

REPORT NO. KAR-99-14

V3029

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
NEW CAR ASSESSMENT PROGRAM
FRONTAL BARRIER IMPACT TEST

GENERAL MOTORS CORPORATION
1999 CHEVROLET ASTRO LS VAN
NHTSA NO. MX0103

PREPARED BY:
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9270 HOLLY ROAD
ADELANTO, CALIFORNIA 92301



FEBRUARY 27, 1999
FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
SAFETY PERFORMANCE STANDARDS
OFFICE OF CRASHWORTHINESS STANDARDS
MAIL CODE: NPS-10
400 SEVENTH STREET, SW, ROOM 5313
WASHINGTON, D.C. 20590

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-97-D-02007.

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Date of Acceptance

KAR99001-14

Technical Report Documentation Page

1. <i>Report No.</i> KAR-99-14	2. <i>Government Accession No.</i>	3. <i>Recipient's Catalog No.</i>																					
4. <i>Title and Subtitle</i> Final Report of New Car Assessment Program (NCAP) Frontal Barrier Impact Test Testing of a 1999 CHEVROLET ASTRO LS VAN PROJECT No. MX0103		5. <i>Report Date</i> FEBRUARY 27, 1999																					
		6. <i>Performing Organization Code</i> KARCO																					
7. <i>Author(s)</i> Mr. James E. Gorth, Project Engineer, KARCO Mr. Frank D. Richardson, Program Manager, KARCO		8. <i>Performing Organization Report No.</i> KAR99001-14																					
9. <i>Performing Organization Name and Address</i> KARCO Engineering 9270 Holly Road Adelanto, California 92301		10. <i>Work unit No.</i>																					
		11. <i>Contract or Grant No.</i> DTNH22-97-D-02007																					
12. <i>Sponsoring Agency Name and Address</i> U.S. Department of Transportation National Highway Traffic Safety Administration Safety Performance Standards Office of Crashworthiness Standards Mail Code: NPS-10 400 Seventh Street, SW, Room 5313 Washington, D.C. 20590		13. <i>Type of report and Period Covered</i> Final Report-Option Year 2																					
		14. <i>Sponsoring Agency Code</i> DOT/NHTSA/NRM/OCS																					
15. <i>Supplementary Notes</i>																							
16. <i>Abstract</i> A 35 mph (56.3 km/h) frontal barrier impact test was conducted on a 1999 CHEVROLET ASTRO LS VAN at KARCO Engineering on February 12, 1999. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301 and footwell intrusion performance. The impact velocity was 56.4 km/h. The ambient temperature at the barrier face at the time of impact was 8.88°C. The vehicle's maximum post-test static crush was 561 mm, located at the vehicle centerline. The test vehicle was equipped with a 3-point continuous belt system and second generation supplemental airbags at both frontal outboard-seating positions. With respect to FMVSS 208 "Occupant Crash Protection – Injury Criteria" the occupant injury response data summary is as follows: <table border="1"> <thead> <tr> <th><u>Injury Criteria</u></th> <th><u>Threshold Value</u></th> <th><u>Driver Dummy</u></th> <th><u>Passenger Dummy</u></th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC)</td> <td>1000</td> <td>528.6</td> <td>301.0</td> </tr> <tr> <td>Chest Resultant Peak 3 msec clip</td> <td>60 G's</td> <td>65.4</td> <td>51.4</td> </tr> <tr> <td>Left Femur Force</td> <td>10009 N</td> <td>-8802.6</td> <td>-7122.2</td> </tr> <tr> <td>Right Femur Force</td> <td>10009 N</td> <td>- 4714.4</td> <td>-6196.4</td> </tr> </tbody> </table>				<u>Injury Criteria</u>	<u>Threshold Value</u>	<u>Driver Dummy</u>	<u>Passenger Dummy</u>	Head Injury Criteria (HIC)	1000	528.6	301.0	Chest Resultant Peak 3 msec clip	60 G's	65.4	51.4	Left Femur Force	10009 N	-8802.6	-7122.2	Right Femur Force	10009 N	- 4714.4	-6196.4
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17. <i>Key Words</i> 56.3 km/h NCAP Frontal Barrier Impact Test 1999 CHEVROLET ASTRO LS VAN NHSTA No. MX0103		18. <i>Distribution Statement</i> Copies of this report are available from: Technical Reference Division National Highway Traffic Safety Admin. Room 5108, Nassif Building 400 7th St., SW Washington, DC 20590																					
19. <i>Security Classification (of this report)</i> UNCLASSIFIED	20. <i>Security Classification (of this page)</i> UNCLASSIFIED	21. <i>No. of Pages</i> 336	22. <i>Price</i>																				

Form DOT F1700.7 (8-72)

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SECTION 1

PURPOSE, TEST PROCEDURE AND SUMMARY OF TEST MX0103

1.1 PURPOSE

This 35 mph (56.3 km/h) frontal barrier impact test is part of the FY' 99 New Car Assessment Program (NCAP) frontal barrier crash worthiness evaluation program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract Number DTNH22-97-D-02007. The purpose of this test was to obtain vehicle crashworthiness, occupant restraint system performance data and lower leg data for frontal barrier impacts. The velocity used in this test was in excess of the current 30 mph (48 km/h) FMVSS 208/212/219/301 requirements.

1.2 TEST PROCEDURE

This 56.3 km/h frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards (OCS) New Car Assessment Program (NCAP) Laboratory Indicant Test Procedure, dated 01 October 1996 and corresponding KARCO Engineering Test Procedure KTP-001, dated October 18, 1996. Data was obtained indicant of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Retention"; FMVSS 219, "Windshield Zone Intrusion (Partial)"; and FMVSS 301 "Fuel System Integrity" performance. Procedures for receiving, inspection testing and reporting of test results are described in the test procedures and are not repeated in this report.

The test was conducted at KARCO Engineering on February 12, 1999 at a speed of 56.4 km/h. The test vehicle was instrumented with eight (8) accelerometers to measure longitudinal axis accelerations. The driver and passenger's restraint systems were instrumented with four (4) seat belt load cells to measure lap and shoulder belt tension. The specified impact velocity range was 55.5 to 57.1 km/h. The frontal barrier impact event was documented by one (1) real-time panning motion picture camera and sixteen (16) high-speed motion picture cameras. The pre- and post-test conditions were recorded by one (1) real-time motion picture camera. Camera locations and pertinent camera information is documented in the data sheets. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The test vehicle contained two (2) part 572E 50th percentile adult male anthropomorphic test devices (ATDs). Both ATDs were instrumented with head, chest and, pelvic tri-axial accelerometers, left/right femur load cells, left/right lower leg sensors and left/right foot accelerometers. In addition, chest displacement and neck six-axis load and moment sensors were utilized. The ATDs were positioned in the front outboard seating positions according to the dummy placement procedures specified in the Laboratory Indicant Test Procedure. Ninety-six channels of data were recorded with a PC based (TDAS) on-board data acquisition system. The data was digitally sampled at 10,000 samples per second and processed per section IP11 of the Laboratory Indicant Test Procedure.

The Driver ATD (serial No. 35) and the right-front passenger ATD (serial No.34) were re-calibrated one test prior to this NCAP test. Injury criteria were not exceeded by either ATD during this frontal barrier impact test.

1.3 SUMMARY OF FRONTAL BARRIER IMPACT TEST

An immovable barrier was impacted by a 1999 CHEVROLET ASTRO LS VAN at a velocity of 56.4 km/h. The test weight, with two (2) 50th percentile male ATDs, was 2301 kg. Twenty four (24) load cell barrier data channels were obtained in conducting the February 12, 1999 NCAP test. The test vehicle was equipped with a longitudinally mounted 4.3 liter, 6 cyl. engine and a 4-speed automatic transmission.

The driver's Head Injury Criteria (HIC) was 528.6, the maximum chest deceleration over three (3) milliseconds was 65.4 g and the left and right femur loads were -8802.6 and -4714.4 Newtons, respectively. Chest deflection for the driver ATD was -16.8 mm. The driver ATD head contacted the airbag and headrest, its chest and abdomen contacted the airbag, the left and right knees contacted the knee bolster.

The right front passenger's HIC was 301.0, maximum chest deceleration over three (3) milliseconds was 51.4 g and the left and right femur loads were -7122.2 and -6196.4 Newtons respectively. Chest deflection for the passenger ATD was -24.6 mm. The passenger ATD head contacted the airbag, and headrest, the chest and abdomen contacted the airbag and both knees contacted the glove box.

Seat belt spoolout, measured by on-board pullout potentiometers was 42.7 mm for the driver ATD and 45.3 mm for the passenger ATD. Shoulder belt stretch was 0.0 mm/cm for the driver ATD and 0.0 mm/cm for the passenger ATD. No data collected on belt stretch

There was 100 percent windshield retention (minimum 50 percent required for passive restraint systems), no intrusion into the protected or unprotected zone of the windshield, and no Stoddard solvent leakage occurred after impact or during any phase of the rollover.

The test vehicle sustained a maximum static crush of 561 mm located to the left of the vehicle centerline. Both the driver side doors and the passenger side doors opened without the aid of tools.

1.4 GENERAL COMMENTS

The 1999 CHEVROLET ASTRO LS VAN passed the requirements of FMVSS 208, FMVSS 212, FMVSS 219 and FMVSS 301-75. Data pertaining to these standards are presented in the data sheets.

The vehicle, occupant, camera and measurement data are presented in Section 2. Appendix A contains the still photograph prints. Appendix B contains the dummy, vehicle and response data traces. Appendix C contains Load Cell Barrier information. Appendix D contains the instrumentation data channel assignments. Appendix E contains the dummy calibration data and Appendix F contains the owner's manual instructions for the occupant restraint systems.

SECTION 2.

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99

CONVERSION FACTORS USED IN THIS REPORT:

2.2 pounds (lb.)	=	1 kilogram (kg)
1 mile (mi.)	=	1.609 kilometer (km)
1 gallon (gal.)	=	3.785 liters (L)
1 pound/square inch (psi)	=	7000 Pascal (7 kPa)

DATA SHEET NO. 1

CRASH TEST SUMMARY

Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99

VEHICLE REBOUND

Measurements in mm	Left	Center	Right
Vehicle Rebound	505	450	445

VEHICLE STATIC CRUSH

Measurements in mm	Left	Center	Right
Pre-test Measurements	4559	4813	4559
Post-test Measurements	4156	4252	4223
Static Crush	-403	-561	-336
Average	-433		

DOOR OPENING AND SEAT TRACK INFORMATION

	Driver	Passenger
Door Opening (Front)	OPENED	OPENED
Door Opening (Rear)	N/A	OPENED
Seat Track Shift (mm of shift)	NONE	NONE
Seat Back Failure	NONE	NONE

DUMMY INFORMATION

	Driver	Passenger
Dummy Type/No.	50% Male Hybrid III (S/N 35)	50% Male Hybrid III (S/N 34)
Data Channels	44	44
Visible Contact Points		
Head	AIR BAG/HEADREST	AIR BAG/HEADREST
Chest	AIR BAG	AIRBAG
Abdomen	AIRBAG	AIRBAG
Left Knee	KNEE BOLSTER	GLOVE BOX
Right Knee	KNEE BOLSTER	GLOVE BOX

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99

TEST VEHICLE INFORMATION			
Manufacturer	GENERAL MOTORS CORPORATION	VIN	1GNDM19W4XB113586
Manufacturing Date	10/98	Delivery Date	2/5/99
Dealer	CREST CHEVROLET	NHTSA NO.	MX0103
Odometer Reading	65.0 mi	Fuel Type	UNLEADED
Engine Displacement	4.3 Liters	Cylinders	6
Transmission	AUTOMATIC	Final Drive	REAR
Engine Placement	LONGITUDINAL	Color	WHITE
Tire Press./Max. Cap. Front	245 kpa	Cold Tire Press. Front	245 kpa
Tire Press./Max. Cap. Rear	245 kpa	Cold Tire Press. Rear	245 kpa
Recommend Tire Size	P215/75/R15	Type of Spare	TEMPORARY T145/80/D16
Tire Size on Vehicle	P215/75/R15	Manufacturer	UNIROYAL
GVWR	2699 kg	Cargo Capacity	136 kg
GAWR Front	1270 kg	GAWR Rear	1429 kg
Air Conditioning	YES	Power Steering	YES
Power Brakes	YES	AM/FM/Cassette	YES
Disc Brakes (Front)	YES	Disc Brakes (Rear)	NO
Power Windows	YES	Tilt Steering	YES
Anti-lock Brakes (ABS)	YES	Power Seats	NO
Driver Airbag	YES	Passenger Airbag	YES

VEHICLE CAPACITY DATA:TYPE OF FRONT SEATS

BUCKET SEATS

TOTAL NUMBER OF OCCUPANTS 8

OCCUPANTS x 68 kg. 544 kg

WEIGHT OF VEHICLE AS RECEIVED AT KARCO (with maximum fluids) 2026 kg

Data Sheet No. 2... (Continued)

VEHICLE CAPACITY DATA: TYPE OF FRONT SEATS BUCKET SEATS

TOTAL NUMBER OF OCCUPANTS 8 **OCCUPANTS x 68 kg.** 544 kg

WEIGHT OF VEHICLE AS RECEIVED AT KARCO (with maximum fluids) 2026 kg

VEHICLE CAPACITY WEIGHT (kg):

Vehicle Capacity Weight	680 kg
--------------------------------	--------

Occupant Weight 544 kg

Rated Cargo/Luggage Weight (RCLW) 136 kg*

	FRONT	REAR	TOTAL
Right	533	484	917
Left	536	473	1009
Total	1069	957	2026
Percent of Total	52.7	47.3	100%

CALCULATION OF TEST

TARGET WEIGHT (kg):

Total Delivered Weight 2026 kg

RCLW	136 kg
------	--------

Weight of 2 P572 ATDs	152 kg
-----------------------	--------

TARGET TEST WEIGHT 2314 kg

TEST WEIGHT OF VEHICLE WITH 2 ATDs AND BALLAST

	FRONT	REAR	TOTAL
Right	555	570	1125
Left	579	597	1176
Total	1134	1167	2301
Percent of Total	49.2	50.8	100%

Weight of Ballast secured in cargo area: 127 kg Does not include cameras, instrumentation, and brake abort system.

Vehicle Components Removed For Weight Reduction:

Side mirrors, jack, tools, spare tire and paneling.

TEST VEHICLE ATTITUDE (mm)

	LF	RF	LR	RR
As Delivered	767	770	786	785
As Tested	735	750	740	756

Vehicle Wheelbase: 2815 mm

FUEL SYSTEM DATA:

Fuel System Capacity From Owner's Manual = 94.6 liters

Usable Capacity Figure Furnished by COTR = 94.6 liters

Test Volume Range (92 to 94% of Usable Capacity) = 87.0 to 88.9 liters

ACTUAL TEST VOLUME = 88.0 liters (With entire fuel system filled)

Test Fluid Type = Stoddard Solvent

Specific Gravity = 0.764

Kinematic Viscosity = as per ASTM Standard D484-71

Color = Red

Type of Fuel Pump = Electric X Mechanical

Does electric pump operate with ignition switch "ON" & engine "OFF"? Yes X No

DETAILS OF FUEL SYSTEM: Key operated w/automatic shut off after a few seconds.

DATA SHEET NO. 3

POST IMPACT DATA

Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99

REQUIRED IMPACT VELOCITY RANGE: 55.51 km/h to 57.11 km/h

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

Trap No. 1 = 56.4 km/h Trap No. 2 = 56.5 km/h

Distance from vehicle to barrier - -

A. entering trap = 1524 mm

B. leaving trap = 305 mm

VEHICLE STATIC CRUSH: (for Frontal and Rear Impacts Only)

Vehicle Length	Left	Center	Right
Pre-test Measurements (mm)	4559	4813	4559
Post-test Measurements (mm)	4156	4252	4223
Static Crush (mm)	-403	-561	-336

VEHICLE REBOUND: (from rigid barrier with rotational movement offsets only)

Measurements in mm	Left Front	Right Front	Left Rear	Right Rear
Vehicle Rebound X axis	N/A	N/A	N/A	N/A
Vehicle Rebound Y axis	N/A	N/A	N/A	N/A
Average X axis	N/A			
Average Y axis	N/A			

DATA SHEET NO. 4

TEST VEHICLE INFORMATION

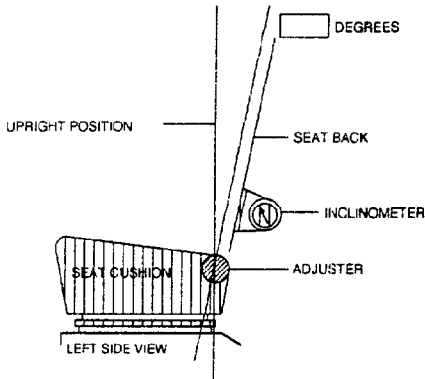
Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99

1. NOMINAL DESIGN RIDING POSITION -



FRONT SEAT ASSEMBLY

For adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent if applicable. Indicate, if applicable, how the detents are numbered (Is the first detent "0" or "1"?).

Measurement Instructions: A special application tool with pointed probes was inserted through the fabric to make contact with the rigid portion of the lower seat frame assembly approximately 13 inches above the pivot point of the seat back. The inclinometer was placed against the flat surface of the tool and the seat back angle was measured directly from the dial face. For reference purposes the first detent from the front of the seat was identified as number "1".

Seat back angle for driver's seat = 22.5° w/seated dummy, taken at seat back cushion.

Measurement Instructions: A special application tool with pointed probes was inserted through the fabric to make contact with the rigid portion of the lower seat frame assembly approximately 13 inches above the pivot point of the seat back. The inclinometer was placed against the flat surface of the tool and the seat back angle was measured directly from the dial face. For reference purposes the first detent from the front of the seat was identified as number "1".

Seat back angle for passenger's seat = 22.5° w/seated dummy, taken at seat back cushion.

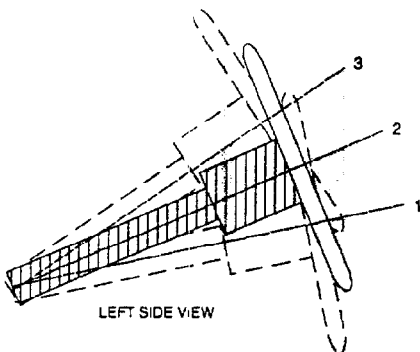
2. SEAT FORE & AFT POSITIONS:

Provide instructions for positioning the driver and front outboard passenger seat(s) in the center of fore and aft travel. For example, provide information to locate the detent in which the seat track is to be locked.

Positioning of the driver's seat: 10 seating positions, set to 6th detent from the front.

Positioning of the passenger's seat (if applicable): 7 seating positions, set to 4th detent from the front.

3. STEERING COLUMN ADJUSTMENTS:



STEERING COLUMN ASSEMBLY

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine the geometric center.

Operational Instructions:

Position No. 1 is at 11°

Position No. 2 is at 21.5°

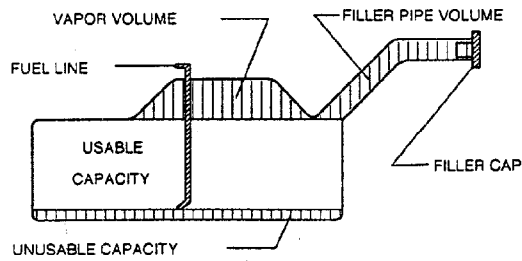
Position No. 3 is at 37°

4. SEAT BELT UPPER ANCHORAGE:

5 Positions, set at the mid position #3.

DATA SHEET NO. 4 (continued)

5. FUEL TANK CAPACITY DATA



5.1 A. "Usable Capacity" of standard equipment fuel tank = 94.6 liters.

B. "Usable Capacity" of optional equipment fuel tank = N/A liters.

C. "Usable Capacity" of vehicle(s) used for certification testing to requirements of FMVSS 301 = 87.0 to 88.9 liters.

VEHICLE FUEL TANK ASSEMBLY

Operational Instructions:

5.2 Amount of Stoddard solvent added to vehicle(s) used for certification test(s) = 88.0 liters

5.3 Is vehicle equipped with electric fuel pump?

Yes X No

If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.
Key operated w/automatic shut off after a few seconds.

DATA SHEET NO. 5

DUMMY POSITIONING IN VEHICLE

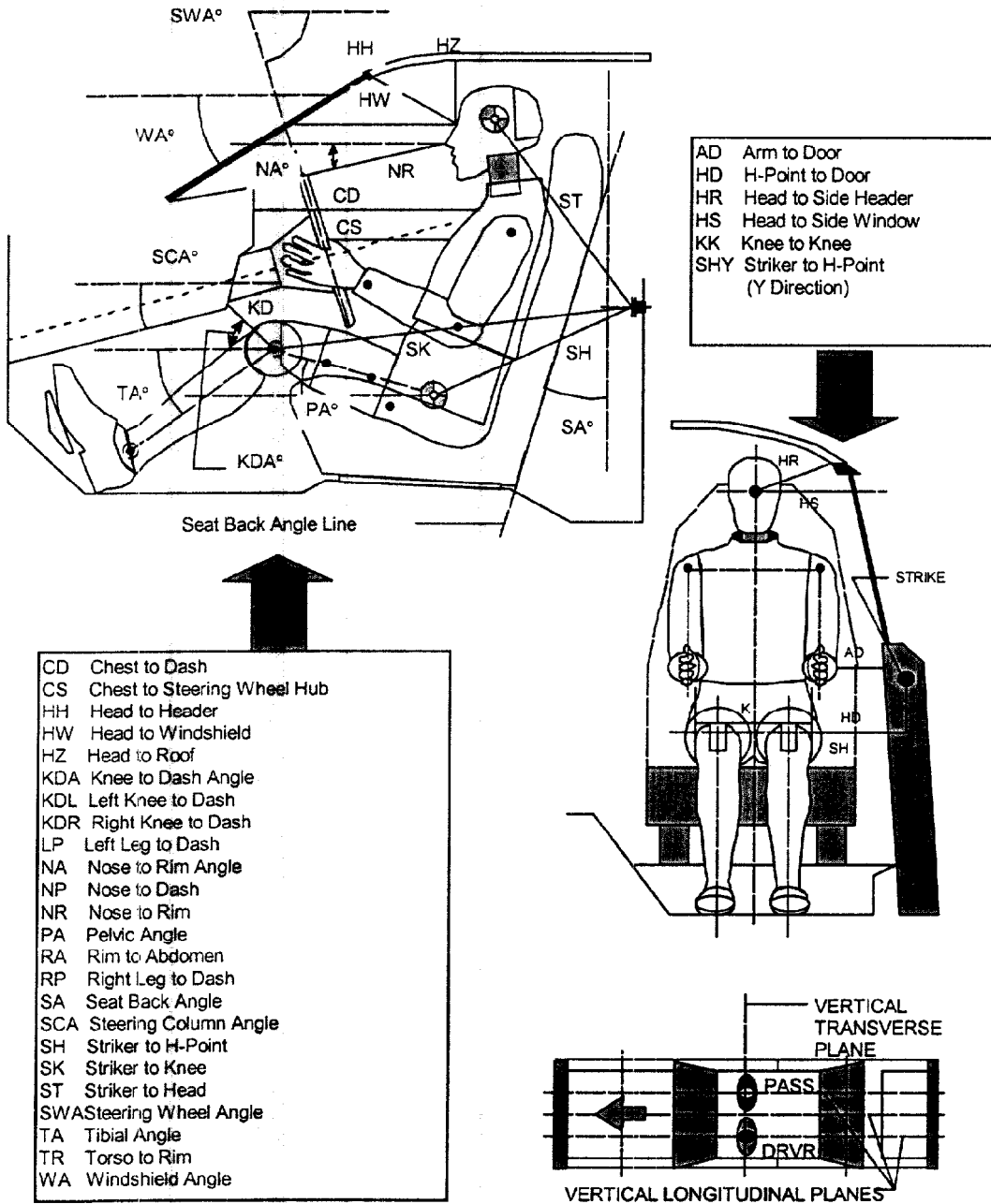
Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS



DATA SHEET NO. 5...(continued)

DUMMY POSITIONING IN VEHICLE

FRONT SEAT MEASUREMENT TABLE

	DRIVER (Serial No. <u>35</u>)		PASS. (Serial No. <u>34</u>)	
	DISTANCE (mm)	ANGLE (°)	DISTANCE (mm)	ANGLE (°)
WA°		42		
SWA°		68.5		
SCA°		26		
SA°		22.5		22.5
HZ	215	90	195	90
HH	450	0	480	0
HW	610	0	605	0
HR	315		287	
NR	370	0		
CD	545		450	
CS	315	0		
RA	195	0		
KDL	175	45	175	
KDR	180		165	30
PA°		22		24
TA°		47		60
KK	220		200	
ST	655	70	625	10
SH	290	8	260	8
SHY	236		237	
HS	355		310	
HD	140		140	
AD	100		25	

DATA SHEET NO. 6

SEAT BELT POSITIONING DATA

Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

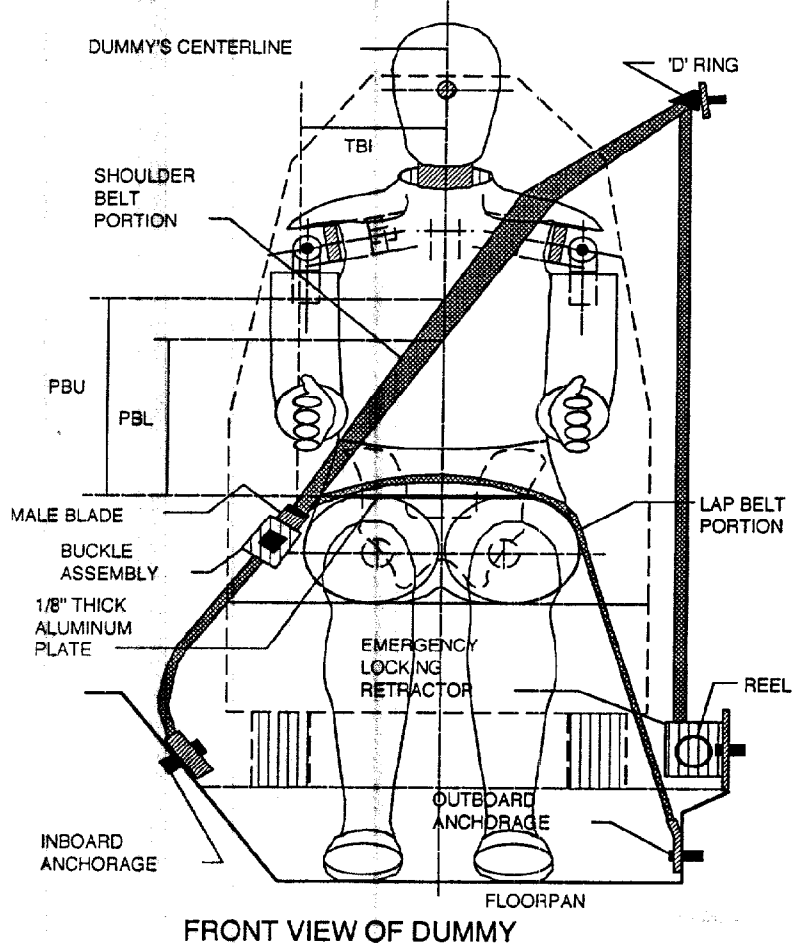
Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99

SEAT BELT PLACEMENT MEASUREMENTS

Measurement Description	Units	Driver	Passenger
TCI - Dummy centerline to shoulder bolt	mm	210	210
PBU - Top surface of reference to belt upper edge	mm	315	315
PBL - Top surface of reference to belt lower edge	mm	250	240
Lap Belt tension	Newtons	10	10
Shoulder Belt tension	N/A	Retractor	Retractor

SEAT BELT POSITIONING DATA



DATA SHEET NO. 7 - VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

TEST VEHICLE: 1999 CHEVROLET ASTRO LS VAN NHTSA No.: MX0103
 TEST PROGRAM: 1999 NHTSA 35 MPH NCAP TEST DATE: 2/12/99

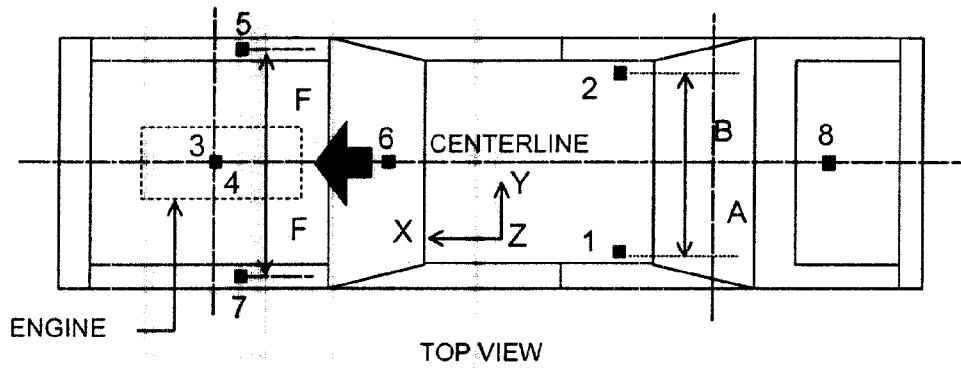
VEHICLE X-AXIS ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)			Peak Values				
		X	Y	Z	Units	Max	Time	Min	Time
1	Left Rear X-Member (Pri.)	2542	-653	605	G's	4.0	121.1	-44.8	55.1
2	Right Rear X-Member (Pri.)	2499	565	602	G's	3.4	121.9	-50.4	53.9
3	Engine Top	0	0	0	G's	0.0	0.0	0.0	0.0*
4	Engine Bottom	3736	62	165	G's	5.0	65.3	-67.1	36.7
5	Left Brake Caliper	3827	-755	337	G's	30.2	45.5	-82.5	27.1
6	Right Brake Caliper	3830	750	340	G's	68.3	45.5	-99.2	39.6
7	Instrument Panel	3556	-30	1350	G's	15.7	82.7	-81.4	77.0
8	Left Rear X-Member (Rednt.)	2496	-720	605	G's	3.6	120.6	-46.3	55.7

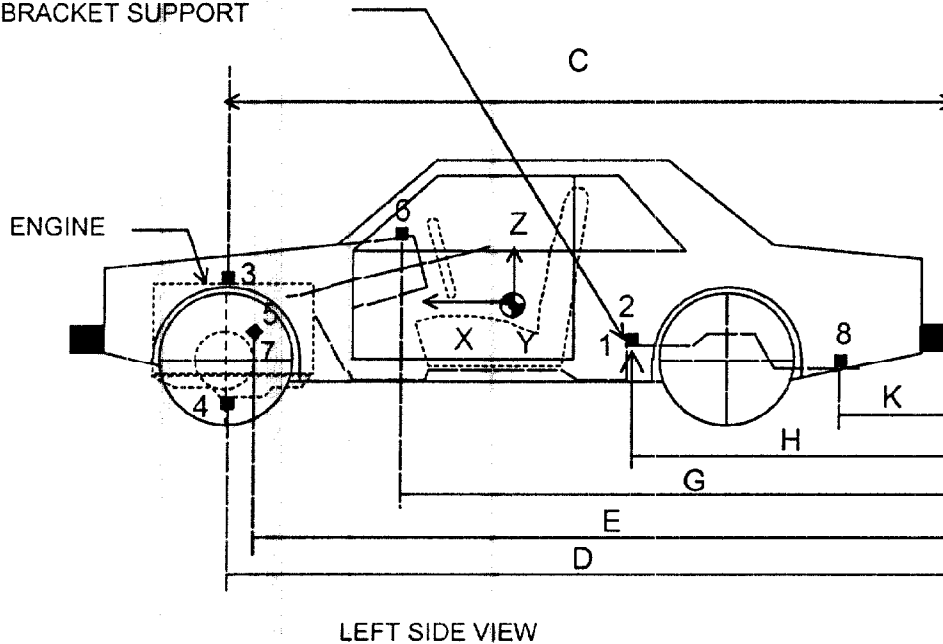
Reference Points X - From Rear Surface of Vehicle Y - Vehicle Centerline Z - Ground Plane

* Not Used

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



REAR SEAT CUSHION
ASSY. FRONT ATTACHMENT
BRACKET SUPPORT



DATA SHEET NO. 8 - HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

TEST VEHICLE: 1999 CHEVROLET ASTRO LS VAN NHTSA No.: MX0103
 TEST PROGRAM: 1999 NHTSA 35 MPH NCAP TEST DATE: 2/12/99

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	11.6	260.0	-68.0	78.6	6.0	255.1	-43.9	84.5
Head CG	Y	G's	11.6	88.2	-6.1	253.6	9.1	128.6	-8.7	49.4
Head CG	Z	G's	23.6	54.1	-31.1	89.9	24.9	74.3	-19.5	97.3
Head CG Resultant	N/A	G's	68.6	78.6			45.1	78.2		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	5.3	145.0	-64.4	82.0	4.0	198.6	-52.7	74.5
Chest CG	Y	G's	4.9	53.6	-6.2	82.5	7.8	85.2	-2.8	117.0
Chest CG	Z	G's	18.1	84.7	-4.8	77.3	14.0	87.7	-6.4	106.2
Chest CG Resultant	N/A	G's	66.1	83.1			53.8	74.4		

FEMUR PEAK FORCES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Femur	Z	Newtons	137.0	24.6	-8802.6	65.5	226.6	101.4	-7122.2	52.8
Right Femur	Z	Newtons	358.5	45.7	-4714.4	63.2	304.9	48.7	-6196.4	62.8

SEAT BELT SENSOR PEAK VALUES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Lap Belt Force	N/A	Newtons	6479.5	65.2	-6.9	143.4	7189.2	67.7	-10.6	213.8
Shoulder Belt Force	N/A	Newtons	4787.6	85.1	-38.7	154.0	5658.8	91.3	-35.7	168.4
Shoulder Belt Spoolout	N/A	MM	42.7	91.0	-18.2	299.9	45.3	64.3	-0.1	0.0
Shoulder Belt Stretch	N/A	MM/CM	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0

* Not Used

HEAD INJURY CRITERIA (HIC)

Location	Driver				Passenger			
	HIC	Avg G's	T ¹	T ²	HIC	Avg G's	T ¹	T ²
Head CG Primary	528.6	46.8	57.2	92.4	301.0	37.1	61.7	97.6

CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Primary	65.4	82.0	85.0	51.4	73.6	76.6

DATA SHEET NO. 8...(continued)

TEST VEHICLE: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

TEST PROGRAM: 1999 NHTSA 35 MPH NCAP

TEST DATE: 2/12/99

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Pelvis	X	G's	6.0	209.1	-83.1	62.9	3.5	121.8	-78.9	52.9
Pelvis	Y	G's	11.7	42.2	-13.6	50.9	16.2	67.9	-9.0	90.7
Pelvis	Z	G's	12.2	52.3	-38.4	76.5	3.4	43.3	-31.5	70.8

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	Newtons	1583.6	87.9	-445.1	146.0	1153.2	75.3	-590.4	146.1
Neck Force	Y	Newtons	281.6	163.4	-174.8	234.7	314.5	74.9	-104.8	200.8
Neck Force	Z	Newtons	1973.3	76.5	-928.2	90.1	982.1	74.4	-519.9	98.7
Neck Moment	X	N·m	16.9	162.8	-21.7	88.0	18.4	125.1	-20.0	69.8
Neck Moment	Y	N·m	103.5	87.9	-19.8	115.2	77.8	68.8	-26.4	105.5
Neck Moment	Z	N·m	13.5	154.9	-22.5	87.6	9.8	164.3	-12.4	120.2

FOOT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Foot Aft	X	G's	51.9	51.1	-261.9	42.2	15.6	66.4	-107.5	49.0
Left Foot Aft	Z	G's	34.2	54.4	-119.4	43.4	8.3	69.6	-53.2	51.4
Left Foot Fore	Z	G's	115.5	37.2	-463.1	41.5	29.3	61.8	-72.2	47.7
Right Foot Aft	X	G's	20.8	53.1	-147.7	48.5	12.2	64.8	-145.9	52.1
Right Foot Aft	Z	G's	26.6	66.9	-223.8	50.8	9.8	72.7	-66.2	50.3
Right Foot Fore	Z	G's	37.0	59.9	-179.3	45.9	37.9	60.3	-151.8	50.0

UPPER AND LOWER TIBIA PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Lower Moment	X	N·m	25.7	62.3	-35.0	47.8	11.0	66.2	-9.8	55.8
Left Lower Moment	Y	N·m	56.4	49.0	-172.8	42.4	10.8	88.8	-36.7	51.1
Left Lower Force	Z	Newtons	434.5	42.8	-2842.3	49.0	145.8	203.9	-3400.7	56.7
Left Upper Moment	X	N·m	14.2	155.6	-59.6	55.4	35.1	62.9	-13.6	94.1
Left Upper Moment	Y	N·m	13.4	217.4	-280.9	42.5	15.6	140.2	-160.7	56.4
Right Lower Moment	X	N·m	21.7	59.5	-48.8	51.1	0.6	13.8	-96.8	54.8
Right Lower Moment	Y	N·m	2.8	35.3	-1.6	28.0	19.5	84.6	-87.5	51.0
Right Lower Force	Z	Newtons	150.9	169.9	-8817.2	51.4	251.5	181.5	-2706.1	53.4
Right Upper Moment	X	N·m	24.9	46.5	-69.1	53.4	38.7	87.7	-27.9	47.4
Right Upper Moment	Y	N·m	23.7	197.4	-246.1	53.2	19.5	242.7	-159.0	57.0

* Driver Channel Failed

DATA SHEET NO. 8...(continued)

TEST VEHICLE: 1999 CHEVROLET ASTRO LS VAN NHTSA No.: MX0103
 TEST PROGRAM: 1999 NHTSA 35 MPH NCAP TEST DATE: 2/12/99

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	MM	0.2	6.7	-16.8	59.6	0.2	7.9	-24.6	58.9

HEAD REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	10.2	256.3	-63.0	78.5	6.1	268.9	-41.6	84.0
Head CG	Y	G's	12.5	87.9	-7.2	250.1	9.3	128.1	-6.4	49.2
Head CG	Z	G's	21.0	71.5	-36.6	90.4	28.7	74.1	-24.6	97.5
Head CG Resultant	N/A	G's	63.8	78.5			44.8	74.1		

CHEST REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	5.6	144.9	-63.6	83.2	4.4	210.0	-51.6	74.3
Chest CG	Y	G's	4.3	78.2	-6.4	81.5	9.9	87.2	-3.9	28.9
Chest CG	Z	G's	22.3	84.9	-5.6	76.3	15.5	87.4	-4.9	106.3
Chest CG Resultant	N/A	G's	66.7	84.6			52.1	74.3		

REDUNDANT HEAD INJURY CRITERIA (HIC)

Location	Driver				Passenger			
	HIC	Avg G's	T ¹	T ²	HIC	Avg G's	T ¹	T ²
Head CG Redundant	490.4	45.1	57.4	93.3	303.2	37.2	62.6	98.5

REDUNDANT CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Redundant	65.7	83.0	86.0	49.6	73.6	76.6

DATA SHEET NO. 9**SEAT BELT PERFORMANCE ASSESSMENT TEST DATA**Test Vehicle: 1999 CHEVROLET ASTRO LS VANNHTSA No.: MX0103Test Program: 1999 35 MPH FRONTAL IMPACTTest Date: 2/12/99**BELT LENGTH DATA**

Measurement Description	Units	Driver	Passenger
Retractor reel to 'D' ring	mm	700	700
Shoulder belt length as measured on ATD	mm	840	820
Lap belt length as measured on ATD	mm	840	835
Remainder of belt on reel	mm	290	290
Total belt length for continuous webbing systems	mm	2670	2645

SHOULDER BELT SPOOL-OFF DATA

Measurement Description	Units	Driver	Passenger
As determined mechanically	mm	42.0	0.0
As determined electronically	mm	42.7	45.3

BELT STRETCH DATA

Measurement Description	Units	Driver	Passenger
Electronically from shoulder belt load cell and "D" ring	mm/cm	N/A	N/A
Mechanically	mm/cm	0.00	0.00

*No data collected by manufactures request.

DATA SHEET NO. 10

SUMMARY OF FMVSS 212 DATA

Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99

Details of windshield mounting (method of retention, type of trim, etc.):

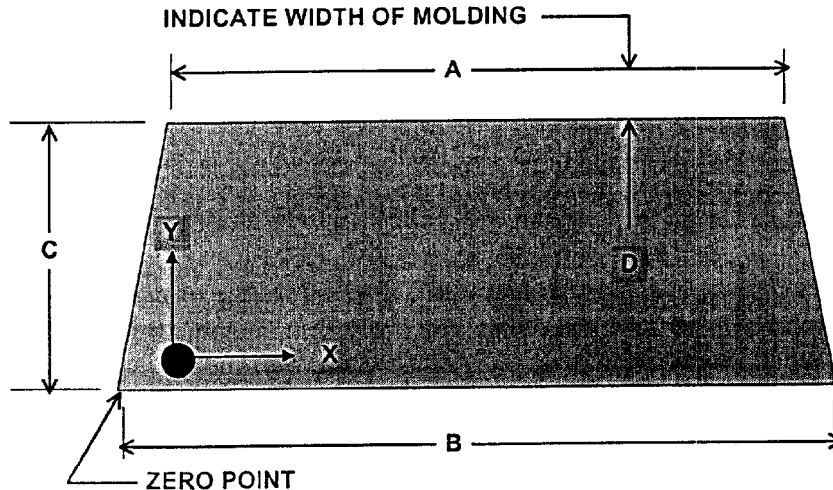
Windshield glass is secured to the vehicle frame with a rubber type adhesive, with rubber molding along the top and sides with rubber and plastic molding along the bottom.

The standard requires that the post test retention measurement be a minimum of 75 percent of the pretest total periphery measurement for vehicles not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles which are equipped with occupant passive restraints.

WINDSHIELD PERIPHERY MEASUREMENTS

	Units	Left Side	Right Side	Total
Pre-Test	mm	2771.5	2771.5	100%
Post-Test	mm	2771.5	2771.5	100%
Percent of retention	Percent	100%	100%	

Indicate area of retention failure.



FRONT VIEW OF WINDSHIELD

Width of molding: Top: 27 mm, Sides: 30 mm, Bottom: 0 mm

Temperature of windshield molding during test: 21.1 °C

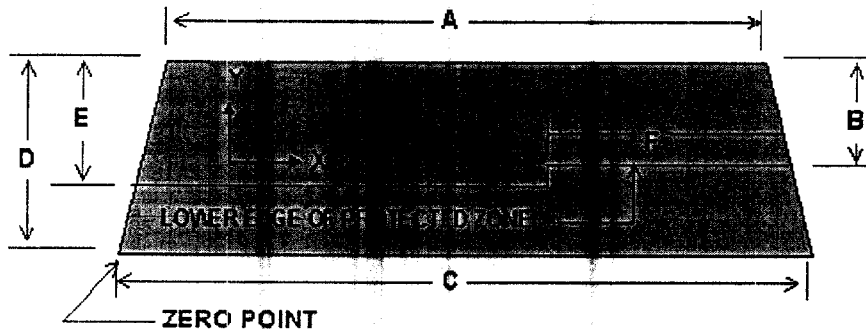
DATA SHEET NO. 11
WINDSHIELD ZONE INTRUSION FMVSS 219 (PARTIAL) DATA

Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1450
B	mm	440
C	mm	1710
D	mm	673
E	mm	321
F	mm	690

Provide all dimensions necessary to reproduce the protected area.

AREA OF PROTECTED ZONE FAILURES

- A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 in. by a vehicle component other than one which is normally in contact with the windshield.

X	Y
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A

- B. Provide coordinates of the area beneath the protected zone template that the inner surface of the windshield was penetrated by a vehicle component.

X	Y
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A

DATA SHEET NO. 12

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99

Test Time: 1:50 PM Temperature at Time of Impact: 8.88° C

STODDARD SOLVENT SPILLAGE MEASUREMENT:

- A. From impact until vehicle motion ceases - -
Actual = 0.0 oz. (Maximum Allowable = 1 ounce)
- B. For 5 minute period after vehicle motion ceases - -
Actual = 0.0 oz. (Maximum Allowable = 5 ounces)
- C. For next 25 minutes - -
Actual = 0.0 oz. (Maximum Allowable = 1 oz./minute)
- D. Provide Spillage Details: No leakage occurred.

DATA SHEET NO. 13

FMVSS 301 STATIC ROLLOVER DATA SHEET

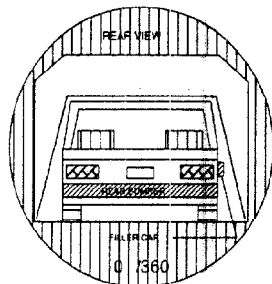
Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

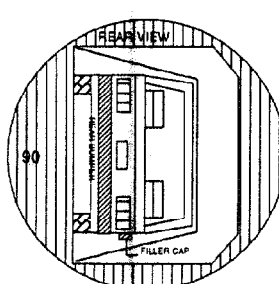
Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99

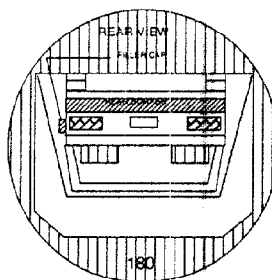
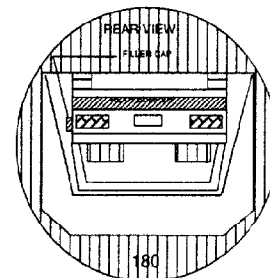
Time: 1:50 PM Temperature: 8.88 °C



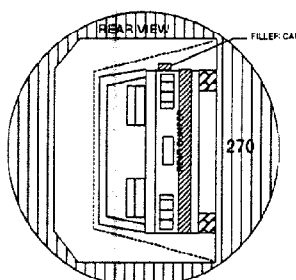
0° TO 90°



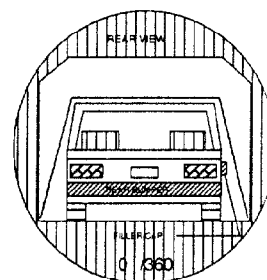
90° TO 180°



180° TO 270°



270° TO 360°



1. The specified fixture rollover rate for each 90° of rotation = 60 to 120 seconds.
2. The position hold time at each position = 300 seconds (minimum).
3. Provide details of Stoddard Solvent spillage locations:
No solvent leakage occurred during rollover testing.

TEST PHASE	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° TO 90°	82	300	0.0
90° TO 180°	79	300	0.0
180° TO 270°	80	300	0.0
270° TO 360°	82	300	0.0

DATA SHEET NO. 14

VEHICLE MEASUREMENTS

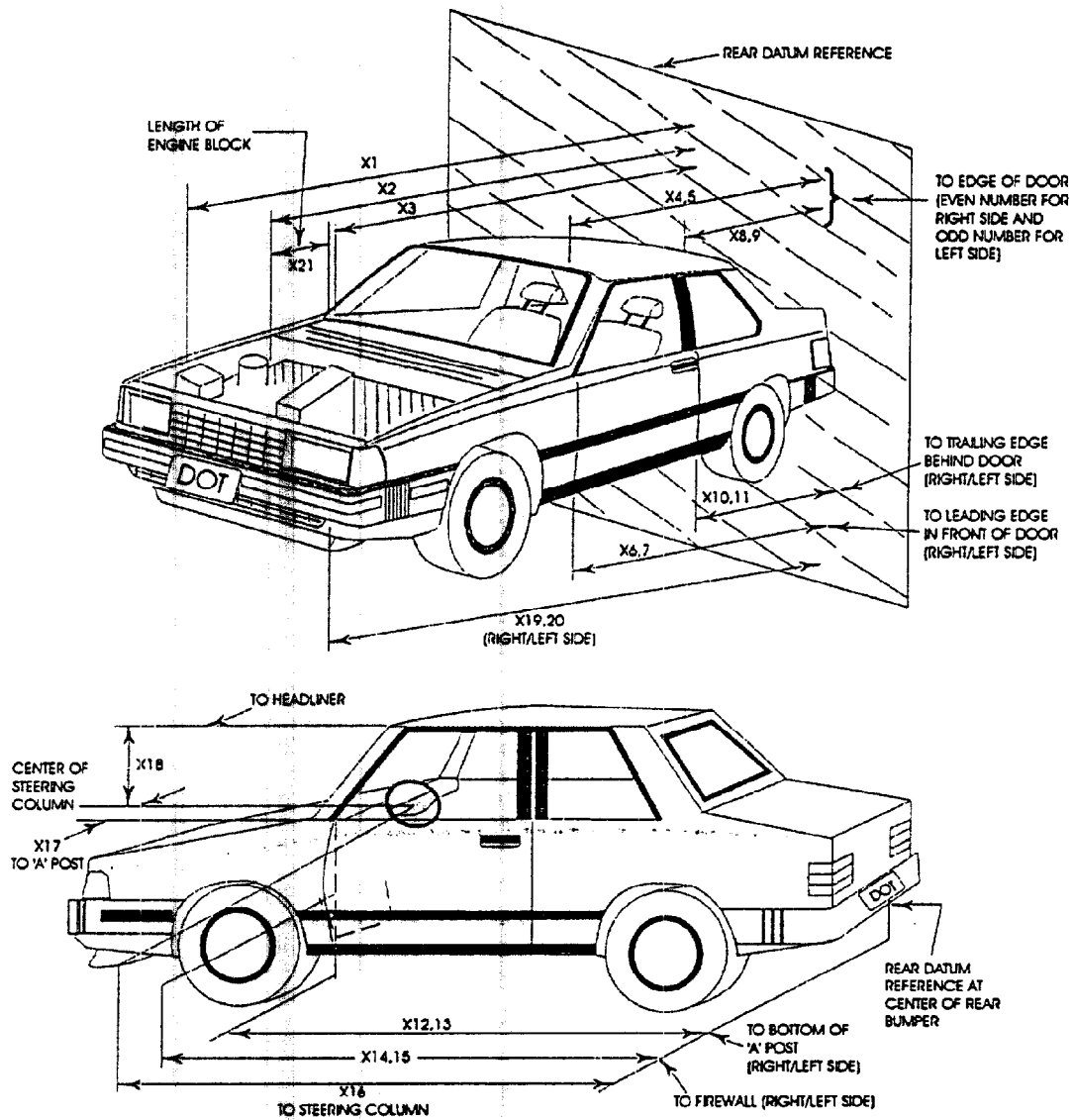
Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	4813	4252	-561
2	RSOV to front of engine	mm	4108	3963	-145
3	RSOV to firewall centerline	mm	4090	4018	-72
4	RSOV to leading edge of right door	mm	3675	3667	-8
5	RSOV to leading edge of left door	mm	3680	3660	-20
6	RSOV to lower leading edge of right door	mm	3485	3500	15
7	RSOV to lower leading edge of left door	mm	3487	3470	-17
8	RSOV to upper trailing edge of right door	mm	2670	2660	-10
9	RSOV to upper trailing edge of left door	mm	2673	2653	-20
10	RSOV to lower trailing edge of right door	mm	2649	2660	11
11	RSOV to lower trailing edge of left door	mm	2647	2638	-9
12	RSOV to bottom of right 'A' pillar	mm	3660	3633	-27
13	RSOV to bottom of left 'A' pillar	mm	3660	3595	-65
14	RSOV to firewall on right side	mm	4018	3923	-95
15	RSOV to firewall of left side	mm	4026	3951	-75
16	RSOV to steering column	mm	3311	3300	-11
17	Center of steering column to left 'A' pillar	mm	395	400	5
18	Center of steering column to headlining	mm	435	435	0
19	RSOV to right side of front bumper	mm	4559	4223	-336
20	RSOV to left side of front bumper	mm	4559	4156	-403
21	Length of engine block	mm	0	0	0
RD	RSOV to right side of dash panel	mm	3505	3510	5
CD	RSOV to center of dash panel	mm	3403	3425	22
LD	RSOV to left side of dash panel	mm	3510	3454	-56



DATA SHEET NO. 15

CAMERA LOCATIONS

Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99

No.	Camera View	Location (mm)			Angle (°)	Film Plane to Head	Lens (mm)	Speed (fps)
		X	Y	Z				
1	Right Side, Real Time	3454	10973	1245	0	1651	Zoom	24
2	Left Side, No. 1	2100	8200	1215	2	7620	13	970
3	Left Side, No. 2	1100	5950	1510	0	5500	25	1040
4	Left Side, No. 3	2750	2850	1245	15	2750	19	980
5	Left Side, No. 4	2150	8300	3070	11	7817	19	1010
6	Left Side, No. 5	2150	8300	2615	9	7719	19	1000
7	Right Side, No. 1	1800	8250	895	1	7700	19	1010
8	Right Side, No. 2	1620	8350	1585	3	7750	40	920
9	Right Side, No. 3	3050	3000	2090	11	2750	19	1000
10	Right Side, No. 4	2250	7250	1505	1	6600	35	990
11	Overhead Overall	750	0	5791	90	N/A	13	1040
12	Front View Driver	-550	430	2810	43	N/A	13	1030
13	Front View, Passenger	-550	430	2810	41	N/A	13	1020
14	Pit Camera, Engine	830	0	-1520	90	N/A	10	840
15	Pit Camera, Fuel Tank	4600	0	-1805	45	N/A	12	950
16	Onboard, Driver	3490	420	1690	15	1685	13	530
17	Onboard, Passenger	3490	400	1690	17	1635	13	500

* X - Barrier Face Y - Monorail Centerline Z - Ground

**DATA SHEET NO. 16
REFERENCE PHOTOGRAPH TARGETS**

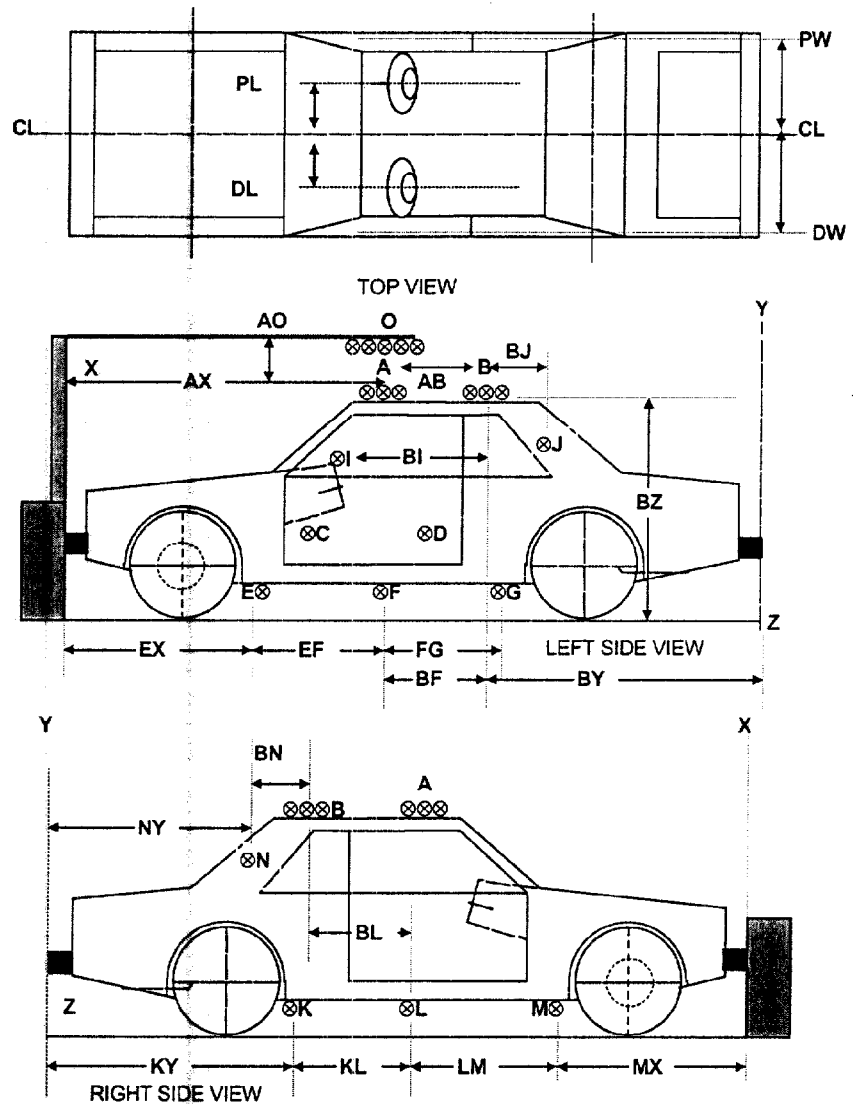
Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99

Item	Value
AX	1901
AB	610
AO	155
BJ	772
BI	992
BZ	1935
EX	1280
EF	952
FG	948
BF	270
BY	2321
NY	1512
BN	806
KY	1604
KL	961
BL	255
LM	960
MX	1280
CL/PL	451
CL/PW	881
CL/DL	451
CL/DW	881



DATA SHEET NO. 17

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

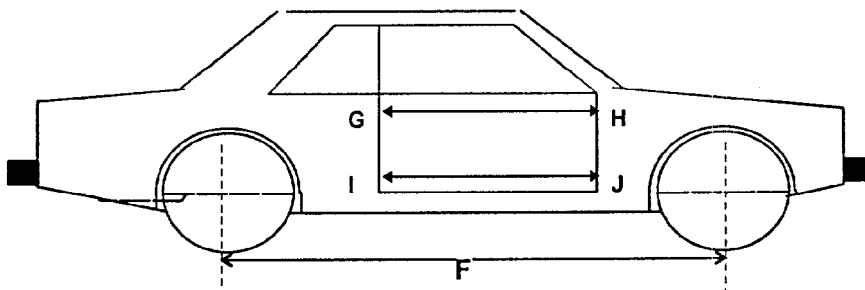
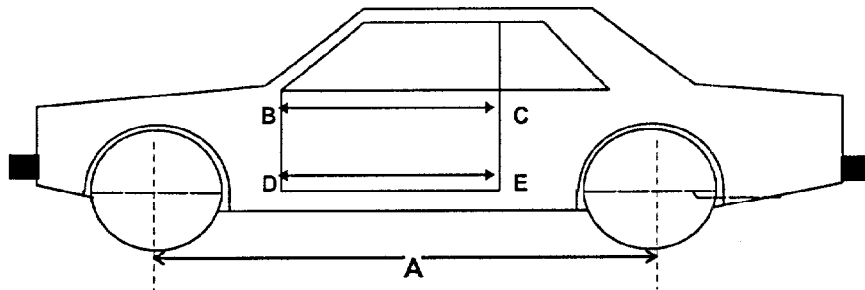
Test Date: 2/12/99

DOOR OPENING WIDTH

UNITS (mm)	LEFT SIDE		RIGHT SIDE	
MEASUREMENT	BC	DE	GH	IJ
PRE-TEST	948	831	944	820
POST-TEST	912	801	925	807
DIFFERENCE	-36	-30	-19	-13

VEHICLE WHEELBASE CHANGE

UNITS (mm)	A = LEFT SIDE WHEELBASE	F = RIGHT SIDE WHEELBASE
PRE-TEST	2815	2815
POST-TEST	2725	2700
DIFFERENCE	-90	-115



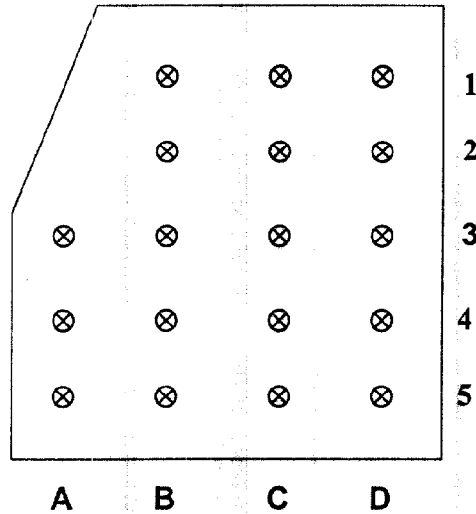
Data Sheet No. 17(Continued)

Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

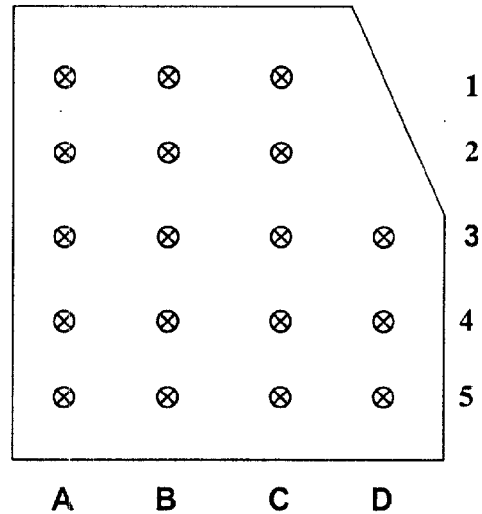
Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99



⊕ X
LEFT FRONT SEAT ANCHOR BOLT
↓
TO RSOV REFERENCE

DRIVER SIDE FLOOR PLAN



⊕ X
RIGHT FRONT SEAT ANCHOR BOLT
↓
TO RSOV REFERENCE

PASSENGER SIDE FLOORPAN

(Data Sheet No. 17Continued)

Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

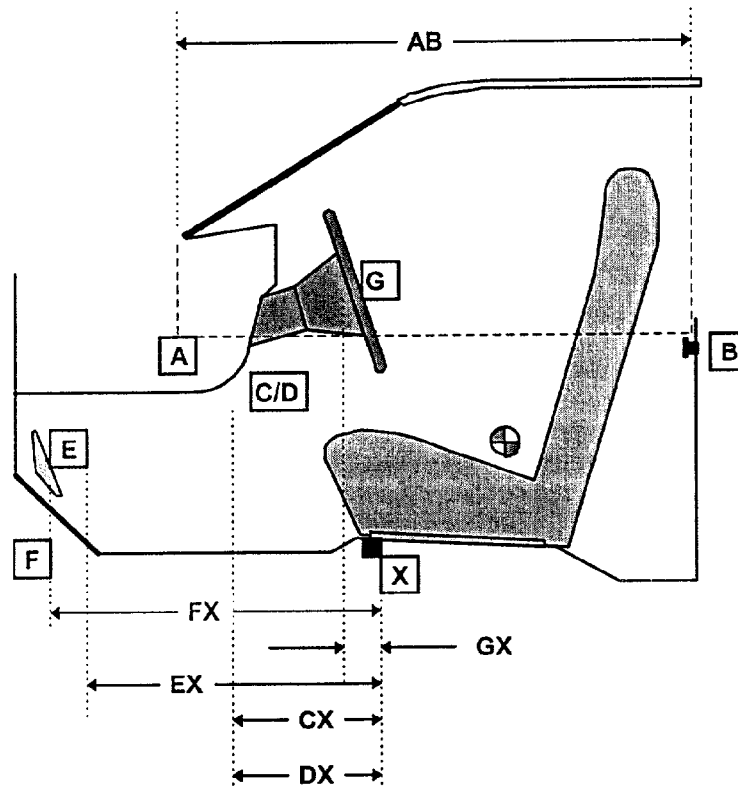
Test Date: 2/12/99

DRIVER COMPARTMENT INTRUSION (Distances in mm)

REF.	DESCRIPTION	PRE-TEST	POST-TEST
AB	DOOR OPENING (INSIDE WINDOW JAM)	948	912
CX	LOWER LEFT KNEE BOLSTER TO X	430	SEE NOTE
DX	LOWER RIGHT KNEE BOLSTER TO X	441	SEE NOTE
EX	BRAKE PEDAL TO X	632	502
FX	FOOT REST TO X	N/A	N/A
GX	STEERING COLUMN HUB (CENTER) TO X	145	105

X = LEFT FRONT SEAT ANCHOR BOLT

NOTE: KNEE BOLSTER FELL OFF DURING IMPACT



DRIVER COMPARTMENT

(Data Sheet No. 17Continued)

DRIVER SIDE "X"

	A			B			C			D		
	PRE-TEST	POST-TEST	DIFF.	PRE-TEST	POST-TEST	DIFF.	PRE-TEST	POST-TEST	DIFF.	PRE-TEST	POST-TEST	DIFF.
1				793	662	-131	806	680	-126	799	685	-114
2				706	610	-96	707	612	-95	701	624	-77
3	N/A	N/A	#VALUE!	604	525	-79	606	531	-75	604	528	-76
4	505	440	-65	493	440	-53	506	435	-71	499	432	-67
5	405	390	-15	405	390	-15	405	375	-30	405	338	-67

DRIVER SIDE "Z"

	A			B			C			D		
	PRE-TEST	POST-TEST	DIFF.	PRE-TEST	POST-TEST	DIFF.	PRE-TEST	POST-TEST	DIFF.	PRE-TEST	POST-TEST	DIFF.
1				101	160	59	102	159	57	103	160	57
2				28	32	4	26	46	20	25	50	25
3	N/A	N/A	#VALUE!	-15	-28	-13	-16	-20	-4	-17	4	21
4	15	30	15	-27	0	27	-25	13	38	-25	6	31
5	-26	-50	-24	-28	-71	-43	-27	-73	-46	-28	-35	-7

PASSENGER SIDE "X"

	A			B			C			D		
	PRE-TEST	POST-TEST	DIFF.	PRE-TEST	POST-TEST	DIFF.	PRE-TEST	POST-TEST	DIFF.	PRE-TEST	POST-TEST	DIFF.
1	751	718	-33	752	721	-31	751	708	-43			
2	653	633	-20	651	639	-12	653	623	-30			
3	550	548	-2	549	549	0	549	543	-6	N/A	N/A	#####
4	450	448	-2	450	449	-1	450	448	-2	450	449	-1
5	350	347	-3	350	348	-2	351	348	-3	350	350	0

PASSENGER SIDE "Z"

	A			B			C			D		
	PRE-TEST	POST-TEST	DIFF.	PRE-TEST	POST-TEST	DIFF.	PRE-TEST	POST-TEST	DIFF.	PRE-TEST	POST-TEST	DIFF.
1	85	124	39	88	122	34	88	135	47			
2	30	52	22	33	52	19	35	60	25			
3	-16	-5	11	-18	-7	11	-17	-3	14	N/A	N/A	#####
4	-20	-22	-2	-19	-10	9	-18	-10	8	-17	-9	8
5	-25	-25	0	-25	-23	-55	-25	-23	2	-26	-15	11

RSOV to anchor bolt
Ground level to anchor bolt

DRIVER		
PRE	POST	DIFF.
3148	3145	-3
N/A	N/A	

PASSENGER		
PRE	POST	DIFF.
3148	3145	-3
N/A	N/A	

DATA SHEET NO. 18

OFFSET BARRIER ORIENTATION

Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99

NOT APPLICABLE TO THIS TEST

A = VEHICLE WIDTH MEASURED AT WIDEST POINT N/A mm

B = 40% OFFSET FROM LEFT EDGE OF VEHICLE N/A mm

ACTUAL OFFSET DURING TEST N/A mm = N/A

DATA SHEET NO. 19

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99

VIN: 1GNDM19W4XB113586 Wheelbase: 2815 mm Test Weight: 2301 kg

Vehicle Size Category: CHEVROLET ASTRO VAN

ACCELEROMETER DATA:

LOCATION: Left and right rear floor pans

CALIBRATION PROCEDURE: 6 months/ drop test

LINEARITY: Good

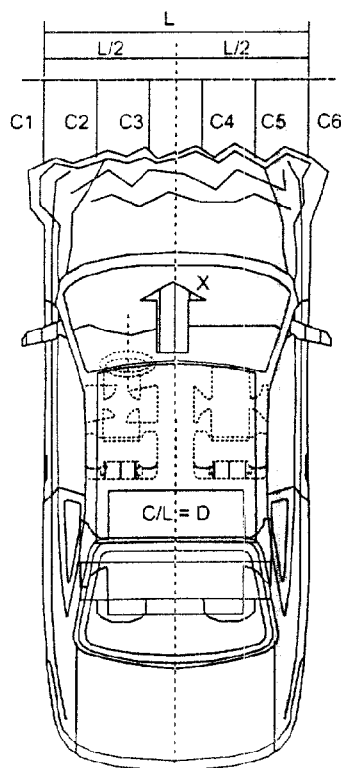
INTEGRATION ALGORITHM: NHTSA Standard

VEHICLE IMPACT SPEED: 56.4 km/h

TIME OF SEPARATION: 74.7 msec

VELOCITY CHANGE: 64.43 km/h

COLLISION DEFORMATION CLASSIFICATION (CDC) CODE: F (frontal)



IMPACT MODE: Full Frontal

CRUSH DEPTH DIMENSIONS:

C1 = 403 mm

C2 = 461 mm

C3 = 561 mm

C4 = 509 mm

C5 = 483 mm

C6 = 336 mm

MIDPOINT OF DAMAGE: Vehicle Centerline

LENGTH OF DAMAGE REGION: 1779 mm

DATA SHEET NO. 20

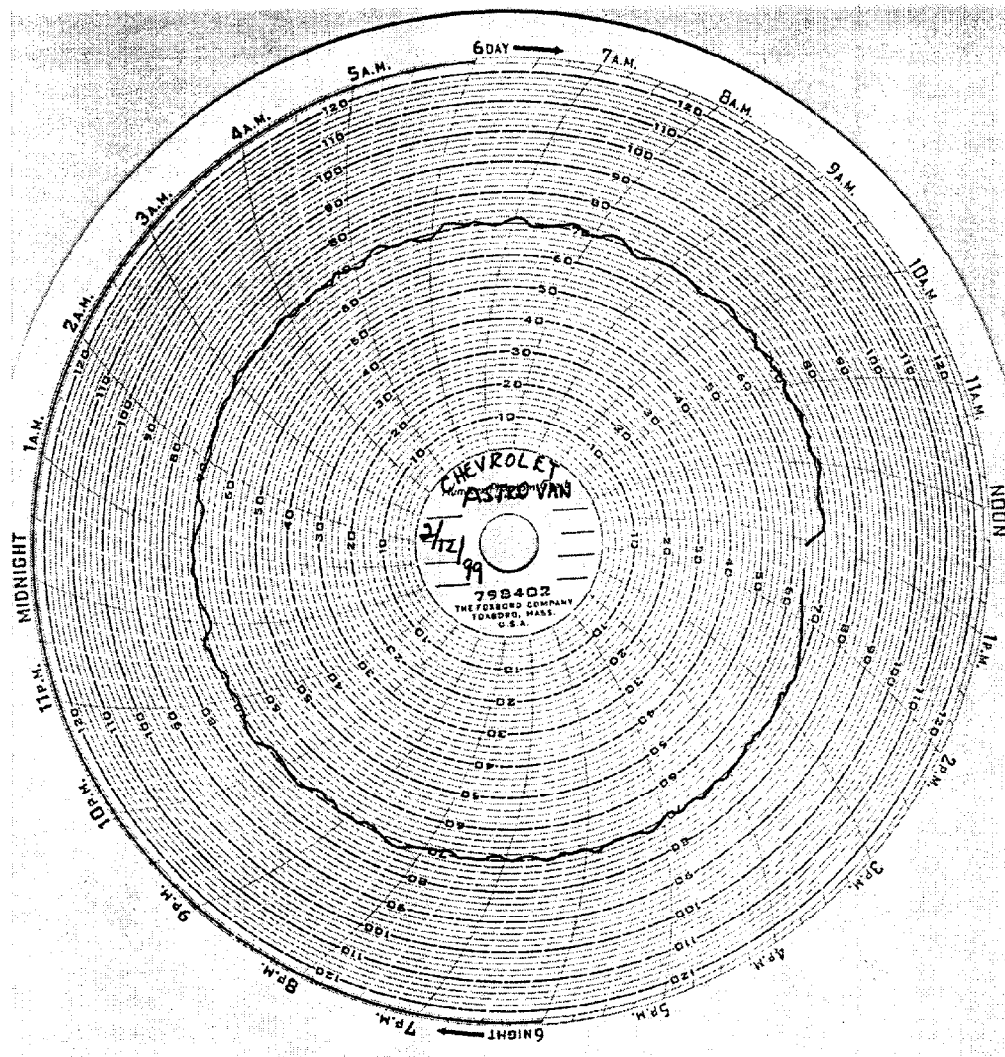
DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 1999 CHEVROLET ASTRO LS VAN

NHTSA No.: MX0103

Test Program: 1999 35 MPH FRONTAL IMPACT

Test Date: 2/12/99



APPENDIX A
PHOTOGRAPHS

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FIGURE A-1. RIGHT FRONT AS RECEIVED

A-1

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FIGURE A-2. LEFT REAR AS RECEIVED

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 MFD BY GENERAL MOTORS CORP 10/98
 GVWR GAWR FRT GAWR RR
 2659KG(5950LB) 1270KG(2800LB) 1429KG(3150LB)
 THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR
 VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF
 MANUFACTURE SHOWN ABOVE.
1GNDM19W4XB113586 TYPE: M.P.V.
 MODEL: M11006 PAYLOAD = 647KG(1427LB)
 MPAP TIRE SIZE SPEED RTG RIM COLD TIRE PRESSURE
 FRT P215/75R15 S 15X6 1/2J 240KPA(35PSI)
 RR P215/75R15 S 15X6 1/2J 240KPA(35PSI)
 SPA T145/80D16 M 16X4T 420KPA(60PSI)
 SEE OWNER'S MANUAL FOR MORE INFORMATION.

FIGURE A-3. VEHICLE CERTIFICATION LABEL



GVWR
2659KG(5950LB)

MFD BY GENERAL MOTORS CORP
GAWR FRT
1270KG(2800LB)

10/98
GAWR RR
1429KG(3150LB)

THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

1GNDM19W4XB113586 TYPE: M.P.V.

MODEL: M11006	PAYLOAD =	647KG(1427LB)
MPAP	TIRE SIZE	SPEED RTG
FRT	P215/75R15	S
RR	P215/75R15	S
SPA	T145/80D16	M
		16X4T
		420KPA(60PSI)

SEE OWNER'S MANUAL FOR MORE INFORMATION.

FIGURE A-4. VEHICLE TIRE PLACARD

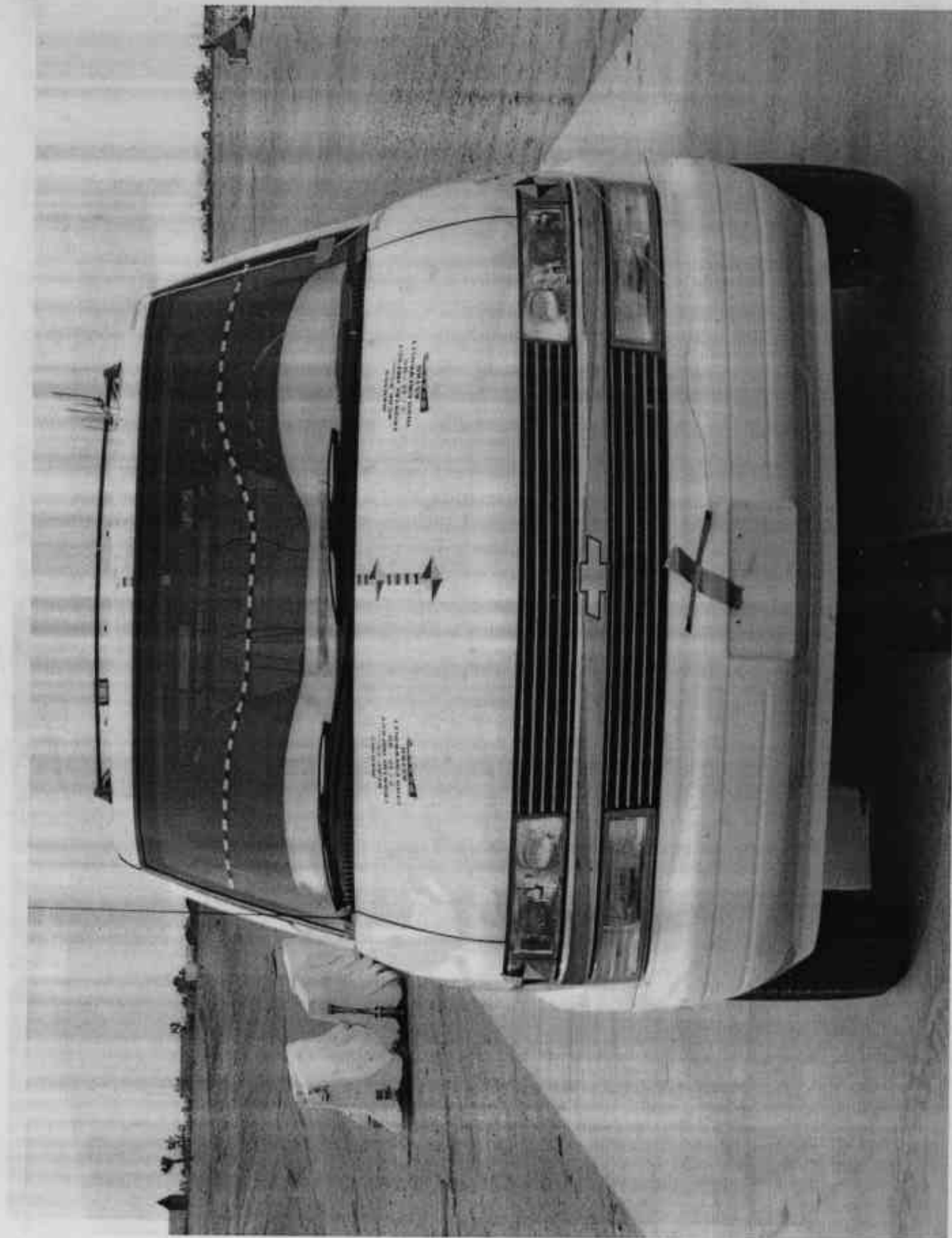


FIGURE A-5. PRETEST FRONT VIEW

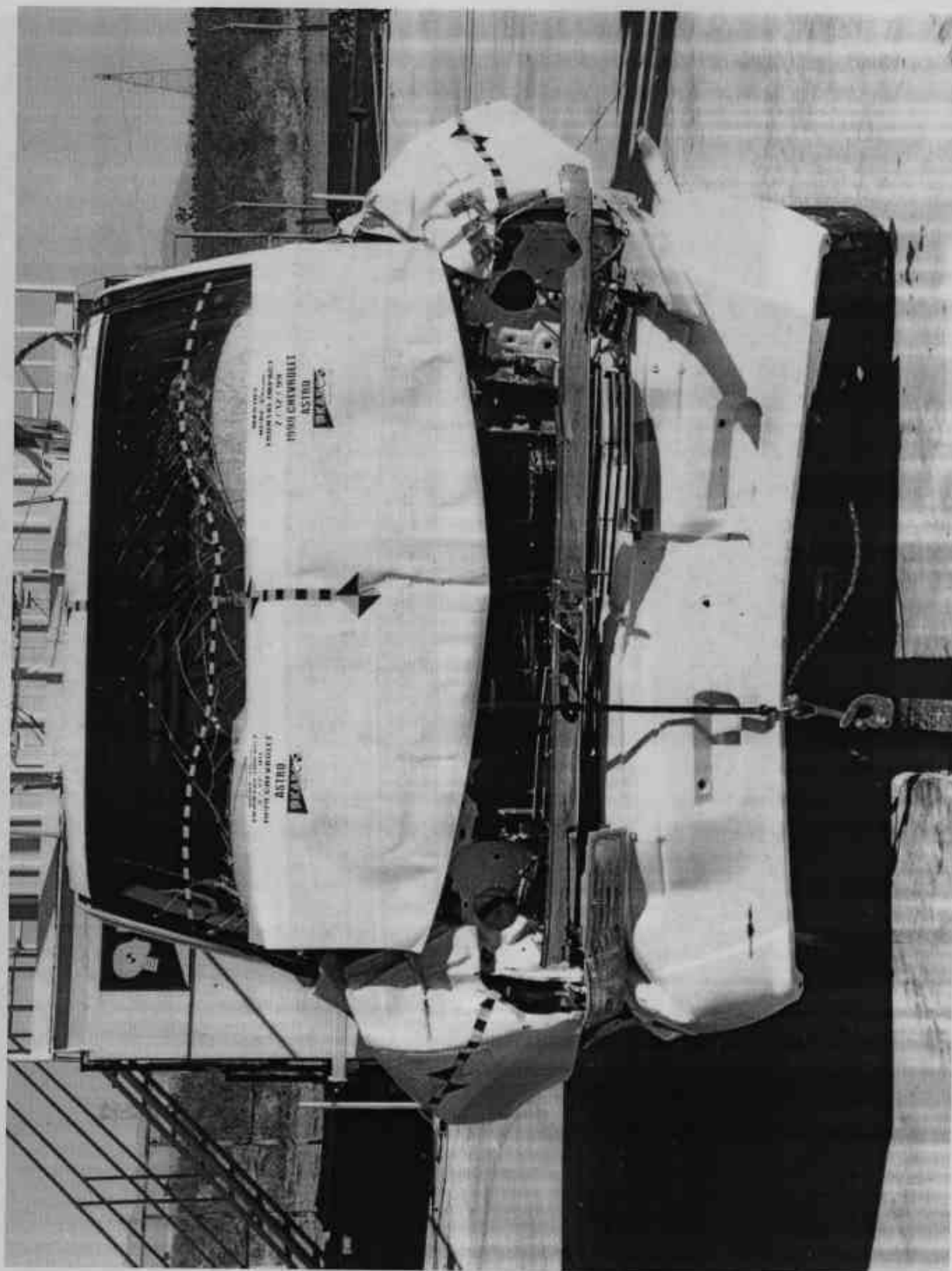


FIGURE A-6. POST TEST FRONT VIEW

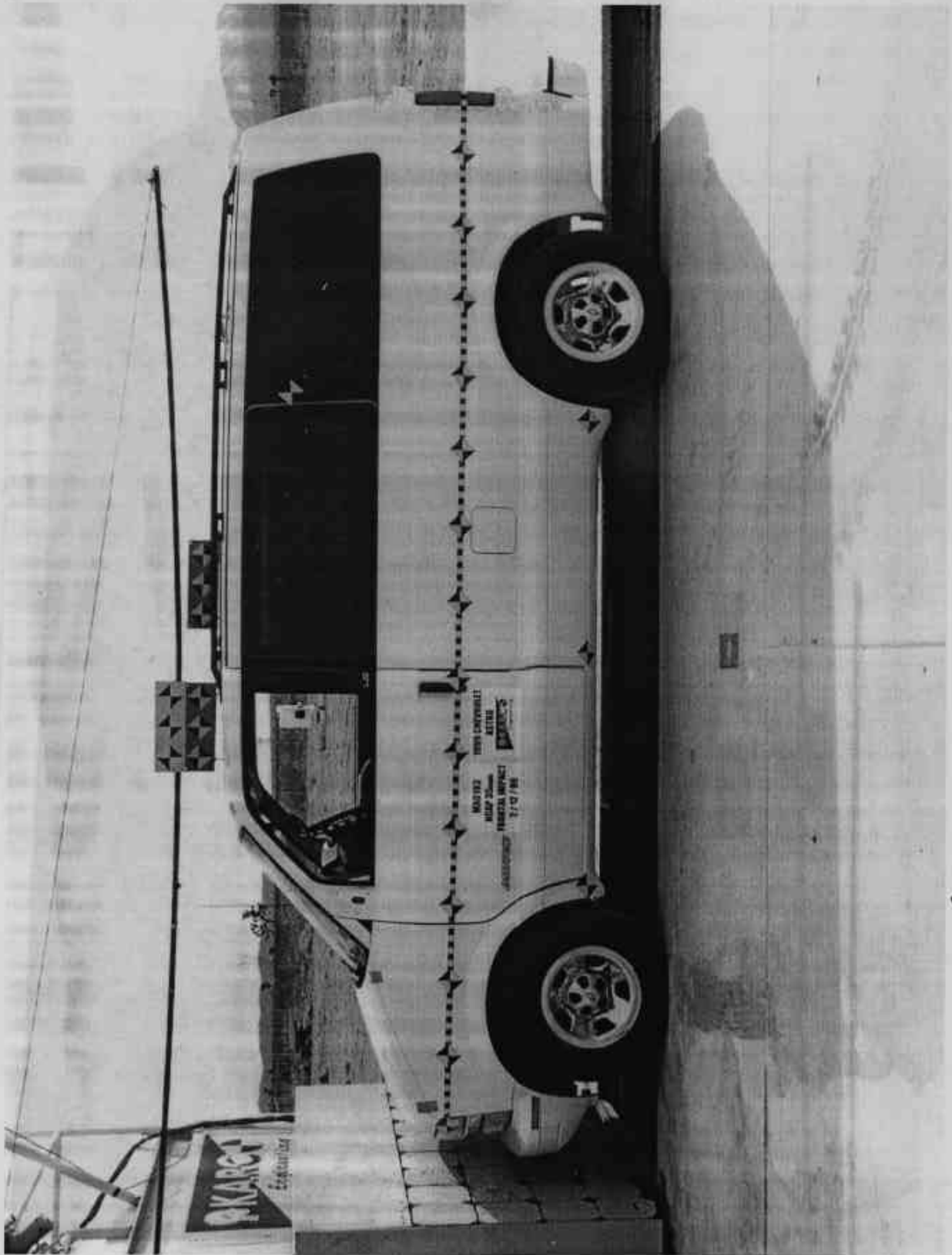


FIGURE A-7. PRETEST LEFT SIDE VIEW

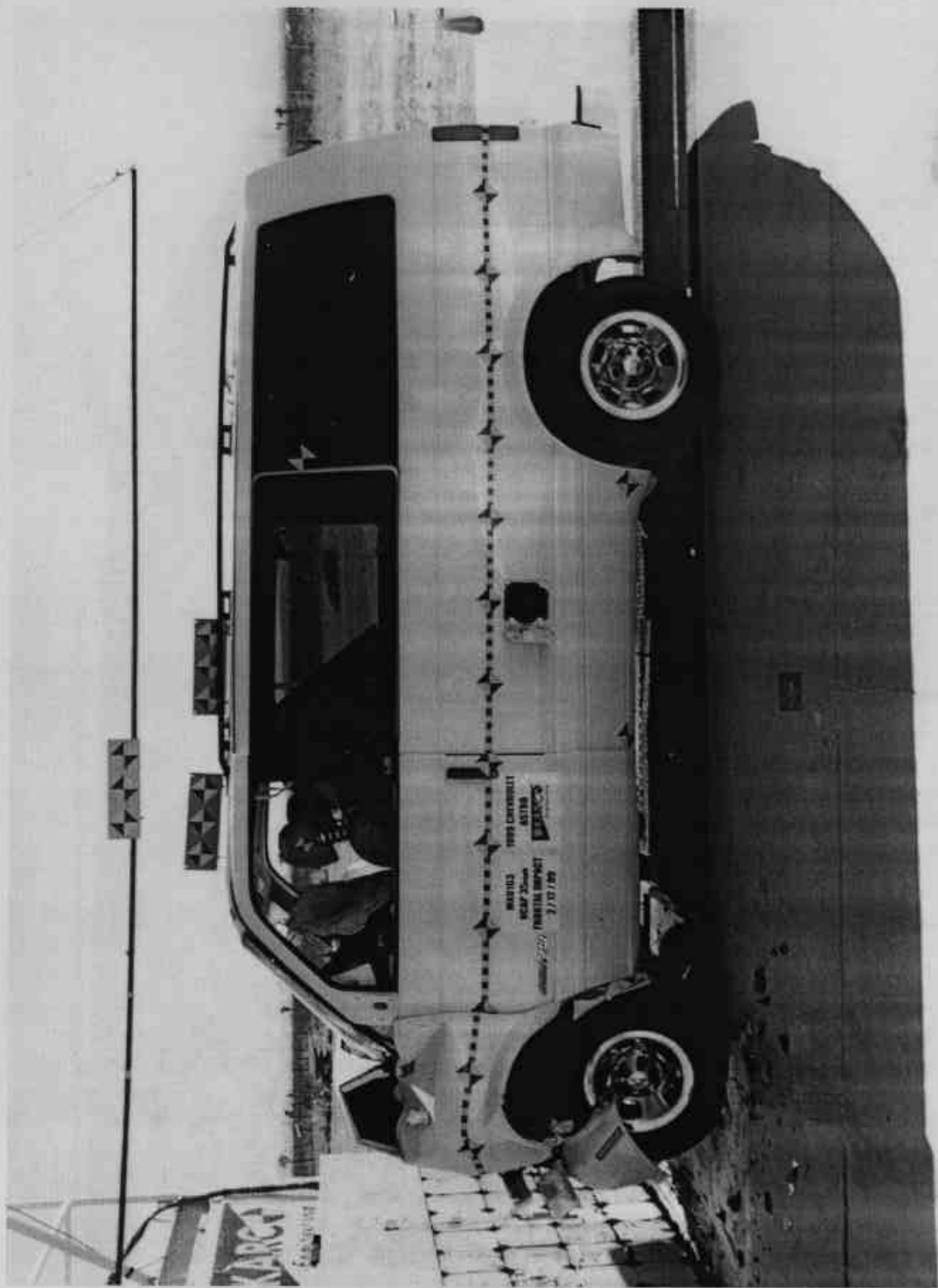


FIGURE A-8. POST TEST LEFT SIDE VIEW

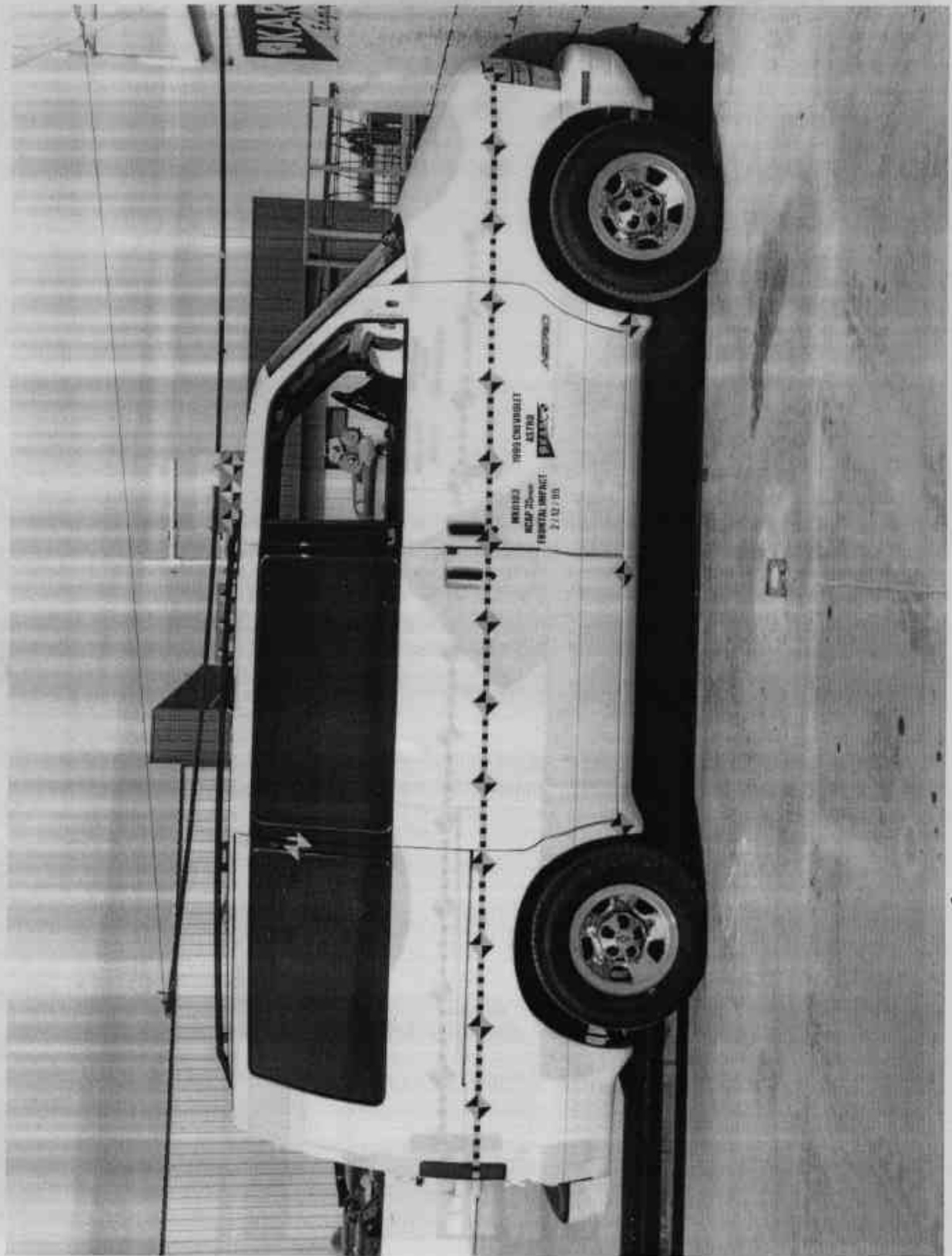


FIGURE A-9. PRETEST RIGHT SIDE VIEW

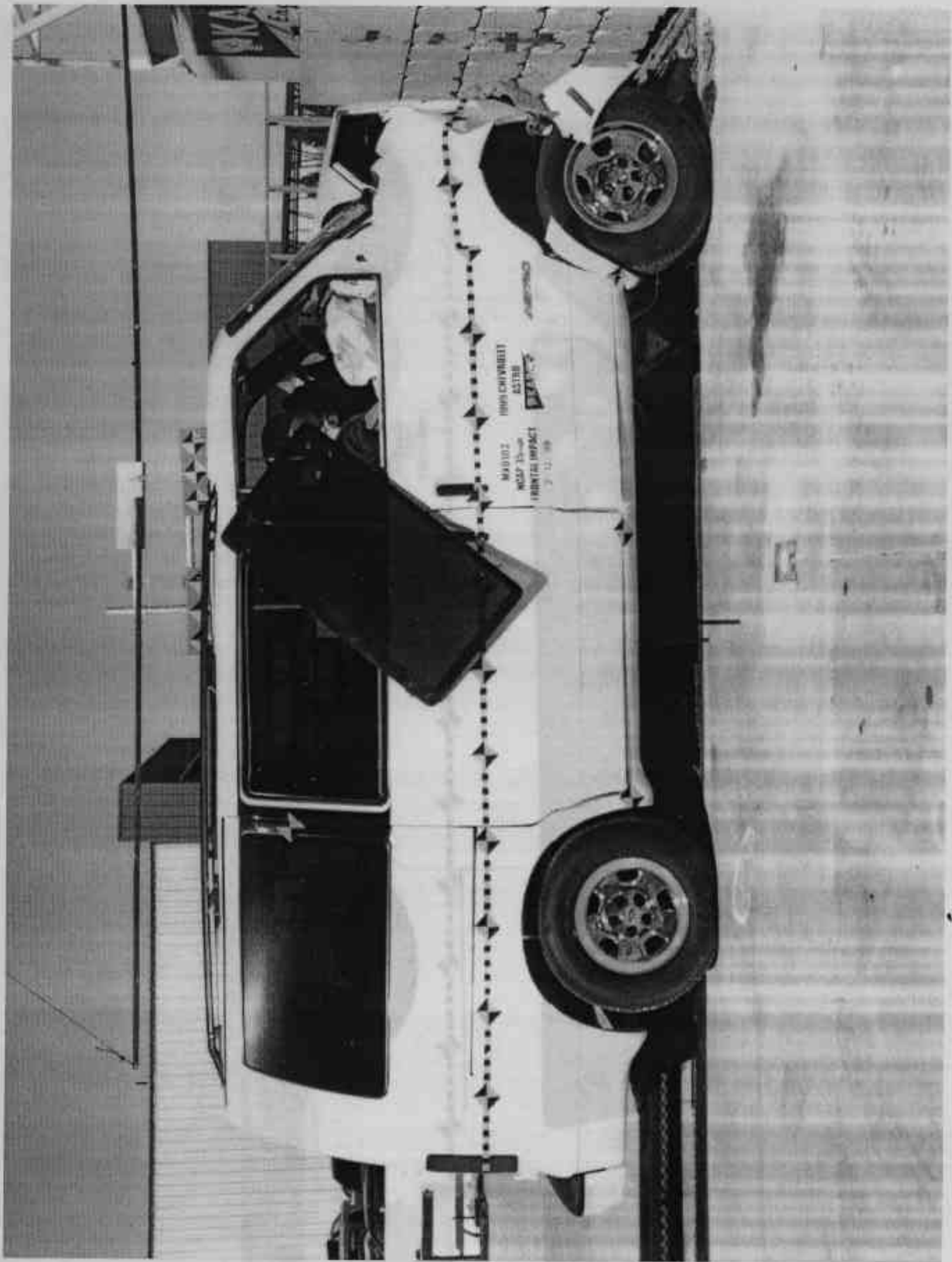


FIGURE A-10. POST TEST RIGHT SIDE VIEW

A-10

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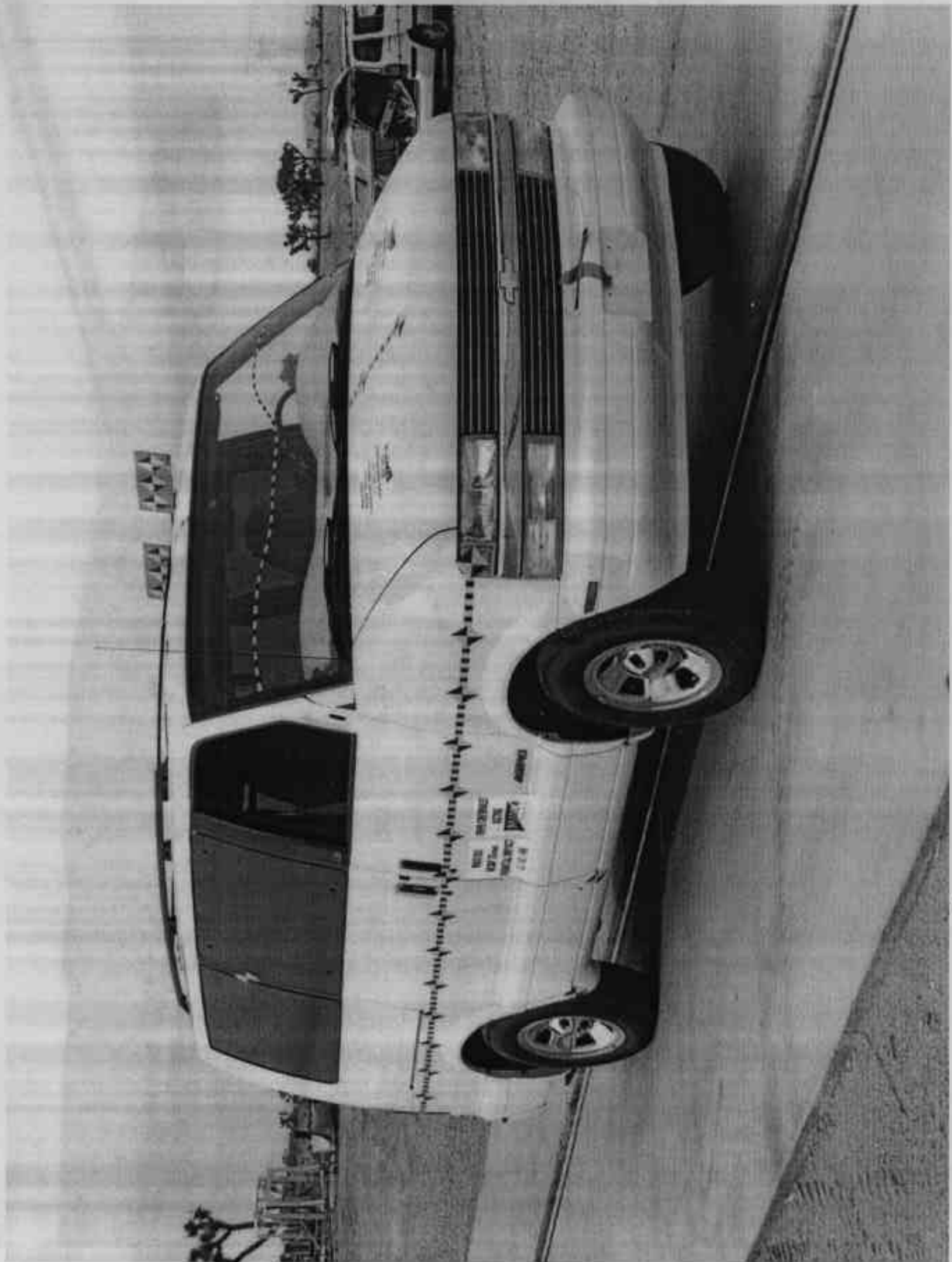


FIGURE A-11. PRETEST RIGHT FRONT VIEW

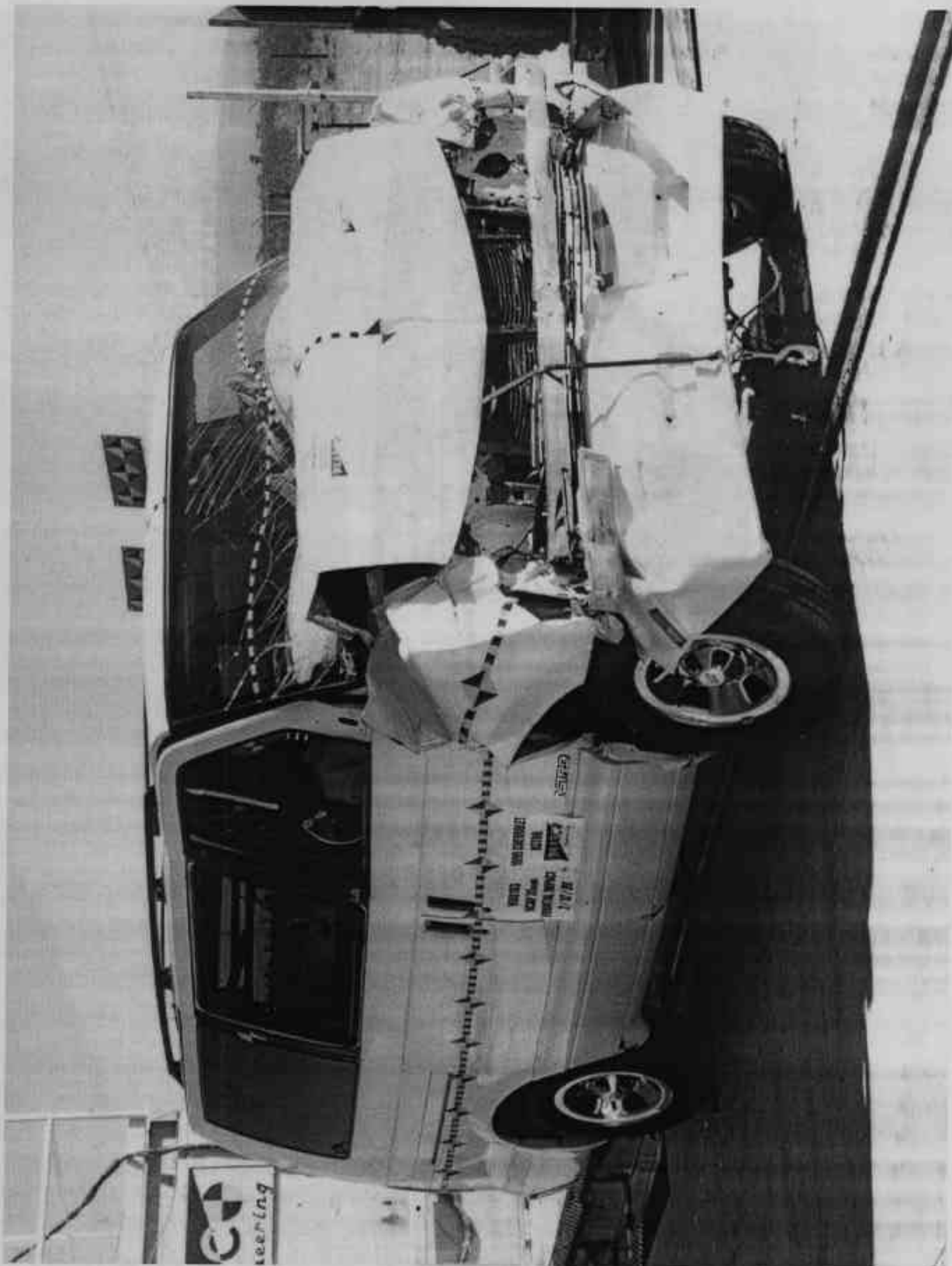


FIGURE A-12. POST TEST RIGHT FRONT VIEW

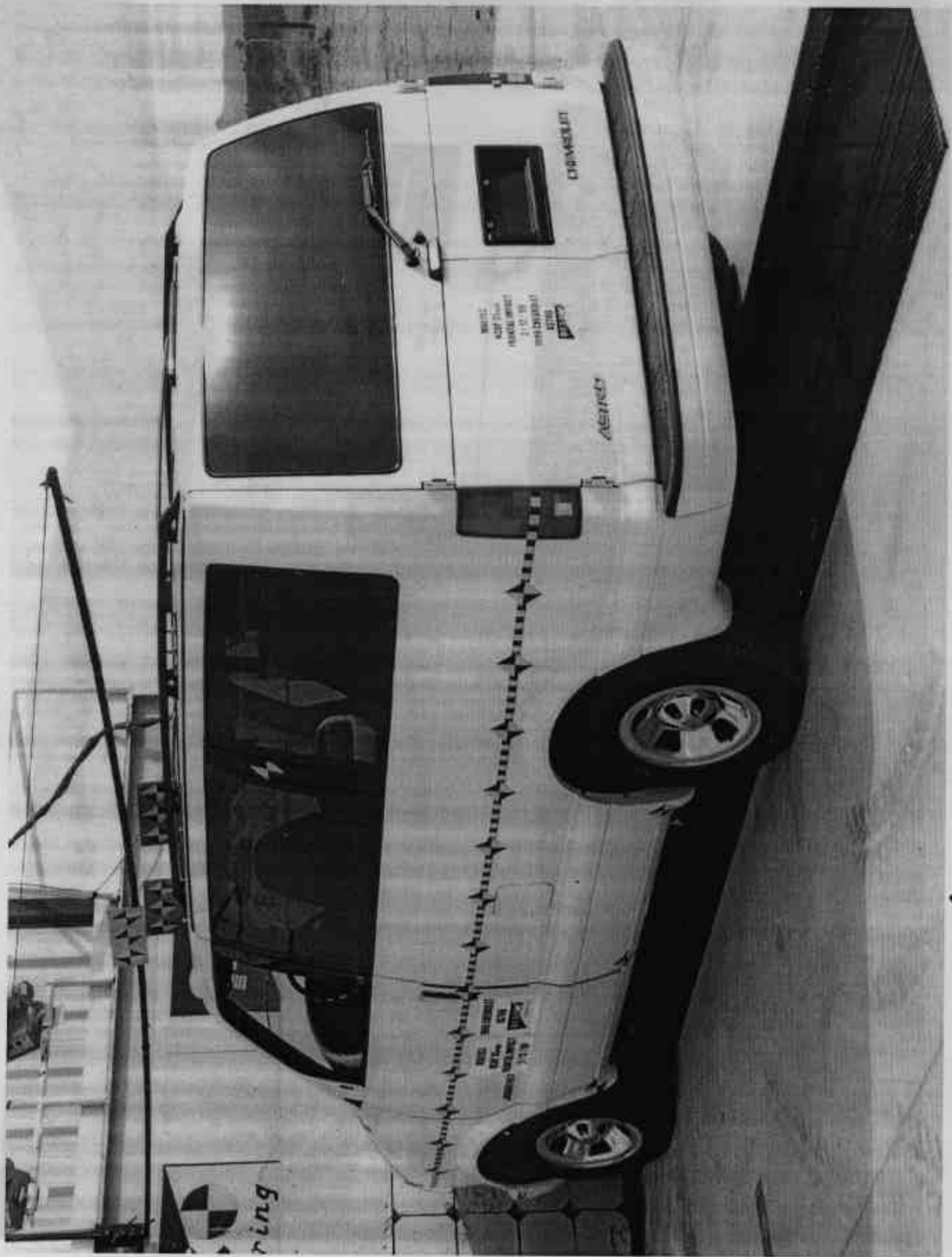


FIGURE A-13. PRETEST LEFT REAR VIEW



FIGURE A-14. POST TEST LEFT REAR VIEW

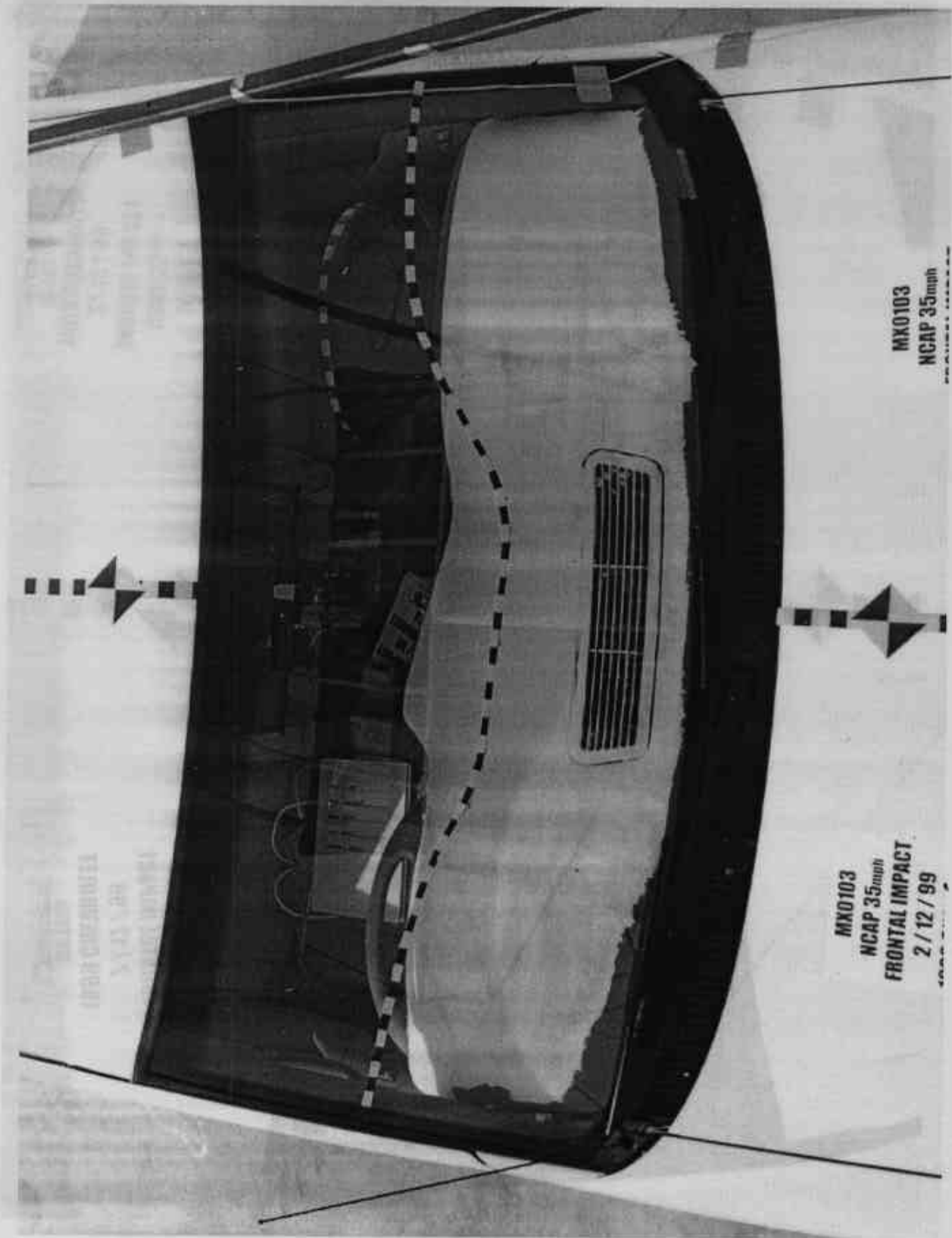


FIGURE A-15. PRETEST WINDSHIELD

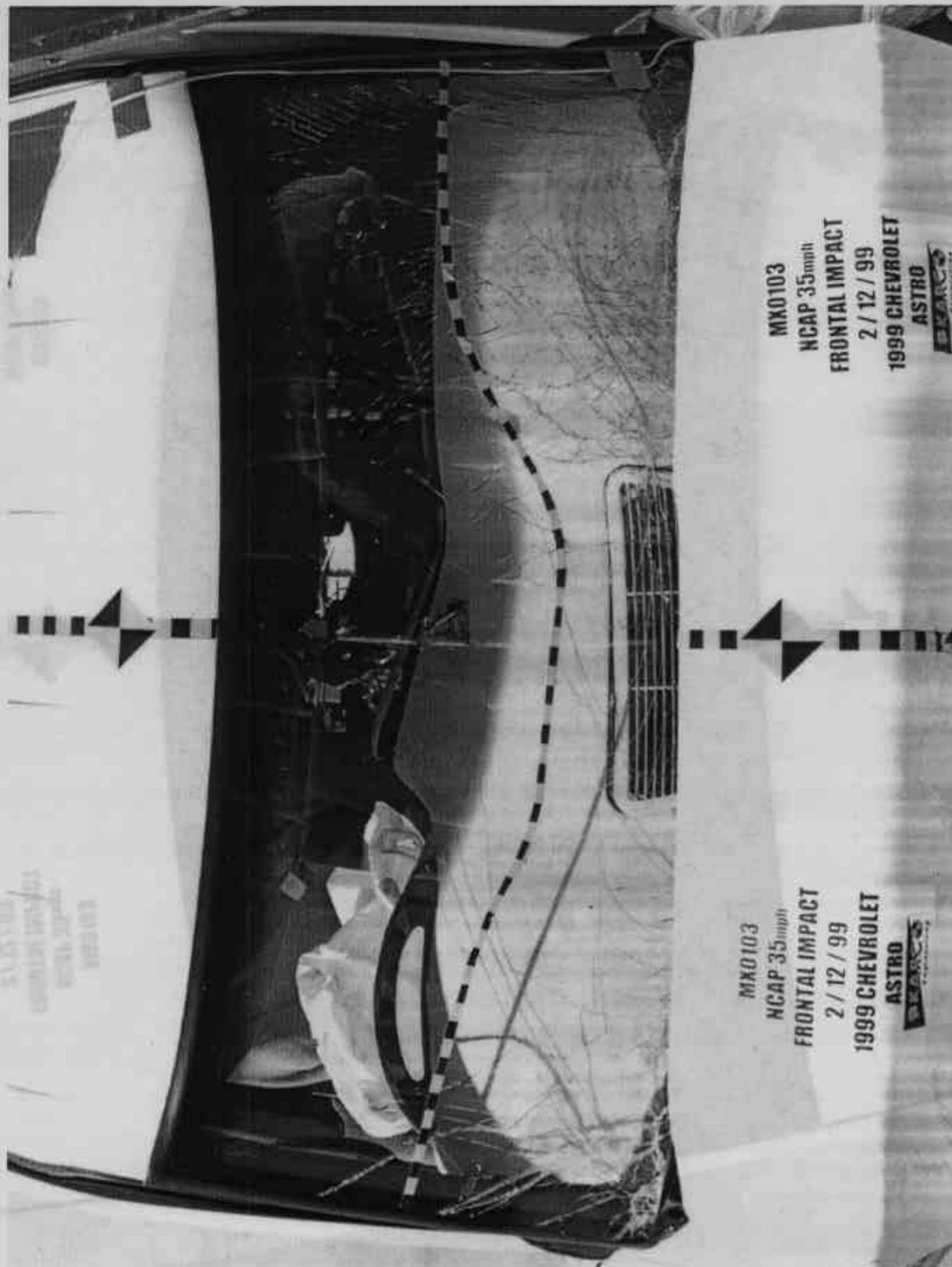


FIGURE A-16. POST TEST WINDSHIELD

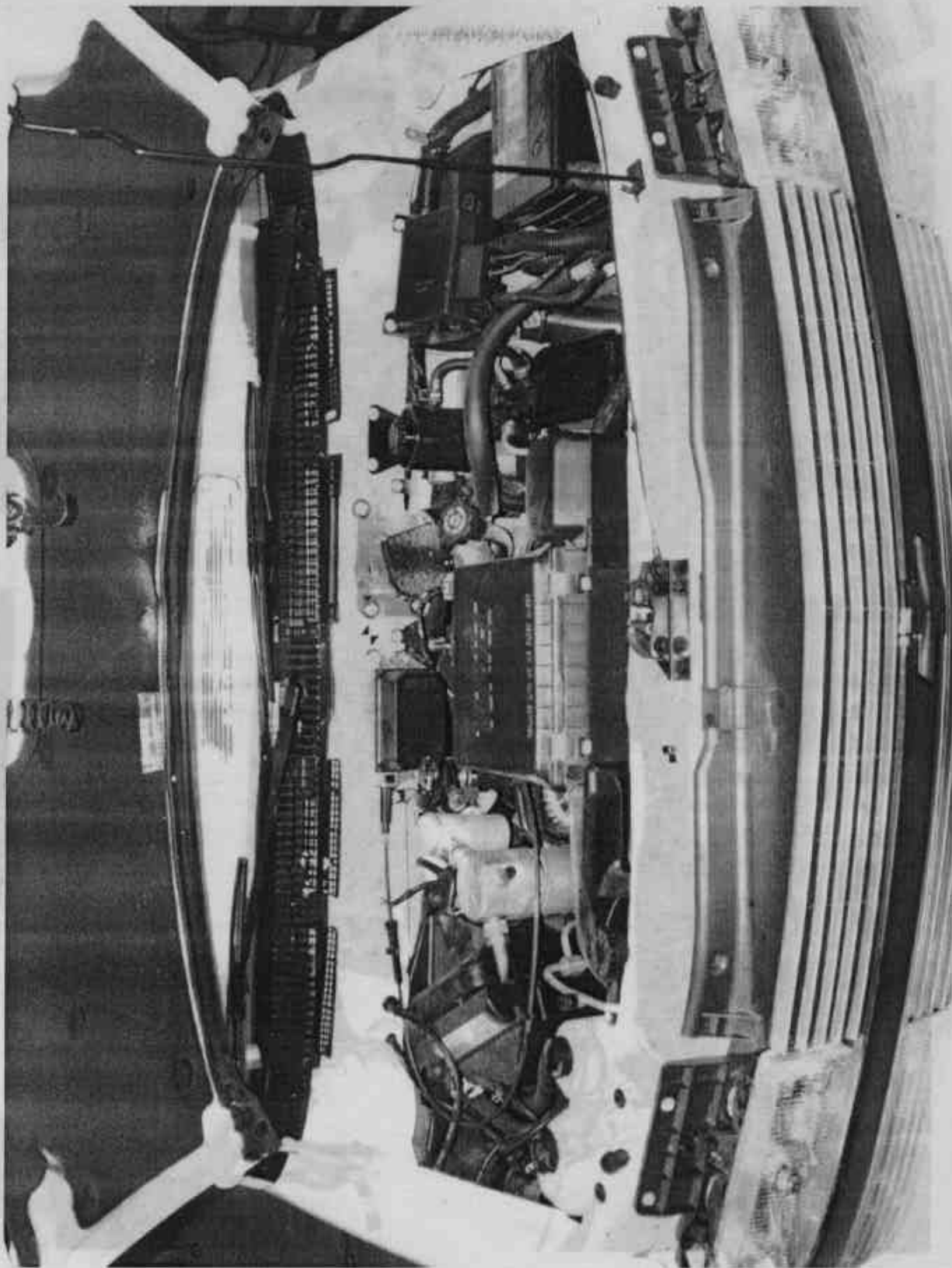


FIGURE A-17. PRETEST ENGINE COMPARTMENT

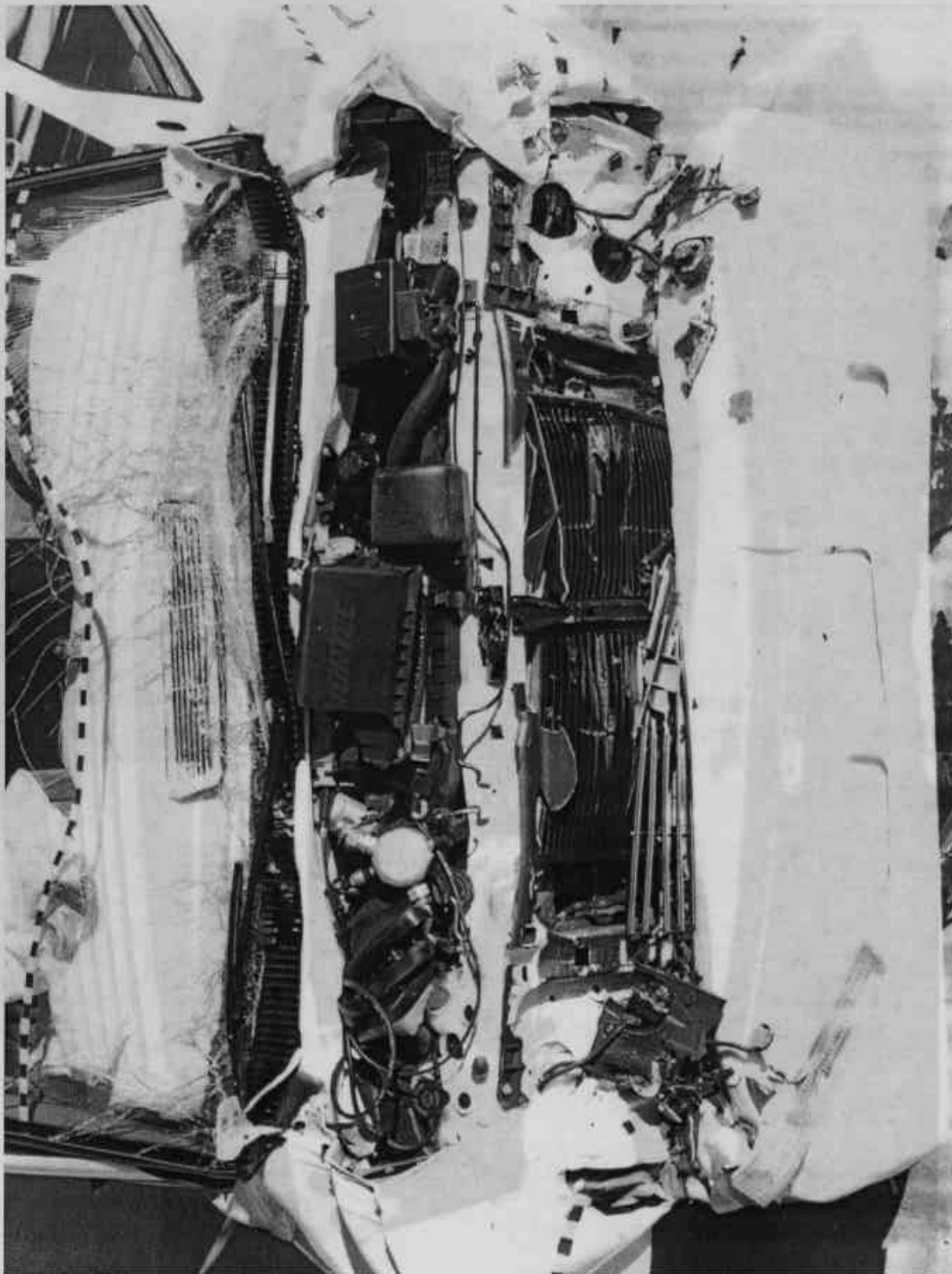


FIGURE A-18. POST TEST ENGINE COMPARTMENT

A-18

KAR99001-14

AF-100029A01

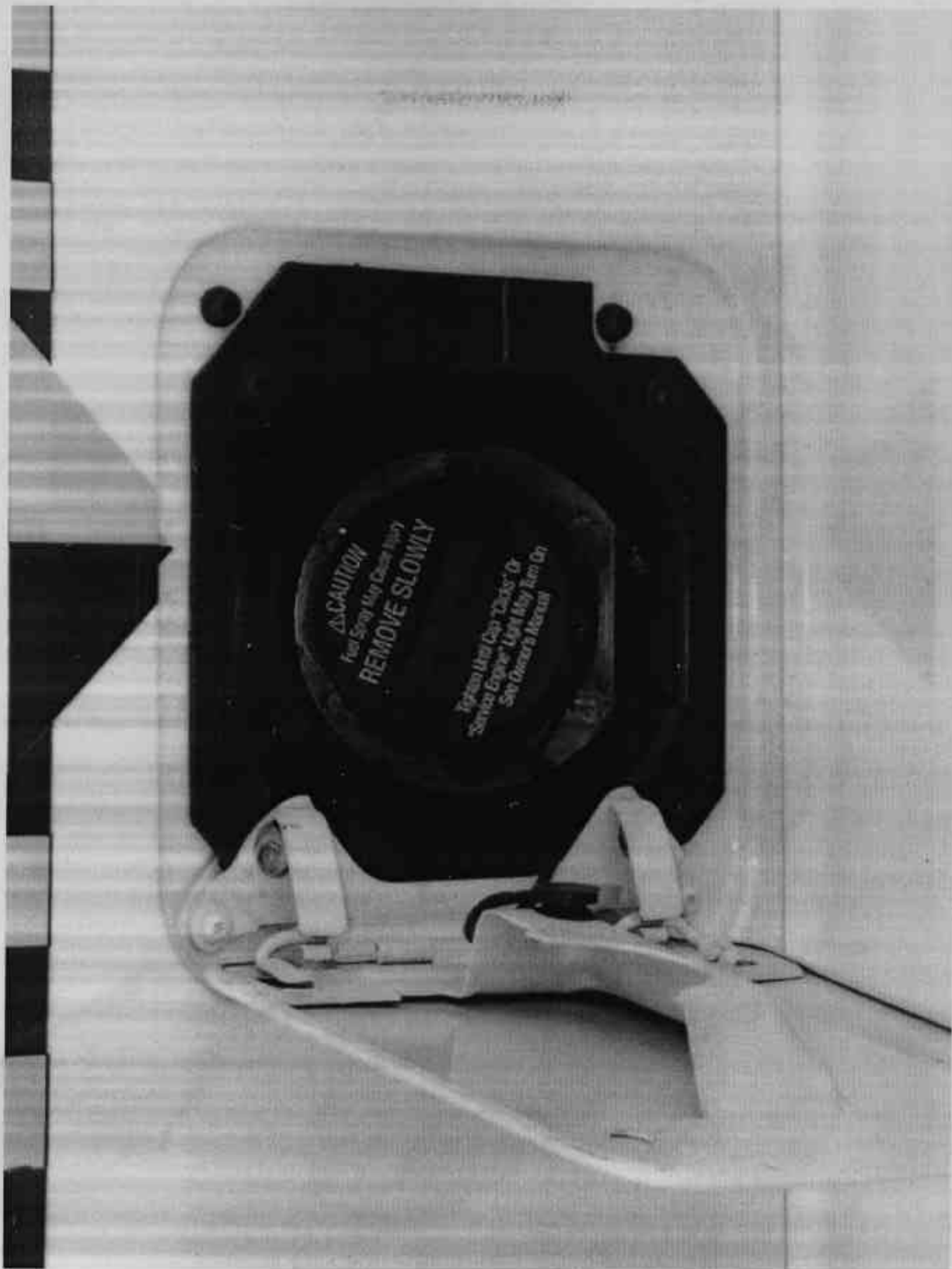


FIGURE A-19. PRETEST FUEL CAP

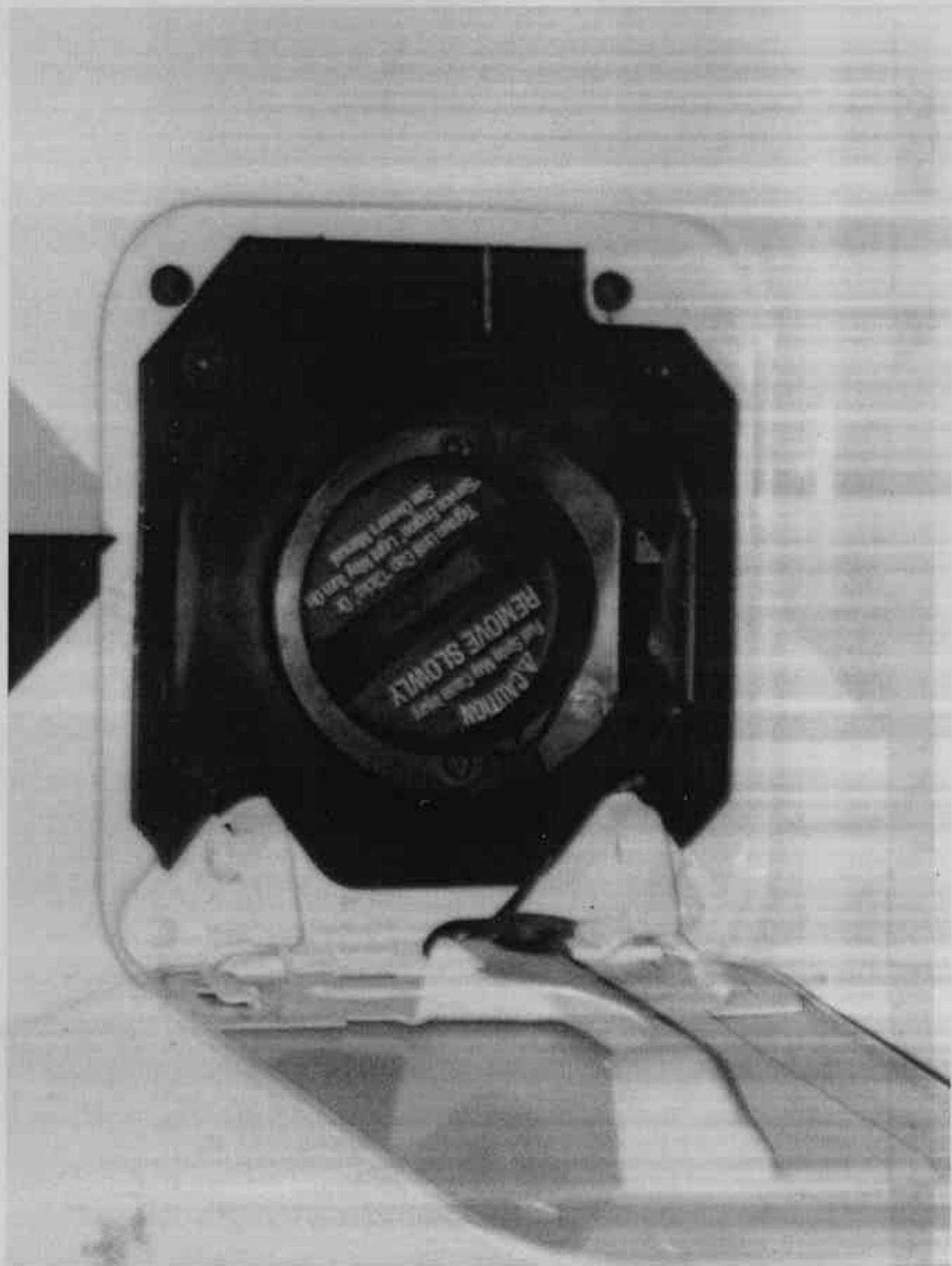


FIGURE A-20. POST TEST FUEL CAP

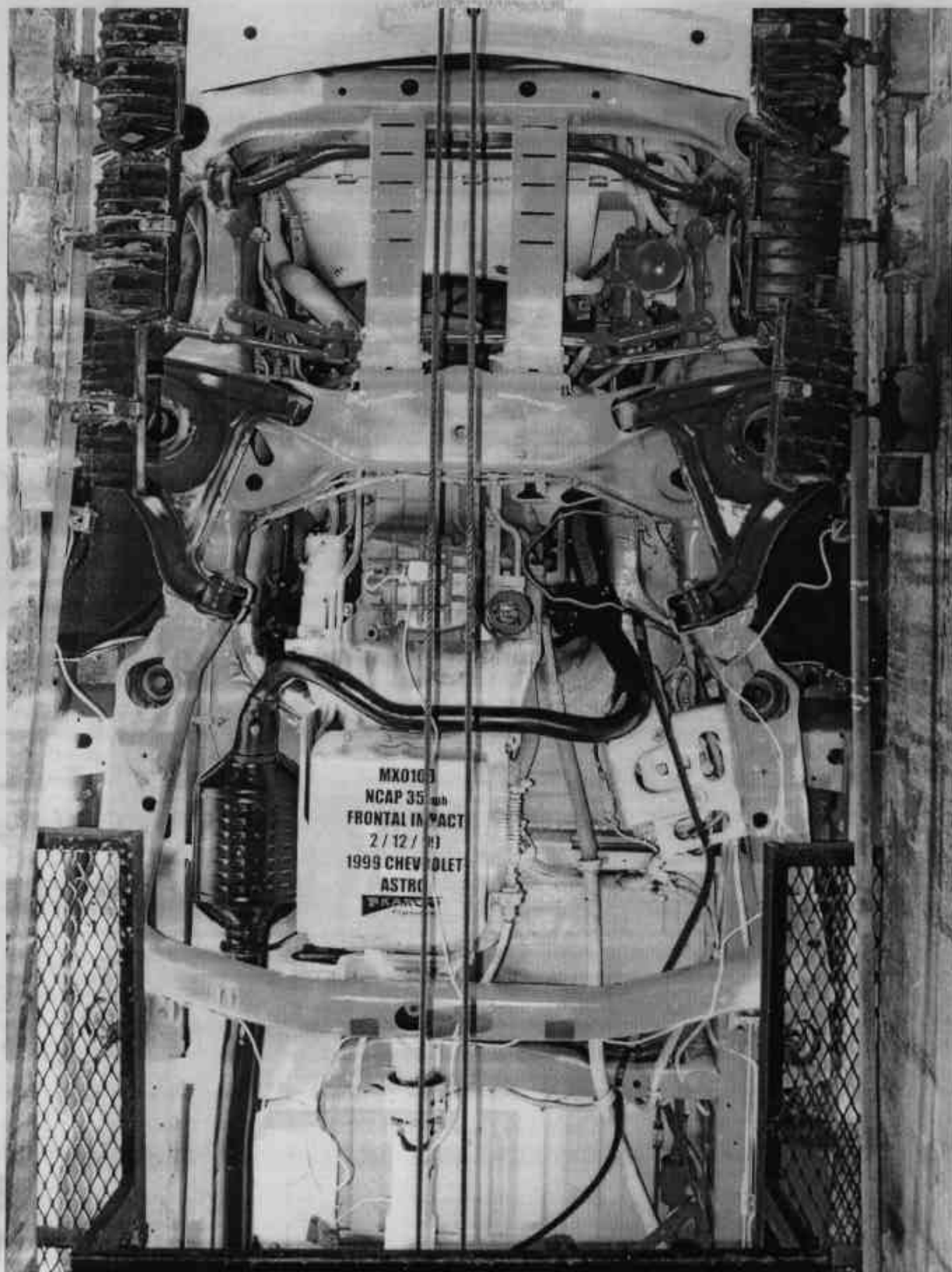


FIGURE A-21. PRETEST FRONT UNDERSIDE

91-1000000000

A-21

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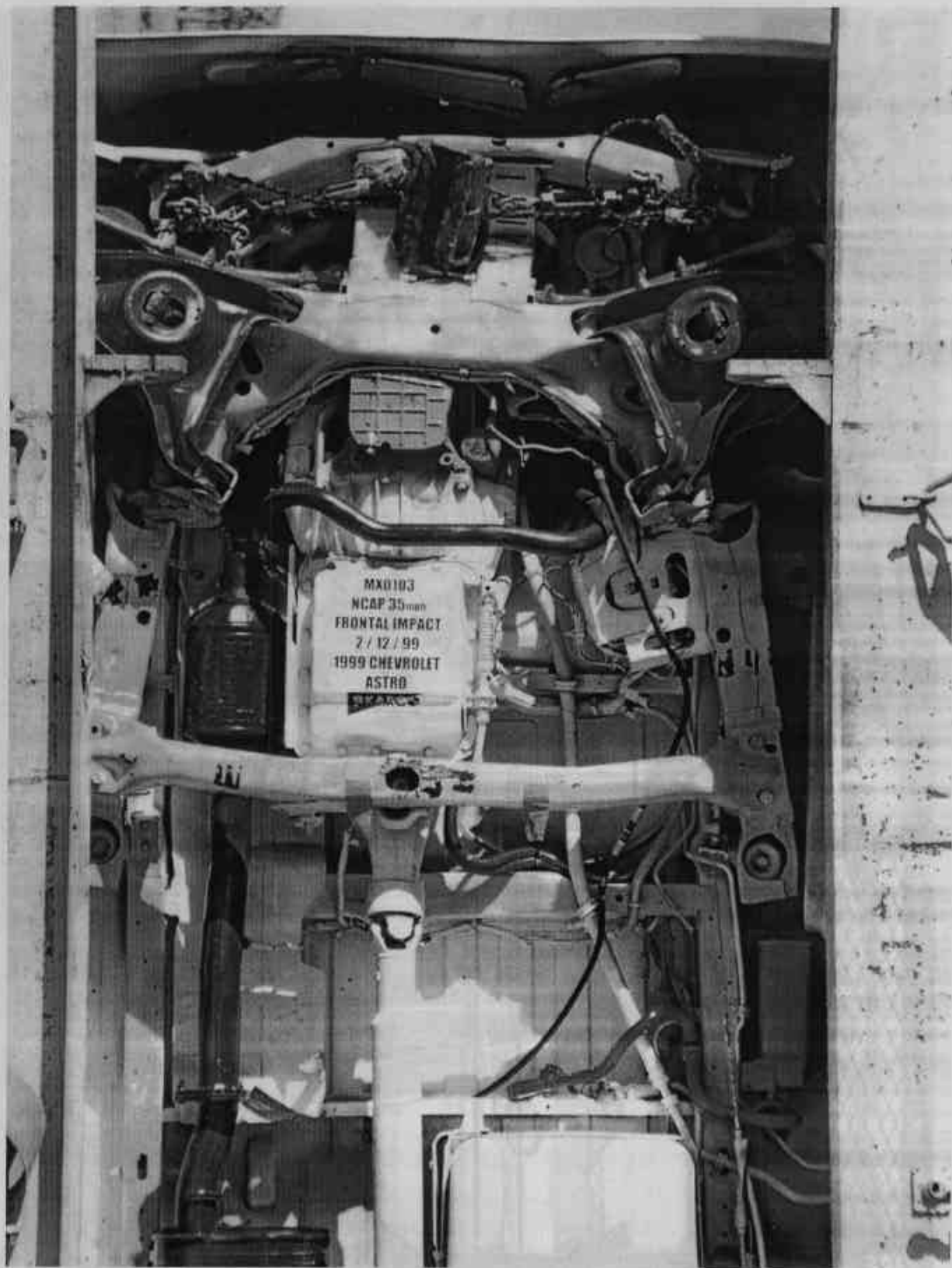


