

V3051

REPORT NUMBER KAR-99-16

NEW CAR ASSESSMENT PROGRAM
FRONTAL BARRIER IMPACT TEST

VOLKSWAGEN
1999 VOLKSWAGEN BEETLE (NEW)
2 DOOR COUPE
NHTSA NUMBER: MX5800

PREPARED BY:
KARCO ENGINEERING
9270 HOLLY ROAD
ADELANTO, CALIFORNIA 92301



MARCH 1, 1999

FINAL REPORT

PREPARED FOR:
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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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16. Abstract A 35 mph (56.3 km/h) frontal barrier impact was conducted on a 1999 Volkswagen Beetle (New) at KARCO Engineering on February 25, 1999. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The impact velocity is 56.8 km/h. The ambient temperature at the barrier face at the time of impact is 16.7 degrees Celcius. The vehicle's maximum post test static crush is 372 mm at the vehicles centerline. The test vehicle is equipped with a 3-point continuous belt system and second generation supplemental airbags in both front outboard seating positions. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows:					
Measurement Description		Units	Threshold	Driver ATD	Passenger ATD
Head Injury Criteria (HIC)		N/A	1000	385.3	442.4
Max. Thorax Accel. (3 msec Clip)		G's	60	46.6	48.3
Left Femur force		Newtons	10009	-2166.0	-5761.4
Right Femur Force		Newtons	10009	-2728.4	-5174.5
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SECTION 1

PURPOSE, TEST PROCEDURE AND SUMMARY OF TEST MX5800

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 is to obtain vehicle crashworthiness, occupant restraint system performance, and lower leg data for frontal barrier impacts. The impact velocity used in this test is in excess of the current 30 mph (48.3 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 the 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 25, 1999 at a speed of 56.8 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 and right femur load cells, upper and lower tibia sensors, and foot accelerometers. In addition, chest displacement and upper neck six-axis force 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 (96) 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 for this test. FMVSS 208 "Occupant Crash Protection" injury criteria were not exceeded by either ATD during this frontal barrier impact test.

1.3 SUMMARY OF FRONTAL BARRIER IMPACT TEST

A rigid load cell barrier was impacted by a 1999 Volkswagen Beetle (New) at a velocity of 56.8 km/h. The test vehicle weight is 1573 kilograms with two (2) part 572E 50th percentile adult male ATDs. Twenty-four (24) load cell barrier data channels were obtained in conducting the February 25, 1999 NCAP test. The test vehicle is equipped with a transverse mounted 2.0-liter, 4-cylinder engine and a 5-speed automatic transmission.

The driver Head Injury Criteria (HIC) is 385.3. The maximum resultant chest deceleration over three (3) milliseconds is 46.6 g's. The left and right femur loads are -2166.3 and -2728.4 Newtons, respectively. Chest deflection for the driver ATD peaked at -27.9 mm. The driver ATD head contacted the airbag and headrest, its chest and abdomen contacted the airbag, and both knees contacted the knee bolster and the steering column.

The right front passenger's HIC is 442.4. The maximum resultant chest deceleration over three (3) milliseconds is 48.3 g's. The left and right femur loads are -5761.4 and -5174.5 Newtons respectively. Chest deflection for the passenger ATD peaked at -29.0 mm. The passenger ATD head contacted the airbag and headrest, the chest and abdomen contacted the airbag and both knees contacted the glove box.

Maximum seat belt spool out as measured by on-board pullout potentiometers is 205.2 mm for the driver ATD and 189.7 mm for the passenger ATD. The shoulder belt stretch sensors are not used with seat belt pre-tensioner systems.

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

The test vehicle sustained a maximum static crush of 372 mm located at the vehicle centerline. Both the driver and passenger side doors opened without the aid of tools.

1.4 GENERAL COMMENTS

The 1999 Volkswagen Beetle (New) 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 and vehicle 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 seating and restraint systems.

SECTION 2

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 1999 Volkswagen Beetle (New)
 Test Program: 1999 NHTSA 35 MPH NCAP

NHTSA No.: MX5800
 Test Date: 2/25/99

CONVERSION FACTORS USED IN THIS REPORT*

Quantity	Typical Application	Old Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	mile/h	km/h	1.609
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.573
Pressure	Tire Pressures	lbf/in ²	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	°F	°C	$=(t_f - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf/ft	Nm	1.355

* Based on the Recommended Practice in SAE J916, May 85

**DATA SHEET NO. 1
CRASH TEST SUMMARY**

Test Vehicle: 1999 Volkswagen Beetle (New)
Test Program: 1999 NHTSA 35 MPH NCAP

NHTSA No.: MX5800
Test Date: 2/25/99

PRIMARY IMPACT DATA

Measured Parameter	Units	Value
Velocity at Impact	km/h	56.75
Test Weight	kg	1573
Impact Angle	degrees	0
Average Rebound	mm	490
Maximum Static Crush	mm	372

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Front Door Opening	Opened	Opened
Rear Door Opening	N/A	N/A
Seat Track Shift (mm)	15	15
Seat Back Failure	None	None

TEST DUMMY INFORMATION

Description	Driver	Passenger
Dummy Type / Serial No.	50% Male Hybrid III / No. 35	50% Male Hybrid III / No. 34
Head Contact	Airbag/Headrest	Airbag/Headrest
Chest Contact	Airbag	Airbag
Abdomen Contact	Airbag	Airbag
Left Knee Contact	Knee Bolster/Steering Column	Glove Box
Right Knee Contact	Knee Bolster/Steering Column	Glove Box

16mm MOVIE COVERAGE

High Speed	16
Real Time	1
Total	17

DATA CHANNELS

Driver ATD Sensors	40
Passenger ATD Sensors	40
Belt Assessment Sensors	8
Vehicle Structure Accelerometers	8
Rigid Barrier Load Cells	24
Total	120

DATA SHEET NO. 2
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 1999 Volkswagen Beetle (New)
Test Program: 1999 NHTSA 35 MPH NCAP

NHTSA No.: MX5800
Test Date: 2/25/99

TEST VEHICLE INFORMATION

Manufacturer	Volkswagen
Model	Beetle
Body Style	2 Door Coupe
NHTSA NO.	MX5800
VIN	3VWCC21C3XM437777
Color	Metallic Blue
Delivery Date	2/12/99
Odometer Reading (mile)	104.1
Dealer	Sbdo. Volkswagen
Transmission	Automatic
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	2
Engine Placement	Transverse

TEST VEHICLE OPTIONS

Driver Airbag	Yes
Passenger Airbag	Yes
Power Windows	Yes
Power Steering	Yes
Power Door Locks	Yes
Tilt Wheel	Yes
Air Conditioning	Yes
Power Brakes	Yes
Disc Brakes, Front	Yes
Disc Brakes, Rear	Yes
Anti-lock Brakes	Yes
AM/FM/Cassette	Yes
Anti-Theft System	No
Cruise Control	No

DATA FROM CERTIFICATION LABEL

Manufactured By	Volkswagen De Mexico S.A. De C.V.	GVWR (kg)	1701
Date of Manufacture	January-99	GAWR Front (kg)	934
		GAWR Rear (kg)	850

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	203	203
Cold Pressure (kPa)	203	203
Recommend Tire Size	P205/55/R16	P205/55/R16
Tire Size on Vehicle	P205/55/R16	P205/55/R16
Tire Manufacturer -	Michelin	Michelin

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	None	
Number of Occupants	2	2	0	4
Capacity Wt. (VCW) (kg)				390
Cargo Weight (RCLW) (kg)				118

DATA SHEET NO. 2...(continued)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 1999 Volkswagen Beetle (New)
 Test Program: 1999 NHTSA 35 MPH NCAP

NHTSA No.: MX5800
 Test Date: 2/25/99

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	415	245		452	344	
Right	kg	420	229		448	329	
Ratio	%	63.8	36.2		57.2	42.8	
Totals	kg	835	474	1309	900	673	1573

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1309
Weight of 2 P572 ATD's	kg	152
Rated Cargo/Luggage Weight (RCLW)	kg	118
Calculated Vehicle Target Weight (TVTW)	kg	1579

TEST VEHICLE ATTITUDE AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	680	684	705	710	915
As Tested	mm	668	666	654	652	1082

Vehicle Wheel base (mm): 2527

Weight of Ballast secured in cargo area (kg): 71 *

Vehicle Components Removed: Side mirrors, jack, tools, spare tire and paneling.

* Ballast weight does not include cameras, instrumentation, and brake abort system.

FUEL SYSTEM DATA

Fuel System Capacity From Owner's Manual (L): 54.9

Usable Capacity Figure Furnished by COTR (L): 55.0

Actual Test Volume with entire fuel System Filled (L): 51.0

Test Fluid Type: Stoddard Solvent ; Specific Gravity: 0.764

Kinematic Viscosity: as per ASTM Standard D484-71 ; Color: Red

Is Vehicle Fuel Pump Electric or Mechanical?: Electric

If electric, does pump operate with ignition switch "ON" & engine "OFF"? Yes

Fuel System Particulars: Driver side filler door, tank mounted at rear seat centerline,
fuel lines travel inside left frame rail.

**DATA SHEET NO. 3
POST IMPACT DATA**

Test Vehicle: 1999 Volkswagen Beetle (New)
Test Program: 1999 NHTSA 35 MPH NCAP

NHTSA No.: MX5800
Test Date: 2/25/99

SPEED TRAP DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	55.51 to 57.12	56.75
Trap No. 1 Entry Distance	mm	< 1524	1524
Trap No. 1 Exit Distance	mm	< 1524	305
Trap No. 2 Velocity (Redundant)	km/h	55.51 to 57.12	56.83
Trap No. 2 Entry Distance	mm	< 1524	1524
Trap No. 2 Exit Distance	mm	< 1524	305

VEHICLE STATIC CRUSH

Measured Parameter	Units	Pre-Test	Post-Test	Difference
Left Side	mm	3830	3598	-232
Center	mm	4065	3693	-372
Right Side	mm	3830	3604	-226

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	522
Center	mm	490
Right Side	mm	529
Average	mm	514

DATA SHEET NO. 4
TEST VEHICLE INFORMATION

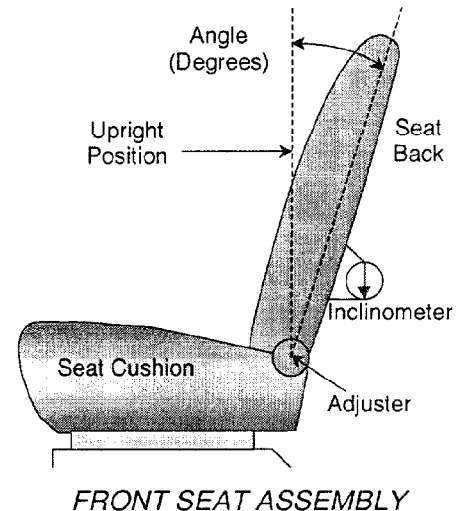
Test Vehicle: 1999 Volkswagen Beetle (New)
Test Program: 1999 NHTSA 35 MPH NCAP

NHTSA No.: MX5800
Test Date: 2/25/99

NOMINAL DESIGN RIDING POSITION

The driver and passenger seat backs are positioned to the manufacturers designated angle. The procedure is as follows: A special application tool with pointed probes is 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. An inclinometer is placed against the flat surface of the tool and the seat back angle is measured directly from the dial face.

Driver seat back angle: 19° with a seated dummy
Passenger seat back angle: 19° with a seated dummy



SEAT FORE/AFT POSITIONS

Both driver and passenger seats have 14 positions or detents. The first or forward most position is counted as number one (1). The fore/aft position is set aft of the middle position for both driver and passenger.

Driver seat fore/aft total travel:	<u>14 seating positions or detents</u>
Passenger seat fore/aft total travel:	<u>14 seating positions or detents</u>
Driver seat fore/aft position:	<u>8th detent from forward most</u>
Passenger seat fore/aft position:	<u>8th detent from forward most</u>

SEAT BELT UPPER ANCHORAGE

The test vehicle is equipped with adjustable anchorages for both driver and passenger seat positions. There are 5 positions or detents. The anchorages are placed in the middle position for testing.

DATA SHEET NO. 4...(continued)

TEST VEHICLE INFORMATION

Test Vehicle: 1999 Volkswagen Beetle (New)

NHTSA No.: MX5800

Test Program: 1999 NHTSA 35 MPH NCAP

Test Date: 2/25/99

FUEL TANK CAPACITY DATA

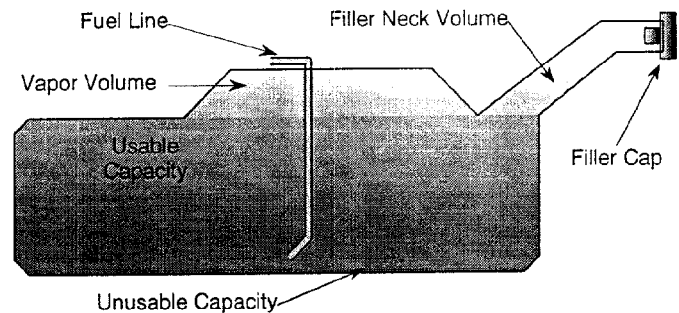
The "Usable Capacity" of the standard equipment fuel tank is: 55.0 liters

The "Usable Capacity" of any optional equipment fuel tank is: N/A liters

"Usable Capacity" used for certification tests FMVSS 301 requirements: 50.5 to 51.6 liters

Actual amount of Stoddard solvent added to vehicle for certification test: 51.0 liters

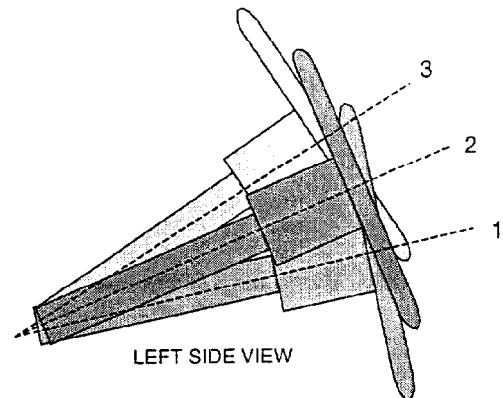
The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed to the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the right rear fender. The standard fuel tank occupies the area under the rear seat. Fuel lines run along the right side of the uni-body to the engine compartment.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

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 motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed onto the plate and the angle is measured. The tested vehicle has its steering column set to the geometric center, or position 2 as indicated in the drawing at right and the angle below.



STEERING COLUMN ASSEMBLY

Lowermost, position 1: 22°

Geometric center, position 2: 25°

Uppermost, position 3: 27°

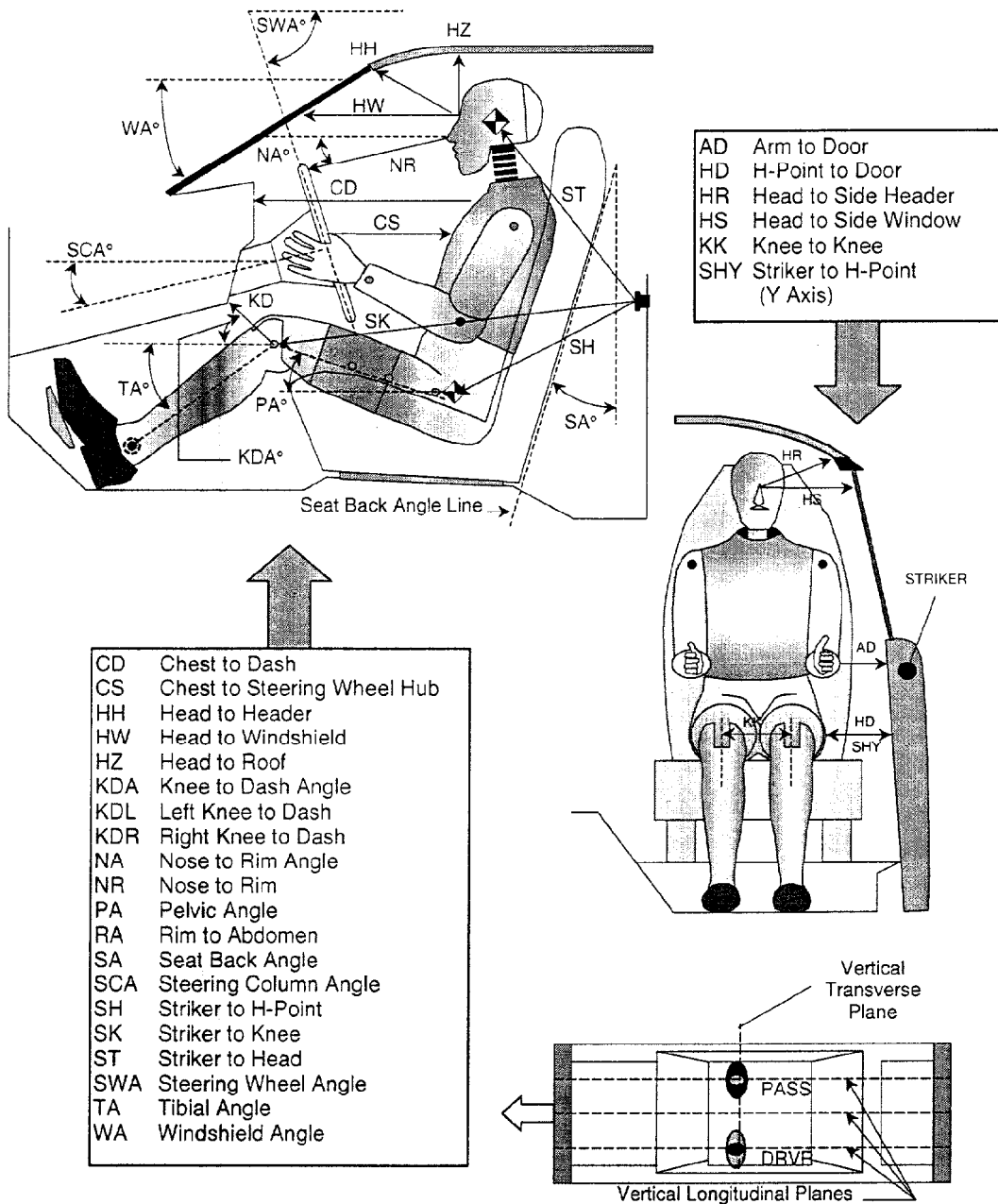
DATA SHEET NO. 5 **DUMMY POSITIONING IN VEHICLE**

Test Vehicle: 1999 Volkswagen Beetle (New)

NHTSA No.: MX5800

Test Program: 1999 NHTSA 35 MPH NCAP

Test Date: 2/25/99



DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS

DATA SHEET NO. 5...(continued)
DUMMY POSITIONING IN VEHICLE

Test Vehicle: 1999 Volkswagen Beetle (New)
 Test Program: 1999 NHTSA 35 MPH NCAP

NHTSA No.: MX5800
 Test Date: 2/25/99

TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		32		
SWA	Steering Wheel Angle		66		
SCA	Steering Column Angle		24		
SA	Seat Back Angle		19		19
HZ	Head to Roof (Z)	295	90	275	90
HH	Head to Header	585	0	590	0
HW	Head to Windshield	883	0	885	0
HR	Head to Side Header (Y)	275		270	
NR	Nose to Rim	429	9		
CD	Chest to Dash	550		485	
CS	Chest to Steering Hub	310	0		
RA	Rim to Abdomen	230	0		
KDL	Left Knee to Dash	190	25	190	
KDR	Right Knee to Dash	175		190	30
PA	Pelvic Angle		23		23
TA	Tibia Angle		44		40
KK	Knee to Knee (Y)	285		190	
ST	Striker to Head	460	63	445	67
SK	Striker to Knee	700	12	710	11
SH	Striker to H-Point	390	40	360	35
SHY	Striker to H-Point (Y)	235		215	
HS	Head to Side Window	320		315	
HD	H-Point to Door (Y)	160		140	
AD	Arm to Door (Y)	100		90	
SK	Striker to Knee	700	12	710	11

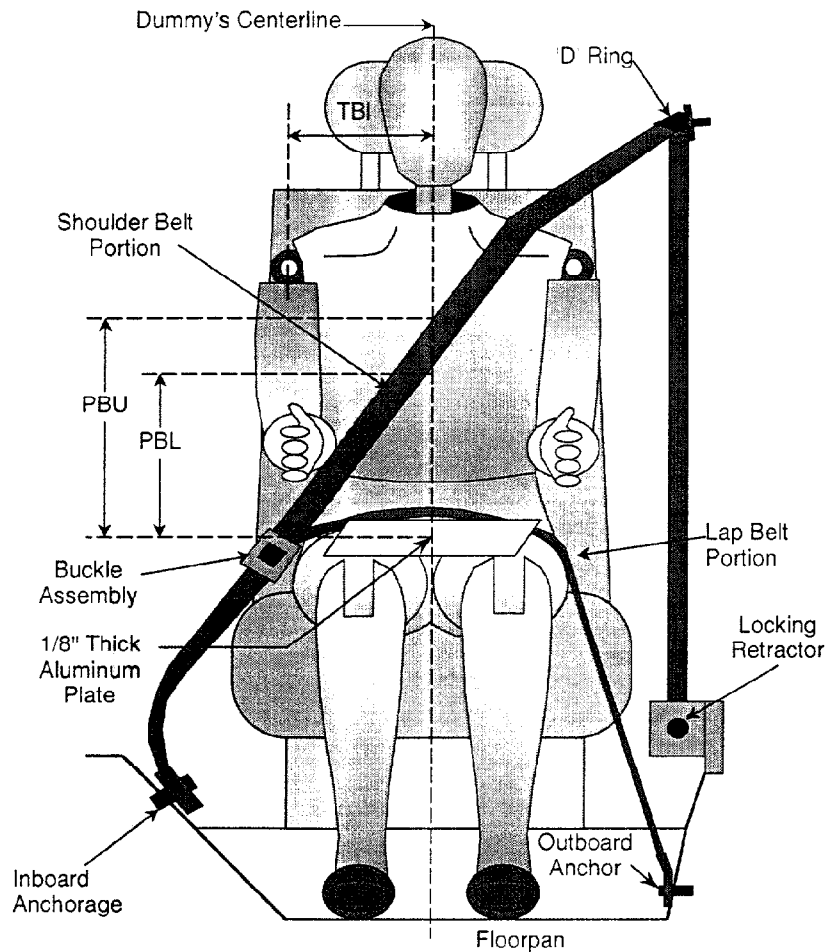
DATA SHEET NO. 6
SEAT BELT POSITIONING DATA

Test Vehicle: 1999 Volkswagen Beetle (New)

NHTSA No.: MX5800

Test Program: 1999 NHTSA 35 MPH NCAP

Test Date: 2/25/99



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
TBI - Dummy centerline to shoulder bolt	mm	185	180
PBU - Top surface of reference to belt upper edge	mm	335	330
PBL - Top surface of reference to belt lower edge	mm	255	250
Lap Belt tension	Newtons	10	10
Shoulder Belt tension	N/A	Retractor	Retractor

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

TEST VEHICLE: 1999 VOLKSWAGEN BEETLE (NEW) NHTSA No.: MX5800
 TEST PROGRAM: 1999 NHTSA 35 MPH NCAP TEST DATE: 2/25/99

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.)	1510	-630	345	G's	1.7	111.5	-47.6	24.7
2	Right Rear X-Member (Pri.)	1505	660	345	G's	1.7	108.3	-37.7	24.1
3	Engine Top	3460	240	800	G's	105.2	33.2	-186.0	21.6
4	Engine Bottom	3530	60	105	G's	30.3	31.8	-159.9	20.4
5	Left Brake Caliper	3380	-675	350	G's	27.9	56.8	-120.5	34.6
6	Right Brake Caliper	3380	675	350	G's	5.5	5.5	-90.7	34.6
7	Instrument Panel	2820	0	930	G's	29.1	53.5	-79.4	37.3
8	Left Rear X-Member (Rednt.)	1660	-620	145	G's	2.7	111.1	-49.2	24.3

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

* Channel failed, check plot for time of failure

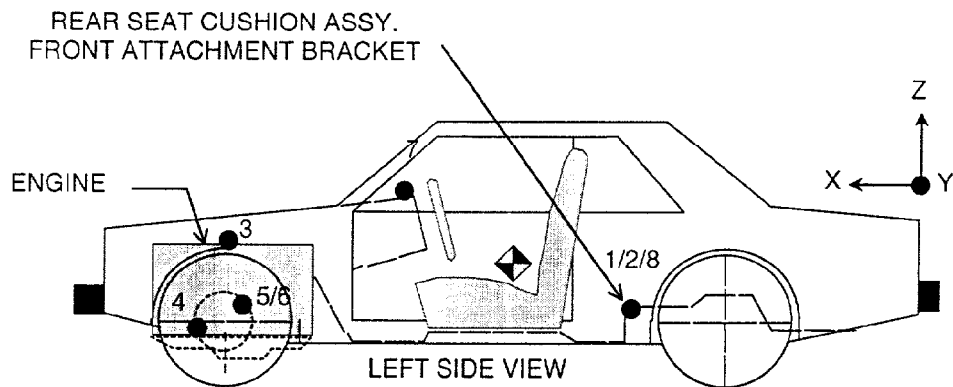
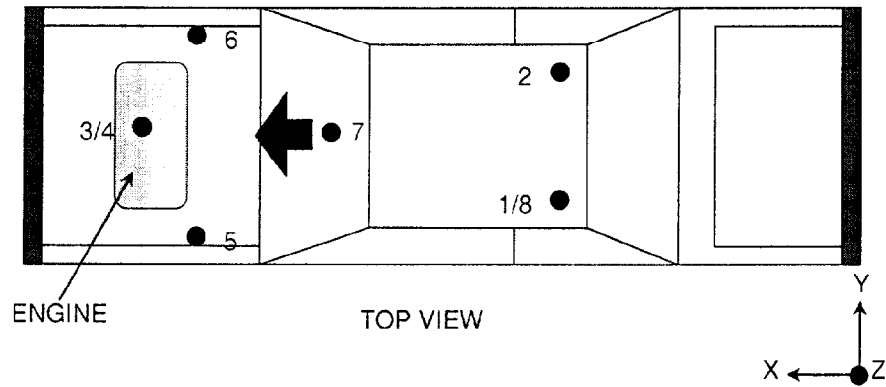
DATA SHEET NO. 7...(continued)
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 1999 Volkswagen Beetle (New)

NHTSA No.: MX5800

Test Program: 1999 NHTSA 35 MPH NCAP

Test Date: 2/25/99



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

TEST VEHICLE: 1999 VOLKSWAGEN BEETLE (NEW) NHTSA No.: MX5800

TEST PROGRAM: 1999 NHTSA 35 MPH NCAP TEST DATE: 2/25/99

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	25.3	179.0	-46.3	76.1	42.7	256.5	-53.9	73.2
Head CG	Y	G's	5.0	58.6	-6.6	87.1	10.0	75.4	-4.5	137.6
Head CG	Z	G's	21.8	43.7	-14.9	86.8	30.8	54.9	-12.4	86.2
Head CG Resultant	N/A	G's	46.7	77.2			56.3	71.6		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	6.6	175.4	-47.7	54.5	5.5	256.4	-49.0	63.4
Chest CG	Y	G's	3.8	18.6	-4.4	55.4	5.9	40.7	-6.8	91.7
Chest CG	Z	G's	13.2	55.4	-12.4	91.3	16.2	54.2	-9.2	84.7
Chest CG Resultant	N/A	G's	49.7	54.5			49.4	63.3		

FEMUR PEAK FORCES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Femur	Z	Newtons	886.5	43.0	-2166.0	57.4	1054.1	40.4	-5761.4	50.2
Right Femur	Z	Newtons	1263.6	39.5	-2728.4	54.4	649.3	43.9	-5174.5	51.6

SEAT BELT SENSOR PEAK VALUES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Lap Belt Force	N/A	Newtons	8343.2	56.9	-0.9	1.2	4031.7	38.0	-148.8	45.0
Shoulder Belt Force	N/A	Newtons	4174.2	37.8	-11.9	193.5	6995.1	40.4	-10.6	230.2
Shoulder Belt Spoolout	N/A	MM	205.2	82.0	0.1	0.0	189.7	84.6	0.0	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 with pre-tensioner

** Passenger side failed, check plot for time of failure

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	385.3	40.9	51.3	87.2	442.4	43.3	54.6	90.5

CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Primary	46.6	53.7	56.7	48.3	62.6	65.6

DATA SHEET NO. 8...(continued)

TEST VEHICLE: 1999 VOLKSWAGEN BEETLE (NEW)

NHTSA No.: MX5800

TEST PROGRAM: 1999 NHTSA 35 MPH NCAP

TEST DATE: 2/25/99

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Pelvis	X	G's	4.1	88.5	-67.0	57.1	4.8	185.9	-86.4	45.5
Pelvis	Y	G's	9.7	77.0	-14.1	43.1	16.8	45.4	-5.7	73.7
Pelvis	Z	G's	4.8	178.9	-30.4	63.0	3.5	185.9	-29.7	60.9

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	Newtons	589.0	54.5	-382.4	131.2	782.6	64.4	-484.5	130.8
Neck Force	Y	Newtons	233.5	59.6	-233.5	90.2	230.7	75.4	-219.3	123.9
Neck Force	Z	Newtons	2269.7	57.0	-306.2	254.6	1211.2	59.3	-230.7	86.7
Neck Moment	X	N•m	10.2	89.1	-4.6	57.5	5.9	95.9	-11.6	132.0
Neck Moment	Y	N•m	49.9	54.6	-26.2	245.8	49.5	63.5	-37.3	91.7
Neck Moment	Z	N•m	4.1	85.9	-3.7	282.1	5.5	111.9	-4.8	78.9

FOOT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Foot Aft	X	G's	19.6	71.2	-63.6	33.2	25.4	52.1	-107.8	45.4 *
Left Foot Aft	Z	G's	5.9	10.2	-71.5	37.1	12.3	38.0	-64.6	44.1 *
Left Foot Fore	Z	G's	80.5	42.7	-94.7	38.2	84.3	37.9	-92.8	32.4 *
Right Foot Aft	X	G's	36.8	58.1	-120.5	46.8	0.6	1.3	-132.0	39.2 *
Right Foot Aft	Z	G's	26.0	56.9	-202.9	47.3	1.9	13.9	-88.3	39.5 *
Right Foot Fore	Z	G's	66.3	56.8	-198.1	46.5	30.2	37.2	-123.1	32.1 *

* Passenger side failed, check plots for time of failure

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	27.8	35.1	-52.2	60.4	9.5	52.0	-36.2	67.4
Left Lower Moment	Y	N•m	148.3	64.5	-21.4	29.3	63.6	54.2	-48.5	43.9
Left Lower Force	Z	Newtons	570.8	18.9	-4367.4	62.1	100.8	21.8	-4535.6	54.1
Left Upper Moment	X	N•m	47.5	39.7	-16.1	62.0	23.0	51.8	-38.8	43.6
Left Upper Moment	Y	N•m	17.1	208.1	-94.1	35.3	117.9	42.2	-158.3	52.5
Right Lower Moment	X	N•m	105.1	52.1	-82.7	47.3	40.9	37.4	-120.4	49.1
Right Lower Moment	Y	N•m	148.4	56.4	-66.7	42.3	67.7	62.0	-52.0	40.2
Right Lower Force	Z	Newtons	653.0	41.1	-4633.2	49.3	116.3	200.2	-3580.7	61.7
Right Upper Moment	X	N•m	21.9	70.4	-82.4	47.7	64.7	39.0	-18.0	49.6
Right Upper Moment	Y	N•m	45.6	44.0	-116.1	48.5	6.5	188.3	-135.1	39.3

DATA SHEET NO. 8...(continued)

TEST VEHICLE: 1999 VOLKSWAGEN BEETLE (NEW) NHTSA No.: MX5800

TEST PROGRAM: 1999 NHTSA 35 MPH NCAP TEST DATE: 2/25/99

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	MM	0.1	7.3	-27.9	56.3	0.3	3.7	-29.0	54.5

HEAD REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	25.6	178.8	-45.0	77.3	42.7	256.6	-53.0	74.5
Head CG	Y	G's	5.7	58.8	-6.7	88.7	11.0	74.4	-4.8	255.4
Head CG	Z	G's	23.8	57.1	-16.8	88.6	28.3	69.4	-16.0	87.5
Head CG Resultant	N/A	G's	46.0	77.3			57.2	70.8		

CHEST REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	6.1	176.1	-47.0	54.3	6.0	256.6	-49.3	63.4
Chest CG	Y	G's	3.9	88.4	-4.6	58.8	10.4	70.7	-8.2	84.5
Chest CG	Z	G's	12.9	53.8	-9.4	90.9	14.7	41.7	-7.5	84.7
Chest CG Resultant	N/A	G's	48.9	54.2			49.7	63.3		

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	379.7	40.7	50.9	86.8	448.2	43.5	55.9	91.8

REDUNDANT CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Redundant	45.8	53.5	56.5	48.4	62.6	65.6

DATA SHEET NO. 9
SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

Test Vehicle: 1999 Volkswagen Beetle (New)
 Test Program: 1999 NHTSA 35 MPH NCAP

NHTSA No.: MX5800
 Test Date: 2/25/99

SEAT BELT PLACEMENT MEASUREMENTS

Measurement Description	Units	Driver	Passenger
TCI - Dummy centerline to shoulder bolt	mm	230	220
PBU - Top surface of reference to belt upper edge	mm	300	310
PBL - Top surface of reference to belt lower edge	mm	215	240
Lap Belt tension	Newtons	10	10
Shoulder Belt tension	N/A	Retractor	Retractor

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Retractor reel to 'D' ring	mm	590	590
Shoulder belt length as measured on ATD	mm	875	875
Lap belt length as measured on ATD	mm	730	735
Remainder of belt on reel	mm	1080	990
Total belt length for continuous webbing systems	mm	3275	3190

SHOULDER BELT SPOOL-OFF DATA

Measurement Description	Units	Driver	Passenger
As determined mechanically	mm	165.0	160.0
As determined electronically	mm	205.2	189.7

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	0.50	0.50

*Not used with shoulder belt pre-tensioner systems.

DATA SHEET NO. 10
SUMMARY OF FMVSS 212 DATA

Test Vehicle: 1999 Volkswagen Beetle (New)
 Test Program: 1999 NHTSA 35 MPH NCAP

NHTSA No.: MX5800
 Test Date: 2/25/99

Windshield Mounting Details:

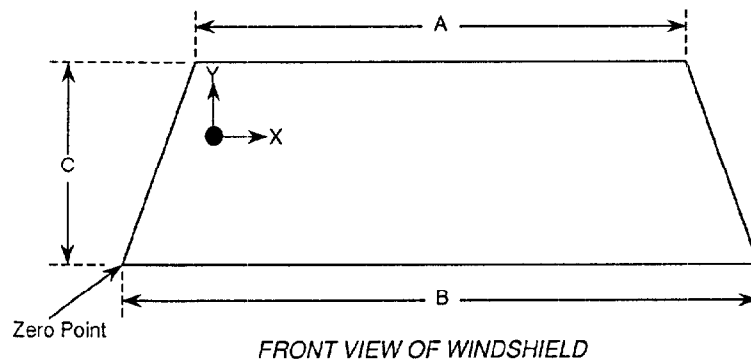
Windshield glass is secured to the vehicle frame with a rubber type adhesive. There is no molding that covers the windshield periphery at any point.

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.

Temperature of windshield molding during test: 21.1 °C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	1549.5	1549.5	100
Right Side	1549.5	1549.5	100
Total	3099.0	3099.0	100



WINDSHIELD DIMENSIONS

Item	Units	Segment Length	Molding Width
A	mm	1180	N/A
B	mm	1475	N/A
C	mm	675	N/A

DATA SHEET NO. 11

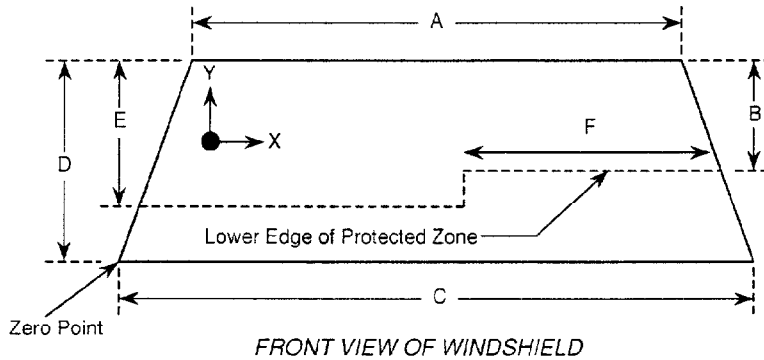
WINDSHIELD ZONE INTRUSION FMVSS 219 (PARTIAL) DATA

Test Vehicle: 1999 Volkswagen Beetle (New)

NHTSA No.: MX5800

Test Program: 1999 NHTSA 35 MPH NCAP

Test Date: 2/25/99



WINDSHIELD AND PROTECTED ZONE

Item	Units	Value
A	mm	1180
B	mm	405
C	mm	1475
D	mm	675
E	mm	500
F	mm	400

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 that 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 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 Volkswagen Beetle (New)

NHTSA No.: MX5800

Test Program: 1999 NHTSA 35 MPH NCAP

Test Date: 2/25/99

Test Time: 12:45 PM Temperature at Time of Impact: 16.7 °C

STODDARD SOLVENT SPILLAGE MEASUREMENT

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

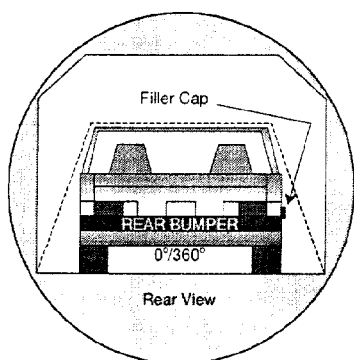
DATA SHEET NO. 13
FMVSS 301 STATIC ROLLOVER DATA SHEET

Test Vehicle: 1999 Volkswagen Beetle (New)

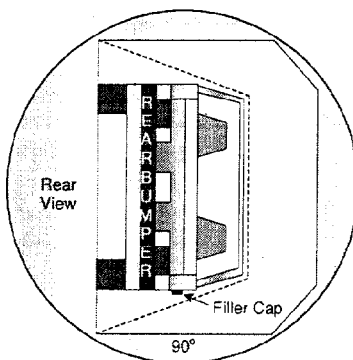
NHTSA No.: MX5800

Test Program: 1999 NHTSA 35 MPH NCAP

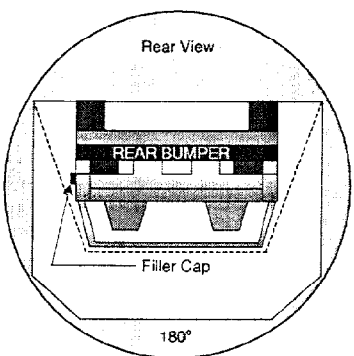
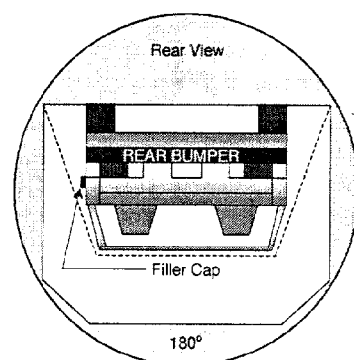
Test Date: 2/25/99



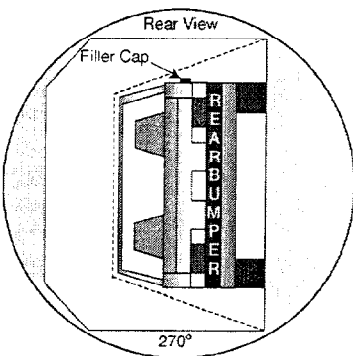
0° TO 90°



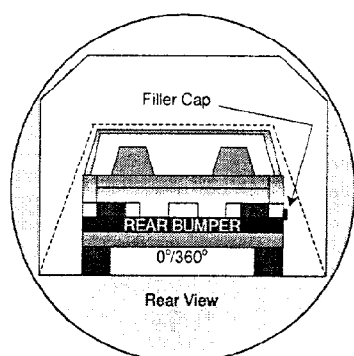
90° TO 180°



180° TO 270°



270° TO 360°



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

TEST PHASE	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° TO 90°	82	300	0.0
90° TO 180°	84	300	0.0
180° TO 270°	79	300	0.0
270° TO 360°	84	300	0.0

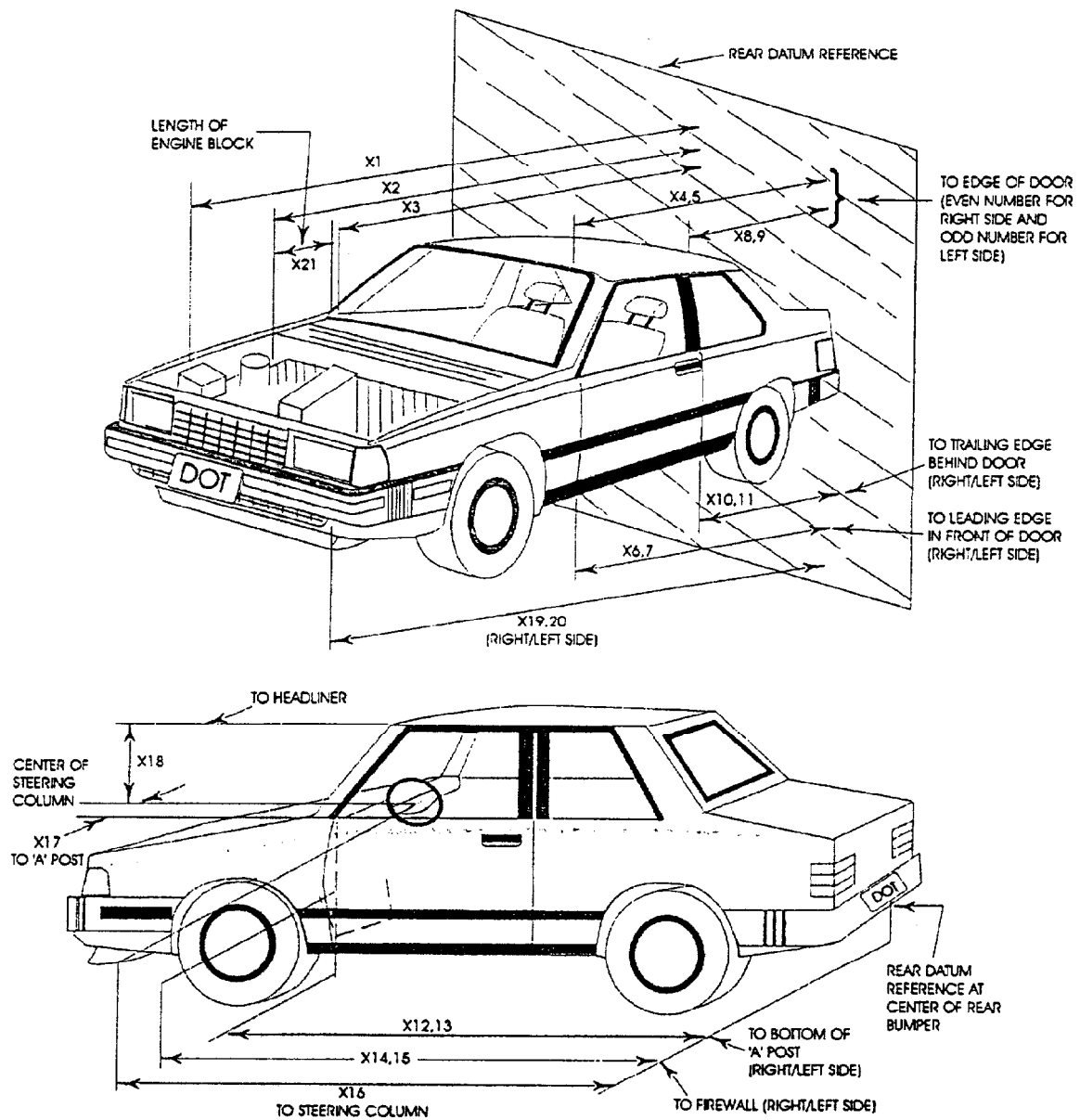
DATA SHEET NO. 14
VEHICLE MEASUREMENTS

Test Vehicle: 1999 Volkswagen Beetle (New)
Test Program: 1999 NHTSA 35 MPH NCAP

NHTSA No.: MX5800
Test Date: 2/25/99

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	4065	3693	-372
2	RSOV to front of engine	mm	3495	3389	-106
3	RSOV to firewall centerline	mm	3010	2953	-57
4	RSOV to leading edge of right door	mm	2788	2782	-6
5	RSOV to leading edge of left door	mm	2785	2777	-8
6	RSOV to lower leading edge of right door	mm	2665	2660	-5
7	RSOV to lower leading edge of left door	mm	2658	2661	3
8	RSOV to upper trailing edge of right door	mm	1639	1630	-9
9	RSOV to upper trailing edge of left door	mm	1635	1625	-10
10	RSOV to lower trailing edge of right door	mm	1628	1620	-8
11	RSOV to lower trailing edge of left door	mm	1624	1623	-1
12	RSOV to bottom of right 'A' pillar	mm	2770	2770	0
13	RSOV to bottom of left 'A' pillar	mm	2770	2765	-5
14	RSOV to firewall on right side	mm	3030	2964	-66
15	RSOV to firewall of left side	mm	3020	2970	-50
16	RSOV to steering column	mm	2320	2381	61
17	Center of steering column to left 'A' pillar	mm	357	385	28
18	Center of steering column to headlining	mm	480	540	60
19	RSOV to right side of front bumper	mm	3830	3604	-226
20	RSOV to left side of front bumper	mm	3830	3598	-232
21	Length of engine block	mm	385	385	0
RD	RSOV to right side of dash panel	mm	2520	2512	-8
CD	RSOV to center of dash panel	mm	2469	2424	-45
LD	RSOV to left side of dash panel	mm	2508	2498	-10

VEHICLE MEASUREMENTS



DATA SHEET NO. 15
CAMERA LOCATIONS

Test Vehicle: 1999 Volkswagen Beetle (New)
Test Program: 1999 NHTSA 35 MPH NCAP

NHTSA No.: MX5800
Test Date: 2/25/99

No.	Camera View	Location (mm)			Angle (Deg.)	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	2030	-8250	1210	1	7753	13	980
3	Left Side, No. 2	1200	-6200	1515	1	5700	25	1030
4	Left Side, No. 3	2900	-3050	2050	19	2810	19	980
5	Left Side, No. 4	2220	-8380	3067	15	8000	19	1000
6	Left Side, No. 5	2200	-8300	2613	10	7900	19	1000
7	Right Side, No. 1	1740	8300	925	1	7971	19	1010
8	Right Side, No. 2	1730	8340	1573	1	7983	40	900
9	Right Side, No. 3	3100	3050	2070	19	3500	19	1000
10	Right Side, No. 4	2250	7050	1325	2	7234	35	990
11	Overhead Overall	600	0	5791	90	N/A	13	1000
12	Front View, Driver	-475	-340	2824	49	N/A	13	1020
13	Front View, Passenger	-475	340	2824	48	N/A	13	1020
14	Pit Camera, Engine	850	0	-1470	90	N/A	10	850
15	Pit Camera, Fuel Tank	4250	0	-1800	48	N/A	12	1000
16	Onboard, Driver	2950	-225	1130	0	935	13	460
17	Onboard, Passenger	3010	265	1085	1	955	13	410

X - Barrier Face Y - Monorail Centerline Z - Ground

DATA SHEET NO. 16
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 1999 Volkswagen Beetle (New)

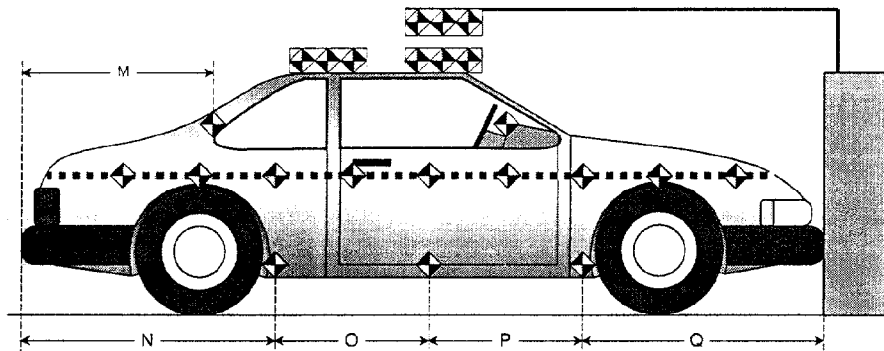
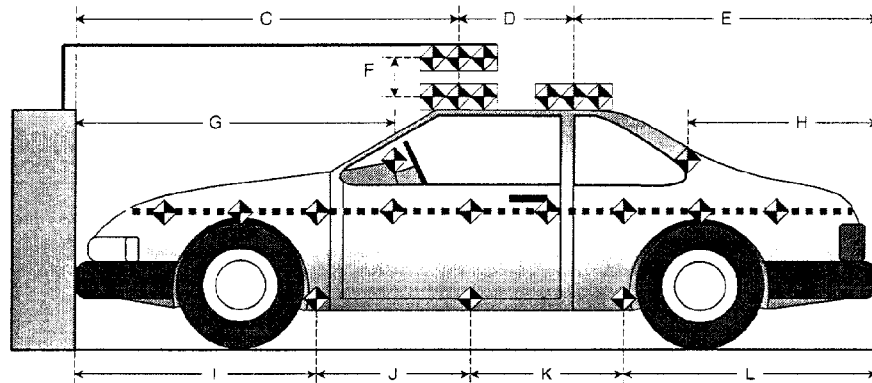
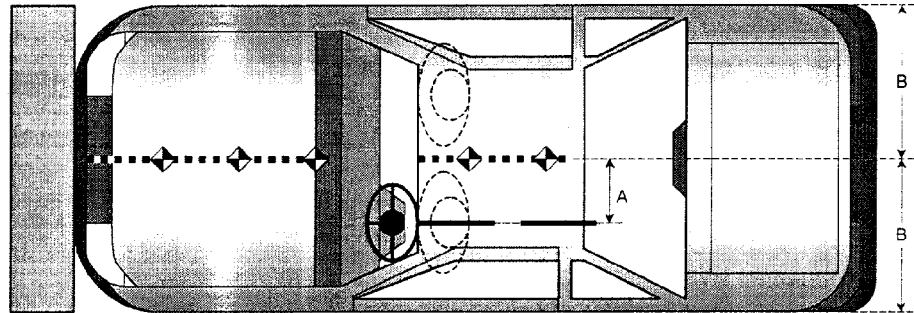
NHTSA No.: MX5800

Test Program: 1999 NHTSA 35 MPH NCAP

Test Date: 2/25/99

All Dimensions
in mm

Item	Value
A	320
B	760
C	1780
D	605
E	1682
F	270
G	1271
H	1147
I	1271
J	813
K	813
L	1168
M	1285
N	1171
O	817
P	812
Q	1266



DATA SHEET NO. 17
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 1999 Volkswagen Beetle (New)
 Test Program: 1999 NHTSA 35 MPH NCAP

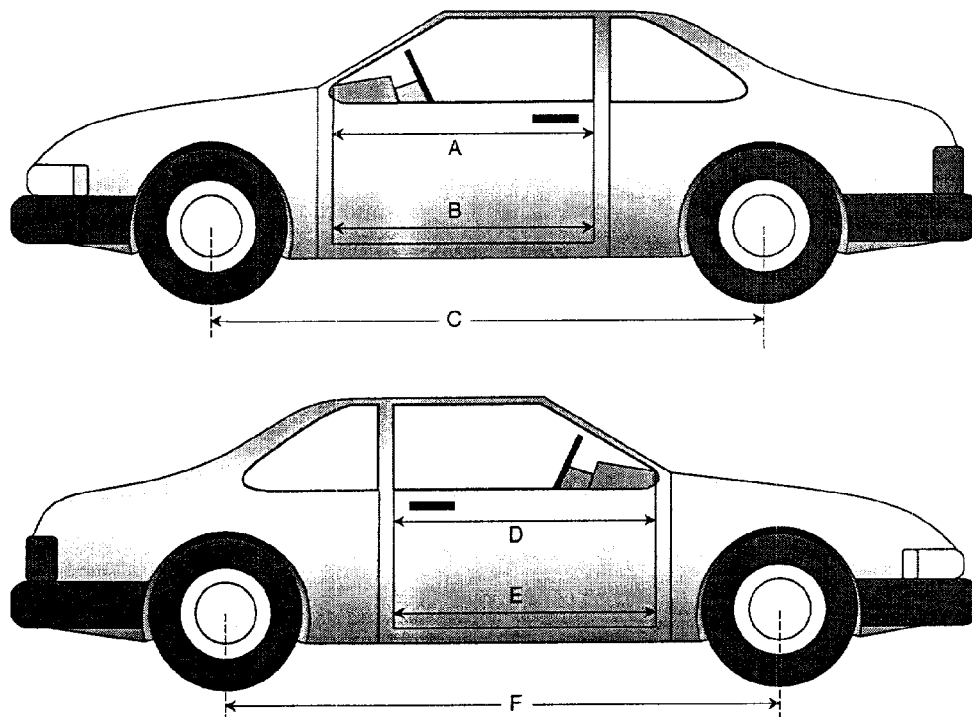
NHTSA No.: MX5800
 Test Date: 2/25/99

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1119	1115	-4
B	Left Side Lower	mm	1116	1109	-7
D	Right Side Upper	mm	1109	1112	3
E	Right Side Lower	mm	1109	1107	-2

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheel base	mm	2527	2441	-86
F	Right Side Wheel base	mm	2527	2456	-71



DATA SHEET NO. 17...(CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 1999 Volkswagen Beetle (New)

NHTSA No.: MX5800

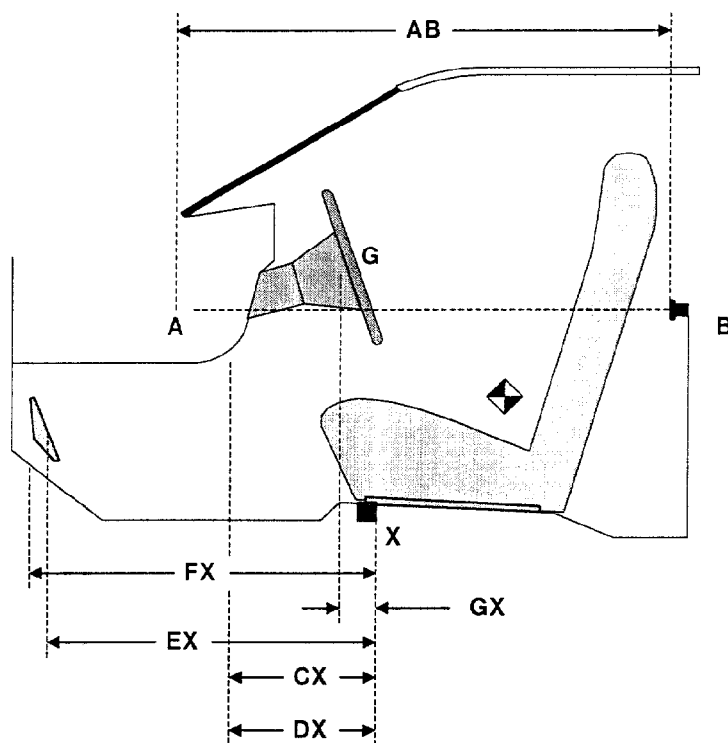
Test Program: 1999 NHTSA 35 MPH NCAP

Test Date: 2/25/99

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	1119	1115	-4
CX	Left Knee Bolster to X	mm	306	295	-11
DX	Right Knee Bolster to X	mm	307	295	-12
EX	Brake Pedal to X	mm	570	450	-120
FX	Foot Rest to X	mm	620	565	-55
GX	Center of Steering Wheel Hub to X	mm	100	115	15

X = Left Front Seat Outboard Anchor Bolt Head



DRIVER COMPARTMENT

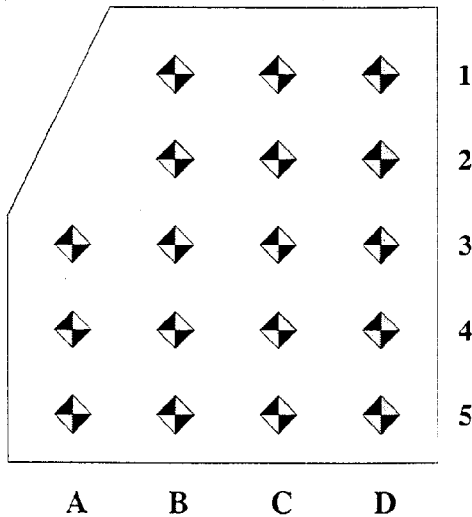
DATA SHEET NO. 17...(CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 1999 Volkswagen Beetle (New)

NHTSA No.: MX5800

Test Program: 1999 NHTSA 35 MPH NCAP

Test Date: 2/25/99



Measurement reference point for X and Z axis is the forward outboard seat mounting bolt.

Columns A through D are evenly spaced.

Rows 1 and 2 are on the toe kick portion of the floor pan. Rows 3,4, and 5 are located on the most level portion of the floor pan.

Row 3 will be at the intersection of the toe kick and the level sections of the floor pan.

DRIVER FLOOR PAN X-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1		744	740	740		610	610	636		-134	-130	-104
2		644	640	640		555	595	595		-89	-45	-45
3	545	544	540	540	501	505	508	510	-44	-39	-32	-30
4	445	445	445	445	430	420	417	416	-15	-25	-28	-29
5	345	345	345	345	330	330	320	320	-15	-15	-25	-25

DRIVER FLOOR PAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1		35	38	35		75	118	87		40	80	52
2		-40	-35	-35		-33	-10	-25		7	25	10
3	-85	-85	-82	-80	-30	-60	-50	-65	55	25	32	15
4	-90	-90	-85	-85	-85	-85	-70	-65	5	5	15	20
5	-85	-90	-80	-85	-70	-85	-88	-88	15	5	-8	-3

DATA SHEET NO. 17...(CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 1999 Volkswagen Beetle (New)

NHTSA No.: MX5800

Test Program: 1999 NHTSA 35 MPH NCAP

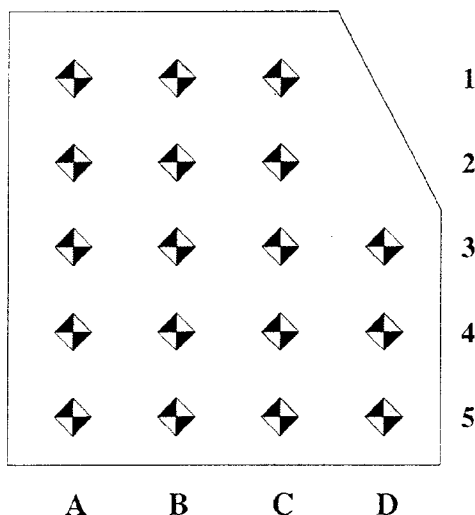
Test Date: 2/25/99

Measurement reference point for X and Z axis is the forward outboard seat mounting bolt.

Columns A through D are evenly spaced.

Rows 1 and 2 are on the toe kick portion of the floor pan. Rows 3,4, and 5 are located on the most level portion of the floor pan.

Row 3 will be at the intersection of the toe kick and the level sections of the floor pan.



PASSENGER FLOOR PAN X-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	733	729	734		679	661	656		-54	-68	-78	
2	641	640	646		610	609	594		-31	-31	-52	
3	538	539	538	537	504	509	506	503	-34	-30	-32	-34
4	438	439	439	438	408	412	414	419	-30	-27	-25	-19
5	341	341	341	341	312	320	324	321	-29	-21	-17	-20

PASSENGER FLOOR PAN Z-AXIS

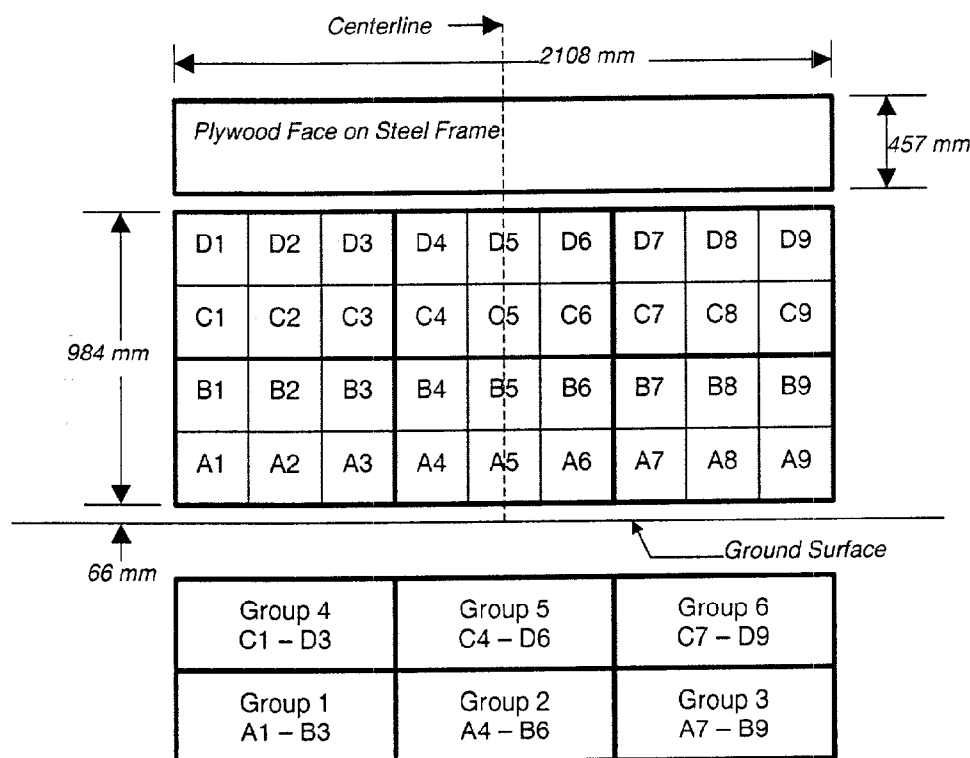
	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	30	30	35		65	80	109		35	50	74	
2	-55	-55	-55		-36	-35	6		19	20	61	
3	-95	-95	-100	-100	-70	-63	-64	-40	25	32	36	60
4	-95	-95	-100	-100	-69	-79	-85	-80	26	16	15	20
5	-92	-90	-93	-87	-58	-98	-95	-77	34	-8	-2	10

DATA SHEET NO. 18
FIXED BARRIER TYPE

Test Vehicle: 1999 Volkswagen Beetle (New)
Test Program: 1999 NHTSA 35 MPH NCAP

NHTSA No.: MX5800
Test Date: 2/25/99

36 Load Cell Rigid Barrier (NHTSA Standard)
Load Cell Locations on Fixed Barrier



6 Groups of 6 Load Cells Each

The Data is presented in Appendix C with the following requirements:

- 1.) Data from 36 individual load cells
- 2.) Sum data from 6 groupings shown above (6 cells/group)
- 3.) Total or sum of all 36 individual load cells
- 4.) Sum of all 36 individual load cells vs. vehicle dynamic crush

DATA SHEET NO. 19
ACCIDENT INVESTIGATION DATA

Test Vehicle: 1999 Volkswagen Beetle (New)
Test Program: 1999 NHTSA 35 MPH NCAP

NHTSA No.: MX5800
Test Date: 2/25/99

VEHICLE INFORMATION

VIN: 3VWCC21C3XM437777 ;
Vehicle Size Category: _____ ;

Wheel base (mm): 2527
Test Weight (kg): 1573

ACCELEROMETER DATA

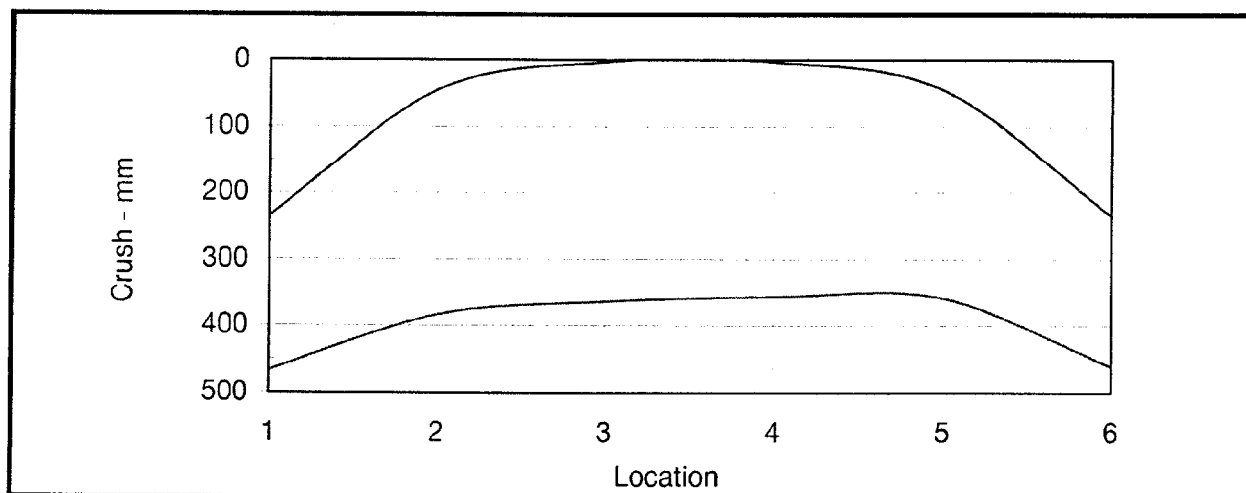
Accelerometer Location: Left rear floor pan
Cal. Procedure/Interval: 6 months / drop test
Integration Algorithm: NHTSA Standard ;
Impact Velocity (km/h): 56.75 ;
Velocity Change (km/h): 62.63 ;

Linearity: Good
Time of Separation (msec): 66.7

CRUSH PROFILE

Collision Deformation Classification: 12FDEW6 ; Midpoint of Damage: Vehicle Centerline
Damage Region Length (mm): 1482 ; Impact Mode: Full Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	235	467	-232
C2	Crush zone 2 on left side	mm	45	384	-339
C3	Crush zone 3 on left side	mm	3	365	-362
C4	Crush zone 4 on right side	mm	3	358	-355
C5	Crush zone 5 on right side	mm	45	360	-315
C6	Crush zone 6 at right side	mm	235	461	-226



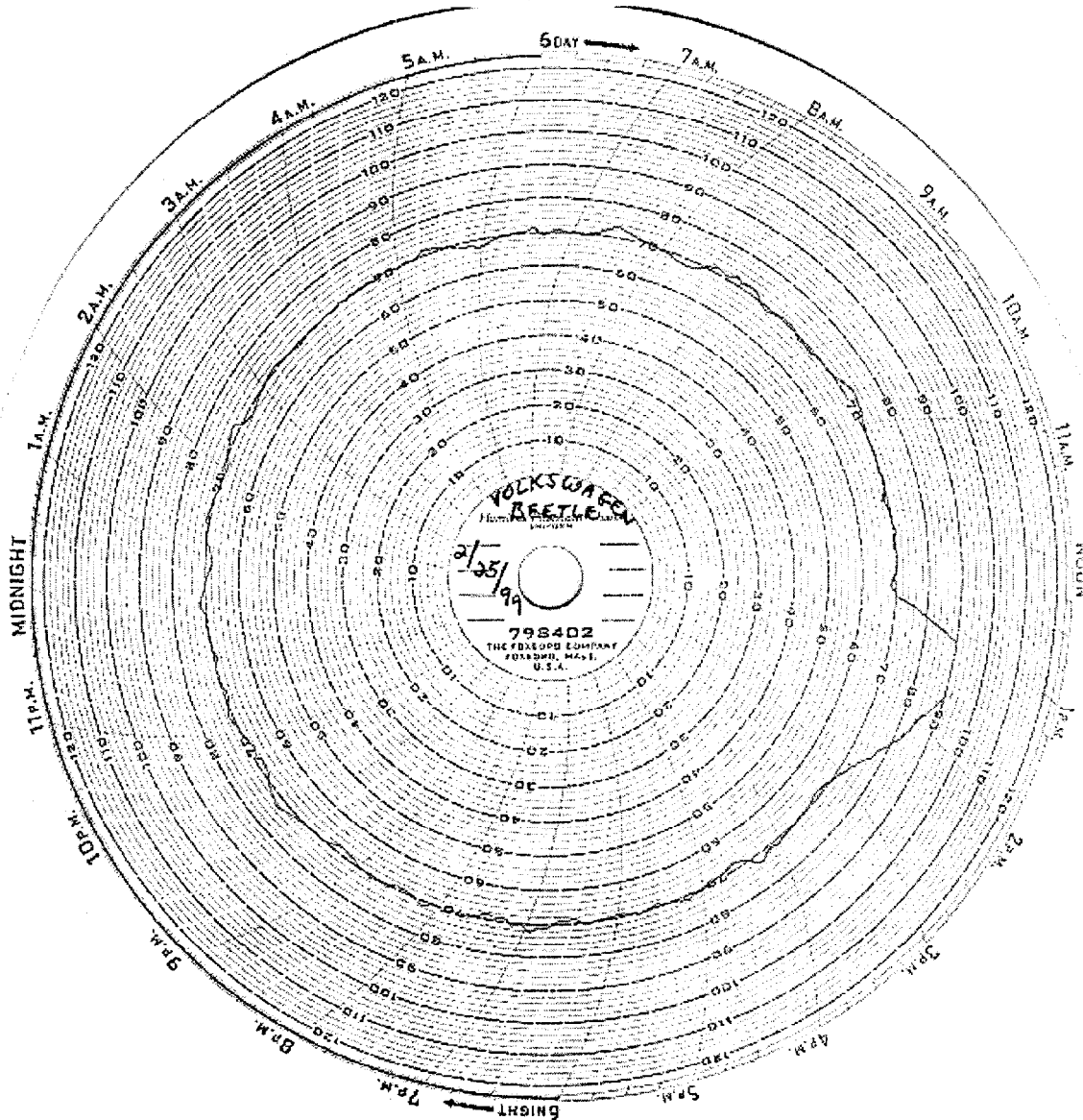
DATA SHEET NO. 20
DUMMY/ VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 1999 Volkswagen Beetle (New)

NHTSA No.: MX5800

Test Program: 1999 NHTSA 35 MPH NCAP

Test Date: 2/25/99



APPENDIX A PHOTOGRAPHS

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FIGURE A-1. RIGHT FRONT AS RECEIVED



FIGURE A-2. LEFT REAR AS RECEIVED



FIGURE A-3. VEHICLE CERTIFICATION LABEL



FIGURE A-4. VEHICLE TIRE PLACARD

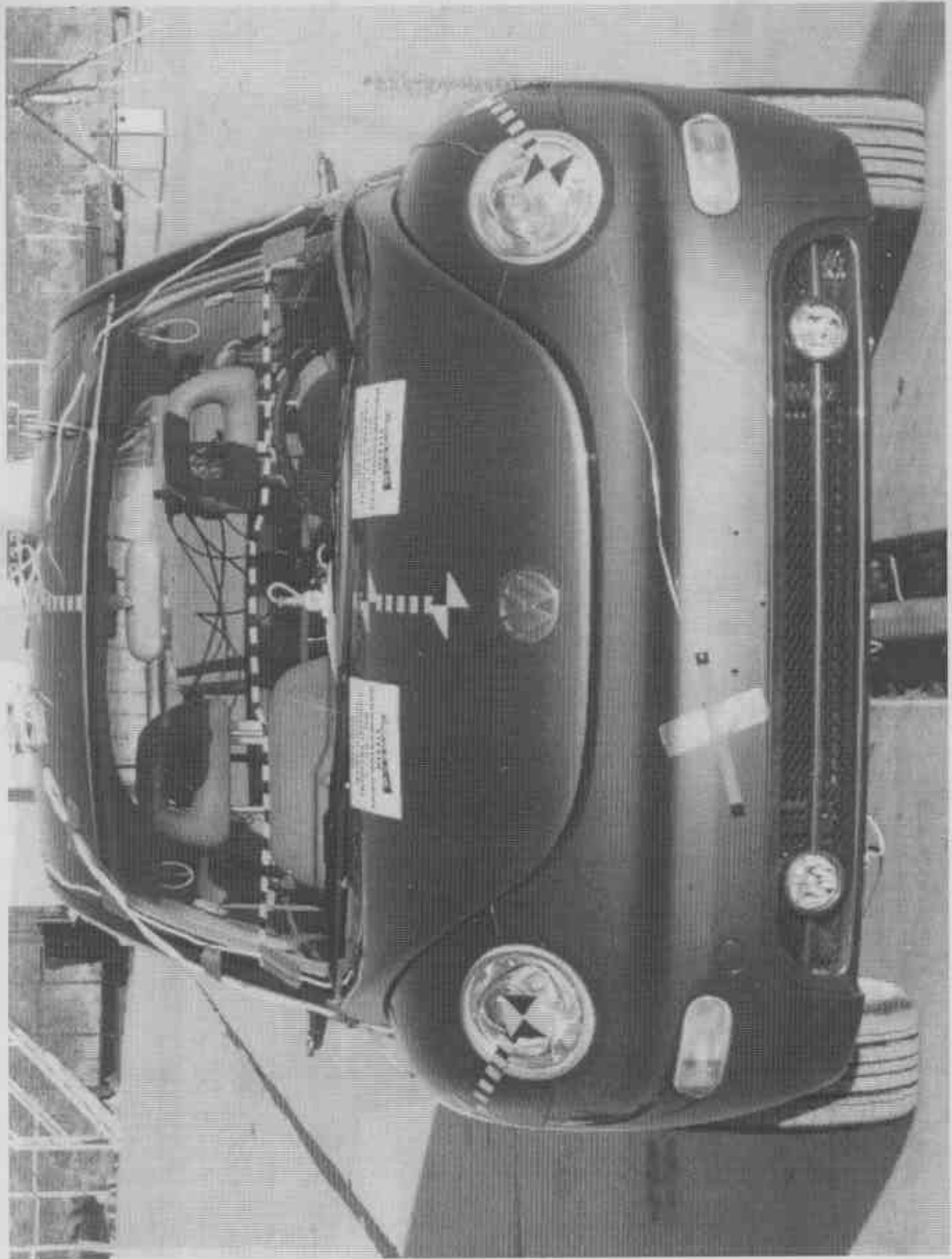


FIGURE A-5. PRETEST FRONT VIEW

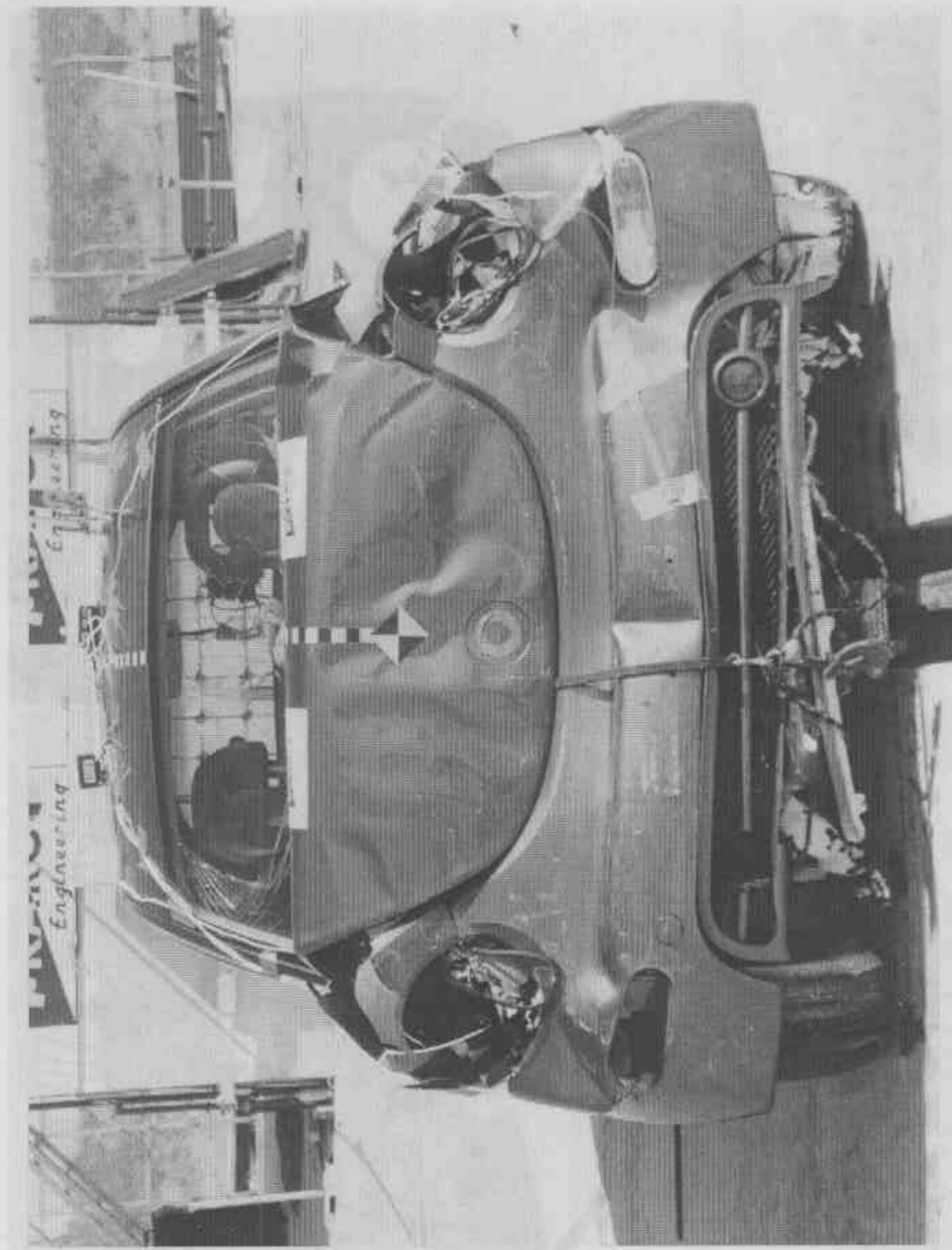


FIGURE A-6. POST TEST FRONT VIEW

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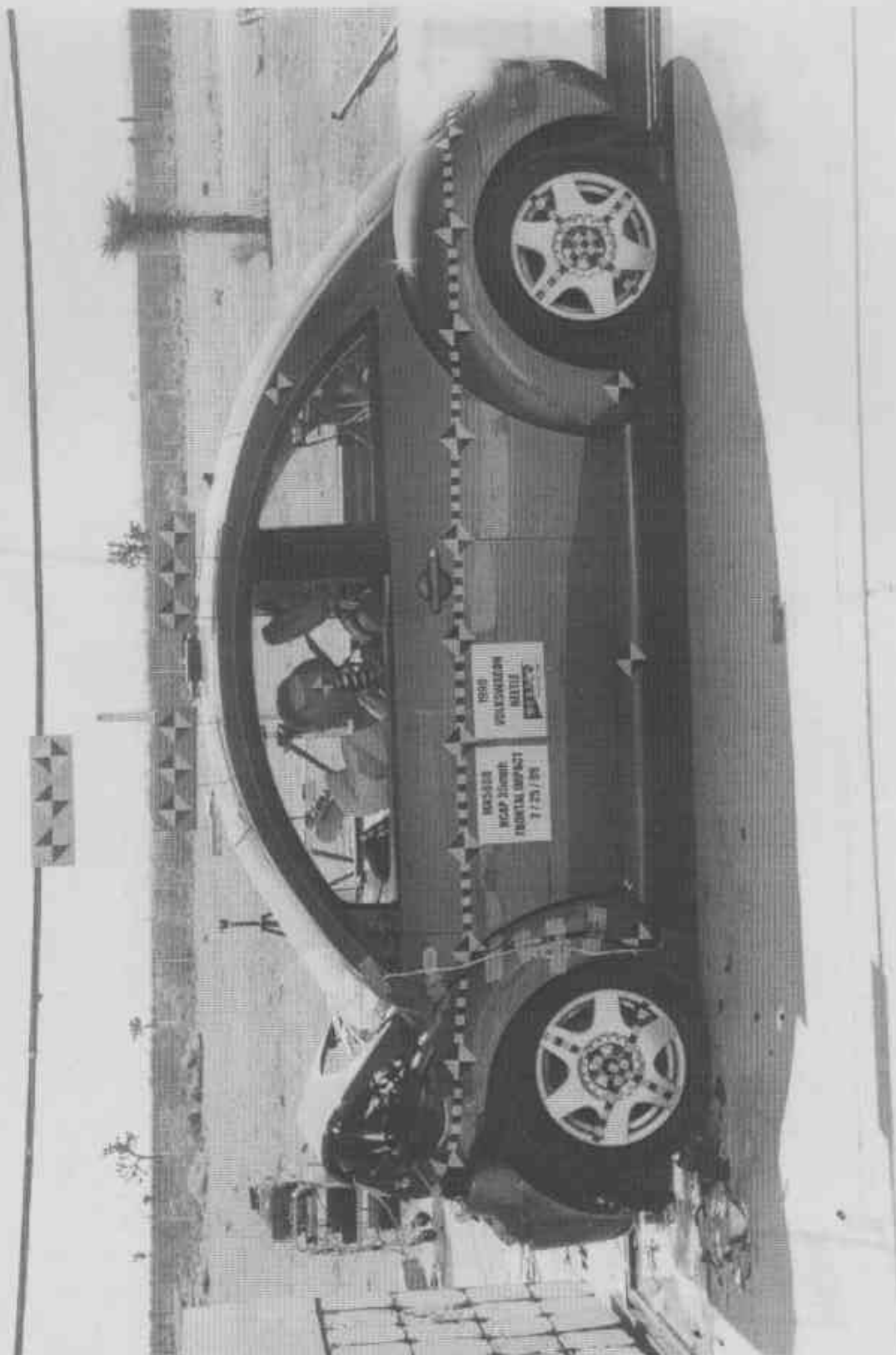


FIGURE A-8. POST TEST LEFT SIDE VIEW



FIGURE A-9. PRETEST RIGHT SIDE VIEW



FIGURE A-10. POST TEST RIGHT SIDE VIEW

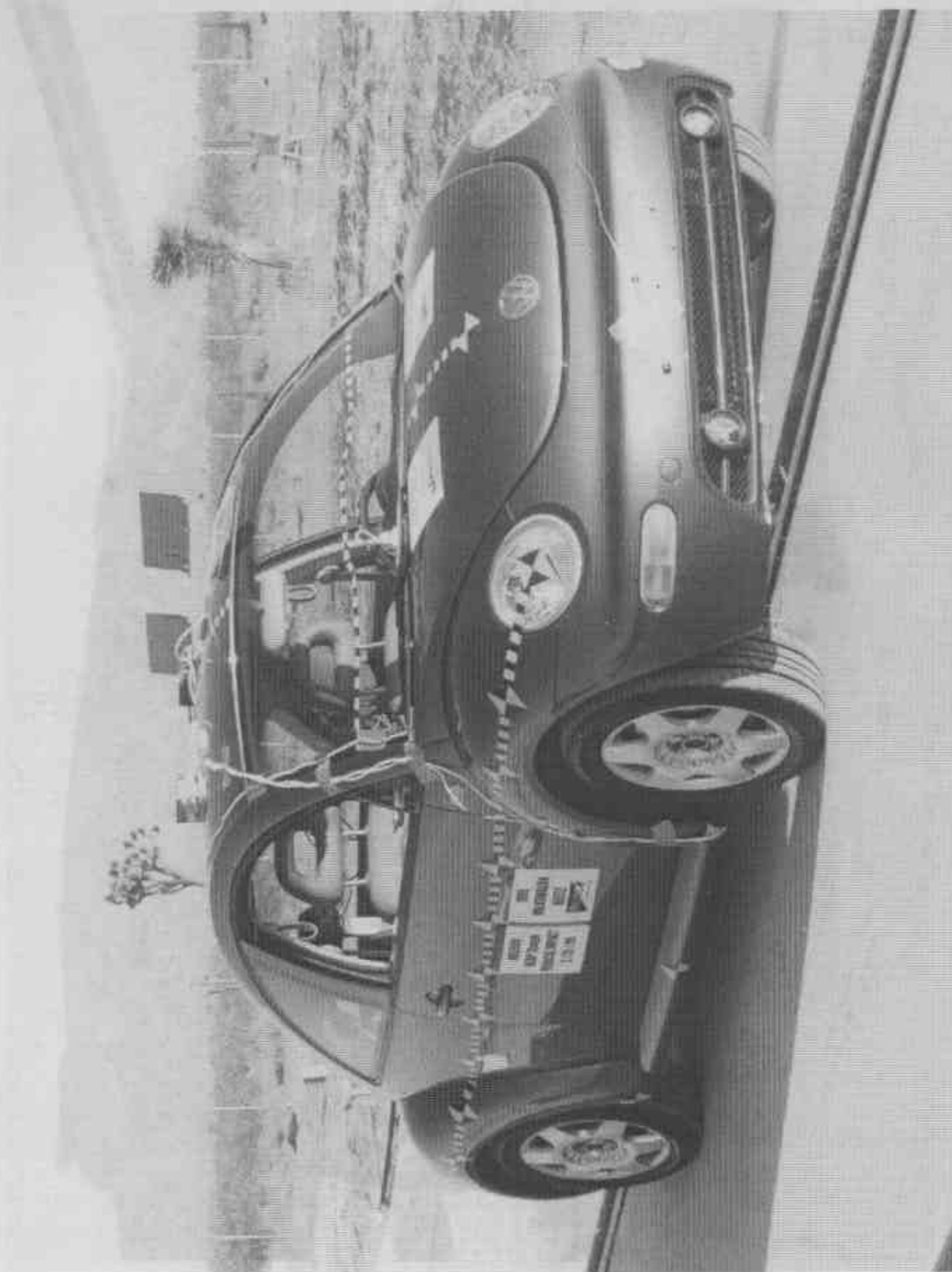


FIGURE A-11. PRETEST RIGHT FRONT VIEW

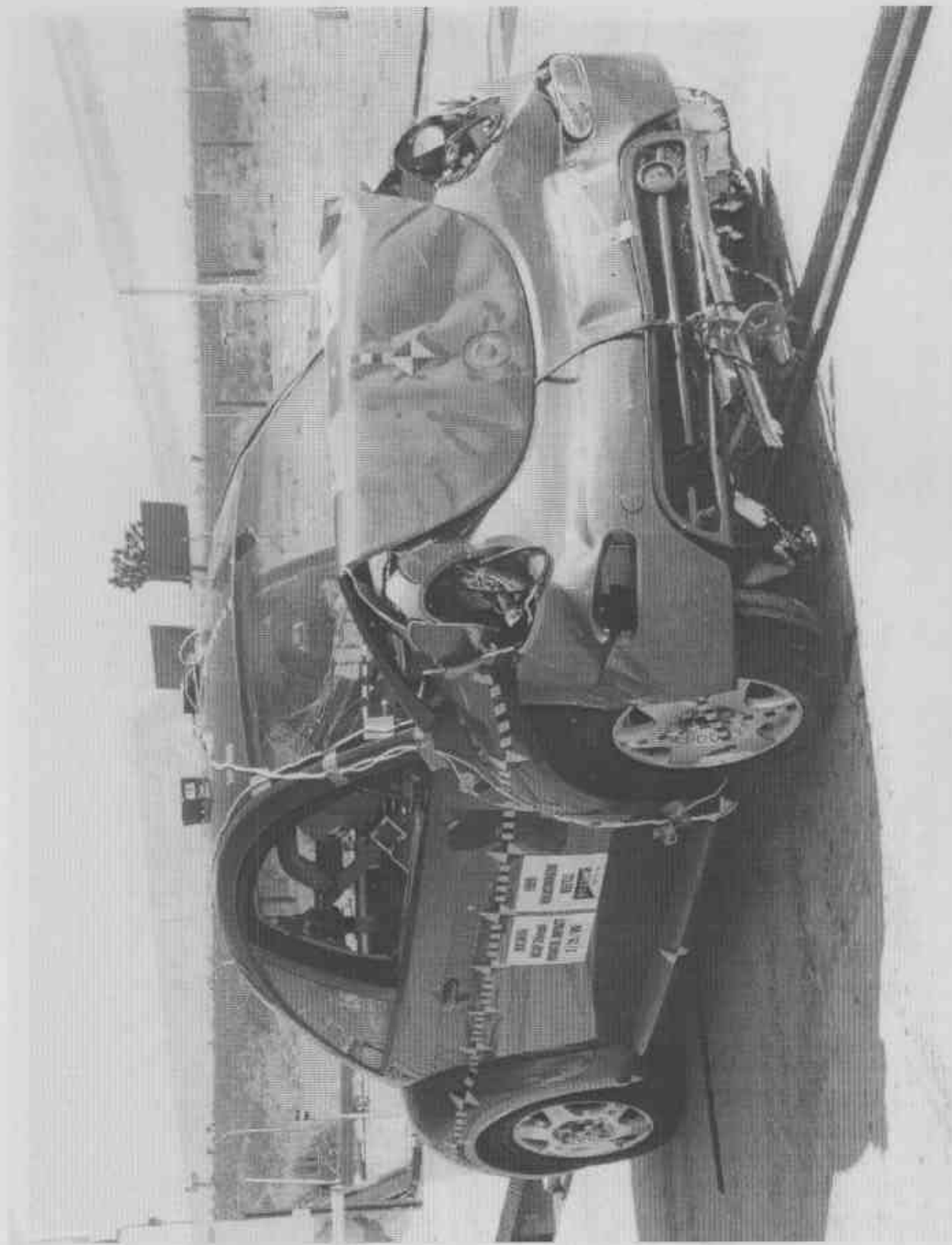


FIGURE A-12. POST TEST RIGHT FRONT VIEW

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FIGURE A-13. PRETEST LEFT REAR VIEW



FIGURE A-14. POST TEST LEFT REAR VIEW

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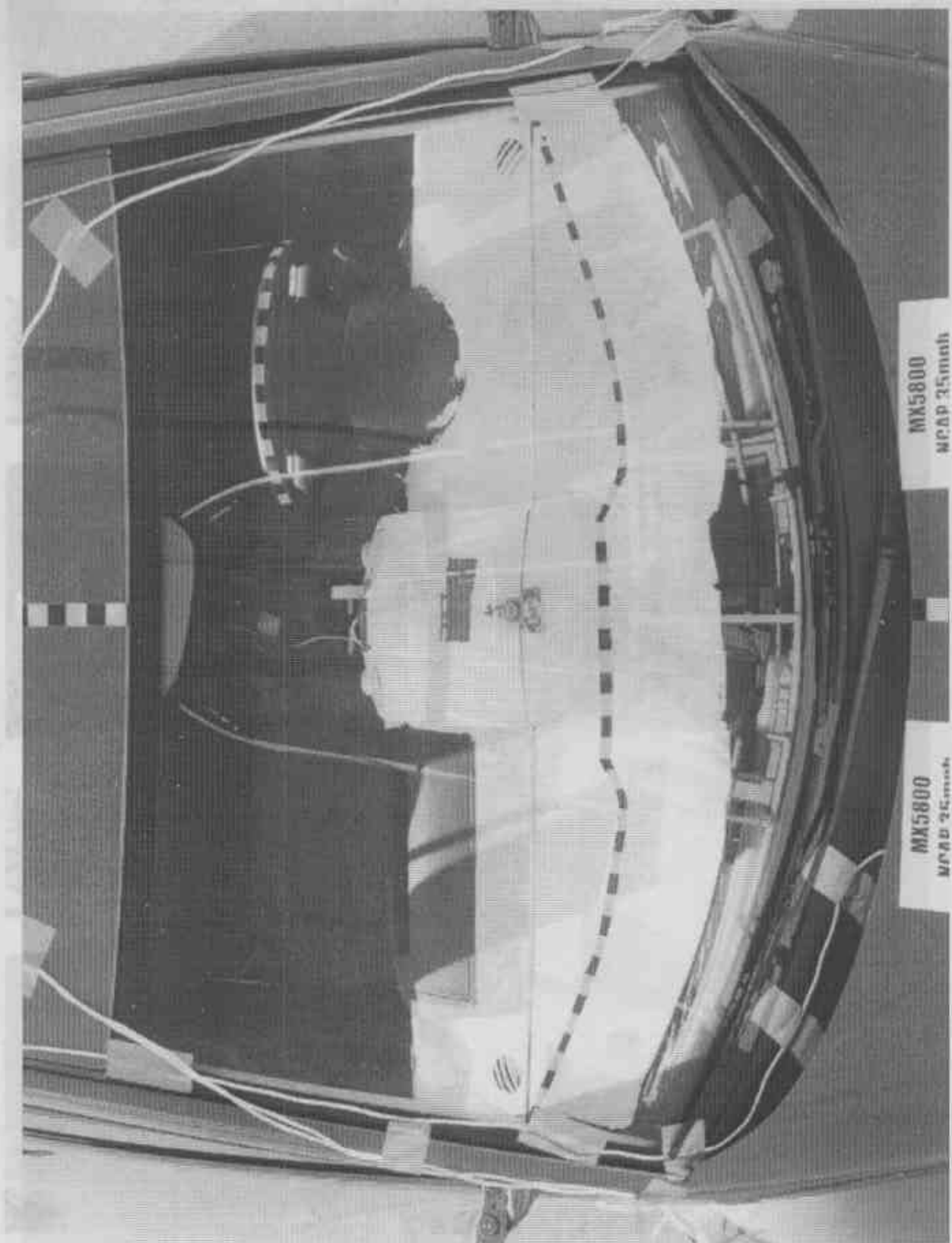


FIGURE A-15. PRETEST WINDSHIELD

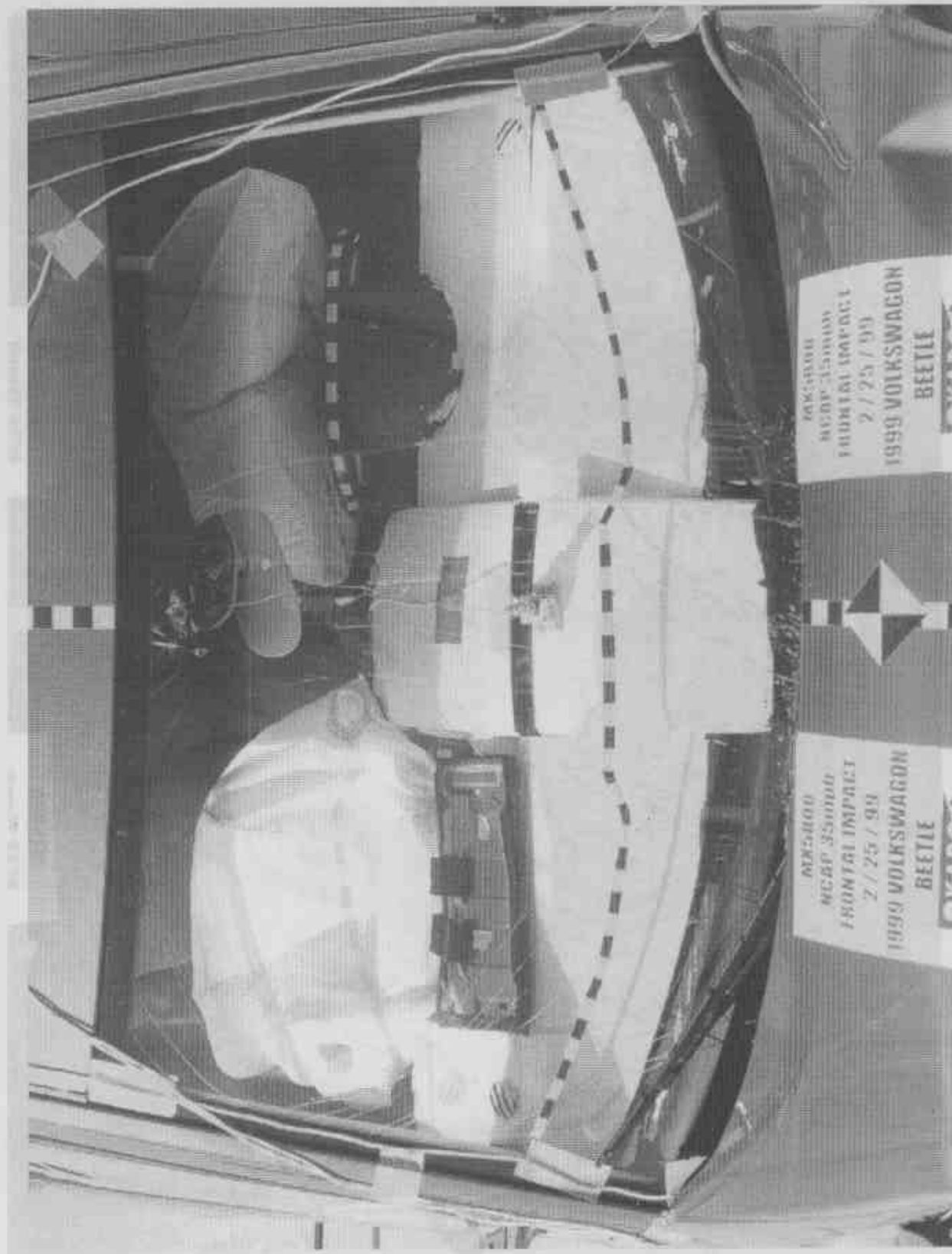


FIGURE A-16. POST TEST WINDSHIELD

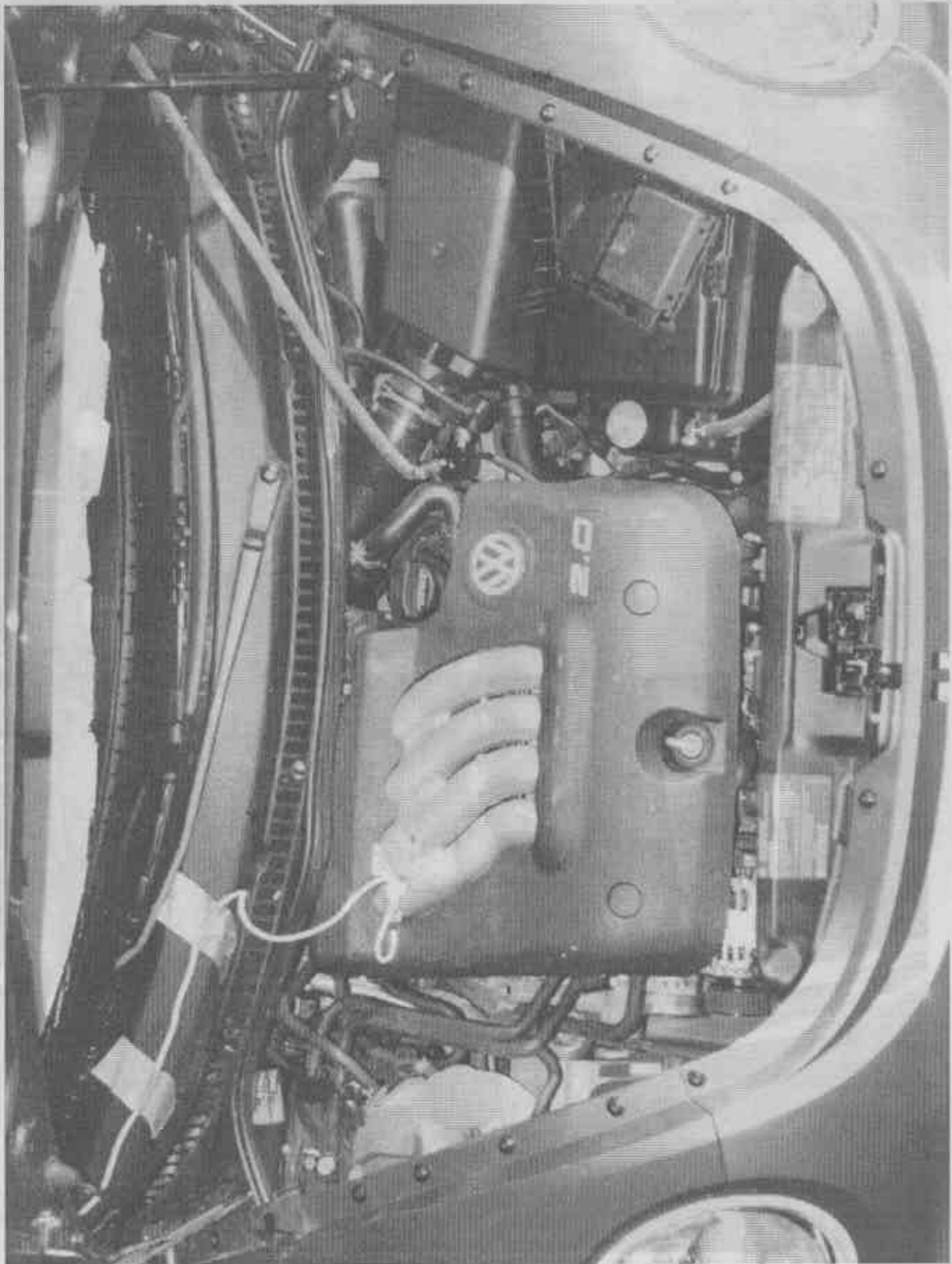


FIGURE A-17. PRETEST ENGINE COMPARTMENT



FIGURE A-18. POST TEST ENGINE COMPARTMENT

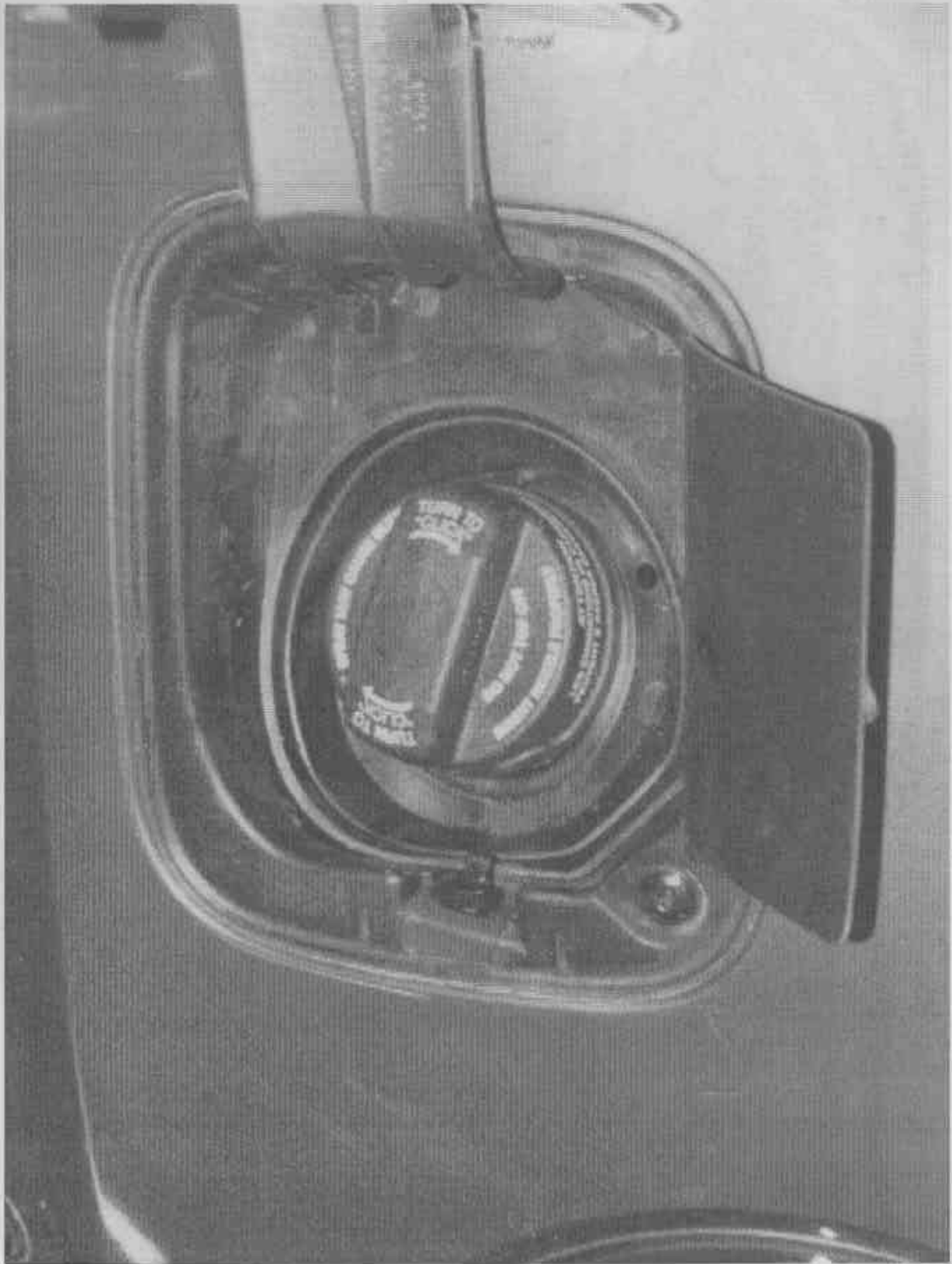


FIGURE A-19. PRETEST FUEL CAP

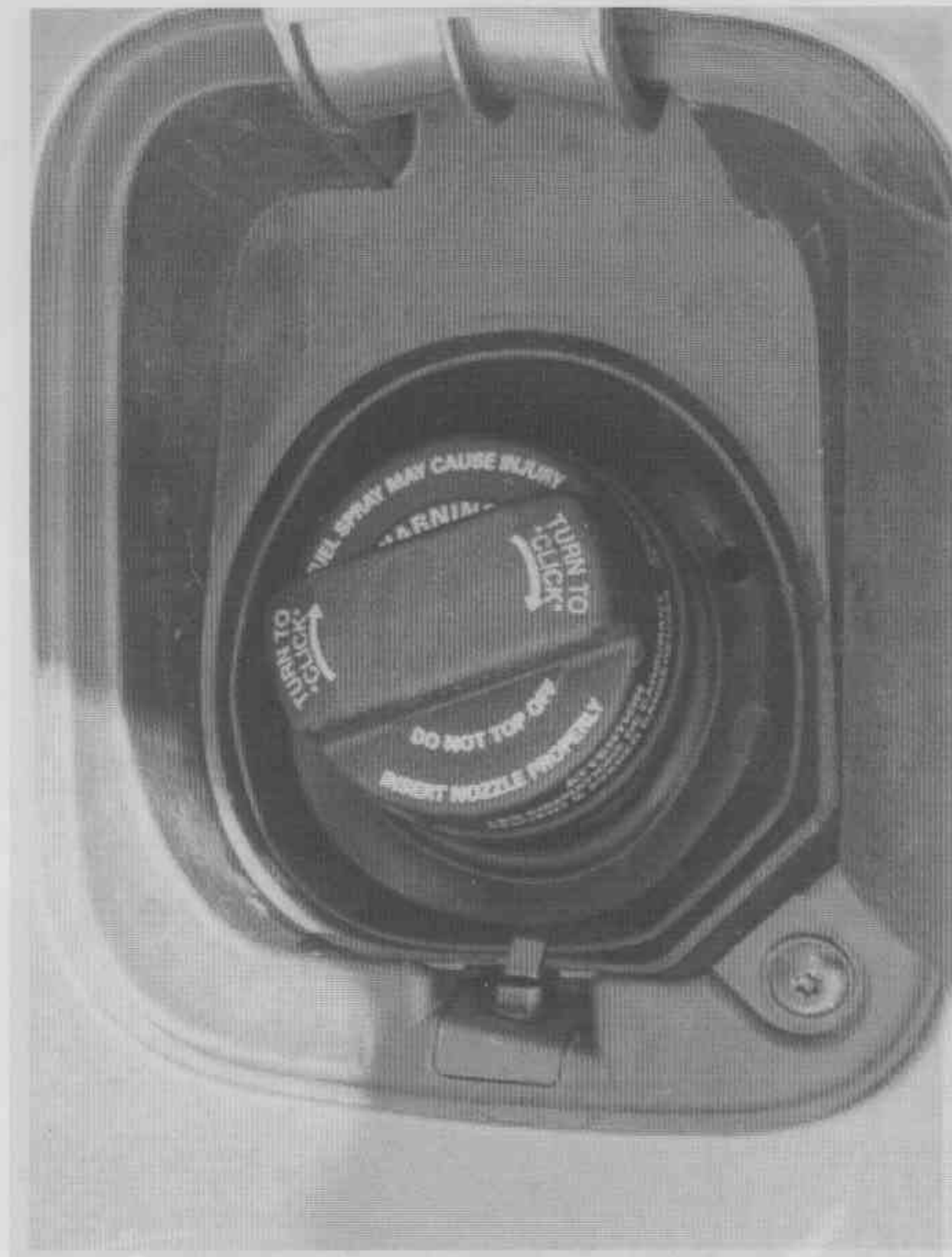


FIGURE A-20. POST TEST FUEL CAP

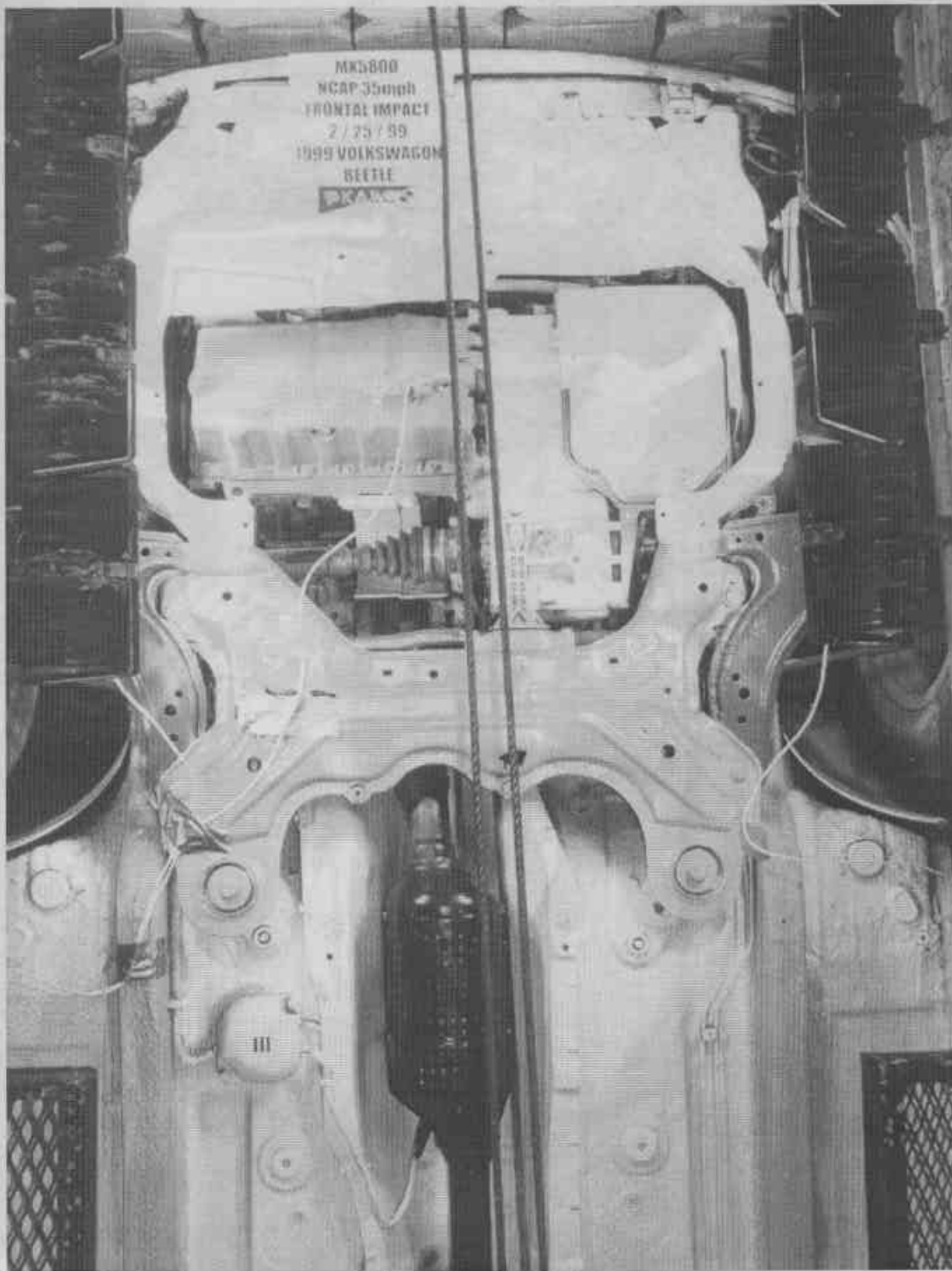


FIGURE A-21. PRETEST FRONT UNDERSIDE

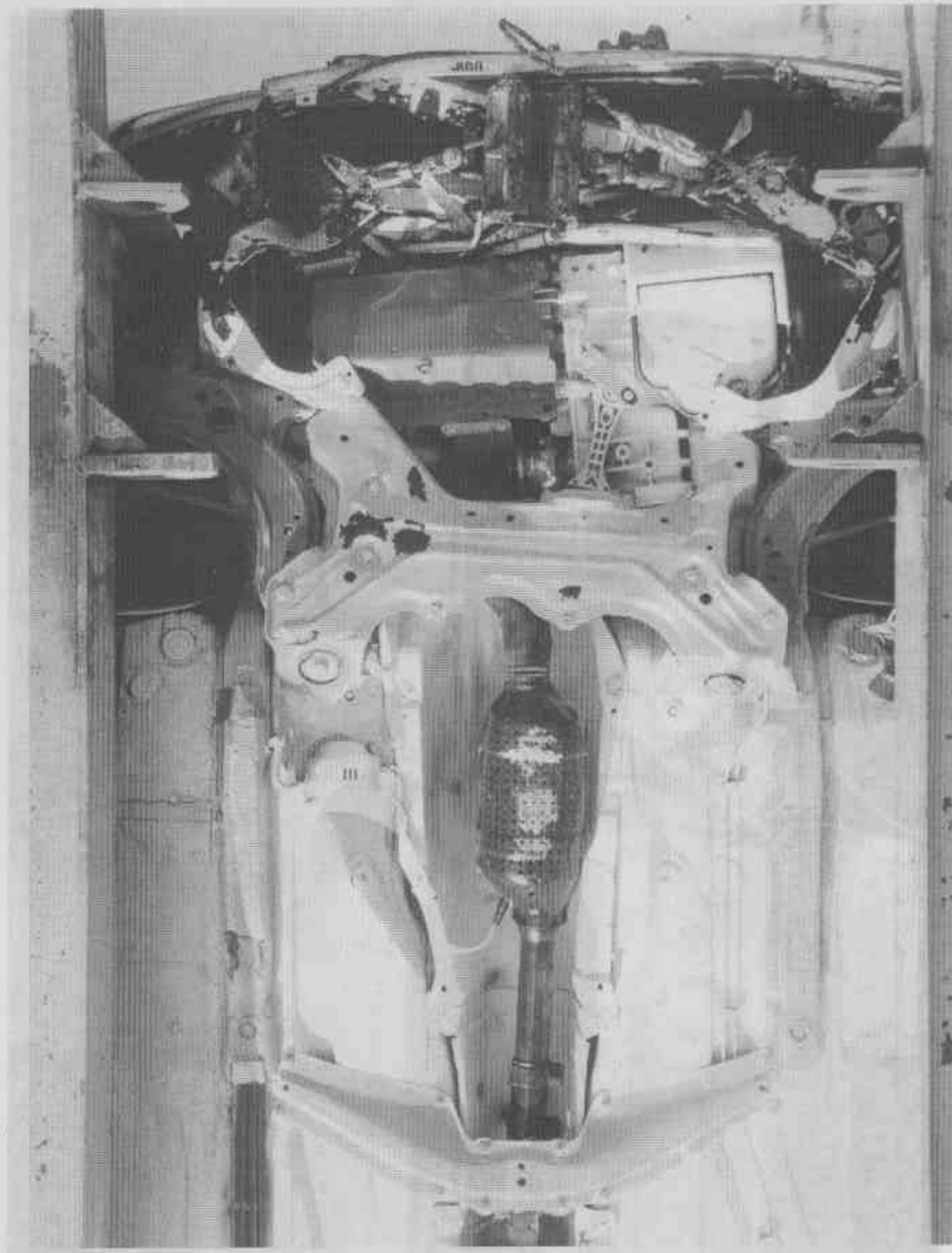


FIGURE A-22. POST TEST FRONT UNDERSIDE

A-22

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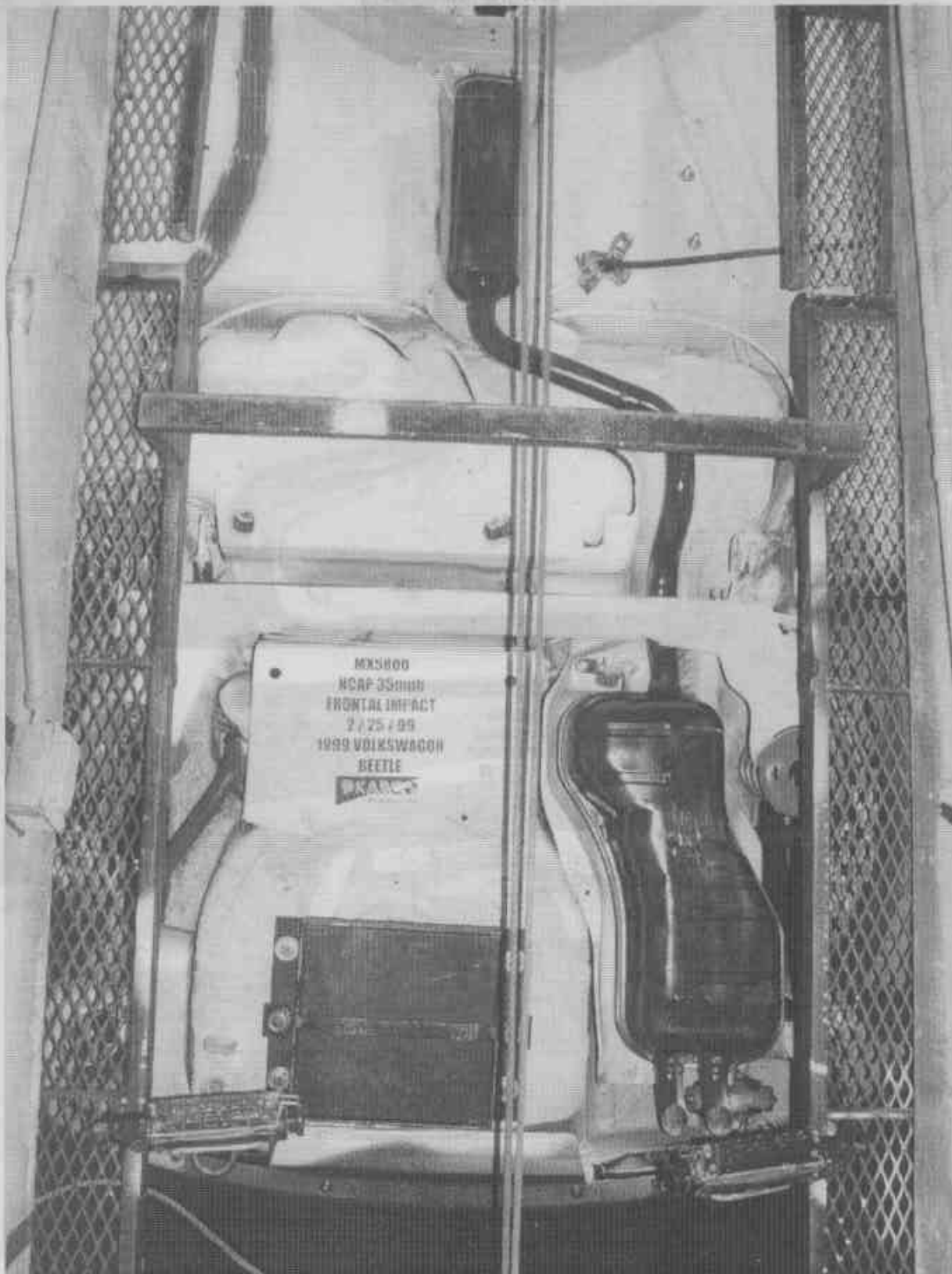


FIGURE A-23. PRETEST REAR UNDERSIDE

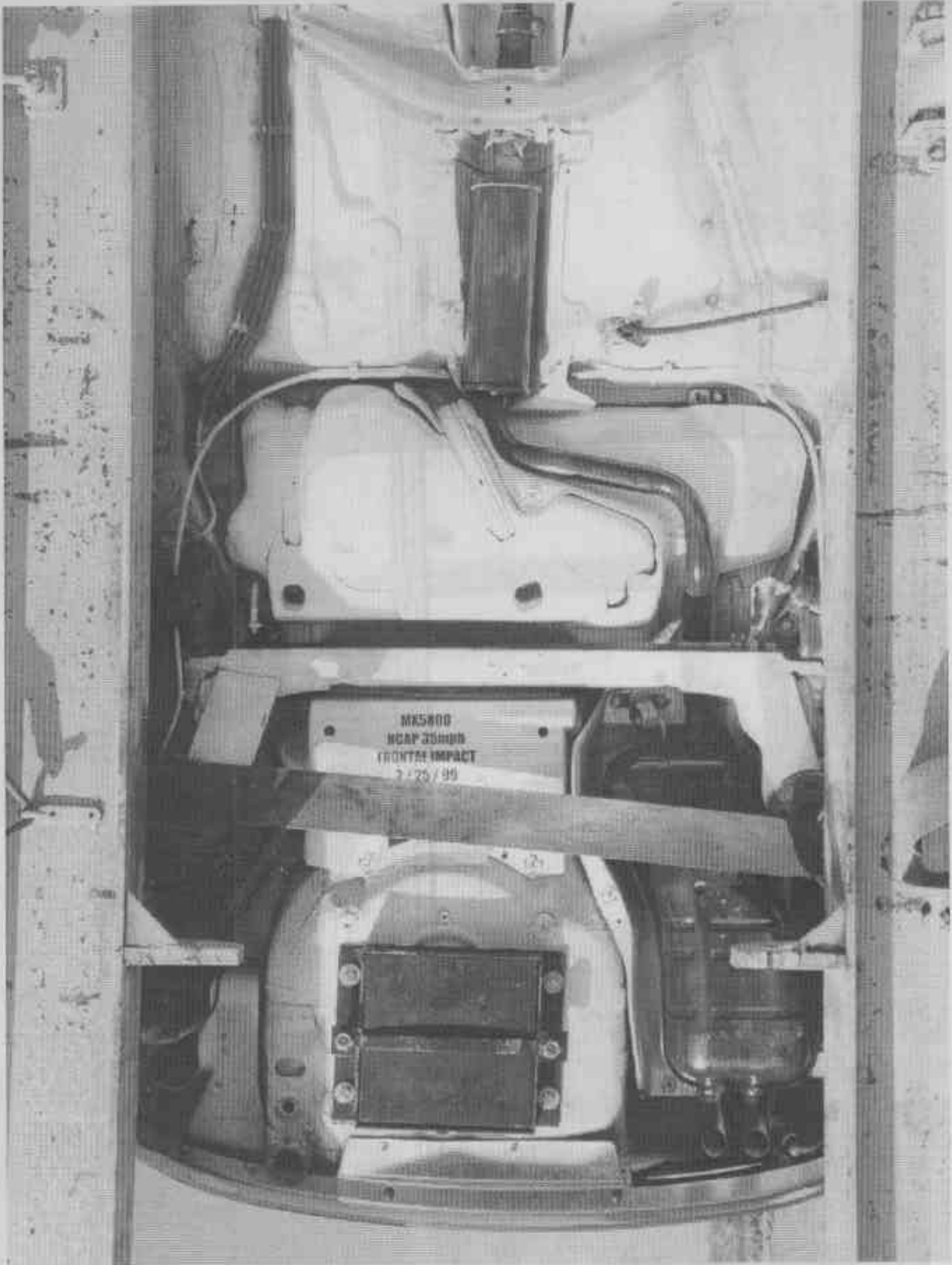


FIGURE A-24. POST TEST REAR UNDERSIDE

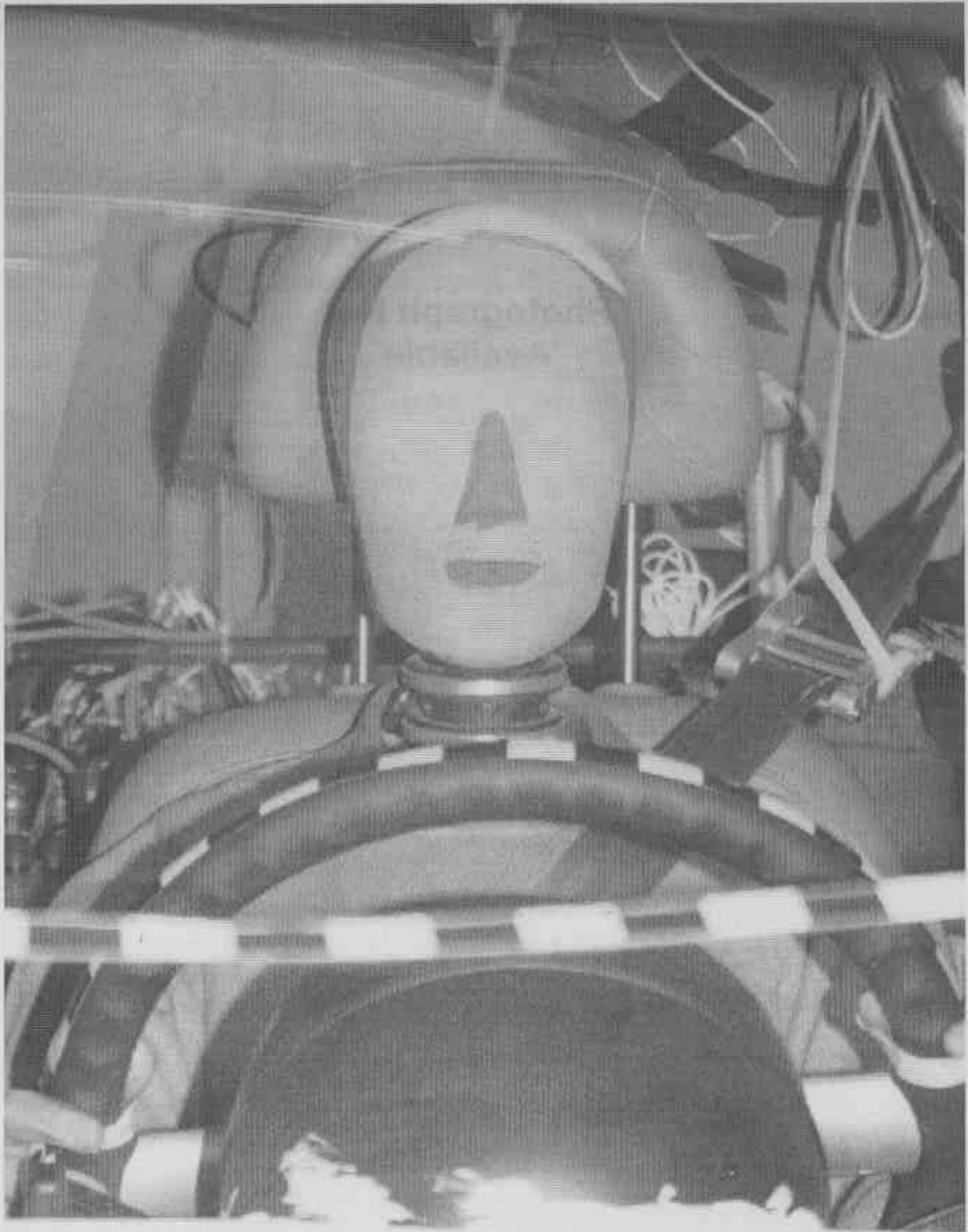


FIGURE A-25. PRETEST DRIVER DUMMY (FRONT VIEW)

