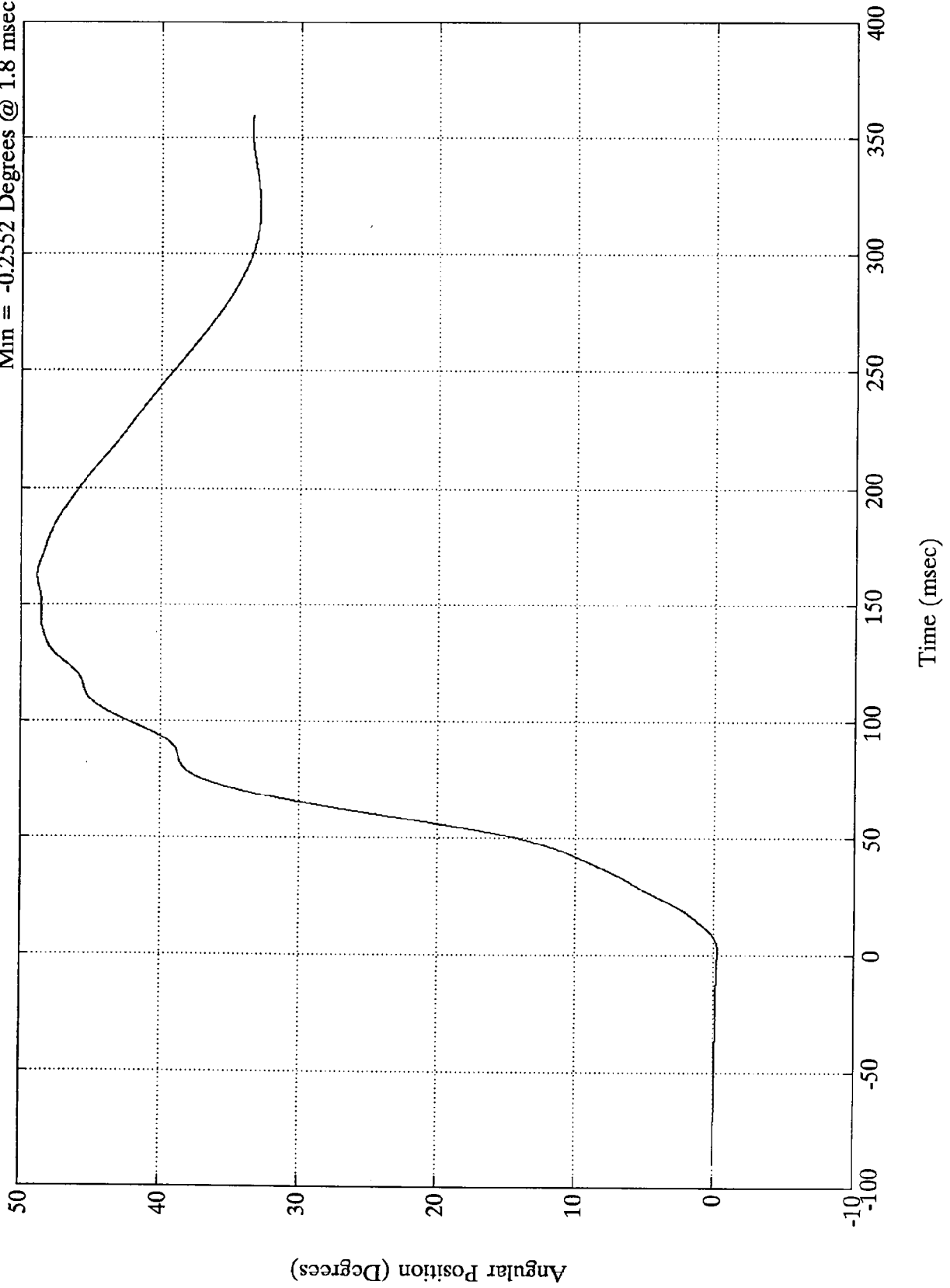
Max = 1141 Deg/sec @ 58.56 msec
Min = -146.7 Deg/sec @ 212.9 msec

Seaback Angular Velocity



301 Rear 30 MPH-1995 Chevrolet Astro

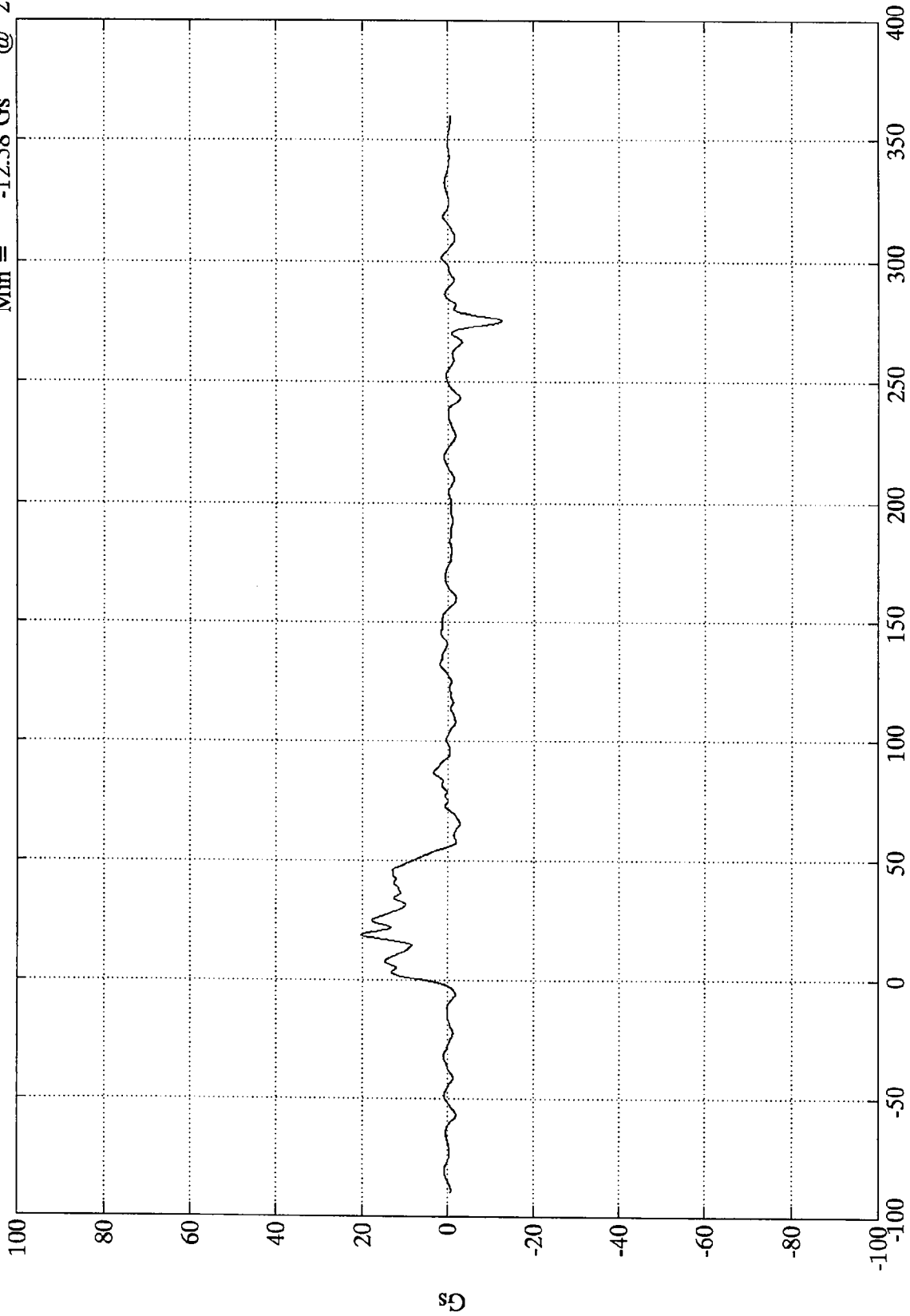
Seatback Angular Position
Max = 48.84 Degrees @ 162.5 msec
Min = -0.2552 Degrees @ 1.8 msec



301 Rear 30 MPH-1995 Chevrolet Astro Van

Max = 20.11 Gs @ 18.84 msec
Min = -12.58 Gs @ 275.27 msec

Left Rear Crossmember X

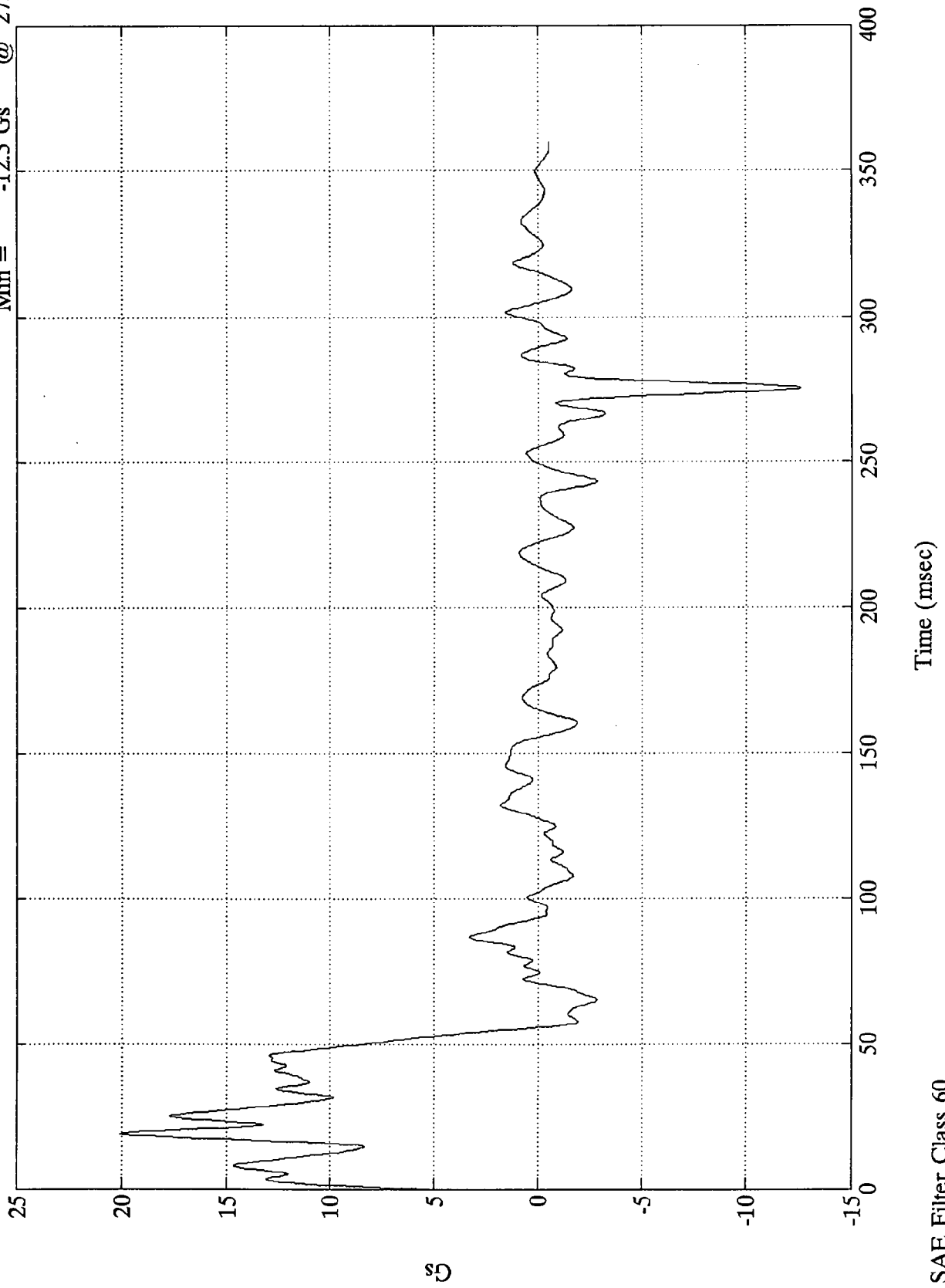


Time (msec)

SAE Filter Class 60

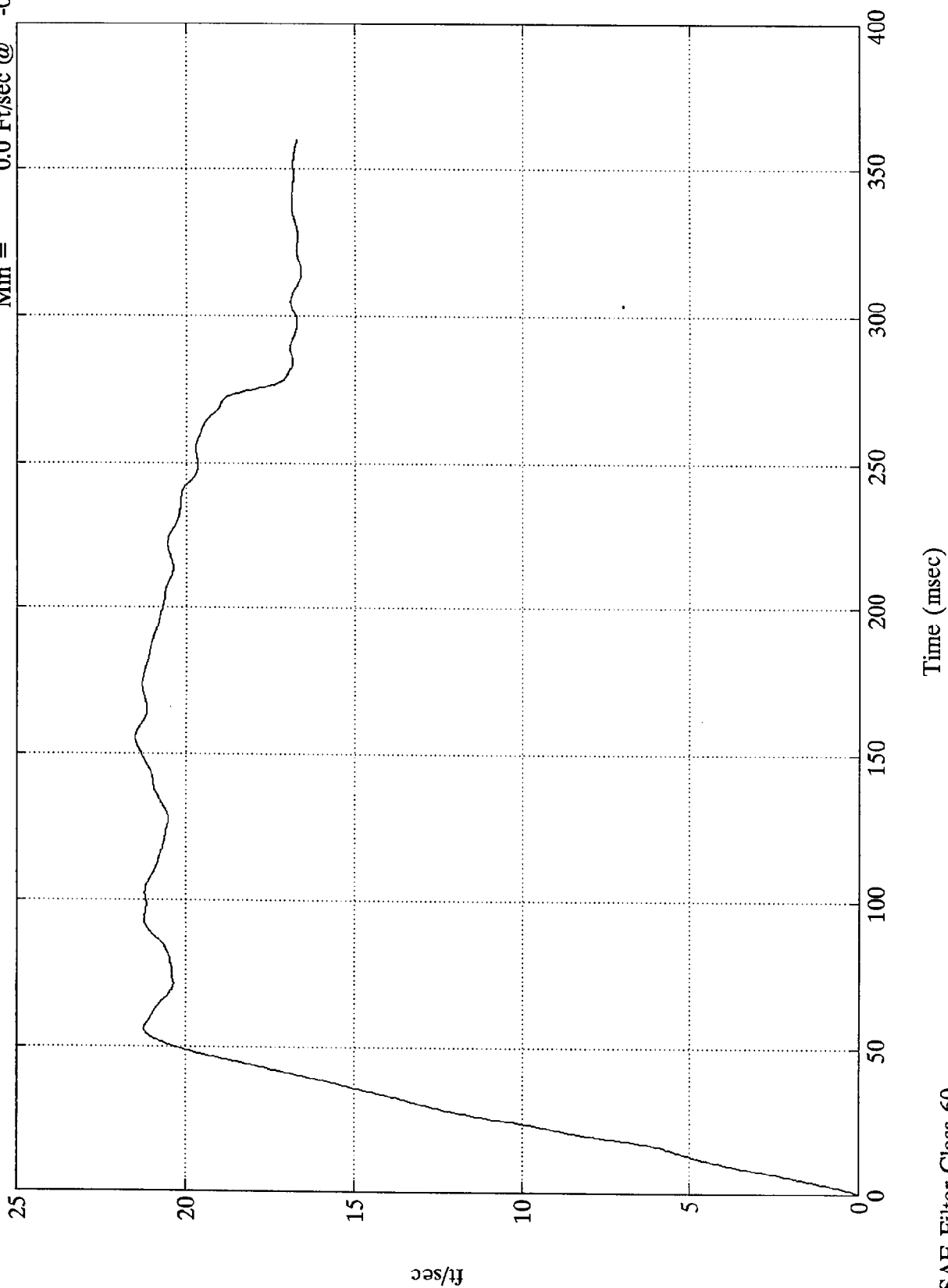
301 Rear 30 MPH-1995 Chevrolet Astro Van