FIGURE A-22. POST TEST FRONT UNDERSIDE

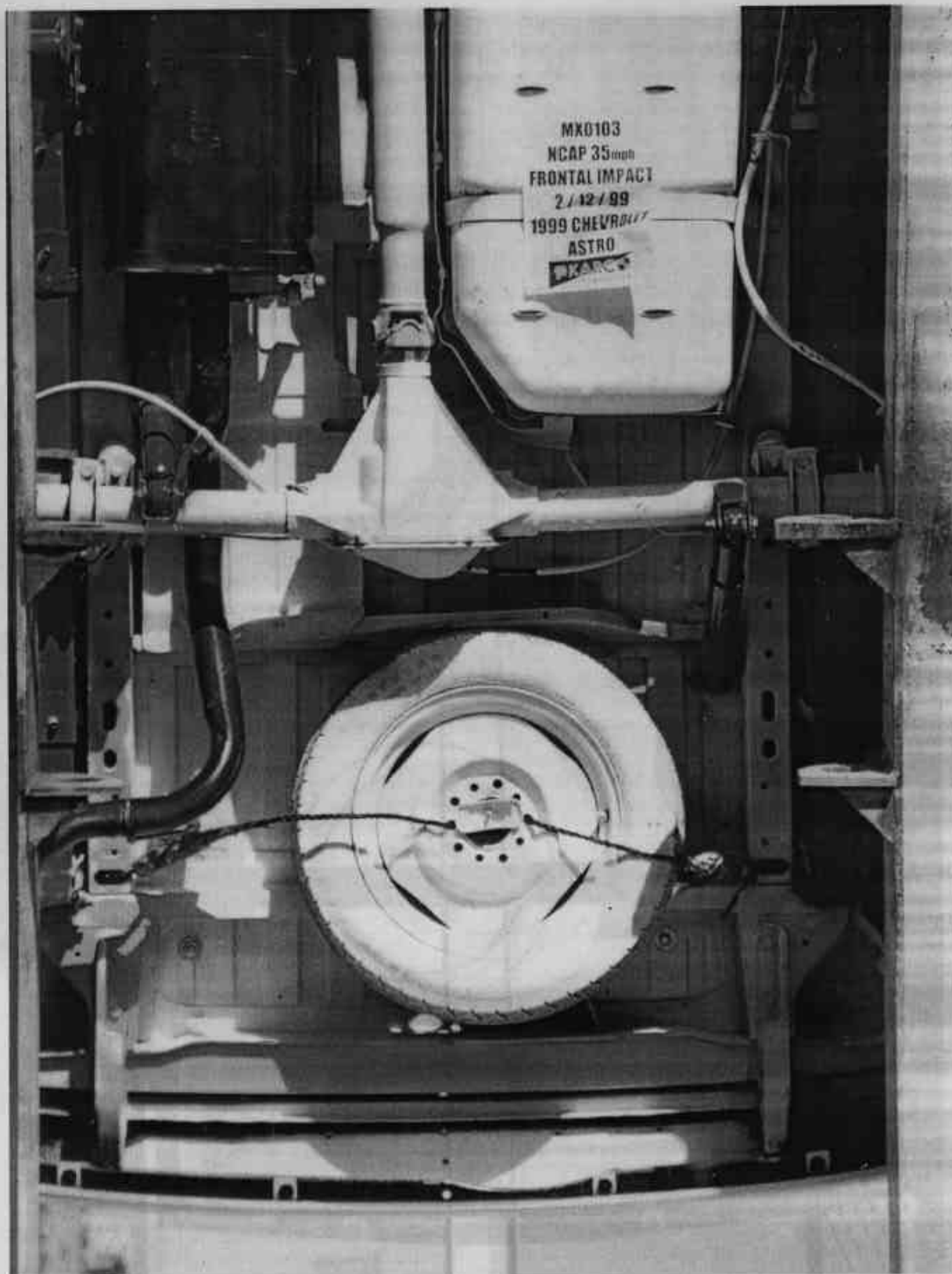


FIGURE A-24. POST TEST REAR UNDERSIDE

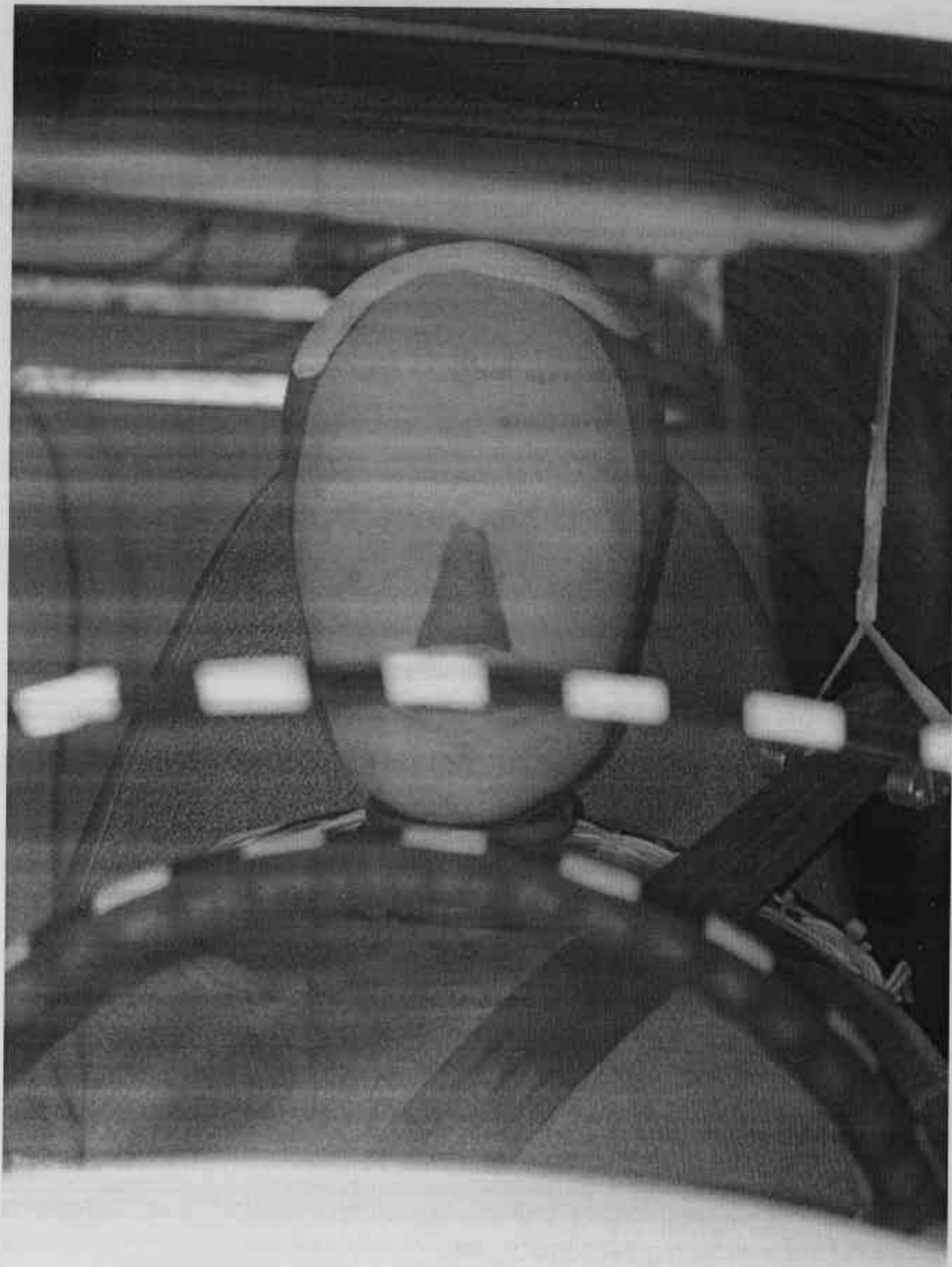


FIGURE A-25. PRETEST DRIVER DUMMY (FRONT VIEW)

Photograph Not
Available

FIGURE A-26. POST TEST DRIVER DUMMY (FRONT VIEW)

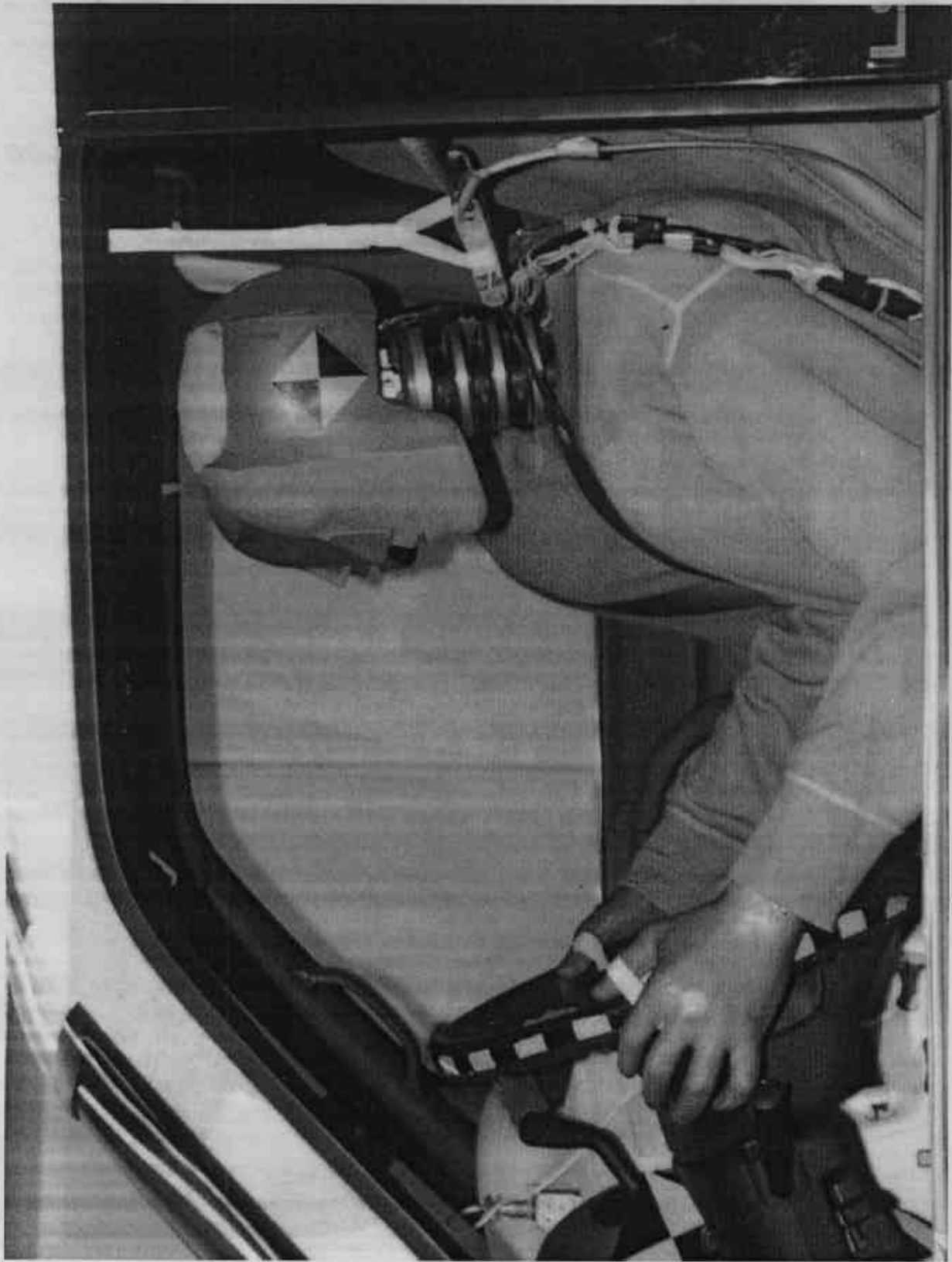


FIGURE A-27. PRETEST DRIVER DUMMY (THRU WINDOW)



FIGURE A-28. POST TEST DRIVER DUMMY (THRU WINDOW)



FIGURE A-29. PRETEST DRIVER DUMMY (DOOR OPEN)

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FIGURE A-30. POST TEST DRIVER DUMMY (DOOR OPEN)



FIGURE A-31. PRETEST DRIVER DUMMY (90° TO VEHICLE)



FIGURE A-33. PRETEST DRIVER DUMMY FEET



FIGURE A-34. POST TEST DRIVER DUMMY FEET AND KNEE CONTACT

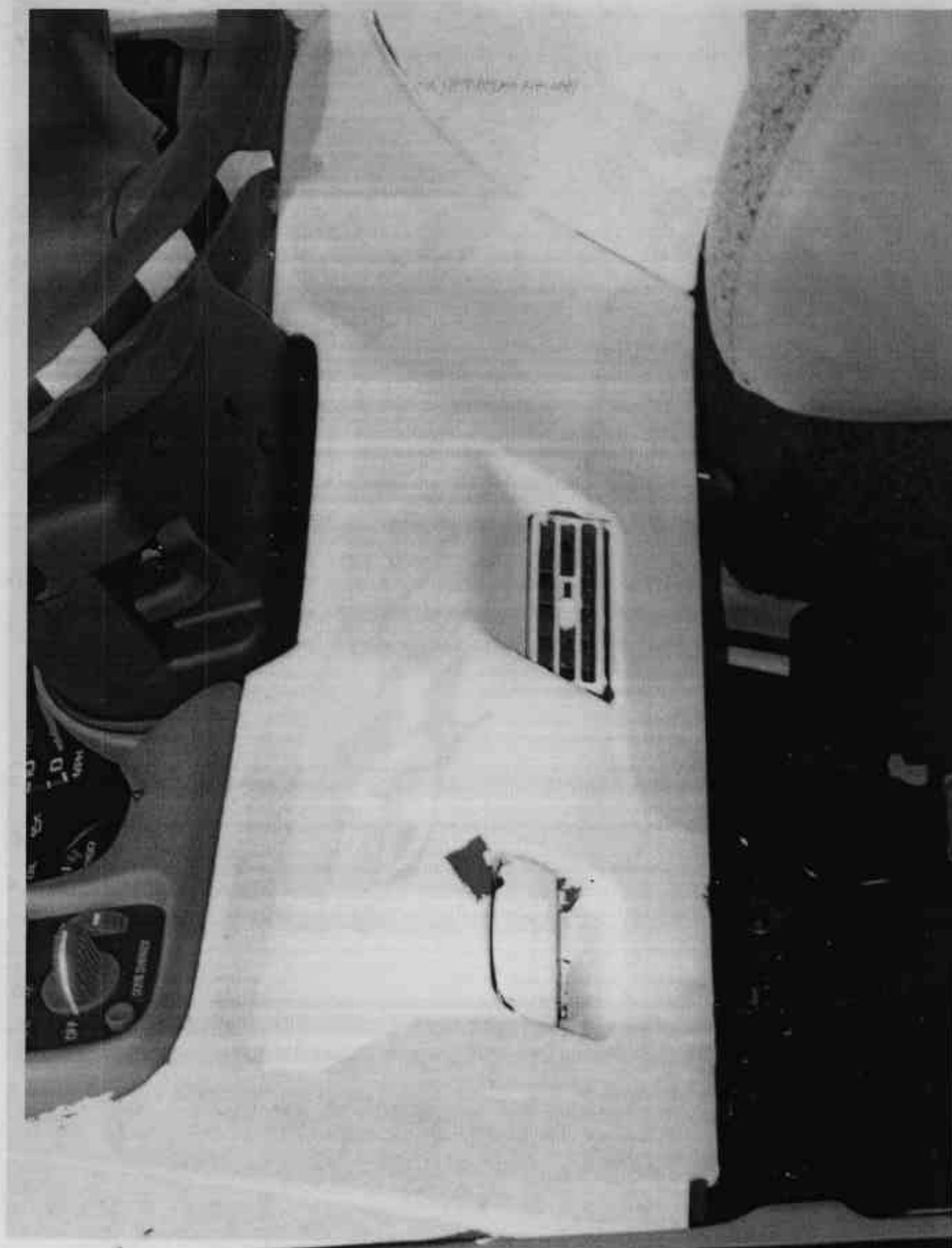


FIGURE A-35. PRETEST DRIVER KNEE BOLSTER

MF10068RA01

A-35

KAR99001-14



FIGURE A-36. POST TEST DRIVER KNEE BOLSTER

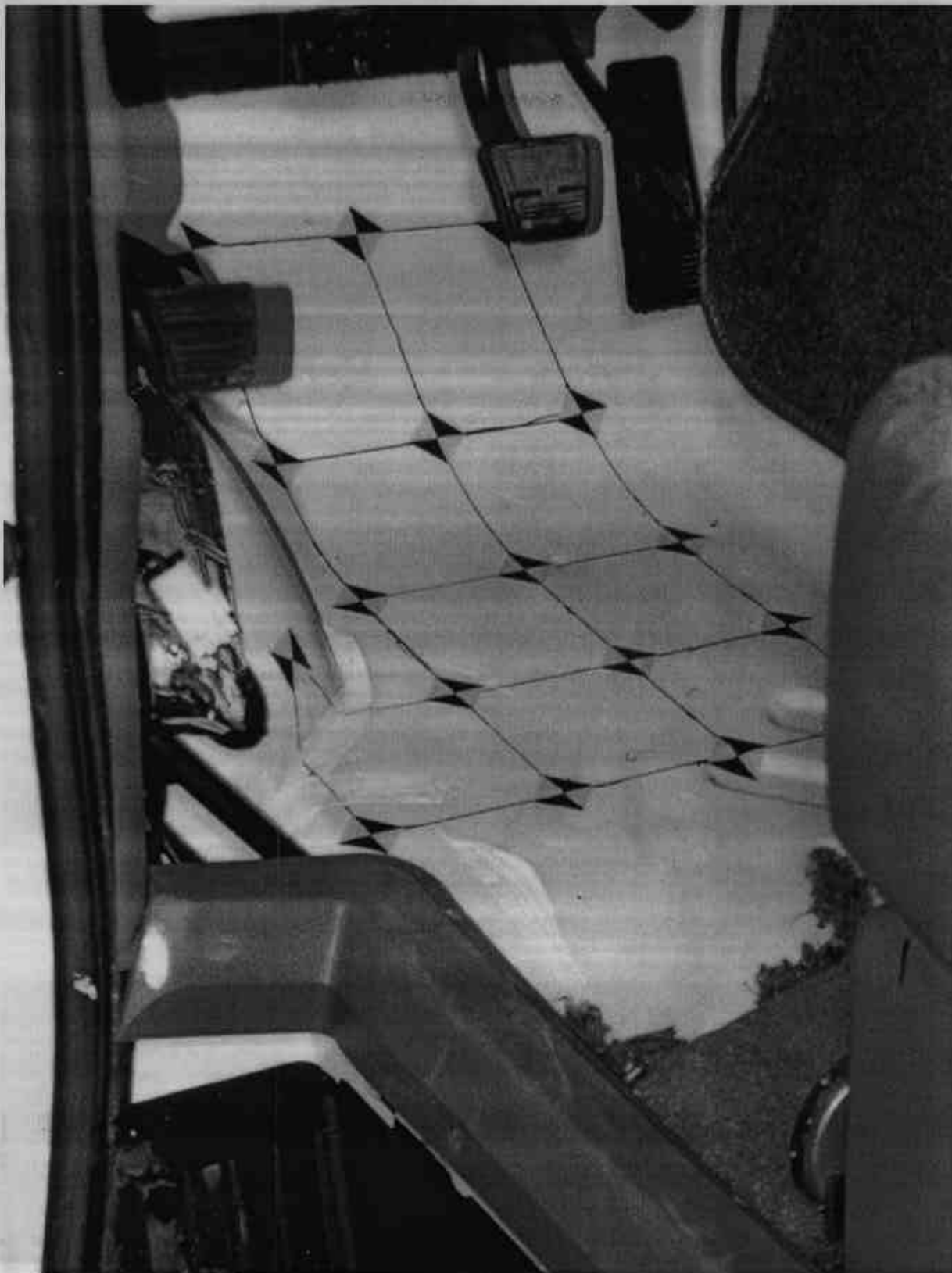


FIGURE A-37. PRETEST DRIVER SIDE FLOOR PAN

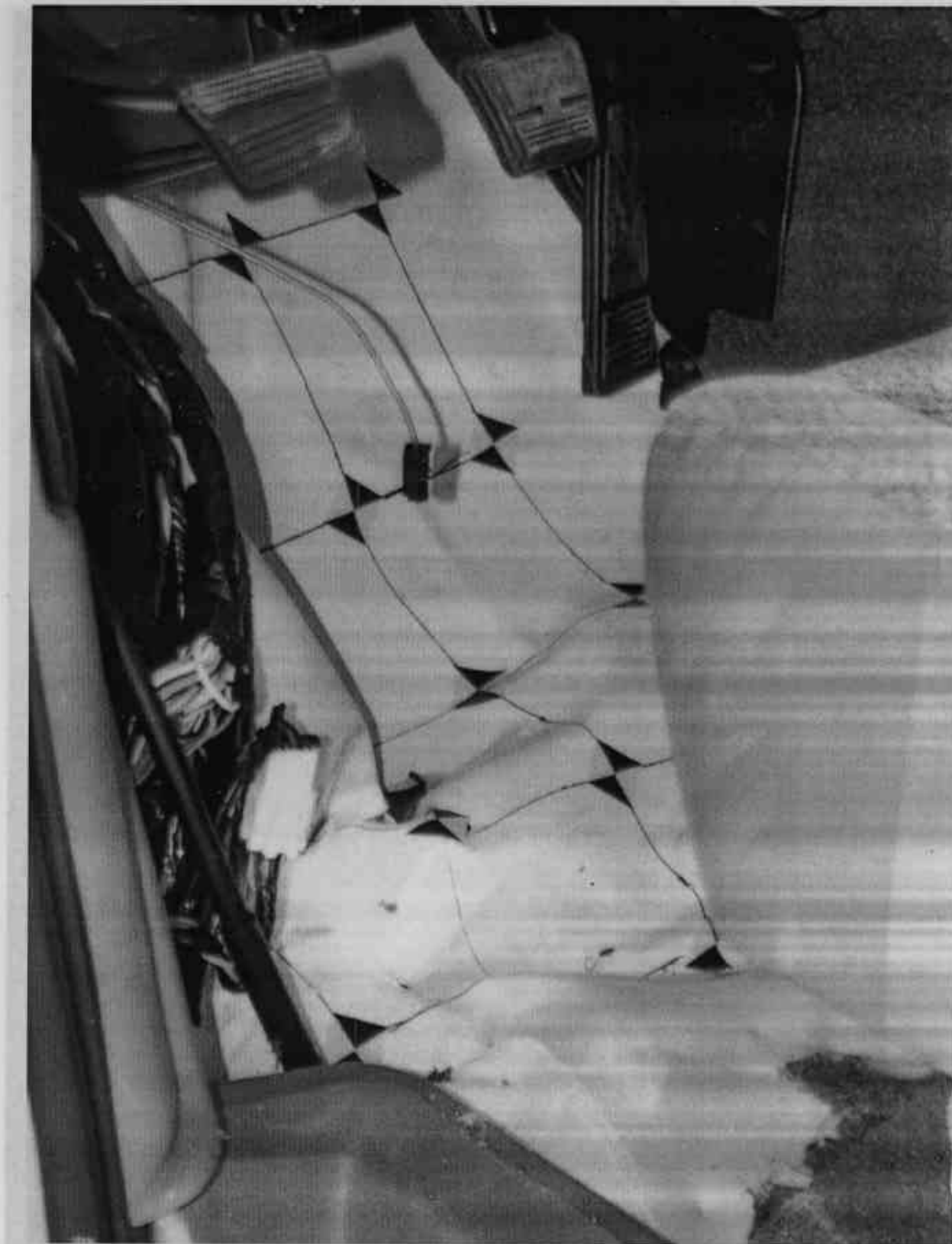


FIGURE A-38. POST TEST DRIVER SIDE FLOOR PAN



FIGURE A-39. POST TEST DRIVER HEAD

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FIGURE A-40. POST TEST DRIVER DUMMY CONTACT

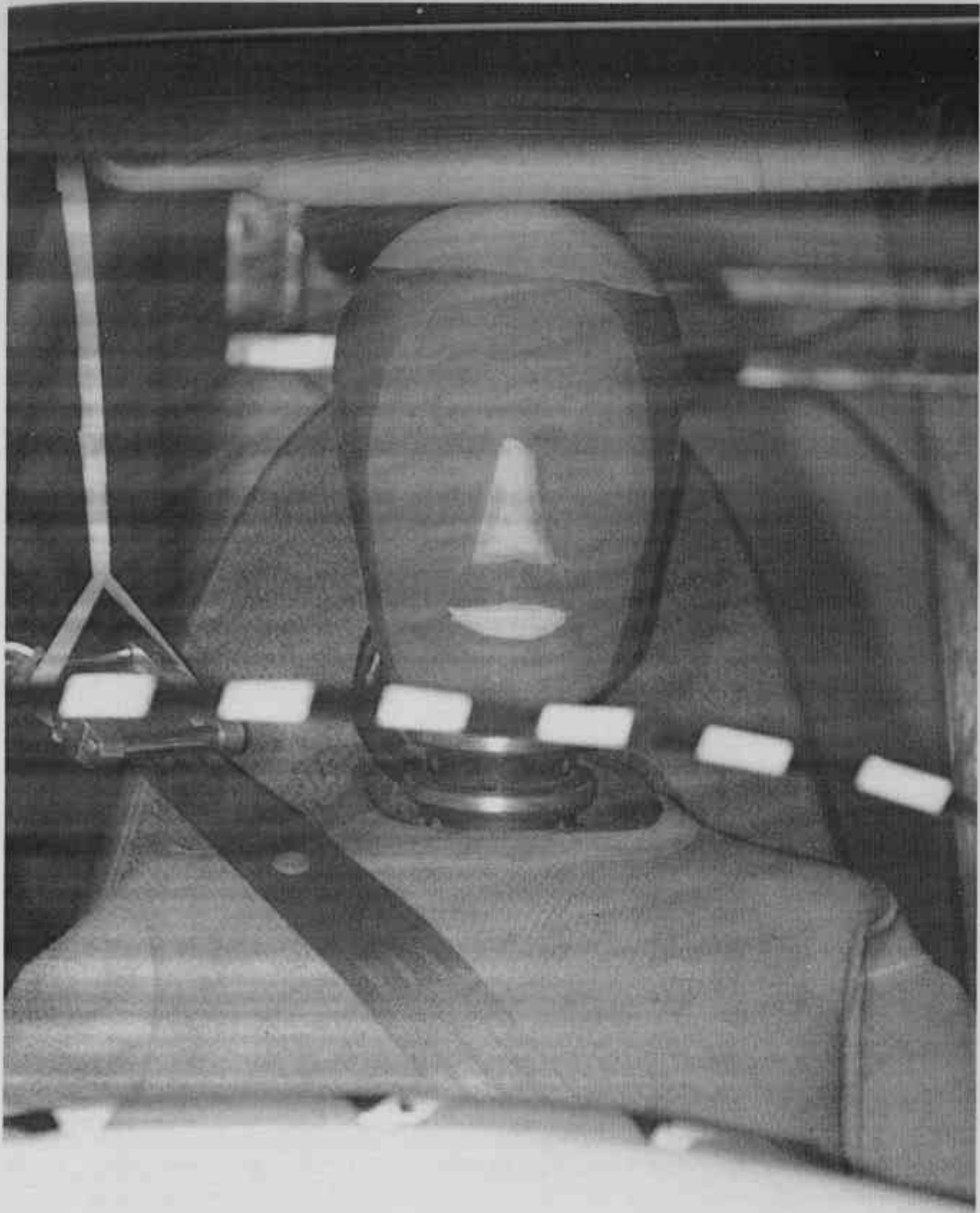


FIGURE A-41. PRETEST PASSENGER DUMMY (FRONT VIEW)

MF-10099R/01

A-41

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Photograph Not
Available

FIGURE A-42. POST TEST PASSENGER DUMMY (FRONT VIEW)



FIGURE A-43. PRETEST PASSENGER DUMMY (THRU WINDOW)



FIGURE A-44. POST TEST PASSENGER DUMMY (THRU WINDOW)



FIGURE A-45. PRETEST PASSENGER DUMMY (DOOR OPEN)



FIGURE A-46. POST TEST PASSENGER DUMMY (DOOR OPEN)



FIGURE A-47. PRETEST PASSENGER DUMMY (90° TO VEHICLE)

AT-10099RAX

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FIGURE A-48. POST TEST PASSENGER DUMMY (90° TO VEHICLE)



FIGURE A-49. PRETEST PASSENGER DUMMY FEET



FIGURE A-50. POST TEST PASSENGER DUMMY FEET AND CONTACT POINT



FIGURE A-51. PRETEST PASSENGER SIDE FLOOR PAN

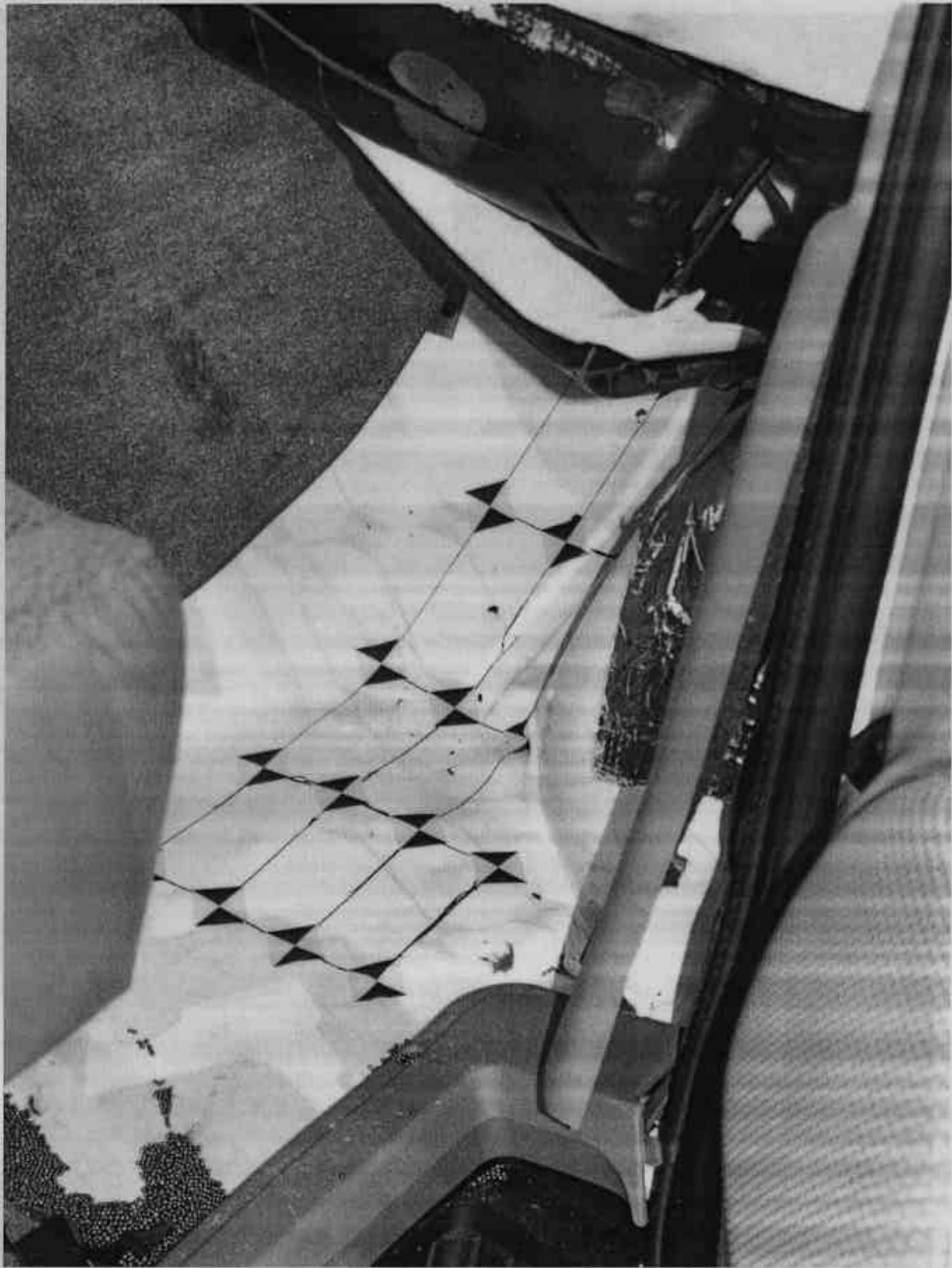


FIGURE A-52. POST TEST PASSENGER SIDE FLOOR PAN

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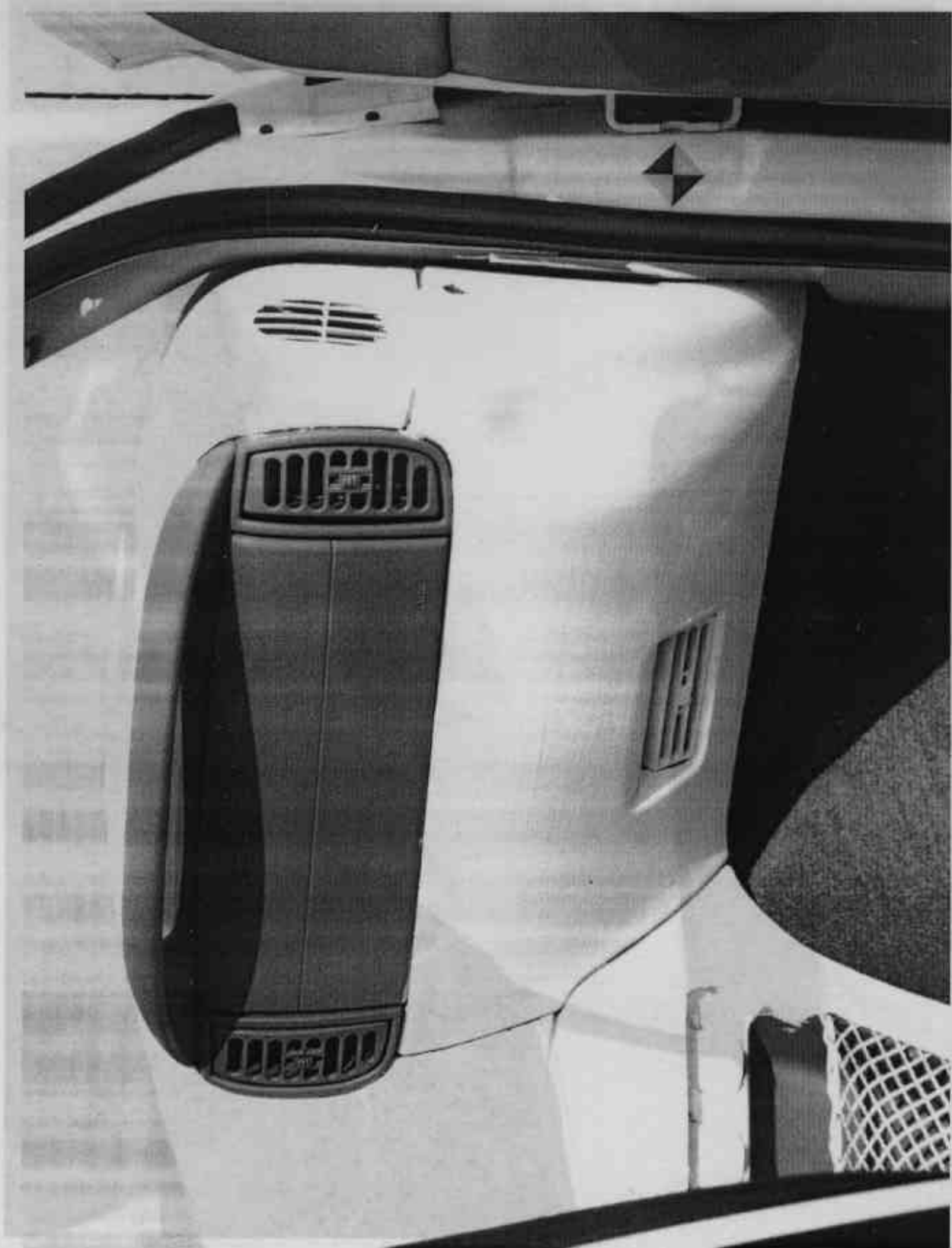


FIGURE A-53. PRETEST PASSENGER SIDE KNEE BOLSTER

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FIGURE A-54. POST TEST PASSENGER SIDE KNEE BOLSTER AND DUMMY CONTACT



FIGURE A-55. POST TEST PASSENGER HEAD

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FIGURE A-56. POST TEST PASSENGER DUMMY CONTACT

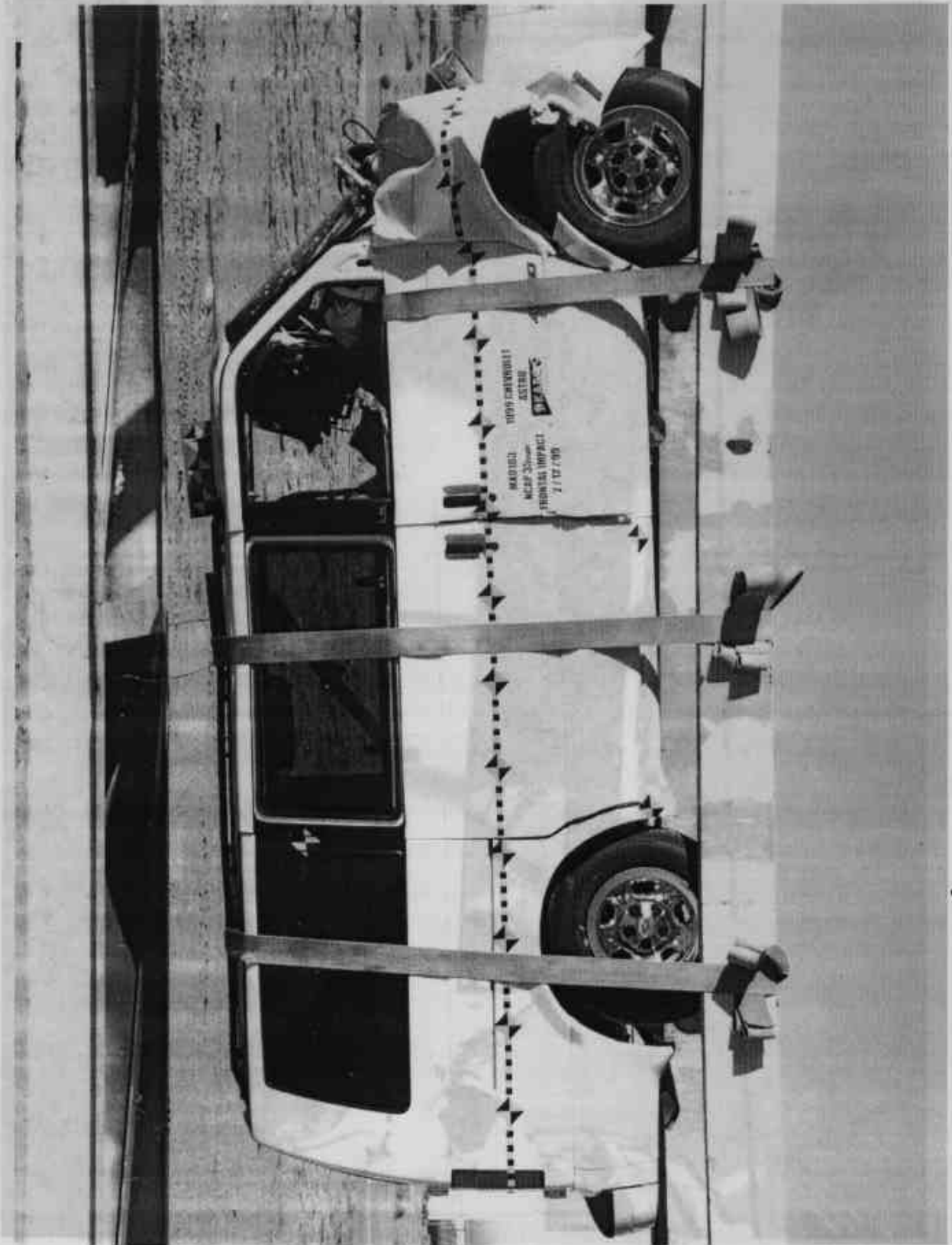


FIGURE A-57. VEHICLE ON ROLLOVER

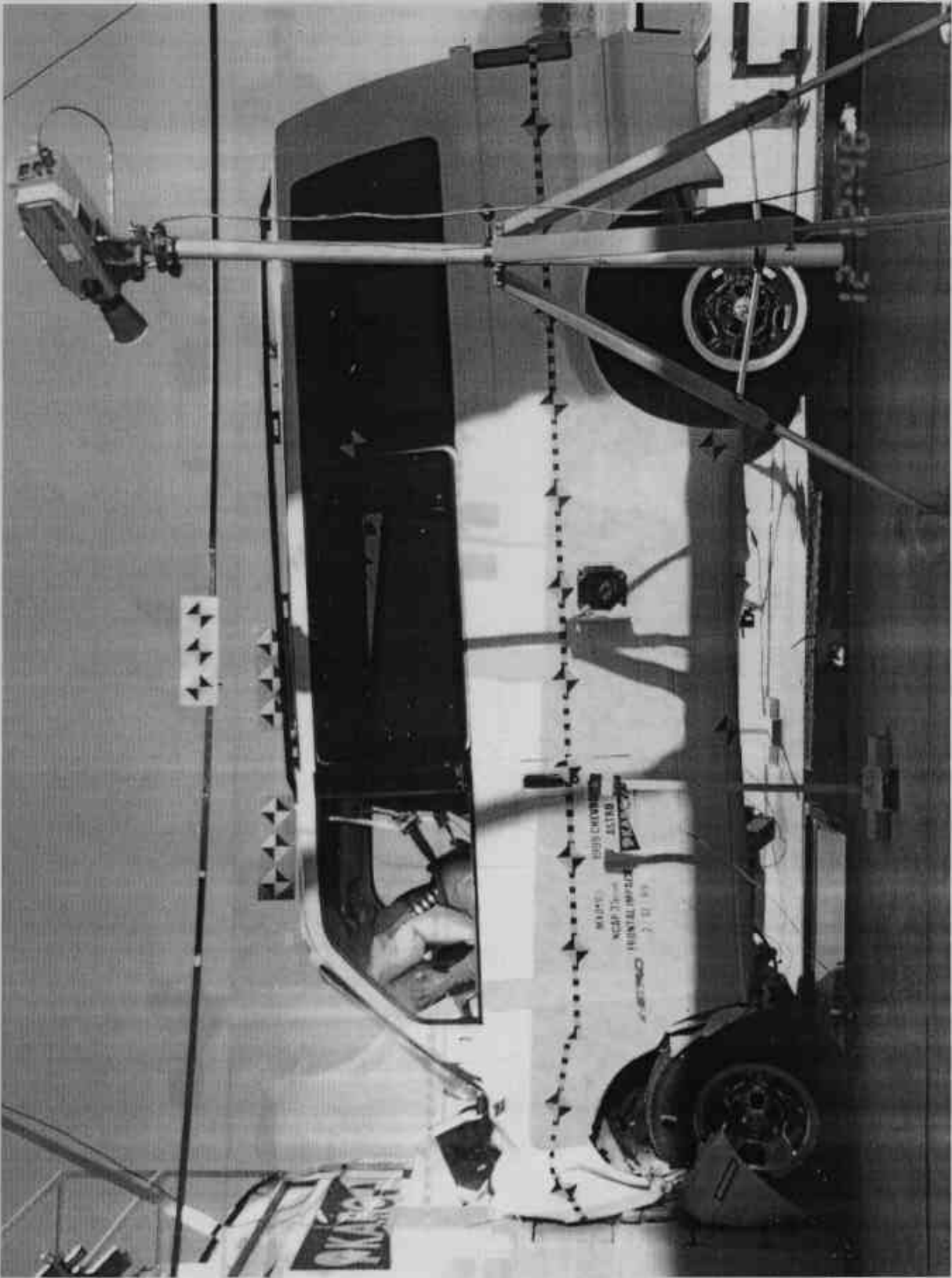


FIGURE A-58. VEHICLE DURING IMPACT

APPENDIX B
DUMMY AND VEHICLE RESPONSE DATA TRACES

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APPENDIX B

DUMMY AND VEHICLE RESPONSE DATA TRACES

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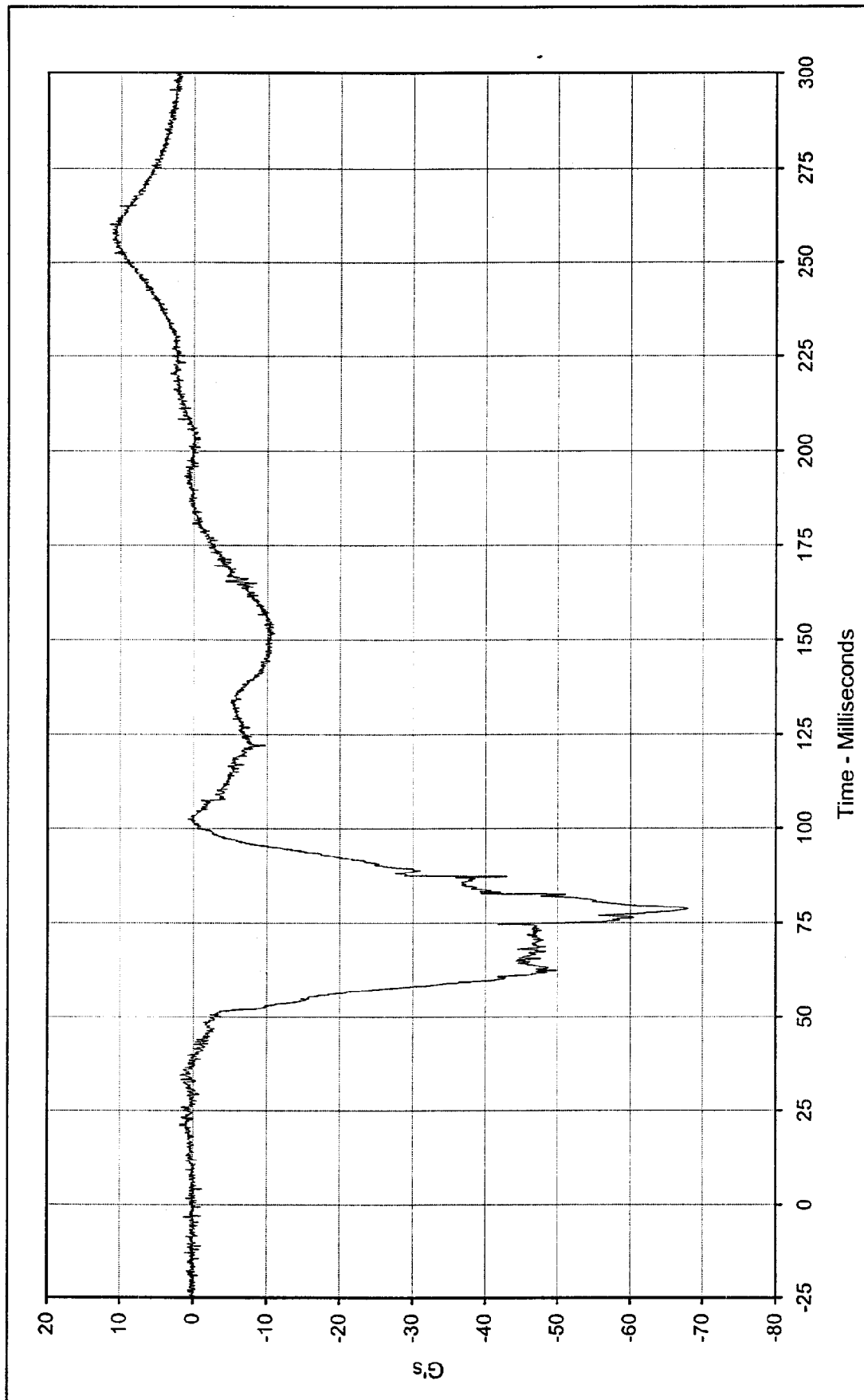
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Curve Description: Driver Head Primary X

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van

Maximum Value: 11.6 at 260.0 Milliseconds

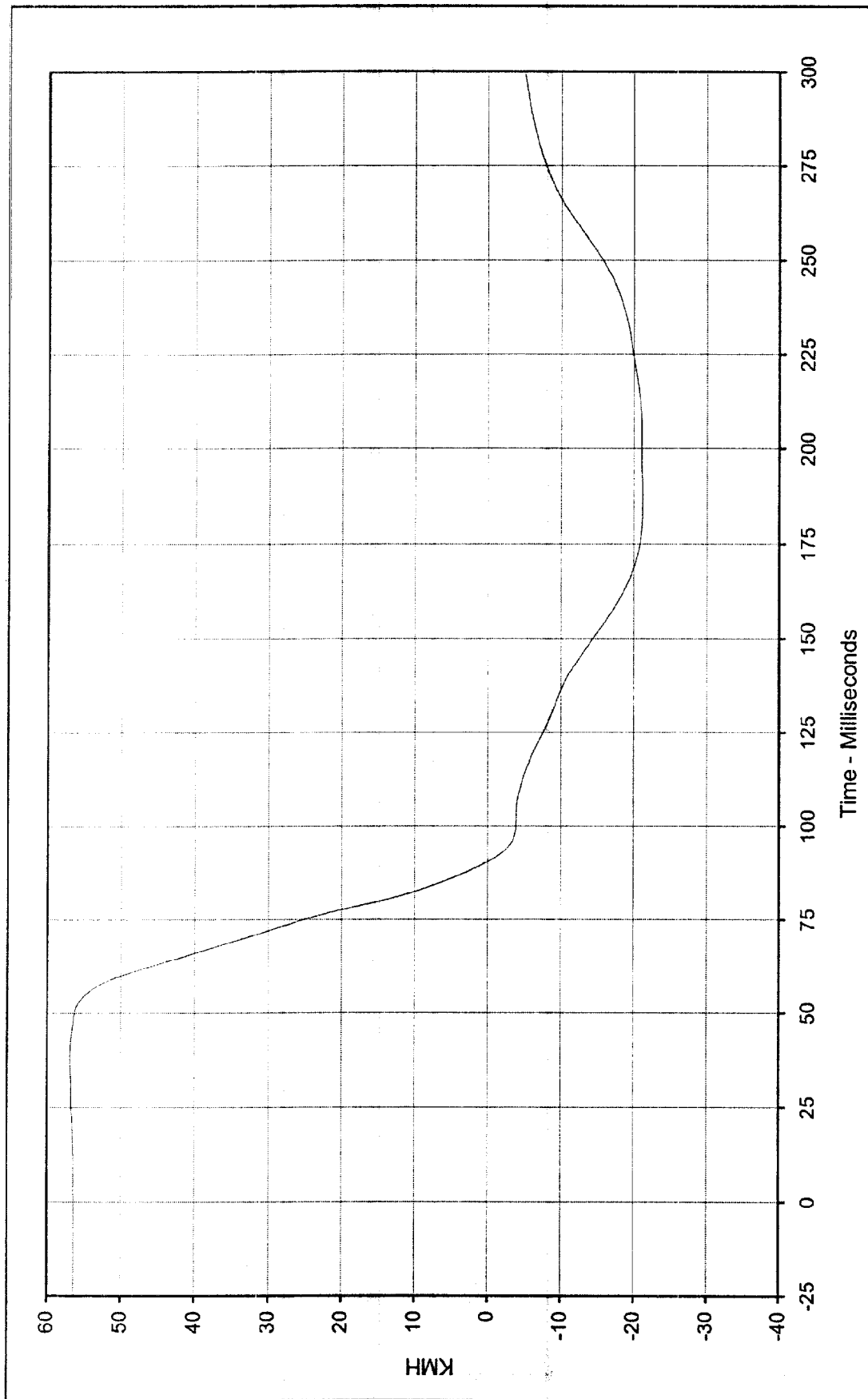
Minimum Value: -68.0 at 78.6 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

Curve Number: FIL-001





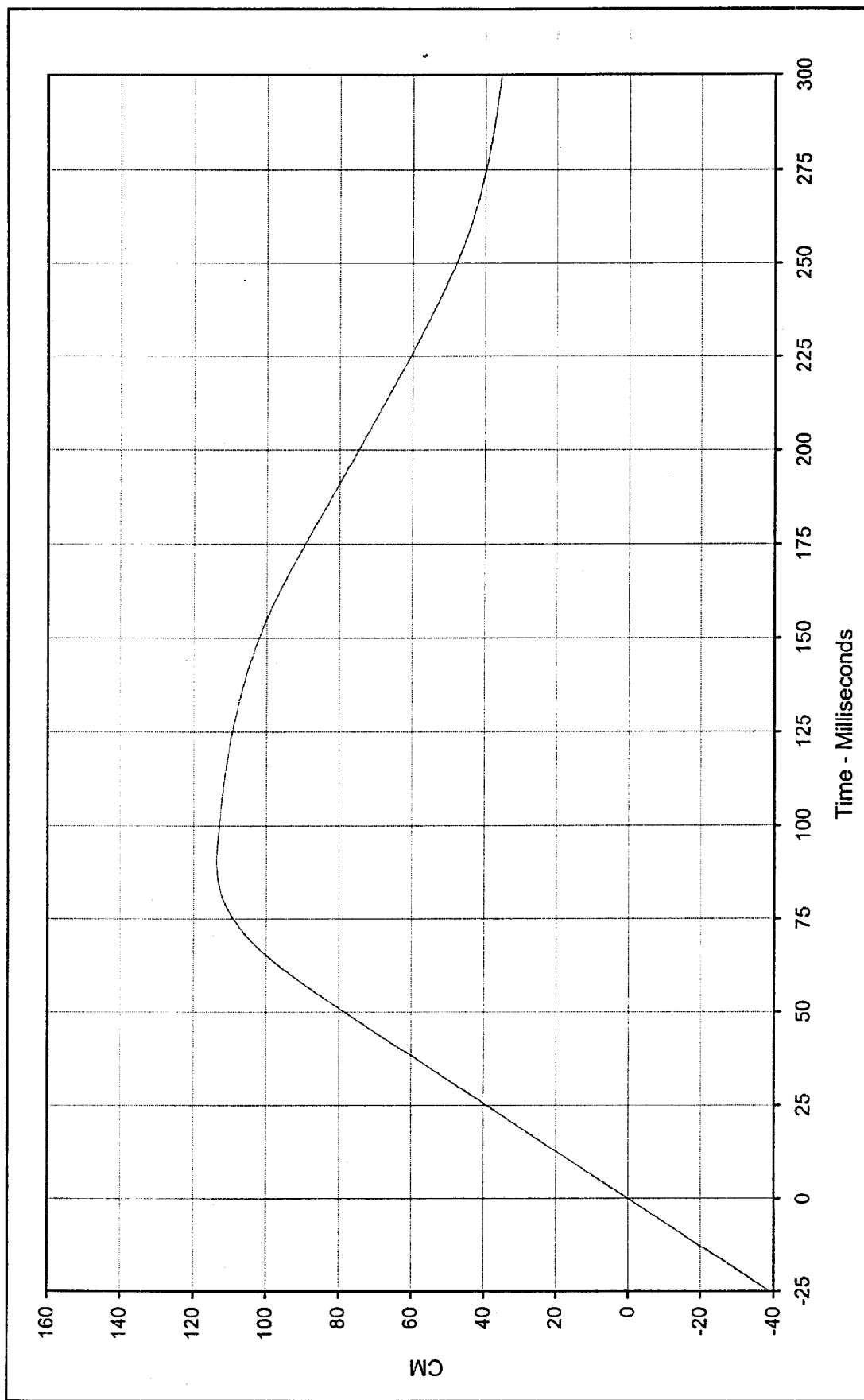
B-2

Curve Description: Driver Head Primary X Velocity
 Maximum Value: 56.9 at 37.6 Milliseconds
 Minimum Value: -21.2 at 185.4 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/12/99
 Curve Number: IN1-001

Testing Program 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van



KAR99001-14

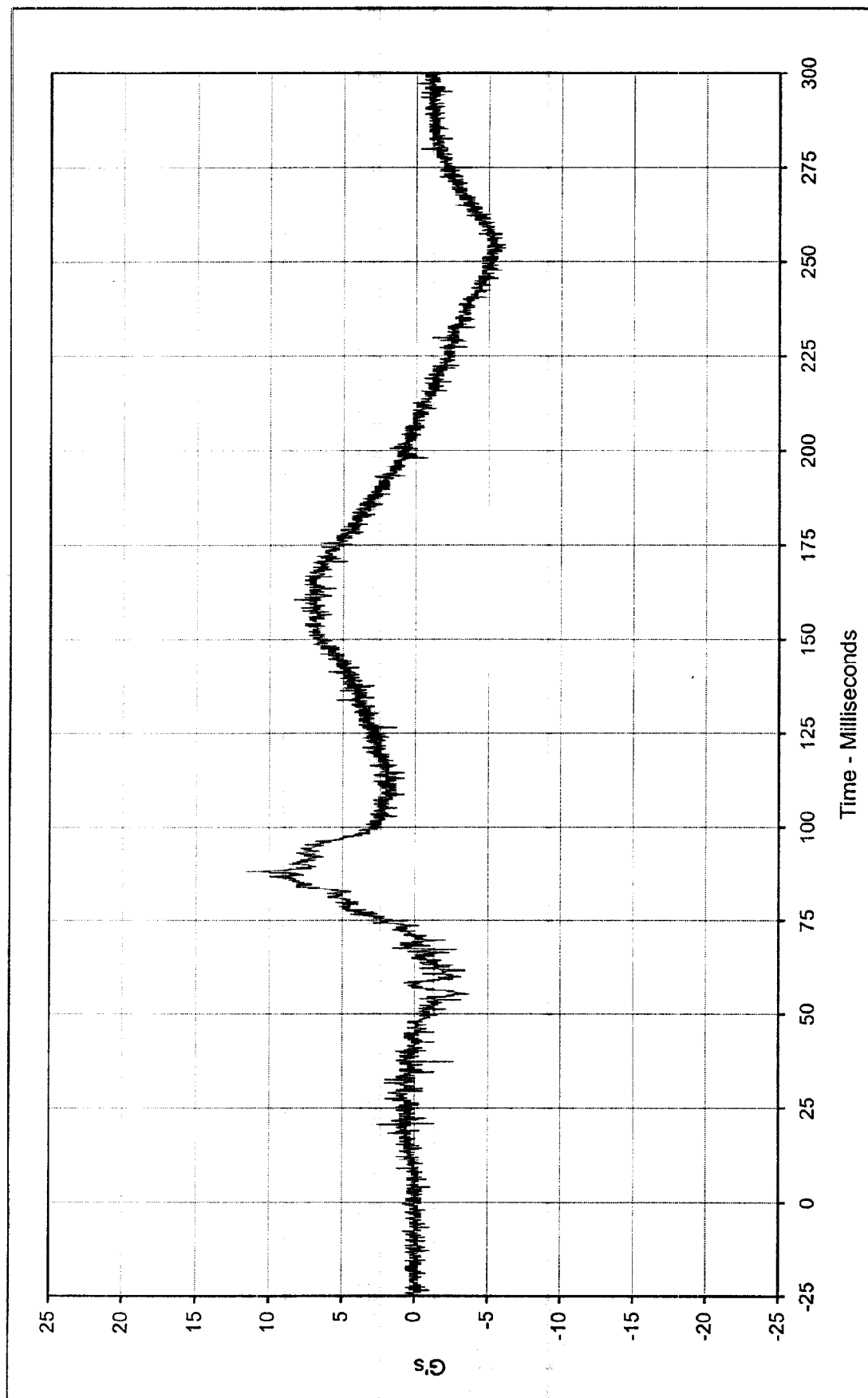


Curve Description: Driver Head Primary X Displ.
 Maximum Value: 113.7 at 90.4 Milliseconds
 Minimum Value: 0.0 at 0.0 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/12/99
 Curve Number: IN2-001

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van



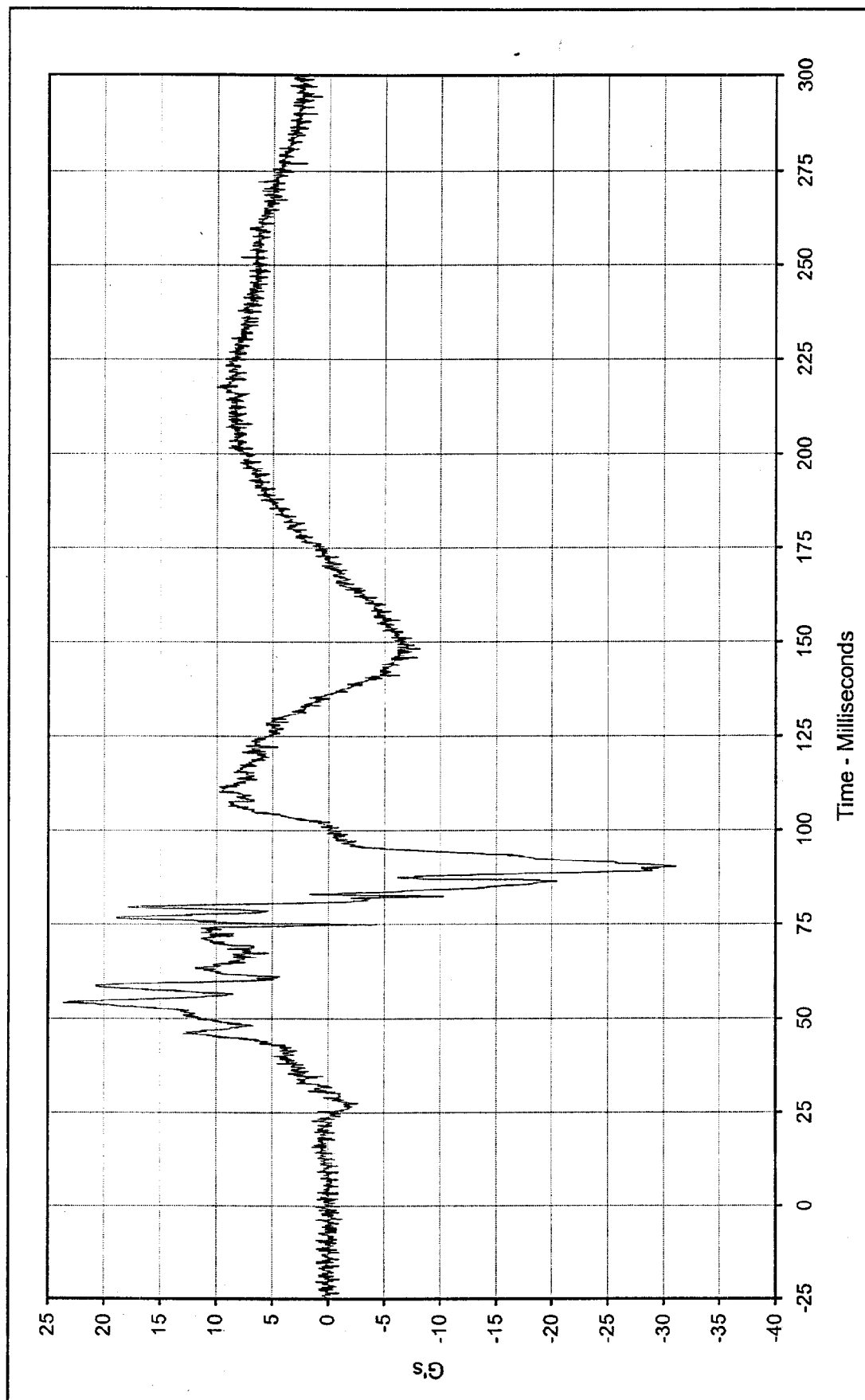


B-4

Curve Description:	Driver Head Primary Y	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	11.6	at	88.2	Milliseconds
Minimum Value:	-6.1	at	253.6	Milliseconds
SAE Filter Class:	1000	Test Vehicle:	1999 Chevrolet Astro LS Van	
Date of Test:	2/12/99			
Curve Number:	FIL-002			

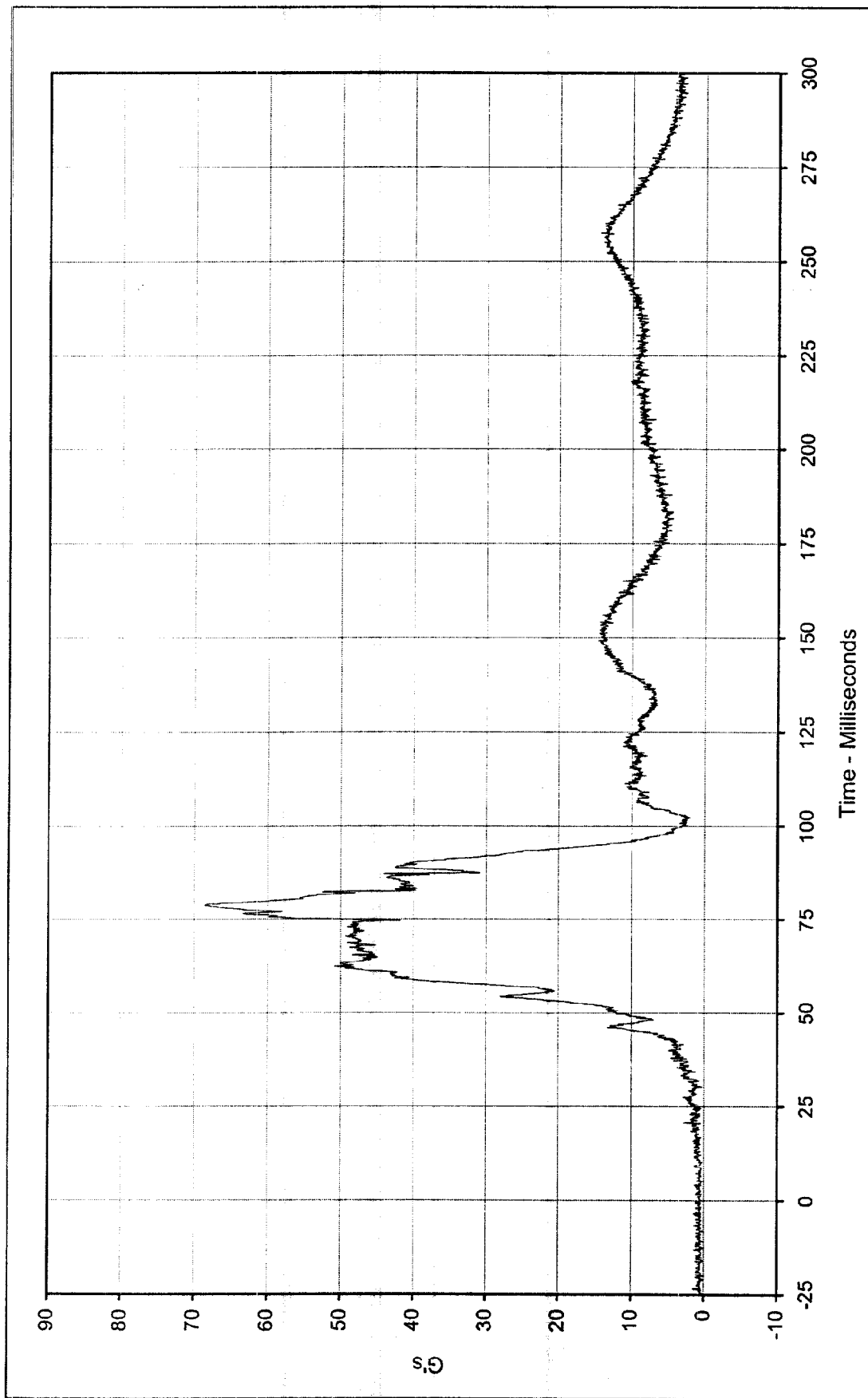


KAR99001-14



Curve Description:	Driver Head Primary Z	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	23.6 at 54.1 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-31.1 at 89.9 Milliseconds			
SAE Filter Class:	1000			
Date of Test:	2/12/99			
Curve Number:	FIL-003			





Curve Description: Driver Head Resultant Primary

Maximum Value: 68.6 at 78.6 Milliseconds

Minimum Value: 0.1 at 5.2 Milliseconds

SAE Filter Class: 1000

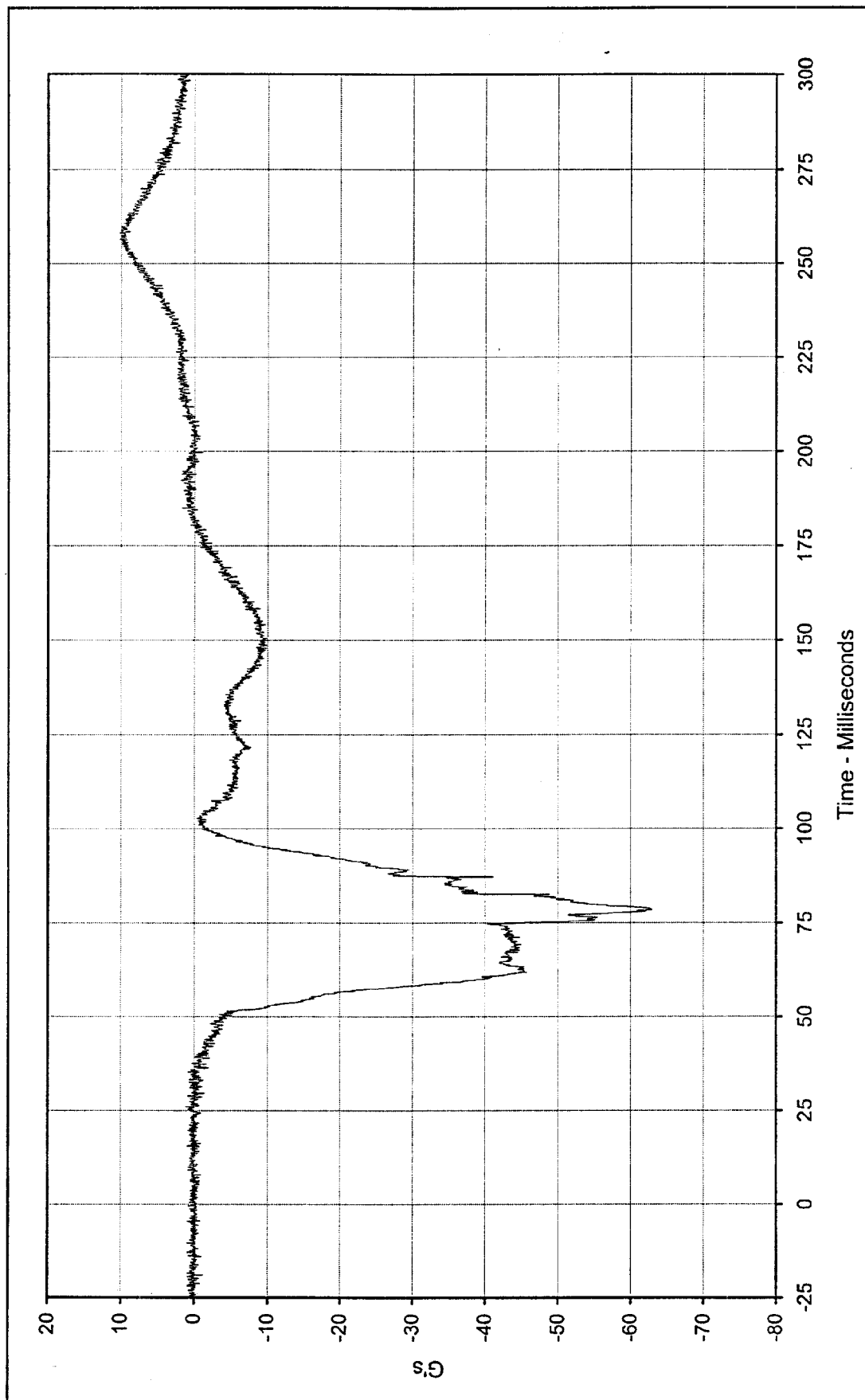
Date of Test: 2/12/99

Curve Number: RES-001

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Driver Head Redundant X Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 10.2 at 256.3 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

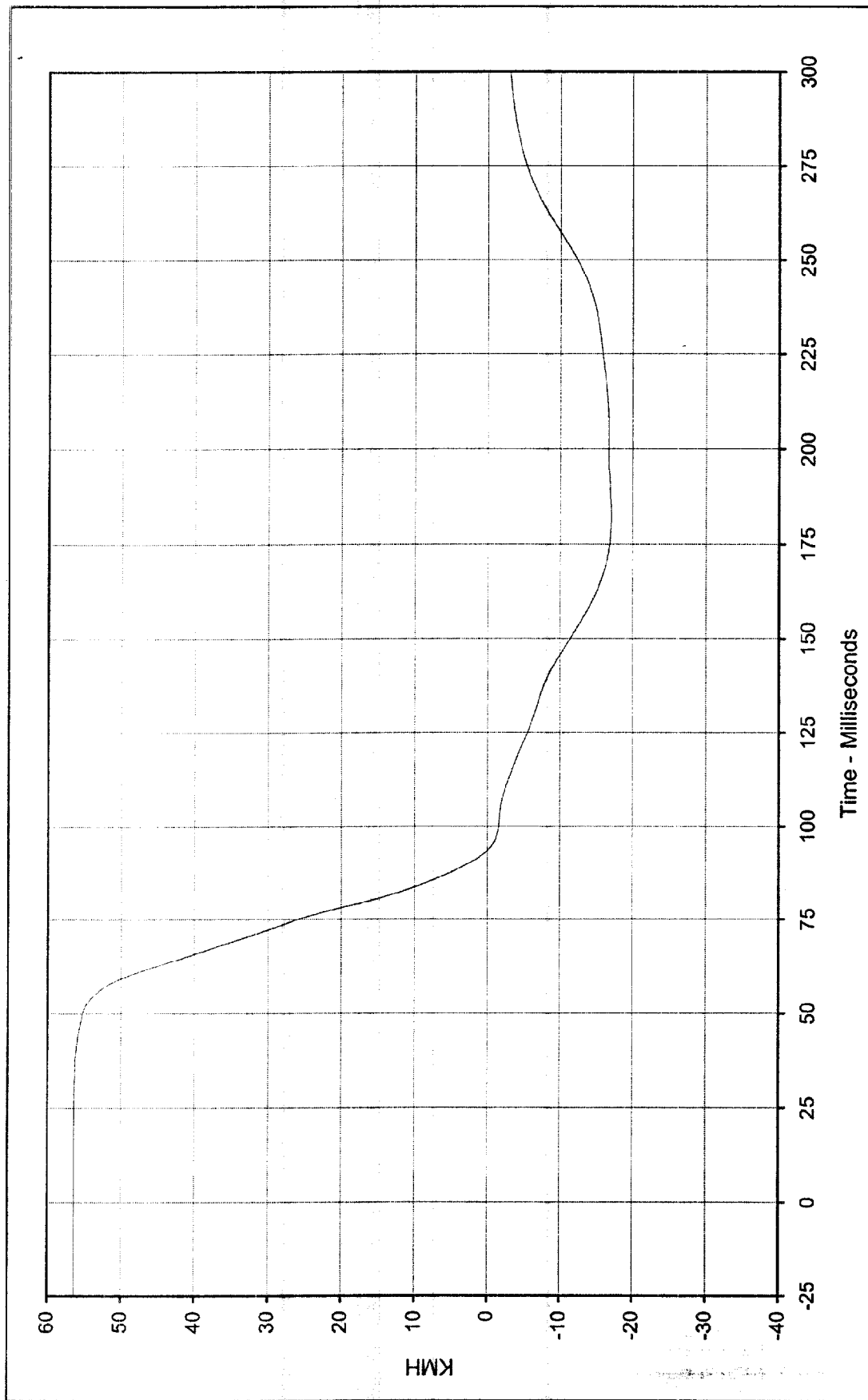
Minimum Value: -63.0 at 78.5 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

Curve Number: FIL-004





Curve Description: Driver Head Redundant X Velocity

Maximum Value: 56.4 at 2.2 Milliseconds

Minimum Value: -17.0 at 181.9 Milliseconds

SAE Filter Class: 180

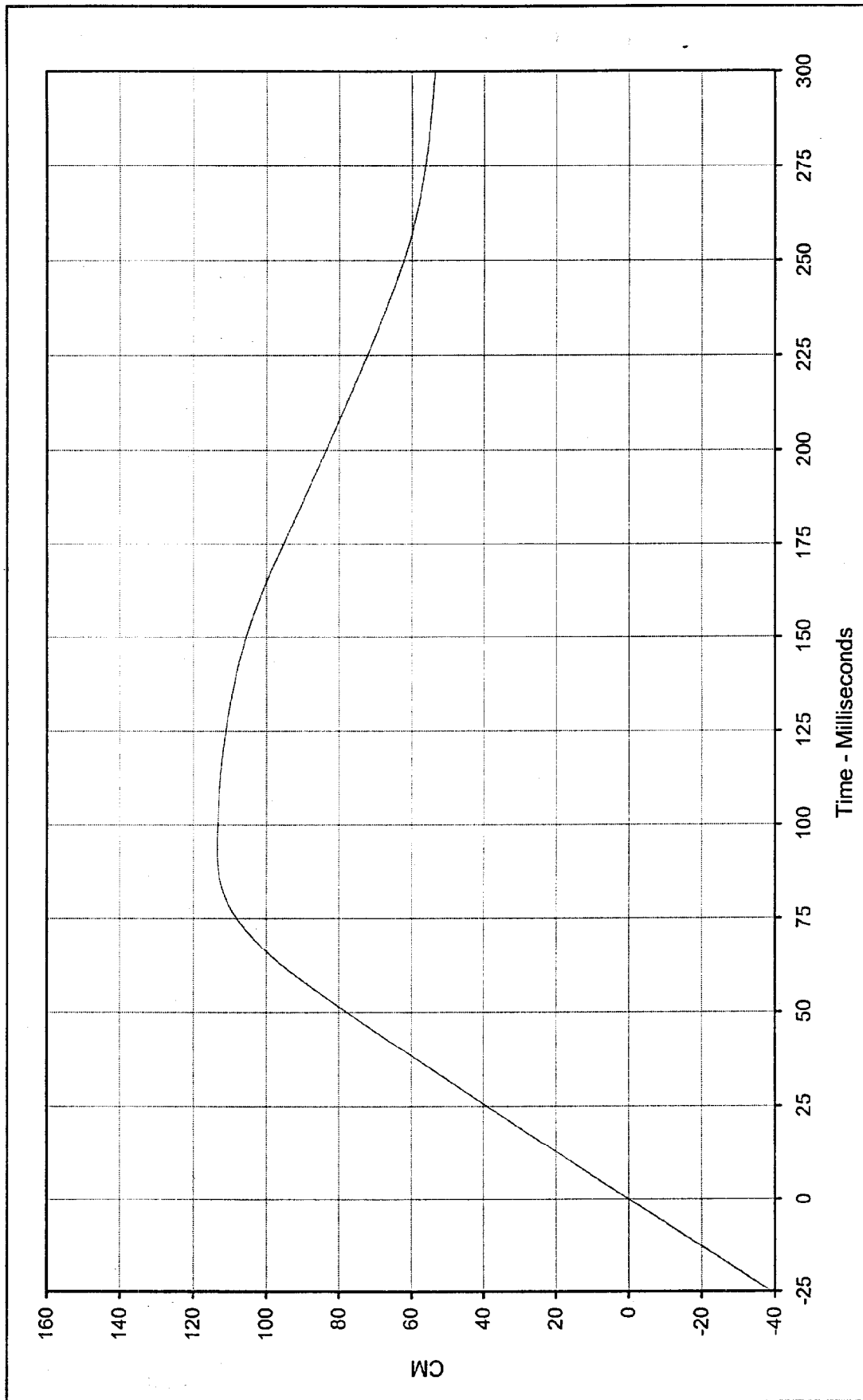
Date of Test: 2/12/99

Curve Number: IN1-004

Testing Program 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Driver Head Redundant X Displ.

Maximum Value: 113.5 at 93.5 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

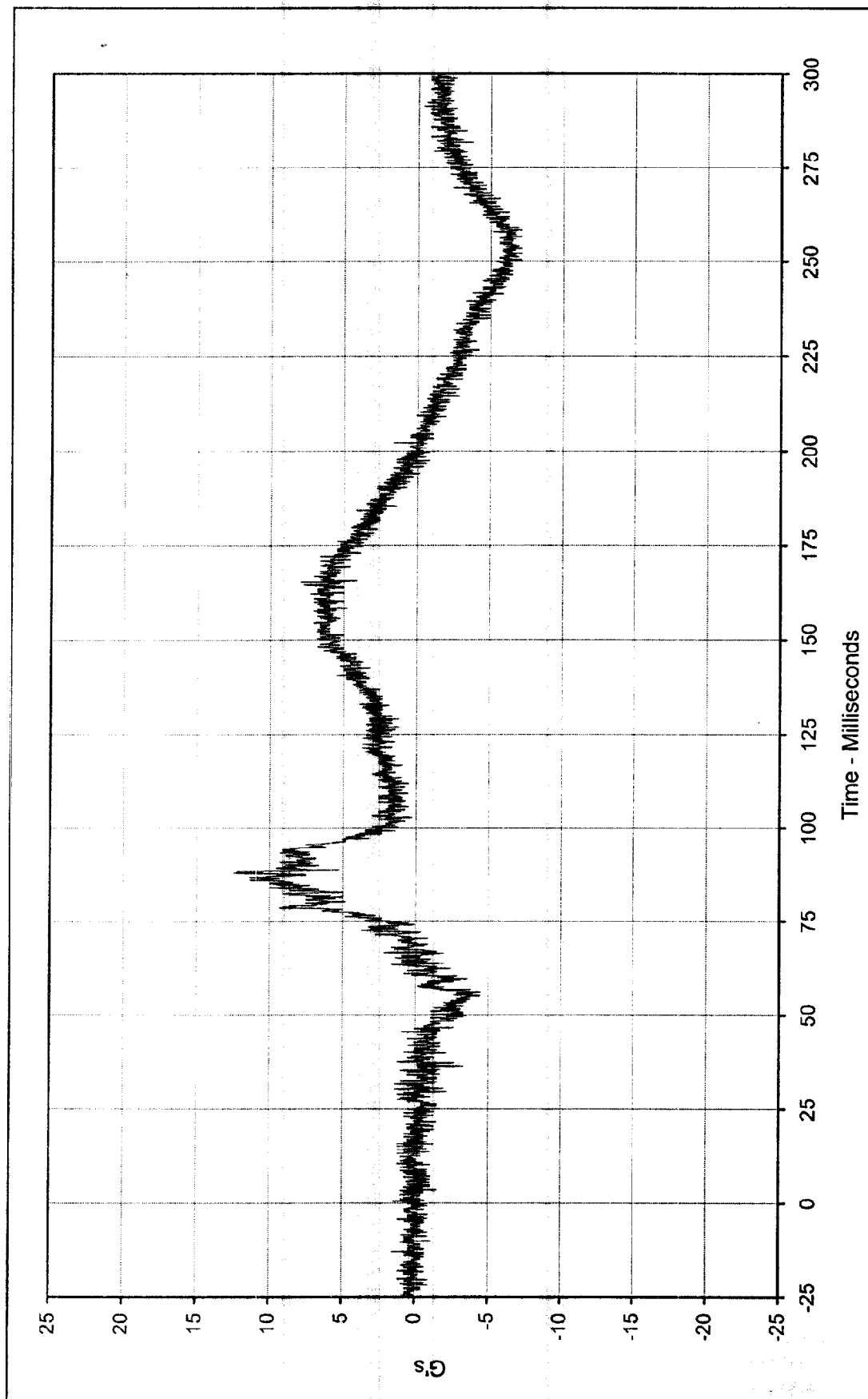
Date of Test: 2/12/99

Curve Number: IN2-004

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van

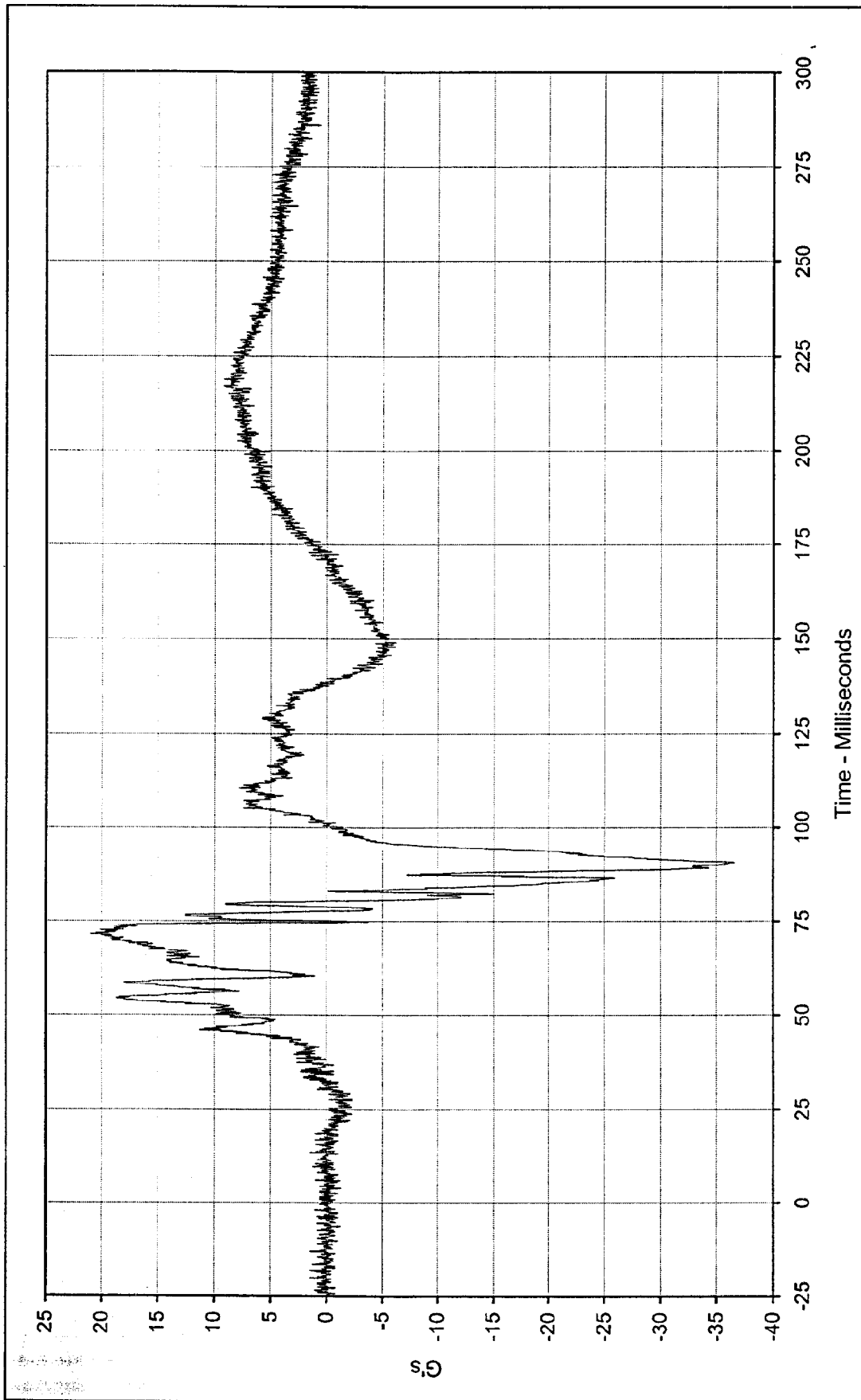




Curve Description:	Driver Head Redundant Y		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	12.5	at 87.9 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-7.2	at 250.1 Milliseconds			
SAE Filter Class:	1000				
Date of Test:	2/12/99				
Curve Number:	FIL-005				





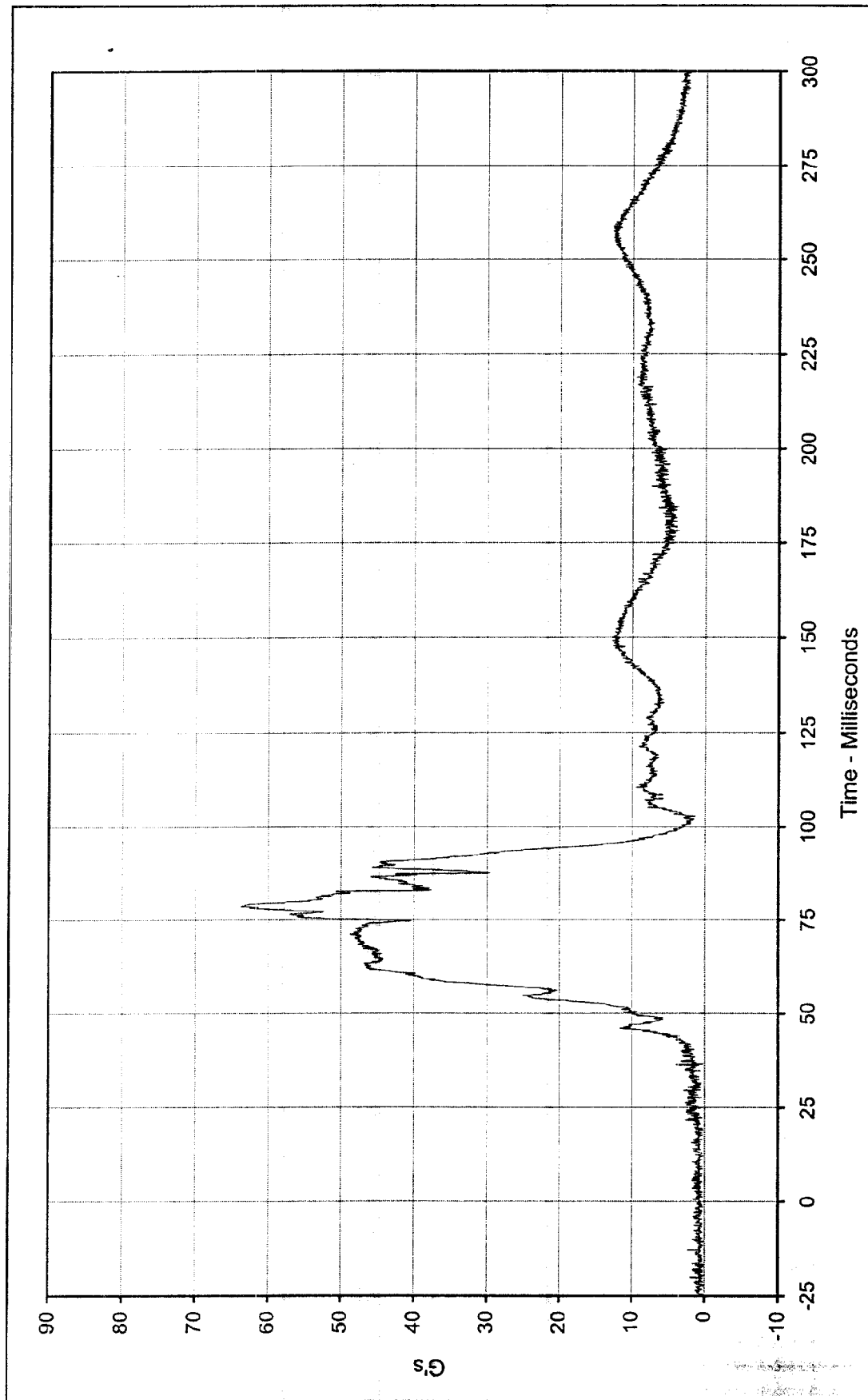


Curve Description: Driver Head Redundant Z
 Maximum Value: 21.0 at 71.5 Milliseconds
 Minimum Value: -36.6 at 90.4 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/12/99
 Curve Number: FIL-006

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Driver Head Resultant Redundant

Maximum Value: 63.8 at 78.5 Milliseconds

Minimum Value: 0.1 at 12.1 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

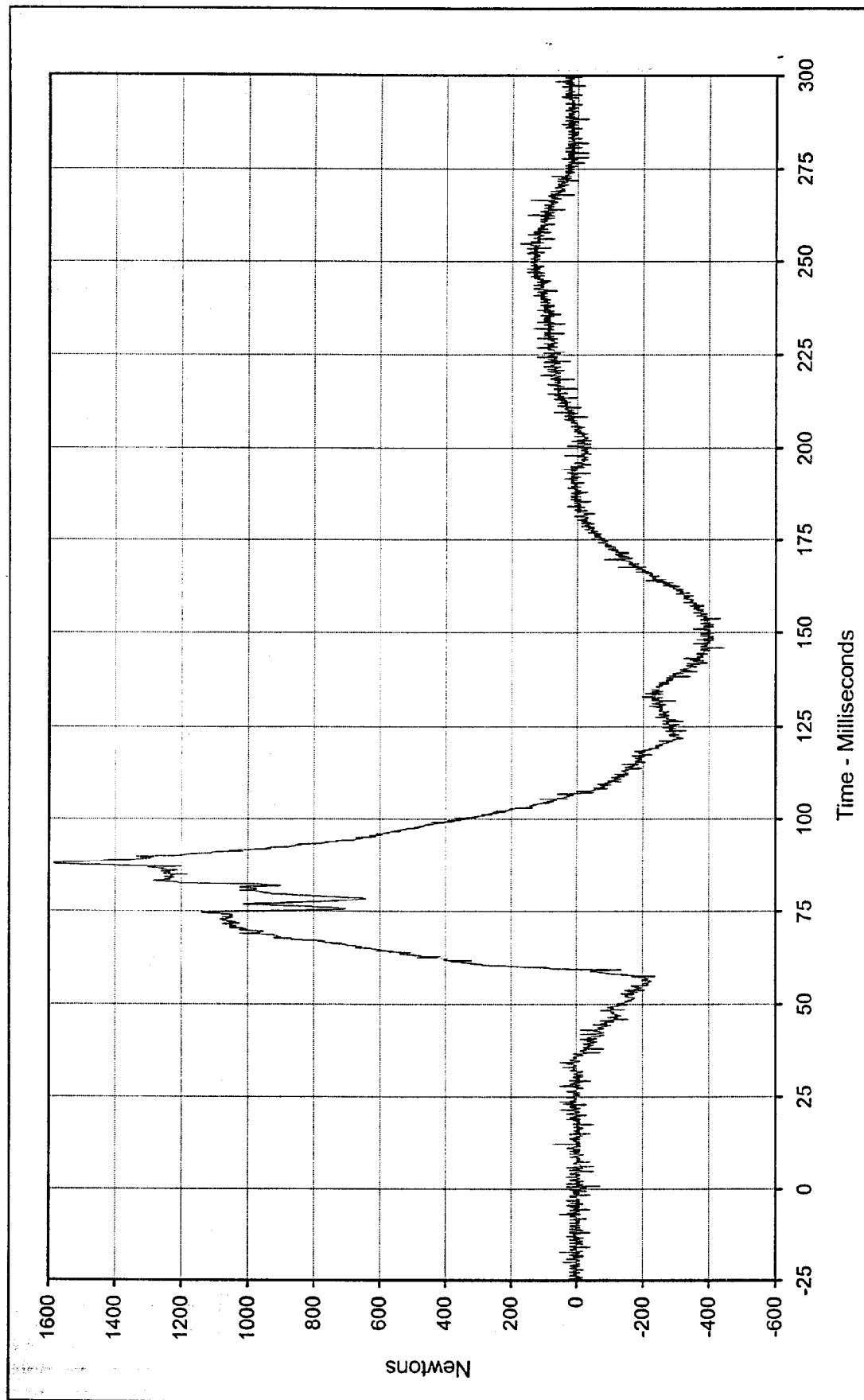
Curve Number: RES-004

Test Program: 1999 NHTSA 35 mph NCAP

Test Vehicle: 1999 Chevrolet Astro LS Van

No.: MX0103





Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Program: 1999 Chevrolet Astro LS Van

Maximum Value: 1583.6 at 87.9 Milliseconds

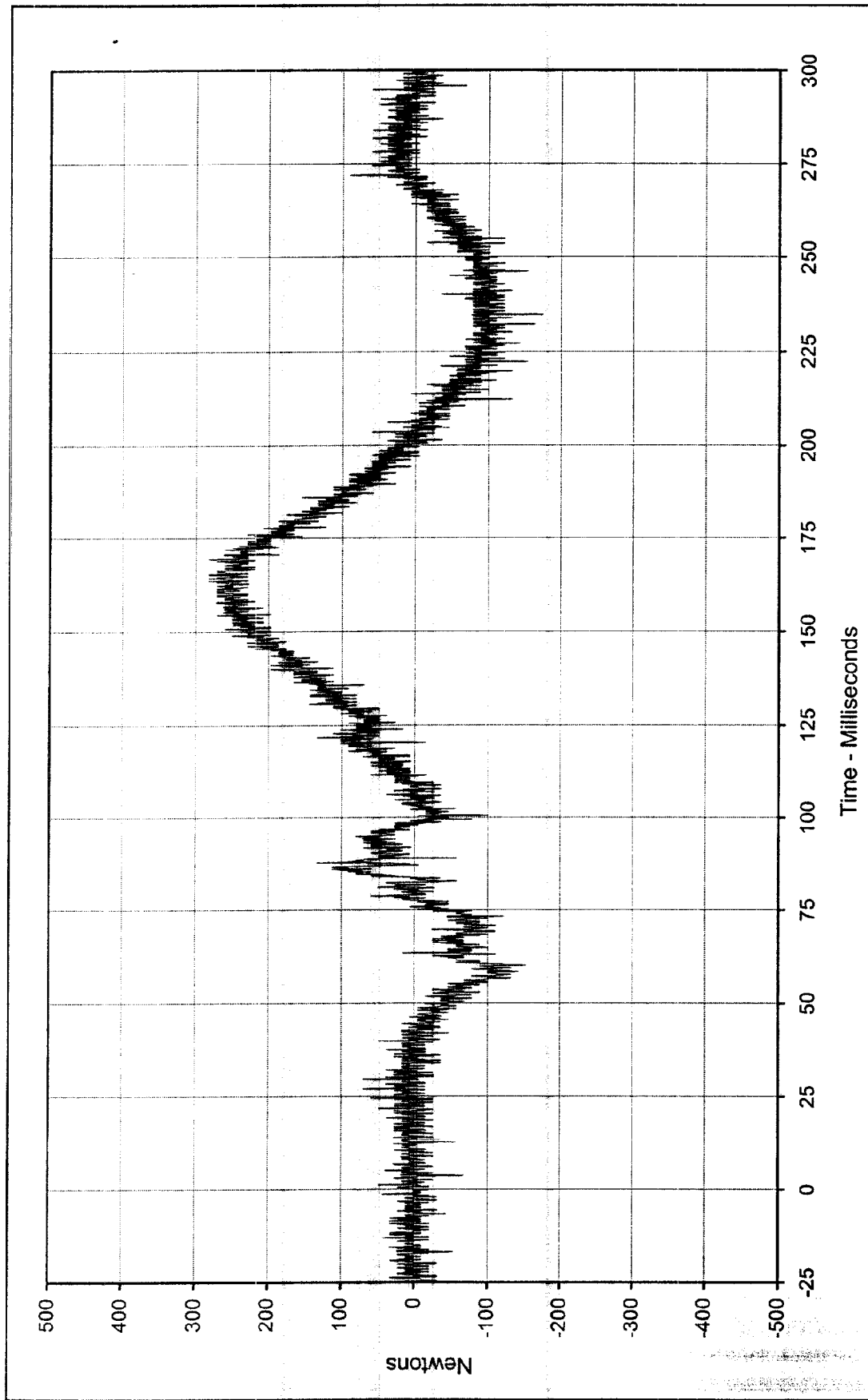
Minimum Value: -445.1 at 146.0 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

Curve Number: FIL-007

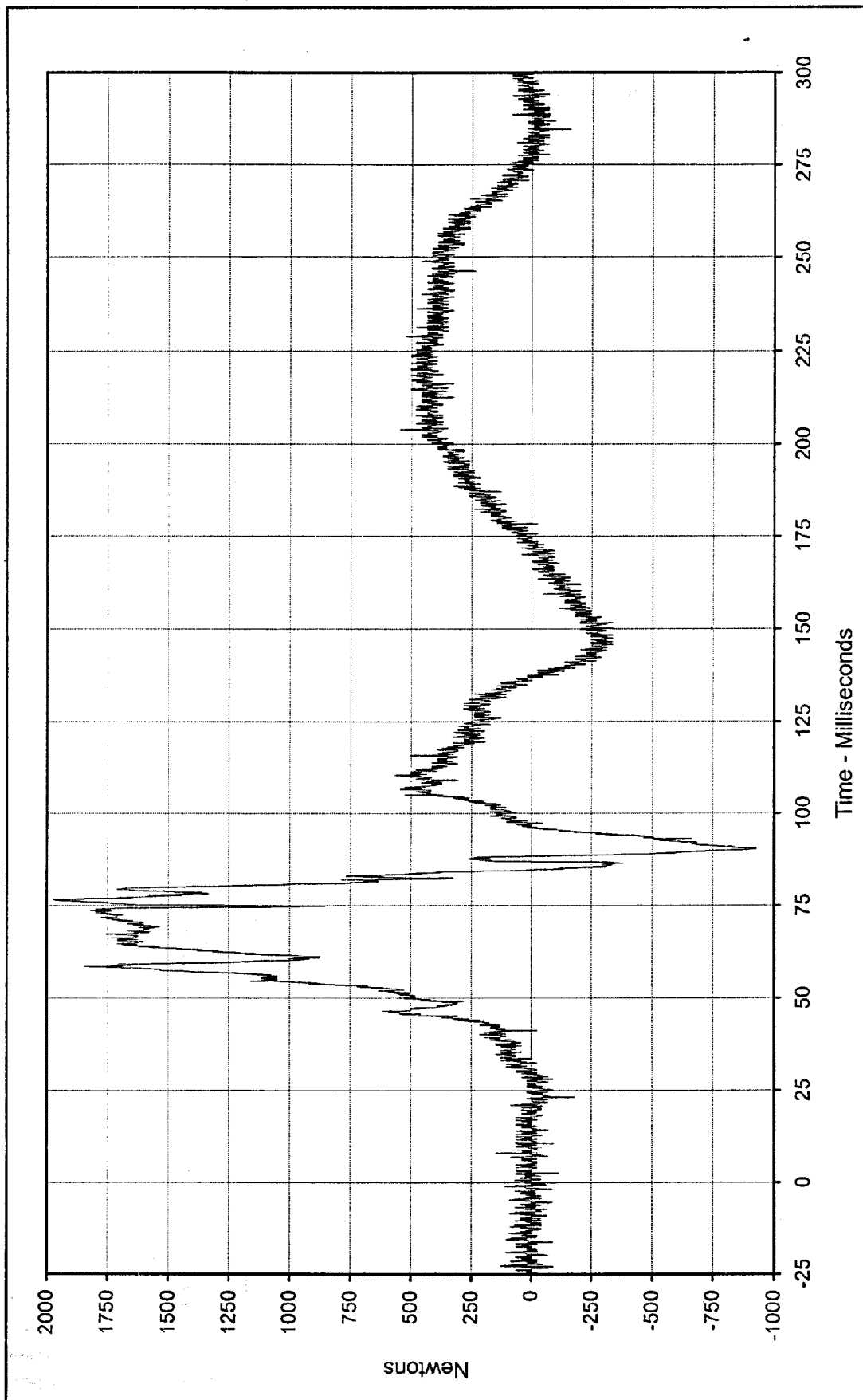




Curve Description: Driver Neck Force Y
 Maximum Value: 281.6 at 163.4 Milliseconds
 Minimum Value: -174.8 at 234.7 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/12/99
 Curve Number: FIL-008

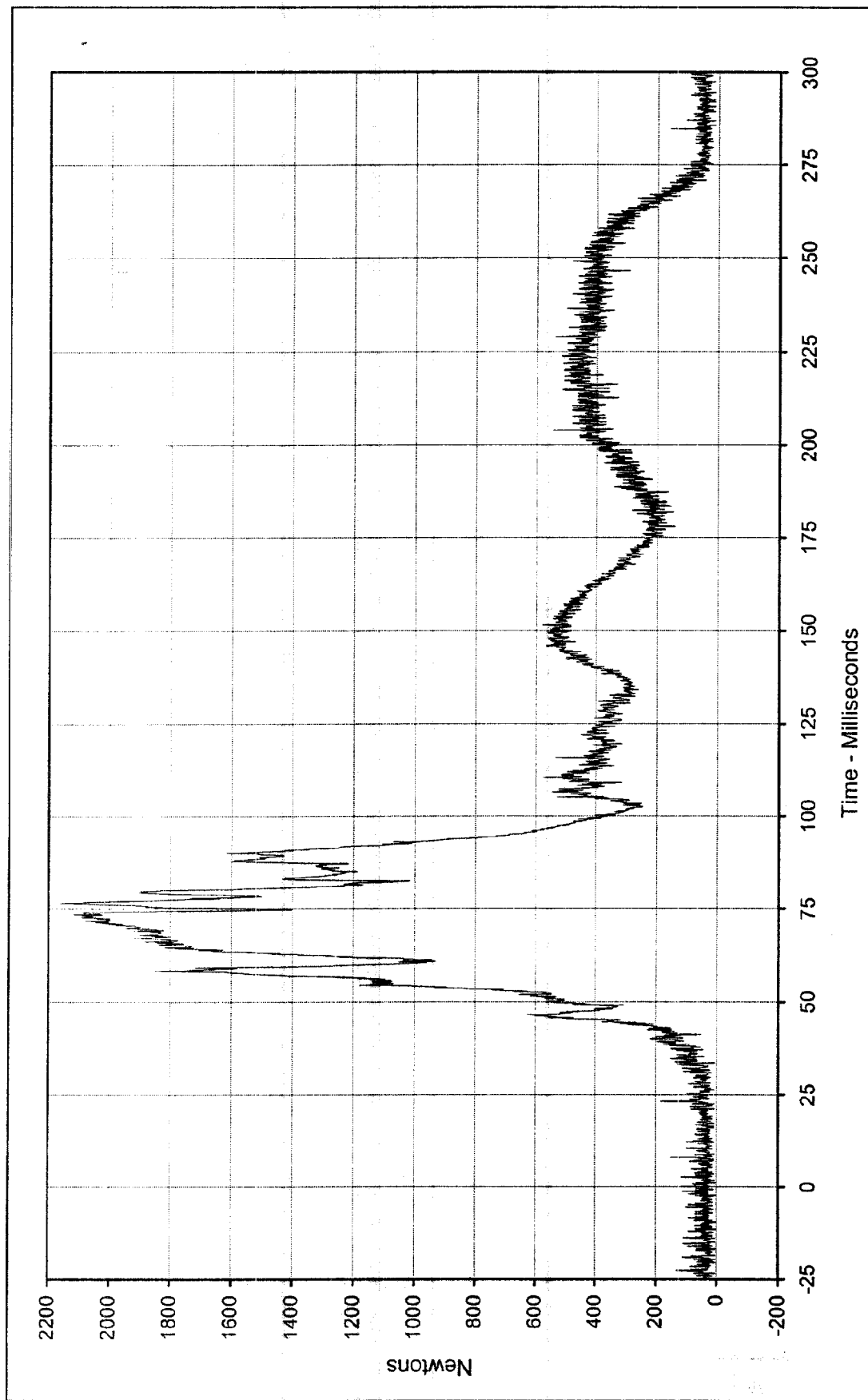
Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description:	Driver Neck Force Z		Test Program:	1999 NHTSA 35 mph NCAP No.: MX0103	
Maximum Value:	1973.3	at 76.5	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-928.2	at 90.1			
SAE Filter Class:	1000				
Date of Test:	2/12/99				
Curve Number:	FIL-009				

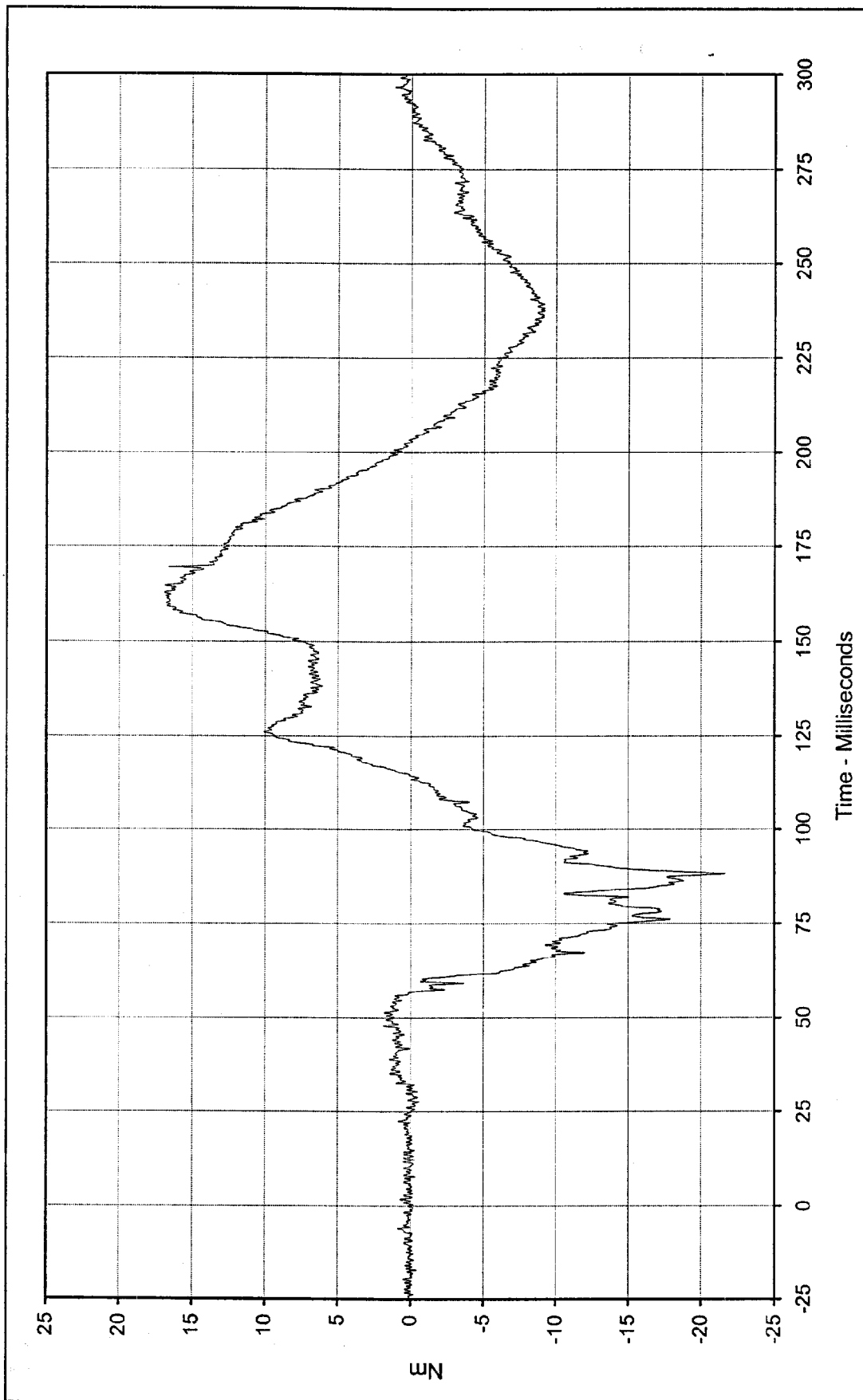




Curve Description: Driver Neck Force Resultant
 Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van

Maximum Value: 2161.1 at 76.5 Milliseconds
 Minimum Value: 0.0 at 1.1 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/12/99
 Curve Number: RES-007





Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Program: 1999 Chevrolet Astro LS Van

Maximum Value: 16.9 at 162.8 Milliseconds

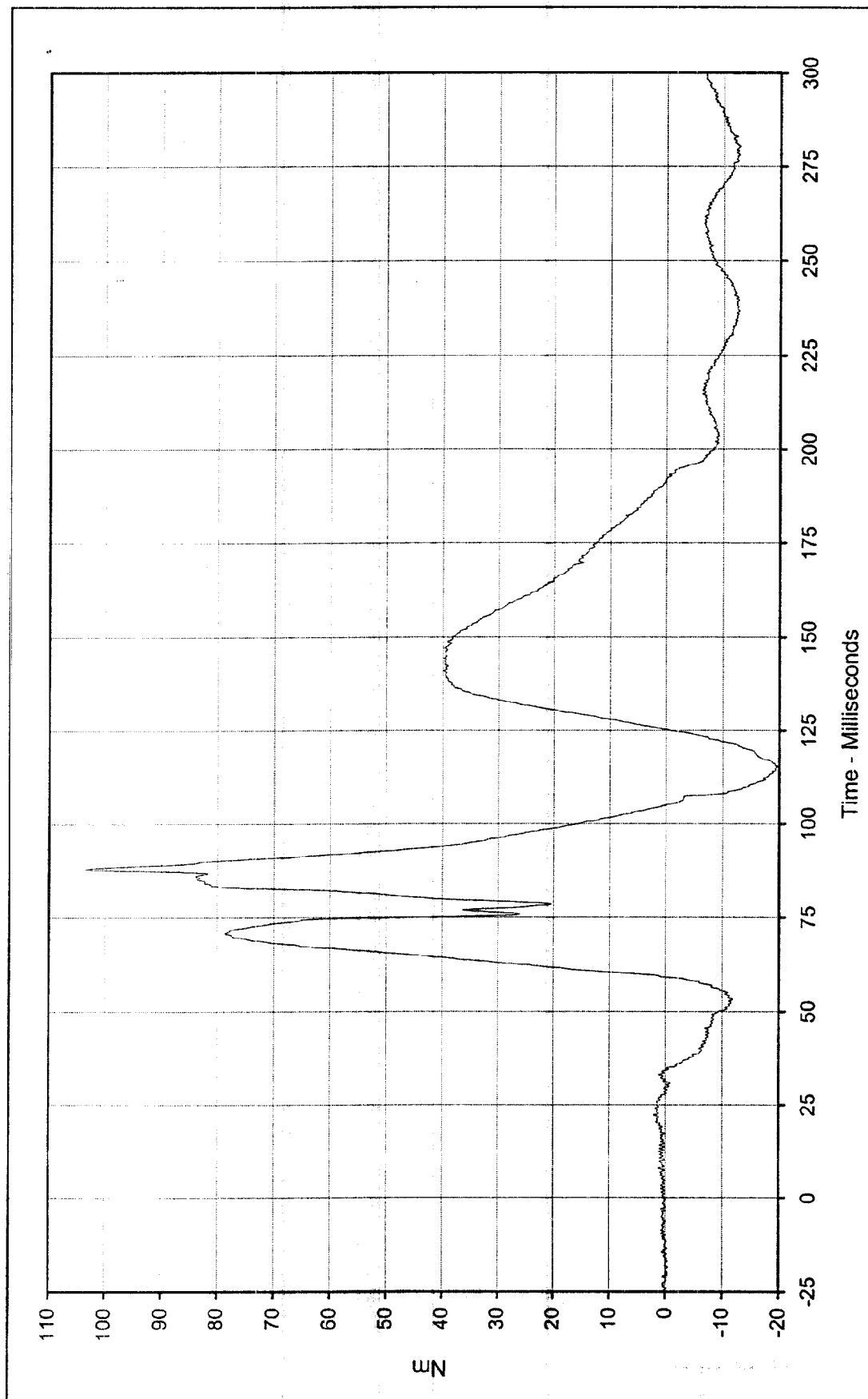
Minimum Value: -21.7 at 88.0 Milliseconds

SAE Filter Class: 600

Date of Test: 2/12/99

Curve Number: FIL-010

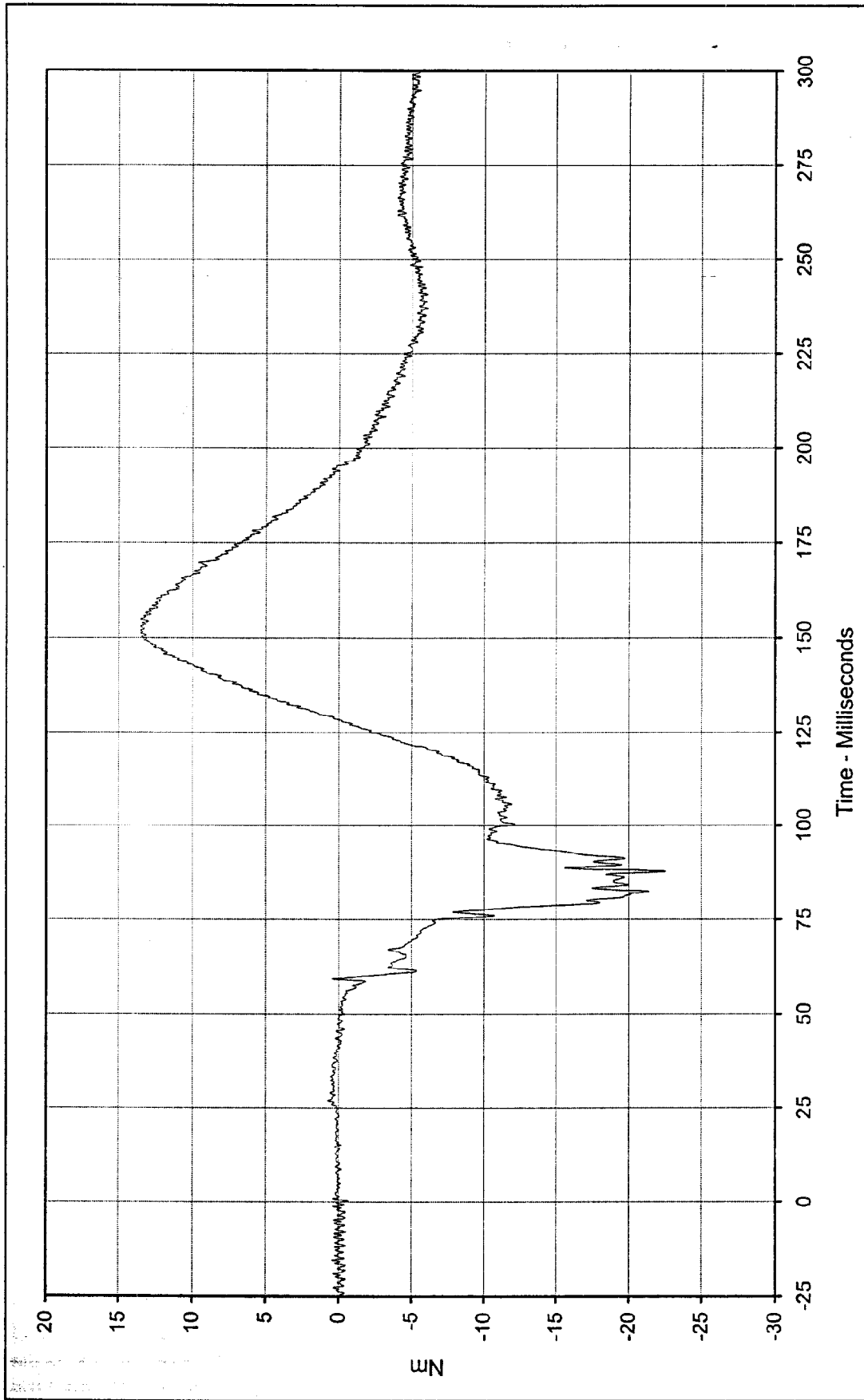




Curve Description:	Driver Neck Moment Y	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	103.5 at 87.9 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-19.8 at 115.2 Milliseconds			

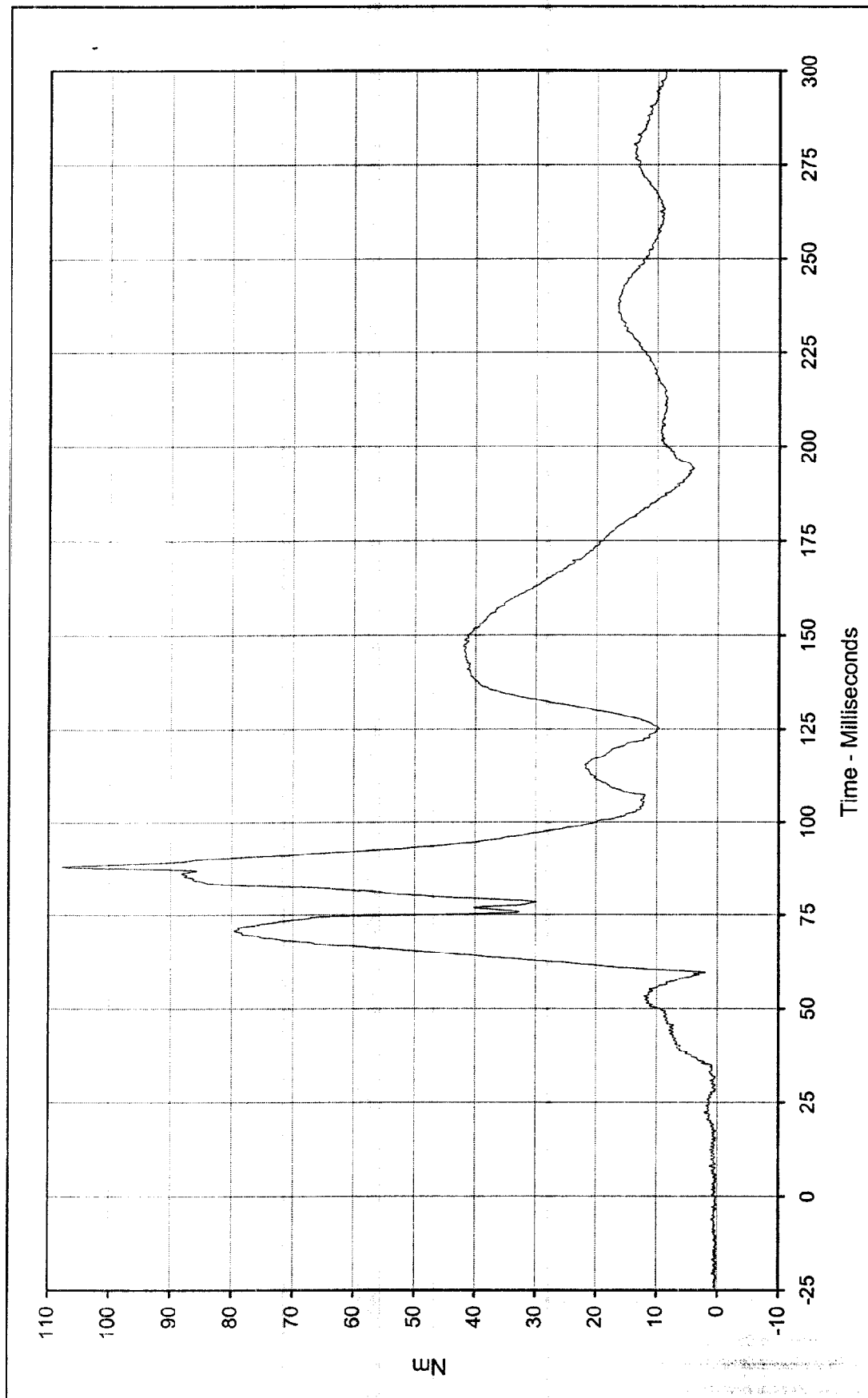


SAE Filter Class:	600
Date of Test:	2/12/99
Curve Number:	FIL-011



Curve Description:	Driver Neck Moment Z	Test Program:	1999 NHTSA 35 mph NCAP No.: MX0103
Maximum Value:	13.5 at 154.9 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van
Minimum Value:	-22.5 at 87.6 Milliseconds		
SAE Filter Class:	600		
Date of Test:	2/12/99		
Curve Number:	FIL-012		