**Photograph Not
Available**

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

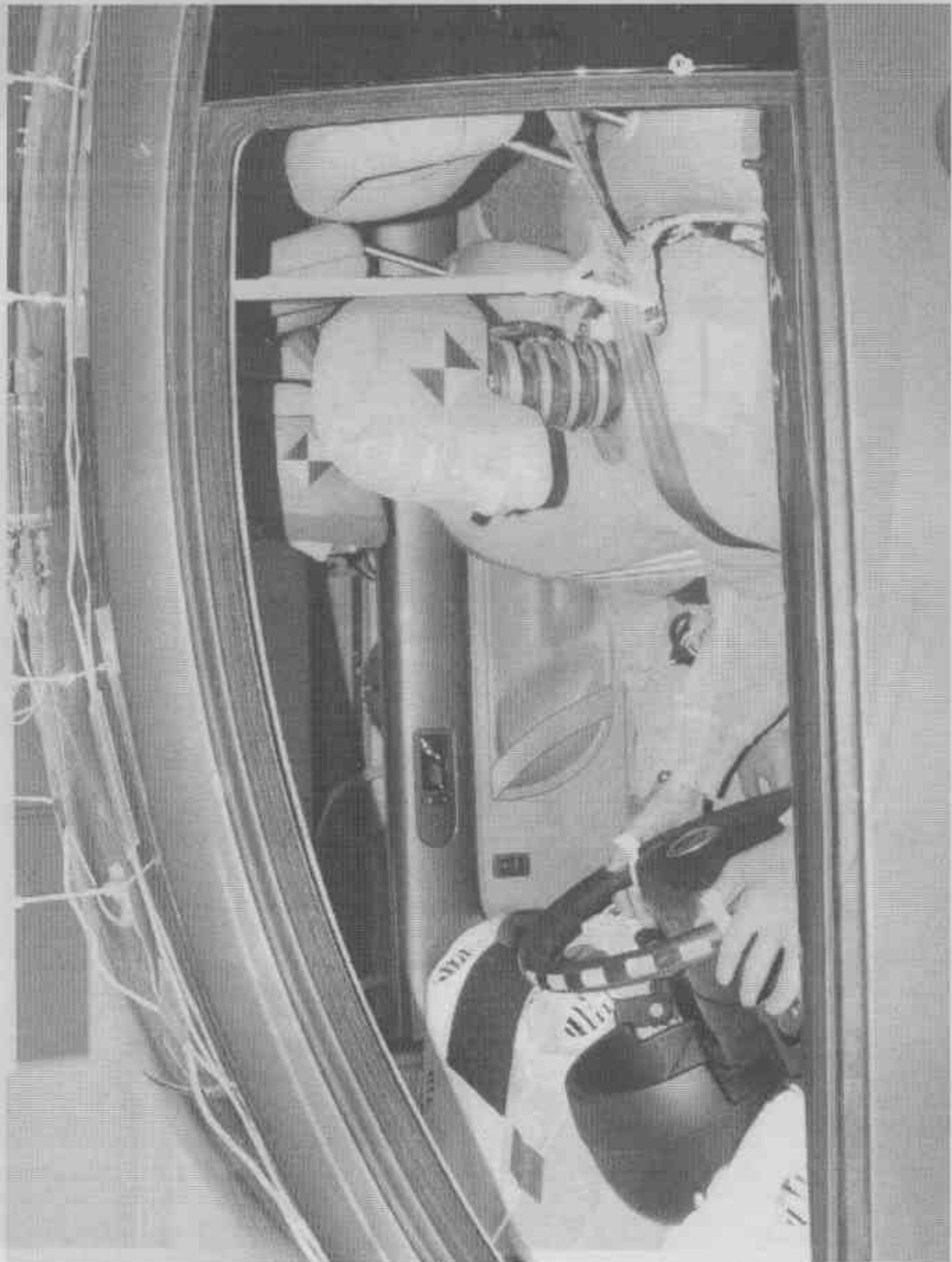


FIGURE A-27. PRETEST DRIVER DUMMY (THUR WINDOW)

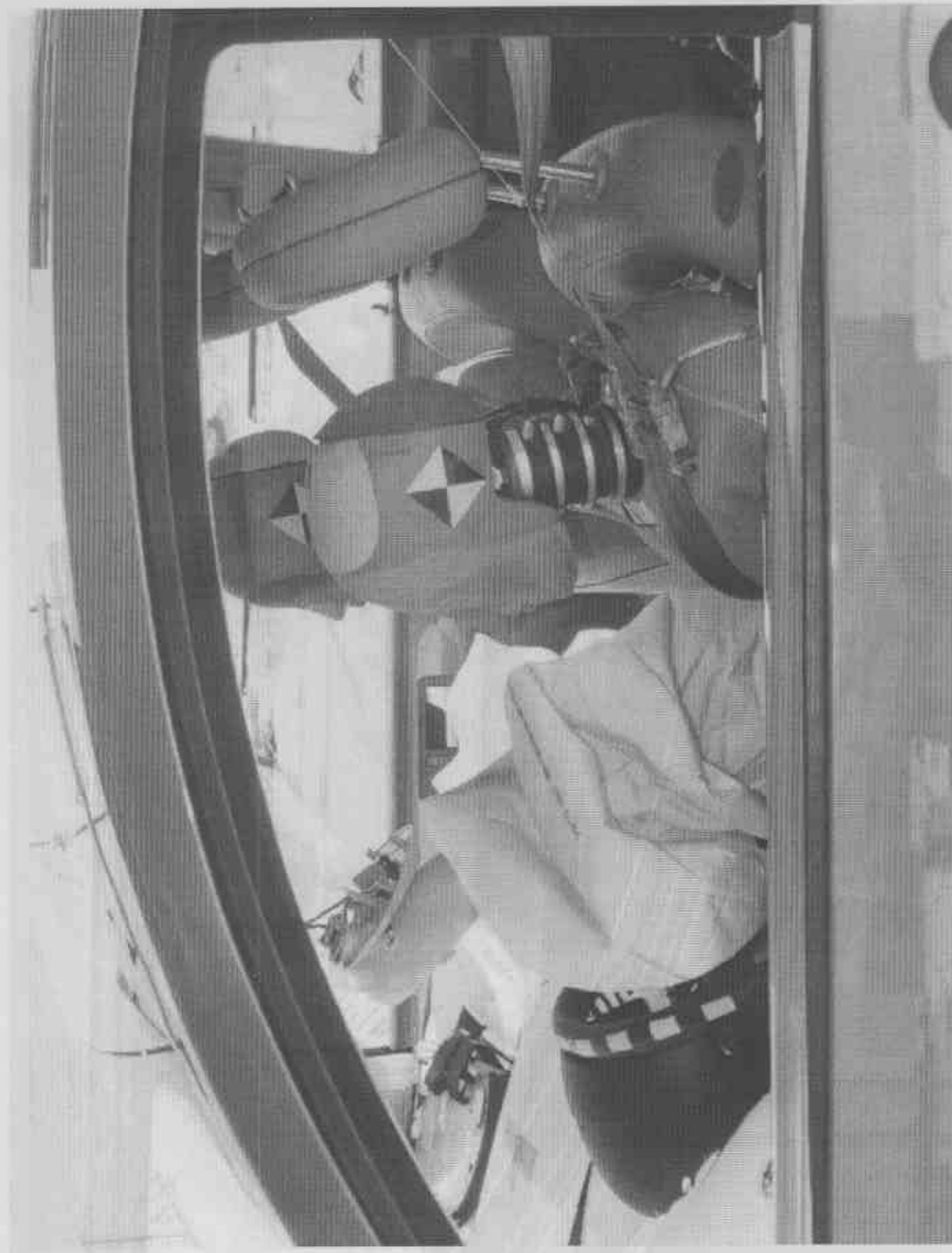


FIGURE A-28. POST TEST DRIVER DUMMY (THUR WINDOW)



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



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



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



FIGURE A-32. POST TEST DRIVER DUMMY (90° TO VEHICLE)

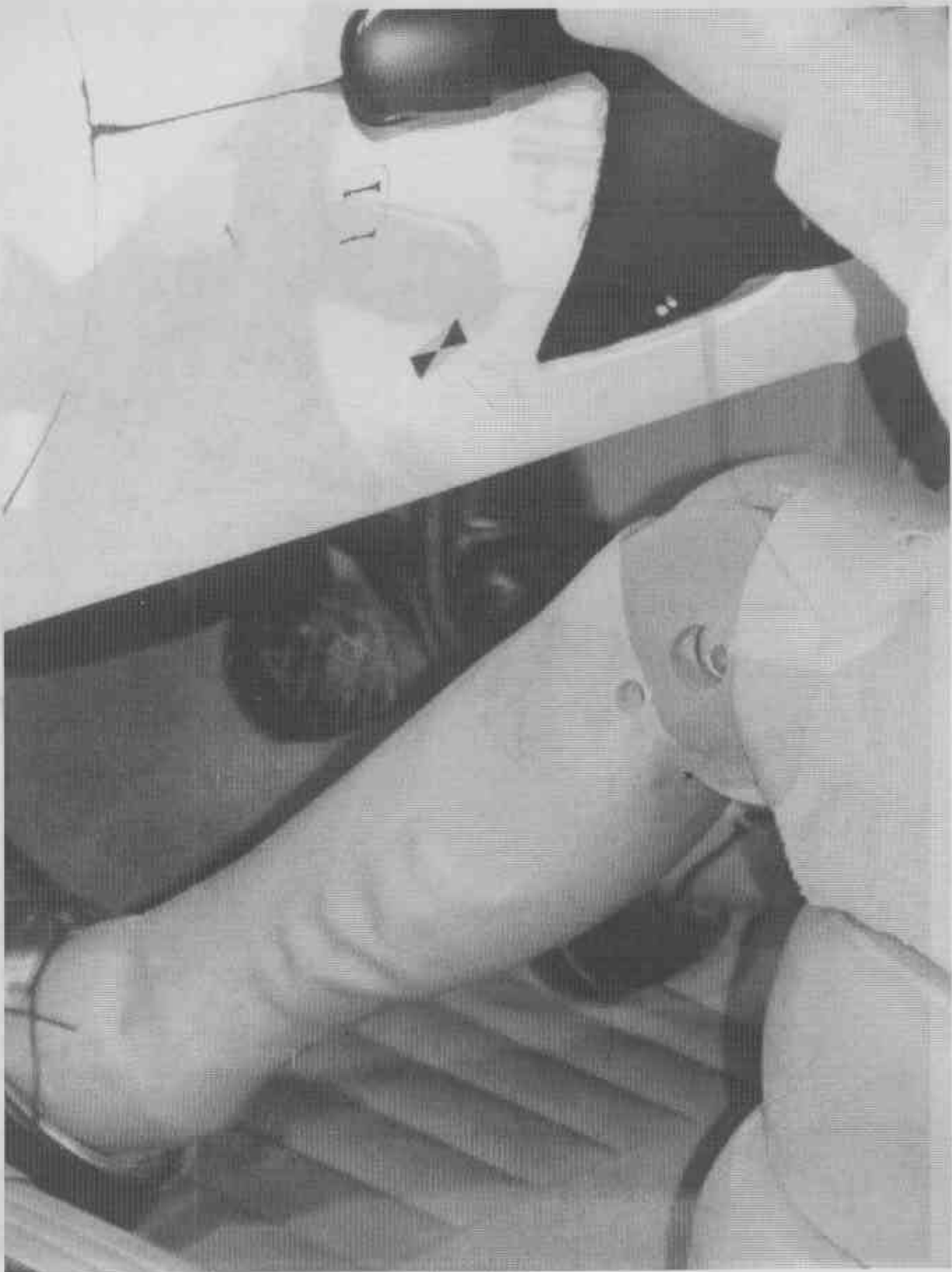


FIGURE A-33. PRETEST DRIVER DUMMY FEET

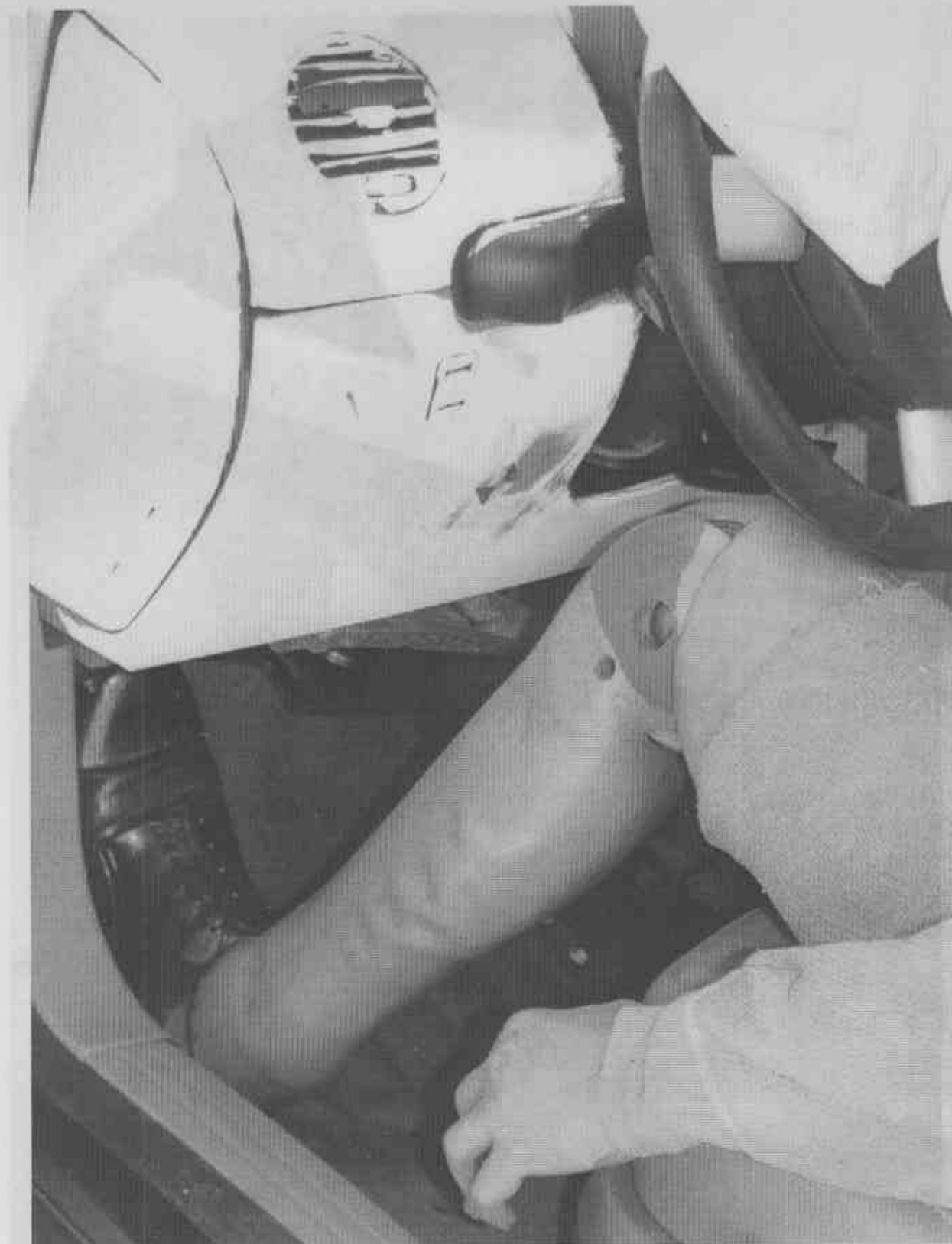


FIGURE A-34. POST TEST DRIVER DUMMY FEET AND KNEE CONTACT



FIGURE A-35. PRETEST DRIVER KNEE BOLSTER



FIGURE A-36. POST TEST DRIVER KNEE BOLSTER



FIGURE A-38. POST TEST DRIVER SIDE FLOOR PAN



FIGURE A-39. POST TEST DRIVER HEAD

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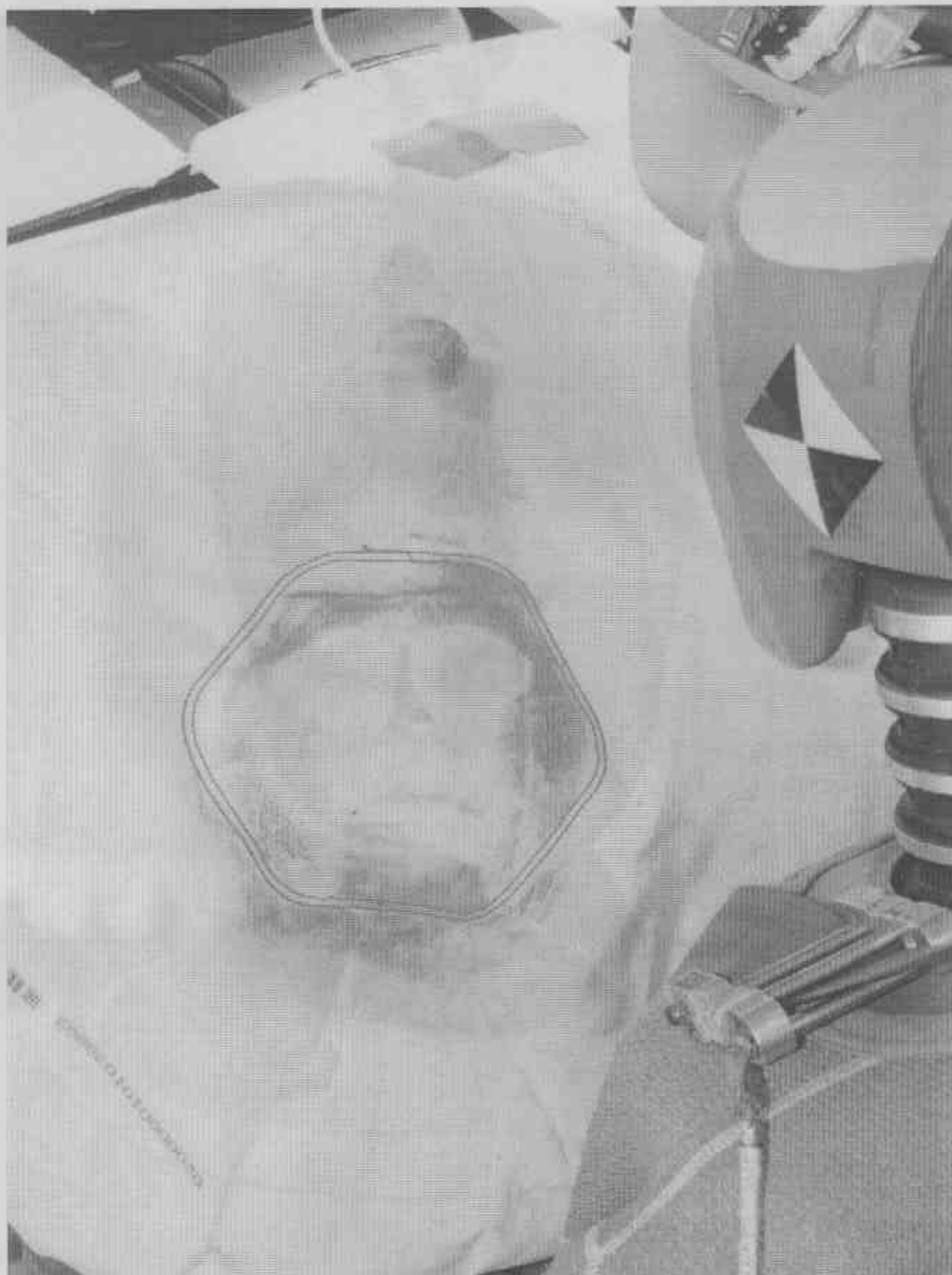


FIGURE A-40. POST TEST DRIVER DUMMY CONTACT

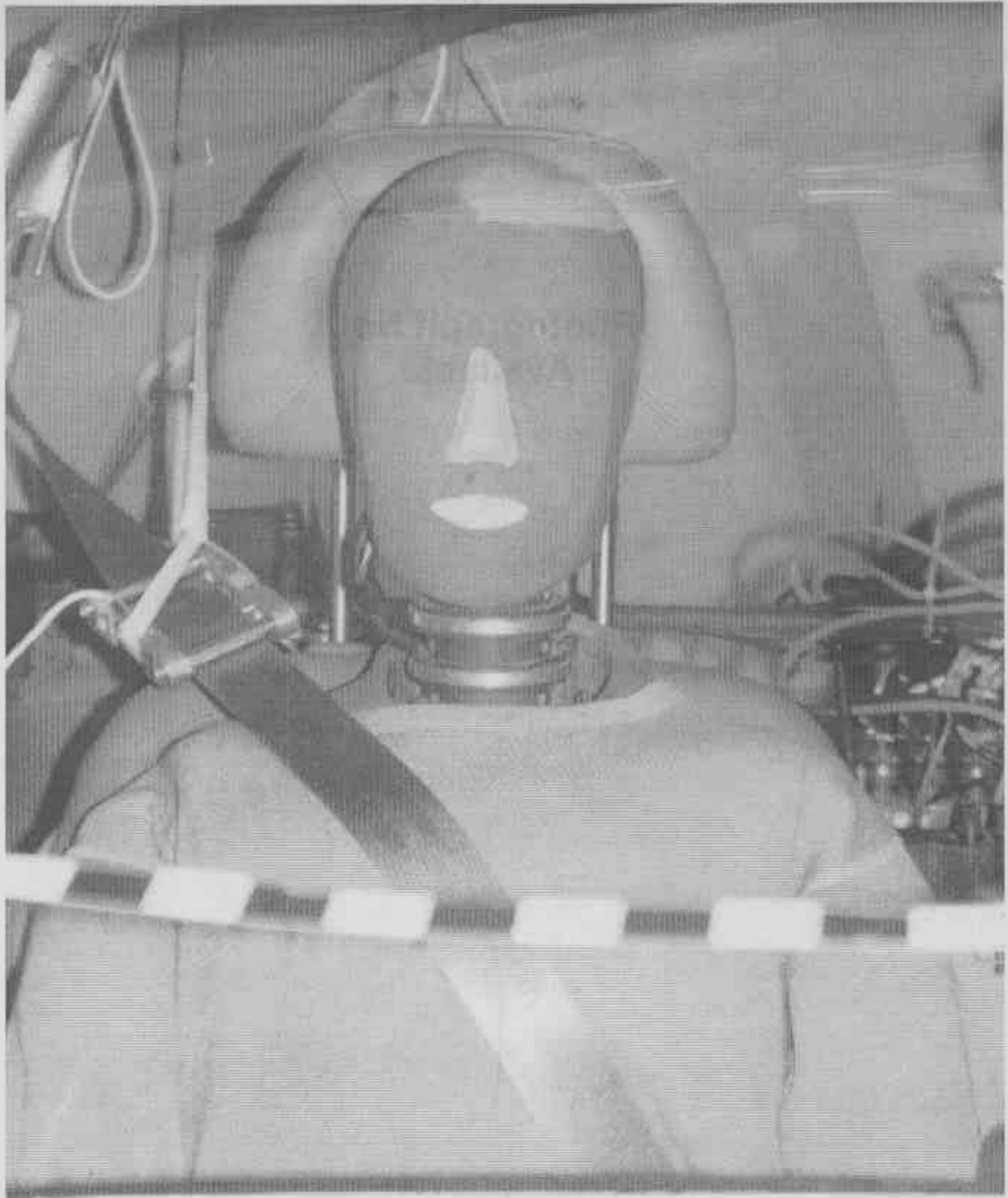


FIGURE A-41. PRETEST PASSENGER DUMMY (FRONT VIEW)

**Photograph Not
Available**

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



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

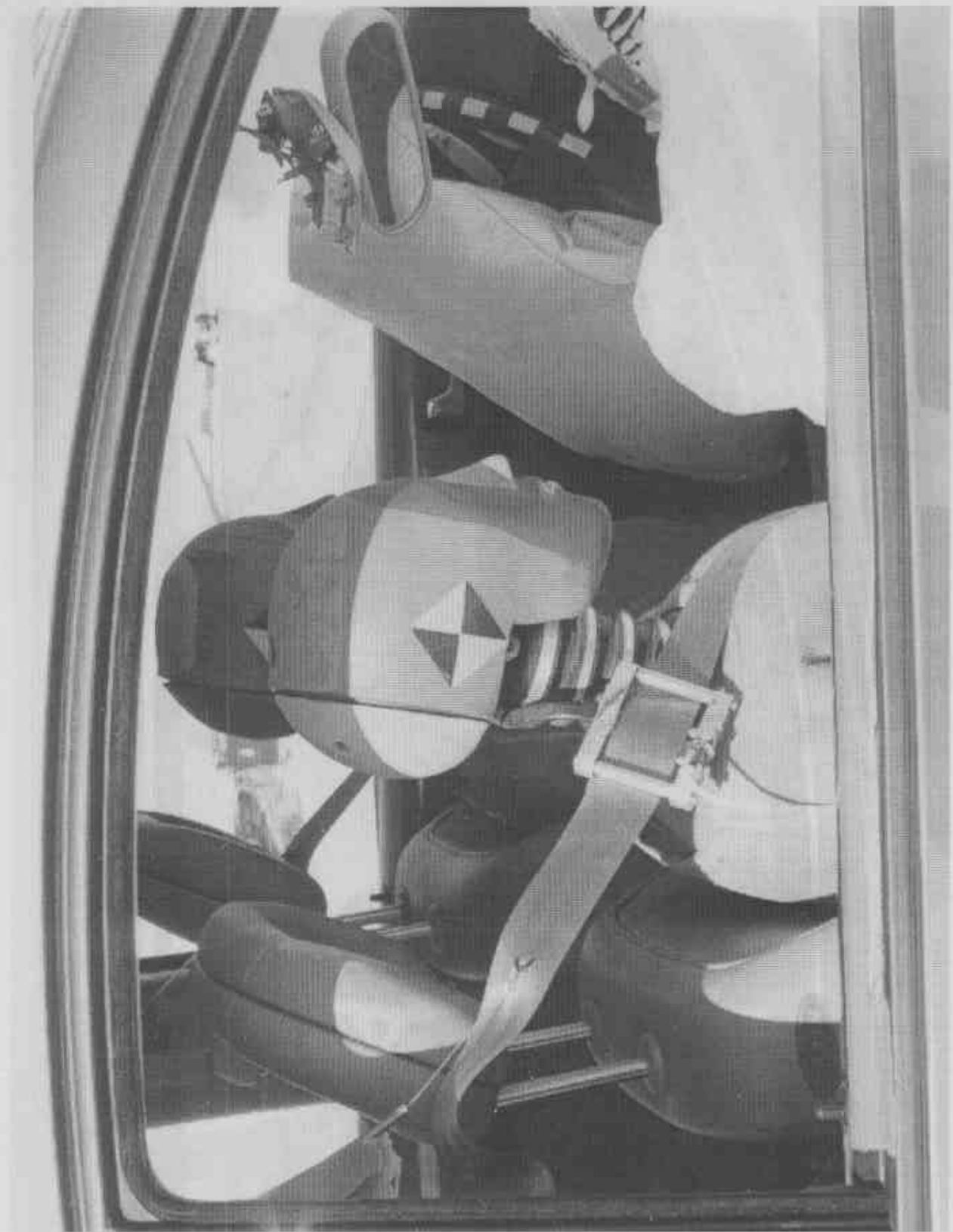


FIGURE A-44. POST TEST PASSENGER DUMMY (THUR WINDOW)



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

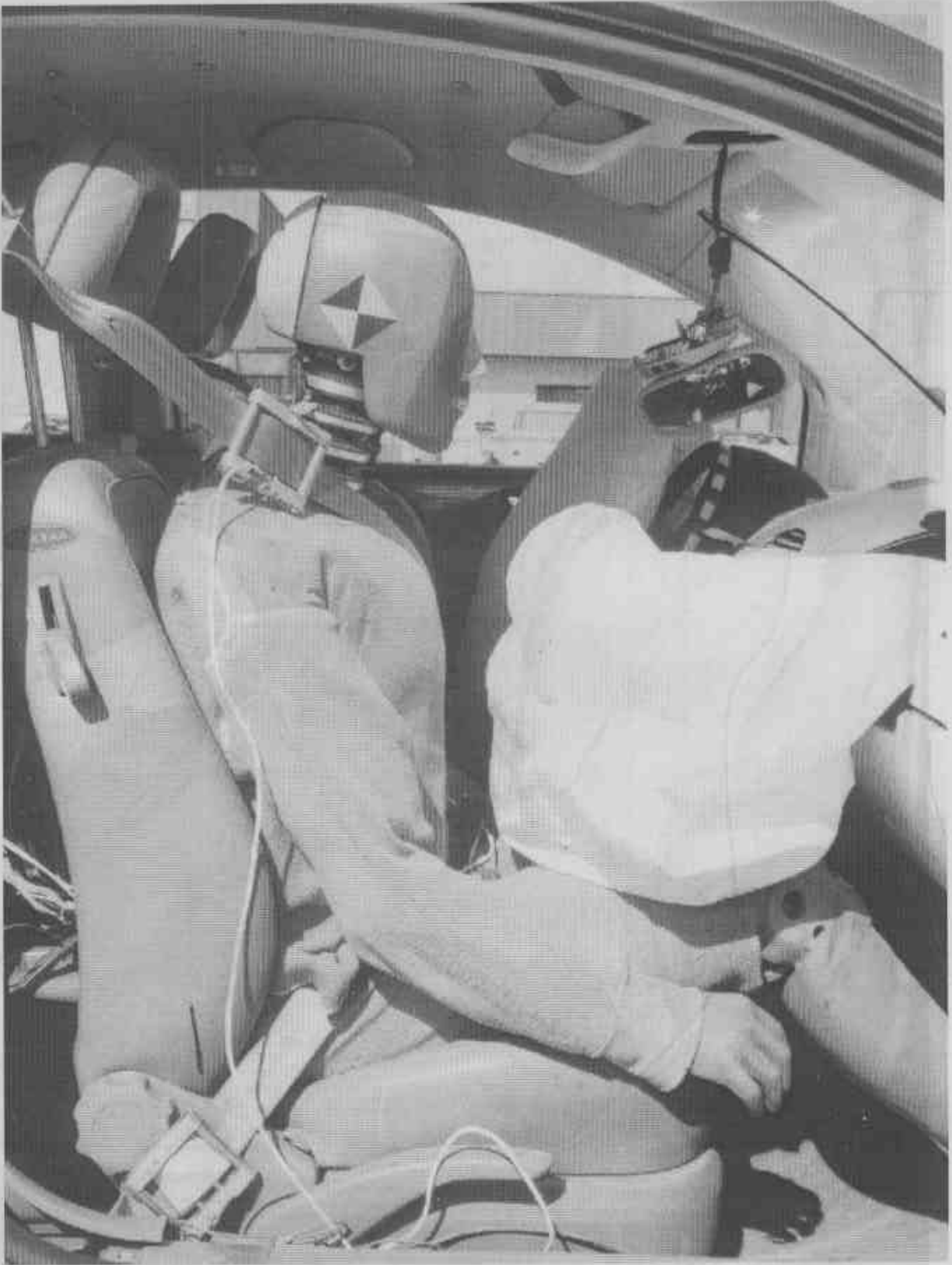


FIGURE A-48. POST TEST PASSENGER DUMMY. (90° TO VEHICLE)



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

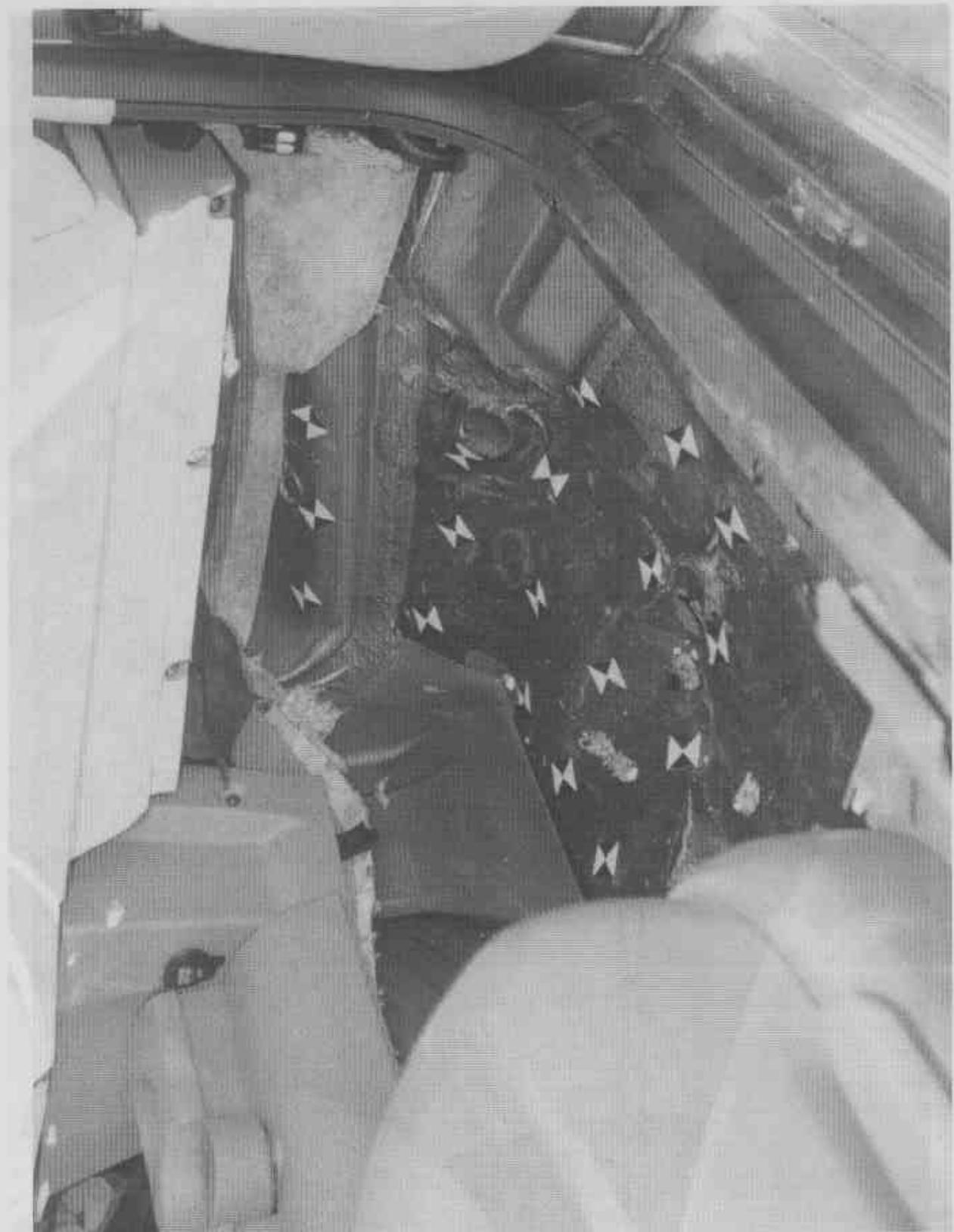


FIGURE A-52. POST TEST PASSENGER SIDE FLOOR PAN

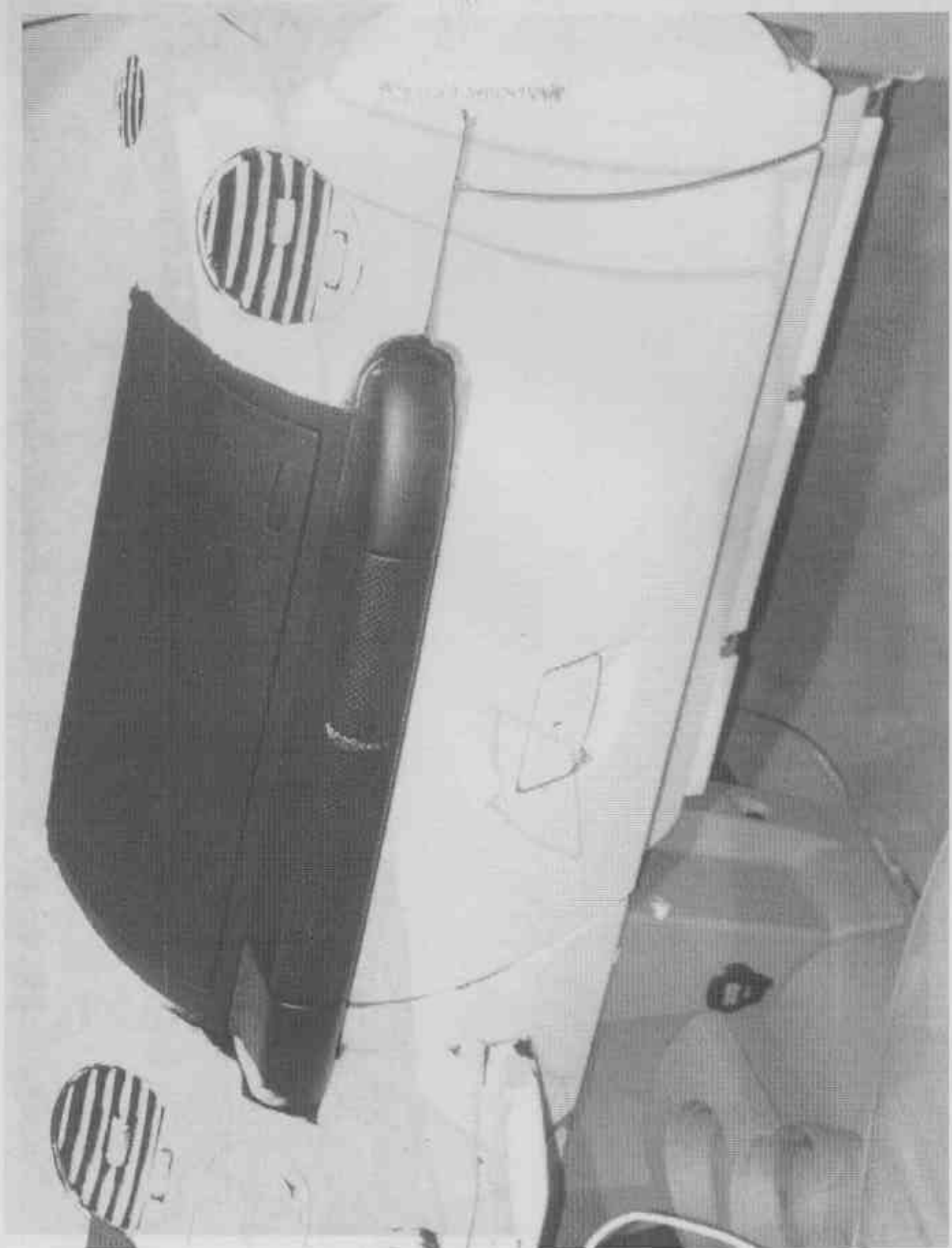


FIGURE A-53. PRETEST PASSENGER SIDE KNEE BOLSTER



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

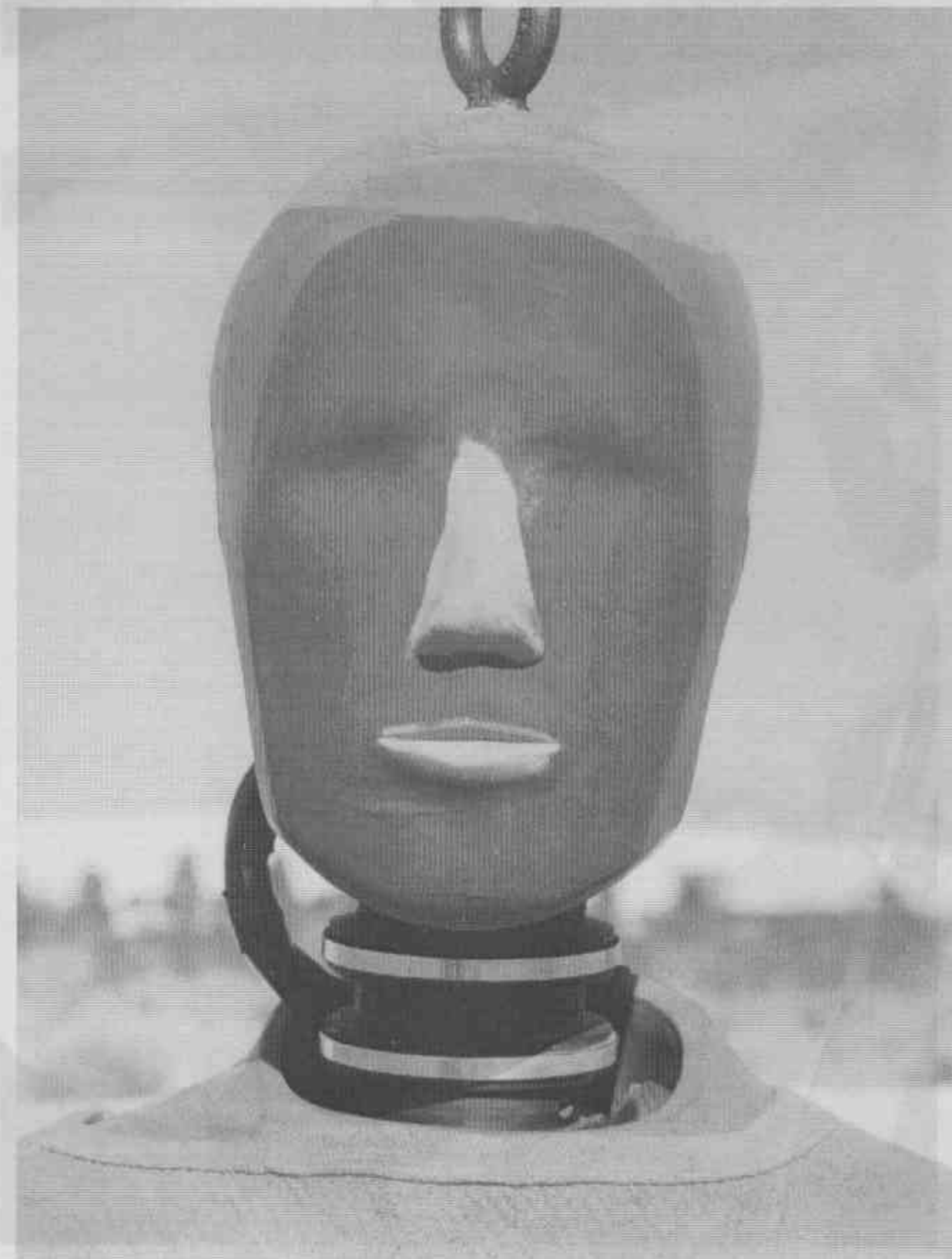


FIGURE A-55. POST TEST PASSENGER HEAD

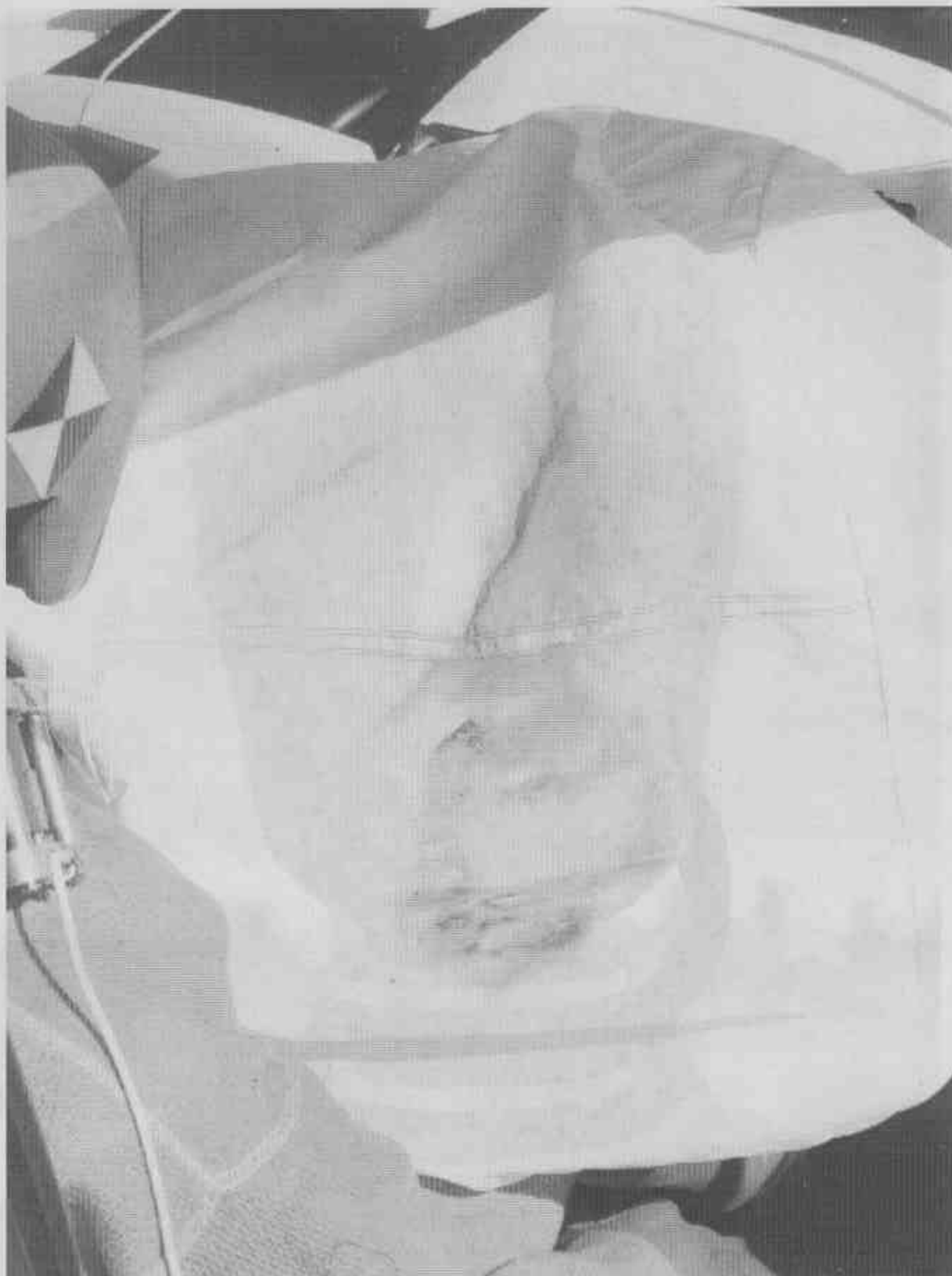


FIGURE A-56. POST TEST PASSENGER DUMMY CONTACT

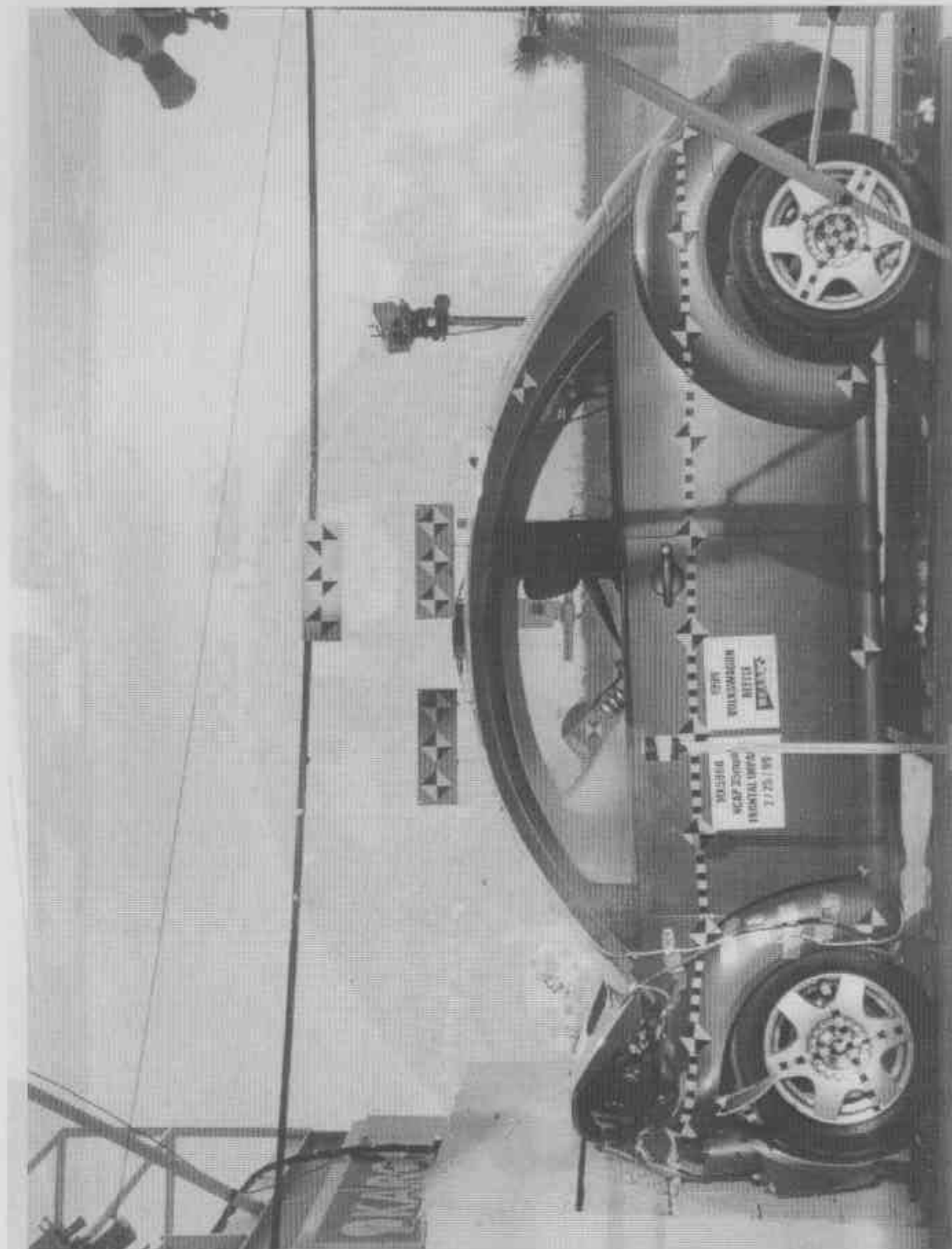


FIGURE A-58. VEHICLE DURING IMPACT

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APPENDIX B
DUMMY AND VEHICLE RESPONSE DATA TRACES

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B-3 Driver Head Primary X Displacement	B-3
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B-5 Driver Head Primary Z	B-5
B-6 Driver Head Resultant Primary	B-6
B-7 Driver Head Redundant X	B-7
B-8 Driver Head Redundant X Velocity	B-8
B-9 Driver Head Redundant X Displacement	B-9
B-10 Driver Head Redundant Y	B-10
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B-21 Driver Chest Primary X	B-21
B-22 Driver Chest Primary X Velocity	B-22
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B-45 Driver Right Upper Tibia Moment Y	B-45
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B-50 Driver Right Lower Tibia Moment Y	B-50
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B-52 Driver Left Foot Aft X	B-52
B-53 Driver Left Foot Aft Z	B-53
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B-55 Driver Right Foot Aft X	B-55
B-56 Driver Right Foot Aft Z	B-56
B-57 Driver Right Foot Fore Z	B-57
B-58 Driver Lap Belt Force	B-58
B-59 Driver Shoulder Belt Force	B-59
B-60 Driver Shoulder Belt Pullout	B-60
B-61 Driver Shoulder Belt Elongation	B-61

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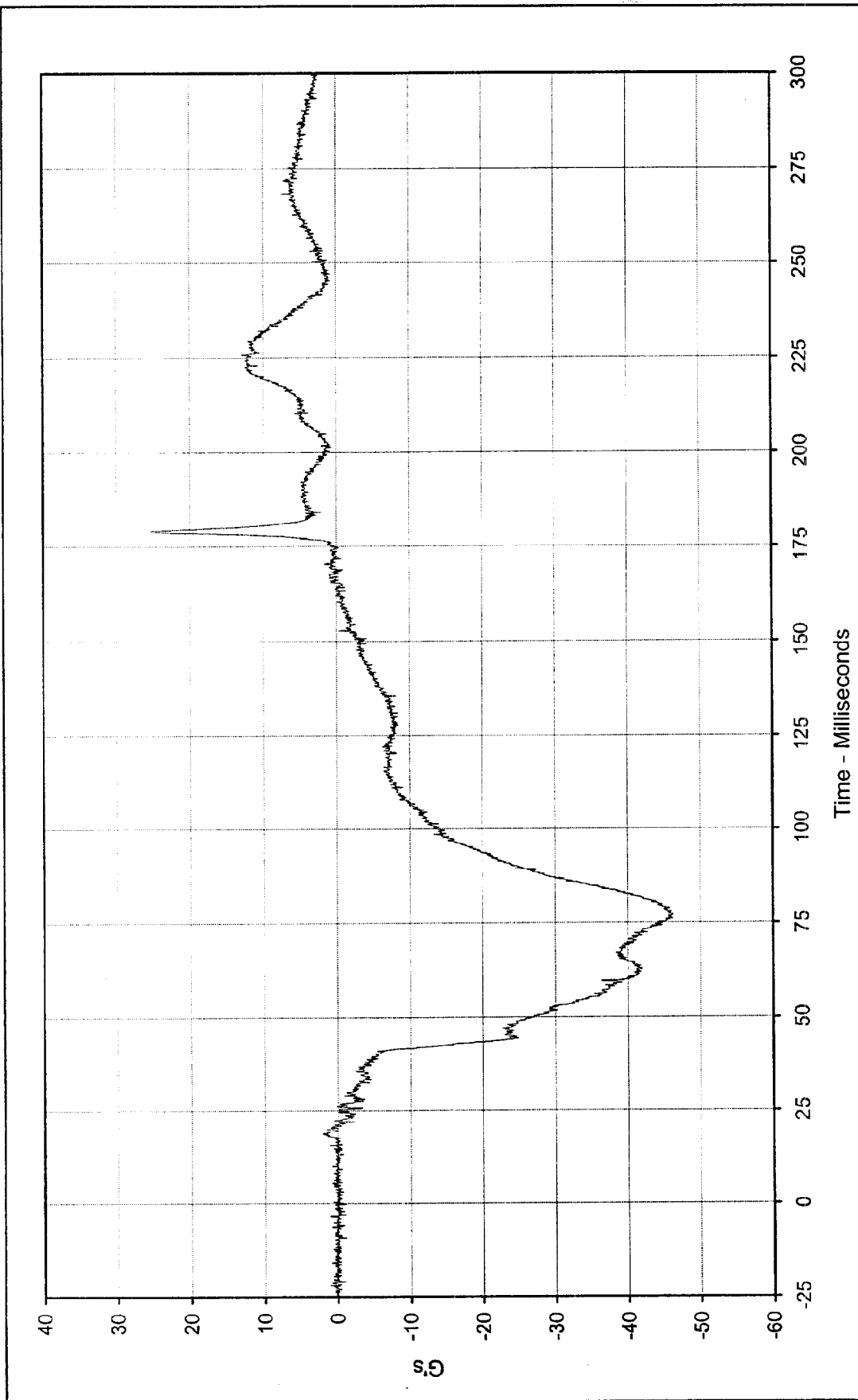
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B-63 Passenger Head Primary X Velocity	B-63
B-64 Passenger Head Primary X Displacement	B-64
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B-66 Passenger Head Primary Z	B-66
B-67 Passenger Head Resultant Primary	B-67
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B-84 Passenger Chest Primary X Displacement	B-84
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B-86 Passenger Chest Primary Z	B-86
B-87 Passenger Chest Primary Resultant	B-87
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B-92 Passenger Chest Redundant Z	B-92
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B-99 Passenger Pelvis Z	B-99
B-100 Passenger Pelvis Resultant	B-100
B-101 Passenger Left Femur Force	B-101
B-102 Passenger Right Femur Force	B-102
B-103 Passenger Left Upper Tibia Moment X	B-103
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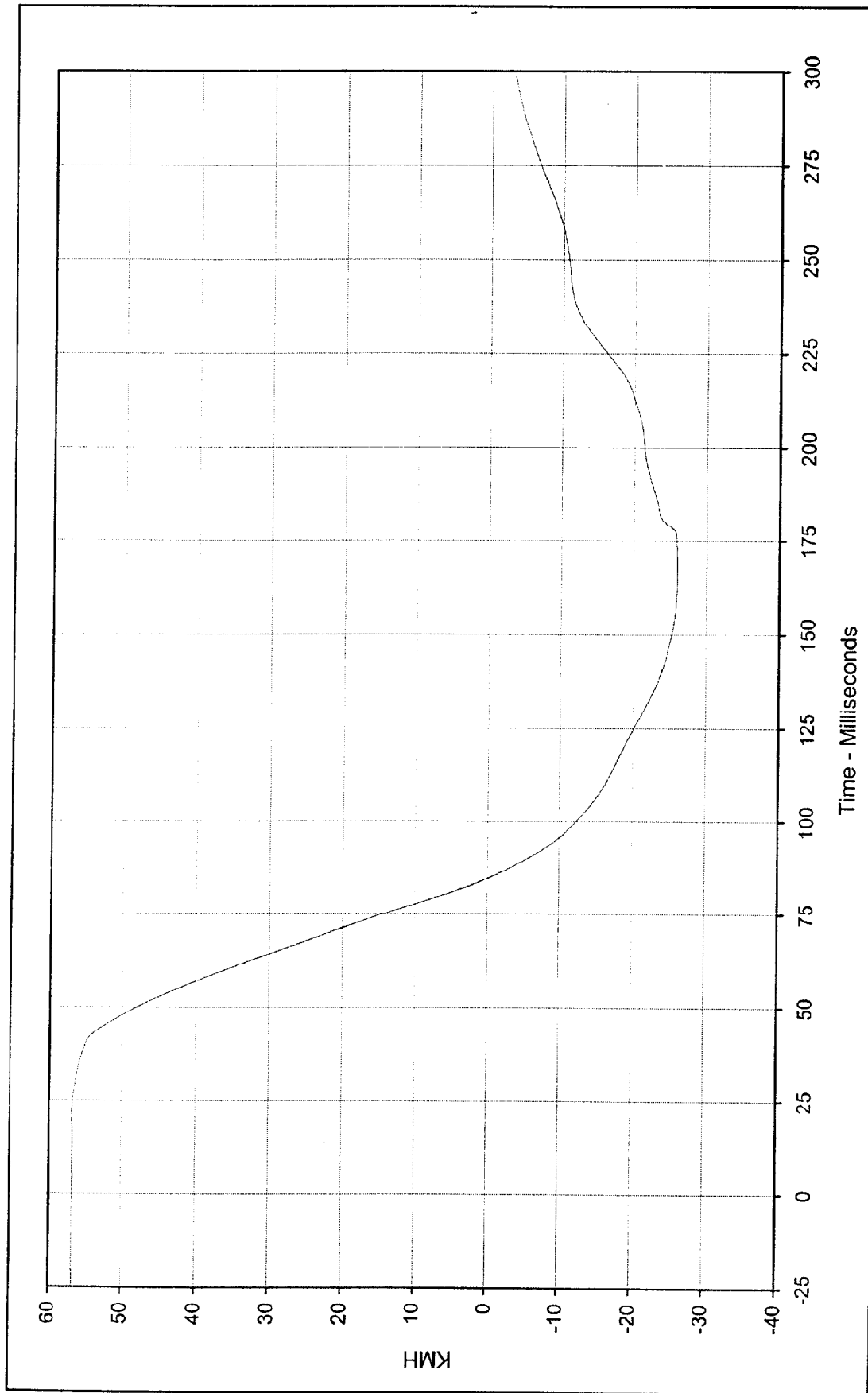
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Curve Description: Driver Head Primary X
 Maximum Value: 25.3 at 179.0 Milliseconds
 Minimum Value: -46.3 at 76.1 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/25/99
 Curve Number: FIL-001

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Driver Head Primary X Velocity

Maximum Value: 56.9 at 21.1 Milliseconds

Minimum Value: -26.0 at 165.5 Milliseconds

SAE Filter Class: 180

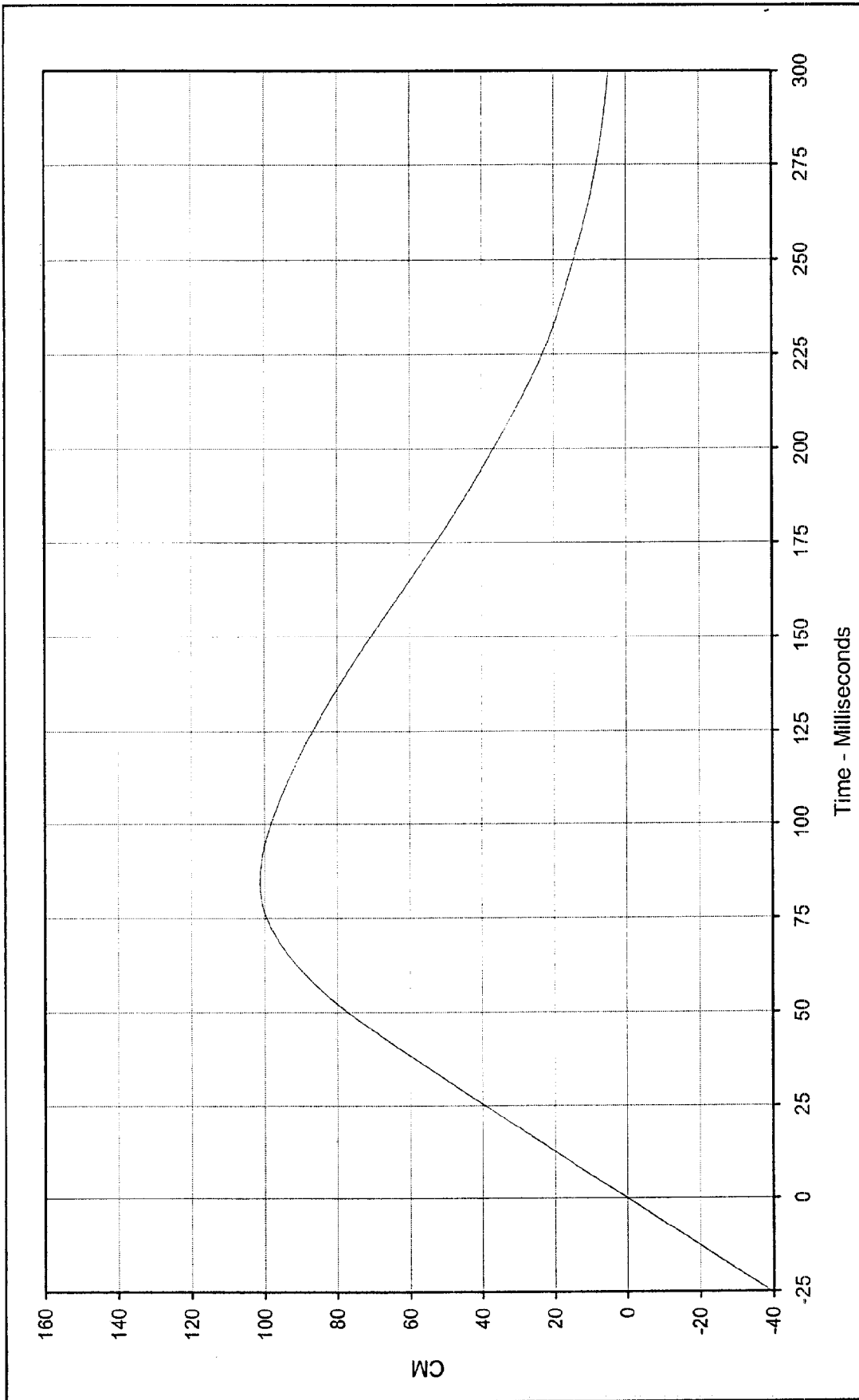
Date of Test: 2/25/99

Curve Number: IN1-001

Testing Program 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)

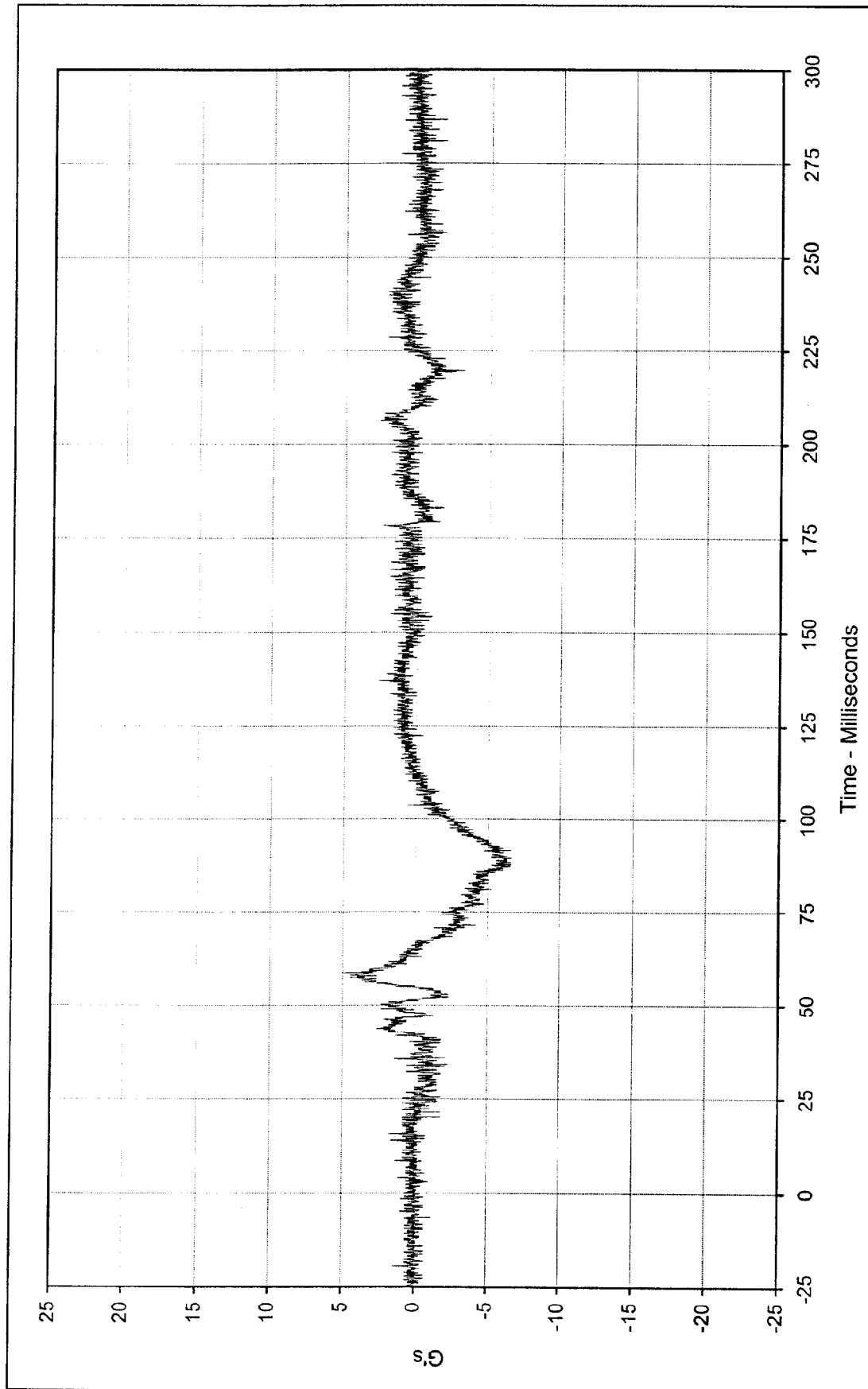




Curve Description: Driver Head Primary X Displ.
 Maximum Value: 101.3 at 84.5 Milliseconds
 Minimum Value: 0.0 at 0.0 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: IN2-001

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

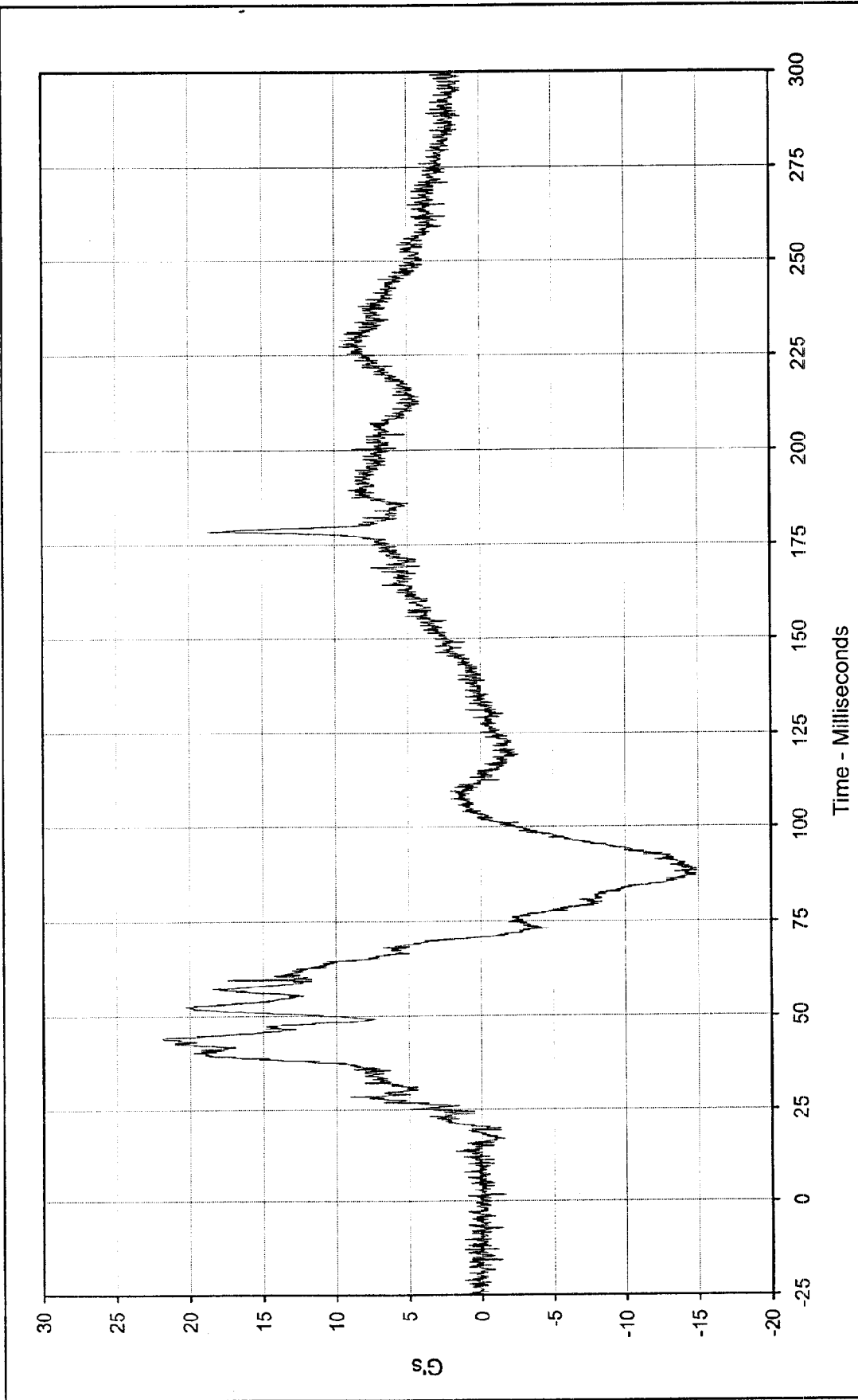




Curve Description:		Driver Head Primary Y		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	5.0	at	58.6	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-6.6	at	87.1			
SAE Filter Class:	1000					
Date of Test:	2/25/99					
Curve Number:	FIL-002					

The logo for KARCO Engineering features a stylized lightbulb with a checkered pattern inside, positioned to the left of the word "KARCO" in a bold, sans-serif font. Below "KARCO", the word "Engineering" is written in a script font, slanted upwards to the right.

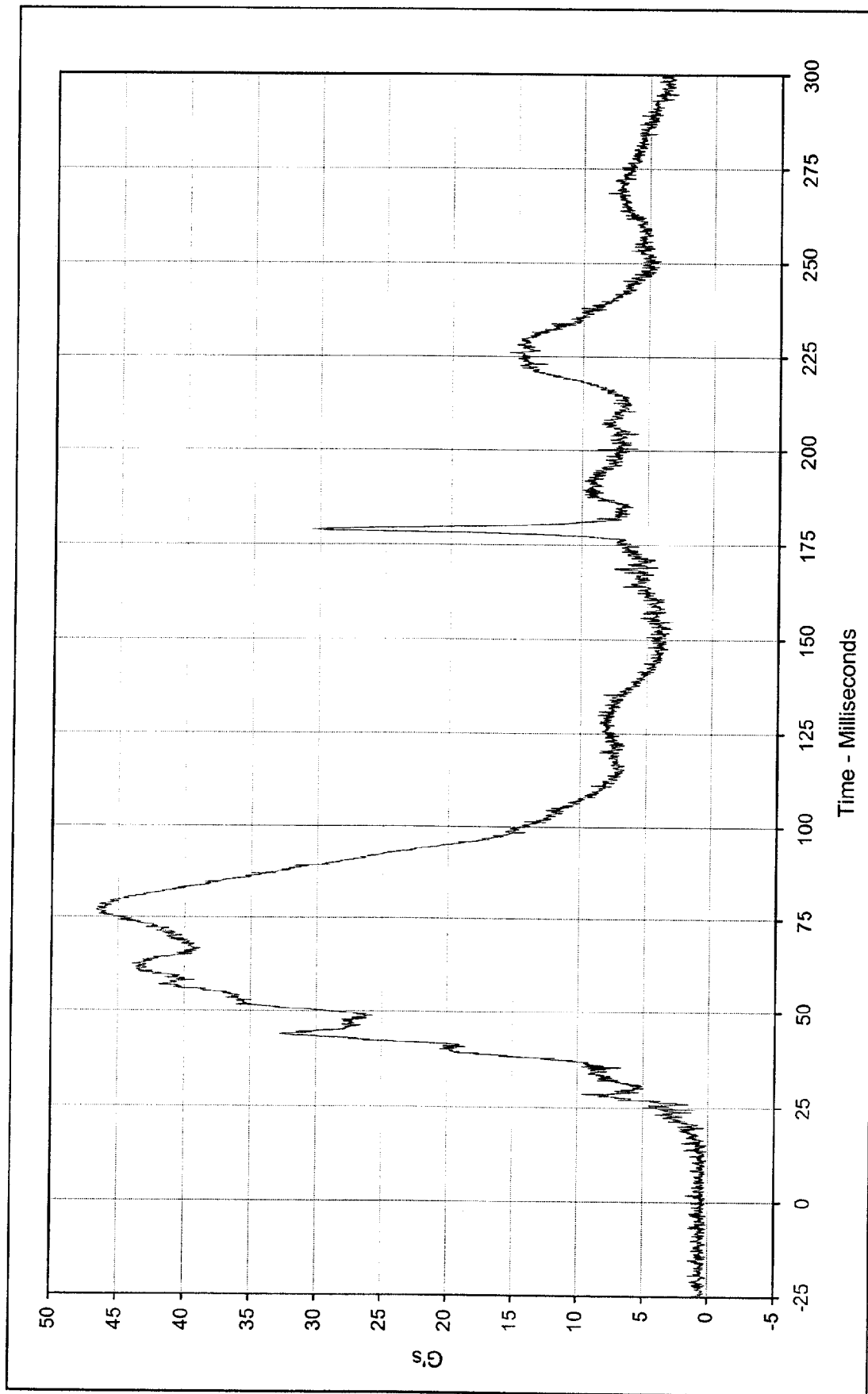




Curve Description: Driver Head Primary Z
 Maximum Value: 21.8 at 43.7 Milliseconds
 Minimum Value: -14.9 at 86.8 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/25/99
 Curve Number: FIL-003

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)



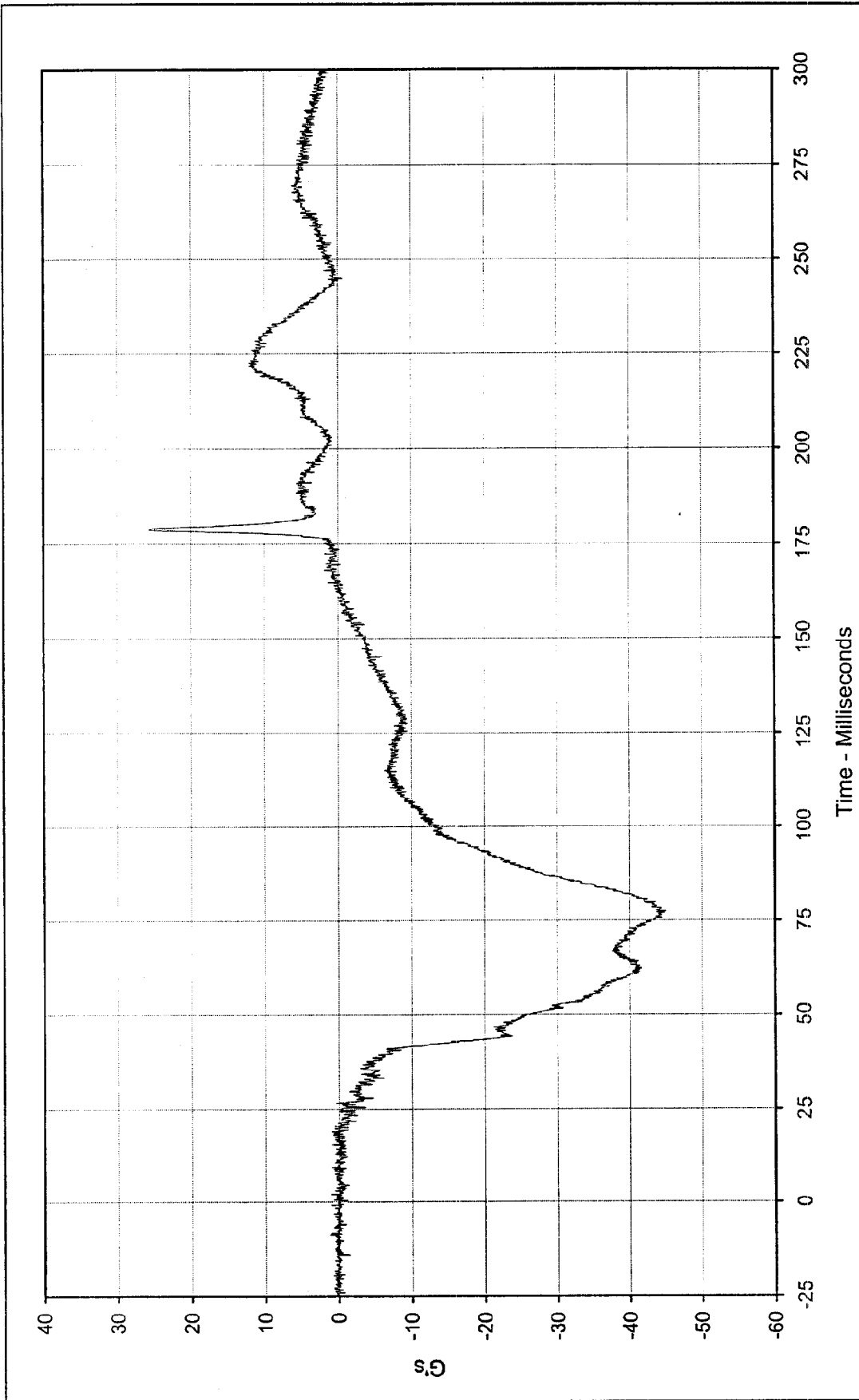


Curve Description:		Driver Head Resultant Primary		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	46.7	at	77.2	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	0.1	at	11.1			
SAE Filter Class:	1000					
Date of Test:	2/25/99					
Curve Number:	RES-001					



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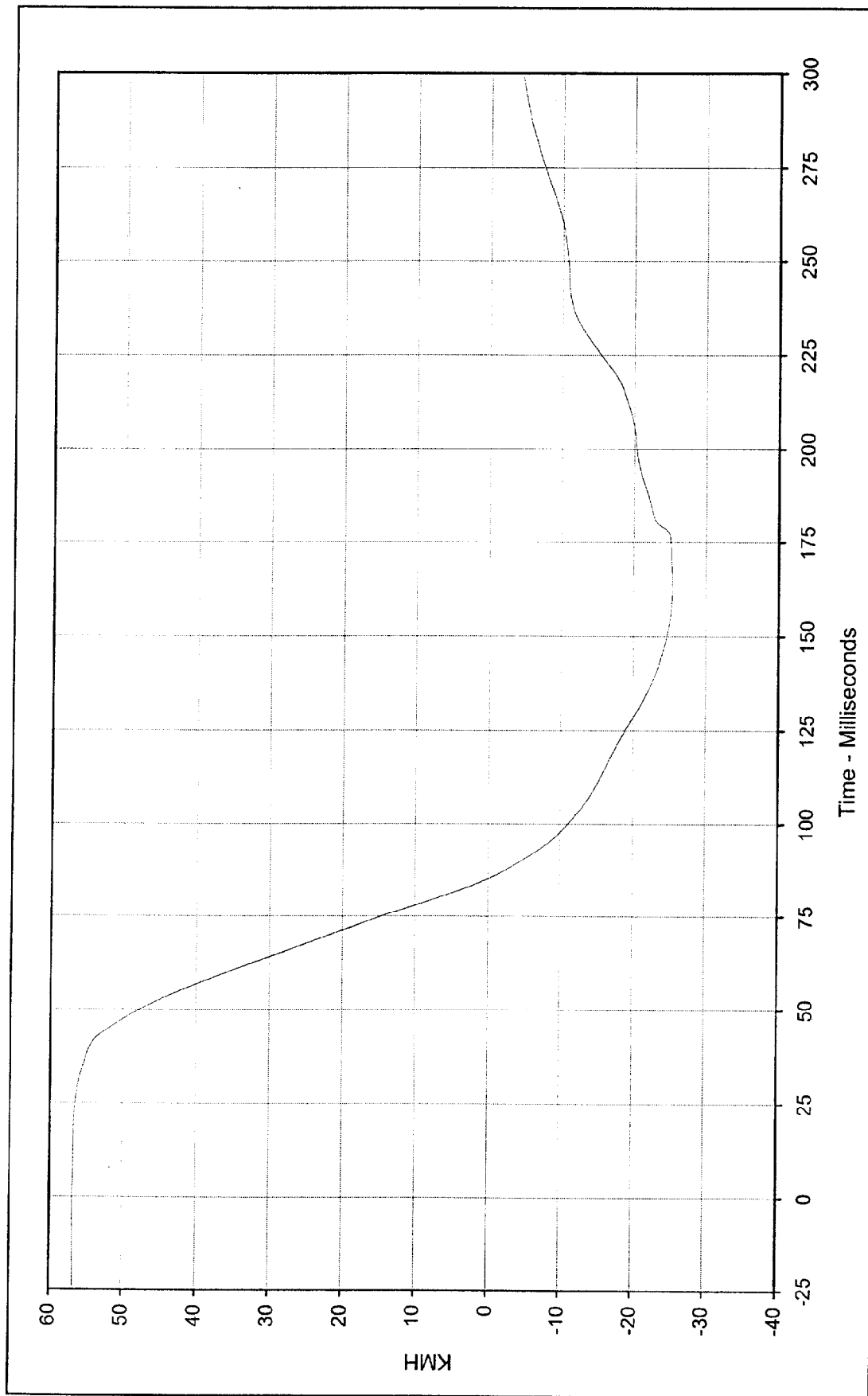




Curve Description: Driver Head Redundant X
 Maximum Value: 25.6 at 178.8 Milliseconds
 Minimum Value: -45.0 at 77.3 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/25/99
 Curve Number: FIL-004

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Driver Head Redundant X Velocity

Maximum Value: 56.8 at 0.0 Milliseconds

Minimum Value: -25.4 at 164.3 Milliseconds

SAE Filter Class: 180

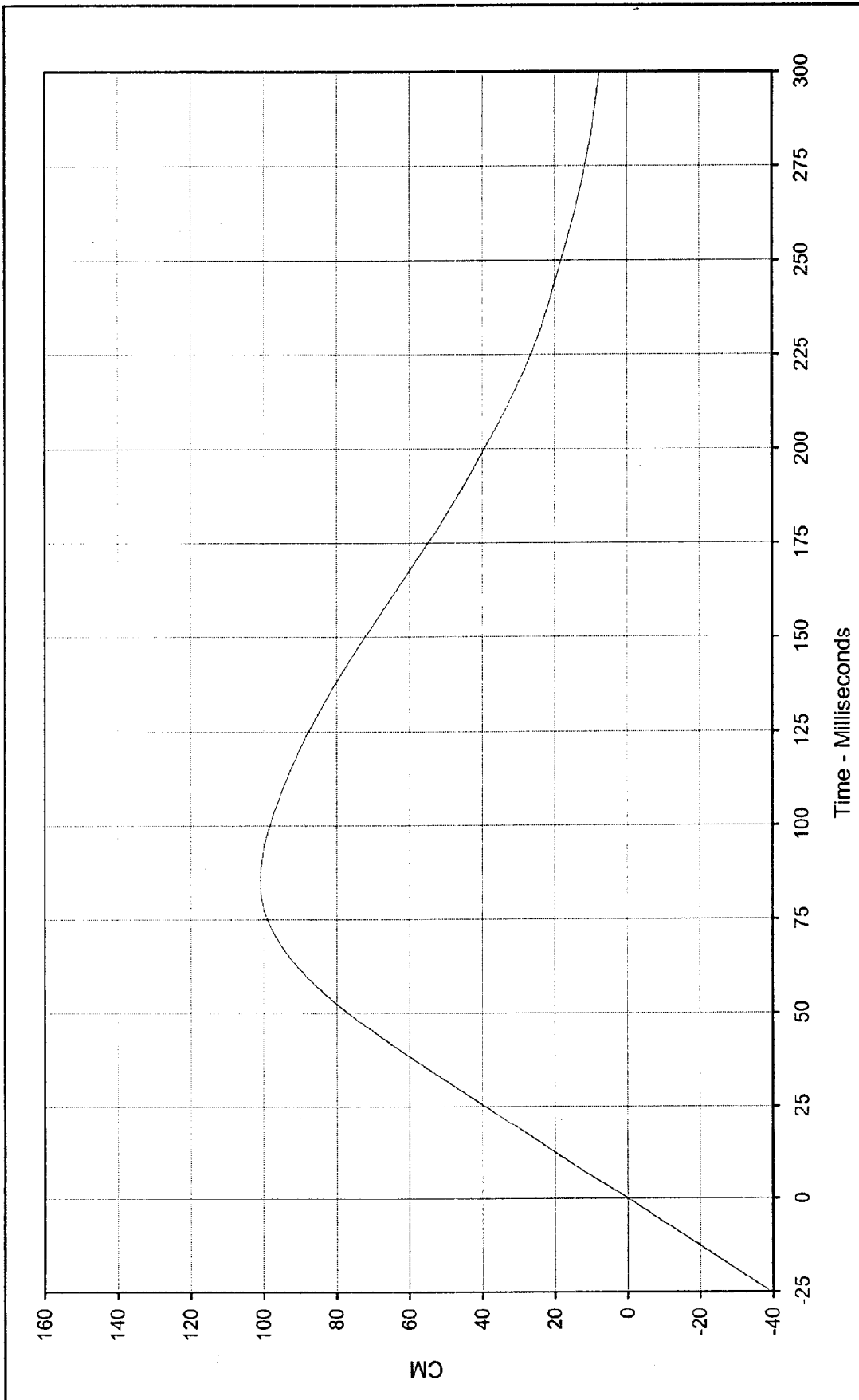
Date of Test: 2/25/99

Curve Number: IN1-004

Testing Program 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)

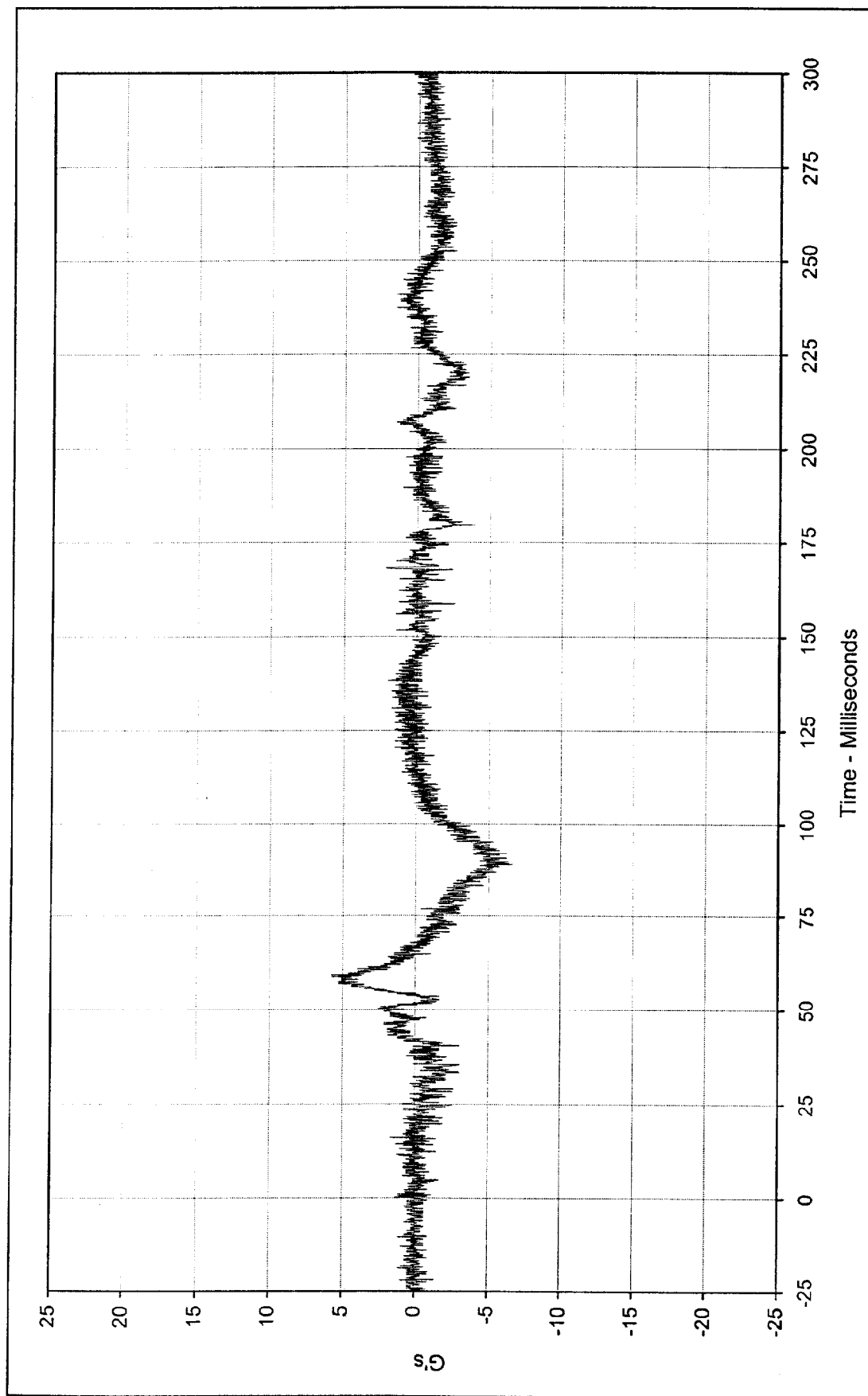




Curve Description: Driver Head Redundant X Displ. Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
Maximum Value: 100.9 at 85.1 Milliseconds Test Vehicle: 1999 Volkswagen Beetle (New)
Minimum Value: 0.0 at 0.0 Milliseconds



SAE Filter Class: 180
Date of Test: 2/25/99
Curve Number: IN2-004



Curve Description: Driver Head Redundant Y Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Maximum Value: 5.7 at 58.8 Milliseconds Test Vehicle: 1999 Volkswagen Beetle (New)

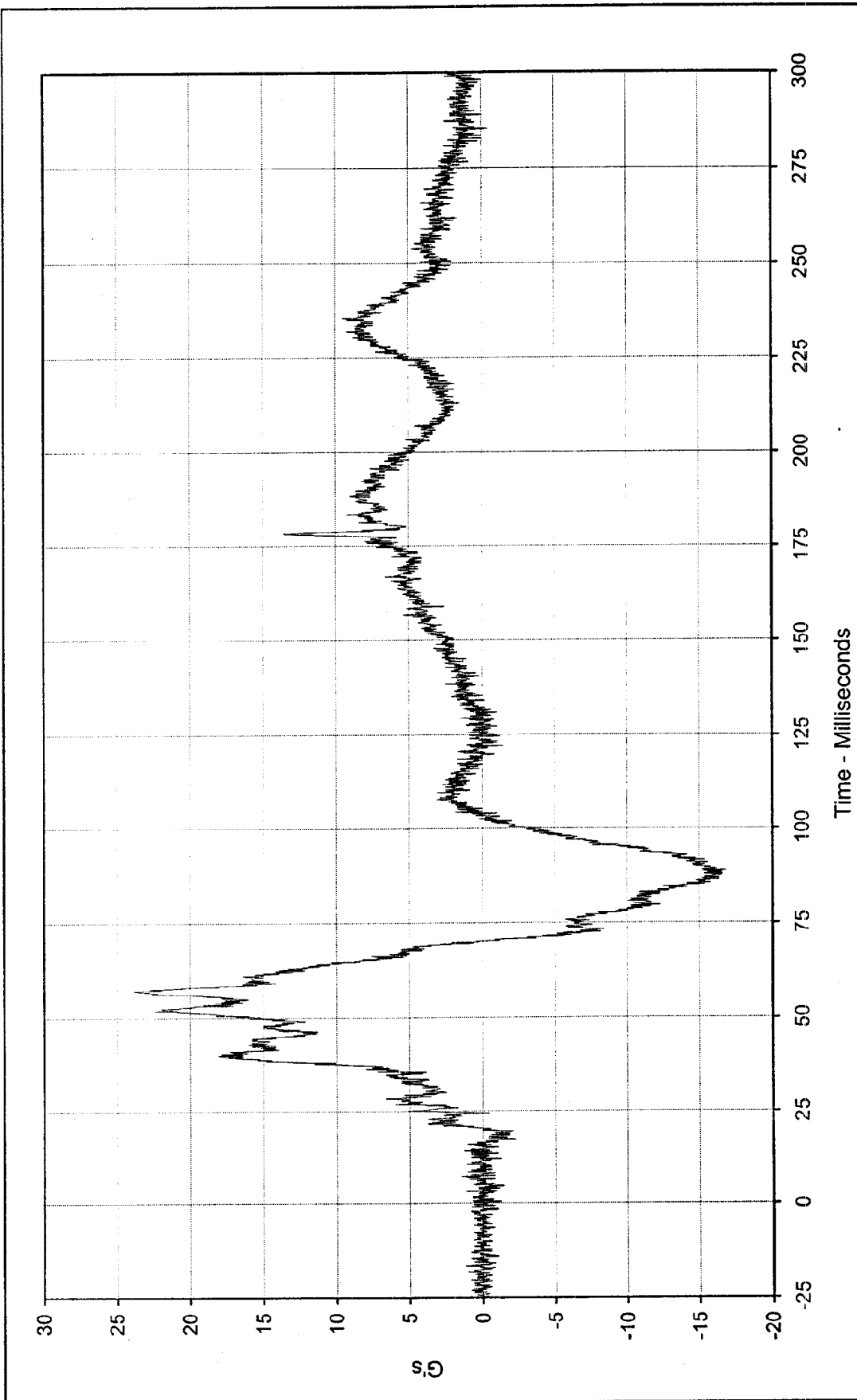
Minimum Value: -6.7 at 88.7 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/25/99

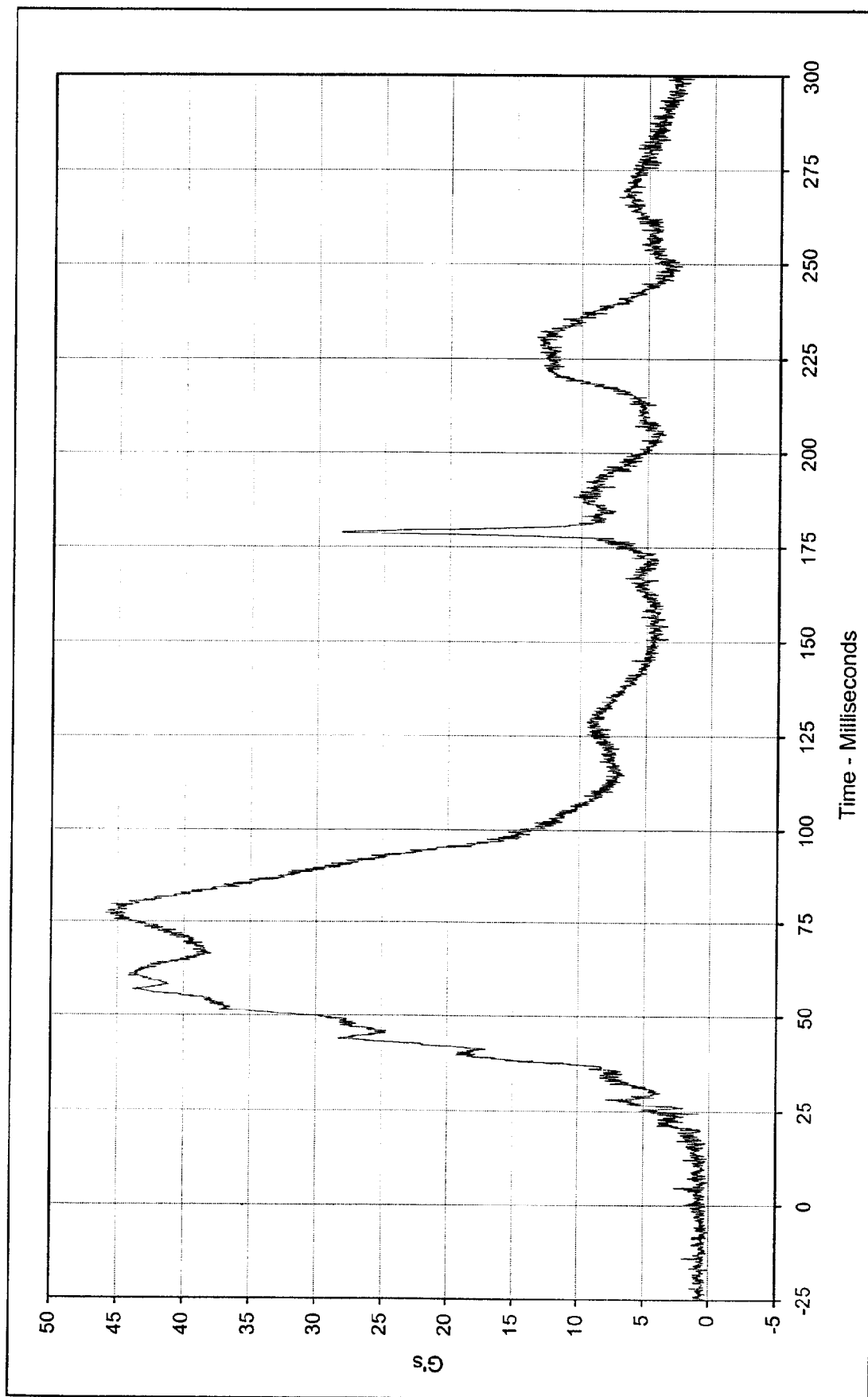
Curve Number: FIL-005





Curve Description:	Driver Head Redundant Z	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	23.8 at 57.1 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-16.8 at 88.6 Milliseconds			
SAE Filter Class:	1000			
Date of Test:	2/25/99			
Curve Number:	FIL-006			

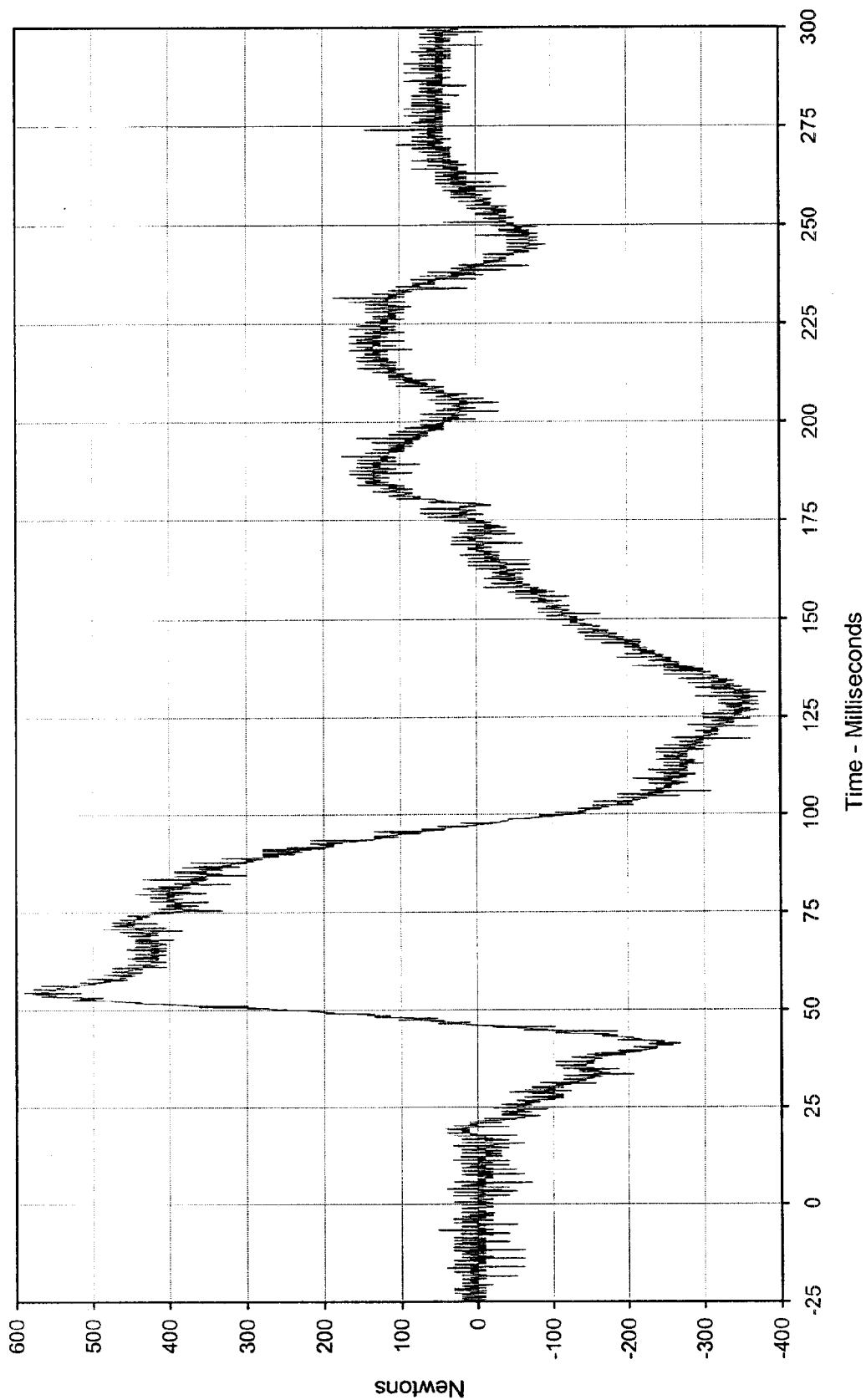




Curve Description:	Driver Head Resultant Redundant	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	46.0 at 77.3 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	0.1 at 6.3 Milliseconds			



SAE Filter Class:	1000
Date of Test:	2/25/99
Curve Number:	RES-004



Curve Description: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Program: 1999 Volkswagen Beetle (New)

Test Vehicle:

Driver Neck Force X

Maximum Value: 589.0 at 54.5 Milliseconds

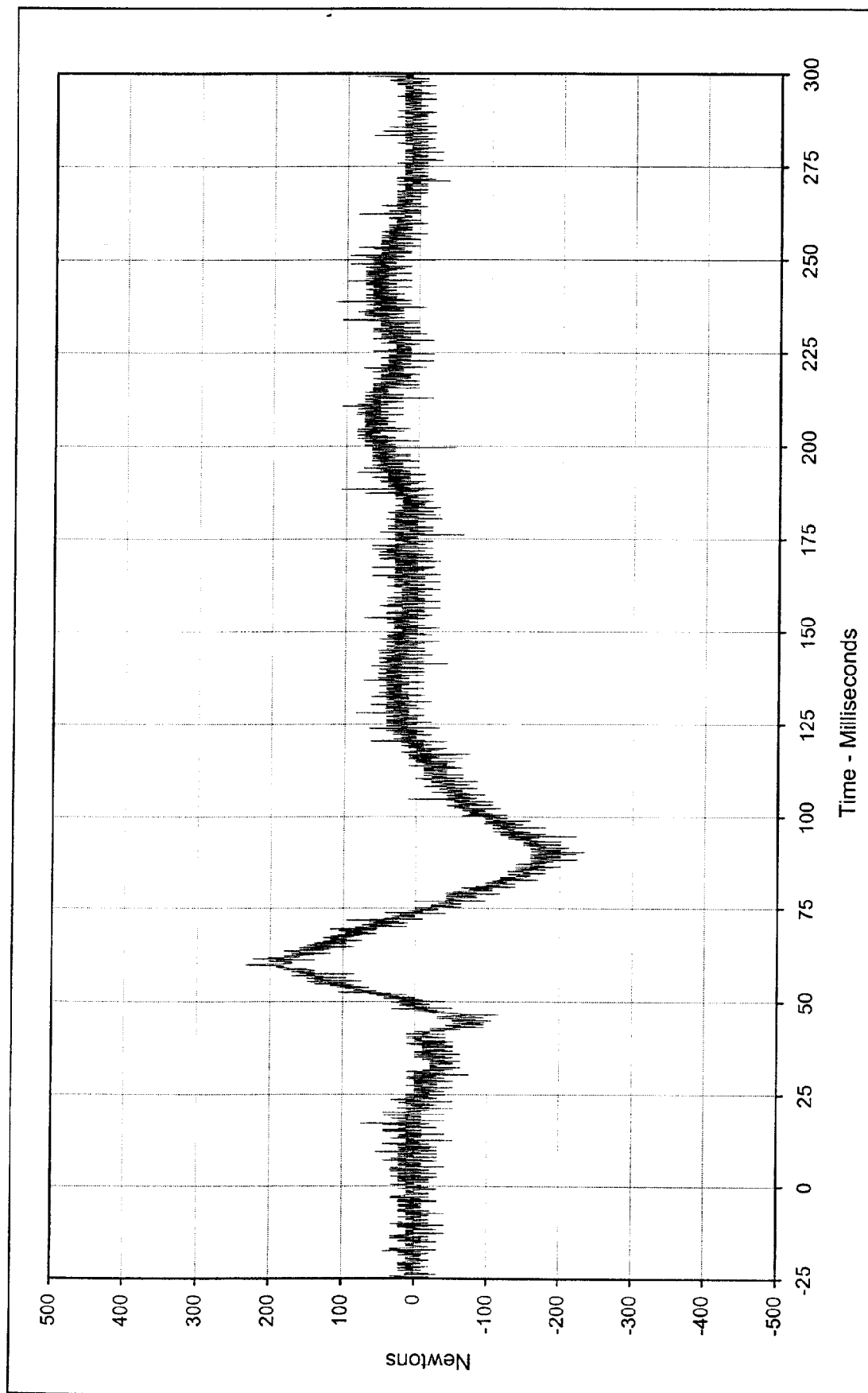
Minimum Value: -382.4 at 131.2 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/25/99

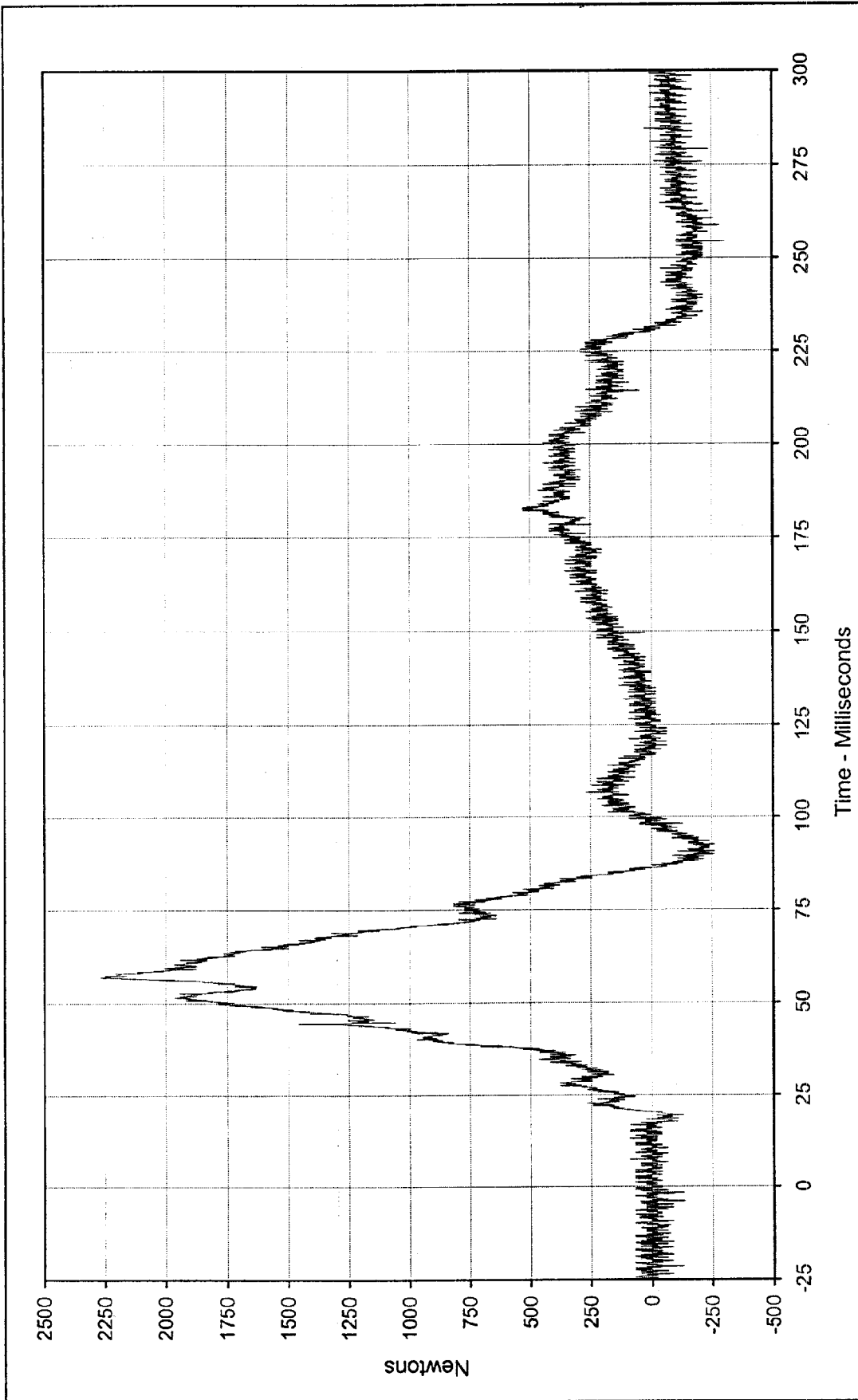
Curve Number: FIL-007





Curve Description:		Driver Neck Force Y		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	233.5	at	59.6	Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)
Minimum Value:	-233.5	at	90.2	Milliseconds		
SAE Filter Class:	1000					
Date of Test:	2/25/99					
Curve Number:	FIL-008					

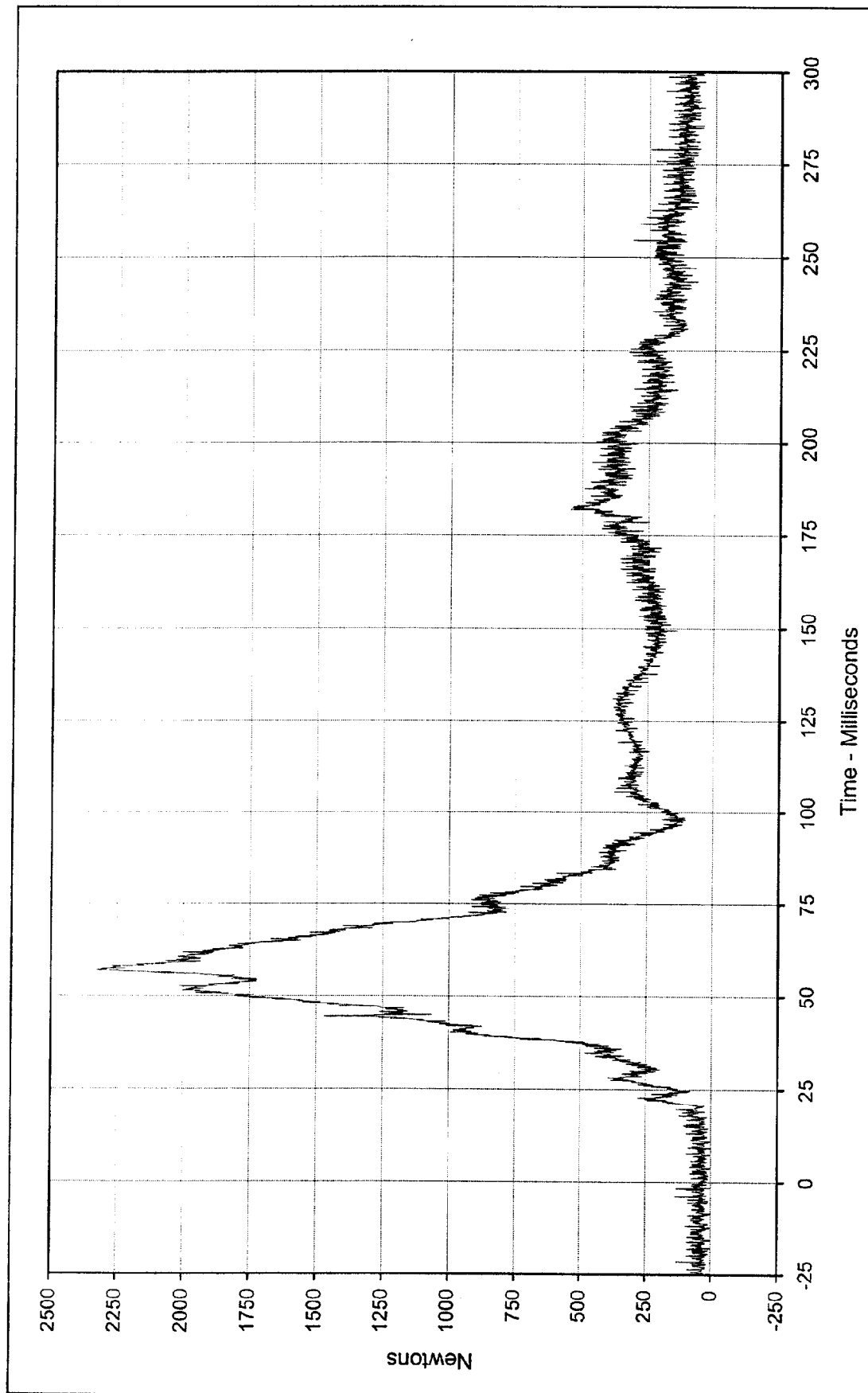




Curve Description: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Program:
 Test Vehicle: 1999 Volkswagen Beetle (New)

Driver Neck Force Z
 Maximum Value: 2269.7 at 57.0 Milliseconds
 Minimum Value: -306.2 at 254.6 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/25/99
 Curve Number: FIL-009

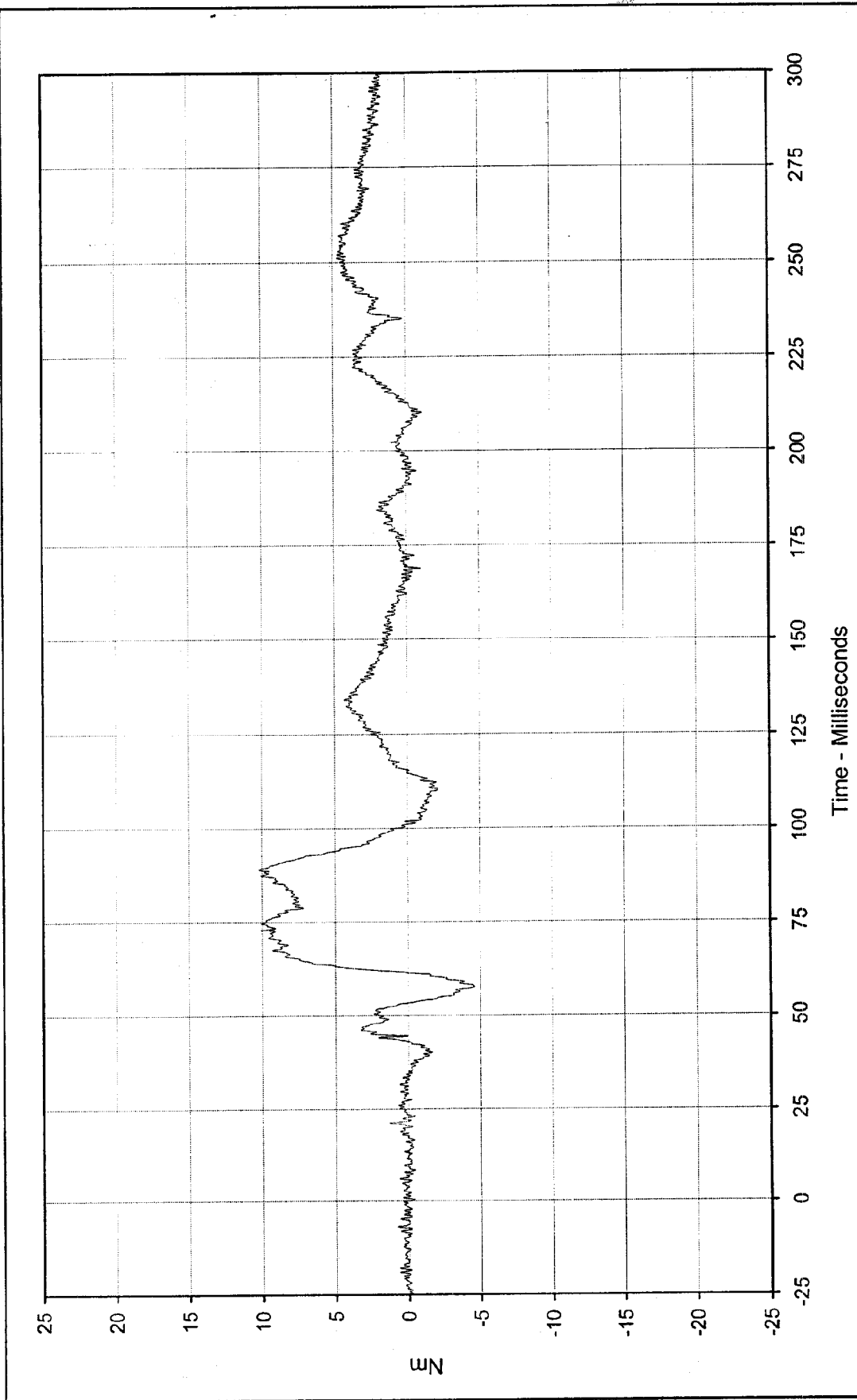




Curve Description:		Driver Neck Force Resultant		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	2325.2	at	57.0	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	2.0	at	3.7			
SAE Filter Class:	1000					
Date of Test:	2/25/99					
Curve Number:	RES-007					

The logo for KARCO Engineering features a stylized lightbulb with a gear-like base, followed by the word "KARCO" in large, bold, sans-serif capital letters. Below this, the word "Engineering" is written in a smaller, italicized, sans-serif font. The entire logo is set against a dark, rectangular background.

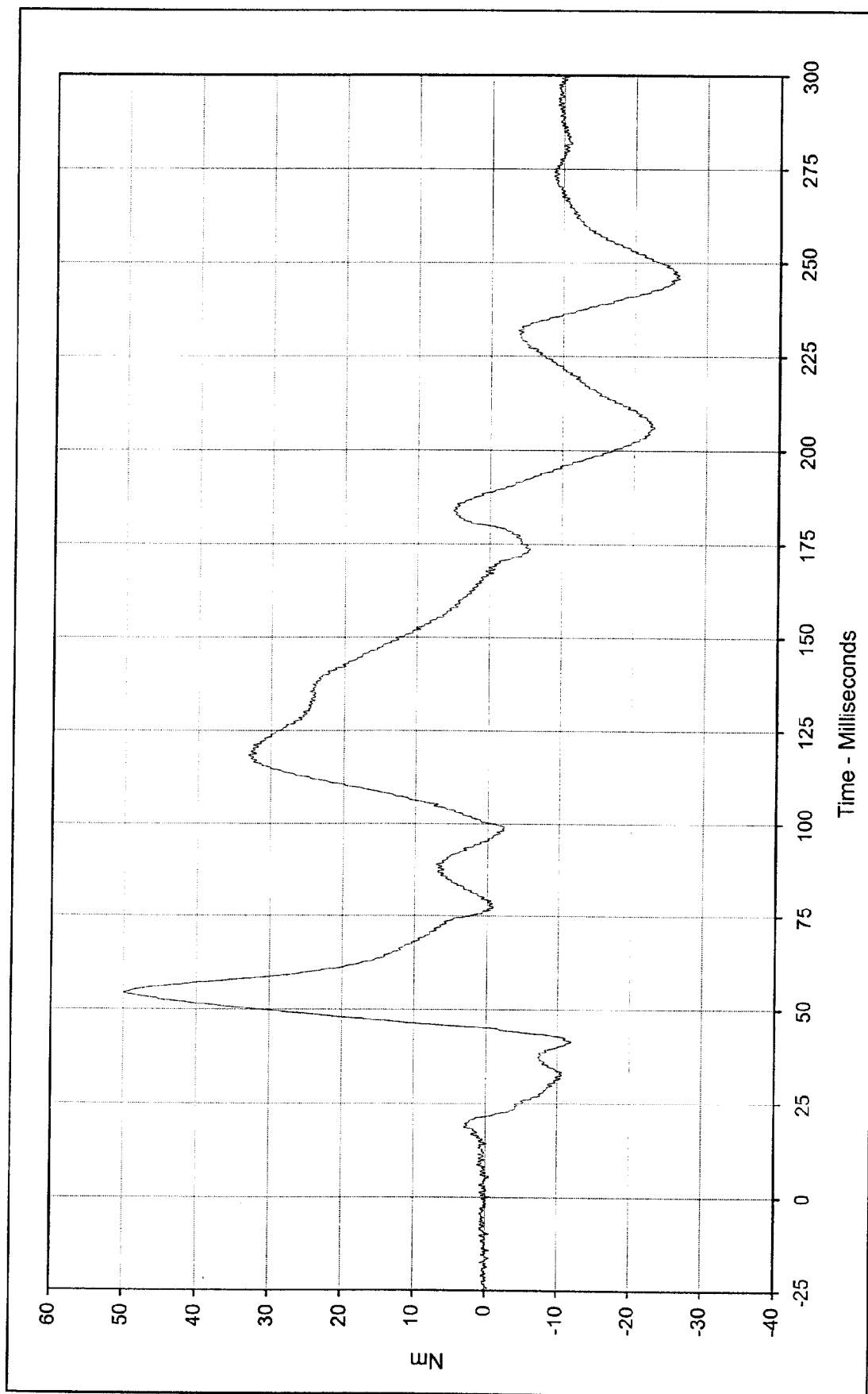




Curve Description:		Driver Neck Moment X		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	10.2	at	89.1	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-4.6	at	57.5			
SAE Filter Class:	600					
Date of Test:	2/25/99					
Curve Number:	FIL-010					

The logo for KARCO Engineering. It features a stylized lightbulb with a gear-like base, followed by the word "KARCO" in large, bold, sans-serif capital letters. To the right of "KARCO", the word "Engineering" is written in a smaller, italicized, sans-serif font. The entire logo is set against a black background with a white diagonal stripe running from the bottom left to the top right.