Left Rear Crossmember X
Max = 20.1 Gs @ 18.84 msec
Min = -12.5 Gs @ 275.27 msec



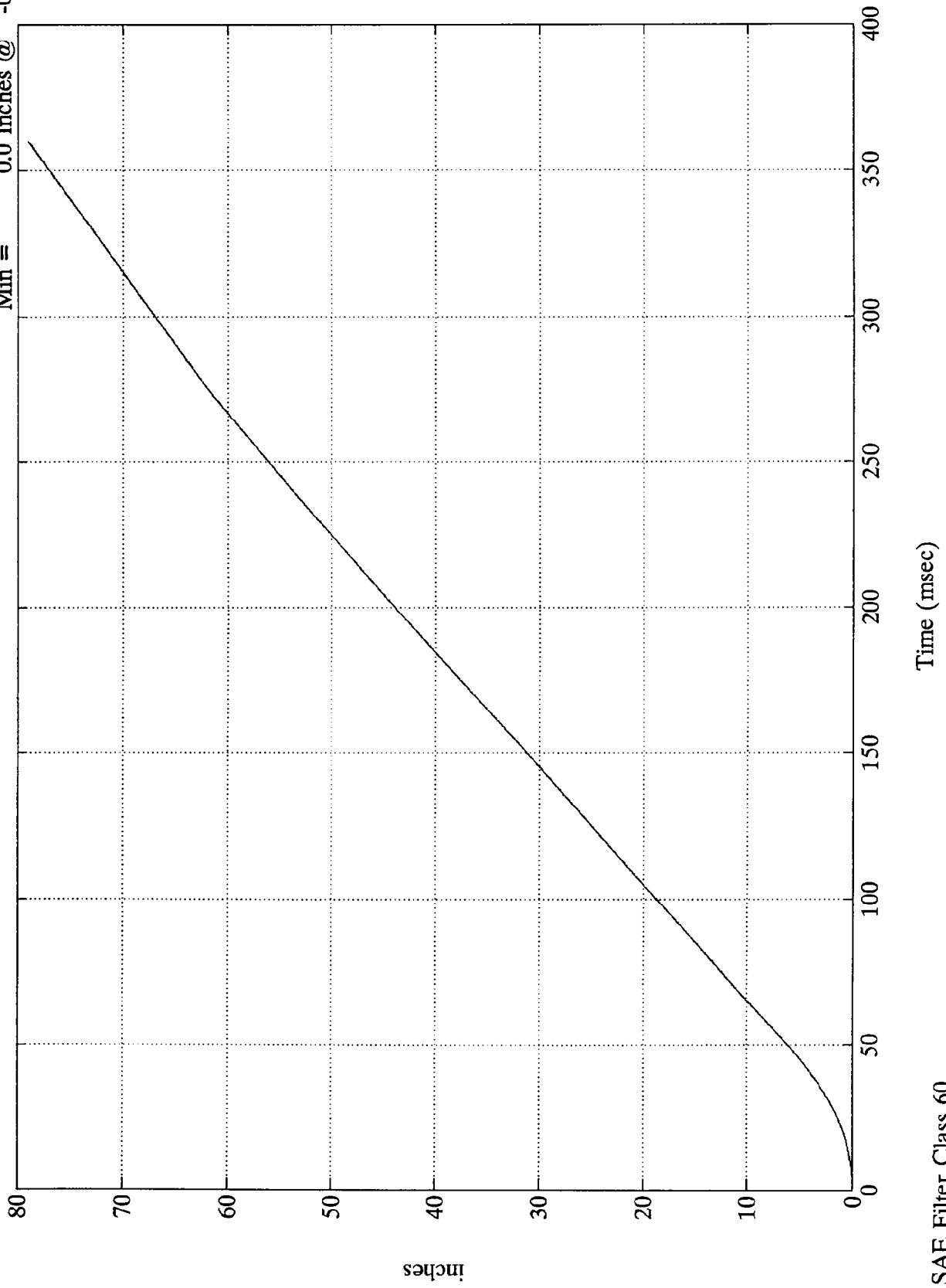
301 Rear 30 MPH-1995 Chevrolet Astro Van
1st Integral Left Rear Crossmember X

Max = 21.5 Ft/sec @ 155.52 msec
Min = 0.0 Ft/sec @ -0.00 msec



SAE Filter Class 60

301 Rear 30 MPH-1995 Chevrolet Astro Van
2nd Integral Left Rear Crossmember X
Max = 79.0 Inches @ 359.88 msec
Min = 0.0 Inches @ -0.00 msec

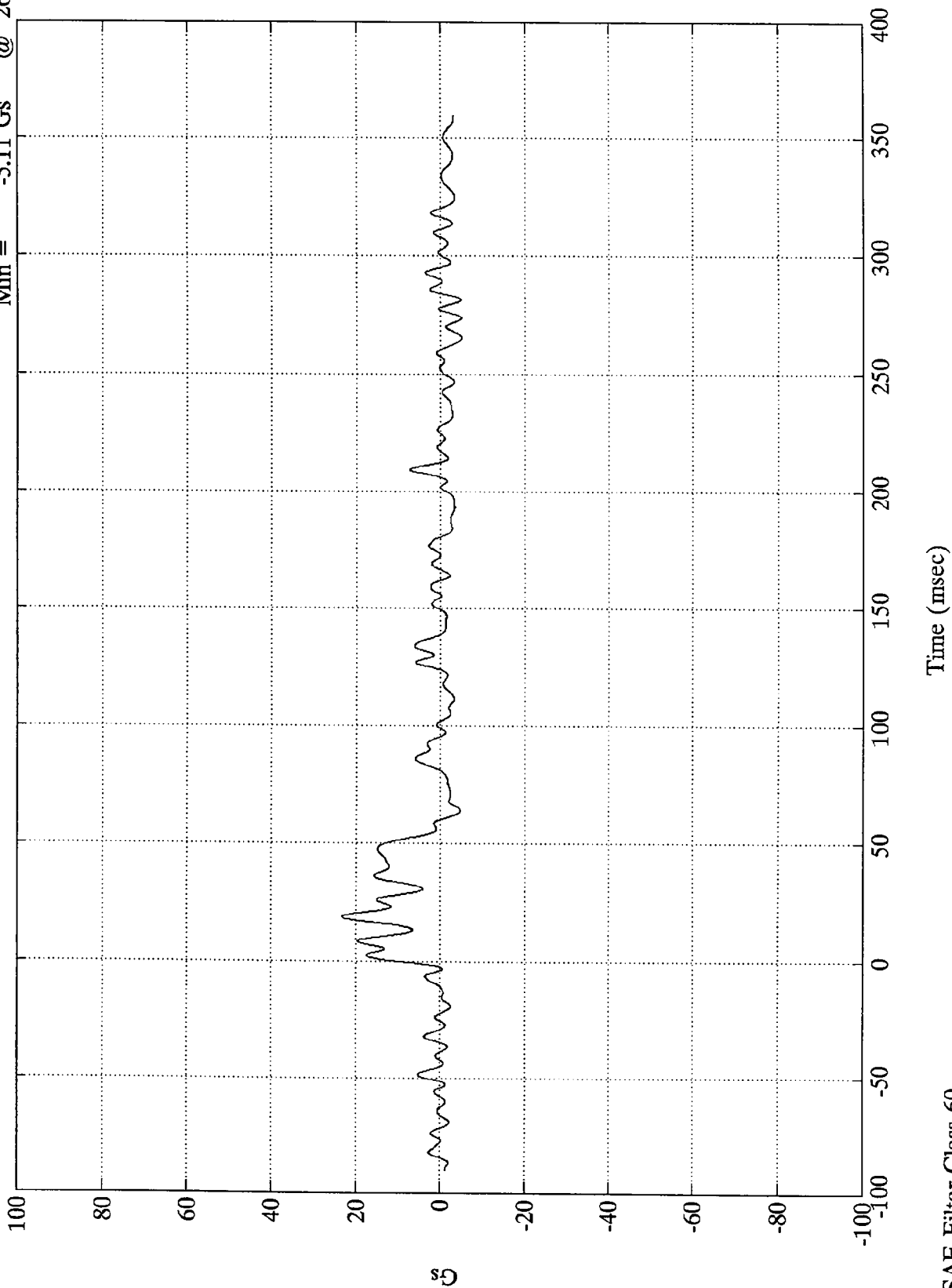


SAE Filter Class 60

301 Rear 30 MPH-1995 Chevrolet Astro Van

Right Rear Crossmember X

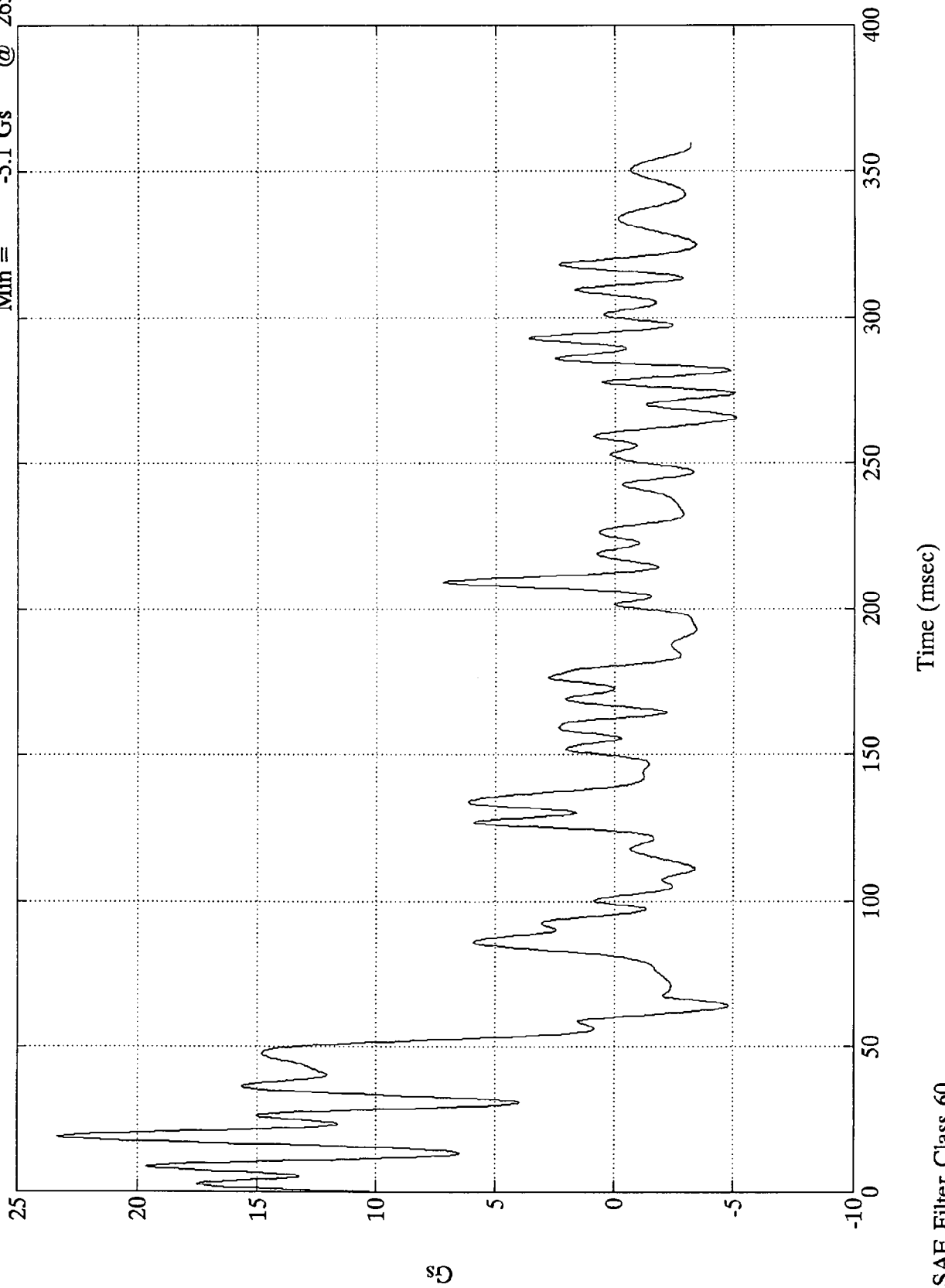
Max = 23.31 Gs @ 18.71 msec
Min = -5.11 Gs @ 265.55 msec



