

REPORT NUMBER KAR22001-01

**NEW CAR ASSESSMENT PROGRAM
FRONTAL BARRIER IMPACT TEST**

**KIA MOTORS CORPORATION
2002 KIA SEDONA LX
MINIVAN**

NHTSA NUMBER: M25009

**PREPARED BY:
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DECEMBER 20, 2001

FINAL REPORT

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16. Abstract A 35 mph (56.3 km/h) frontal barrier impact was conducted on a 2002 Kia Sedona LX Minivan at KARCO Engineering on 12/7/01. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The impact velocity is 55.94 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 556 mm located at 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	338.8	249.9
Max. Thorax Accel. (3 msec Clip)		G's	60	42.5	36.9
Left Femur force		Newtons	10009	-4775.0	-3462.4
Right Femur Force		Newtons	10009	-5043.8	-3980.5
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SECTION 1

PURPOSE AND SUMMARY OF TEST M25009

1.1 PURPOSE

This 35 mph (56.3 km/h) frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-01-D-02005. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 30 mph (48.3 km/h) requirements.

The 35 mph (56.3 km/h) frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Test procedure.

1.2 SUMMARY

A load cell barrier consisting of 24 load cells was impacted by a 2002 Kia Sedona LX Minivan at a velocity of 55.85 km/h. The test was performed at Karco Engineering on December 7, 2001. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time and 16 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

Two Part 572E, 50th percentile male anthropomorphic test devices (ATDs), were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

Both ATDs were fully instrumented with nine accelerometer array head, chest and pelvis triaxial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, left and right knee sliders, and lower leg instrumentation. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver(position 1) ATD (Serial No. 34) and the right-front passenger (position 2) ATD (Serial No. 35) were calibrated previous to this test.

The Ninety-seven (97) channels of data were recorded on an on-board data acquisition system. Appendix B contains the vehicle and dummy 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 and restraint systems.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was no Stoddard solvent leakage after the event or during any phase of the static rollover.

Note: Driver side windshield had 355mm of separation. 210mm of windshield overlap on hood on passenger side.

The maximum static crush of the vehicle was 556 mm and both the driver and the passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: The driver ATD head contacted the airbag and headrest, its chest and abdomen contacted the airbag and seat belt, and both knees contacted the knee bolster.

The passenger's visible contact points were as follows: The passenger ATD head contacted the airbag and headrest. The chest and abdomen contacted the airbag and belt. Both knees contacted the glove box.

The driver and passenger were both equipped with Hybrid III 50th percentile dummy's nine accelerometer array head (NAAH) with redundant head C.G. accelerometers.

Occupant injury data contained in table below.

OCCUPANT DATA SUMMARY

ATD Position	HIC	Clip (g)	Chest Disp (mm)	Left Femur (N)	Right Femur (N)	Belt Spool (mm)
Driver	338.8	42.5	-22.0	-4775.0	-5043.8	129.6
Passenger	249.9	36.9	-23.7	-3462.4	-3980.5	119.2

SECTION 2
OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2002 Kia Sedona LX Minivan
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
 Test Date: 12/7/01

CONVERSION FACTORS USED IN THIS REPORT*

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

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

DATA SHEET NO. 1
CRASH TEST SUMMARY

Test Vehicle: 2002 Kia Sedona LX Minivan
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
Test Date: 12/7/01

PRIMARY IMPACT DATA

Measured Parameter	Units	Value
Velocity at Impact	km/h	55.94
Test Weight	kg	2328
Impact Angle	degrees	0
Average Rebound	mm	816
Maximum Static Crush	mm	556

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Front Door Opening	Opened by Hand	Opened by Hand
Rear Door Opening	Opened with aid of tools	Opened by Hand
Seat Track Shift (mm)	None	None
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	Belt/ Airbag	Belt/Airbag
Abdomen Contact	Belt	Belt/Airbag
Left Knee Contact	Knee Bolster	Glove Box
Right Knee Contact	Knee Bolster	Glove Box

16mm MOVIE COVERAGE

High Speed	16
Real Time	1
Total	17

DATA CHANNELS

Driver ATD Sensors	48
Passenger ATD Sensors	48
Belt Assessment Sensors	8
Vehicle Structure Accelerometers	9
Rigid Barrier Load Cells	24
Total	137

DATA SHEET NO. 2
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2002 Kia Sedona LX Minivan
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
 Test Date: 12/7/01

TEST VEHICLE INFORMATION

Make	Kia
Model	Sedona LX
Body Style	Minivan
NHTSA No.	M25009
VIN	KNDUP131526231645
Color	Green
Delivery Date	11/31/01
Odometer Reading (mi.)	132
Dealer	Long Beach Kia
Transmission	4 Speed Automatic
Final Drive	Front
Type/No. Cylinders	V-6
Engine Displacement (L)	3.5
Engine Placement	Longitudinal
Front Seat Side Airbag	No

TEST VEHICLE OPTIONS

Driver Front Airbag	Yes
Pass. Front 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	No
Anti-lock Brakes	No
Head Airbag	No
Anti-Theft System	No
Cruise Control	Yes
Bucket Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Kia Motor Corporation	GVWR (kg)	2625
Date of Manufacture	November-01	GAWR Front (kg)	1330
		GAWR Rear (kg)	1295

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	245	245
Cold Pressure (kPa)	245	245
Recommend Tire Size	P215/70R15	P215/70R15
Tire Size on Vehicle	P215/70/R15	P215/70/R15
Tire Manufacturer	Kumho	Kumho

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	None	
Number of Occupants	2	3	2	7
Capacity Wt. (VCW) (kg)				525
Cargo Weight (RCLW) (kg)				49

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

Test Vehicle: 2002 Kia Sedona LX Minivan
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NHTSA No.: M25009
 Test Date: 12/7/01

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	621	463		664	512	
Right	kg	611	438		658	494	
Ratio	%	57.8	42.2		56.8	43.2	
Totals	kg	1232	901	2133	1322	1006	2328

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2133
Weight of 2 P572 ATD's	kg	152
Rated Cargo/Luggage Weight (RCLW)	kg	49
Calculated Vehicle Target Weight (TVTW)	kg	2333

TEST VEHICLE ATTITUDE AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	750	754	757	764	1229
As Tested	mm	730	733	740	745	1258

Vehicle Wheel base (mm): 2912

Weight of Ballast secured in cargo area (kg): 10

Vehicle Components Removed: _____

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

FUEL SYSTEM DATA

Fuel System Capacity From Owner's Manual (L): 75.0

Usable Capacity Figure Furnished by COTR (L): 75.7

Actual Test Volume with entire fuel System Filled (L): 69.7

Test Fluid Type: Stoddard Solvent ; Specific Gravity: 0.764

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

Is Vehicle Fuel Pump Electric or Mechanical?: Electric

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

Fuel System Particulars: Driver side filler door, tank mounted at rear.

DATA SHEET NO. 3
POST IMPACT DATA

Test Vehicle: 2002 Kia Sedona LX Minivan
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
Test Date: 12/7/01

SPEED TRAP DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	55.51 to 57.12	55.94
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	55.94
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	4750	4317	-433
Center	mm	4920	4364	-556
Right Side	mm	4750	4313	-437

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	856
Center	mm	782
Right Side	mm	810
Average	mm	816

DATA SHEET NO. 4
TEST VEHICLE INFORMATION

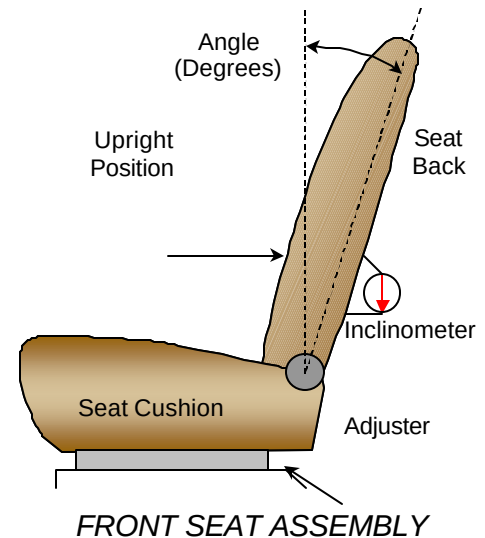
Test Vehicle: 2002 Kia Sedona LX Minivan
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
Test Date: 12/7/01

NOMINAL DESIGN RIDING POSITION

The driver and passenger seat backs are positioned to the manufacturers designated angle. The procedure is as follows: A special application tool with pointed probes is inserted through the fabric to make contact with the rigid portion of the lower seat frame assembly, approximately 13 inches above the pivot point of the seat back. An inclinometer is placed against the flat surface of the tool and the seat back angle is measured directly from the dial face.

Driver seat back angle: 24° with a seated dummy
Passenger seat back angle: 24° with a seated dummy



SEAT FORE/AFT POSITIONS

Both driver and passenger seats have 19 positions or detents. The first or forward most position is counted as number one (1). The fore/aft position is set aft of the middle position for both driver and passenger.

Driver seat fore/aft total travel: 24 seating positions or detents
Driver seat fore/aft position: 13th detent from forward most
Passenger seat fore/aft total travel: 24 seating positions or detents
Passenger seat fore/aft position: 13th detent from forward most

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. Both the driver and the passenger anchorages are placed in the 3rd position from the uppermost.

DATA SHEET NO. 4...(CONTINUED) **TEST VEHICLE INFORMATION**

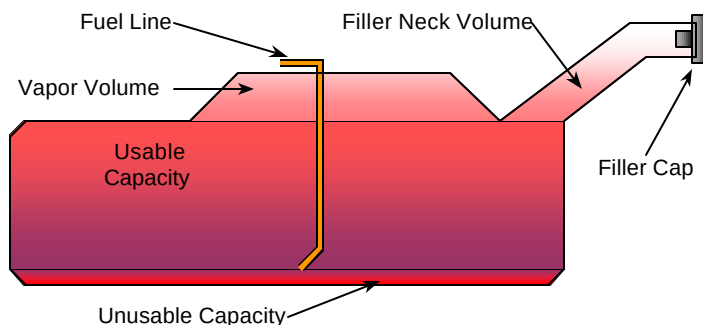
Test Vehicle: 2002 Kia Sedona LX Minivan
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
 Test Date: 12/7/01

FUEL TANK CAPACITY DATA

The "Usable Capacity" of the standard equipment fuel tank is:	<u>75.0</u>	liters
The "Usable Capacity" of any optional equipment fuel tank is:	<u>75.7</u>	liters
"Usable Capacity" used for certification tests FMVSS 301 requirements:	<u>69.0 to 70.4</u>	liters
Actual amount of Stoddard solvent added to vehicle for certification test:	<u>69.7</u>	liters

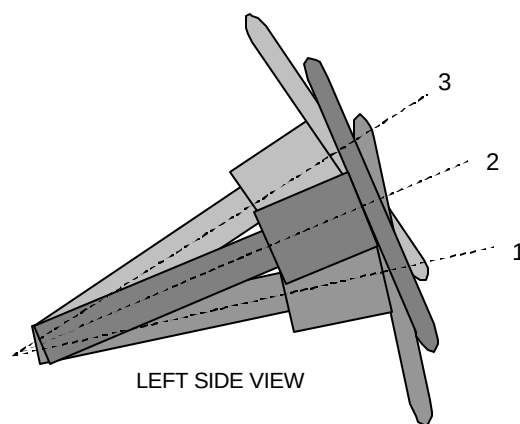
The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed in the "ON" position, after which the fuel pump automatically shuts off. The fuel tank filler door is located on the left rear fender.



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 moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured.



STEERING COLUMN ASSEMBLY

Lowermost; position 1:	<u>23°</u>
Geometric center; position 2:	<u>25°</u>
Uppermost position 3:	<u>31°</u>

DATA SHEET NO. 5
DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2002 Kia Sedona LX Minivan
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
Test Date: 12/7/01

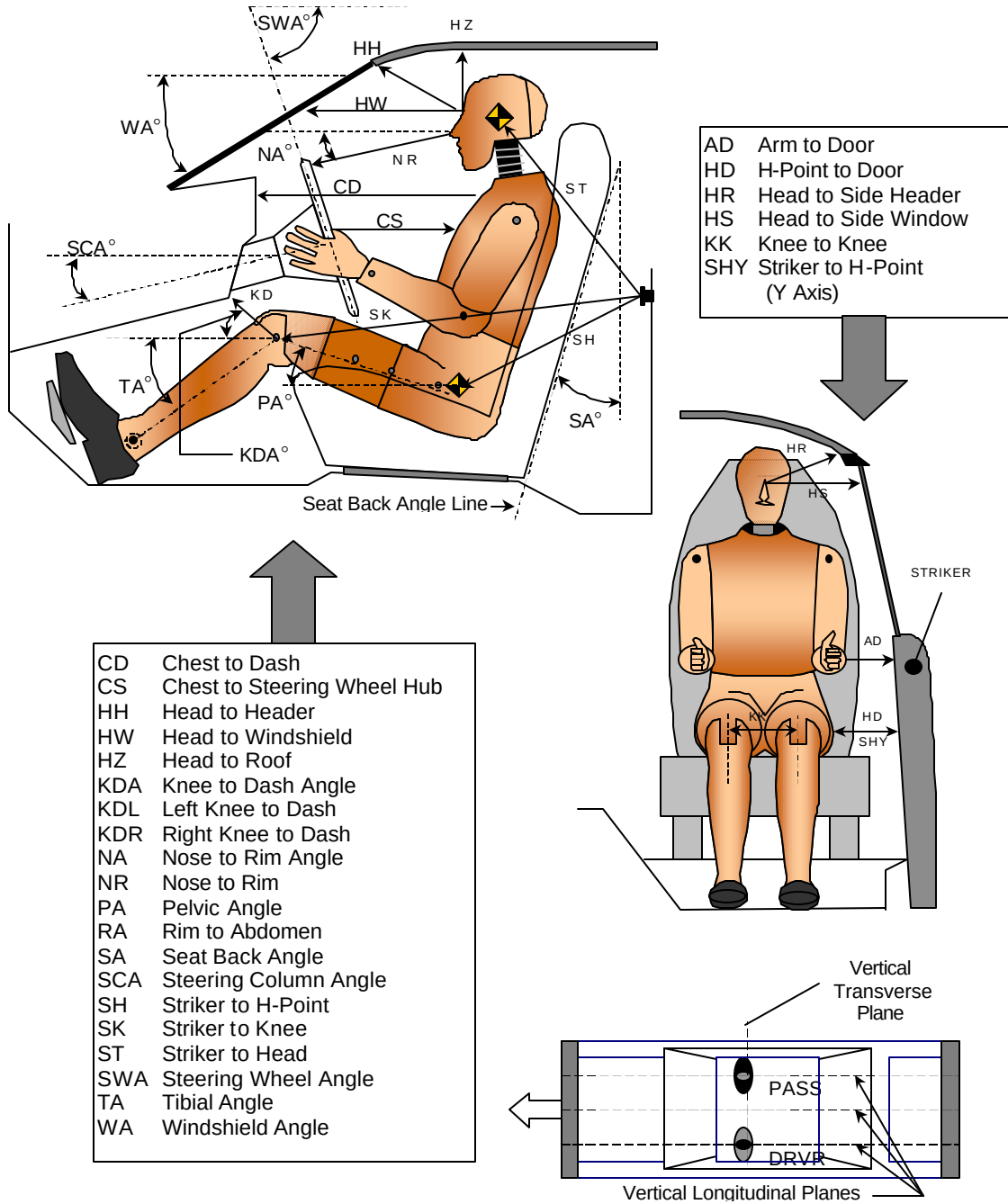
TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		31		
SWA	Steering Wheel Angle		25		
SCA	Steering Column Angle		65		
SA	Seat Back Angle		24		24
HZ	Head to Roof (Z)	204	90	210	90
HH	Head to Header	368		365	
HW	Head to Windshield	560		620	
HR	Head to Side Header (Y)	235		250	
NR	Nose to Rim	415	10		
CD	Chest to Dash	542		550	
CS	Chest to Steering Hub	313			
RA	Rim to Abdomen	178			
KDL	Left Knee to Dash	155	19	140	
KDR	Right Knee to Dash	138		147	2
PA	Pelvic Angle		25		25
TA	Tibia Angle		51		58
KK	Knee to Knee (Y)	240		230	
ST	Striker to Head	622	4	635	10
SK	Striker to Knee	680	81	663	6
SH	Striker to H-Point	229		220	
SHY	Striker to H-Point (Y)	241		227	
HS	Head to Side Window	306		285	
HD	H-Point to Door (Y)	192		161	
AD	Arm to Door (Y)	115		45	

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

Test Vehicle: 2002 Kia Sedona LX Minivan
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NHTSA No.: M25009
Test Date: 12/7/01

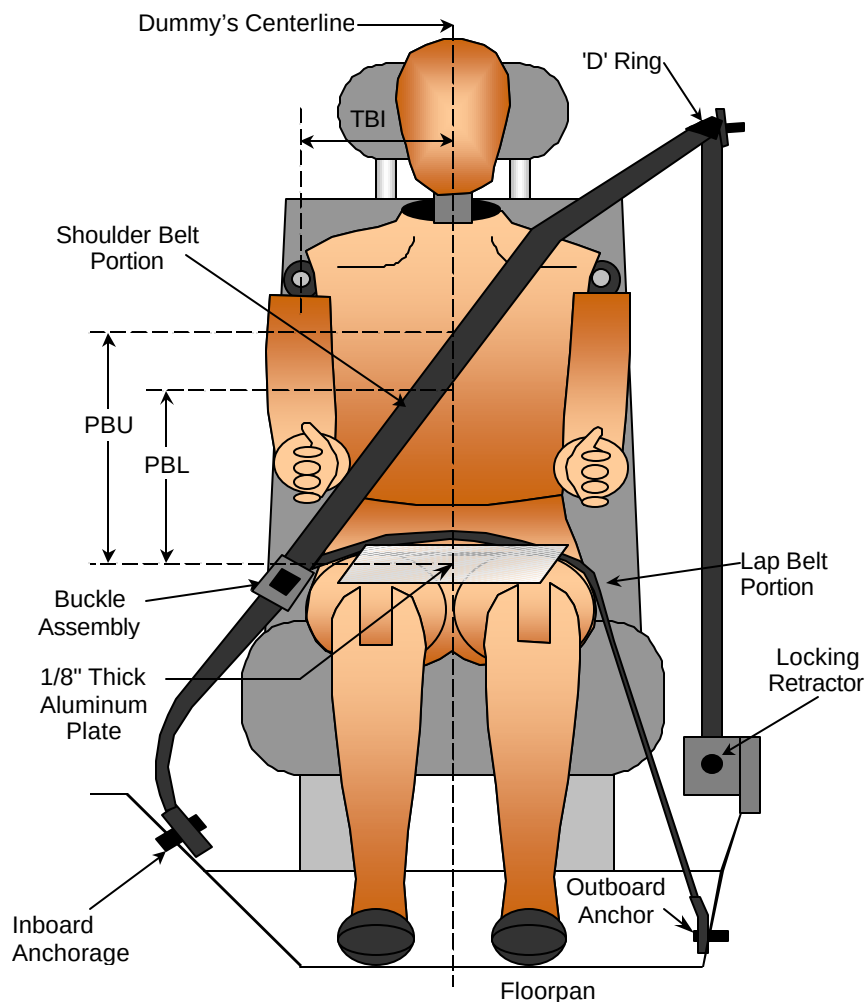


DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS

DATA SHEET NO. 6 **SEATBELT POSITIONING DATA**

Test Vehicle: 2002 Kia Sedona LX Minivan
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 Test Date: 12/7/01



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
TBI - Dummy C/L to Lap/Shoulder Belt Intersect	mm	225	220
PBU - Top surface of reference to belt upper edge	mm	305	300
PBL - Top surface of reference to belt lower edge	mm	215	230
Lap Belt tension	Newton's	10	10
Shoulder Belt tension	N/A	Retractor	Retractor

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

Test Vehicle: 2002 Kia Sedona LX Minivan

NHTSA No.: M25009

Test Program: 2002 NHTSA 35mph NCAP

Test Date: 12/7/01

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	7.9	270.6	-51.0	72.8	11.2	259.2	-38.2	68.5
Head CG	Y	G's	3.9	45.5	-10.0	83.5	6.4	90.1	-7.1	46.7
Head CG	Z	G's	12.0	59.8	-14.2	86.6	21.0	95.1	-0.8	2.9
Head CG Resultant	N/A	G's	51.6	72.8			38.6	68.5		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	2.9	149.8	-43.3	81.6	2.5	296.9	-37.7	71.1
Chest CG	Y	G's	5.7	70.8	-3.6	39.8	3.5	18.2	-5.2	83.1
Chest CG	Z	G's	9.1	81.5	-2.2	39.7	7.9	95.8	-6.1	61.4
Chest CG Resultant	N/A	G's	44.3	81.6			38.1	71.1		

FEMUR PEAK FORCES AND KNEE DISPLACEMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Femur	Z	Newtons	259.6	26.2	-4775.0	43.0	548.4	29.7	-3462.4	50.1
Right Femur	Z	Newtons	308.5	30.2	-5043.8	42.4	477.6	29.0	-3980.5	49.2
Left Knee Slider	Z	MM	0.44	36.1	-2.16	43.5	0.50	34.6	-1.46	75.1
Right Knee Slider	Z	MM	0.25	58.7	-3.54	43.3	0.53	140.7	-6.16	72.0

SEAT BELT SENSOR PEAK VALUES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Lap Belt Force	N/A	Newtons	4771.8	48.0	-3.4	187.7	3963.8	51.3	11.2	0.0
Shoulder Belt Force	N/A	Newtons	4583.1	77.4	-2.6	188.2	4685.8	83.0	-7.0	7.4
Shoulder Belt Pullout	N/A	MM	129.6	80.6	-41.8	33.1	119.2	77.7	-19.9	29.2

PRIMARY HEAD INJURY CRITERIA (HIC)

Location	Driver				Passenger			
	HIC	Avg G	T ¹	T ²	HIC	Avg G	T ¹	T ²
Head CG Primary	338.8	38.9	54.8	90.5	249.9	34.4	58.2	94.1

PRIMARY CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Primary	42.5	80.9	83.9	36.9	70.1	73.1

DATA SHEET NO. 8...(continued)

Test Vehicle: 2002 Kia Sedona LX Minivan

NHTSA No.: M25009

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PELVIC PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Pelvis	X	G's	6.3	200.9	-52.6	39.5	6.2	192.9	-44.5	48.7
Pelvis	Y	G's	6.1	75.8	-7.4	38.2	0.7	91.3	-2.5	72.6
Pelvis	Z	G's	3.4	203.2	-20.5	66.2	4.5	188.0	-32.2	62.1

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	Newtons	279.5	54.0	-310.5	135.3	175.4	262.5	-598.4	91.9
Neck Force	Y	Newtons	136.5	149.7	-105.0	92.3	201.0	65.2	-179.9	94.4
Neck Force	Z	Newtons	1335.0	62.5	-174.1	150.0	1137.6	67.1	-87.5	4.2
Neck Moment	X	N•m	8.0	90.7	-12.0	112.9	15.3	83.4	-19.3	120.2
Neck Moment	Y	N•m	28.6	51.6	-34.0	78.2	36.0	108.4	-47.4	81.8
Neck Moment	Z	N•m	12.1	90.2	-6.3	161.0	8.7	96.0	-2.8	138.1

FOOT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Foot Aft	X	G's	2.7	230.8	-70.2	35.8	15.8	53.8	-24.1	27.7
Left Foot Aft	Z	G's	4.1	76.4	-56.3	36.3	8.3	48.3	-55.7	26.9
Left Foot Fore	Z	G's	14.6	75.6	-66.3	36.7	35.9	49.0	-84.0	26.4
Right Foot Aft	X	G's	13.6	73.5	-131.3	41.1	6.8	42.4	-68.0	27.7
Right Foot Aft	Z	G's	13.5	61.9	-137.6	39.5	2.8	51.1	-64.6	28.9
Right Foot Fore	Z	G's	27.5	69.5	-222.5	38.6	16.5	34.6	-135.7	25.5

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	17.1	37.7	-23.9	83.5	13.2	58.7	-5.2	37.6
Left Lower Moment	Y	N•m	25.9	42.9	-14.5	27.1	58.8	76.7	-23.5	28.4
Left Lower Force	Z	Newtons	81.3	157.6	-3398.6	36.8	131.8	189.5	-1867.9	27.7
Left Upper Moment	X	N•m	29.4	37.1	-11.2	89.8	48.0	68.4	-33.1	30.2
Left Upper Moment	Y	N•m	24.3	44.2	-91.2	36.7	73.4	92.5	-97.2	29.3
Right Lower Moment	X	N•m	9.7	41.1	-24.1	76.4	21.8	73.8	-21.2	30.1
Right Lower Moment	Y	N•m	60.8	66.4	-71.8	41.0	40.0	50.7	-35.4	27.2
Right Lower Force	Z	Newtons	284.4	39.3	-1542.1	46.7	120.0	190.9	-2310.1	29.5
Right Upper Moment	X	N•m	26.0	54.0	-4.1	296.0	13.8	47.7	-22.9	86.6
Right Upper Moment	Y	N•m	18.9	44.1	-46.5	61.9	33.3	89.6	-81.3	28.2

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

Test Vehicle: 2002 Kia Sedona LX Minivan

NHTSA No.: M25009

Test Program: 2002 NHTSA 35mph NCAP

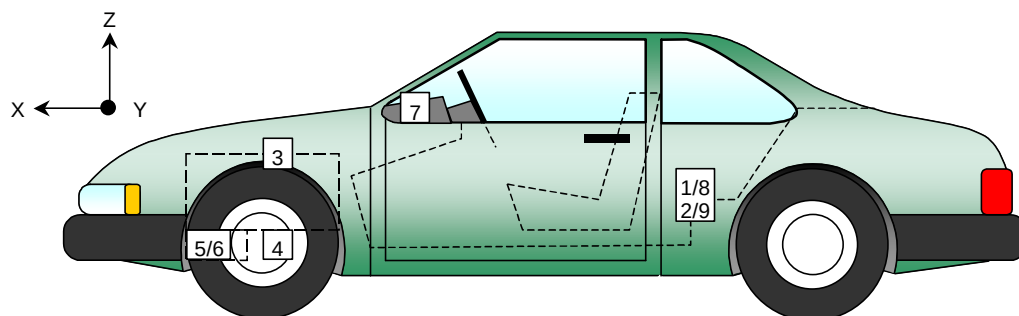
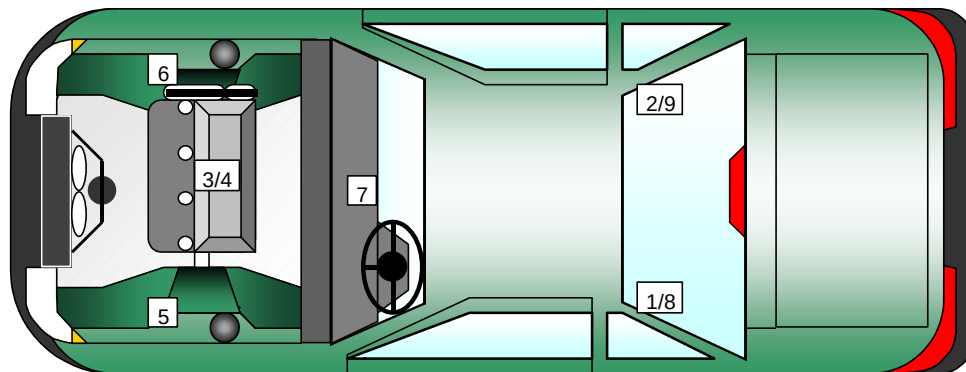
Test Date: 12/7/01

VEHICLE ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)			Peak Values				
		X	Y	Z	Units	Max	Time	Min	Time
1	Left Rear X-Member	1780	-775	485	G's	2.3	145.3	-29.6	53.6
2	Right Rear X-Member	1780	775	490	G's	2.4	140.9	-30.2	53.7
3	Engine Top	3990	130	915	G's	52.7	33.3	-106.4	22.7 *
4	Engine Bottom	4100	250	195	G's	61.1	42.3	-138.0	24.8 *
5	Left Brake Caliper	4030	-720	240	G's	45.3	57.6	-85.3	11.2 *
6	Right Brake Caliper	4030	720	240	G's	46.1	46.9	-97.6	27.6 *
7	Instrument Panel	3300	0	1160	G's	33.7	25.2	-83.8	29.7
8	Left Rear X-Member (Z-Axis)	1780	-735	485	G's	8.2	15.9	-4.6	6.4
9	Right Rear X-Member (Z-Axis)	1780	735	490	G's	4.4	19.3	-4.9	31.1

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

* Channels failed at 76.2 msec.



DATA SHEET NO. 8...(continued)

Test Vehicle: 2002 Kia Sedona LX Minivan

NHTSA No.: M25009

Test Program: 2002 NHTSA 35mph NCAP

Test Date: 12/7/01

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	MM	0.1	0.4	-22.0	61.5	0.3	4.3	-23.7	65.1

HEAD REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	7.0	270.9	-49.0	73.9	11.4	261.1	-38.6	69.1
Head CG	Y	G's	3.6	16.8	-10.0	83.8	7.3	90.8	-6.8	46.4
Head CG	Z	G's	10.3	46.5	-16.6	86.9	20.2	95.0	-1.4	14.2
Head CG Resultant	N/A	G's	49.6	73.9			38.8	68.0		

CHEST REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	3.3	149.9	-43.2	81.7	2.6	297.0	-37.6	71.1
Chest CG	Y	G's	5.5	70.7	-4.2	39.8	2.9	32.3	-5.1	84.7
Chest CG	Z	G's	7.9	81.6	-4.0	39.7	6.5	102.6	-7.2	56.1
Chest CG Resultant	N/A	G's	43.9	81.7			38.0	71.1		

REDUNDANT HEAD INJURY CRITERIA (HIC)

Location	Driver				Passenger			
	HIC	Avg G	T ¹	T ²	HIC	Avg G	T ¹	T ²
Head CG Redundant	332.1	38.6	55.0	90.8	248.1	34.3	58.3	94.2

REDUNDANT CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Redundant	42.3	80.9	83.9	37.0	69.9	72.9

DATA SHEET NO. 9
SEATBELT ASSESSMENT TEST DATA

Test Vehicle: 2002 Kia Sedona LX Minivan
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
 Test Date: 12/7/01

SEAT BELT PLACEMENT MEASUREMENTS

Measurement Description	Units	Driver	Passenger
TBI - Dummy C/L to Lap/Shoulder Belt Intersect	mm	225	220
PBU - Top surface of reference to belt upper edge	mm	305	300
PBL - Top surface of reference to belt lower edge	mm	215	230
Lap Belt tension	Newton's	10	10
Shoulder Belt tension	N/A	Retractor	Retractor

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Retractor reel to 'D' ring	mm	885	885
Shoulder belt length as measured on ATD	mm	840	835
Lap belt length as measured on ATD	mm	880	920
Remainder of belt on reel	mm	725	740
Total belt length for continuous webbing systems	mm	3330	3380

SHOULDER BELT SPOOL-OFF DATA

Measurement Description	Units	Driver	Passenger
As determined mechanically	mm	Broke	75.0
As determined electronically	mm	129.6	119.2

BELT STRETCH DATA

Measurement Description	Units	Driver	Passenger
Electronically between shoulder belt load cell and "D" ring	mm/cm	*	*
Mechanically	mm/cm	*	*

*Not used with shoulder belt pre-tensioner systems.

DATA SHEET NO. 10
SUMMARY OF FMVSS 212 DATA

Test Vehicle: 2002 Kia Sedona LX Minivan
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
 Test Date: 12/7/01

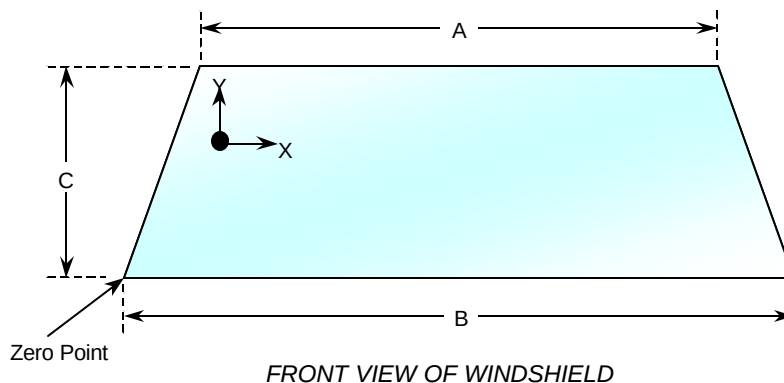
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with a rubber type adhesive. No molding covers the windshield periphery at any point.

The standard requires that the posttest 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 that 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	2250	2250	100
Right Side	2250	2250	100
Total	4500	4500	100



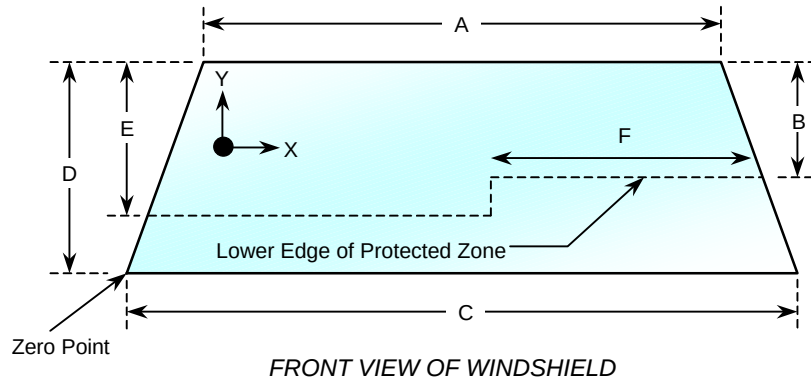
WINDSHIELD DIMENSIONS

Item	Units	Segment Length	Molding Width
A	mm	1260	10
B	mm	1620	10
C	mm	810	10

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

Test Vehicle: 2002 Kia Sedona LX Minivan
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
 Test Date: 12/7/01



**WINDSHIELD AND
PROTECTED ZONE**

Item	Units	Value
A	mm	1260
B	mm	420
C	mm	1620
D	mm	810
E	mm	566
F	mm	555

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: 2002 Kia Sedona LX Minivan NHTSA No.: M25009
Test Program: 2002 NHTSA 35mph NCAP Test Date: 12/7/01

Test Time: 12:40 P.M.

Temperature at Time of Impact 15.0 Deg. C

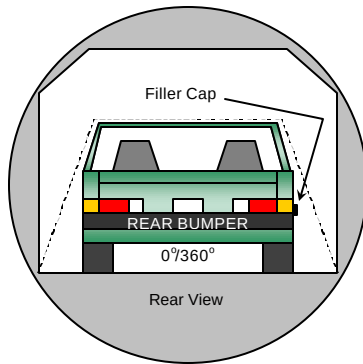
STODDARD SOLVENT SPILLAGE MEASUREMENTS

- 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 Location Details: No leakage occurred

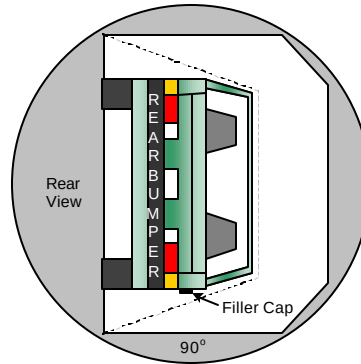
DATA SHEET NO. 13
FMVSS 301 STATIC ROLLOVER DATA SHEET

Test Vehicle: 2002 Kia Sedona LX Minivan
 Test Program: 2002 NHTSA 35mph NCAP

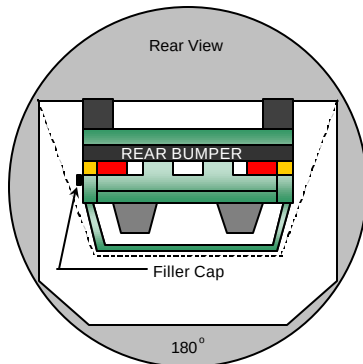
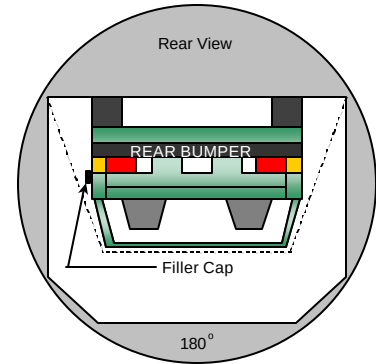
NHTSA No.: M25009
 Test Date: 12/7/01



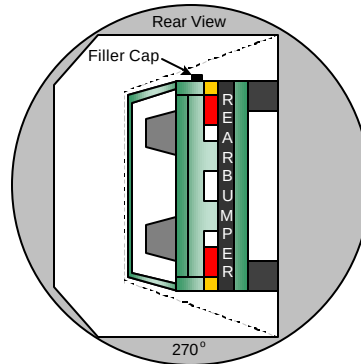
0° to 90°



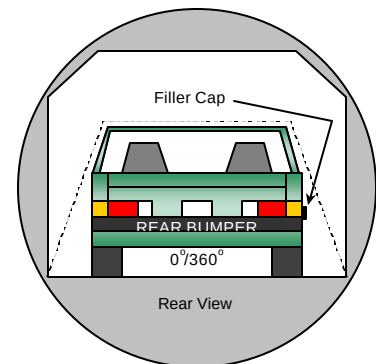
90° to 180°



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. No solvent leakage occurred during rollover.