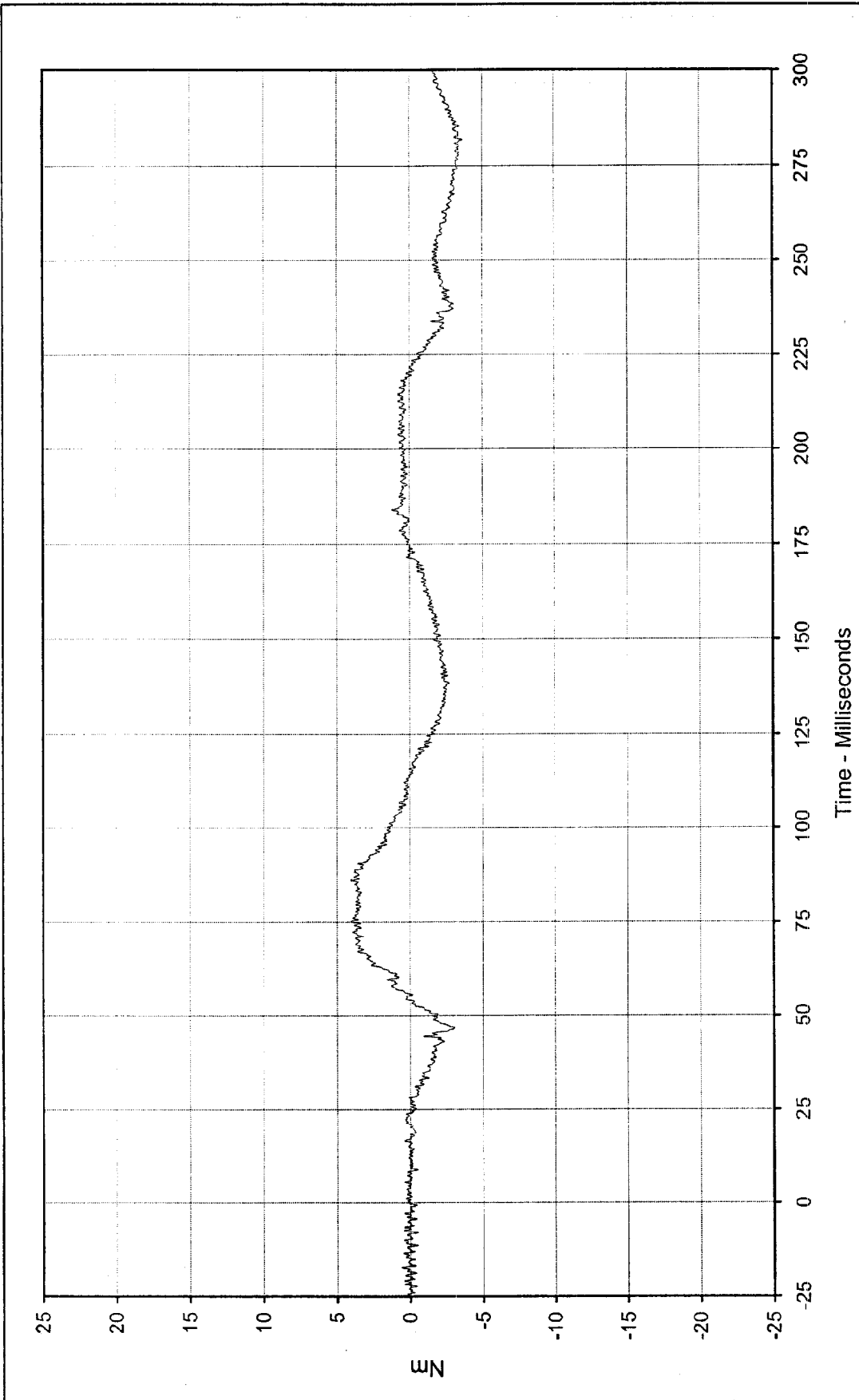


Curve Description:		Driver Neck Moment Y		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:		49.9	at 54.6	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:		-26.2	at 245.8			
SAE Filter Class:		600				
Date of Test:		2/25/99				
Curve Number:		FIL-011				



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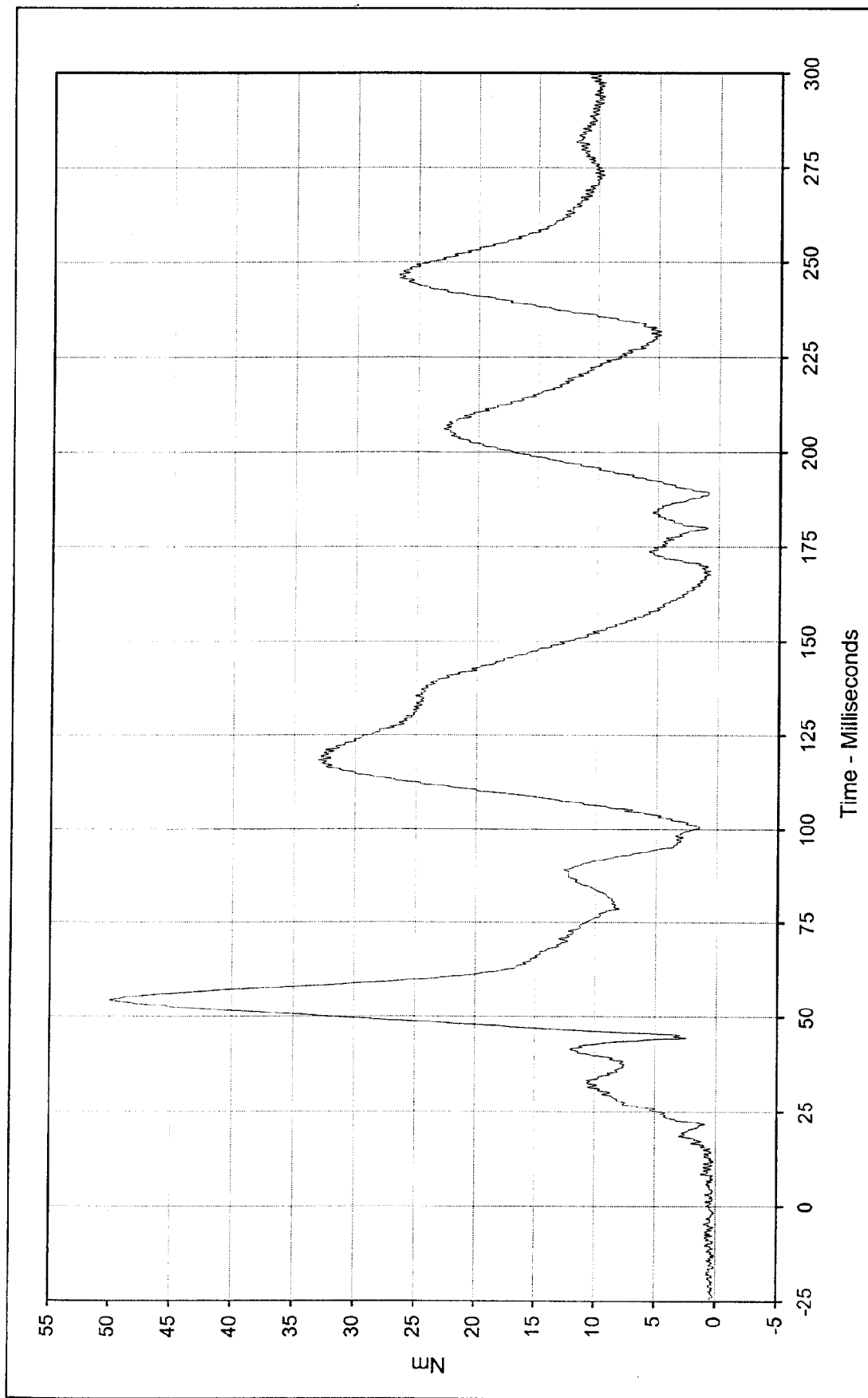




Curve Description: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Program: 1999 Volkswagen Beetle (New)
 Test Vehicle:

Driver Neck Moment Z
 Maximum Value: 4.1 at 85.9 Milliseconds
 Minimum Value: -3.7 at 282.1 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/25/99
 Curve Number: FIL-012

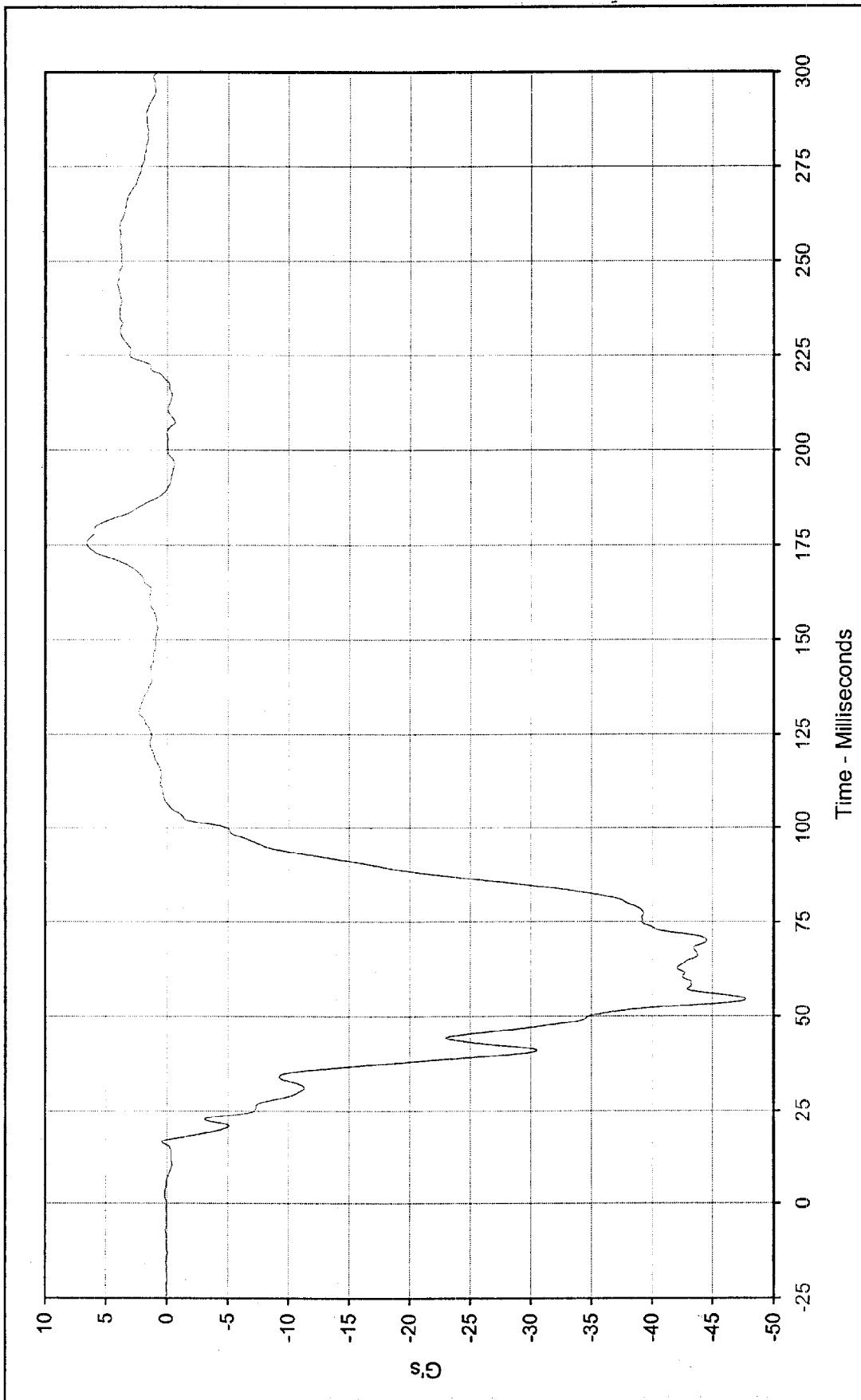




Curve Description:		Driver Neck Moment Resultant		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	50.0	at	54.6	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	0.1	at	11.9			
SAE Filter Class:	600					
Date of Test:	2/25/99					
Curve Number:	RES-010					



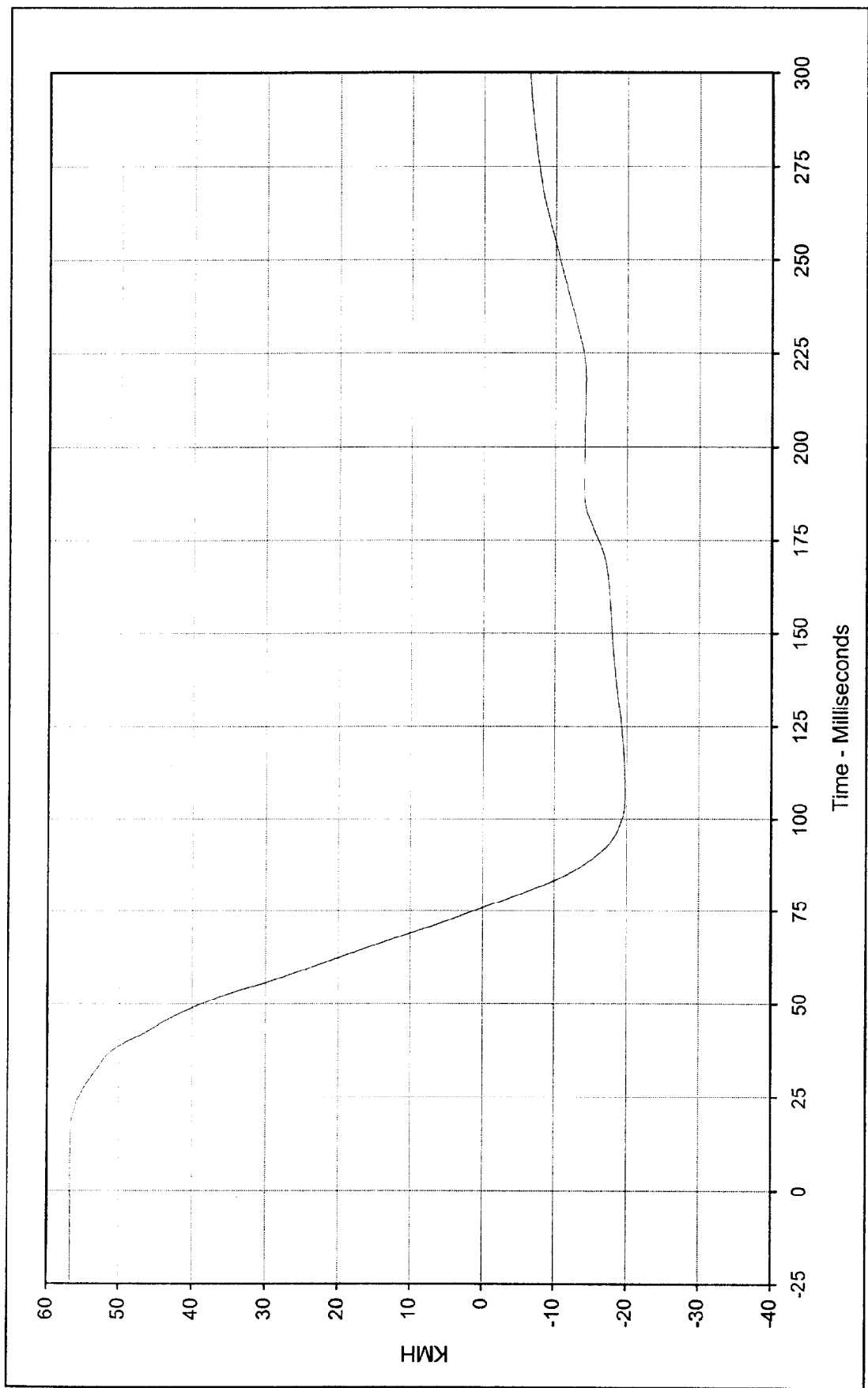




Curve Description:	Driver Chest Primary X	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	6.6 at 175.4 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-47.7 at 54.5 Milliseconds			



SAE Filter Class:	180
Date of Test:	2/25/99
Curve Number:	FIL-013



Curve Description: Driver Chest Primary X Velocity

Maximum Value: 56.8 at 6.6 Milliseconds

Minimum Value: -19.8 at 106.7 Milliseconds

SAE Filter Class: 180

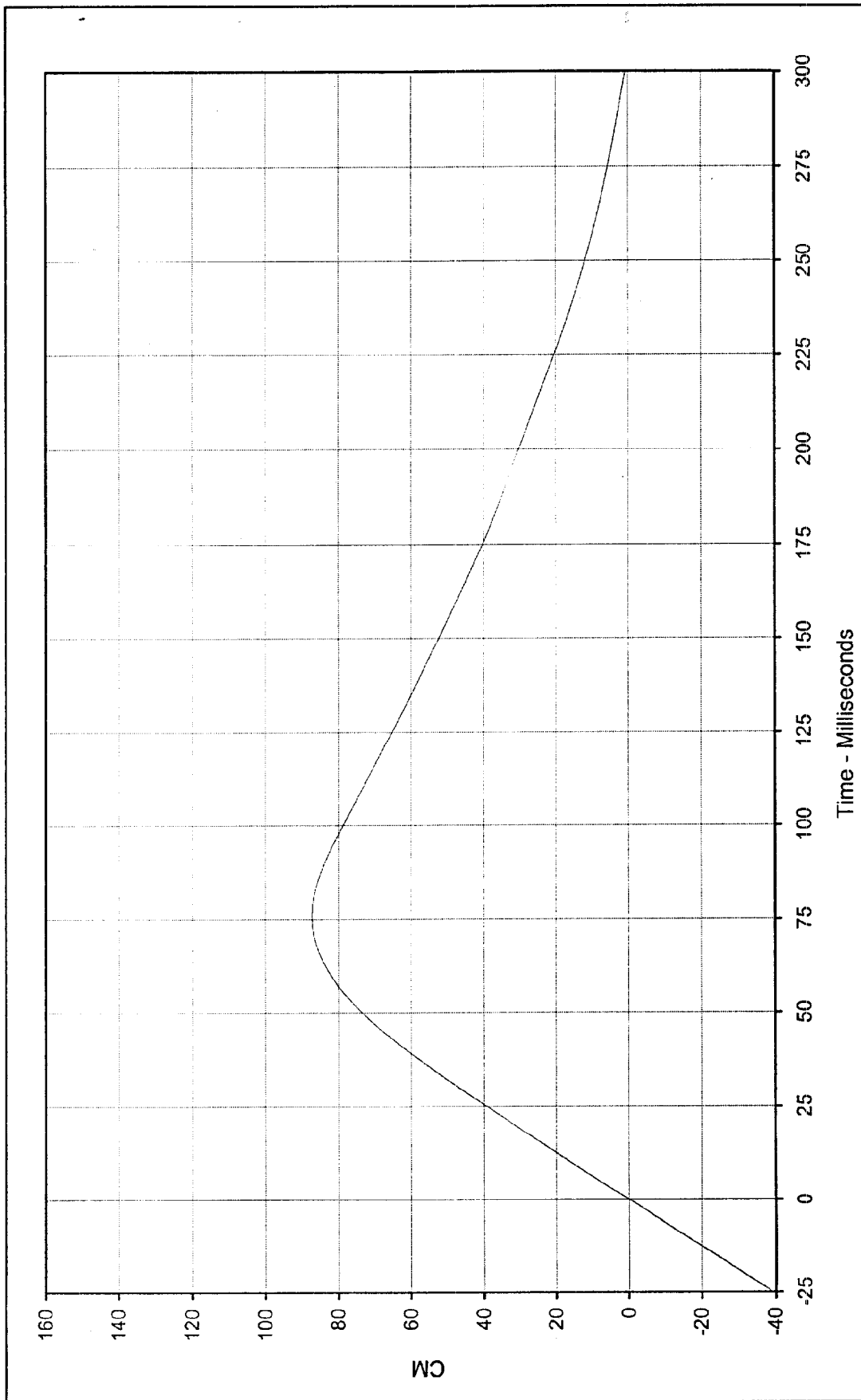
Date of Test: 2/25/99

Curve Number: IN1-013

Testing Program 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)

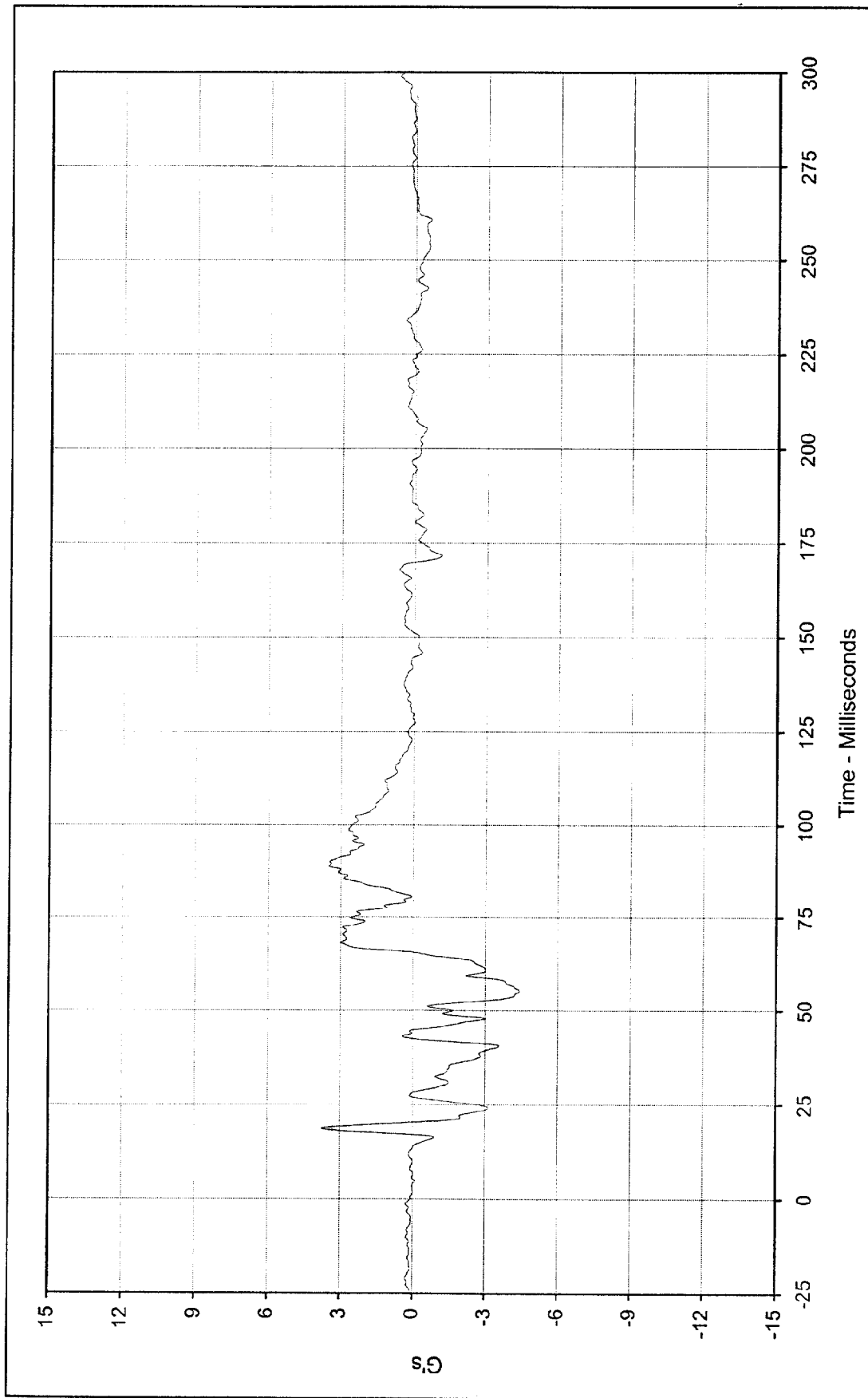




Curve Description: Driver Chest Primary X Displ.
 Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

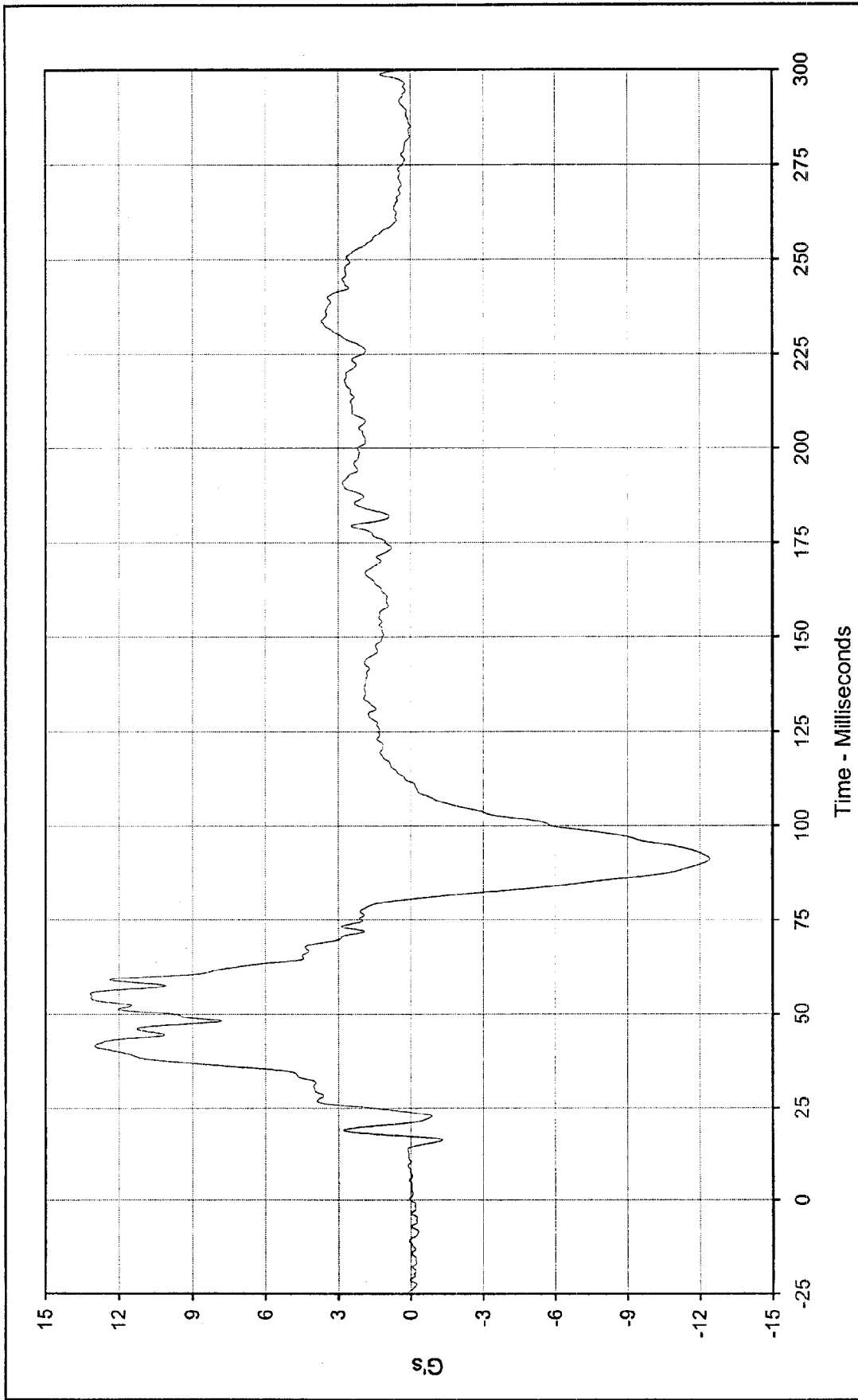
Maximum Value: 87.3 at 75.8 Milliseconds
 Minimum Value: 0.0 at 0.0 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: IN2-013





Curve Description:		Driver Chest Primary Y		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	3.8	at	18.6	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-4.4	at	55.4			
SAE Filter Class:	180					
Date of Test:	2/25/99					
Curve Number:	FIL-014					

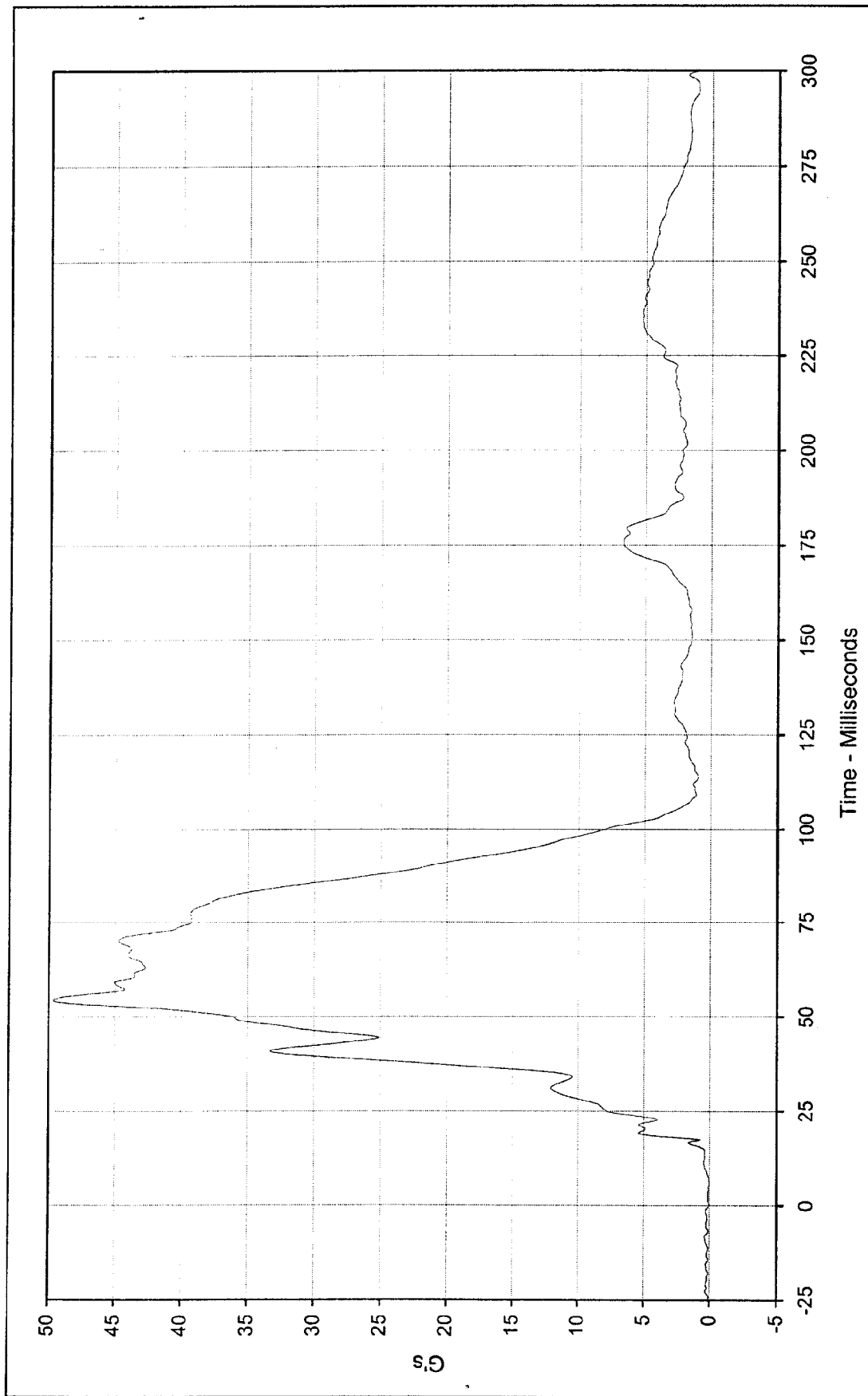




Curve Description: Driver Chest Primary Z
 Maximum Value: 13.2 at 55.4 Milliseconds
 Minimum Value: -12.4 at 91.3 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: FIL-015

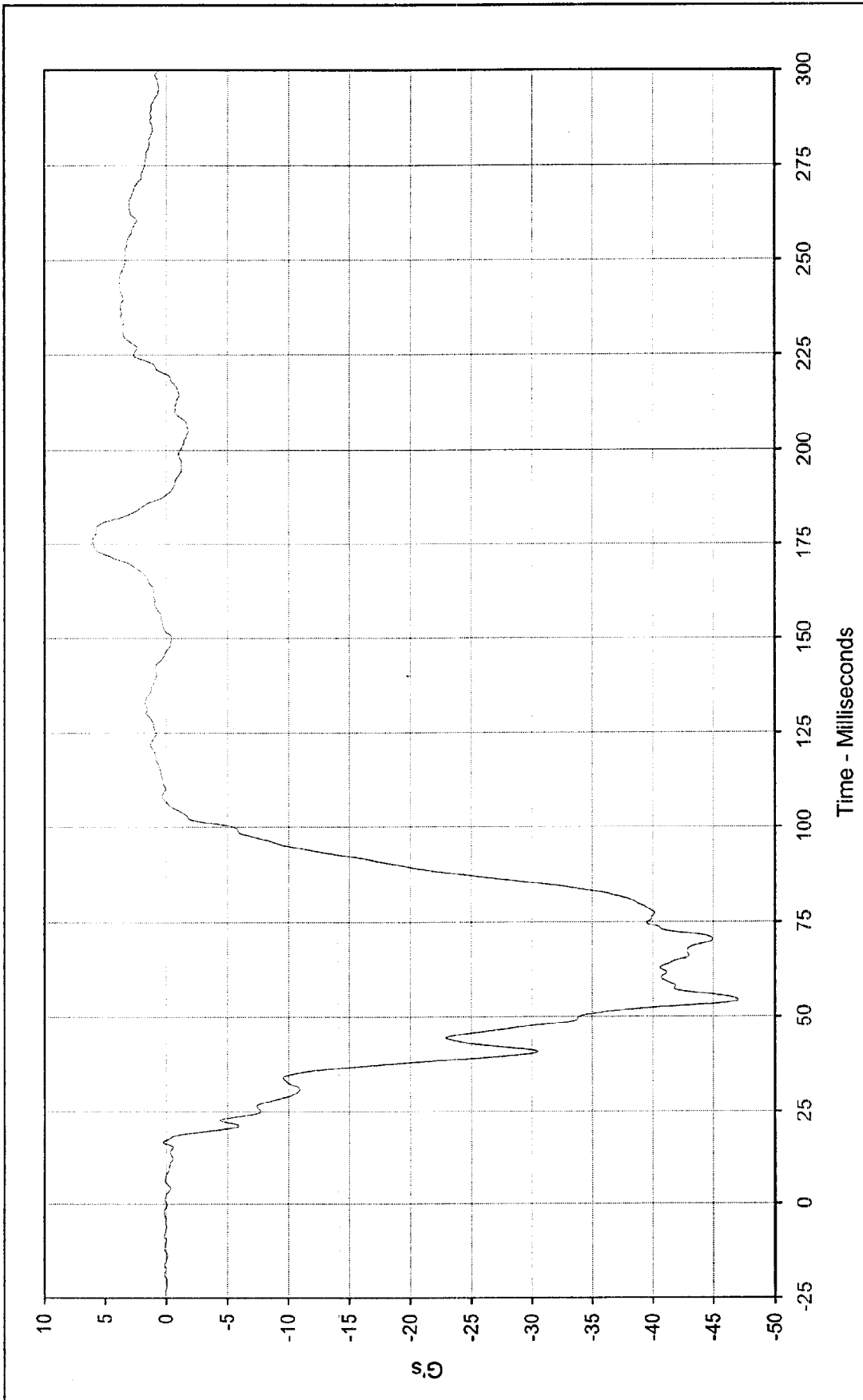
Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description:		Driver Chest Resultant Primary		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	49.7	at	54.5	Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)
Minimum Value:	0.0	at	6.1	Milliseconds		
SAE Filter Class:	180					
Date of Test:	2/25/99					
Curve Number:	RES-013					

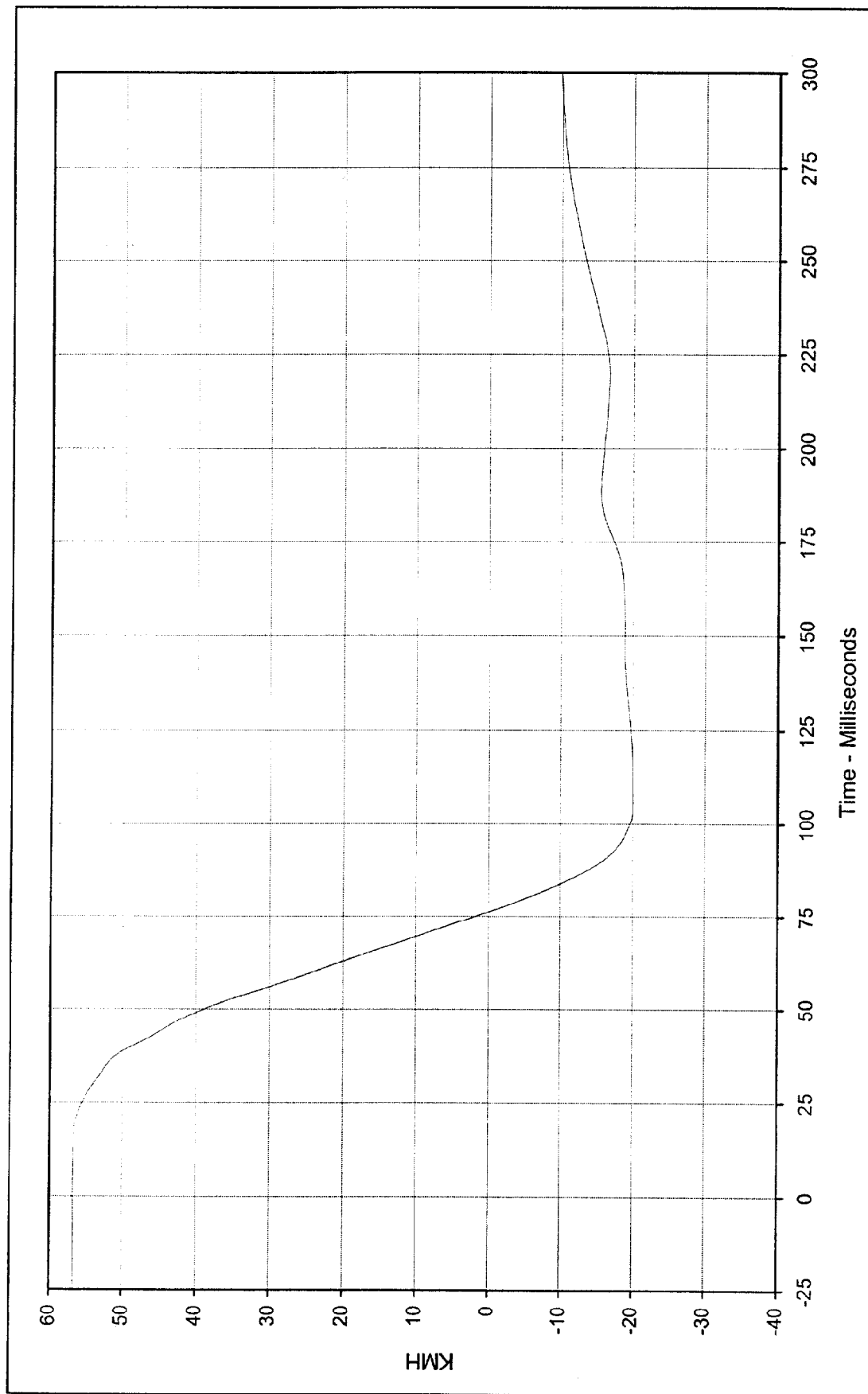




Curve Description: Driver Chest Redundant X
 Maximum Value: 6.1 at 176.1 Milliseconds
 Minimum Value: -47.0 at 54.3 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: FIL-016

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

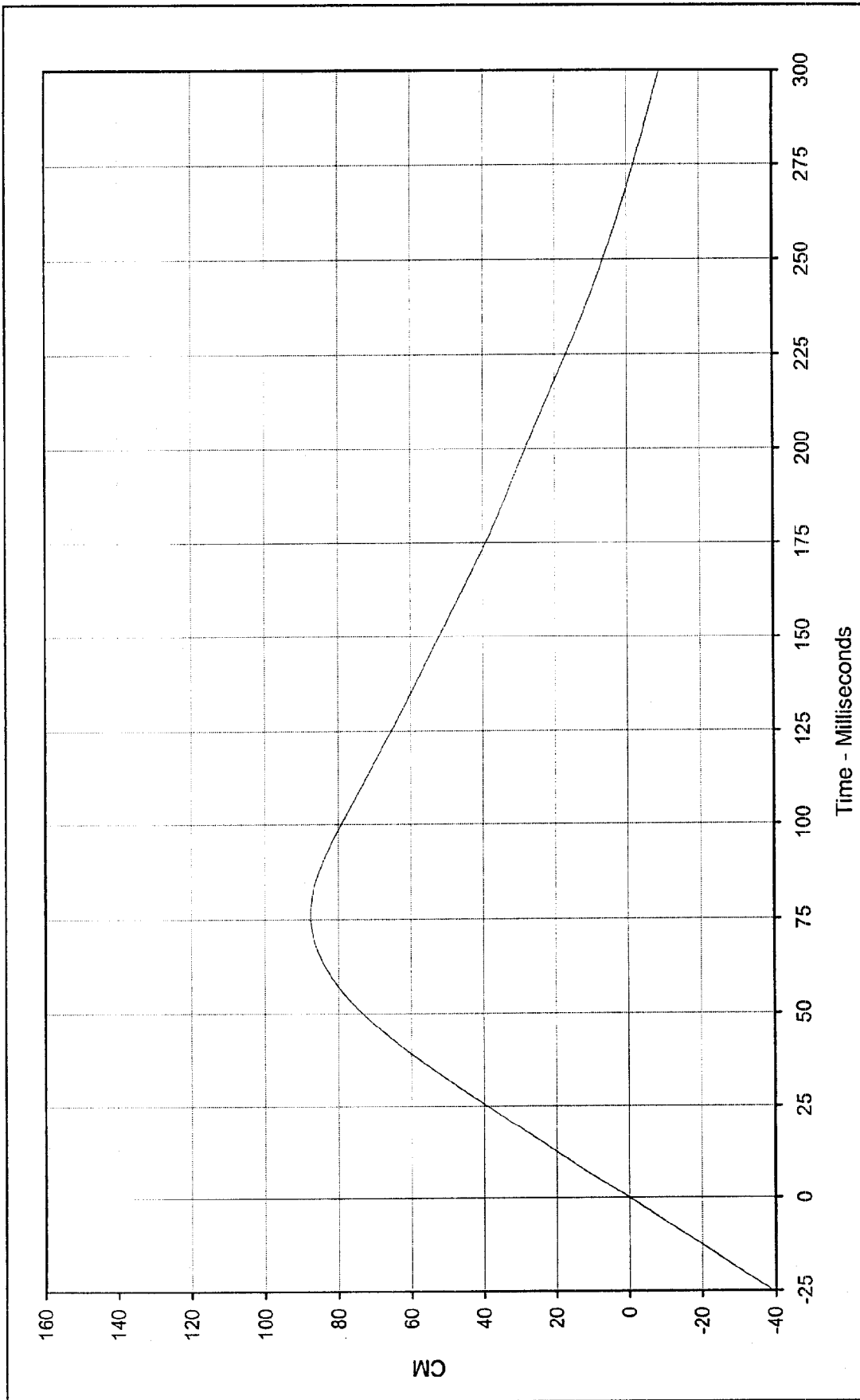




Curve Description: Driver Chest Redundant X Velocity
Maximum Value: 56.8 at 2.5 Milliseconds
Minimum Value: -20.1 at 106.8 Milliseconds
SAE Filter Class: 180
Date of Test: 2/25/99
Curve Number: IN1-016

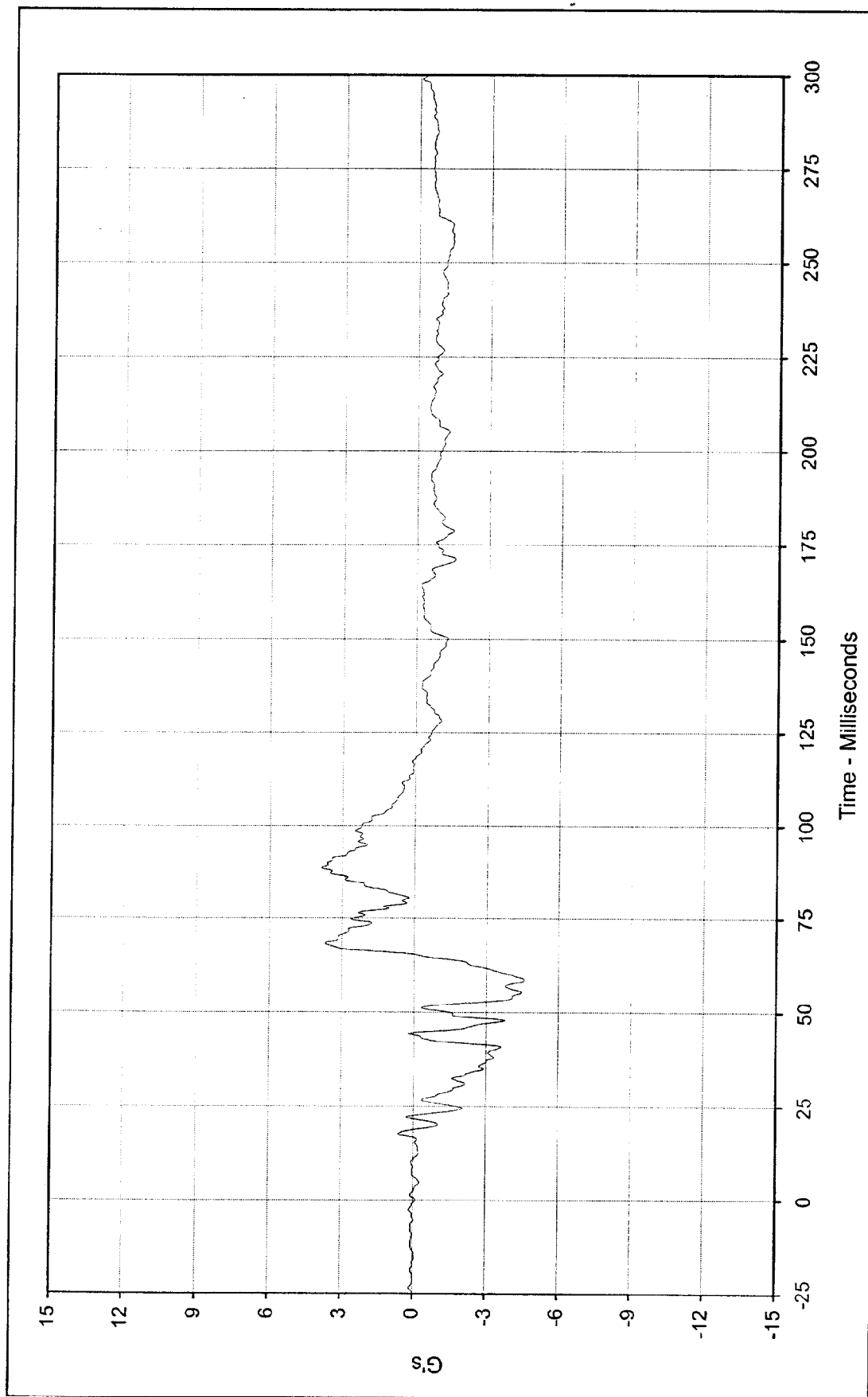
Testing Program 1999 NHTSA 35 mph NCAP No.: MX5800
Test Vehicle: 1999 Volkswagen Beetle (New)





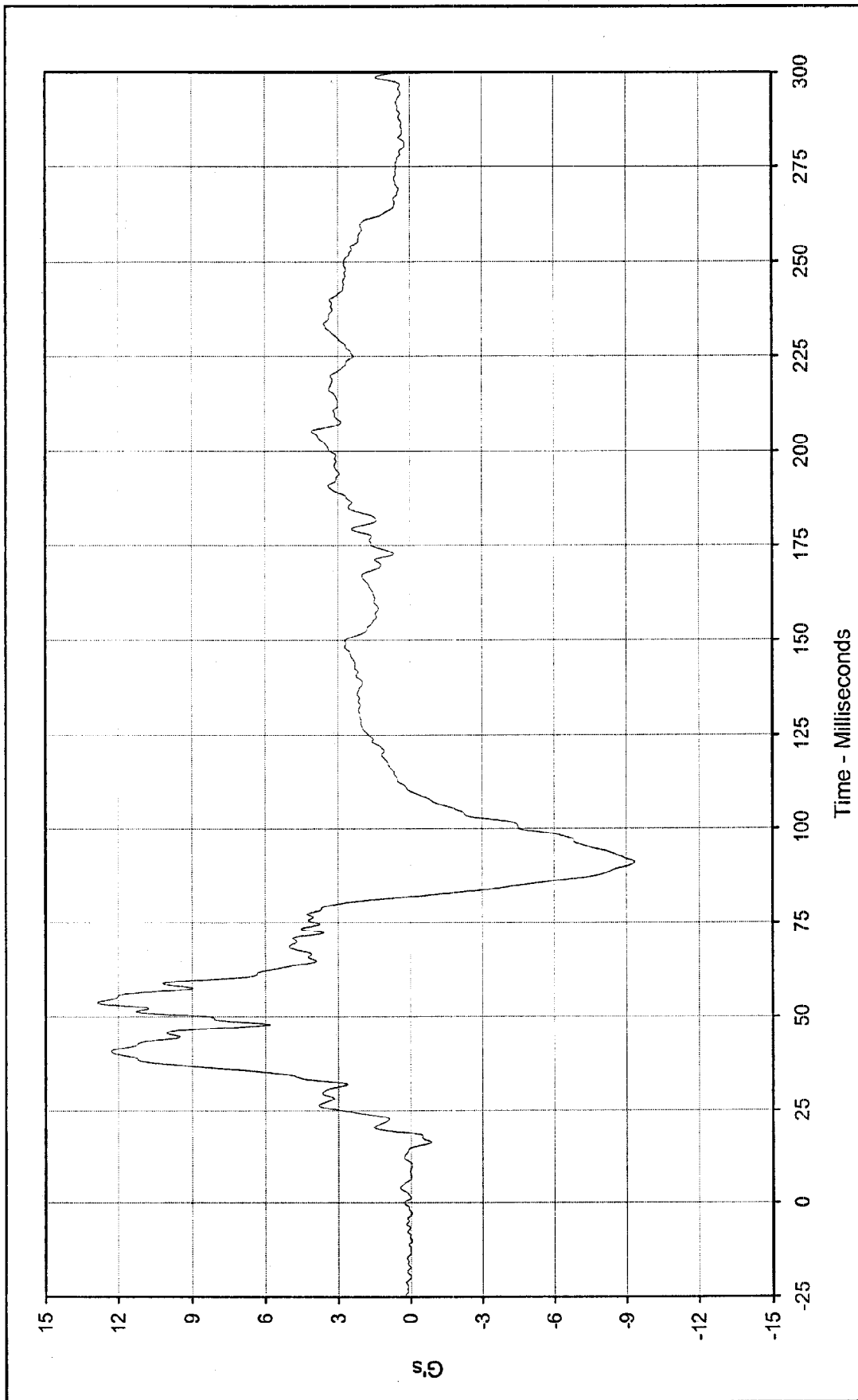
Curve Description:	Driver Chest Redundant X Displ.	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	87.5 at 76.2 milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-8.9 at 299.9 milliseconds			
SAE Filter Class:	180			
Date of Test:	2/25/99			
Curve Number:	IN2-016			





Curve Description:	Driver Chest Redundant Y	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	3.9 at 88.4 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-4.6 at 58.8 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/25/99			
Curve Number:	FIL-017			

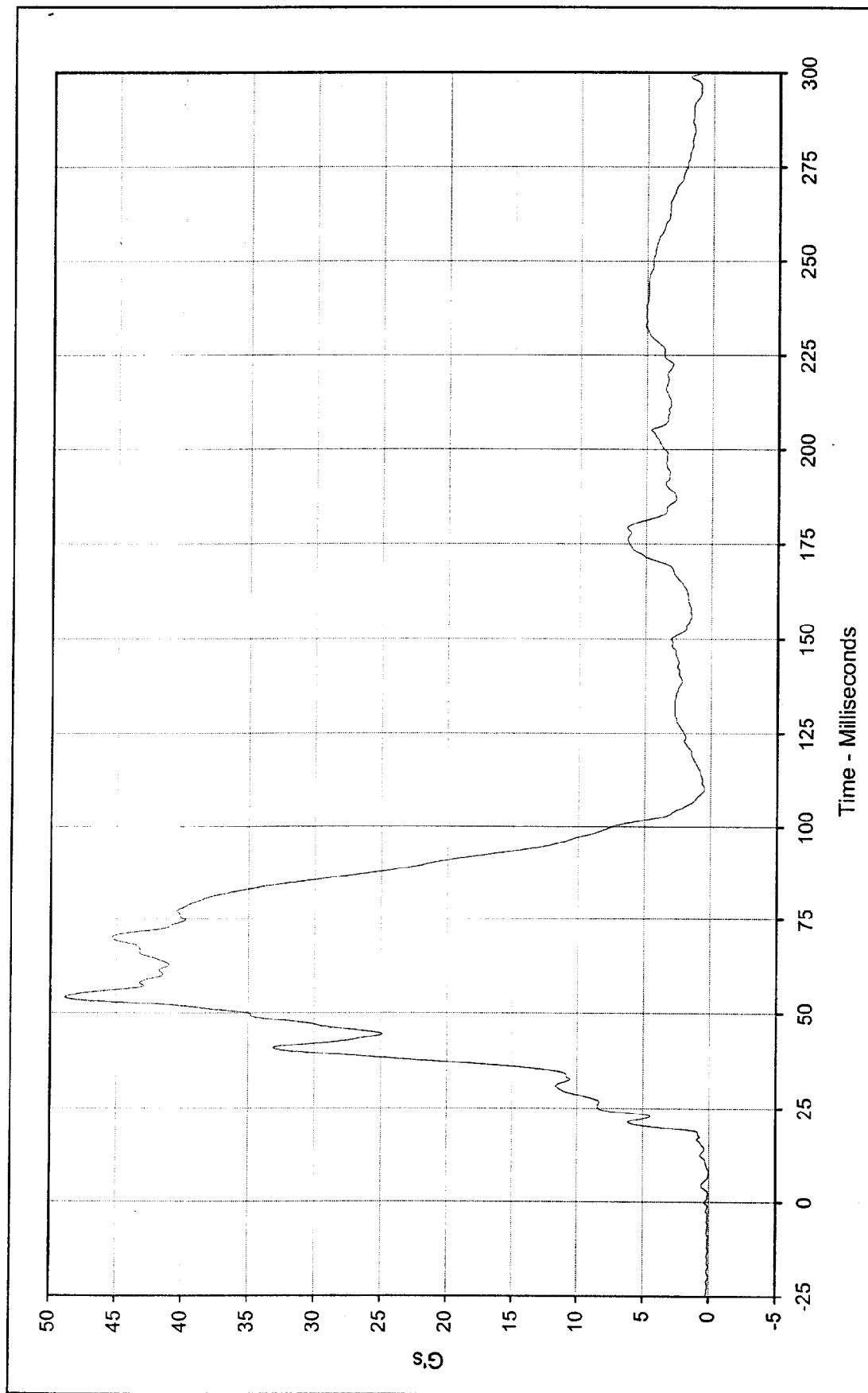




Curve Description: Driver Chest Redundant Z
 Maximum Value: 12.9 at 53.8 Milliseconds
 Minimum Value: -9.4 at 90.9 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: FIL-018

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

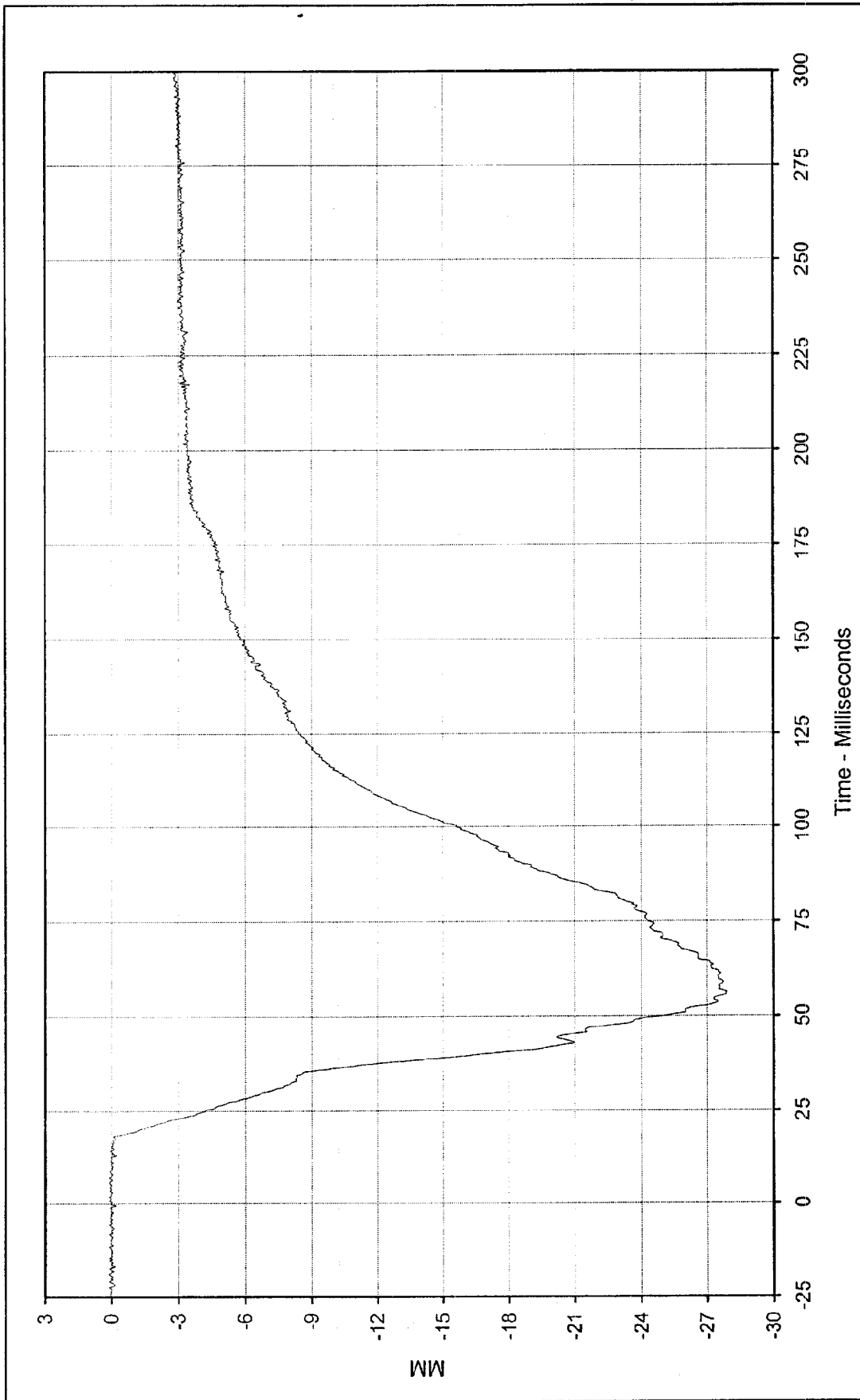




Curve Description: Driver Chest Resultant Redundant
 Maximum Value: 48.9 at 54.2 Milliseconds
 Minimum Value: 0.0 at 8.2 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: RES-016

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

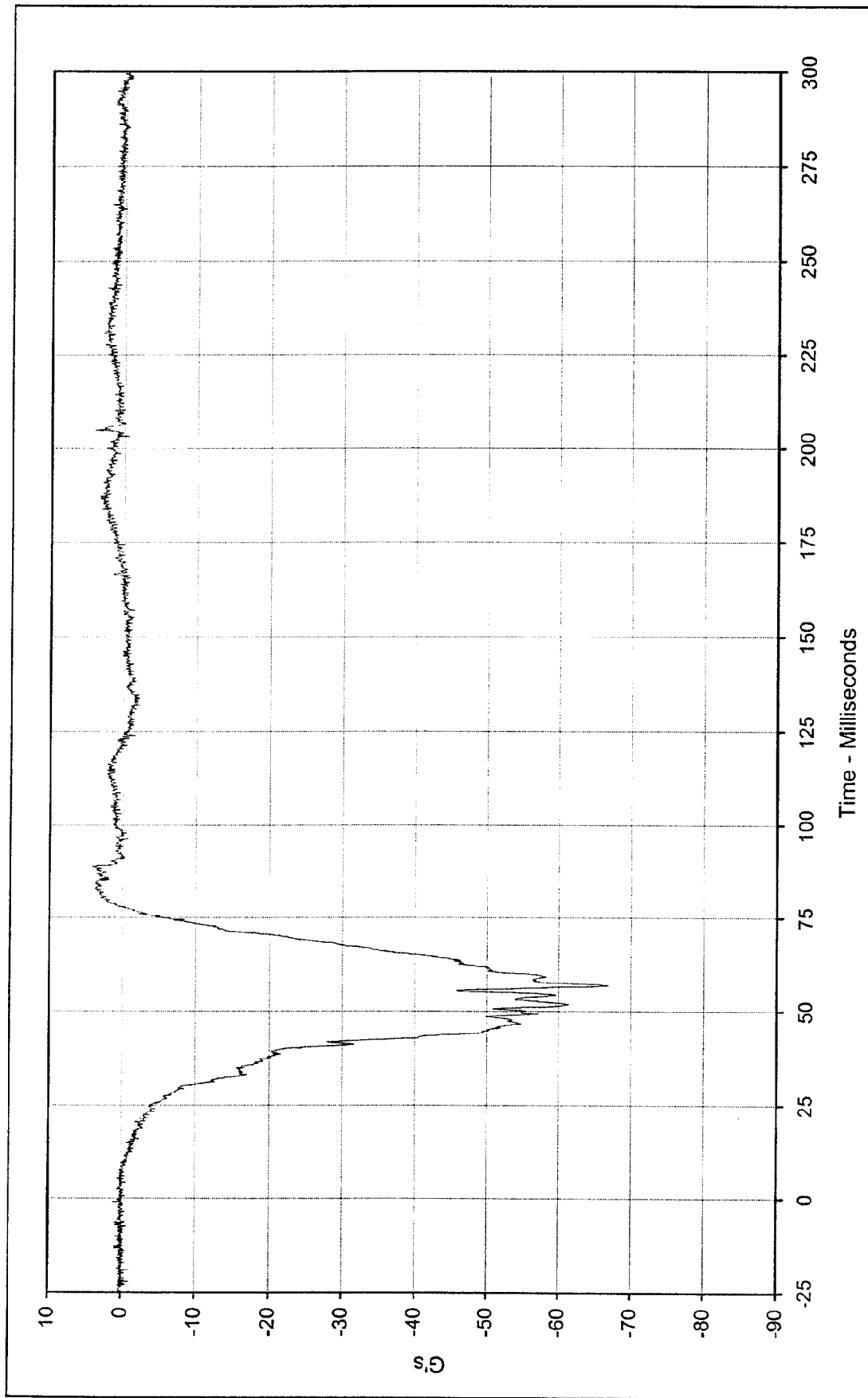




Curve Description: Driver Chest Displacement X
 Maximum Value: 0.1 at 7.3 Milliseconds
 Minimum Value: -27.9 at 56.3 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/25/99
 Curve Number: FIL-019

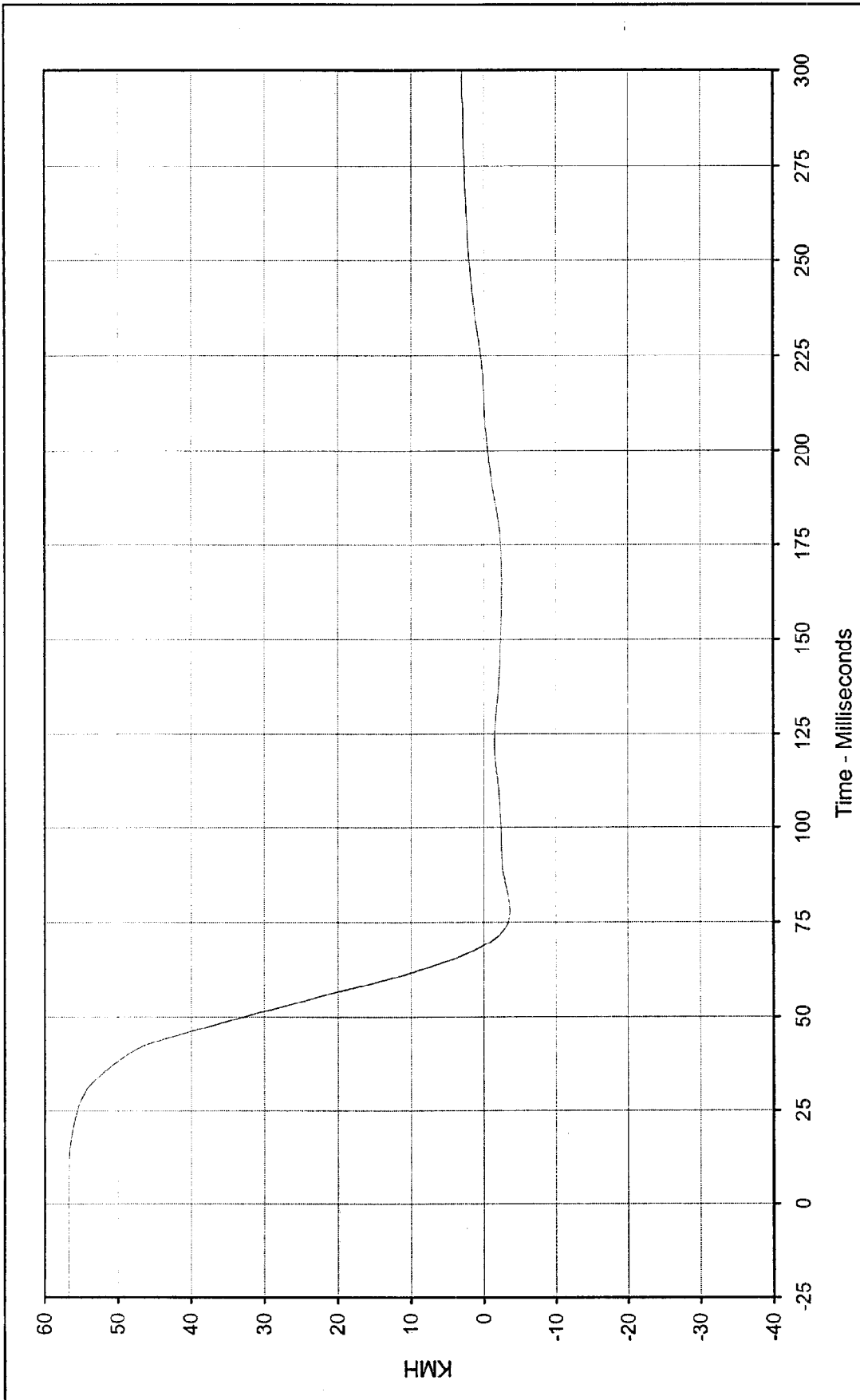
Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





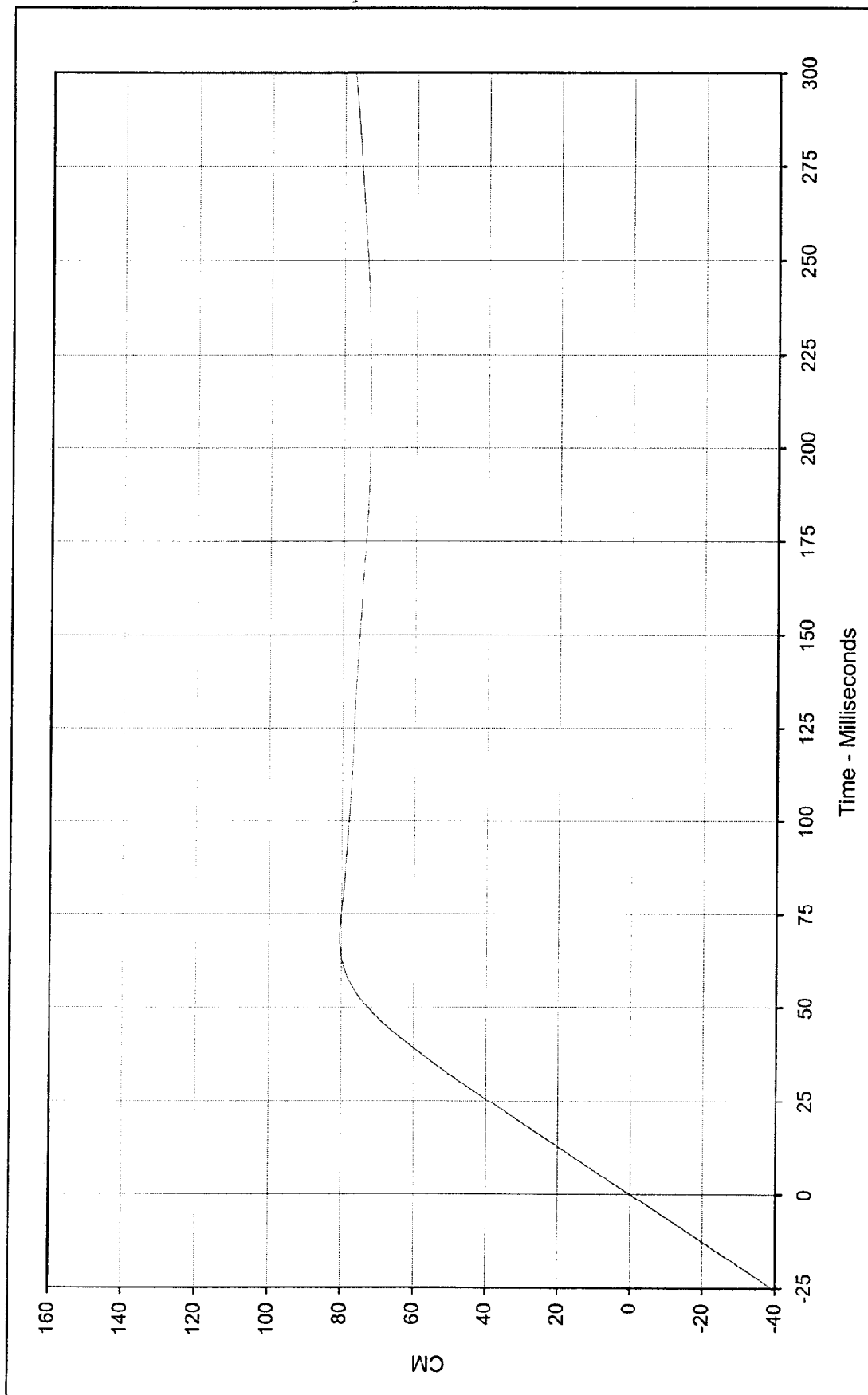
Curve Description:	Driver Pelvis X	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	4.1 at 88.5 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-67.0 at 57.1 Milliseconds			
SAE Filter Class:	1000			
Date of Test:	2/25/99			
Curve Number:	FIL-020			





Curve Description: Testing Program 1999 NHTSA 35 mph NCAP No.: MX5800
 Maximum Value: 56.8 at 3.7 Milliseconds
 Minimum Value: -3.6 at 78.0 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: IN1-020

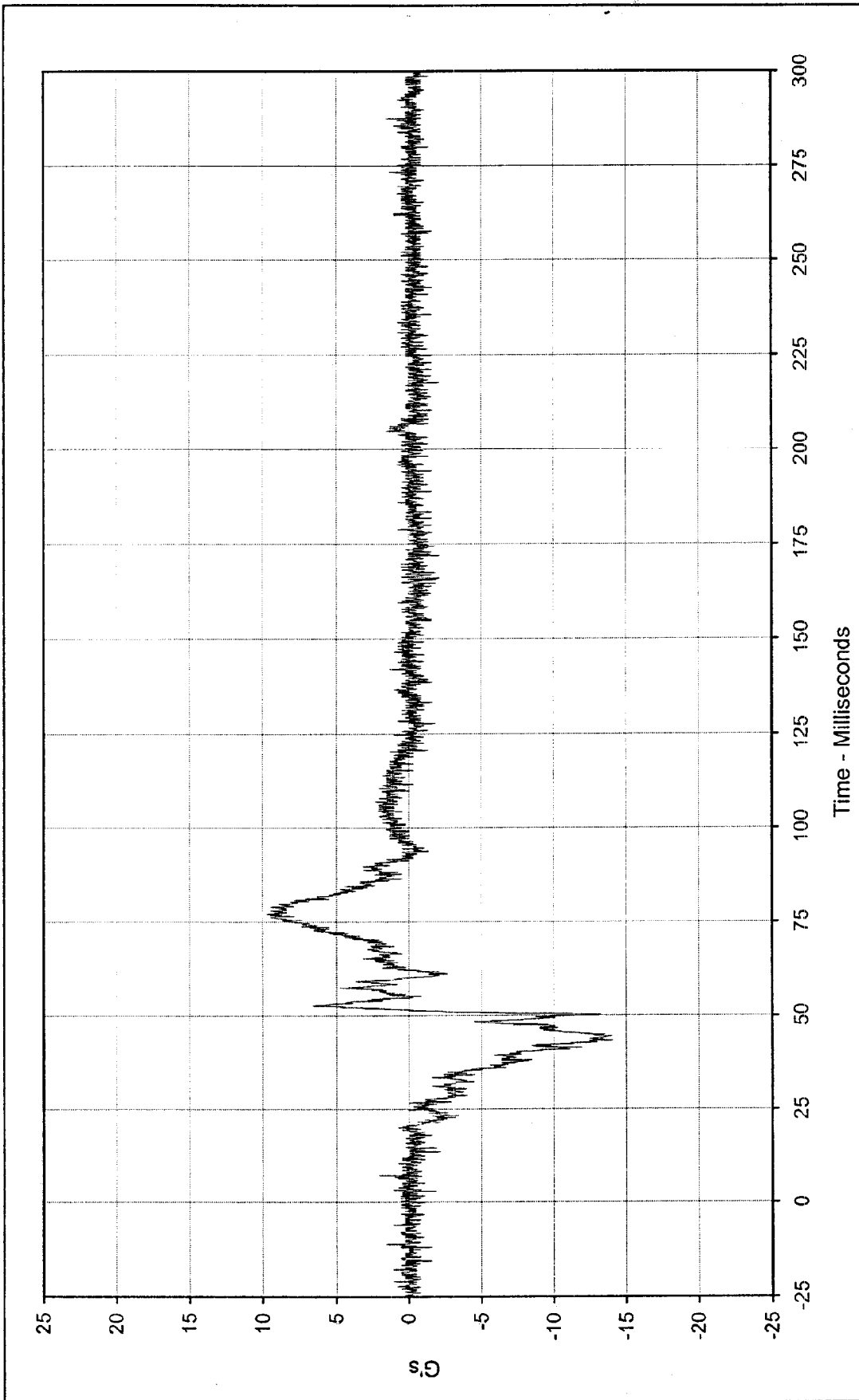




Curve Description: Driver Pelvis X Displ.
 Maximum Value: 80.4 at 68.7 Milliseconds
 Minimum Value: 0.0 at 0.0 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: IN2-020

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

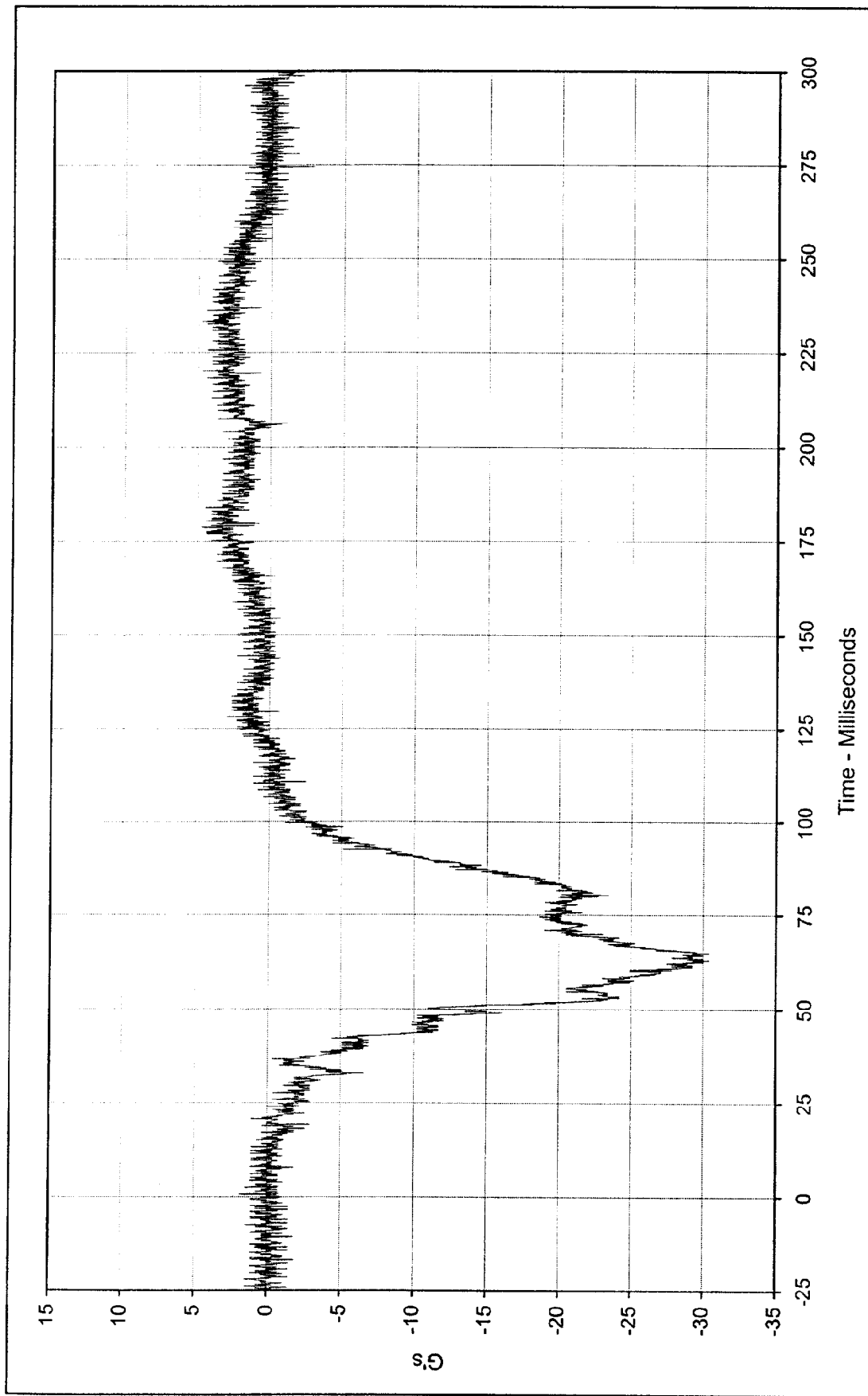




Curve Description:		Driver Pelvis Y		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	9.7	at	77.0			
Minimum Value:	-14.1	at	43.1			
SAE Filter Class:	1000					
Date of Test:	2/25/99					
Curve Number:	FIL-021					





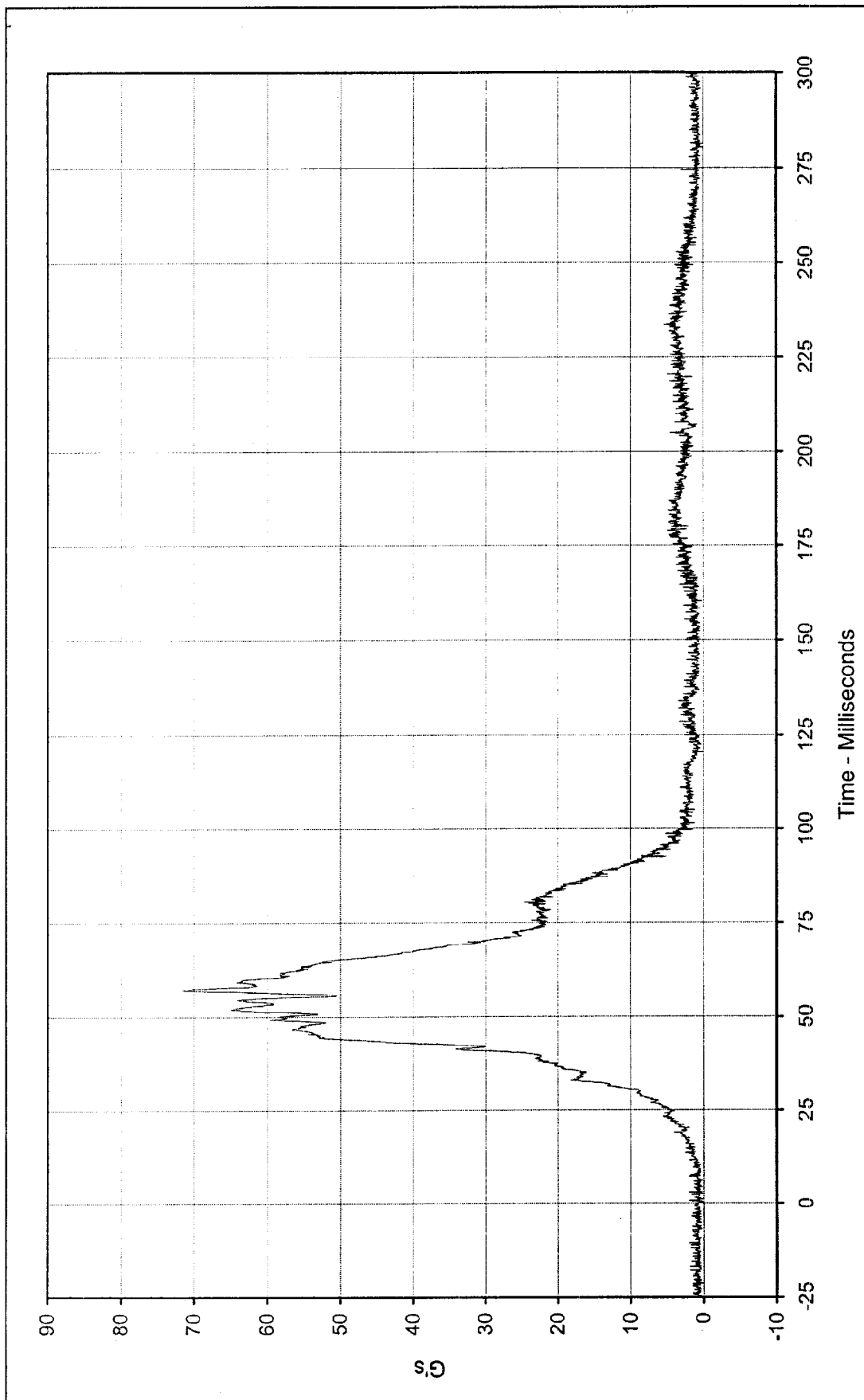


Curve Description:		Driver Pelvis Z		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	4.8	at	178.9	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-30.4	at	63.0			
SAE Filter Class:	1000					
Date of Test:	2/25/99					
Curve Number:	FIL-022					



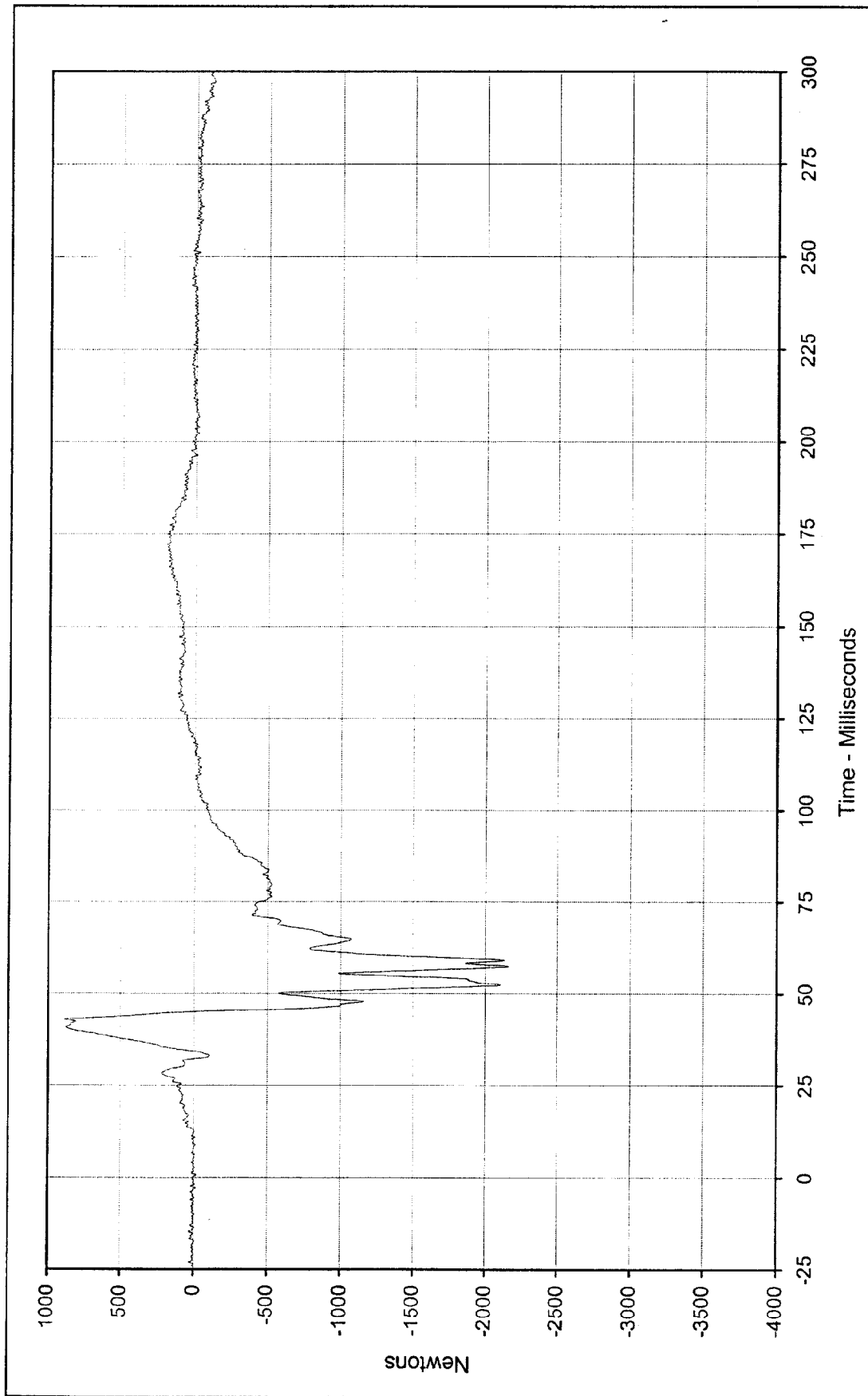
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Curve Description:	Driver Pelvis Resultant	Test Program:	1999 NHTSA 35 mph NCAP	No.:	MX5800
Maximum Value:	71.6 at 57.1 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)		
Minimum Value:	0.0 at 0.3 Milliseconds				
SAE Filter Class:	1000				
Date of Test:	2/25/99				
Curve Number:	RES-020				

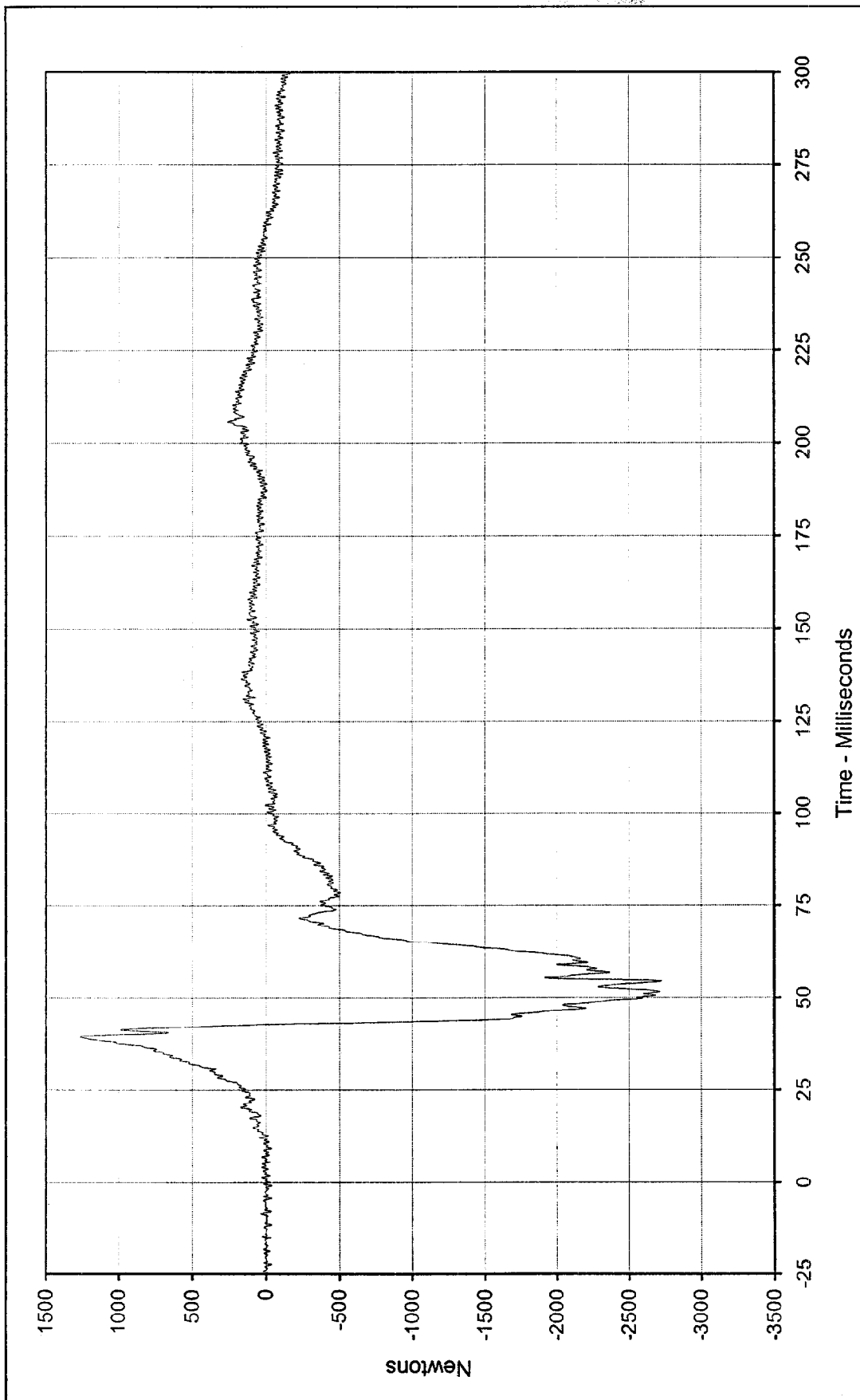




Curve Description: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Program:
 Test Vehicle: 1999 Volkswagen Beetle (New)

Driver Left Femur Force
 Maximum Value: 886.5 at 43.0 Milliseconds
 Minimum Value: -2166.0 at 57.4 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/25/99
 Curve Number: FIL-023

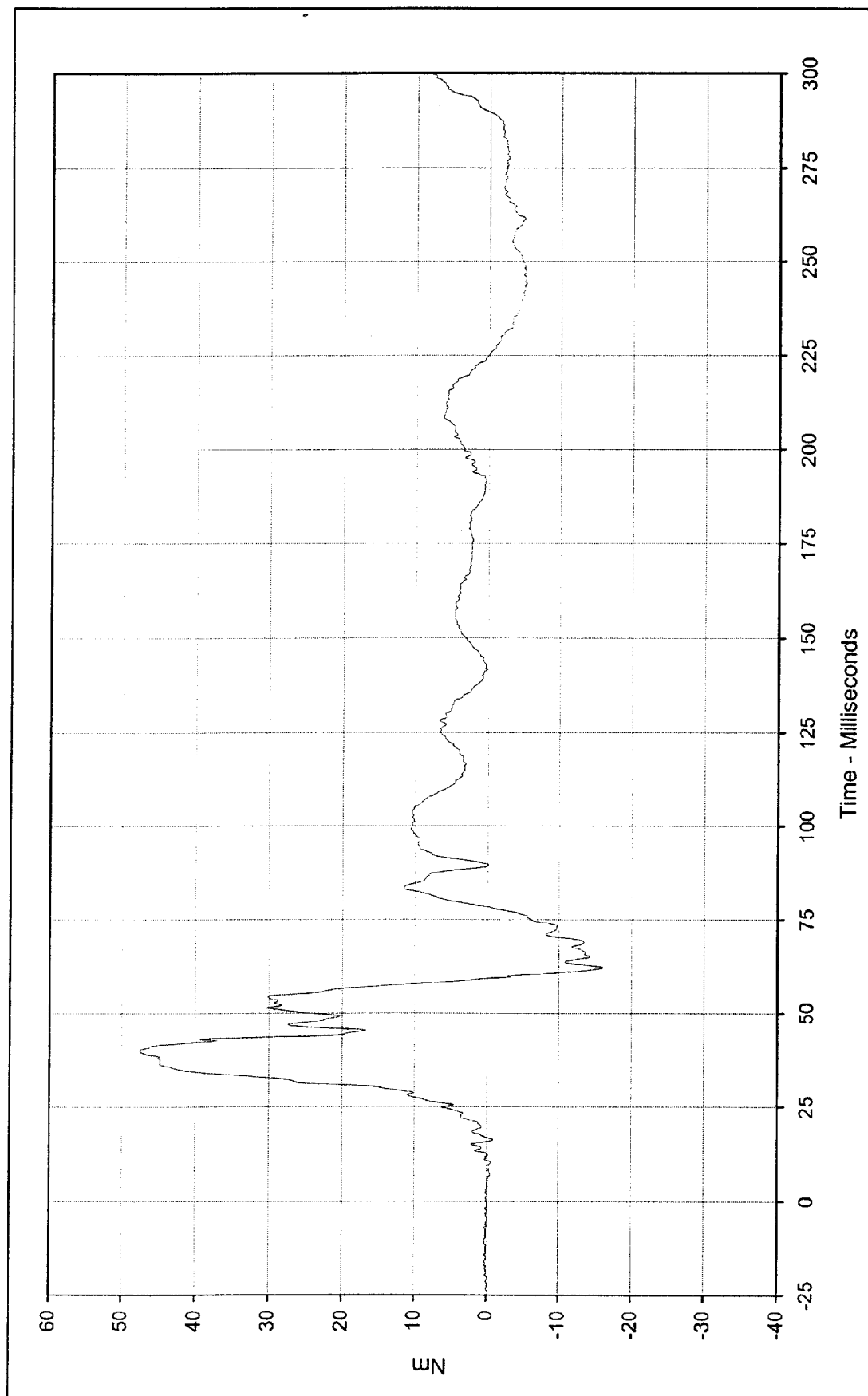




Curve Description: Driver Right Femur Force
 Maximum Value: 1263.6 at 39.5 Milliseconds
 Minimum Value: -2728.4 at 54.4 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/25/99
 Curve Number: FIL-024

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Driver Left Upper Tibia Moment X Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Maximum Value: 47.5 at 39.7 Milliseconds Test Vehicle: 1999 Volkswagen Beetle (New)

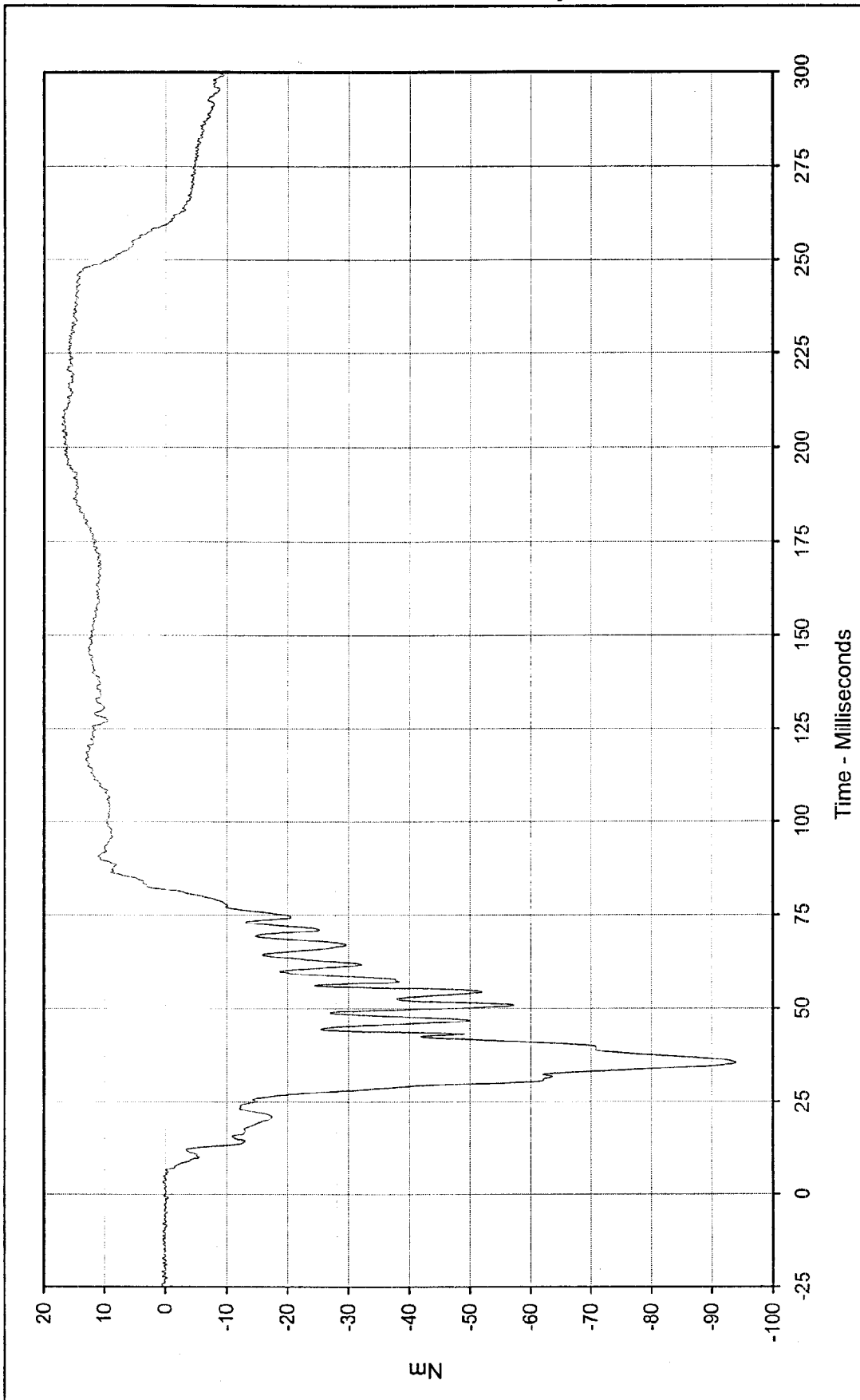
Minimum Value: -16.1 at 62.0 Milliseconds

SAE Filter Class: 600

Date of Test: 2/25/99

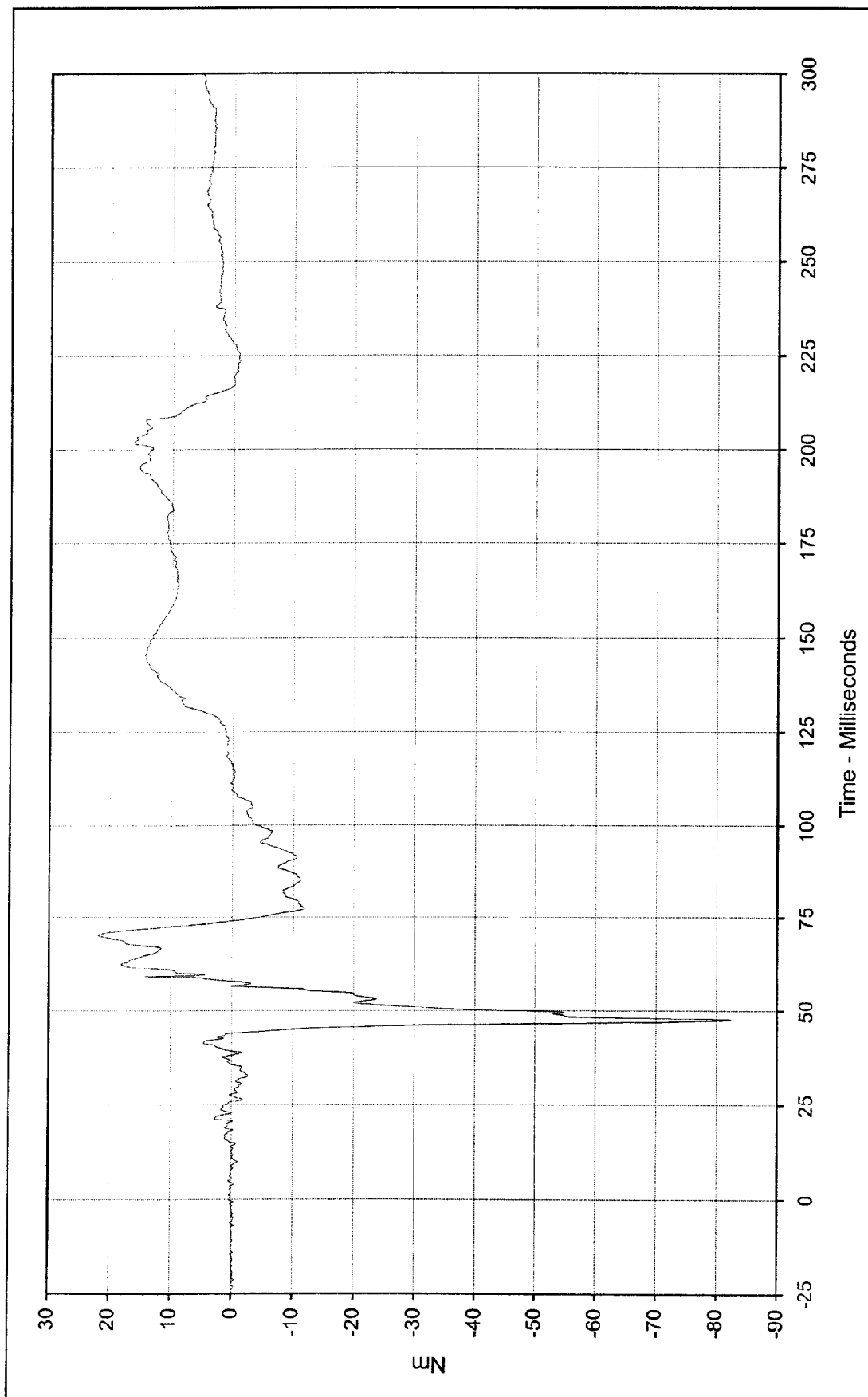
Curve Number: FIL-025





Curve Description:	Driver Left Upper Tibia Moment Y	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	17.1 at 208.1 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-94.1 at 35.3 Milliseconds			
SAE Filter Class:	600			
Date of Test:	2/25/99			
Curve Number:	FIL-026			

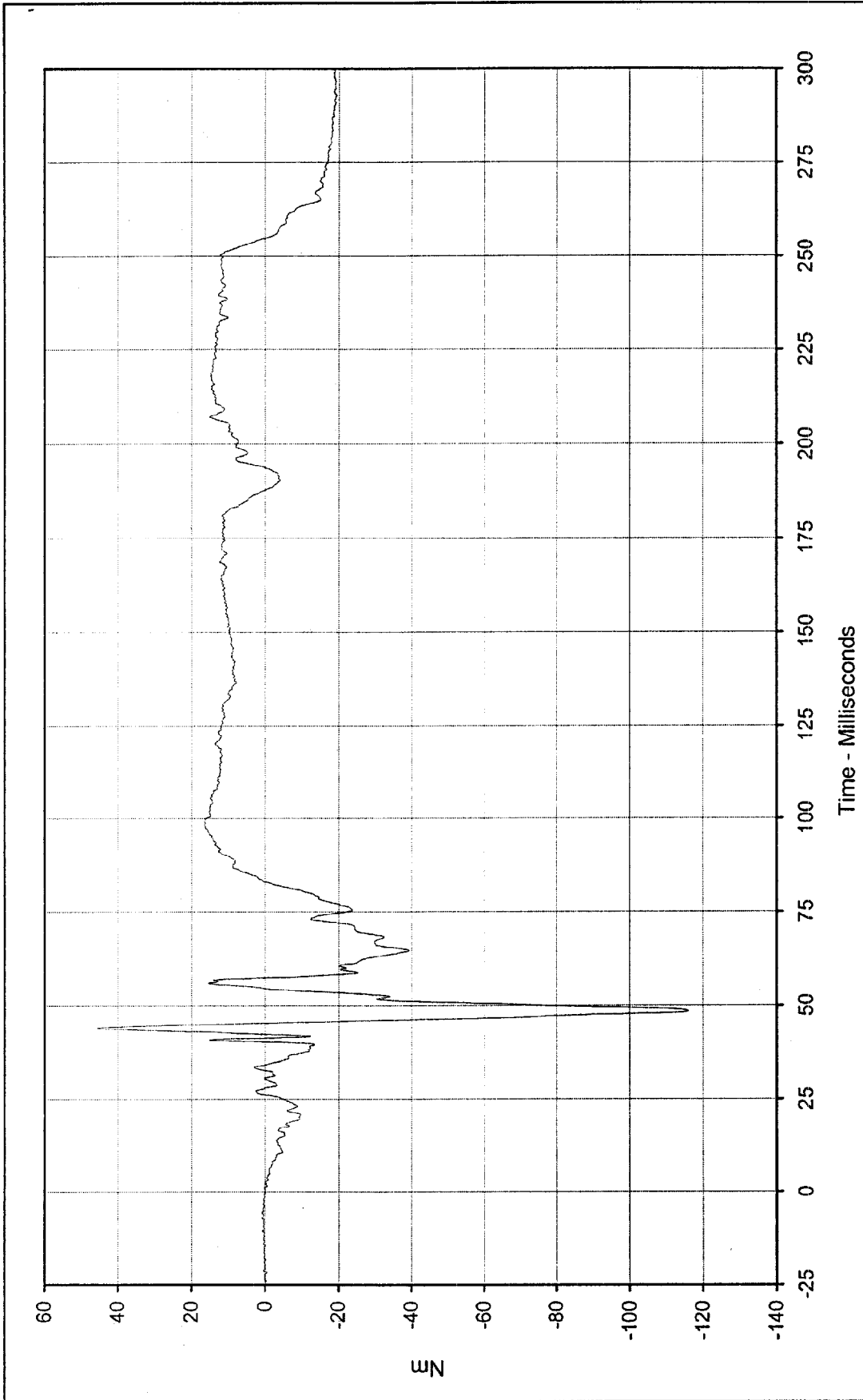




Curve Description: Driver Right Upper Tibia Moment X
 Maximum Value: 21.9 at 70.4 Milliseconds
 Minimum Value: -82.4 at 47.7 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/25/99
 Curve Number: FIL-027

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

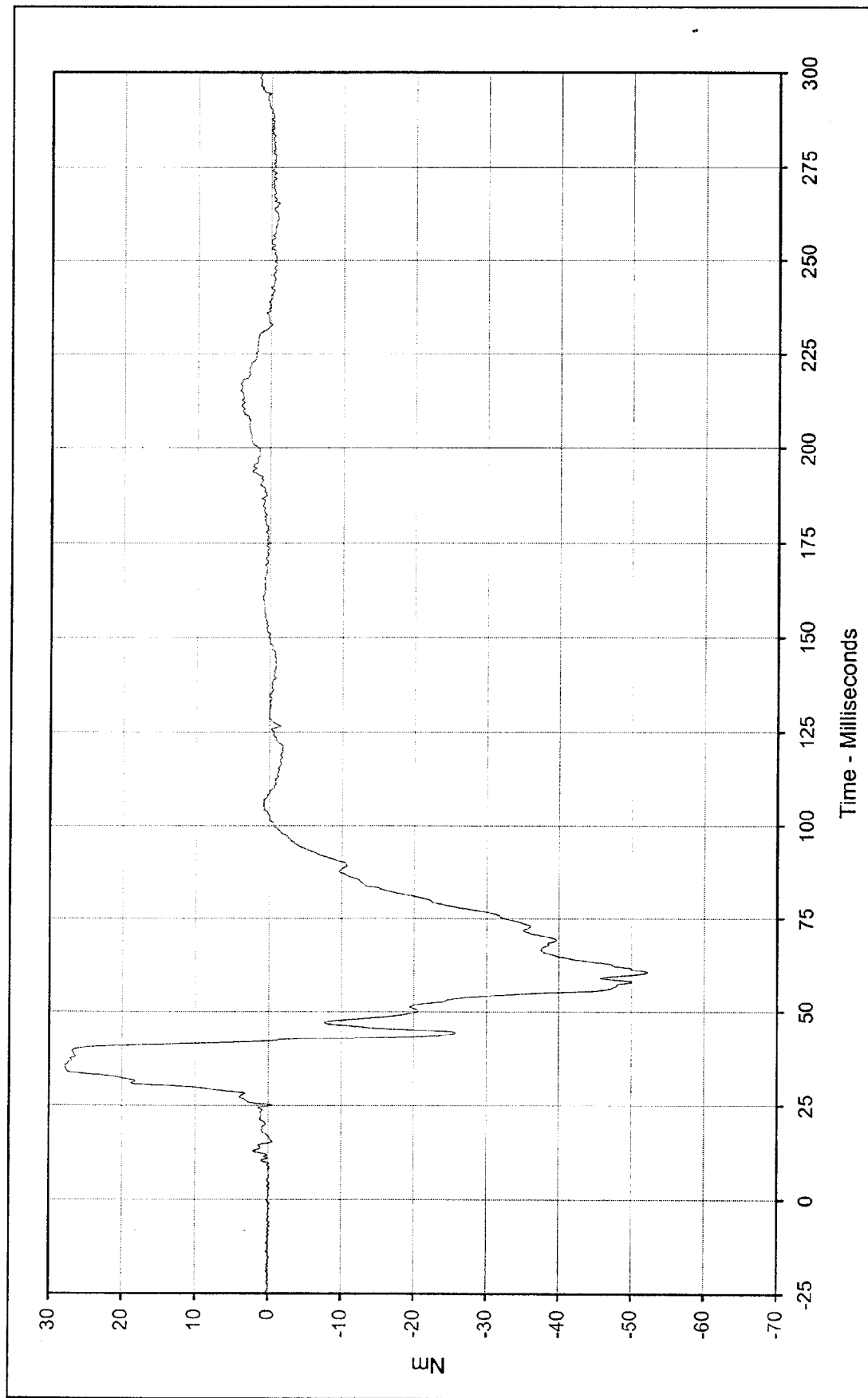




Curve Description: Driver Right Upper Tibia Moment Y
Maximum Value: 45.6 at 44.0 Milliseconds
Minimum Value: -116.1 at 48.5 Milliseconds
SAE Filter Class: 600
Date of Test: 2/25/99
Curve Number: FIL-028

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Driver Left Lower Tibia Moment X

Maximum Value: 27.8 at 35.1 Milliseconds

Minimum Value: -52.2 at 60.4 Milliseconds

SAE Filter Class: 600

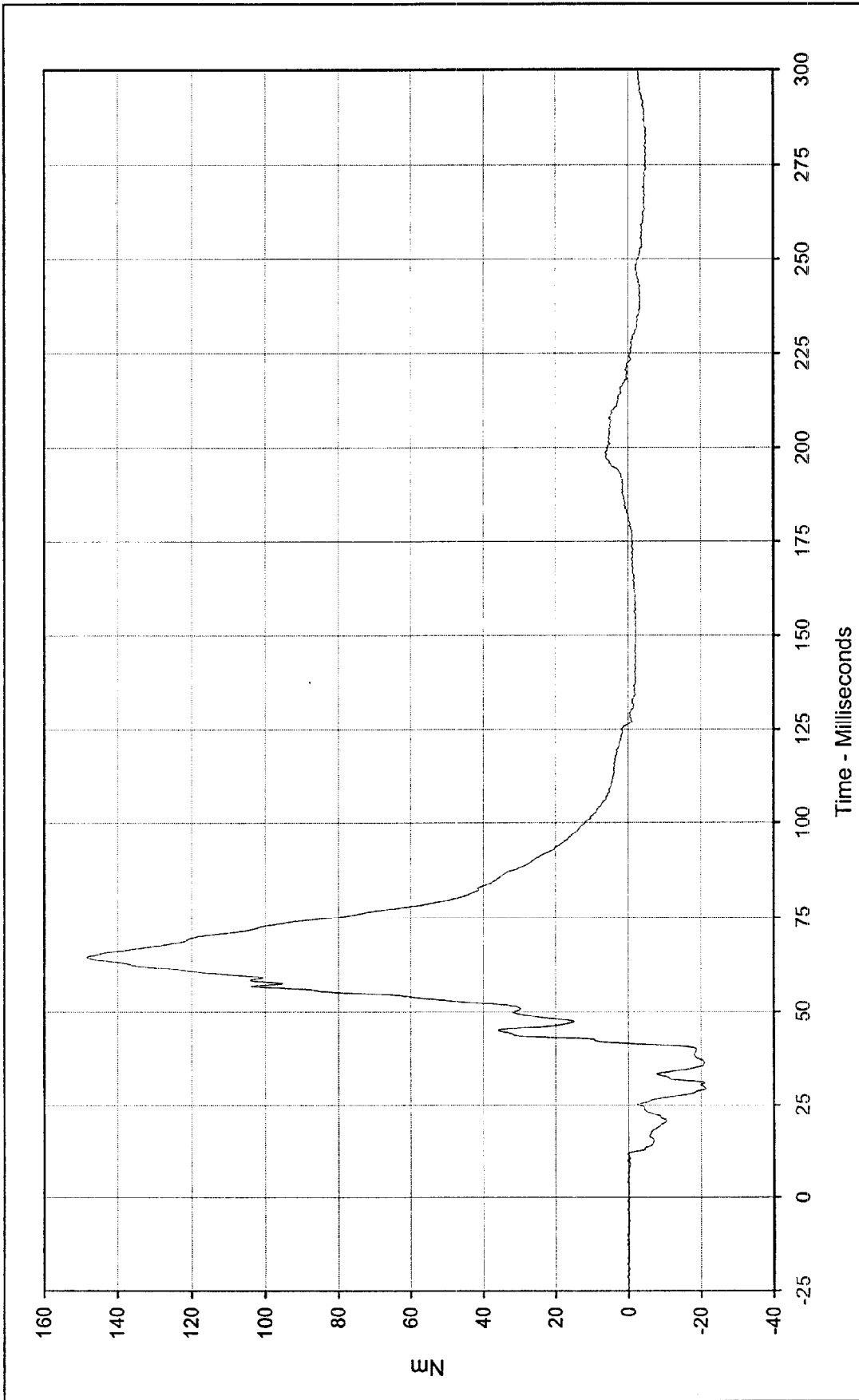
Date of Test: 2/25/99

Curve Number: FIL-029

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

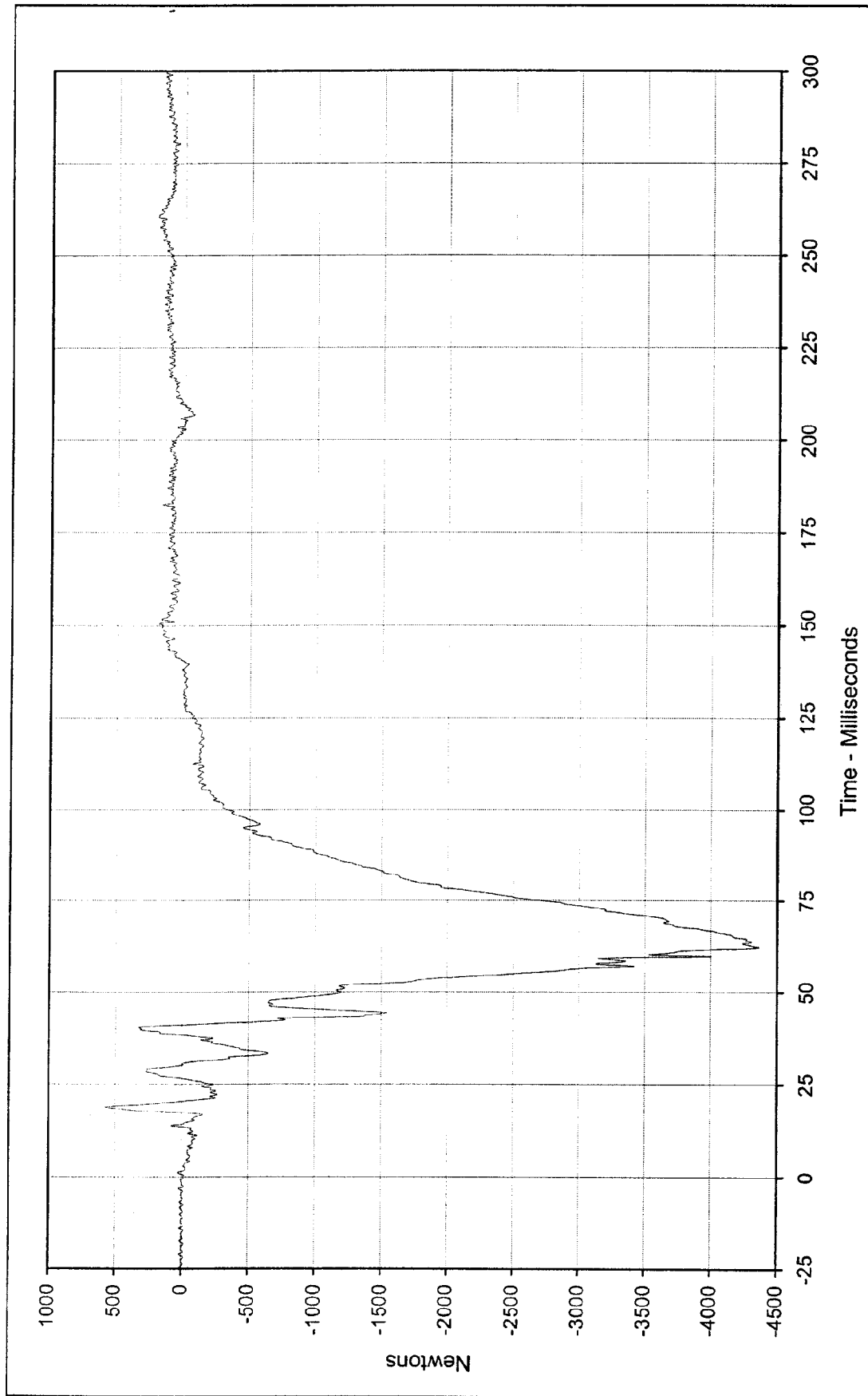
Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description:	Driver Left Lower Tibia Moment Y	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	148.3 at 64.5 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-21.4 at 29.3 Milliseconds			
SAE Filter Class:	600			
Date of Test:	2/25/99			
Curve Number:	FIL-030			

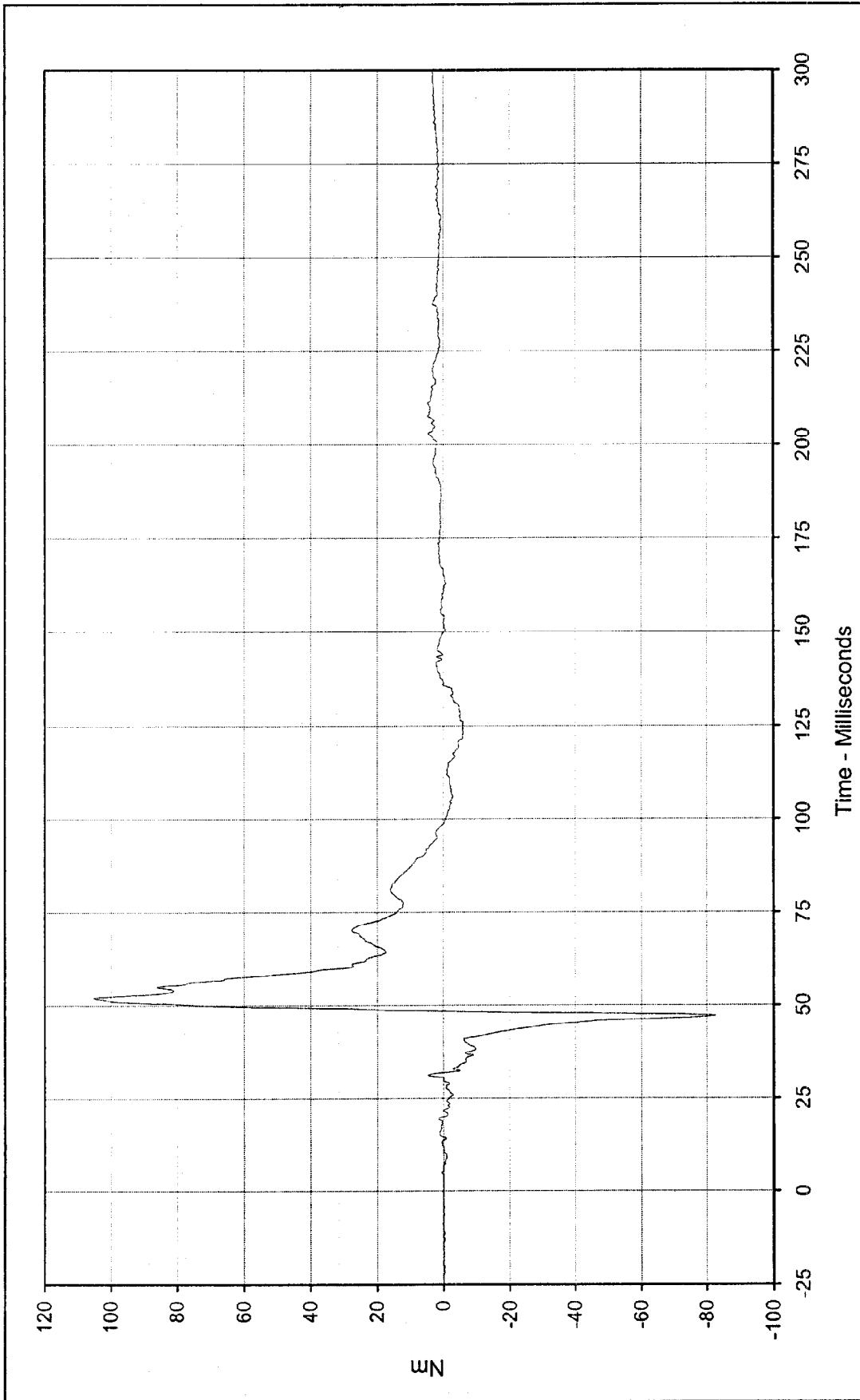




Curve Description: Driver Left Lower Tibia Force Z
Maximum Value: 570.8 at 18.9 Milliseconds
Minimum Value: -4367.4 at 62.1 Milliseconds
SAE Filter Class: 600
Date of Test: 2/25/99
Curve Number: FIL-031

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
Test Vehicle: 1999 Volkswagen Beetle (New)

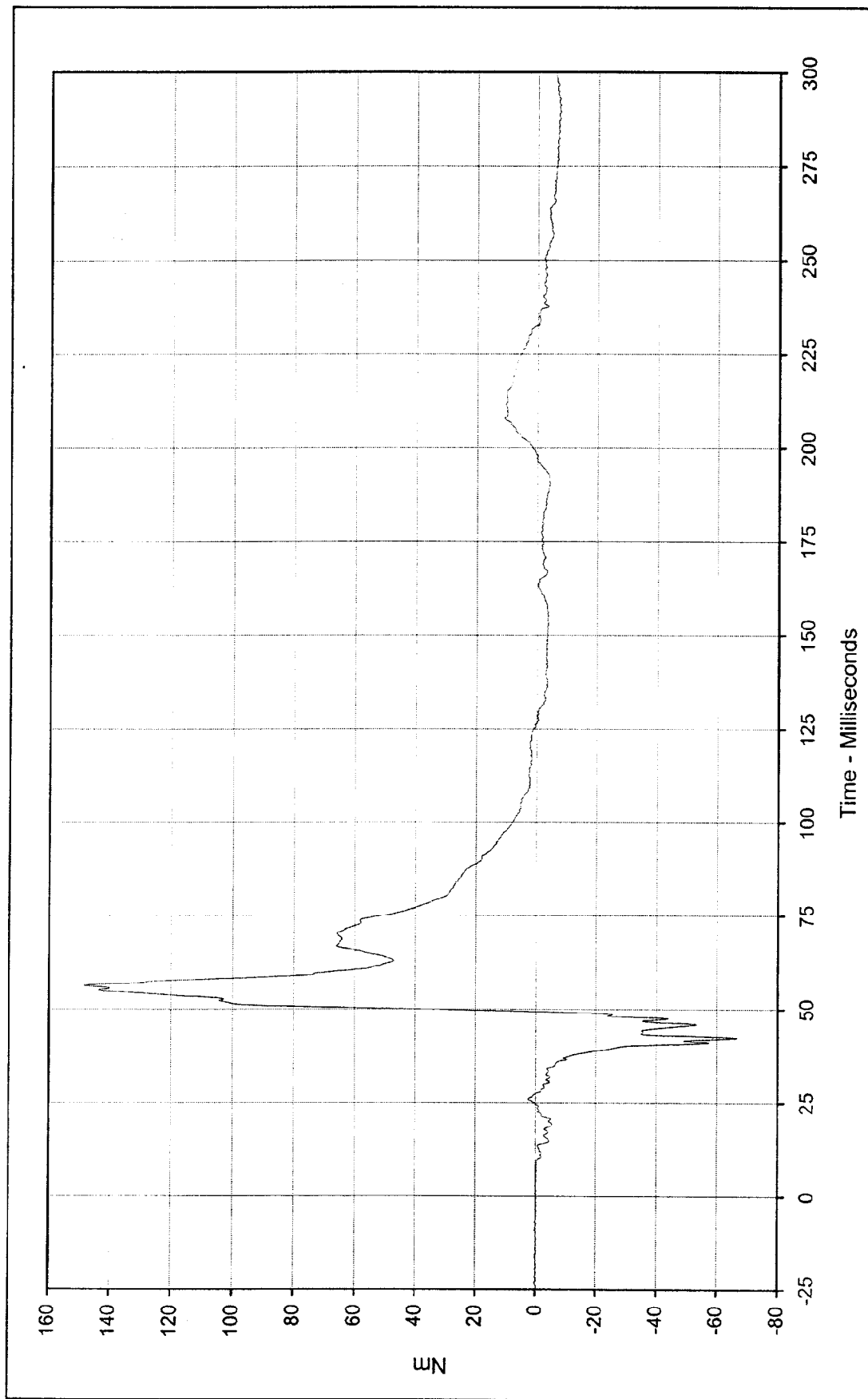




Curve Description: Driver Right Lower Tibia Moment X
 Maximum Value: 105.1 at 52.1 Milliseconds
 Minimum Value: -82.7 at 47.3 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/25/99
 Curve Number: FIL-032

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Driver Right Lower Tibia Moment Y

Maximum Value: 148.4 at 56.4 Milliseconds

Minimum Value: -66.7 at 42.3 Milliseconds

SAE Filter Class: 600

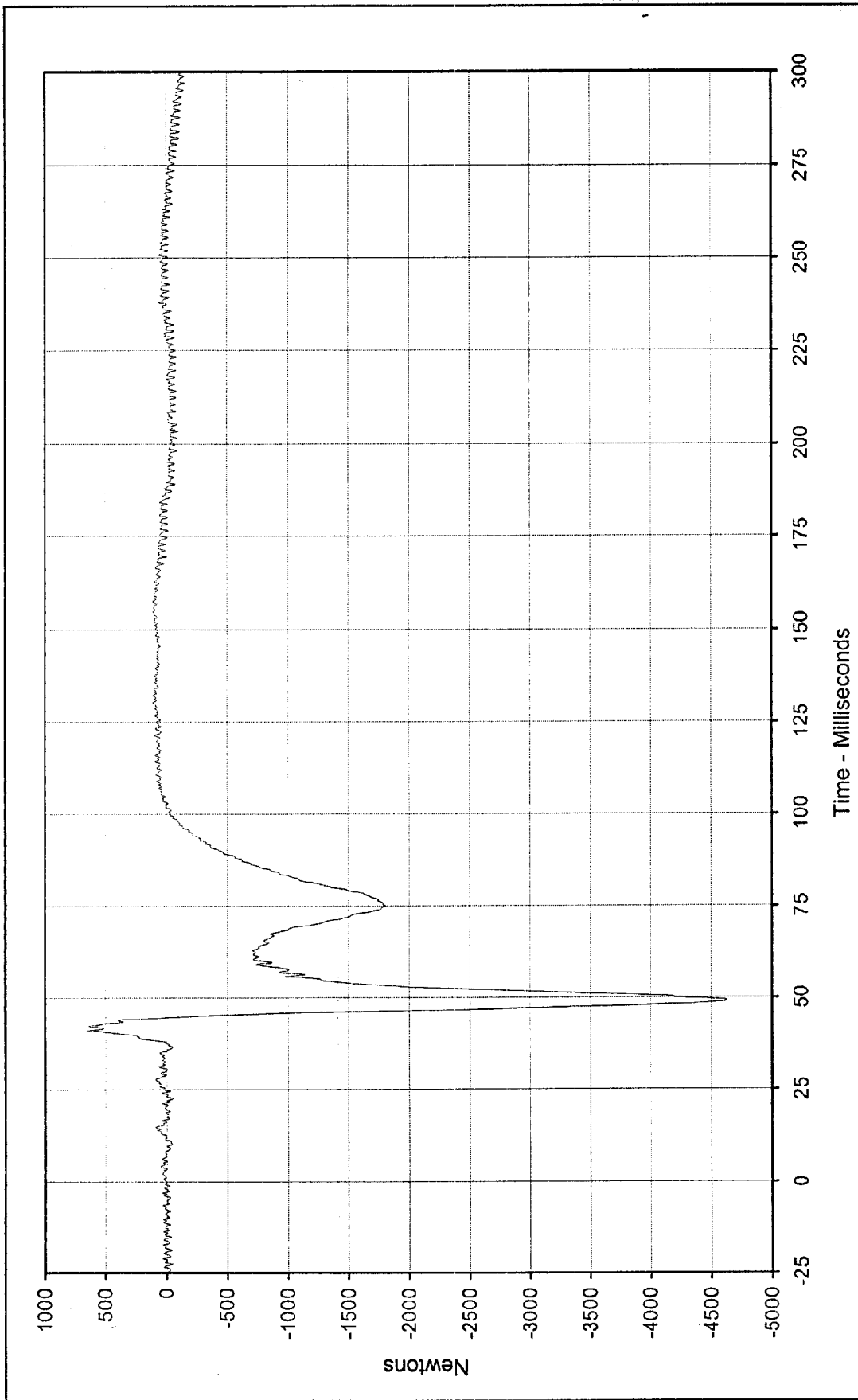
Date of Test: 2/25/99

Curve Number: FIL-033

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)

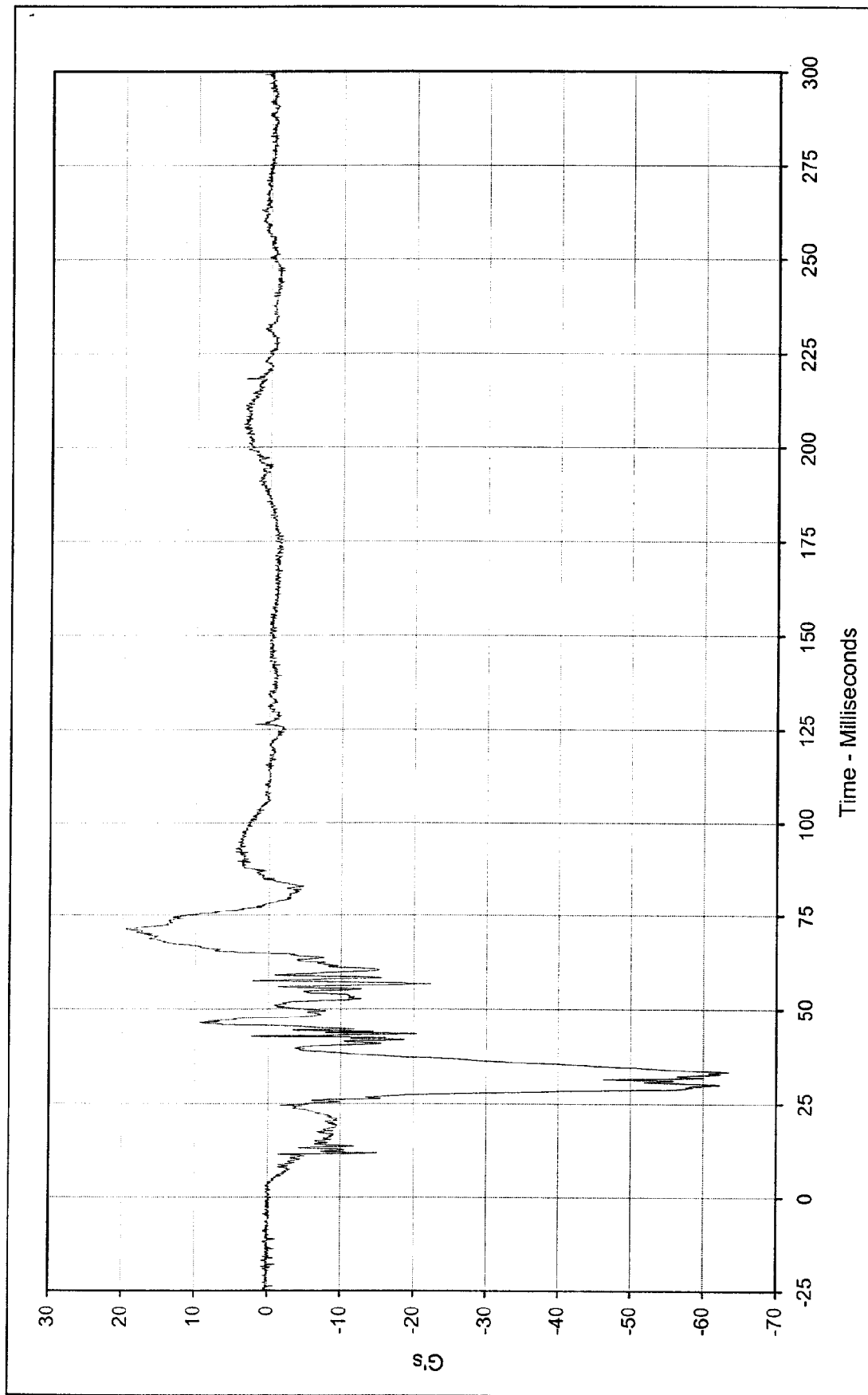




Curve Description: Driver Right Lower Tibia Force Z
 Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