Curve Description: Driver Neck Moment Resultant Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 107.8 at 87.9 Milliseconds

Minimum Value: 0.1 at 4.7 Milliseconds

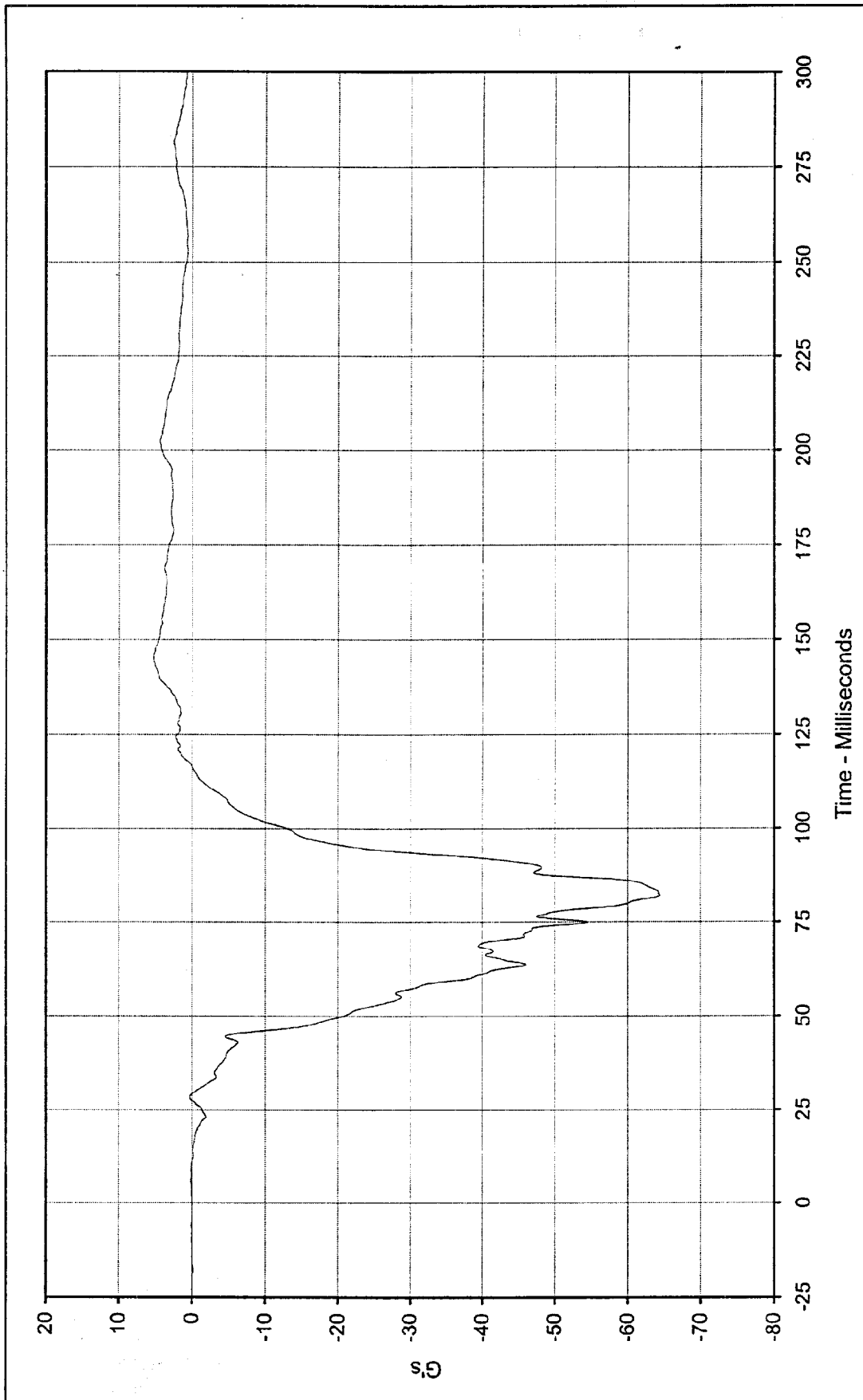
SAE Filter Class: 600

Date of Test: 2/12/99

Curve Number: RES-010

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Program:

Test Vehicle: 1999 Chevrolet Astro LS Van

Maximum Value: 5.3 at 145.0 Milliseconds

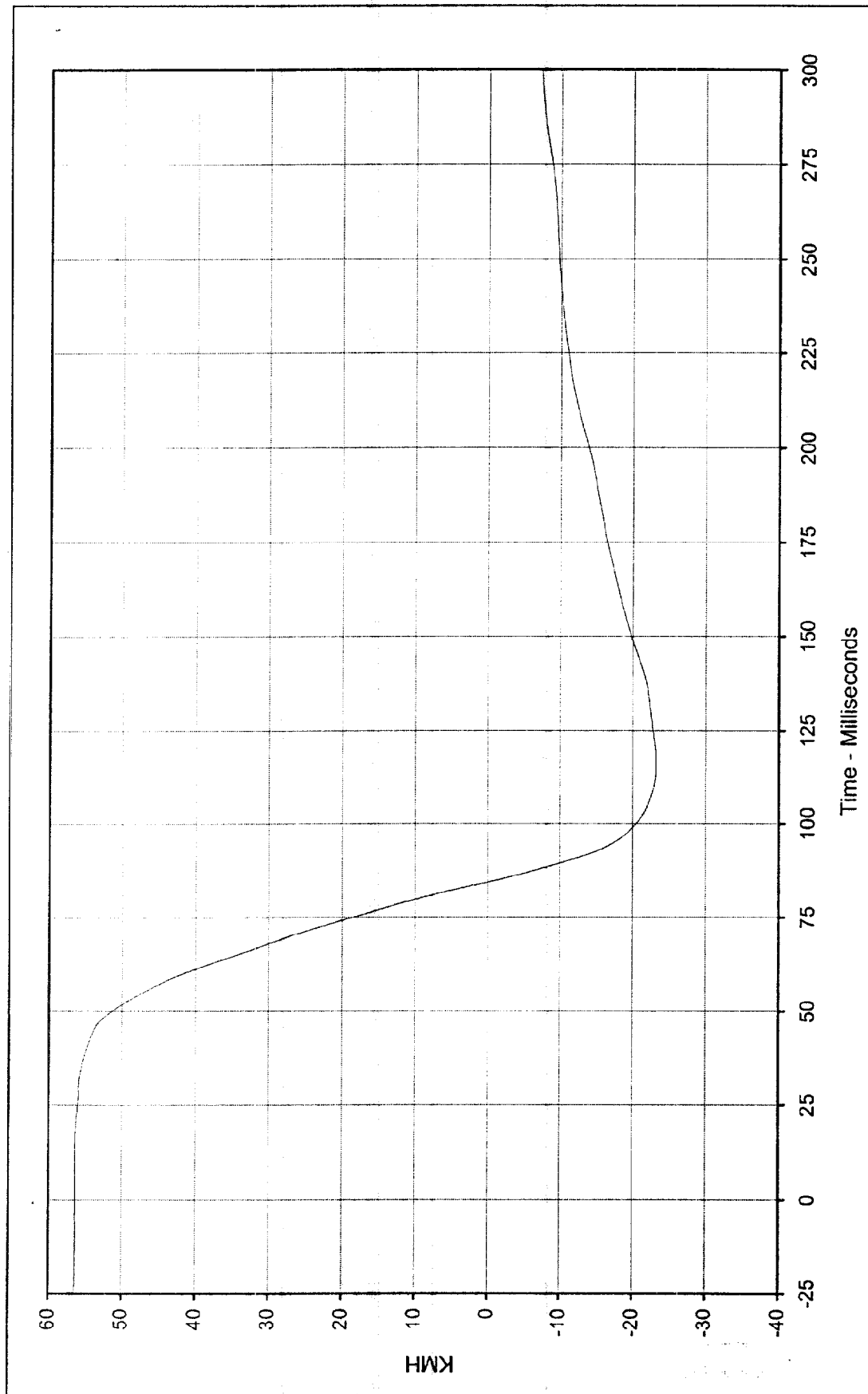
Minimum Value: -64.4 at 82.0 Milliseconds

SAE Filter Class: 180

Date of Test: 2/12/99

Curve Number: FIL-013



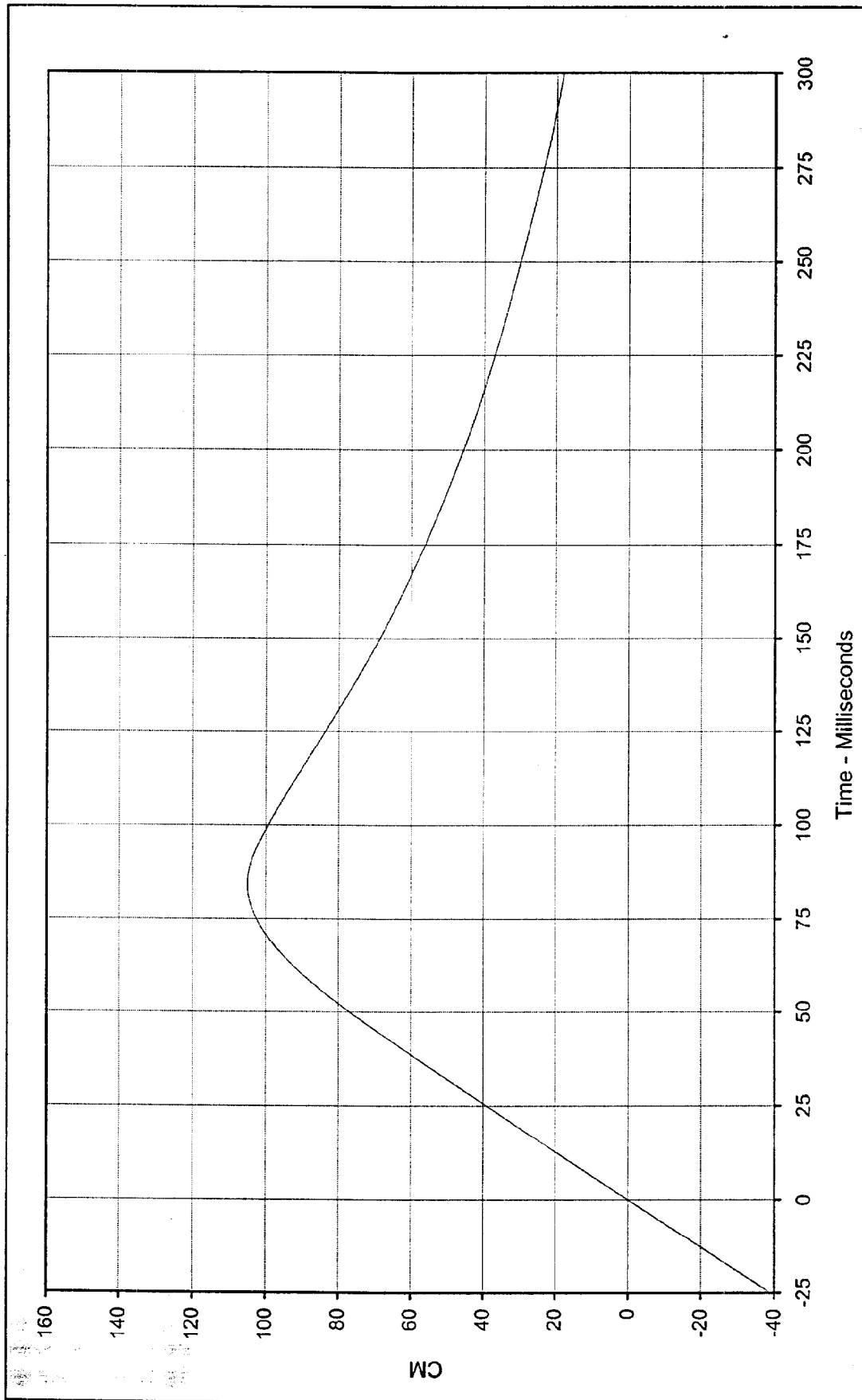


Curve Description: Driver Chest Primary X Velocity
 Maximum Value: 56.4 at 10.9 Milliseconds
 Minimum Value: -23.2 at 116.4 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/12/99
 Curve Number: IN1-013

Testing Program 1999 NHTSA 35 mph NCAP No.: MX0103

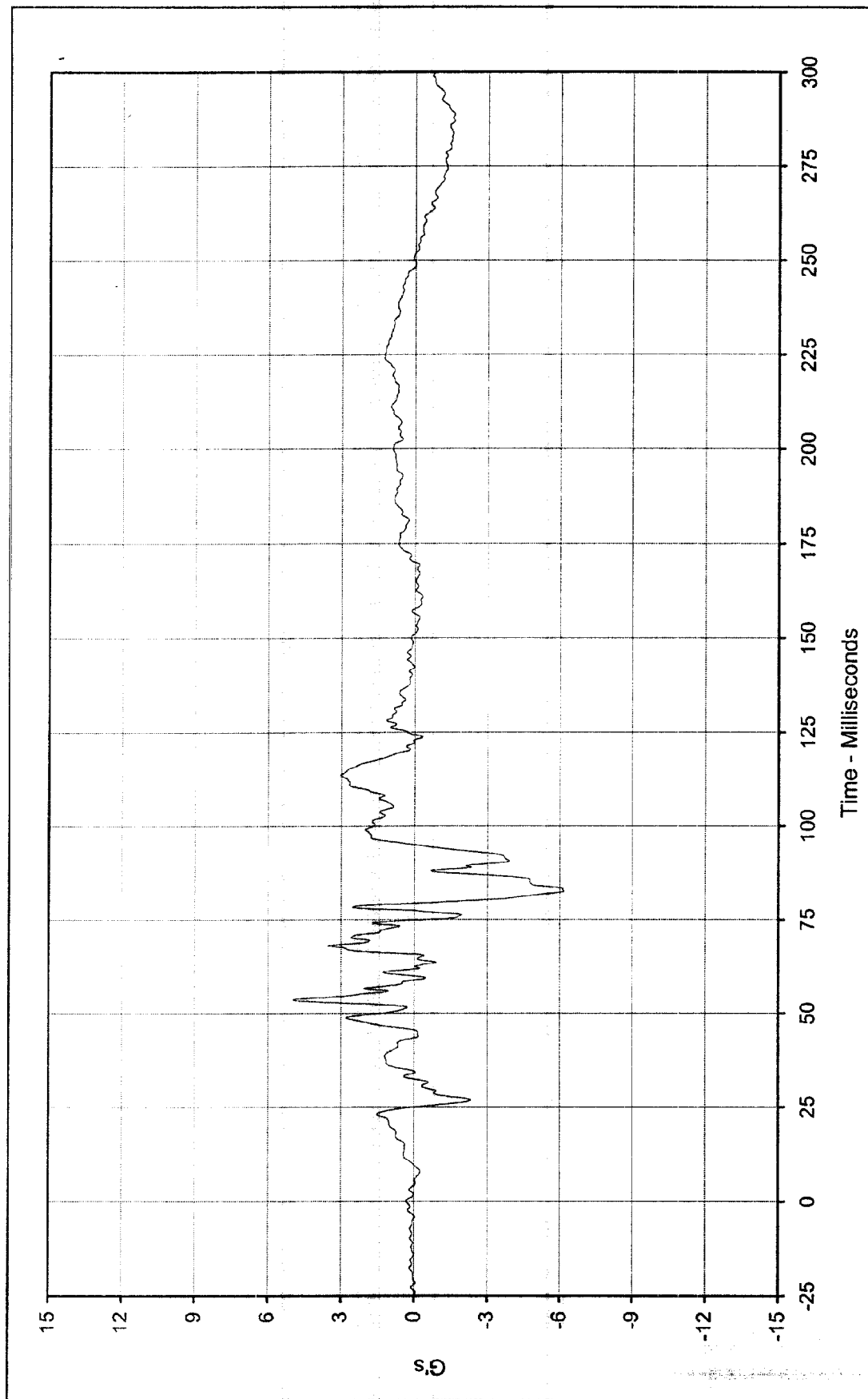
Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description:	Driver Chest Primary X Displ.	Test Program:	1999 NHTSA 35 mph NCAP No.: MX0103
Maximum Value:	105.0 at 84.1 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van
Minimum Value:	0.0 at 0.0 Milliseconds		
SAE Filter Class:	180		
Date of Test:	2/12/99		
Curve Number:	IN2-013		

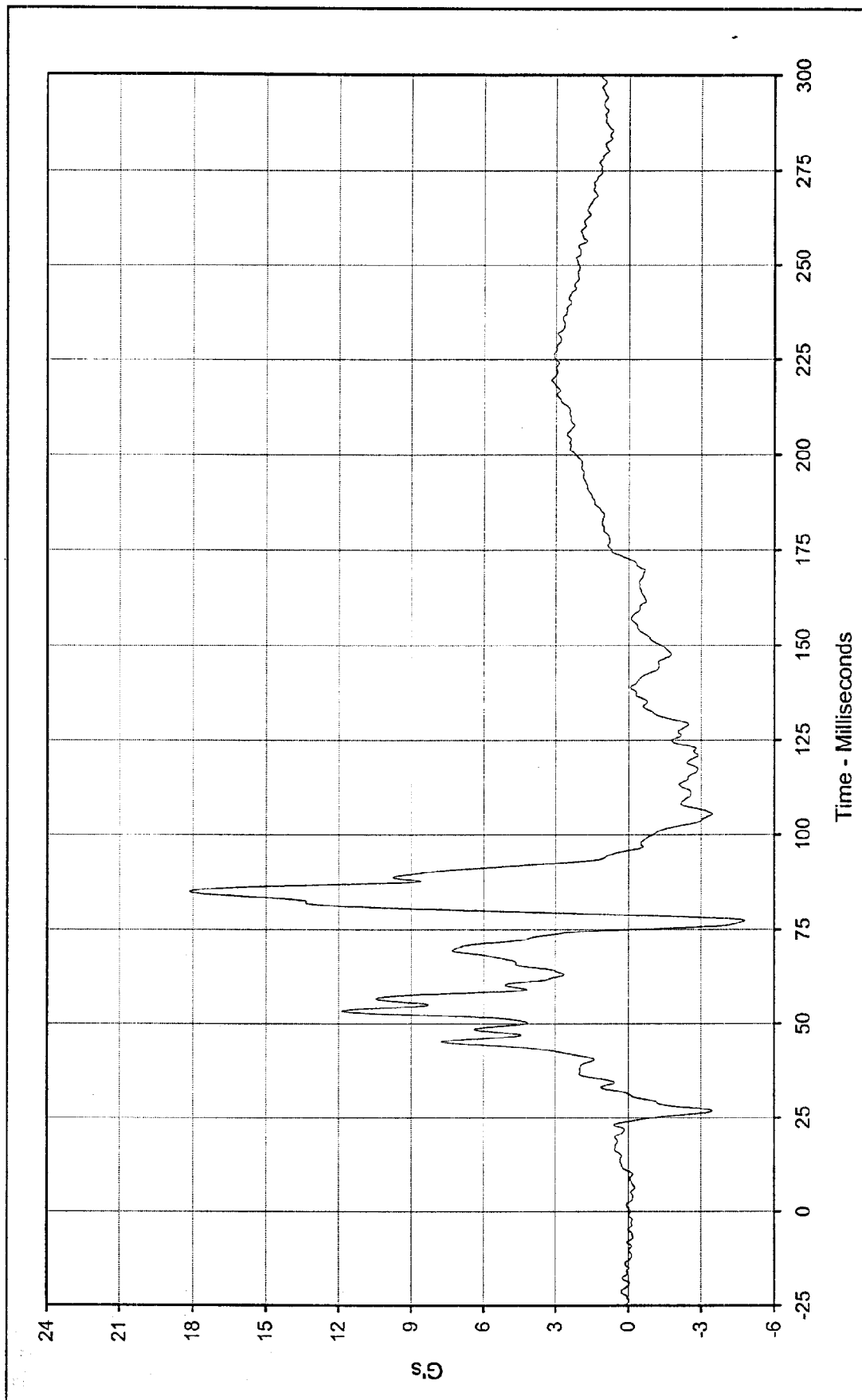




Curve Description: Driver Chest Primary Y
 Maximum Value: 4.9 at 53.6 Milliseconds
 Minimum Value: -6.2 at 82.5 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/12/99
 Curve Number: FIL-014

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Driver Chest Primary Z

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van

Maximum Value: 18.1 at 84.7 Milliseconds

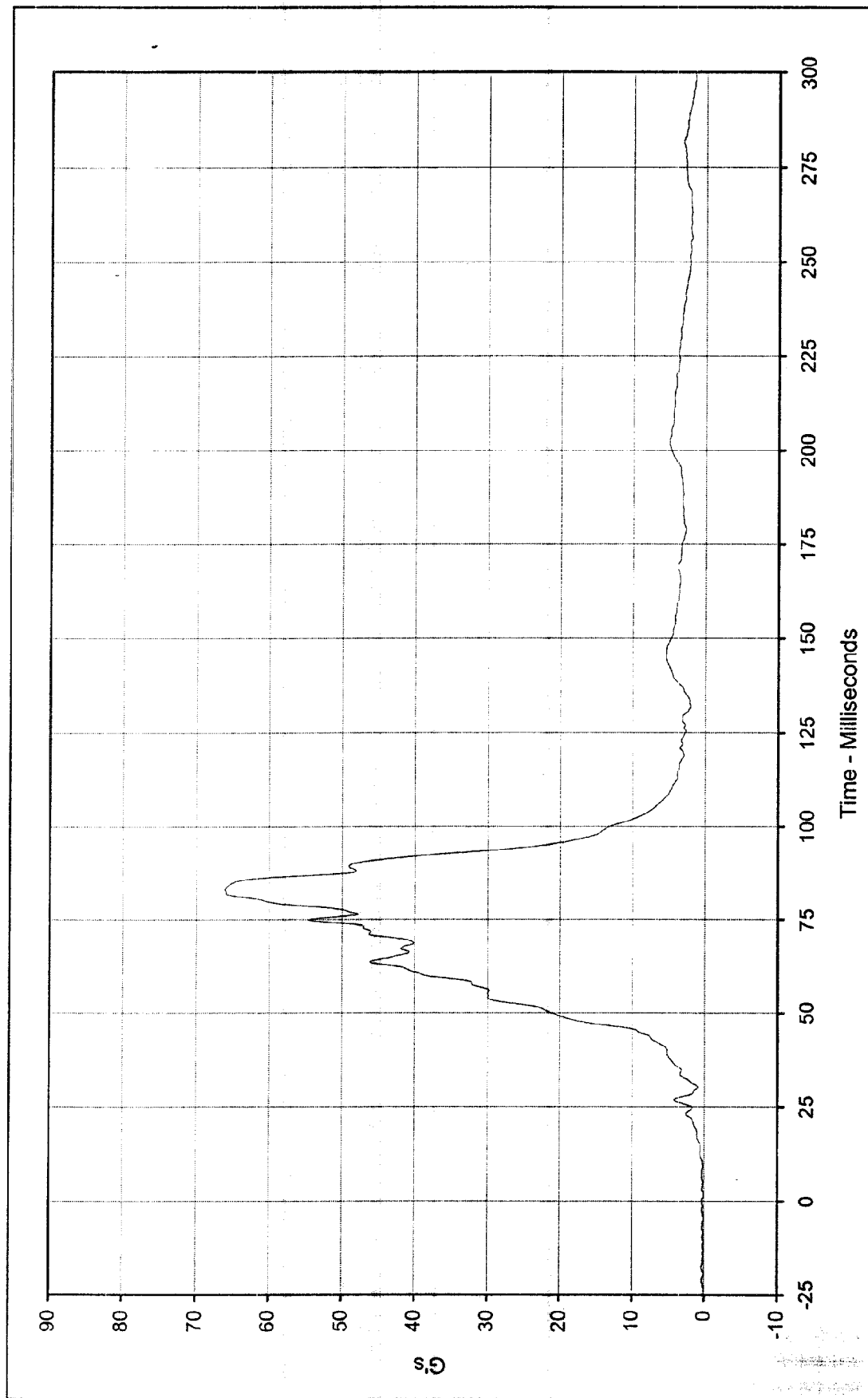
Minimum Value: -4.8 at 77.3 Milliseconds

SAE Filter Class: 180

Date of Test: 2/12/99

Curve Number: FIL-015

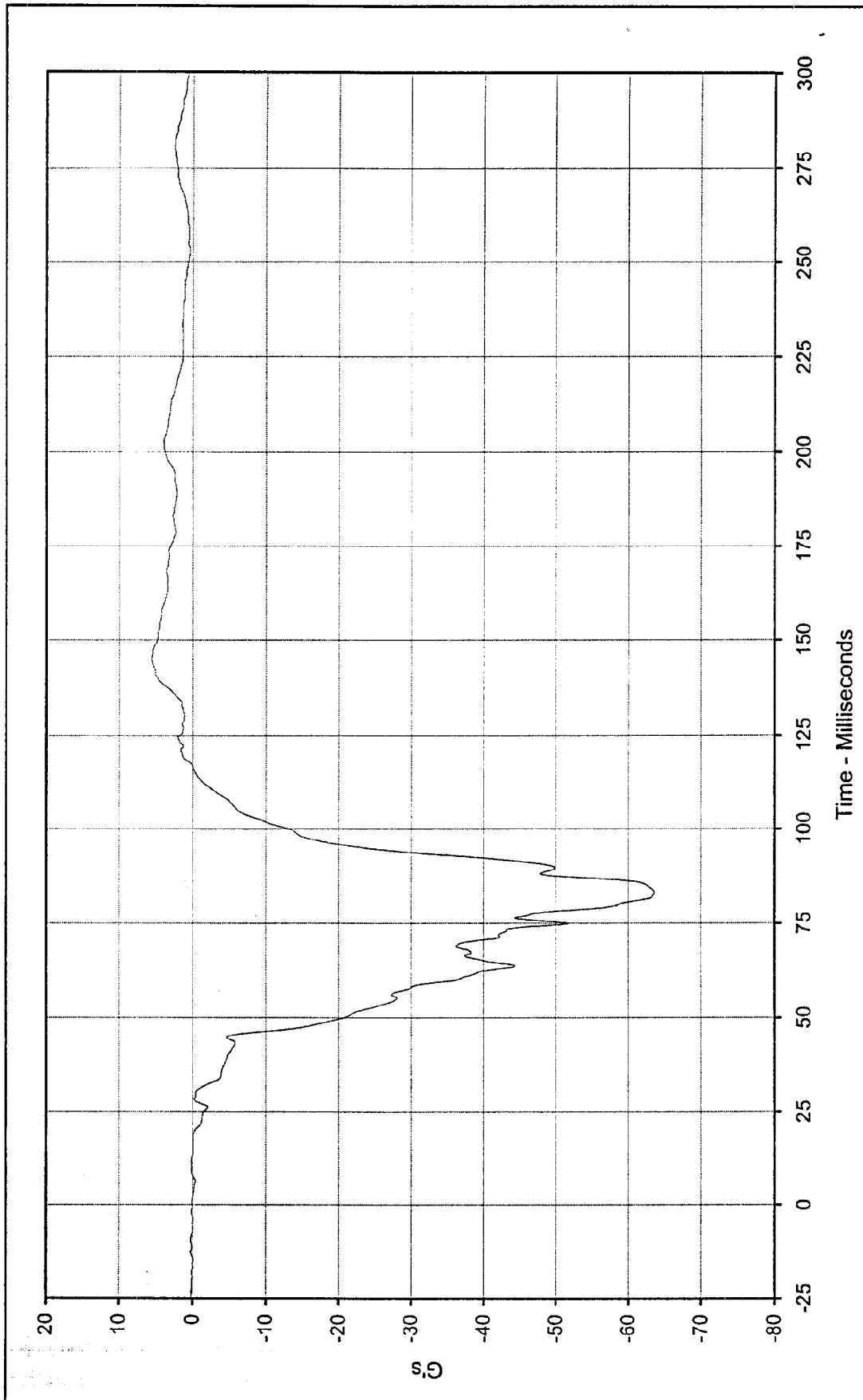




Curve Description: Driver Chest Resultant Primary
 Maximum Value: 66.1 at 83.1 Milliseconds
 Minimum Value: 0.1 at 1.4 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/12/99
 Curve Number: RES-013

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Driver Chest Redundant X

Maximum Value: 5.6 at 144.9 Milliseconds

Minimum Value: -63.6 at 83.2 Milliseconds

SAE Filter Class: 180

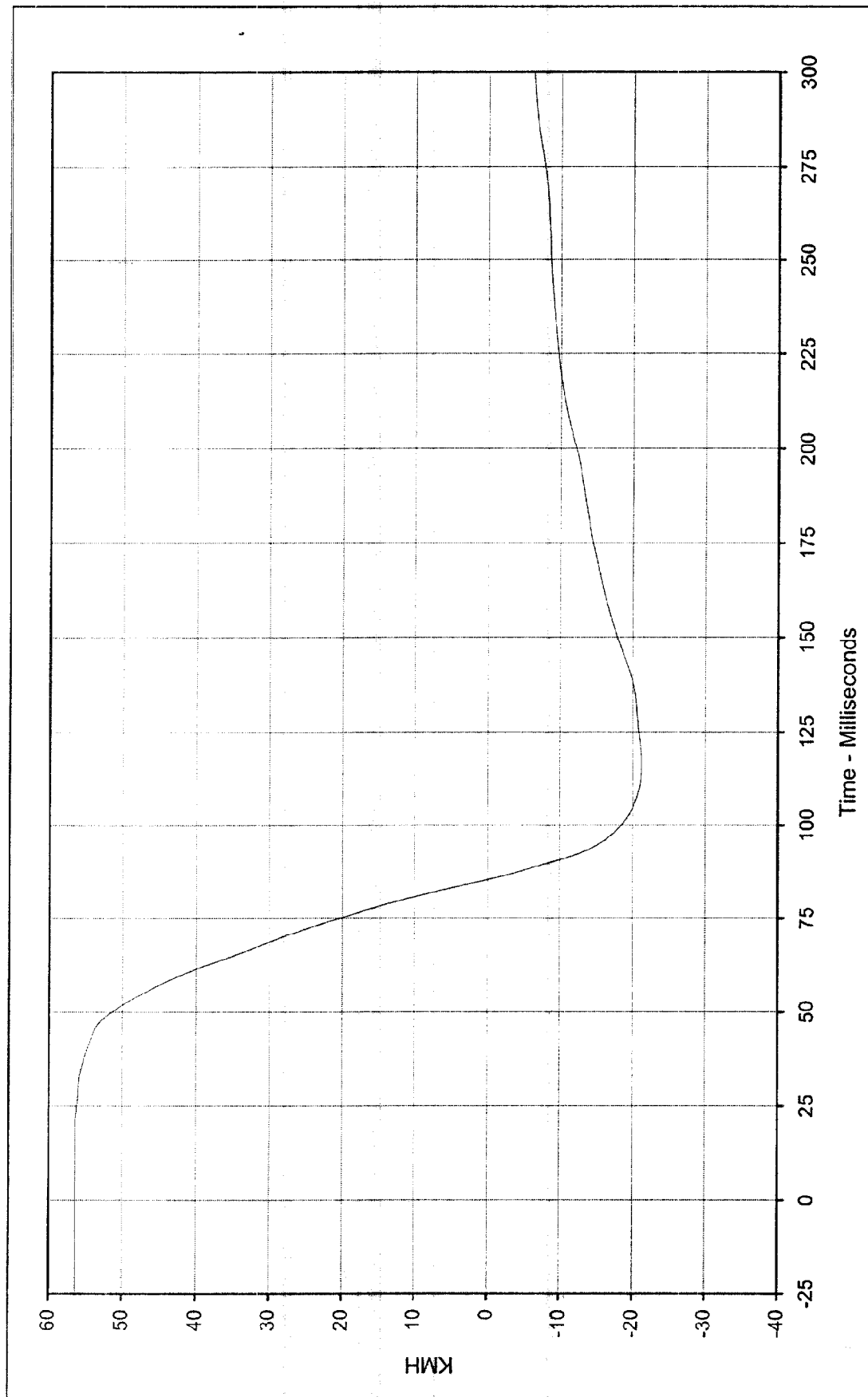
Date of Test: 2/12/99

Curve Number: FIL-016

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Driver Chest Redundant X Velocity

Maximum Value: 56.4 at 2.0 Milliseconds

Minimum Value: -21.2 at 116.8 Milliseconds

SAE Filter Class: 180

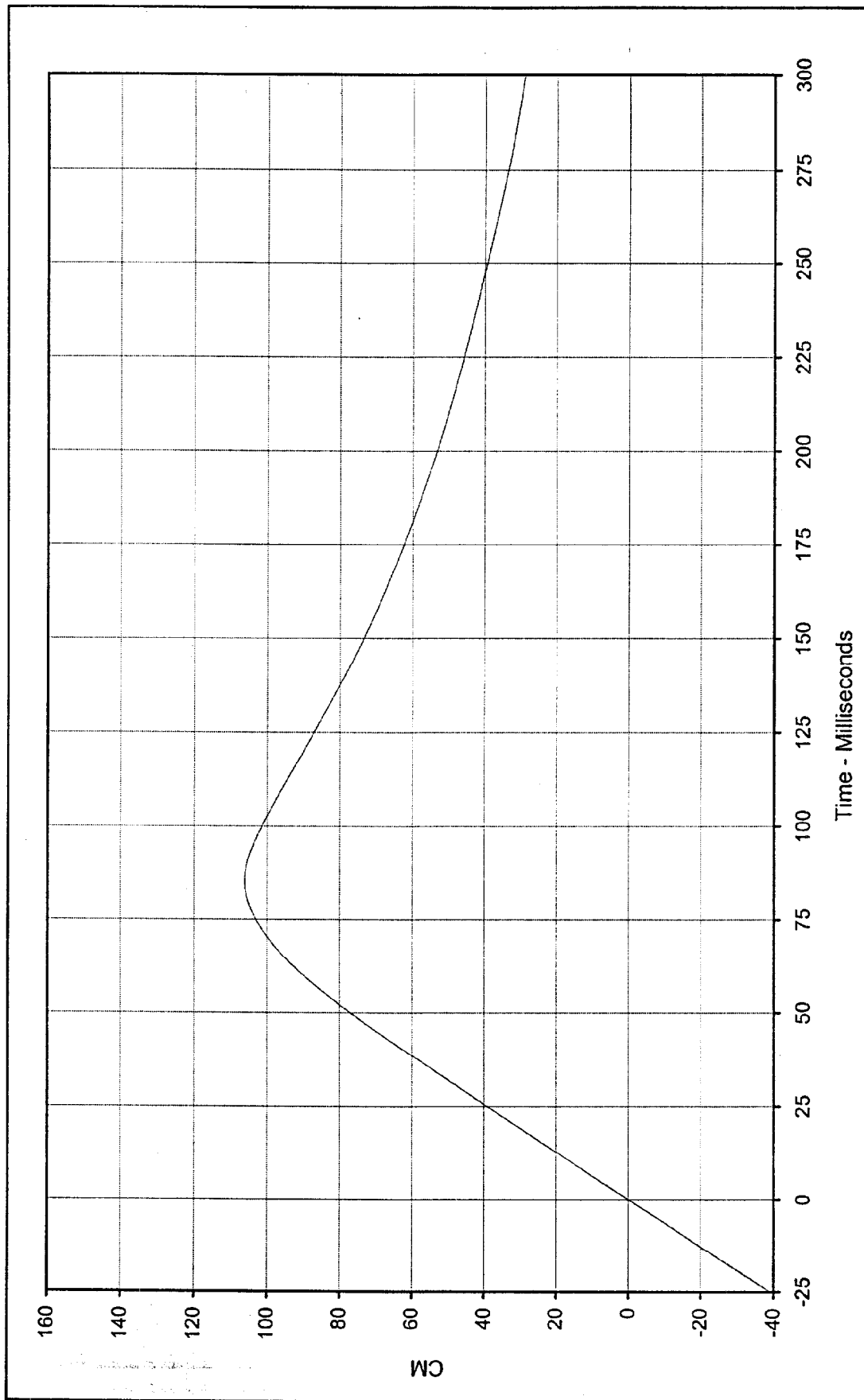
Date of Test: 2/12/99

Curve Number: IN1-016

Testing Program 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Driver Chest Redundant X Displ.

Maximum Value: 106.2 at 85.2 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

Date of Test: 2/12/99

Curve Number: IN2-016

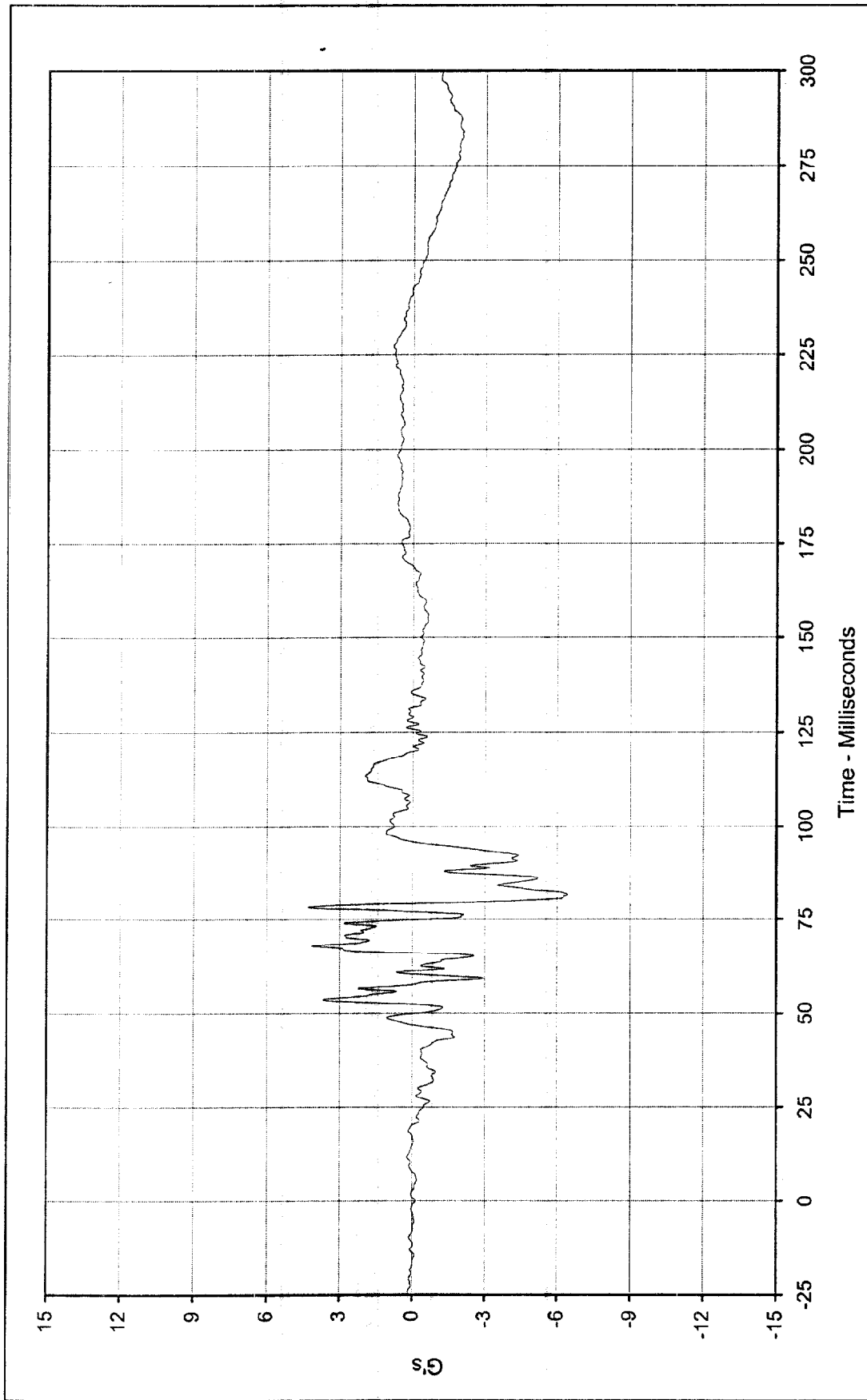
Test Program:

1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle:

1999 Chevrolet Astro LS Van





Curve Description: Driver Chest Redundant Y

Maximum Value: 4.3 at 78.2 Milliseconds

Minimum Value: -6.4 at 81.5 Milliseconds

SAE Filter Class: 180

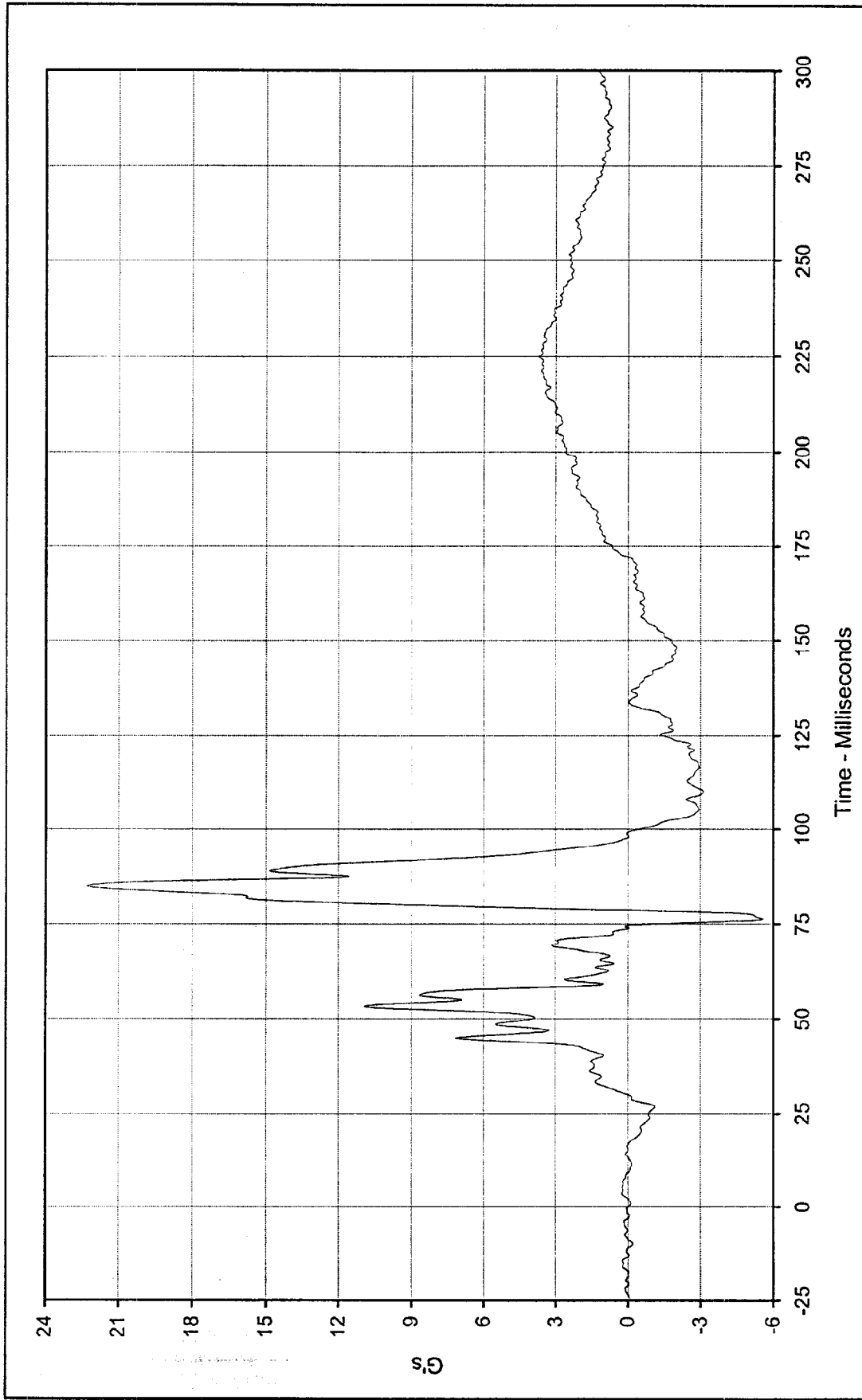
Date of Test: 2/12/99

Curve Number: FIL-017

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

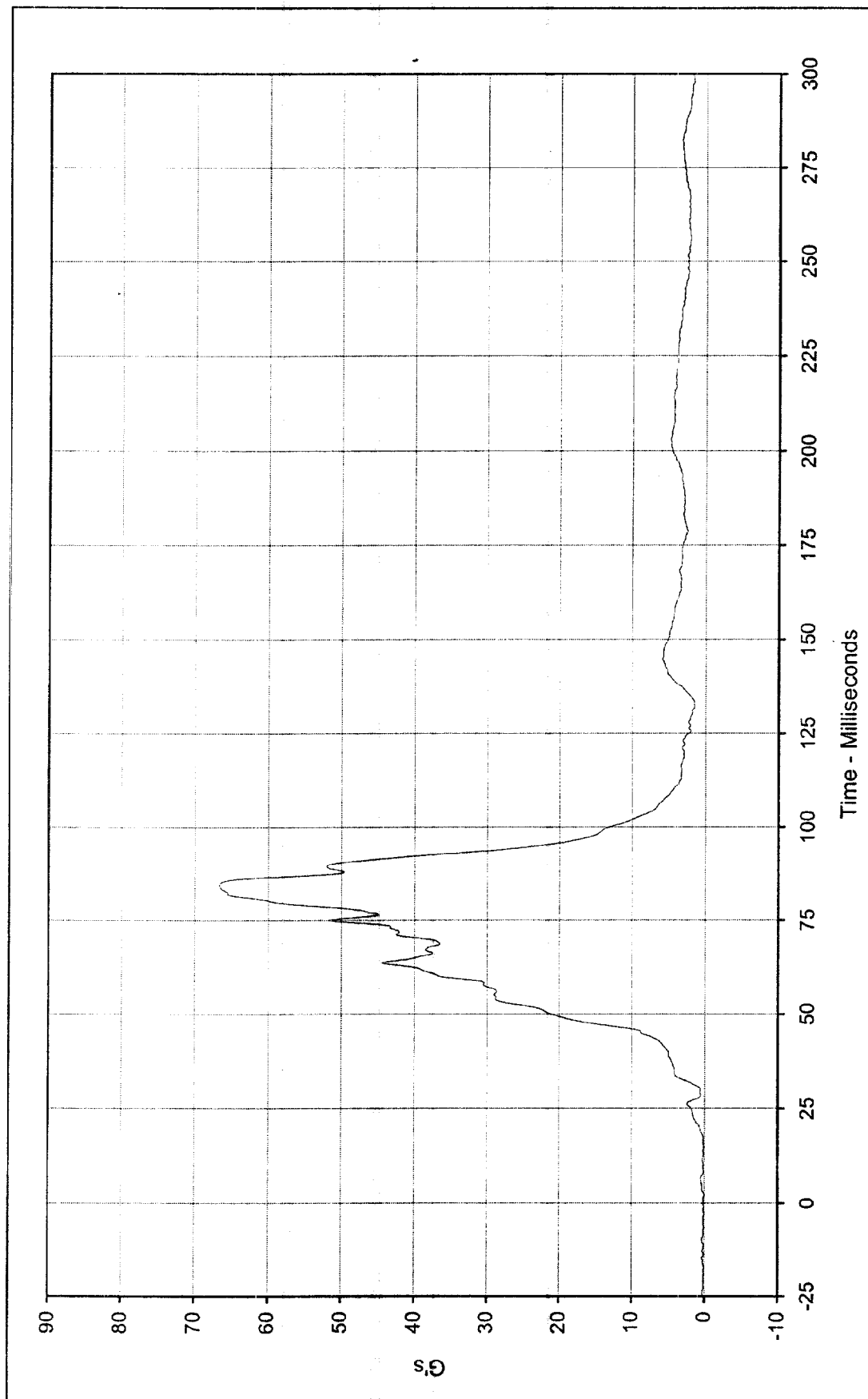
Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description:	Driver Chest Redundant Z	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	22.3 at 84.9 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-5.6 at 76.3 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/12/99			
Curve Number:	FIL-018			

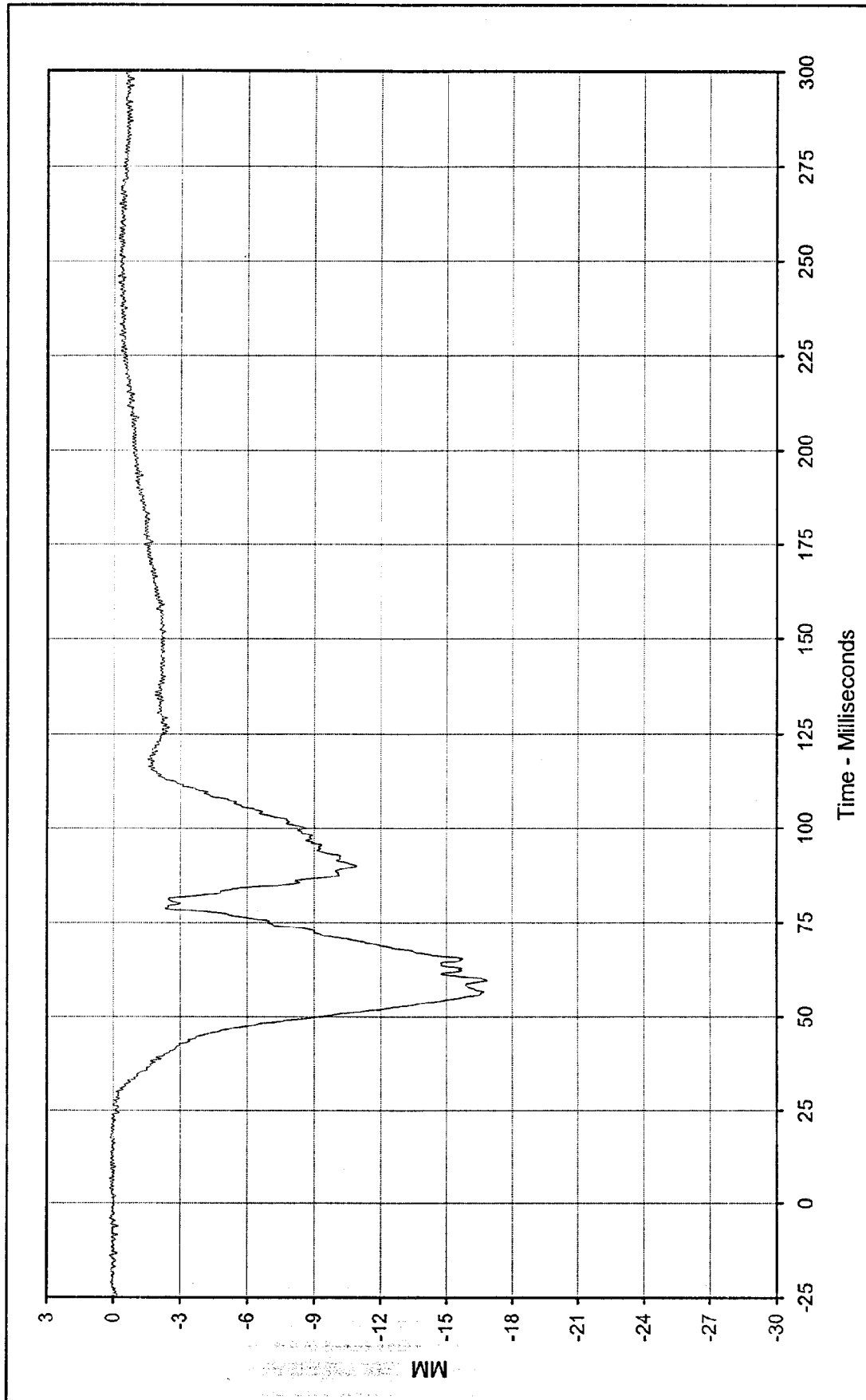




Curve Description: Driver Chest Resultant Redundant
 Maximum Value: 66.7 at 84.6 Milliseconds
 Minimum Value: 0.0 at 2.2 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/12/99
 Curve Number: RES-016

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Driver Chest Displacement X

Maximum Value: 0.2 at 6.7 Milliseconds

Minimum Value: -16.8 at 59.6 Milliseconds

SAE Filter Class: 600

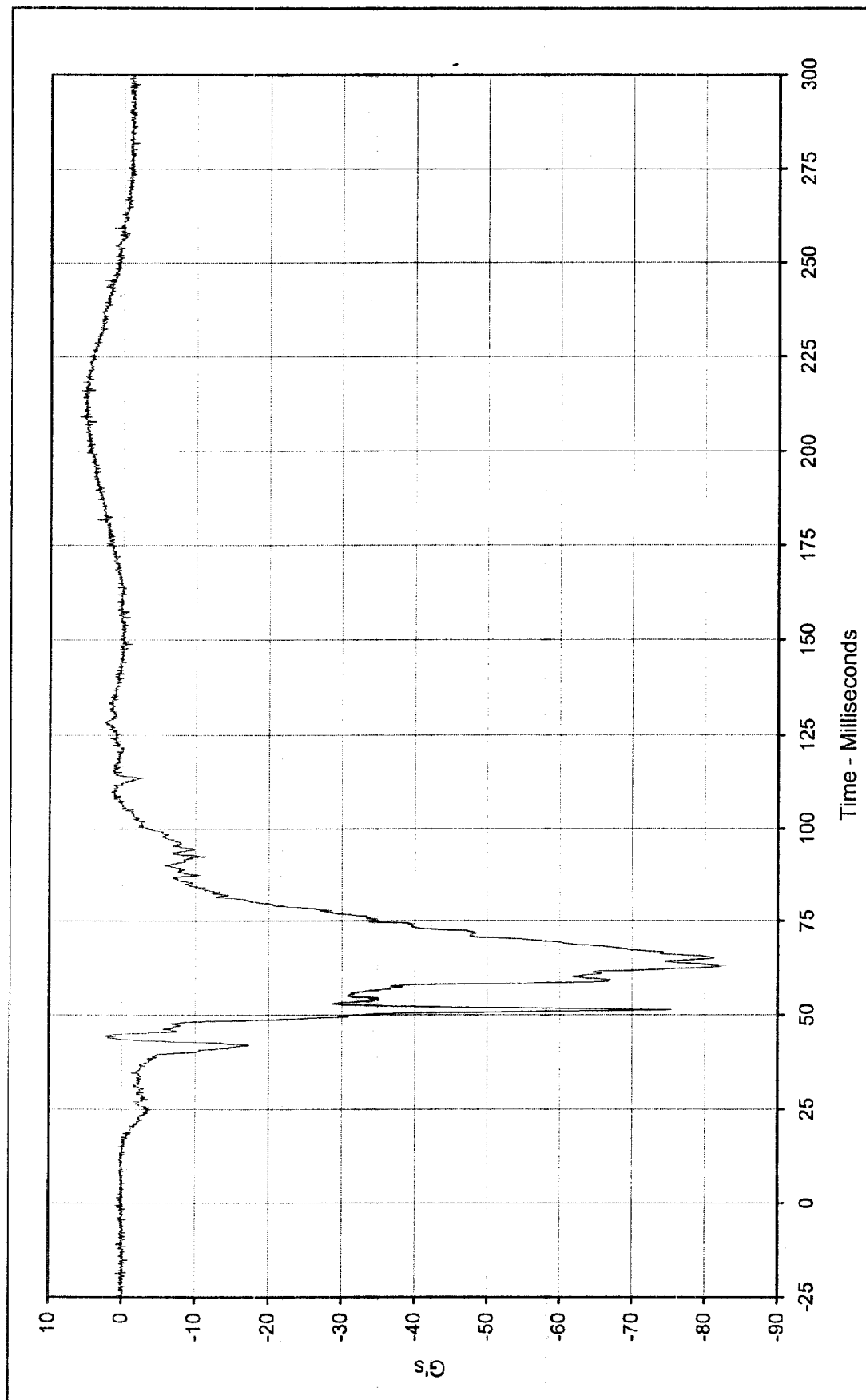
Date of Test: 2/12/99

Curve Number: FIL-019

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van

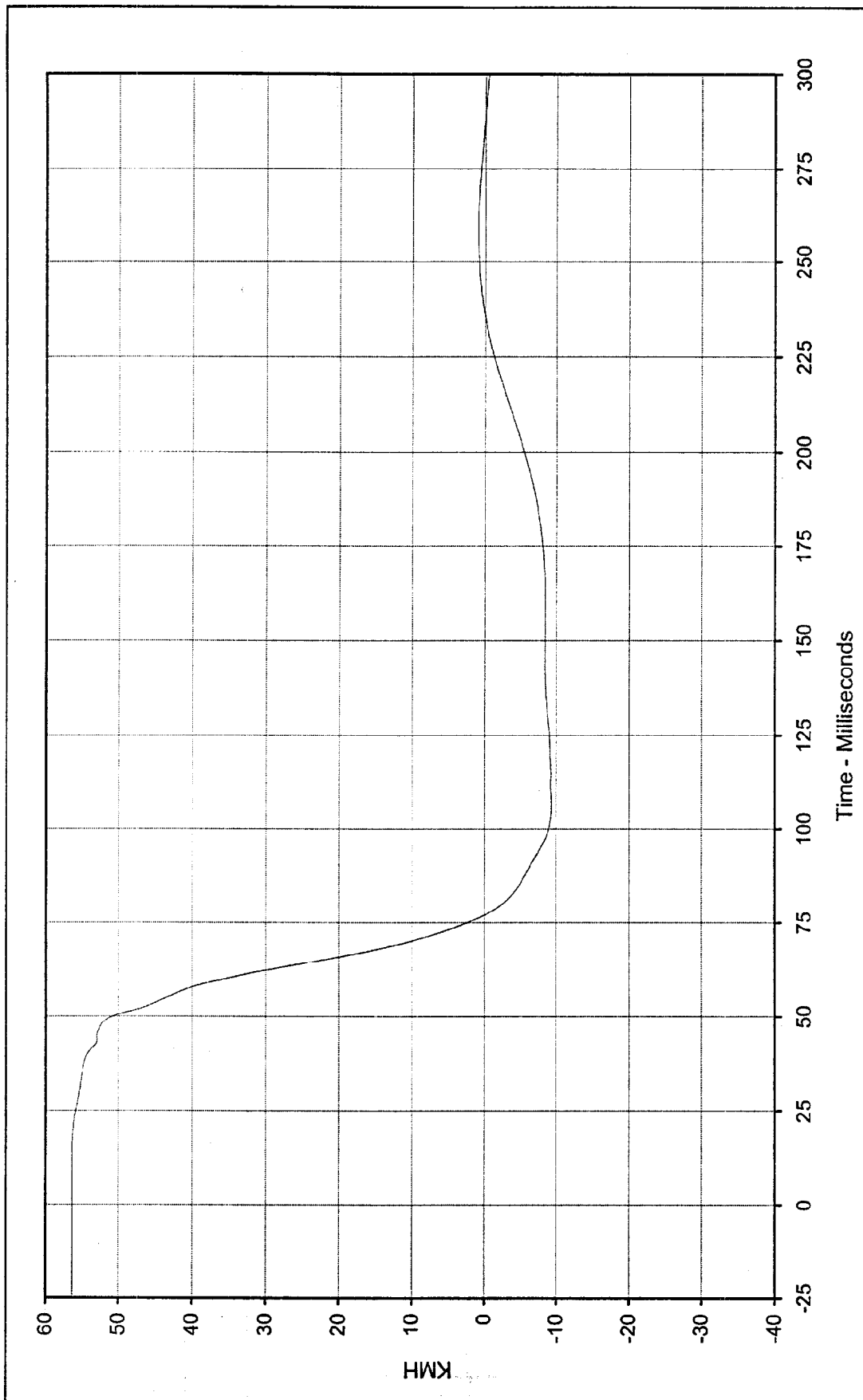




Curve Description: Driver Pelvis X
 Maximum Value: 6.0 at 209.1 Milliseconds
 Minimum Value: -83.1 at 62.9 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/12/99
 Curve Number: FIL-020

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Driver Pelvis X Velocity

Maximum Value: 56.4 at 13.5 Milliseconds

Minimum Value: -9.3 at 106.4 Milliseconds

SAE Filter Class: 180

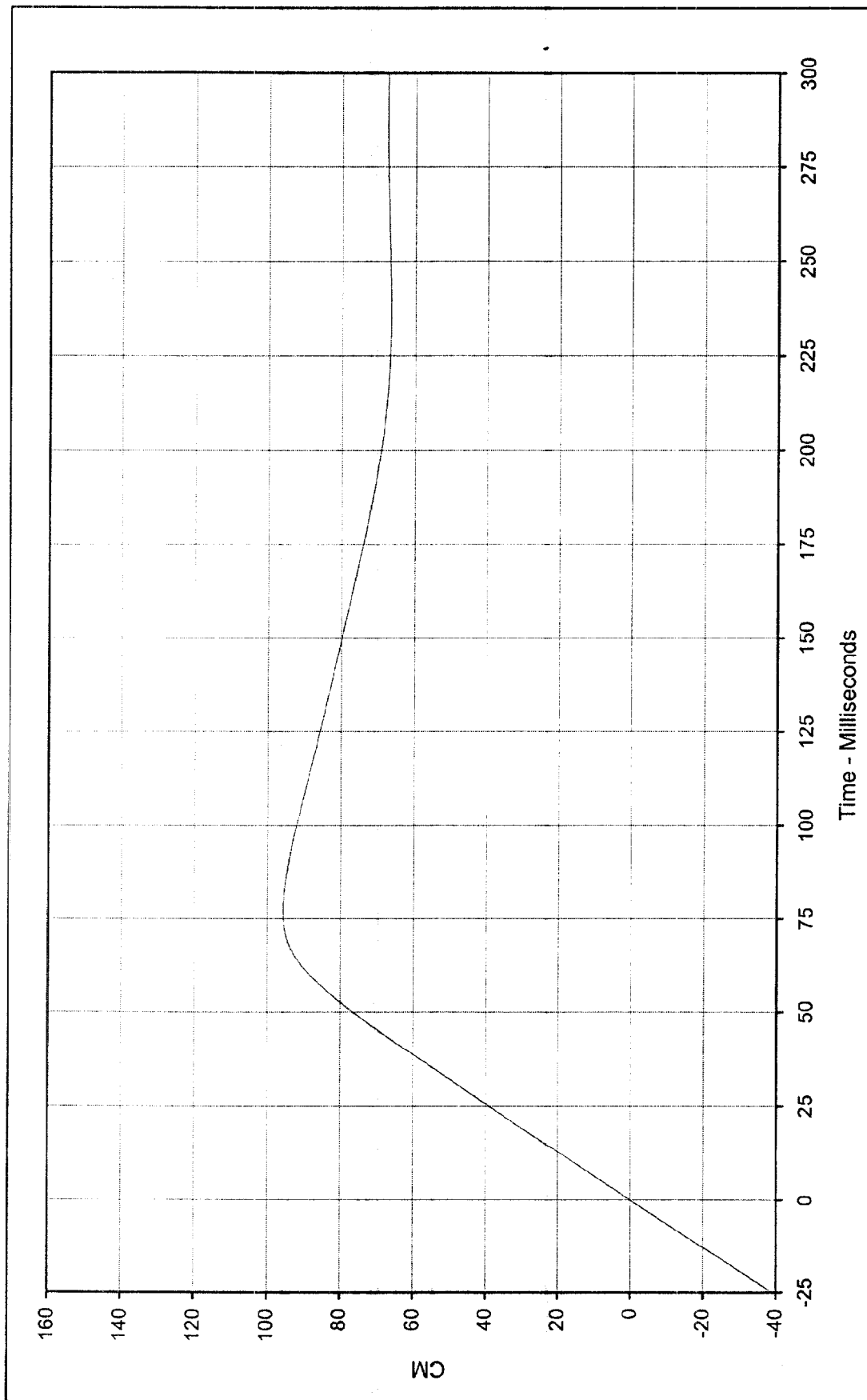
Date of Test: 2/12/99

Curve Number: IN1-020

Testing Program 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Driver Pelvis X Displ. Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 95.7 at 77.0 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

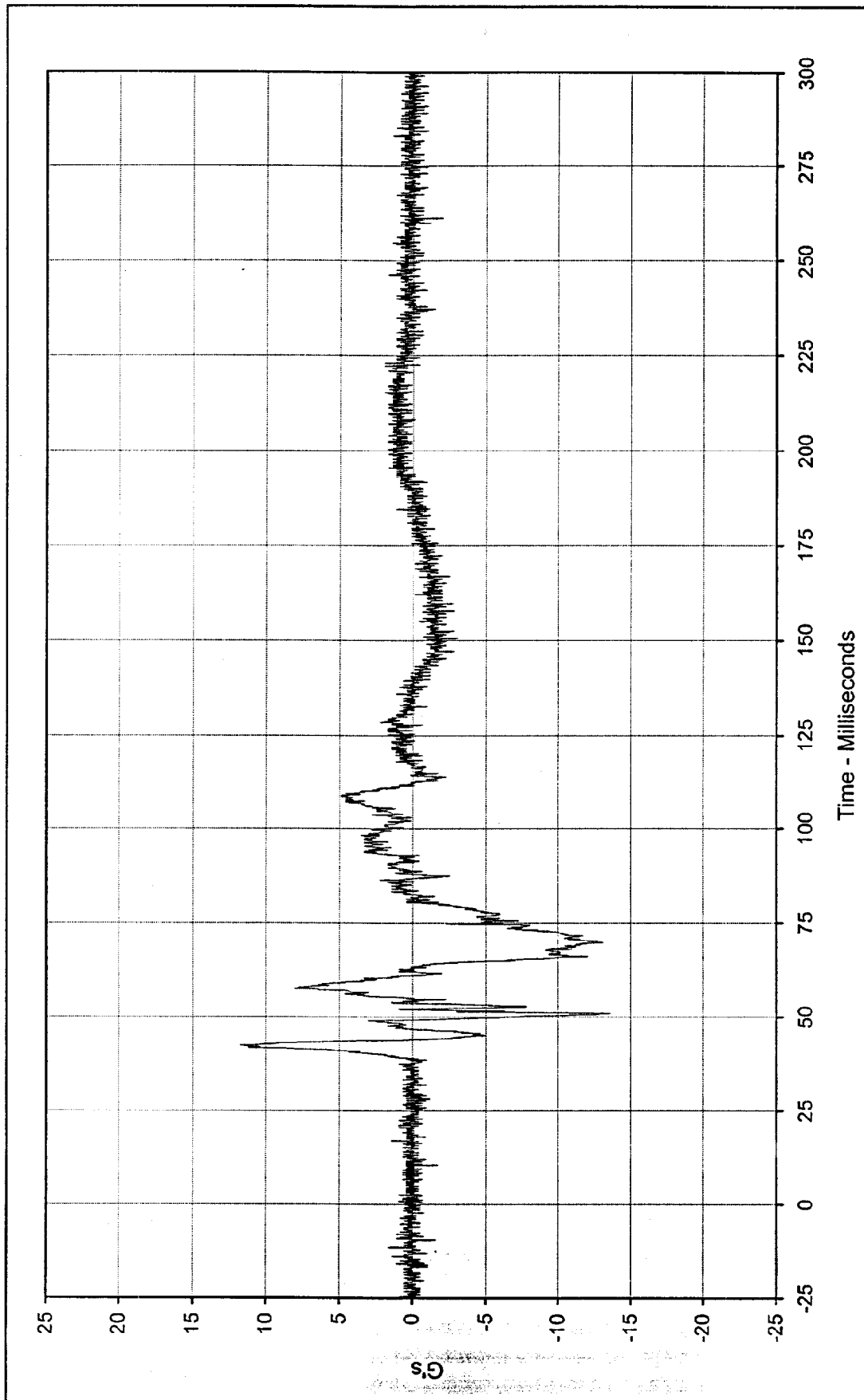
Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

Date of Test: 2/12/99

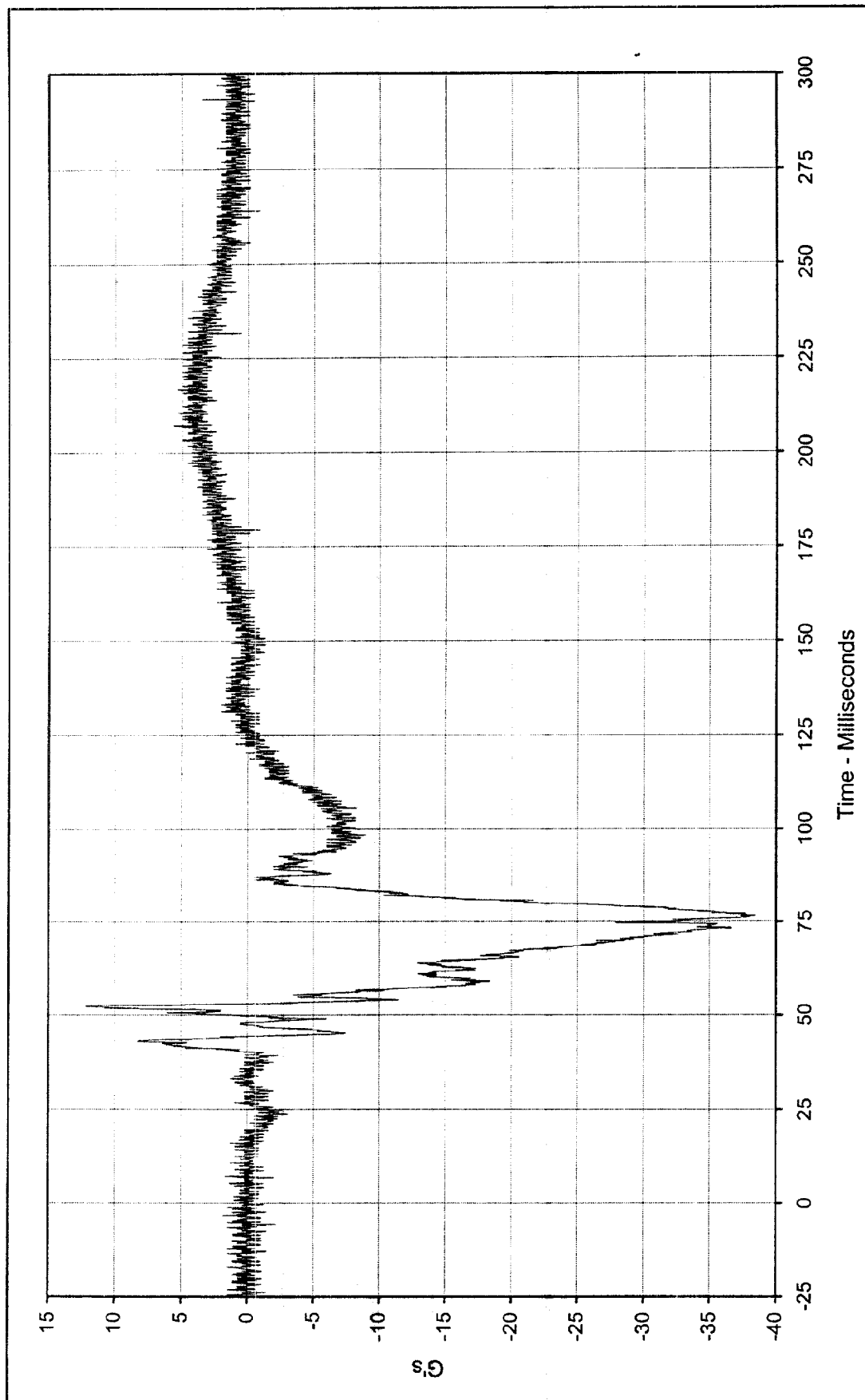
Curve Number: IN2-020





Curve Description:		Test Program:		1999 NHTSA 35 mph NCAP No.: MX0103	
Maximum Value:	11.7	at	42.2	Milliseconds	Test Vehicle:
Minimum Value:	-13.6	at	50.9	Milliseconds	1999 Chevrolet Astro LS Van
SAE Filter Class:	1000				
Date of Test:	2/12/99				
Curve Number:	FIL-021				





Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 12.2 at 52.3 Milliseconds

Minimum Value: -38.4 at 76.5 Milliseconds

SAE Filter Class: 1000

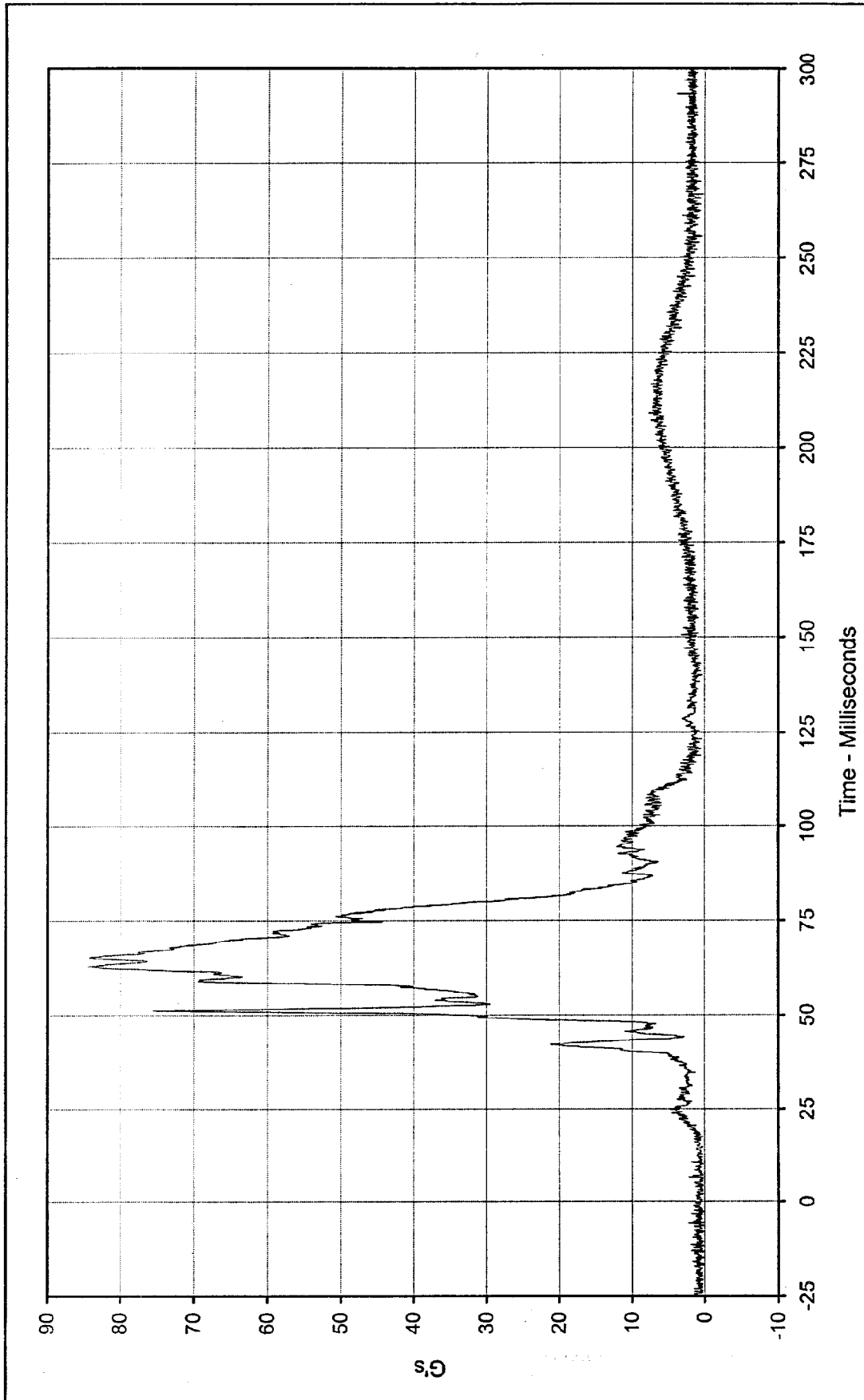
Date of Test: 2/12/99

Curve Number: FIL-022

Test Program:

Test Vehicle:

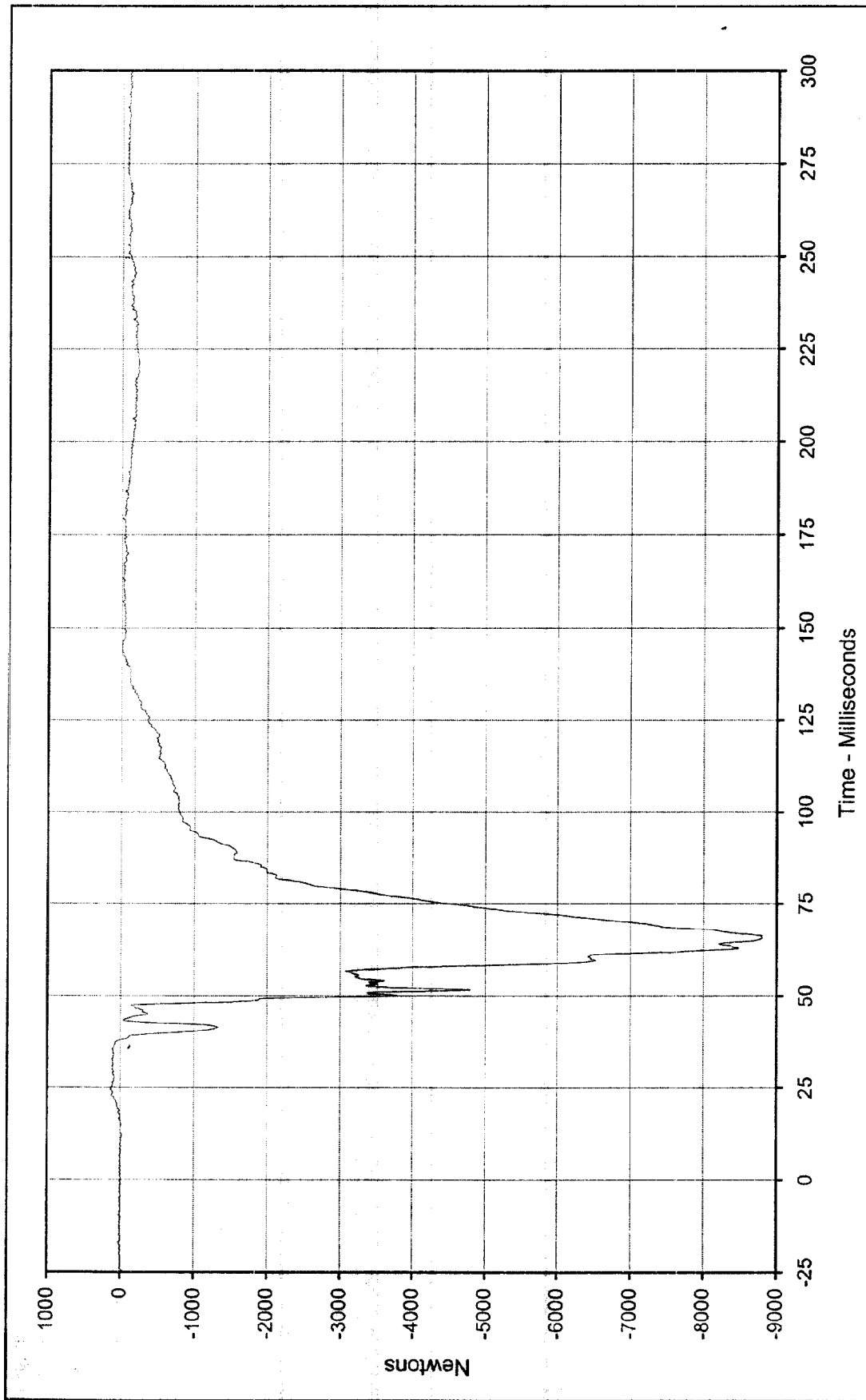




Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van

Curve Description: Driver Pelvis Resultant
 Maximum Value: 84.4 at 62.9 Milliseconds
 Minimum Value: 0.2 at 4.3 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/12/99
 Curve Number: RES-020





Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Program: 1999 Chevrolet Astro LS Van

Maximum Value: 137.0 at 24.6 Milliseconds

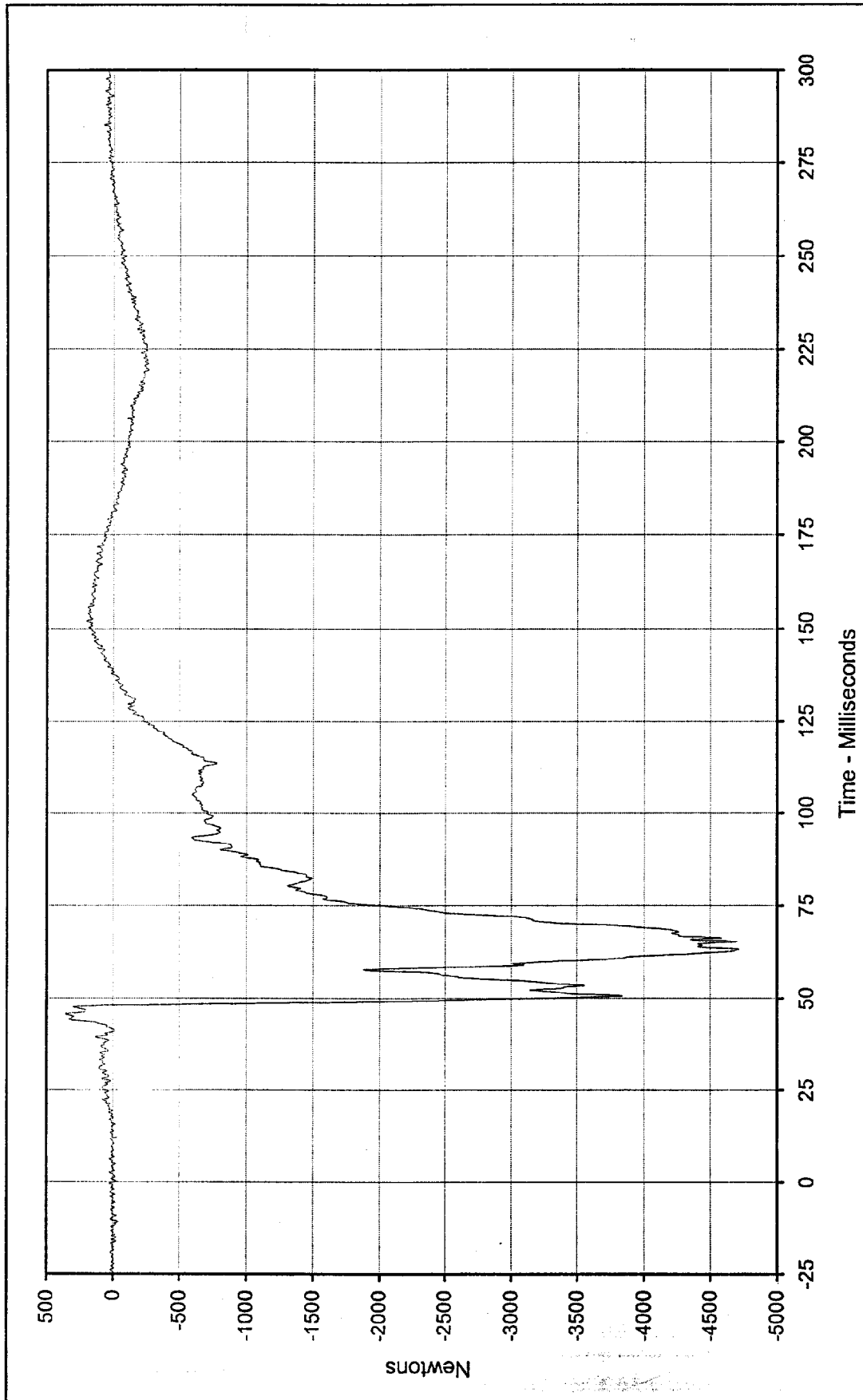
Minimum Value: -8802.6 at 65.5 Milliseconds

SAE Filter Class: 600

Date of Test: 2/12/99

Curve Number: FIL-023

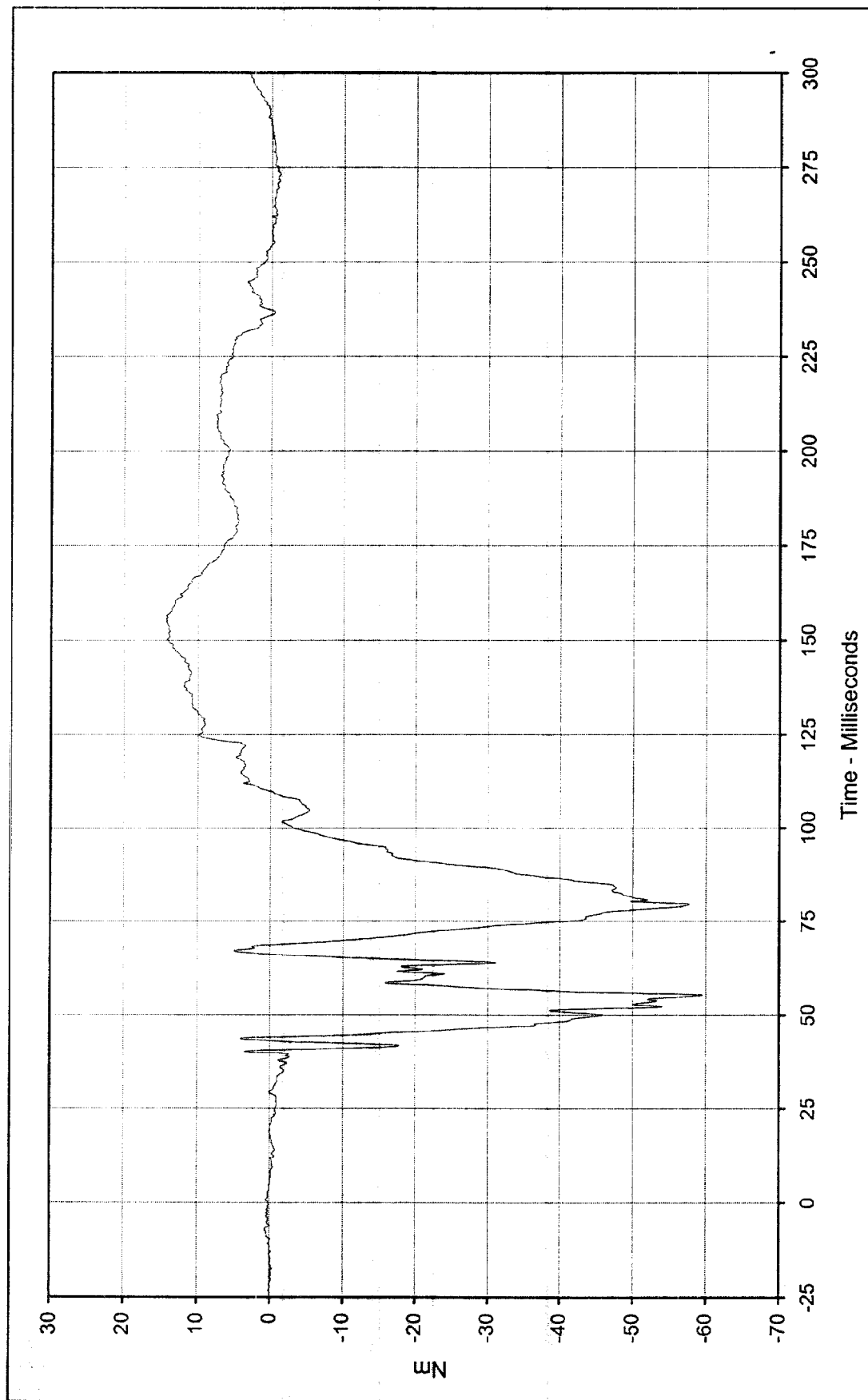




Curve Description: Driver Right Femur Force
Maximum Value: 358.5 at 45.7 Milliseconds
Minimum Value: -4714.4 at 63.2 Milliseconds
SAE Filter Class: 600
Date of Test: 2/12/99
Curve Number: FIL-024

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Driver Left Upper Tibia Moment X Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 14.2 at 155.6 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

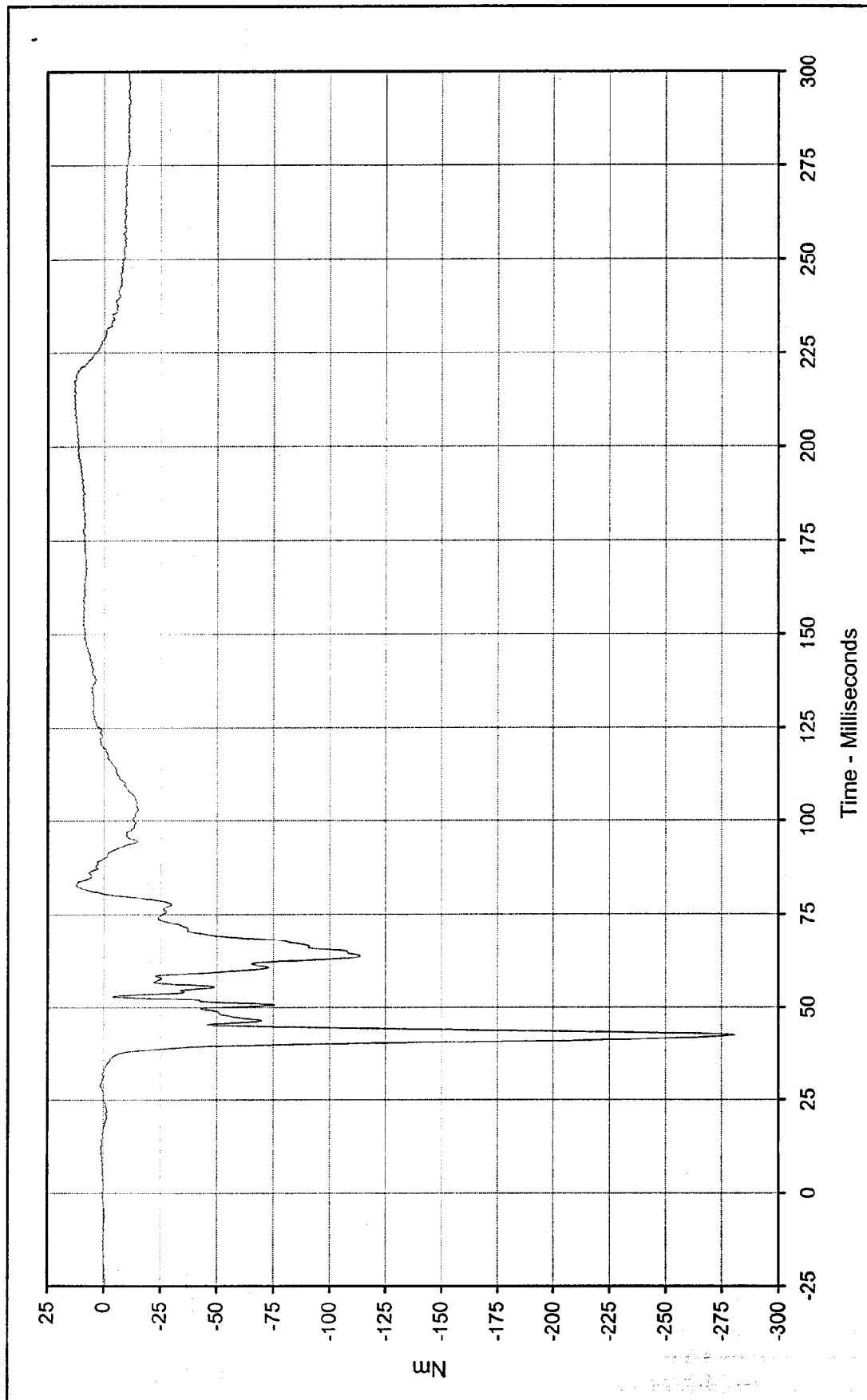
Minimum Value: -59.6 at 55.4 Milliseconds

SAE Filter Class: 600

Date of Test: 2/12/99

Curve Number: FIL-025



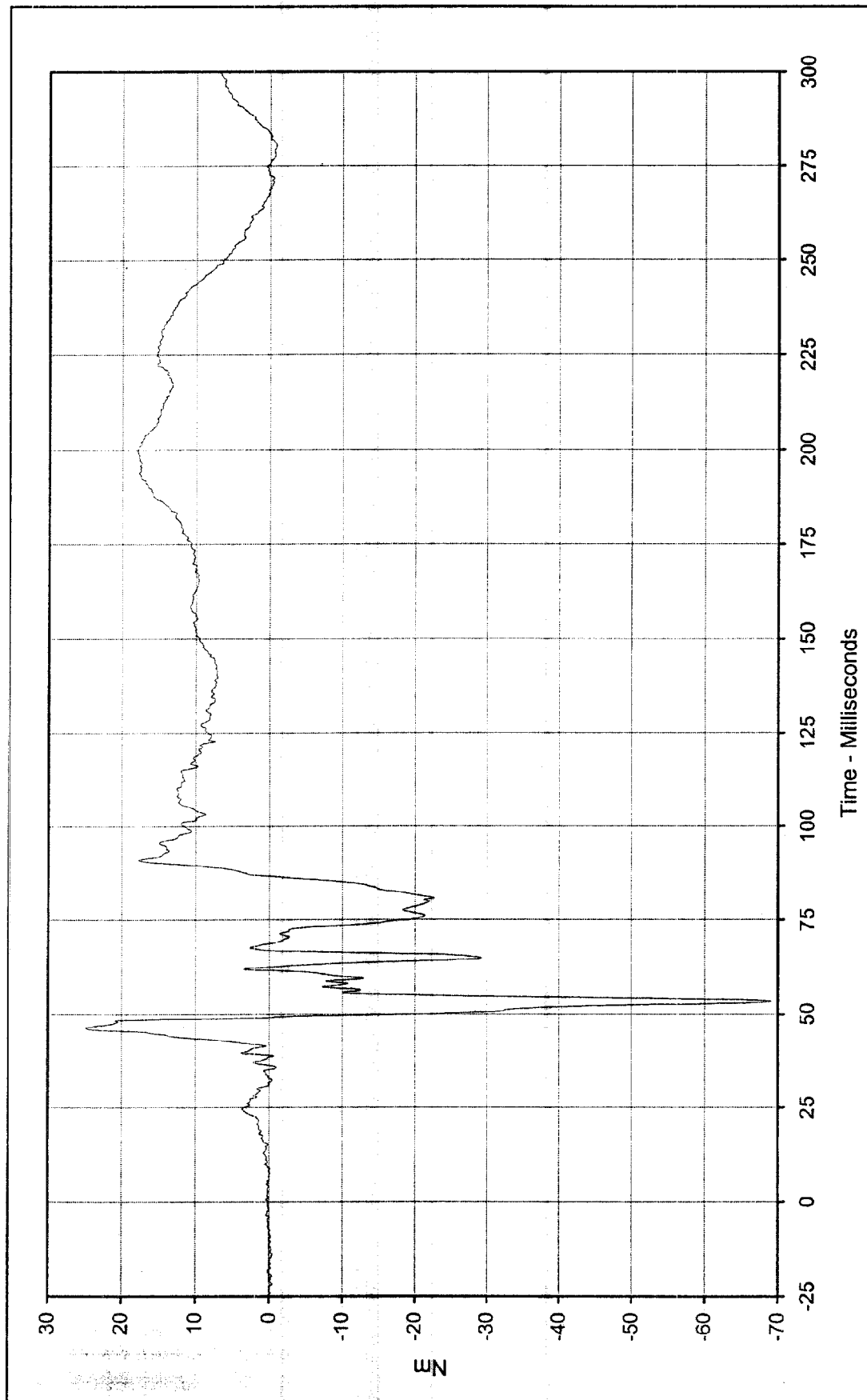


Curve Description: Driver Left Upper Tibia Moment Y
 Maximum Value: 13.4 at 217.4 Milliseconds
 Minimum Value: -280.9 at 42.5 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/12/99
 Curve Number: FIL-026

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Driver Right Upper Tibia Moment X Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 24.9 at 46.5 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

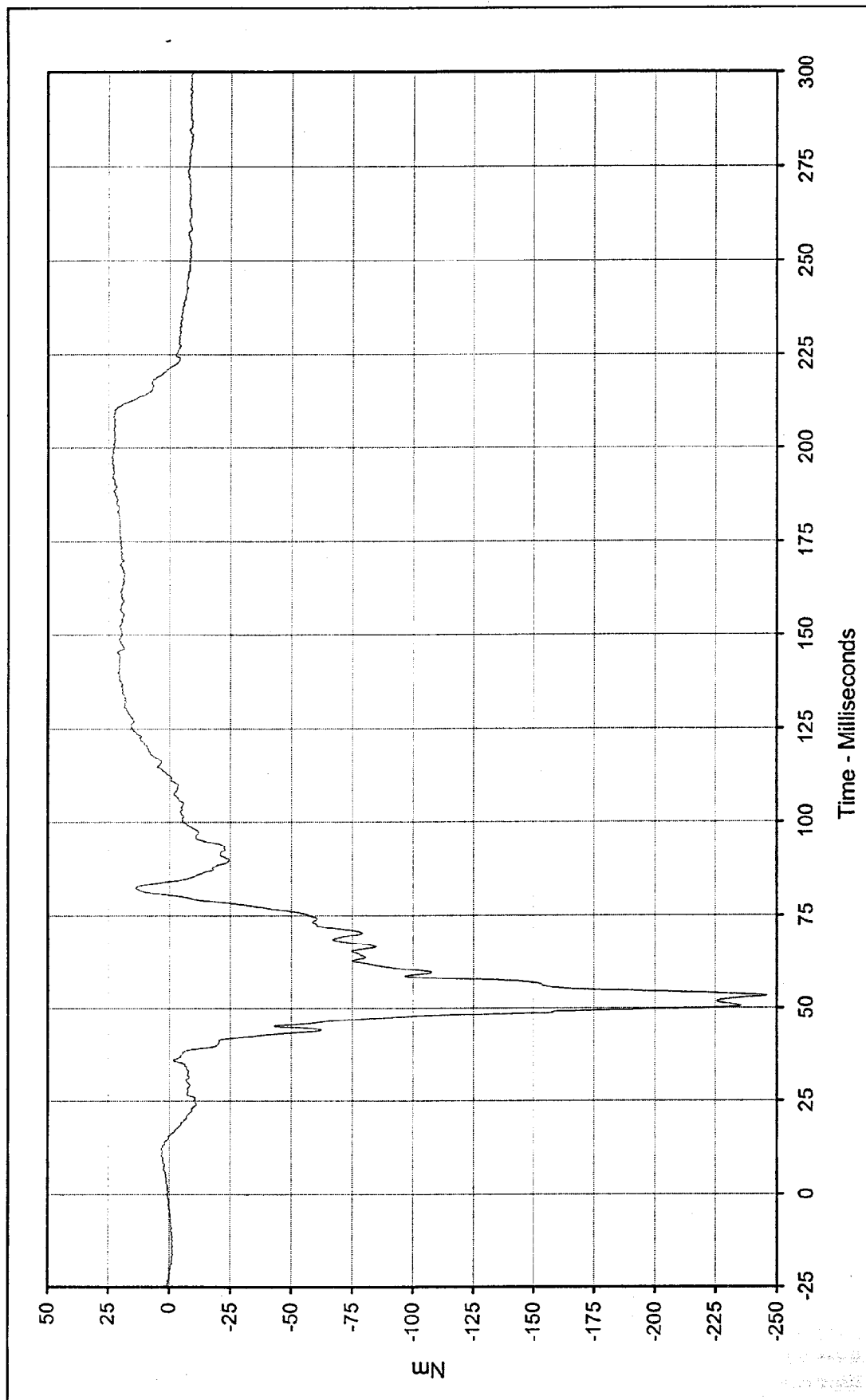
Minimum Value: -69.1 at 53.4 Milliseconds

SAE Filter Class: 600

Date of Test: 2/12/99

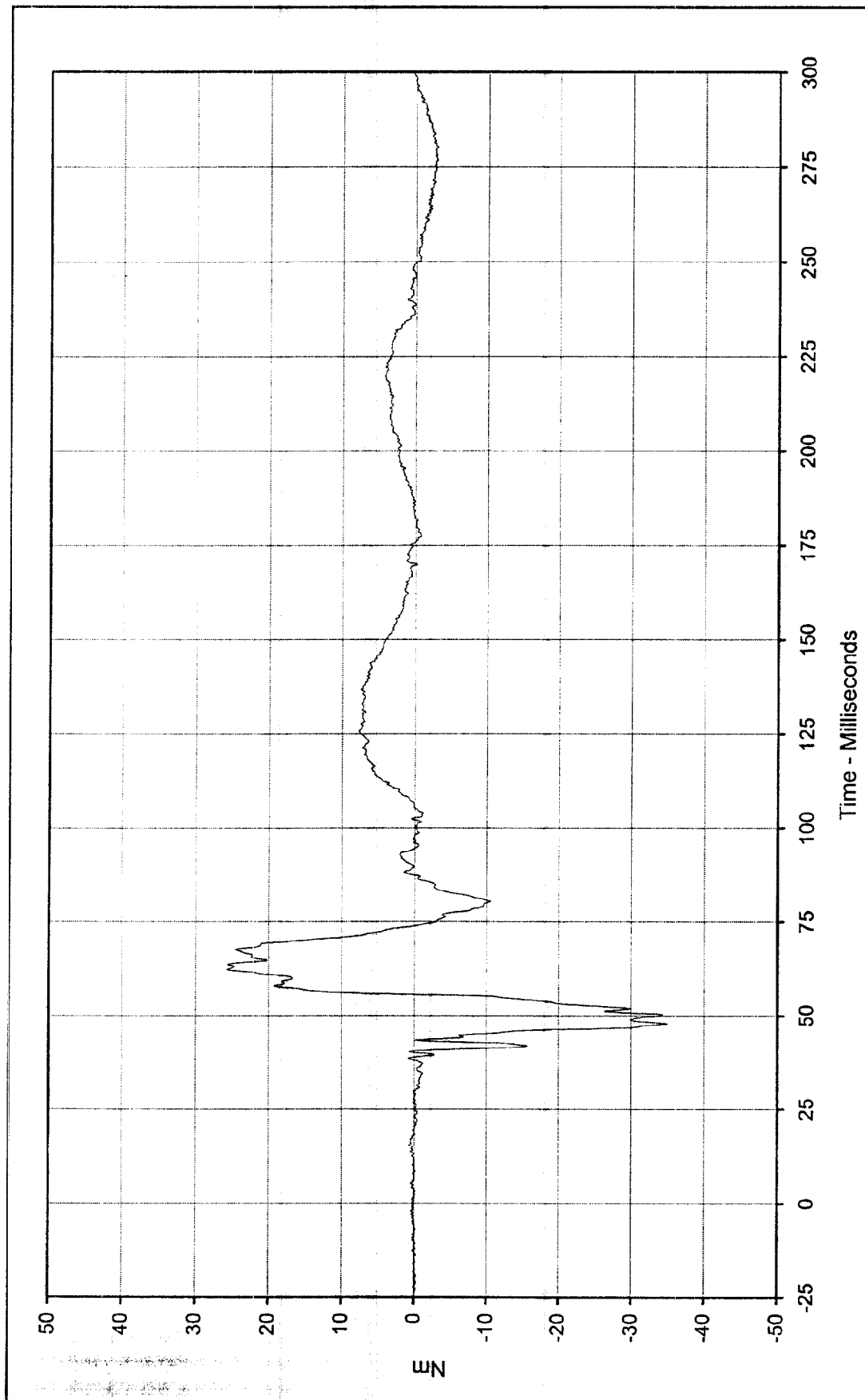
Curve Number: FIL-027





Curve Description:	Driver Right Upper Tibia Moment Y	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	23.7 at 197.4 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-246.1 at 53.2 Milliseconds			
SAE Filter Class:	600			
Date of Test:	2/12/99			
Curve Number:	FIL-028			

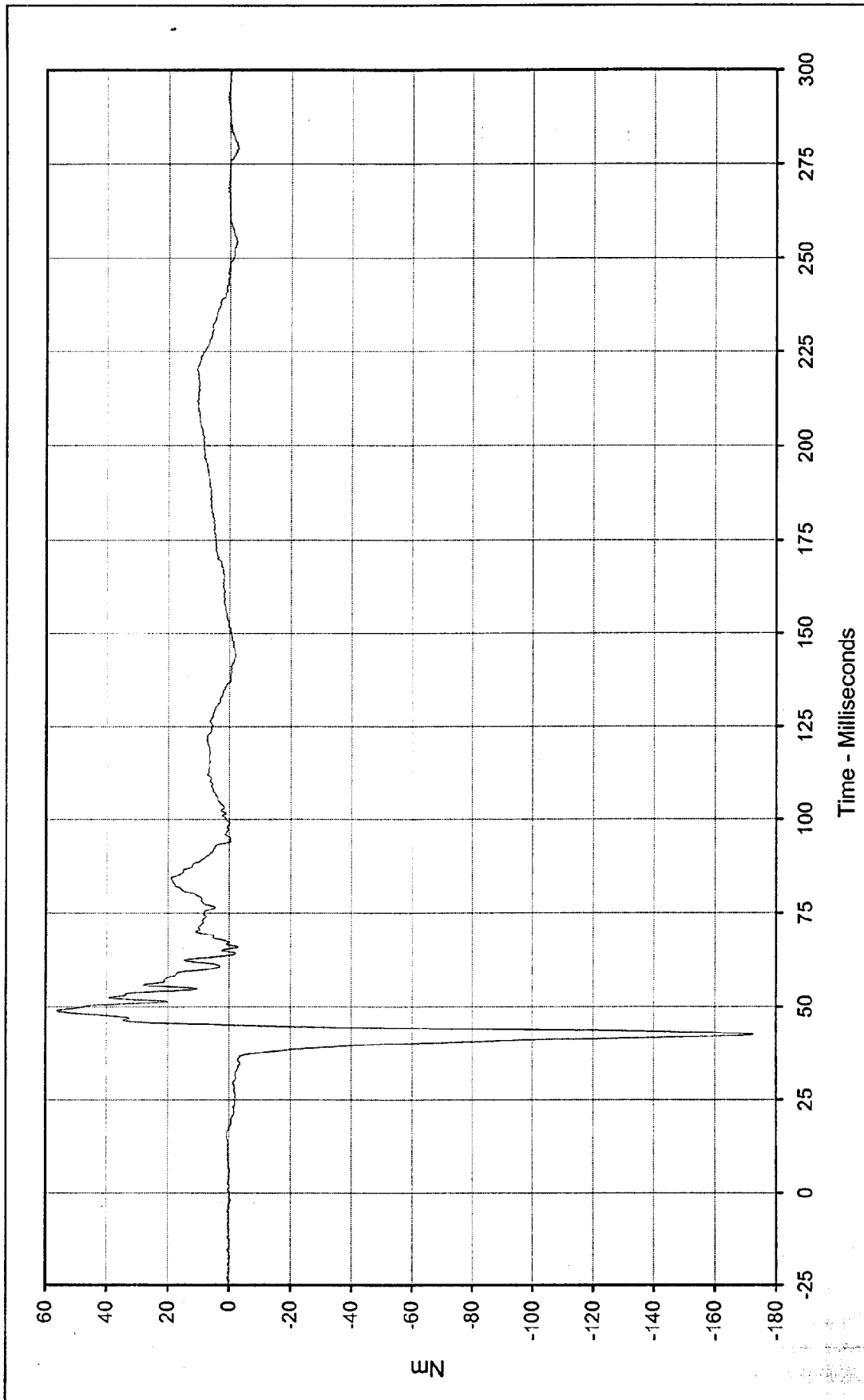




Curve Description: Driver Left Lower Tibia Moment X
 Maximum Value: 25.7 at 62.3 Milliseconds
 Minimum Value: -35.0 at 47.8 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/12/99
 Curve Number: FIL-029

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Driver Left Lower Tibia Moment Y

Maximum Value: 56.4 at 49.0 Milliseconds

Minimum Value: -172.8 at 42.4 Milliseconds

SAE Filter Class: 600

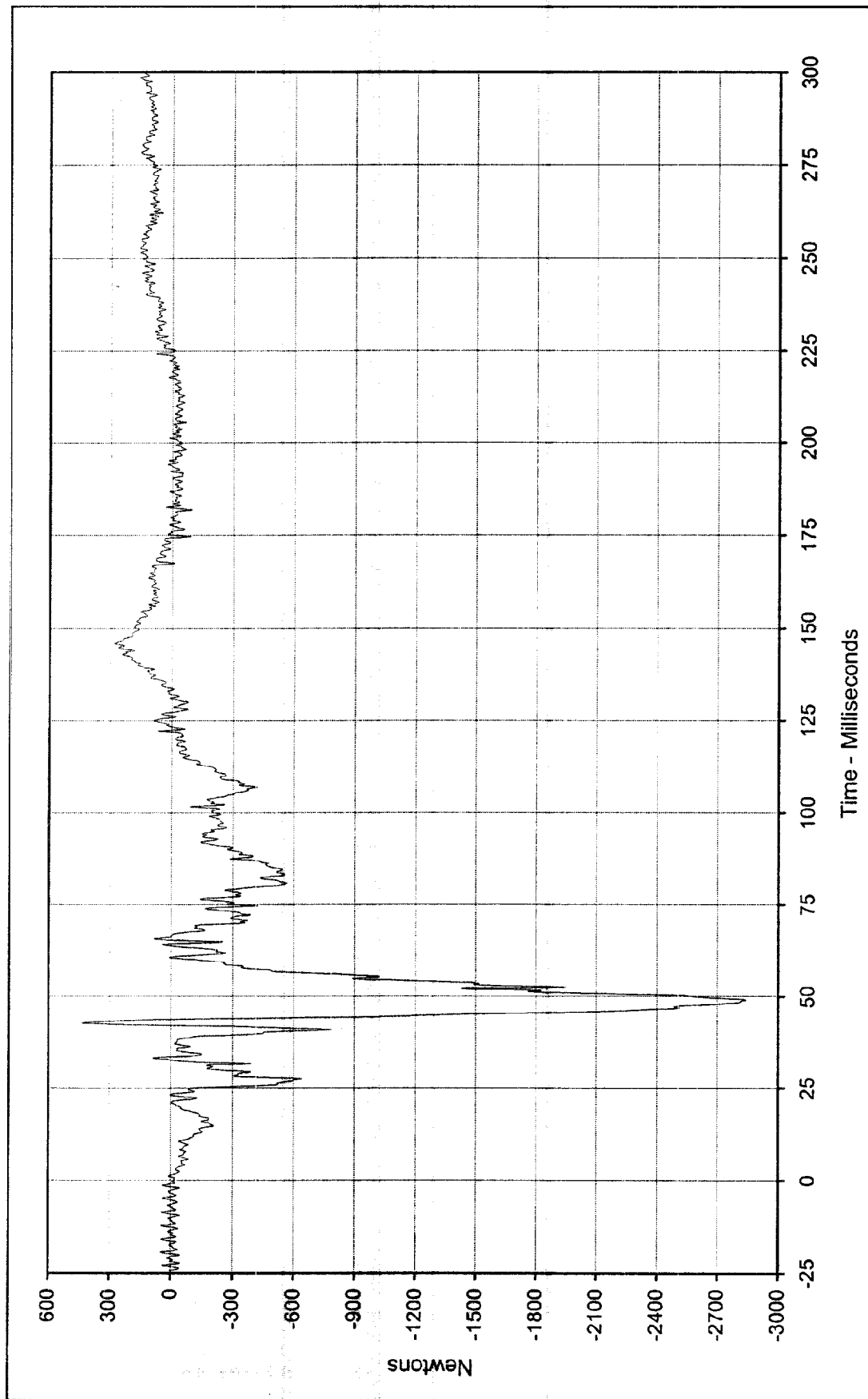
Date of Test: 2/12/99

Curve Number: FIL-030

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van

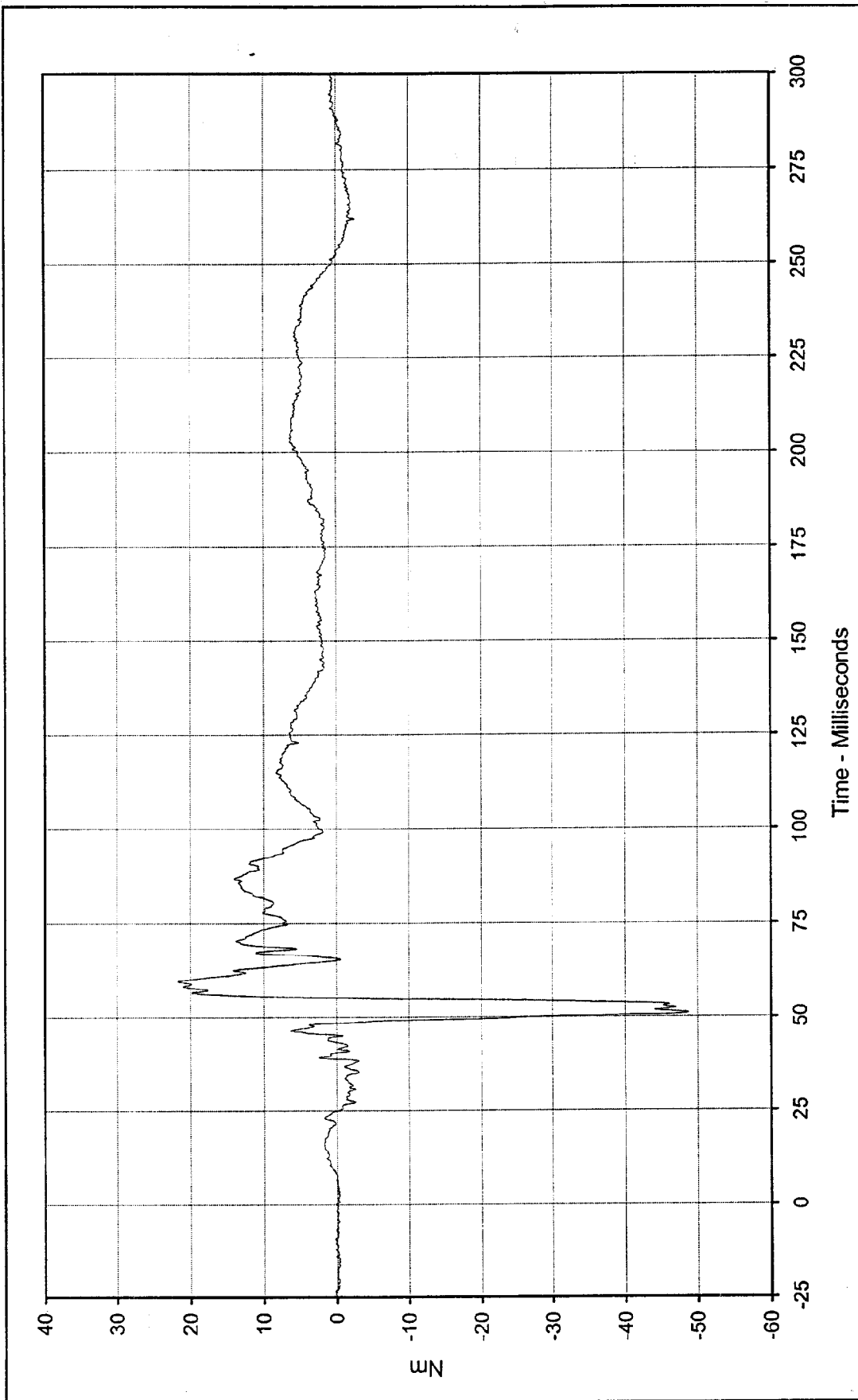




Curve Description: Driver Left Lower Tibia Force Z
 Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van

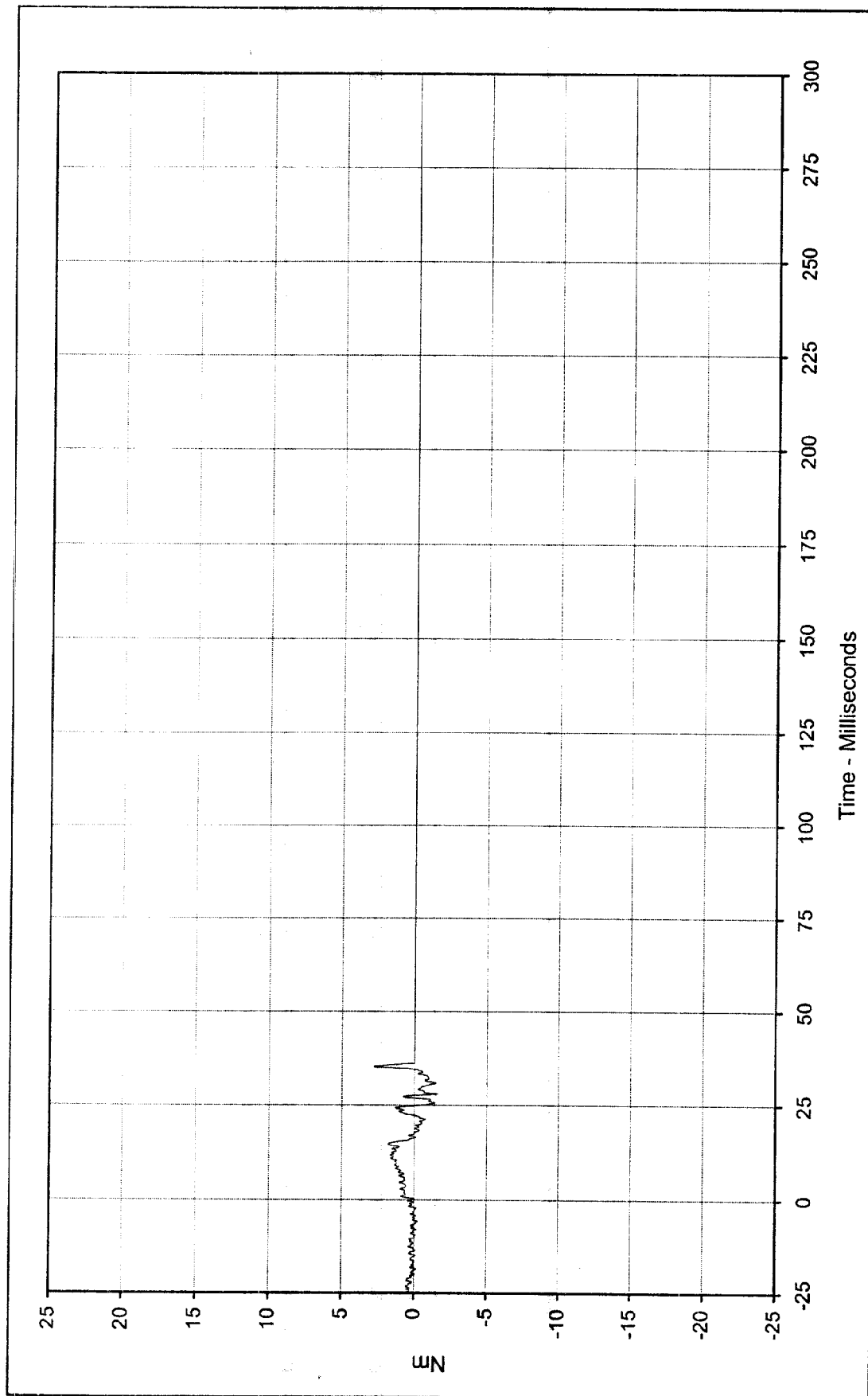
Maximum Value: 434.5 at 42.8 Milliseconds
 Minimum Value: -2842.3 at 49.0 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/12/99
 Curve Number: FIL-031





Curve Description:	Driver Right Lower Tibia Moment X	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	21.7 at 59.5 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-48.8 at 51.1 Milliseconds			
SAE Filter Class:	600			
Date of Test:	2/12/99			
Curve Number:	FIL-032			



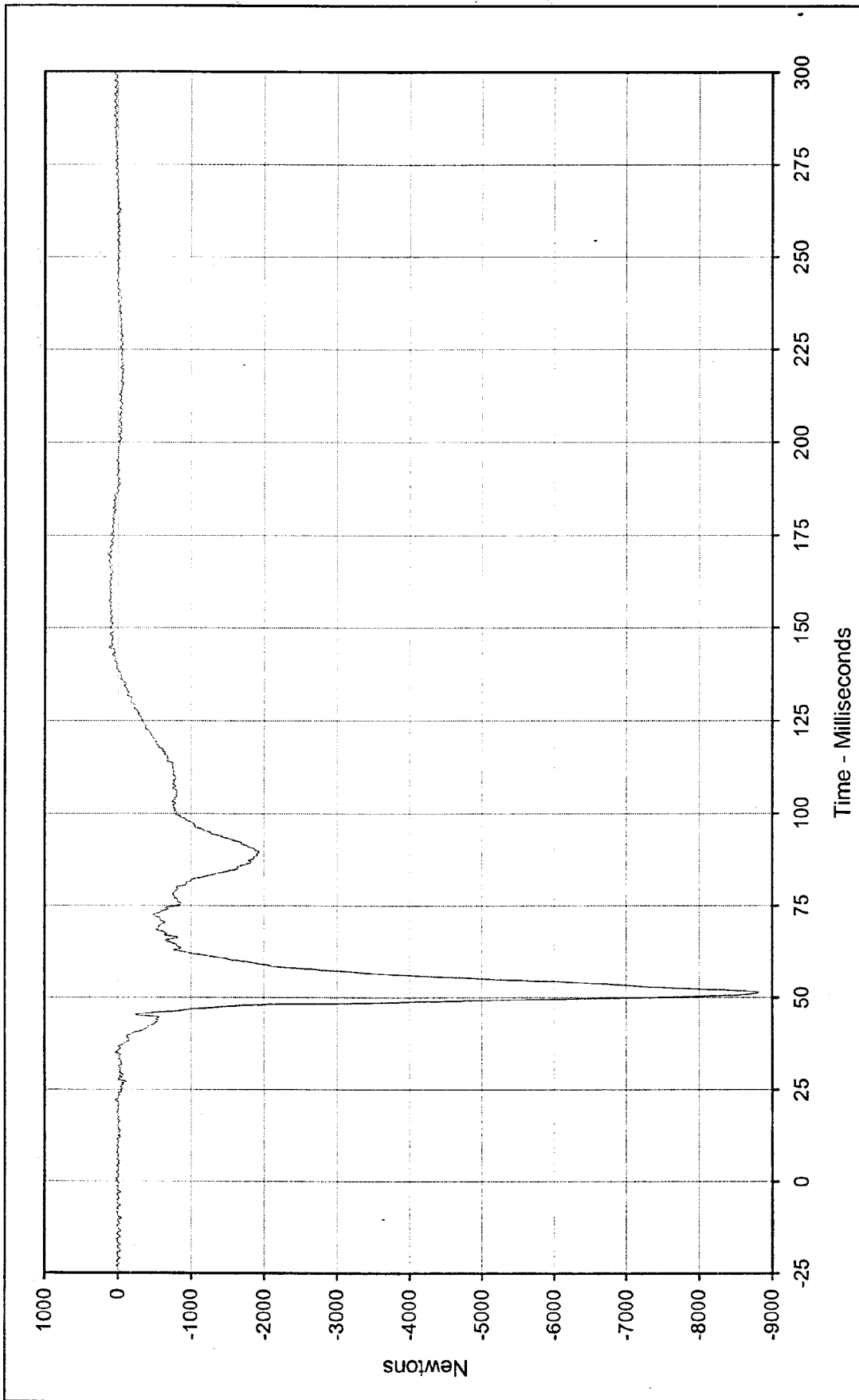


Curve Description: Driver Right Lower Tibia Moment Y *
 Maximum Value: 2.8 at 35.3 Milliseconds
 Minimum Value: -1.6 at 28.0 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/12/99
 Curve Number: FIL-033

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van



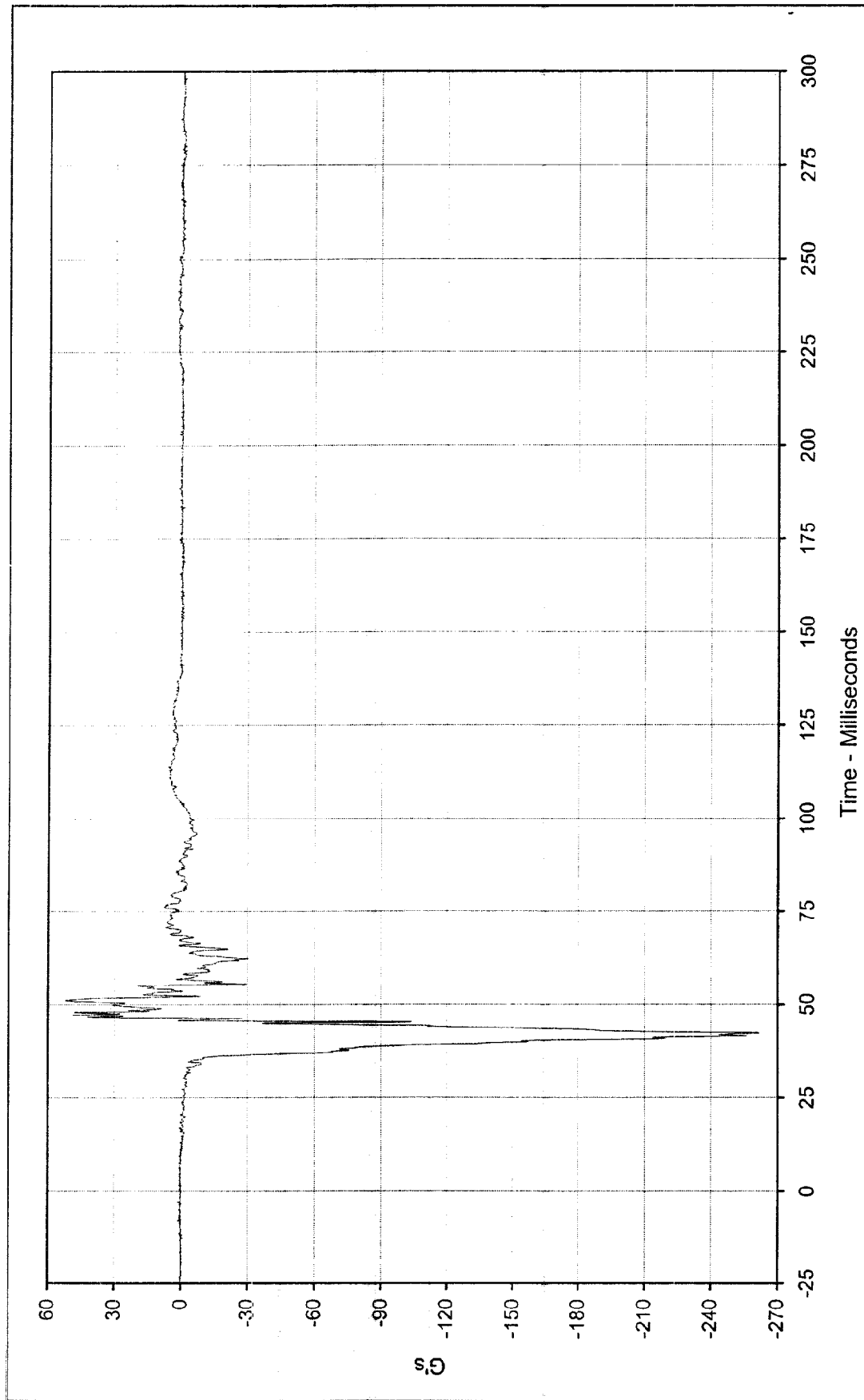
* Channel Failed at 36.1 Msec.



