3239

REPORT NUMBER KAR-20-06

NEW CAR ASSESSMENT PROGRAM
FRONTAL BARRIER IMPACT TEST

VOLKSWAGEN CORPORATION
2000 VOLKSWAGEN PASSAT
4-DOOR SEDAN
NHTSA NUMBER: MY5803

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

DECEMBER 22, 1999

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
SAFETY PERFORMANCE STANDARDS
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15. Supplementary Notes

16. Abstract

A 35 mph (56.3 km/h) frontal barrier impact was conducted on a 2000 Volkswagen Passat 4-Door Sedan at KARCO Engineering on December 16, 1999. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The impact velocity was 55.91 km/h. The ambient temperature at the barrier face at the time of impact is 15.0 degrees Celcius. The vehicle's maximum post test static crush is 495 mm located to the left of the vehicle 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	376.6	318.0
Max. Thorax Accel. (3 msec Clip)	G's	60	43.5	40.7
Left Femur force	Newtons	10009	-3534.1	-4278.1
Right Femur Force	Newtons	10009	-4642.4	-1407.7

17. Key Words	18. Distribution Statement
56.3 km/h NCAP Frontal Barrier Impact Test New Car Assessment Program (NCAP) 2000 Volkswagen Passat 4-Door Sedan NHTSA No. MY5803	Copies of this report are available from: NHTSA Technical Reference Division National Highway Traffic Safety Admin. 400 Seventh St., SW, Room 5108 Washington, DC 20590

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SECTION 1

PURPOSE, TEST PROCEDURE AND SUMMARY OF TEST MY5803

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 December 16, 1999 at a speed of 55.91 km/h. The test vehicle was instrumented with eight (8) accelerometers to measure longitudinal axi 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 eighteen (18) 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-four (94) 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. 34) and the right-front passenger ATD (Serial No. 35) were re-calibrated two tests prior to 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 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN at a velocity of 55.91 km/h. The test vehicle weight is 1695 kilograms with two (2) part 572E 50th percentile adult male ATDs. Twenty-four (24) load cell barrier data channels were obtained in conducting the December 16, 1999 NCAP test. The test vehicle is equipped with a longitudinally mounted 2.4-liter, 4-cylinder engine and a 5-speed automatic transmission.

The driver Head Injury Criteria (HIC) is 376.6. The maximum resultant chest deceleration over three (3) milliseconds is 43.5 g's. The left and right femur loads are –3534.1 and –4642.4 Newtons, respectively. Chest deflection for the driver ATD peaked at —28.5 mm. The driver ATD head contacted the airbag and headrest, its chest and abdomen contacted the airbag, the left and right knees contacted the knee bolster and steering column.

The right front passenger's HIC is 318.0. The maximum resultant chest deceleration over three (3) milliseconds is 40.7 g's. The left and right femur loads are –4278.1 and –1407.7 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 55.4mm for the driver ATD and 117.2 mm for the passenger ATD. The shoulder belt stretch is not measured with 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 495 mm located to the left of the vehicle centerline. Both the driver and passenger side doors opened without the aid of tools.

1.4 GENERAL COMMENTS

The 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN 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: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

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	=(tf -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: 2000 Volkswagen Passat 4-Door Sedan

NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP

Test Date: 12/16/99

PRIMARY IMPACT DATA

Measured Parameter	Units	Value
Velocity at Impact	km/h	55.91
Test Weight	kg	1695
Impact Angle	degrees	0
Average Rebound	mm	555
Maximum Static Crush	mm	495

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Front Door Opening	Opened	Opened
Rear Door Opening	Opened	Opened
Seat Track Shift (mm)	0	0
Seat Back Failure	None	None

TEST DUMMY INFORMATION

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

16mm MOVIE COVERAGE

High Speed	18
Real Time	1
Total	19

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: 2000 Volkswagen Passat 4-Door Sedan NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

TEST VEHICLE INFORMATION

Manufacturer	Volkswagen
Model	Volkswagen Passat
Body Style	4-Door Sedan
NHTSA NO.	MY5803
VIN	WVWMA23B1YP117035
Color	White
Delivery Date	11/30/99
Odometer Reading (mile)	60
Dealer	Freeway Lincojn/Mercury
Transmission	Automatic
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	1781cc's
Engine Placement	Longitudinal

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	Yes
Cruise Control	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Volkswagen
Date of Manufacture	September-99

GVWR (kg)	1960
GAWR Front (kg)	1050
GAWR Rear (kg)	960

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	200	200
Cold Pressure (kPa)	200	200
Recommend Tire Size	195/65/15	195/65/15
Tire Size on Vehicle	195/65/15	195/65/15
Tire Manufacturer	Continental	Continental

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	None	
Number of Occupants	2	3	0	5
Capacity Wt. *(VCW)* (kg)				453
Cargo Weight (RCLW) (kg)				113

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

Test Vehicle: 2000 Volkswagen Passat 4-Door Sedan NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

TEST VEHICLE WEIGHTS

	Units	As Delivered *(UVW)*			As Tested *(ATW)*		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	436	278		454	376	
Right	kg	445	278		478	387	
Ratio	%	61.3	38.7		55.0	45.0	
Totals	kg	881	556	1437	932	763	1695

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight *(UVW)*	kg	1437
Weight of 2 P572 ATD's	kg	152
Rated Cargo/Luggage Weight *(RCLW)*	kg	113
Calculated Vehicle Target Weight *(TVTW)*	kg	1702

TEST VEHICLE ATTITUDE AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	687	683	713	715	1050
As Tested	mm	677	670	657	656	1222

Vehicle Wheel base (mm): 2715

Weight of Ballast secured in cargo area (kg): 51 *

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): 61.7

Usable Capacity Figure Furnished by COTR (L): n/a

Actual Test Volume with entire fuel System Filled (L): 57.3

Test Fluid Type: Stoddard Solvent ; Specific Gravity: 0.764

Is Vehicle Fuel Pump Electric or Mechanical?: Electric

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

Fuel System Particulars: Will pump for 5 seconds when ignition is turned on.

DATA SHEET NO. 3
POST IMPACT DATA

Test Vehicle: 2000 Volkswagen Passat 4-Door Sedan NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

SPEED TRAP DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	55.51 to 57.12	55.91
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	55.96
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	4320	3990	-330
Center	mm	4650	4155	-495
Right Side	mm	4320	4007	-313

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	600
Center	mm	470
Right Side	mm	595
Average	mm	555

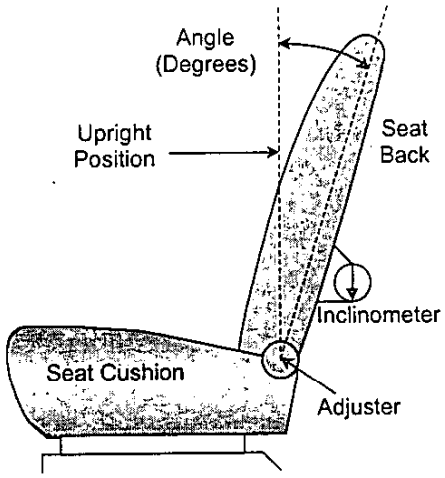
DATA SHEET NO. 4
TEST VEHICLE INFORMATION

Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

NOMINAL DESIGN RIDING POSITION

The driver and passenger seat backs are positioned to the manufacturers designated angle. The procedure is as follows: The seat back angle is adjusted so that the distance from the center of the inner sunvisor bracket bolt to the center of the outer headrest mounting hole is per manufacturers specifications. An inclinometer is placed against the flat surface of the tool and the seat back angle is measured directly from the dial face.



FRONT SEAT ASSEMBLY

Driver seat back angle: 15.0° with a seated dummy

Passenger seat back angle: 15.0° with a seated dummy

SEAT FORE/AFT POSITIONS

Both driver and passenger seats have manually operated seats. The total travel on the driver and the passenger is 14 seat positions. The fore/aft position is set at the middle position for both driver and passenger.

Driver seat fore/aft total travel: 14 seat detent positions

Passenger seat fore/aft total travel: 14 seat detent positons

Driver seat fore/aft position: Set at 8th detent position

Passenger seat fore/aft position: Set at 8th detent position

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 were placed in position #3.

DATA SHEET NO. 4...(continued)

TEST VEHICLE INFORMATION

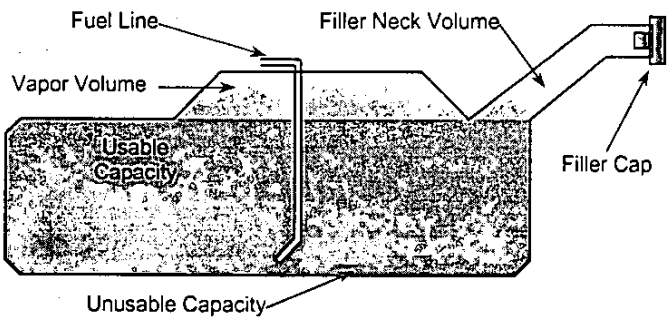
Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

FUEL TANK CAPACITY DATA

The "Usable Capacity" of the standard equipment fuel tank is:	61.7	liters
The "Usable Capacity" of any optional equipment fuel tank is:	N/A	liters
"Usable Capacity" used for certification tests FMVSS 301 requirements:	56.7 to 58.0	liters
Actual amount of Stoddard solvent added to vehicle for certification test:	57.3	liters

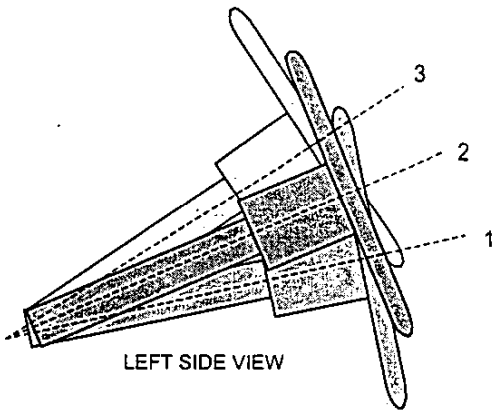
The test vehicle is equipped with an electric fuel pump. The fuel pump operates for 5 seconds after the ignition is turned on.The fuel filler door is located on the right rear fender.



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.



STEERING COLUMN ASSEMBLY

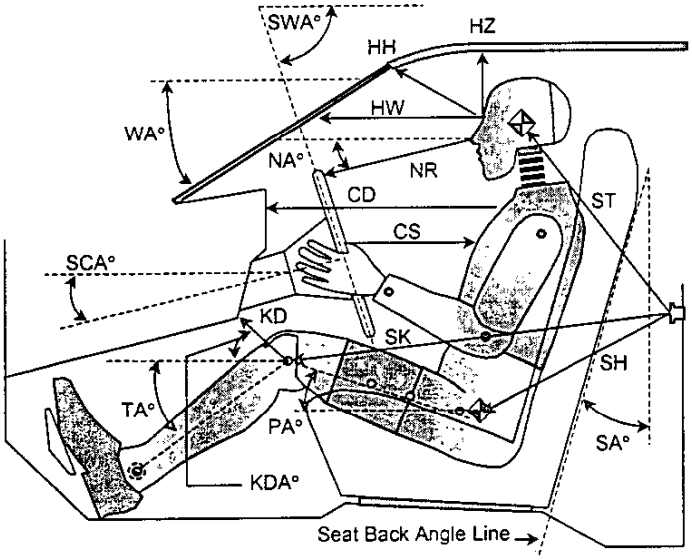
Lowermost, position 1:	22°
Geometric center, position 2:	23°
Uppermost, position 3:	24°

DATA SHEET NO. 5

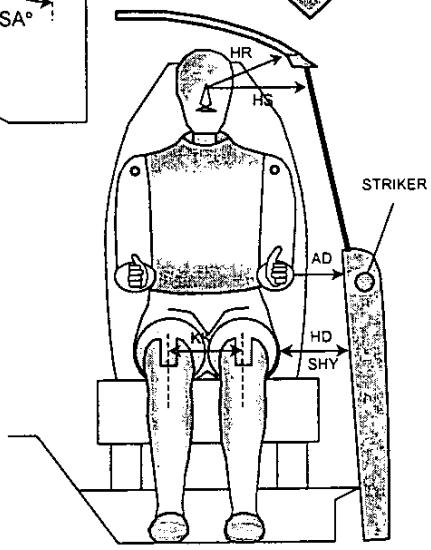
DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

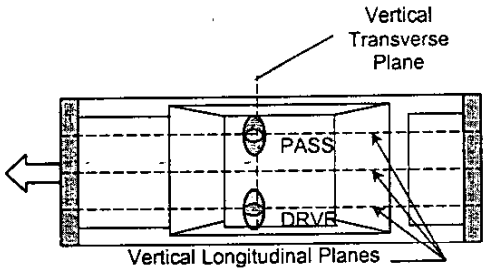
Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99



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



CD	Chest to Dash
CS	Chest to Steering Wheel Hub
HH	Head to Header
HW	Head to Windshield
HZ	Head to Roof
KDA	Knee to Dash Angle
KDL	Left Knee to Dash
KDR	Right Knee to Dash
NA	Nose to Rim Angle
NR	Nose to Rim
PA	Pelvic Angle
RA	Rim to Abdomen
SA	Seat Back Angle
SCA	Steering Column Angle
SH	Striker to H-Point
SK	Striker to Knee
ST	Striker to Head
SWA	Steering Wheel Angle
TA	Tibial Angle
WA	Windshield Angle



DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS

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

Test Vehicle: 2000 Volkswagen Passat 4-Door Sedan NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

TEST DUMMY POSITION MEASUREMENTS

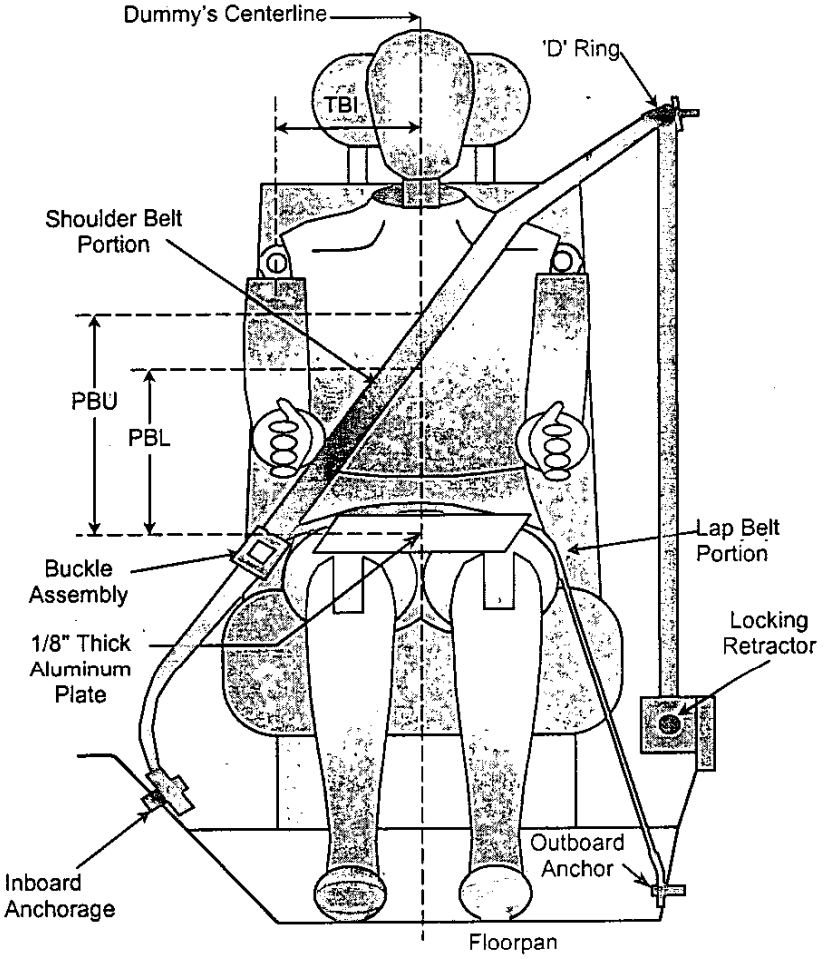
Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		32		
SWA	Steering Wheel Angle		67		
SCA	Steering Column Angle		23		
SA	Seat Back Angle		15		15
HZ	Head to Roof (Z)	230	90	210	90
HH	Head to Header	350	0	365	0
HW	Head to Windshield	635	0	655	0
HR	Head to Side Header (Y)	245		230	
NR	Nose to Rim	390	8		
CD	Chest to Dash	515		540	
CS	Chest to Steering Hub	320	0		
RA	Rim to Abdomen	235	0		
KDL	Left Knee to Dash	220	21	225	
KDR	Right Knee to Dash	225		225	25
PA	Pelvic Angle		20		20
TA	Tibia Angle		23		34
KK	Knee to Knee (Y)	250		200	
SK	Striker to Knee	610	15	610	13
ST	Striker to Head	460	75	456	75
SH	Striker to H-Point	310	50	298	50
SHY	Striker to H-Point (Y)	230		220	
HS	Head to Side Window	325		315	
HD	H-Point to Door (Y)	154		148	
AD	Arm to Door (Y)	126		60	
AA	Ankle to Ankle	n/a		n/a	

DATA SHEET NO. 6

SEAT BELT POSITIONING DATA

Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
TBI - Dummy centerline to shoulder bolt	mm	260	260
PBU -Top surface of reference to belt upper edge	mm	280	280
PBL - Top surface of reference to belt lower edge	mm	210	210
Lap Belt tension	Newtons	10	10
Shoulder Belt tension	N/A	Retractor	Retractor

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

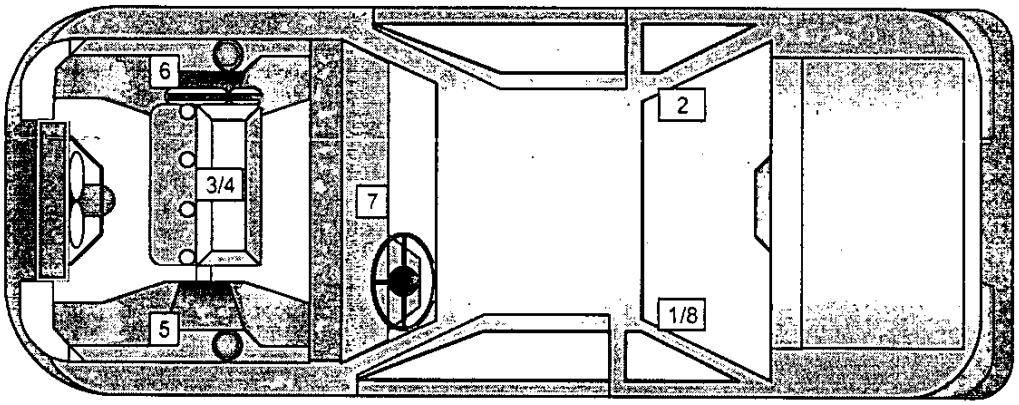
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan NHTSA No.: MY5803

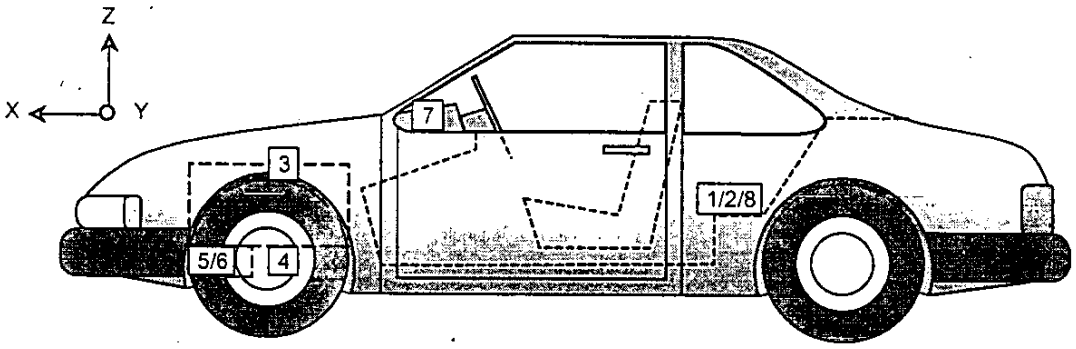
Test Program: 2000 NHTSA 35 mph NCAP Test Date: 12/16/99

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

		Measurements (mm)			Peak Values				
No.	Accelerometer Location	X	Y	Z	Units	Max	Time	Min	Time
1	Left Rear X-Member (Pri.)	1305	-425	510	G's	3.4	124.5	-30.2	26.5
2	Right Rear X-Member (Pri.)	1305	455	510	G's	2.6	138.1	-33.0	25.9
3	Engine Top	4015	-160	795	G's	61.6	27.6	-208.9	19.5
4	Engine Bottom	3680	0	210	G's	48.3	29.9	-189.9	19.1
5	Left Brake Caliper	3630	-640	355	G's	25.0	71.6	-84.5	32.5
6	Right Brake Caliper	3630	640	355	G's	73.2	55.4	-90.5	42.2
7	Instrument Panel	2985	0	775	G's	27.3	26.6	-79.0	37.4
8	Left Rear X-Member (Rednt.)	1305	-375	510	G's	3.2	124.7	-30.1	26.5

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





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

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 mph NCAP Test Date: 12/16/99

HEAD PRIMARY PEAK ACCELERATIONS

			Driver				Passenger			
Location	Axis	Units	Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	13.0	219.2	-49.5	65.5	10.8	245.2	-46.5	73.5
Head CG	Y	G's	7.0	59.4	-4.4	97.4	3.5	56.2	-6.9	142.0
Head CG	Z	G's	29.3	42.9	-12.0	92.6	18.5	40.9	-3.6	106.6
Head CG Resultant	N/A	G's	50.4	65.5			46.6	73.5		

CHEST PRIMARY PEAK ACCELERATIONS

			Driver				Passenger			
Location	Axis	Units	Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	3.9	255.2	-44.6	77.3	4.3	281.5	-41.7	69.2
Chest CG	Y	G's	4.5	96.8	-3.6	73.0	4.2	46.9	-7.3	97.2
Chest CG	Z	G's	21.2	44.0	-8.1	98.7	13.3	39.9	-7.2	107.9
Chest CG Resultant	N/A	G's	45.1	77.3			42.2	69.3		

FEMUR PEAK FORCES

			Driver				Passenger			
Location	Axis	Units	Max	Time	Min	Time	Max	Time	Min	Time
Left Femur	Z	Newtons	1034.0	44.4	-3534.1	57.1	994.8	40.0	-4278.1	60.3
Right Femur	Z	Newtons	1030.7	45.3	-4642.4	60.7	1019.2	41.5	-1407.7	44.3

SEAT BELT SENSOR PEAK VALUES

			Driver				Passenger			
Location	Axis	Units	Max	Time	Min	Time	Max	Time	Min	Time
Lap Belt Force	N/A	Newtons	6473.7	53.3	2.9	0.0	6563.2	51.0	-9.6	204.4
Shoulder Belt Force	N/A	Newtons	5108.7	62.0	-46.2	8.5	4041.5	83.1	-26.4	217.5
Shoulder Belt Pullout	N/A	MM	55.4	80.2	-34.6	299.8	117.2	87.7	-67.3	299.9
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 on vehicle with pre-tensioners.

HEAD INJURY CRITERA (HIC)

	Driver				Passenger			
Location	HIC	Avg G's	T^1	T^2	HIC	Avg G's	T^1	T^2
Head CG Primary	376.6	40.5	52.8	88.7	318.0	37.9	57.7	93.6

CHEST CLIP (3MSEC)

	Driver			Passenger		
Location	CLIP	T^1	T^2	CLIP	T^1	T^2
Chest CG Primary	43.5	62.8	65.8	40.7	67.0	70.0

DATA SHEET NO. 8...(continued)

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 mph NCAP Test Date: 12/16/99

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Pelvis	X	G's	2.0	130.4	-60.2	59.6	3.0	204.3	-58.8	55.4
Pelvis	Y	G's	11.9	72.2	-18.3	38.4	8.5	47.3	-16.0	63.6
Pelvis	Z	G's	14.1	38.4	-30.5	65.8	8.5	44.8	-27.1	56.9

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	Newtons	580.5	70.1	-425.0	137.9	278.6	63.1	-443.7	131.3
Neck Force	Y	Newtons	157.5	258.5	-252.0	70.7	264.5	84.4	-275.1	134.7
Neck Force	Z	Newtons	1162.7	42.8	-271.3	96.9	1275.8	71.9	-102.5	14.7
Neck Moment	X	N•m	19.2	54.0	-12.1	111.9	13.1	100.4	-17.9	139.0
Neck Moment	Y	N•m	36.0	62.0	-16.8	84.7	31.0	118.8	-45.2	78.3
Neck Moment	Z	N•m	8.8	250.9	-9.0	63.4	6.6	99.3	-4.6	156.4

FOOT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Foot Aft	X	G's	21.8	68.9	-48.7	41.6	73.2	49.1	-212.2	38.6
Left Foot Aft	Z	G's	5.4	63.3	-59.6	49.1	19.8	59.0	-70.0	38.4
Left Foot Fore	Z	G's	17.7	37.8	-63.2	49.5	118.6	45.0	-293.9	37.0
Right Foot Aft	X	G's	40.0	56.2	-196.2	38.5	69.8	46.0	-138.9	37.8
Right Foot Aft	Z	G's	39.3	45.3	-163.9	40.1	46.1	55.3	-205.6	42.8
Right Foot Fore	Z	G's	45.0	56.1	-169.7	40.0	92.7	50.1	-111.2	33.3

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	79.8	57.6	-19.7	42.1	7.0	67.7	-50.2	48.9
Left Lower Moment	Y	N•m	117.0	63.9	-32.5	43.0	62.3	49.1	-134.9	39.0
Left Lower Force	Z	Newtons	158.9	146.8	-2656.9	57.6	133.3	159.1	-4467.6	48.2
Left Upper Moment	X	N•m	67.0	57.1	-40.2	41.9	11.6	186.0	-65.2	49.4
Left Upper Moment	Y	N•m	93.4	54.7	-275.4	40.0	8.4	138.8	-240.4	38.8
Right Lower Moment	X	N•m	109.9	40.1	-88.7	46.1	16.0	43.5	-36.7	74.9
Right Lower Moment	Y	N•m	91.0	60.0	-53.1	34.0	93.3	45.2	-82.2	38.3
Right Lower Force	Z	Newtons	205.3	31.6	-8945.8	39.7	210.4	232.4	-9178.1	44.1
Right Upper Moment	X	N•m	104.9	41.8	-9.4	243.6	15.9	179.3	-37.1	89.9
Right Upper Moment	Y	N•m	17.5	118.4	-83.3	56.7	23.2	232.1	-218.3	43.7

DATA SHEET NO. 8...(continued)

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 mph NCAP Test Date: 12/16/99

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	MM	0.3	0.5	-28.5	65.8	0.3	7.0	-29.0	68.5

HEAD REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	13.4	221.7	-48.8	65.9	9.8	246.7	-46.4	76.5
Head CG	Y	G's	7.0	60.1	-5.8	143.3	3.2	55.7	-7.6	134.2
Head CG	Z	G's	28.8	42.8	-16.3	86.6	18.4	40.6	-5.8	82.3
Head CG Resultant	N/A	G's	50.6	65.9			46.5	76.5		

CHEST REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	3.8	256.1	-44.2	77.1	4.5	281.8	-42.1	69.2
Chest CG	Y	G's	5.4	96.8	-4.3	77.1	5.9	46.9	-7.9	97.3
Chest CG	Z	G's	21.4	41.5	-7.0	98.6	13.4	39.6	-7.2	108.2
Chest CG Resultant	N/A	G's	45.2	77.0			42.8	69.2		

REDUNDANT HEAD INJURY CRITERA (HIC)

Location	Driver				Passenger			
	HIC	Avg G's	T^1	T^2	HIC	Avg G's	T^1	T^2
Head CG Redundant	372.1	40.3	52.7	88.6	306.2	37.3	56.3	92.2

REDUNDANT CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T^1	T^2	CLIP	T^1	T^2
Chest CG Redundant	43.1	75.9	78.9	41.0	67.1	70.1

DATA SHEET NO. 9

SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

SEAT BELT PLACEMENT MEASUREMENTS

Measurement Description	Units	Driver	Passenger
TCI - Dummy centerline to shoulder bolt	mm	260	260
PBU -Top surface of reference to belt upper edge	mm	280	280
PBL - Top surface of reference to belt lower edge	mm	210	210
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	700	700
Shoulder belt length as measured on ATD	mm	955	945
Lap belt length as measured on ATD	mm	740	715
Remainder of belt on reel	mm	785	750
Total belt length for continuous webbing systems	mm	3180	3110

SHOULDER BELT SPOOL-OFF DATA

Measurement Description	Units	Driver	Passenger
As determined mechanically	mm	28.0	85.0
As determined electronically	mm	55.4	117.2

BELT STRETCH DATA

Measurement Description	Units	Driver	Passenger
Electronically from shoulder belt load cell and "D" ring	mm/cm	0.00*	0.00*
Mechanically	mm/cm	3.00	1.00

*Not used on vehicles with pre-tensioners.

DATA SHEET NO. 10

SUMMARY OF FMVSS 212 DATA

Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

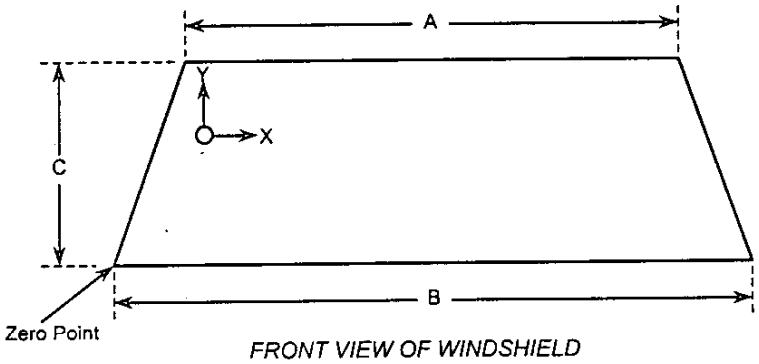
Windshield Mounting Details:
Windshield glass is secured to the vehicle frame with a rubber type adhesive. There is no molding that covers the windshield periphery at any point.

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	2025.5	2025.5	100
Right Side	2025.5	2025.5	100
Total	4051.0	4051.0	100



FRONT VIEW OF WINDSHIELD

WINDSHIELD DIMENSIONS

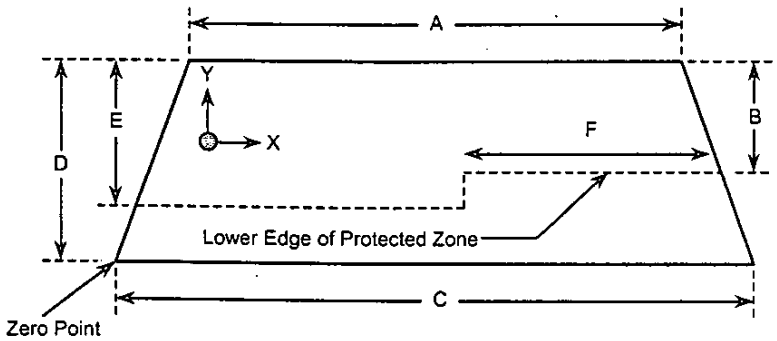
Item	Units	Segment Length	Molding Width
A	mm	1102	6
B	mm	1429	0
C	mm	760	17

DATA SHEET NO. 11

WINDSHIELD ZONE INTRUSION FMVSS 219 (PARTIAL) DATA

Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99



FRONT VIEW OF WINDSHIELD

WINDSHIELD AND PROTECTED ZONE

Item	Units	Value
A	mm	1102
B	mm	420
C	mm	1429
D	mm	760
E	mm	451
F	mm	540

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: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

Test Time: 12:11 PM Temperature at Time of Impact: 15.0 °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)

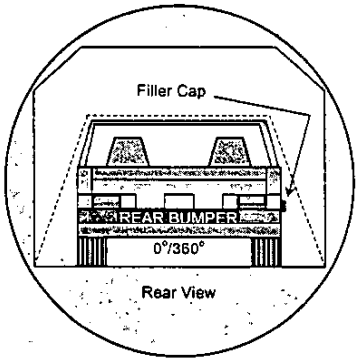
D. Spillage Details: No leakage occurred

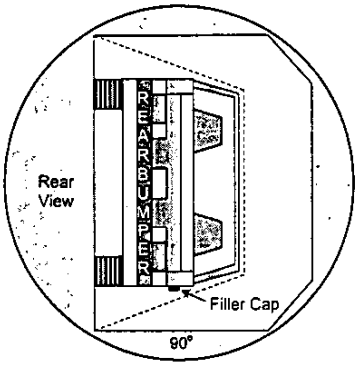
DATA SHEET NO. 13

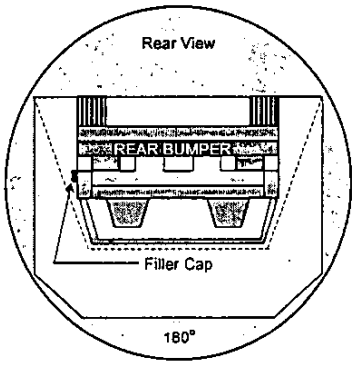
FMVSS 301 STATIC ROLLOVER DATA SHEET

Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

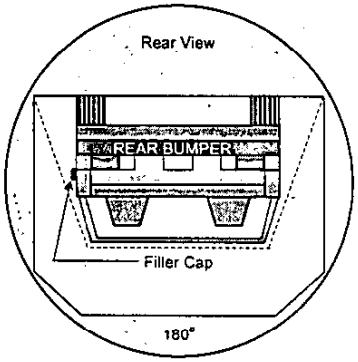
Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

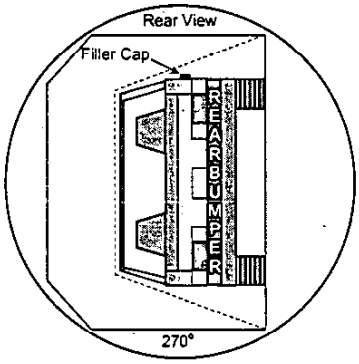


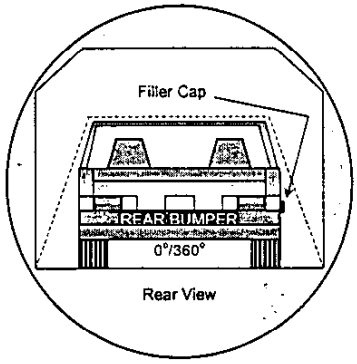




0° TO 90° **90°TO 180°**







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.

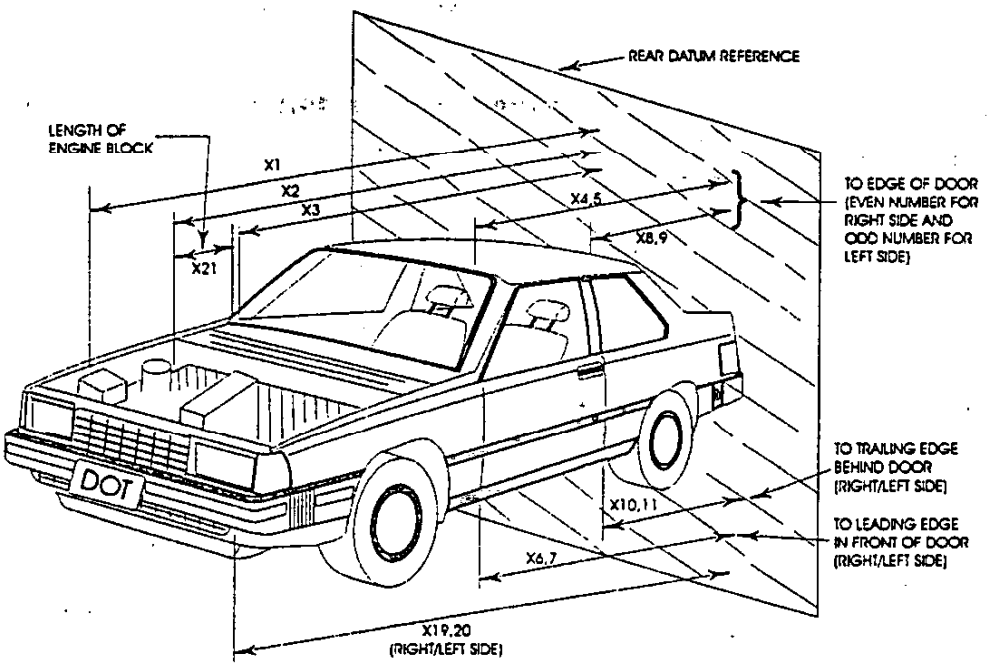
TEST PHASE	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° TO 90°	82	300	0.0
90° TO 180°	82	300	0.0
180° TO 270°	79	300	0.0
270° TO 360°	80	300	0.0

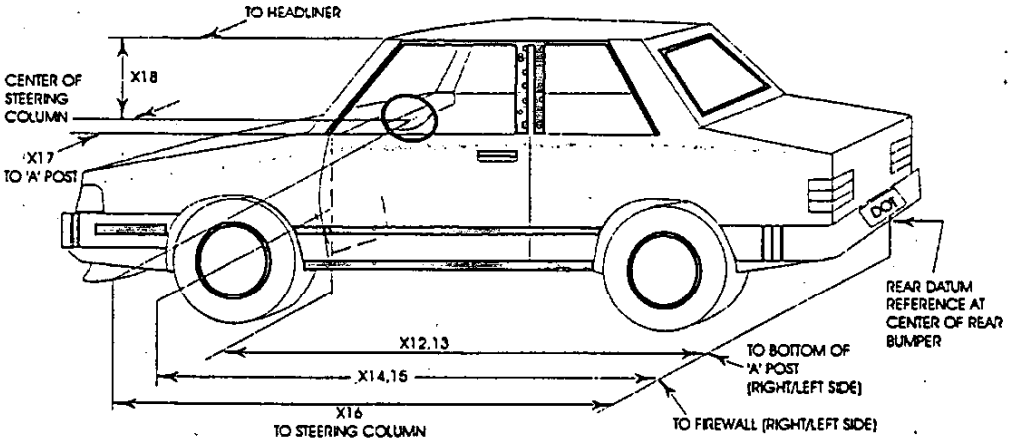
DATA SHEET NO. 14
VEHICLE MEASUREMENTS

Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	4650	4155	-495
2	RSOV to front of engine	mm	4268	3945	-323
3	RSOV to firewall centerline	mm	3730	3487	-243
4	RSOV to leading edge of right door	mm	3223	3213	-10
5	RSOV to leading edge of left door	mm	3220	3205	-15
6	RSOV to lower leading edge of right door	mm	3220	3213	-7
7	RSOV to lower leading edge of left door	mm	3221	3217	-4
8	RSOV to upper trailing edge of right door	mm	2141	2133	-8
9	RSOV to upper trailing edge of left door	mm	2140	2128	-12
10	RSOV to lower trailing edge of right door	mm	2148	2140	-8
11	RSOV to lower trailing edge of left door	mm	2145	2135	-10
12	RSOV to bottom of right 'A' pillar	mm	3168	3165	-3
13	RSOV to bottom of left 'A' pillar	mm	3168	3175	7
14	RSOV to firewall on right side	mm	3746	3536	-210
15	RSOV to firewall of left side	mm	3755	3610	-145
16	RSOV to steering column	mm	2760	2785	25
17	Center of steering column to left 'A' pillar	mm	400	350	-50
18	Center of steering column to headlining	mm	431	385	-46
19	RSOV to right side of front bumper	mm	4320	4007	-313
20	RSOV to left side of front bumper	mm	4320	3990	-330
21	Length of engine block	mm	440	440	0
RD	RSOV to right side of dash panel	mm	2945	2875	-70
CD	RSOV to center of dash panel	mm	2950	2905	-45
LD	RSOV to left side of dash panel	mm	2948	2945	-3


REAR DATUM REFERENCE
LENGTH OF ENGINE BLOCK
X1
X2
X3
X21
X4,5
X8,9
TO EDGE OF DOOR (EVEN NUMBER FOR RIGHT SIDE AND ODD NUMBER FOR LEFT SIDE)
DOT
TO TRAILING EDGE BEHIND DOOR (RIGHT/LEFT SIDE)
X10,11
TO LEADING EDGE IN FRONT OF DOOR (RIGHT/LEFT SIDE)
X6,7
X19,20 (RIGHT/LEFT SIDE)


TO HEADLINER
CENTER OF STEERING COLUMN
X18
X17 TO 'A' POST
DOT
REAR DATUM REFERENCE AT CENTER OF REAR BUMPER
X12,13
TO BOTTOM OF 'A' POST (RIGHT/LEFT SIDE)
X14,15
X16 TO STEERING COLUMN
TO FIREWALL (RIGHT/LEFT SIDE)

DATA SHEET NO. 15
CAMERA LOCATIONS

Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

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	2000	8420	1300	2	7820	12	1010
3A	Left Side No. 2	1420	8380	1705	4	7855	35	990
3B	Left Side No. 3A	1370	9450	1425	2	8922	50	1050
4	Left Side No. 3B	7650	10900	2930	9	11920	80	990
5	Left Side, No. 4	1820	8380	3242	18	8060	19	1020
6	Left Side, No. 5	1730	8630	2835	12	8142	19	1020
7	Right Side, No. 1	2050	8260	1033	2	7855	13	960
8A	Right Side, No. 2A	1760	8270	1675	1	7820	35	1020
8B	Right Side, No. 2B	1550	10250	1377	1	9950	50	890
9	Right Side, No. 3	8100	9420	3005	10	11100	80	960
10	Right Side, No. 4	2350	7900	1990	3	7510	24	1000
11	Overhead Overall	550	0	5486	90	N/A	13	1000
12	Front View, Driver	412	360	2810	46	N/A	13	1010
13	Front View, Passenger	412	360	2810	47	N/A	13	1020
14	Pit Camera, Engine	550	0	1470	90	N/A	13	950
15	Pit Camera, Fuel Tank	4975	0	1900	52	N/A	19	900
16	Onboard, Driver	3530	295	1125	4	1290	13	960
17	Onboard, Passenger	3535	315	1125	4	1265	13	950

X - Barrier Face Y - Monorail Centerline Z - Ground

DATA SHEET NO. 16

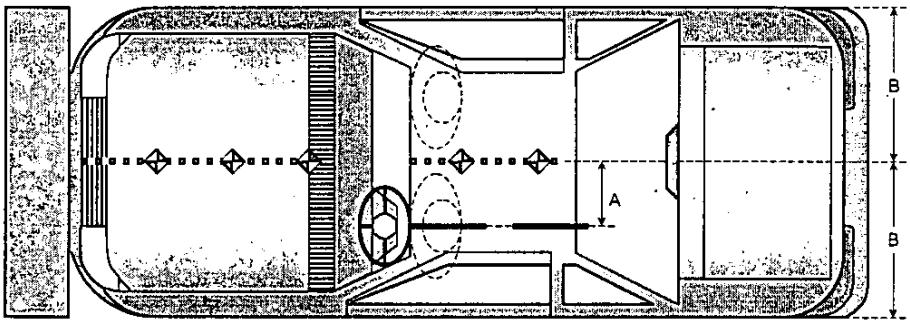
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

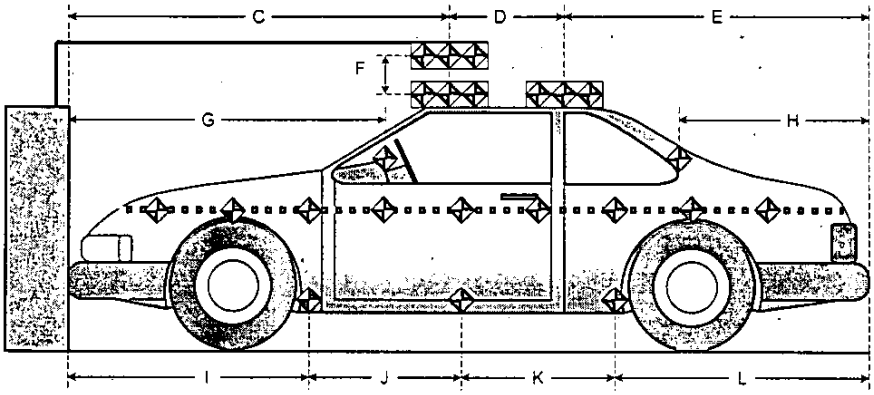
Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

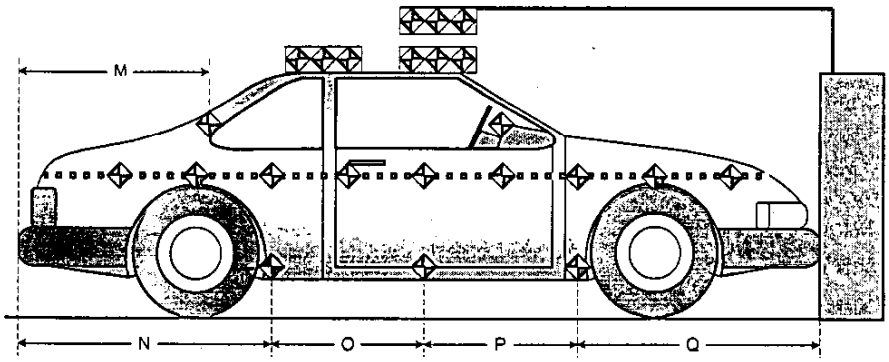
Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

All Dimensions in mm

Item	Value
A	345
B	865
C	2143
D	605
E	906
F	155
G	1713
H	1010
I	1396
J	908
K	908
L	1420
M	1015
N	1415
O	922
P	922
Q	1391







DATA SHEET NO. 17

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

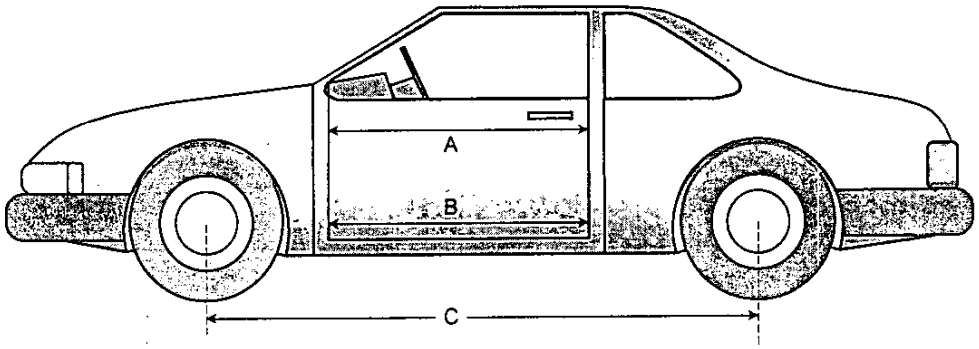
Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

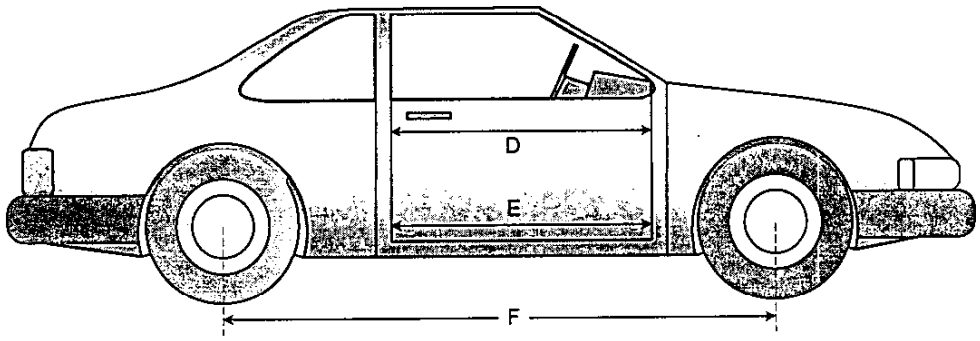
DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	961	954	-7
B	Left Side Lower	mm	913	911	-2
D	Right Side Upper	mm	962	954	-8
E	Right Side Lower	mm	906	904	-2

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheel base	mm	2715	2635	-80
F	Right Side Wheel base	mm	2715	2600	-115





DATA SHEET NO. 17...(CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

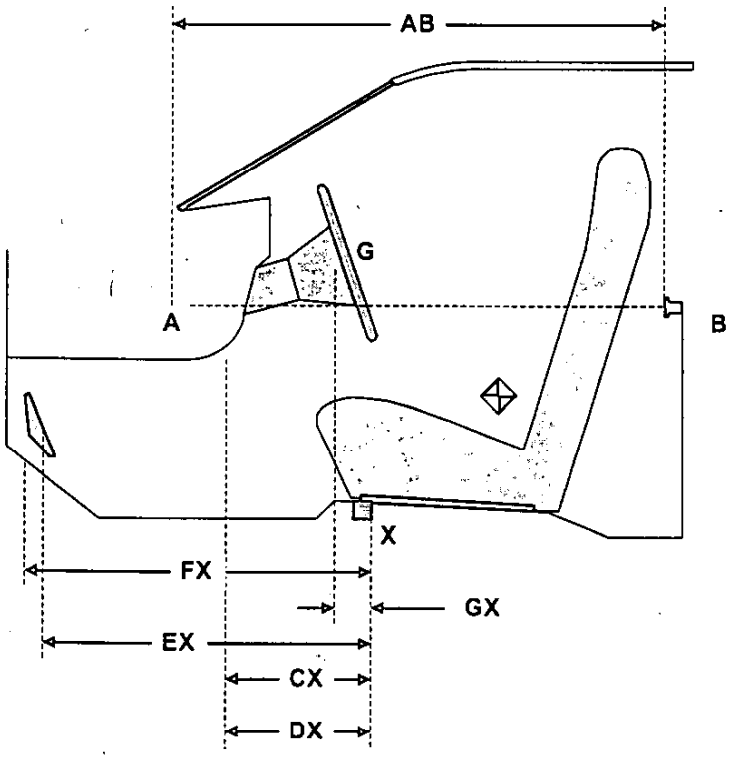
Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	961	954	-7
CX	Left Knee Bolster to X	mm	305	290	-15
DX	Right Knee Bolster to X	mm	310	230	-80
EX	Brake Pedal to X	mm	578	570	-8
FX	Foot Rest to X	mm	612	598	-14
GX	Center of Steering Wheel Hub to X	mm	75	30	-45

X = Left Front Seat Outboard Anchor Bolt Head

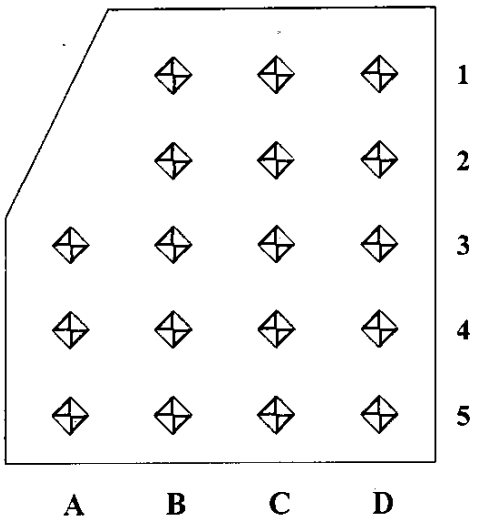


DRIVER COMPARTMENT

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

Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99



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.

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	N/A	814	808	810	N/A	693	668	666	N/A	-121	-140	-144
2	N/A	719	708	713	N/A	627	608	597	N/A	-92	-100	-116
3	619	614	608	610	539	526	523	524	-80	-88	-85	-86
4	519	512	508	508	458	443	432	420	-61	-69	-76	-88
5	417	410	408	408	349	343	332	325	-68	-67	-76	-83

DRIVER FLOOR PAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	N/A	65	65	83	N/A	118	139	140	15	53	74	57
2	N/A	-20	-15	-10	N/A	20	29	21	-15	40	44	31
3	-70	-70	-50	-50	-68	-56	-41	-38	2	14	9	12
4	-115	-105	-65	-65	-115	-104	-65	-62	0	1	0	3
5	-125	-105	-65	-60	-118	-98	-67	-61	7	7	-2	-1

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

Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

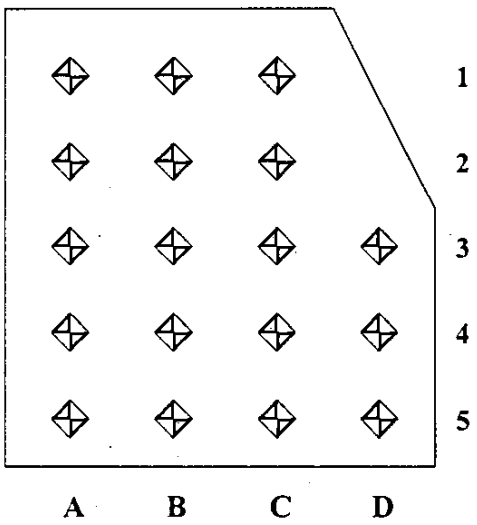
Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

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	814	813	811	N/A	606	618	610	N/A	-208	-195	-201	N/A
2	718	719	716	N/A	534	536	535	N/A	-184	-183	-181	N/A
3	611	614	613	611	435	458	454	513	-176	-156	-159	-98
4	511	512	510	511	355	372	385	411	-156	-140	-125	-100
5	408	409	408	408	274	270	285	315	-134	-139	-123	-93

PASSENGER FLOOR PAN Z-AXIS

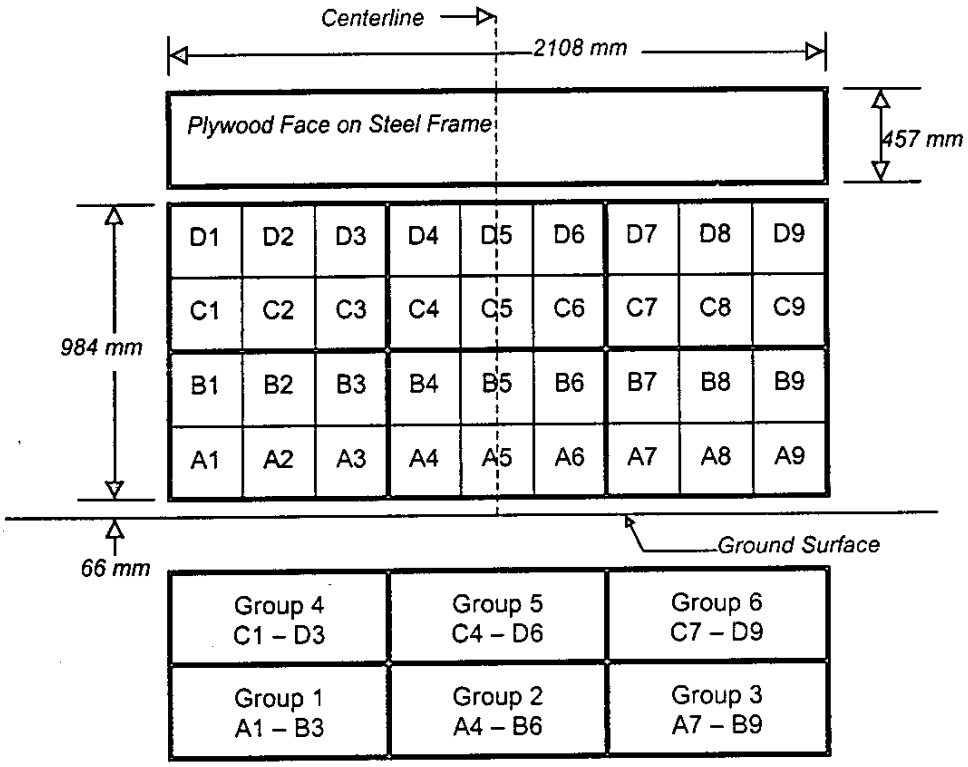
	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	45	50	50	N/A	86	87	102	N/A	41	37	52	N/A
2	-30	-30	-30	N/A	-6	-9	1	N/A	24	21	31	N/A
3	-60	-65	-62	-75	-45	-76	-67	-4	15	-11	-5	71
4	-60	-65	-98	-116	-23	-47	-103	-80	37	18	-5	36
5	-70	-70	-110	-125	-41	-39	-58	-37	29	31	52	88

DATA SHEET NO. 18
FIXED BARRIER TYPE

Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99

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: 2000 Volkswagen Passat 4-Door Sedan — NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP — Test Date: 12/16/99

VEHICLE INFORMATION

VIN: WVWMA23B1YP117035 — Wheel base (mm): 2715

Vehicle Size Category: 4-Door Sedan — Test Weight (kg): 1695

ACCELEROMETER DATA

Accelerometer Location: Left rear floor pan

Cal. Procedure/Interval: 6 months / drop test

Integration Algorithm: NHTSA Standard — Linearity: Good

Impact Velocity (km/h): 55.91

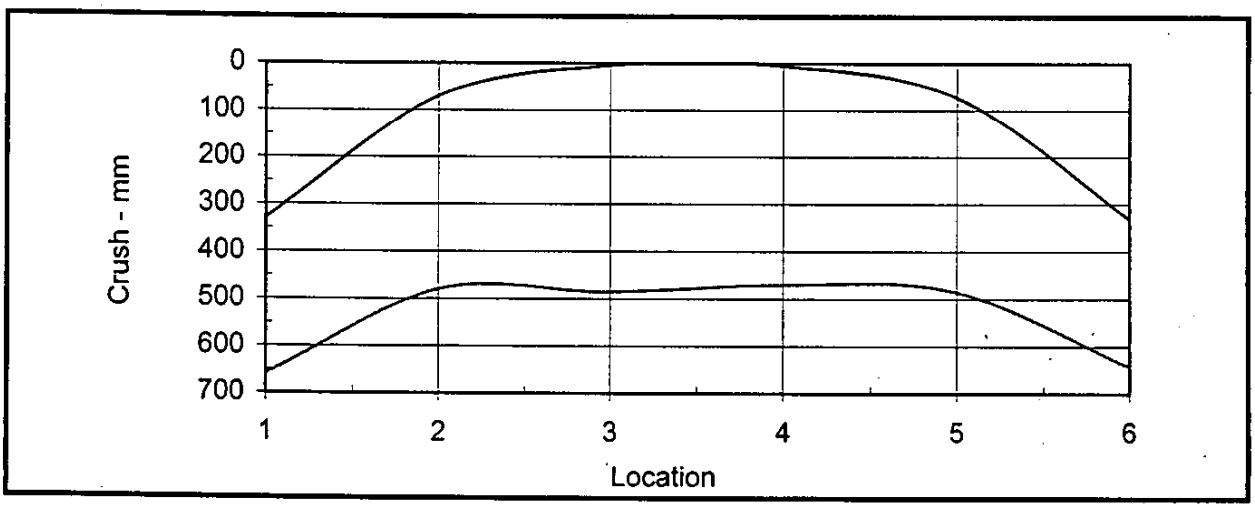
Velocity Change (km/h): 63.6 — Time of Separation (msec): 76.6

CRUSH PROFILE

Collision Deformation Classification: 12FDEW6 — Midpoint of Damage: Vehicle Centerline

Damage Region Length (mm): 1516 — Impact Mode: Full Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	330	660	-330
C2	Crush zone 2 on left side	mm	70	480	-410
C3	Crush zone 3 on left side	mm	5	485	-480
C4	Crush zone 4 on right side	mm	6	470	-464
C5	Crush zone 5 on right side	mm	72	485	-413
C6	Crush zone 6 at right side	mm	330	643	-313

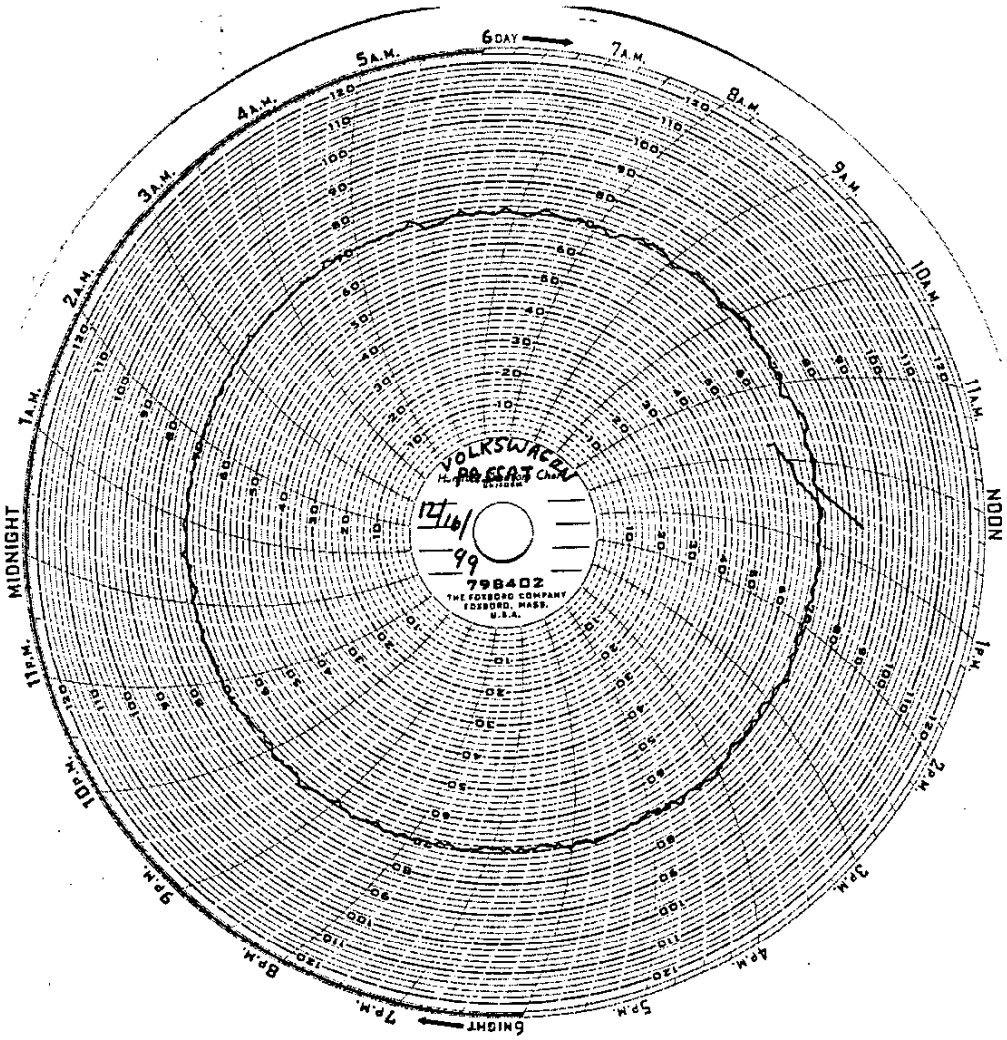


DATA SHEET NO. 20

DUMMY/ VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2000 VOLKSWAGEN PASSAT 4-DOOR SEDAN NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 MPH NCAP Test Date: 12/16/99



APPENDIX A

PHOTOGRAPHS

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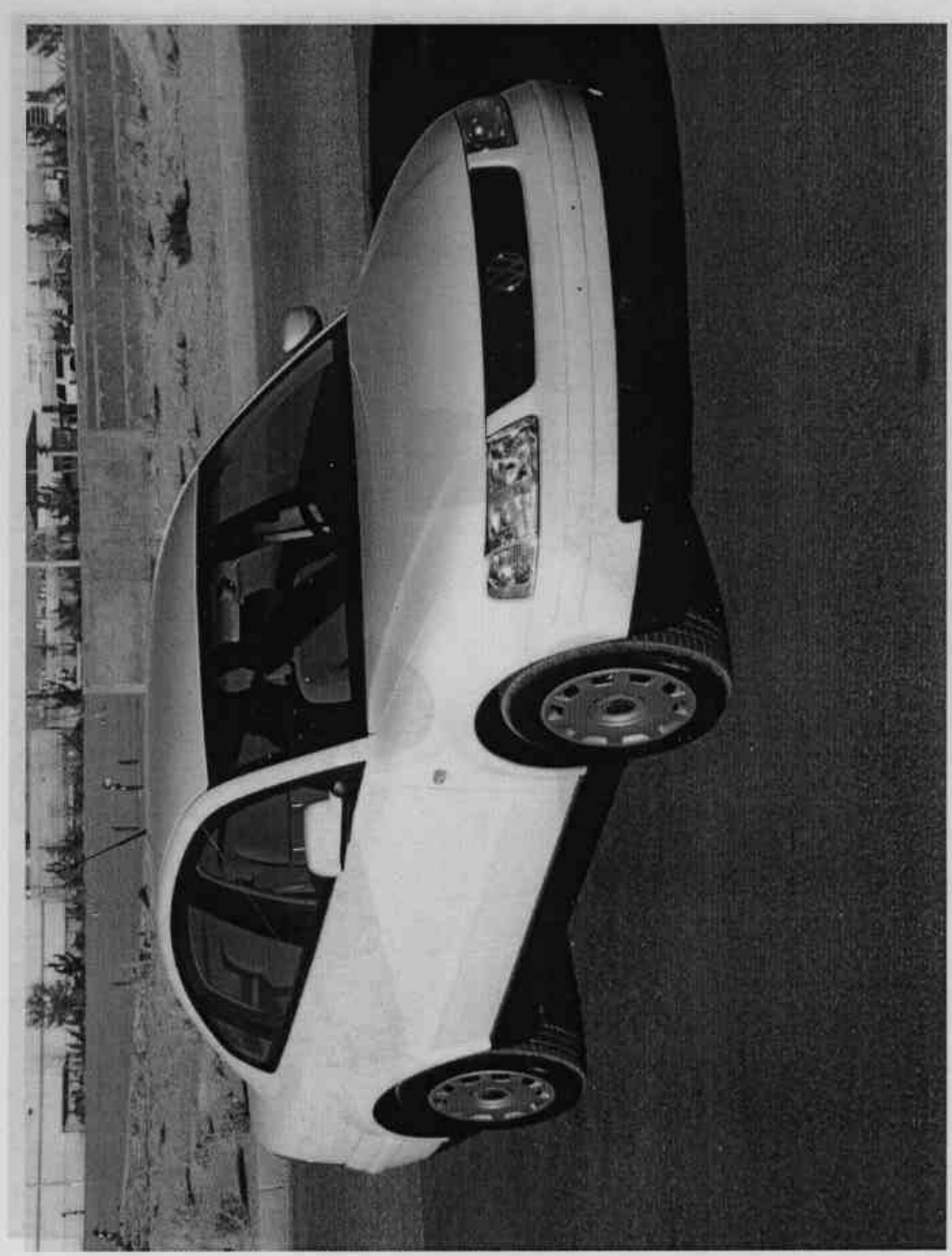

FIGURE A-1. RIGHT FRONT AS RECEIVED

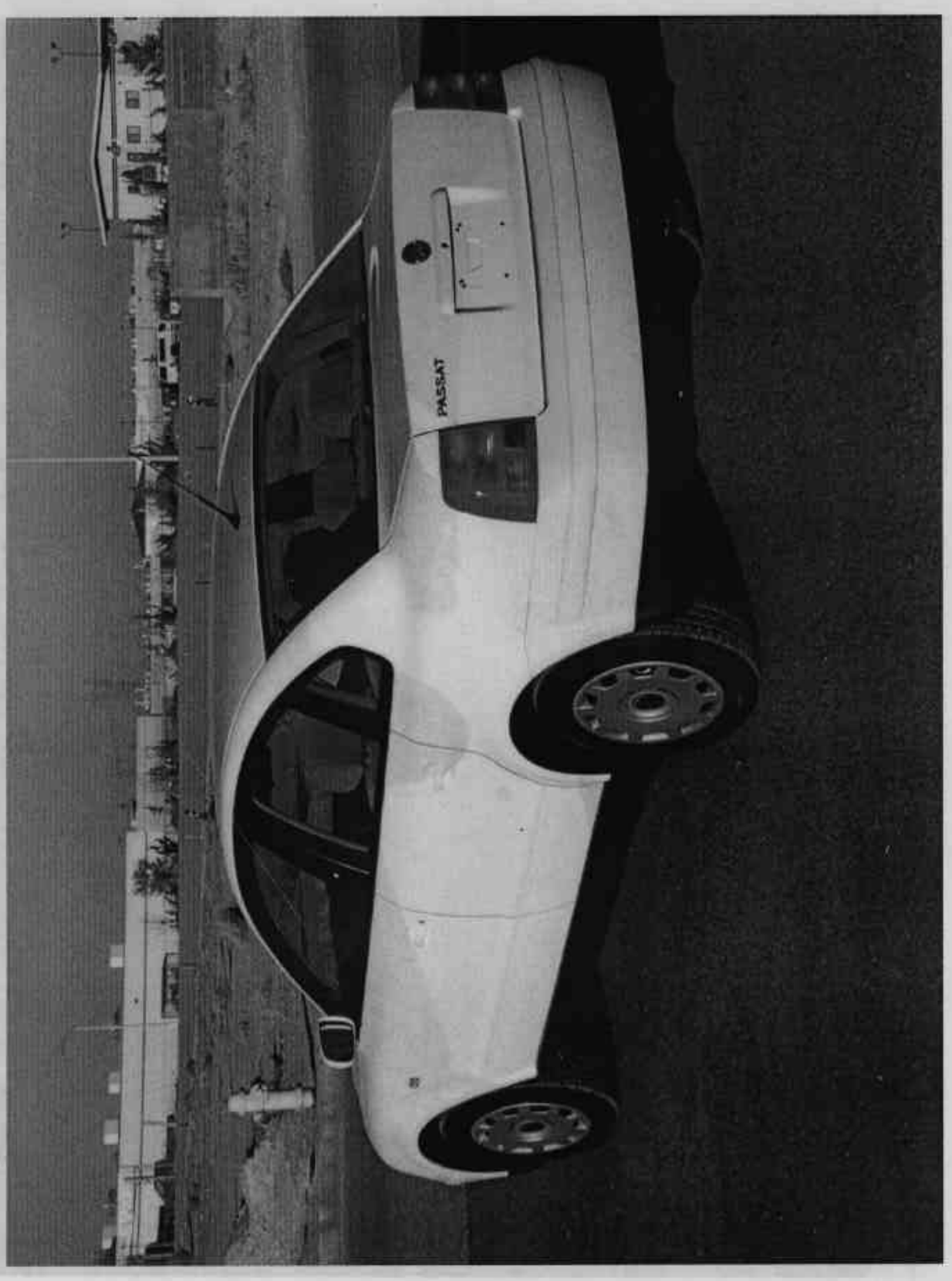

FIGURE A-2. LEFT REAR AS RECEIVED

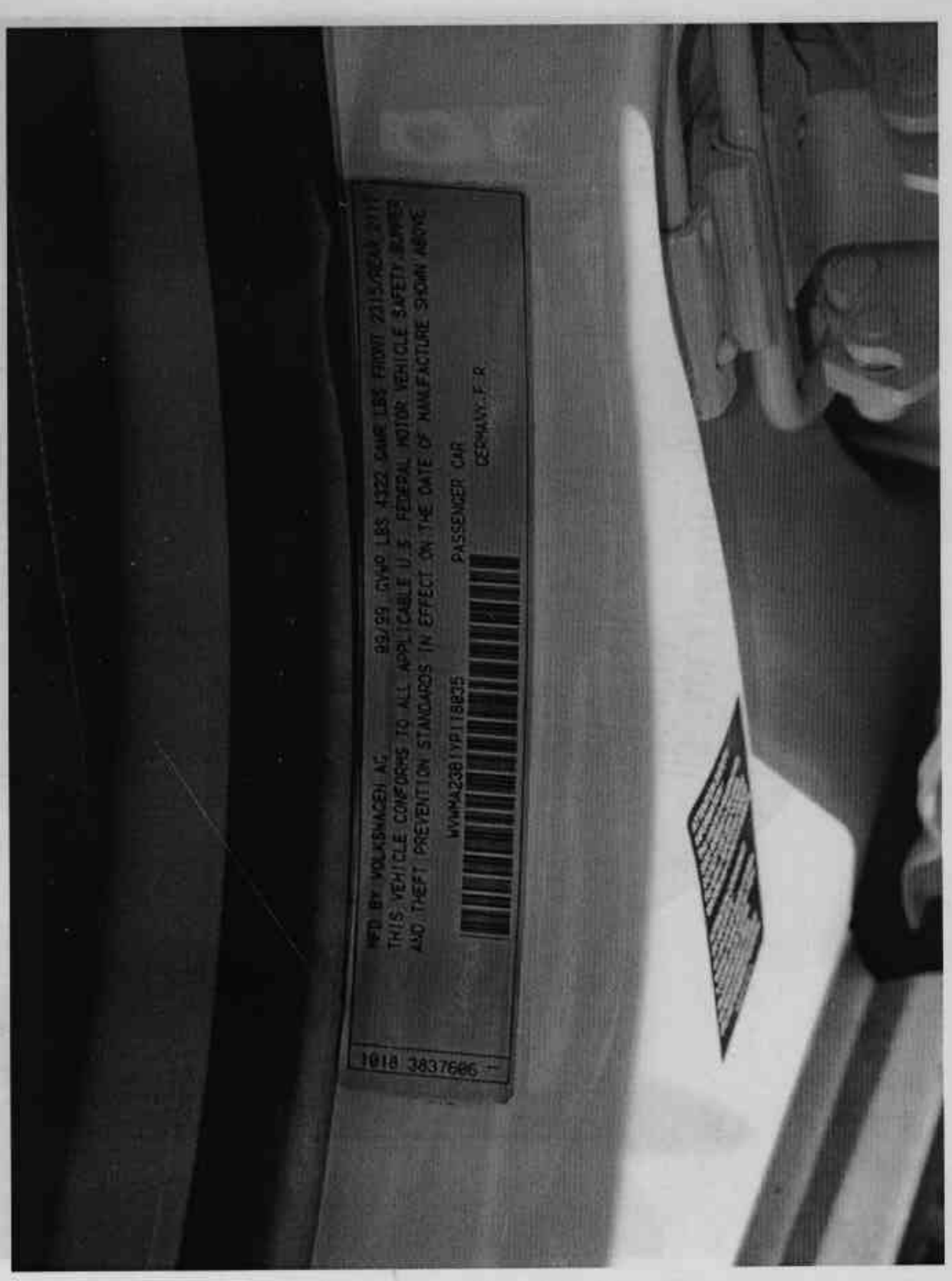

FIGURE A-3. VEHICLE CERTIFICATION LABEL

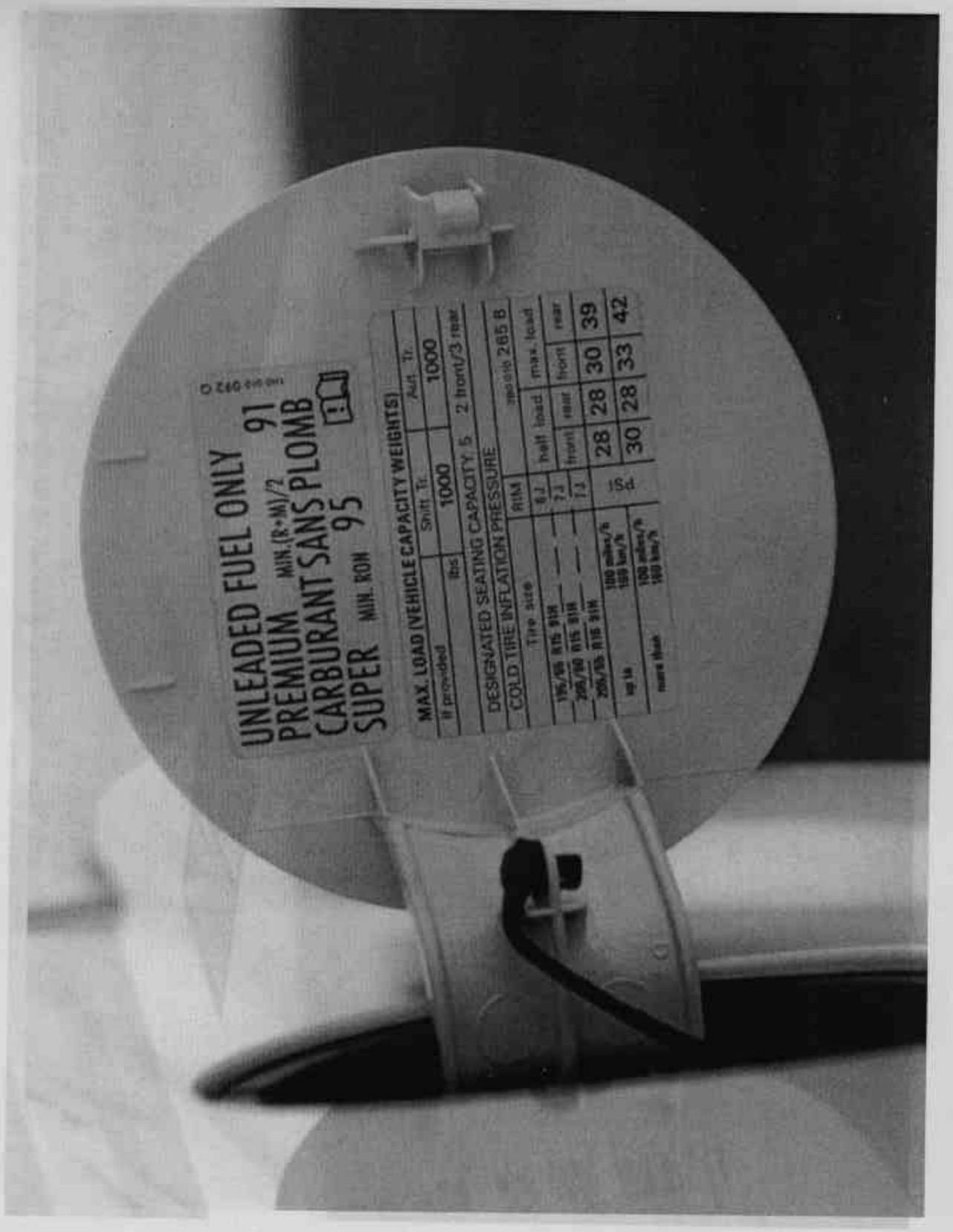

FIGURE A-4. VEHICLE TIRE PLACARD

FIGURE A-5. PRETEST FRONT VIEW

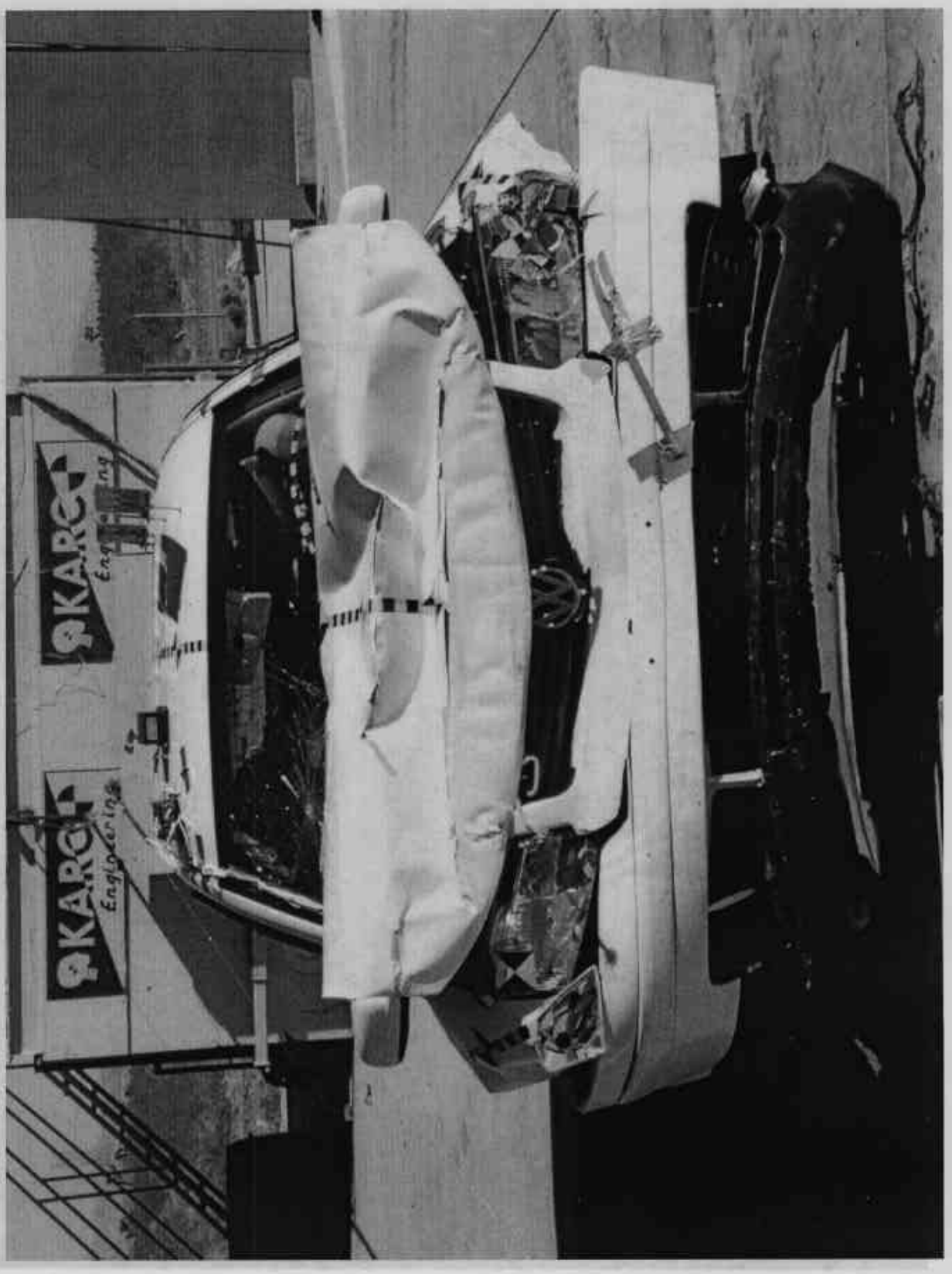

FIGURE A-6. POST TEST FRONT VIEW

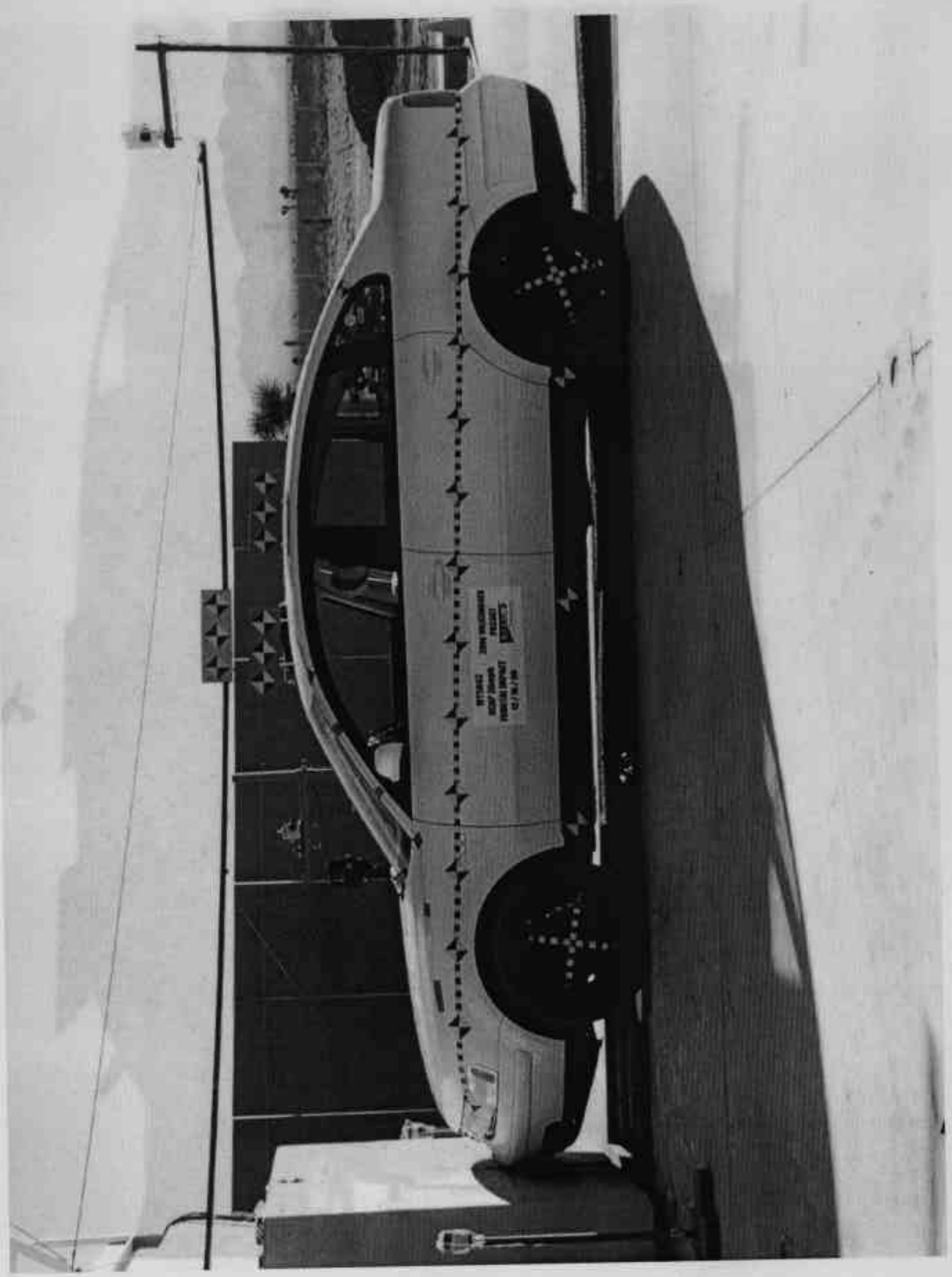

FIGURE A-7. PRETEST LEFT SIDE VIEW

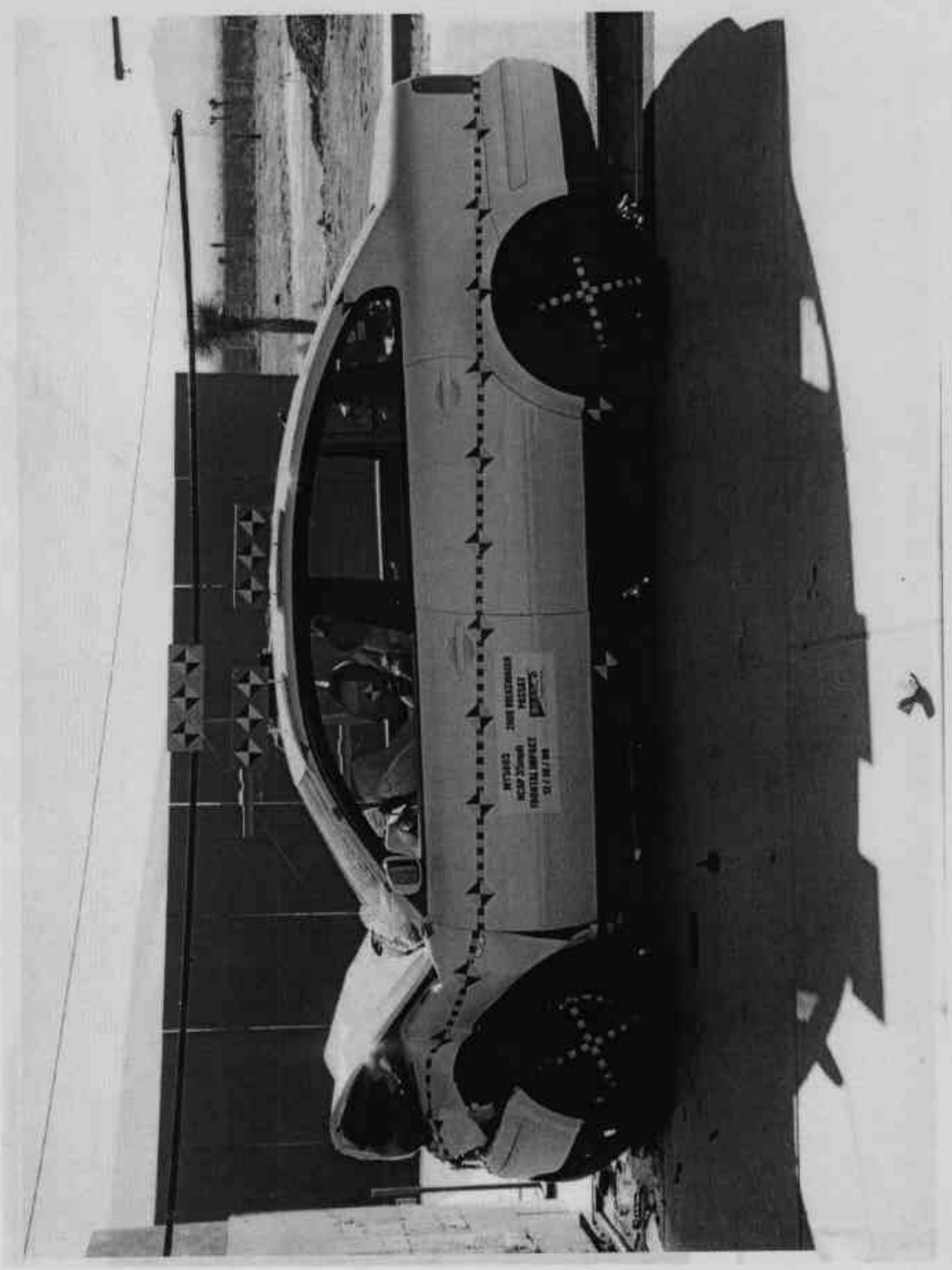

FIGURE A-8. POST TEST LEFT SIDE VIEW

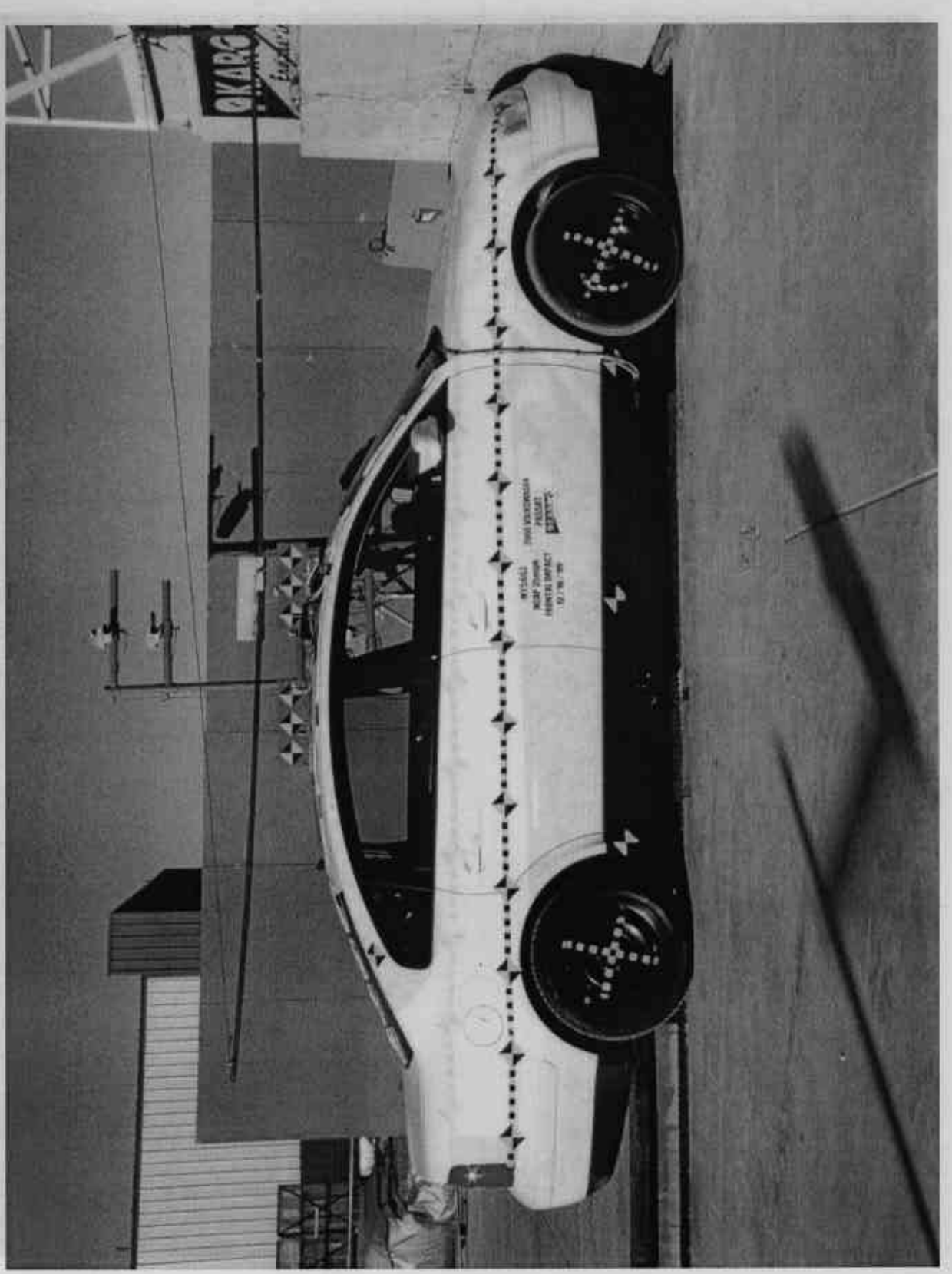

FIGURE A-9. PRETEST RIGHT SIDE VIEW

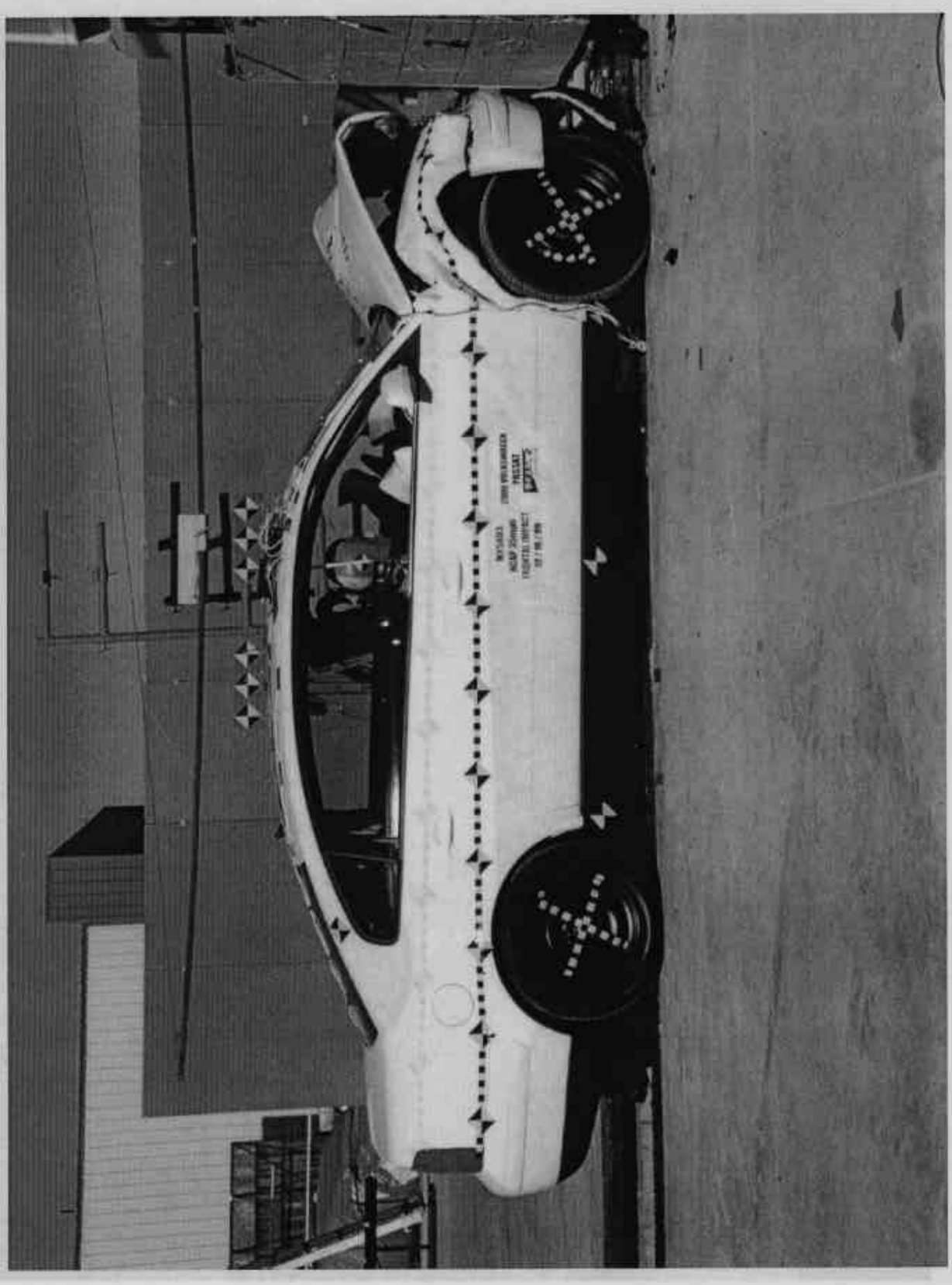

FIGURE A-10. POST TEST RIGHT SIDE VIEW

FIGURE A-11. PRETEST RIGHT FRONT VIEW

FIGURE A-12. POST TEST RIGHT FRONT VIEW

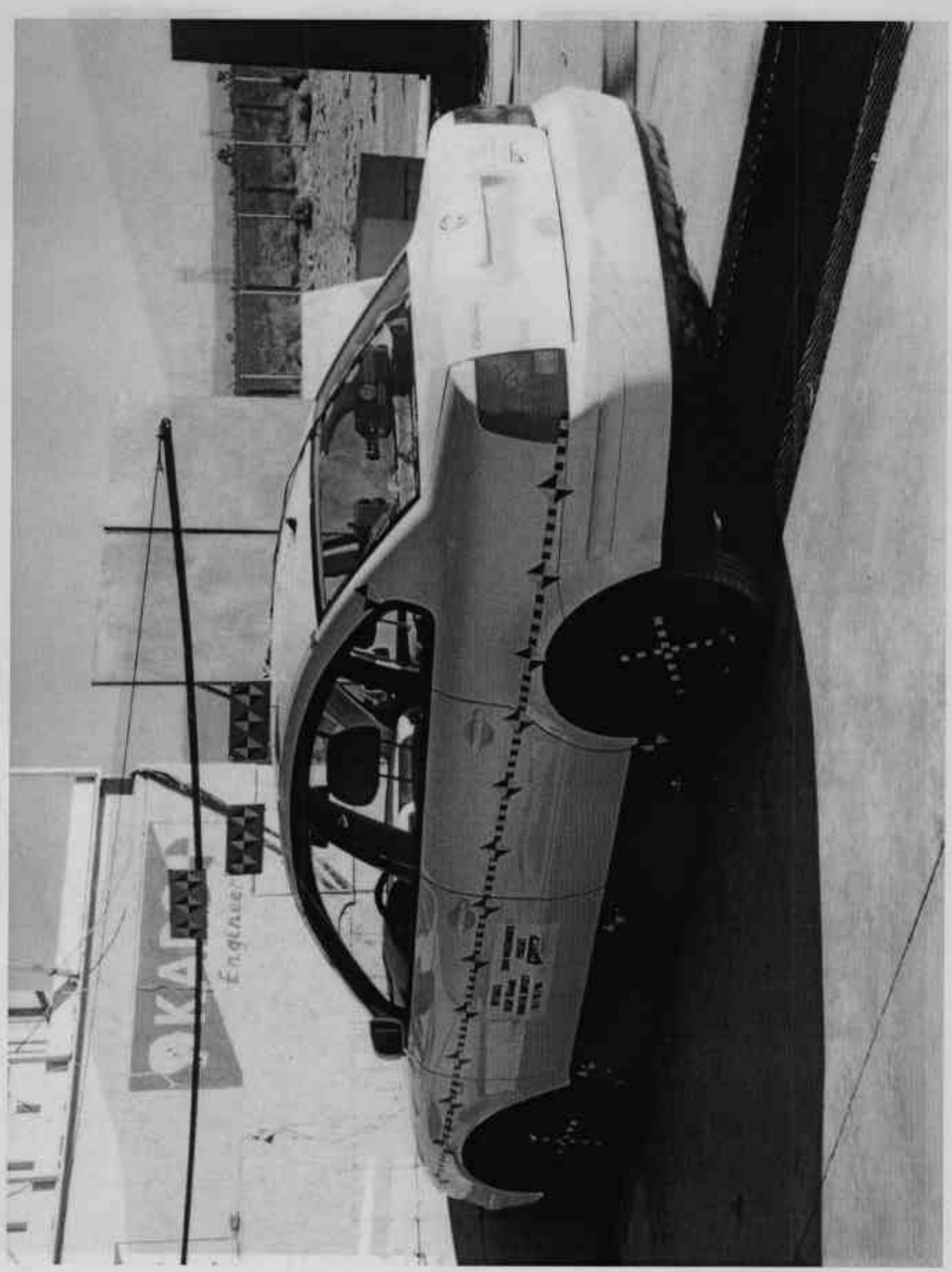

FIGURE A-13. PRETEST LEFT REAR VIEW

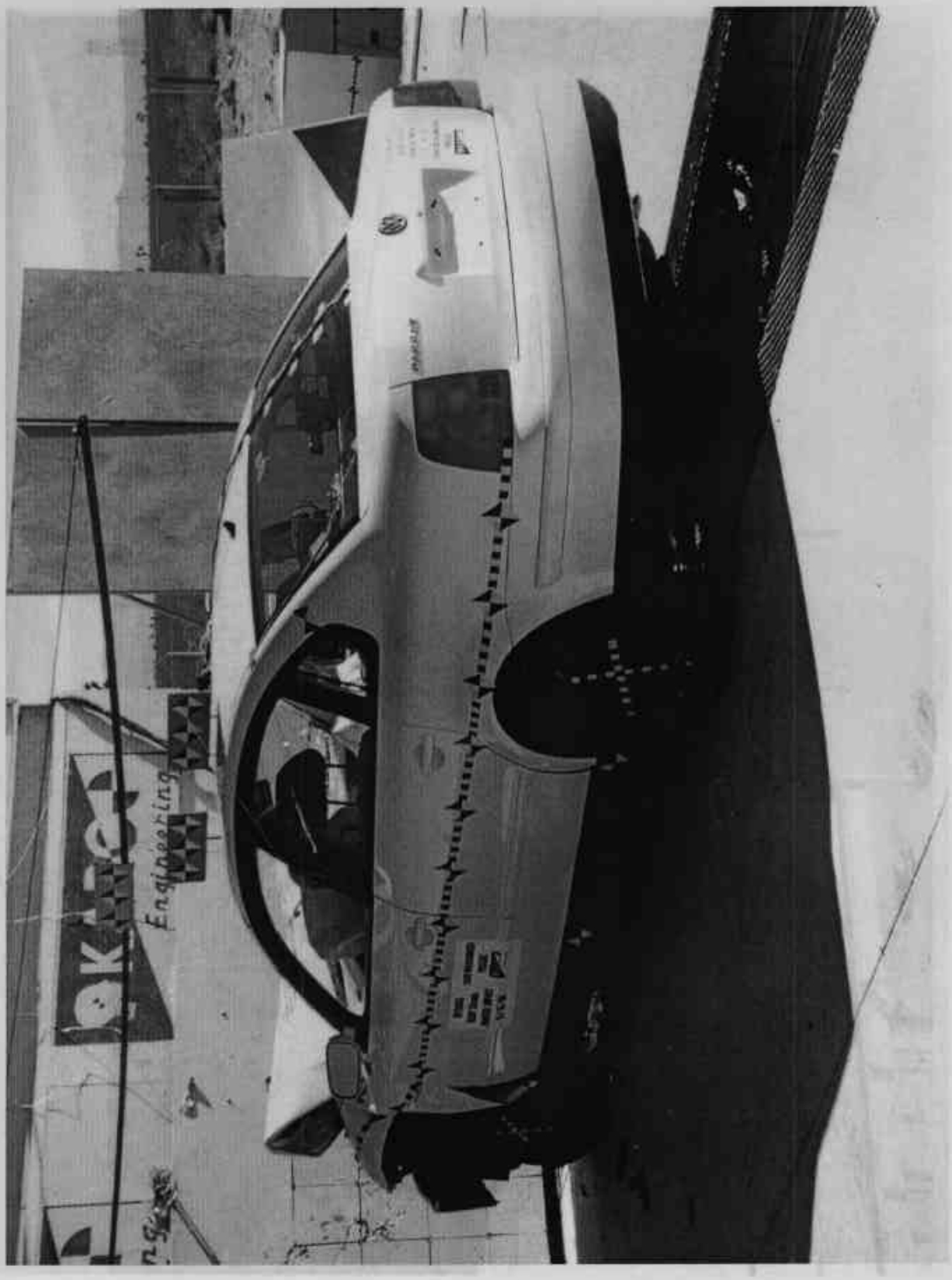

FIGURE A-14. POST TEST LEFT REAR VIEW

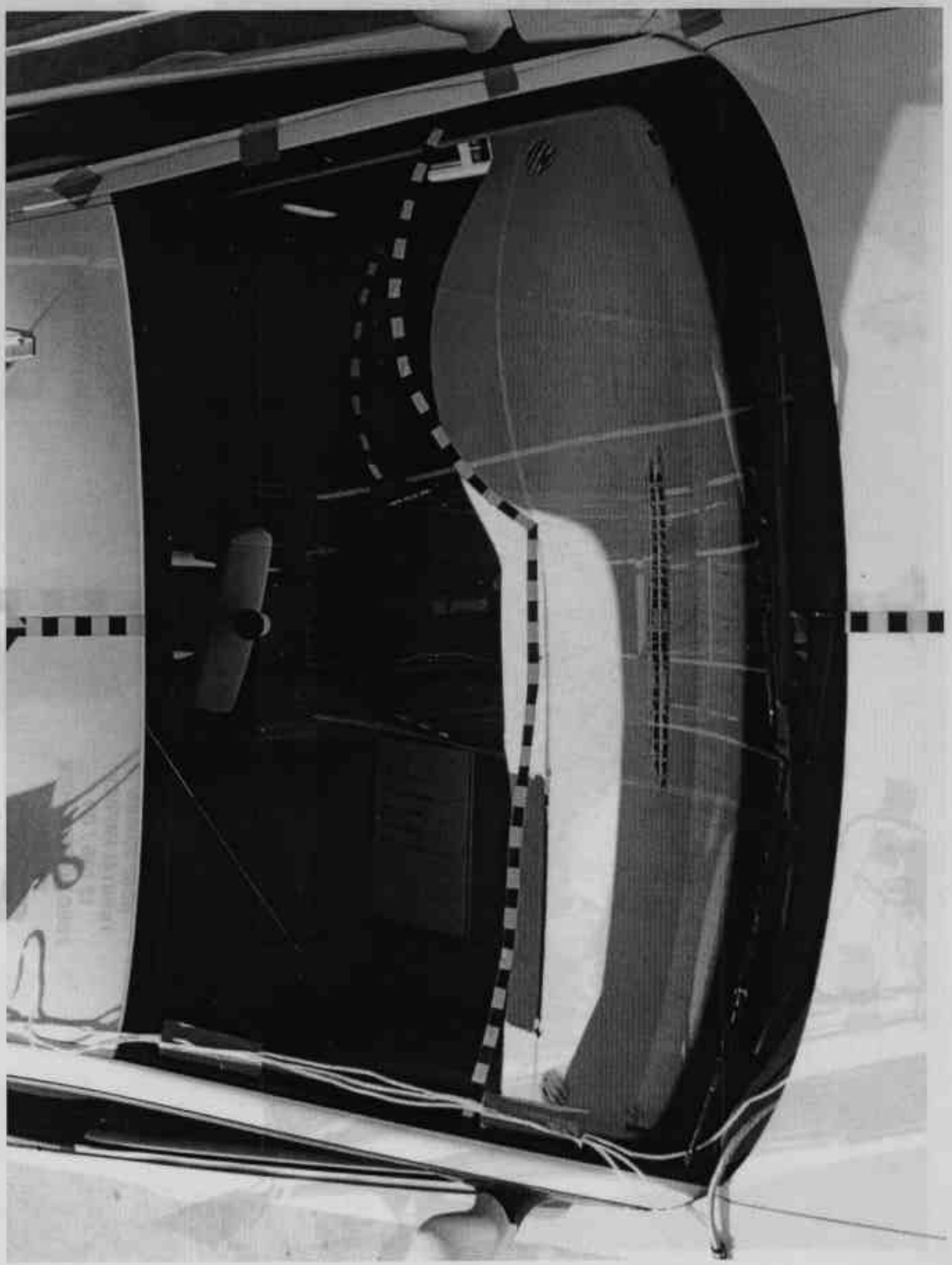

FIGURE A-15. PRETEST WINDSHIELD

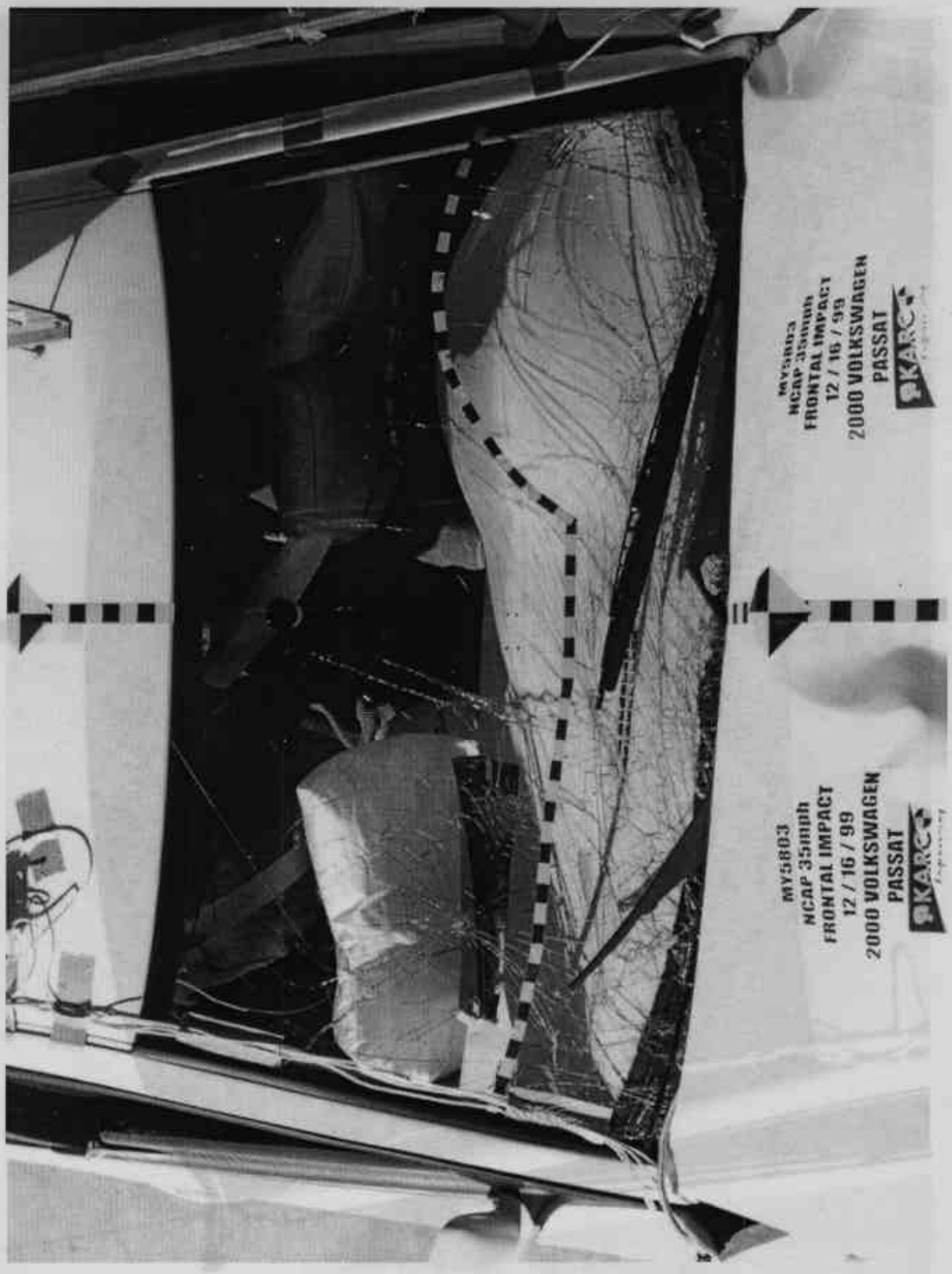

FIGURE A-16. POST TEST WINDSHIELD

FIGURE A-17. PRETEST ENGINE COMPARTMENT

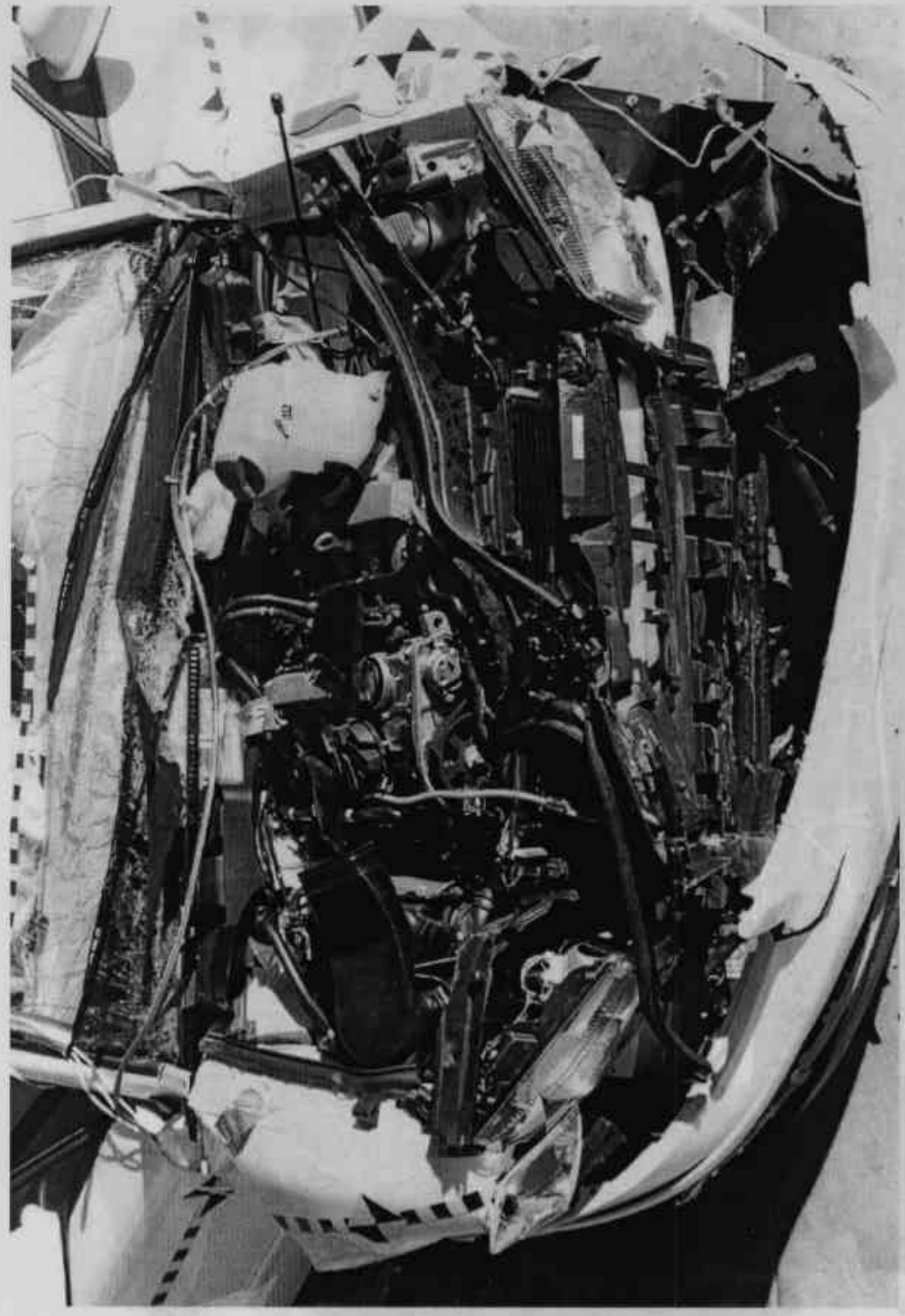

FIGURE A-18. POST TEST ENGINE COMPARTMENT

FIGURE A-19. PRETEST FUEL CAP

FIGURE A-20. POST TEST FUEL CAP

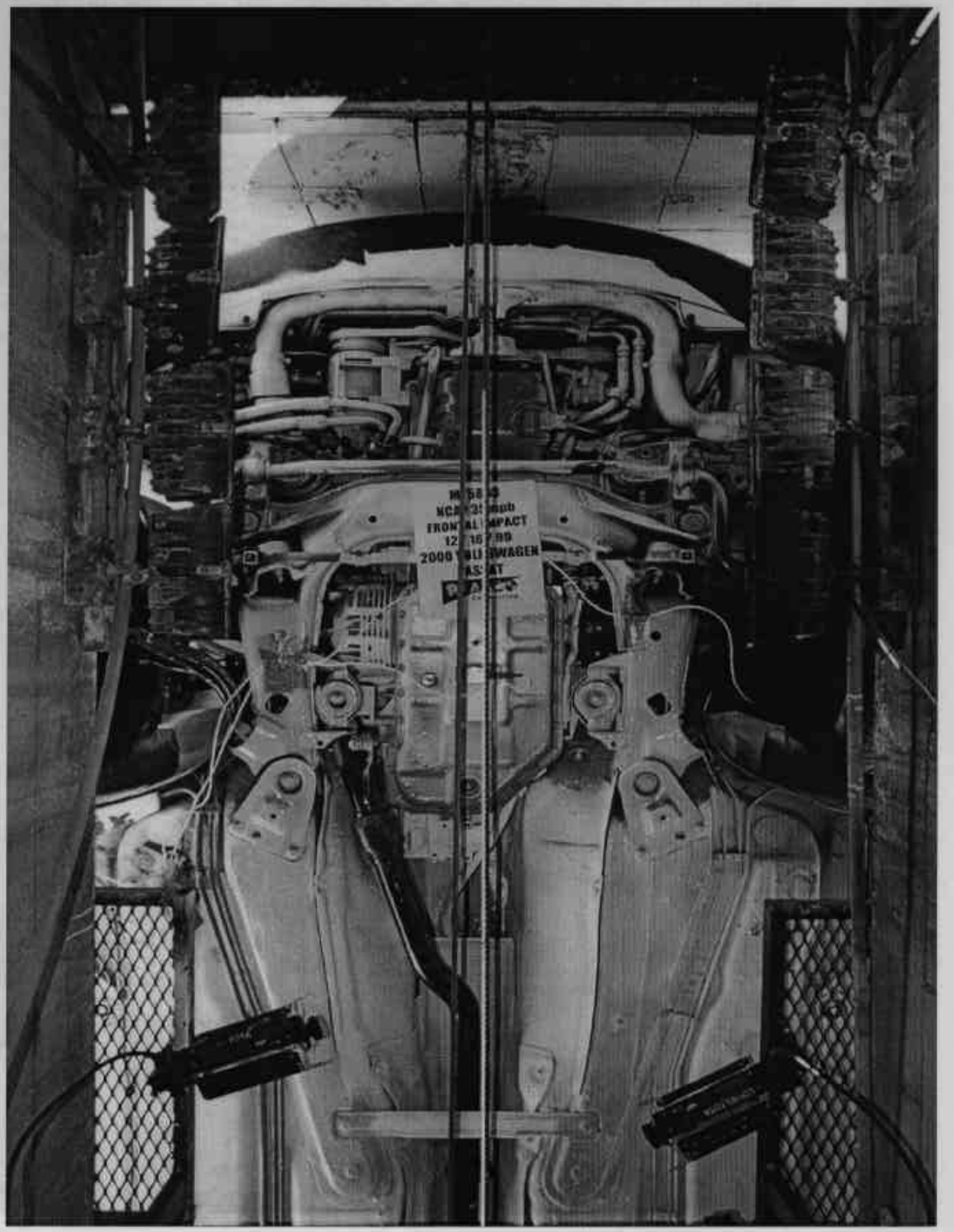

FIGURE A-21. PRETEST FRONT UNDERSIDE

FIGURE A-22. POST TEST FRONT UNDERSIDE

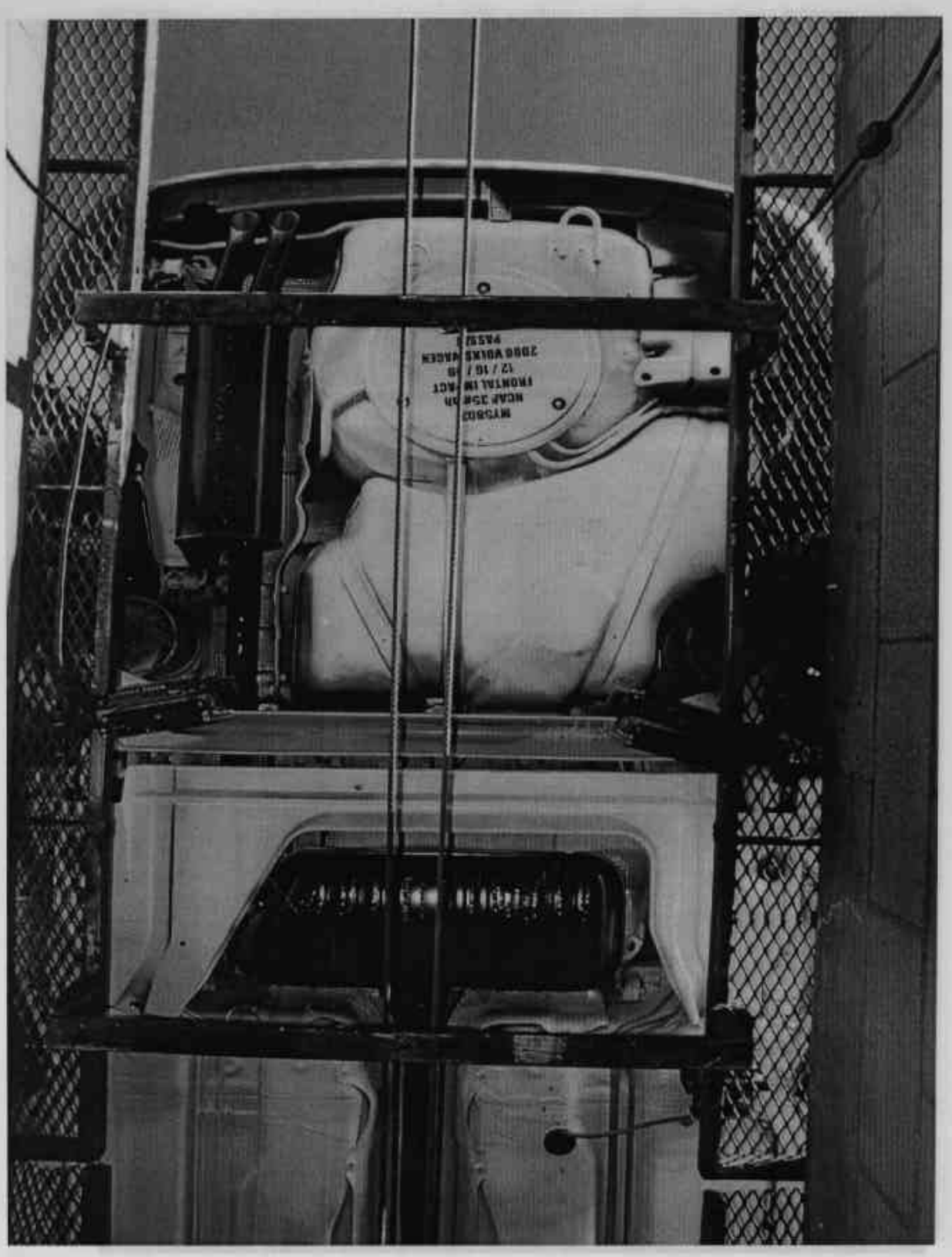

FIGURE A-23. PRETEST REAR UNDERSIDE

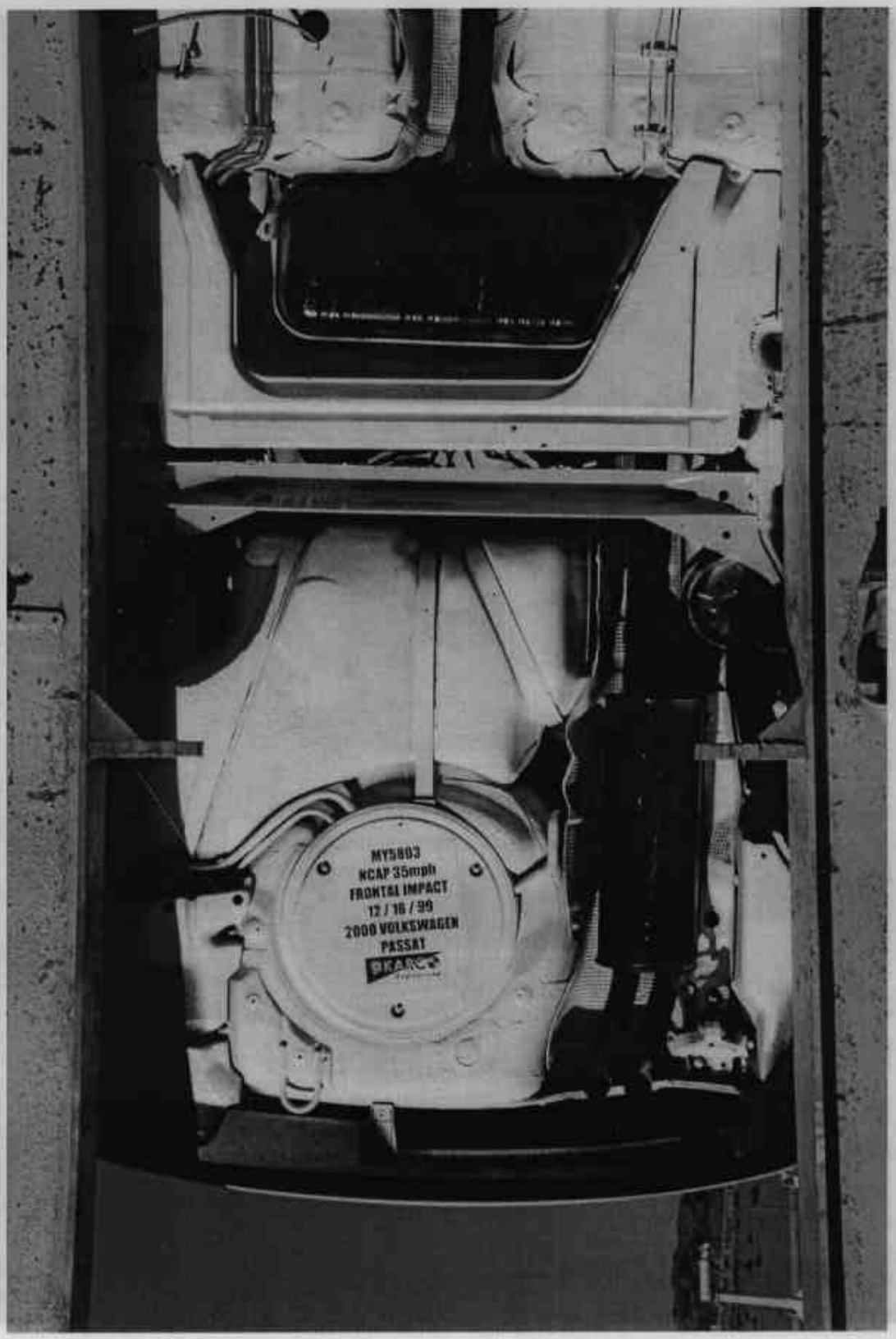

FIGURE A-24. POST TEST REAR UNDERSIDE

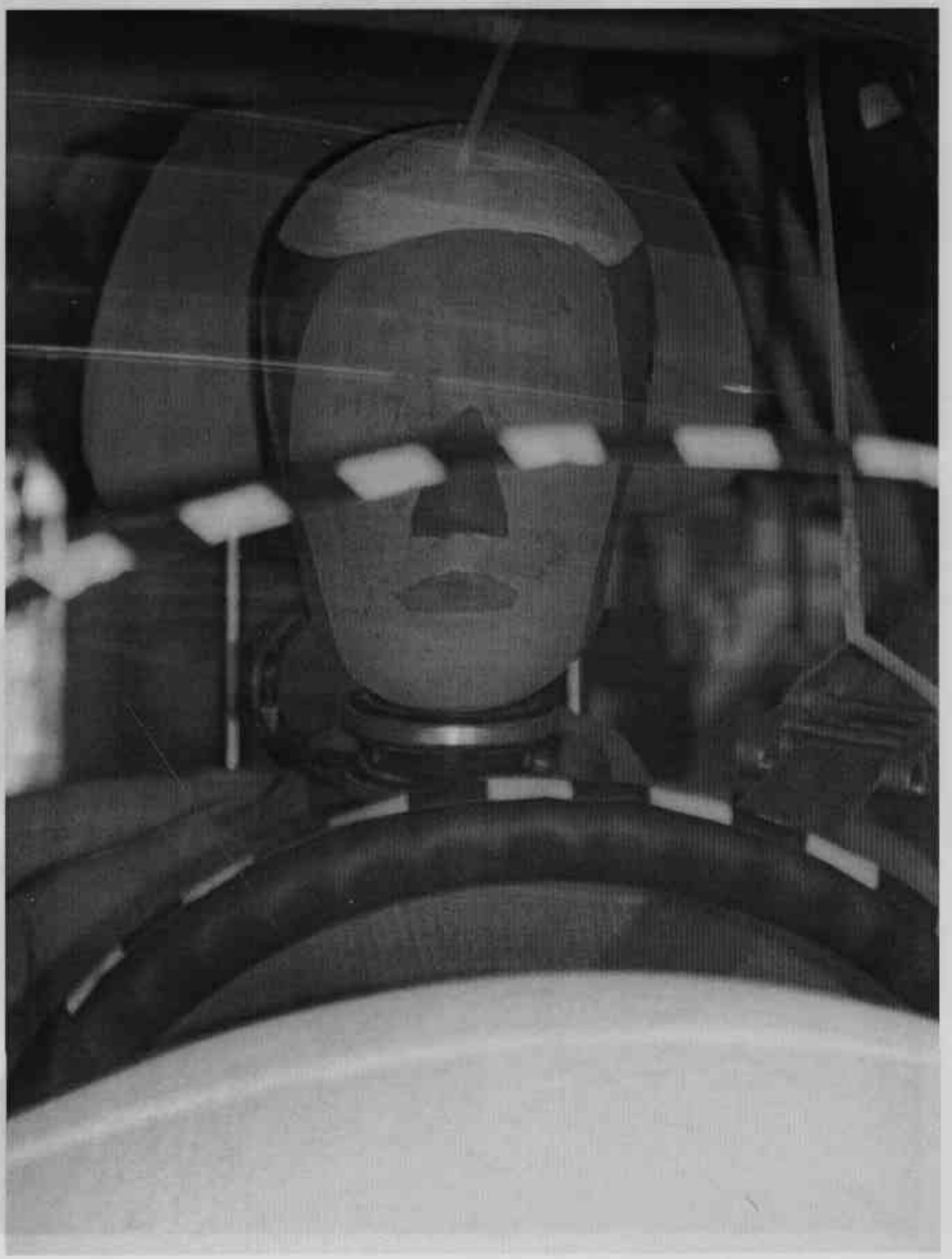

FIGURE A-25. PRETEST DRIVER DUMMY (FRONT VIEW)