301 Rear 30 MPH-1995 Chevrolet Astro Van

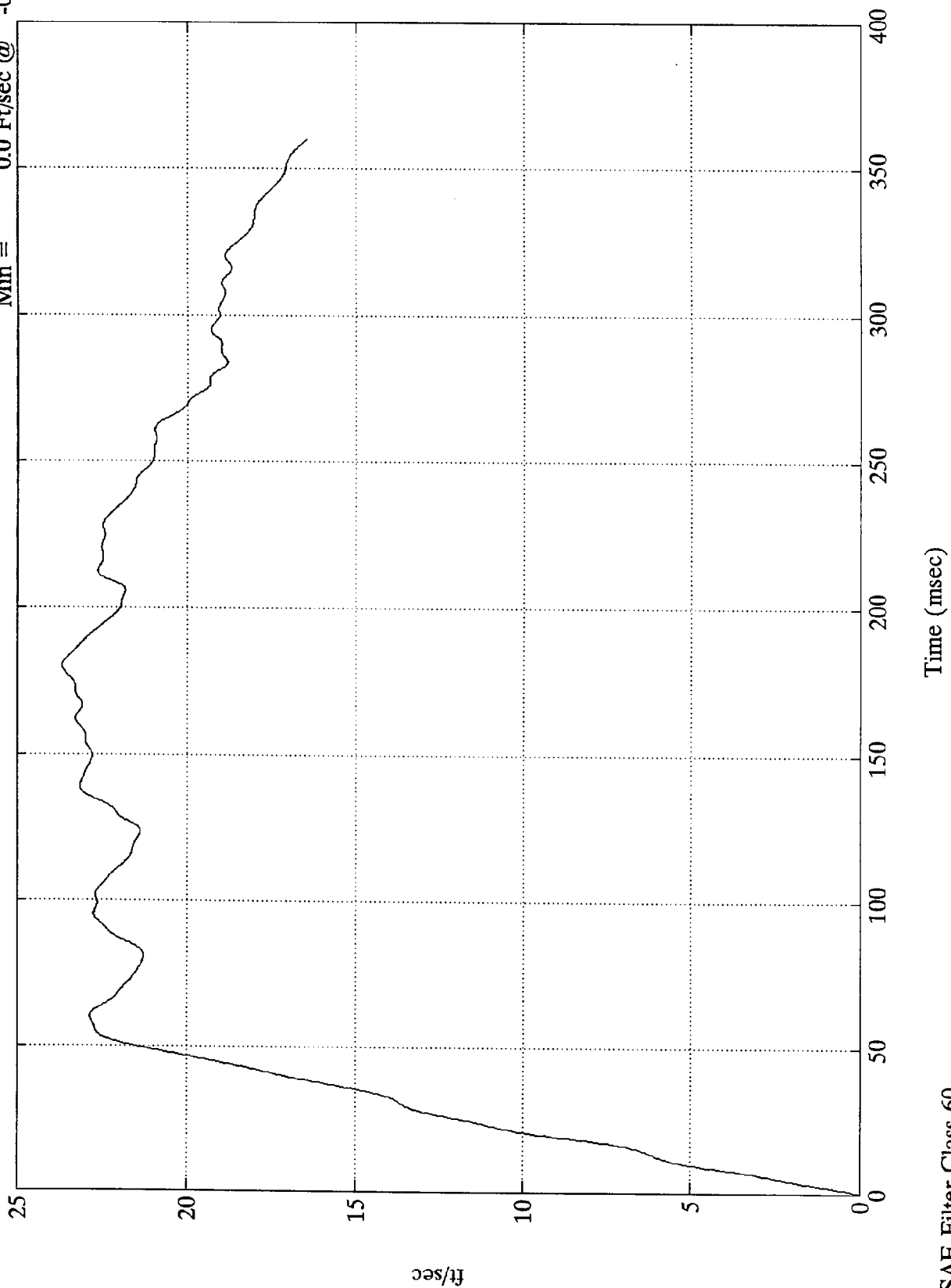
Right Rear Crossmember X

Max = 23.3 Gs @ 18.71 msec
Min = -5.1 Gs @ 265.56 msec



SAE Filter Class 60

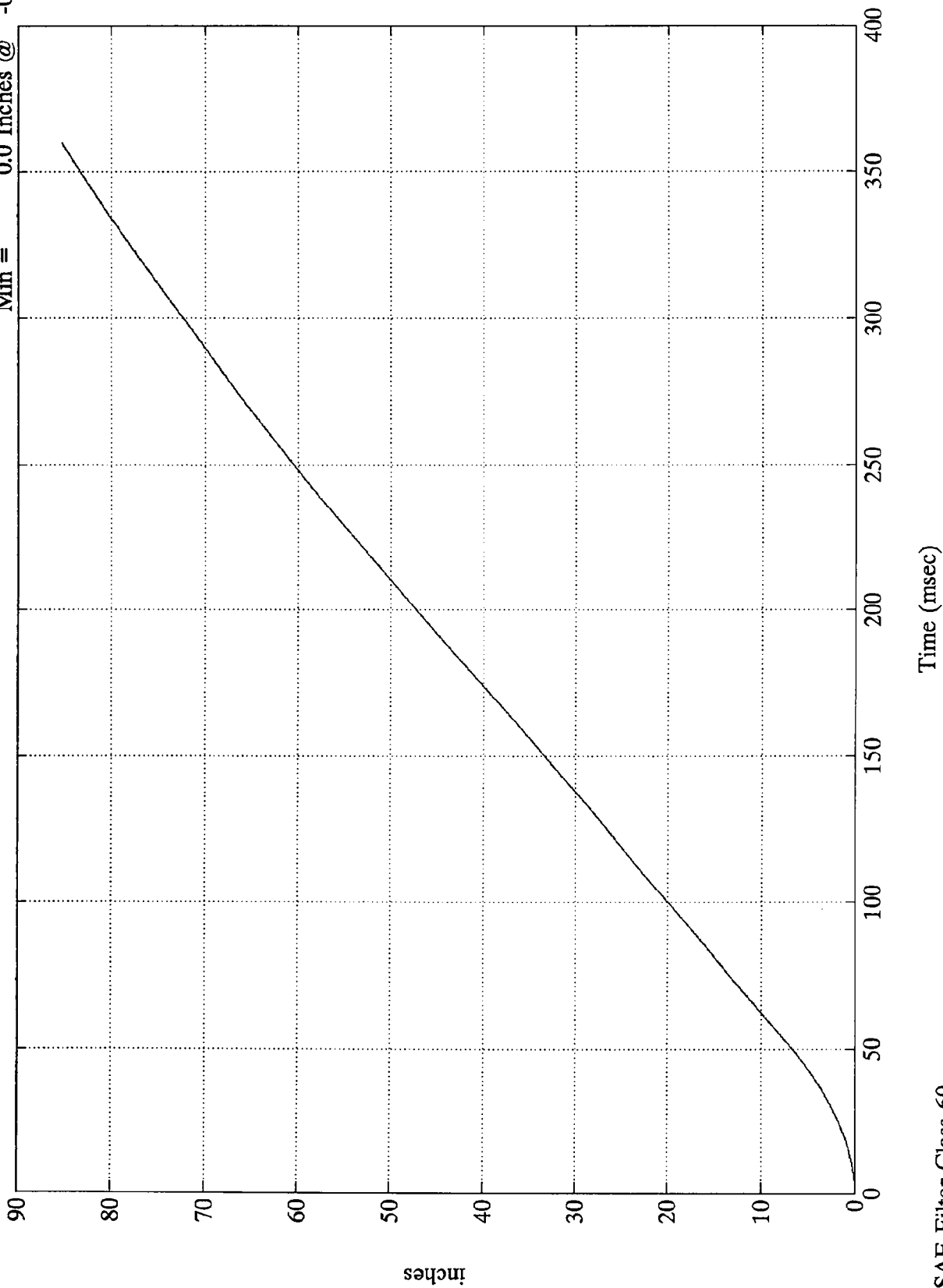
301 Rear 30 MPH-1995 Chevrolet Astro Van
1st Integral Right Rear Crossmember X
Max = 23.6 Ft/sec @ 180.24 msec
Min = 0.0 Ft/sec @ -0.00 msec