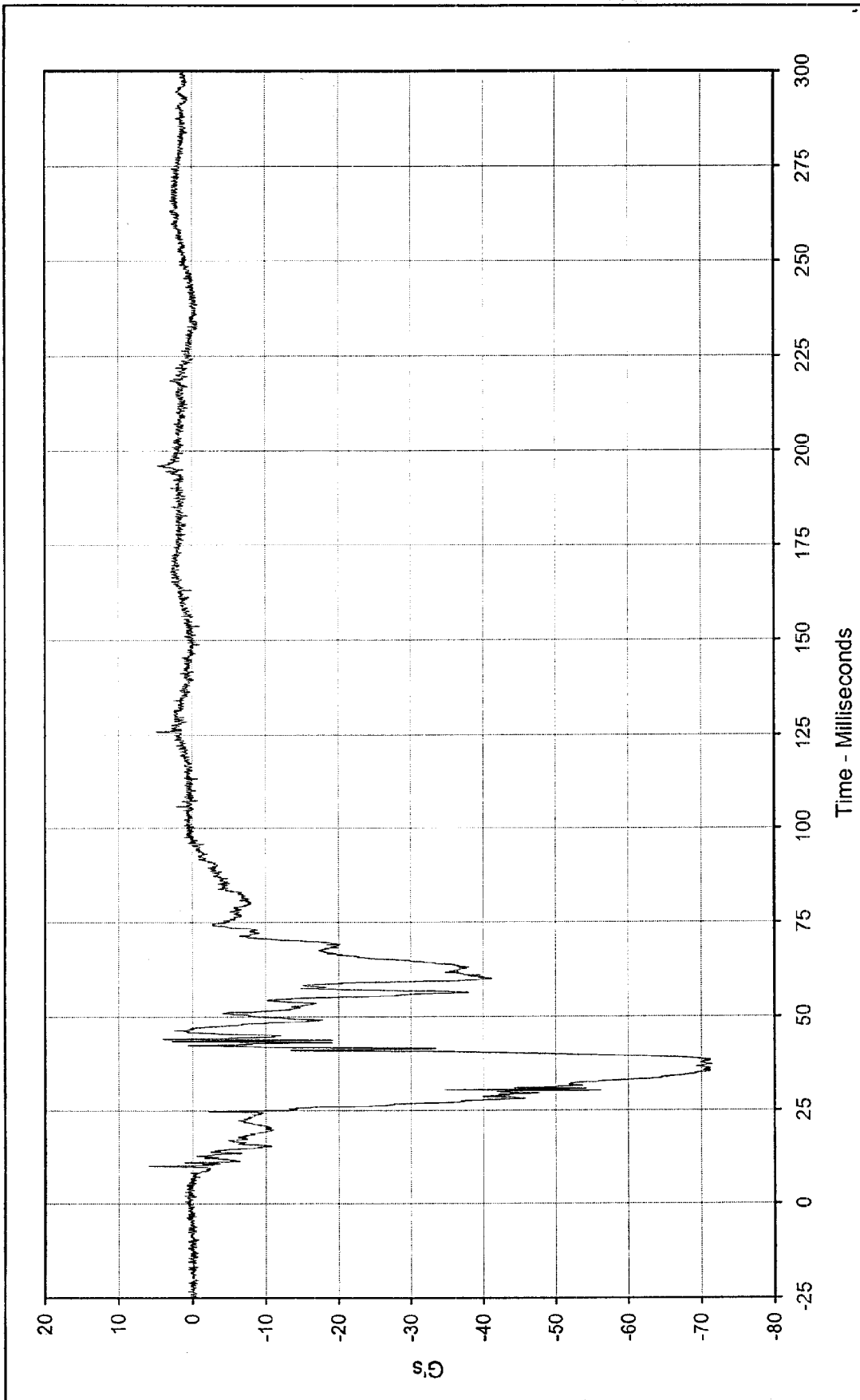
Maximum Value: 653.0 at 41.1 Milliseconds
 Minimum Value: -4633.2 at 49.3 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/25/99
 Curve Number: FIL-034





Curve Description:	Driver Left Foot Aft X	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	19.6 at 71.2 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-63.6 at 33.2 Milliseconds			
SAE Filter Class:	1000			
Date of Test:	2/25/99			
Curve Number:	FIL-035			

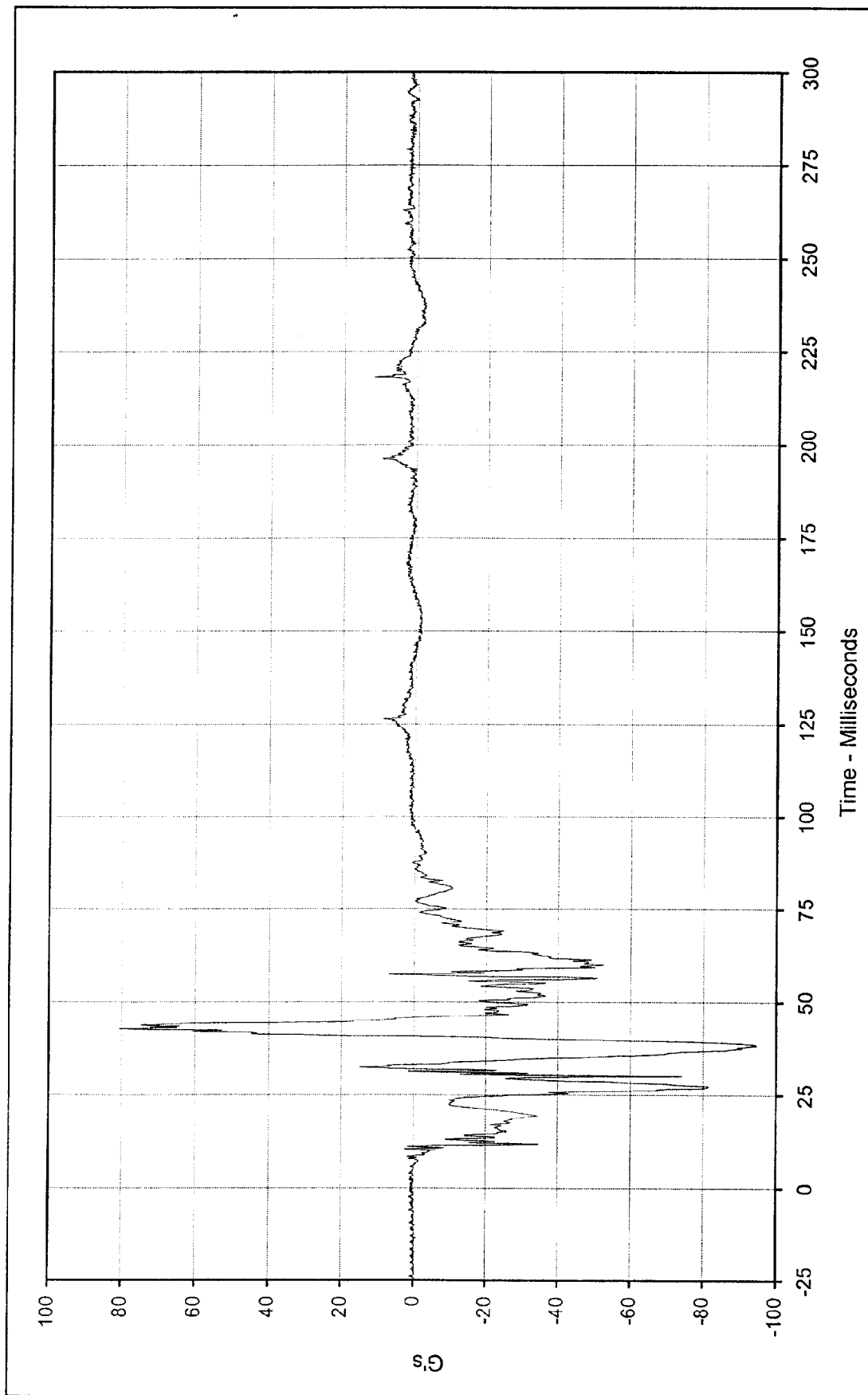




Curve Description: Driver Left Foot Aft Z
 Maximum Value: 5.9 at 10.2 Milliseconds
 Minimum Value: -71.5 at 37.1 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/25/99
 Curve Number: FIL-036

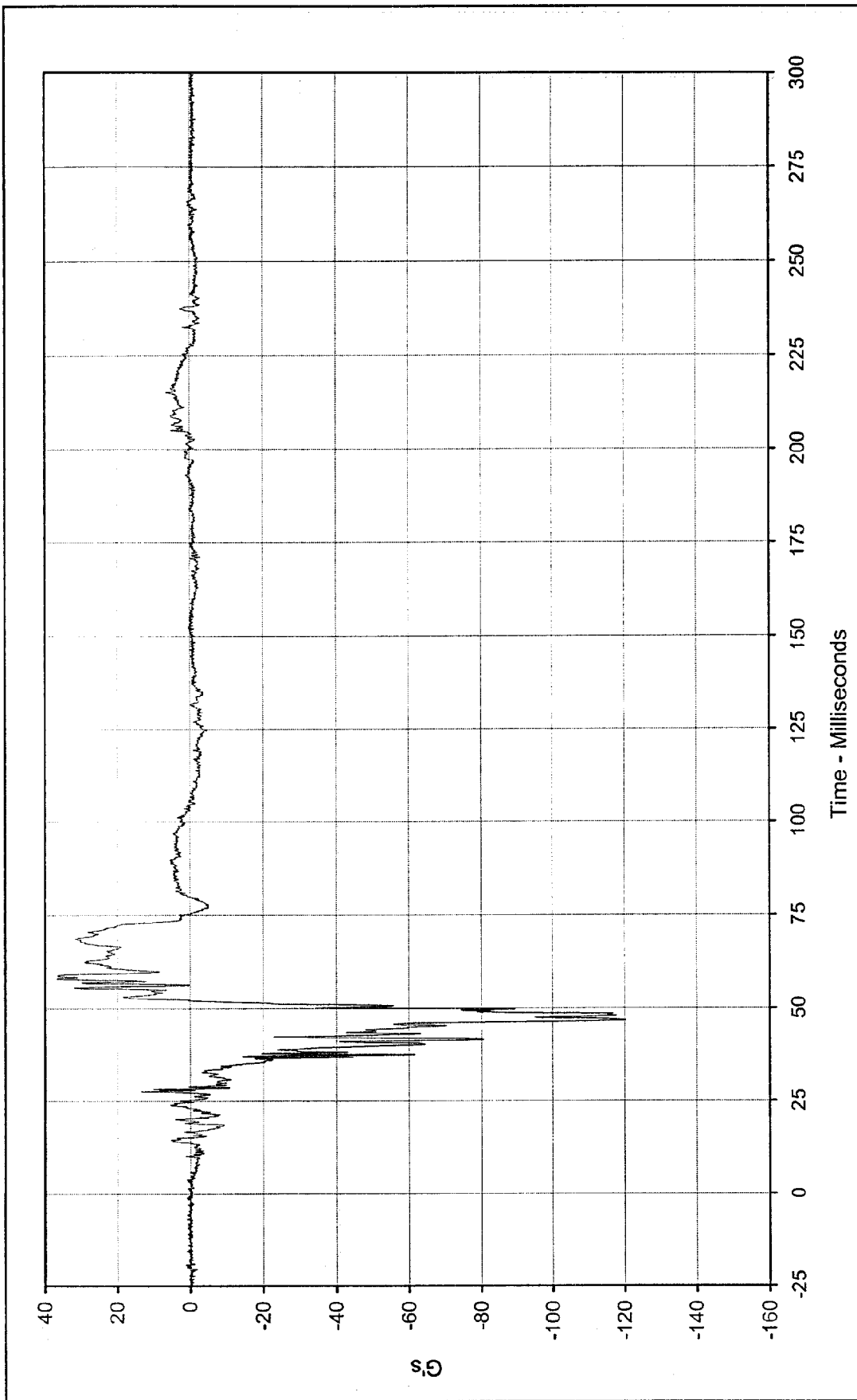
Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





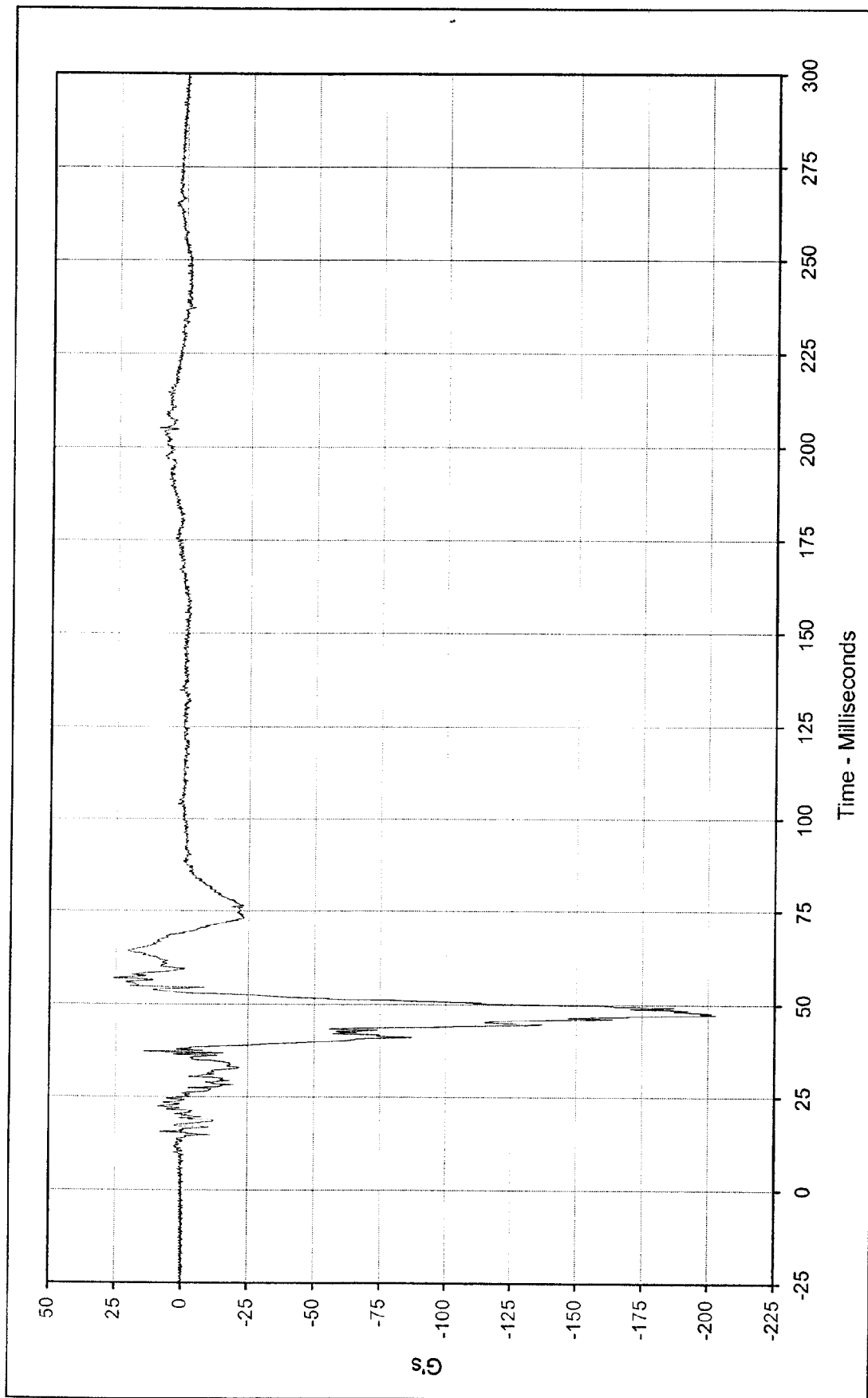
Curve Description:	Driver Left Foot Fore Z		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	80.5	at 42.7	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-94.7	at 38.2			
SAE Filter Class:	1000				
Date of Test:	2/25/99				
Curve Number:	FIL-037				





Curve Description:	Driver Right Foot Aft X	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	36.8 at 58.1 milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-120.5 at 46.8 milliseconds			
SAE Filter Class:	1000			
Date of Test:	2/25/99			
Curve Number:	FIL-038			

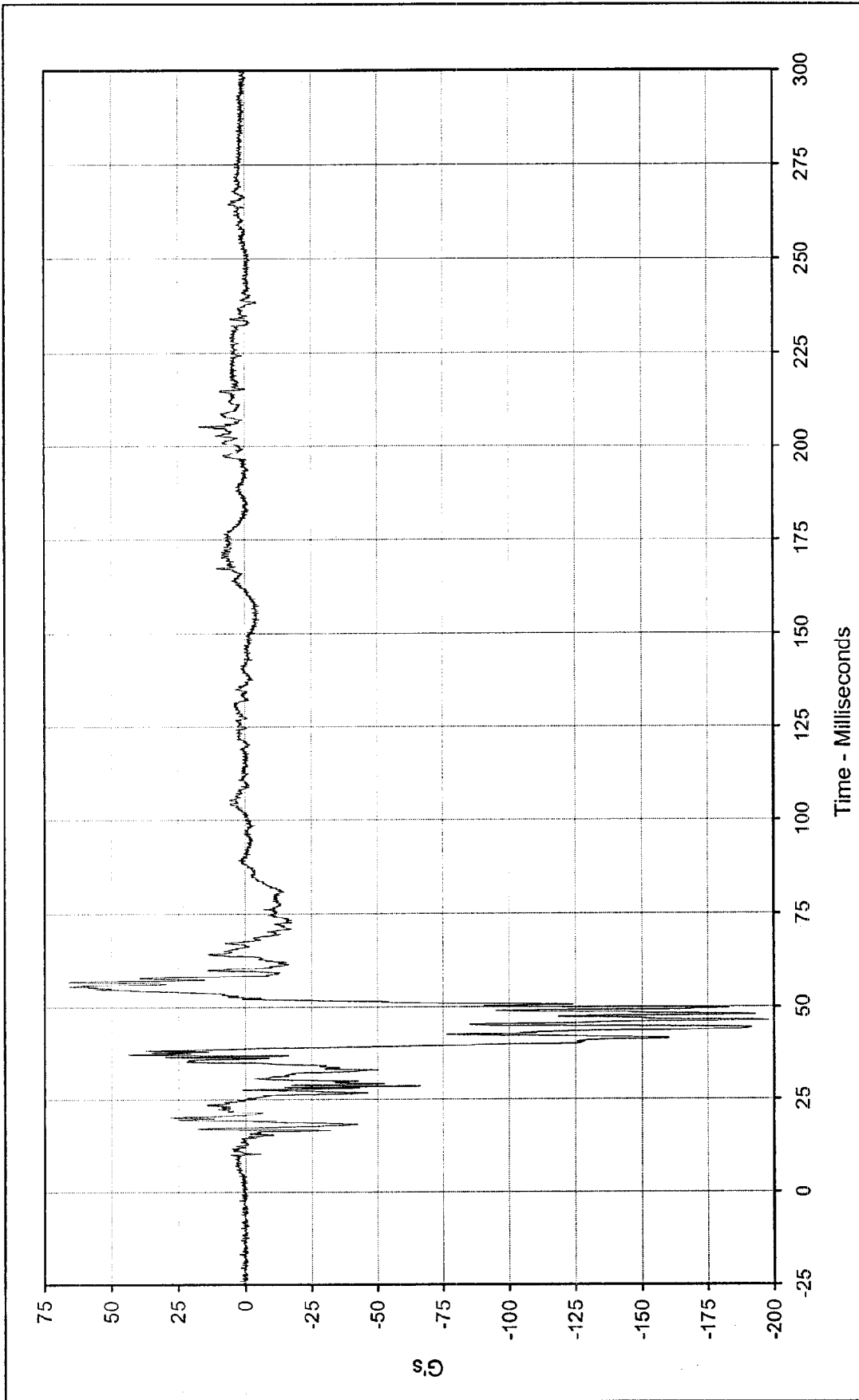




Curve Description:		Driver Right Foot Aft Z		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	26.0	at	56.9	Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)
Minimum Value:	-202.9	at	47.3	Milliseconds		
SAE Filter Class:	1000					
Date of Test:	2/25/99					
Curve Number:	FIL-039					

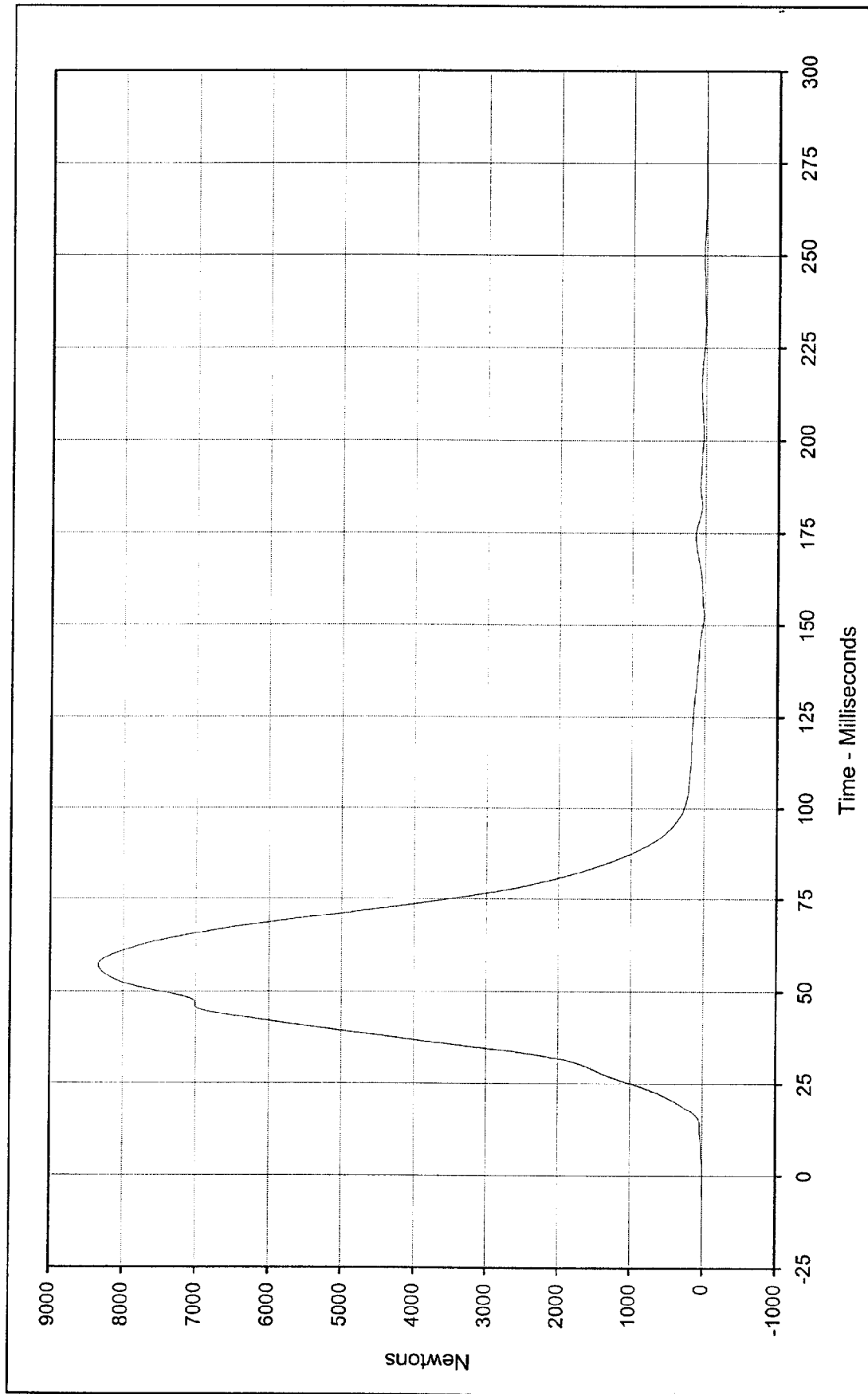
The logo for KARCO Engineering. It features the word "KARCO" in a large, bold, sans-serif font. The letter "K" is stylized with a lightbulb icon inside its upper loop. To the right of "KARCO", the word "Engineering" is written in a smaller, italicized, sans-serif font. The entire logo is set against a dark background with a diagonal white line.





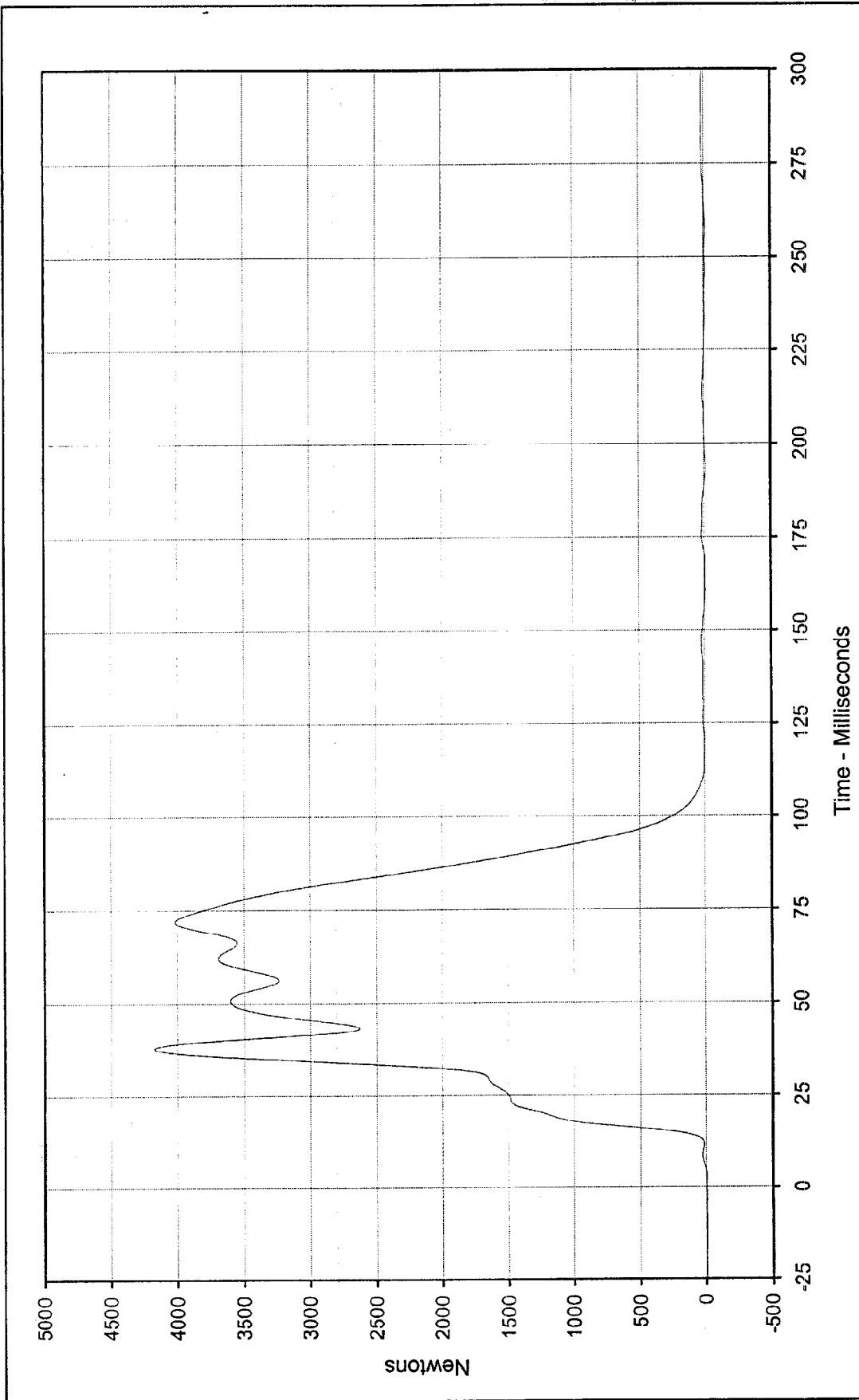
Curve Description:	Driver Right Foot Fore Z	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	66.3 at 56.8 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-198.1 at 46.5 Milliseconds			
SAE Filler Class:	1000			
Date of Test:	2/25/99			
Curve Number:	FIL-040			





Curve Description:		Test Program:	No.:
Driver Lap Belt Force		1999 NHTSA 35 mph NCAP	MX5800
Maximum Value:	8343.2 at 56.9 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)
Minimum Value:	-0.9 at 1.2 Milliseconds		
SAE Filter Class:	60		
Date of Test:	2/25/99		
Curve Number:	FIL-041		





Curve Description: Driver Shoulder Belt Force

Maximum Value: 4174.2 at 37.8 Milliseconds

Minimum Value: -11.9 at 193.5 Milliseconds

SAE Filter Class: 60

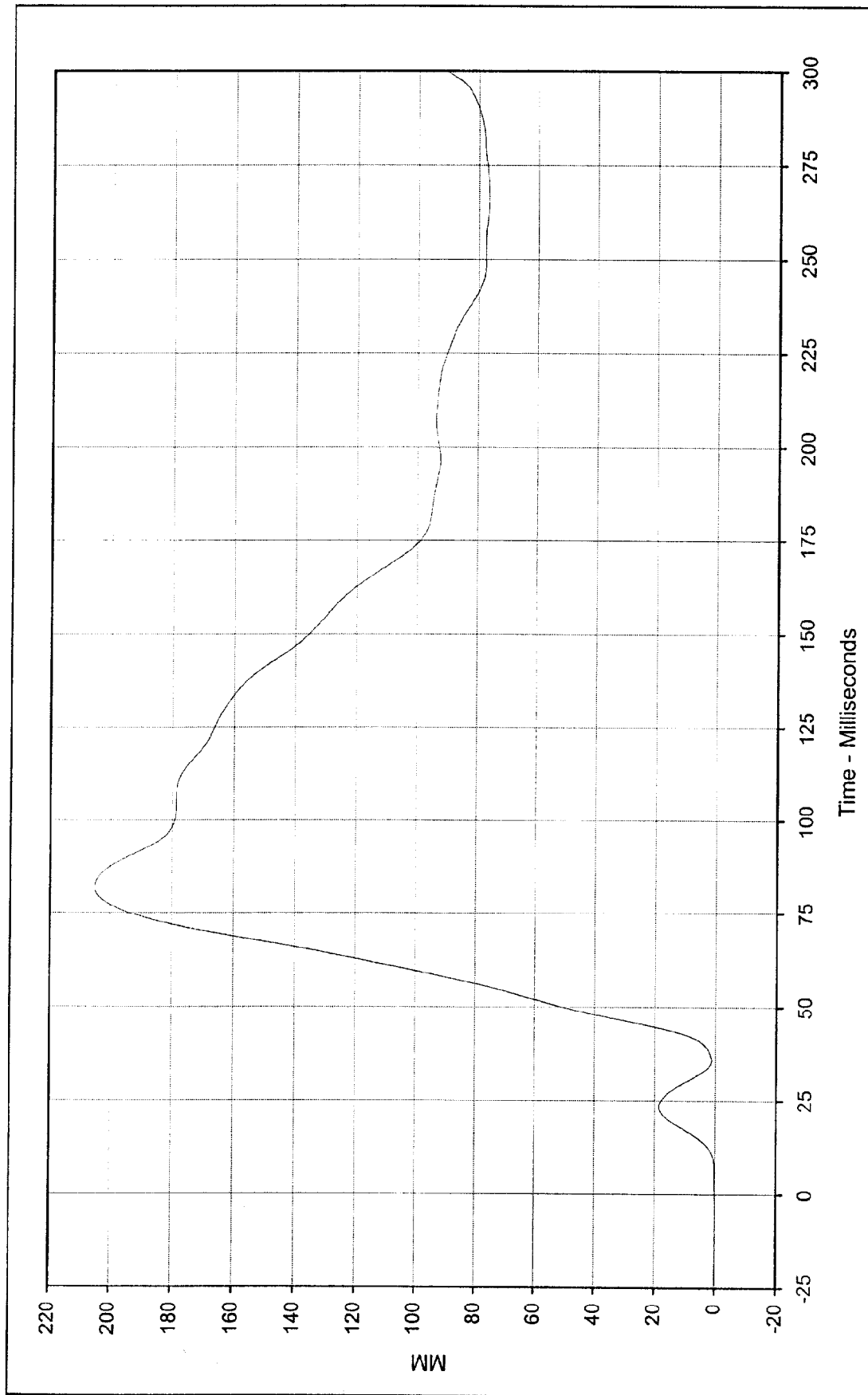
Date of Test: 2/25/99

Curve Number: FIL-042

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

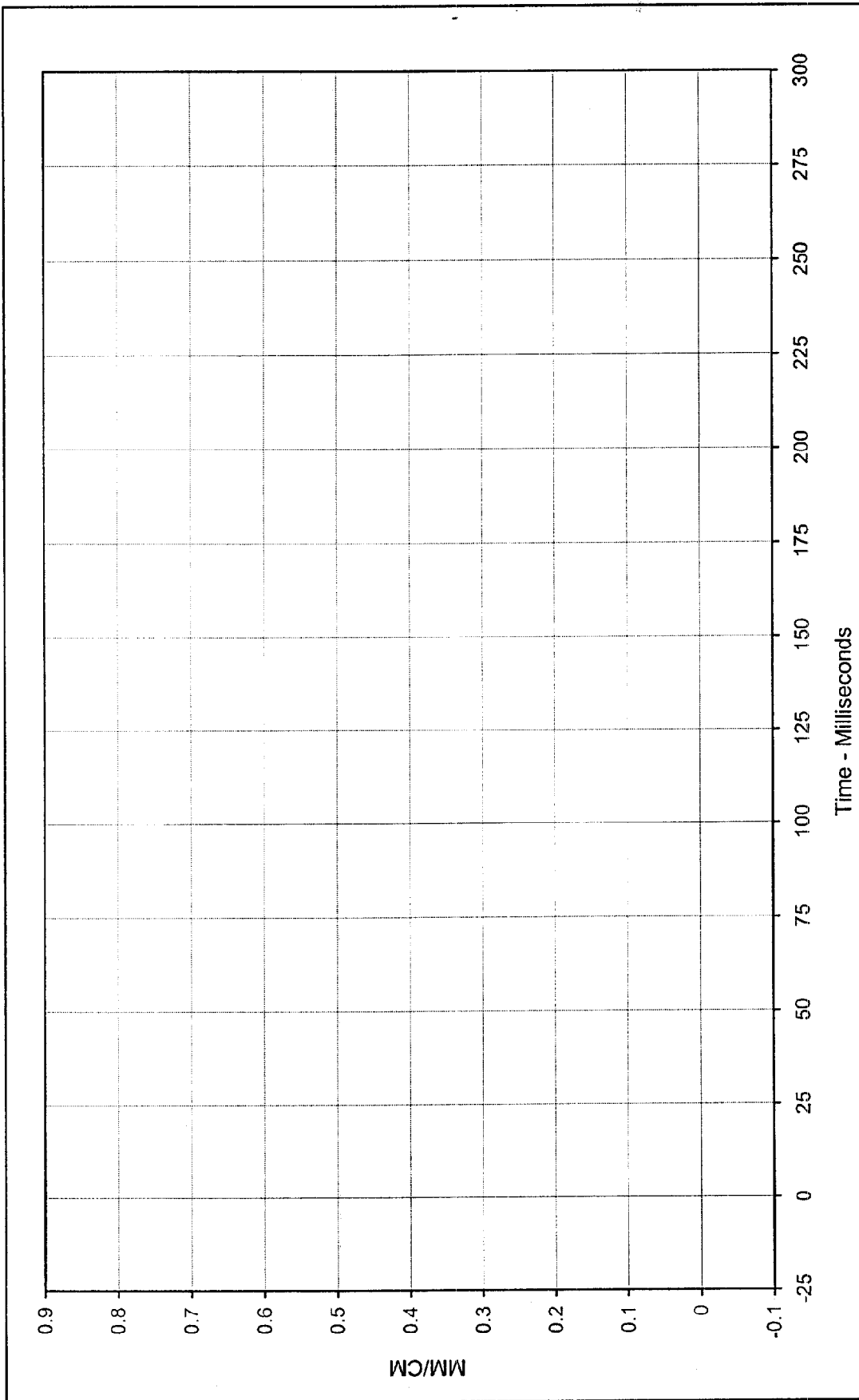
Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description:	Driver Shoulder Belt Pullout	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	205.2 at 82.0 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	0.1 at 0.0 Milliseconds			
SAE Filter Class:	60			
Date of Test:	2/25/99			
Curve Number:	FIL-043			



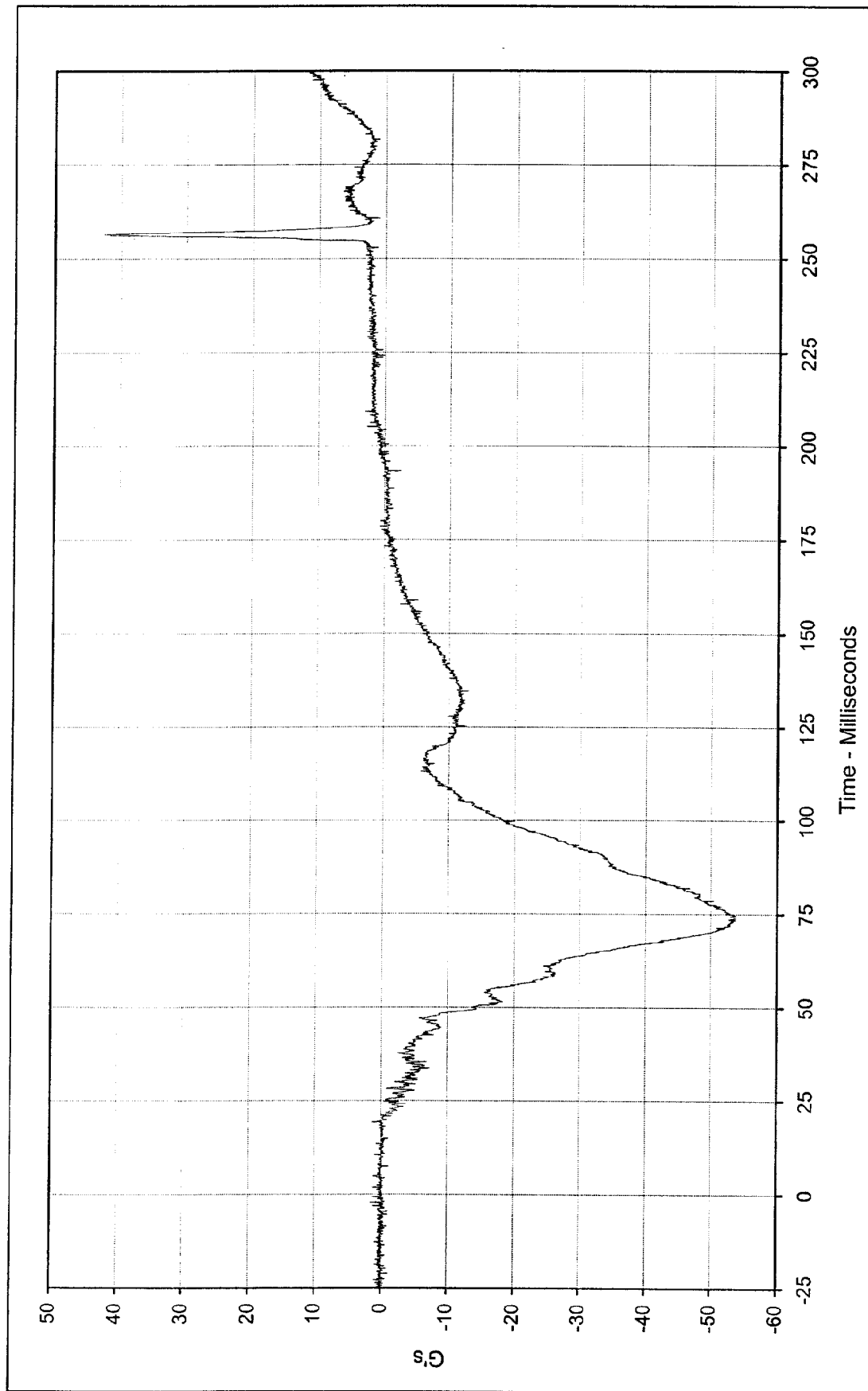


Curve Description: Driver Shoulder Belt Elongation * Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Maximum Value: 0.00 at 0.0 Milliseconds Test Vehicle: 1999 Volkswagen Beetle (New)
 Minimum Value: 0.00 at 0.0 Milliseconds



SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-044

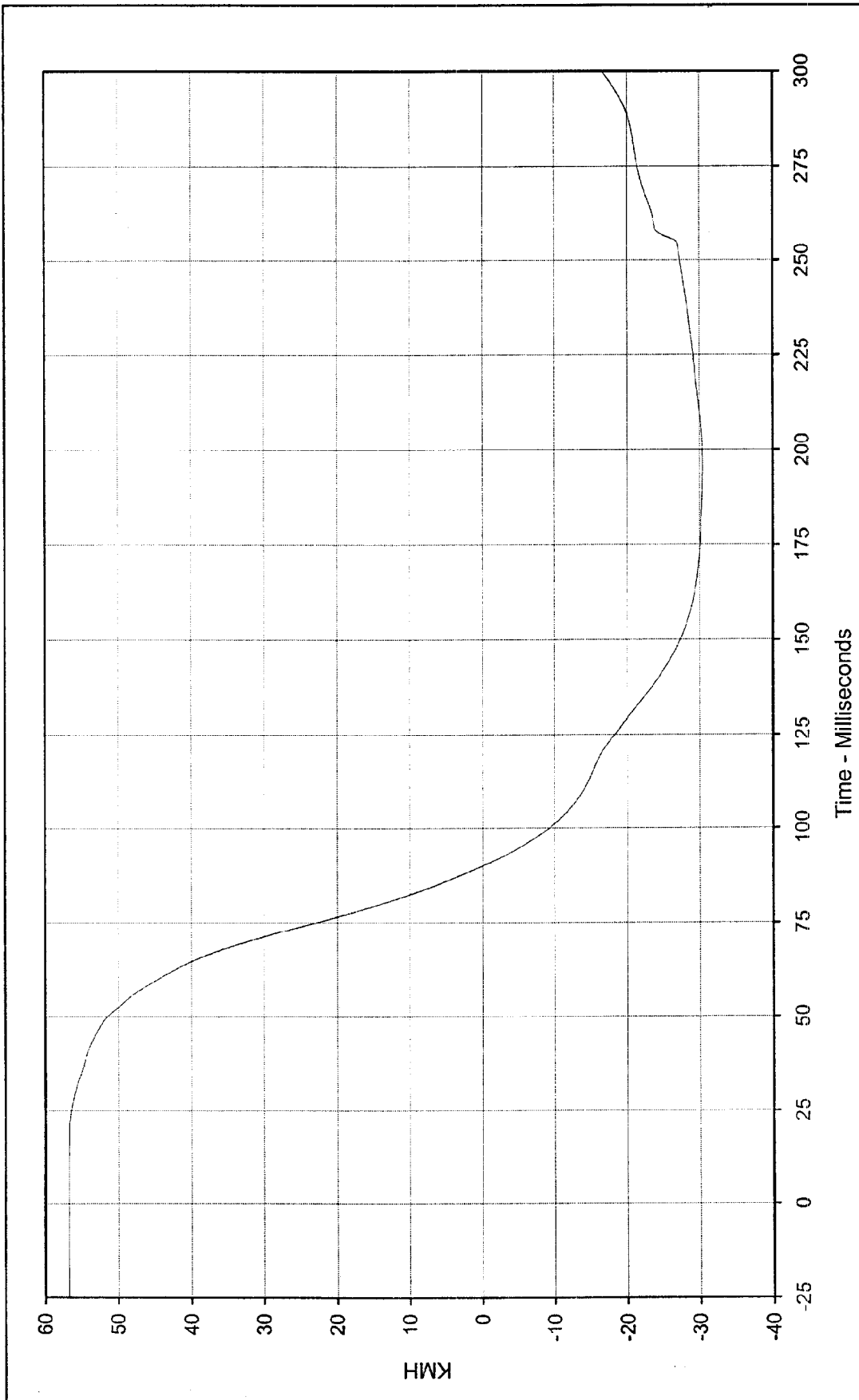
*Not used with pre-tensioner



Curve Description: Passenger Head Primary X
 Maximum Value: 42.7 at 256.5 Milliseconds
 Minimum Value: -53.9 at 73.2 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/25/99
 Curve Number: FIL-045

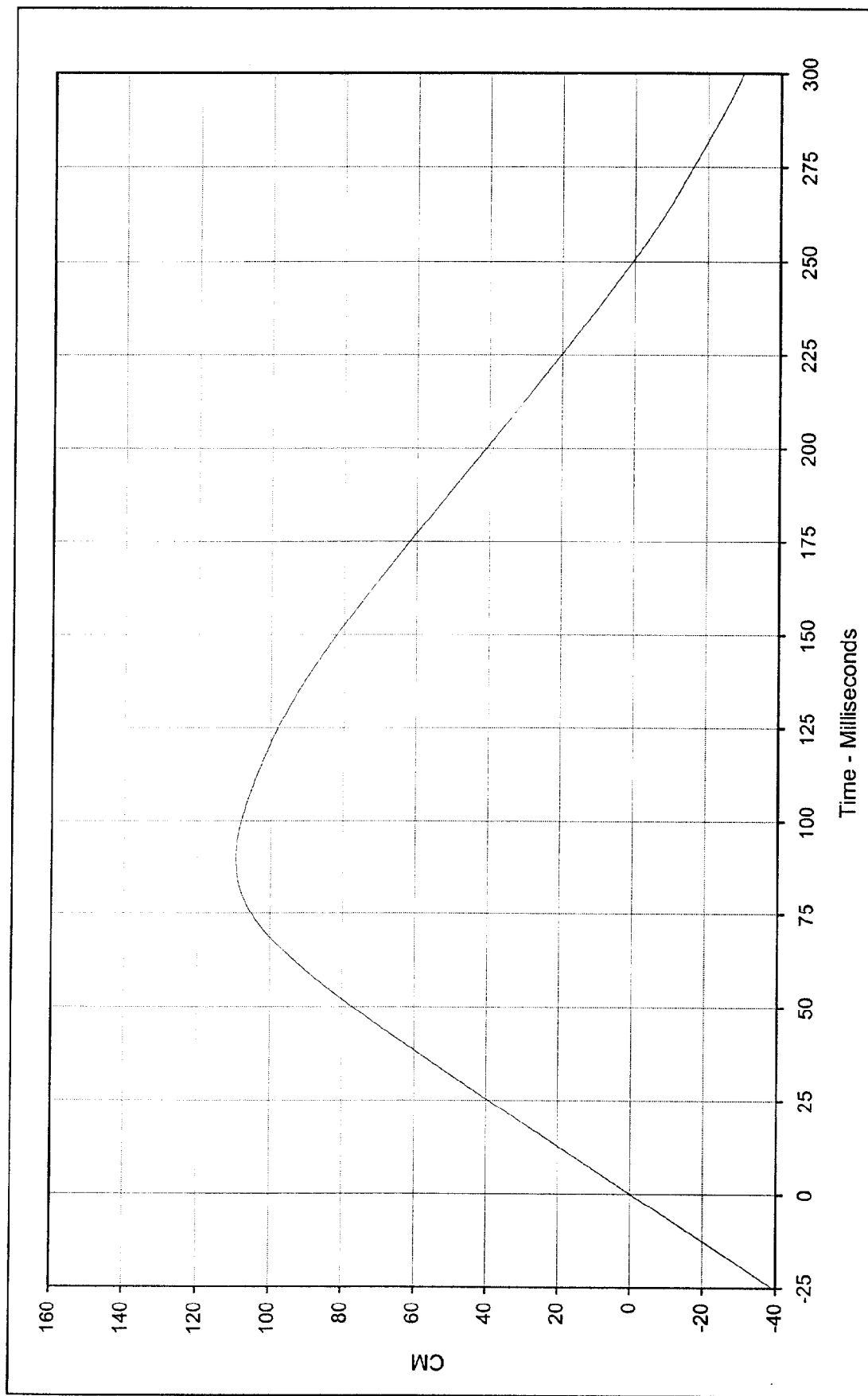
Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description:	Passenger Head Primary X Velocity	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	56.8 at 6.8 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-30.4 at 196.2 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/25/99			
Curve Number:	IN1-045			





Curve Description: Passenger Head Primary X Displ.

Maximum Value: 109.4 at 89.9 Milliseconds

Minimum Value: -29.7 at 299.9 Milliseconds

SAE Filter Class: 180

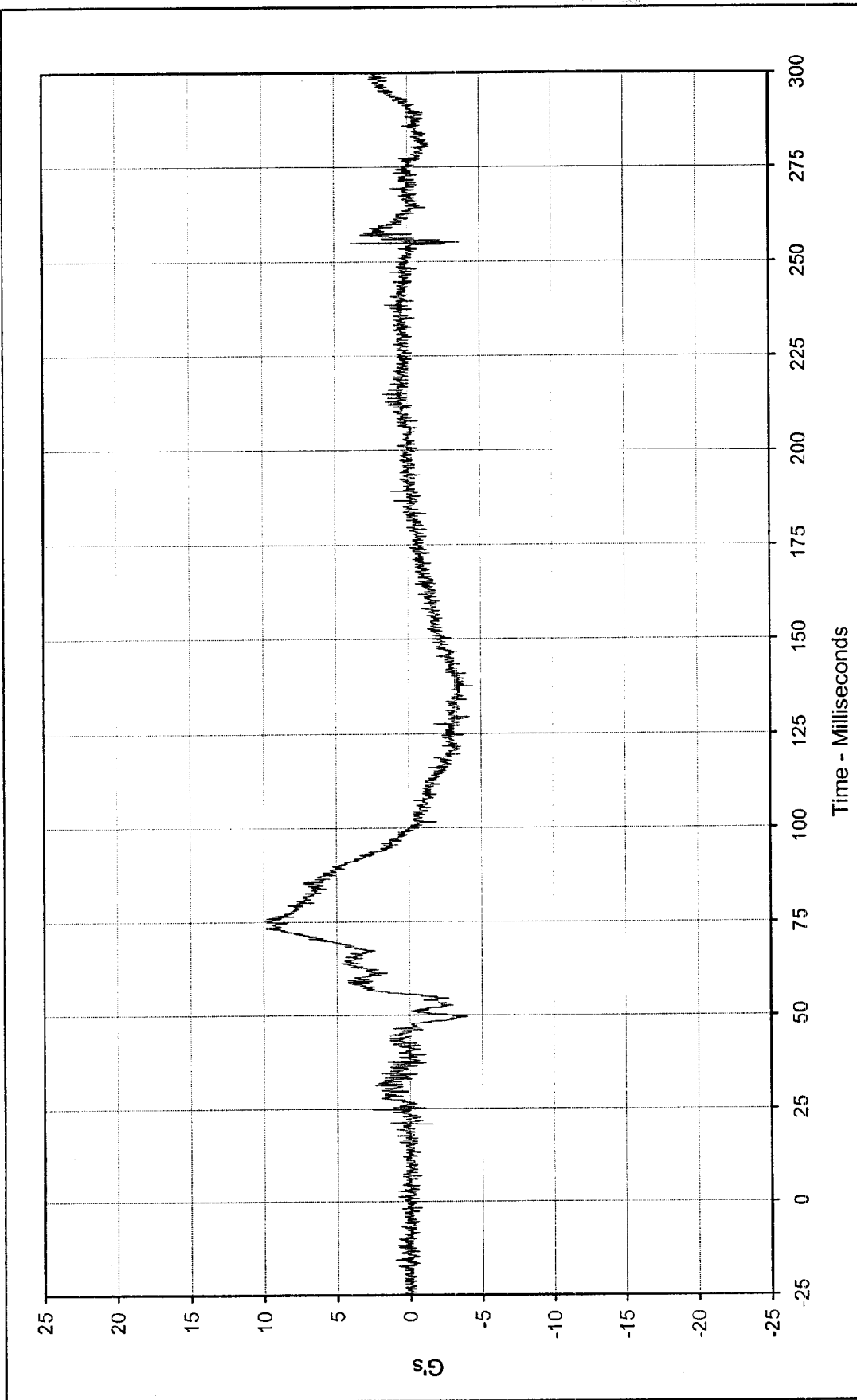
Date of Test: 2/25/99

Curve Number: IN2-045

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

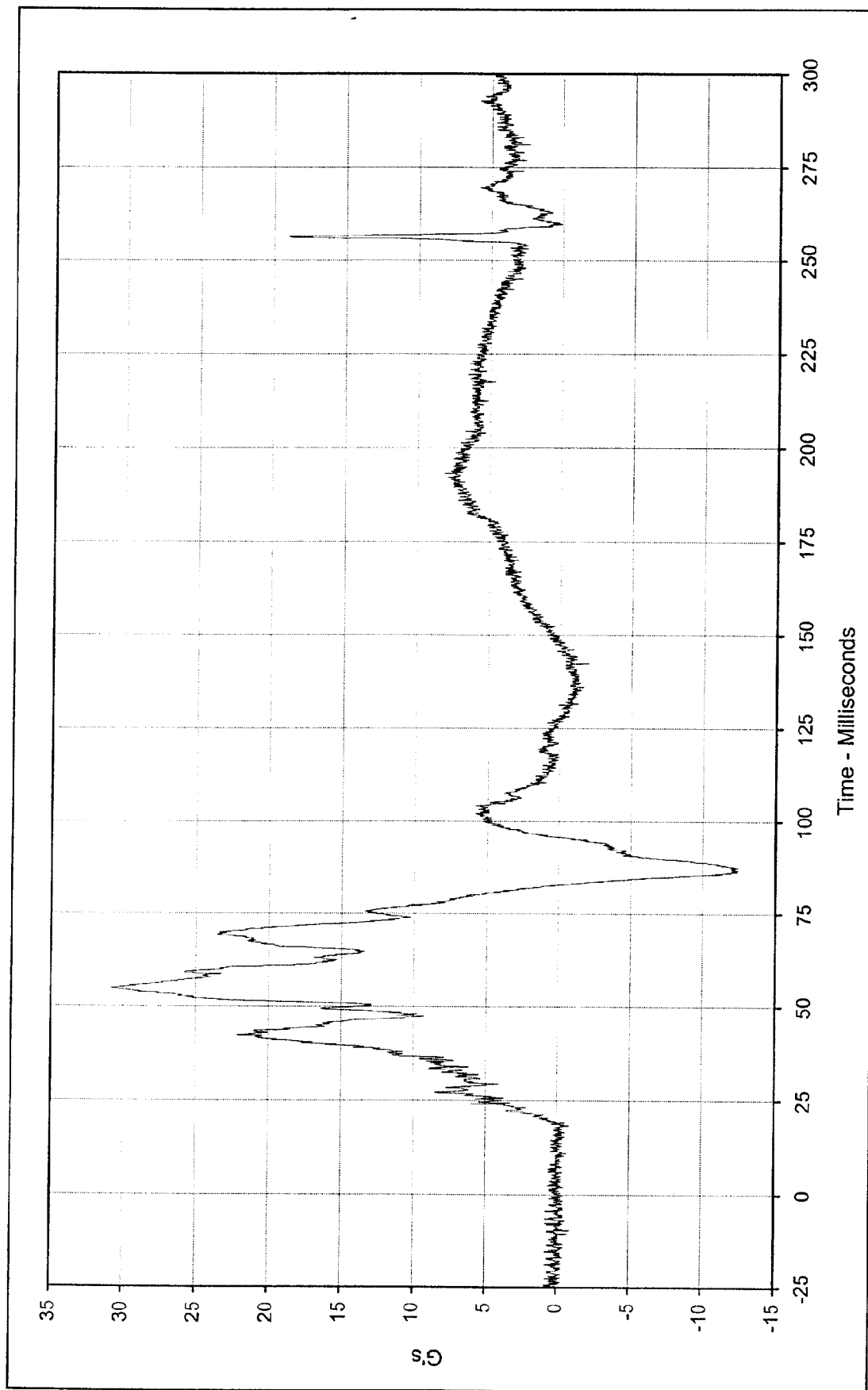
Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description:	Passenger Head Primary Y	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	10.0 at 75.4 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-4.5 at 137.6 Milliseconds			
SAE Filter Class:	1000			
Date of Test:	2/25/99			
Curve Number:	FIL-046			

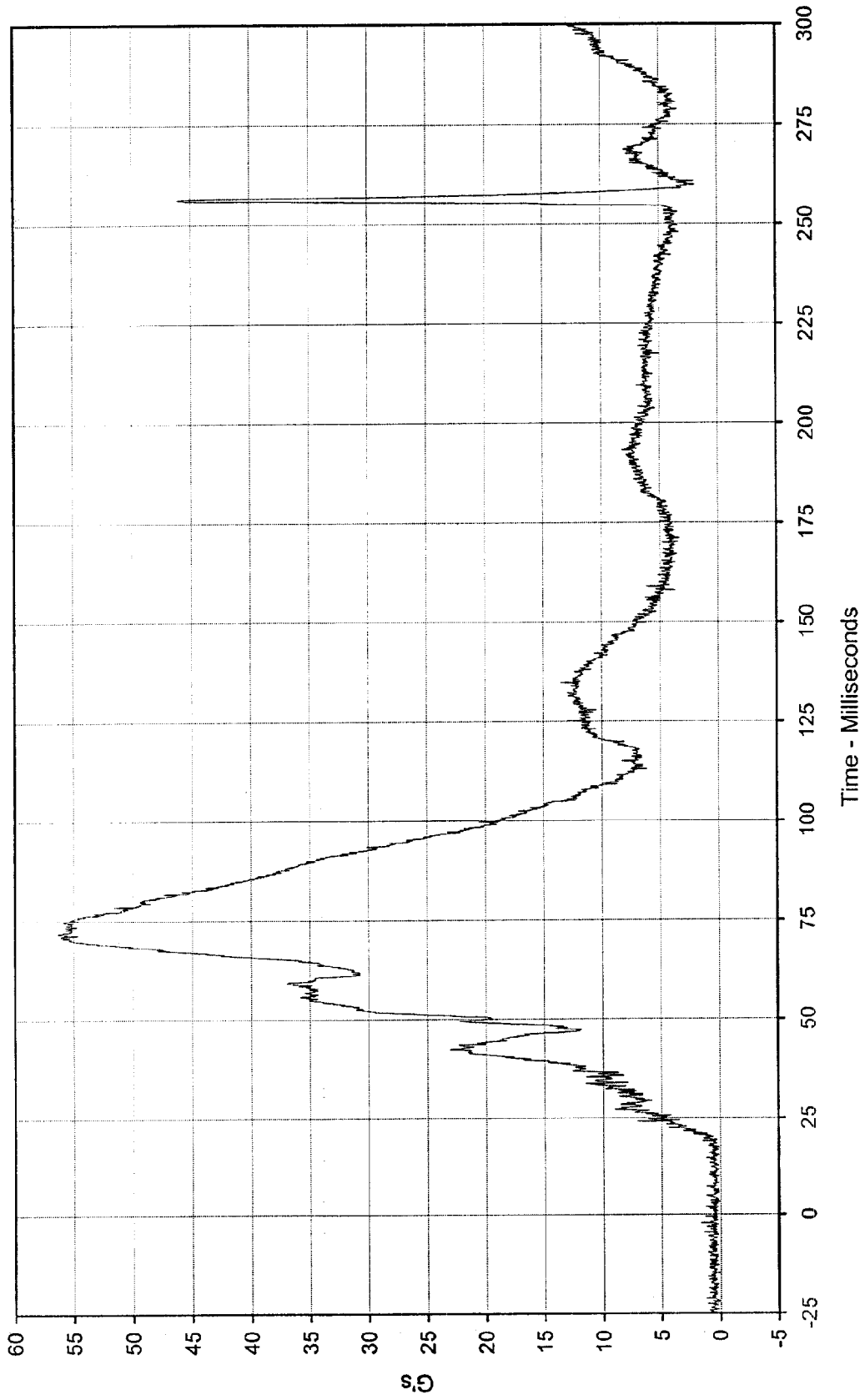




Curve Description:	Passenger Head Primary Z	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	30.8	at	54.9	Milliseconds
Minimum Value:	-12.4	at	86.2	Milliseconds
SAE Filter Class:	1000	Test Vehicle:	1999 Volkswagen Beetle (New)	
Date of Test:	2/25/99			
Curve Number:	FIL-047			







Curve Description: Passenger Head Resultant Primary Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Maximum Value: 56.3 at 71.6 Milliseconds Test Vehicle: 1999 Volkswagen Beetle (New)

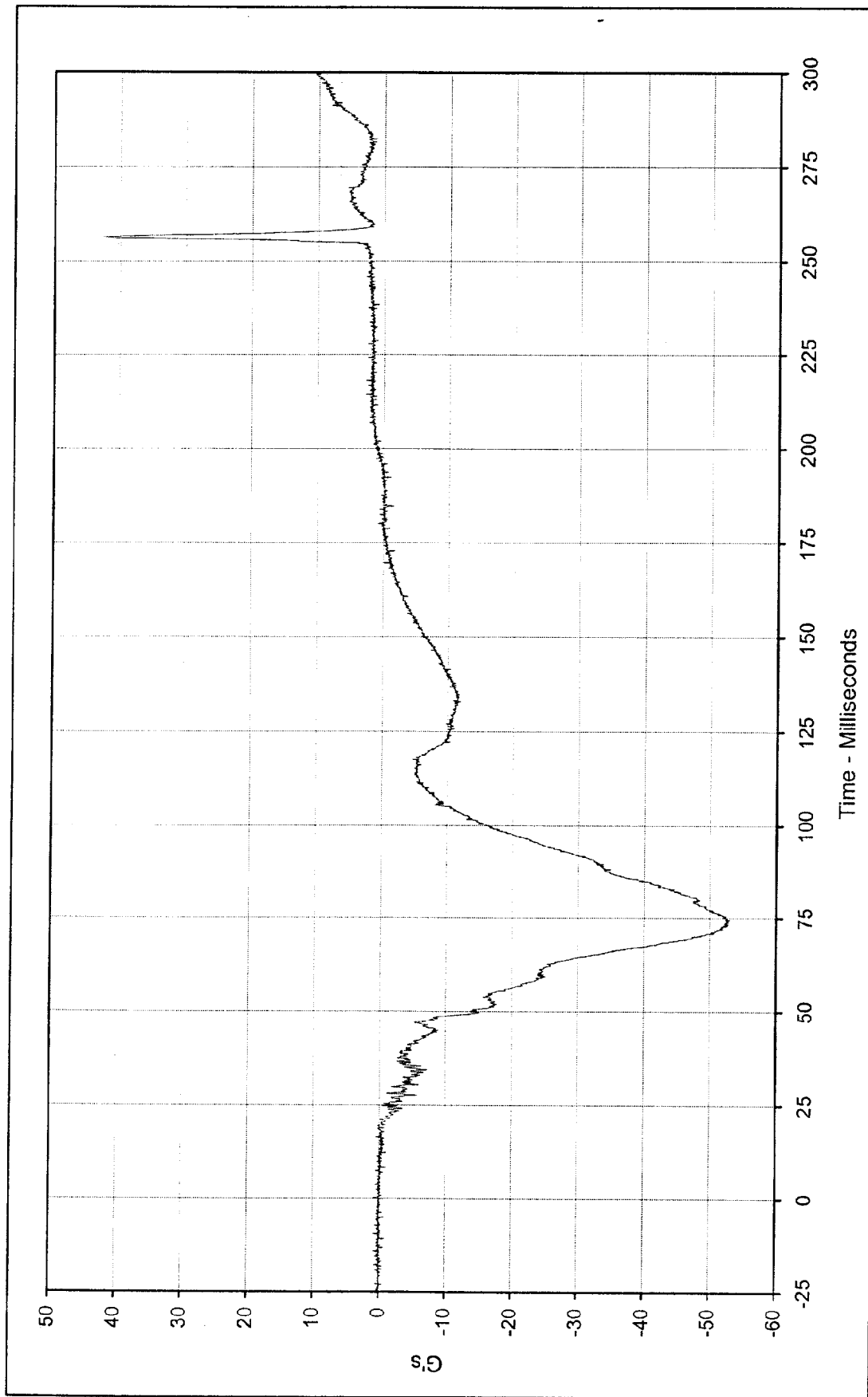
Minimum Value: 0.1 at 3.3 Milliseconds

SAE Filter Class: 1000

Date of Test: 2/25/99

Curve Number: RES-045

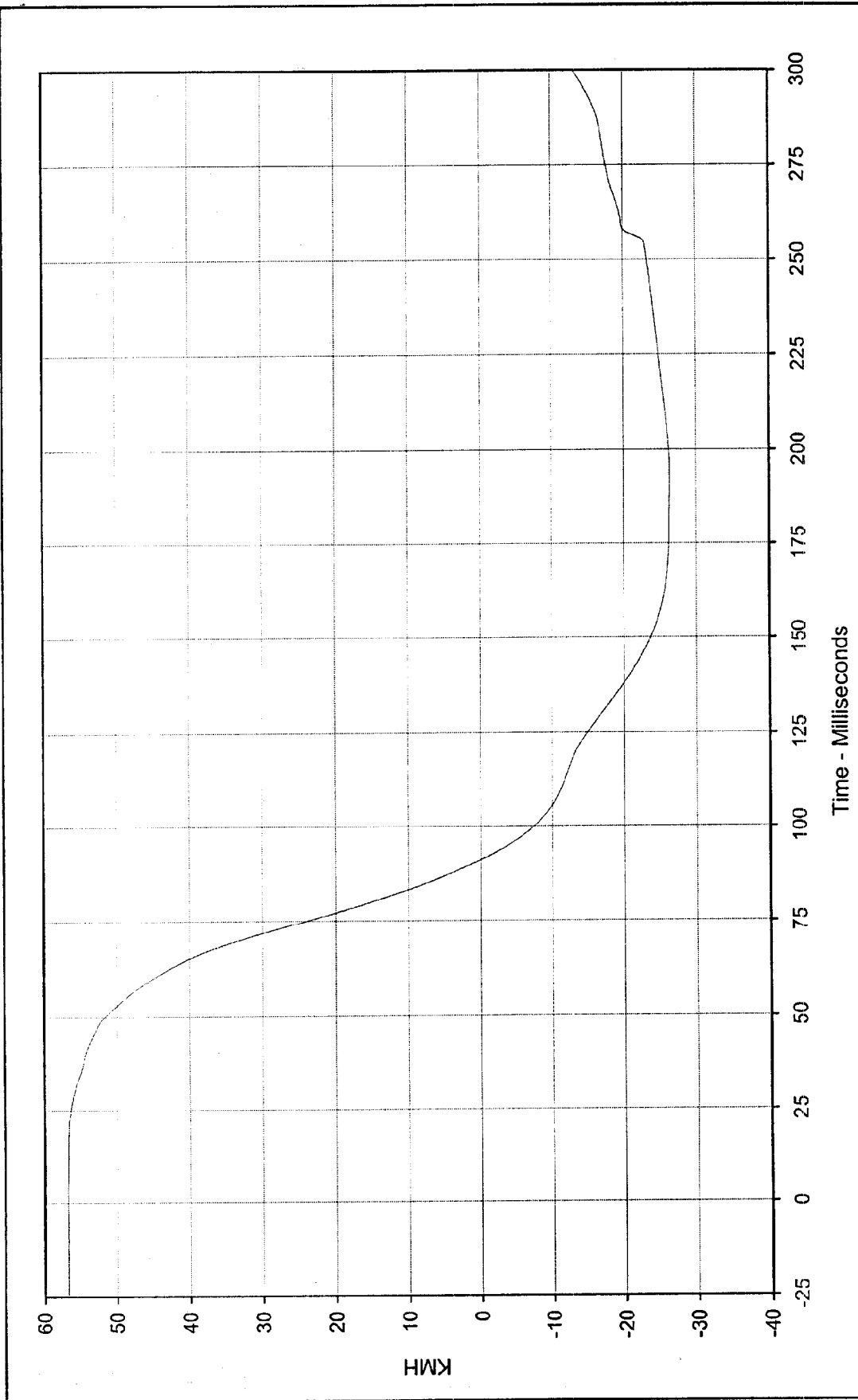




Curve Description: Passenger Head Redundant X
 Maximum Value: 42.7 at 256.6 Milliseconds
 Minimum Value: -53.0 at 74.5 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/25/99
 Curve Number: FIL-048

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Passenger Head Redundant X Velocity

Maximum Value: 56.8 at 0.6 Milliseconds

Minimum Value: -26.4 at 194.0 Milliseconds

SAE Filter Class: 180

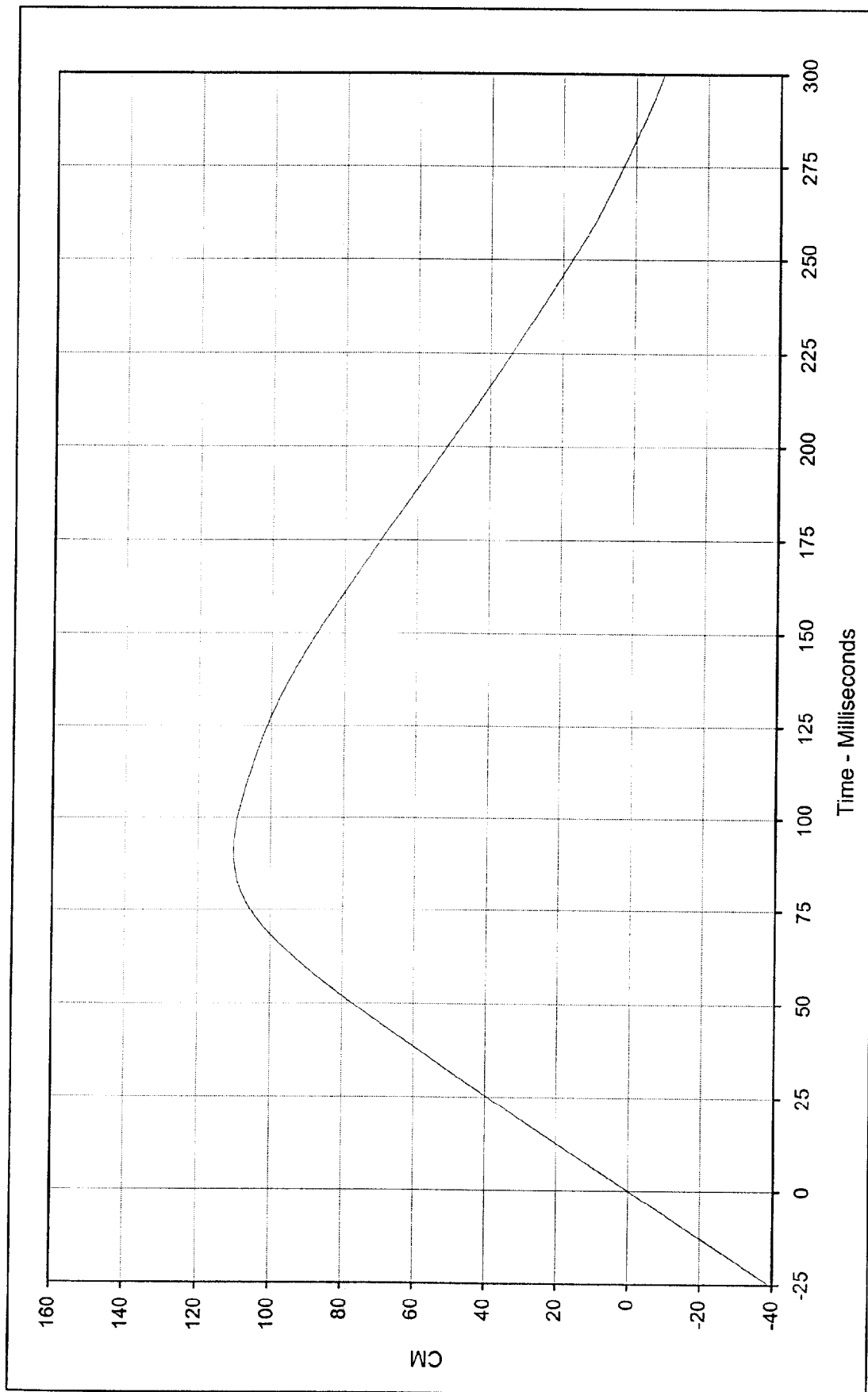
Date of Test: 2/25/99

Curve Number: IN1-048

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Passenger Head Redundant X Displ.

Maximum Value: 110.2 at 91.0 Milliseconds

Minimum Value: -7.6 at 299.9 Milliseconds

SAE Filter Class: 180

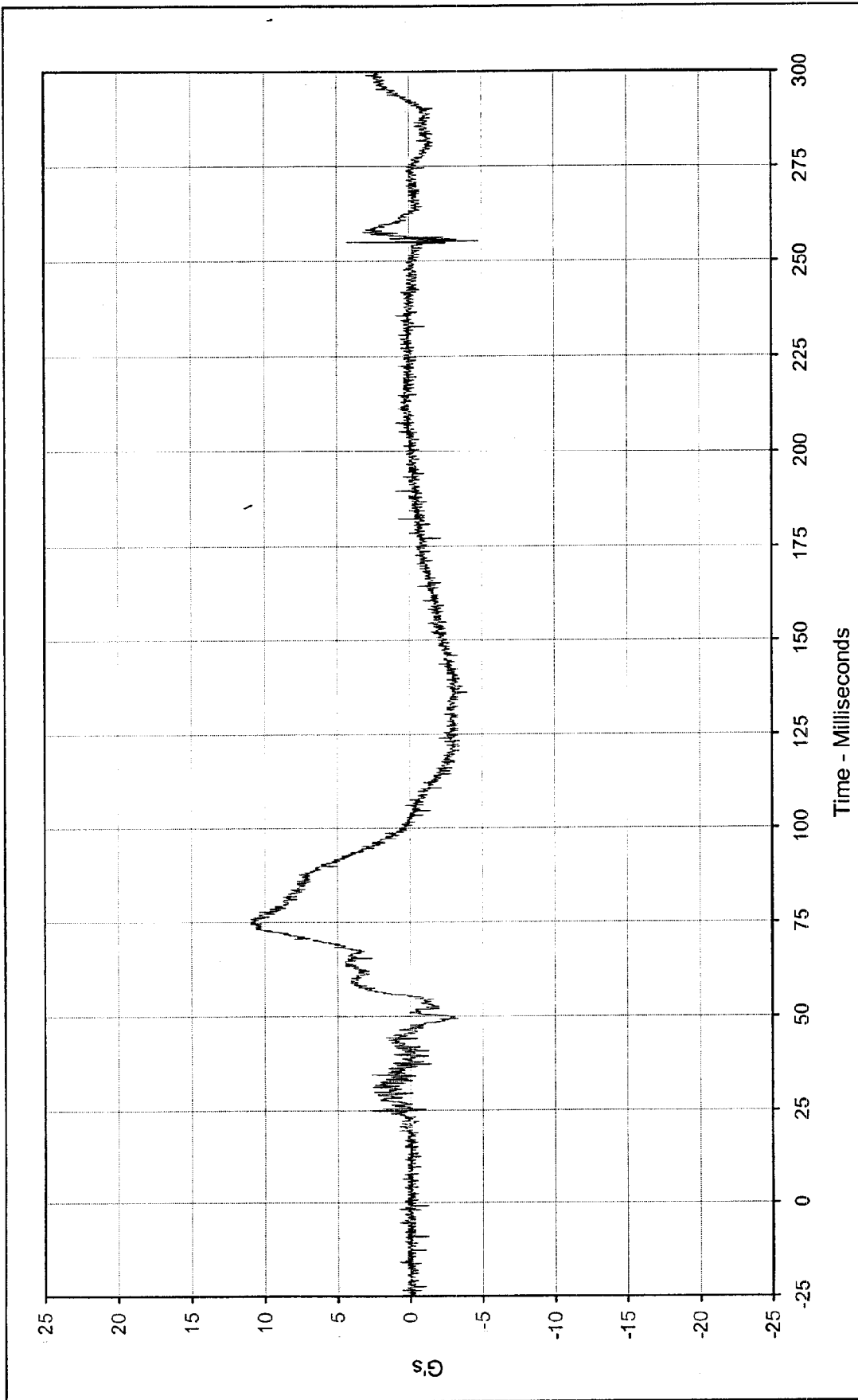
Date of Test: 2/25/99

Curve Number: IN2-048

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)

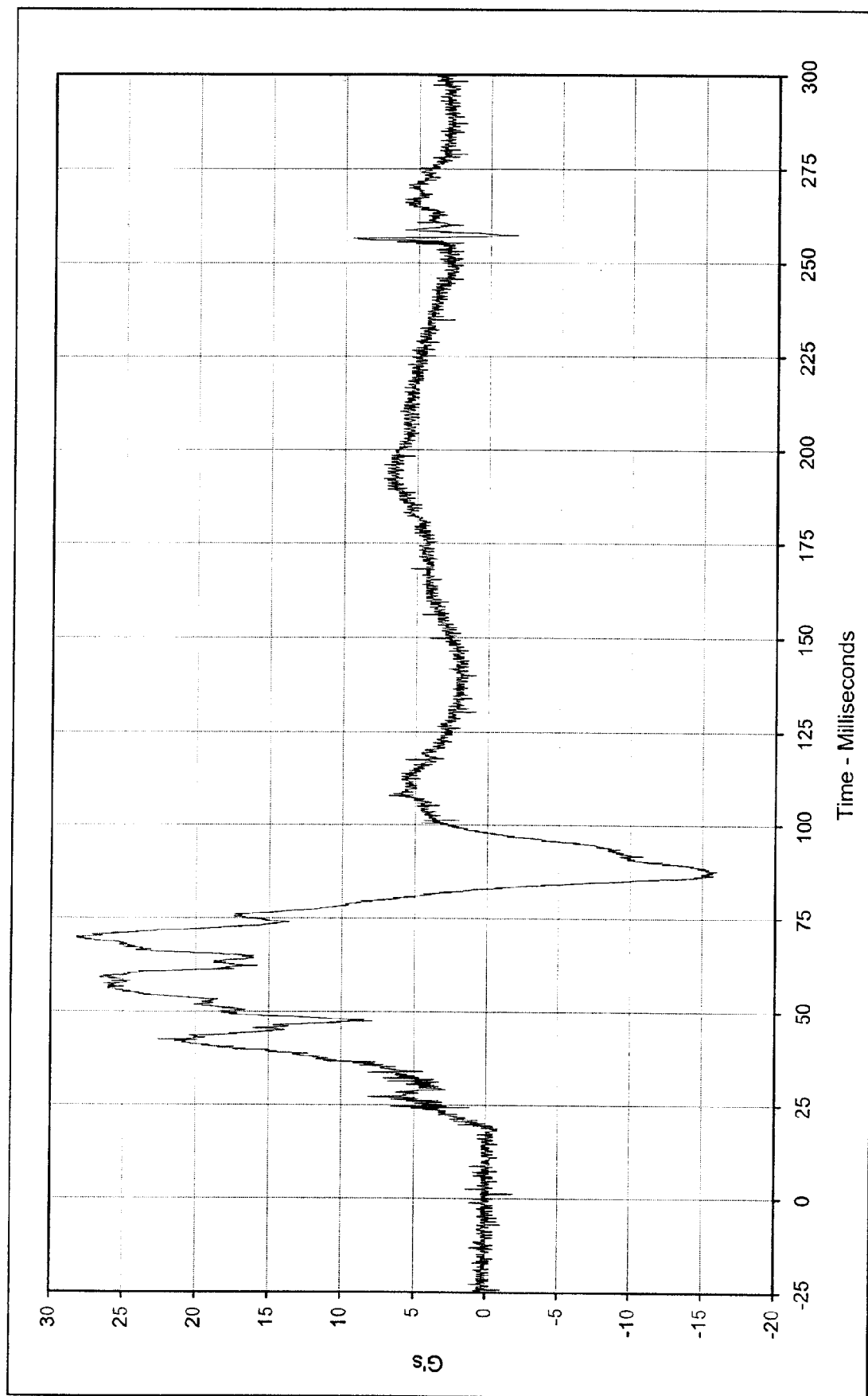




Curve Description: Passenger Head Redundant Y
 Maximum Value: 11.0 at 74.4 Milliseconds
 Minimum Value: -4.8 at 255.4 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/25/99
 Curve Number: FIL-049

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

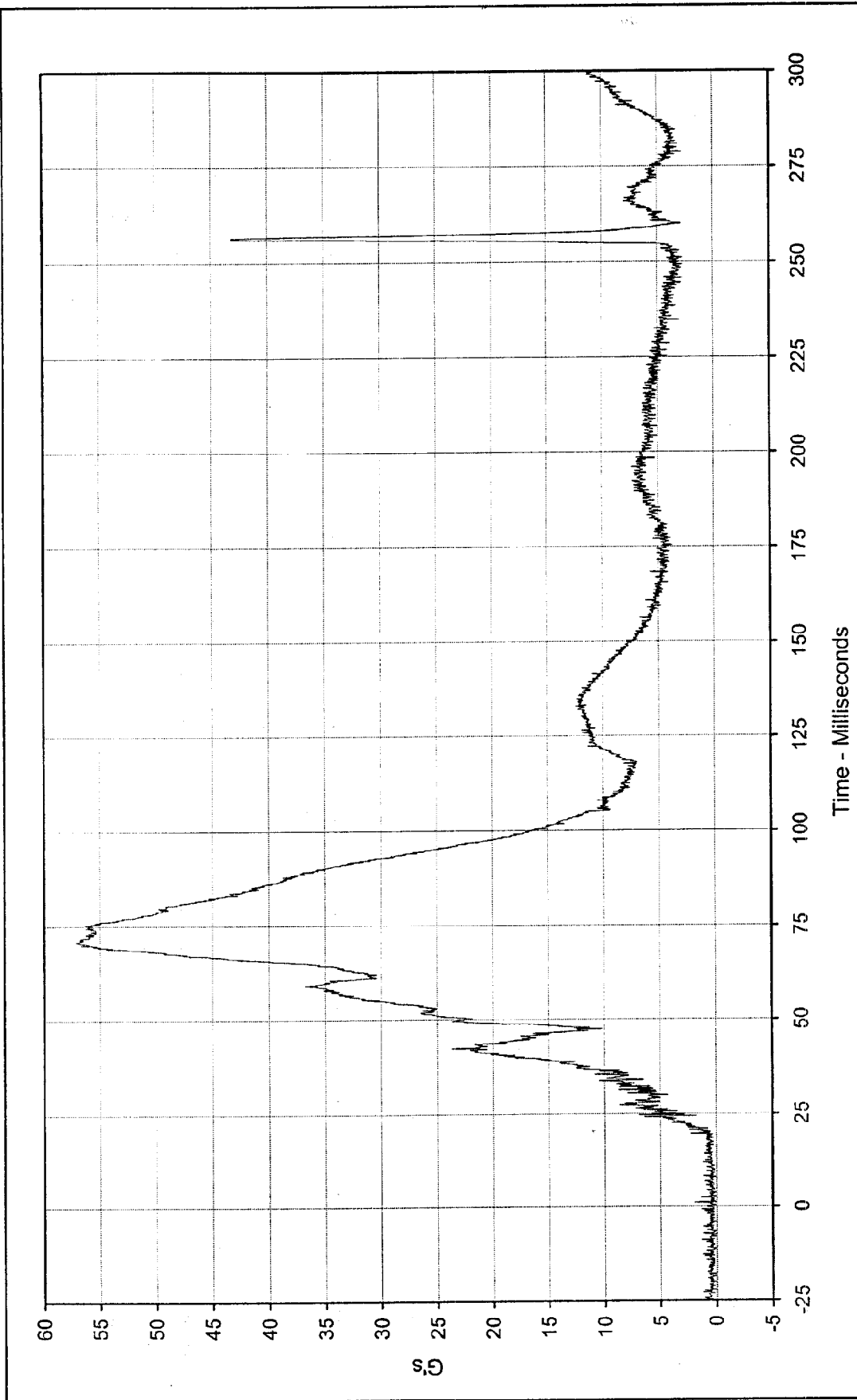




Curve Description: Passenger Head Redundant Z
 Maximum Value: 28.3 at 69.4 Milliseconds
 Minimum Value: -16.0 at 87.5 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/25/99
 Curve Number: FIL-050

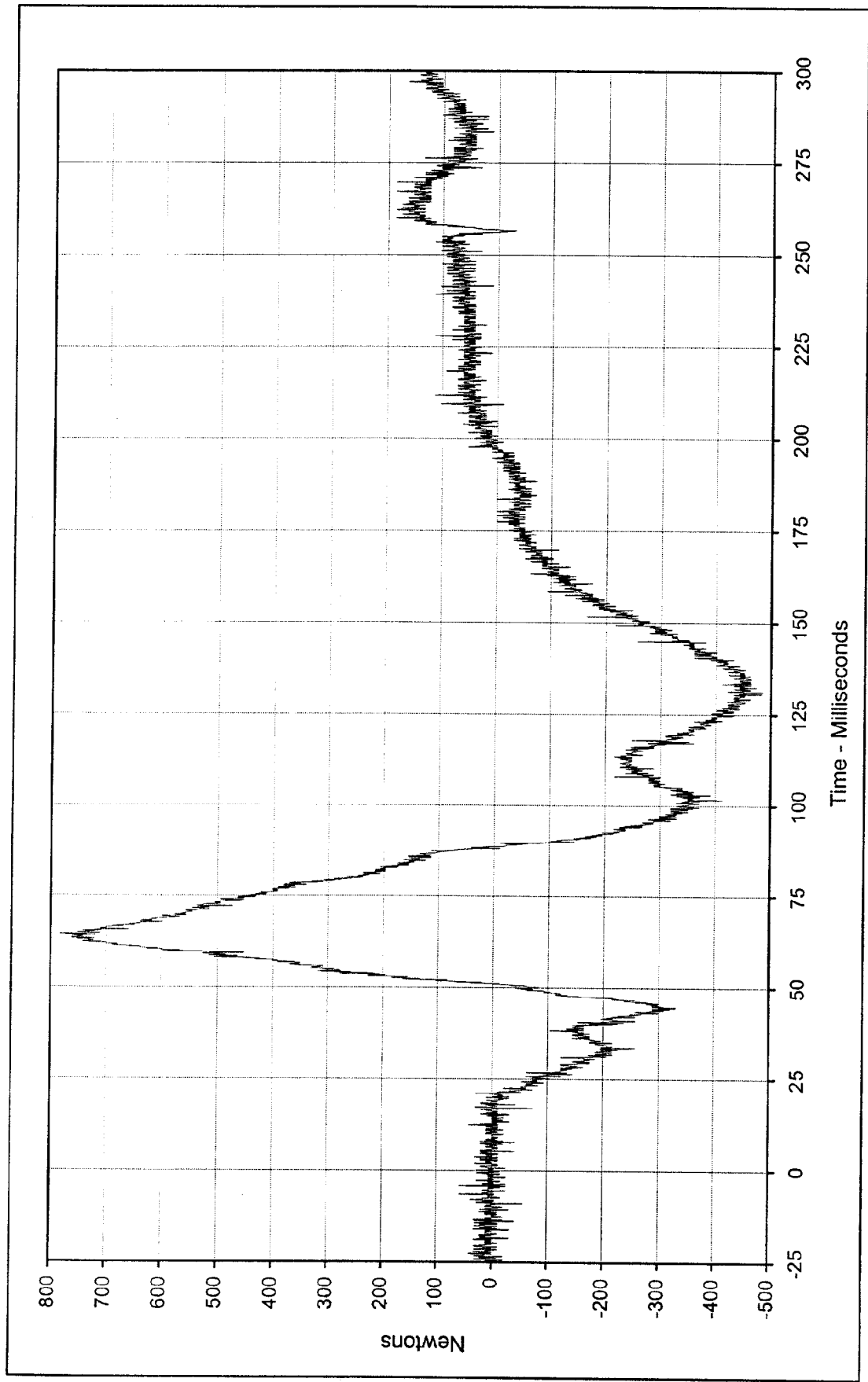
Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Passenger Head Resultant Redundant		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	57.2	at	70.8	Milliseconds
Minimum Value:	0.0	at	0.3	Milliseconds
SAE Filter Class:	1000			
Date of Test:	2/25/99			
Curve Number:	RES-048			
		Test Vehicle:	1999 Volkswagen Beetle (New)	

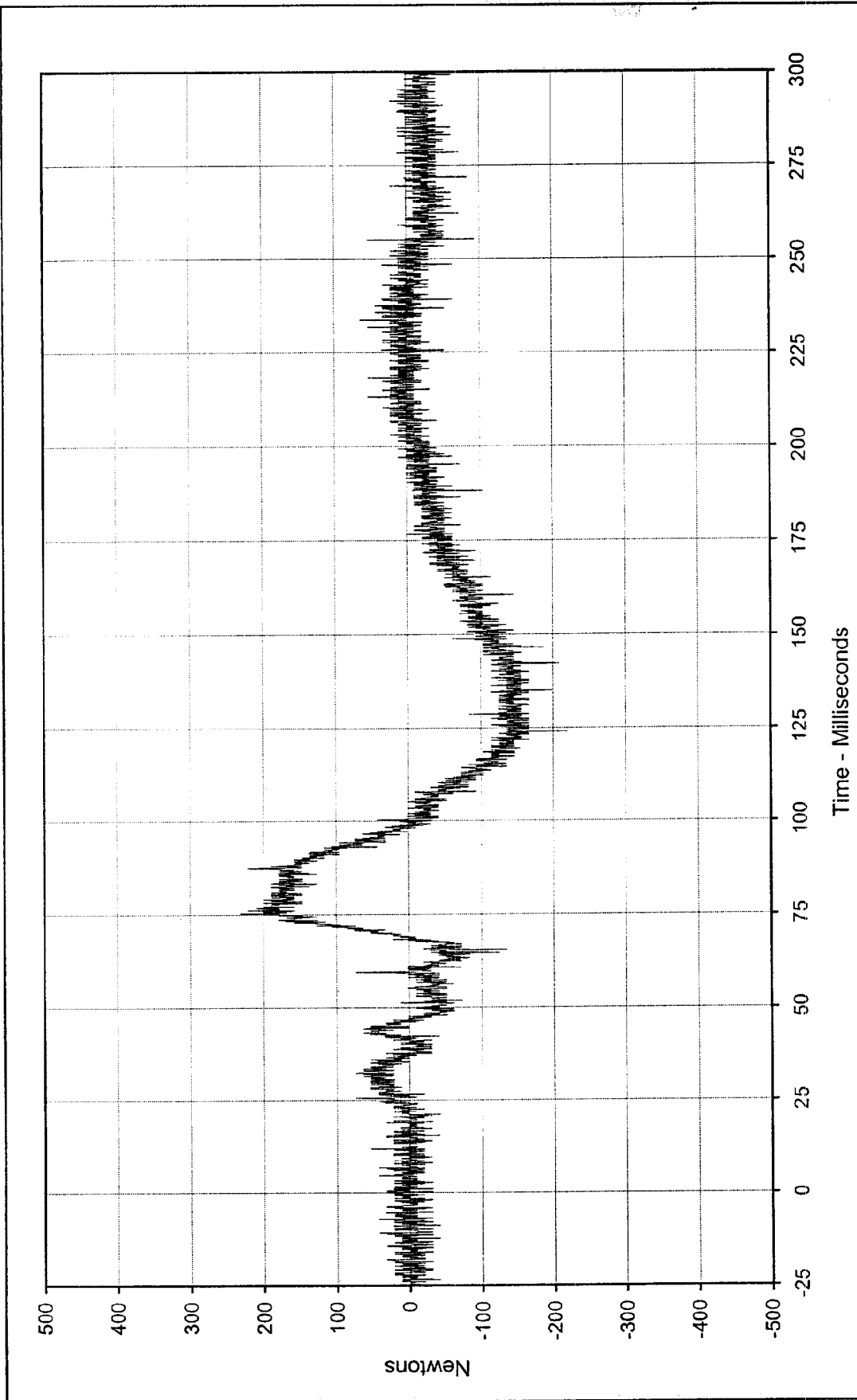




Curve Description: Passenger Neck Force X
Maximum Value: 782.6 at 64.4 Milliseconds
Minimum Value: -484.5 at 130.8 Milliseconds
SAE Filter Class: 1000
Date of Test: 2/25/99
Curve Number: FIL-051

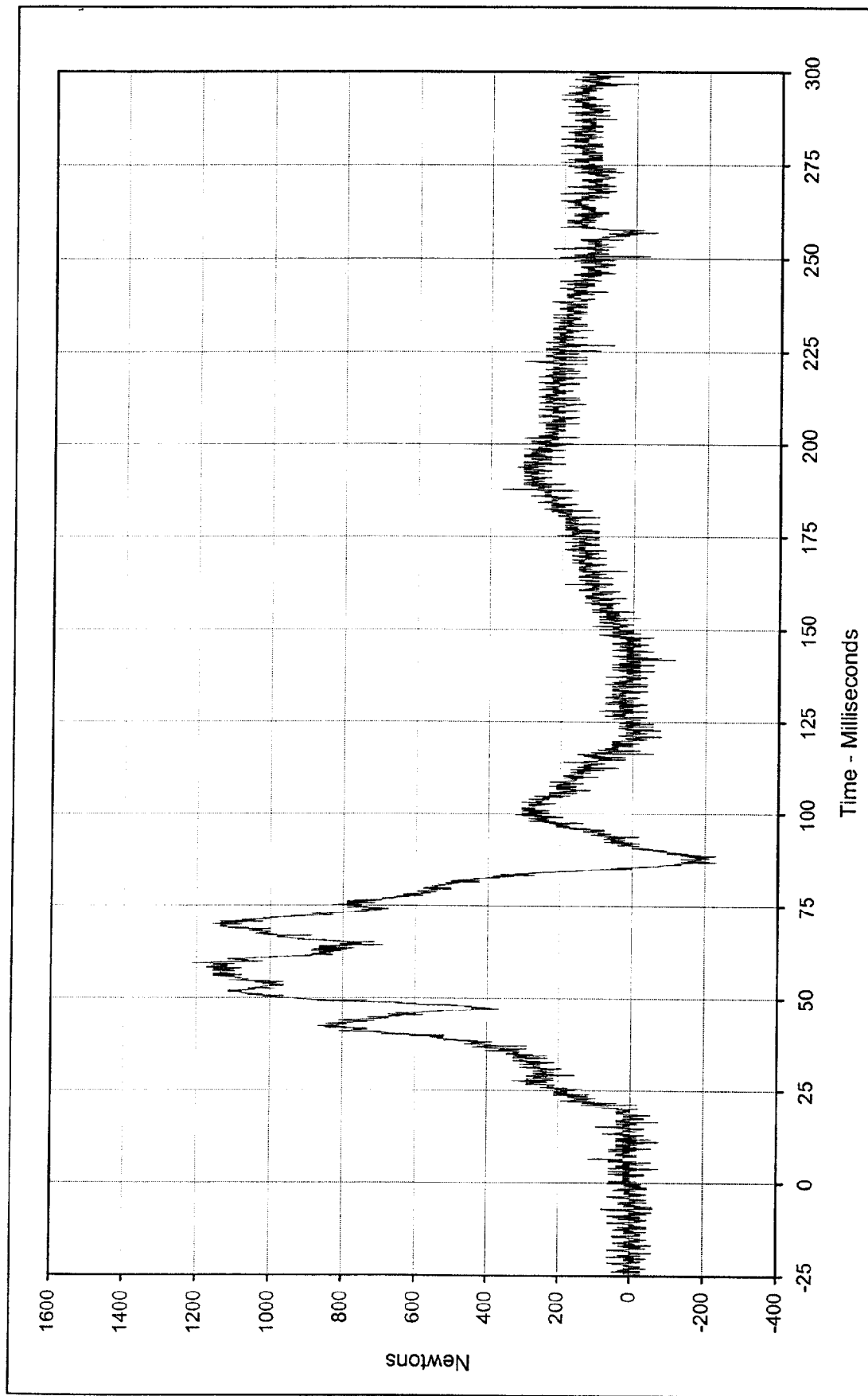
Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
Test Vehicle: 1999 Volkswagen Beetle (New)



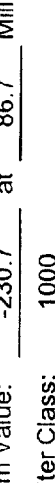


Curve Description:	Passenger Neck Force Y	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	230.7 at 75.4 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-219.3 at 123.9 Milliseconds			
SAE Filter Class:	1000			
Date of Test:	2/25/99			
Curve Number:	FIL-052			



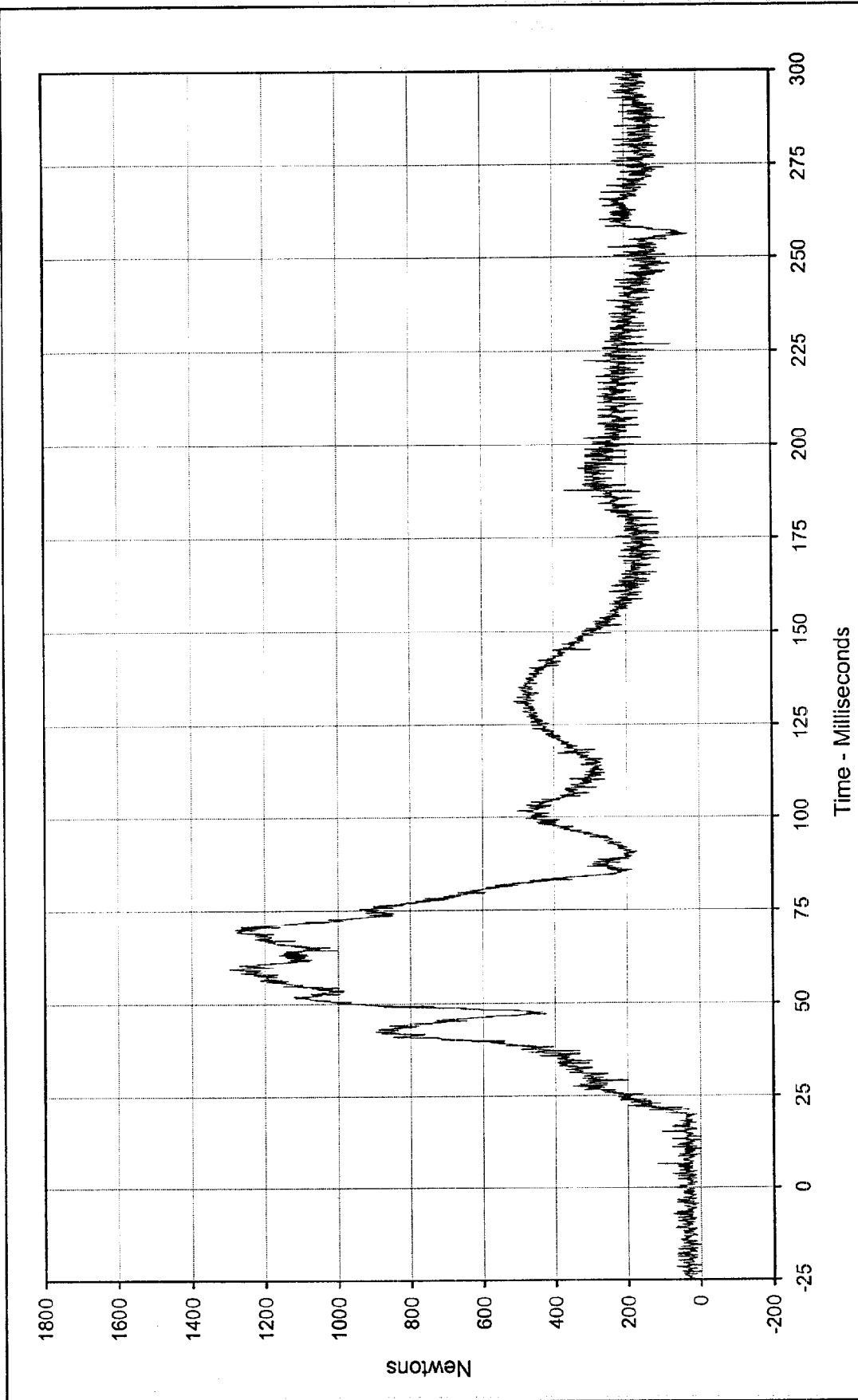


Curve Description:	Passenger Neck Force Z		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	1211.2	at 59.3	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-230.7	at 86.7			
SAE Filter Class:	1000				
Date of Test:	2/25/99				
Curve Number:	FIL-053				



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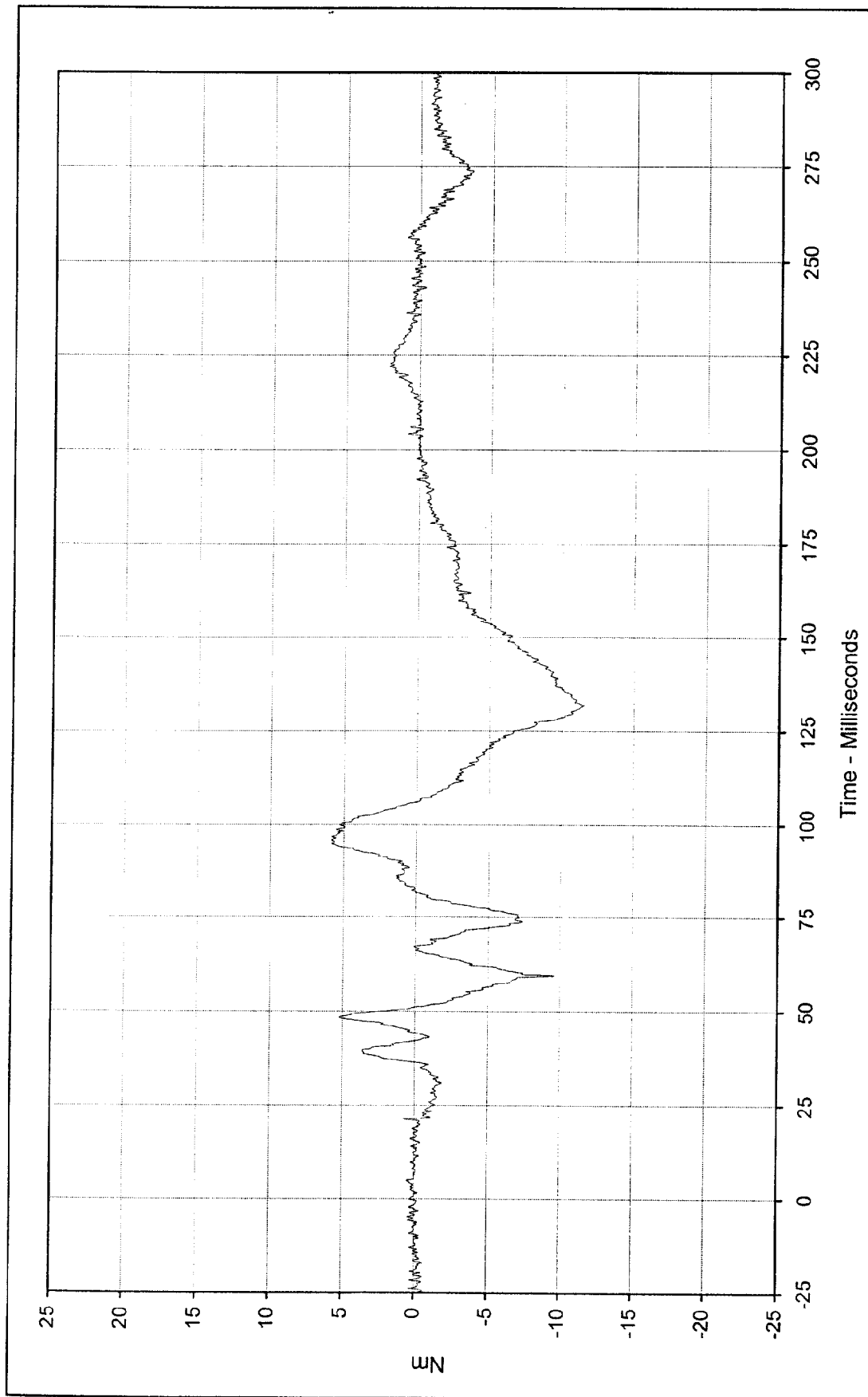




Curve Description: Passenger Neck Force Resultant
 Maximum Value: 1297.2 at 59.3 Milliseconds
 Minimum Value: 0.6 at 9.2 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/25/99
 Curve Number: RES-051

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

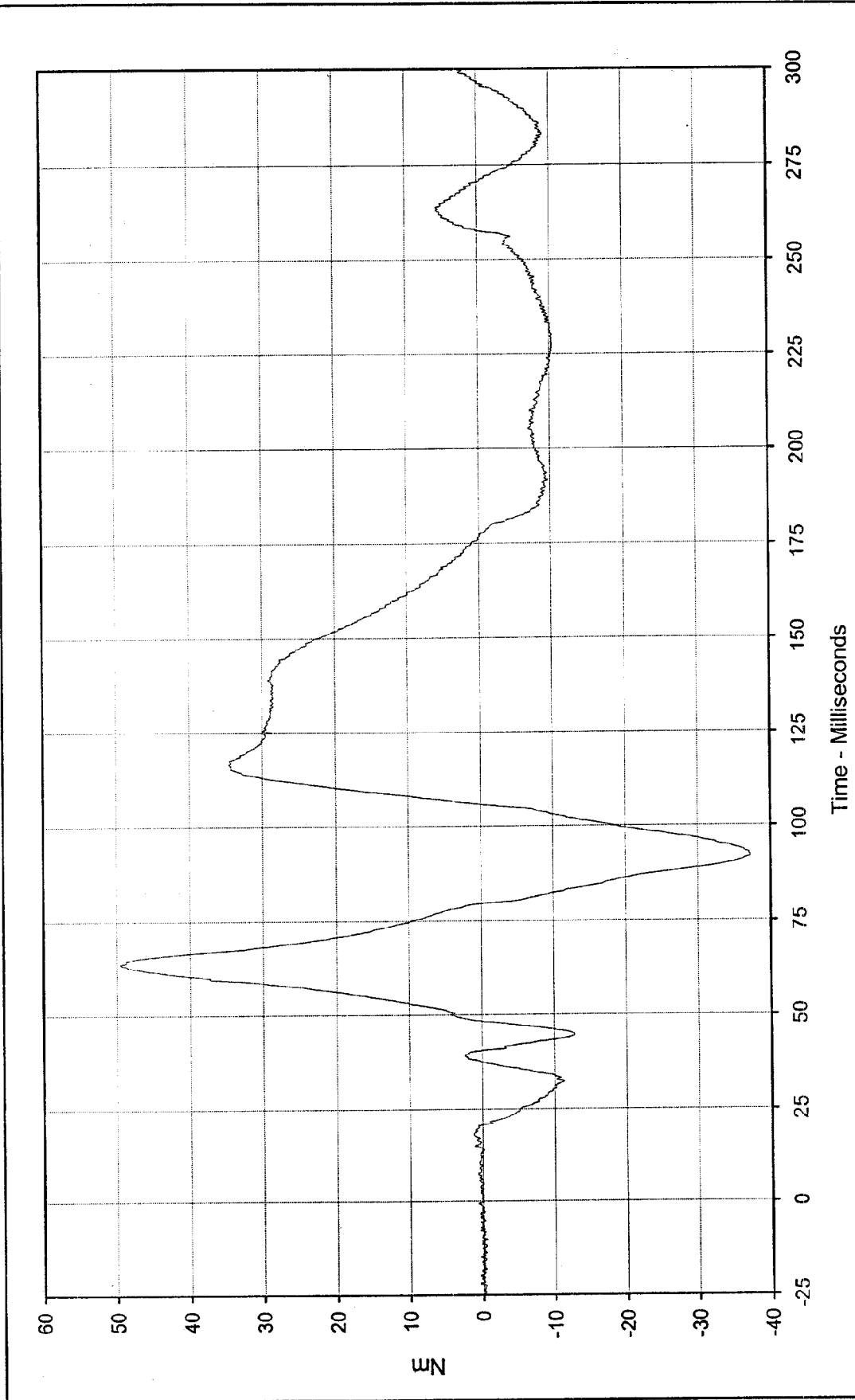




Curve Description:	Passenger Neck Moment X	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	5.9 at 95.9 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-11.6 at 132.0 Milliseconds			
SAE Filter Class:	600			
Date of Test:	2/25/99			
Curve Number:	FIL-054			



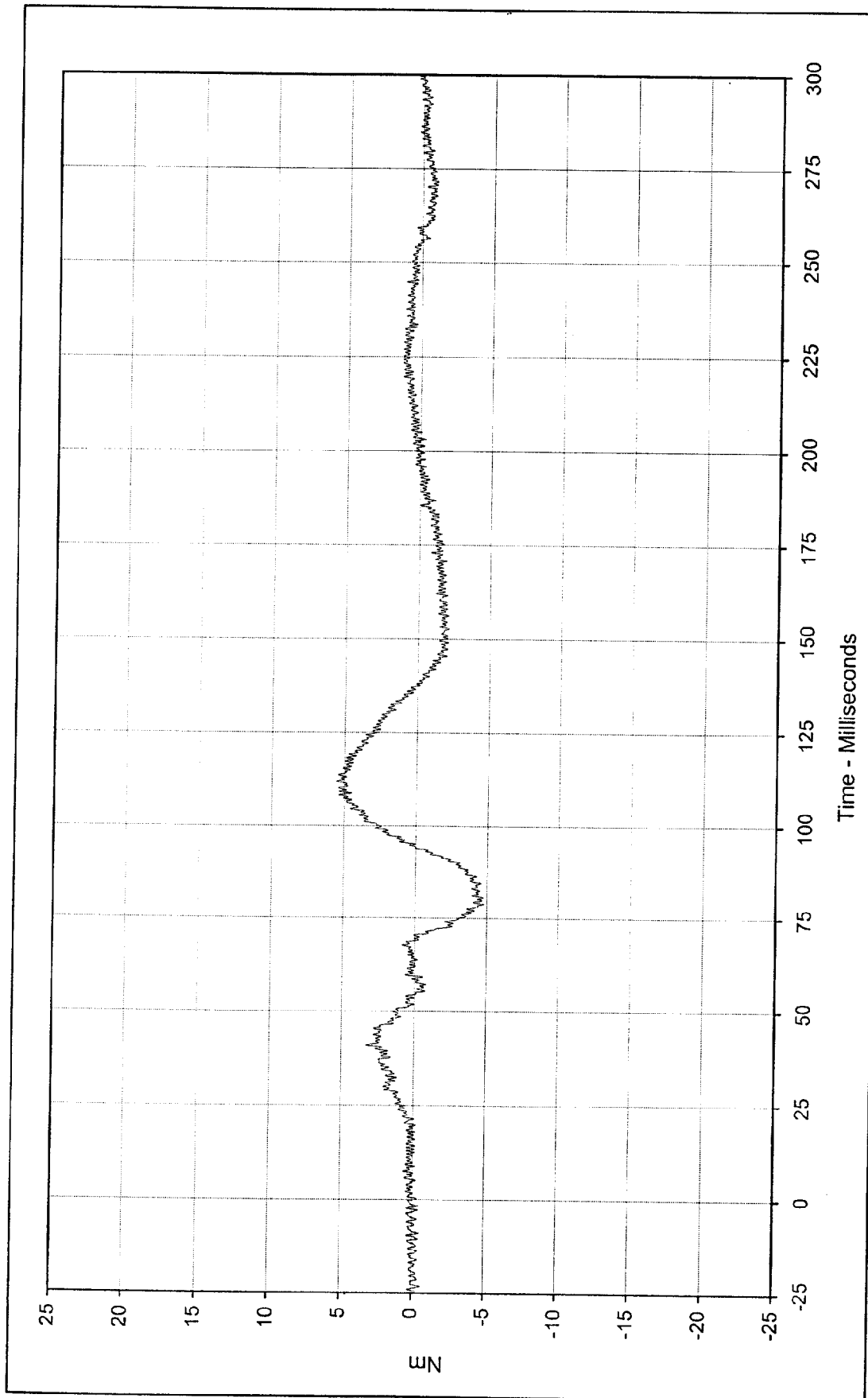




Curve Description: Passenger Neck Moment Y
 Maximum Value: 49.5 at 63.5 Milliseconds
 Minimum Value: -37.3 at 91.7 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/25/99
 Curve Number: FIL-055

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

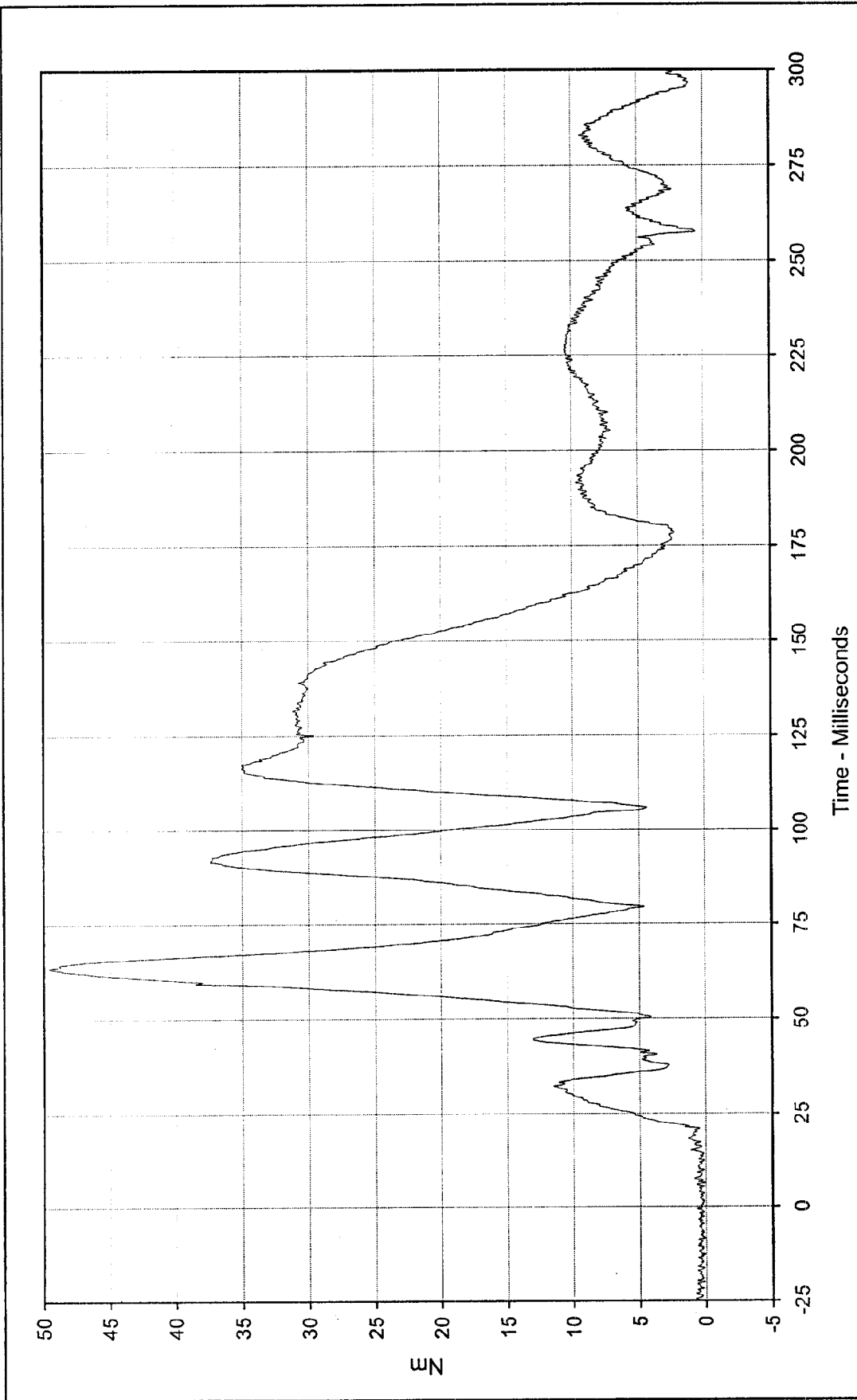




Curve Description:	Passenger Neck Moment Z	Test Program:	1999 NHTSA 35 mph NCAP	No.:	MX5800
Maximum Value:	5.5 at 111.9 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)		
Minimum Value:	-4.8 at 78.9 Milliseconds				
SAE Filter Class:	600				
Date of Test:	2/25/99				
Curve Number:	FIL-056				

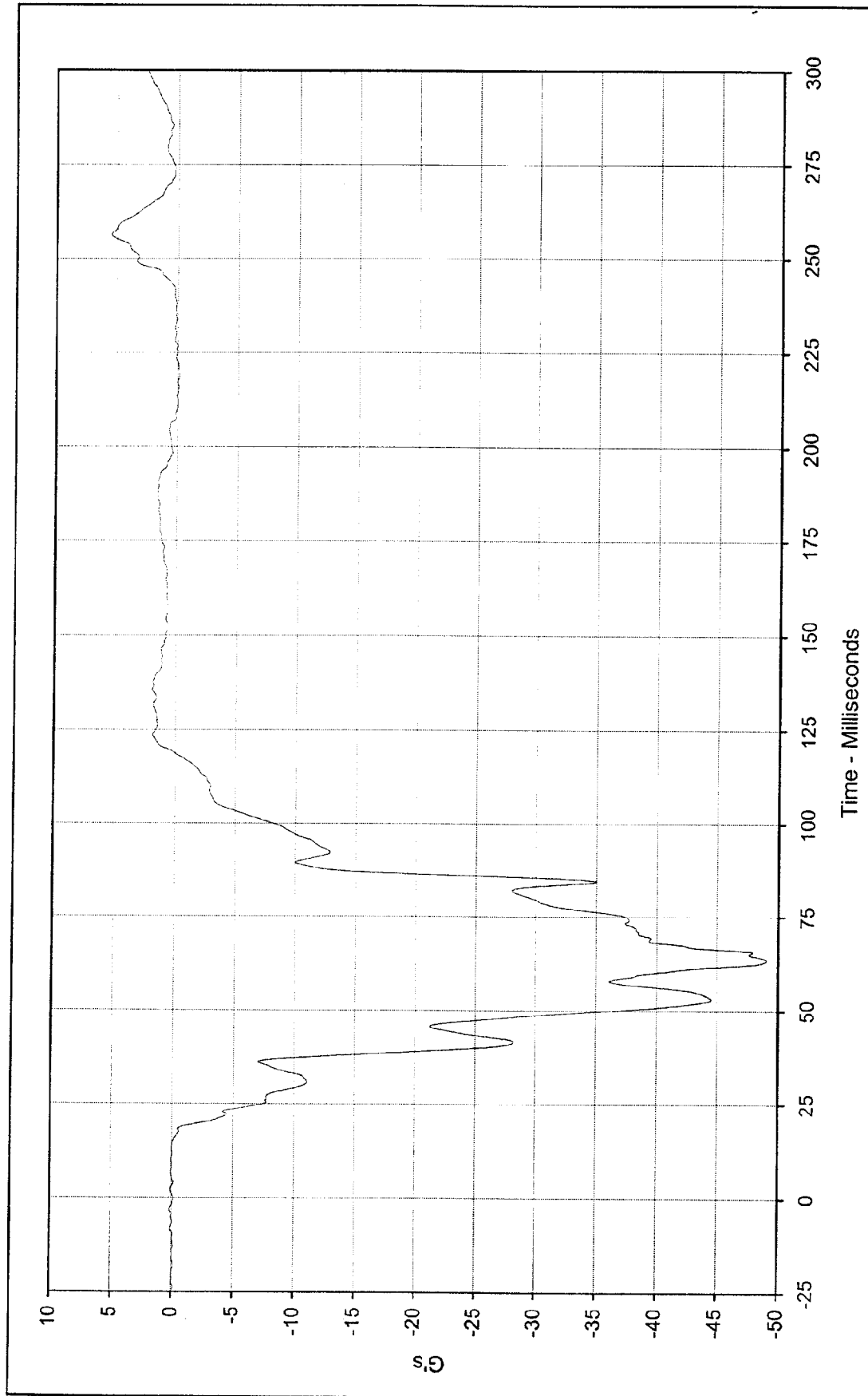






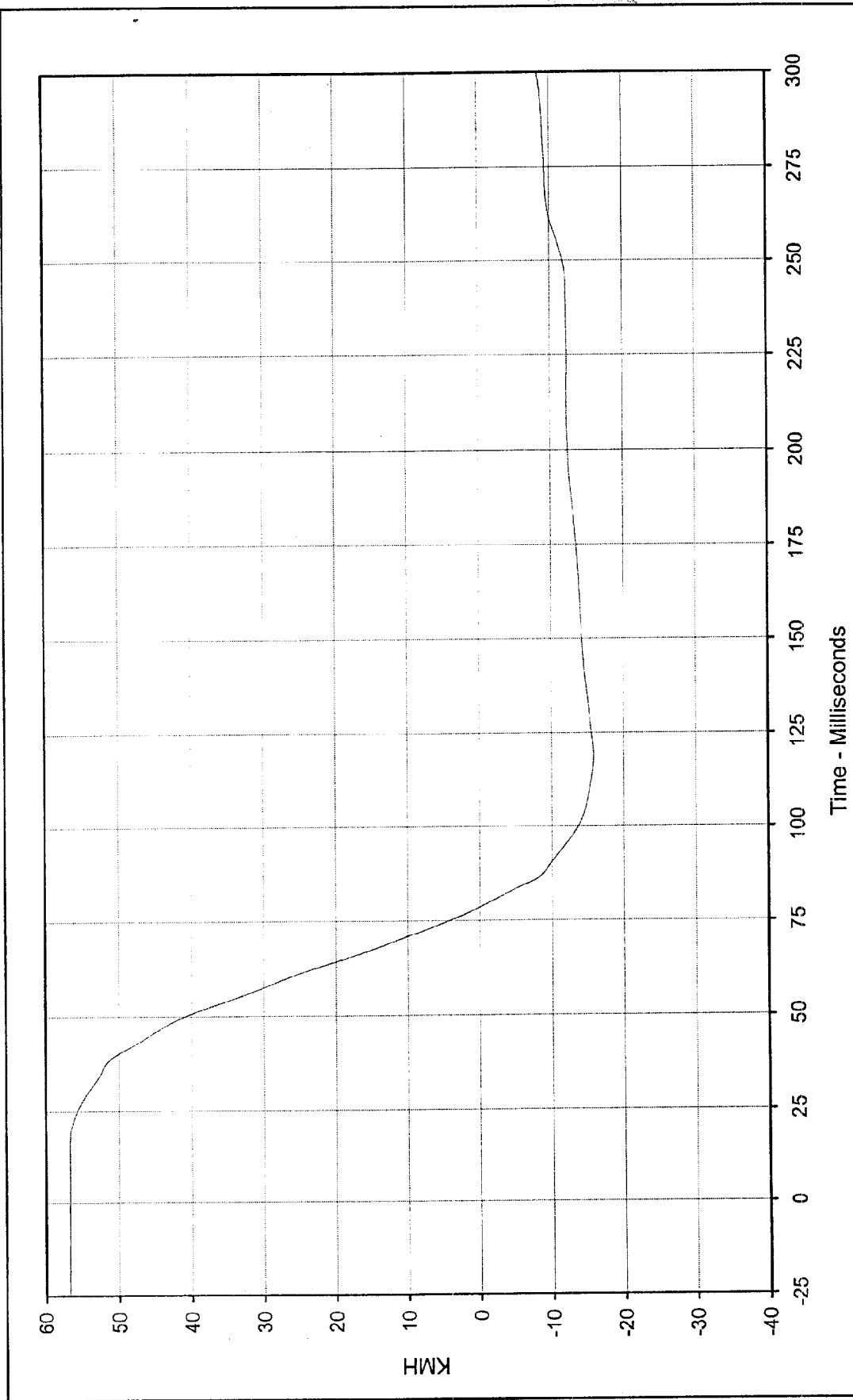
Curve Description: Passenger Neck Moment Resultant		Test Program: 1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	49.6 at 63.5 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)
Minimum Value:	0.1 at 6.3 Milliseconds		
SAE Filter Class:	600		
Date of Test:	2/25/99		
Curve Number:	RES-054		





Curve Description:	Passenger Chest Primary X	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	5.5 at 256.4 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-49.0 at 63.4 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/25/99			
Curve Number:	FIL-057			

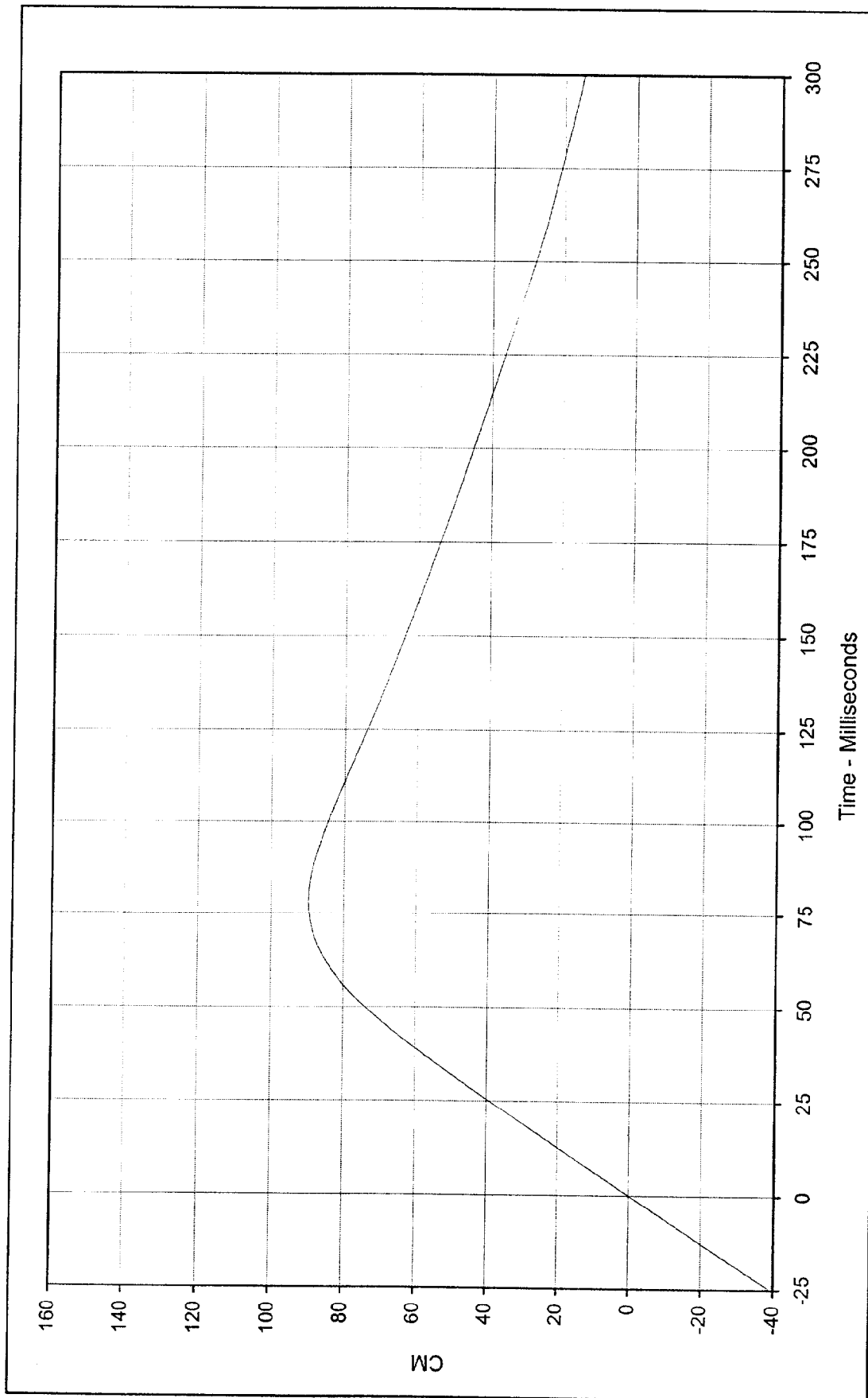




Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

Curve Description: Passenger Chest Primary X Velocity
 Maximum Value: 56.7 at 10.9 Milliseconds
 Minimum Value: -15.8 at 118.8 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: IN1-057