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

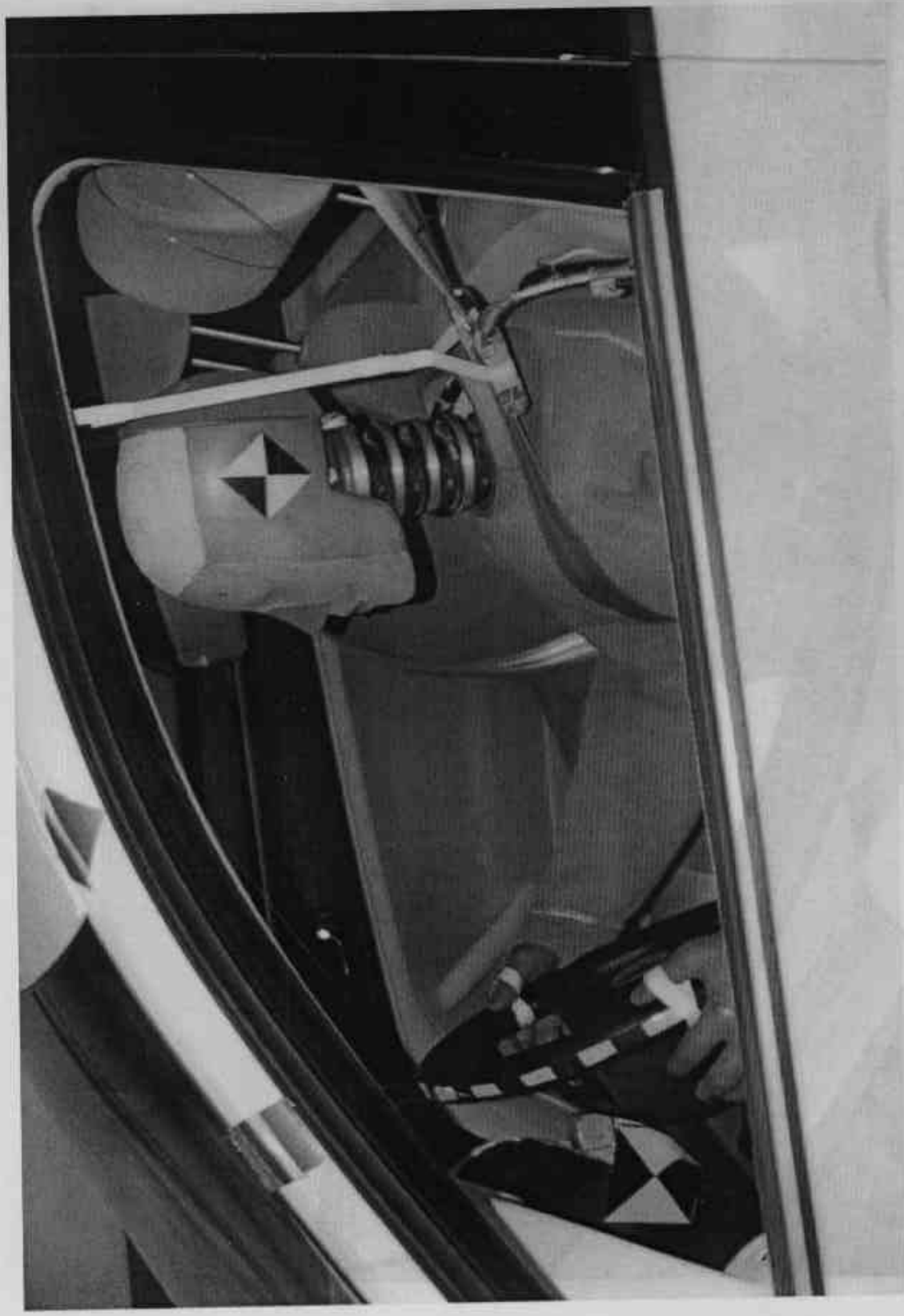

FIGURE A-27. PRETEST DRIVER DUMMY (THRU WINDOW)

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

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

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)

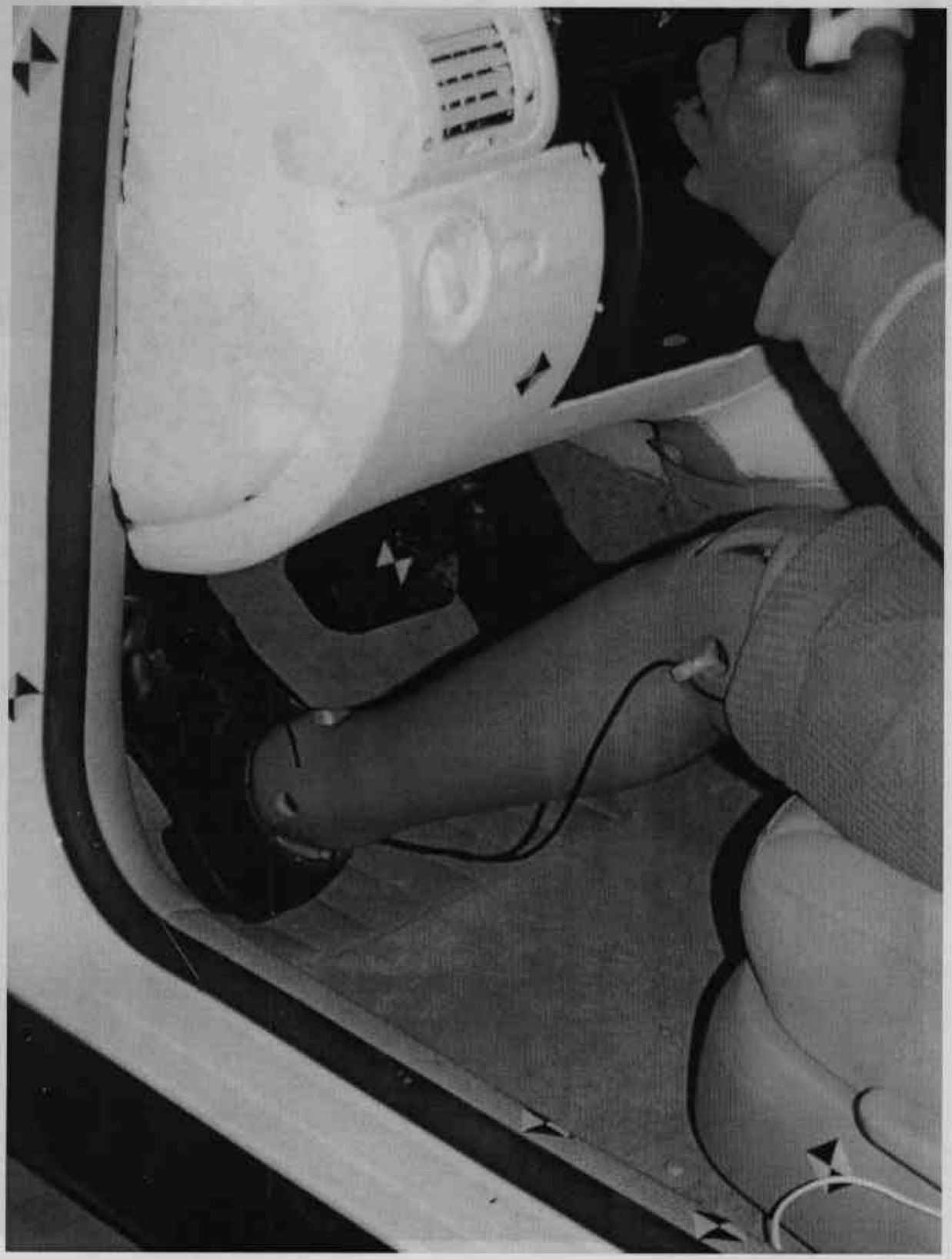

FIGURE A-33. PRETEST DRIVER DUMMY FEET

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

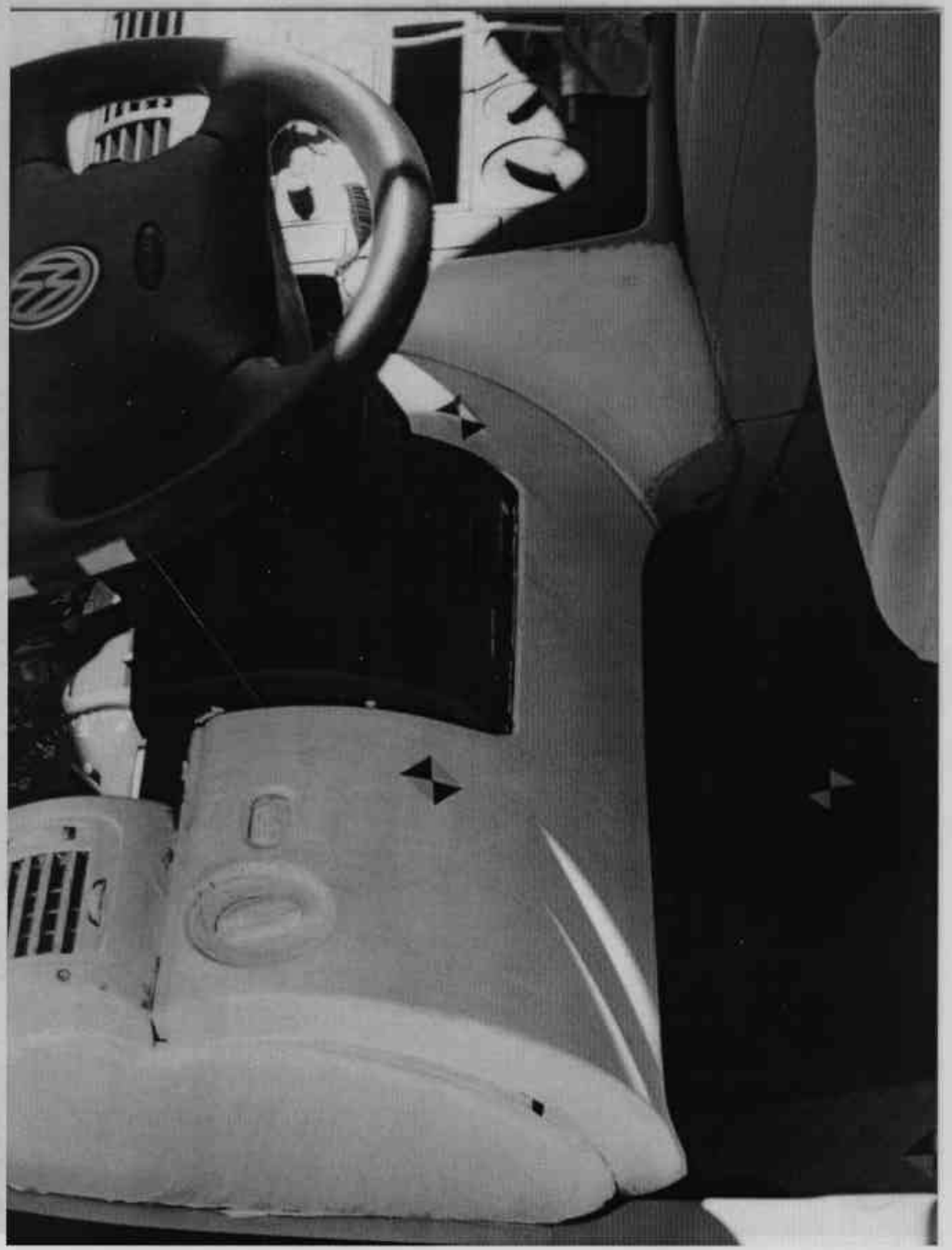

FIGURE A-35. PRE TEST DRIVER KNEE BOLSTER

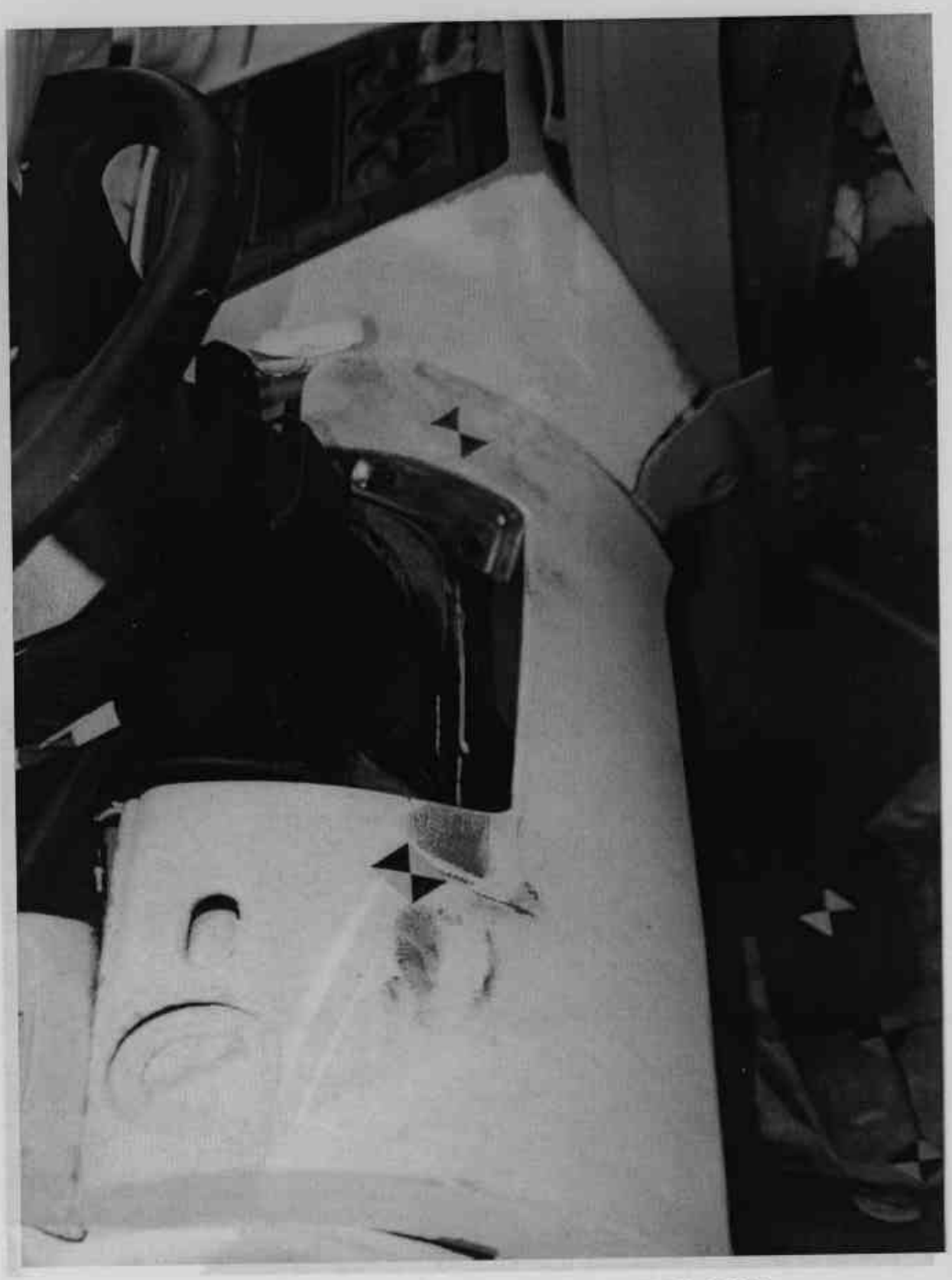

FIGURE A-36. POST TEST DRIVER KNEE BOLSTER

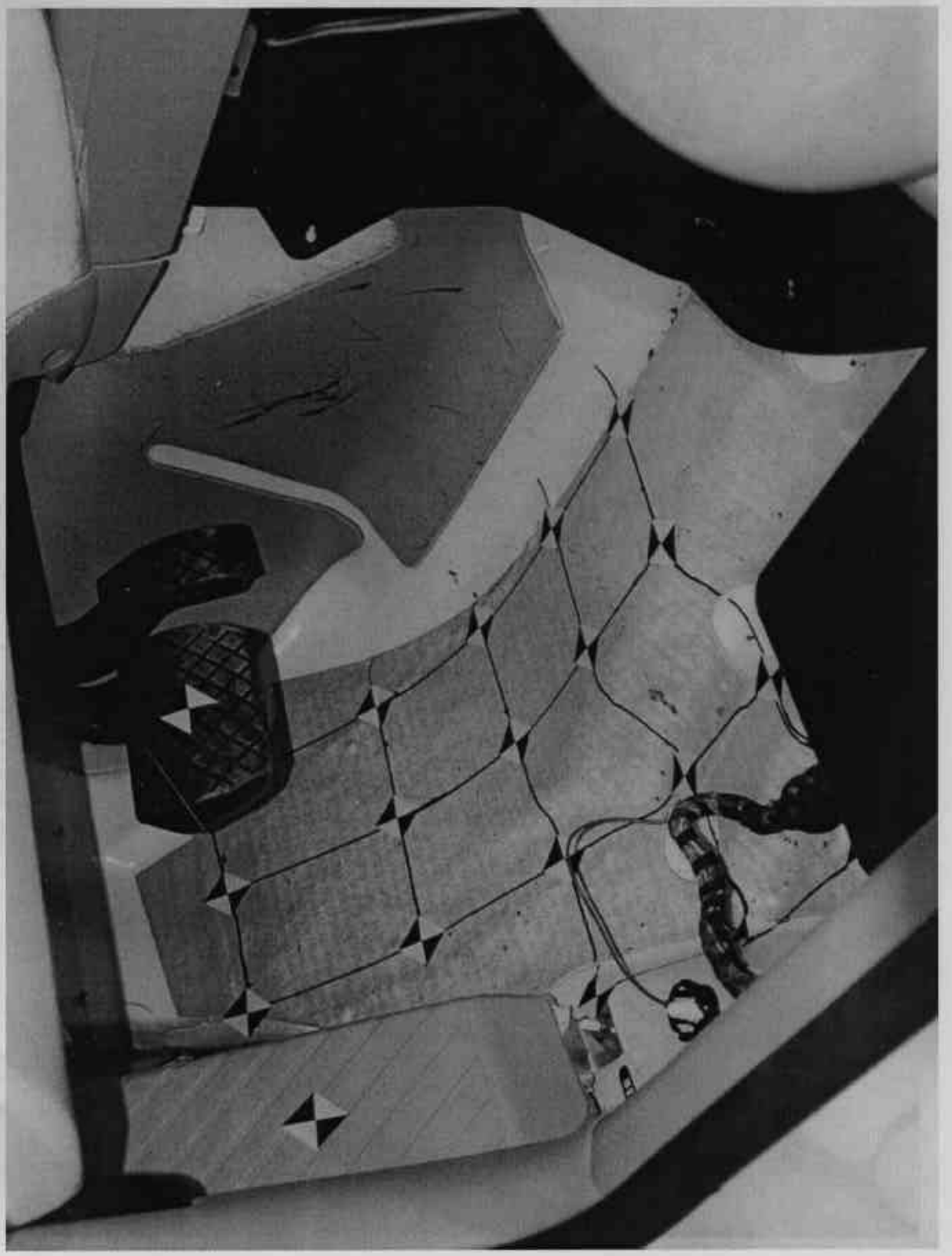

FIGURE A-37. PRE TEST DRIVER SIDE FLOOR PAN

FIGURE A-38. POST TEST DRIVER SIDE FLOOR PAN

FIGURE A-39. POST TEST DRIVER HEAD

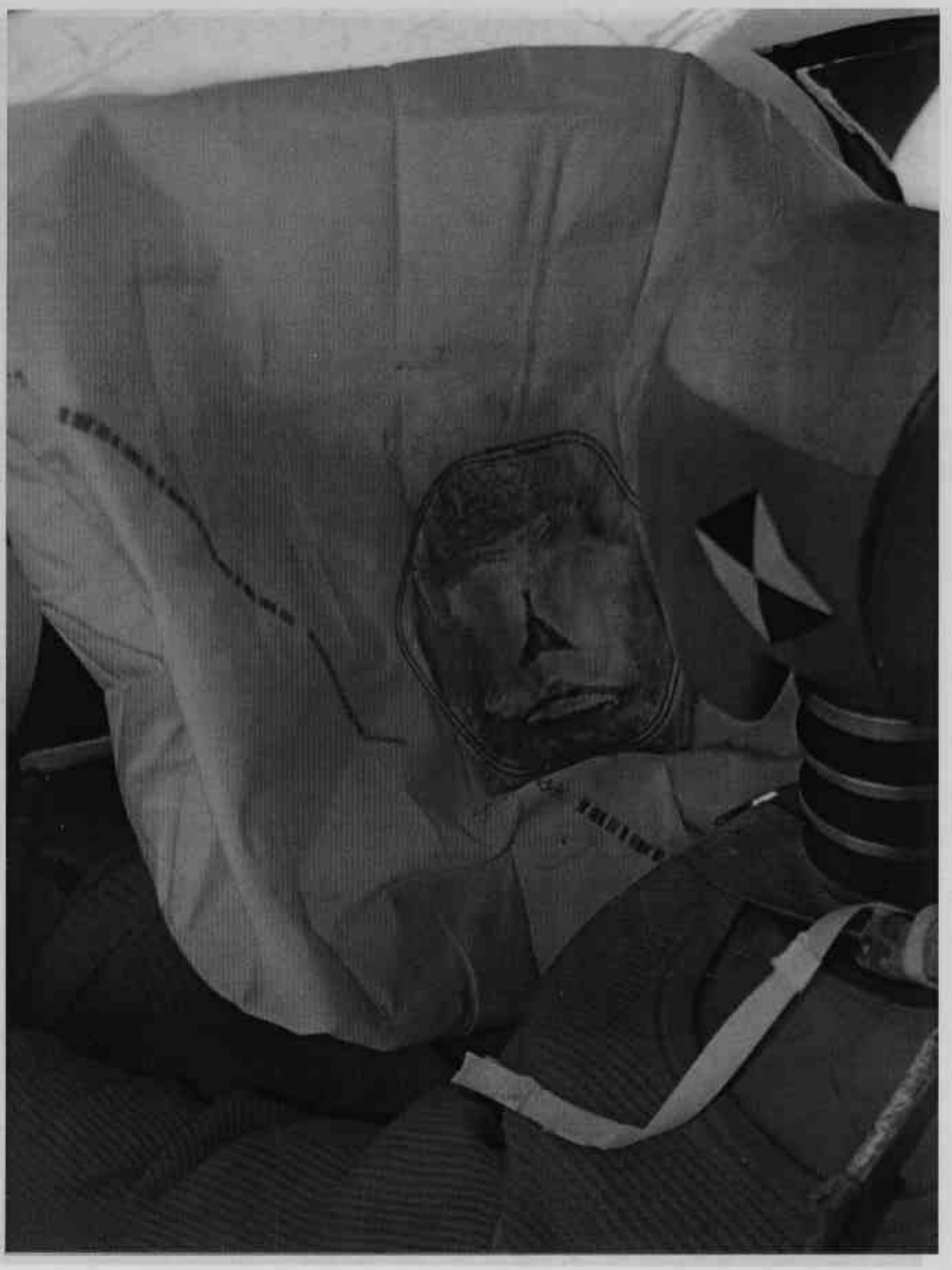

FIGURE A-40. POST TEST DRIVER DUMMY CONTACT

FIGURE A-41. PRE TEST PASSENGER DUMMY (FRONT VIEW)

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

FIGURE A-43. PRE TEST PASSENGER DUMMY (THRU WINDOW)

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

FIGURE A-45. PRE TEST PASSENGER DUMMY (DOOR OPEN)

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

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

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

FIGURE A-49. PRE TEST PASSENGER DUMMY FEET

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

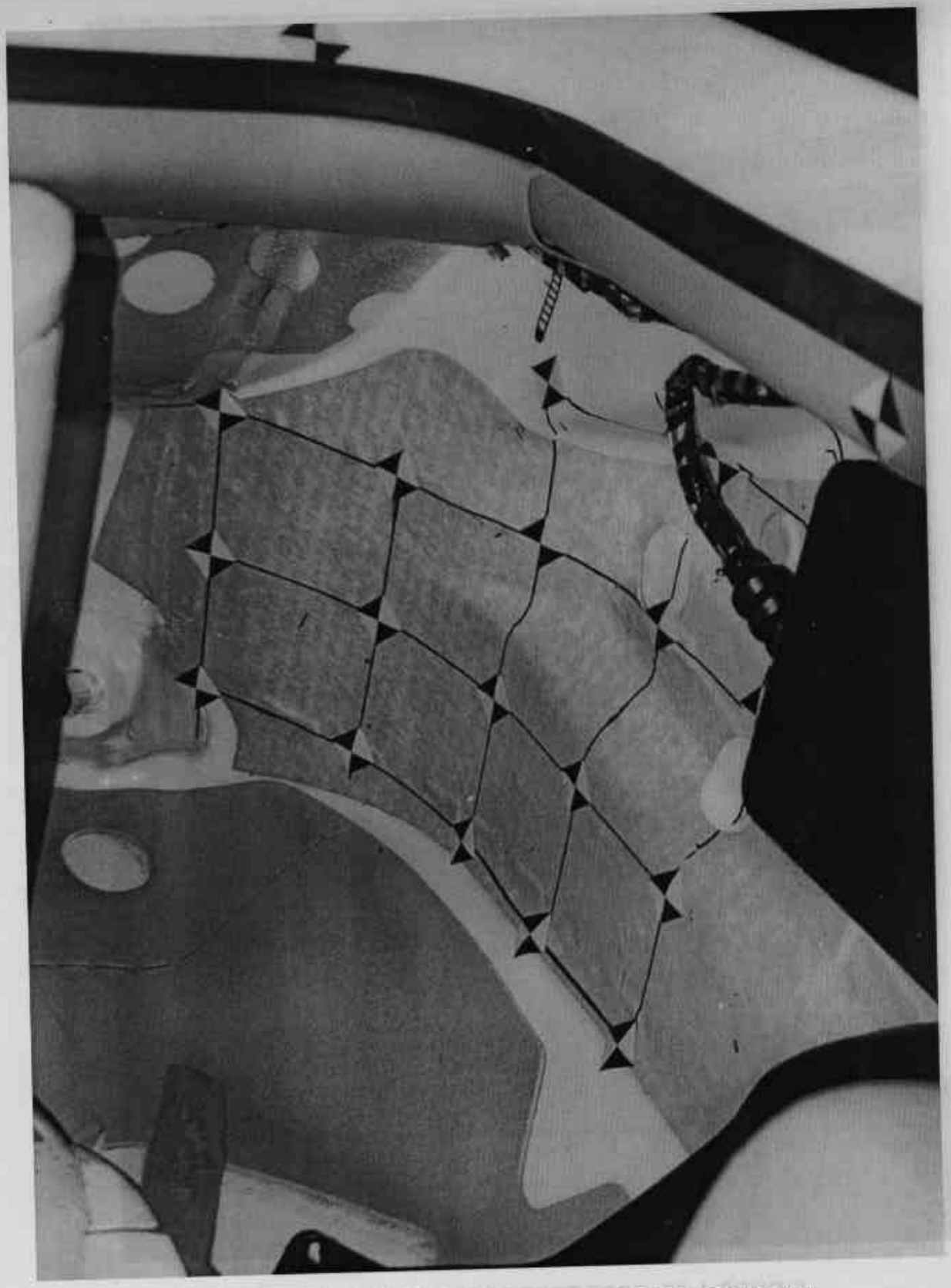

FIGURE A-51. PRETEST PASSENGER SIDE FLOOR PAN

FIGURE A-52. POST TEST PASSENGER SIDE FLOOR PAN

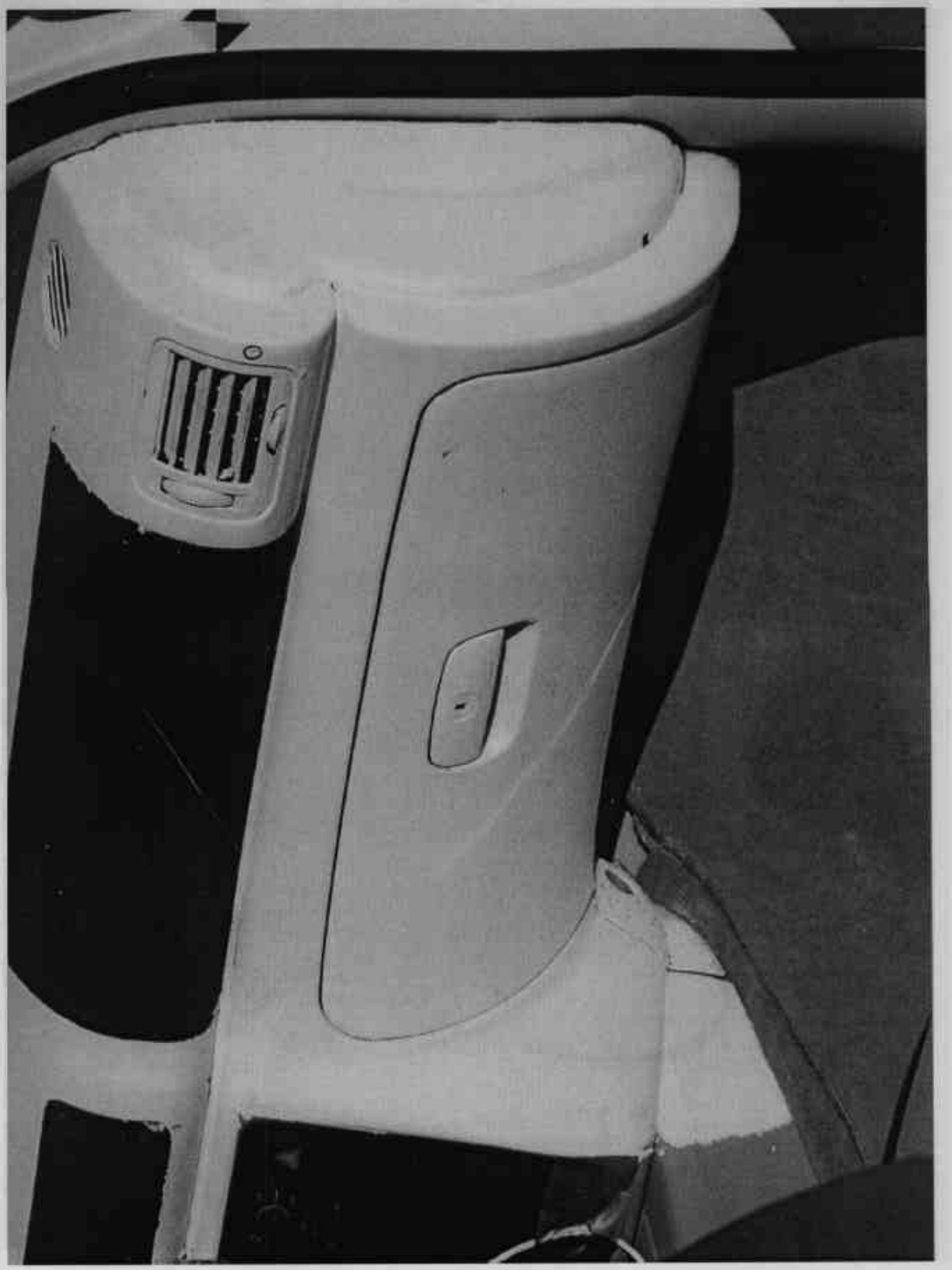

FIGURE A-53. PRE TEST PASSENGER SIDE KNEE BOLSTER

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

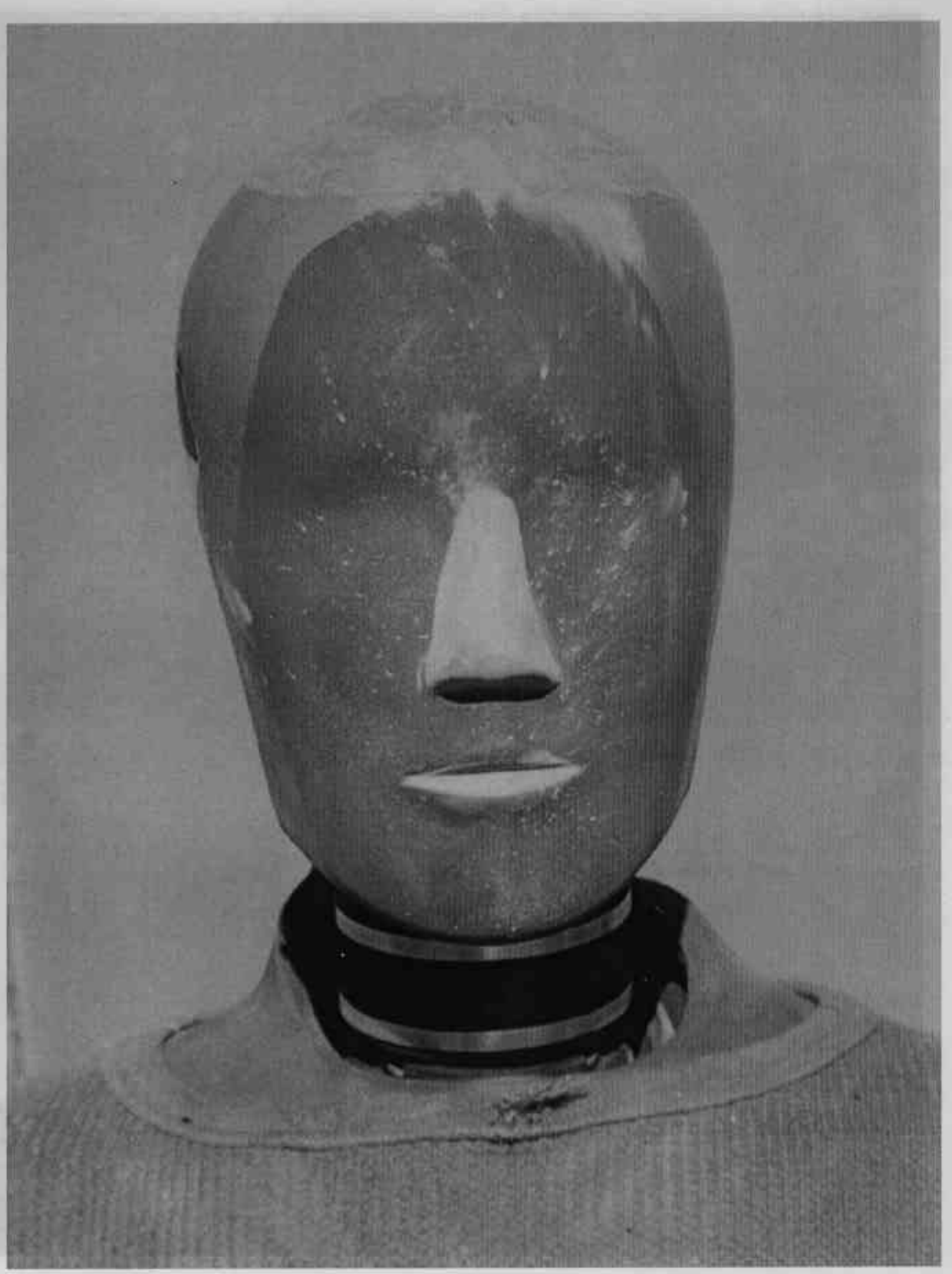

FIGURE A-55. POST TEST PASSENGER HEAD

FIGURE A-56. POST TEST PASSENGER DUMMY CONTACT

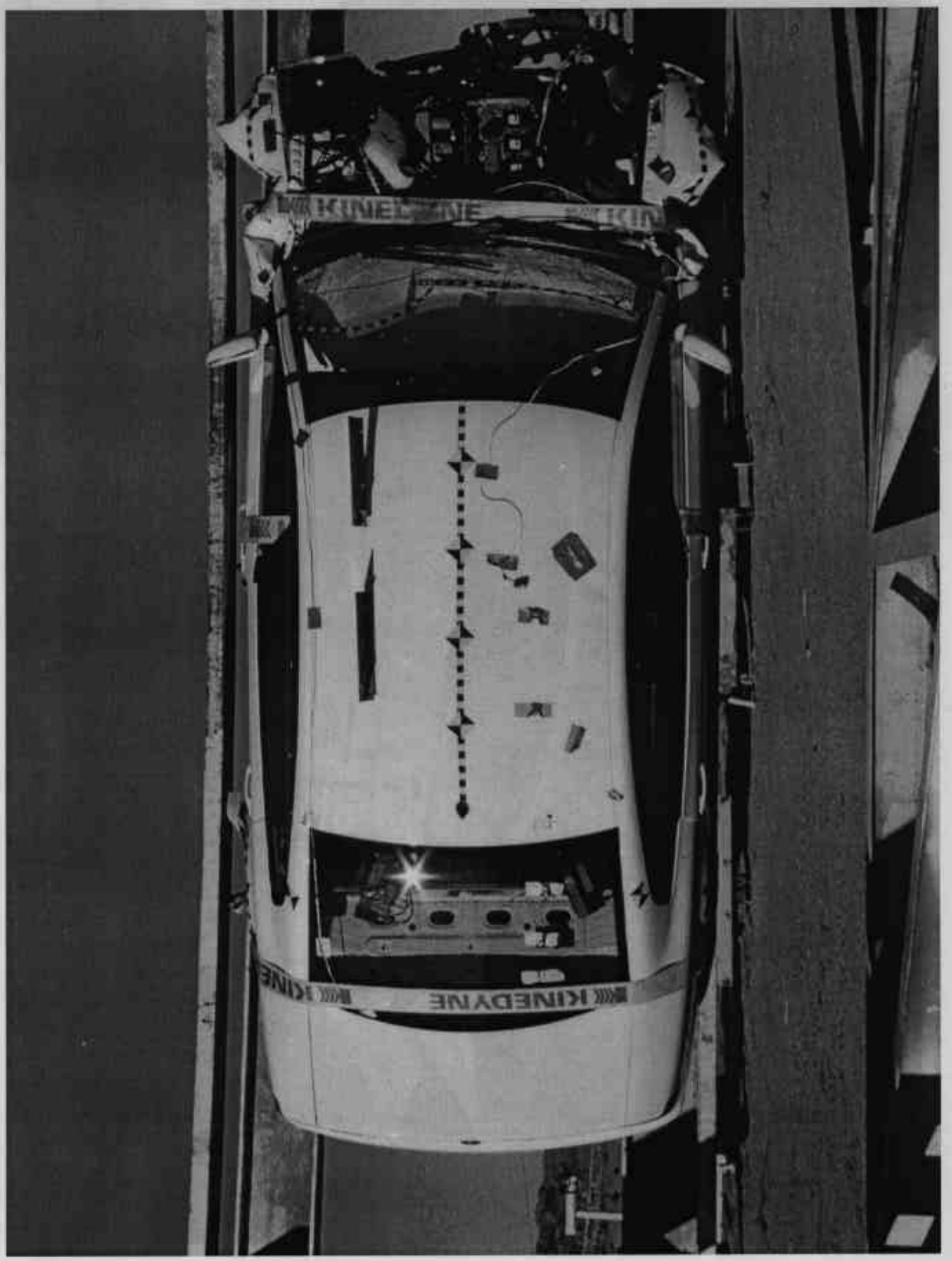

FIGURE A-57. VEHICLE ON ROLLOVER

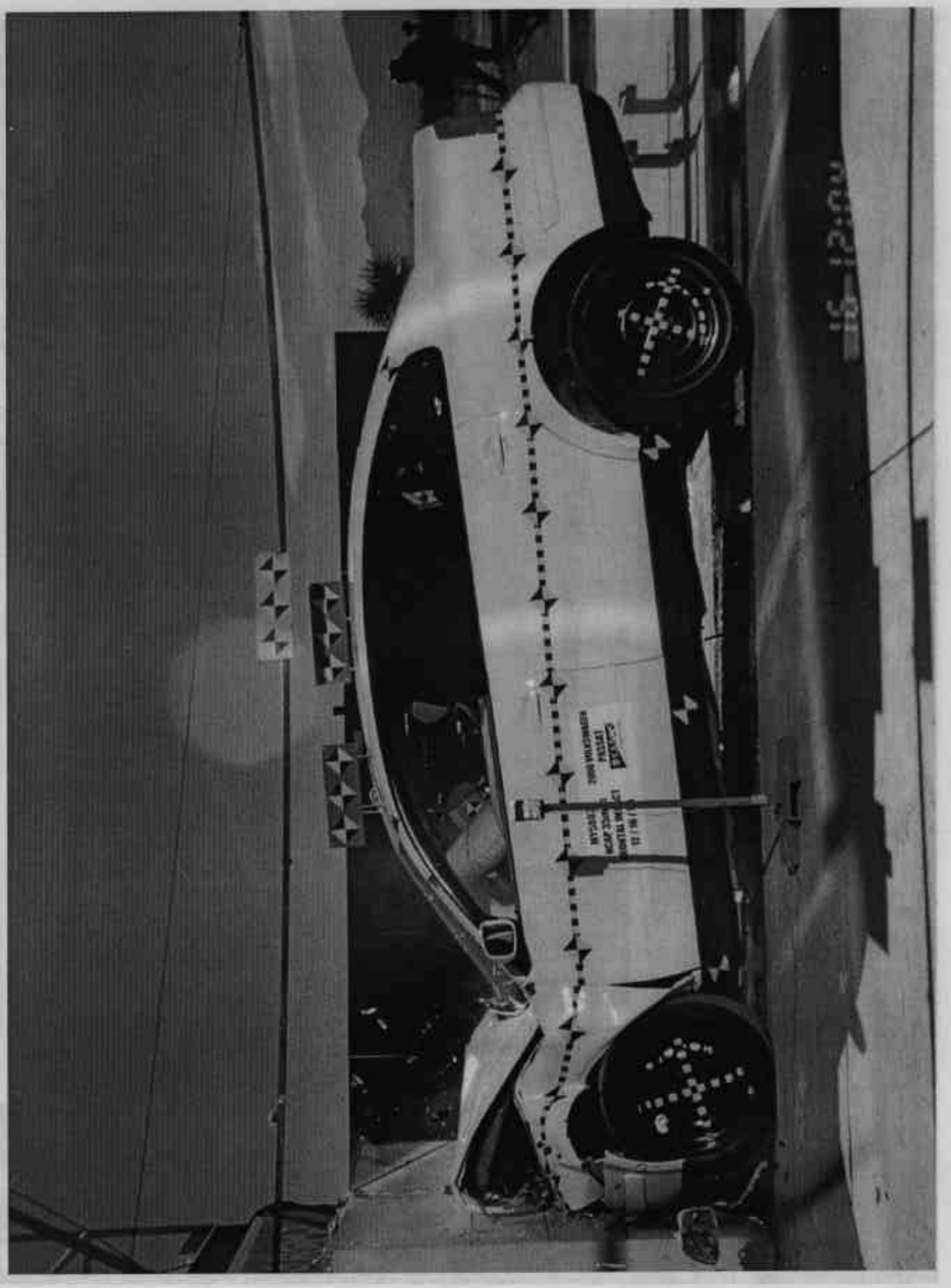

FIGURE A-58. VEHICLE DURING IMPACT

APPENDIX B

DUMMY AND VEHICLE RESPONSE DATA TRACES

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B-26	Driver Chest Primary Resultant	B-26
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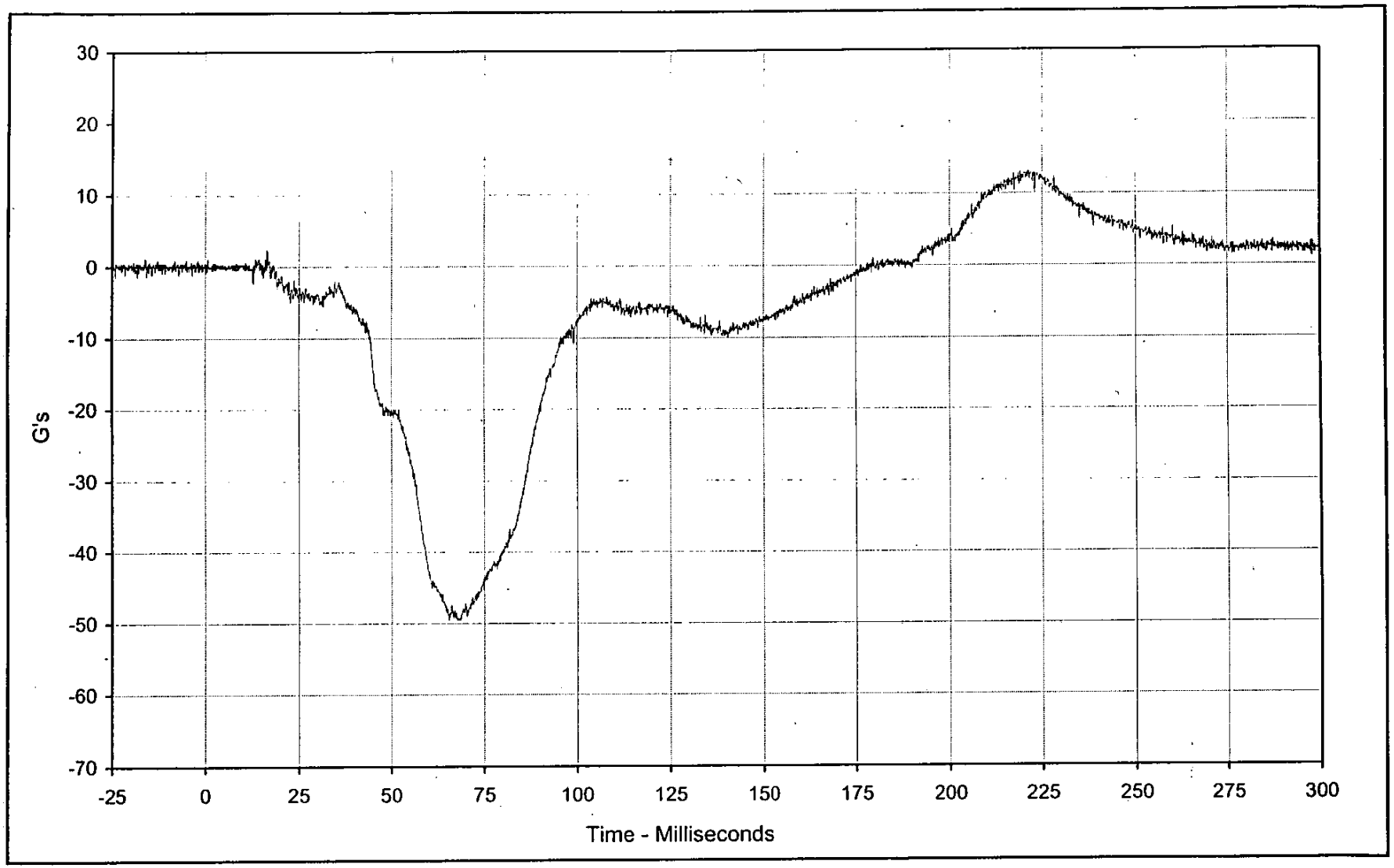
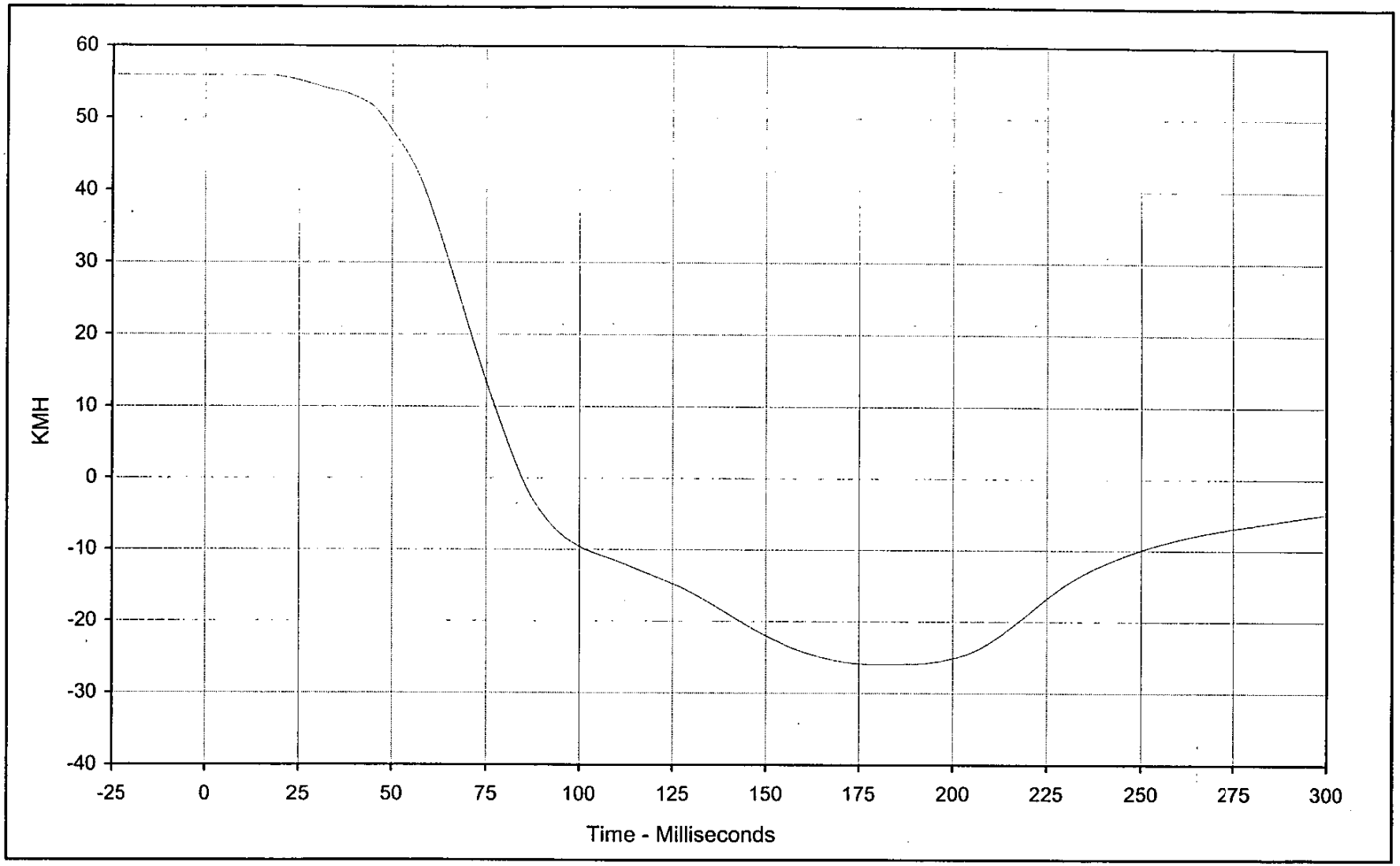


Curve Description:	Driver Head Primary X			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	13.0	at	219.2 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-49.5	at	65.5 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-001				

KARCO Engineering

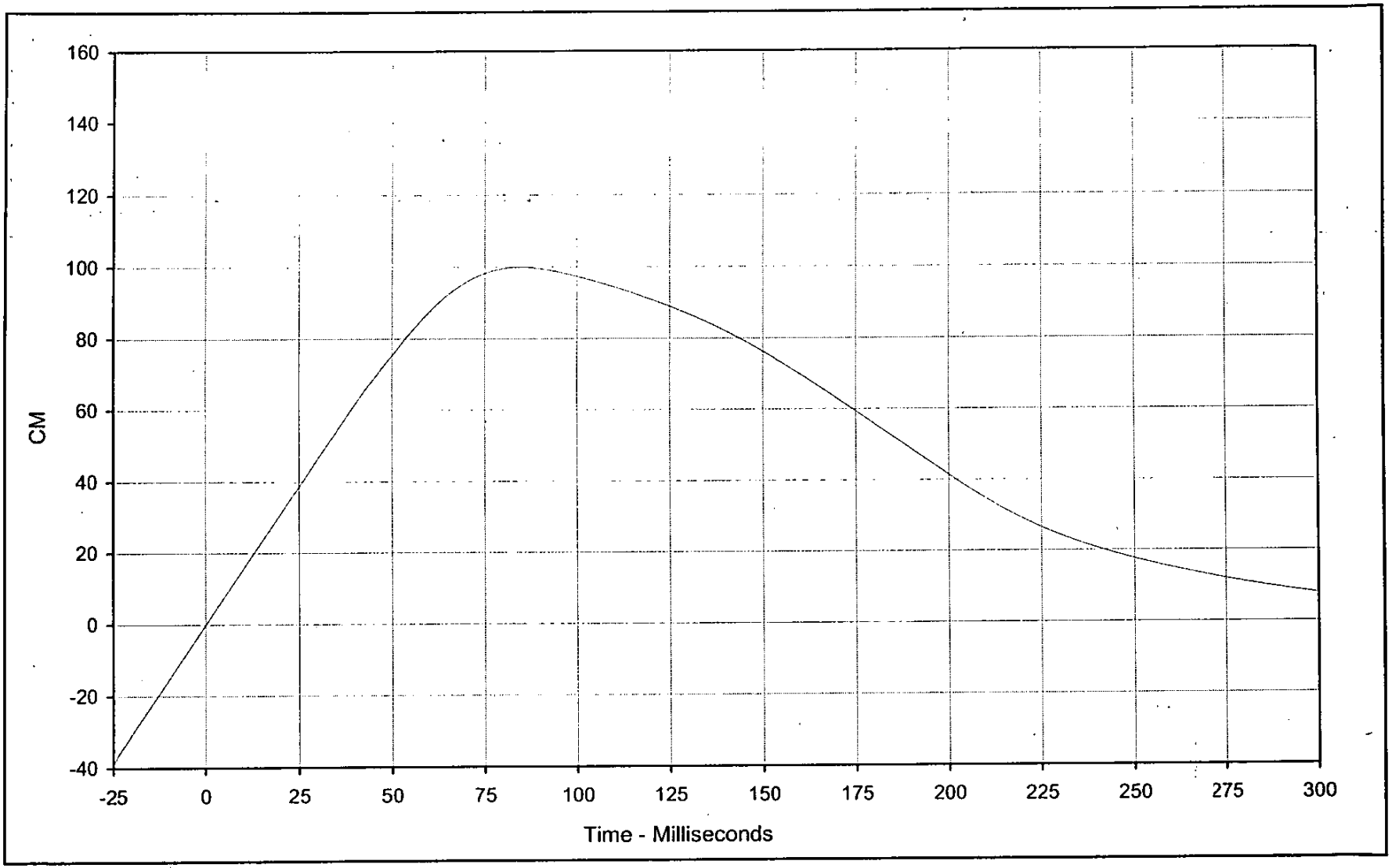


Curve Description:	Driver Head Primary X Velocity			
Maximum Value:	55.9	at	0.7	Milliseconds
Minimum Value:	-26.0	at	181.2	Milliseconds
SAE Filter Class:	180			
Date of Test:	12/16/99			
Curve Number:	IN1-001			

Testing Program 2000 NHTSA 35 mph NCAP No.: MY5803

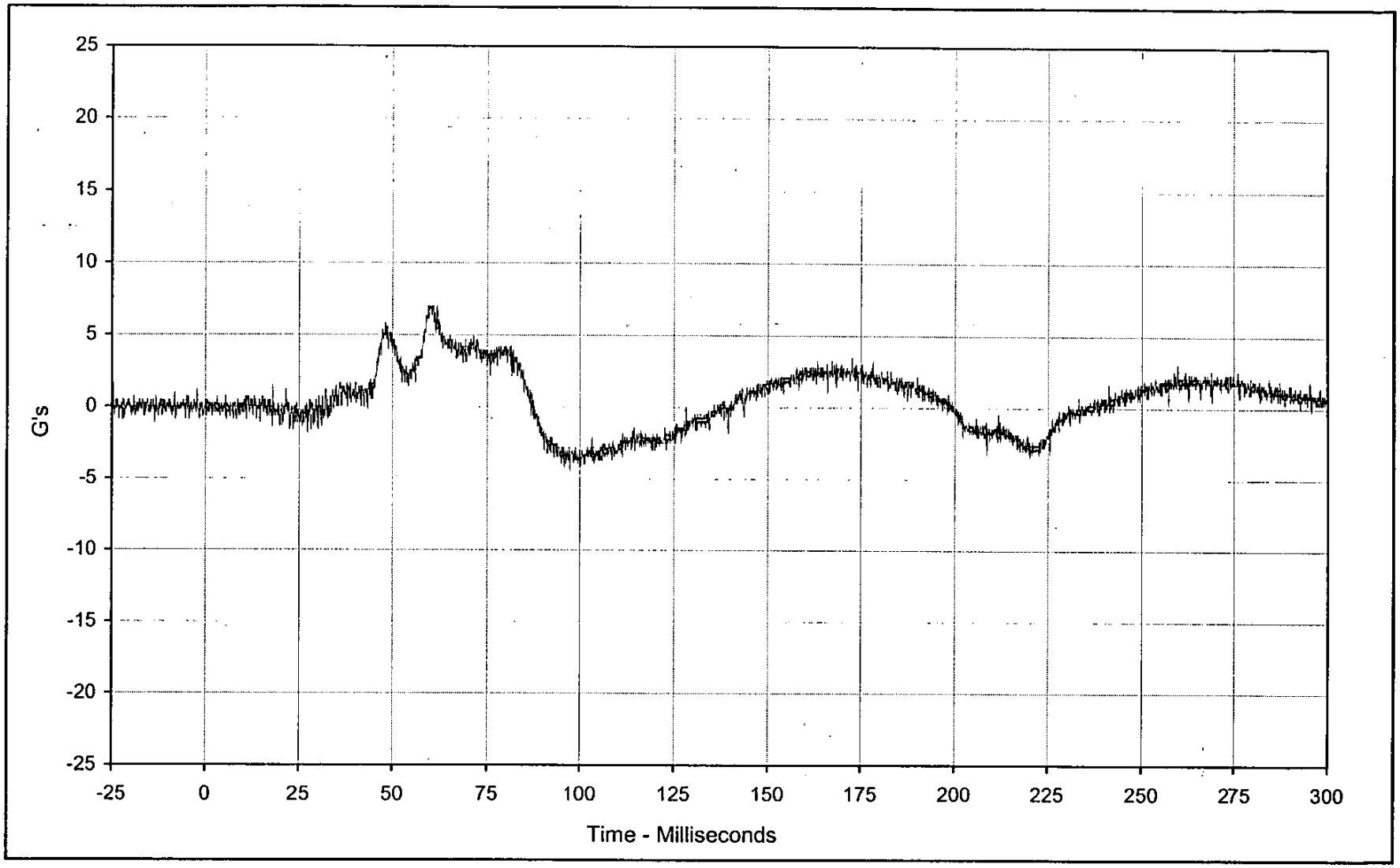
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARC Engineering



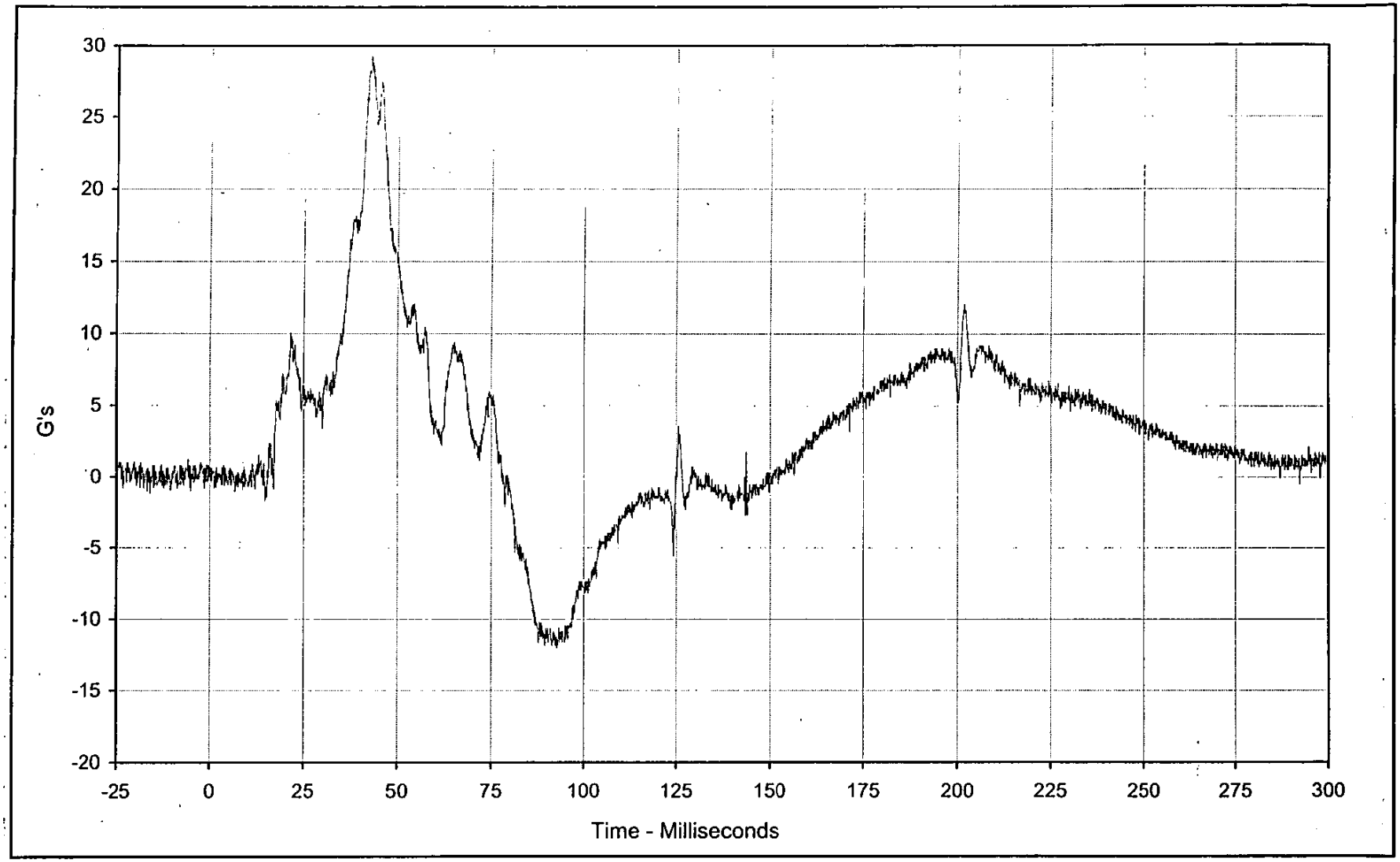
Curve Description:	Driver Head Primary X Displ.			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	99.9	at	84.5 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	0.0	at	0.0 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	IN2-001				

KARCO Engineering



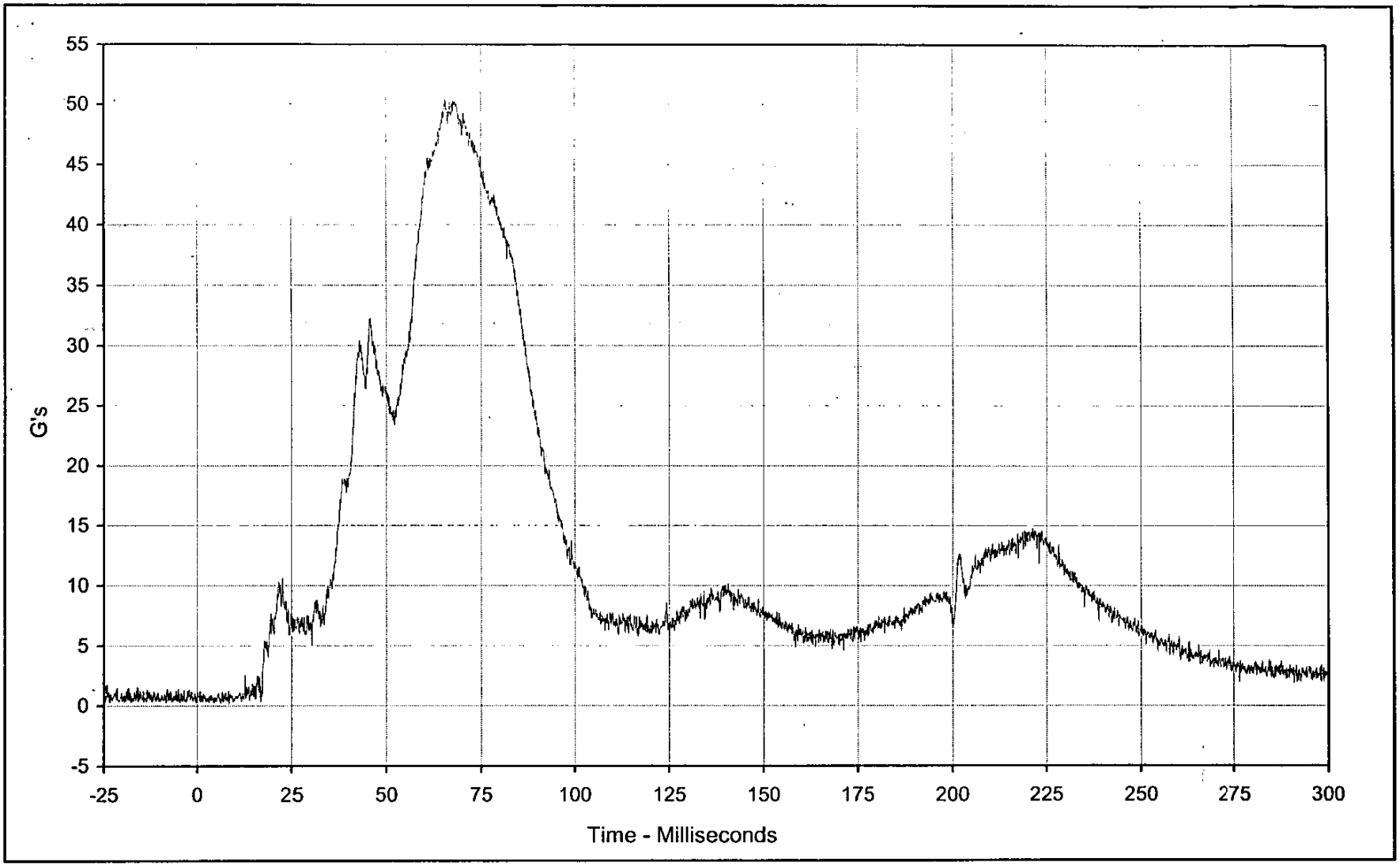
Curve Description:	Driver Head Primary Y			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	7.0	at	59.4	Milliseconds	Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-4.4	at	97.4	Milliseconds	
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-002				

KARCO Engineering



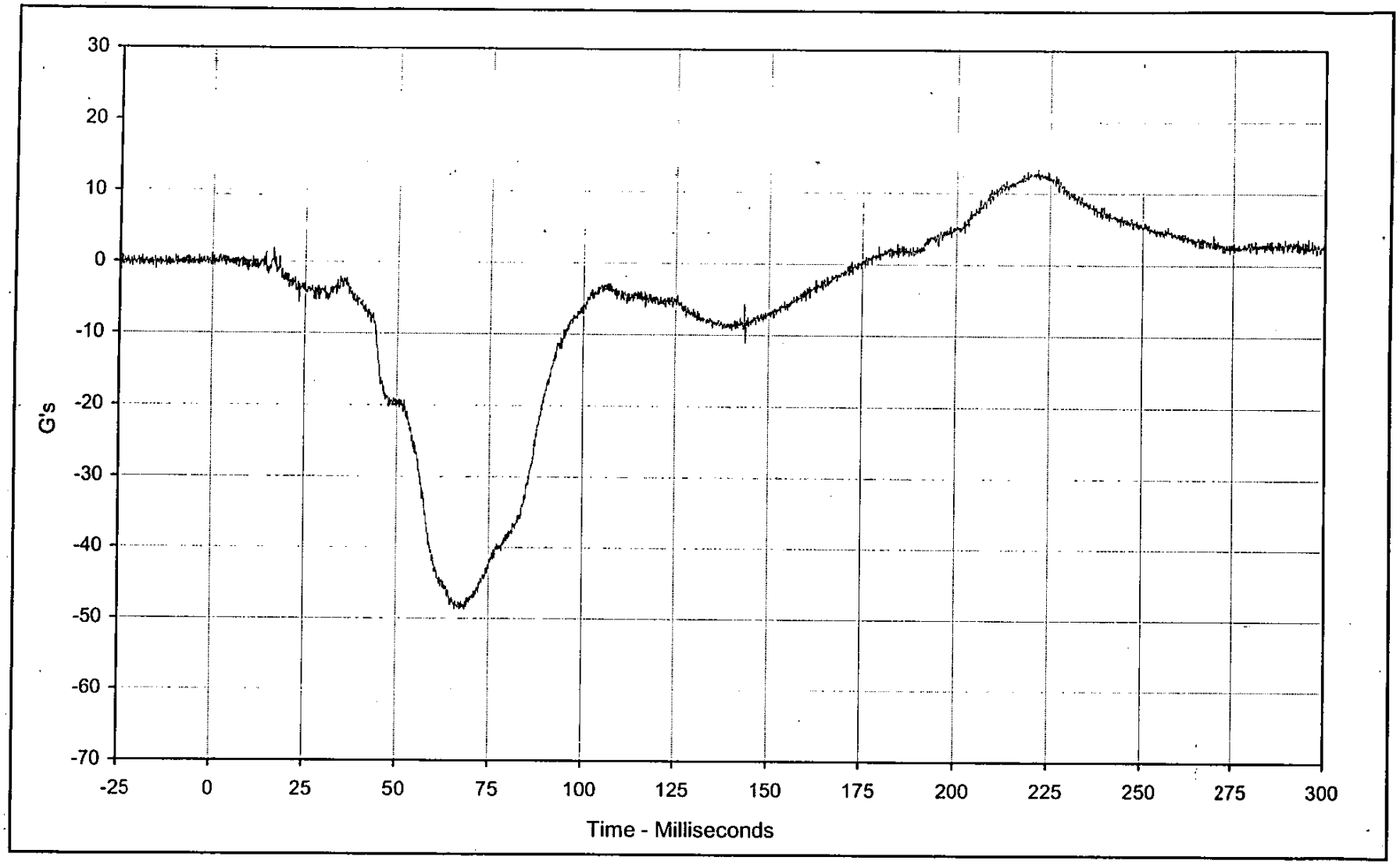
Curve Description:	Driver Head Primary Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	29.3	at	42.9	Milliseconds	Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-12.0	at	92.6	Milliseconds	
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-003				

KARC Engineering



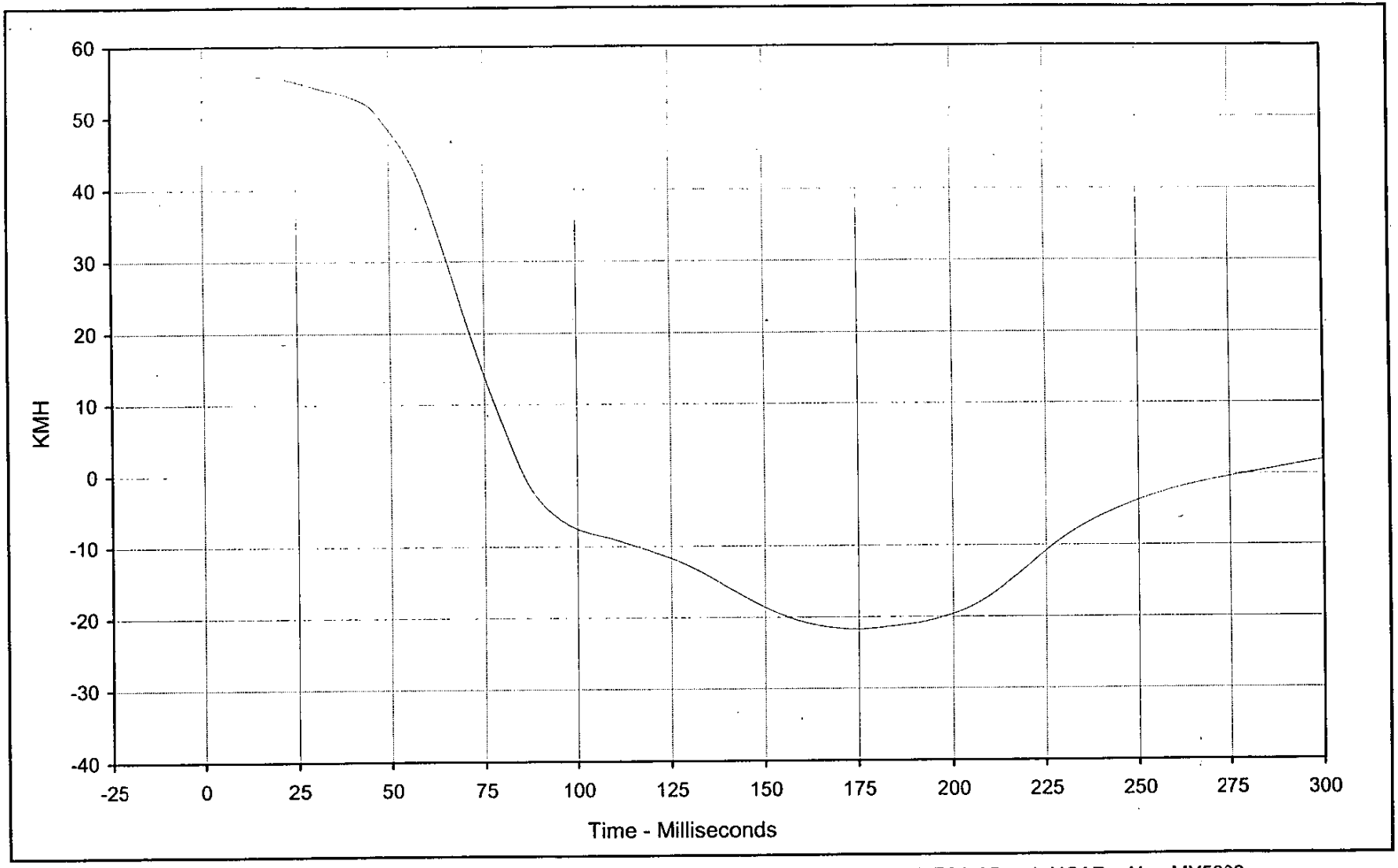
Curve Description:	Driver Head Resultant Primary			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	50.4	at	65.5 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	0.1	at	8.4 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	RES-001				

KARCO Engineering



Curve Description:	Driver Head Redundant X			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	13.4	at	221.7 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-48.8	at	65.9 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-004				

KARCO Engineering



Curve Description: Driver Head Redundant X Velocity

Maximum Value: 55.9 at 4.8 Milliseconds

Minimum Value: -21.7 at 174.5 Milliseconds

SAE Filter Class: 180

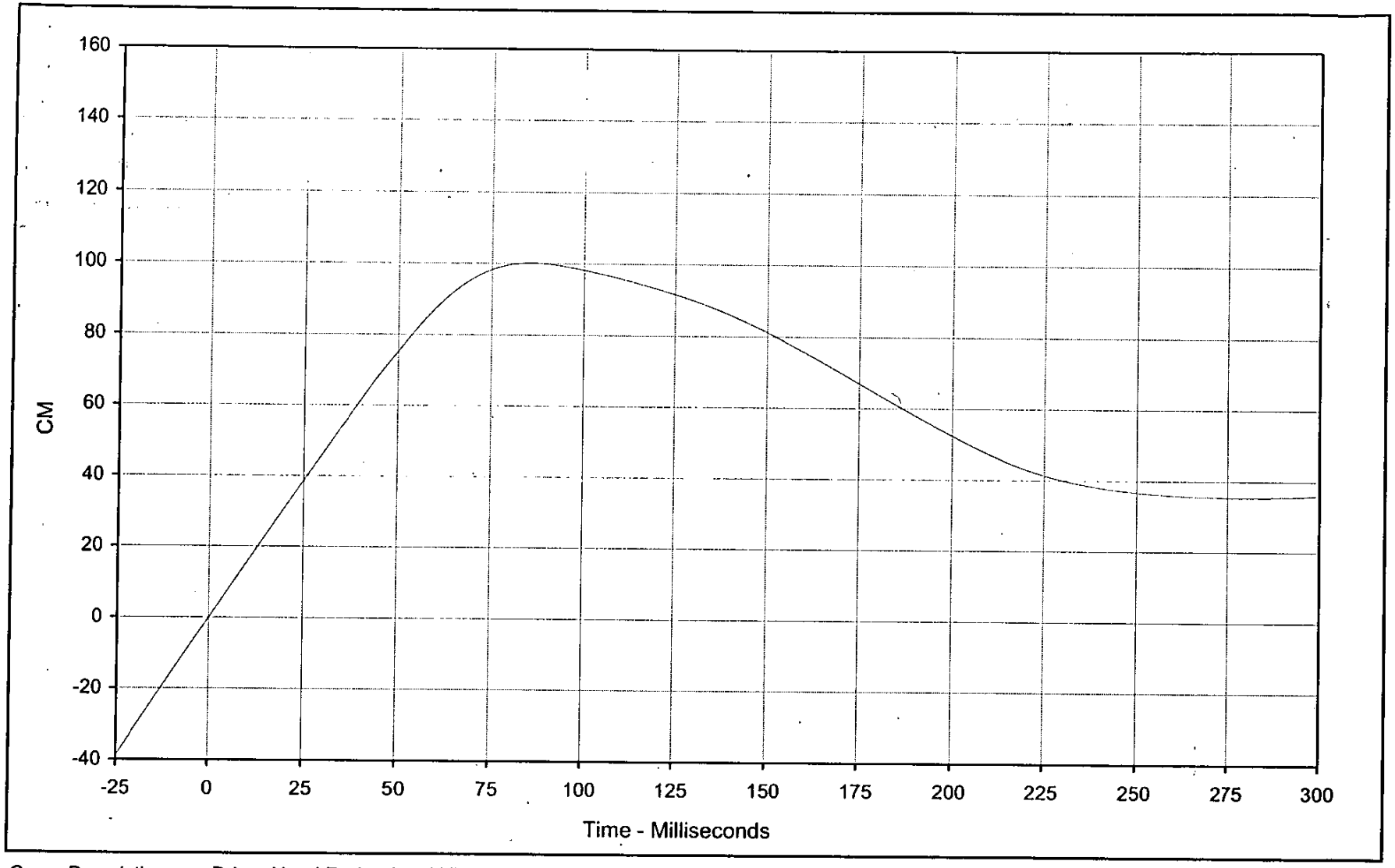
Date of Test: 12/16/99

Curve Number: IN1-004

Testing Program 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARC Engineering



Curve Description: Driver Head Redundant X Displ.

Maximum Value: 100.1 at 85.4 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

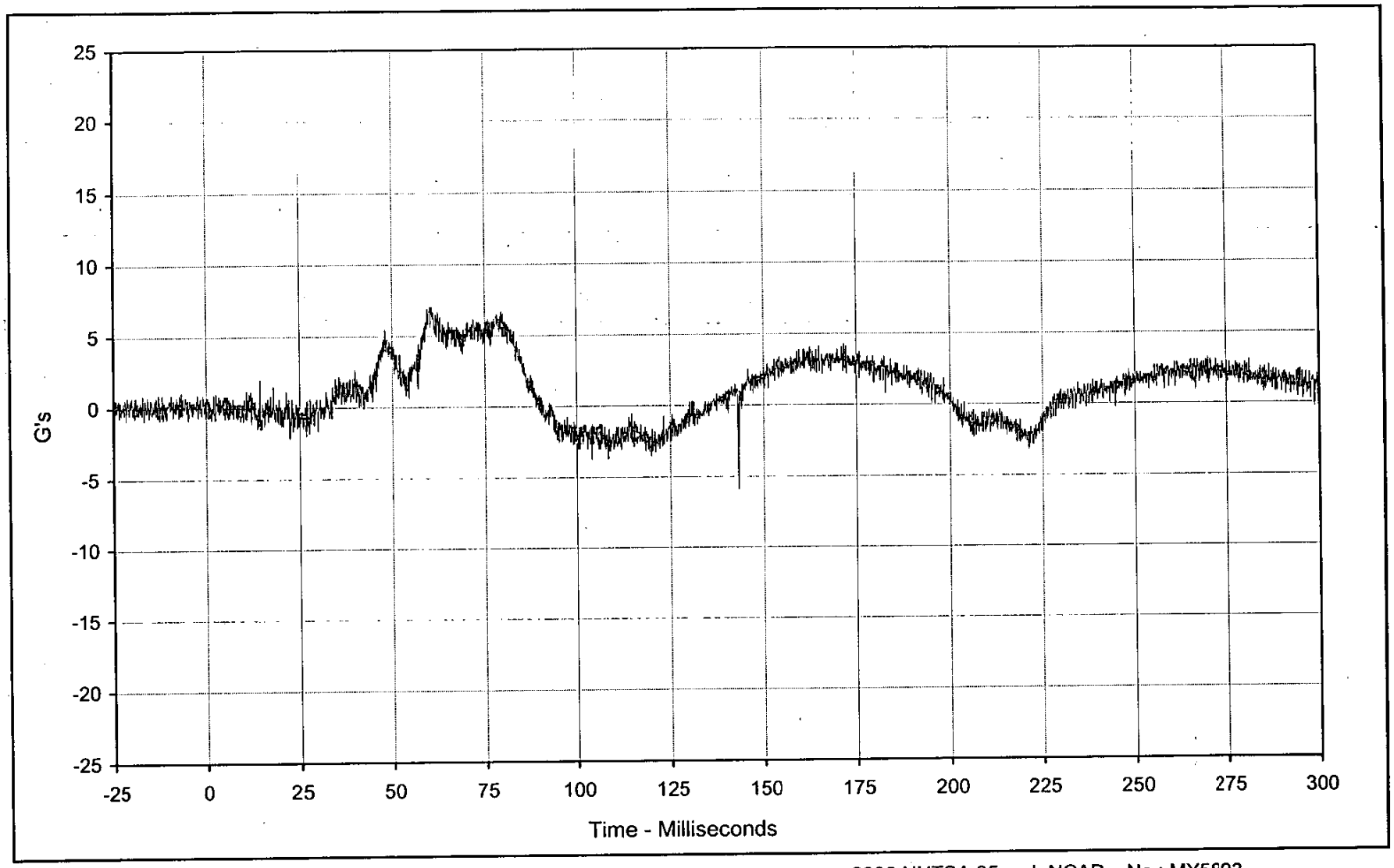
Date of Test: 12/16/99

Curve Number: IN2-004

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Driver Head Redundant Y

Maximum Value: 7.0 at 60.1 Milliseconds

Minimum Value: -5.8 at 143.3 Milliseconds

SAE Filter Class: 1000

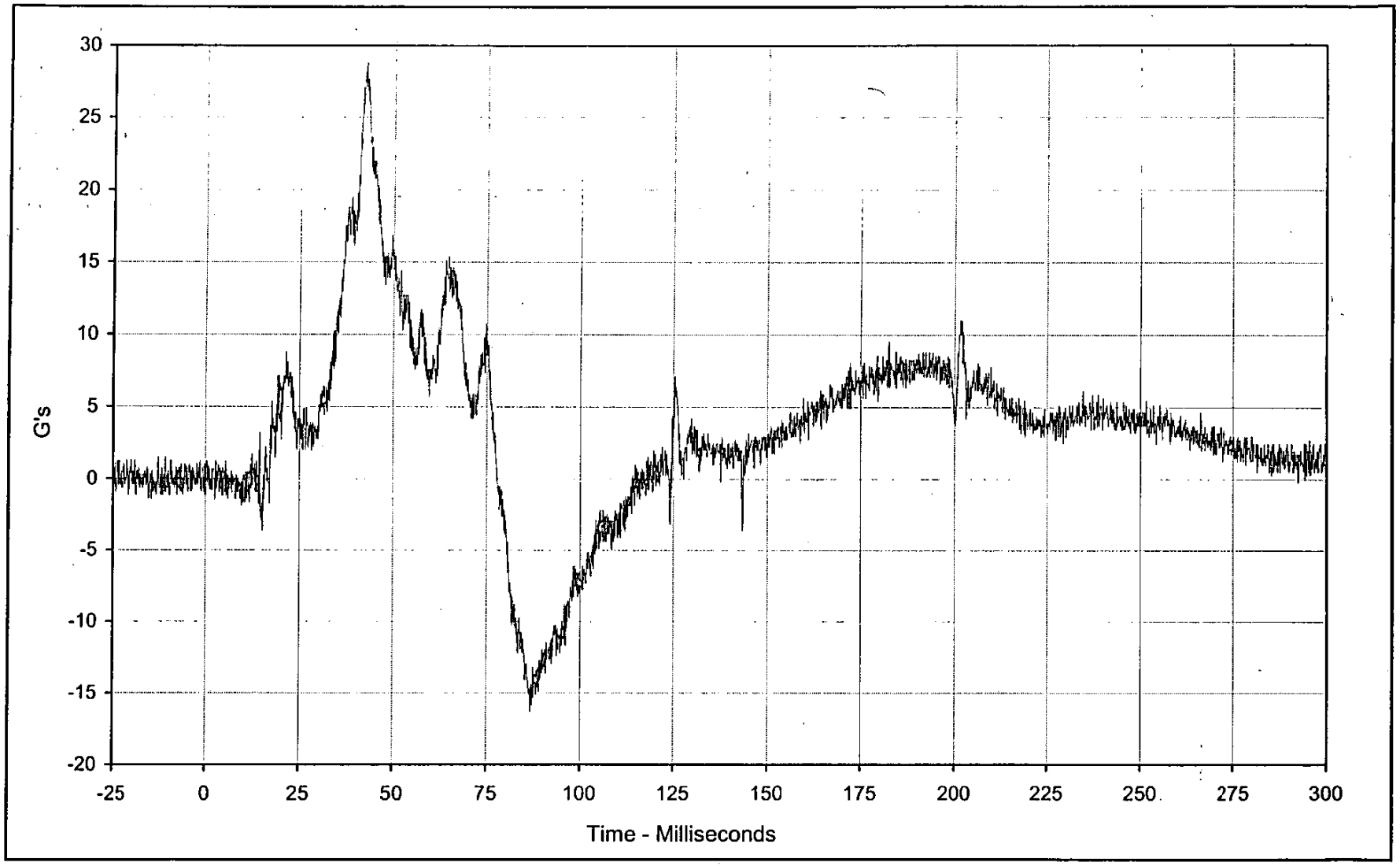
Date of Test: 12/16/99

Curve Number: FIL-005

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

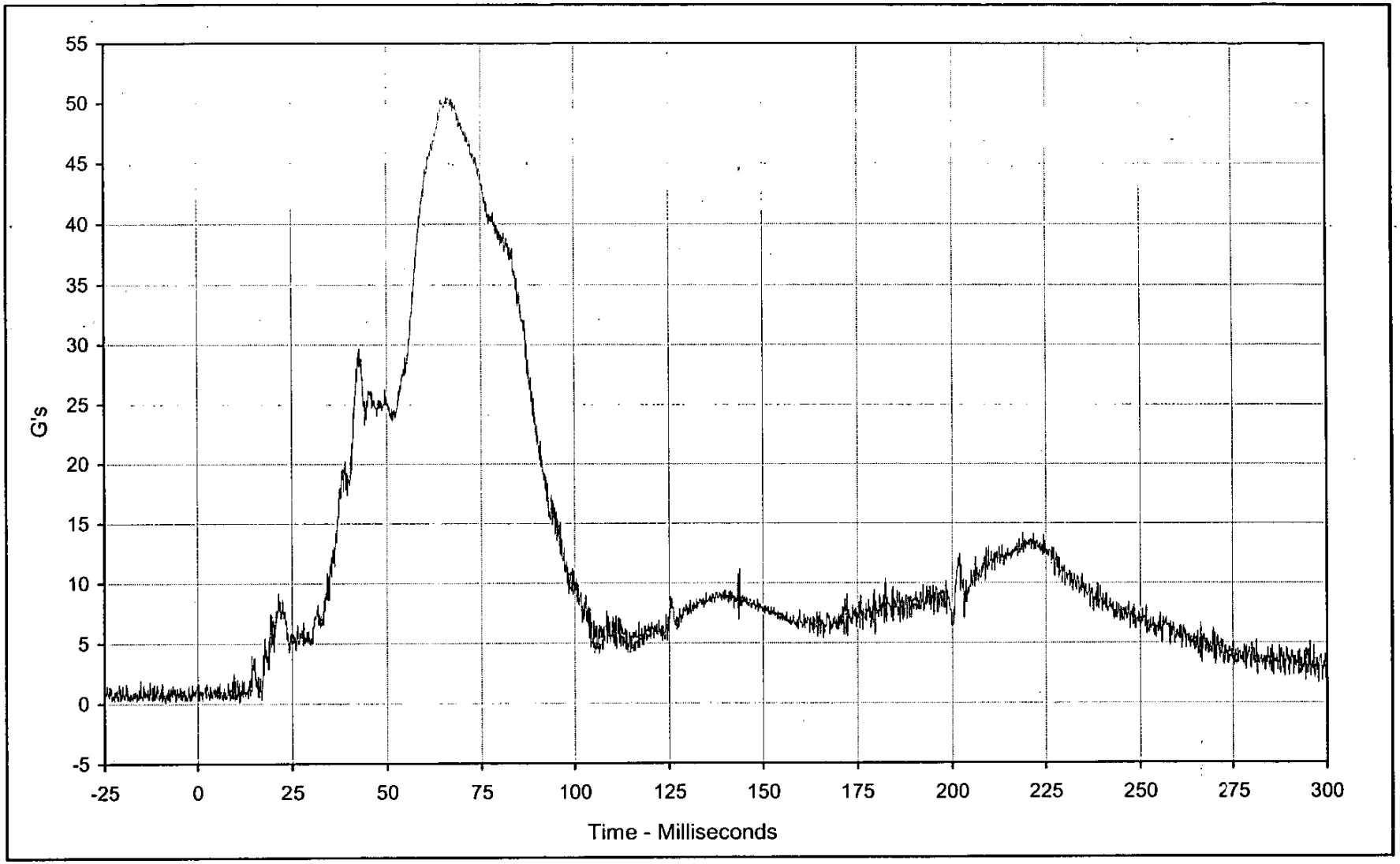
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



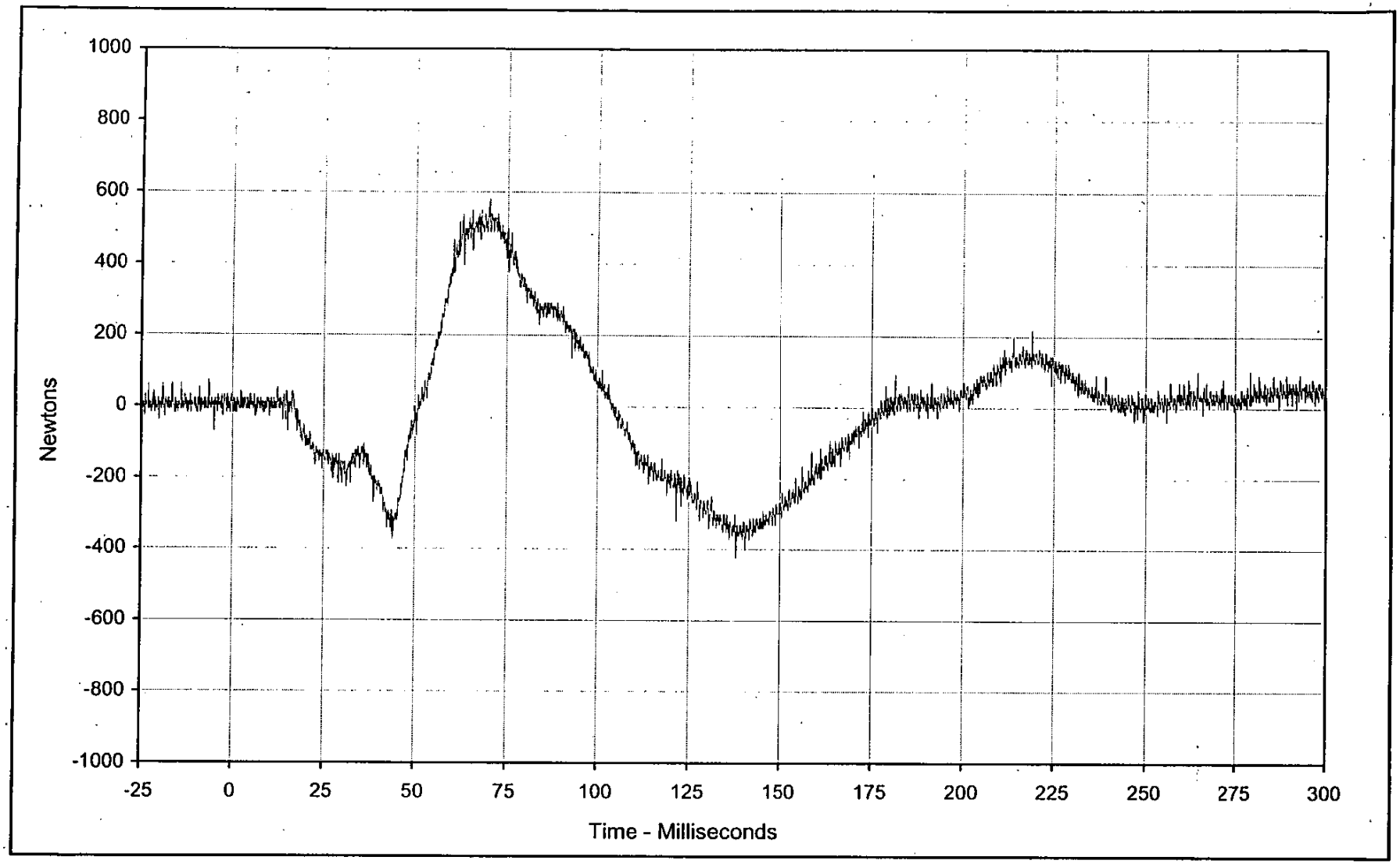
Curve Description:	Driver Head Redundant Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	28.8	at	42.8 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-16.3	at	86.6 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-006				

KARCO Engineering



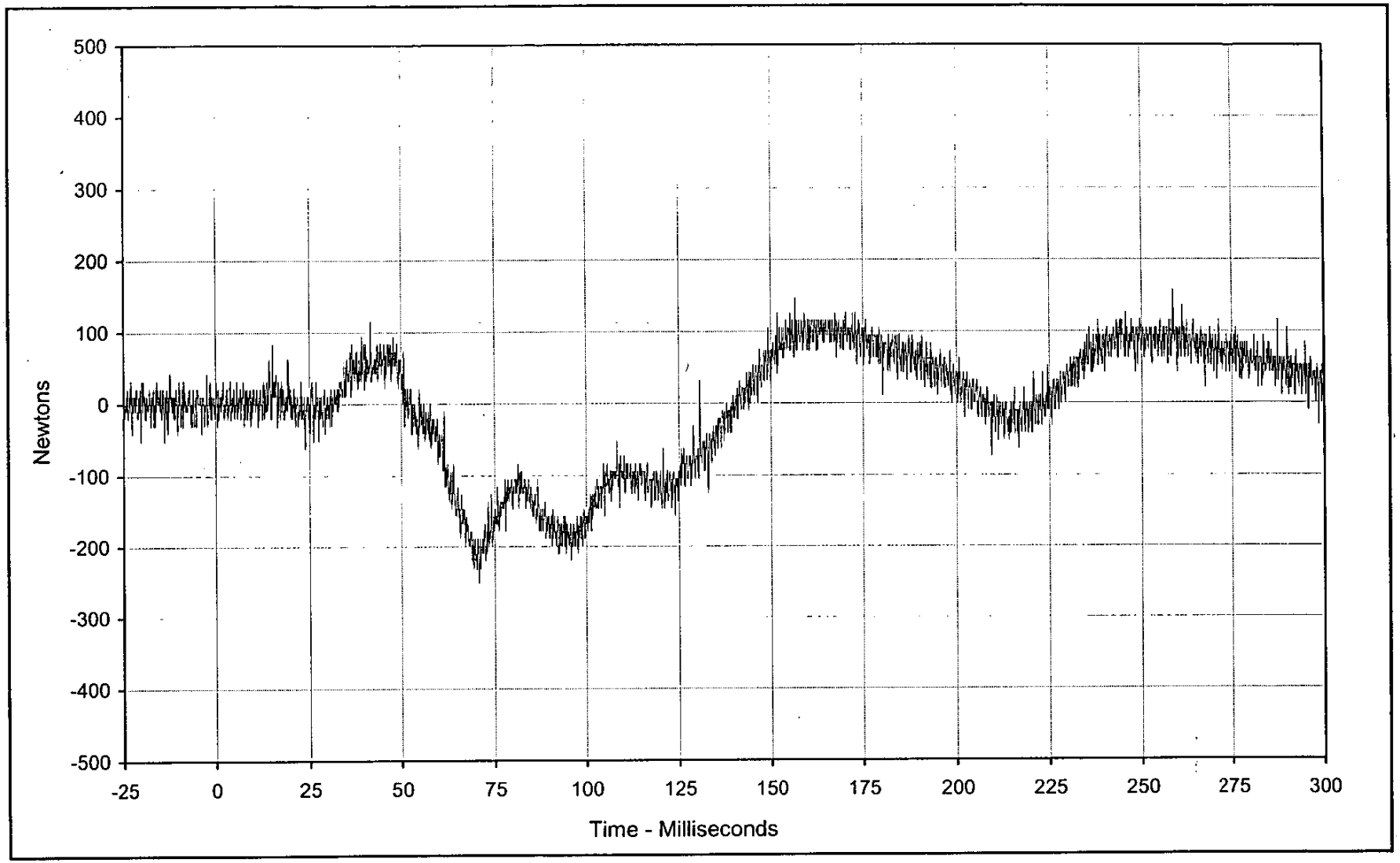
Curve Description:	Driver Head Resultant Redundant			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	50.6	at	65.9 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	0.1	at	11.1 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	RES-004				

KARCO Engineering



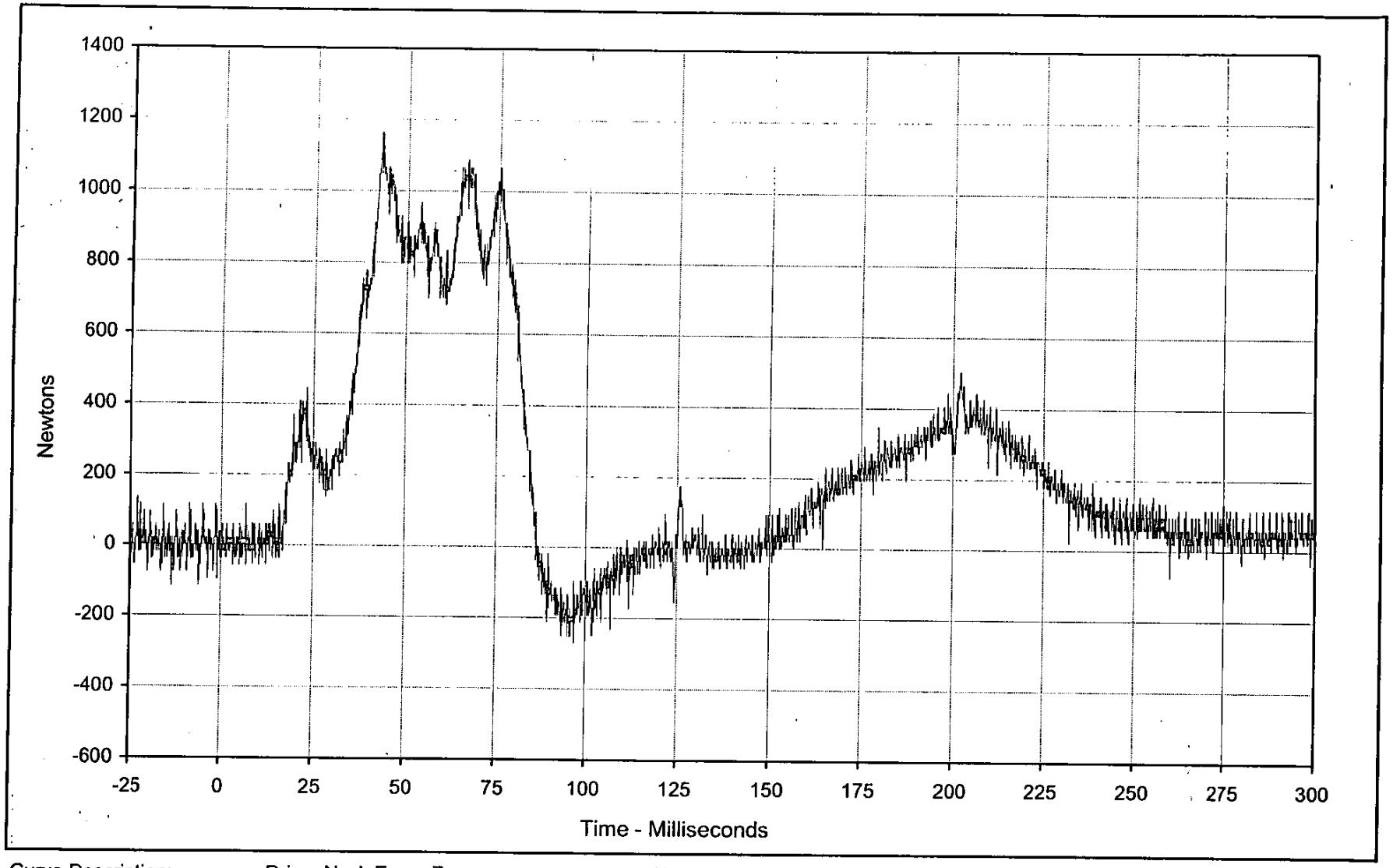
Curve Description:	Driver Neck Force X			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	580.5	at	70.1	Milliseconds	Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-425.0	at	137.9	Milliseconds	
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-007				

KARCO Engineering



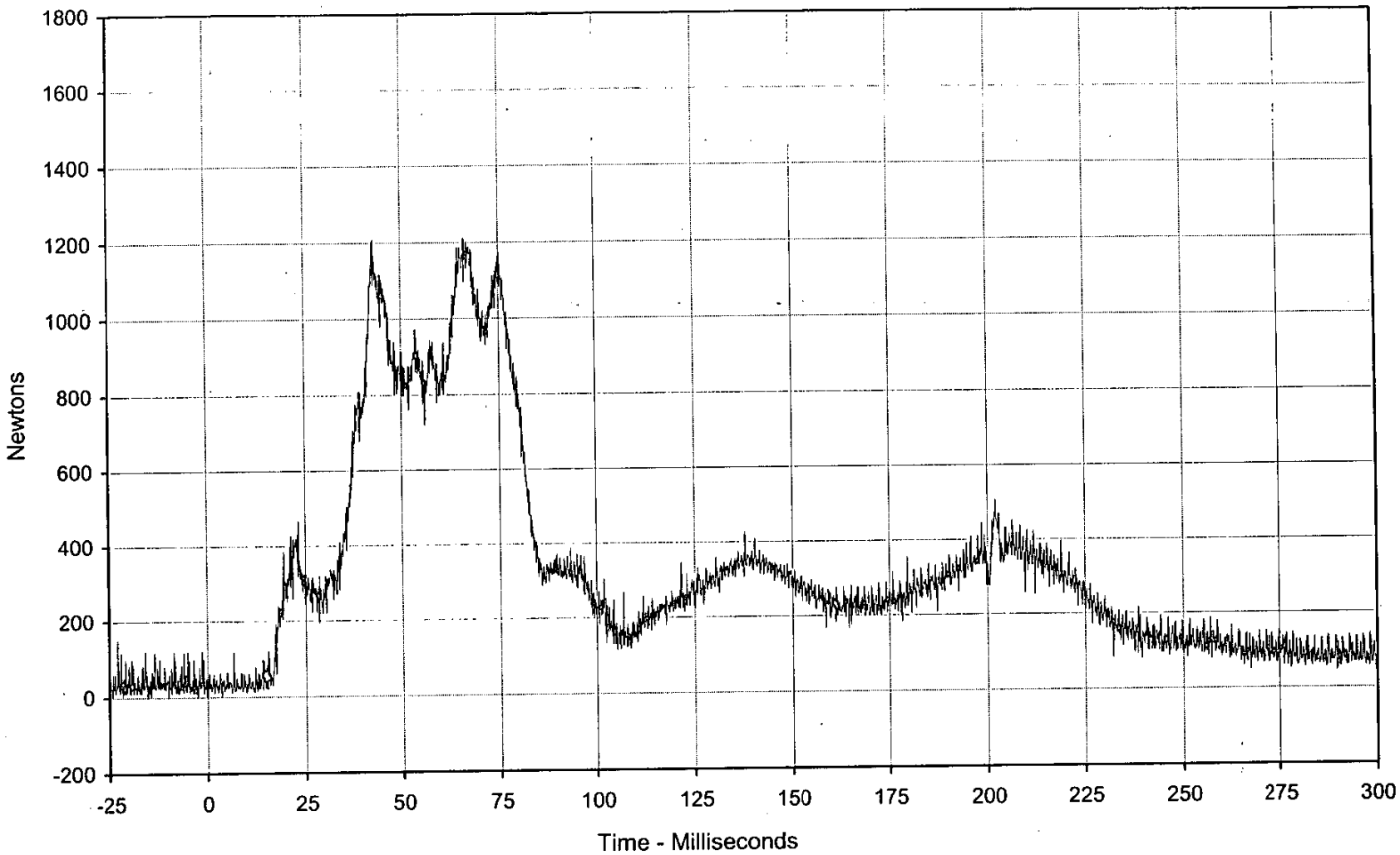
Curve Description:	Driver Neck Force Y			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	157.5	at	258.5 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-252.0	at	70.7 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-008				

KARC Engineering



Curve Description:	Driver Neck Force Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	1162.7	at	42.8 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-271.3	at	96.9 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-009				

KARCO Engineering



Curve Description: Driver Neck Force Resultant

Maximum Value: 1209.9 at 66.2 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 1000

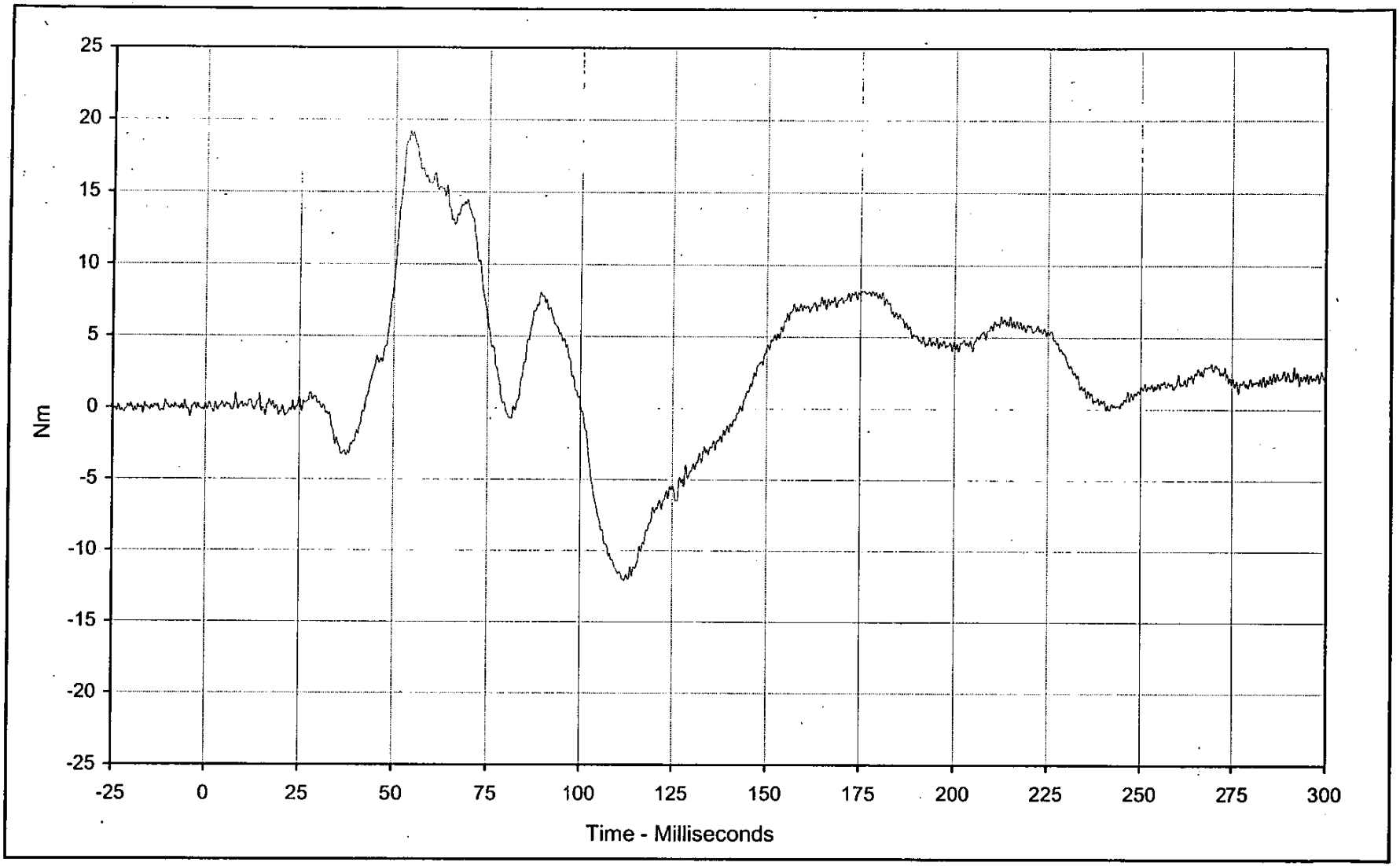
Date of Test: 12/16/99

Curve Number: RES-007

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

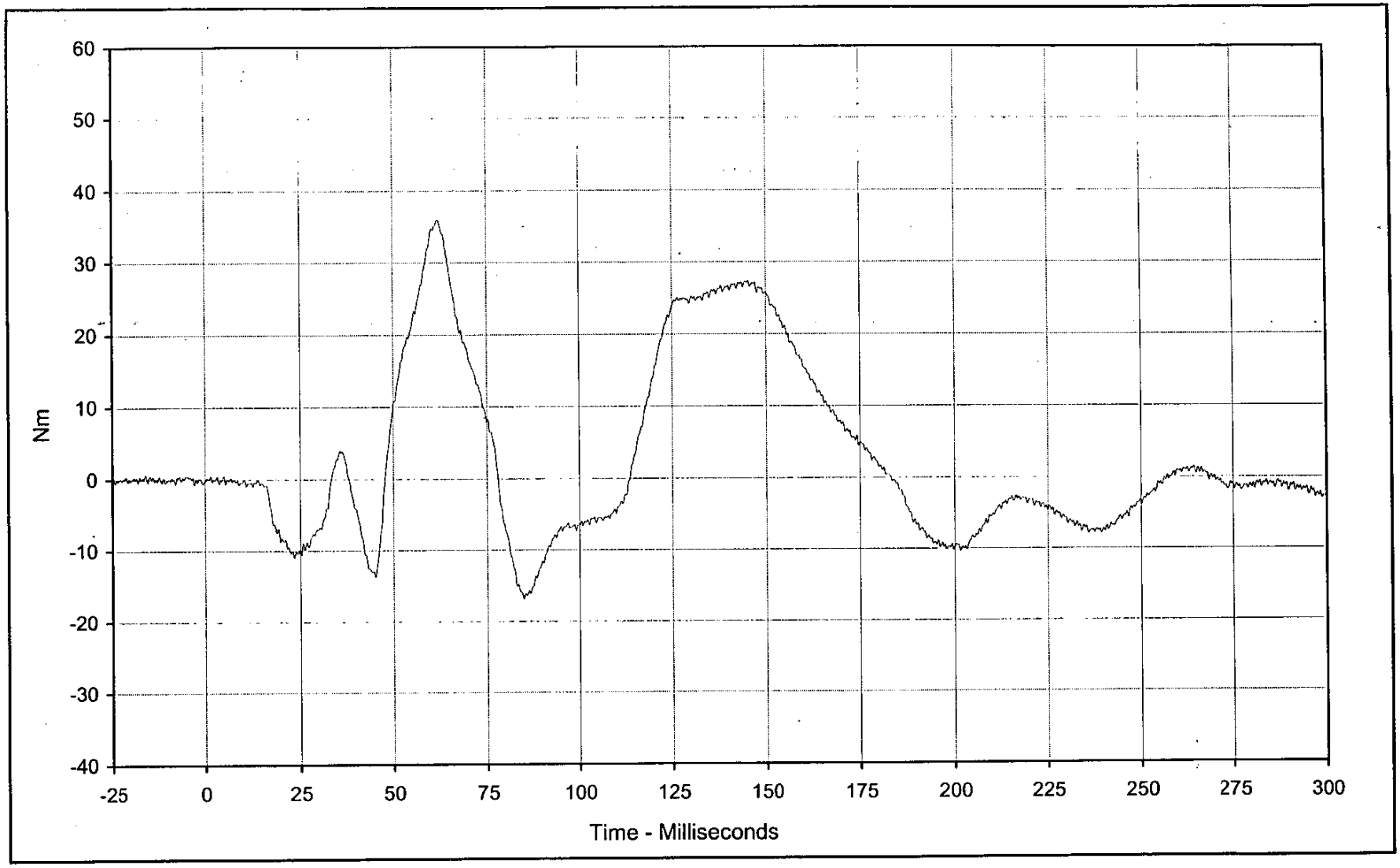
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description:	Driver Neck Moment X			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	19.2	at	54.0 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-12.1	at	111.9 Milliseconds		
SAE Filter Class:	600				
Date of Test:	12/16/99				
Curve Number:	FIL-010				

KARCO Engineering



Curve Description: Driver Neck Moment Y

Maximum Value: 36.0 at 62.0 Milliseconds

Minimum Value: -16.8 at 84.7 Milliseconds

SAE Filter Class: 600

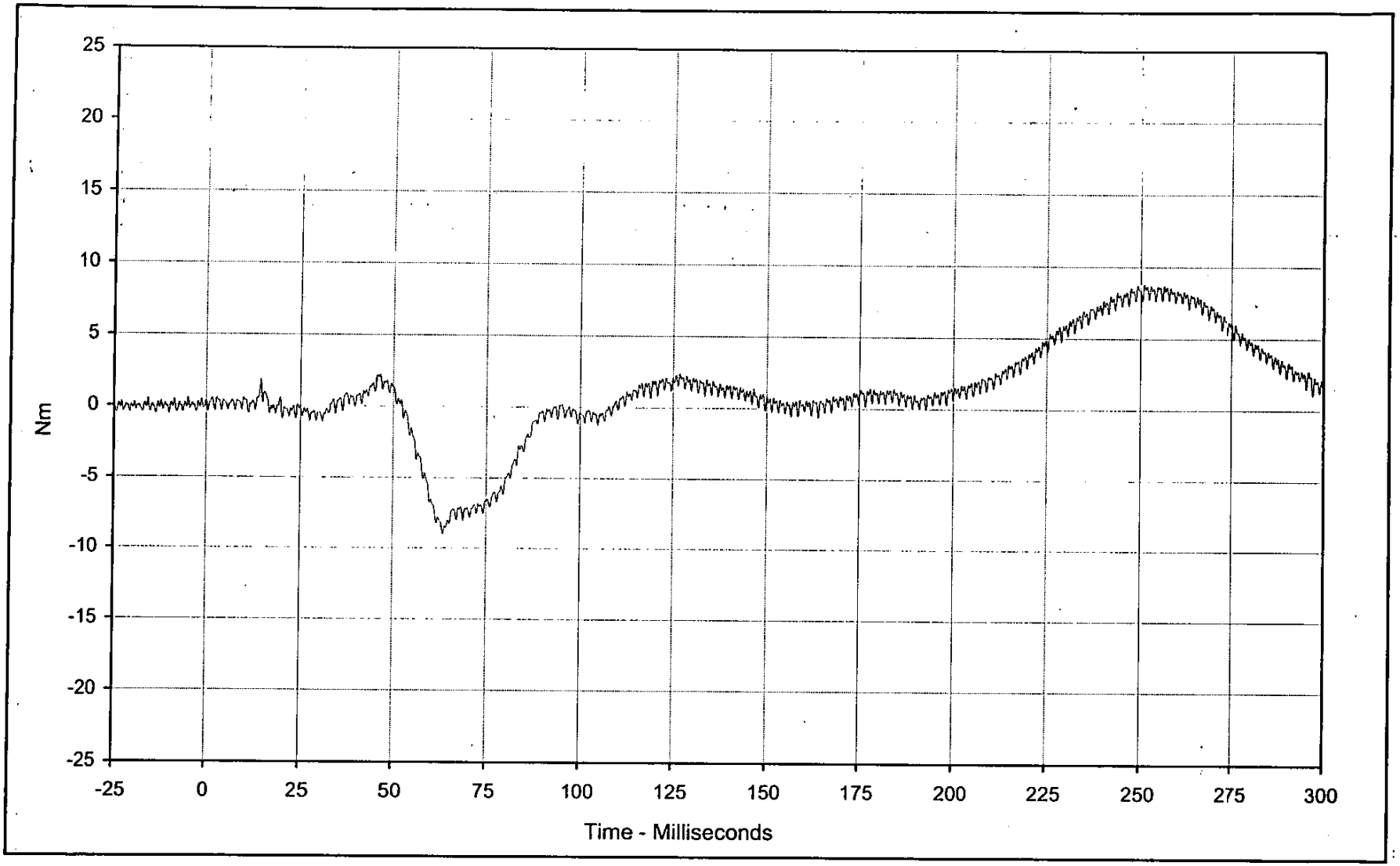
Date of Test: 12/16/99

Curve Number: FIL-011

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

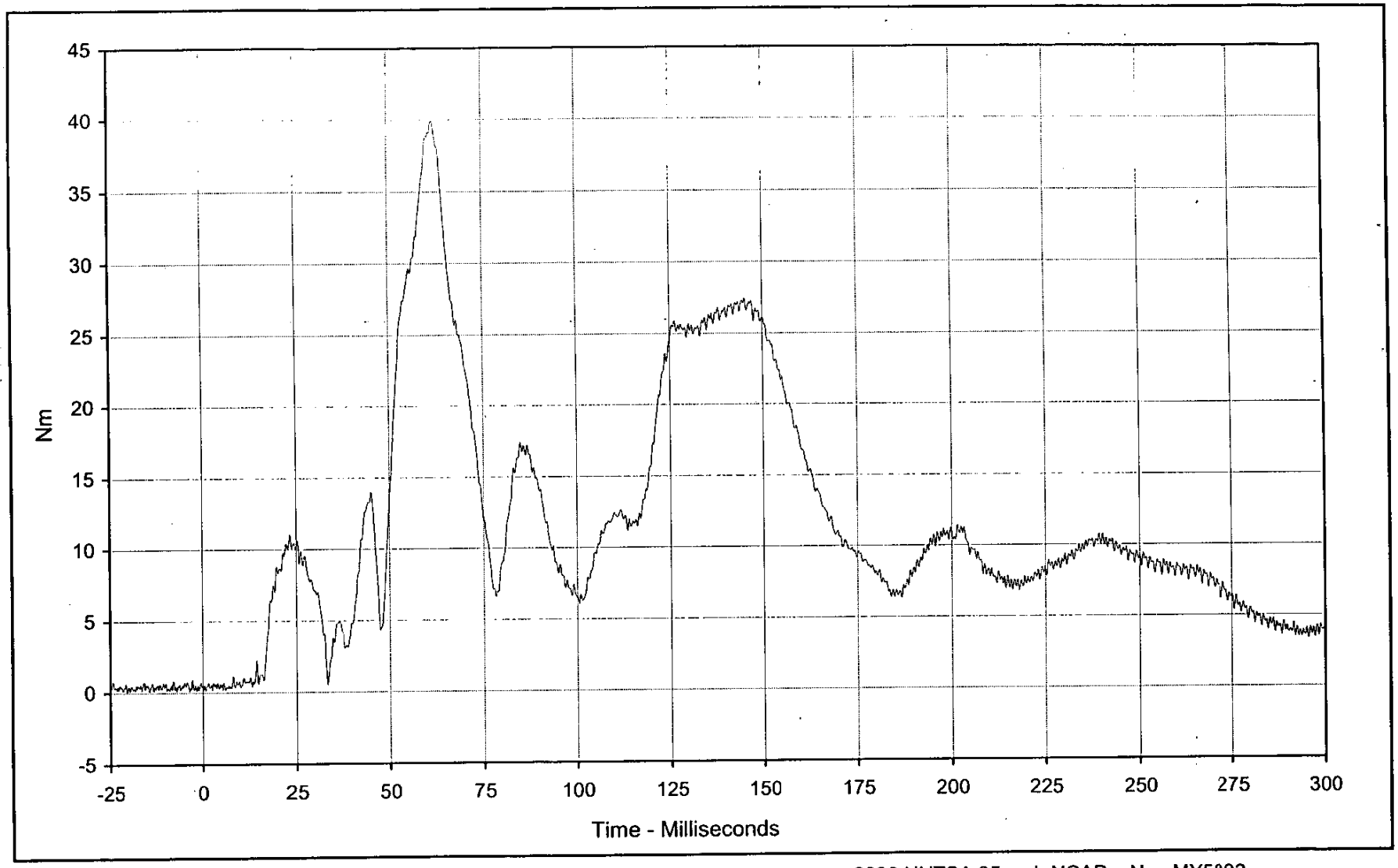
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