SAE Filter Class 60

301 Rear 30 MPH-1995 Chevrolet Astro Van
 2nd Integral Right Rear Crossmember X

Max = 85.3 Inches @ 359.88 msec
 Min = 0.0 Inches @ -0.00 msec



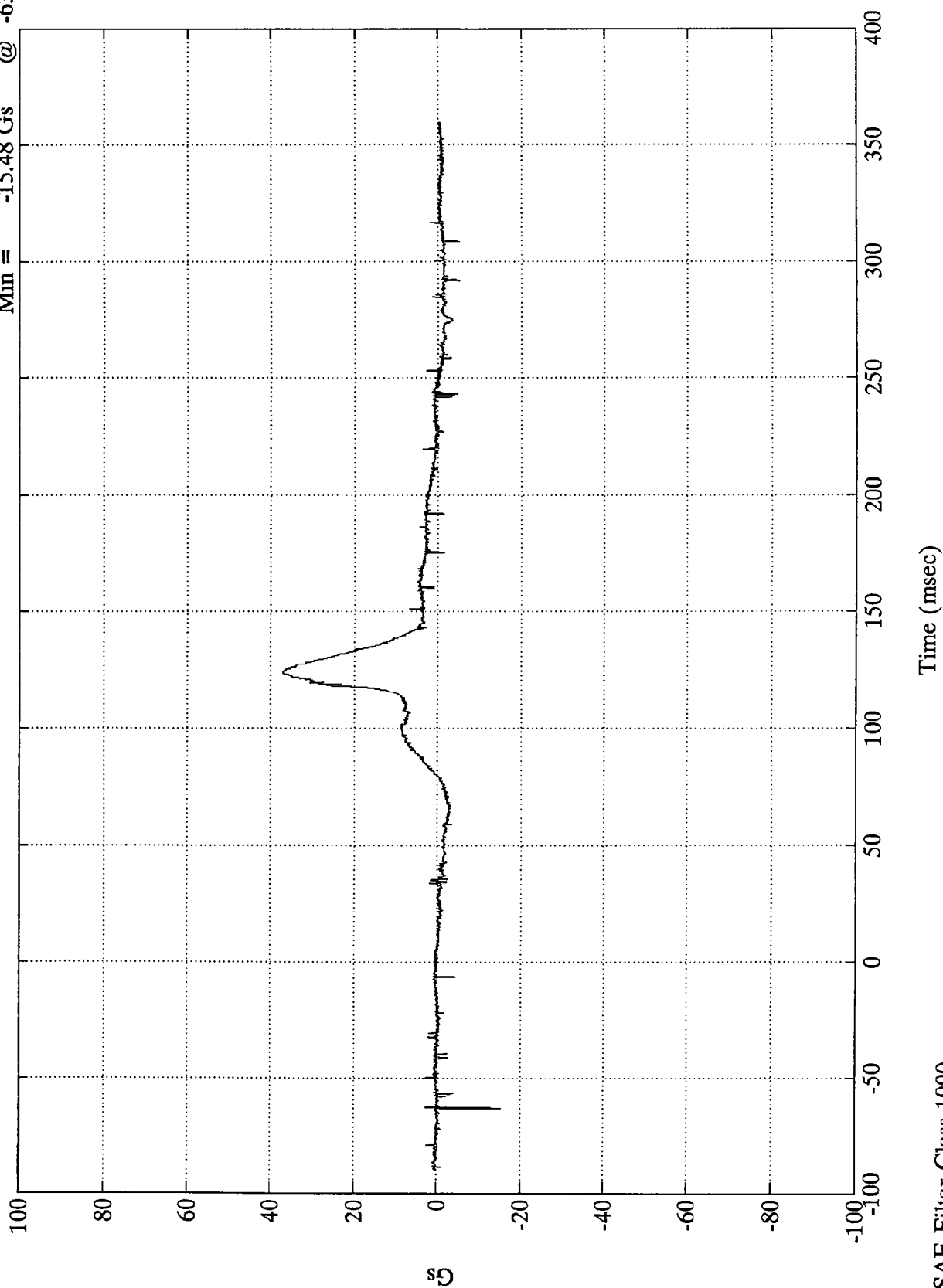
TEST NO. CS0116

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 Chevrolet Astro Van

Pos. 1 Head X

Max = 37.27 Gs @ 124.44 msec
Min = -15.48 Gs @ -63.36 msec

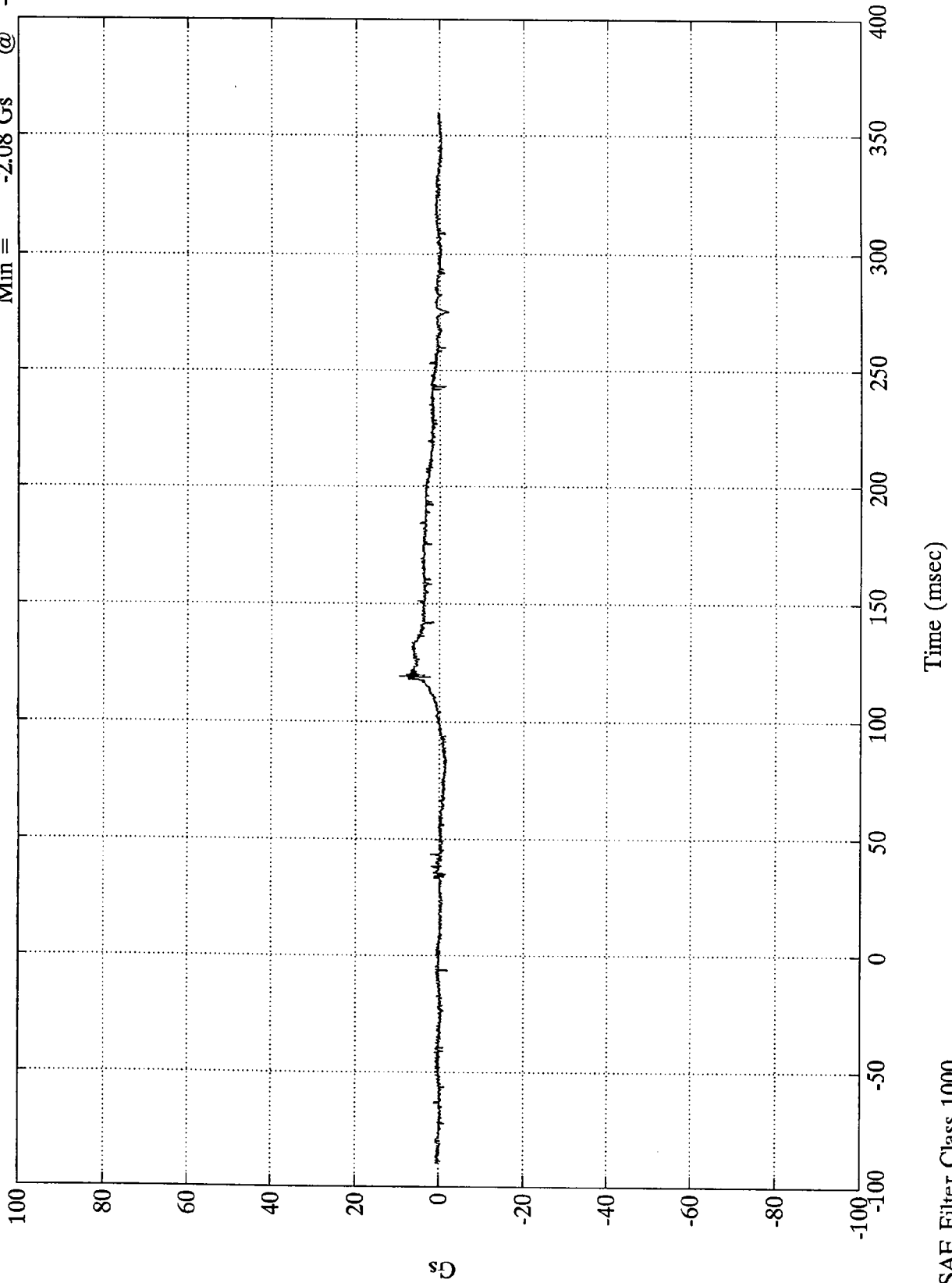


SAE Filter Class 1000

301 Rear 30 MPH-1995 Chevrolet Astro Van

Max = 9.66 Gs @ 119.40 msec
Min = -2.08 Gs @ -6.36 msec

Pos. 1 Head Y

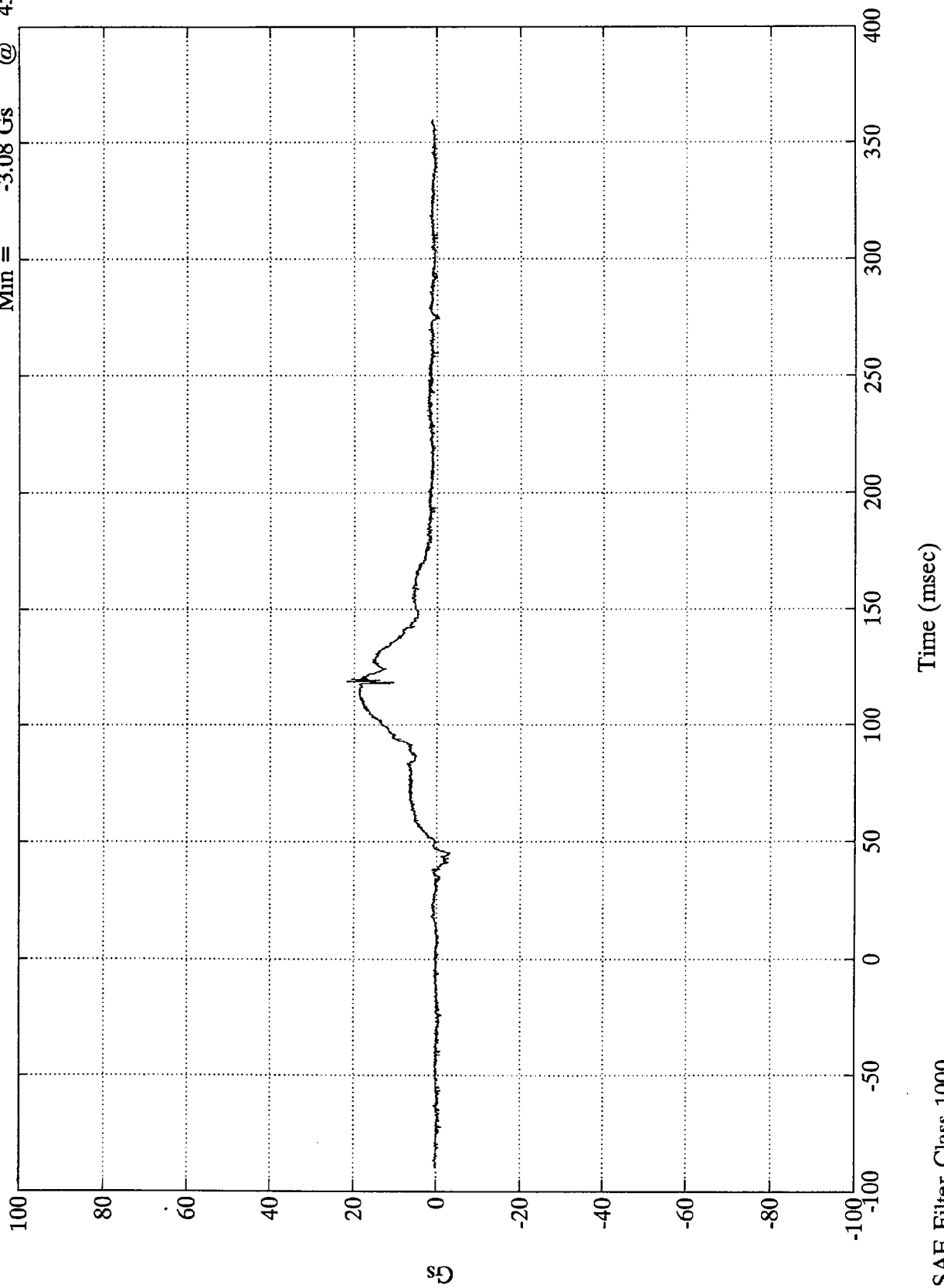


SAE Filter Class 1000

301 Rear 30 MPH-1995 Chevrolet Astro Van

Pos. 1 Head Z

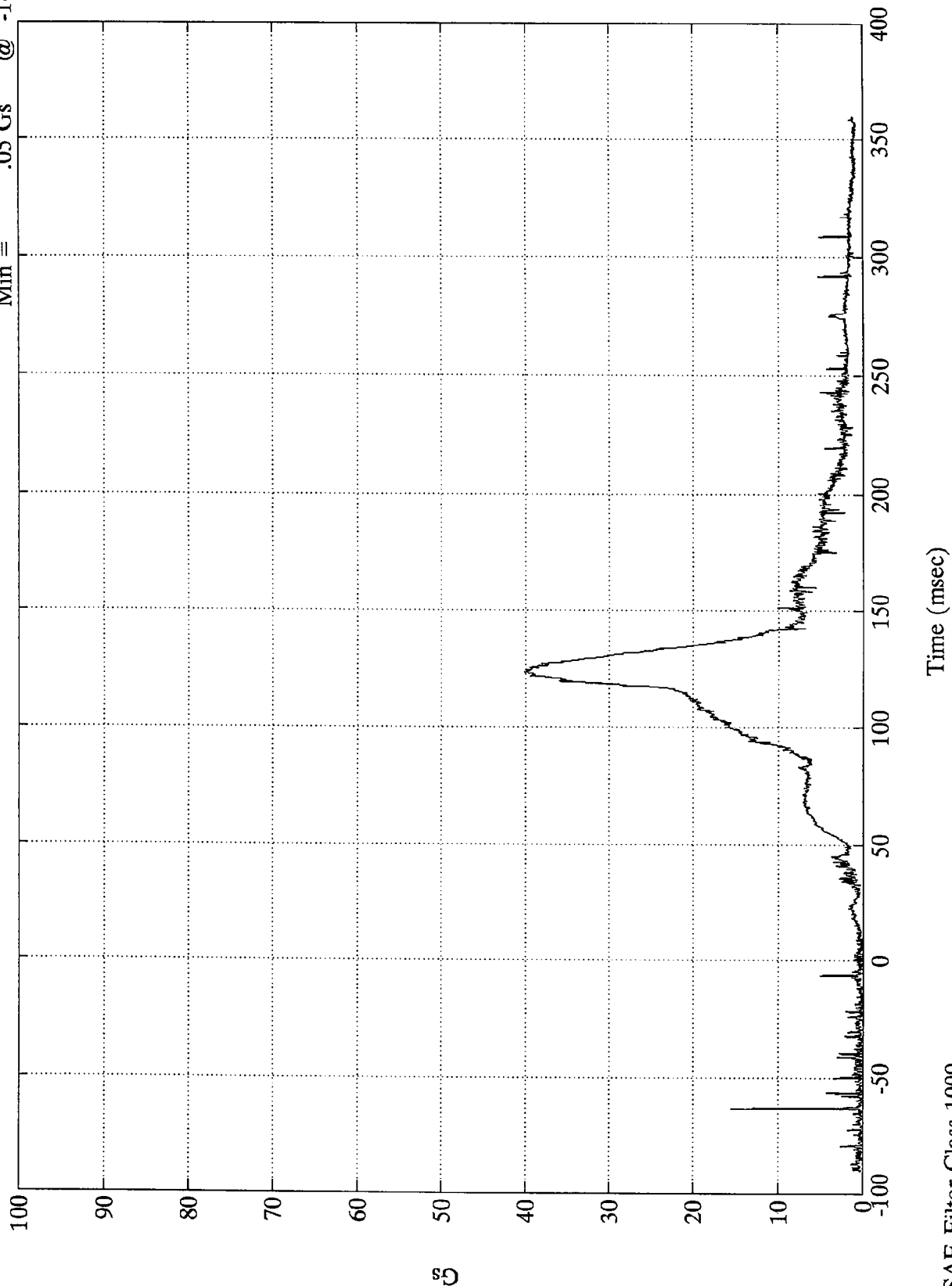
Max = 21.65 Gs @ 118.92 msec
Min = -3.08 Gs @ 45.24 msec



301 Rear 30 MPH-1995 Chevrolet Astro Van

Max = 40.08 Gs @ 123.48 msec
Min = .05 Gs @ -14.40 msec

Pos. 1 Head Resultant

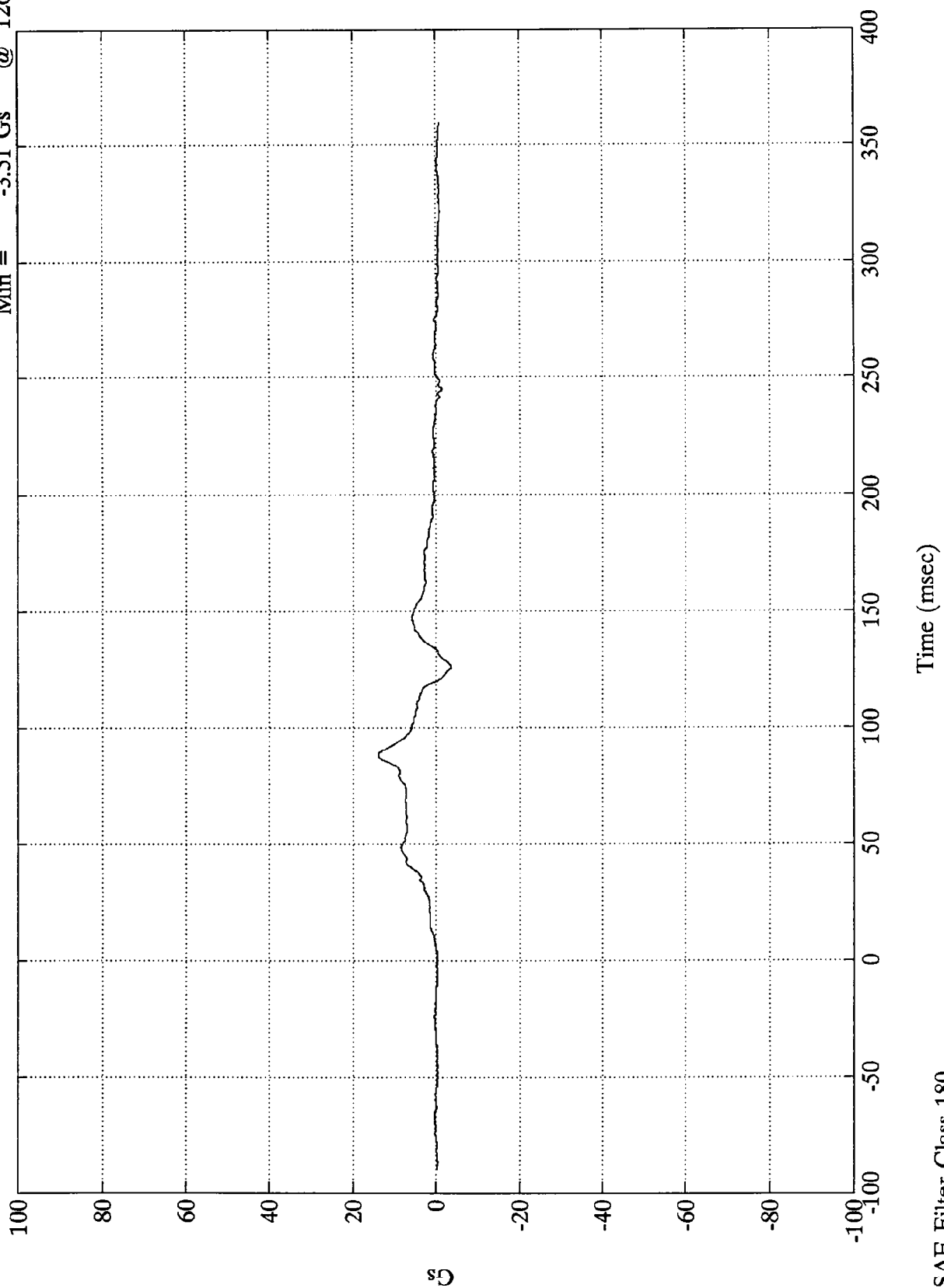


SAE Filter Class 1000

301 Rear 30 MPH-1995 Chevrolet Astro Van

Pos. 1 Chest X

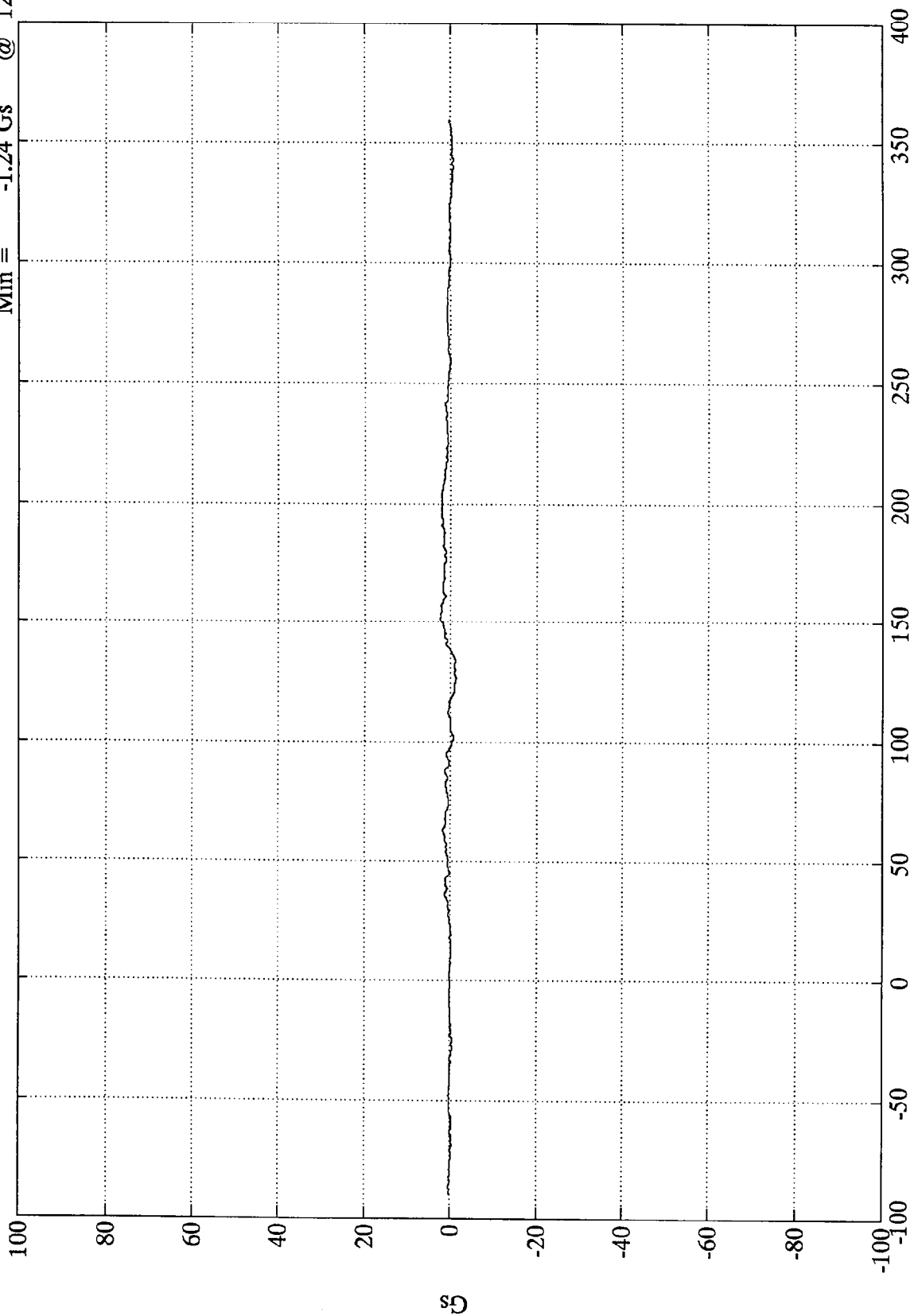
Max = 13.95 Gs @ 88.79 msec
Min = -3.51 Gs @ 126.12 msec