Curve Description:	Driver Right Lower Tibia Force Z	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	150.9 at 169.9 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-8817.2 at 51.4 Milliseconds			



SAE Filter Class:	600
Date of Test:	2/12/99
Curve Number:	FIL-034



Curve Description: Driver Left Foot Aft X Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 51.9 at 51.1 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

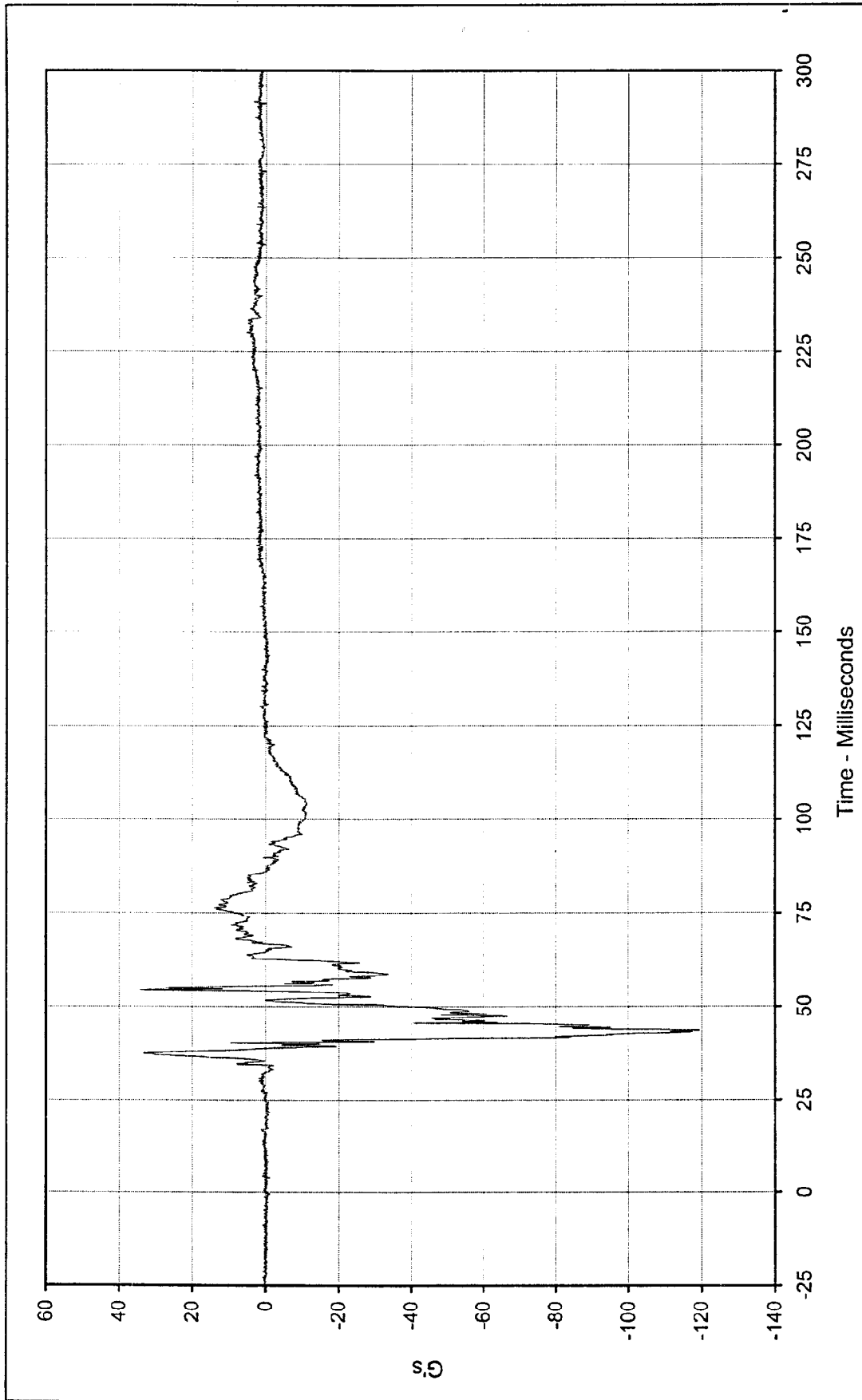
Minimum Value: -261.9 at 42.2 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

Curve Number: FIL-035





Curve Description: Driver Left Foot Aft Z Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 34.2 at 54.4 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

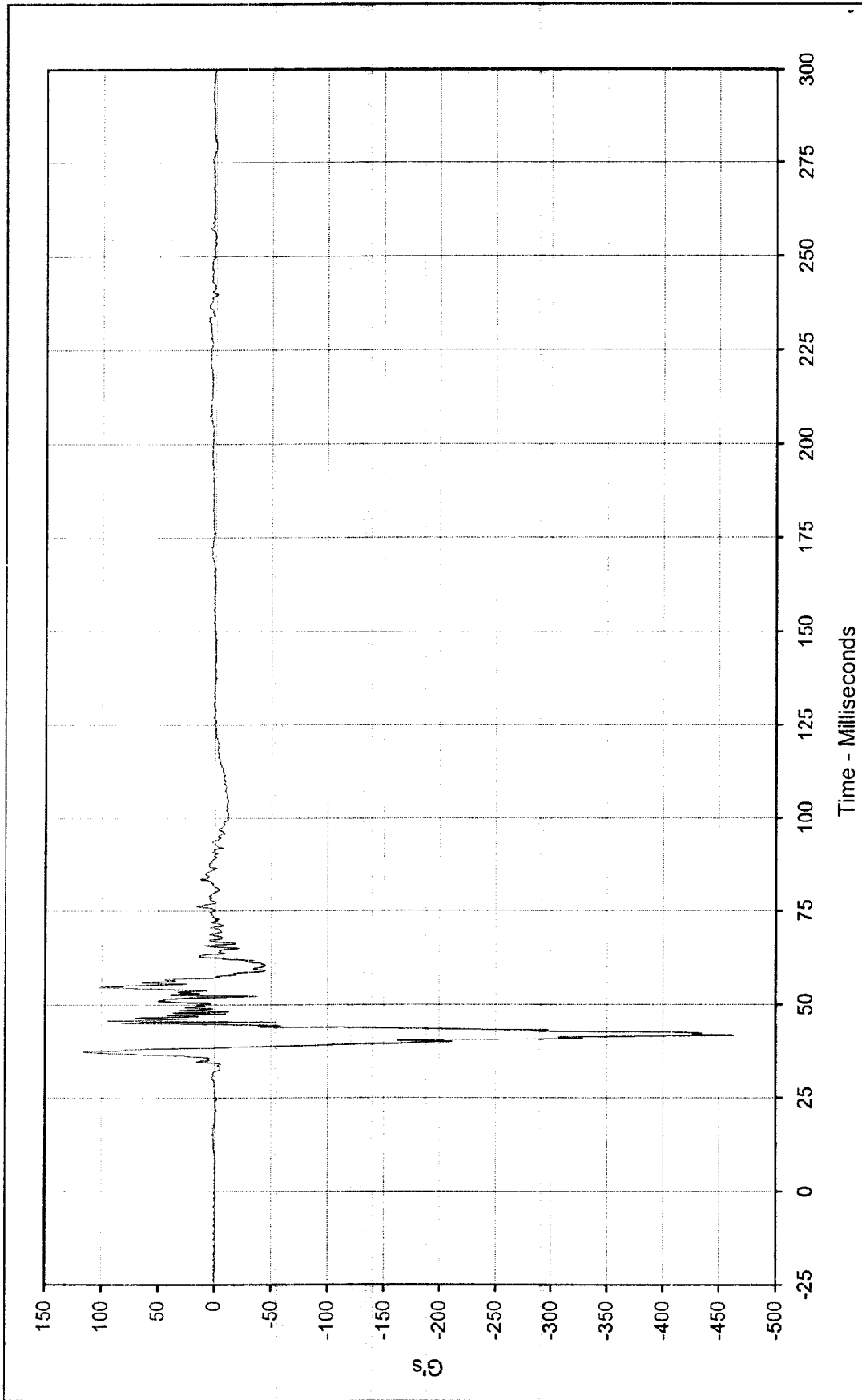
Minimum Value: -119.4 at 43.4 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

Curve Number: FIL-036

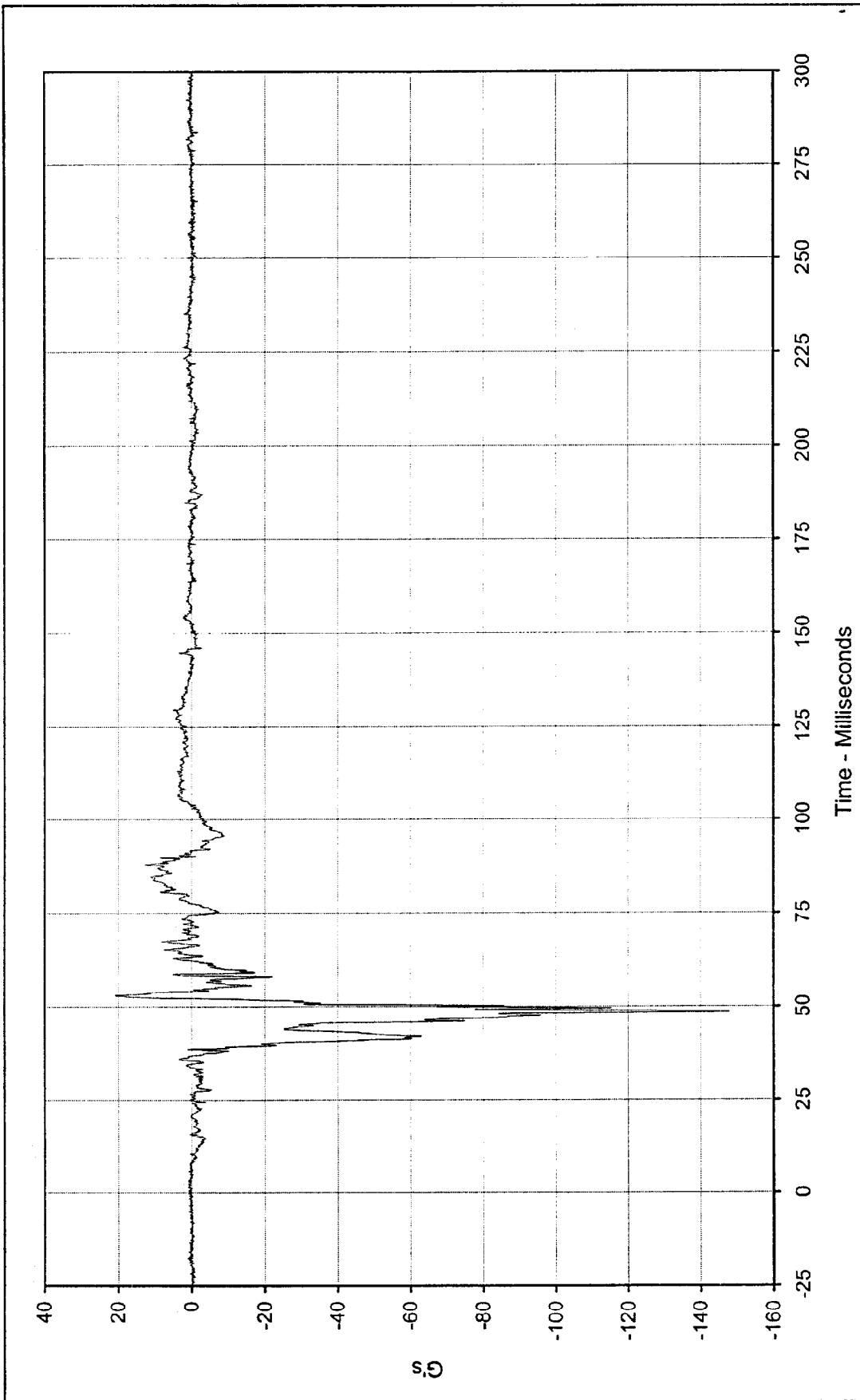




Curve Description:	Driver Left Foot Fore Z	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	115.5 at 37.2 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-463.1 at 41.5 Milliseconds			



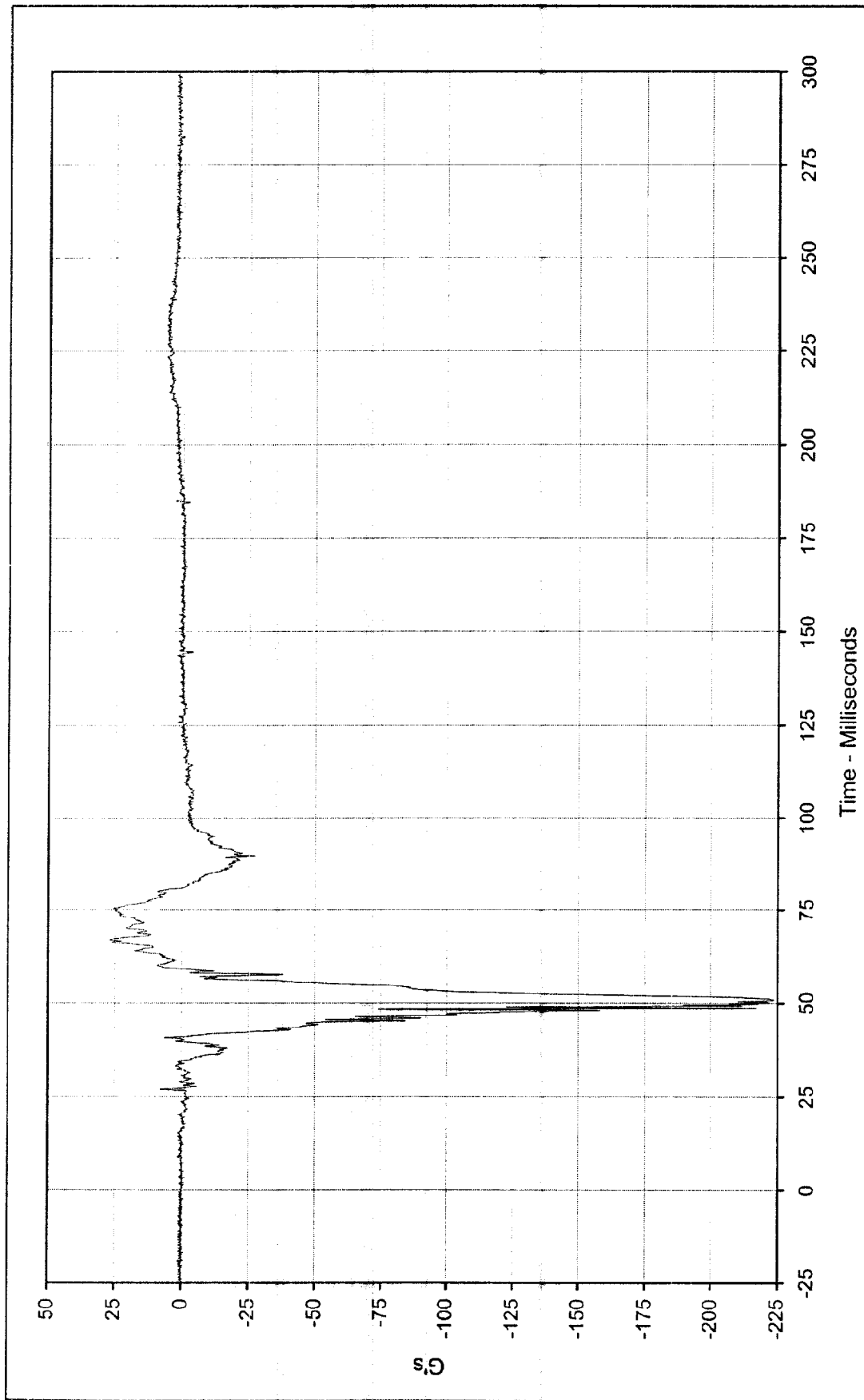
SAE Filter Class:	1000
Date of Test:	2/12/99
Curve Number:	FIL-037



Curve Description: Driver Right Foot Aft X
 Maximum Value: 20.8 at 53.1 Milliseconds
 Minimum Value: -147.7 at 48.5 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/12/99
 Curve Number: FIL-038

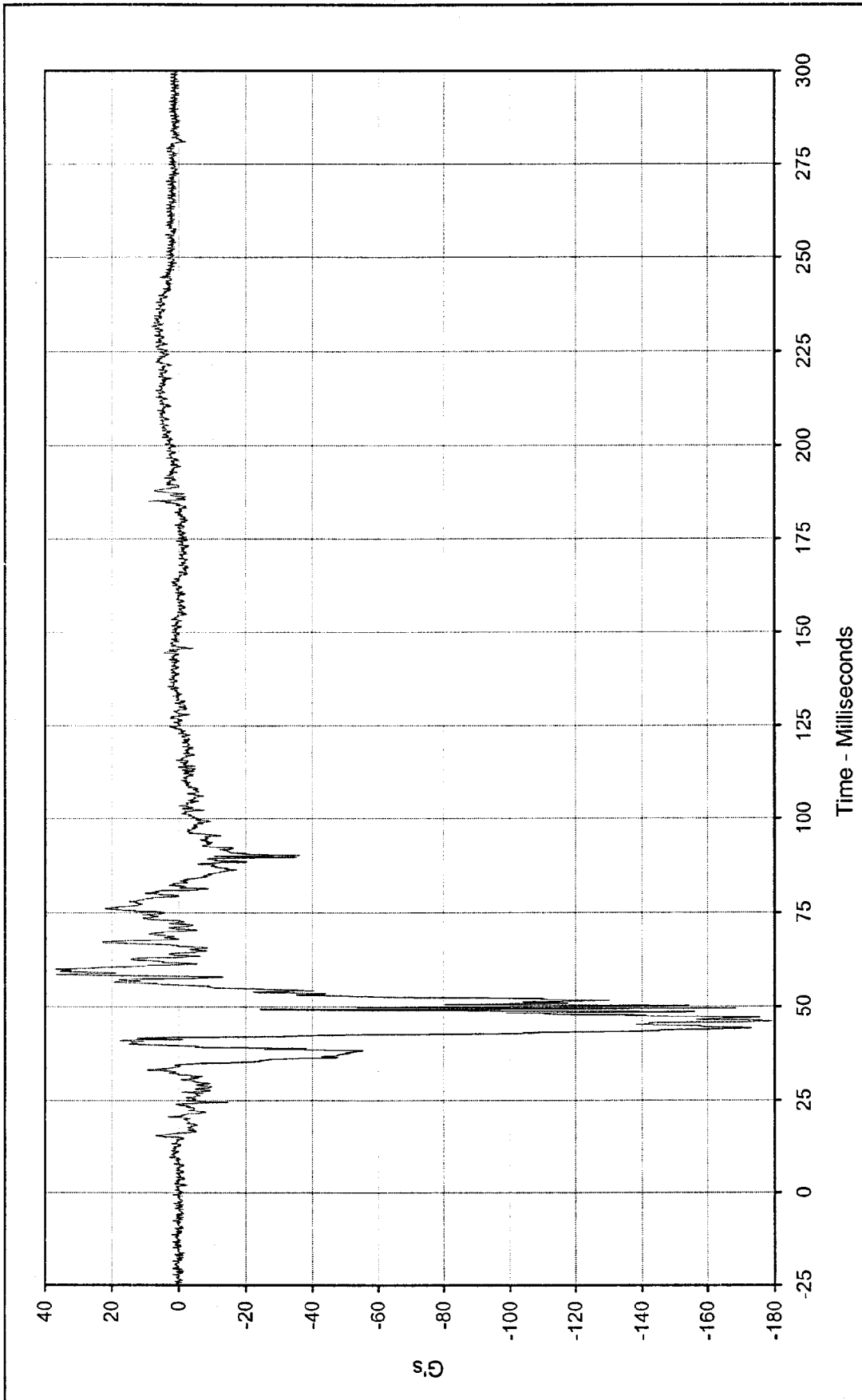
Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





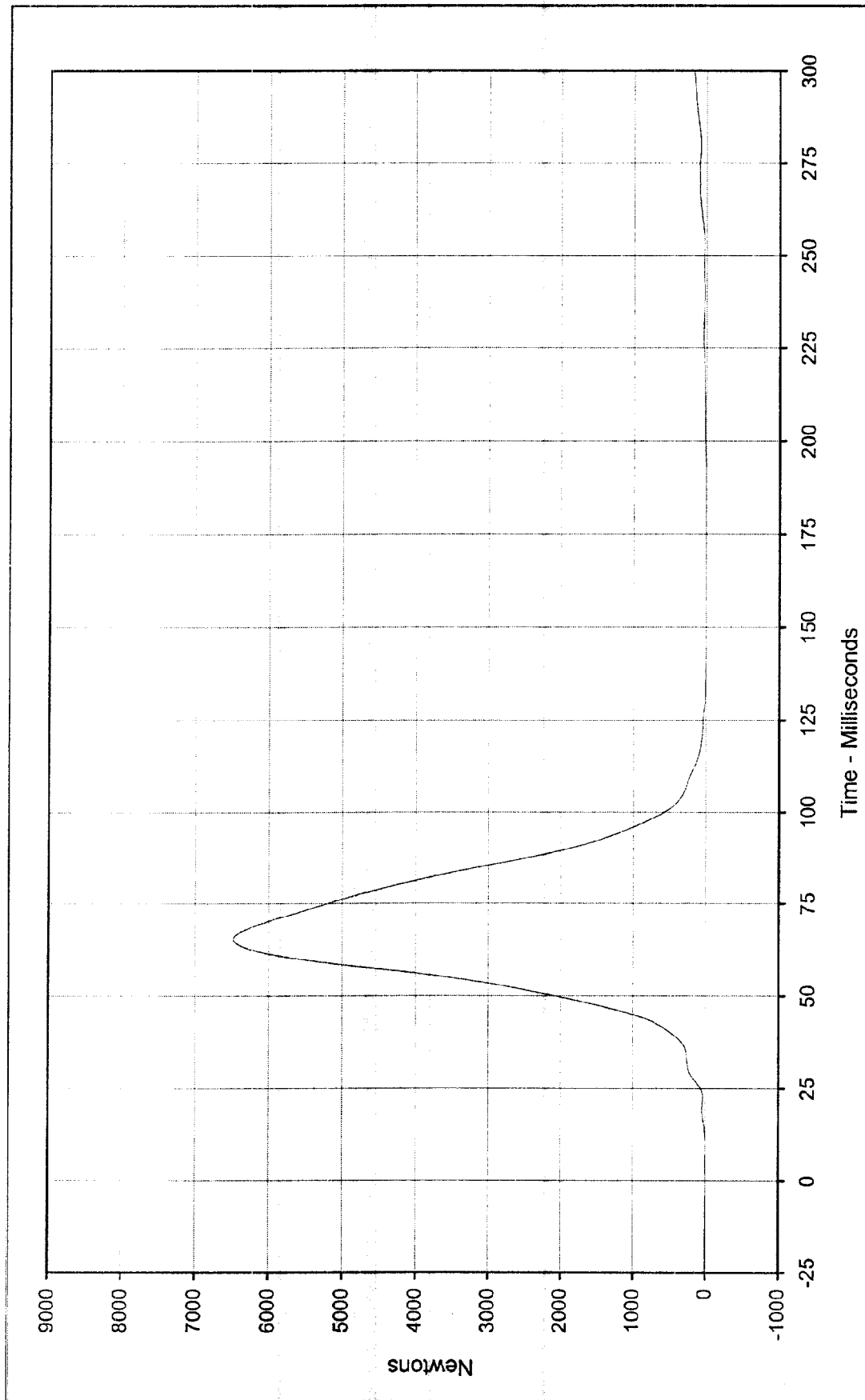
Curve Description:	Driver Right Foot Aft Z	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	26.6 at 66.9 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-223.8 at 50.8 Milliseconds			
SAE Filter Class:	1000			
Date of Test:	2/12/99			
Curve Number:	FIL-039			





Curve Description:	Driver Right Foot Fore Z	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	37.0 at 59.9 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-179.3 at 45.9 Milliseconds			
SAE Filter Class:	1000			
Date of Test:	2/12/99			
Curve Number:	FIL-040			



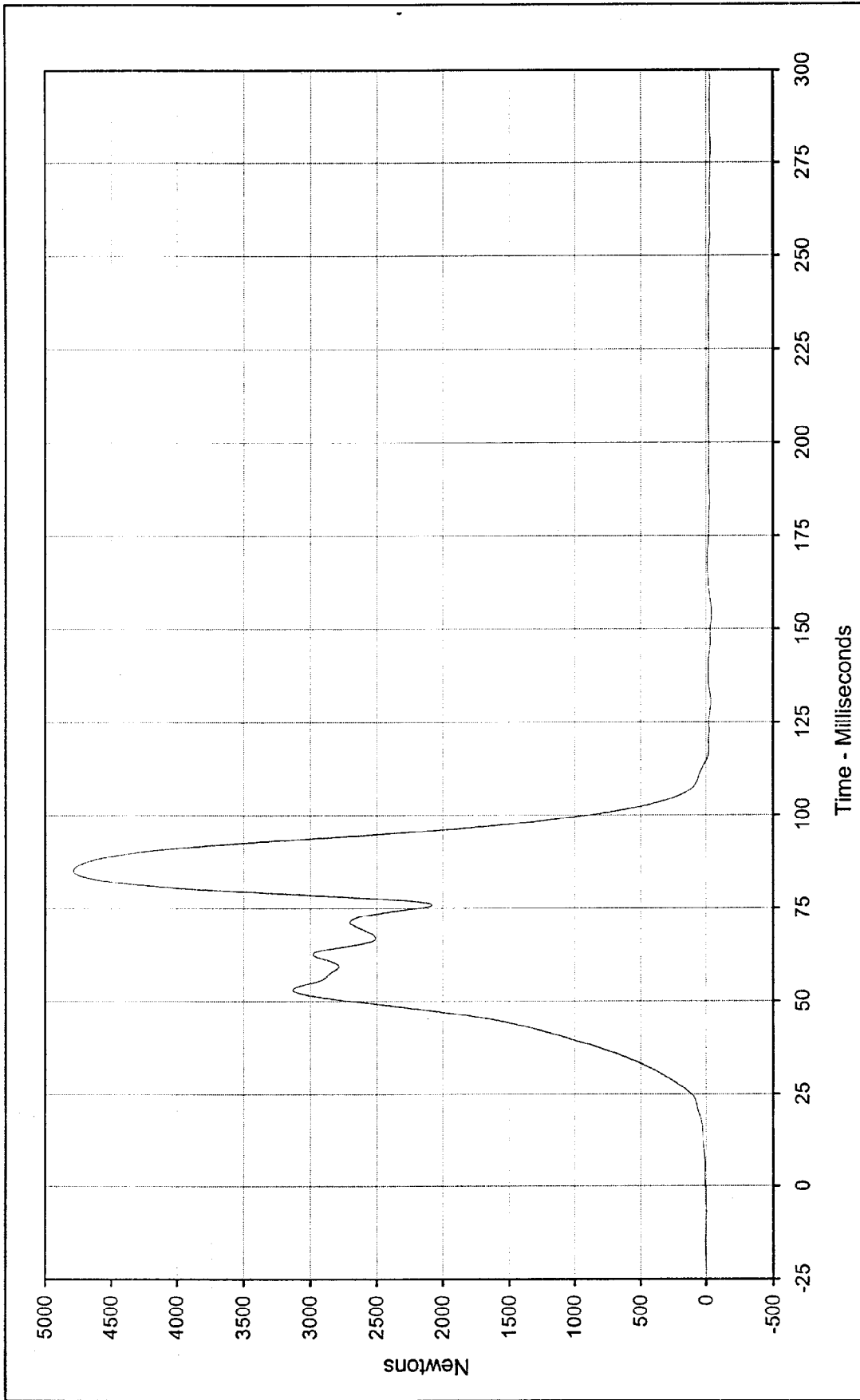


Curve Description:		Driver Lap Belt Force		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	6479.5	at	65.2	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-6.9	at	143.4			
SAE Filter Class:	60					
Date of Test:	2/12/99					
Curve Number:	FIL-041					



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Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Program:

Test Vehicle: 1999 Chevrolet Astro LS Van

Maximum Value: 4787.6 at 85.1 Milliseconds

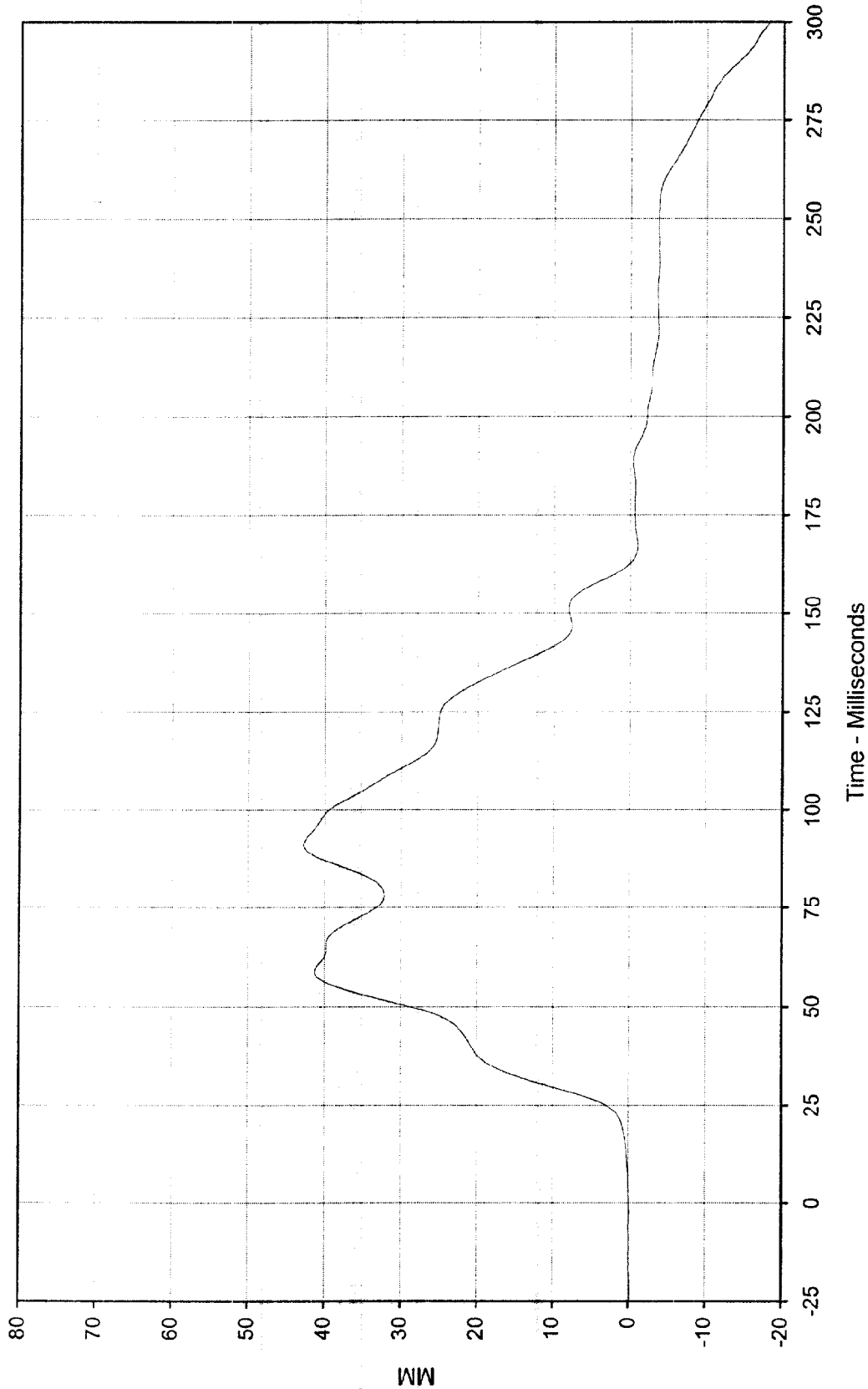
Minimum Value: -38.7 at 154.0 Milliseconds

SAE Filter Class: 60

Date of Test: 2/12/99

Curve Number: FIL-042





Curve Description: Driver Shoulder Belt Pullout Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 42.7 at 91.0 Milliseconds

Minimum Value: -18.2 at 299.9 Milliseconds

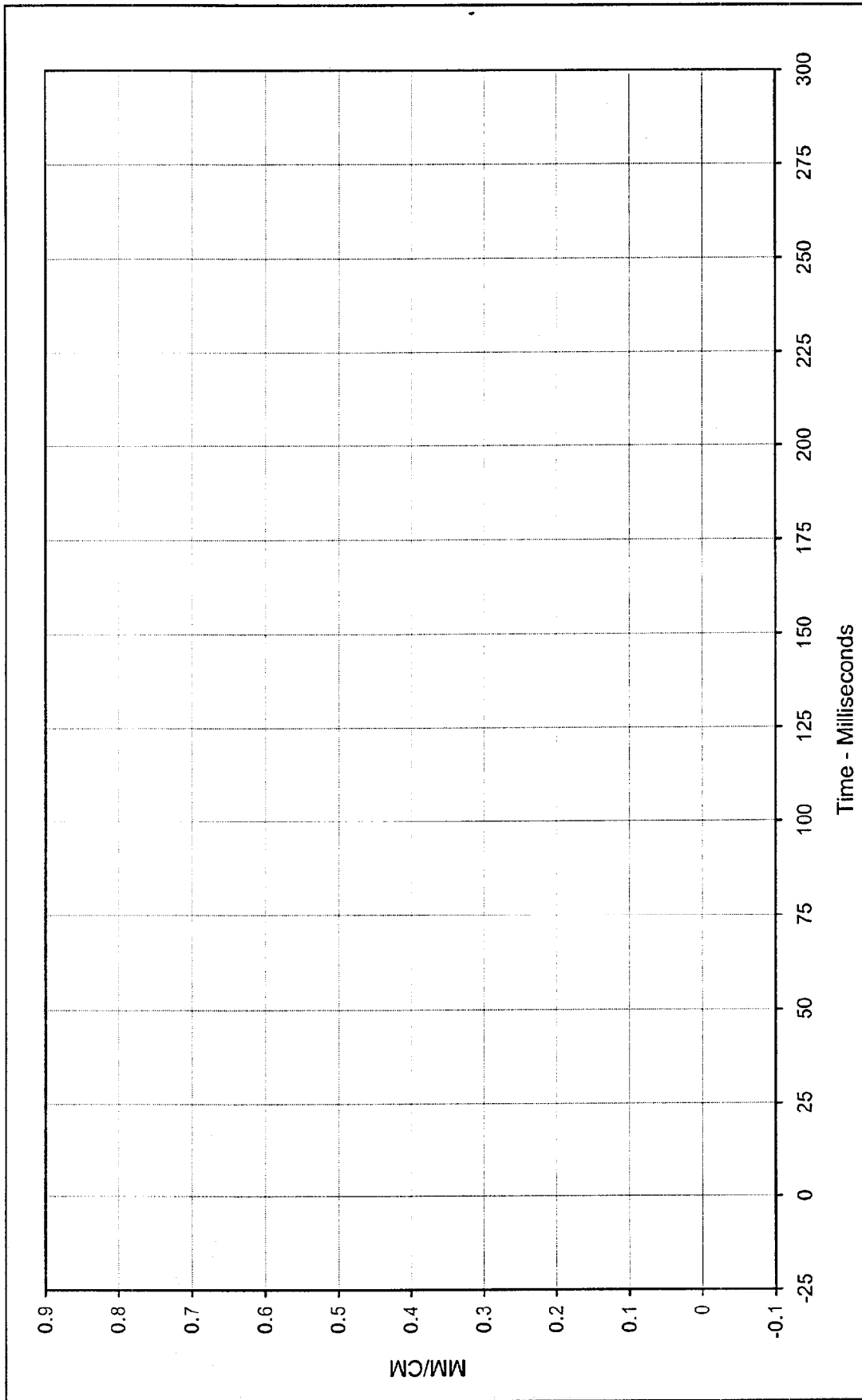
SAE Filter Class: 60

Date of Test: 2/12/99

Curve Number: FIL-043

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Driver Shoulder Belt Elongation * Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 0.00 at 0.0 Milliseconds

Minimum Value: 0.00 at 0.0 Milliseconds

SAE Filter Class: 60

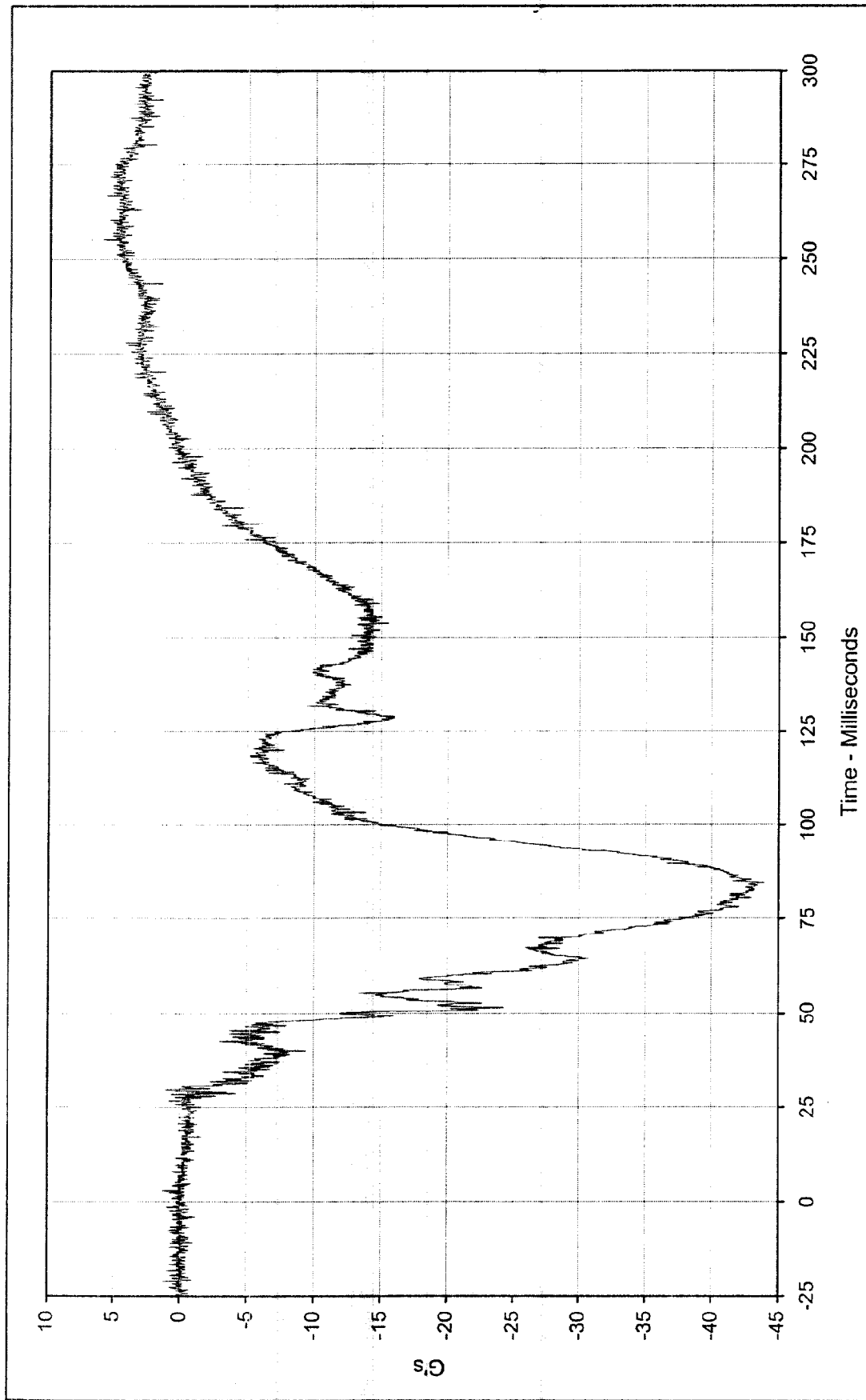
Date of Test: 2/12/99

Curve Number: FIL-044

Test Vehicle: 1999 Chevrolet Astro LS Van



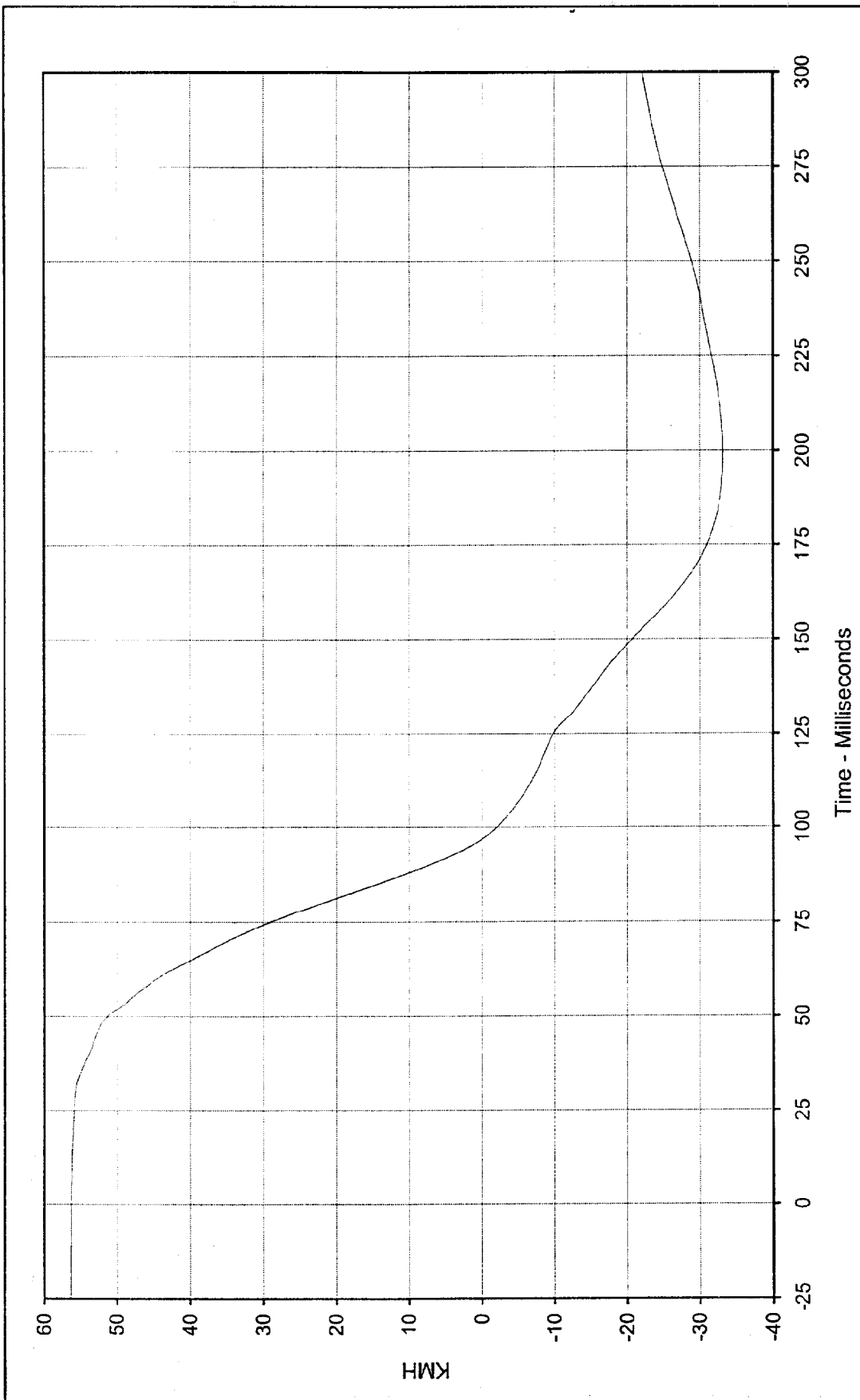
*Not used



Curve Description:	Passenger Head Primary X	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	6.0 at 255.1 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-43.9 at 84.5 Milliseconds			



SAE Filter Class:	1000
Date of Test:	2/12/99
Curve Number:	FIL-045



Curve Description: Passenger Head Primary X Velocity

Maximum Value: 56.3 at 3.6 Milliseconds

Minimum Value: -33.2 at 198.9 Milliseconds

SAE Filter Class: 180

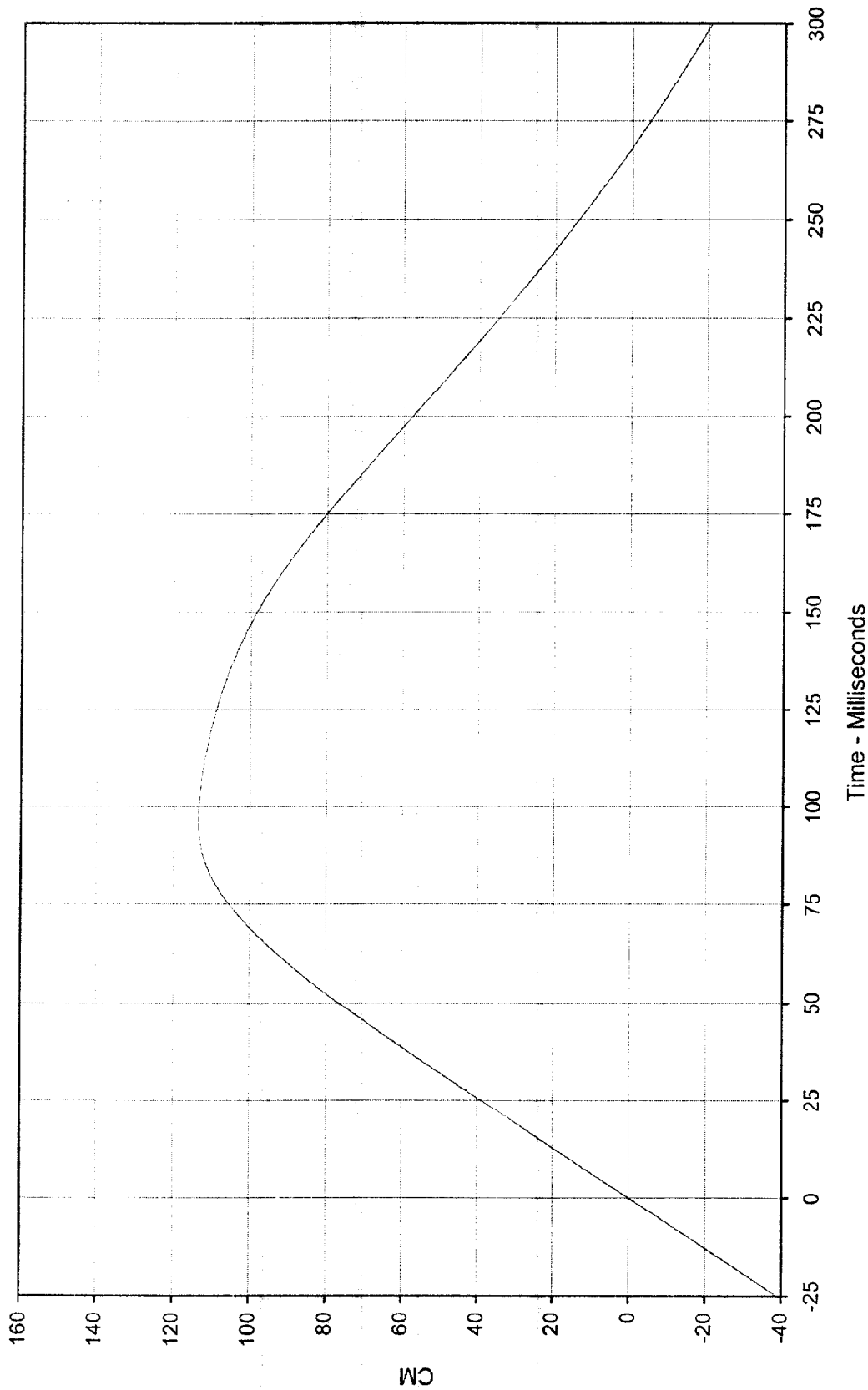
Date of Test: 2/12/99

Curve Number: IN1-045

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van

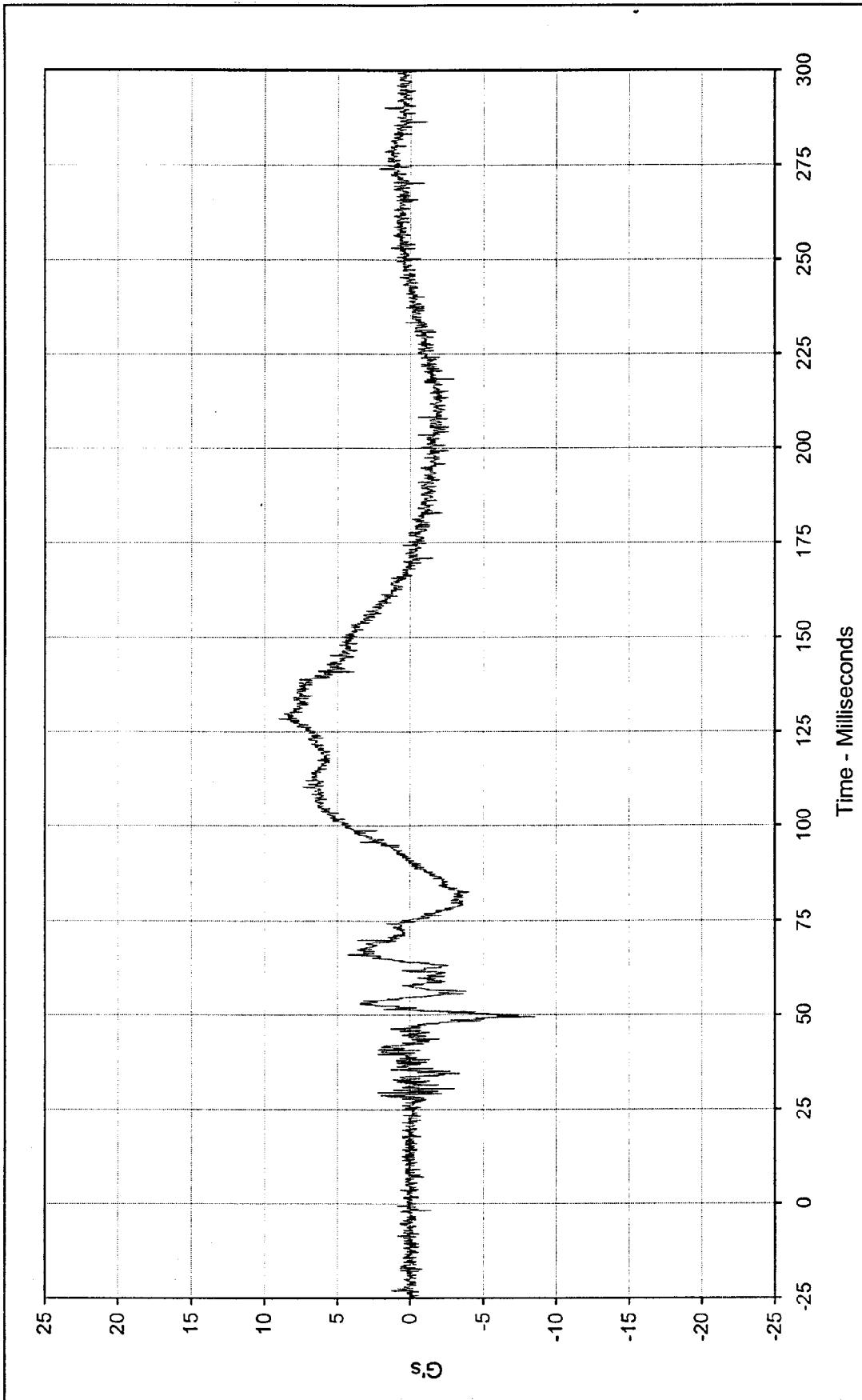




Curve Description: Passenger Head Primary X Displ.
 Maximum Value: 113.5 at 96.8 Milliseconds
 Minimum Value: -20.8 at 299.9 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/12/99
 Curve Number: IN2-045

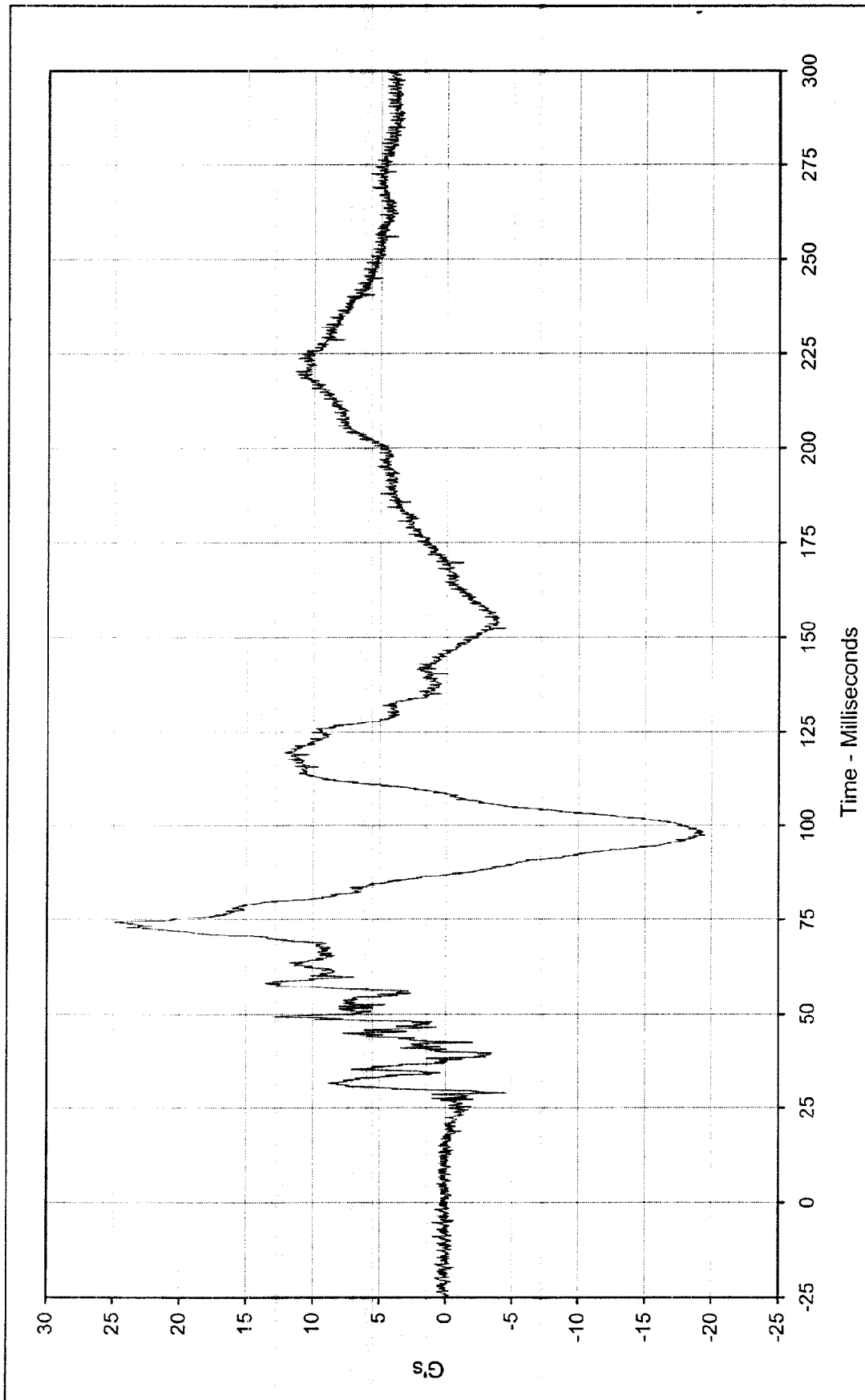
Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





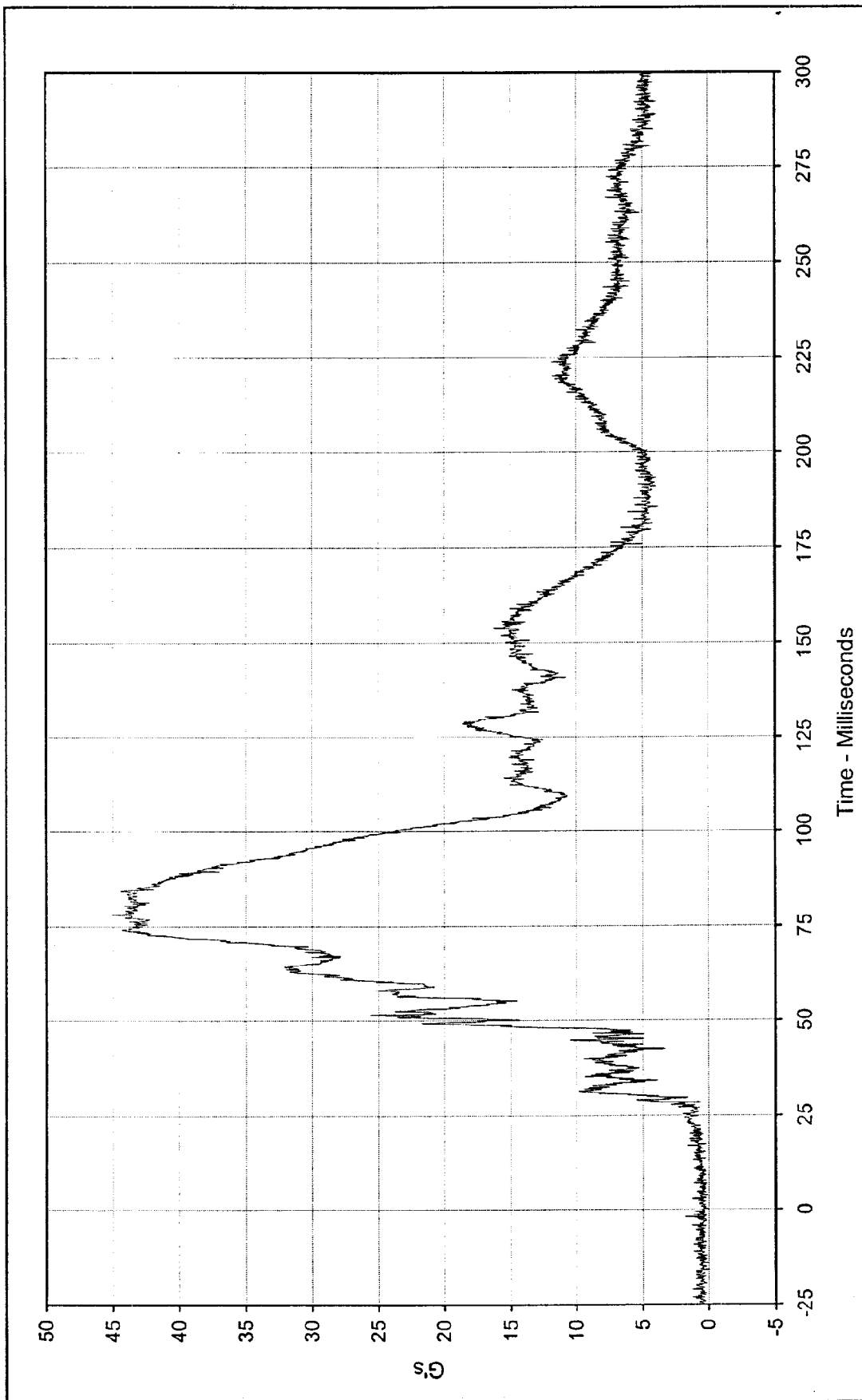
Curve Description:	Passenger Head Primary Y	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	9.1 at 128.6 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-8.7 at 49.4 Milliseconds			
SAE Filter Class:	1000			
Date of Test:	2/12/99			
Curve Number:	FIL-046			





Curve Description:	Passenger Head Primary Z	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	24.9 at 74.3 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-19.5 at 97.3 Milliseconds			
SAE Filter Class:	1000			
Date of Test:	2/12/99			
Curve Number:	FIL-047			





Curve Description: Passenger Head Resultant Primary Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 45.1 at 78.2 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

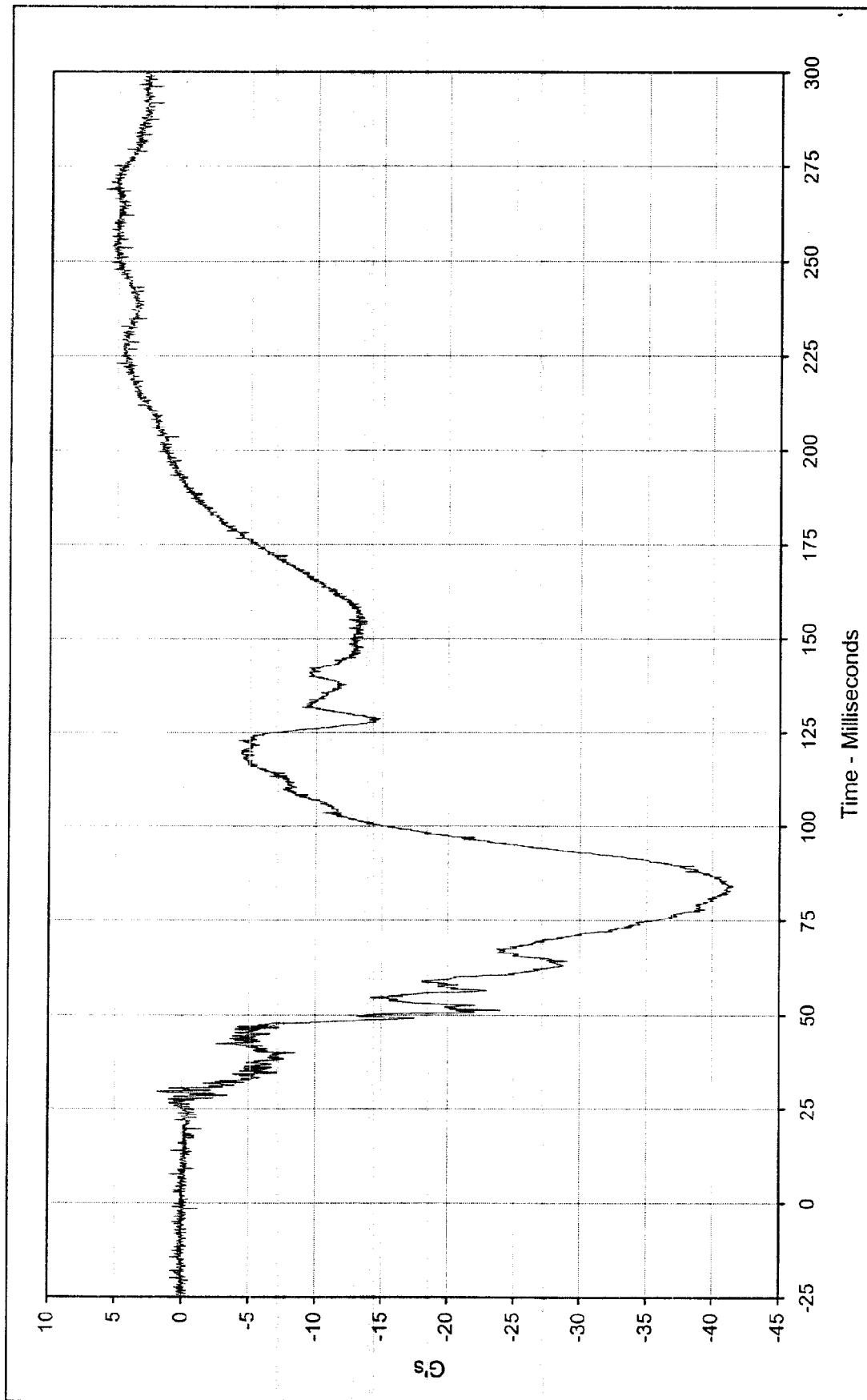
Minimum Value: 0.0 at 0.2 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

Curve Number: RES-045





Curve Description: Passenger Head Redundant X

Maximum Value: 6.1 at 268.9 Milliseconds

Minimum Value: -41.6 at 84.0 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

Curve Number: FIL-048

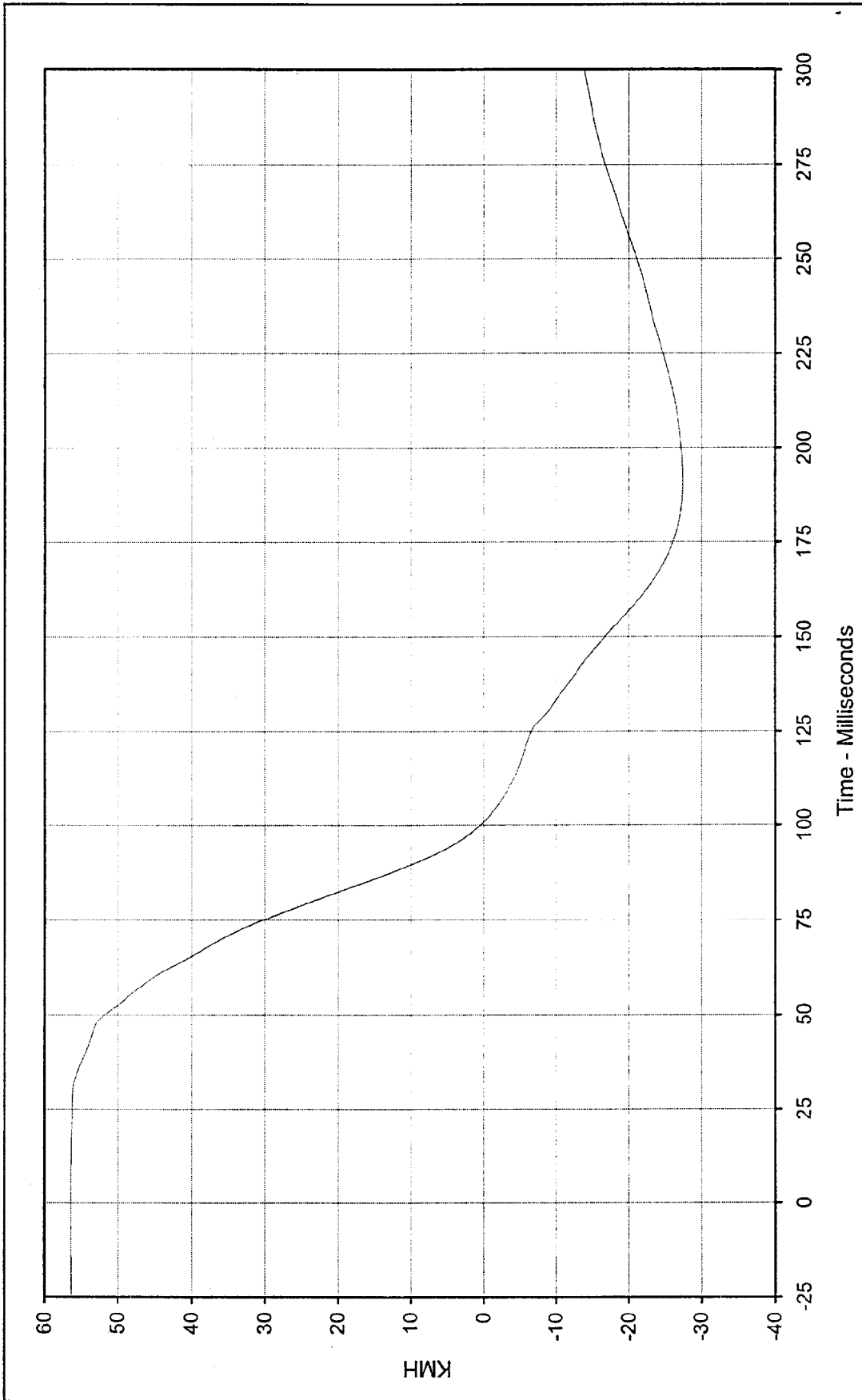
Test Program:

1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle:

1999 Chevrolet Astro LS Van





Curve Description: Passenger Head Redundant X Velocity

Maximum Value: 56.4 at 0.0 Milliseconds

Minimum Value: -27.4 at 191.4 Milliseconds

SAE Filter Class: 180

Date of Test: 2/12/99

Curve Number: IN1-048

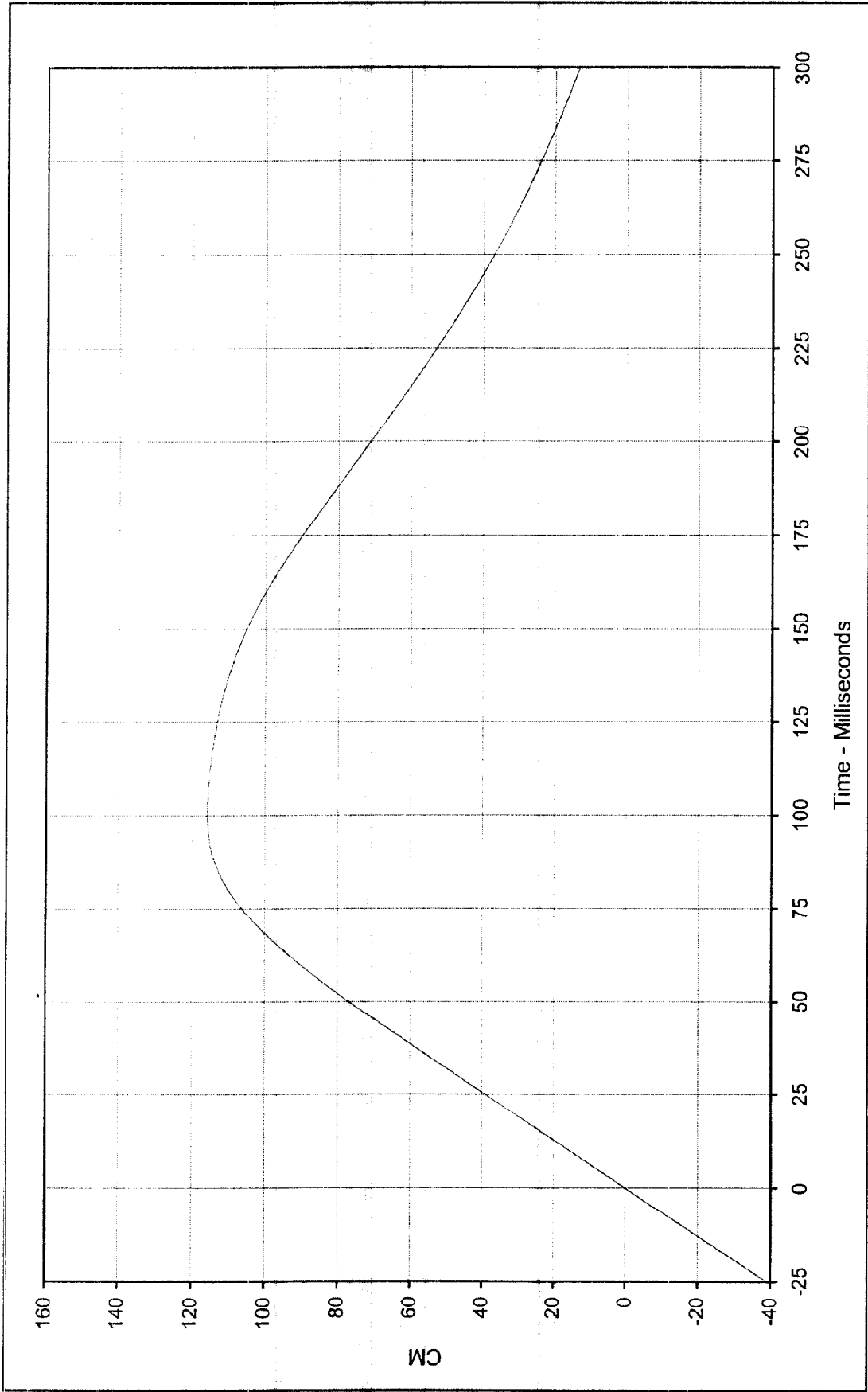
Test Program:

1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle:

1999 Chevrolet Astro LS Van

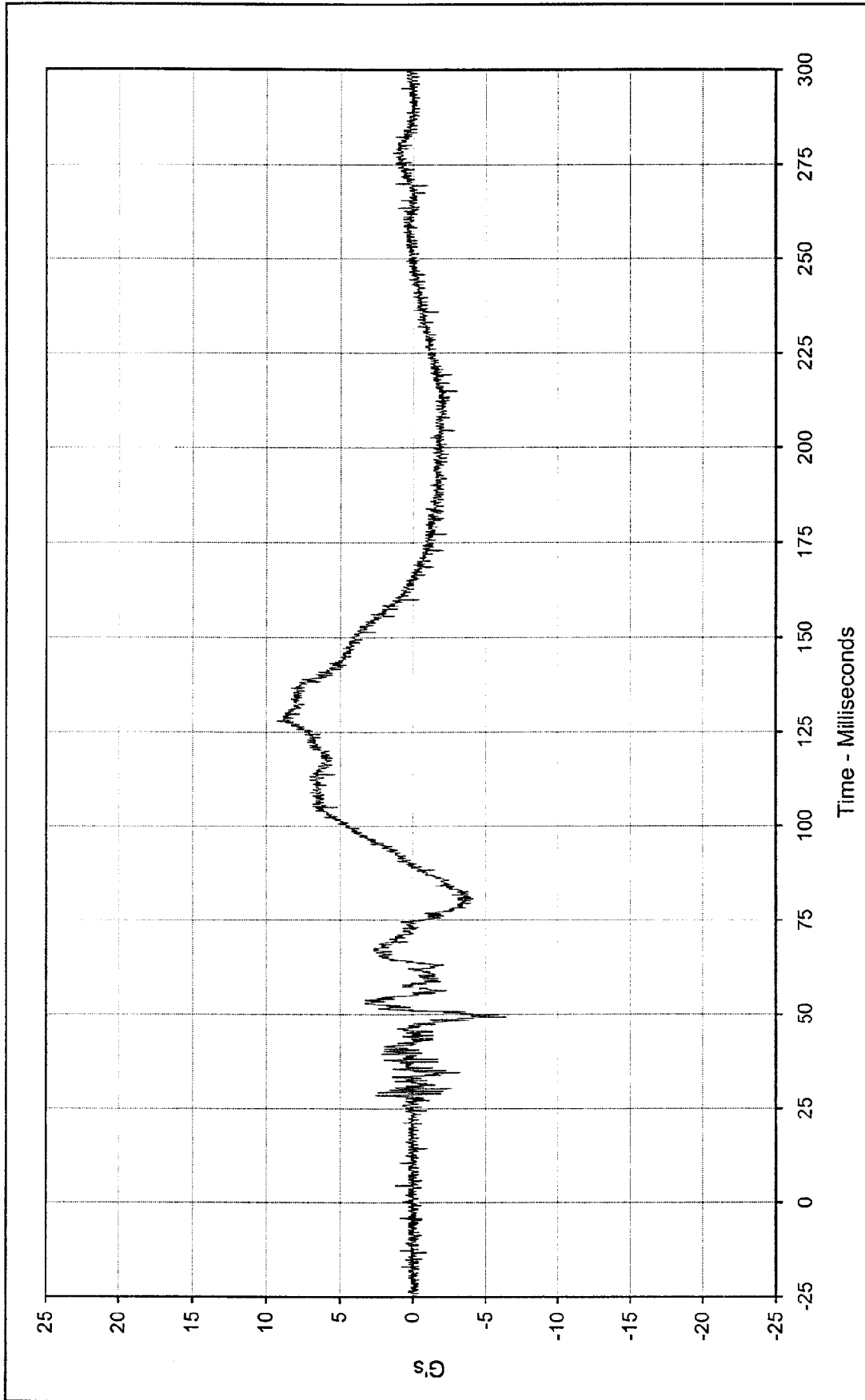




Curve Description: Passenger Head Redundant X Displ.
 Maximum Value: 115.7 at 100.9 Milliseconds
 Minimum Value: 0.0 at 0.0 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/12/99
 Curve Number: IN2-048

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Passenger Head Redundant Y Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 9.3 at 128.1 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

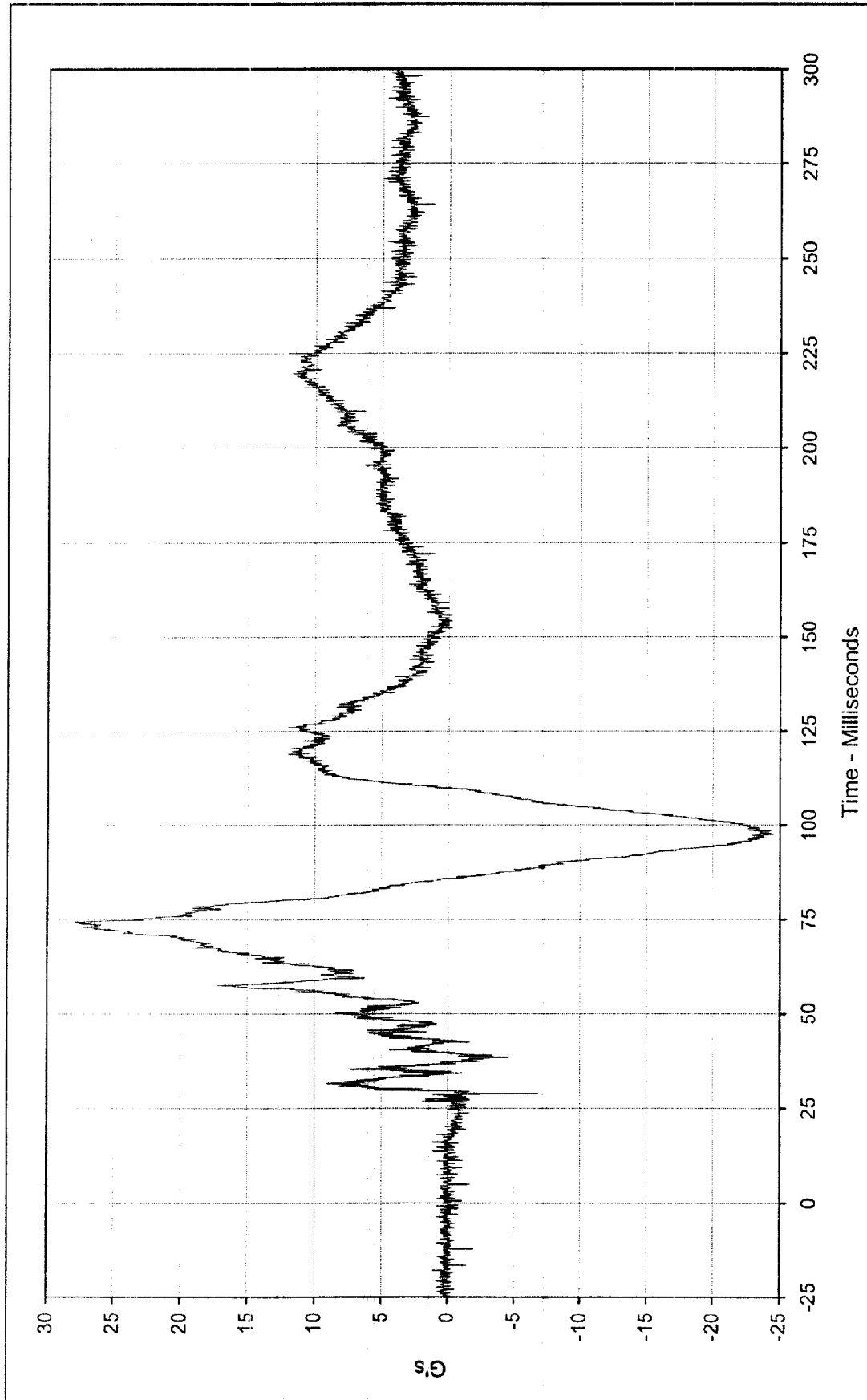
Minimum Value: -6.4 at 49.2 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

Curve Number: FIL-049

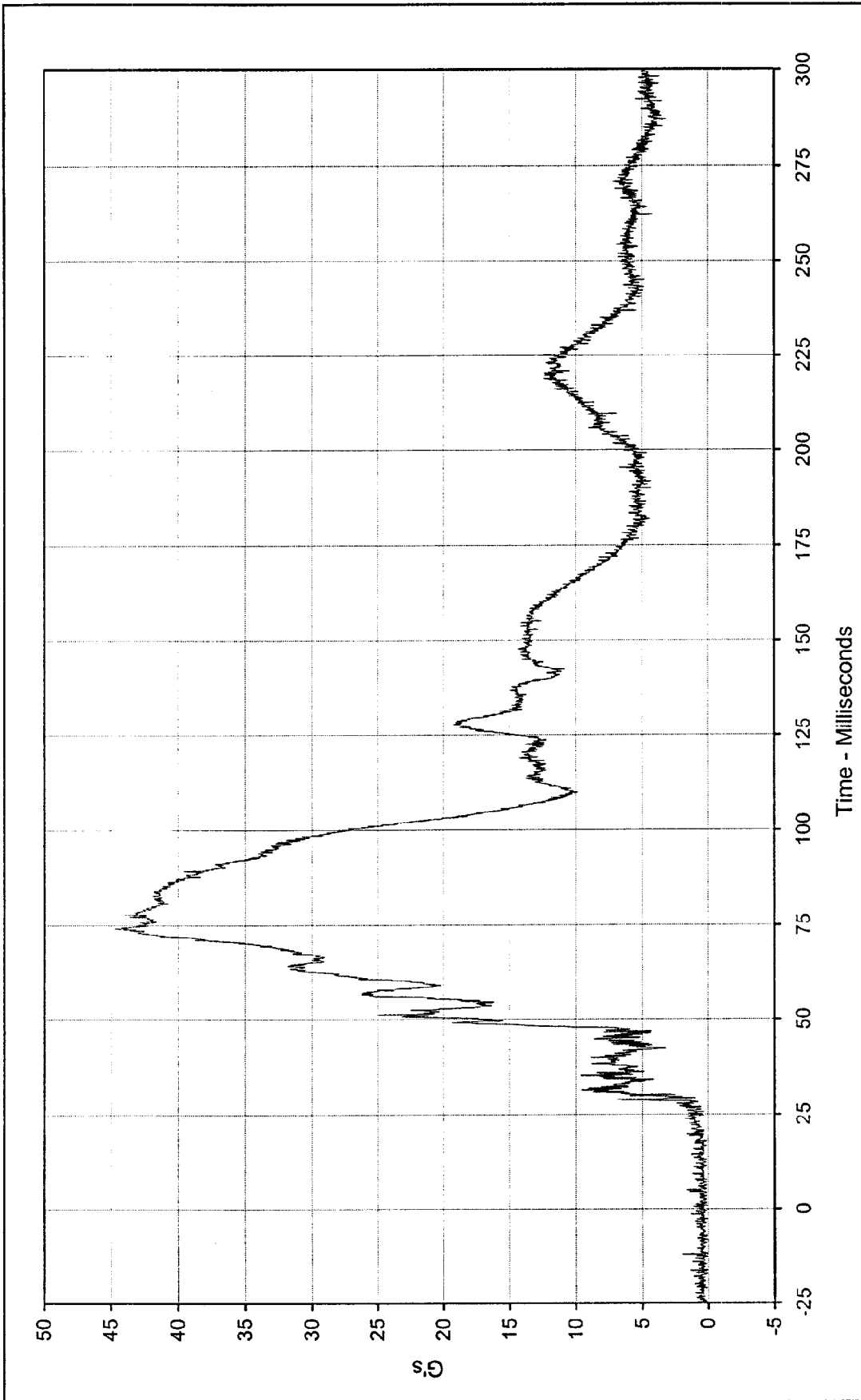




Curve Description:	Passenger Head Redundant Z	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	28.7 at 74.1 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-24.6 at 97.5 Milliseconds			



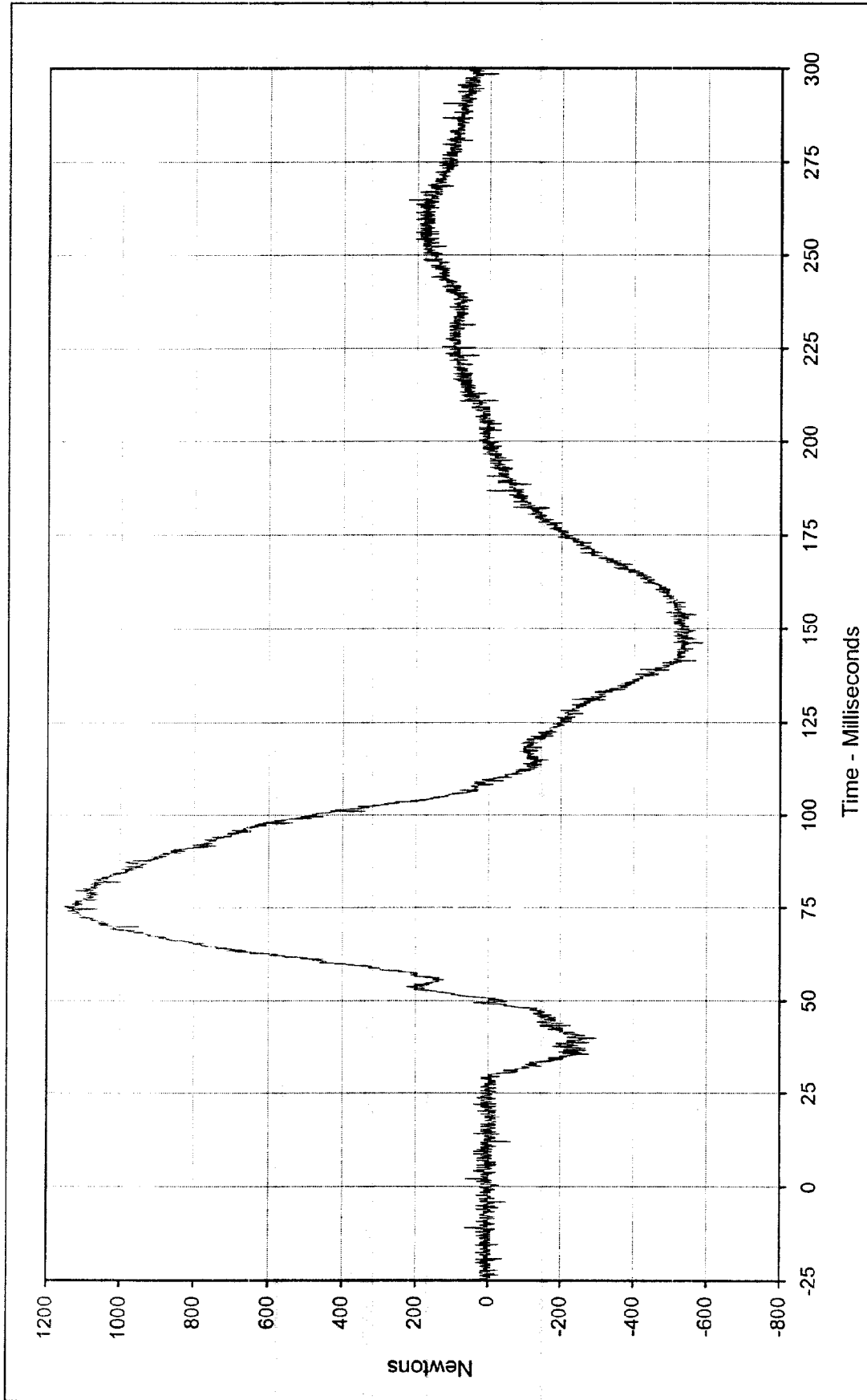
SAE Filter Class:	1000
Date of Test:	2/12/99
Curve Number:	FIL-050



Curve Description: Passenger Head Resultant Redundant
 Maximum Value: 44.8 at 74.1 Milliseconds
 Minimum Value: 0.1 at 0.9 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/12/99
 Curve Number: RES-048

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Passenger Neck Force X Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 1153.2 at 75.3 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

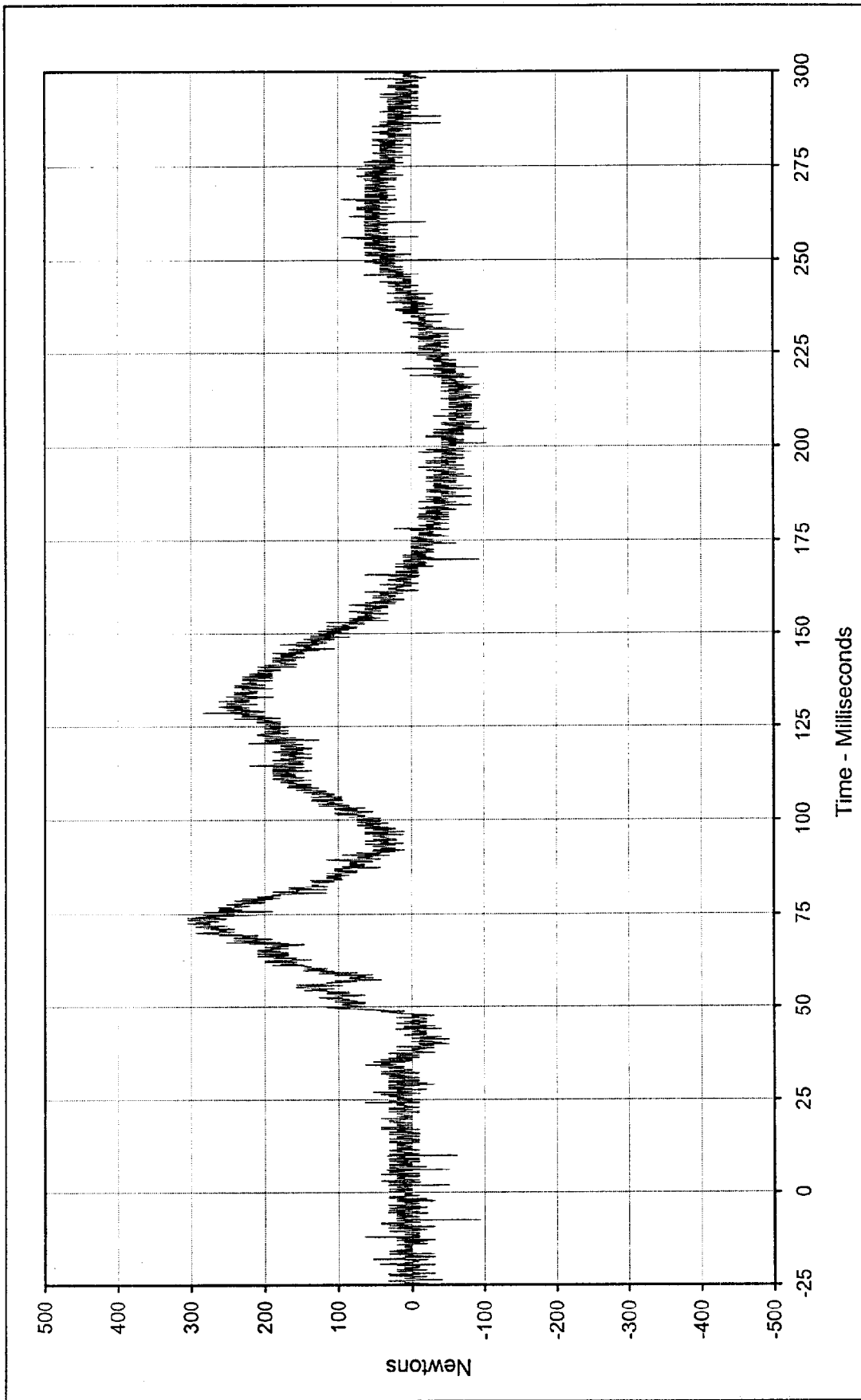
Minimum Value: -590.4 at 146.1 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

Curve Number: FIL-051





Curve Description: Passenger Neck Force Y Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 314.5 at 74.9 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

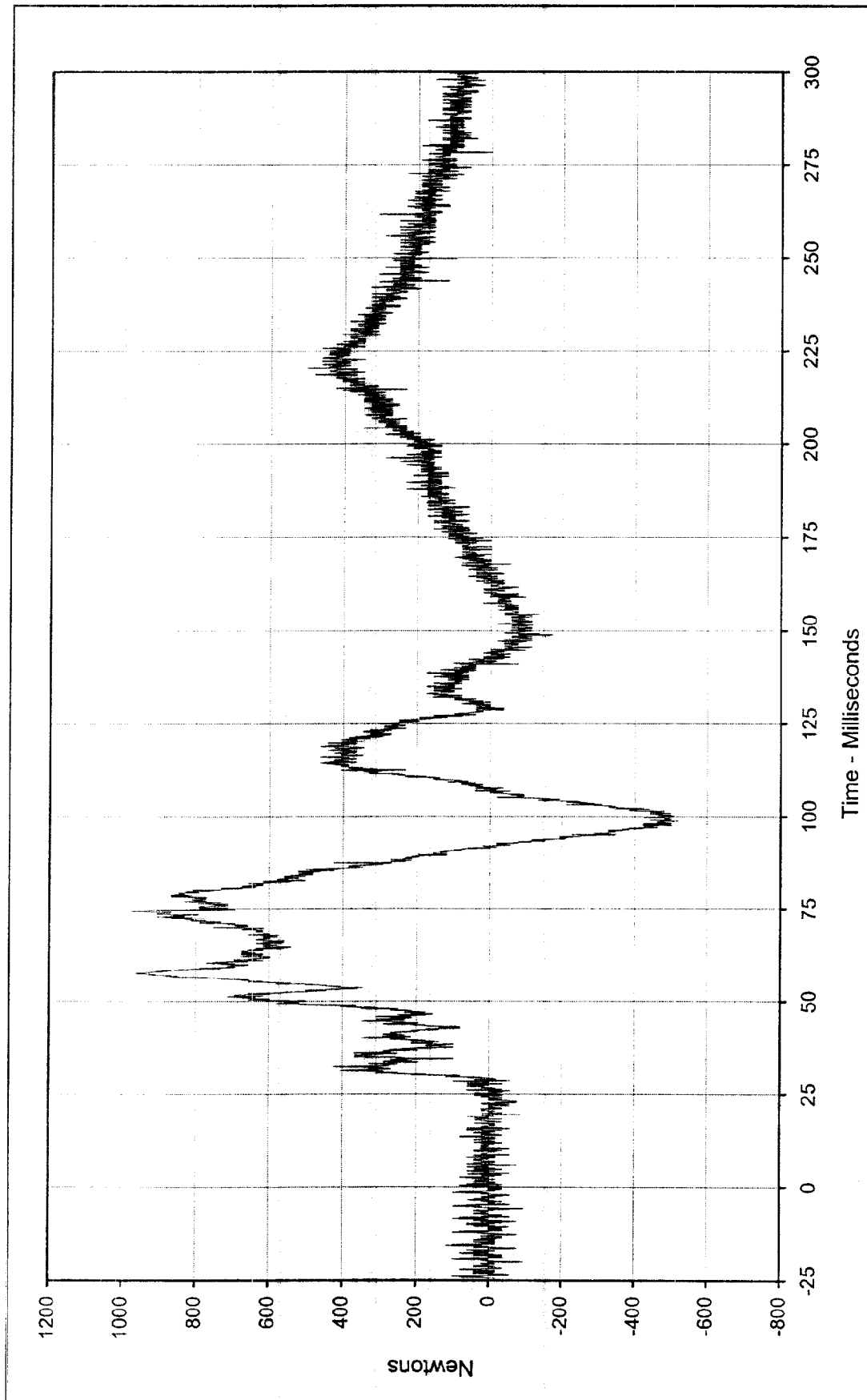
Minimum Value: -104.8 at 200.8 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

Curve Number: FIL-052

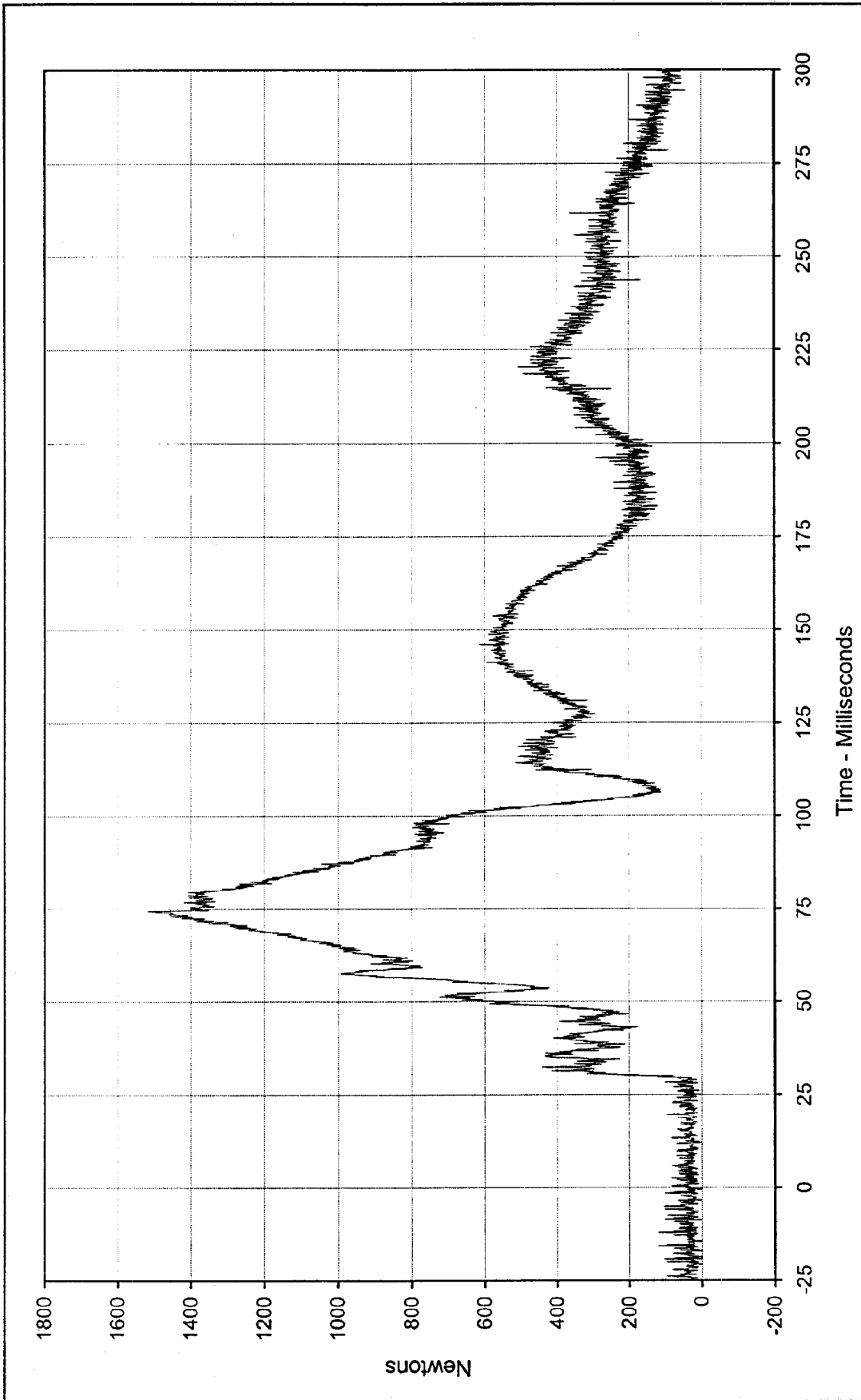




Curve Description:	Passenger Neck Force Z	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	982.1 at 74.4 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-519.9 at 98.7 Milliseconds			



SAE Filter Class:	1000
Date of Test:	2/12/99
Curve Number:	FIL-053



Curve Description: Passenger Neck Force Resultant Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 1518.3 at 74.4 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

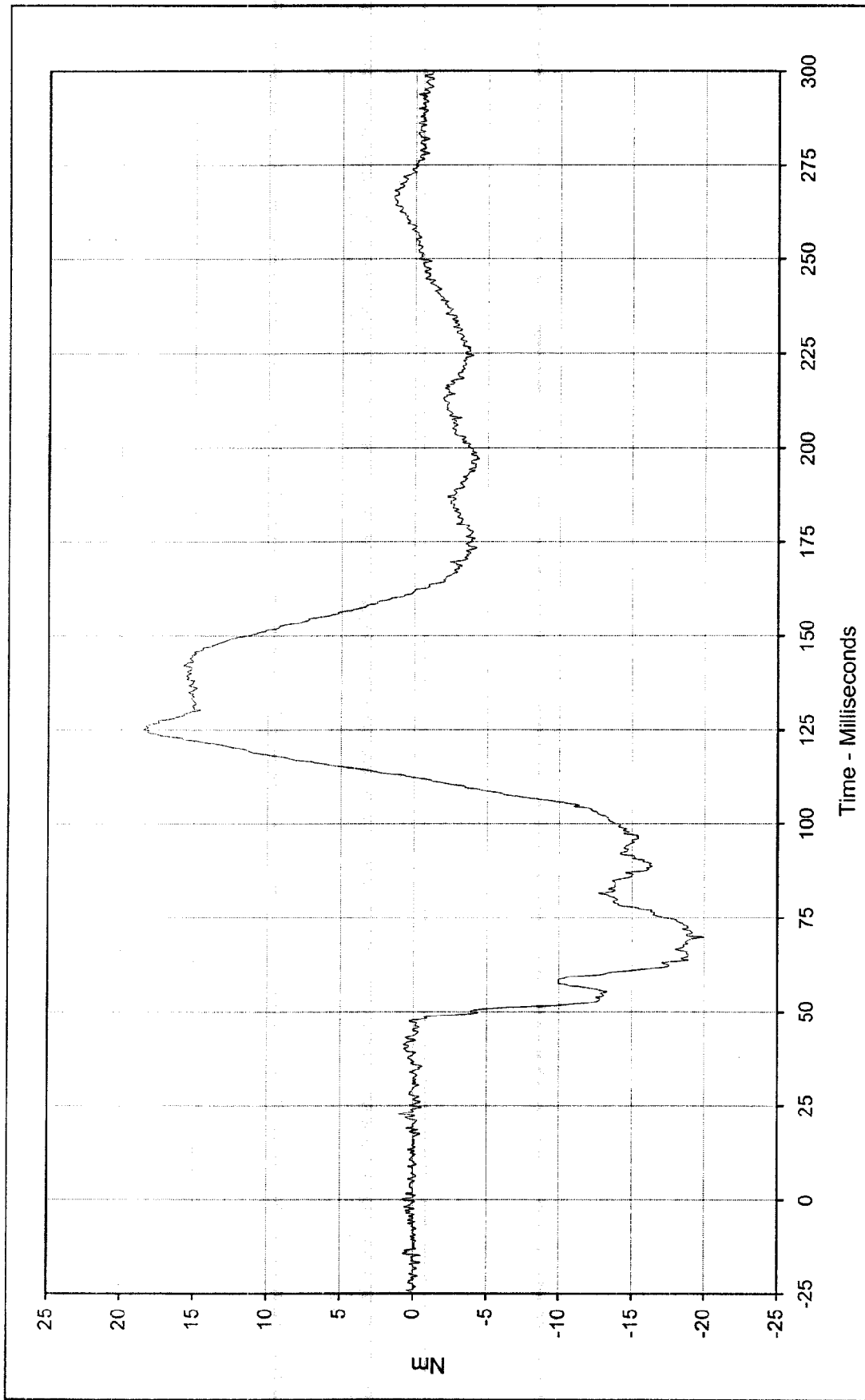
Minimum Value: 2.3 at 12.2 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

Curve Number: RES-051

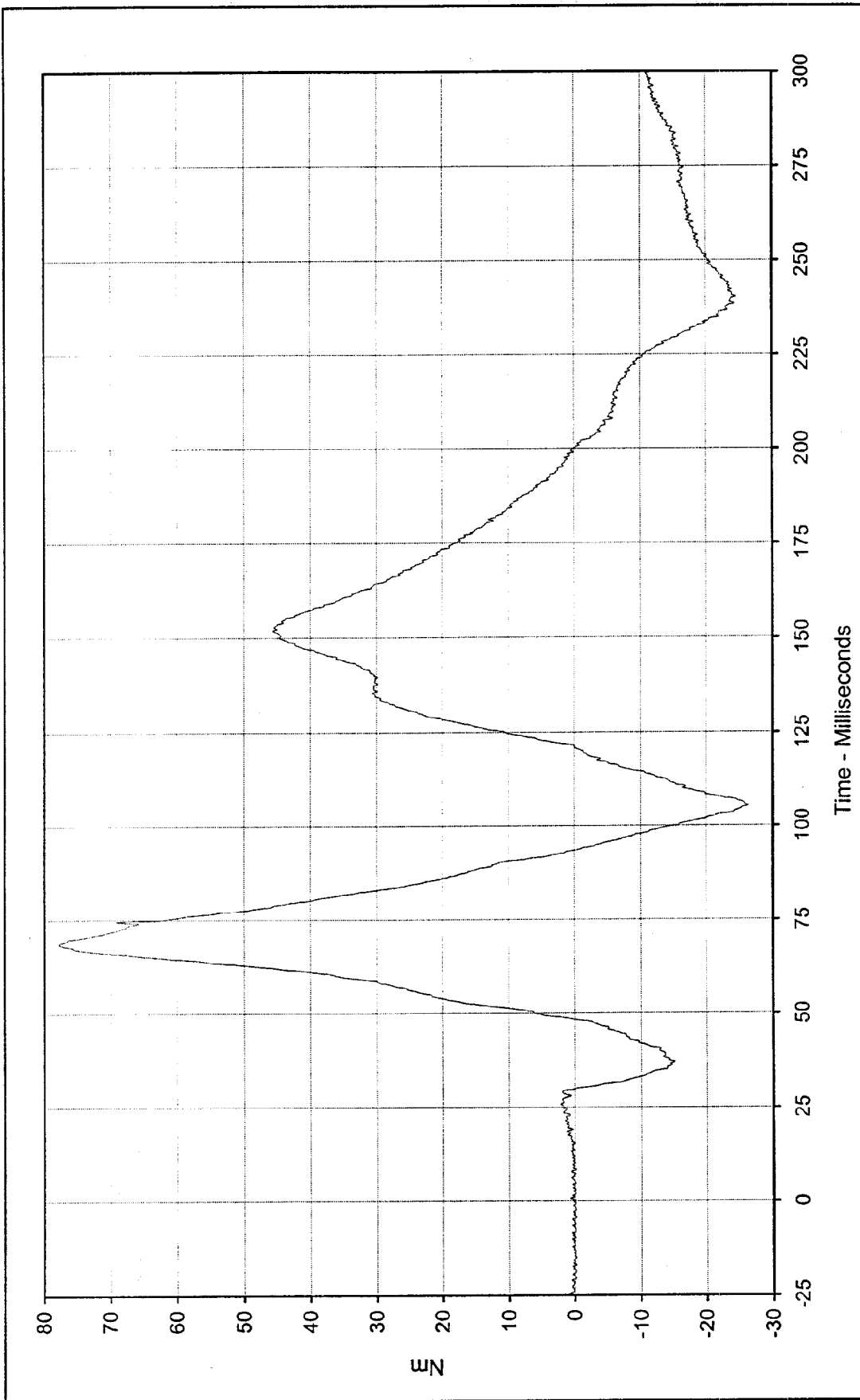




Curve Description: Passenger Neck Moment X
 Maximum Value: 18.4 at 125.1 Milliseconds
 Minimum Value: -20.0 at 69.8 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/12/99
 Curve Number: FIL-054

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van

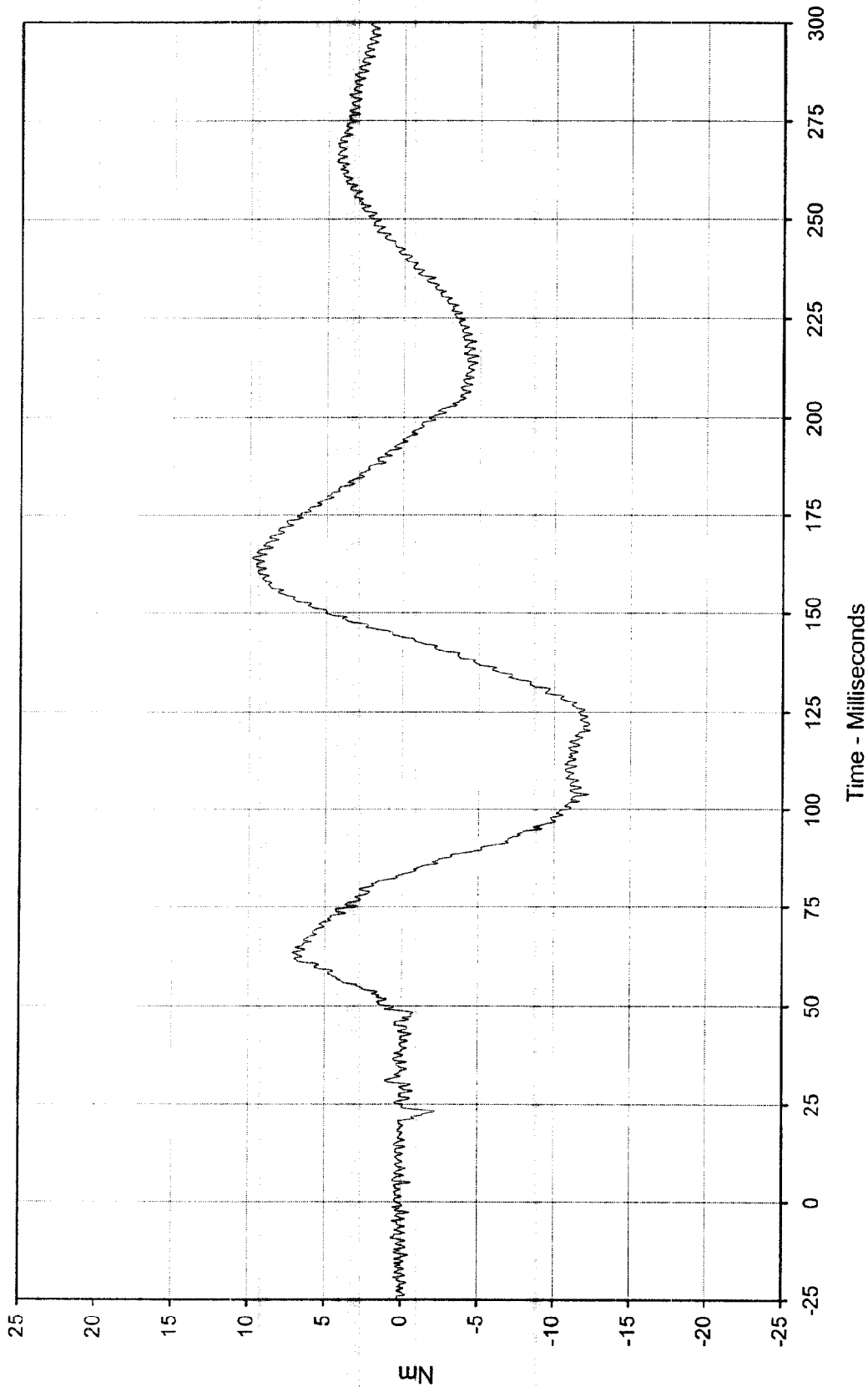




Curve Description: Passenger Neck Moment Y
 Maximum Value: 77.8 at 68.8 Milliseconds
 Minimum Value: -26.4 at 105.5 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/12/99
 Curve Number: FIL-055

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Passenger Neck Moment Z

Maximum Value: 9.8 at 164.3 Milliseconds

Minimum Value: -12.4 at 120.2 Milliseconds

SAE Filter Class: 600

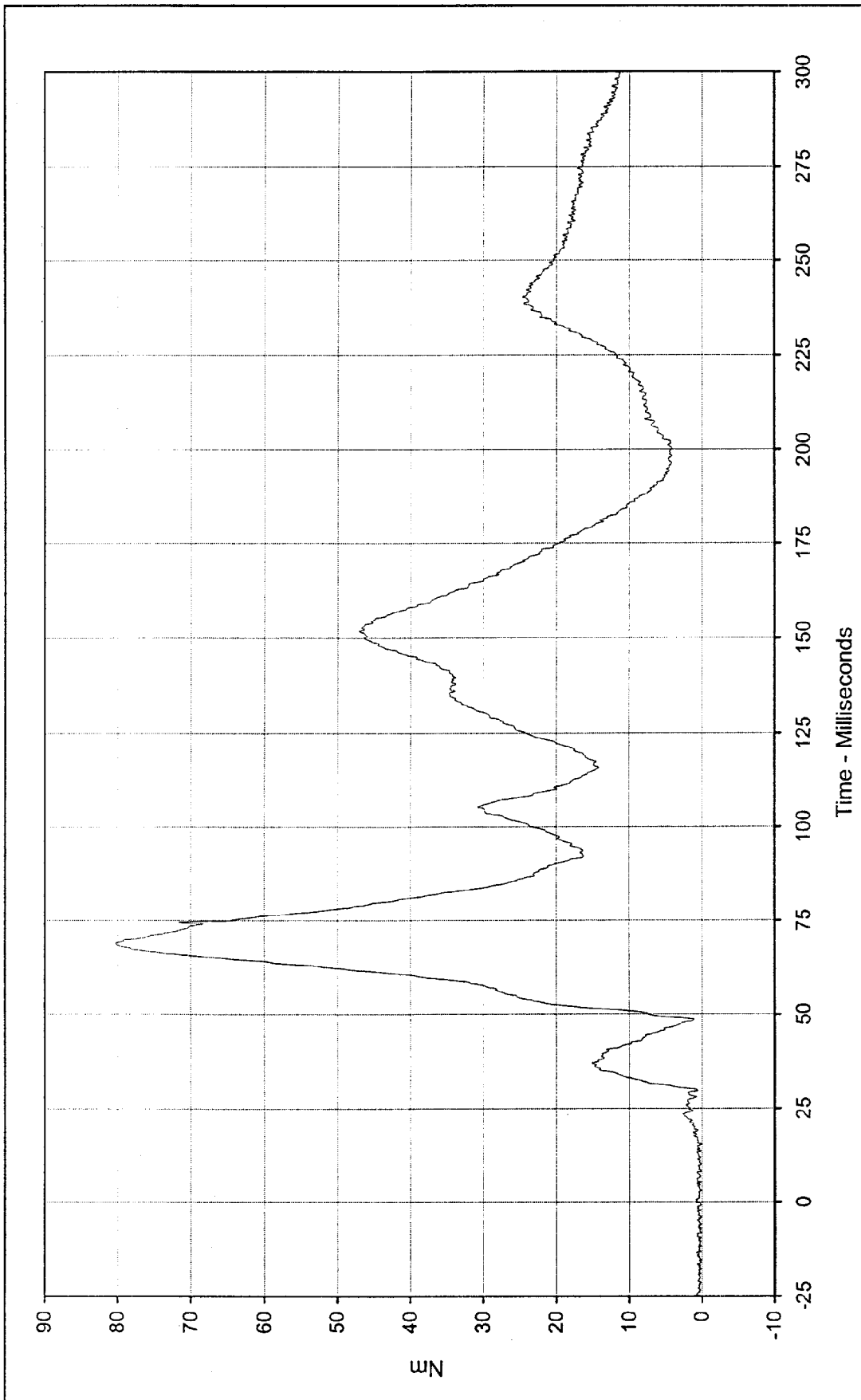
Date of Test: 2/12/99

Curve Number: FIL-056

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Passenger Neck Moment Resultant

Maximum Value: 80.2 at 68.8 Milliseconds

Minimum Value: 0.0 at 15.5 Milliseconds

SAE Filter Class: 600

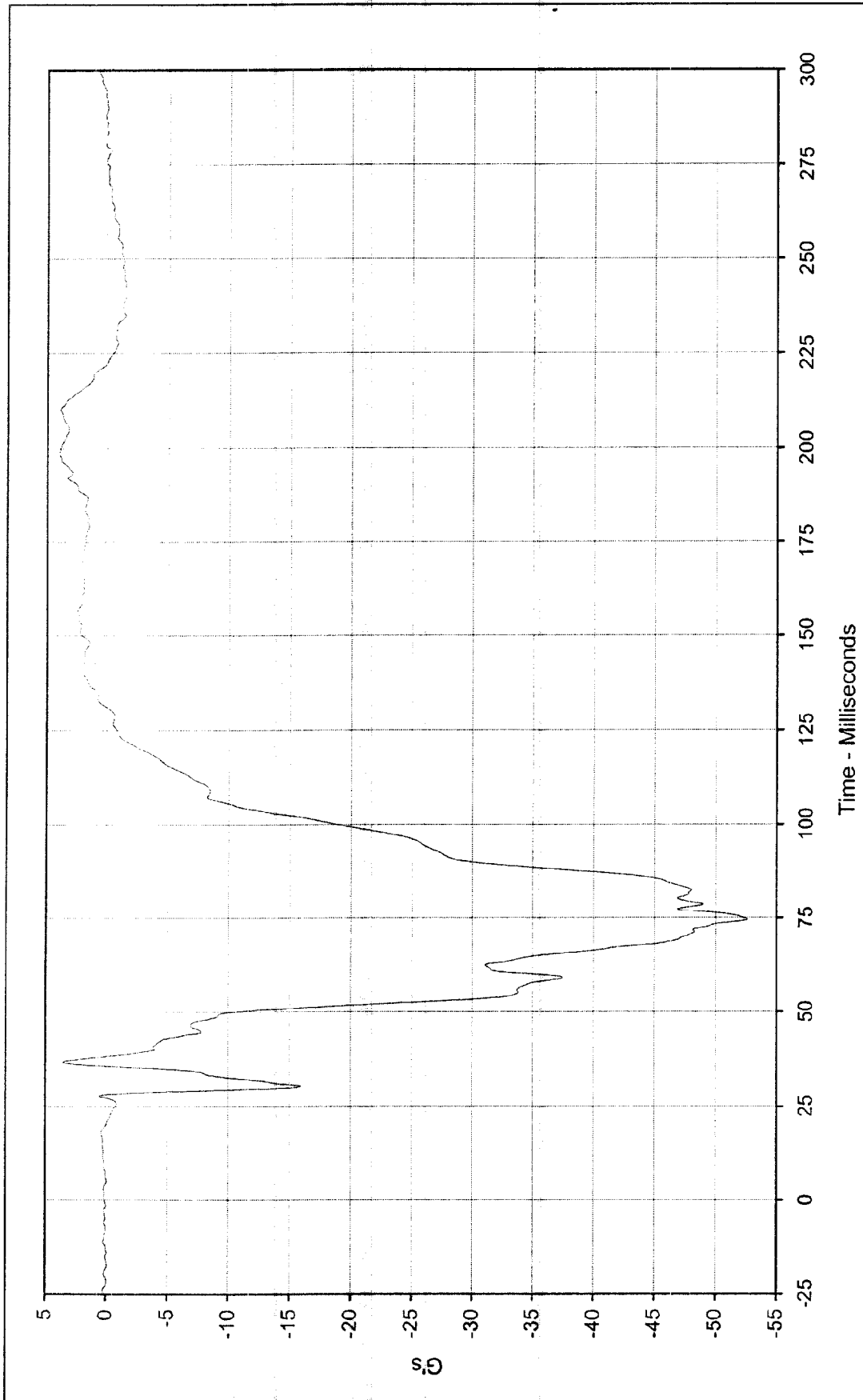
Date of Test: 2/12/99

Curve Number: RES-054

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van

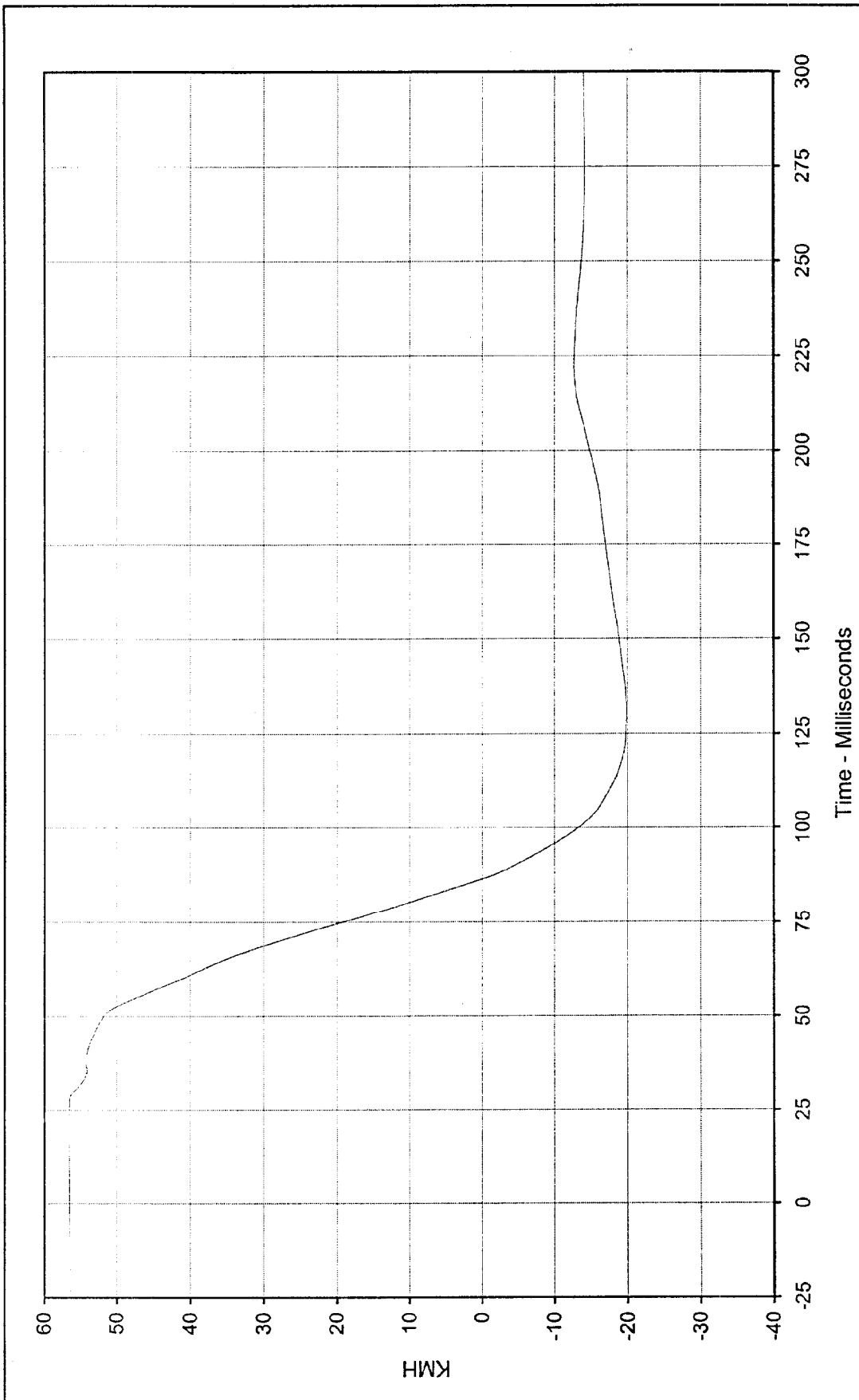




Curve Description: Passenger Chest Primary X
 Maximum Value: 4.0 at 198.6 Milliseconds
 Minimum Value: -52.7 at 74.5 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/12/99
 Curve Number: FIL-057

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van

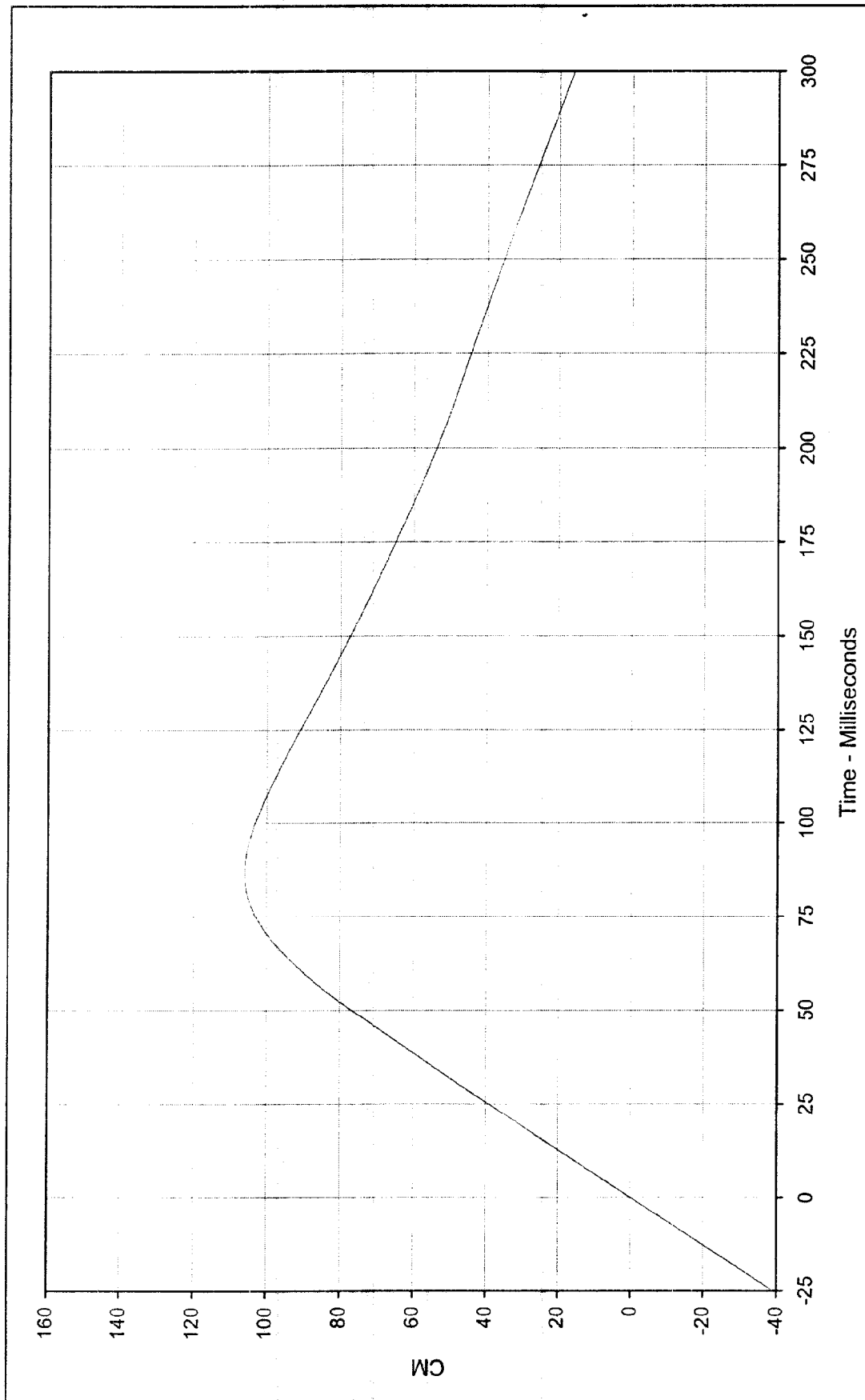




Curve Description: Passenger Chest Primary X Velocity
 Maximum Value: 56.6 at 20.0 Milliseconds
 Minimum Value: -19.8 at 131.1 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/12/99
 Curve Number: IN1-057

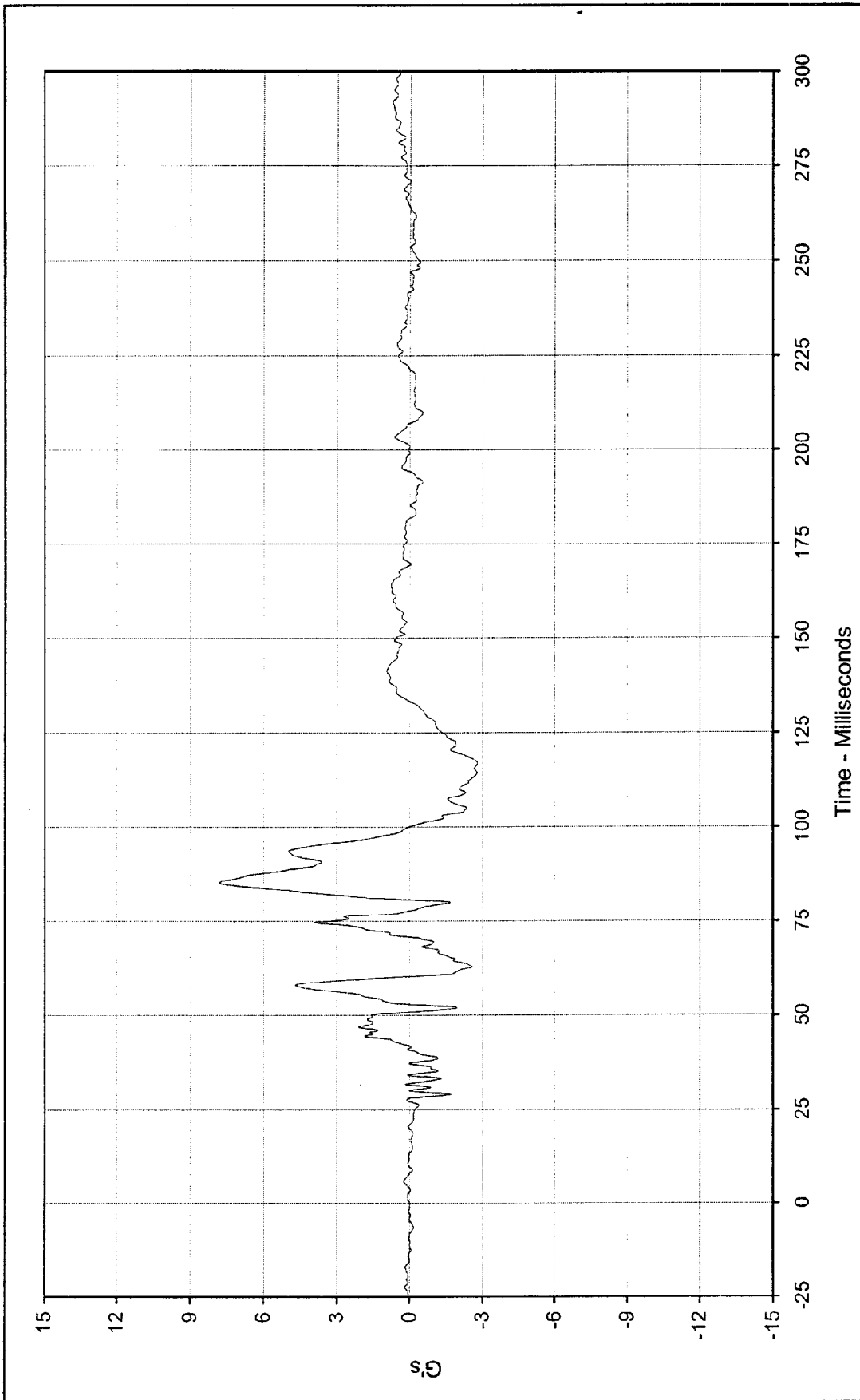
Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





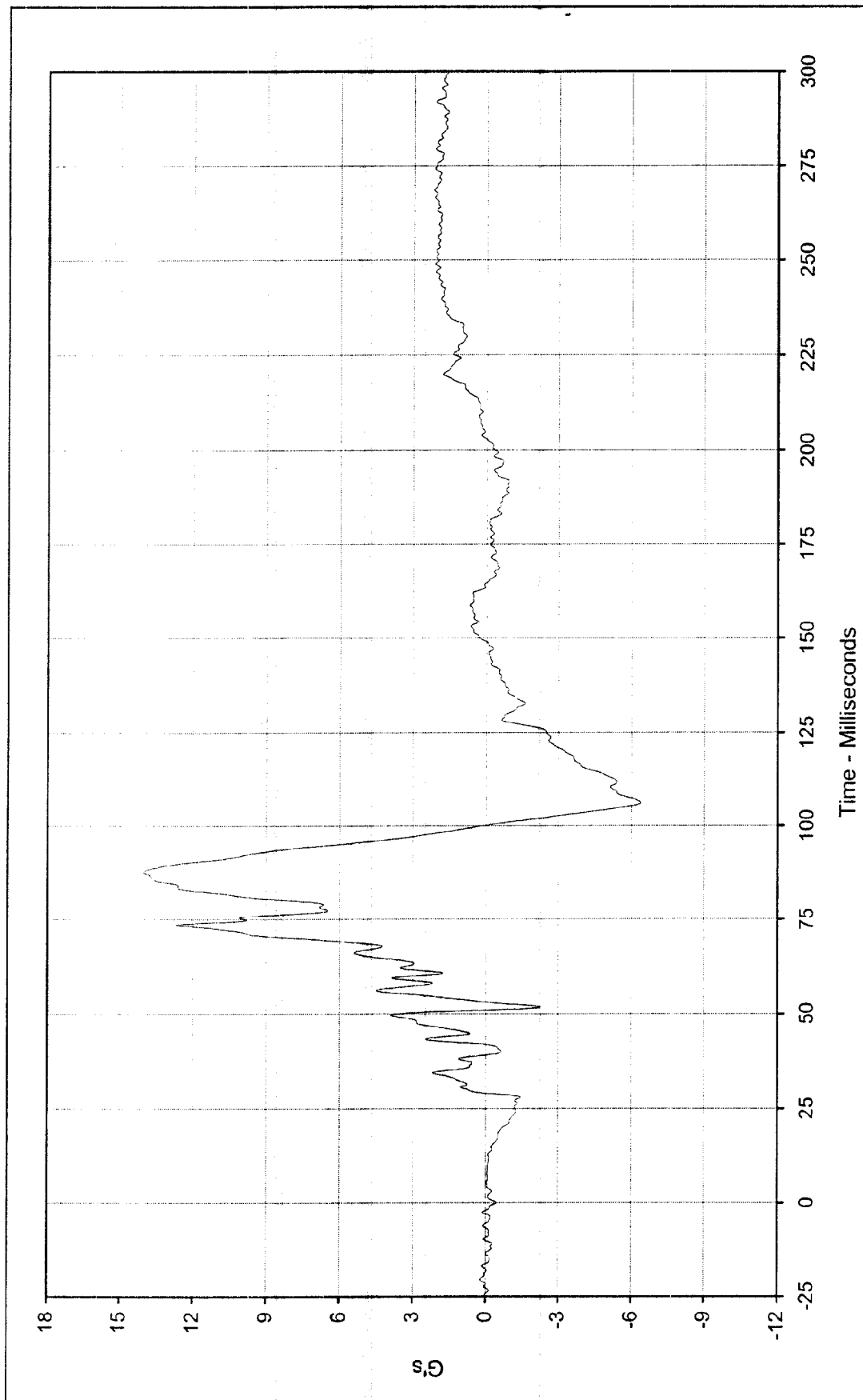
Curve Description:	Passenger Chest Primary X Displ.	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	105.9 at 86.4 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	0.0 at 0.0 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/12/99			
Curve Number:	IN2-057			





Curve Description:	Passenger Chest Primary Y	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	7.8 at 85.2 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-2.8 at 117.0 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/12/99			
Curve Number:	FIL-058			





Curve Description: Passenger Chest Primary Z Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 14.0 at 87.7 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

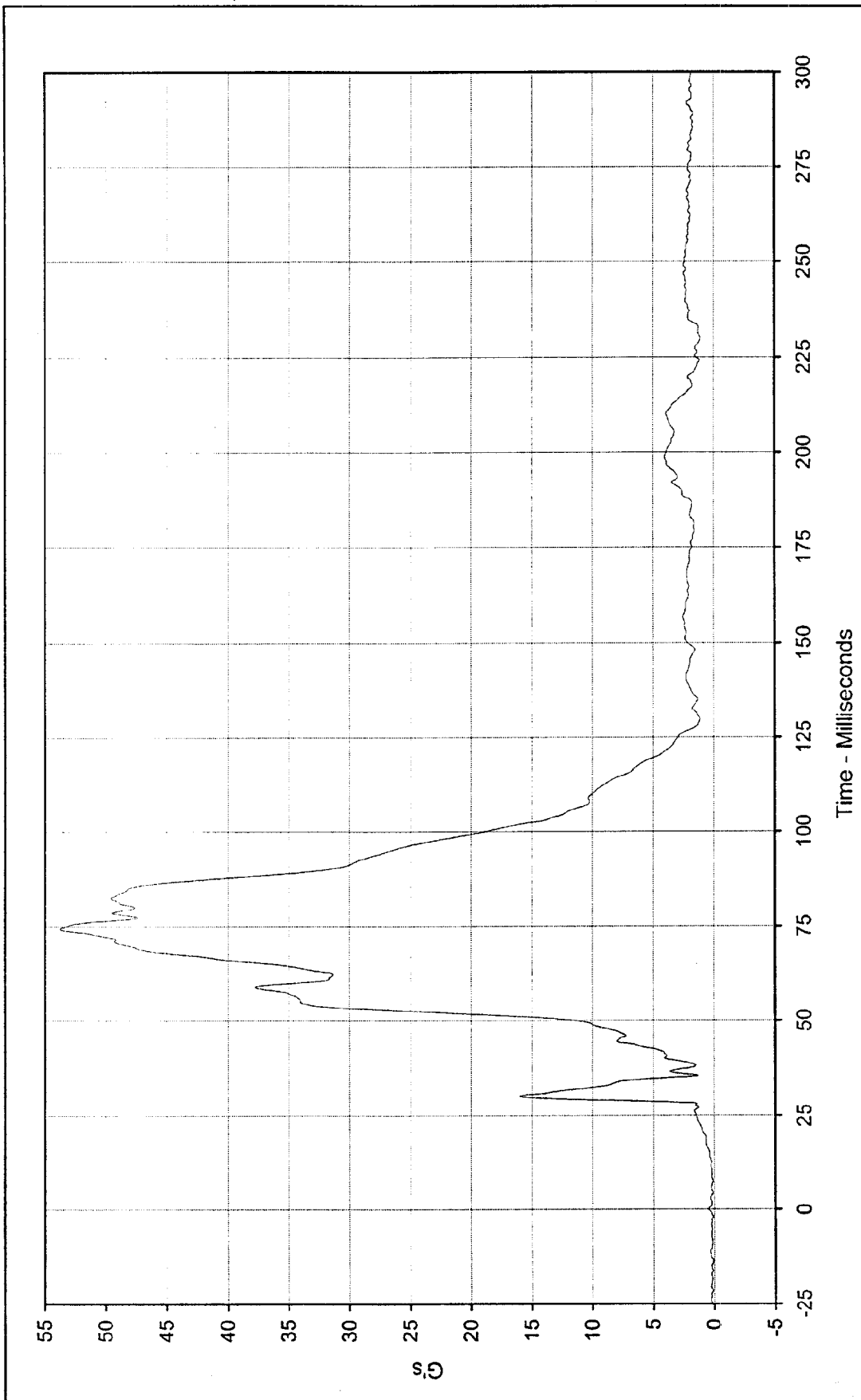
Minimum Value: -6.4 at 106.2 Milliseconds

SAE Filter Class: 180

Date of Test: 2/12/99

Curve Number: FIL-059

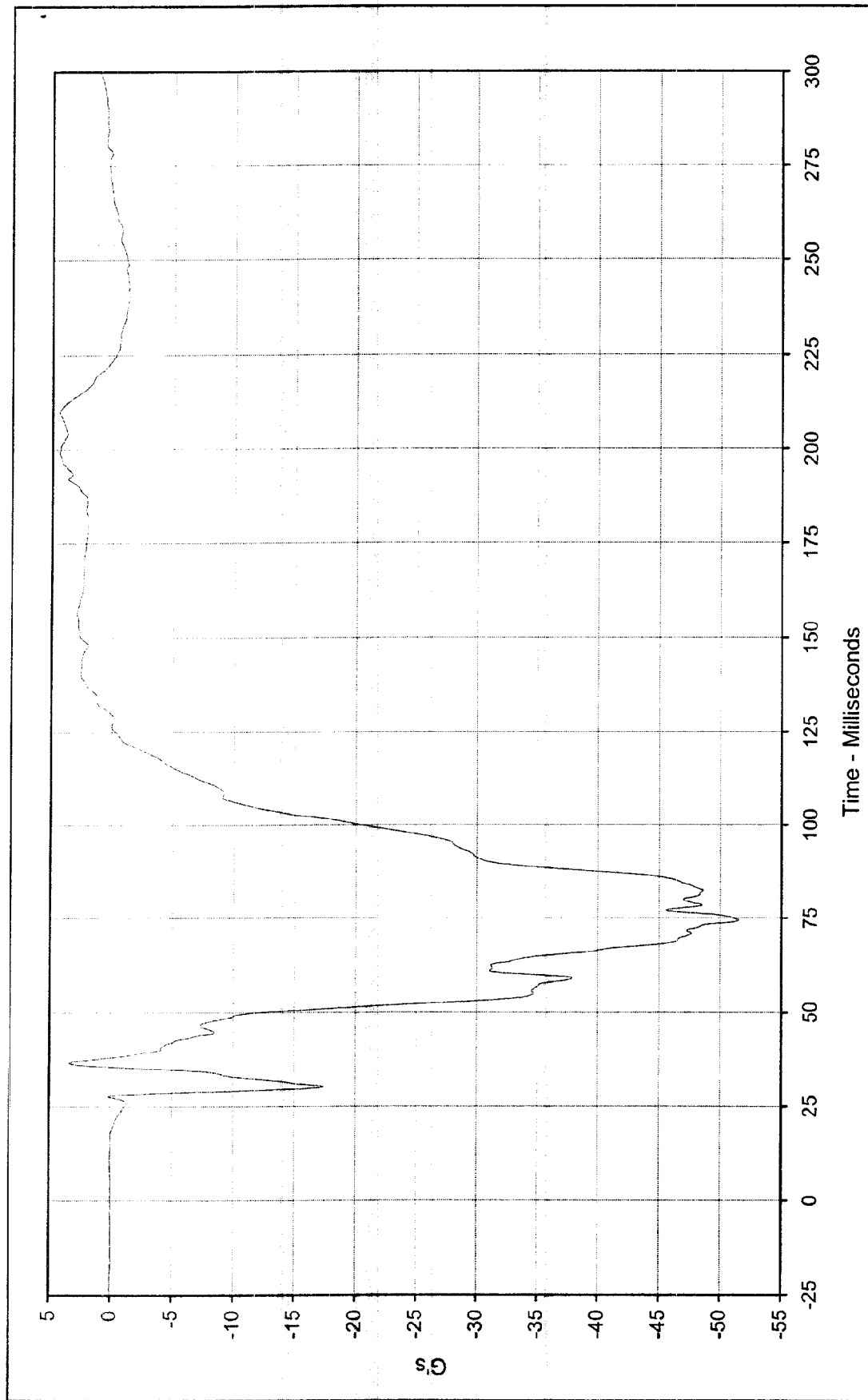




Curve Description: Passenger Chest Resultant Primary
 Maximum Value: 53.8 at 74.4 Milliseconds
 Minimum Value: 0.1 at 4.3 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/12/99
 Curve Number: RES-057

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Passenger Chest Redundant X Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 4.4 at 210.0 Milliseconds

Minimum Value: -51.6 at 74.3 Milliseconds

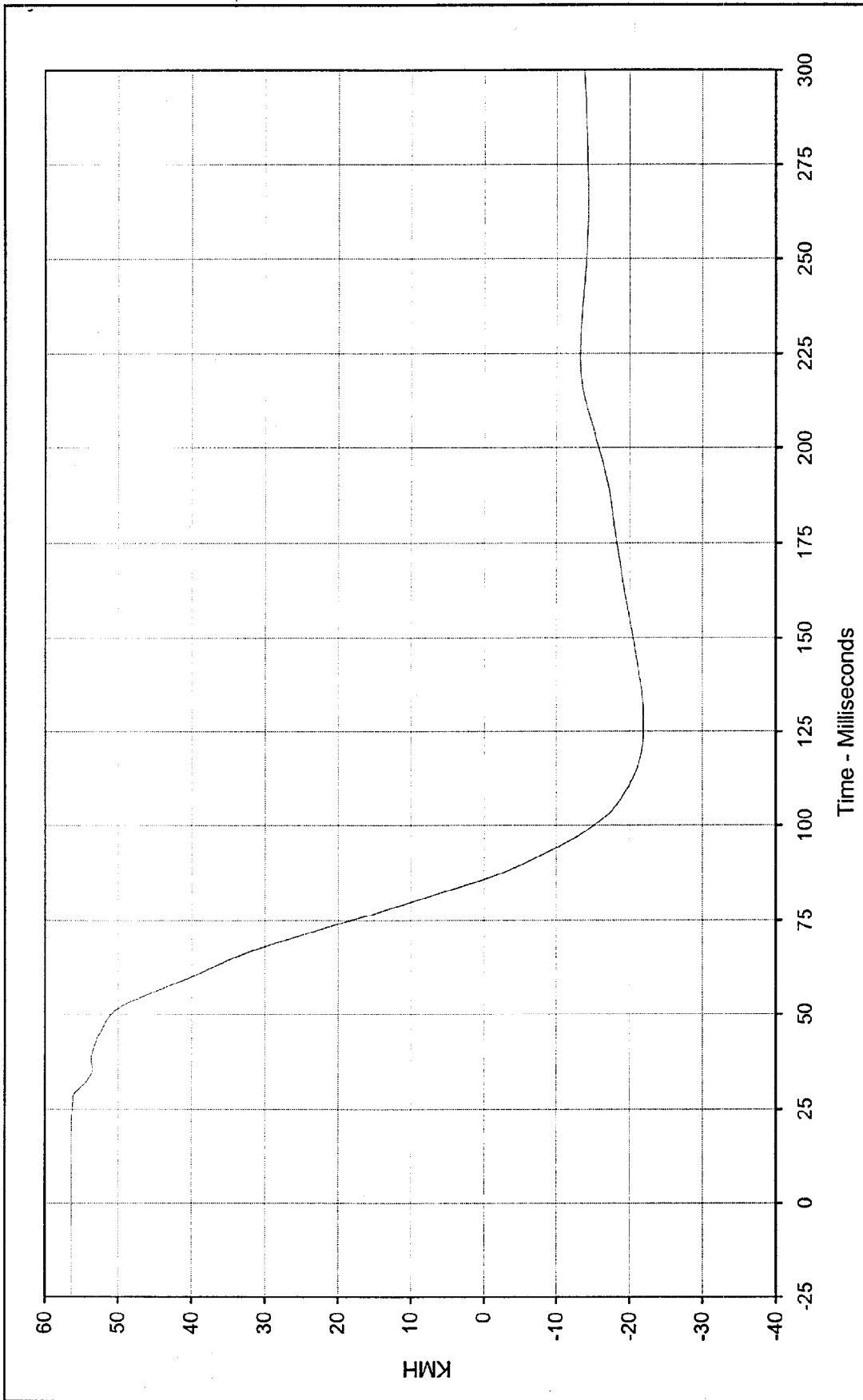
SAE Filter Class: 180

Date of Test: 2/12/99

Curve Number: FIL-060

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Passenger Chest Redundant X Velocity

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 56.4 at 17.5 Milliseconds

Test Vehicle: 1999 Chevrolet Astro LS Van

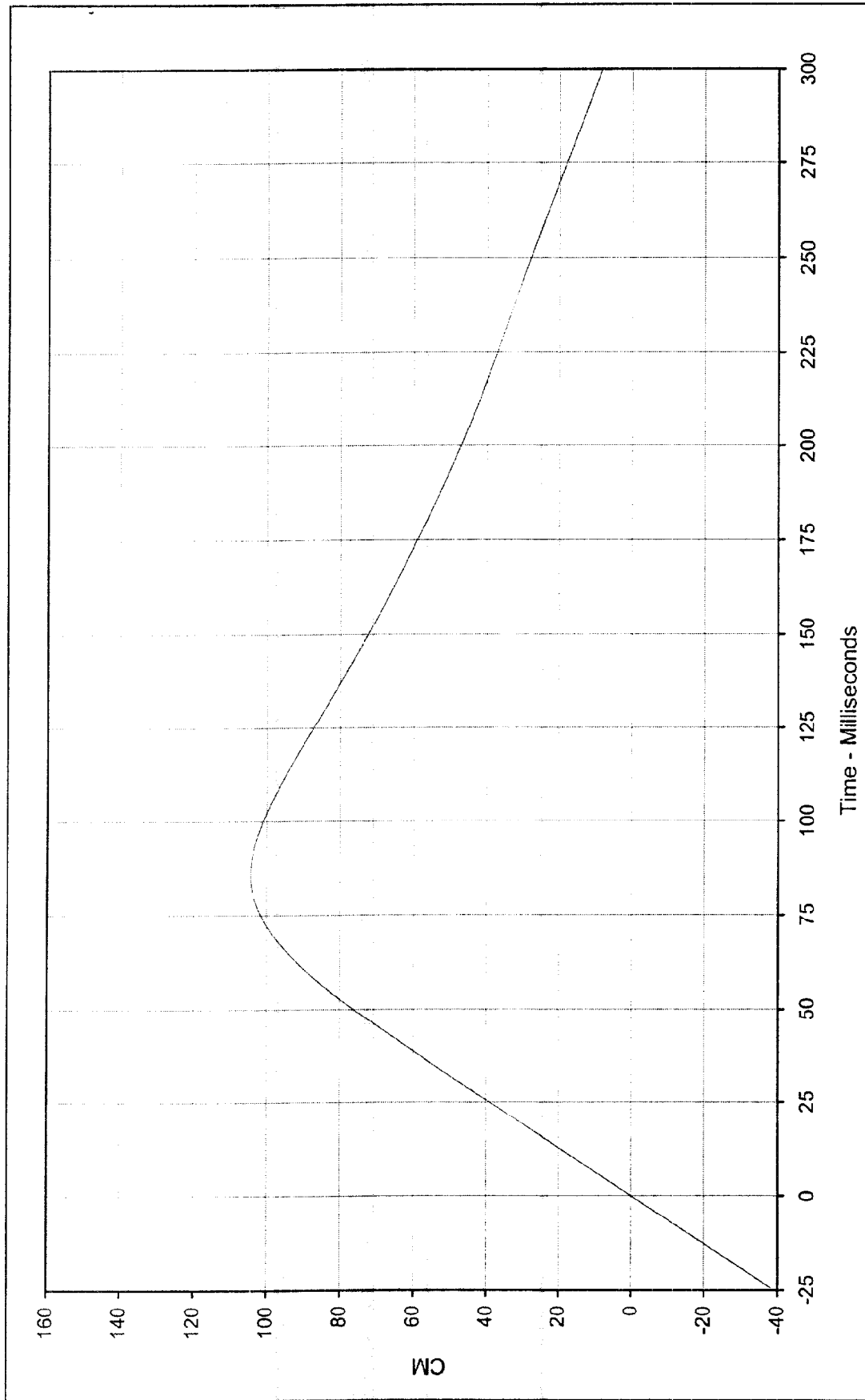
Minimum Value: -21.9 at 129.8 Milliseconds

SAE Filter Class: 180

Date of Test: 2/12/99

Curve Number: IN1-060





Curve Description: Passenger Chest Redundant X Displ.