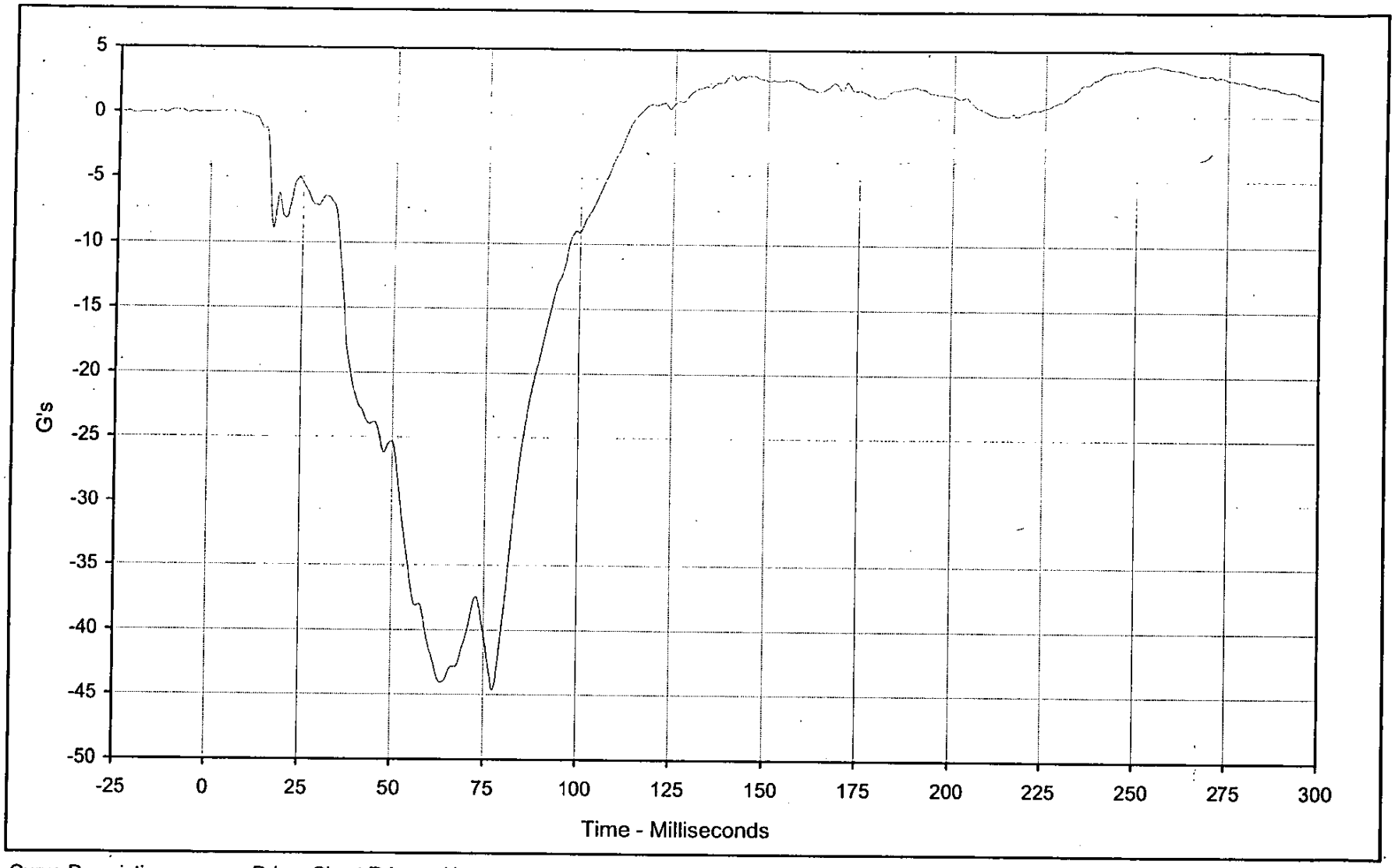
Curve Description:	Driver Neck Moment Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	8.8	at	250.9 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-9.0	at	63.4 Milliseconds		
SAE Filter Class:	600				
Date of Test:	12/16/99				
Curve Number:	FIL-012				

KARCO Engineering



Curve Description:	Driver Neck Moment Resultant			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	39.9	at	61.9 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	0.1	at	0.7 Milliseconds		
SAE Filter Class:	600				
Date of Test:	12/16/99				
Curve Number:	RES-010				

KARCO Engineering

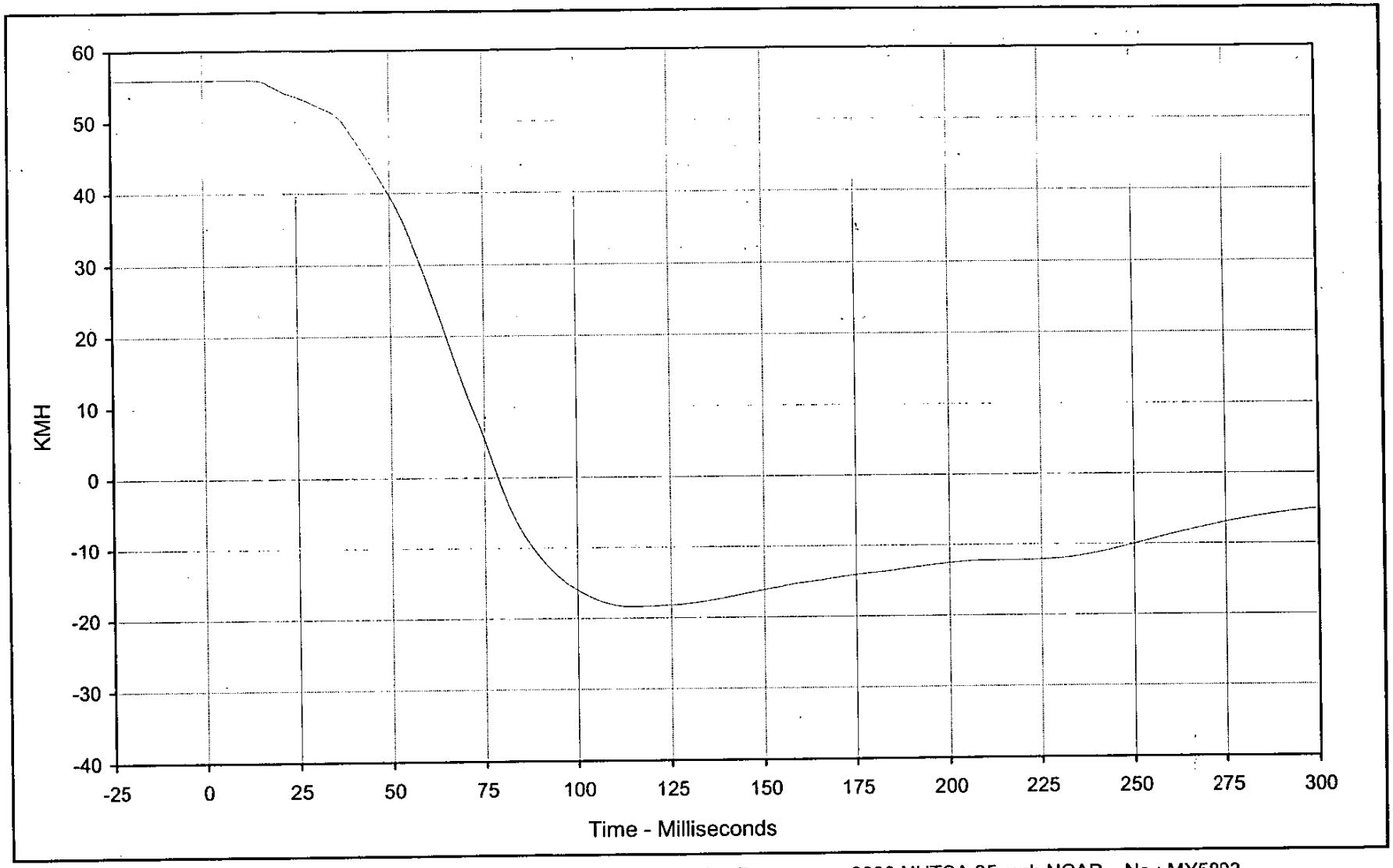


Curve Description:	Driver Chest Primary X			
Maximum Value:	3.9	at	255.2	Milliseconds
Minimum Value:	-44.6	at	77.3	Milliseconds
SAE Filter Class:	180			
Date of Test:	12/16/99			
Curve Number:	FIL-013			

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Driver Chest Primary X Velocity

Maximum Value: 55.9 at 7.8 Milliseconds

Minimum Value: -18.4 at 115.4 Milliseconds

SAE Filter Class: 180

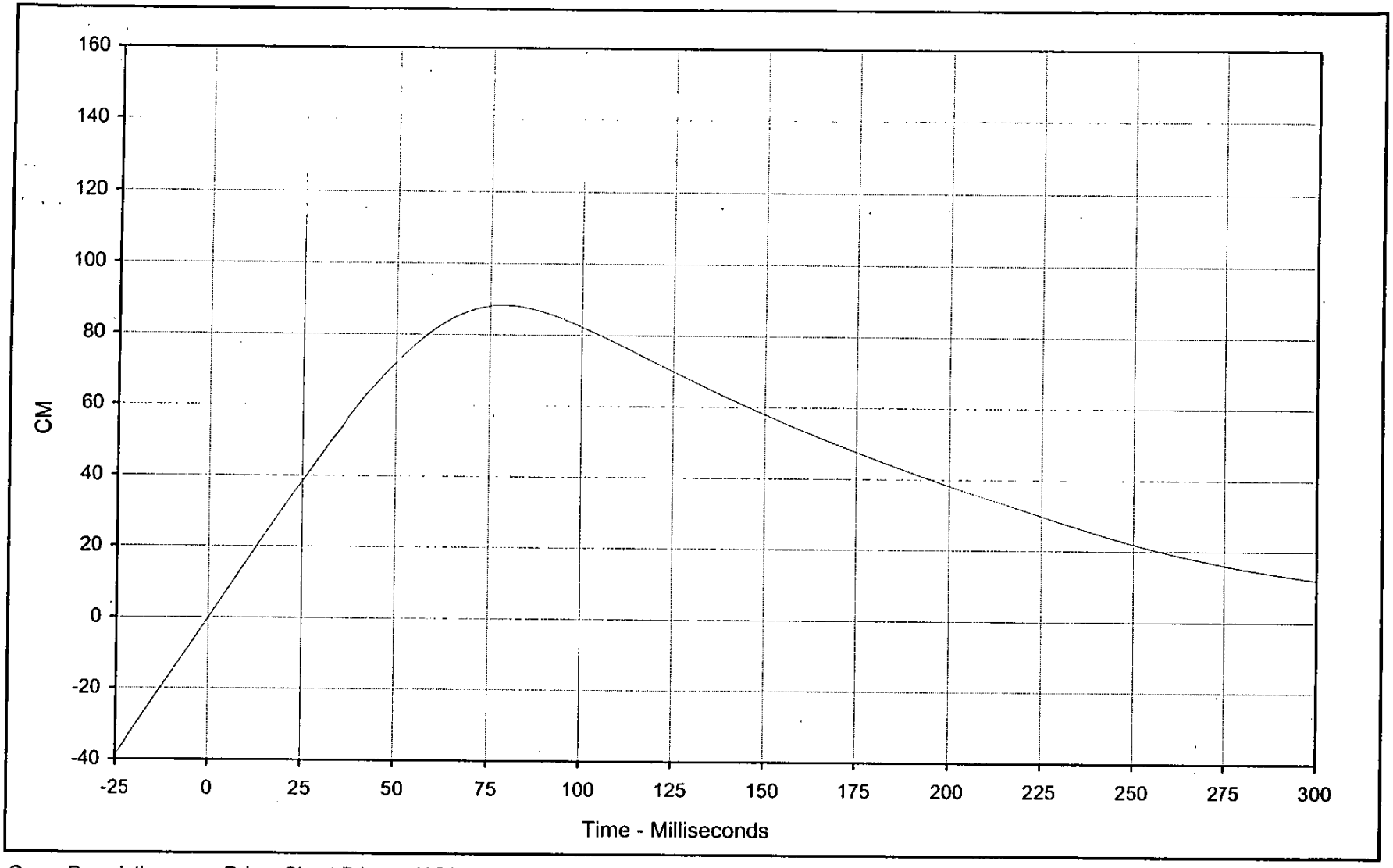
Date of Test: 12/16/99

Curve Number: IN1-013

Testing Program 2000 NHTSA 35 mph NCAP No.: MY5803

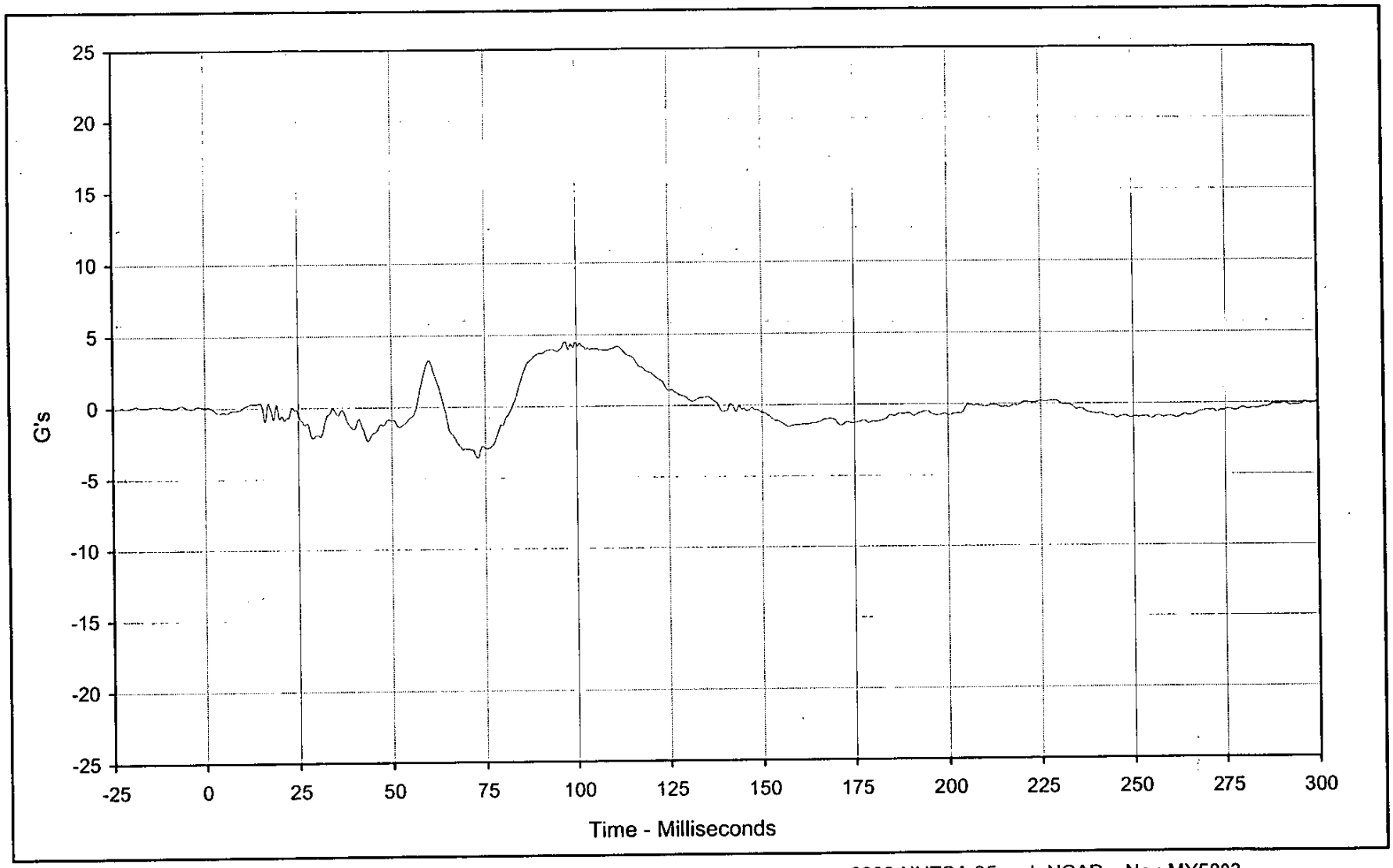
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



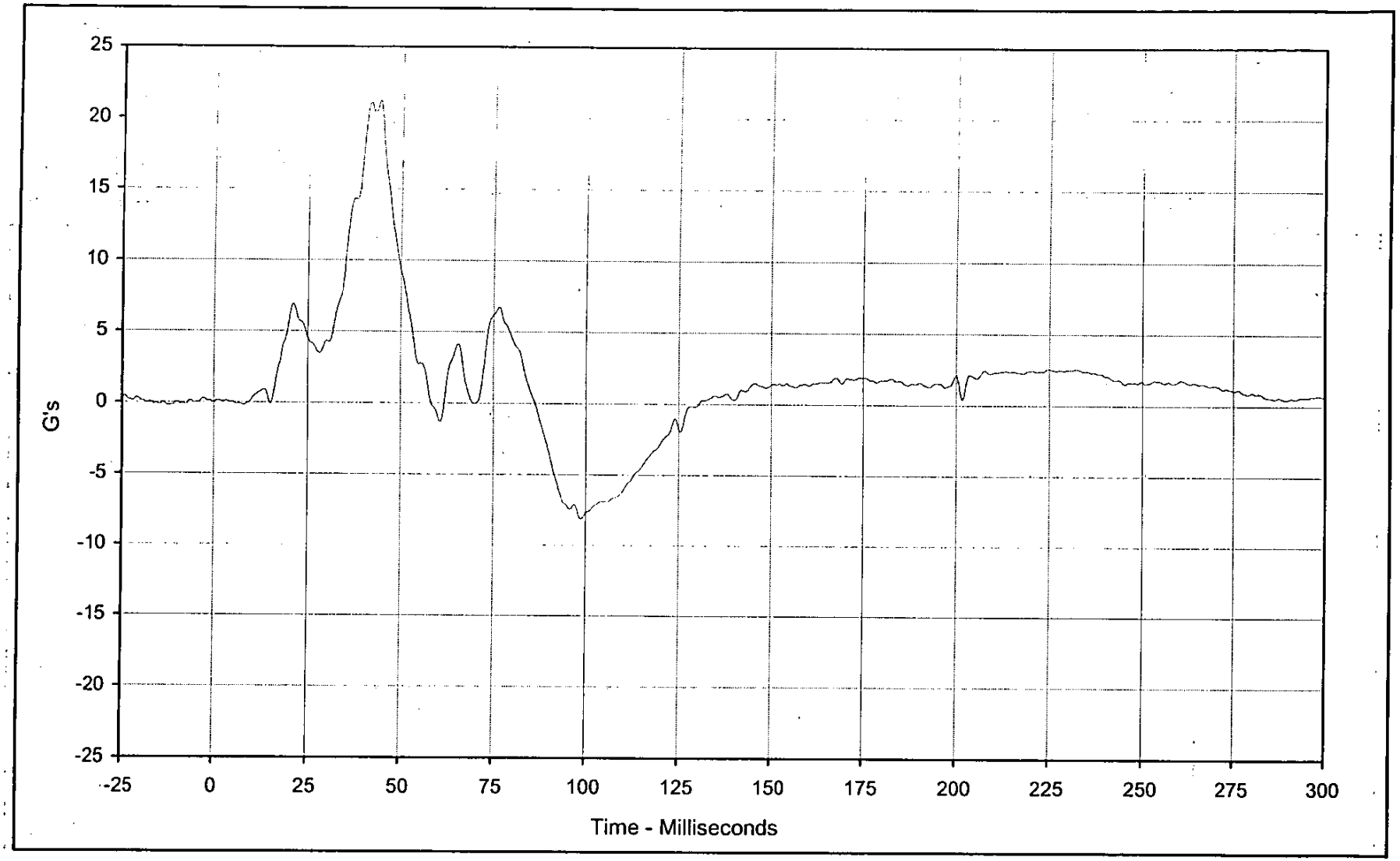
Curve Description:	Driver Chest Primary X Displ.			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	88.3	at	78.5 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	0.0	at	0.0 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	IN2-013				

KARCO Engineering



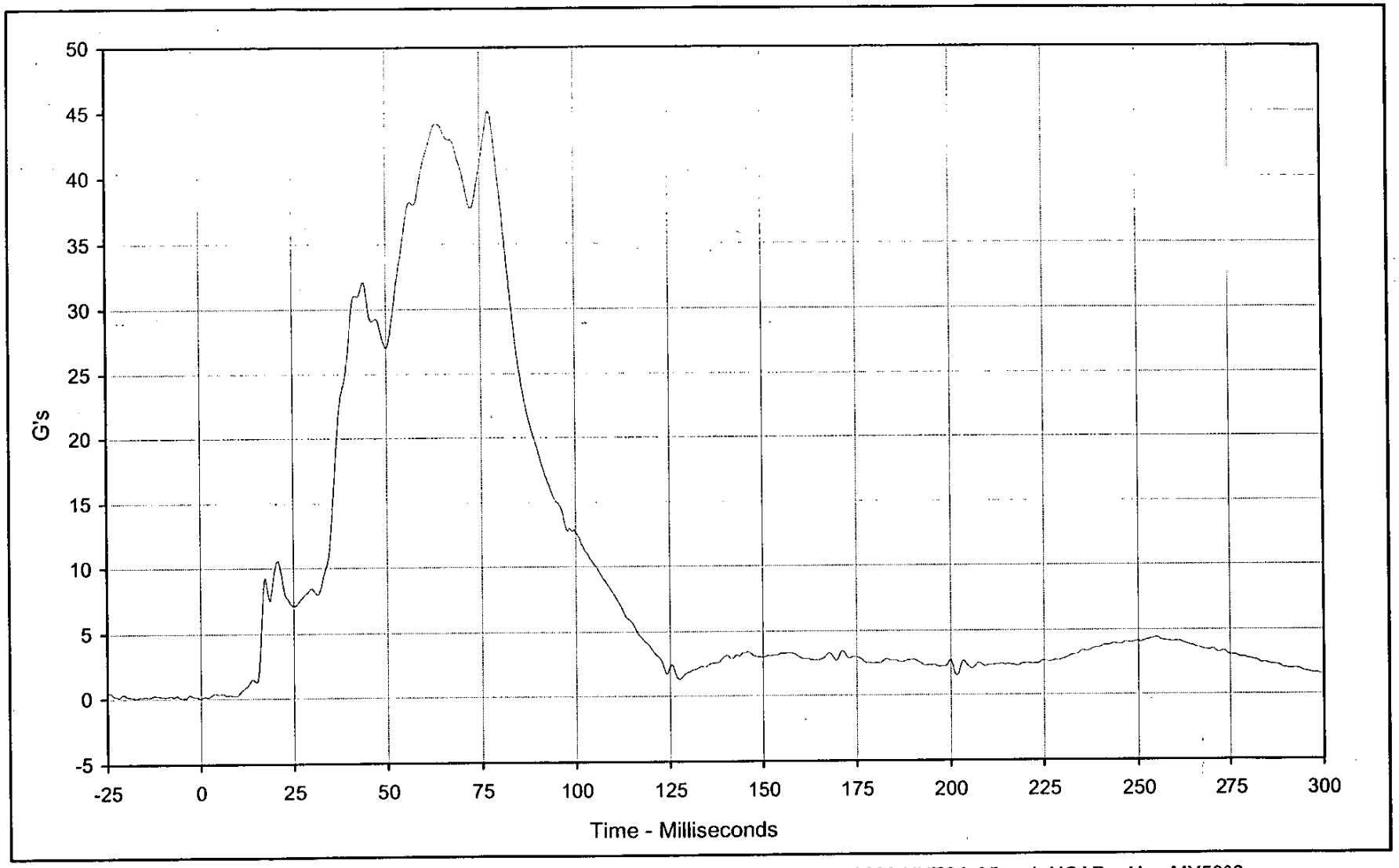
Curve Description:	Driver Chest Primary Y			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	4.5	at	96.8 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-3.6	at	73.0 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	FIL-014				

KARCO Engineering



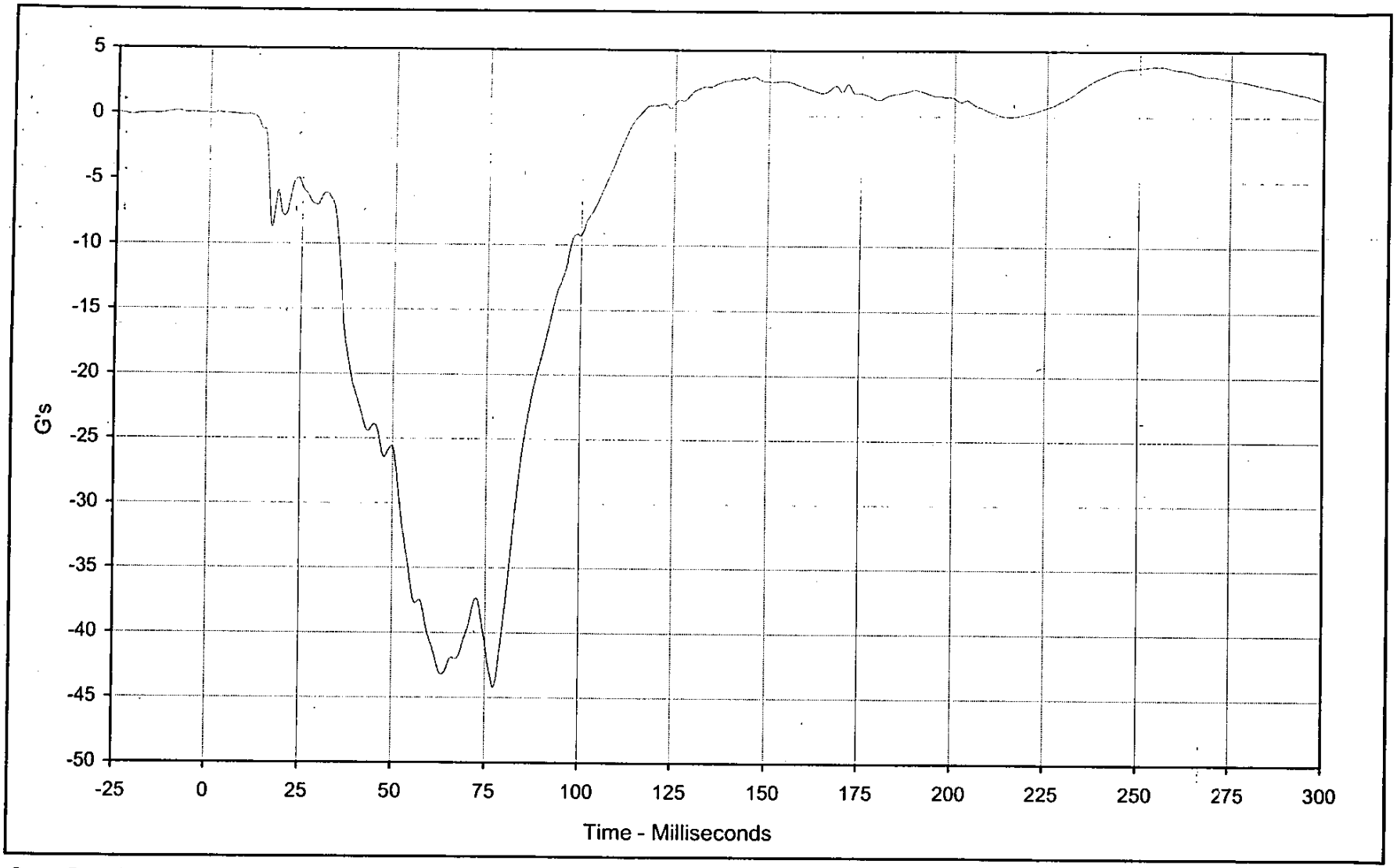
Curve Description:	Driver Chest Primary Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	21.2	at	44.0 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-8.1	at	98.7 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	FIL-015				

KARCO Engineering



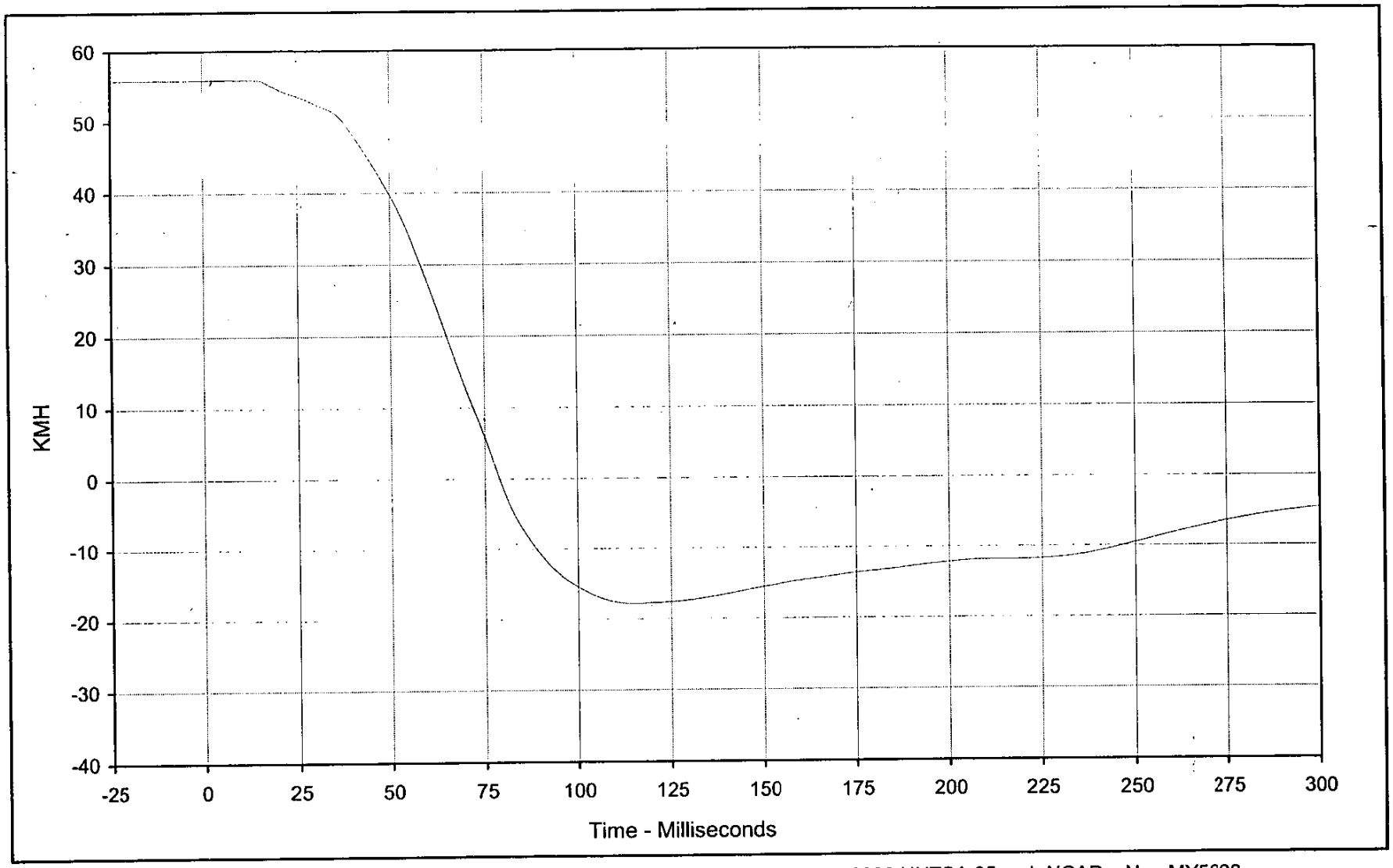
Curve Description:	Driver Chest Resultant Primary			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	45.1	at	77.3 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	0.0	at	0.0 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	RES-013				

KARC Engineering



Curve Description:	Driver Chest Redundant X			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	3.8	at	256.1 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-44.2	at	77.1 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	FIL-016				

KARCO Engineering



Curve Description: Driver Chest Redundant X Velocity

Maximum Value: 55.9 at 4.4 Milliseconds

Minimum Value: -17.8 at 115.4 Milliseconds

SAE Filter Class: 180

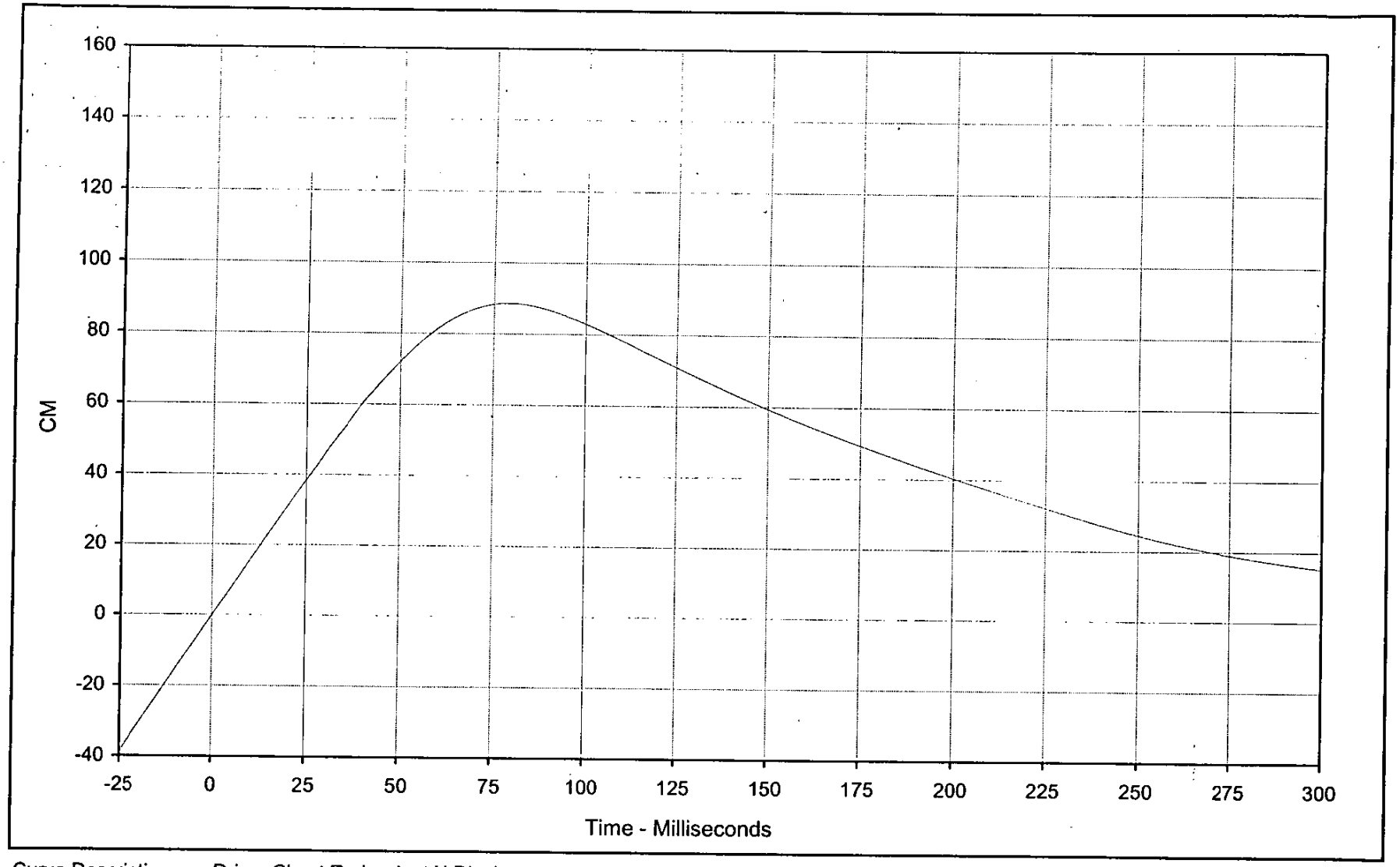
Date of Test: 12/16/99

Curve Number: IN1-016

Testing Program 2000 NHTSA 35 mph NCAP No.: MY5803

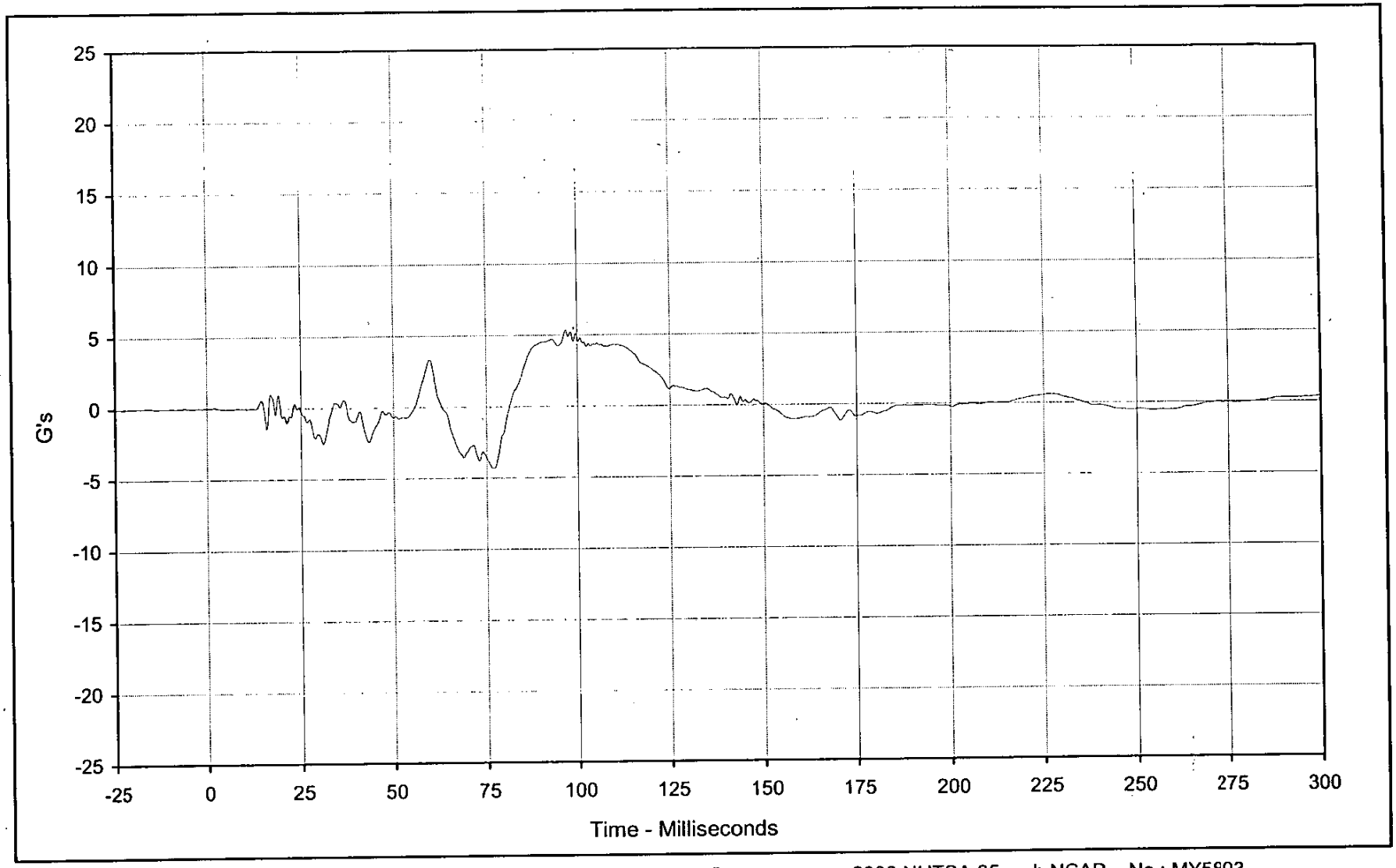
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



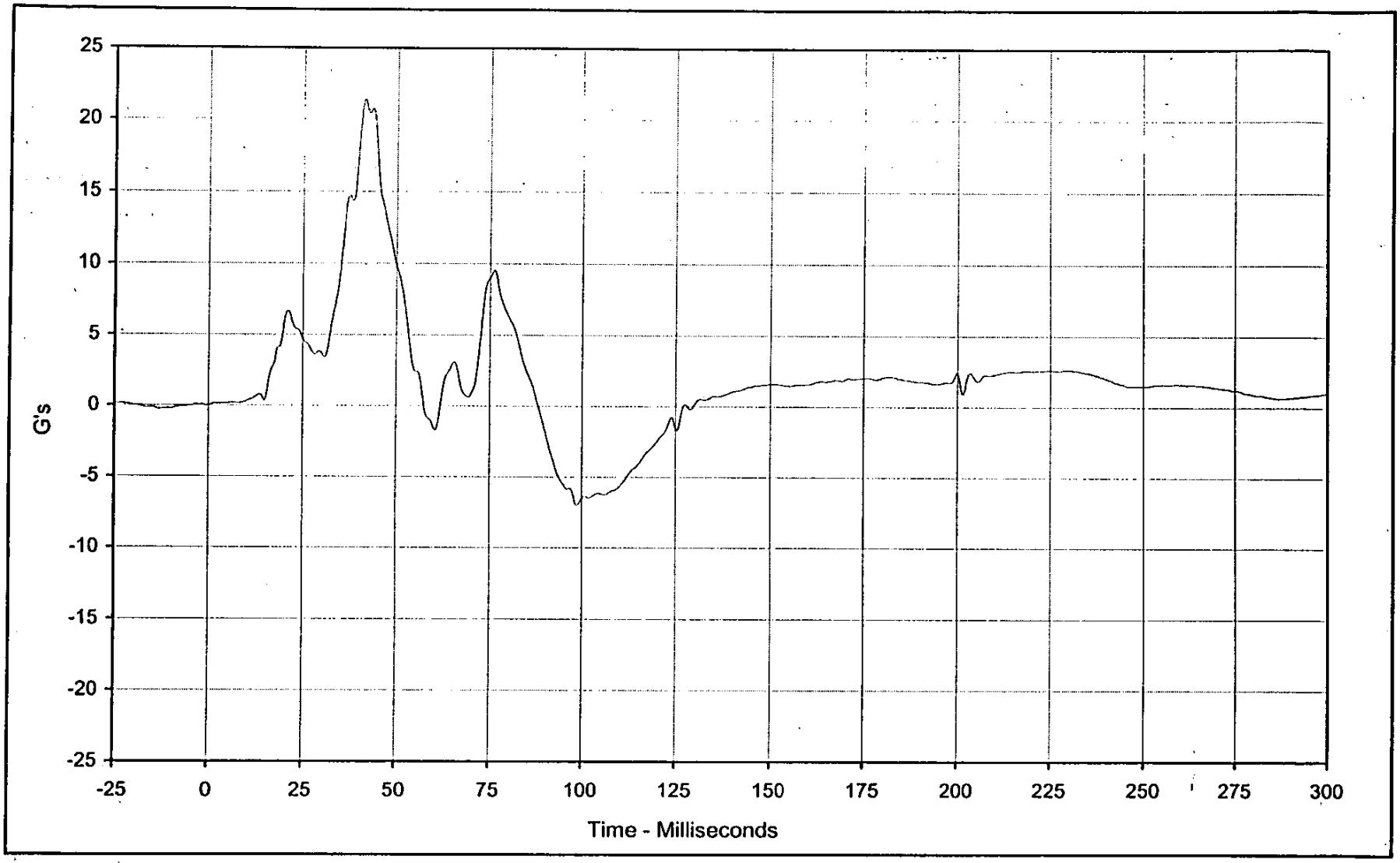
Curve Description:	Driver Chest Redundant X Displ.			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	88.6	at	78.8 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	0.0	at	0.0 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	IN2-016				

KARCO Engineering



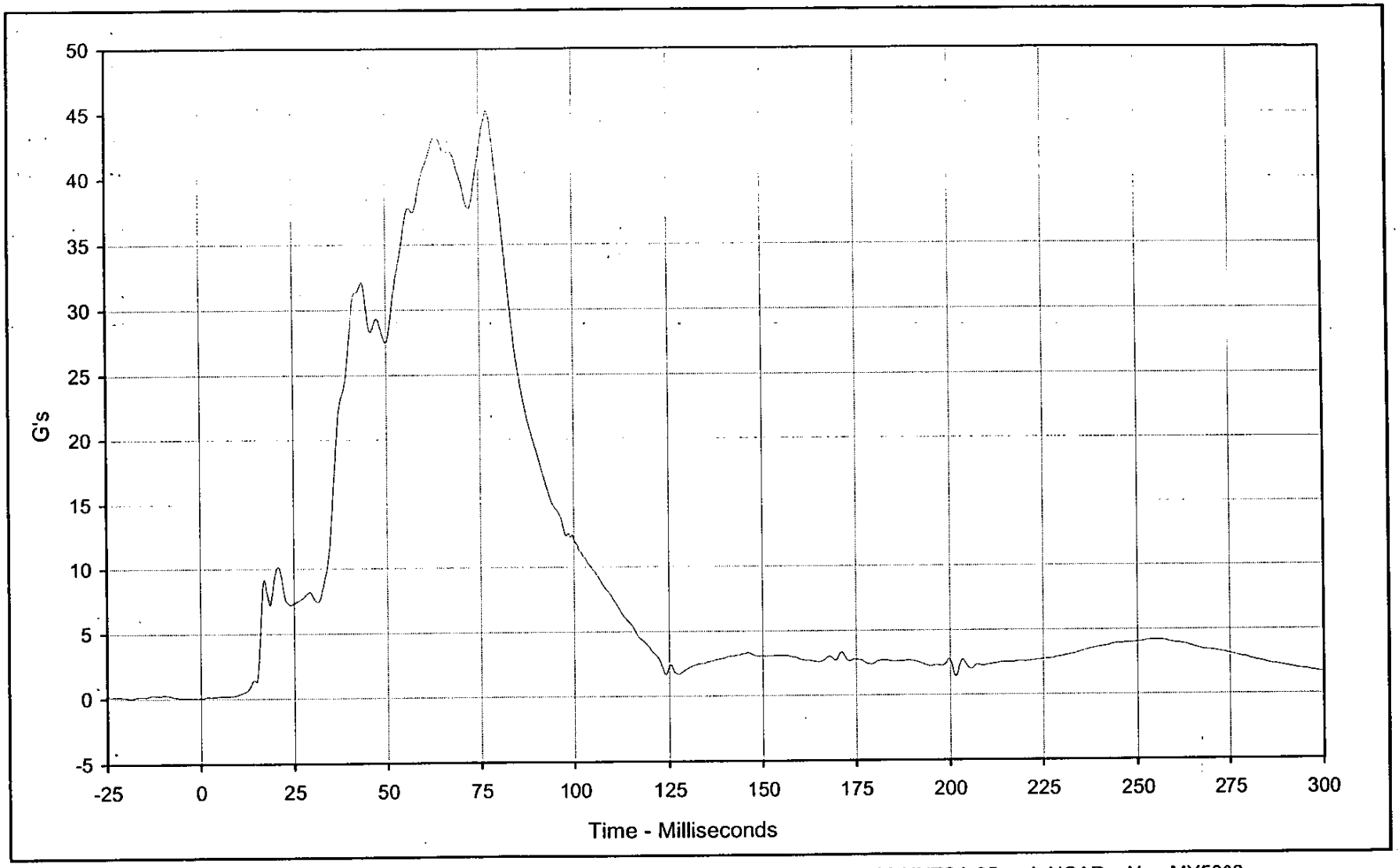
Curve Description:	Driver Chest Redundant Y			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	5.4	at	96.8 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-4.3	at	77.1 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	FIL-017				

KARCO Engineering



Curve Description:	Driver Chest Redundant Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	21.4	at	41.5 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-7.0	at	98.6 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	FIL-018				

KARCO Engineering



Curve Description: Driver Chest Resultant Redundant

Maximum Value: 45.2 at 77.0 Milliseconds

Minimum Value: 0.0 at 0.3 Milliseconds

SAE Filter Class: 180

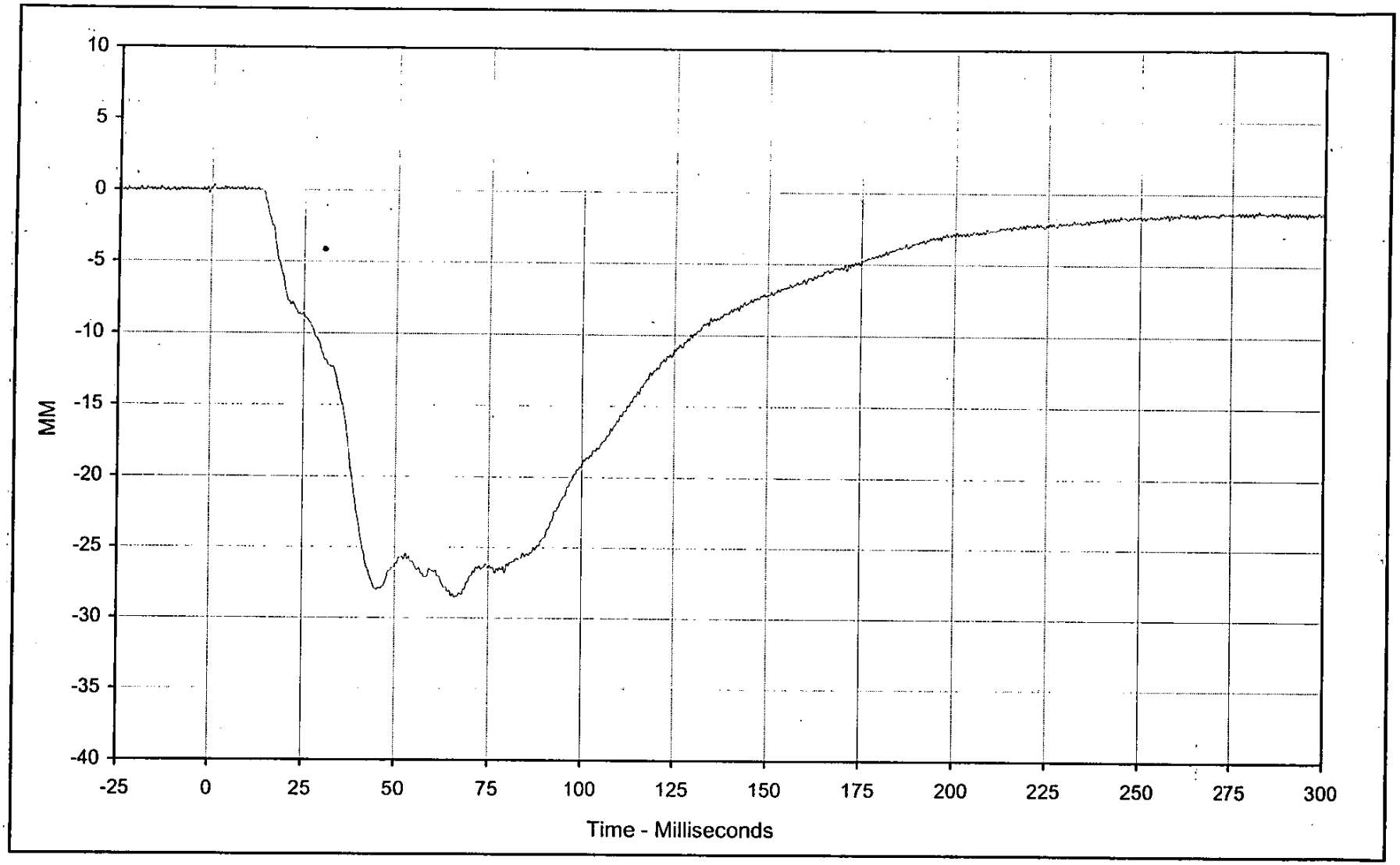
Date of Test: 12/16/99

Curve Number: RES-016

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

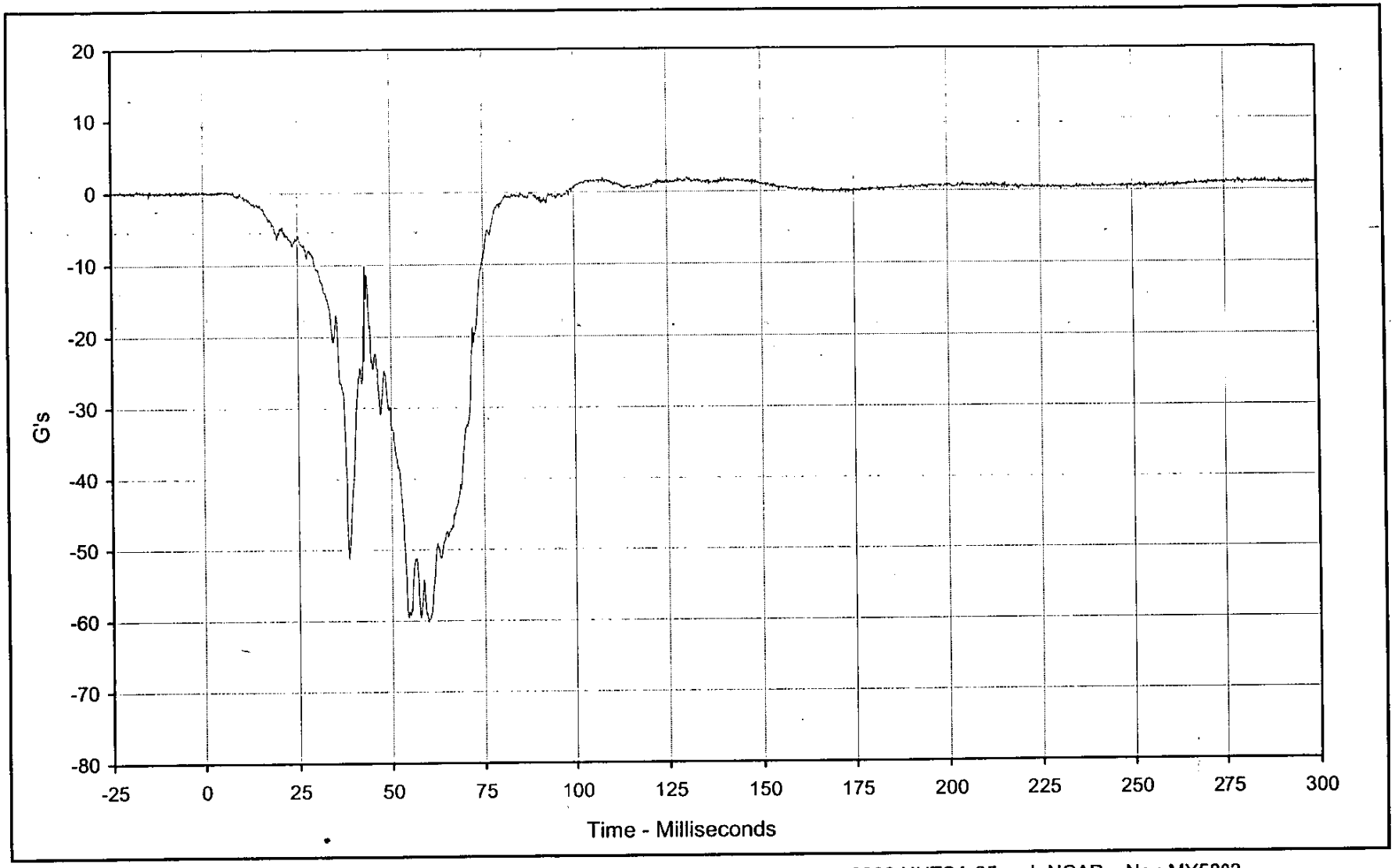
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARC Engineering



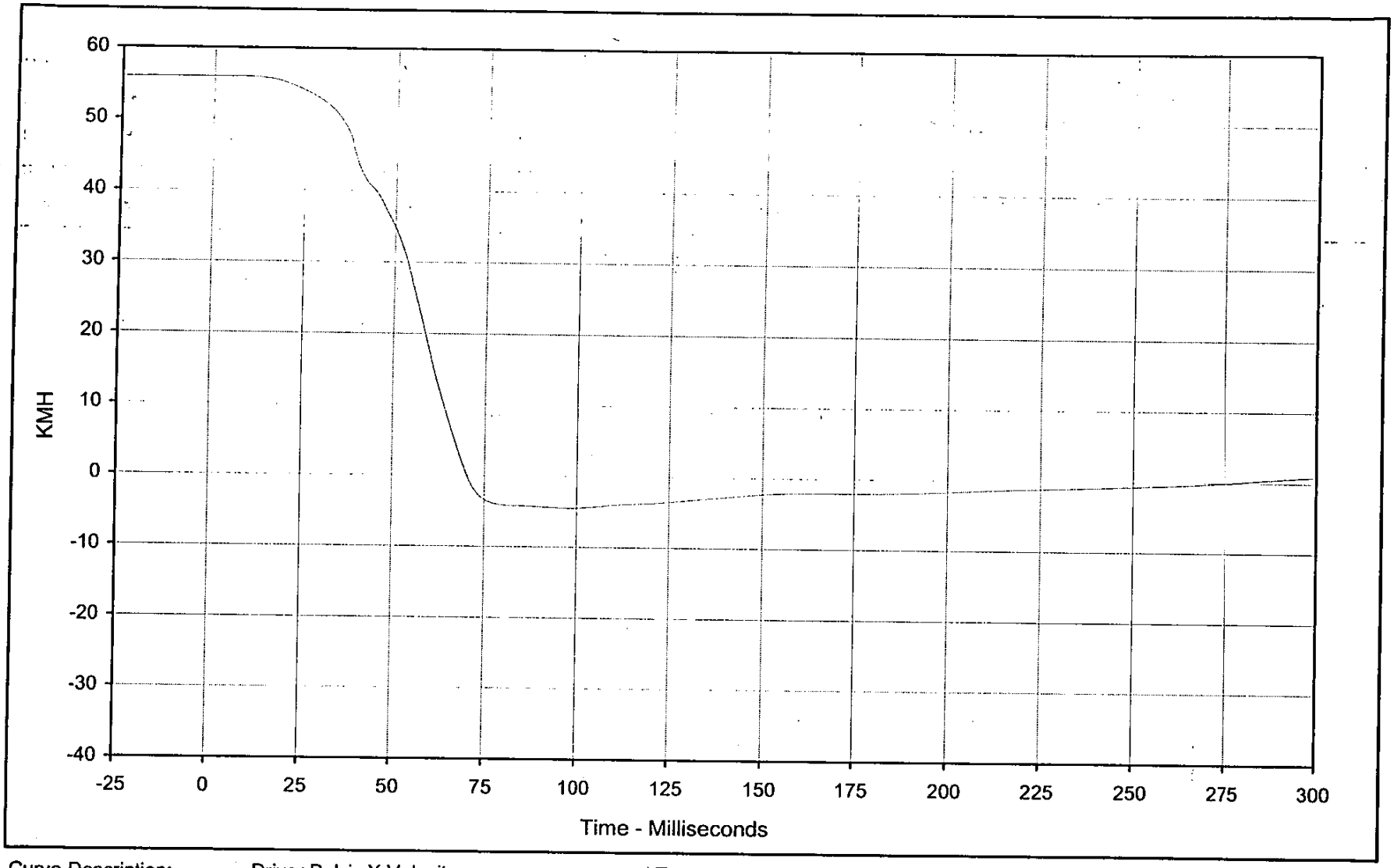
Curve Description:	Driver Chest Displacement X			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	0.3	at	0.5 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-28.5	at	65.8 Milliseconds		
SAE Filter Class:	600				
Date of Test:	12/16/99				
Curve Number:	FIL-019				

KARCO Engineering



Curve Description:	Driver Pelvis X			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	2.0	at	130.4 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-60.2	at	59.6 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-020				

KARC Engineering



Curve Description: Driver Pelvis X Velocity

Maximum Value: 56.0 at 7.3 Milliseconds

Minimum Value: -4.5 at 98.3 Milliseconds

SAE Filter Class: 180

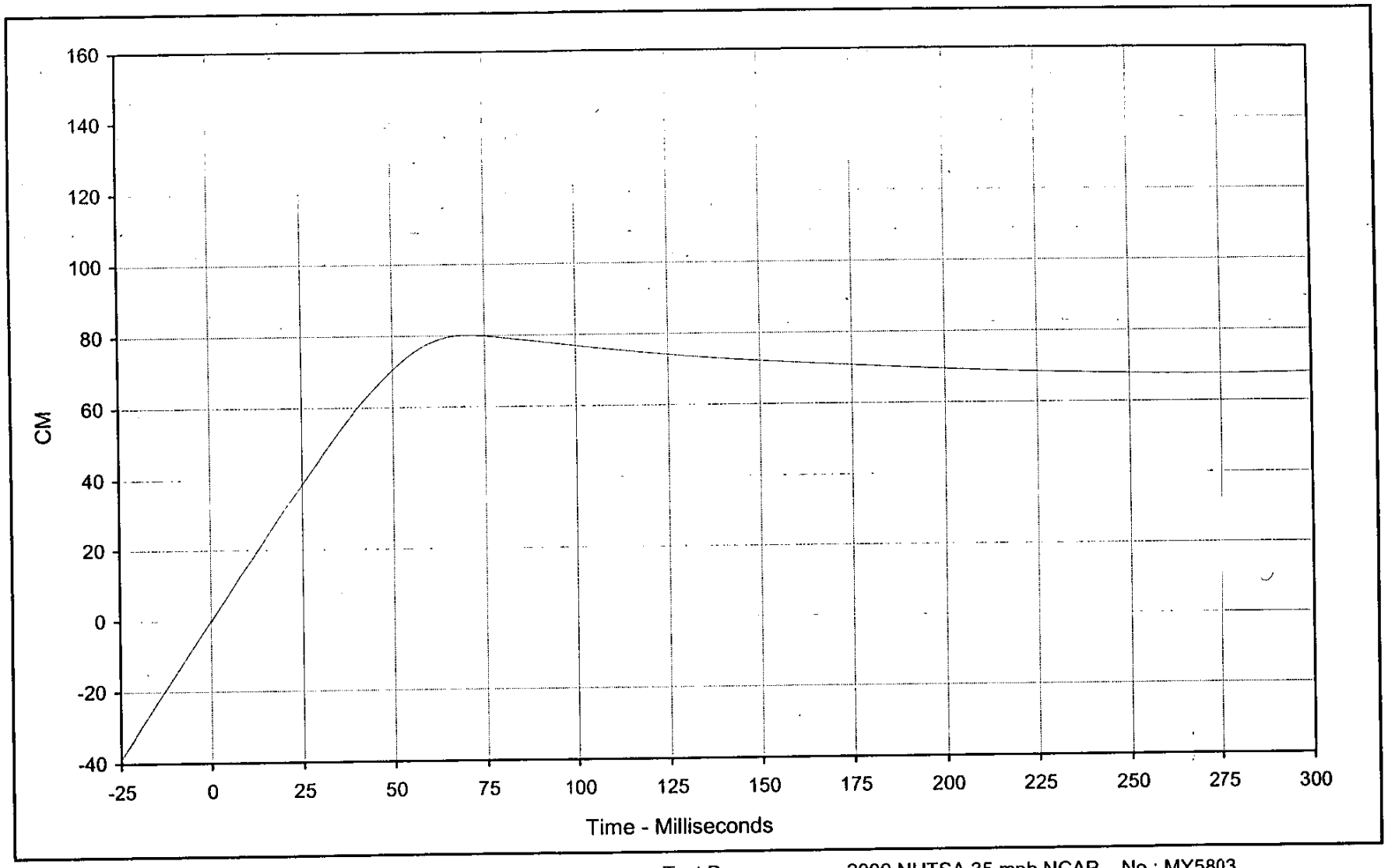
Date of Test: 12/16/99

Curve Number: IN1-020

Testing Program 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Driver Pelvis X Displ.

Maximum Value: 80.1 at 70.2 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

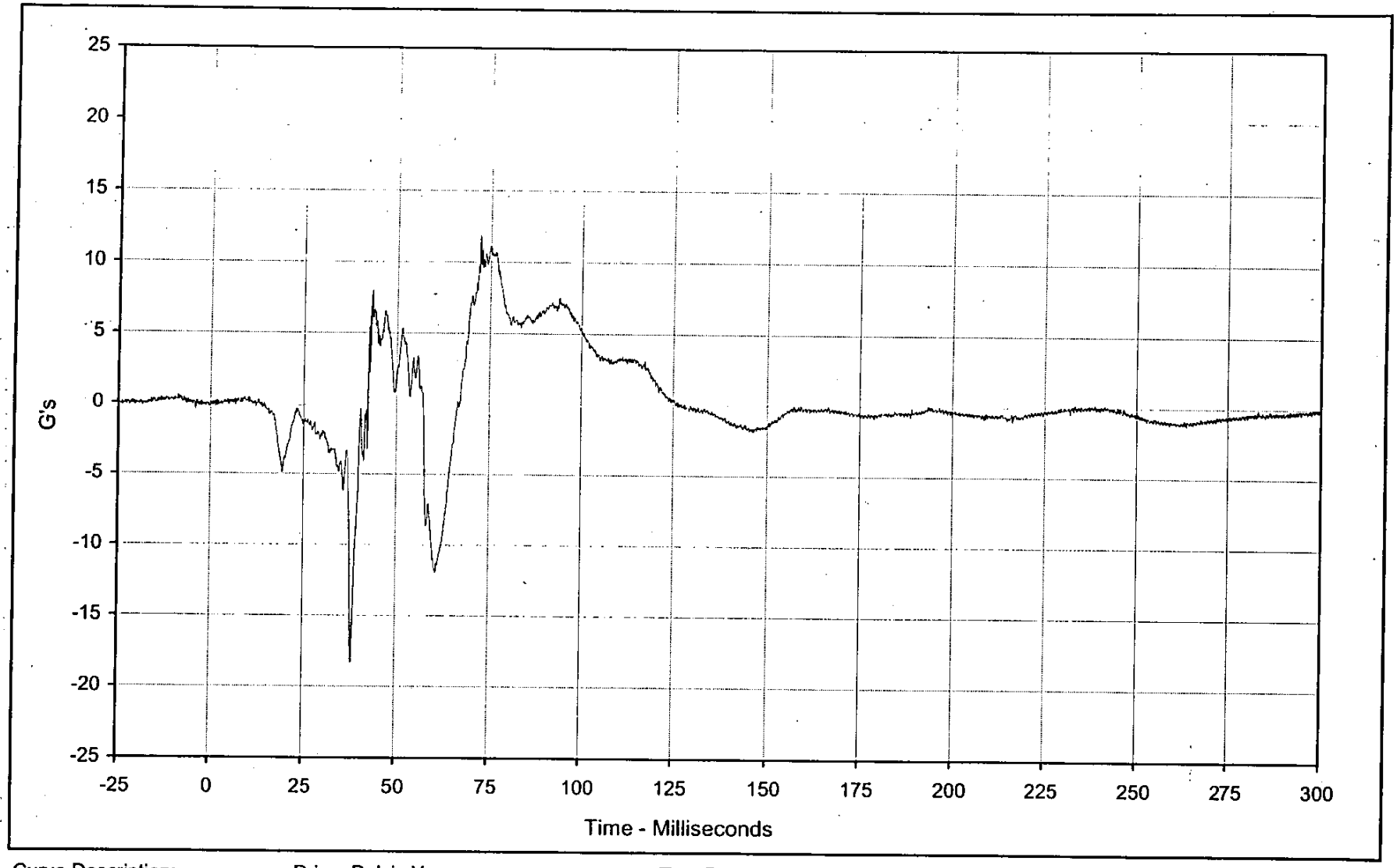
Date of Test: 12/16/99

Curve Number: IN2-020

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

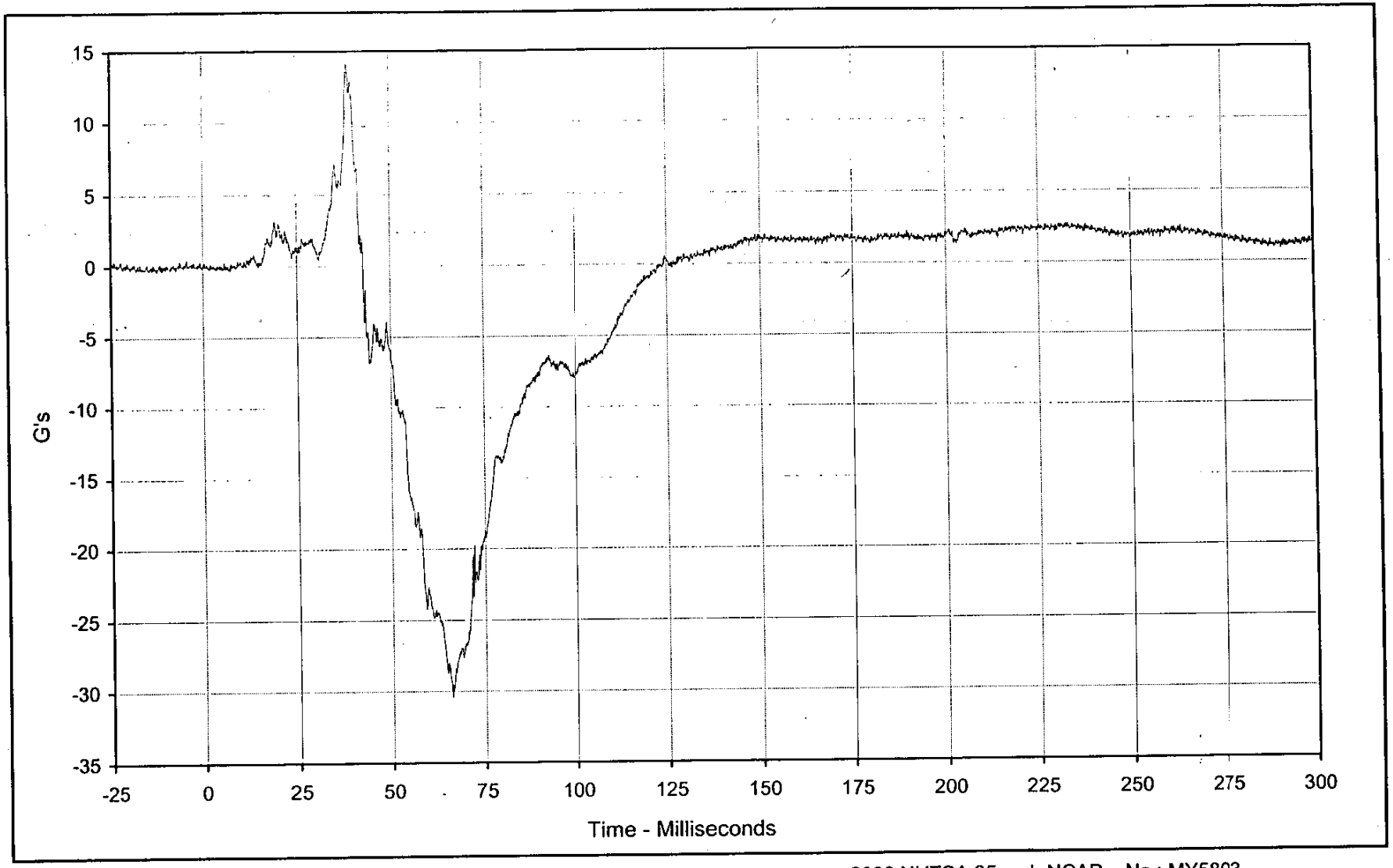
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



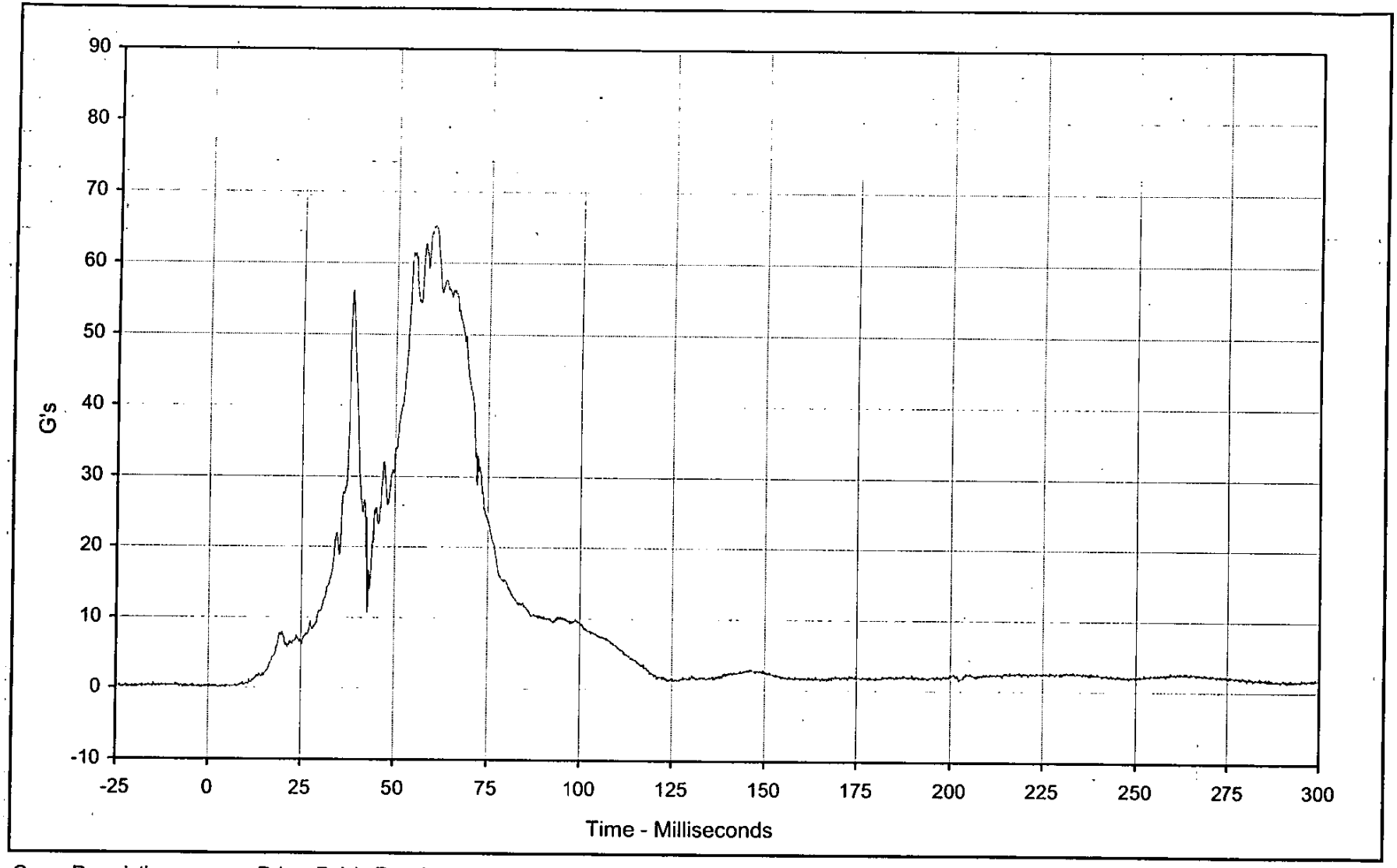
Curve Description:	Driver Pelvis Y			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	11.9	at	72.2 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-18.3	at	38.4 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-021				

KARCO Engineering



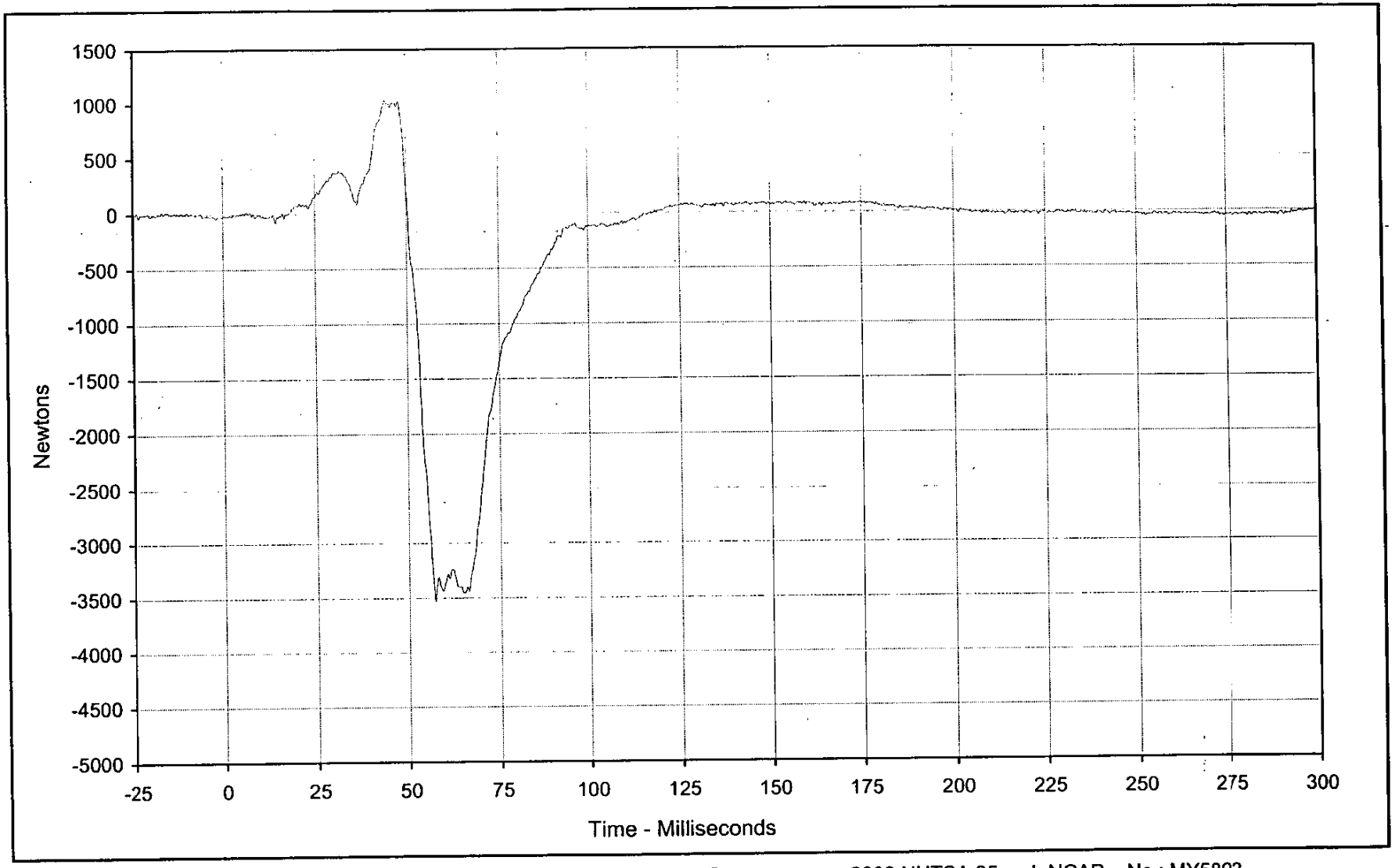
Curve Description:	Driver Pelvis Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	14.1	at	38.4 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-30.5	at	65.8 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-022				

KARCO Engineering



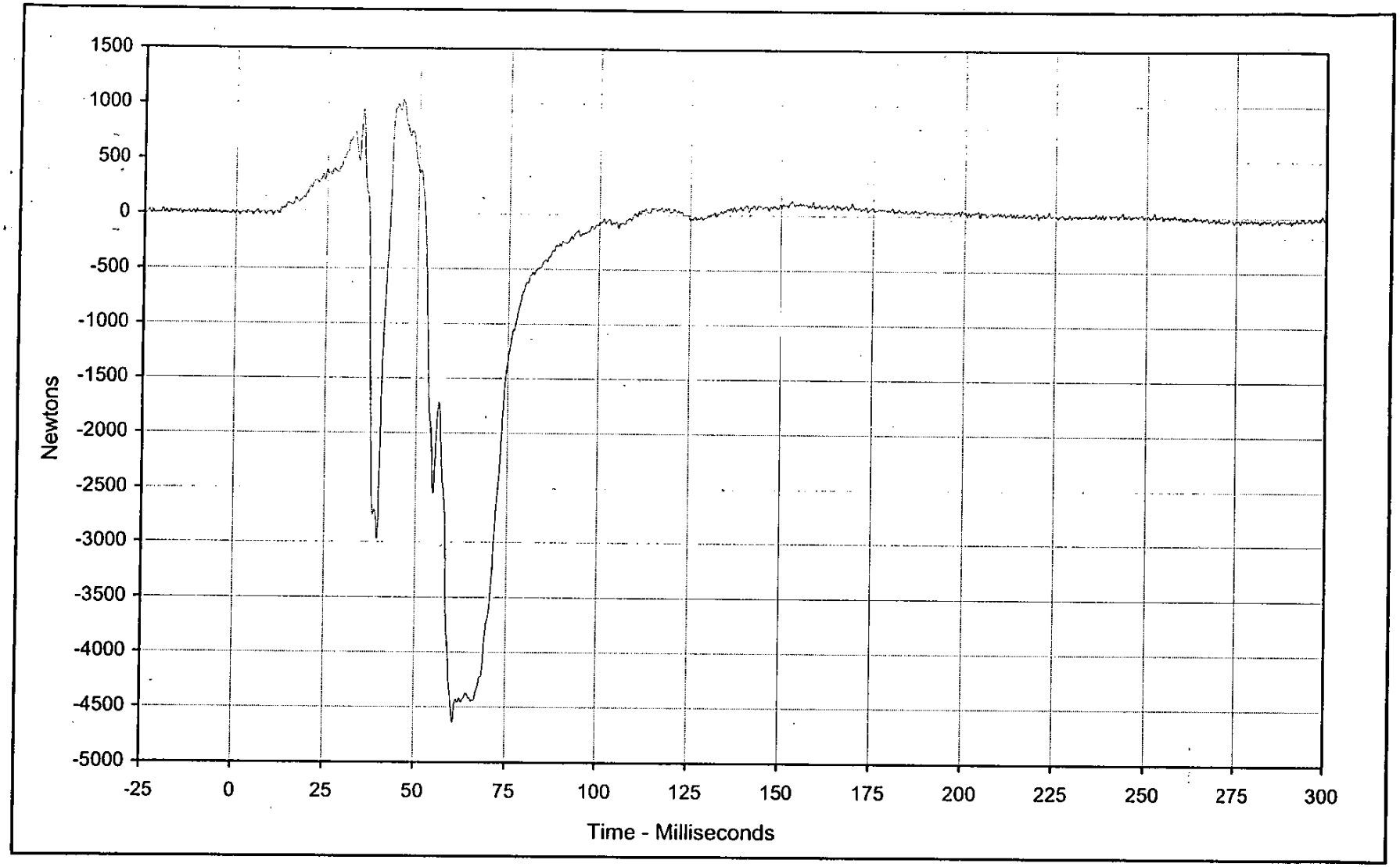
Curve Description:	Driver Pelvis Resultant			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	65.3	at	60.1 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	0.0	at	0.1 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	RES-020				

KARCO Engineering



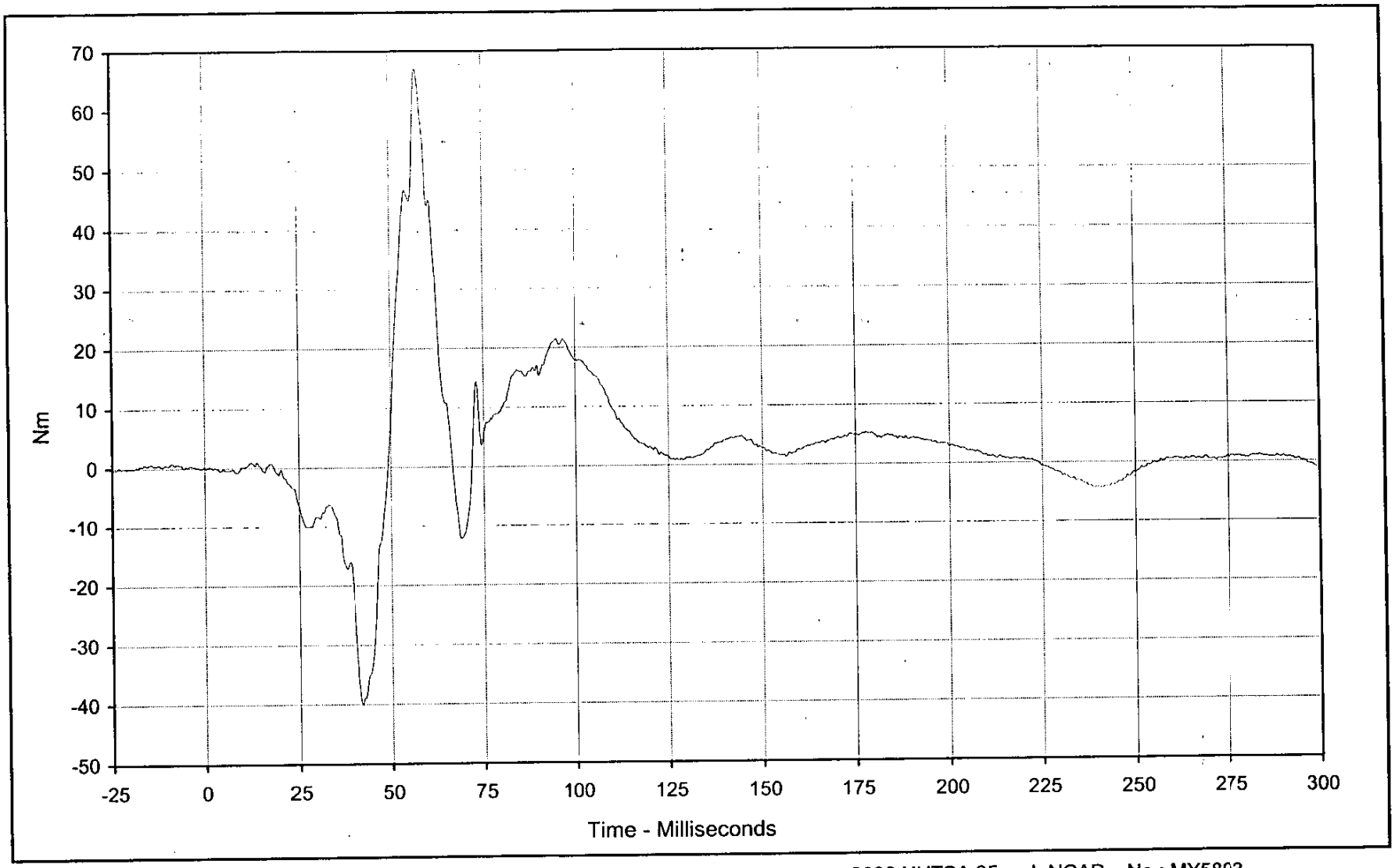
Curve Description:	Driver Left Femur Force			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	1034.0	at	44.4 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-3534.1	at	57.1 Milliseconds		
SAE Filter Class:	600				
Date of Test:	12/16/99				
Curve Number:	FIL-023				

KARCO Engineering



Curve Description:	Driver Right Femur Force			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	1030.7	at	45.3	Milliseconds	Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-4642.4	at	60.7	Milliseconds	
SAE Filter Class:	600				
Date of Test:	12/16/99				
Curve Number:	FIL-024				

KARCO Engineering



Curve Description: Driver Left Upper Tibia Moment X

Maximum Value: 67.0 at 57.1 Milliseconds

Minimum Value: -40.2 at 41.9 Milliseconds

SAE Filter Class: 600

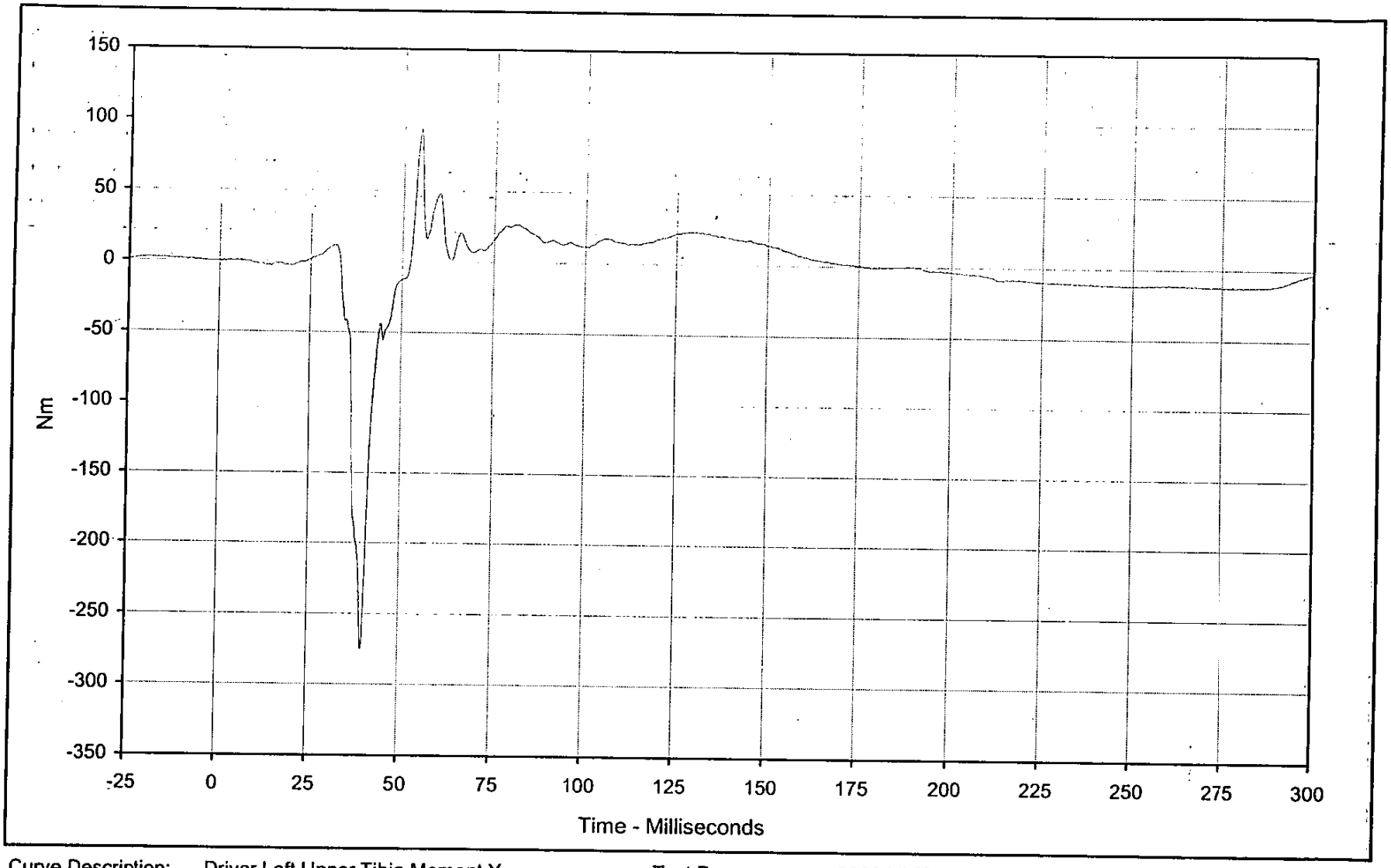
Date of Test: 12/16/99

Curve Number: FIL-025

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

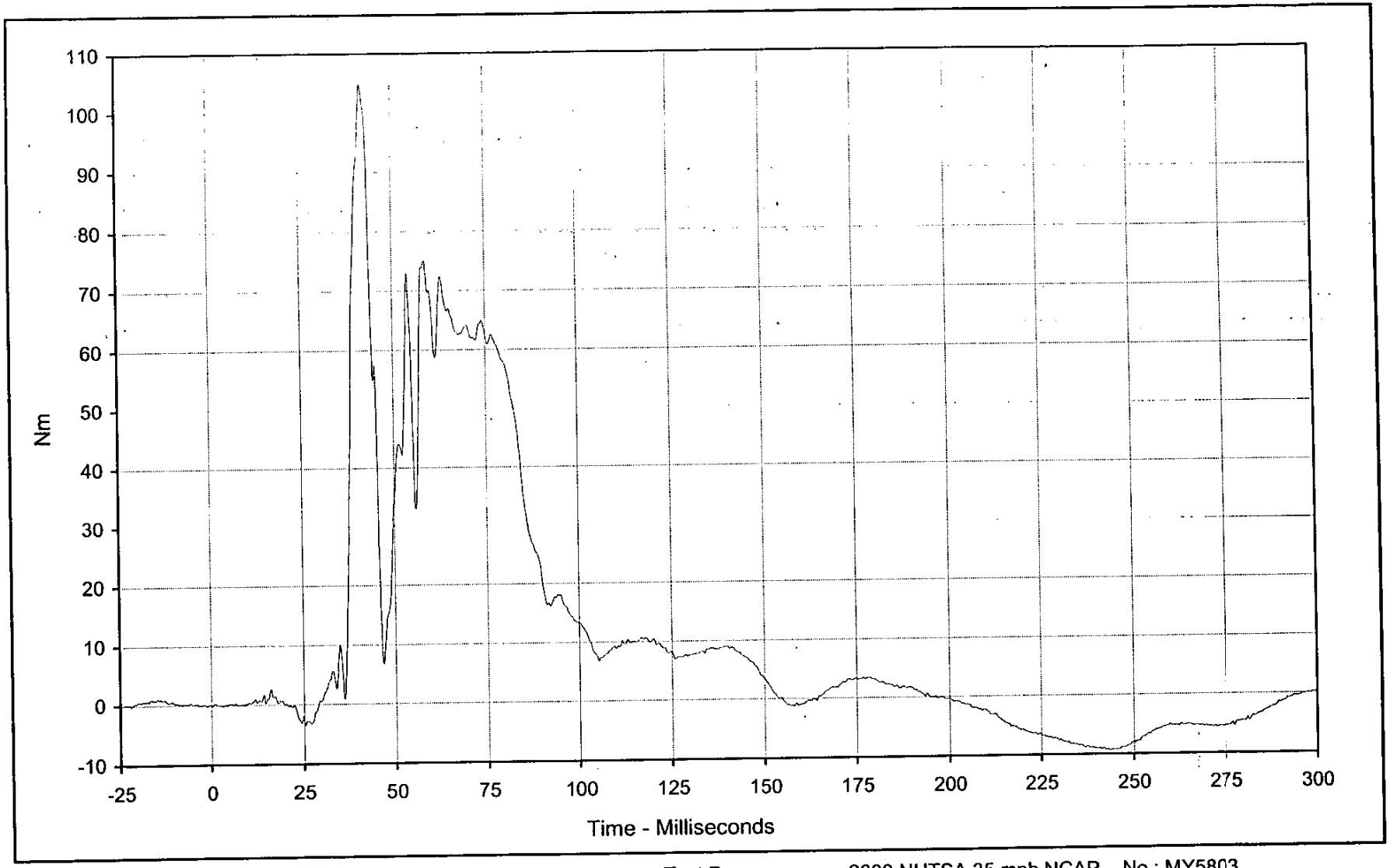
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description:	Driver Left Upper Tibia Moment Y			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	93.4	at	54.7 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-275.4	at	40.0 Milliseconds		
SAE Filter Class:	600				
Date of Test:	12/16/99				
Curve Number:	FIL-026				

KARCO Engineering



Curve Description: Driver Right Upper Tibia Moment X

Maximum Value: 104.9 at 41.8 Milliseconds

Minimum Value: -9.4 at 243.6 Milliseconds

SAE Filter Class: 600

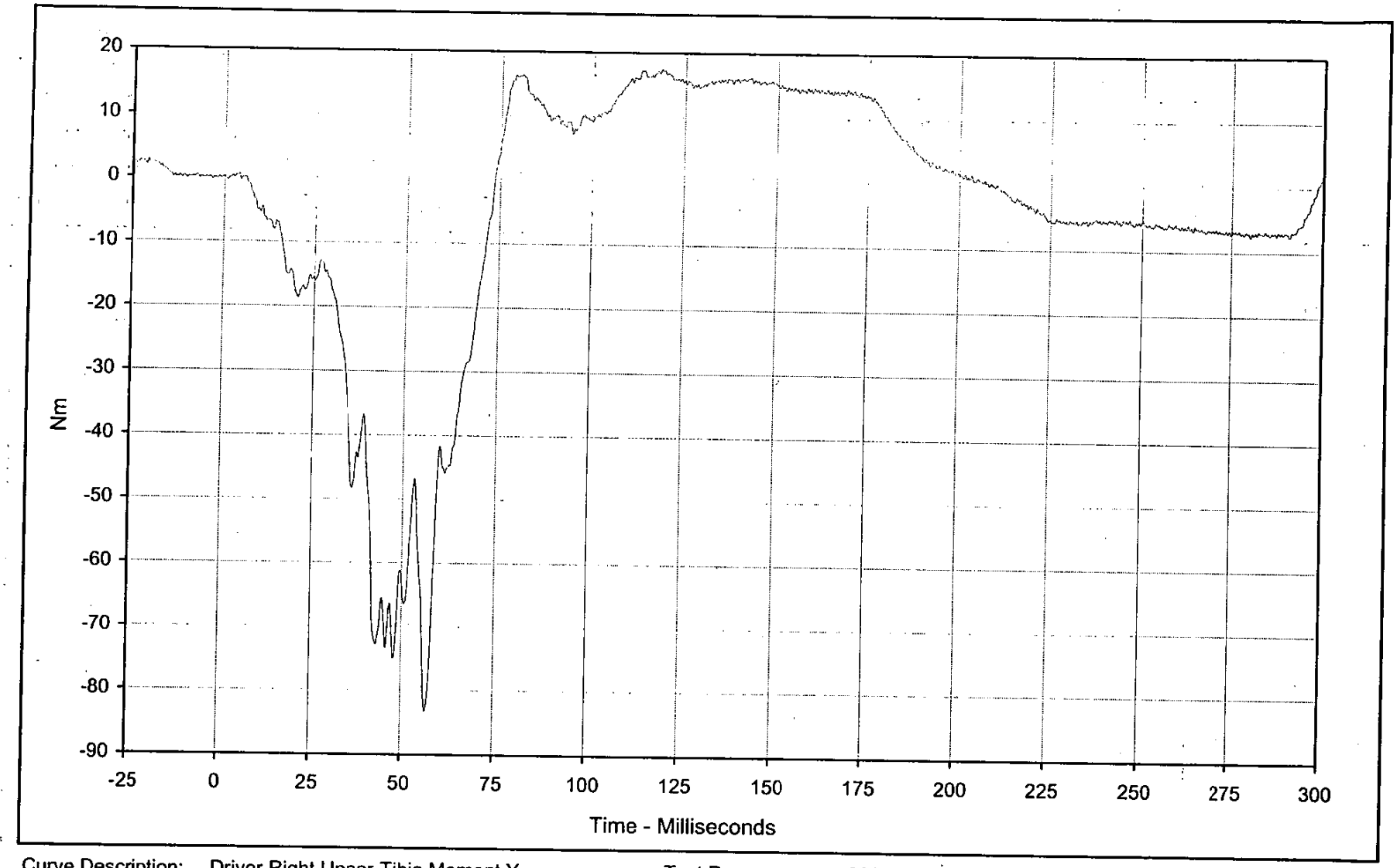
Date of Test: 12/16/99

Curve Number: FIL-027

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Driver Right Upper Tibia Moment Y

Maximum Value: 17.5 at 118.4 Milliseconds

Minimum Value: -83.3 at 56.7 Milliseconds

SAE Filter Class: 600

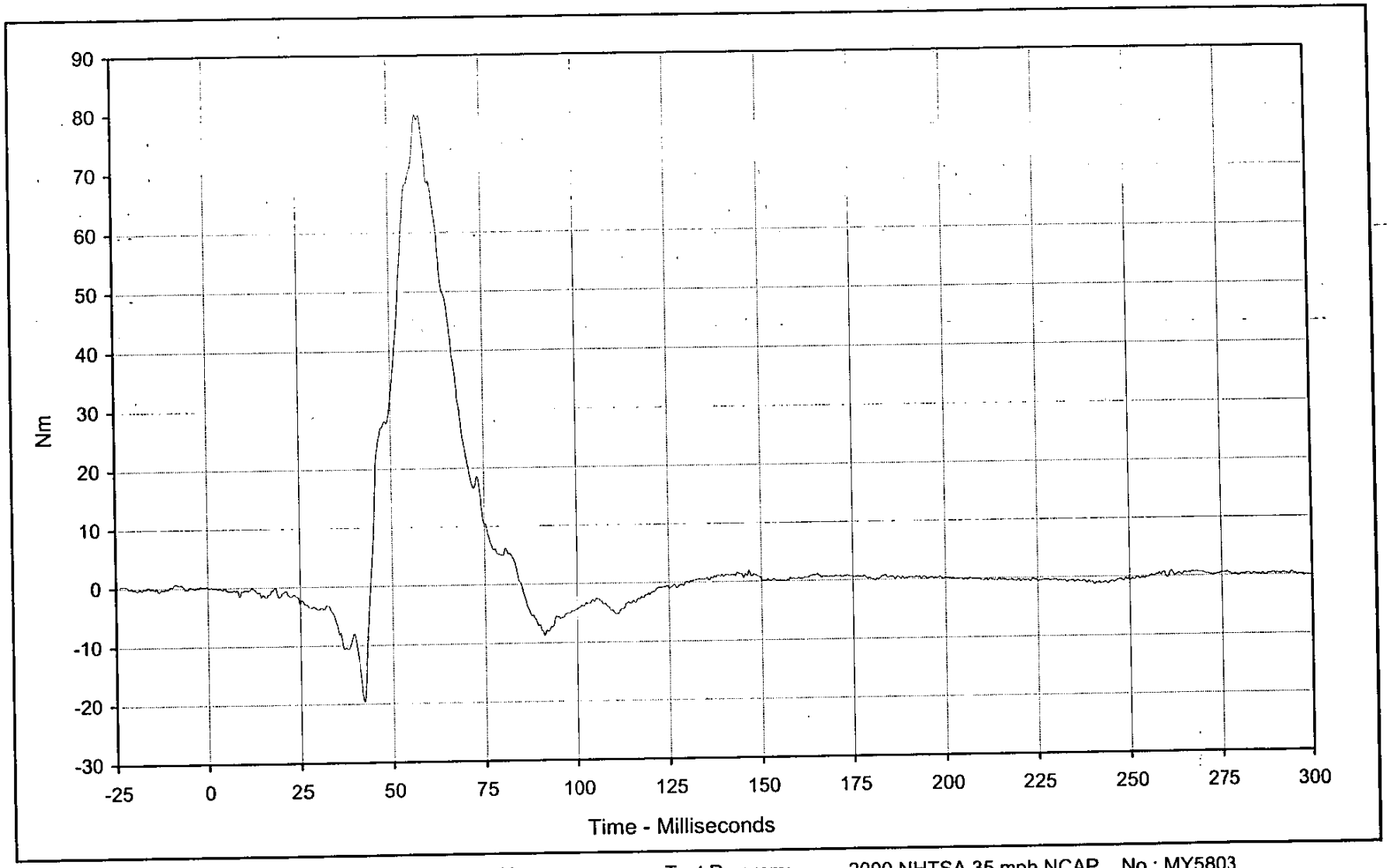
Date of Test: 12/16/99

Curve Number: FIL-028

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARC Engineering

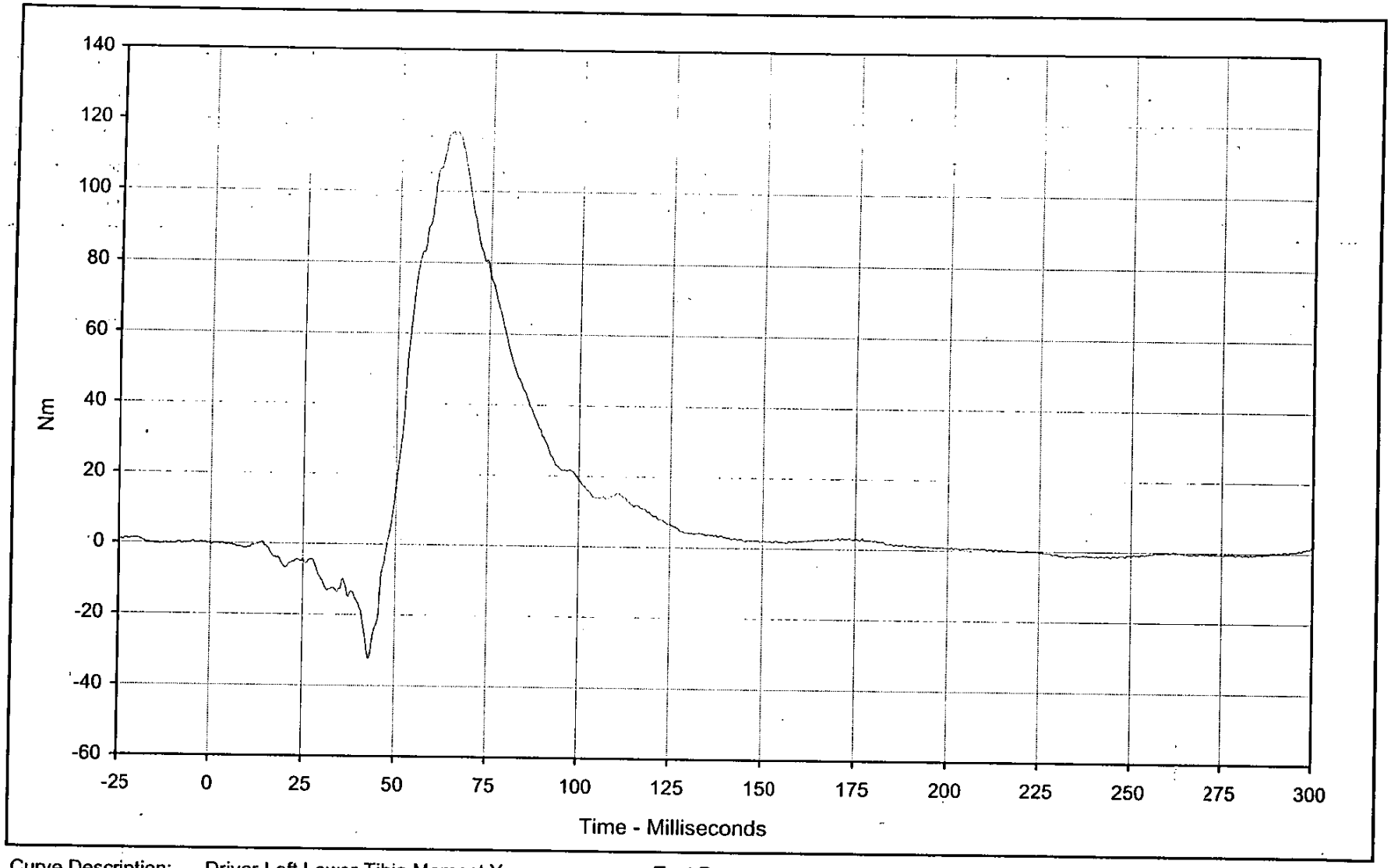


Curve Description:	Driver Left Lower Tibia Moment X			
Maximum Value:	79.8	at	57.6	Milliseconds
Minimum Value:	-19.7	at	42.1	Milliseconds
SAE Filter Class:	600			
Date of Test:	12/16/99			
Curve Number:	FIL-029			

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

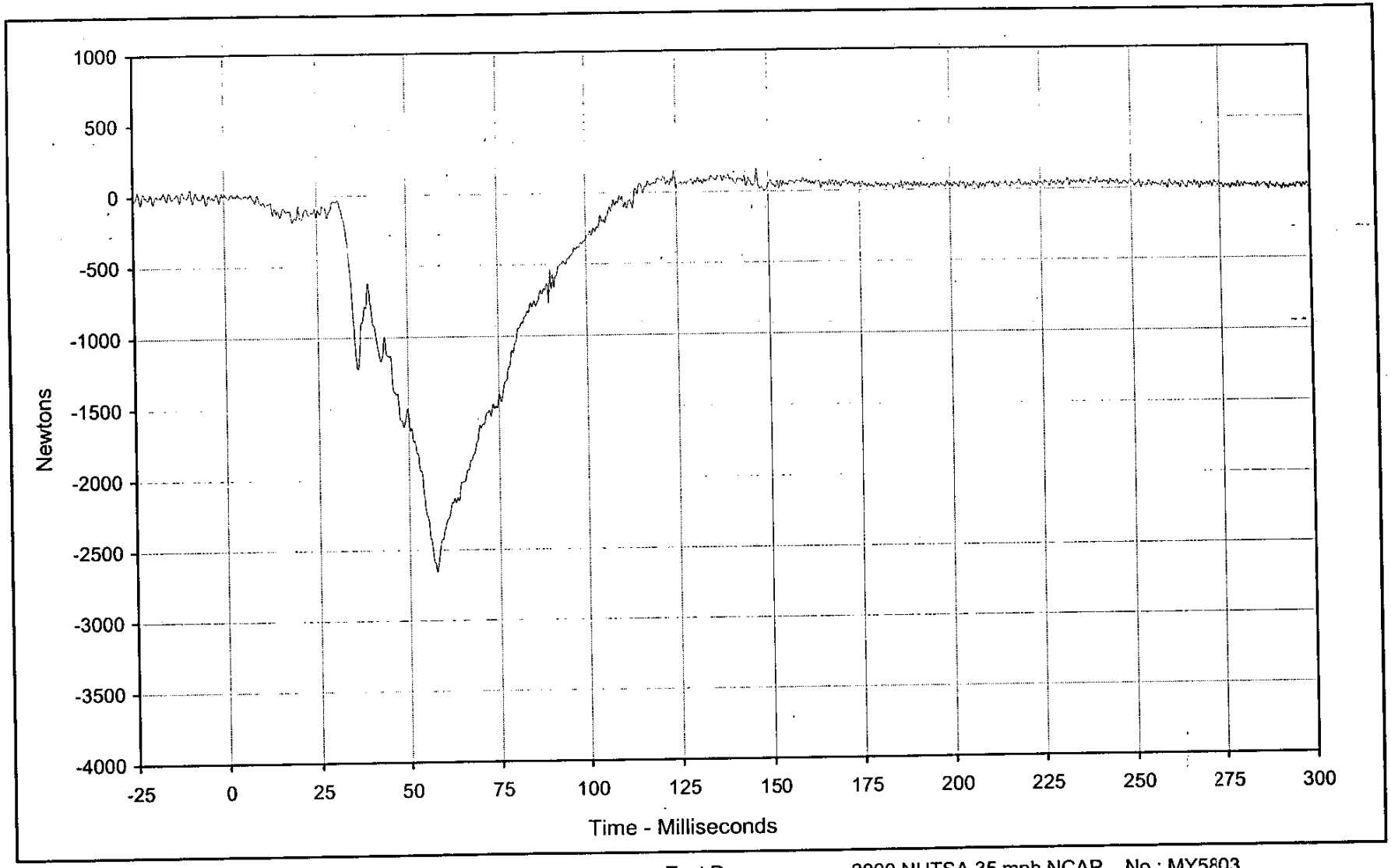
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description:	Driver Left Lower Tibia Moment Y			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	117.0	at	63.9 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-32.5	at	43.0 Milliseconds		
SAE Filter Class:	600				
Date of Test:	12/16/99				
Curve Number:	FIL-030				

KARCO Engineering



Curve Description: Driver Left Lower Tibia Force Z

Maximum Value: 158.9 at 146.8 Milliseconds

Minimum Value: -2656.9 at 57.6 Milliseconds

SAE Filter Class: 600

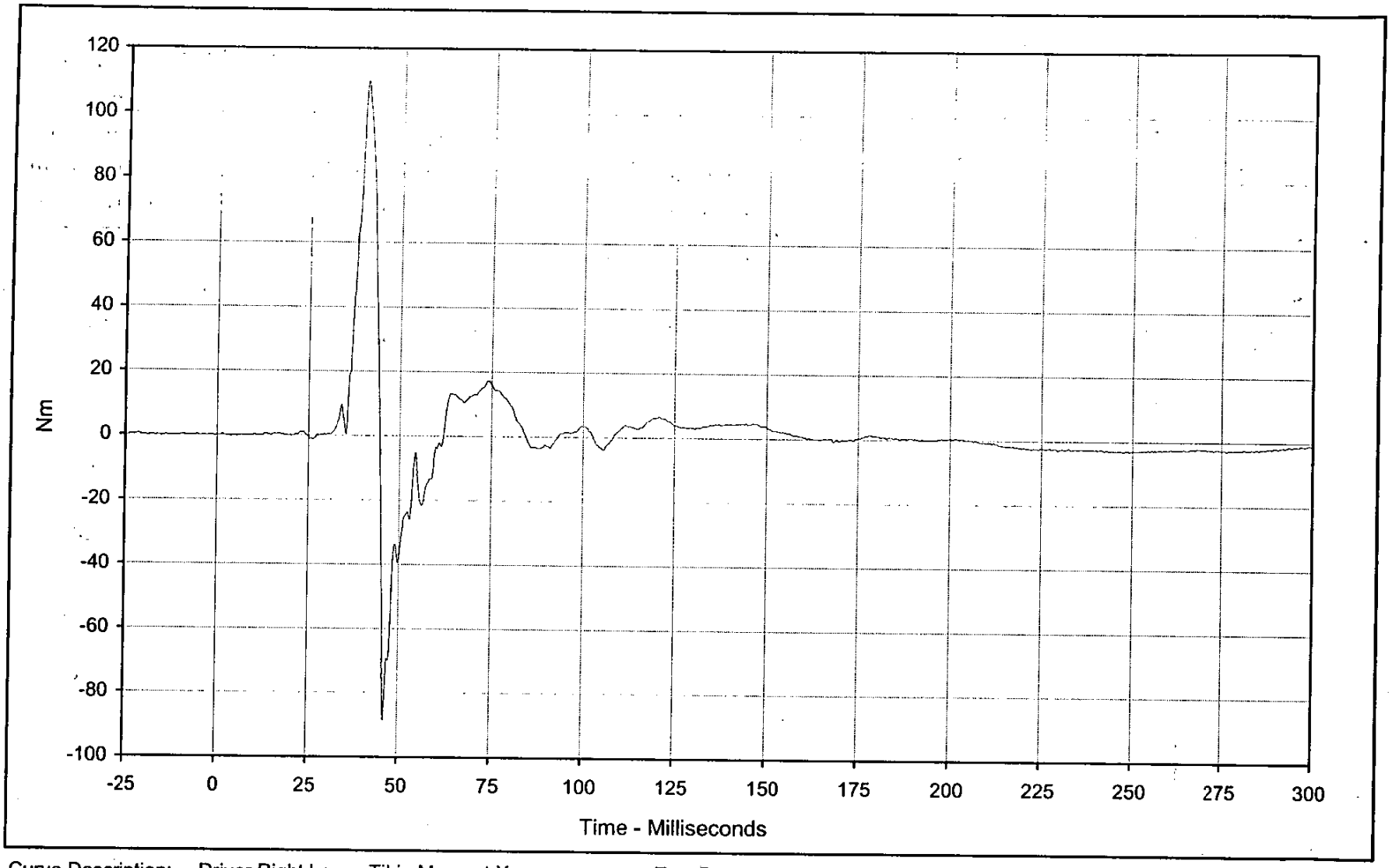
Date of Test: 12/16/99

Curve Number: FIL-031

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Driver Right Lower Tibia Moment X

Maximum Value: 109.9 at 40.1 Milliseconds

Minimum Value: -88.7 at 46.1 Milliseconds

SAE Filter Class: 600

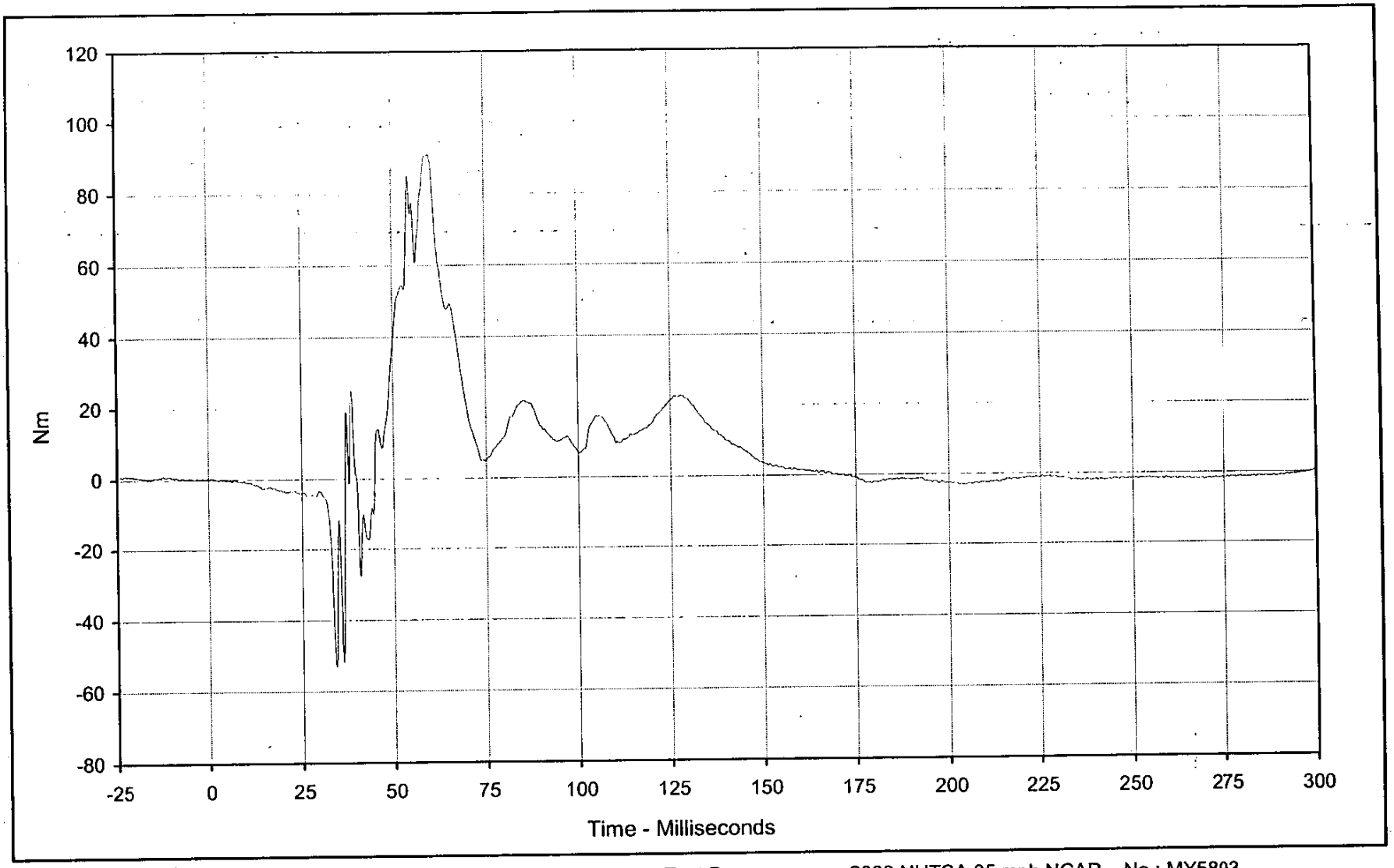
Date of Test: 12/16/99

Curve Number: FIL-032

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

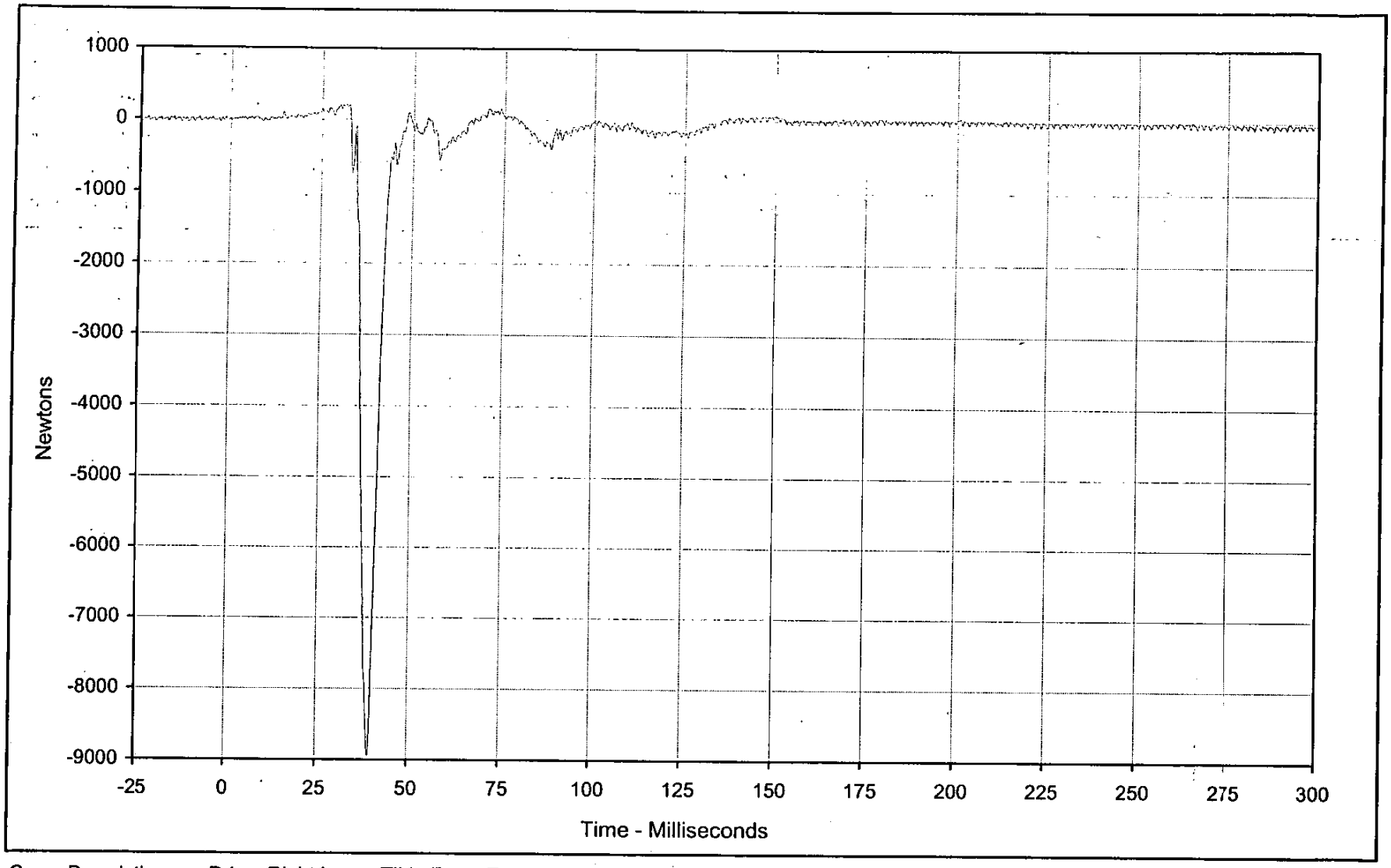
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



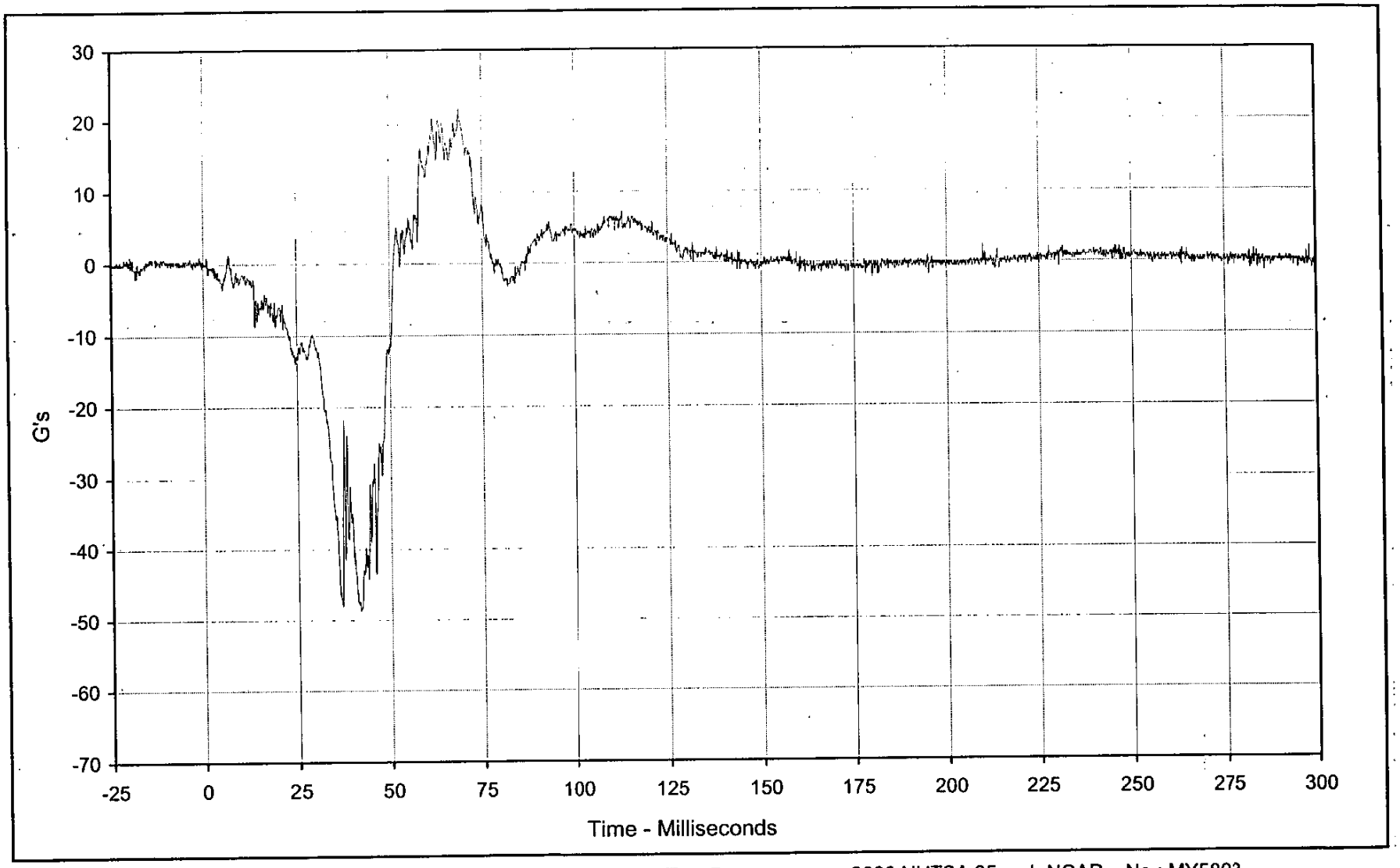
Curve Description:	Driver Right Lower Tibia Moment Y			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	91.0	at	60.0 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-53.1	at	34.0 Milliseconds		
SAE Filter Class:	600				
Date of Test:	12/16/99				
Curve Number:	FIL-033				

KARC Engineering



Curve Description:	Driver Right Lower Tibia Force Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	205.3	at	31.6 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-8945.8	at	39.7 Milliseconds		
SAE Filter Class:	600				
Date of Test:	12/16/99				
Curve Number:	FIL-034				