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° to 90°	84	300	0
90° to 180°	81	300	0
180° to 270°	79	300	0
270° to 360°	79	300	0

DATA SHEET NO. 14
VEHICLE MEASUREMENTS

Test Vehicle: 2002 Kia Sedona LX Minivan
Test Program: 2002 NHTSA 35mph NCAP

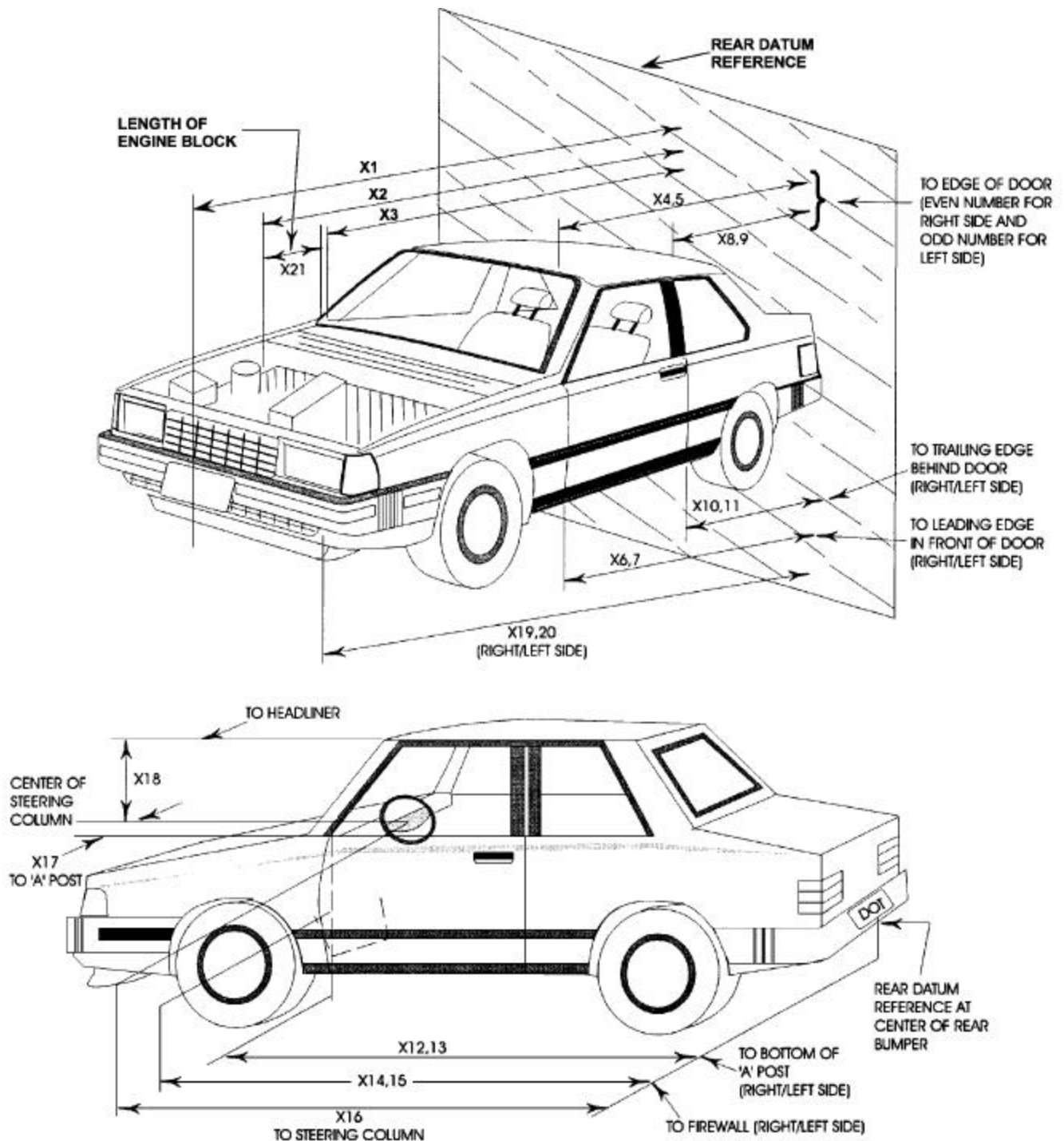
NHTSA No.: M25009
Test Date: 12/7/01

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	4920	4364	-556
2	RSOV to front of engine	mm	4426	4122	-304
3	RSOV to firewall centerline	mm	3868	3760	-108
4	RSOV to leading edge of right door	mm	3460	3413	-47
5	RSOV to leading edge of left door	mm	3455	3425	-30
6	RSOV to lower leading edge of right door	mm	3420	3411	-9
7	RSOV to lower leading edge of left door	mm	3419	3418	-1
8	RSOV to upper trailing edge of right door	mm	2394	2346	-48
9	RSOV to upper trailing edge of left door	mm	3288	2363	-925
10	RSOV to lower trailing edge of right door	mm	2387	2382	-5
11	RSOV to lower trailing edge of left door	mm	3289	2388	-901
12	RSOV to bottom of right 'A' pillar	mm	3257	3371	114
13	RSOV to bottom of left 'A' pillar	mm	3424	3385	-39
14	RSOV to firewall on right side	mm	3786	3685	-101
15	RSOV to firewall of left side	mm	3784	3720	-64
16	RSOV to steering column	mm	2985	3018	33
17	Center of steering column to left 'A' pillar	mm	415	390	-25
18	Center of steering column to headlining	mm	430	405	-25
19	RSOV to right side of front bumper	mm	4750	4313	-437
20	RSOV to left side of front bumper	mm	4750	4317	-433
21	Length of engine block	mm	495	495	0
RD	RSOV to right side of dash panel	mm	3428	3157	-271
CD	RSOV to center of dash panel	mm	3258	3153	-105
LD	RSOV to left side of dash panel	mm	3256	3185	-71

DATA SHEET NO. 14...(CONTINUED)
VEHICLE MEASUREMENTS

Test Vehicle: 2002 Kia Sedona LX Minivan
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
 Test Date: 12/7/01



DATA SHEET NO. 15
CAMERA LOCATIONS

Test Vehicle: 2002 Kia Sedona LX Minivan
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
Test Date: 12/7/01

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	1960	-8250	880	-1	7969	13	0
3	Left Side, No. 2	1060	-6210	1440	0	6046	25	510
4	Left Side, No. 3	6500	-10580	4640	-16	11525	65	1000
5	Left Side, No. 4	1460	-8250	3100	-16	8168	19	1010
6	Left Side, No. 5	1460	-8250	2700	-13	8095	19	920
7	Right Side, No. 1	1960	8150	730	-1	7882	19	1030
8	Right Side, No. 2	2280	8150	1450	-4	7841	35	1010
9	Right Side, No. 3	7860	8900	2800	-9	10282	80	960
10	Right Side, No. 4	2750	9600	1500	-2	9298	50	940
11	Overhead Overall	250	0	4460	-86	NA	13	1110
12	Front View, Driver	-530	-380	2590	-43	NA	12	1080
13	Front View, Passenger	-530	380	2590	-55	NA	13	950
14	Pit Camera, Engine	580	0	-1360	-90	NA		1100
15	Pit Camera, Fuel Tank	3760	0	-1680	-55	NA		1040
16	Driver Belt	0	0	0	1	NA	4	830
17	Passenger Belt	0	0	0	1	NA	4	780
18	Left Side Extra	Not Used						

X - Barrier Face Y - Monorail Centerline Z - Ground

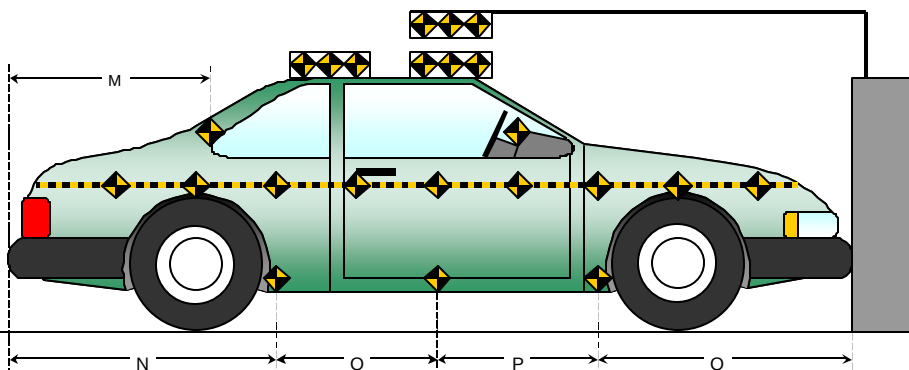
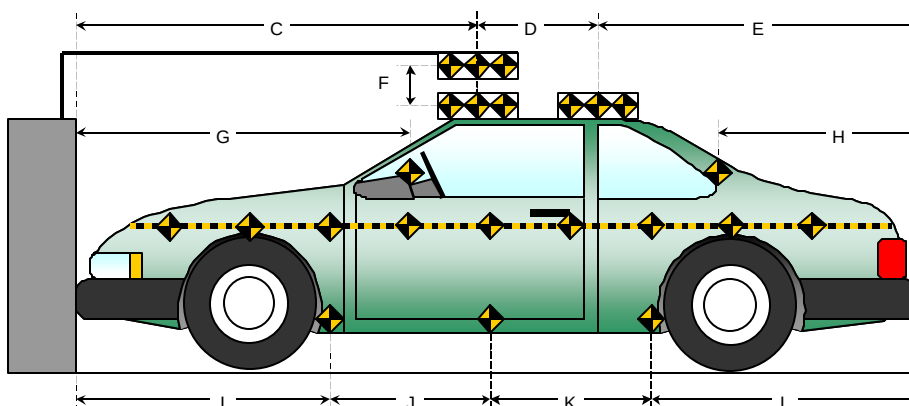
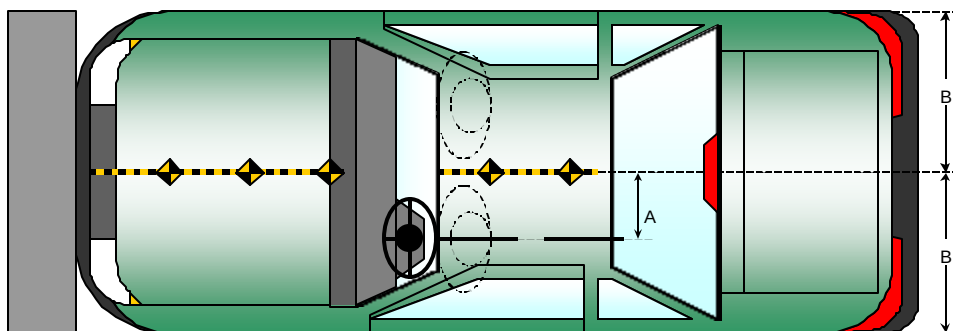
DATA SHEET NO. 16
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2002 Kia Sedona LX Minivan
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
 Test Date: 12/7/01

in mm

Item	Value
A	445
B	945
C	2317
D	608
E	2001
F	155
G	1759
H	1388
I	1475
J	983
K	983
L	1485
M	1394
N	1488
O	977
P	977
Q	1479



DATA SHEET NO. 17
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2002 Kia Sedona LX Minivan
 Test Program: 2002 NHTSA 35mph NCAP

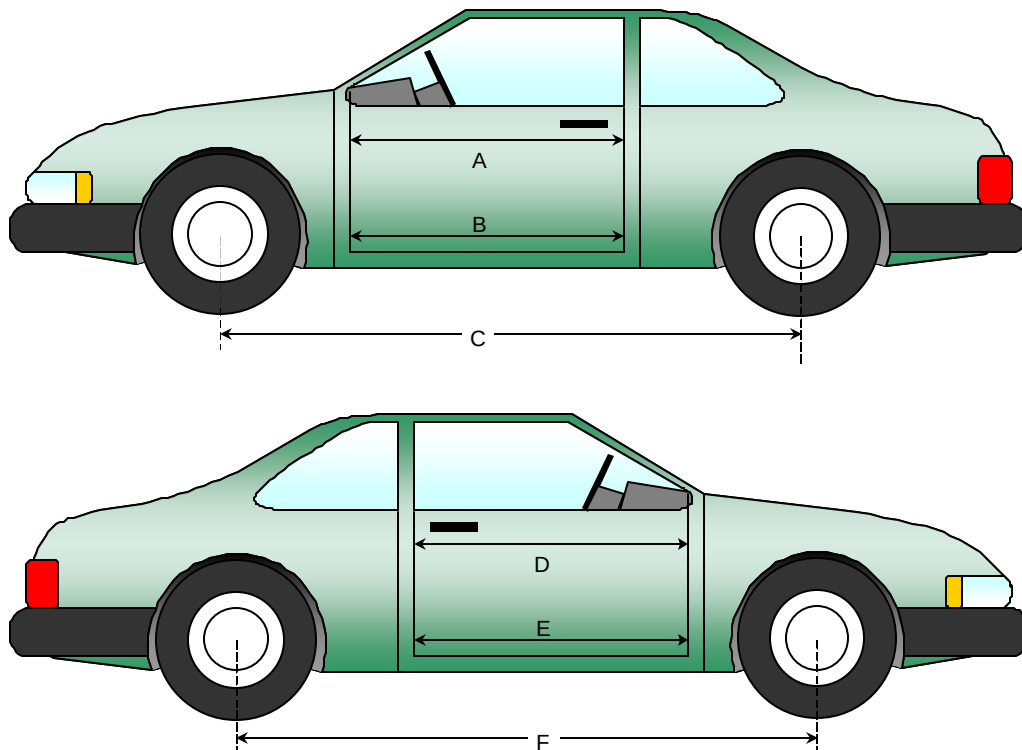
NHTSA No.: M25009
 Test Date: 12/7/01

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	960	931	-29
B	Left Side Lower	mm	907	897	-10
D	Right Side Upper	mm	964	929	-35
E	Right Side Lower	mm	905	885	-20

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheel base	mm	2912	2835	-77
F	Right Side Wheel base	mm	2912	2808	-104



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

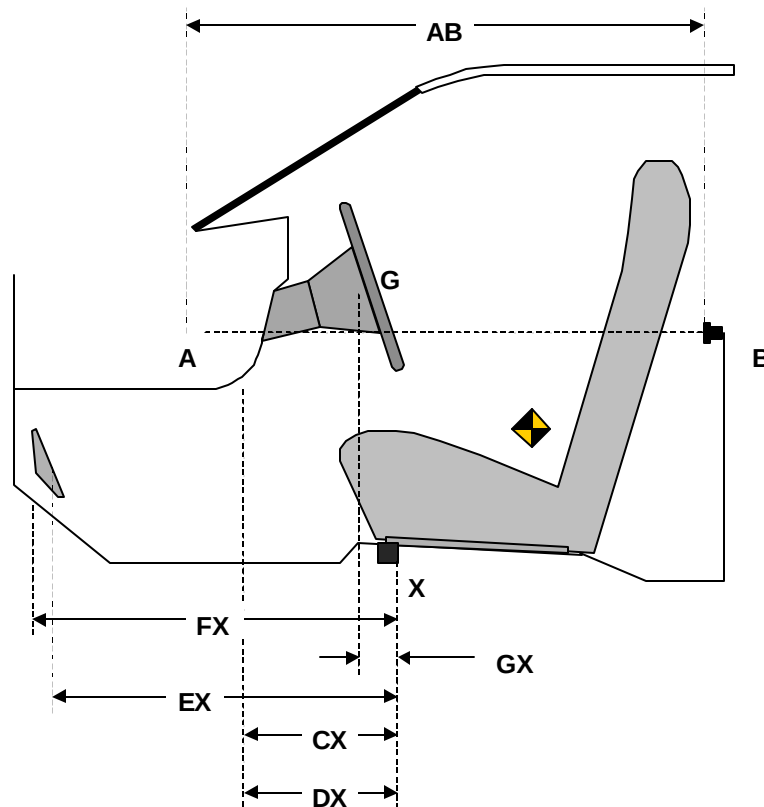
Test Vehicle: 2002 Kia Sedona LX Minivan
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
 Test Date: 12/7/01

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	960	931	-29
CX	Left Knee Bolster to X	mm	331	288	-43
DX	Right Knee Bolster to X	mm	312	272	-40
EX	Brake Pedal to X	mm	551	380	-171
FX	Foot Rest to X	mm	639	560	-79
GX	Center of Steering Wheel Hub to X	mm	144	55	-89

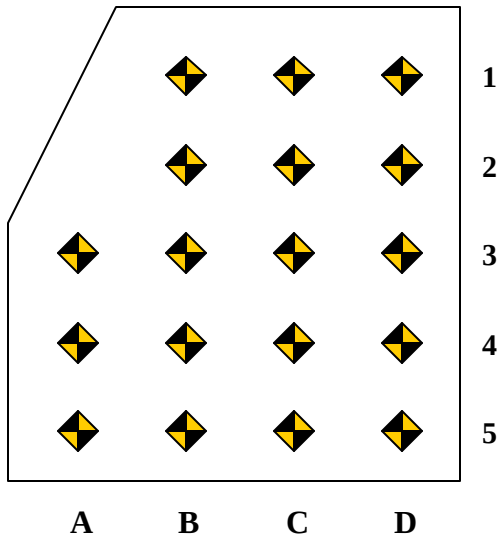
X = Left Front Seat Outboard Anchor Bolt Head



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

Test Vehicle: 2002 Kia Sedona LX Minivan
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
 Test Date: 12/7/01



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

Columns A through D are evenly spaced.

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

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

DRIVER FLOOR PAN X-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1		712	711	708		582	565	537		-130	-146	-171
2		610	611	610		518	517	498		-92	-94	-112
3	515	510	508	508	422	425	420	410	-93	-85	-88	-98
4	415	411	408	410	372	354	356	357	-43	-57	-52	-53
5	313	310	308	307	272	272	270	260	-41	-38	-38	-47

DRIVER FLOOR PAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1		75	75	64		140	138	149		65	63	85
2		20	20	14		59	55	63		39	35	49
3	10	10	9	6	39	24	21	30	29	14	12	24
4	10	8	28	33	4	10	32	45	-6	2	4	12
5	1	4	7	23	7	0	-8	10	6	-4	-15	-13

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

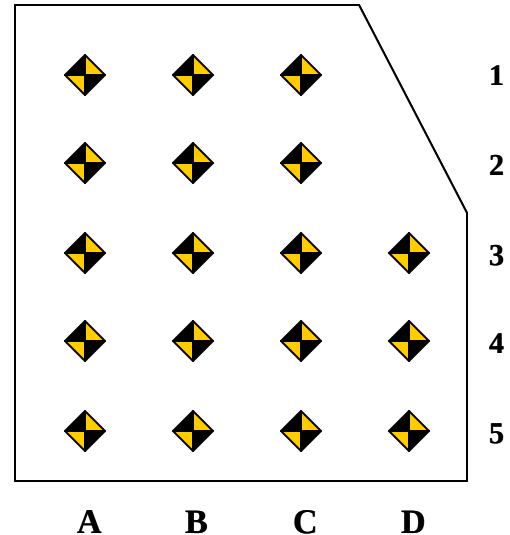
Test Vehicle: 2002 Kia Sedona LX Minivan
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
 Test Date: 12/7/01

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	606	590	619		462	480	496		-144	-110	-123	
2	549	549	533		469	472	469		-80	-77	-64	
3	451	450	453	449	378	373	377	383	-73	-77	-76	-66
4	351	352	353	351	335	334	332	339	-16	-18	-21	-12
5	251	253	253	249	234	235	233	236	-17	-18	-20	-13

PASSENGER FLOOR PAN Z-AXIS

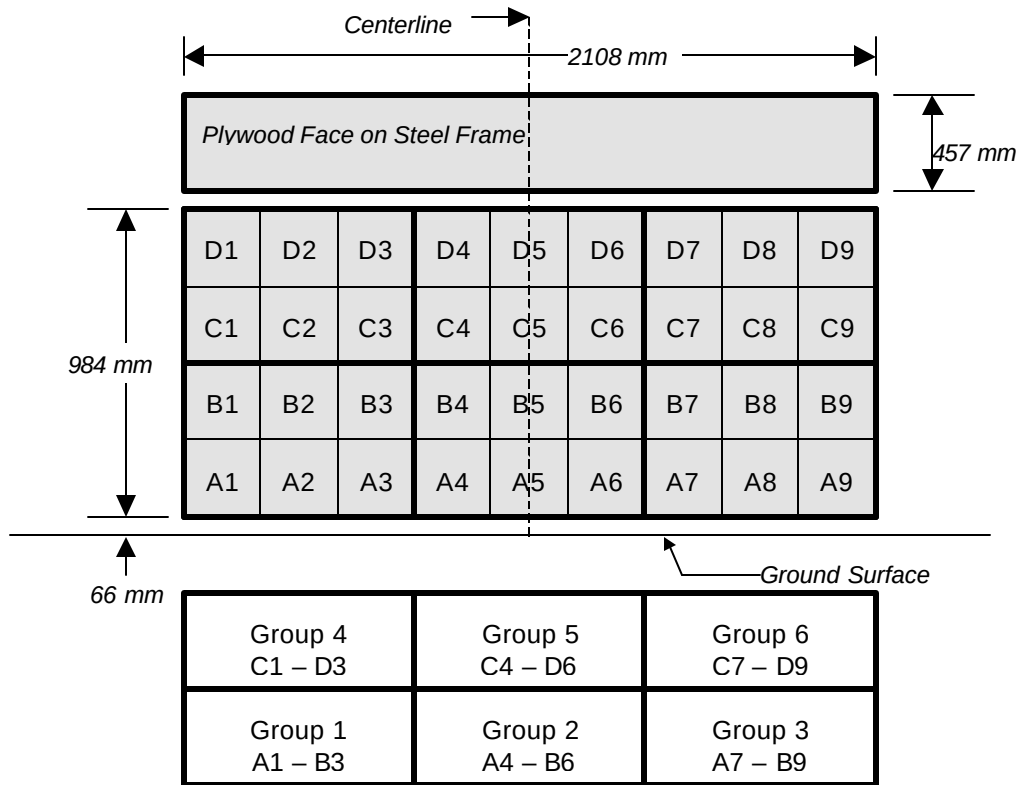
	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	125	117	118		211	192	212		86	75	94	
2	11	10	61		26	36	111		15	26	50	
3	10	5	9	12	14	18	22	24	4	13	13	12
4	10	-3	11	11	-25	4	13	11	-35	7	2	0
5	3	5	9	12	13	10	17	17	10	5	8	5

DATA SHEET NO. 18
FIXED BARRIER TYPE

Test Vehicle: 2002 Kia Sedona LX Minivan
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
 Test Date: 12/7/01

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 DIVISION DATA

Test Vehicle: 2002 Kia Sedona LX Minivan
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
 Test Date: 12/7/01

VEHICLE INFORMATION

VIN: KNUP131526231645
 Vehicle Size Category: Minivan

Wheel base (mm): 2912
 Test Weight (kg): 2328

ACCELEROMETER DATA

Accelerometer Location: Left rear floor pan
 Cal. Procedure/Interval: 6 months / drop test
 Integration Algorithm: NHTSA Standard
 Impact Velocity (km/h): 55.94
 Velocity Change (km/h): 65.3

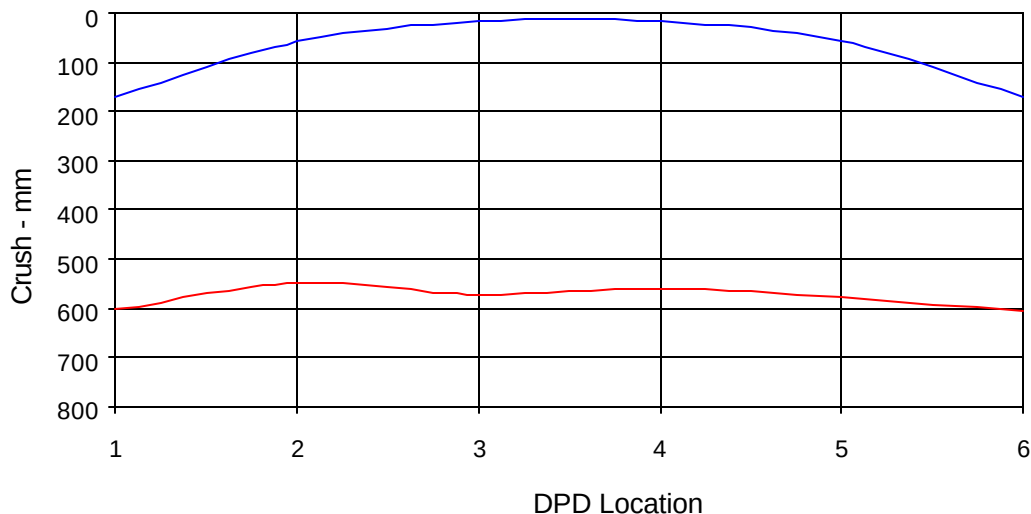
Linearity: Good

Time of Separation (msec): 78.5

CRUSH PROFILE

Collision Deformation Classification: 12FDEW6 Midpoint of Damage: Vehicle Centerline
 Damage Region Length (mm): 1549 Impact Mode: Full Frontal

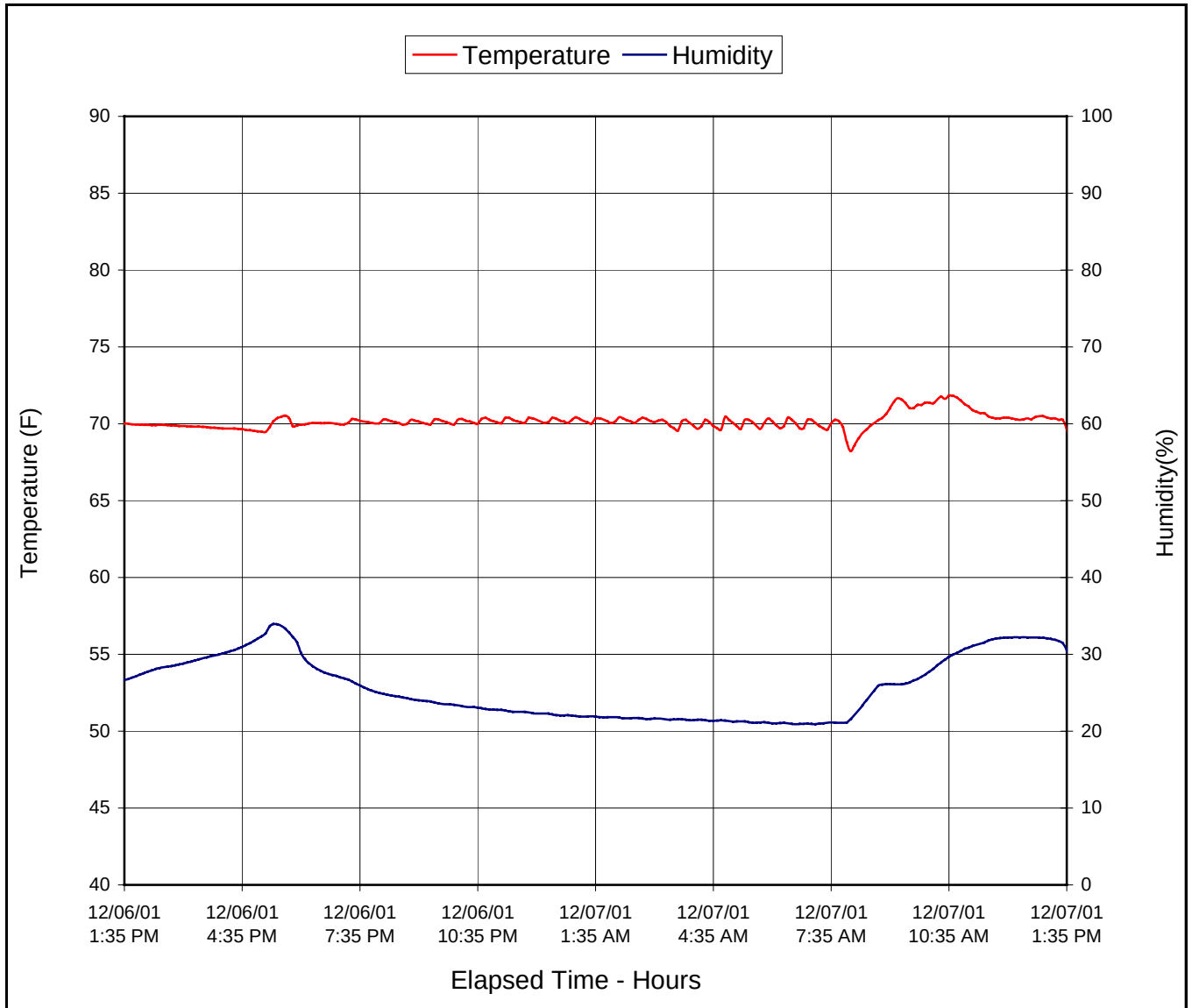
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	170	603	-433
C2	Crush zone 2 on left side	mm	58	548	-490
C3	Crush zone 3 on left side	mm	16	572	-556
C4	Crush zone 4 on right side	mm	16	560	-544
C5	Crush zone 5 on right side	mm	57	578	-521
C6	Crush zone 6 at right side	mm	170	607	-437



DATA SHEET NO. 20
DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2002 Kia Sedona LX Minivan
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009
Test Date: 12/7/01



APPENDIX A

PHOTOGRAPHS

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Figure A-1: Right Front, as Received



Figure A-2: Left Rear, as Received



MFD. BY KIA MOTORS CO.