Maximum Value: 104.3 at 85.8 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

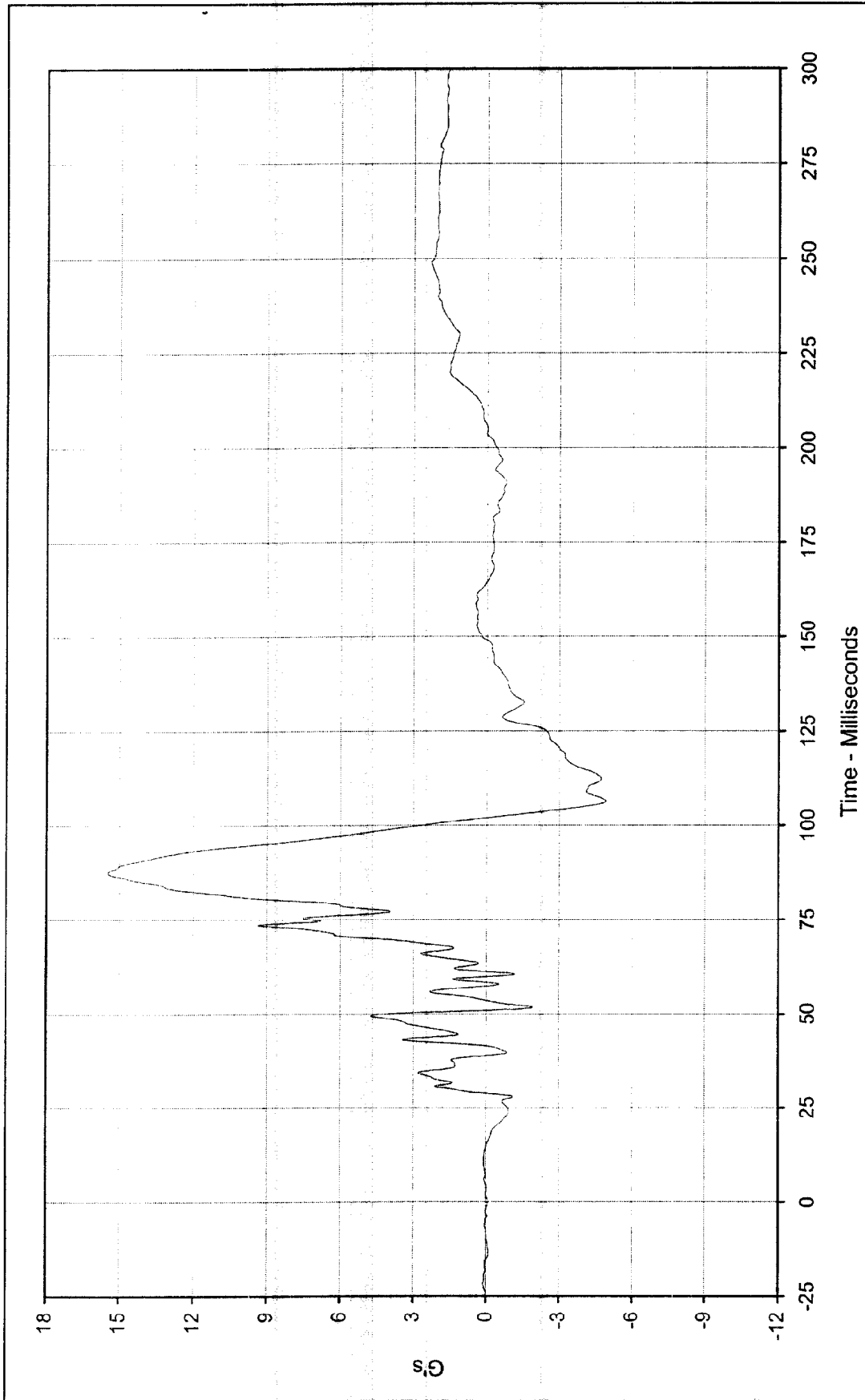
Date of Test: 2/12/99

Curve Number: IN2-060

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Passenger Chest Redundant Z

Maximum Value: 15.5 at 87.4 Milliseconds

Minimum Value: -4.9 at 106.3 Milliseconds

SAE Filter Class: 180

Date of Test: 2/12/99

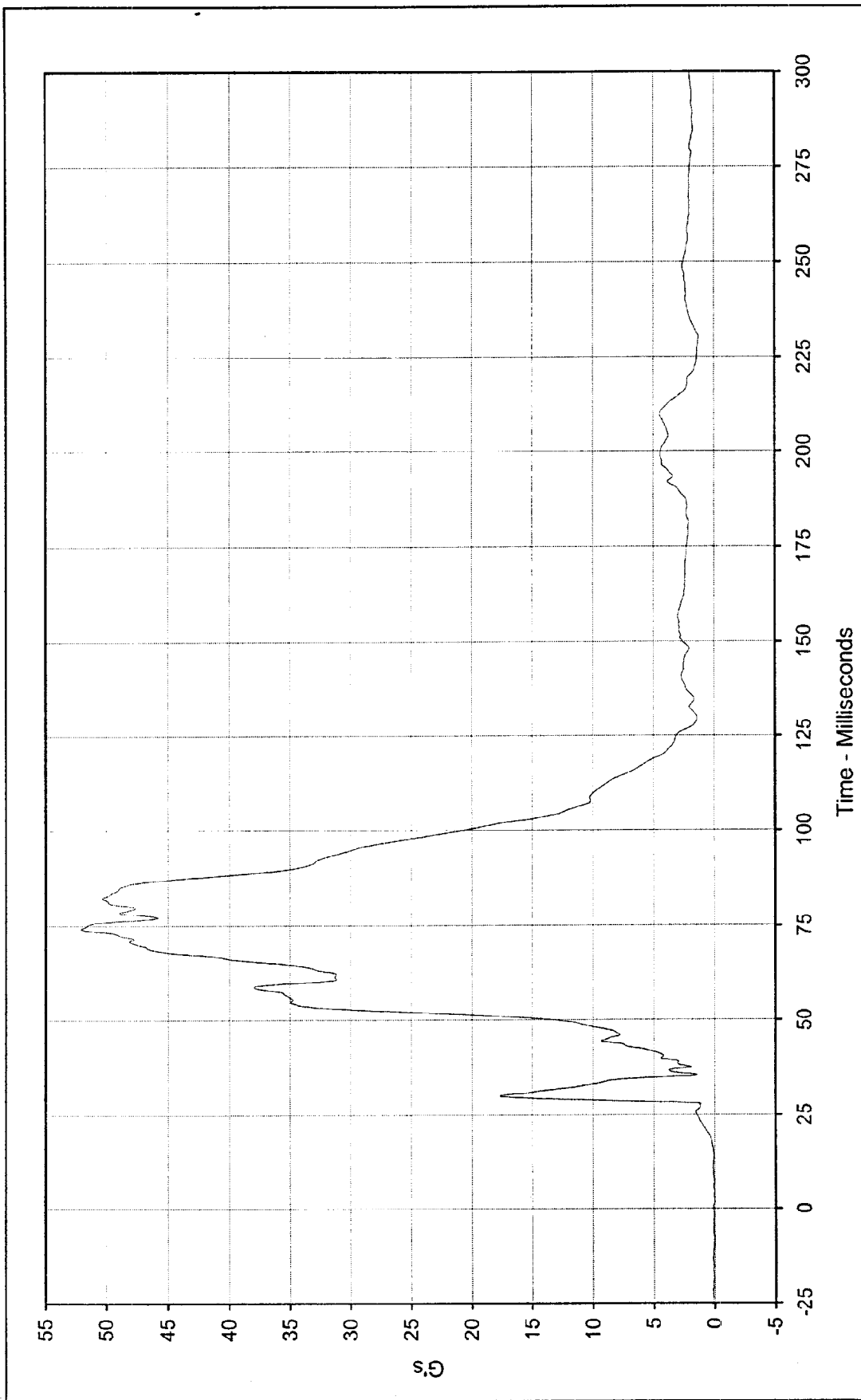
Curve Number: FIL-062

Test Program: 1999 NHTSA 35 mph NCAP

Test Vehicle: 1999 Chevrolet Astro LS Van

No.: MX0103



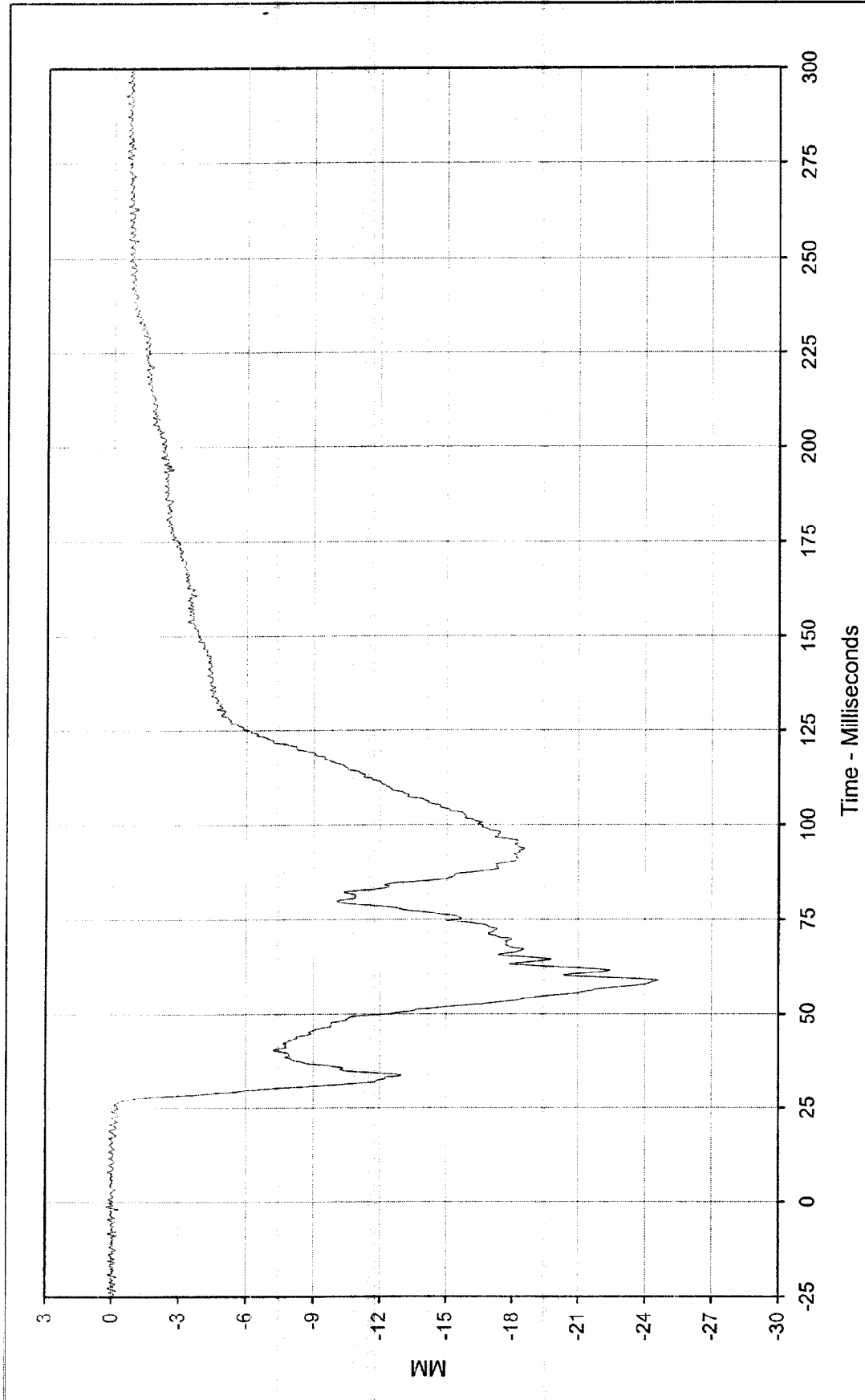


Curve Description: Passenger Chest Resultant Redundant
 Maximum Value: 52.1 at 74.3 Milliseconds
 Minimum Value: 0.0 at 1.6 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/12/99
 Curve Number: RES-060

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van

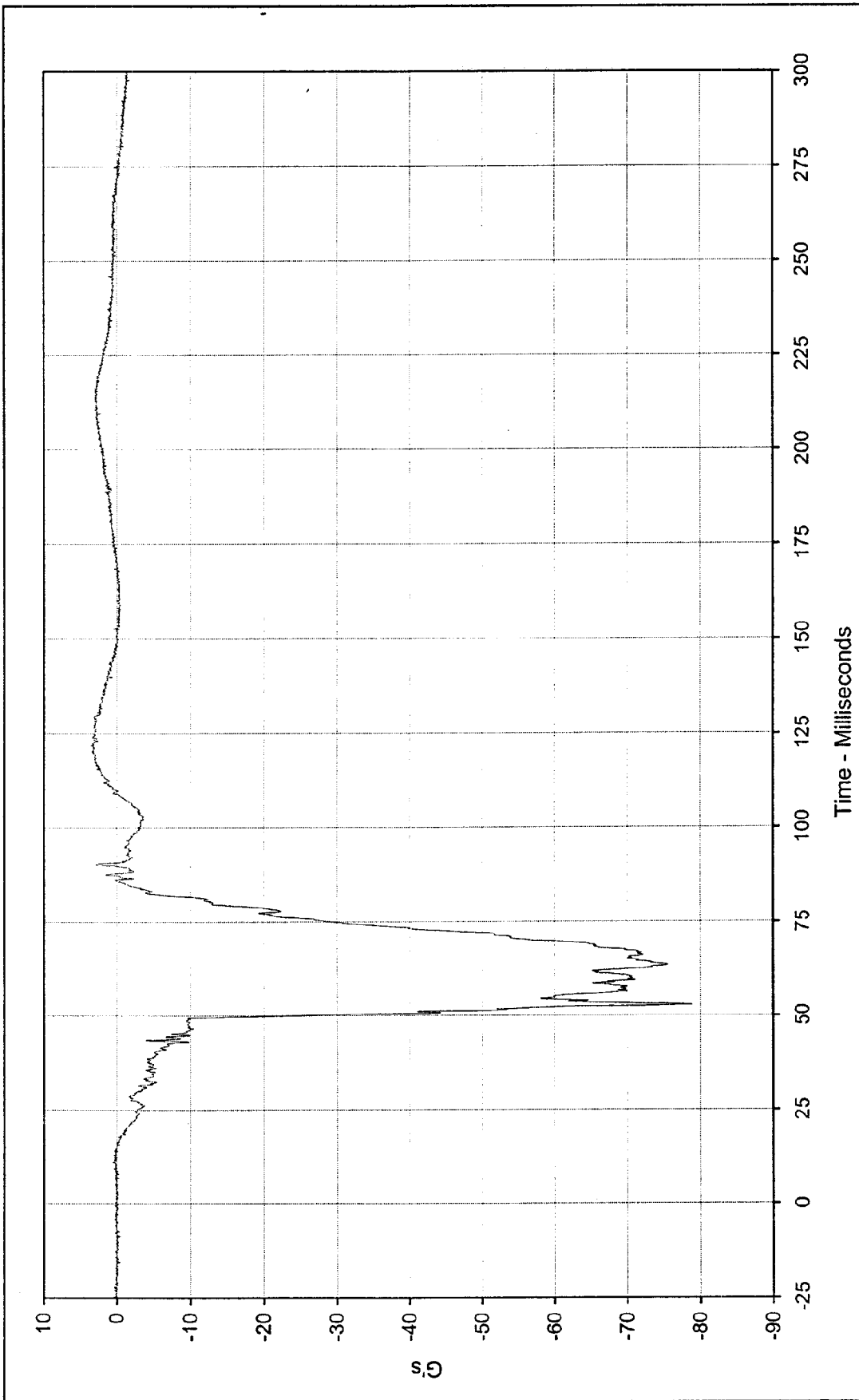




Curve Description: Passenger Chest Displacement X
Maximum Value: 0.2 at 7.9 Milliseconds
Minimum Value: -24.6 at 58.9 Milliseconds
SAE Filter Class: 600
Date of Test: 2/12/99
Curve Number: FIL-063

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Passenger Pelvis X

Test Program: 1999 NHTSA 35 mph NCAP

Maximum Value: 3.5 at 121.8 Milliseconds

Test Vehicle: 1999 Chevrolet Astro LS Van

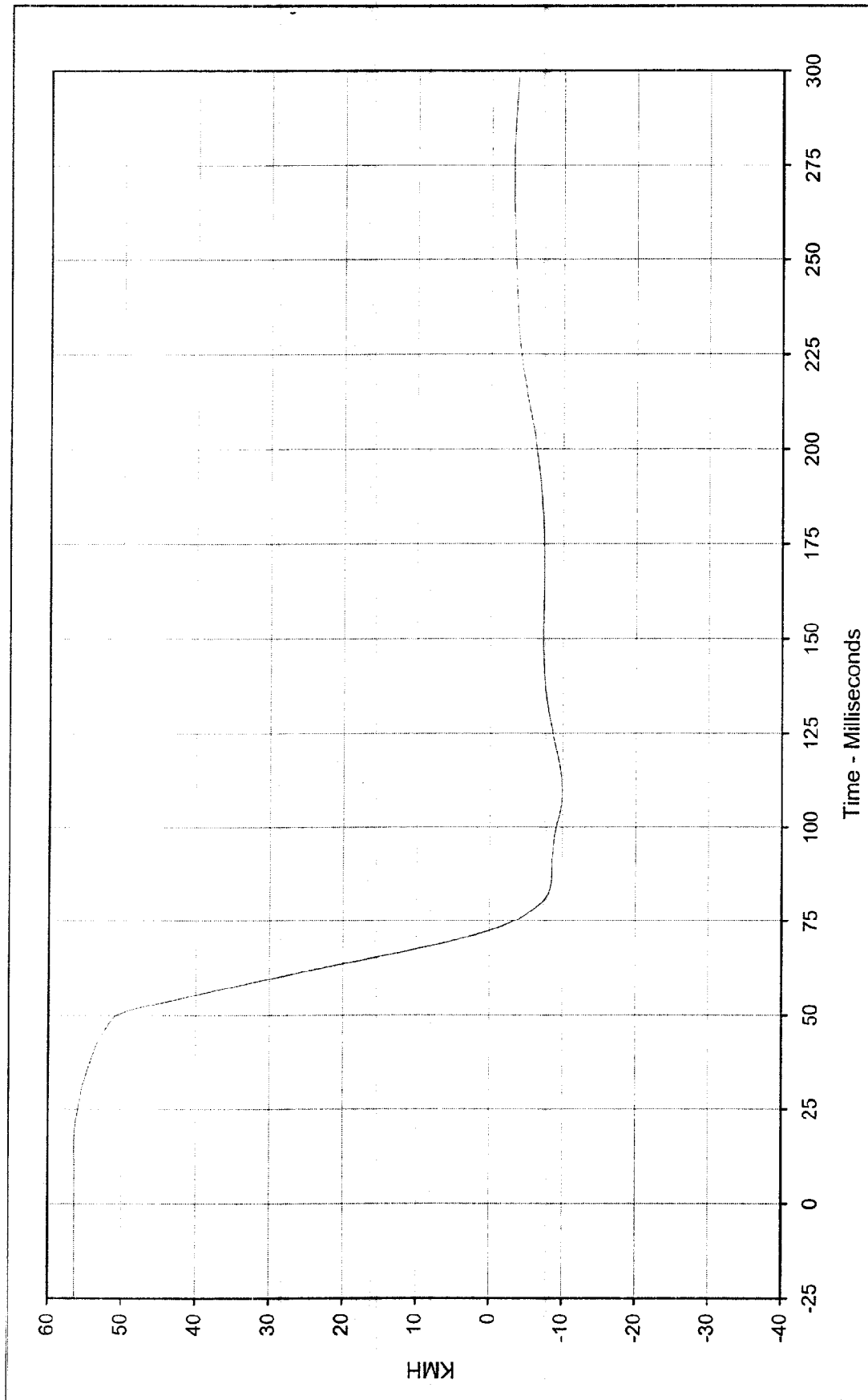
Minimum Value: -78.9 at 52.9 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

Curve Number: FIL-064





Curve Description: Passenger Pelvis X Velocity

Maximum Value: 56.5 at 15.3 Milliseconds

Minimum Value: -9.9 at 109.1 Milliseconds

SAE Filter Class: 180

Date of Test: 2/12/99

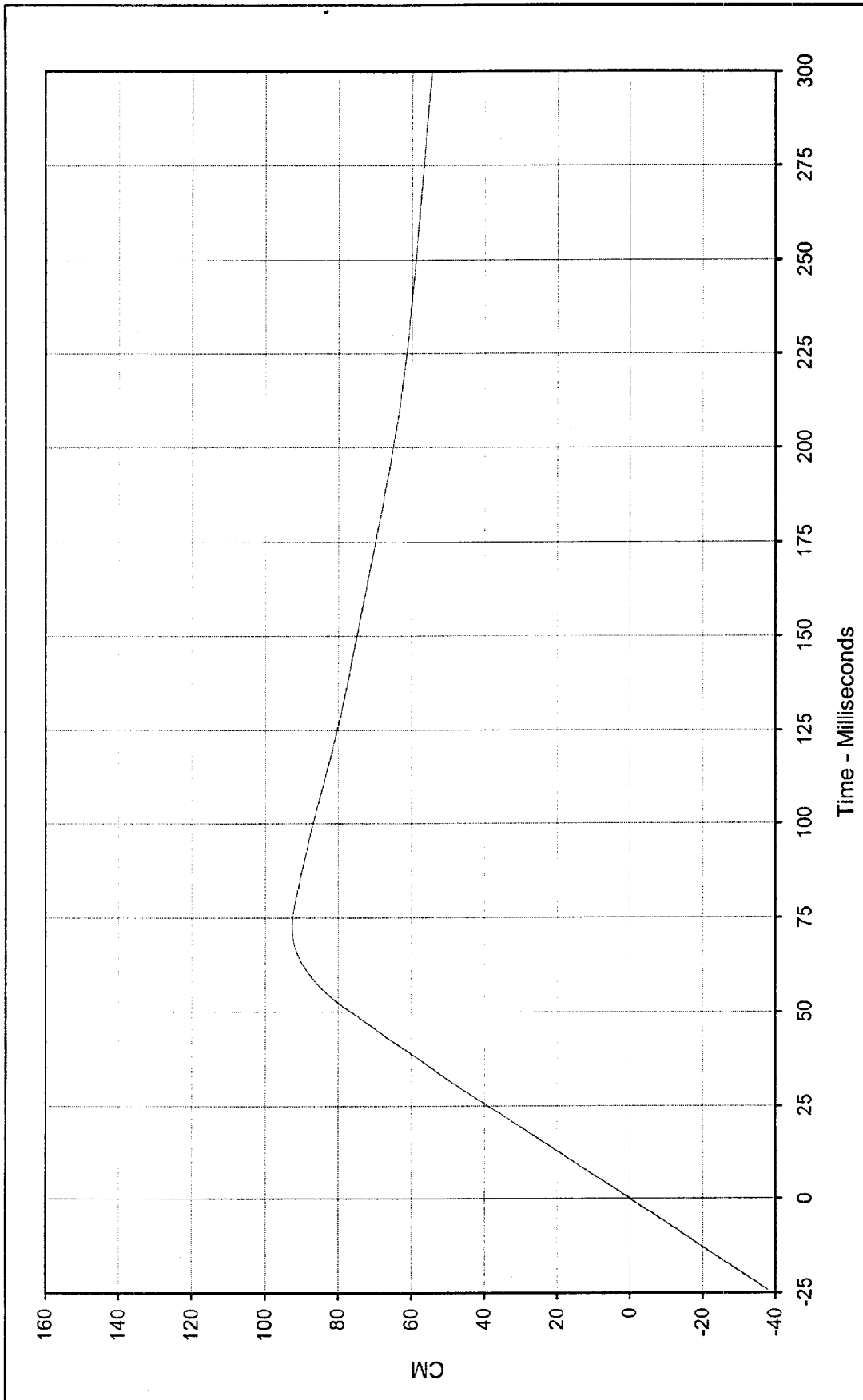
Curve Number: IN1-064

Test Program: 1999 NHTSA 35 mph NCAP

Test Vehicle: 1999 Chevrolet Astro LS Van

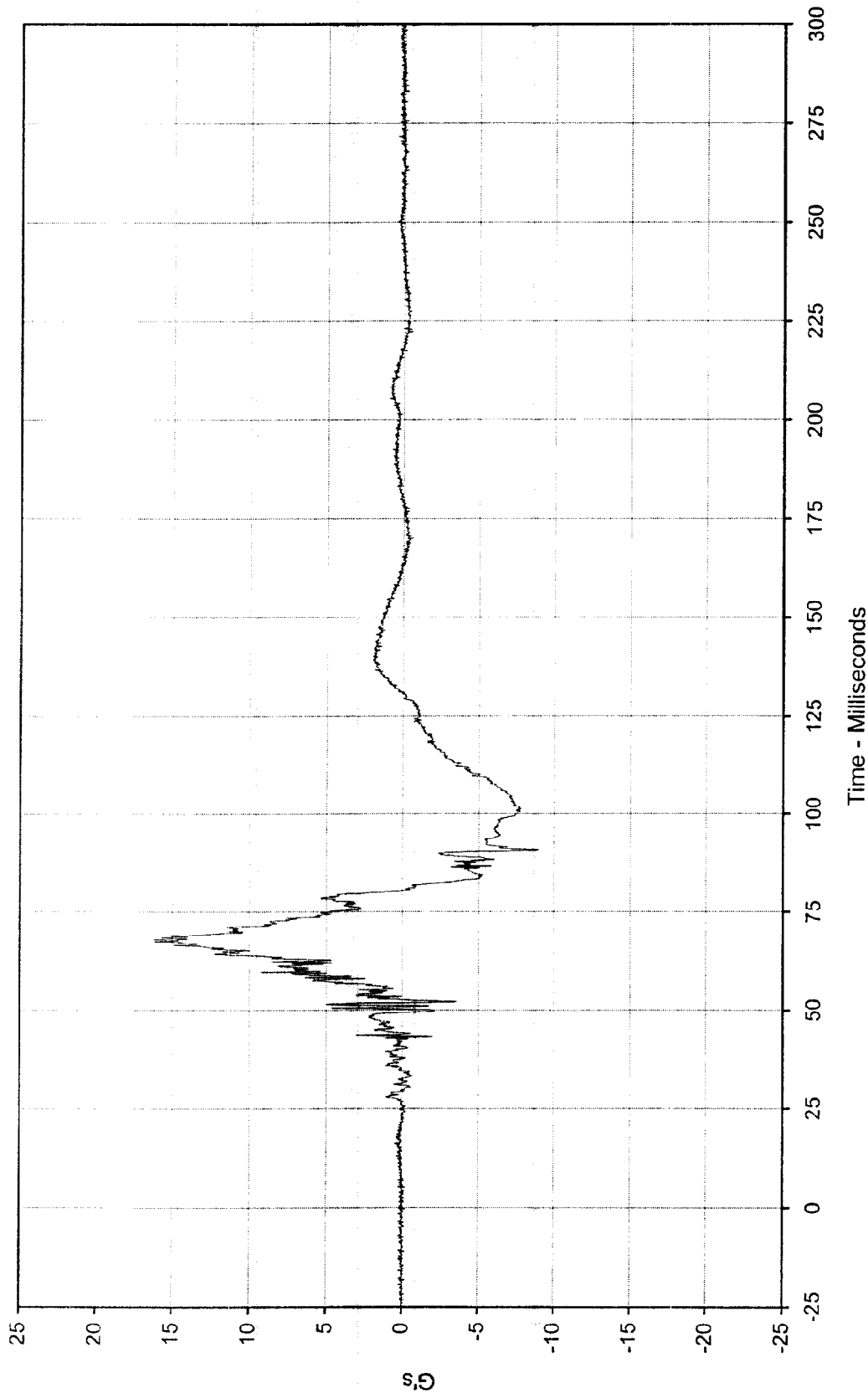
No.: MX0103





Curve Description:	Passenger Pelvis X Displ.	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	92.5 at 72.4 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	0.0 at 0.0 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/12/99			
Curve Number:	IN2-064			





Curve Description: Passenger Pelvis Y

Maximum Value: 16.2 at 67.9 Milliseconds

Minimum Value: -9.0 at 90.7 Milliseconds

SAE Filter Class: 1000

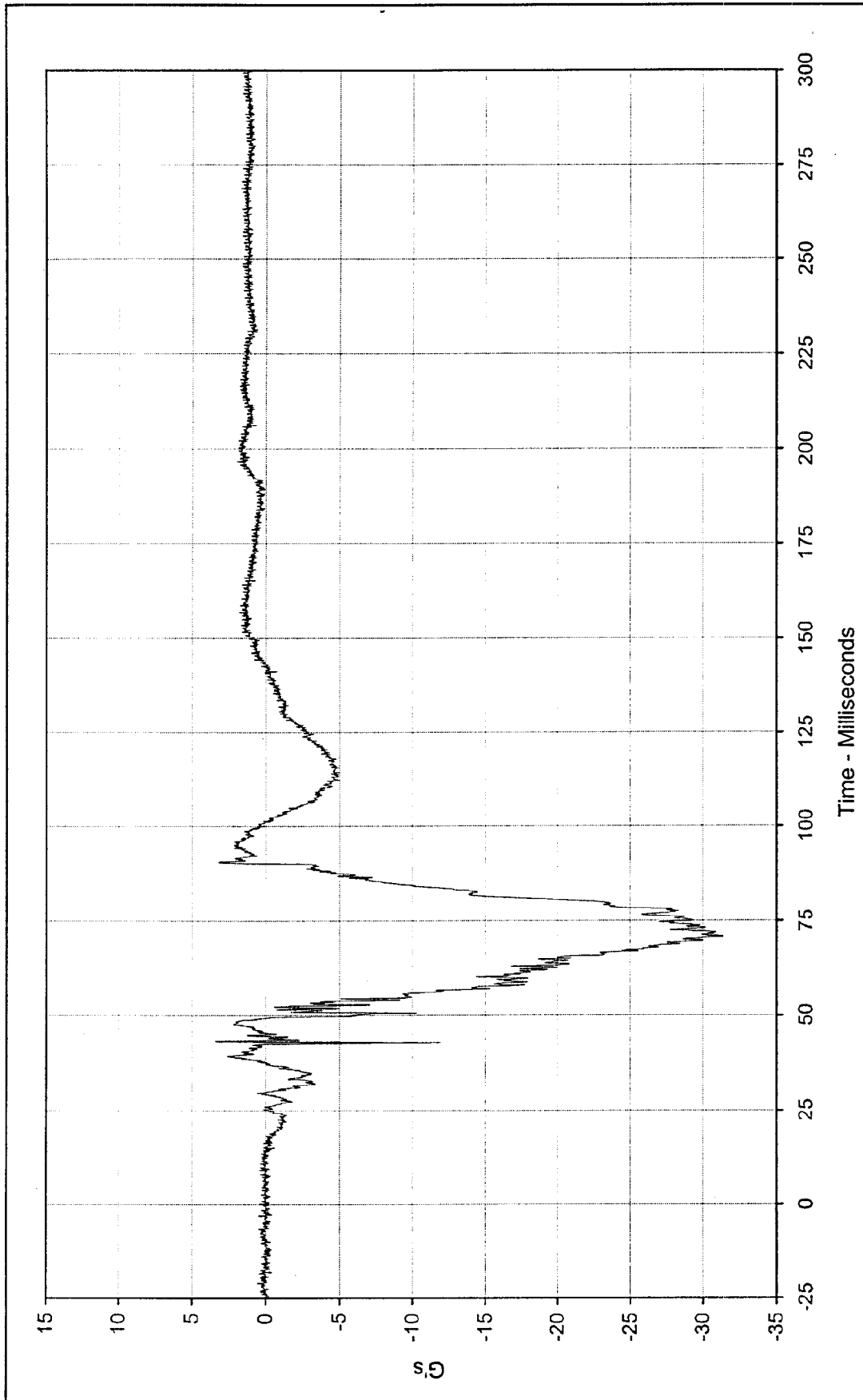
Date of Test: 2/12/99

Curve Number: FIL-065

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Program:

Test Vehicle: 1999 Chevrolet Astro LS Van

Passenger Pelvis Z

Maximum Value: 3.4 at 43.3 Milliseconds

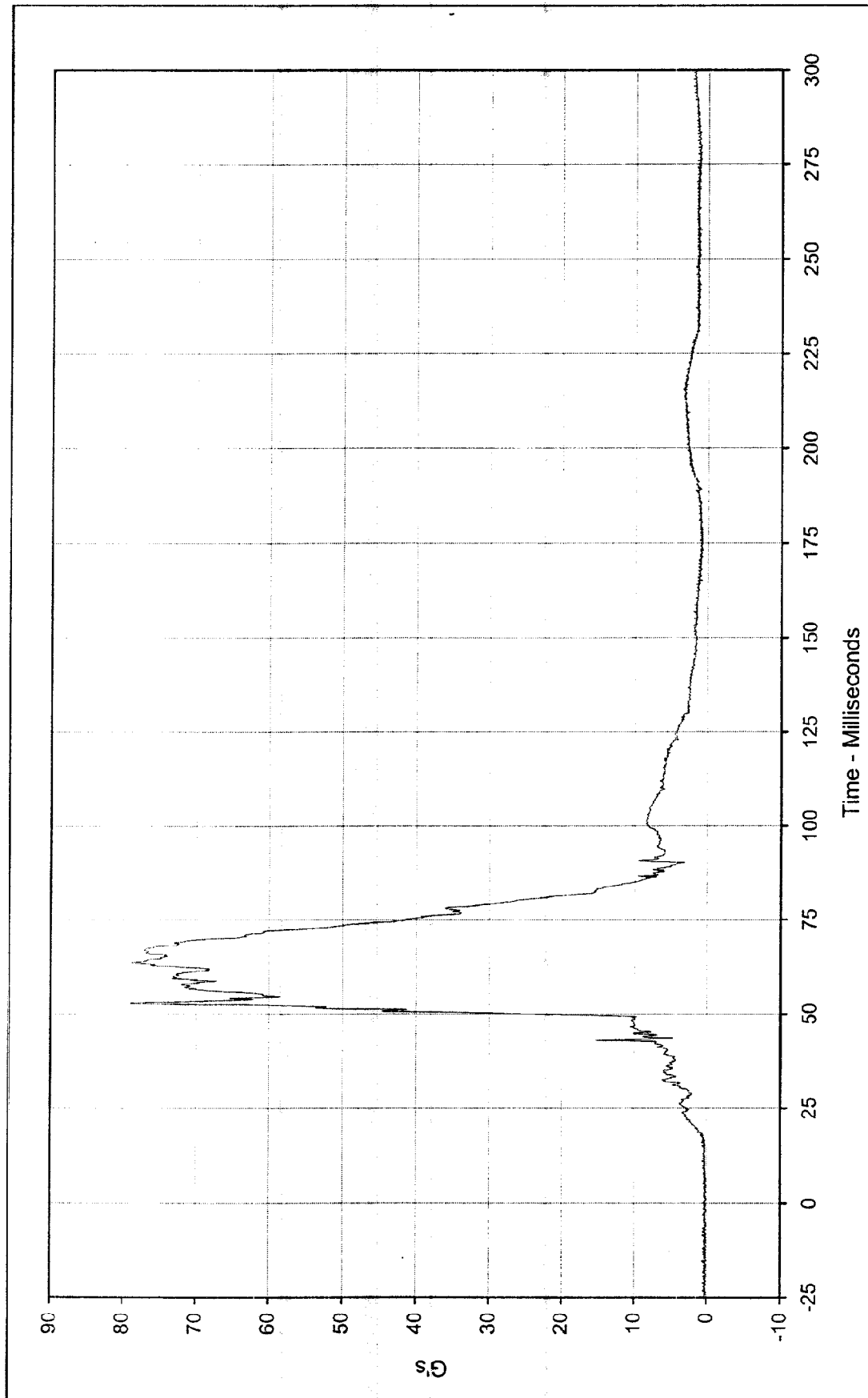
Minimum Value: -31.5 at 70.8 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

Curve Number: FIL-066



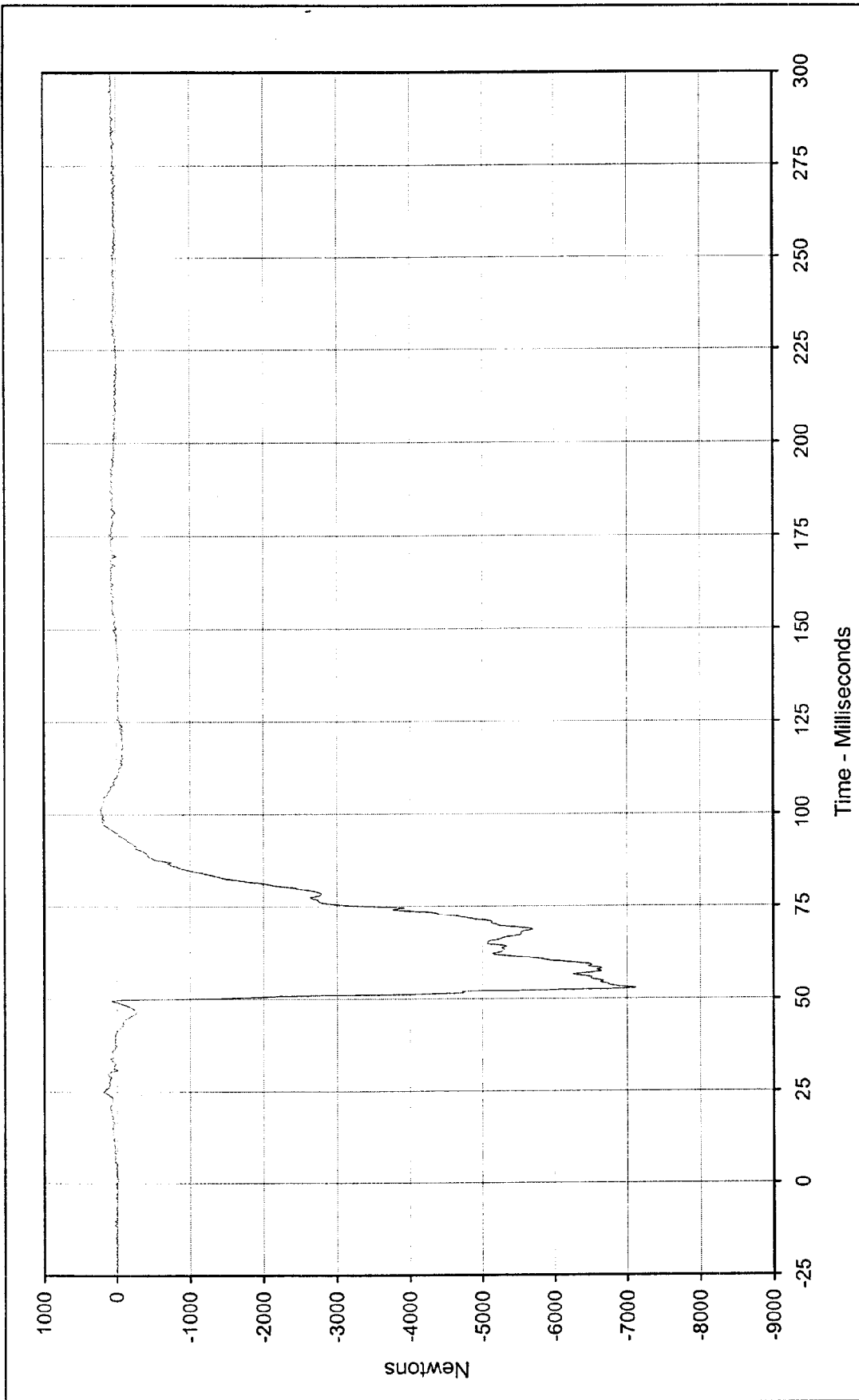


B-100

Curve Description:	Passenger Pelvis Resultant	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	79.1 at 52.9 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	0.1 at 1.2 Milliseconds			
SAE Filter Class:	1000			
Date of Test:	2/12/99			
Curve Number:	RES-064			

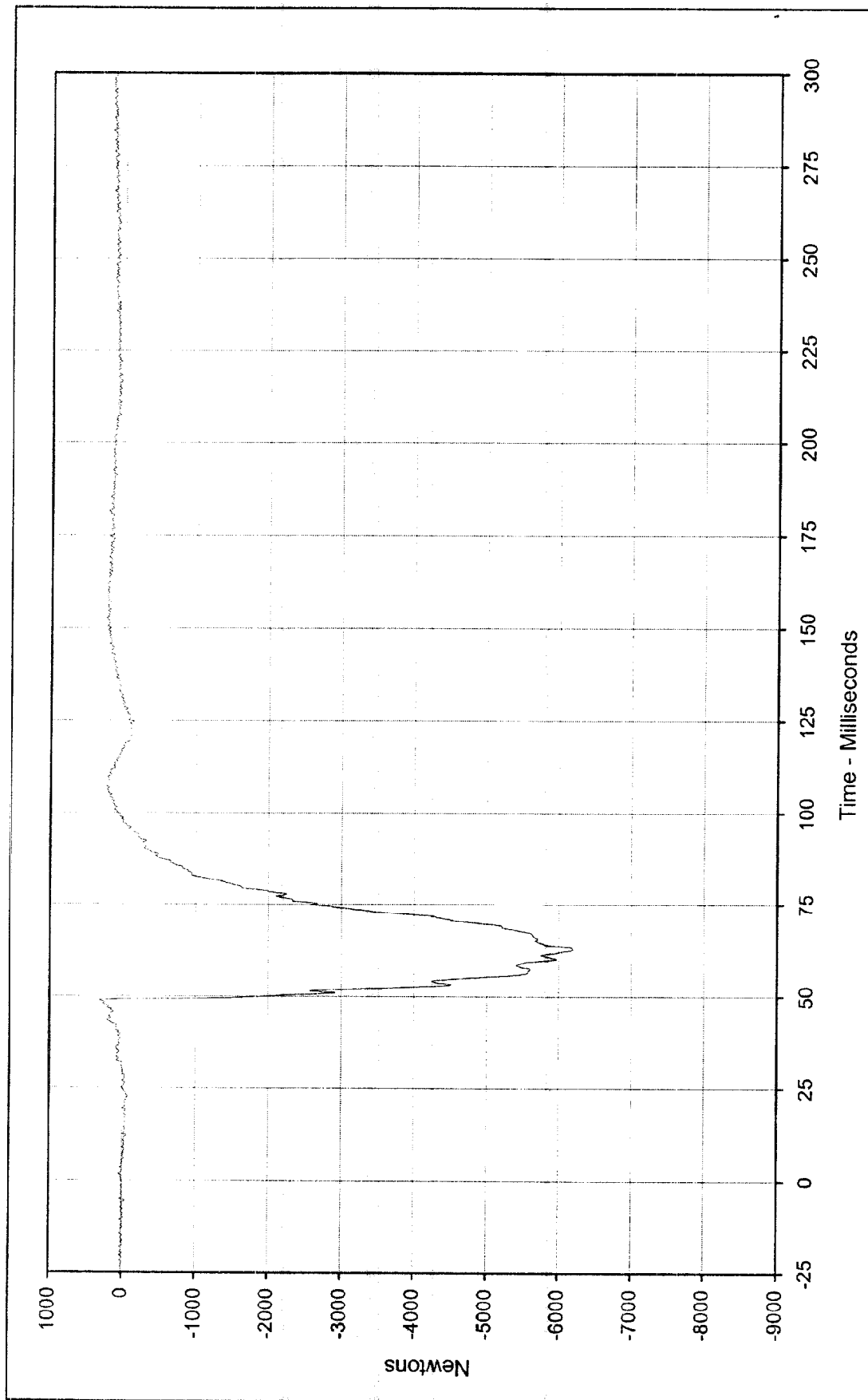


KAR99001-14



Curve Description:	Passenger Left Femur Force	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	226.6 at 101.4 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-7122.2 at 52.8 Milliseconds			
SAE Filter Class:	600			
Date of Test:	2/12/99			
Curve Number:	FIL-067			



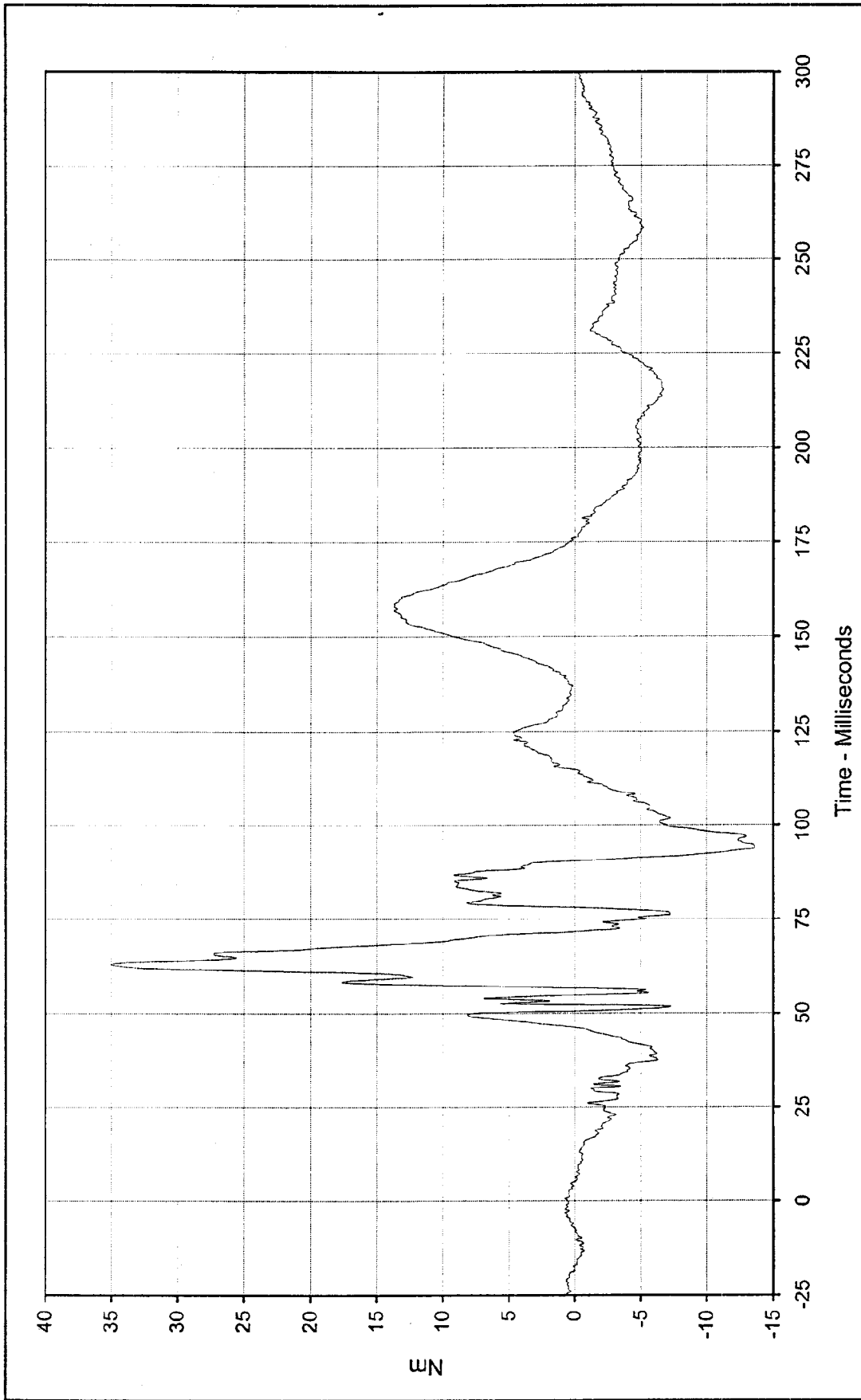


Curve Description:		Passenger Right Femur Force		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	304.9	at	48.7	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-6196.4	at	62.8			
SAE Filter Class:	600					
Date of Test:	2/12/99					
Curve Number:	FIL-068					



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Curve Description: Passenger Left Upper Tibia Moment X

Maximum Value: 35.1 at 62.9 Milliseconds

Minimum Value: -13.6 at 94.1 Milliseconds

SAE Filter Class: 600

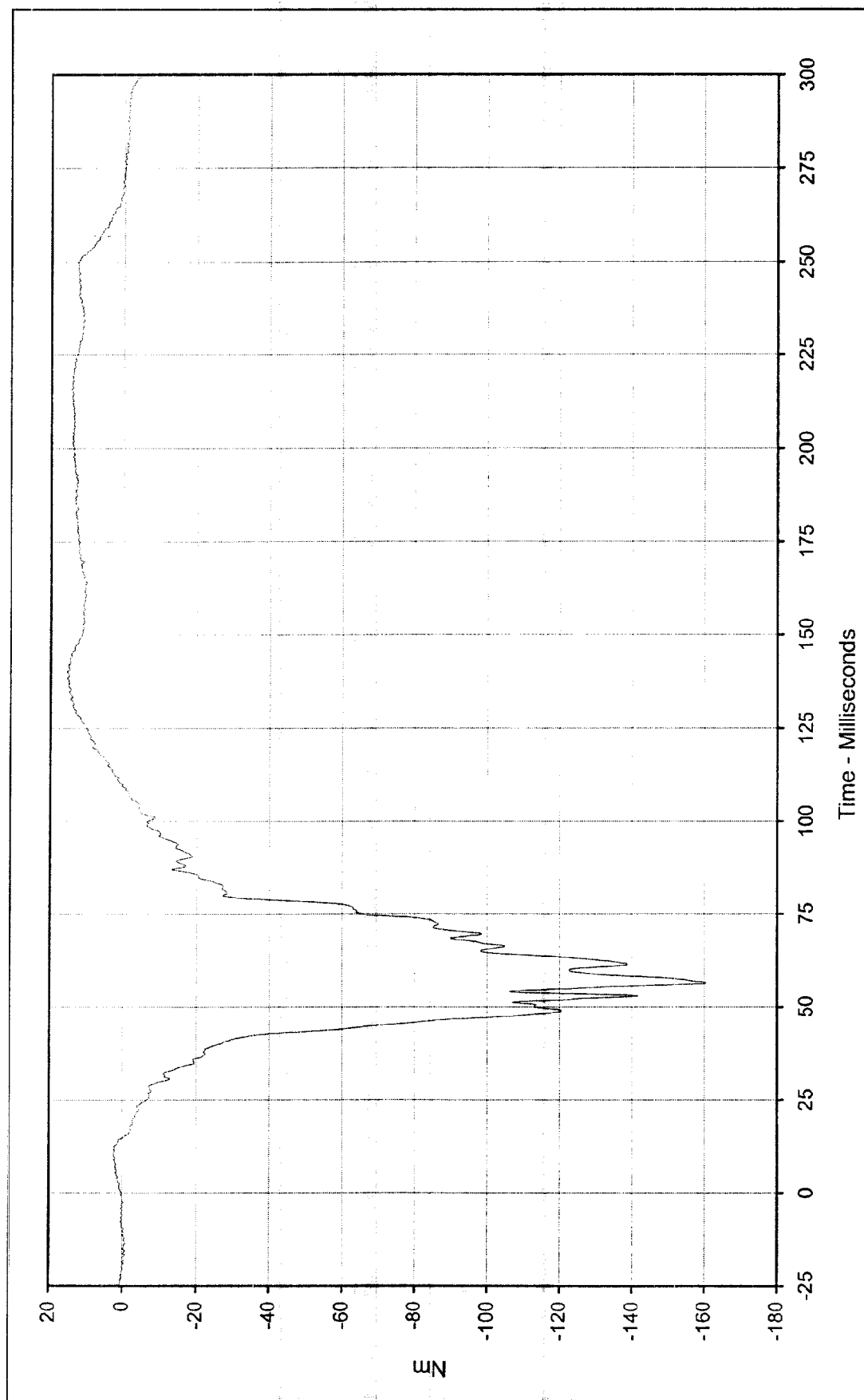
Date of Test: 2/12/99

Curve Number: FIL-069

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Passenger Left Upper Tibia Moment Y

Maximum Value: 15.6 at 140.2 Milliseconds

Minimum Value: -160.7 at 56.4 Milliseconds

SAE Filter Class: 600

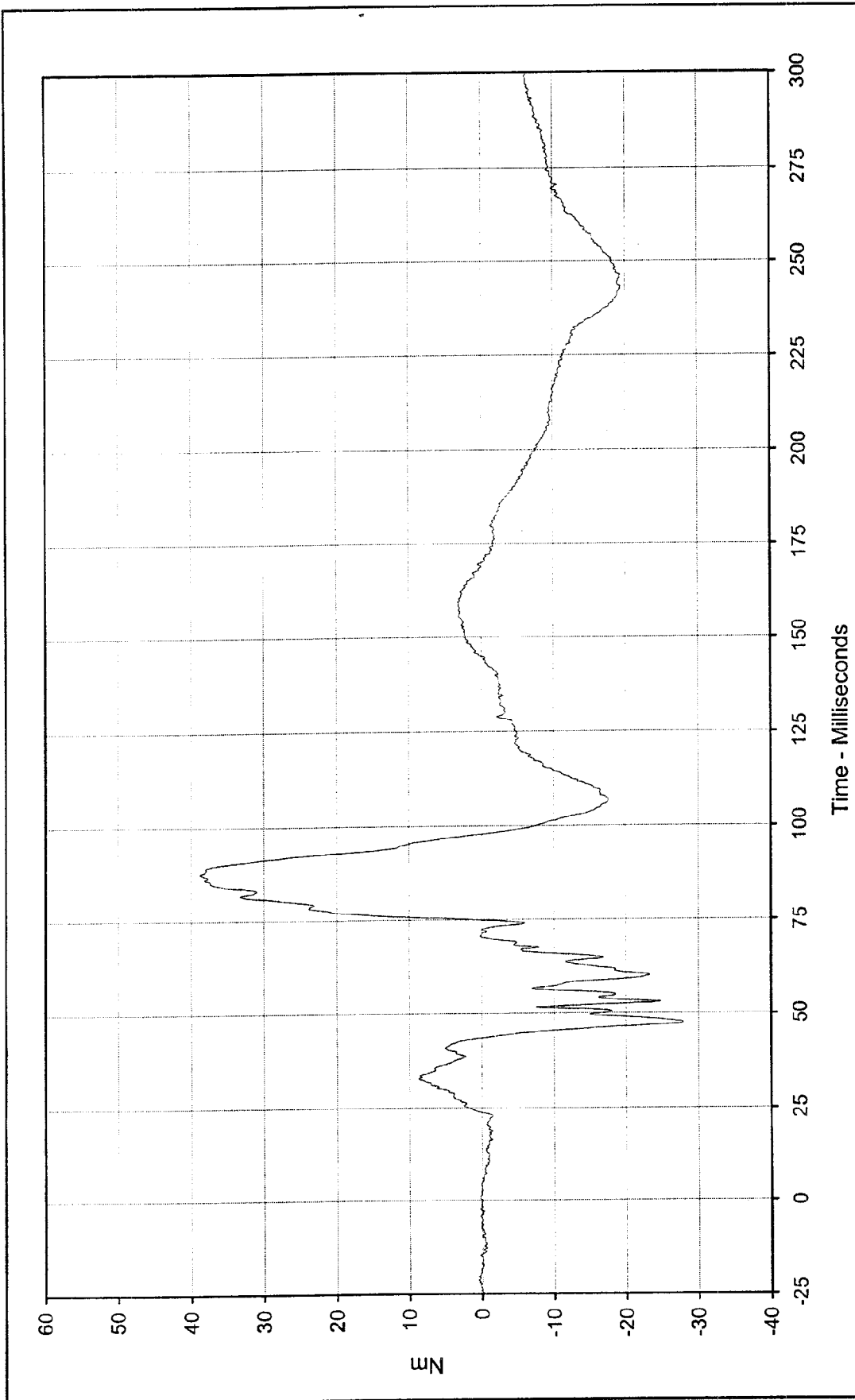
Date of Test: 2/12/99

Curve Number: FIL-070

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Passenger Right Upper Tibia Moment X

Maximum Value: 38.7 at 87.7 Milliseconds

Minimum Value: -27.9 at 47.4 Milliseconds

SAE Filter Class: 600

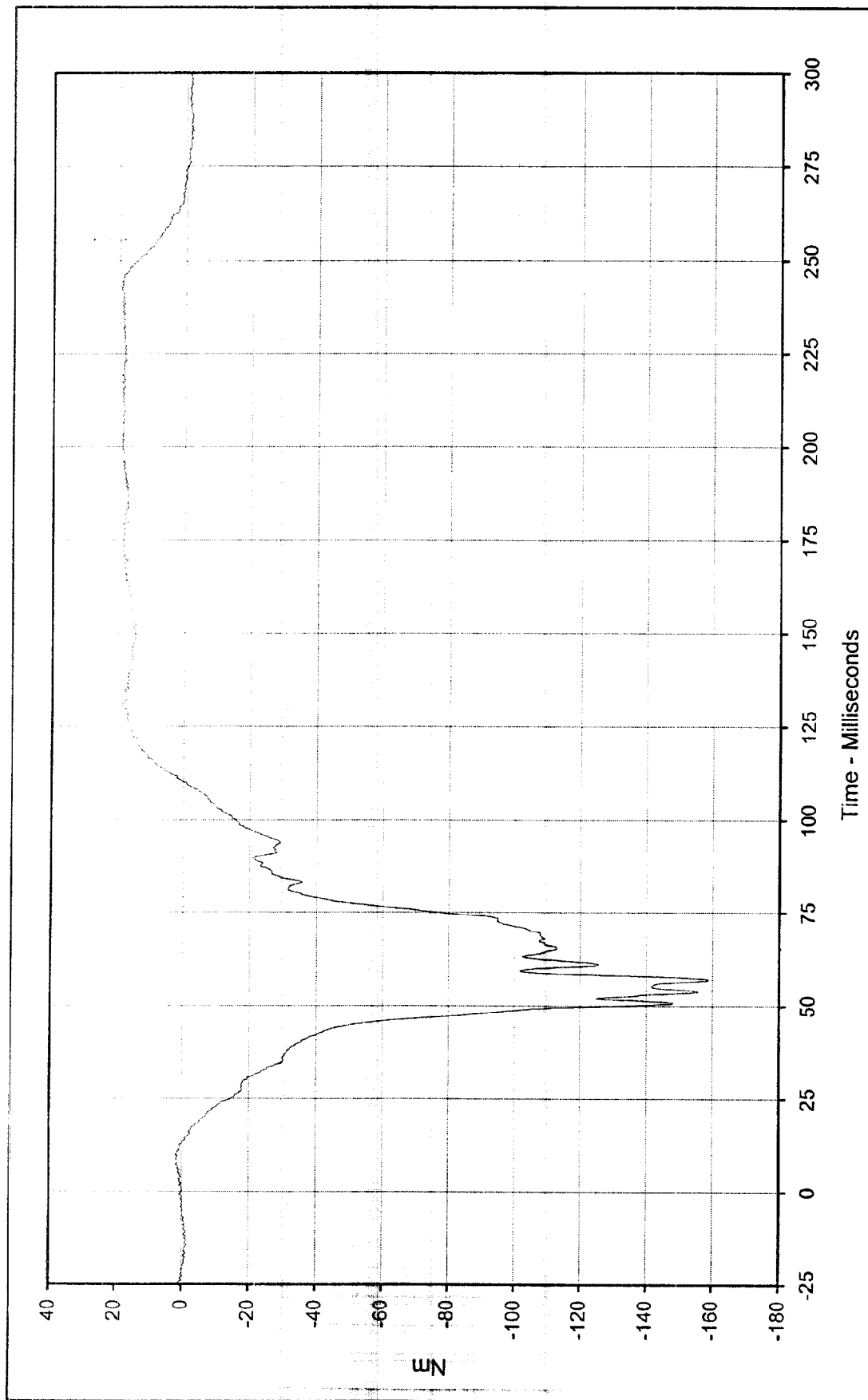
Date of Test: 2/12/99

Curve Number: FIL-071

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Passenger Right Upper Tibia Moment Y

Maximum Value: 19.5 at 242.7 Milliseconds

Minimum Value: -159.0 at 57.0 Milliseconds

SAE Filter Class: 600

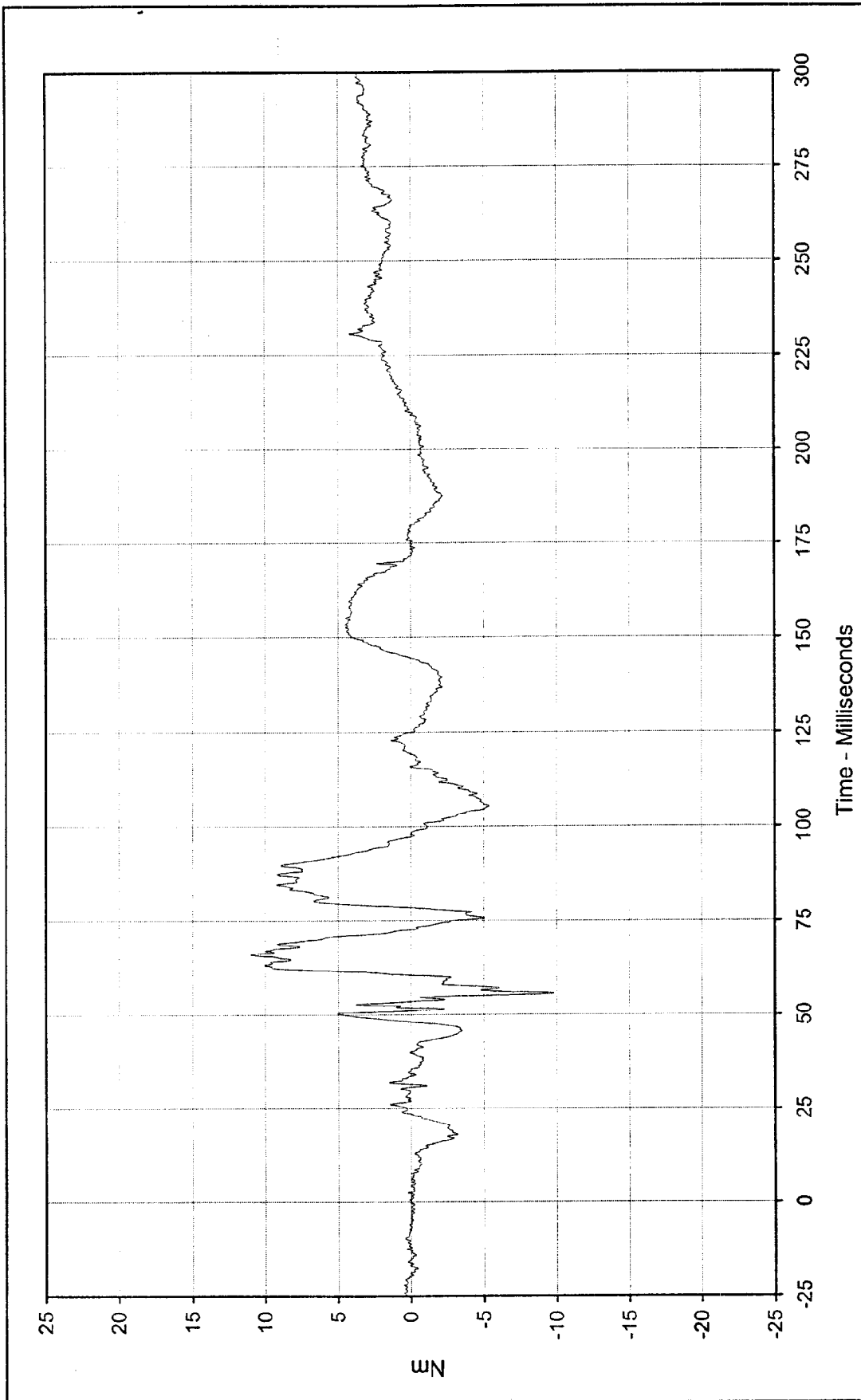
Date of Test: 2/12/99

Curve Number: FIL-072

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Passenger Left Lower Tibia Moment X

Maximum Value: 11.0 at 66.2 Milliseconds

Minimum Value: -9.8 at 55.8 Milliseconds

SAE Filter Class: 600

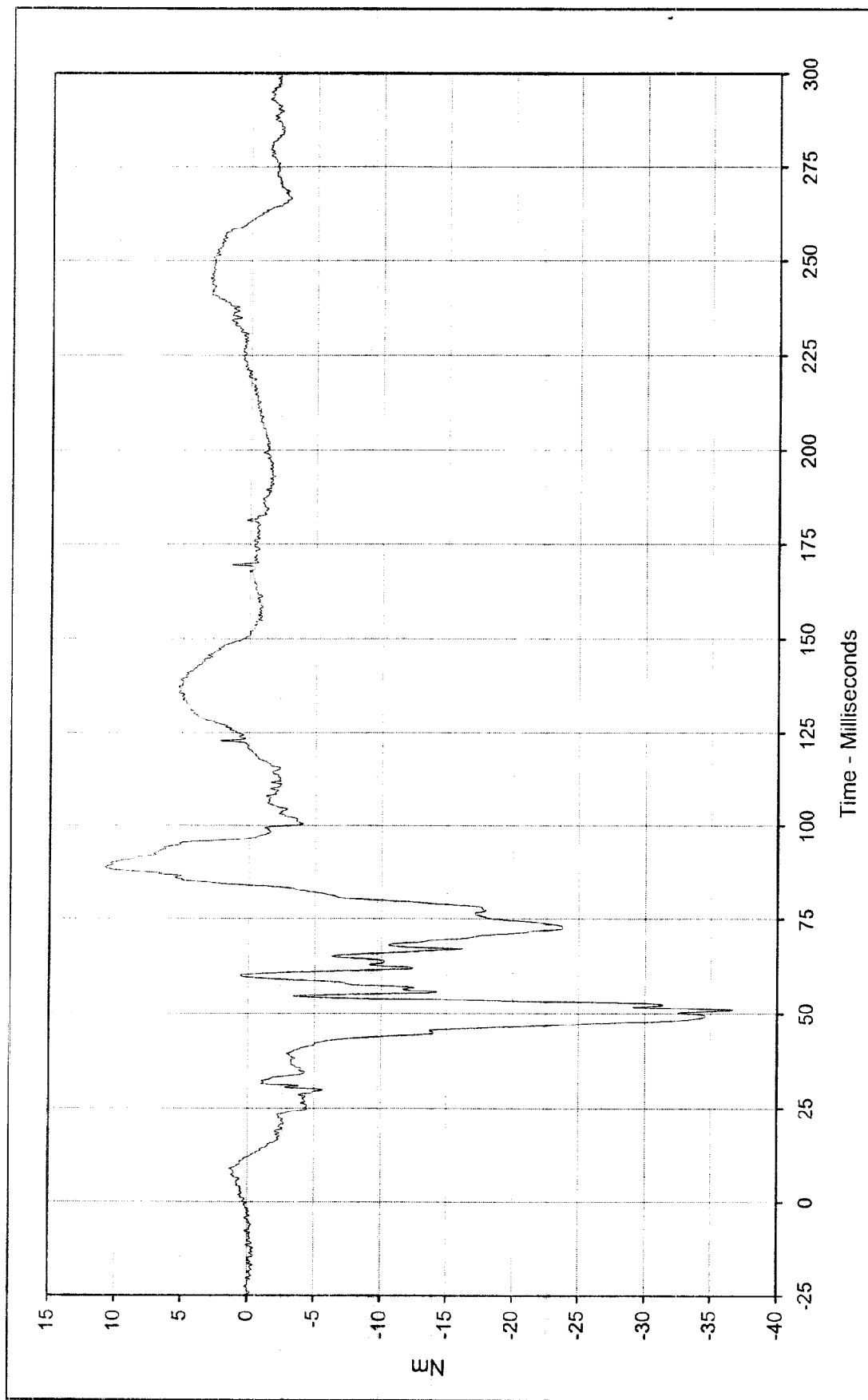
Date of Test: 2/12/99

Curve Number: FIL-073

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Passenger Left Lower Tibia Moment Y

Maximum Value: 10.8 at 88.8 Milliseconds

Minimum Value: -36.7 at 51.1 Milliseconds

SAE Filter Class: 600

Date of Test: 2/12/99

Curve Number: FIL-074

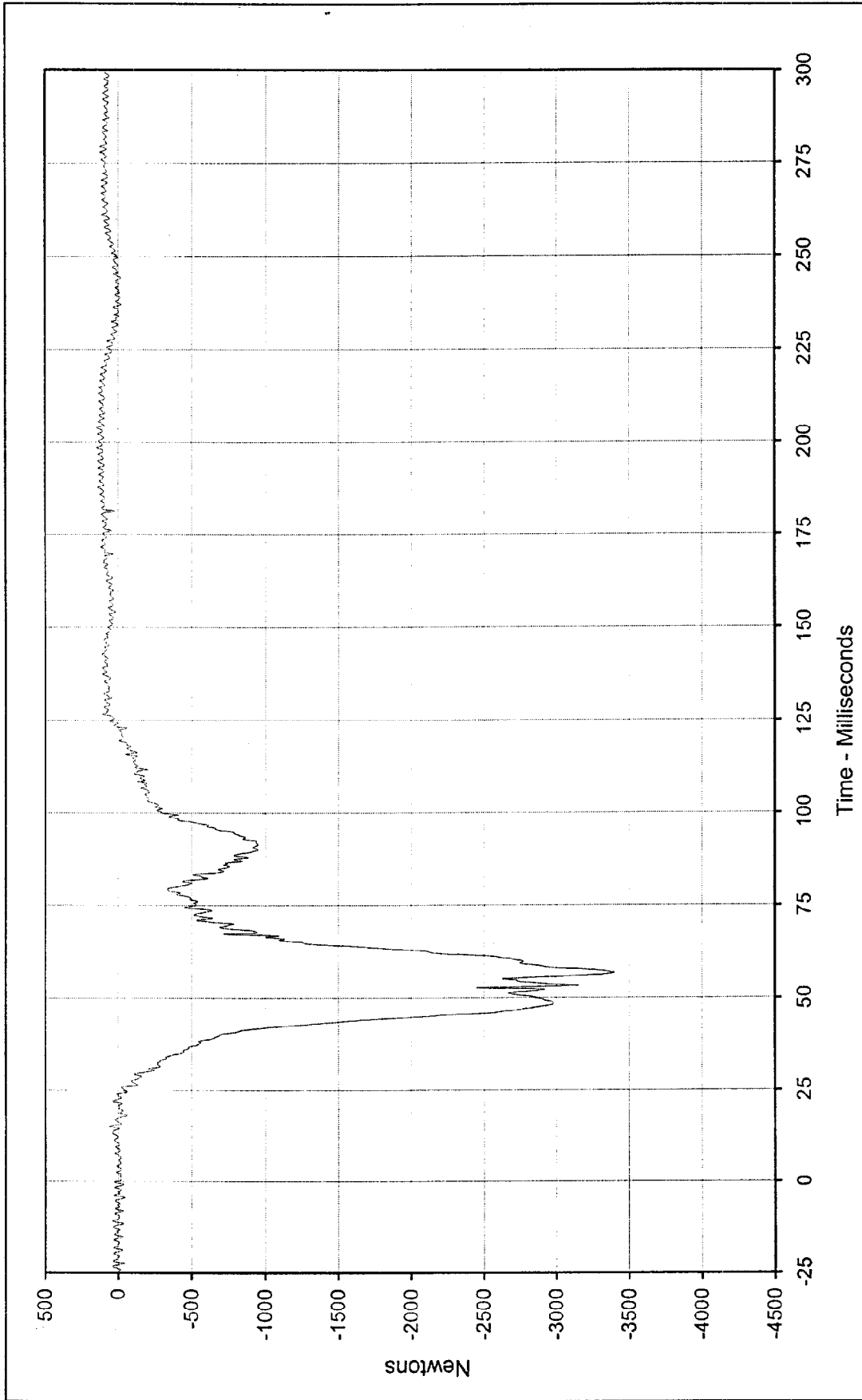
Test Program:

1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle:

1999 Chevrolet Astro LS Van





Curve Description: Passenger Left Lower Tibia Force Z Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 145.8 at 203.9 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

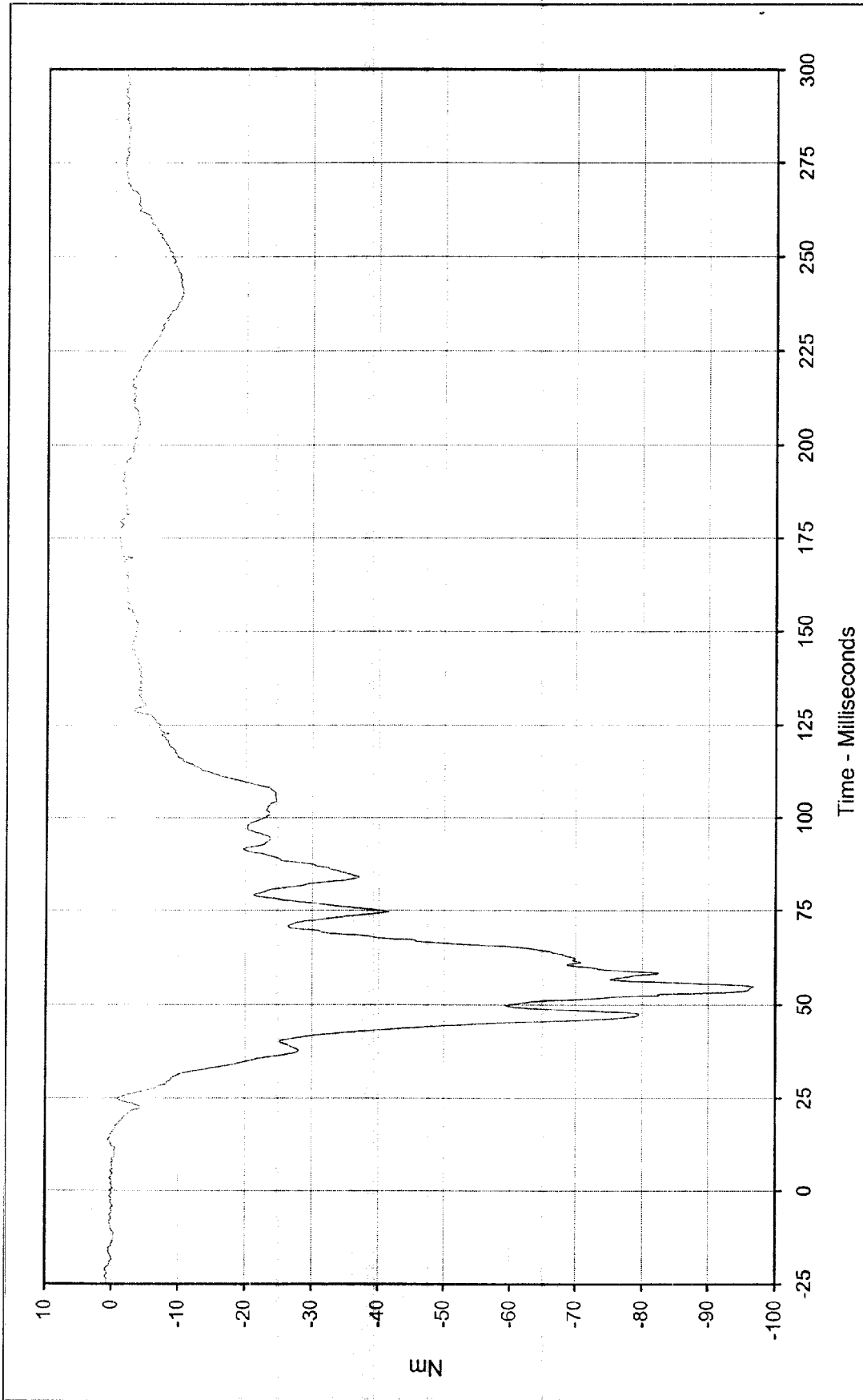
Minimum Value: -3400.7 at 56.7 Milliseconds

SAE Filter Class: 600

Date of Test: 2/12/99

Curve Number: FIL-075





Curve Description: Passenger Right Lower Tibia Moment X

Maximum Value: 0.6 at 13.8 Milliseconds

Minimum Value: -96.8 at 54.8 Milliseconds

SAE Filter Class: 600

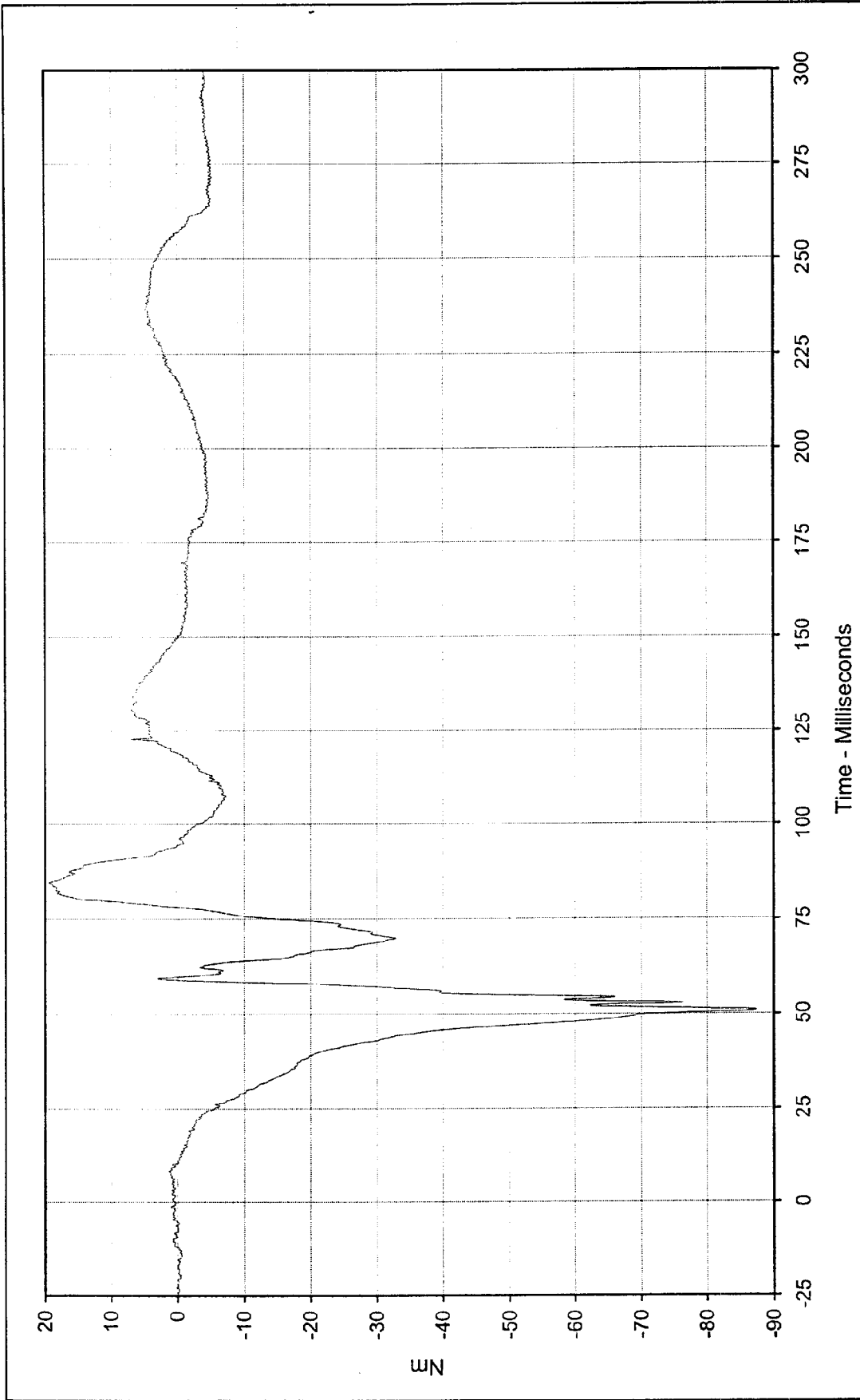
Date of Test: 2/12/99

Curve Number: FIL-076

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Passenger Right Lower Tibia Moment Y

Maximum Value: 19.5 at 84.6 Milliseconds

Minimum Value: -87.5 at 51.0 Milliseconds

SAE Filter Class: 600

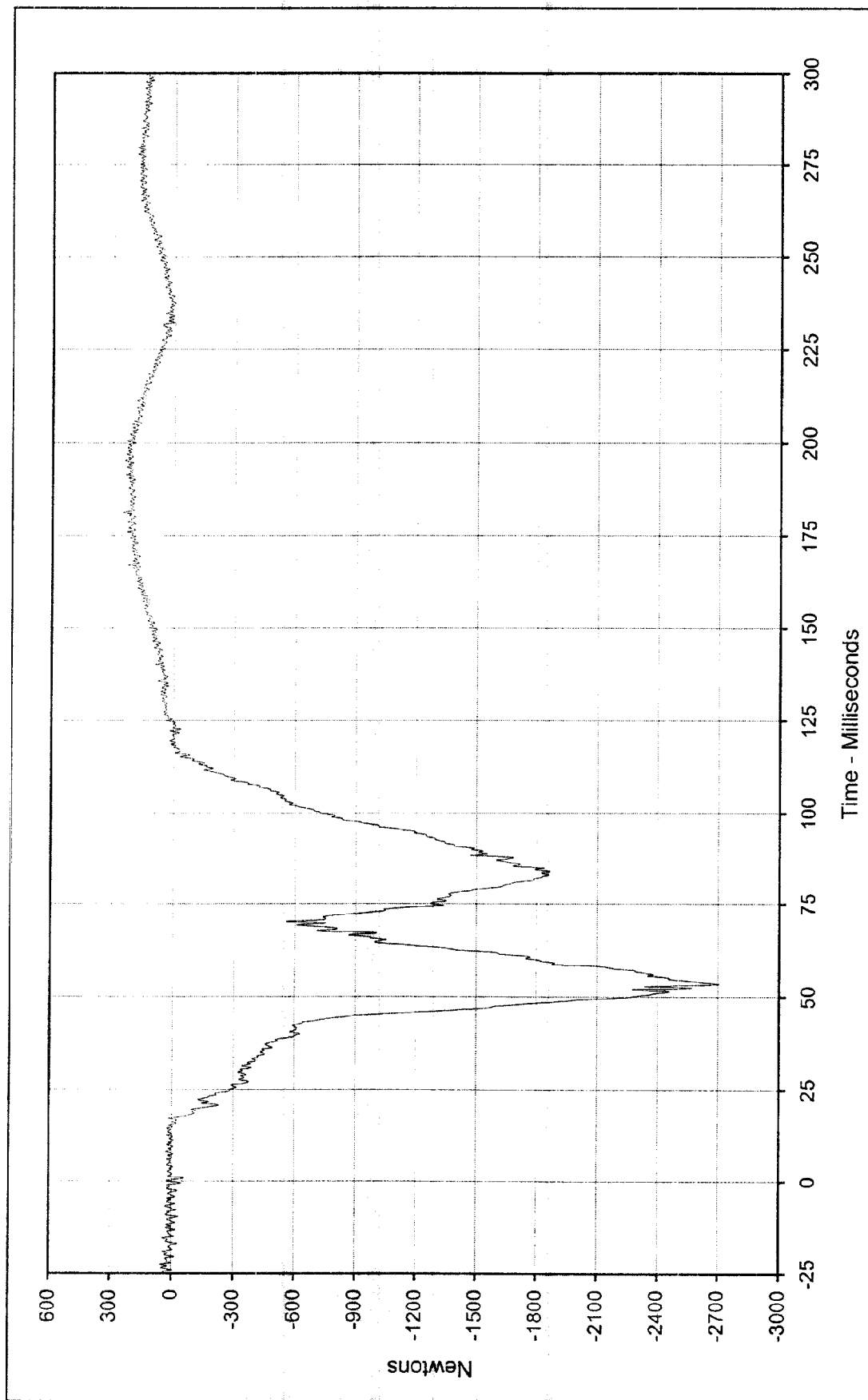
Date of Test: 2/12/99

Curve Number: FIL-077

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Passenger Right lower Tibia Force Z

Maximum Value: 251.5 at 181.5 Milliseconds

Minimum Value: -2706.1 at 53.4 Milliseconds

SAE Filter Class: 600

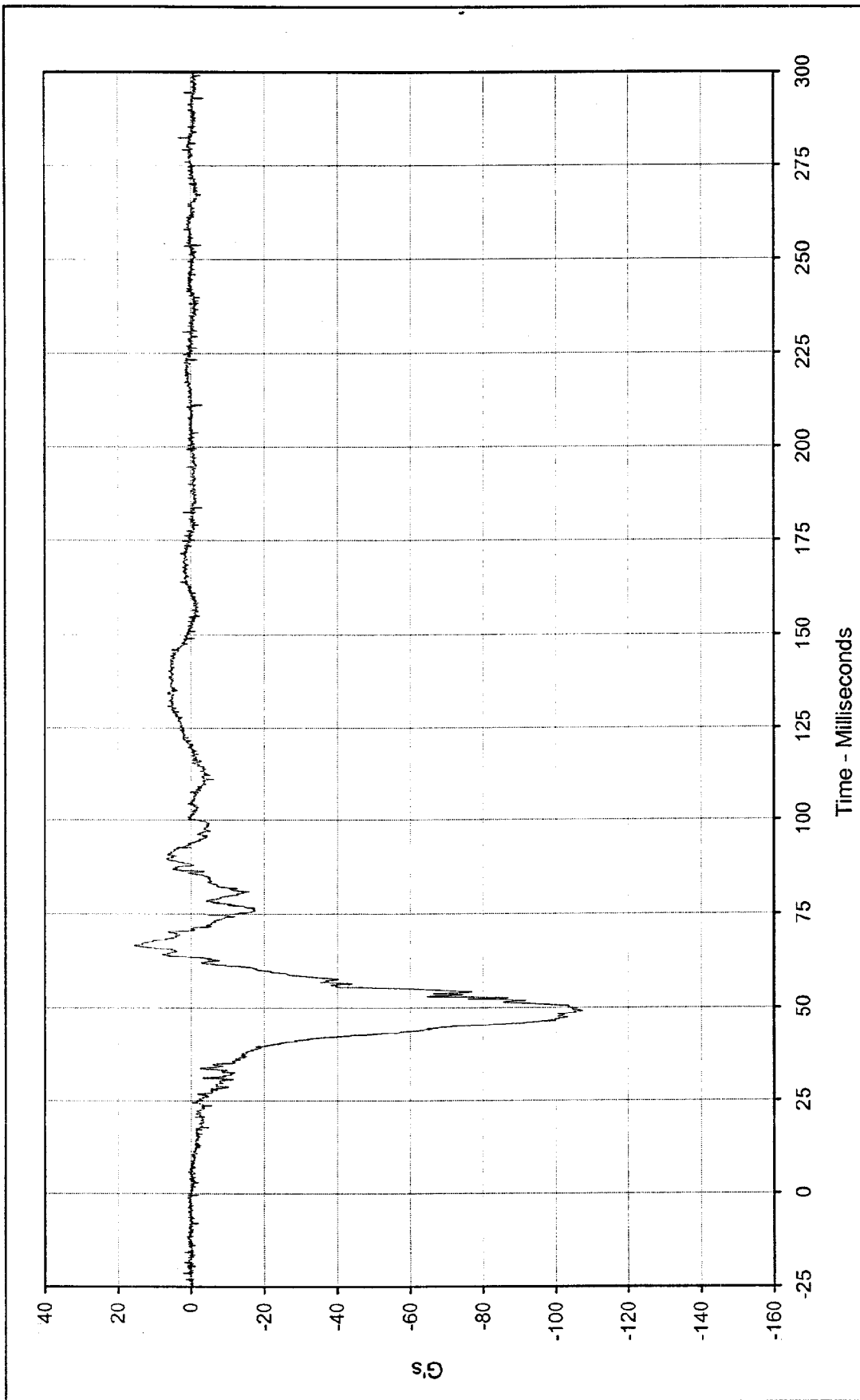
Date of Test: 2/12/99

Curve Number: FIL-078

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

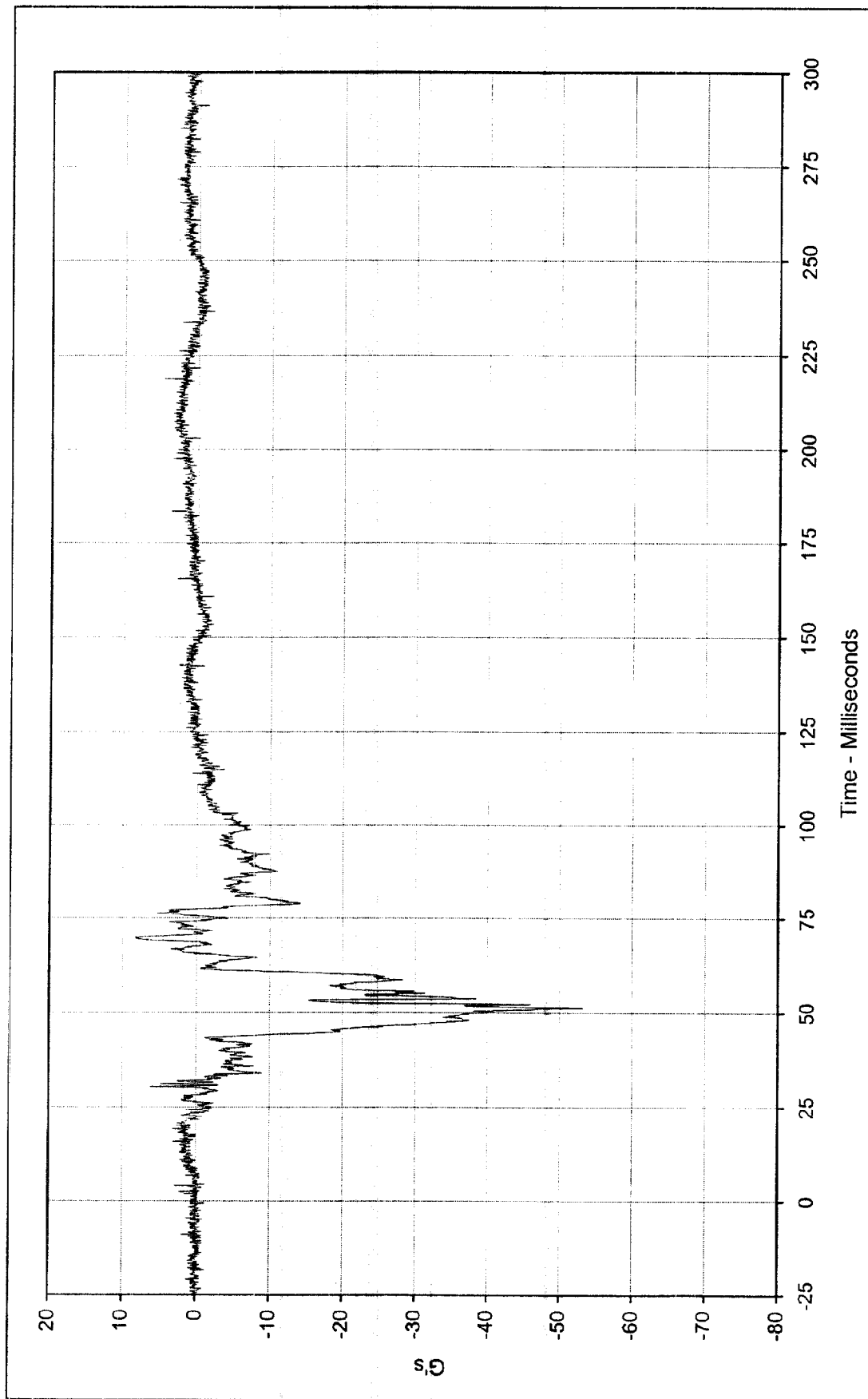
Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description:	Passenger Left Foot Aft X	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	15.6 at 66.4 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-107.5 at 49.0 Milliseconds			
SAE Filter Class:	1000			
Date of Test:	2/12/99			
Curve Number:	FIL-079			



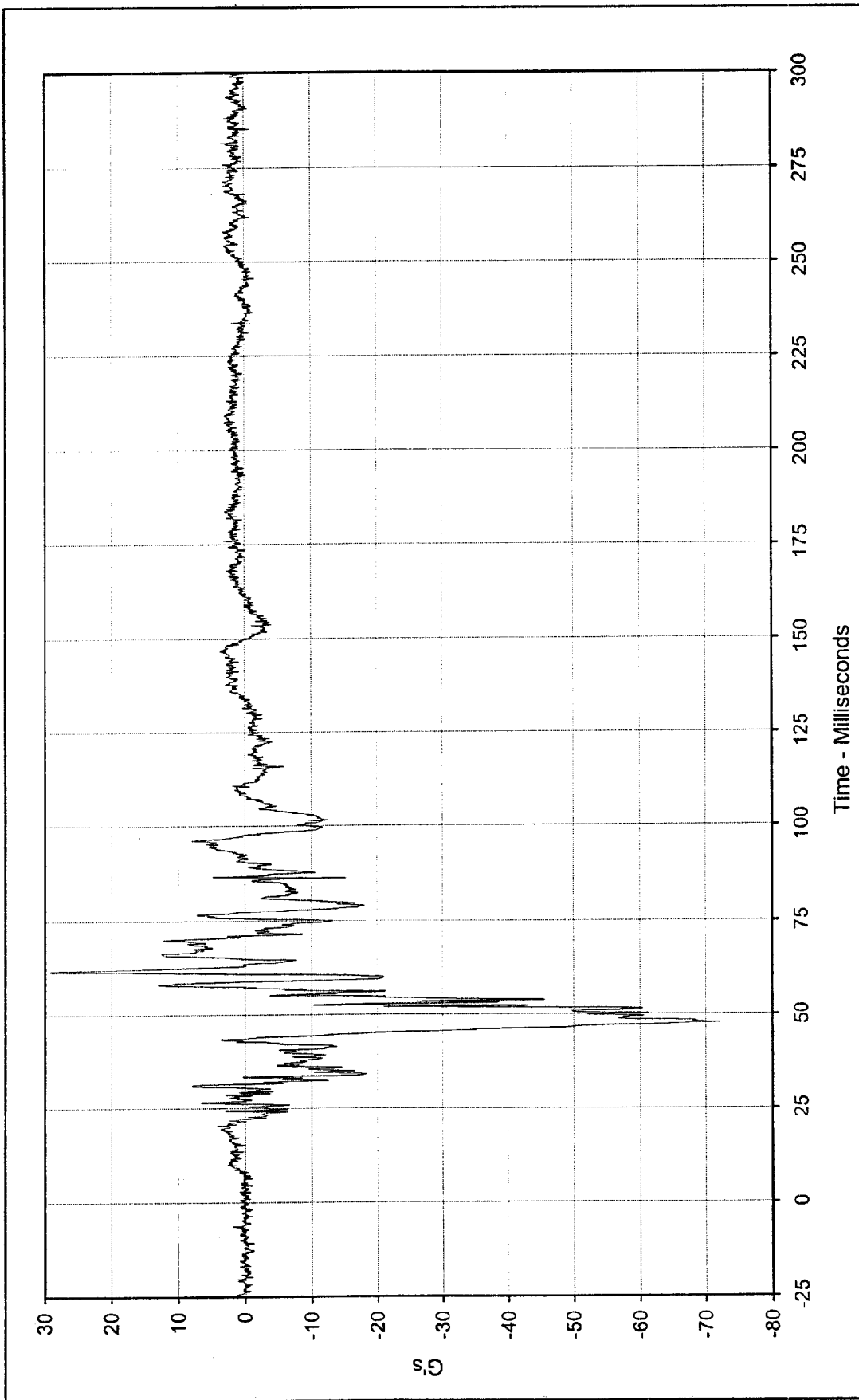


Curve Description:	Passenger Left Foot Aft Z		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	8.3	at 69.6	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-53.2	at 51.4			
SAE Filter Class:	1000				
Date of Test:	2/12/99				
Curve Number:	FIL-080				



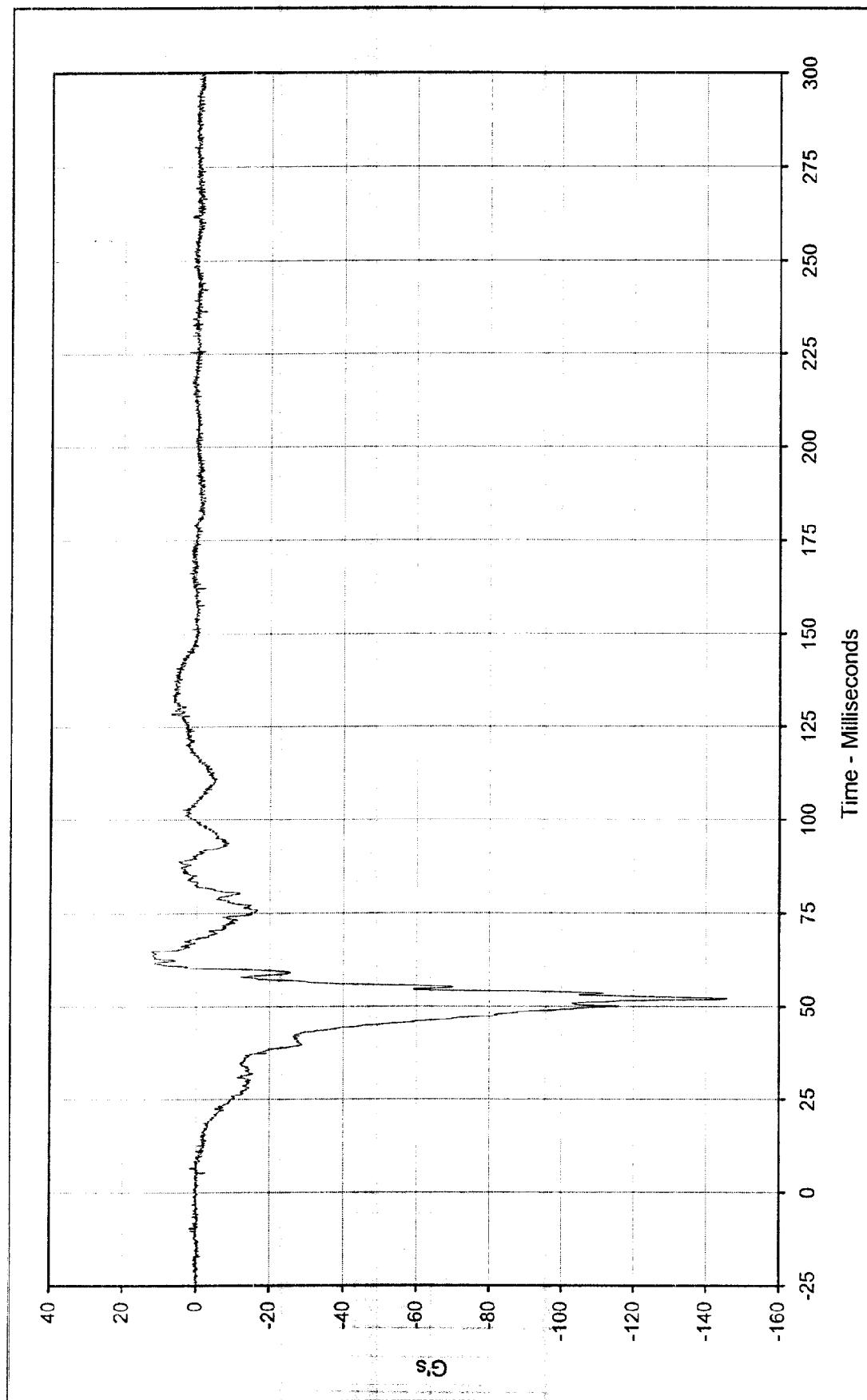
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Curve Description:	Passenger Left Foot Fore Z	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	29.3 at 61.8 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-72.2 at 47.7 Milliseconds			
SAE Filter Class:	1000			
Date of Test:	2/12/99			
Curve Number:	FIL-081			





Curve Description: Passenger Right Foot Aft X Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 12.2 at 64.8 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

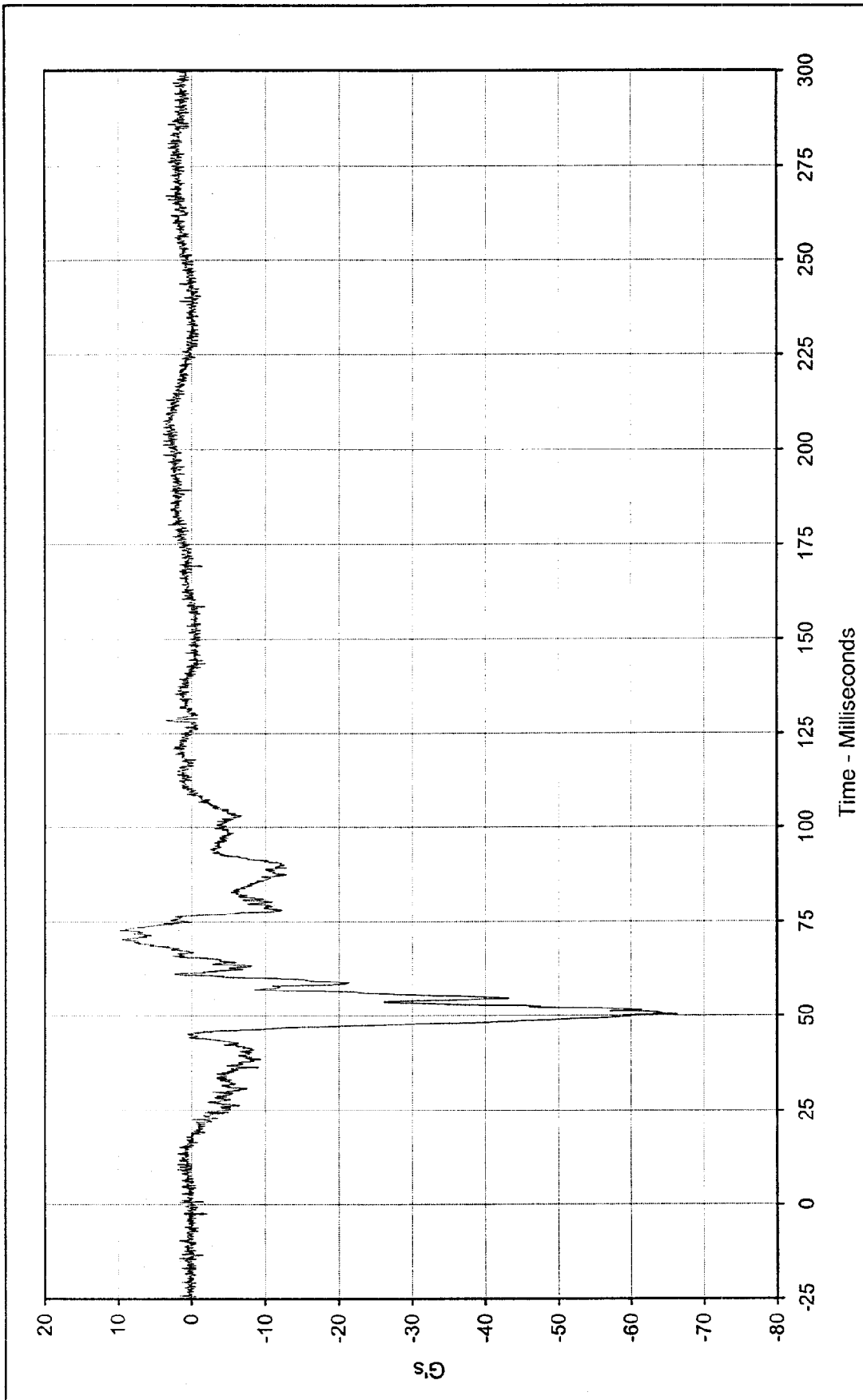
Minimum Value: -145.9 at 52.1 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

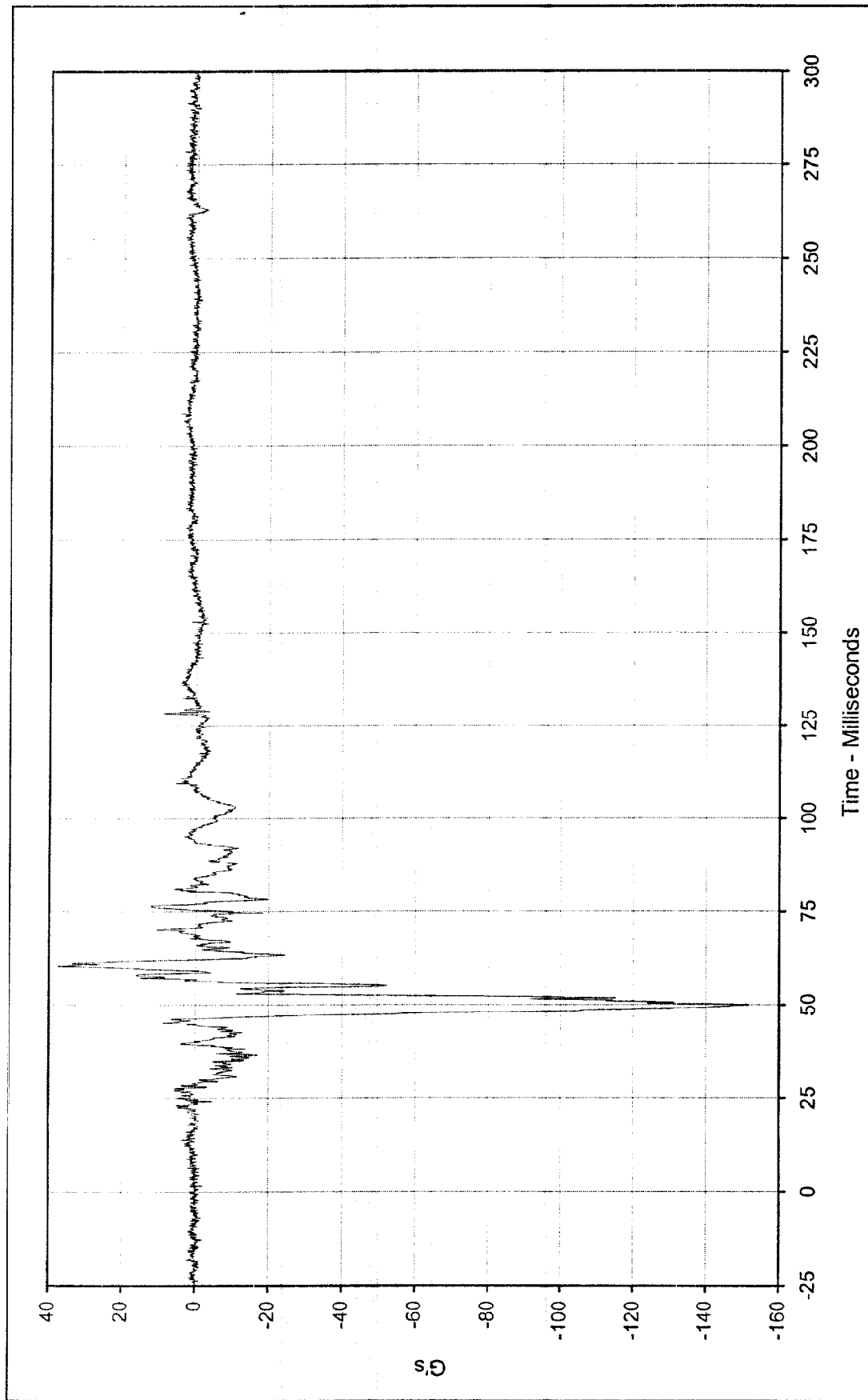
Curve Number: FIL-082





Curve Description:	Passenger Right Foot Aft Z	Test Program:	1999 NHTSA 35 mph NCAP No.: MX0103
Maximum Value:	9.8 at 72.7 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van
Minimum Value:	-66.2 at 50.3 Milliseconds		
SAE Filter Class:	1000		
Date of Test:	2/12/99		
Curve Number:	FIL-083		





Curve Description: Passenger Right Foot Fore Z Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 37.9 at 60.3 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

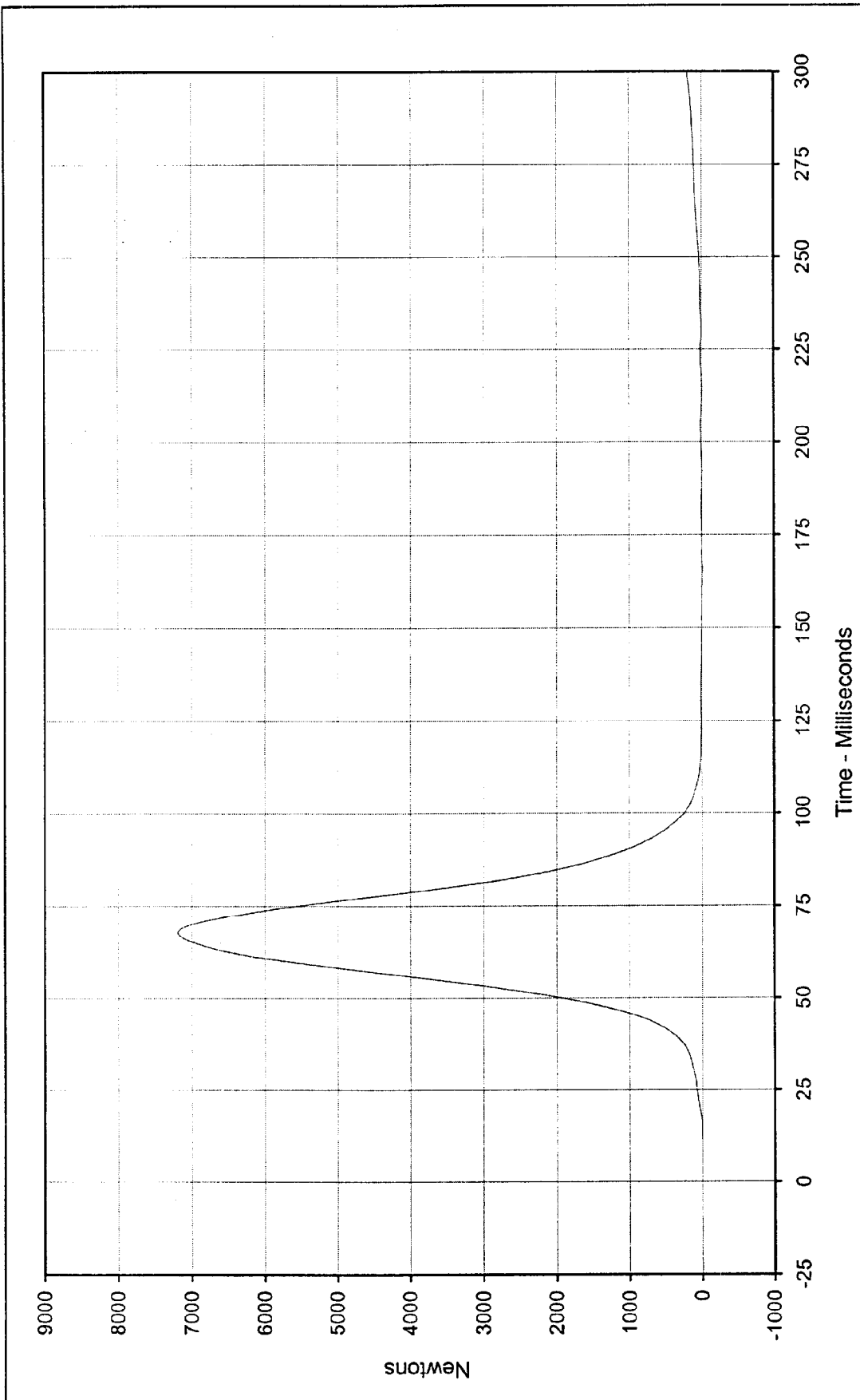
Minimum Value: -151.8 at 50.0 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/12/99

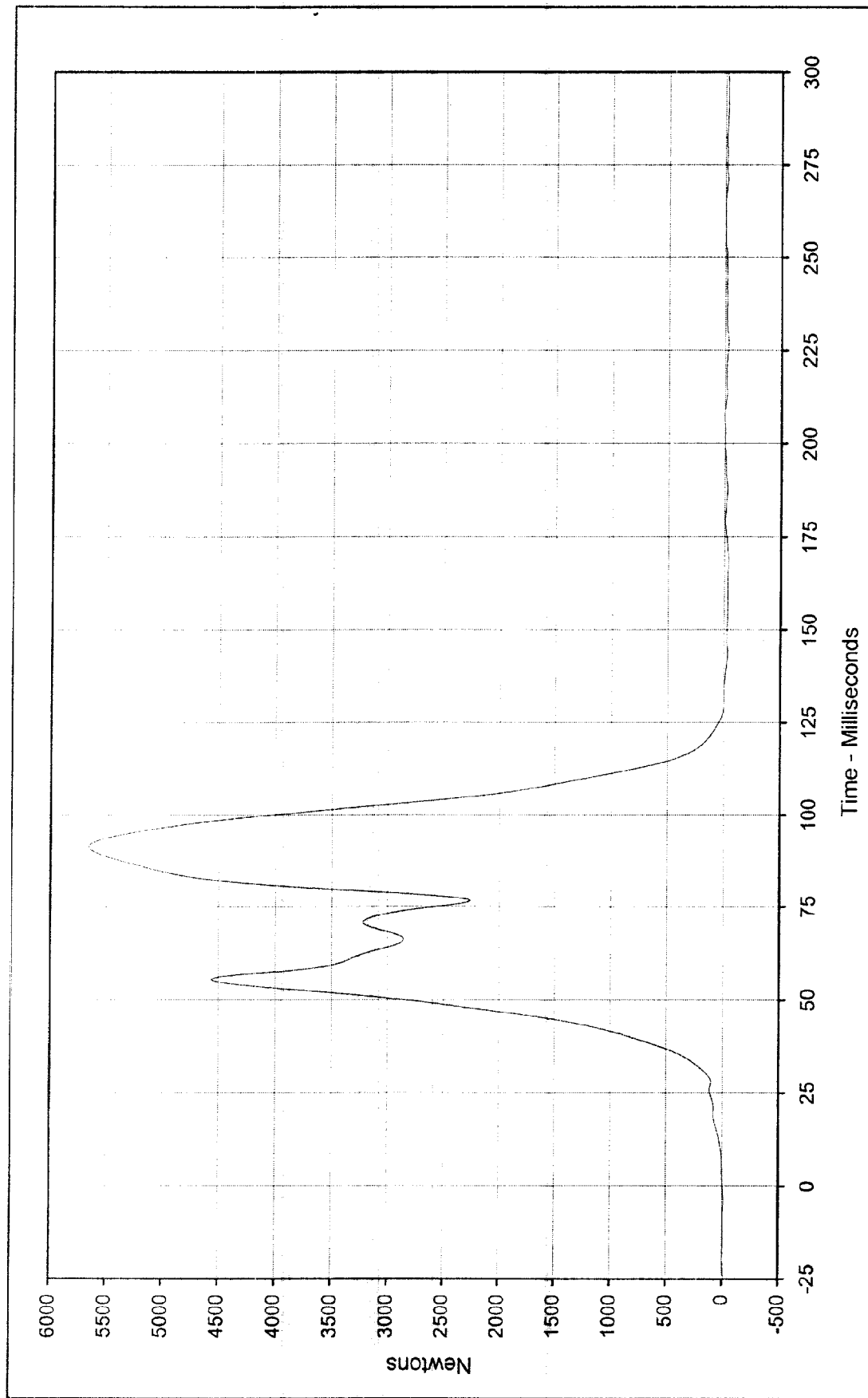
Curve Number: FIL-084





Curve Description:	Passenger Lap Belt Force	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	7189.2 at 67.7 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-10.6 at 213.8 Milliseconds			
SAE Filter Class:	60			
Date of Test:	2/12/99			
Curve Number:	FIL-085			



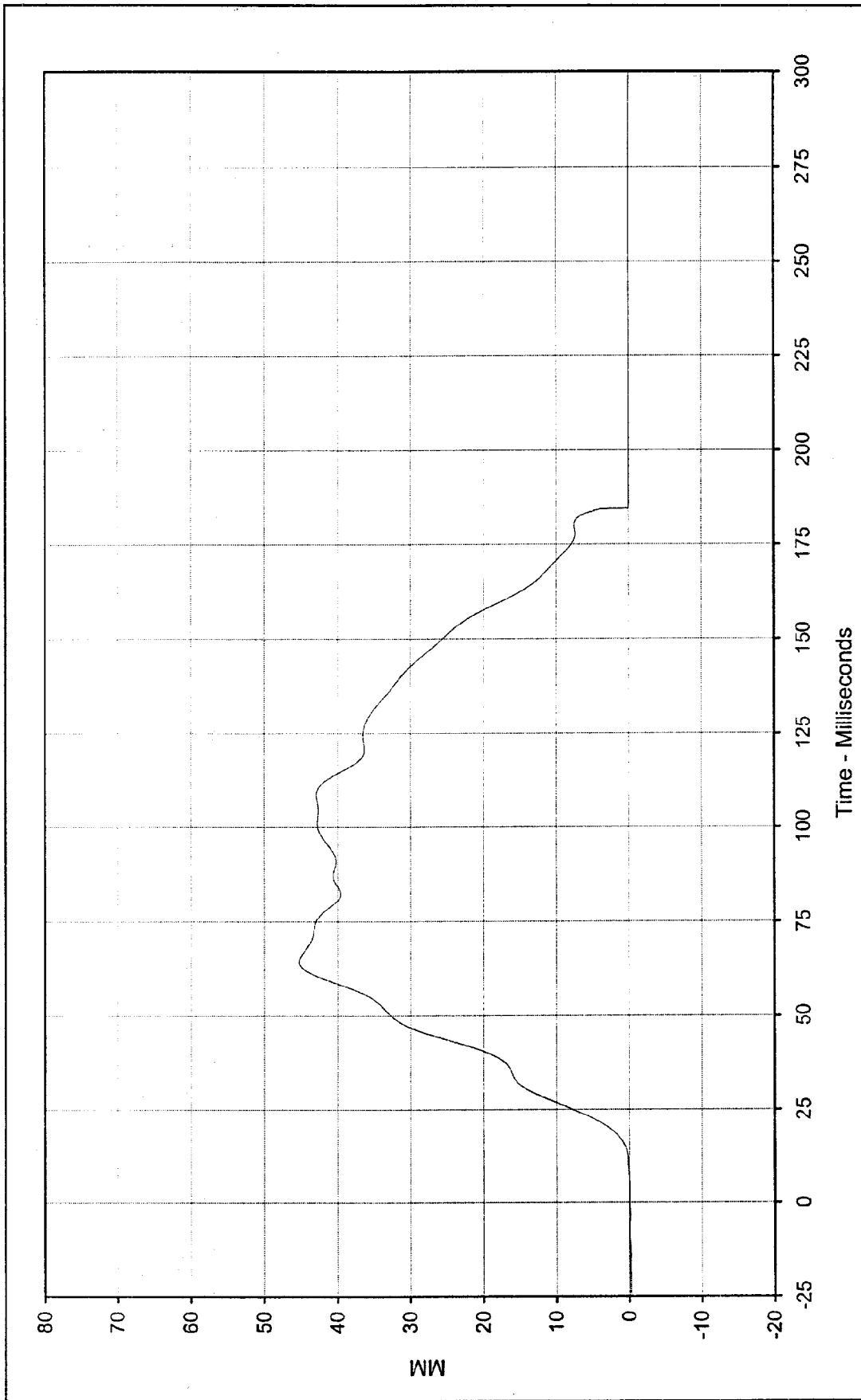


Curve Description:		Passenger Shoulder Belt Force		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	5658.8	at	91.3	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-35.7	at	168.4			
SAE Filter Class:	60					
Date of Test:	2/12/99					
Curve Number:	FIL-086					



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Curve Description: Passenger Shoulder Belt Pullout * Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 45.3 at 64.3 Milliseconds

Minimum Value: -0.1 at 0.0 Milliseconds

SAE Filter Class: 60

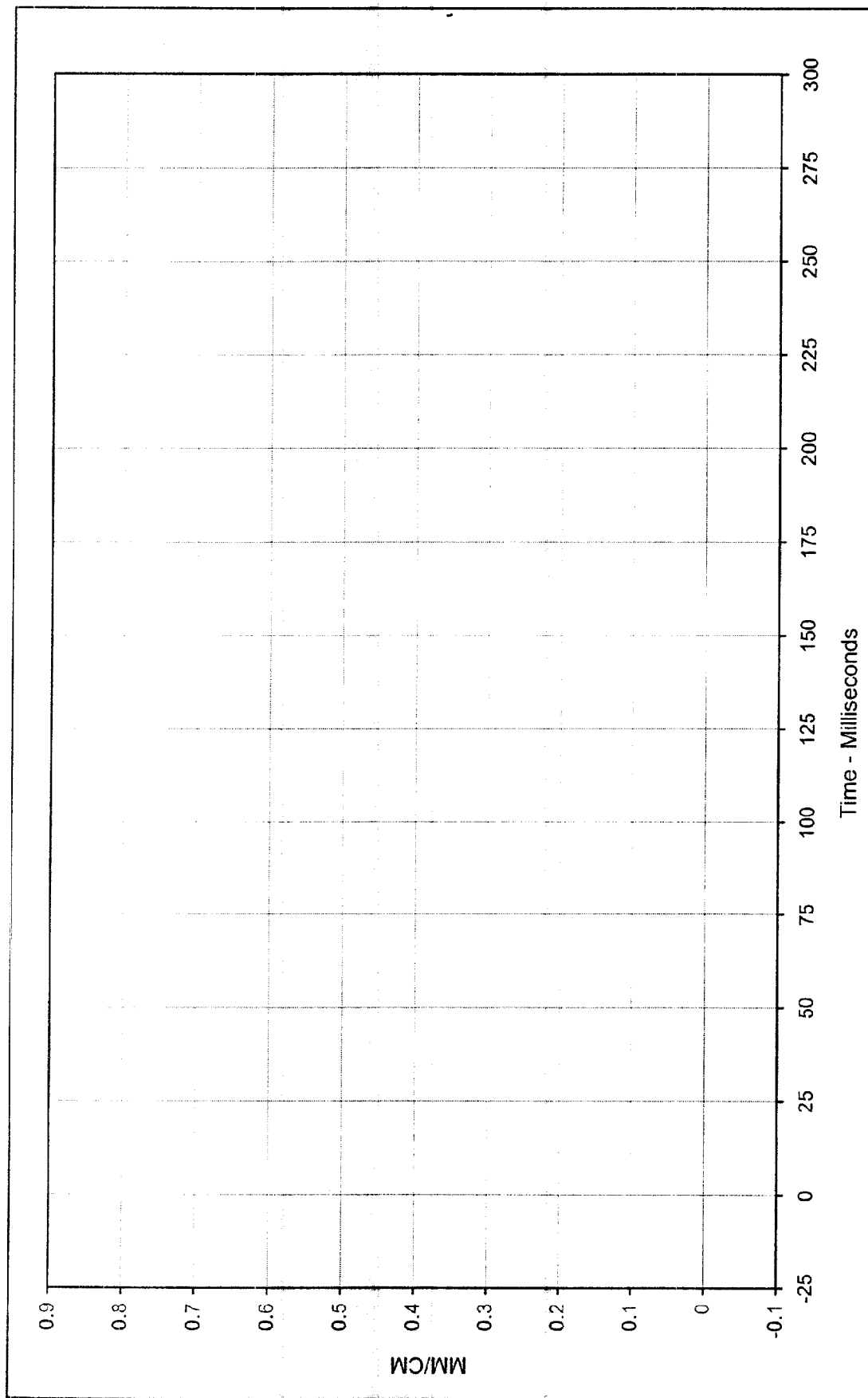
Date of Test: 2/12/99

Curve Number: FIL-087

Test Vehicle: 1999 Chevrolet Astro LS Van



* Channel Failed at 184.6 Msec.