KARCO Engineering

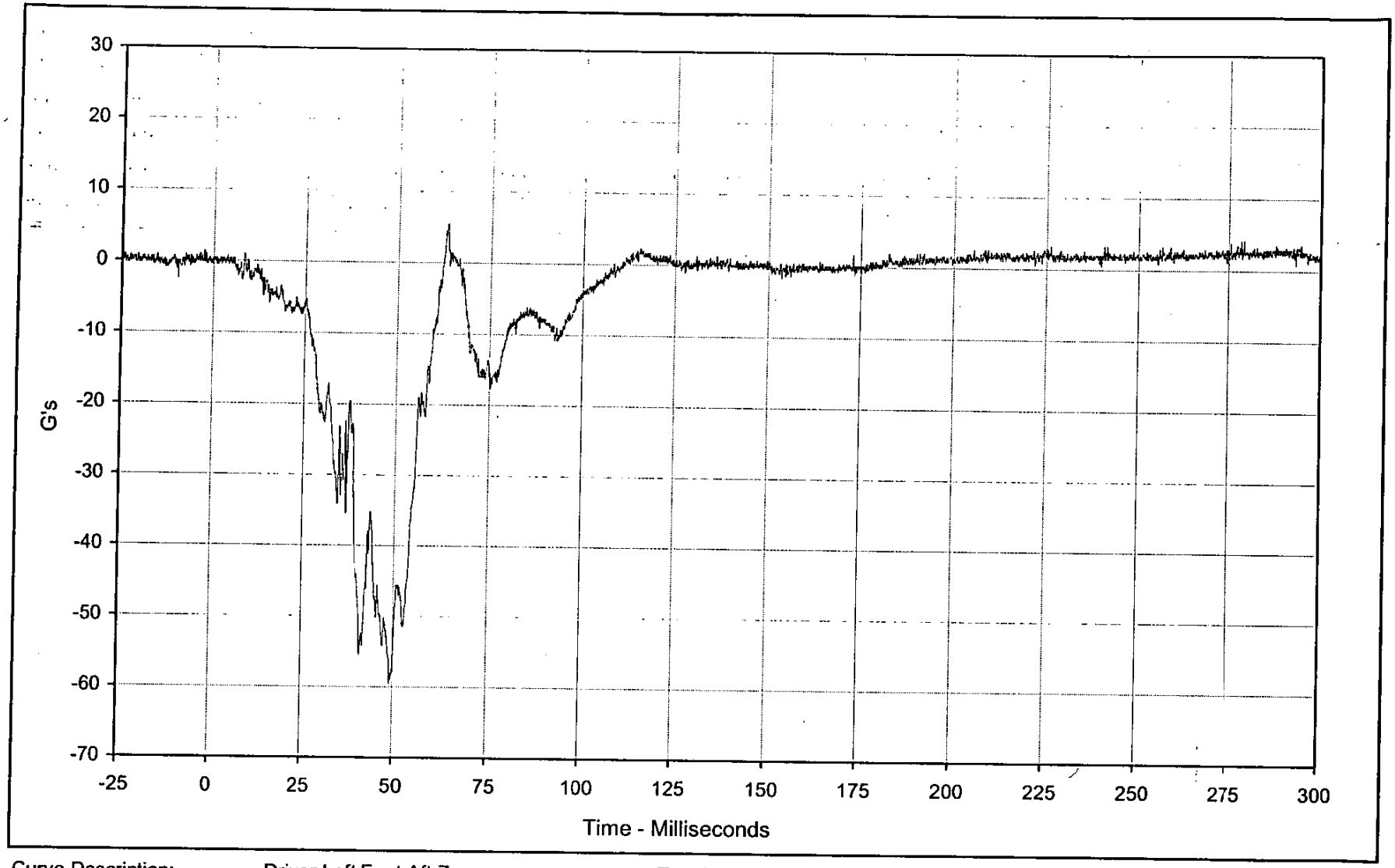


Curve Description:	Driver Left Foot Aft X			
Maximum Value:	21.8	at	68.9	Milliseconds
Minimum Value:	-48.7	at	41.6	Milliseconds
SAE Filter Class:	1000			
Date of Test:	12/16/99			
Curve Number:	FIL-035			

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

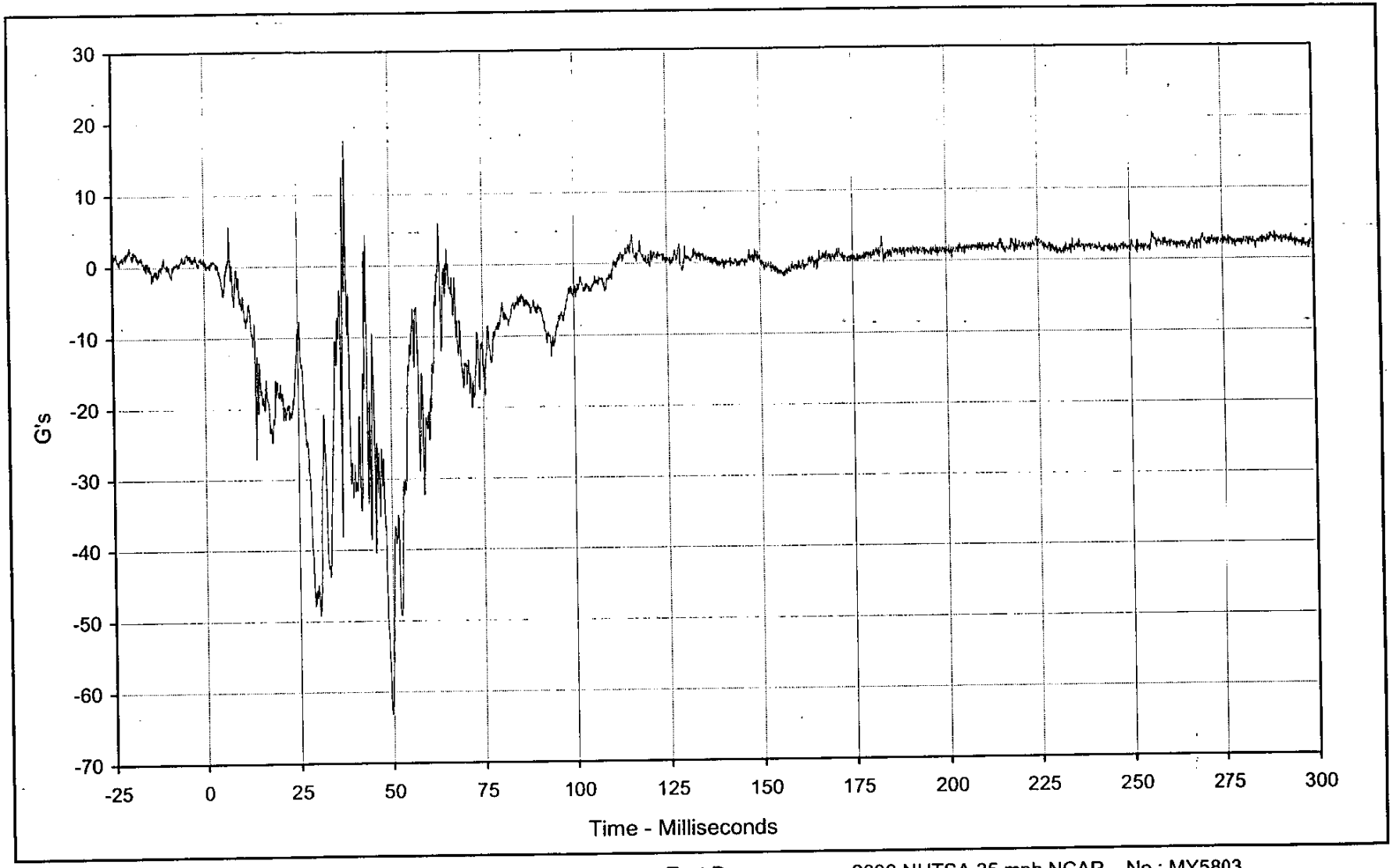
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description:	Driver Left Foot Aft Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	5.4	at	63.3 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-59.6	at	49.1 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-036				

KARCO Engineering



Curve Description: Driver Left Foot Fore Z

Maximum Value: 17.7 at 37.8 Milliseconds

Minimum Value: -63.2 at 49.5 Milliseconds

SAE Filter Class: 1000

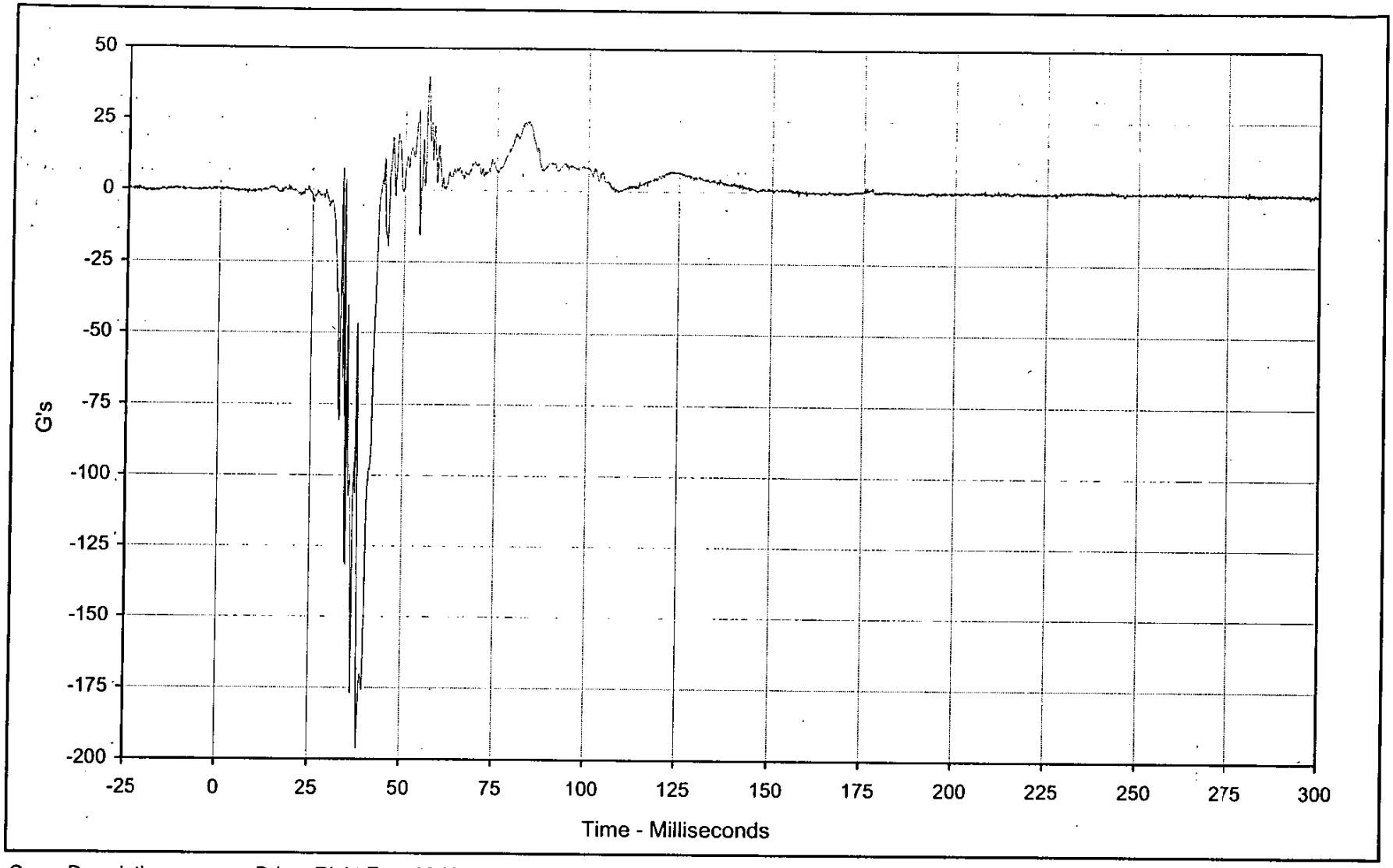
Date of Test: 12/16/99

Curve Number: FIL-037

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

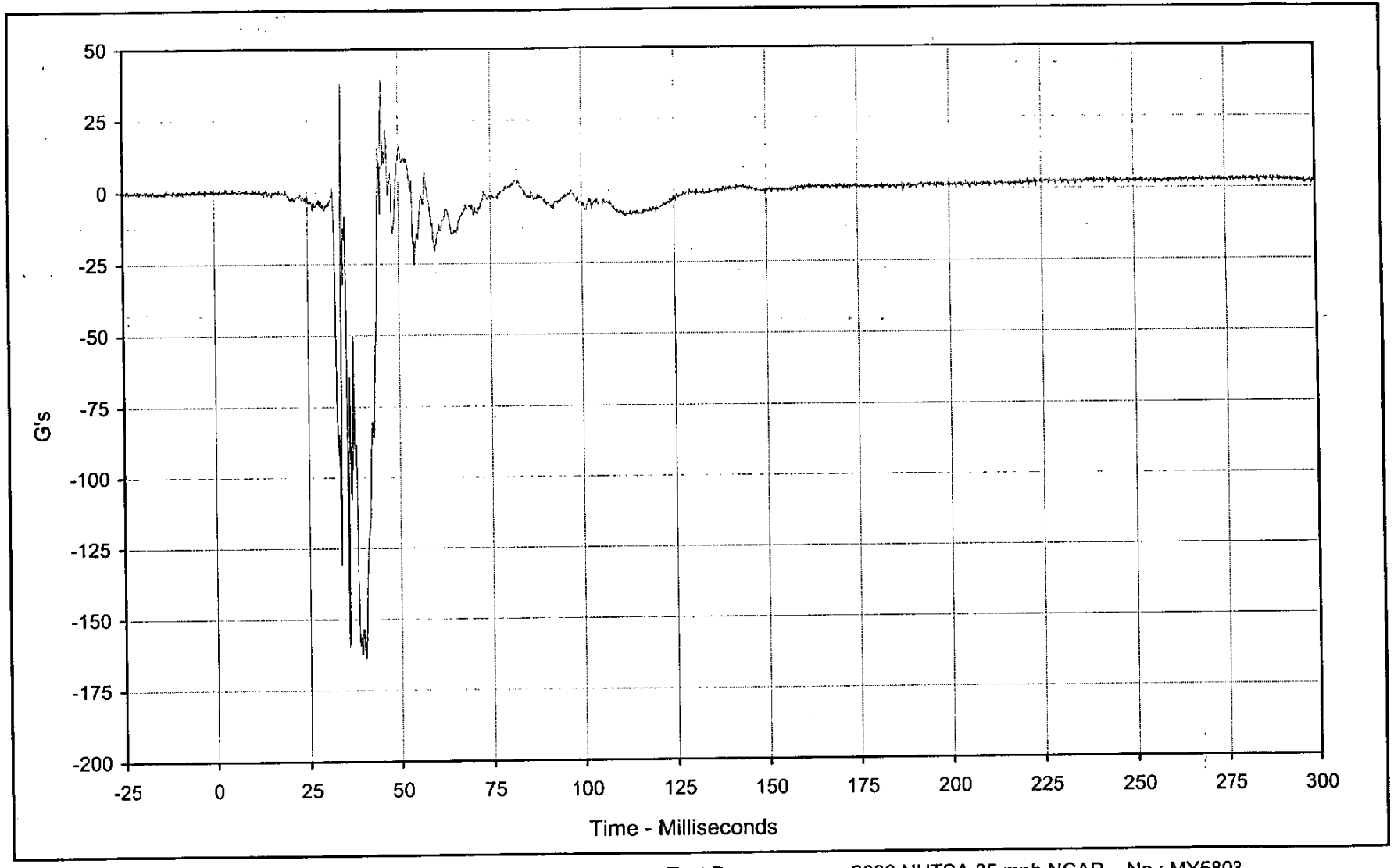
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



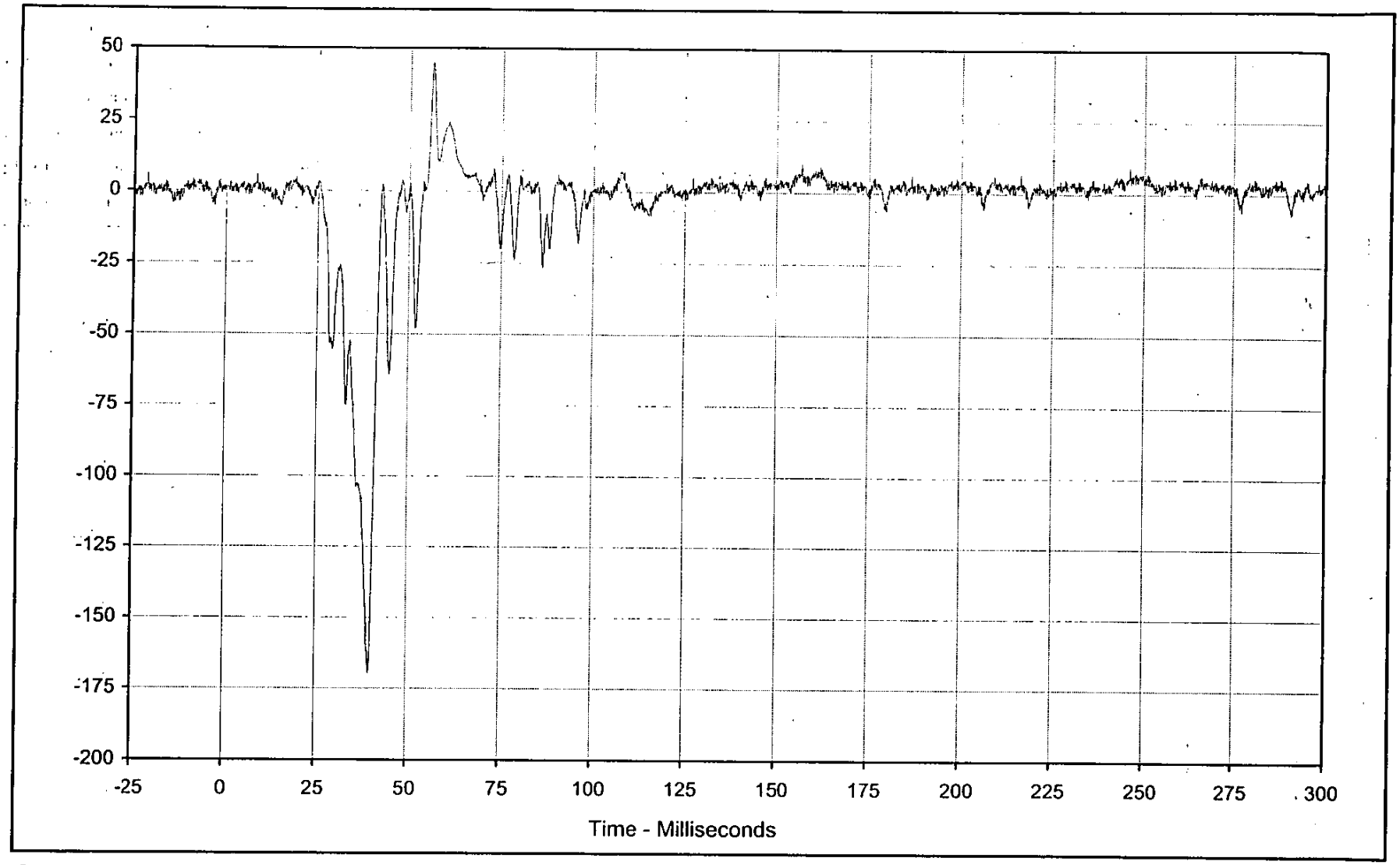
Curve Description:	Driver Right Foot Aft X			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	40.0	at	56.2 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-196.2	at	38.5 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-038				

KARC Engineering



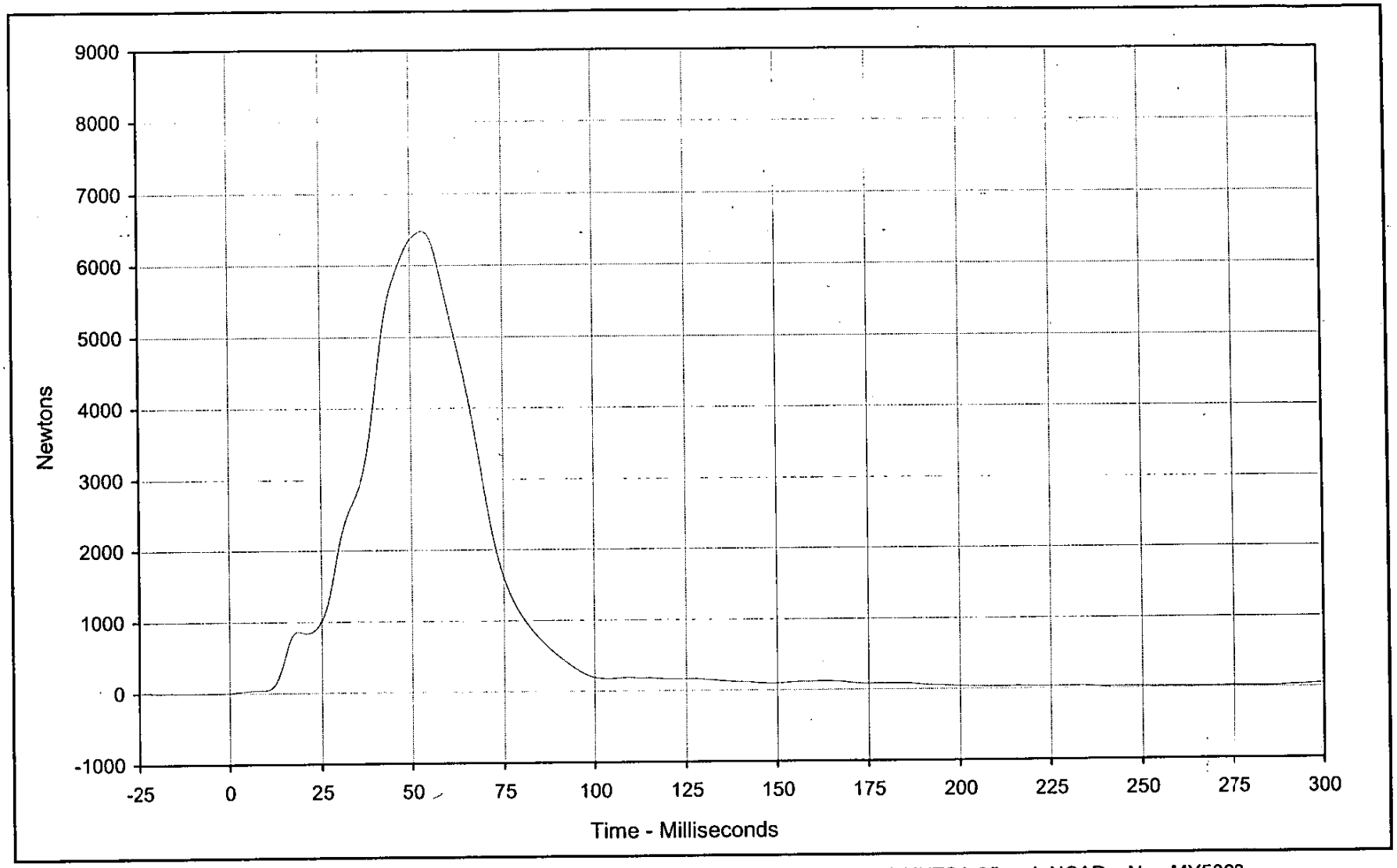
Curve Description:	Driver Right Foot Aft Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	39.3	at	45.3 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-163.9	at	40.1 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-039				

KARC Engineering



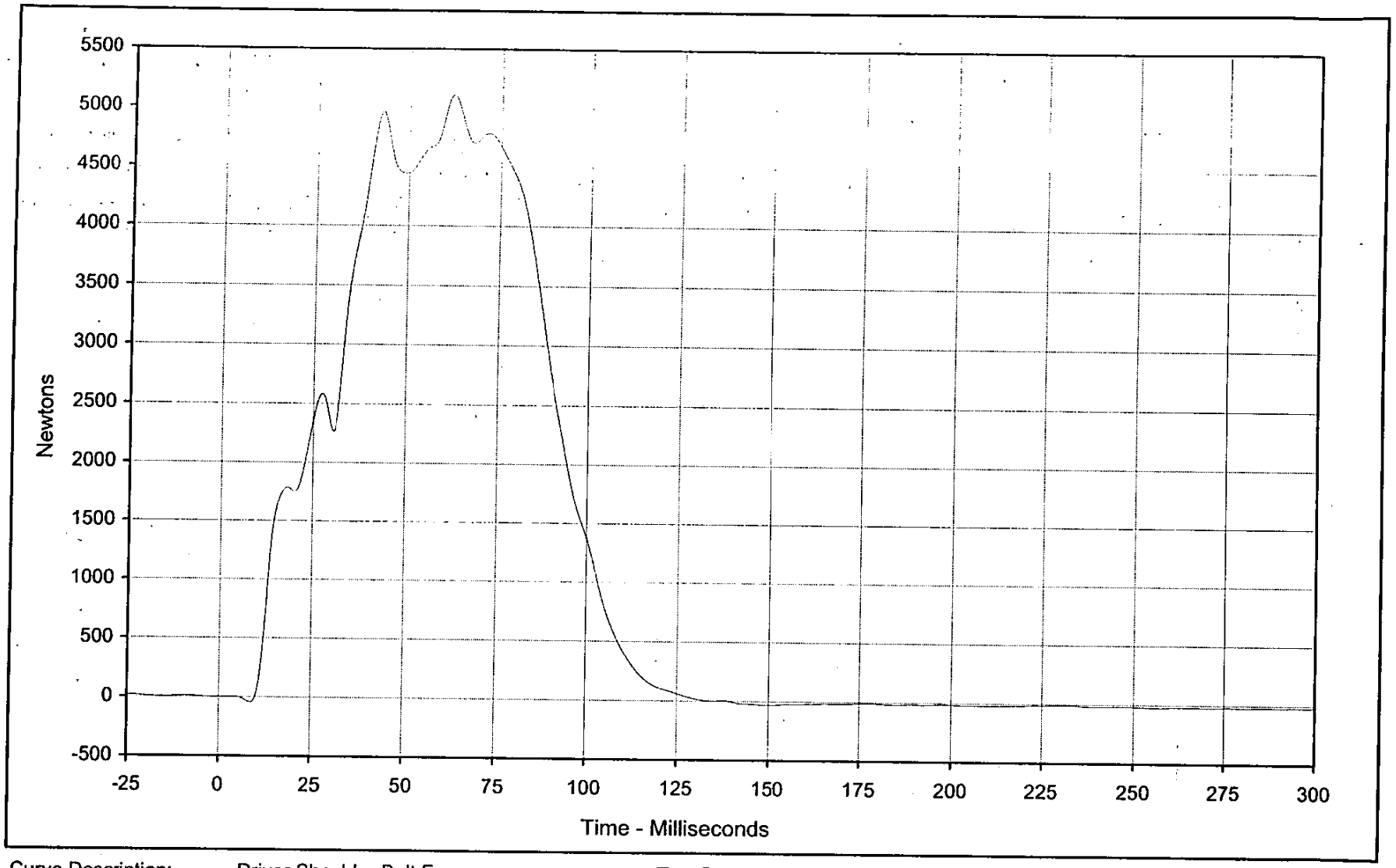
Curve Description:	Driver Right Foot Fore Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	45.0	at	56.1 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-169.7	at	40.0 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-040				

KARCO Engineering



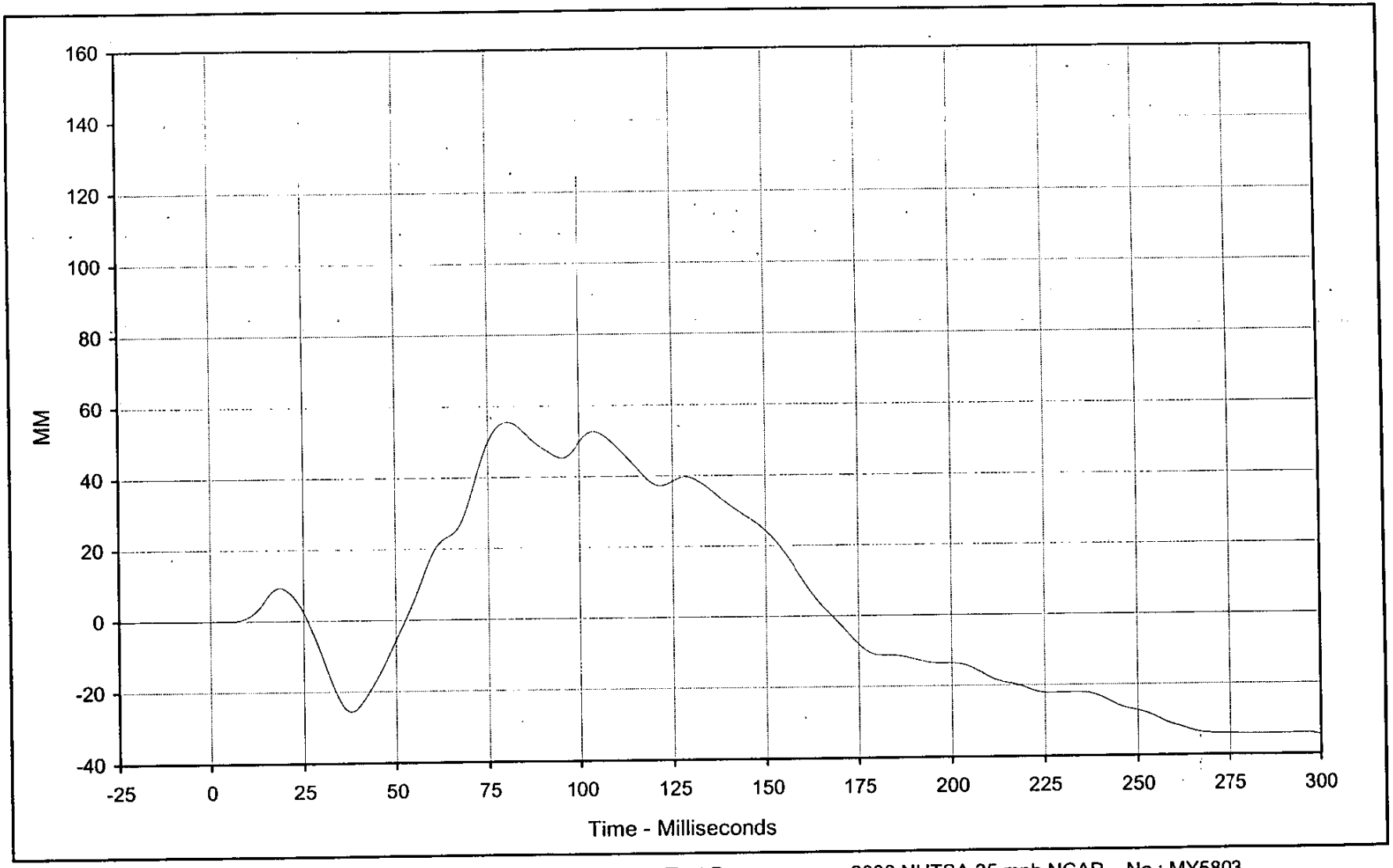
Curve Description:	Driver Lap Belt Force			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	6473.7	at	53.3 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	2.9	at	0.0 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-041				

KARCO Engineering



Curve Description:	Driver Shoulder Belt Force			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	5108.7	at	62.0 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-46.2	at	8.5 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-042				

KARCO Engineering



Curve Description: Driver Shoulder Belt Pullout

Maximum Value: 55.4 at 80.2 Milliseconds

Minimum Value: -34.6 at 299.8 Milliseconds

SAE Filter Class: 60

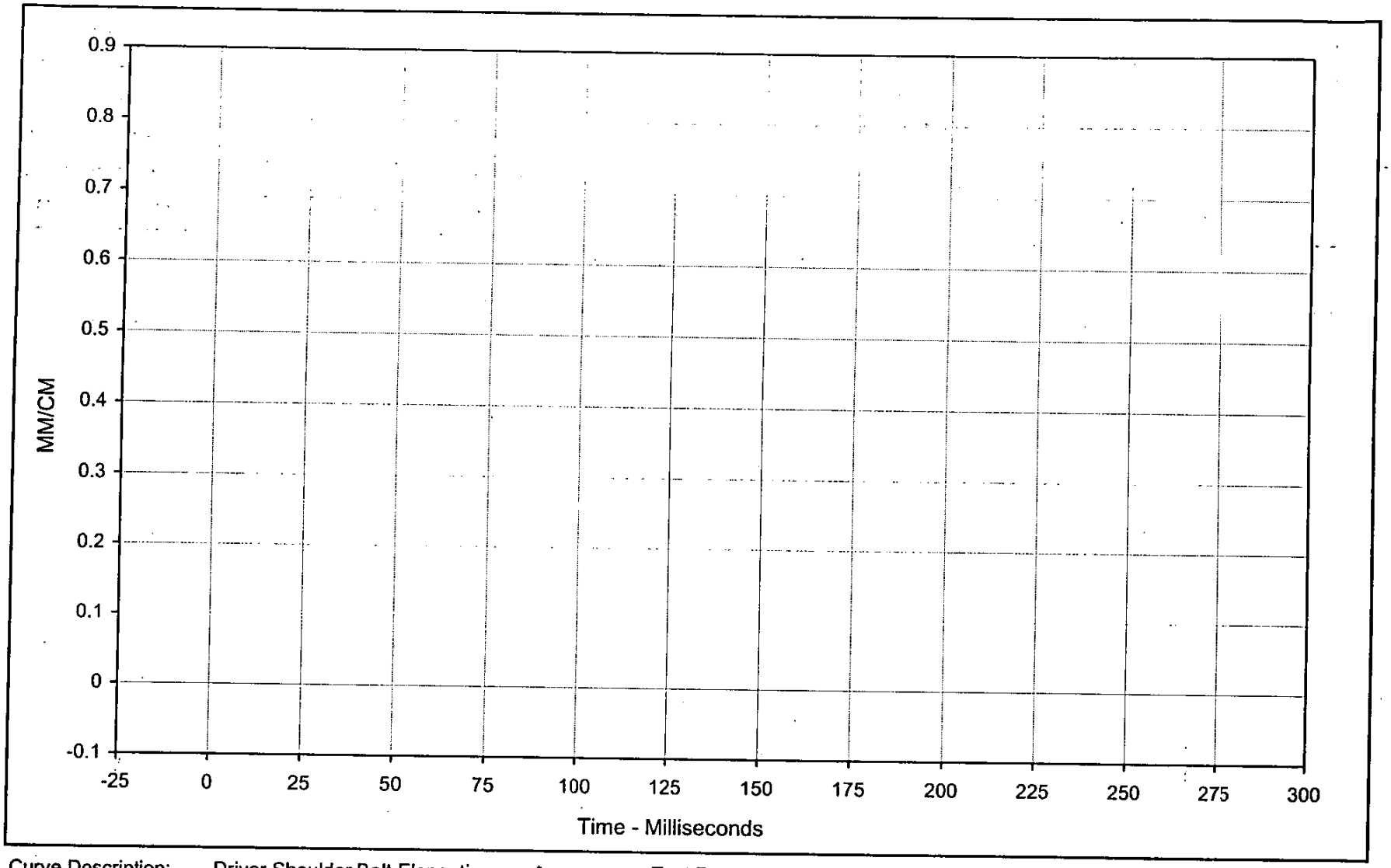
Date of Test: 12/16/99

Curve Number: FIL-043

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Driver 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: 12/16/99

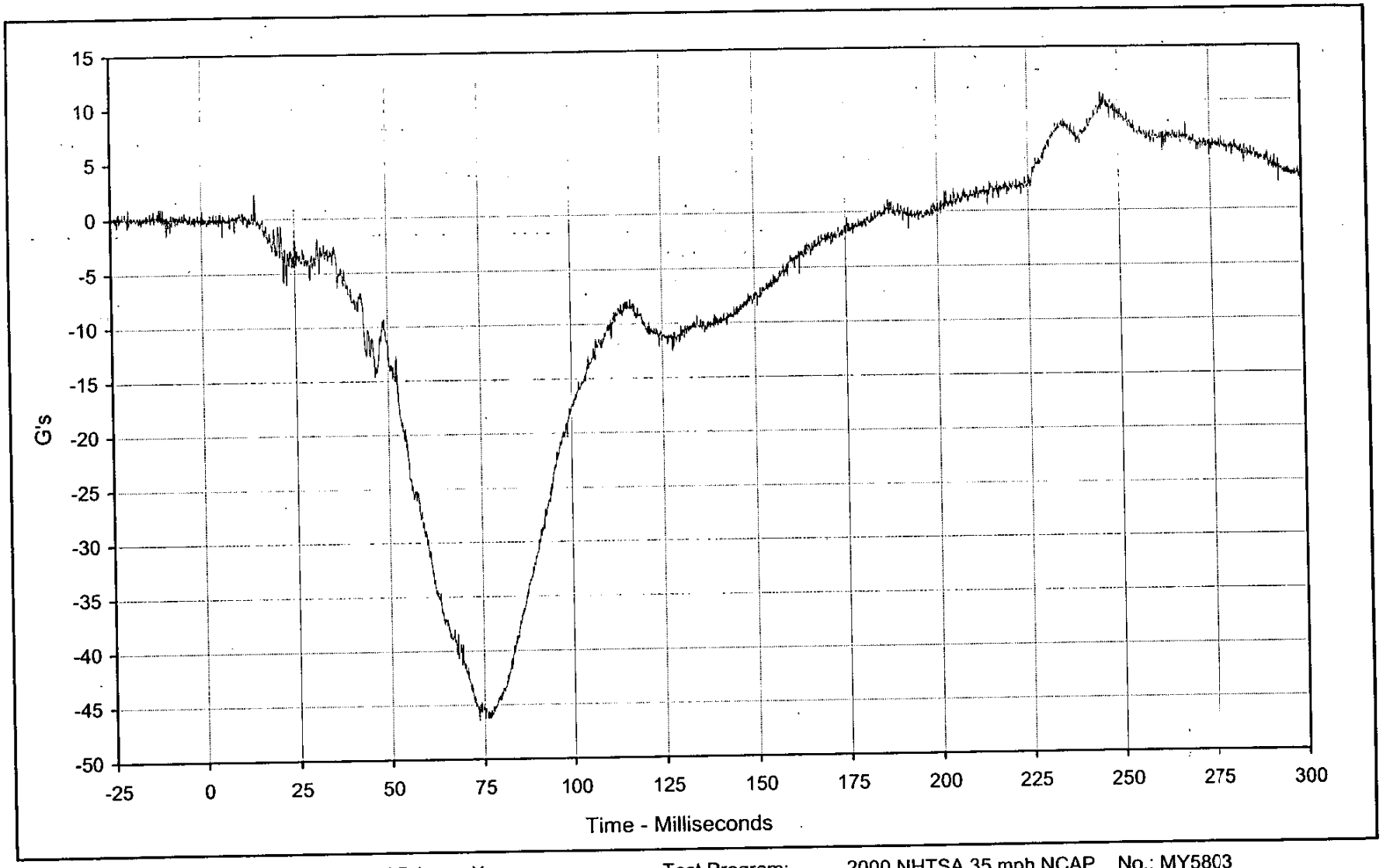
Curve Number: FIL-044

* Not Installed

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Head Primary X

Maximum Value: 10.8 at 245.2 Milliseconds

Minimum Value: -46.5 at 73.5 Milliseconds

SAE Filter Class: 1000

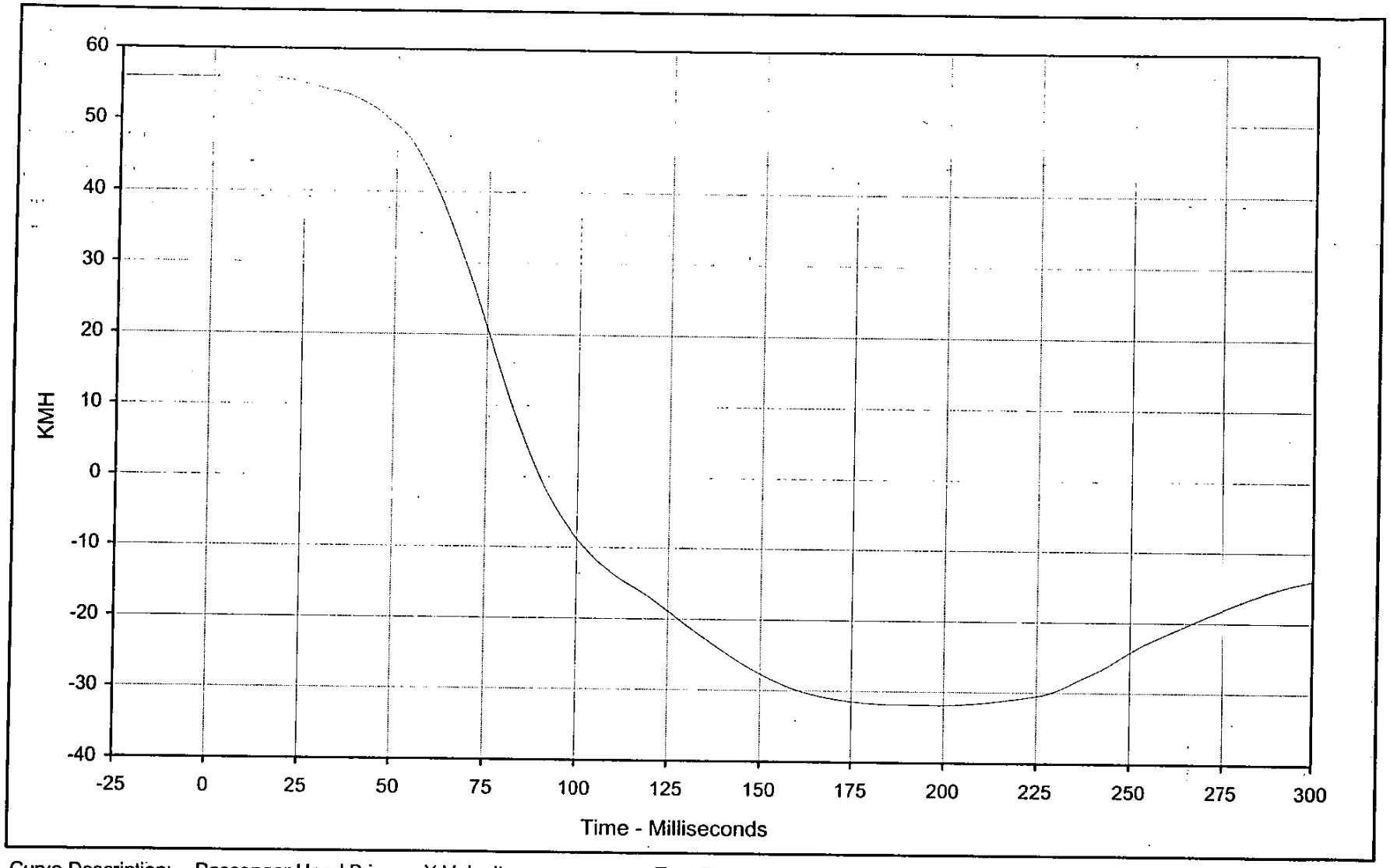
Date of Test: 12/16/99

Curve Number: FIL-045

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Head Primary X Velocity

Maximum Value: 55.9 at 0.0 Milliseconds

Minimum Value: -31.9 at 198.7 Milliseconds

SAE Filter Class: 180

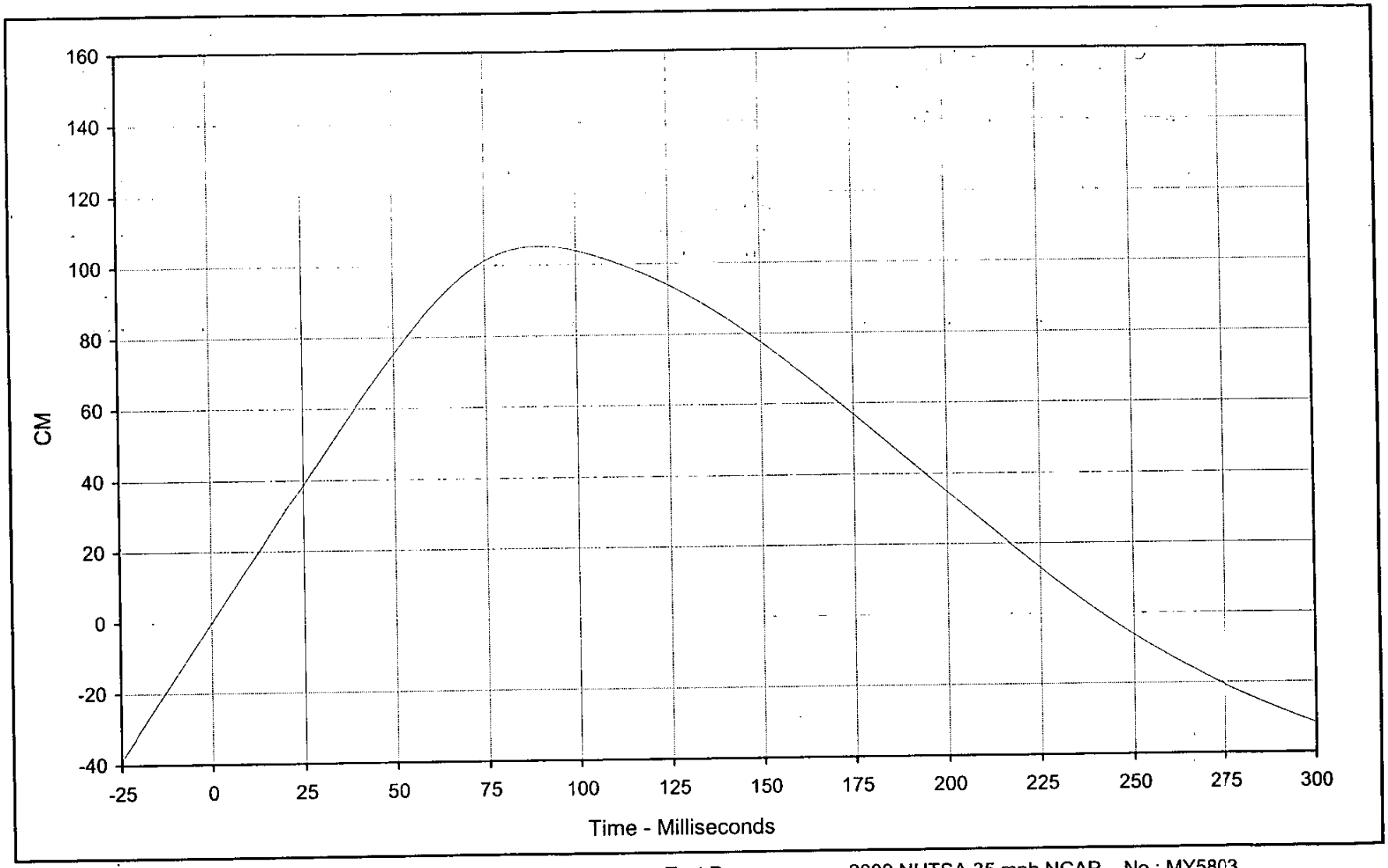
Date of Test: 12/16/99

Curve Number: IN1-045

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Head Primary X Displ.

Maximum Value: 105.3 at 89.6 Milliseconds

Minimum Value: -31.7 at 299.9 Milliseconds

SAE Filter Class: 180

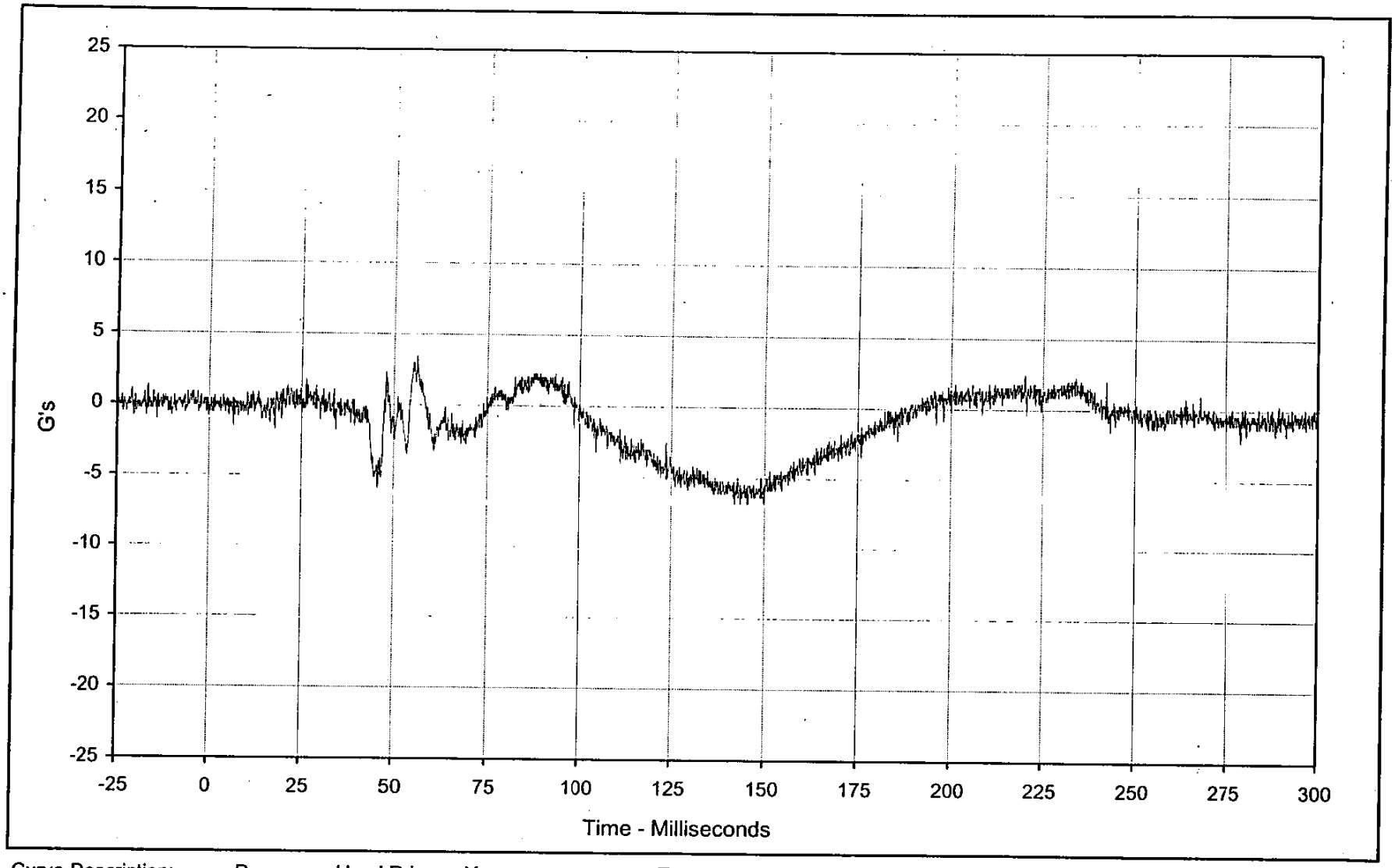
Date of Test: 12/16/99

Curve Number: IN2-045

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Head Primary Y

Maximum Value: 3.5 at 56.2 Milliseconds

Minimum Value: -6.9 at 142.0 Milliseconds

SAE Filter Class: 1000

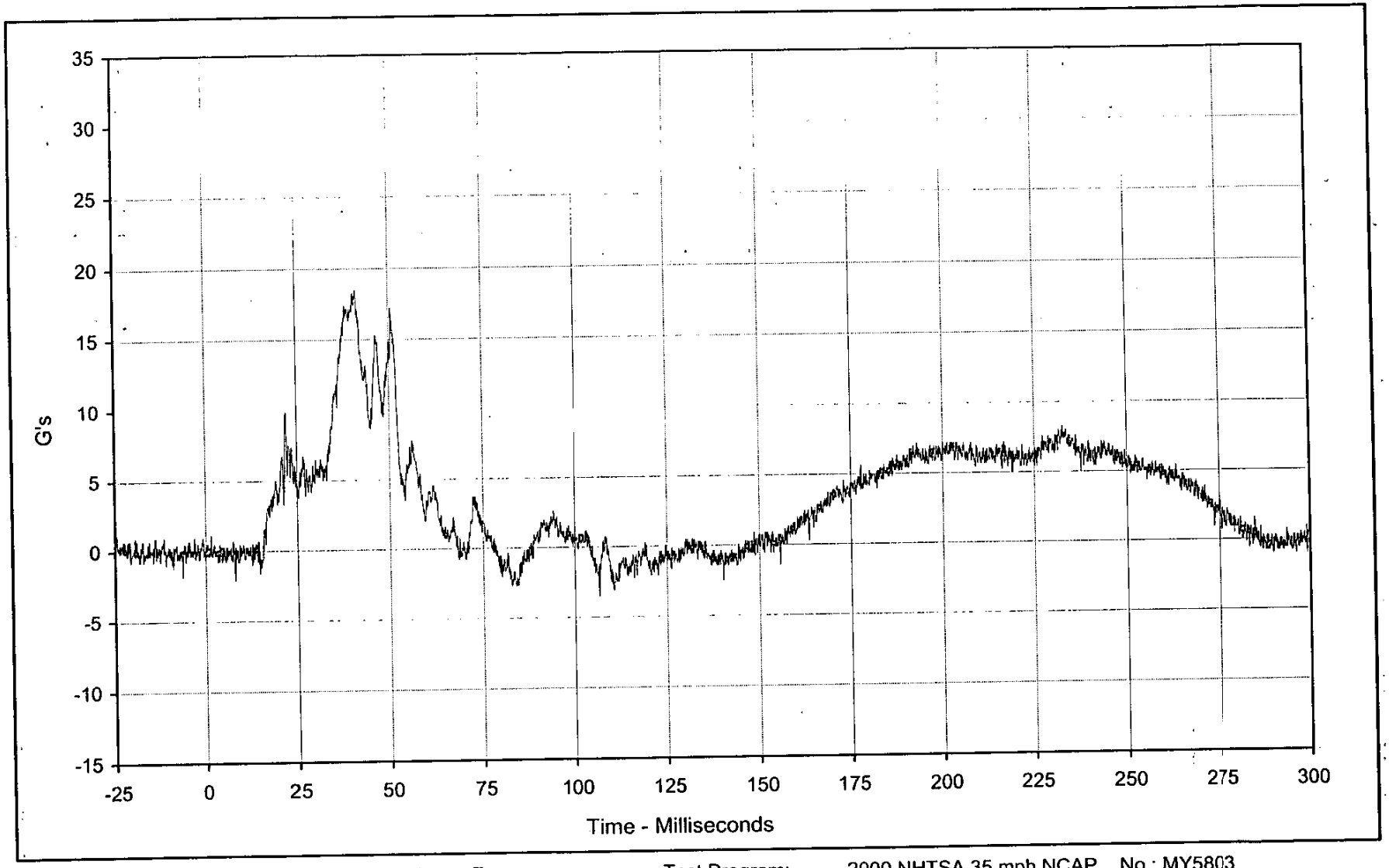
Date of Test: 12/16/99

Curve Number: FIL-046

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Head Primary Z

Maximum Value: 18.5 at 40.9 Milliseconds

Minimum Value: -3.6 at 106.6 Milliseconds

SAE Filter Class: 1000

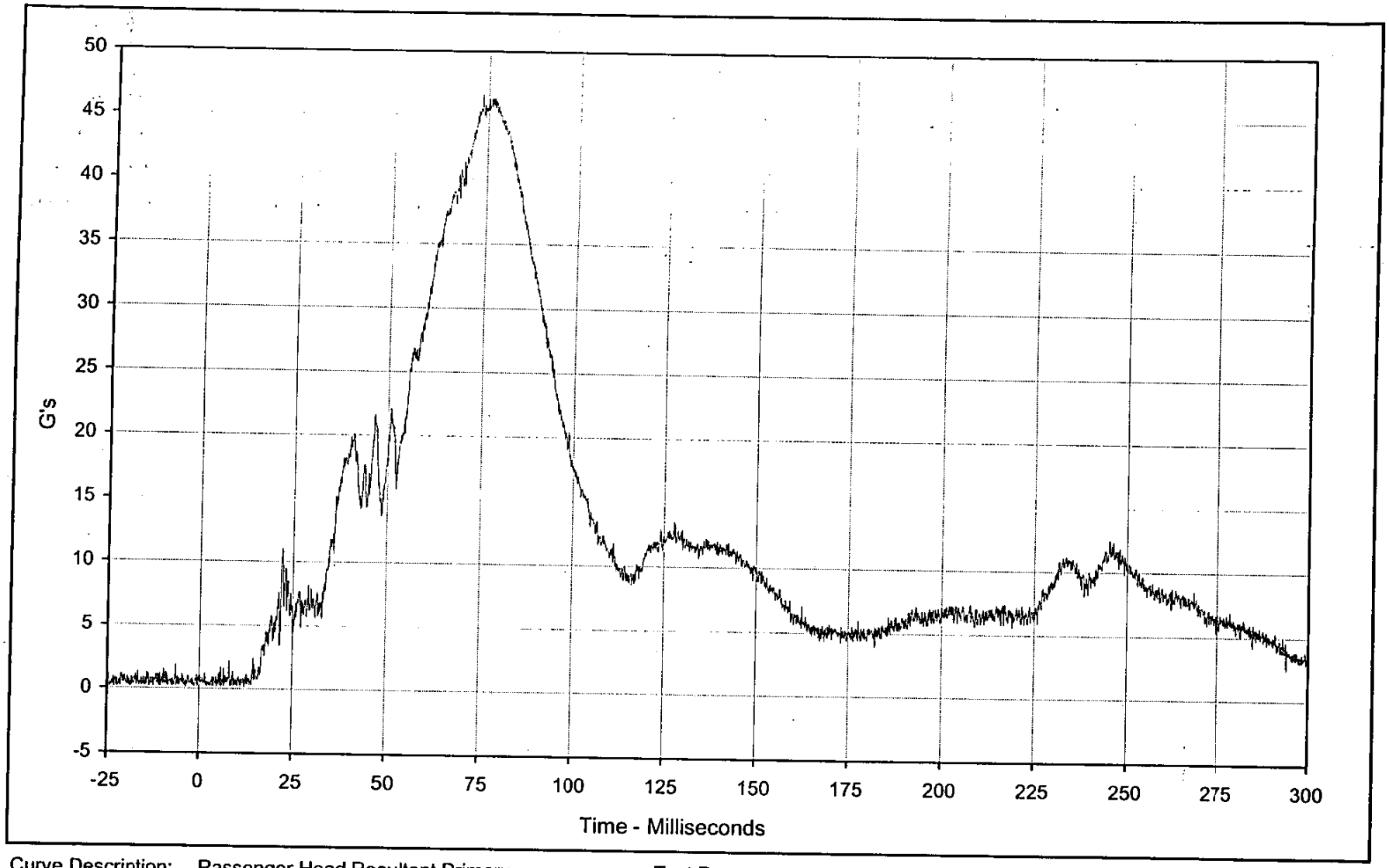
Date of Test: 12/16/99

Curve Number: FIL-047

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

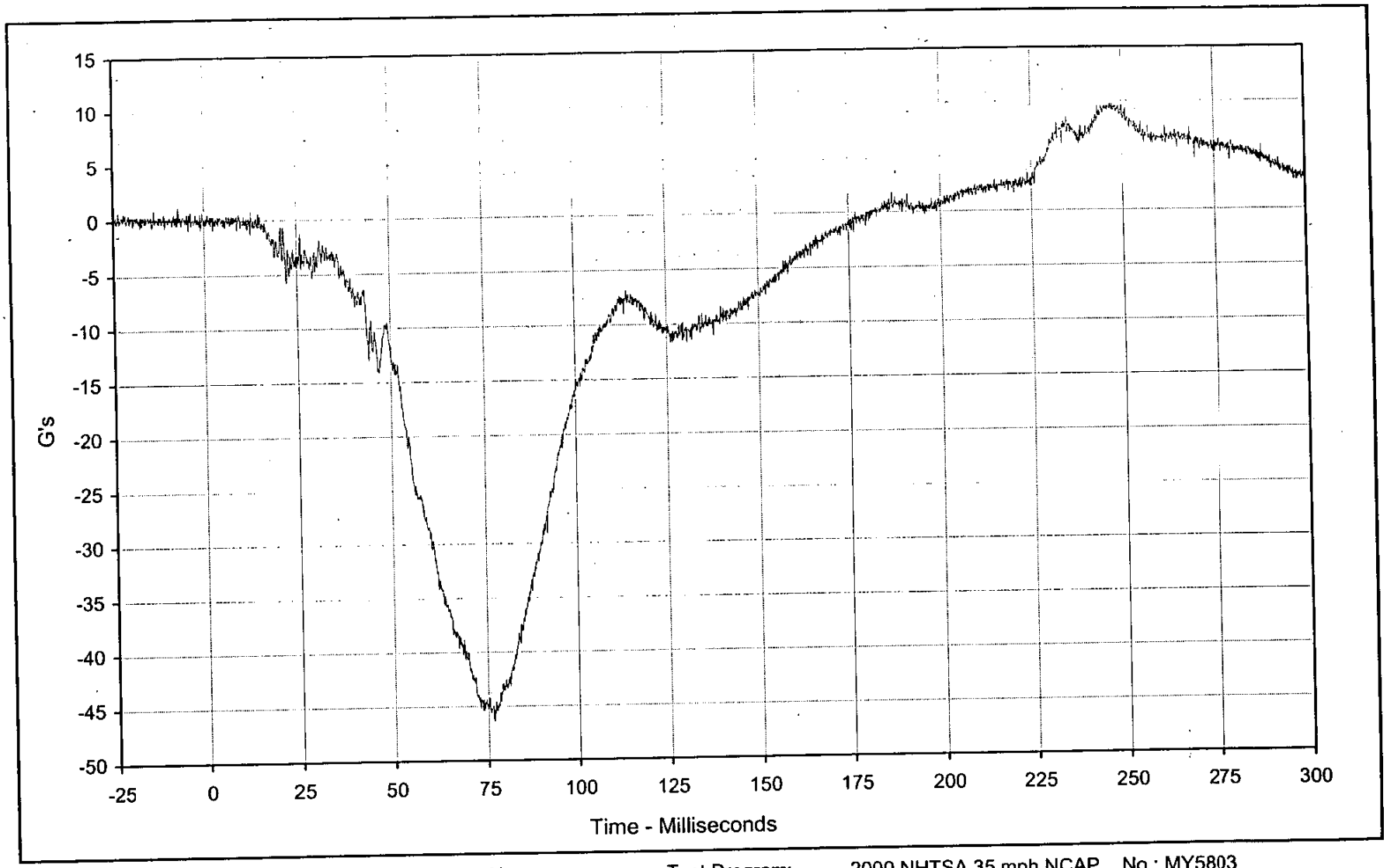
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description:	Passenger Head Resultant Primary			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	46.6	at	73.5 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	0.2	at	2.0 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	RES-045				

KARCO Engineering



Curve Description: Passenger Head Redundant X

Maximum Value: 9.8 at 246.7 Milliseconds

Minimum Value: -46.4 at 76.5 Milliseconds

SAE Filter Class: 1000

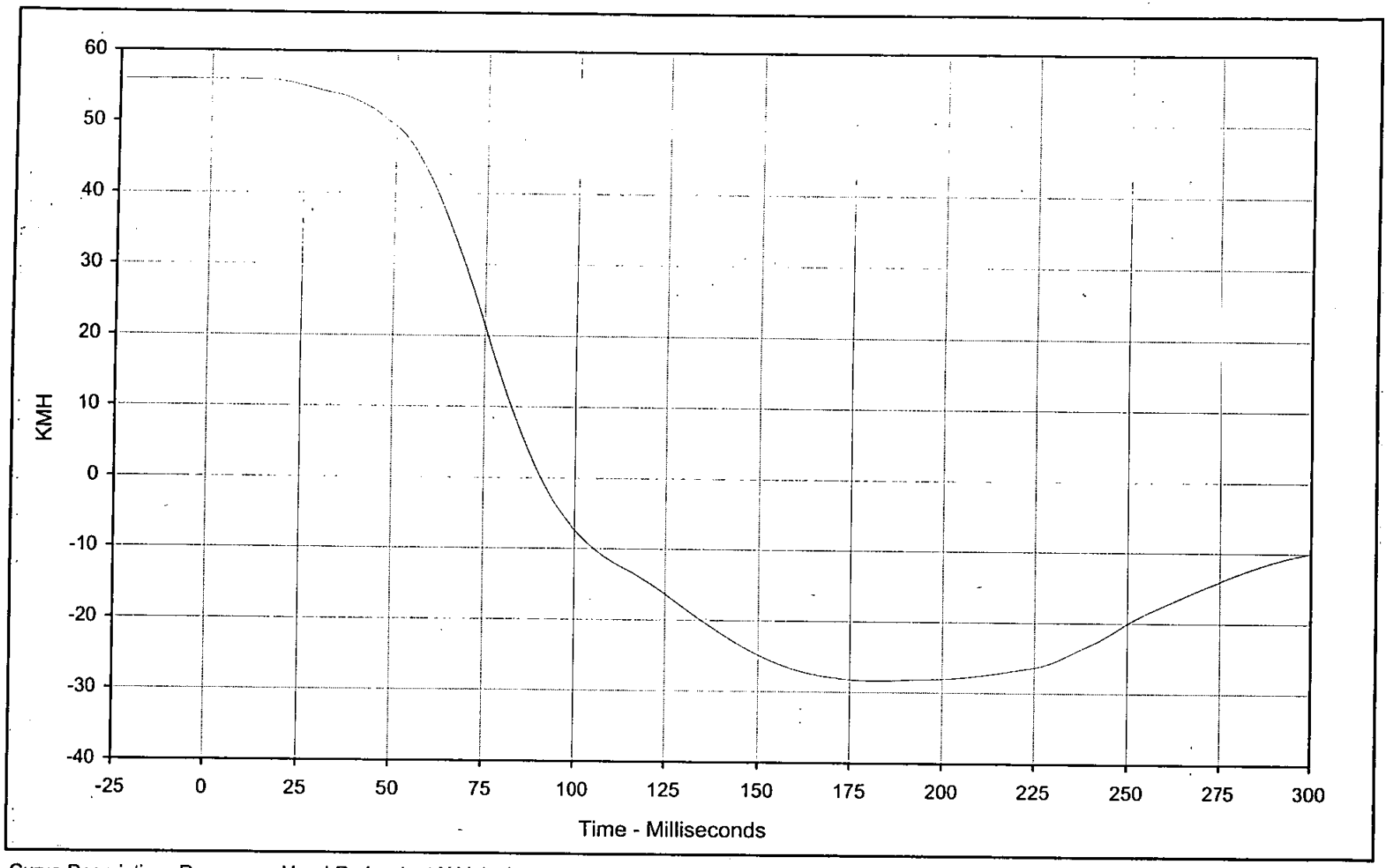
Date of Test: 12/16/99

Curve Number: FIL-048

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Head Redundant X Velocity

Maximum Value: 56.0 at 0.0 Milliseconds

Minimum Value: -28.4 at 181.8 Milliseconds

SAE Filter Class: 180

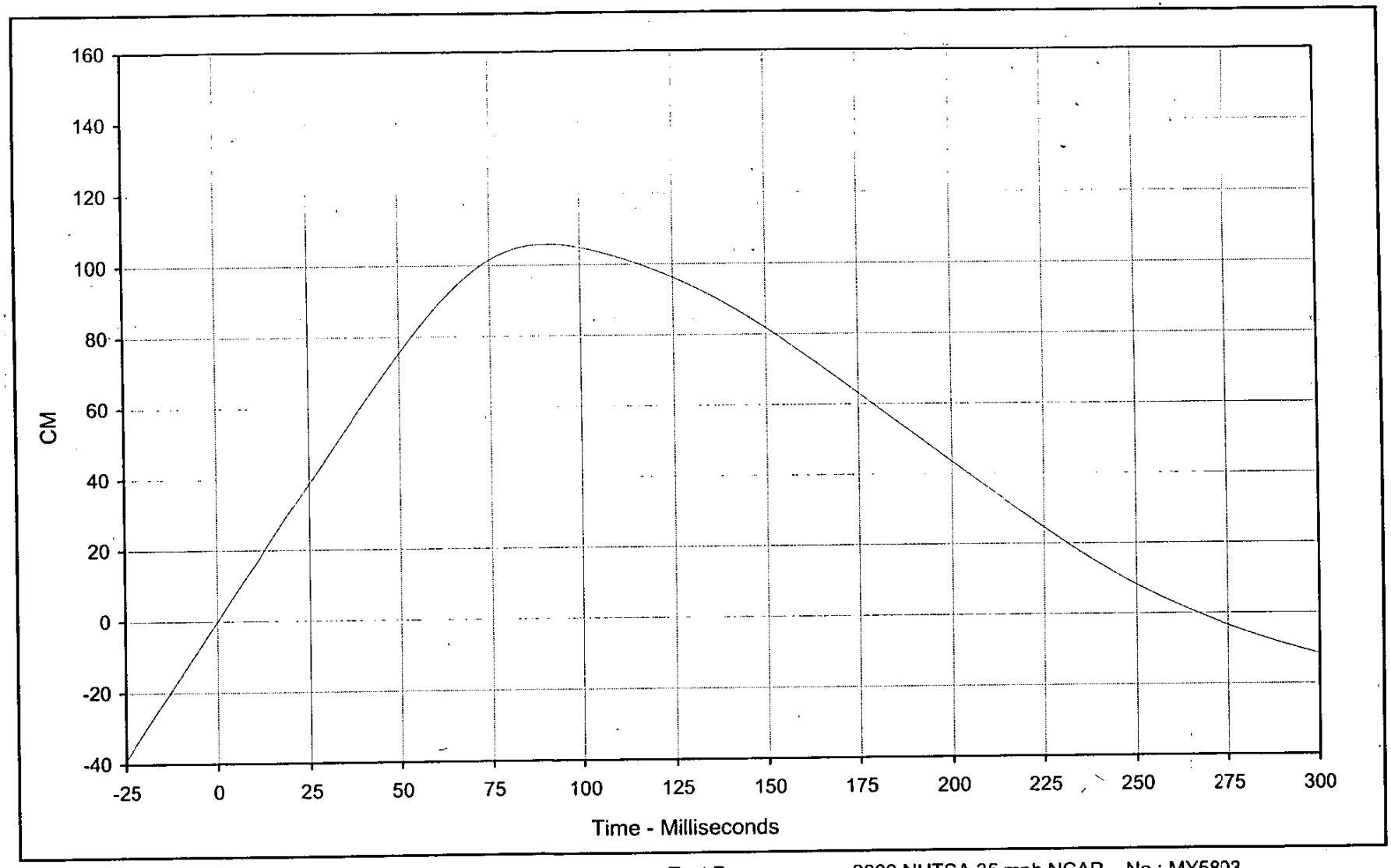
Date of Test: 12/16/99

Curve Number: IN1-048

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Head Redundant X Displ.

Maximum Value: 105.8 at 90.5 Milliseconds

Minimum Value: -11.6 at 299.9 Milliseconds

SAE Filter Class: 180

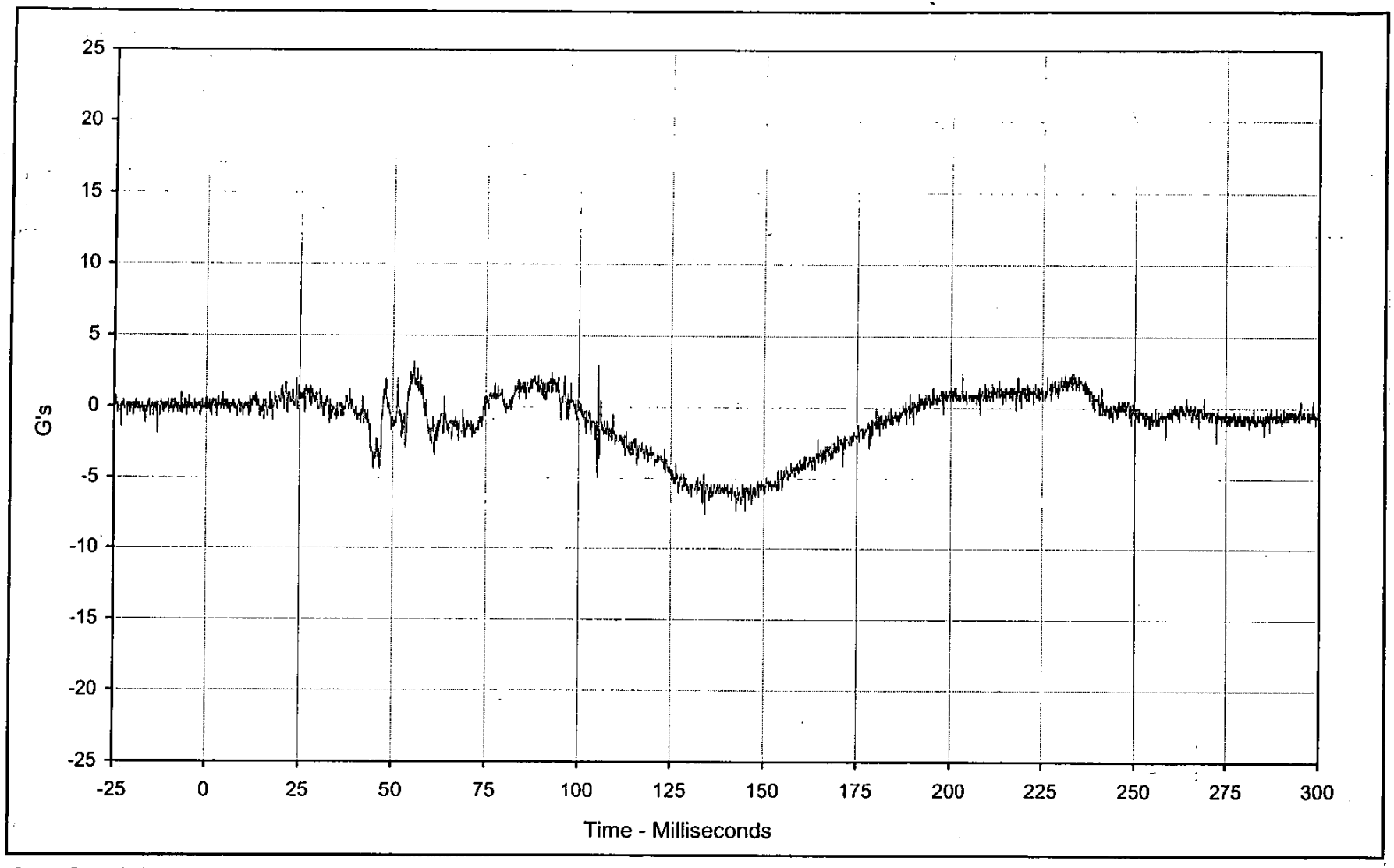
Date of Test: 12/16/99

Curve Number: IN2-048

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

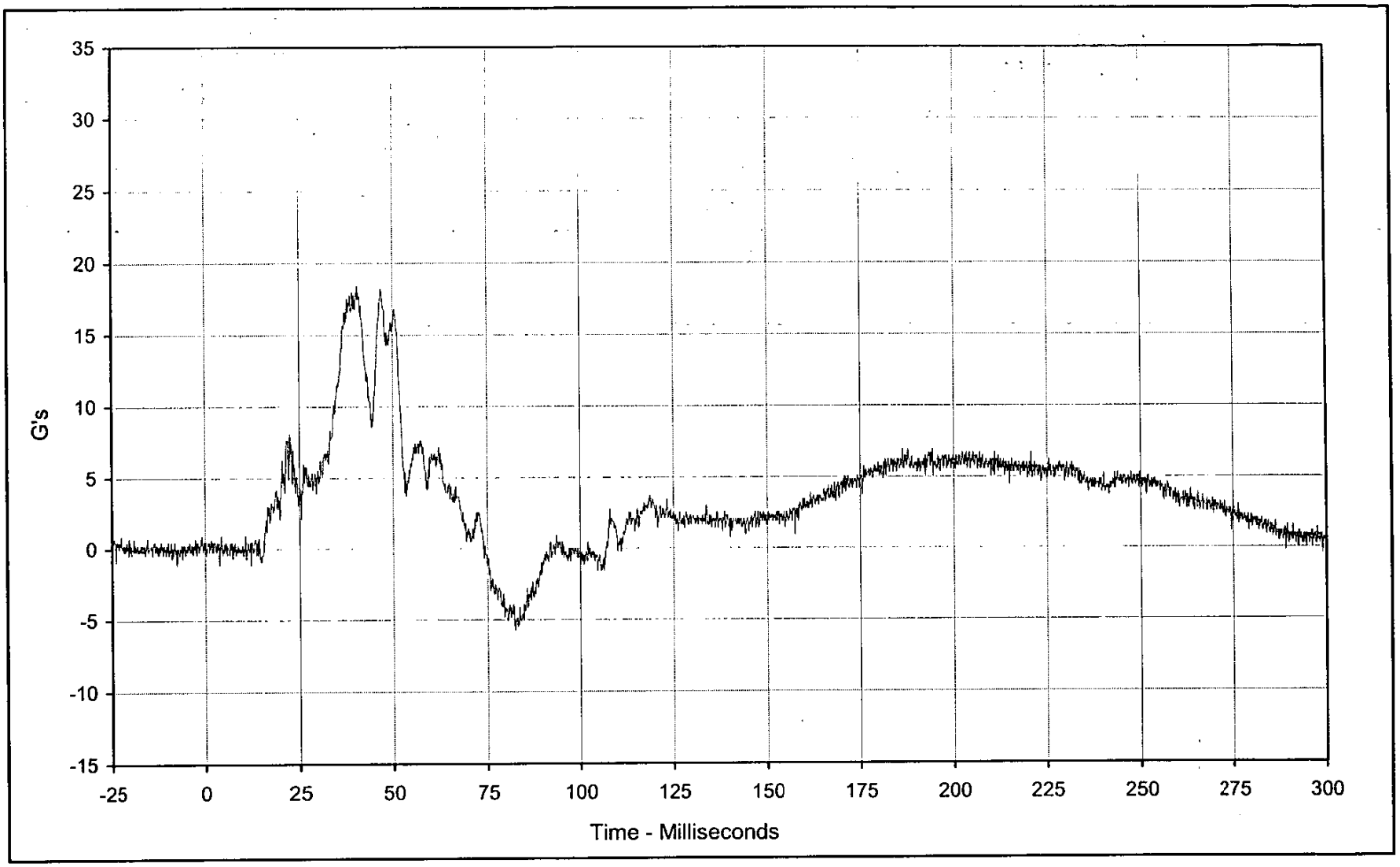
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARC Engineering



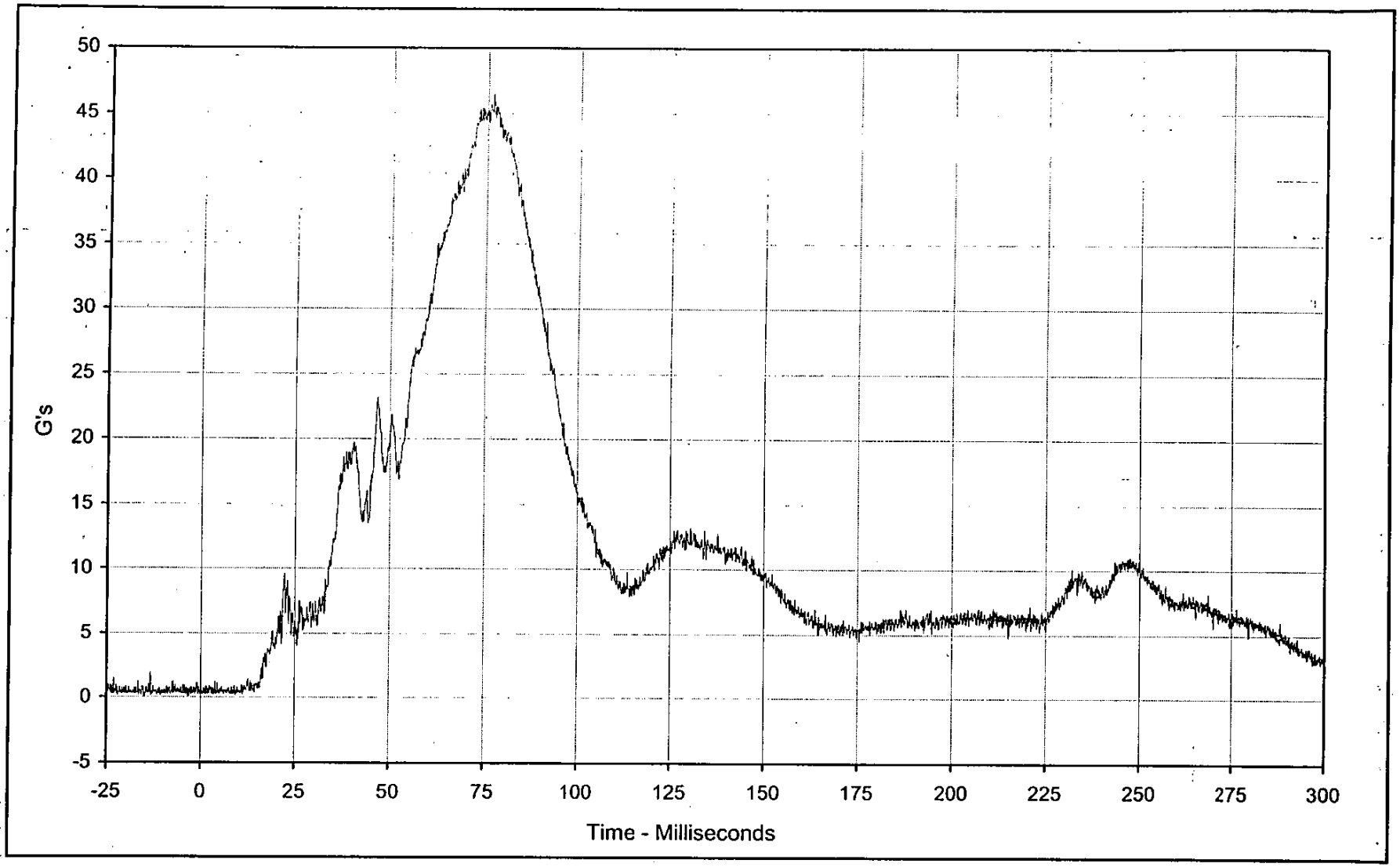
Curve Description:	Passenger Head Redundant Y			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	3.2	at	55.7 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-7.6	at	134.2 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-049				

KARCO Engineering



Curve Description:	Passenger Head Redundant Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	18.4	at	40.6 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-5.8	at	82.3 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-050				

KARCO Engineering



Curve Description: Passenger Head Resultant Redundant

Maximum Value: 46.5 at 76.5 Milliseconds

Minimum Value: 0.2 at 9.3 Milliseconds

SAE Filter Class: 1000

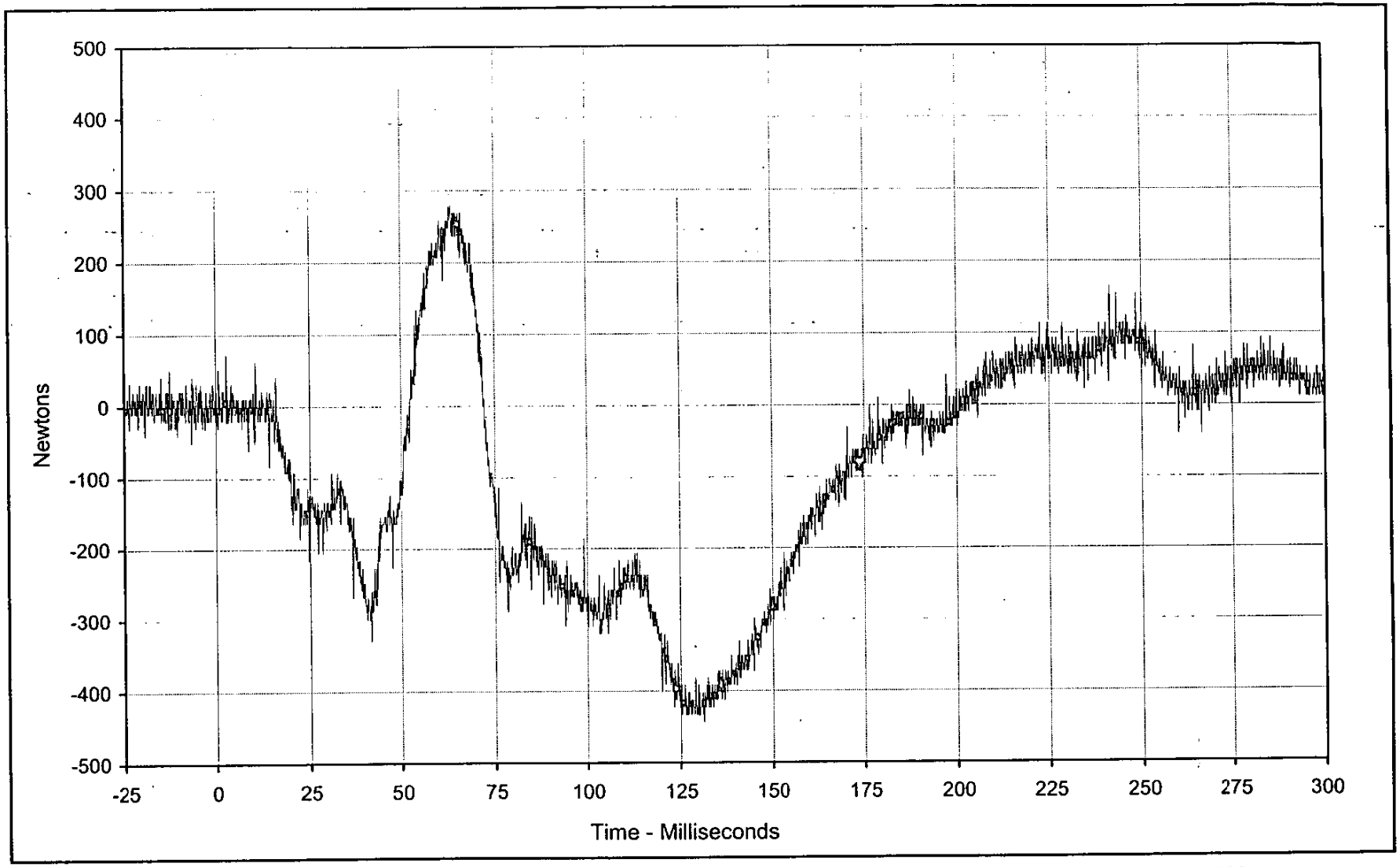
Date of Test: 12/16/99

Curve Number: RES-048

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Neck Force X

Maximum Value: 278.6 at 63.1 Milliseconds

Minimum Value: -443.7 at 131.3 Milliseconds

SAE Filter Class: 1000

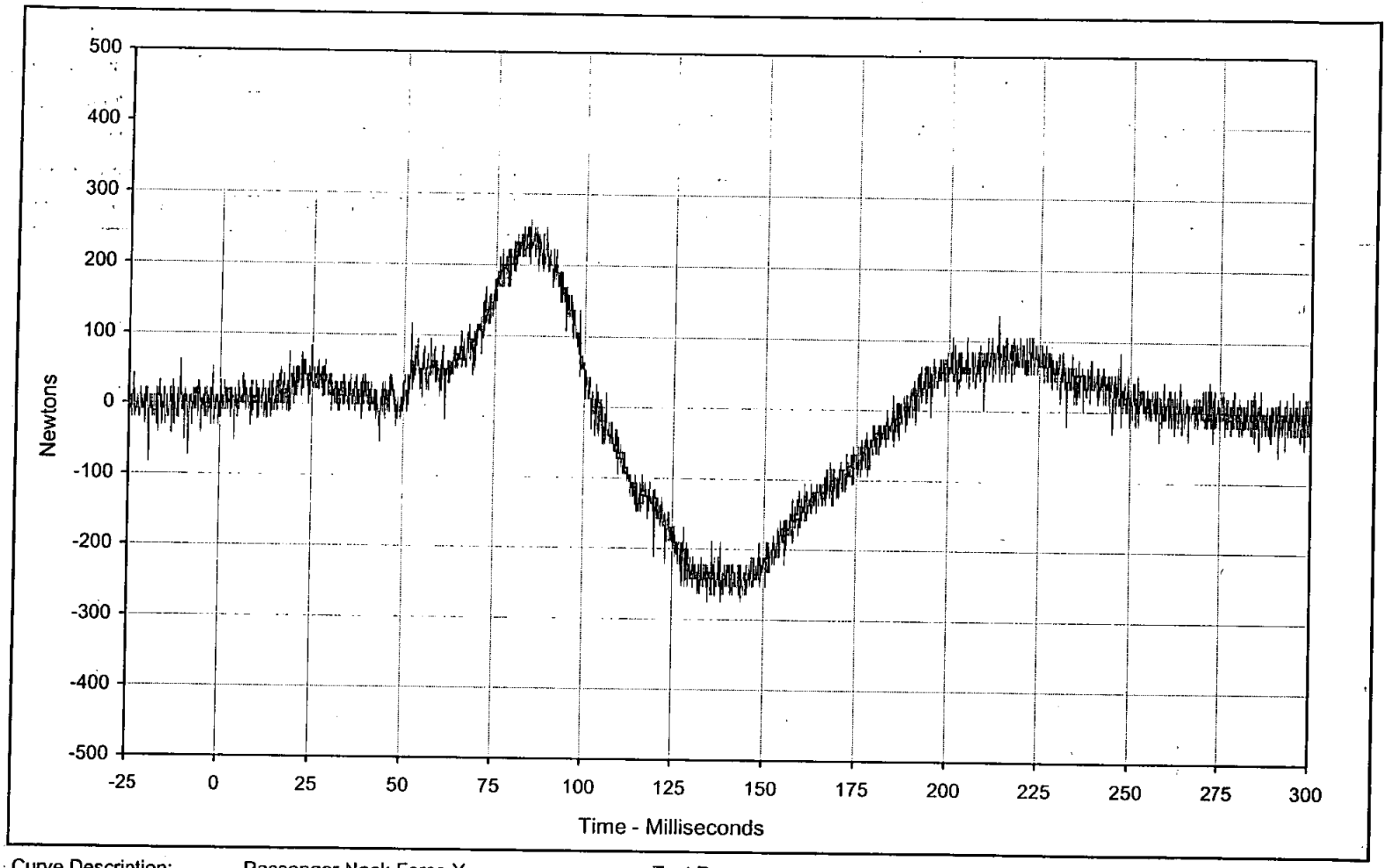
Date of Test: 12/16/99

Curve Number: FIL-051

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARC Engineering



Curve Description: Passenger Neck Force Y

Maximum Value: 264.5 at 84.4 Milliseconds

Minimum Value: -275.1 at 134.7 Milliseconds

SAE Filter Class: 1000

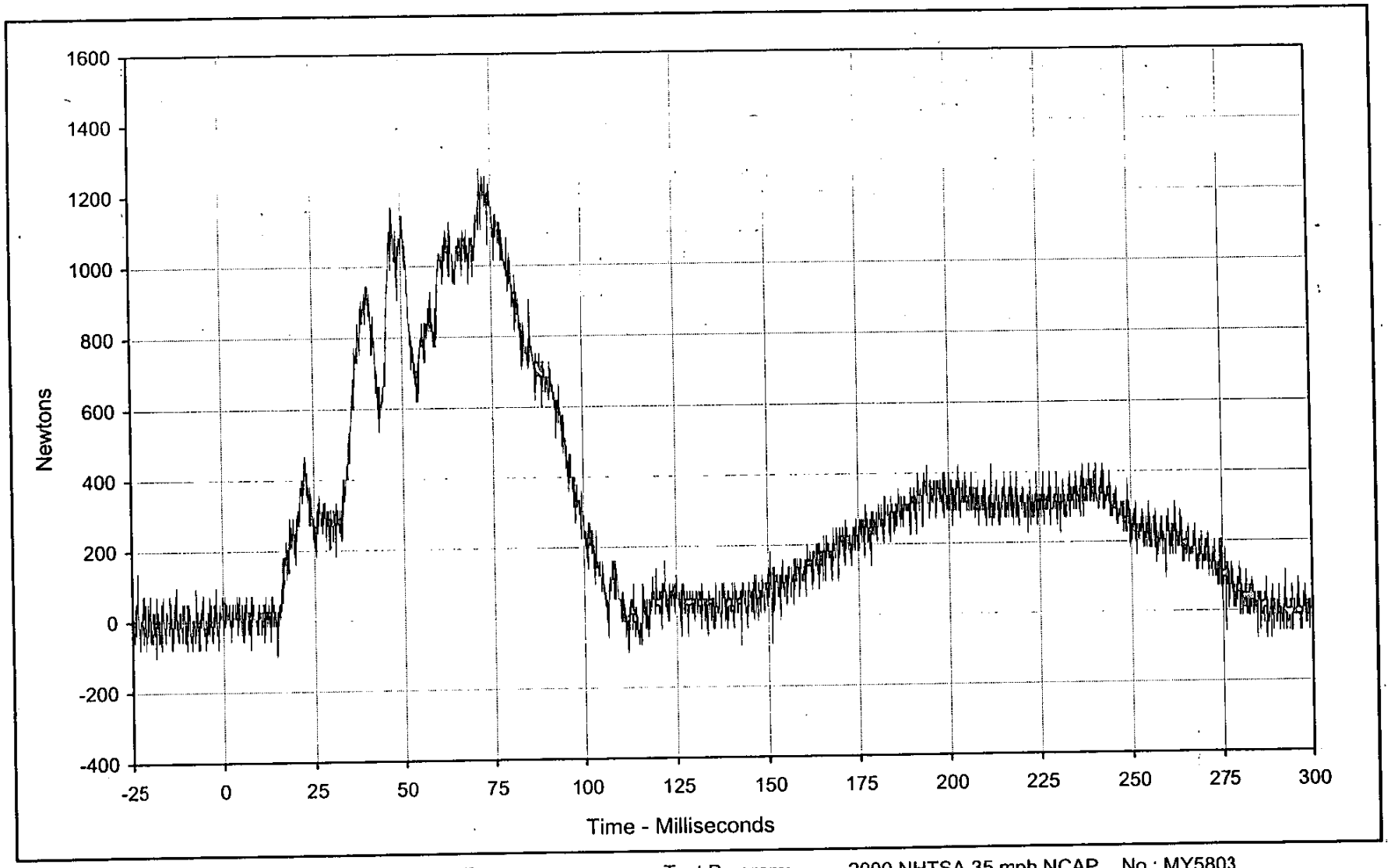
Date of Test: 12/16/99

Curve Number: FIL-052

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Neck Force Z

Maximum Value: 1275.8 at 71.9 Milliseconds

Minimum Value: -102.5 at 14.7 Milliseconds

SAE Filter Class: 1000

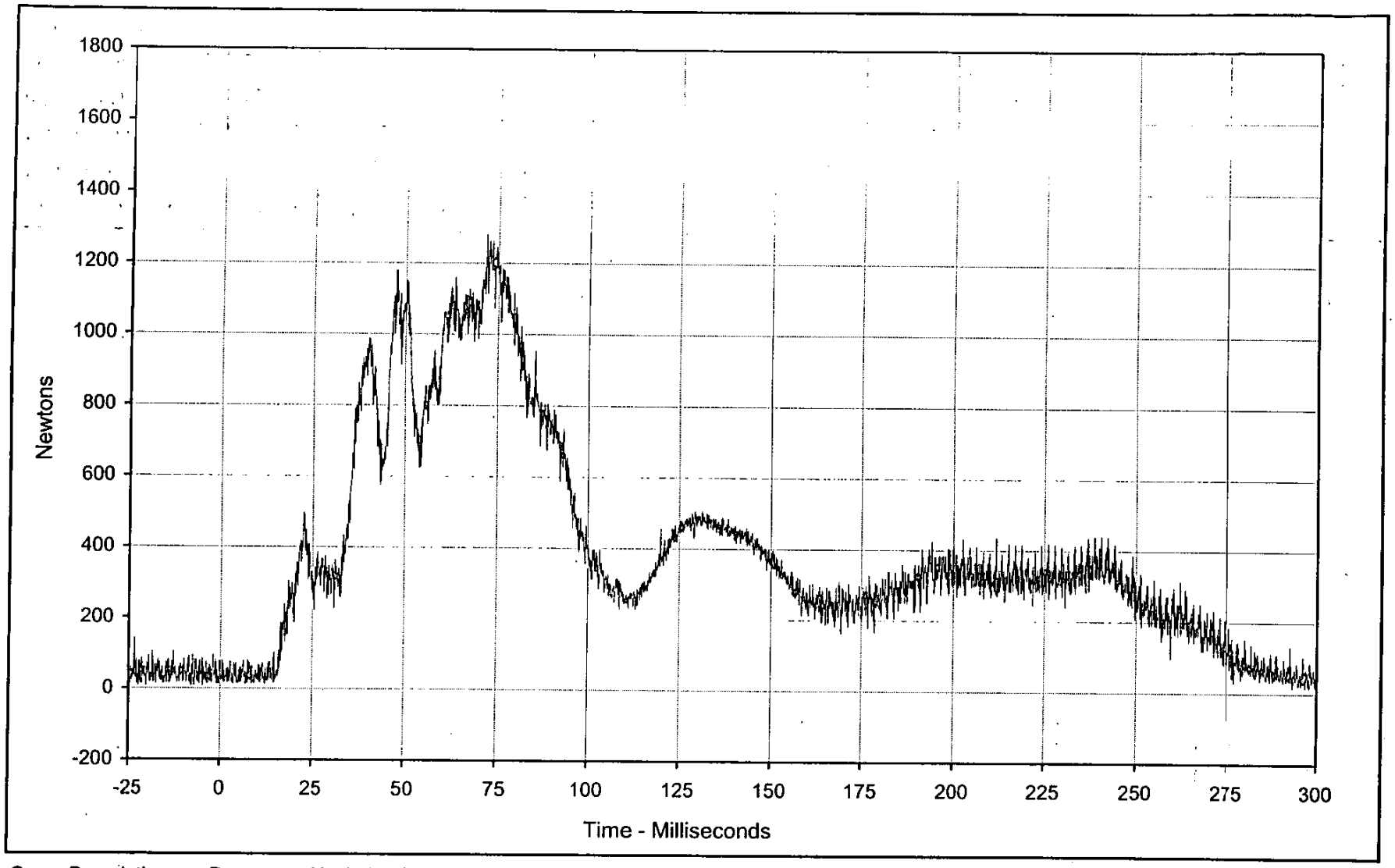
Date of Test: 12/16/99

Curve Number: FIL-053

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

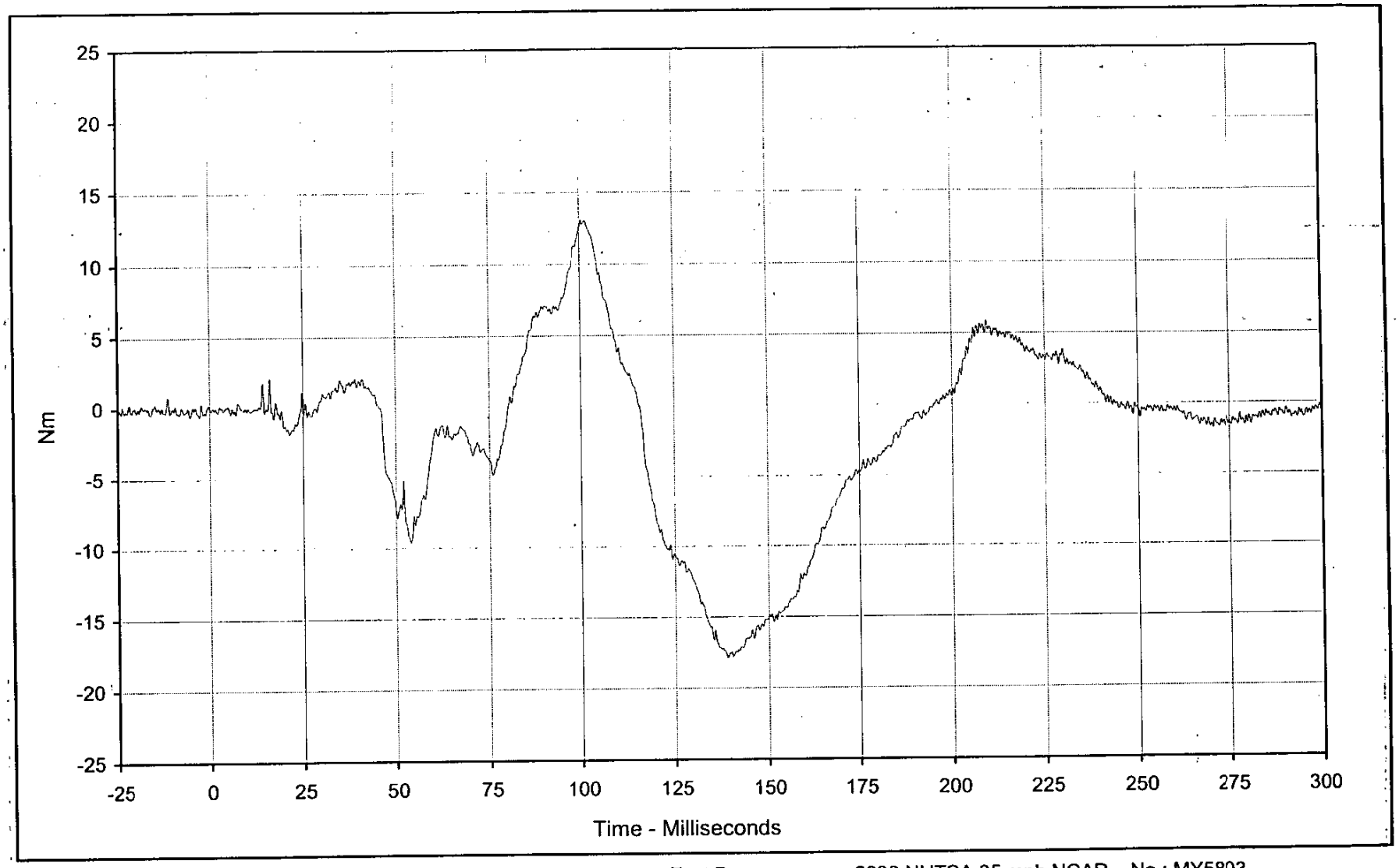
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description:	Passenger Neck Force Resultant			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	1280.1	at	71.9 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	12.6	at	3.5 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	RES-051				

KARCO Engineering



Curve Description: Passenger Neck Moment X

Maximum Value: 13.1 at 100.4 Milliseconds

Minimum Value: -17.9 at 139.0 Milliseconds

SAE Filter Class: 600

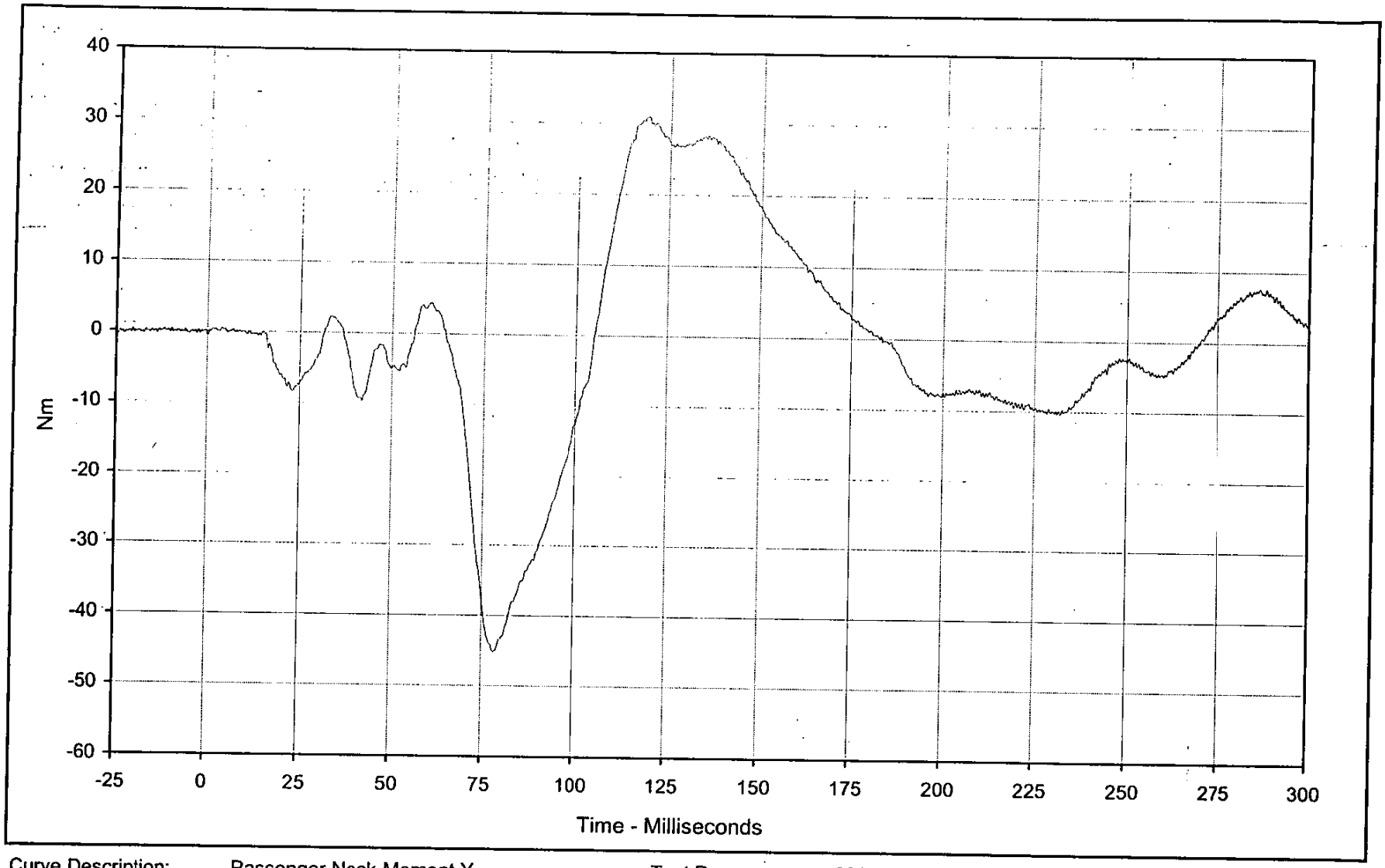
Date of Test: 12/16/99

Curve Number: FIL-054

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARC Engineering



Curve Description: Passenger Neck Moment Y

Maximum Value: 31.0 at 118.8 Milliseconds

Minimum Value: -45.2 at 78.3 Milliseconds

SAE Filter Class: 600

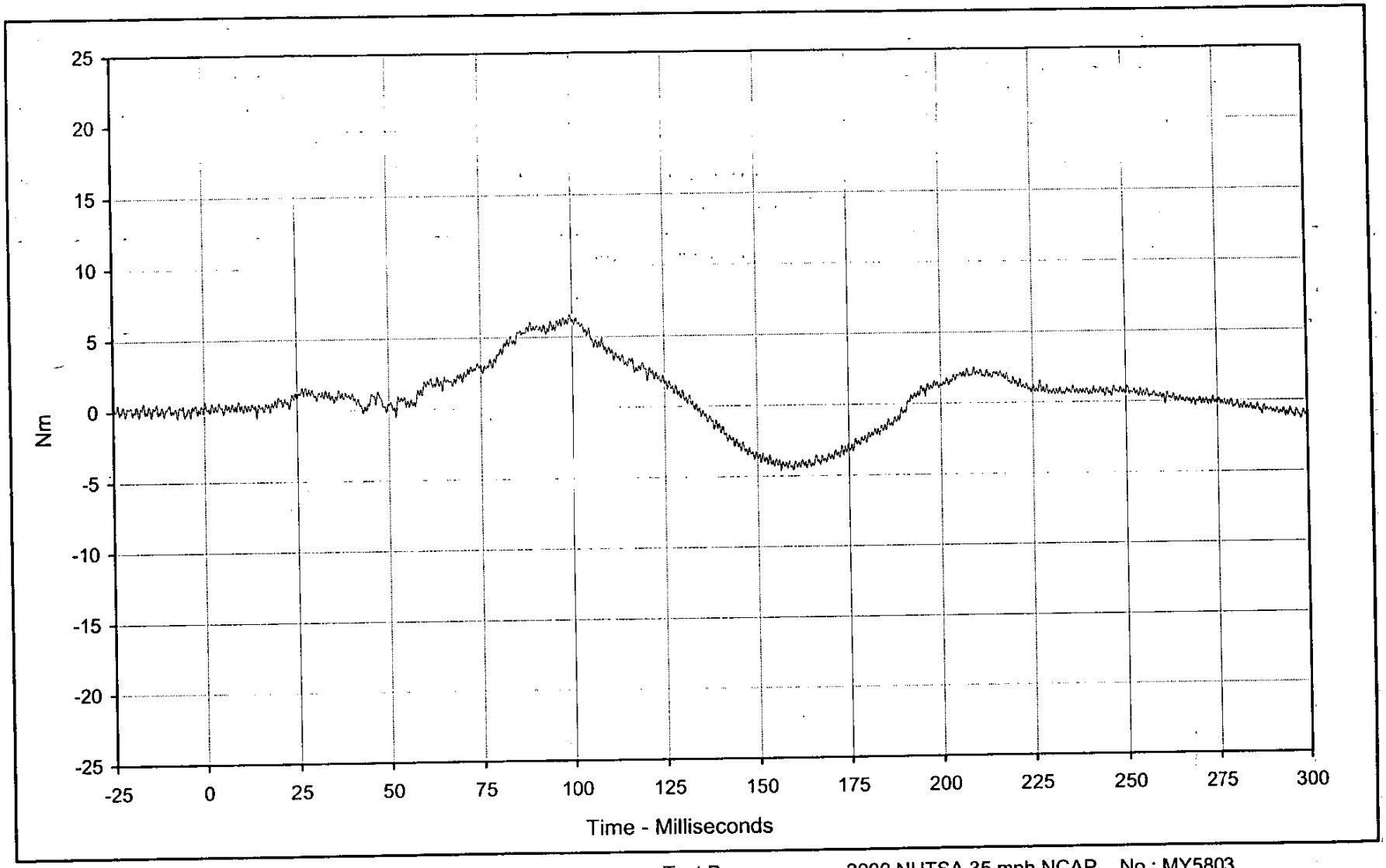
Date of Test: 12/16/99

Curve Number: FIL-055

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Neck Moment Z

Maximum Value: 6.6 at 99.3 Milliseconds

Minimum Value: -4.6 at 156.4 Milliseconds

SAE Filter Class: 600

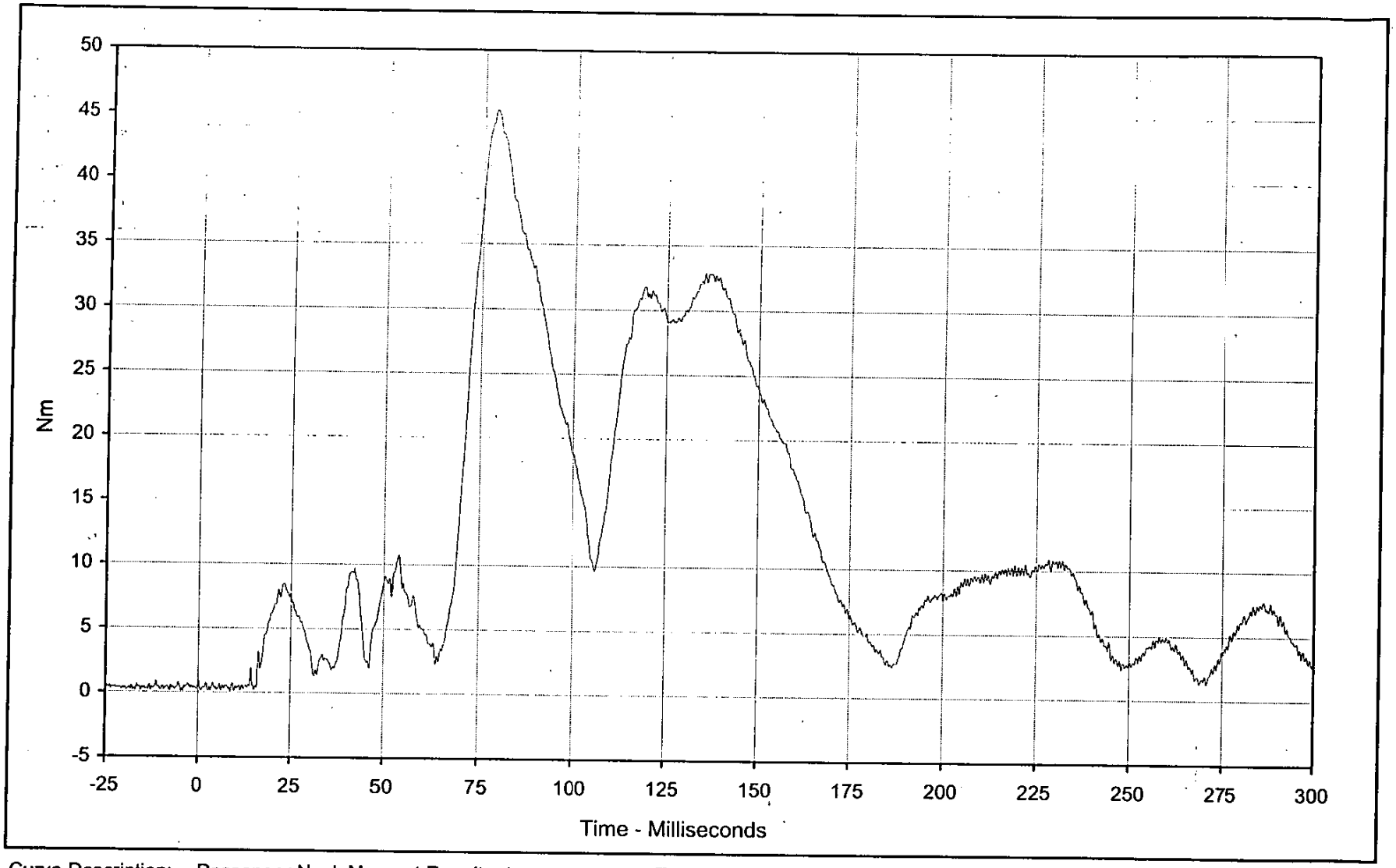
Date of Test: 12/16/99

Curve Number: FIL-056

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

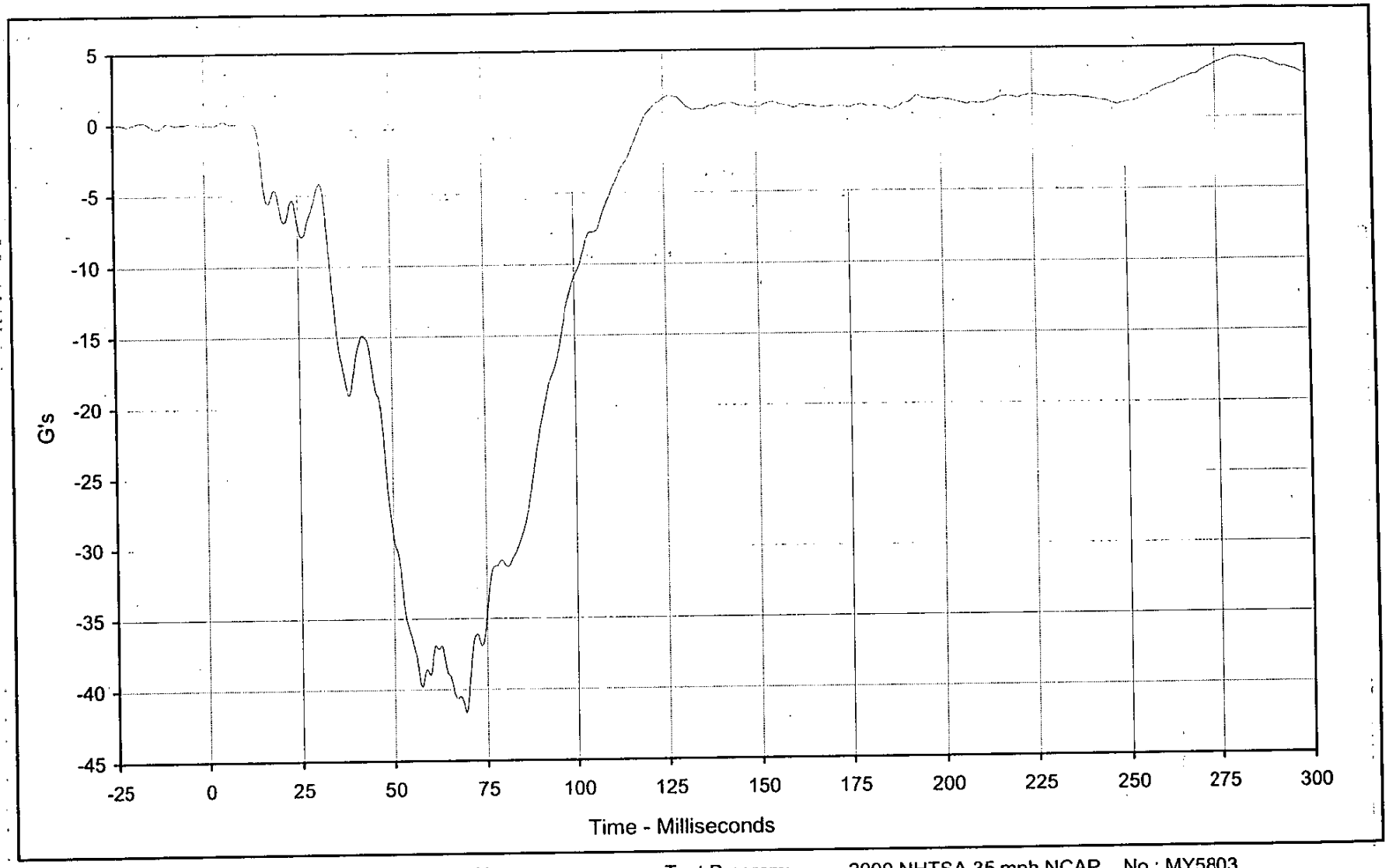
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



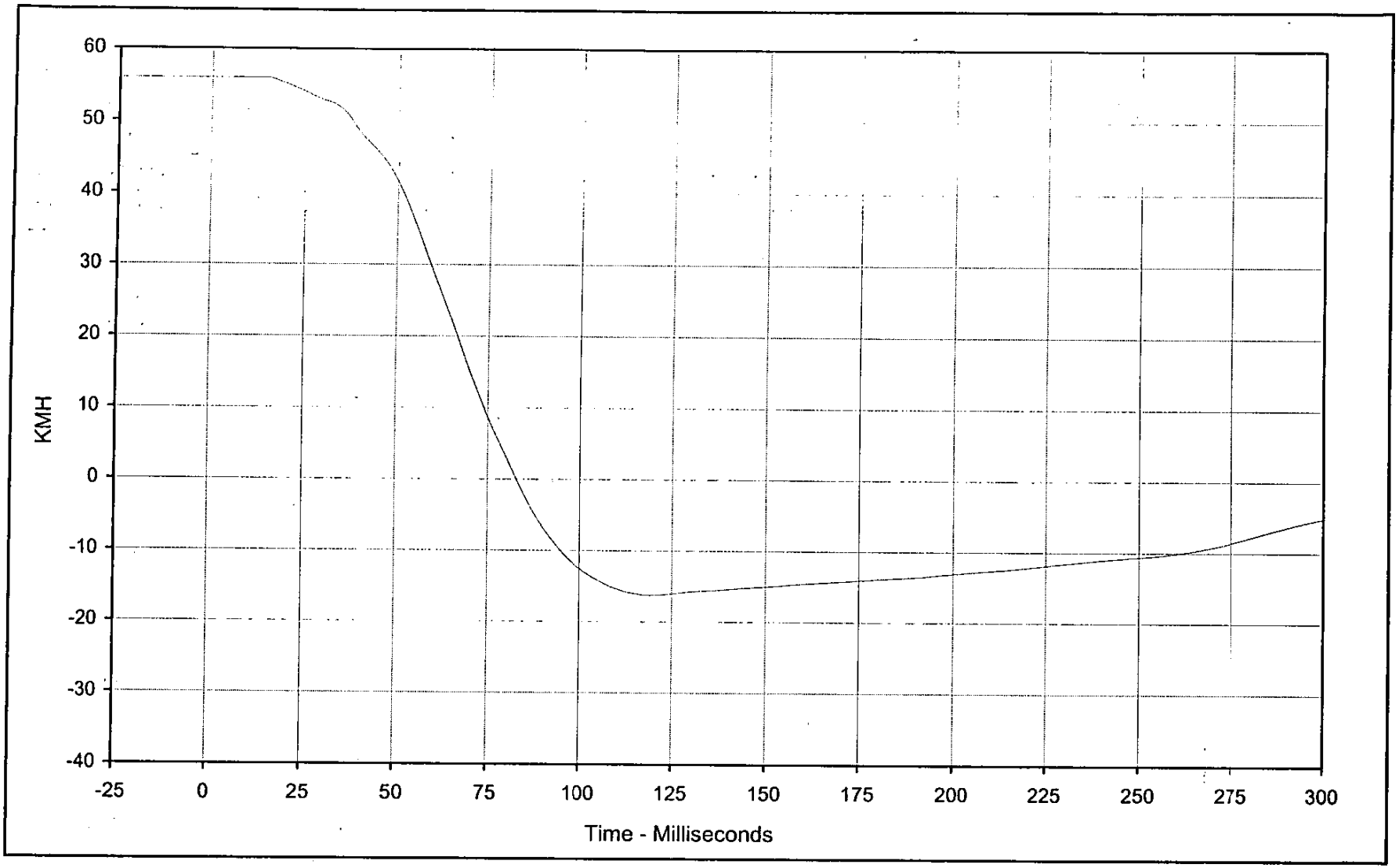
Curve Description:	Passenger Neck Moment Resultant			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	45.4	at	78.3 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	0.1	at	8.7 Milliseconds		
SAE Filter Class:	600				
Date of Test:	12/16/99				
Curve Number:	RES-054				

KARCO Engineering



Curve Description:	Passenger Chest Primary X			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	4.3	at	281.5 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-41.7	at	69.2 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	FIL-057				

KARC Engineering



Curve Description: Passenger Chest Primary X Velocity

Maximum Value: 56.0 at 13.5 Milliseconds

Minimum Value: -16.2 at 119.2 Milliseconds

SAE Filter Class: 180

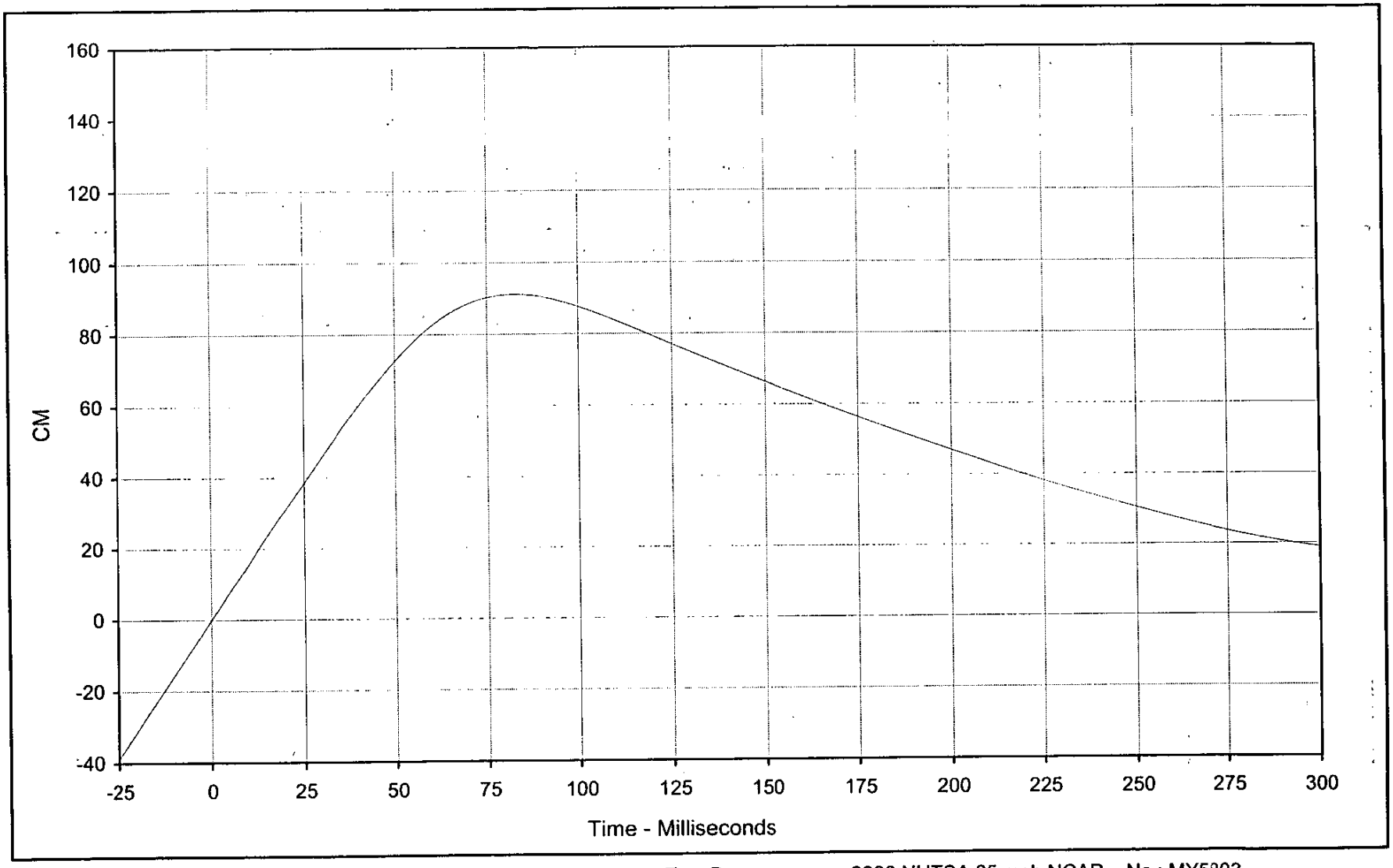
Date of Test: 12/16/99

Curve Number: IN1-057

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Chest Primary X Displ.