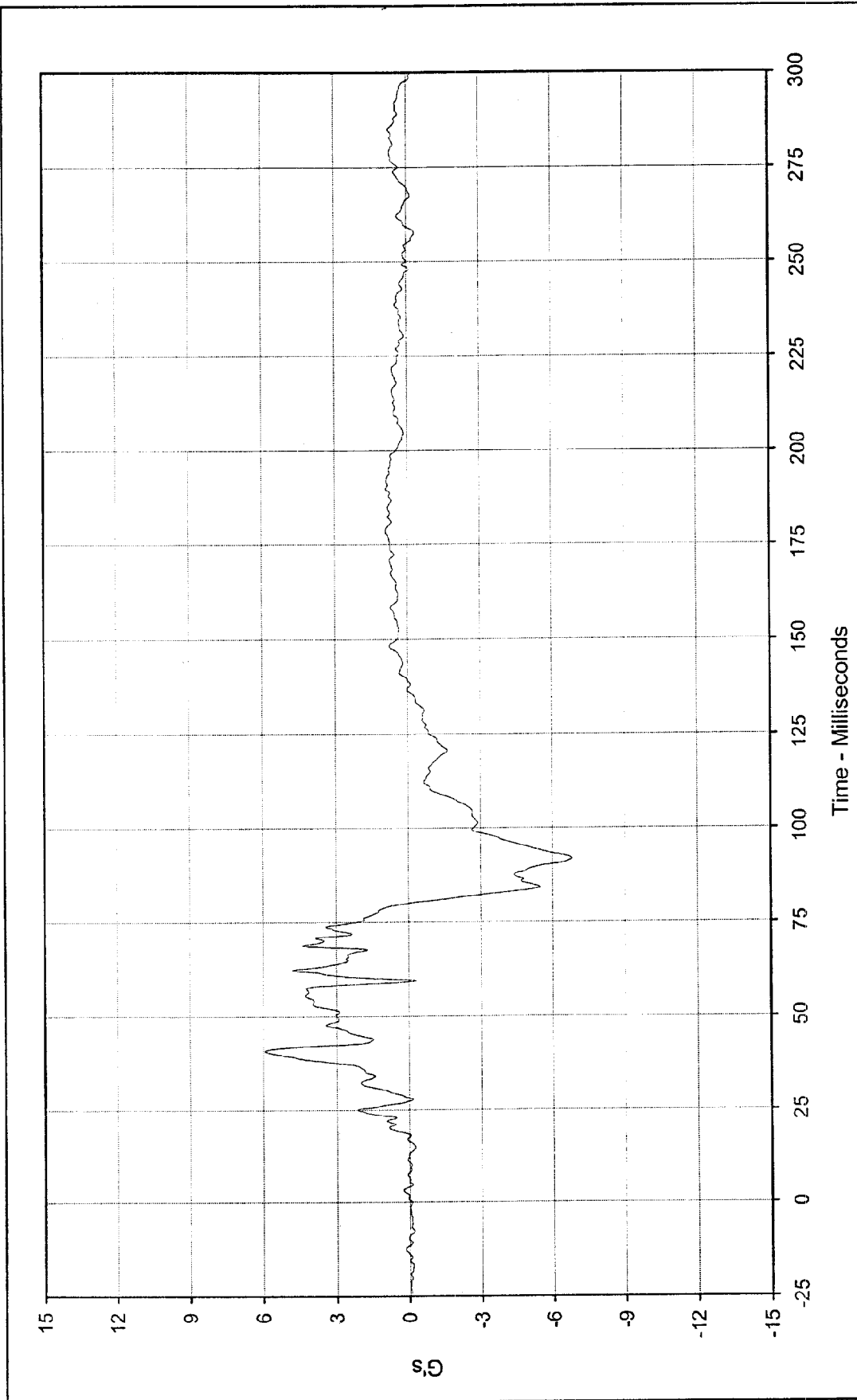




Curve Description: Passenger Chest Primary X Displ.
 Maximum Value: 89.6 at 78.4 Milliseconds
 Minimum Value: 0.0 at 0.0 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: IN2-057

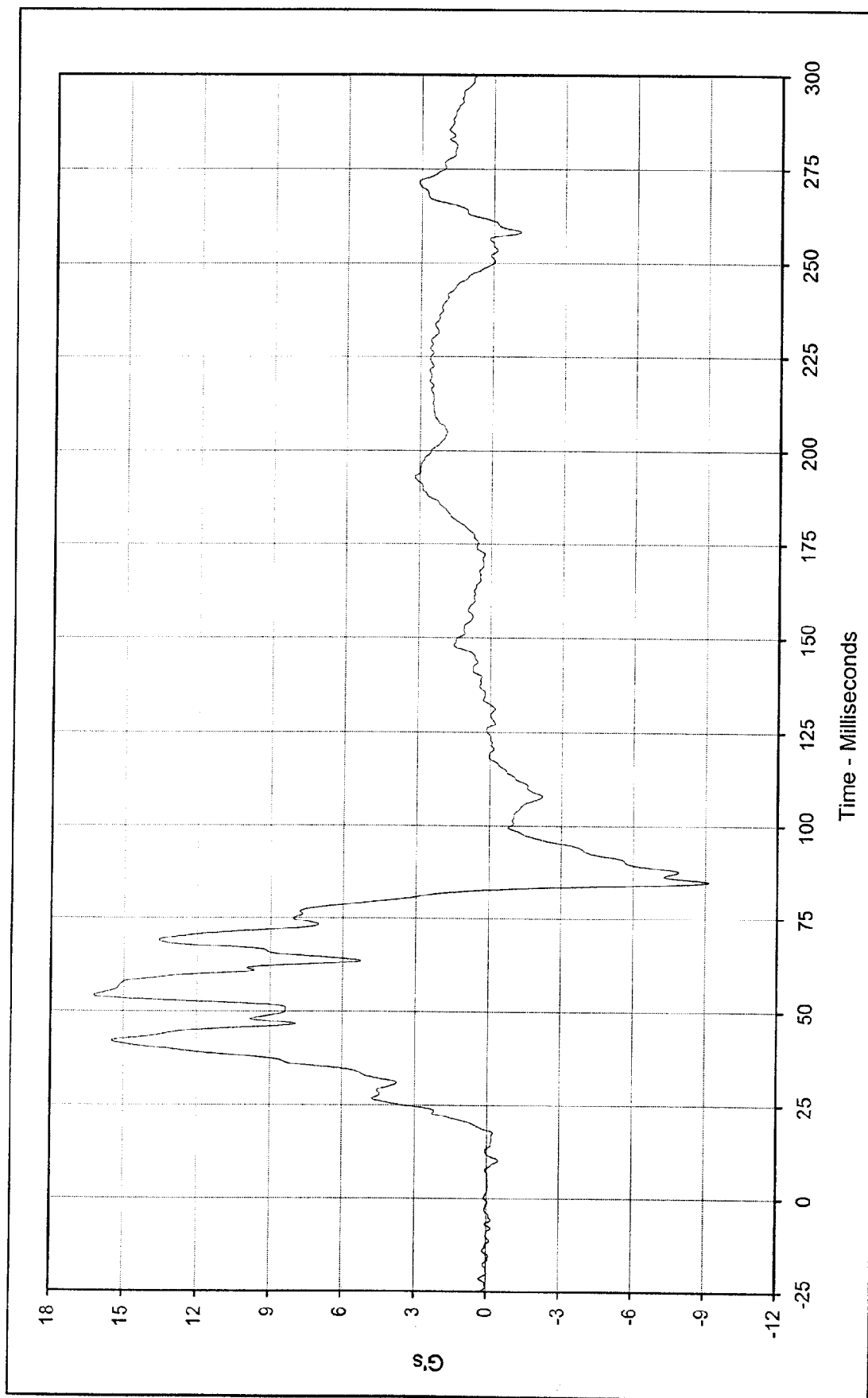
Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





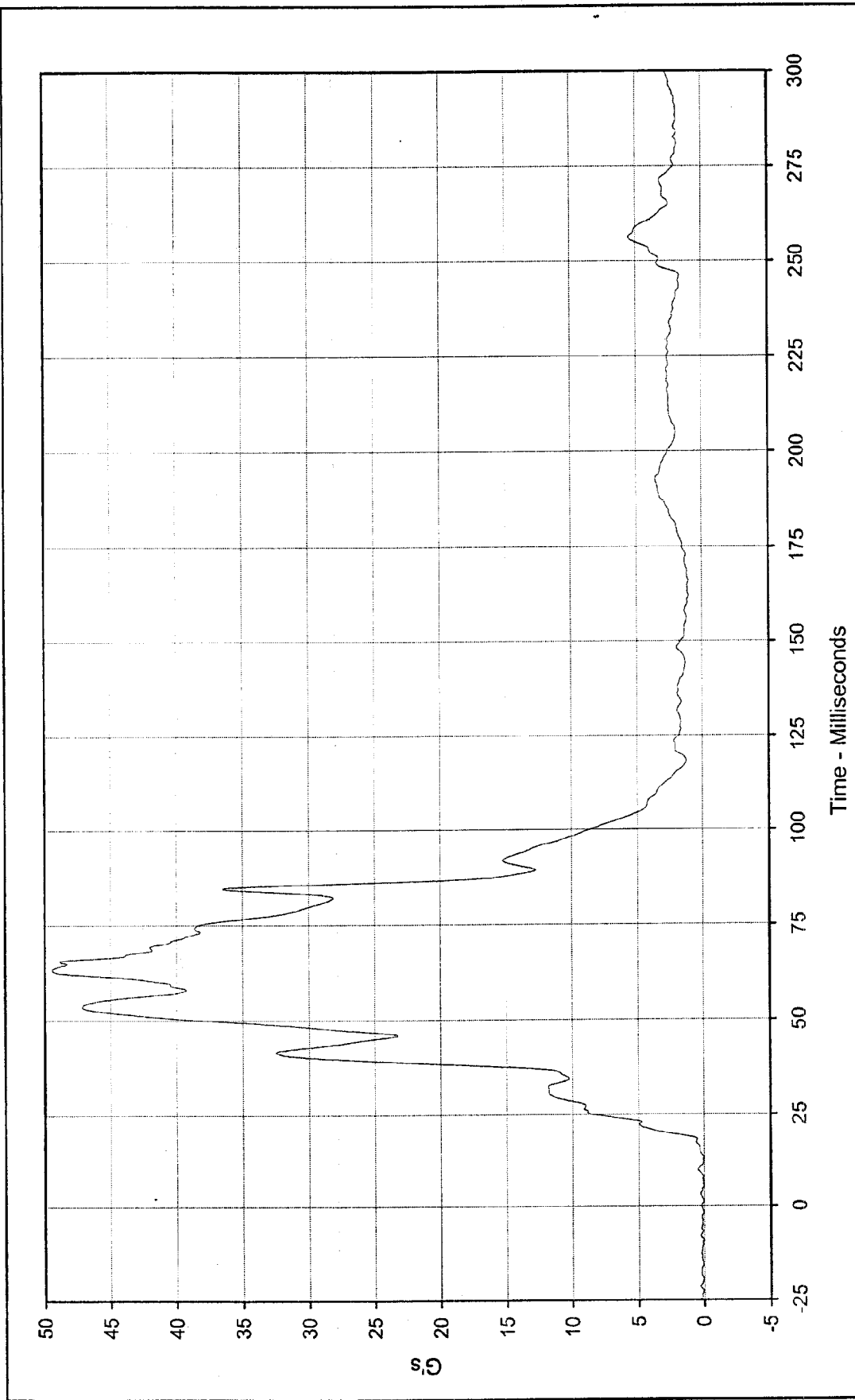
Curve Description:	Passenger Chest Primary Y	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	5.9 at 40.7 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-6.8 at 91.7 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/25/99			
Curve Number:	FIL-058			





Curve Description:	Passenger Chest Primary Z		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	16.2	at 54.2	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-9.2	at 84.7			
SAE Filter Class:	180				
Date of Test:	2/25/99				
Curve Number:	FIL-059				

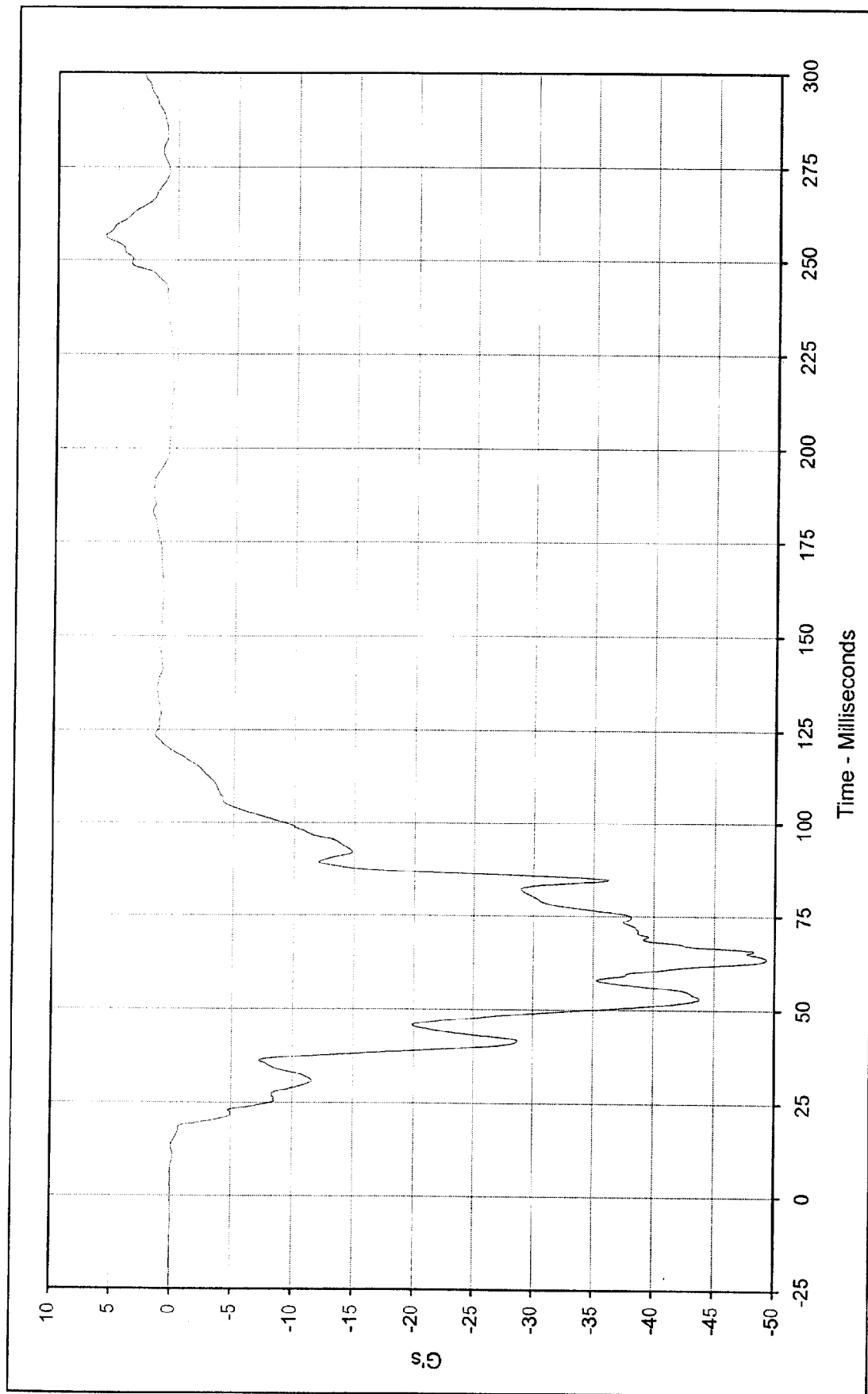




Curve Description: Passenger Chest Resultant Primary
 Maximum Value: 49.4 at 63.3 Milliseconds
 Minimum Value: 0.0 at 13.3 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: RES-057

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

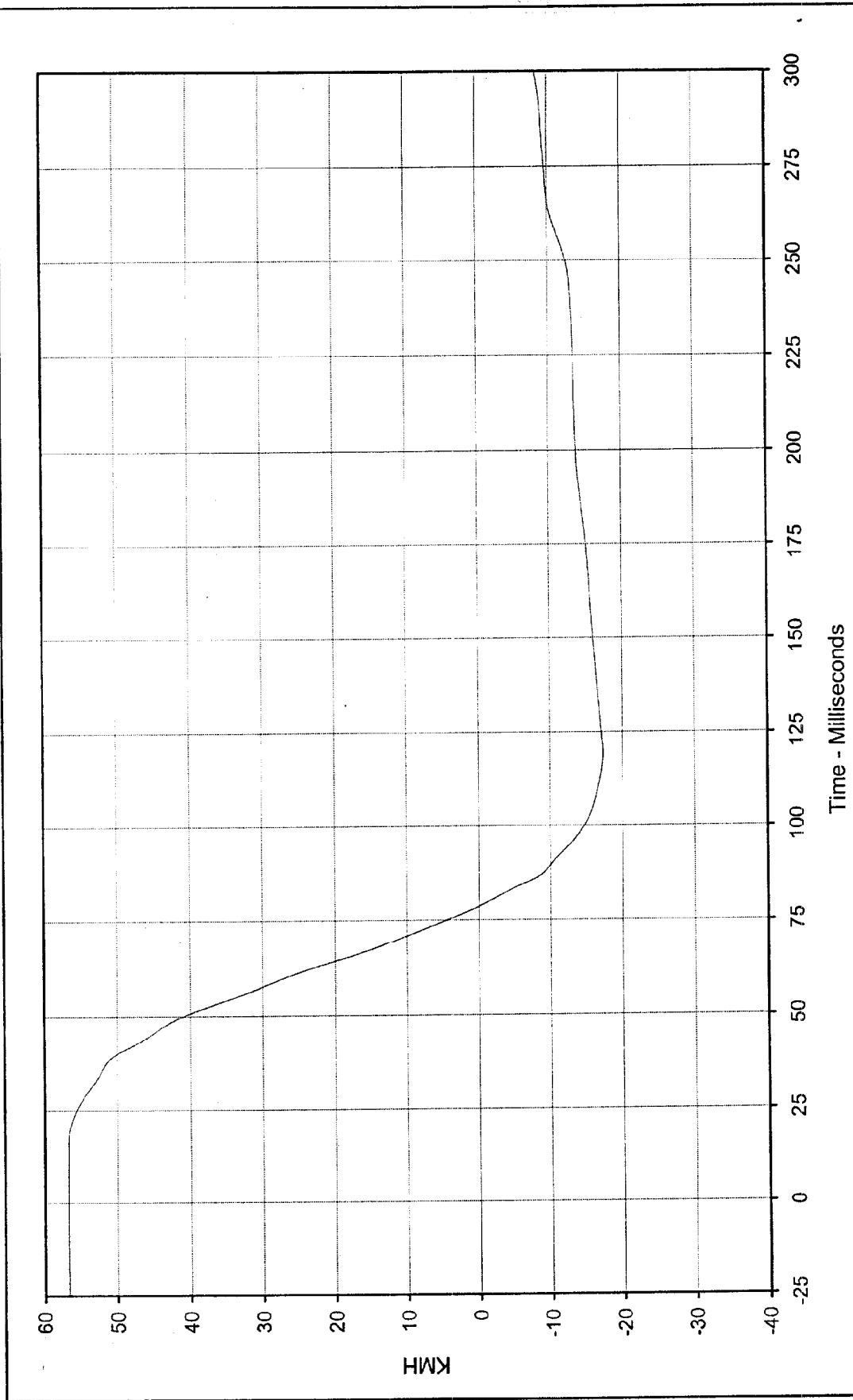




Curve Description: Passenger Chest Redundant X
 Maximum Value: 6.0 at 256.6 Milliseconds
 Minimum Value: -49.3 at 63.4 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: FIL-060

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Passenger Chest Redundant X Velocity

Maximum Value: 56.8 at 7.5 Milliseconds

Minimum Value: -17.3 at 119.3 Milliseconds

SAE Filter Class: 180

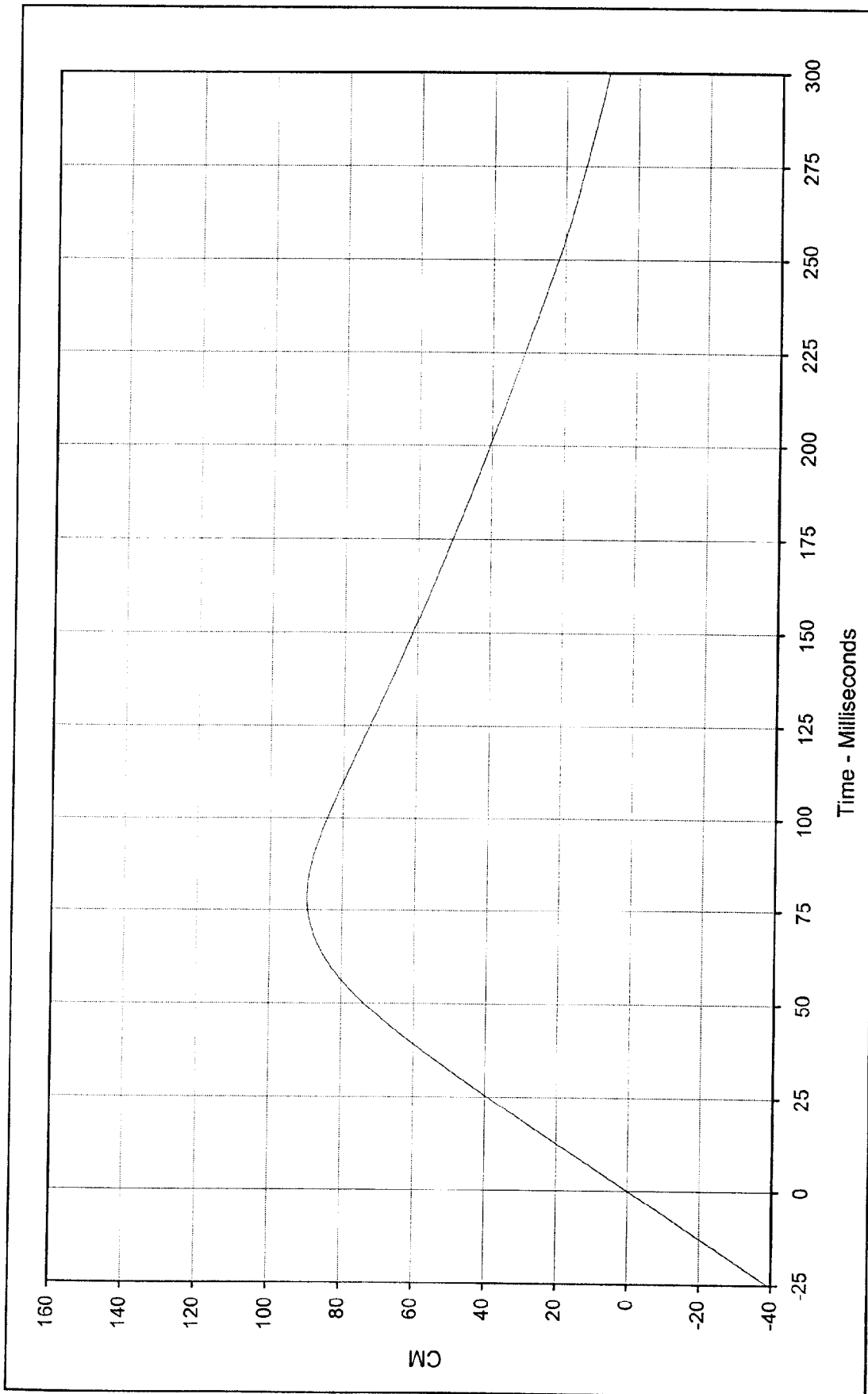
Date of Test: 2/25/99

Curve Number: IN1-060

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Passenger Chest Redundant X Displ.

Maximum Value: 89.7 at 78.6 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

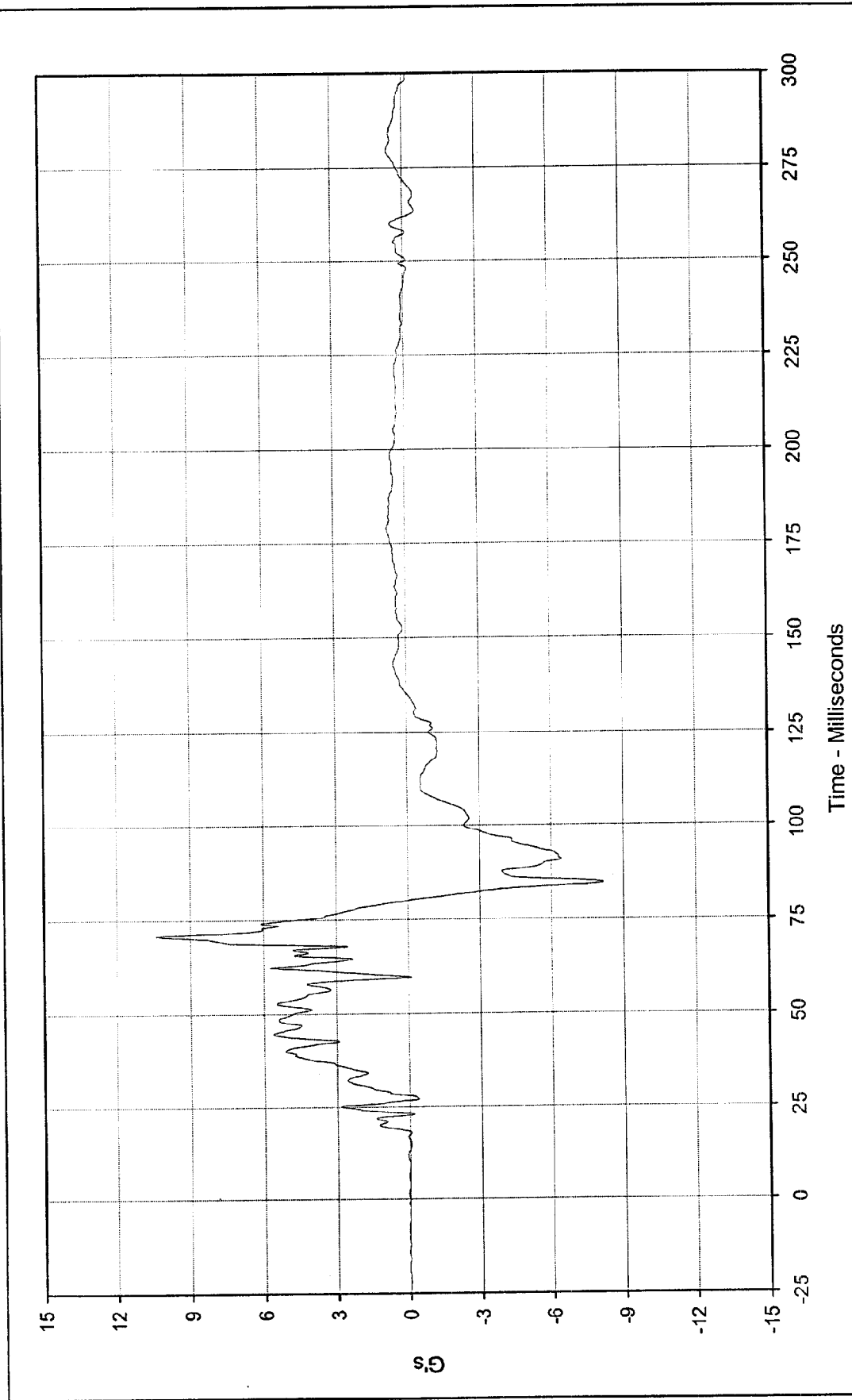
Date of Test: 2/25/99

Curve Number: IN2-060

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)

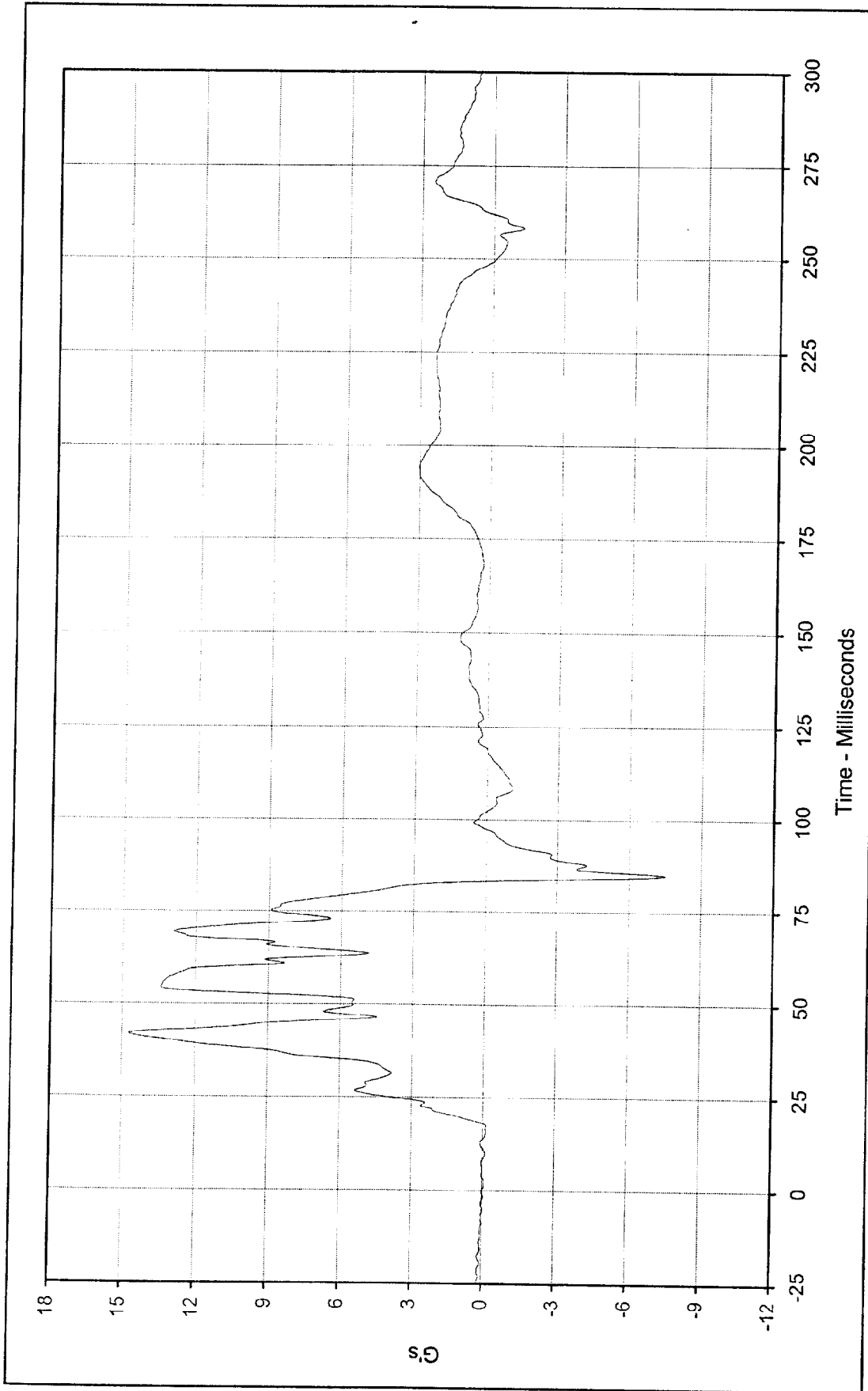




Curve Description: Passenger Chest Redundant Y
 Maximum Value: 10.4 at 70.7 Milliseconds
 Minimum Value: -8.2 at 84.5 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: FIL-061

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

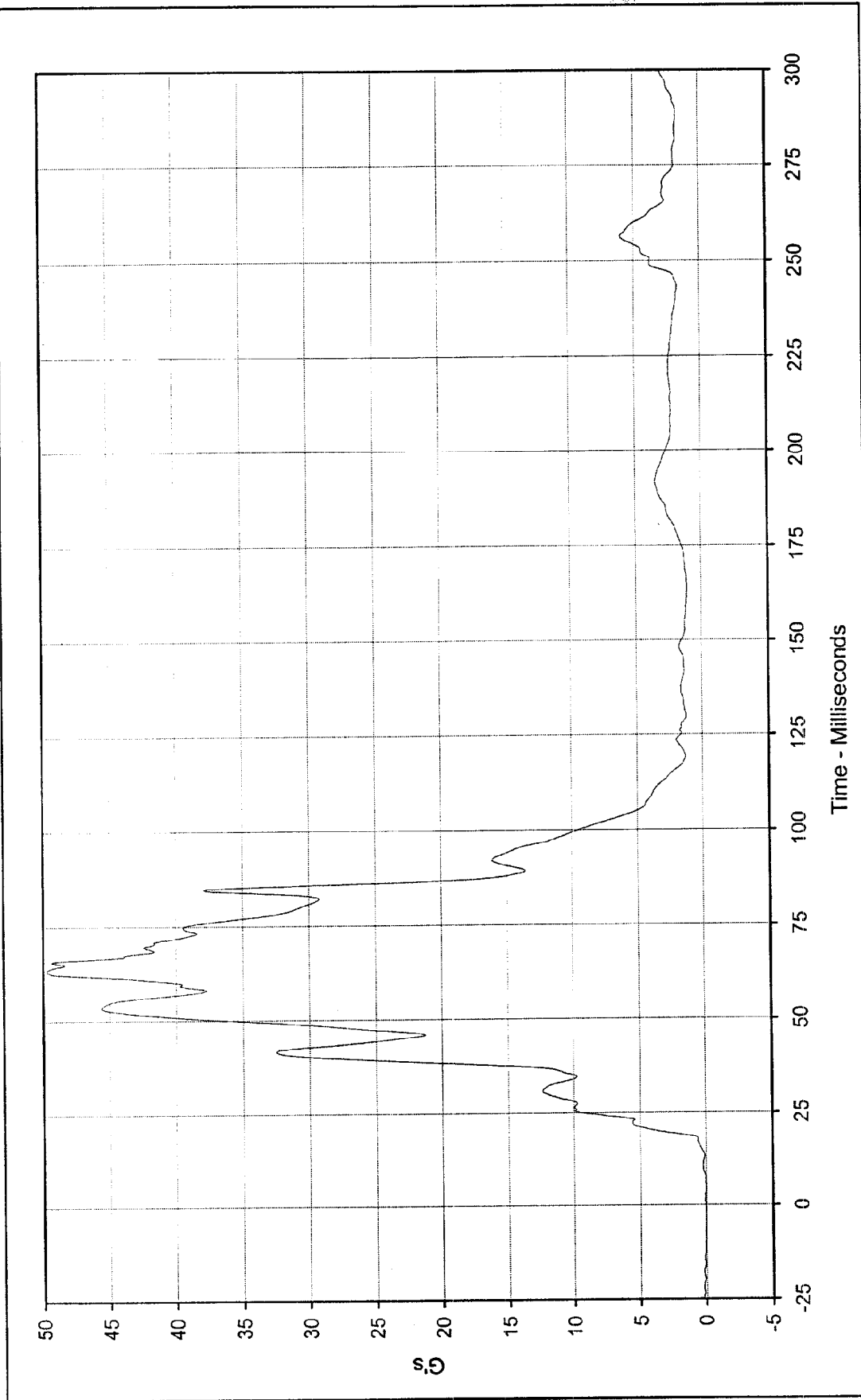




Curve Description: Passenger Chest Redundant Z
 Maximum Value: 14.7 at 41.7 Milliseconds
 Minimum Value: -7.5 at 84.7 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: FIL-062

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

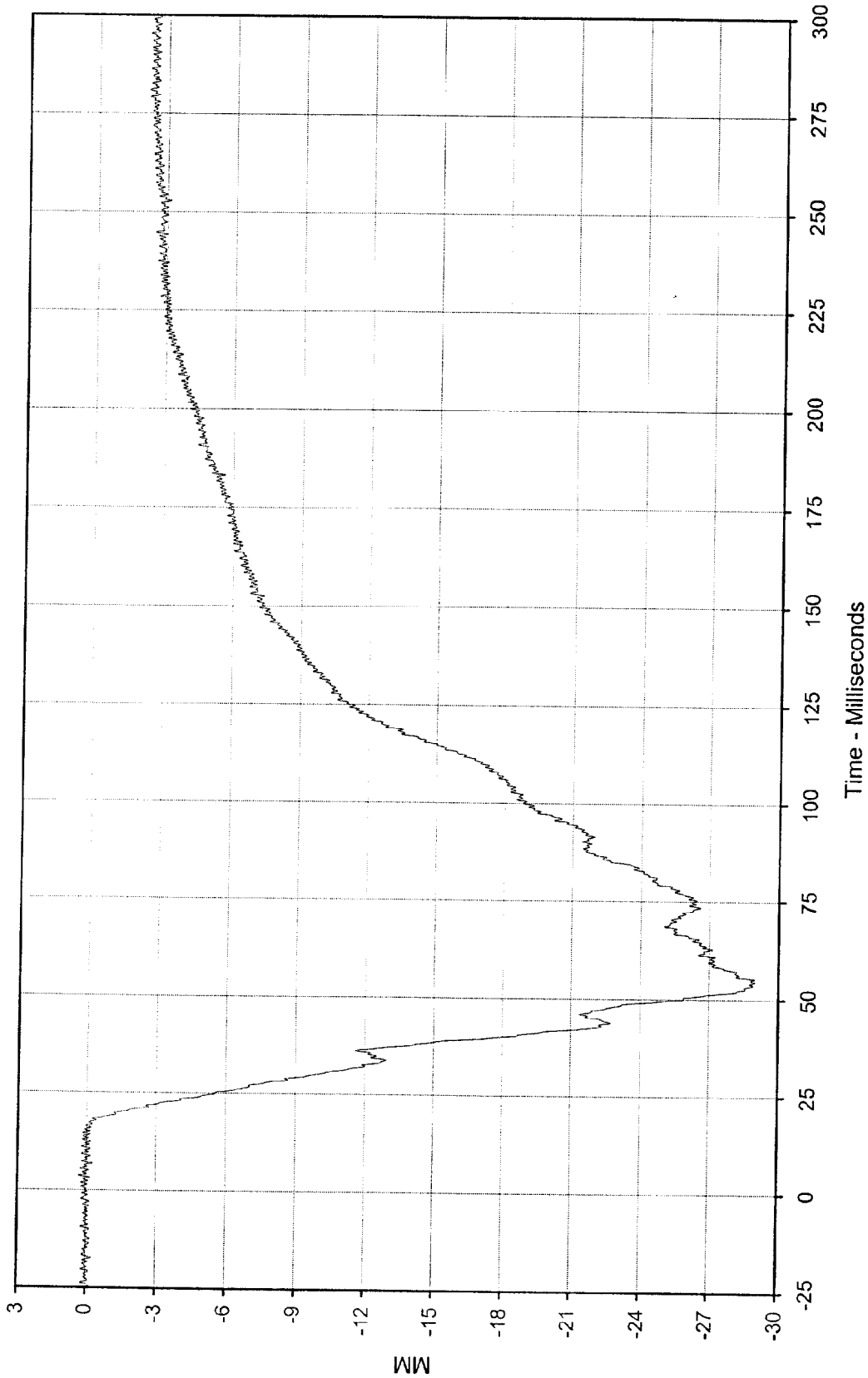




Curve Description: Passenger Chest Resultant Redundant
 Maximum Value: 49.7 at 63.3 Milliseconds
 Minimum Value: 0.0 at 0.1 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: RES-060

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

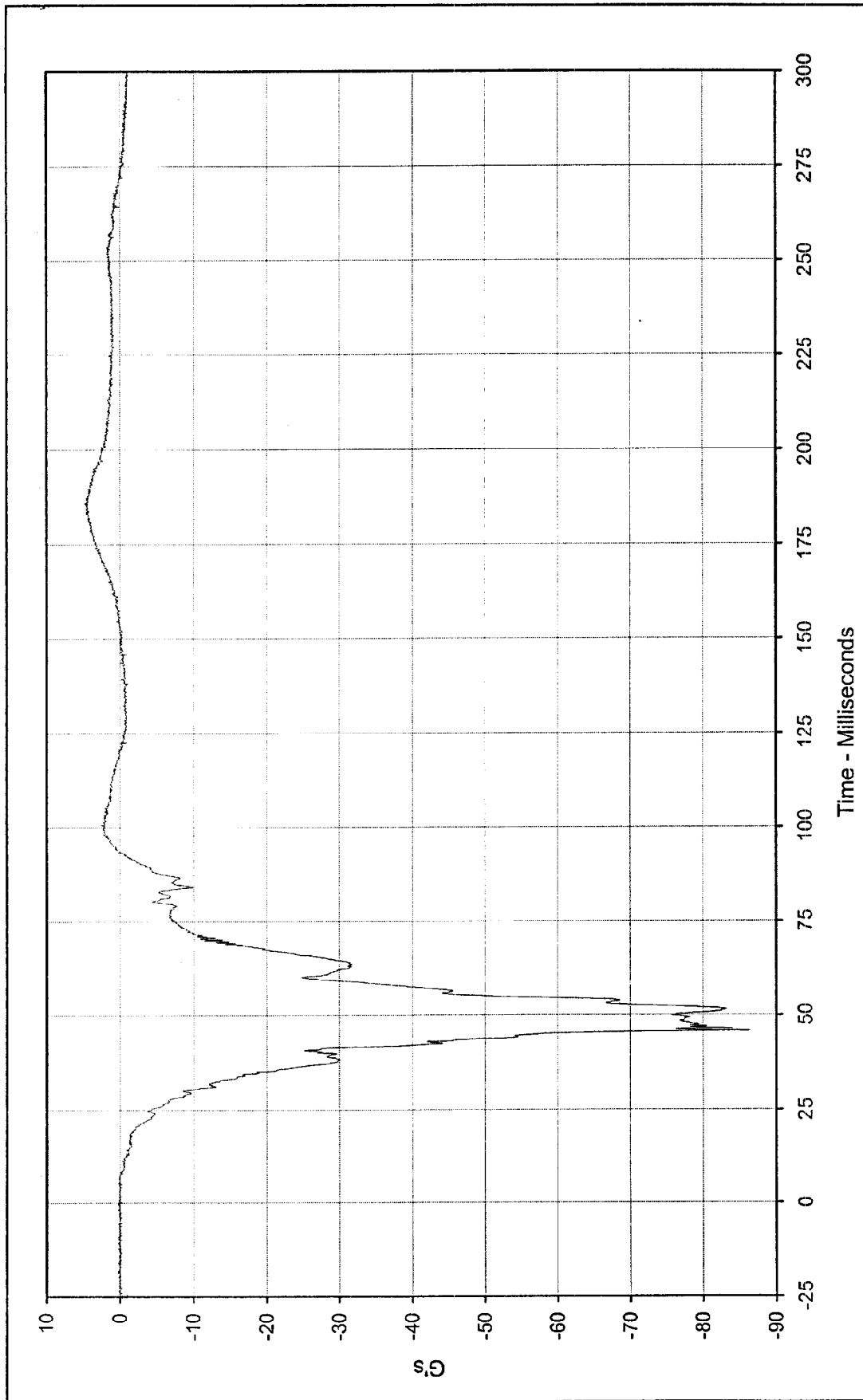




Curve Description: Passenger Chest Displacement X
 Maximum Value: 0.3 at 3.7 Milliseconds
 Minimum Value: -29.0 at 54.5 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/25/99
 Curve Number: FIL-063

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

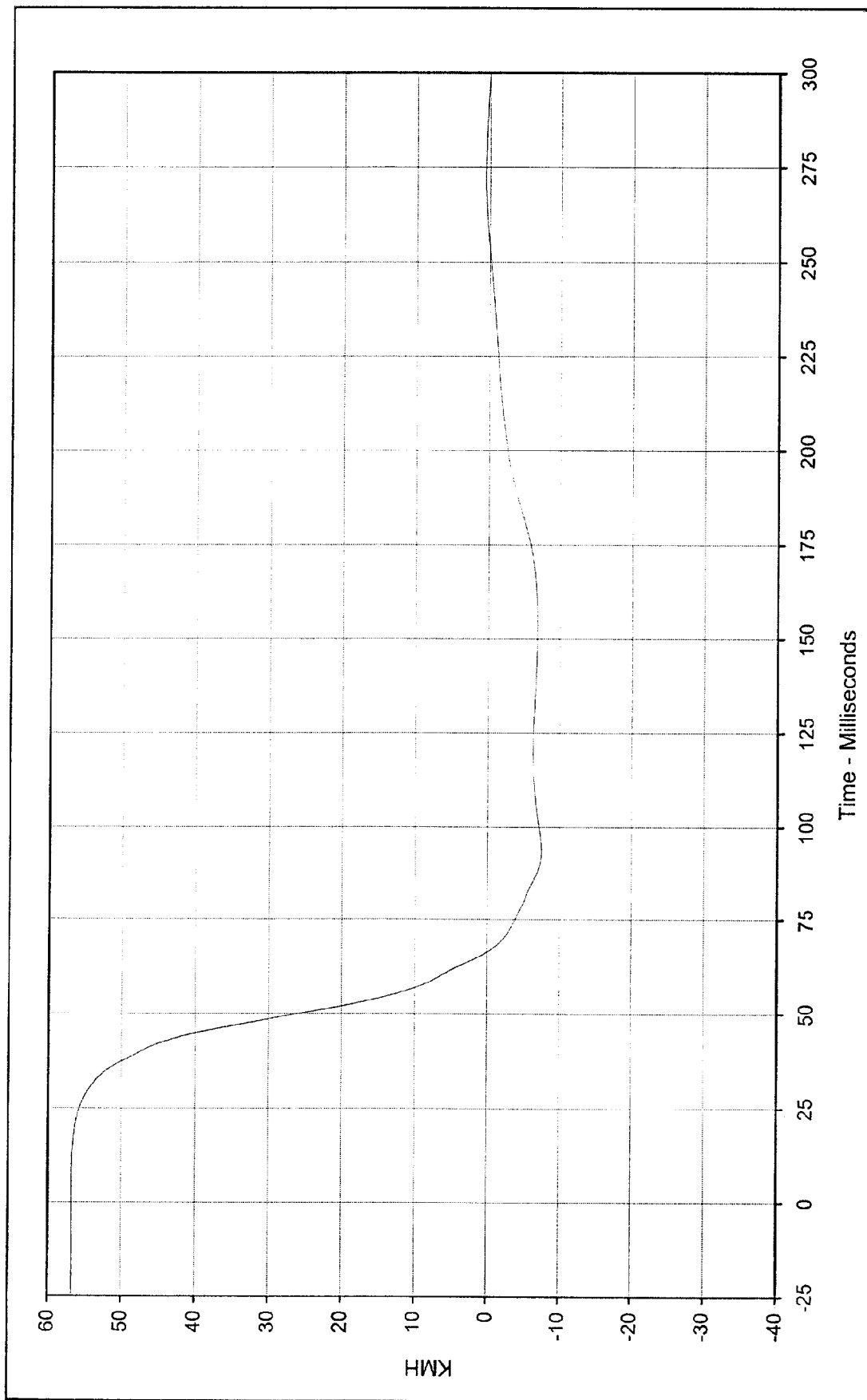




Curve Description: Passenger Pelvis X
 Maximum Value: 4.8 at 185.9 Milliseconds
 Minimum Value: -86.4 at 45.5 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/25/99
 Curve Number: FIL-064

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Program: 1999 Volkswagen Beetle (New)

Maximum Value: 56.8 at 7.6 Milliseconds

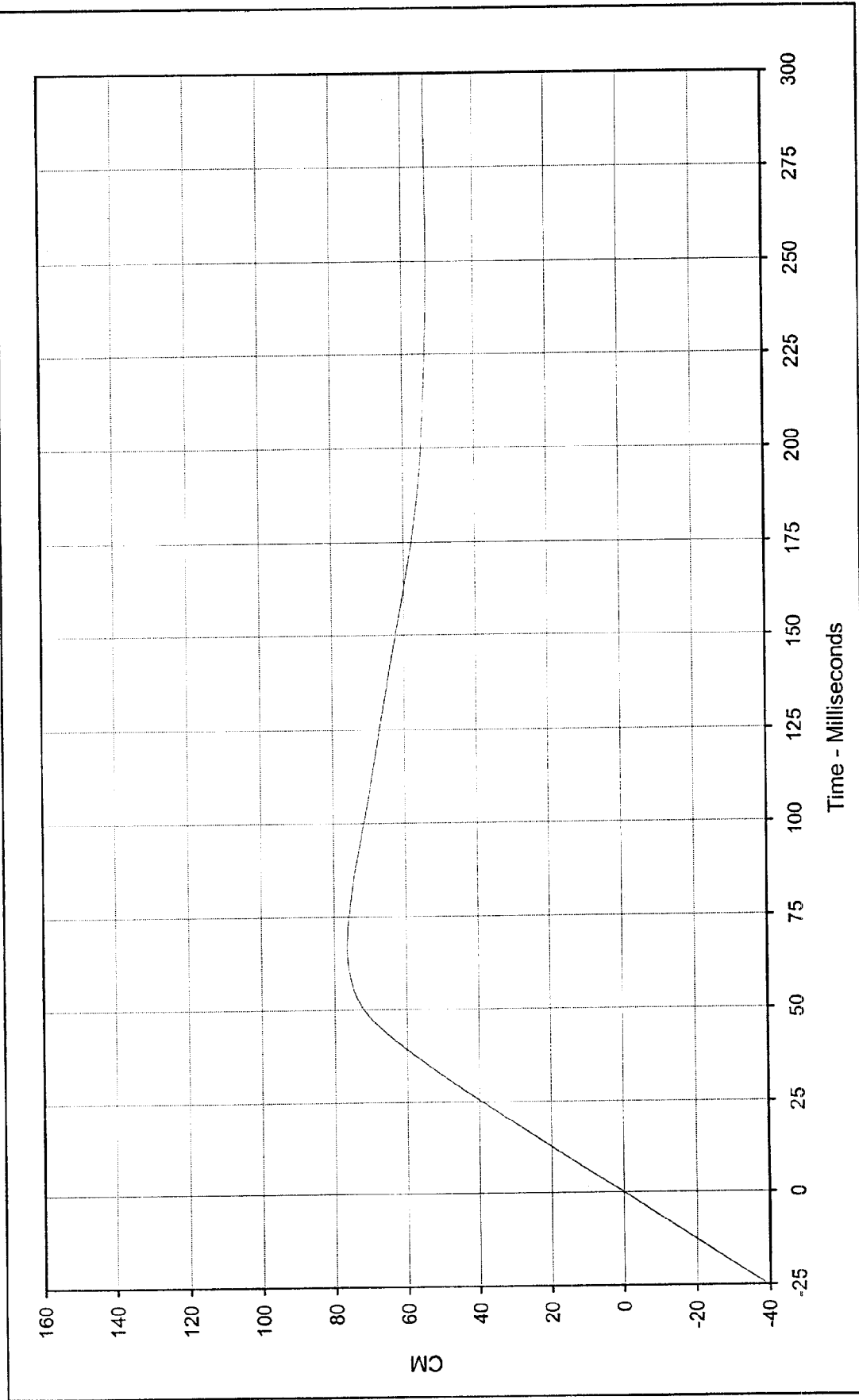
Minimum Value: -7.5 at 93.4 Milliseconds

SAE Filter Class: 180

Date of Test: 2/25/99

Curve Number: IN1-064

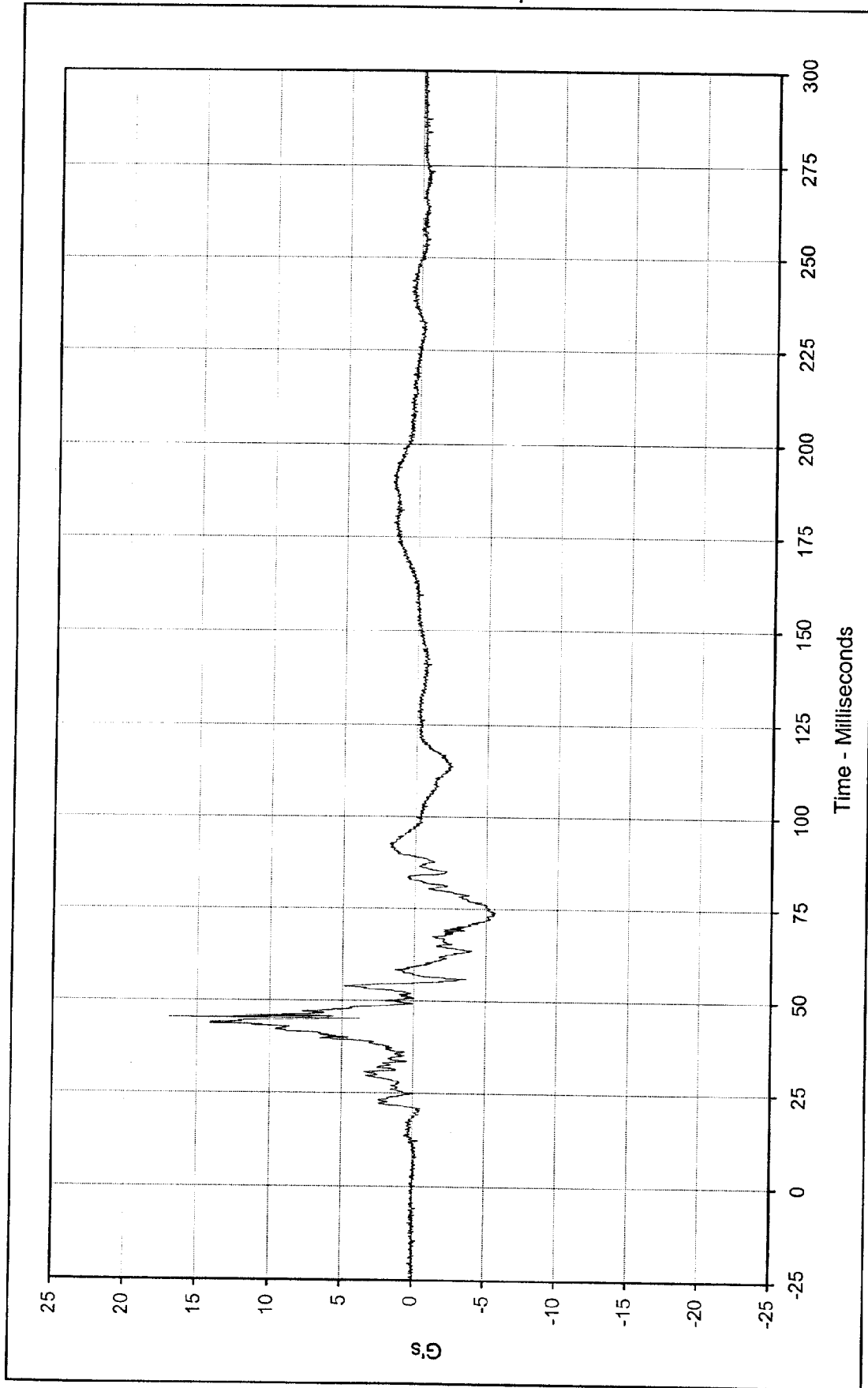




Curve Description: Passenger Pelvis X Displ.
 Maximum Value: 76.4 at 66.4 Milliseconds
 Minimum Value: 0.0 at 0.0 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: IN2-064

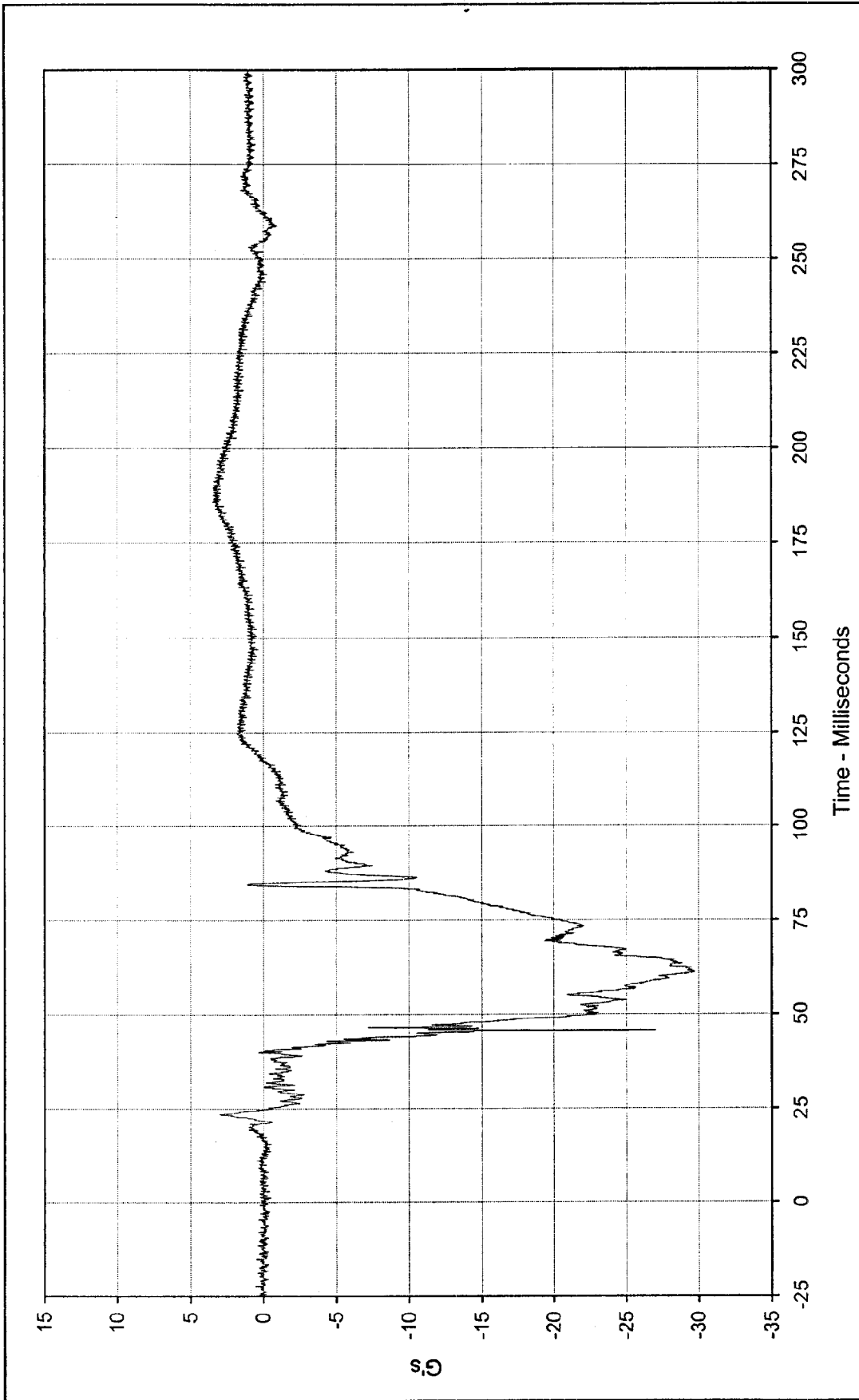
Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





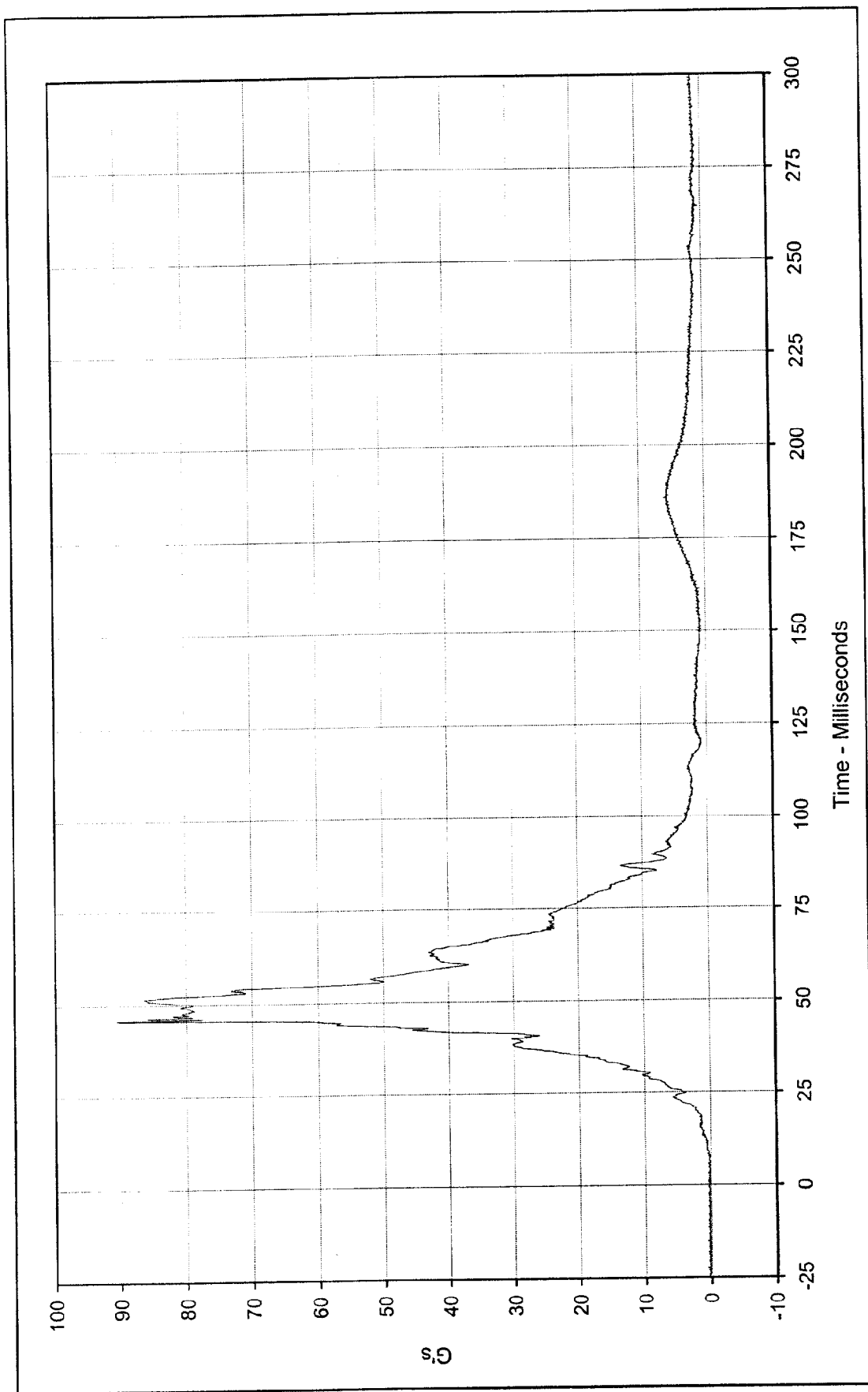
Curve Description:	Passenger Pelvis Y		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	16.8	at 45.4 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-5.7	at 73.7 Milliseconds			
SAE Filter Class:	1000				
Date of Test:	2/25/99				
Curve Number:	FIL-065				





Curve Description:	Passenger Pelvis Z		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	3.5	at 185.9	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-29.7	at 60.9			
SAE Filter Class:	1000				
Date of Test:	2/25/99				
Curve Number:	FIL-066				
					

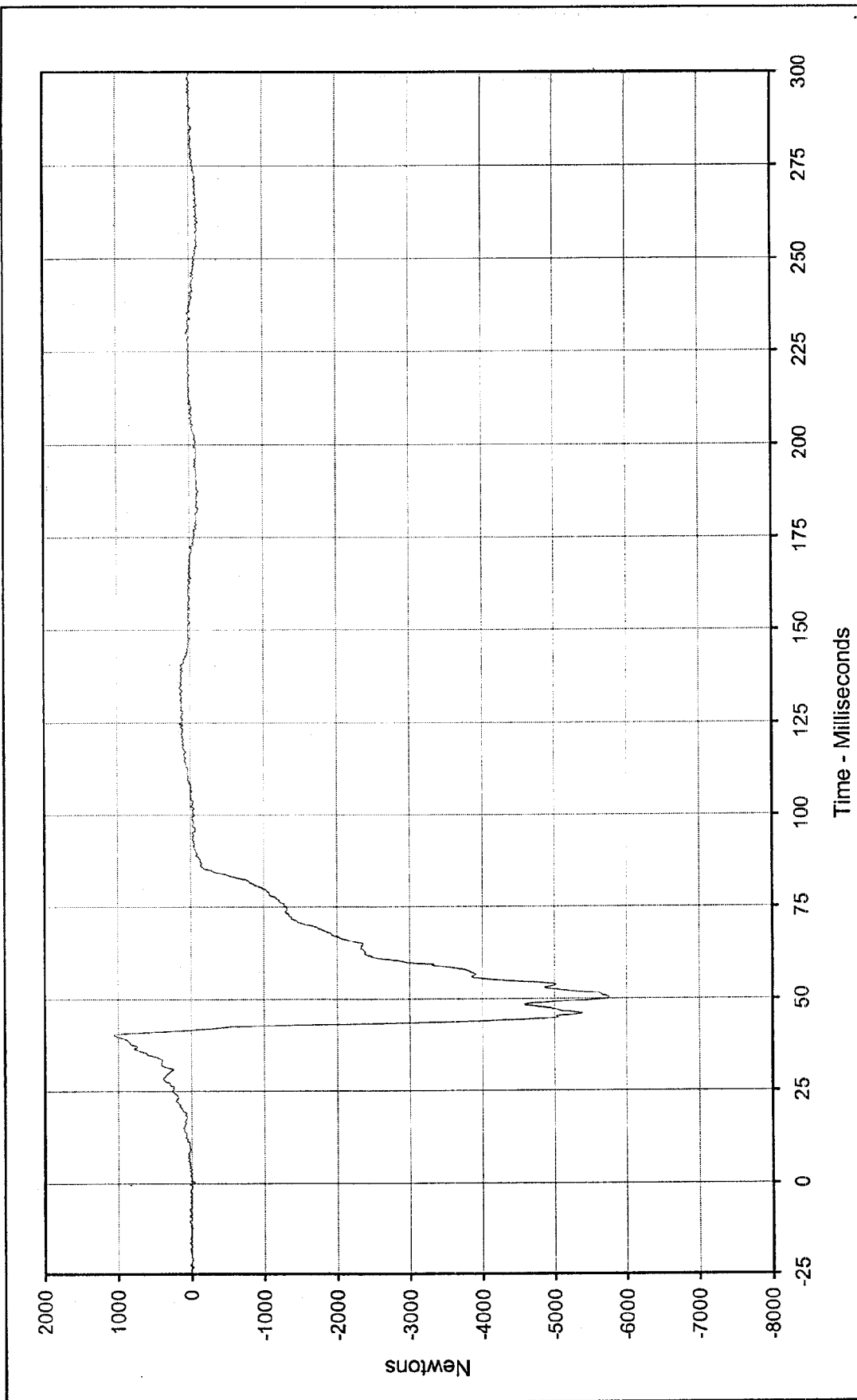




Curve Description: Passenger Pelvis Resultant
 Maximum Value: 90.6 at 45.5 Milliseconds
 Minimum Value: 0.0 at 1.0 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/25/99
 Curve Number: RES-064

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

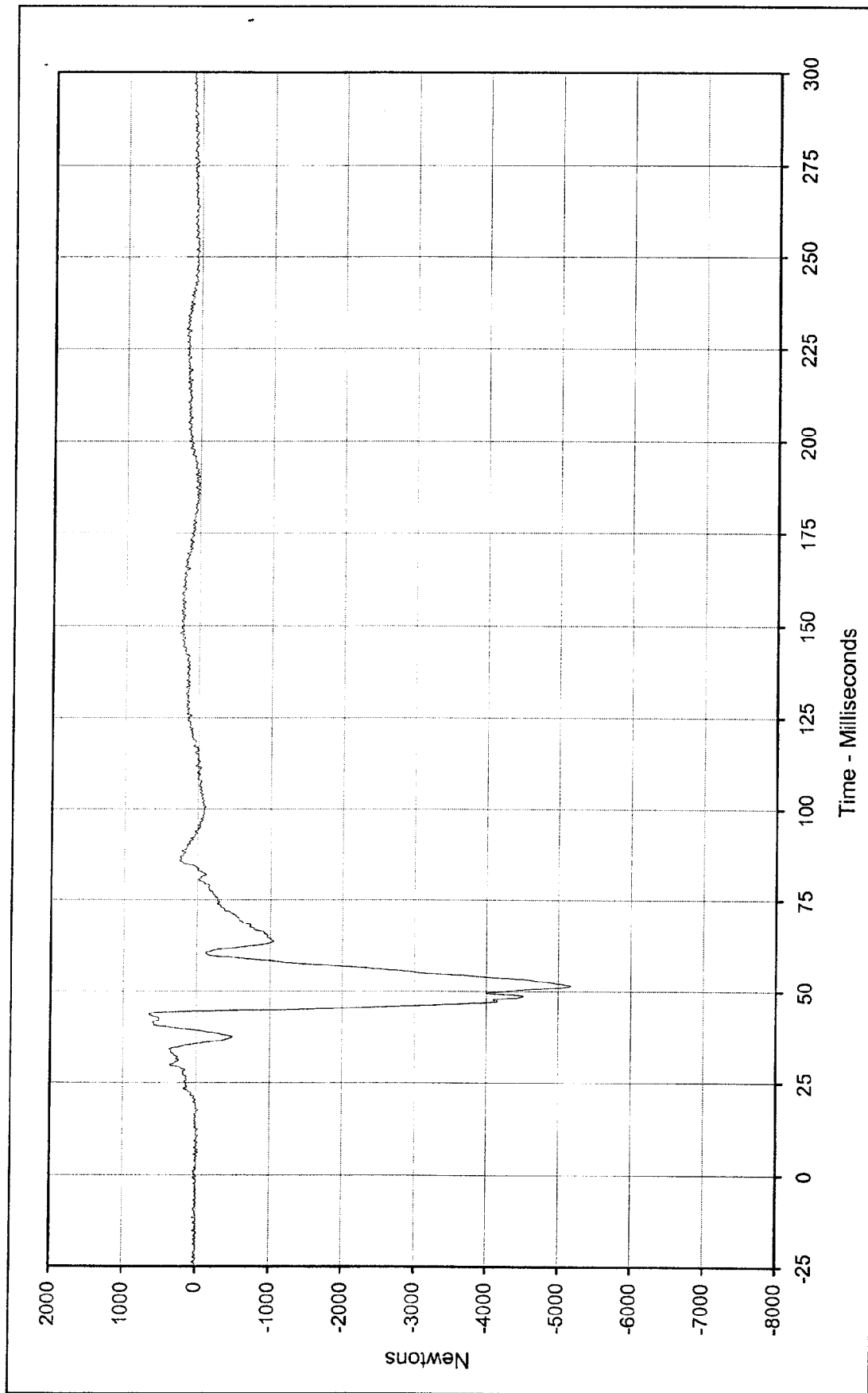




Curve Description:	Passenger Left Femur Force		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	1054.1	at 40.4	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-5761.4	at 50.2			
SAE Filter Class:	600				
Date of Test:	2/25/99				
Curve Number:	FIL-067				



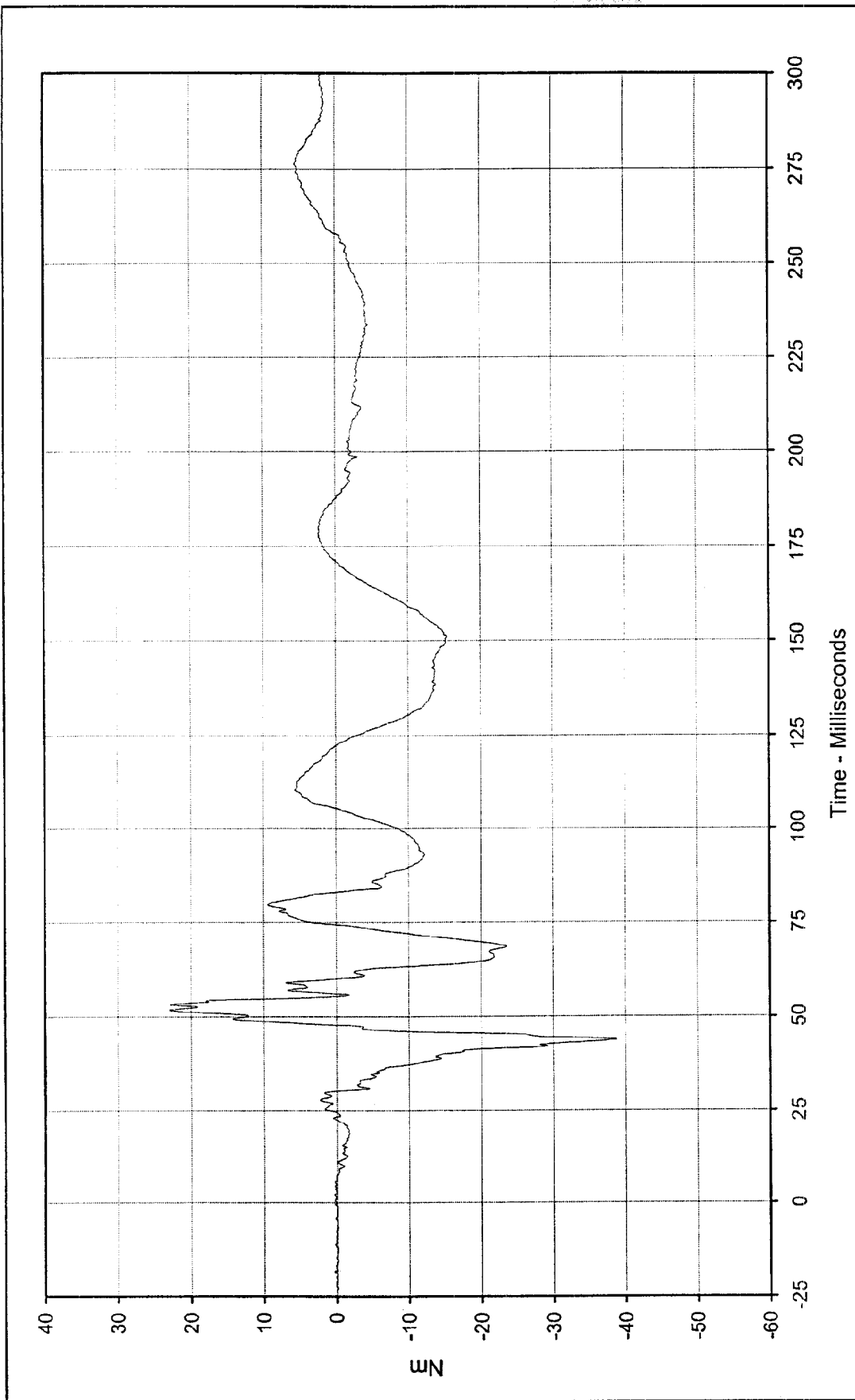




Curve Description: Passenger Right Femur Force
 Maximum Value: 649.3 at 43.9 Milliseconds
 Minimum Value: -5174.5 at 51.6 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/25/99
 Curve Number: FIL-068

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Passenger Left Upper Tibia Moment X

Maximum Value: 23.0 at 51.8 Milliseconds

Minimum Value: -38.8 at 43.6 Milliseconds

SAE Filter Class: 600

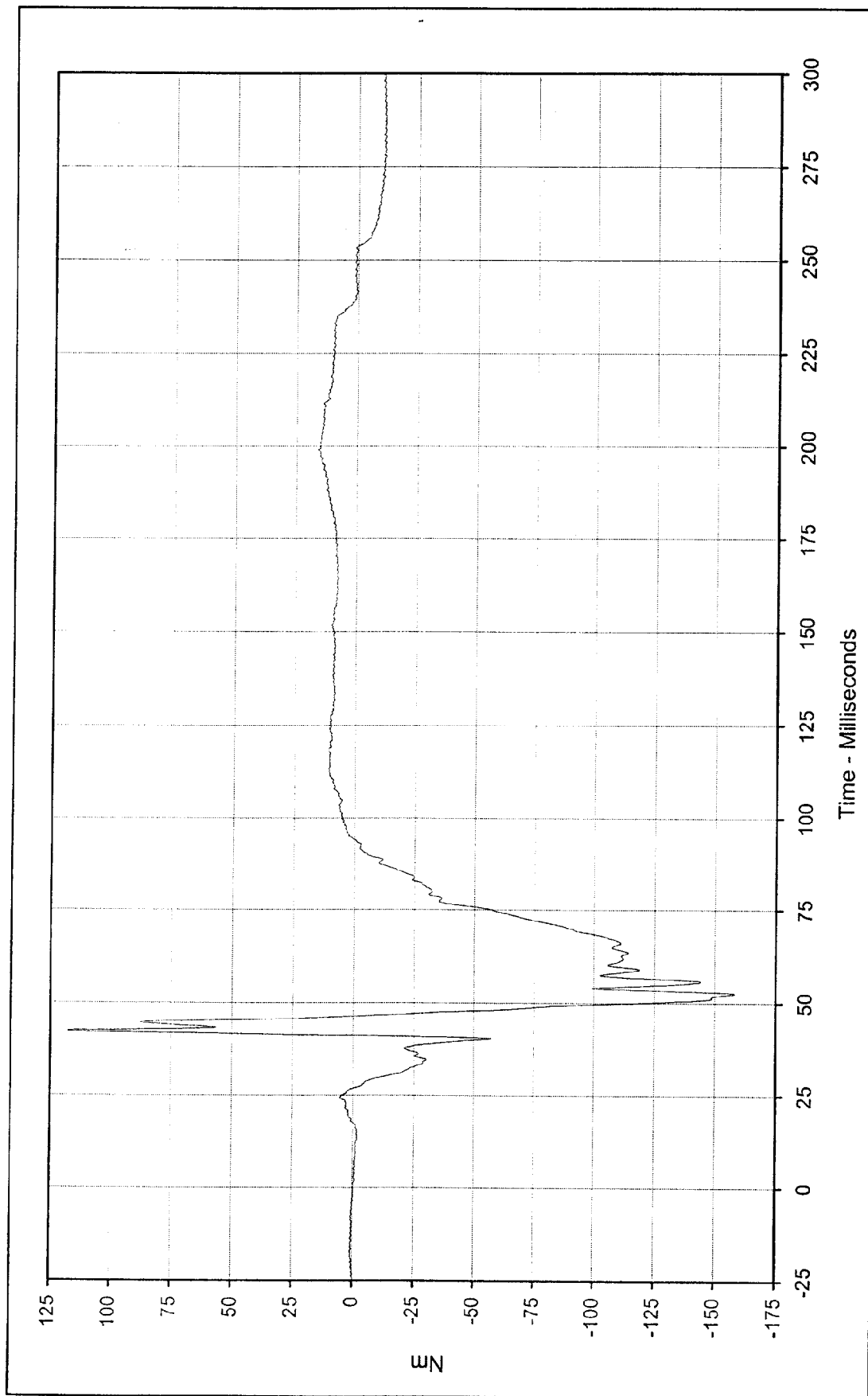
Date of Test: 2/25/99

Curve Number: FIL-069

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Passenger Left Upper Tibia Moment Y

Maximum Value: 117.9 at 42.2 Milliseconds

Minimum Value: -158.3 at 52.5 Milliseconds

SAE Filter Class: 600

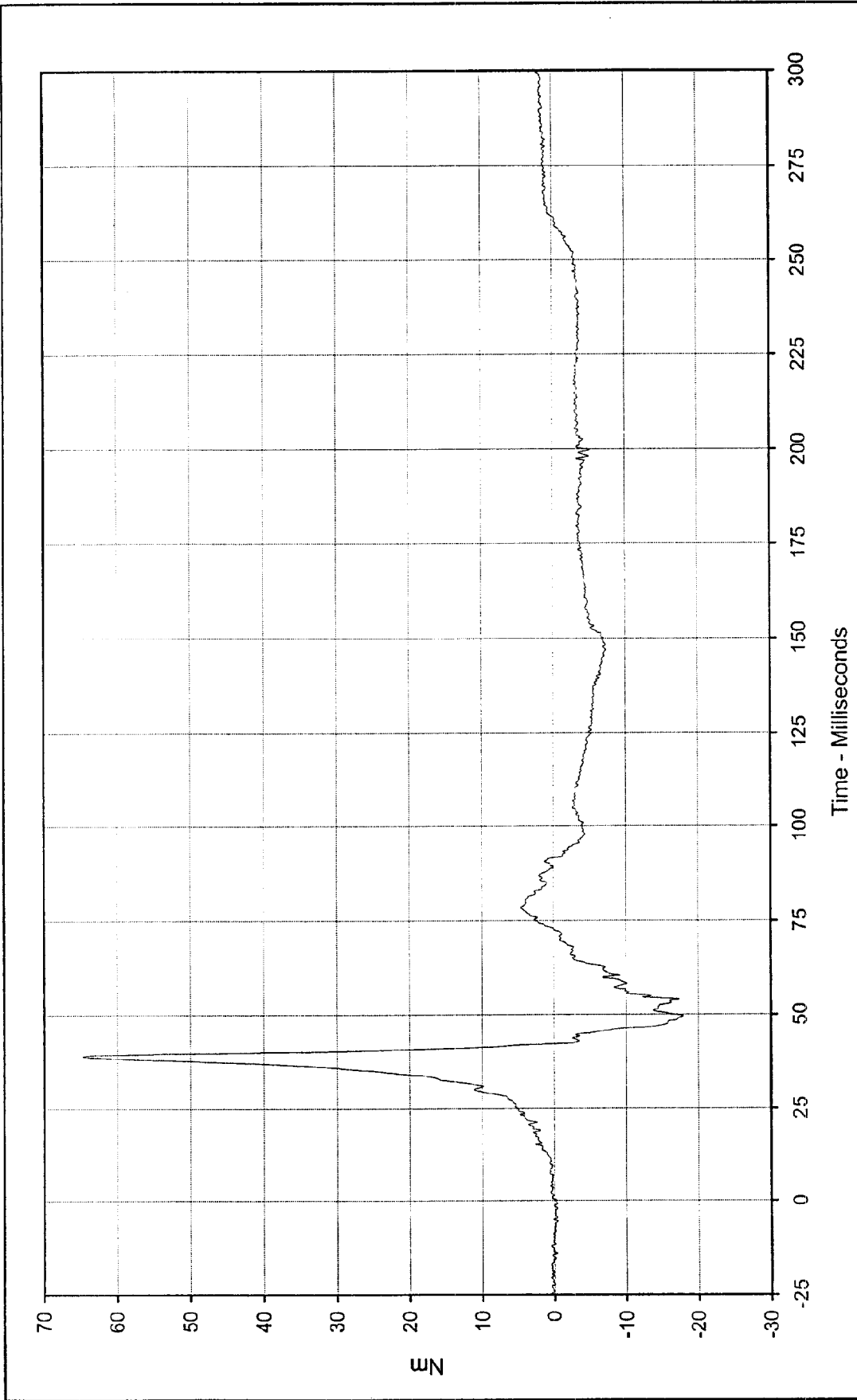
Date of Test: 2/25/99

Curve Number: FIL-070

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Passenger Right Upper Tibia Moment X

Maximum Value: 64.7 at 39.0 Milliseconds

Minimum Value: -18.0 at 49.6 Milliseconds

SAE Filter Class: 600

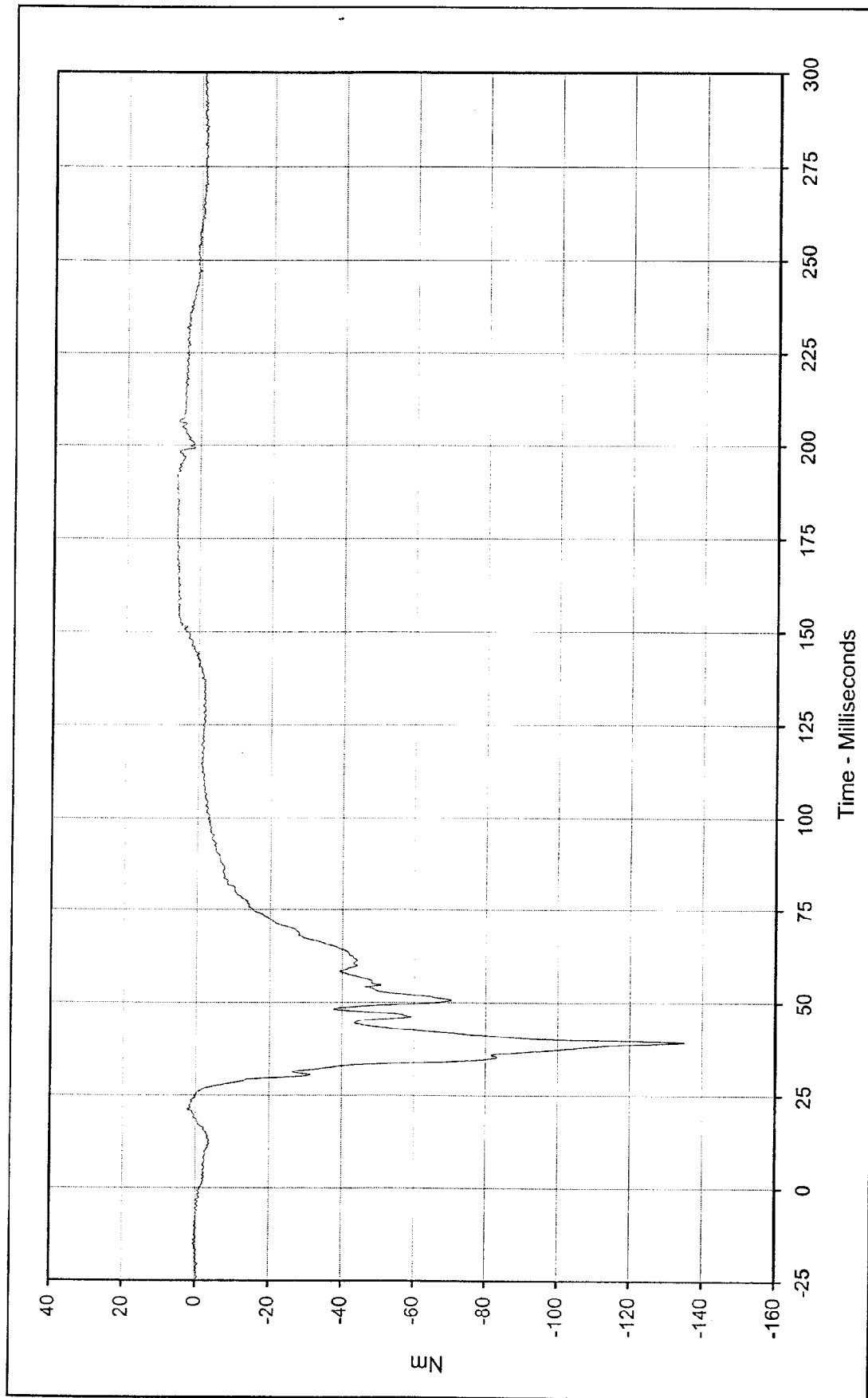
Date of Test: 2/25/99

Curve Number: FIL-071

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Passenger Right Upper Tibia Moment Y

Maximum Value: 6.5 at 188.3 Milliseconds

Minimum Value: -135.1 at 39.3 Milliseconds

SAE Filter Class: 600

Date of Test: 2/25/99

Curve Number: FIL-072

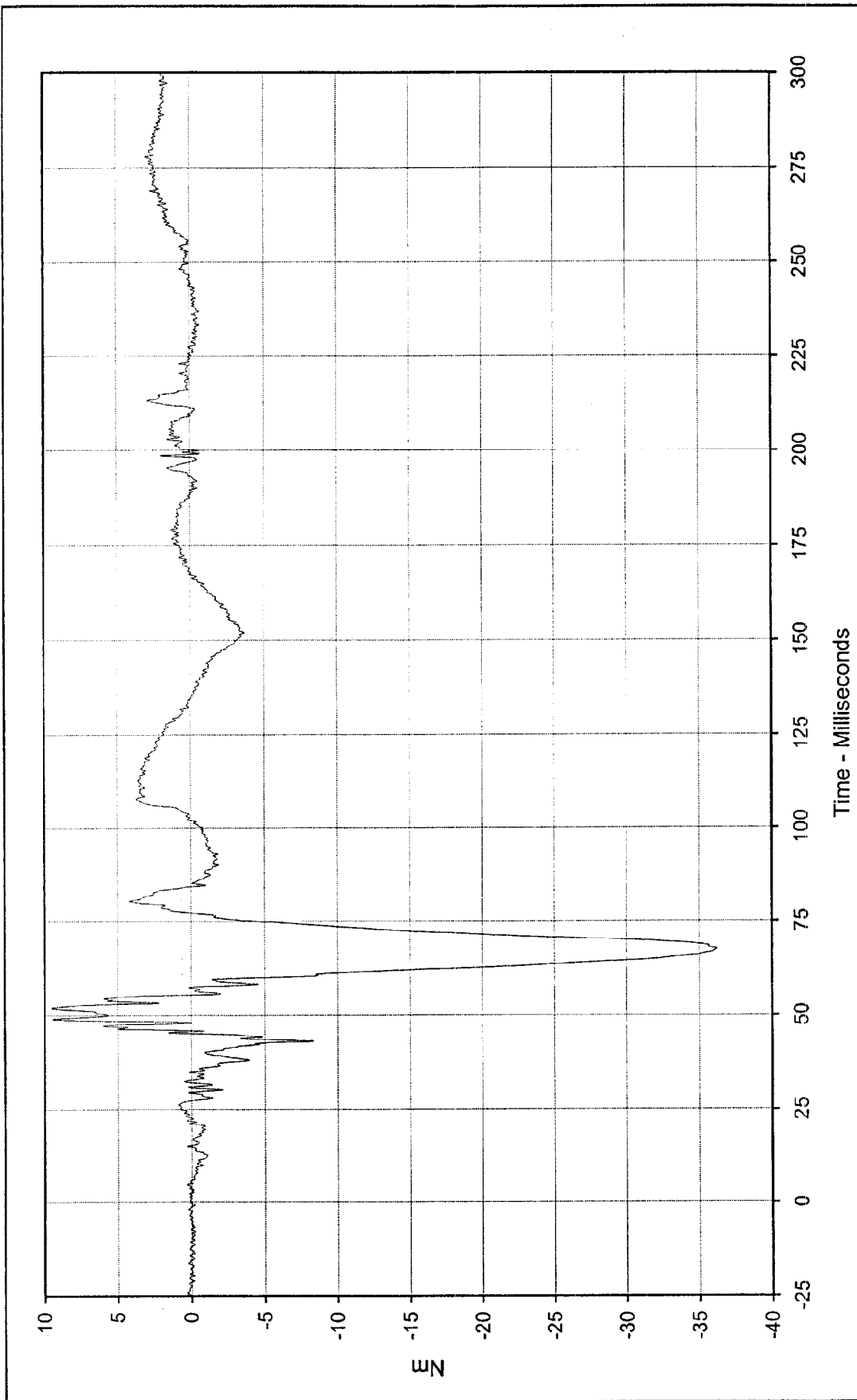
Test Program:

1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle:

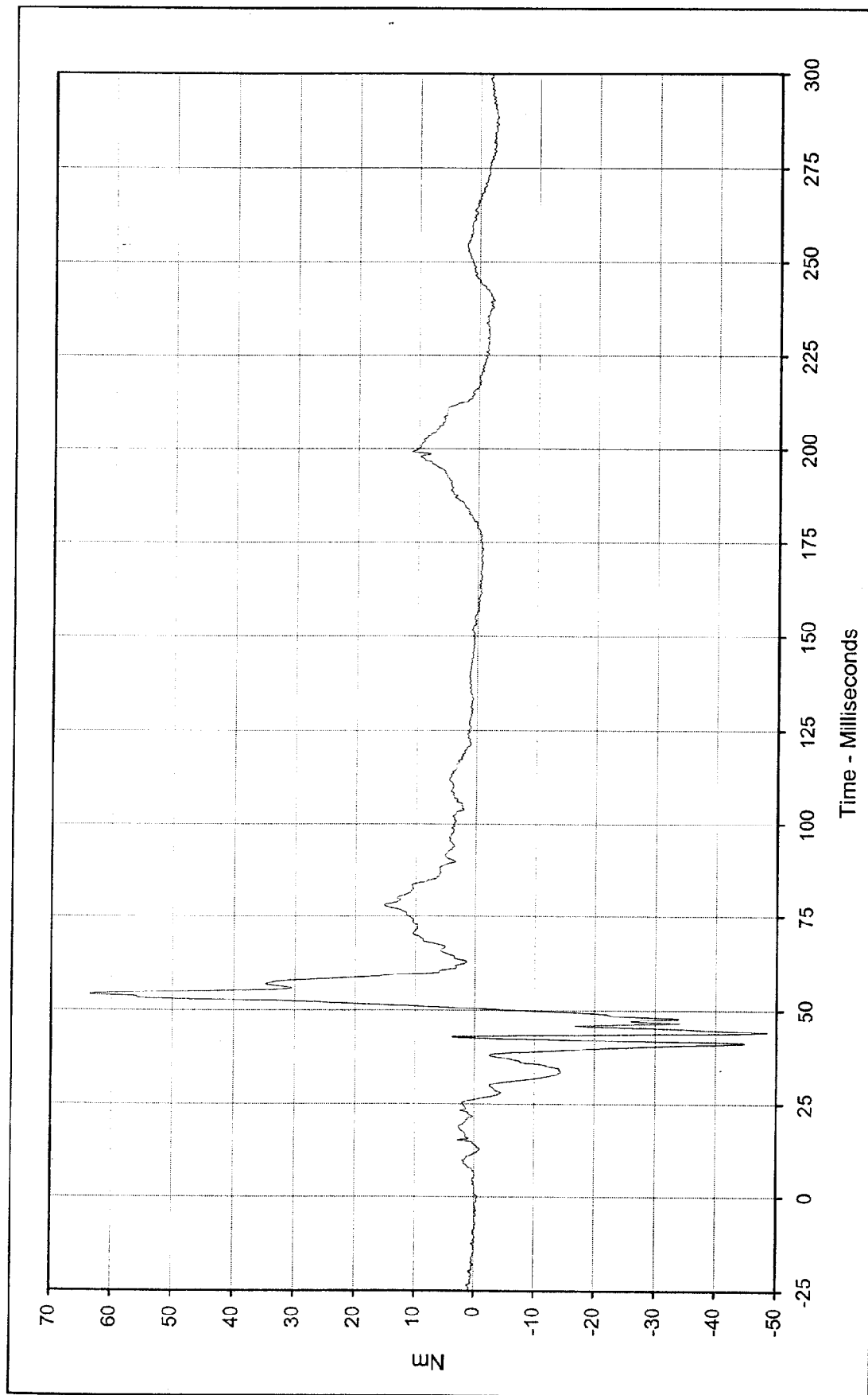
1999 Volkswagen Beetle (New)





Curve Description: Passenger Left Lower Tibia Moment X				Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	9.5	at	52.0	Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)
Minimum Value:	-36.2	at	67.4	Milliseconds		
SAE Filter Class:	600					
Date of Test:	2/25/99					
Curve Number:	FIL-073					





Curve Description: Passenger Left Lower Tibia Moment Y

Maximum Value: 63.6 at 54.2 Milliseconds

Minimum Value: -48.5 at 43.9 Milliseconds

SAE Filter Class: 600

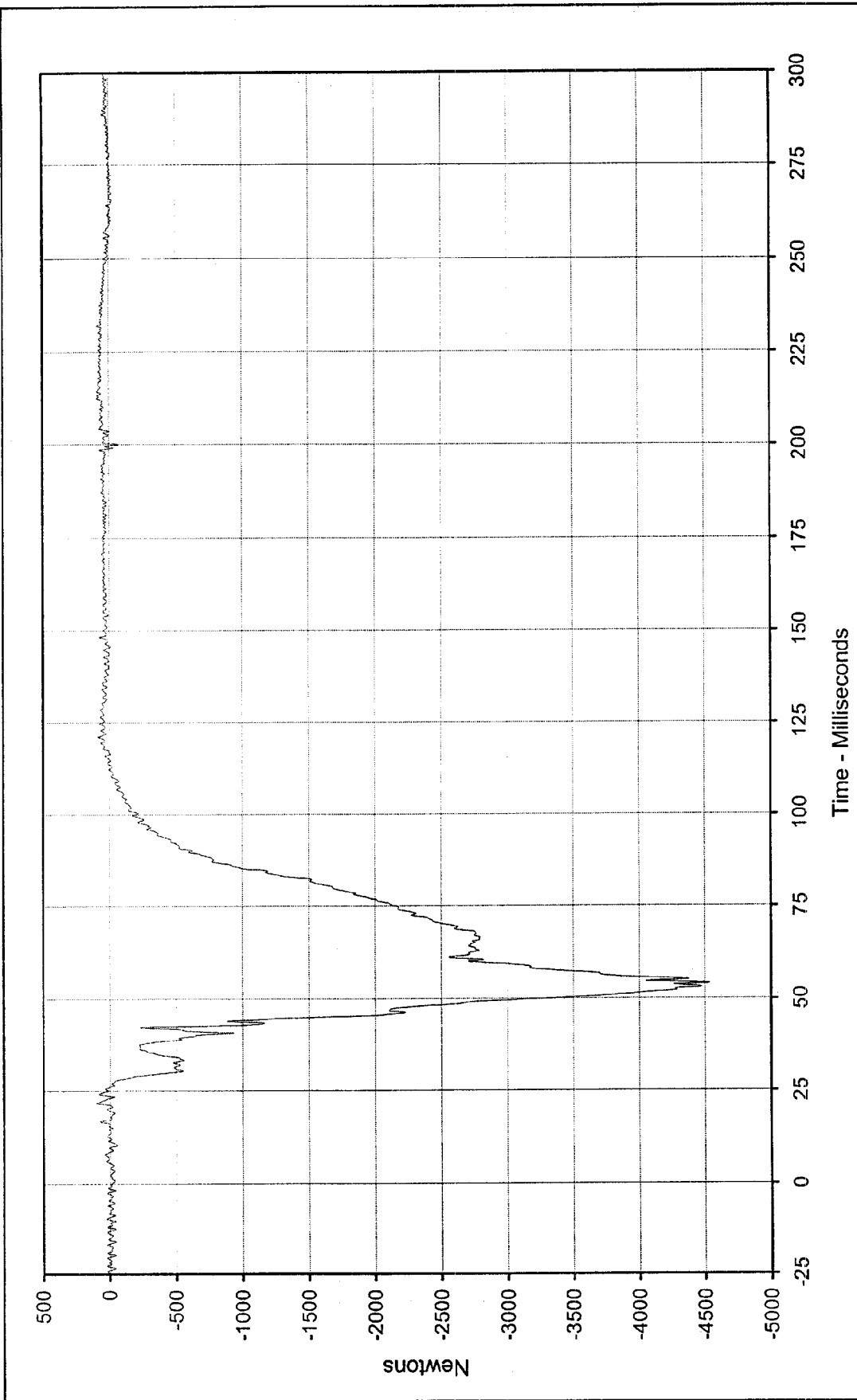
Date of Test: 2/25/99

Curve Number: FIL-074

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

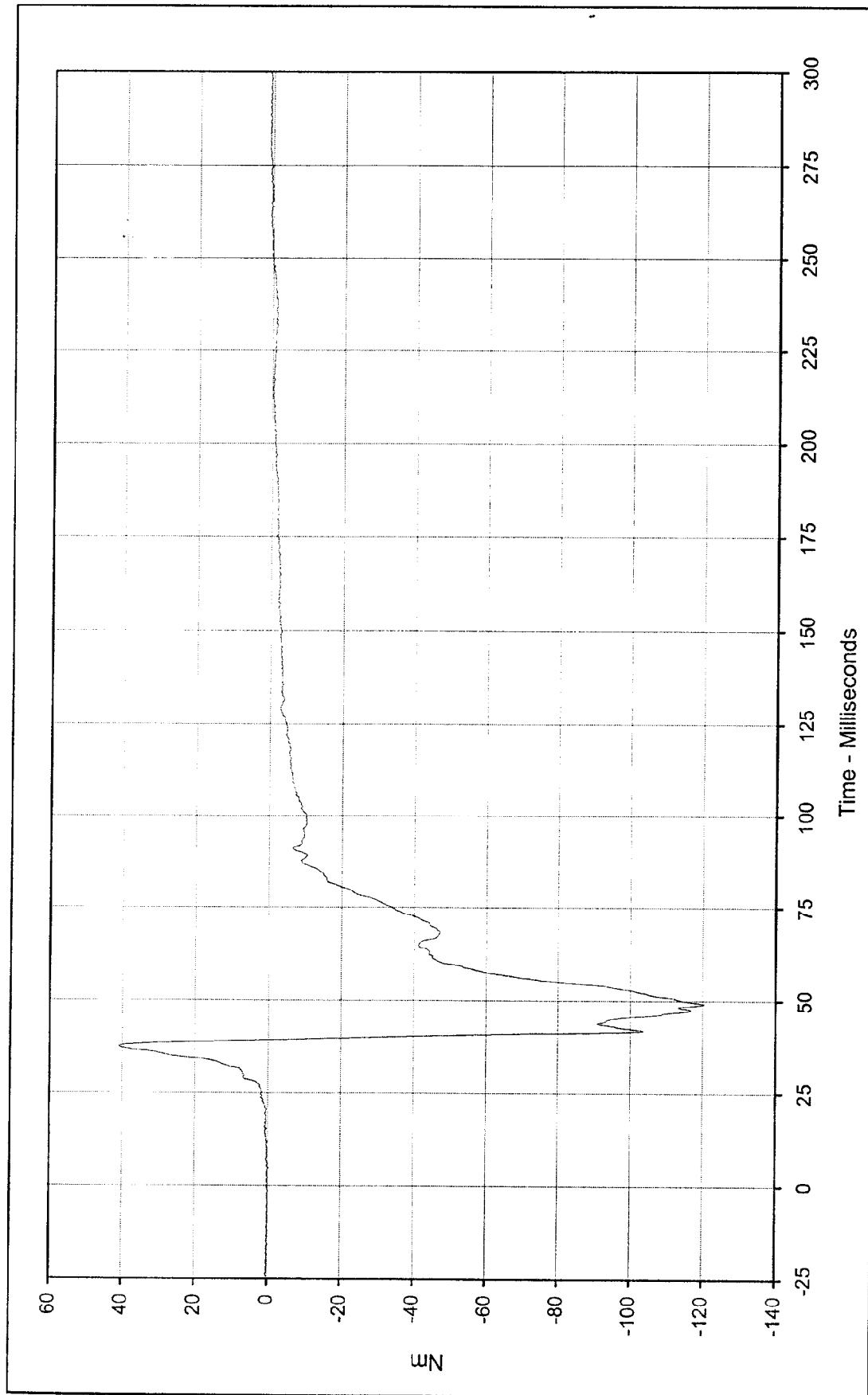
Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description:	Passenger Left Lower Tibia Force Z	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	100.8 at 21.8 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-4535.6 at 54.1 Milliseconds			
SAE Filter Class:	600			
Date of Test:	2/25/99			
Curve Number:	FIL-075			





Curve Description: Passenger Right Lower Tibia Moment X

Maximum Value: 40.9 at 37.4 Milliseconds

Minimum Value: -120.4 at 49.1 Milliseconds

SAE Filter Class: 600

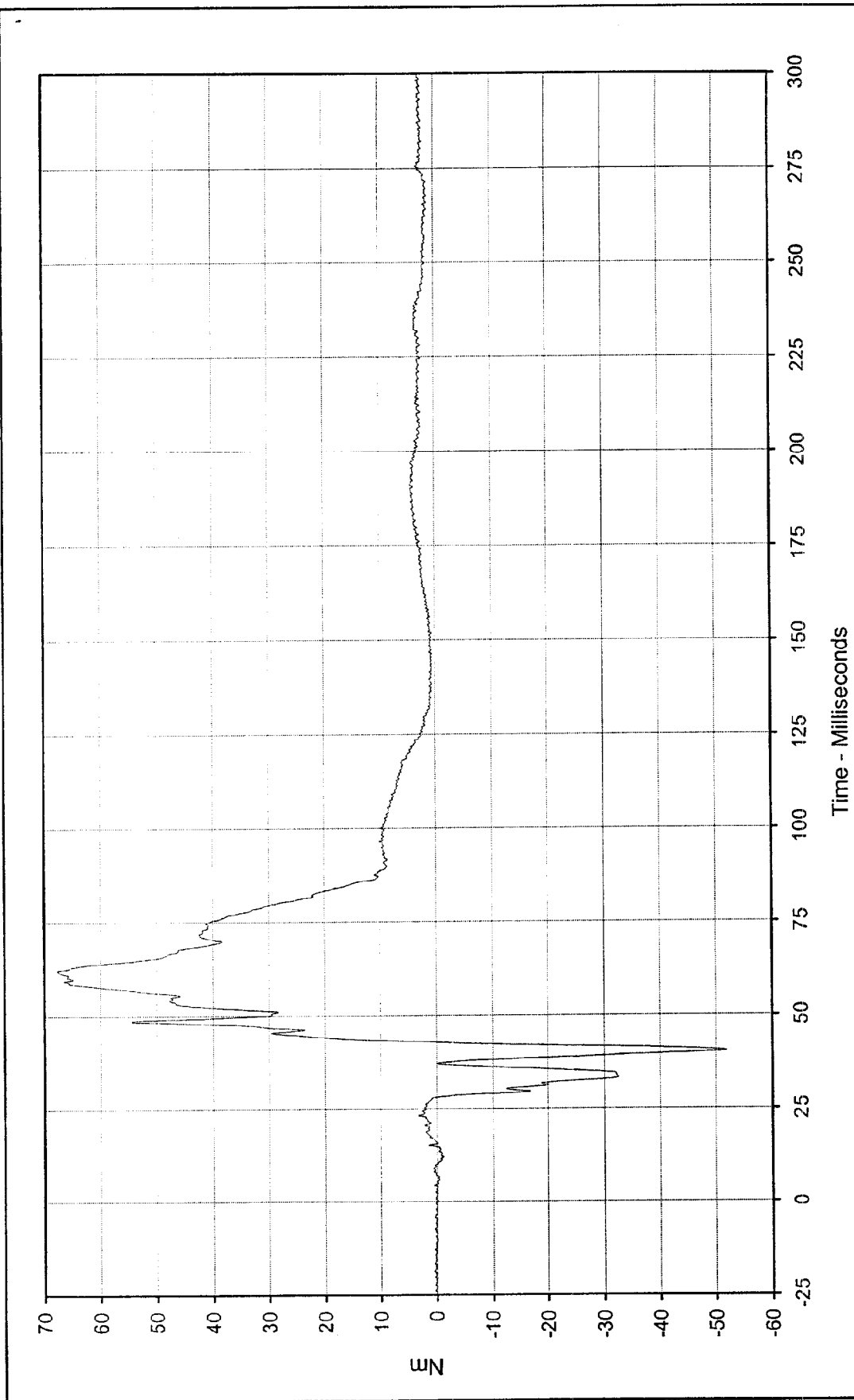
Date of Test: 2/25/99

Curve Number: FIL-076

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

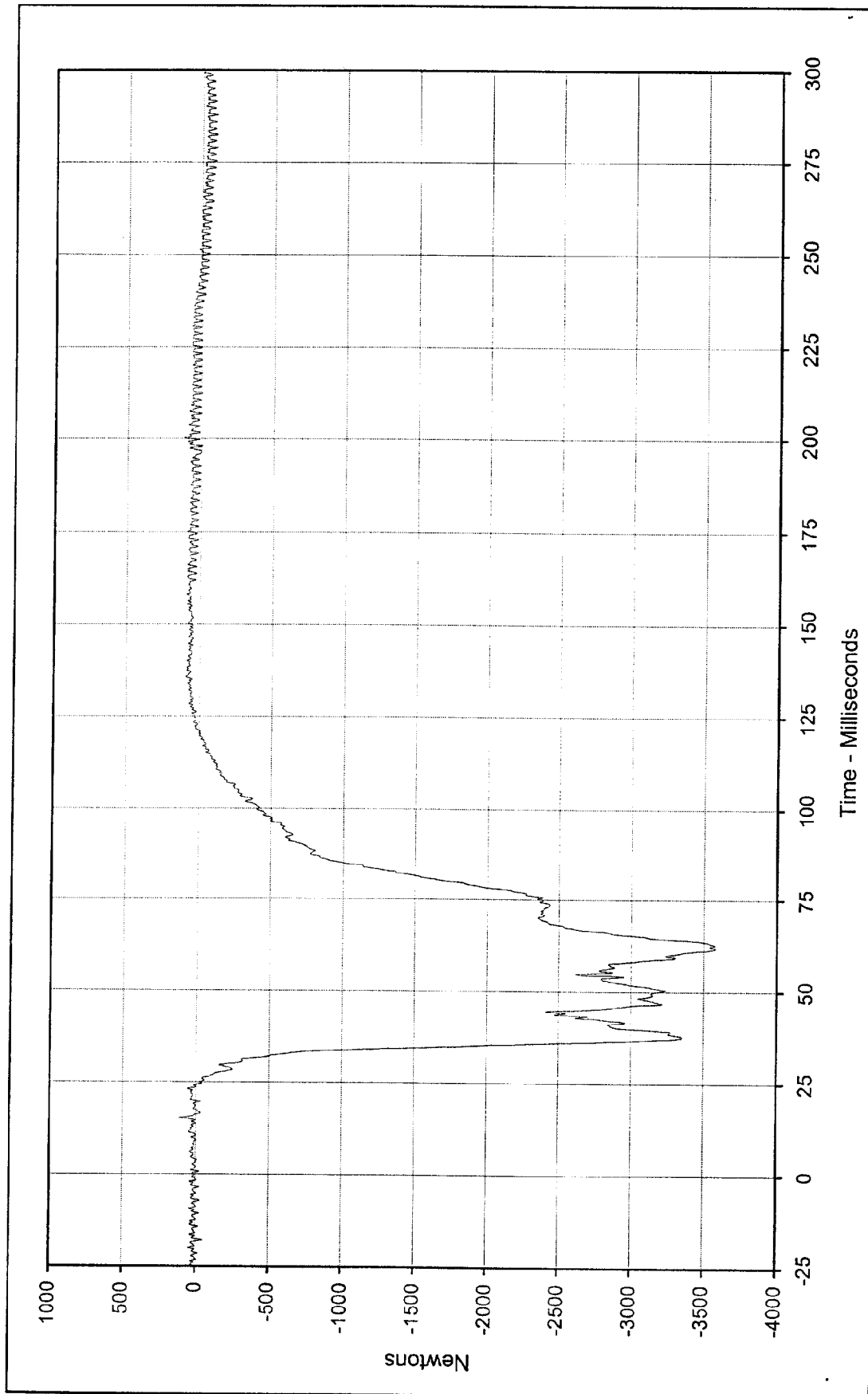
Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Passenger Right Lower Tibia Moment Y		Test Program: 1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value: 67.7	at 62.0 Milliseconds	Test Vehicle: 1999 Volkswagen Beetle (New)	
Minimum Value: -52.0	at 40.2 Milliseconds		
SAE Filter Class: 600			
Date of Test: 2/25/99			
Curve Number: FIL-077			

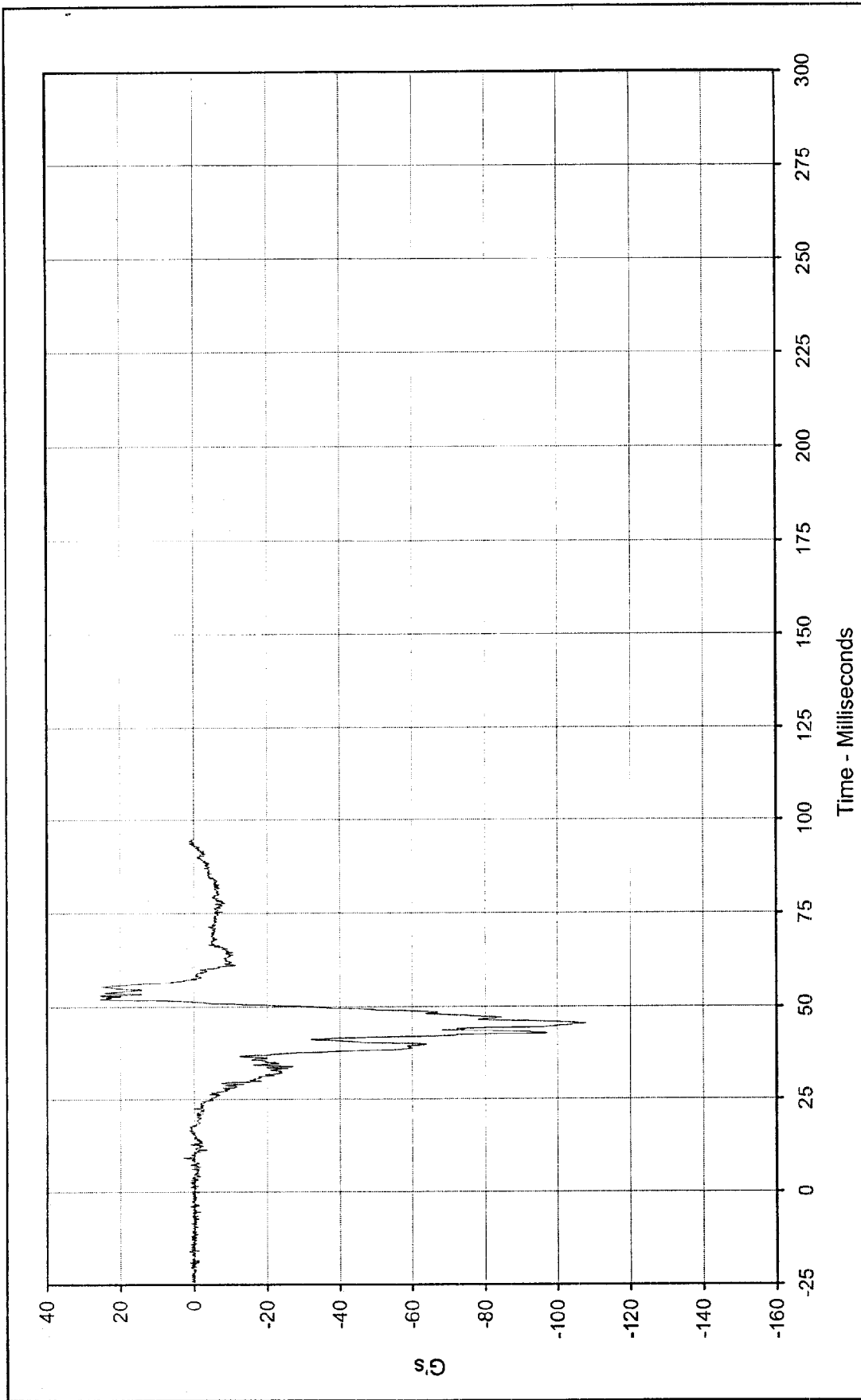




Curve Description: Passenger Right lower Tibia Force Z
 Maximum Value: 116.3 at 200.2 Milliseconds
 Minimum Value: -3580.7 at 61.7 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/25/99
 Curve Number: FIL-078

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)



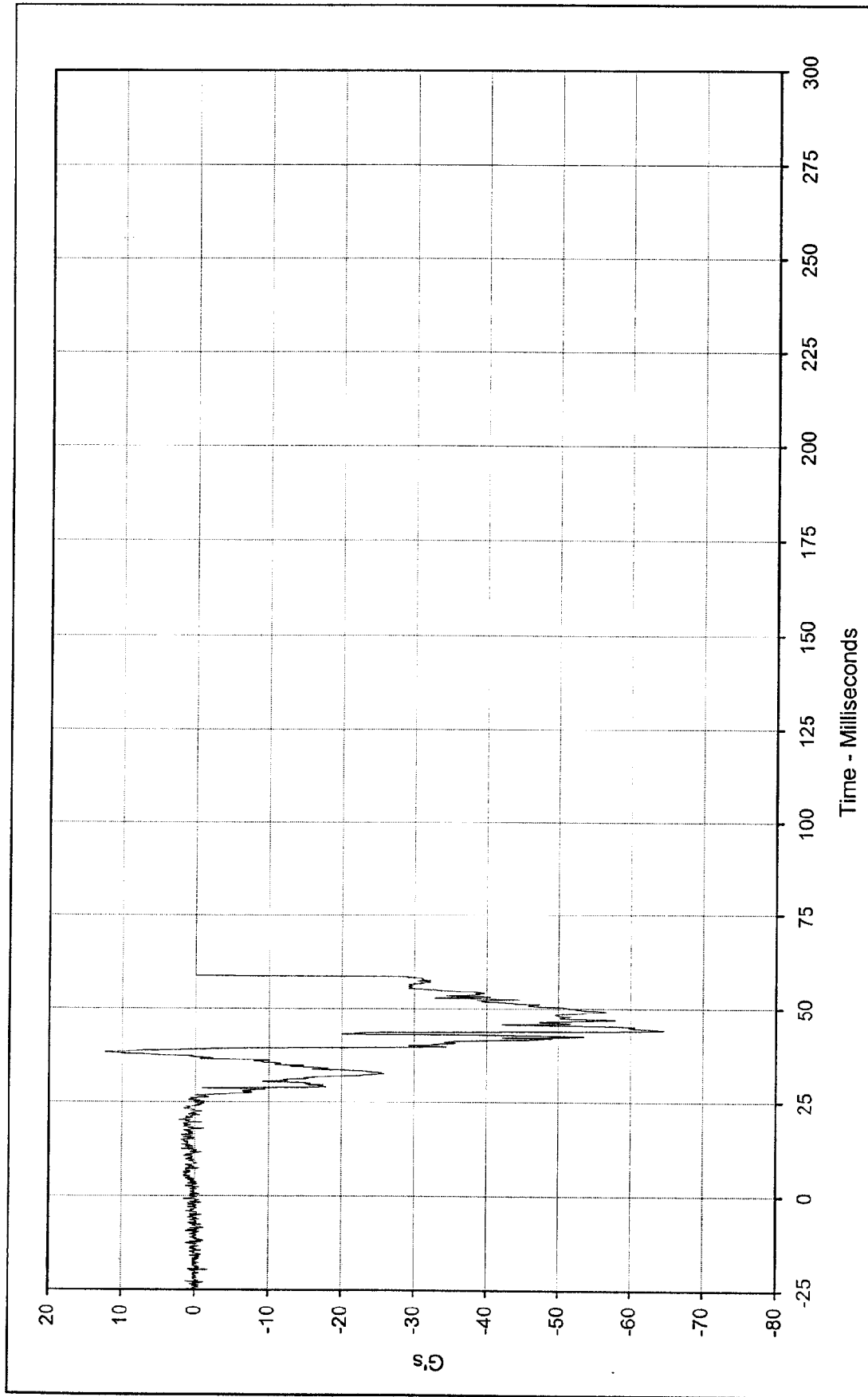


Curve Description: Passenger Left Foot Aft X * Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
Maximum Value: 25.4 at 52.1 Milliseconds Test Vehicle: 1999 Volkswagen Beetle (New)
Minimum Value: -107.8 at 45.4 Milliseconds



SAE Filter Class: 1000
Date of Test: 2/25/99
Curve Number: FIL-079

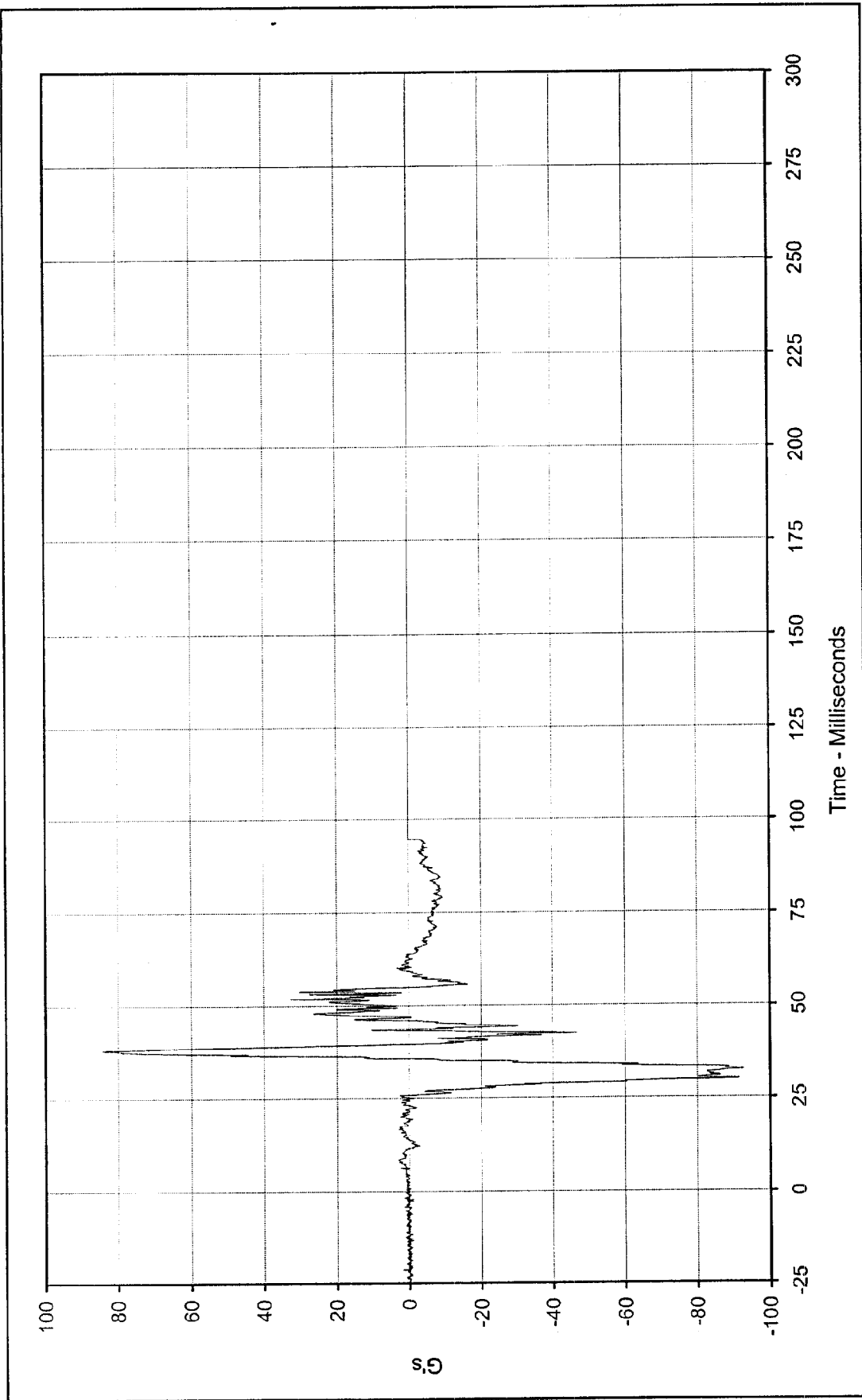
* Channel failed at 94.6 Msec



Curve Description:	Passenger Left Foot Aft Z	*	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	12.3	at 38.0	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-64.6	at 44.1			
SAE Filter Class:	1000				
Date of Test:	2/25/99				
Curve Number:	FIL-080				



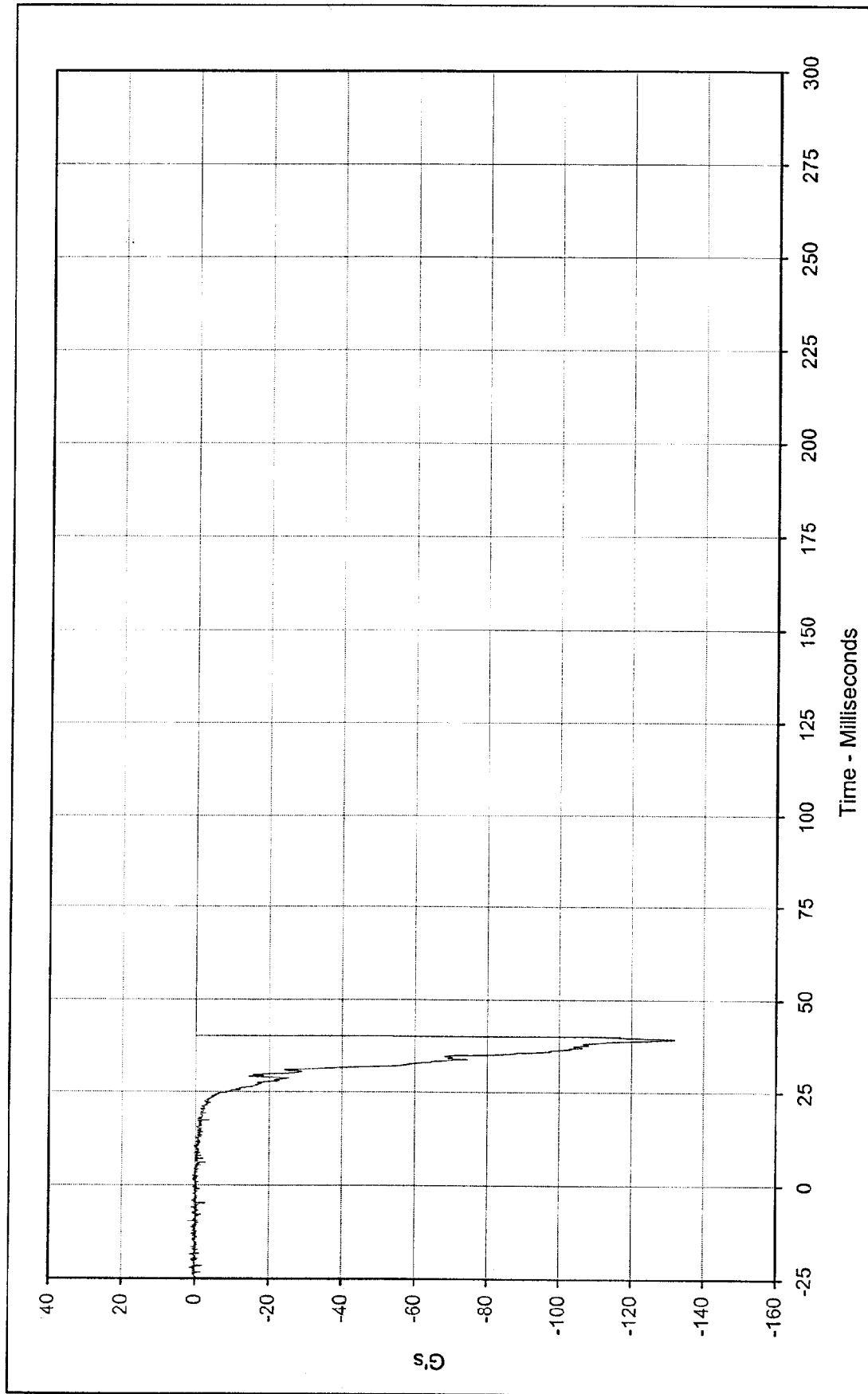
* Channel failed at 58.6 Msec



Curve Description:	Passenger Left Foot Fore Z	*	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	84.3	at 37.9	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-92.8	at 32.4			
SAE Filter Class:	1000				
Date of Test:	2/25/99				
Curve Number:	FIL-081				



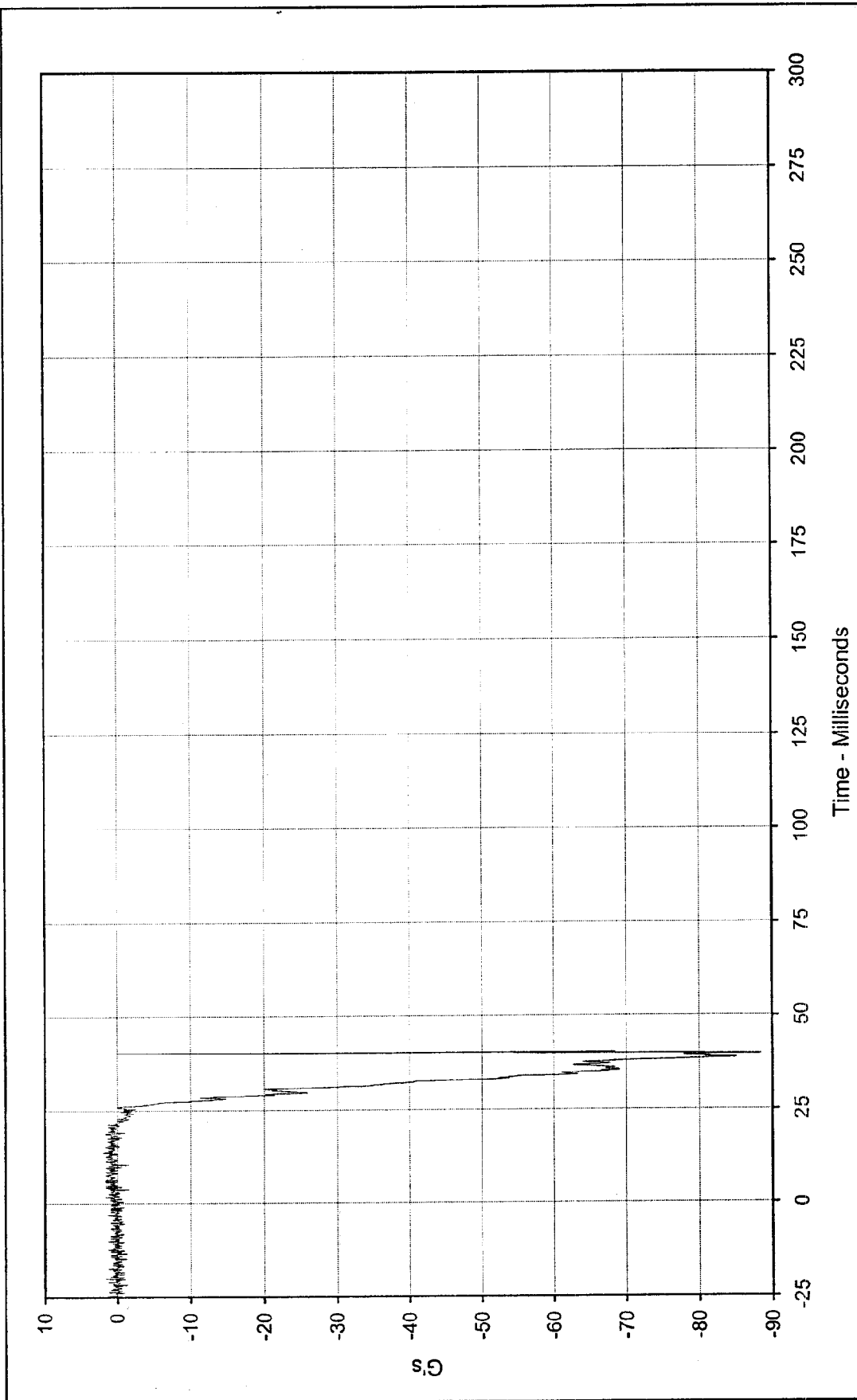
* Channel failed at 94.6 Msec



Curve Description:		Passenger Right Foot Aft X		* Test Program:		1999 NHTSA 35 mph NCAP		No.: MX5800	
Maximum Value:		0.6 at 1.3		Test Vehicle:		1999 Volkswagen Beetle (New)			
Minimum Value:		-132.0 at 39.2							
SAE Filter Class:		1000							
Date of Test:		2/25/99							
Curve Number:		FIL-082							



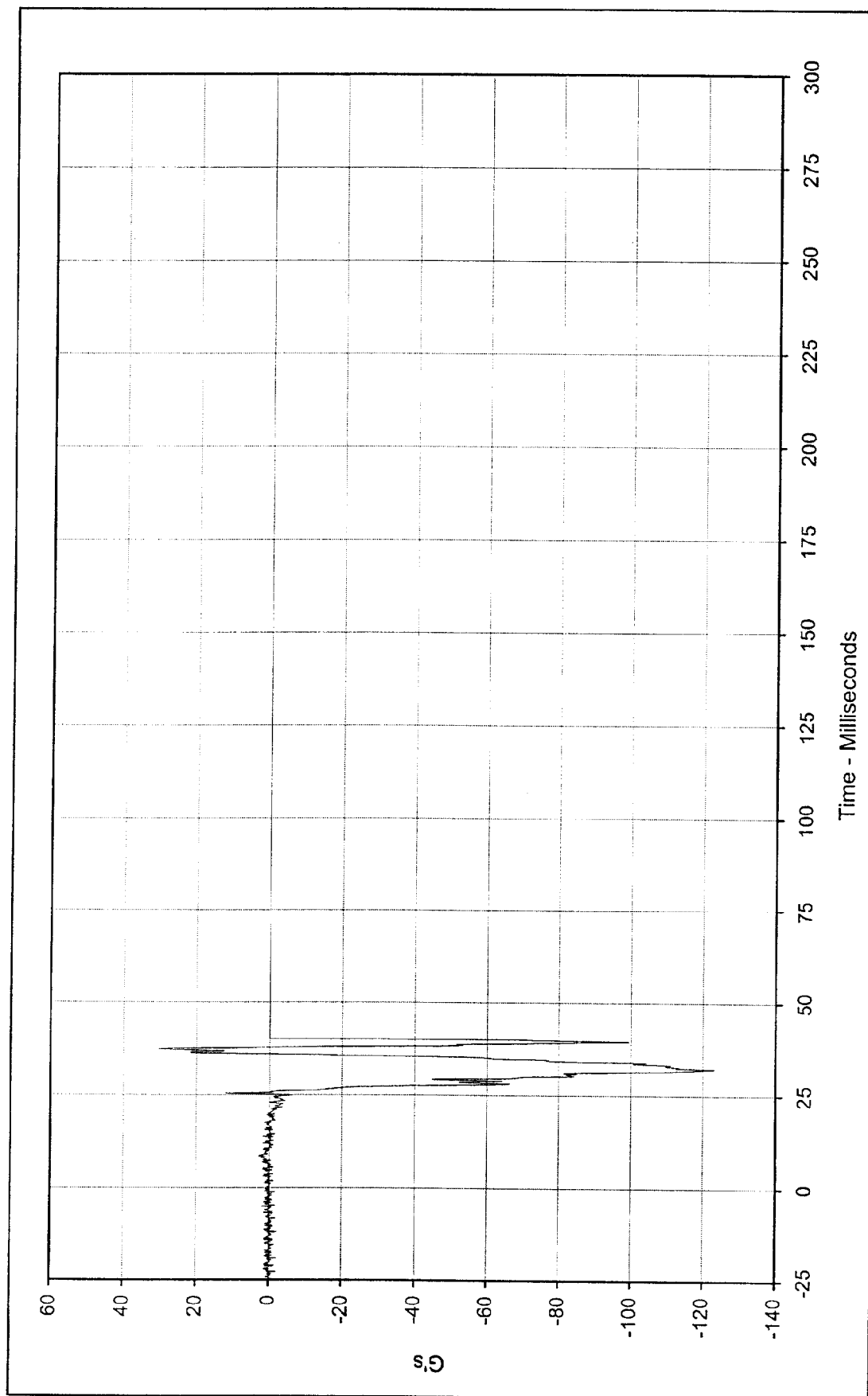
* Channel failed at 40.0 Msec



Curve Description:	Passenger Right Foot Aft Z	*	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	1.9	at 13.9	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-88.3	at 39.5			
SAE Filter Class:	1000				
Date of Test:	2/25/99				
Curve Number:	FIL-083				



* Channel failed at 40.0 Msec

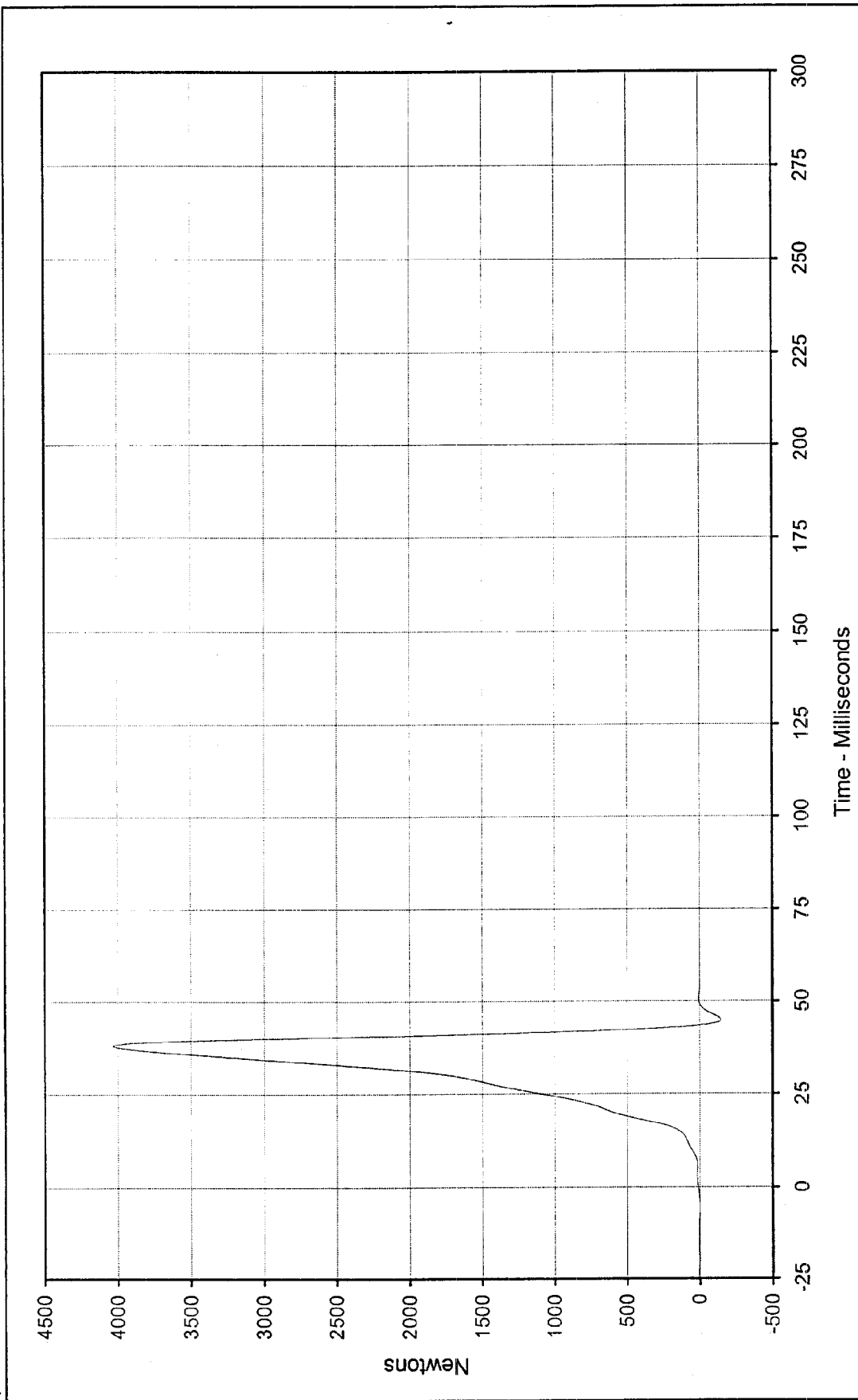


Curve Description:	Passenger Right Foot Fore Z	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	30.2 at 37.2 milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-123.1 at 32.1 milliseconds			



SAE Filter Class:	1000
Date of Test:	2/25/99
Curve Number:	FIL-084

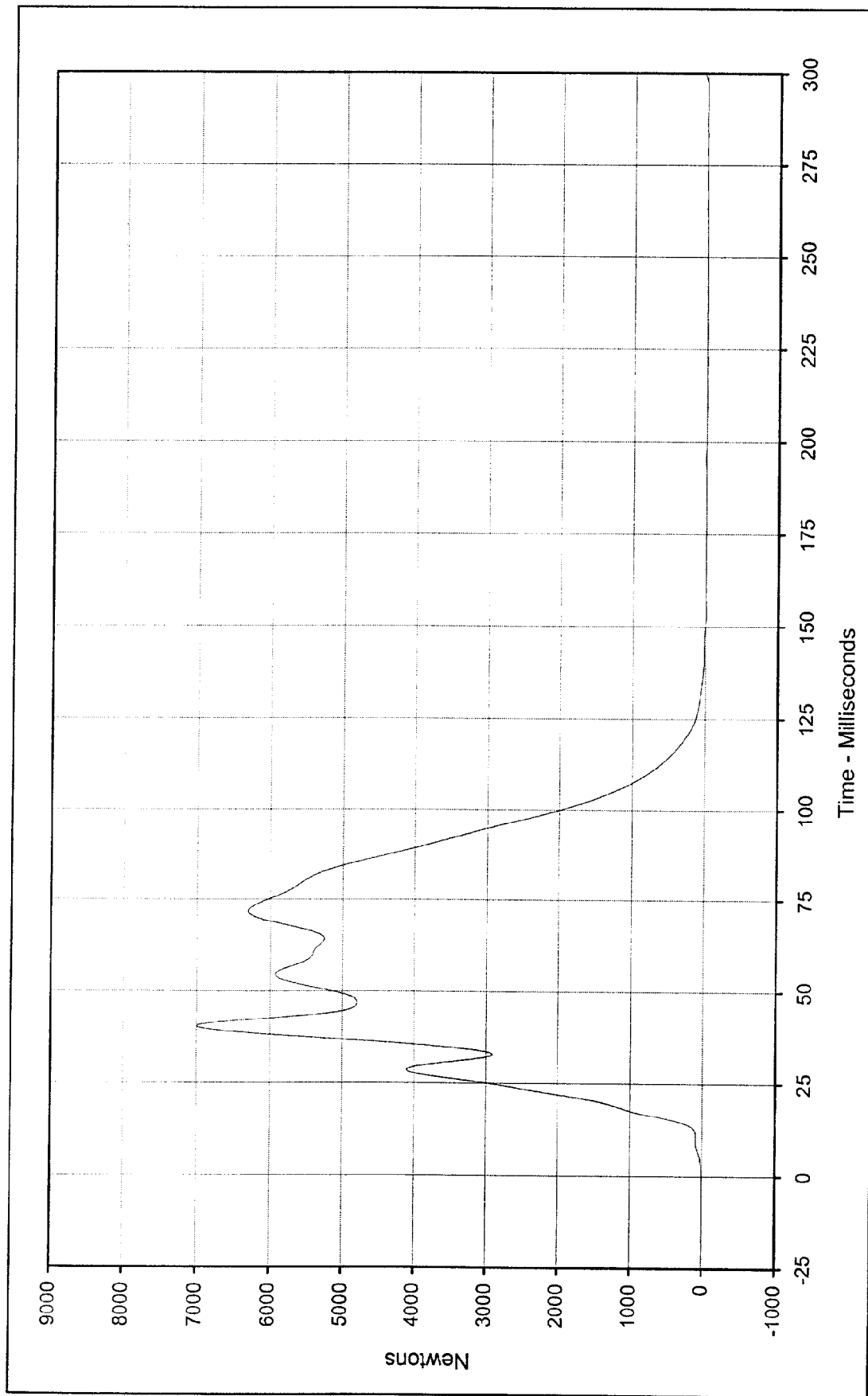
* Channel failed at 40.0 Msec



Curve Description:	Passenger Lap Belt Force	*	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	4031.7	at 38.0	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-148.8	at 45.0			
SAE Filter Class:	60				
Date of Test:	2/25/99				
Curve Number:	FIL-085				



* Channel failed at 40.6 Msec.