301 Rear 30 MPH-1995 Chevrolet Astro Van

Max = 2.51 Gs @ 151.20 msec
Min = -1.24 Gs @ 126.47 msec

Pos. 1 Chest Y



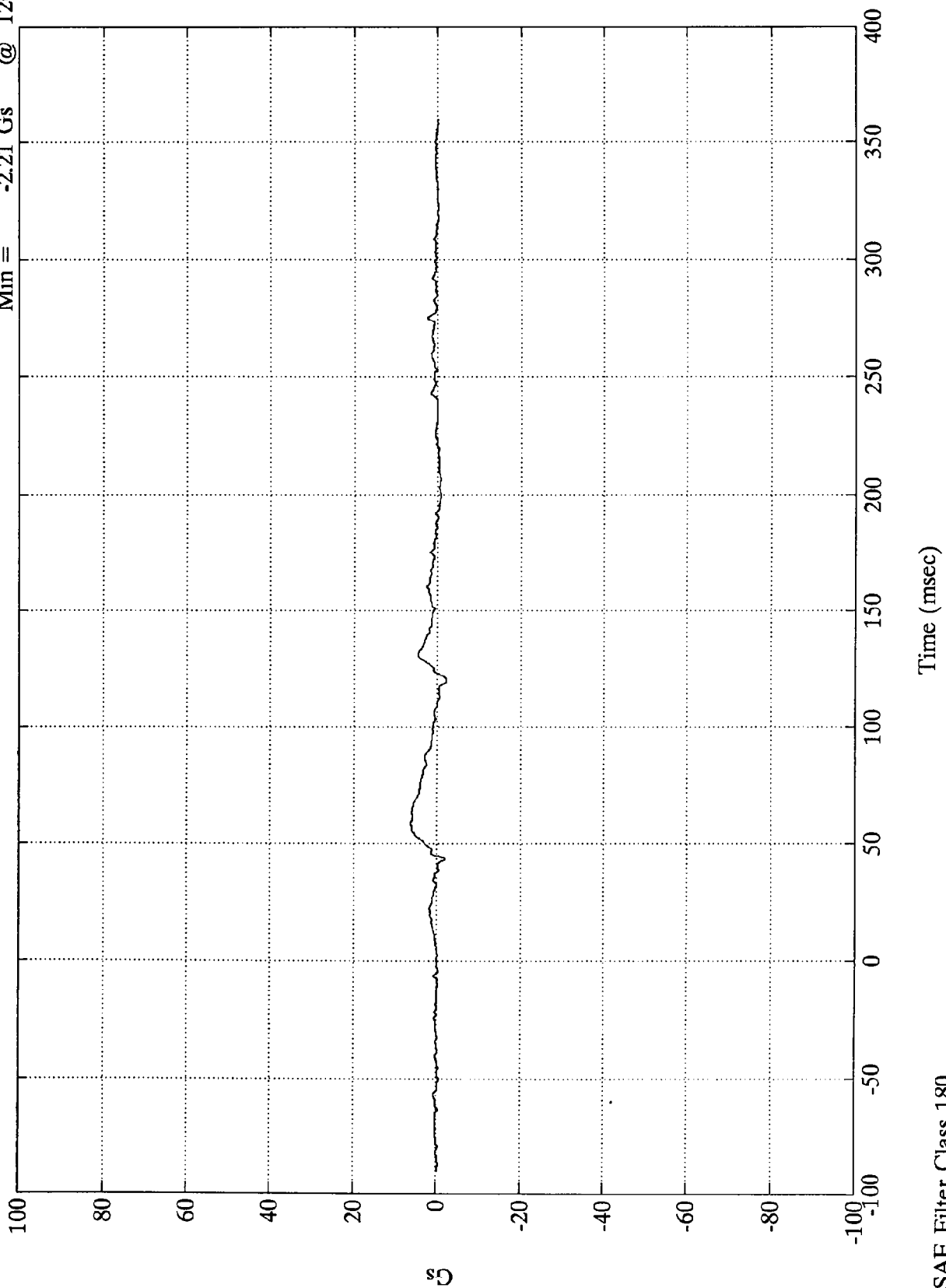
SAE Filter Class 180

Time (msec)