Maximum Value: 91.1 at 82.7 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

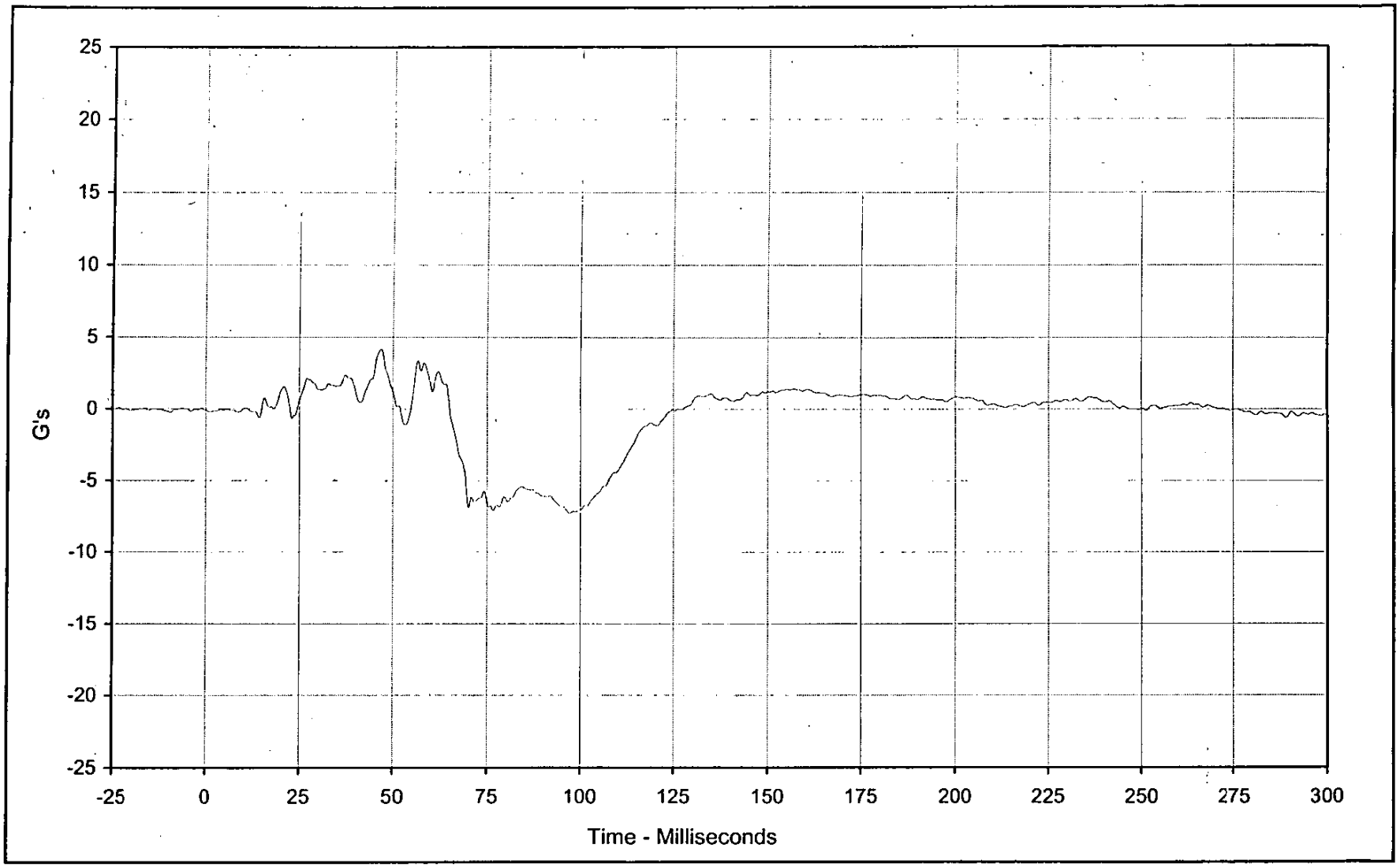
Date of Test: 12/16/99

Curve Number: IN2-057

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

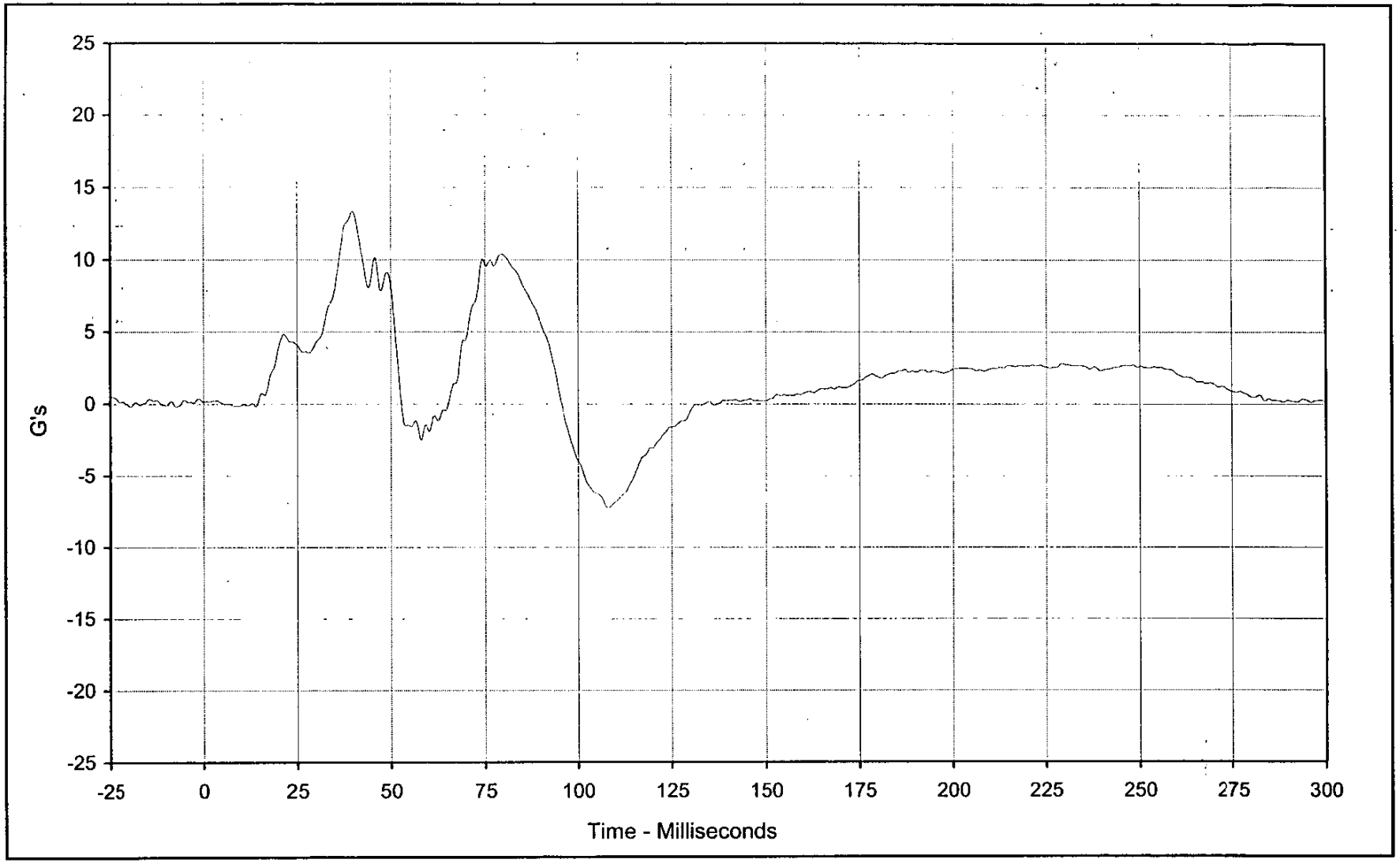
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



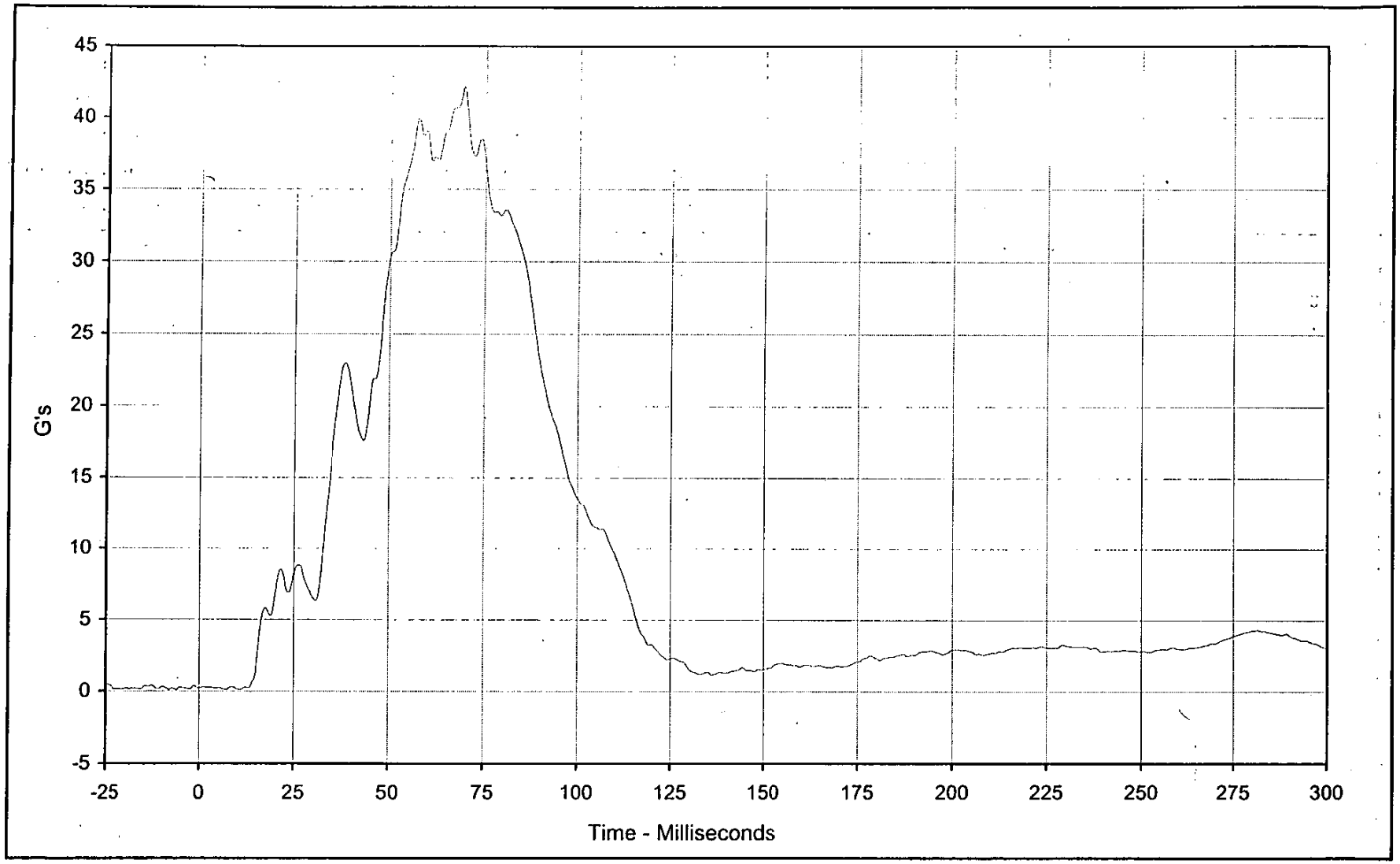
Curve Description:	Passenger Chest Primary Y			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	4.2	at	46.9 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-7.3	at	97.2 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	FIL-058				

KARCO Engineering



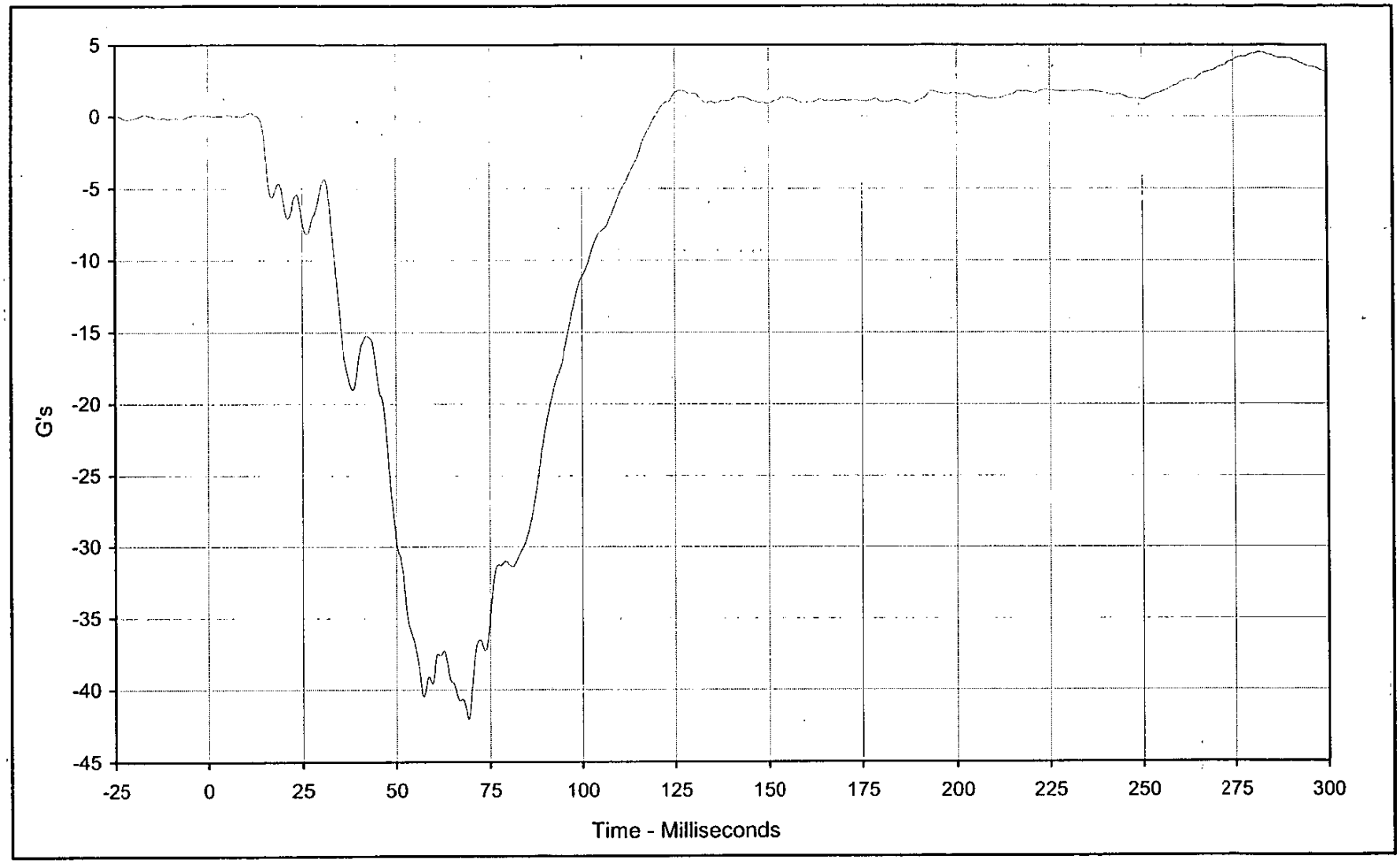
Curve Description:	Passenger Chest Primary Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	13.3	at	39.9 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-7.2	at	107.9 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	FIL-059				

KARCO Engineering



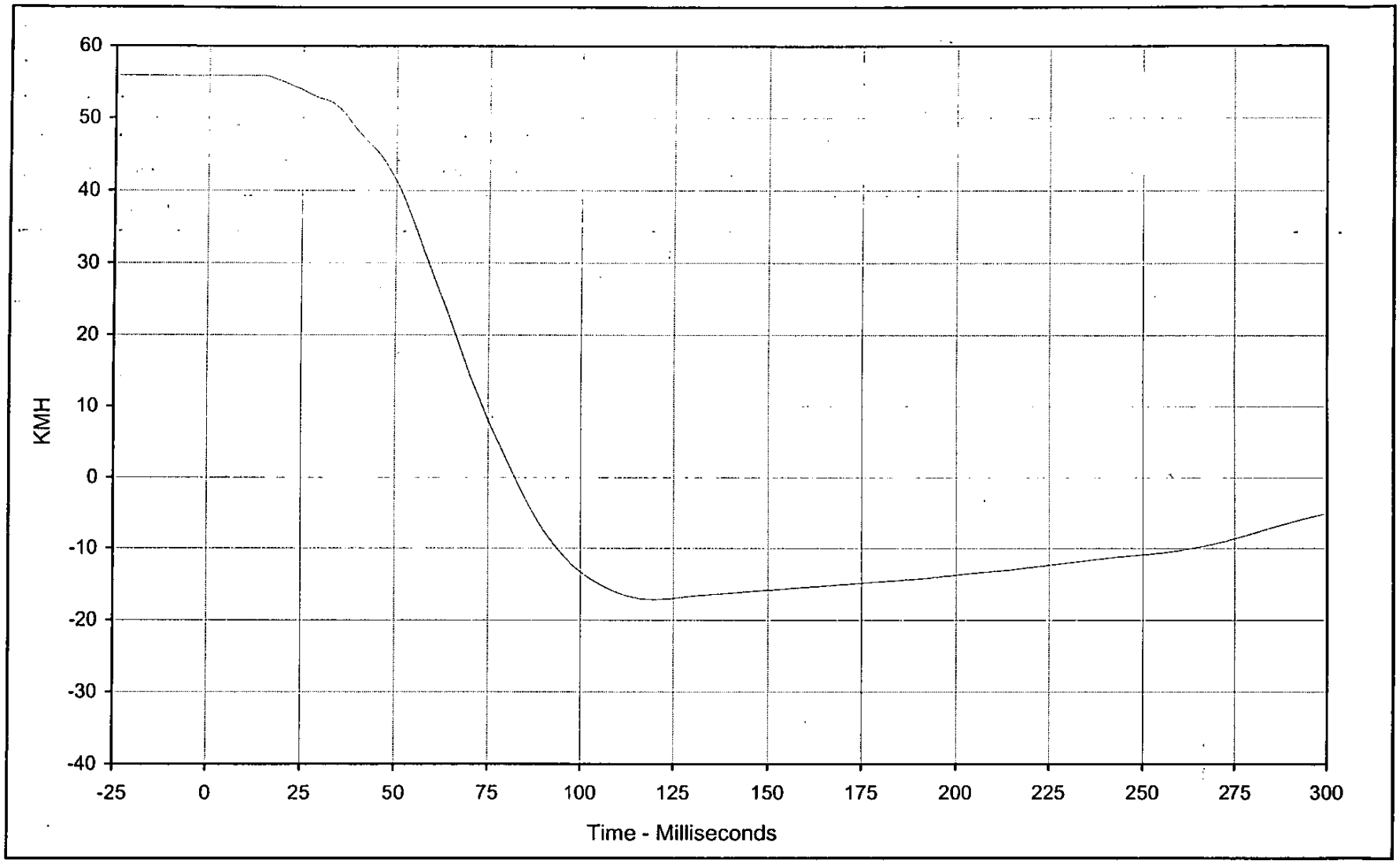
Curve Description:	Passenger Chest Resultant Primary			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	42.2	at	69.3 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	0.1	at	10.9 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	RES-057				

KARCO Engineering



Curve Description:	Passenger Chest Redundant X			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	4.5	at	281.8 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-42.1	at	69.2 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	FIL-060				

KARCO Engineering



Curve Description: Passenger Chest Redundant X Velocity

Maximum Value: 55.9 at 13.3 Milliseconds

Minimum Value: -17.1 at 119.6 Milliseconds

SAE Filter Class: 180

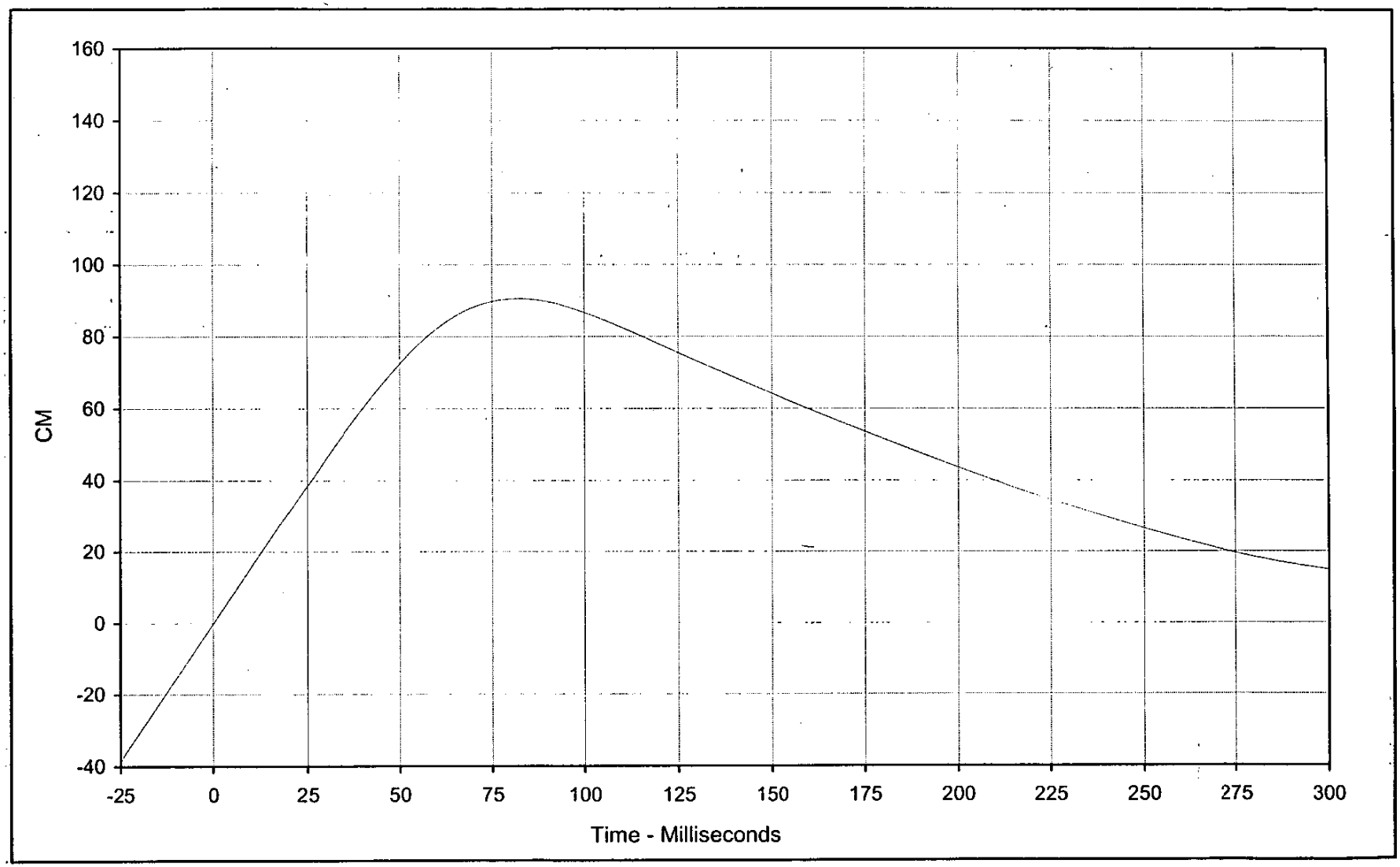
Date of Test: 12/16/99

Curve Number: IN1-060

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Chest Redundant X Displ.

Maximum Value: 90.5 at 82.1 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

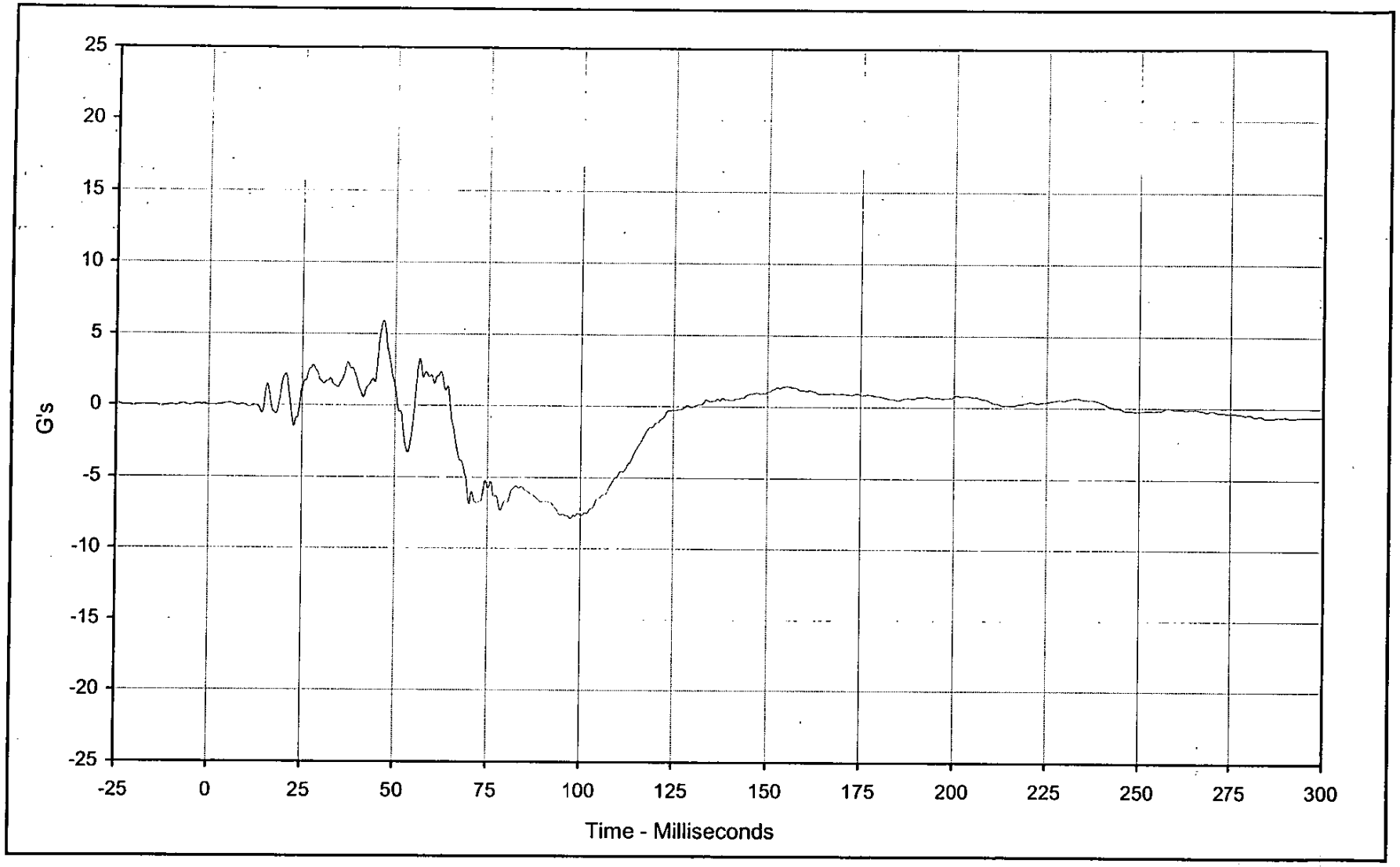
Date of Test: 12/16/99

Curve Number: IN2-060

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

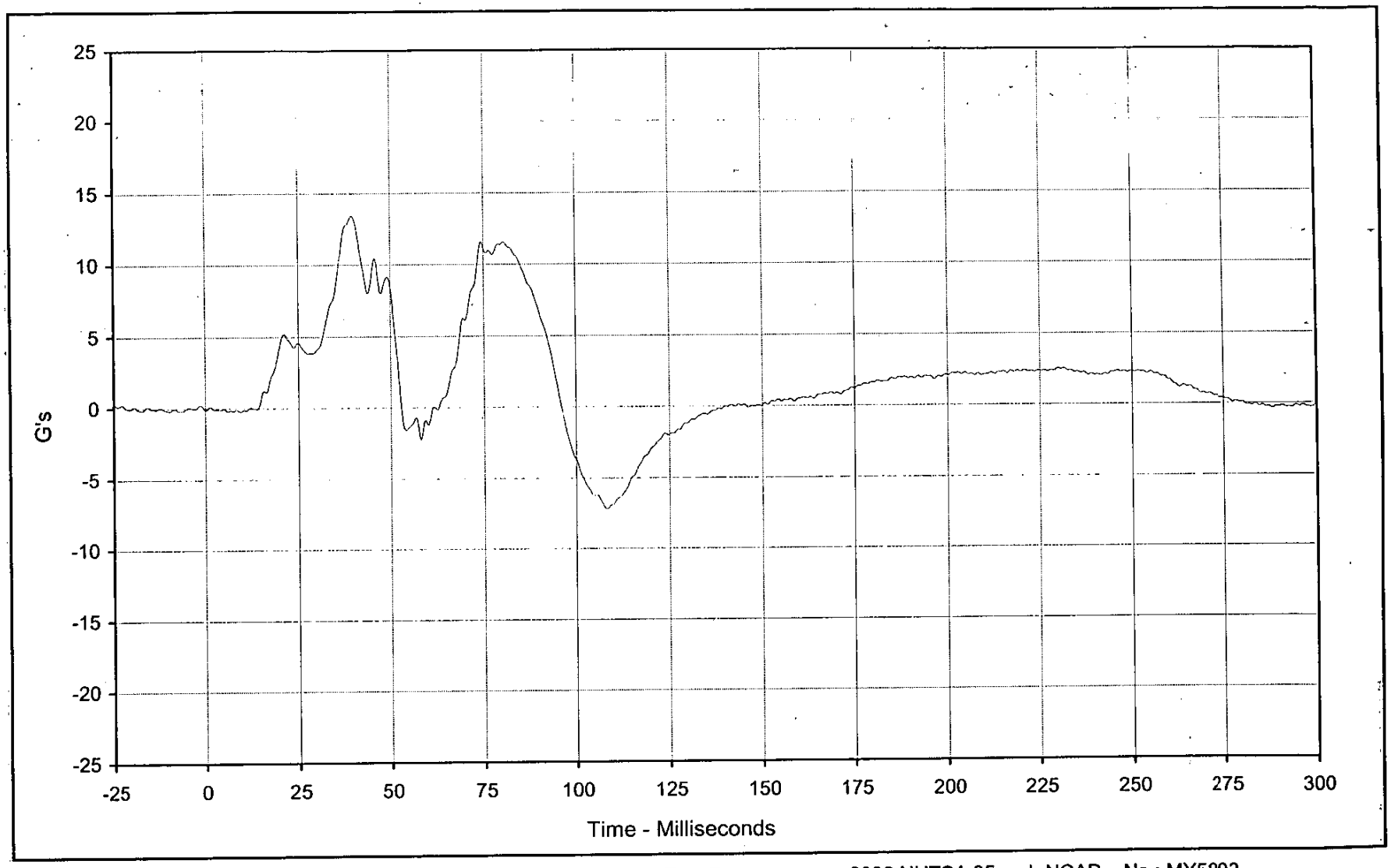
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



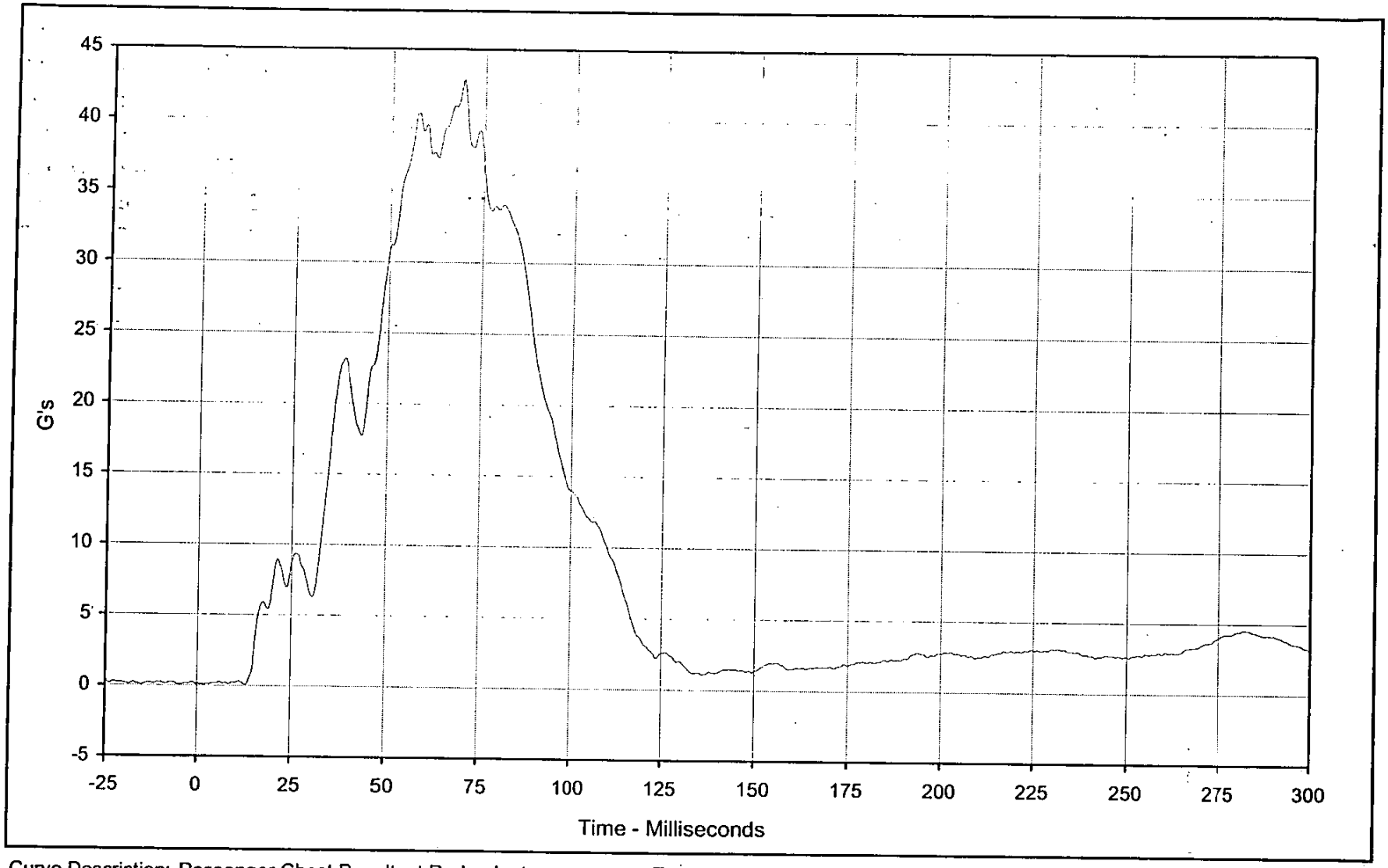
Curve Description:	Passenger Chest Redundant Y			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	5.9	at	46.9 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-7.9	at	97.3 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	FIL-061				

KARCO Engineering



Curve Description:	Passenger Chest Redundant Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	13.4	at	39.6 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-7.2	at	108.2 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	FIL-062				

KARC Engineering



Curve Description: Passenger Chest Resultant Redundant

Maximum Value: 42.8 at 69.2 Milliseconds

Minimum Value: 0.0 at 1.8 Milliseconds

SAE Filter Class: 180

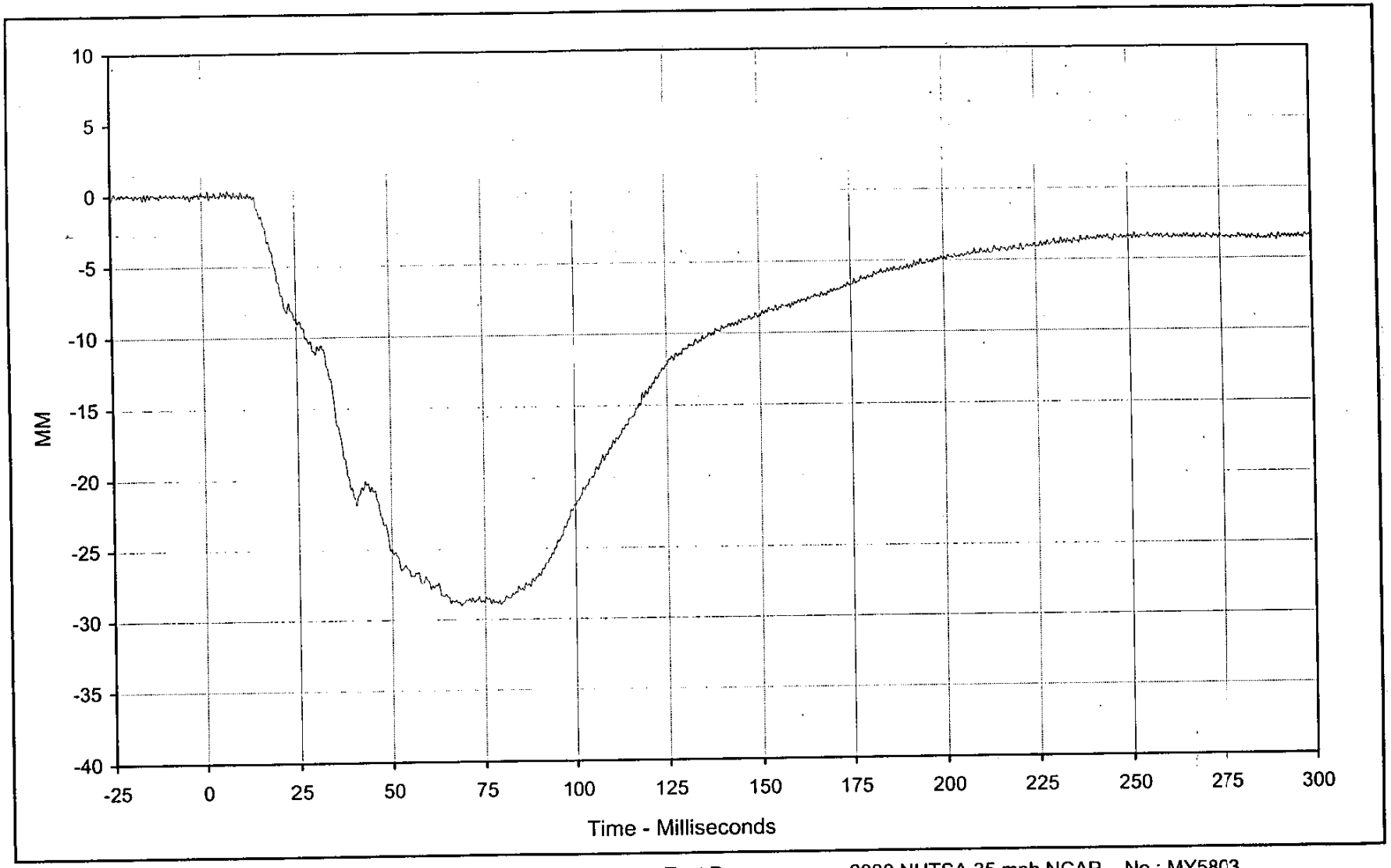
Date of Test: 12/16/99

Curve Number: RES-060

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Chest Displacement X

Maximum Value: 0.3 at 7.0 Milliseconds

Minimum Value: -29.0 at 68.5 Milliseconds

SAE Filter Class: 600

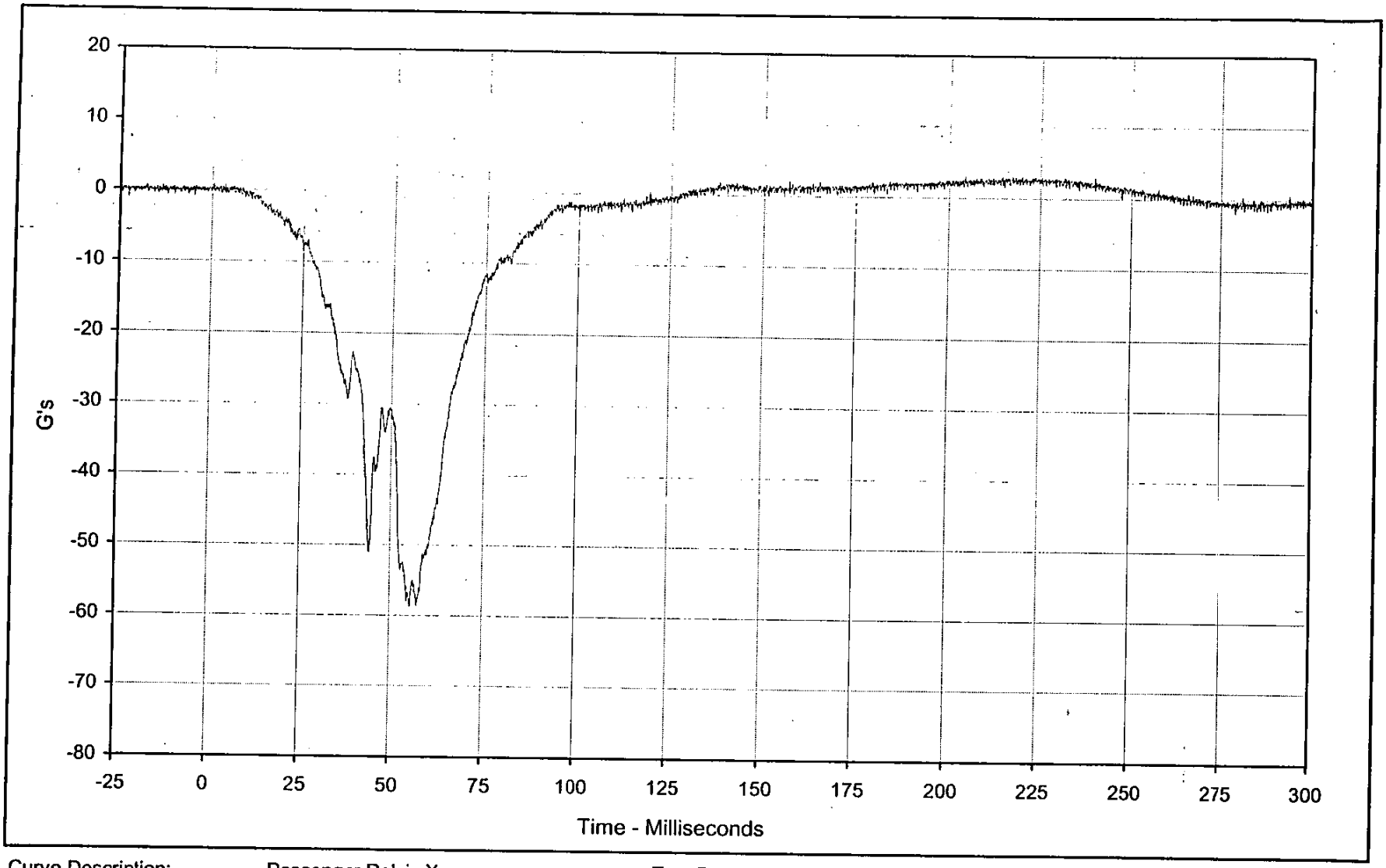
Date of Test: 12/16/99

Curve Number: FIL-063

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

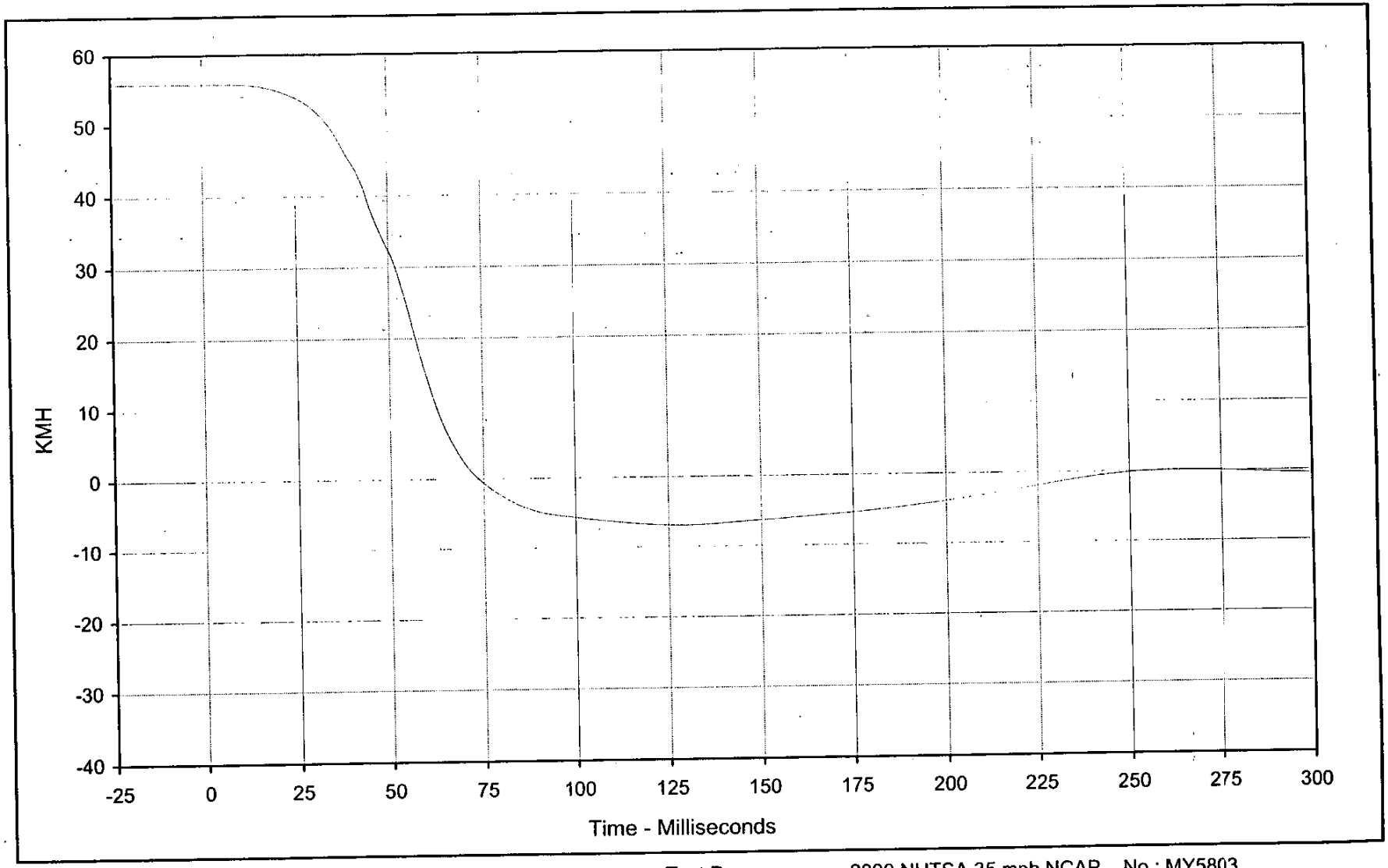
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description:	Passenger Pelvis X			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	3.0	at	204.3 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-58.8	at	55.4 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-064				

KARCO Engineering



Curve Description: Passenger Pelvis X Velocity

Maximum Value: 55.9 at 1.4 Milliseconds

Minimum Value: -7.0 at 128.5 Milliseconds

SAE Filter Class: 180

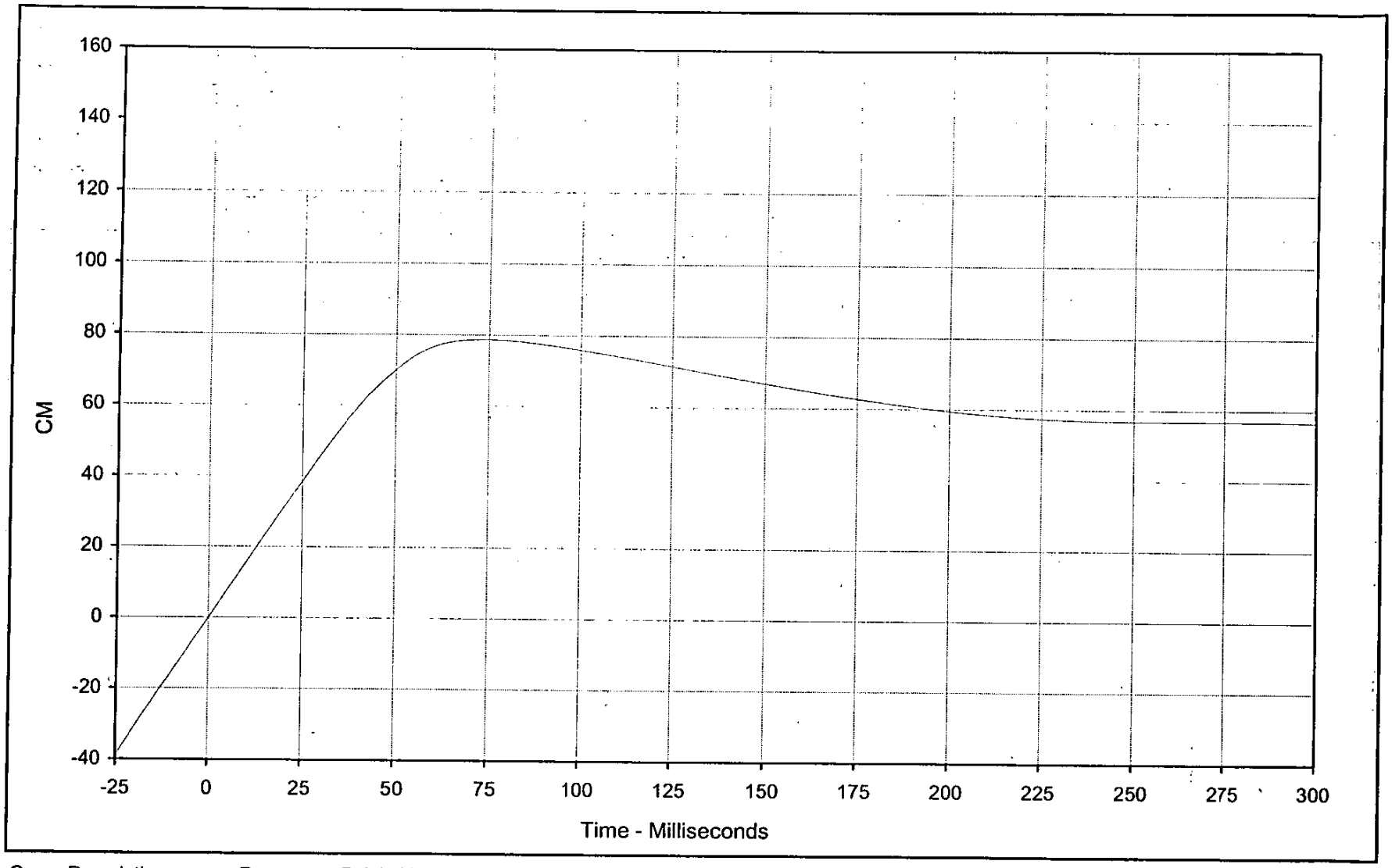
Date of Test: 12/16/99

Curve Number: IN1-064

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

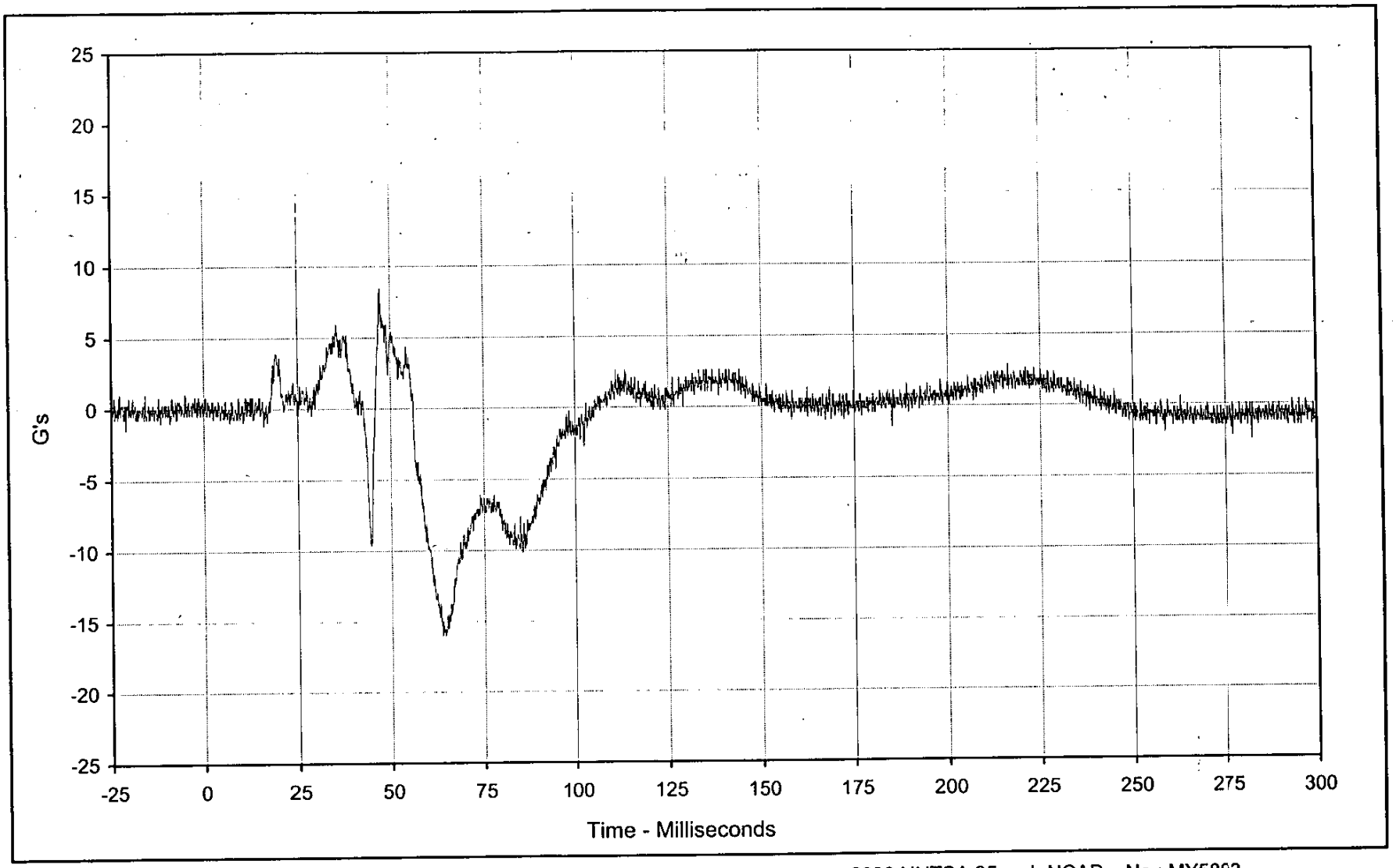
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description:	Passenger Pelvis X Displ.			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	78.7	at	73.5 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	0.0	at	0.0 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	IN2-064				

KARCO Engineering



Curve Description: Passenger Pelvis Y

Maximum Value: 8.5 at 47.3 Milliseconds

Minimum Value: -16.0 at 63.6 Milliseconds

SAE Filter Class: 1000

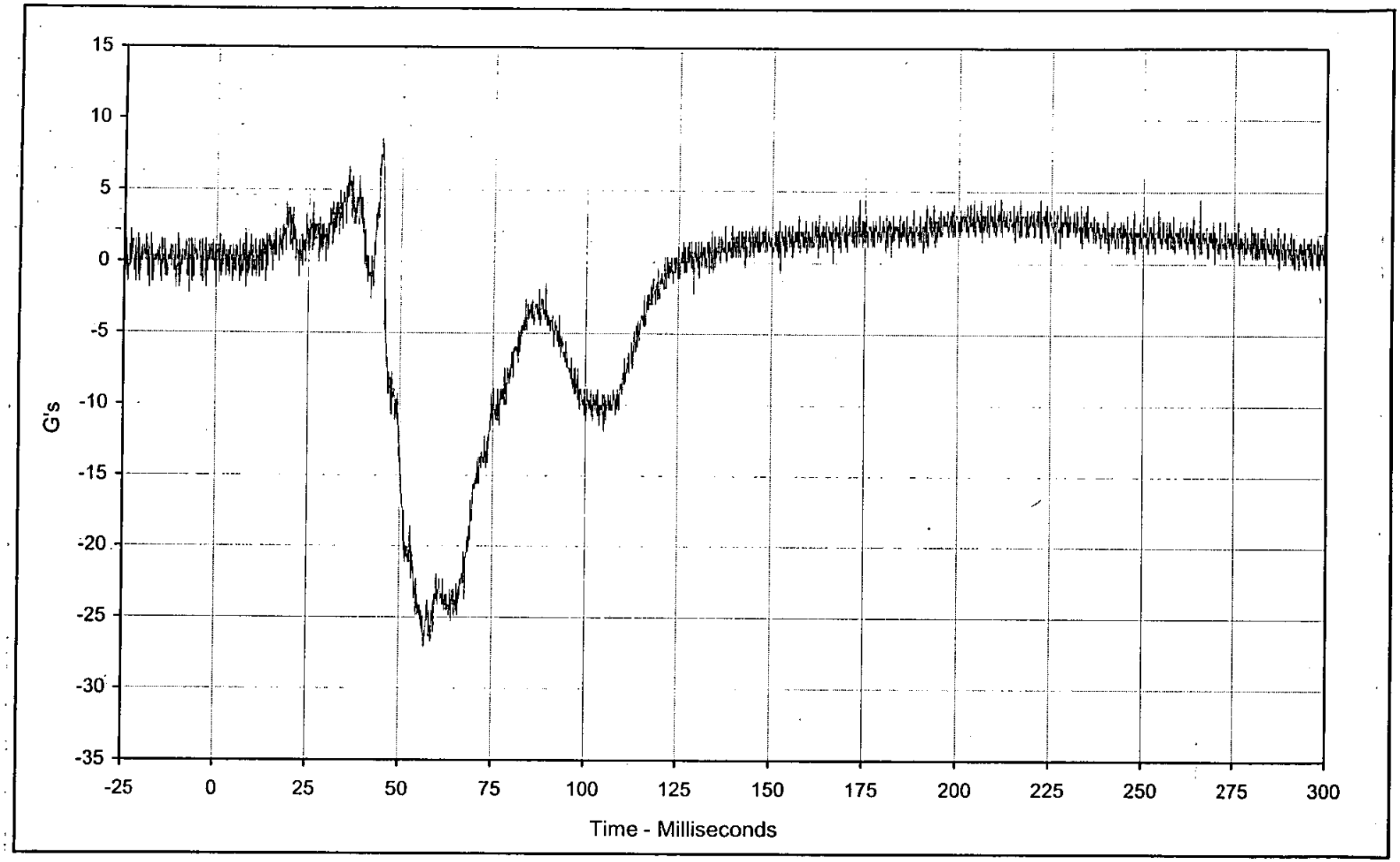
Date of Test: 12/16/99

Curve Number: FIL-065

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

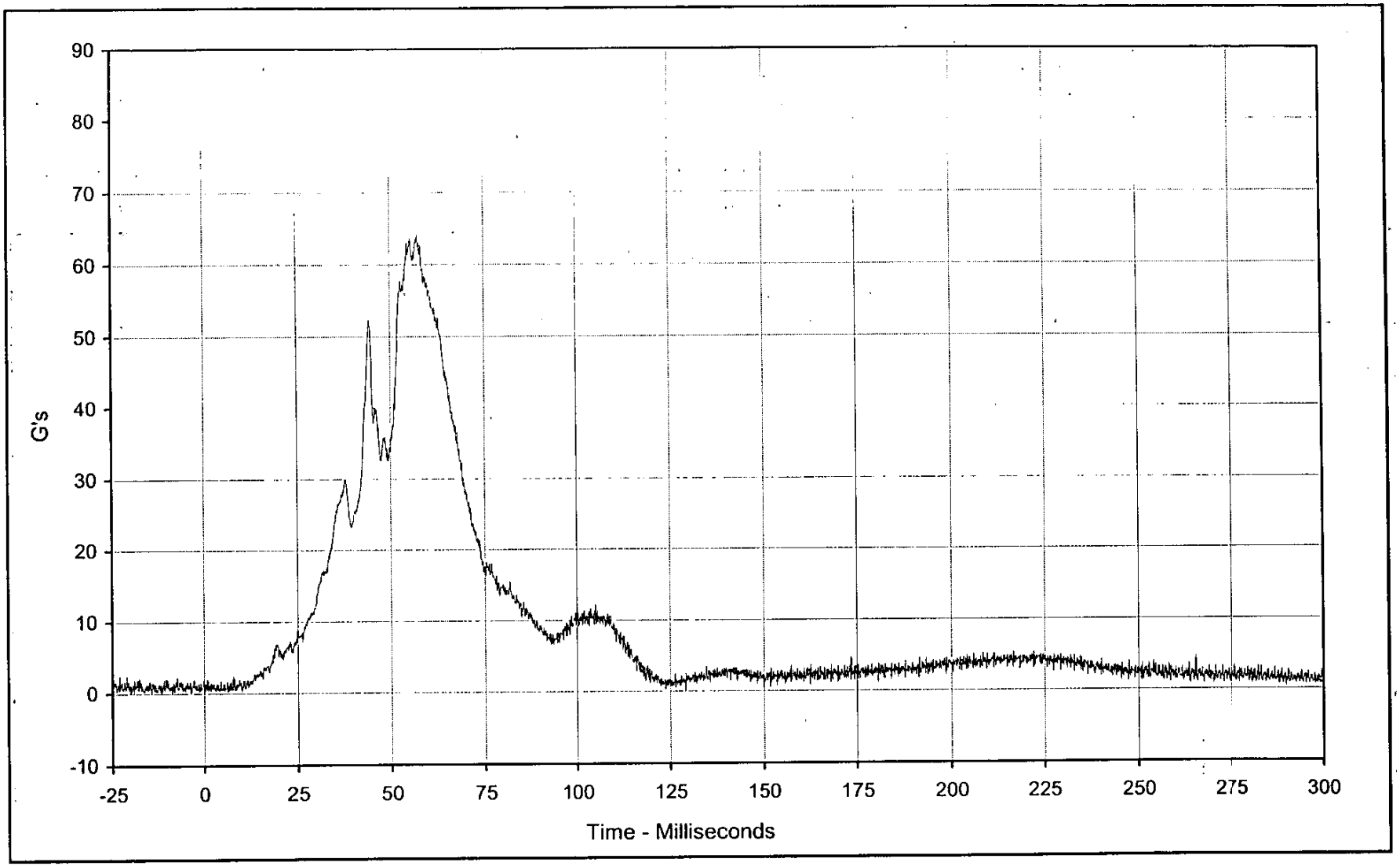
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



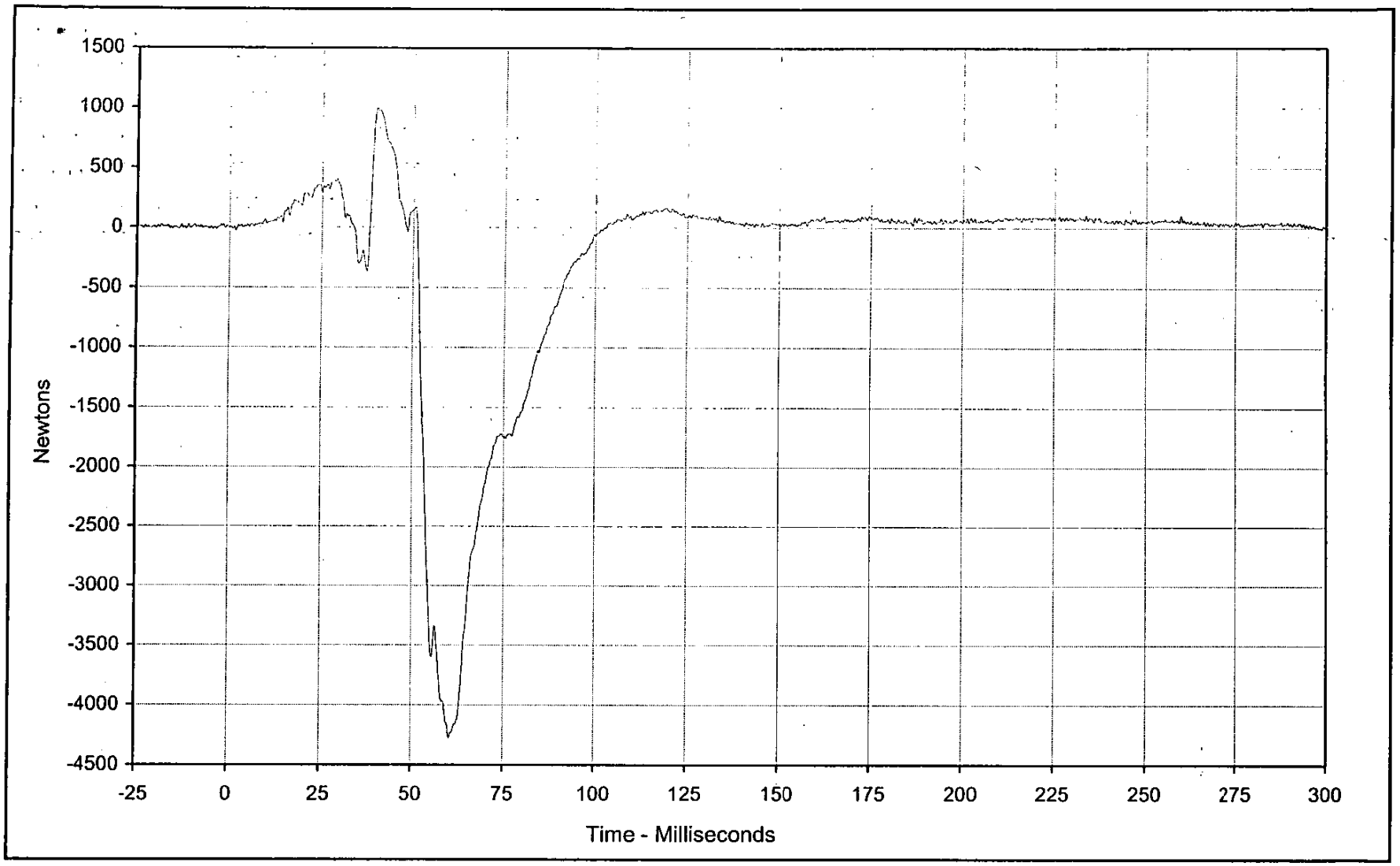
Curve Description:	Passenger Pelvis Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	8.5	at	44.8	Milliseconds	Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-27.1	at	56.9	Milliseconds	
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-066				

KARCO Engineering



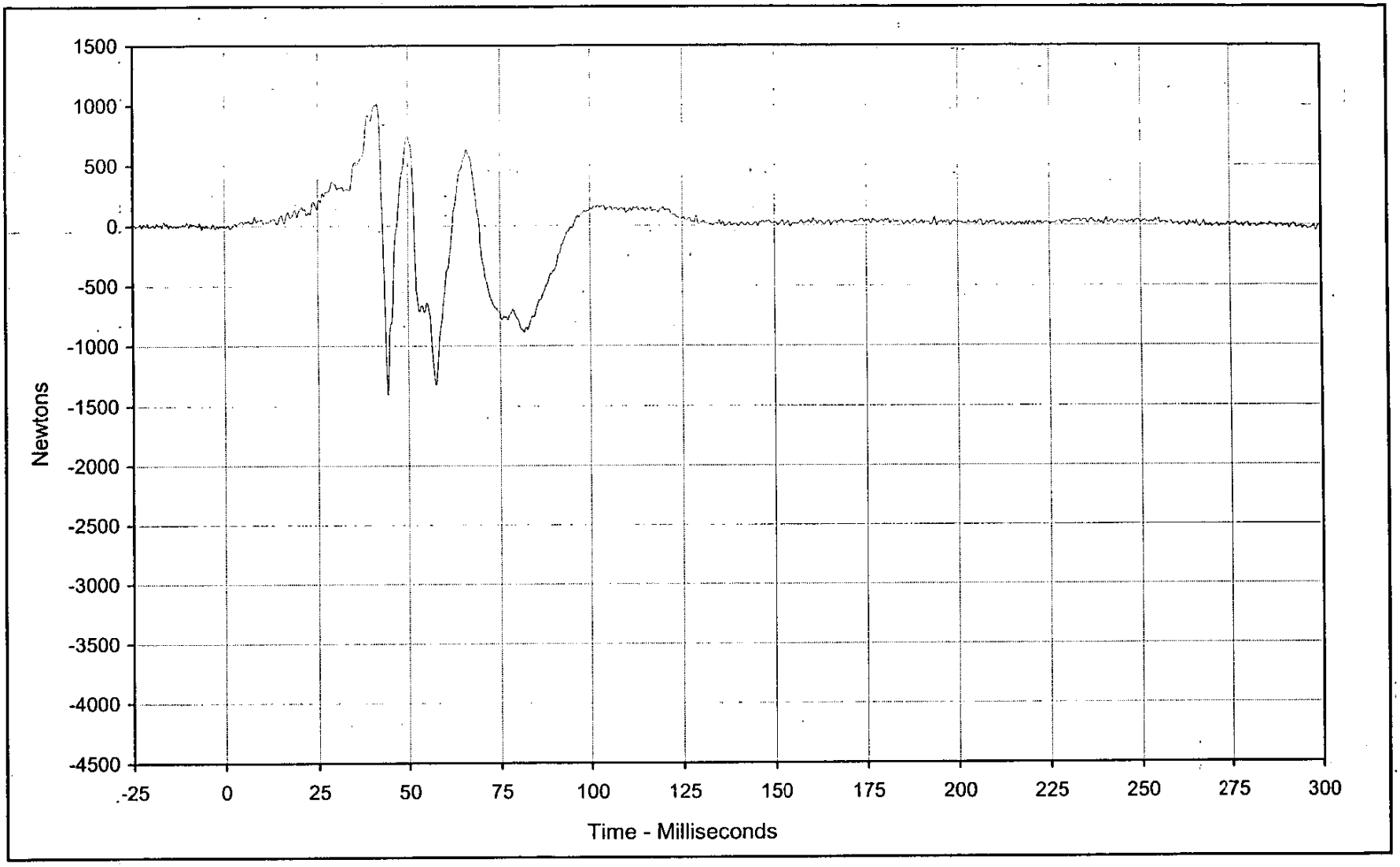
Curve Description:	Passenger Pelvis Resultant			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	64.1	at	57.3 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	0.1	at	129.0 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	RES-064				

KARC Engineering



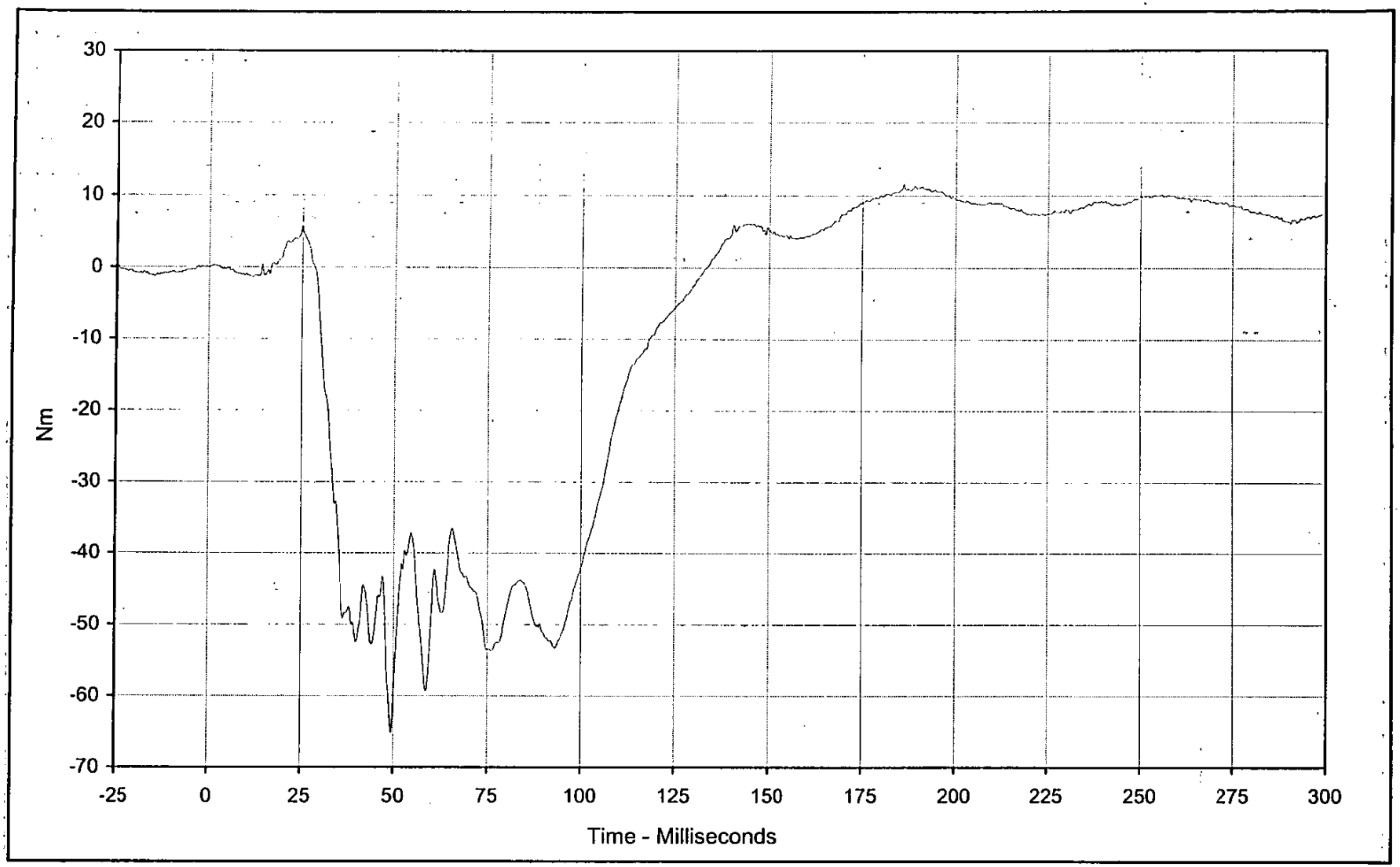
Curve Description:	Passenger Left Femur Force				Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	994.8	at	40	Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-4278.1	at	60.3	Milliseconds		
SAE Filter Class:	600					
Date of Test:	12/16/99					
Curve Number:	FIL-067					

KARCO Engineering



Curve Description:	Passenger Right Femur Force			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	1019.2	at	41.5 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-1407.7	at	44.3 Milliseconds		
SAE Filter Class:	600				
Date of Test:	12/16/99				
Curve Number:	FIL-068				

KARCO Engineering



Curve Description: Passenger Left Upper Tibia Moment X

Maximum Value: 11.6 at 186.0 Milliseconds

Minimum Value: -65.2 at 49.4 Milliseconds

SAE Filter Class: 600

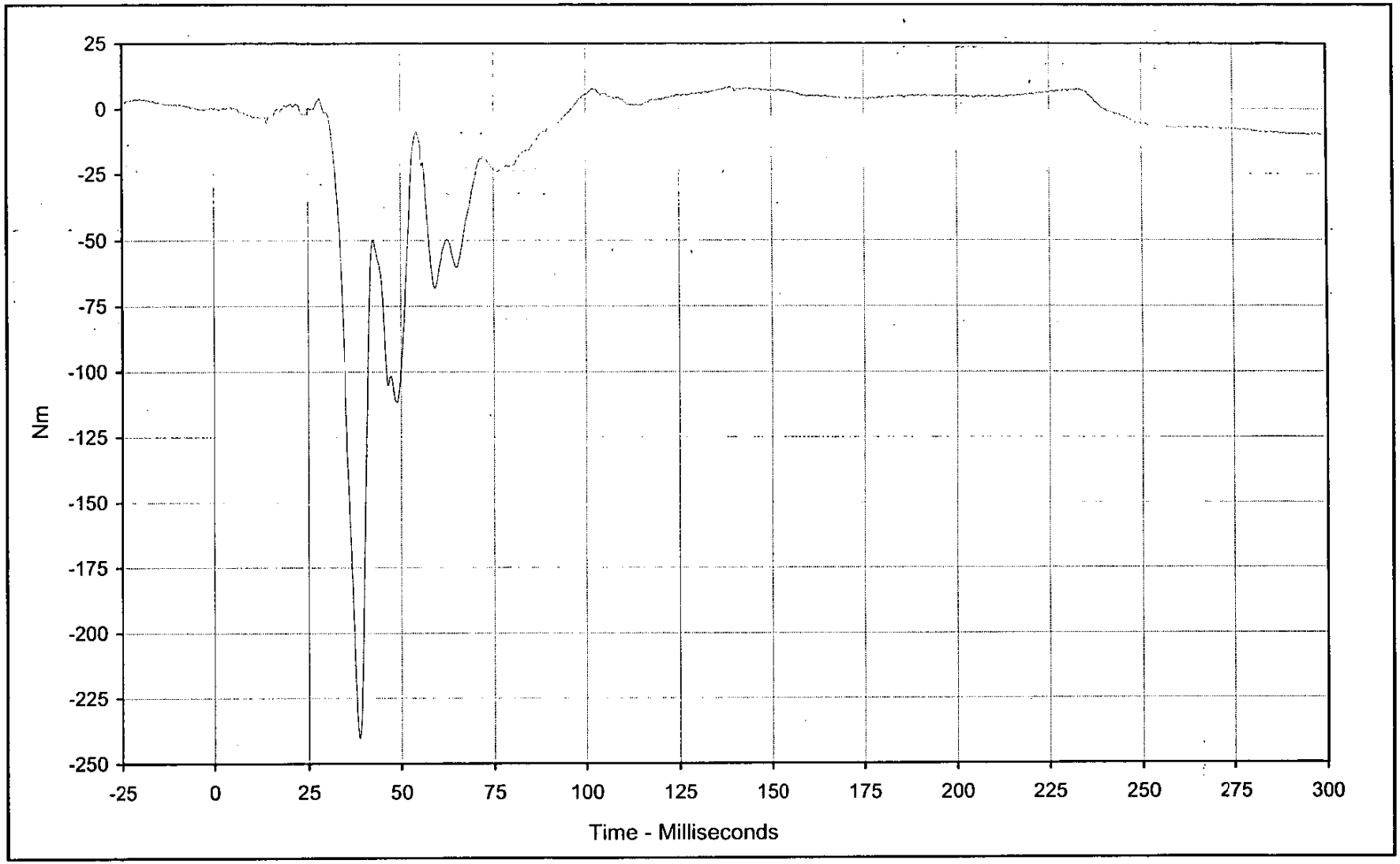
Date of Test: 12/16/99

Curve Number: FIL-069

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Left Upper Tibia Moment Y

Maximum Value: 8.4 at 138.8 Milliseconds

Minimum Value: -240.4 at 38.8 Milliseconds

SAE Filter Class: 600

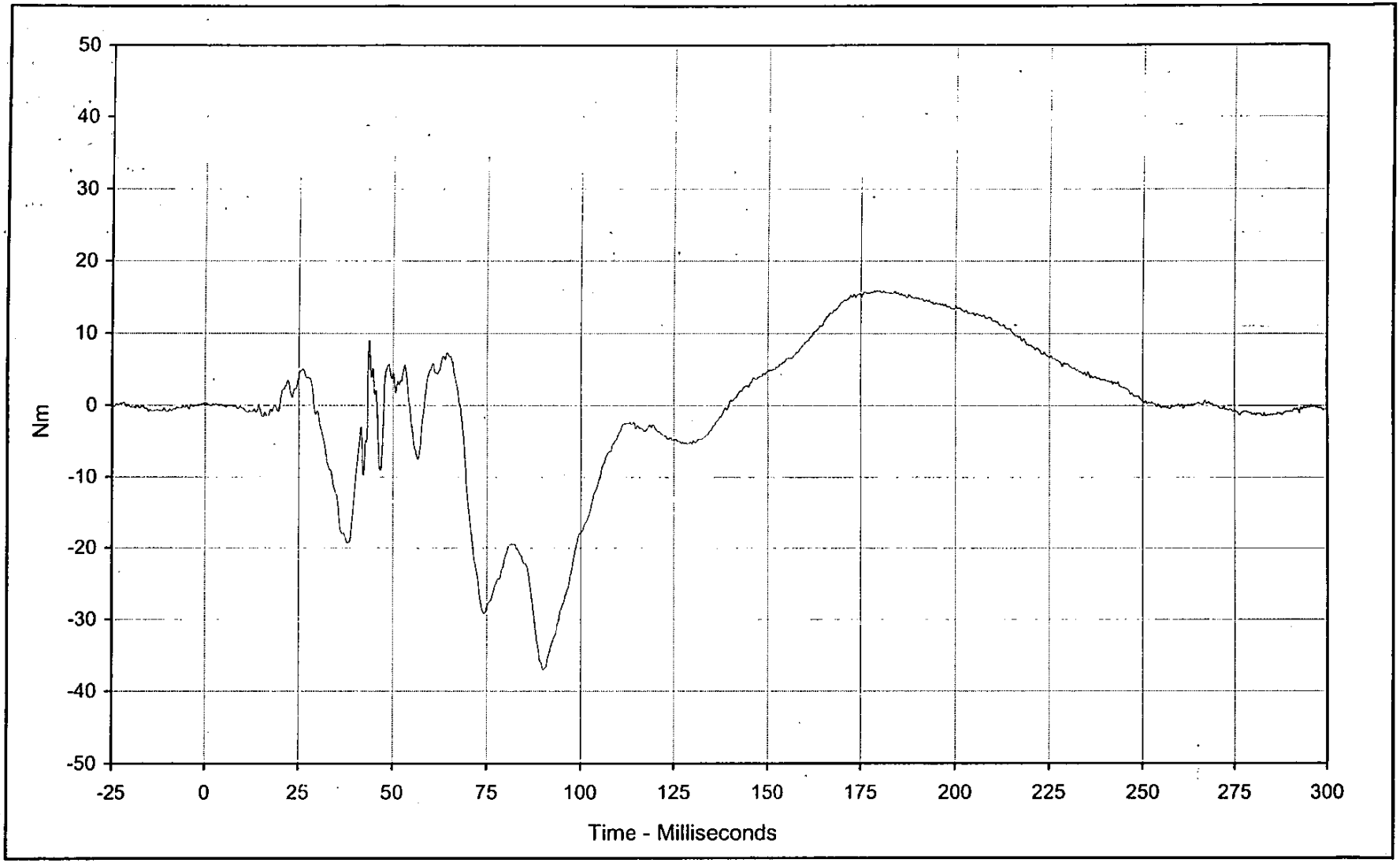
Date of Test: 12/16/99

Curve Number: FIL-070

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Right Upper Tibia Moment X

Maximum Value: 15.9 at 179.3 Milliseconds

Minimum Value: -37.1 at 89.9 Milliseconds

SAE Filter Class: 600

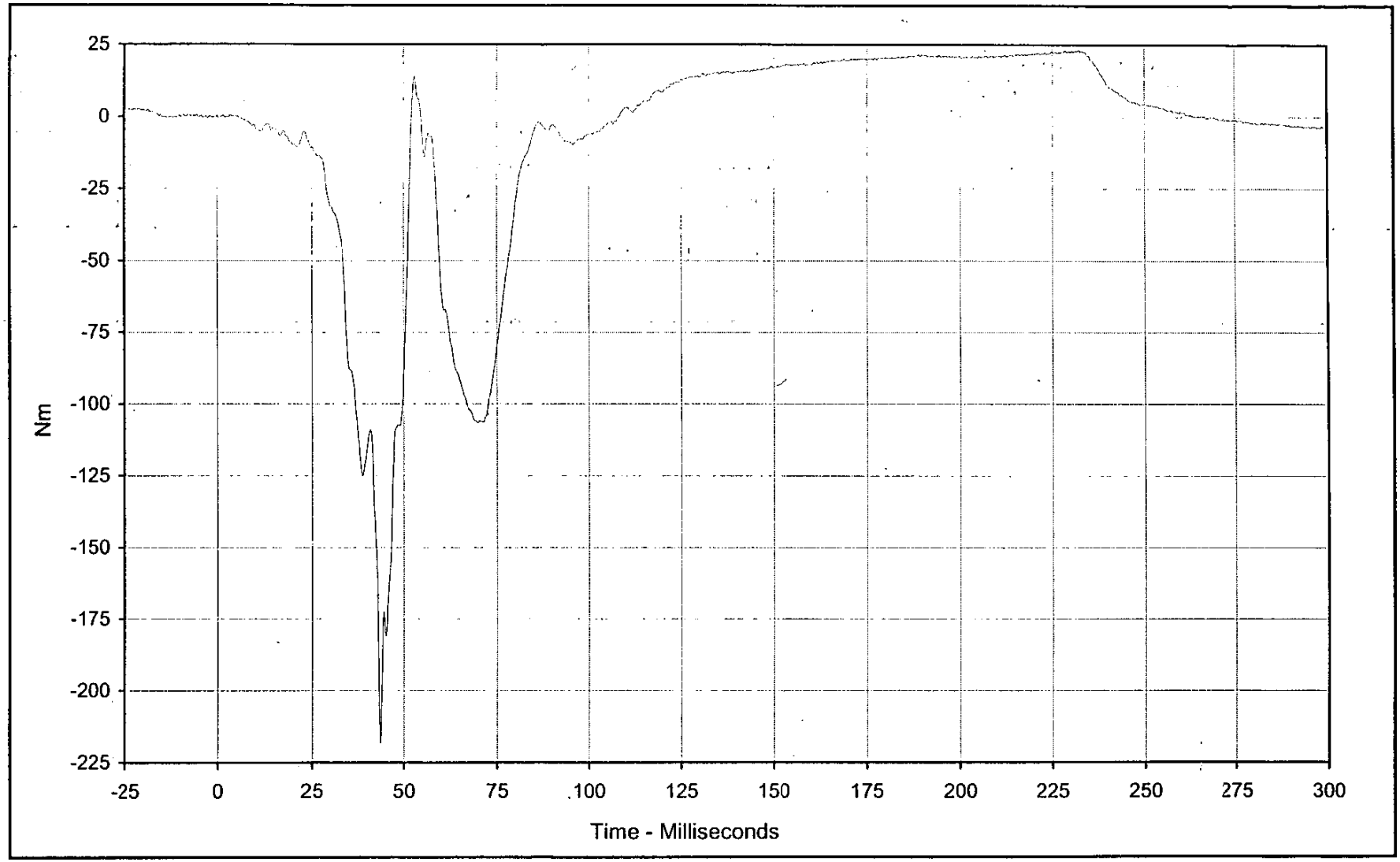
Date of Test: 12/16/99

Curve Number: FIL-071

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Right Upper Tibia Moment Y

Maximum Value: 23.2 at 232.1 Milliseconds

Minimum Value: -218.3 at 43.7 Milliseconds

SAE Filter Class: 600

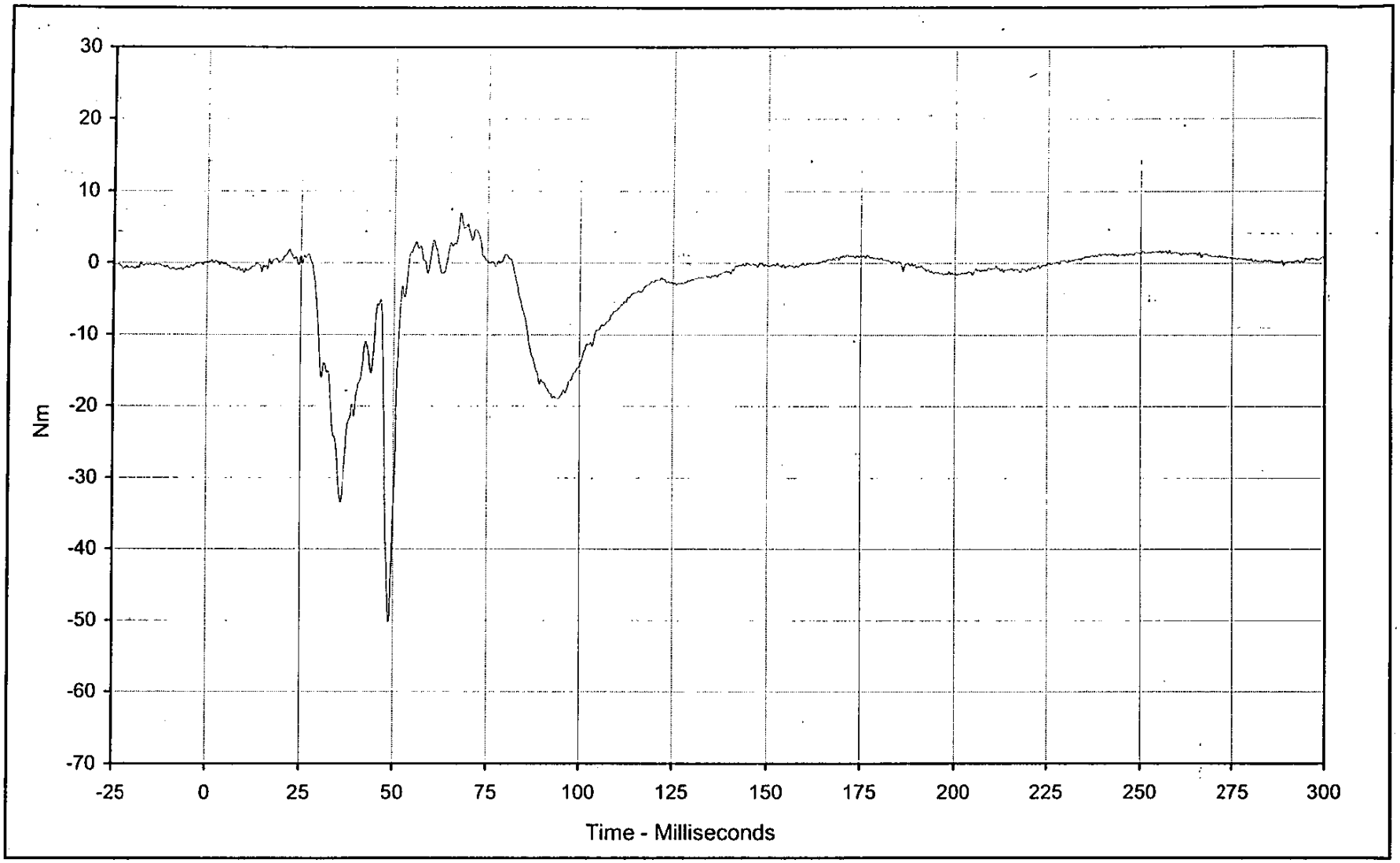
Date of Test: 12/16/99

Curve Number: FIL-072

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Left Lower Tibia Moment X

Maximum Value: 7.0 at 67.7 Milliseconds

Minimum Value: -50.2 at 48.9 Milliseconds

SAE Filter Class: 600

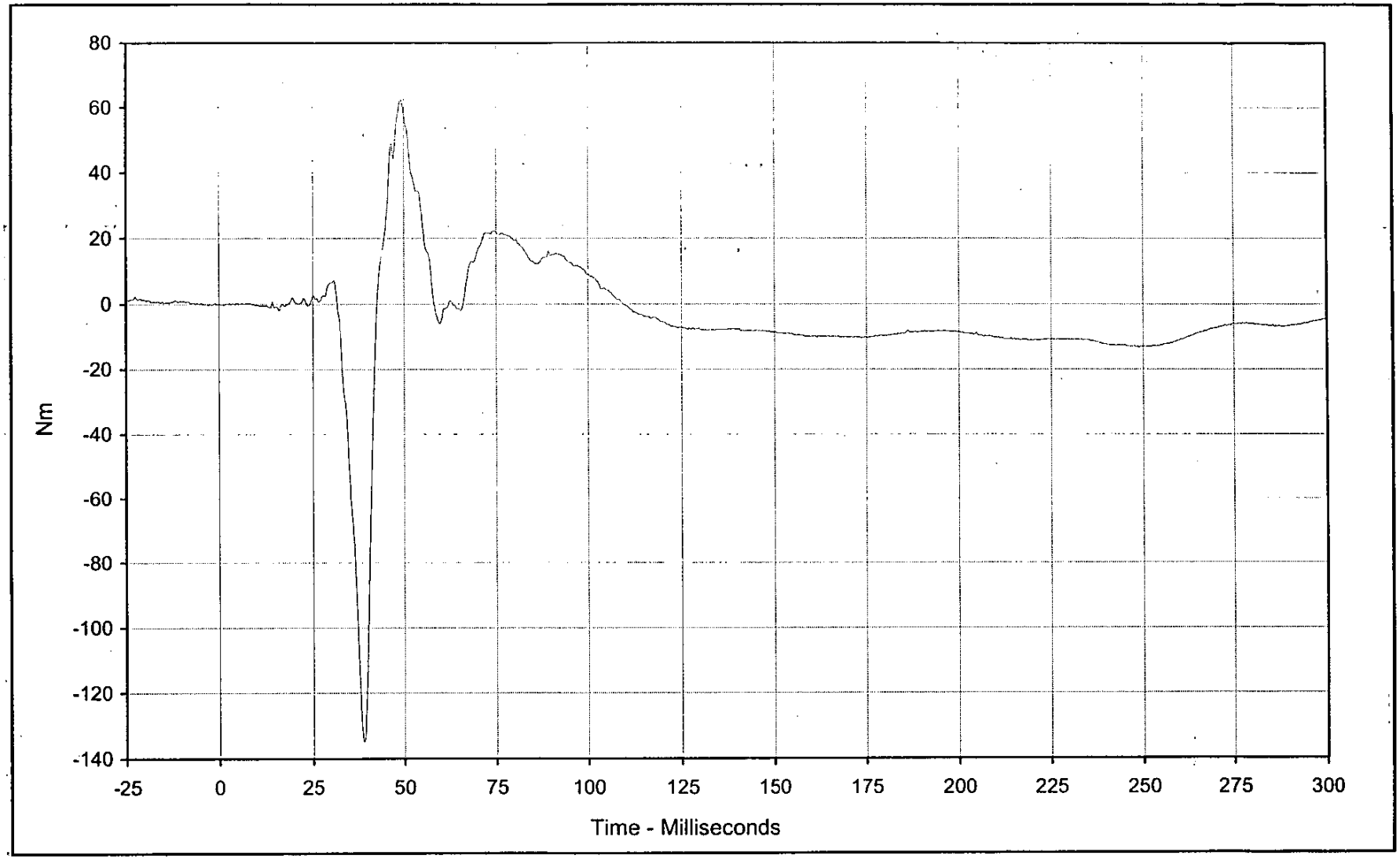
Date of Test: 12/16/99

Curve Number: FIL-073

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Left Lower Tibia Moment Y

Maximum Value: 62.3 at 49.1 Milliseconds

Minimum Value: -134.9 at 39.0 Milliseconds

SAE Filter Class: 600

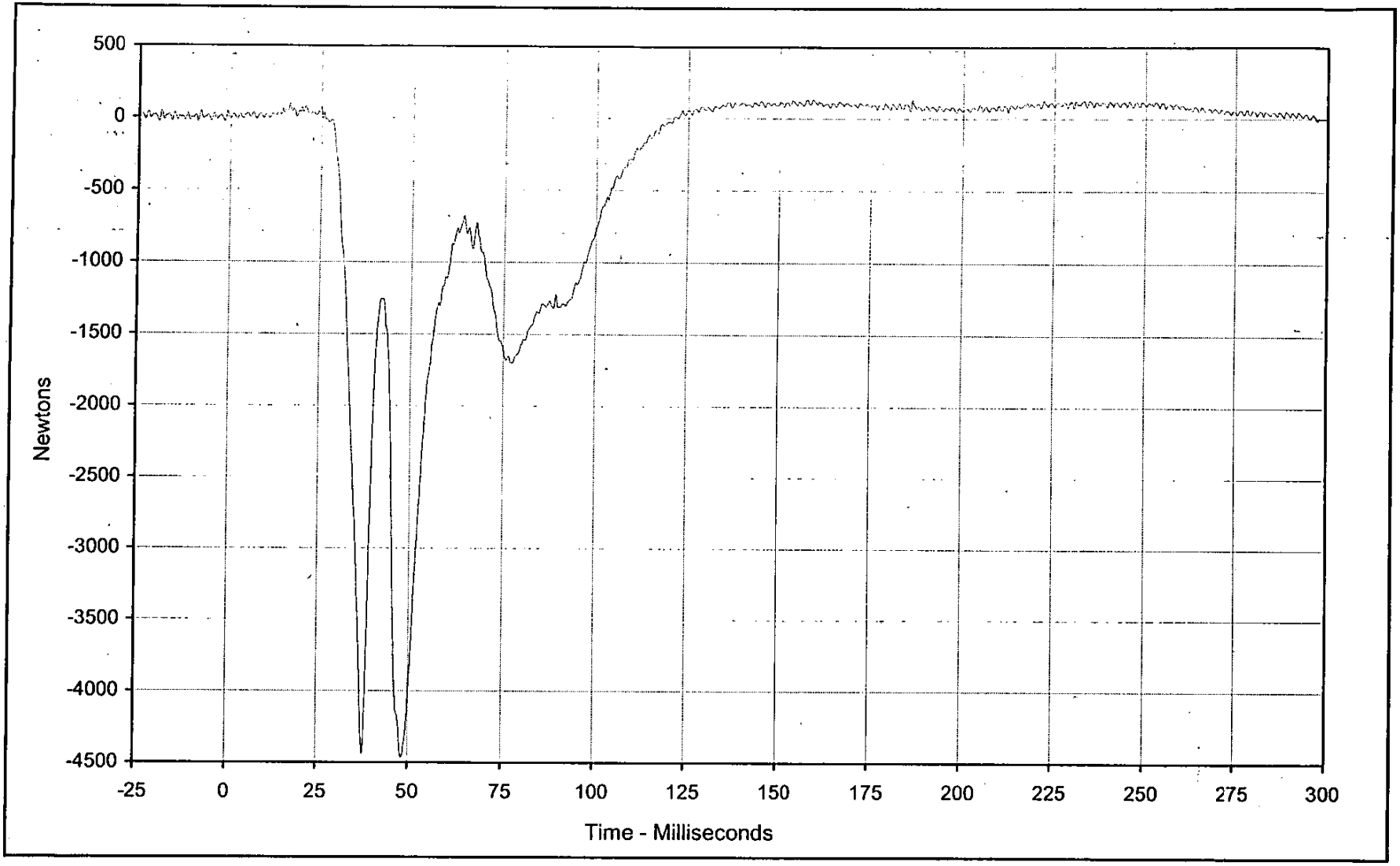
Date of Test: 12/16/99

Curve Number: FIL-074

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

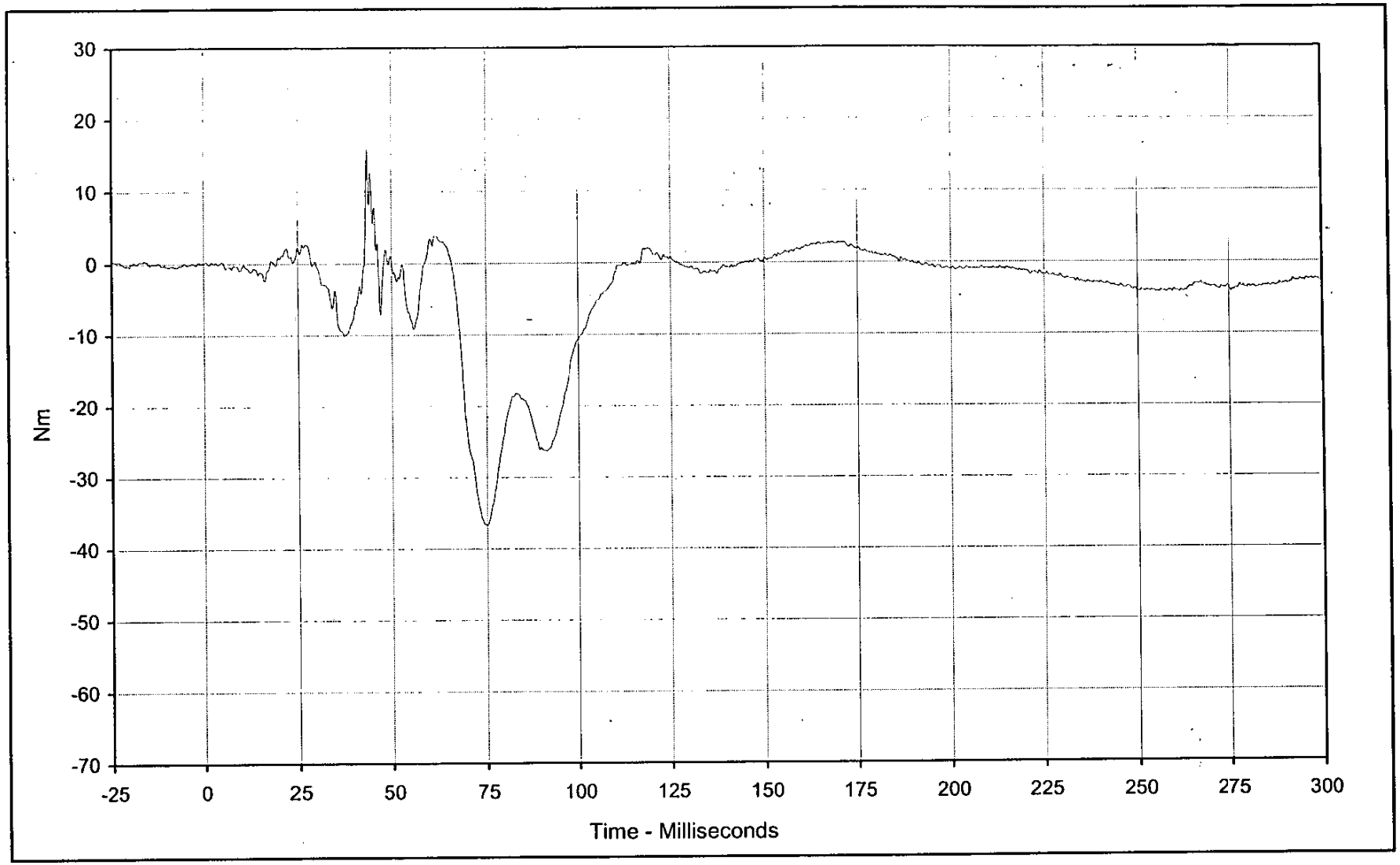
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARC Engineering



Curve Description:	Passenger Left Lower Tibia Force Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	133.3	at	159.1 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-4467.6	at	48.2 Milliseconds		
SAE Filter Class:	600				
Date of Test:	12/16/99				
Curve Number:	FIL-075				

KARCO Engineering



Curve Description: Passenger Right Lower Tibia Moment X

Maximum Value: 16.0 at 43.5 Milliseconds

Minimum Value: -36.7 at 74.9 Milliseconds

SAE Filter Class: 600

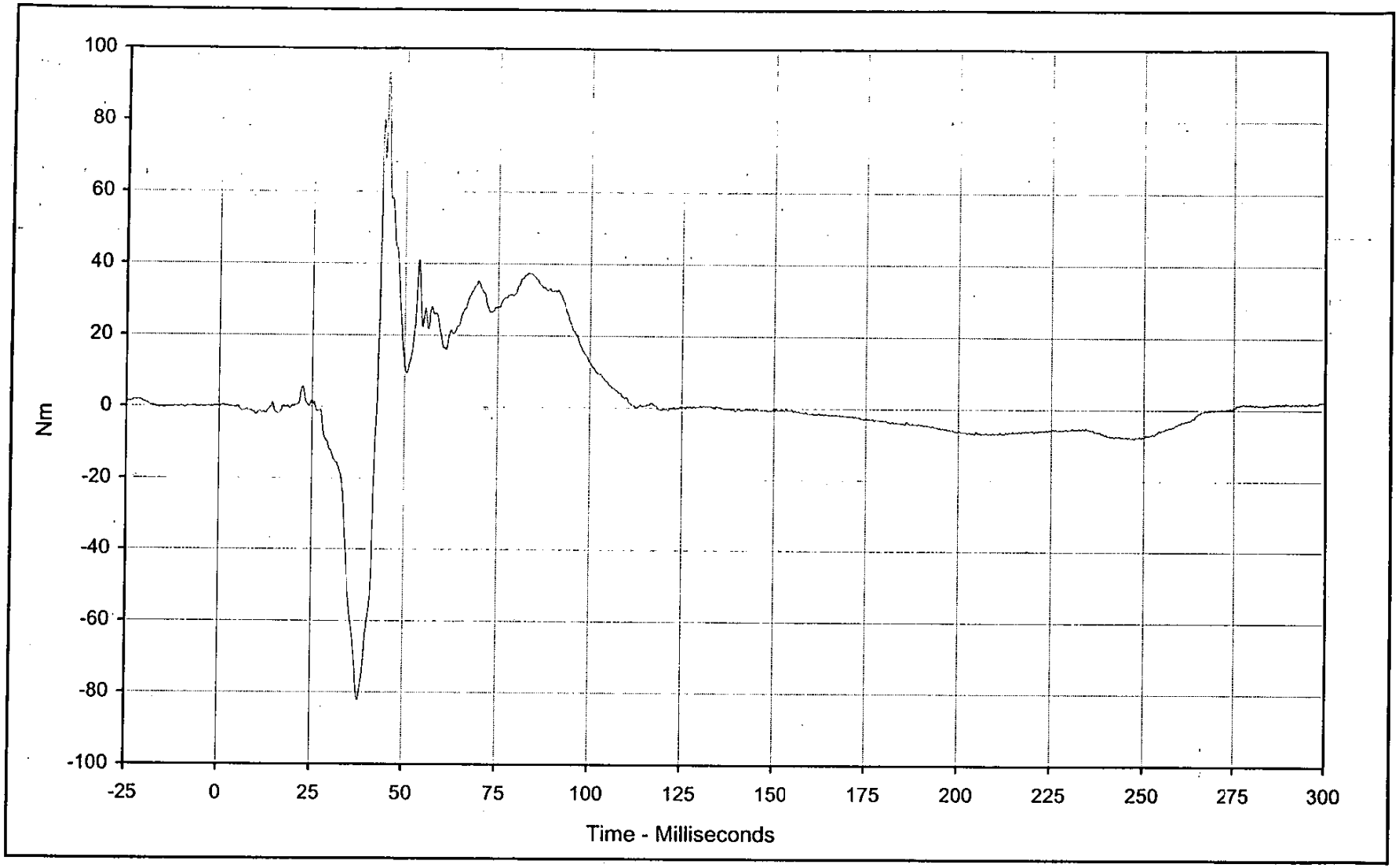
Date of Test: 12/16/99

Curve Number: FIL-076

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARC Engineering



Curve Description: Passenger Right Lower Tibia Moment Y

Maximum Value: 93.3 at 45.2 Milliseconds

Minimum Value: -82.2 at 38.3 Milliseconds

SAE Filter Class: 600

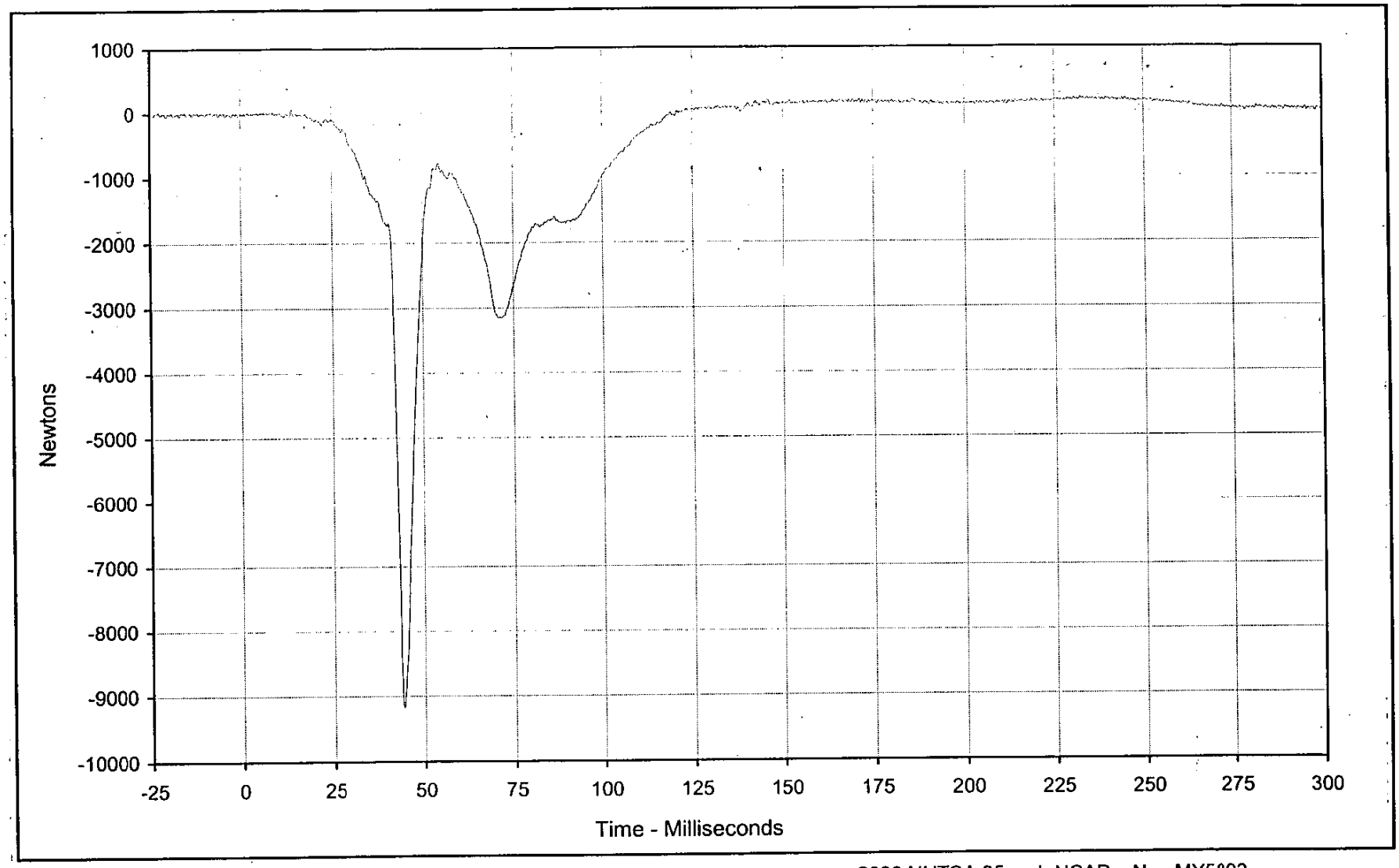
Date of Test: 12/16/99

Curve Number: FIL-077

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Passenger Right lower Tibia Force Z

Maximum Value: 210.4 at 232.4 Milliseconds

Minimum Value: -9178.1 at 44.1 Milliseconds

SAE Filter Class: 600

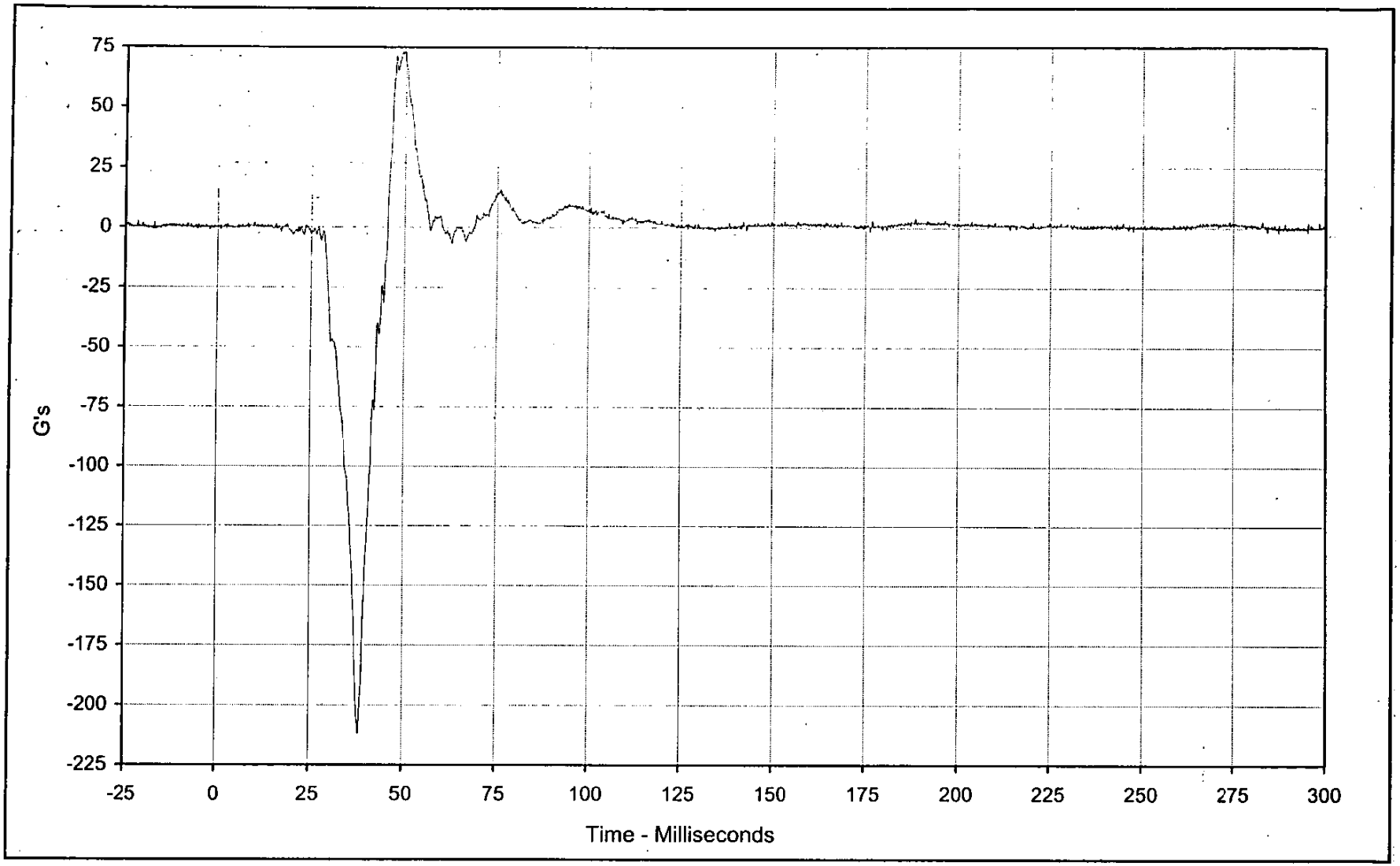
Date of Test: 12/16/99

Curve Number: FIL-078

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

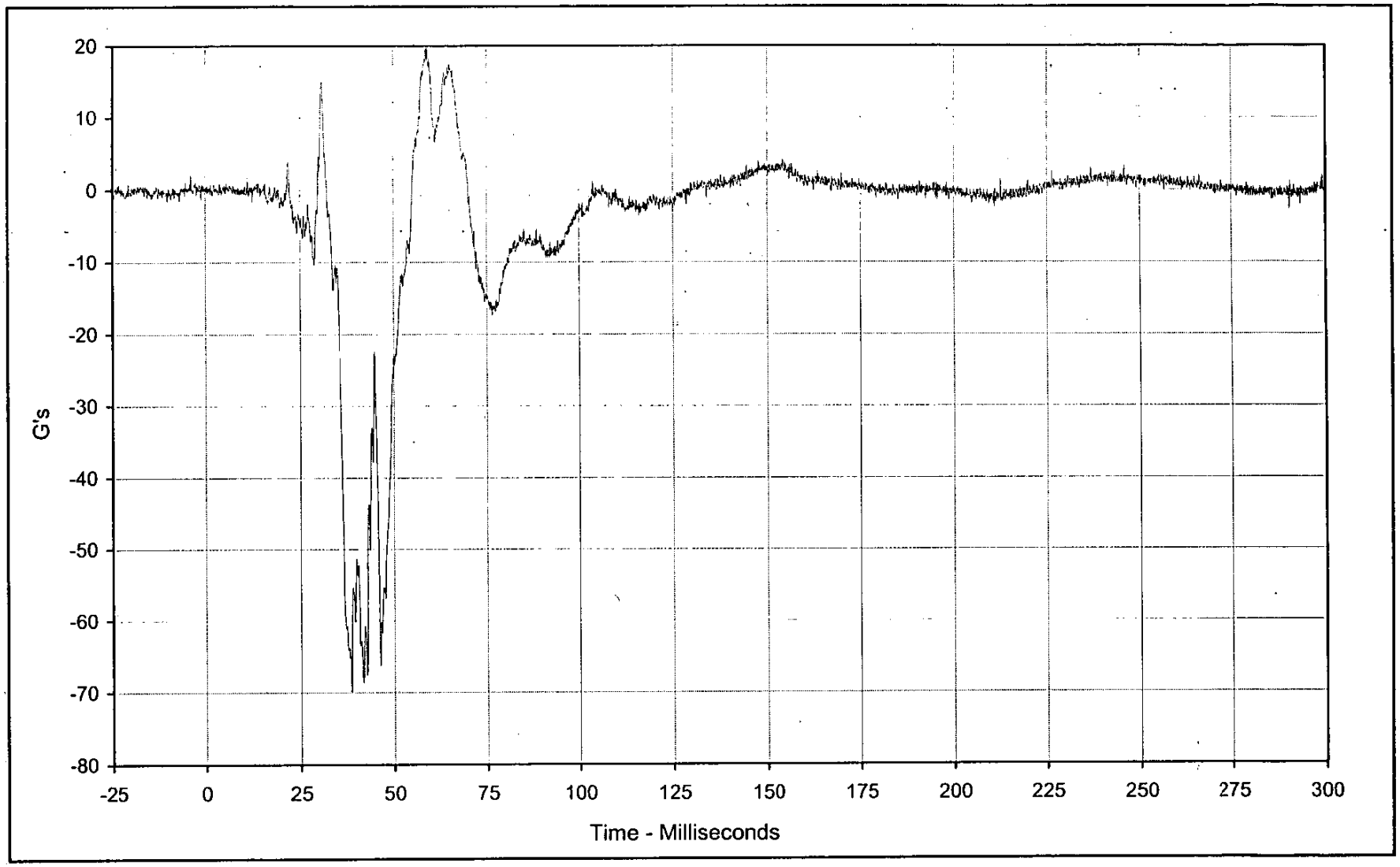
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description:	Passenger Left Foot Aft X			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	73.2	at	49.1 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-212.2	at	38.6 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-079				

KARCO Engineering



Curve Description: Passenger Left Foot Aft Z

Maximum Value: 19.8 at 59.0 Milliseconds

Minimum Value: -70.0 at 38.4 Milliseconds

SAE Filter Class: 1000

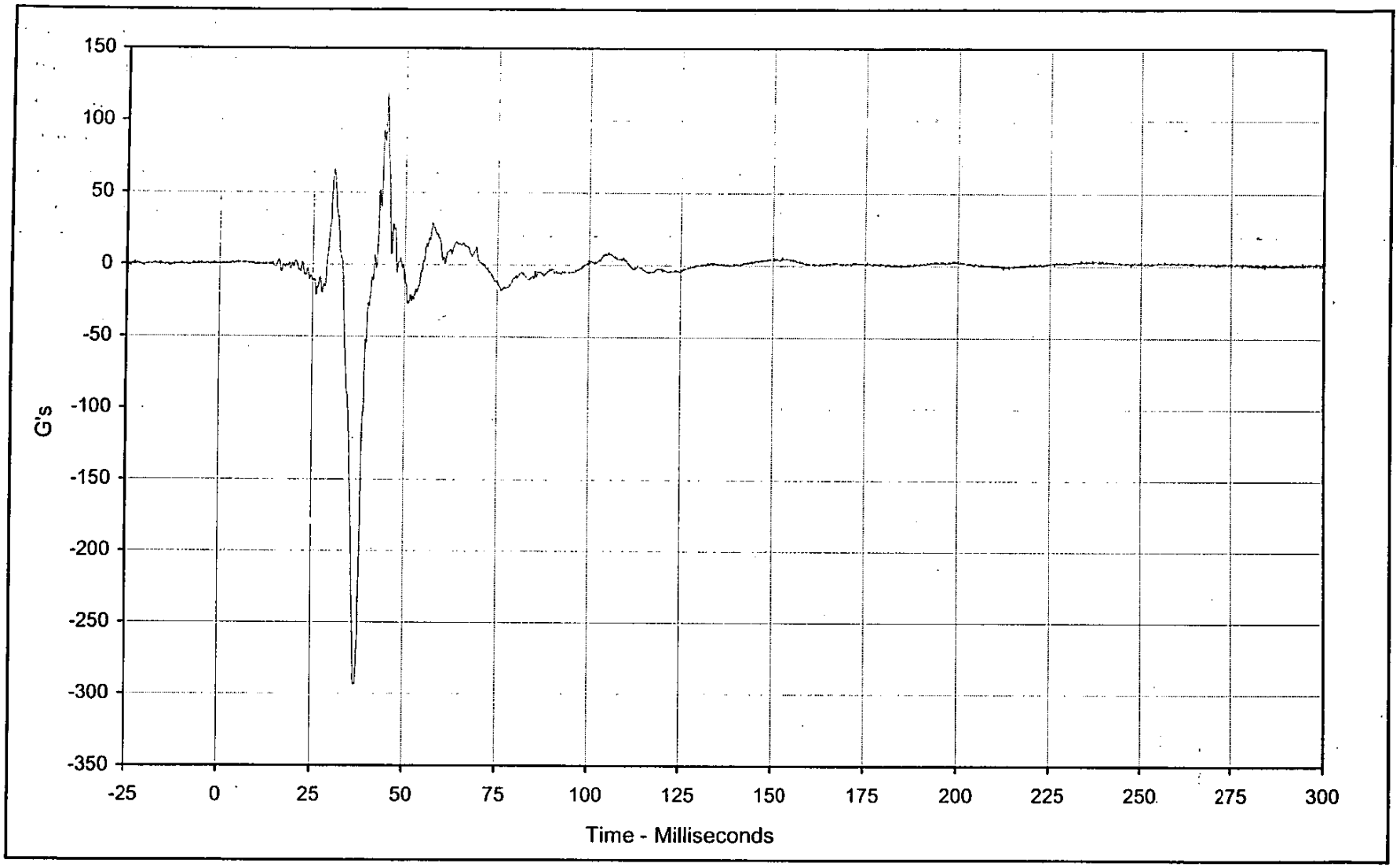
Date of Test: 12/16/99

Curve Number: FIL-080

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

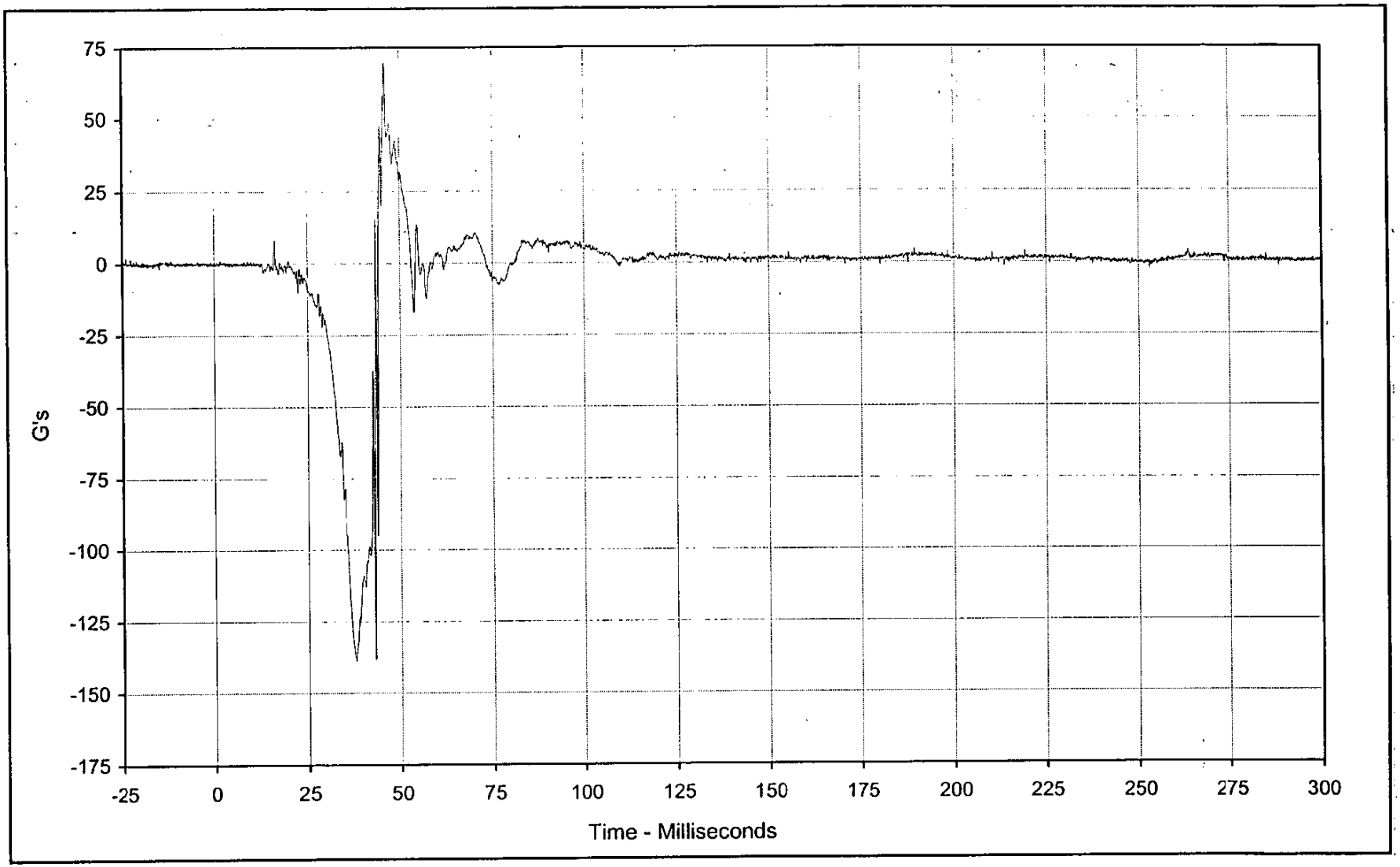
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description:	Passenger Left Foot Fore Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	118.6	at	45.0 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-293.9	at	37.0 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-081				