DATE: 11/01/01 GVWR 5787 LB GAWR FRT 2932 LB GAWR RR 2855 LB
PNBV 2625 KG PNBE FRT 1330 KG PNBE RR 1295 KG

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

VIN KNDUP131526231645
TYPE M.P.V
G6

EXTERIOR PAINT COLORS					DSO	
BODY	VR	MLDG.	INT. TRIM	TAPE	AX	TR
B			44		S	D
IN KOREA						

Figure A-3: Vehicle Certification Label



Figure A-4: Vehicle Tire Label



Figure A-5: Front View, Pre-Test



Figure A-6: Front View, Post-Test



Figure A-7: Left Side View, Pre-Test



Figure A-8: Left Side View, Post-Test



Figure A-9: Right Side View, Pre-Test



Figure A-10: Right Side View, Post-Test



Figure A-11: Right Front View, Pre-Test

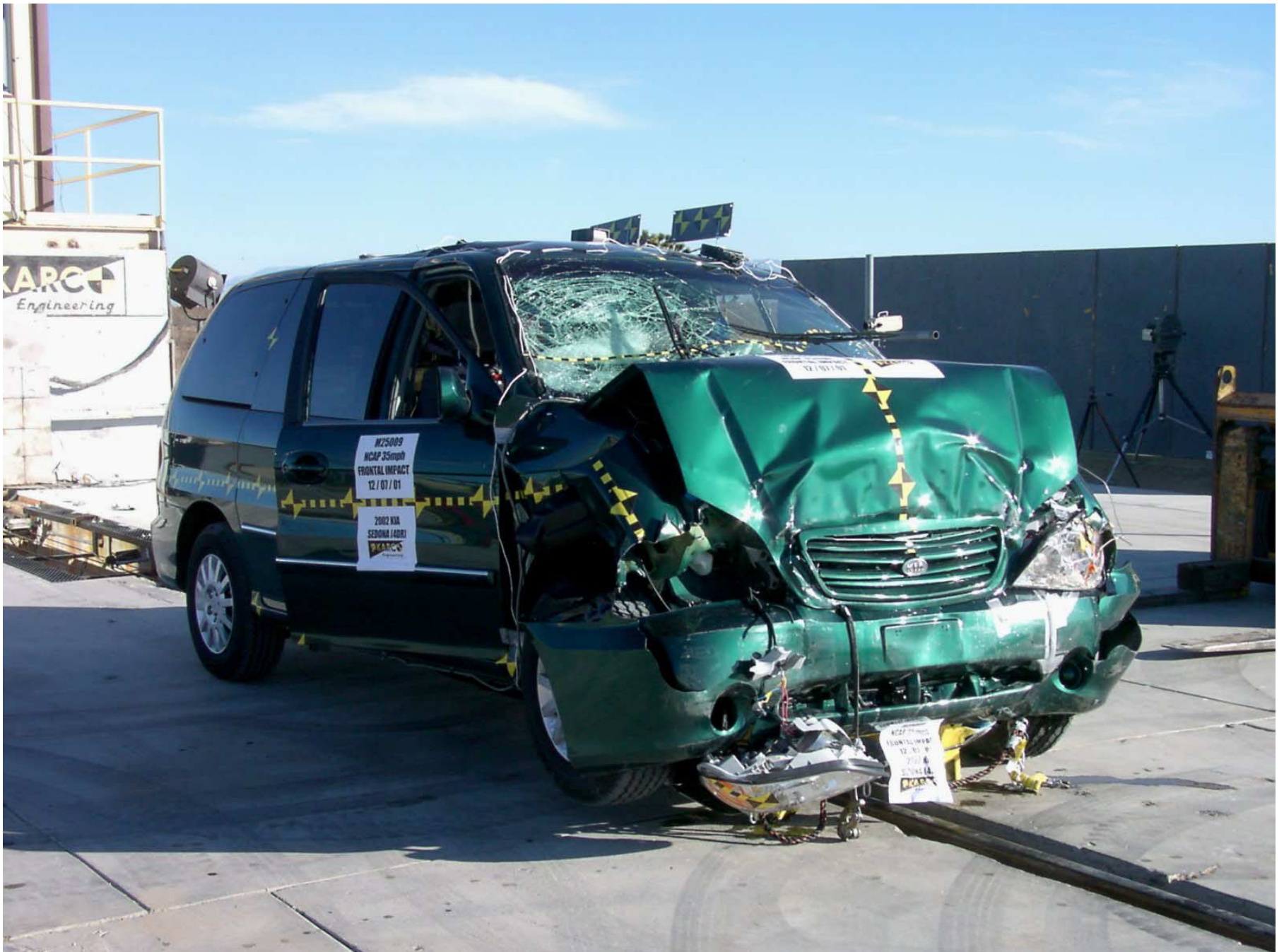


Figure A-12: Right Front View, Post-Test



Figure A-13: Left Rear View, Pre-Test



Figure A-14: Left Rear View, Post-Test

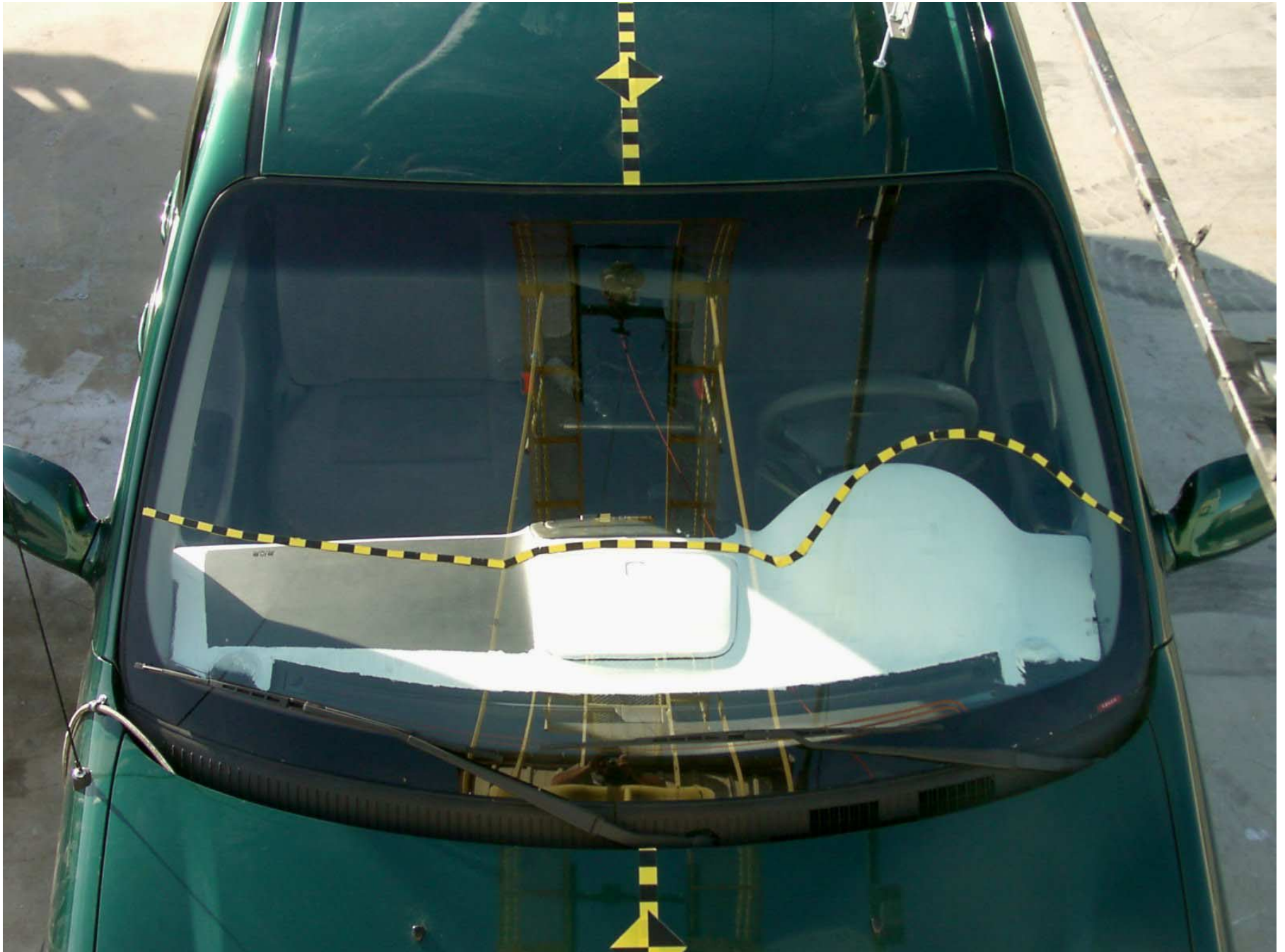


Figure A-15: Windshield, Pre-Test



Figure A-16: Windshield, Post-Test



Figure A-17: Engine Compartment, Pre-Test



Figure A-18: Engine Compartment, Post-Test



Figure A-19: Fuel Cap, Pre-test



Figure A-20: Fuel Cap, Post-Test

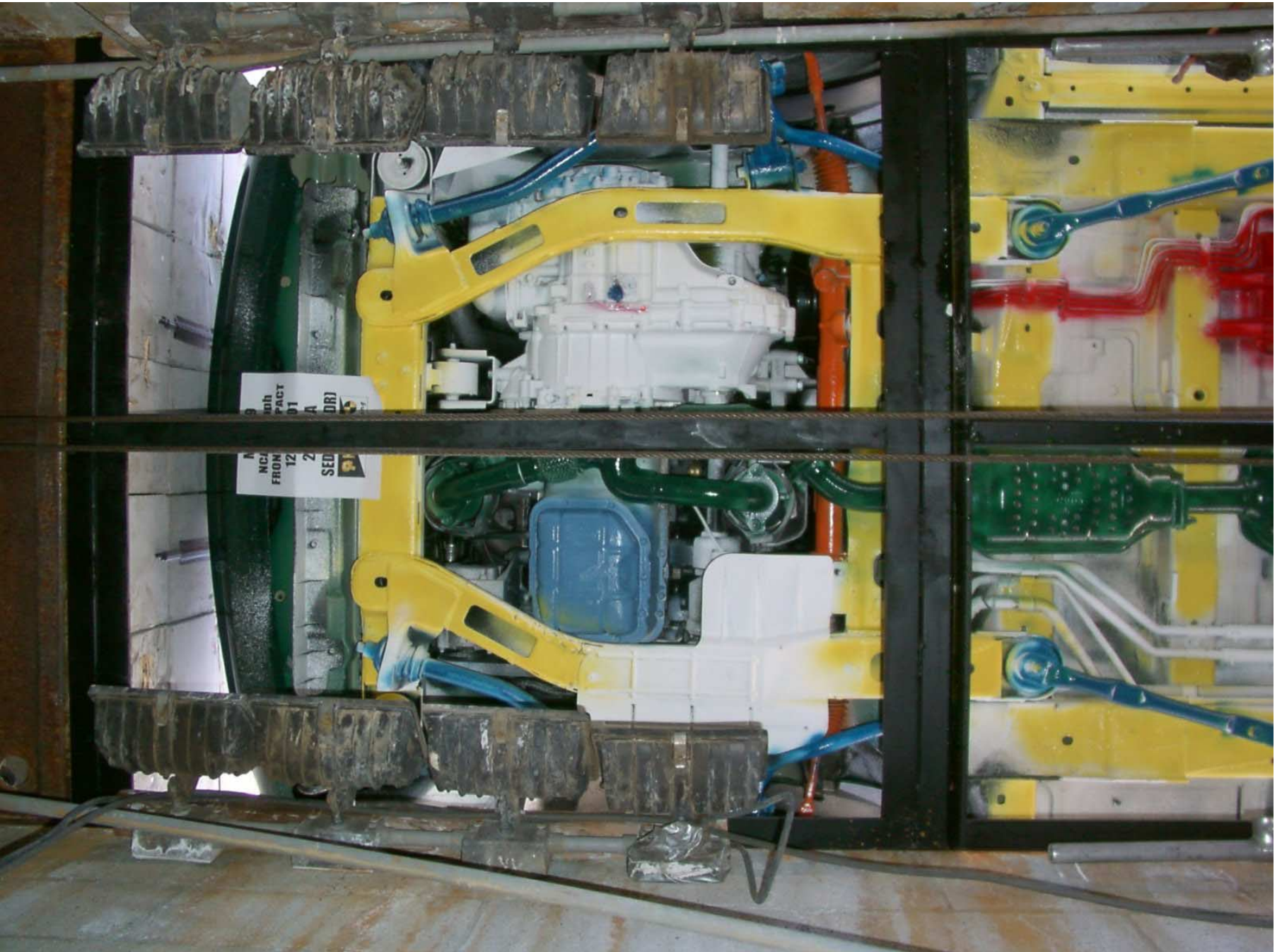


Figure A-21: Front Underside, Pre-Test

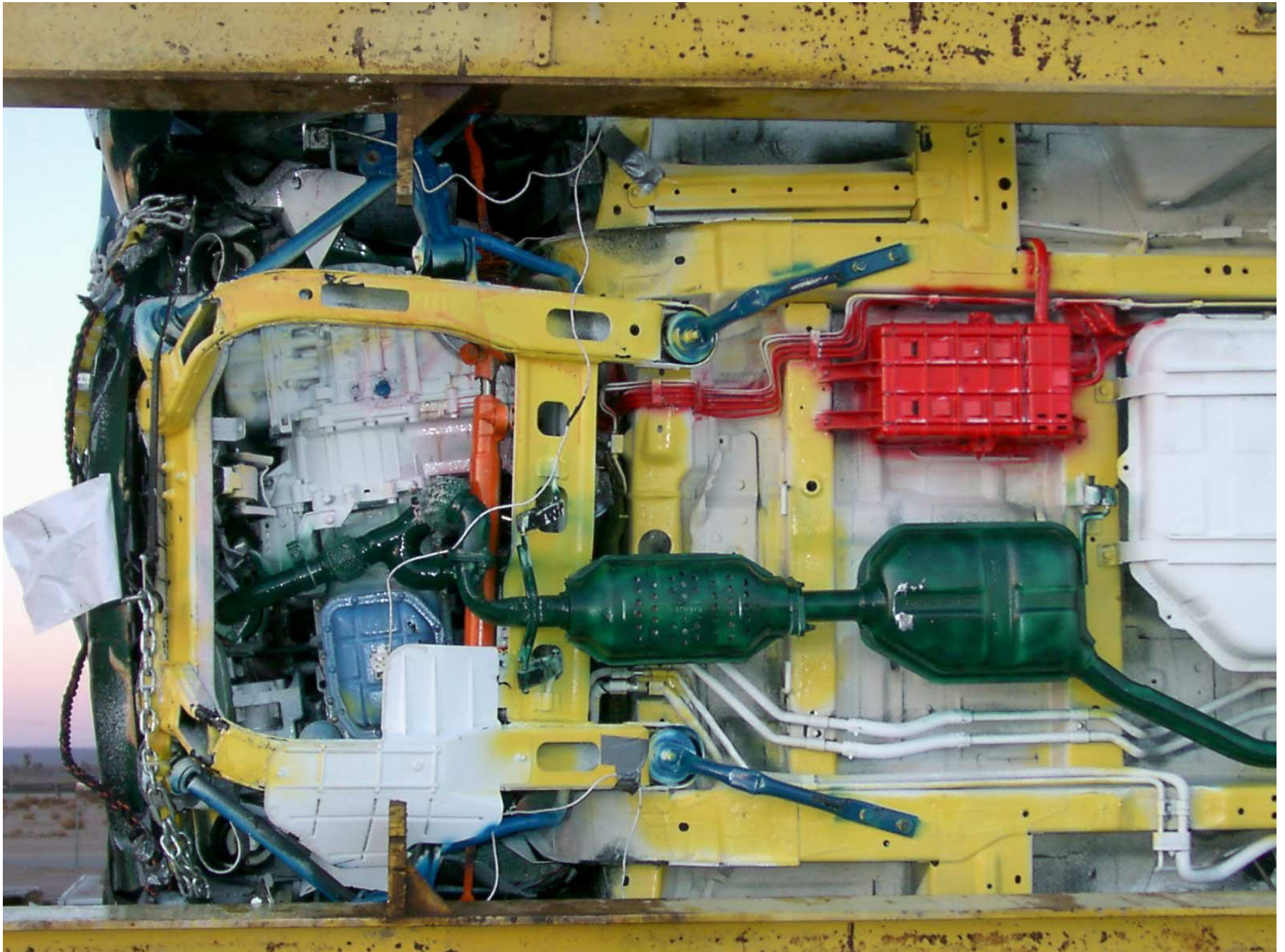


Figure A-22: Front Underside, Post-Test

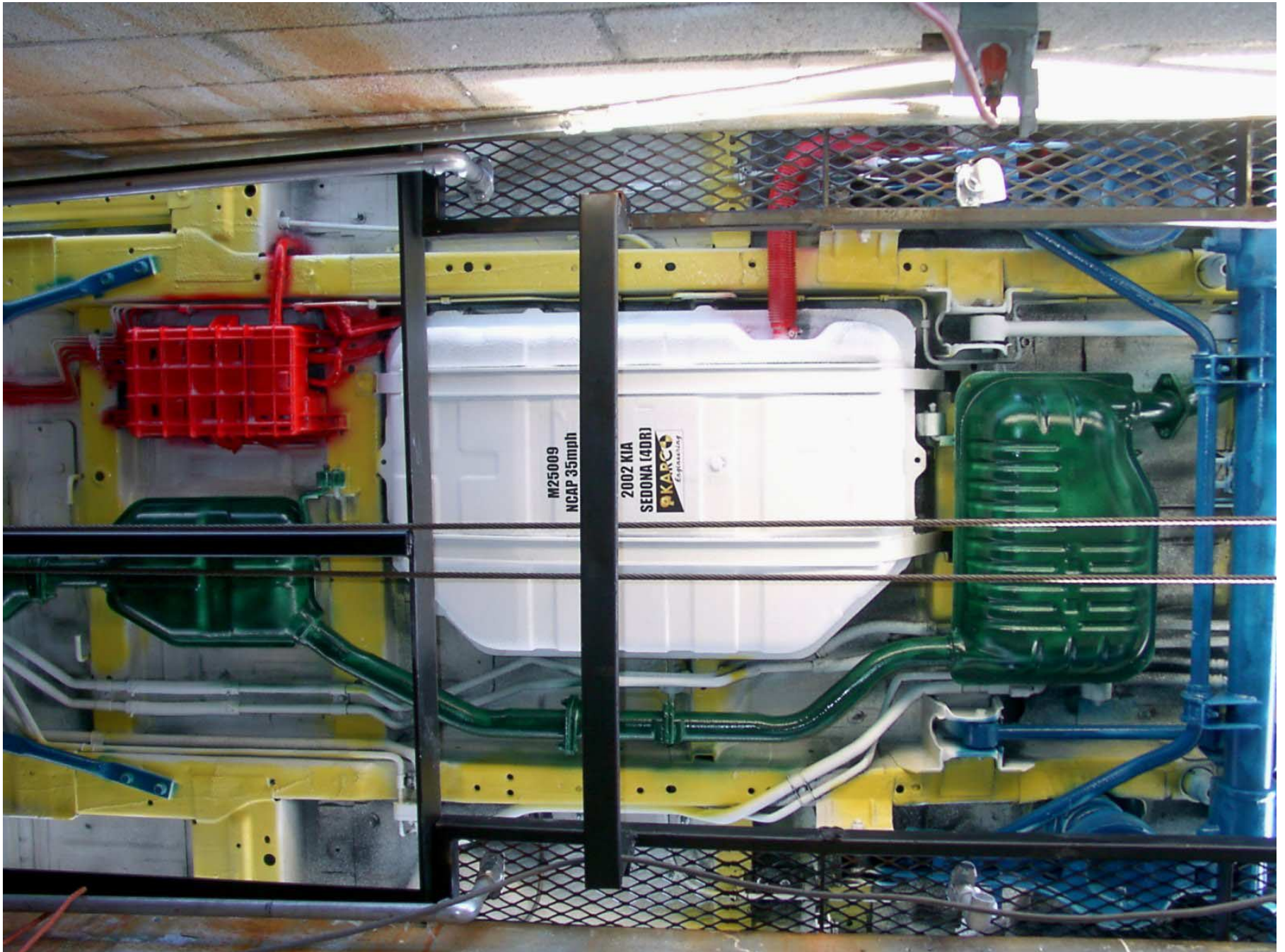


Figure A-23: Rear Underside, Pre-Test

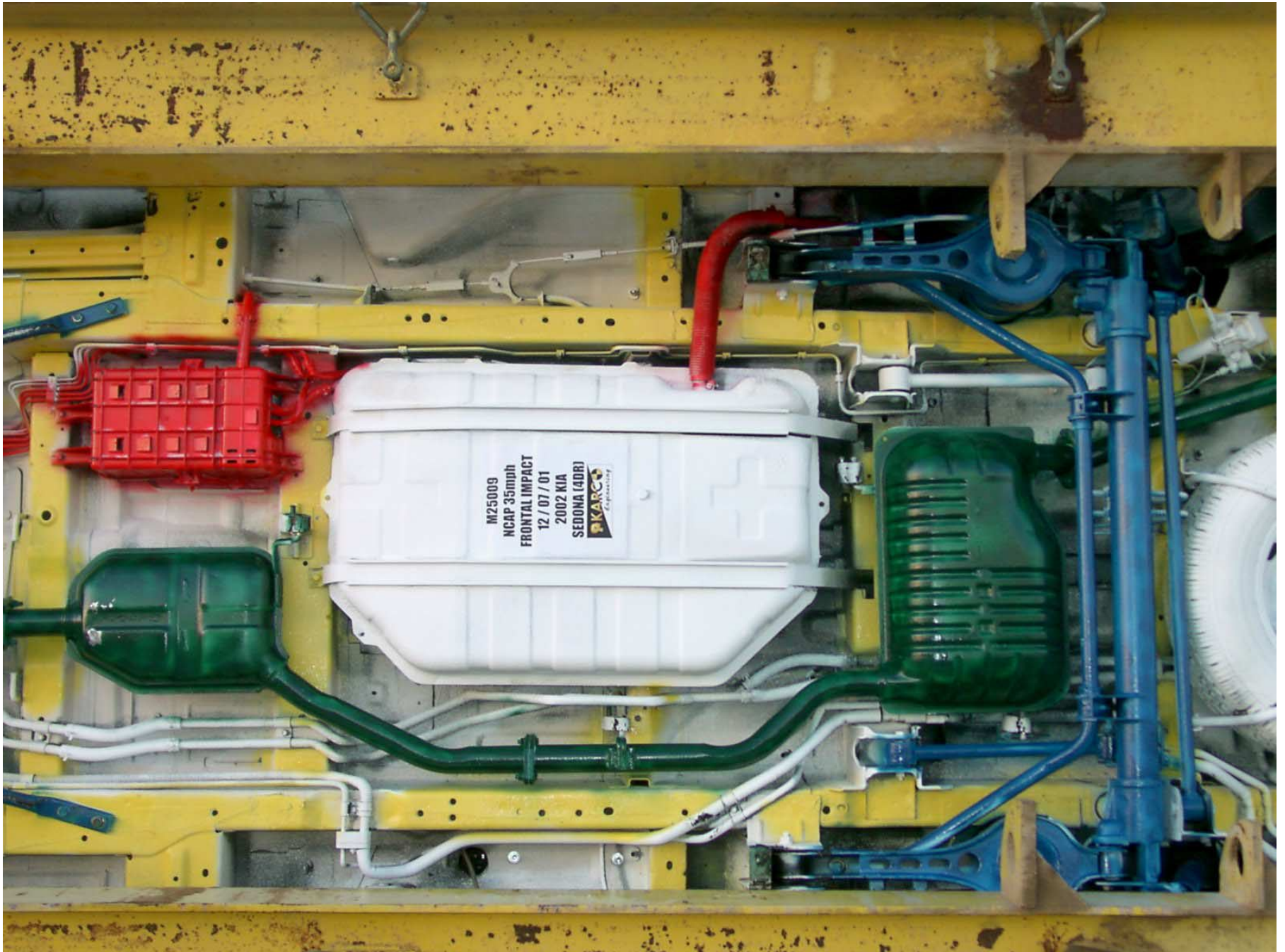


Figure A-24: Rear Underside, Post-Test

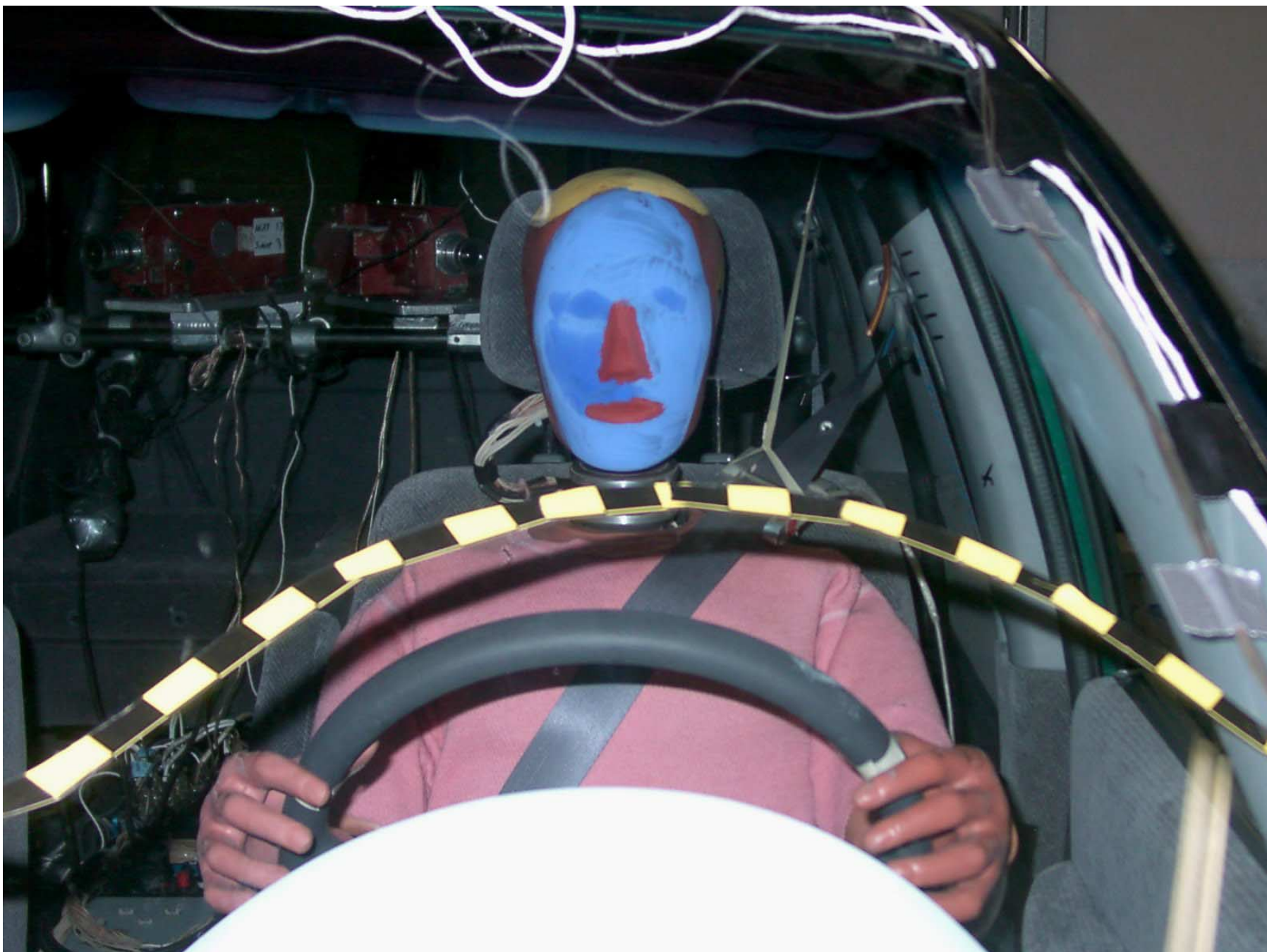


Figure A-25: Driver Dummy Front View, Pre-Test



Figure A-26: Driver Dummy Front View, Post-Test



Figure A-27: Driver Dummy Through Window, Pre-Test



M25009
NCAP 35mph
FRONTAL IMPACT

Figure A-28: Driver Dummy Through Window, Post-Test



Figure A-29: Driver Dummy Door Open, Pre-Test



Figure A-30: Driver Dummy Door Open, Post-Test



Figure A-31: Driver Dummy 90° To Vehicle, Pre-Test



Figure A-32: Driver Dummy 90° To Vehicle, Post-Test



Figure A-33: Driver Dummy Feet, Pre-Test



Figure A-34: Driver Dummy Feet and Knee Contact, Post-Test



Figure A-35: Driver Side Knee Bolster, Pre-Test



Figure A-36: Driver Side Knee Bolster, Post-Test



Figure A-37: Driver Side Floor Pan, Pre-Test



Figure A-38: Driver Side Floor Pan, Post-Test



Figure A-39: Driver Dummy Head, Post-Test



Figure A-40: Driver Dummy Contact, Post-Test

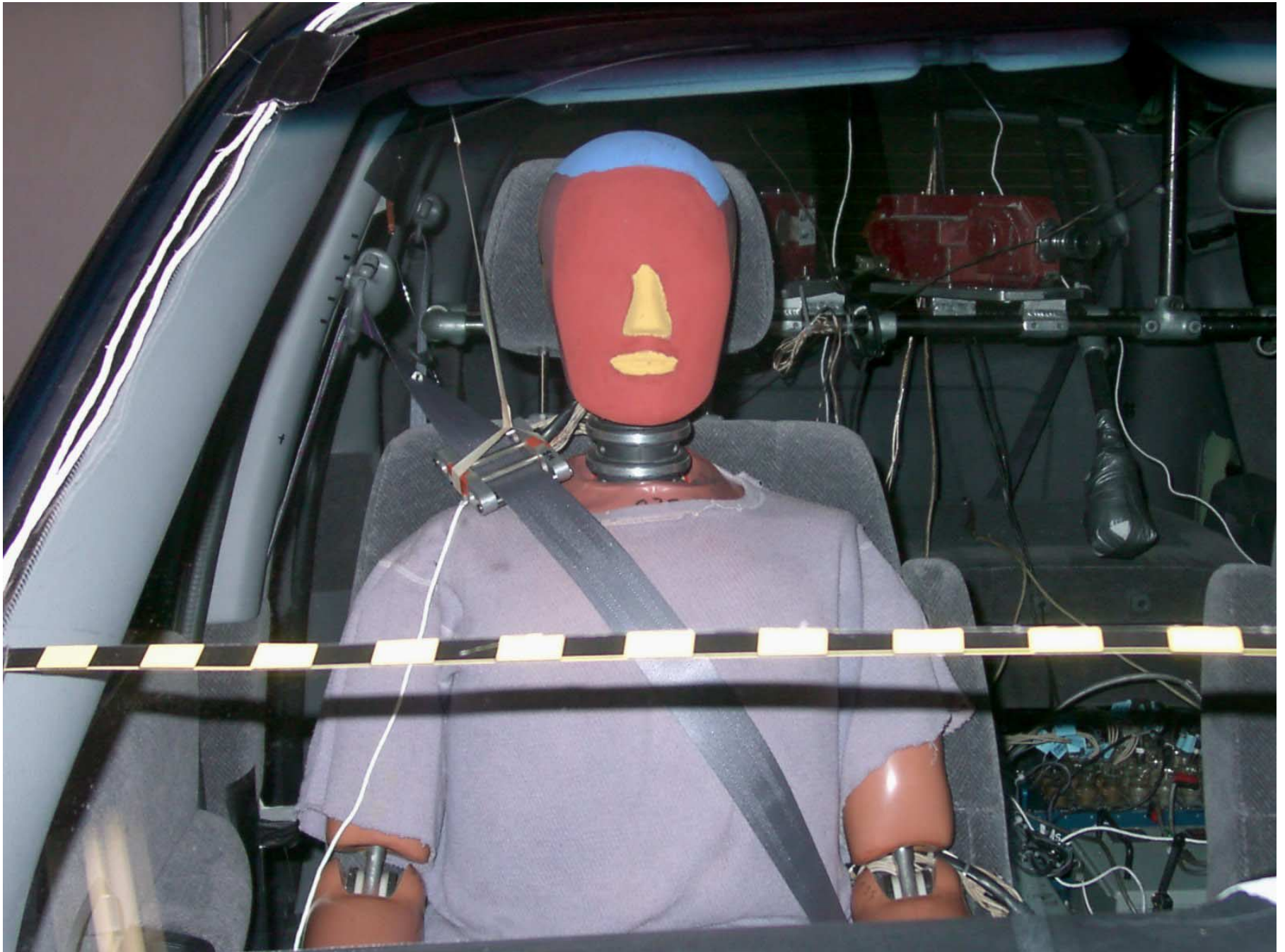


Figure A-41: Passenger Dummy Front View, Pre-Test



Figure A-42: Passenger Dummy Front View, Post-Test



Figure A-43: Passenger Dummy Through Window, Pre-Test



Figure A-44: Passenger Dummy Through Window, Post-Test



Figure A-45: Passenger Dummy Door Open, Pre-Test



Figure A-46: Passenger Dummy Door Open, Post-Test



Figure A-47: Passenger Dummy 90° To Vehicle, Pre-Test



Figure A-48: Passenger Dummy 90° To Vehicle, Post-Test



Figure A-49: Passenger Dummy Feet, Pre-Test

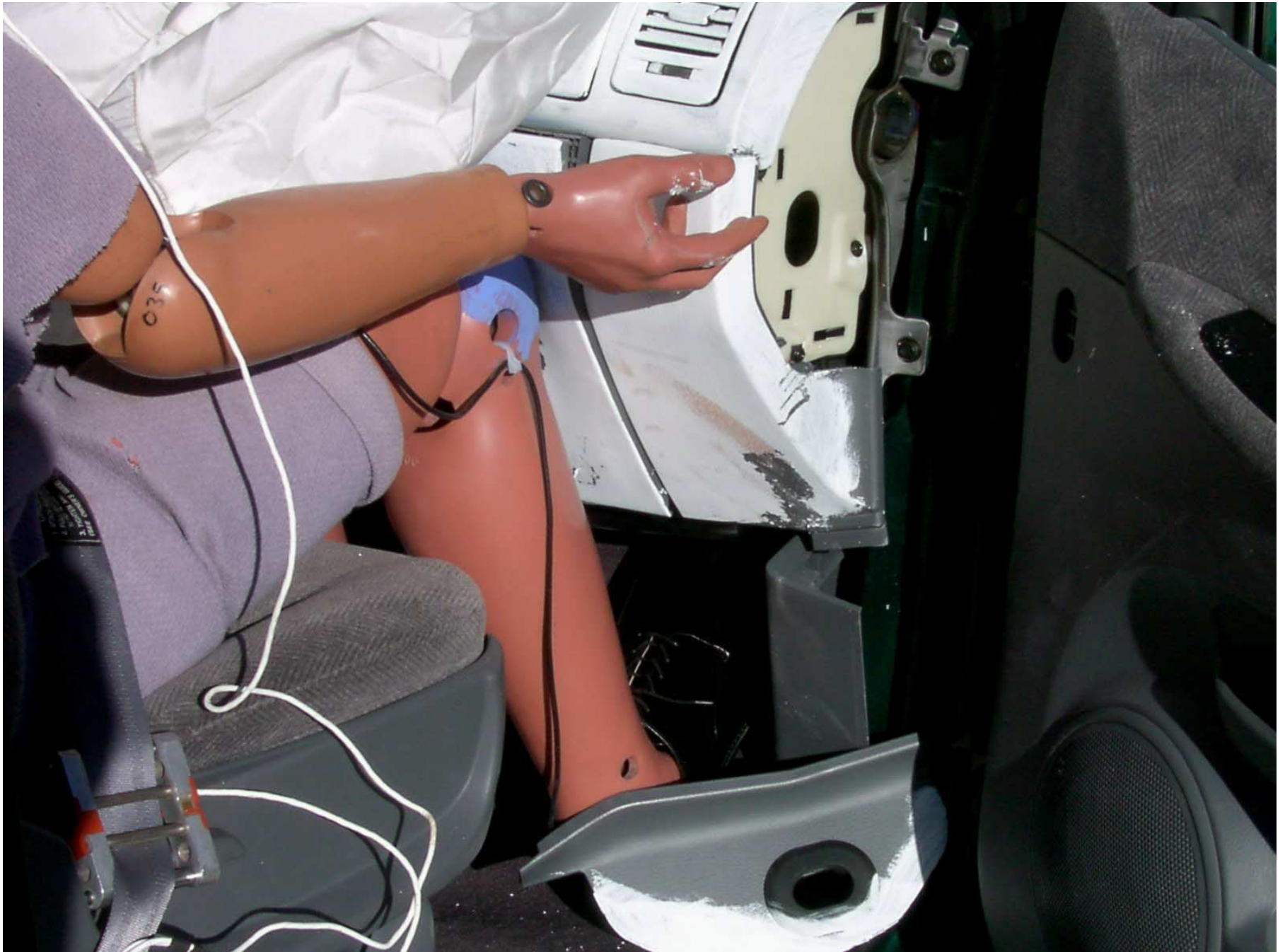


Figure A-50: Passenger Dummy Feet and Knee Contact, Post-Test

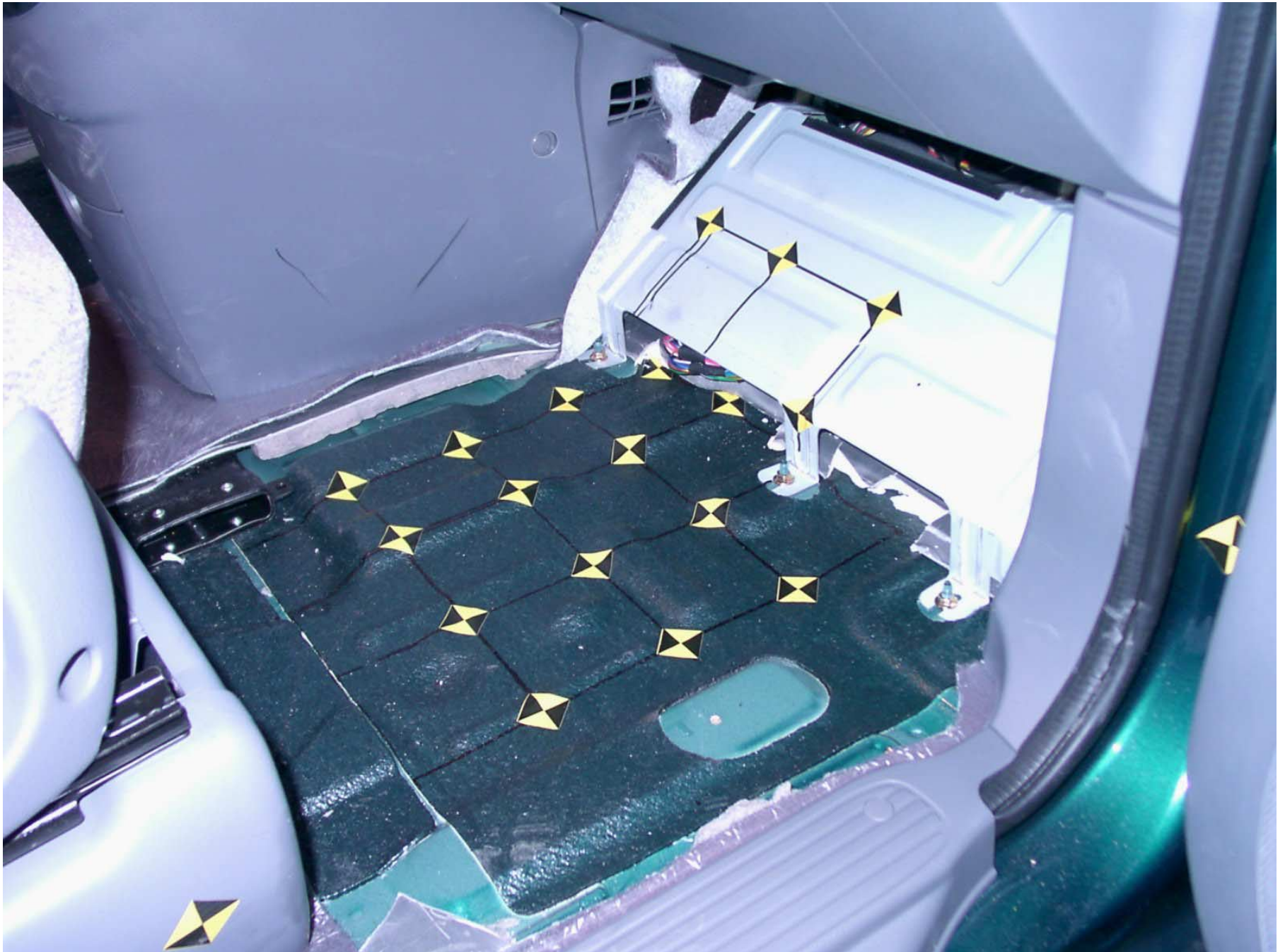


Figure A-51: Passenger Side Floor Pan, Pre-Test



Figure A-52: Passenger Side Floor Pan, Post-Test



Figure A-53: Passenger Side Knee Bolster, Pre-Test



Figure A-54: Passenger Side Knee Bolster, Post-Test

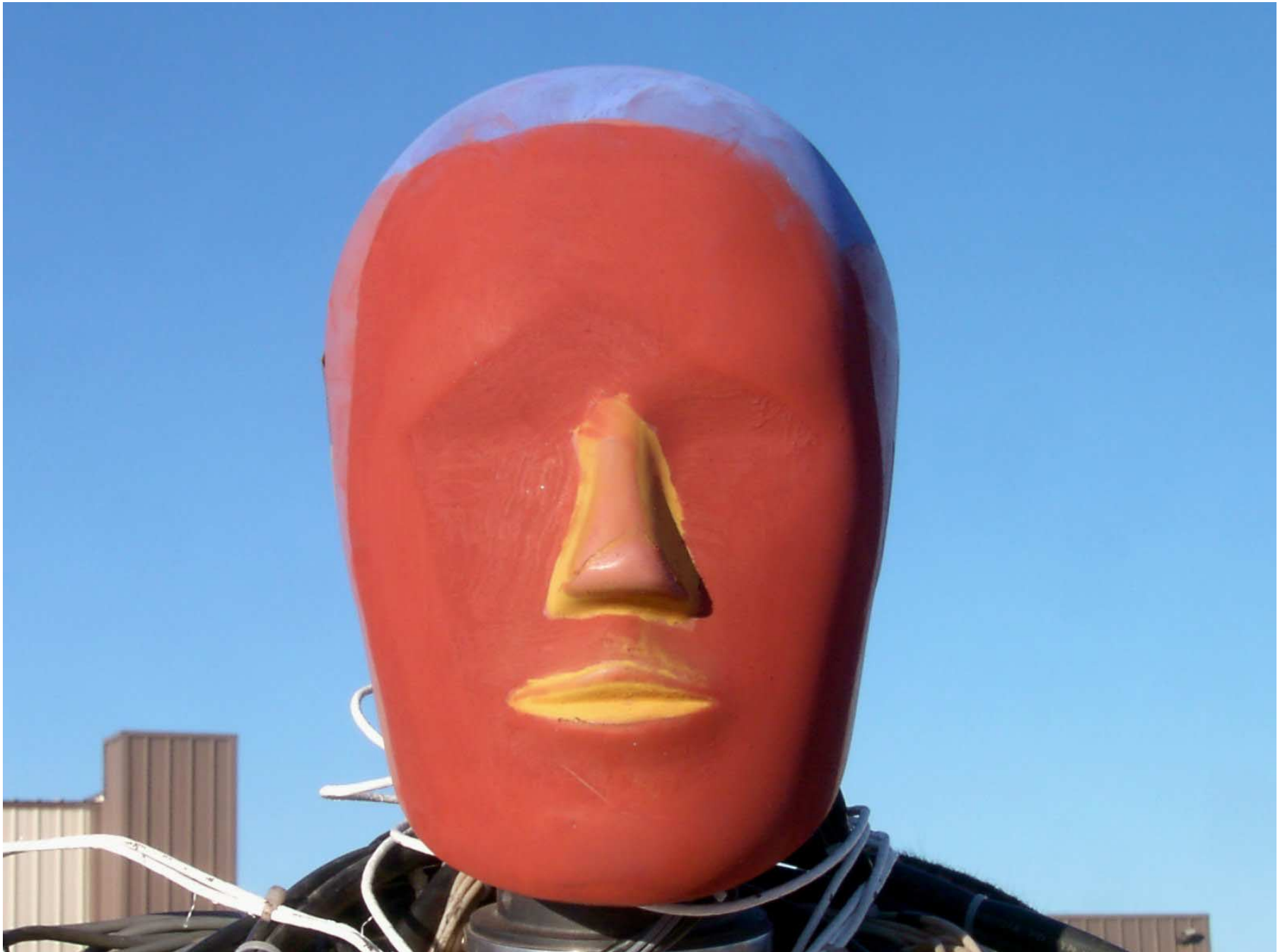


Figure A-55: Passenger Head, Post-Test



Figure A-56: Passenger Dummy Contact, Post-Test



Figure A-57: Vehicle on Rollover Device

**Photograph Not
Available**

Figure A-58: Vehicle During Impact

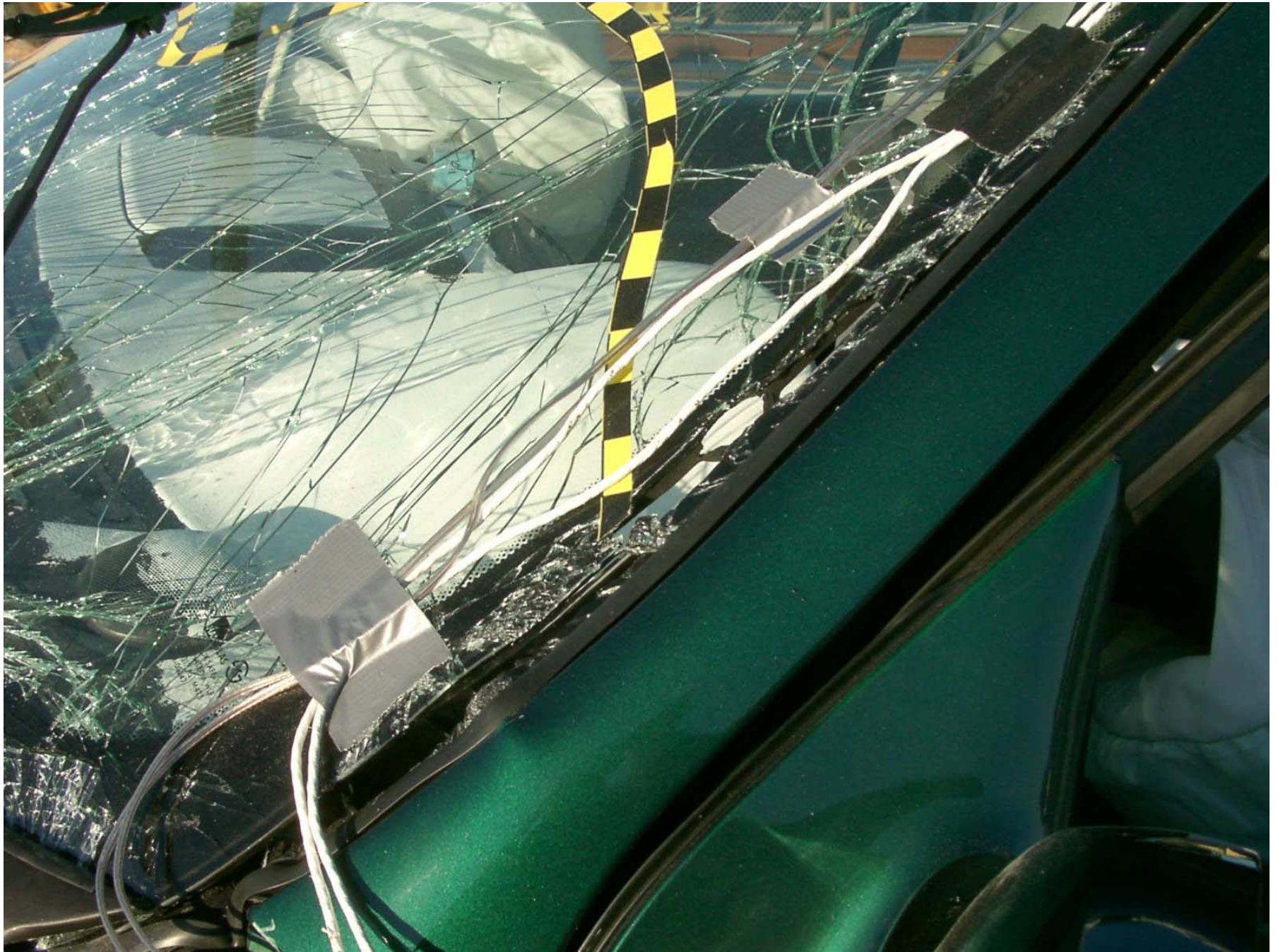


Figure A-59: Windshield Separation

APPENDIX B

DATA PLOTS

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B-88	Passenger Chest Primary Z
B-89	Passenger Chest Primary Resultant
B-90	Passenger Chest Redundant X
B-91	Passenger Chest Redundant X Velocity
B-92	Passenger Chest Redundant X Displacement
B-93	Passenger Chest Redundant Y
B-94	Passenger Chest Redundant Z
B-95	Passenger Chest Redundant Resultant
B-96	Passenger Chest Displacement X

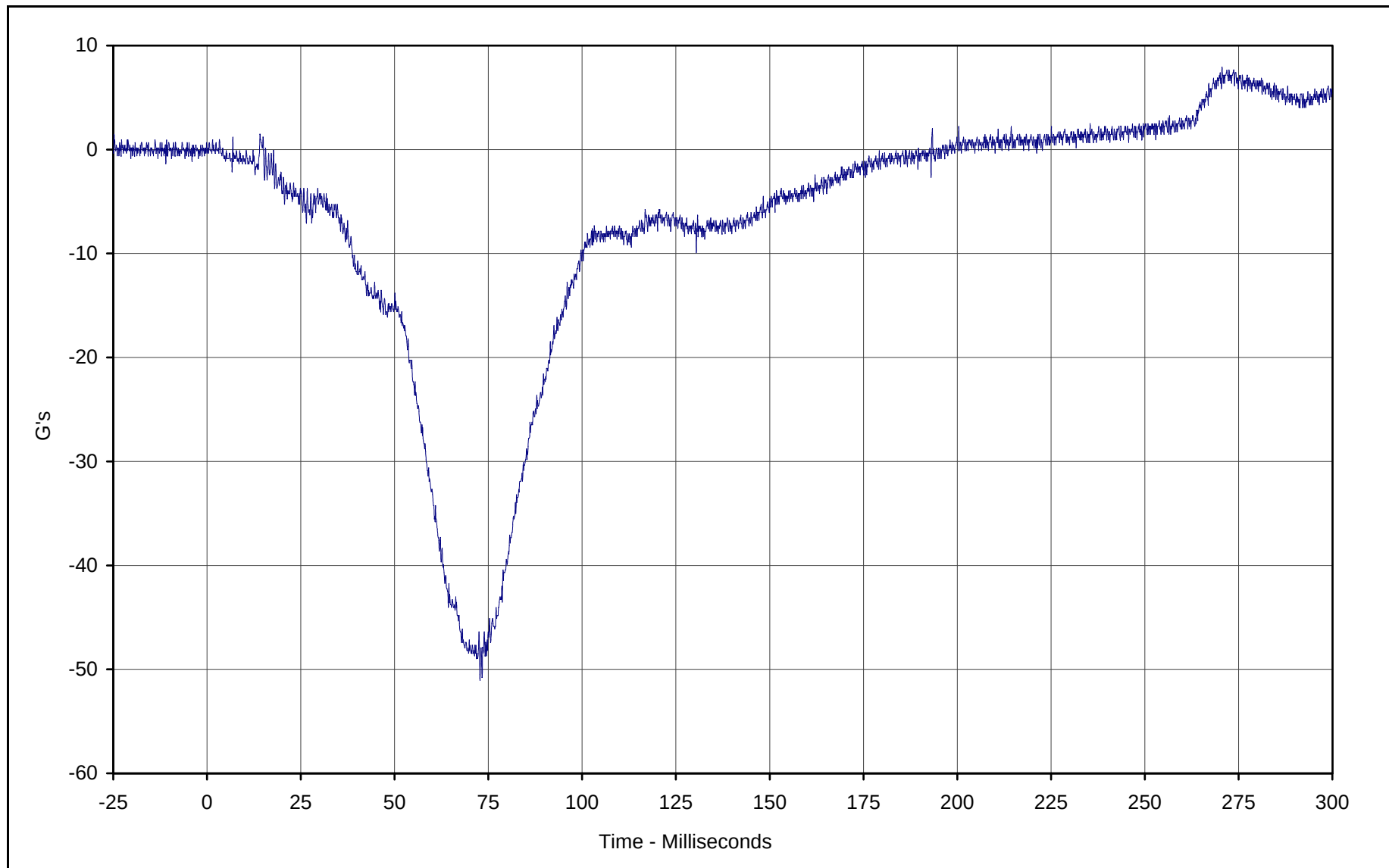
LIST OF DATA PLOTS...(Continued)

Data Plot	Page
B-97	Passenger Pelvis X
B-98	Passenger Pelvis X Velocity
B-99	Passenger Pelvis X Displacement
B-100	Passenger Pelvis Y
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B-102	Passenger Pelvis Resultant
B-103	Passenger Left Femur Force
B-104	Passenger Right Femur Force
B-105	Passenger Left Knee Slider
B-106	Passenger Right Knee Slider
B-107	Passenger Left Upper Tibia Moment X
B-108	Passenger Left Upper Tibia Moment Y
B-109	Passenger Right Upper Tibia Moment X
B-110	Passenger Right Upper Tibia Moment Y
B-111	Passenger Left Lower Tibia Moment X
B-112	Passenger Left Lower Tibia Moment Y
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B-126	Passenger Shoulder Belt Elongation

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B-1



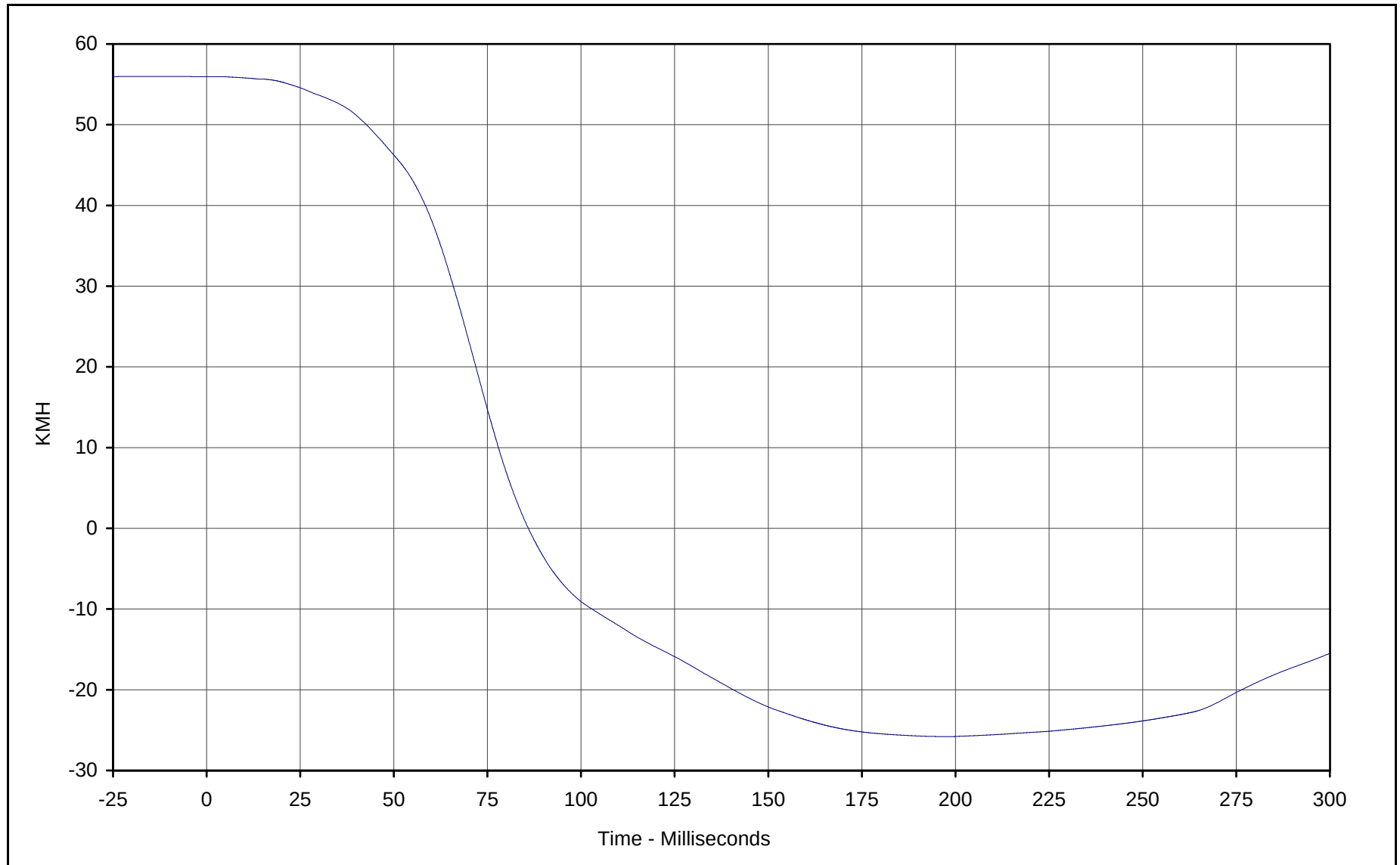
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Maximum Value: 7.9 at 270.6 Milliseconds
Minimum Value: -51.0 at 72.8 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-001

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

B-2

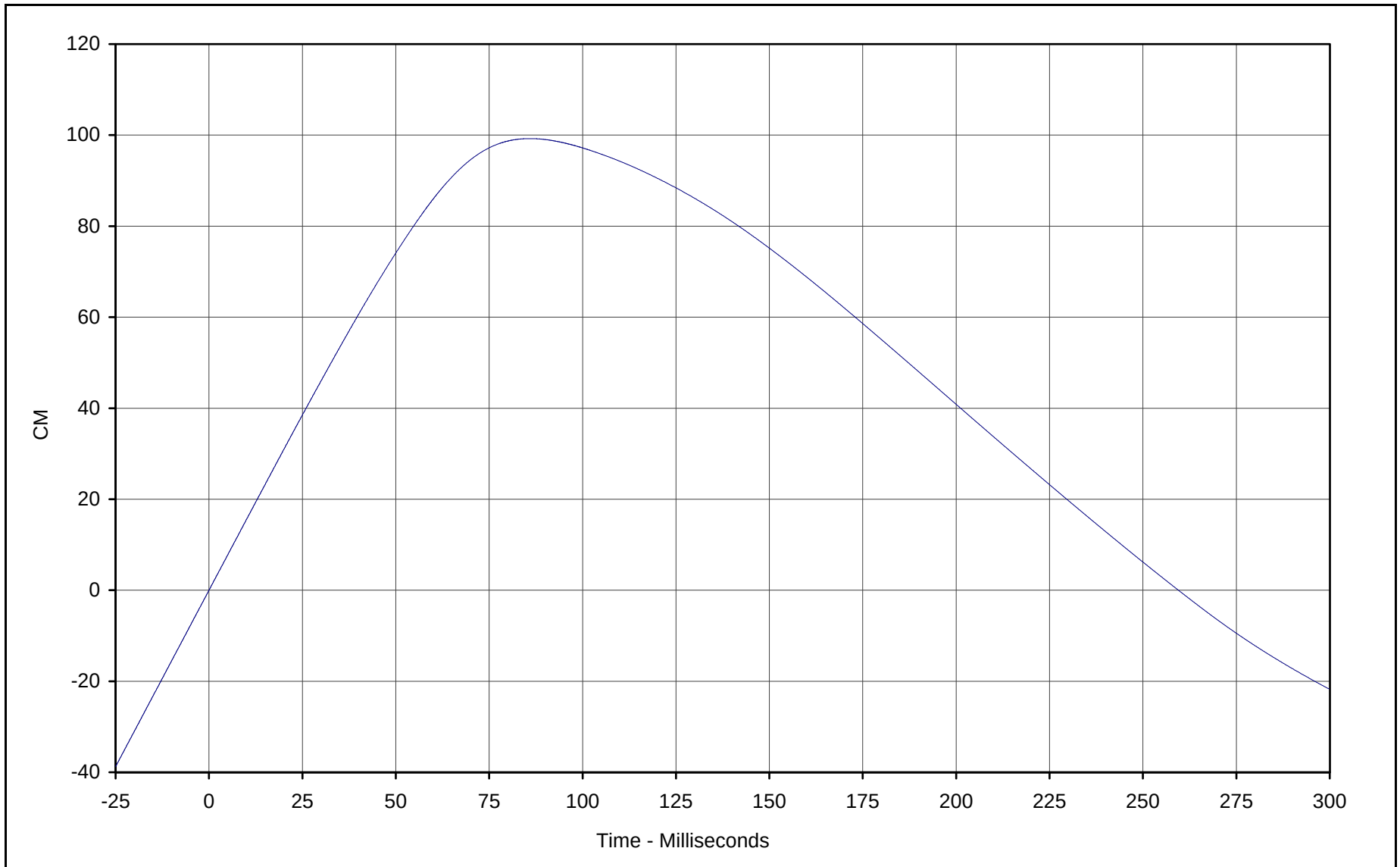


Curve Description: Driver Head Primary X Velocity
Maximum Value: 56.0 at 3.4 Milliseconds
Minimum Value: -25.8 at 197.4 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN1-001