301 Rear 30 MPH-1995 Chevrolet Astro Van

Pos. 1 Chest Z

Max = 6.35 Gs @ 59.04 msec
Min = -2.21 Gs @ 120.12 msec

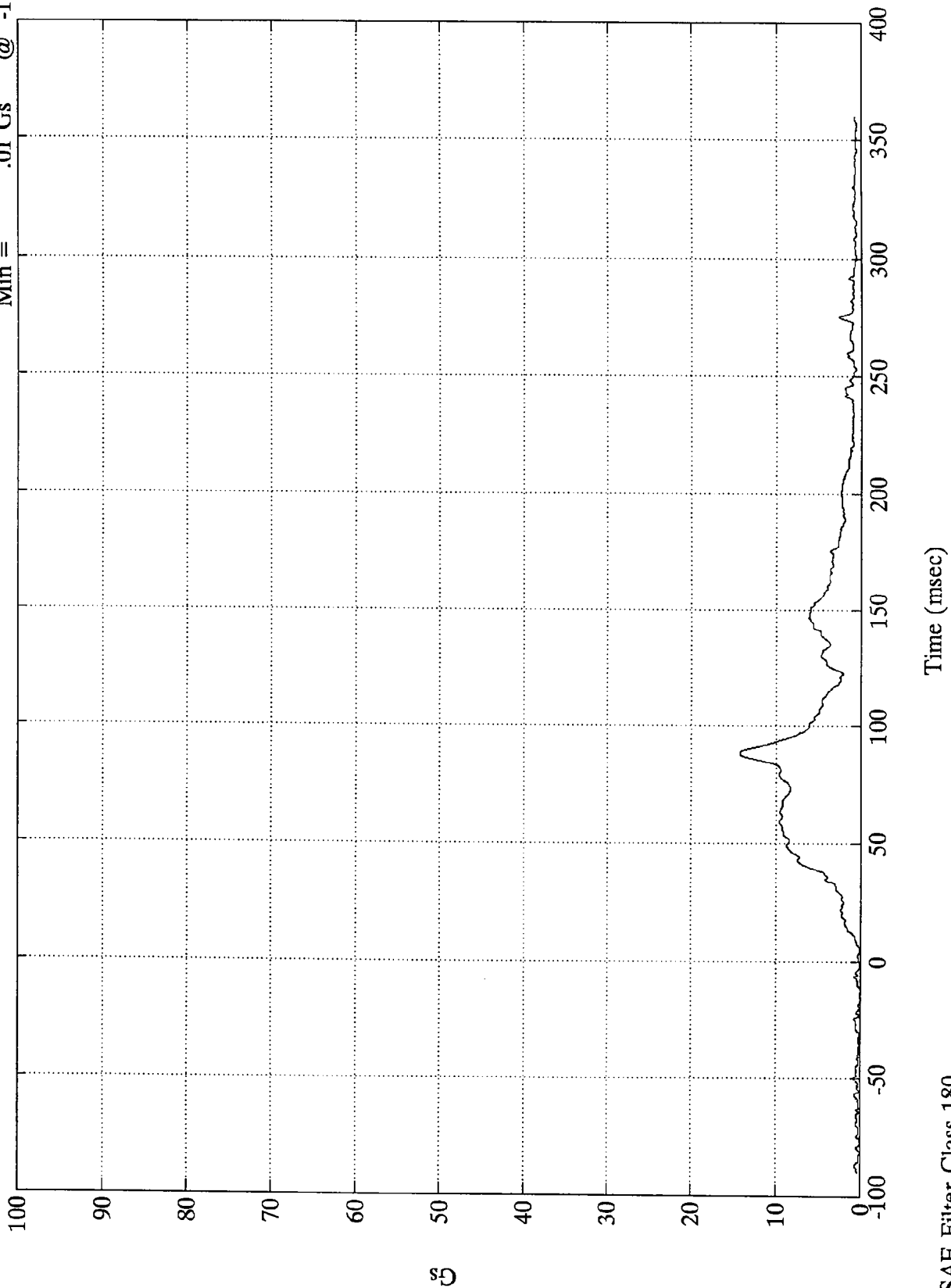


SAE Filter Class 180

301 Rear 30 MPH-1995 Chevrolet Astro Van

Max = 14.25 Gs @ 88.68 msec
Min = .01 Gs @ -15.60 msec

Pos. 1 Chest Resultant

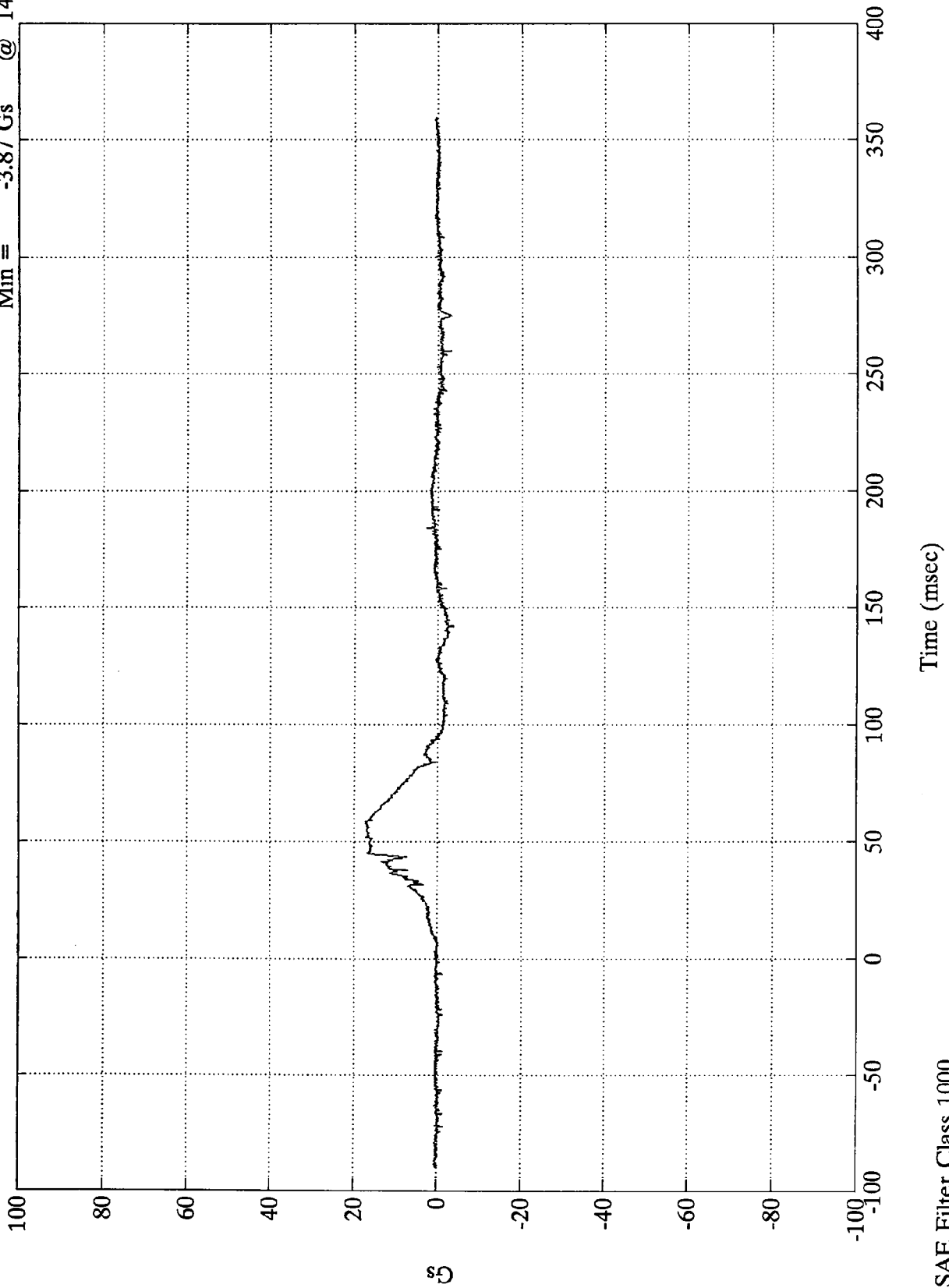


SAE Filter Class 180

301 Rear 30 MPH-1995 Chevrolet Astro Van

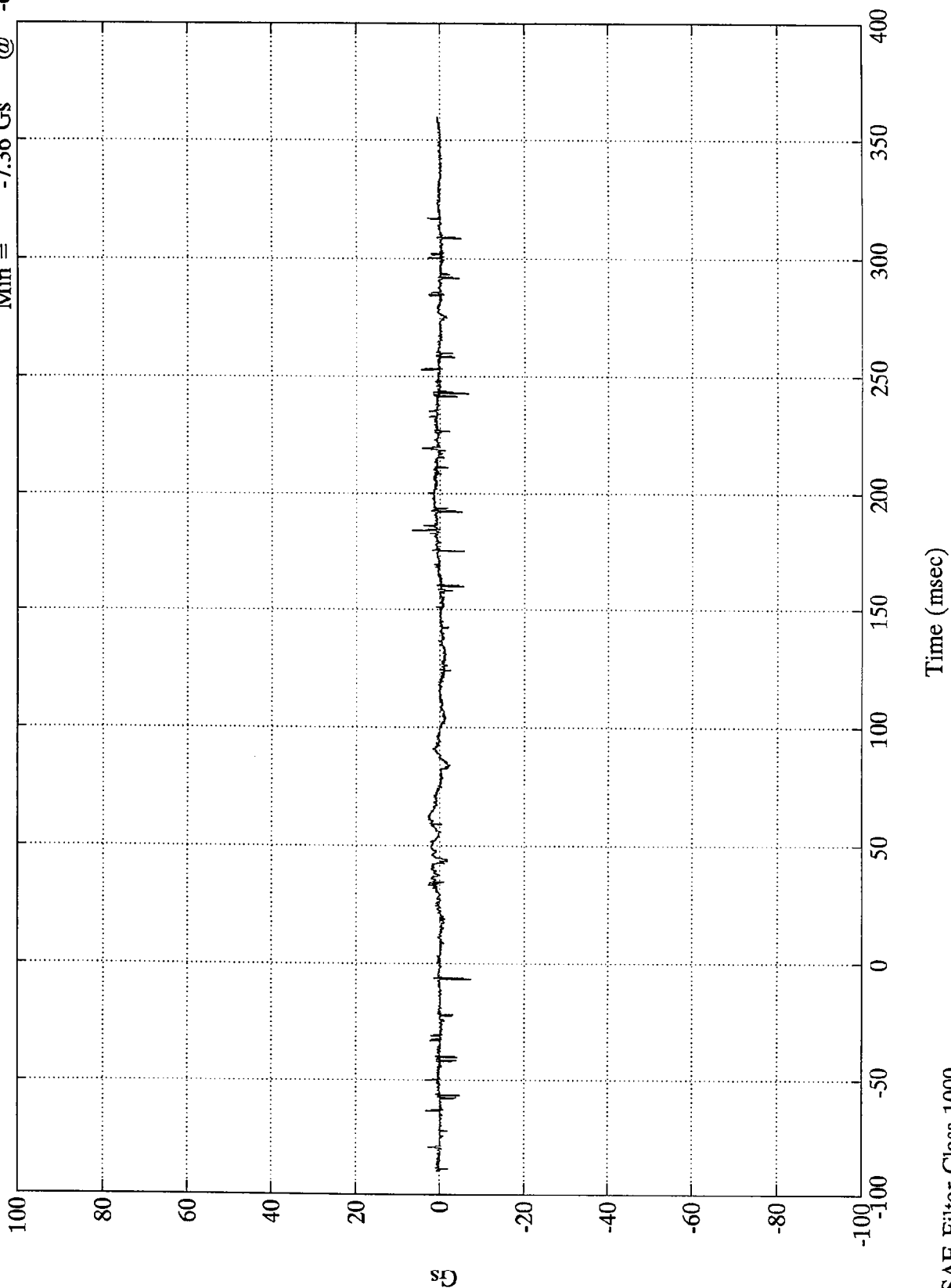
Pos. 1 Pelvic X

Max = 17.20 Gs @ 58.68 msec
Min = -3.87 Gs @ 142.32 msec



301 Rear 30 MPH-1995 Chevrolet Astro Van

Pos. 1 Pelvic Y
Max = 6.84 Gs @ 184.19 msec
Min = -7.36 Gs @ -6.36 msec

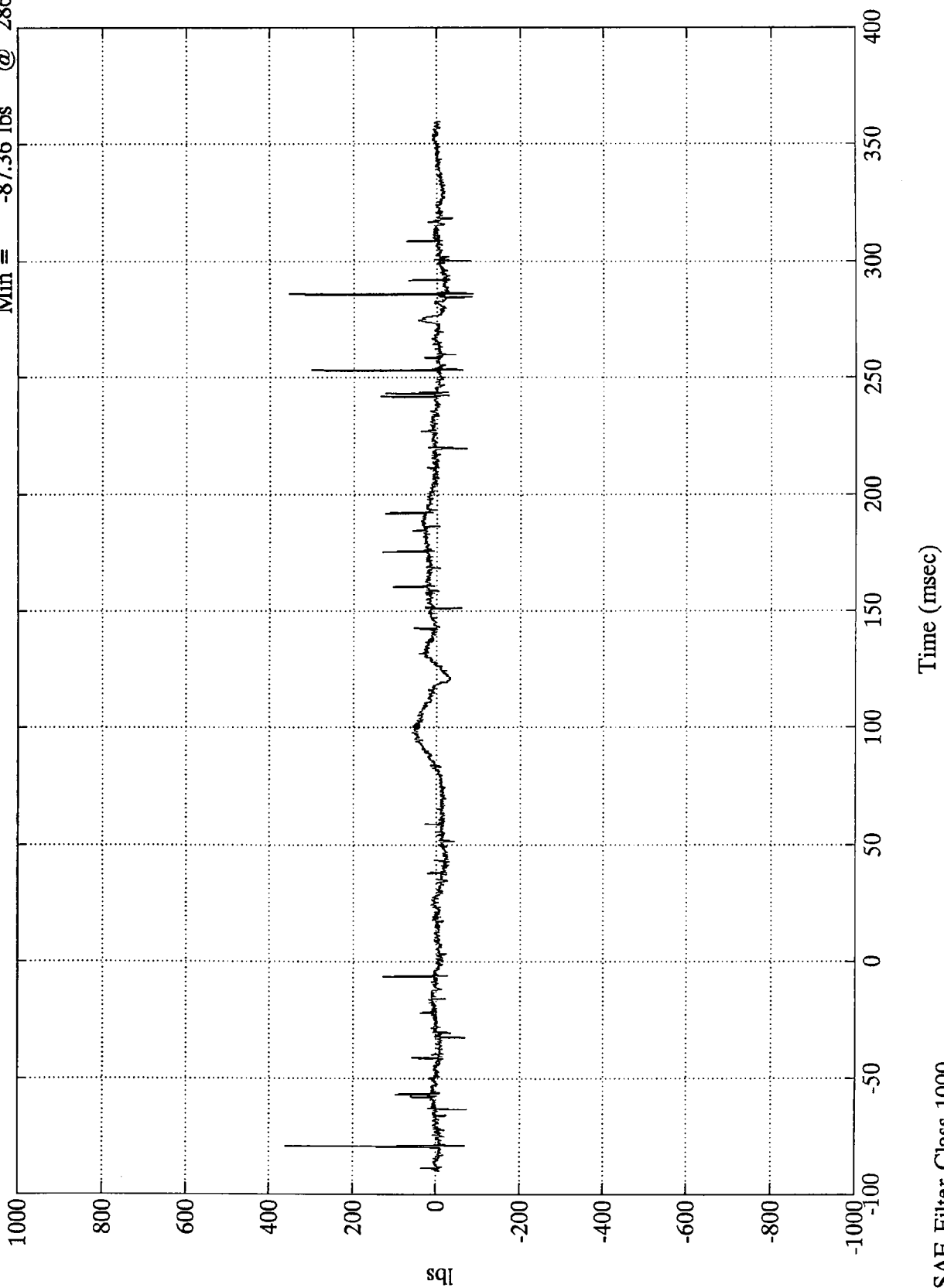


SAE Filter Class 1000

301 Rear 30 MPH-1995 Chevrolet Astro Van

Pos. 1 Upper Neck Fx

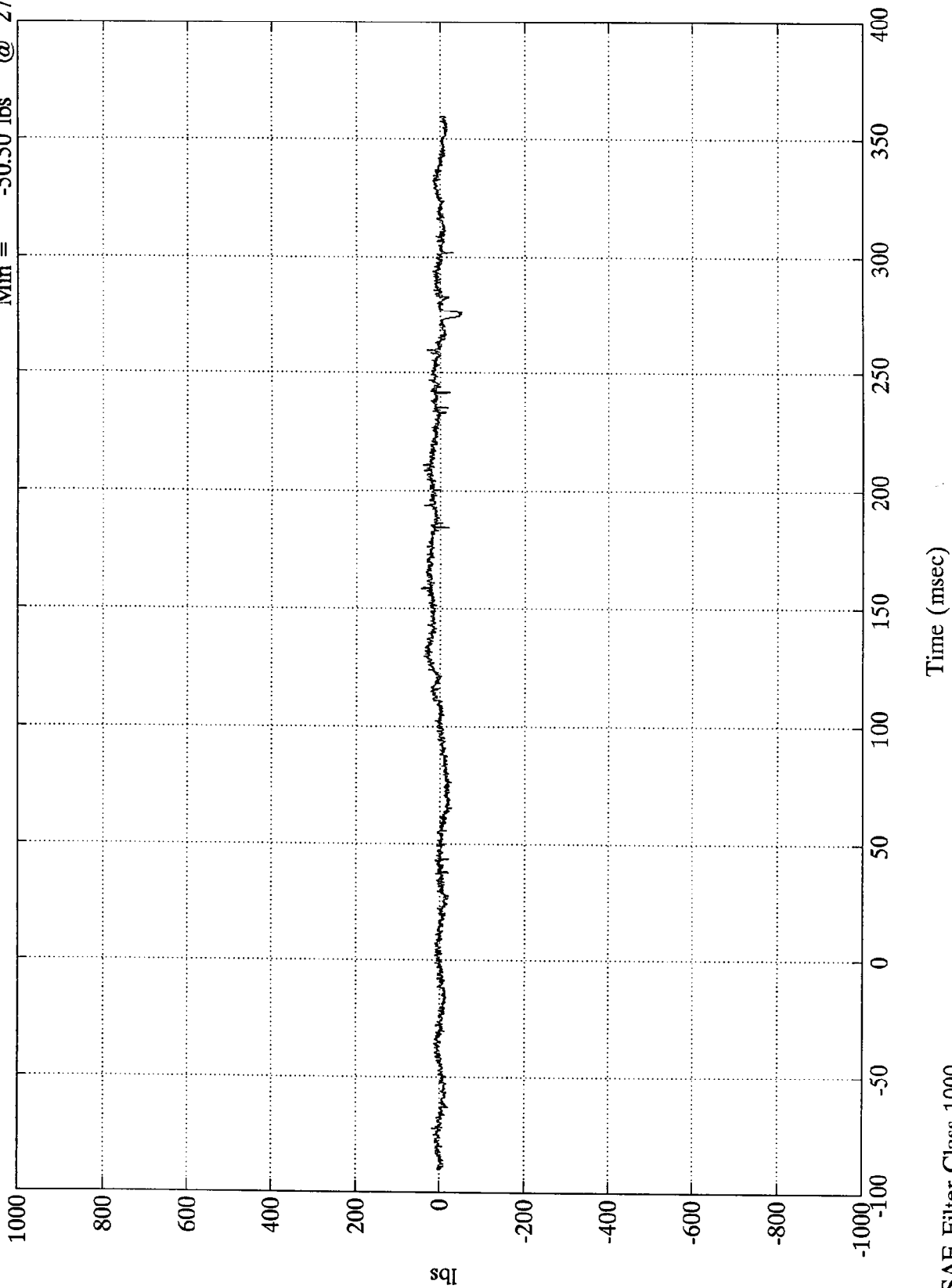
Max = 359.73 lbs @ -79.32 msec
Min = -87.36 lbs @ 286.32 msec



301 Rear 30 MPH-1995 Chevrolet Astro Van

Pos. 1 Upper Neck Fy

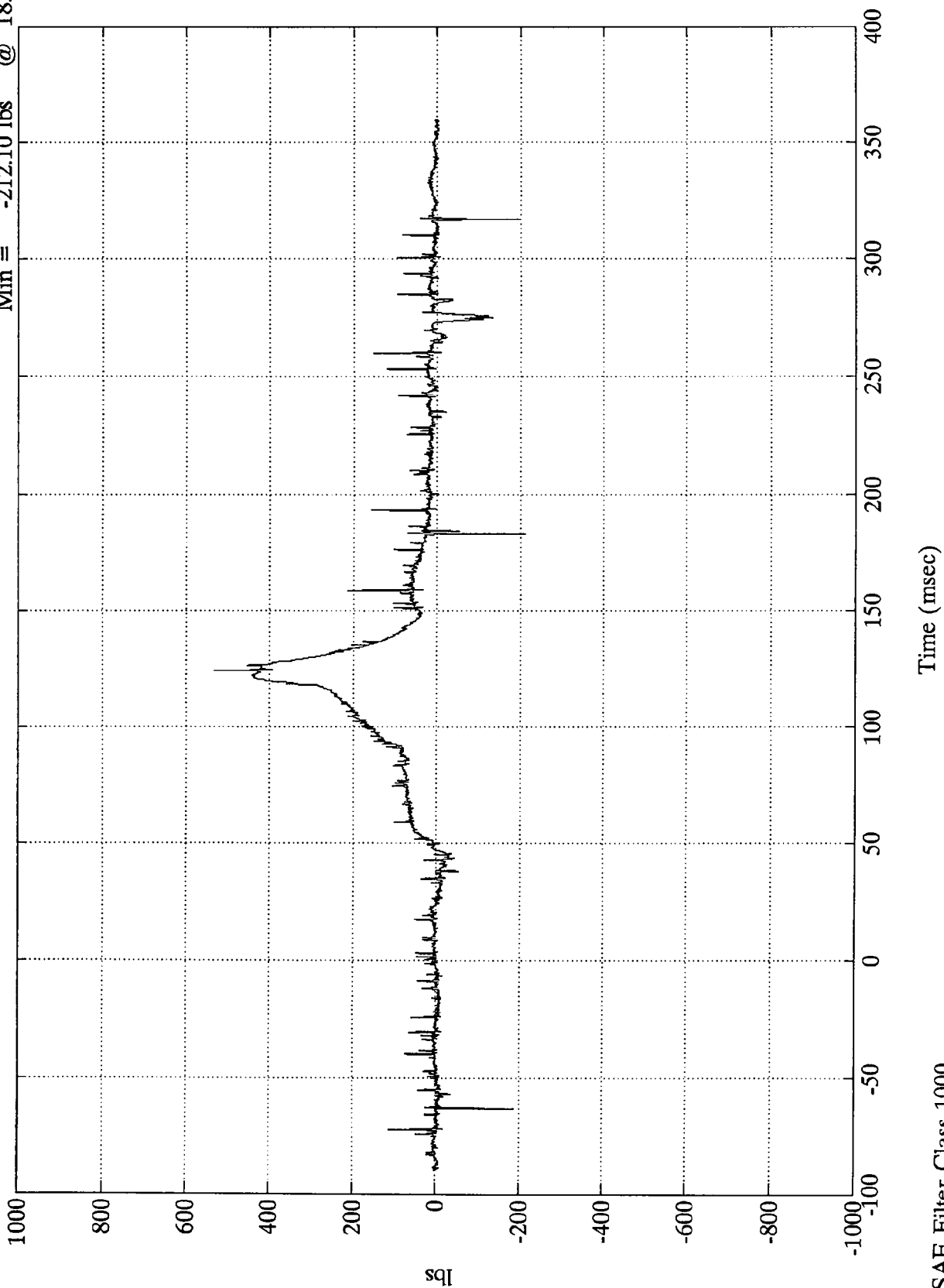
Max = 43.90 lbs @ 158.76 msec
Min = -50.50 lbs @ 275.88 msec