KARCO Engineering



Curve Description: Passenger Right Foot Aft X

Maximum Value: 69.8 at 46.0 Milliseconds

Minimum Value: -138.9 at 37.8 Milliseconds

SAE Filter Class: 1000

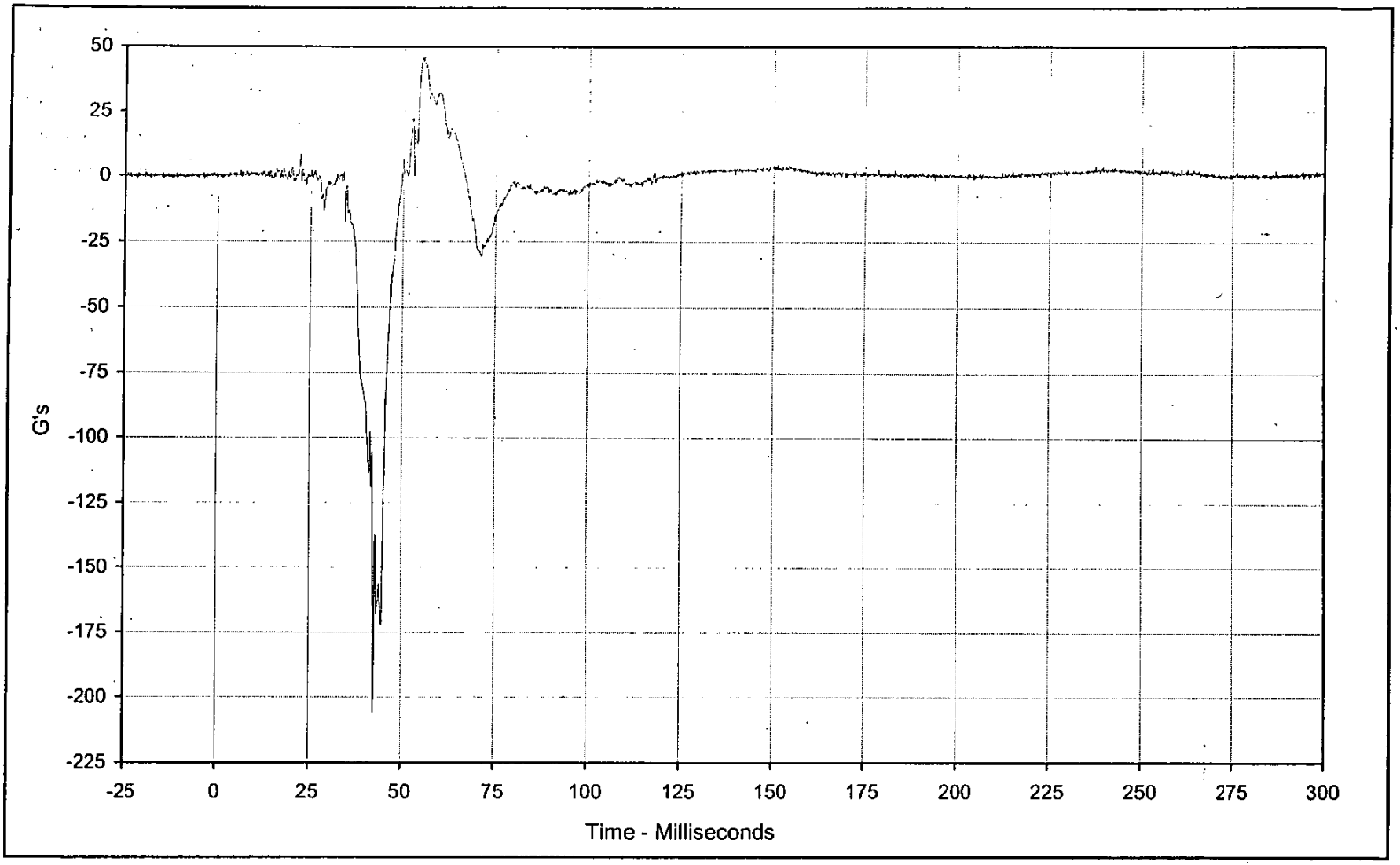
Date of Test: 12/16/99

Curve Number: FIL-082

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

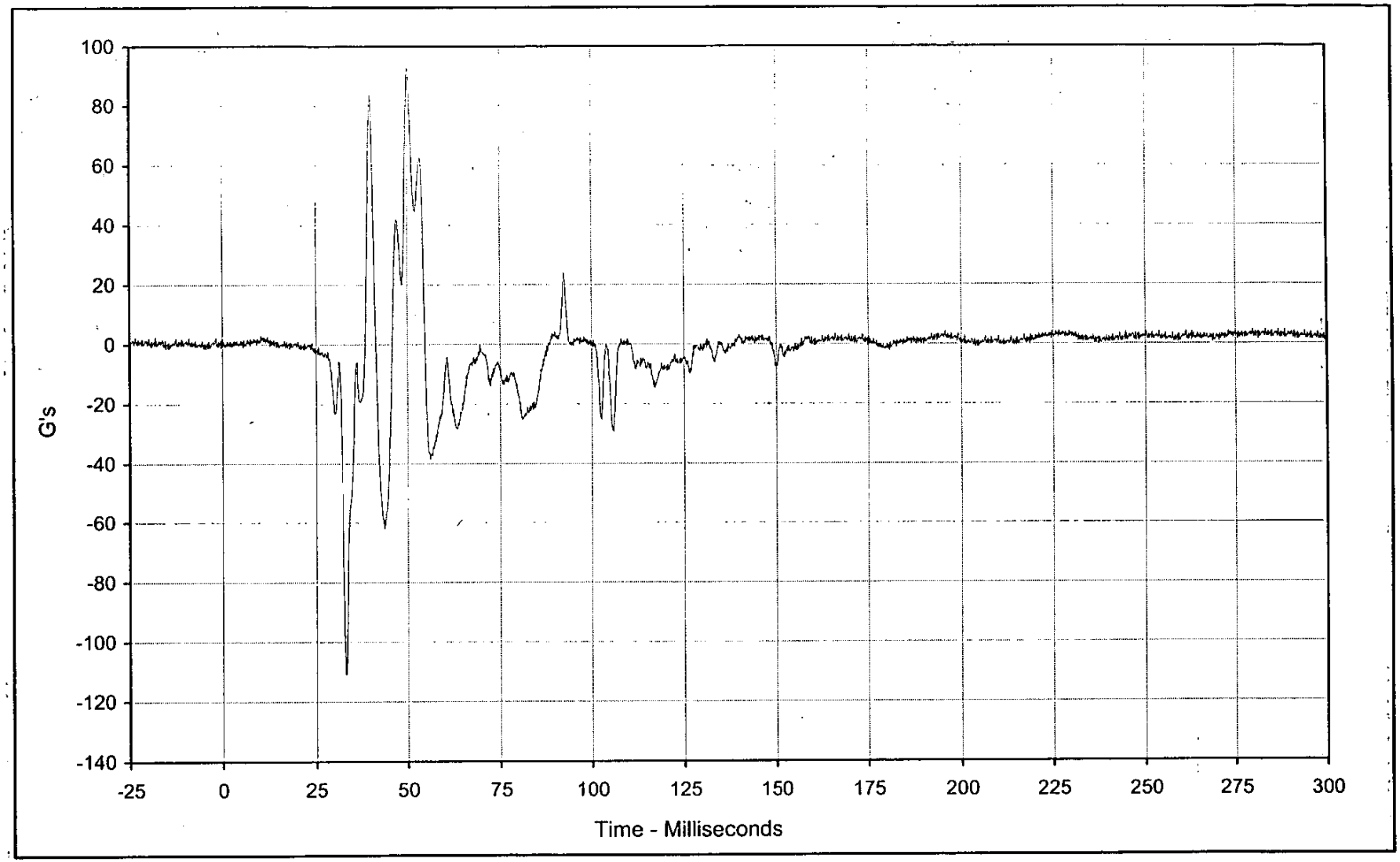
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



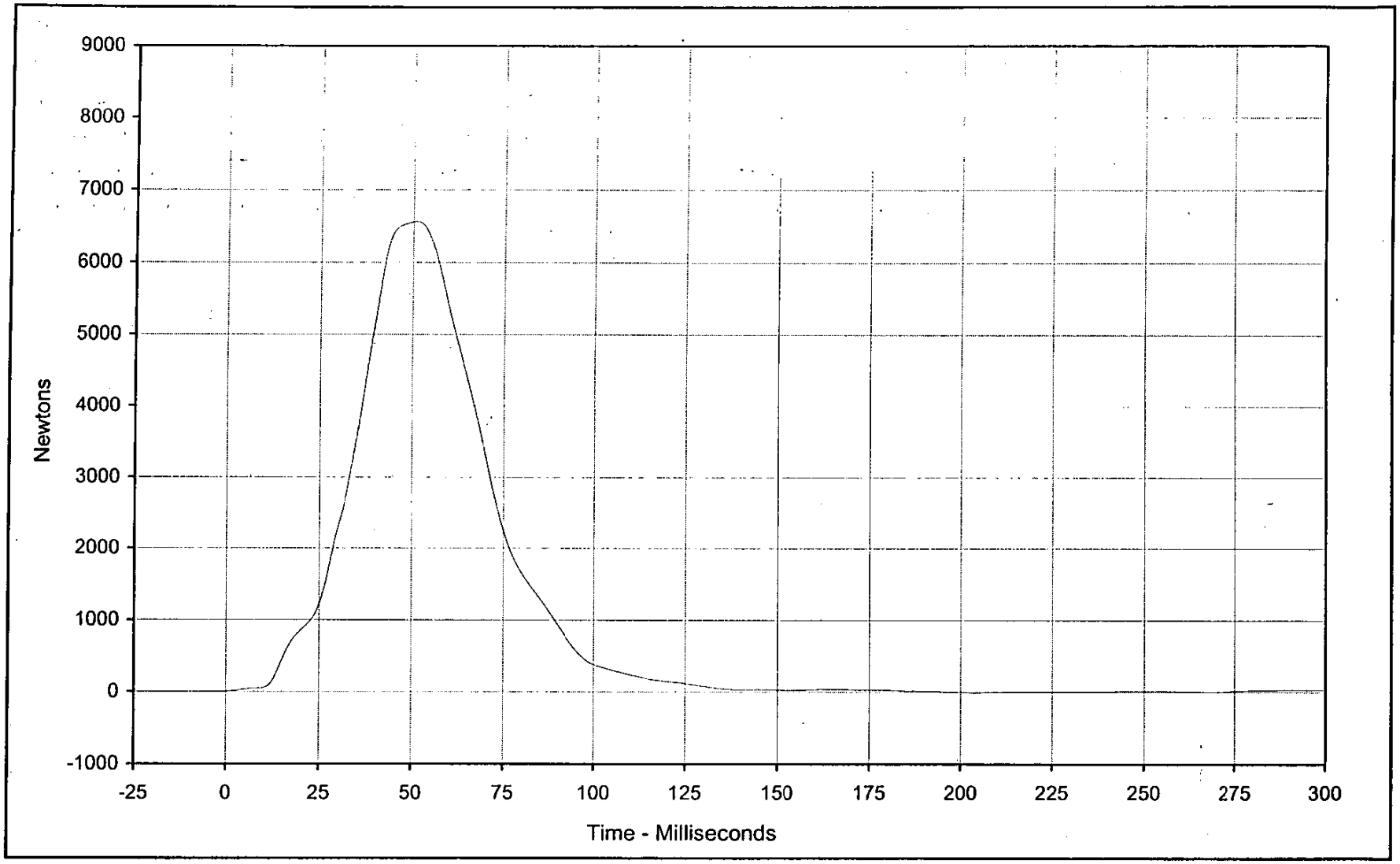
Curve Description:	Passenger Right Foot Aft Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	46.1	at	55.3 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-205.6	at	42.8 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-083				

KARCO Engineering



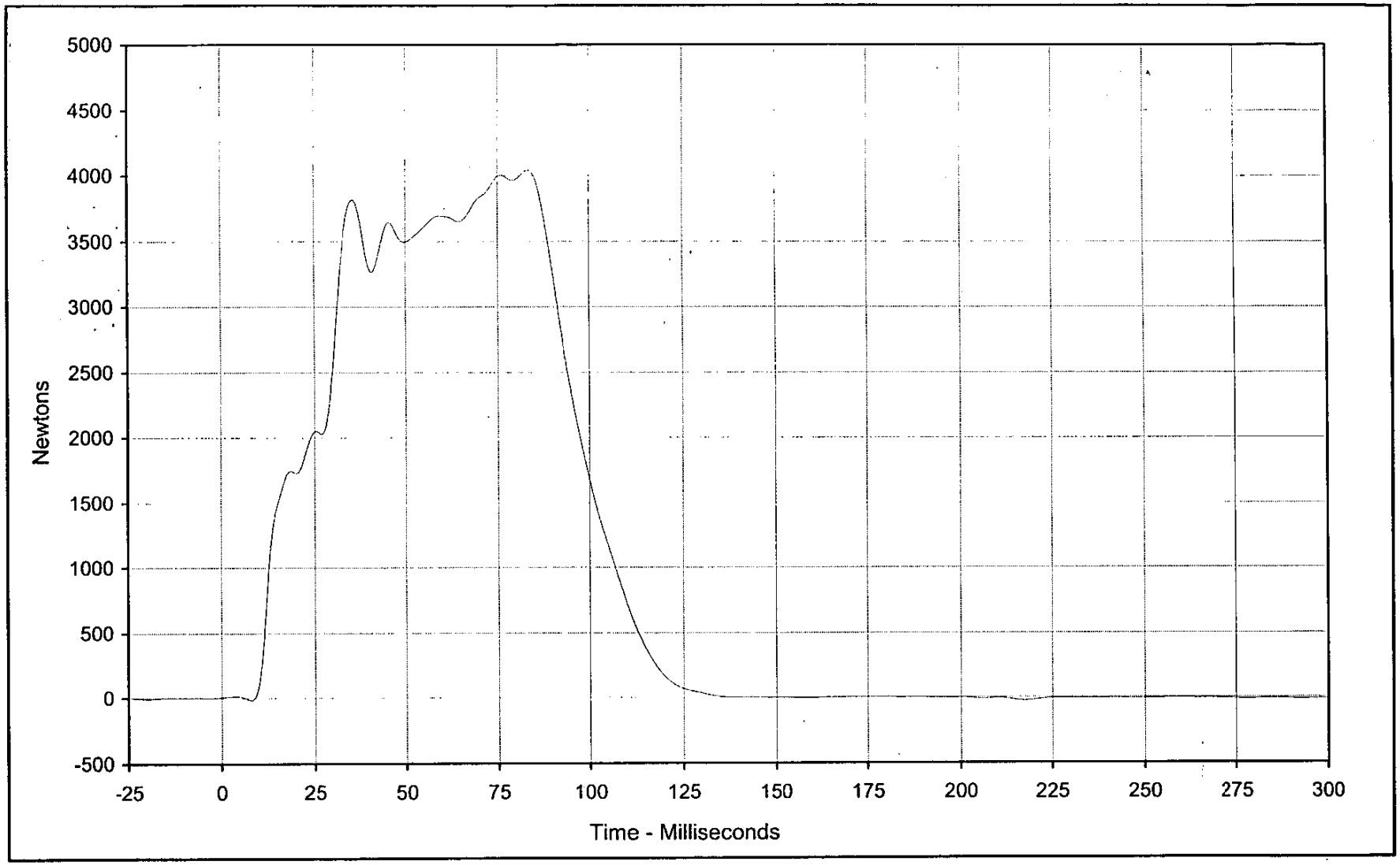
Curve Description:	Passenger Right Foot Fore Z			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	92.7	at	50.1 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-111.2	at	33.3 Milliseconds		
SAE Filter Class:	1000				
Date of Test:	12/16/99				
Curve Number:	FIL-084				

KARCO Engineering



Curve Description:	Passenger Lap Belt Force			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	6563.2	at	51.0 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-9.6	at	204.4 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-085				

KARCO Engineering



Curve Description: Passenger Shoulder Belt Force

Maximum Value: 4041.5 at 83.1 Milliseconds

Minimum Value: -26.4 at 217.5 Milliseconds

SAE Filter Class: 60

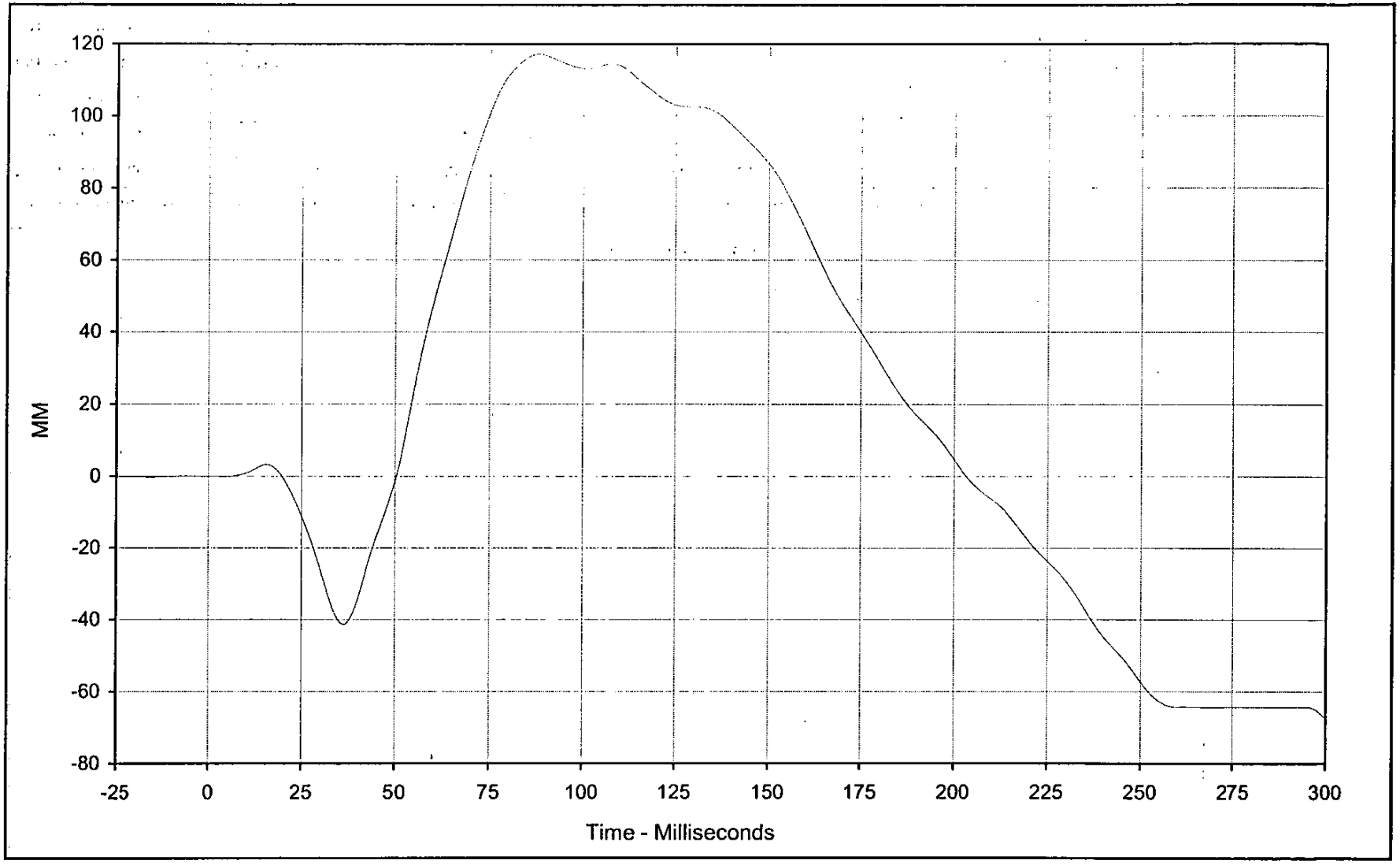
Date of Test: 12/16/99

Curve Number: FIL-086

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

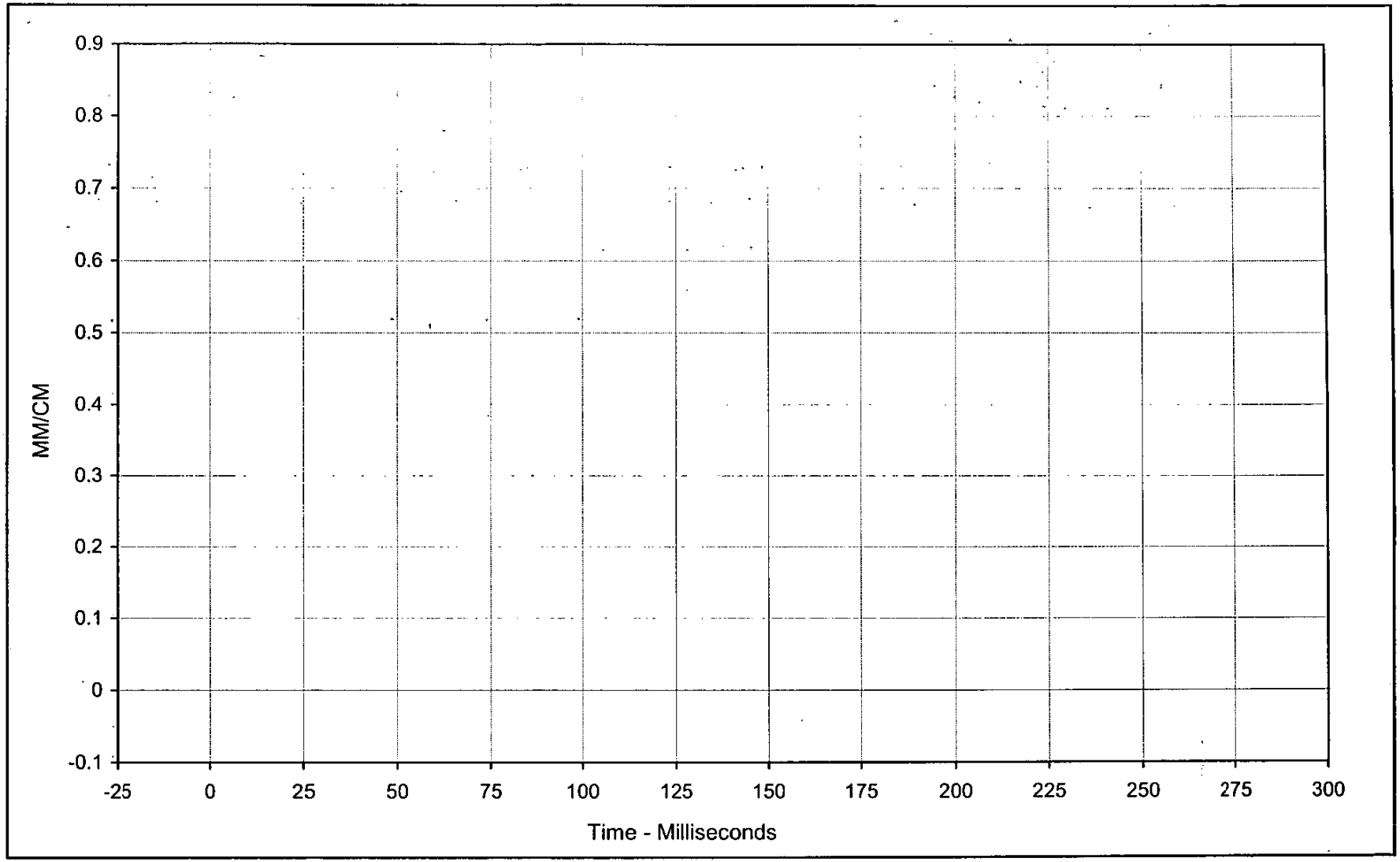
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description:	Passenger Shoulder Belt Pullout			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	117.2	at	87.7 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-67.3	at	299.9 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-087				

KARC Engineering



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: 12/16/99

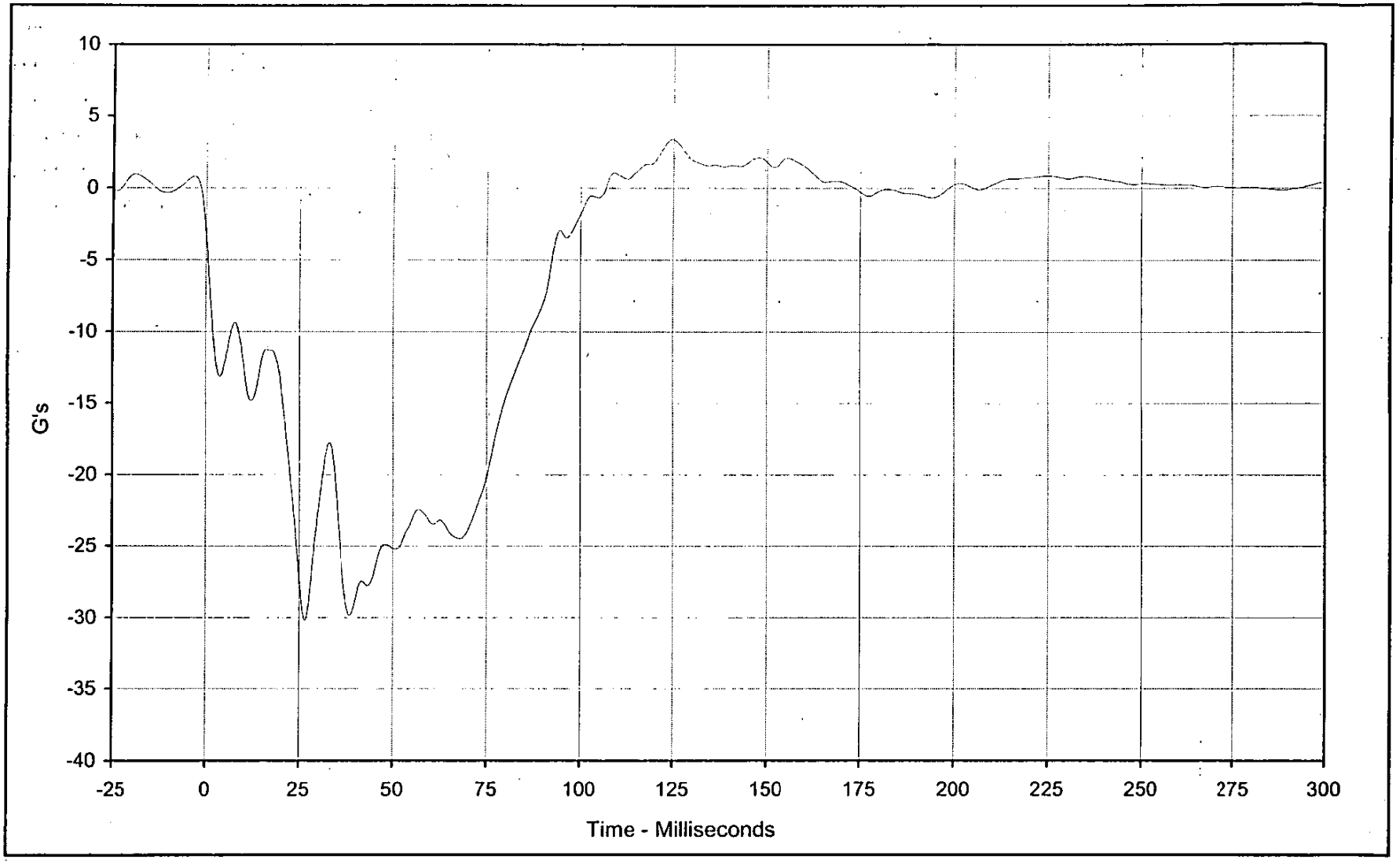
Curve Number: FIL-088

* Not Installed

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

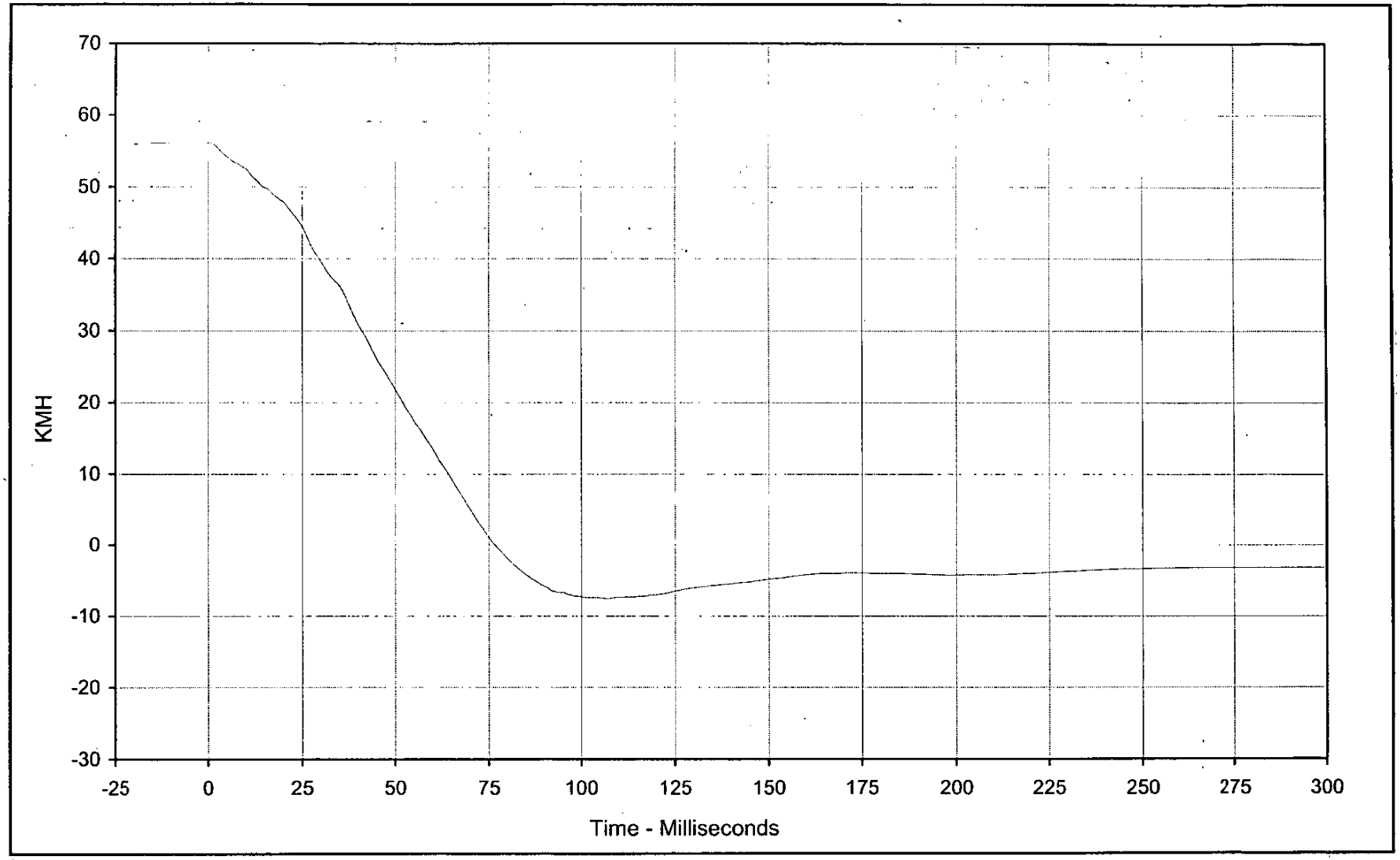
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



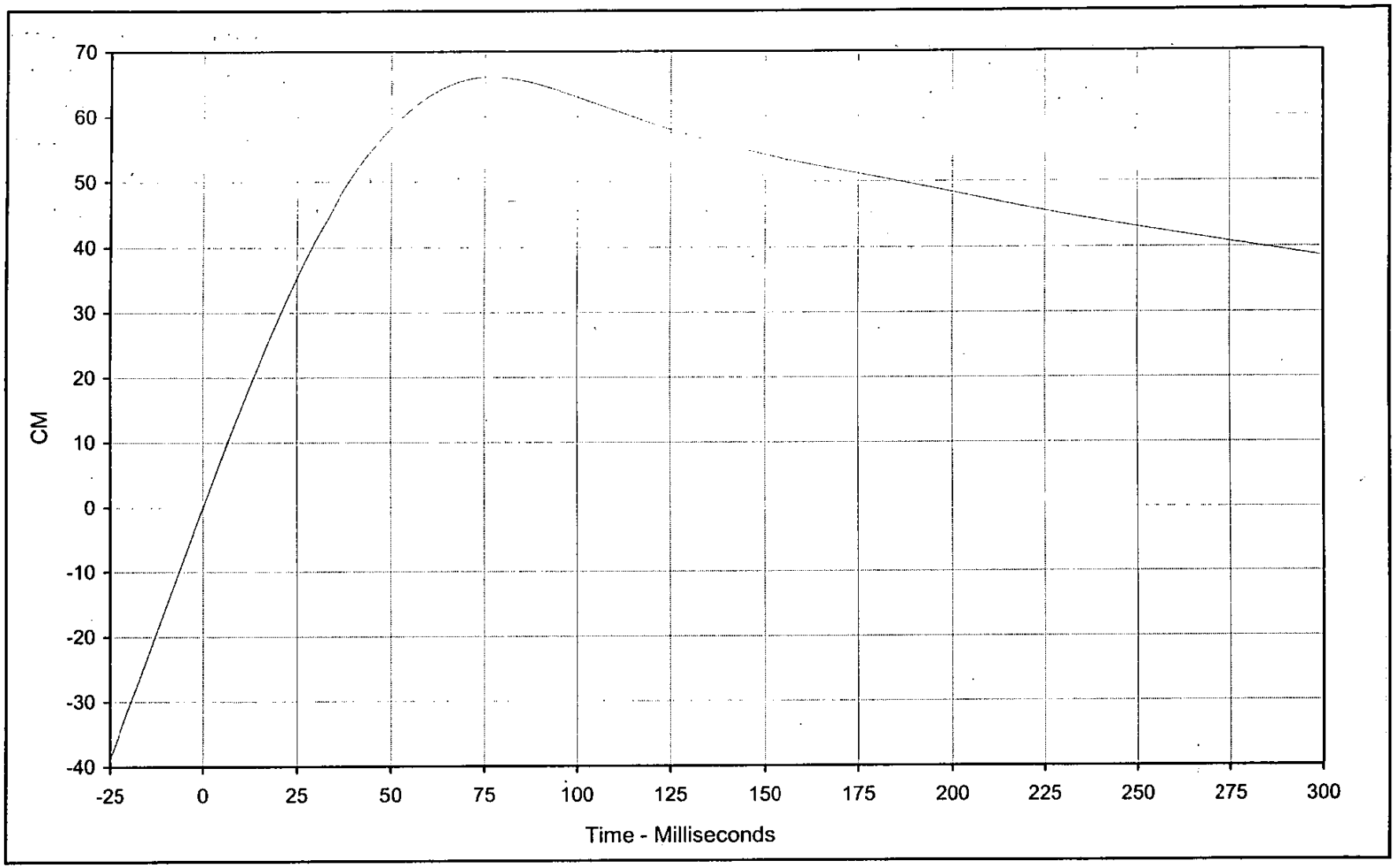
Curve Description:	Vehicle Left Rear Primary			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	3.4	at	124.5 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-30.2	at	26.5 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-089				

KARCO Engineering



Curve Description:	Vehicle Left Rear Primary Velocity			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	56.1	at	0.0 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-7.6	at	107.0 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	IN1-089				

KARCO Engineering



Curve Description: Vehicle Left Rear Primary Displ.

Maximum Value: 66.1 at 76.5 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

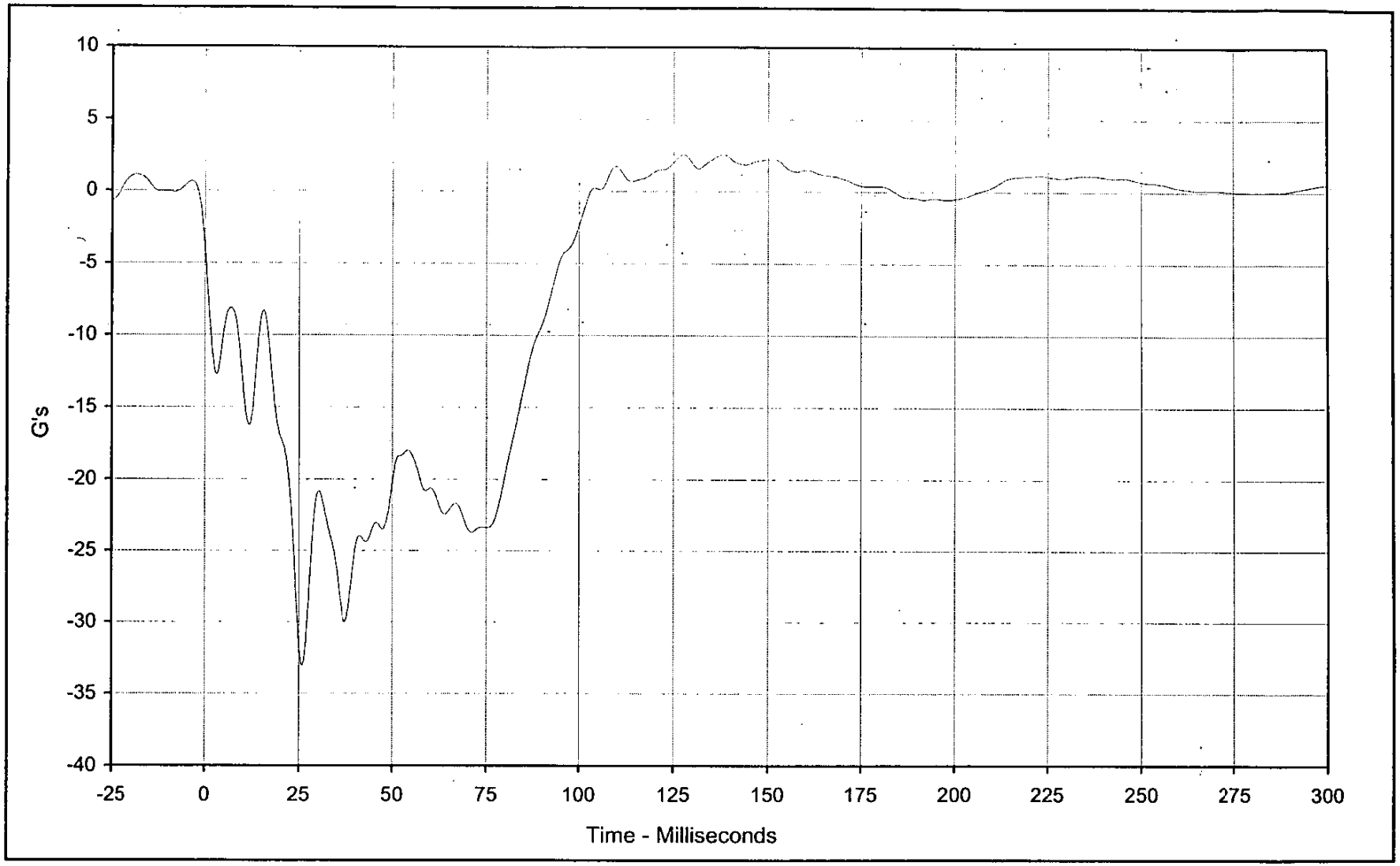
Date of Test: 12/16/99

Curve Number: IN2-089

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

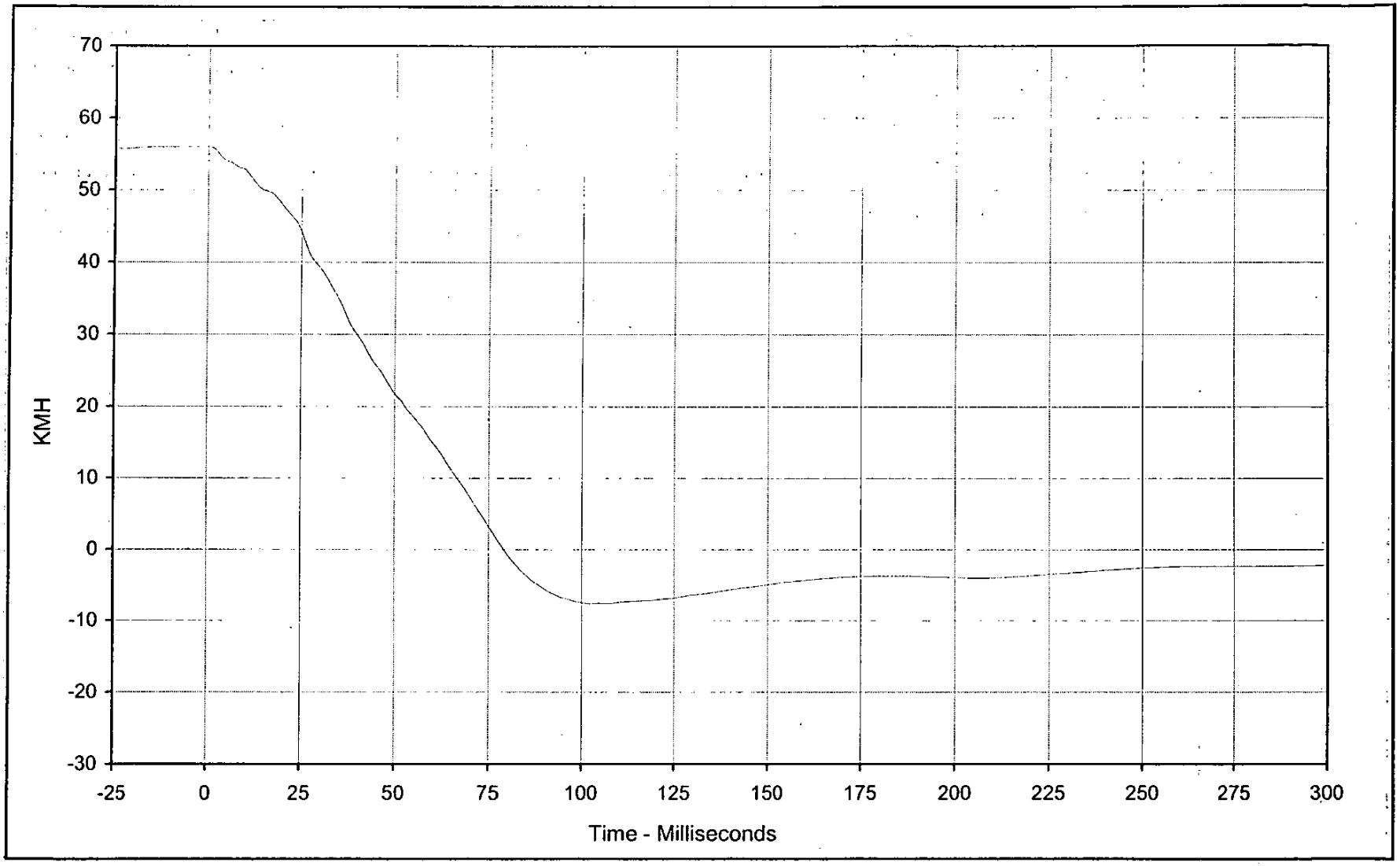
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



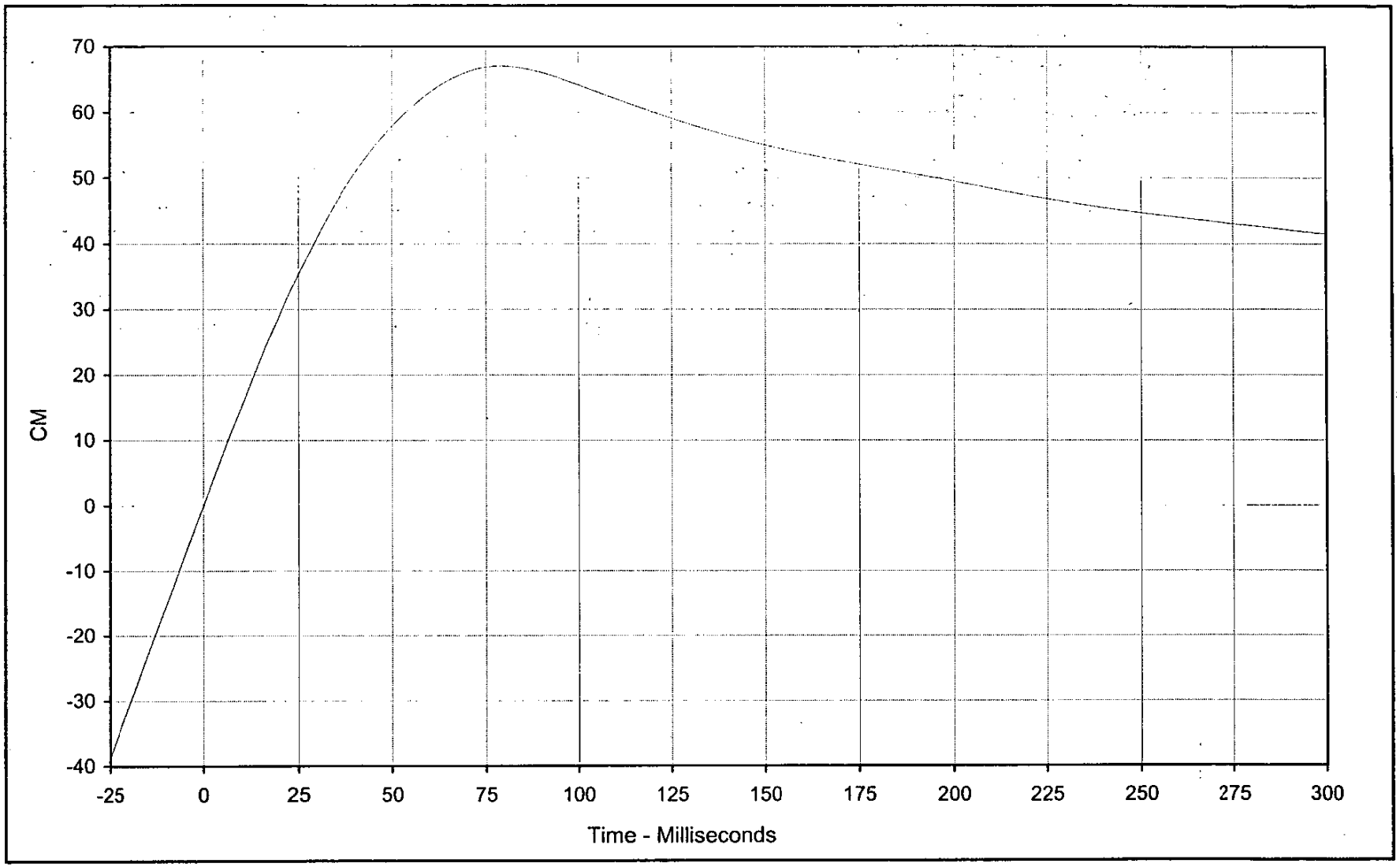
Curve Description:	Vehicle Right Rear Primary			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	2.6	at	138.1 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-33.0	at	25.9 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-090				

KARC Engineering



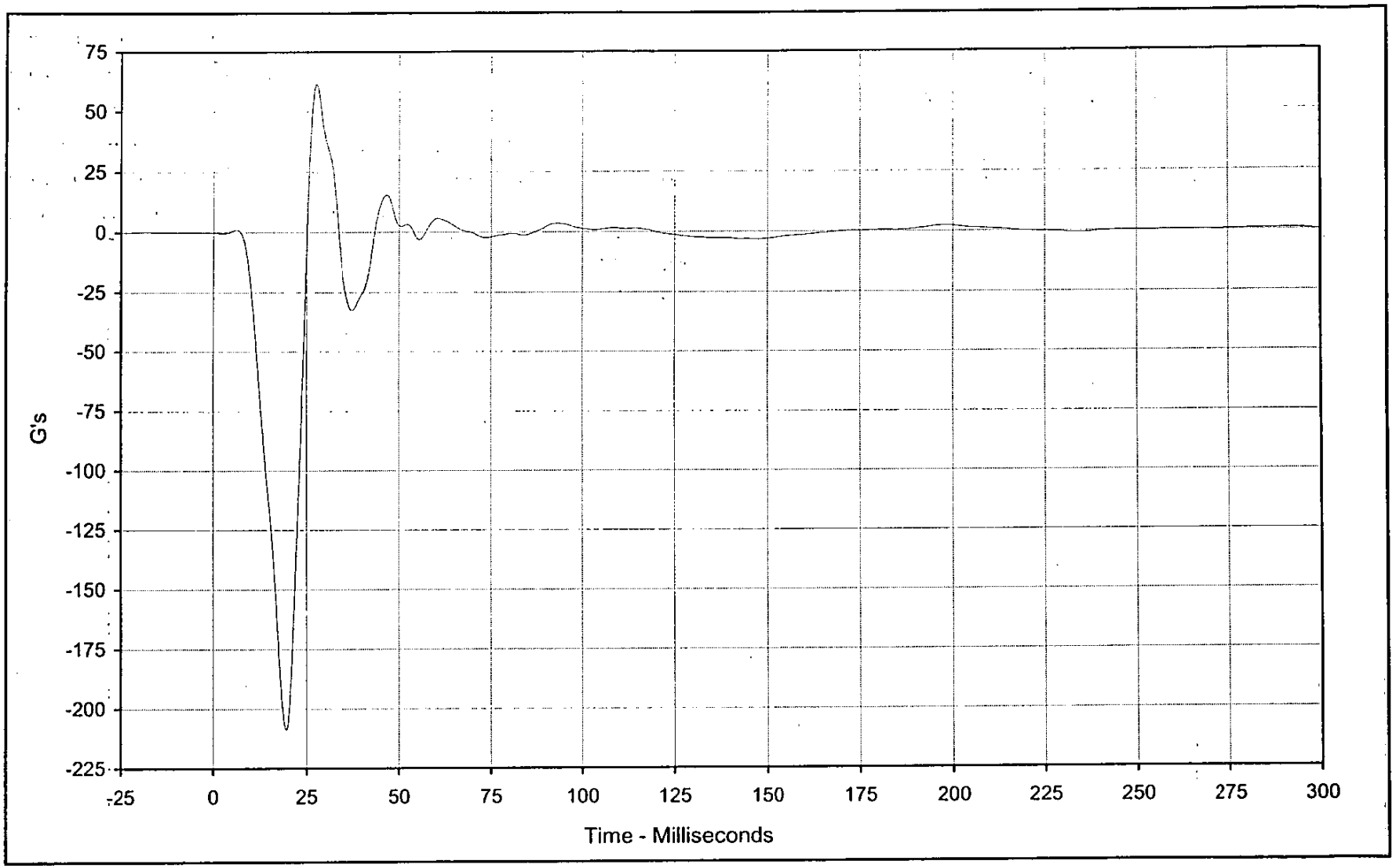
Curve Description:	Vehicle Right Rear Primary Velocity			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	56.0	at	0.0	Milliseconds	Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-7.6	at	102.5	Milliseconds	
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	IN1-090				

KARCO Engineering



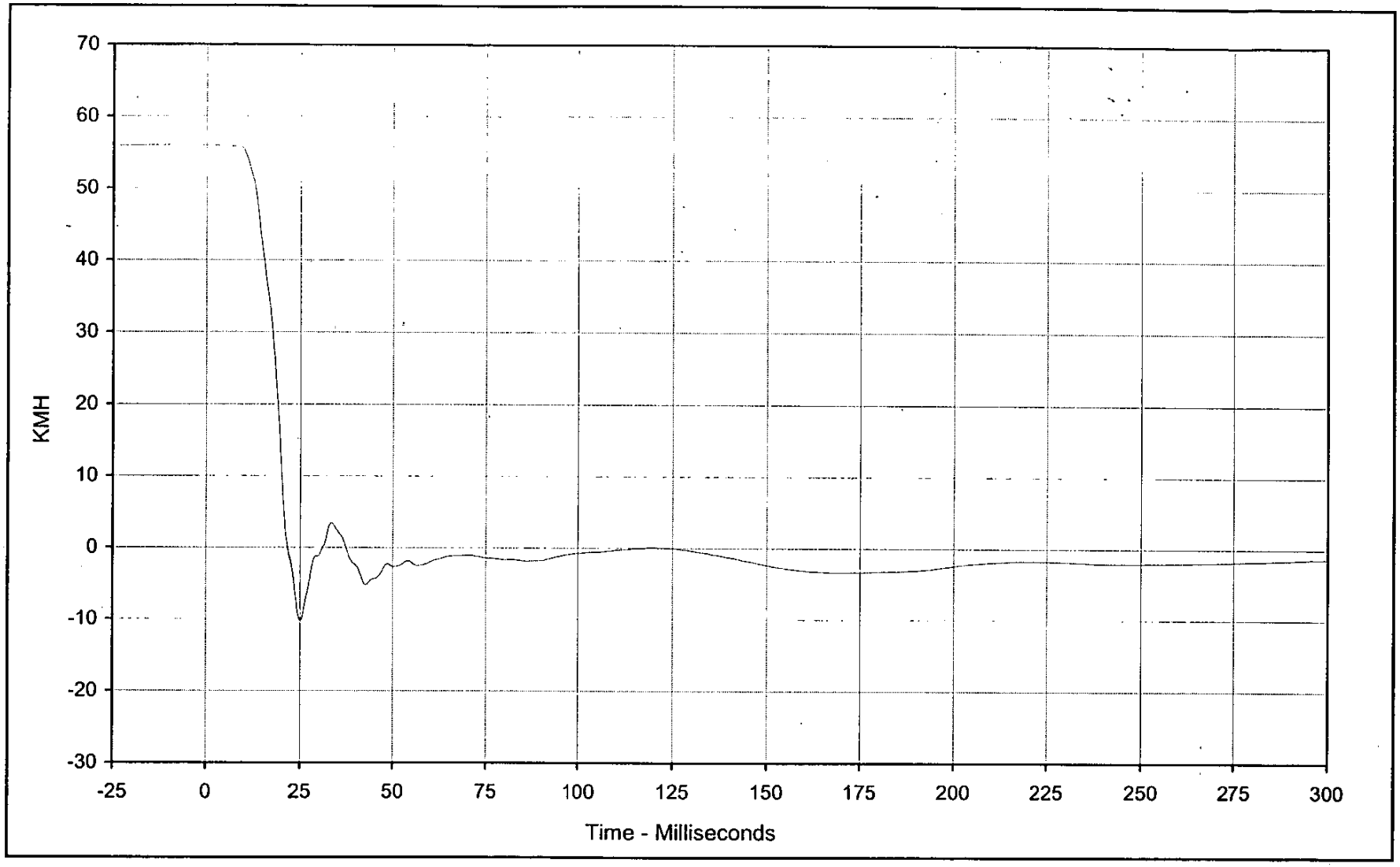
Curve Description:	Vehicle Right Rear Primary Displ.			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	67.0	at	78.9 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	0.0	at	0.0 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	IN2-090				

KARCO Engineering



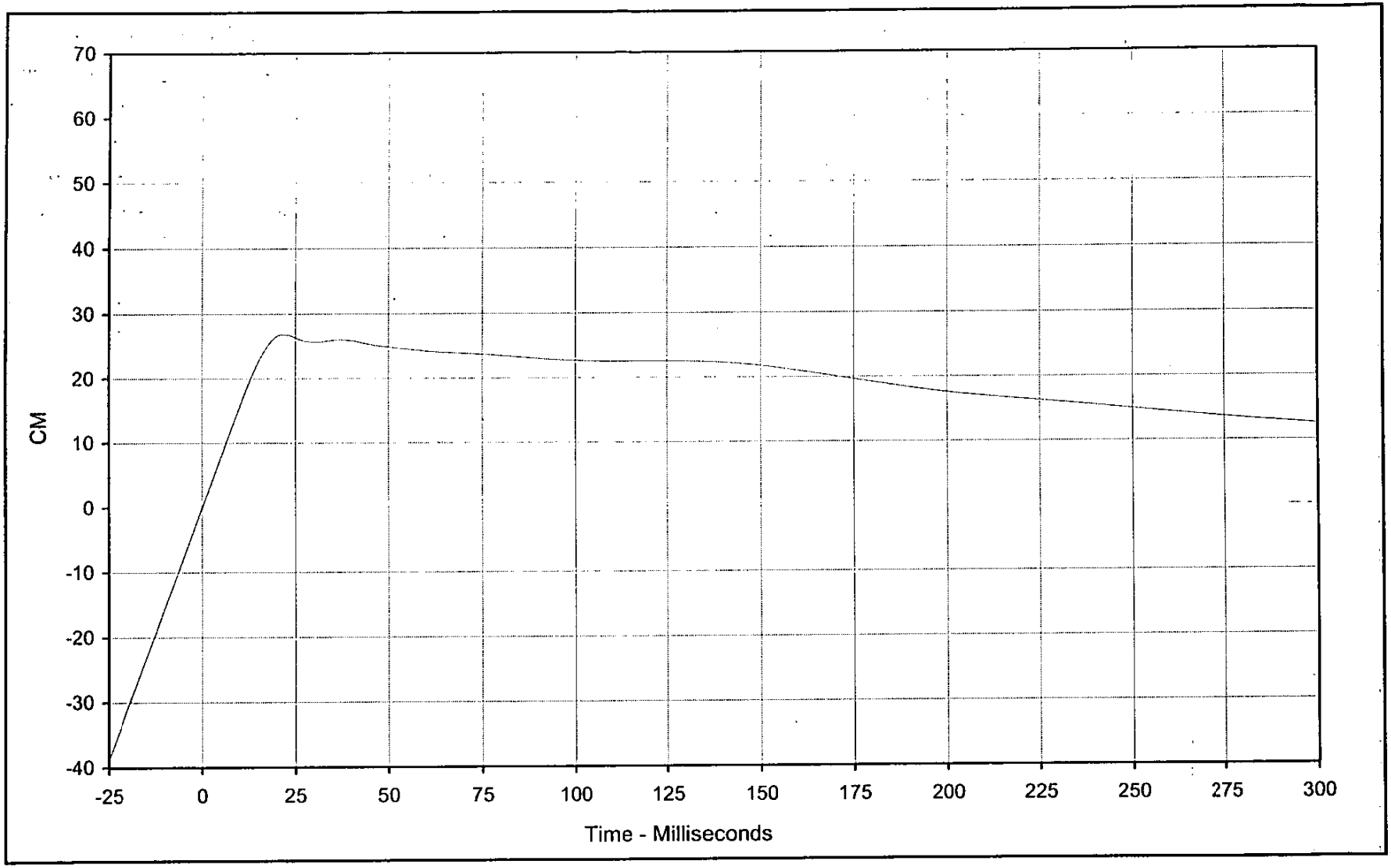
Curve Description:	Vehicle Engine Top			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	61.6	at	27.6 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-208.9	at	19.5 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-091				

KARCO Engineering



Curve Description:	Vehicle Engine Top Velocity			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	56.0	at	1.6 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-10.3	at	25.1 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	IN1-091				

KARC Engineering



Curve Description: Vehicle Engine Top Displacement

Maximum Value: 26.9 at 21.8 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

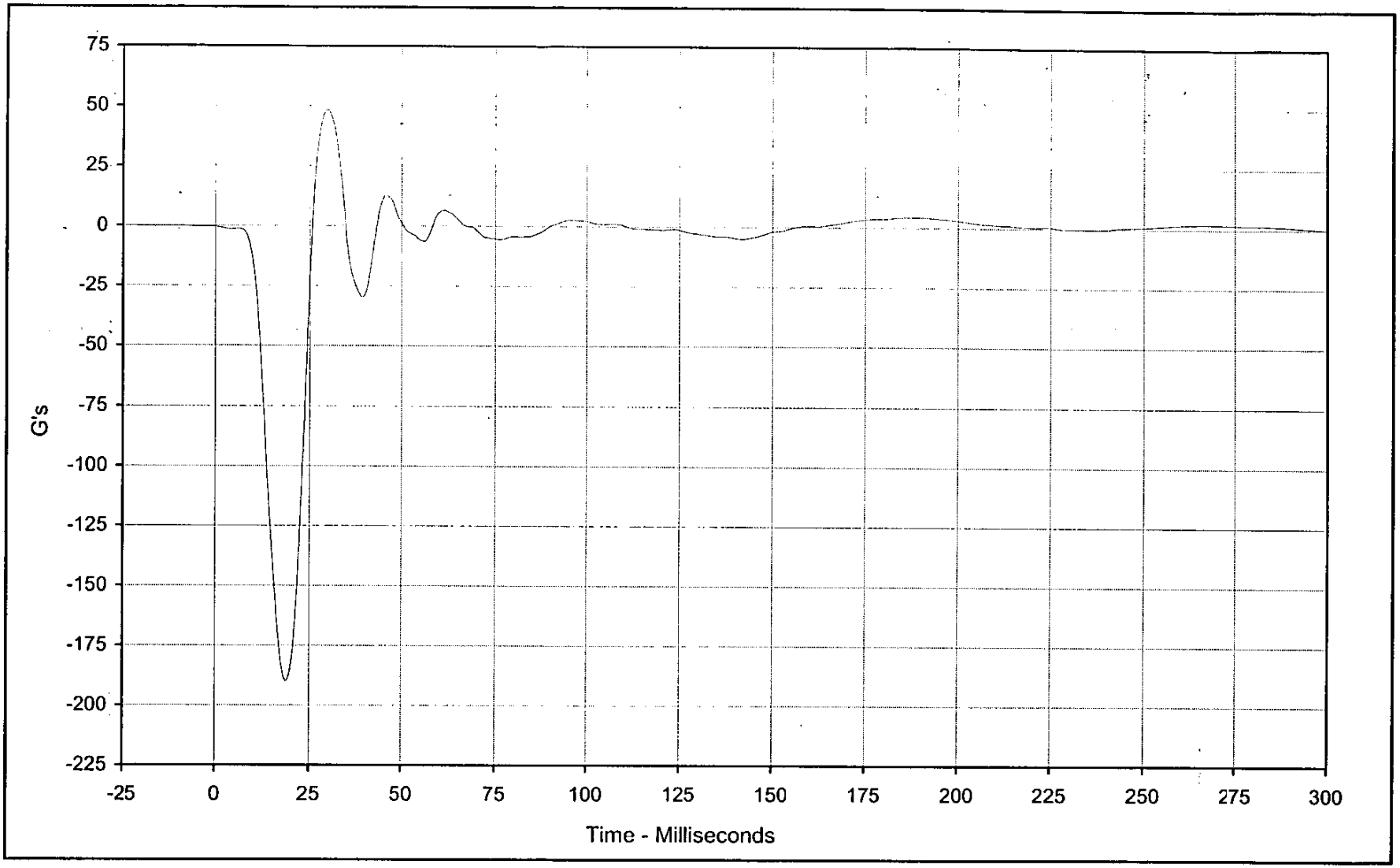
Date of Test: 12/16/99

Curve Number: IN2-091

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

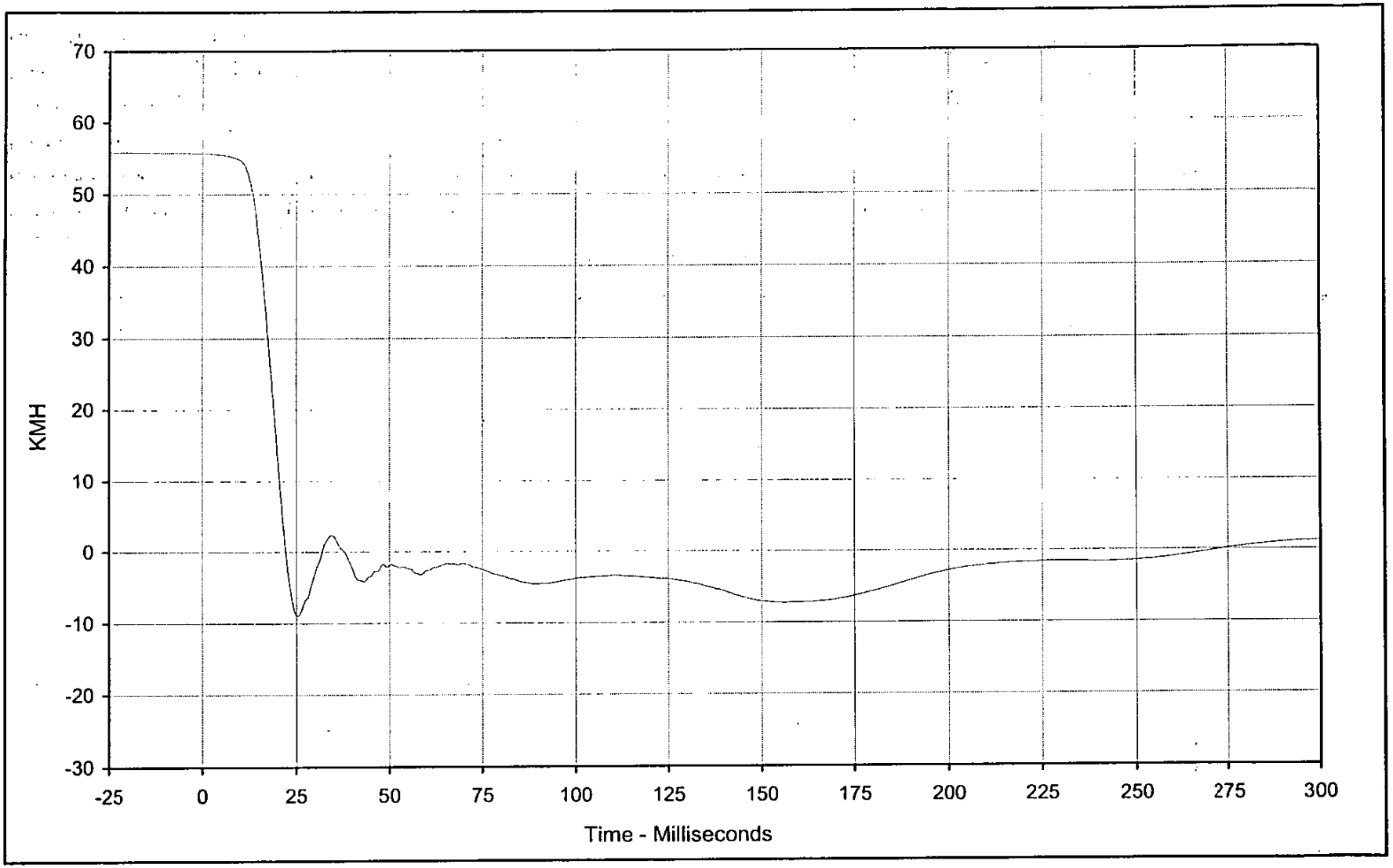
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



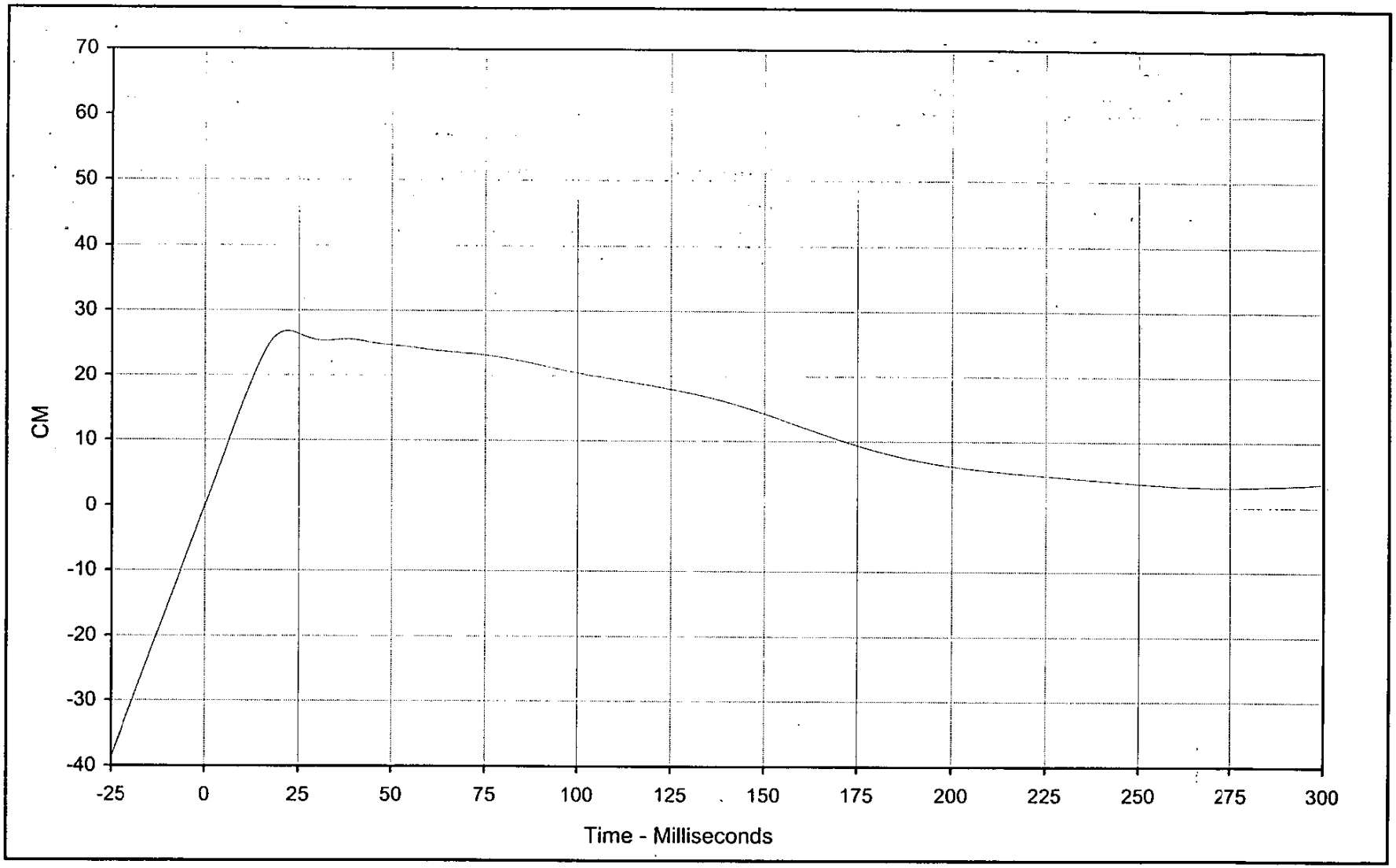
Curve Description:	Vehicle Engine Bottom			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	48.3	at	29.9 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-189.9	at	19.1 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-092				

KARCO Engineering



Curve Description:	Vehicle Engine Bottom Velocity			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	55.7	at	0.0 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-9.0	at	25.3 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	IN1-092				

KARCO Engineering



Curve Description: Vehicle Engine Bottom Displacement

Maximum Value: 26.8 at 22.2 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

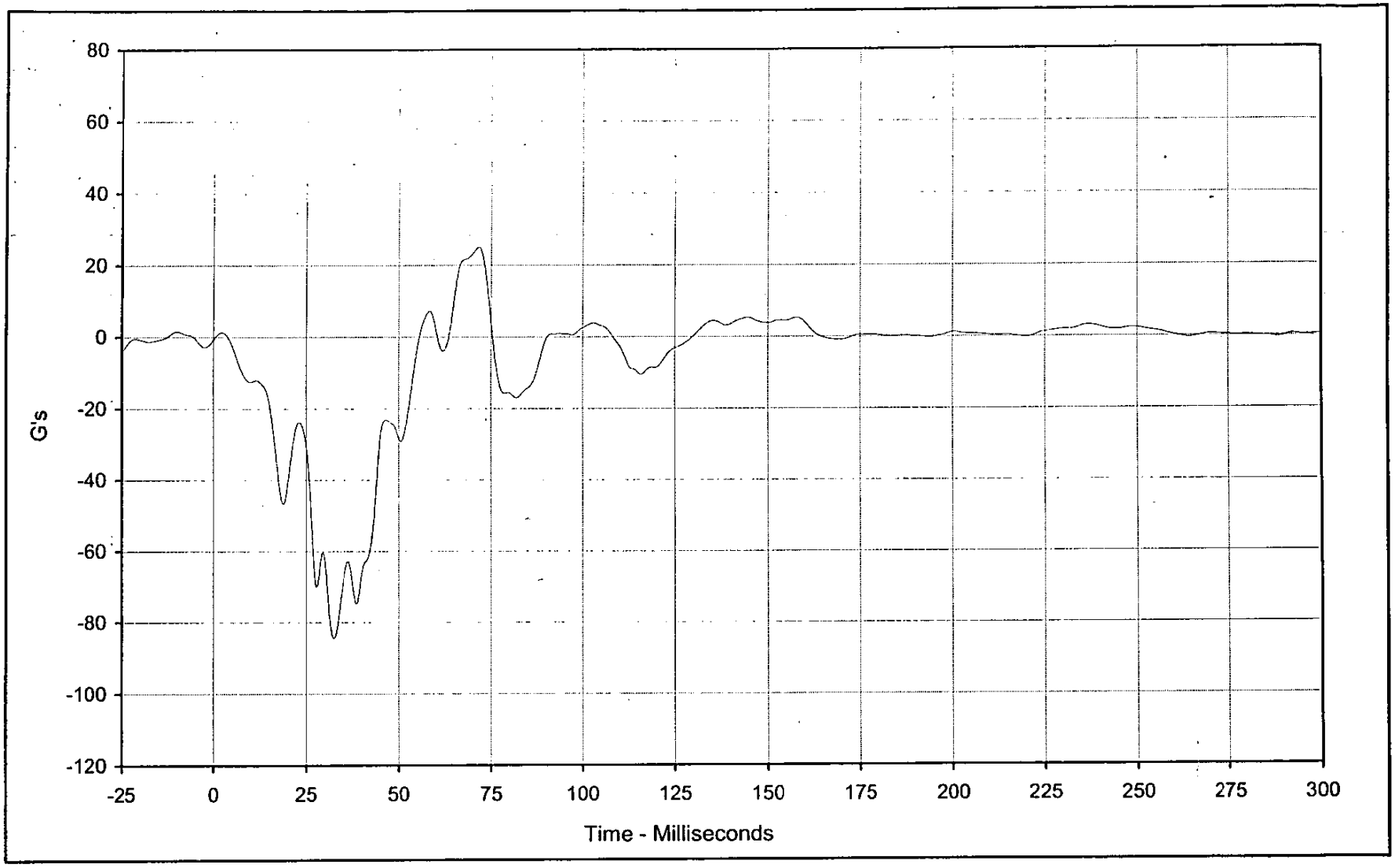
Date of Test: 12/16/99

Curve Number: IN2-092

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

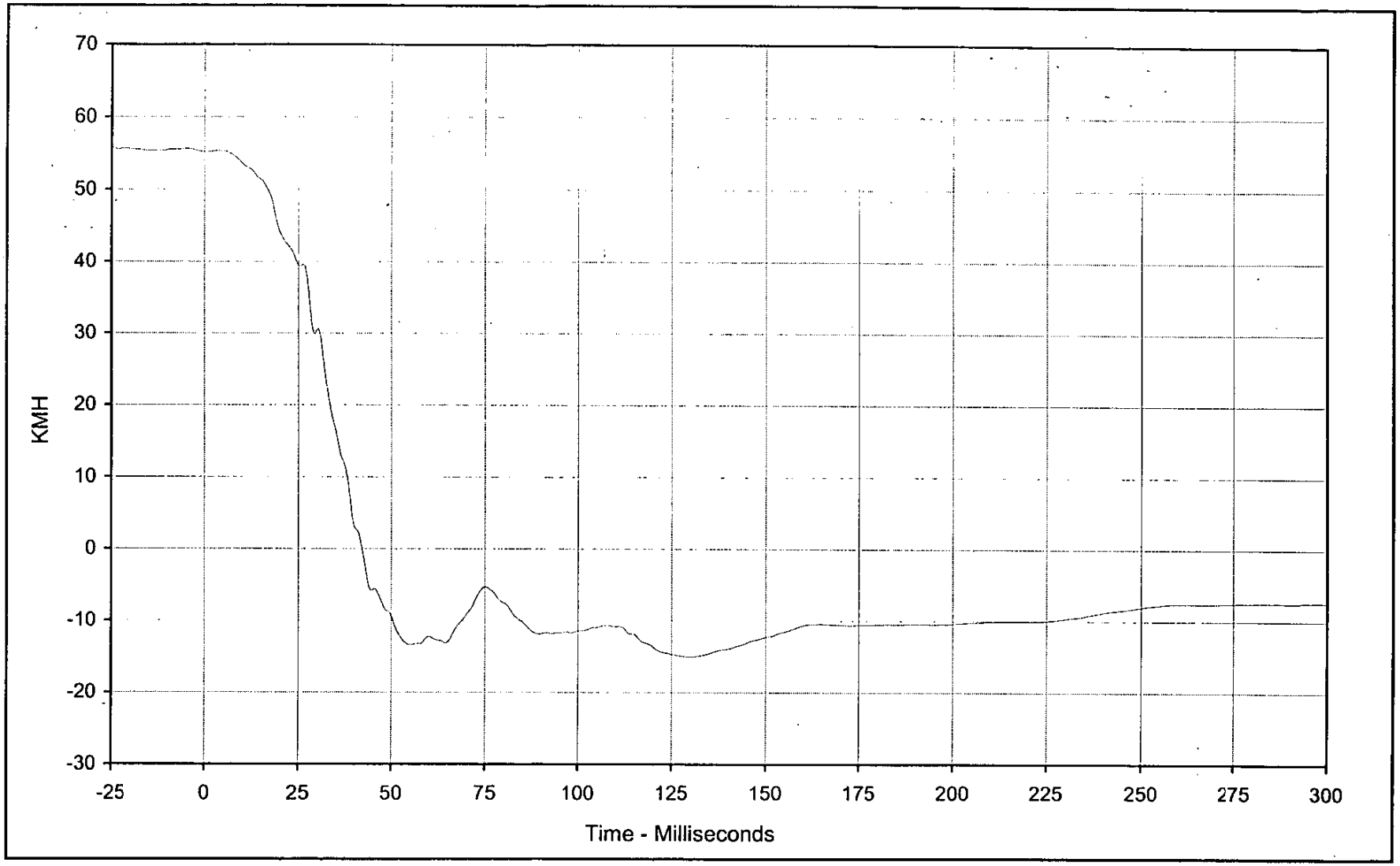
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description:	Vehicle Left Brake Caliper			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	25.0	at	71.6 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-84.5	at	32.5 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-093				

KARCO Engineering



Curve Description: Vehicle Left Brake Caliper Velocity

Maximum Value: 55.4 at 4.0 Milliseconds

Minimum Value: -15.0 at 130.1 Milliseconds

SAE Filter Class: 180

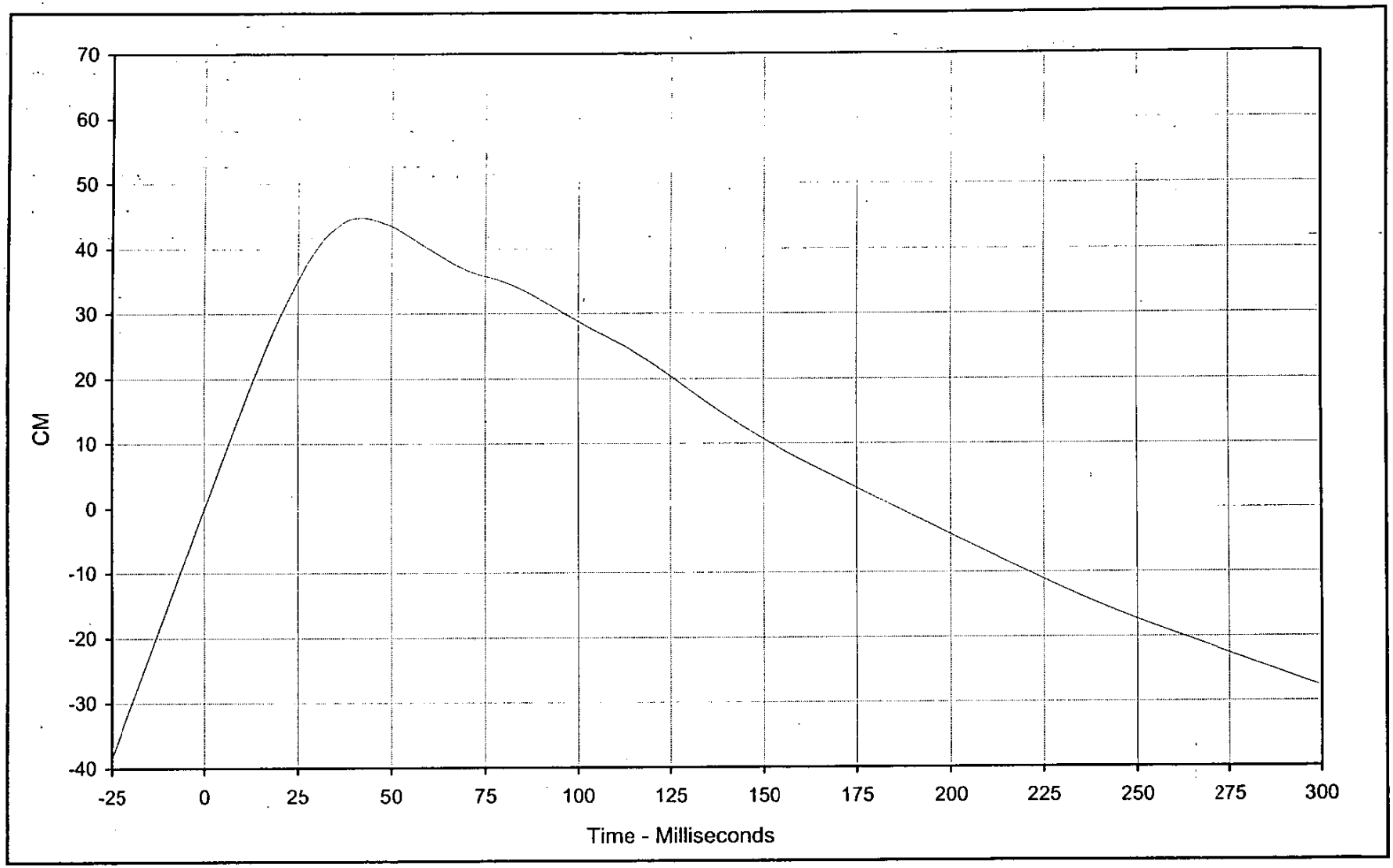
Date of Test: 12/16/99

Curve Number: IN1-093

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Vehicle Left Brake Caliper Displ.

Maximum Value: 44.8 at 42.1 Milliseconds

Minimum Value: -27.7 at 299.9 Milliseconds

SAE Filter Class: 180

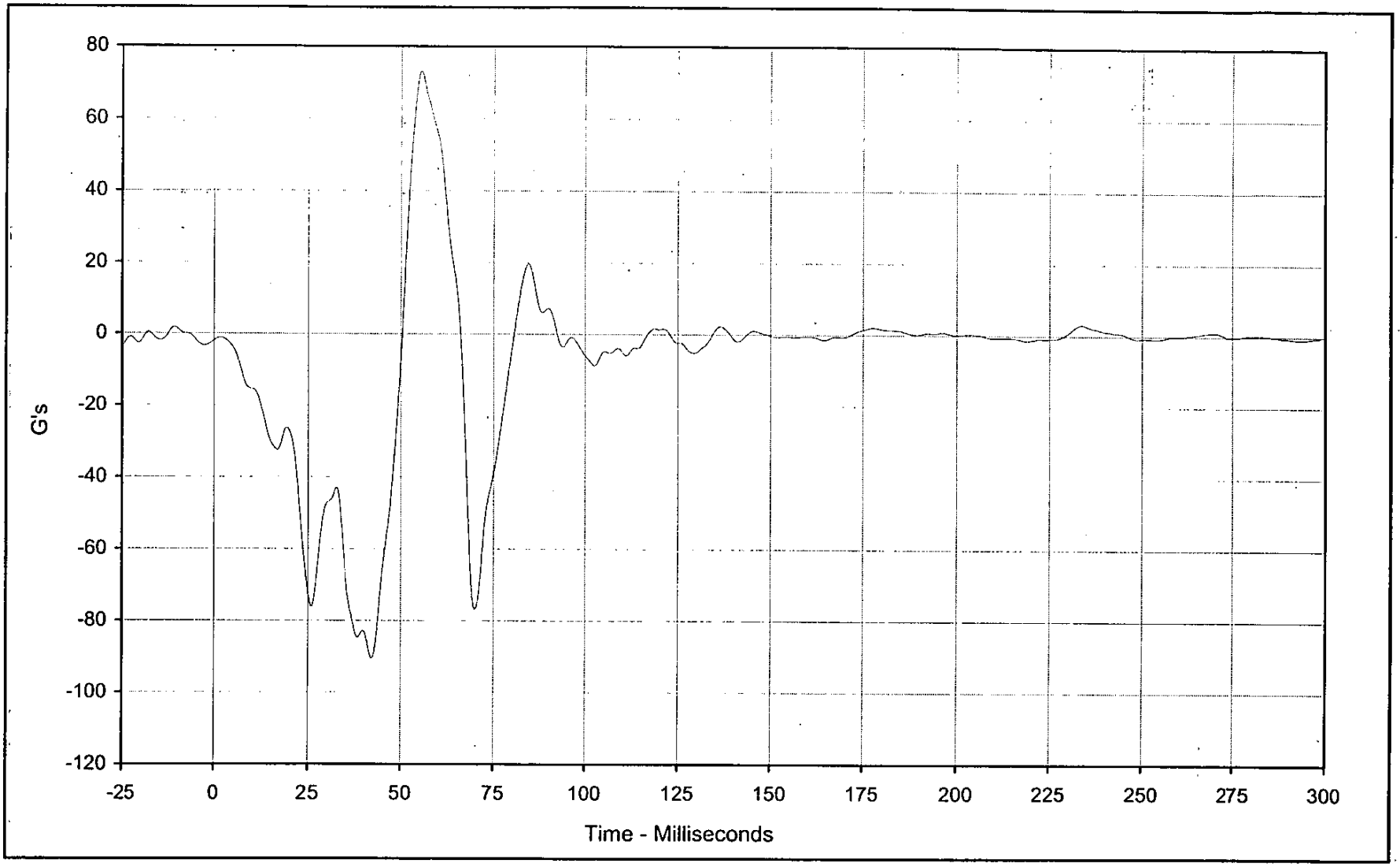
Date of Test: 12/16/99

Curve Number: IN2-093

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Vehicle Right Brake Caliper

Maximum Value: 73.2 at 55.4 Milliseconds

Minimum Value: -90.5 at 42.2 Milliseconds

SAE Filter Class: 60

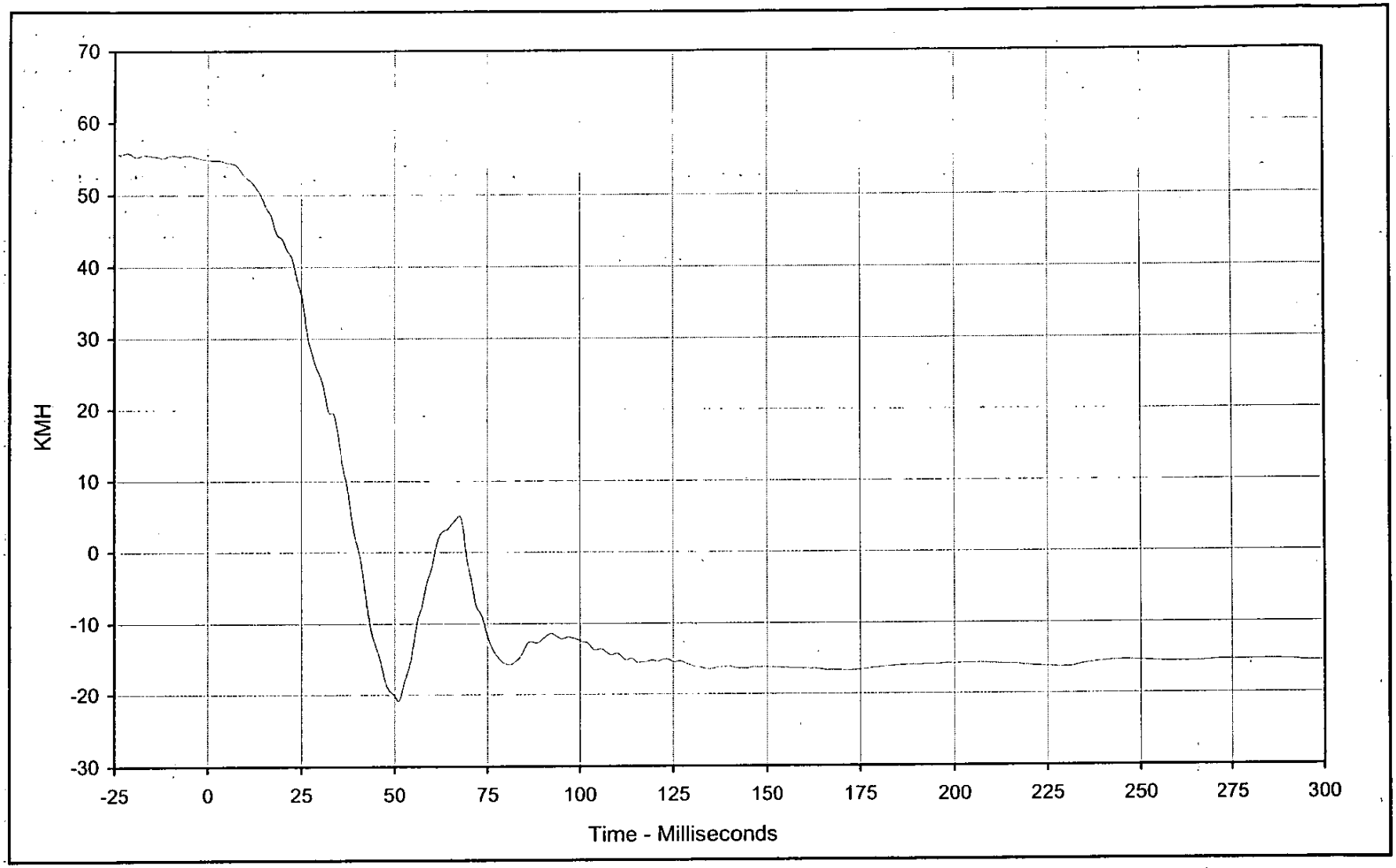
Date of Test: 12/16/99

Curve Number: FIL-094

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description: Vehicle Right Brake Caliper Velocity

Maximum Value: 54.8 at 0.0 Milliseconds

Minimum Value: -20.9 at 51.0 Milliseconds

SAE Filter Class: 180

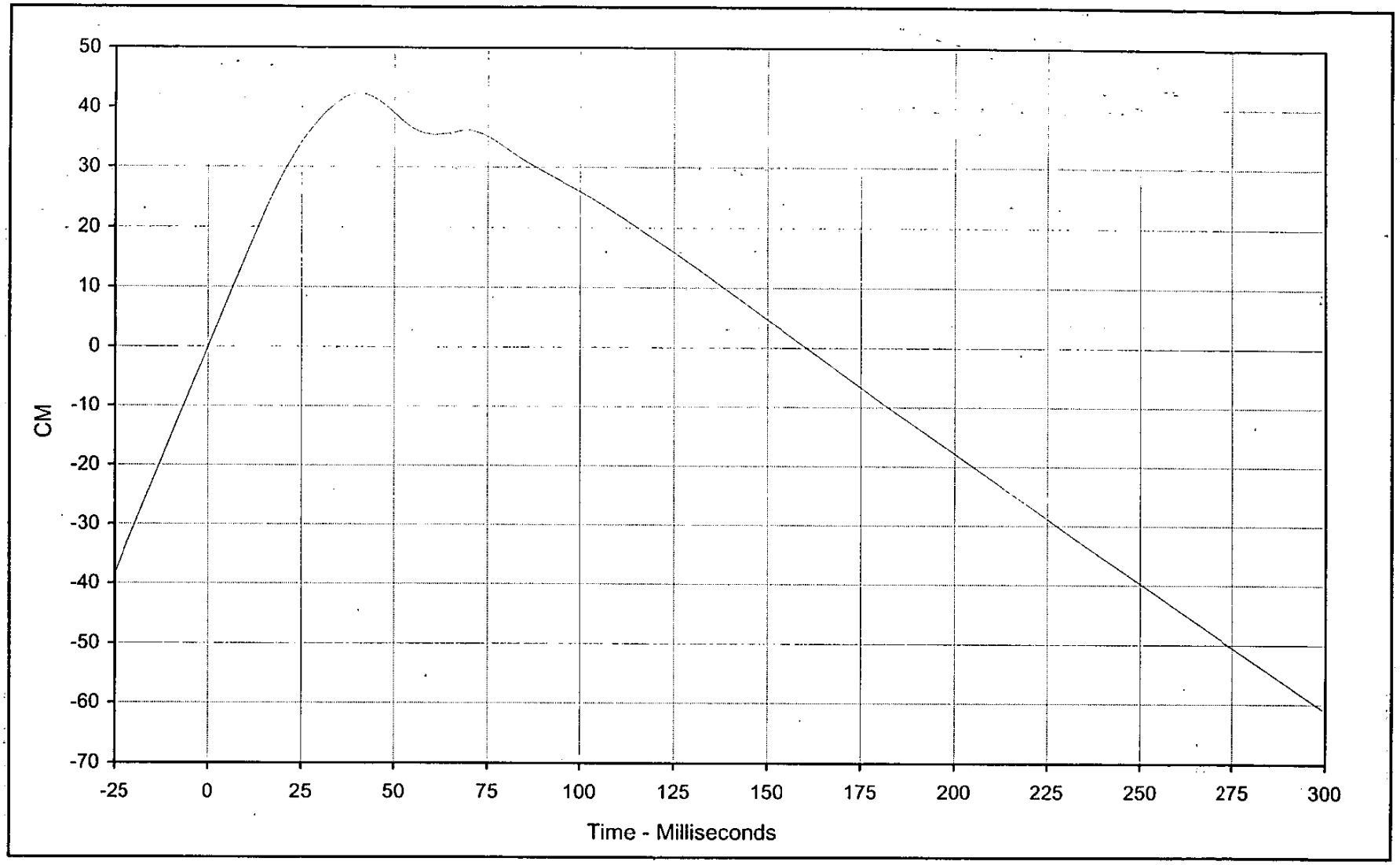
Date of Test: 12/16/99

Curve Number: IN1-094

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

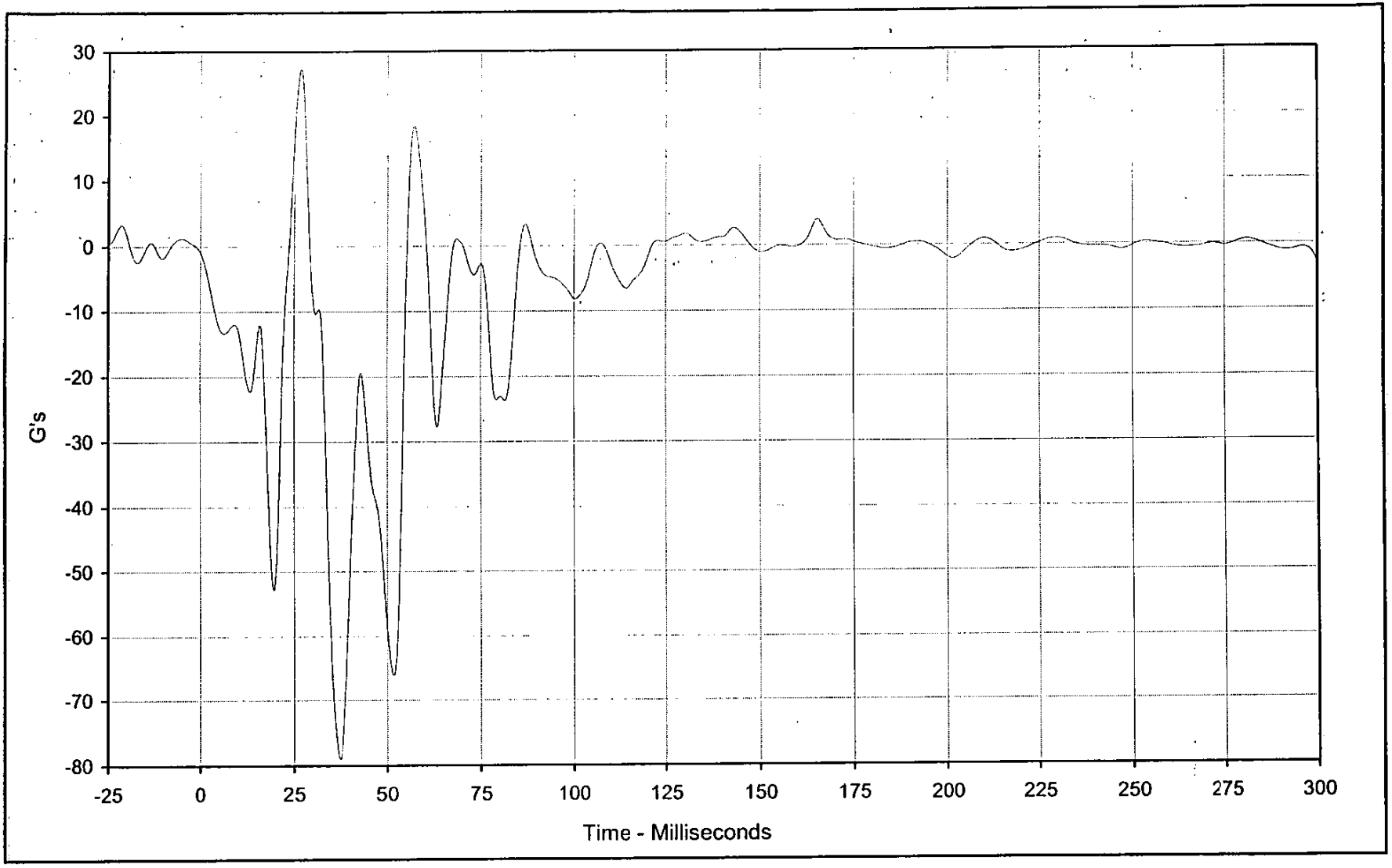
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description:	Vehicle Right Brake Caliper Displ.			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	42.2	at	40.8 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-61.1	at	299.9 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	IN2-094				

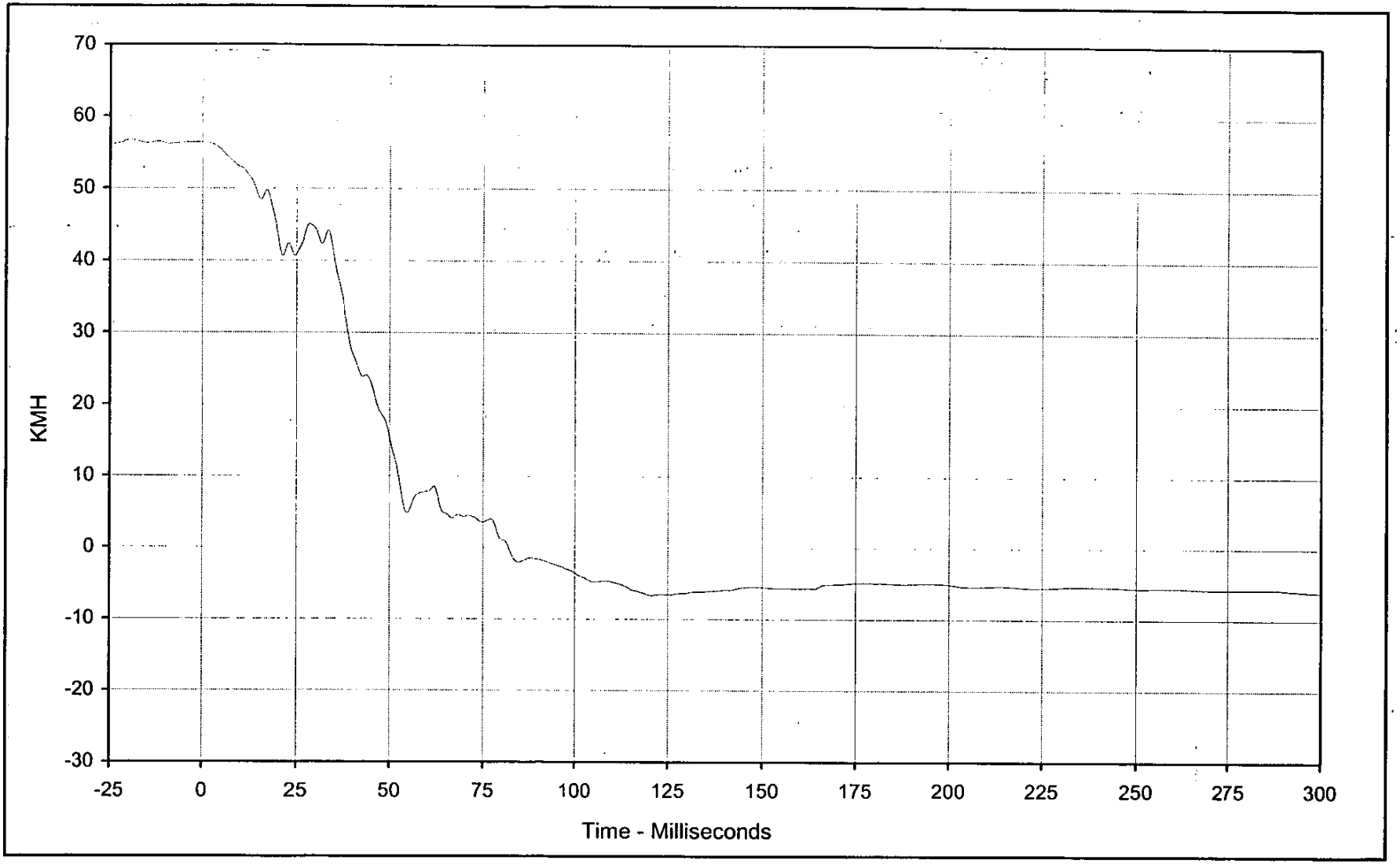
KARCO Engineering



Curve Description:	Vehicle Instrument Panel			
Maximum Value:	27.3	at	26.6	Milliseconds
Minimum Value:	-79.0	at	37.4	Milliseconds
SAE Filter Class:	60			
Date of Test:	12/16/99			
Curve Number:	FIL-095			

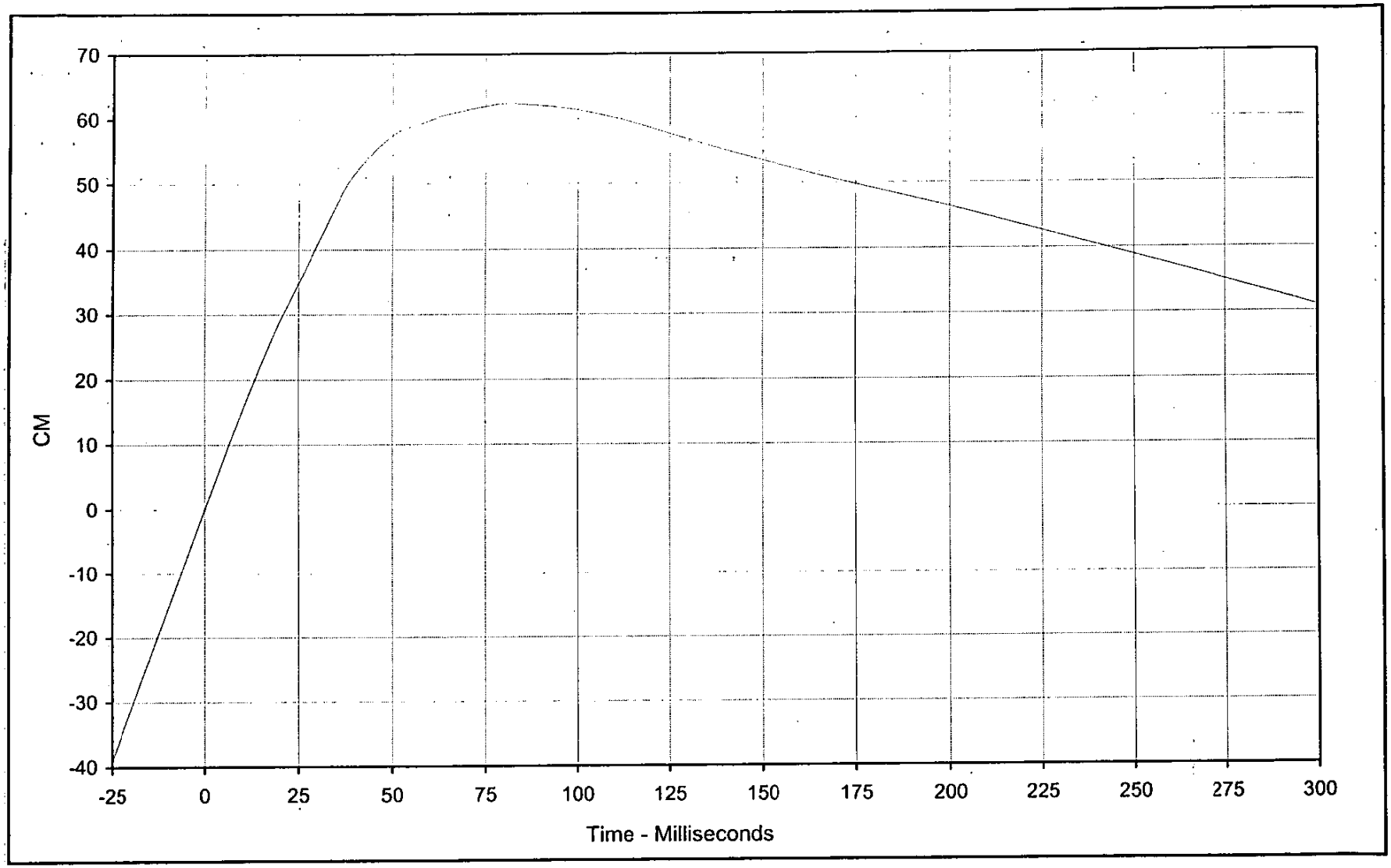
Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description:	Vehicle Instrument Panel Velocity			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	56.3	at	0.0 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-6.7	at	120.6 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	IN1-095				

KARCO Engineering



Curve Description: Vehicle Instrument Panel Displacement

Maximum Value: 62.4 at 81.8 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

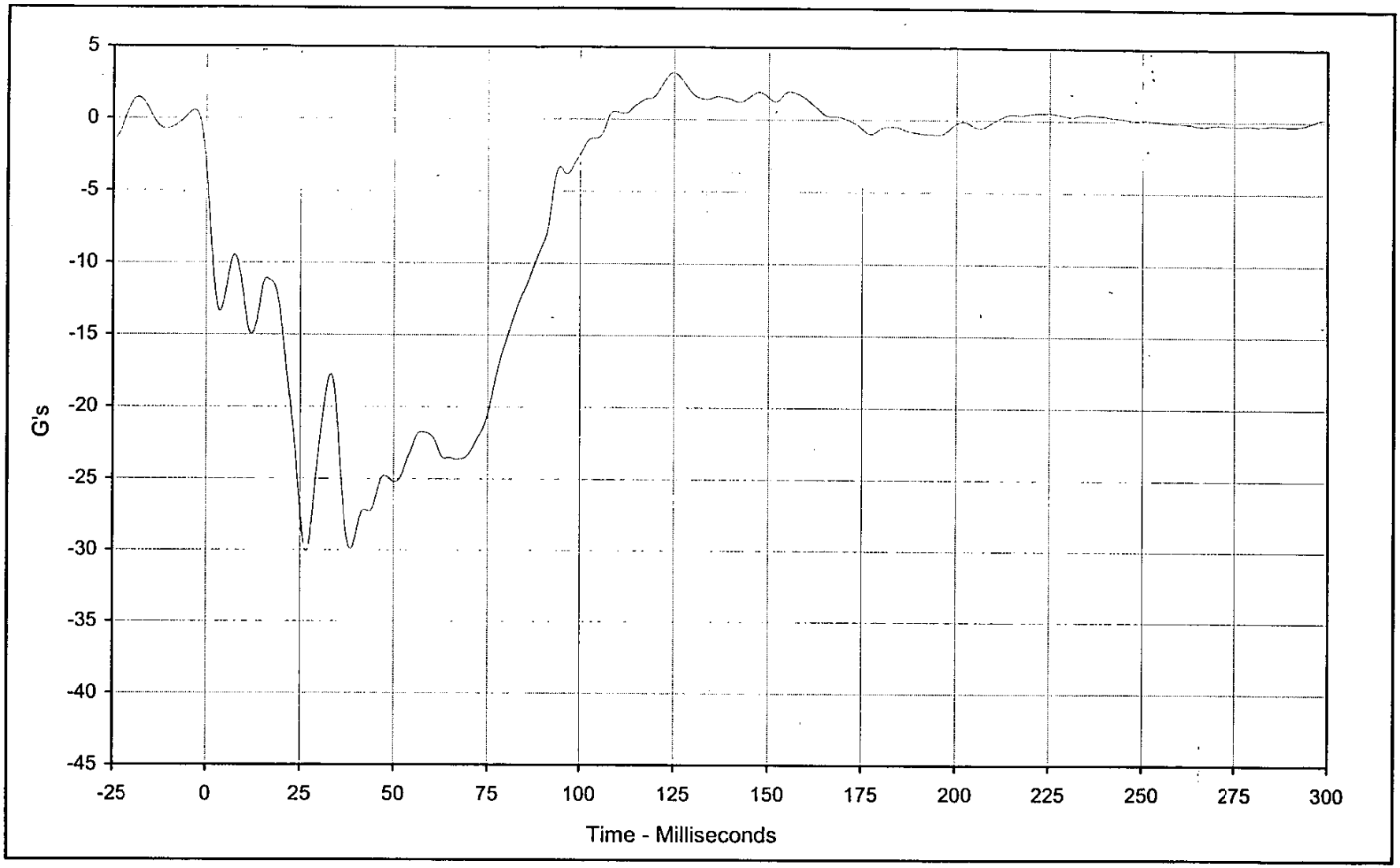
Date of Test: 12/16/99

Curve Number: IN2-095

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

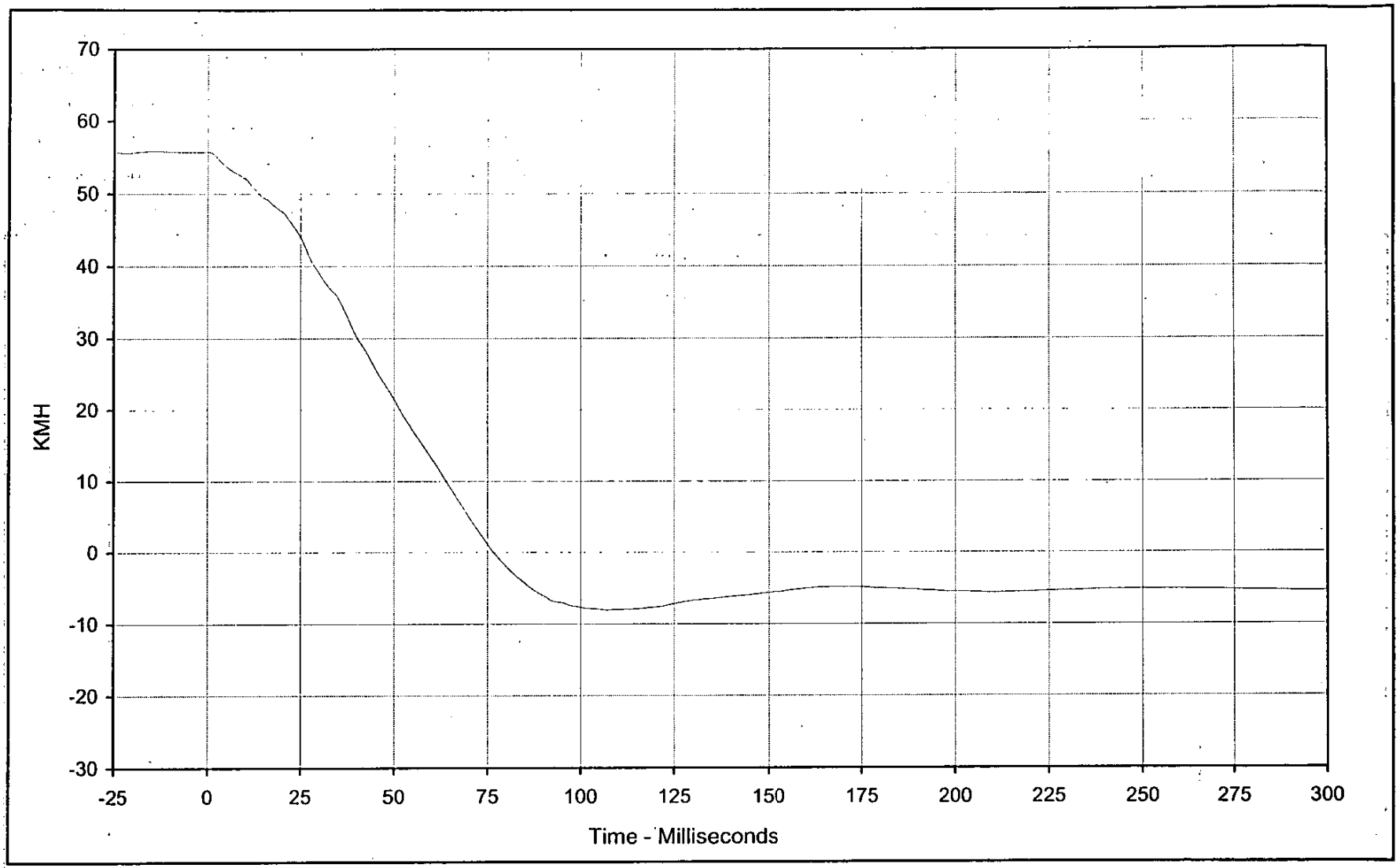
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



Curve Description:	Vehicle Left Rear Redundant			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	3.2	at	124.7 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-30.1	at	26.5 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-096				

KARC Engineering



Curve Description: Vehicle Left Rear Redundant Velocity

Maximum Value: 55.7 at 0.0 Milliseconds

Minimum Value: -8.1 at 107.0 Milliseconds

SAE Filter Class: 180

Date of Test: 12/16/99

Curve Number: IN1-096

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

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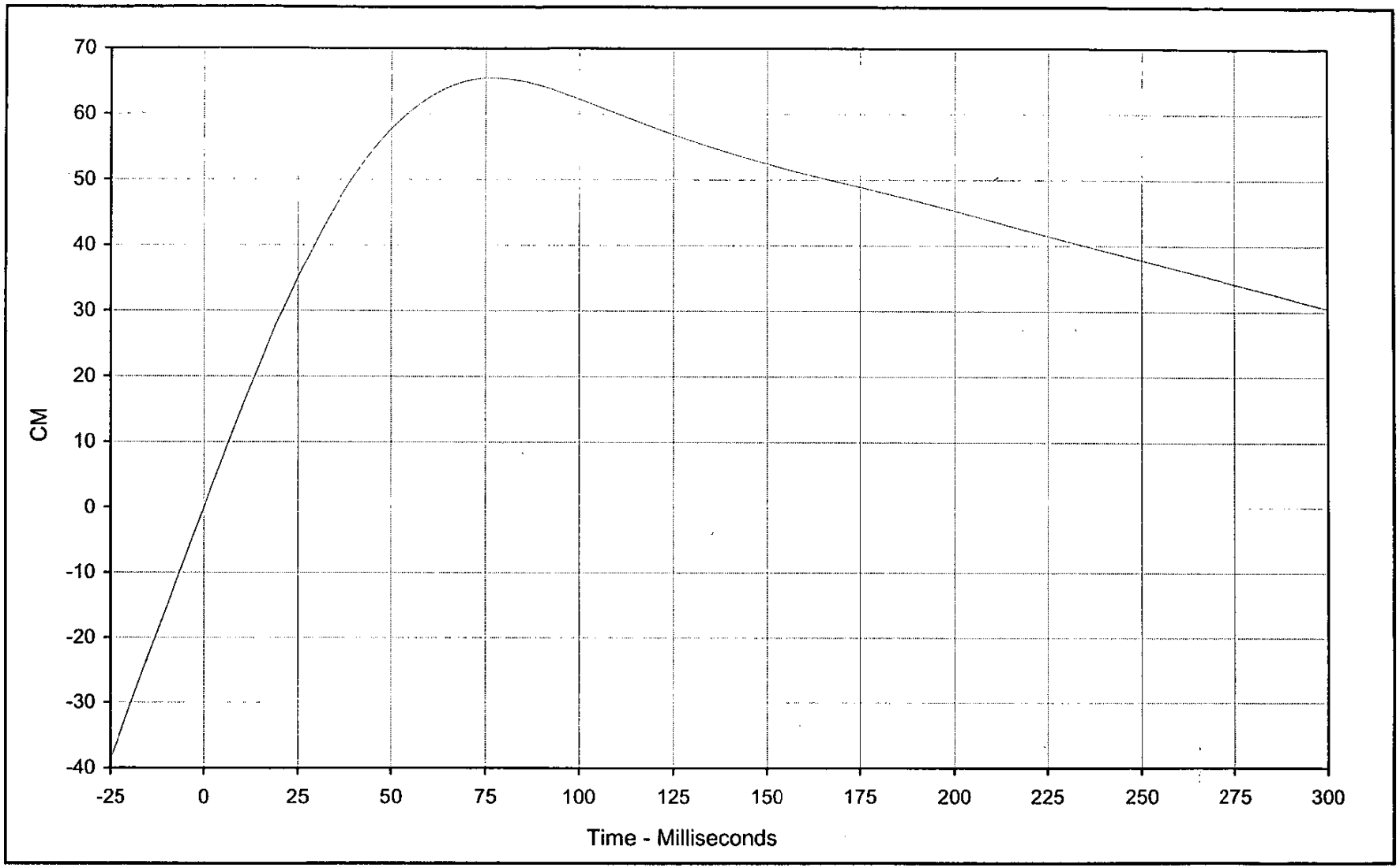

Curve Description:	Vehicle Left Rear Redundant Displ.			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	65.5	at	76.6 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	0.0	at	0.0 Milliseconds		
SAE Filter Class:	180				
Date of Test:	12/16/99				
Curve Number:	IN2-096				

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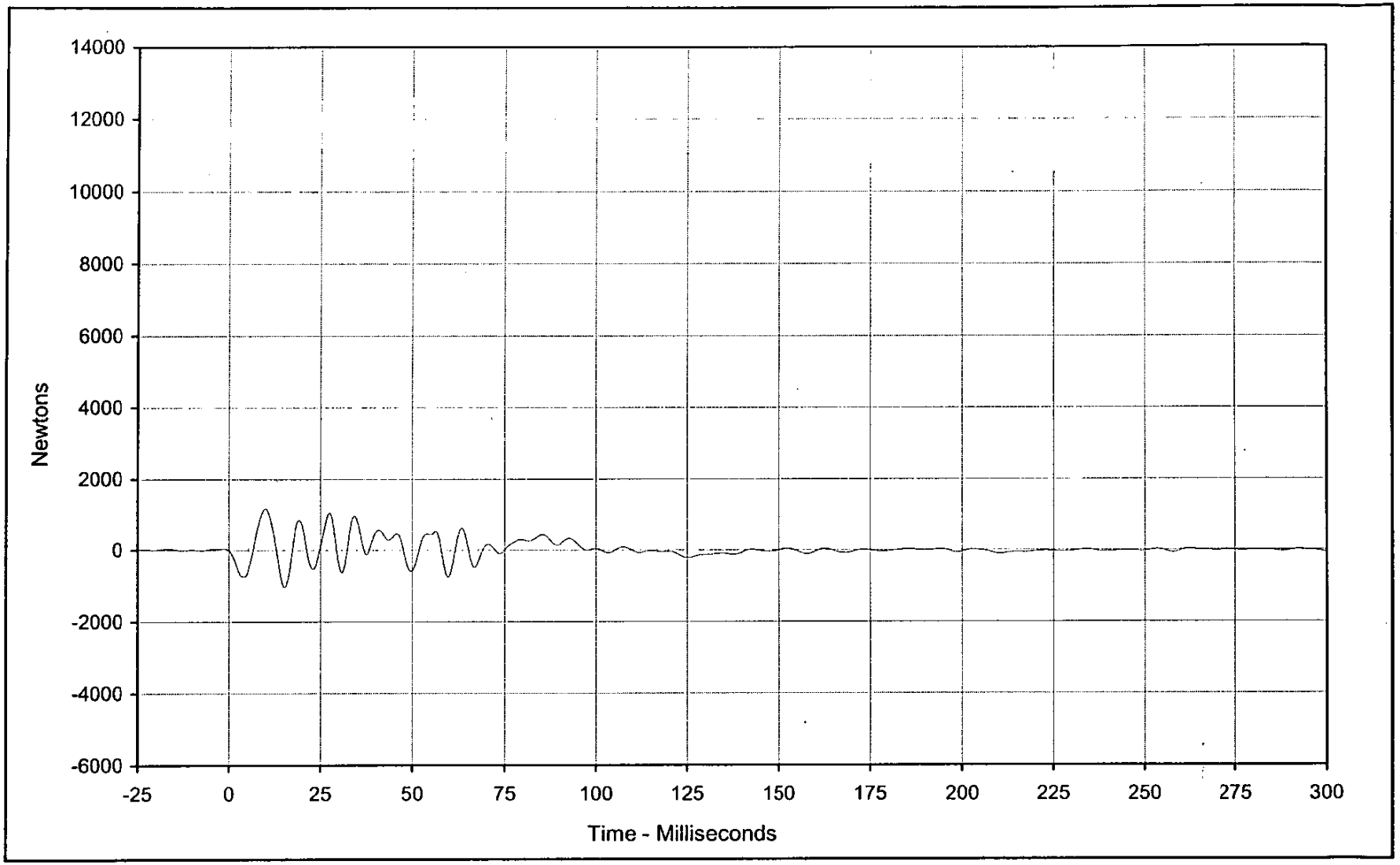
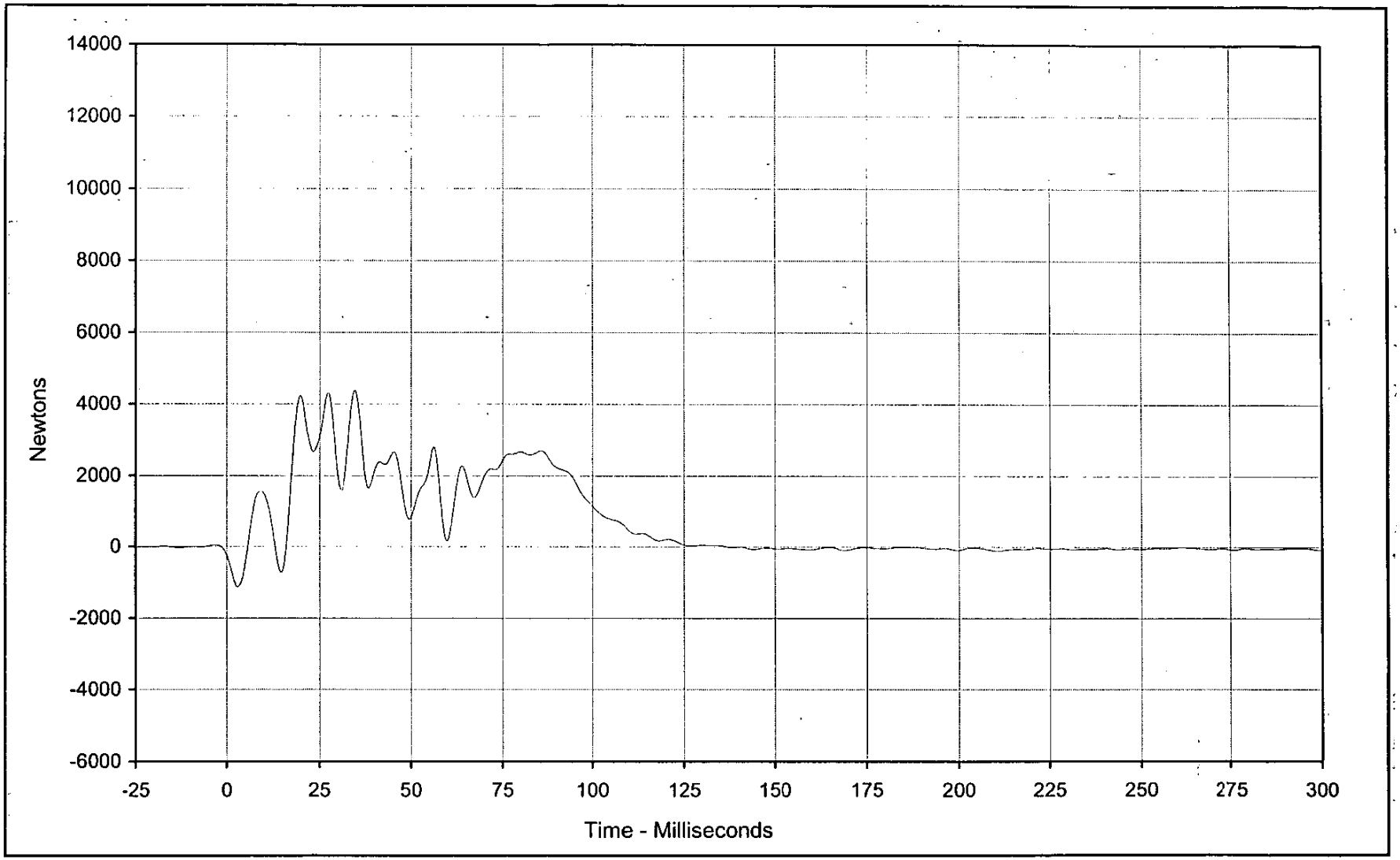
APPENDIX C

LOAD CELL BARRIER INFORMATION



Curve Description:	Barrier Force A2			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	1170.9	at	10.0 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-1033.9	at	15.1 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-099				

KARCO Engineering



Curve Description:	Barrier Force A3				Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	4373.2	at	34.7	Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-1130.5	at	2.8	Milliseconds		
SAE Filter Class:	60					
Date of Test:	12/16/99					
Curve Number:	FIL-100					