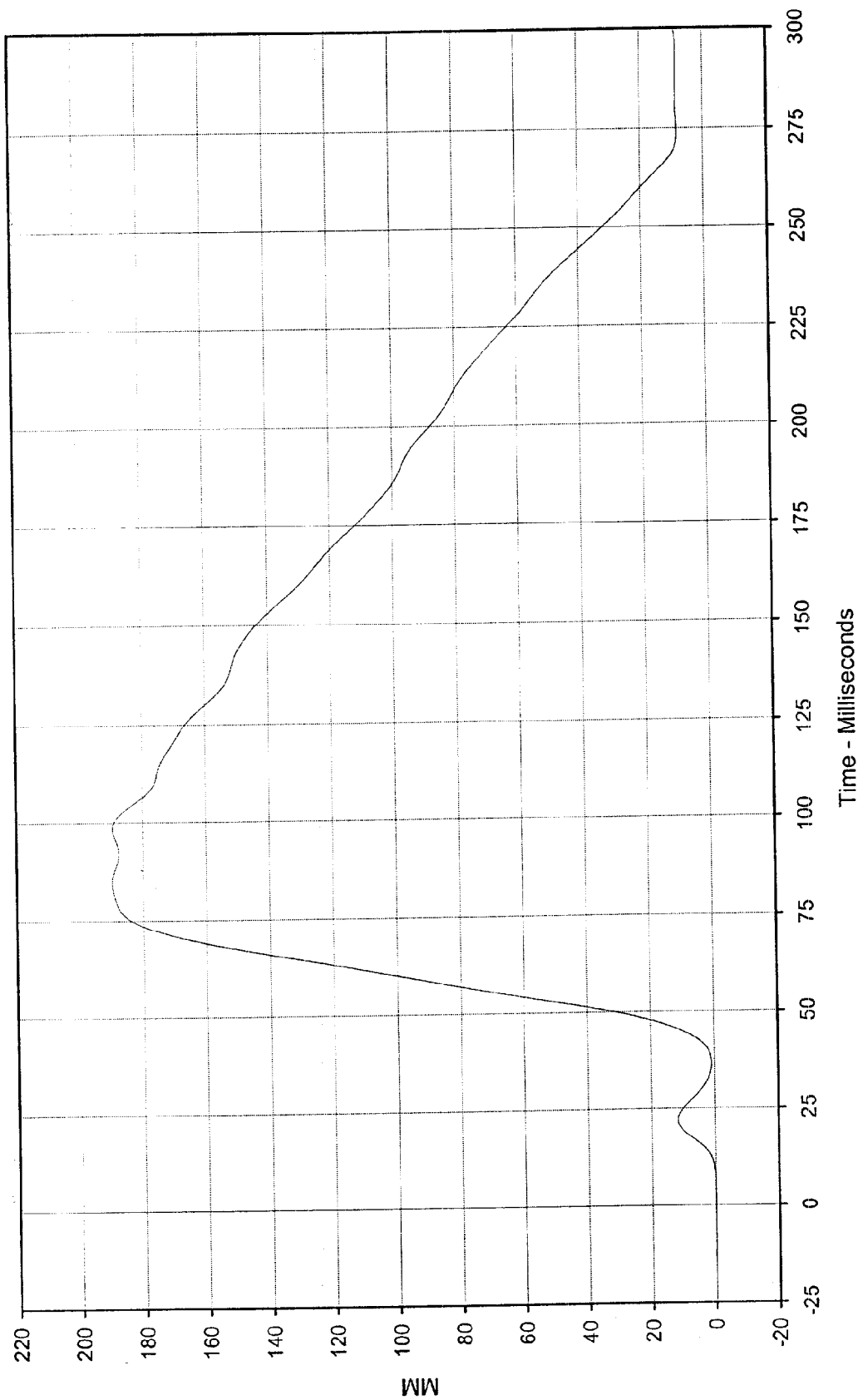


Curve Description: Passenger Shoulder Belt Force
 Maximum Value: 6995.1 at 40.4 Milliseconds
 Minimum Value: -10.6 at 230.2 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-086

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)

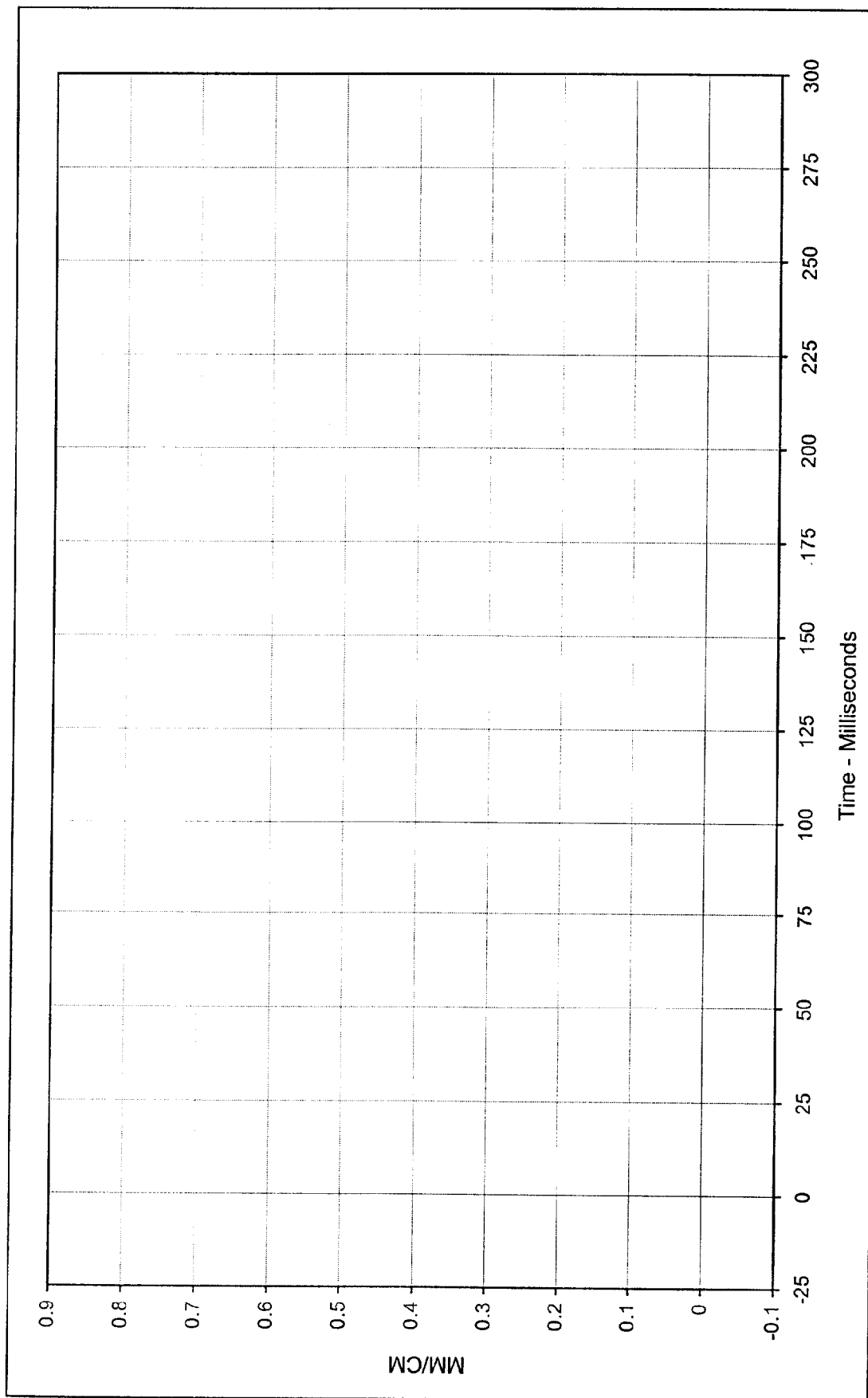




Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

Curve Description: Passenger Shoulder Belt Pullout
 Maximum Value: 189.7 at 84.6 Milliseconds
 Minimum Value: 0.0 at 0.0 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-087





Curve Description: Passenger Shoulder Belt Elongation *

Maximum Value: 0.00 at 0.0 Milliseconds

Minimum Value: 0.00 at 0.0 Milliseconds

SAE Filter Class: 60

Date of Test: 2/25/99

Curve Number: FIL-088

Test Program:

Test Vehicle:

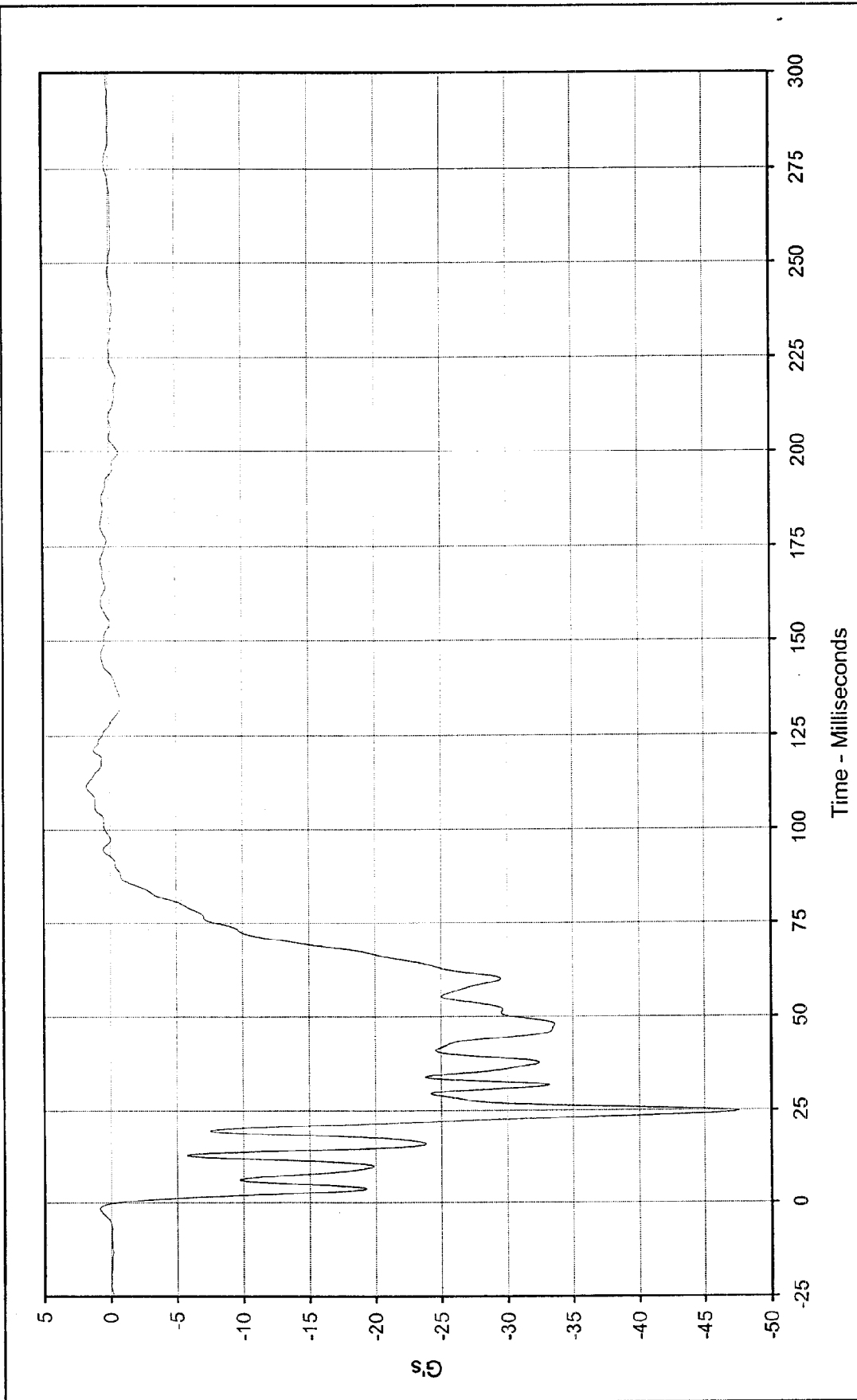
1999 NHTSA 35 mph NCAP

1999 Volkswagen Beetle (New)

No.: MX5800



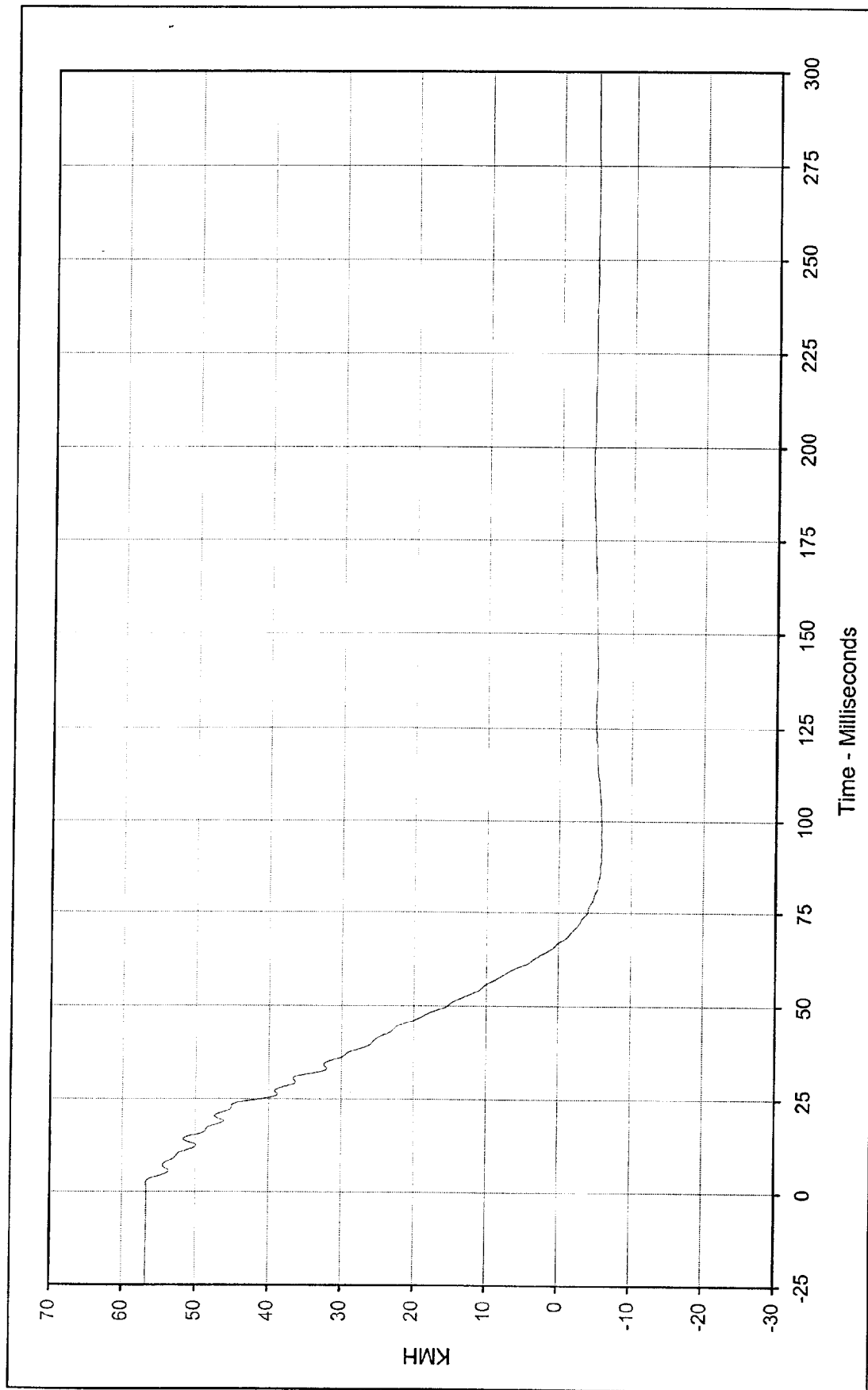
*Not used with pre-tensioner



Curve Description: Vehicle Left Rear Primary
 Maximum Value: 1.7 at 111.5 Milliseconds
 Minimum Value: -47.6 at 24.7 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-089

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Vehicle Left Rear Primary Velocity

Maximum Value: 56.7 at 2.3 Milliseconds

Minimum Value: -5.9 at 92.9 Milliseconds

SAE Filter Class: 180

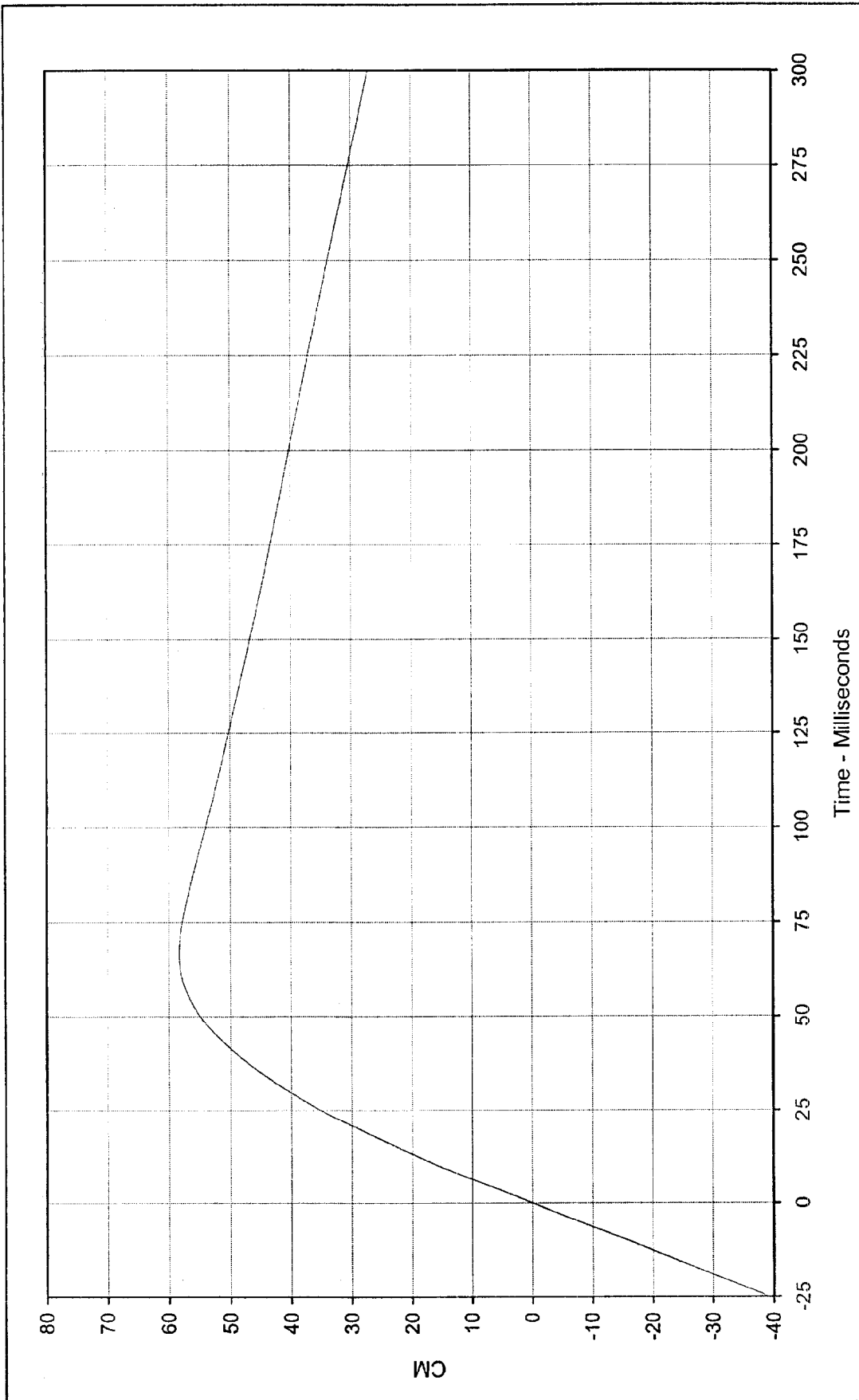
Date of Test: 2/25/99

Curve Number: IN1-089

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

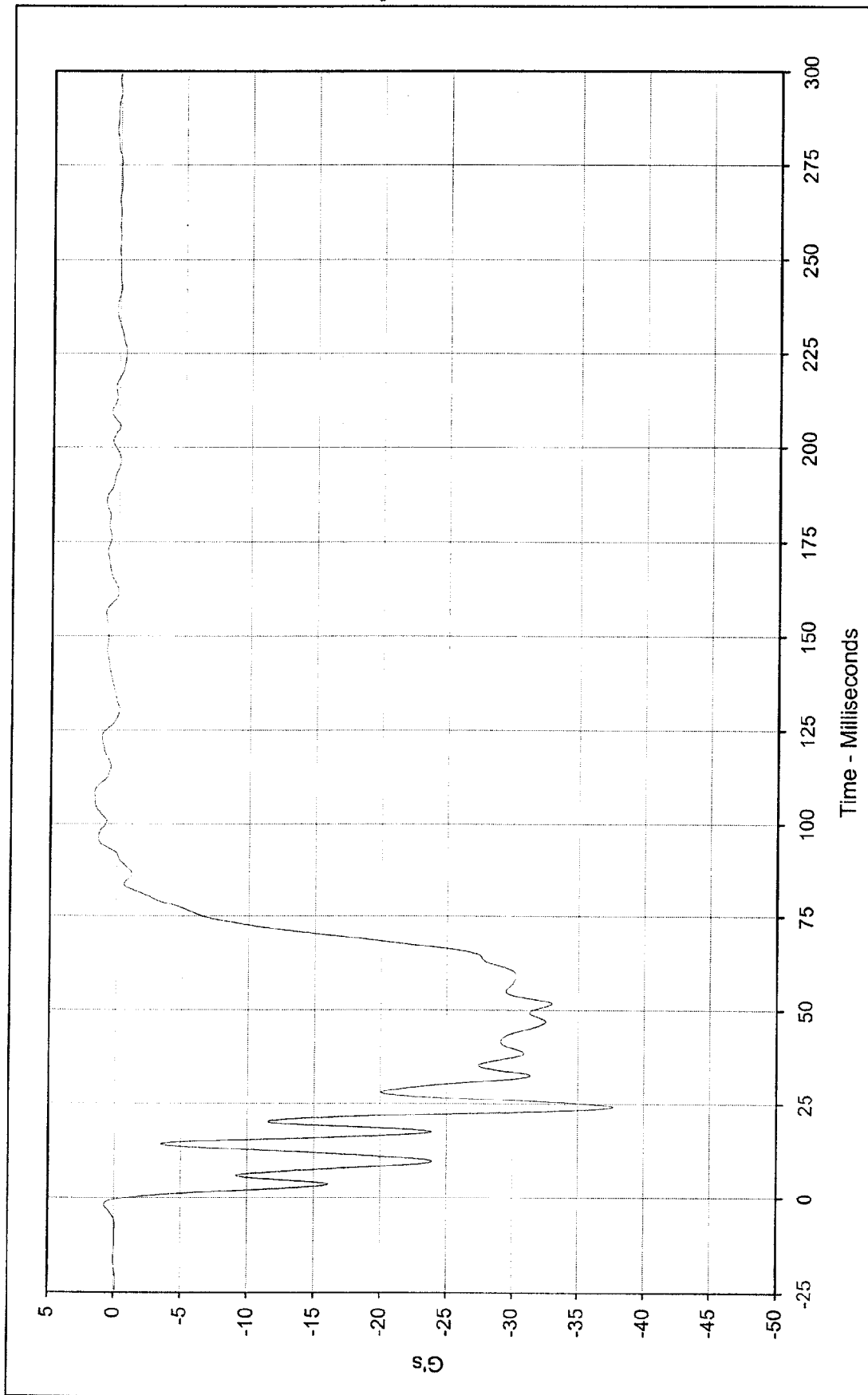
Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description:	Vehicle Left Rear Primary Displ.	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	58.3 at 66.6 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	0.0 at 0.0 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/25/99			
Curve Number:	IN2-089			

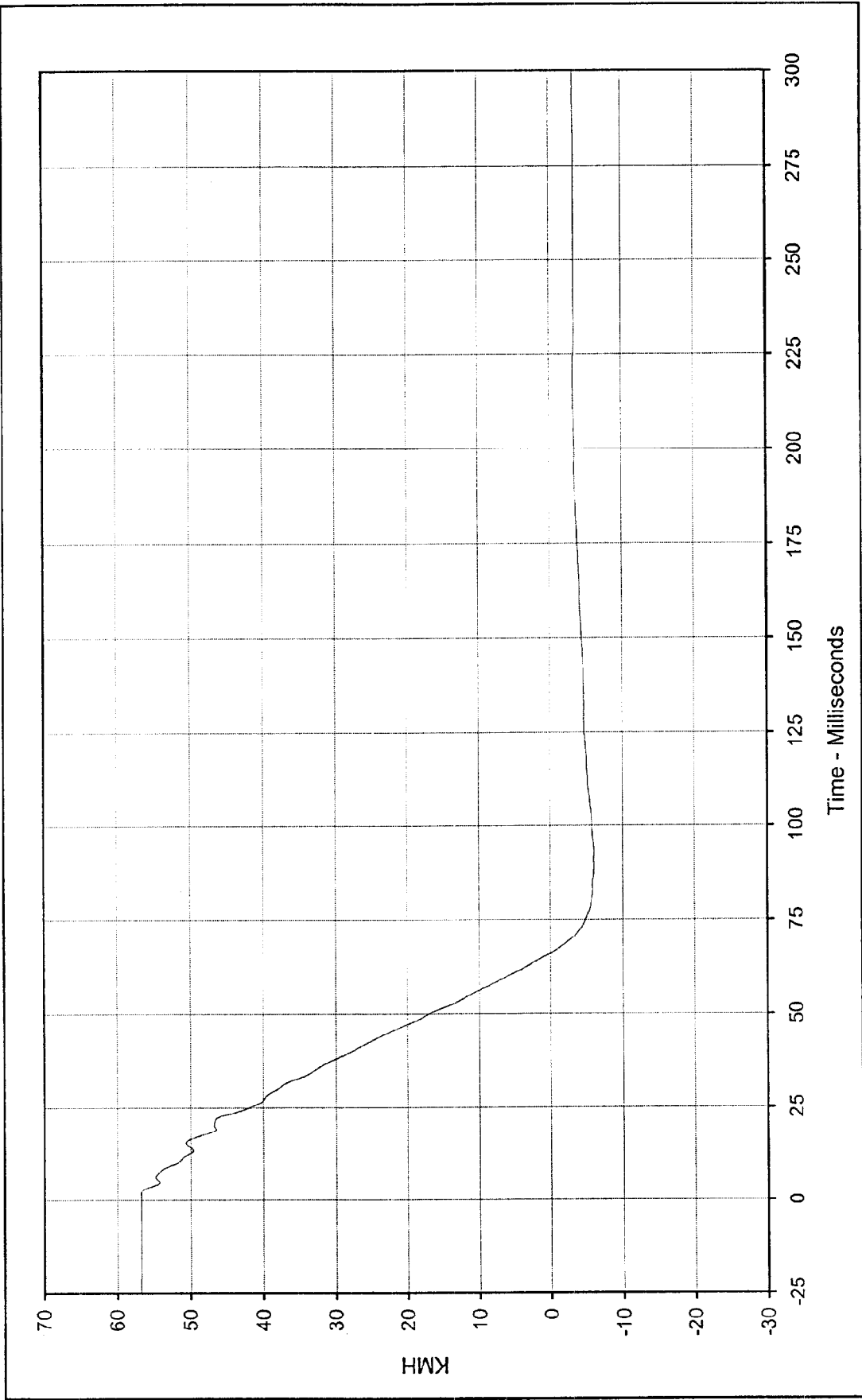




Curve Description: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Program: 1999 Volkswagen Beetle (New)
 Test Vehicle:

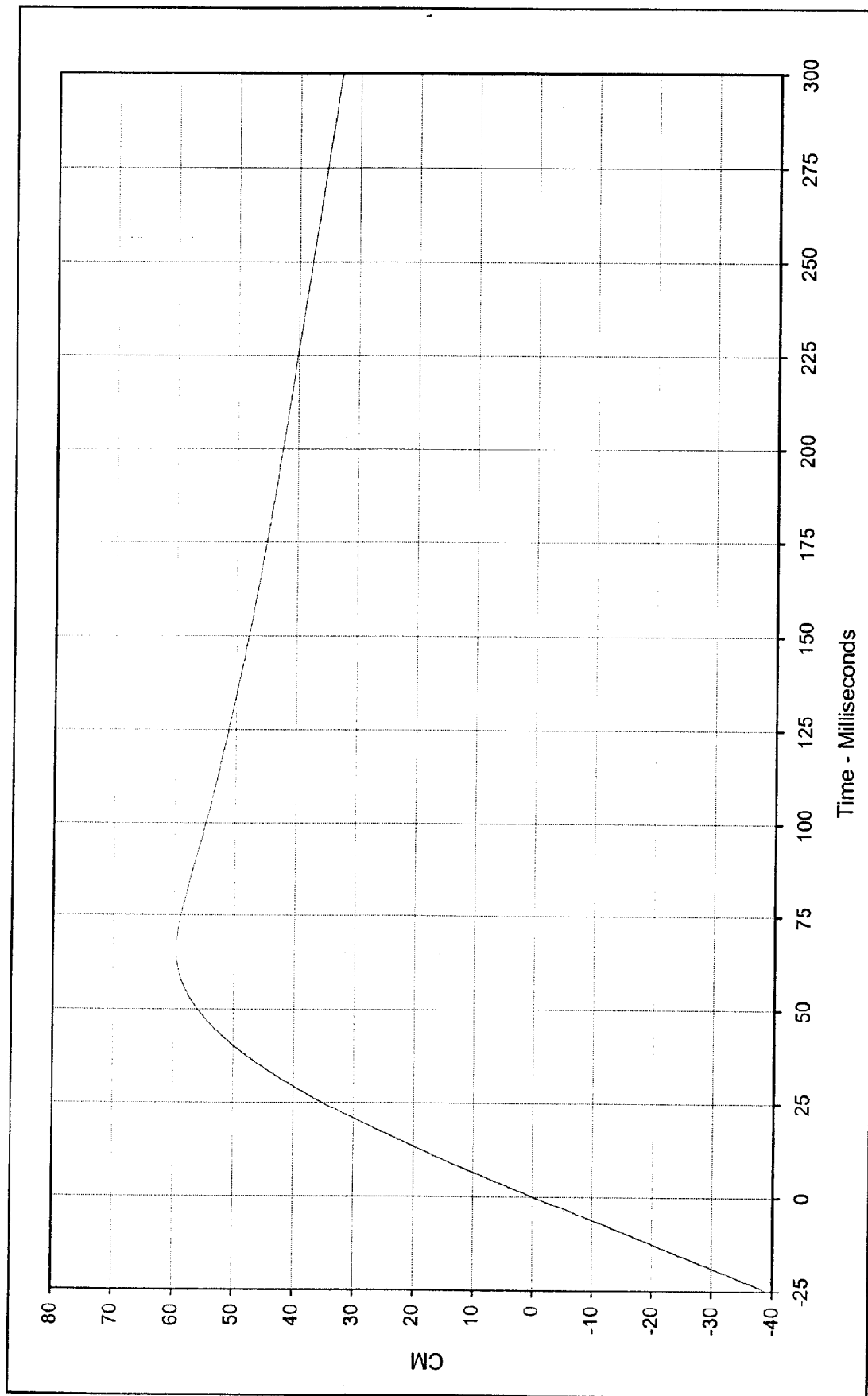
Vehicle Right Rear Primary
 Maximum Value: 1.7 at 108.3 Milliseconds
 Minimum Value: -37.7 at 24.1 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-090





Curve Description:	Vehicle Right Rear Primary Velocity	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	56.8 at 2.0 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-6.1 at 92.9 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/25/99			
Curve Number:	IN1-090			

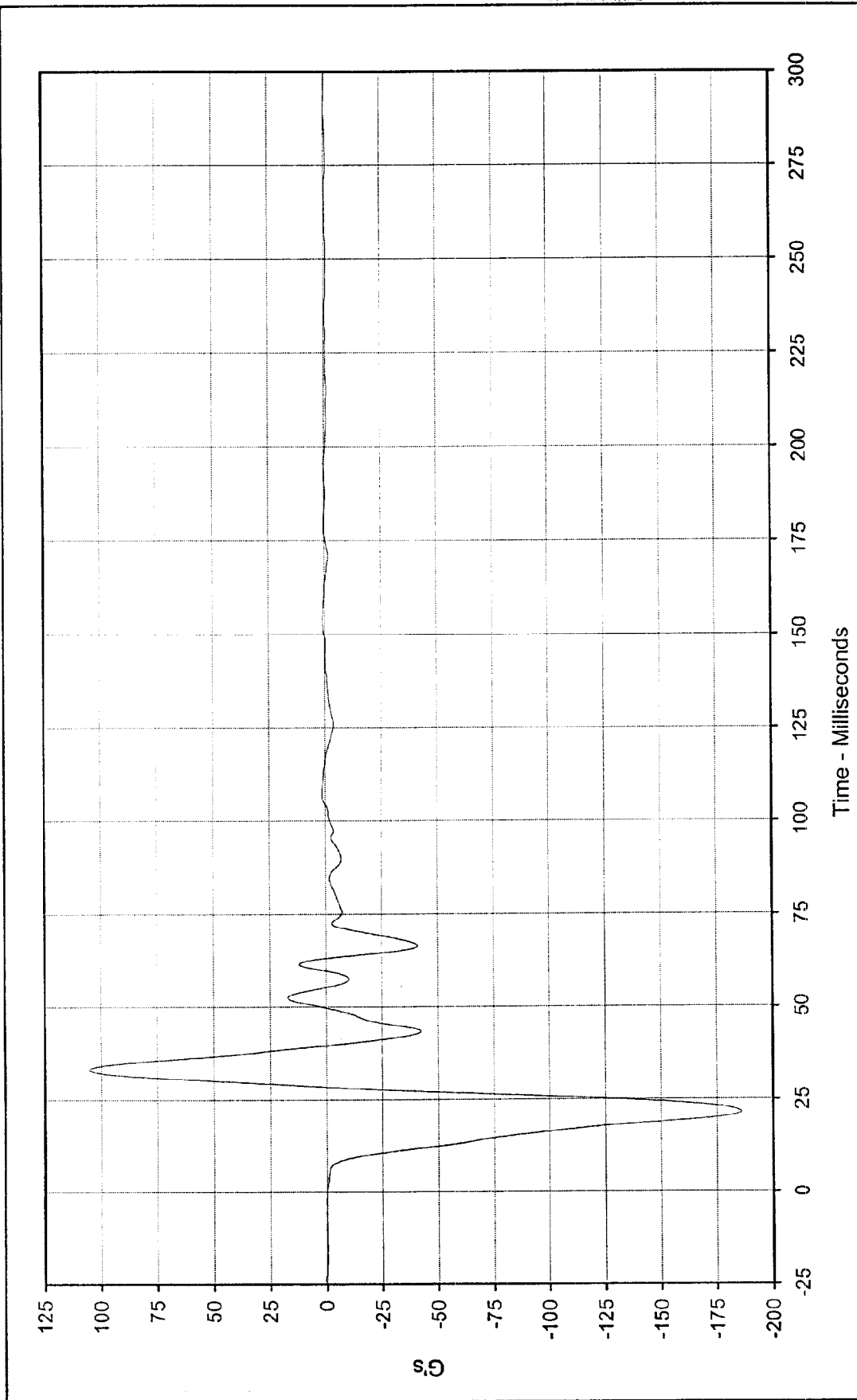




Curve Description: Vehicle Right Rear Primary Displ.
 Maximum Value: 59.6 at 65.9 Milliseconds
 Minimum Value: 0.0 at 0.0 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: IN2-090

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

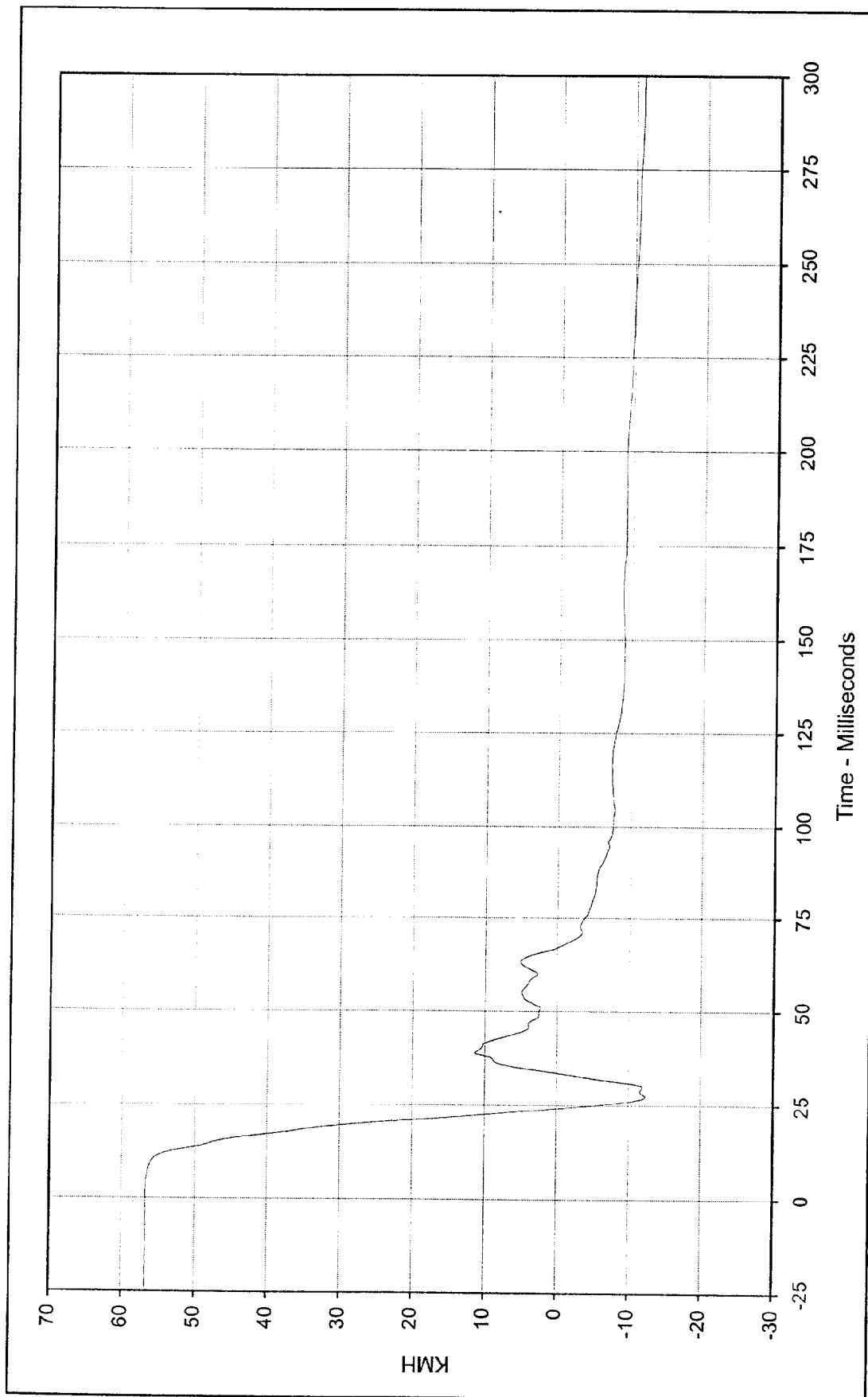




Curve Description: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Program:
 Test Vehicle: 1999 Volkswagen Beetle (New)

Vehicle Engine Top
 Maximum Value: 105.2 at 33.2 Milliseconds
 Minimum Value: -186.0 at 21.6 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-091



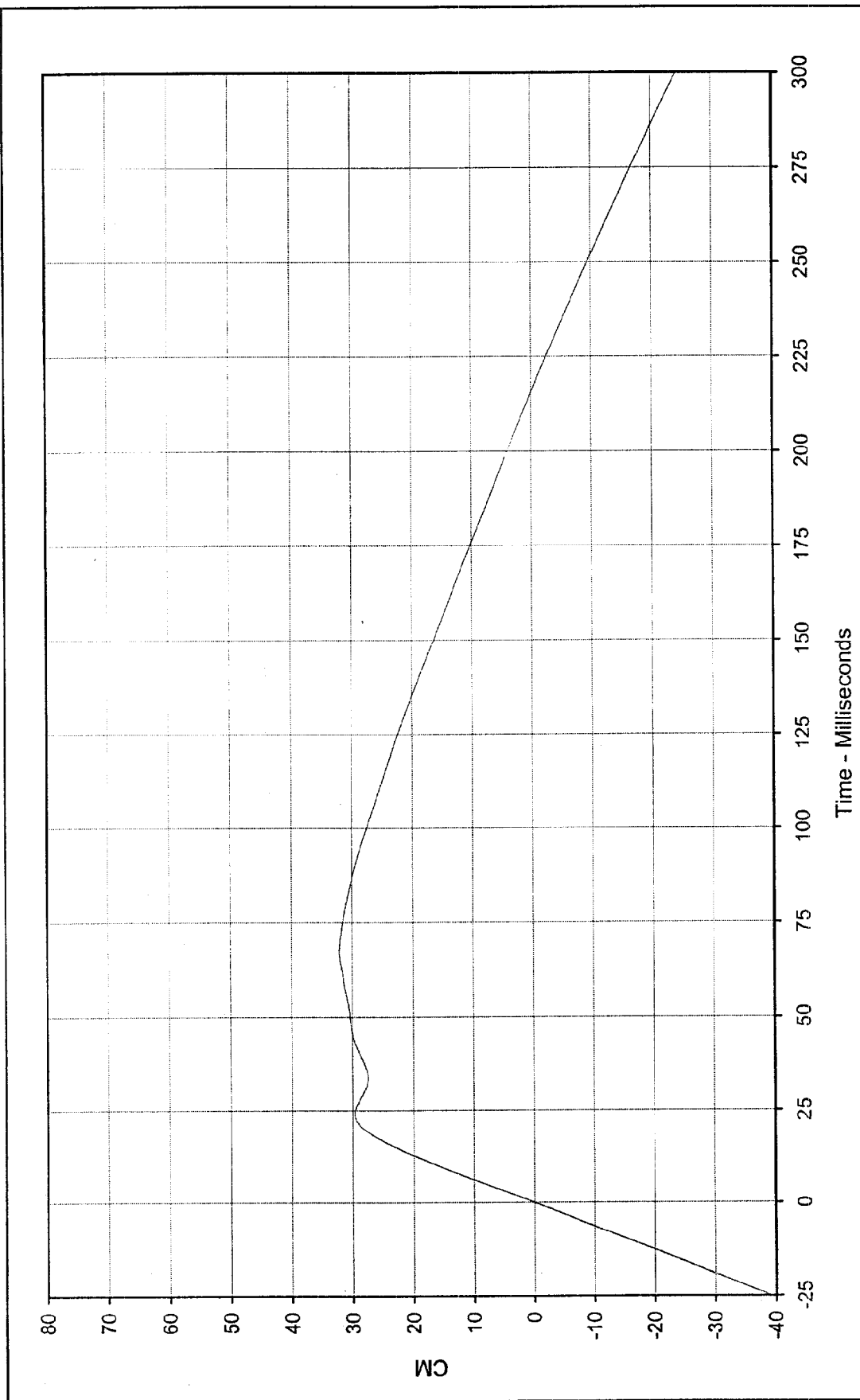


Curve Description:	Vehicle Engine Top Velocity	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	56.8 at 1.3 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-12.3 at 27.5 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/25/99			
Curve Number:	IN1-091			



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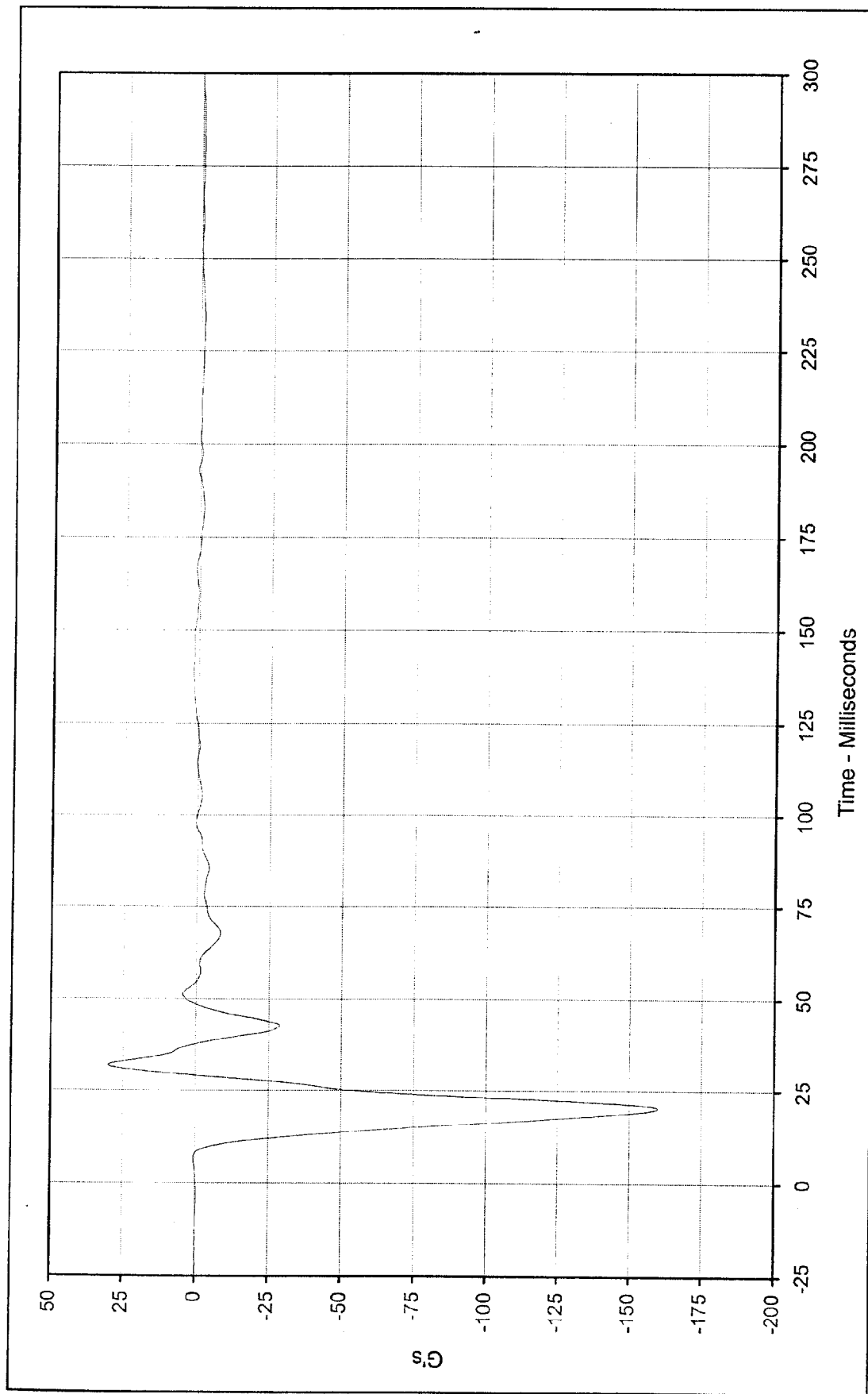




Curve Description: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Program: 1999 Volkswagen Beetle (New)
 Test Vehicle:

Vehicle Engine Top Displ.
 Maximum Value: 32.2 at 67.1 Milliseconds
 Minimum Value: -24.2 at 299.9 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: IN2-091

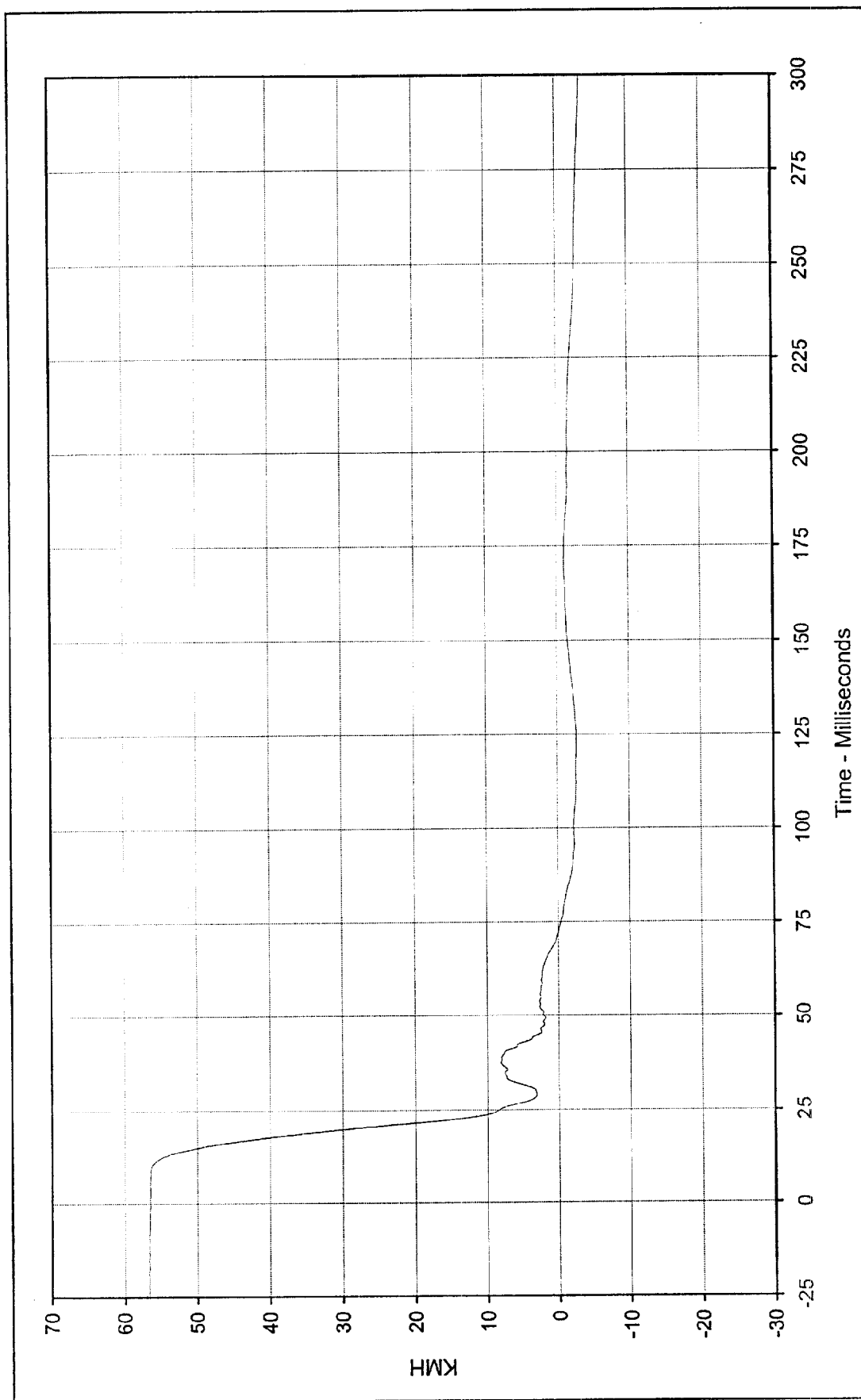




Curve Description:		Vehicle Engine Bottom		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	30.3	at	31.8	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-159.9	at	20.4			
SAE Filter Class:	60					
Date of Test:	2/25/99					
Curve Number:	FIL-092					

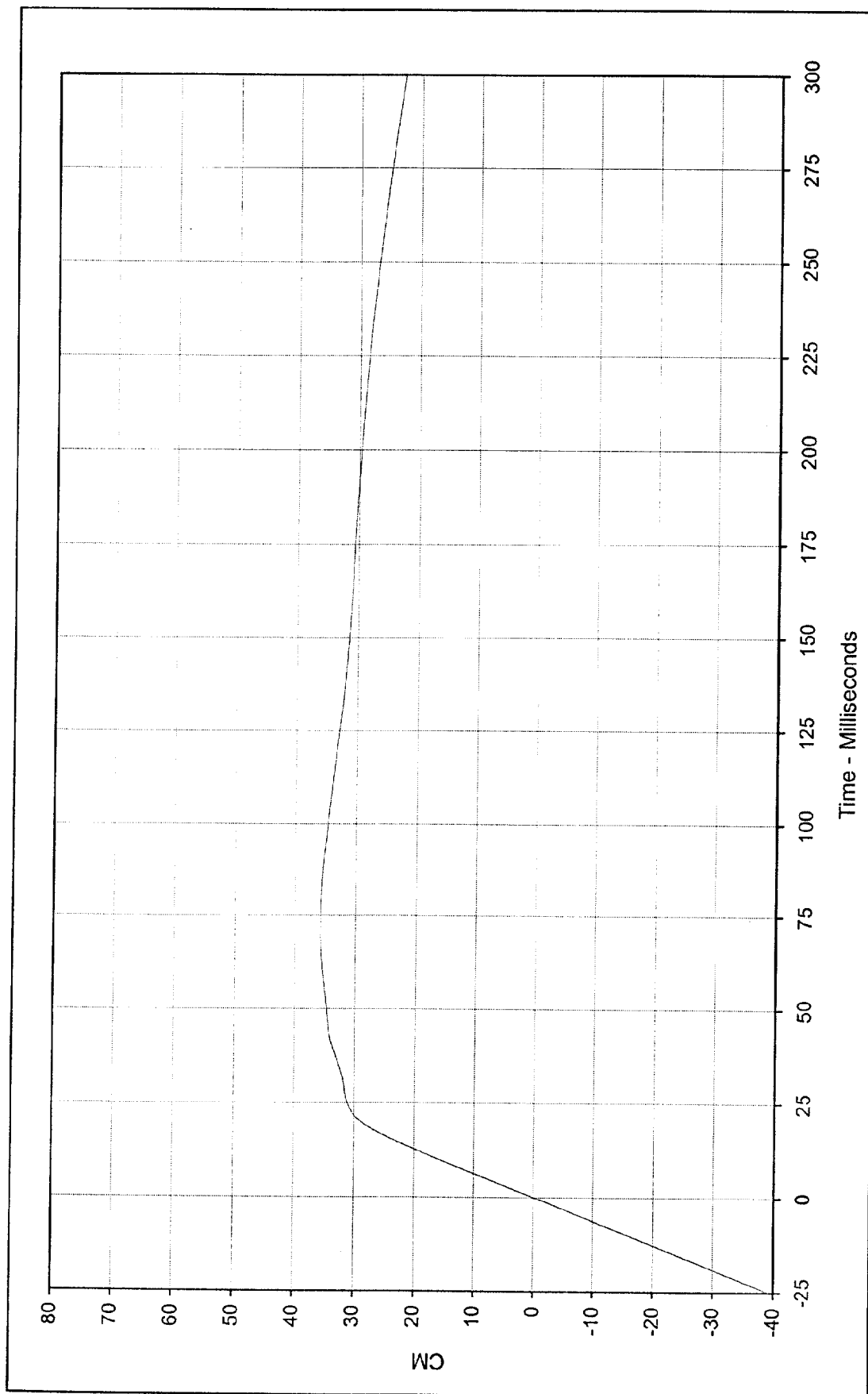






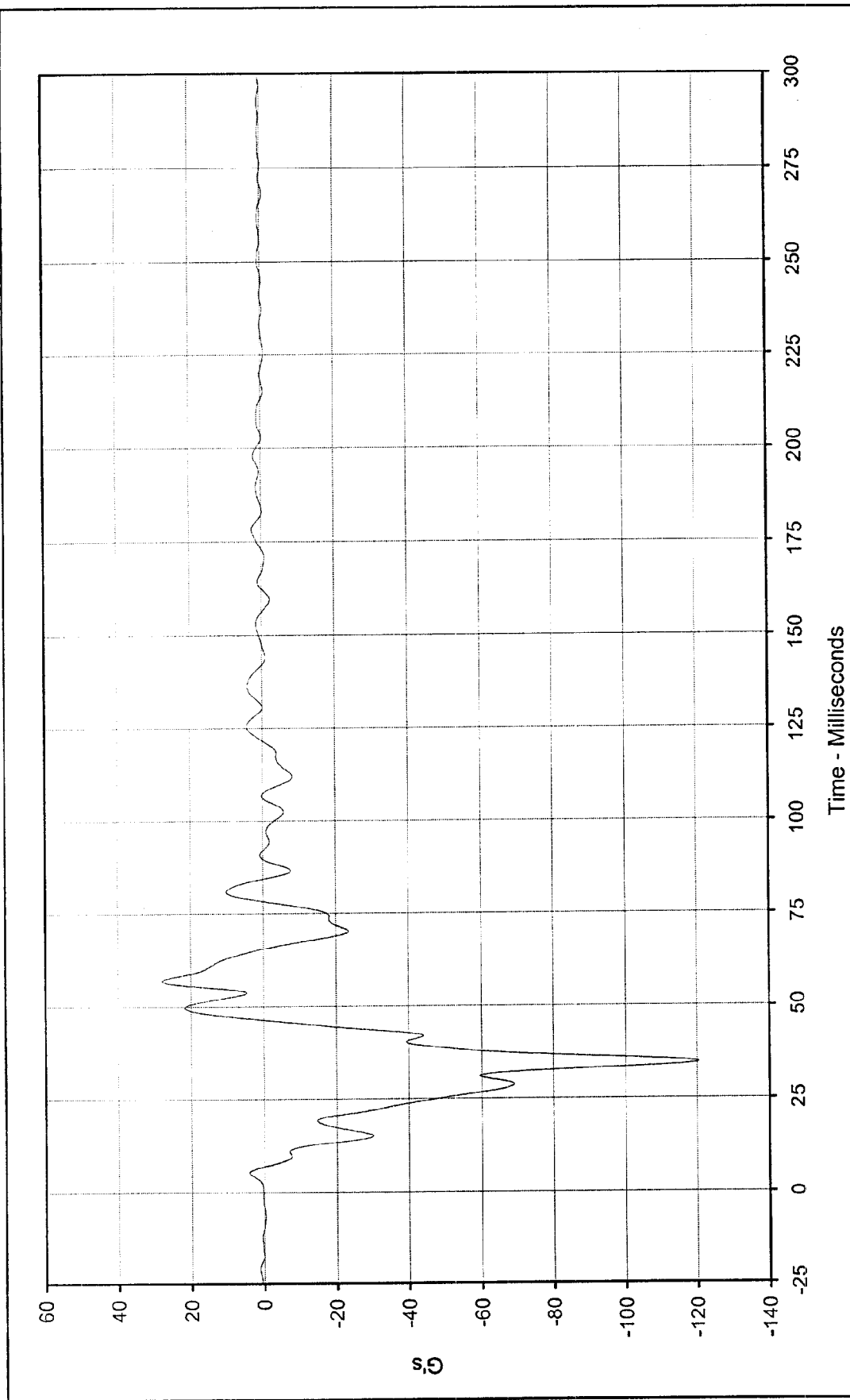
Curve Description:	Vehicle Engine Bottom Velocity	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	56.5 at 0.6 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-3.4 at 299.9 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/25/99			
Curve Number:	IN1-092			





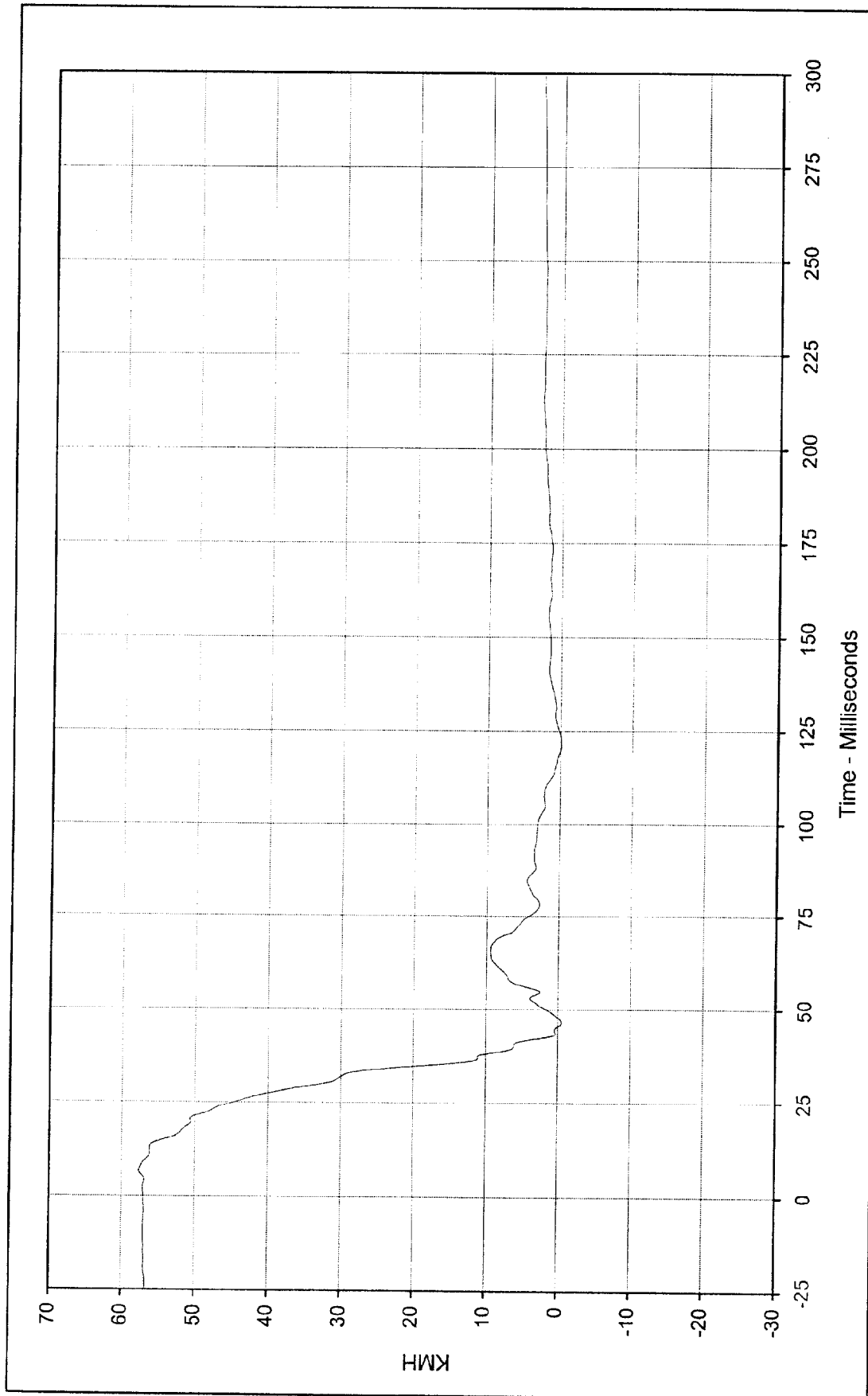
Curve Description:	Vehicle Engine Bottom Displ.	Test Program:	1999 NHTSA 35 mph NCAP	No.:	MX5800
Maximum Value:	35.8	at	72.4	Milliseconds	Test Vehicle:
Minimum Value:	0.0	at	0.0	Milliseconds	1999 Volkswagen Beetle (New)
SAE Filter Class:	180				
Date of Test:	2/25/99				
Curve Number:	IN2-092				





Curve Description:	Vehicle Left Brake Caliper		Test Program:	1999 NHTSA 35 mph NCAP		No.: MX5800
Maximum Value:	27.9	at 56.8	Test Vehicle:	1999 Volkswagen Beetle (New)		
Minimum Value:	-120.5	at 34.6				
SAE Filter Class:	60					
Date of Test:	2/25/99					
Curve Number:	FIL-093					



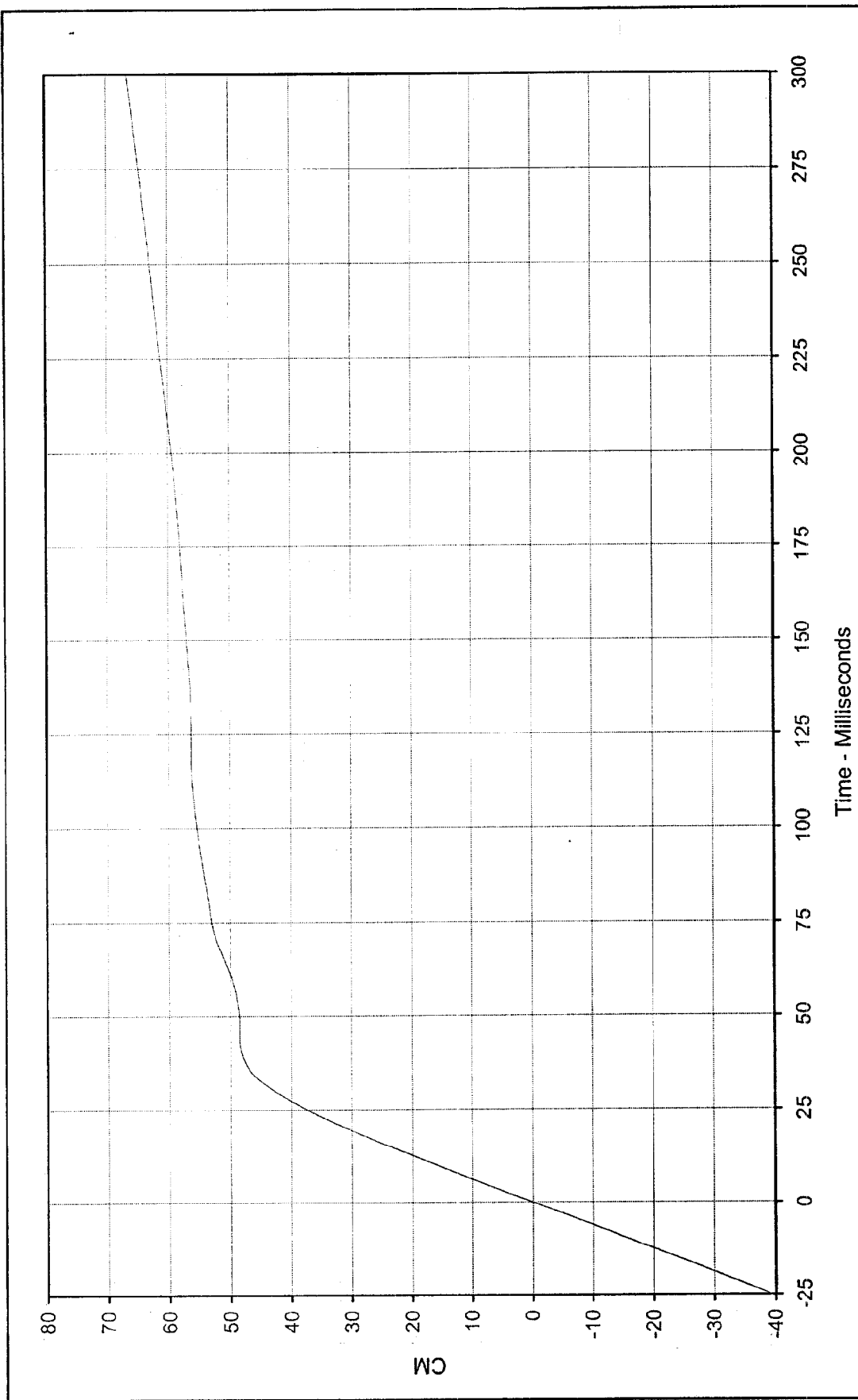


Curve Description:	Vehicle Left Brake Caliper Velocity		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	57.7	at 6.5	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-0.5	at 46.5			
SAE Filter Class:	180				
Date of Test:	2/25/99				
Curve Number:	IN1-093				



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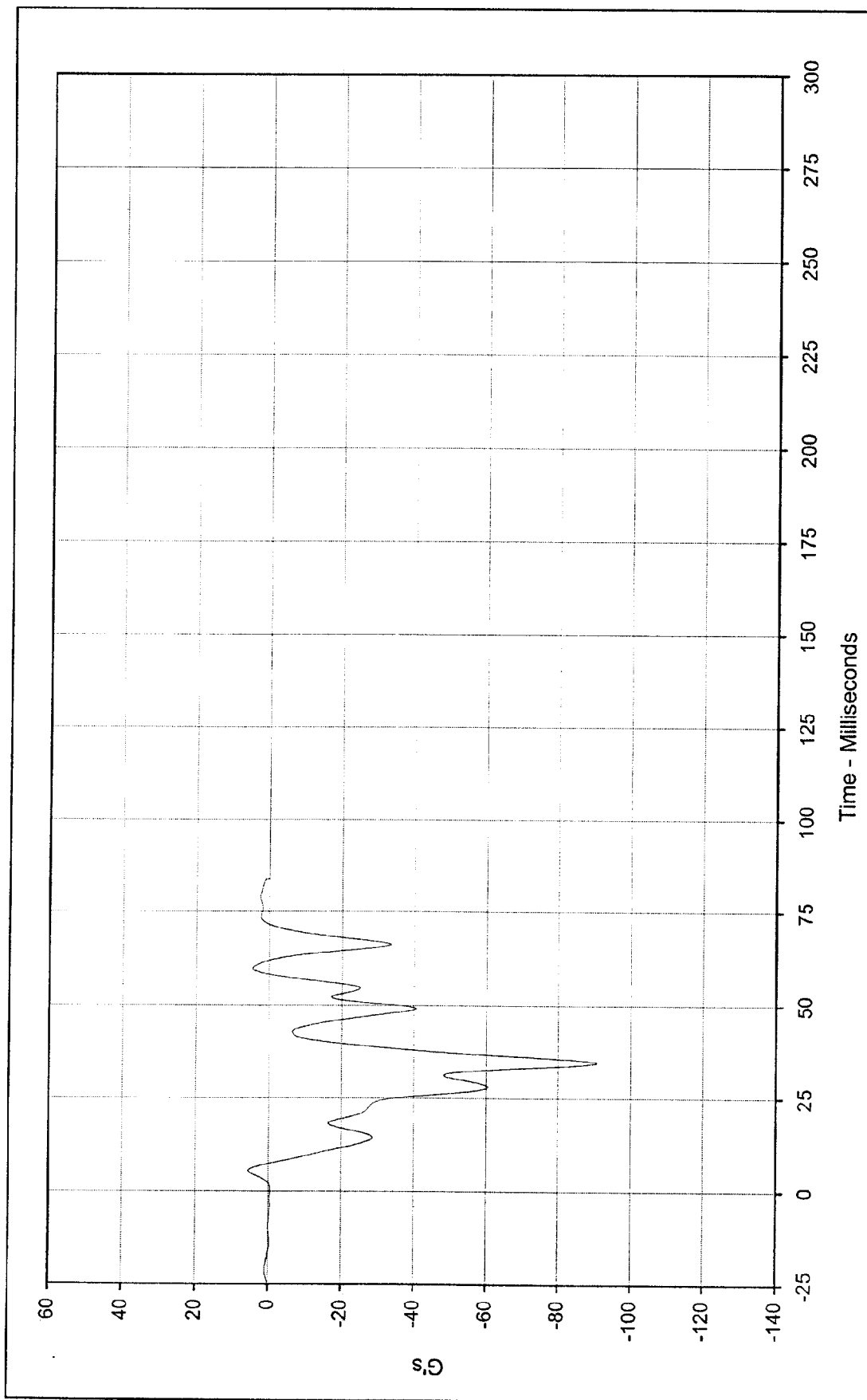




Curve Description: Vehicle Left Brake Caliper Displ. Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
Maximum Value: 66.6 at 299.9 Milliseconds Test Vehicle: 1999 Volkswagen Beetle (New)
Minimum Value: 0.0 at 0.0 Milliseconds



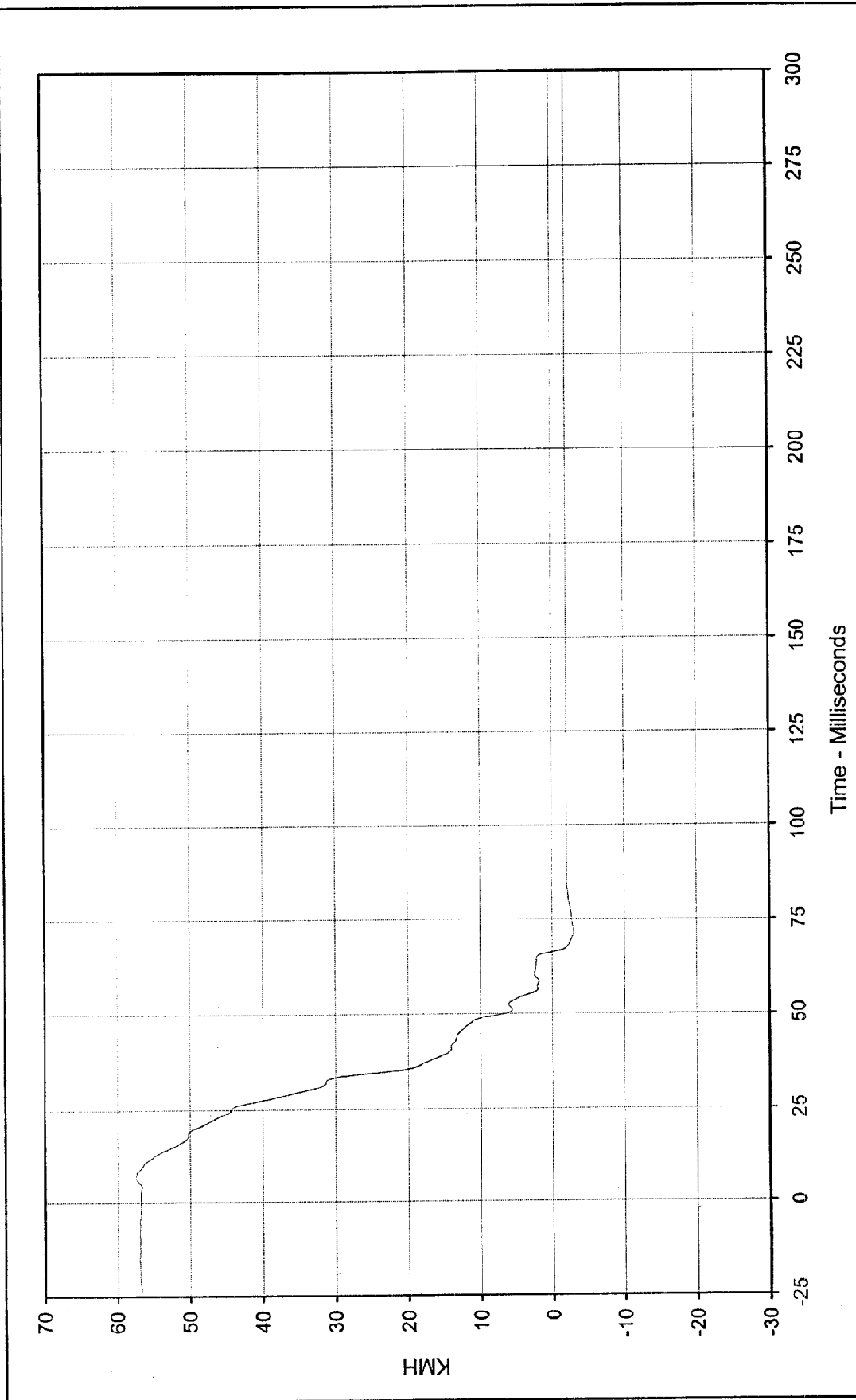
SAE Filter Class: 180
Date of Test: 2/25/99
Curve Number: IN2-093



Curve Description: 1999 NHTSA 35 mph NCAP Test Program: No.: MX5800
 Maximum Value: 5.5 at 5.5 Milliseconds
 Minimum Value: -90.7 at 34.6 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-094



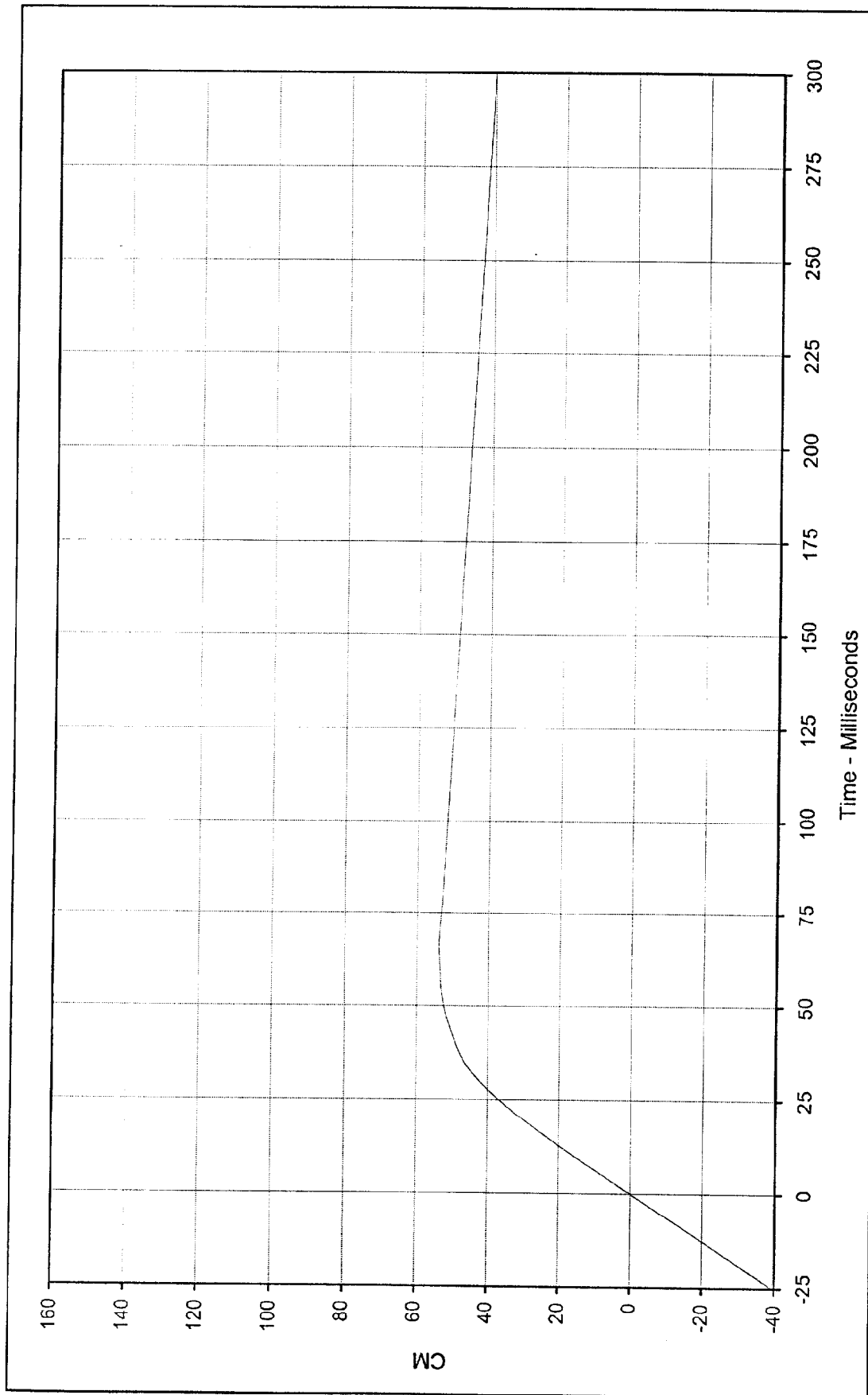
* Channel failed at 83.9 Msec.



Curve Description:	Vehicle Right Brake Caliper Velocity *	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	57.5 at 7.1 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-3.0 at 71.4 Milliseconds			
SAE Filter Class:	180			
Date of Test:	2/25/99			
Curve Number:	IN1-094			



* Channel failed at 83.9 Msec.



Curve Description: Vehicle Right Brake Caliper Displ. *

Maximum Value: 53.8 at 66.2 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

Date of Test: 2/25/99

Curve Number: IN2-094

Test Program:

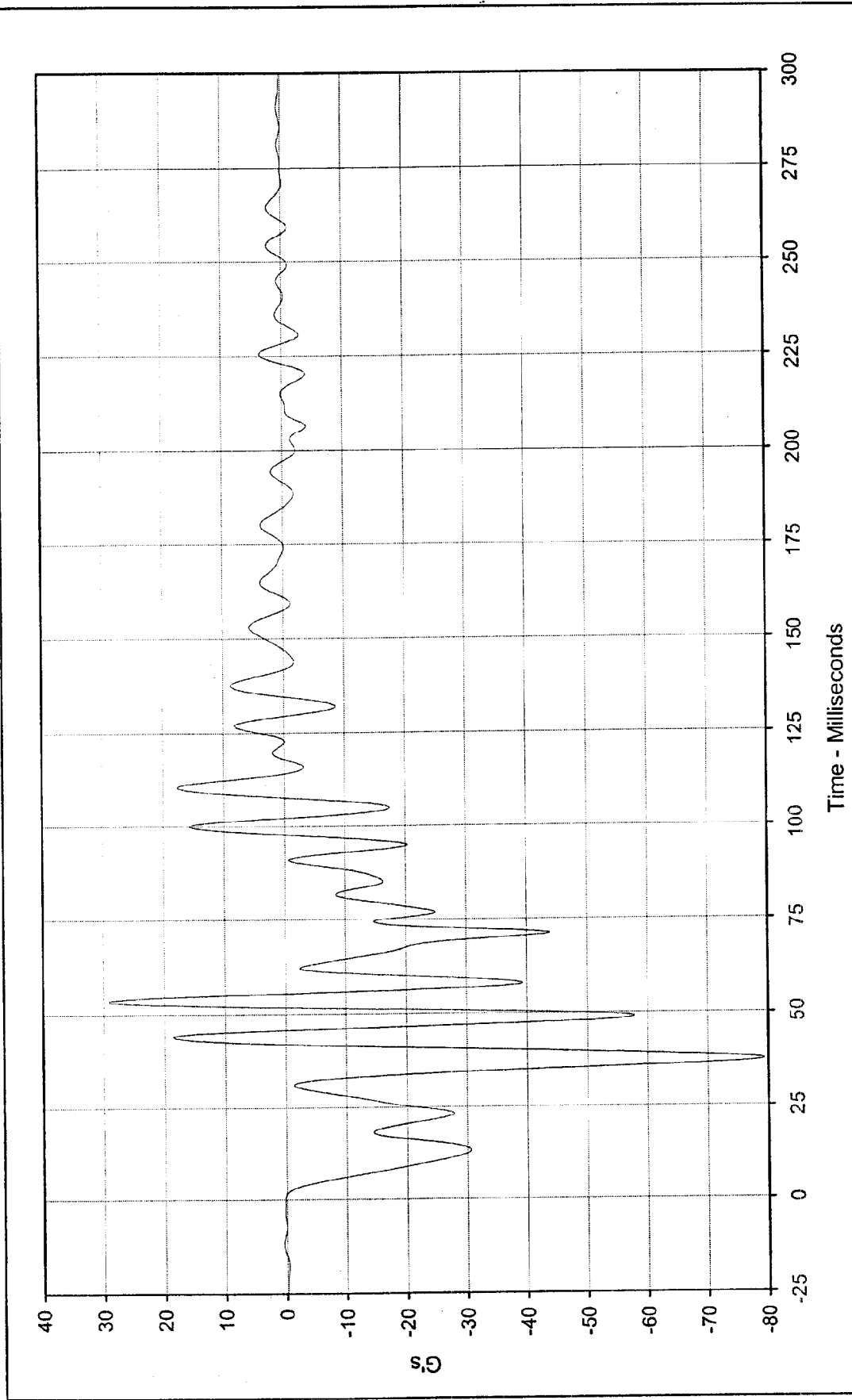
Test Vehicle:

1999 NHTSA 35 mph NCAP No.: MX5800

1999 Volkswagen Beetle (New)



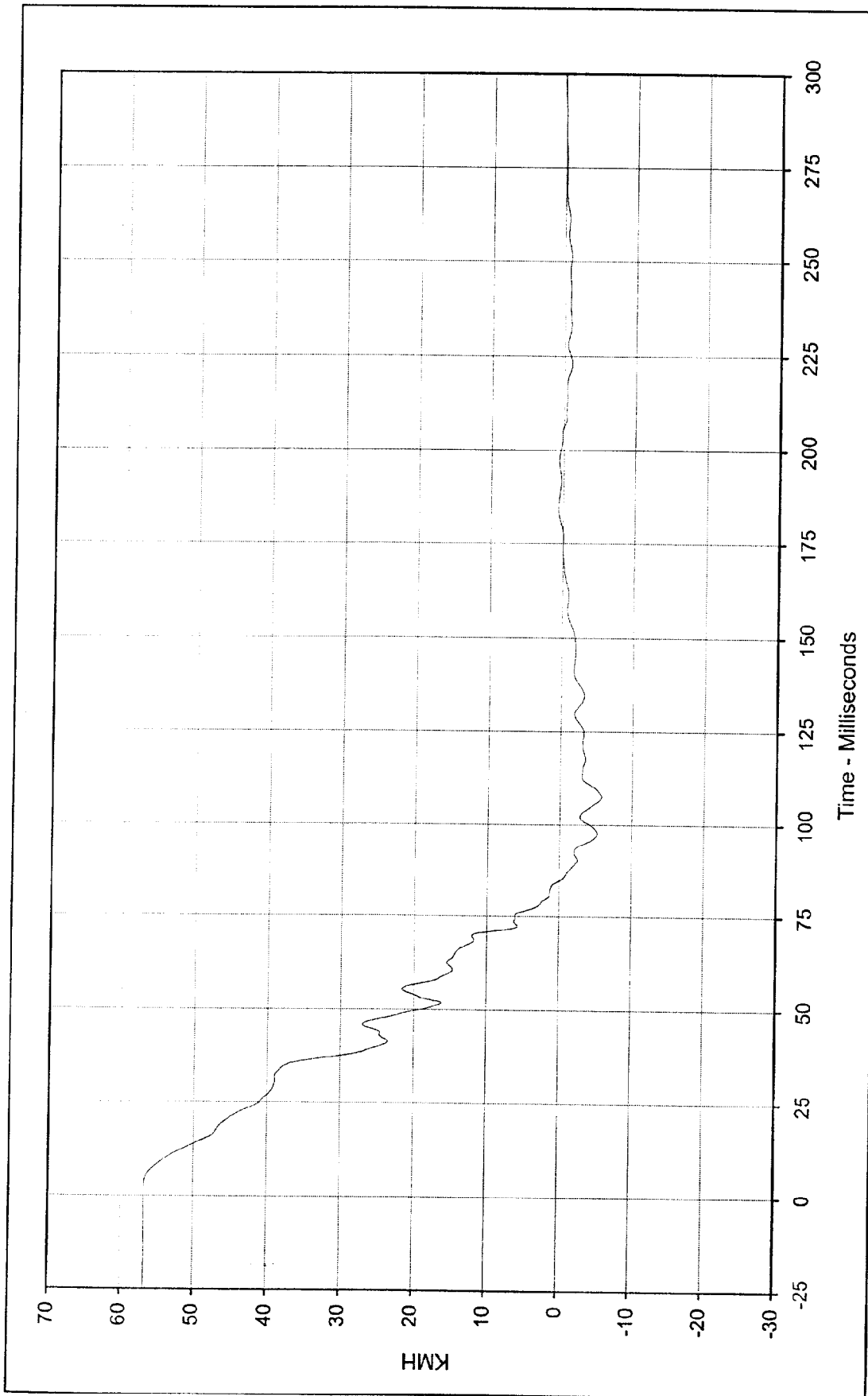
* Channel failed at 83.9 Msec.



Curve Description: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Program:
 Test Vehicle: 1999 Volkswagen Beetle (New)

Vehicle Instrument Panel
 Maximum Value: 29.1 at 53.5 Milliseconds
 Minimum Value: -79.4 at 37.3 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-095

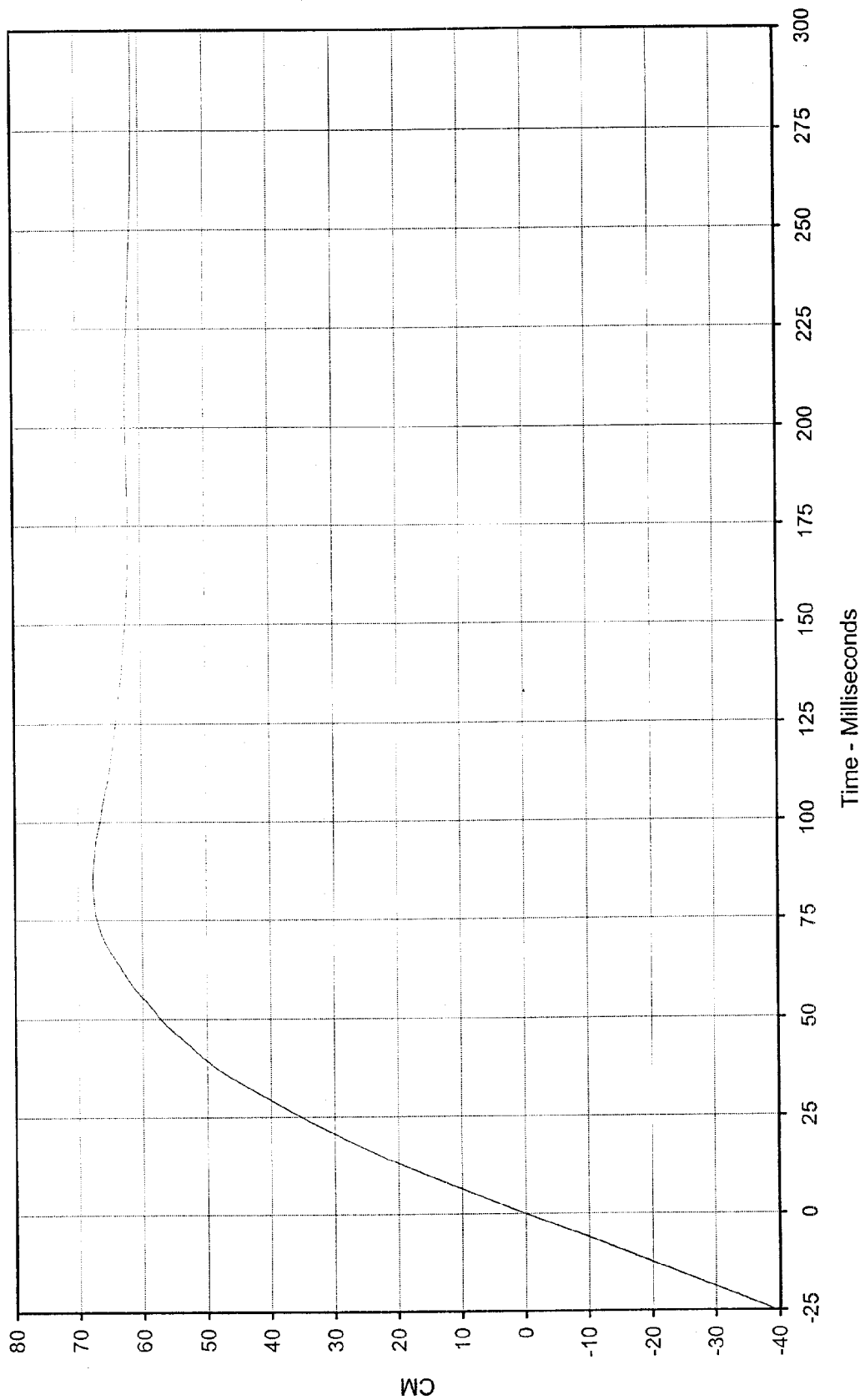




Curve Description: Vehicle Instrument Panel Velocity
 Maximum Value: 56.8 at 0.0 Milliseconds
 Minimum Value: -5.8 at 107.6 Milliseconds
 SAE Filter Class: 180
 Date of Test: 2/25/99
 Curve Number: IN1-095

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Program: 1999 Volkswagen Beetle (New)

Vehicle Instrument Panel Displ.

Maximum Value: 67.8 at 84.7 Milliseconds

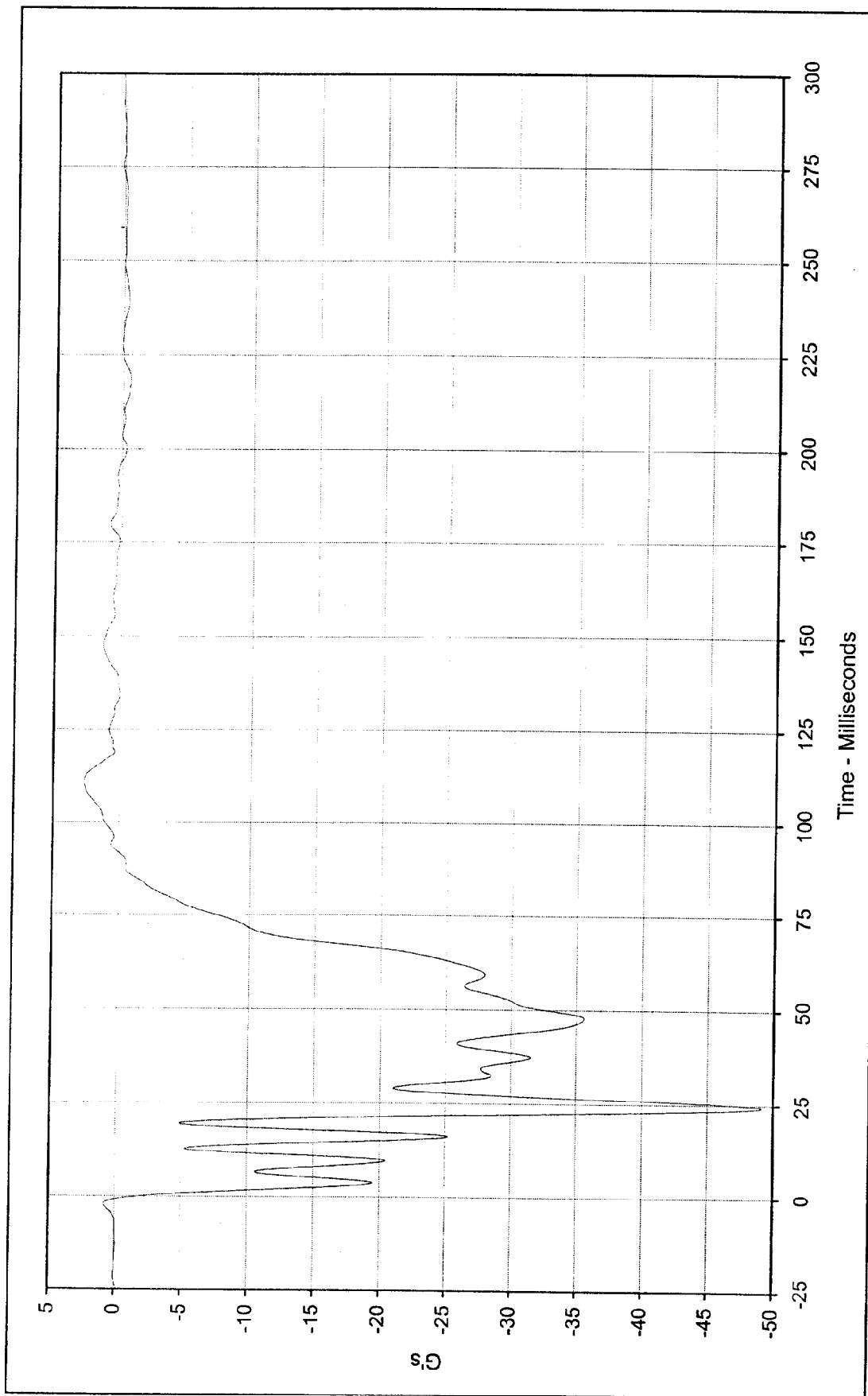
Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

Date of Test: 2/25/99

Curve Number: IN2-095

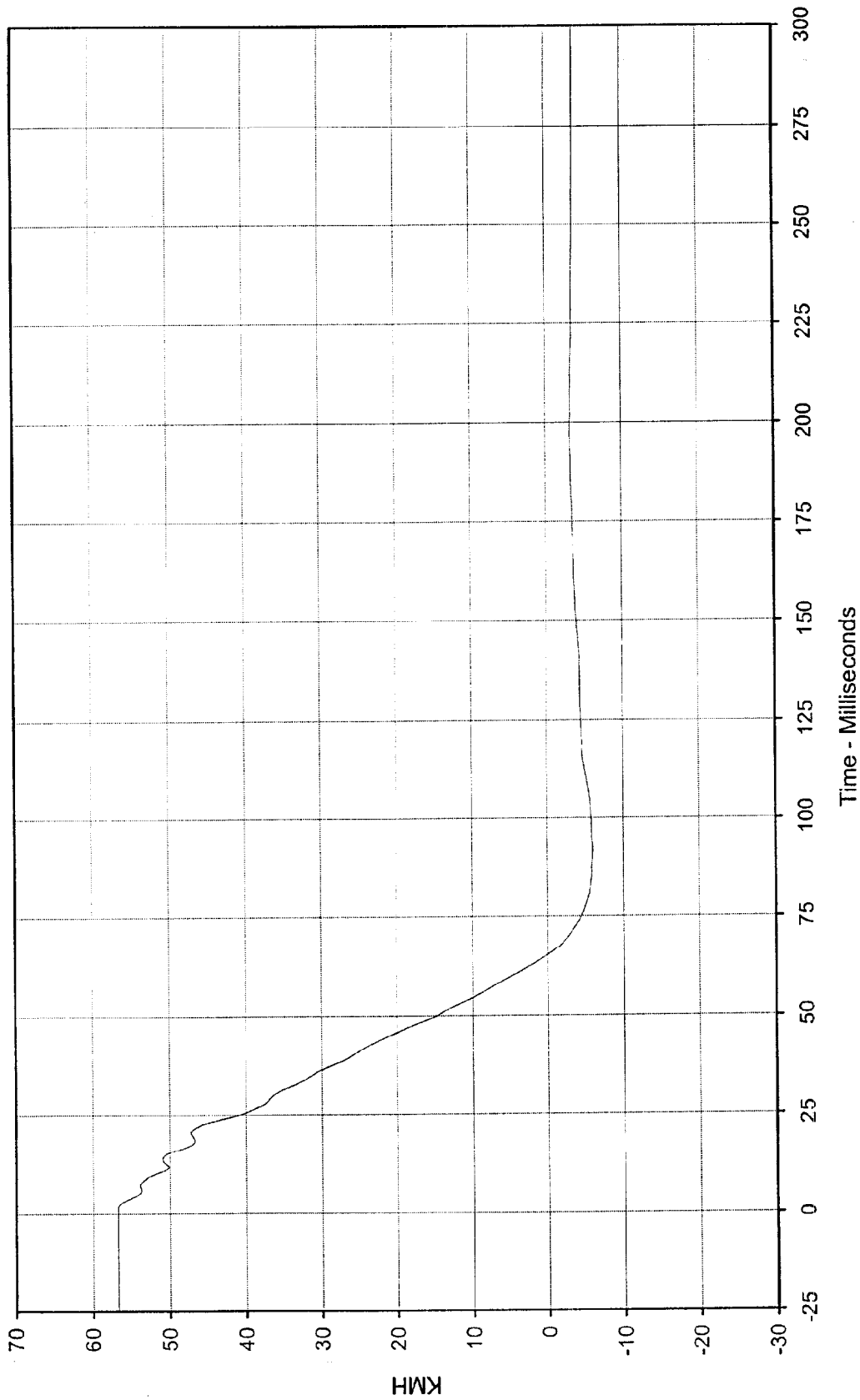




Curve Description: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Program:
 Test Vehicle: 1999 Volkswagen Beetle (New)

Curve Description: Vehicle Left Rear Redundant
 Maximum Value: 2.7 at 111.1 Milliseconds
 Minimum Value: -49.2 at 24.3 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-096





Curve Description: Vehicle Left Rear Redundant Velocity

Maximum Value: 56.8 at 1.4 Milliseconds

Minimum Value: -6.0 at 92.3 Milliseconds

SAE Filter Class: 180

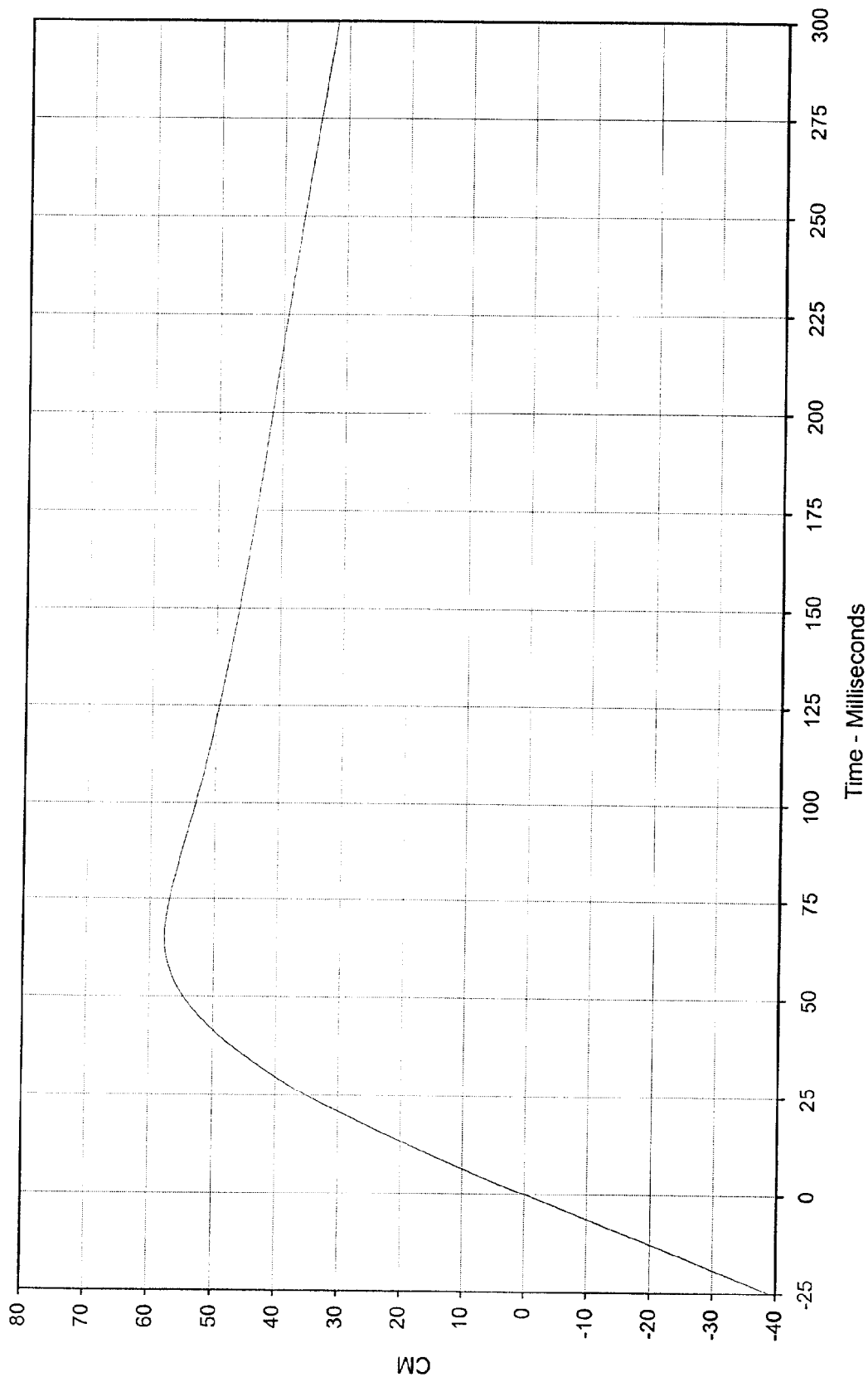
Date of Test: 2/25/99

Curve Number: IN1-096

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Vehicle Left Rear Redundant Displ.