Curve Description: Passenger Shoulder Belt Elongation * Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 0.00 at 0.0 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

Minimum Value: 0.00 at 0.0 Milliseconds

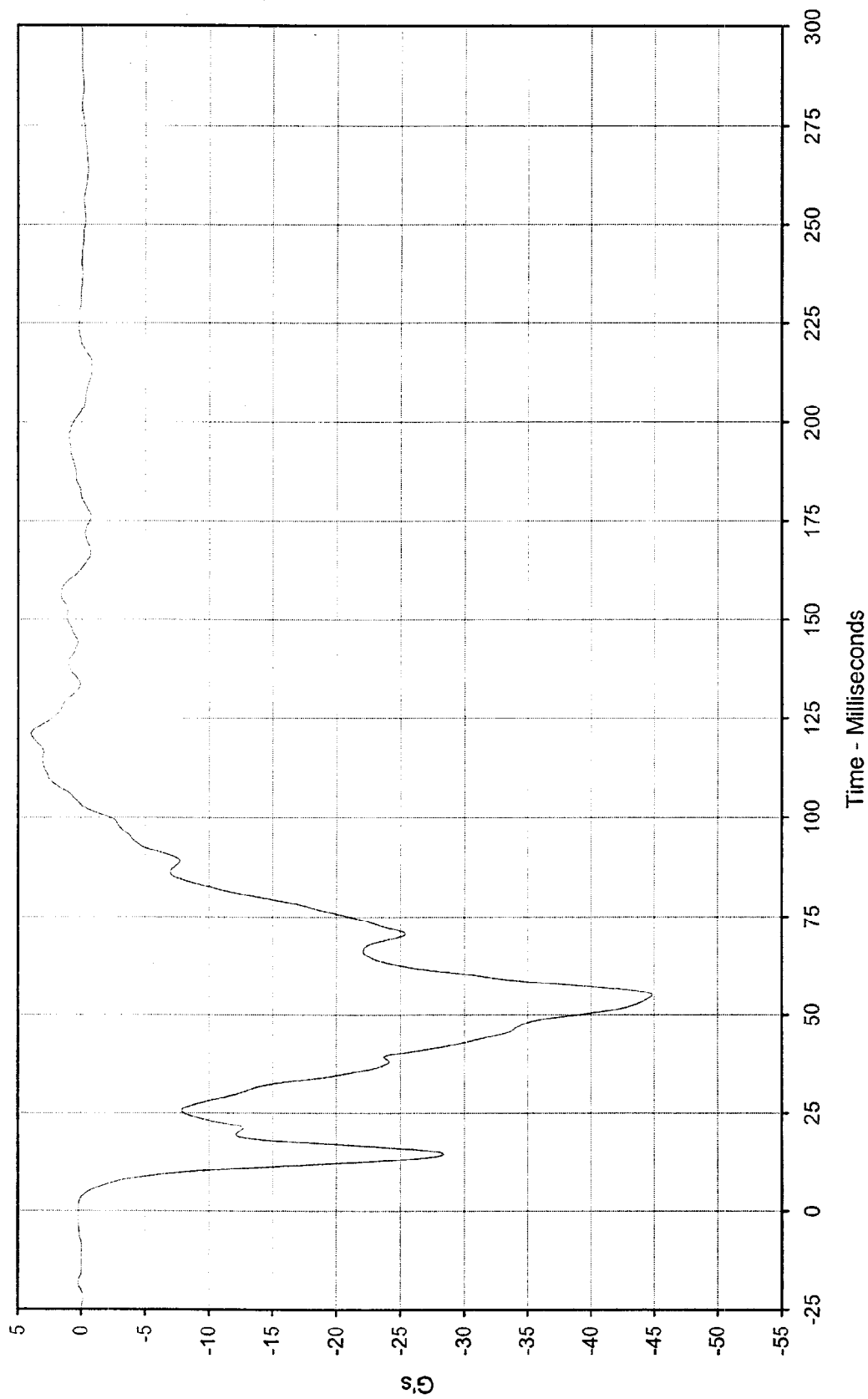
SAE Filter Class: 60

Date of Test: 2/12/99

Curve Number: FIL-088



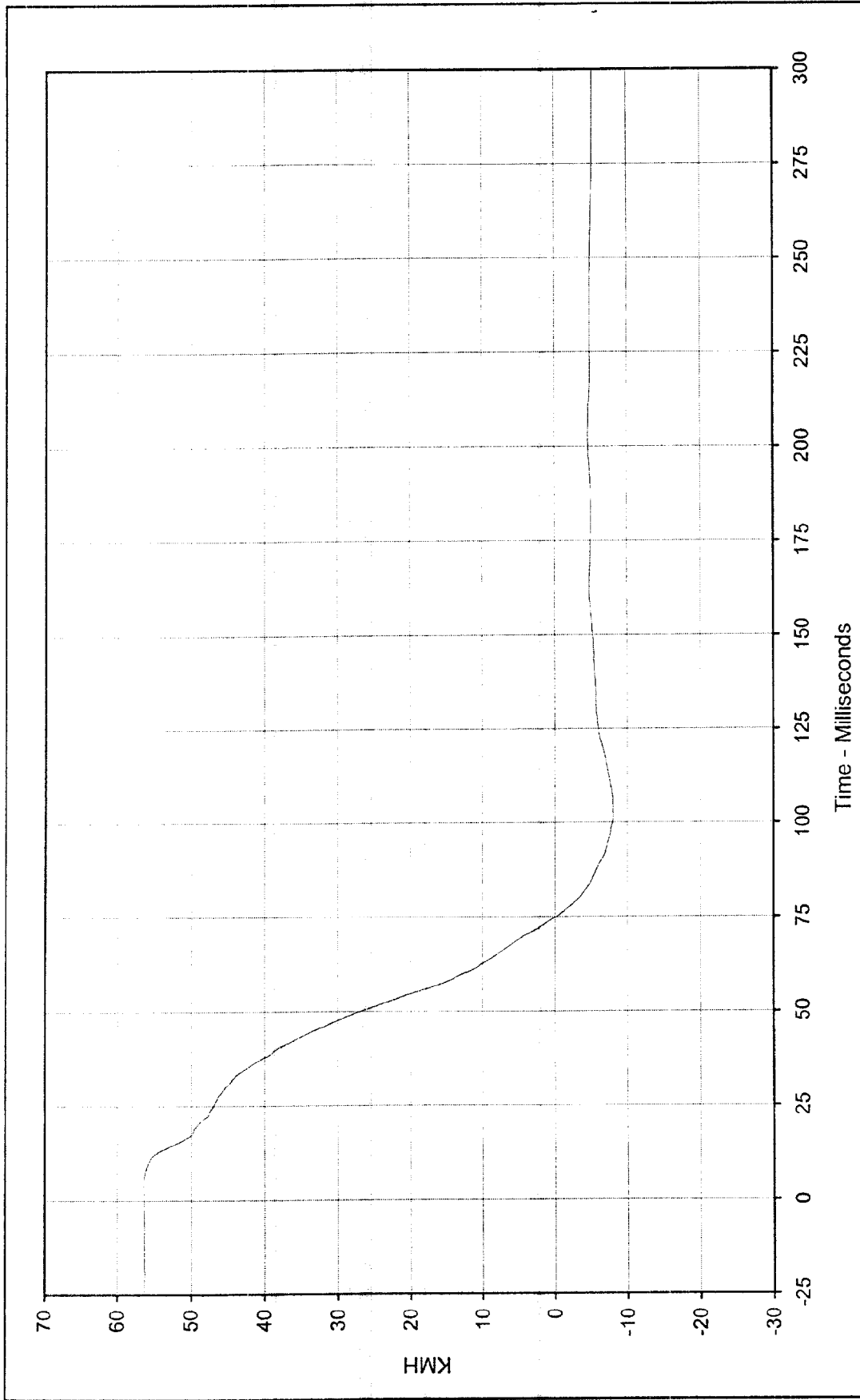
*Not used



Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Program:
 Test Vehicle: 1999 Chevrolet Astro LS Van

Vehicle Left Rear Primary
 Maximum Value: 4.0 at 121.1 Milliseconds
 Minimum Value: -44.8 at 55.1 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/12/99
 Curve Number: FIL-089





Curve Description: Vehicle Left Rear Primary Velocity Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 56.4 at 3.0 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

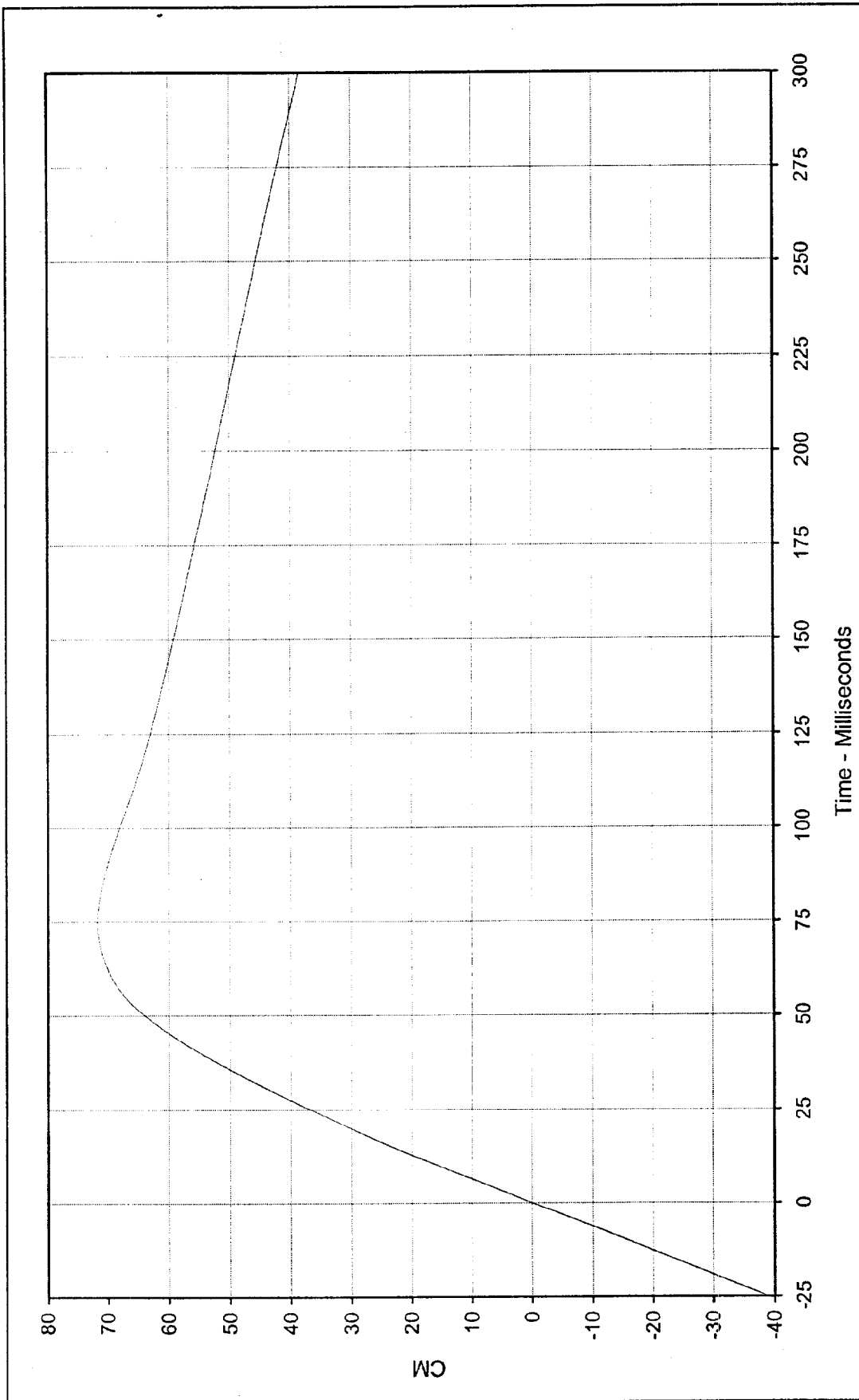
Minimum Value: -8.0 at 101.6 Milliseconds

SAE Filter Class: 180

Date of Test: 2/12/99

Curve Number: IN1-089





Curve Description: Vehicle Left Rear Primary Displ.

Maximum Value: 71.8 at 74.7 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

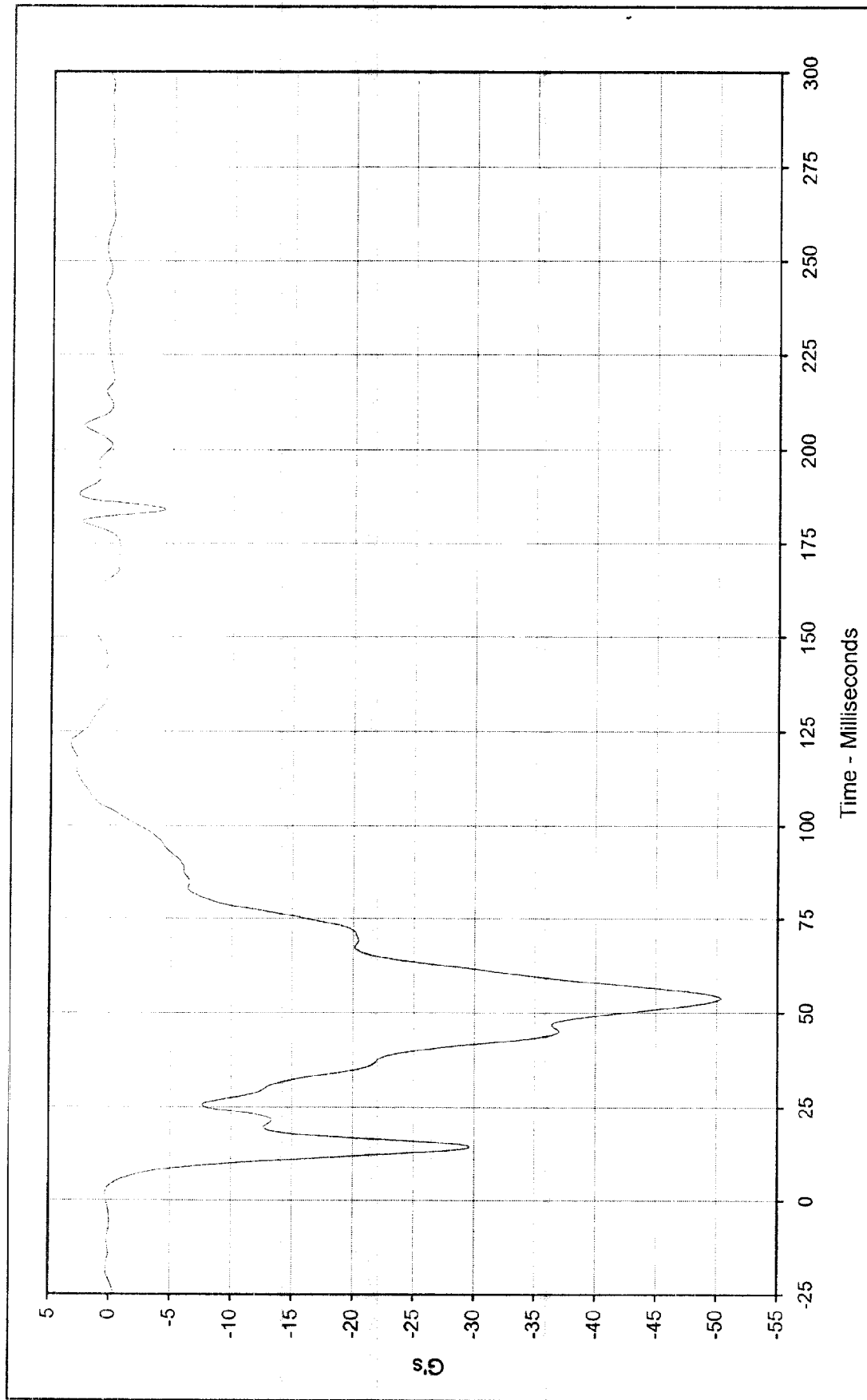
Date of Test: 2/12/99

Curve Number: IN2-089

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van



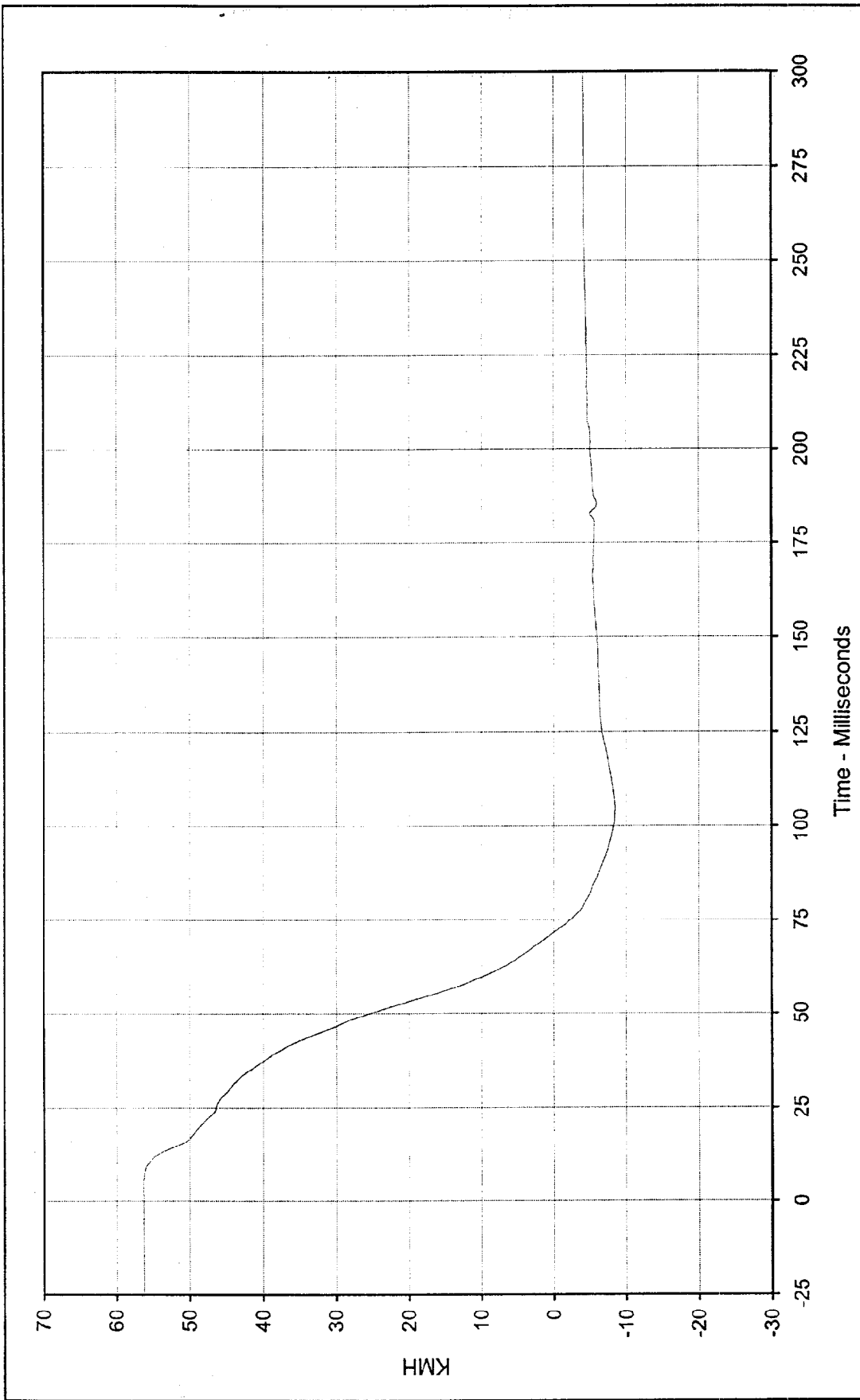


Curve Description:	Vehicle Right Rear Primary		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	3.4	at 121.9	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-50.4	at 53.9			
SAE Filter Class:	60				
Date of Test:	2/12/99				
Curve Number:	FIL-090				



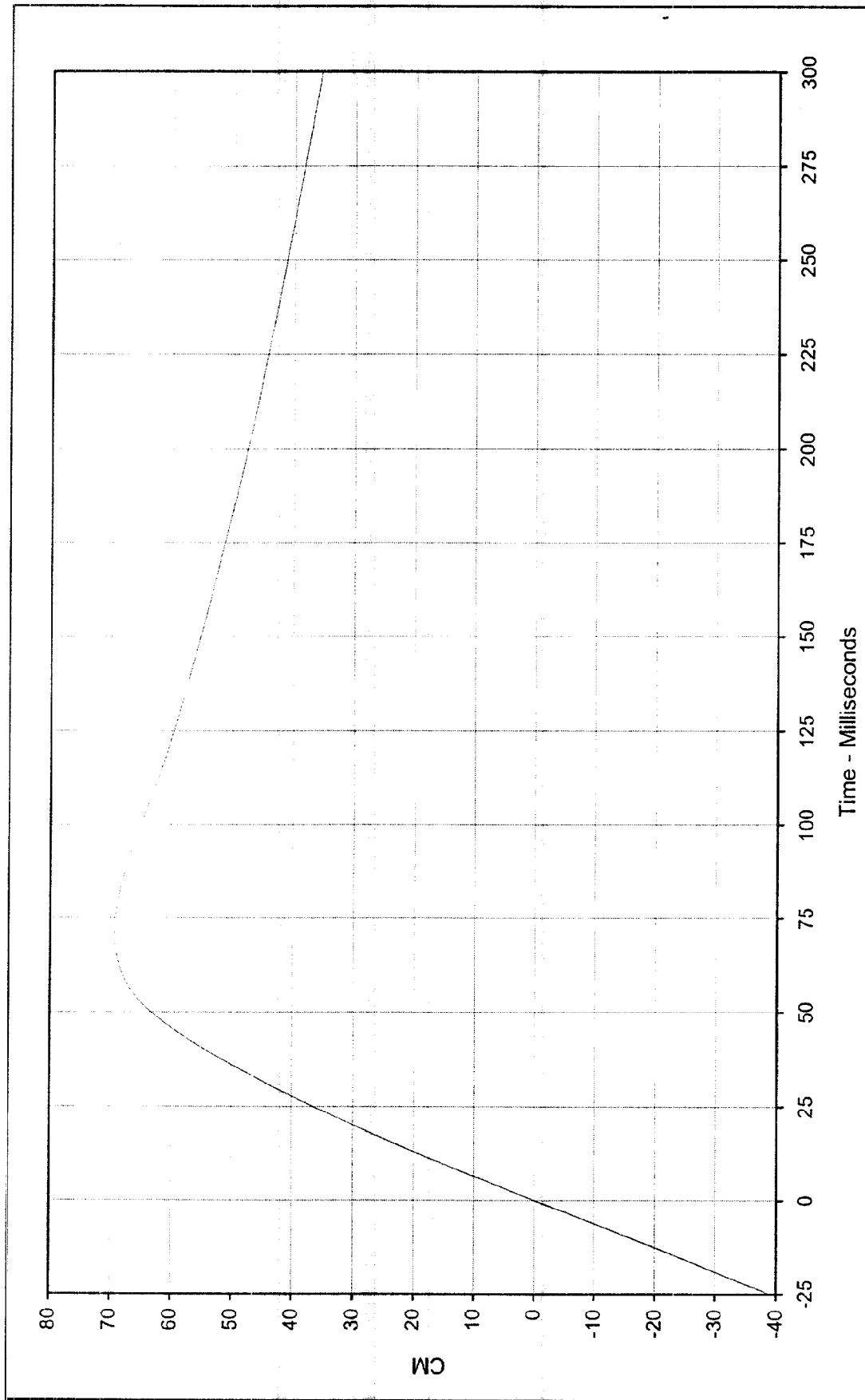
KARCO
Engineering





Curve Description: Vehicle Right Rear Primary Velocity		Test Program: 1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	56.4 at 4.2 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van
Minimum Value:	-8.5 at 104.6 Milliseconds		
SAE Filter Class:	180		
Date of Test:	2/12/99		
Curve Number:	IN1-090		





B-128

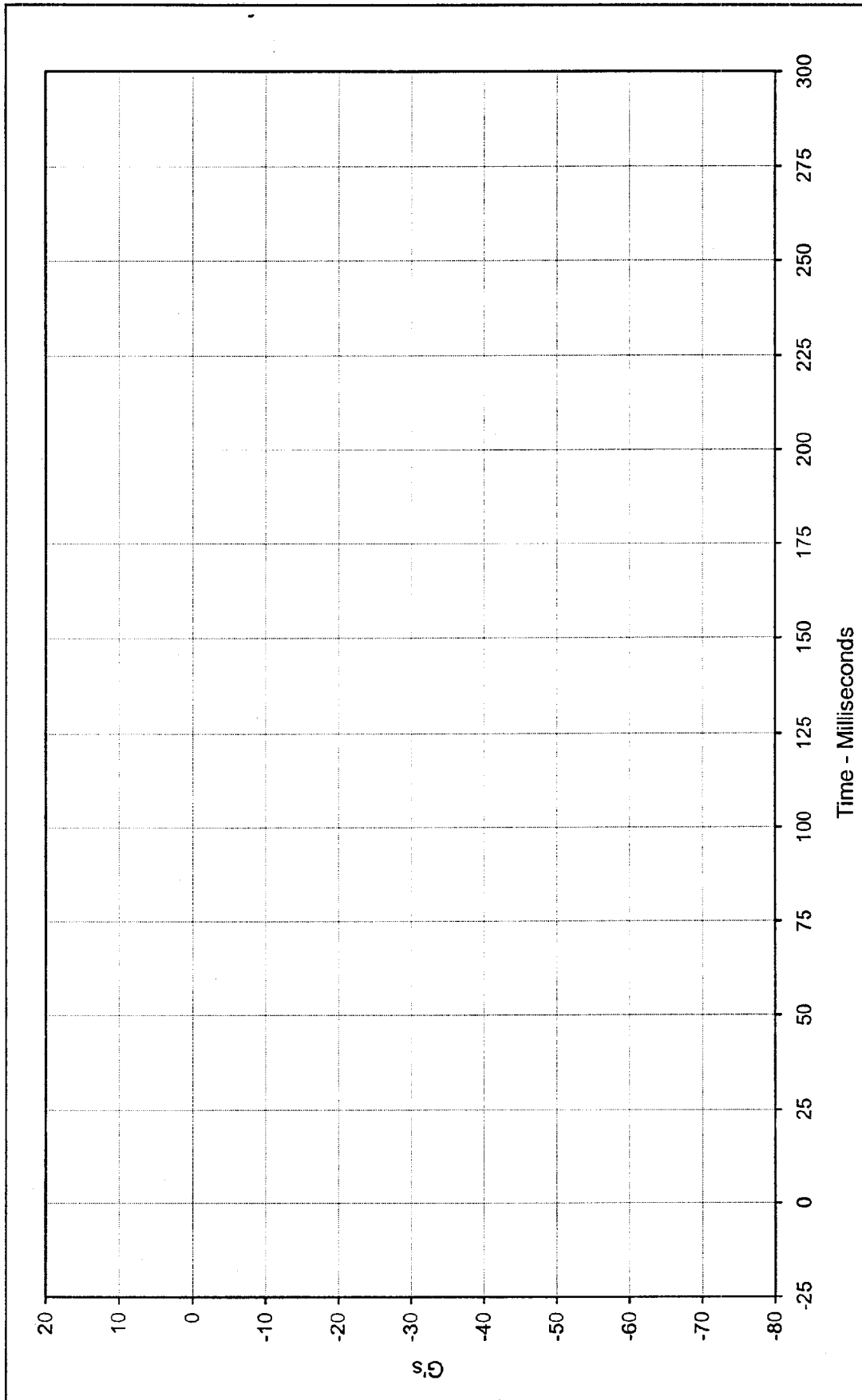
Curve Description: Vehicle Right Rear Primary Displ.
 Maximum Value: 69.4 at 71.5 Milliseconds
 Minimum Value: 0.0 at 0.0 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/12/99
 Curve Number: IN2-090

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van



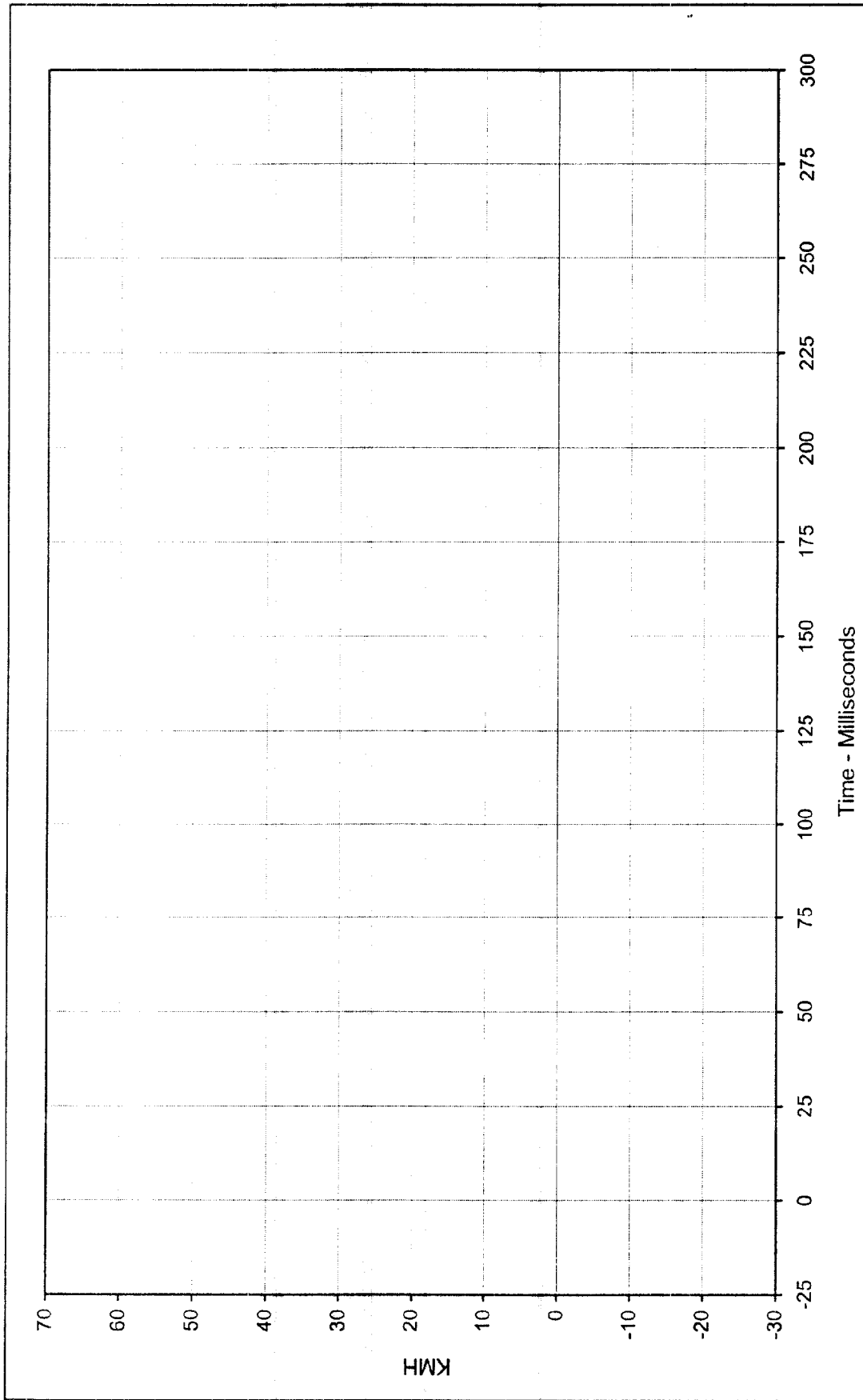
KAR99001-14



Curve Description: _____ Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Maximum Value: 0.0 at 0.0 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van
 Minimum Value: 0.0 at 0.0 Milliseconds



SAE Filter Class: 60
 Date of Test: 2/12/99
 Curve Number: FIL-091
 * Not Used



Curve Description: _____ Vehicle Engine Top Velocity _____ * Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 0.0 at 0.0 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

Minimum Value: 0.0 at 0.0 Milliseconds

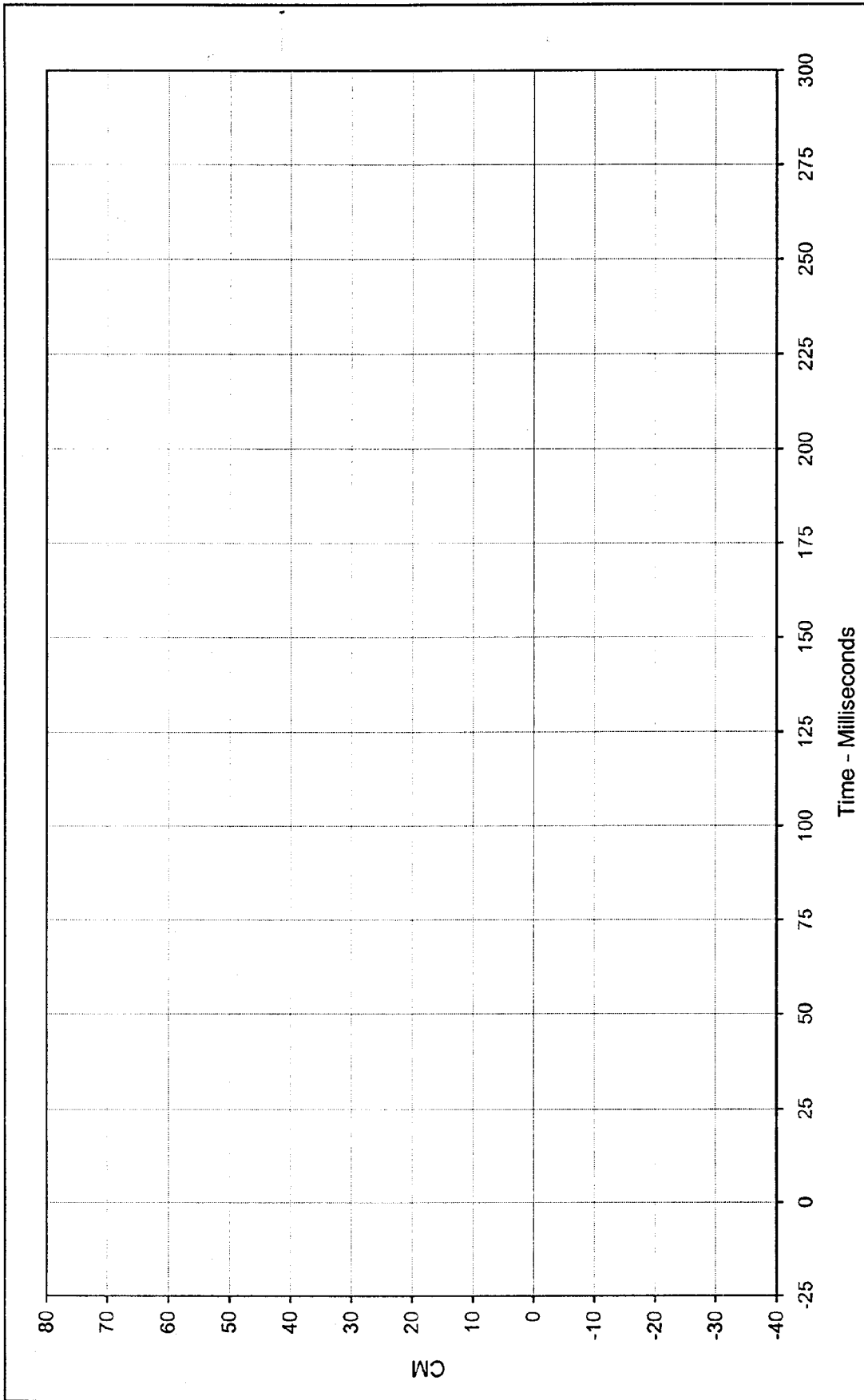
SAE Filter Class: 180

Date of Test: 2/12/99

Curve Number: IN1-091



* Not Used

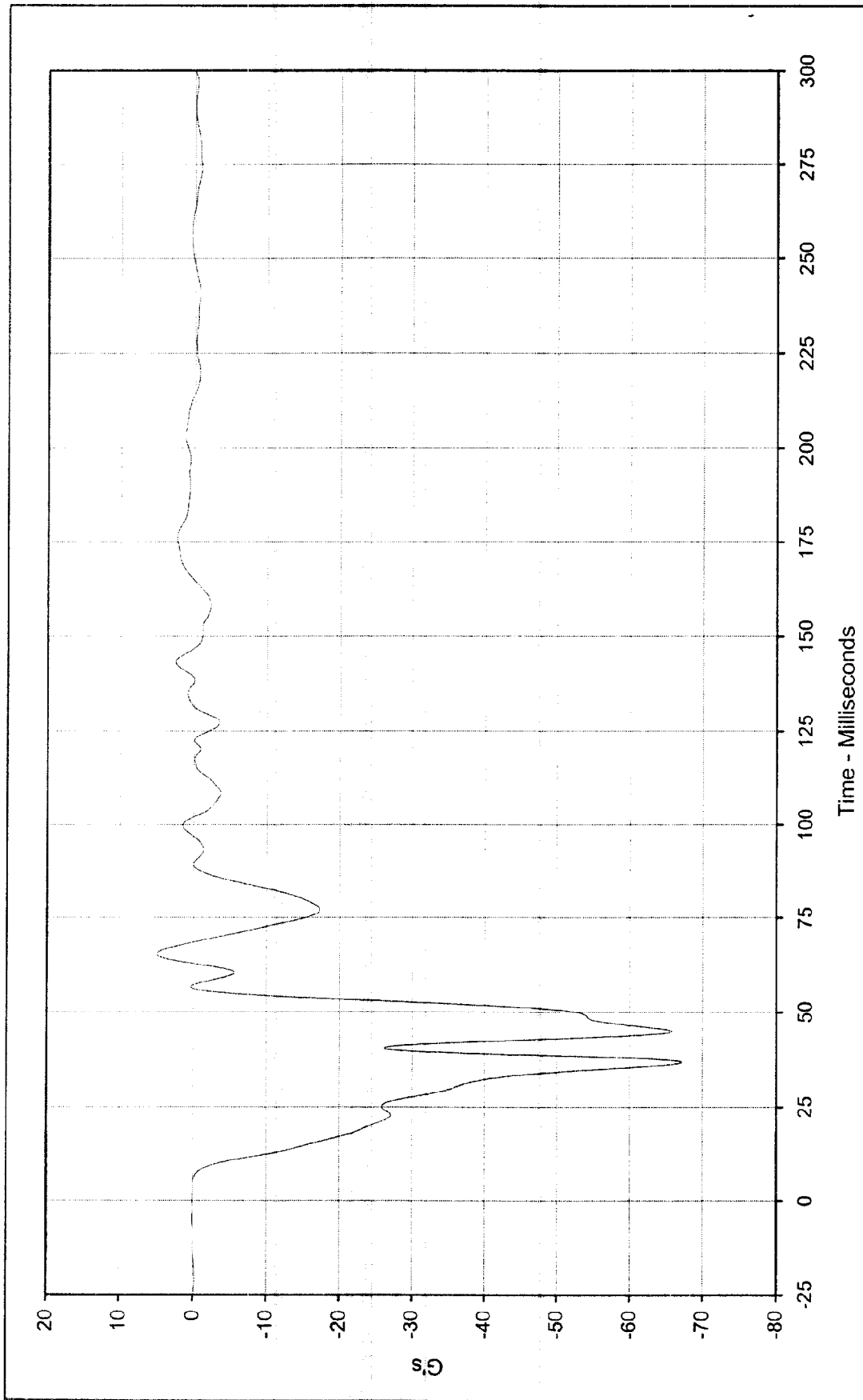


Curve Description: _____ Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Maximum Value: 0.0 at 0.0 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van
 Minimum Value: 0.0 at 0.0 Milliseconds



SAE Filter Class: 180
 Date of Test: 2/12/99
 Curve Number: IN2-091

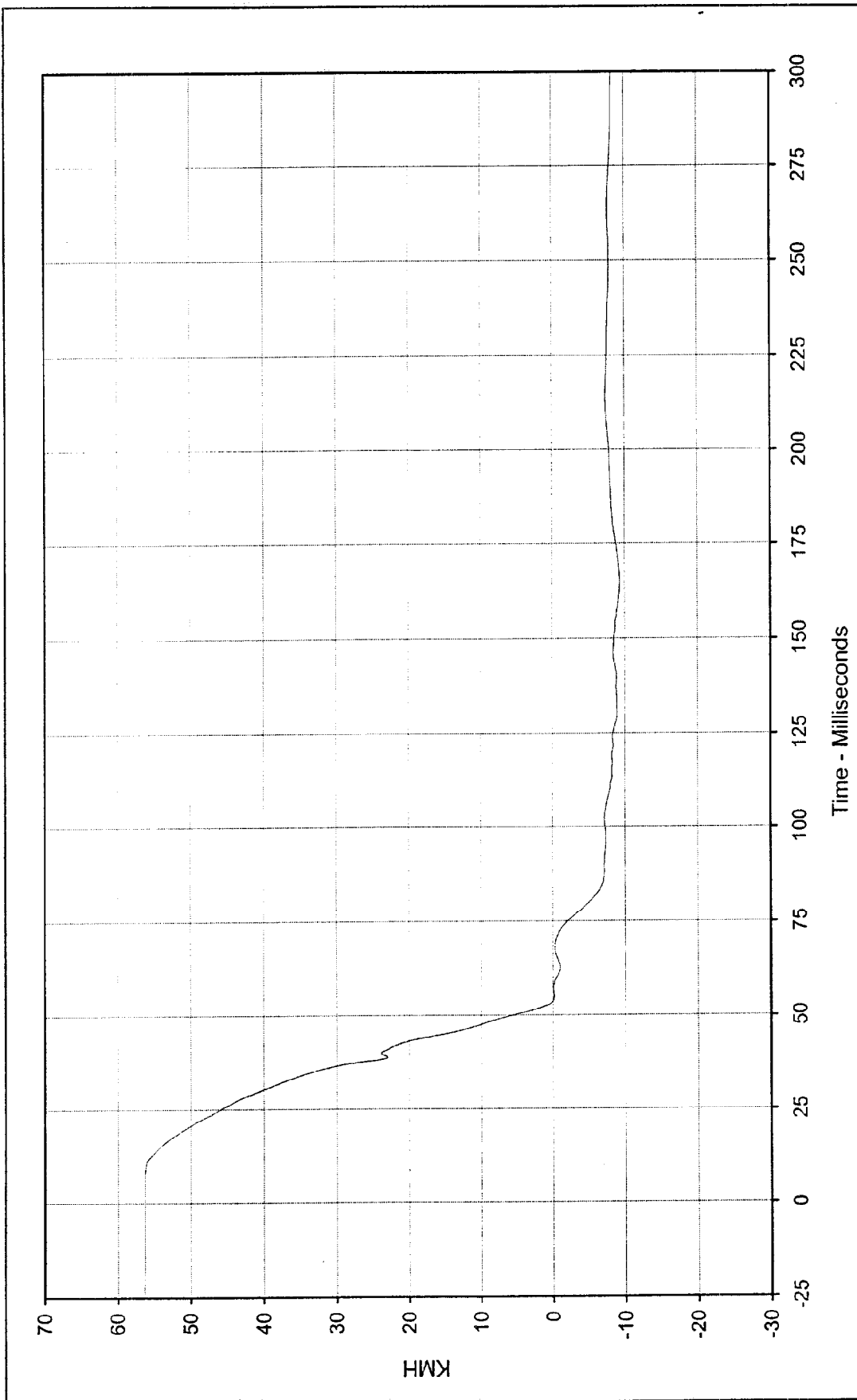
* Not Used



Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Program: 1999 Chevrolet Astro LS Van
 Test Vehicle:

Vehicle Engine Bottom
 Maximum Value: 5.0 at 65.3 Milliseconds
 Minimum Value: -67.1 at 36.7 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/12/99
 Curve Number: FIL-092





Curve Description: Vehicle Engine Bottom Velocity Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 56.3 at 2.0 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

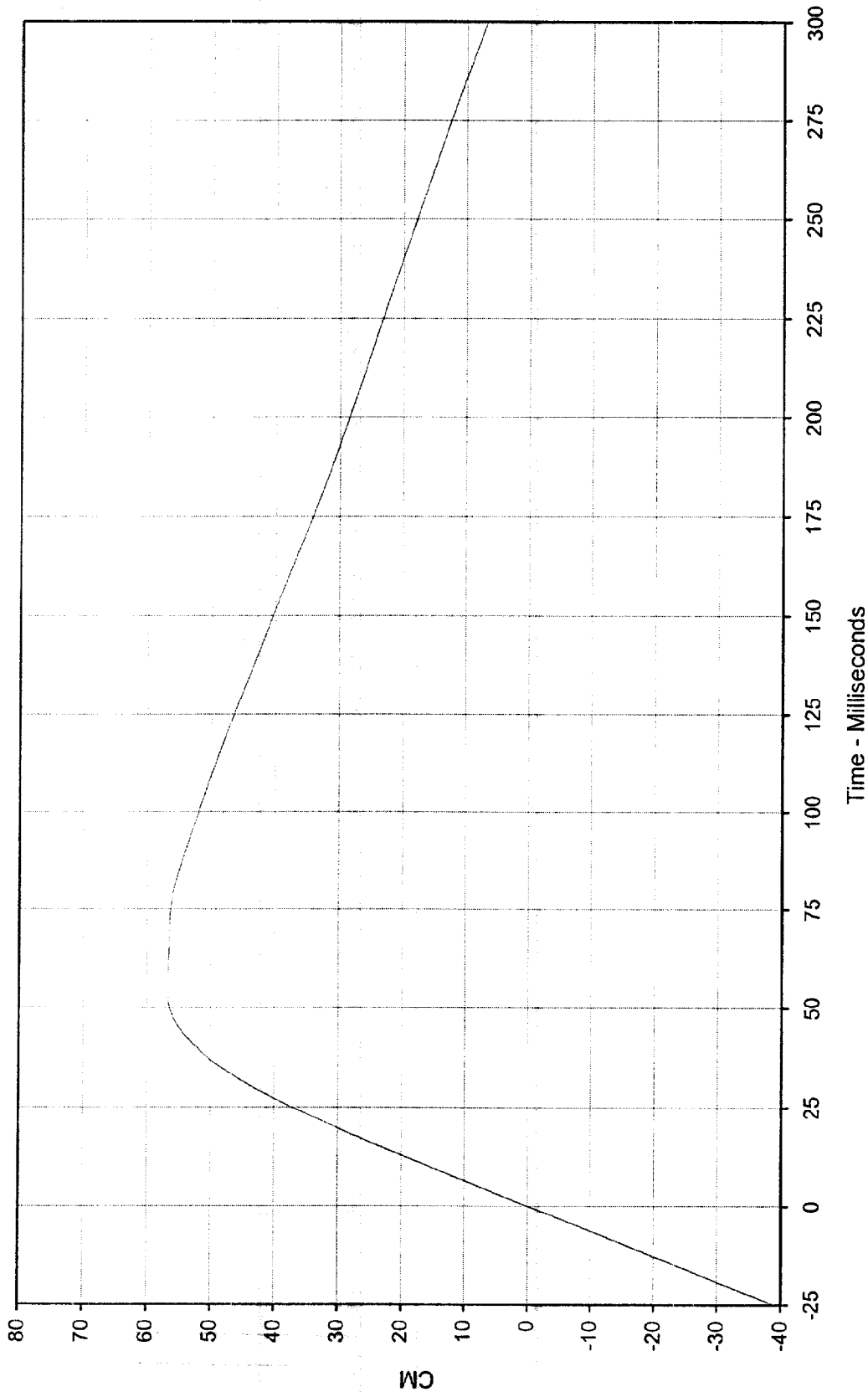
Minimum Value: -9.3 at 165.0 Milliseconds

SAE Filter Class: 180

Date of Test: 2/12/99

Curve Number: IN1-092





Curve Description: Vehicle Engine Bottom Displ. Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 56.7 at 53.7 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

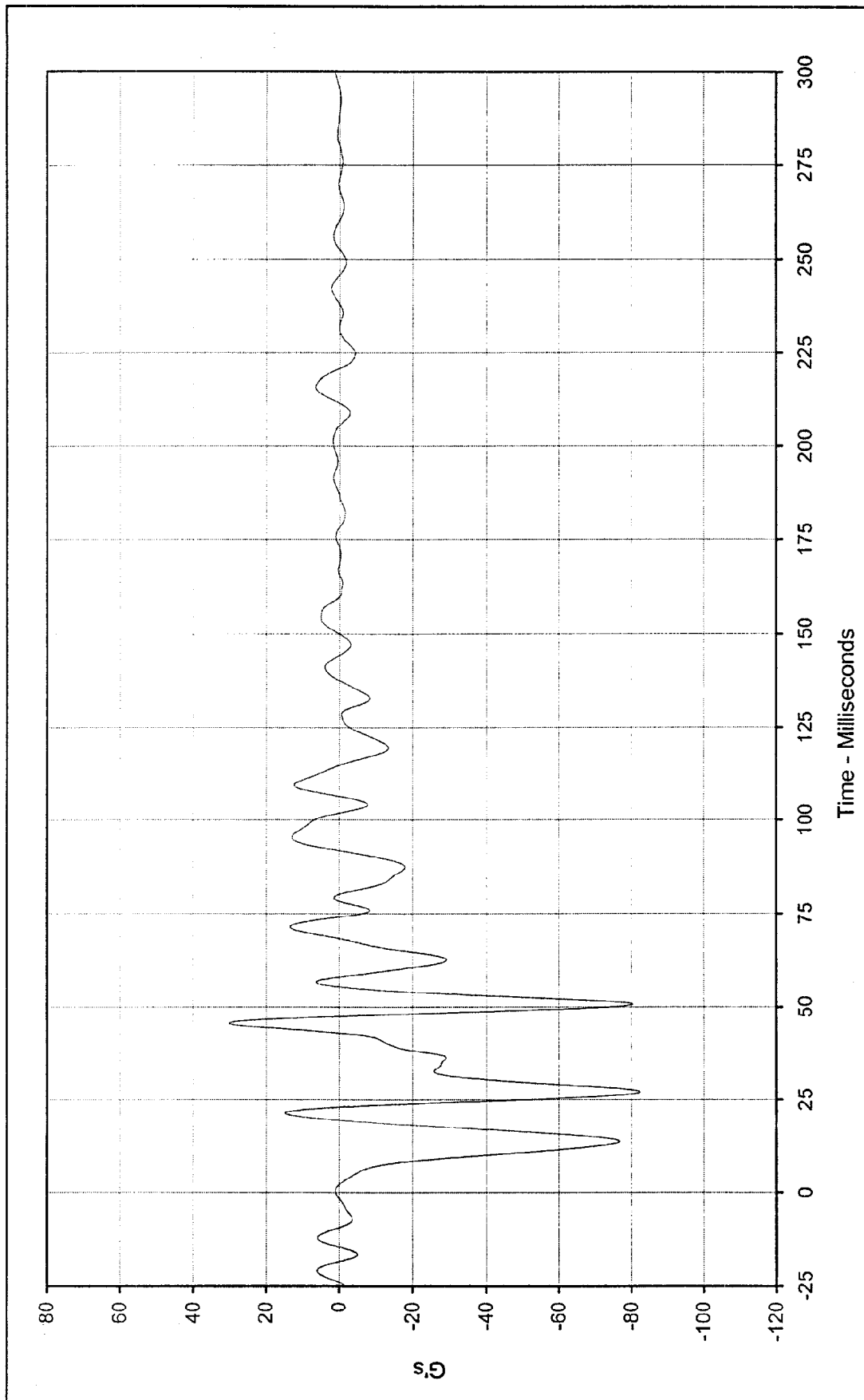
Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

Date of Test: 2/12/99

Curve Number: IN2-092





Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Program:

Test Vehicle: 1999 Chevrolet Astro LS Van

Vehicle Left Brake Caliper *
Maximum Value: 30.2 at 45.5 Milliseconds

Minimum Value: -82.5 at 27.1 Milliseconds

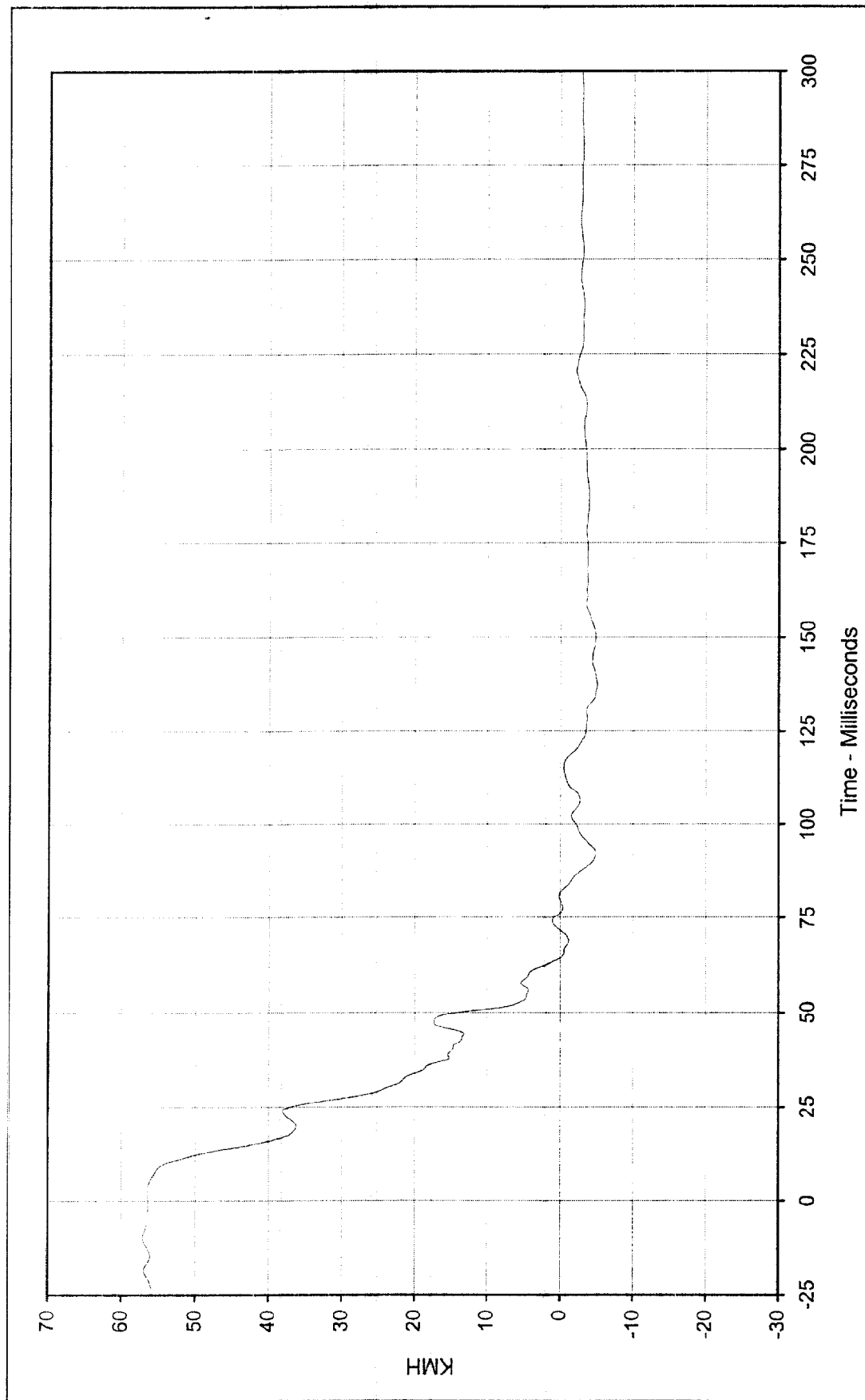
SAE Filter Class: 60

Date of Test: 2/12/99

Curve Number: FIL-093



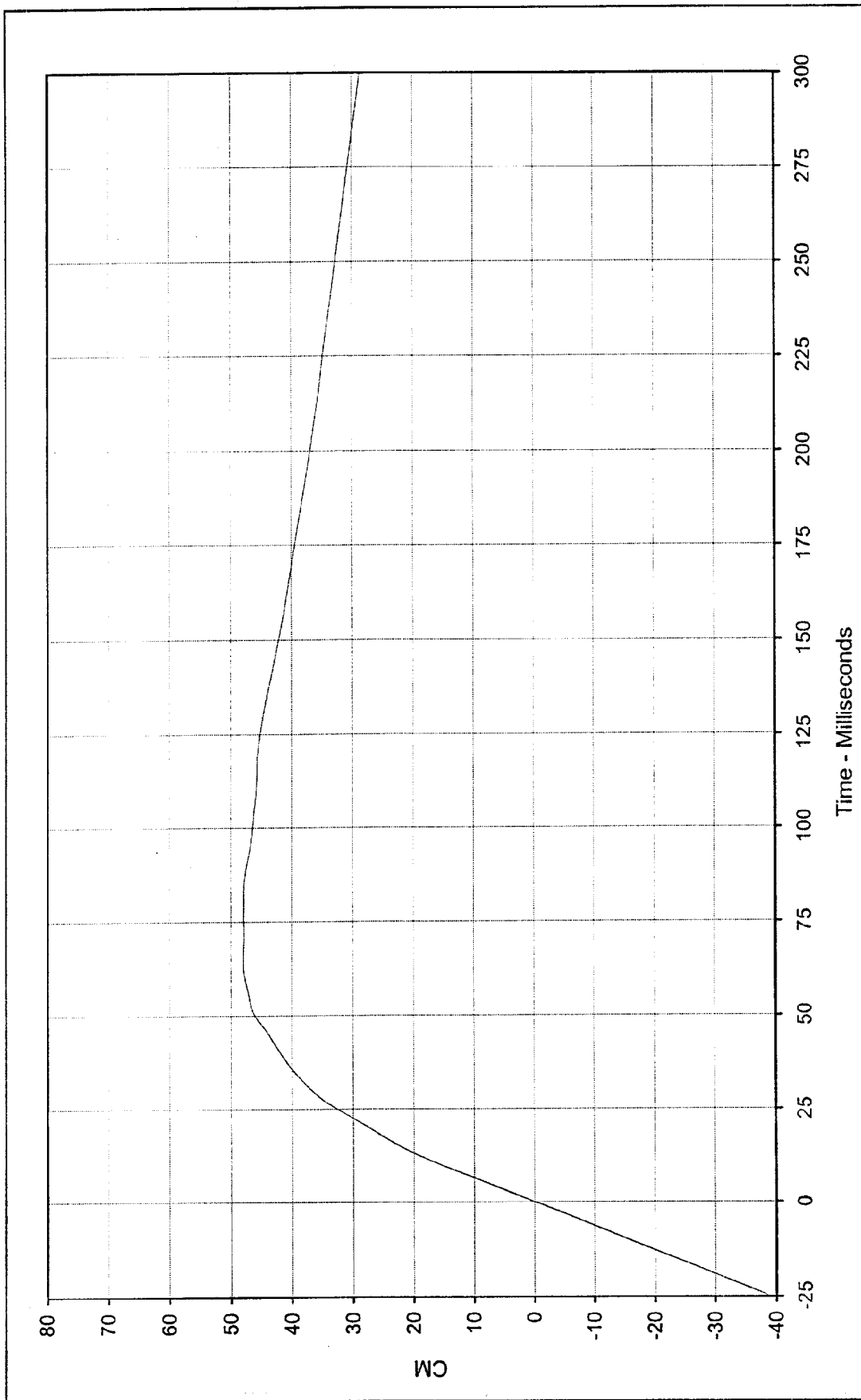
* Channel failed at 73.6 msec.



Curve Description:	Vehicle Left Brake Caliper Velocity	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	56.5 at 2.1 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-5.0 at 137.4 Milliseconds			



SAE Filter Class:	180
Date of Test:	2/12/99
Curve Number:	IN1-093



Curve Description: Vehicle Left Brake Caliper Displ. Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 48.0 at 64.3 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

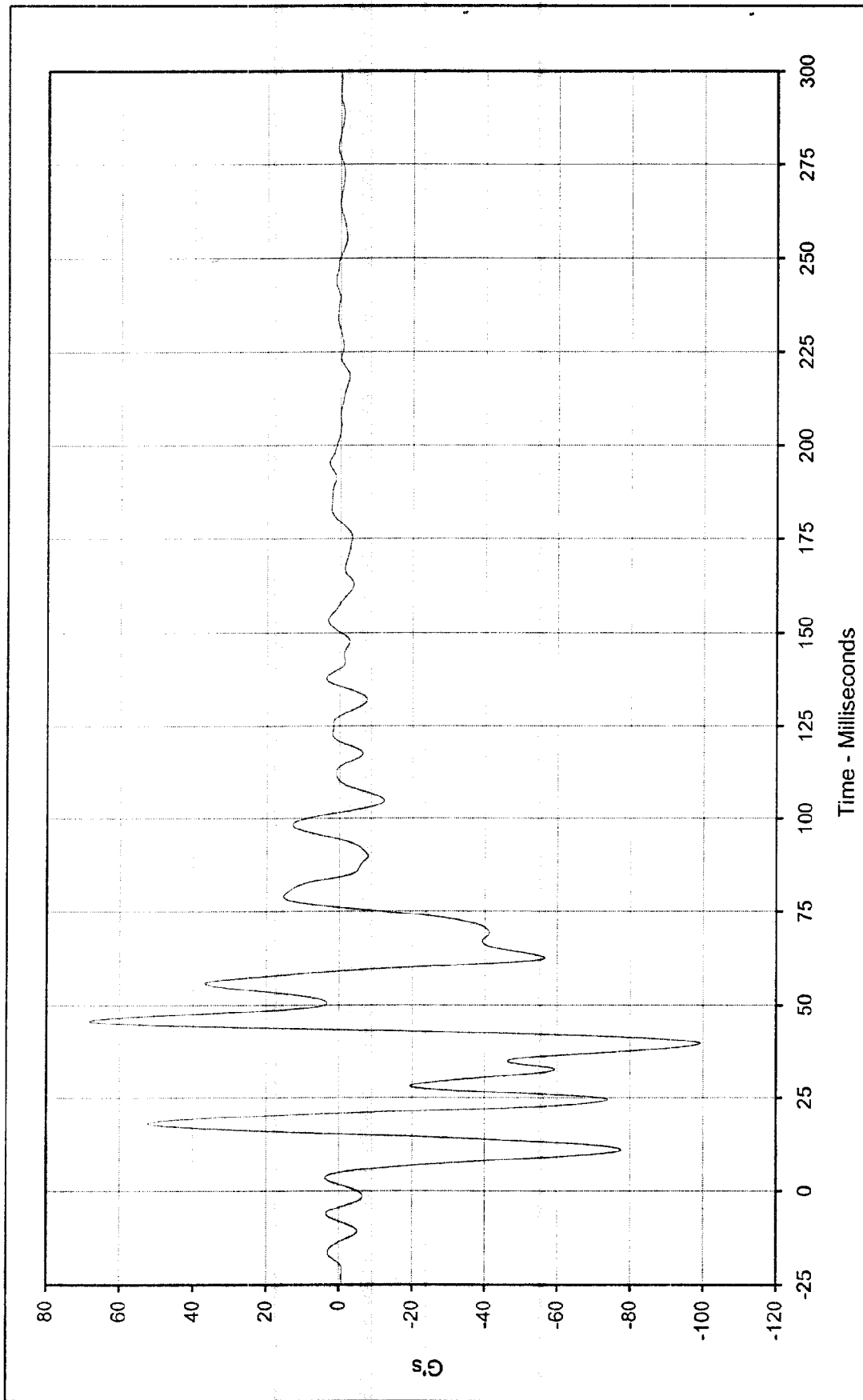
Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

Date of Test: 2/12/99

Curve Number: IN2-093





Curve Description: Vehicle Right Brake Caliper

Maximum Value: 68.3 at 45.5 Milliseconds

Minimum Value: -99.2 at 39.6 Milliseconds

SAE Filter Class: 60

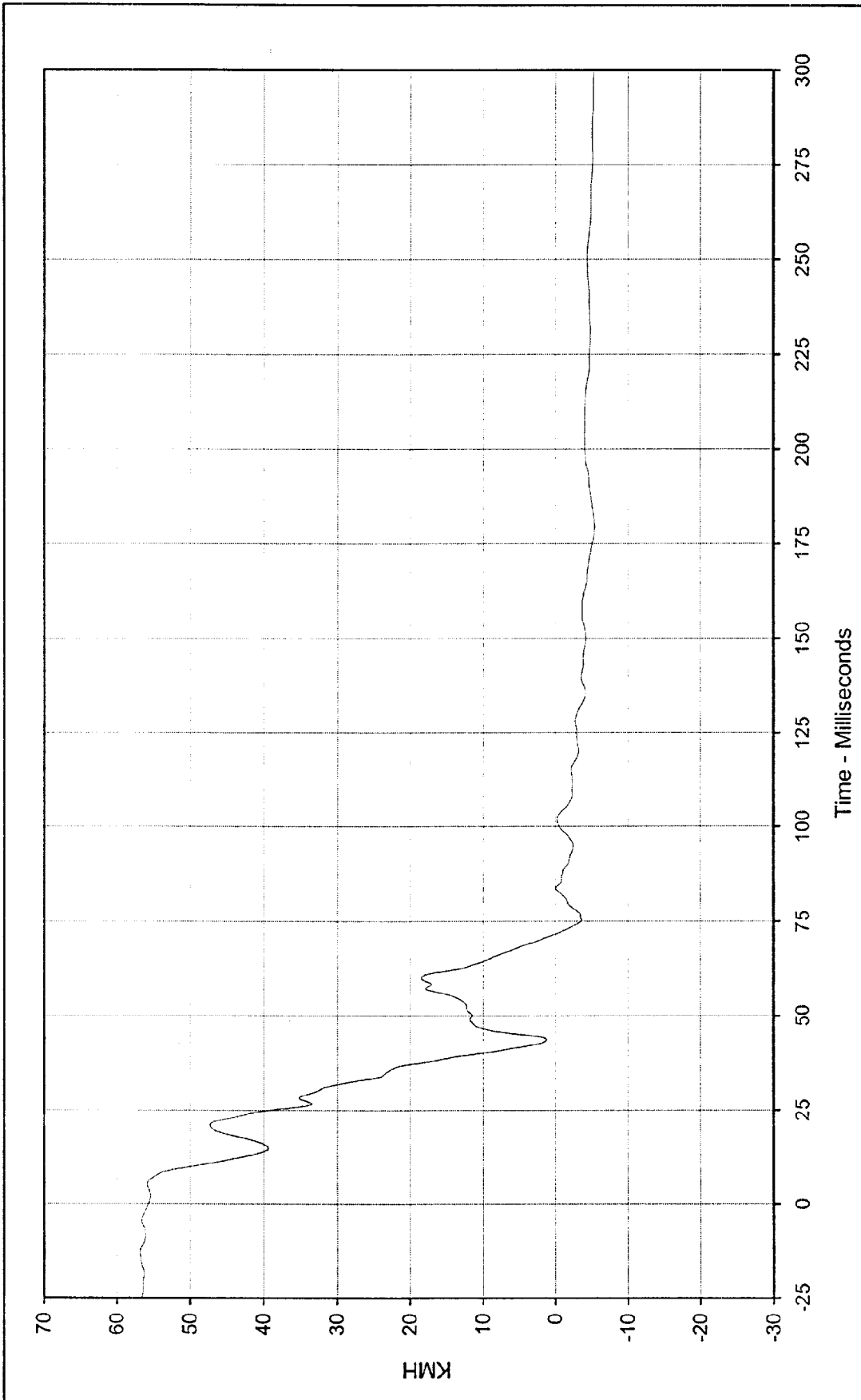
Date of Test: 2/12/99

Curve Number: FIL-094

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Vehicle Right Brake Caliper Velocity

Maximum Value: 55.9 at 5.2 Milliseconds

Minimum Value: -5.5 at 179.7 Milliseconds

SAE Filter Class: 180

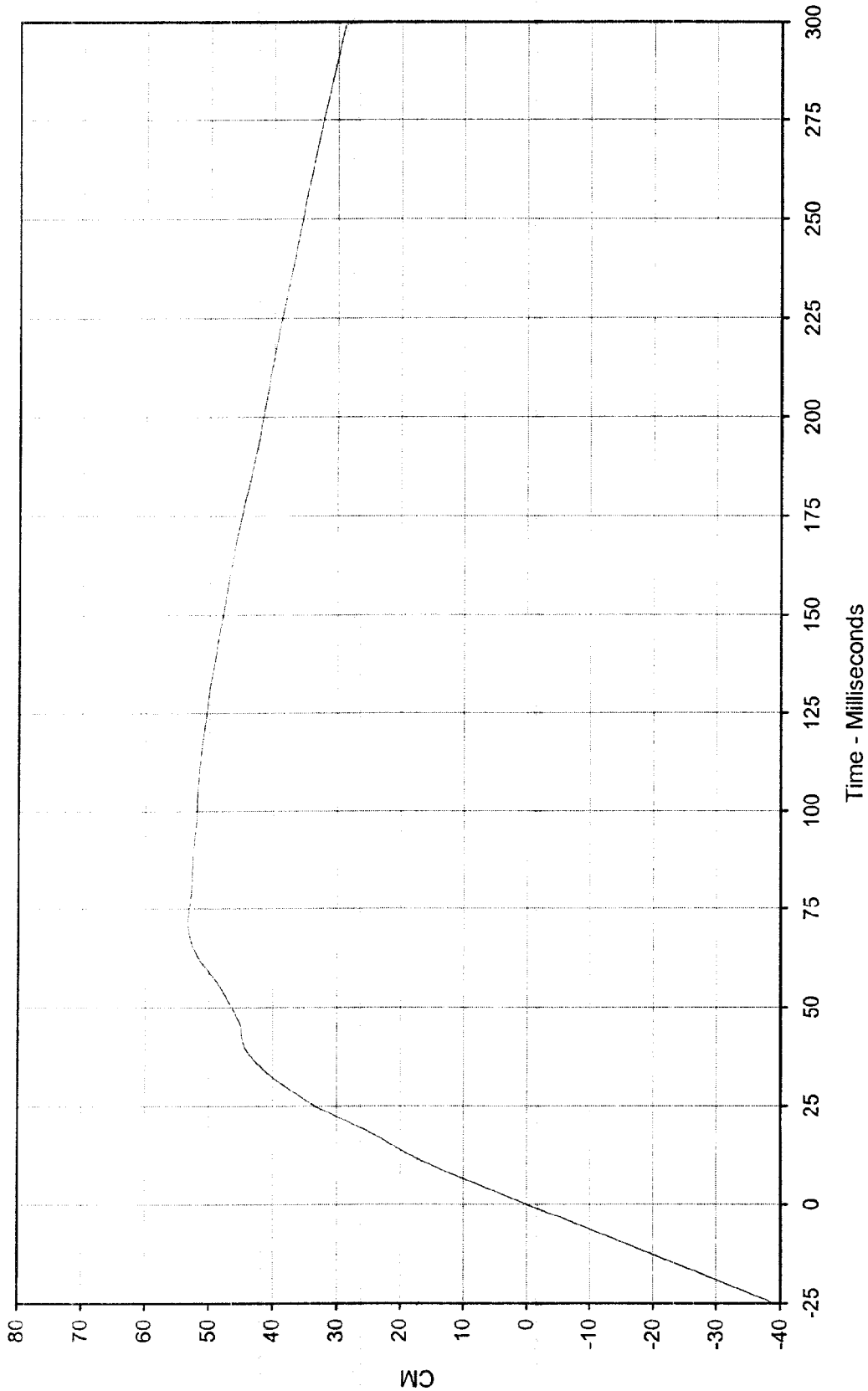
Date of Test: 2/12/99

Curve Number: IN1-094

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

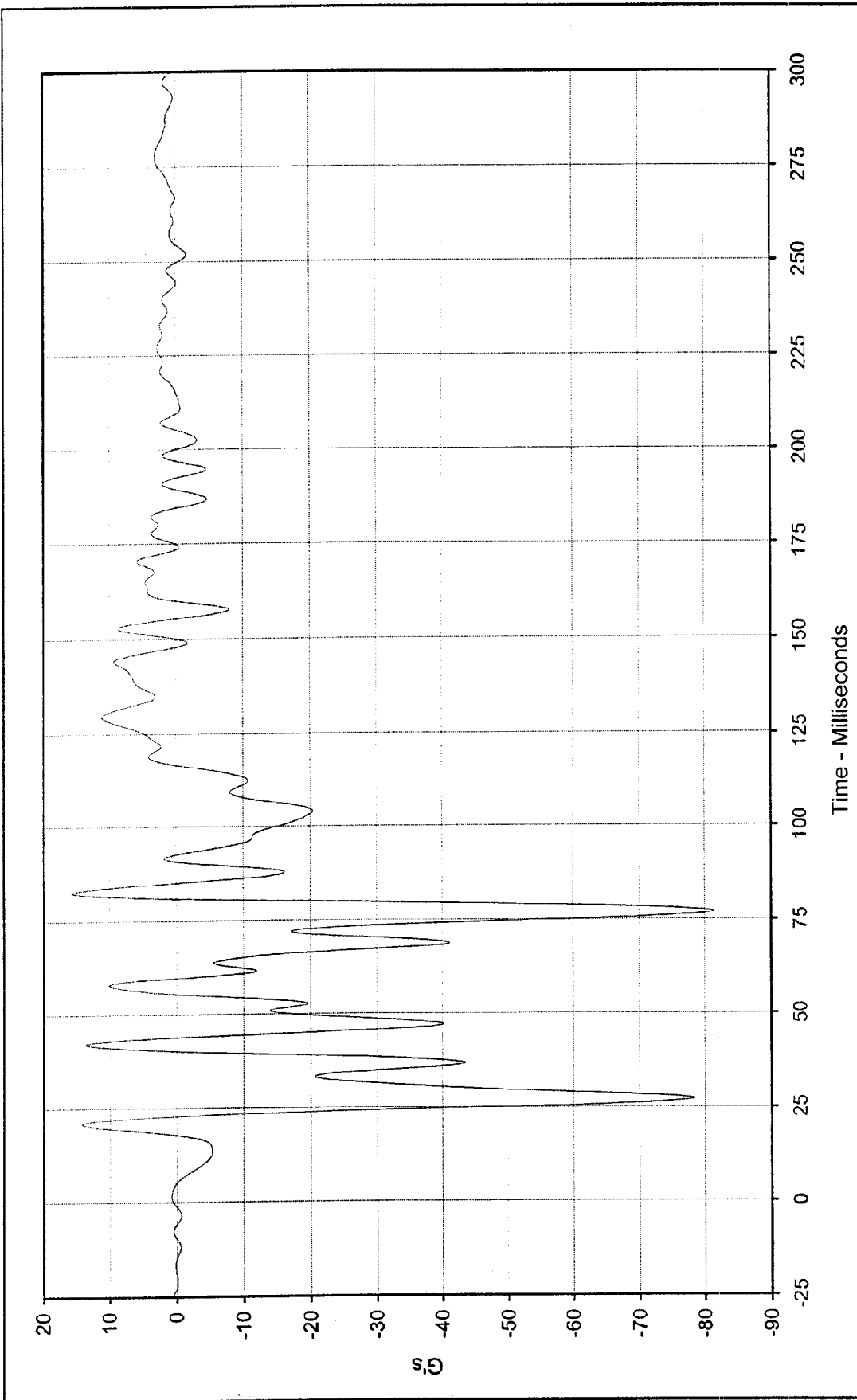
Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description:	Vehicle Right Brake Caliper Displ.	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	53.3 at 71.6 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	0.0 at 0.0 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/12/99			
Curve Number:	IN2-094			

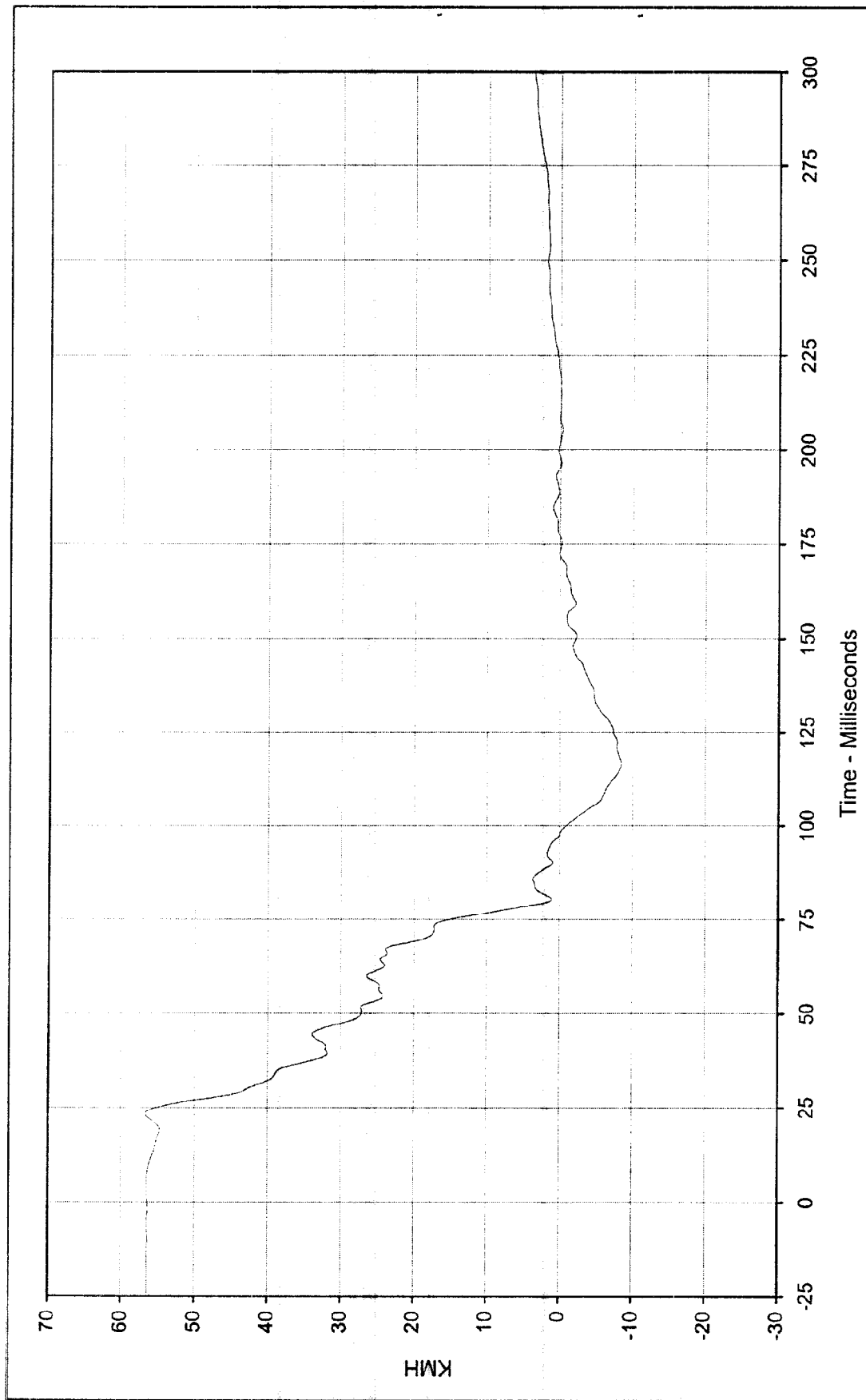




Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Program: 1999 Chevrolet Astro LS Van
 Test Vehicle:

Vehicle Instrument Panel
 Maximum Value: 15.7 at 82.7 Milliseconds
 Minimum Value: -81.4 at 77.0 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/12/99
 Curve Number: FIL-095





Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Program: 1999 Chevrolet Astro LS Van

Vehicle Instrument Panel Velocity

Maximum Value: 56.7 at 23.4 Milliseconds

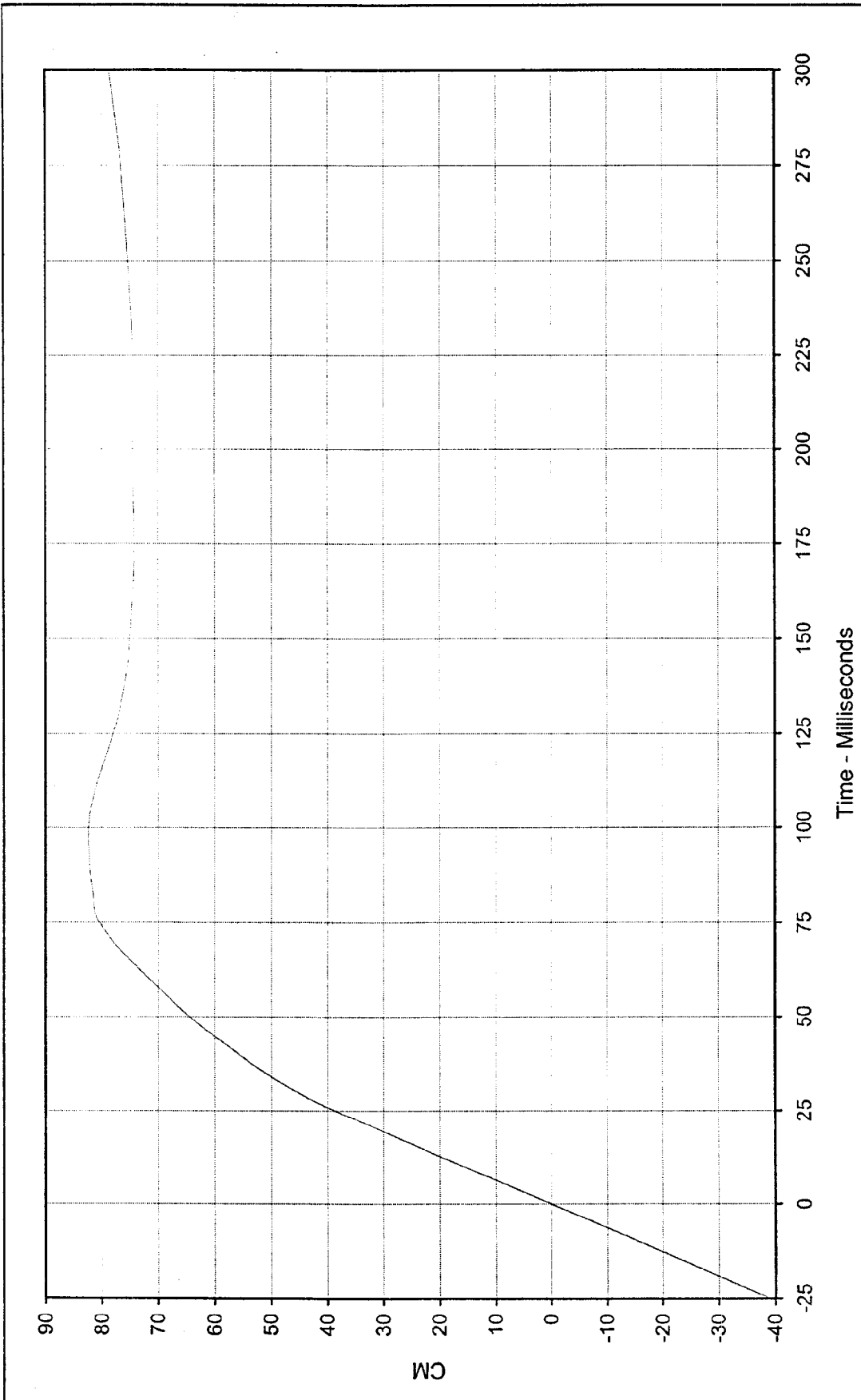
Minimum Value: -8.5 at 116.5 Milliseconds

SAE Filter Class: 180

Date of Test: 2/12/99

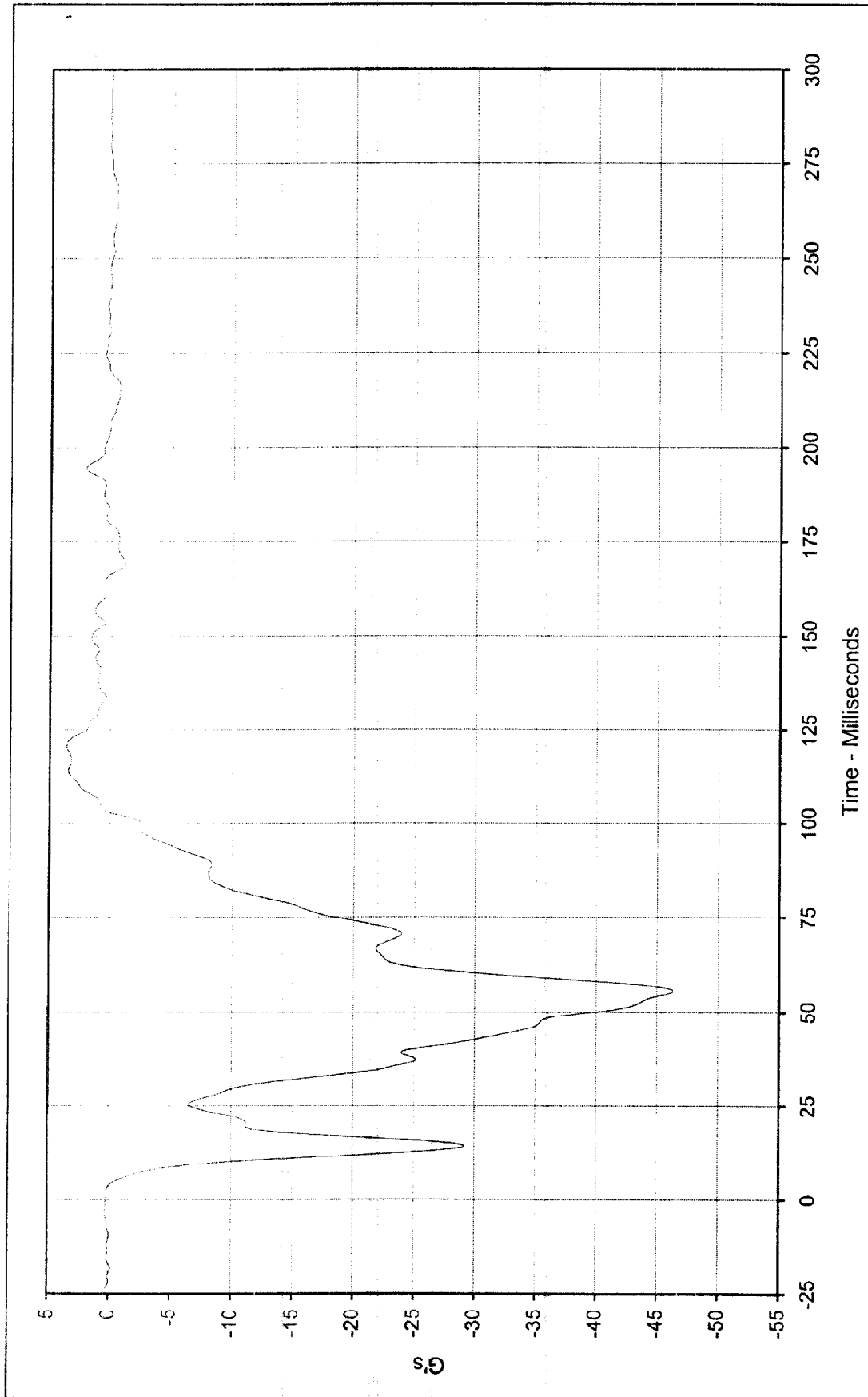
Curve Number: IN1-095





Curve Description:	Vehicle Instrument Panel Displ.	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	82.4 at 97.4 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	0.0 at 0.0 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/12/99			
Curve Number:	IN2-095			





Curve Description: Vehicle Left Rear Redundant Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 3.6 at 120.6 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

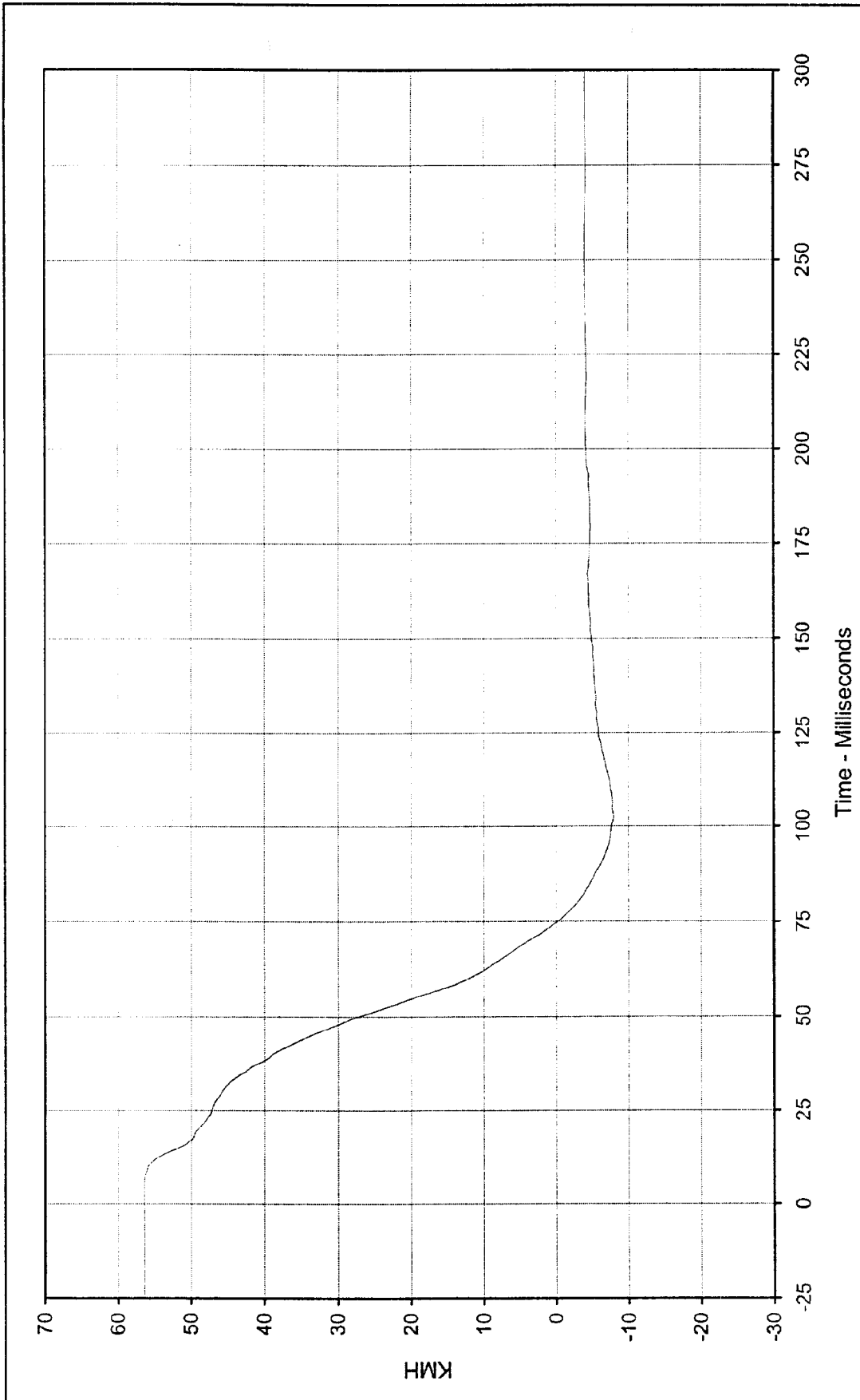
Minimum Value: -46.3 at 55.7 Milliseconds

SAE Filter Class: 60

Date of Test: 2/12/99

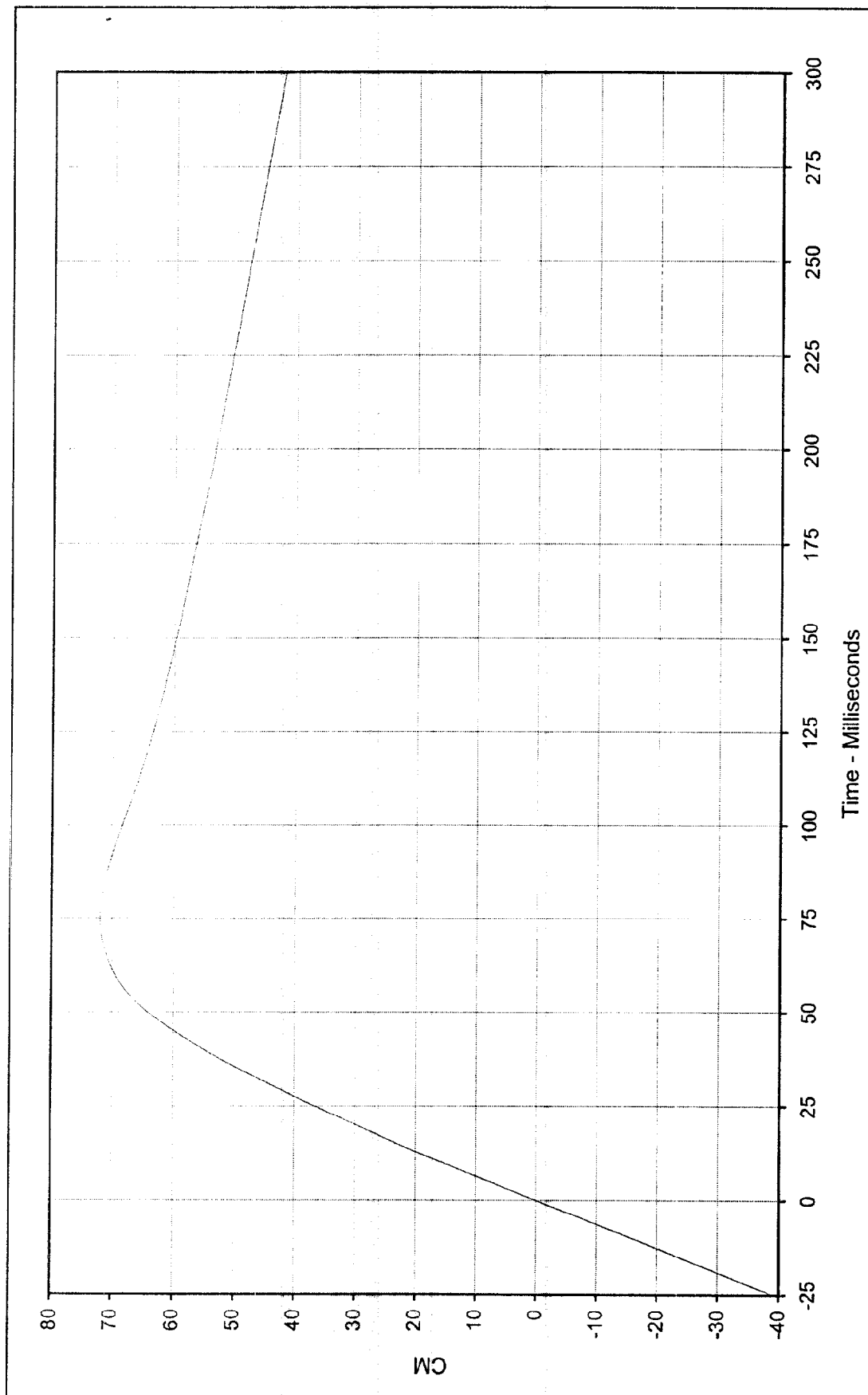
Curve Number: FIL-096





Curve Description:	Vehicle Left Rear Redundant Velocity	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	56.5 at 4.8 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-8.0 at 102.6 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/12/99			
Curve Number:	IN1-096			





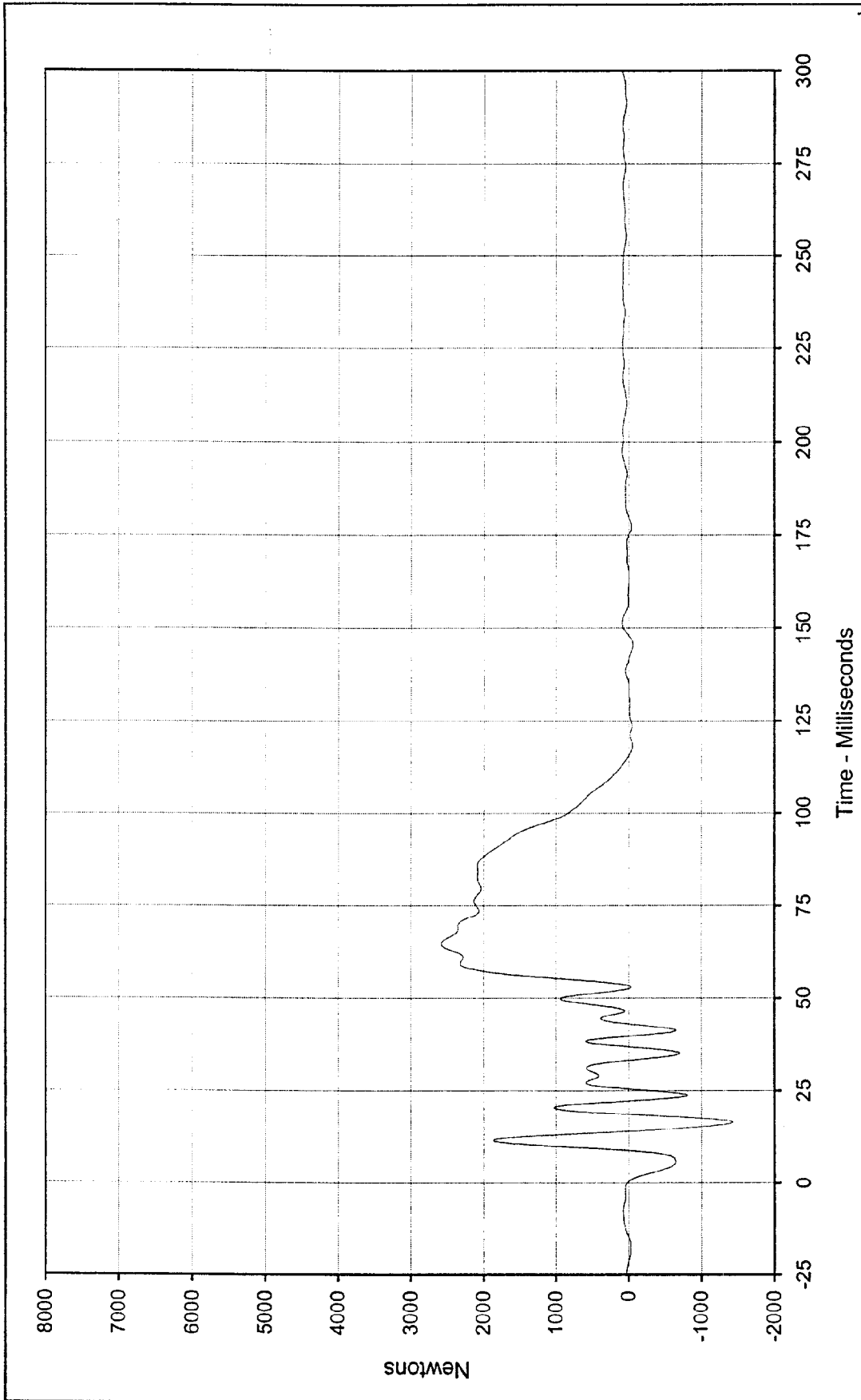
Curve Description: Vehicle Left Rear Redundant Displ.
 Maximum Value: 71.9 at 74.7 Milliseconds
 Minimum Value: 0.0 at 0.0 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/12/99
 Curve Number: IN2-096

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van

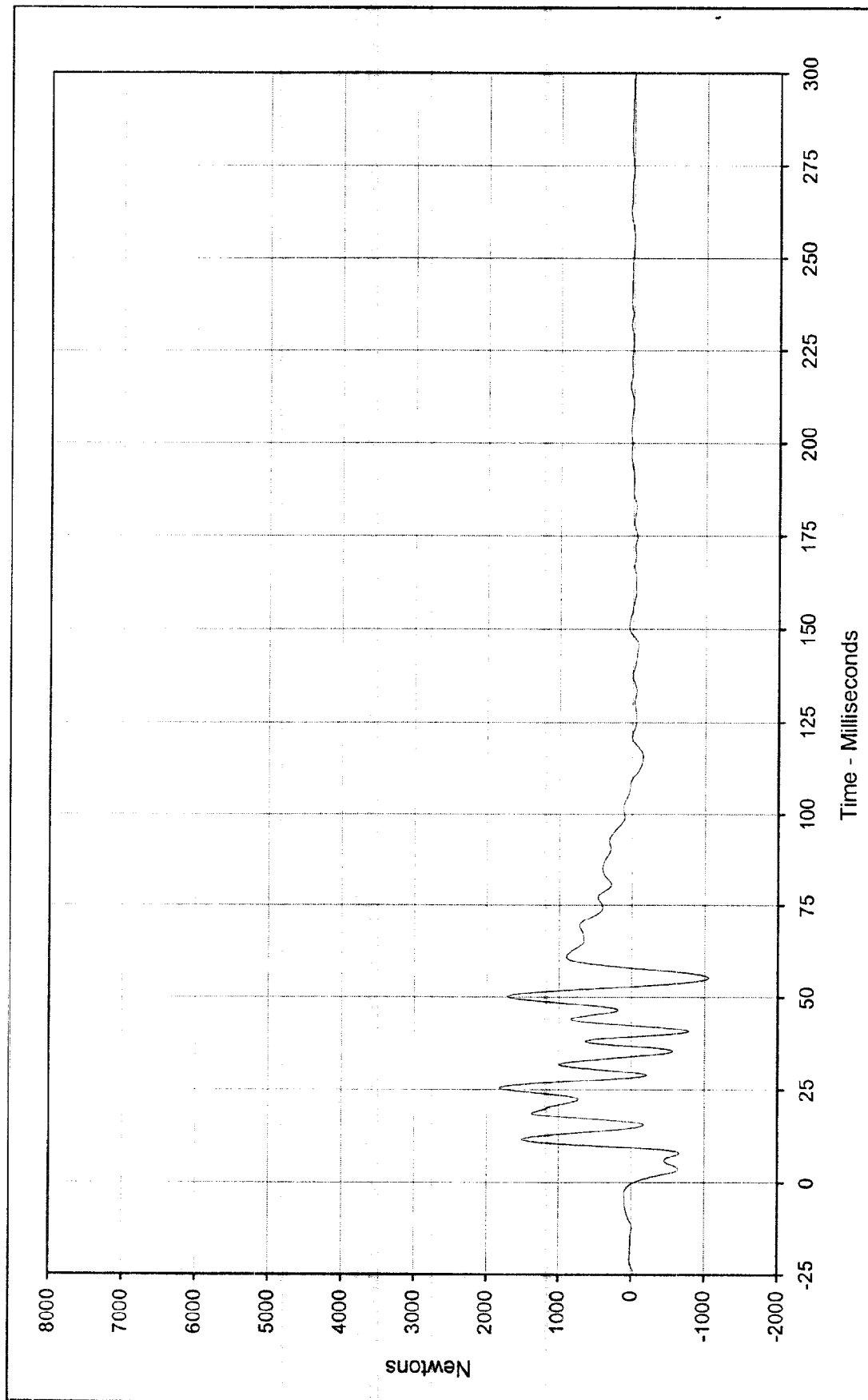


APPENDIX C
LOAD CELL BARRIER INFORMATION



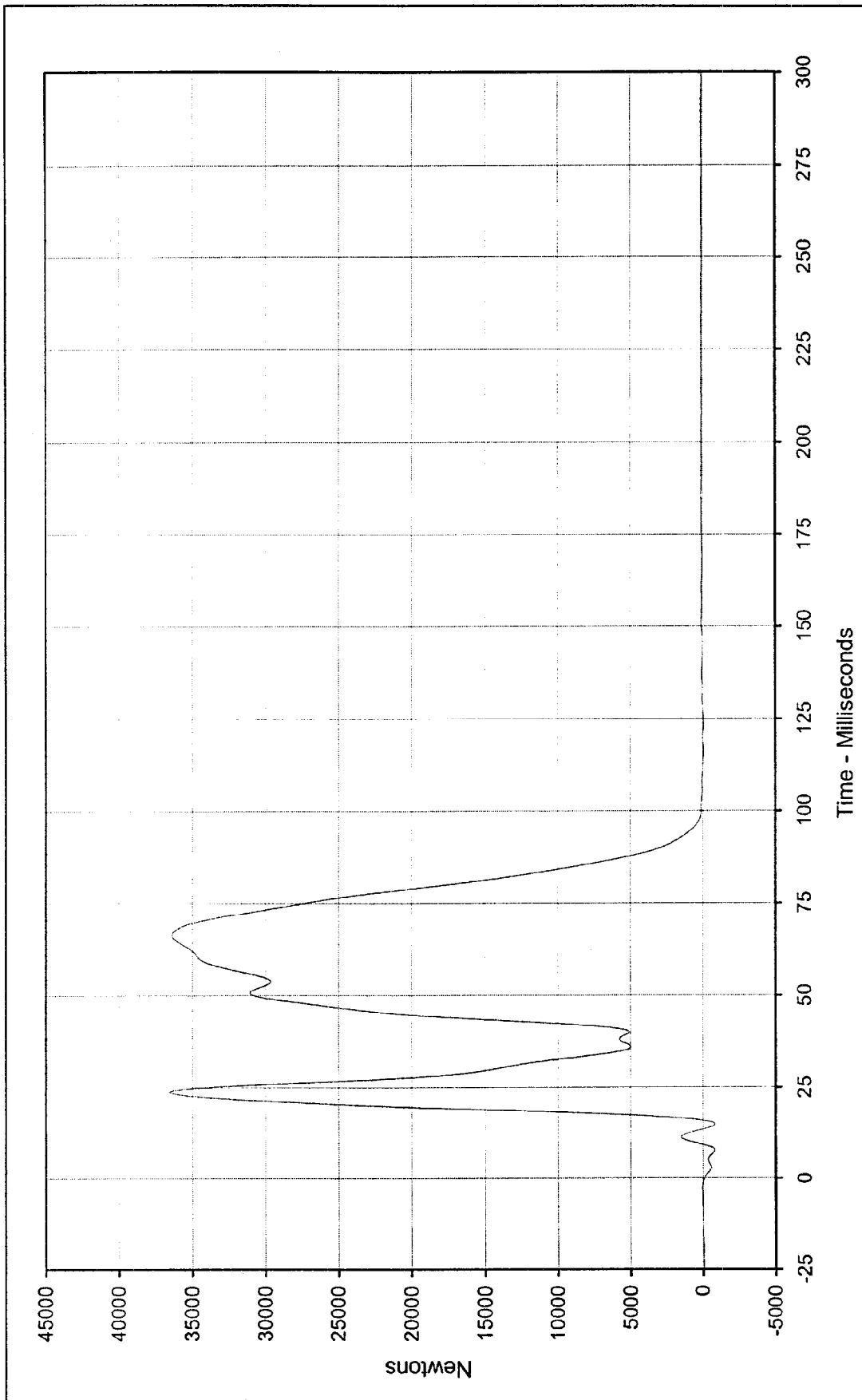
Curve Description:	Barrier Force A2	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	2582.2 at 64.6 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-1431.0 at 16.3 Milliseconds			
SAE Filter Class:	60			
Date of Test:	2/12/99			
Curve Number:	FIL-099			





Curve Description:	Barrier Force A3	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	1822.1	at	25.5	Milliseconds
Minimum Value:	-1059.8	at	55.2	Milliseconds
SAE Filter Class:	60			
Date of Test:	2/12/99			
Curve Number:	FIL-100			
Test Vehicle:	1999 Chevrolet Astro LS Van			

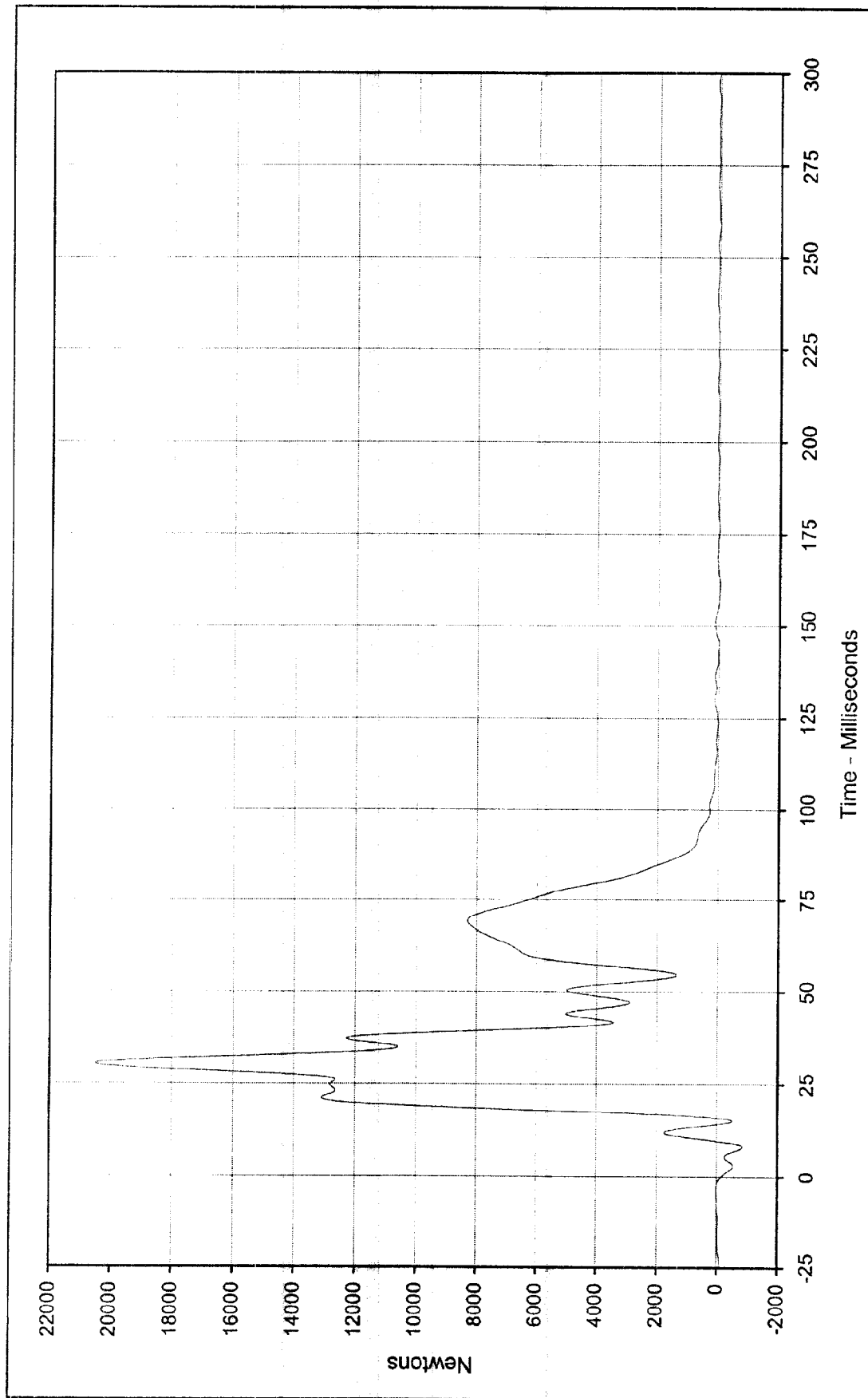




Curve Description: Barrier Force A4
 Maximum Value: 36570.6 at 23.8 Milliseconds
 Minimum Value: -862.9 at 14.8 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/12/99
 Curve Number: FIL-101

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Barrier Force A5

Maximum Value: 20508.9 at 30.4 Milliseconds

Minimum Value: -856.7 at 8.1 Milliseconds

SAE Filter Class: 60

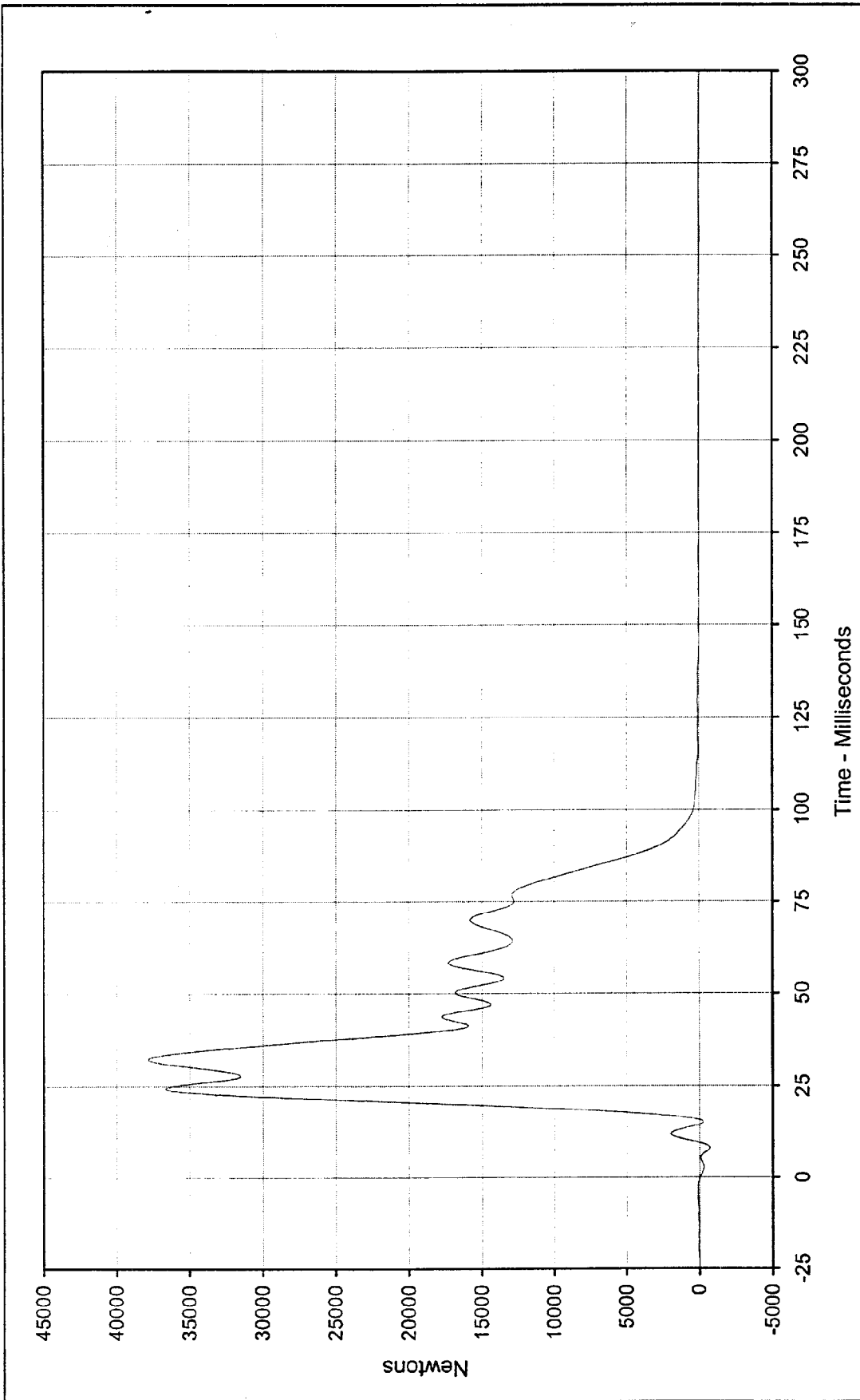
Date of Test: 2/12/99

Curve Number: FIL-102

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

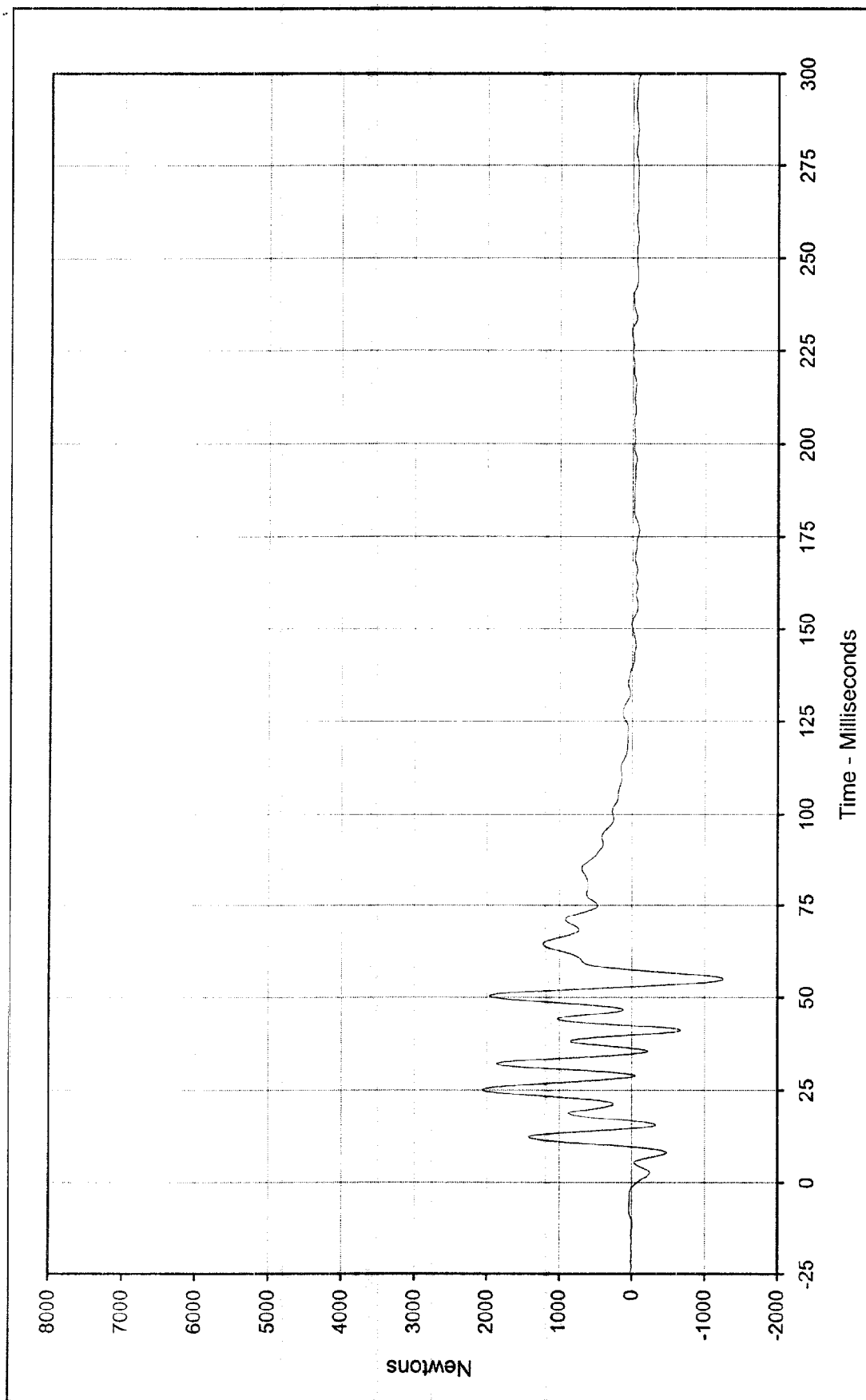
Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description:	Barrier Force A6	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	37833.9 at 32.2 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-714.1 at 8.1 Milliseconds			
SAE Filter Class:	60			
Date of Test:	2/12/99			
Curve Number:	FIL-103			