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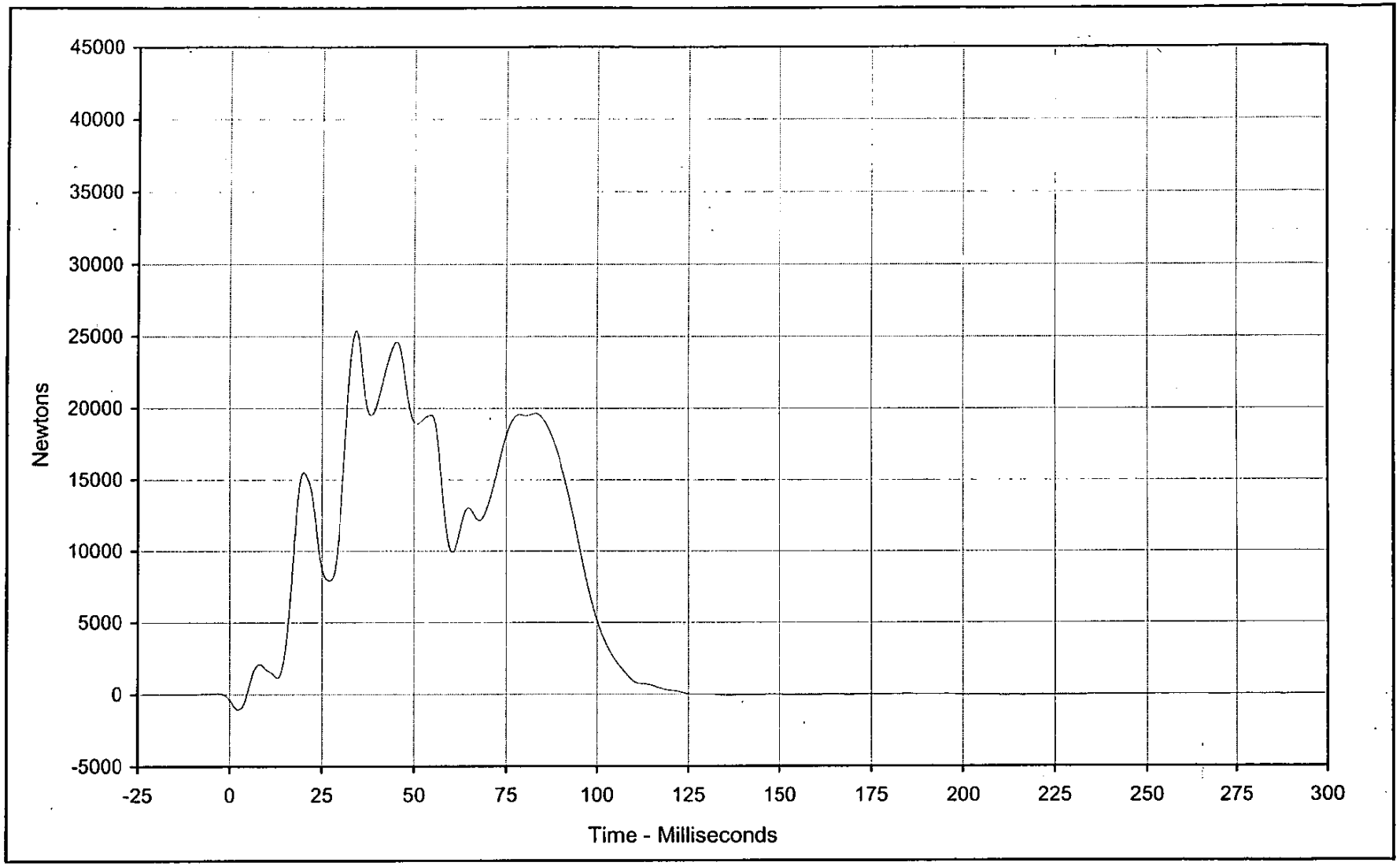
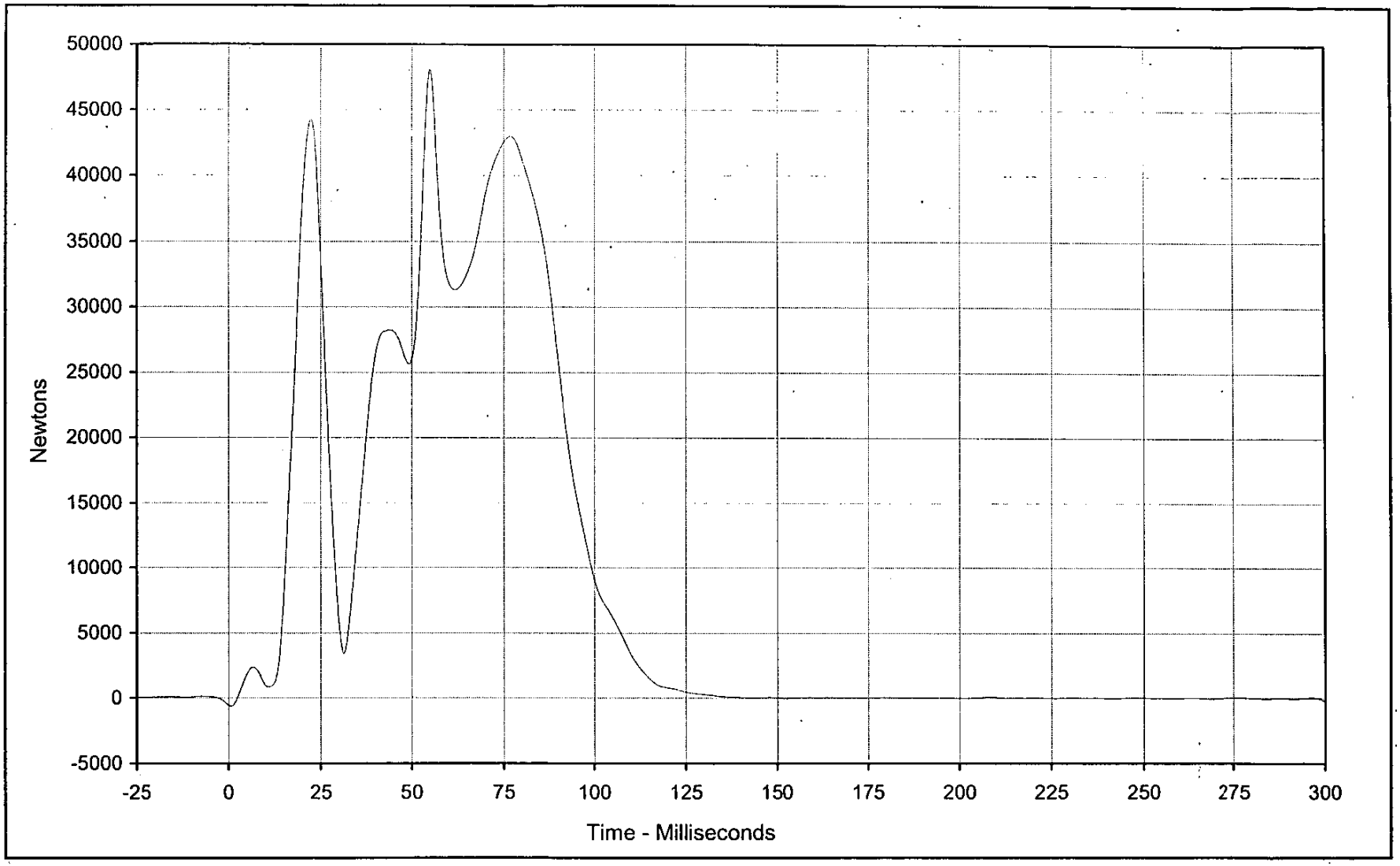


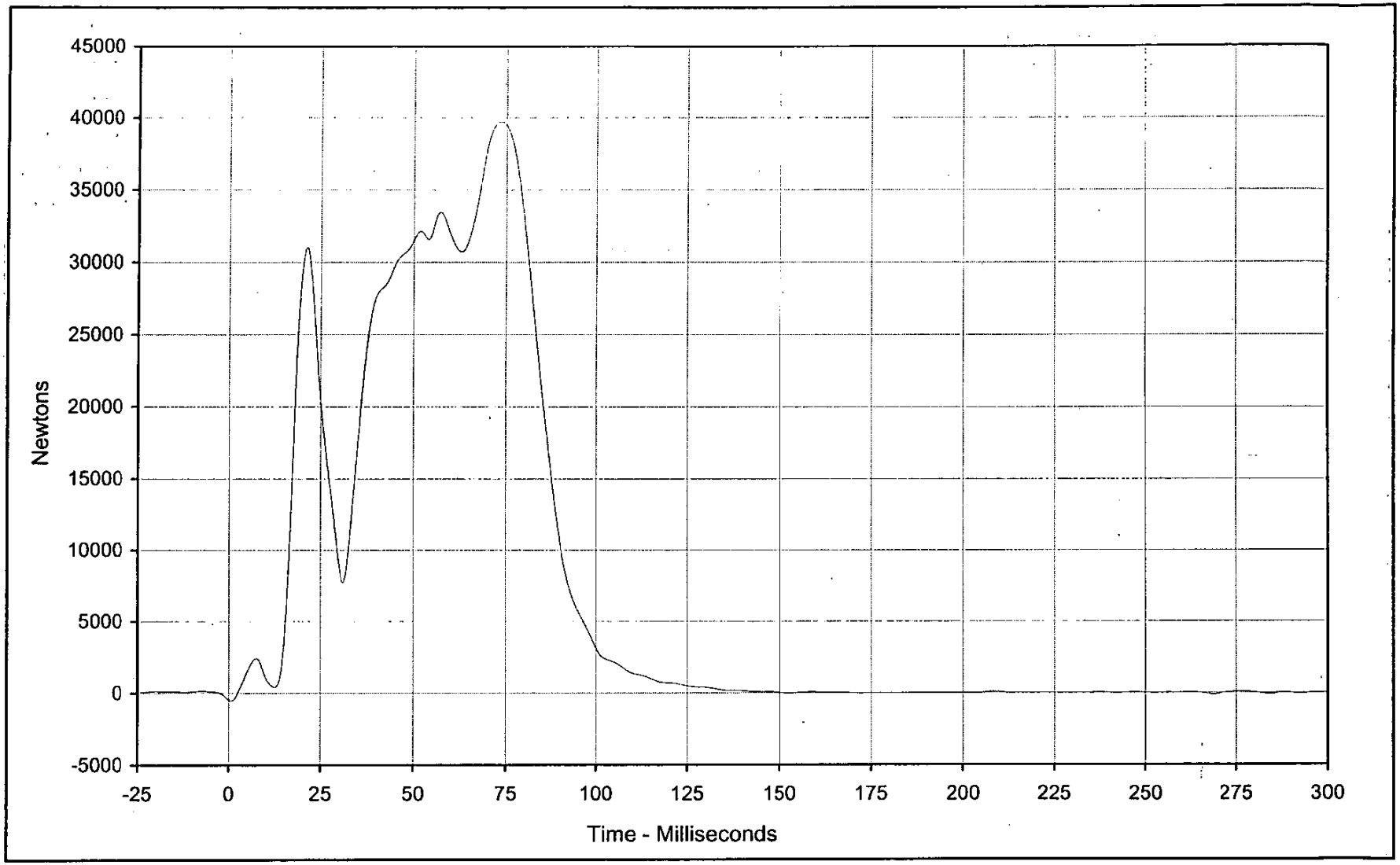
Curve Description:	Barrier Force A4			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	25388.0	at	34.5 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-1066.5	at	2.3 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-101				

KARCO Engineering



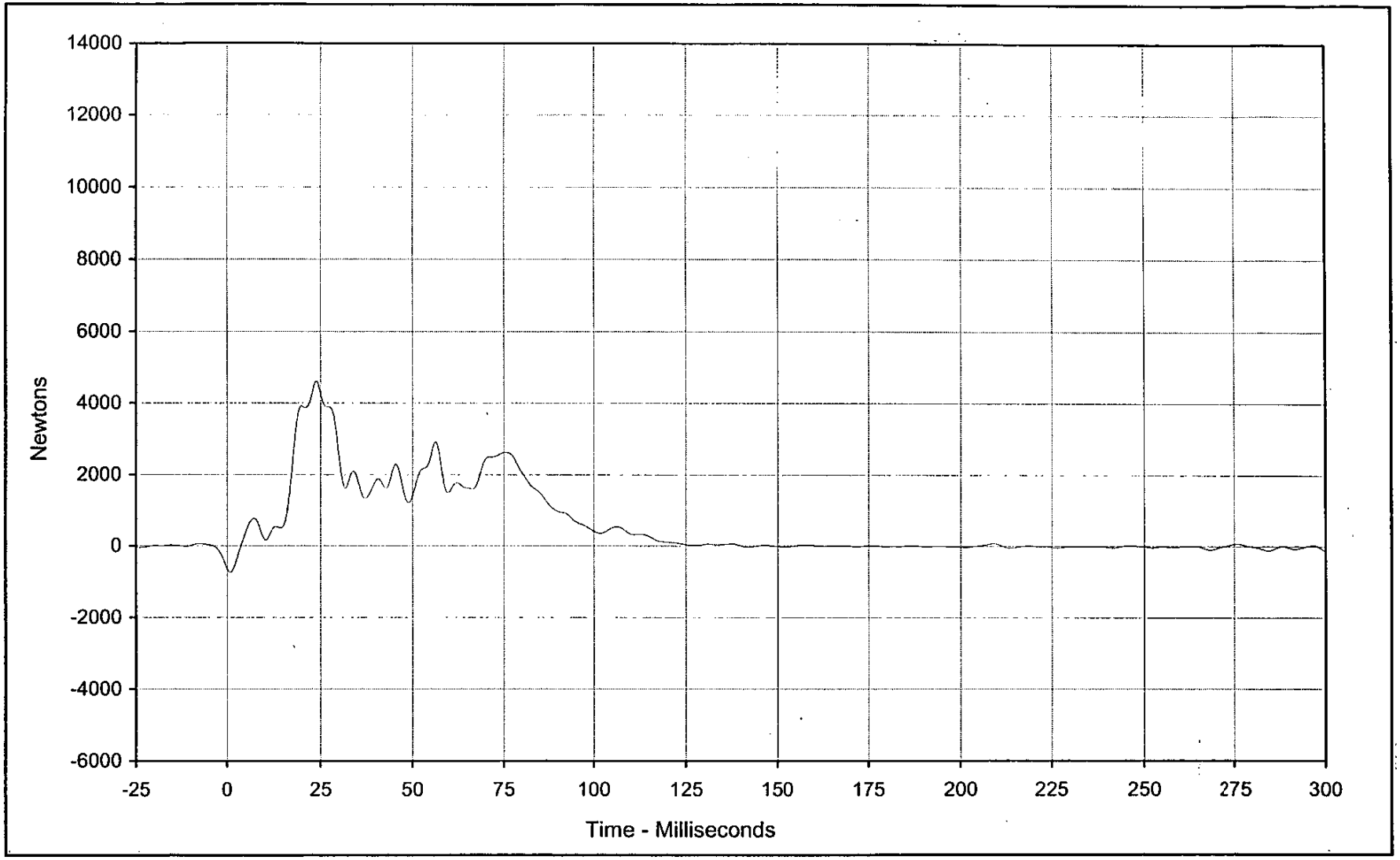
Curve Description:	Barrier Force A5			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	48068.4	at	54.9 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-637.6	at	0.7 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-102				

KARCO Engineering



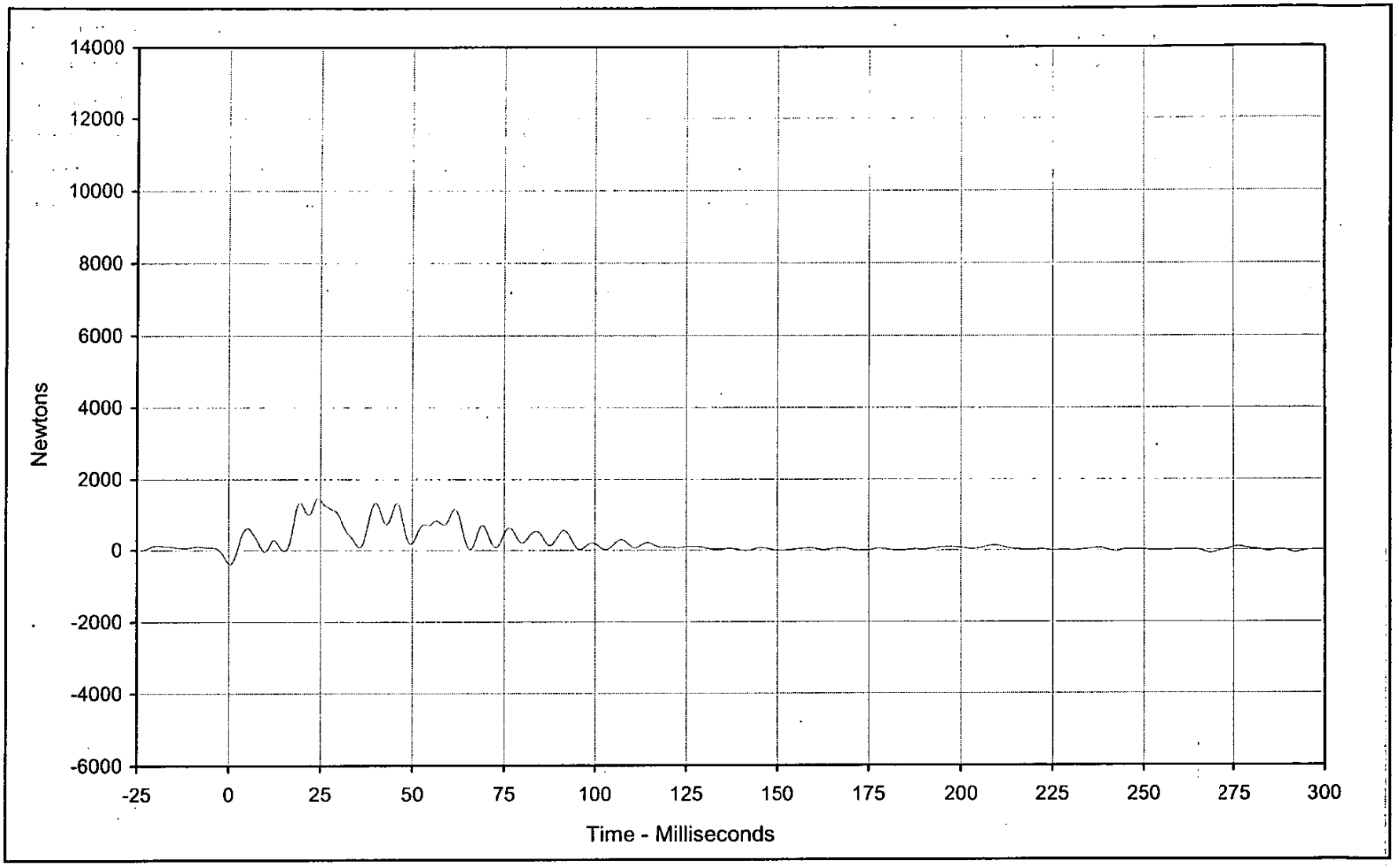
Curve Description:	Barrier Force A6			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	39731.1	at	73.4	Milliseconds	Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-544.0	at	0.6	Milliseconds	
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-103				

KARCO Engineering



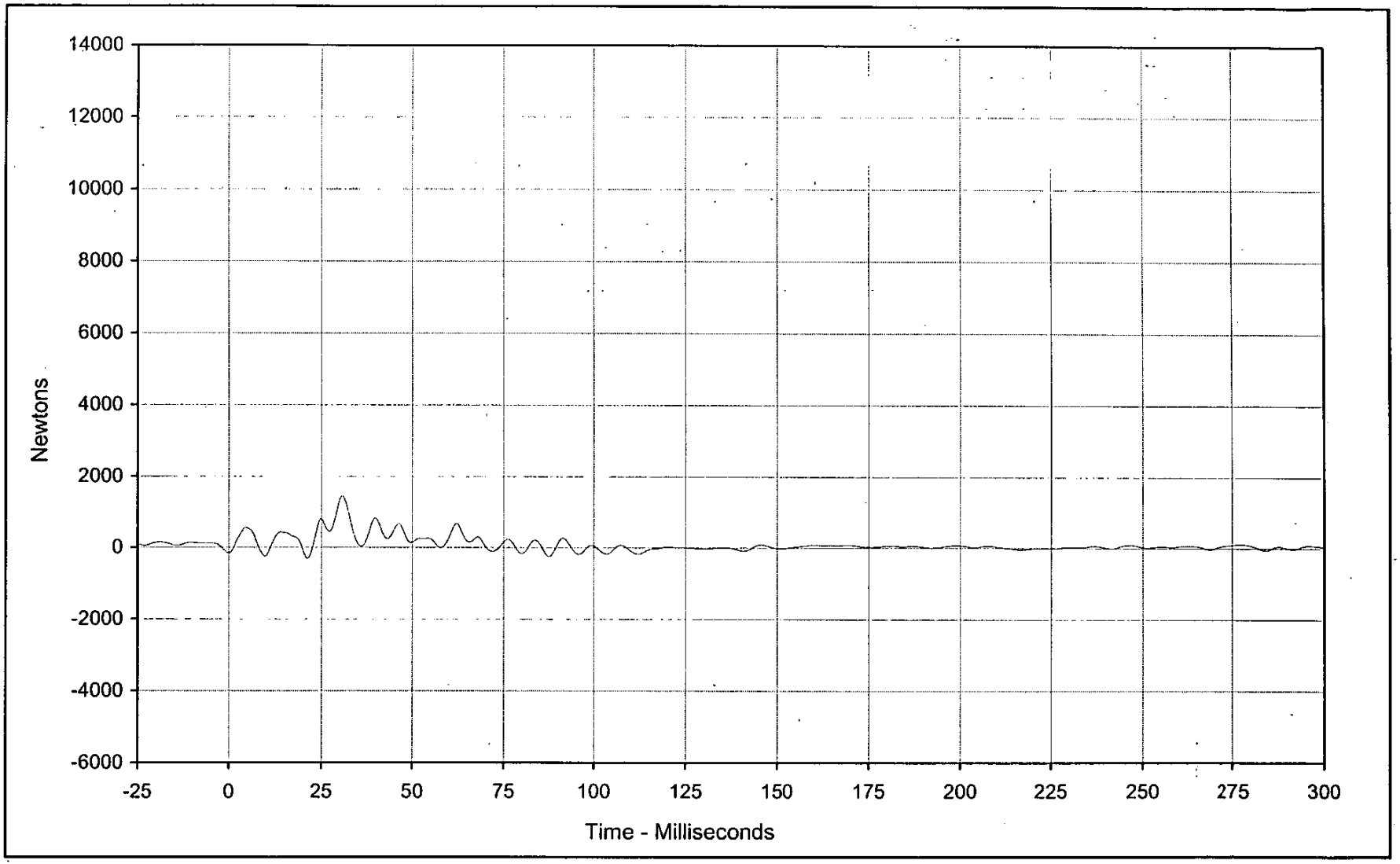
Curve Description:	Barrier Force A7			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	4615.5	at	23.8 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-741.1	at	0.8 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-104				

KARC Engineering



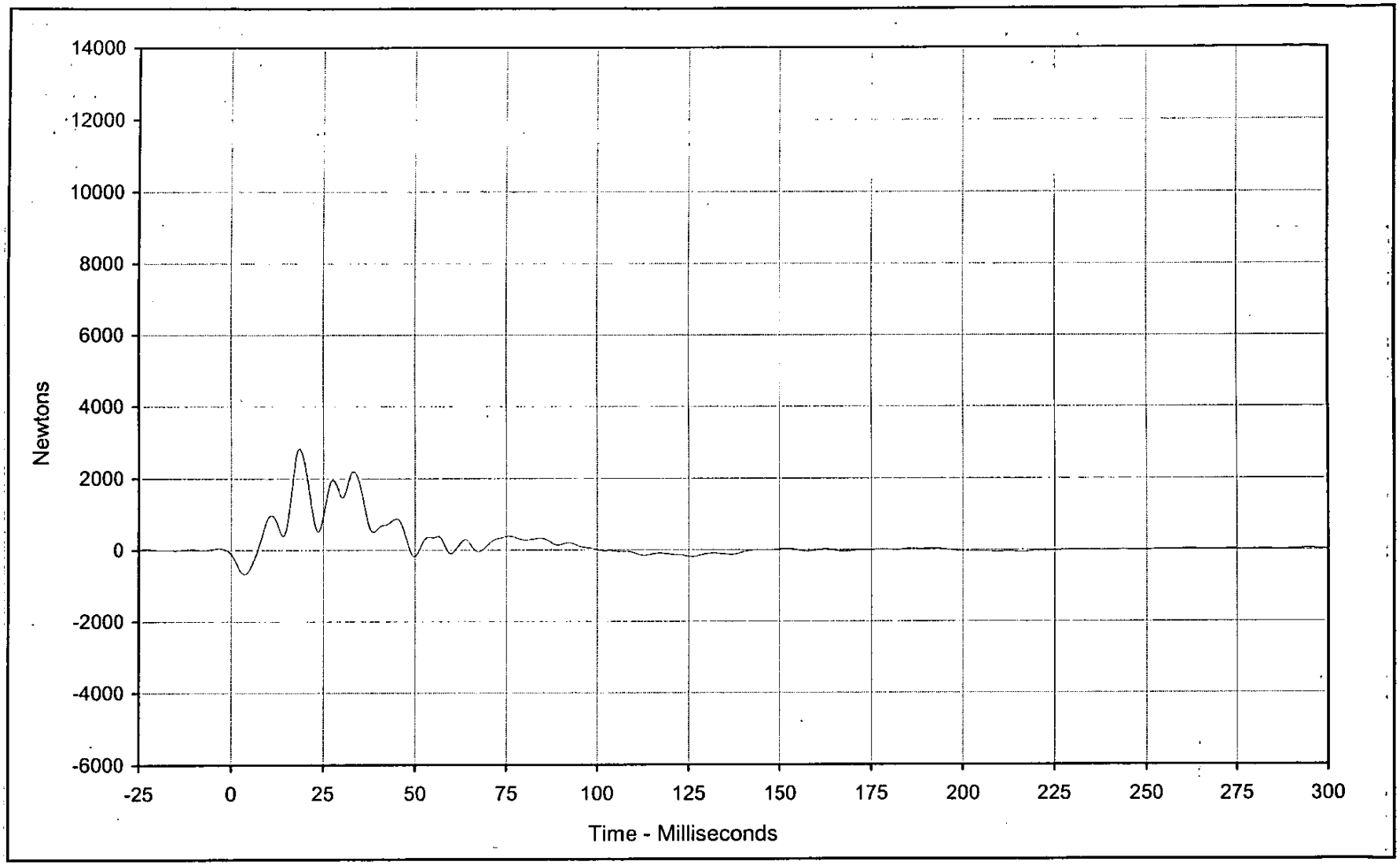
Curve Description:	Barrier Force A8			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	1466.8	at	24.3 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-396.4	at	0.4 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-105				

KARCO Engineering



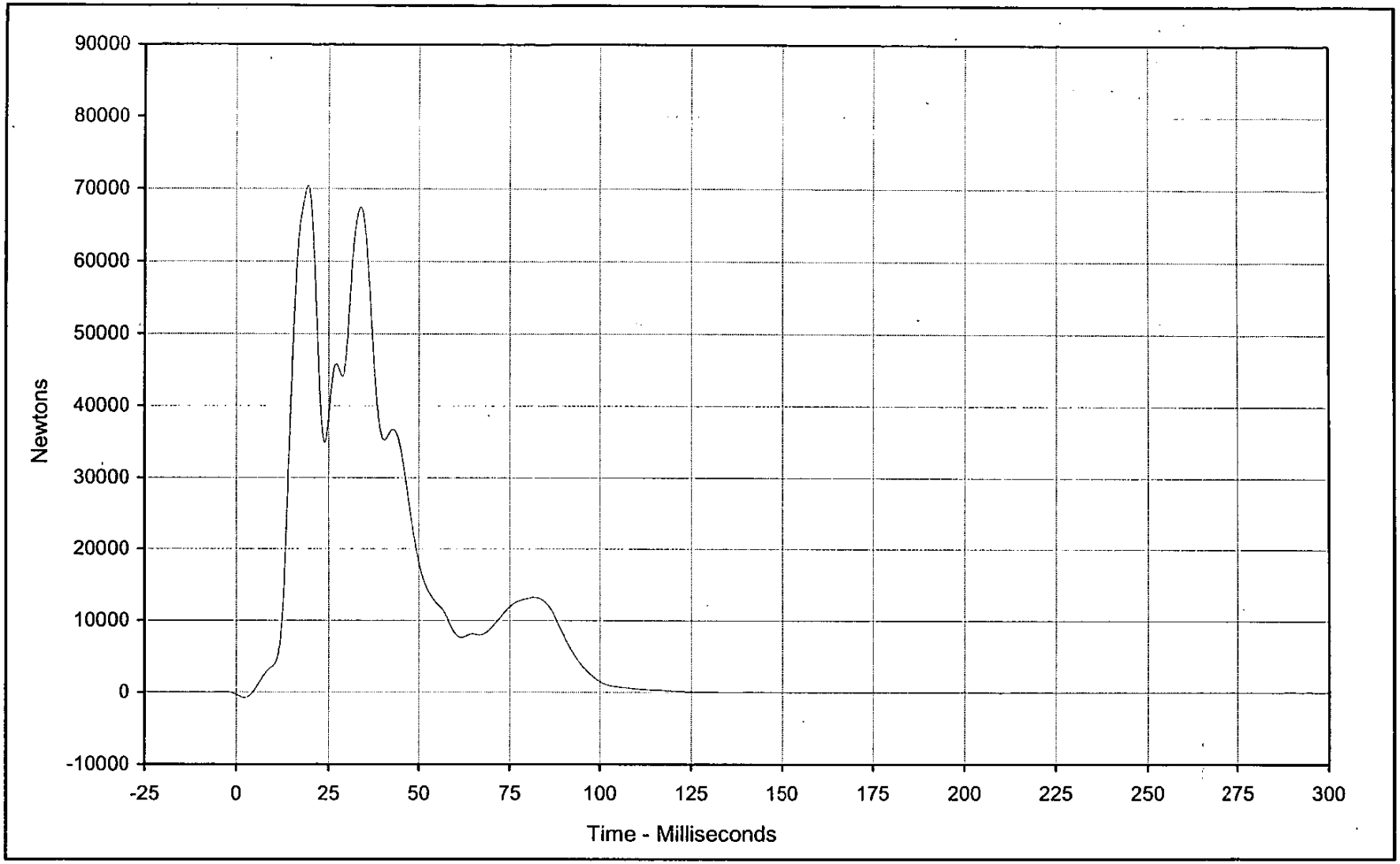
Curve Description:	Barrier Force A9			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	1452.4	at	30.7 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-306.8	at	21.2 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-106				

KARCO Engineering



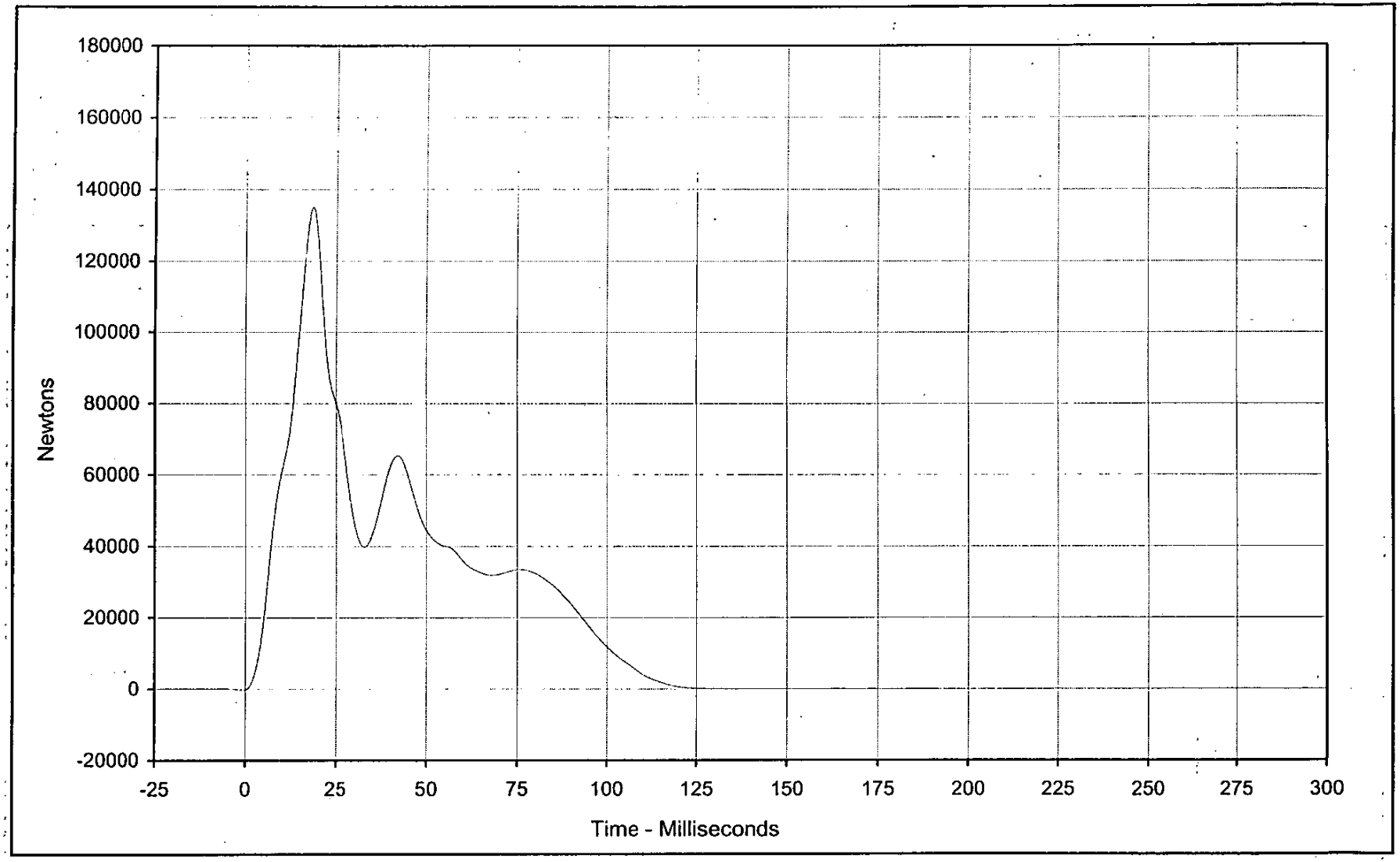
Curve Description:	Barrier Force B2			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	2814.0	at	18.6 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-672.3	at	3.8 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-108				

KARCO Engineering



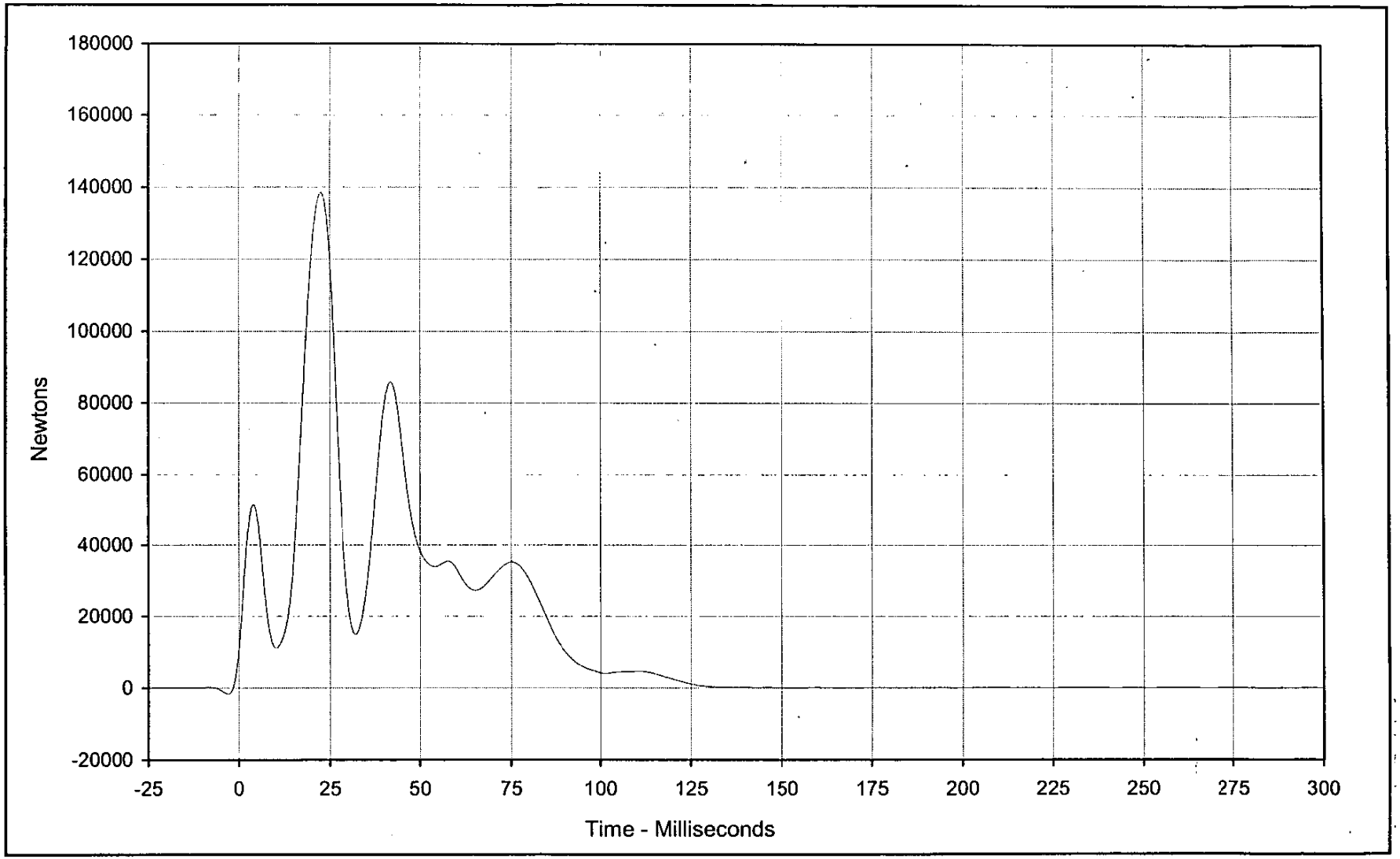
Curve Description:	Barrier Force B3			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	70387.0	at	19.4 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-784.2	at	2.1 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-109				

KARCO Engineering



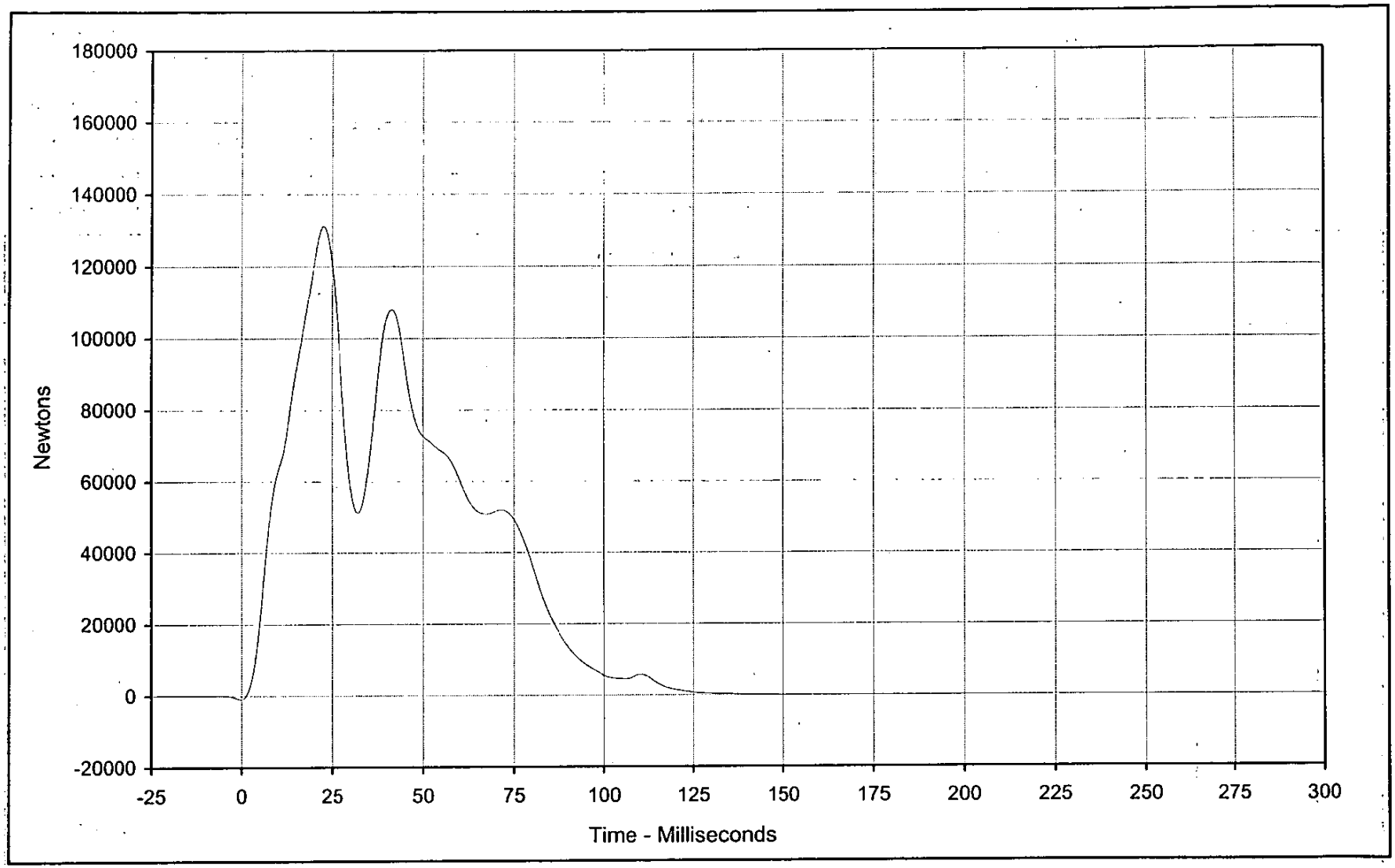
Curve Description:	Barrier Force B4			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	135083.2	at	18.5 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-289.7	at	0.0 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-110				

KARCO Engineering



Curve Description:	Barrier Force B5			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	138477.1	at	22.5 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-83.9	at	284.7 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-111				

KARCO Engineering

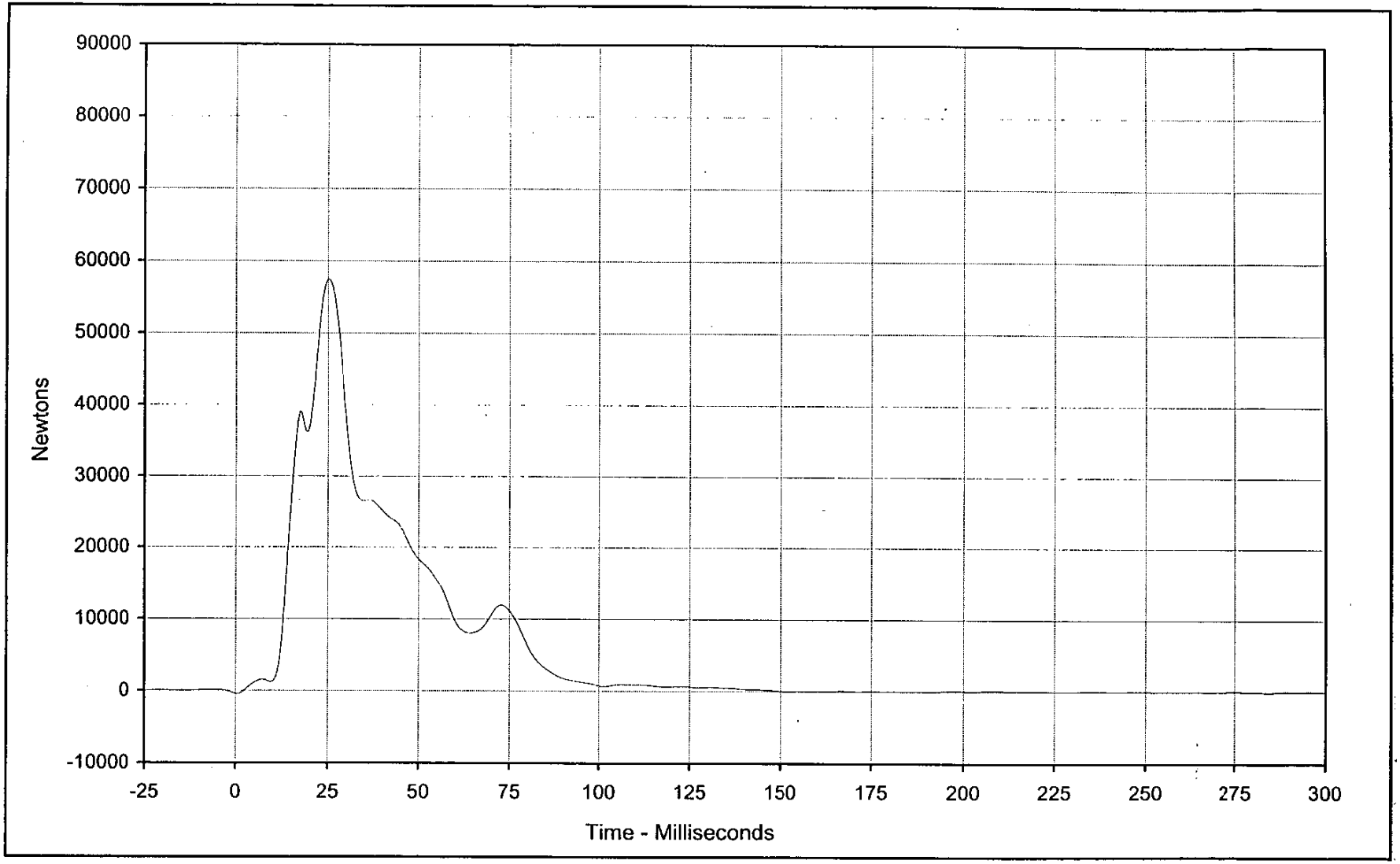


Curve Description:	Barrier Force B6			
Maximum Value:	131214.8	at	22.5	Milliseconds
Minimum Value:	-952.3	at	0.0	Milliseconds
SAE Filter Class:	60			
Date of Test:	12/16/99			
Curve Number:	FIL-112			

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering

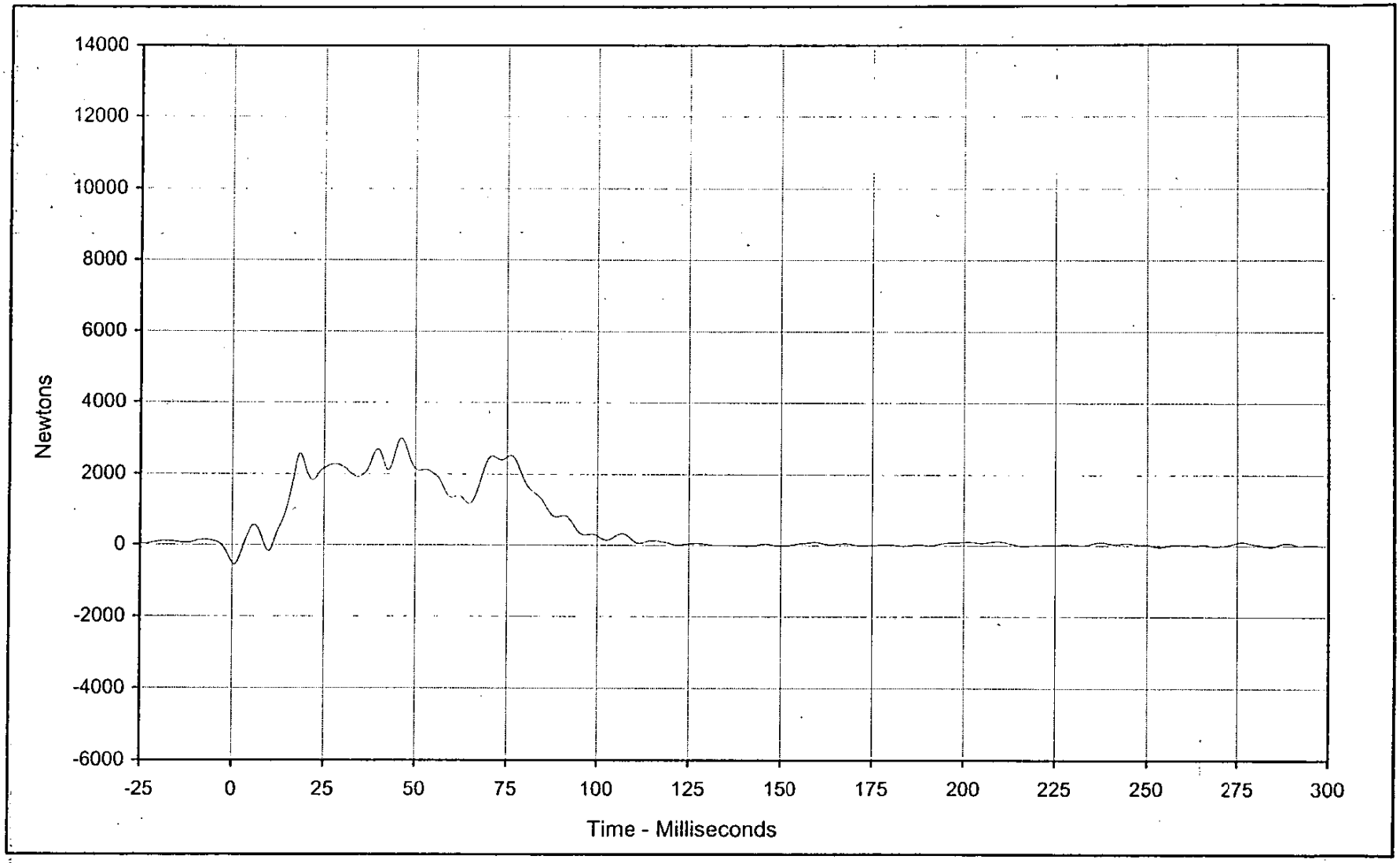


Curve Description:	Barrier Force B7			
Maximum Value:	57428.2	at	25.2	Milliseconds
Minimum Value:	-486.4	at	0.4	Milliseconds
SAE Filter Class:	60			
Date of Test:	12/16/99			
Curve Number:	FIL-113			

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

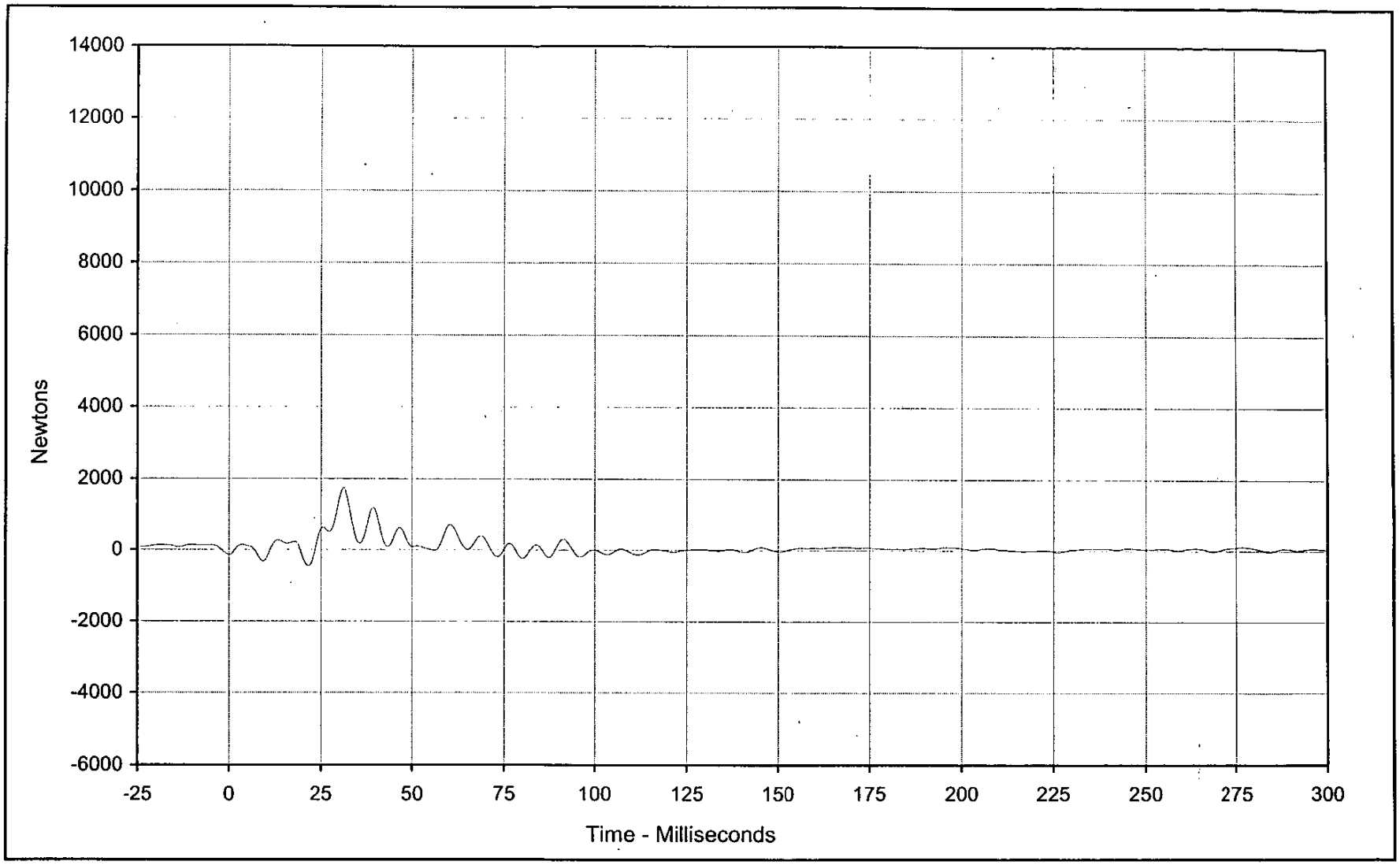
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



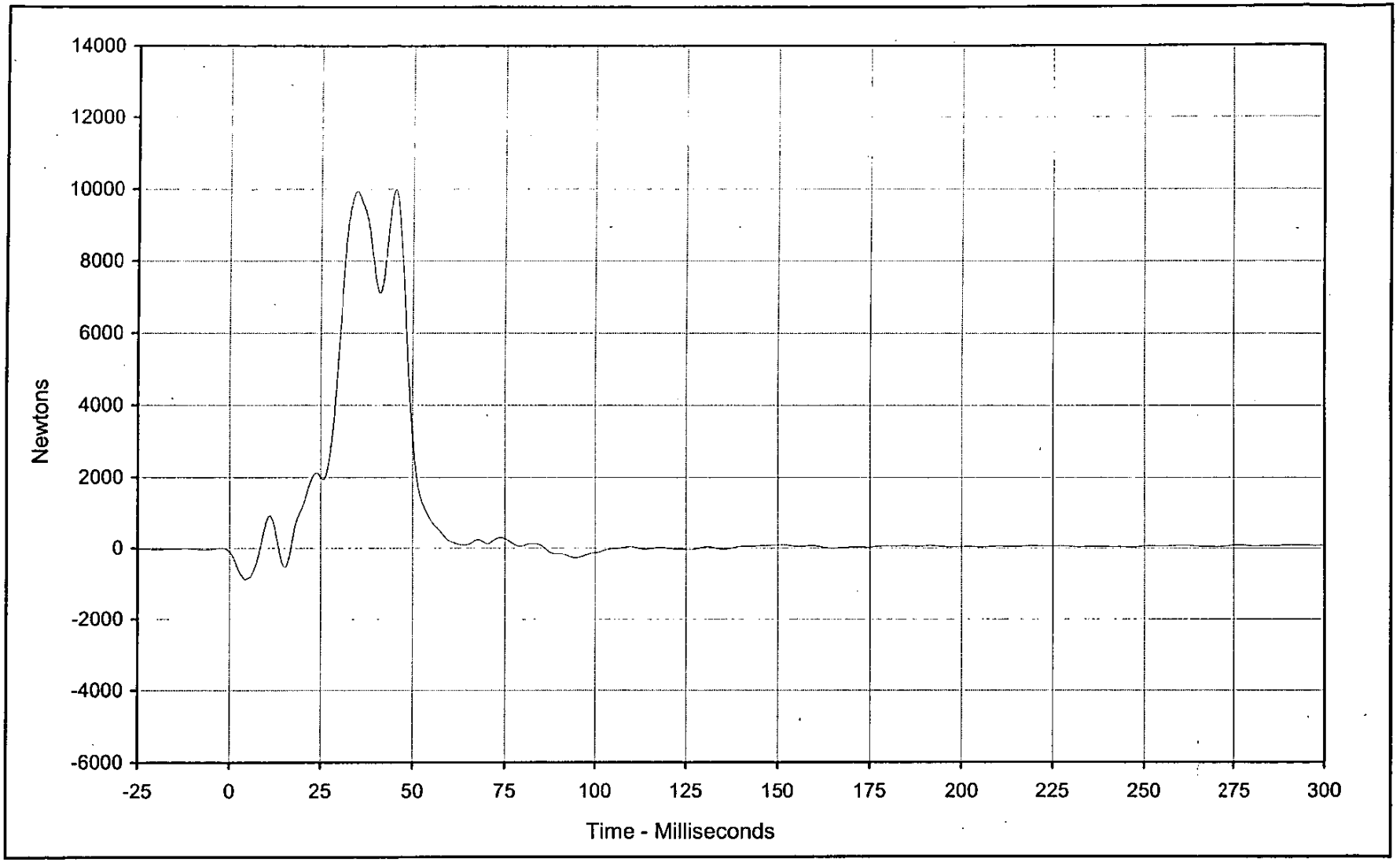
Curve Description:	Barrier Force B8			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	2990.2	at	46.0	Milliseconds	Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-555.0	at	0.5	Milliseconds	
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-114				

KARCO Engineering



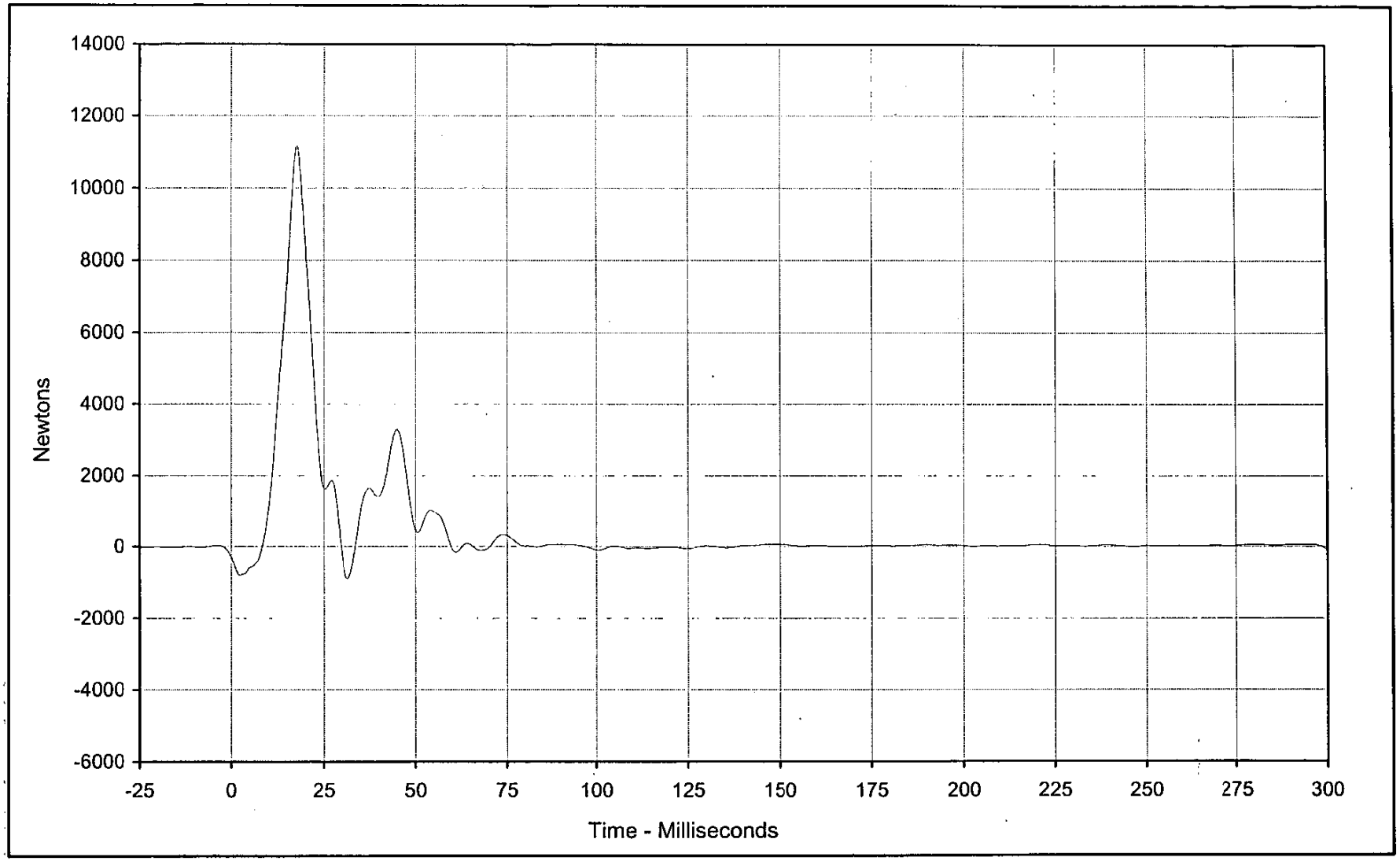
Curve Description:	Barrier Force B9			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	1747.1	at	31.2 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-455.6	at	21.5 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-115				

KARCO Engineering



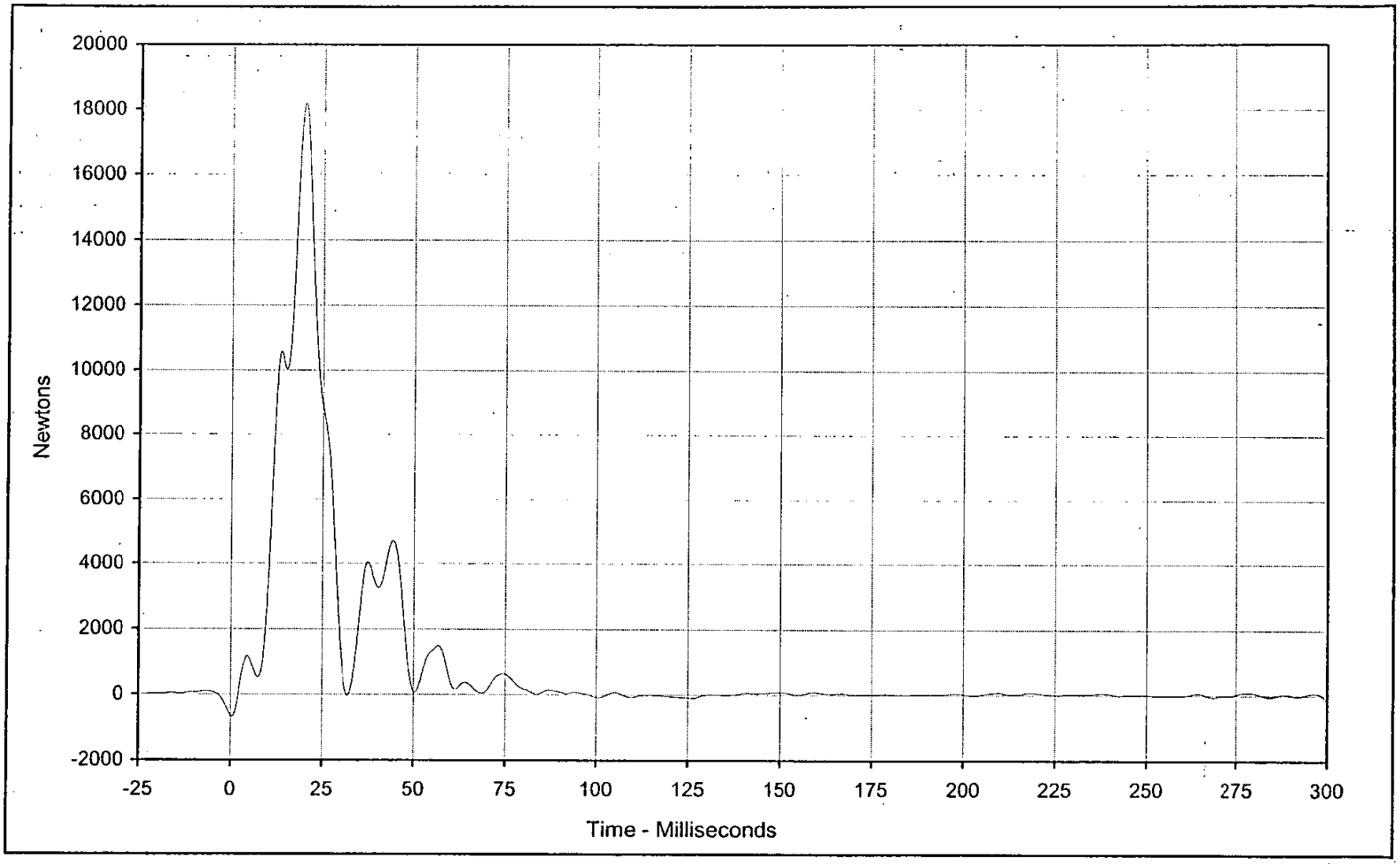
Curve Description:	Barrier Force C2			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	9978.2	at	45.1	Milliseconds	Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-879.6	at	4.3	Milliseconds	
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-117				

KARCO Engineering



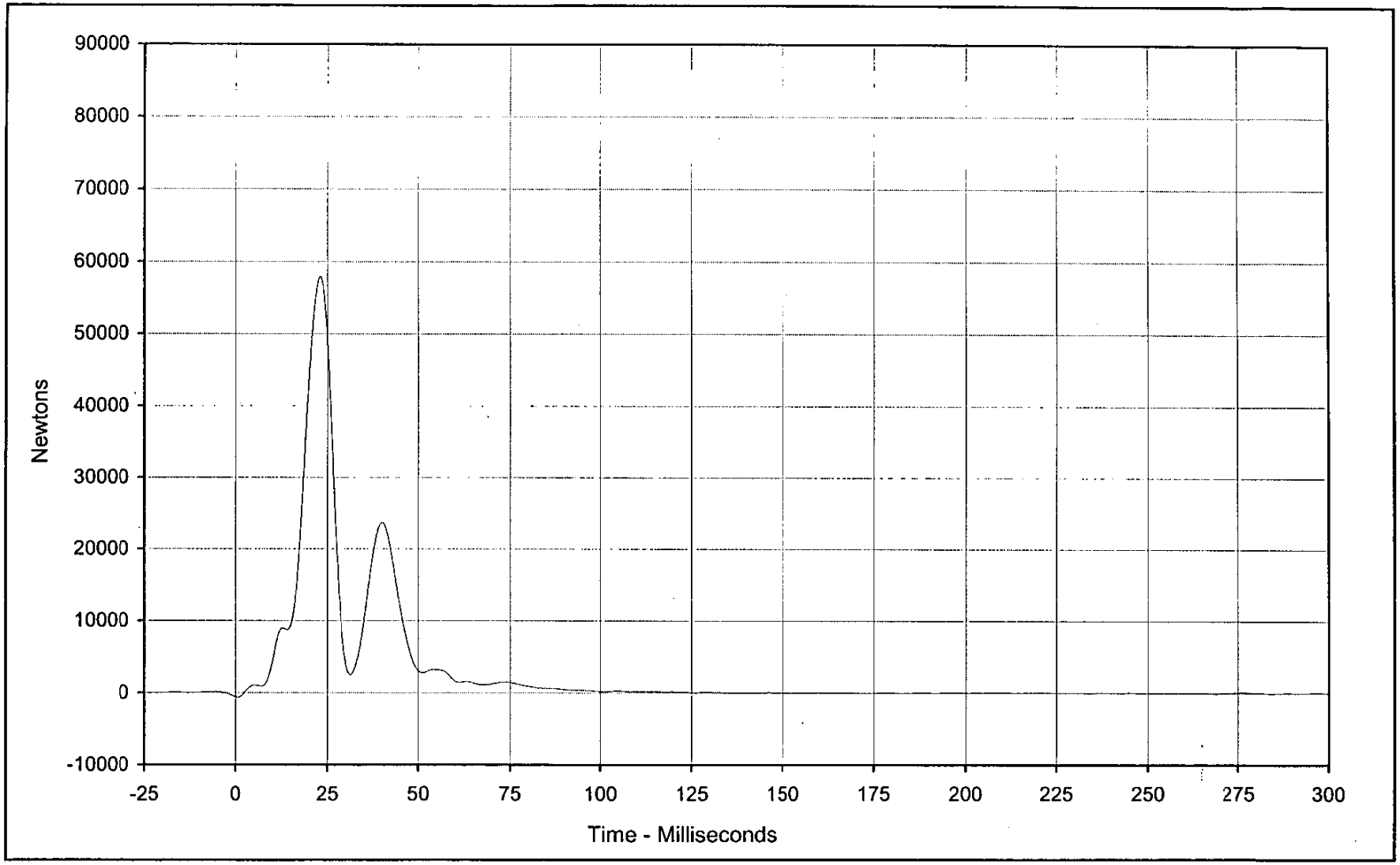
Curve Description:	Barrier Force C3			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	11164.3	at	17.7 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-895.9	at	31.4 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-118				

KARCO Engineering



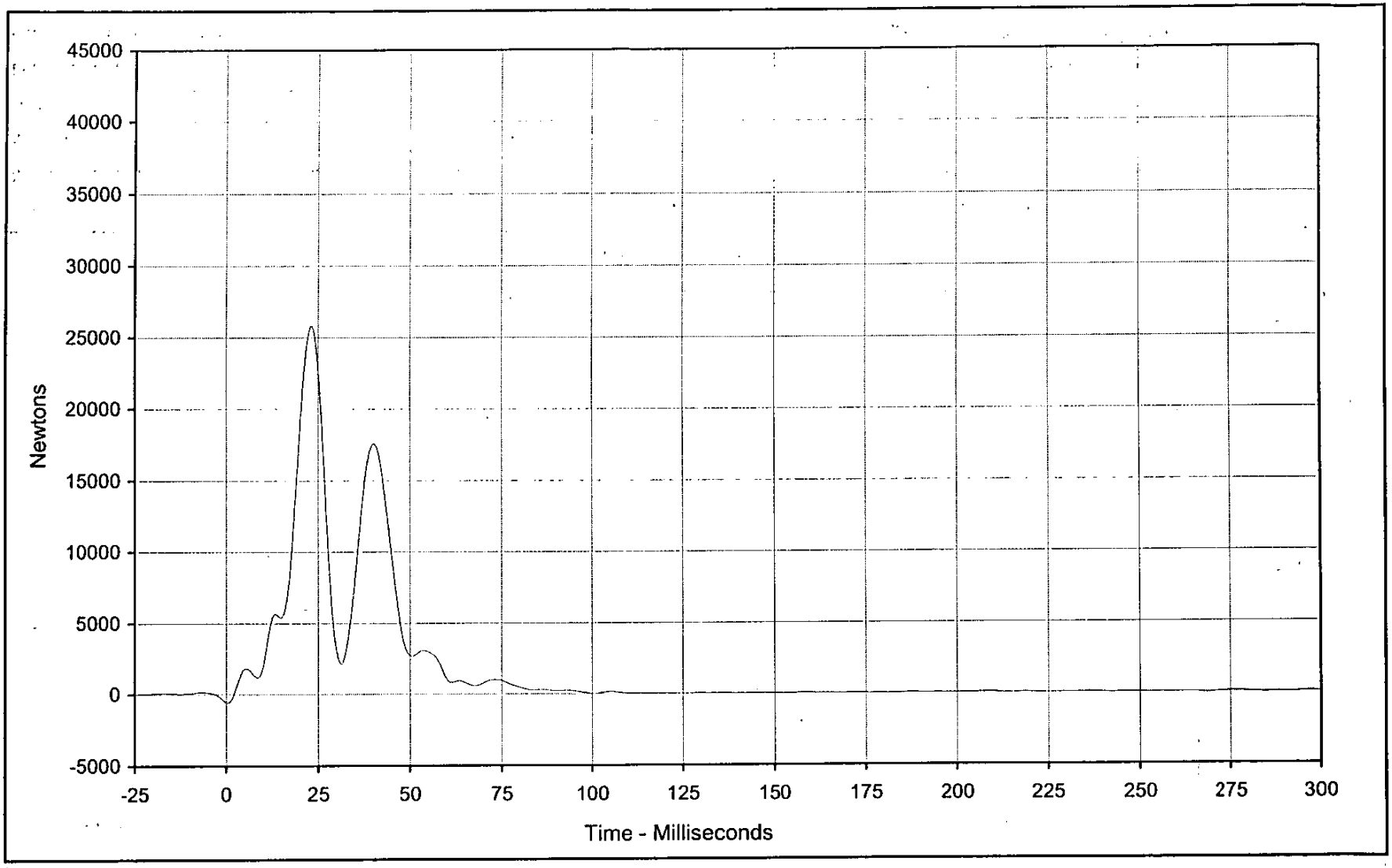
Curve Description:	Barrier Force C4			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	18185.0	at	19.9 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-680.0	at	0.4 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-119				

KARC Engineering



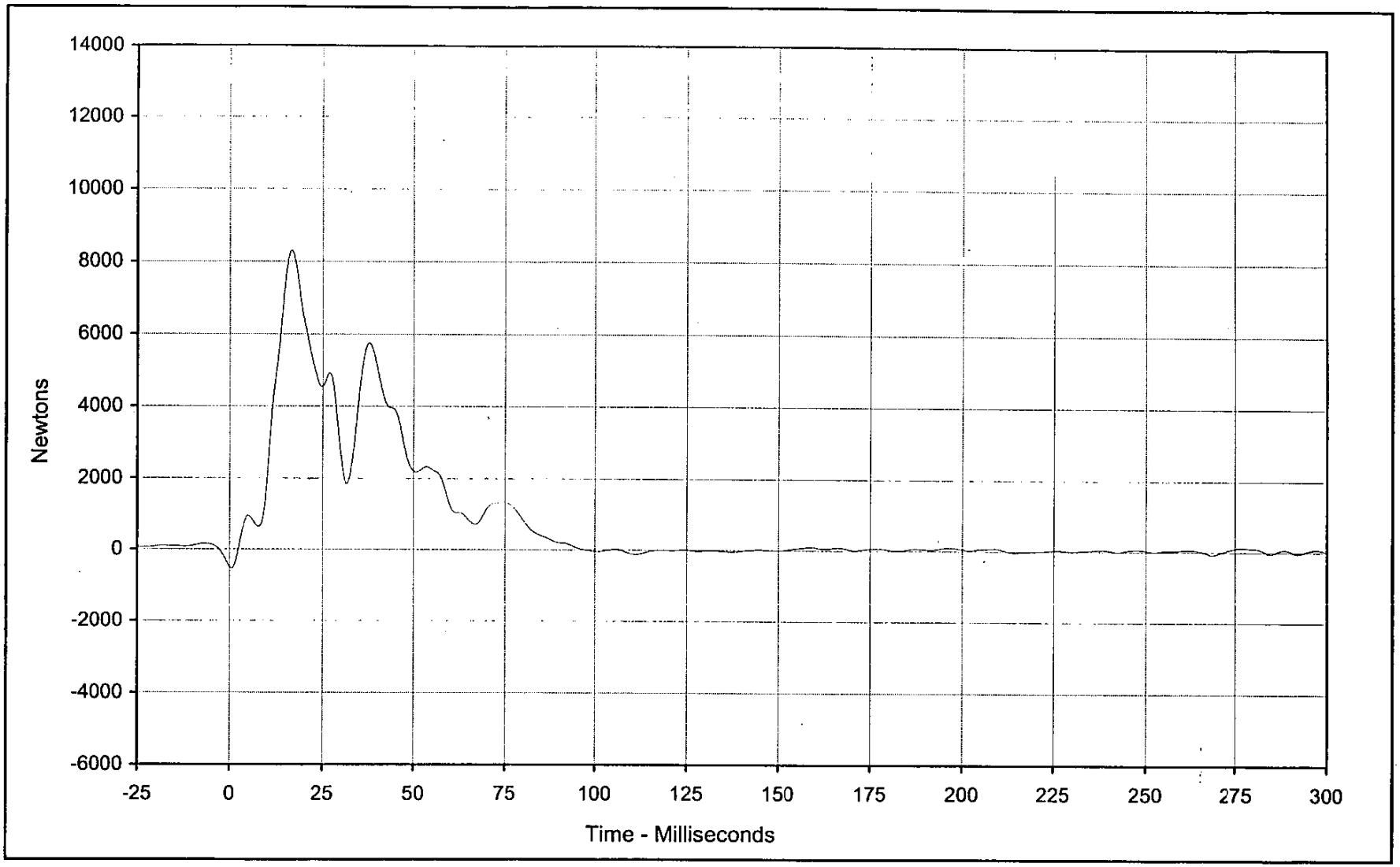
Curve Description:	Barrier Force C5			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	57933.5	at	23.0 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-655.5	at	0.5 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-120				

KARCO Engineering



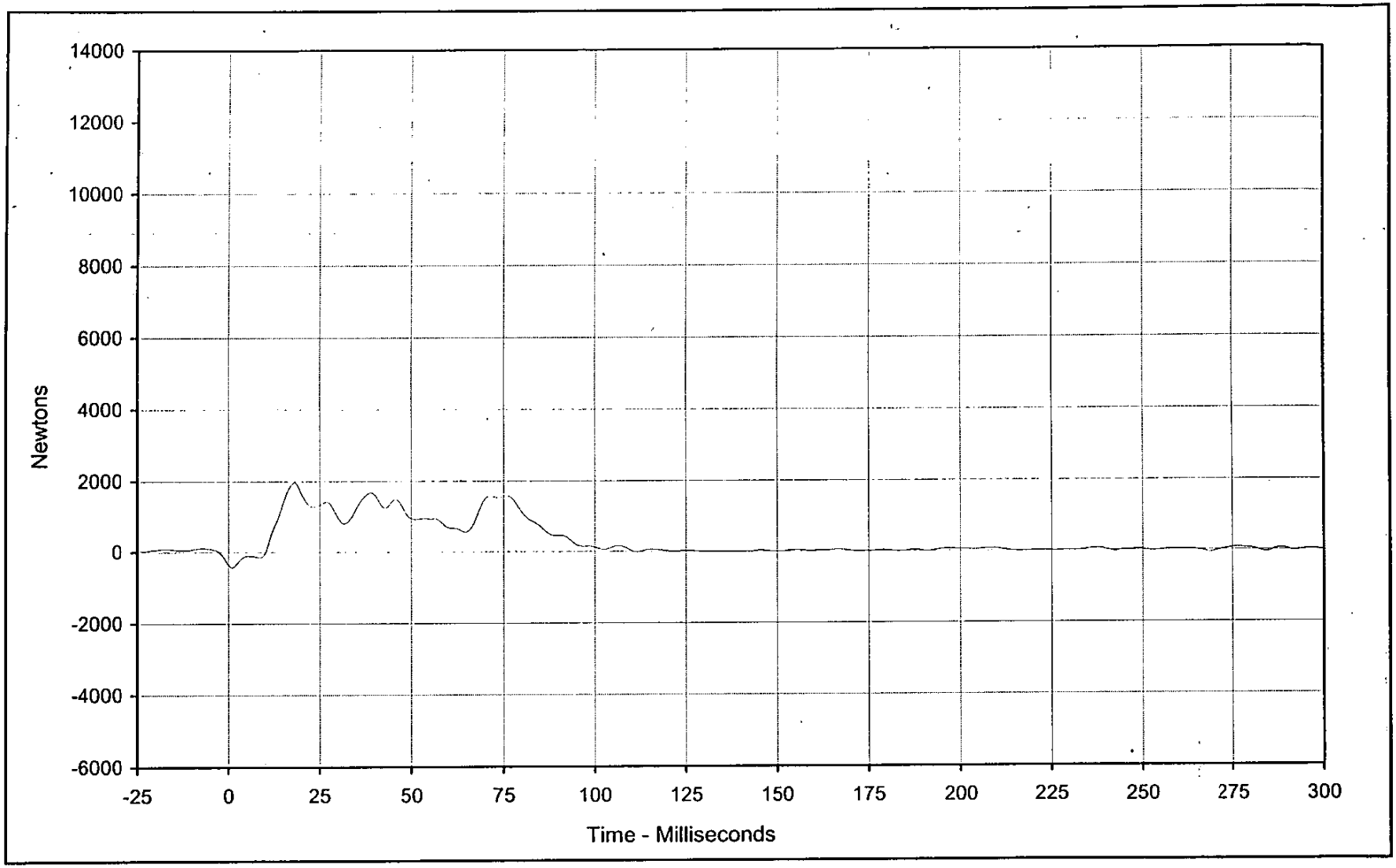
Curve Description:	Barrier Force C6			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	25800.7	at	23.1 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-592.2	at	0.4 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-121				

KARCO Engineering



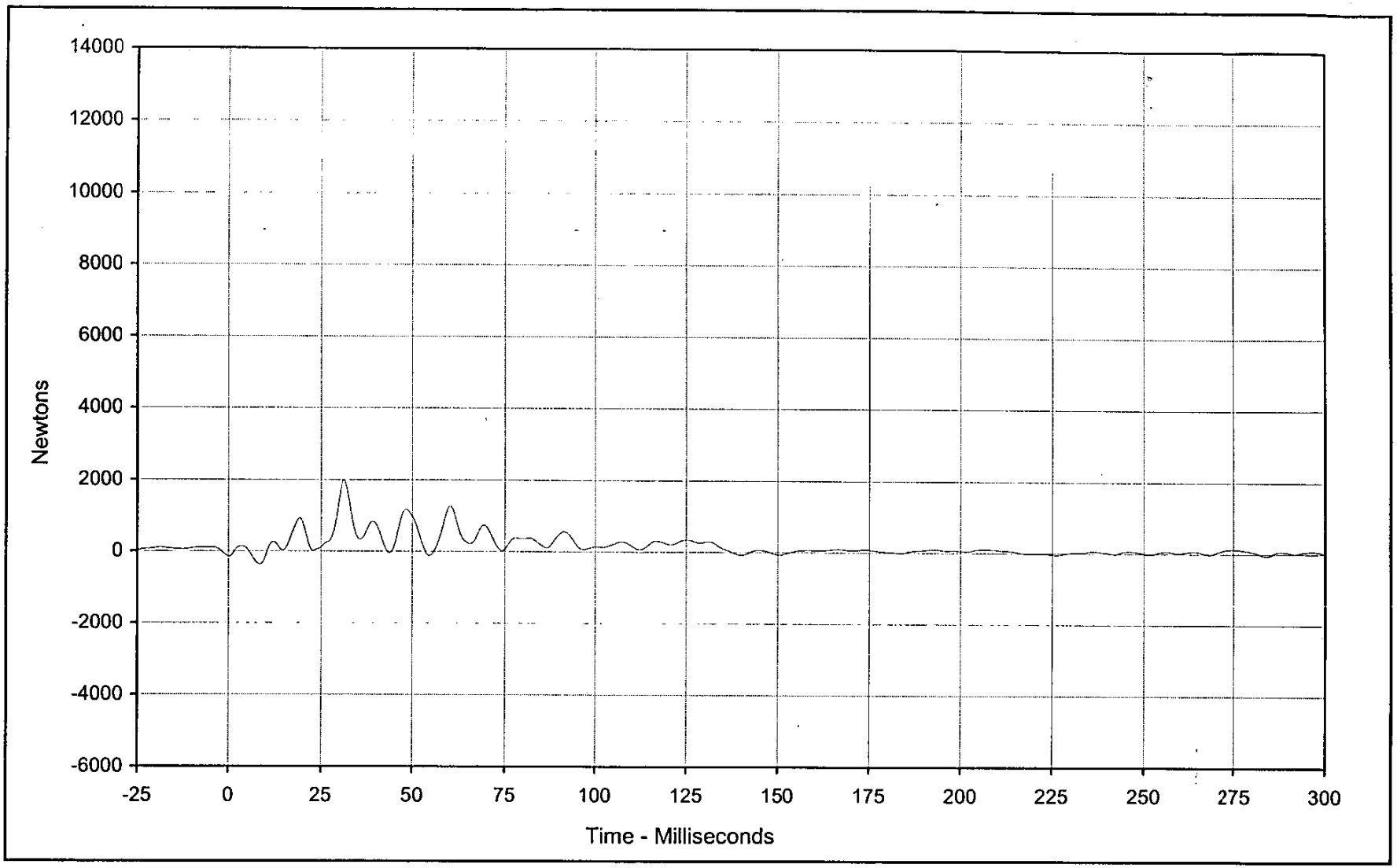
Curve Description:	Barrier Force C7			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	8302.3	at	16.7 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-540.2	at	0.5 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-122				

KARCO Engineering



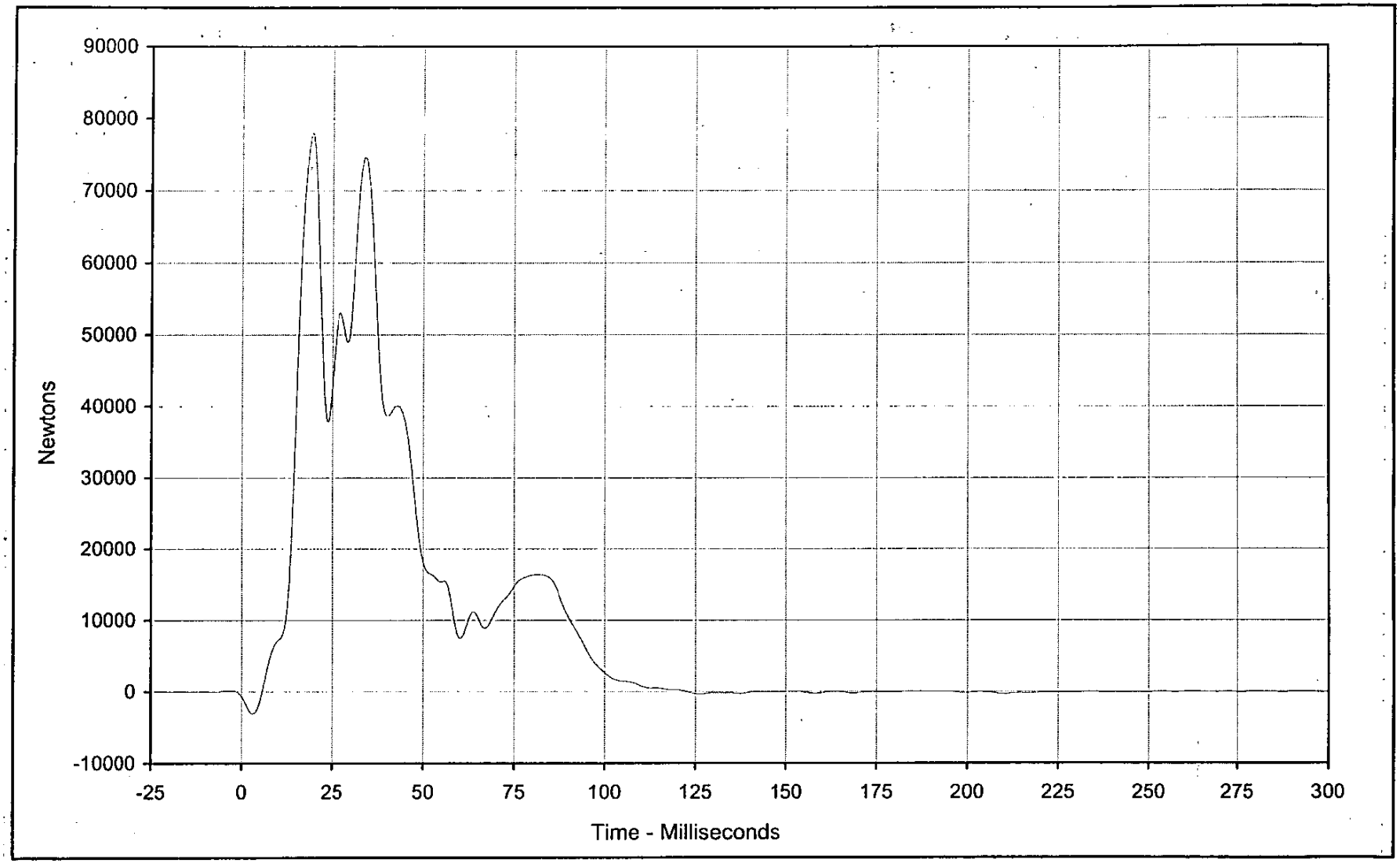
Curve Description:	Barrier Force C8			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	1968.8	at	18.0	Milliseconds	Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-429.8	at	0.9	Milliseconds	
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-123				

KARCO Engineering



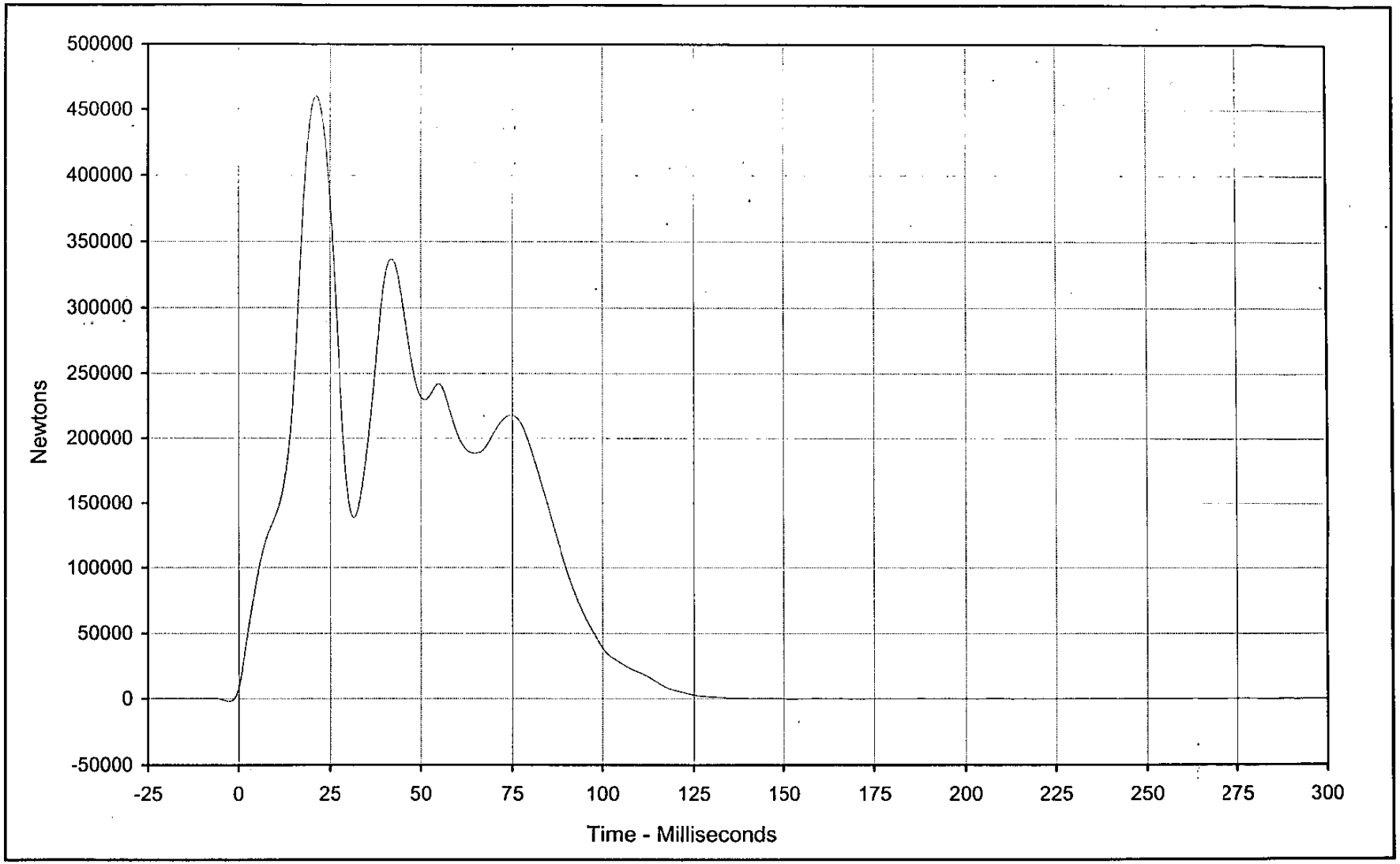
Curve Description:	Barrier Force C9			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	1987.3	at	31.4 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-365.1	at	8.5 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	FIL-124				

KARCO Engineering



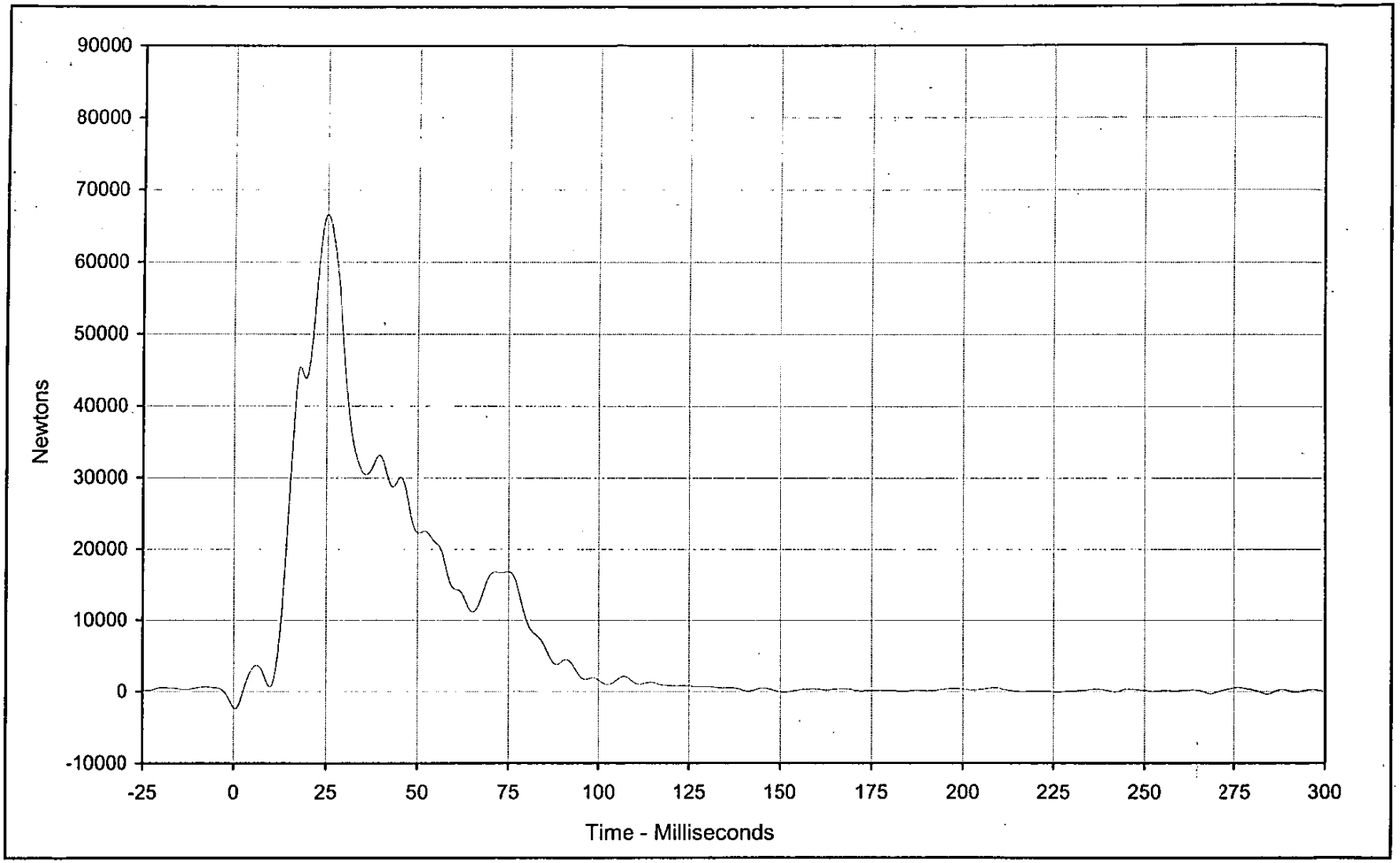
Curve Description:	Barrier Force Sum Group 1			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	77993.4	at	19.4 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-3105.0	at	3.0 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	SUM-001				

KARCO Engineering



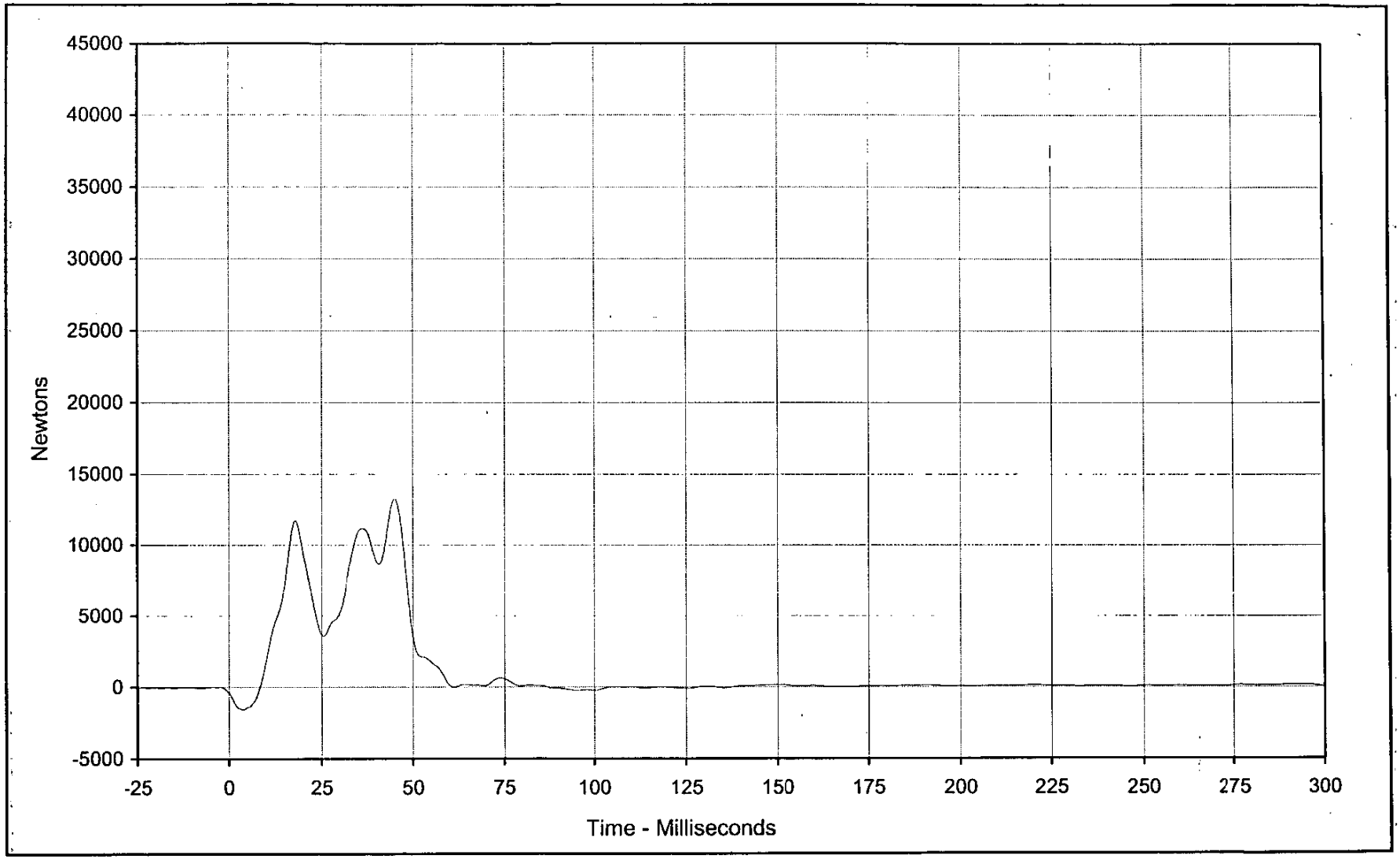
Curve Description:	Barrier Force Sum Group 2			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	460442.4	at	21.1 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-387.5	at	268.1 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	SUM-002				

KARCO Engineering



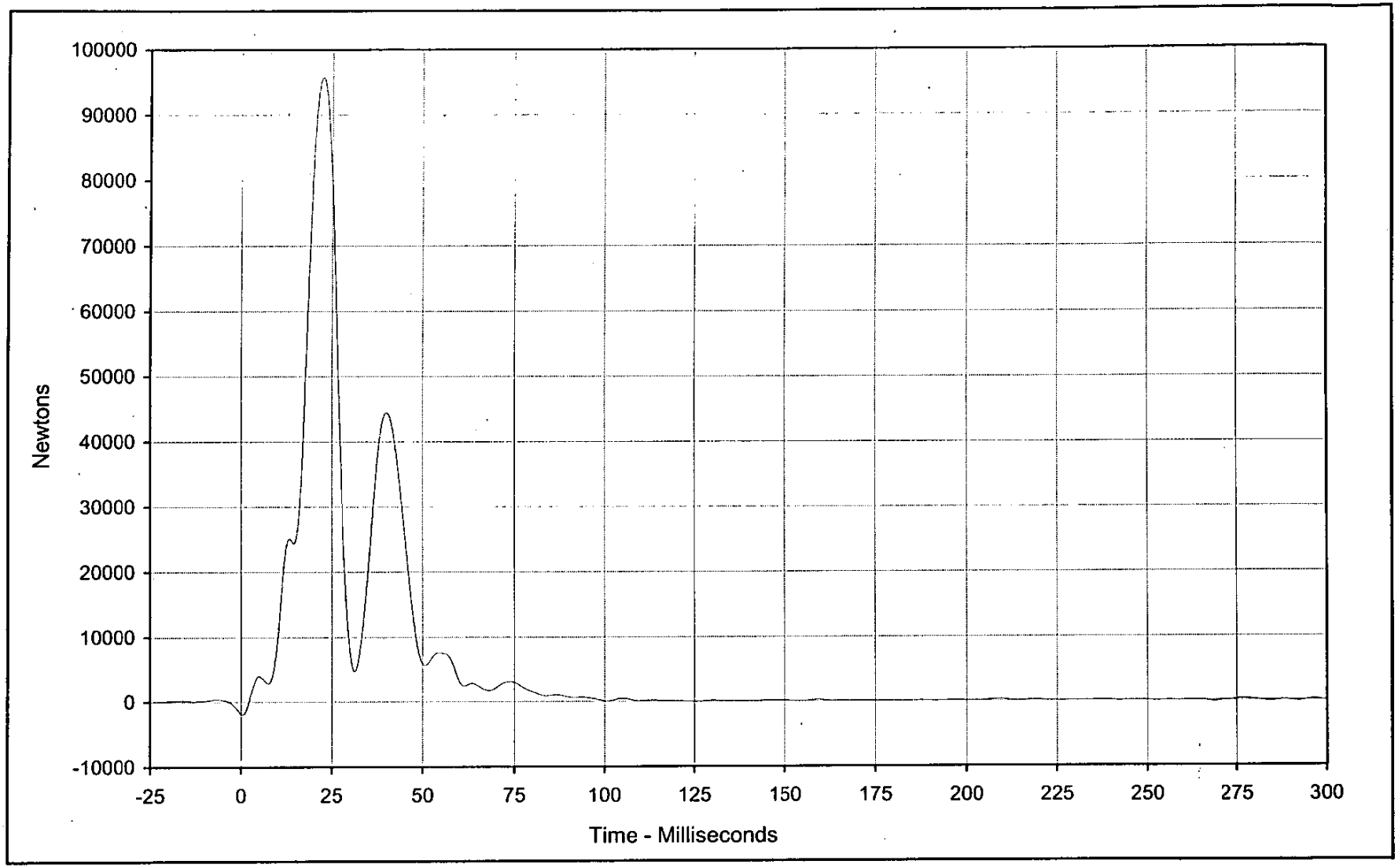
Curve Description:	Barrier Force Sum Group 3			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	66580.1	at	25.0 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-2432.1	at	0.4 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	SUM-003				

KARC Engineering



Curve Description:	Barrier Force Sum Group 4			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	13254.6	at	45.0 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-1582.6	at	3.9 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	SUM-004				

KARCO Engineering



Curve Description: Barrier Force Sum Group 5

Maximum Value: 95700.1 at 22.5 Milliseconds

Minimum Value: -1925.3 at 0.4 Milliseconds

SAE Filter Class: 60

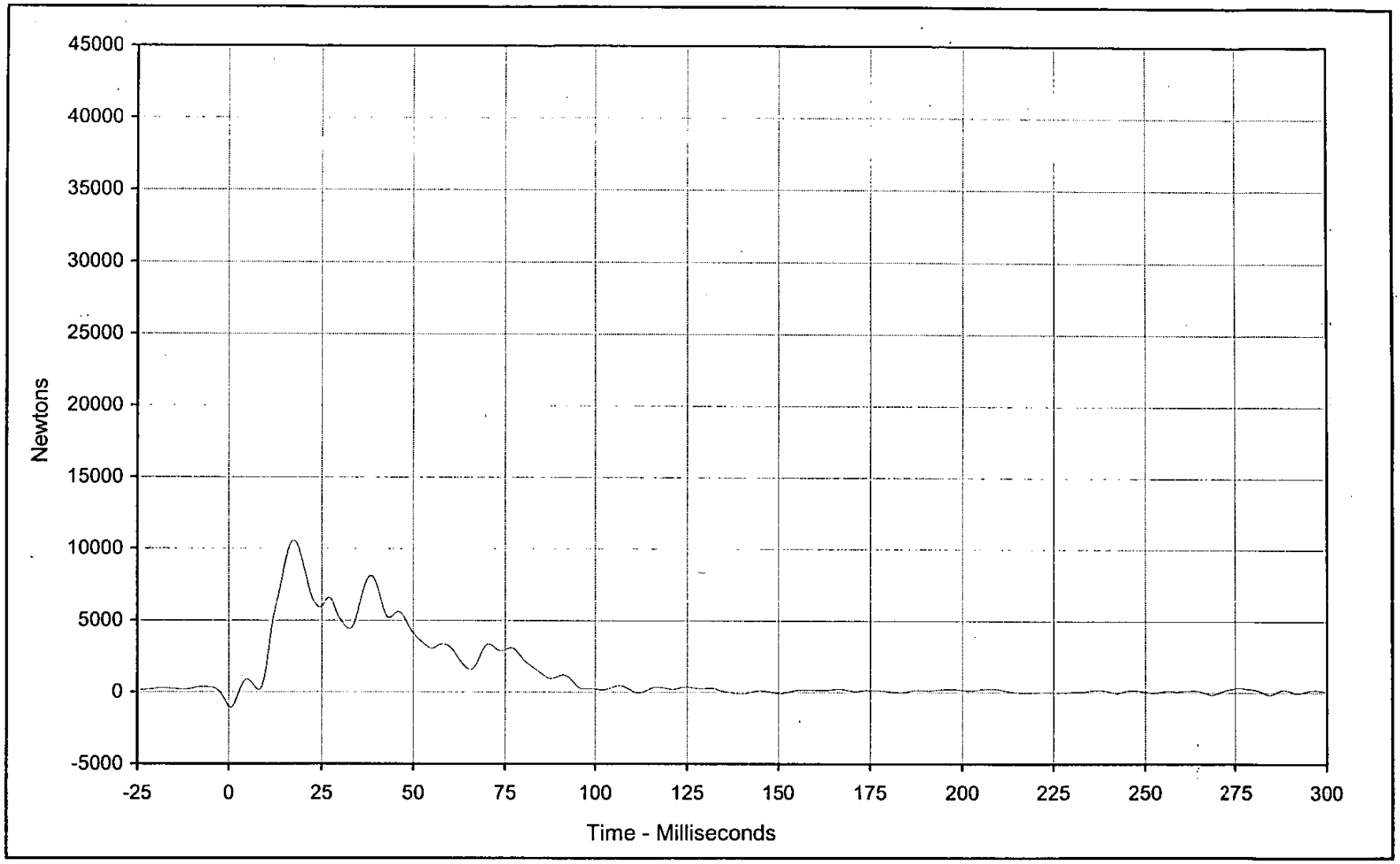
Date of Test: 12/16/99

Curve Number: SUM-005

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

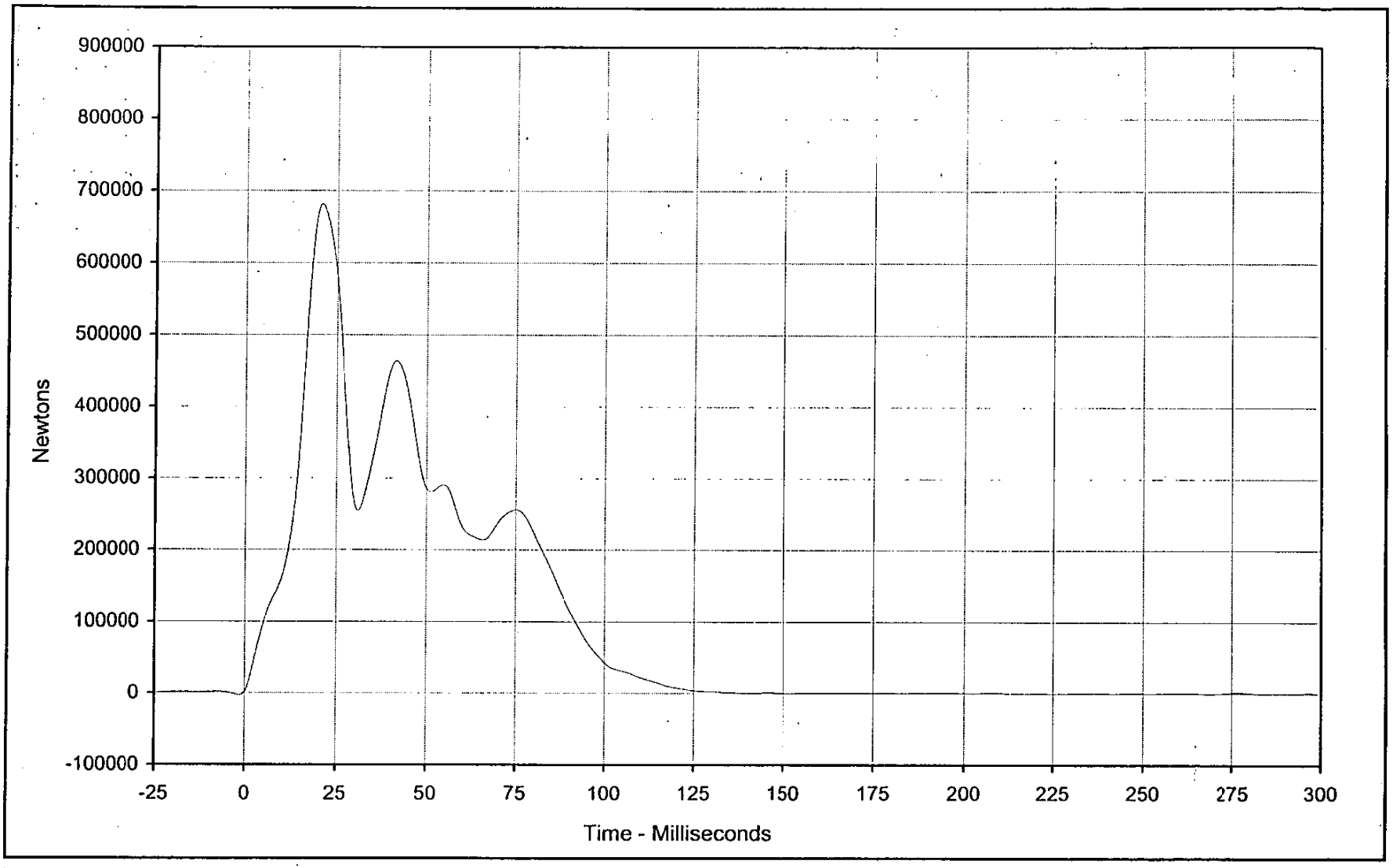
Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering



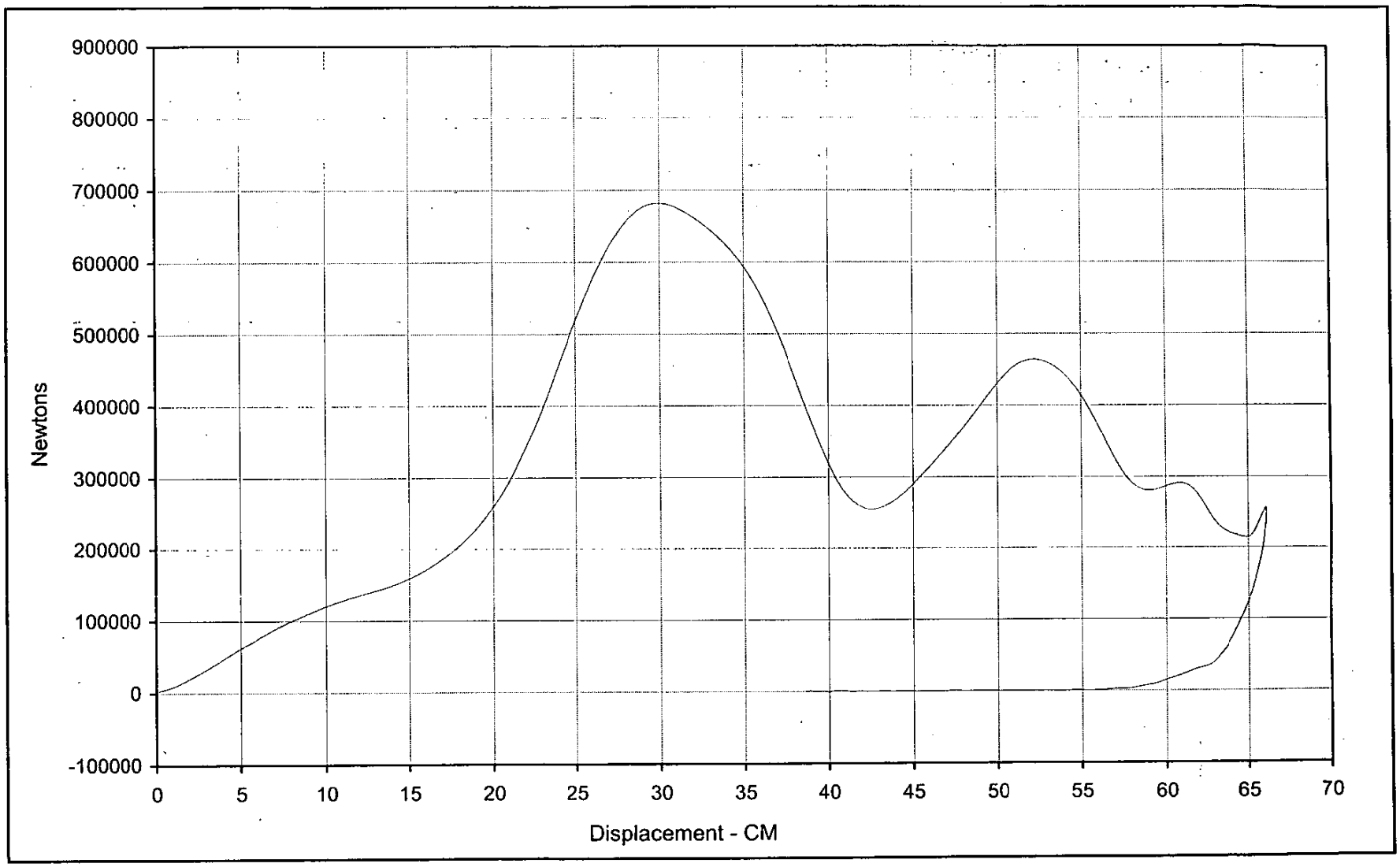
Curve Description:	Barrier Force Sum Group 6			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	10573.5	at	17.3 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-1100.8	at	0.5 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	SUM-006				

KARCO Engineering



Curve Description:	Barrier Force Sum Total			Test Program:	2000 NHTSA 35 mph NCAP No.: MY5803
Maximum Value:	681697.4	at	20.8 Milliseconds	Test Vehicle:	2000 Volkswagen Passat 4 Door Sedan
Minimum Value:	-1095.5	at	268.2 Milliseconds		
SAE Filter Class:	60				
Date of Test:	12/16/99				
Curve Number:	SUM-007				

KARCO Engineering



Curve Description: Sum Force Total vs. Dynamic Crush

Maximum Displ.: 66.1 at 76.6 Milliseconds

Maximum Force: 681697.4 at 20.8 Milliseconds

Measured Energy: 209,726 joules

Date of Test: 12/16/99

Curve Number: XVY-001

Test Program: 2000 NHTSA 35 mph NCAP No.: MY5803

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan

KARCO Engineering

BARRIER LOAD CELL SUMMARY DATA

Test Vehicle: 2000 Volkswagen Passat 4 Door Sedan NHTSA No.: MY5803

Test Program: 2000 NHTSA 35 mph NCAP Test Date: 12/16/99

BARRIER LOAD CELL PEAK FORCES

Location	Units	Max	Time	Min	Time
Barrier Force A2	Newtons	1170.9	10.0	-1033.9	15.1
Barrier Force A3	Newtons	4373.2	34.7	-1130.5	2.8
Barrier Force A4	Newtons	25388.0	34.5	-1066.5	2.3
Barrier Force A5	Newtons	48068.4	54.9	-637.6	0.7
Barrier Force A6	Newtons	39731.1	73.4	-544.0	0.6
Barrier Force A7	Newtons	4615.5	23.8	-741.1	0.8
Barrier Force A8	Newtons	1466.8	24.3	-396.4	0.4
Barrier Force A9	Newtons	1452.4	30.7	-306.8	21.2
Barrier Force B2	Newtons	2814.0	18.6	-672.3	3.8
Barrier Force B3	Newtons	70387.0	19.4	-784.2	2.1
Barrier Force B4	Newtons	135083.2	18.5	-289.7	0.0
Barrier Force B5	Newtons	138477.1	22.5	-83.9	284.7
Barrier Force B6	Newtons	131214.8	22.5	-952.3	0.0
Barrier Force B7	Newtons	57428.2	25.2	-486.4	0.4
Barrier Force B8	Newtons	2990.2	46.0	-555.0	0.5
Barrier Force B9	Newtons	1747.1	31.2	-455.6	21.5
Barrier Force C2	Newtons	9978.2	45.1	-879.6	4.3
Barrier Force C3	Newtons	11164.3	17.7	-895.9	31.4
Barrier Force C4	Newtons	18185.0	19.9	-680.0	0.4
Barrier Force C5	Newtons	57933.5	23.0	-655.5	0.5
Barrier Force C6	Newtons	25800.7	23.1	-592.2	0.4
Barrier Force C7	Newtons	8302.3	16.7	-540.2	0.5
Barrier Force C8	Newtons	1968.8	18.0	-429.8	0.9
Barrier Force C9	Newtons	1987.3	31.4	-365.1	8.5
Barrier Force Sum Group 1	Newtons	77993.4	19.4	-3105.0	3.0
Barrier Force Sum Group 2	Newtons	460442.4	21.1	-387.5	268.1
Barrier Force Sum Group 3	Newtons	66580.1	25.0	-2432.1	0.4
Barrier Force Sum Group 4	Newtons	13254.6	45.0	-1582.6	3.9
Barrier Force Sum Group 5	Newtons	95700.1	22.5	-1925.3	0.4
Barrier Force Sum Group 6	Newtons	10573.5	17.3	-1100.8	0.5
Barrier Force Sum Total	Newtons	681697.4	20.8	-1095.5	268.2

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

APPENDIX D

INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

2000 NHTSA 35 mph NCAP

Instrumentation Data Channel Assignments

Driver A.T.D Serial Number 34

12/16/99

2000 Volkswagen Passat 4 Door Sedan

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	KEFF001	Load cell, Femur	R.A. Denton	2121	N
24	RIGHT FEMUR FORCE	Z	KEFF002	Load cell, Femur	R.A. Denton	2121	N

2000 NHTSA 35 mph NCAP
Instrumentation Data Channel Assignments
Driver A.T.D Serial Number 34
12/16/99
2000 Volkswagen Passat 4 Door Sedan

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

2000 NHTSA 35 mph NCAP
Instrumentation Data Channel Assignments
Driver A.T.D Serial Number 35
12/16/99
2000 Volkswagen Passat 4 Door Sedan

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	KEFF003	Load cell, Femur	R.A. Denton	2121	N
68	RIGHT FEMUR FORCE	Z	KEFF004	Load cell, Femur	R.A. Denton	2121	N

2000 NHTSA 35 mph NCAP
Instrumentation Data Channel Assignments
Driver A.T.D Serial Number 35
12/16/99
2000 Volkswagen Passat 4 Door Sedan

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

2000 NHTSA 35 mph NCAP
Instrumentation Data Channel Assignments
Vehicle Accelerometers and Reference Channel
12/16/99
2000 Volkswagen Passat 4 Door Sedan

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
89	Left Rear X-Member (Pri.)	X	KEVA002	Accel., Pre-Amp	I.C.S/Karco	3031-500	G
90	Right Rear X-Member (Pri.)	X	KEVA006	Accel., Vehicle block	I.C. Sensor	3031-200	G
91	Engine Top	X	KEVA001	Accel., Vehicle block	I.C. Sensor	3031-500	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	KEVA003	Accel., Vehicle block	I.C. Sensor	3031-500	G
95	Instrument Panel	X	KEVA005	Accel., Vehicle block	I.C. Sensor	3031-500	G
96	Left Rear X-Member (Rednt.)	X	KEVA011	Accel., Vehicle block	I.C. Sensor	3031-200	G
97	ZERO REFERENCE	N/A	N/A	N/A	N/A	N/A	N/A

2000 NHTSA 35 mph NCAP
Instrumentation Data Channel Assignments
Rigid Load Cell Barrier
12/16/99
2000 Volkswagen Passat 4 Door Sedan

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
98	BARRIER FORCE A1	X	BARRIER	Not Used	N/A	N/A	N/A
99	BARRIER FORCE A2	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
100	BARRIER FORCE A3	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
101	BARRIER FORCE A4	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
102	BARRIER FORCE A5	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
103	BARRIER FORCE A6	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
104	BARRIER FORCE A7	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
105	BARRIER FORCE A8	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
106	BARRIER FORCE A9	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
107	BARRIER FORCE B1	X	BARRIER	Not Used	N/A	N/A	N/A
108	BARRIER FORCE B2	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
109	BARRIER FORCE B3	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
110	BARRIER FORCE B4	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
111	BARRIER FORCE B5	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
112	BARRIER FORCE B6	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
113	BARRIER FORCE B7	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
114	BARRIER FORCE B8	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
115	BARRIER FORCE B9	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N

2000 NHTSA 35 mph NCAP
Instrumentation Data Channel Assignments
Rigid Load Cell Barrier
12/16/99
2000 Volkswagen Passat 4 Door Sedan

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
116	BARRIER FORCE C1	X	BARRIER	Not Used	N/A	N/A	N/A
117	BARRIER FORCE C2	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
118	BARRIER FORCE C3	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
119	BARRIER FORCE C4	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
120	BARRIER FORCE C5	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
121	BARRIER FORCE C6	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
122	BARRIER FORCE C7	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
123	BARRIER FORCE C8	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
124	BARRIER FORCE C9	X	BARRIER	Load Cell, LCB	Lebow	1220-FS	N
125	BARRIER FORCE D1	X	BARRIER	Not Used	N/A	N/A	N/A
126	BARRIER FORCE D2	X	BARRIER	Not Used	N/A	N/A	N/A
127	BARRIER FORCE D3	X	BARRIER	Not Used	N/A	N/A	N/A
128	BARRIER FORCE D4	X	BARRIER	Not Used	N/A	N/A	N/A
129	BARRIER FORCE D5	X	BARRIER	Not Used	N/A	N/A	N/A
130	BARRIER FORCE D6	X	BARRIER	Not Used	N/A	N/A	N/A
131	BARRIER FORCE D7	X	BARRIER	Not Used	N/A	N/A	N/A
132	BARRIER FORCE D8	X	BARRIER	Not Used	N/A	N/A	N/A
133	BARRIER FORCE D9	X	BARRIER	Not Used	N/A	N/A	N/A

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.: LK12A

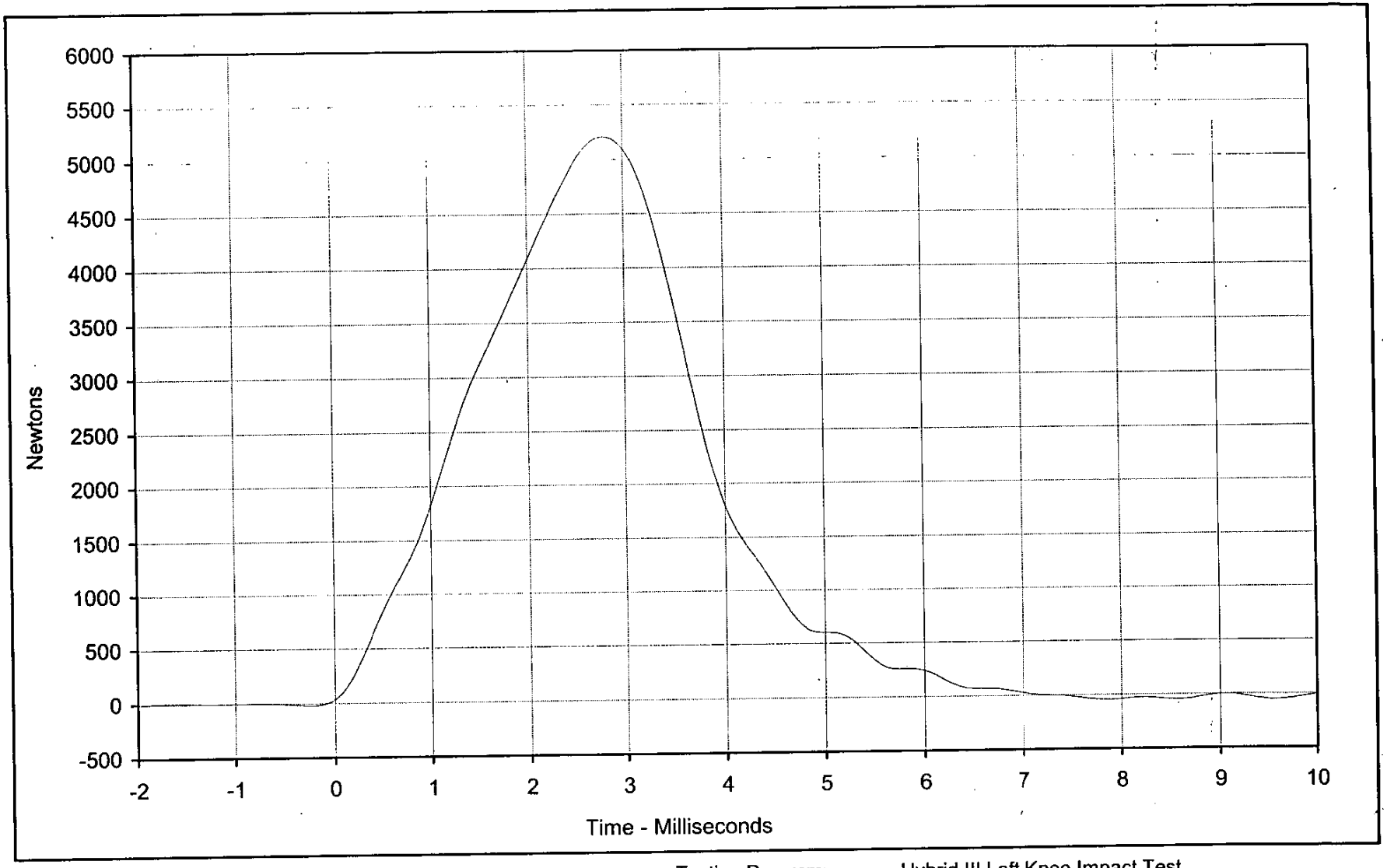
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Velocity	m/s	2.073 to 2.134	2.088	Pass
Peak Probe Force	Newtons	4715 to 5782	5204.9	Pass
		Overall Test Results		Pass