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

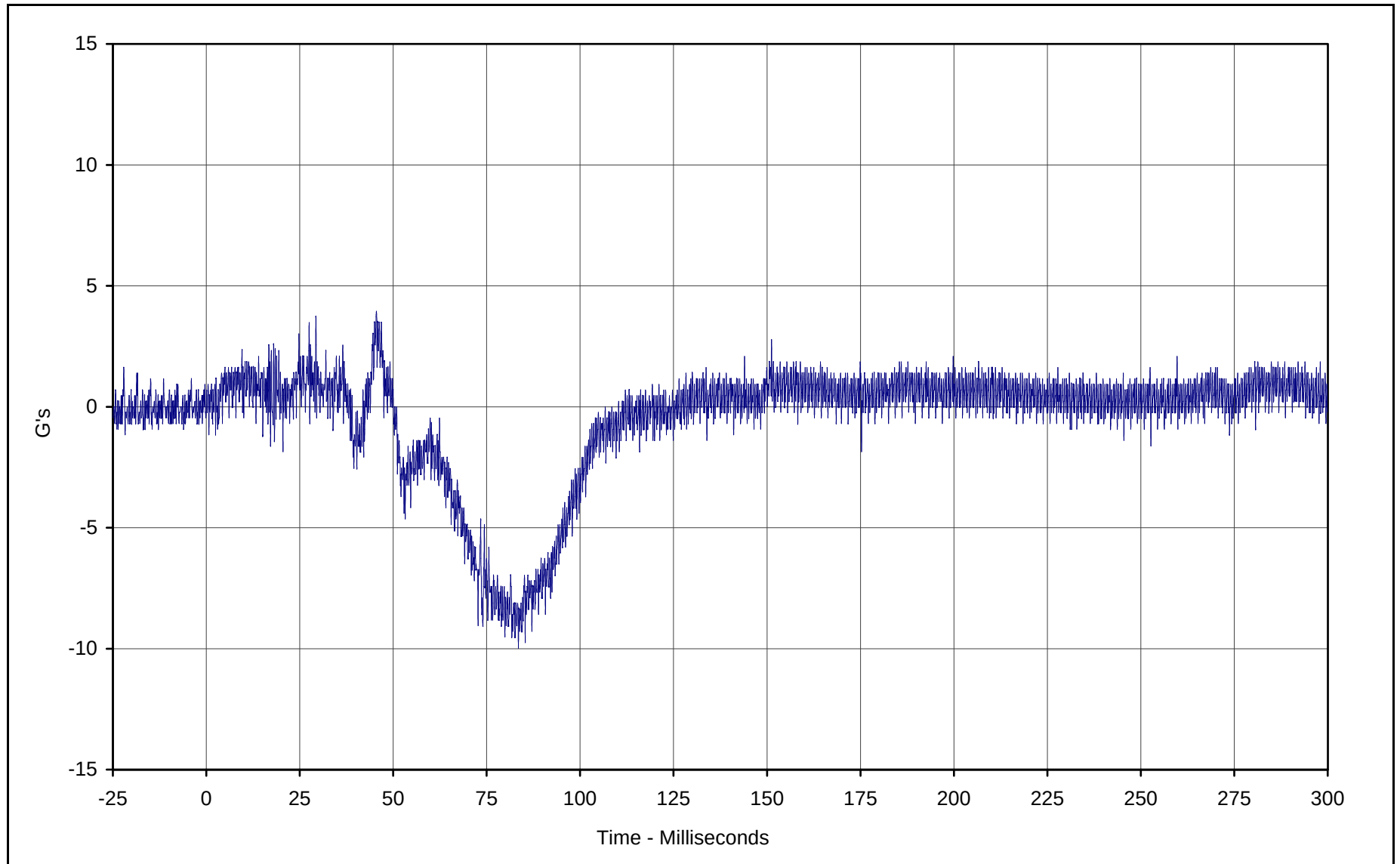


Curve Description: Driver Head Primary X Displ.
Maximum Value: 99.2 at 85.9 Milliseconds
Minimum Value: -21.7 at 299.9 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN2-001

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



B-4



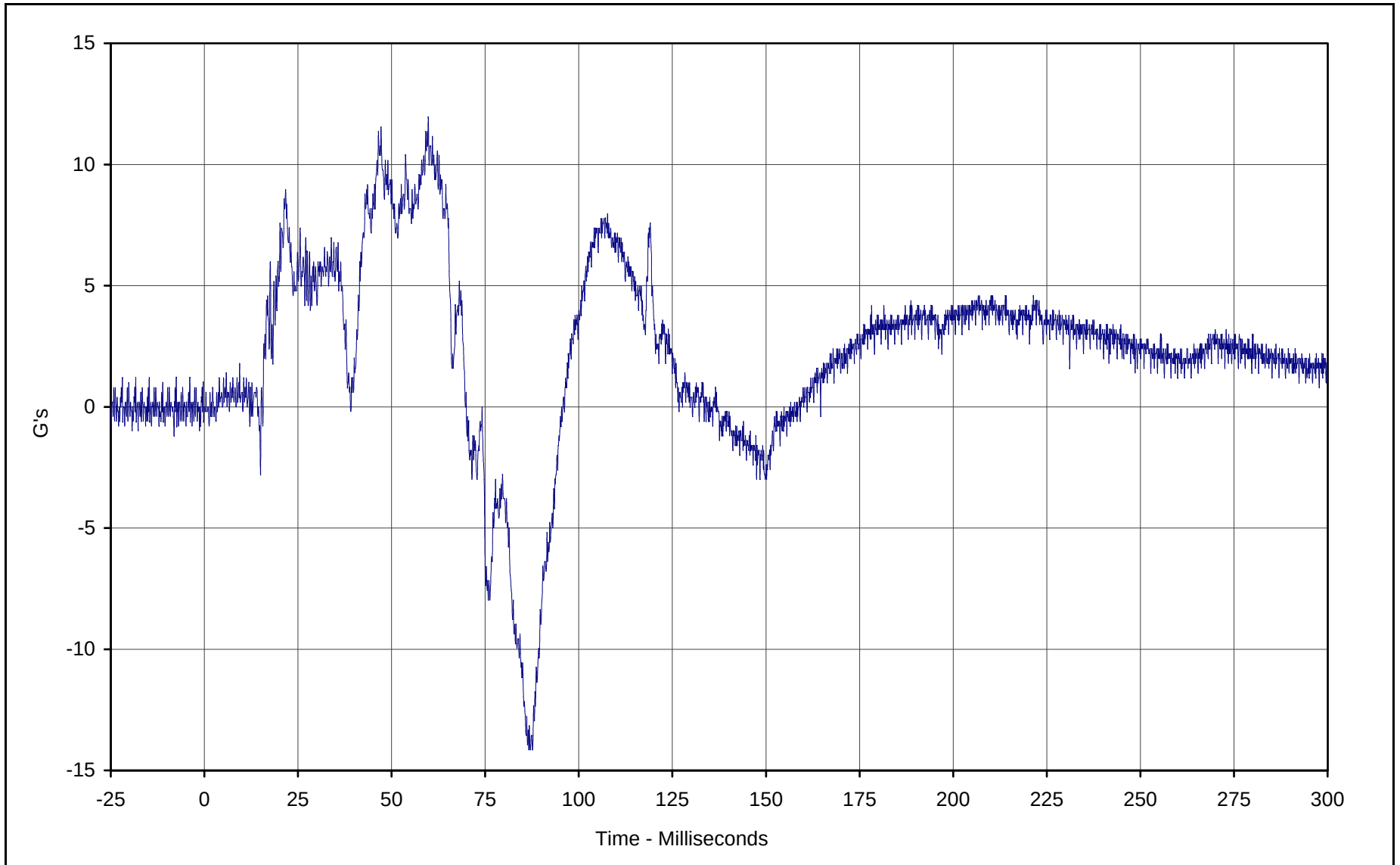
Curve Description: Driver Head Primary Y
Maximum Value: 3.9 at 45.5 Milliseconds
Minimum Value: -10.0 at 83.5 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-002

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

B-5

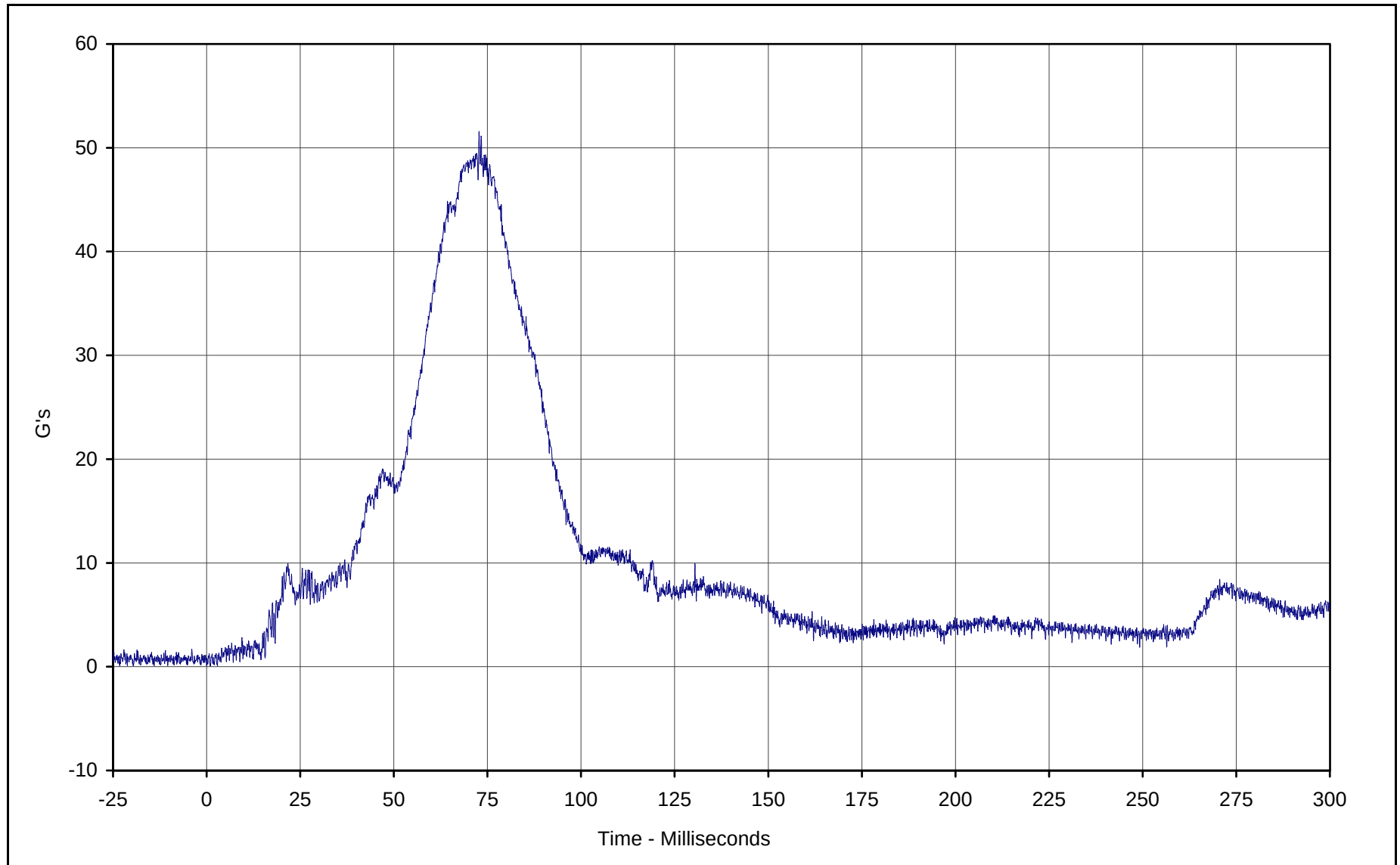


Curve Description: Driver Head Primary Z
Maximum Value: 12.0 at 59.8 Milliseconds
Minimum Value: -14.2 at 86.6 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-003

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



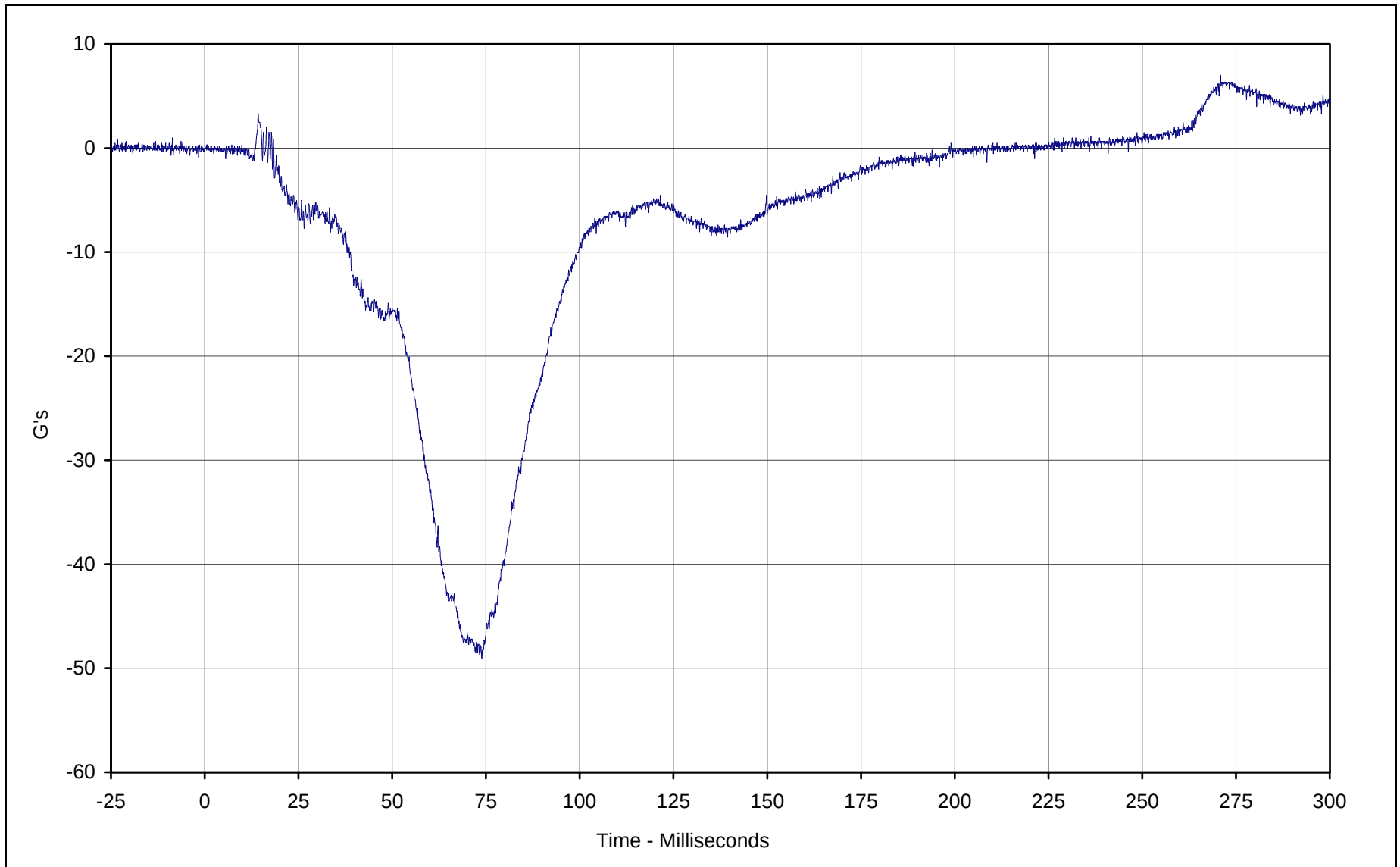
KAR22001-01



Curve Description: Driver Head Resultant Primary
Maximum Value: 51.6 at 72.8 Milliseconds
Minimum Value: 0.1 at 0.0 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: RES-001

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



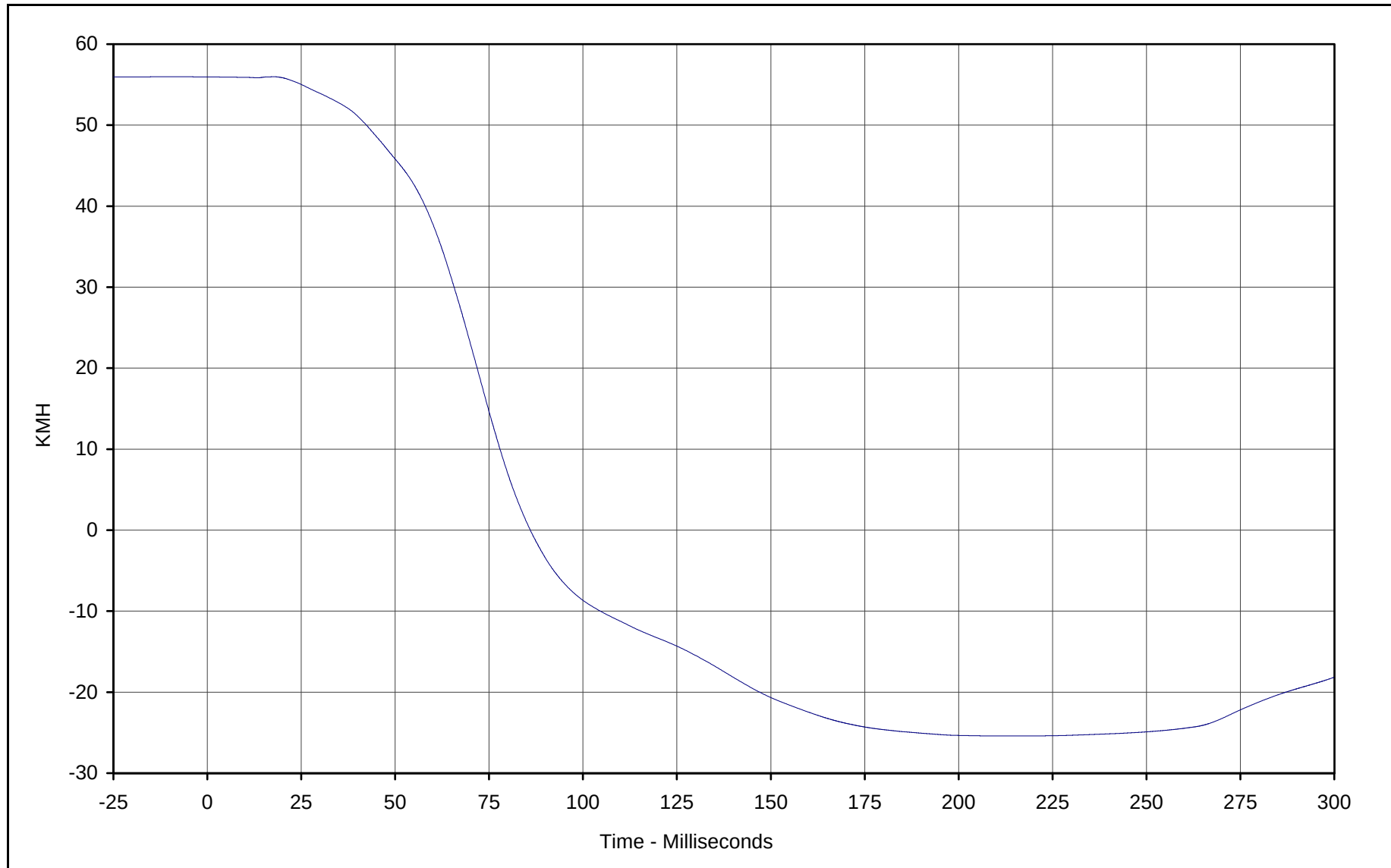


Curve Description: Driver Head Redundant X
Maximum Value: 7.0 at 270.9 Milliseconds
Minimum Value: -49.0 at 73.9 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-004

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



B-8

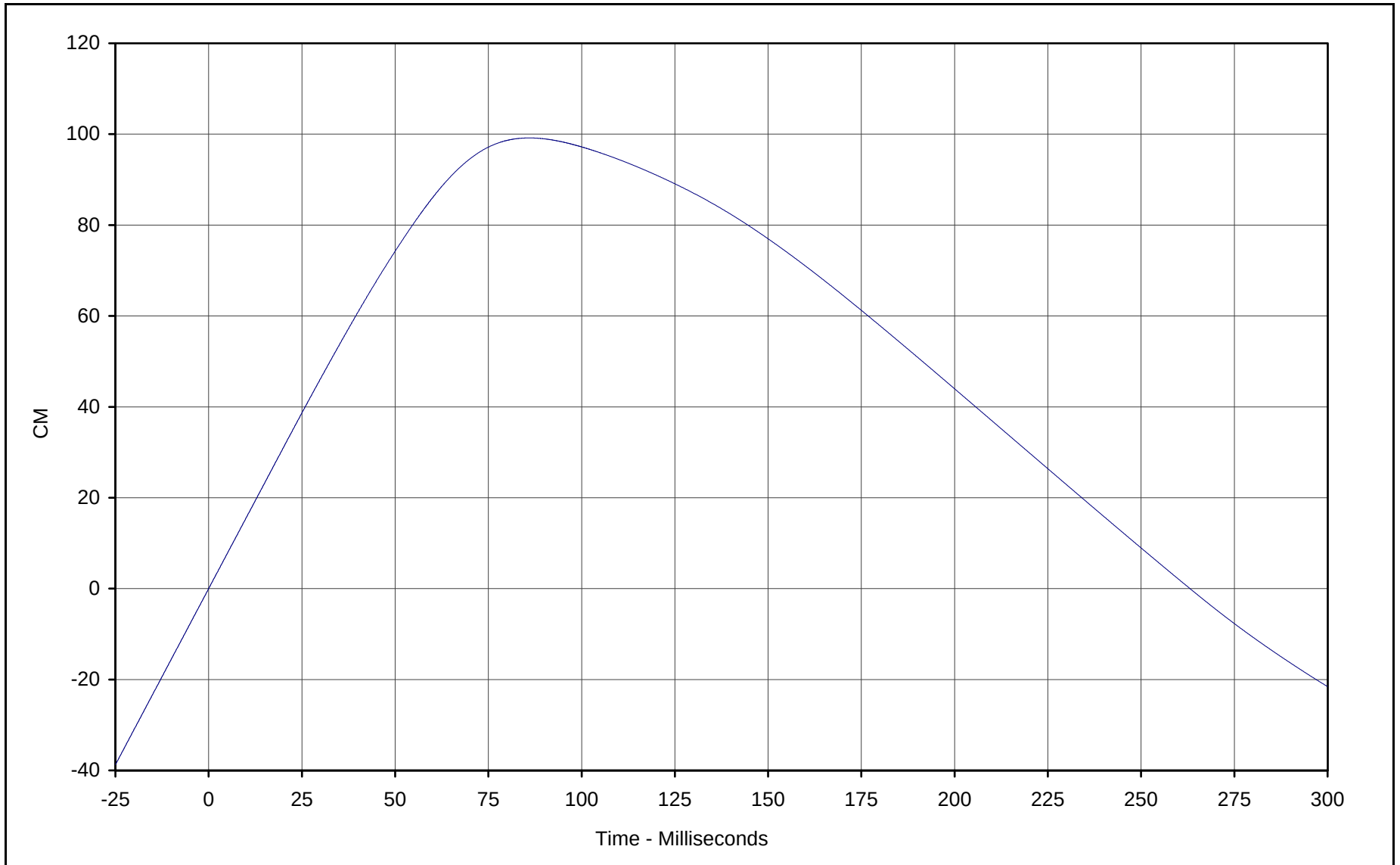


Curve Description: Driver Head Redundant X Velocity
Maximum Value: 56.0 at 17.8 Milliseconds
Minimum Value: -25.4 at 215.0 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN1-004

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

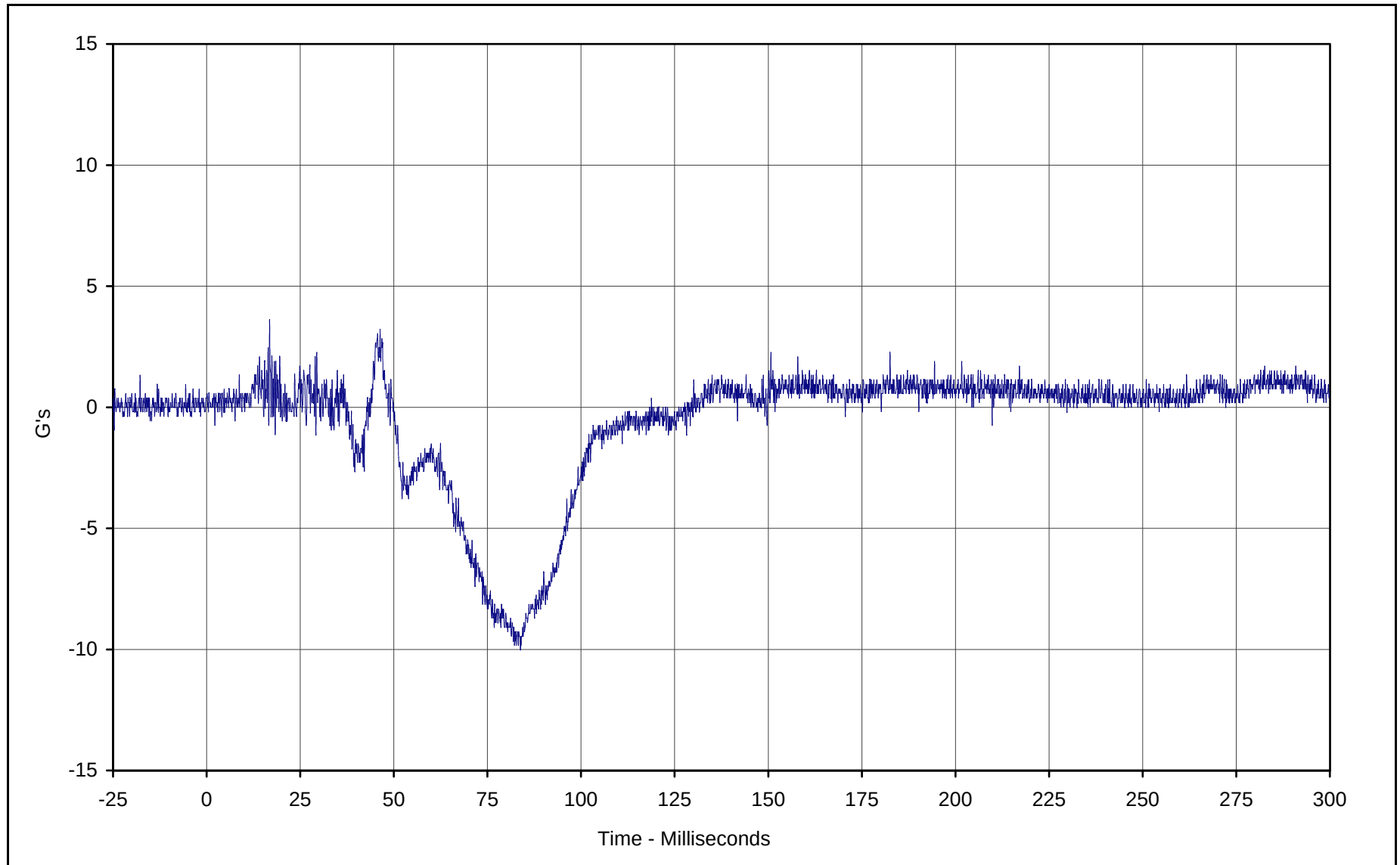


Curve Description: Driver Head Redundant X Displ.
Maximum Value: 99.2 at 86.0 Milliseconds
Minimum Value: -21.5 at 299.9 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN2-004

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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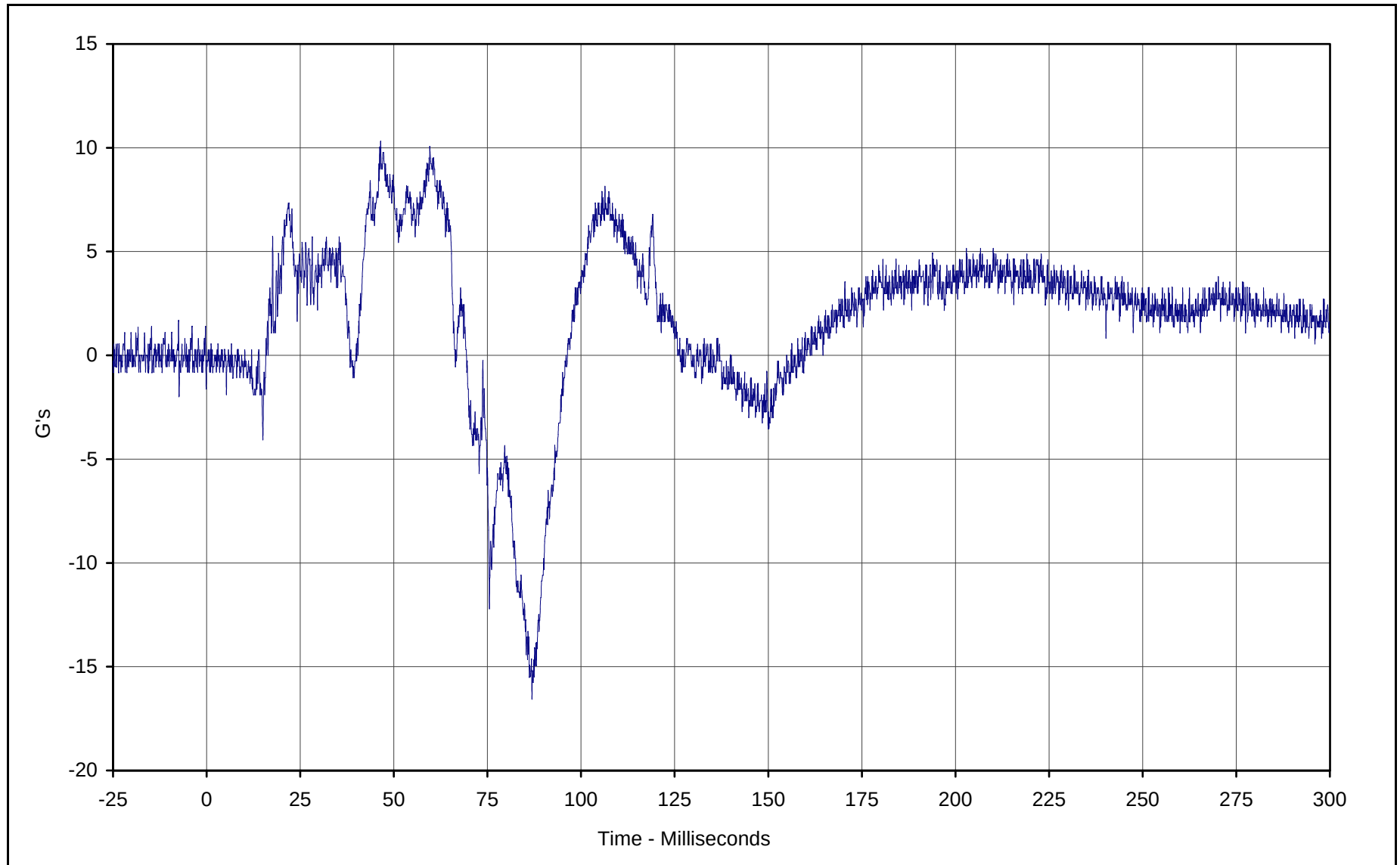


Curve Description: Driver Head Redundant Y
Maximum Value: 3.6 at 16.8 Milliseconds
Minimum Value: -10.0 at 83.8 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-005

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



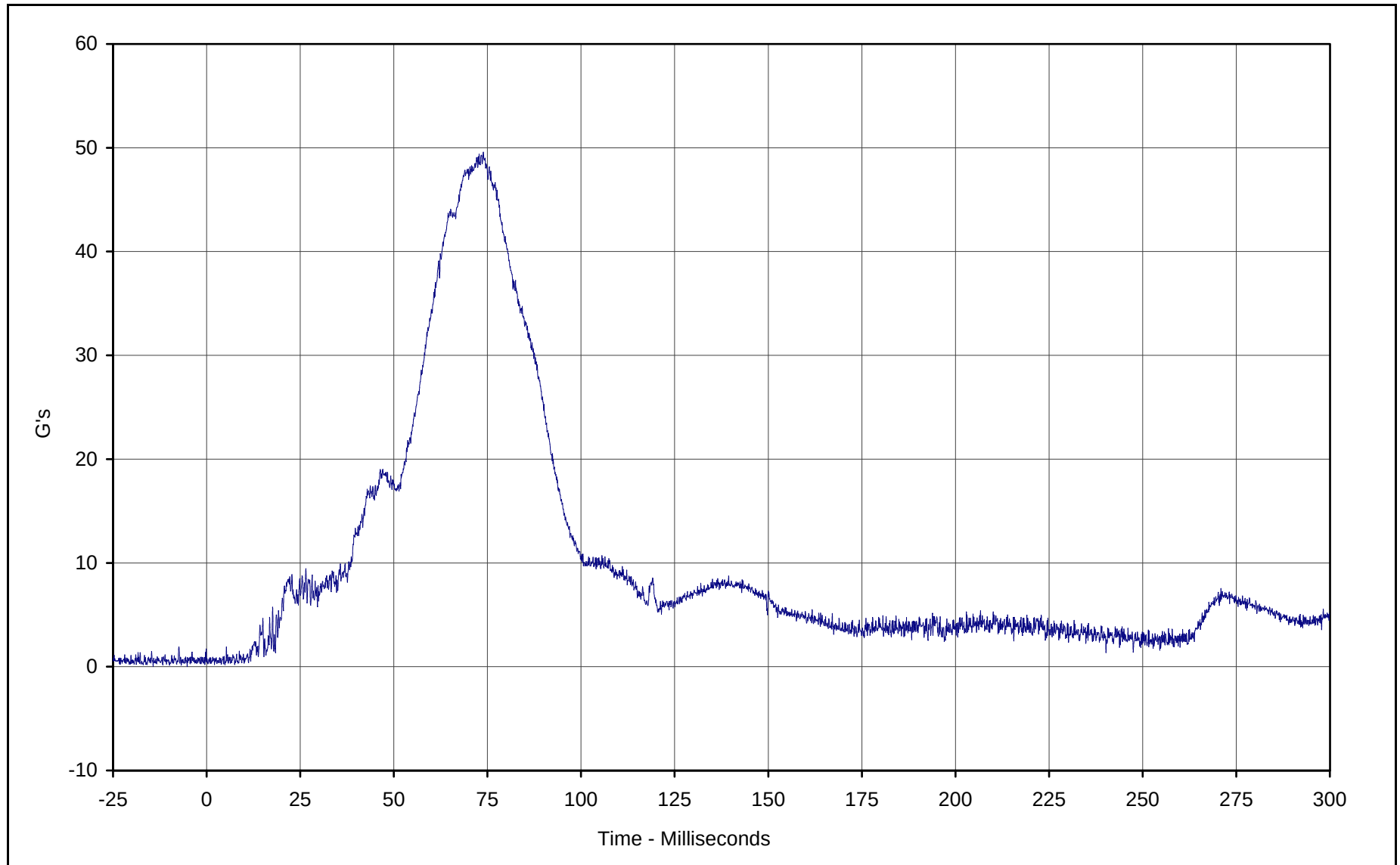
KAR22001-01



Curve Description: Driver Head Redundant Z
Maximum Value: 10.3 at 46.5 Milliseconds
Minimum Value: -16.6 at 86.9 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-006

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan

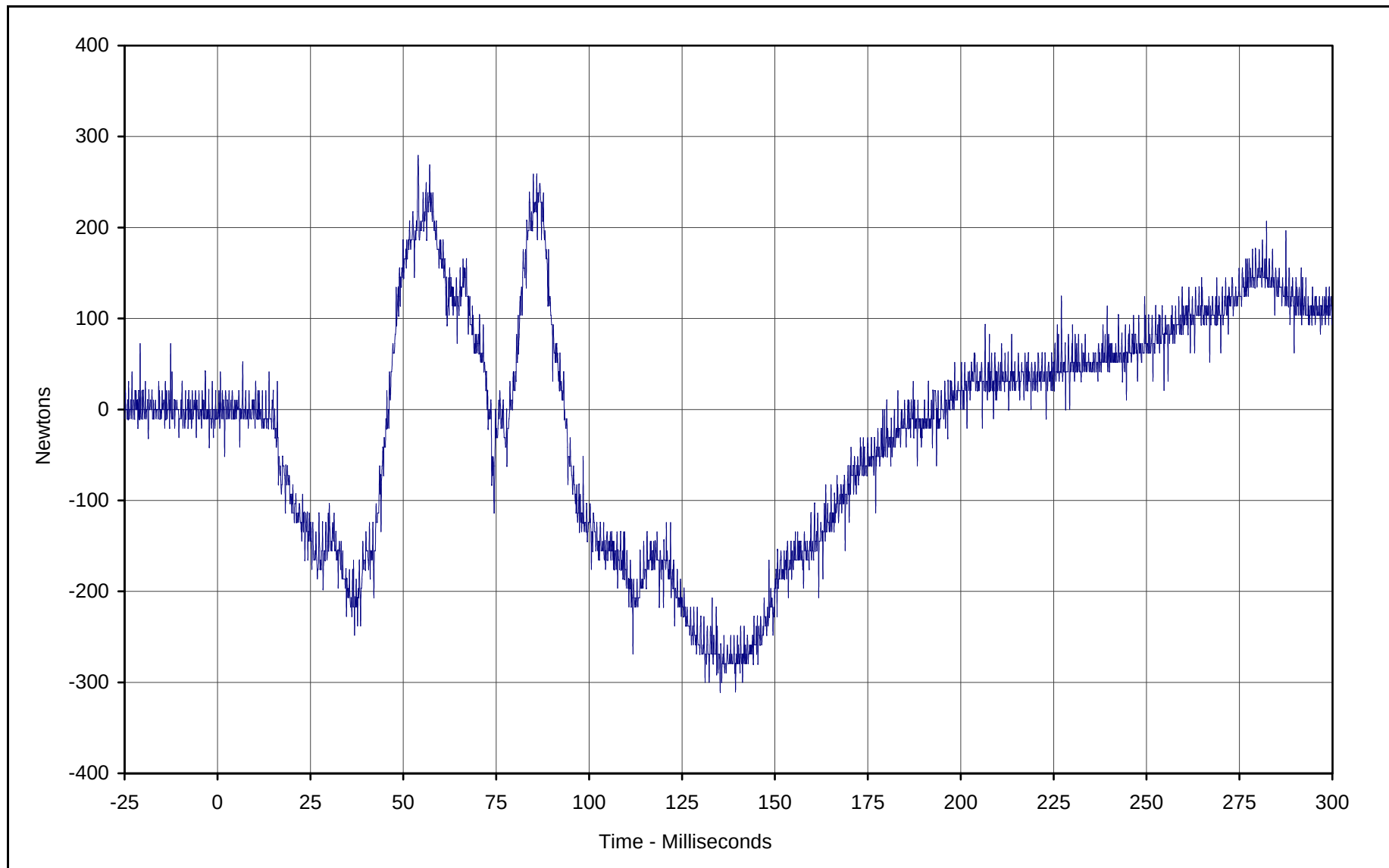




Curve Description: Driver Head Resultant Redundant
Maximum Value: 49.6 at 73.9 Milliseconds
Minimum Value: 0.2 at 4.9 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: RES-004

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



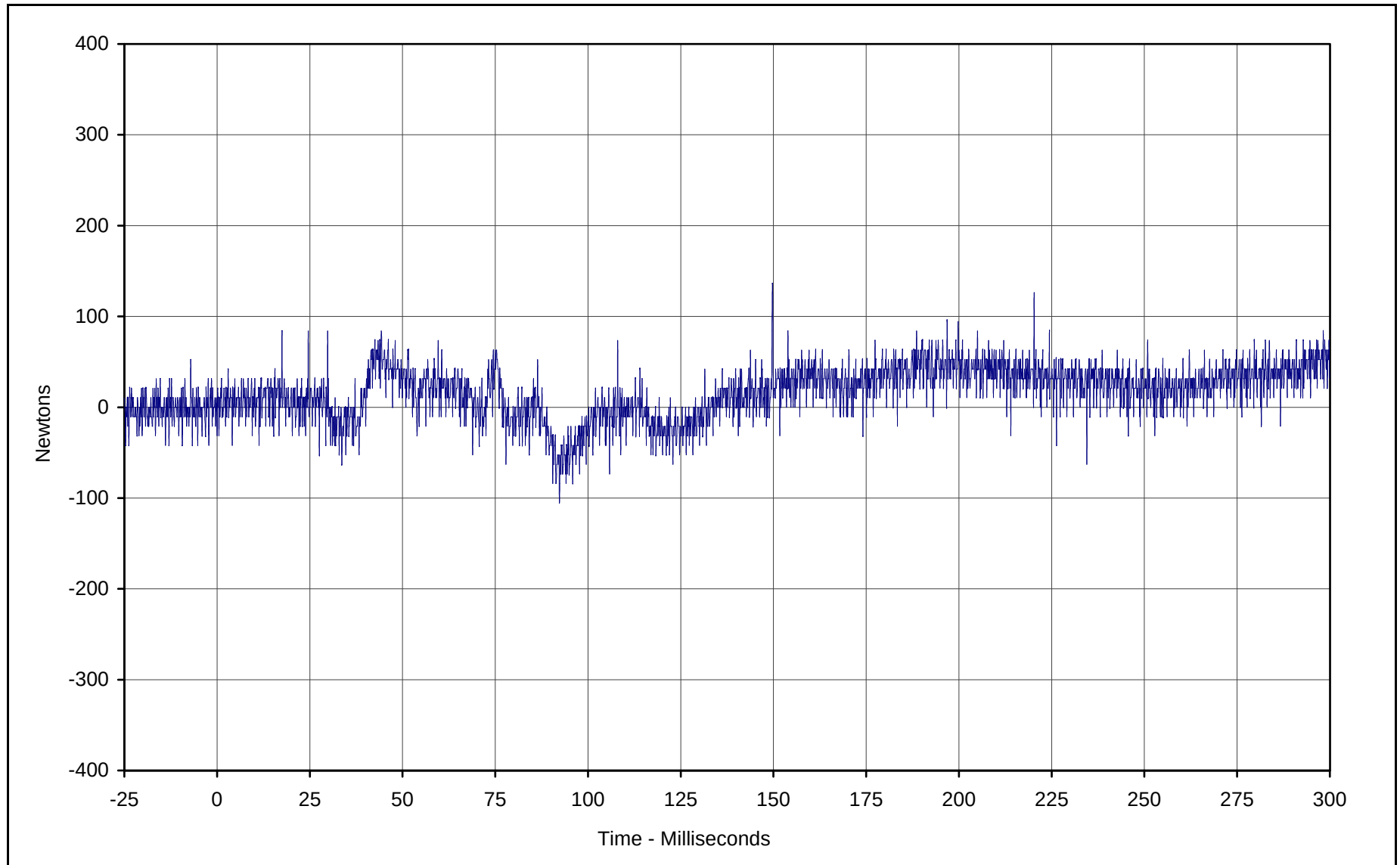


Curve Description: Driver Neck Force X
Maximum Value: 279.5 at 54.0 Milliseconds
Minimum Value: -310.5 at 135.3 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-007