301 Rear 30 MPH-1995 Chevrolet Astro Van

Pos. 1 Upper Neck Fz

Max = 533.62 lbs @ 124.31 msec
Min = -212.10 lbs @ 183.00 msec

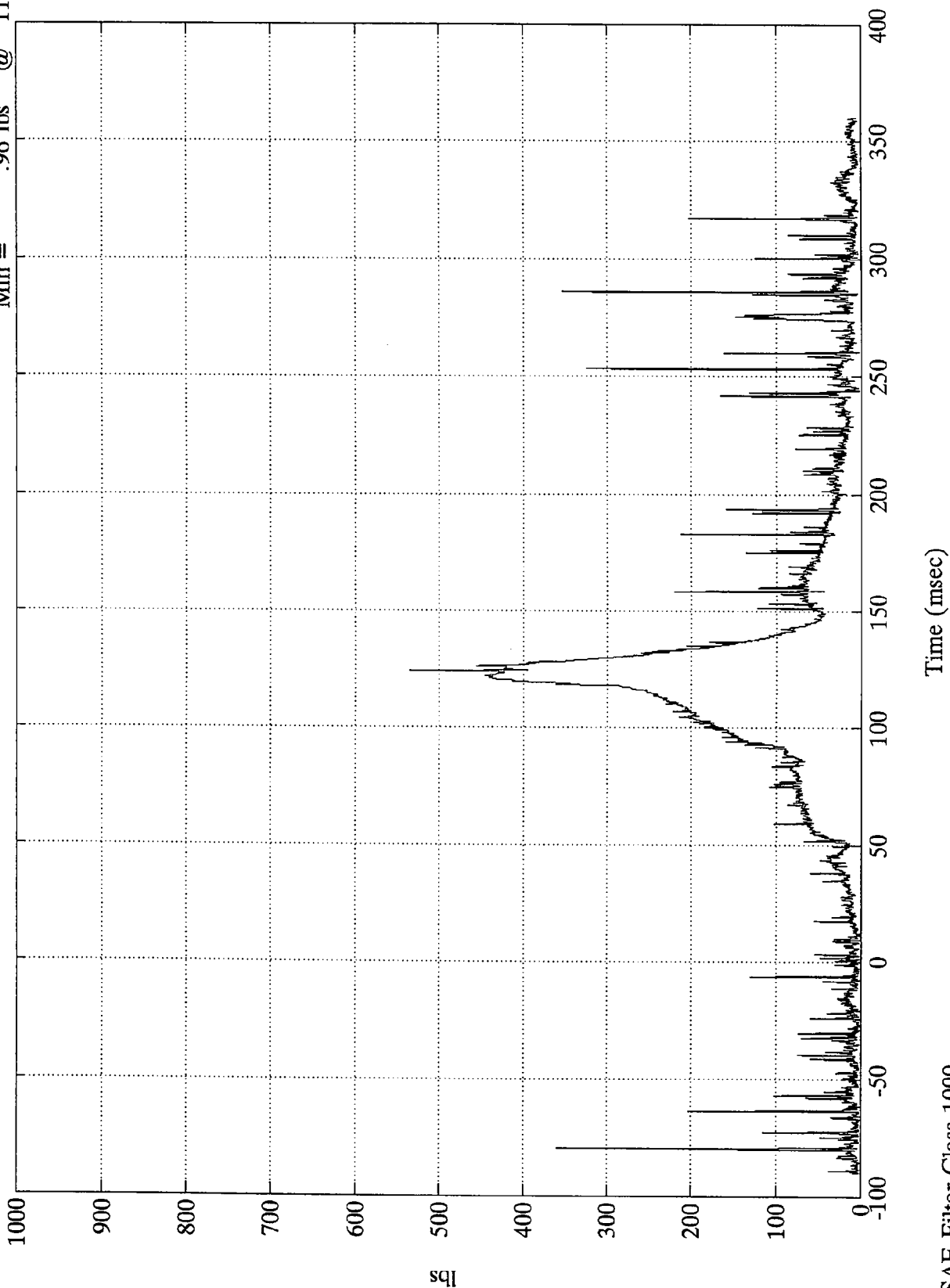


SAE Filter Class 1000

301 Rear 30 MPH-1995 Chevrolet Astro Van

Pos. 1 Neck Force Res.

Max = 534.43 lbs @ 124.31 msec
Min = .96 lbs @ 11.99 msec

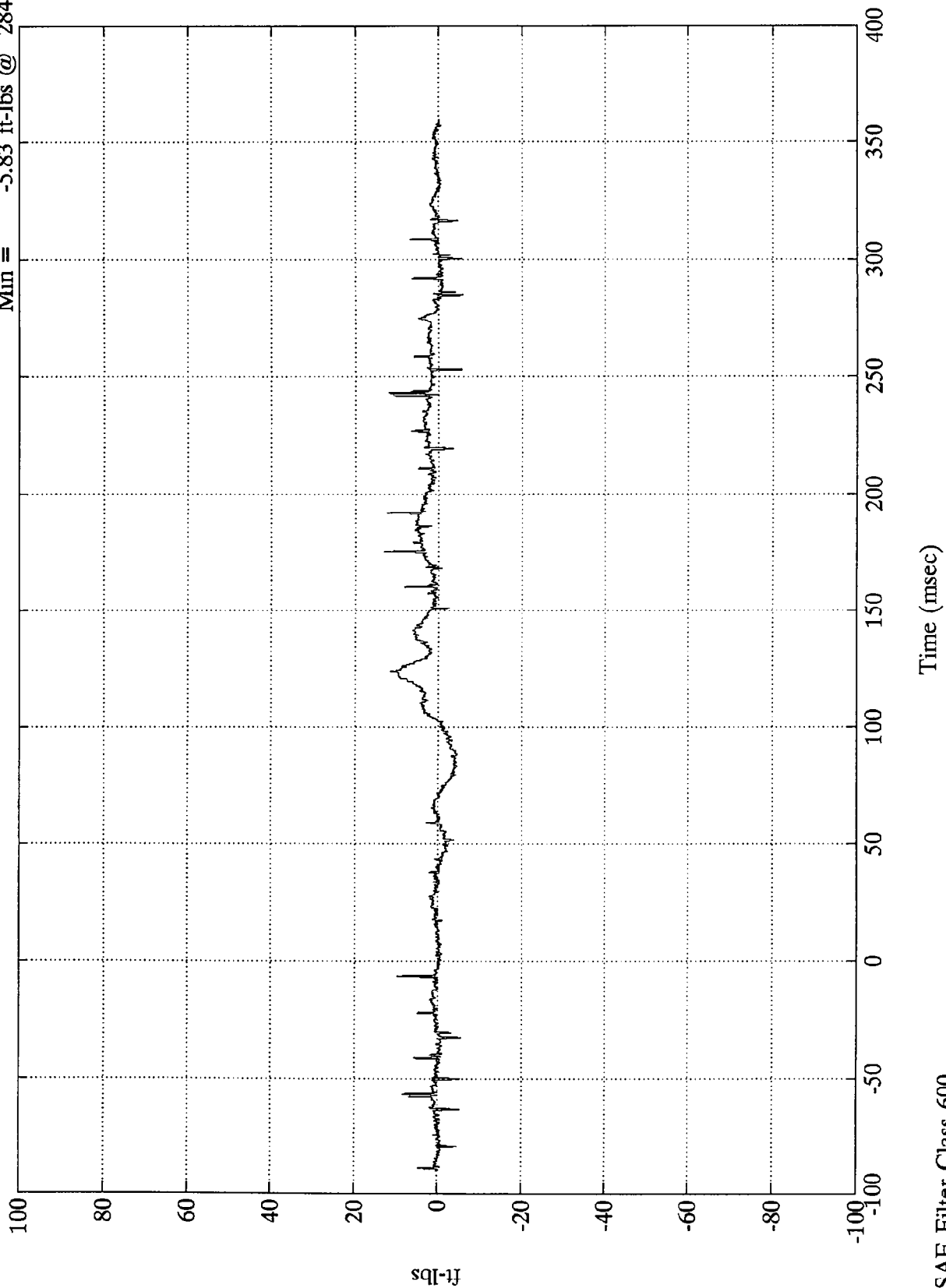


SAE Filter Class 1000

301 Rear 30 MPH-1995 Chevrolet Astro Van

Pos. 1 Upper Neck Mx

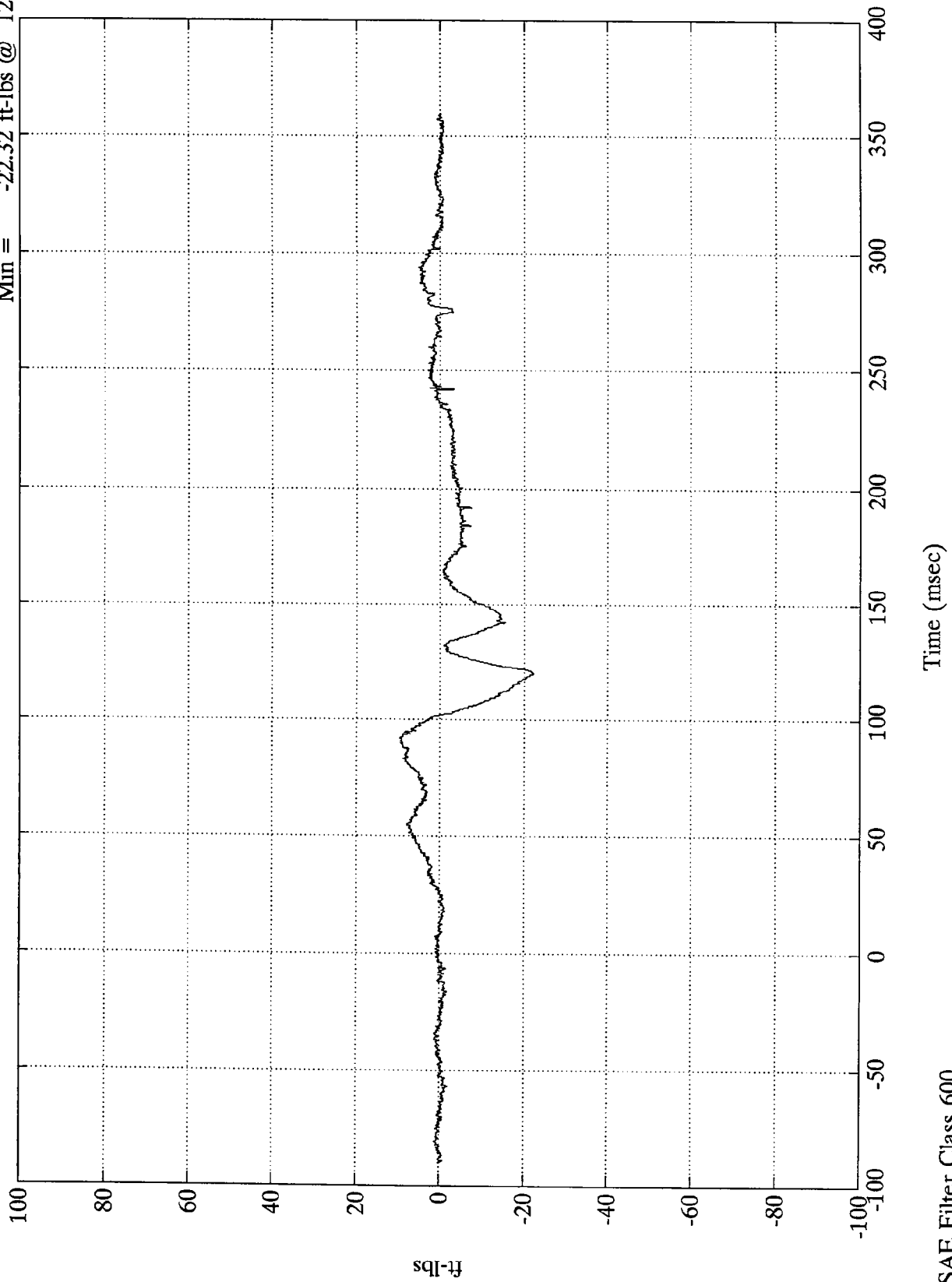
Max = 12.91 ft-lbs @ 175.31 msec
Min = -5.83 ft-lbs @ 284.76 msec