Laboratory Technician

December 14, 1999
Test Date

James E. Hoeth
Approved By

12/14/99
Date



Curve Description:	Probe Force			
Maximum Value:	5204.9	at	2.8	Milliseconds
Minimum Value:	-46.8	at	7.9	Milliseconds
SAE Filter Class:	600			
Date of Test:	12/14/99			
ATD Serial No.:	34			

Testing Program: Hybrid III Left Knee Impact Test

Test Information: Part S/N: n/a Test I.D.: LK12A

KARCO Engineering

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

ATD Serial No.: 34 Part Serial No.: n/a Test I.D.: RK12A

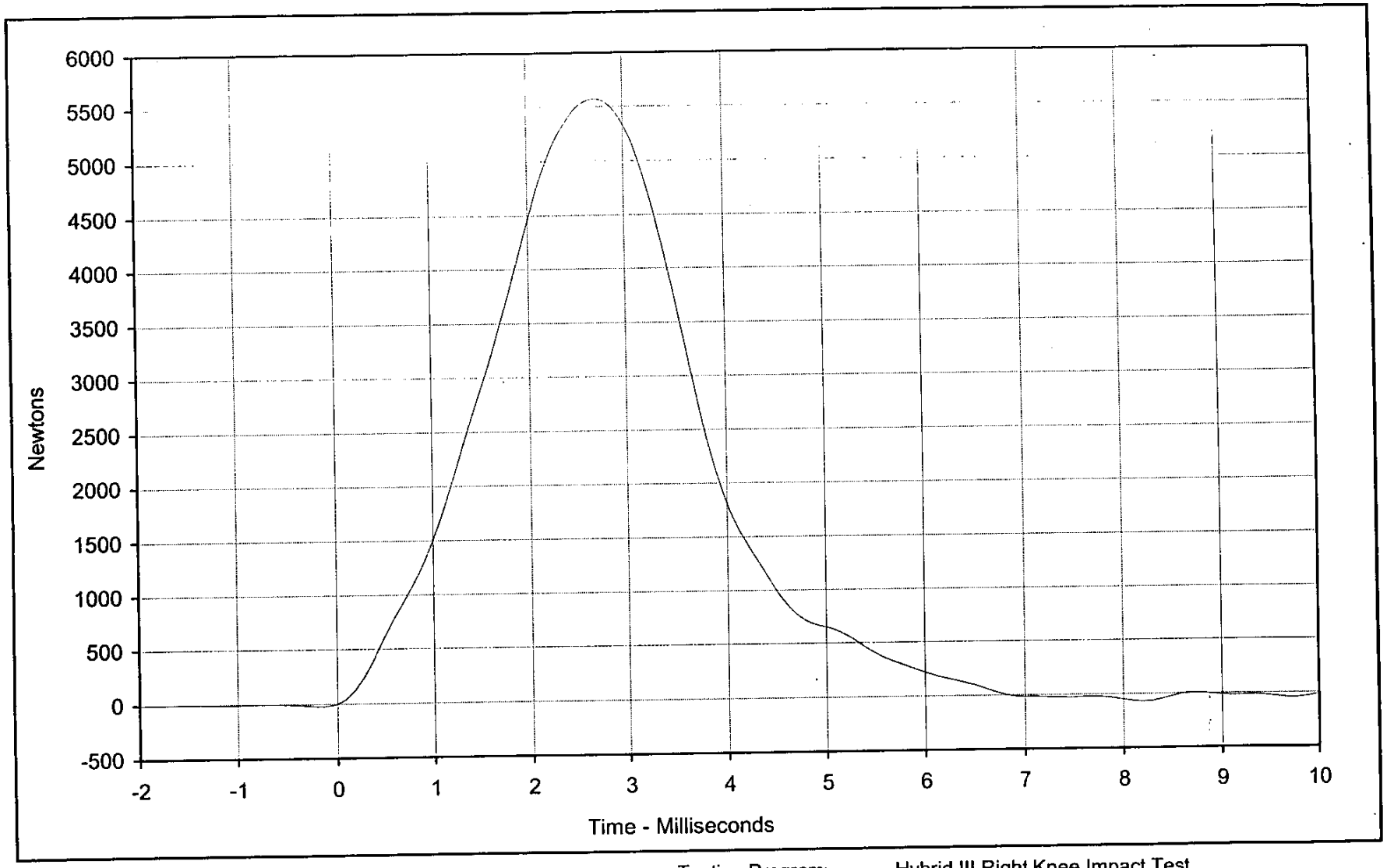
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Velocity	m/s	2.073 to 2.134	2.112	Pass
Peak Probe Force	Newtons	4715 to 5782	5570.5	Pass
		Overall Test Results		Pass

Laboratory Technician

December 14, 1999
Test Date

James E. Hoth
Approved By

12/14/99
Date



Curve Description:	Probe Force			
Maximum Value:	5570.5	at	2.7	Milliseconds
Minimum Value:	-49.6	at	8.0	Milliseconds
SAE Filter Class:	600			
Date of Test:	12/14/99			
ATD Serial No.:	34			

Testing Program: Hybrid III Right Knee Impact Test

Test Information: Part S/N: n/a Test I.D.: RK12A

KARCO Engineering

Hybrid III Calibration Data Sheet
50TH Percentile Male
Head Drop Calibration

ATD Serial No.: 034 Part Serial No.: n/a Test I.D.: HD12A

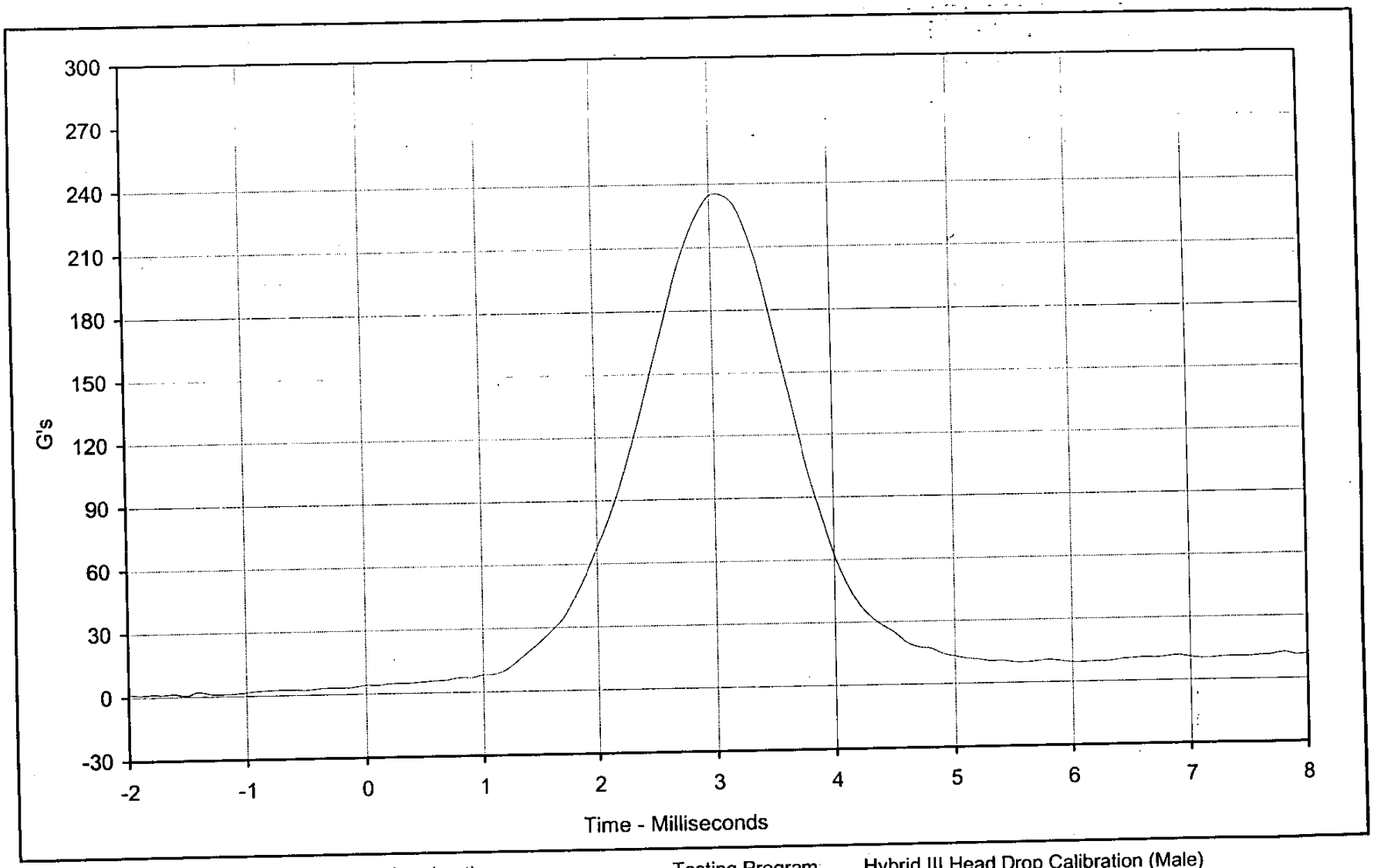
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	234.9	Pass
Peak Lateral Acceleration	G's	≤15.0	1.9	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

December 14, 1999
Test Date

James E. Keith
Approved By

12/14/99
Date



Curve Description: Head Resultant Acceleration

Maximum Value: 234.9 at 3.1 Milliseconds

Minimum Value: 0.5 at -1.5 Milliseconds

SAE Filter Class: 1000

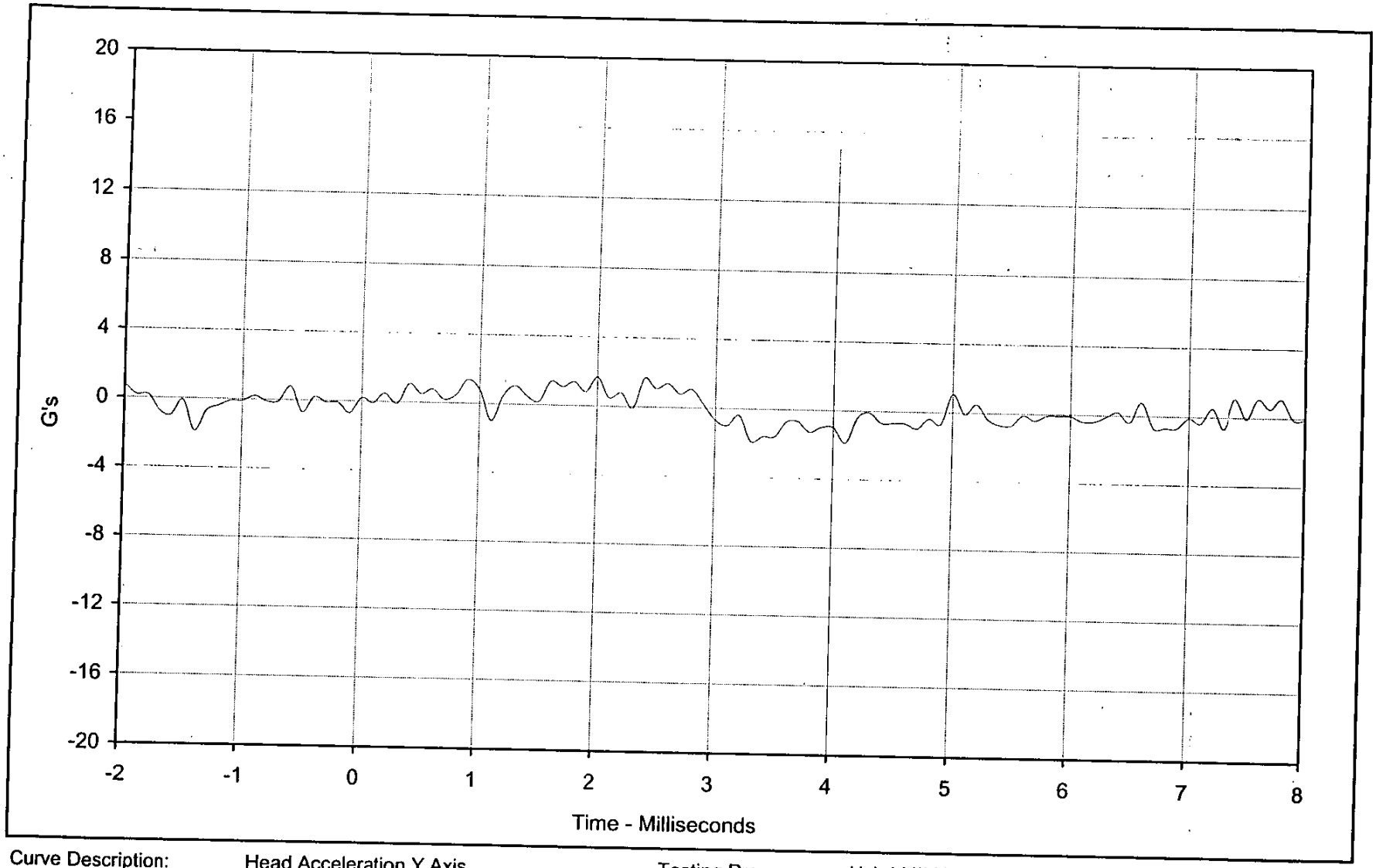
Date of Test: 12/14/99

ATD Serial No.: 034

Testing Program: Hybrid III Head Drop Calibration (Male)

Test Information: S/N of Part: n/a Test I.D.: HD12A

KARCO Engineering



Curve Description: Head Acceleration Y Axis

Maximum Value: 1.7 at 2.0 Milliseconds

Minimum Value: -1.9 at -1.4 Milliseconds

SAE Filter Class: 1000

Date of Test: 12/14/99

ATD Serial No.: 034

Testing Program: Hybrid III Head Drop Calibration (Male)

Test Information: S/N of Part: n/a Test I.D.: HD12A

KARCO Engineering

Hybrid III Calibration Data Sheet
50TH Percentile Male
Thorax Impact Test

ATD Serial No.: 034 Part Serial No.: N/A Test I.D.: CH12D

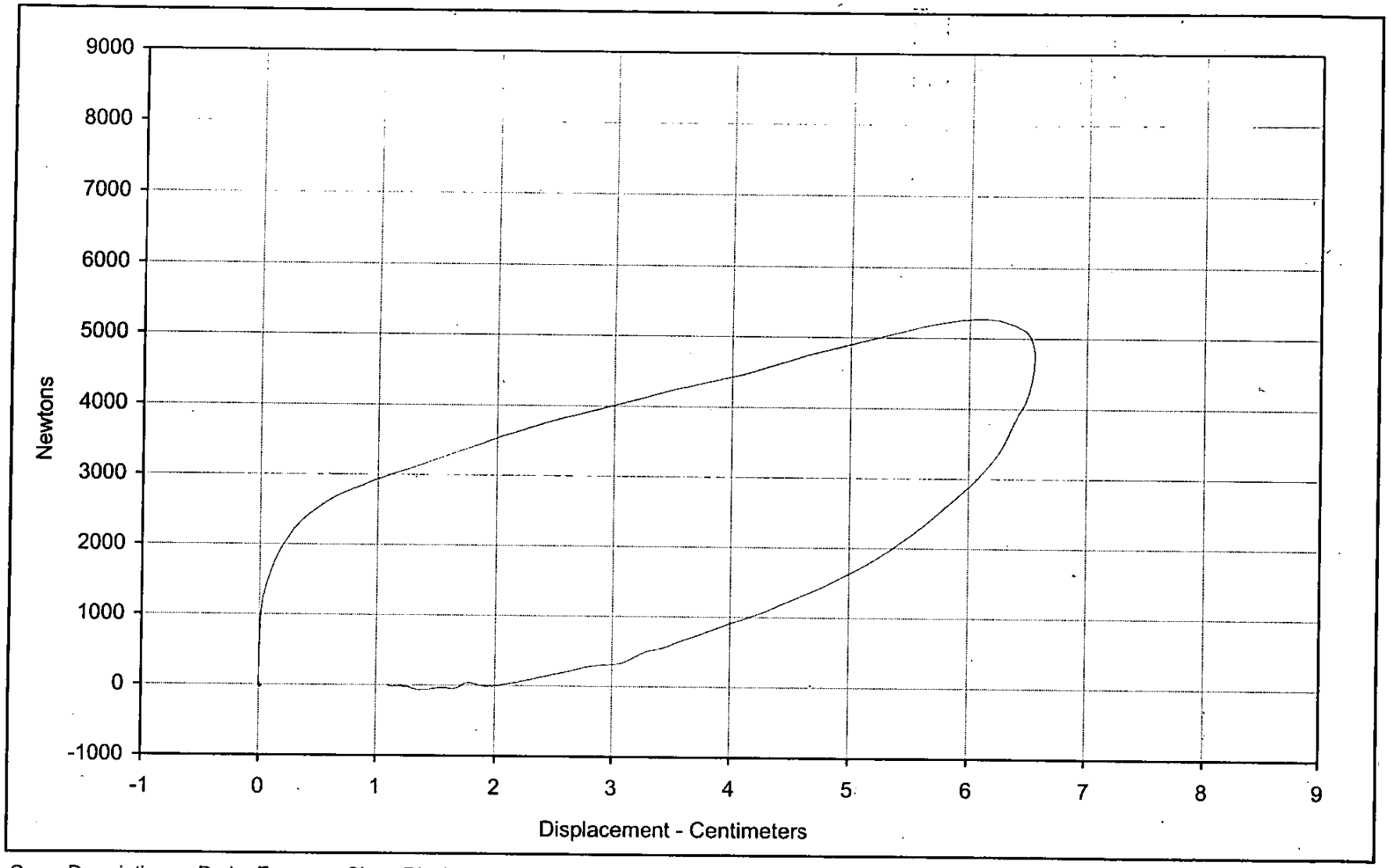
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Probe Velocity	m/s	6.58 to 6.82	6.64	Pass
Peak Probe Force	Newtons	5159 to 5893	5272	Pass
Peak Sternum Displacement	CM	6.35 to 7.26	6.56	Pass
Internal Hysterysis	%	69 to 85	76.5	Pass
		Overall Test Results		Pass

Laboratory Technician

December 14, 1999
Test Date

James E. Hoitt
Approved By

12/14/99
Date



Curve Description:	Probe Force vs. Chest Displacement	Testing Program:	Hybrid III Thorax Impact Test
Probe Force:	5272.4 Newtons	Test Information:	S/N of Part: N/A Test I.D.: CH12D
Chest Displ.:	6.56 Centimeters		
SAE Filter Class:	180		
Date of Test:	12/14/99		
ATD Serial No.:	034		

KARCO Engineering

Hybrid III Calibration Data Sheet
50TH Percentile Male
Neck Flexion Test

ATD Serial No.: 34 Part Serial No.: n/a Test I.D.: NF12B

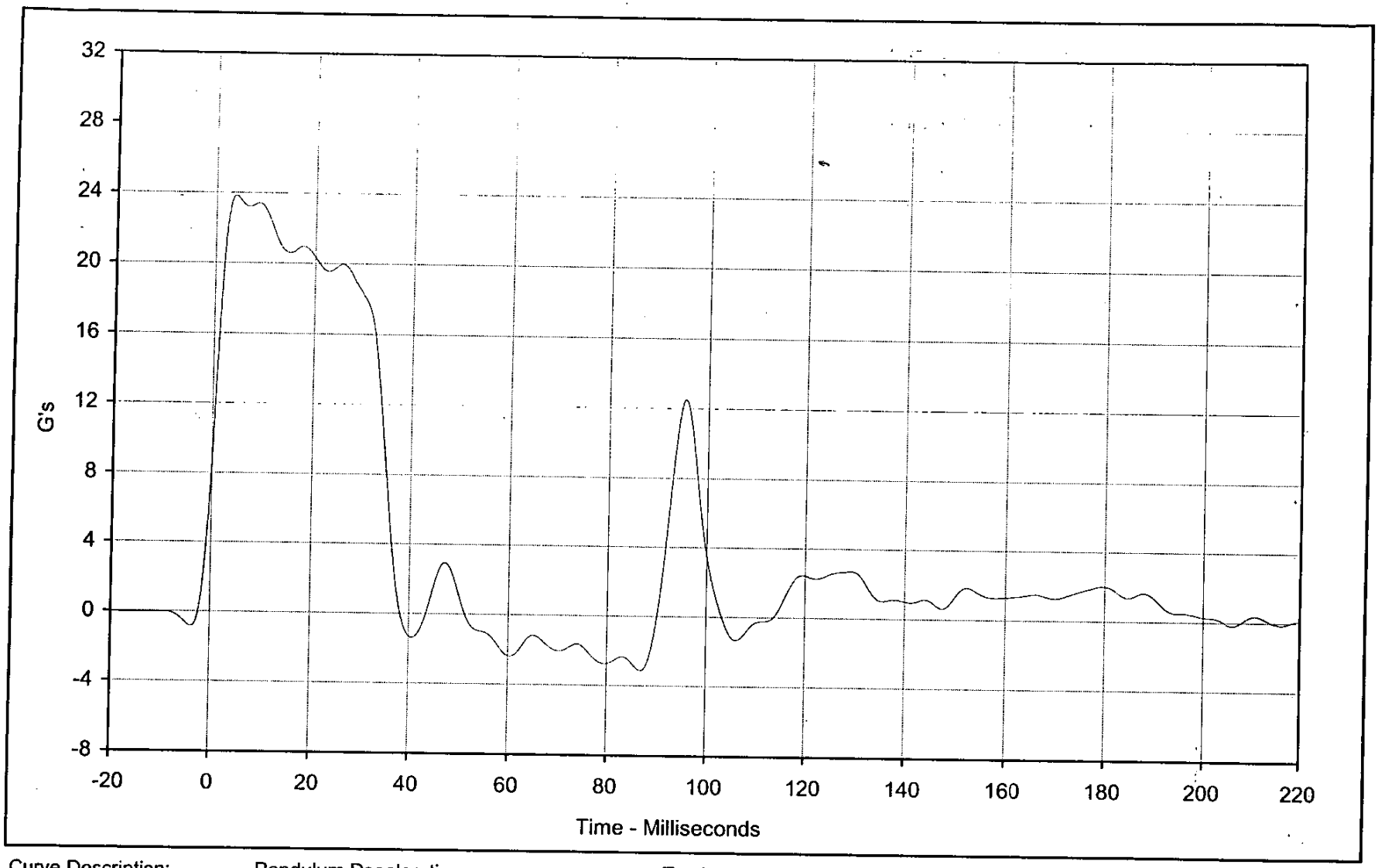
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	40	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.01	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.1	Pass
	20 Msec.	G's	17.6 to 22.6	20.4	Pass
	30 Msec.	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	36.1	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	76.8	Pass
	Time	Msec.	57.0 to 64.0	58.2	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	113.2	Pass
Moment About Occipital Condyle	Maximum	N • m	84.1 to 108.5	99.3	Pass
	Time	Msec.	47.0 to 58.0	54.4	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	98.0	Pass
			Overall Test Results		Pass

Laboratory Technician

December 15, 1999
Test Date

James E. Hoth
Approved By

12/15/99
Date



Curve Description: Pendulum Deceleration

Maximum Value: 23.8 at 3.9 Milliseconds

Minimum Value: -3.1 at 86.8 Milliseconds

SAE Filter Class: 60

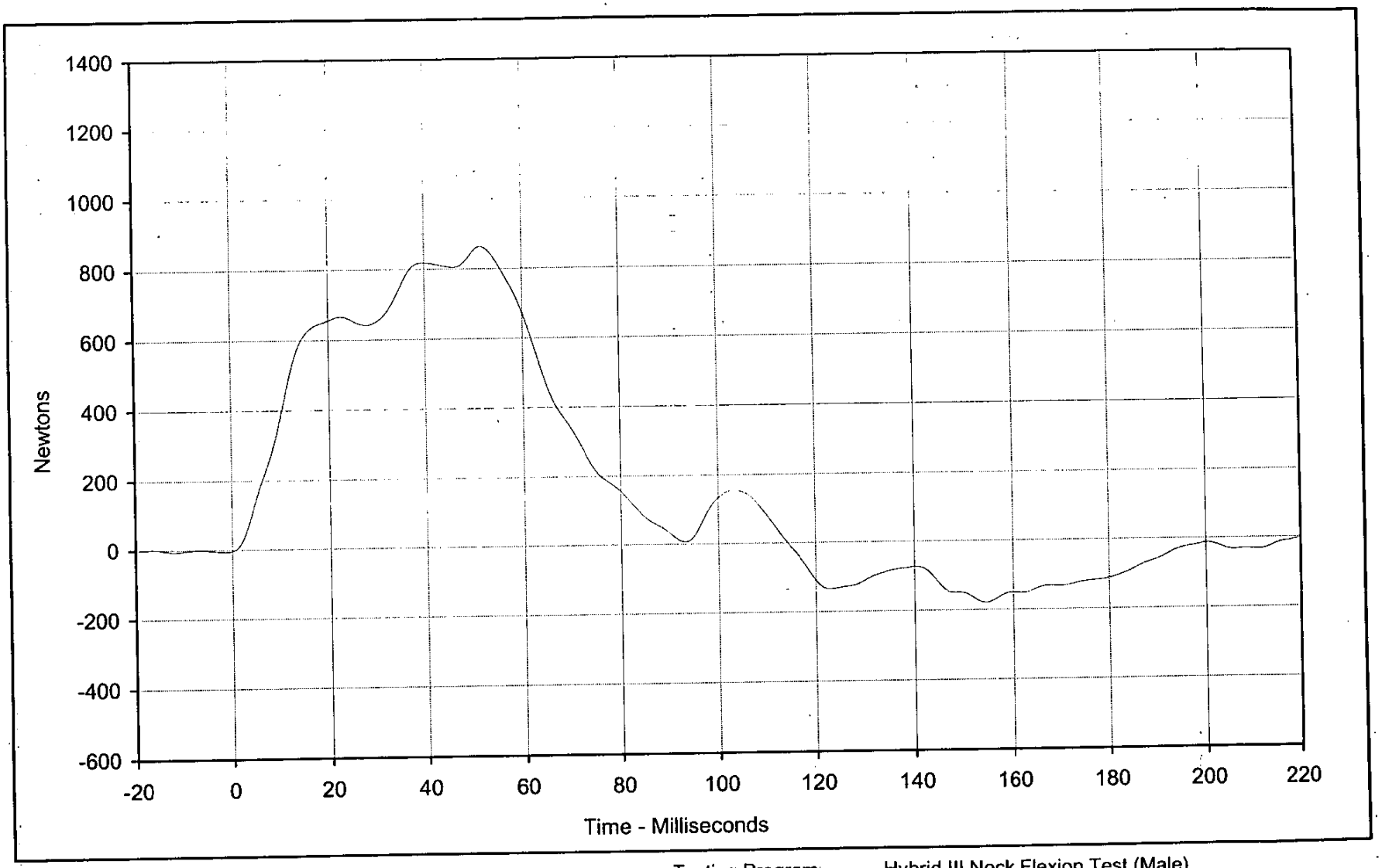
Date of Test: 12/15/99

ATD Serial No.: 34

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NF12B

KARCO Engineering



Curve Description: Neck Force X

Maximum Value: 862.8 at 51.5 Milliseconds

Minimum Value: -179.0 at 154.5 Milliseconds

SAE Filter Class: 60

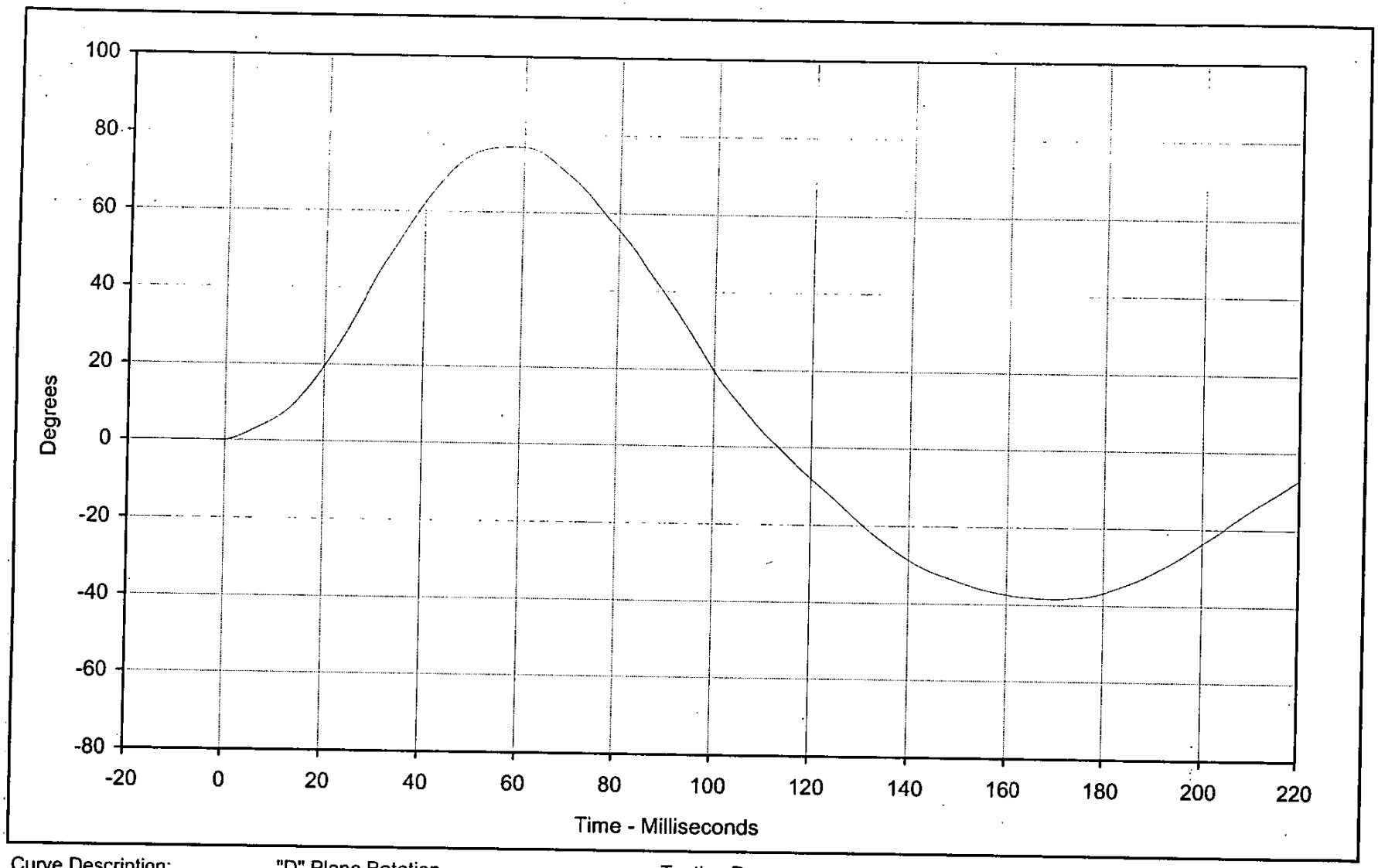
Date of Test: 12/15/99

ATD Serial No.: 34

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NF12B

KARCO Engineering



Curve Description: "D" Plane Rotation

Maximum Value: 76.8 at 58.2 Milliseconds

Minimum Value: -38.5 at 169.6 Milliseconds

SAE Filter Class: 60

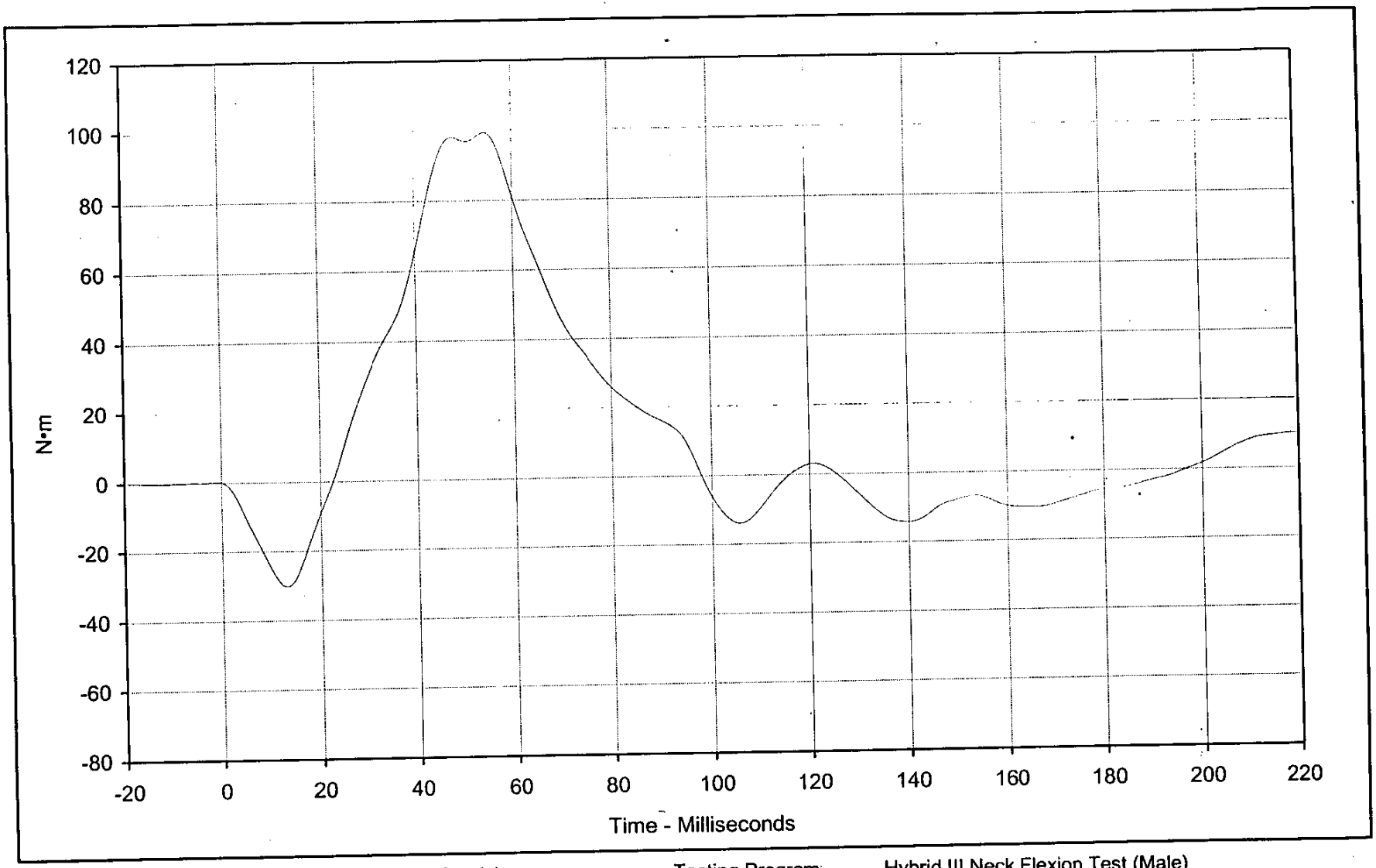
Date of Test: 12/15/99

ATD Serial No.: 34

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NF12B

KARCO Engineering



Curve Description: Moment About Occipital Condyles

Maximum Value: 99.3 at 54.4 Milliseconds

Minimum Value: -30.2 at 13.1 Milliseconds

SAE Filter Class: 60

Date of Test: 12/15/99

ATD Serial No.: 34

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NF12B

KARCO Engineering

Hybrid III Calibration Data Sheet
50TH Percentile Male
Neck Extension Test

ATD Serial No.: 034 Part Serial No.: n/a Test I.D.: NE12B

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	36	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.00	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	17.8	Pass
	20 Msec.	G's	14.0 to 19.0	16.2	Pass
	30 Msec.	G's	11.0 to 16.0	15.9	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 22.0	15.9	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	43.6	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	98.1	Pass
	Time	Msec.	72.0 to 82.0	78.8	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	150.8	Pass
Moment About Occipital Condyle	Maximum	N • m	-52.9 to- 79.9	-70.7	Pass
	Time	Msec.	65.0 to 79.0	69.0	Pass
Negative Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	139.5	Pass
			Overall Test Results		Pass

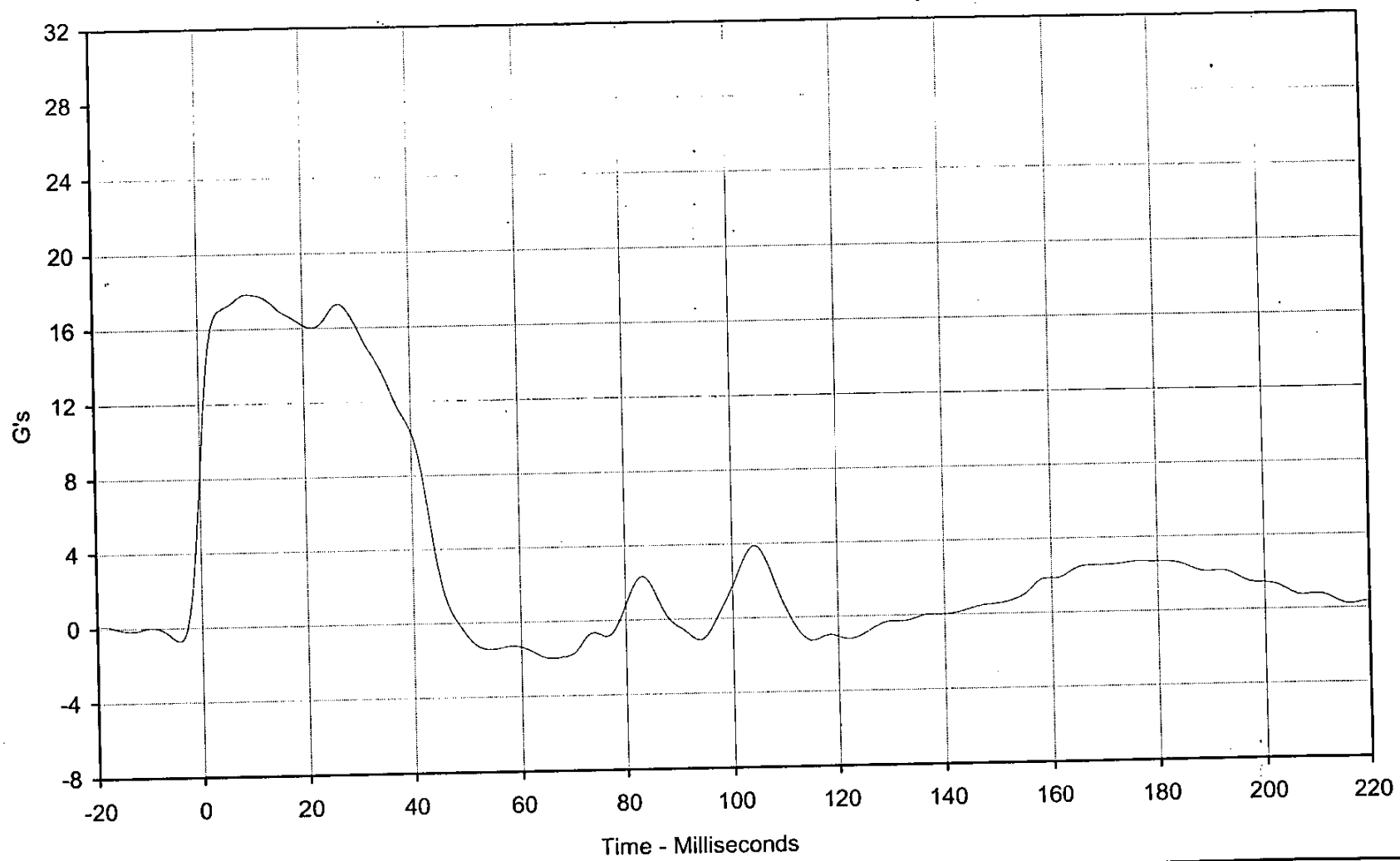
Laboratory Technician

December 15, 1999
Test Date

James E. Hoth
Approved By

12/15/99
Date

KAR20001-06



Curve Description: Pendulum Deceleration

Maximum Value: 17.8 at 9.4 Milliseconds

Minimum Value: -2.0 at 65.7 Milliseconds

SAE Filter Class: 60

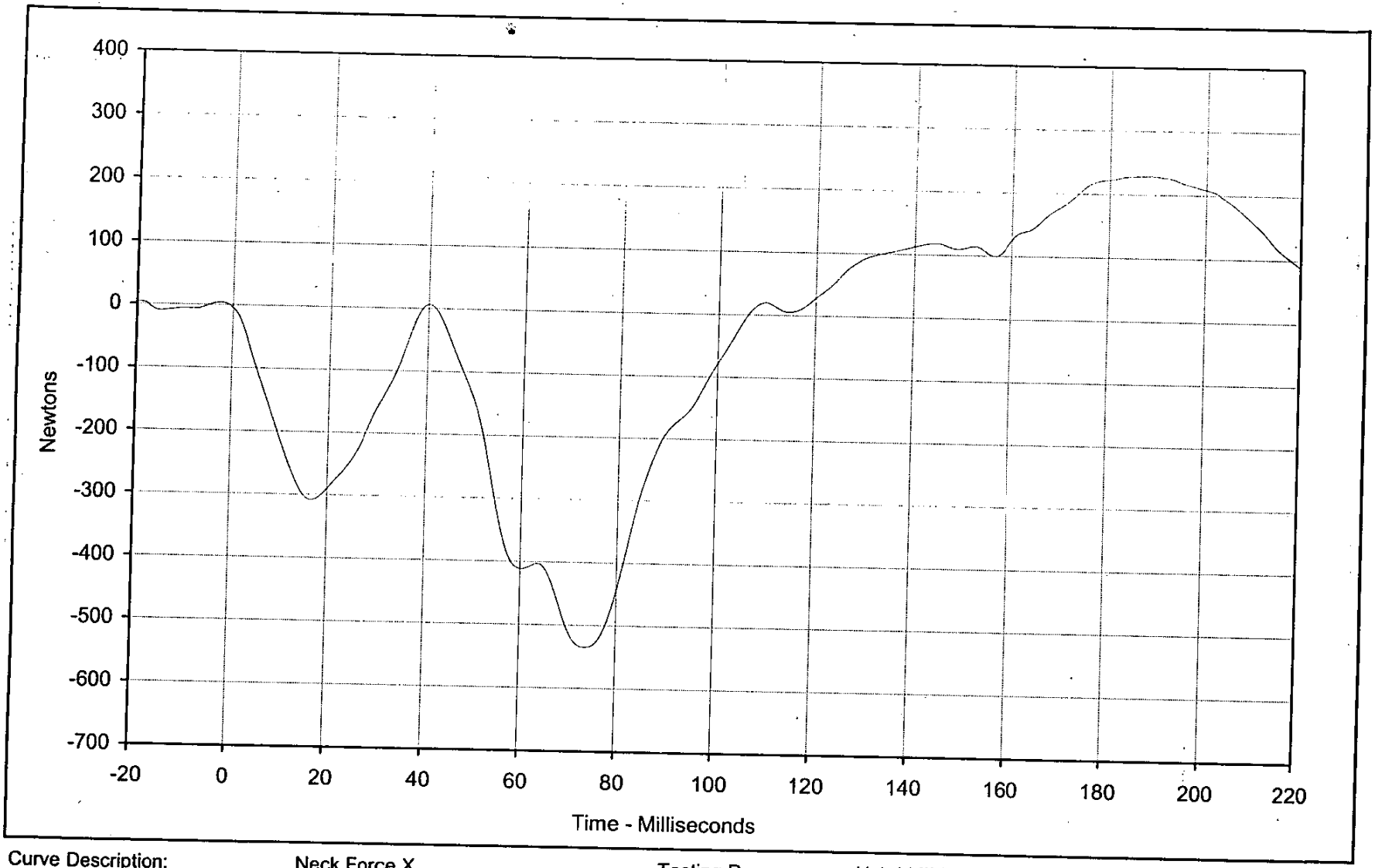
Date of Test: 12/15/99

ATD Serial No.: 034

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NE12B

KARCO Engineering



Curve Description: Neck Force X

Maximum Value: 229.3 at 188.4 Milliseconds

Minimum Value: -534.8 at 73.8 Milliseconds

SAE Filter Class: 60

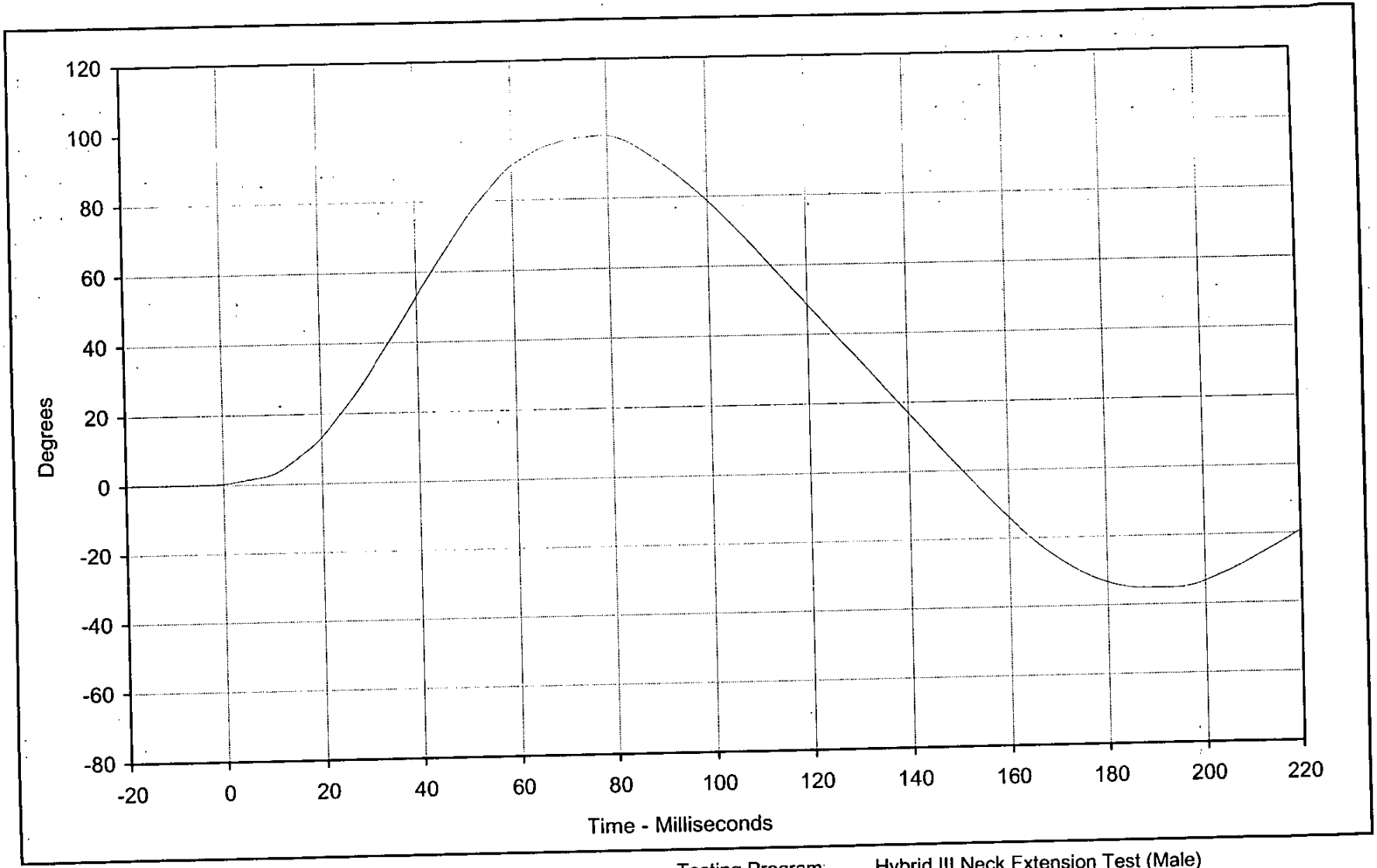
Date of Test: 12/15/99

ATD Serial No.: 034

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NE12B

KARCO Engineering



Curve Description: "D" Plane Rotation

Maximum Value: 98.1 at 78.8 Milliseconds

Minimum Value: -35.2 at 189.6 Milliseconds

SAE Filter Class: 60

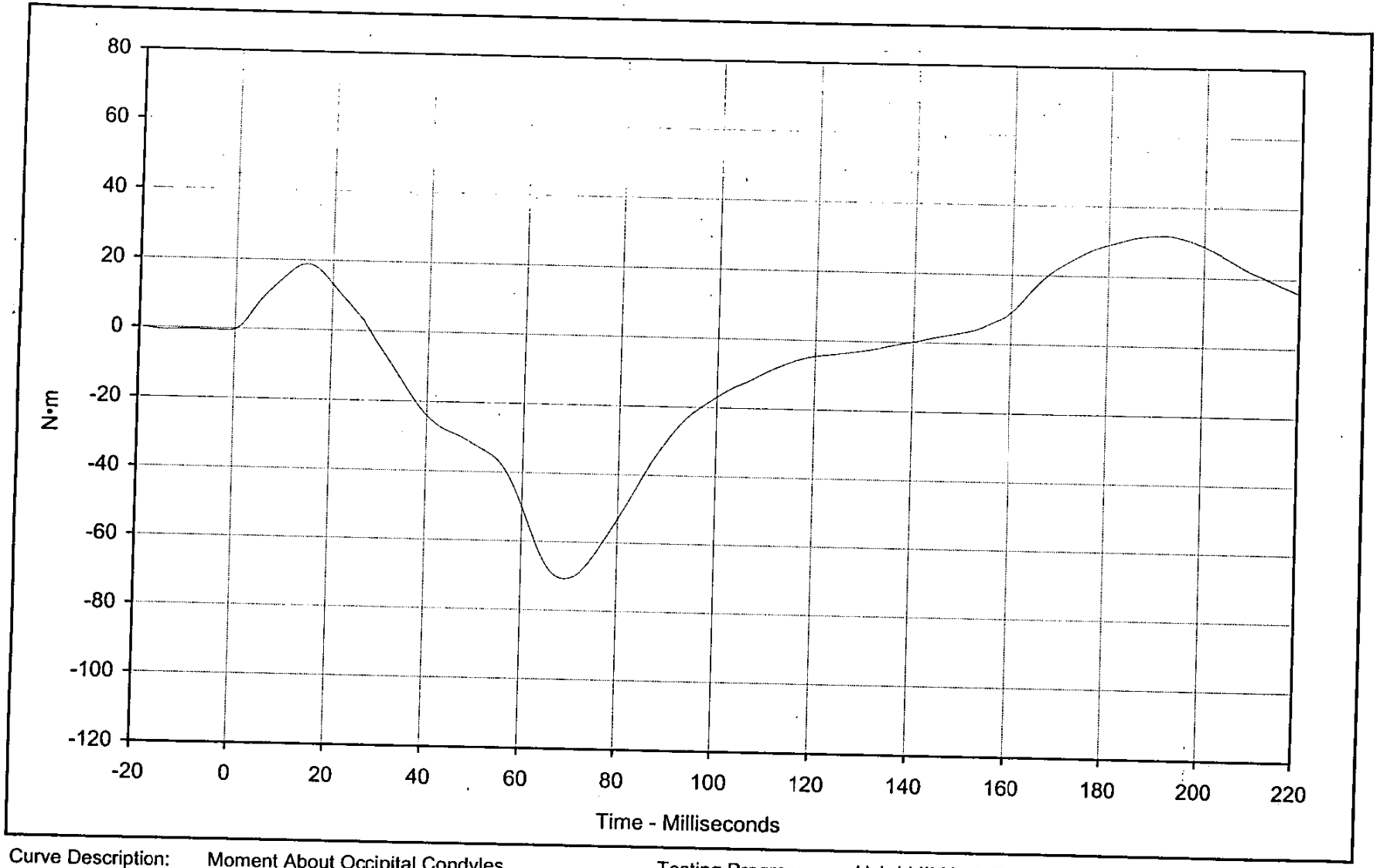
Date of Test: 12/15/99

ATD Serial No.: 034

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NE12B

KARCO Engineering



Curve Description: Moment About Occipital Condyles

Maximum Value: 31.8 at 191.7 Milliseconds

Minimum Value: -70.7 at 69.0 Milliseconds

SAE Filter Class: 60

Date of Test: 12/15/99

ATD Serial No.: 034

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NE12B

KARCO Engineering

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	20.9	Pass
Laboratory relative humidity	%	10 to 70	43	Pass
A - Total sitting height	mm	878.8 to 889.0	888.1	Pass
B - Shoulder pivot height	mm	505.5 to 520.7	50.0	Pass
C - "H" point height	mm	83.8 to 88.9	88.0	Pass
D - "H" point from seat back	mm	134.6 to 139.7	136.0	Pass
E - Shoulder pivot from back	mm	83.8 to 94.0	91.0	Pass
F - Thigh clearance	mm	139.7 to 154.9	152.0	Pass
G - Elbow back to wrist pivot	mm	289.6 to 304.8	301.0	Pass
H - Skull cap to back line	mm	40.6 to 45.7	44.0	Pass
I - Shoulder to elbow length	mm	330.2 to 345.4	332.0	Pass
J - Elbow rest height	mm	190.5 to 210.8	205.0	Pass
K - Buttock to knee length	mm	579.1 to 604.5	603.1	Pass
L - Poplipteal length	mm	429.3 to 454.7	451.0	Pass
M - Knee pivot height	mm	485.1 to 500.4	500.0	Pass
N - Buttock poplipteal length	mm	452.1 to 477.5	470.0	Pass
O - Chest depth	mm	213.4 to 228.6	226.0	Pass
P - Foot length	mm	251.5 to 266.7	260.0	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	999.0	Pass
Z - Waist circumference	mm	835.7 to 866.1	864.0	Pass
AA - Location for chest circumference	mm	429.3 to 434.3	430.0	Pass
BB - Location for waist circumference	mm	226.1 to 231.1	229.0	Pass
		Overall Test Results		Pass

Laboratory Technician

December 15, 1999
Test Date

James E. Hoth
Approved By

12/15/99
Date

KAR20001-06

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

ATD Serial No.: 35 Part Serial No.: n/a Test I.D.: LK12B

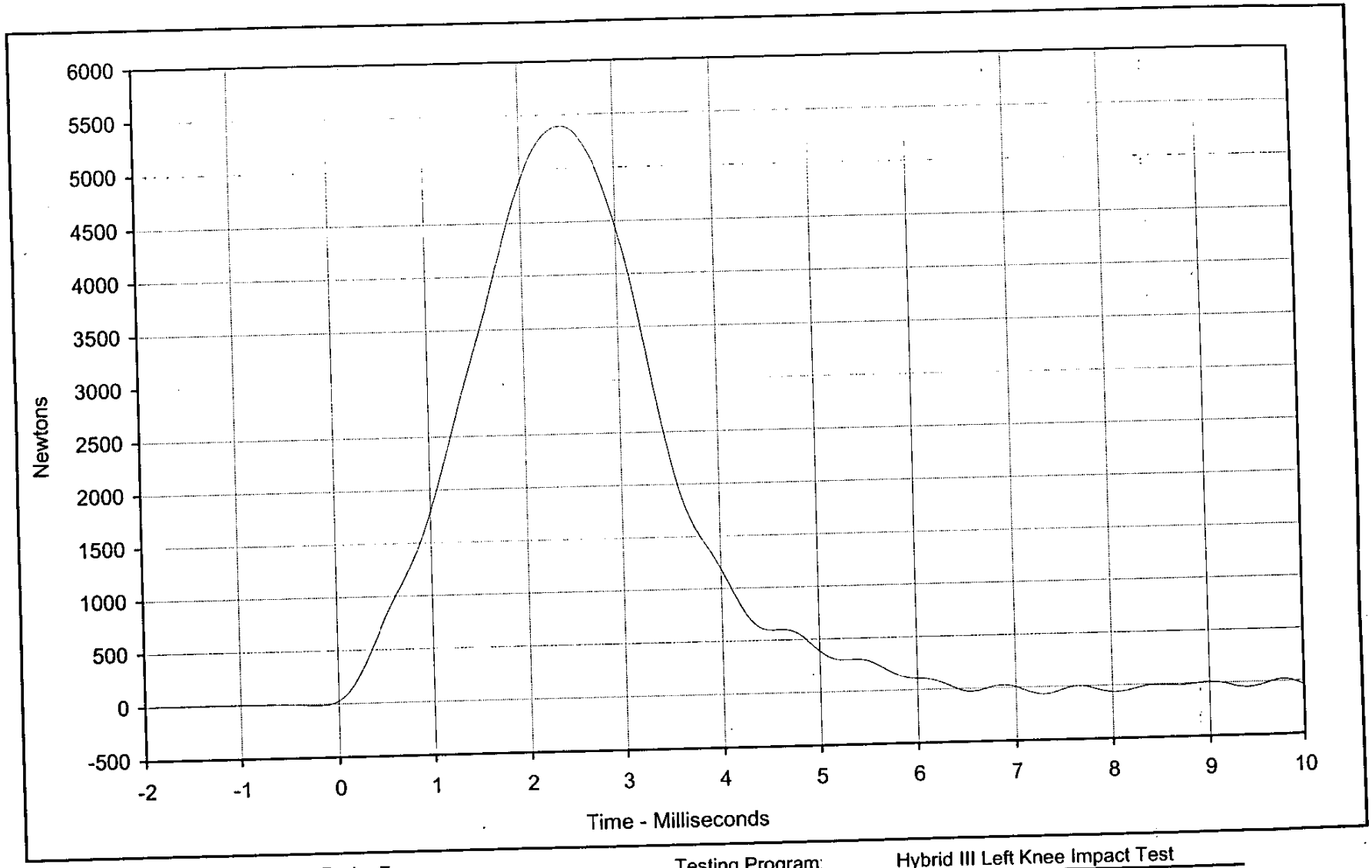
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Velocity	m/s	2.073 to 2.134	2.088	Pass
Peak Probe Force	Newtons	4715 to 5782	5391.7	Pass
		Overall Test Results		Pass

Laboratory Technician

December 14, 1999
Test Date

James E. Hoth
Approved By

12/14/99
Date



Curve Description: Probe Force

Maximum Value: 5391.7 at 2.4 Milliseconds

Minimum Value: -69.9 at 7.3 Milliseconds

SAE Filter Class: 600

Date of Test: 12/14/99

ATD Serial No.: 35

Testing Program: Hybrid III Left Knee Impact Test

Test Information: Part S/N: n/a Test I.D.: LK12B

KARCO Engineering

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

ATD Serial No.: 35 Part Serial No.: n/a Test I.D.: RK12B

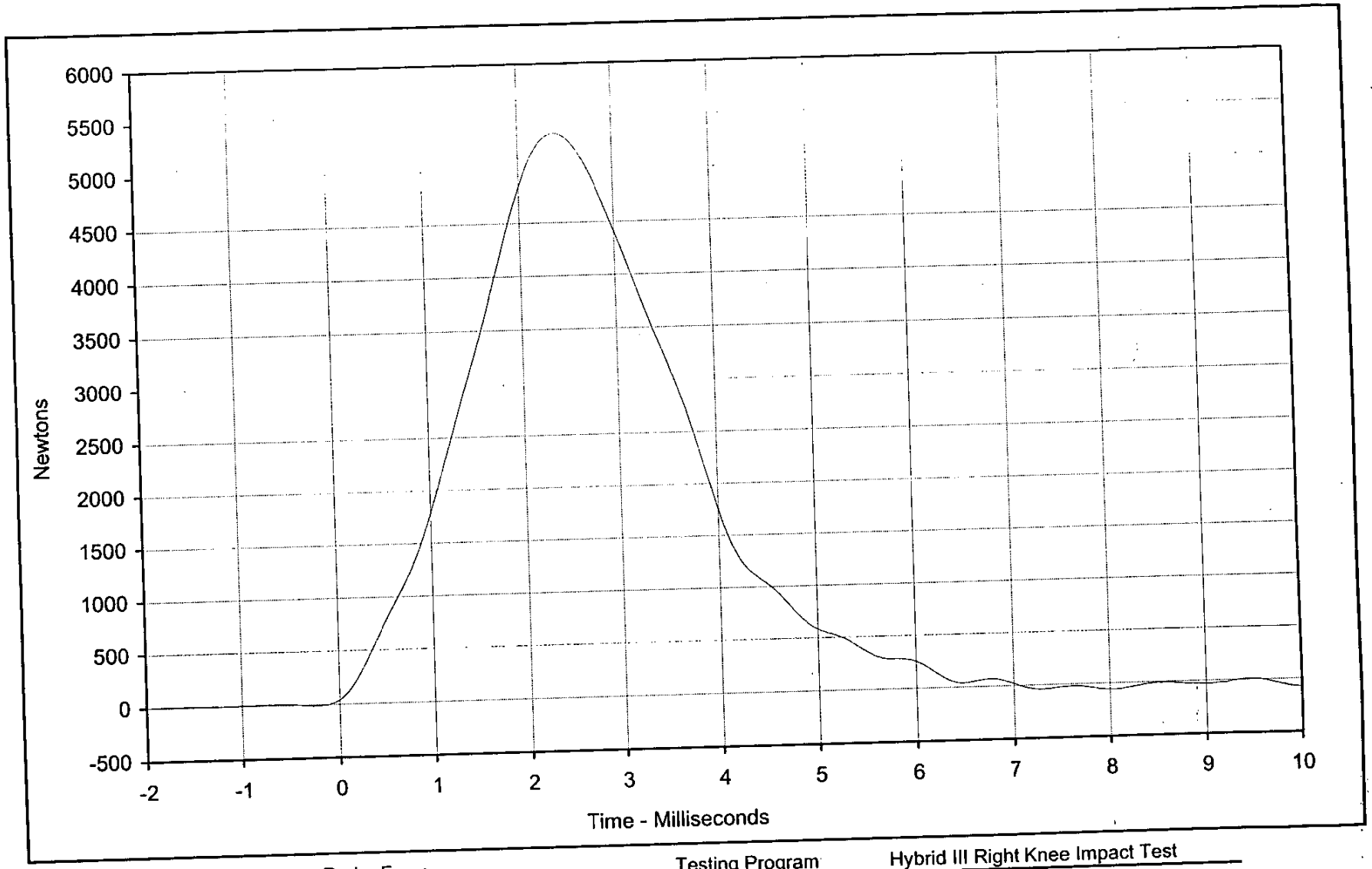
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Velocity	m/s	2.073 to 2.134	2.106	Pass
Peak Probe Force	Newtons	4715 to 5782	5336.0	Pass
		Overall Test Results		Pass

Laboratory Technician

December 14, 1999
Test Date

James E. Smith
Approved By

12/14/99
Date



Curve Description: Probe Force

Maximum Value: 5336.0 at 2.4 Milliseconds

Minimum Value: -60.2 at 8.0 Milliseconds

SAE Filter Class: 600

Date of Test: 12/14/99

ATD Serial No.: 35

Testing Program: Hybrid III Right Knee Impact Test

Test Information: Part S/N: n/a Test I.D.: RK12B

KARCO Engineering

Hybrid III Calibration Data Sheet
50TH Percentile Male
Head Drop Calibration

ATD Serial No.: 035 Part Serial No.: n/a Test I.D.: HD12B

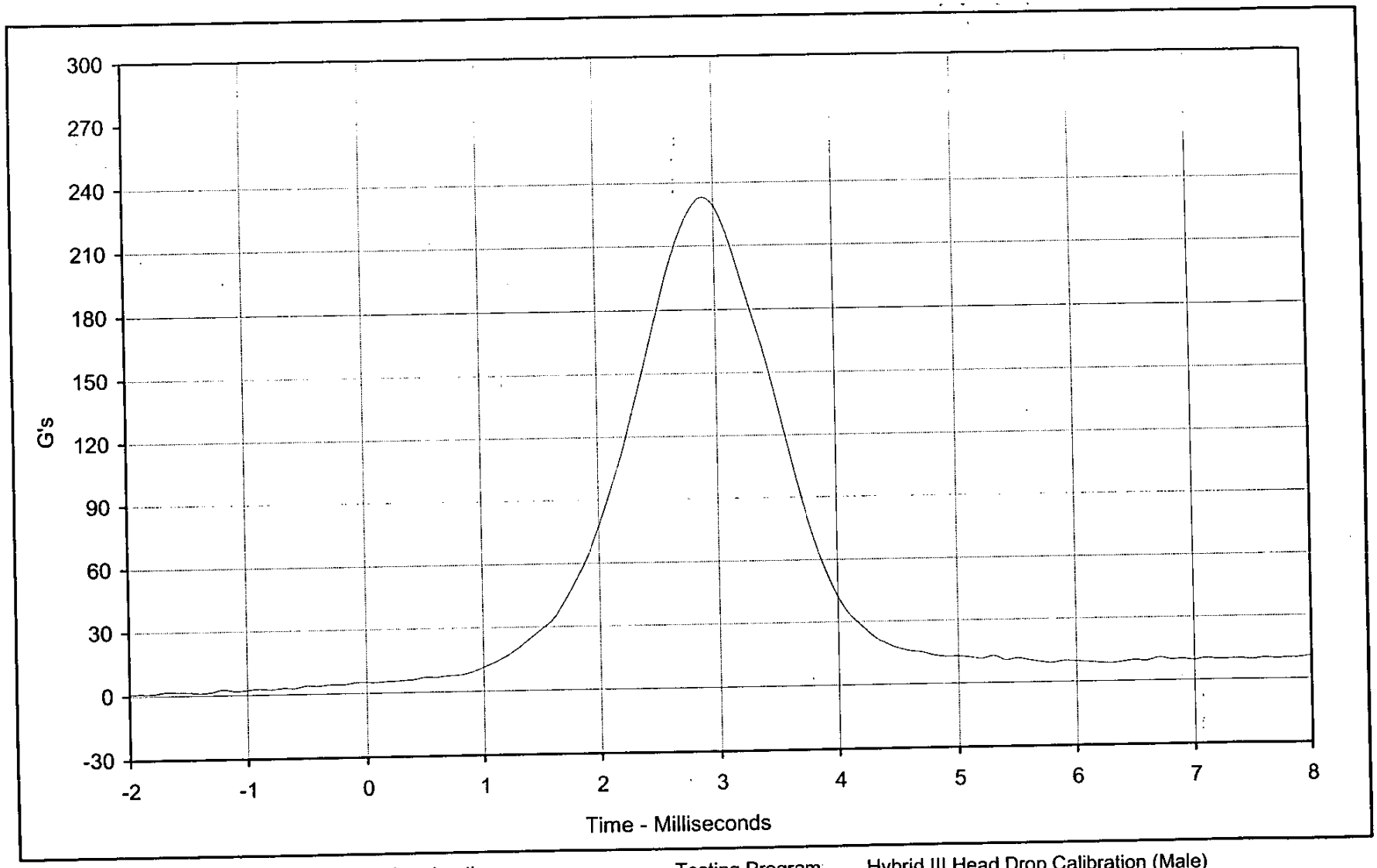
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	233.0	Pass
Peak Lateral Acceleration	G's	≤15.0	3.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

December 14, 1999
Test Date

James E. Hoth
Approved By

12/14/99
Date



Curve Description: Head Resultant Acceleration

Maximum Value: 233.0 at 2.9 Milliseconds

Minimum Value: 0.8 at -2.0 Milliseconds

SAE Filter Class: 1000

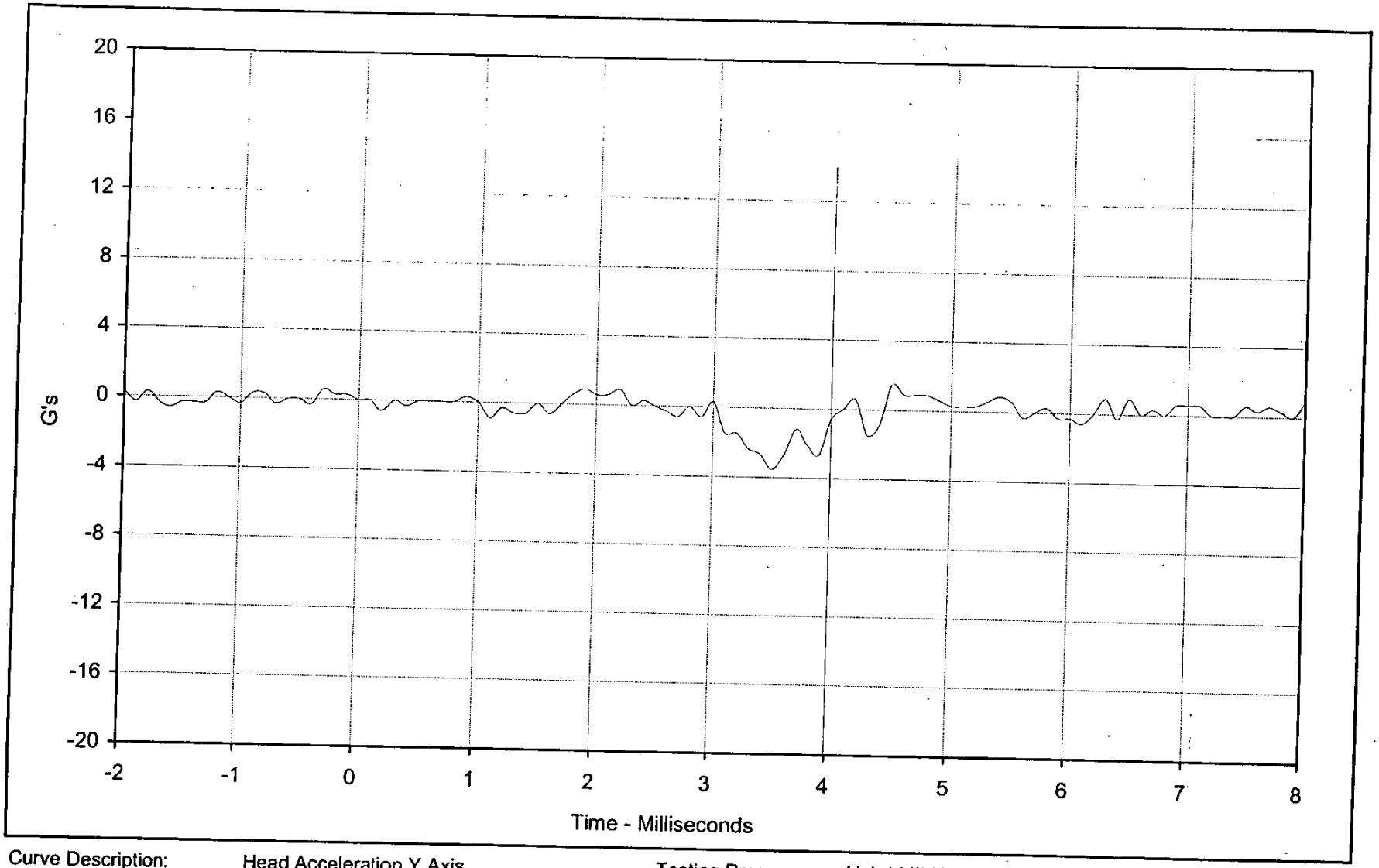
Date of Test: 12/14/99

ATD Serial No.: 035

Testing Program: Hybrid III Head Drop Calibration (Male)

Test Information: S/N of Part: n/a Test I.D.: HD12B

KARCO Engineering



Curve Description: Head Acceleration Y Axis

Maximum Value: 1.5 at 4.5 Milliseconds

Minimum Value: -3.5 at 3.5 Milliseconds

SAE Filter Class: 1000

Date of Test: 12/14/99

ATD Serial No.: 035

Testing Program: Hybrid III Head Drop Calibration (Male)

Test Information: S/N of Part: n/a Test I.D.: HD12B

KARCO Engineering

Hybrid III Calibration Data Sheet
50TH Percentile Male
Thorax Impact Test

ATD Serial No.: 35 Part Serial No.: N/A Test I.D.: CH12A

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	6.75	Pass
Peak Probe Force	Newtons	5159 to 5893	5828	Pass
Peak Sternum Displacement	CM	6.35 to 7.26	6.65	Pass
Internal Hysterysis	%	69 to 85	75.6	Pass
		Overall Test Results		Pass

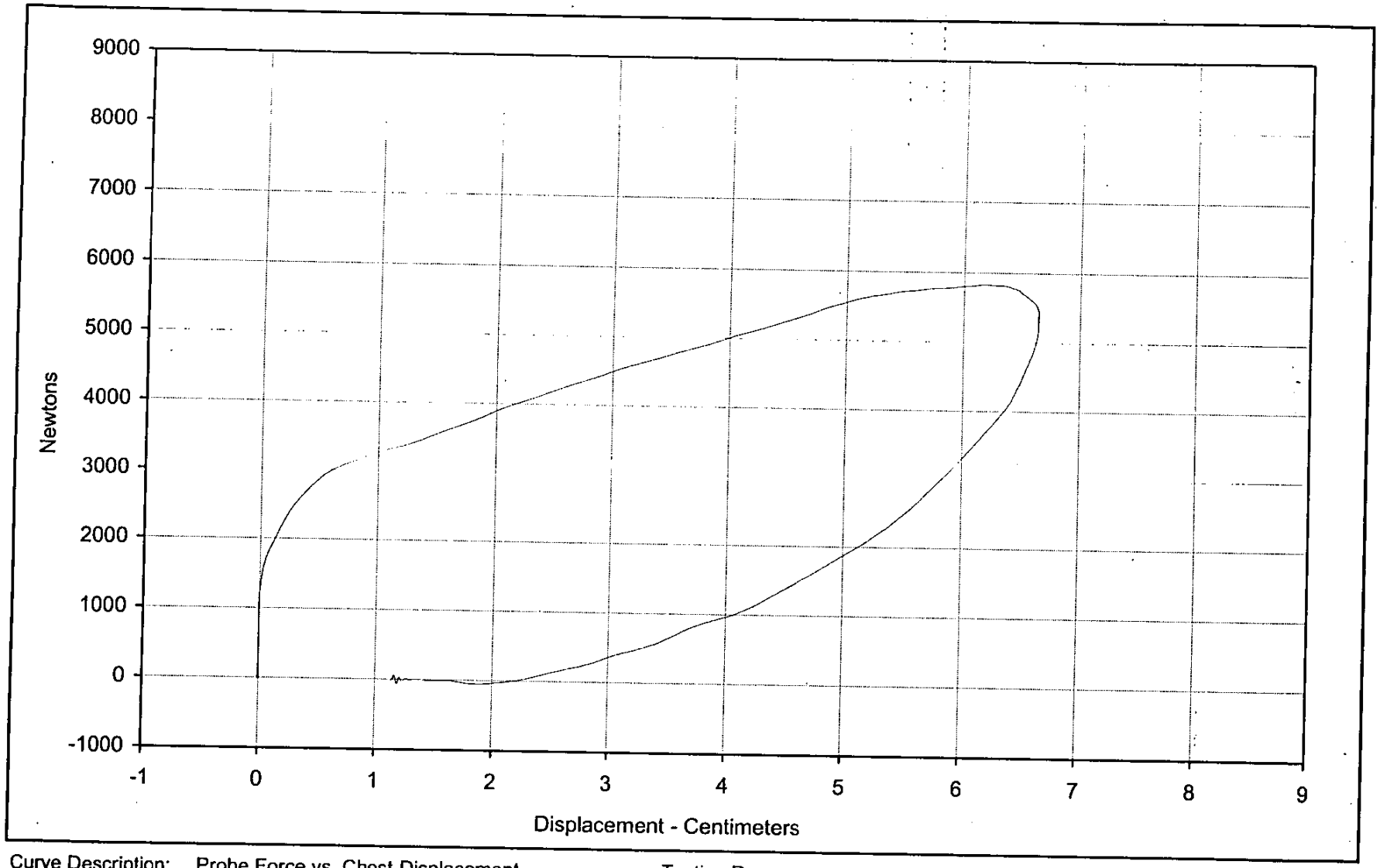
Laboratory Technician

December 14, 1999
Test Date

James E. Hoth
Approved By

12/14/99
Date

KAR20001-06



Curve Description: Probe Force vs. Chest Displacement

Probe Force: 5828.0 Newtons

Chest Displ.: 6.65 Centimeters

SAE Filter Class: 180

Date of Test: 12/14/99

ATD Serial No.: 35

Testing Program: Hybrid III Thorax Impact Test

Test Information: S/N of Part: N/A Test I.D.: CH12A

KARCO Engineering

Hybrid III Calibration Data Sheet
50TH Percentile Male
Neck Flexion Test

ATD Serial No.: 35 Part Serial No.: n/a Test I.D.: NF12A

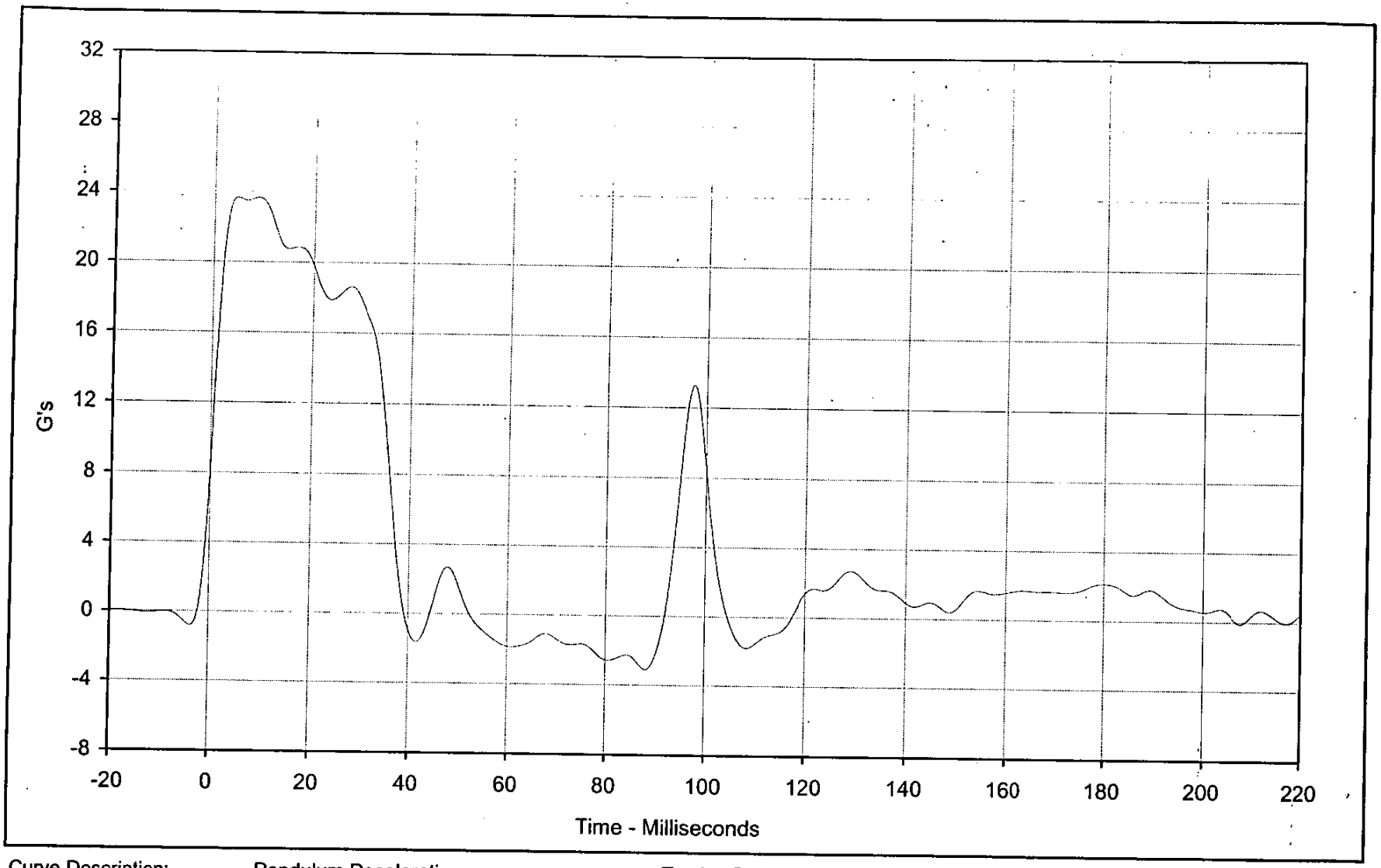
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	40	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.99	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.5	Pass
	20 Msec.	G's	17.6 to 22.6	19.8	Pass
	30 Msec.	G's	12.5 to 18.5	17.7	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	17.7	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	36.9	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	70.7	Pass
	Time	Msec.	57.0 to 64.0	59.3	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	117.6	Pass
Moment About Occipital Condyle	Maximum	N • m	84.1 to 108.5	89.2	Pass
	Time	Msec.	47.0 to 58.0	54.8	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	100.4	Pass
			Overall Test Results		Pass

Laboratory Technician

December 15, 1999
Test Date

James E. Goth
Approved By

12/15/99
Date



Curve Description: Pendulum Deceleration

Maximum Value: 23.7 at 8.7 Milliseconds

Minimum Value: -3.1 at 88.1 Milliseconds

SAE Filter Class: 60

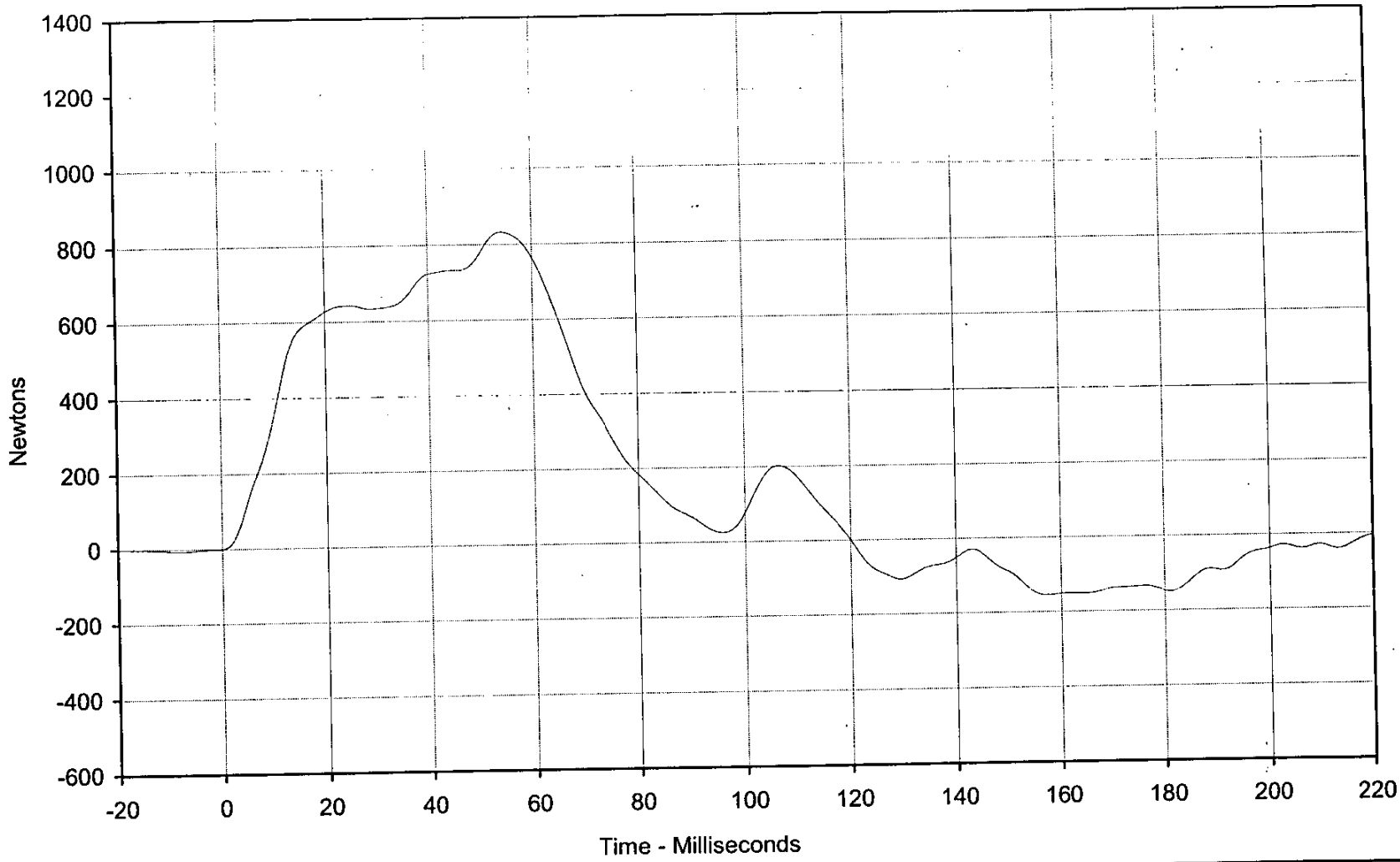
Date of Test: 12/15/99

ATD Serial No.: 35

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NF12A

KARCO Engineering



Curve Description: Neck Force X

Maximum Value: 832.0 at 54.1 Milliseconds

Minimum Value: -154.7 at 157.3 Milliseconds

SAE Filter Class: 60

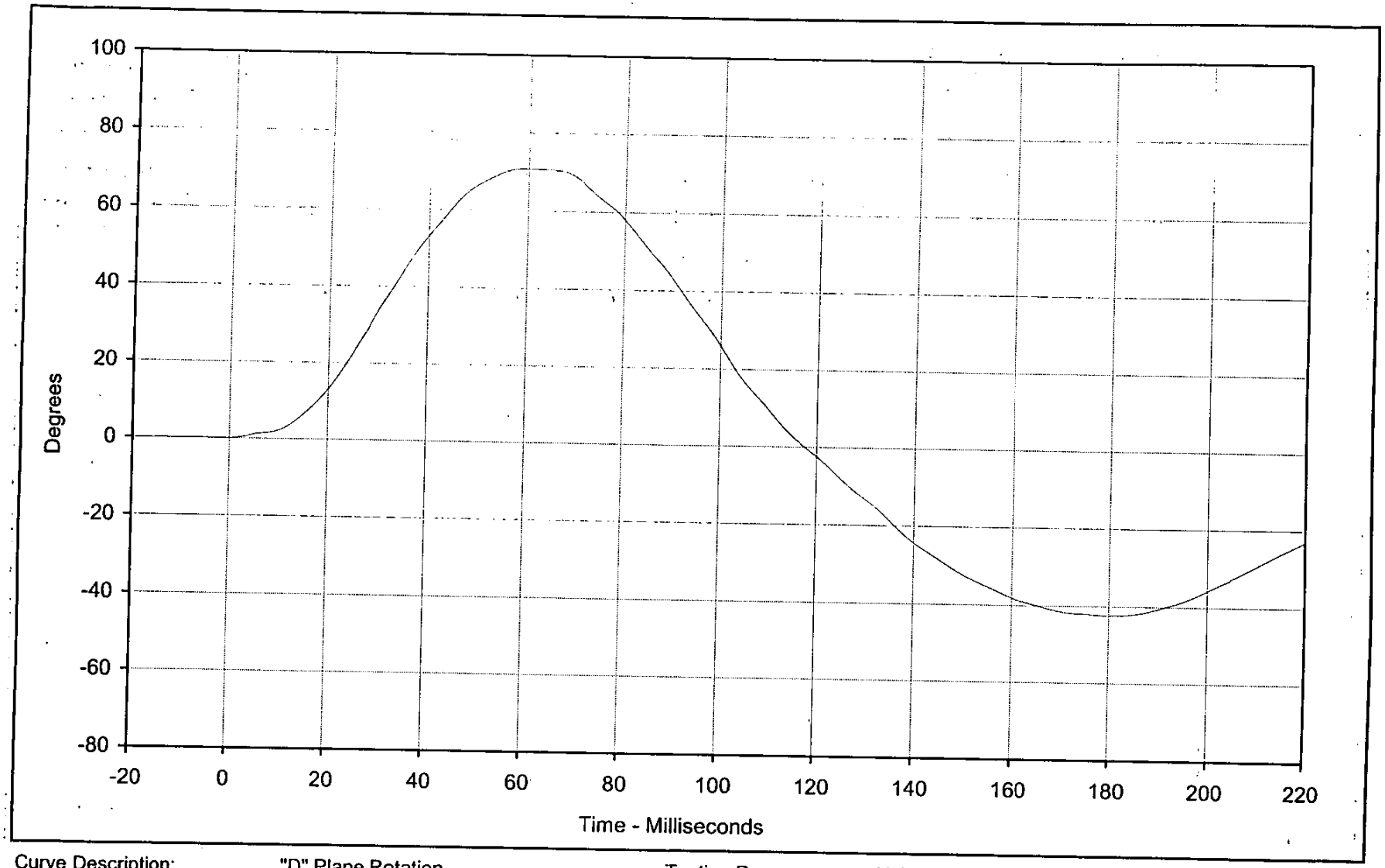
Date of Test: 12/15/99

ATD Serial No.: 35

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NF12A

KARCO Engineering



Curve Description: "D" Plane Rotation

Maximum Value: 70.7 at 59.3 Milliseconds

Minimum Value: -42.4 at 179.5 Milliseconds

SAE Filter Class: 60

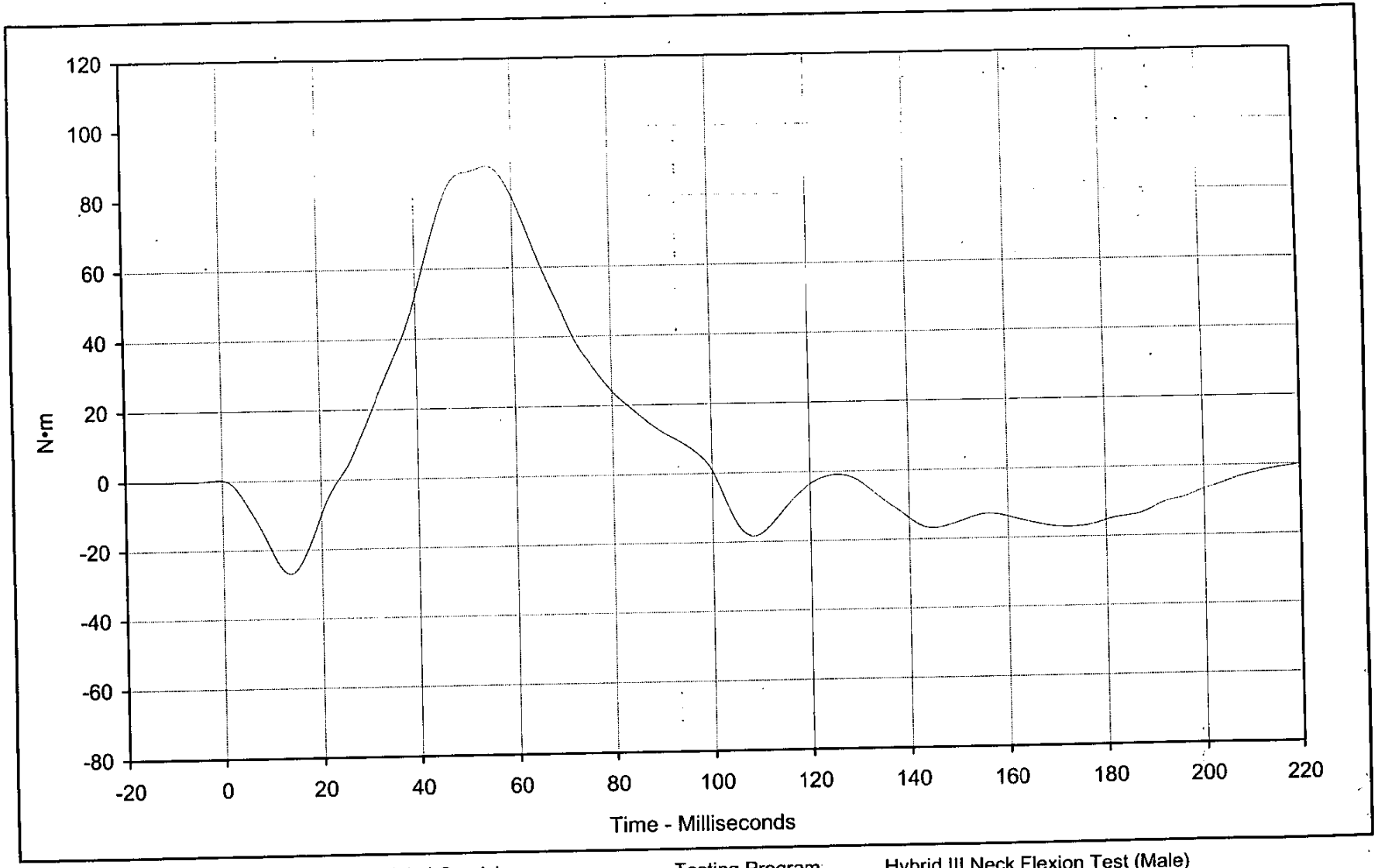
Date of Test: 12/15/99

ATD Serial No.: 35

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NF12A

KARCO Engineering



Curve Description: Moment About Occipital Condyles

Maximum Value: 89.2 at 54.8 Milliseconds

Minimum Value: -26.9 at 13.6 Milliseconds

SAE Filter Class: 60

Date of Test: 12/15/99

ATD Serial No.: 35

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NF12A

KARCO Engineering

Hybrid III Calibration Data Sheet
50TH Percentile Male
Neck Extension Test

ATD Serial No.: 035 Part Serial No.: n/a Test I.D.: NE12A

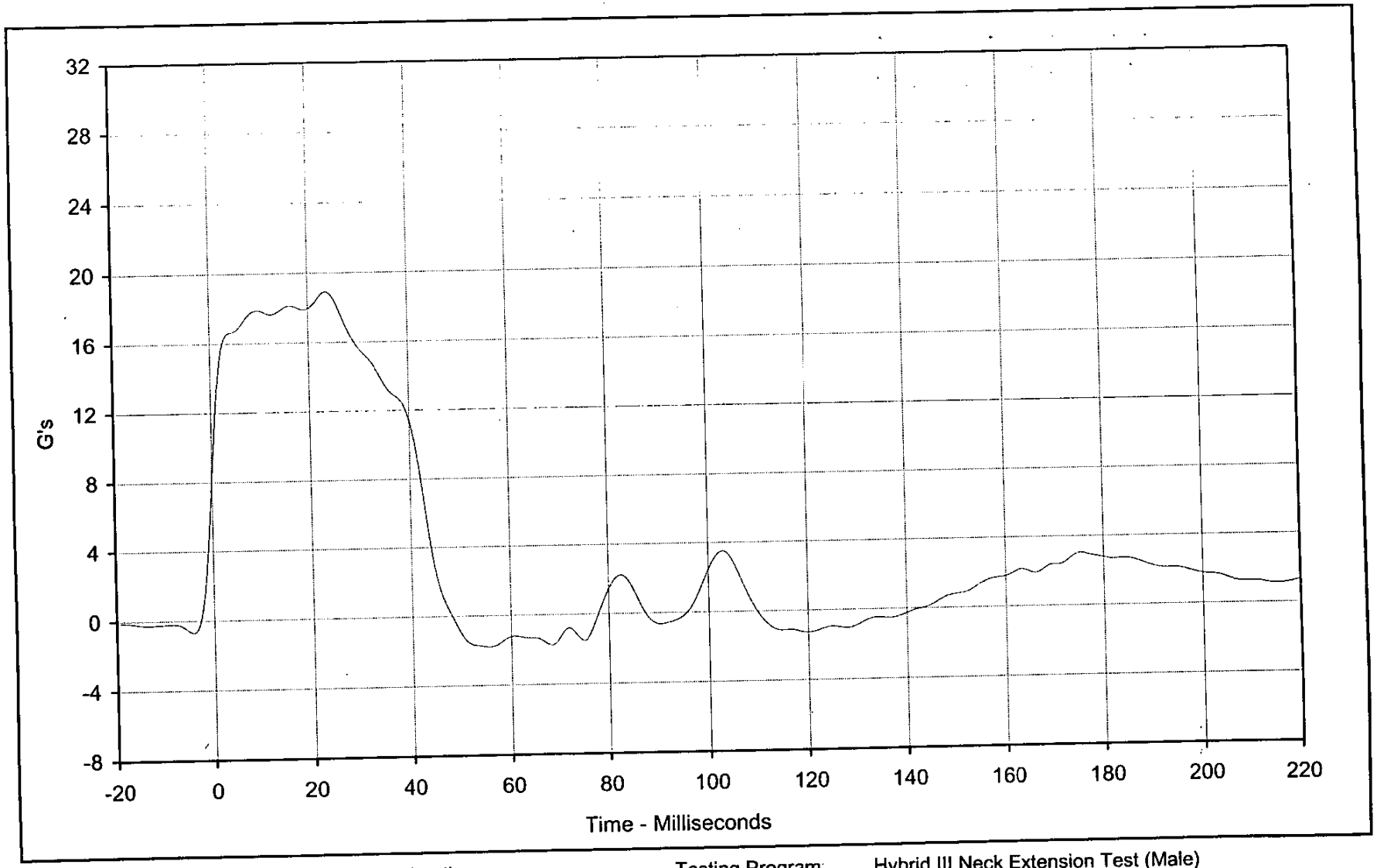
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	36	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.09	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	17.9	Pass
	20 Msec.	G's	14.0 to 19.0	18.0	Pass
	30 Msec.	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	43.6	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	94.6	Pass
	Time	Msec.	72.0 to 82.0	78.9	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	157.9	Pass
Moment About Occipital Condyle	Maximum	N • m	-52.9 to- 79.9	-68.0	Pass
	Time	Msec.	65.0 to 79.0	71.1	Pass
Negative Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	140.2	Pass
			Overall Test Results		Pass

Laboratory Technician

December 15, 1999
Test Date

James E. Hoitt
Approved By

12/15/99
Date



Curve Description: Pendulum Deceleration

Maximum Value: 18.9 at 23.5 Milliseconds

Minimum Value: -1.8 at 55.6 Milliseconds

SAE Filter Class: 60

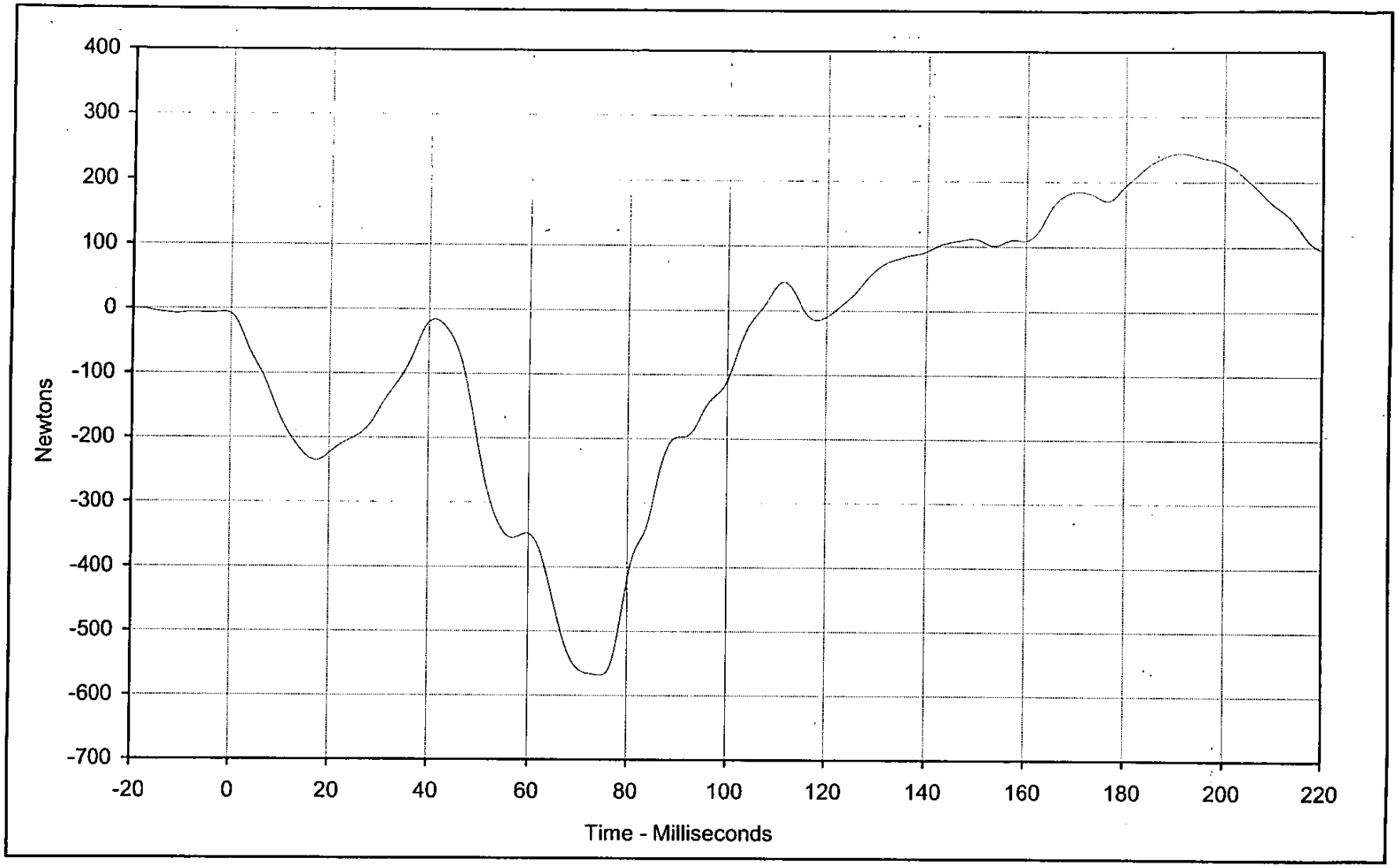
Date of Test: 12/15/99

ATD Serial No.: 035

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NE12A

KARCO Engineering

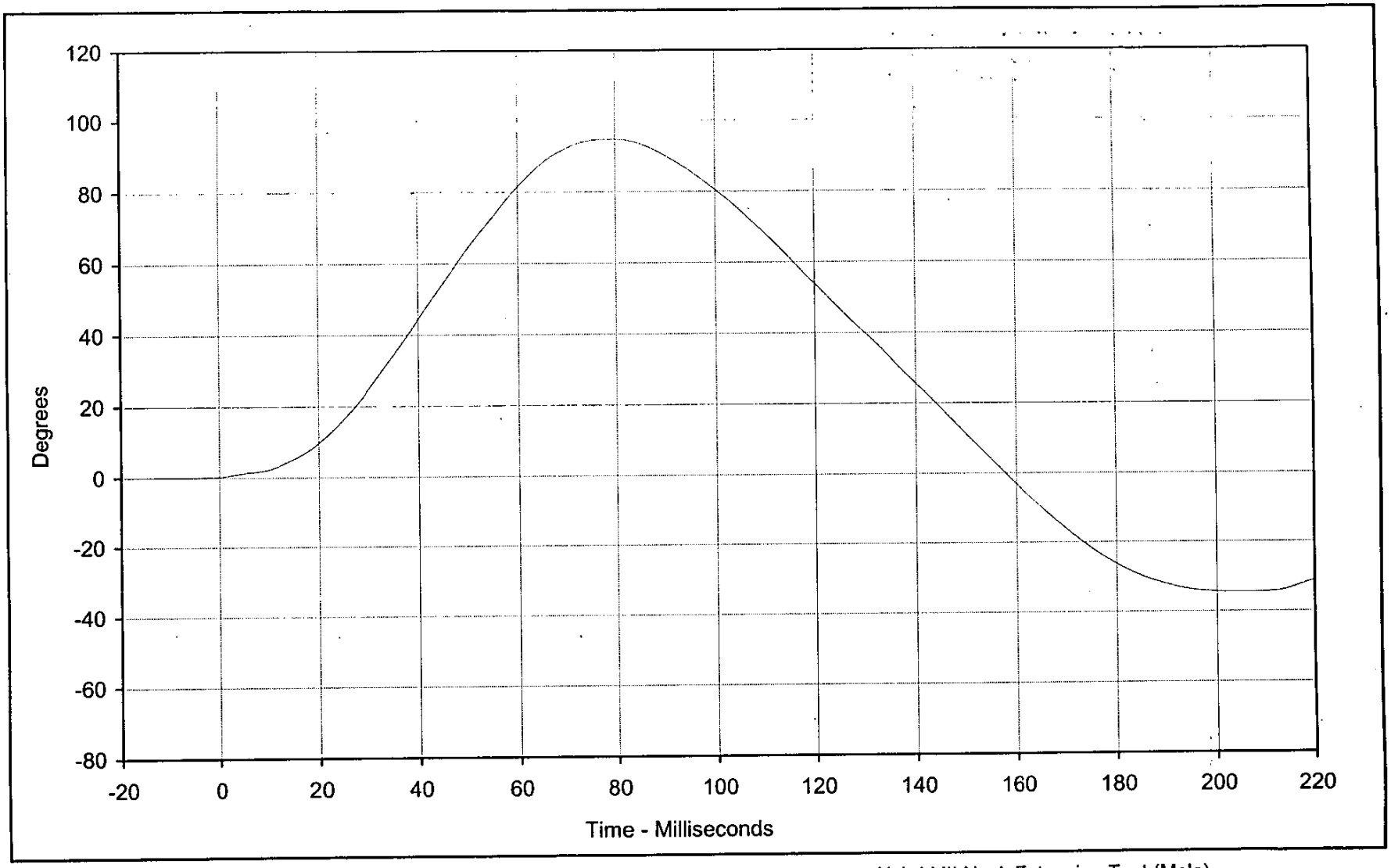


Curve Description:	Neck Force X			
Maximum Value:	244.2	at	191.1	Milliseconds
Minimum Value:	-568.3	at	74.6	Milliseconds
SAE Filter Class:	60			
Date of Test:	12/15/99			
ATD Serial No.:	035			

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NE12A

KARCO Engineering



Curve Description: "D" Plane Rotation

Maximum Value: 94.6 at 78.9 Milliseconds

Minimum Value: -34.4 at 207.6 Milliseconds

SAE Filter Class: 60

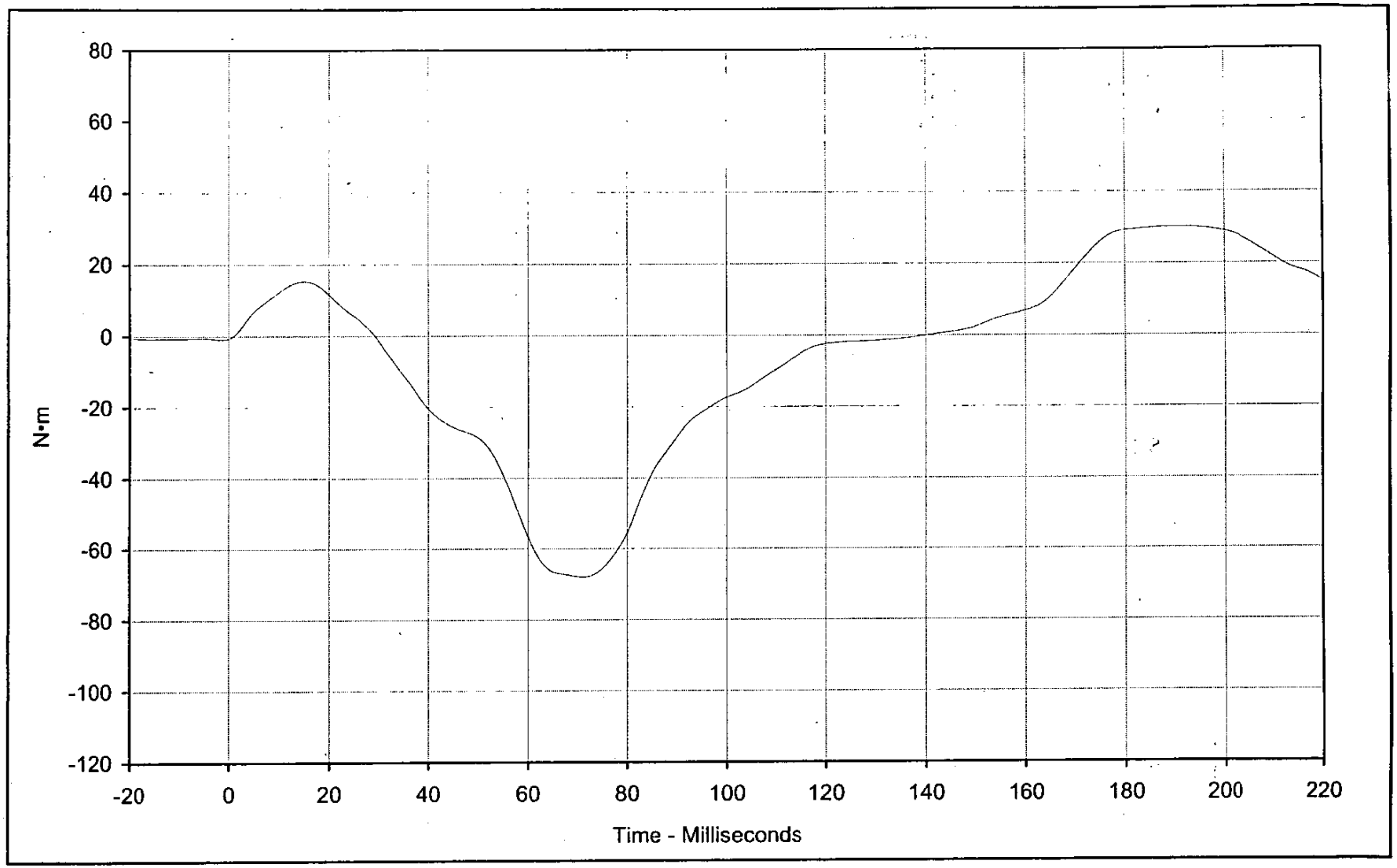
Date of Test: 12/15/99

ATD Serial No.: 035

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NE12A

KARC Engineering



Curve Description: Moment About Occipital Condyles

Maximum Value: 30.1 at 188.9 Milliseconds

Minimum Value: -68.0 at 71.1 Milliseconds

SAE Filter Class: 60

Date of Test: 12/15/99

ATD Serial No.: 035

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: n/a Test I.D.: NE12A

KARCO Engineering

Hybrid III Calibration Data Sheet
50TH Percentile Male
External Measurements

ATD Serial No.: 035 Part Serial No.: N/A Test I.D.: N/A

External Measurement Data				
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory temperature	°C	20.4 to 22.1	20.9	Pass
Laboratory relative humidity	%	10 to 70	43	Pass
A - Total sitting height	mm	878.8 to 889.0	888.1	Pass
B - Shoulder pivot height	mm	505.5 to 520.7	50.0	Pass
C - "H" point height	mm	83.8 to 88.9	88.0	Pass
D - "H" point from seat back	mm	134.6 to 139.7	136.0	Pass
E - Shoulder pivot from back	mm	83.8 to 94.0	92.0	Pass
F - Thigh clearance	mm	139.7 to 154.9	152.0	Pass
G - Elbow back to wrist pivot	mm	289.6 to 304.8	301.0	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	332.0	Pass
J - Elbow rest height	mm	190.5 to 210.8	205.0	Pass
K - Buttock to knee length	mm	579.1 to 604.5	586.0	Pass
L - Poplipteal 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 poplipteal length	mm	452.1 to 477.5	470.0	Pass
O - Chest depth	mm	213.4 to 228.6	226.0	Pass
P - Foot length	mm	251.5 to 266.7	260.0	Pass
V - Shoulder breadth	mm	421.6 to 436.9	431.0	Pass
W - Foot breadth	mm	91.4 to 106.7	101.0	Pass
Y - Chest circumference	mm	970.3 to 1000.8	998.0	Pass
Z - Waist circumference	mm	835.7 to 866.1	840.0	Pass
AA - Location for chest circumference	mm	429.3 to 434.3	431.0	Pass
BB - Location for waist circumference	mm	226.1 to 231.1	228.0	Pass
		Overall Test Results		Pass

Laboratory Technician — December 15, 1999 Test Date

James E. Hatt — Approved By — 12/15/99 Date

APPENDIX F

VEHICLE OWNER'S MANUAL

OCCUPANT RESTRAINT INSTRUCTIONS

How to wear safety belts properly

Safety belts must always be properly positioned across the strongest bones of your body.

WARNING

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

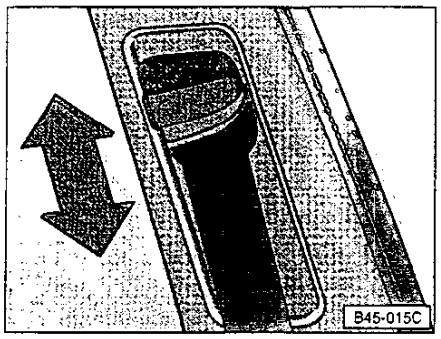
Safety belts can work only when used properly. Never wear safety belts in any other way than illustrated and described in this section. Always observe the following precautions:

- **Never wear belts twisted.**
- **Never strap more than one person, including small children, into any 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.**
- **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.**

WARNING continued

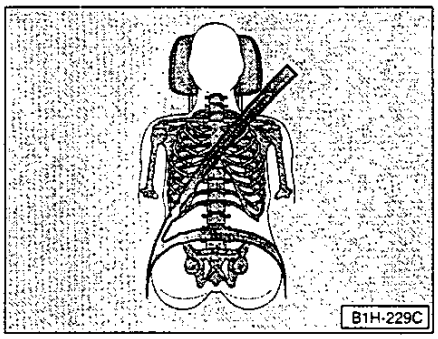
- **Do not wear the shoulder part of the belt under your arm or otherwise out of position.**
- **Several layers of heavy clothing may interfere with proper positioning of belts and reduce the overall effectiveness of the system.**
- **Never allow safety belts to become damaged by being caught in door or seat hardware. Always keep belt buckles free of any obstruction that may prevent secure locking.**
- **Never use comfort clips or devices that create slack in the shoulder belt portion. However, clips may be required for the proper use of some child restraint systems.**
- **Torn or frayed safety belts can tear and damaged belt hardware can break in an accident. Inspect belts periodically.**

If belts show damage to webbing, bindings, buckles, or retractors, have them replaced.



Safety belt height adjustors for the front seats and the rear outer seating positions can be used to adjust the height of the shoulder portion of the safety belt. This feature will help you properly position the shoulder portion of the safety belt across your shoulder.

- To adjust the height of the safety belt, press the upper part of the handle in the direction of the arrow, hold it in this position and then slide the height adjuster up or down until the shoulder portion of the safety belt is positioned directly over the center of your shoulder – **it must never rest against the neck** (see right illustration.
- Pull on the shoulder belt to check whether the belt anchor is securely locked in place.

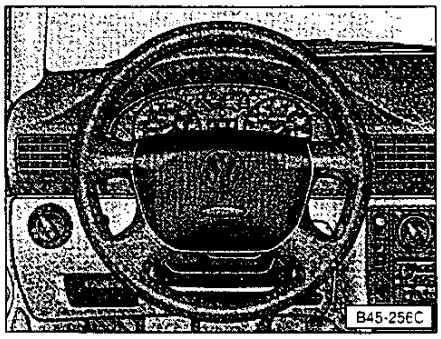


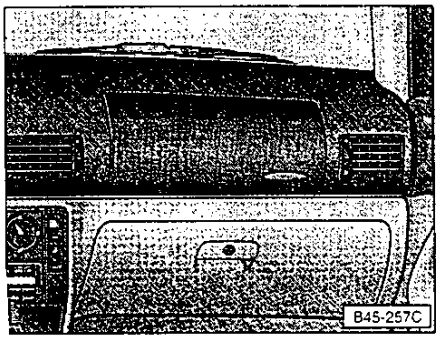
The shoulder belt must be positioned over the shoulder.
It must never rest against the neck and must fit against your body. The lap belt must be worn low and tight across the pelvis.
See illustration above. Pull belt tight.

WARNING

Always heed WARNINGS on next page.

Airbag system





Your vehicle has **two front, two side and two head airbags**, one front one side airbag for each front seat occupant. The head airbags cover the window area on the front and rear doors on both sides of the vehicle.

Front airbag

The airbag for the driver is located in the steering wheel hub and is marked "AIRBAG." The airbag for the front passenger's seat is located in the instrument panel above the glove compartment and is also marked with "AIRBAG." See illustration.

It is very important to remember that **front airbags** only supplement the three point safety belts in some frontal accidents in which the vehicle deceleration is high enough to activate the airbags.

Front airbags are not activated...

- if the ignition is switched off
- in side collisions
- in rear-end collisions
- in rollovers.

Front airbags may not inflate in certain frontal collisions. Vehicle damage, repair costs or even the lack of vehicle damage is not necessarily an indication of proper airbag operation.

The front airbags can only provide additional protection for the chest and face of the driver and the front seat passenger when...

- safety belts are worn properly,
- the seats have been positioned so that the occupant is properly seated as far as possible from the airbag
- and the head restraints have been properly adjusted.

Airbags do not protect the lower part of the body.

Safety belts are important to help keep front seat occupants in the proper seated position so that airbags can unfold properly and provide added protection as intended.

For more details see next pages.

Importance of proper seating position

In a collision airbags must inflate within a blink of an eye and with considerable force. The supplemental airbags could injure you if you are not seated properly. Therefore in order to help the airbag to do its job, it is important, both as a driver and as a passenger to sit properly at all times. By keeping room between your body and the front of the passenger compartment, the airbag can inflate fully and completely and provide supplemental protection in certain frontal collisions. See page 43 for information on the adjustment of the front seats and also "Front seats" → ***booklet 3.1,*** for details on the operation of the seat adjustment controls. It's especially important that children be properly restrained. See chapter "Child safety", page 31.

WARNING

o Sitting too close to the steering wheel (less than 10 inch, 25 cm) or instrument panel will decrease the effectiveness of the airbags and will increase the risk of personal injury in an accident.

o If you are unrestrained, leaning forward, sitting sideways or out of position in any way, your risk of injury is much higher. You will also receive serious or fatal injuries from the airbag if you are up against it or too close to it when it inflates.

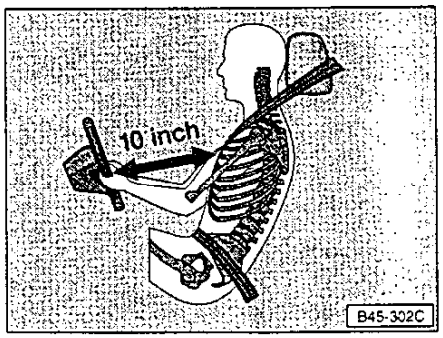
WARNING continued

o To reduce the risk of injury when an airbag inflates, always wear safety belts properly.
See "How to wear the safety belts properly" in this booklet.

o Children age 12 or younger should always ride in the rear seat. If children are not properly restrained, they may be severely injured or killed when an airbag inflates. Never let children ride unrestrained or improperly restrained in the vehicle.

o Adjust the front seats properly.

- **Never ride with the backrest reclined.**
- **Always sit as far as possible from the the steering wheel or the instrument panel.**
- **Always sit upright with your back against the backrest of your seat.**
- **Never place your feet on the instrument panel or on the seat. Always keep both feet on the floor in front of the seat to help prevent serious injuries to the legs and hips if the airbag inflates.**



There is a lot that you and your passengers can do to help the individual safety features installed in your Volkswagen work together as a system.

Adjusting the driver's seat

For detailed steps for adjusting the driver's seat please see "Front Seats" on page 43.

We recommend that you adjust the driver's seat as follows:

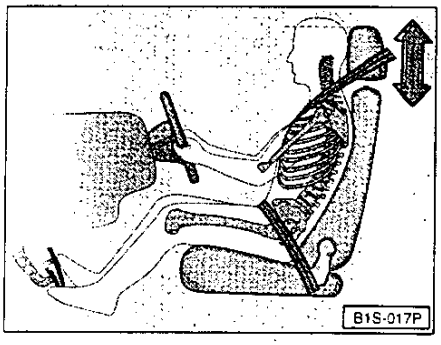
- adjust the seat in fore and aft direction so that you can easily push the pedals all the way while keeping your knee slightly bent.
- adjust the seatback so that when you sit with your back against the seatback, you can still grasp the top of the steering wheel.
- adjust the steering wheel – see below and chapter "Adjustable steering column" ➜ ***booklet 3.1.***
- the distance from the center of your breastbone to the center of the airbag cover on the steering wheel must be **at least** 10 inches (25 cm) or more. See illustration.

⚠ WARNING

o Never sit closer than 10 inches (25 cm) to the steering wheel.

o If you cannot sit more than 10 inches (25 cm) from the steering wheel, we recommend that you investigate whether adaptive equipment may be available to help you reach the pedals and increase your seating distance from the steering wheel.

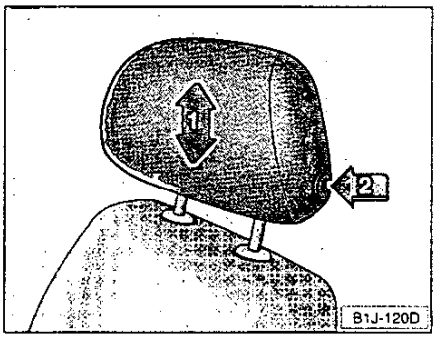
Head restraints



The padded head restraints are adjustable.

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

For maximum protection, the upper edge should be at least at eye level or higher (see illustration).

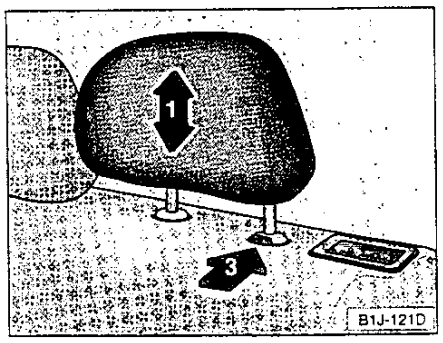


Height adjustment (arrow 1)

o For height adjustment, grasp firmly with both hands and pull up. To push the front head restraints down, press the button (arrow 2).

⚠ WARNING

Head restraints are designed to help reduce injuries in an accident. Do not drive the vehicle without the head restraints in place and properly adjusted.



Removing

Front head restraints

To **remove** the head restraints, pull the head restraint upward until it stops. Then press the button (arrow 2). While doing this, Pull the head restraint upward and remove.

Rear head restraints

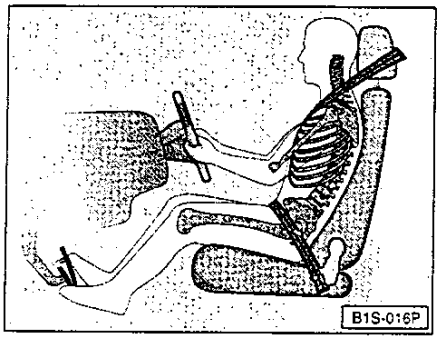
To **remove** the rear head head restraints, pull the head restraint upward until it stops. Then press the button (arrow 3) on the rod. While doing this, pull the head restraint upward and remove.

Reinstalling

Front and rear head restraints

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

Front seats



The correct positioning of the seats is important:

- so that you can reach all the controls on the vehicle quickly and safely;
- so that you can drive or ride relaxed which helps reduce fatigue
- **and for maximum protection offered by the safety belts and airbag system.**

Therefore, always adjust the position of the front seats as described on the following pages and in the chapter "Front seats" ***→ booklet 3.1.***
Remember to adjust the seats before fastening the safety belts and before driving off. Always be sure to follow these general guidelines:

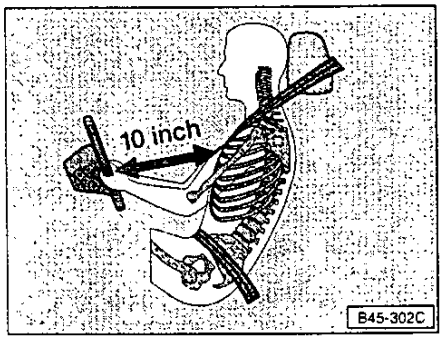
⚠ WARNING

o Always sit as far away from the steering wheel and the instrument panel as possible.

o Never sit less than 10 inches (25 cm) from the steering wheel and the instrument panel.

o Do not adjust seats while the vehicle is moving. Your seat may move unexpectedly, causing sudden loss of vehicle control and personal injury.

o Passengers must always keep their feet on the floor whenever the vehicle is moving. Never place feet on the dashboard or on the seats. In an accident, serious personal injury can result from an improper seating position.



WARNING

- **Never sit closer than 10 inches (25 cm) to the steering wheel.**
- **If you cannot sit more than 10 inches (25 cm) from the steering wheel, we recommend that you investigate whether adaptive equipment may be available to help you reach the pedals and increase your seating distance from the steering wheel.**

Driver's seat

To avoid contact with the airbag while it is unfolding, the driver must not sit any closer to the steering wheel than necessary and always properly wear the three point safety belt provided.

We recommend that you adjust the driver's seat as follows:

- adjust the seat in fore and aft direction so that you can easily push the pedals all the way while keeping your knee slightly bent.
- adjust the seatback so that when you sit with your back against the seatback, you can still grasp the top of the steering wheel.
- adjust the steering wheel so that the distance from the center of your breastbone to the center of the airbag cover on the steering wheel must be **at least** 10 inches (25 cm) or more.
  See illustration above and chapter "Front seats" ➔ ***booklet 3.1***.

Front passenger's seat

To avoid contact with the airbag while it is unfolding, the adult front seat passenger must not sit any closer to the instrument panel than necessary and always properly wear available three point belts.

We recommend that you adjust the passenger's seat as follows:

- backrest upright (**never** reclined)
- place your feet on the floor in front of the passenger's seat
- adjust the passenger's seat as far as possible to the rear of the fore and aft adjustment range.

WARNING

o Always keep both feet on the floor in front of the seat.

o Never place your feet on the instrument panel or on the seat. If the airbag inflates and your feet are on the instrument panel or on the seat, your could receive serious personal injuries to the legs, hips and even the head if the airbag inflates.

For safety information on transporting children on the front passenger seat see page 31.

WARNING

o To reduce the risk of personal injury in an accident, front seat passengers must never ride in a moving vehicle with the seatback reclined. Safety belts offer protection only when the seatback is upright and belts are properly positioned on the body. The more the seatback is reclined, the greater the risk of personal injury from an out-of-position safety belt.

o For driver's and passenger's protection, make sure front seats and seatbacks are securely locked in place.

o Never store items under the seats. Loose objects can interfere with the seat latching mechanism and can also cause personal injury in an accident.