Maximum Value: 57.7 at 65.3 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

Date of Test: 2/25/99

Curve Number: IN2-096

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)

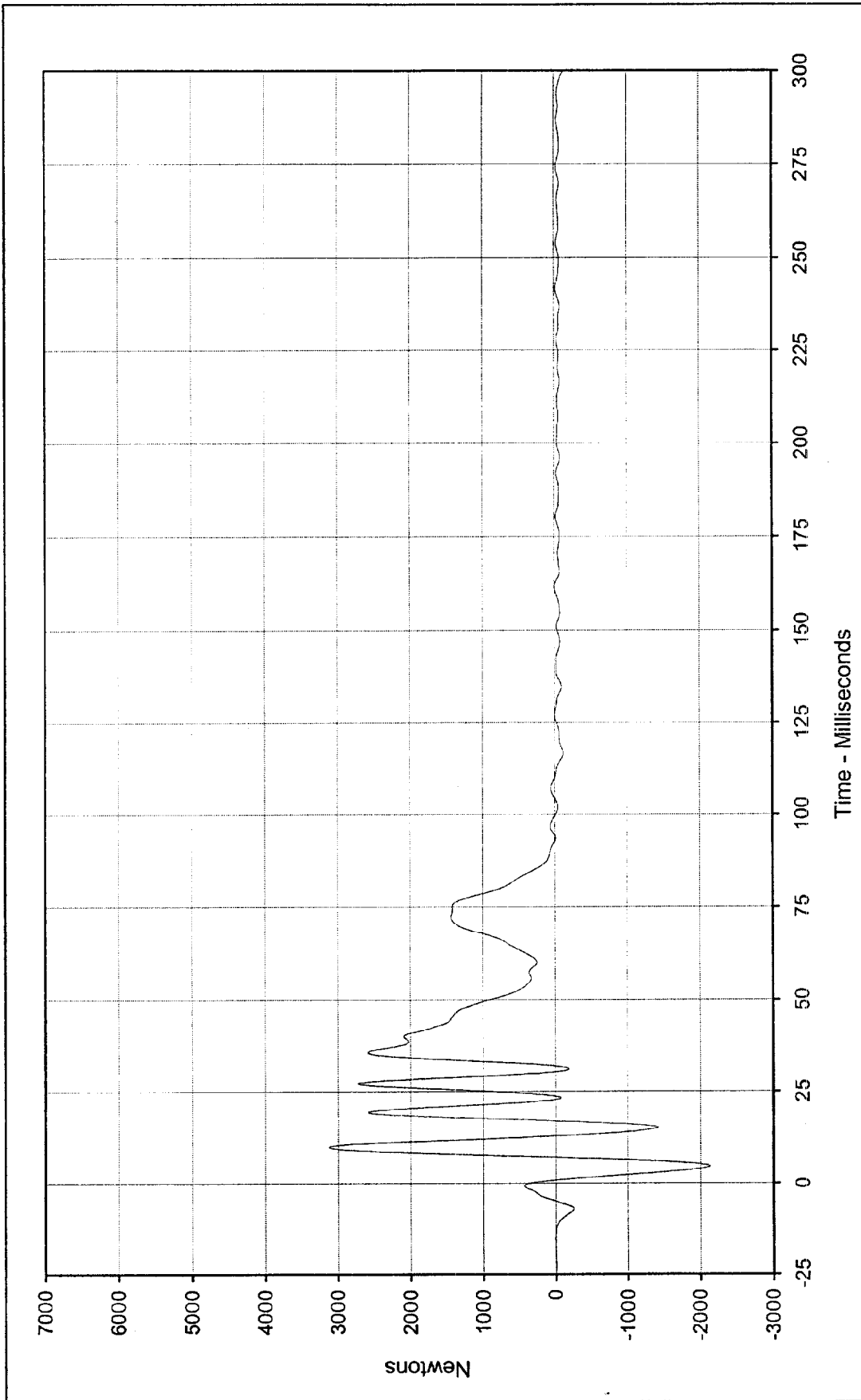


APPENDIX C
LOAD CELL BARRIER INFORMATION

KAR99001-16

LIST OF BARRIER DATA PLOTS

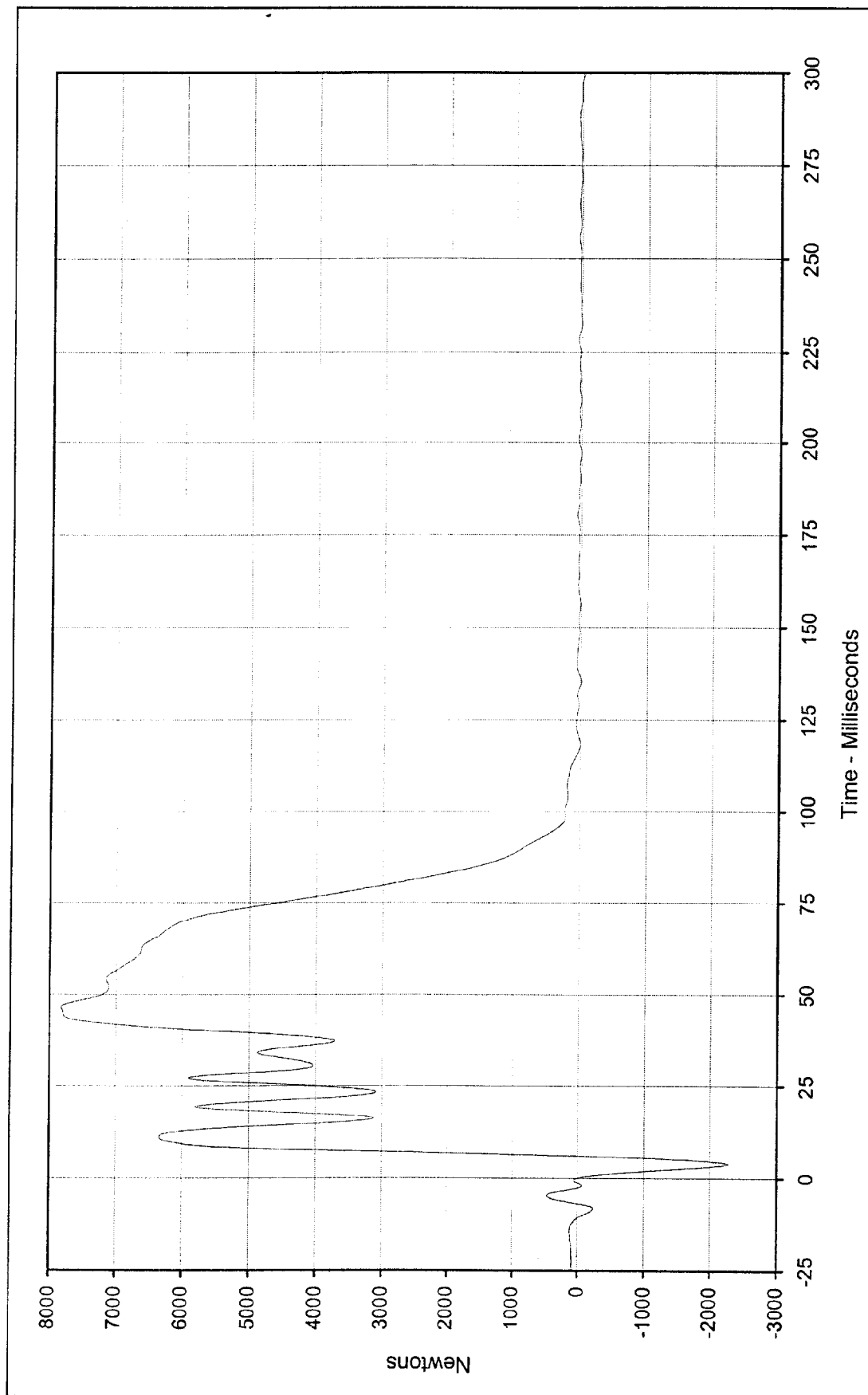
Data Plot		Page
C-1	Barrier Force A2	C-1
C-2	Barrier Force A3	C-2
C-3	Barrier Force A4	C-3
C-4	Barrier Force A5	C-4
C-5	Barrier Force A6	C-5
C-6	Barrier Force A7	C-6
C-7	Barrier Force A8	C-7
C-8	Barrier Force A9	C-8
C-9	Barrier Force B2	C-9
C-10	Barrier Force B3	C-10
C-11	Barrier Force B4	C-11
C-12	Barrier Force B5	C-12
C-13	Barrier Force B6	C-13
C-14	Barrier Force B7	C-14
C-15	Barrier Force B8	C-15
C-16	Barrier Force B9	C-16
C-17	Barrier Force C2	C-17
C-18	Barrier Force C3	C-18
C-19	Barrier Force C4	C-19
C-20	Barrier Force C5	C-20
C-21	Barrier Force C6	C-21
C-22	Barrier Force C7	C-22
C-23	Barrier Force C8	C-23
C-24	Barrier Force C9	C-24
C-25	Barrier Force Group No. 1 Sum	C-25
C-26	Barrier Force Group No. 2 Sum	C-26
C-27	Barrier Force Group No. 3 Sum	C-27
C-28	Barrier Force Group No. 4 Sum	C-28
C-29	Barrier Force Group No. 5 Sum	C-29
C-30	Barrier Force Group No. 6 Sum	C-30
C-31	Barrier Force Total Sum	C-31
C-32	Barrier Force Total Sum vs. Dynamic Crush	C-32
C-33	Barrier Load Cell Summary Data	C-33



Curve Description: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Program:
 Test Vehicle: 1999 Volkswagen Beetle (New)

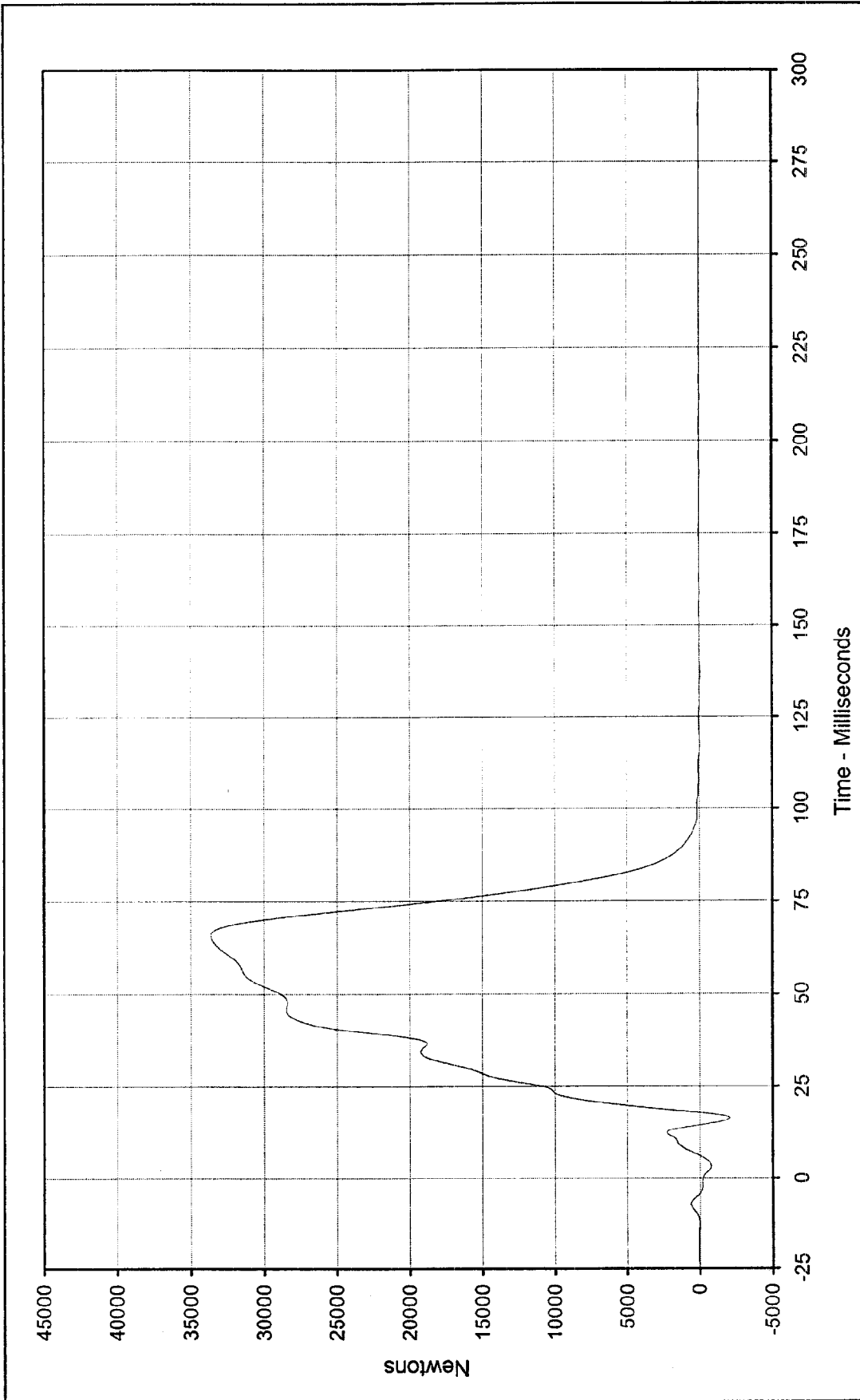
Barrier Force A2
 Maximum Value: 3123.3 at 9.8 Milliseconds
 Minimum Value: -2131.7 at 4.6 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-099





Curve Description:	Barrier Force A3	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	7822.0 at 46.4 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-2276.8 at 3.9 Milliseconds			
SAE Filter Class:	60			
Date of Test:	2/25/99			
Curve Number:	FIL-100			





Curve Description: Barrier Force A4

Maximum Value: 33606.8 at 65.8 Milliseconds

Minimum Value: -2069.0 at 16.5 Milliseconds

SAE Filter Class: 60

Date of Test: 2/25/99

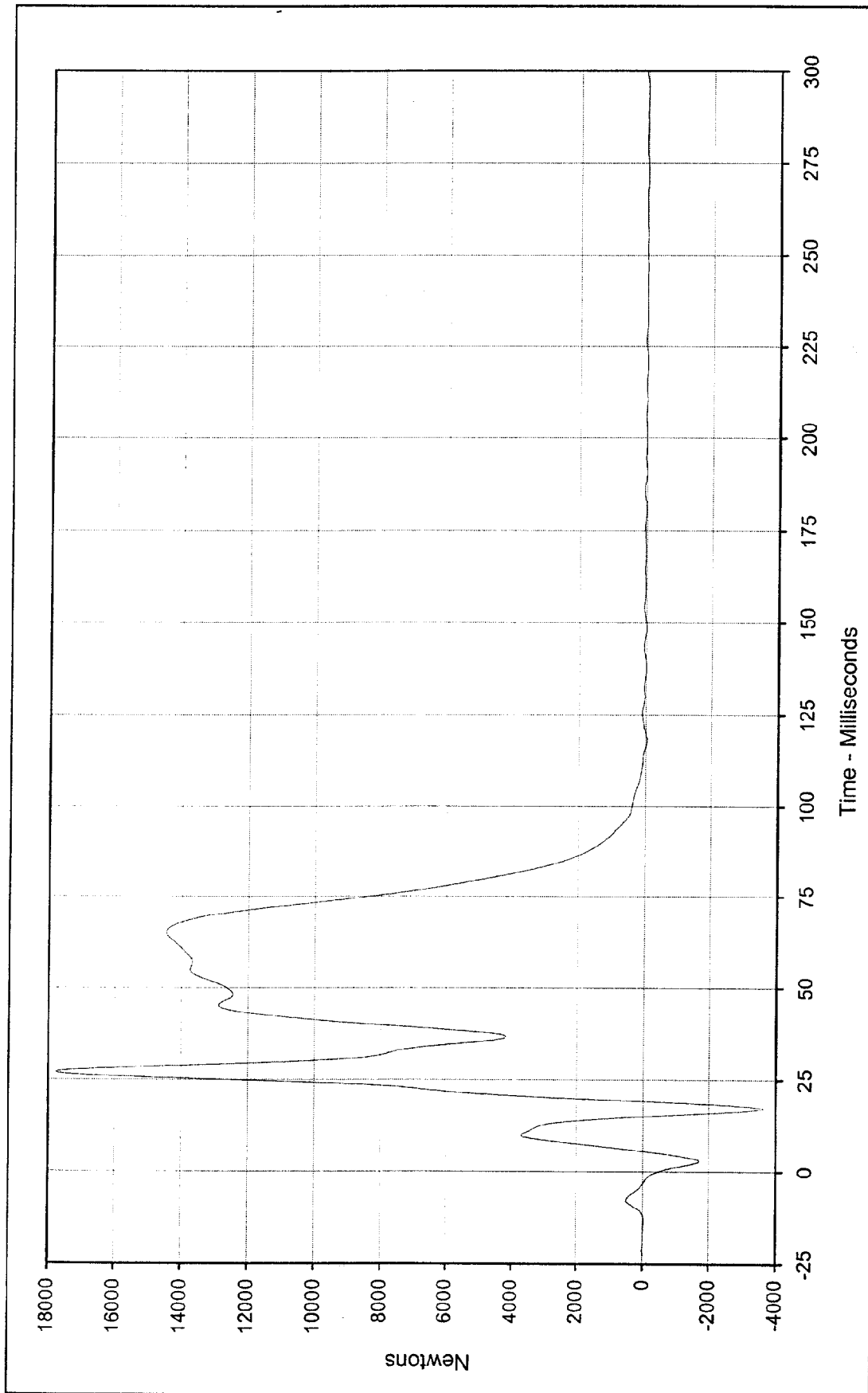
Curve Number: FIL-101

Test Program: 1999 NHTSA 35 mph NCAP

Test Vehicle: 1999 Volkswagen Beetle (New)

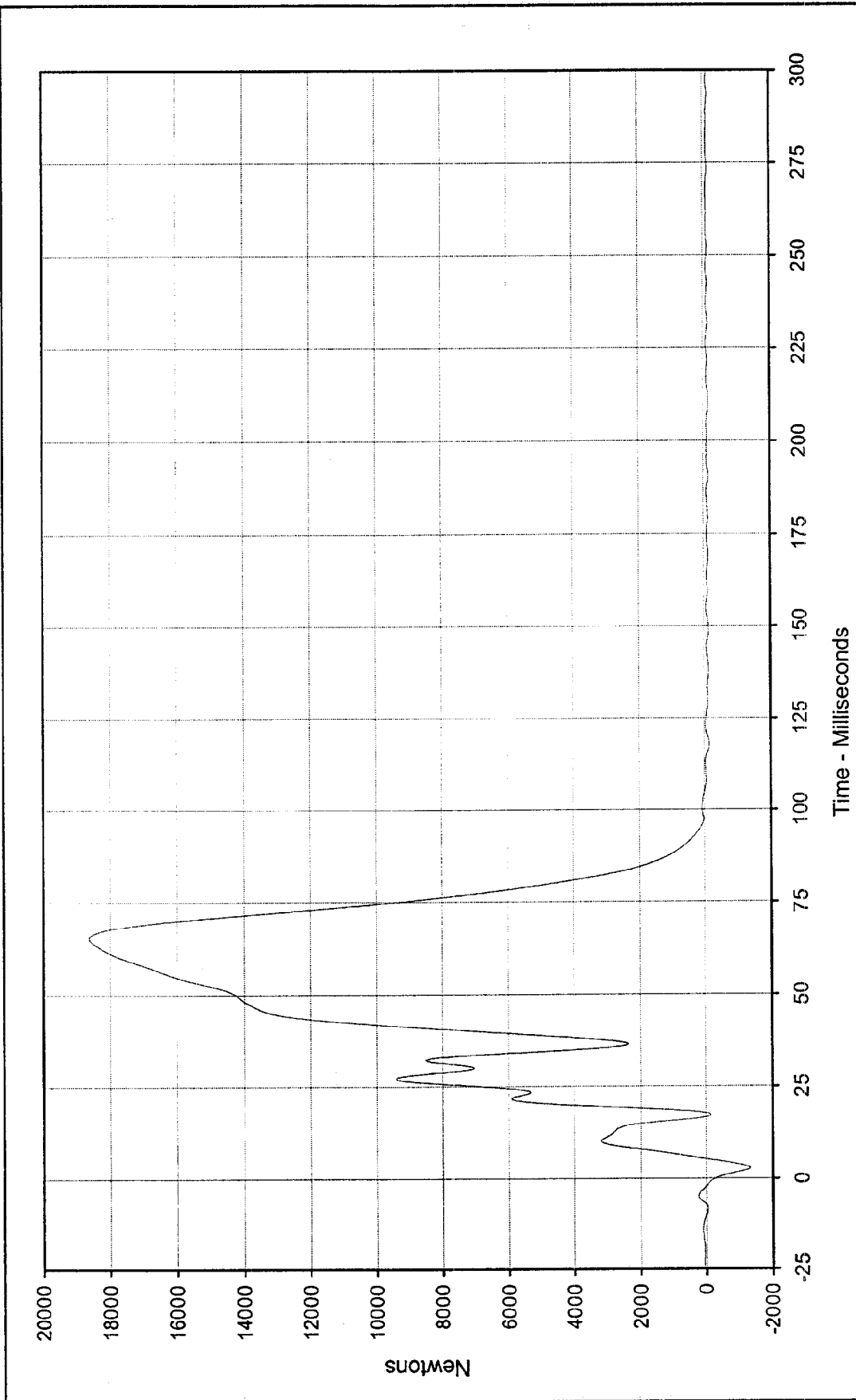
No.: MX5800





Curve Description:	Barrier Force A.5	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	17761.7 at 27.0 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-3618.8 at 17.1 Milliseconds			
SAE Filter Class:	60			
Date of Test:	2/25/99			
Curve Number:	FIL-102			

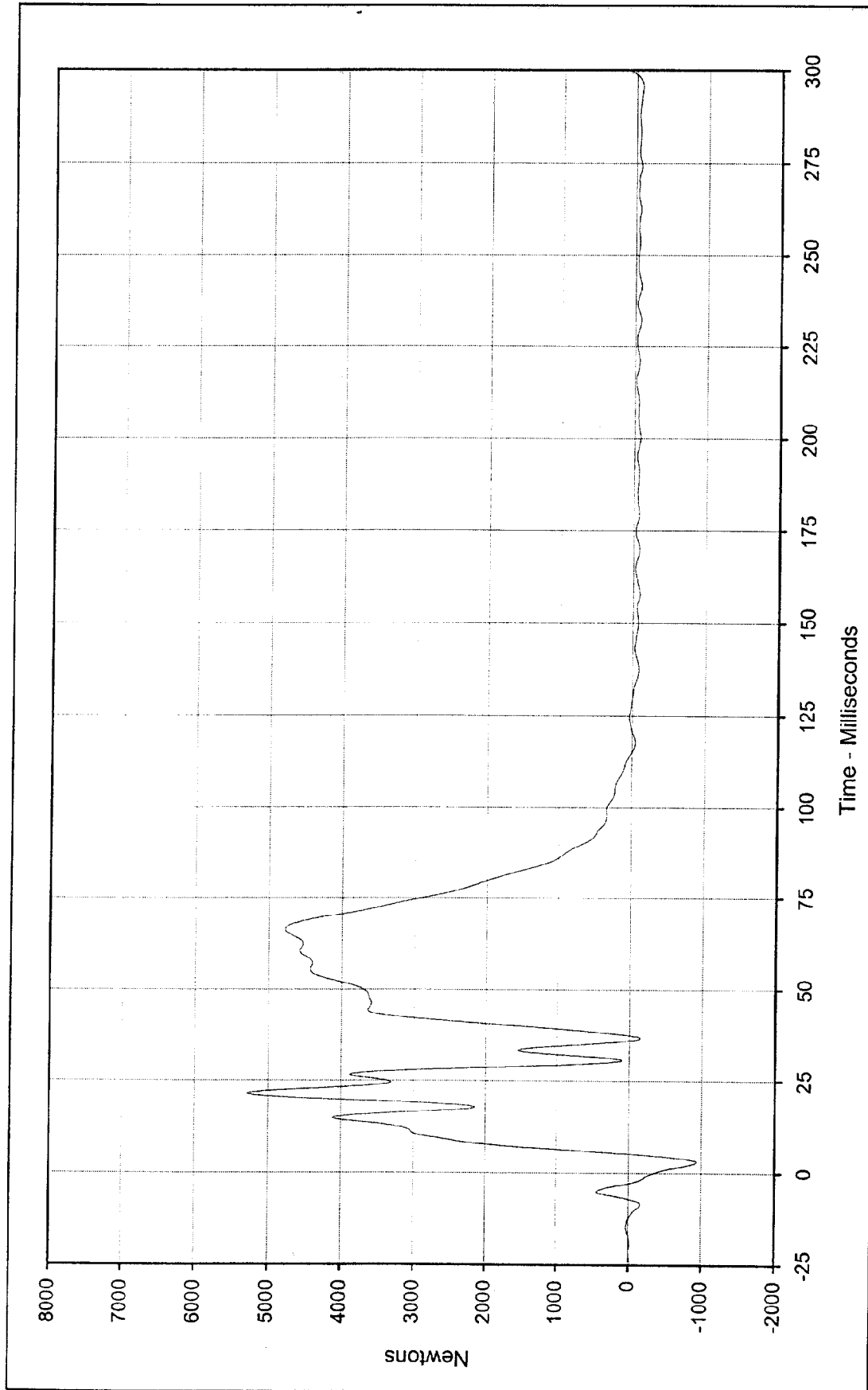




Curve Description: Barrier Force A6
 Maximum Value: 18629.1 at 65.2 Milliseconds
 Minimum Value: -1325.5 at 2.8 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-103

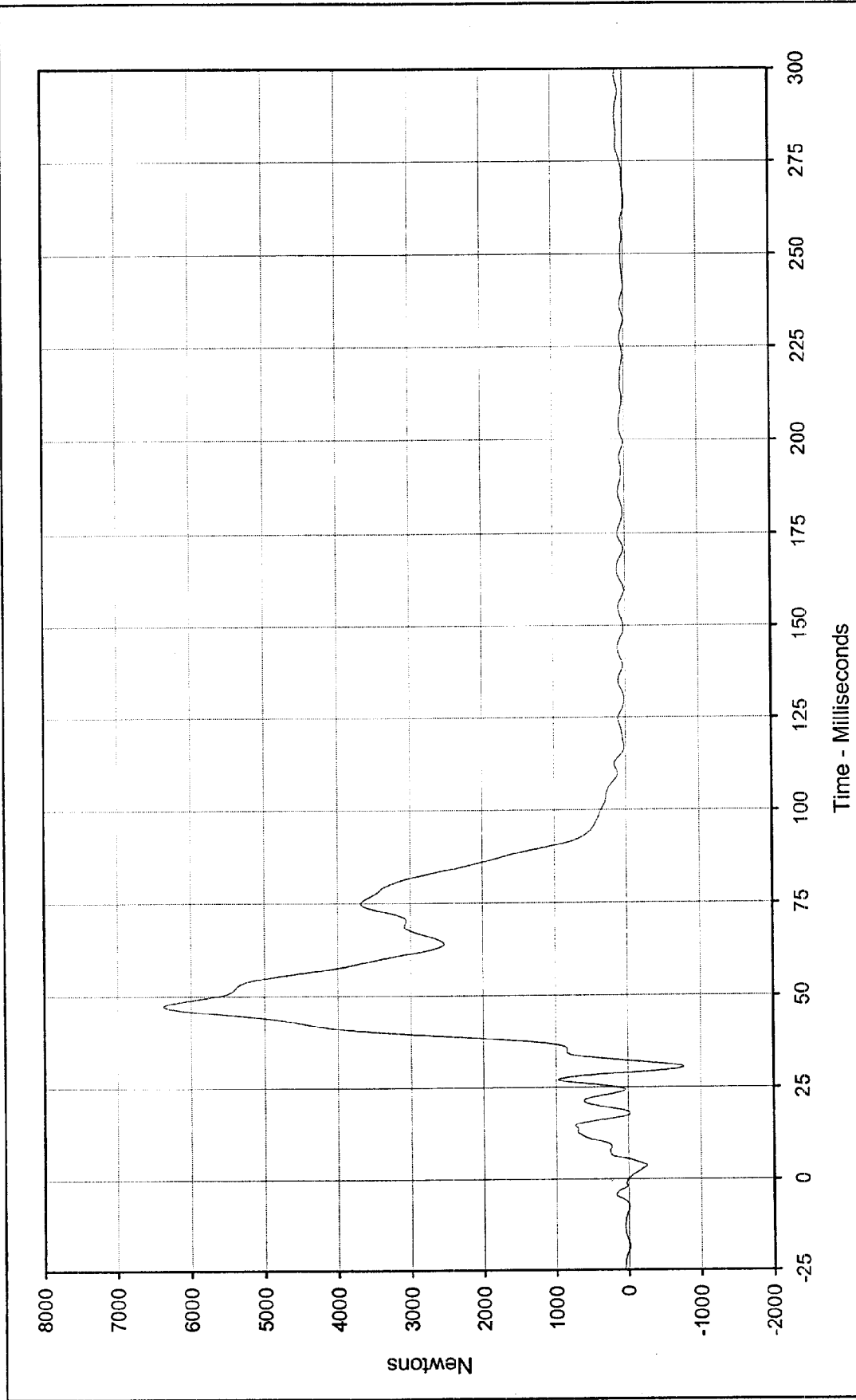
Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description:	Barrier Force A7	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	5278.6 at 21.5 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-937.9 at 2.9 Milliseconds			
SAE Filter Class:	60			
Date of Test:	2/25/99			
Curve Number:	FIL-104			

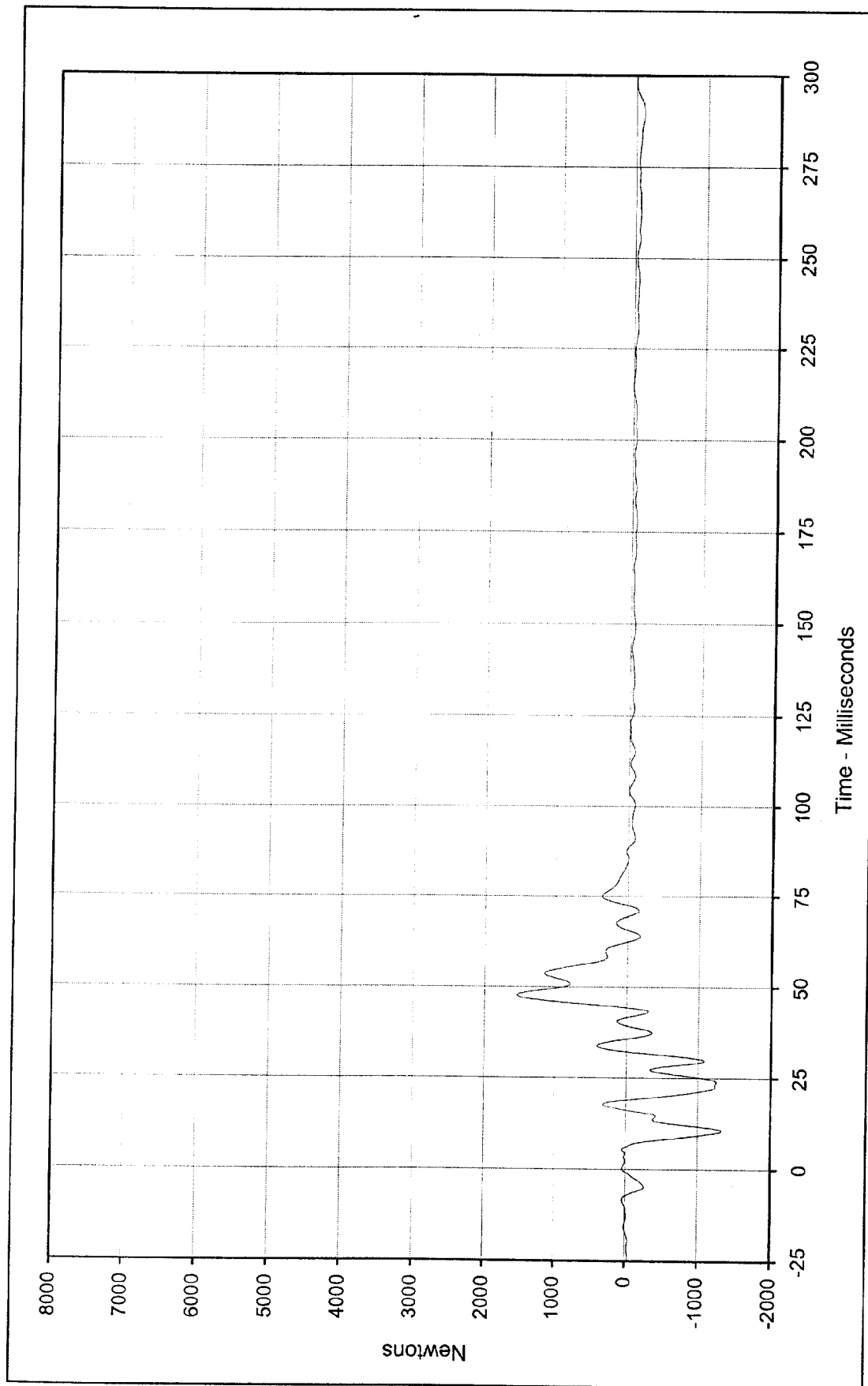




Curve Description: Barrier Force A8
 Maximum Value: 6370.9 at 47.3 Milliseconds
 Minimum Value: -765.5 at 30.3 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-105

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

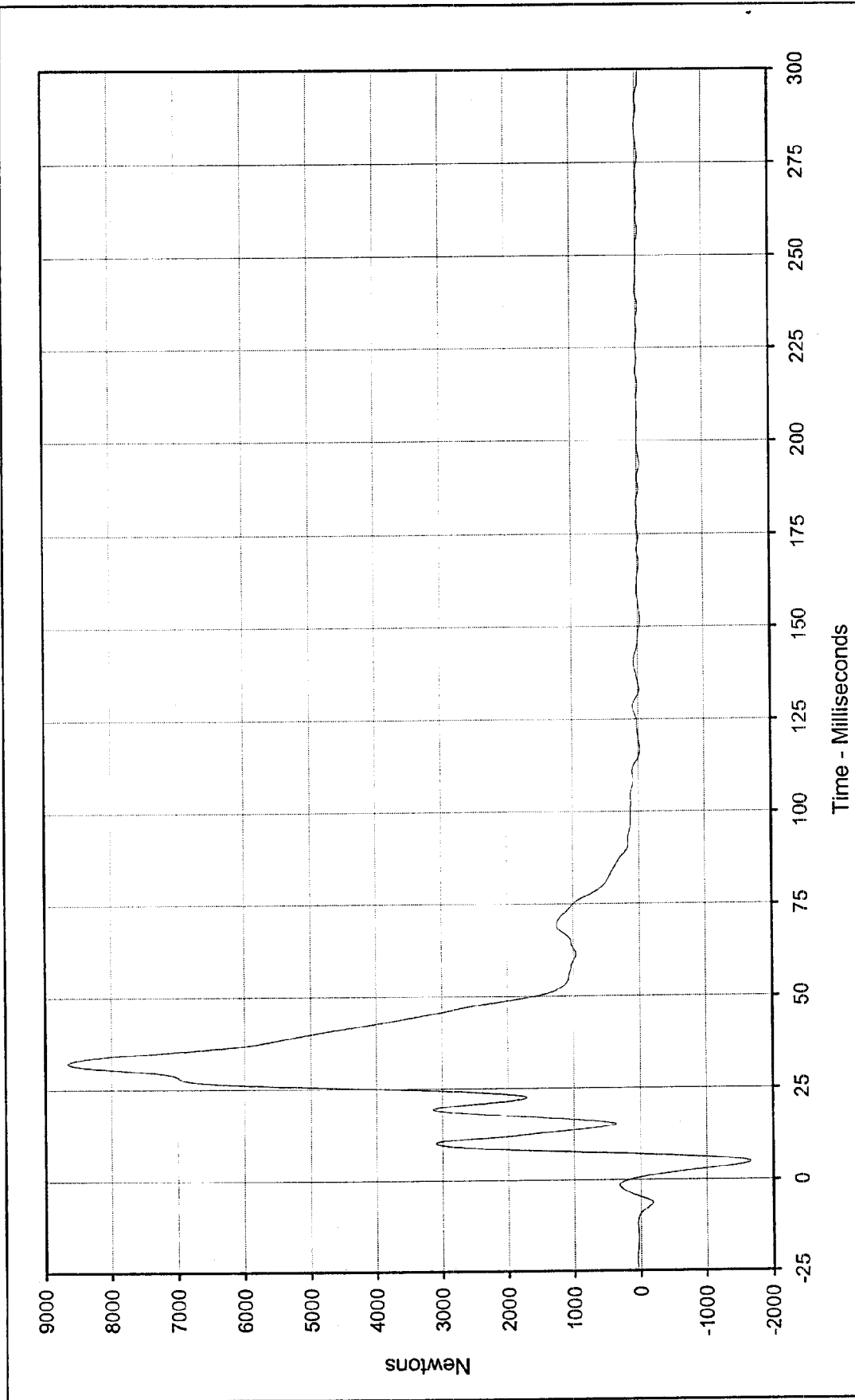




Curve Description:		Barrier Force A9		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	1544.2	at	47.7	Milliseconds	Test Vehicle: 1999 Volkswagen Beetle (New)	
Minimum Value:	-1331.6	at	10.4	Milliseconds		
SAE Filter Class:	60					
Date of Test:	2/25/99					
Curve Number:	FIL-106					







Curve Description: Barrier Force B2

Maximum Value: 8657.1 at 32.2 Milliseconds

Minimum Value: -1665.0 at 4.8 Milliseconds

SAE Filter Class: 60

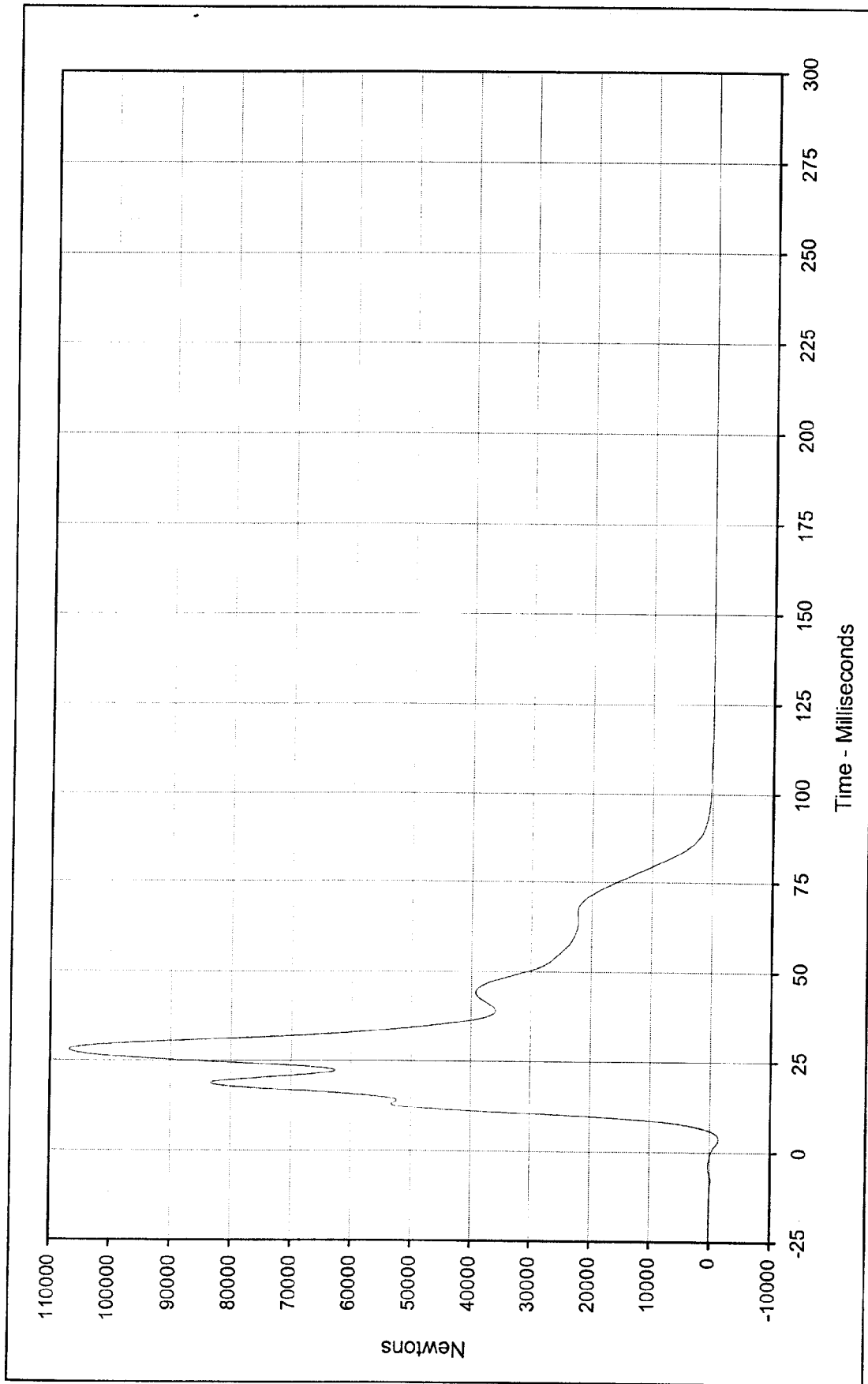
Date of Test: 2/25/99

Curve Number: FIL-108

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)



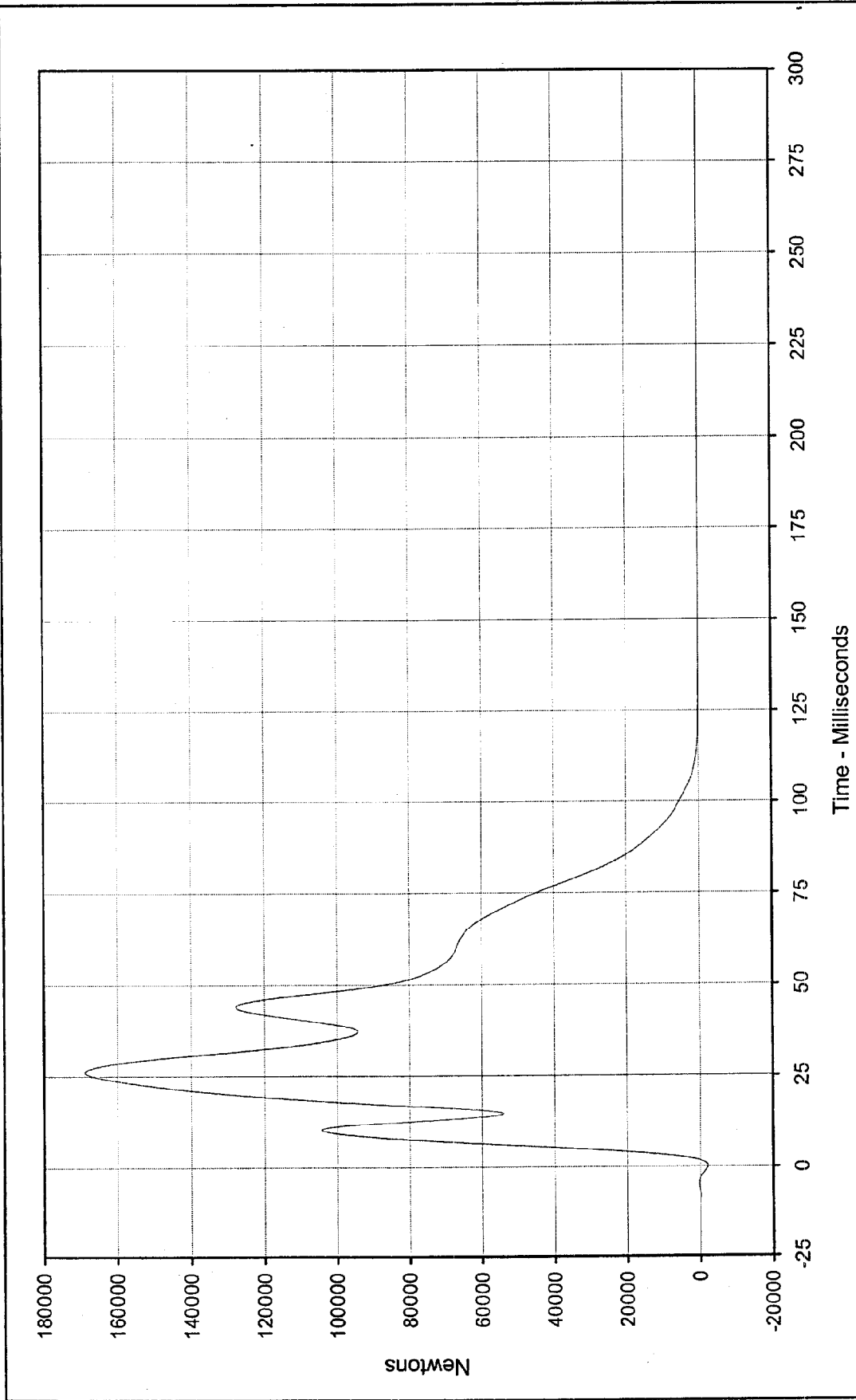


Curve Description:		Barrier Force B3		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	106764.9	at	28.0	Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)
Minimum Value:	-1463.8	at	3.6	Milliseconds		
SAE Filter Class:	60					
Date of Test:	2/25/99					
Curve Number:	FIL-109					



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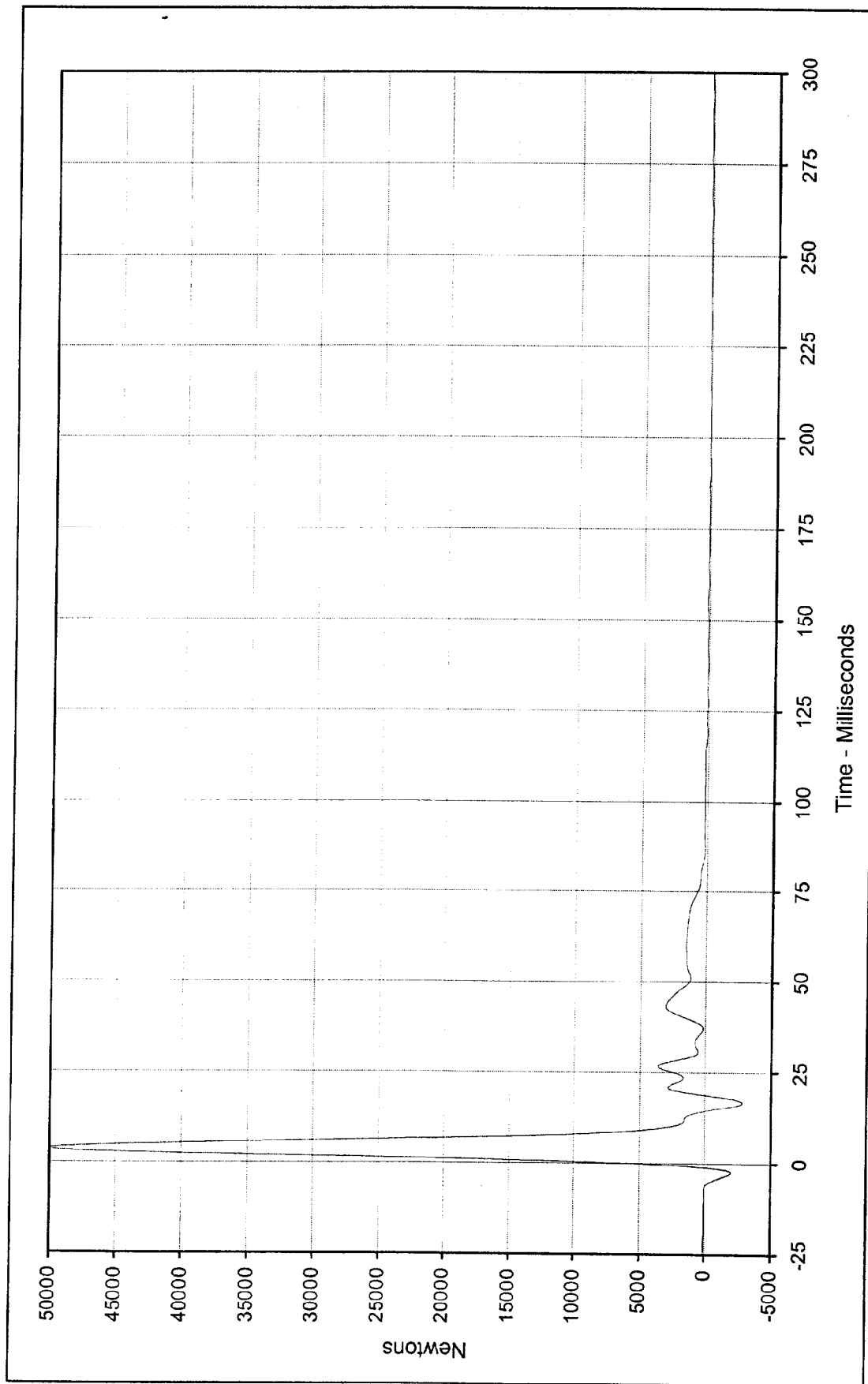




Curve Description: Barrier Force B4
 Maximum Value: 168853.5 at 26.2 Milliseconds
 Minimum Value: -2014.8 at 0.1 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-110

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

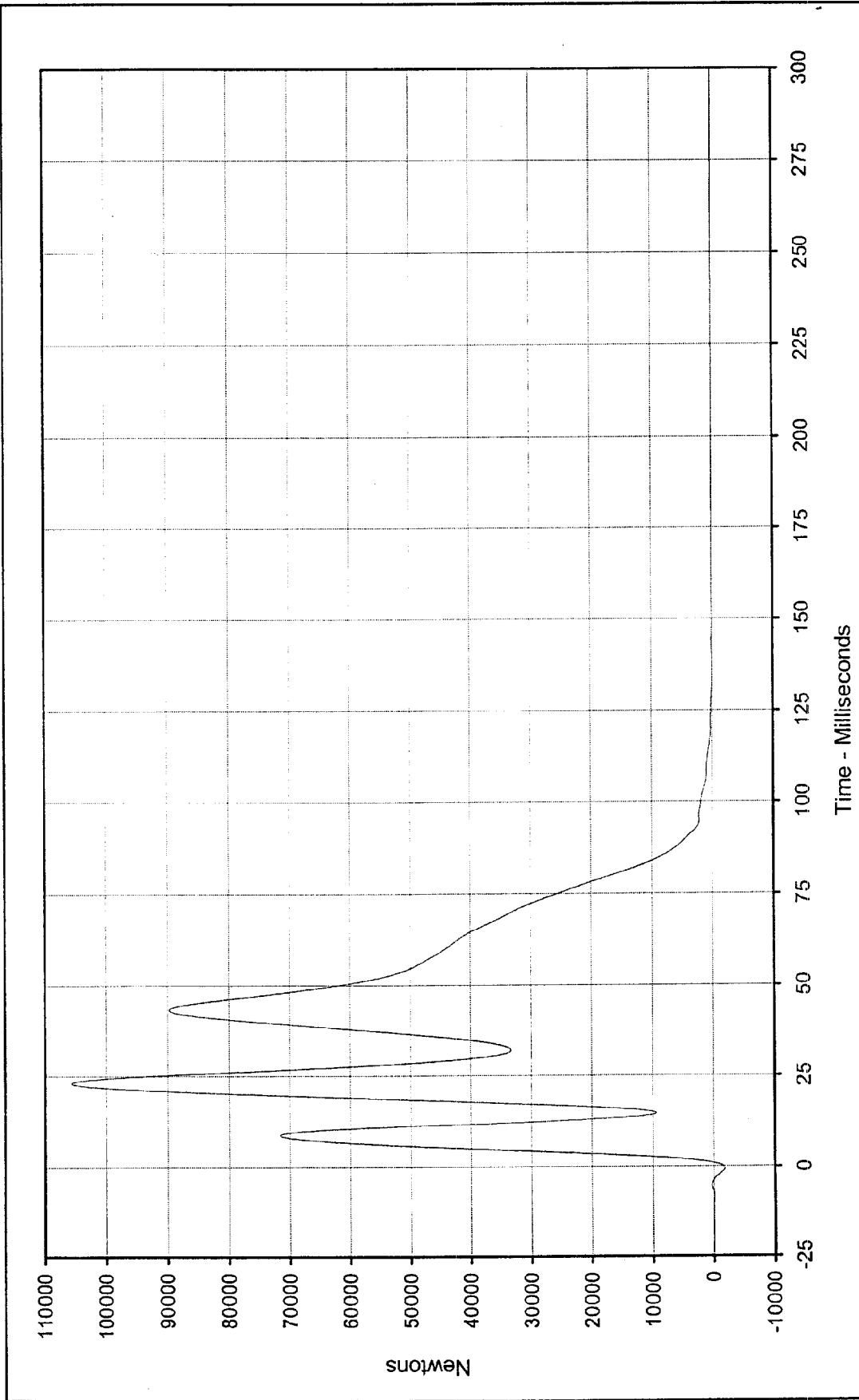




Curve Description:	Barrier Force B5		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	49990.3	at 3.7	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-2830.4	at 16.8			
SAE Filter Class:	60				
Date of Test:	2/25/99				
Curve Number:	FIL-111				



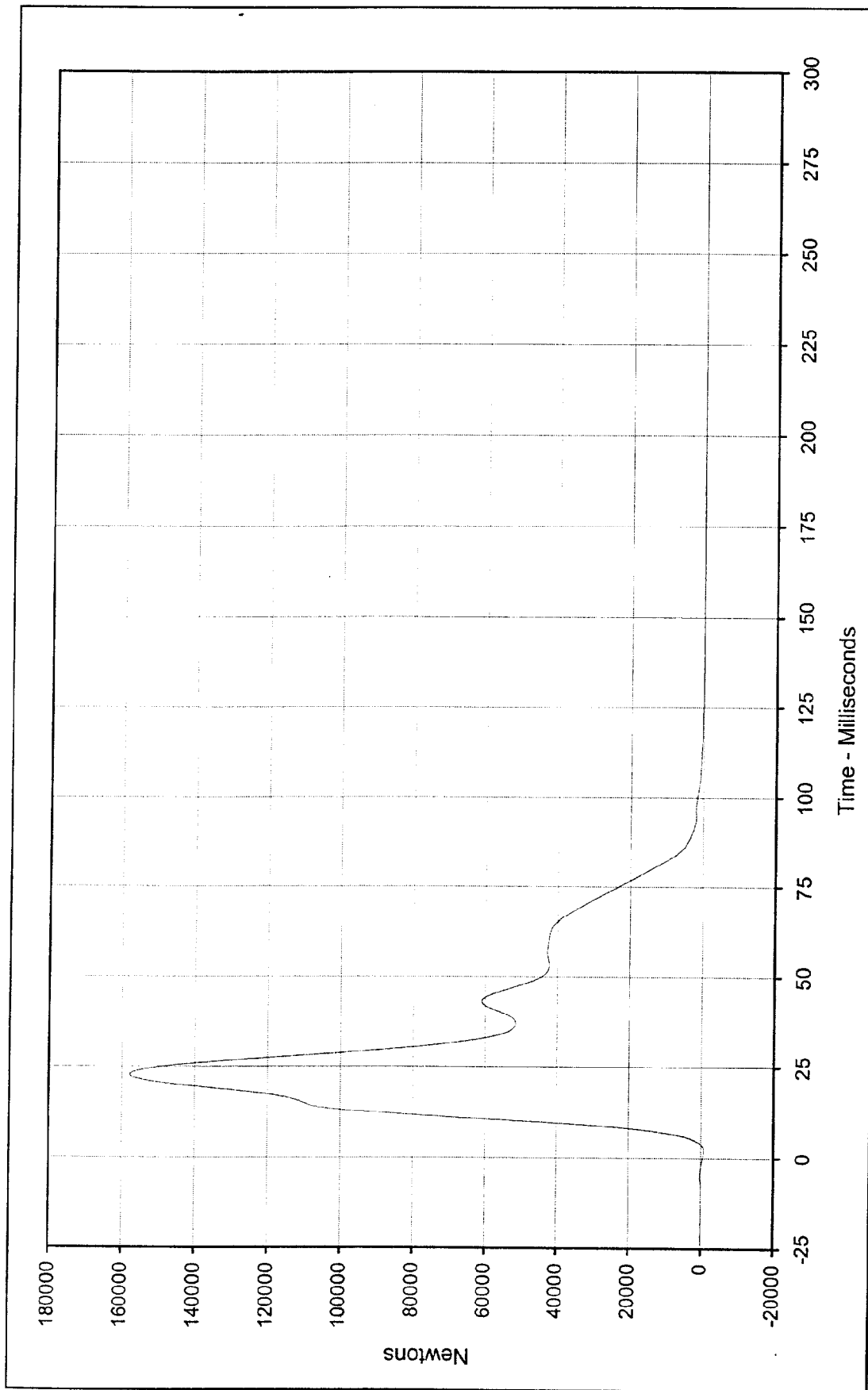




Curve Description: Barrier Force B6
 Maximum Value: 105673.5 at 23.1 Milliseconds
 Minimum Value: -1682.2 at 0.0 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-112

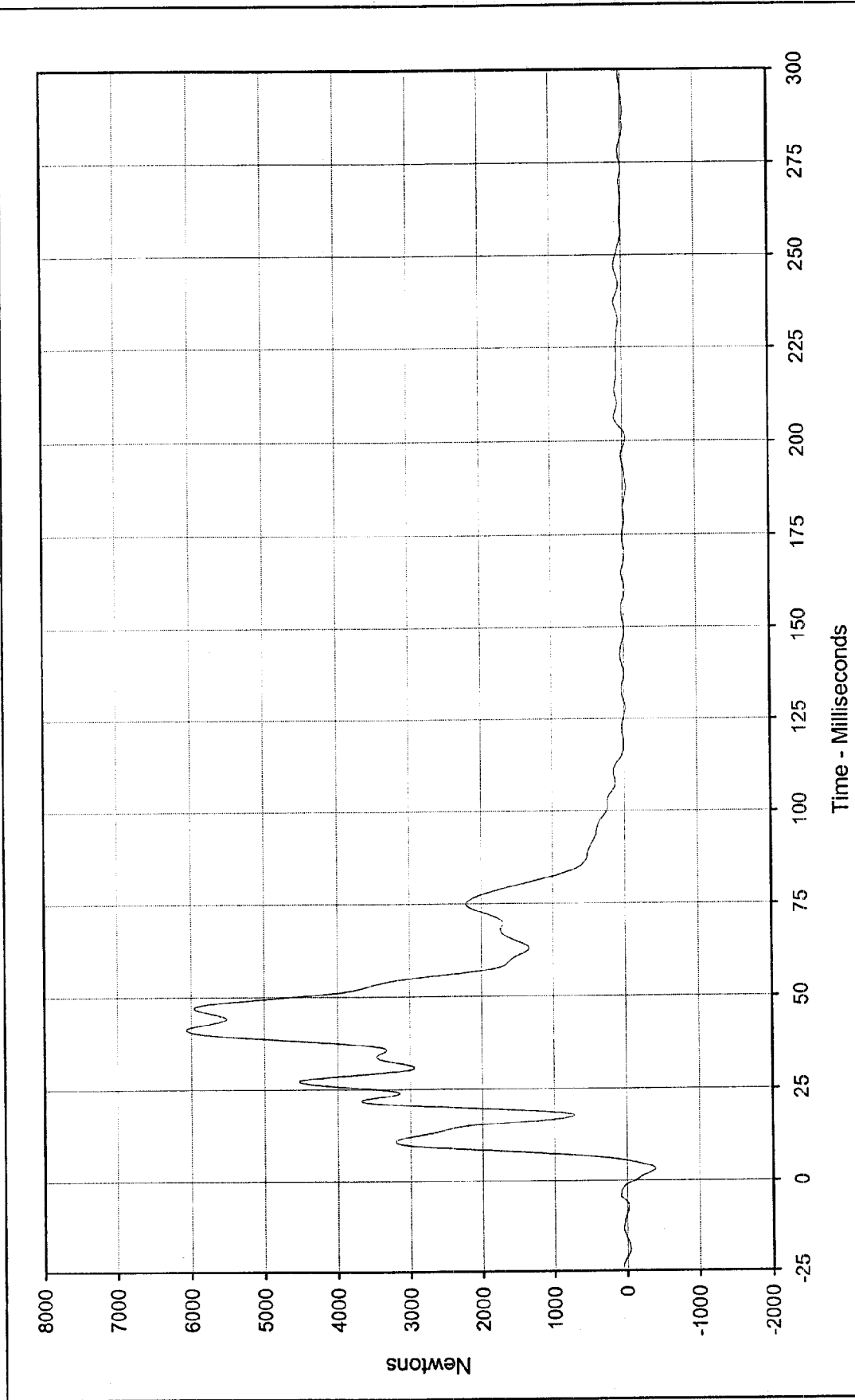
Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description:	Barrier Force B7	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	157870.8 at 22.9 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-880.2 at 2.0 Milliseconds			
SAE Filter Class:	60			
Date of Test:	2/25/99			
Curve Number:	FIL-113			

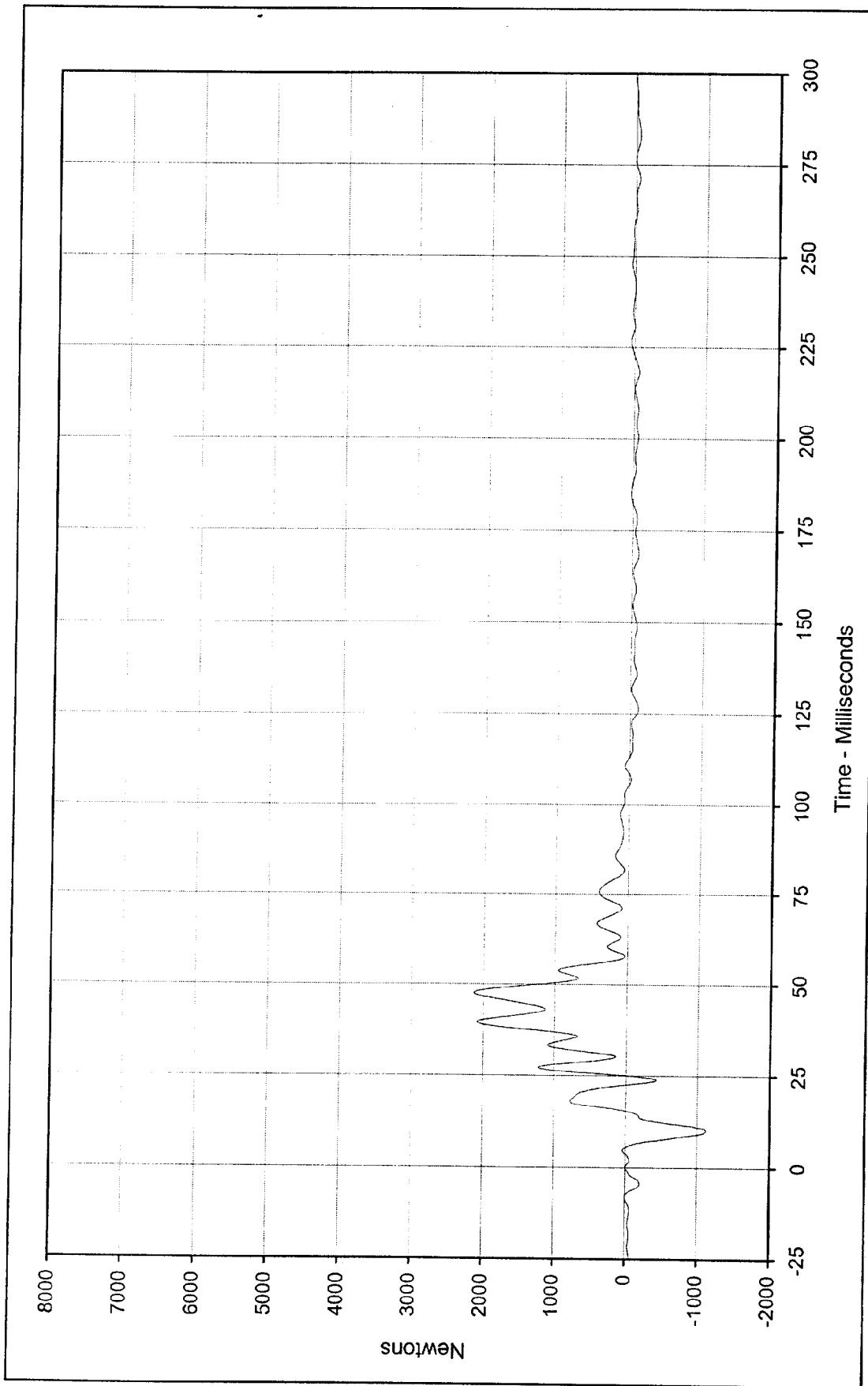




Curve Description: Barrier Force B8
 Maximum Value: 6061.0 at 41.1 Milliseconds
 Minimum Value: -392.1 at 3.2 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-114

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

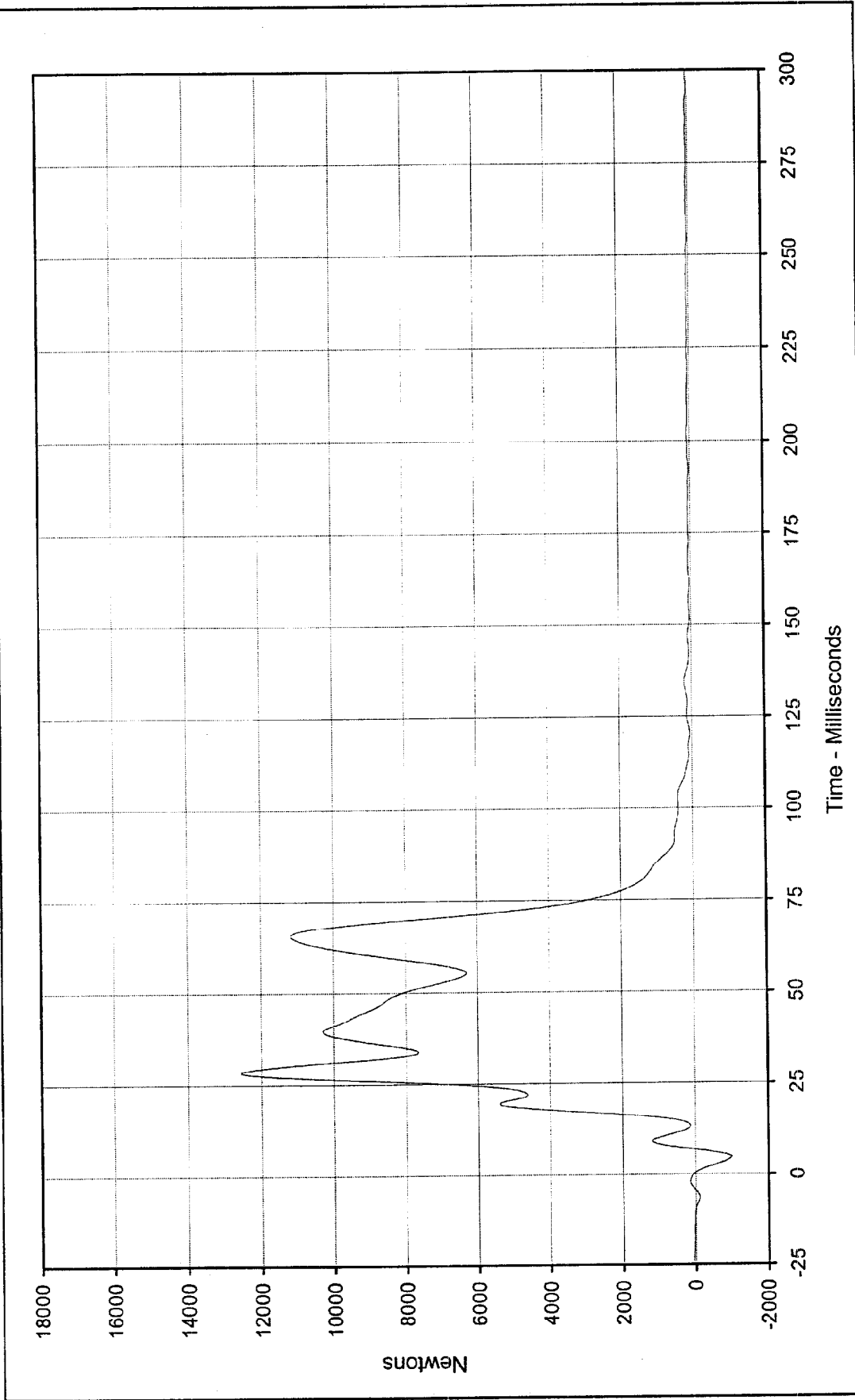




Curve Description:		Barrier Force B9		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	2133.2	at	47.6	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-1123.2	at	10.0			
SAE Filter Class:	60					
Date of Test:	2/25/99					
Curve Number:	FIL-115					

The logo for KARCO Engineering features the word "KARCO" in a large, bold, sans-serif font. A stylized lightbulb with a filament is integrated into the letter "A". To the right of "KARCO", the word "Engineering" is written in a smaller, italicized, sans-serif font. The entire logo is set against a black rectangular background.

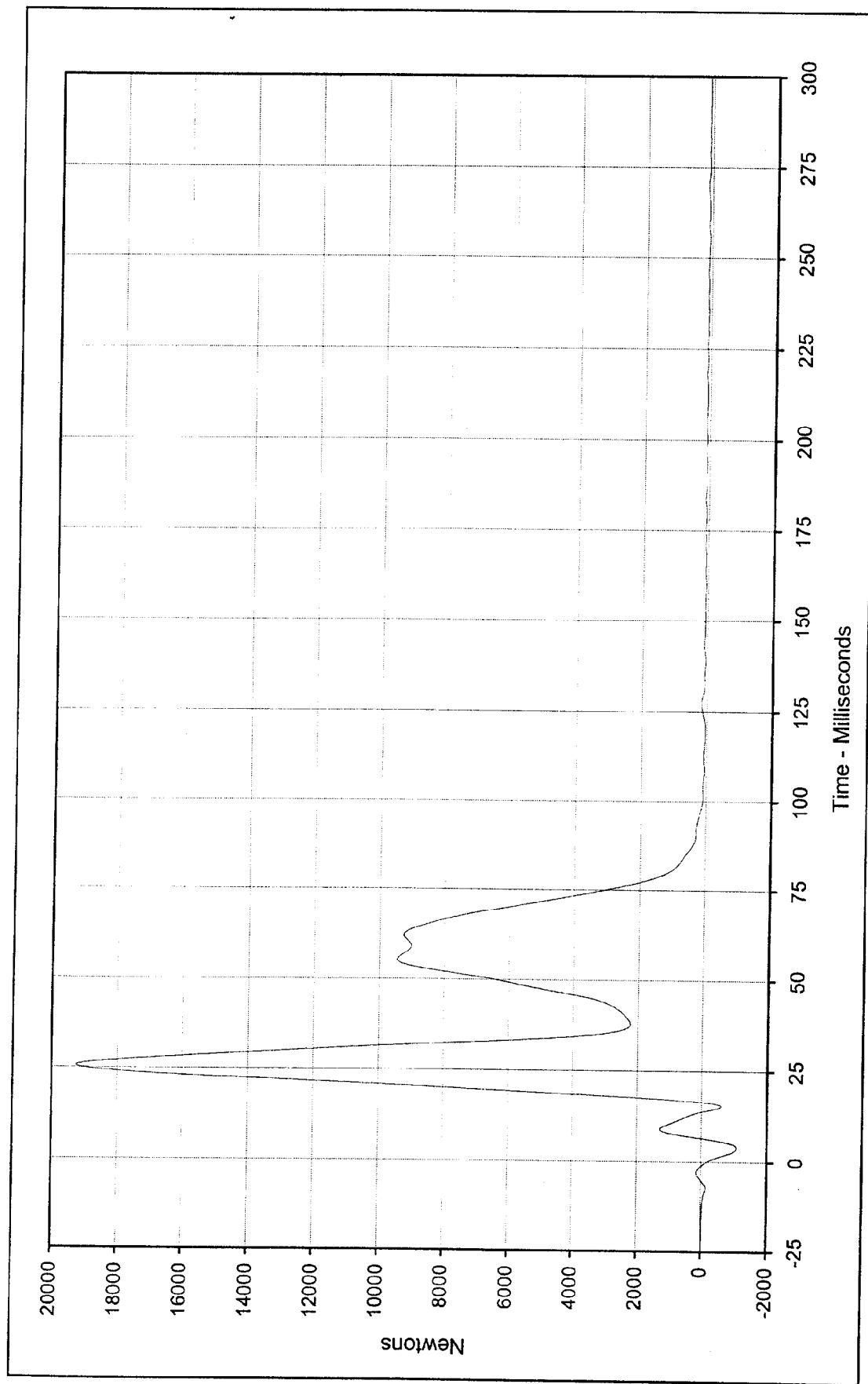




Curve Description: Barrier Force C2
Maximum Value: 12553.5 at 28.3 Milliseconds
Minimum Value: -1000.3 at 4.7 Milliseconds
SAE Filter Class: 60
Date of Test: 2/25/99
Curve Number: FIL-117

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description:

Barrier Force C3

Maximum Value:

19253.5 at 25.6 Milliseconds

Minimum Value:

-1076.2 at 3.9 Milliseconds

SAE Filter Class:

60

Date of Test:

2/25/99

Curve Number:

FIL-118

Test Program:

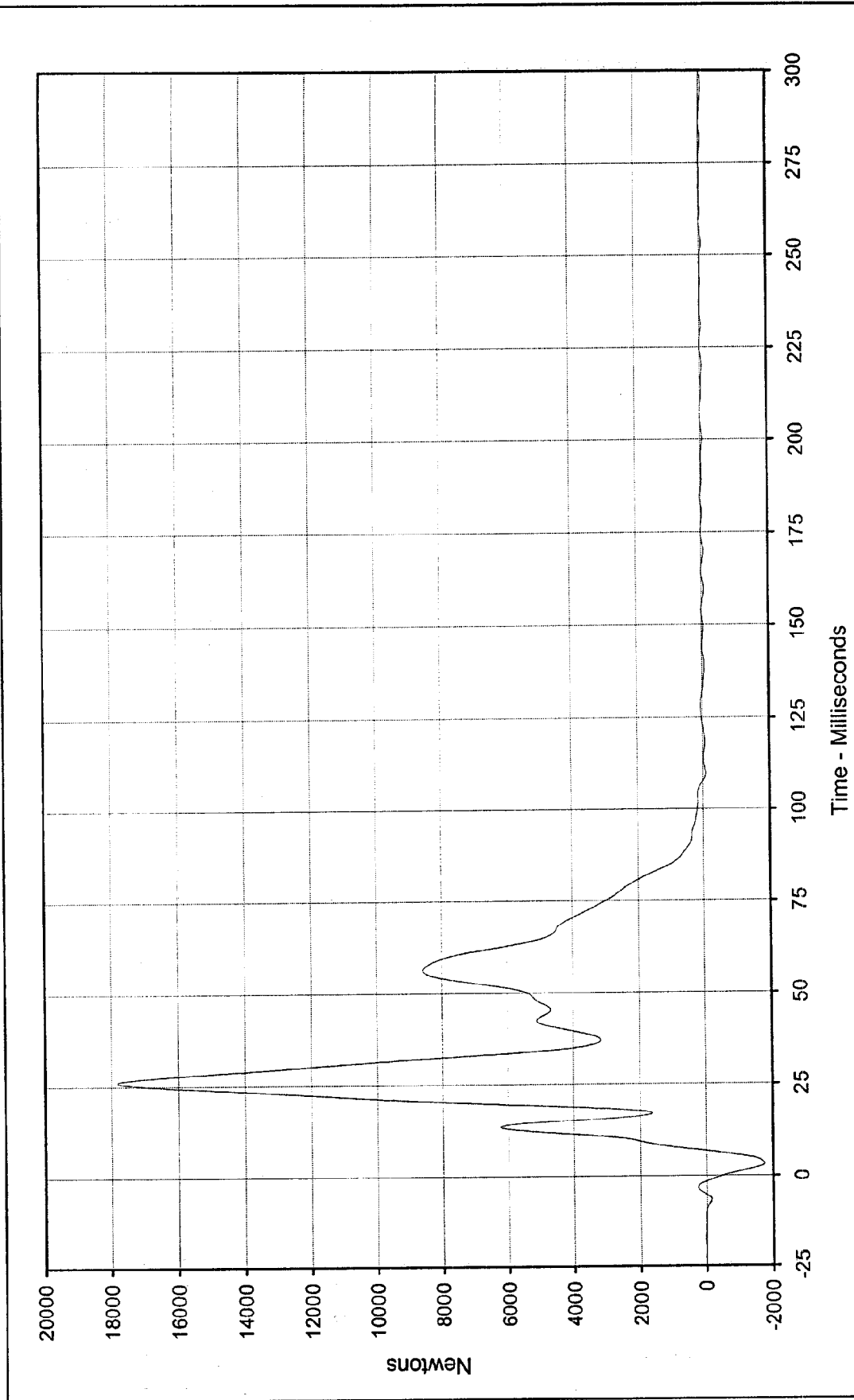
1999 NHTSA 35 mph NCAP

No.: MX5800

Test Vehicle:

1999 Volkswagen Beetle (New)





Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle: 1999 Volkswagen Beetle (New)

Curve Description: Barrier Force C4
Maximum Value: 17828.9 at 26.0 Milliseconds

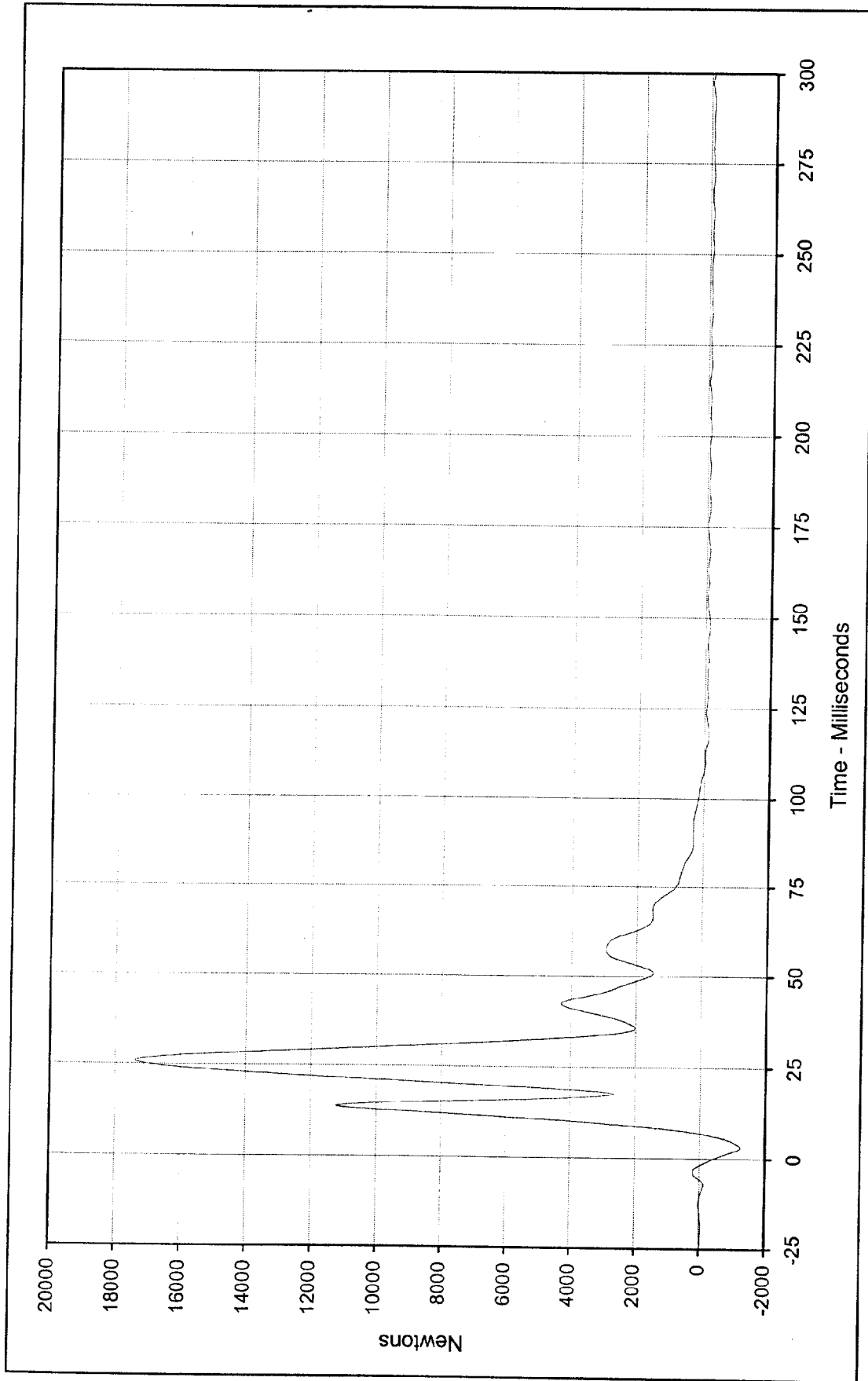
Minimum Value: -1741.3 at 3.2 Milliseconds

SAE Filter Class: 60

Date of Test: 2/25/99

Curve Number: FIL-119





Curve Description:

Barrier Force C5

Maximum Value:

17393.1 at 25.8 Milliseconds

Minimum Value:

-1250.1 at 3.1 Milliseconds

SAE Filter Class:

60

Date of Test:

2/25/99

Curve Number:

FIL-120

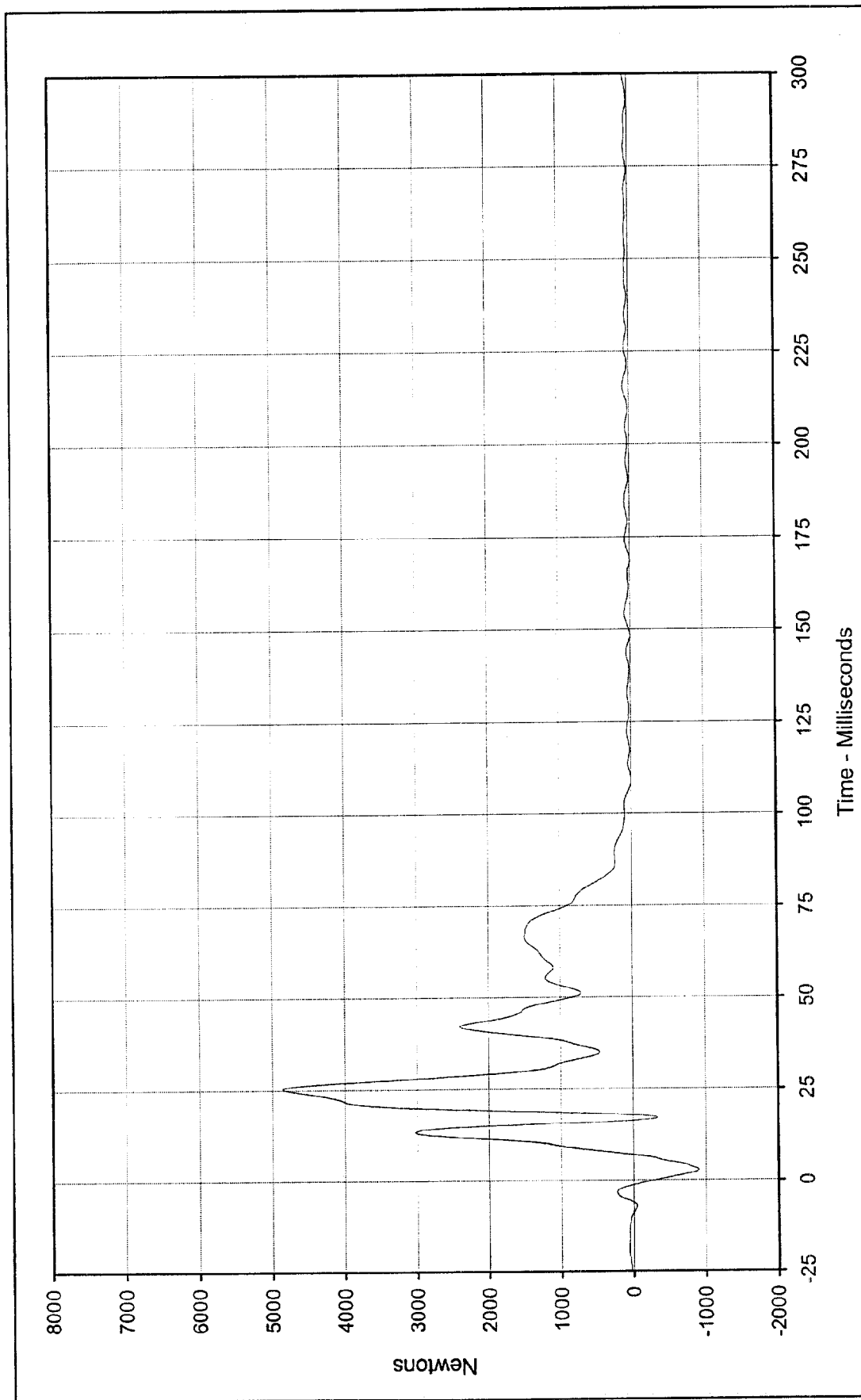
Test Program:

1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle:

1999 Volkswagen Beetle (New)





Curve Description: Barrier Force C6

Maximum Value: 4858.6 at 25.3 Milliseconds

Minimum Value: -908.7 at 2.8 Milliseconds

SAE Filter Class: 60

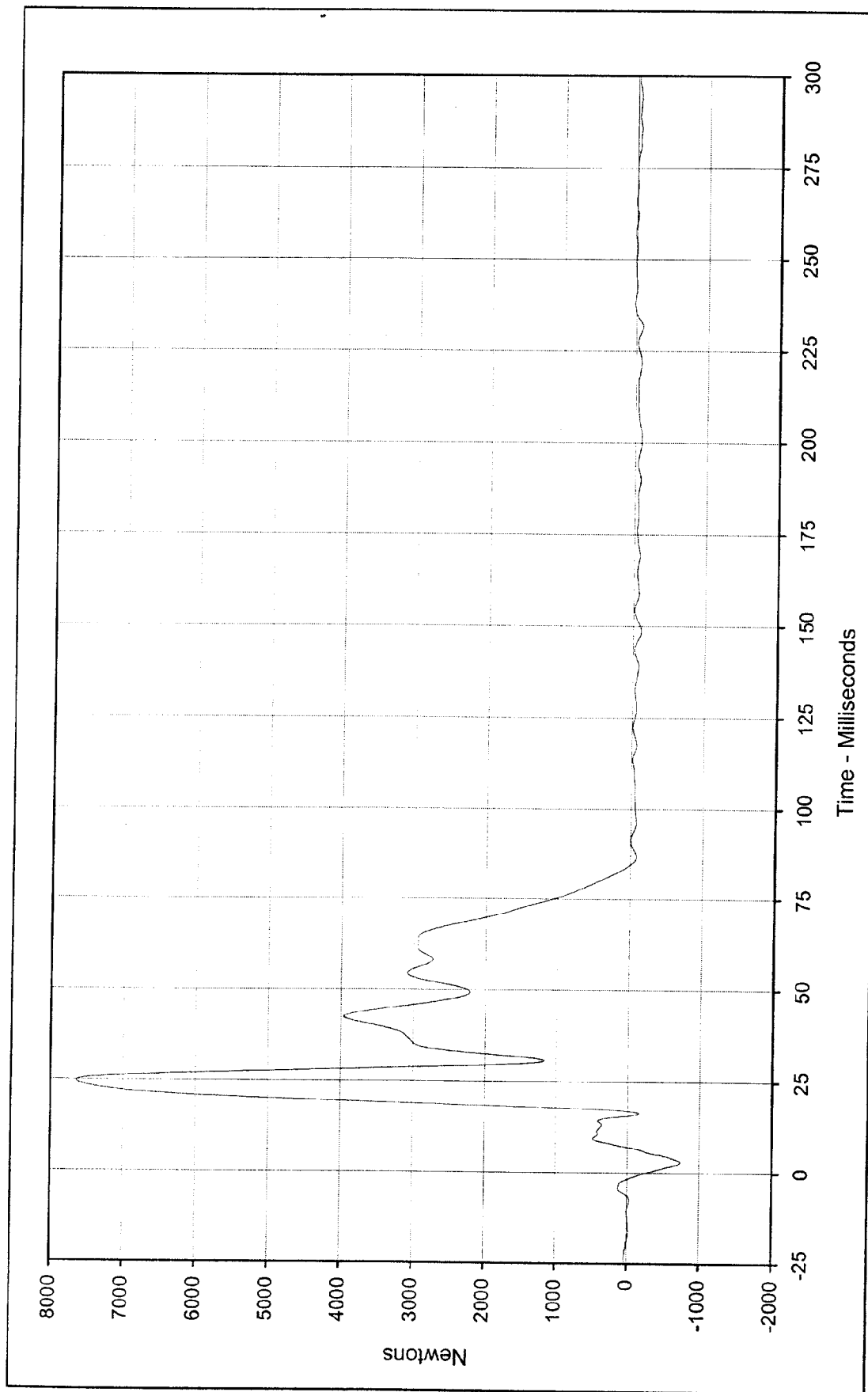
Date of Test: 2/25/99

Curve Number: FIL-121

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

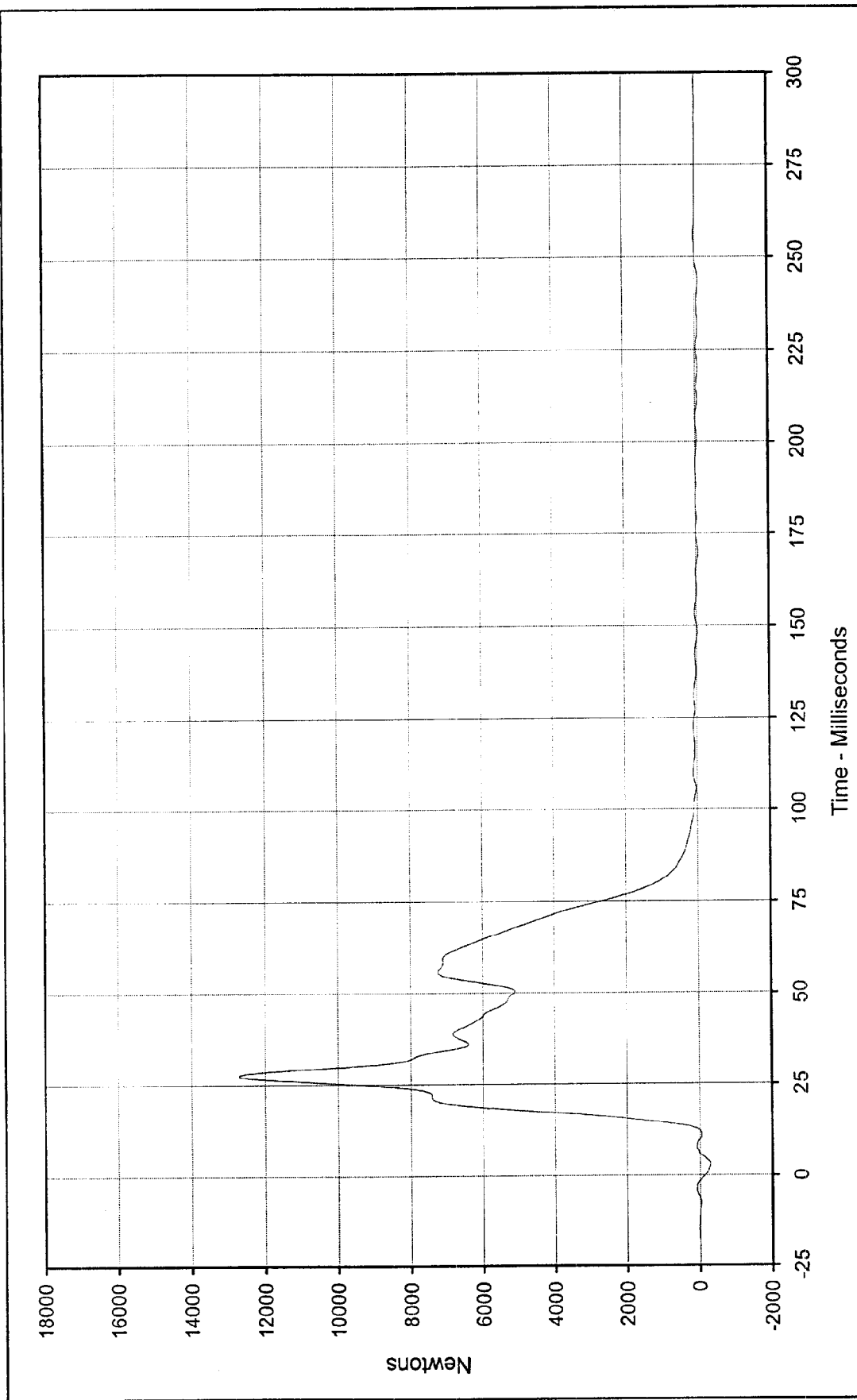
Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description:	Barrier Force C7		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	7644.6	at 24.7 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-741.2	at 2.9 Milliseconds			
SAE Filter Class:	60				
Date of Test:	2/25/99				
Curve Number:	FIL-122				

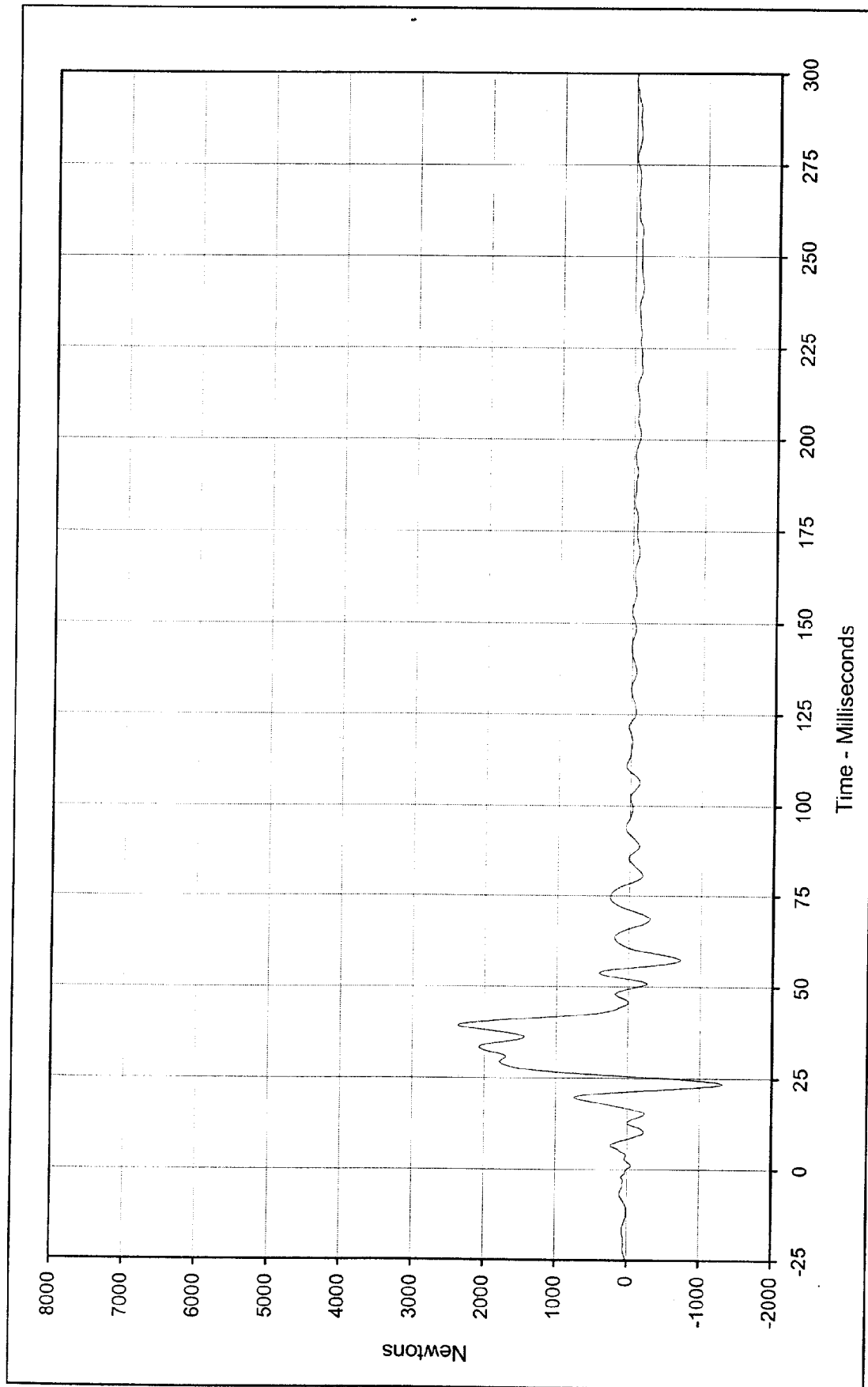




Curve Description: Barrier Force C8
 Maximum Value: 12713.8 at 27.5 Milliseconds
 Minimum Value: -295.5 at 3.0 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: FIL-123

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description:

Maximum Value:

2362.1 at 23.6 Milliseconds

Minimum Value:

-1320.8 at 23.6 Milliseconds

SAE Filter Class:

60

Date of Test:

2/25/99

Curve Number:

FIL-124

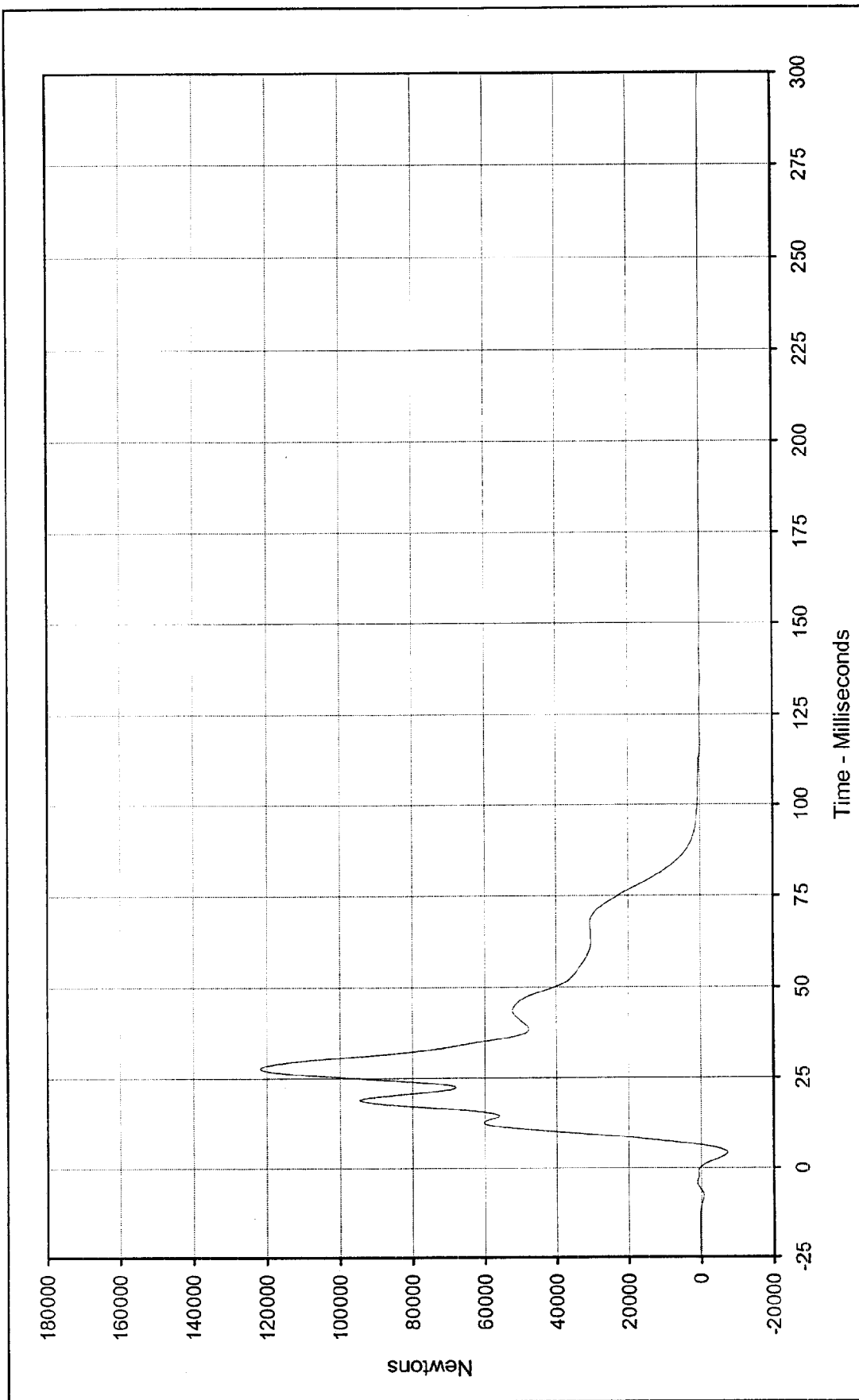
Test Program:

1999 NHTSA 35 mph NCAP No.: MX5800

Test Vehicle:

1999 Volkswagen Beetle (New)





Curve Description: Barrier Force Sum No.1 Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800

Maximum Value: 121736.1 at 27.7 Milliseconds Test Vehicle: 1999 Volkswagen Beetle (New)

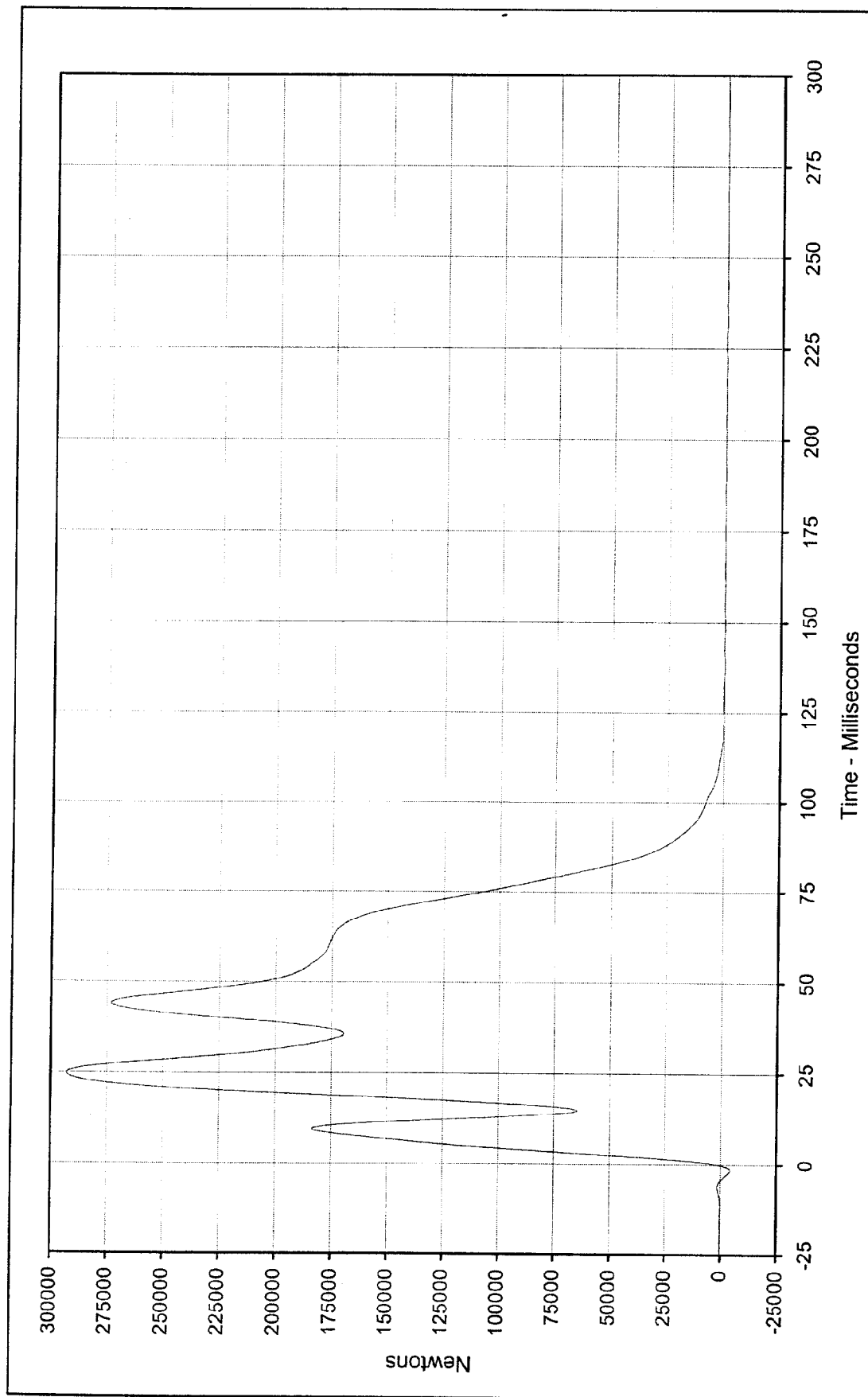
Minimum Value: -7275.4 at 4.2 Milliseconds

SAE Filter Class: 60

Date of Test: 2/25/99

Curve Number: SUM-001



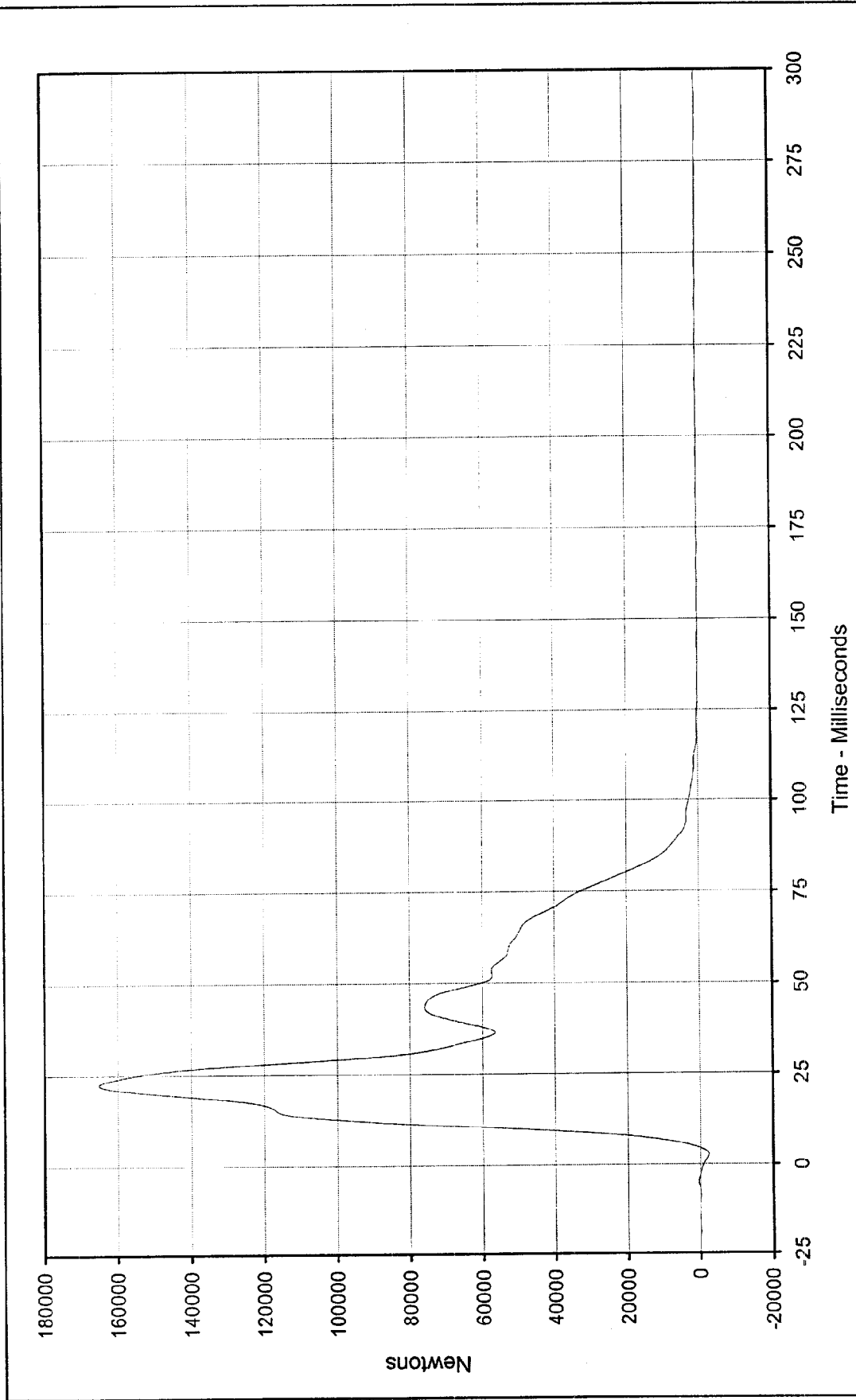


Curve Description:		Barrier Force Sum No.2		Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	293001.1	at	24.8	Milliseconds	1999 Volkswagen Beetle (New)	
Minimum Value:	-165.7	at	138.0	Milliseconds		
SAE Filter Class:	60					
Date of Test:	2/25/99			Test Vehicle:		
Curve Number:	SUM-002					



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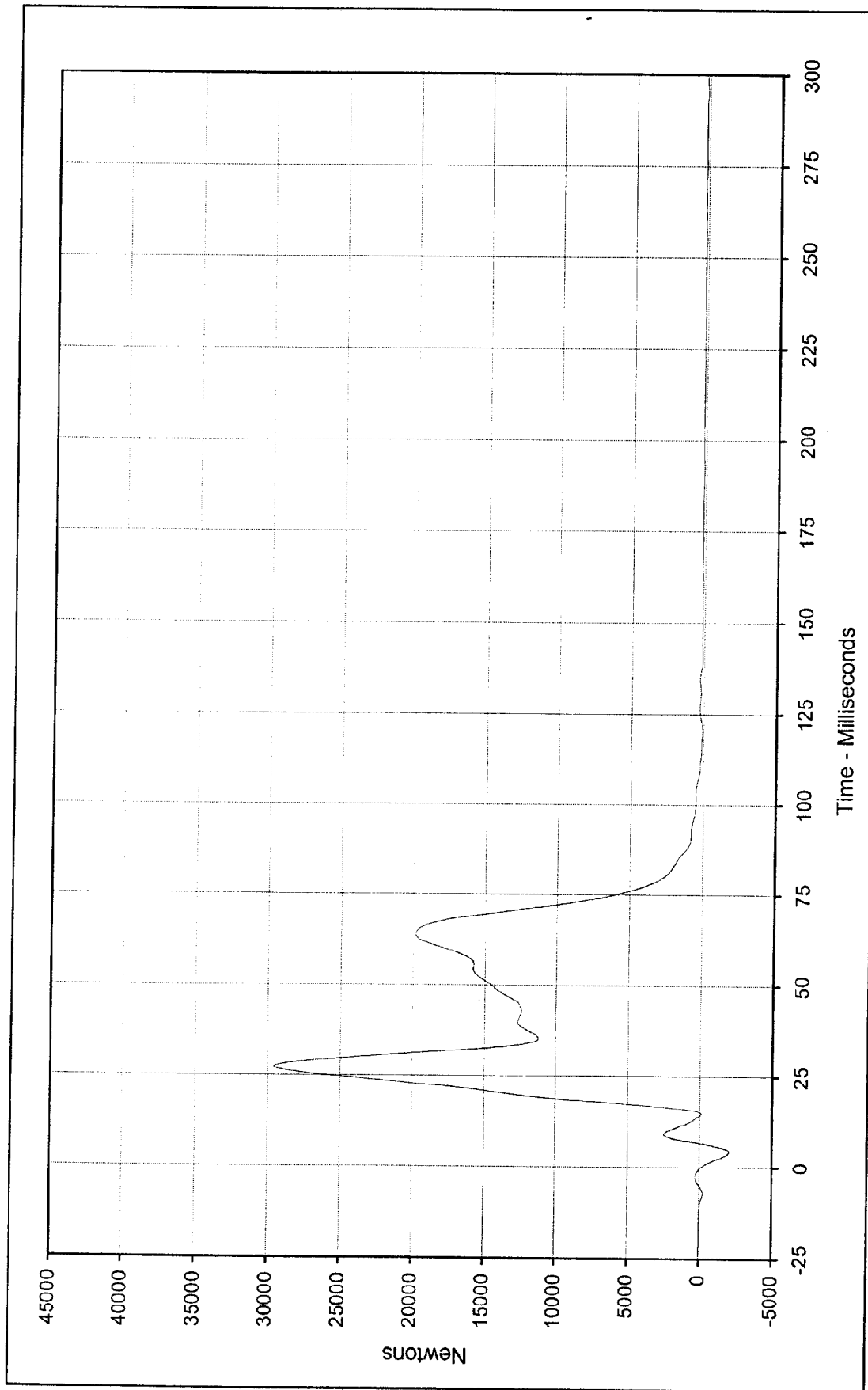




Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

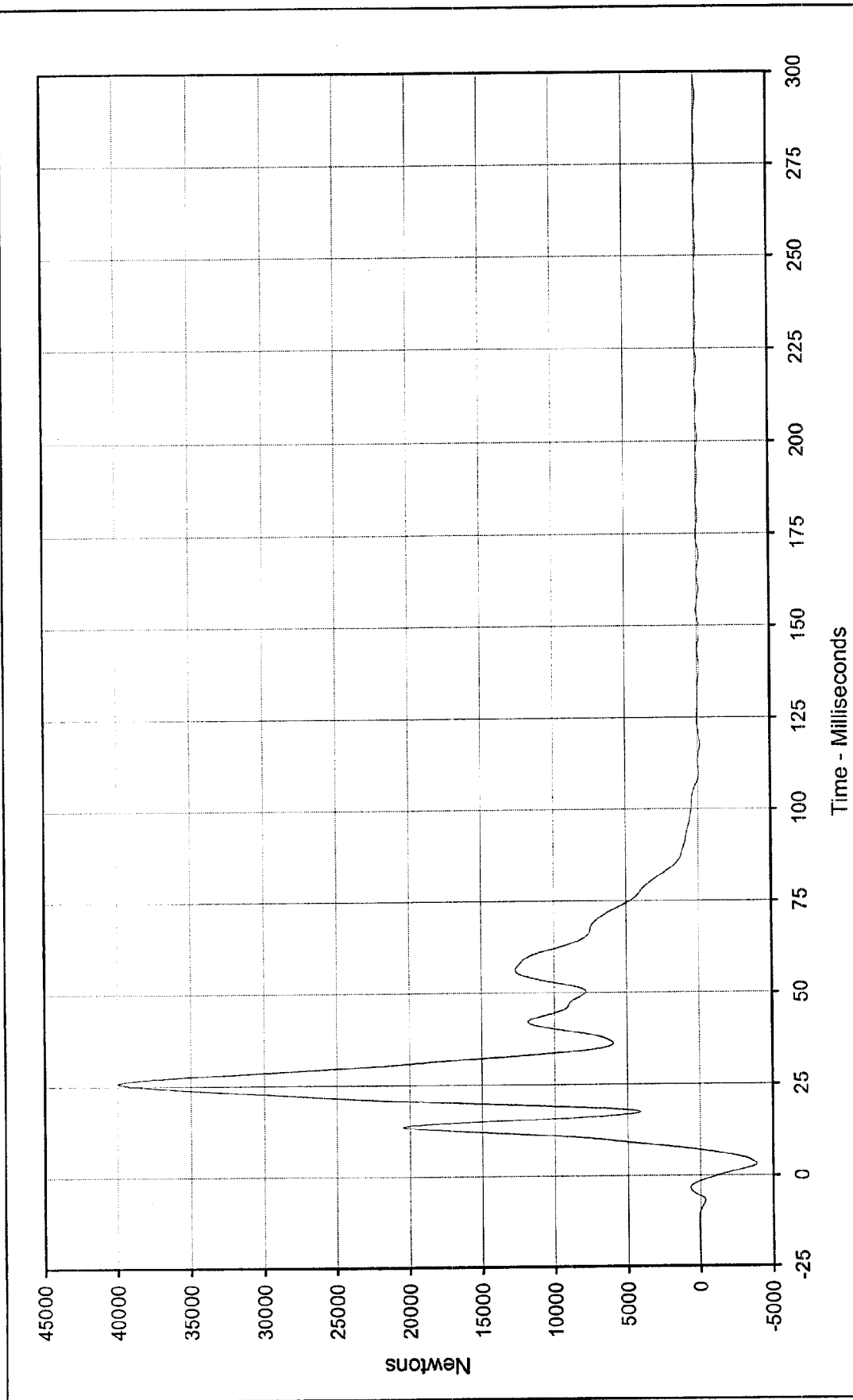


Curve Description: Barrier Force Sum No.3
 Maximum Value: 165192.4 at 22.4 Milliseconds
 Minimum Value: -2294.1 at 2.6 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: SUM-003



Curve Description:	Barrier Force Sum No.4	Test Program:	1999 NHTSA 35 mph NCAP	No.: MX5800
Maximum Value:	29569.7 at 27.3 Milliseconds	Test Vehicle:	1999 Volkswagen Beetle (New)	
Minimum Value:	-2038.0 at 4.4 Milliseconds			
SAE Filter Class:	60			
Date of Test:	2/25/99			
Curve Number:	SUM-004			

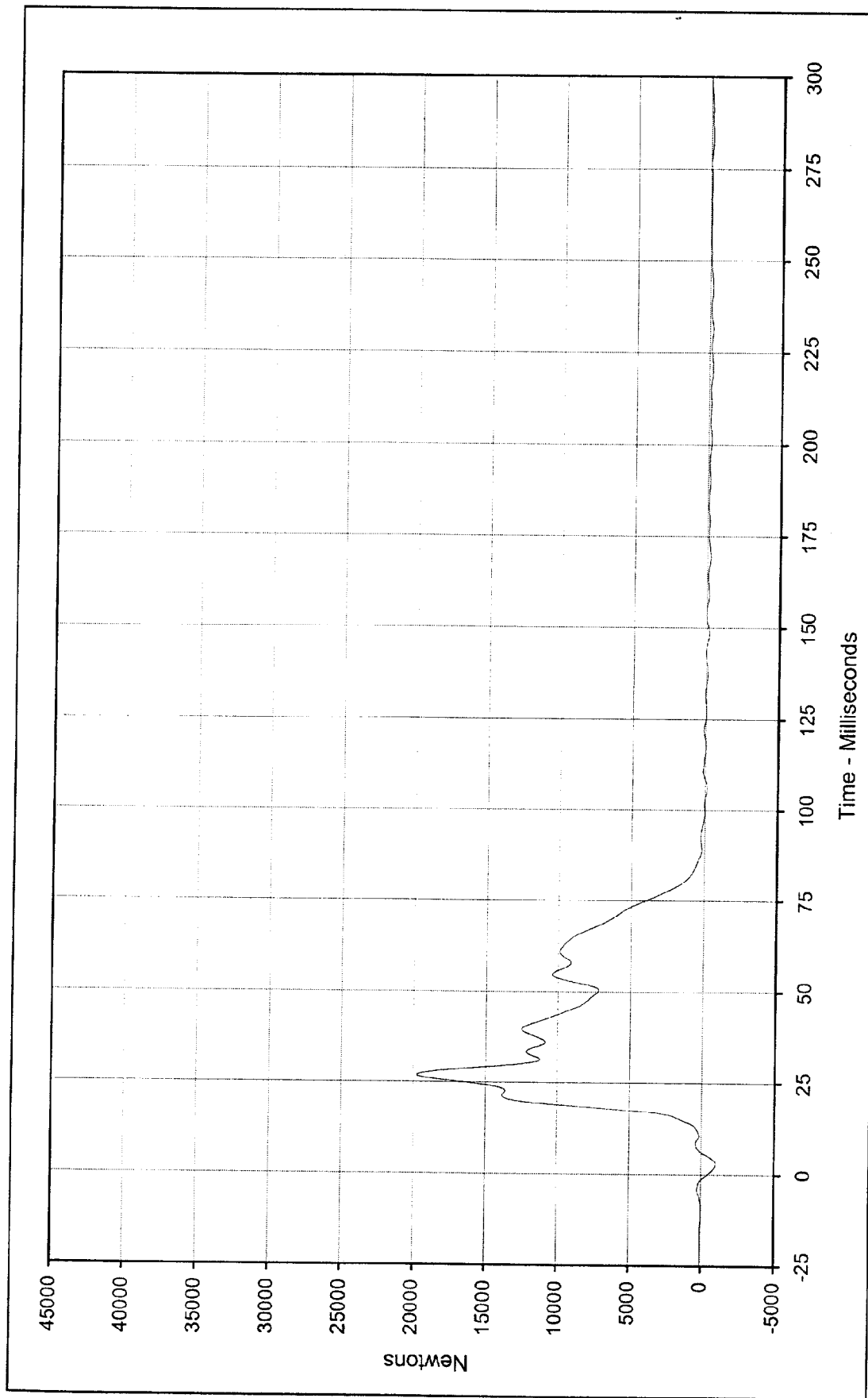




Curve Description: Barrier Force Sum No.5
 Maximum Value: 39965.3 at 25.8 Milliseconds
 Minimum Value: -3882.4 at 3.0 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: SUM-005

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)

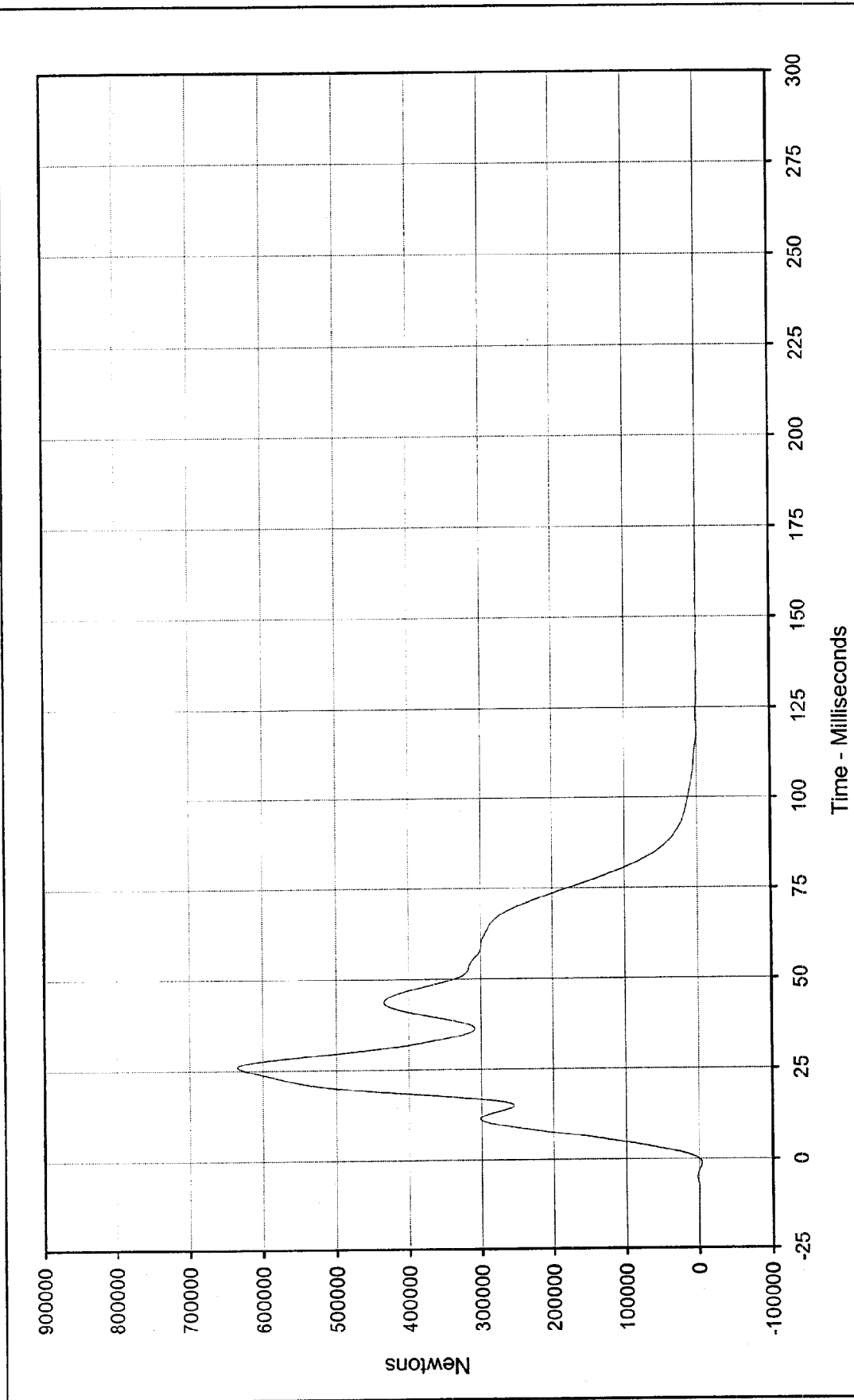




Curve Description:		Barrier Force Sum No.6		Test Program:		1999 NHTSA 35 mph NCAP		No.: MX5800	
Maximum Value:		19776.6	at	26.8	Test Vehicle:		1999 Volkswagen Beetle (New)		
Minimum Value:		-999.4	at	2.9					
SAE Filter Class:		60							
Date of Test:		2/25/99							
Curve Number:		SUM-006							



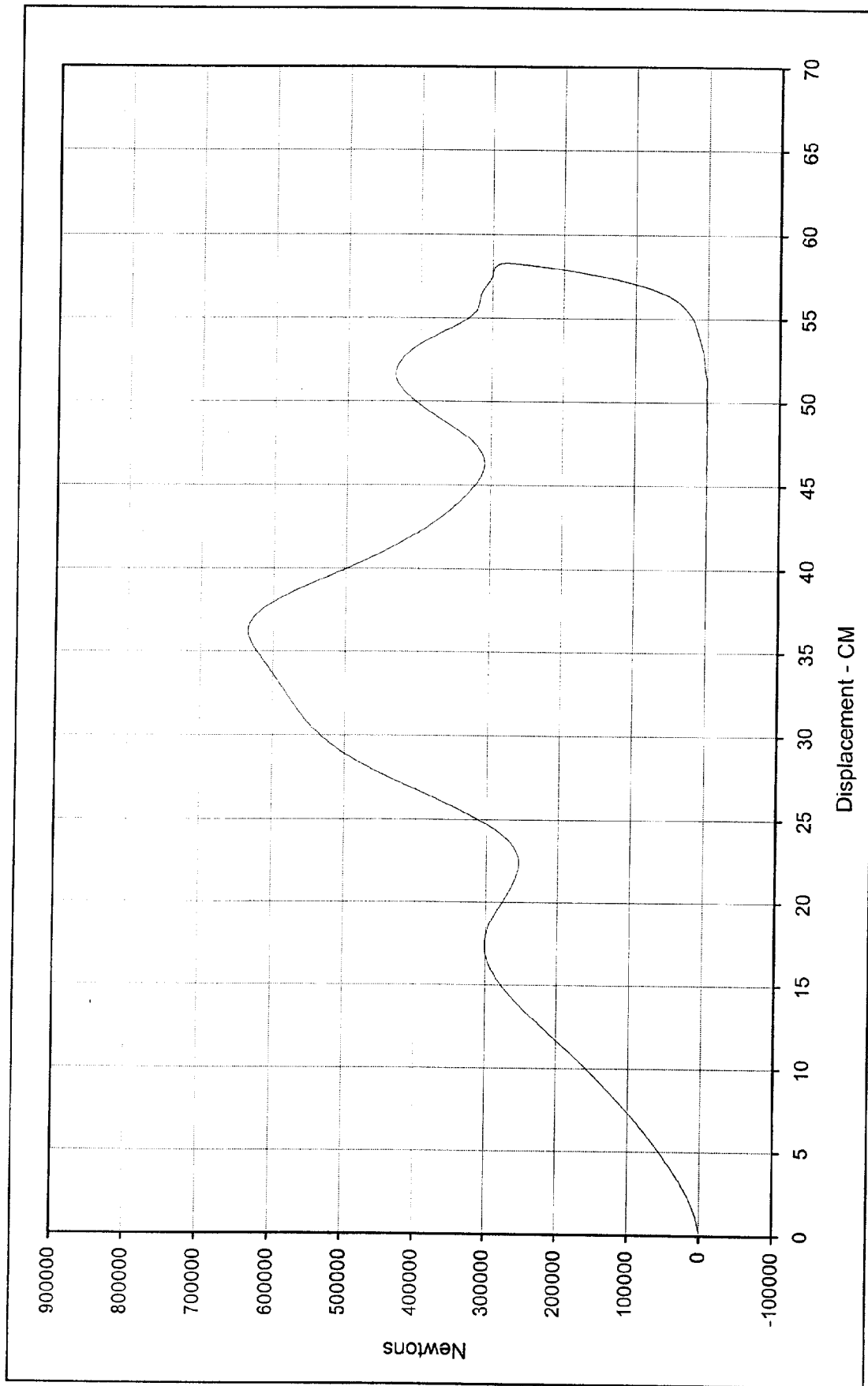




Curve Description: Barrier Force Sum Total
 Maximum Value: 634739.9 at 26.0 Milliseconds
 Minimum Value: -841.0 at 0.0 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/25/99
 Curve Number: SUM-007

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)





Curve Description: Sum Force Total vs. Dynamic Crush
 Maximum Displ.: 58.3 at 66.6 Milliseconds
 Maximum Force: 634739.9 at 26.0 Milliseconds
 SAE Filter Class: N/A
 Date of Test: 2/25/99
 Curve Number: XYY-001

Test Program: 1999 NHTSA 35 mph NCAP No.: MX5800
 Test Vehicle: 1999 Volkswagen Beetle (New)



BARRIER LOAD CELL SUMMARY DATATEST VEHICLE: 1999 VOLKSWAGEN BEETLE (NEW)NHTSA No.: MX5800TEST PROGRAM: 1999 NHTSA 35 MPH NCAPTEST DATE: 2/25/99**BARRIER LOAD CELL PEAK FORCES**

Location	Units	Max	Time	Min	Time
Barrier Force A2	Newtons	3123.3	9.8	-2131.7	4.6
Barrier Force A3	Newtons	7822.0	46.4	-2276.8	3.9
Barrier Force A4	Newtons	33606.8	65.8	-2069.0	16.5
Barrier Force A5	Newtons	17761.7	27.0	-3618.8	17.1
Barrier Force A6	Newtons	18629.1	65.2	-1325.5	2.8
Barrier Force A7	Newtons	5278.6	21.5	-937.9	2.9
Barrier Force A8	Newtons	6370.9	47.3	-765.5	30.3
Barrier Force A9	Newtons	1544.2	47.7	-1331.6	10.4
Barrier Force B2	Newtons	8657.1	32.2	-1665.0	4.8
Barrier Force B3	Newtons	106764.9	28.0	-1463.8	3.6
Barrier Force B4	Newtons	168853.5	26.2	-2014.8	0.1
Barrier Force B5	Newtons	49990.3	3.7	-2830.4	16.8
Barrier Force B6	Newtons	105673.5	23.1	-1682.2	0.0
Barrier Force B7	Newtons	157870.8	22.9	-880.2	2.0
Barrier Force B8	Newtons	6061.0	41.1	-392.1	3.2
Barrier Force B9	Newtons	2133.2	47.6	-1123.2	10.0
Barrier Force C2	Newtons	12553.5	28.3	-1000.3	4.7
Barrier Force C3	Newtons	19253.5	25.6	-1076.2	3.9
Barrier Force C4	Newtons	17828.9	26.0	-1741.3	3.2
Barrier Force C5	Newtons	17393.1	25.8	-1250.1	3.1
Barrier Force C6	Newtons	4858.6	25.3	-908.7	2.8
Barrier Force C7	Newtons	7644.6	24.7	-741.2	2.9
Barrier Force C8	Newtons	12713.8	27.5	-295.5	3.0
Barrier Force C9	Newtons	2362.1	39.2	-1320.8	23.6
Barrier Force Sum No.1	Newtons	121736.1	27.7	-7275.4	4.2
Barrier Force Sum No.2	Newtons	293001.1	24.8	-165.7	138.0
Barrier Force Sum No.3	Newtons	165192.4	22.4	-2294.1	2.6
Barrier Force Sum No.4	Newtons	29569.7	27.3	-2038.0	4.4
Barrier Force Sum No.5	Newtons	39965.3	25.8	-3882.4	3.0
Barrier Force Sum No.6	Newtons	19776.6	26.8	-999.4	2.9
Barrier Force Sum Total	Newtons	634739.9	26.0	-841.0	0.0

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

APPENDIX D
INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

35 mph Frontal NCAP
Instrumentation Data Channel Assignments
Driver A.T.D Serial Number 35
2/25/99
1999 Volkswagen Beetle GL

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

35 mph Frontal NCAP
Instrumentation Data Channel Assignments
Driver A.T.D Serial Number 35
2/25/99
1999 Volkswagen Beetle GL

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	GPLT09MX	3 ch., lower tibia gage	R. A. Denton	3093	Nm
30	LWR. TIBIA LEFT MOM.	Y	GPLT09MY	3 ch., lower tibia gage	R. A. Denton	3093	Nm
31	LWR. TIBIA LEFT FORCE	Z	GPLT09FZ	3 ch., lower tibia gage	R. A. Denton	3093	N
32	LWR. TIBIA RIGHT MOM.	X	GPLT09MX	3 ch., lower tibia gage	R. A. Denton	3093	Nm
33	LWR. TIBIA RIGHT MOM.	Y	GPLT09MY	3 ch., lower tibia gage	R. A. Denton	3093	Nm
34	LWR. TIBIA RIGHT FORCE	Z	GPLT09FZ	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	Celesco	PTX101-0030	MM
44	SHOULDER BELT ELONG.	X	KEEP001	Linear pot., belt stretch	E.T.I.	LCP8-10 10K	MM/CM

35 mph Frontal NCAP
Instrumentation Data Channel Assignments
Driver A.T.D Serial Number 34
2/25/99
1999 Volkswagen Beetle GL

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

35 mph Frontal NCAP
Instrumentation Data Channel Assignments
Driver A.T.D Serial Number 34
2/25/99
1999 Volkswagen Beetle GL

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
69	UP. TIBIA LEFT MOM.	X	GPU09MX	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
70	UP. TIBIA LEFT MOM.	Y	GPU09MY	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
71	UP. TIBIA RIGHT MOM.	X	GPU09MX	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
72	UP. TIBIA RIGHT MOM.	Y	GPU09MY	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

35 mph Frontal NCAP
Instrumentation Data Channel Assignments
Vehicle Accelerometers
2/25/99
1999 Volkswagen Beetle GL

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

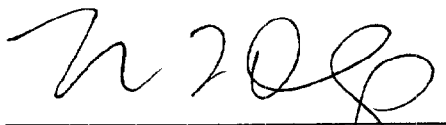
Left Knee Impact Test

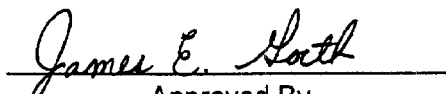
ATD Serial No.: 34

Part Serial No.: N/A

Test I.D.: KN03A

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	2.100	Pass
Peak Probe Force	Newtons	4715 to 5782	5411.8	Pass
Overall Test Results				Pass


Laboratory Technician

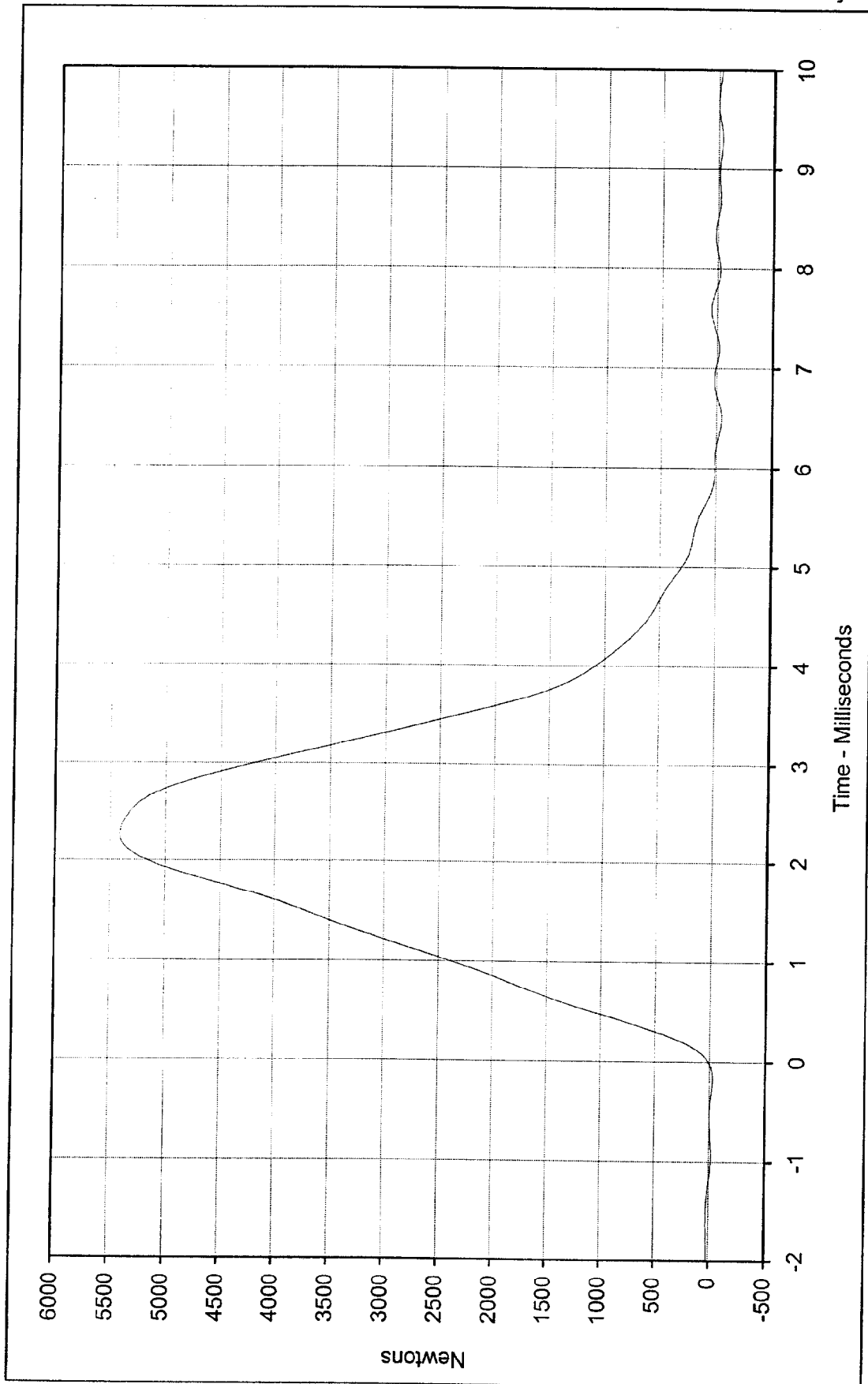

Approved By

February 13, 1999

Test Date

3/1/99

Date



Curve Description:		Testing Program	Hybrid III Left Knee Impact Test
Maximum Value:	5411.8	Part S/N:	N/A
Minimum Value:	-44.5	Test I.D.:	KN03A
SAE Filter Class:	600		
Date of Test:	2/13/99		
ATD Serial No.:	34		





Hybrid III Calibration Data Sheet

50TH Percentile Male

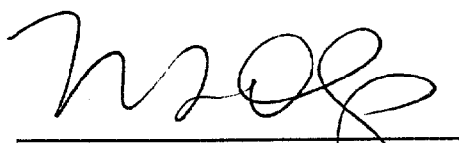
Right Knee Impact Test

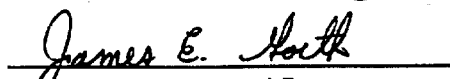
ATD Serial No.: 34

Part Serial No.: N/A

Test I.D.: KN03B

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	2.094	Pass
Peak Probe Force	Newtons	4715 to 5782	5372.2	Pass
Overall Test Results				Pass