301 Rear 30 MPH-1995 Chevrolet Astro Van

Pos. 1 Upper Neck My

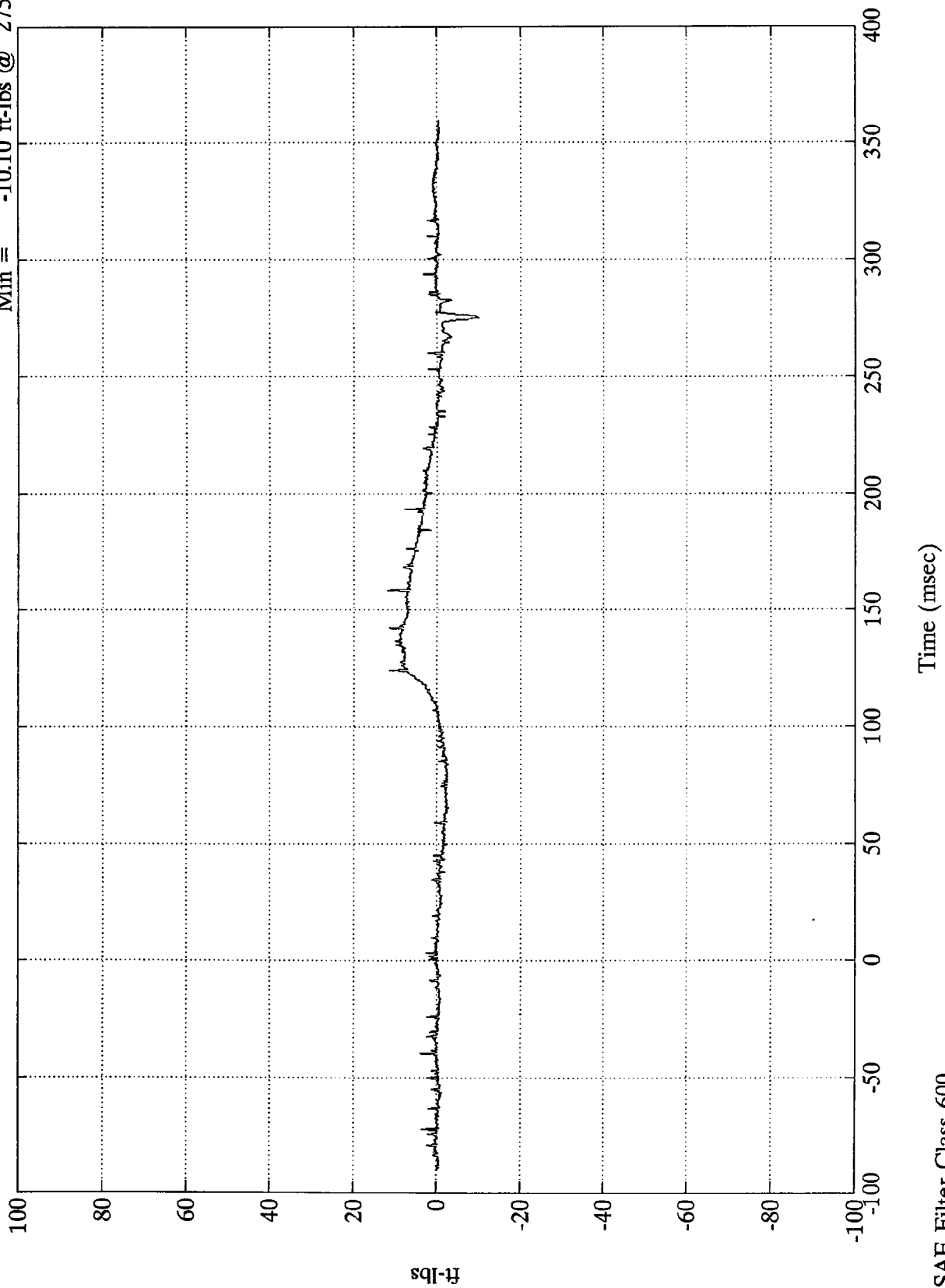
Max = 9.62 ft-lbs @ 92.04 msec
Min = -22.32 ft-lbs @ 120.12 msec



301 Rear 30 MPH-1995 Chevrolet Astro Van

Pos. 1 Upper Neck Mz

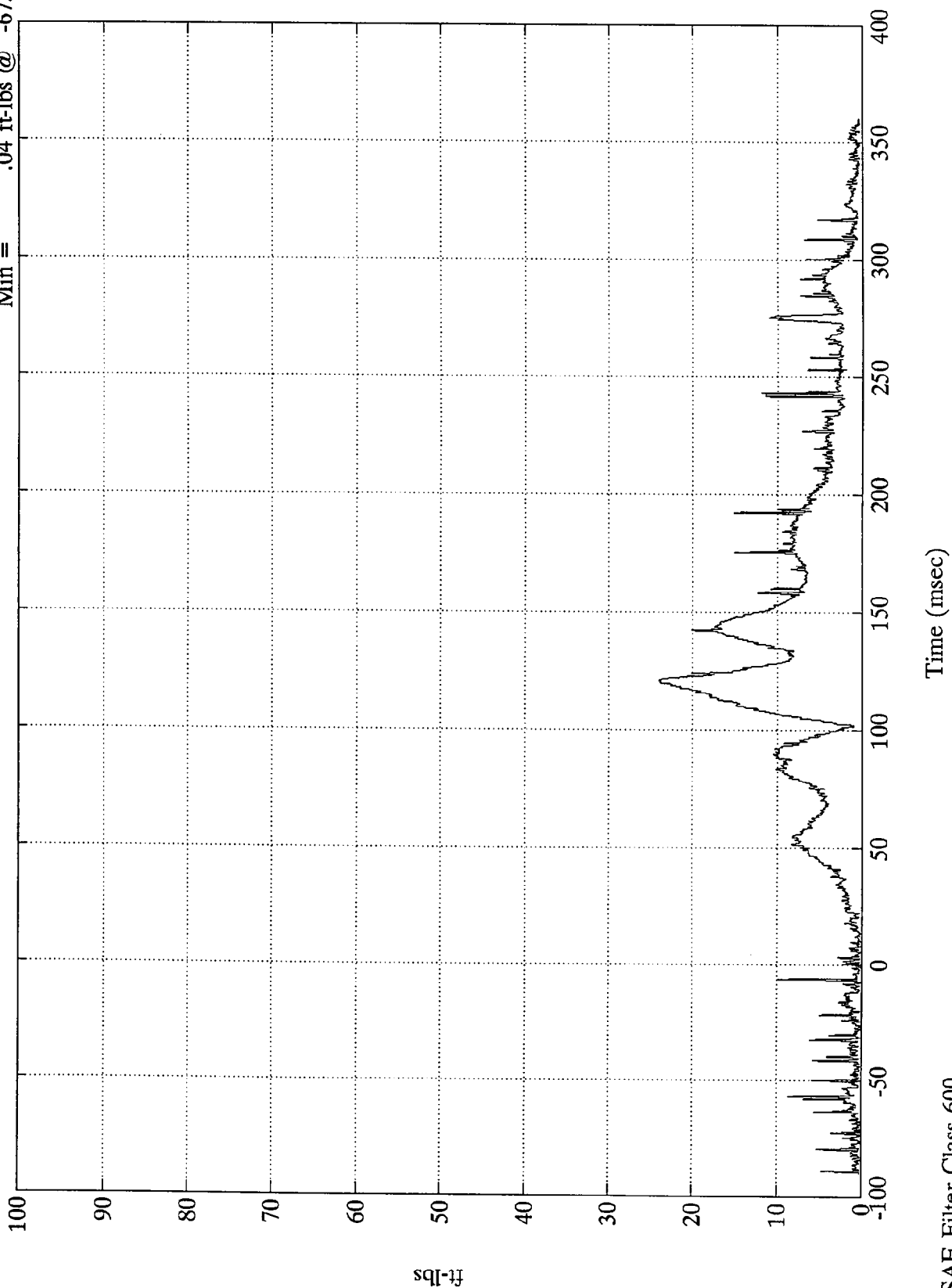
Max = 11.98 ft-lbs @ 158.76 msec
Min = -10.10 ft-lbs @ 275.27 msec



301 Rear 30 MPH-1995 Chevrolet Astro Van

Pos. 1 Neck Moment Res.

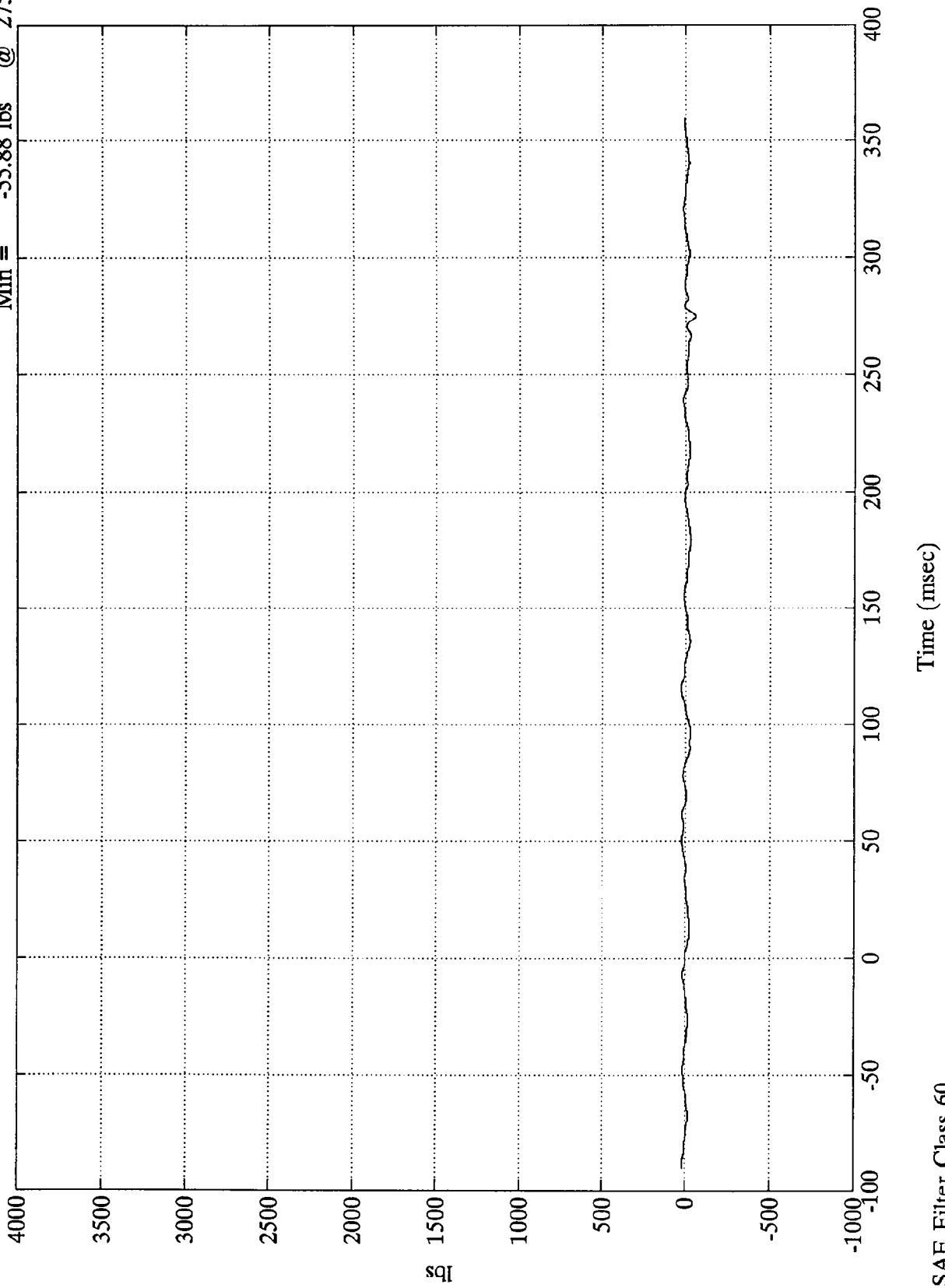
Max = 24.07 ft-lbs @ 121.20 msec
Min = .04 ft-lbs @ -67.56 msec



301 Rear 30 MPH-1995 Chevrolet Astro Van

Pos. 1 Lap Belt

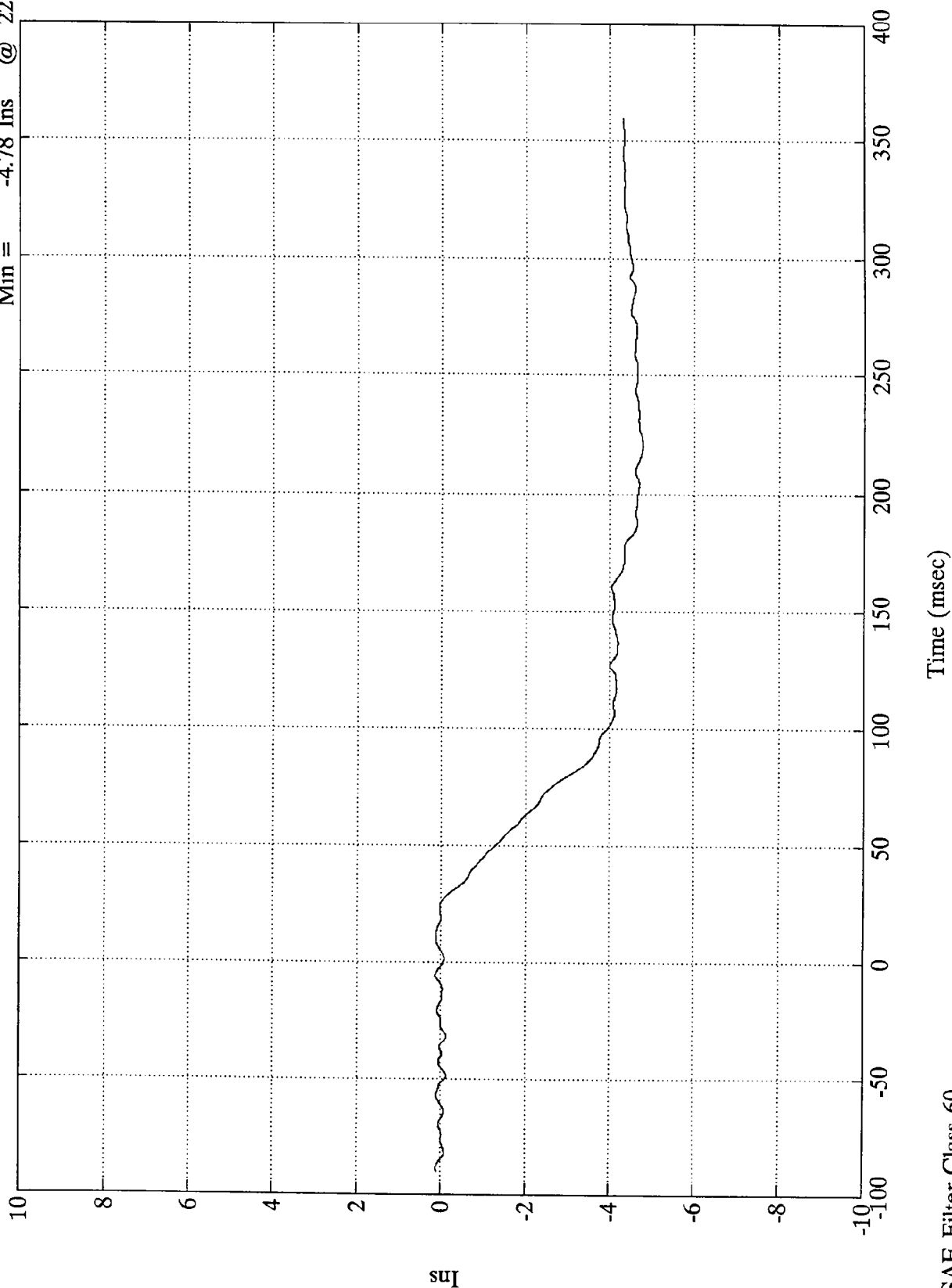
Max = 29.52 lbs @ 115.91 msec
Min = -55.88 lbs @ 275.04 msec



SAE Filter Class 60

301 Rear 30 MPH-1995 Chevrolet Astro Van

Pos. 1 Belt Spoolout
Max = .13 Ins @ -5.76 msec
Min = -4.78 Ins @ 220.80 msec



SAE Filter Class 60