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan

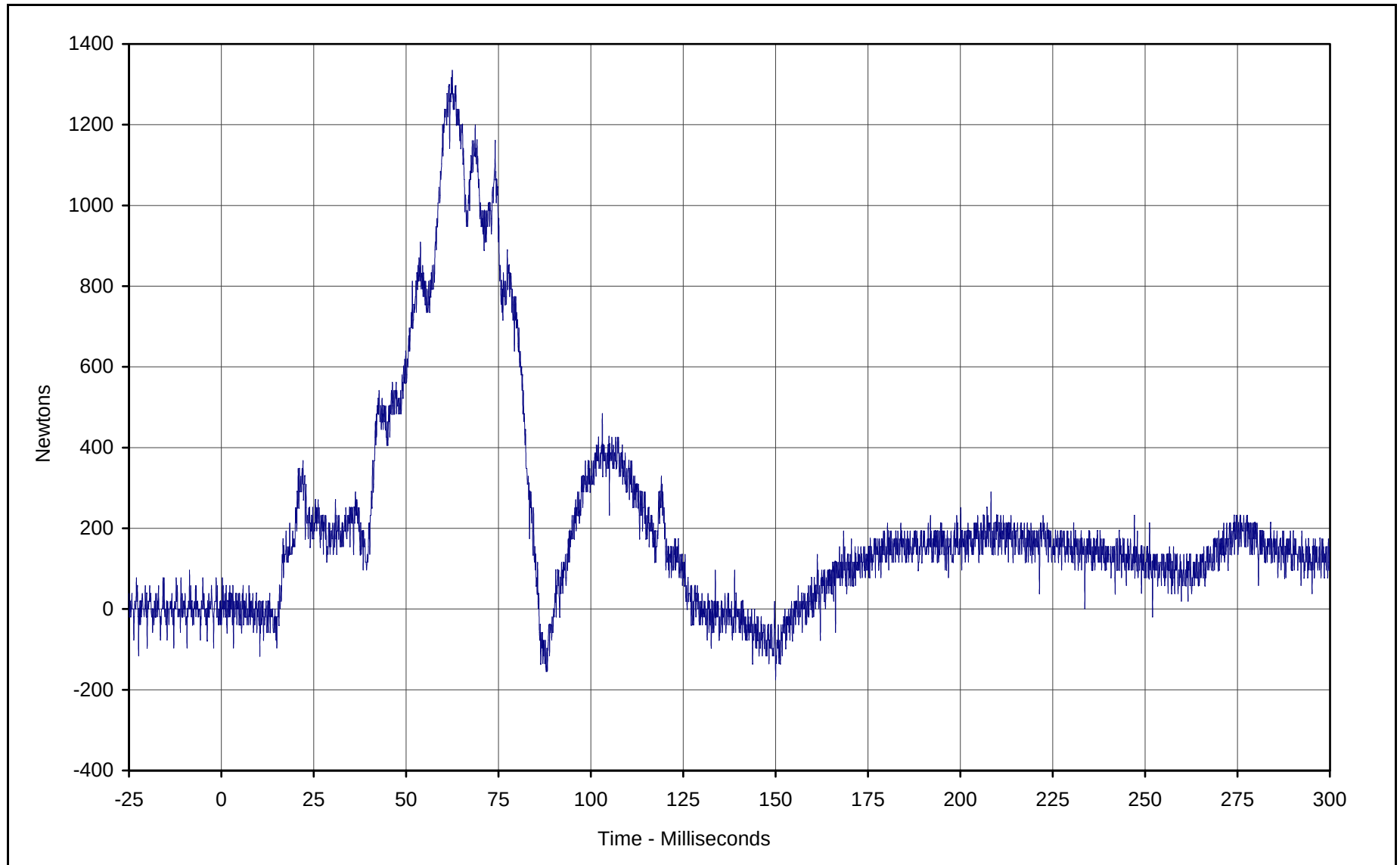




Curve Description: Driver Neck Force Y
Maximum Value: 136.5 at 149.7 Milliseconds
Minimum Value: -105.0 at 92.3 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-008

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan

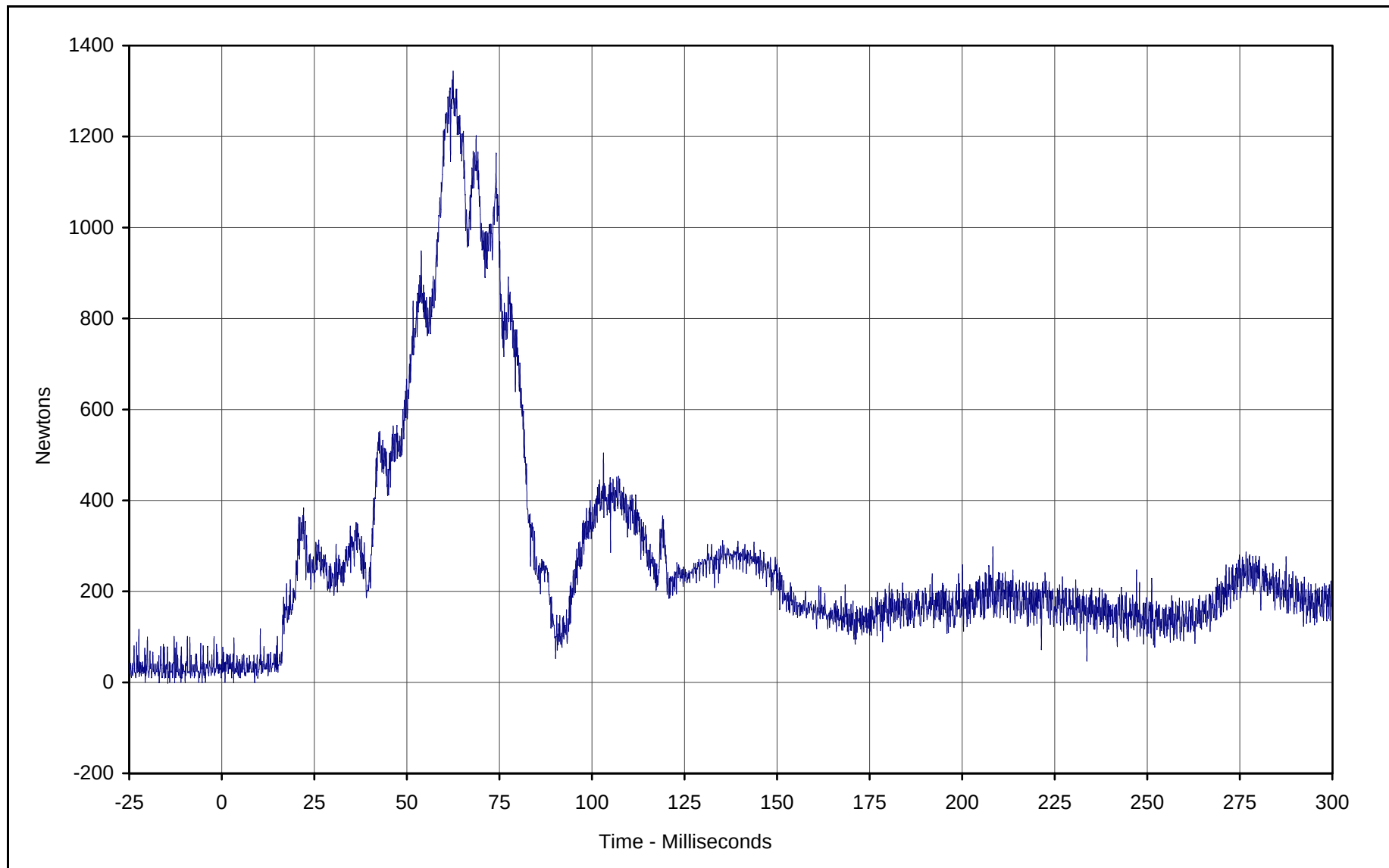




Curve Description: Driver Neck Force Z
Maximum Value: 1335.0 at 62.5 Milliseconds
Minimum Value: -174.1 at 150.0 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-009

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



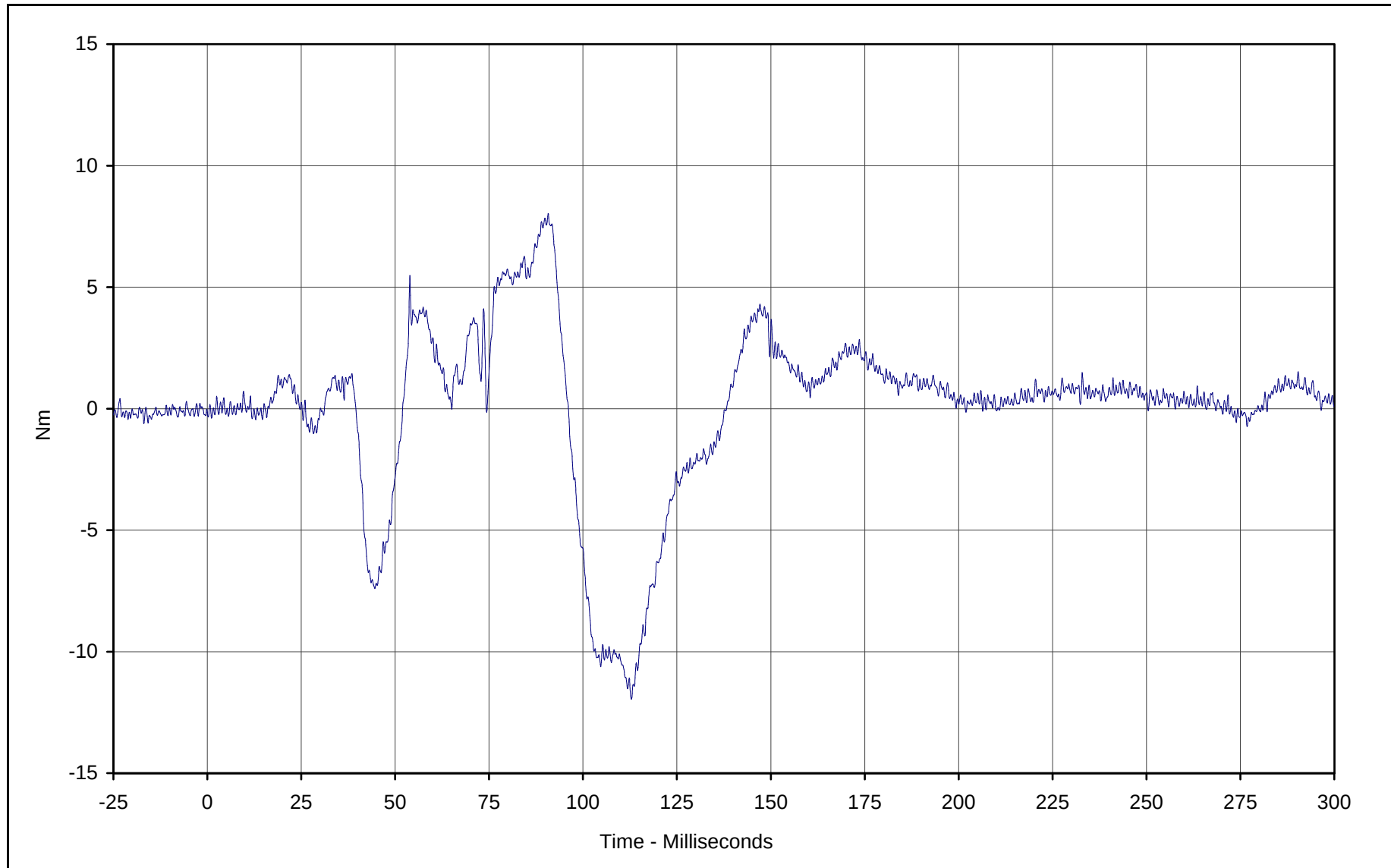


Curve Description: Driver Neck Force Resultant
Maximum Value: 1344.0 at 62.5 Milliseconds
Minimum Value: 0.0 at 0.9 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: RES-007

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan

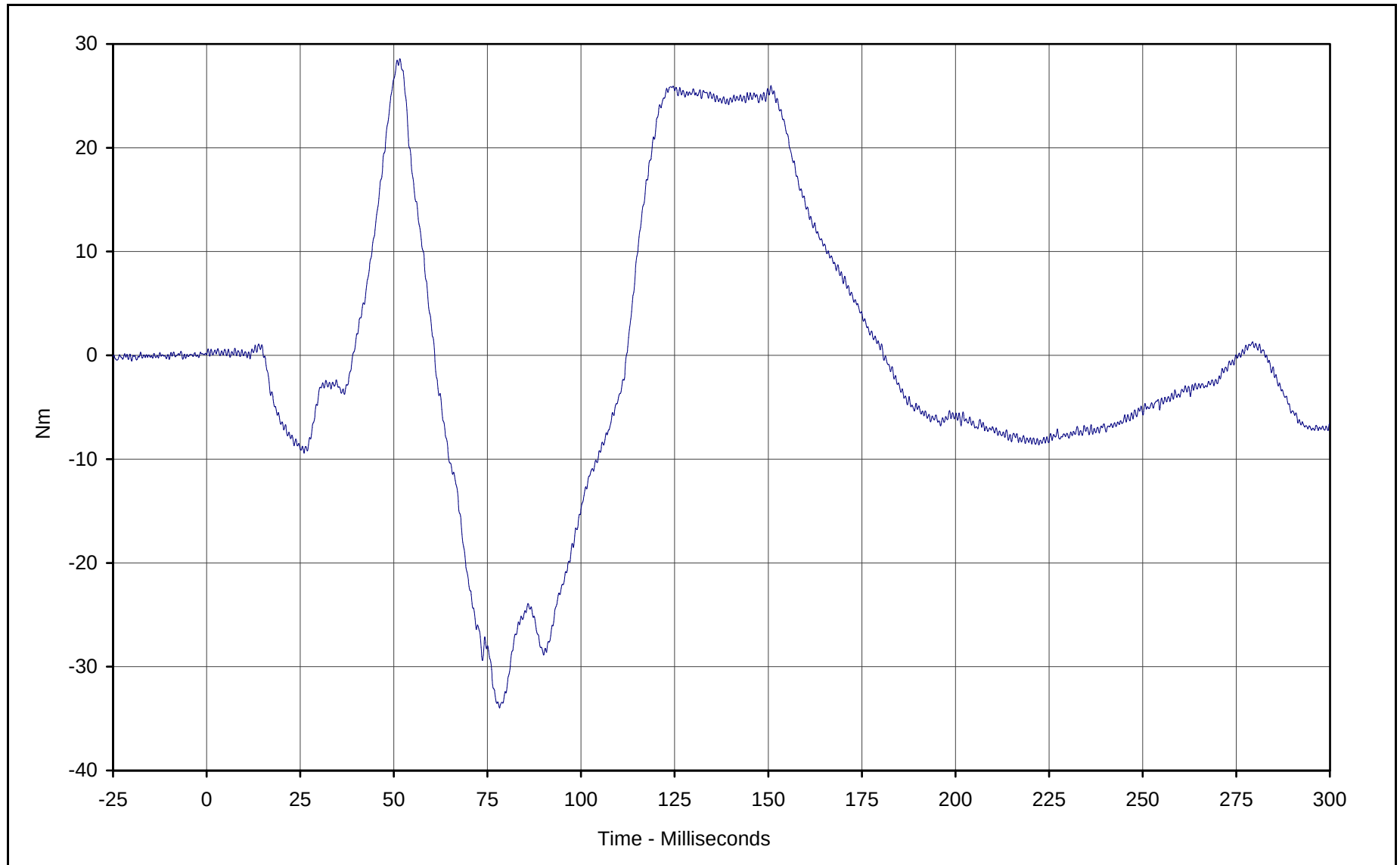




Curve Description: Driver Neck Moment X
Maximum Value: 8.0 at 90.7 Milliseconds
Minimum Value: -12.0 at 112.9 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-010

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan

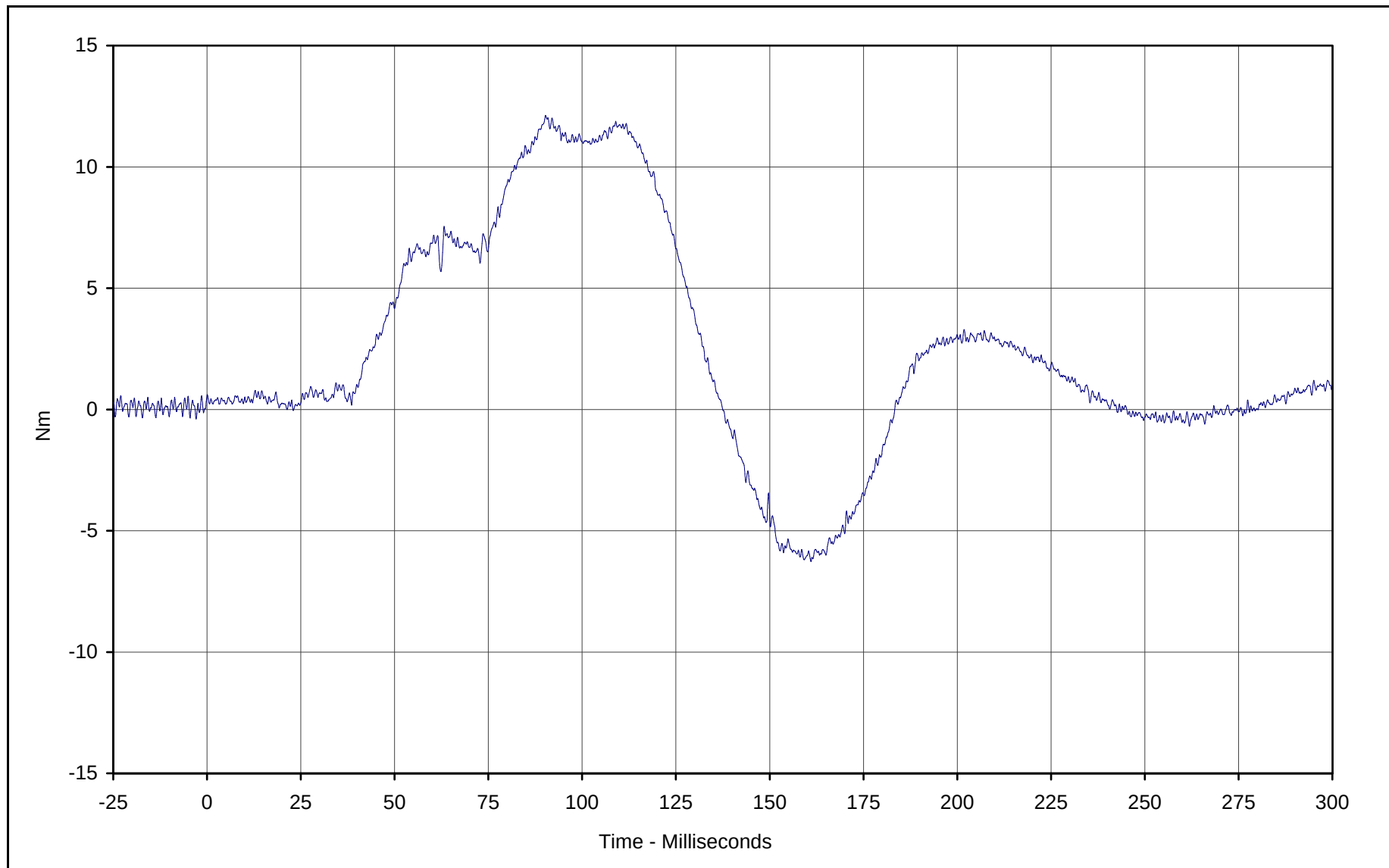




Curve Description: Driver Neck Moment Y
Maximum Value: 28.6 at 51.6 Milliseconds
Minimum Value: -34.0 at 78.2 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-011

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan

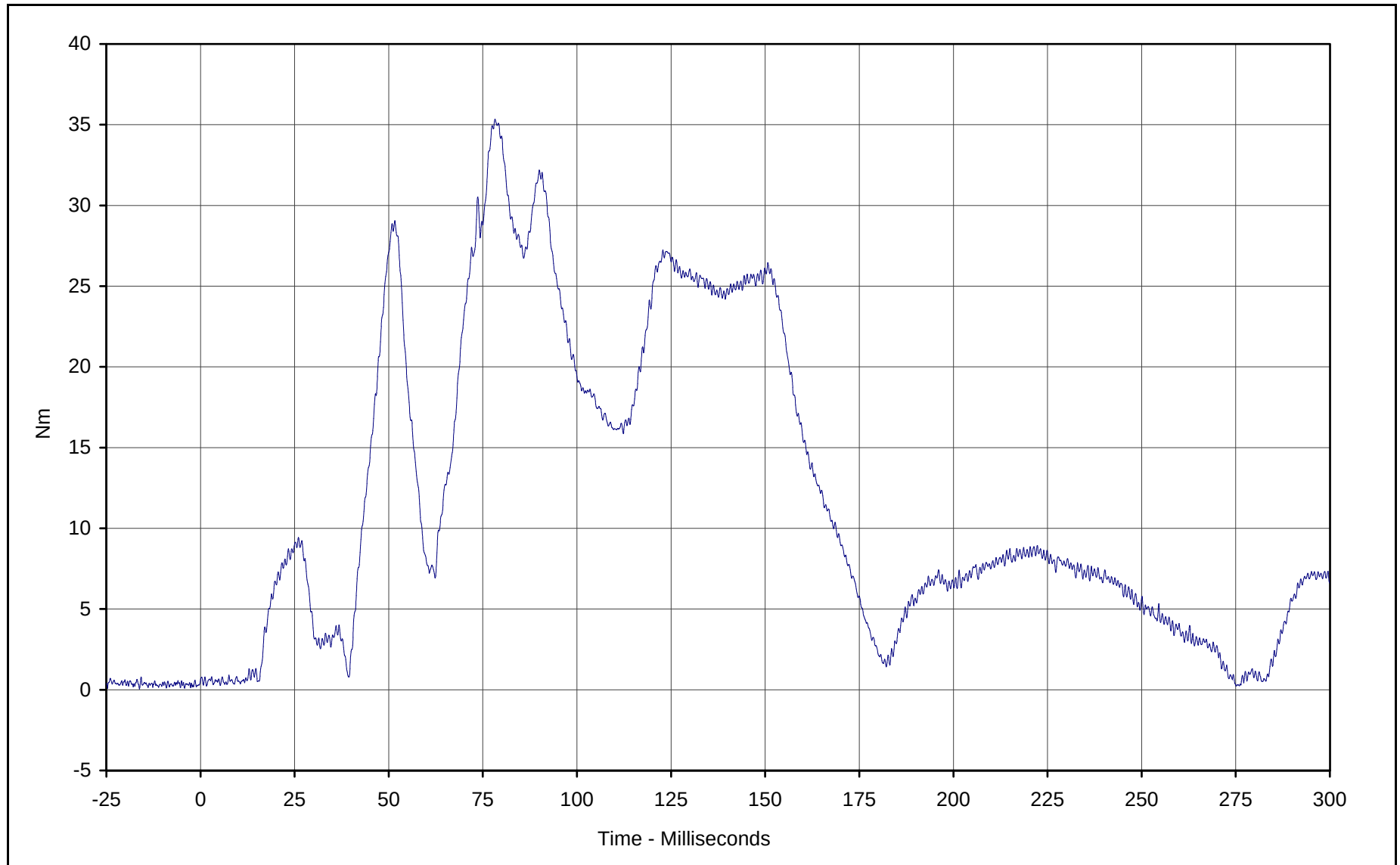




Curve Description: Driver Neck Moment Z
Maximum Value: 12.1 at 90.2 Milliseconds
Minimum Value: -6.3 at 161.0 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-012

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



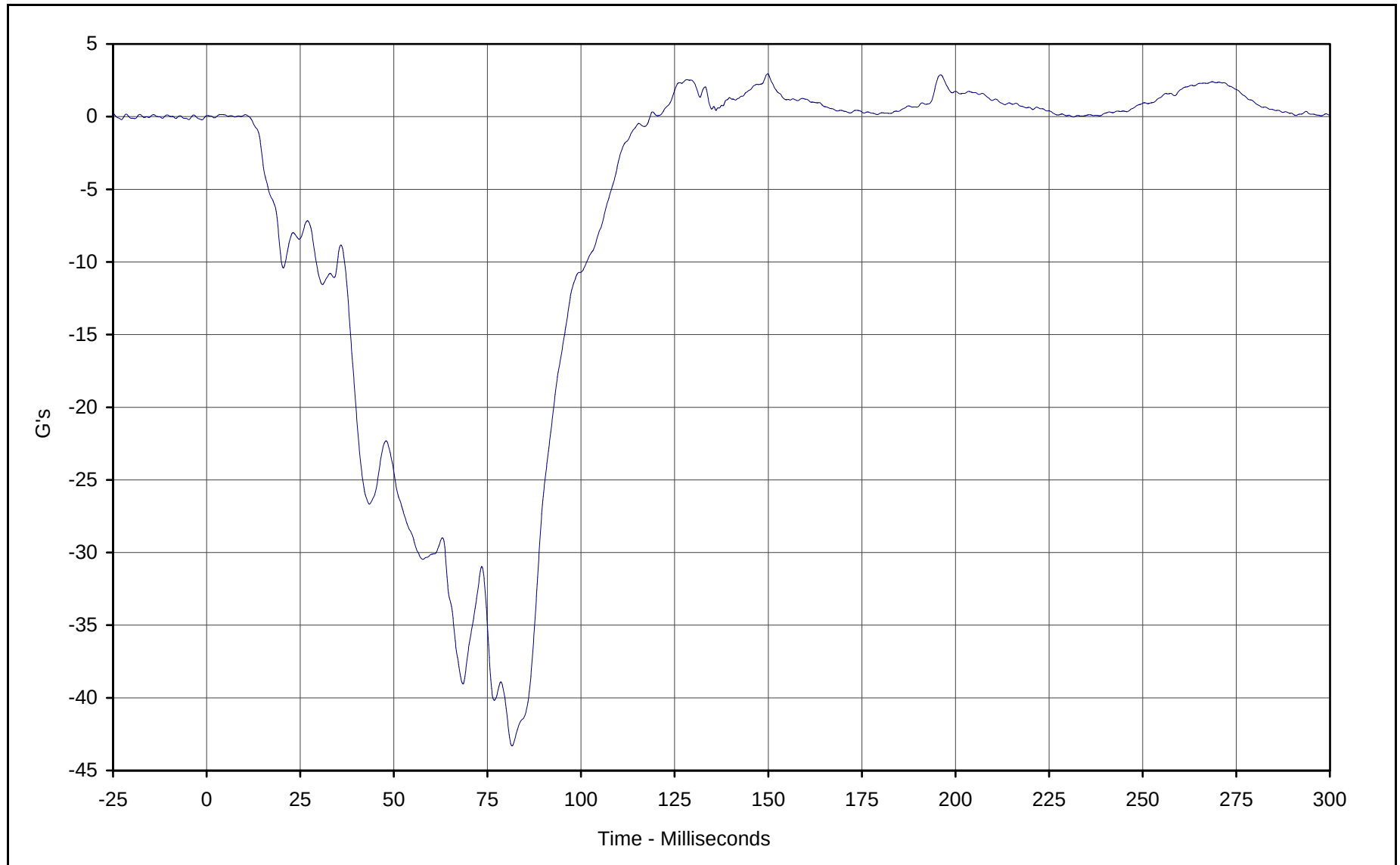


Curve Description: Driver Neck Moment Resultant
Maximum Value: 35.3 at 78.2 Milliseconds
Minimum Value: 0.2 at 275.1 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: RES-010

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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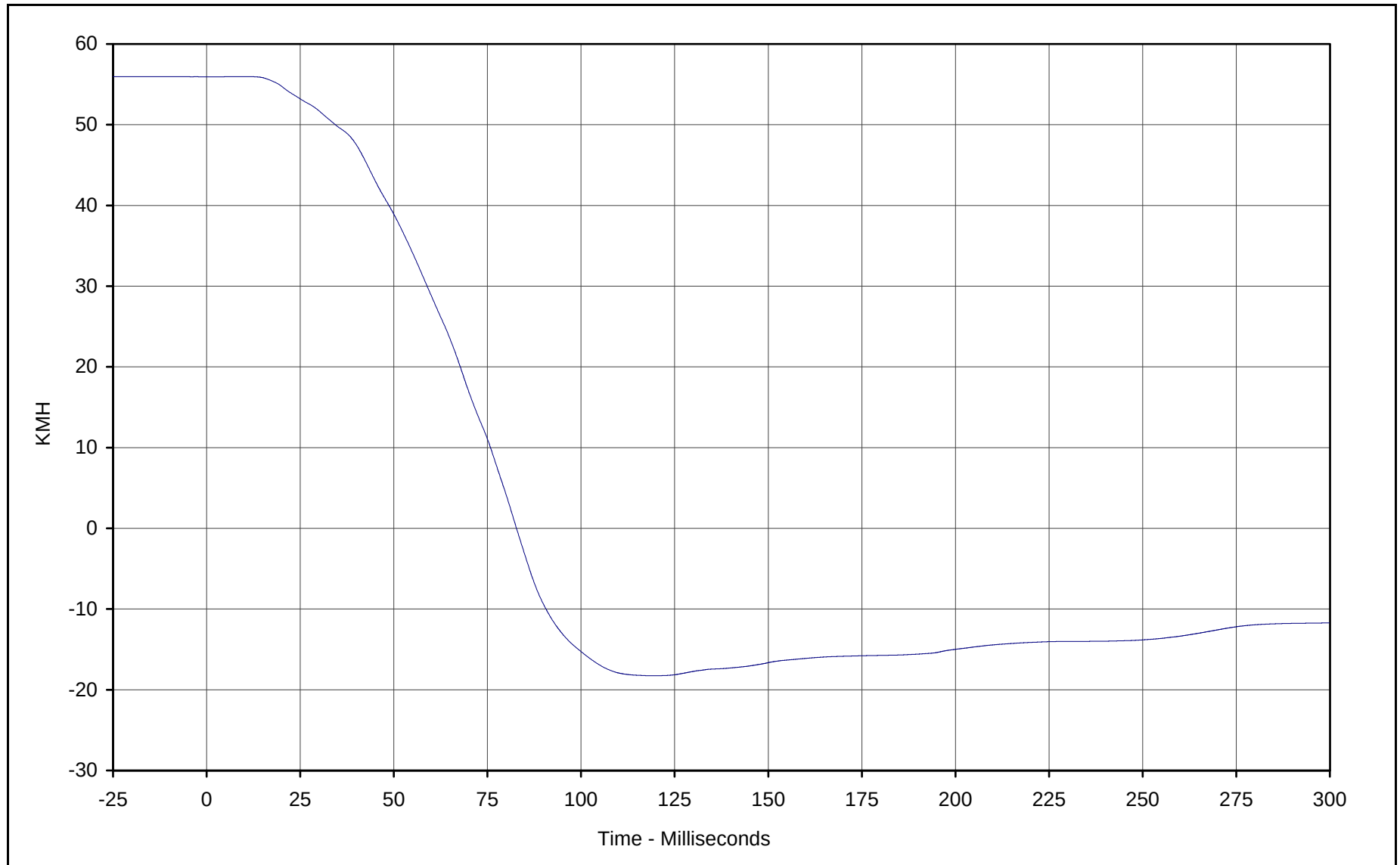


Curve Description: Driver Chest Primary X
Maximum Value: 2.9 at 149.8 Milliseconds
Minimum Value: -43.3 at 81.6 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-013

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



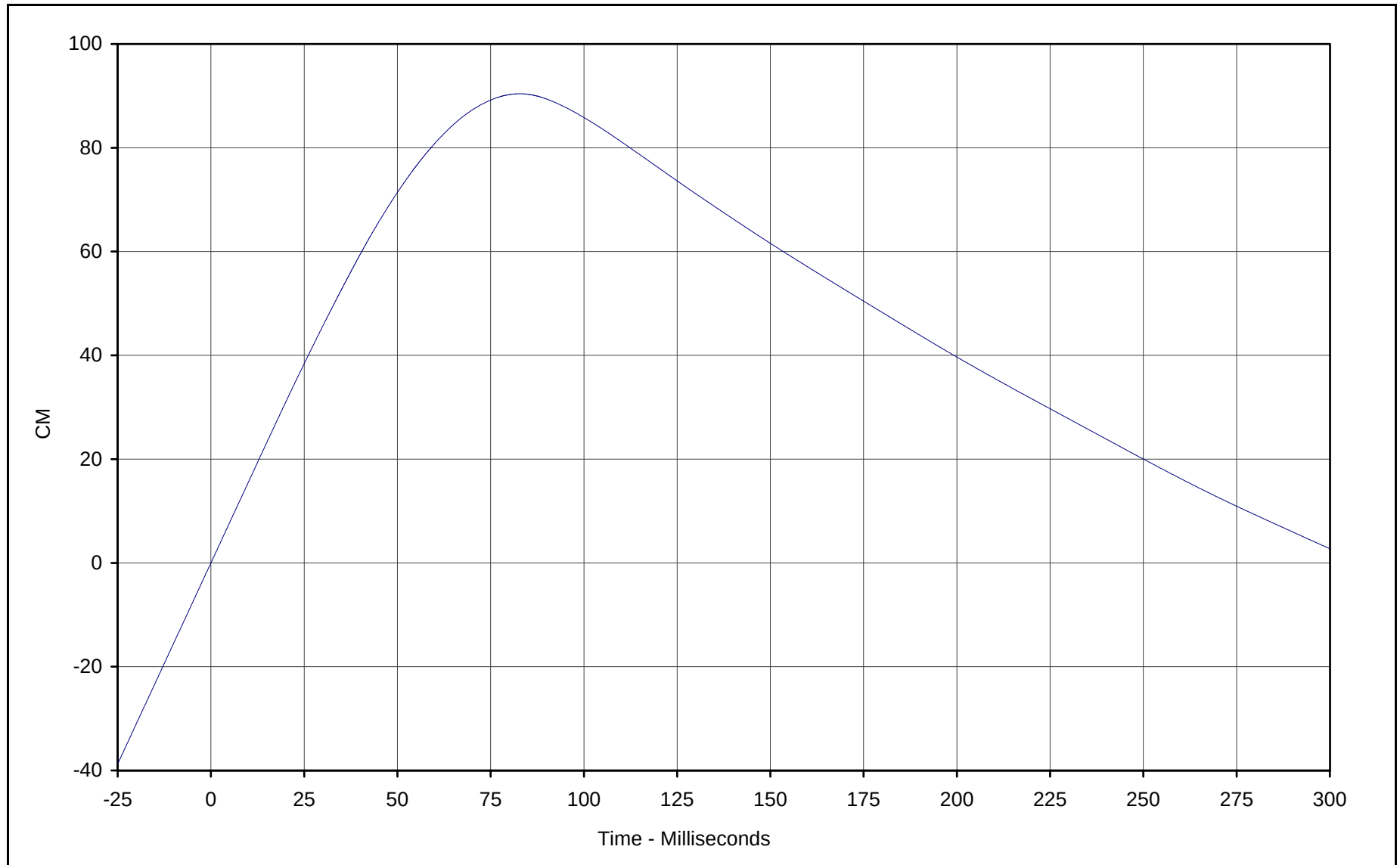
KAR22001-01



Curve Description: Driver Chest Primary X Velocity
Maximum Value: 56.0 at 11.3 Milliseconds
Minimum Value: -18.3 at 118.4 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN1-013

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan

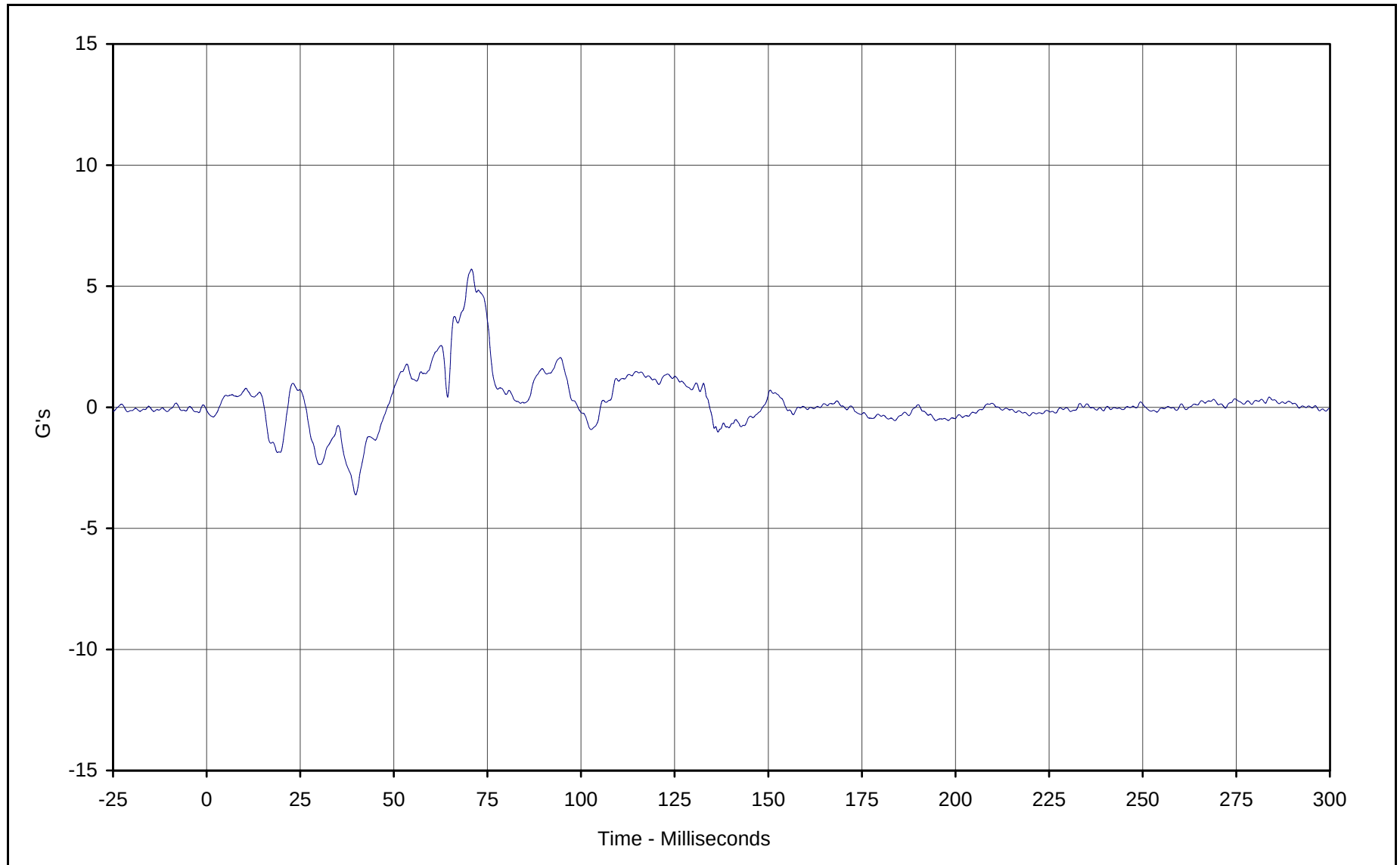




Curve Description: Driver Chest Primary X Displ.
Maximum Value: 90.4 at 82.8 Milliseconds
Minimum Value: 0.0 at 0.0 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN2-013