Laboratory Technician

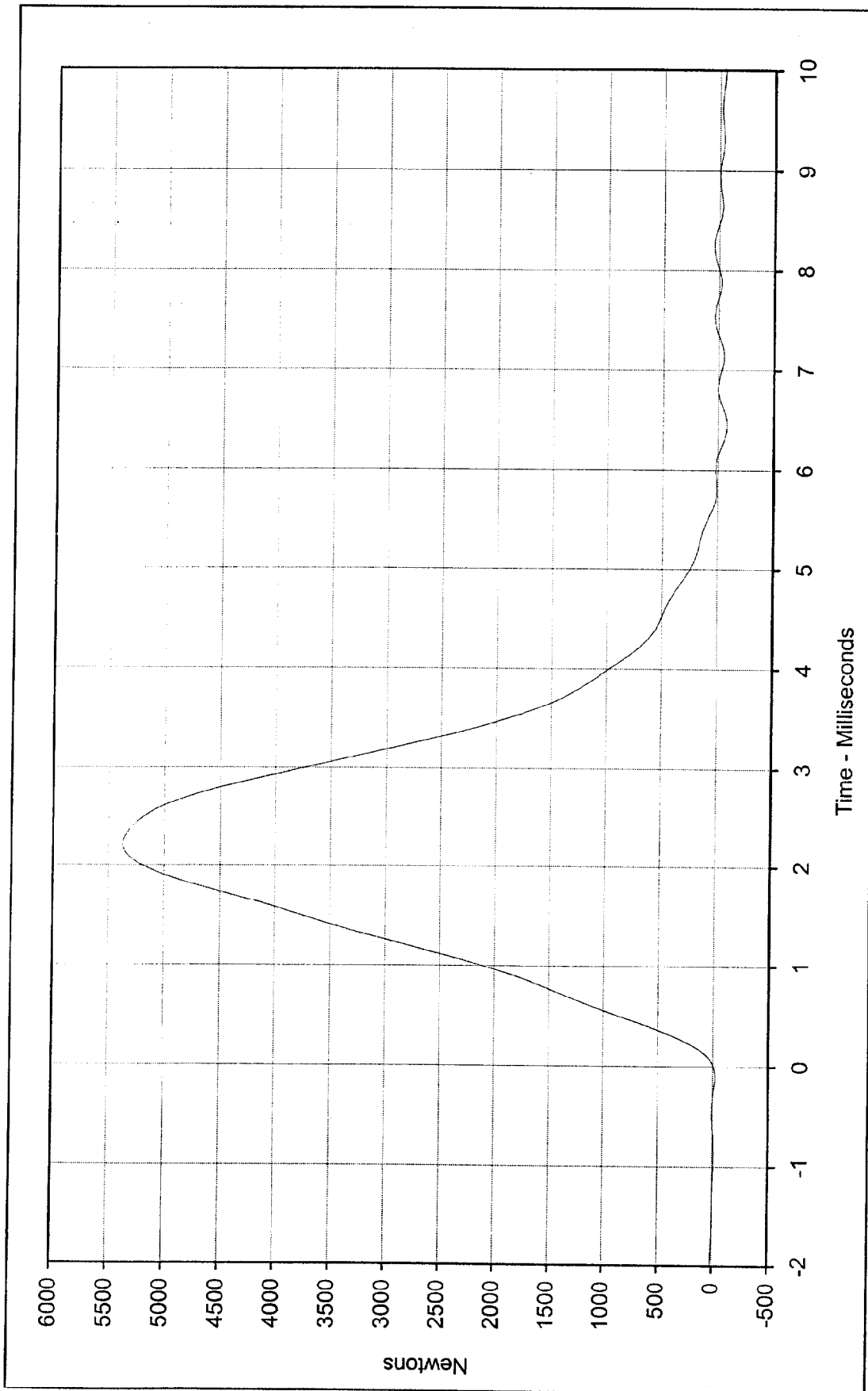

Approved By

February 13, 1999

Test Date

3/1/99

Date



Curve Description: _____ Testing Program: Hybrid III Right Knee Impact Test
 Maximum Value: 5372.2 at 2.2 Milliseconds
 Minimum Value: -78.1 at 6.4 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/13/99
 ATD Serial No.: 34





Hybrid III Calibration Data Sheet

50TH Percentile Male

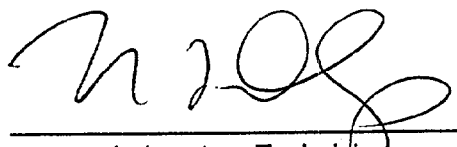
Head Drop Calibration

ATD Serial No.: 034

Part Serial No.: N/A

Test I.D.: HD03A

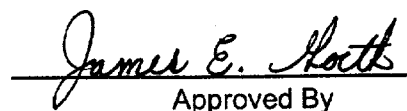
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	246.9	Pass
Peak Lateral Acceleration	G's	≤15.0	2.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



Laboratory Technician

February 13, 1999

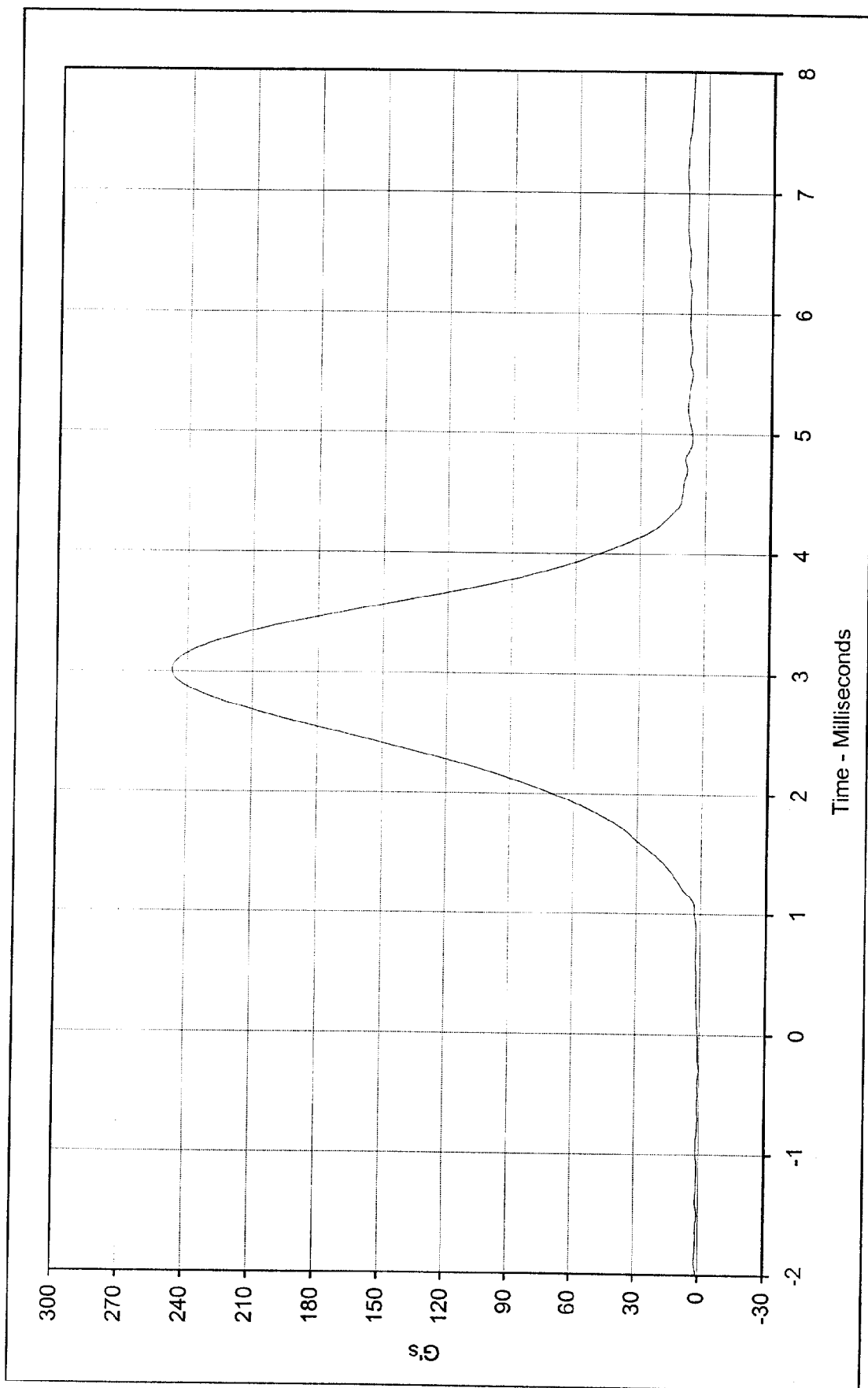
Test Date



Approved By

3/1/99

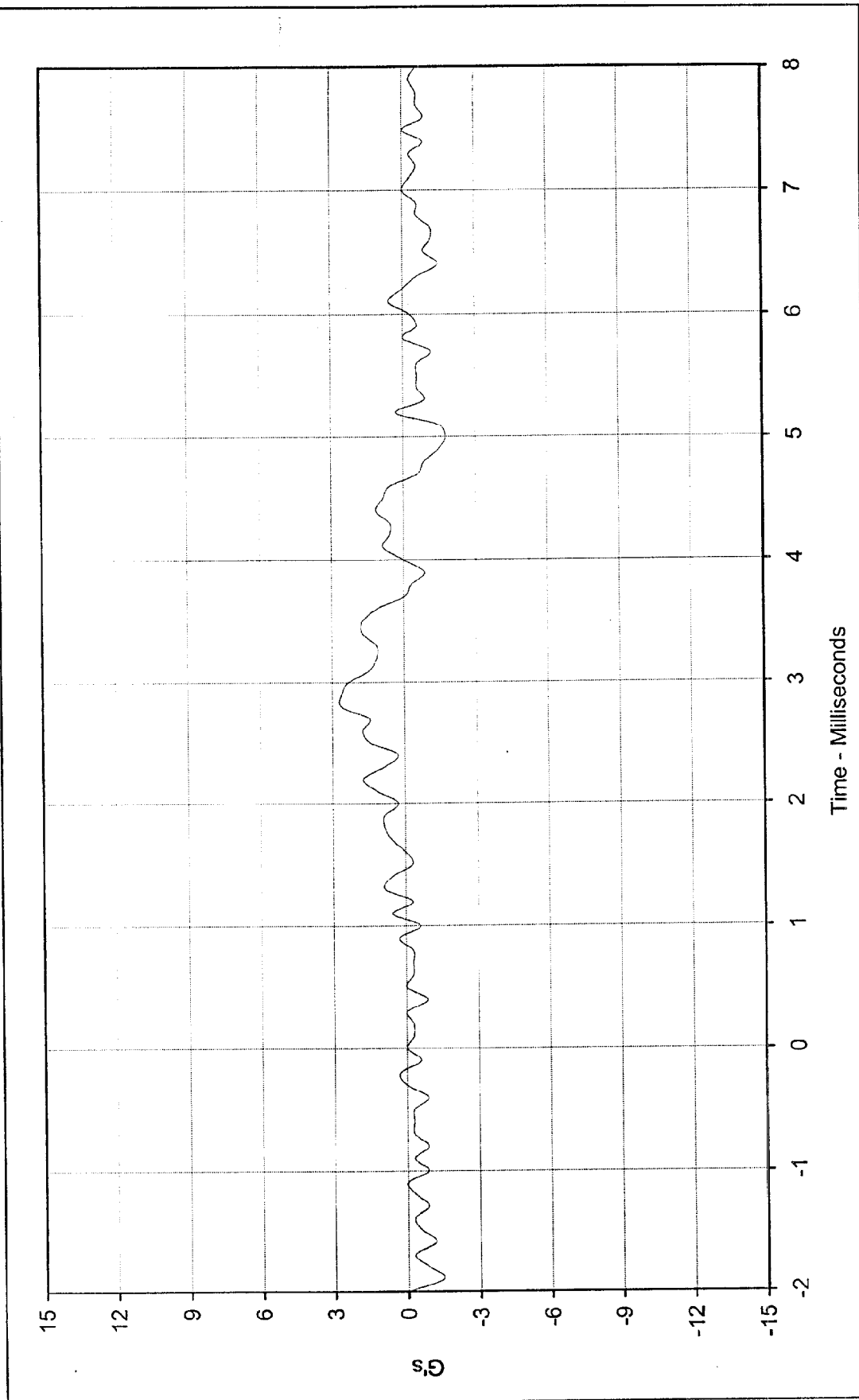
Date



Curve Description: Head Resultant Acceleration
 Maximum Value: 246.9 at 3.0 Milliseconds
 Minimum Value: 0.4 at -0.3 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/13/99
 ATD Serial No.: 034

Testing Program: Hybrid III Head Drop Calibration (Male)
 Test Information: S/N of Part: N/A Test I.D.: HD03A

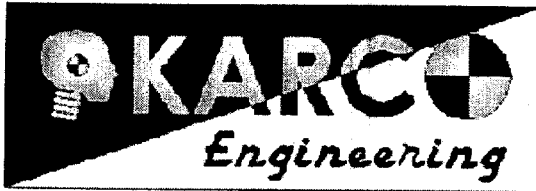




Testing Program: Hybrid III Head Drop Calibration (Male)
 Test Information: S/N of Part: N/A Test I.D.: HD03A



Curve Description: Head Acceleration Y Axis
 Maximum Value: 2.6 at 2.8 Milliseconds
 Minimum Value: -1.7 at 5.0 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/13/99
 ATD Serial No.: 034



Hybrid III Calibration Data Sheet

50TH Percentile Male

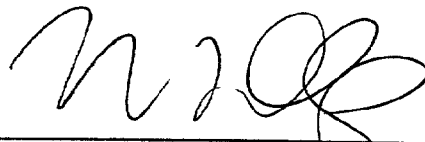
Thorax Impact Test

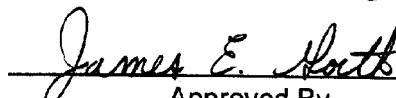
ATD Serial No.: 034

Part Serial No.: N/A

Test I.D.: CH03A

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Probe Velocity	m/s	6.58 to 6.82	6.74	Pass
Peak Probe Force	Newtons	5159 to 5893	5752	Pass
Peak Sternum Displacement	CM	6.35 to 7.26	7.14	Pass
Internal Hysteresis	%	69 to 85	73.1	Pass
Overall Test Results				Pass


Laboratory Technician

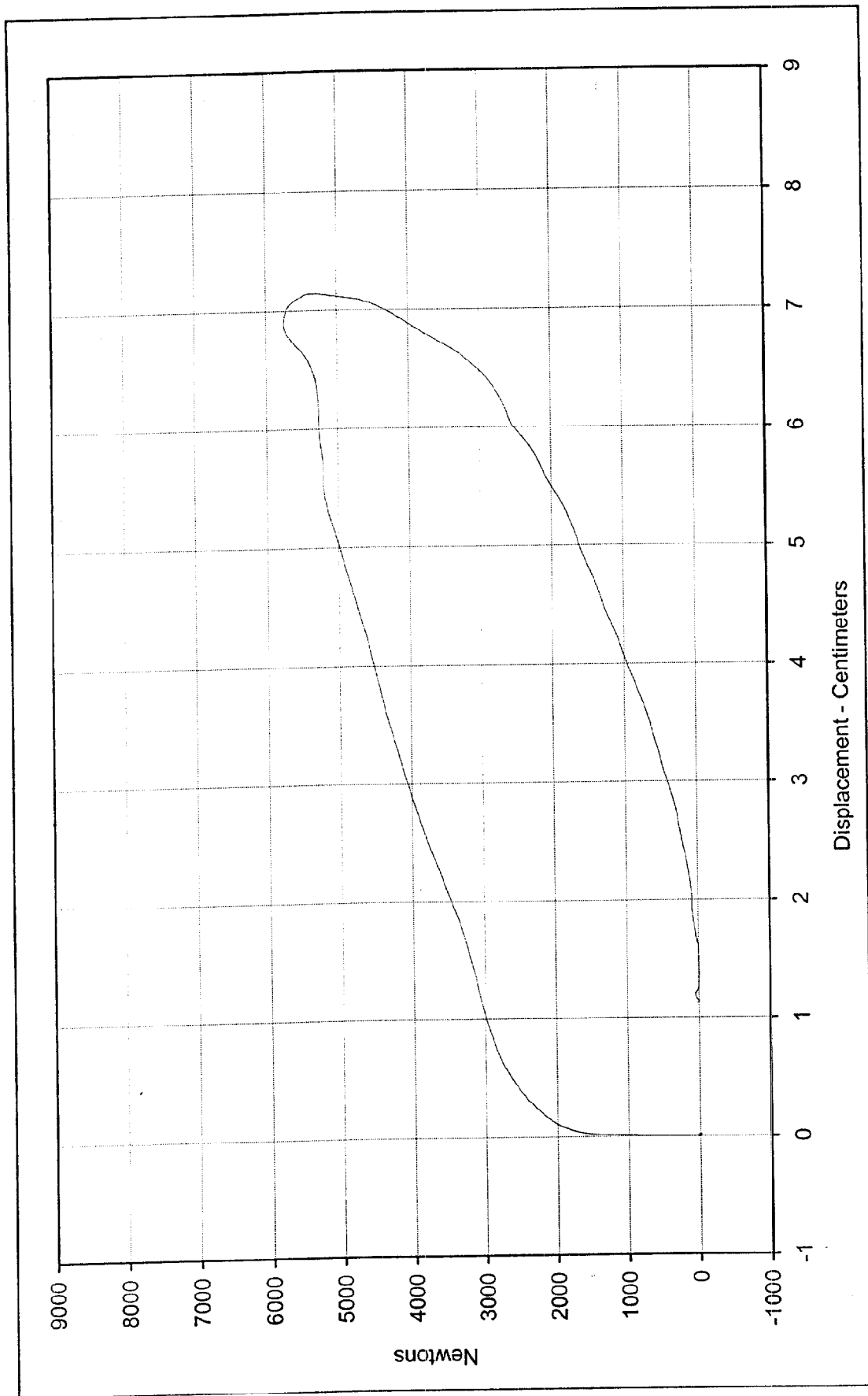

Approved By

February 15, 1999

Test Date

3/1/99

Date



Curve Description: Probe Force vs. Chest Displacement Testing Program: Hybrid III Thorax Impact Test
 Probe Force: 5751.7 Newtons Test Information: S/N of Part: N/A Test I.D.: CH03A

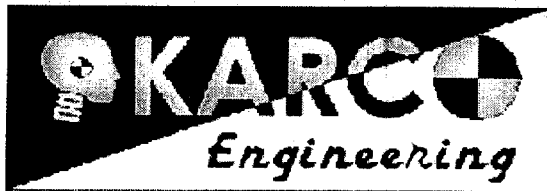
Chest Displ.: 7.14 Centimeters

SAE Filter Class: 180

Date of Test: 2/15/99

ATD Serial No.: 034





Hybrid III Calibration Data Sheet

50TH Percentile Male

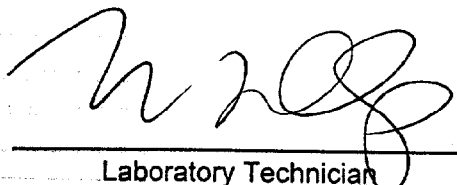
Neck Flexion Test

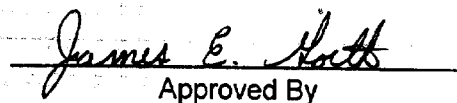
ATD Serial No.: 034

Part Serial No.: n/a

Test I.D.: NF03A

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	40	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.02	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.7	Pass
	20 Msec.	G's	17.6 to 22.6	21.1	Pass
	30 Msec.	G's	12.5 to 18.5	18.2	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	18.2	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	36.8	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	64.4	Pass
	Time	Msec.	57.0 to 64.0	62.7	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	117.3	Pass
Moment About Occipital Condyle	Maximum	N • m	84.1 to 108.5	88.7	Pass
	Time	Msec.	47.0 to 58.0	54.8	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	100.6	Pass
Overall Test Results					Pass


Laboratory Technician

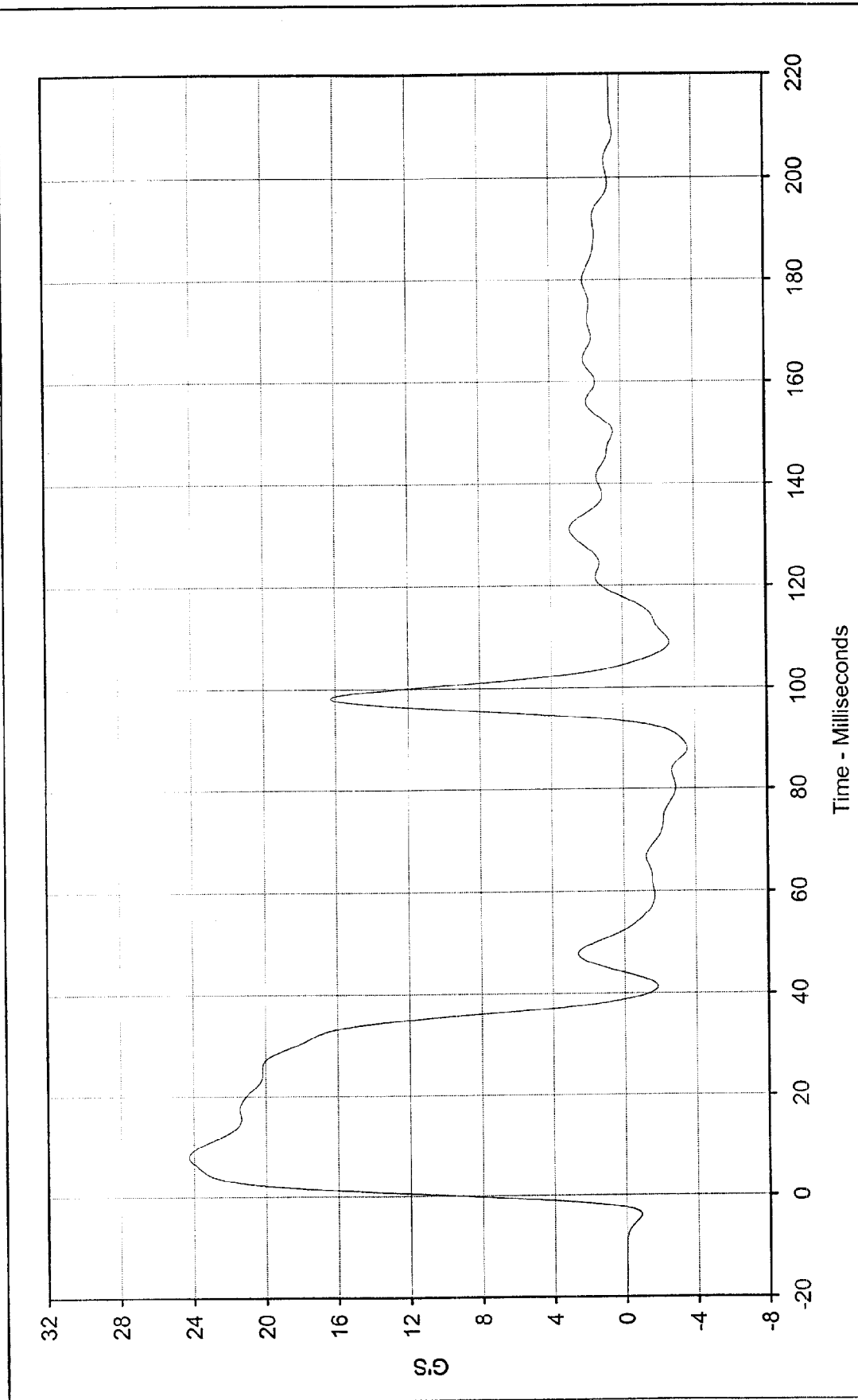

Approved By

February 14, 1999

Test Date



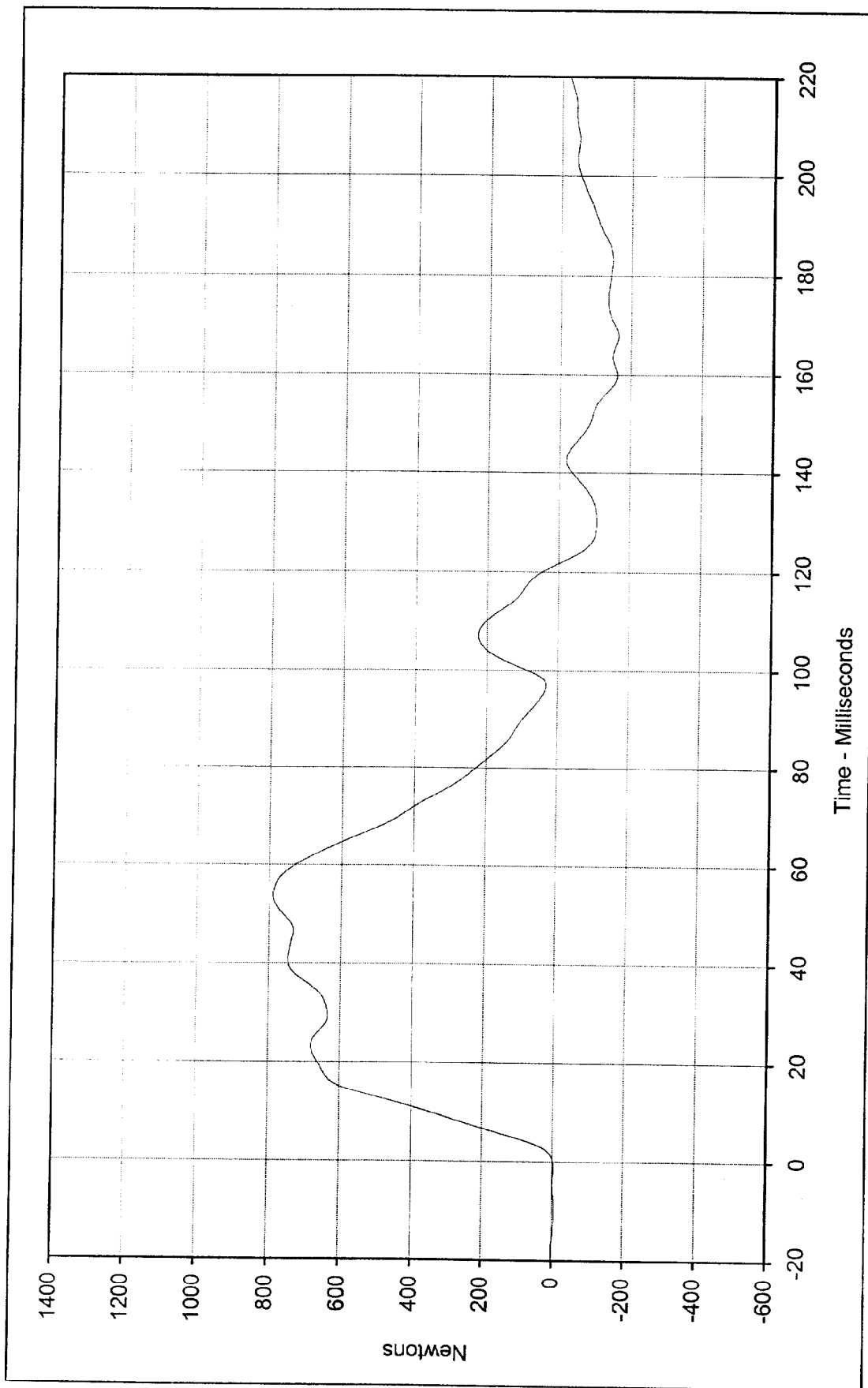
Date



Testing Program: Hybrid III Neck Flexion Test (Male)
 Test Information: S/N of Part: n/a Test I.D.: NF03A

Curve Description: Pendulum Deceleration
 Maximum Value: 24.3 at 8.0 Milliseconds
 Minimum Value: -3.6 at 87.9 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/14/99
 ATD Serial No.: 034





Curve Description: Neck Force X

Maximum Value: 789.5 at 53.7 Milliseconds

Minimum Value: -163.3 at 167.8 Milliseconds

SAE Filter Class: 60

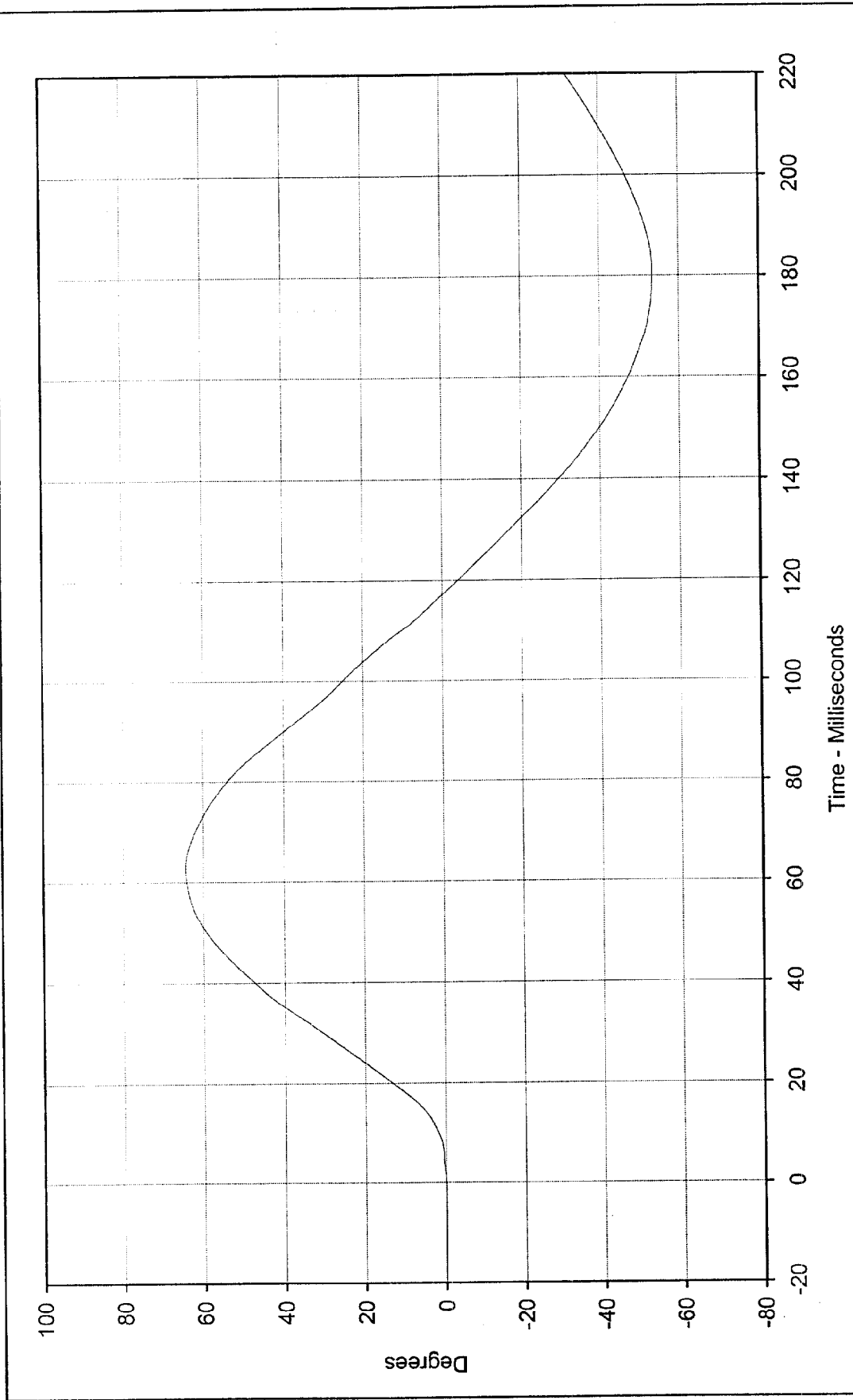
Date of Test: 2/14/99

ATD Serial No.: 034

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NF03A

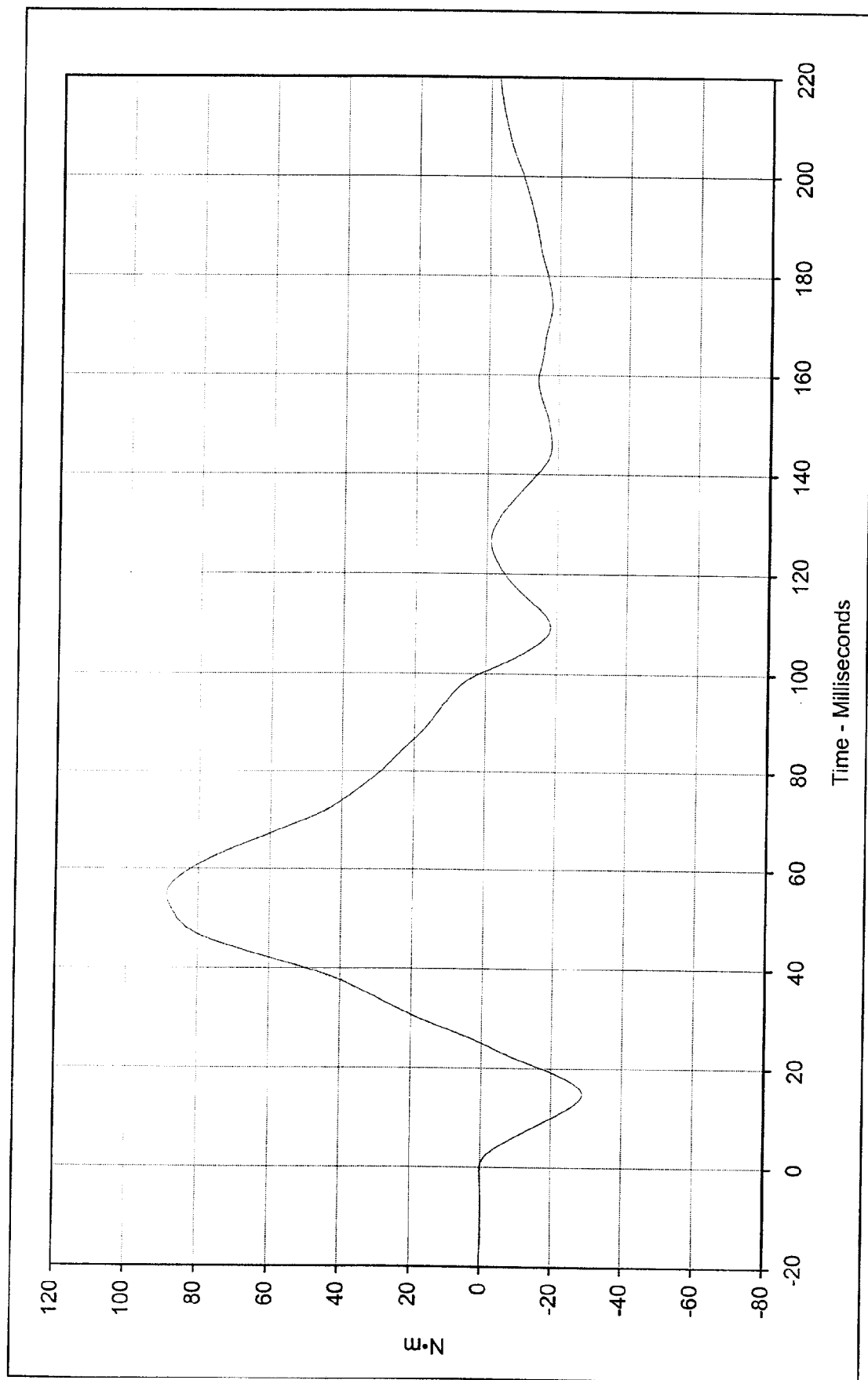




Testing Program Hybrid III Neck Flexion Test (Male)
 Test Information: S/N of Part: n/a Test I.D.: NF03A

Curve Description: "D" Plane Rotation
 Maximum Value: 64.4 at 62.7 Milliseconds
 Minimum Value: -53.4 at 181.1 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/14/99
 ATD Serial No.: 034





Curve Description: Moment About Occipital Condyles
 Maximum Value: 88.7 at 54.8 Milliseconds
 Minimum Value: -28.7 at 14.7 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/14/99
 ATD Serial No.: 034

Testing Program Hybrid III Neck Flexion Test (Male)
 Test Information: S/N of Part: n/a Test I.D.: NF03A





Hybrid III Calibration Data Sheet

50TH Percentile Male

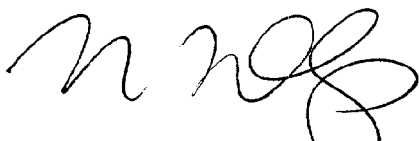
Neck Extension Test

ATD Serial No.: 034

Part Serial No.: n/a

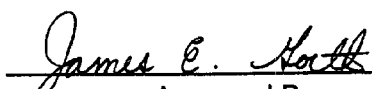
Test I.D.: NE03A

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	40	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.09	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	17.3	Pass
	20 Msec.	G's	14.0 to 19.0	14.6	Pass
	30 Msec.	G's	11.0 to 16.0	13.2	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 22.0	13.2	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	45.6	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	94.7	Pass
	Time	Msec.	72.0 to 82.0	78.0	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	158.5	Pass
Moment About Occipital Condyle	Maximum	N • m	-52.9 to- 79.9	-66.1	Pass
	Time	Msec.	65.0 to 79.0	69.8	Pass
Negative Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	146.0	Pass
Overall Test Results					Pass


 Laboratory Technician

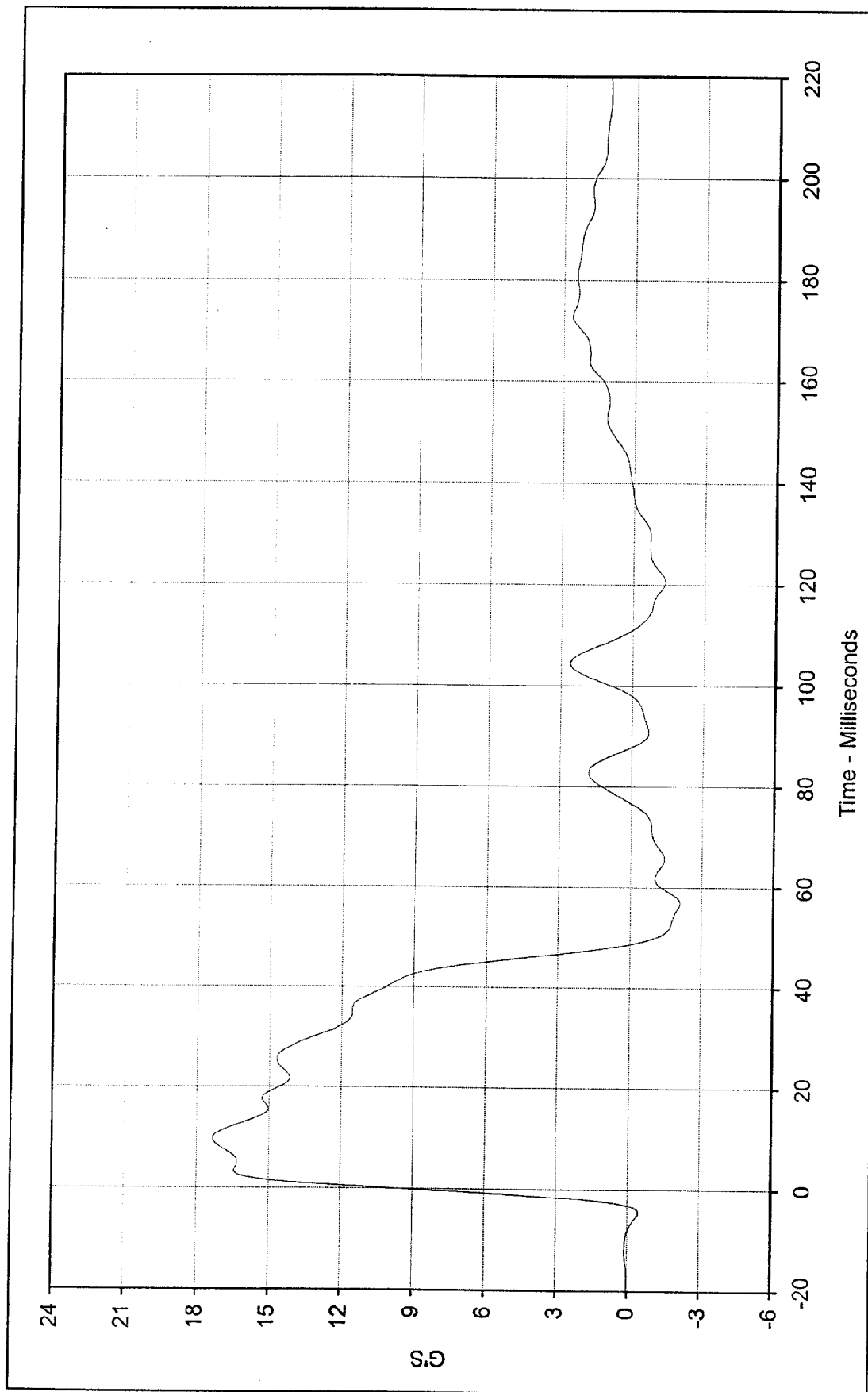
February 14, 1999

Test Date


 Approved By

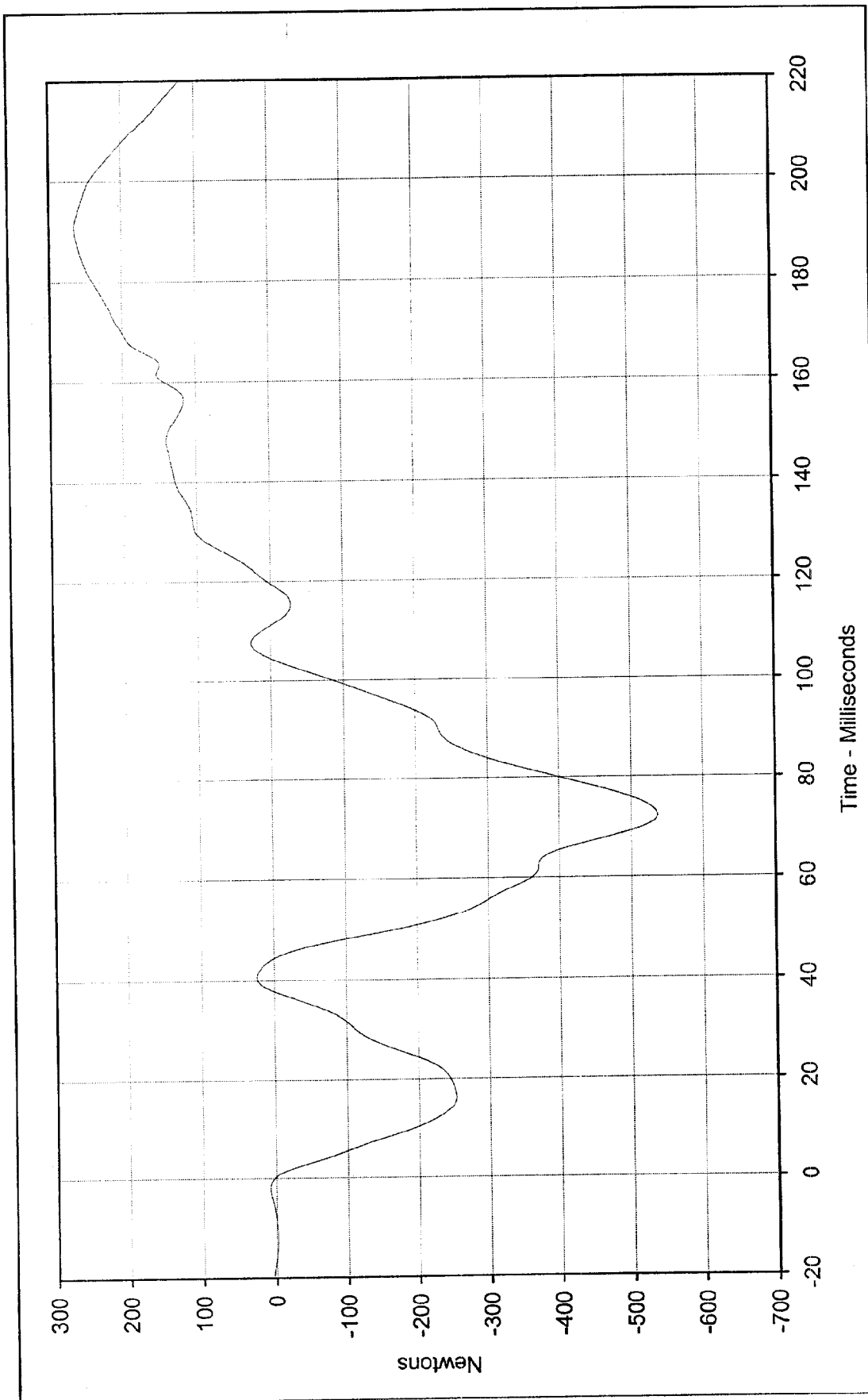
3/1/99

Date



Curve Description:	Pendulum Deceleration		Testing Program	Hybrid III Neck Extension Test (Male)
Maximum Value:	17.3	at 9.7	Test Information:	S/N of Part: n/a Test I.D.: NE03A
Minimum Value:	-2.1	at 56.8		
SAE Filter Class:	60			
Date of Test:	2/14/99			
ATD Serial No.:	034			

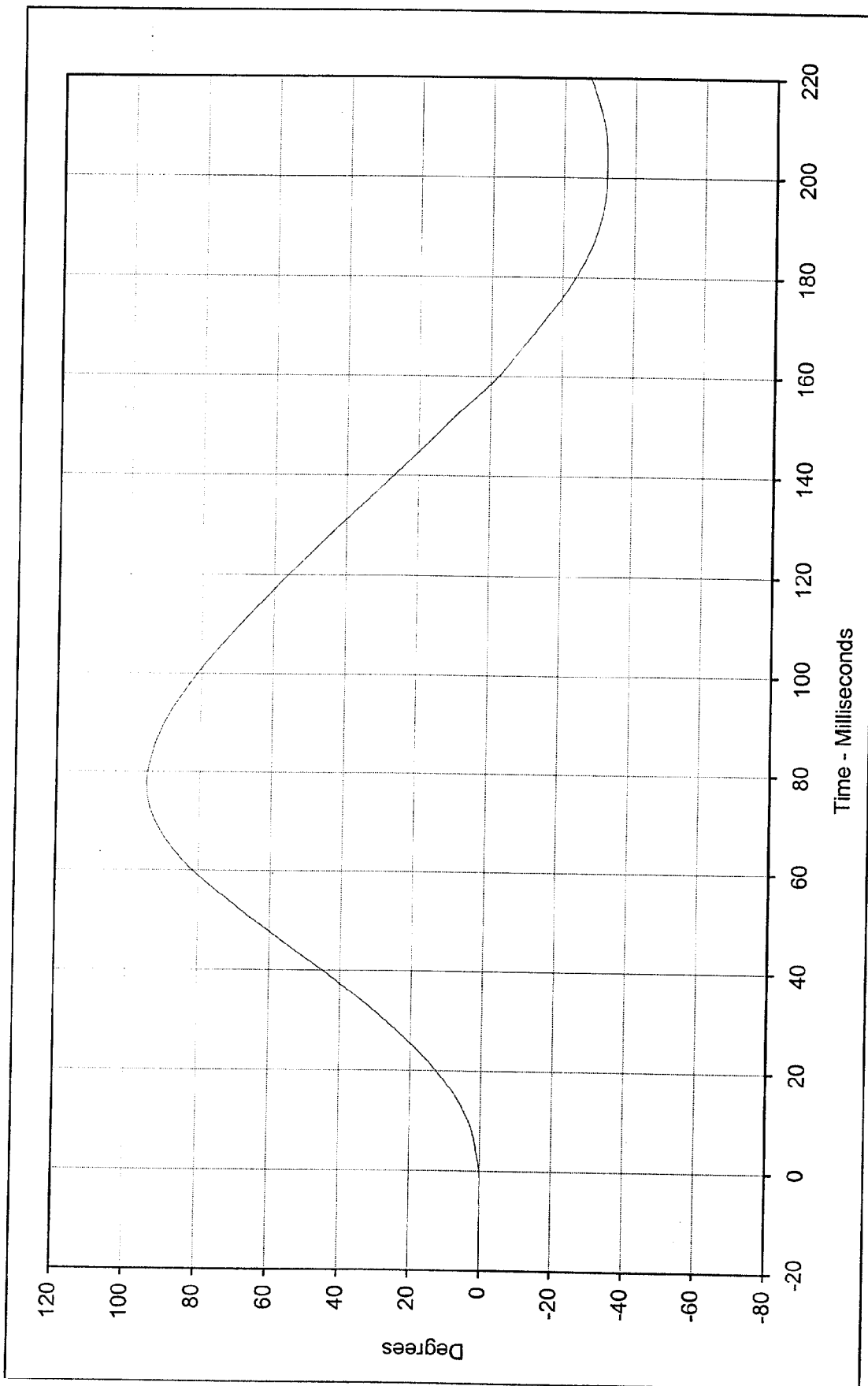




Testing Program: Hybrid III Neck Extension Test (Male)
 Test Information: S/N of Part: n/a Test I.D.: NE03A

Curve Description: Neck Force X
 Maximum Value: 265.6 at 190.9 Milliseconds
 Minimum Value: -536.9 at 72.2 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/14/99
 ATD Serial No.: 034

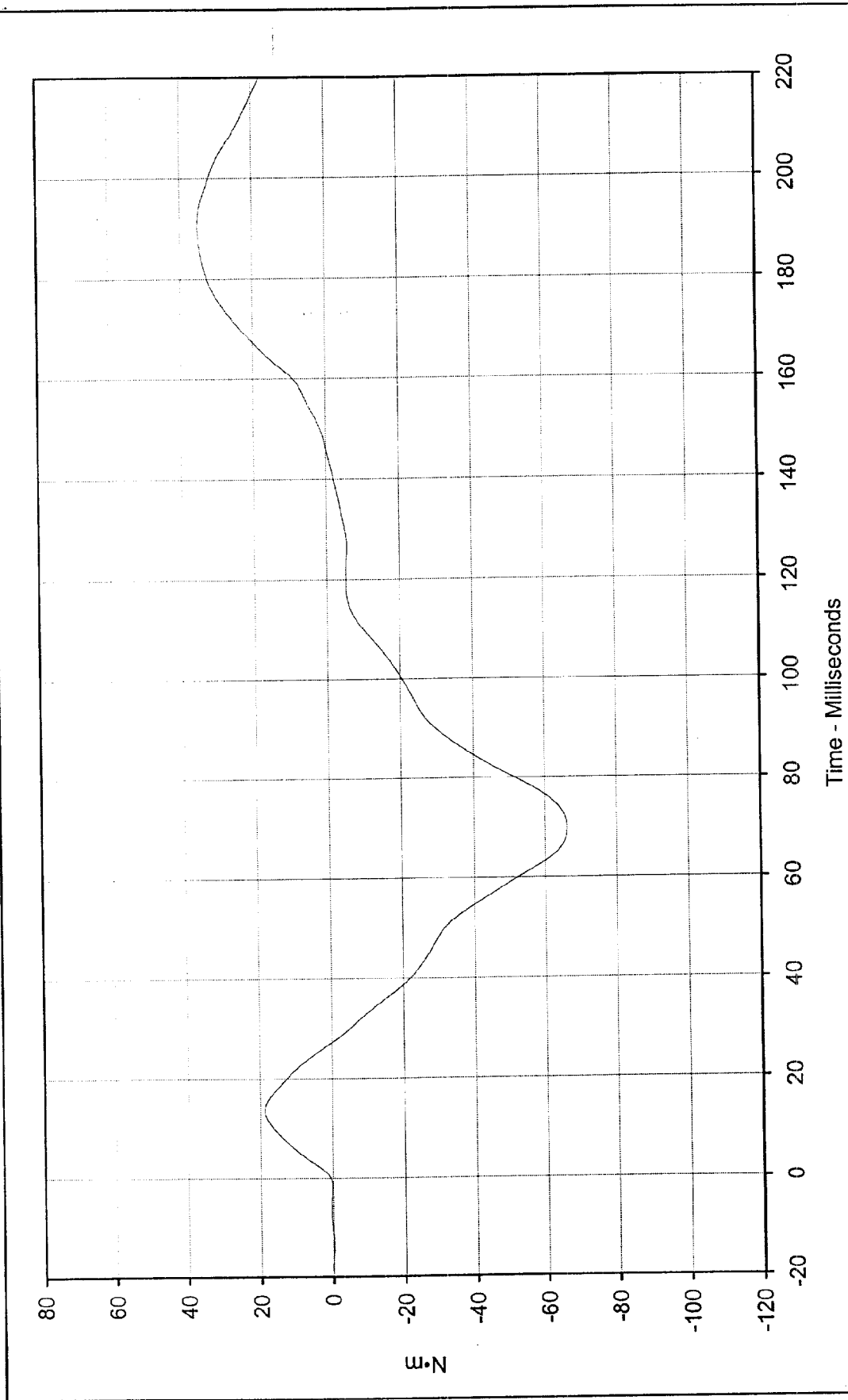




Curve Description:	"D" Plane Rotation	
Maximum Value:	94.7	at 78.0 Milliseconds
Minimum Value:	-32.0	at 203.5 Milliseconds
SAE Filter Class:	60	
Date of Test:	2/14/99	
ATD Serial No.:	034	

Testing Program	Hybrid III Neck Extension Test (Male)
Test Information:	S/N of Part: n/a Test I.D.: NE03A





Testing Program: Hybrid III Neck Extension Test (Male)
 Test Information: S/N of Part: n/a Test I.D.: NE03A

Curve Description: Moment About Occipital Condyles
 Maximum Value: 35.1 at 190.7 Milliseconds
 Minimum Value: -66.1 at 69.8 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/14/99
 ATD Serial No.: 034





Hybrid III Calibration Data Sheet

50TH Percentile Male

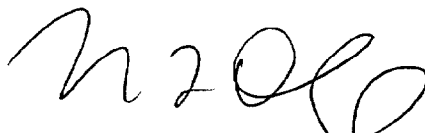
External Measurements

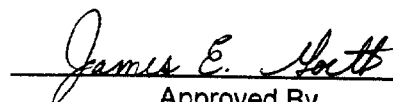
ATD Serial No.: 034

Part Serial No.: N/A

Test I.D.: N/A

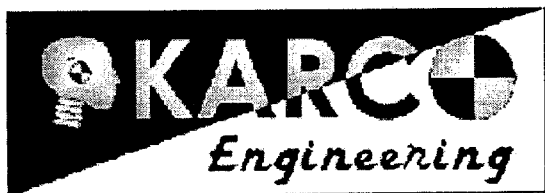
External Measurement Data				
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory temperature	°C	20.4 to 22.1	21.9	Pass
Laboratory relative humidity	%	10 to 70	35	Pass
A - Total sitting height	mm	878.8 to 889.0	881.0	Pass
B - Shoulder pivot height	mm	505.5 to 520.7	515.0	Pass
C - "H" point height	mm	83.8 to 88.9	85.5	Pass
D - "H" point from seat back	mm	134.6 to 139.7	138.0	Pass
E - Shoulder pivot from back	mm	83.8 to 94.0	85.0	Pass
F - Thigh clearance	mm	139.7 to 154.9	153.0	Pass
G - Elbow back to wrist pivot	mm	289.6 to 304.8	301.0	Pass
H - Skull cap to back line	mm	40.6 to 45.7	45.0	Pass
I - Shoulder to elbow length	mm	330.2 to 345.4	341.0	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	598.0	Pass
L - Popliteal length	mm	429.3 to 454.7	451.0	Pass
M - Knee pivot height	mm	485.1 to 500.4	490.0	Pass
N - Buttock popliteal length	mm	452.1 to 477.5	470.0	Pass
O - Chest depth	mm	213.4 to 228.6	227.0	Pass
P - Foot length	mm	251.5 to 266.7	261.0	Pass
V - Shoulder breadth	mm	421.6 to 436.9	430.0	Pass
W - Foot breadth	mm	91.4 to 106.7	101.0	Pass
Y - Chest circumference	mm	970.3 to 1000.8	980.0	Pass
Z - Waist circumference	mm	835.7 to 866.1	850.0	Pass
AA - Location for chest circumference	mm	429.3 to 434.3	432.0	Pass
BB - Location for waist circumference	mm	226.1 to 231.1	228.0	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

February 15, 1999
Test Date

3/1/99
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.: KN03C

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	2.084	Pass
Peak Probe Force	Newtons	4715 to 5782	5701.1	Pass
Overall Test Results				Pass

Laboratory Technician

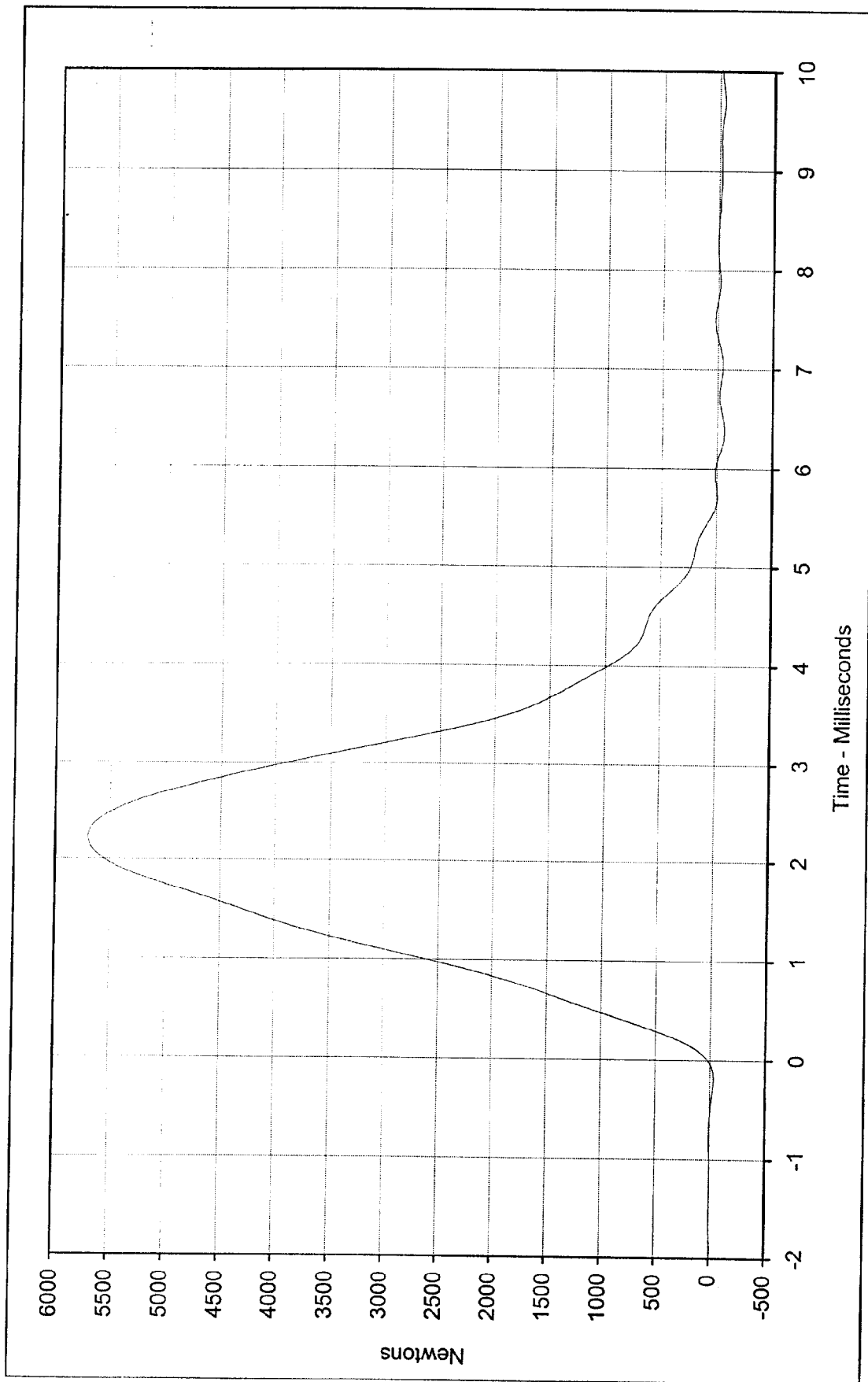
February 13, 1999

Test Date

Approved By

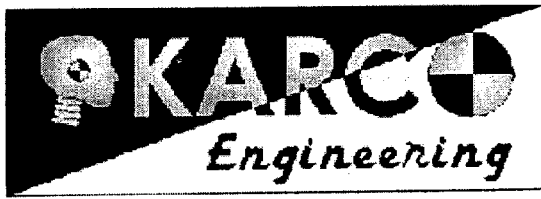
3/1/99

Date



Curve Description:	Testing Program	Hybrid III Left Knee Impact Test
Maximum Value: 5701.1	Part S/N:	N/A
Minimum Value: -65.9	Test I.D.:	KN03C
SAE Filter Class: 600		
Date of Test: 2/13/99		
ATD Serial No.: 35		





Hybrid III Calibration Data Sheet

50TH Percentile Male

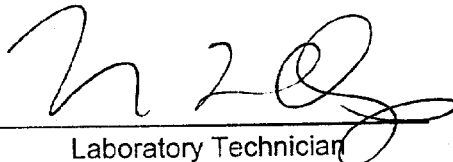
Right Knee Impact Test

ATD Serial No.: 35

Part Serial No.: N/A

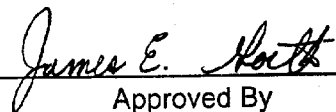
Test I.D.: KN03D

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	5635.2	Pass
Overall Test Results				Pass


Laboratory Technician

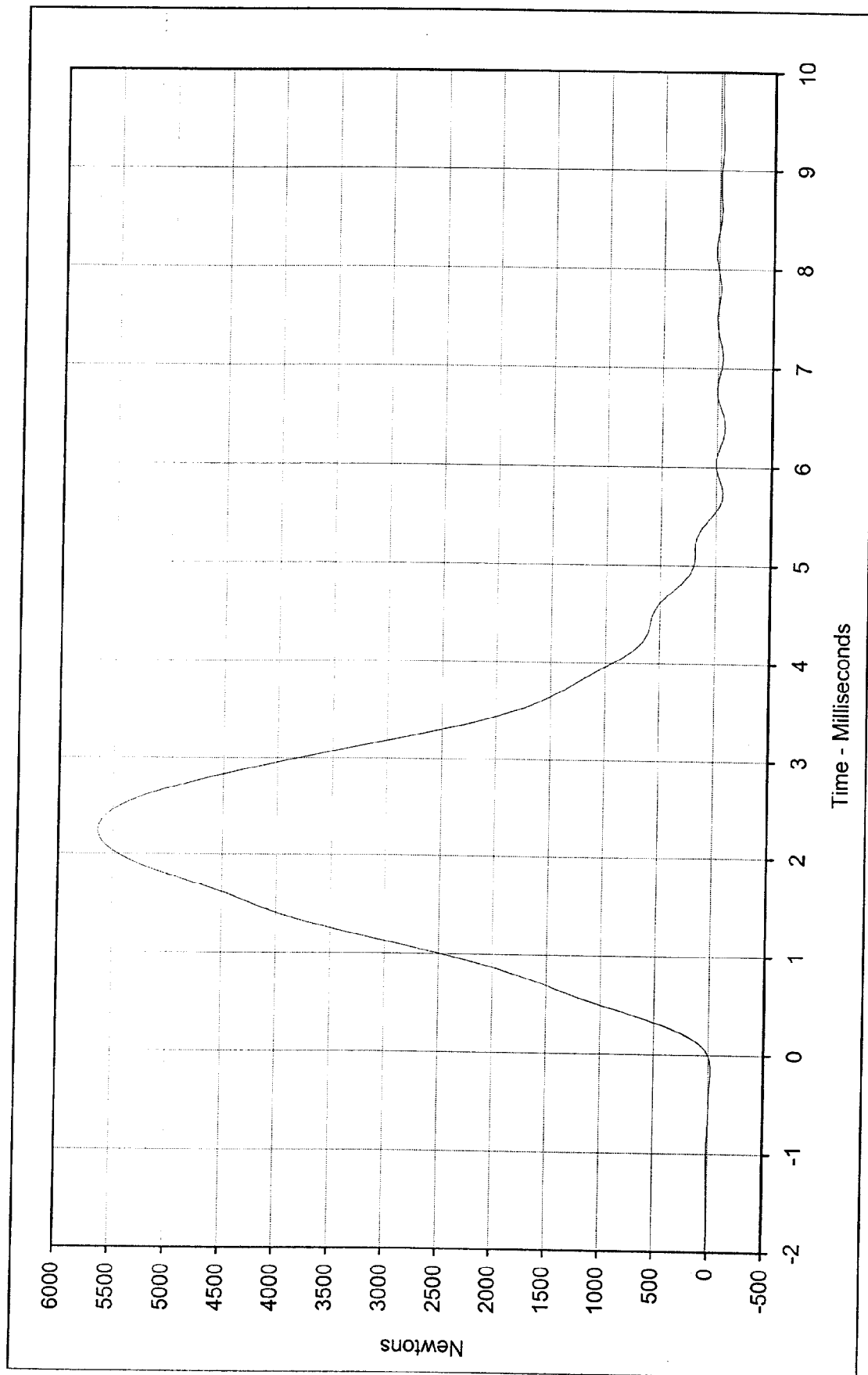
February 13, 1999

Test Date


Approved By

3/1/99

Date



Curve Description: Hybrid III Right Knee Impact Test
 Testing Program: Part S/N: N/A Test I.D.: KN03D

Probe Force
 Maximum Value: 5635.2 at 2.2 Milliseconds
 Minimum Value: -72.0 at 6.4 Milliseconds
 SAE Filter Class: 600
 Date of Test: 2/13/99
 ATD Serial No.: 35





Hybrid III Calibration Data Sheet

50TH Percentile Male

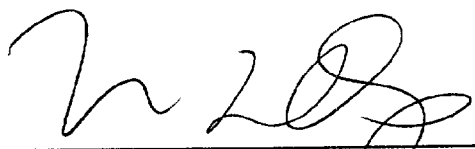
Head Drop Calibration

ATD Serial No.: 035

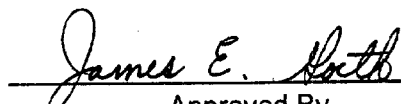
Part Serial No.: N/A

Test I.D.: HD03B

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	248.5	Pass
Peak Lateral Acceleration	G's	≤15.0	4.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



Laboratory Technician



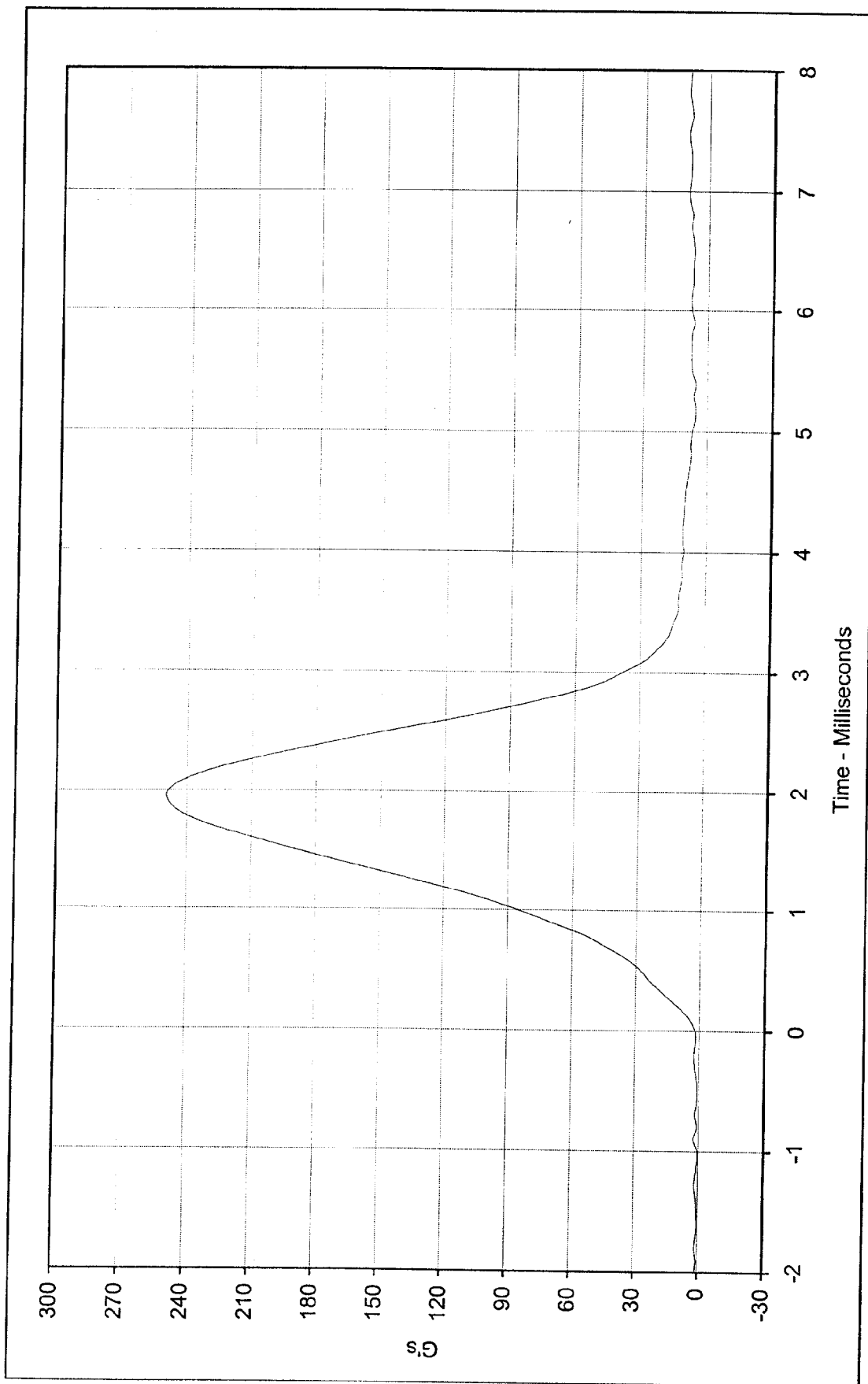
Approved By

February 13, 1999

Test Date

3/1/99

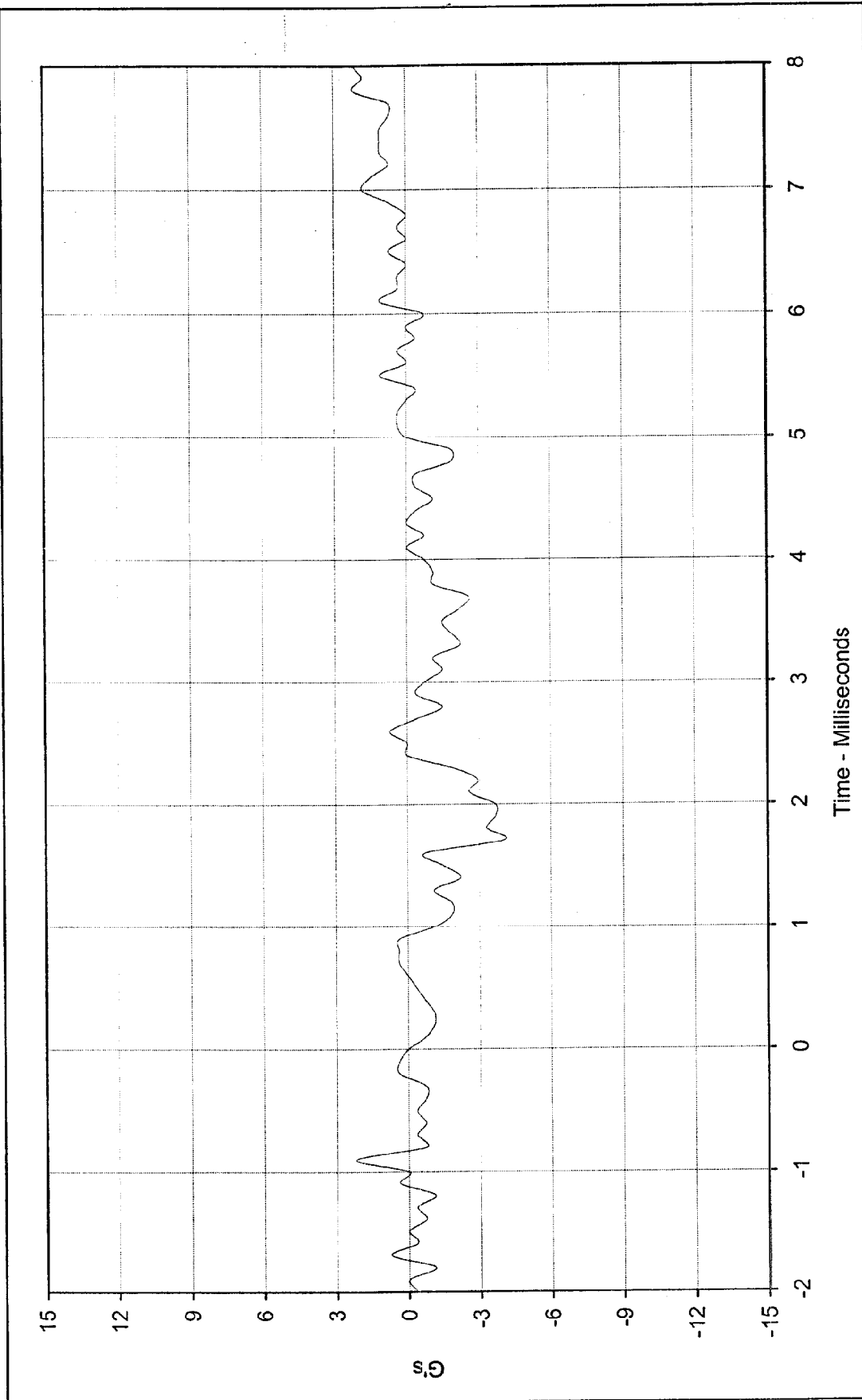
Date



Curve Description: Head Resultant Acceleration
 Testing Program Hybrid III Head Drop Calibration (Male)
 Test Information: S/N of Part: N/A Test I.D.: HD03B

Maximum Value: 248.5 at 2.0 Milliseconds
 Minimum Value: 0.4 at -1.6 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/13/99
 ATD Serial No.: 035

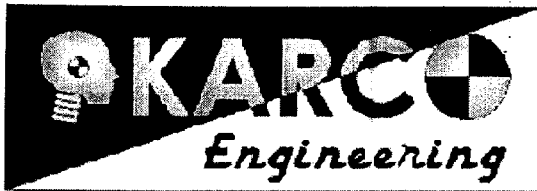




Testing Program Hybrid III Head Drop Calibration (Male)
 Test Information: S/N of Part: N/A Test I.D.: HD03B

Curve Description: Head Acceleration Y Axis
 Maximum Value: 2.2 at -0.9 Milliseconds
 Minimum Value: -4.0 at 1.7 Milliseconds
 SAE Filter Class: 1000
 Date of Test: 2/13/99
 ATD Serial No.: 035





Hybrid III Calibration Data Sheet

50TH Percentile Male

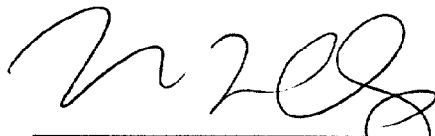
Thorax Impact Test

ATD Serial No.: 035

Part Serial No.: N/A

Test I.D.: CH03B

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	6.68	Pass
Peak Probe Force	Newtons	5159 to 5893	5845	Pass
Peak Sternum Displacement	CM	6.35 to 7.26	6.57	Pass
Internal Hysteresis	%	69 to 85	74.1	Pass
Overall Test Results				Pass



Laboratory Technician



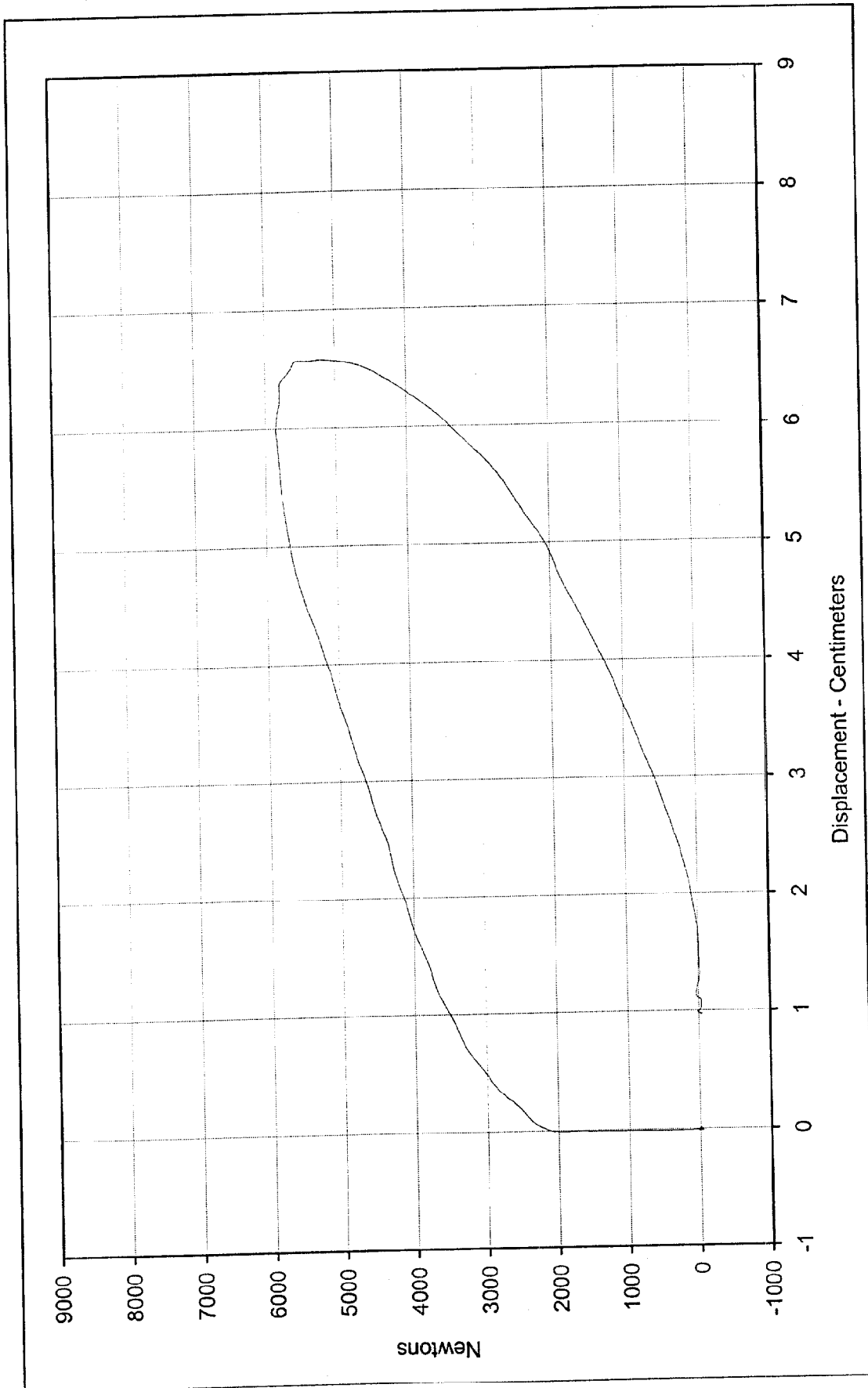
Approved By

February 15, 1999

Test Date

3/1/99

Date



Testing Program Hybrid III Thorax Impact Test
 Test Information: S/N of Part: N/A Test I.D.: CH03B



Curve Description: Probe Force vs. Chest Displacement
 Probe Force: 5844.9 Newtons
 Chest Displ.: 6.57 Centimeters
 SAE Filter Class: 180
 Date of Test: 2/15/99
 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.: NF03B

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	41	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.92	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.4	Pass
	20 Msec.	G's	17.6 to 22.6	20.9	Pass
	30 Msec.	G's	12.5 to 18.5	17.9	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	17.9	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	36.6	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	65.3	Pass
	Time	Msec.	57.0 to 64.0	62.5	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	117.1	Pass
Moment About Occipital Condyle	Maximum	N • m	84.1 to 108.5	97.6	Pass
	Time	Msec.	47.0 to 58.0	54.6	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	100.4	Pass
Overall Test Results				Pass	

[Signature]

Laboratory Technician

February 14, 1999

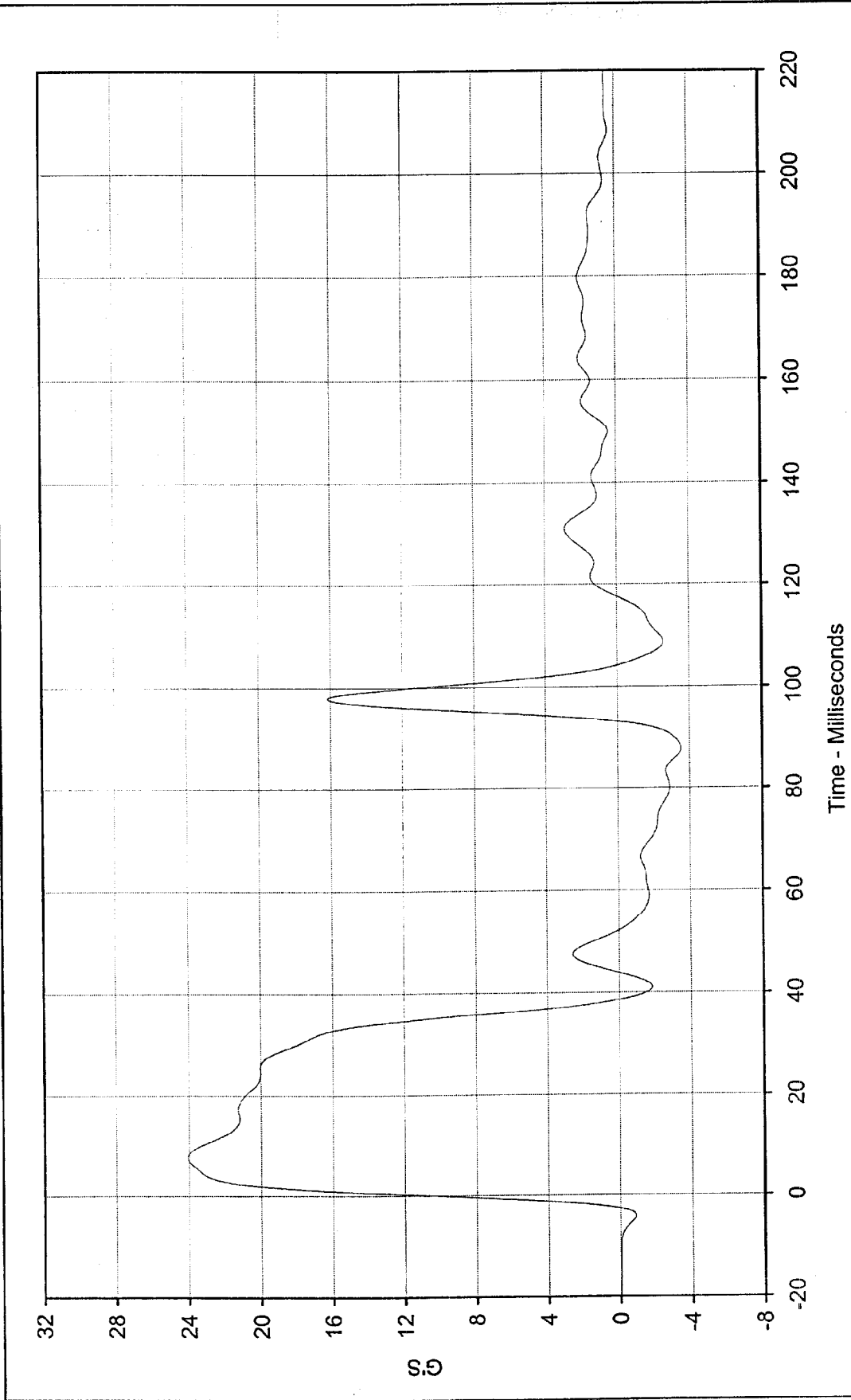
Test Date

[Signature]

Approved By

3/1/99

Date

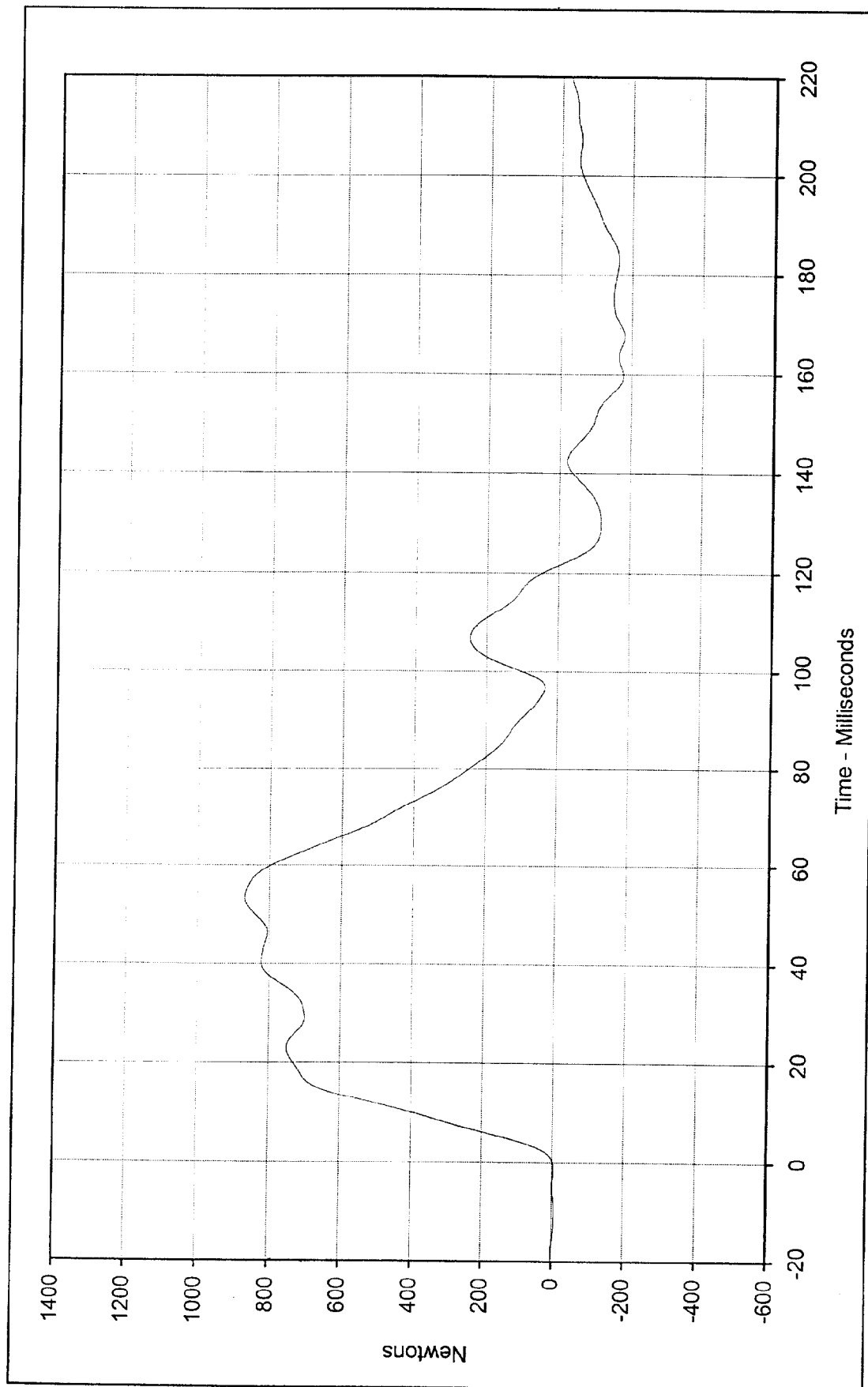


Curve Description: Pendulum Deceleration
 Maximum Value: 24.1 at 7.8 Milliseconds
 Minimum Value: -3.5 at 87.7 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/14/99
 ATD Serial No.: 035

Testing Program: Hybrid III Neck Flexion Test (Male)

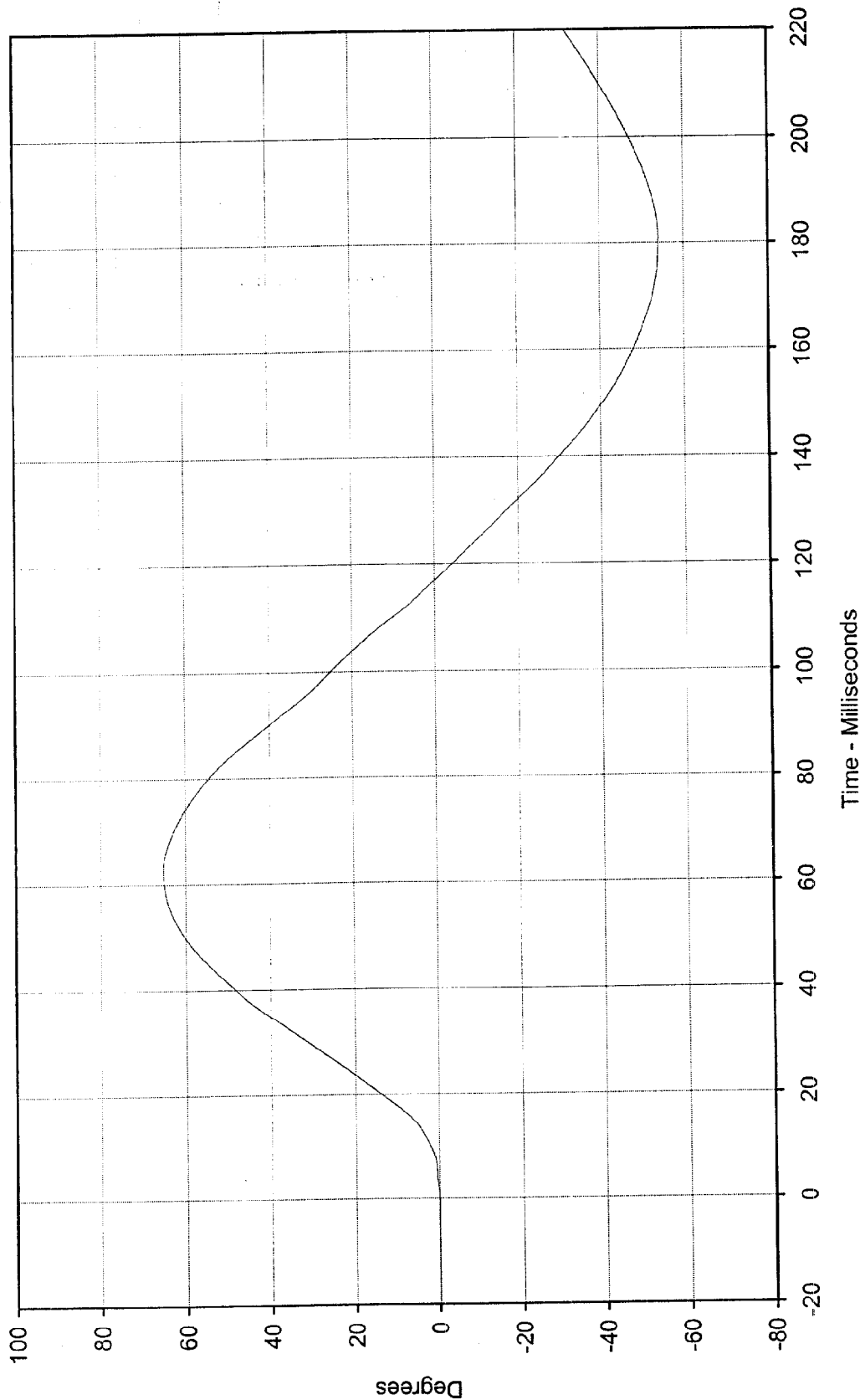
Test Information: S/N of Part: n/a Test I.D.: NF03B





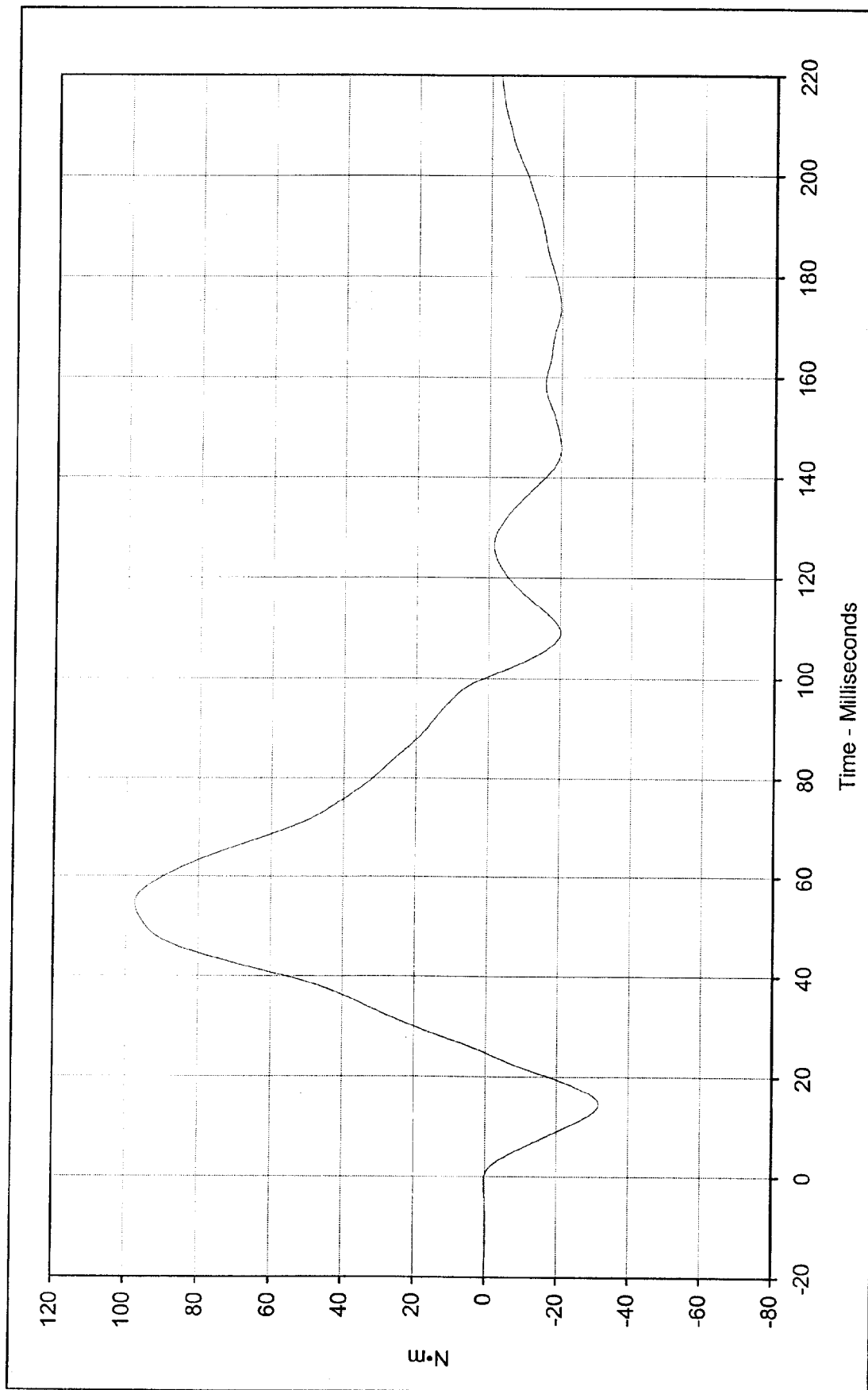
Curve Description:	Neck Force X	Testing Program	Hybrid III Neck Flexion Test (Male)
Maximum Value:	868.5 at 53.5 Milliseconds	Test Information:	S/N of Part: n/a Test I.D.: NF03B
Minimum Value:	-179.7 at 167.6 Milliseconds		
SAE Filter Class:	60		
Date of Test:	2/14/99		
ATD Serial No.:	035		





Curve Description:		"D" Plane Rotation		Testing Program	Hybrid III Neck Flexion Test (Male)
Maximum Value:	65.3	at	62.5	Test Information:	S/N of Part: n/a
Minimum Value:	-54.0	at	180.9	Test I.D.:	NF03B
SAE Filter Class:	60				
Date of Test:	2/14/99				
ATD Serial No.:	035				

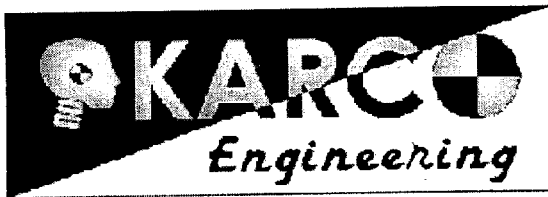




Curve Description: Moment About Occipital Condyles
 Maximum Value: 97.6 at 54.6 Milliseconds
 Minimum Value: -31.6 at 14.5 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/14/99
 ATD Serial No.: 035

Testing Program: Hybrid III Neck Flexion Test (Male)
 Test Information: S/N of Part: n/a Test I.D.: NF03B





Hybrid III Calibration Data Sheet

50TH Percentile Male

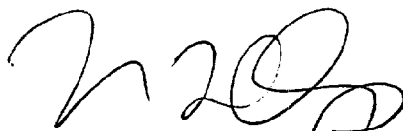
Neck Extension Test

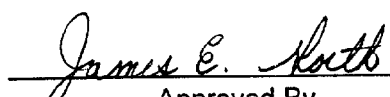
ATD Serial No.: 035

Part Serial No.: n/a

Test I.D.: NE03B

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	40	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.10	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	18.4	Pass
	20 Msec.	G's	14.0 to 19.0	17.8	Pass
	30 Msec.	G's	11.0 to 16.0	15.6	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 22.0	15.6	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	41.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	102.7	Pass
	Time	Msec.	72.0 to 82.0	77.8	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	160.2	Pass
Moment About Occipital Condyle	Maximum	N • m	-52.9 to- 79.9	-69.8	Pass
	Time	Msec.	65.0 to 79.0	70.6	Pass
Negative Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	143.8	Pass
Overall Test Results					Pass


 Laboratory Technician

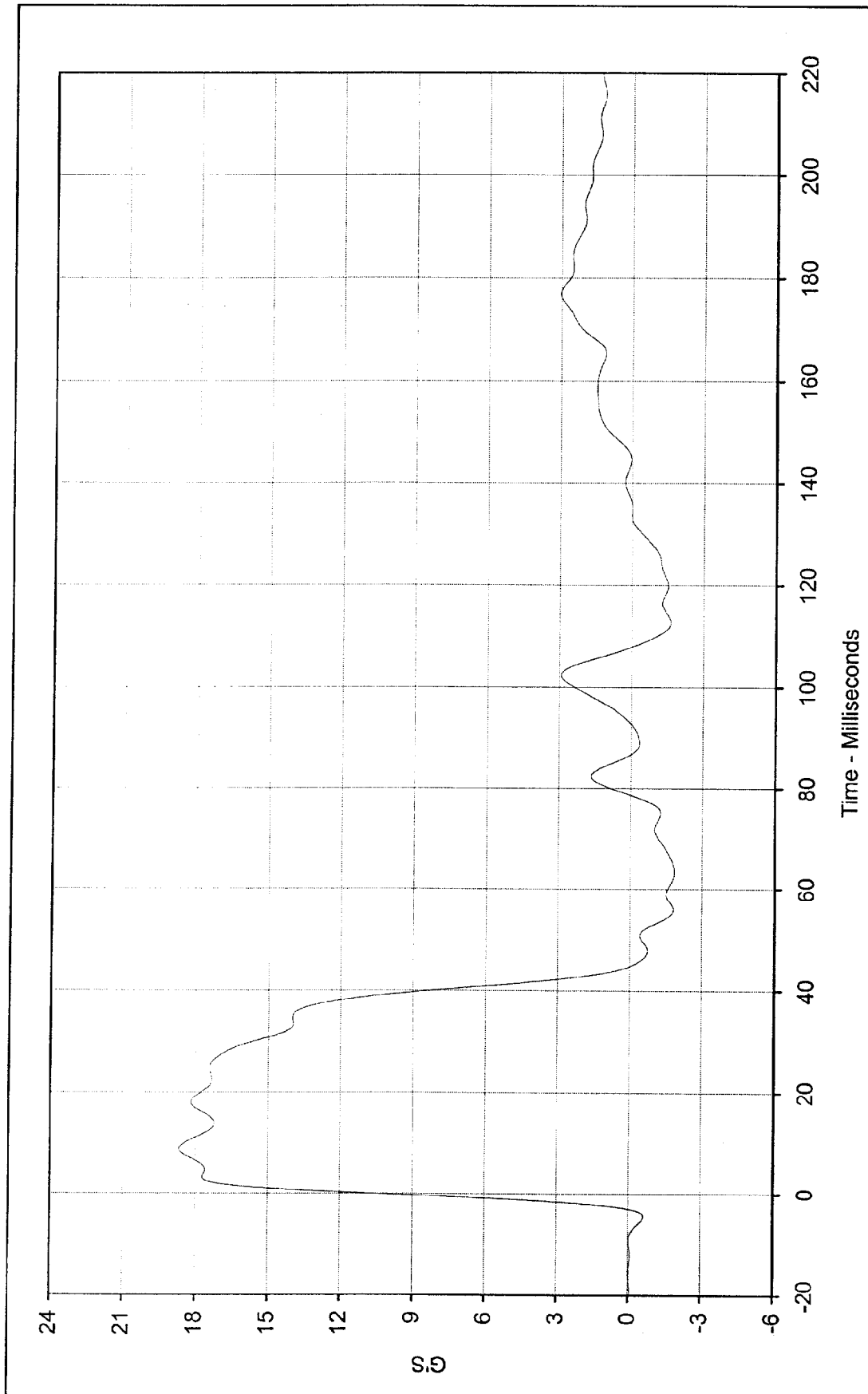

 Approved By

February 14, 1999

Test Date



Date



Curve Description: Pendulum Deceleration Testing Program Hybrid III Neck Extension Test (Male)

Maximum Value: 18.7 at 8.8 Milliseconds

Minimum Value: -1.8 at 63.2 Milliseconds

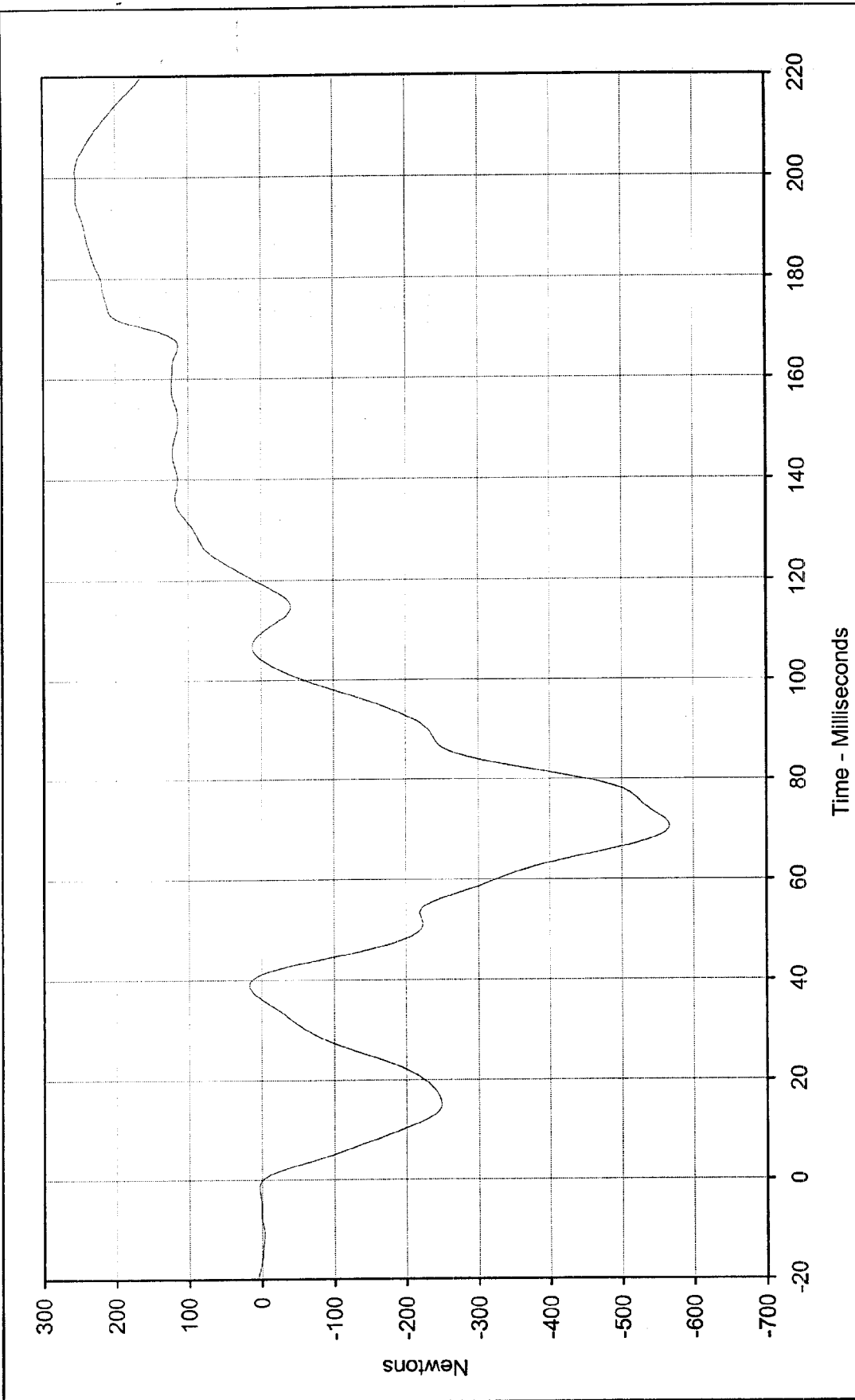
SAE Filter Class: 60

Date of Test: 2/14/99

ATD Serial No.: 035

Test Information: S/N of Part: n/a Test I.D.: NE03B

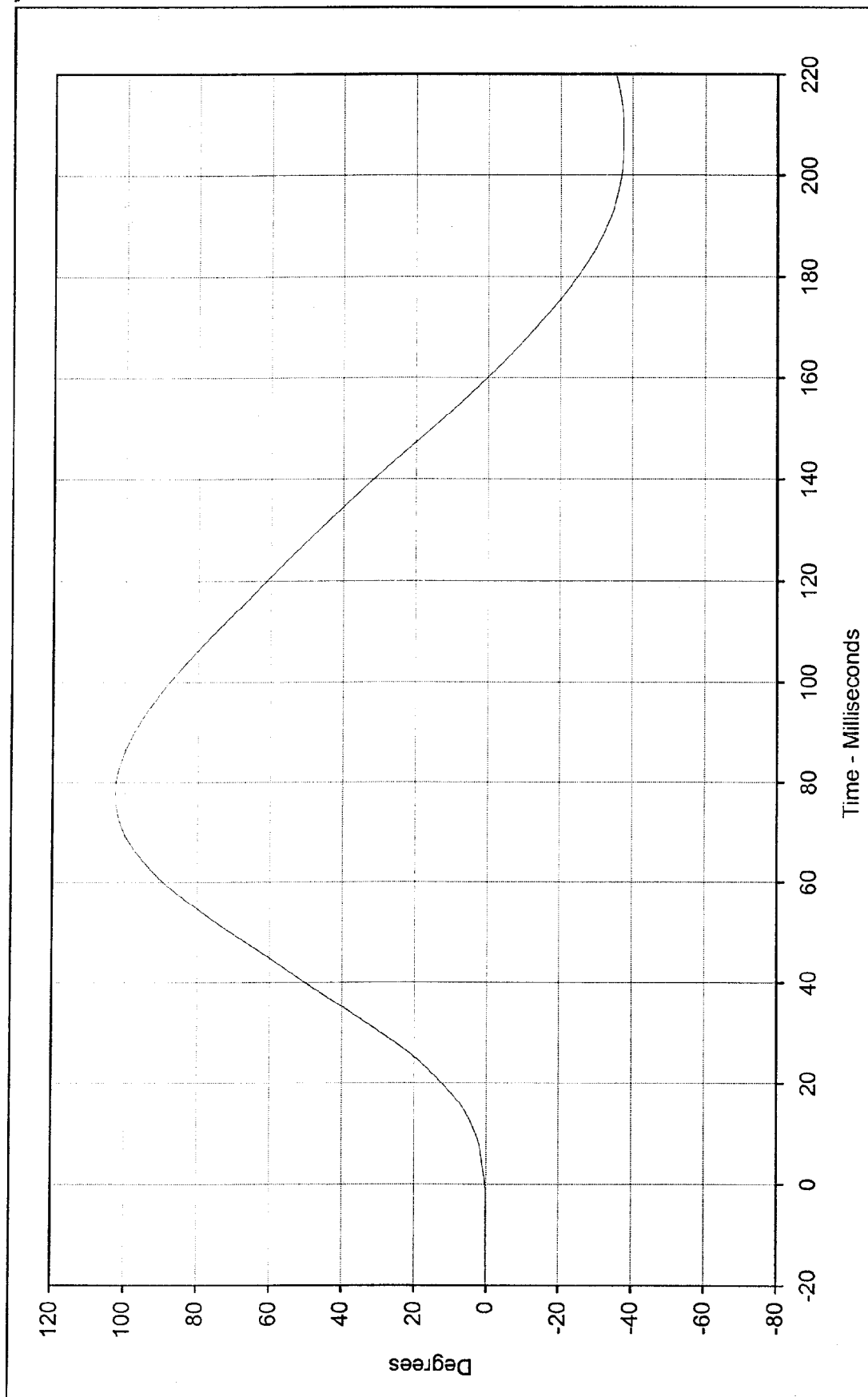




Testing Program: Hybrid III Neck Extension Test (Male)
 Test Information: S/N of Part: n/a Test I.D.: NE03B

Curve Description: Neck Force X
 Maximum Value: 256.0 at 201.2 Milliseconds
 Minimum Value: -566.5 at 70.4 Milliseconds
 SAE Filter Class: 60
 Date of Test: 2/14/99
 ATD Serial No.: 035





Curve Description: _____ Testing Program Hybrid III Neck Extension Test (Male)

Maximum Value: 102.7 at 77.8 Milliseconds Test Information: S/N of Part: n/a Test I.D.: NE03B

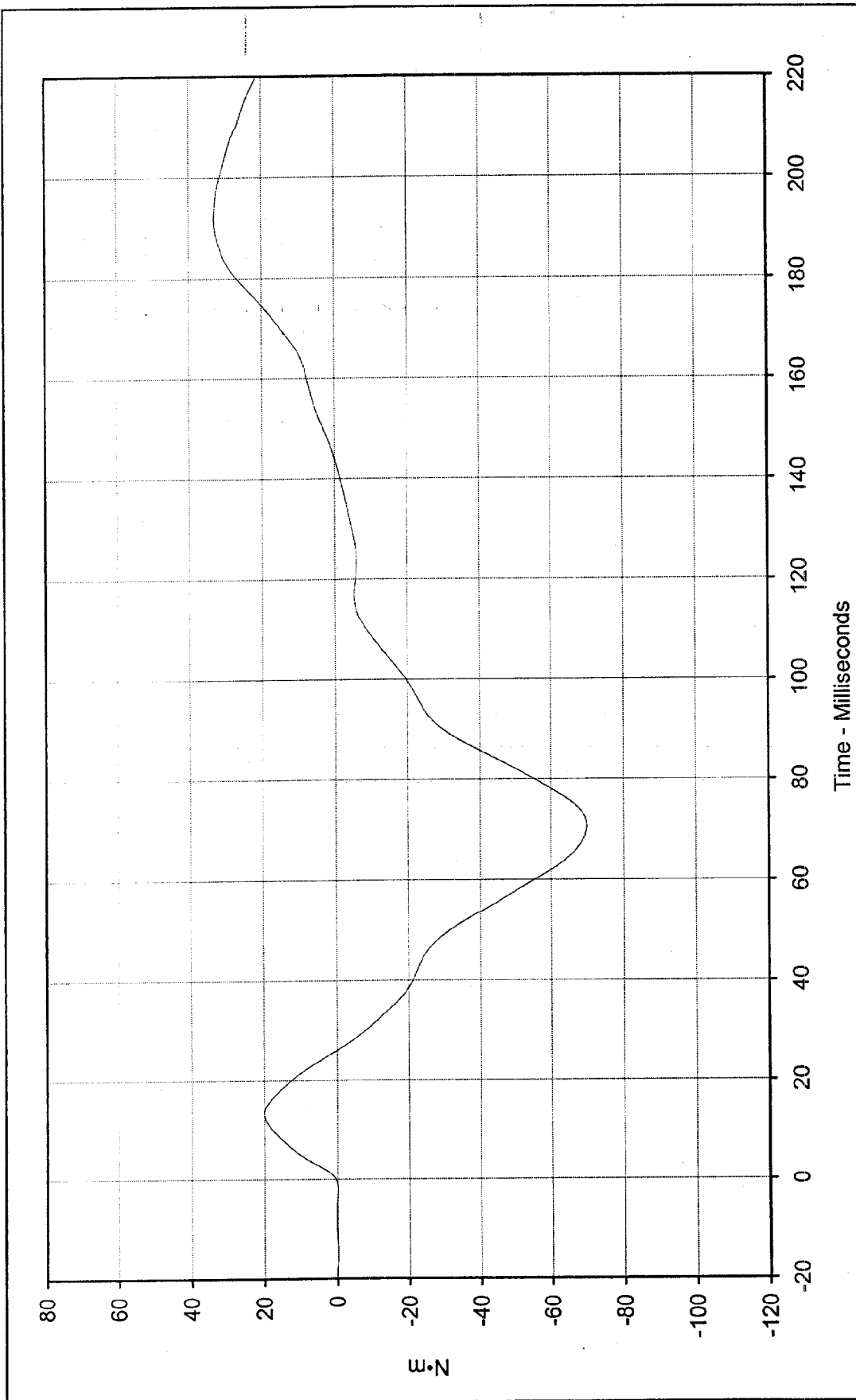
Minimum Value: -37.4 at 209.6 Milliseconds

SAE Filter Class: 60

Date of Test: 2/14/99

ATD Serial No.: 035





Curve Description: Moment About Occipital Condyles Testing Program Hybrid III Neck Extension Test (Male)

Maximum Value: 32.9 at 191.7 Milliseconds Test Information: S/N of Part: n/a Test I.D.: NE03B

Minimum Value: -69.8 at 70.6 Milliseconds

SAE Filter Class: 60

Date of Test: 2/14/99

ATD Serial No.: 035





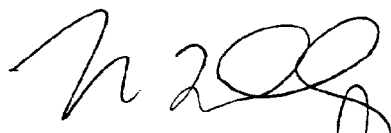
Hybrid III Calibration Data Sheet

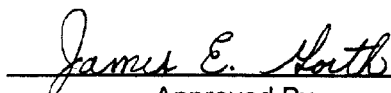
50TH Percentile Male

External Measurements

ATD Serial No.: 035Part Serial No.: N/ATest 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	139.0	Pass
E - Shoulder pivot from back	mm	83.8 to 94.0	84.5	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	302.0	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	600.0	Pass
L - Popliteal length	mm	429.3 to 454.7	450.0	Pass
M - Knee pivot height	mm	485.1 to 500.4	491.0	Pass
N - Buttock popliteal length	mm	452.1 to 477.5	475.0	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	435.0	Pass
W - Foot breadth	mm	91.4 to 106.7	100.0	Pass
Y - Chest circumference	mm	970.3 to 1000.8	996.0	Pass
Z - Waist circumference	mm	835.7 to 866.1	862.0	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	229.0	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

February 15, 1999

Test Date

3/1/99

Date

APPENDIX F
VEHICLE OWNER'S MANUAL
OCCUPANT RESTRAINT INSTRUCTIONS

KAR99001-16

How to wear safety belts properly

On the previous pages, you have seen how safety belts offer protection in accidents. Accident statistics show that passengers properly wearing safety belts have a lower risk of being injured and a much better chance of surviving an accident. For this reason, wearing a safety belt is legally required in most countries and in much of the United States and Canada.

WARNING

Always fasten your safety belts before driving off. Always make sure your passengers are properly restrained - even those sitting in the rear,

Safety belts can only work when used properly. Always observe the following precautions:

- **Never wear belts twisted.**
- **Never strap in more than one person, including small children, with each belt. It is especially dangerous to place a safety belt over a child sitting on your lap.**
- **Never place your feet on the instrument panel or on the seat. Always keep both feet on the floor in front of the seat.**

WARNING continued

- **Never wear belts over rigid or breakable objects in or on your clothing, such as eye glasses, pens, keys, etc. as these may cause injury.**
- **Never wear safety belts in any other way than illustrated and described in this chapter. For instance, do not wear shoulder part of belt under your arm or otherwise out of position. This would increase the risk of serious injury in case of an accident.**
- **Several layers of heavy clothing may interfere with proper positioning of belts and reduce the overall effectiveness of the system.**
- **Never allow safety belts to become damaged by being caught in door or seat hardware. Always keep belt buckles free of any obstruction that may prevent secure locking.**
- **Never use comfort clips or devices which create slack in the shoulder belt portion and can increase the risk of injury in an accident. However such clips may be required in the proper use of some child restraint systems.**

 **Always heed all WARNINGS on next page.**

A WARNING continued

- **Inspect your belts periodically. If belts show damage to webbing, bindings, buckles or retractors, they must be replaced.**
- **The belts must be kept clean as otherwise the retractors may not work properly -see also "Cleaning and protection" → booklet 3.2.**
- **Safety belts that have been worn and loaded in an accident must be replaced with the correct replacement safety belt by an authorized VOLKSWAGEN dealer.**
- **Never modify, disassemble or attempt to repair the safety belts in your vehicle.**

Seating capacity

Your New Beetle has 4 seating positions. 2 in the front and 2 in the rear. Each seating position has been provided with a safety belt, which must be used in the interests of safety whenever the vehicle is in motion.

Never let more people ride in the vehicle as they are seat belts available. Each person must be correctly restrained with her or his own seat belt.

Lap-shoulder belt

- The front seats are equipped with three-point safety belts.

The front passenger three-point safety belt are equipped with a convertible locking feature in addition to the emergency locking feature.

- The rear seat outside passenger positions are also equipped with three-point safety belts.

The combination lap-shoulder belts have locking retractors. The system adjusts automatically to your size and movements as long as the pull on the belt is slow.

Hard braking or a collision locks the belt. The belt will also lock when you drive up or down a steep hill or in a sharp curve.

The retractors for the rear seat three-point safety belts are also equipped with a convertible locking feature in addition to the emergency locking feature.

Convertible locking feature - see page 10.

Fastening the safety belt

- Before fastening the safety belt, first adjust your seat - see page 35.

**WARNING**

Safety belts only offer optimum protection when the seat back is upright and belts are properly positioned on the body. Improperly positioned safety belts can cause serious personal injury in an accident.

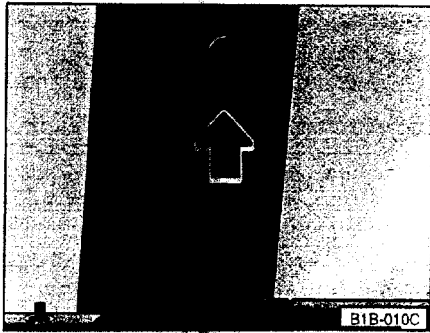


- To fasten, grasp belt tongue and pull belt in continuous slow motion across your chest and lap.
- Insert belt tongue into buckle on inboard side of seat. Push down until it is securely locked with an audible click.

Pull belt to check!

**WARNING**

- Always make certain that the safety belt tongue is inserted into the safety belt buckle associated with the corresponding seat.
- Attaching the safety belt to the buckle for another seat could reduce safety belt effectiveness and cause injury.



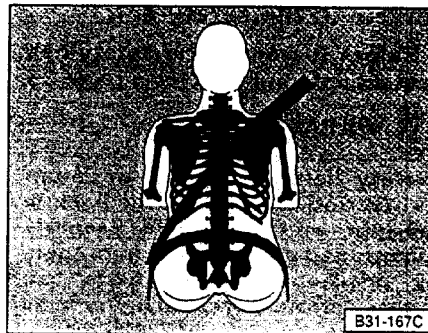
Safety belt height adjusters on the front seats can be used to adjust the height of the shoulder portion of the safety belt.

- To adjust the position of the height adjuster, press in the direction indicated by the arrow, hold in this position, and then move the height adjuster up or down until the shoulder portion of the safety belt is generally aligned with the center of your shoulders. **It must never extend across your neck.**

- Pull on the shoulder belt to check whether the belt anchor is securely locked in place.

- To make sure the safety belt fits properly, use the front seat height adjustment.

Wearing your safety belt properly - see page 8.



The shoulder belt must be positioned over the shoulder - it must never rest against the neck and must fit against your body.

See illustration.

The lap belt portion of the three point belt must pass as low as possible across the pelvis. Pull belt tight if necessary.

The lap belt portion must never pass over the stomach or abdomen.



Unfastening the safety belt

- Push the orange release button on the buckle. The belt tongue will spring out of the buckle.
- Allow belt to wind up on retractor as you guide belt tongue to its stowed position.

Belt tensioner

The safety of the driver and front passenger **wearing their safety belts** has been increased not only by the airbag system but also by a special safety belt retractor for the three-point automatic safety belts.

The system is activated by sensors in some frontal collisions. A fine dust will be released from each belt tensioner. The safety belts will automatically be tensioned.

The belt tensioner will not activate in the event of light frontal collision which is insufficient to actuate the tensioner or in any side, rollover or rear collision,

WARNING

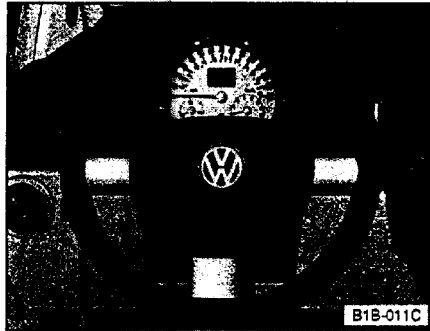
- Due to special repair procedures, any work on the system, as well as the removal and installation of any components of the system, must be performed by an authorized VOLKSWAGEN dealer only.
- The belt tensioner system works for one accident only. If the belt tensioners have been activated, then the system must be replaced.

Notes

- When the safety belt tensioner is activated, a fine dust is released. This is normal and is not caused by a fire in the vehicle.
- Observe all safety regulations if the vehicle or individual parts of the system are to be scrapped.

Your authorized VOLKSWAGEN dealers are familiar with these regulations and can perform this service for you.

Airbag system

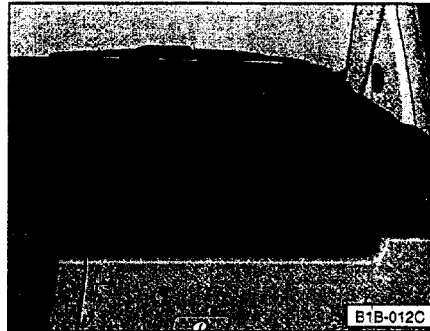


Your vehicle is equipped with **two front and two side airbags**, one front and one side airbag for each front occupant.

The airbags are intended to supplement the three-point safety belts. When the safety belts are properly worn, the supplemental airbag restraints can provide additional protection for the chest and face of the driver and the front seat passenger in the event of a severe frontal collision.

Aside from providing proven safety benefits, the safety belts are particularly important to help keep front seat occupants in the proper seated position so that the airbags can unfold properly and provide added protection as intended.

In the event of a severe side collision the side airbags reduce the risk of injury to the occupants in the areas of the body facing the impact.

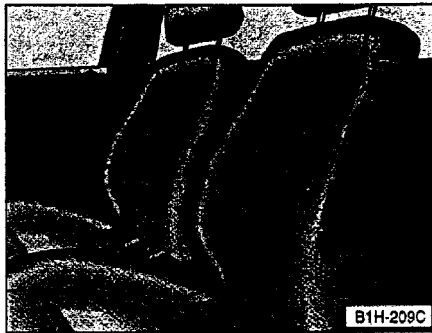


The airbag is not a substitute for the safety belt, but rather a part of the overall passive vehicle safety system. Bear in mind that the airbag system works most effectively when used in conjunction with the safety belts provided.

It is therefore most important to wear the safety belts at all times.
See pages 3 to 14.

The **front airbags** for the driver and front passenger are located in the padded hub of the steering wheel and on the right side of the instrument panel above the glove compartment (see illustrations above). The installation points are marked with the word "AIR BAG"

More details see next pages.



The **side airbags** are located in the backrest padding for the front seats (see illustration). The installation points are marked with the word "AIRBAG."

⚠ WARNING

To ensure that the function of the side airbags is not impaired, never place protective covers over the seatback and do not use extra cushions on the seats covering the area where the side airbag inflates.

System components

The airbag system consists of the following components:

- an electronic control / monitoring unit (control unit),
- the two front airbags
 - one for the driver
 - one for the front passenger,
- the two side airbags
 - one for the driver
 - one for the front passenger,
- an airbag indicator light in the instrument cluster (see "Warning / Indicator lights" → *booklet 3.1*)

The airbag indicator light in the instrument cluster (readiness light) will light up for a few seconds each time the ignition is switched on.

The light monitors the electric control / monitoring unit, ignitor sensor circuits, and system wiring.

The system must be inspected if the indicator light:

- does not come on when the ignition is switched on;
- does not go out after a few seconds after the ignition is switched on, or;
- comes on while driving.

In the event of a system malfunction, the indicator light will stay on continuously to serve as a constant reminder to have the system repaired.

**WARNING**

If any of these conditions occur, have the system inspected immediately by your VOLKSWAGEN dealer. Otherwise, the airbag may not function properly.

When are the airbags triggered?

The airbag system is designed so that in a severe **frontal collision** the driver and front passenger airbags are triggered.

In **severe side collisions** the side airbag on the impact side of the vehicle is triggered.

Both the front and side airbags may be triggered together in certain types of accidents.

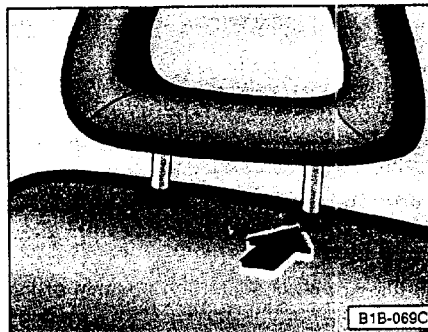
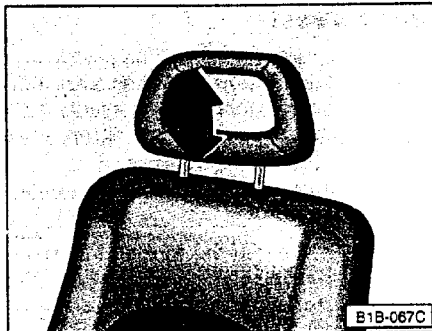
The airbag system is **not triggered in minor** frontal or side collisions or in rear collisions or if the car overturns. In such situations the occupants are protected in the normal way by the safety belts.

It is not possible to define an airbag triggering range that will cover every possible angle of impact, since the circumstances will vary considerably between one accident and another.

Important factors include, for example, the nature (hard or soft) of the object which the car hits, the angle of impact, vehicle speed, and etc.

The triggering of the airbag system depends on the vehicle deceleration rate induced by the collision and registered by the control unit. If this rate is below the reference value programmed into the control unit the airbags will not be triggered, even though the car may be badly damaged as a result of the accident.

Head restraints



The padded head restraints on the front and rear seats are adjustable.

Position the head restraints according to the occupant's height. Properly positioned head restraints, together with the use of safety belts offer effective protection in most accident situations.

Height adjustment

- For height adjustment, grasp firmly with both hands and pull up or push down.
- For maximum protection, the upper edge should be at least at eye level or higher.



WARNING

Do not drive the vehicle without the head restraints provided. Head restraints are designed to help reduce injuries.

Removing and reinstalling

To **remove** the head restraints, pull the head restraint upward until it stops. Then, press the button (arrow) on the rod. While doing this, pull the head restraint upward and remove.

To **reinstall**, push the two rods of the headrest into the guides until you hear them lock into place.

Note:

To remove the rear head restraints, either open the rear lid or slightly fold the rear seat back forward.



Adjustable driver and front passenger seats

1- Forward and backward adjustment

- Pull handle 1.
- Slide seat into position.
- Release the handle and move seat slightly back and forth to make sure it is securely locked into position.

2- Rear seat access (Easy entry)

Pull up on lever 2 and fold the seatback forward. The seat cushion surface will also rise slightly at the same time and move forward.

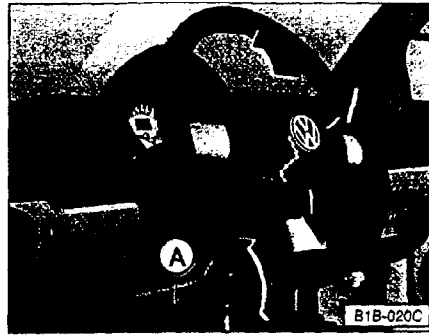
3- Seatback adjustment

Turn wheel 2 on outboard side of seat cushion, with your body weight taken off the seatback.

Height adjustment

By "pumping" the lever on the outside of the seat, you can raise or lower the seat.

- **Raising:** Pull the handle upward in a "pumping" motion to raise the seat,
- **Lowering:** Press the handle downward in a "pumping" motion to lower the seat.

Adjustable steering column (tilt and telescopic)**⚠ WARNING**

- For safety reasons the lever for the steering wheel reach adjustment must be pushed back up as far as it will go after adjusting the steering wheel. This will ensure that the position of the steering wheel is not altered unintentionally when the vehicle is moving.
- To help prevent loss of vehicle control and an accident, only adjust the steering wheel when the vehicle is stationary.

The height and reach of the steering wheel can be adjusted to suit the driver.

The driver's seat should be adjusted first. Then reposition the steering wheel accordingly.

- Swivel the lever **A** beneath the steering column forward as far as it will go. See illustration.
- Alter the steering wheel **angle and reach** as required.
- Swivel the lever **A** back and press against the steering column to lock.