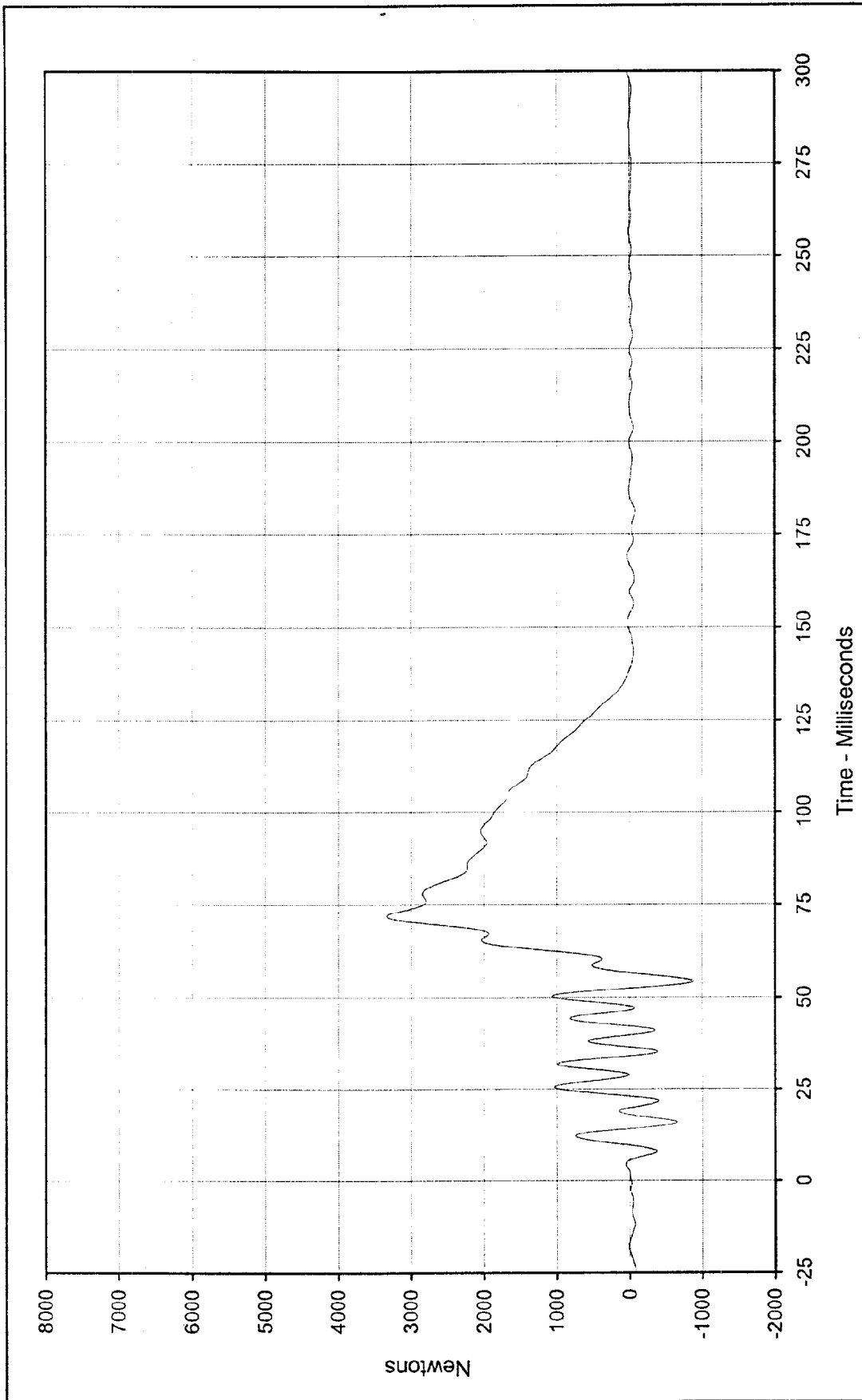




Curve Description:	Barrier Force A7		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	2058.3	at 25.1	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-1263.8	at 54.9			
SAE Filter Class:	60				
Date of Test:	2/12/99				
Curve Number:	FIL-104				



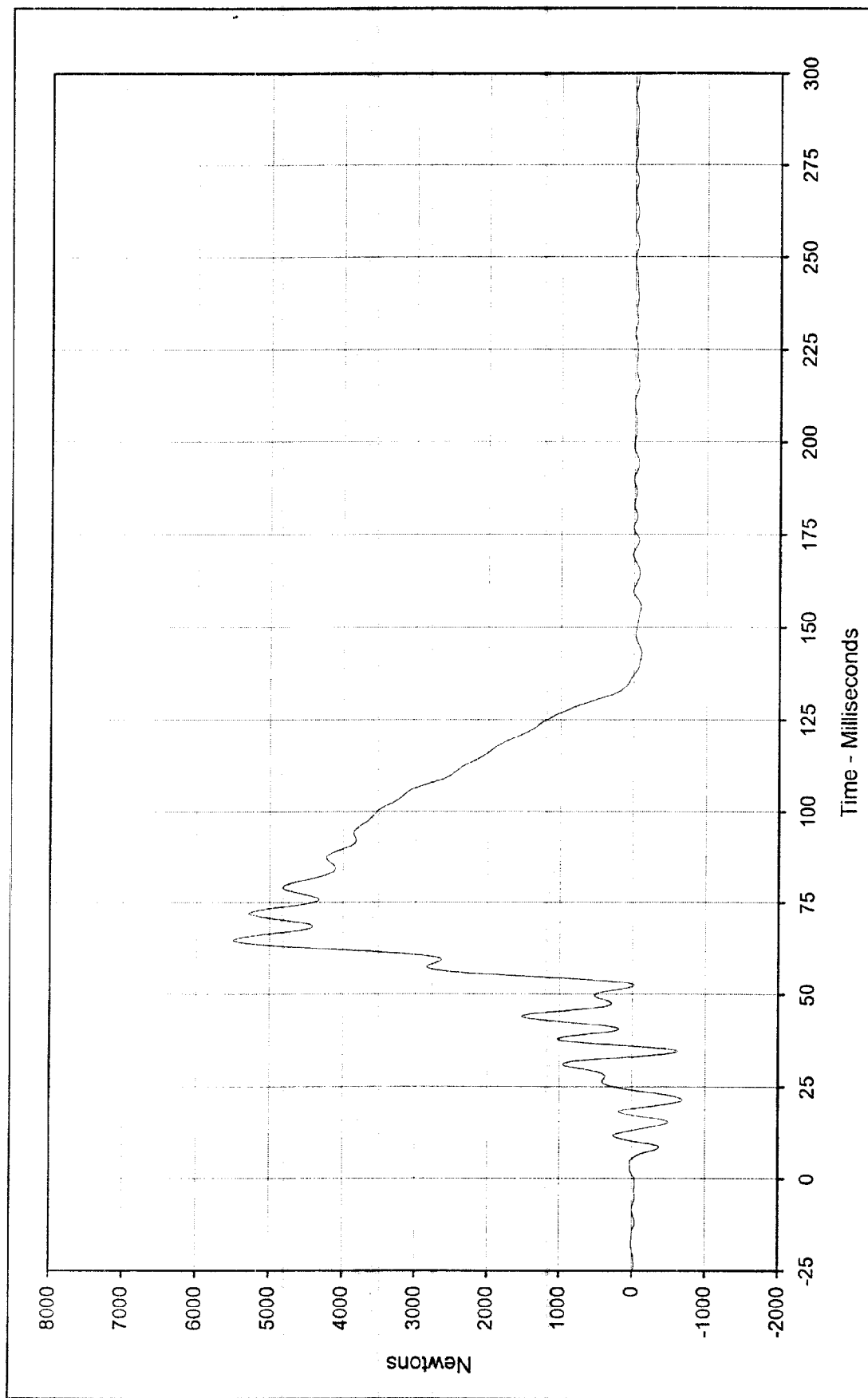




Curve Description: Barrier Force A8
 Maximum Value: 3332.4 at 71.8 Milliseconds
 Minimum Value: -879.7 at 54.2 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/12/99
 Curve Number: FIL-105

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Barrier Force A9 Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 5495.3 at 64.7 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

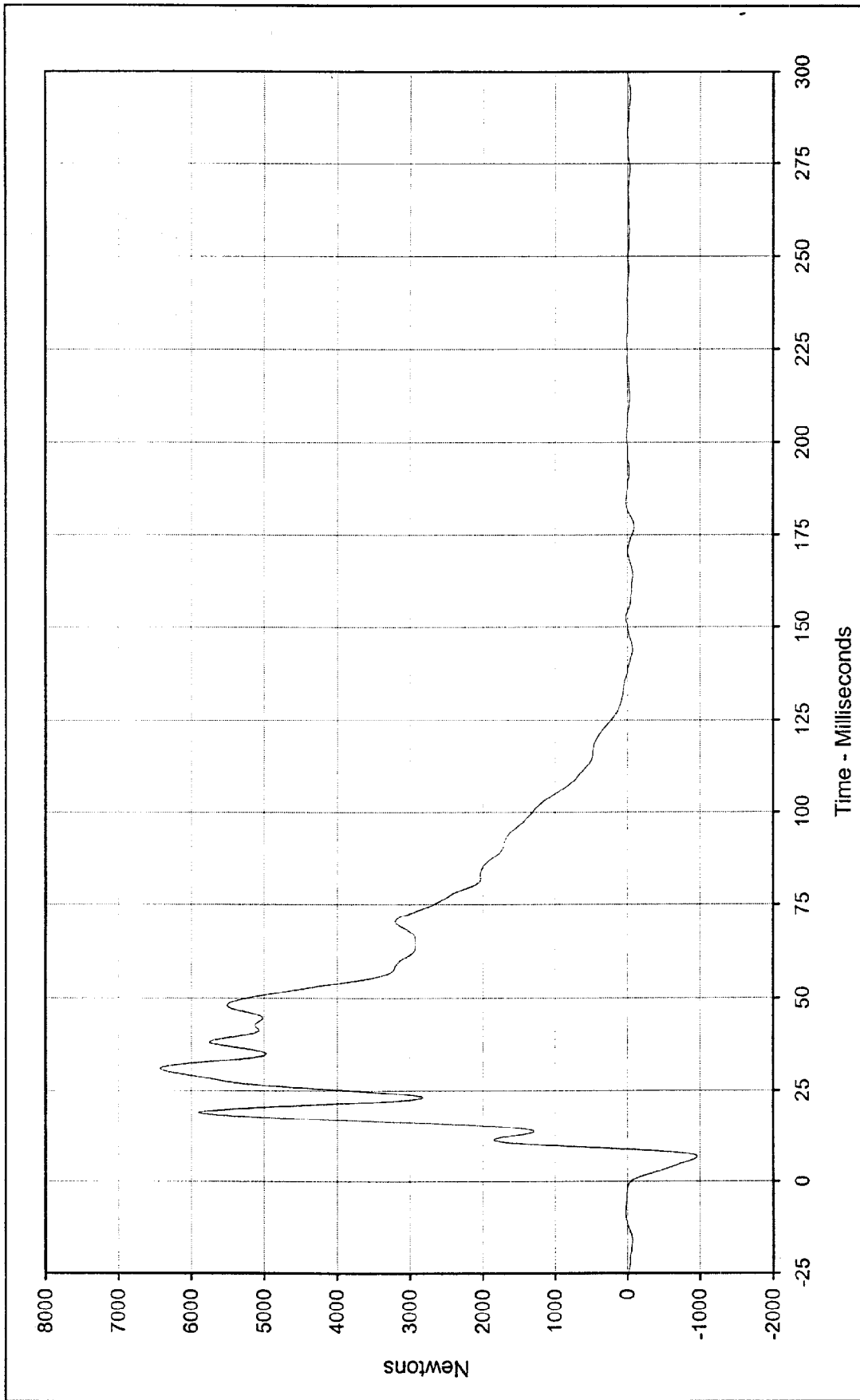
Minimum Value: -695.5 at 21.5 Milliseconds

SAE Filter Class: 60

Date of Test: 2/12/99

Curve Number: FIL-106





Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Program:

Test Vehicle: 1999 Chevrolet Astro LS Van

Barrier Force B2

Maximum Value: 6428.3 at 30.9 Milliseconds

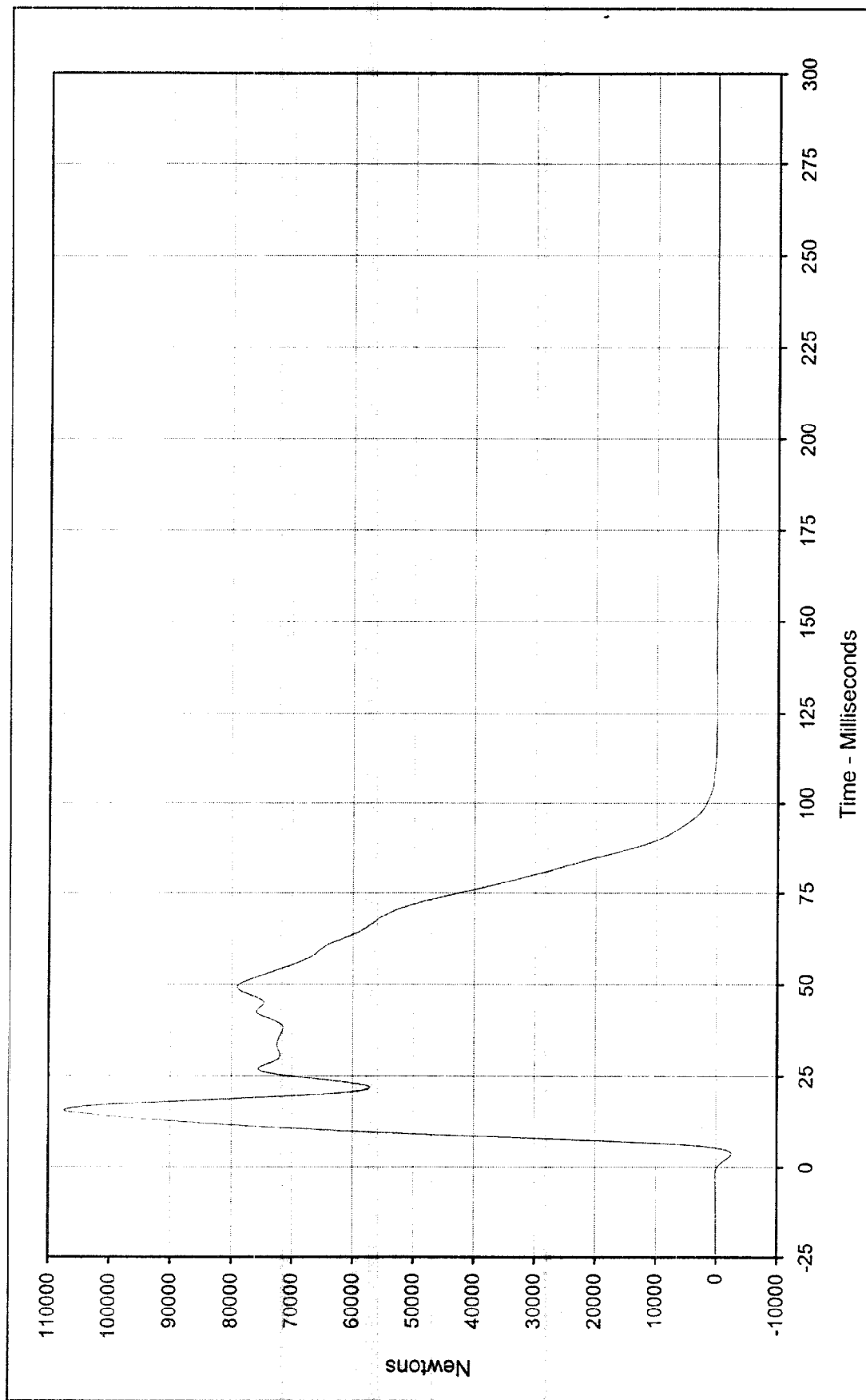
Minimum Value: -965.3 at 6.9 Milliseconds

SAE Filter Class: 60

Date of Test: 2/12/99

Curve Number: FIL-108





Curve Description: Barrier Force B3

Maximum Value: 107363.7 at 15.7 Milliseconds

Minimum Value: -2549.9 at 3.7 Milliseconds

SAE Filter Class: 60

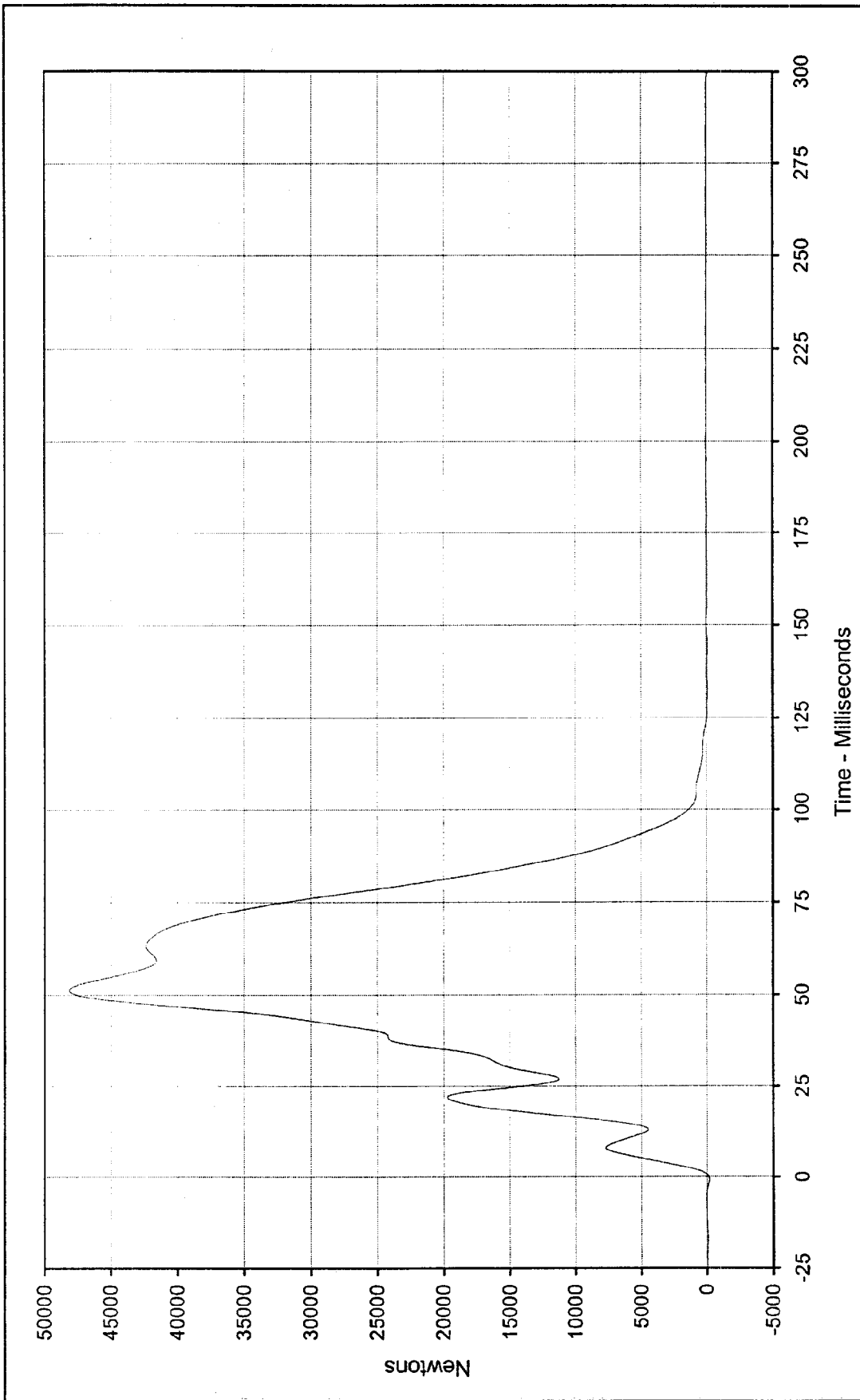
Date of Test: 2/12/99

Curve Number: FIL-109

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van

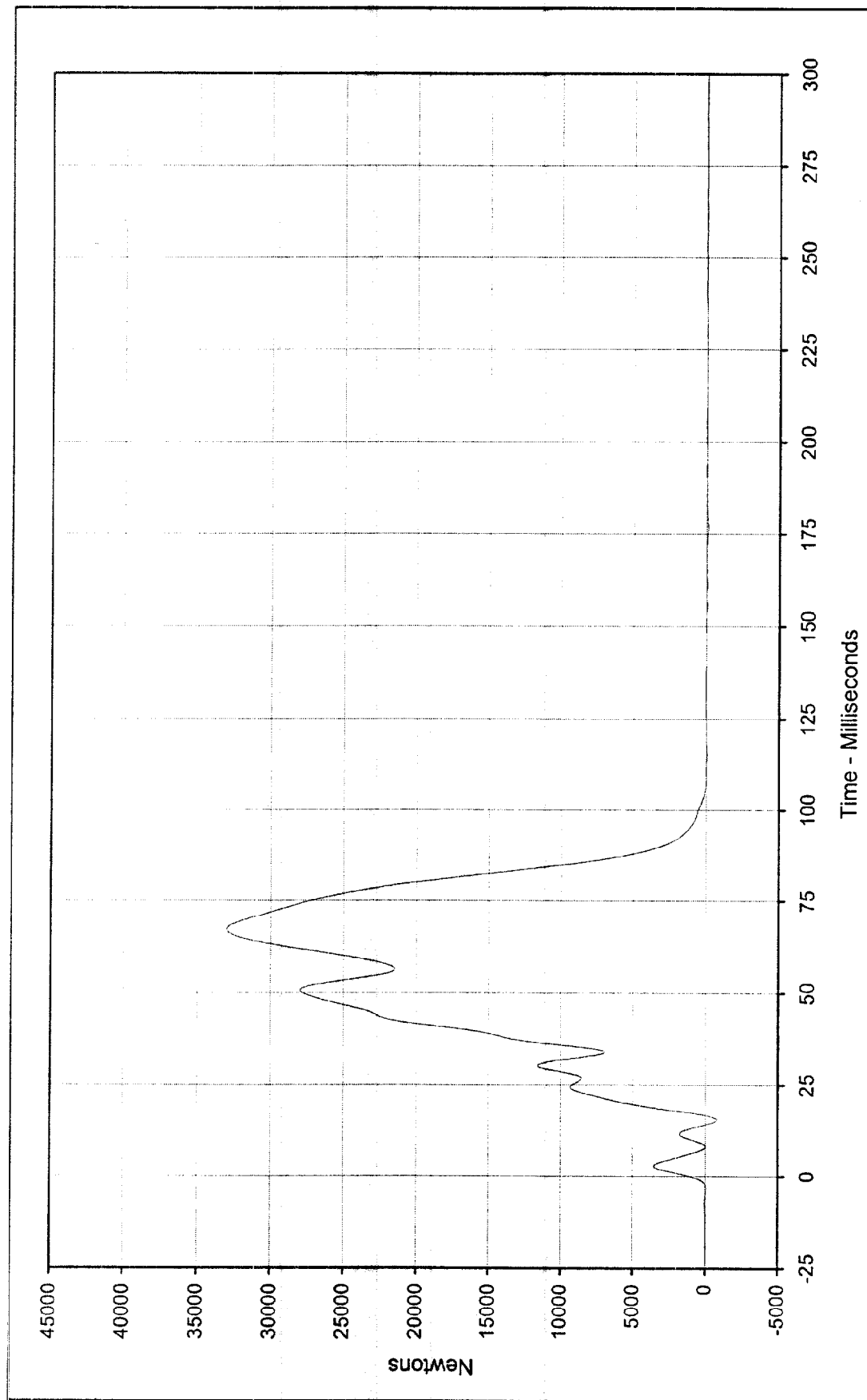




Curve Description: Barrier Force B4
 Maximum Value: 48104.1 at 51.3 Milliseconds
 Minimum Value: -138.8 at 0.0 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/12/99
 Curve Number: FIL-110

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Barrier Force B5

Maximum Value: 32976.1 at 67.1 Milliseconds

Minimum Value: -823.4 at 15.3 Milliseconds

SAE Filter Class: 60

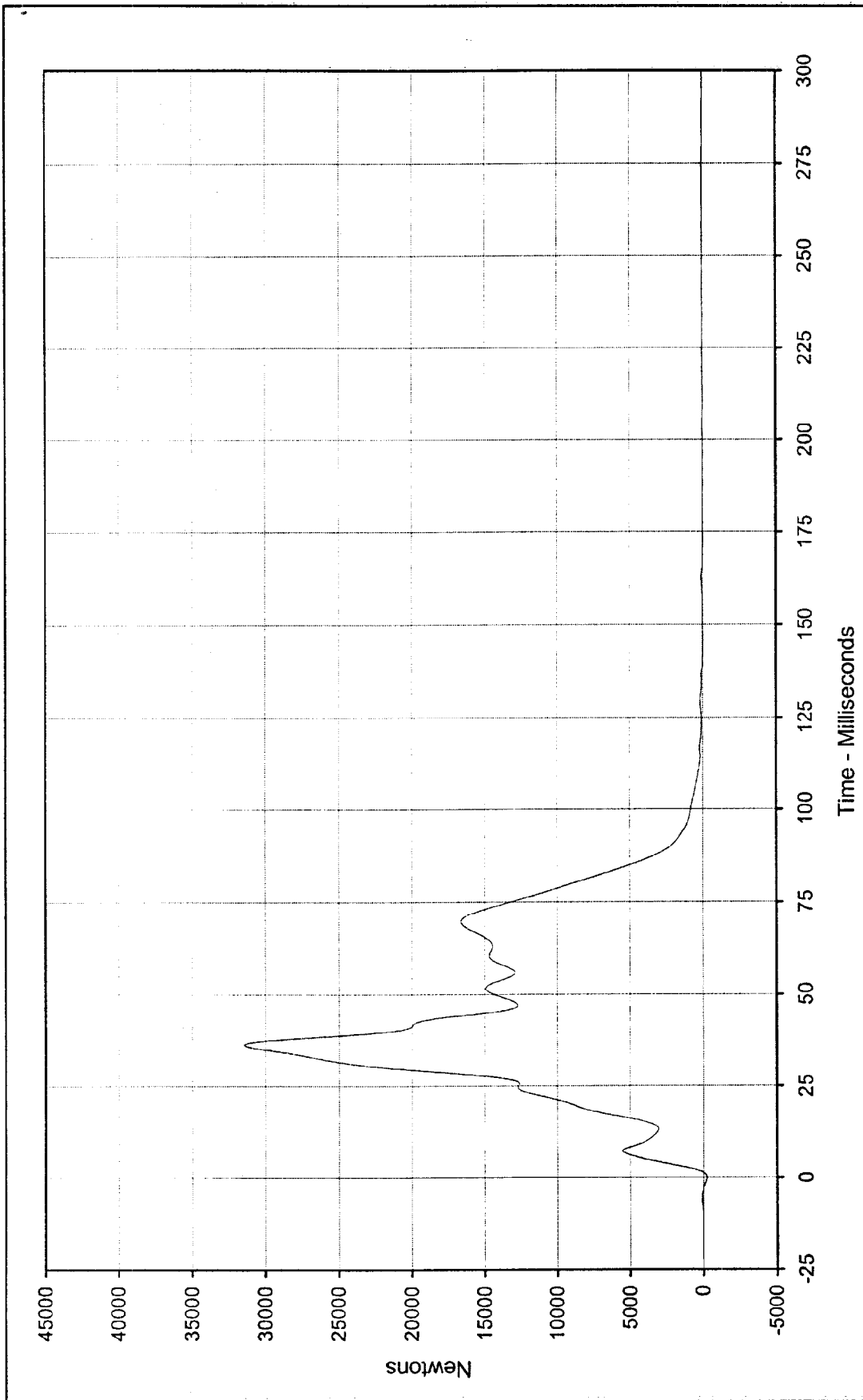
Date of Test: 2/12/99

Curve Number: FIL-111

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van

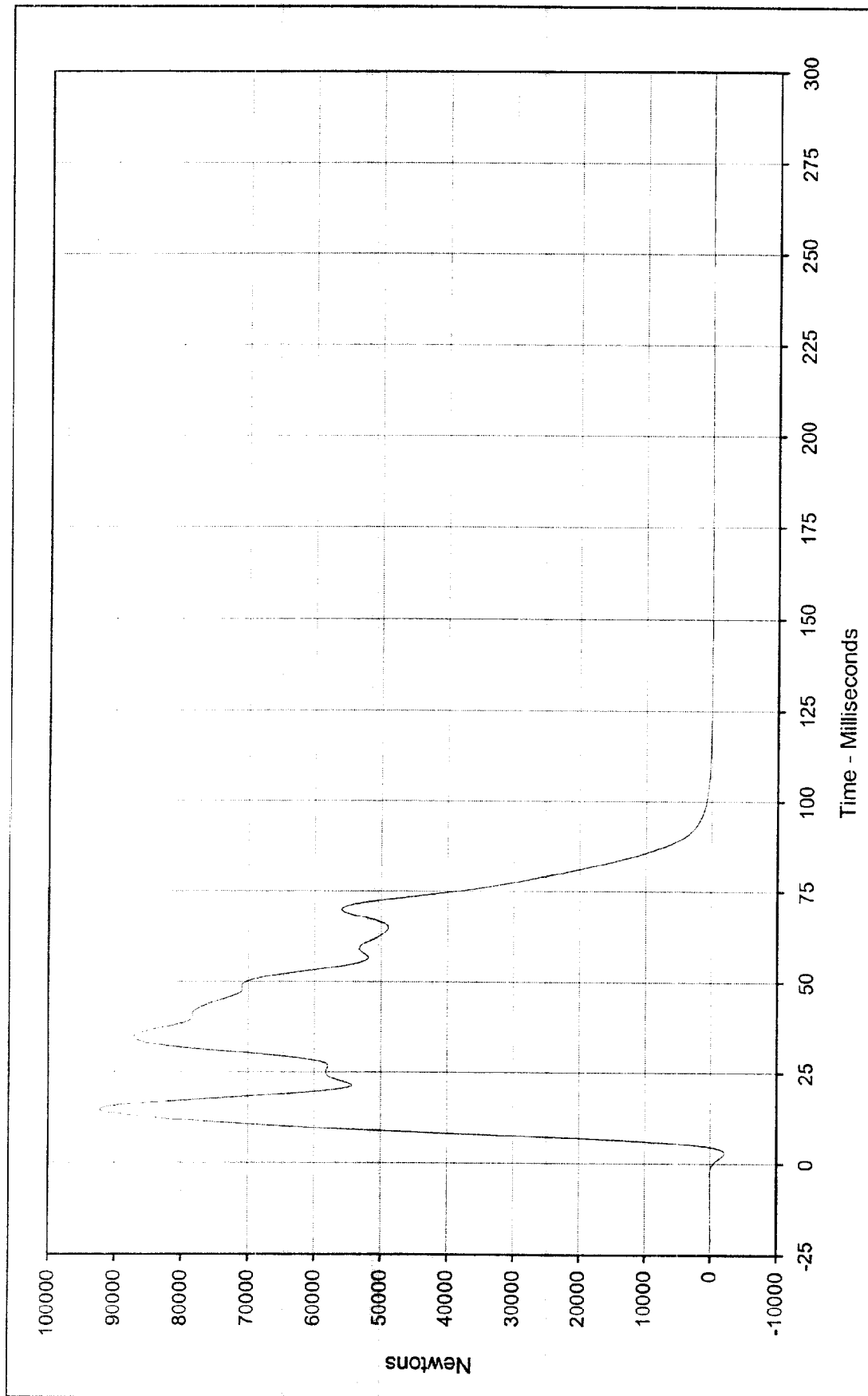




Curve Description: Barrier Force B6
 Maximum Value: 31441.2 at 36.1 Milliseconds
 Minimum Value: -250.8 at 0.0 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/12/99
 Curve Number: FIL-112

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Barrier Force B7 Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 92203.5 at 14.8 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

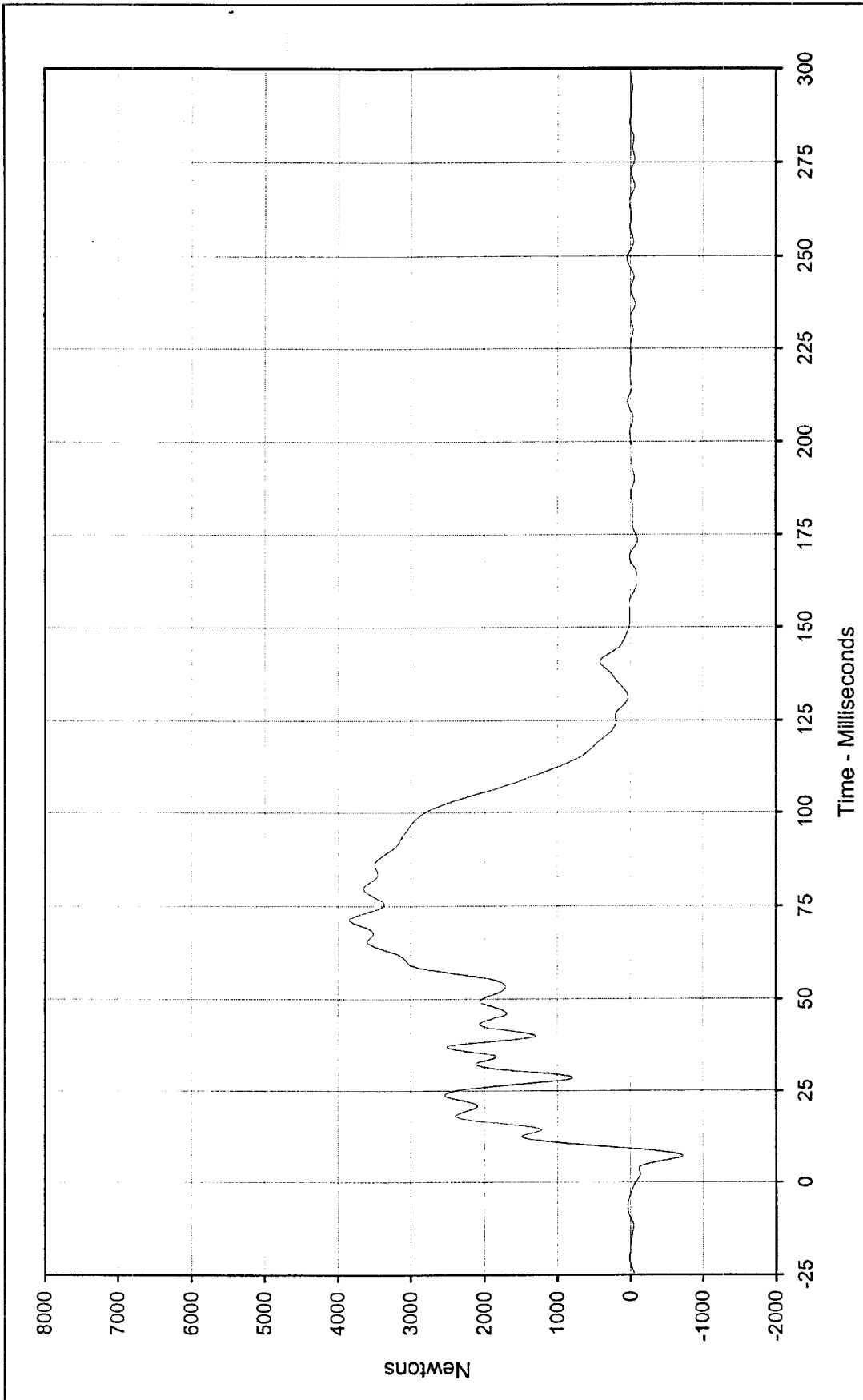
Minimum Value: -2132.1 at 3.0 Milliseconds

SAE Filter Class: 60

Date of Test: 2/12/99

Curve Number: FIL-113





Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van

Curve Description: Barrier Force B8

Maximum Value: 3847.3 at 71.3 Milliseconds

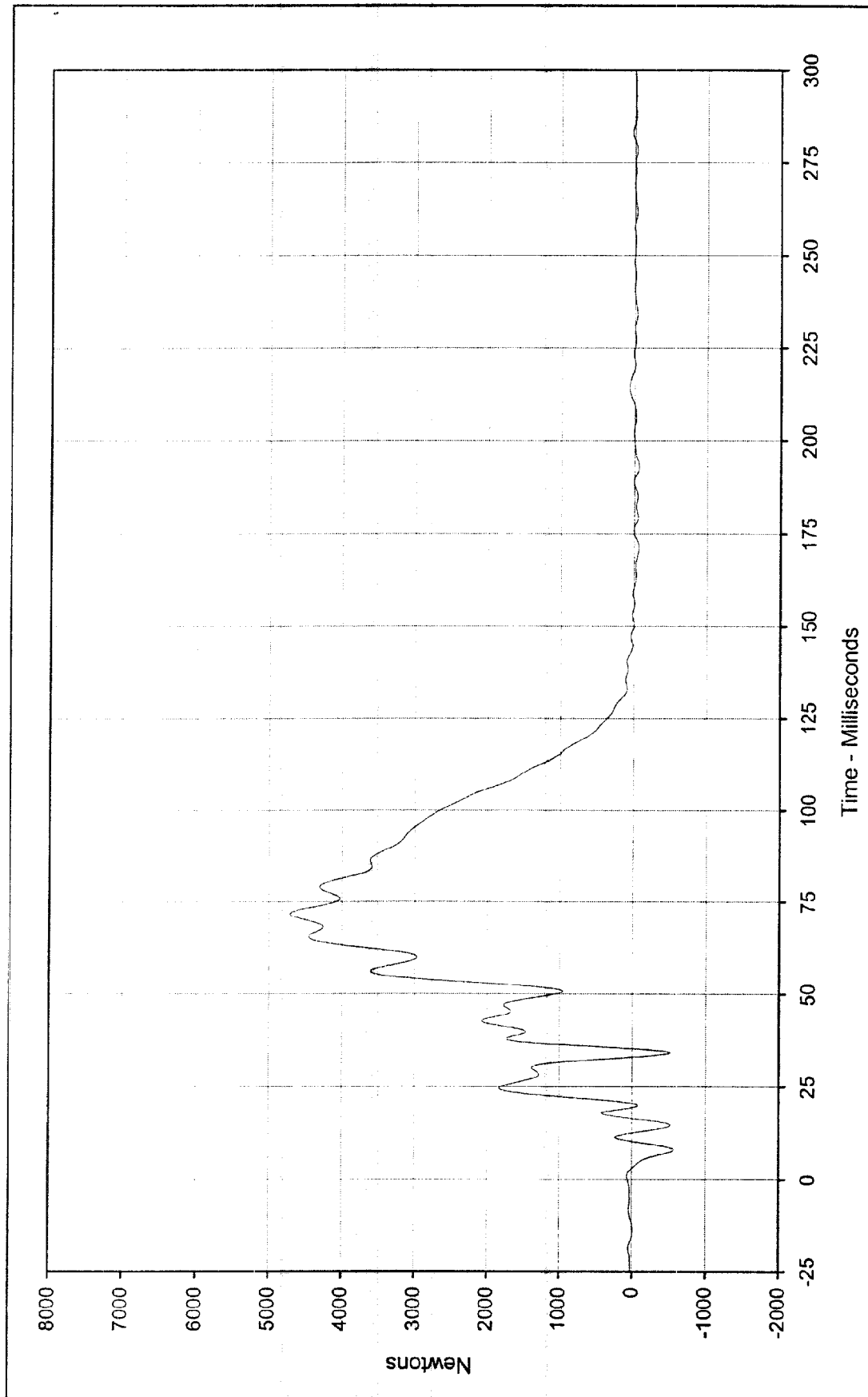
Minimum Value: -729.9 at 7.4 Milliseconds

SAE Filter Class: 60

Date of Test: 2/12/99

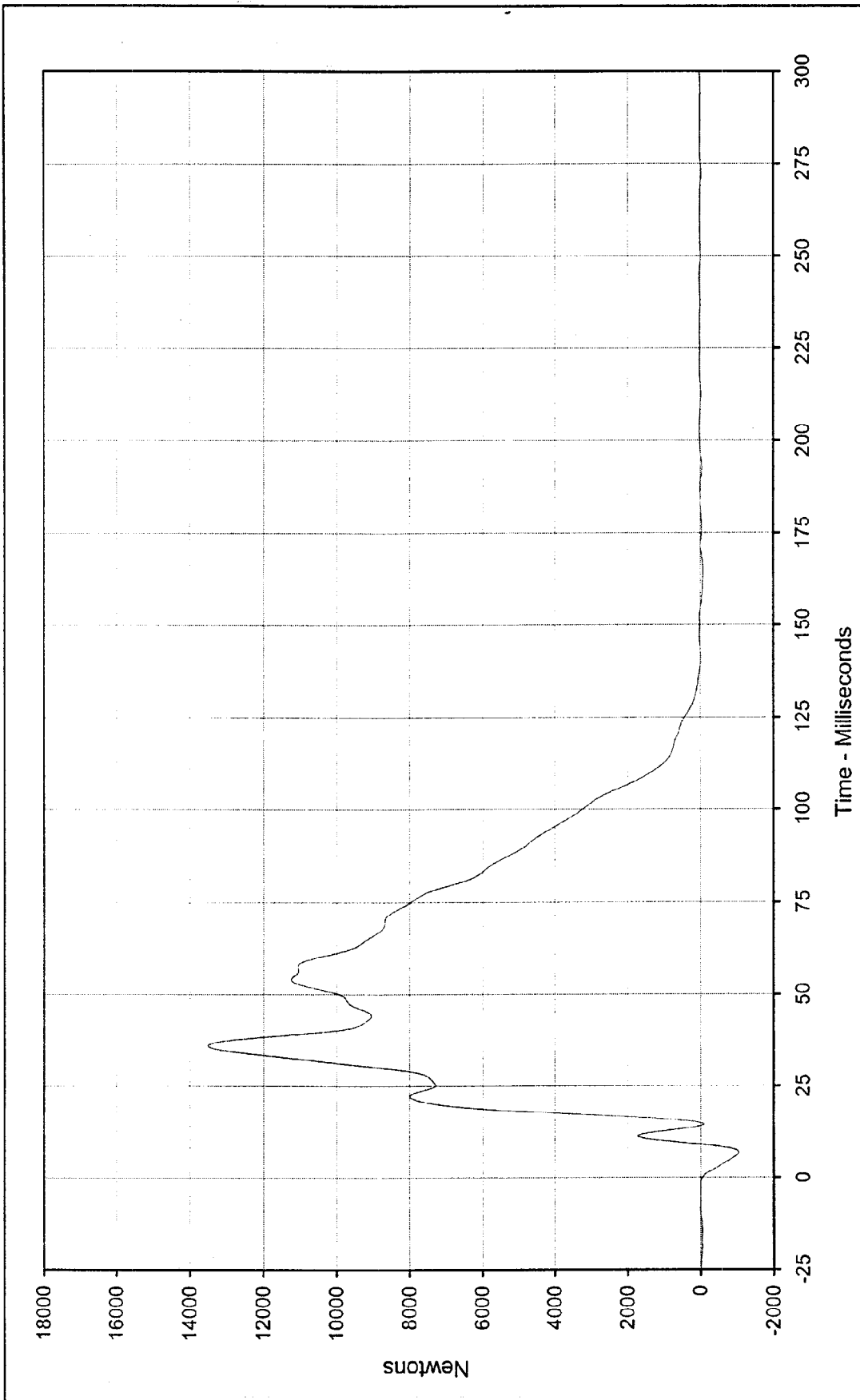
Curve Number: FIL-114





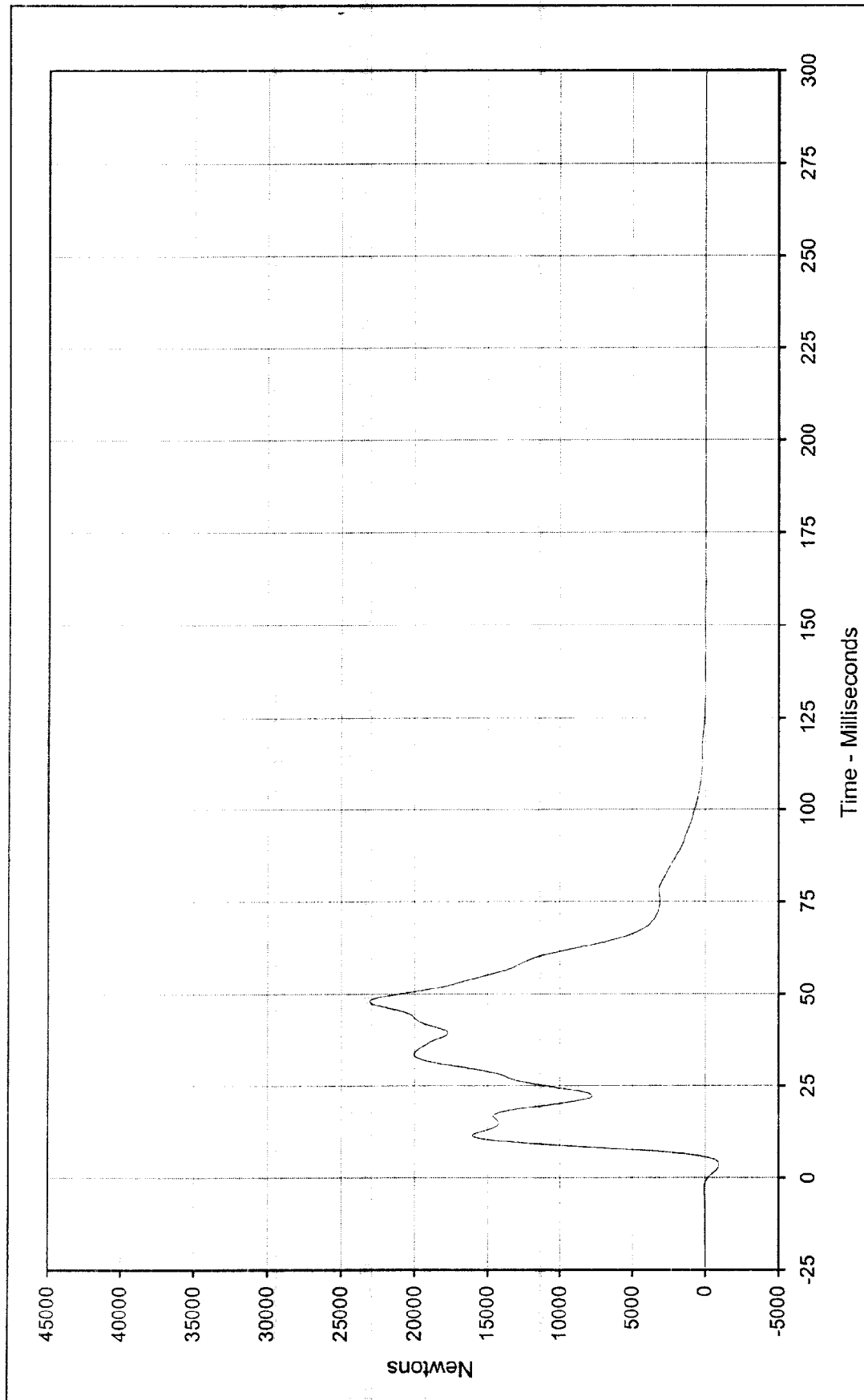
Curve Description:	Barrier Force B9	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	4713.5 at 71.6 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-569.4 at 8.0 Milliseconds			
SAE Filter Class:	60			
Date of Test:	2/12/99			
Curve Number:	FIL-115			





Curve Description:	Barrier Force C2	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	13510.6 at 35.9 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-1037.5 at 6.8 Milliseconds			
SAE Filter Class:	60			
Date of Test:	2/12/99			
Curve Number:	FIL-117			





Curve Description: Barrier Force C3 Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 23072.1 at 48.0 Milliseconds Test Vehicle: 1999 Chevrolet Astro LS Van

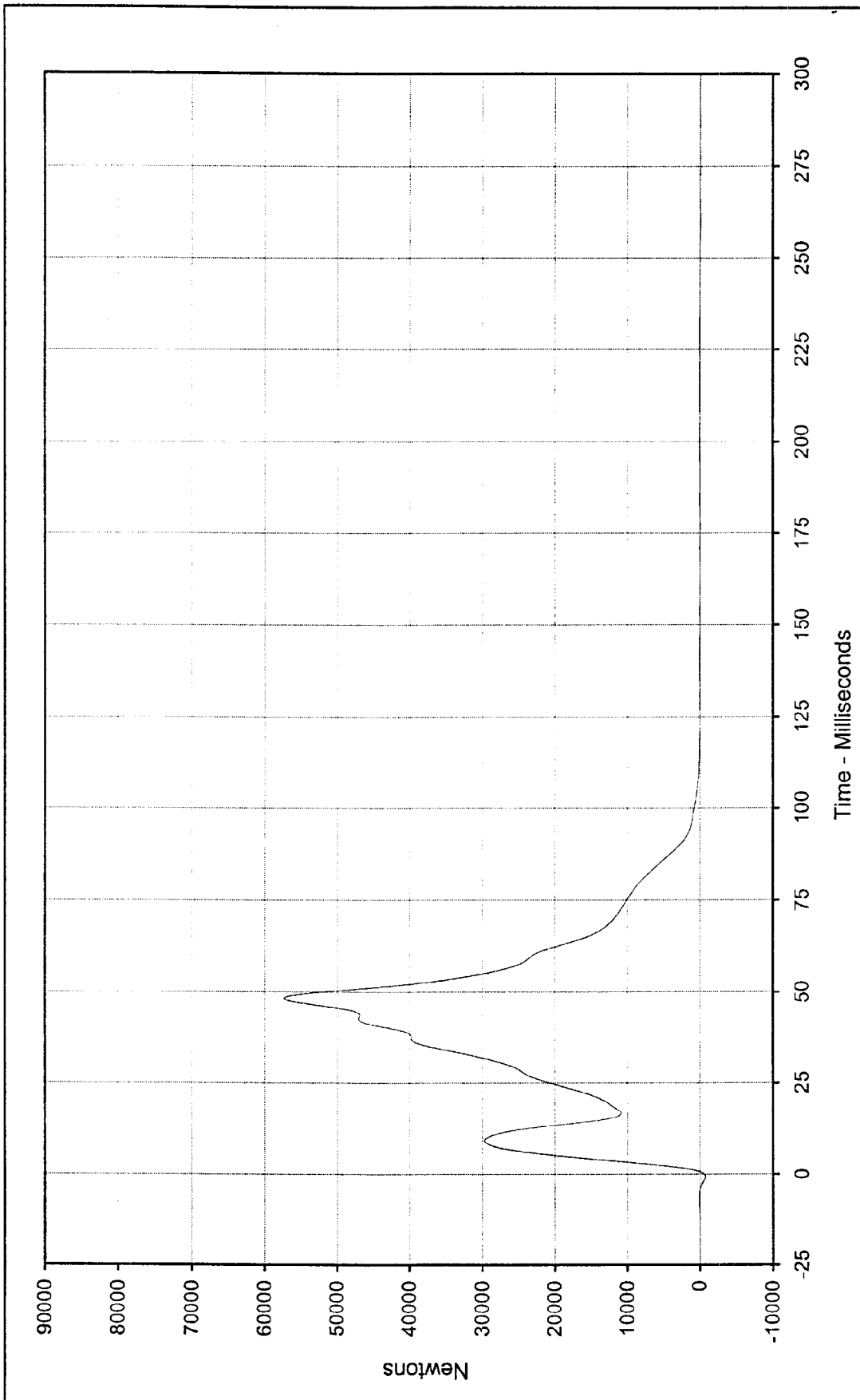
Minimum Value: -935.2 at 3.6 Milliseconds

SAE Filter Class: 60

Date of Test: 2/12/99

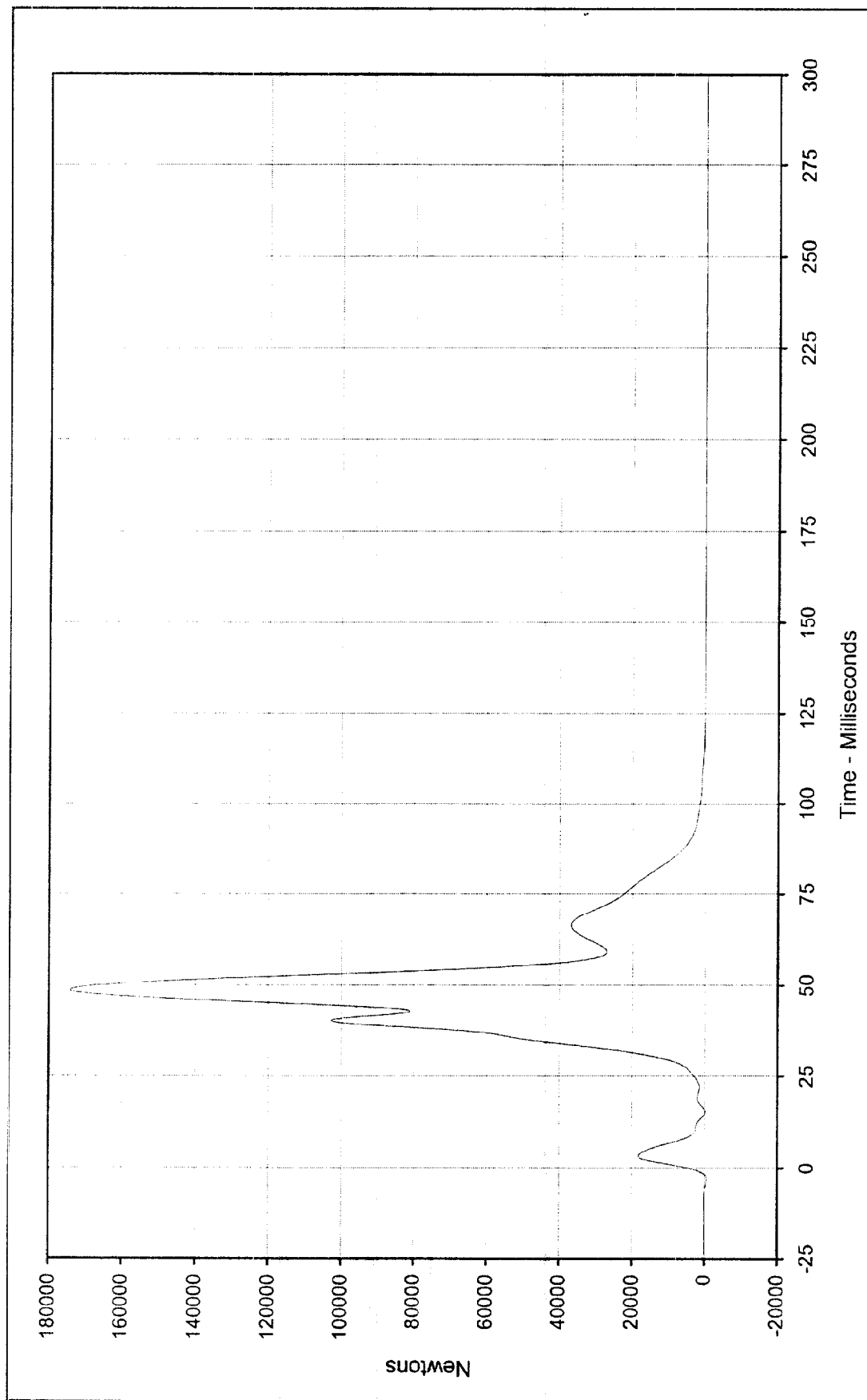
Curve Number: FIL-118





Curve Description:	Barrier Force C4	Test Program:	1999 NHTSA 35 mph NCAP No.: MX0103
Maximum Value:	57368.3 at 48.2 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van
Minimum Value:	-604.4 at 0.0 Milliseconds		
SAE Filter Class:	60		
Date of Test:	2/12/99		
Curve Number:	FIL-119		

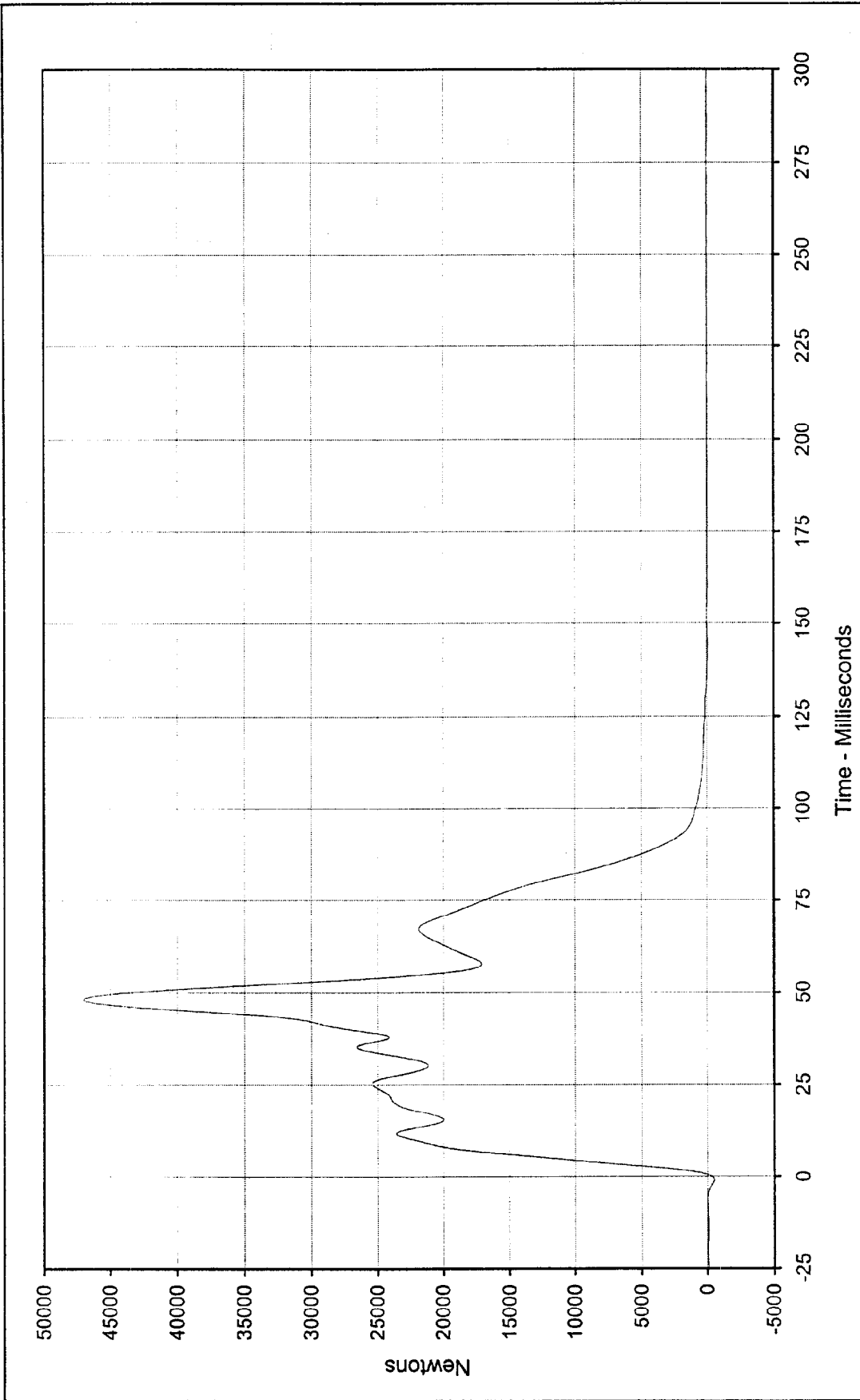




Curve Description:	Barrier Force C5	Test Program:	1999 NHTSA 35 mph NCAP No.: MX0103
Maximum Value:	174239.0 at 48.6 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van
Minimum Value:	-214.7 at 15.3 Milliseconds		



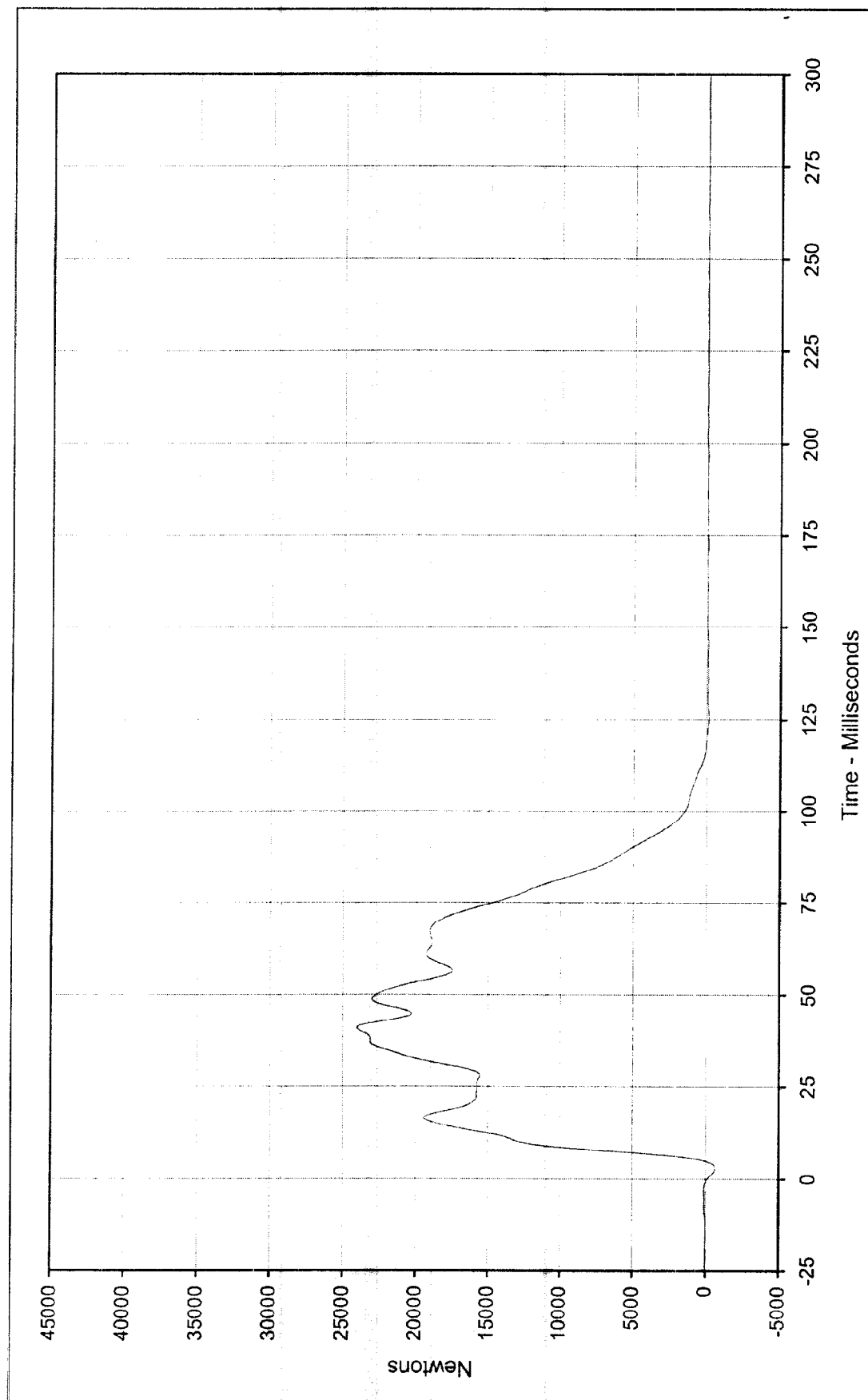
SAE Filter Class:	60
Date of Test:	2/12/99
Curve Number:	FIL-120



Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103
Test Program: 1999 Chevrolet Astro LS Van
Test Vehicle:

Barrier Force C6
Maximum Value: 47037.6 at 48.2 Milliseconds
Minimum Value: -331.4 at 0.0 Milliseconds
SAE Filter Class: 60
Date of Test: 2/12/99
Curve Number: FIL-121





Curve Description: Barrier Force C7 Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Maximum Value: 24050.1 at 40.9 Milliseconds

Minimum Value: -688.7 at 2.9 Milliseconds

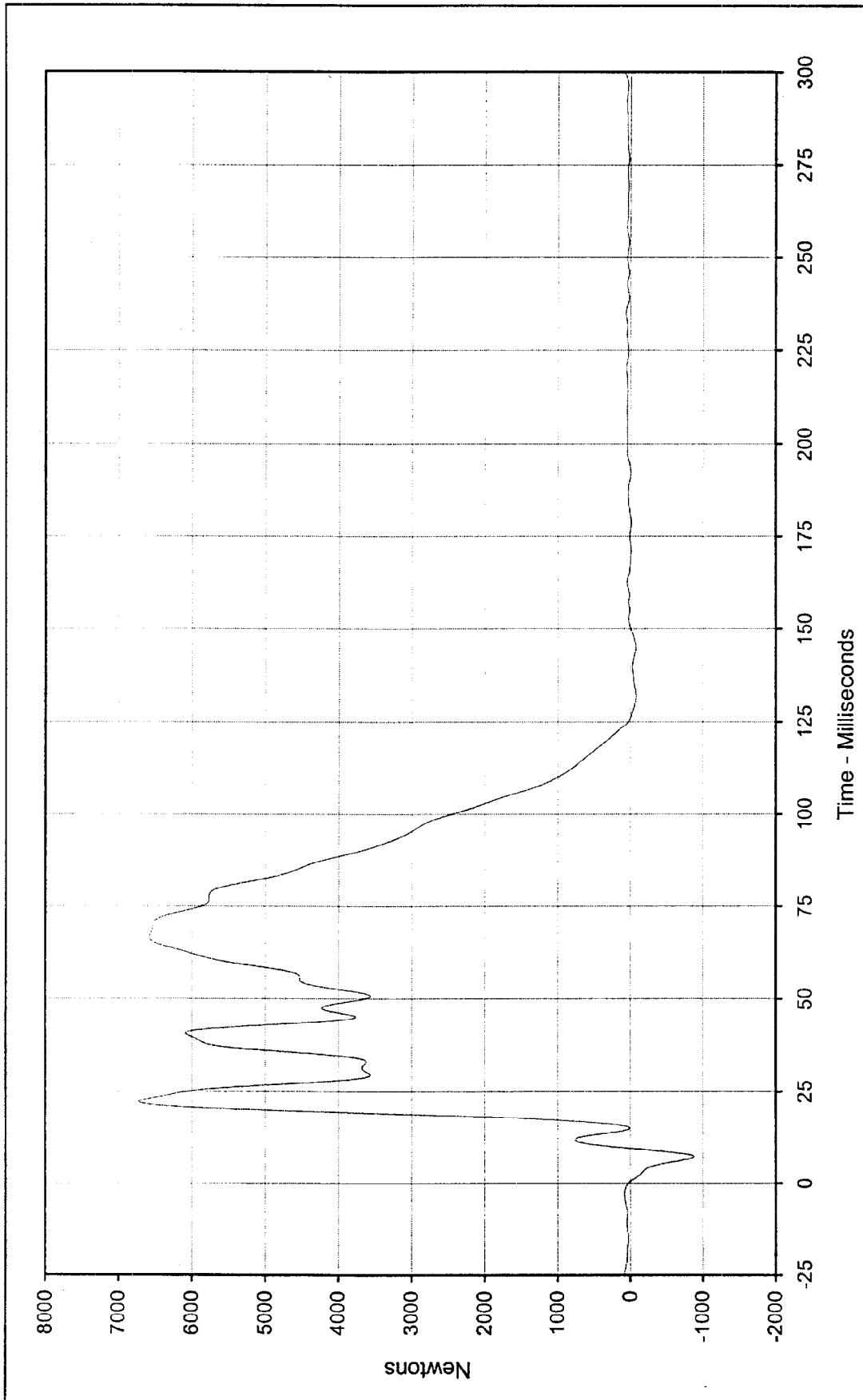
SAE Filter Class: 60

Date of Test: 2/12/99

Curve Number: FIL-122

Test Vehicle: 1999 Chevrolet Astro LS Van





Curve Description: Barrier Force C8

Maximum Value: 6718.0 at 22.3 Milliseconds

Minimum Value: -877.5 at 7.5 Milliseconds

SAE Filter Class: 60

Date of Test: 2/12/99

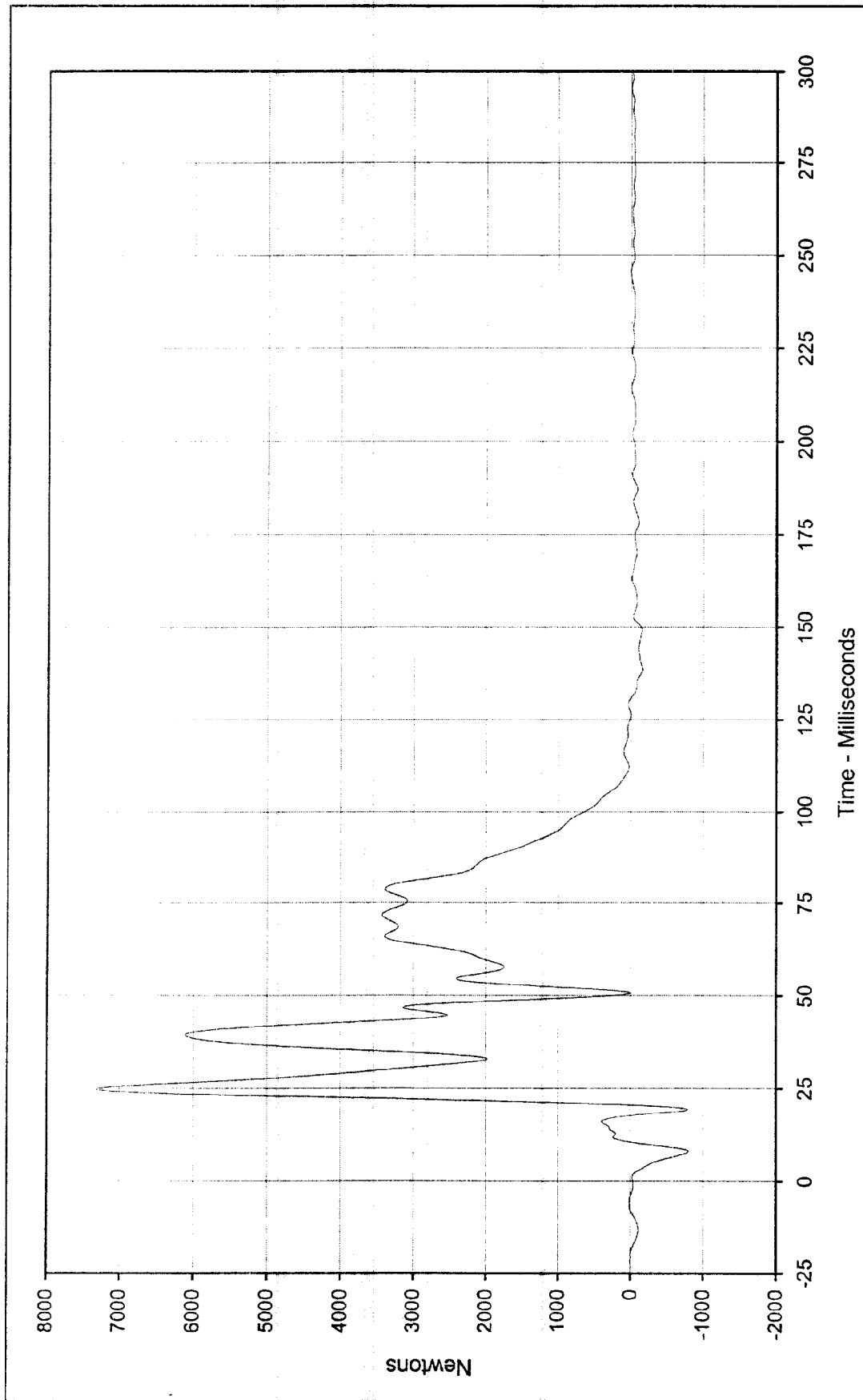
Curve Number: FIL-123

Test Program: 1999 NHTSA 35 mph NCAP

Test Vehicle: 1999 Chevrolet Astro LS Van

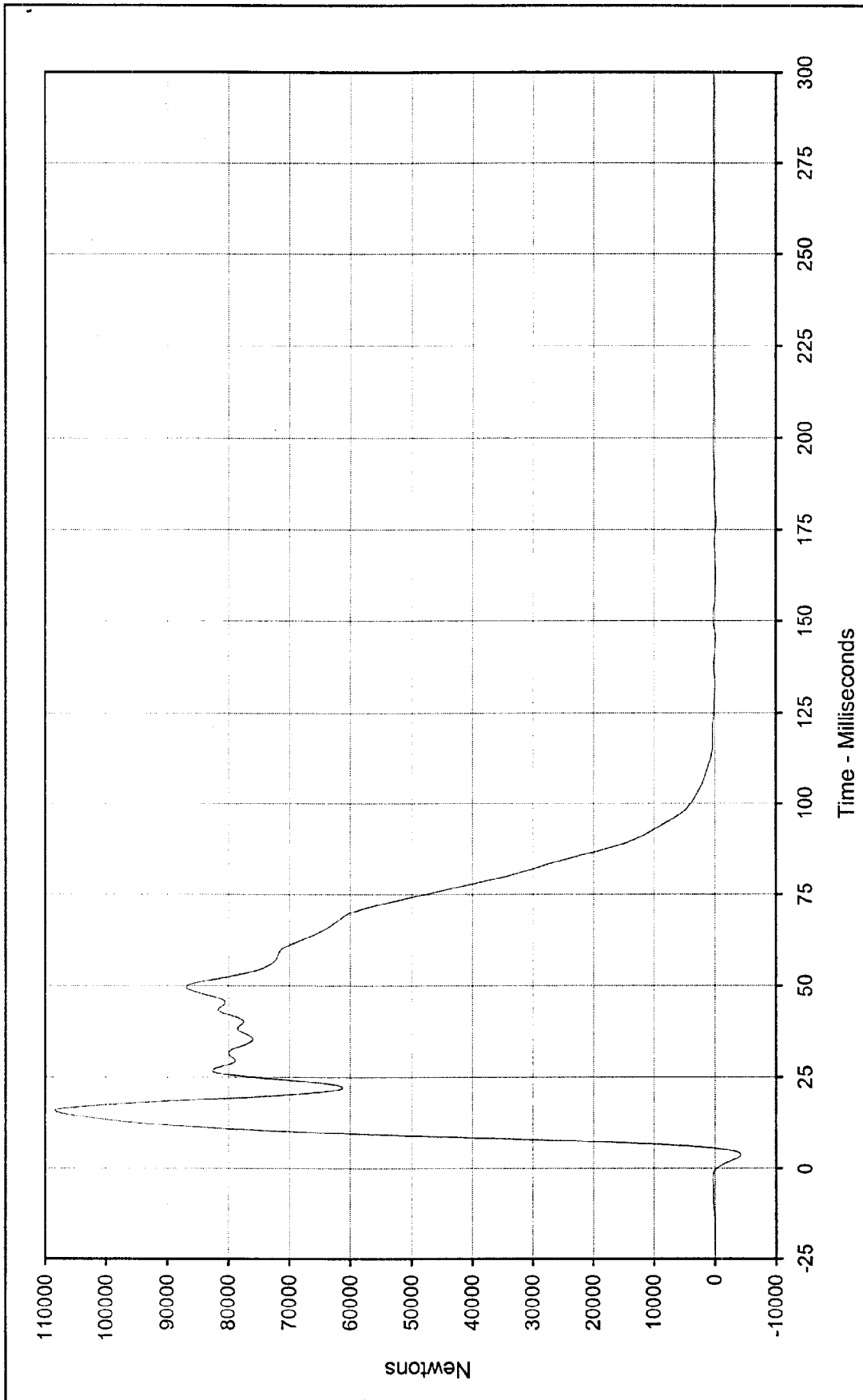
No.: MX0103





Curve Description:	Barrier Force C9	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	7312.1 at 24.8 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-804.4 at 8.0 Milliseconds			
SAE Filter Class:	60			
Date of Test:	2/12/99			
Curve Number:	FIL-124			

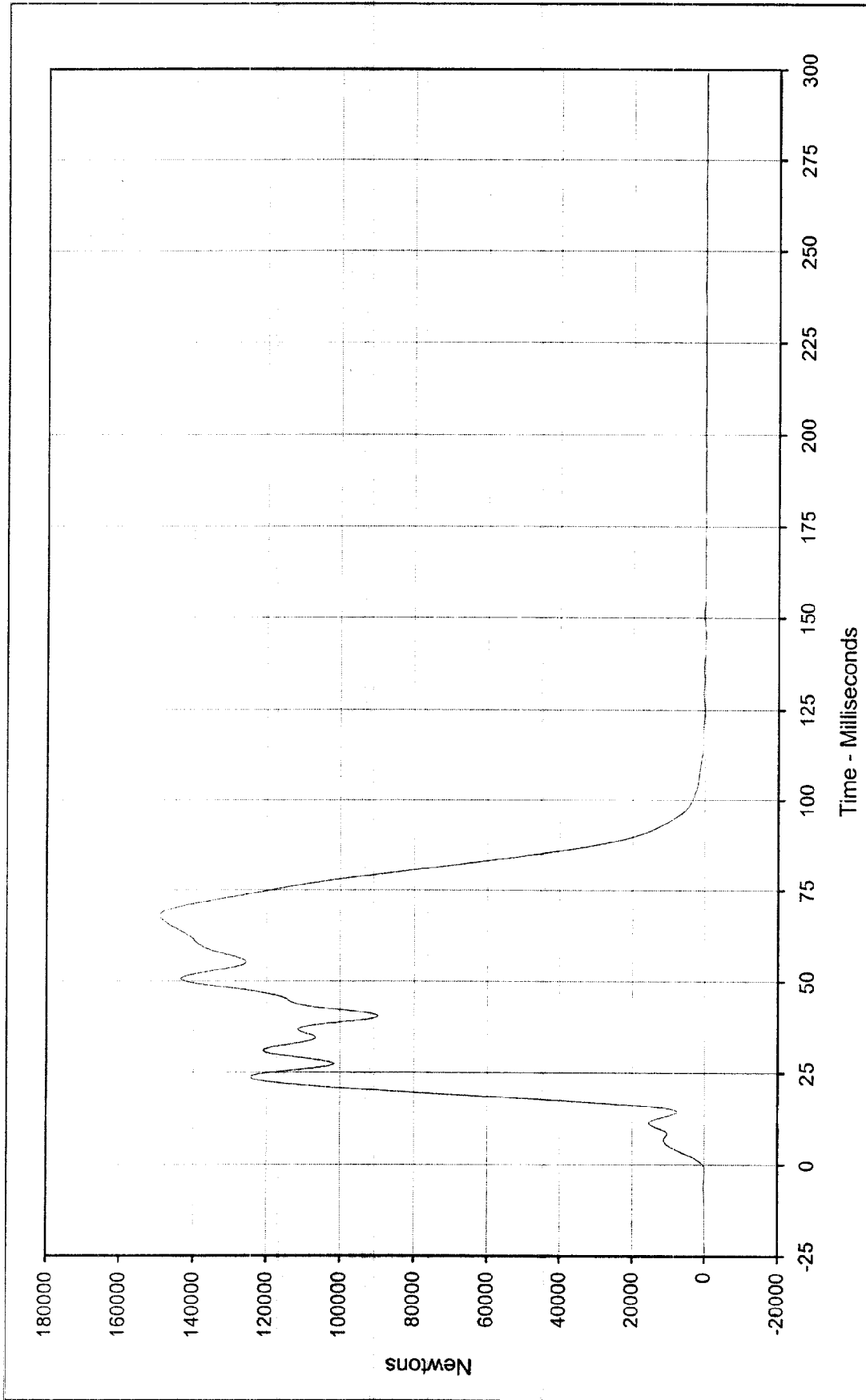




Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van



Curve Description: Barrier Force Sum No.1
 Maximum Value: 108406.9 at 15.9 Milliseconds
 Minimum Value: -4254.0 at 3.9 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/12/99
 Curve Number: SUM-001



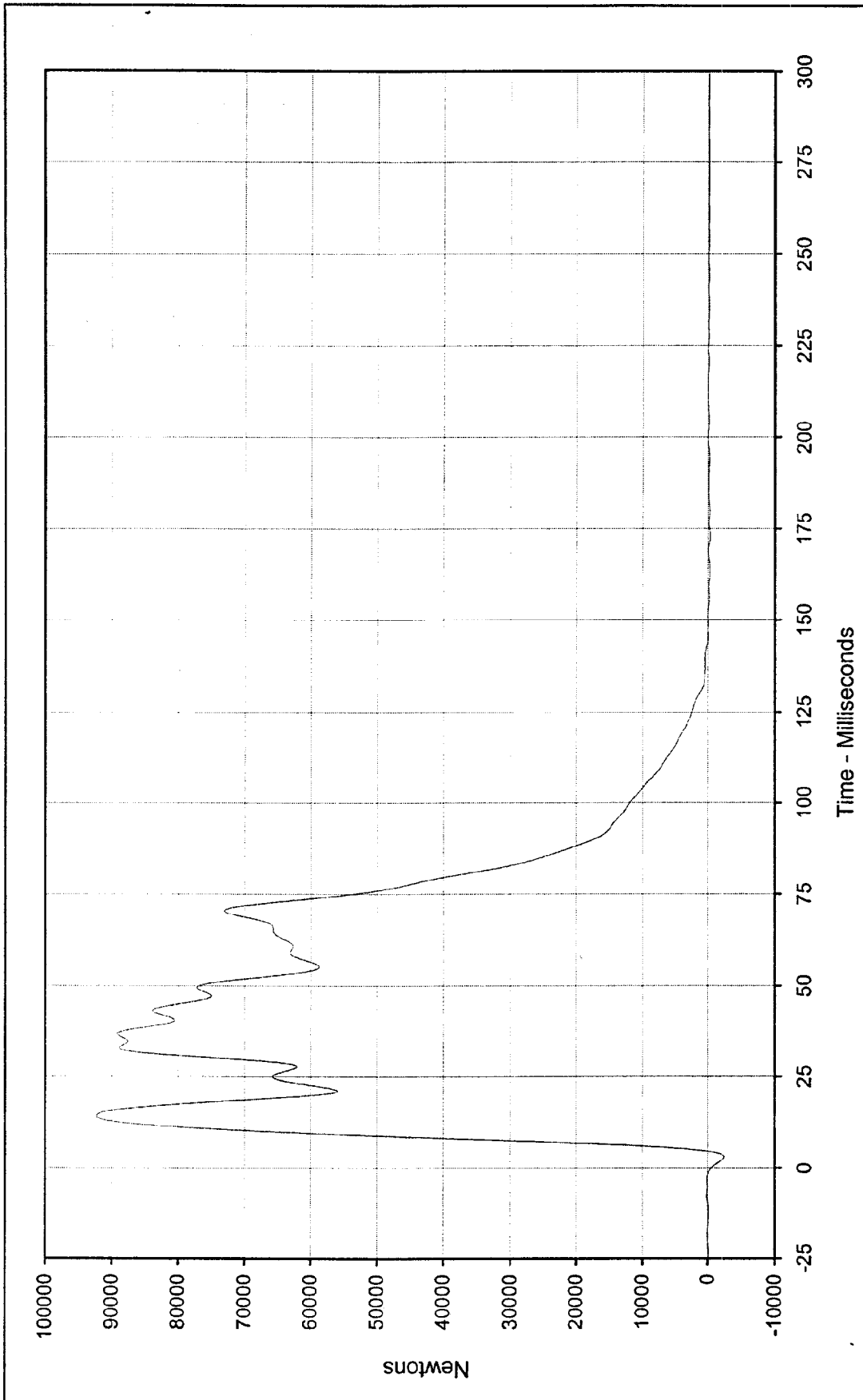
Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Program: 1999 Chevrolet Astro LS Van

Barrier Force Sum No.2
 Maximum Value: 148958.8 at 67.9 Milliseconds
 Minimum Value: -192.6 at 145.3 Milliseconds

SAE Filter Class: 60
 Date of Test: 2/12/99
 Curve Number: SUM-002

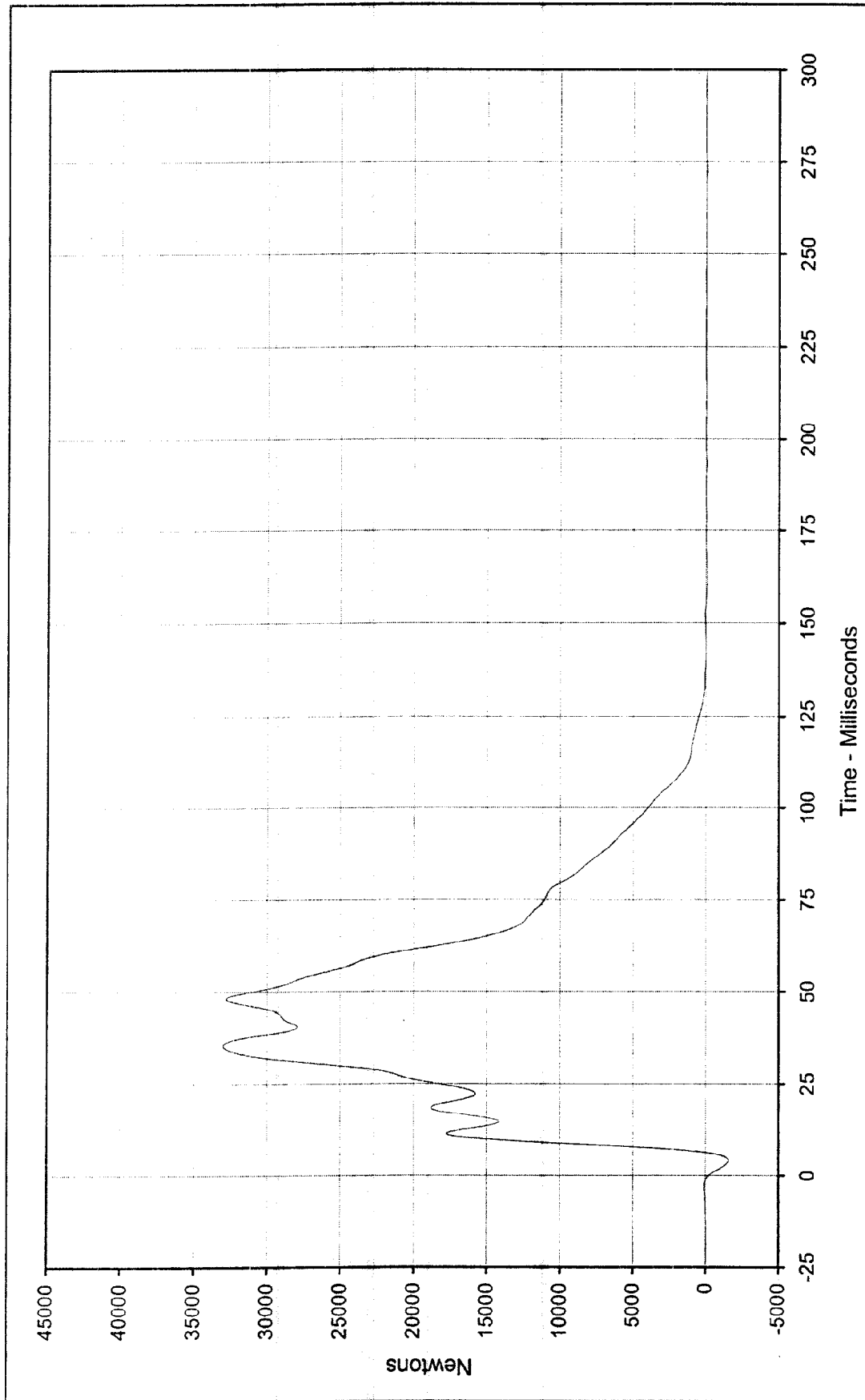




Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Program: 1999 Chevrolet Astro LS Van
 Test Vehicle:

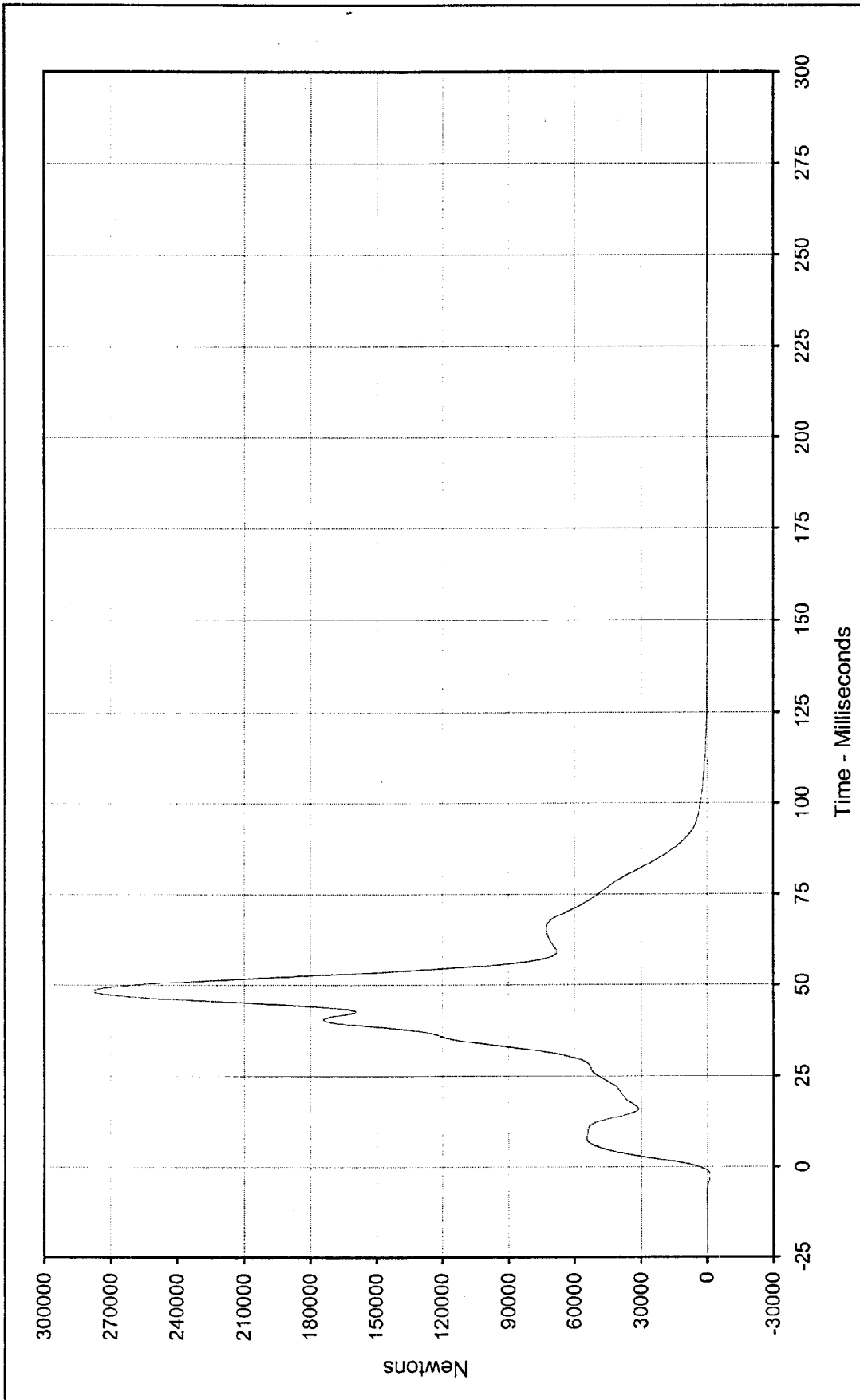
Barrier Force Sum No.3
 Maximum Value: 92275.8 at 14.2 Milliseconds
 Minimum Value: -2462.2 at 2.9 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/12/99
 Curve Number: SUM-003





Curve Description:	Barrier Force Sum No.4	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX0103
Maximum Value:	32985.2 at 35.2 Milliseconds	Test Vehicle:	1999 Chevrolet Astro LS Van	
Minimum Value:	-1577.4 at 4.1 Milliseconds			
SAE Filter Class:	60			
Date of Test:	2/12/99			
Curve Number:	SUM-004			

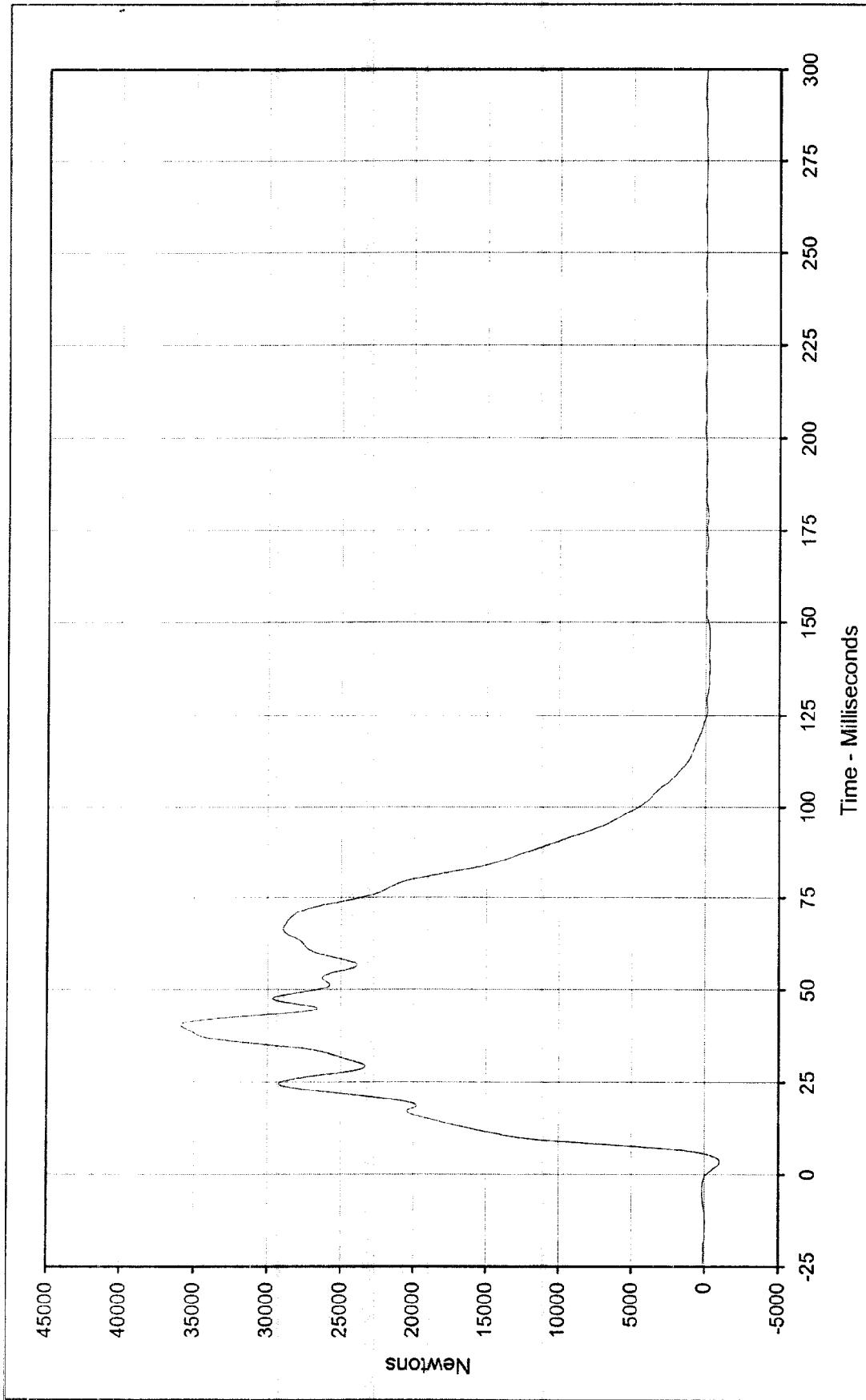




Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Program: 1999 Chevrolet Astro LS Van
 Test Vehicle:

Barrier Force Sum No.5
 Maximum Value: 278366.7 at 48.4 Milliseconds
 Minimum Value: -117.4 at 176.8 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/12/99
 Curve Number: SUM-005





Curve Description: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Program: 1999 Chevrolet Astro LS Van

Barrier Force Sum No.6

Maximum Value: 35880.5 at 40.4 Milliseconds

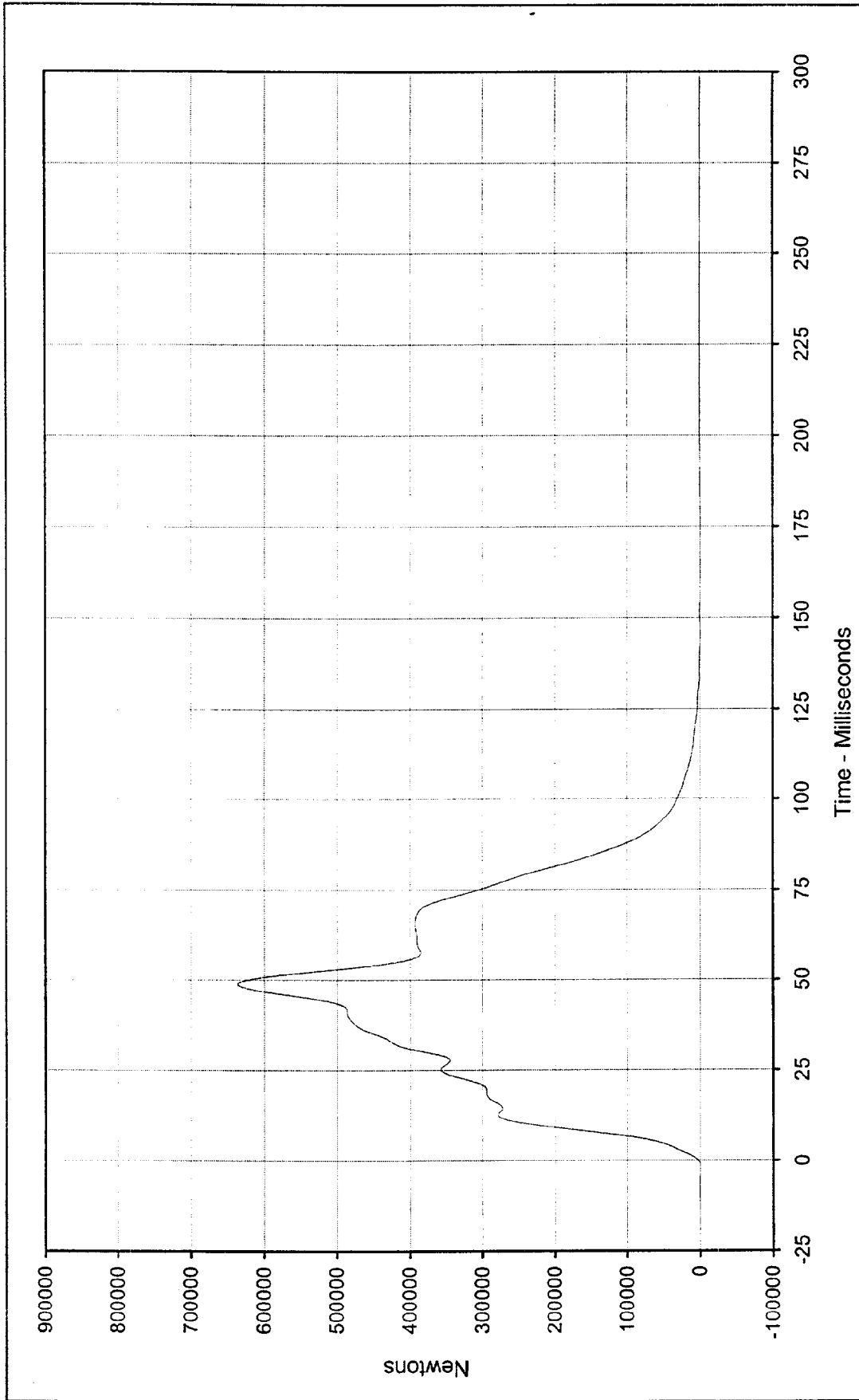
Minimum Value: -998.4 at 3.4 Milliseconds

SAE Filter Class: 60

Date of Test: 2/12/99

Curve Number: SUM-006





Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103

Test Vehicle: 1999 Chevrolet Astro LS Van

Curve Description: Barrier Force Sum Total

Maximum Value: 636215.4 at 48.9 Milliseconds

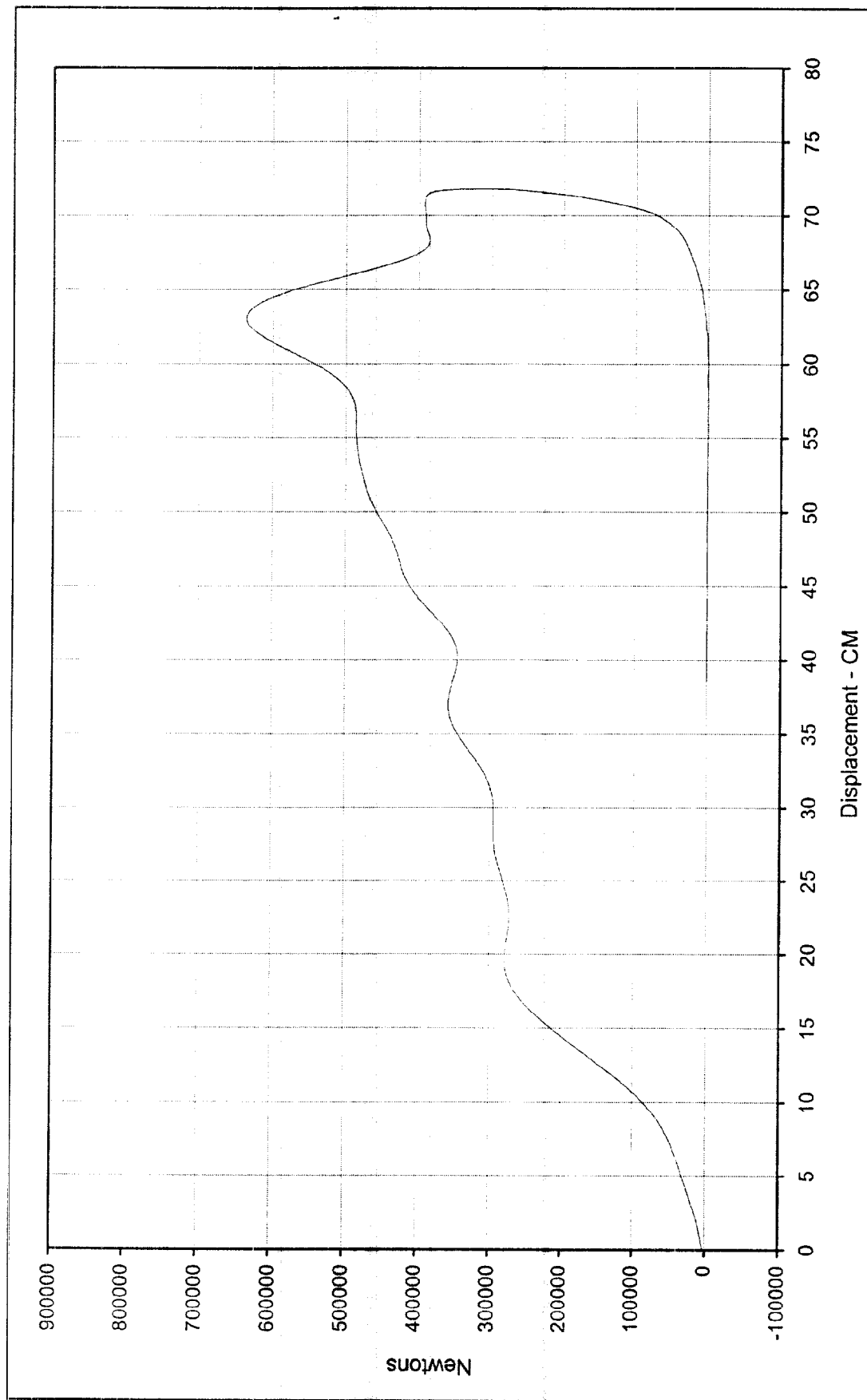
Minimum Value: -719.7 at 177.8 Milliseconds

SAE Filter Class: 60

Date of Test: 2/12/99

Curve Number: SUM-007





Curve Description: Sum Force Total vs. Dynamic Crush
 Maximum Displ.: 71.8 at 74.7 Milliseconds
 Maximum Force: 636215.4 at 48.9 Milliseconds
 SAE Filter Class: N/A
 Date of Test: 2/12/99
 Curve Number: XYY-001

Test Program: 1999 NHTSA 35 mph NCAP No.: MX0103
 Test Vehicle: 1999 Chevrolet Astro LS Van



BARRIER LOAD CELL SUMMARY DATATEST VEHICLE: 1999 CHEVROLET ASTRO LS VANNHTSA No.: MX0103TEST PROGRAM: 1999 NHTSA 35 MPH NCAPTEST DATE: 2/12/99**BARRIER LOAD CELL PEAK FORCES**

Location	Units	Max	Time	Min	Time
Barrier Force A2	Newtons	2582.2	64.6	-1431.0	16.3
Barrier Force A3	Newtons	1822.1	25.5	-1059.8	55.2
Barrier Force A4	Newtons	36570.6	23.8	-862.9	14.8
Barrier Force A5	Newtons	20508.9	30.4	-856.7	8.1
Barrier Force A6	Newtons	37833.9	32.2	-714.1	8.1
Barrier Force A7	Newtons	2058.3	25.1	-1263.8	54.9
Barrier Force A8	Newtons	3332.4	71.8	-879.7	54.2
Barrier Force A9	Newtons	5495.3	64.7	-695.5	21.5
Barrier Force B2	Newtons	6428.3	30.9	-965.3	6.9
Barrier Force B3	Newtons	107363.7	15.7	-2549.9	3.7
Barrier Force B4	Newtons	48104.1	51.3	-138.8	0.0
Barrier Force B5	Newtons	32976.1	67.1	-823.4	15.3
Barrier Force B6	Newtons	31441.2	36.1	-250.8	0.0
Barrier Force B7	Newtons	92203.5	14.8	-2132.1	3.0
Barrier Force B8	Newtons	3847.3	71.3	-729.9	7.4
Barrier Force B9	Newtons	4713.5	71.6	-569.4	8.0
Barrier Force C2	Newtons	13510.6	35.9	-1037.5	6.8
Barrier Force C3	Newtons	23072.1	48.0	-935.2	3.6
Barrier Force C4	Newtons	57368.3	48.2	-604.4	0.0
Barrier Force C5	Newtons	174239.0	48.6	-214.7	15.3
Barrier Force C6	Newtons	47037.6	48.2	-331.4	0.0
Barrier Force C7	Newtons	24050.1	40.9	-688.7	2.9
Barrier Force C8	Newtons	6718.0	22.3	-877.5	7.5
Barrier Force C9	Newtons	7312.1	24.8	-804.4	8.0
Barrier Force Sum No.1	Newtons	108406.9	15.9	-4254.0	3.9
Barrier Force Sum No.2	Newtons	148958.8	67.9	-192.6	145.3
Barrier Force Sum No.3	Newtons	92275.8	14.2	-2462.2	2.9
Barrier Force Sum No.4	Newtons	32985.2	35.2	-1577.4	4.1
Barrier Force Sum No.5	Newtons	278366.7	48.4	-117.4	176.8
Barrier Force Sum No.6	Newtons	35880.5	40.4	-998.4	3.4
Barrier Force Sum Total	Newtons	636215.4	48.9	-719.7	177.8

Barrier Load cells A1,B1,C1, and D1 through D9 (12 locations) were not recorded.

APPENDIX D
INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

1999 NHTSA 35 mph NCAP
Instrumentation Data Channel Assignments
Driver A.T.D Serial Number 35
2/12/99
1999 Chevrolet Astro LS Van

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
1	HEAD, PRIMARY	X	KEAC039	Accel., 1/2 bridge	Endevco	7264-2000	G
2	HEAD, PRIMARY	Y	KEAC038	Accel., 1/2 bridge	Endevco	7264-2000	G
3	HEAD, PRIMARY	Z	KEAC027	Accel., 1/2 bridge	Endevco	7264-2000	G
4	HEAD, REDUNDANT	X	KEAC031	Accel., 1/2 bridge	Endevco	7264-2000	G
5	HEAD, REDUNDANT	Y	KEAC032	Accel., 1/2 bridge	Endevco	7264-2000	G
6	HEAD, REDUNDANT	Z	KEAC026	Accel., 1/2 bridge	Endevco	7264-2000	G
7	NECK FORCE	X	GPUN02FX	Load cell, six axis neck	R. A. Denton	1716A	N
8	NECK FORCE	Y	GPUN02FY	Load cell, six axis neck	R. A. Denton	1716A	N
9	NECK FORCE	Z	GPUN02FZ	Load cell, six axis neck	R. A. Denton	1716A	N
10	NECK MOMENT	X	GPUN02MX	Load cell, six axis neck	R. A. Denton	1716A	Nm
11	NECK MOMENT	Y	GPUN02MY	Load cell, six axis neck	R. A. Denton	1716A	Nm
12	NECK MOMENT	Z	GPUN02MZ	Load cell, six axis neck	R. A. Denton	1716A	Nm
13	CHEST , PRIMARY	X	GPAC031	Accel., 1/2 bridge	Endevco	7264-2000	G
14	CHEST , PRIMARY	Y	GPAC024	Accel., 1/2 bridge	Endevco	7264-2000	G
15	CHEST , PRIMARY	Z	GPAC029	Accel., 1/2 bridge	Endevco	7264-2000	G
16	CHEST , REDUNDANT	X	KEAC023	Accel., 1/2 bridge	Endevco	7264-200	G
17	CHEST , REDUNDANT	Y	KEAC022	Accel., 1/2 bridge	Endevco	7264-200	G
18	CHEST , REDUNDANT	Z	KEAC024	Accel., 1/2 bridge	Endevco	7264-200	G
19	CHEST DISPLACEMENT	X	GPCP001	Rotary Pot Chest	Servo	14CBI	MM
20	PELVIS, PRIMARY	X	KEAC019	Accel., 1/2 bridge	Endevco	7264-200	G
21	PELVIS, PRIMARY	Y	KEAC020	Accel., 1/2 bridge	Endevco	7264-200	G
22	PELVIS, PRIMARY	Z	KEAC021	Accel., 1/2 bridge	Endevco	7264-200	G
23	LEFT FEMUR FORCE	Z	KEFF002	Load cell, Femur	R.A. Denton	2121	N
24	RIGHT FEMUR FORCE	Z	KEFF003	Load cell, Femur	R.A. Denton	2121	N

1999 NHTSA 35 mph NCAP
Instrumentation Data Channel Assignments
Driver A.T.D Serial Number 35
2/12/99
1999 Chevrolet Astro LS Van

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
25	UP. TIBIA LEFT MOM.	X	GPUT09MX	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
26	UP. TIBIA LEFT MOM.	Y	GPUT09MY	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
27	UP. TIBIA RIGHT MOM.	X	GPUT09MX	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
28	UP. TIBIA RIGHT MOM.	Y	GPUT09MY	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
29	LWR. TIBIA LEFT MOM.	X	GPUT09MX	3 ch., lower tibia gage	R. A. Denton	3093	Nm
30	LWR. TIBIA LEFT MOM.	Y	GPUT09MY	3 ch., lower tibia gage	R. A. Denton	3093	Nm
31	LWR. TIBIA LEFT FORCE	Z	GPUT09FZ	3 ch., lower tibia gage	R. A. Denton	3093	N
32	LWR. TIBIA RIGHT MOM.	X	GPUT09MX	3 ch., lower tibia gage	R. A. Denton	3093	Nm
33	LWR. TIBIA RIGHT MOM.	Y	GPUT09MY	3 ch., lower tibia gage	R. A. Denton	3093	Nm
34	LWR. TIBIA RIGHT FORCE	Z	GPUT09FZ	3 ch., lower tibia gage	R. A. Denton	3093	N
35	FOOT LEFT	X	KEIC003X	Accel., Foot Triax	I.C. Sensor	3031-500	G
36	FOOT LEFT	Y	KEIC003Y	Accel., Foot Triax	I.C. Sensor	3031-500	G
37	FOOT LEFT	Z	KEIC003Z	Accel., Foot Triax	I.C. Sensor	3031-500	G
38	FOOT RIGHT	X	KEIC004X	Accel., Foot Triax	I.C. Sensor	3031-500	G
39	FOOT RIGHT	Y	KEIC004Y	Accel., Foot Triax	I.C. Sensor	3031-500	G
40	FOOT RIGHT	Z	KEIC004Z	Accel., Foot Triax	I.C. Sensor	3031-500	G
41	LAP BELT FORCE	X	KELC001	Load cell, Seat belt	Lebow	3371	N
42	SHOULDER BELT FORCE	X	KELC002	Load cell, Seat belt	Lebow	3371	N
43	SHOULDER BELT SPOOL	X	KEPP001	Pullout pot	Celeco	PTX101-0030	MM
44	SHOULDER BELT ELONG.	X	KEEP001	Linear pot., belt stretch	E.T.I.	LCP8-10 10K	MM/CM

1999 NHTSA 35 mph NCAP
Instrumentation Data Channel Assignments
Driver A.T.D Serial Number 34
2/12/99
1999 Chevrolet Astro LS Van

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
45	HEAD, PRIMARY	X	GPAC027	Accel., 1/2 bridge	Endevco	7264-2000	G
46	HEAD, PRIMARY	Y	GPAC002	Accel., 1/2 bridge	Endevco	7264-2000	G
47	HEAD, PRIMARY	Z	GPAC003	Accel., 1/2 bridge	Endevco	7264-2000	G
48	HEAD, REDUNDANT	X	GPAC032	Accel., 1/2 bridge	Endevco	7264-2000	G
49	HEAD, REDUNDANT	Y	GPAC021	Accel., 1/2 bridge	Endevco	7264-2000	G
50	HEAD, REDUNDANT	Z	GPAC026	Accel., 1/2 bridge	Endevco	7264-2000	G
51	NECK FORCE	X	GPUN01FX	Load cell, six axis neck	R. A. Denton	1716A	N
52	NECK FORCE	Y	GPUN01FY	Load cell, six axis neck	R. A. Denton	1716A	N
53	NECK FORCE	Z	GPUN01FZ	Load cell, six axis neck	R. A. Denton	1716A	N
54	NECK MOMENT	X	GPUN01MX	Load cell, six axis neck	R. A. Denton	1716A	Nm
55	NECK MOMENT	Y	GPUN01MY	Load cell, six axis neck	R. A. Denton	1716A	Nm
56	NECK MOMENT	Z	GPUN01MZ	Load cell, six axis neck	R. A. Denton	1716A	Nm
57	CHEST, PRIMARY	X	GPAC005	Accel., 1/2 bridge	Endevco	7264-2000	G
58	CHEST, PRIMARY	Y	GPAC011	Accel., 1/2 bridge	Endevco	7264-2000	G
59	CHEST, PRIMARY	Z	GPAC010	Accel., 1/2 bridge	Endevco	7264-2000	G
60	CHEST, REDUNDANT	X	GPAC034	Accel., 1/2 bridge	Endevco	7264-2000	G
61	CHEST, REDUNDANT	Y	GPAC023	Accel., 1/2 bridge	Endevco	7264-2000	G
62	CHEST, REDUNDANT	Z	GPAC020	Accel., 1/2 bridge	Endevco	7264-2000	G
63	CHEST DISPLACEMENT	X	GPCP002	Rotary Pot Chest	Servo	14CBI	MM
64	PELVIS, PRIMARY	X	GPAC025	Accel., 1/2 bridge	Endevco	7264-2000	G
65	PELVIS, PRIMARY	Y	GPAC022	Accel., 1/2 bridge	Endevco	7264-2000	G
66	PELVIS, PRIMARY	Z	GPAC019	Accel., 1/2 bridge	Endevco	7264-2000	G
67	LEFT FEMUR FORCE	Z	KEFF001	Load cell, Femur	R.A. Denton	2121	N
68	RIGHT FEMUR FORCE	Z	GPLC001	Load cell, Femur	G.S.E.	2430	N

**1999 NHTSA 35 mph NCAP
Instrumentation Data Channel Assignments**

Driver A.T.D Serial Number 34

2/12/99

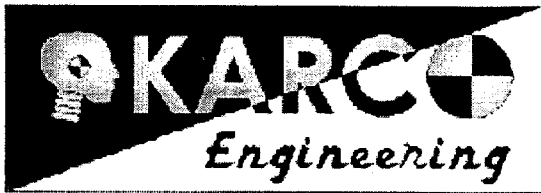
1999 Chevrolet Astro LS Van

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
69	UP. TIBIA LEFT MOM.	X	GPUT09MX	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
70	UP. TIBIA LEFT MOM.	Y	GPUT09MY	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
71	UP. TIBIA RIGHT MOM.	X	GPUT09MX	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
72	UP. TIBIA RIGHT MOM.	Y	GPUT09MY	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
73	LWR. TIBIA LEFT MOM.	X	GPLT09MX	3 ch., lower tibia gage	R. A. Denton	3093	Nm
74	LWR. TIBIA LEFT MOM.	Y	GPLT09MY	3 ch., lower tibia gage	R. A. Denton	3093	Nm
75	LWR. TIBIA LEFT FORCE	Z	GPLT09FZ	3 ch., lower tibia gage	R. A. Denton	3093	N
76	LWR. TIBIA RIGHT MOM.	X	GPLT09MX	3 ch., lower tibia gage	R. A. Denton	3093	Nm
77	LWR. TIBIA RIGHT MOM.	Y	GPLT09MY	3 ch., lower tibia gage	R. A. Denton	3093	Nm
78	LWR. TIBIA RIGHT FORCE	Z	GPLT09FZ	3 ch., lower tibia gage	R. A. Denton	3093	N
79	FOOT LEFT	X	KEIC002X	Accel., Foot Triax	I.C. Sensor	3031-500	G
80	FOOT LEFT	Y	KEIC002Y	Accel., Foot Triax	I.C. Sensor	3031-500	G
81	FOOT LEFT	Z	KEIC002Z	Accel., Foot Triax	I.C. Sensor	3031-500	G
82	FOOT RIGHT	X	KEIC001X	Accel., Foot Triax	I.C. Sensor	3031-500	G
83	FOOT RIGHT	Y	KEIC001Y	Accel., Foot Triax	I.C. Sensor	3031-500	G
84	FOOT RIGHT	Z	KEIC001Z	Accel., Foot Triax	I.C. Sensor	3031-500	G
85	LAP BELT FORCE	X	KELC003	Load cell, Seat belt	Lebow	3371	N
86	SHOULDER BELT FORCE	X	KELC004	Load cell, Seat belt	Lebow	3371	N
87	SHOULDER BELT SPOOL	X	KEPP001	Pullout pot	Celesco	PTX101-0030	CM
88	SHOULDER BELT ELONG.	X	KEEP001	Linear pot., belt stretch	E.T.I.	LCP8-10 10K	MM/CM

1999 NHTSA 35 mph NCAP
Instrumentation Data Channel Assignments
Vehicle Accelerometers
2/12/99
1999 Chevrolet Astro LS Van

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
89	Left Rear X-Member (Pri.)	X	KEVA005	Accel., Vehicle block	I.C. Sensor	3031-500	G
90	Right Rear X-Member (Pri.)	X	KEVA006	Accel., Vehicle block	I.C. Sensor	3031-200	G
91	Engine Top	X	KEVA011	Accel., Vehicle block	I.C. Sensor	3031-200	G
92	Engine Bottom	X	KEVA007	Accel., Vehicle block	I.C. Sensor	3031-500	G
93	Left Brake Caliper	X	KEVA008	Accel., Vehicle block	I.C. Sensor	3031-500	G
94	Right Brake Caliper	X	KEVA009	Accel., Vehicle block	I.C. Sensor	3031-500	G
95	Instrument Panel	X	KEVA004	Accel., Vehicle block	I.C. Sensor	3031-500	G
96	Left Rear X-Member (Rednt.)	X	KEVA010	Accel., Vehicle block	I.C. Sensor	3031-200	G

APPENDIX E
DUMMY CALIBRATION DATA



Hybrid III Calibration Data Sheet

50TH Percentile Male

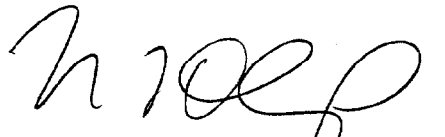
Left Knee Impact Test

ATD Serial No.: 34

Part Serial No.: N/A

Test I.D.: KI02C

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	2.073 to 2.134	2.091	Pass
Peak Probe Force	Newtons	4715 to 5782	5292.5	Pass
Overall Test Results				Pass



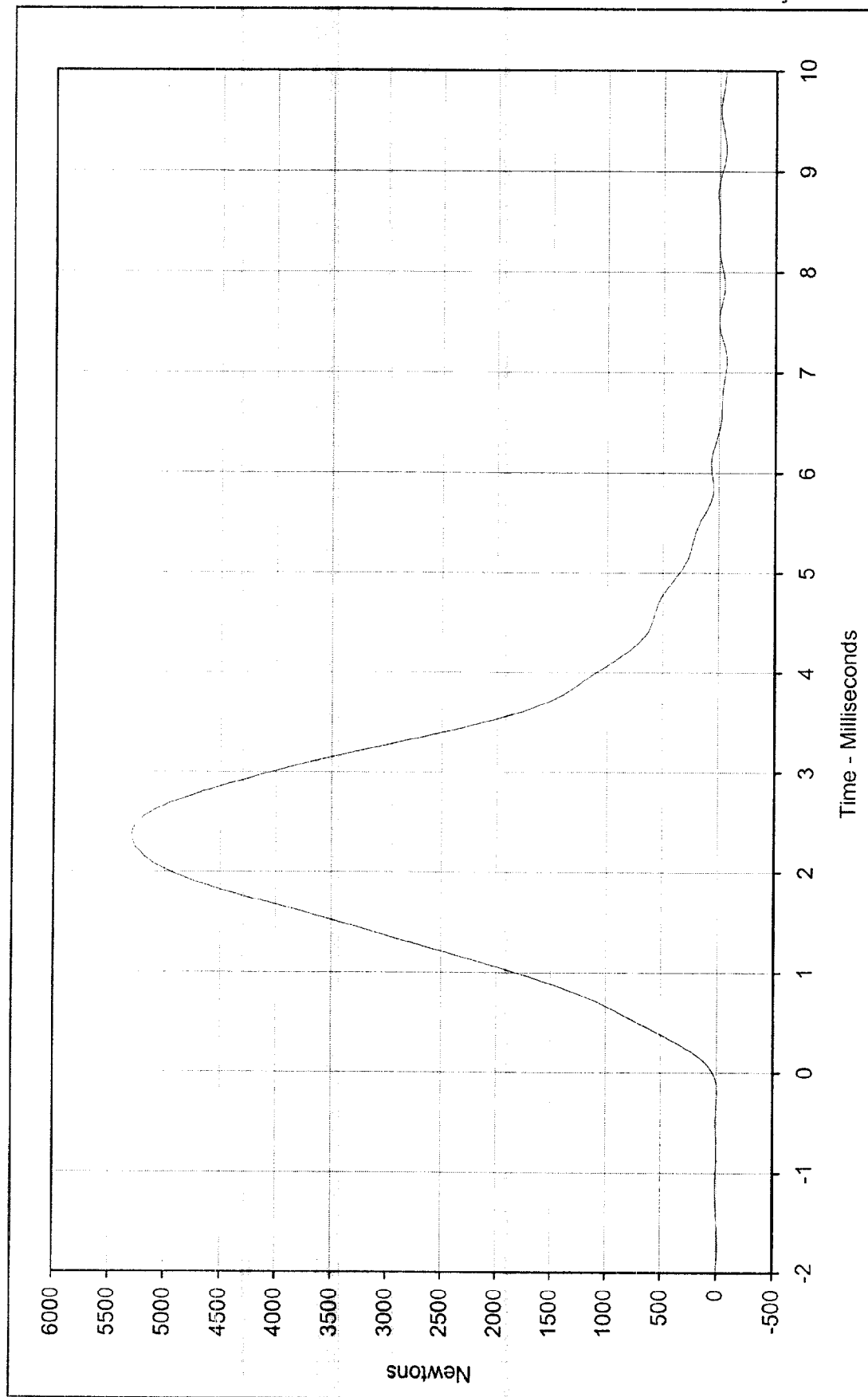
Laboratory Technician

January 23, 1999
Test Date



Approved By

2/15/99
Date



Curve Description:	Testing Program	Hybrid III Left Knee Impact Test
Maximum Value:	Part S/N:	N/A
Minimum Value:	Test I.D.:	KI02C



Probe Force	at	2.4	Milliseconds
SAE Filter Class:	at	7.1	Milliseconds
Date of Test:			
ATD Serial No.:			



Hybrid III Calibration Data Sheet

50TH Percentile Male

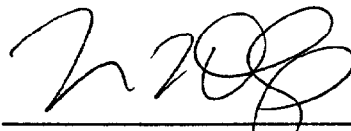
Right Knee Impact Test

ATD Serial No.: 34

Part Serial No.: N/A

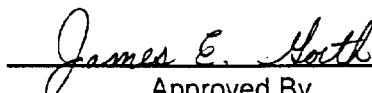
Test I.D.: KI02D

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	2.073 to 2.134	2.087	Pass
Peak Probe Force	Newtons	4715 to 5782	5480.7	Pass
Overall Test Results				Pass



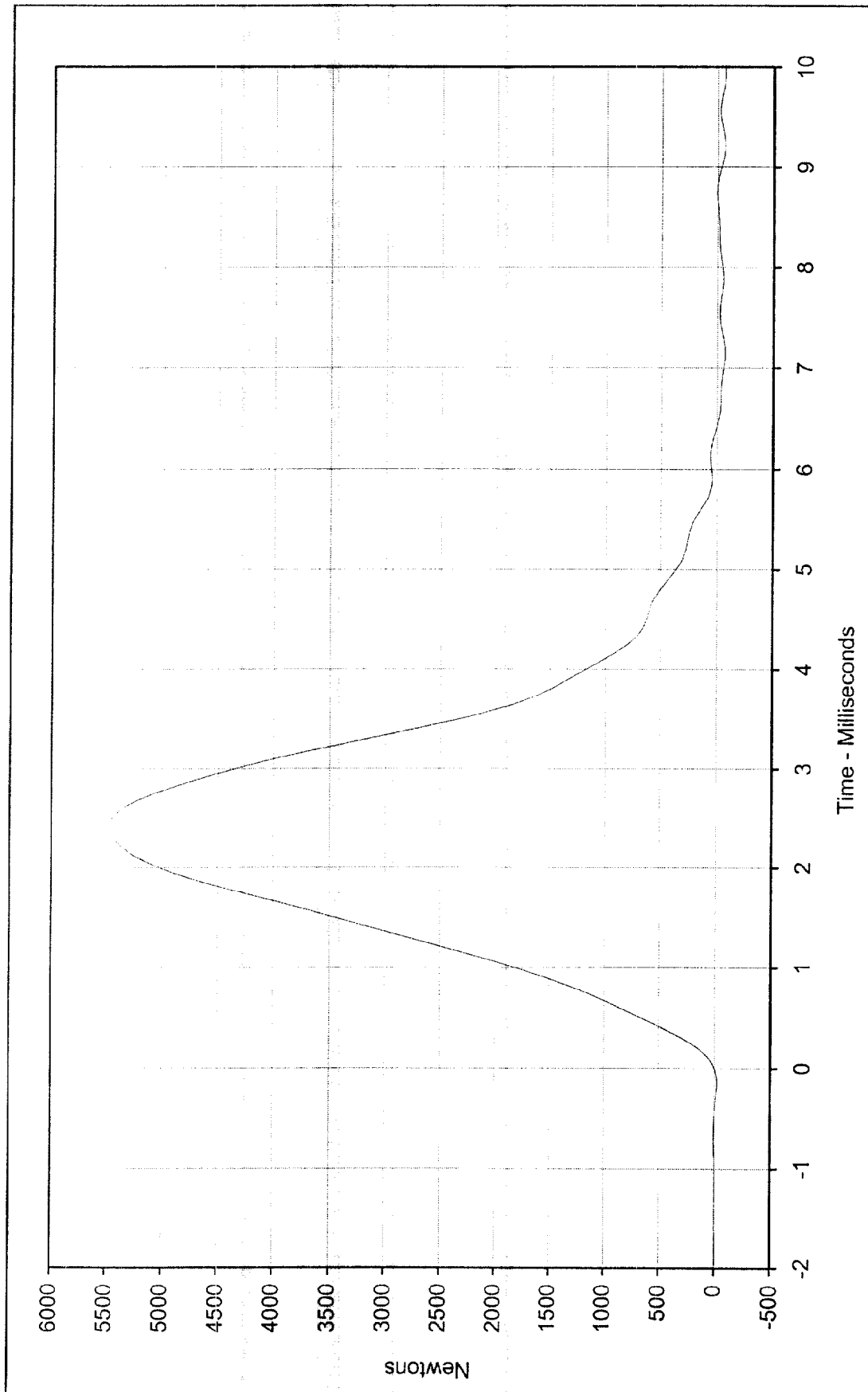
Laboratory Technician

January 23, 1999
Test Date



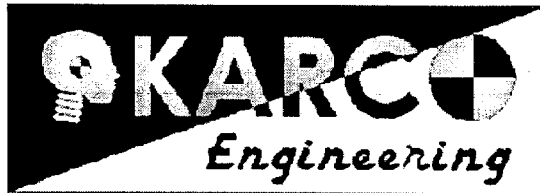
Approved By

2/15/99
Date



Curve Description: _____ Testing Program: Hybrid III Right Knee Impact Test
 Maximum Value: 5480.7 at 2.4 Milliseconds
 Minimum Value: -65.2 at 7.1 Milliseconds
 SAE Filter Class: 600
 Date of Test: 1/23/99
 ATD Serial No.: 34





Hybrid III Calibration Data Sheet

50TH Percentile Male

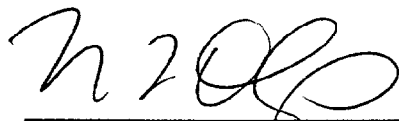
Head Drop Calibration

ATD Serial No.: 034

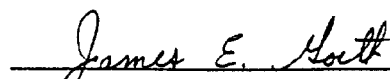
Part Serial No.: N/A

Test I.D.: HD01D

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	242.9	Pass
Peak Lateral Acceleration	G's	≤15.0	2.9	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