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



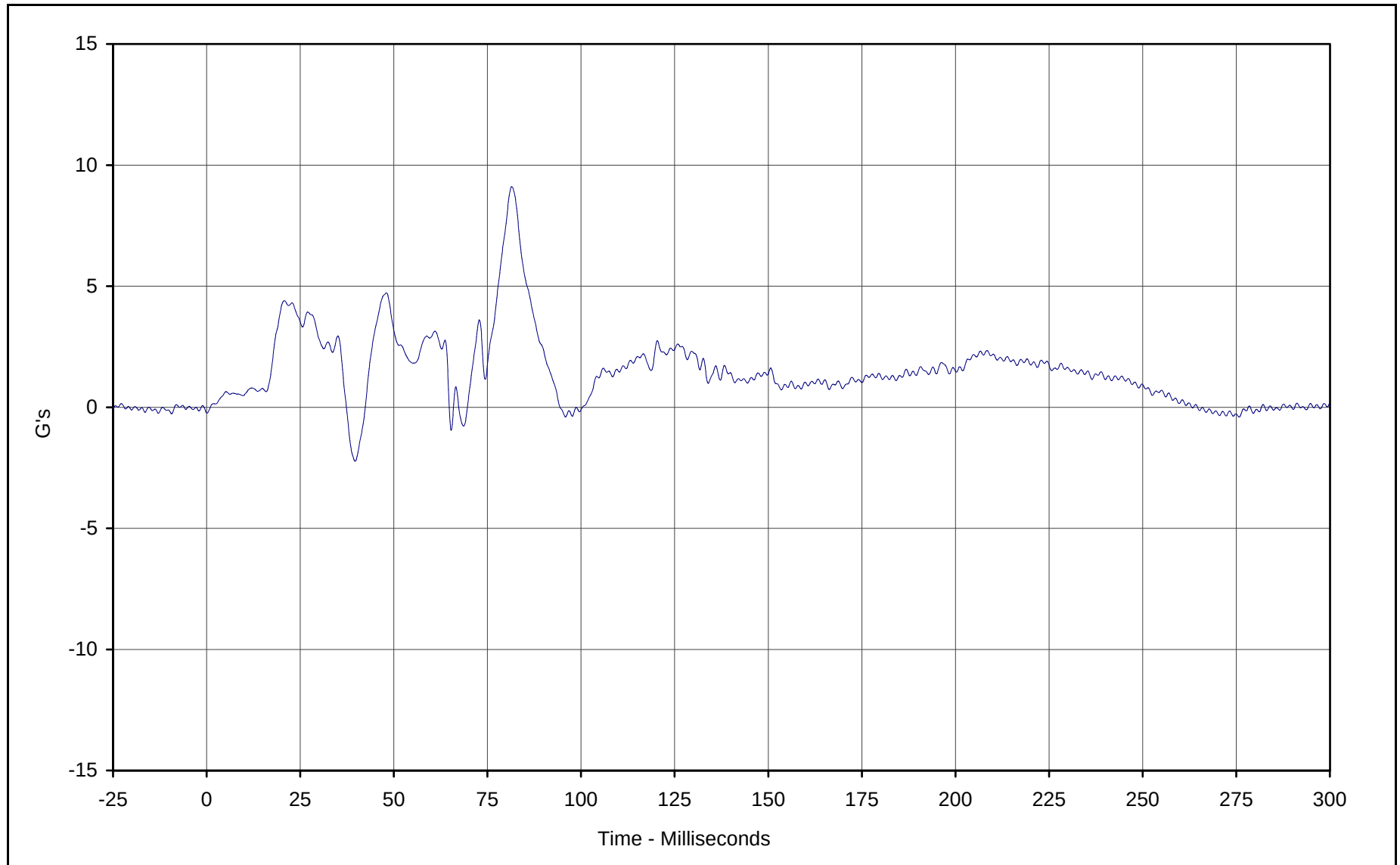


Curve Description: Driver Chest Primary Y
Maximum Value: 5.7 at 70.8 Milliseconds
Minimum Value: -3.6 at 39.8 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-014

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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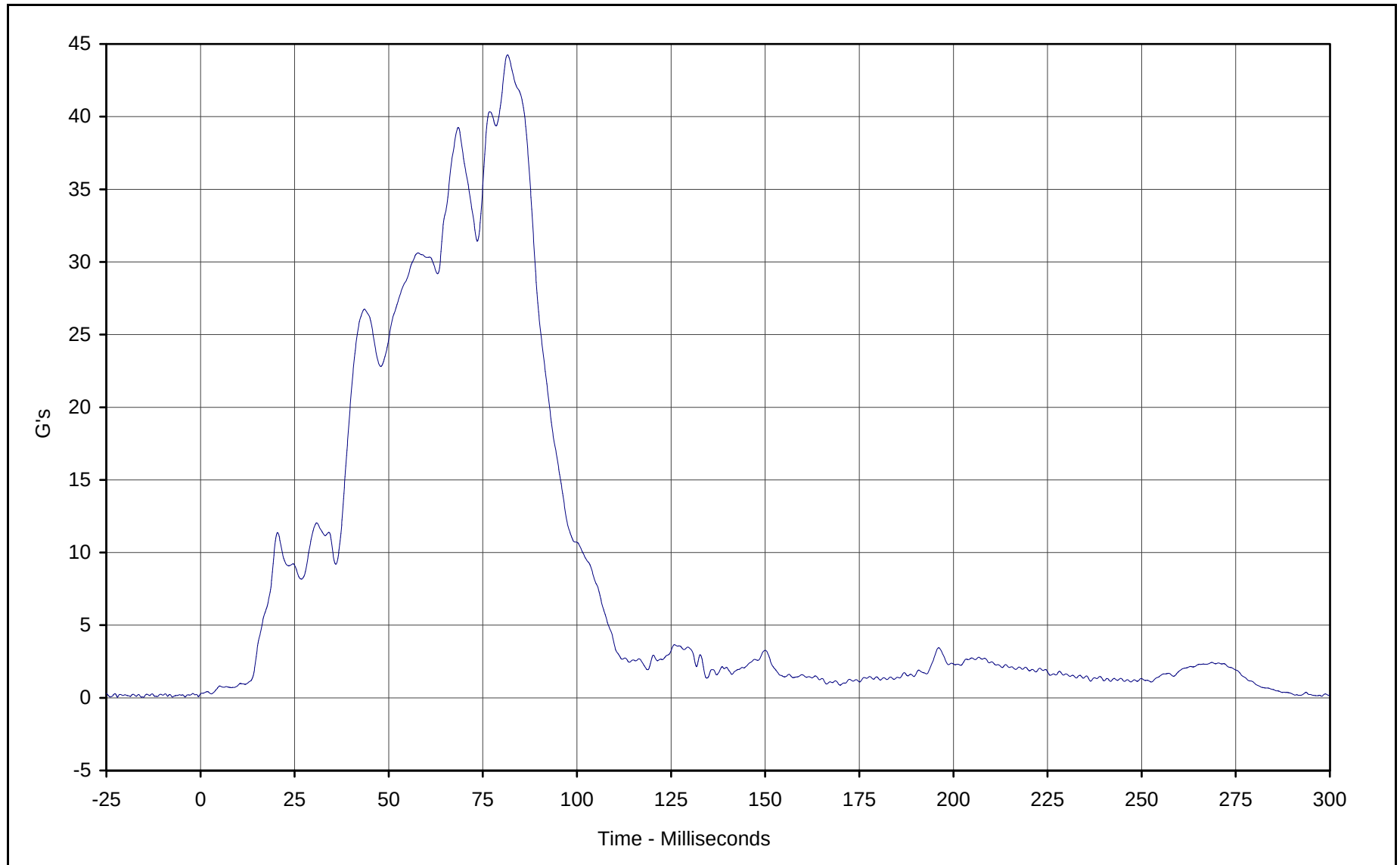


Curve Description: Driver Chest Primary Z
Maximum Value: 9.1 at 81.5 Milliseconds
Minimum Value: -2.2 at 39.7 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-015

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



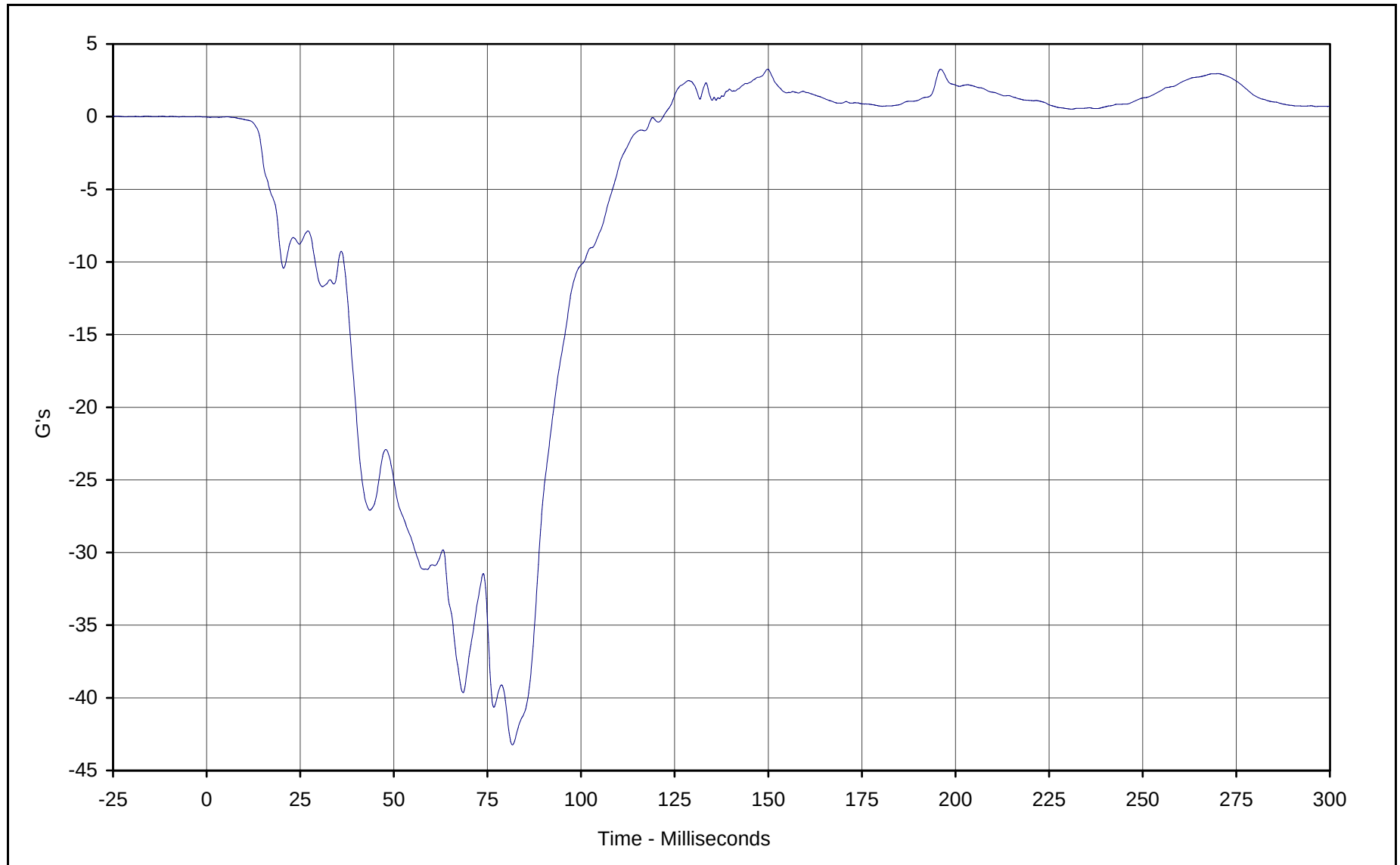
KAR22001-01



Curve Description: Driver Chest Resultant Primary
Maximum Value: 44.3 at 81.6 Milliseconds
Minimum Value: 0.1 at 297.9 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: RES-013

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan

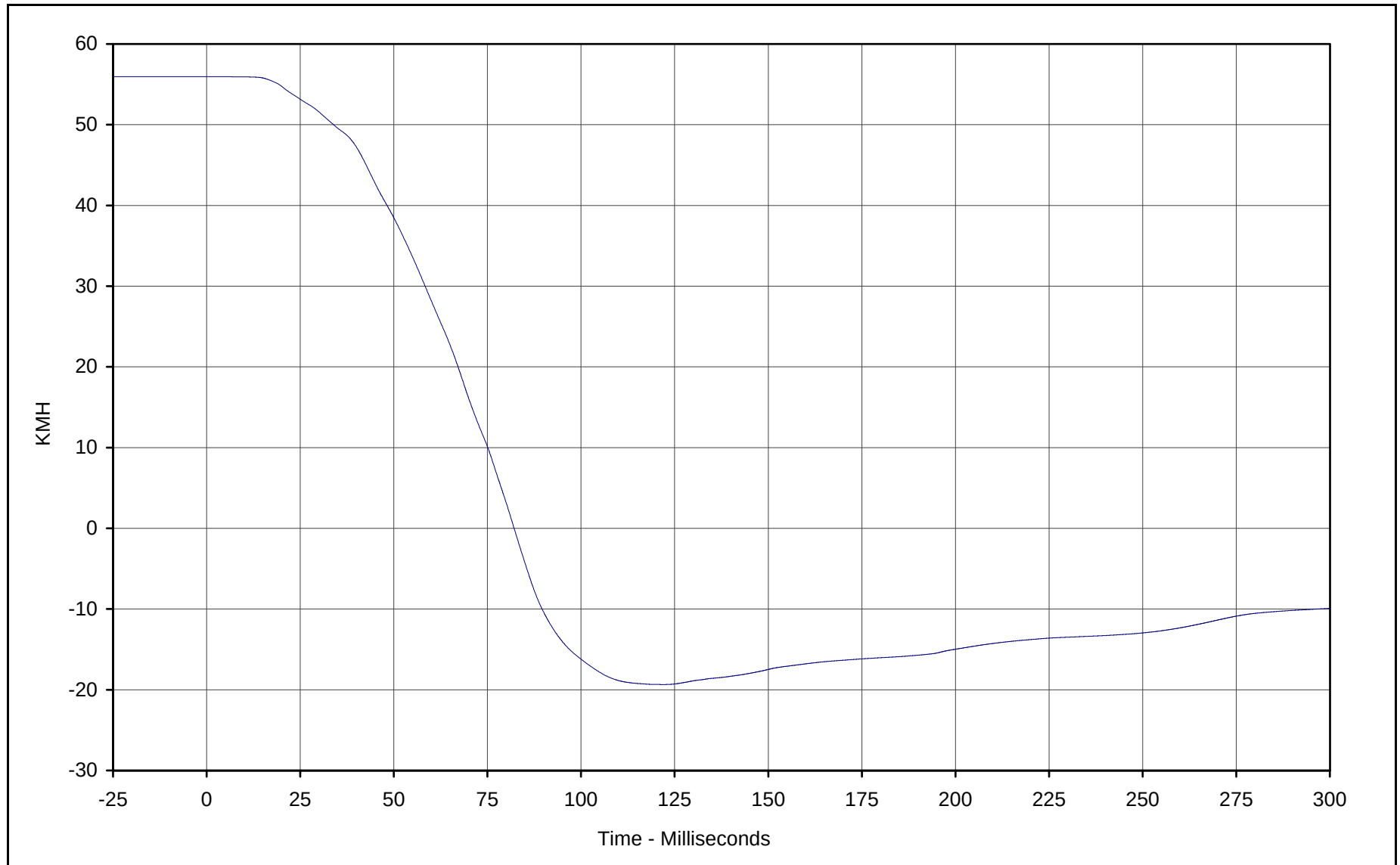




Curve Description: Driver Chest Redundant X
Maximum Value: 3.3 at 149.9 Milliseconds
Minimum Value: -43.2 at 81.7 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-016

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan

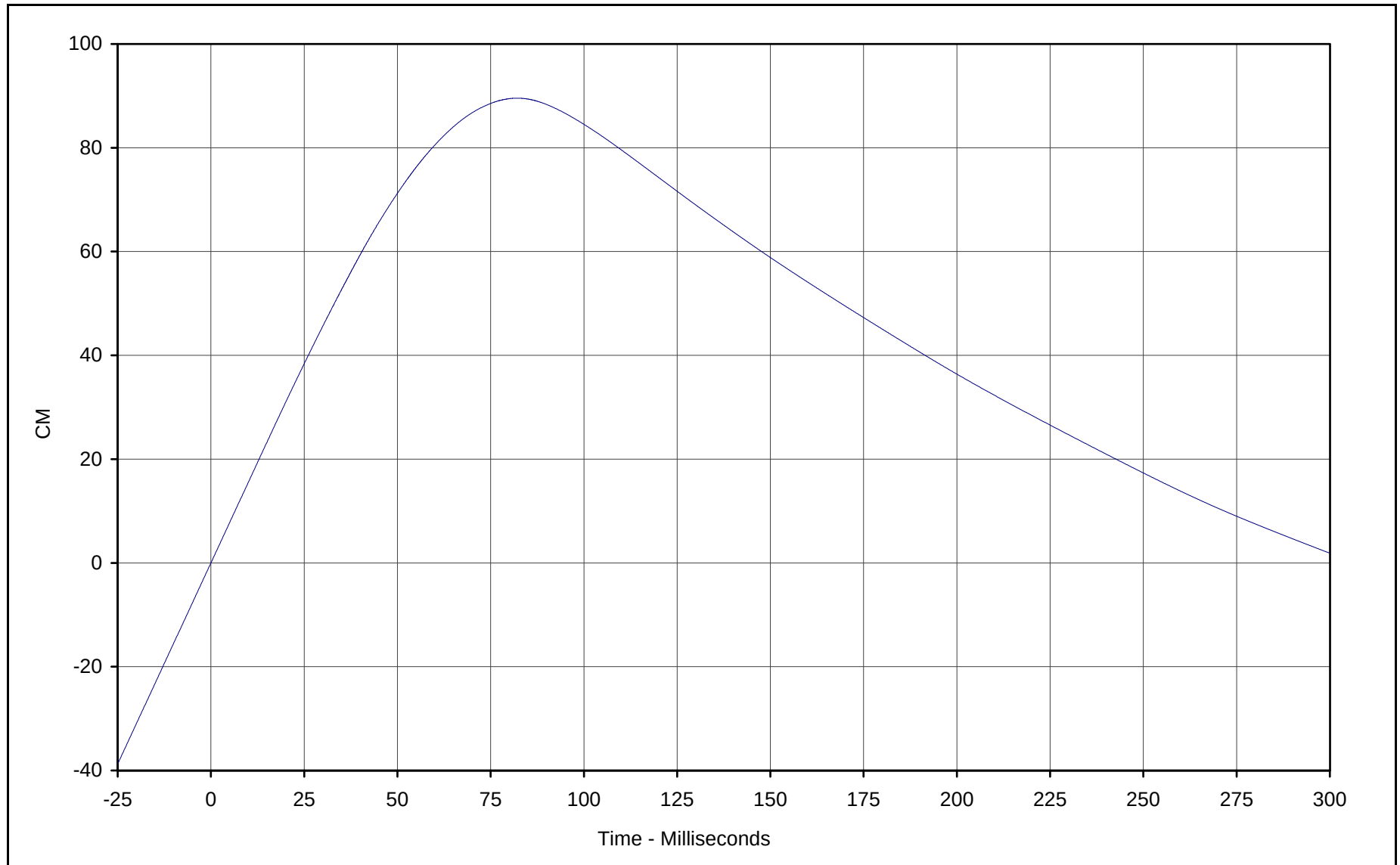




Curve Description: Driver Chest Redundant X Velocity
Maximum Value: 55.9 at 0.0 Milliseconds
Minimum Value: -19.4 at 121.9 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN1-016

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



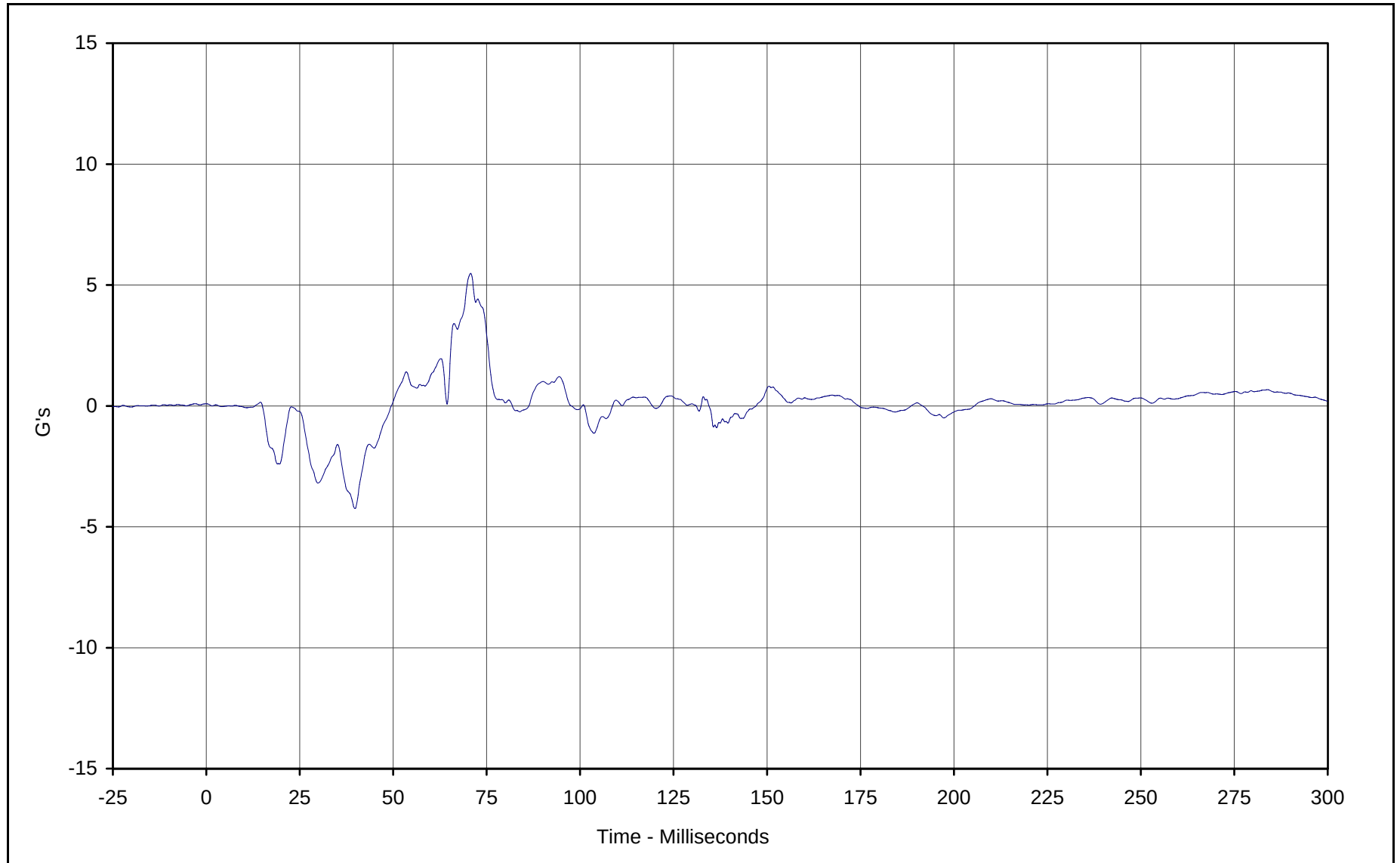


Curve Description: Driver Chest Redundant X Displ.
Maximum Value: 89.6 at 82.1 Milliseconds
Minimum Value: 0.0 at 0.0 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN2-016

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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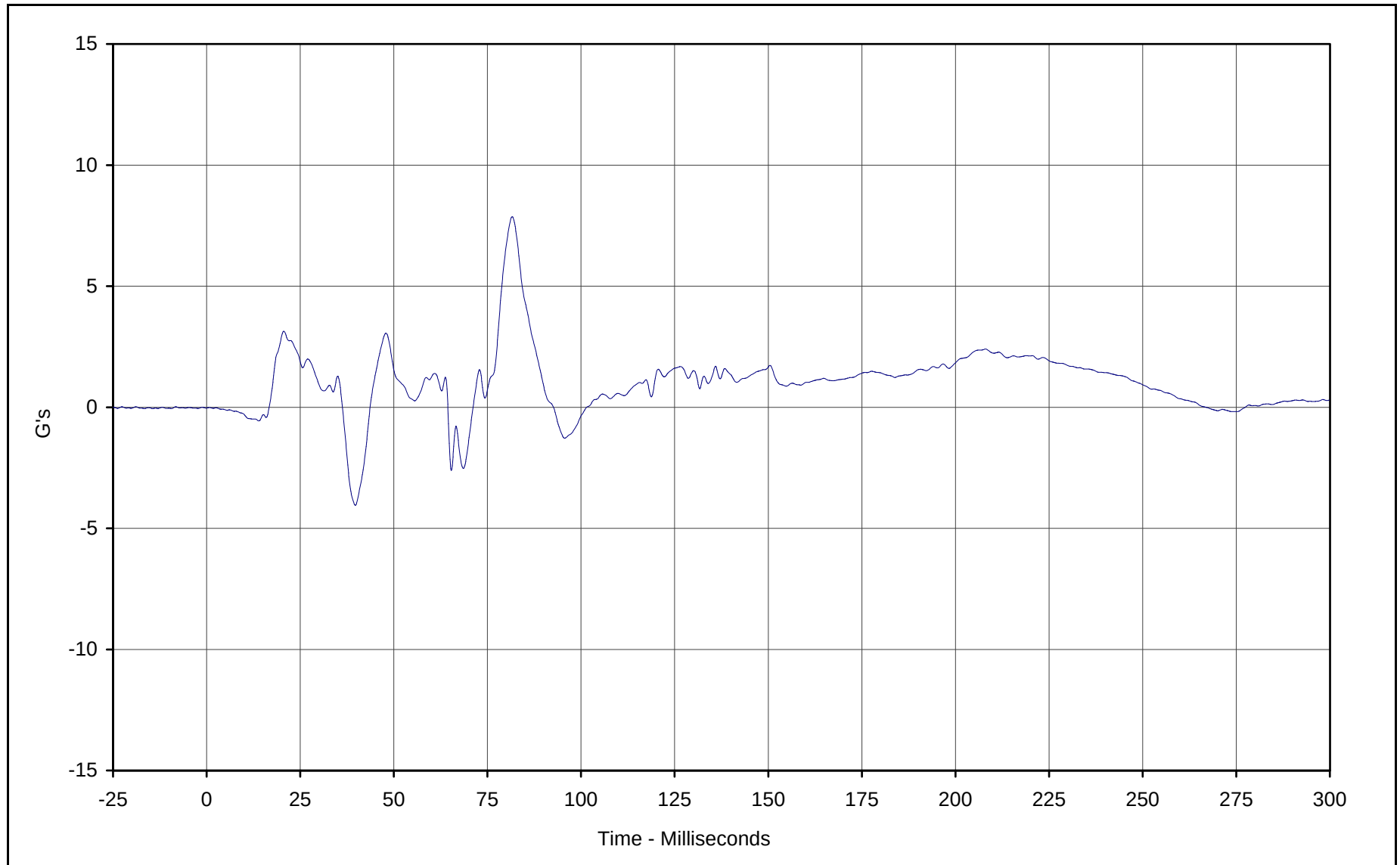


Curve Description: Driver Chest Redundant Y
Maximum Value: 5.5 at 70.7 Milliseconds
Minimum Value: -4.2 at 39.8 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-017

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

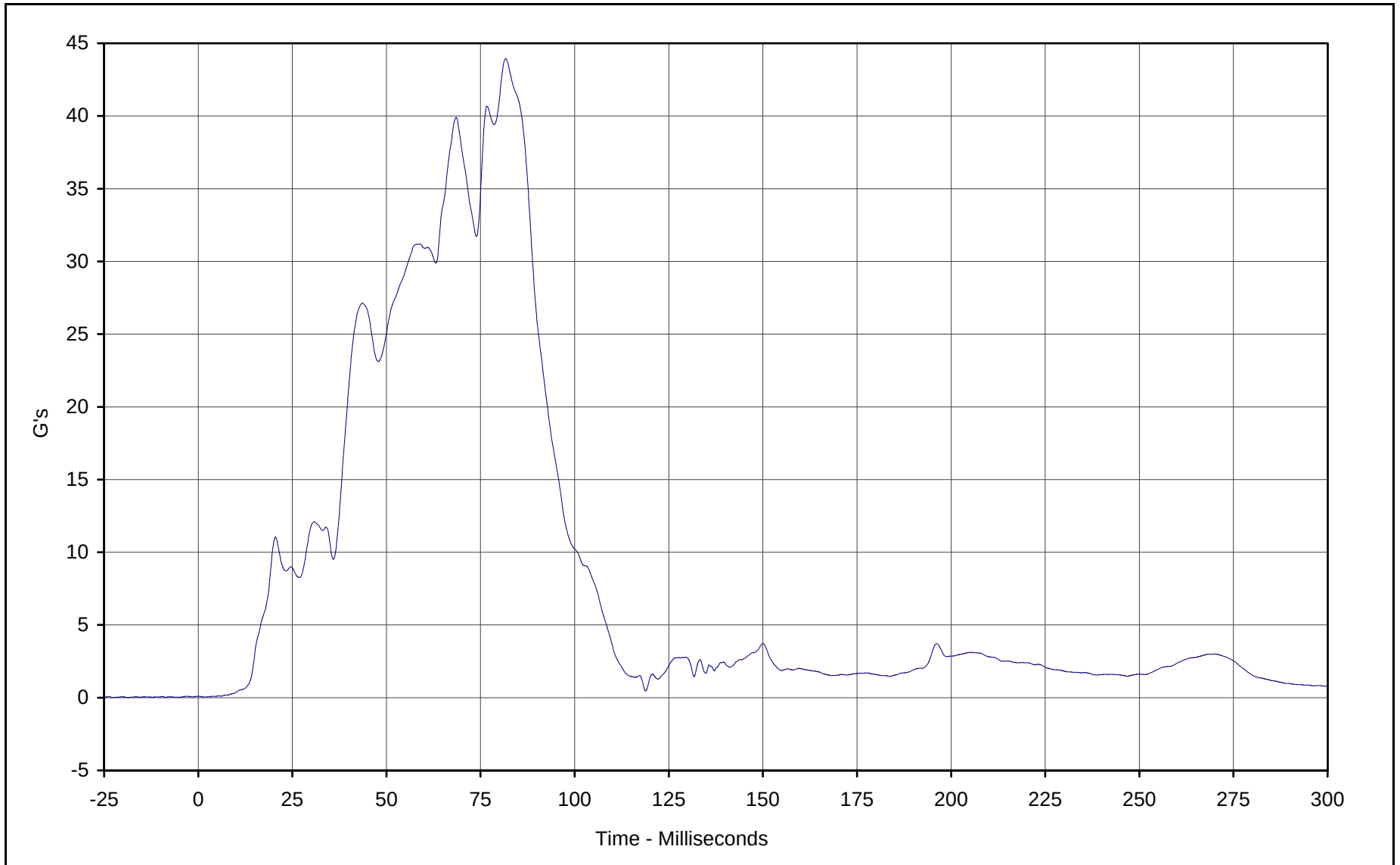


Curve Description: Driver Chest Redundant Z
Maximum Value: 7.9 at 81.6 Milliseconds
Minimum Value: -4.0 at 39.7 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-018

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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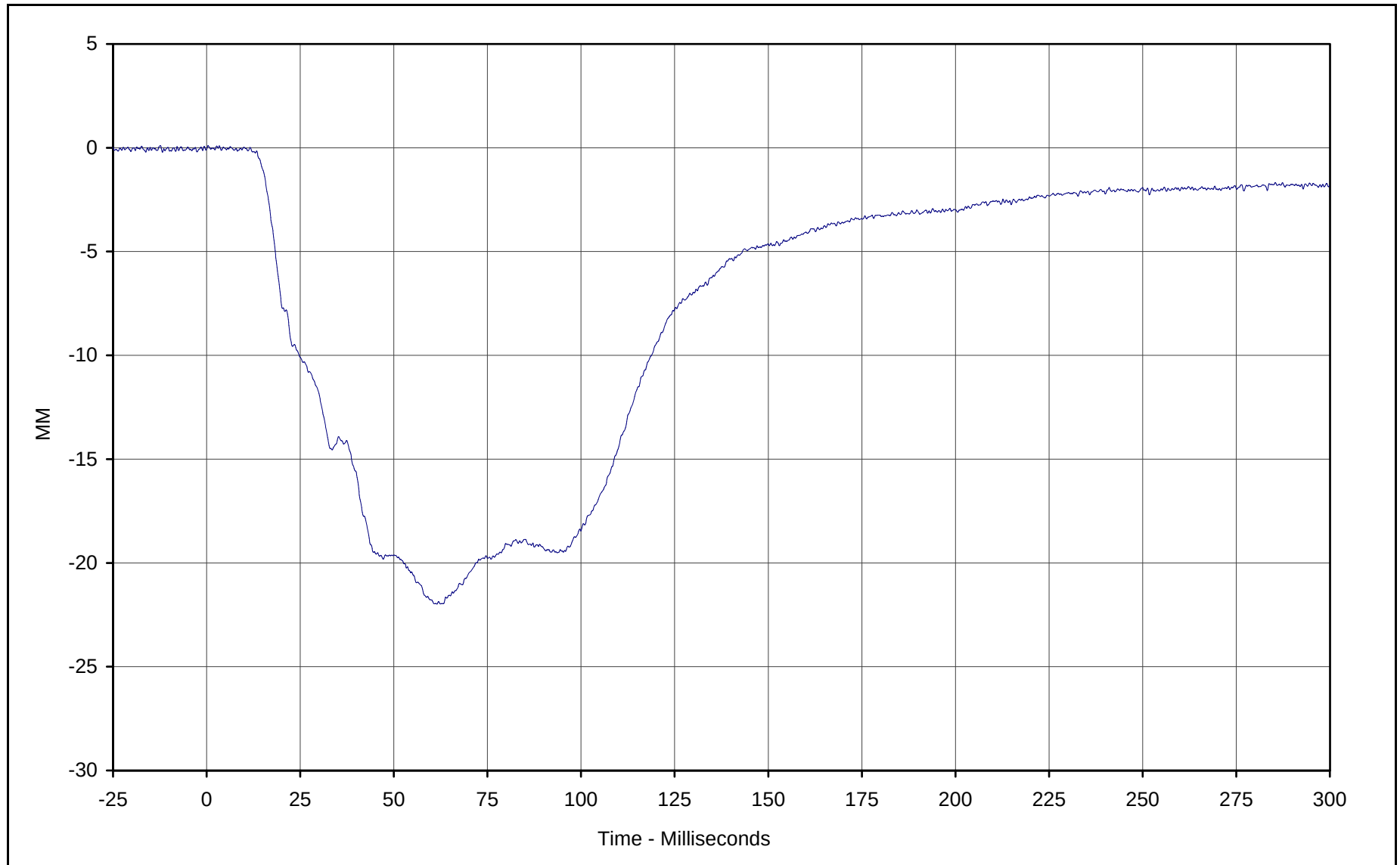


Curve Description: Driver Chest Resultant Redundant
Maximum Value: 43.9 at 81.7 Milliseconds
Minimum Value: 0.1 at 1.3 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: RES-016

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



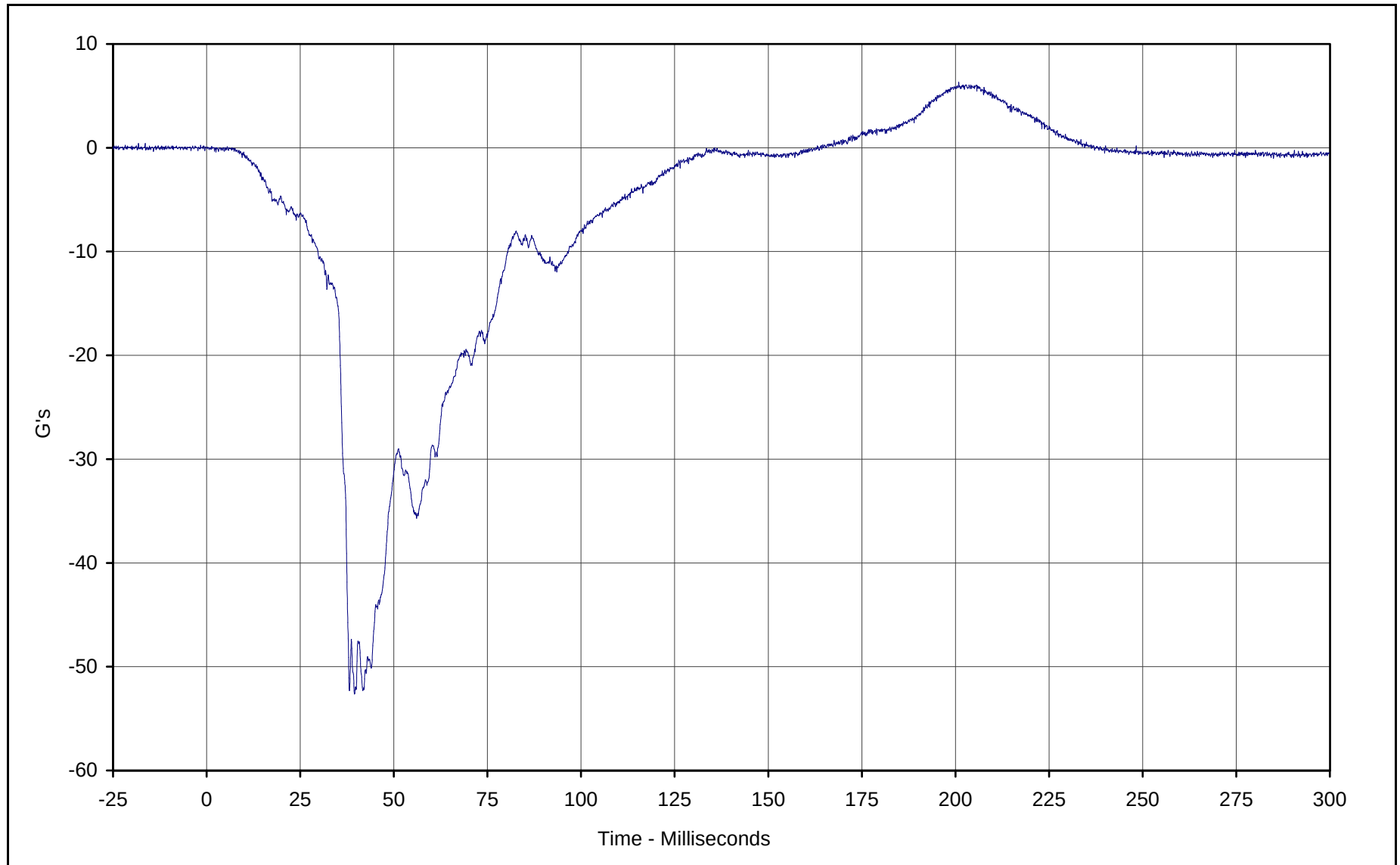
KAR22001-01



Curve Description: Driver Chest Displacement X
Maximum Value: 0.1 at 0.4 Milliseconds
Minimum Value: -22.0 at 61.5 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-019

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



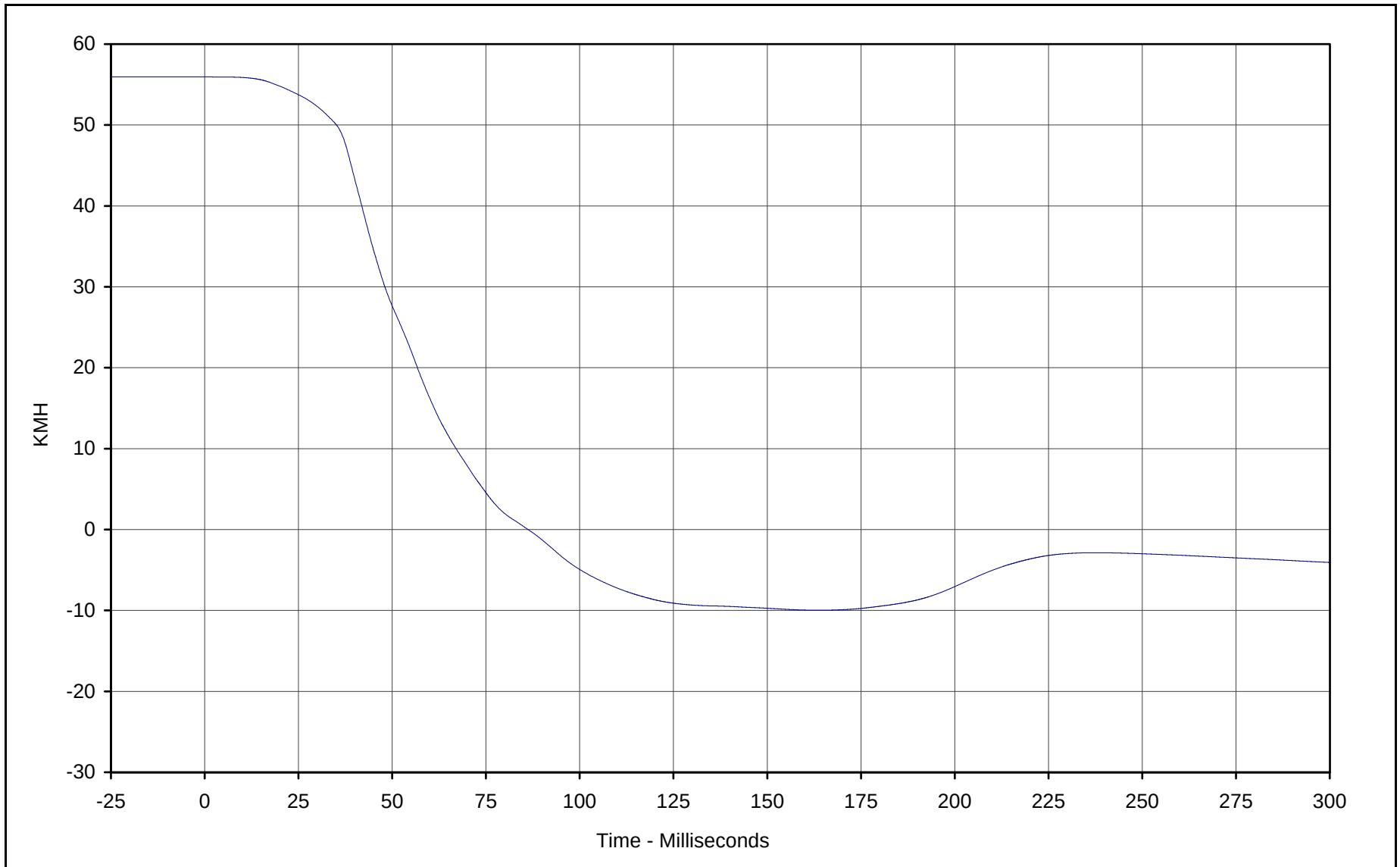


Curve Description: Driver Pelvis X
Maximum Value: 6.3 at 200.9 Milliseconds
Minimum Value: -52.6 at 39.5 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-020