Laboratory Technician



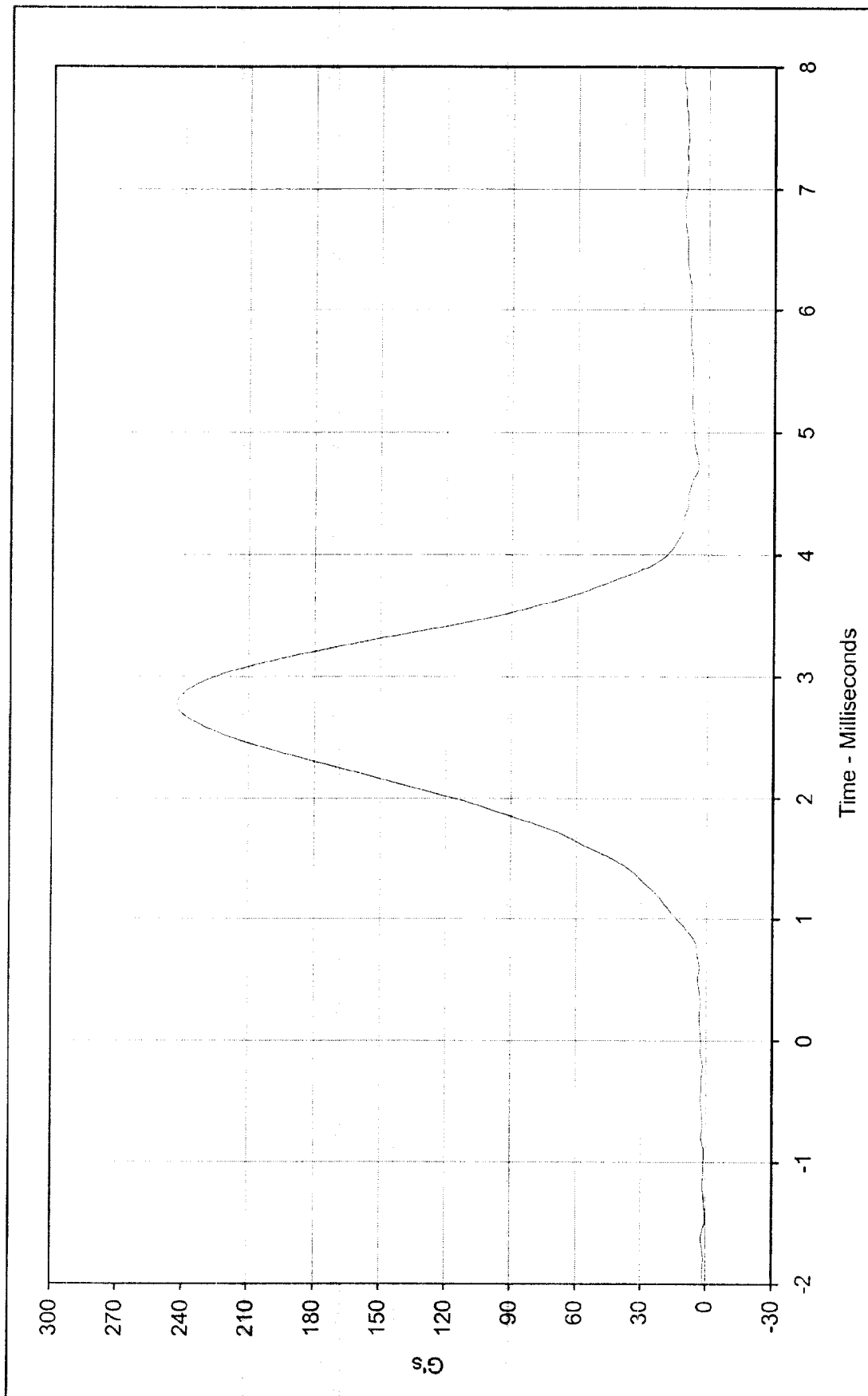
Approved By

January 23, 1999

Test Date

2/15/99

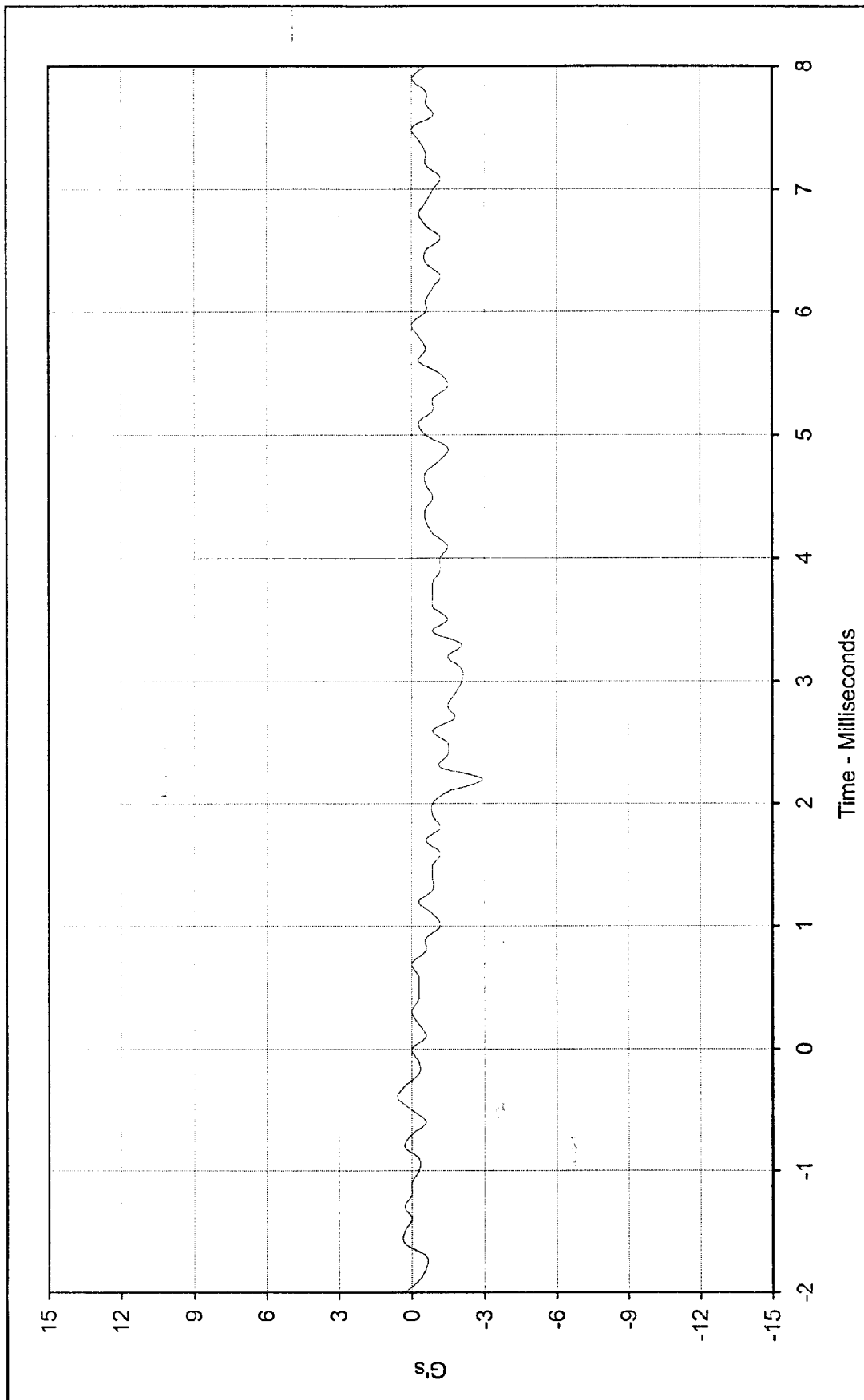
Date



Curve Description:	Head Resultant Acceleration	Testing Program	Hybrid III Head Drop Calibration (Male)
Maximum Value:	242.9 at 2.8 Milliseconds	Test Information:	S/N of Part: N/A Test I.D.: HD01D
Minimum Value:	0.4 at -1.5 Milliseconds		



SAE Filter Class:	1000
Date of Test:	1/23/99
ATD Serial No.:	034



Testing Program Hybrid III Head Drop Calibration (Male)
 Test Information: S/N of Part: N/A Test I.D.: HD01D



Curve Description: Head Acceleration Y Axis
 Maximum Value: 0.6 at -0.4 Milliseconds
 Minimum Value: -2.9 at 2.2 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 1/23/99
 ATD Serial No.: 034



Hybrid III Calibration Data Sheet

50TH Percentile Male

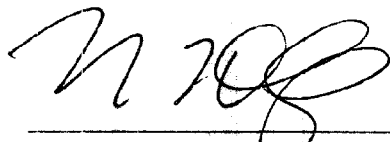
Thorax Impact Test

ATD Serial No.: 034

Part Serial No.: N/A

Test I.D.: CH02F

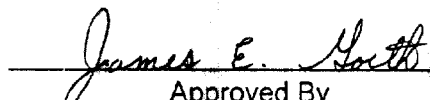
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Probe Velocity	m/s	6.58 to 6.82	6.67	Pass
Peak Probe Force	Newtons	5159 to 5893	5358	Pass
Peak Sternum Displacement	CM	6.35 to 7.26	6.55	Pass
Internal Hysteresis	%	69 to 85	73.6	Pass
Overall Test Results				Pass



Laboratory Technician

January 24, 1999

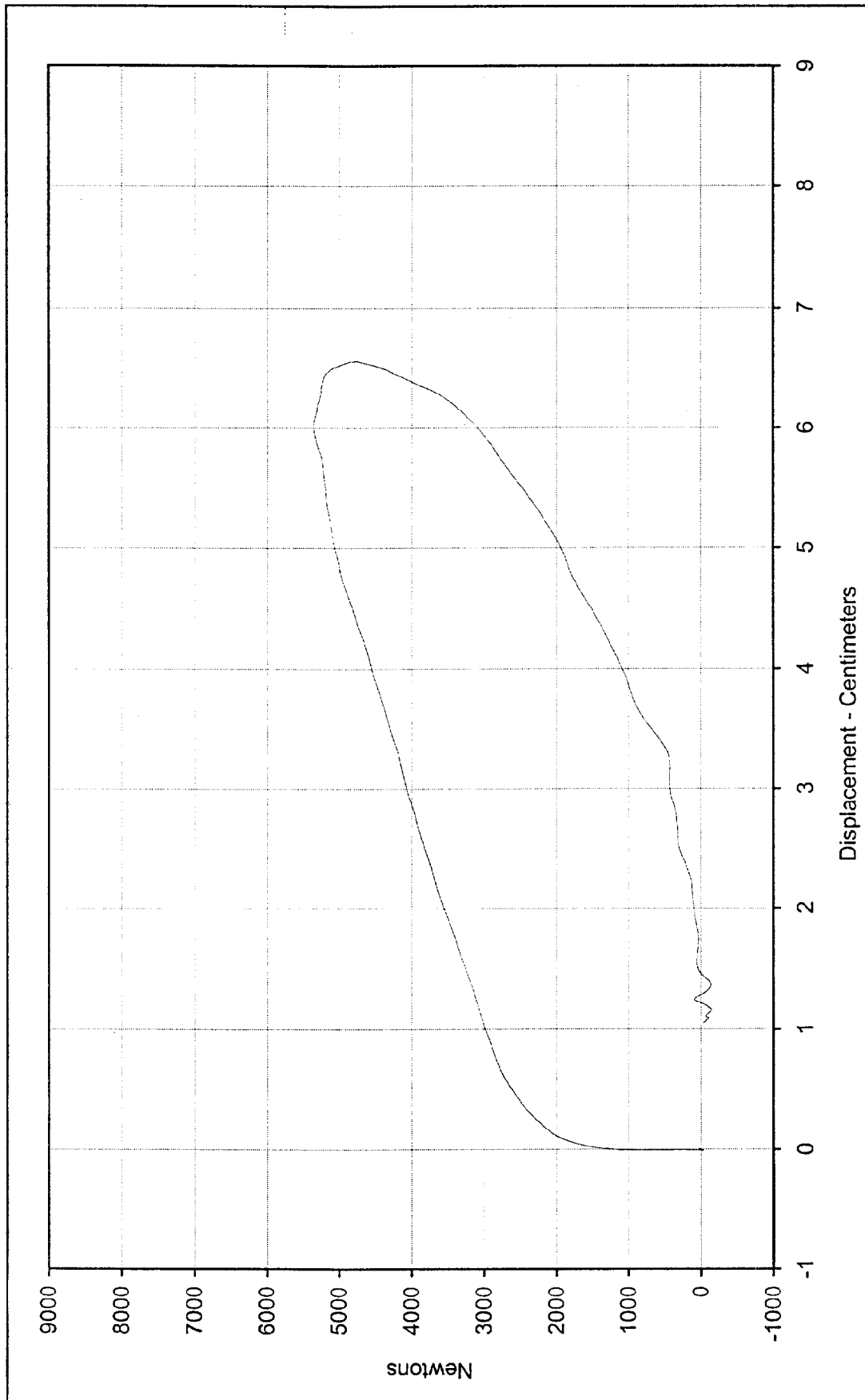
Test Date



Approved By

2/15/99

Date



Curve Description:	Probe Force vs. Chest Displacement	Testing Program	Hybrid III Thorax Impact Test
Probe Force:	5358.3 Newtons	Test Information:	S/N of Part: N/A Test I.D.: CH02F

Chest Displ.:	6.55 Centimeters
SAE Filter Class:	180
Date of Test:	1/24/99
ATD Serial No.:	034





Hybrid III Calibration Data Sheet

50TH Percentile Male

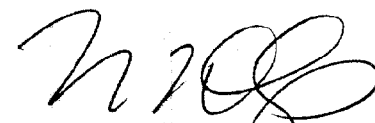
Neck Flexion Test

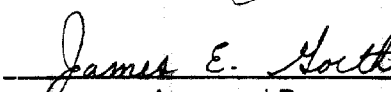
ATD Serial No.: 034

Part Serial No.: N/A

Test I.D.: NF01C

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	39	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.90	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	22.7	Pass
	20 Msec.	G's	17.6 to 22.6	19.7	Pass
	30 Msec.	G's	12.5 to 18.5	18.1	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	18.3	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	38.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	68.3	Pass
	Time	Msec.	57.0 to 64.0	63.2	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	113.6	Pass
Moment About Occipital Condyle	Maximum	N • m	84.1 to 108.5	89.3	Pass
	Time	Msec.	47.0 to 58.0	53.1	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	99.3	Pass
Overall Test Results					Pass


 Laboratory Technician

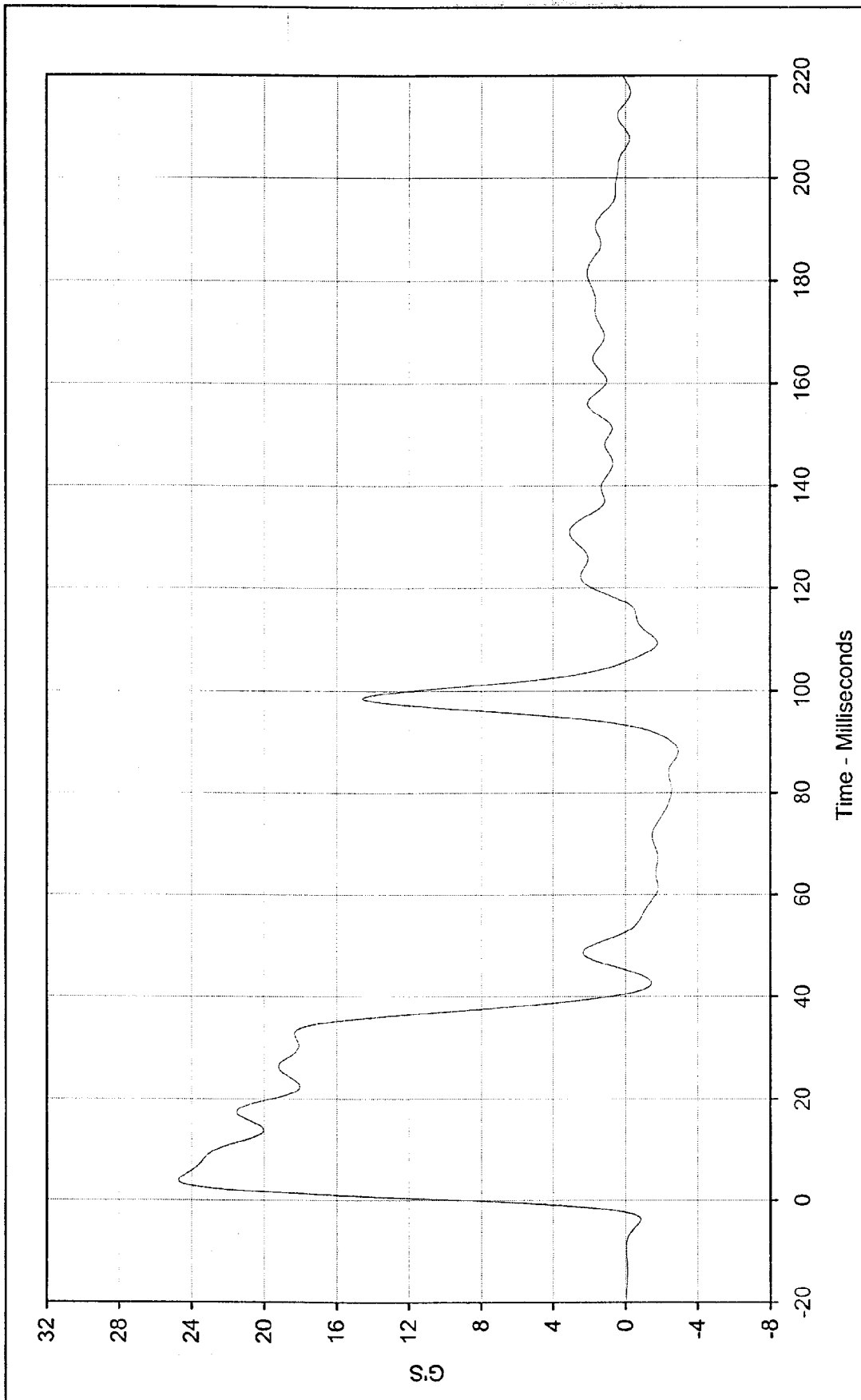

 Approved By

January 24, 1999

Test Date

2/15/99

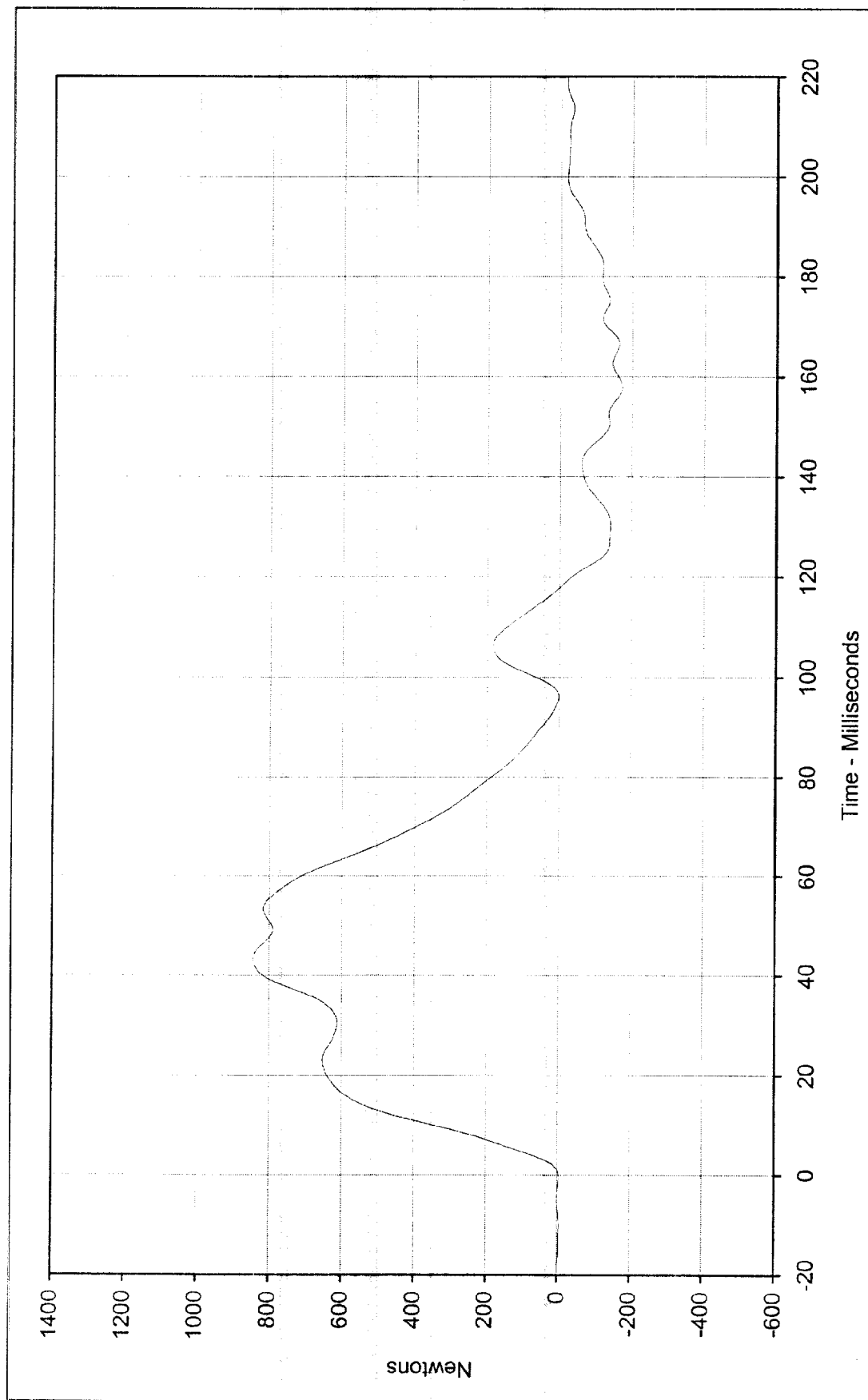
Date



Curve Description: Hybrid III Neck Flexion Test (Male)
 Testing Program: S/N of Part: N/A Test I.D.: NF01C

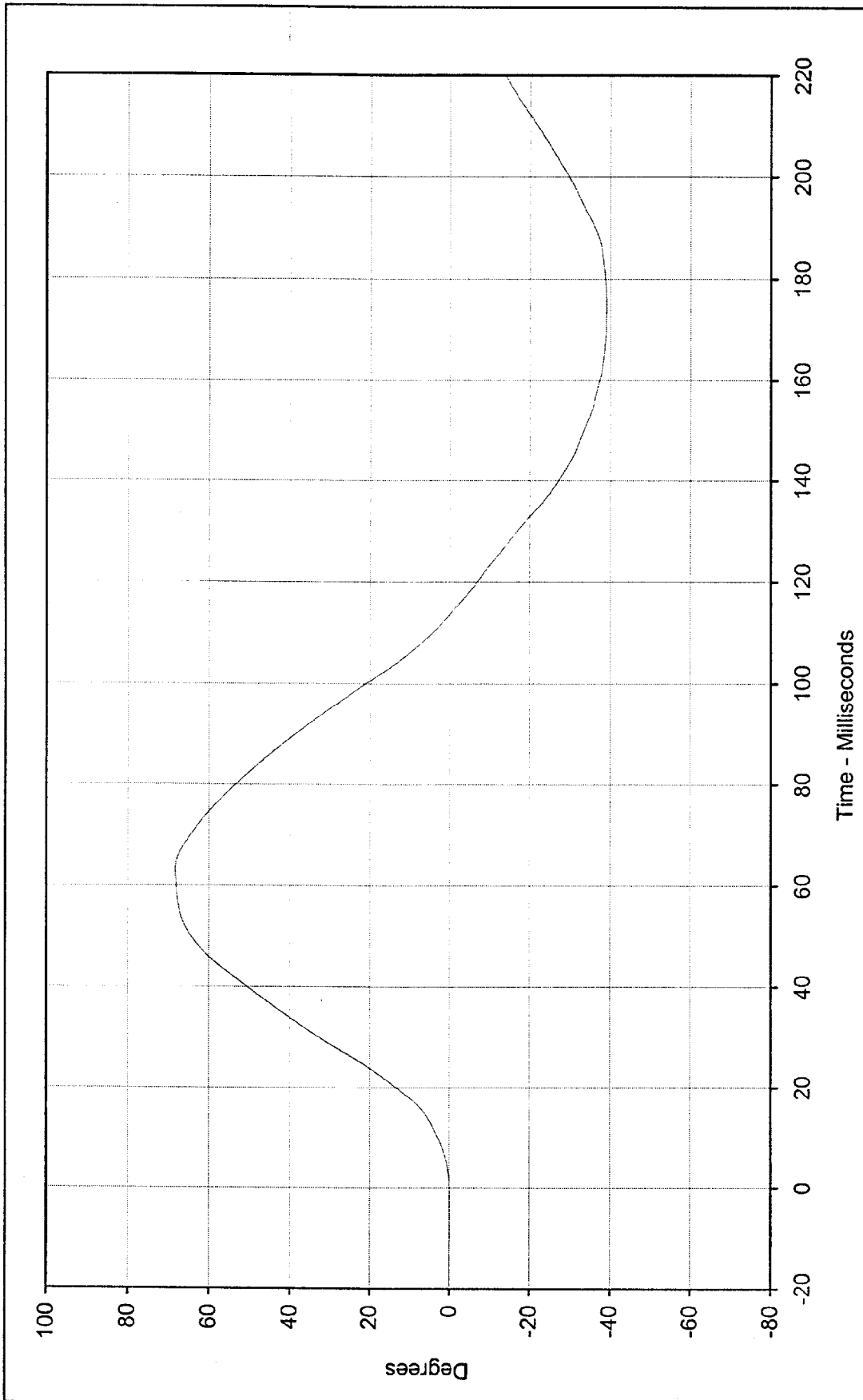
Pendulum Deceleration
 Maximum Value: 24.7 at 4.0 Milliseconds
 Minimum Value: -2.9 at 88.0 Milliseconds
 SAE Filter Class: 60
 Date of Test: 1/24/99
 ATD Serial No.: 034





Curve Description:		Neck Force X		Testing Program	Hybrid III Neck Flexion Test (Male)
Maximum Value:	843.9	at	43.3	S/N of Part:	N/A
Minimum Value:	-172.3	at	158.0	Test I.D.:	NF01C
SAE Filter Class:	60				
Date of Test:	1/24/99				
ATD Serial No.:	034				

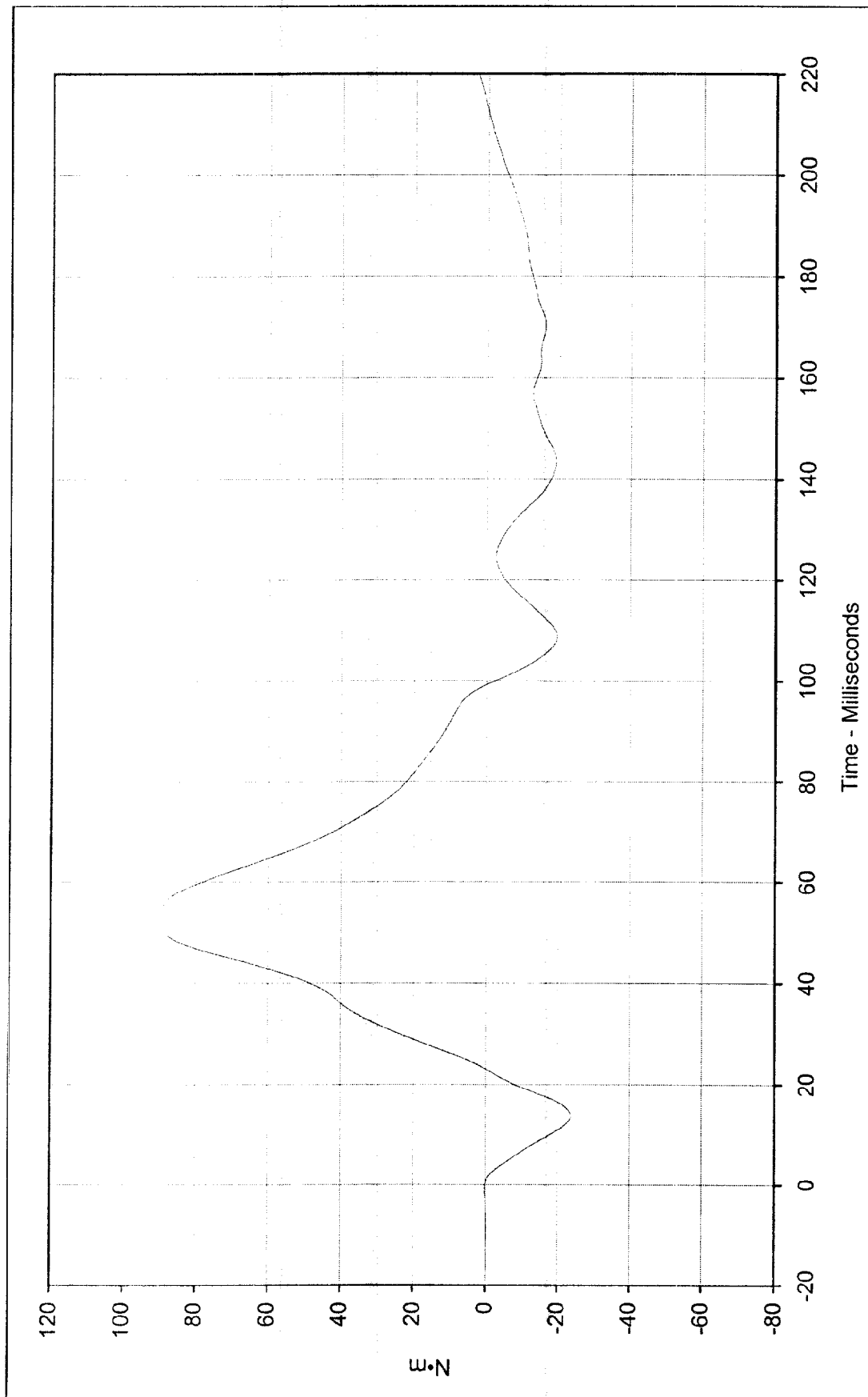




Curve Description: "D" Plane Rotation
 Maximum Value: 68.3 at 63.2 Milliseconds
 Minimum Value: -39.1 at 174.7 Milliseconds
 SAE Filter Class: 60
 Date of Test: 1/24/99
 ATD Serial No.: 034

Testing Program: Hybrid III Neck Flexion Test (Male)
 Test Information: S/N of Part: N/A Test I.D.: NF01C





Curve Description:	Moment About Occipital Condyles	Testing Program	Hybrid III Neck Flexion Test (Male)
Maximum Value:	89.3 at 53.1 Milliseconds	Test Information:	S/N of Part: N/A Test I.D.: NF01C
Minimum Value:	-23.7 at 13.7 Milliseconds		



SAE Filter Class:	60
Date of Test:	1/24/99
ATD Serial No.:	034



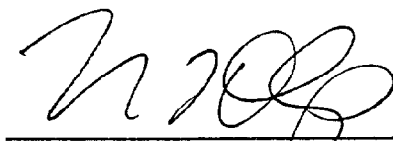
Hybrid III Calibration Data Sheet

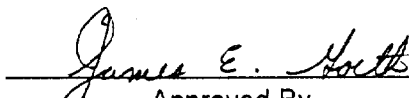
50TH Percentile Male

Neck Extension Test

ATD Serial No.: 034Part Serial No.: N/ATest I.D.: NE01D

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	36	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.18	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	19.7	Pass
	20 Msec.	G's	14.0 to 19.0	18.2	Pass
	30 Msec.	G's	11.0 to 16.0	14.7	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 22.0	14.7	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	42.8	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	96.8	Pass
	Time	Msec.	72.0 to 82.0	74.5	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	153.2	Pass
Moment About Occipital Condyle	Maximum	N • m	-52.9 to- 79.9	-69.4	Pass
	Time	Msec.	65.0 to 79.0	68.1	Pass
Negative Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	140.9	Pass
Overall Test Results					Pass


Laboratory Technician

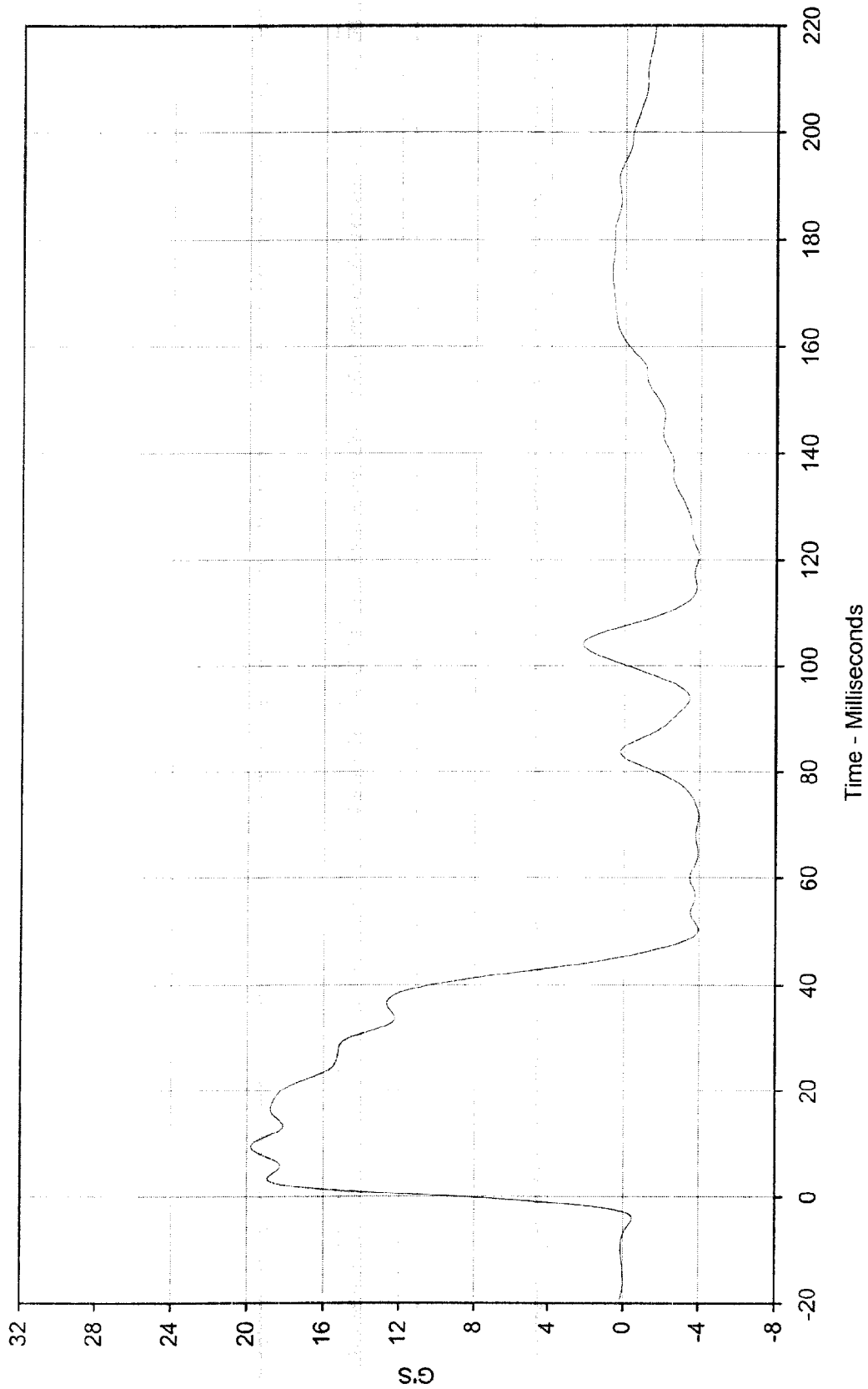

Approved By

January 24, 1999

Test Date

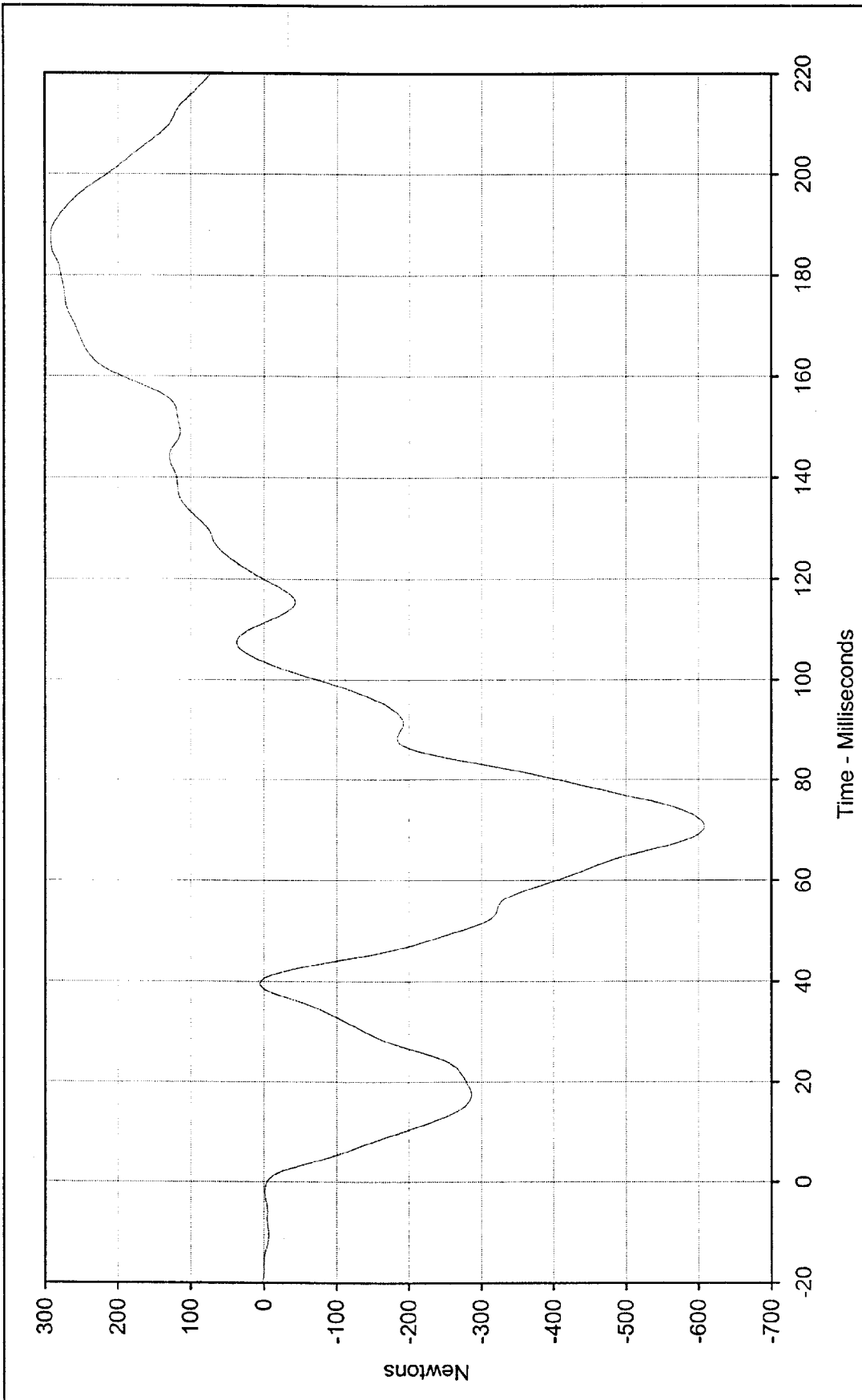
2/15/99

Date



Curve Description:		Pendulum Deceleration		Testing Program	Hybrid III Neck Extension Test (Male)	
Maximum Value:	19.8	at	9.5	Milliseconds	S/N of Part:	N/A
Minimum Value:	-4.0	at	50.3	Milliseconds	Test I.D.:	NE01D
SAE Filter Class:	60					
Date of Test:	1/24/99					
ATD Serial No.:	034					





Curve Description: Neck Force X

Maximum Value: 292.4 at 187.8 Milliseconds

Minimum Value: -607.9 at 70.6 Milliseconds

SAE Filter Class: 60

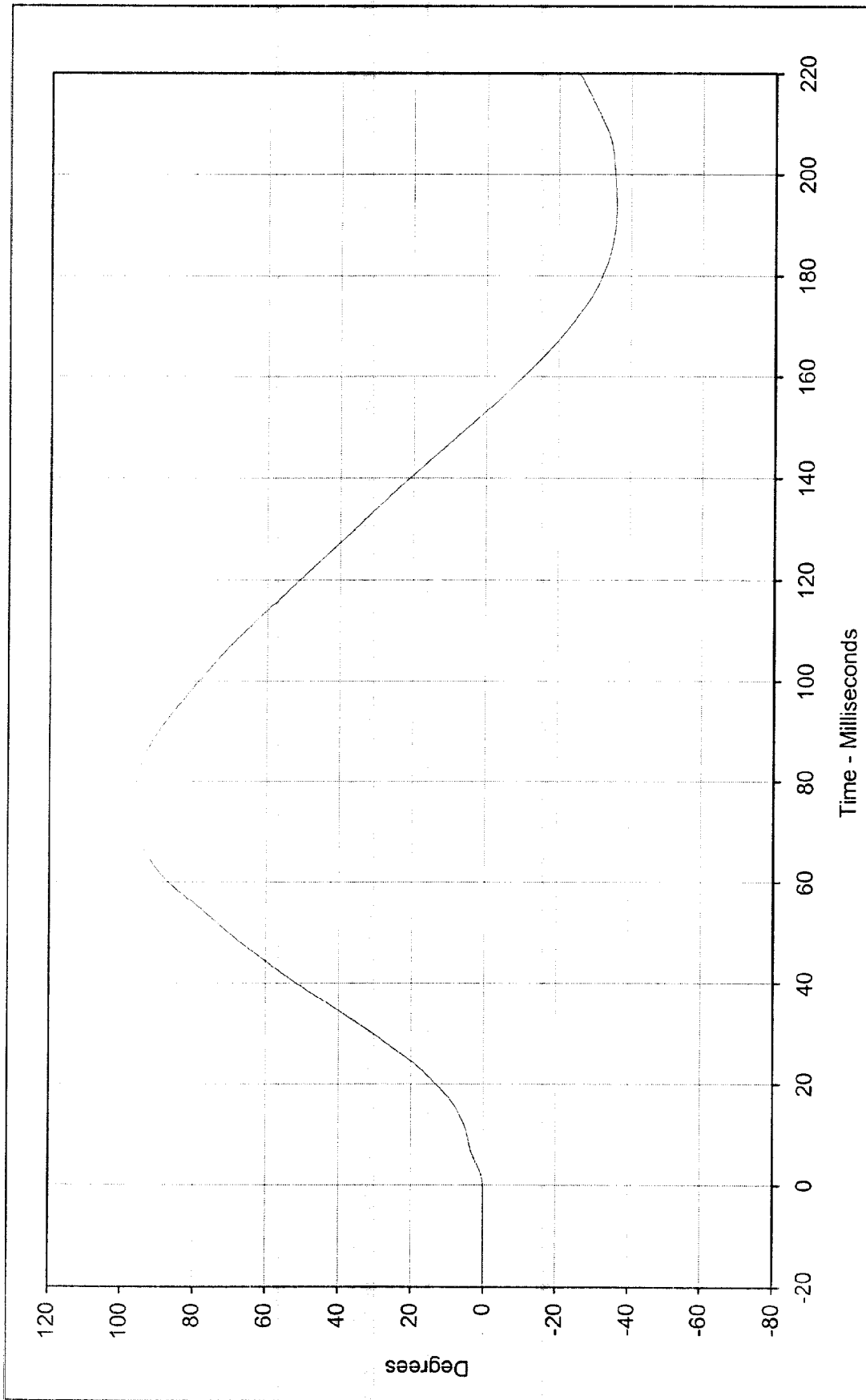
Date of Test: 1/24/99

ATD Serial No.: 034

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NE01D

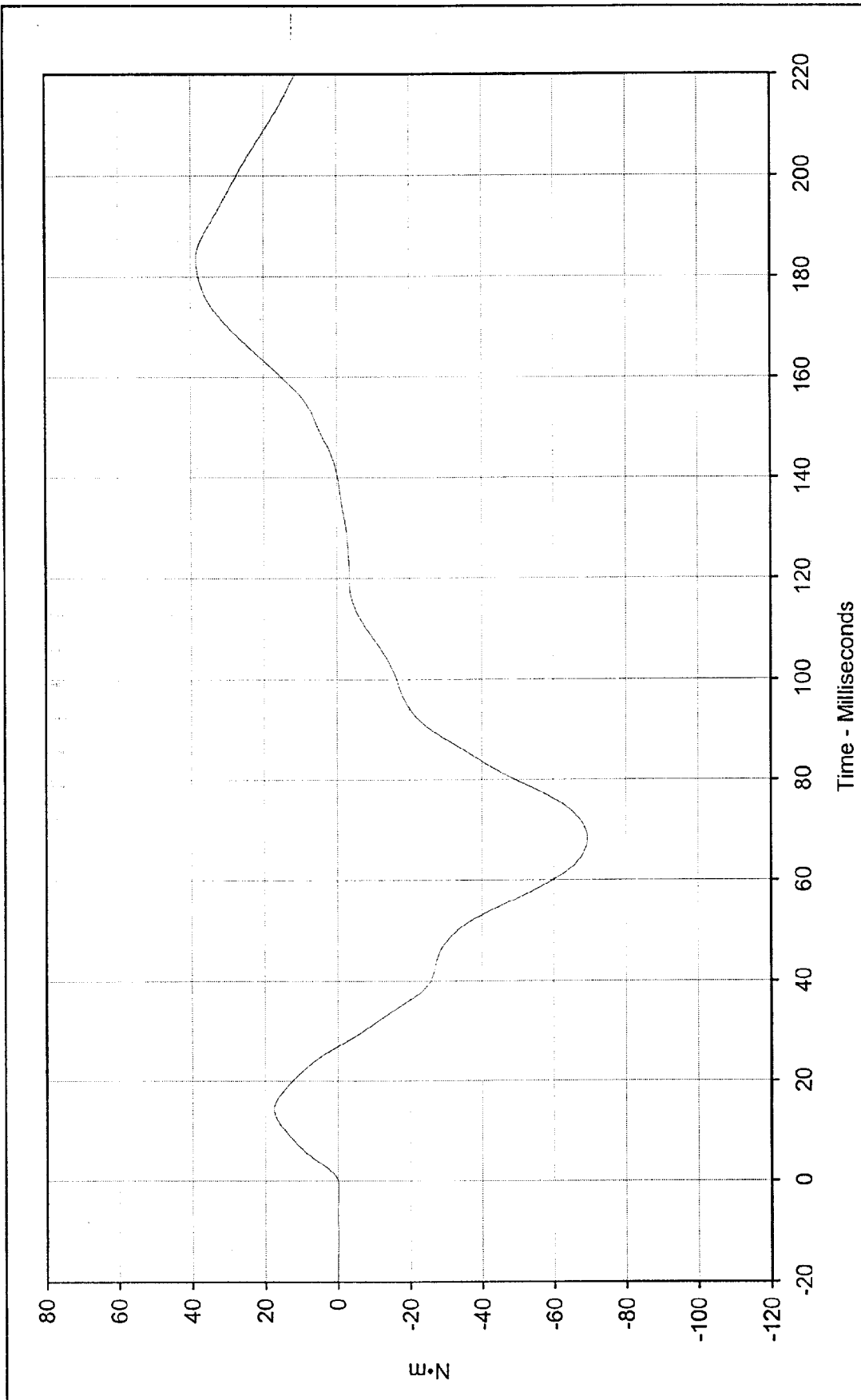




Curve Description: _____ Testing Program Hybrid III Neck Extension Test (Male)
 Test Information: S/N of Part: N/A Test I.D.: NE01D

"D" Plane Rotation
 Maximum Value: 96.8 at 74.5 Milliseconds
 Minimum Value: -35.8 at 193.4 Milliseconds
 SAE Filter Class: 60
 Date of Test: 1/24/99
 ATD Serial No.: 034





Testing Program Hybrid III Neck Extension Test (Male)
 Test Information: S/N of Part: N/A Test I.D.: NE01D

Curve Description: Moment About Occipital Condyles
 Maximum Value: 38.4 at 183.6 Milliseconds
 Minimum Value: -69.4 at 68.1 Milliseconds
 SAE Filter Class: 60
 Date of Test: 1/24/99
 ATD Serial No.: 034





Hybrid III Calibration Data Sheet

50TH Percentile Male

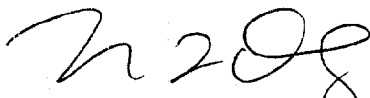
External Measurements

ATD Serial No.: 034

Part Serial No.: N/A

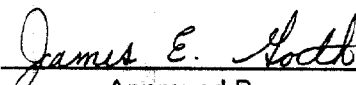
Test I.D.: N/A

External Measurement Data				
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory temperature	°C	20.4 to 22.1	21.9	Pass
Laboratory relative humidity	%	10 to 70	35	Pass
A - Total sitting height	mm	878.8 to 889.0	885.0	Pass
B - Shoulder pivot height	mm	505.5 to 520.7	510.0	Pass
C - "H" point height	mm	83.8 to 88.9	84.0	Pass
D - "H" point from seat back	mm	134.6 to 139.7	138.5	Pass
E - Shoulder pivot from back	mm	83.8 to 94.0	85.0	Pass
F - Thigh clearance	mm	139.7 to 154.9	152.0	Pass
G - Elbow back to wrist pivot	mm	289.6 to 304.8	300.0	Pass
H - Skull cap to back line	mm	40.6 to 45.7	43.0	Pass
I - Shoulder to elbow length	mm	330.2 to 345.4	335.0	Pass
J - Elbow rest height	mm	190.5 to 210.8	209.0	Pass
K - Buttock to knee length	mm	579.1 to 604.5	581.0	Pass
L - Popliteal length	mm	429.3 to 454.7	444.0	Pass
M - Knee pivot height	mm	485.1 to 500.4	491.0	Pass
N - Buttock popliteal length	mm	452.1 to 477.5	465.0	Pass
O - Chest depth	mm	213.4 to 228.6	221.0	Pass
P - Foot length	mm	251.5 to 266.7	260.0	Pass
V - Shoulder breadth	mm	421.6 to 436.9	434.0	Pass
W - Foot breadth	mm	91.4 to 106.7	98.0	Pass
Y - Chest circumference	mm	970.3 to 1000.8	995.0	Pass
Z - Waist circumference	mm	835.7 to 866.1	850.0	Pass
AA - Location for chest circumference	mm	429.3 to 434.3	435.0	Pass
BB - Location for waist circumference	mm	226.1 to 231.1	228.0	Pass
Overall Test Results				Pass


Laboratory Technician

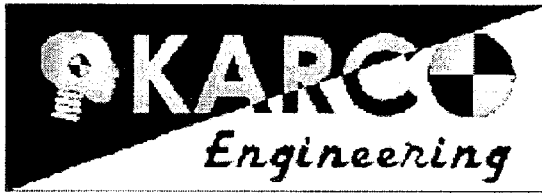
January 25, 1999

Test Date


Approved By

2/15/99

Date



Hybrid III Calibration Data Sheet

50TH Percentile Male

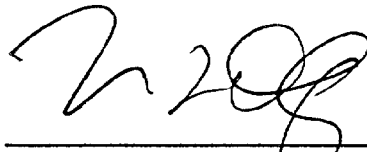
Left Knee Impact Test

ATD Serial No.: 35

Part Serial No.: n/a

Test I.D.: KI02A

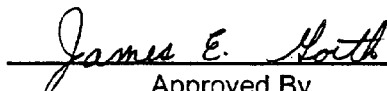
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	2.073 to 2.134	2.076	Pass
Peak Probe Force	Newtons	4715 to 5782	5139.3	Pass
Overall Test Results				Pass



Laboratory Technician

January 23, 1999

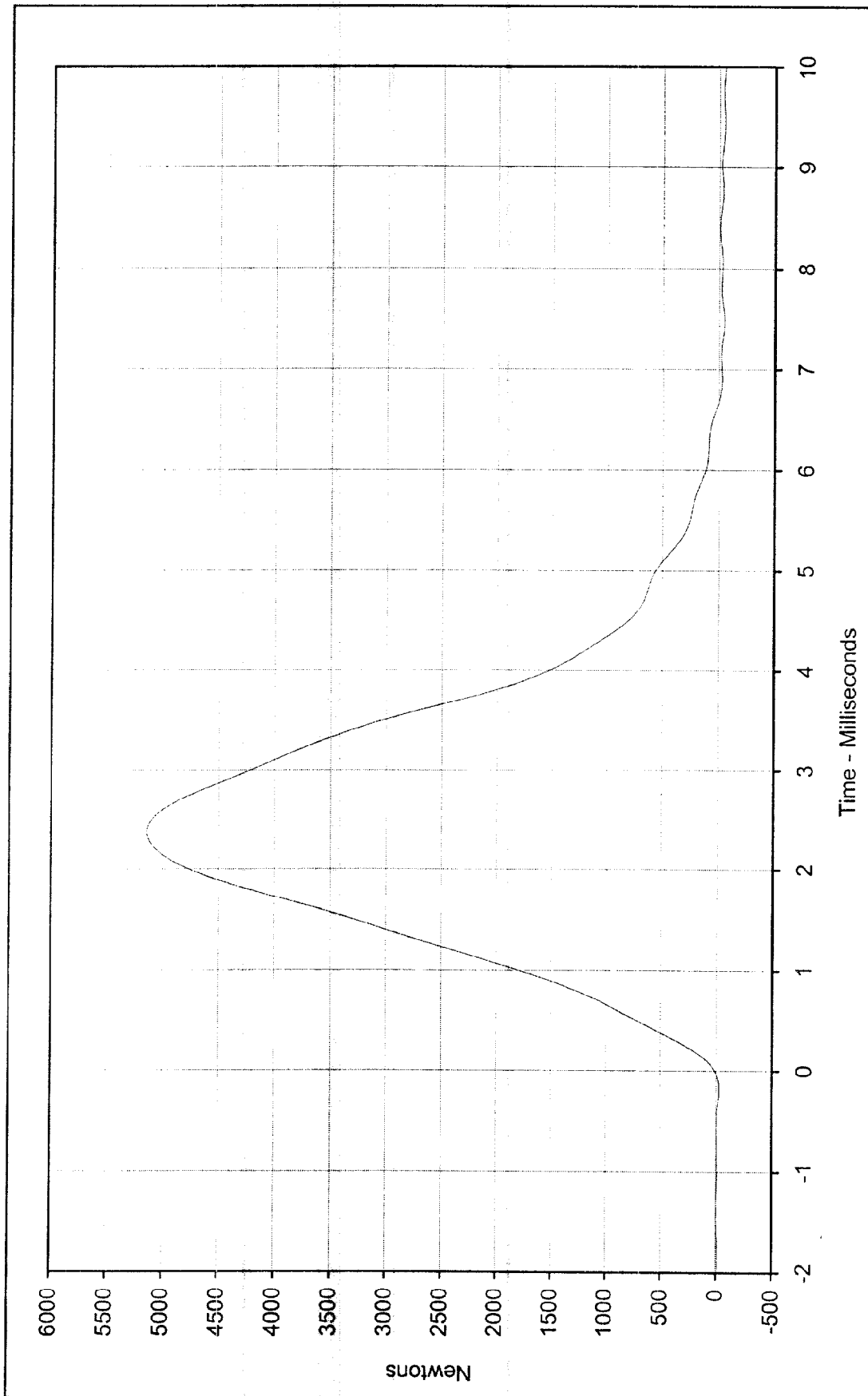
Test Date



Approved By

2/15/99

Date



Curve Description: _____ Testing Program: Hybrid III Left Knee Impact Test
 Maximum Value: 5139.3 at 2.4 Milliseconds
 Minimum Value: -46.1 at 7.5 Milliseconds
 SAE Filter Class: 600
 Date of Test: 1/23/99
 ATD Serial No.: 35





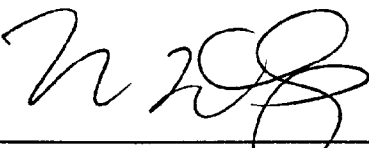
Hybrid III Calibration Data Sheet
50TH Percentile Male
Right Knee Impact Test

ATD Serial No.: 35

Part Serial No.: N/A

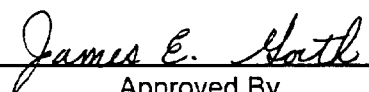
Test I.D.: KI02B

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	2.073 to 2.134	2.092	Pass
Peak Probe Force	Newtons	4715 to 5782	5643.7	Pass
Overall Test Results				Pass



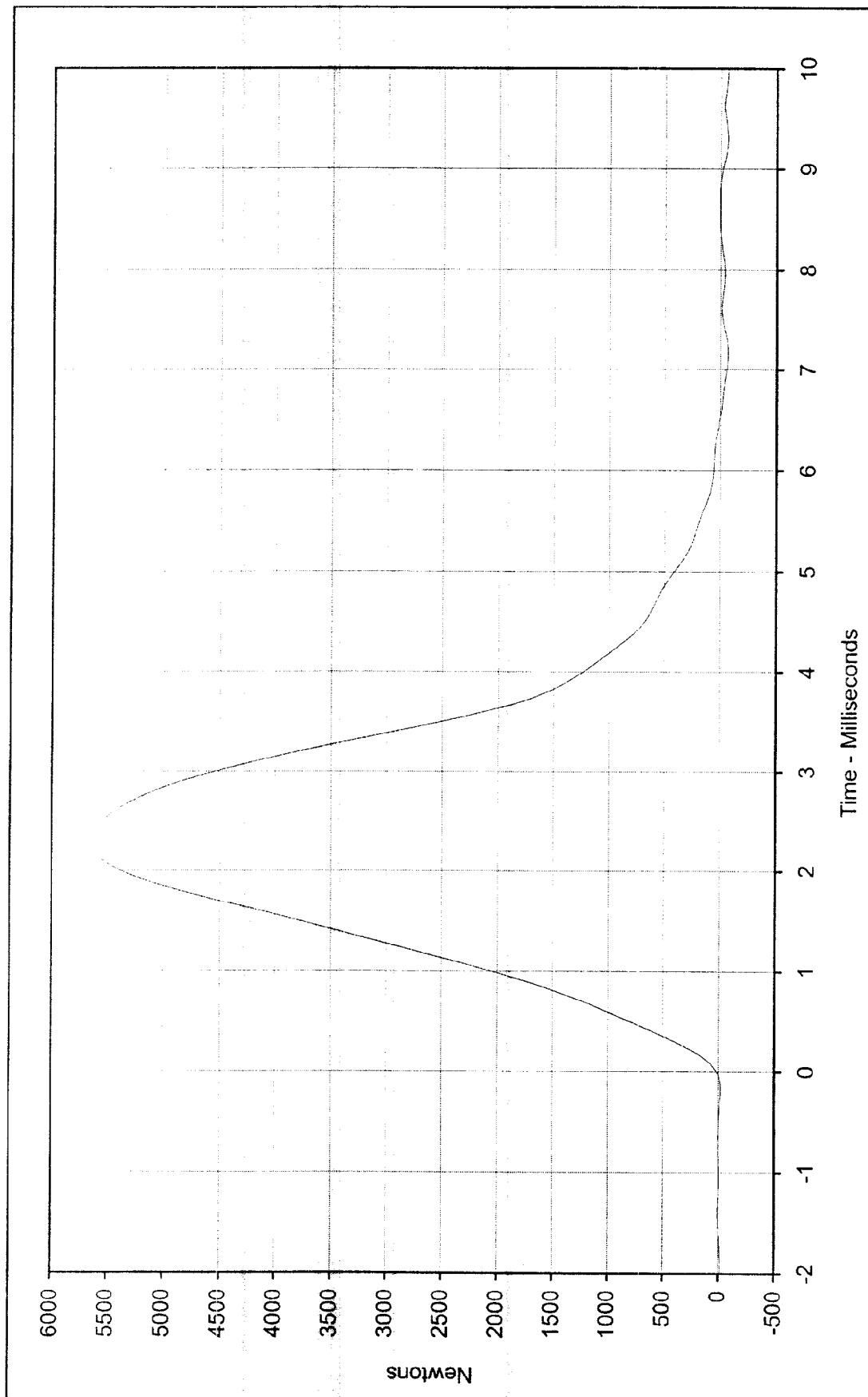
Laboratory Technician

January 23, 1999
Test Date



Approved By

2/15/99
Date



Curve Description: _____ Testing Program: Hybrid III Right Knee Impact Test
 Maximum Value: 5643.7 at 2.3 Milliseconds
 Minimum Value: -68.0 at 7.2 Milliseconds
 SAE Filter Class: 600
 Date of Test: 1/23/99
 ATD Serial No.: 35





Hybrid III Calibration Data Sheet

50TH Percentile Male

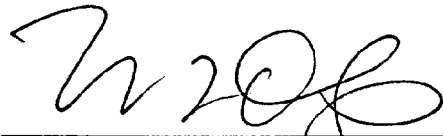
Head Drop Calibration

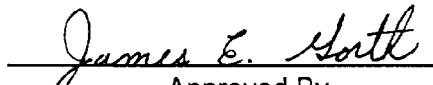
ATD Serial No.: 035

Part Serial No.: N/A

Test I.D.: HD01C

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	261.2	Pass
Peak Lateral Acceleration	G's	≤15.0	4.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

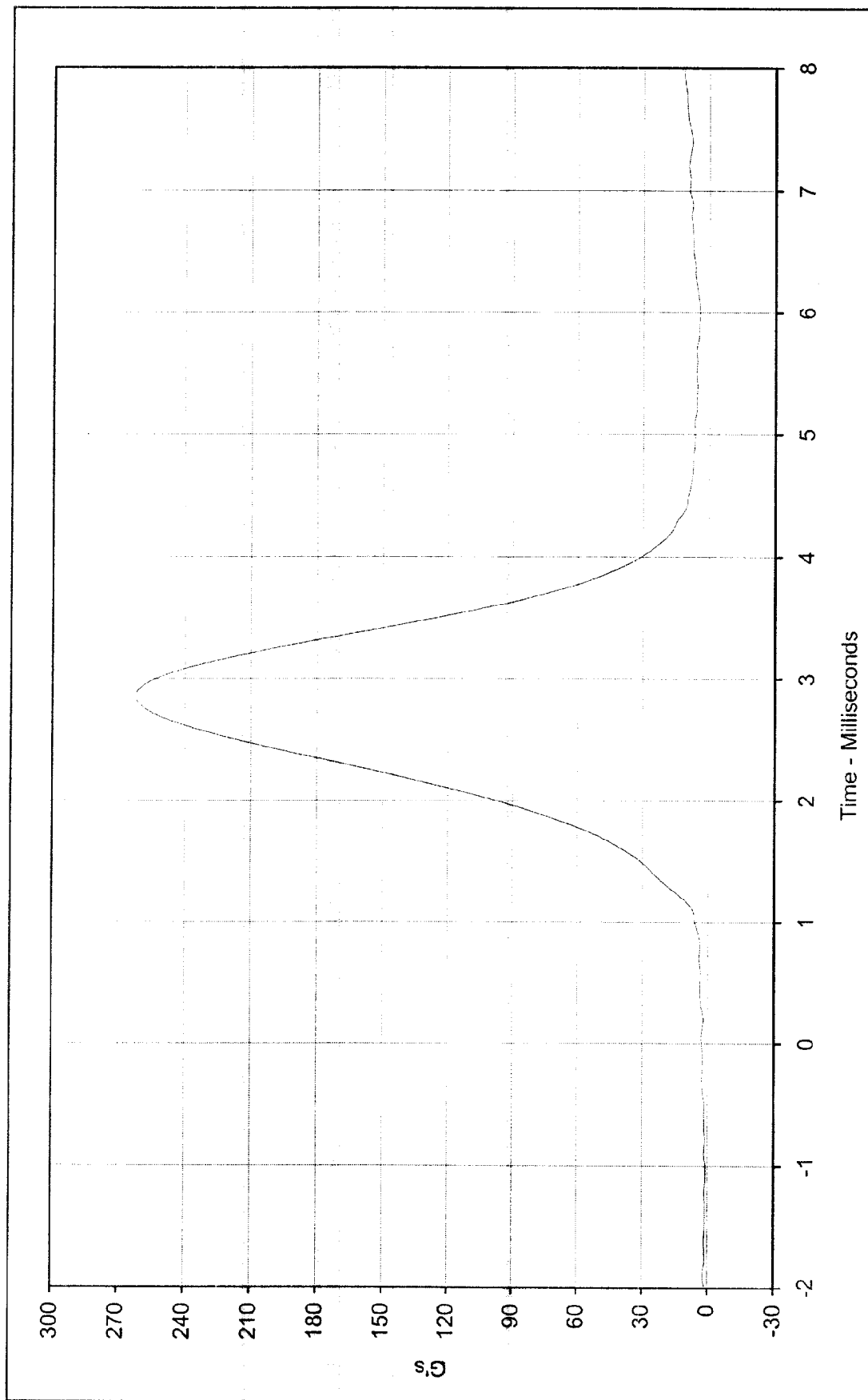

Approved By

January 23, 1999

Test Date

2/15/99

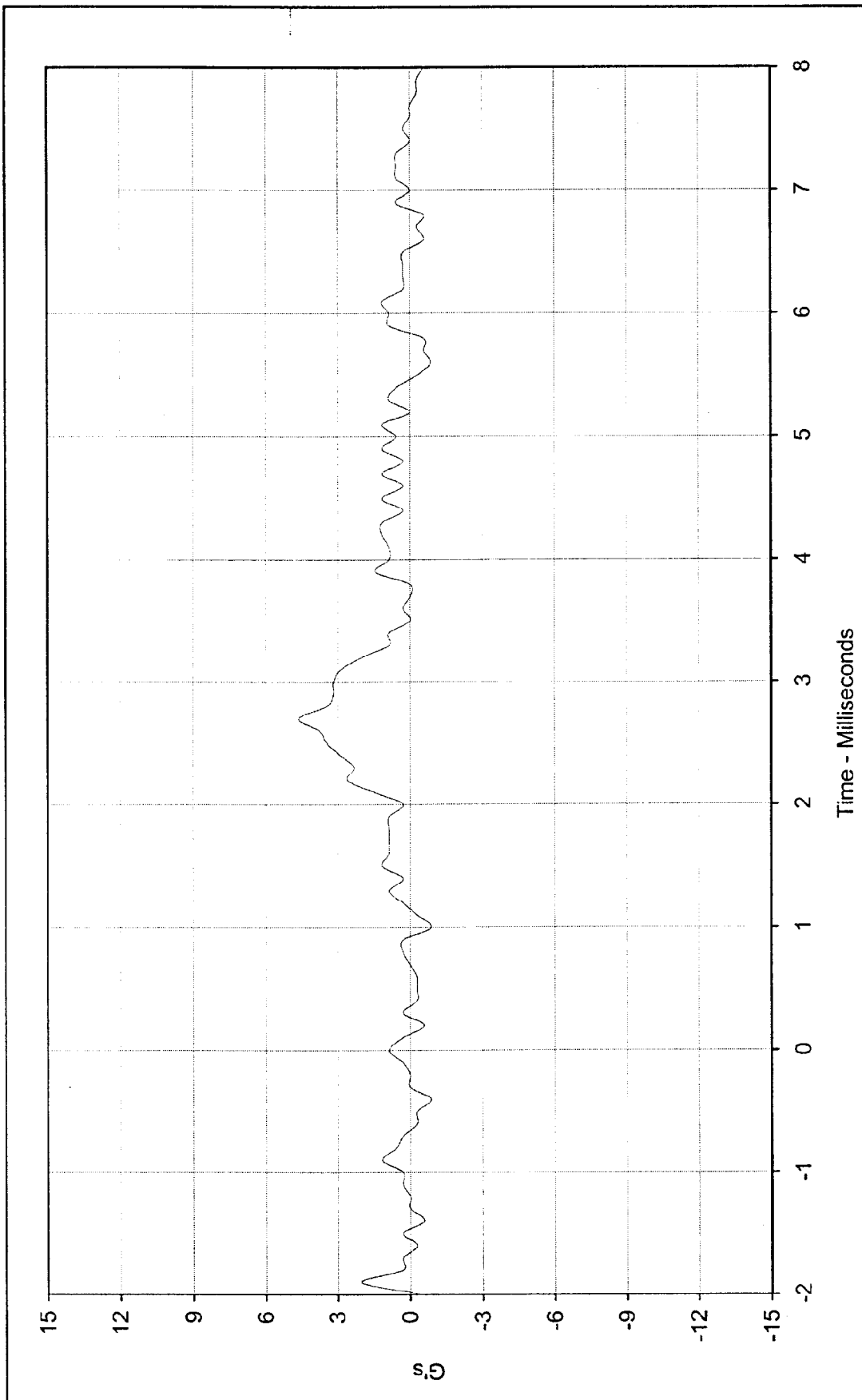
Date



Curve Description: Head Resultant Acceleration
 Testing Program Hybrid III Head Drop Calibration (Male)
 Test Information: S/N of Part: N/A Test I.D.: HD01C

Maximum Value: 261.2 at 2.9 Milliseconds
 Minimum Value: 0.9 at -1.0 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 1/23/99
 ATD Serial No.: 035

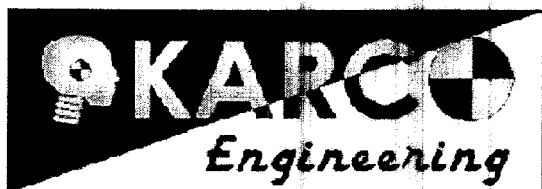




Testing Program Hybrid III Head Drop Calibration (Male)
 Test Information: S/N of Part: N/A Test I.D.: HD01C

Curve Description: Head Acceleration Y Axis
 Maximum Value: 4.6 at 2.7 Milliseconds
 Minimum Value: -0.9 at -0.4 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 1/23/99
 ATD Serial No.: 035





Hybrid III Calibration Data Sheet

50TH Percentile Male

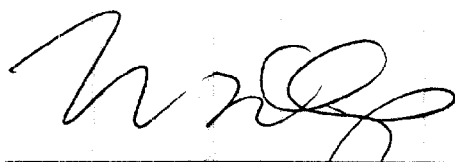
Thorax Impact Test

ATD Serial No.: 035

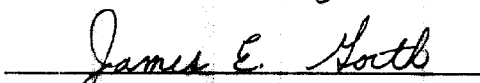
Part Serial No.: N/A

Test I.D.: CH02B

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Probe Velocity	m/s	6.58 to 6.82	6.65	Pass
Peak Probe Force	Newtons	5159 to 5893	5374	Pass
Peak Sternum Displacement	CM	6.35 to 7.26	6.39	Pass
Internal Hysteresis	%	69 to 85	73.9	Pass
Overall Test Results				Pass



Laboratory Technician



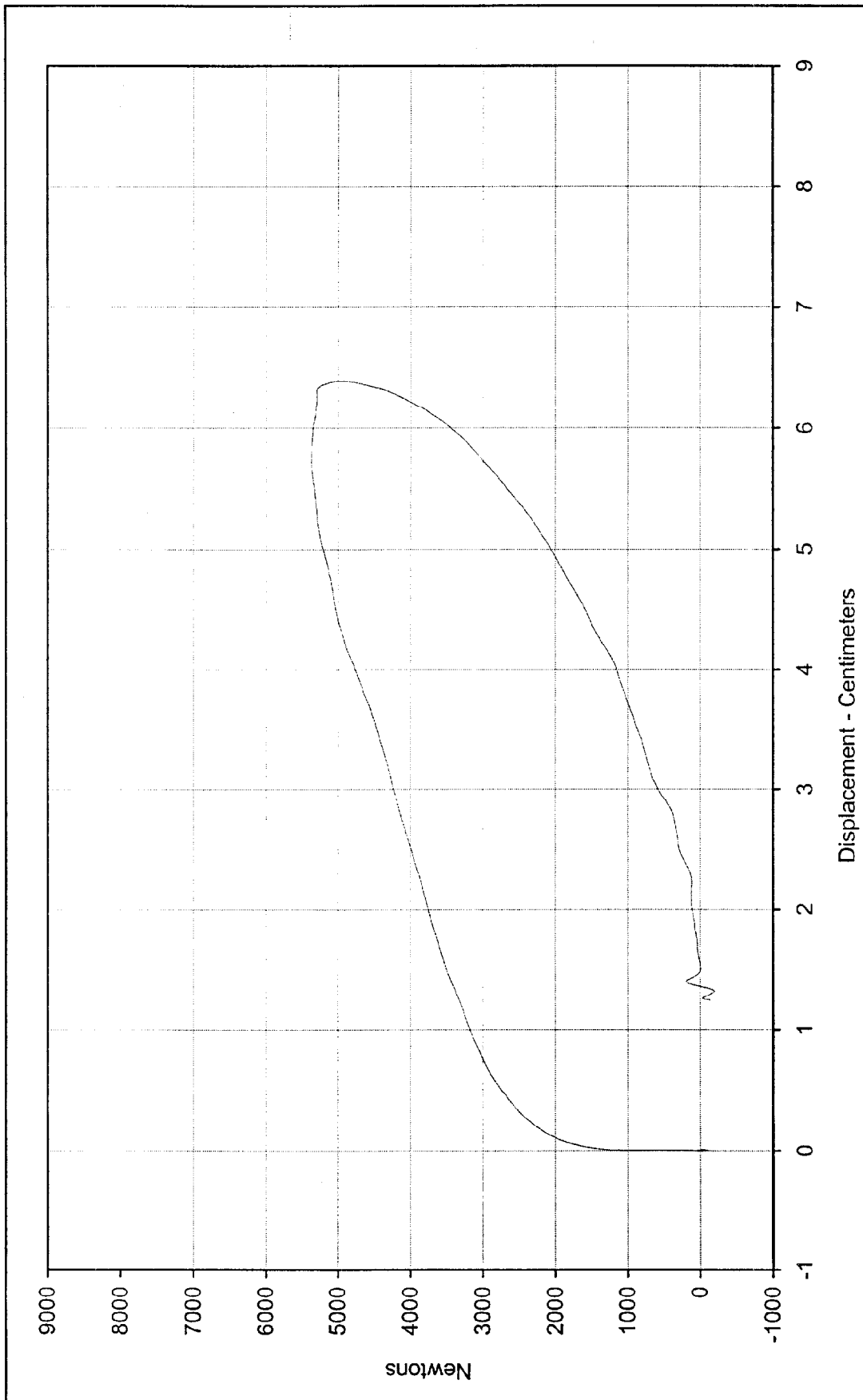
Approved By

January 24, 1999

Test Date

2/15/99

Date



Curve Description:	Probe Force vs. Chest Displacement	Testing Program	Hybrid III Thorax Impact Test
Probe Force:	5374.2 Newtons	Test Information:	S/N of Part: N/A Test I.D.: CH02B

Chest Displ.:	6.39 Centimeters
SAE Filter Class:	180
Date of Test:	1/24/99
ATD Serial No.:	035





Hybrid III Calibration Data Sheet

50TH Percentile Male

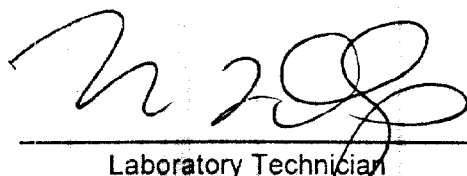
Neck Flexion Test

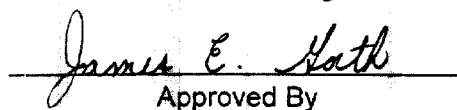
ATD Serial No.: 035

Part Serial No.: N/A

Test I.D.: NF01D

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	39	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.94	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	26.2	Pass
	20 Msec.	G's	17.6 to 22.6	22.3	Pass
	30 Msec.	G's	12.5 to 18.5	18.4	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	18.4	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	38.7	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	72.0	Pass
	Time	Msec.	57.0 to 64.0	60.9	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	118.9	Pass
Moment About Occipital Condyle	Maximum	N • m	84.1 to 108.5	88.8	Pass
	Time	Msec.	47.0 to 58.0	56.6	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	102.1	Pass
			Overall Test Results		Pass


Laboratory Technician

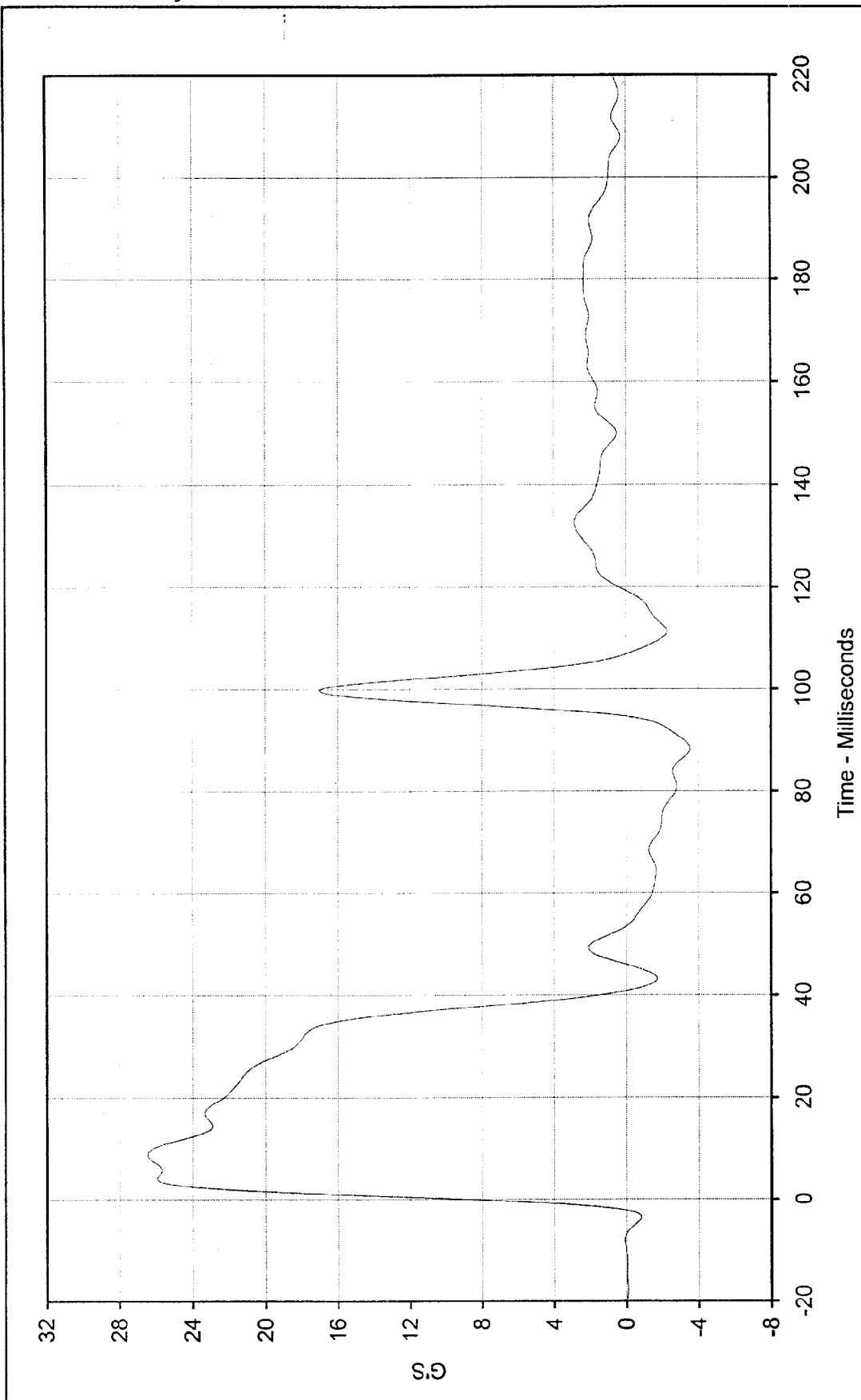

Approved By

January 24, 1999

Test Date



Date

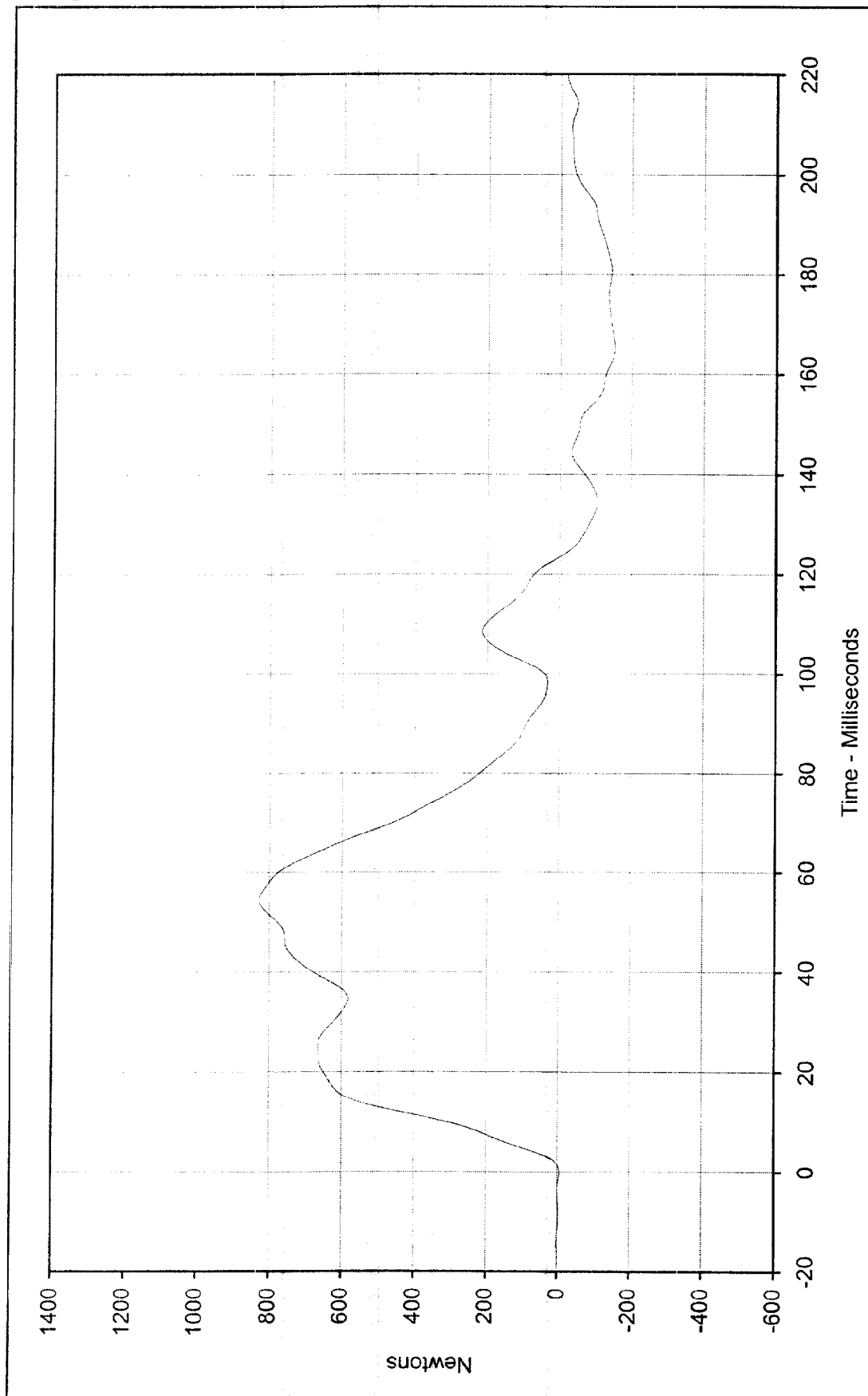


Curve Description: Pendulum Deceleration
 Maximum Value: 26.5 at 8.9 Milliseconds
 Minimum Value: -3.5 at 88.3 Milliseconds
 SAE Filter Class: 60
 Date of Test: 1/24/99
 ATD Serial No.: 035

Testing Program Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF01D

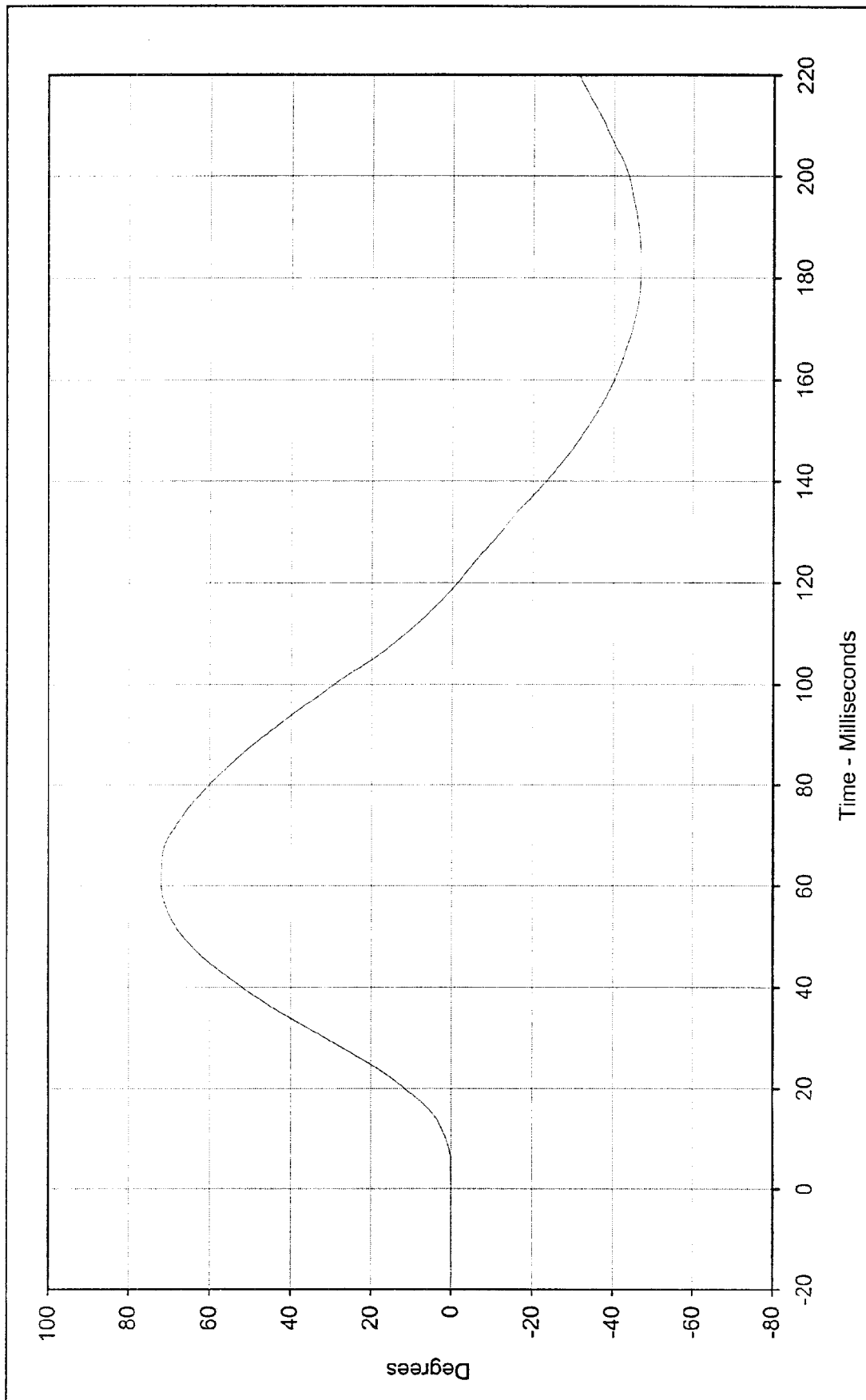




Curve Description: Neck Force X Testing Program Hybrid III Neck Flexion Test (Male)
 Maximum Value: 828.0 at 54.4 Milliseconds Test Information: S/N of Part: N/A Test I.D.: NF01D
 Minimum Value: -151.7 at 165.2 Milliseconds

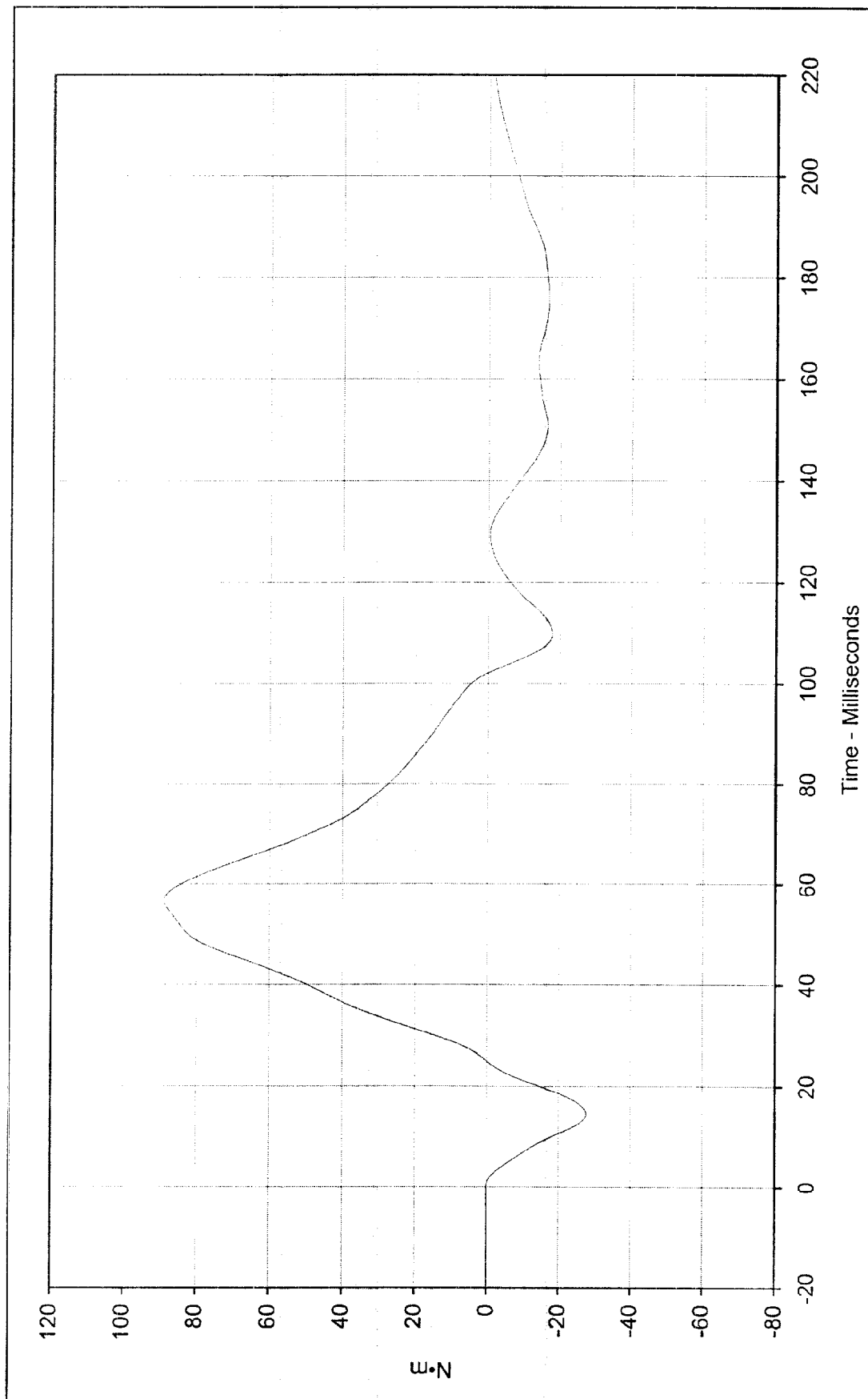


SAE Filter Class: 60
 Date of Test: 1/24/99
 ATD Serial No.: 035



Curve Description:	"D" Plane Rotation	Testing Program	Hybrid III Neck Flexion Test (Male)
Maximum Value:	72.0 at 60.9 Milliseconds	Test Information:	S/N of Part: N/A Test I.D.: NF01D
Minimum Value:	-46.7 at 182.9 Milliseconds		
SAE Filter Class:	60		
Date of Test:	1/24/99		
ATD Serial No.:	035		





Curve Description: Moment About Occipital Condyles
Maximum Value: 88.8 at 56.6 Milliseconds
Minimum Value: -27.6 at 14.4 Milliseconds
SAE Filter Class: 60
Date of Test: 1/24/99
ATD Serial No.: 035

Testing Program Hybrid III Neck Flexion Test (Male)
Test Information: S/N of Part: N/A Test I.D.: NF01D





Hybrid III Calibration Data Sheet

50TH Percentile Male

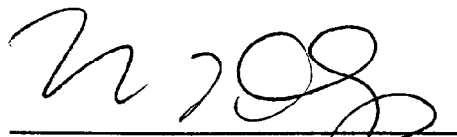
Neck Extension Test

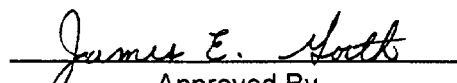
ATD Serial No.: 035

Part Serial No.: N/A

Test I.D.: NE01C

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	36	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	17.7	Pass
	20 Msec.	G's	14.0 to 19.0	15.9	Pass
	30 Msec.	G's	11.0 to 16.0	13.9	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 22.0	13.9	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	43.3	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	101.0	Pass
	Time	Msec.	72.0 to 82.0	79.5	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	158.2	Pass
Moment About Occipital Condyle	Maximum	N • m	-52.9 to- 79.9	-72.0	Pass
	Time	Msec.	65.0 to 79.0	69.9	Pass
Negative Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	141.0	Pass
Overall Test Results					Pass


 Laboratory Technician

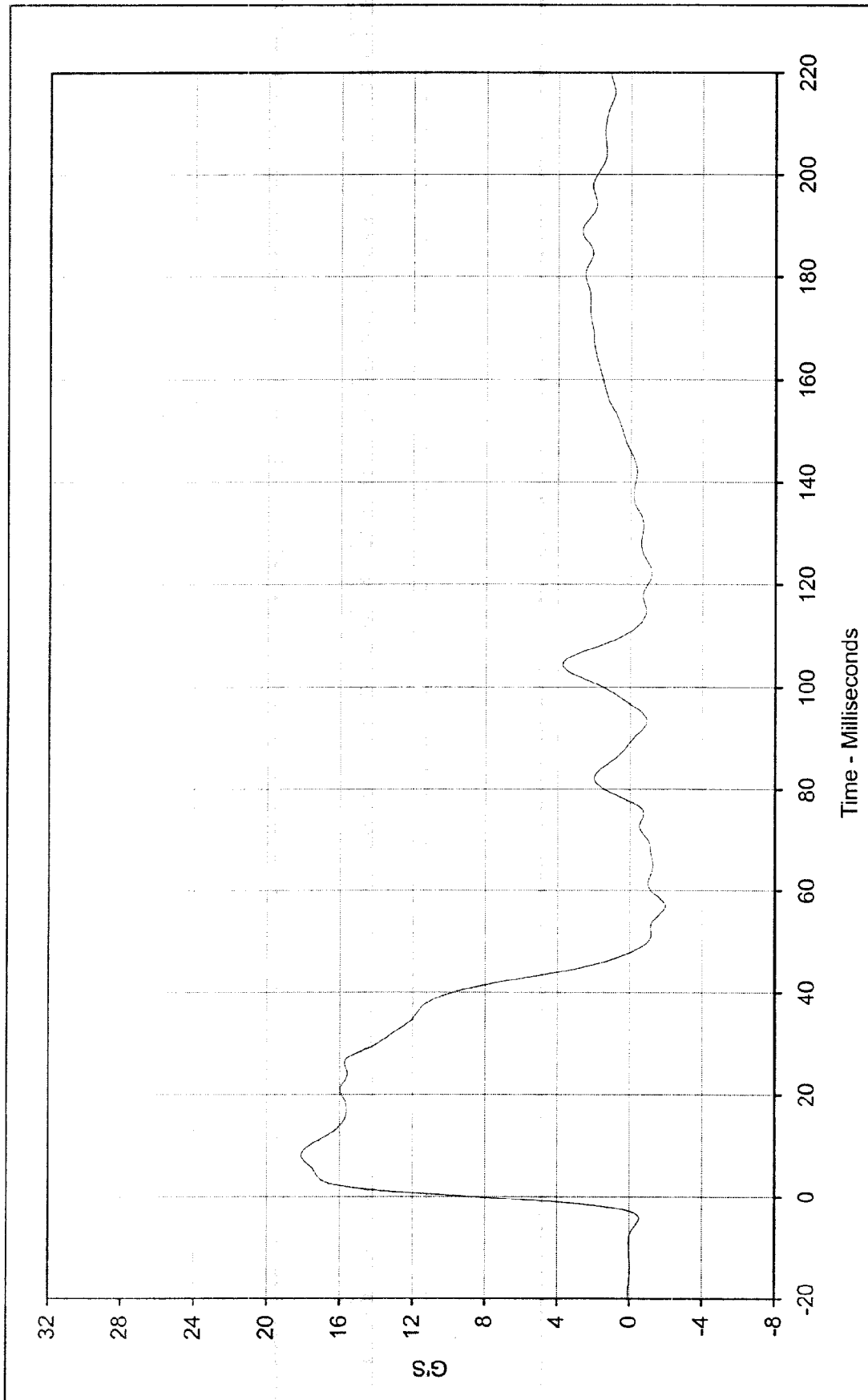

 Approved By

January 24, 1999

Test Date

2/15/99

Date



Curve Description: Hybrid III Neck Extension Test (Male)

Testing Program: S/N of Part: N/A Test I.D.: NE01C

Maximum Value: 18.1 at 8.1 Milliseconds

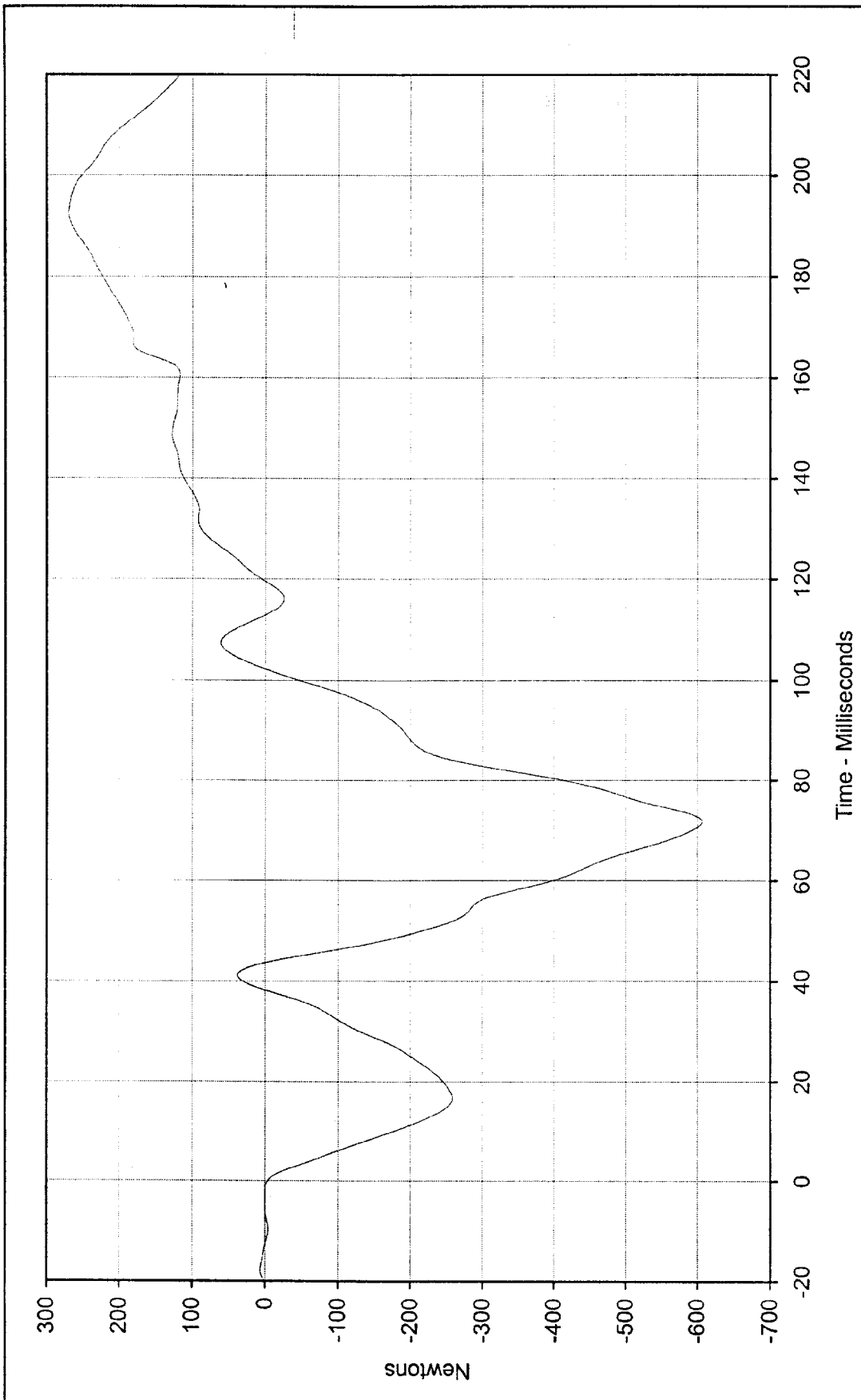
Minimum Value: -2.0 at 56.8 Milliseconds

SAE Filter Class: 60

Date of Test: 1/24/99

ATD Serial No.: 035

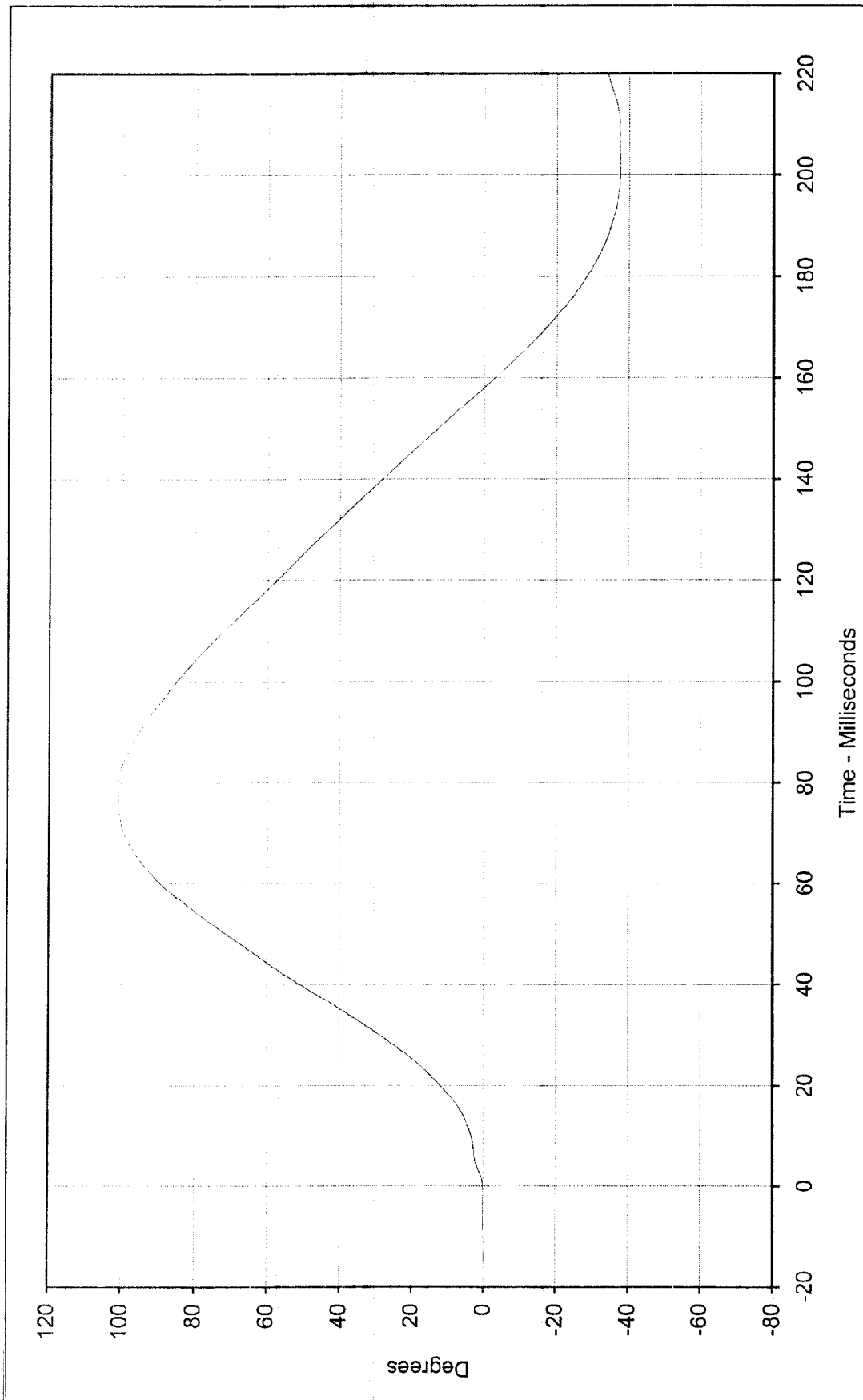




Testing Program Hybrid III Neck Extension Test (Male)
 Test Information: S/N of Part: N/A Test I.D.: NE01C

Curve Description: Neck Force X
 Maximum Value: 269.8 at 192.8 Milliseconds
 Minimum Value: -606.3 at 71.6 Milliseconds
 SAE Filter Class: 60
 Date of Test: 1/24/99
 ATD Serial No.: 035

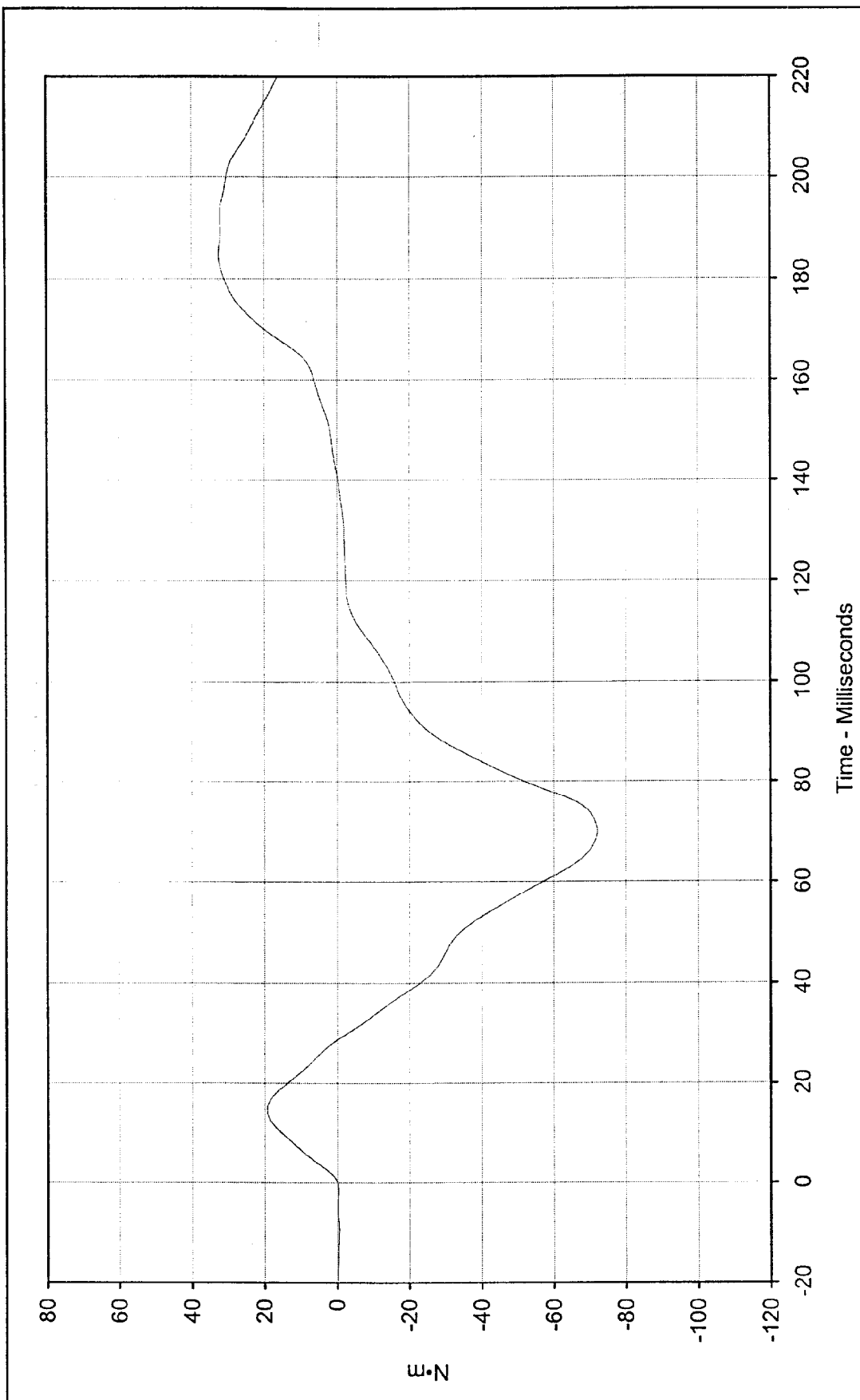




Curve Description: "D" Plane Rotation
 Maximum Value: 101.0 at 79.5 Milliseconds
 Minimum Value: -37.5 at 201.6 Milliseconds
 SAE Filter Class: 60
 Date of Test: 1/24/99
 ATD Serial No.: 035

Testing Program Hybrid III Neck Extension Test (Male)
 Test Information: S/N of Part: N/A Test I.D.: NE01C





Curve Description: Moment About Occipital Condyles

Maximum Value: 32.5 at 184.9 Milliseconds

Minimum Value: -72.0 at 69.9 Milliseconds

SAE Filter Class: 60

Date of Test: 1/24/99

ATD Serial No.: 035

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NE01C





Hybrid III Calibration Data Sheet

50TH Percentile Male

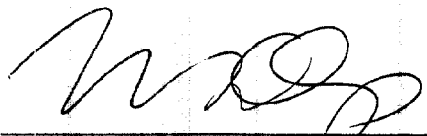
External Measurements

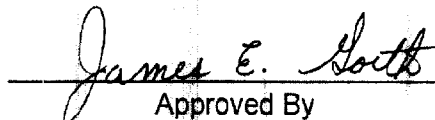
ATD Serial No.: 035

Part Serial No.: N/A

Test I.D.: N/A

External Measurement Data				
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory temperature	°C	20.4 to 22.1	21.9	Pass
Laboratory relative humidity	%	10 to 70	35	Pass
A - Total sitting height	mm	878.8 to 889.0	885.0	Pass
B - Shoulder pivot height	mm	505.5 to 520.7	510.0	Pass
C - "H" point height	mm	83.8 to 88.9	84.0	Pass
D - "H" point from seat back	mm	134.6 to 139.7	138.5	Pass
E - Shoulder pivot from back	mm	83.8 to 94.0	85.0	Pass
F - Thigh clearance	mm	139.7 to 154.9	152.0	Pass
G - Elbow back to wrist pivot	mm	289.6 to 304.8	300.0	Pass
H - Skull cap to back line	mm	40.6 to 45.7	43.0	Pass
I - Shoulder to elbow length	mm	330.2 to 345.4	335.0	Pass
J - Elbow rest height	mm	190.5 to 210.8	208.0	Pass
K - Buttock to knee length	mm	579.1 to 604.5	600.0	Pass
L - Popliteal length	mm	429.3 to 454.7	444.0	Pass
M - Knee pivot height	mm	485.1 to 500.4	491.0	Pass
N - Buttock popliteal length	mm	452.1 to 477.5	470.0	Pass
O - Chest depth	mm	213.4 to 228.6	221.0	Pass
P - Foot length	mm	251.5 to 266.7	260.0	Pass
V - Shoulder breadth	mm	421.6 to 436.9	434.0	Pass
W - Foot breadth	mm	91.4 to 106.7	100.0	Pass
Y - Chest circumference	mm	970.3 to 1000.8	995.0	Pass
Z - Waist circumference	mm	835.7 to 866.1	860.0	Pass
AA - Location for chest circumference	mm	429.3 to 434.3	435.0	Pass
BB - Location for waist circumference	mm	226.1 to 231.1	228.0	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

January 25, 1999

Test Date

2/15/99

Date

APPENDIX F
VEHICLE OWNER'S MANUAL
OCCUPANT RESTRAINT INSTRUCTIONS

Seats and Seat Controls

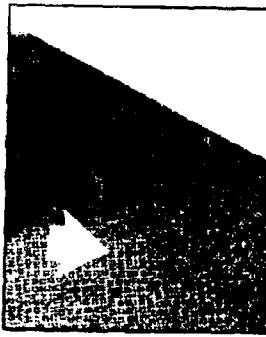
This section tells you about the seats -- how to adjust them, take them out and put them back in. It also tells you about bucket and bench seats, power seats and head restraints.

Manual Front Seats

CAUTION:

You can lose control of the vehicle if you try to adjust a manual driver's seat while the vehicle is moving. The sudden movement could startle and confuse you, or make you push a pedal when you don't want to. Adjust the driver's seat only when the vehicle is not moving.

2-Way Front Seat



The bucket seats can be adjusted forward or rearward by the lever at the front of the seat.

Move the seat adjustment lever at the front of the seat toward the driver's door to unlock it. Slide the seat to where you want it. Then release the lever and try to move the seat with your body, to make sure the seat is locked into place.

1-2

Manual Lumbar Support (If Equipped)

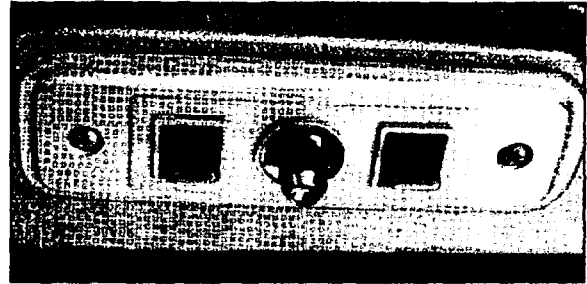


If you have this feature, there will be a knob on the inboard side of the driver and passenger bucket seats.

Turn the knob toward the front of the vehicle to increase lumbar support. Turn the knob toward the rear of the vehicle to decrease lumbar support.

Power Seats (If Equipped)

If you have this feature, there will be a control pad on the inboard side of the driver and passenger bucket seats.



The front control makes the front of the seat go up and down.

The center control makes the whole seat go forward, rearward, up or down.

The rear control makes the rear of the seat go up and down.

1-3

Reclining Seatbacks

There is a lever on the inside of the seat to adjust the seatback.



You can adjust the seatback by lifting the lever and leaning back. Release the lever to lock the seatback where you want it. Pull up on the lever, lean forward and the seat will go to an upright position.



But don't have a seatback reclined if your vehicle is moving.

1-4

CAUTION:

Sitting in a reclined position when your vehicle is in motion can be dangerous. Even if you buckle up, your safety belts can't do their job when you're reclined like this.

The shoulder belt can't do its job because it won't be against your body. Instead, it will be in front of you. In a crash you could go into it, receiving neck or other injuries.

The lap belt can't do its job either. In a crash the belt could go up over your abdomen. The belt forces would be there, not at your pelvic bones. This could cause serious internal injuries.

For proper protection when the vehicle is in motion, have the seatback upright. Then sit well back in the seat and wear your safety belt properly.

Head Restraints

Head restraints are fixed on some models and adjustable on others. Slide an adjustable head restraint up or down so that the top of the restraint is closest to the top of your ears. This position reduces the chance of a neck injury in a crash.

Seatback Latches (Non-Touring Bench Seats)



The seatback lever is on the right rear of your seat.

1-5

CAUTION:

A safety belt that is twisted or not properly attached won't provide the protection needed in a crash. The person wearing the belt could be **seriously injured**. After installing the seat, always check to be sure that the safety belts are not twisted and are properly attached.

Safety Belts: They're for Everyone

This part of the manual tells you how to use safety belts properly. It also tells you some things you should not do with safety belts.

And it explains the air bag system.

CAUTION:

Don't let anyone ride where he or she can't wear a safety belt properly. If you are in a crash and you're not wearing a safety belt, your injuries can be much worse. You can hit things inside the vehicle or be ejected from it. You can be seriously injured or killed. In the same crash, you might not be if you are buckled up. Always fasten your safety belt, and check that your passengers' belts are fastened properly too.

CAUTION:

It is extremely dangerous to ride in a cargo area, inside or outside of a vehicle. In a collision, people riding in these areas are more likely to be seriously injured or killed. Do not allow people to ride in any area of your vehicle that is not equipped with seats and safety belts. Be sure everyone in your vehicle is in a seat and using a safety belt properly.

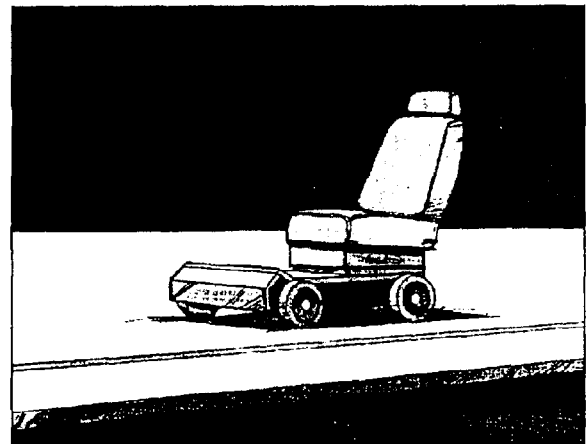
1-12



Your vehicle has a light that comes on as a reminder to buckle up. (See "Safety Belt Reminder Light" in the Index.)

Why Safety Belts Work

When you ride in or on anything, you go as fast as it goes.



Take the simplest vehicle. Suppose it's just a seat on wheels.

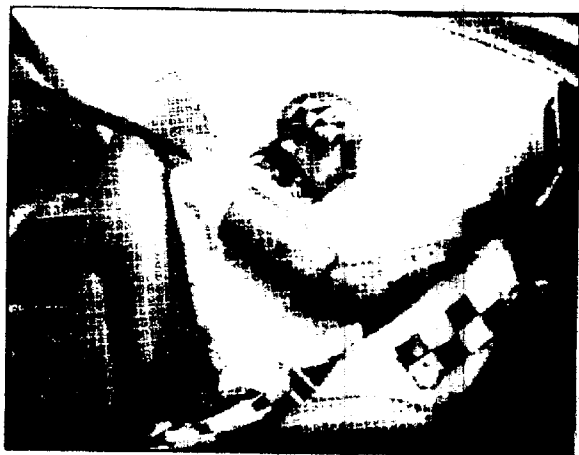
In most states and Canadian provinces, the law says to wear safety belts. Here's why: *They work.*

You never know if you'll be in a crash. If you do have a crash, you don't know if it will be a bad one.

A few crashes are mild, and some crashes can be so serious that even buckled up a person wouldn't survive. But most crashes are in between. In many of them, people who buckle up can survive and sometimes walk away. Without belts they could have been badly hurt or killed.

After more than 30 years of safety belts in vehicles, the facts are clear. In most crashes buckling up does matter . . . a lot!

1-13



or the safety belts!

With safety belts, you slow down as the vehicle does. You get more time to stop. You stop over more distance, and your strongest bones take the forces. That's why safety belts make such good sense.

Here Are Questions Many People Ask About Safety Belts -- and the Answers

- Q:** Won't I be trapped in the vehicle after an accident if I'm wearing a safety belt?
- A:** You *could* be -- whether you're wearing a safety belt or not. But you can unbuckle a safety belt, even if you're upside down. And your chance of being conscious during and after an accident, so you *can* unbuckle and get out, is *much* greater if you are belted.
- Q:** If my vehicle has air bags, why should I have to wear safety belts?
- A:** Air bags are in many vehicles today and will be in most of them in the future. But they are supplemental systems only; so they work *with* safety belts -- not instead of them. Every air bag system ever offered for sale has required the use of safety belts. Even if you're in a vehicle that has air bags, you still have to buckle up to get the most protection. That's true not only in frontal collisions, but especially in side and other collisions.

1-16

Q: If I'm a good driver, and I never drive far from home, why should I wear safety belts?

A: You may be an excellent driver, but if you're in an accident -- even one that isn't your fault -- you and your passengers *can* be hurt. Being a good driver doesn't protect you from things beyond your control, such as bad drivers.

Most accidents occur within 25 miles (40 km) of home. And the greatest number of serious injuries and deaths occur at speeds of less than 40 mph (65 km/h).

Safety belts are for everyone.

How to Wear Safety Belts Properly

Adults

This part is only for people of adult size.

Be aware that there are special things to know about safety belts and children. And there are different rules for smaller children and babies. If a child will be riding in your vehicle, see the part of this manual called "Children." Follow those rules for everyone's protection.

First, you'll want to know which restraint systems your vehicle has.

We'll start with the driver position.

Driver Position

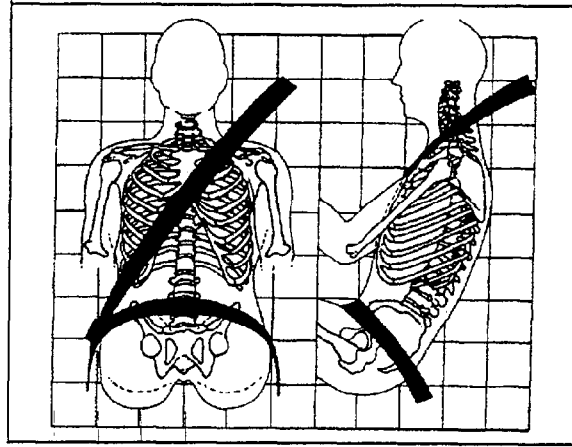
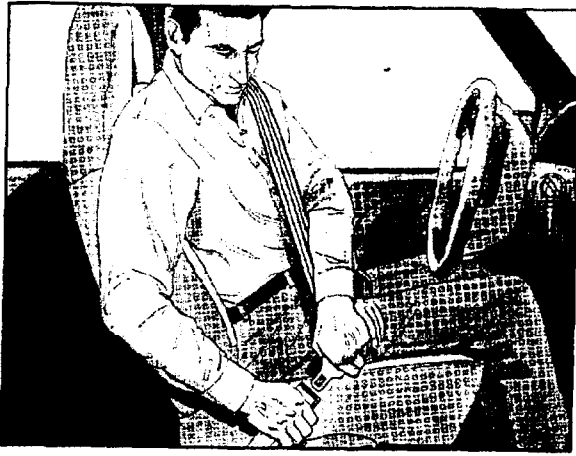
This part describes the driver's restraint system.

Lap-Shoulder Belt

The driver has a lap-shoulder belt. Here's how to wear it properly.

1. Close and lock the door.
2. Adjust the seat (to see how, see "Seats" in the Index) so you can sit up straight.

1-17



3. Pick up the latch plate and pull the belt across you. Don't let it get twisted.

4. Push the latch plate into the buckle until it clicks. Pull up on the latch plate to make sure it is secure. If the belt isn't long enough, see "Safety Belt Extender" at the end of this section.

Make sure the release button on the buckle is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.

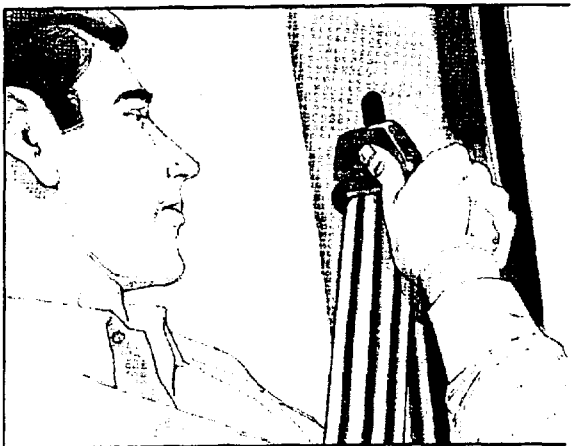
The lap part of the belt should be worn low and snug on the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even fatal injuries. The shoulder belt should go over the shoulder and across the chest. These parts of the body are best able to take belt restraining forces.

The safety belt locks if there's a sudden stop or a crash.

1-18

Shoulder Belt Height Adjuster

Before you begin to drive, move the shoulder belt adjuster to the height that is right for you.



To move it down, push in at the top of the arrows and move the height adjuster to the desired position. You can move the adjuster up just by pushing up on the shoulder belt guide. After you move the adjuster to where you want it, try to move it down without pushing in to make sure it has locked into position.

Adjust the height so that the shoulder portion of the belt is centered on your shoulder. The belt should be away from your face and neck, but not falling off your shoulder.

1-19

The best way to protect the fetus is to protect the mother. When a safety belt is worn properly, it's more likely that the fetus won't be hurt in a crash. For pregnant women, as for anyone, the key to making safety belts effective is wearing them properly.

Right Front Passenger Position

To learn how to wear the right front passenger's safety belt properly, see "Driver Position" earlier in this section.

The right front passenger's safety belt works the same way as the driver's safety belt -- except for one thing. If you ever pull the lap portion of the belt out all the way, you will engage the child restraint locking feature. If this happens, just let the belt go back all the way and start again.

Air Bag System

This part explains the air bag system.

Your vehicle has "Next Generation" frontal air bags -- one air bag for the driver and another air bag for the right front passenger.

Next Generation frontal air bags are designed to help reduce the risk of injury from the force of an inflating air bag. But even these air bags must inflate very quickly if they are to do their job and comply with federal regulations.

Here are the most important things to know about the air bag system:

CAUTION:

You can be severely injured or killed in a crash if you aren't wearing your safety belt -- even if you have air bags. Wearing your safety belt during a crash helps reduce your chance of hitting things inside the vehicle or being ejected from it. Air bags are "supplemental restraints" to the safety belts. All air bags -- even Next Generation air bags -- are designed to work with safety belts, but don't replace them. Air bags are designed to work only in moderate to severe crashes where the front of your vehicle hits something. They aren't designed to inflate at all in rollover, rear, side or low-speed frontal crashes. And, for unrestrained occupants, Next Generation air bags may provide less protection in frontal crashes than more forceful air bags have provided in the past. Everyone in your vehicle should wear a safety belt properly -- whether or not there's an air bag for that person.

CAUTION:

Air bags inflate with great force, faster than the blink of an eye. If you're too close to an inflating air bag, as you would be if you were leaning forward, it could seriously injure you. This is true even with Next Generation frontal air bags. Safety belts help keep you in position before and during a crash. Always wear your safety belt, even with Next Generation air bags. The driver should sit as far back as possible while still maintaining control of the vehicle.

CAUTION:

Children who are up against, or very close to, any air bag when it inflates can be seriously injured or killed. This is true even though your vehicle has Next Generation frontal air bags. Air bags plus lap-shoulder belts offer the best protection for adults, but not for young children and infants. Neither the vehicle's safety belt system nor its air bag system is designed for them. Young children and infants need the protection that a child restraint system can provide. Always secure children properly in your vehicle. To read how, see the part of this manual called "Children" and see the caution labels on the sunvisors and the right front passenger's safety belt.

AIR BAG

There is an air bag readiness light on the instrument panel, which shows AIR BAG.

The system checks the air bag electrical system for malfunctions. The light tells you if there is an electrical problem. See "Air Bag Readiness Light" in the Index for more information.

1-28

CAUTION:

If something is between an occupant and an air bag, the bag might not inflate properly or it might force the object into that person. The path of an inflating air bag must be kept clear. Don't put anything between an occupant and an air bag, and don't attach or put anything on the steering wheel hub or on or near any other air bag covering. And don't hang anything from the assist handle on the passenger's side of the instrument panel.

When should an air bag inflate?

An air bag is designed to inflate in a moderate to severe frontal or near-frontal crash. The air bag will inflate only if the impact speed is above the system's designed "threshold level." If your vehicle goes straight into a wall that doesn't move or deform, the threshold level is about 11 to 16 mph (18 to 26 km/h). The threshold level can vary, however, with specific vehicle design, so that it can be somewhat above or below this range. If your vehicle strikes something that will move or deform, such as a parked car, the threshold level will be higher. The air bag is not designed to inflate in rollovers, side impacts or rear impacts, because inflation would not help the occupant.

In any particular crash no one can say whether an air bag should have inflated simply because of the damage to a vehicle or because of what the repair costs were. Inflation is determined by the angle of the impact and how quickly the vehicle slows down in frontal or near-frontal impacts.

1-30

What makes an air bag inflate?

In an impact of sufficient severity, the air bag sensing system detects that the vehicle is in a crash. The sensing system triggers a release of gas from the inflator, which inflates the air bag. The inflator, air bag and related hardware are all part of the air bag modules inside the steering wheel and in the instrument panel in front of the right front passenger.

How does an air bag restrain?

In moderate to severe frontal or near-frontal collisions, even belted occupants can contact the steering wheel or the instrument panel. Air bags supplement the protection provided by safety belts. Air bags distribute the force of the impact more evenly over the occupant's upper body, stopping the occupant more gradually. But air bags would not help you in many types of collisions, including rollovers, rear impacts and side impacts, primarily because an occupant's motion is not toward those air bags. Air bags should never be regarded as anything more than a supplement to safety belts, and then only in moderate to severe frontal or near-frontal collisions.

What will you see after an air bag inflates?

After an air bag inflates, it quickly deflates, so quickly that some people may not even realize the air bag inflated. Some components of the air bag module -- the steering wheel hub for the driver's air bag, or the instrument panel for the right front passenger's bag -- will be hot for a short time. The parts of the bag that come into contact with you may be warm, but not too hot to touch. There will be some smoke and dust coming from vents in the deflated air bags. Air bag inflation doesn't prevent the driver from seeing or from being able to steer the vehicle, nor does it stop people from leaving the vehicle.

CAUTION:

When an air bag inflates, there is dust in the air. This dust could cause breathing problems for people with a history of asthma or other breathing trouble. To avoid this, everyone in the vehicle should get out as soon as it is safe to do so. If you have breathing problems but can't get out of the vehicle after an air bag inflates, then get fresh air by opening a window or door.

- Air bags are designed to inflate only once. After they inflate, you'll need some new parts for your air bag system. If you don't get them, the air bag system won't be there to help protect you in another crash. A new system will include air bag modules and possibly other parts. The service manual for your vehicle covers the need to replace other parts.
- Your vehicle is equipped with a crash sensing and diagnostic module, which records information about the air bag system. The module records information about the readiness of the system, when the sensors are activated and driver's safety belt usage at deployment.
- Let only qualified technicians work on your air bag system. Improper service can mean that your air bag system won't work properly. See your dealer for service.

NOTICE:

If you damage the covering for the driver's or the right front passenger's air bag, the bag may not work properly. You may have to replace the air bag module in the steering wheel or both the air bag module and the instrument panel for the right front passenger's air bag. Do not open or break the air bag coverings.

If your vehicle ever gets into a lot of water -- such as water up to the carpeting or higher -- or if water enters your vehicle and soaks the carpet, the air bag controller can be soaked and ruined. If this ever happens, and then you start your vehicle, the damage could make the air bags inflate, even if there's no crash. You would have to replace the air bags as well as the sensors and related parts. If your vehicle is ever in a flood, or if it's exposed to water that soaks the carpet, you can avoid needless repair costs by turning off the vehicle immediately and disconnecting the battery cables. Don't let anyone start the vehicle under any circumstances. See your dealer for service.