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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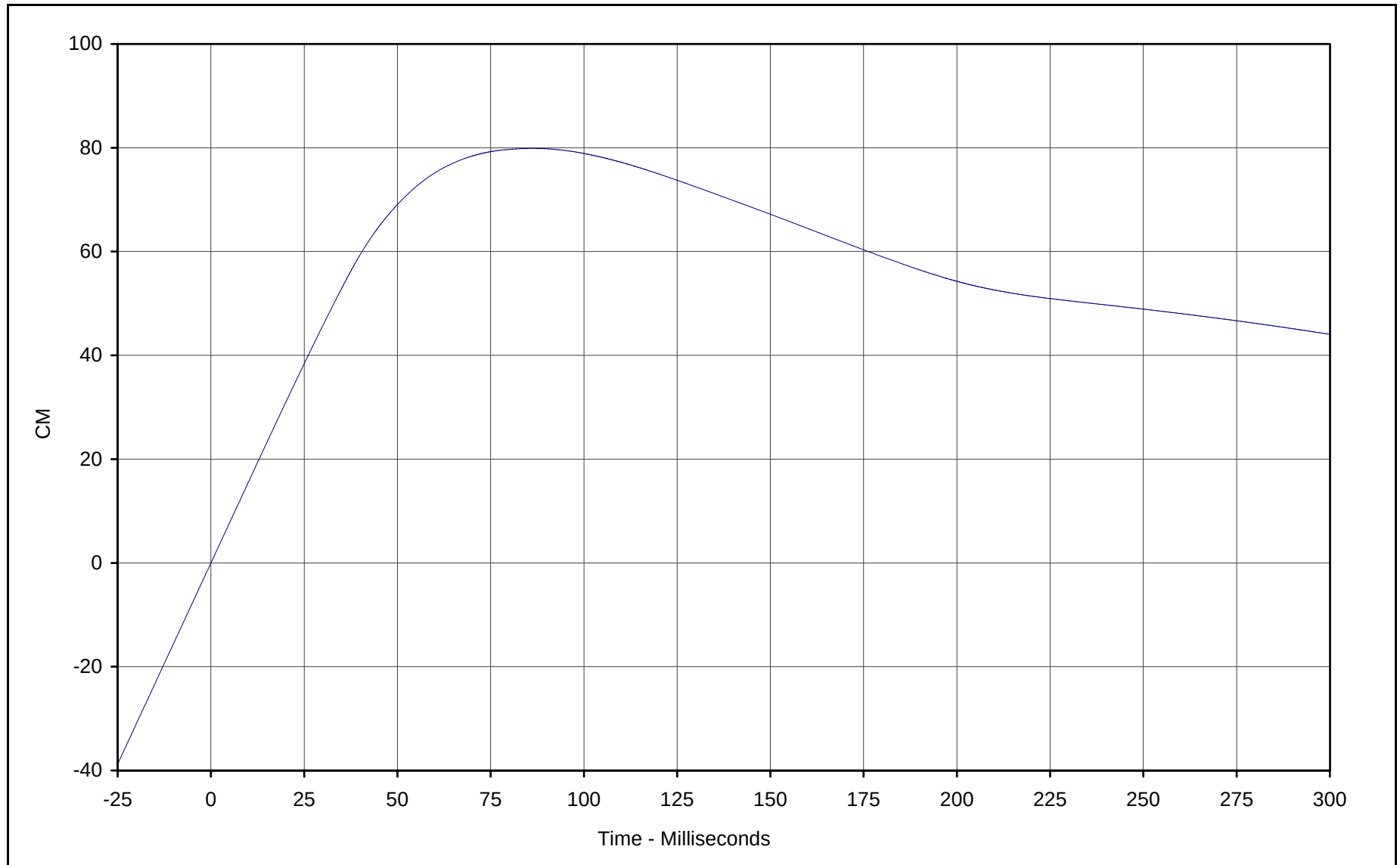


Curve Description: Driver Pelvis X Velocity
Maximum Value: 55.9 at 0.0 Milliseconds
Minimum Value: -10.0 at 163.7 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN1-020

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



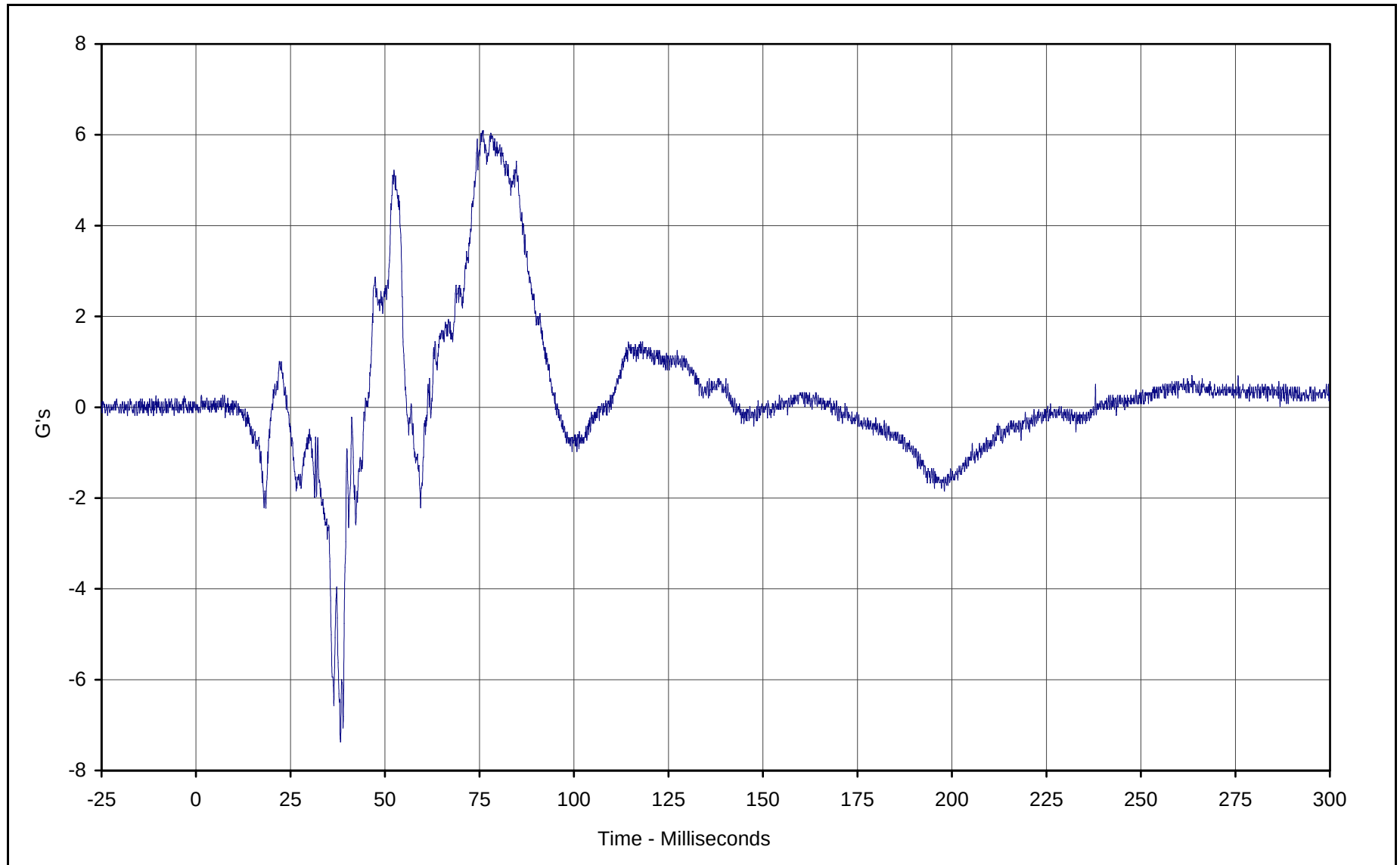
KAR22001-01



Curve Description: Driver Pelvis X Displ.
Maximum Value: 79.9 at 86.2 Milliseconds
Minimum Value: 0.0 at 0.0 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN2-020

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan





Curve Description: Driver Pelvis Y

Maximum Value: 6.1 at 75.8 Milliseconds

Minimum Value: -7.4 at 38.2 Milliseconds

SAE Filter Class: 1000

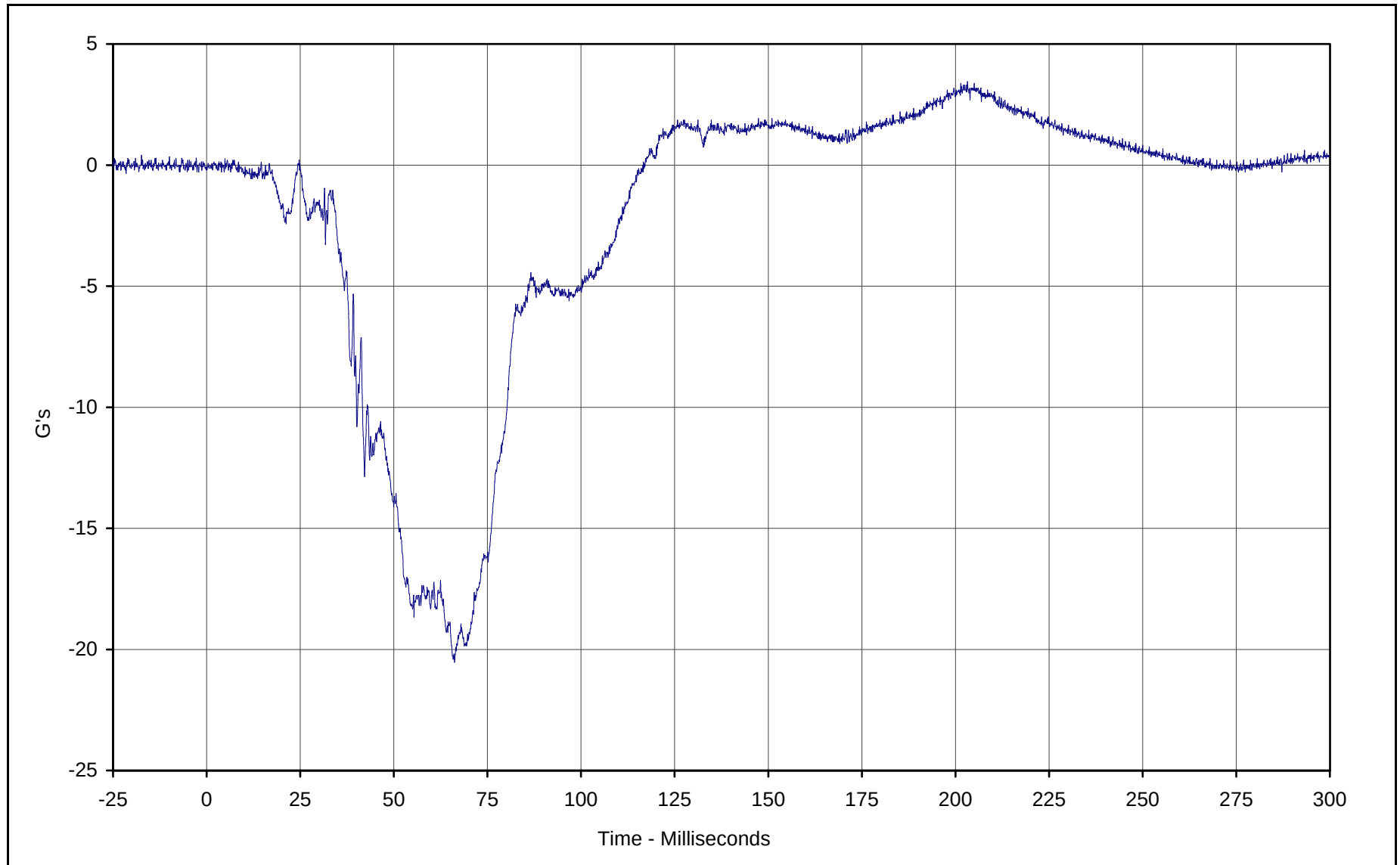
Date of Test: 12/7/01

Curve Number: FIL-021

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan





Curve Description: Driver Pelvis Z

Maximum Value: 3.4 at 203.2 Milliseconds

Minimum Value: -20.5 at 66.2 Milliseconds

SAE Filter Class: 1000

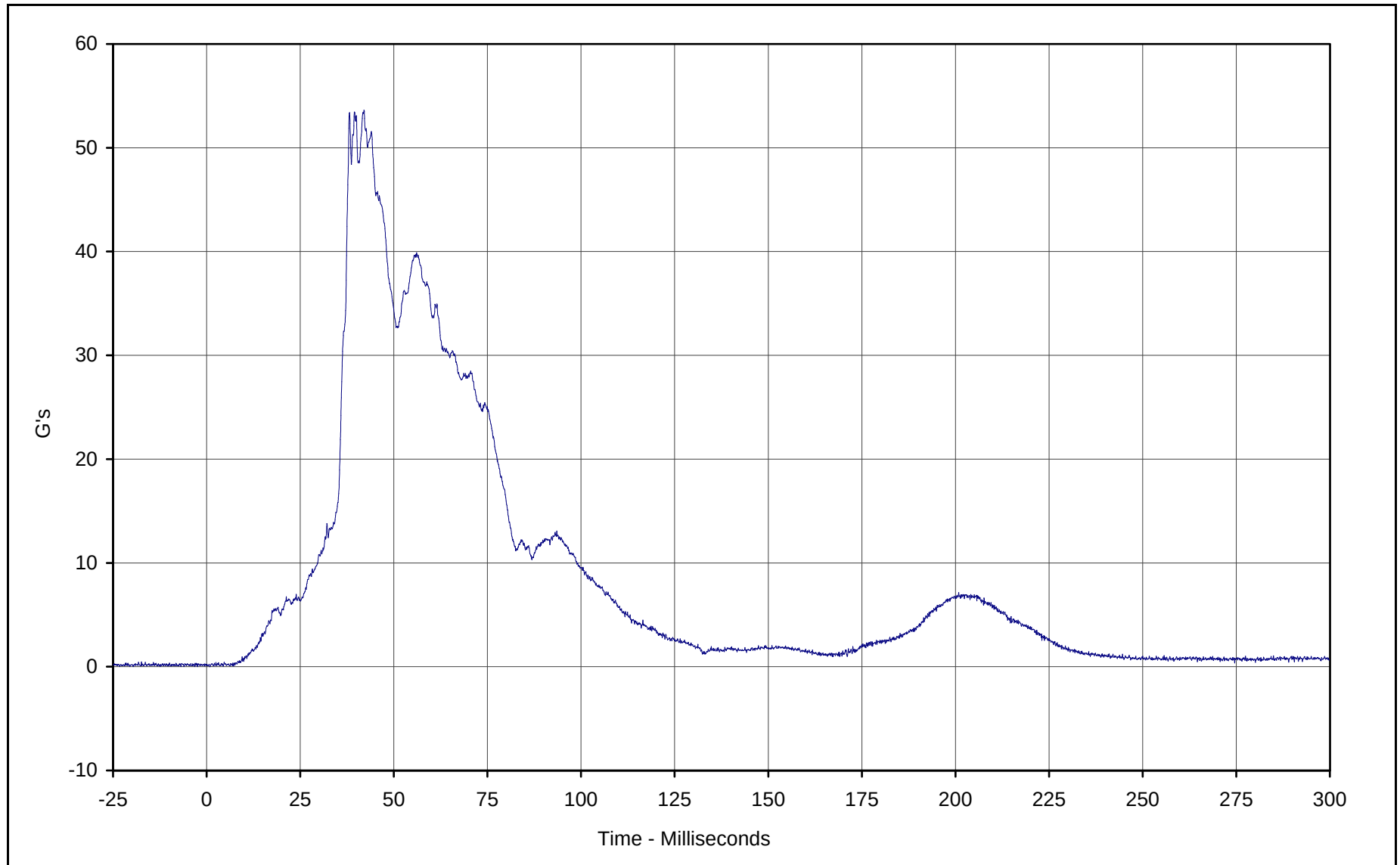
Date of Test: 12/7/01

Curve Number: FIL-022

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



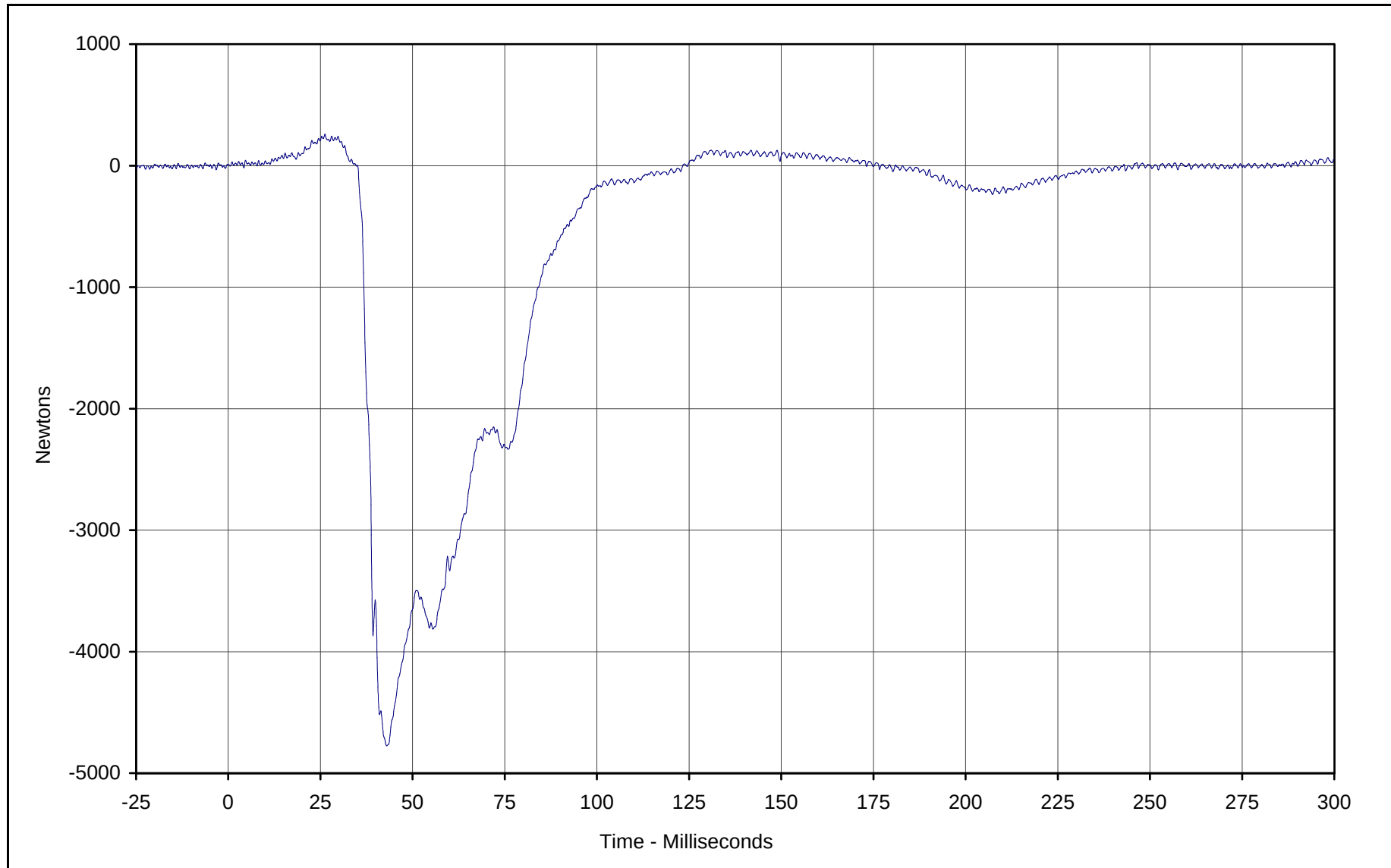


Curve Description: Driver Pelvis Resultant
Maximum Value: 53.6 at 42.0 Milliseconds
Minimum Value: 0.0 at 0.8 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: RES-020

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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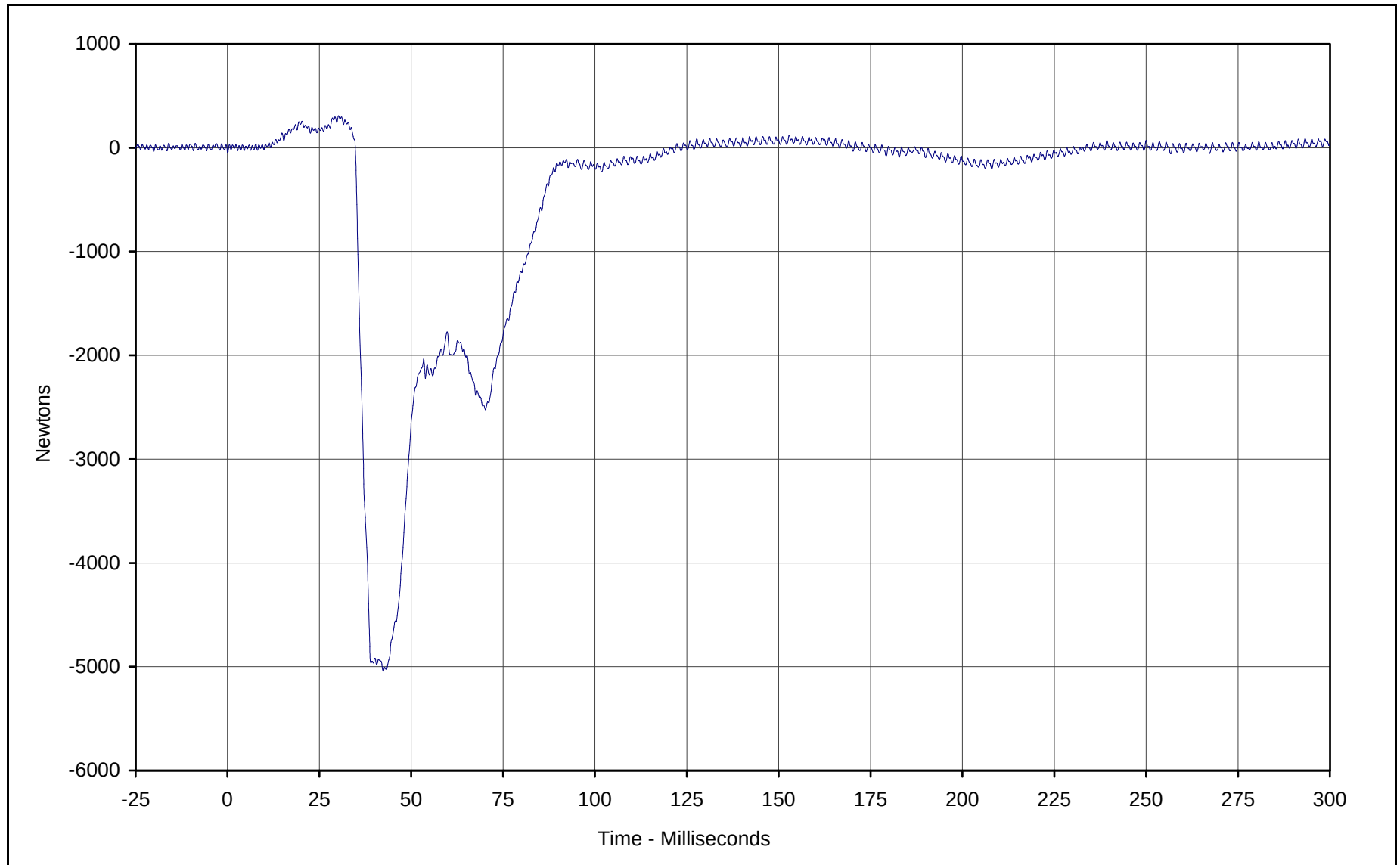
Curve Description: Driver Left Femur Force
Maximum Value: 259.6 at 26.2 Milliseconds
Minimum Value: -4775.0 at 43.0 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-023

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

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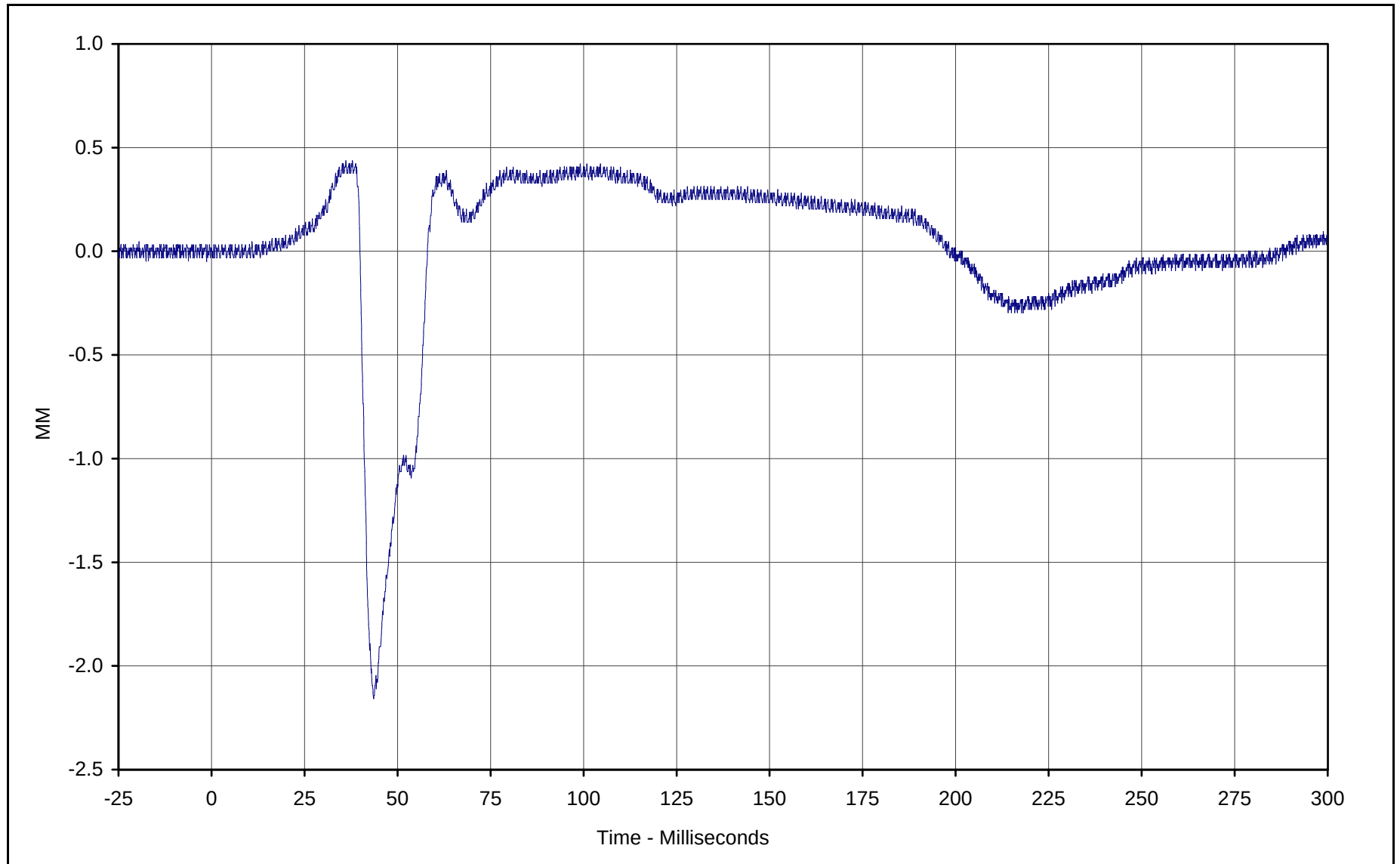
Curve Description: Driver Right Femur Force
Maximum Value: 308.5 at 30.2 Milliseconds
Minimum Value: -5043.8 at 42.4 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-024

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

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Curve Description: Driver Left Knee Slider

Maximum Value: 0.44 at 36.1 Milliseconds

Minimum Value: -2.16 at 43.5 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

Curve Number: FIL-025

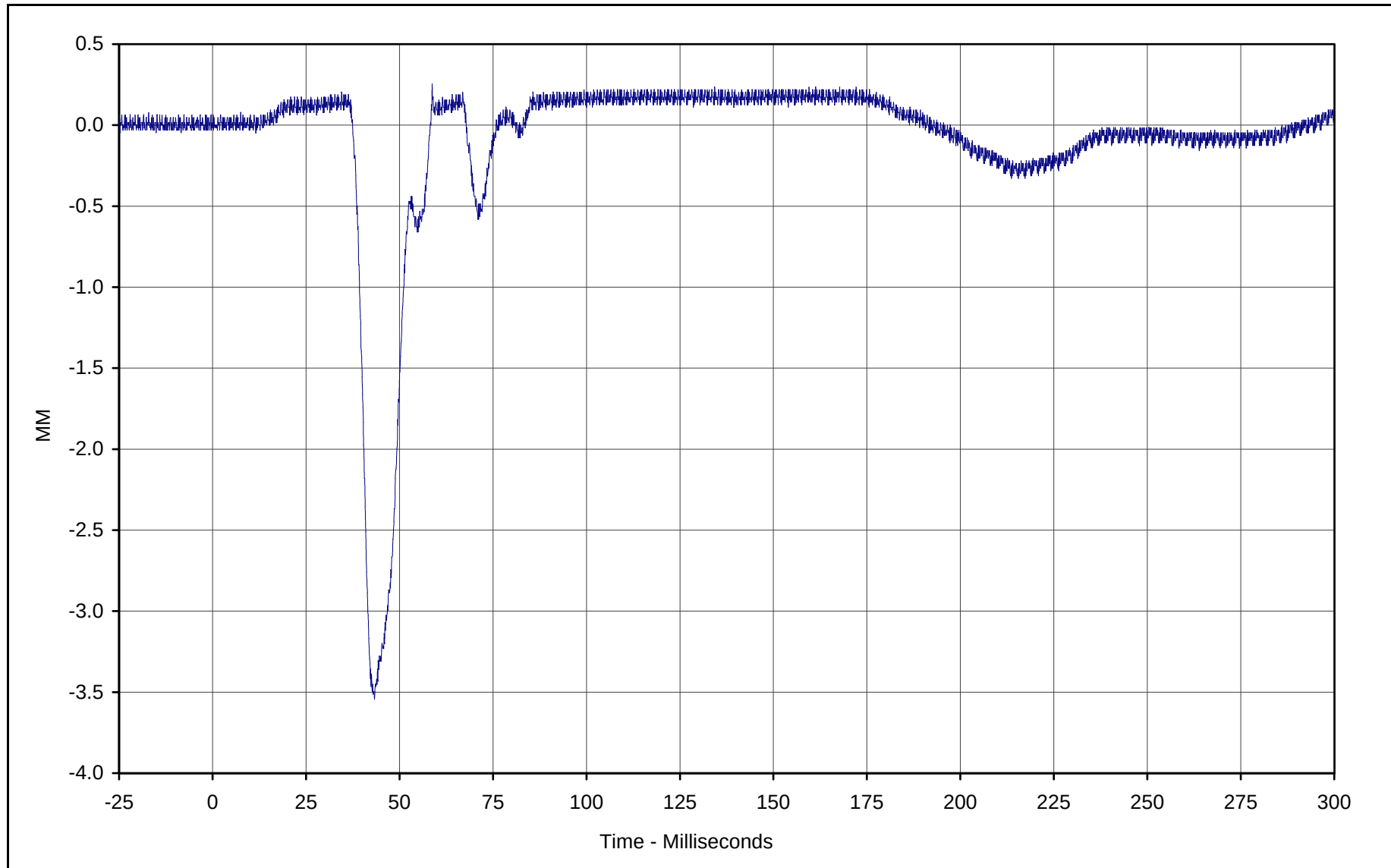
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

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Curve Description: Driver Right Knee Slider

Maximum Value: 0.25 at 58.7 Milliseconds

Minimum Value: -3.54 at 43.3 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

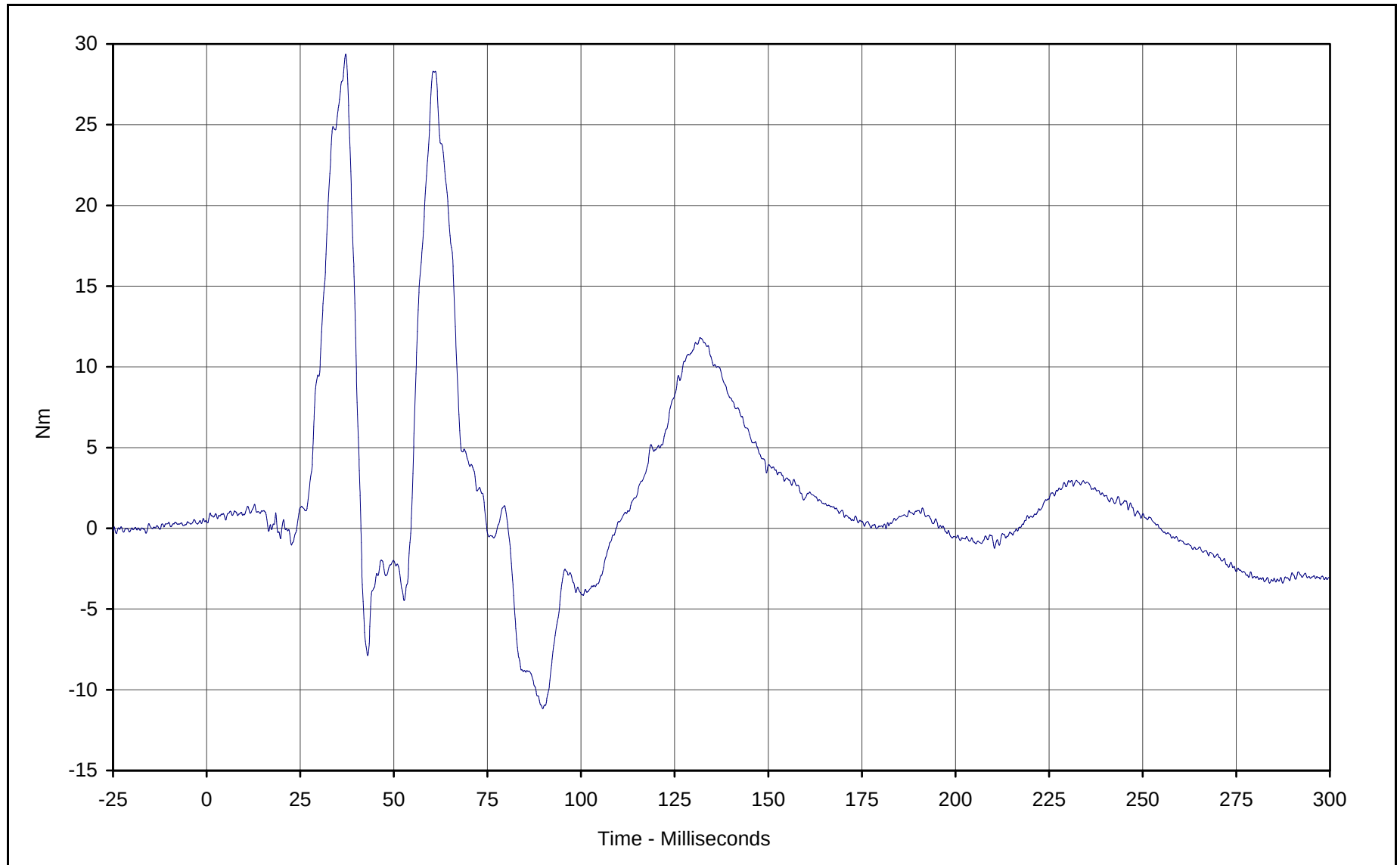
Curve Number: FIL-026

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01



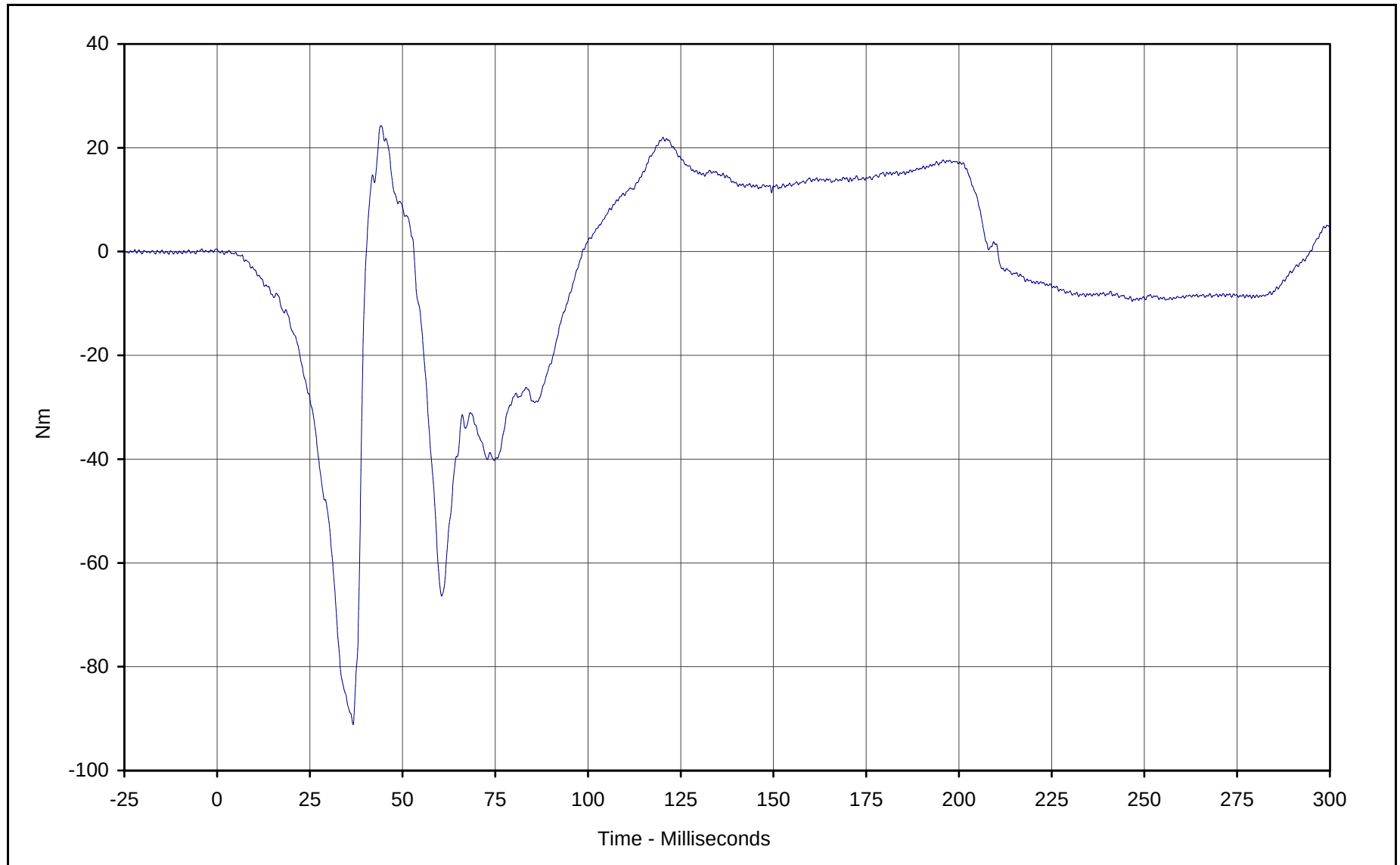
Curve Description: Driver Left Upper Tibia Moment X
Maximum Value: 29.4 at 37.1 Milliseconds
Minimum Value: -11.2 at 89.8 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-027

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



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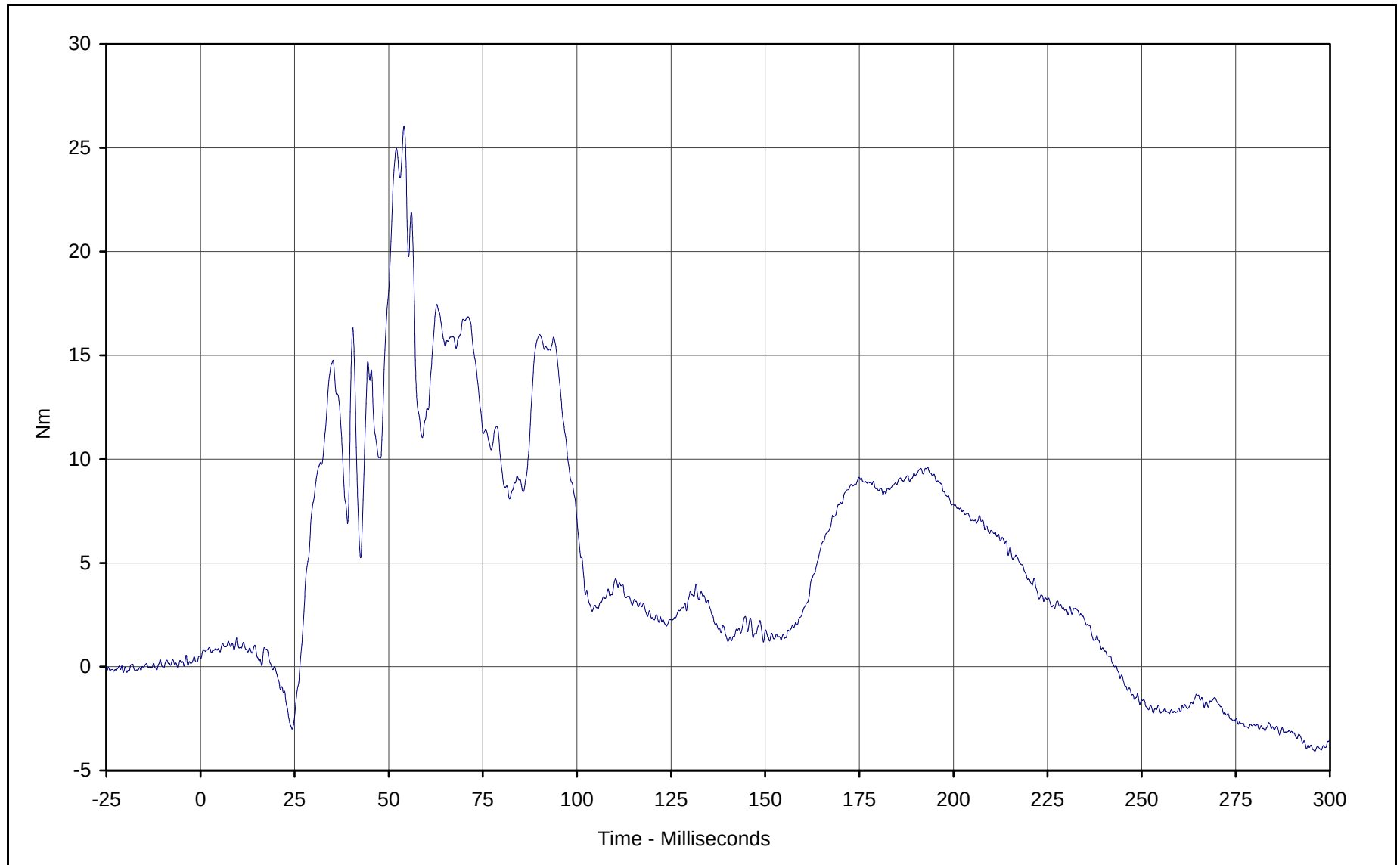


Curve Description: Driver Left Upper Tibia Moment Y
Maximum Value: 24.3 at 44.2 Milliseconds
Minimum Value: -91.2 at 36.7 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-028

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

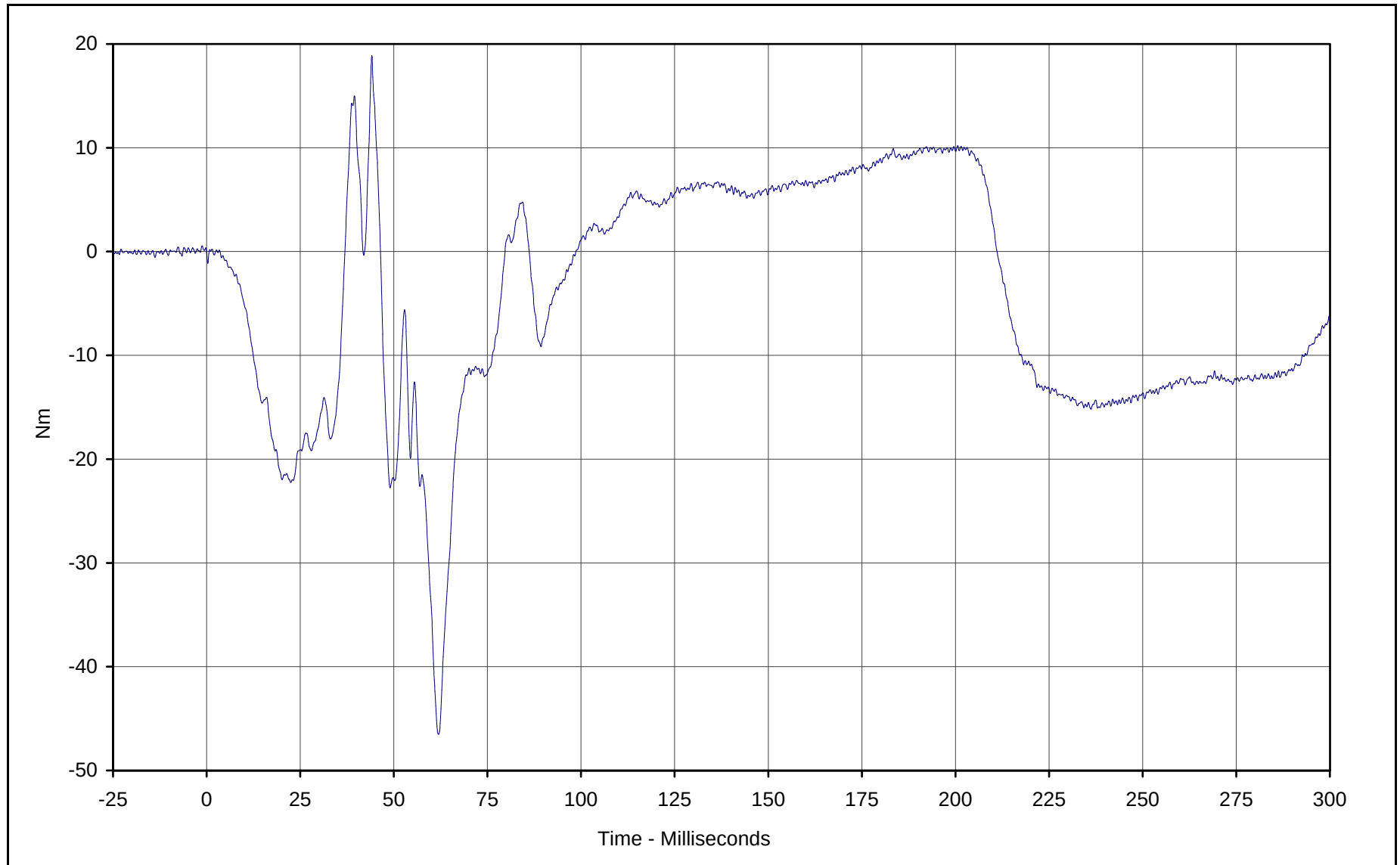


Curve Description: Driver Right Upper Tibia Moment X
Maximum Value: 26.0 at 54.0 Milliseconds
Minimum Value: -4.1 at 296.0 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-029

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



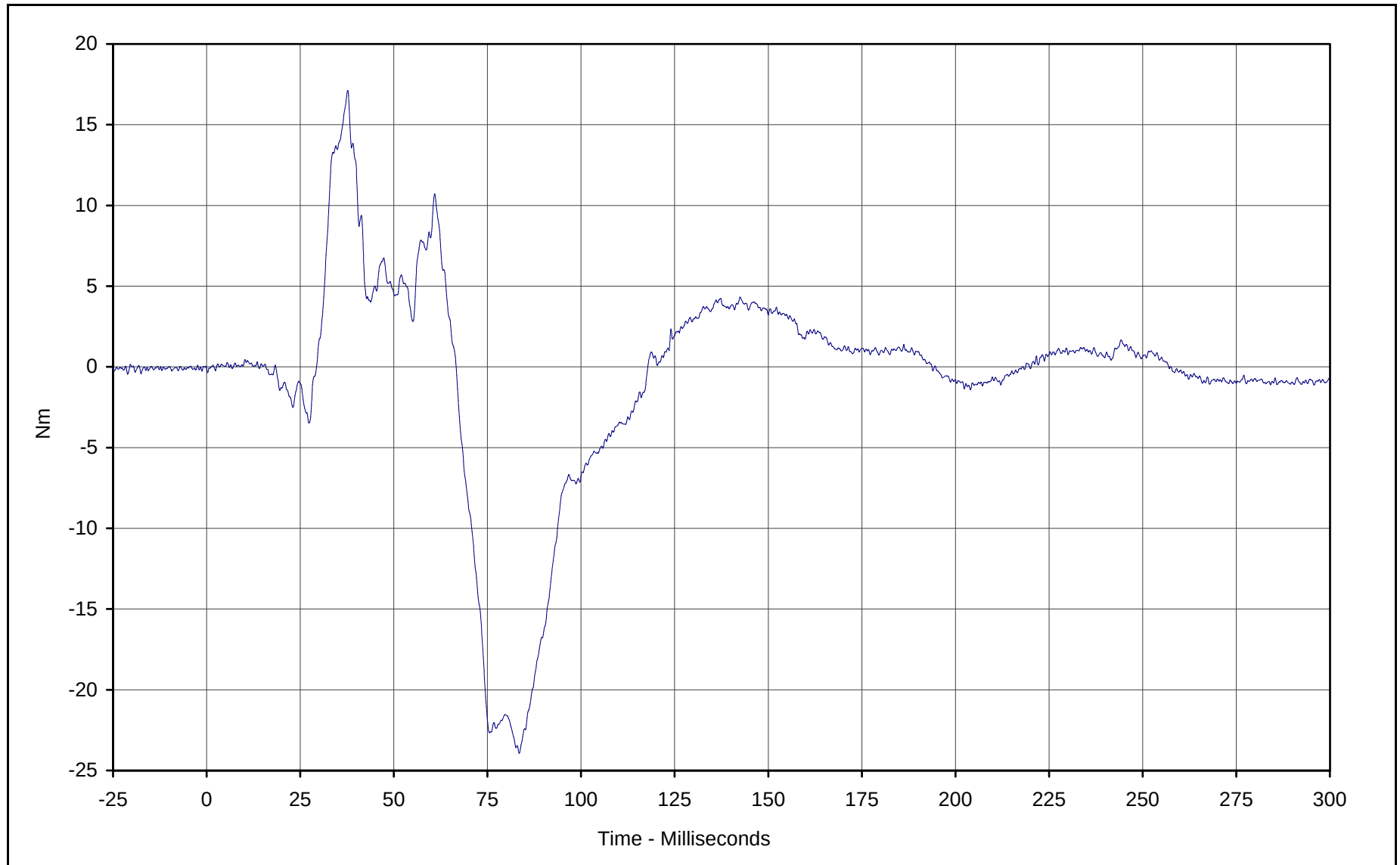


Curve Description: Driver Right Upper Tibia Moment Y
Maximum Value: 18.9 at 44.1 Milliseconds
Minimum Value: -46.5 at 61.9 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-030

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



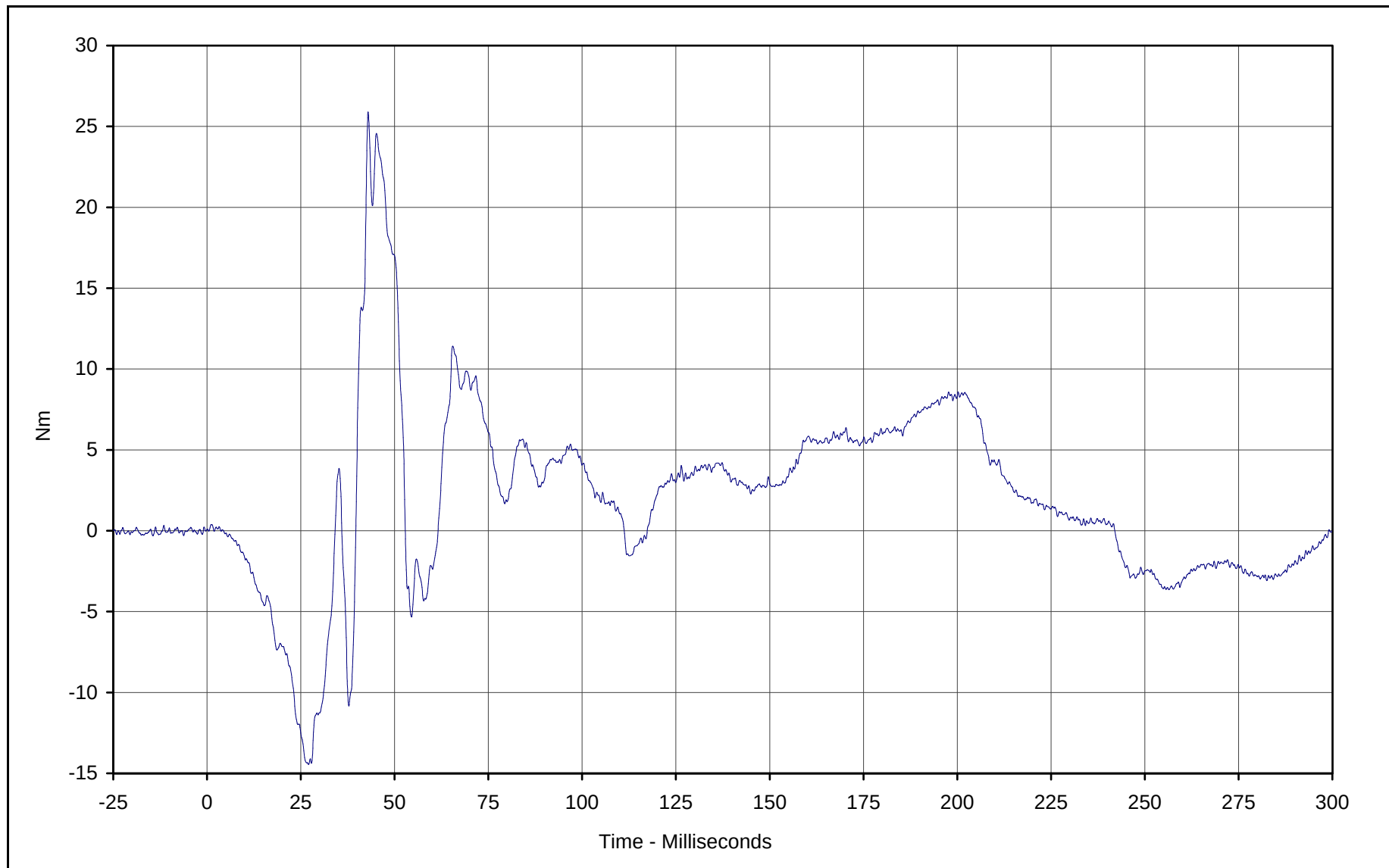


Curve Description: Driver Left Lower Tibia Moment X
Maximum Value: 17.1 at 37.7 Milliseconds
Minimum Value: -23.9 at 83.5 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-031

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan





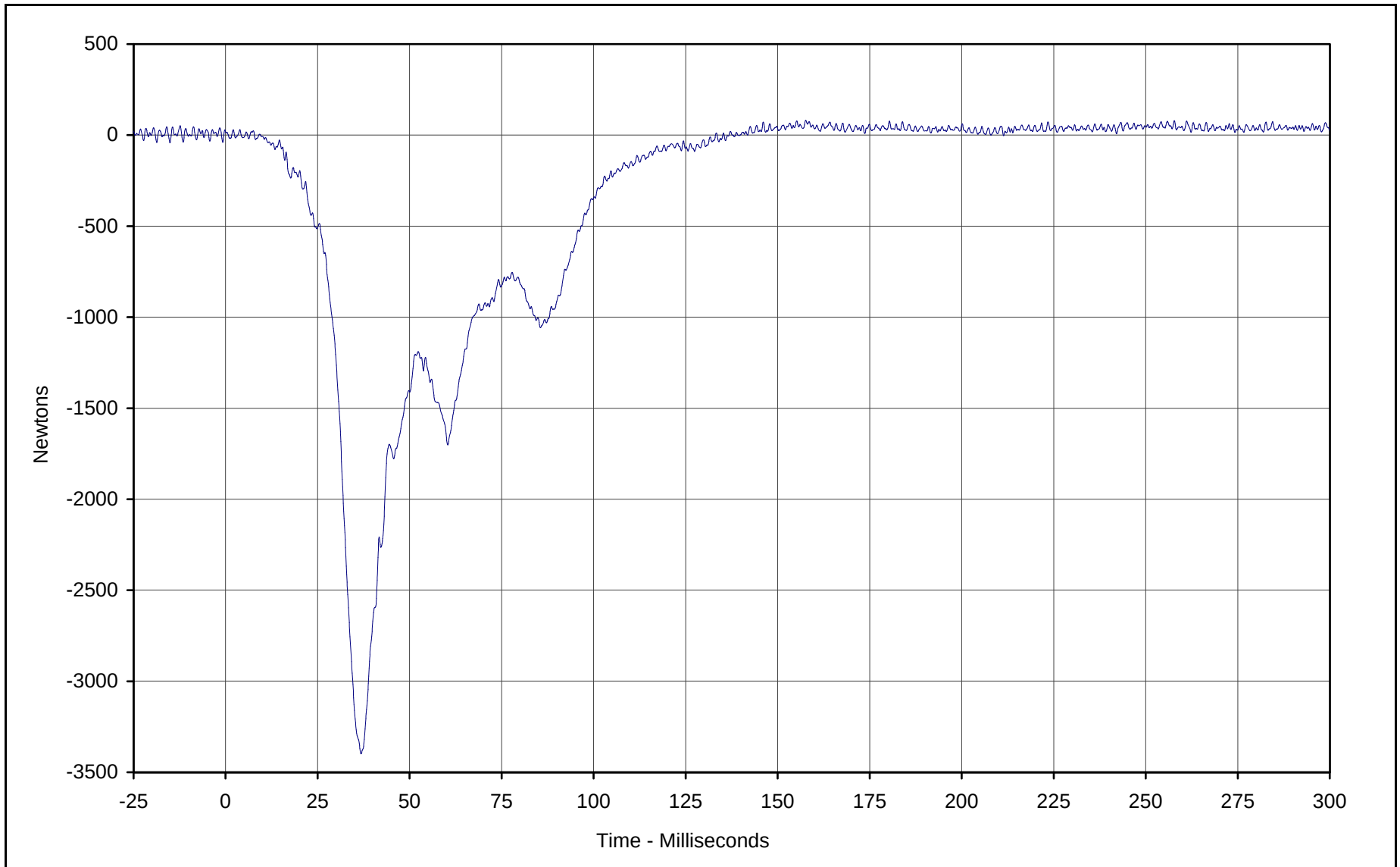
Curve Description: Driver Left Lower Tibia Moment Y
Maximum Value: 25.9 at 42.9 Milliseconds
Minimum Value: -14.5 at 27.1 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-032

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



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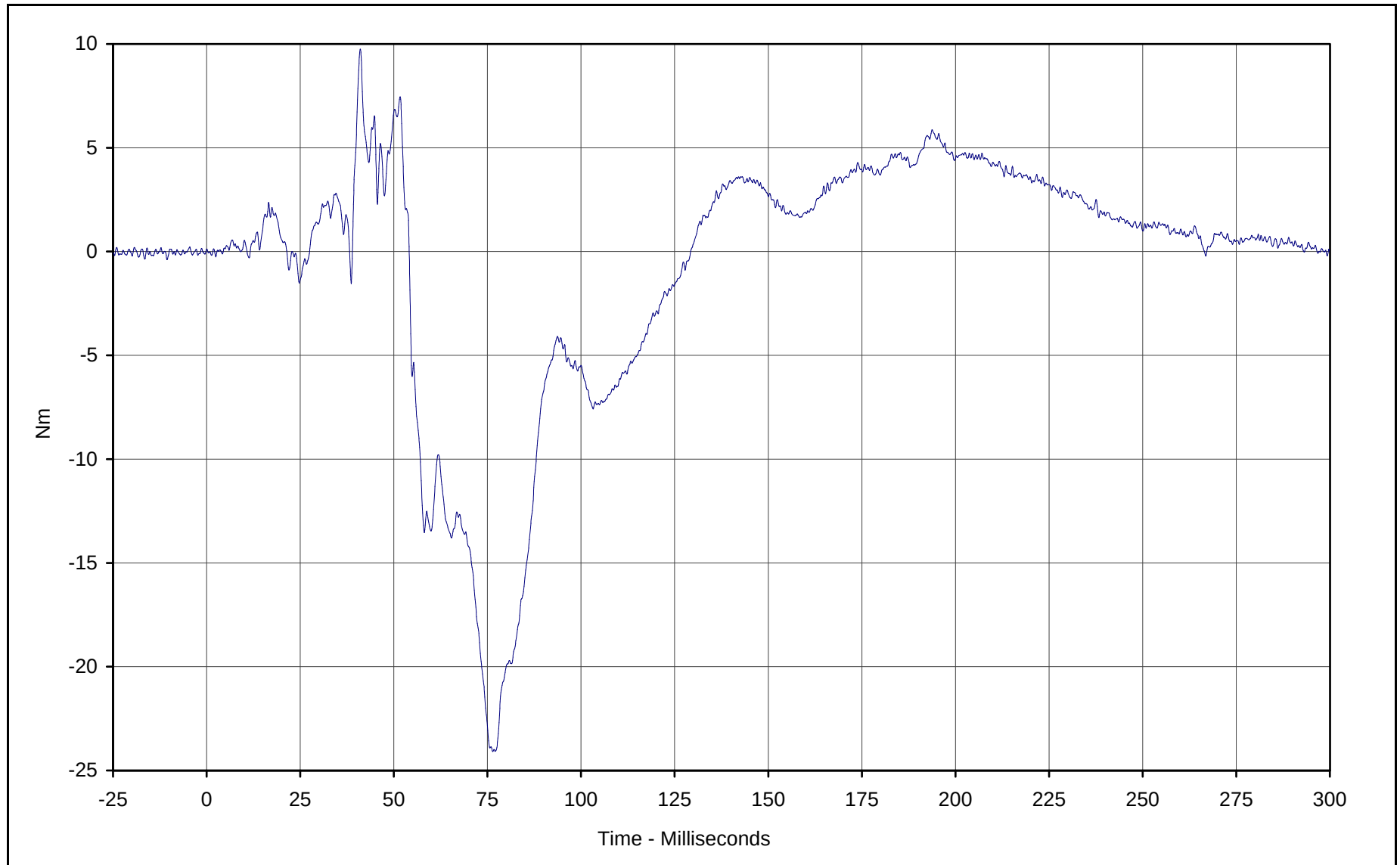


Curve Description: Driver Left Lower Tibia Force Z
Maximum Value: 81.3 at 157.6 Milliseconds
Minimum Value: -3398.6 at 36.8 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-033

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



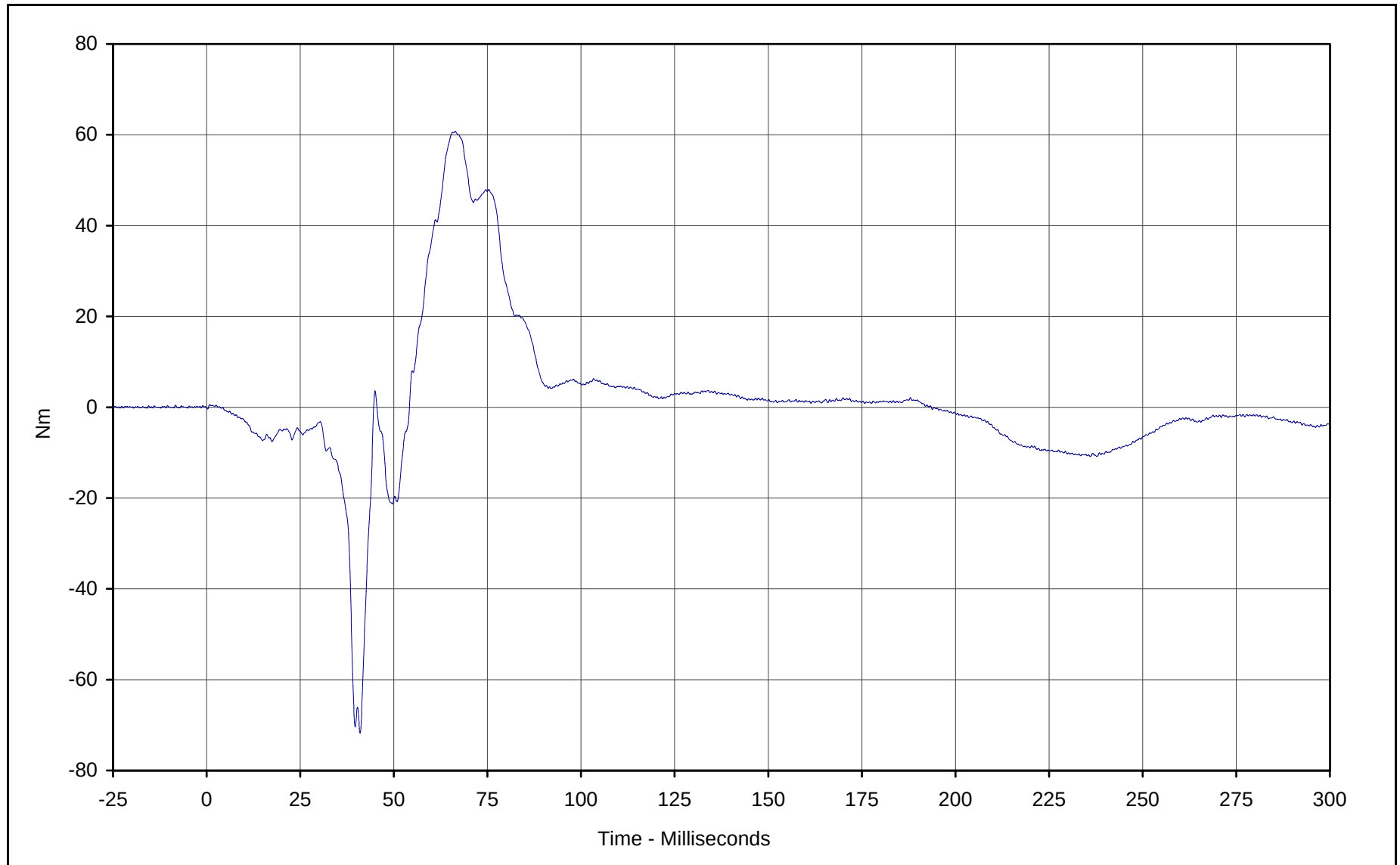
KAR22001-01



Curve Description: Driver Right Lower Tibia Moment X
Maximum Value: 9.7 at 41.1 Milliseconds
Minimum Value: -24.1 at 76.4 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-034

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



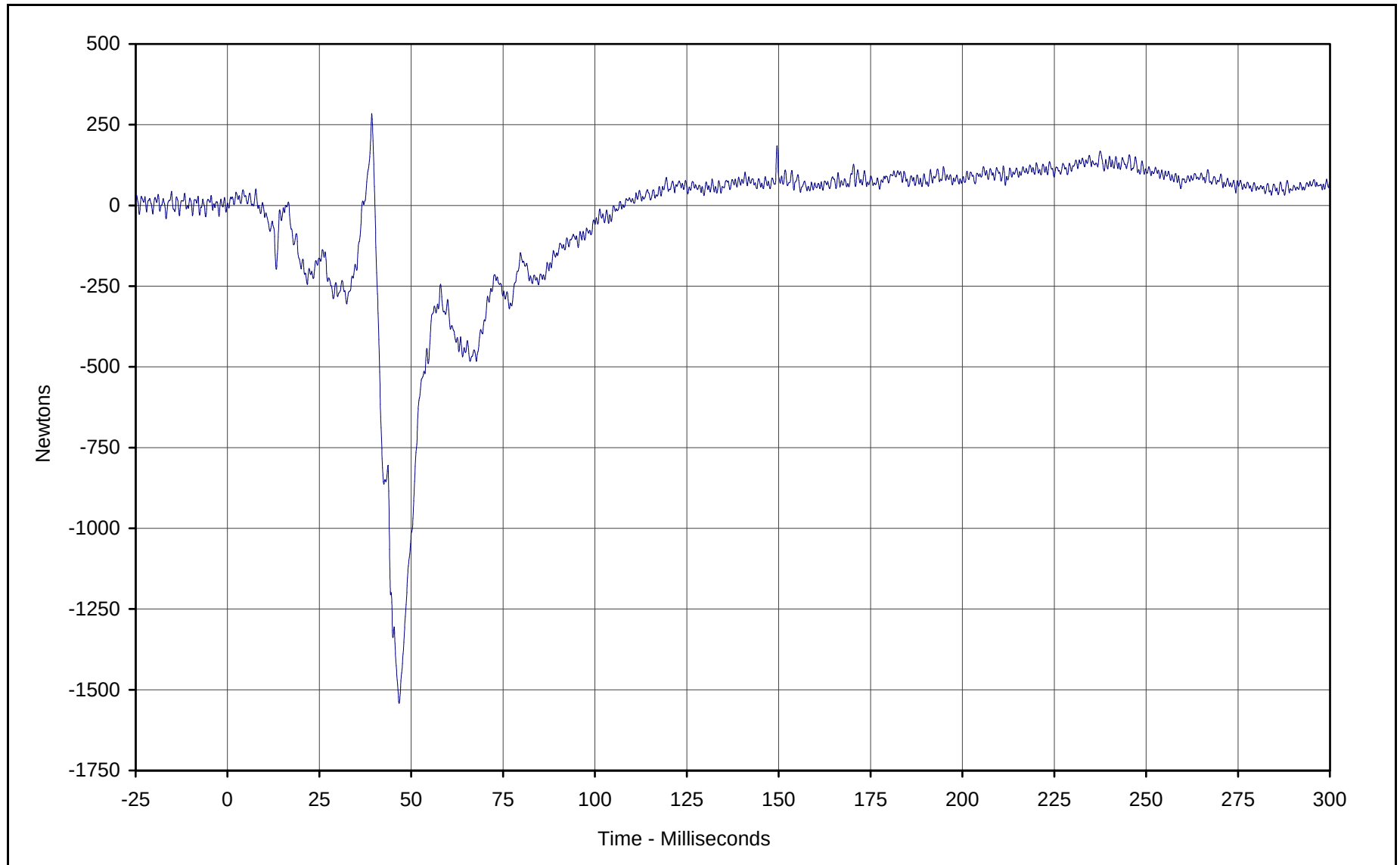


Curve Description: Driver Right Lower Tibia Moment Y
Maximum Value: 60.8 at 66.4 Milliseconds
Minimum Value: -71.8 at 41.0 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-035

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan

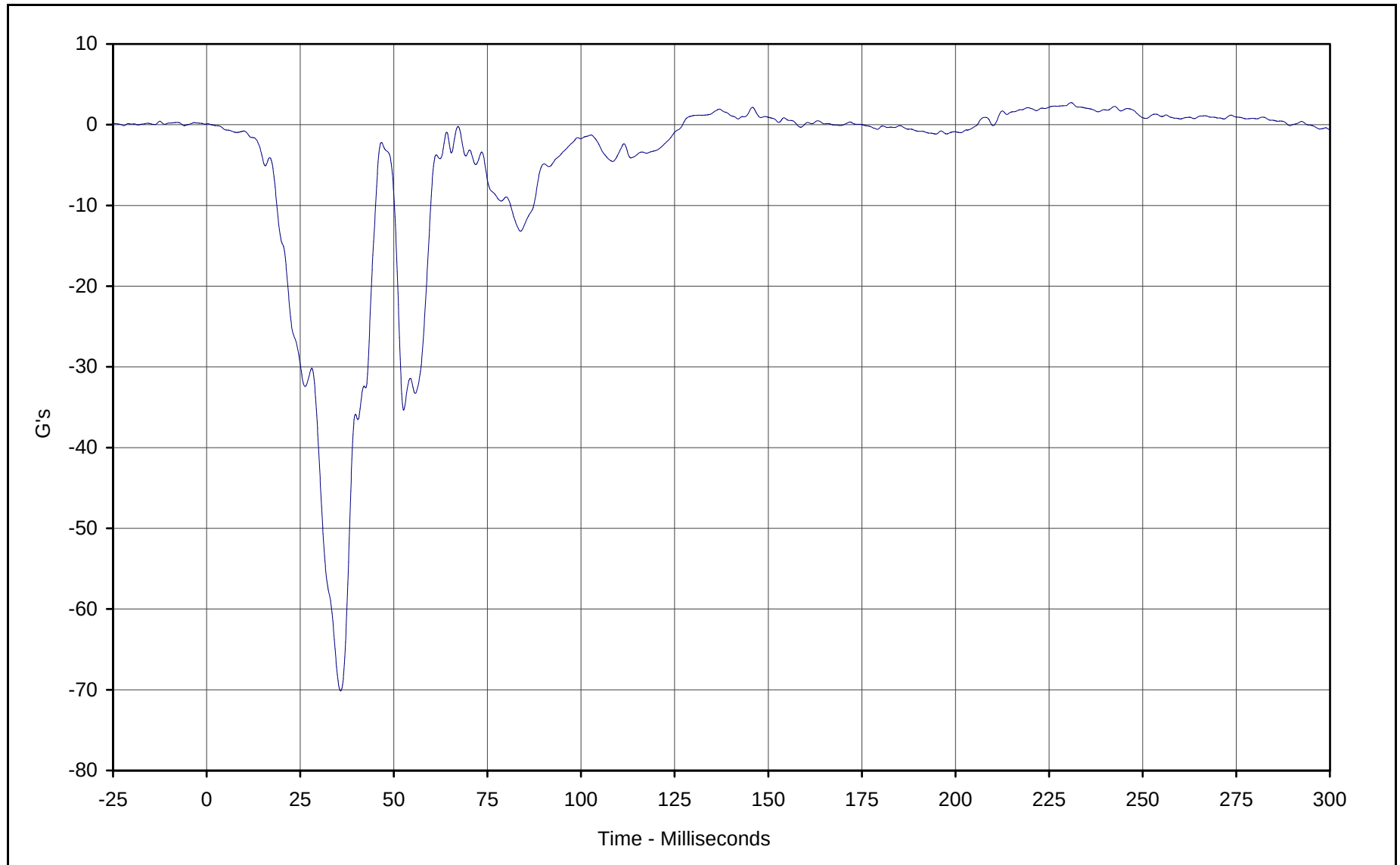




Curve Description: Driver Right Lower Tibia Force Z
Maximum Value: 284.4 at 39.3 Milliseconds
Minimum Value: -1542.1 at 46.7 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-036

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan





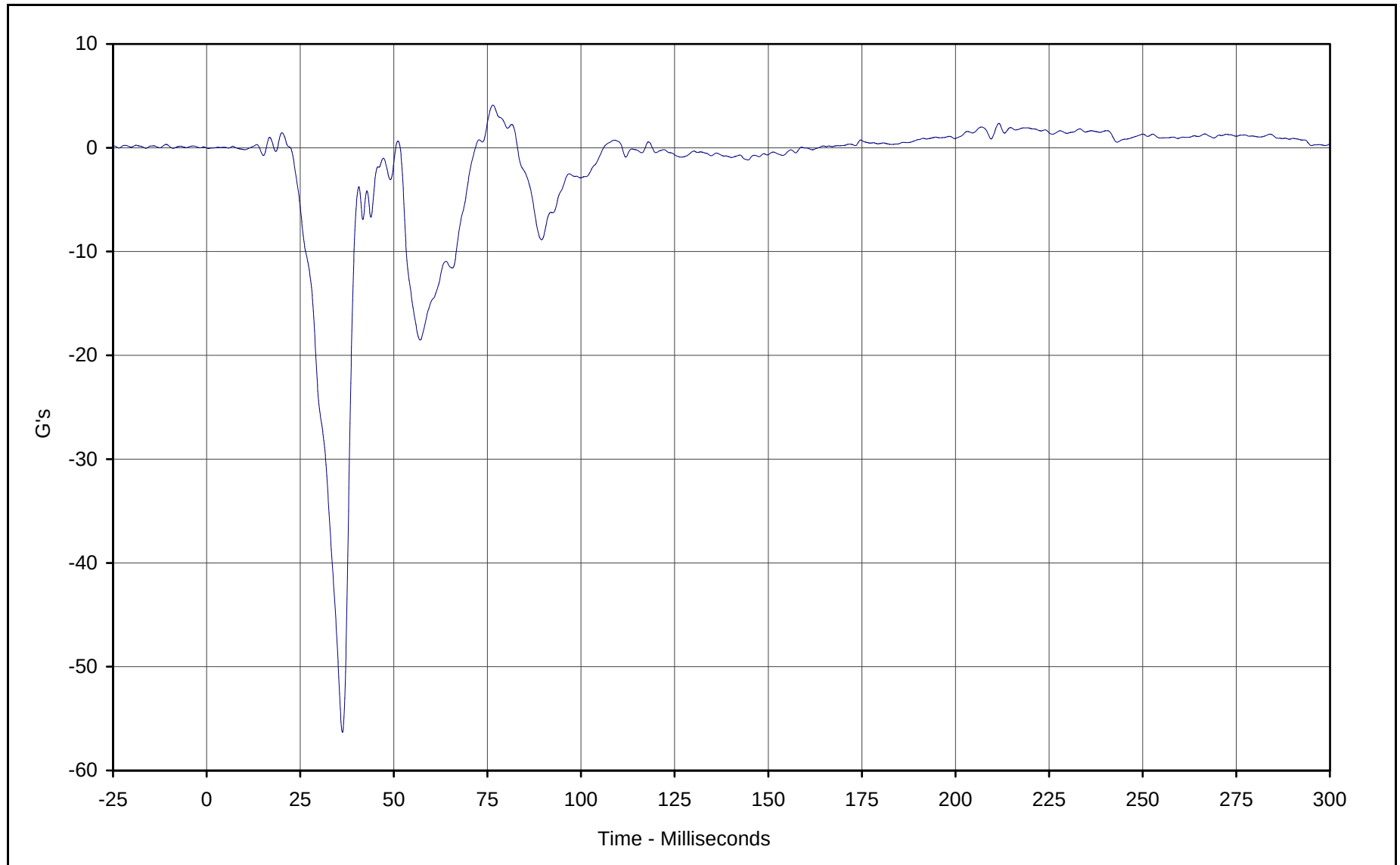
Curve Description: Driver Left Foot Aft X
Maximum Value: 2.7 at 230.8 Milliseconds
Minimum Value: -70.2 at 35.8 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-037

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



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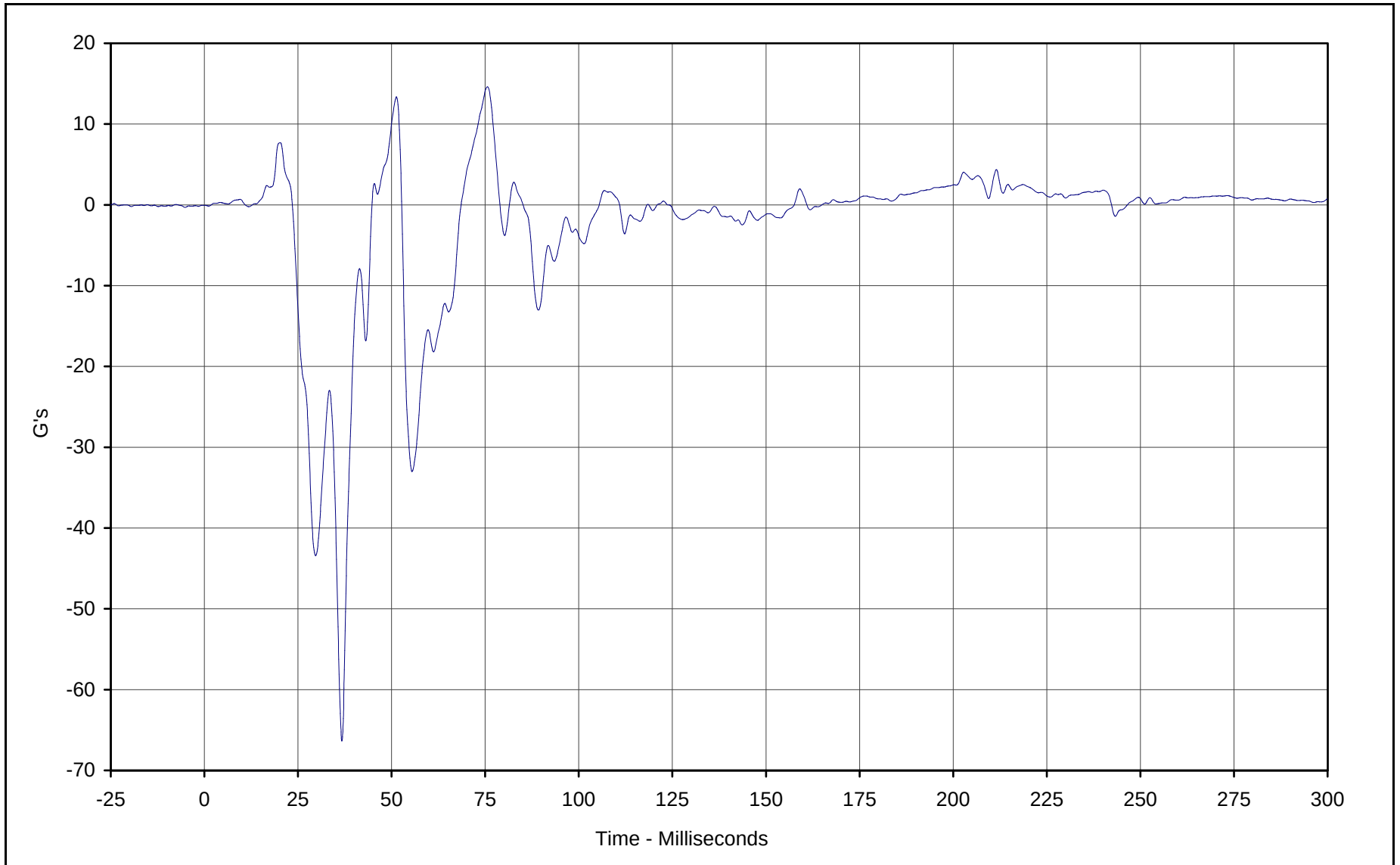
Curve Description: Driver Left Foot Aft Z
Maximum Value: 4.1 at 76.4 Milliseconds
Minimum Value: -56.3 at 36.3 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-038

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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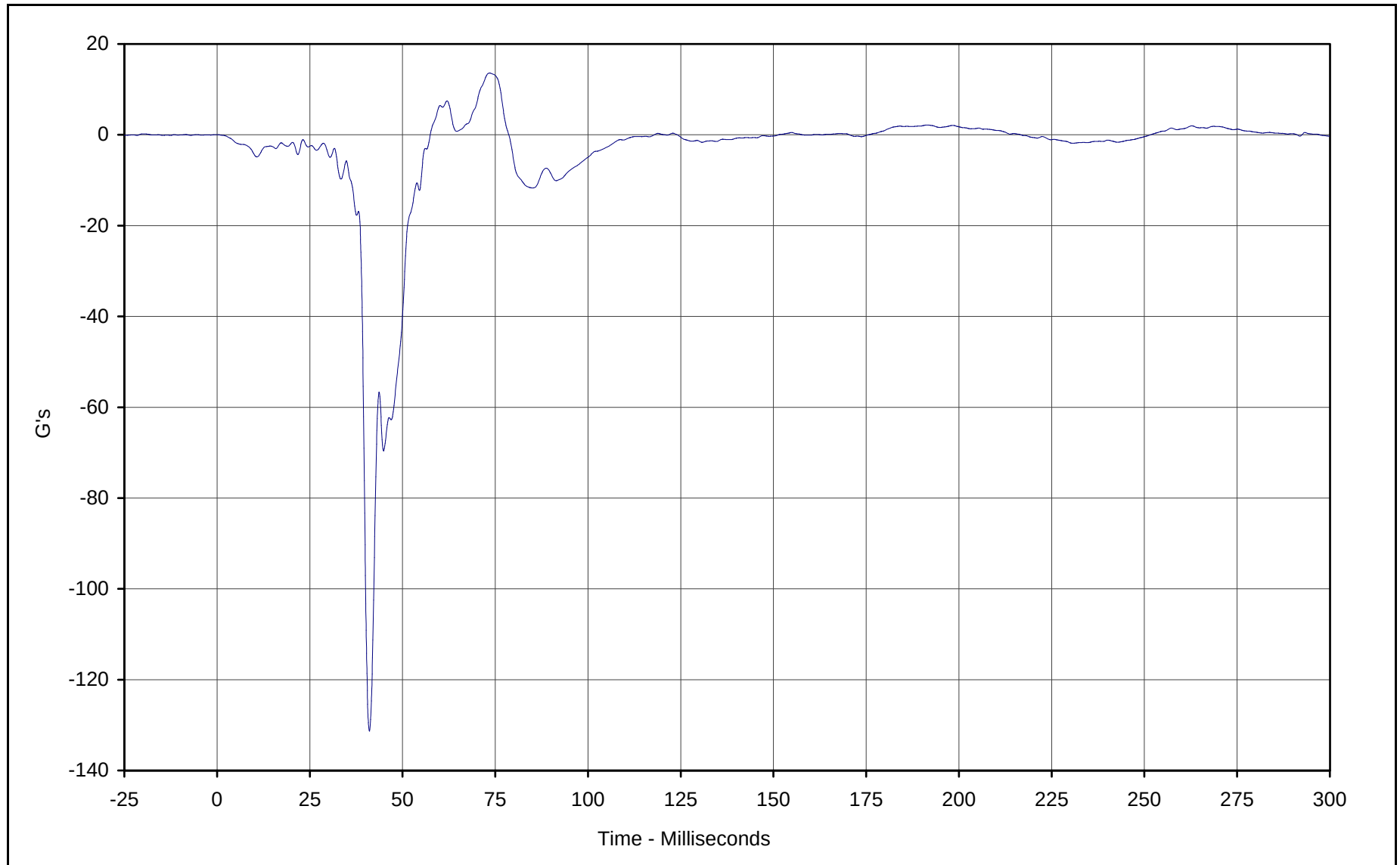


Curve Description: Driver Left Foot Fore Z
Maximum Value: 14.6 at 75.6 Milliseconds
Minimum Value: -66.3 at 36.7 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-039

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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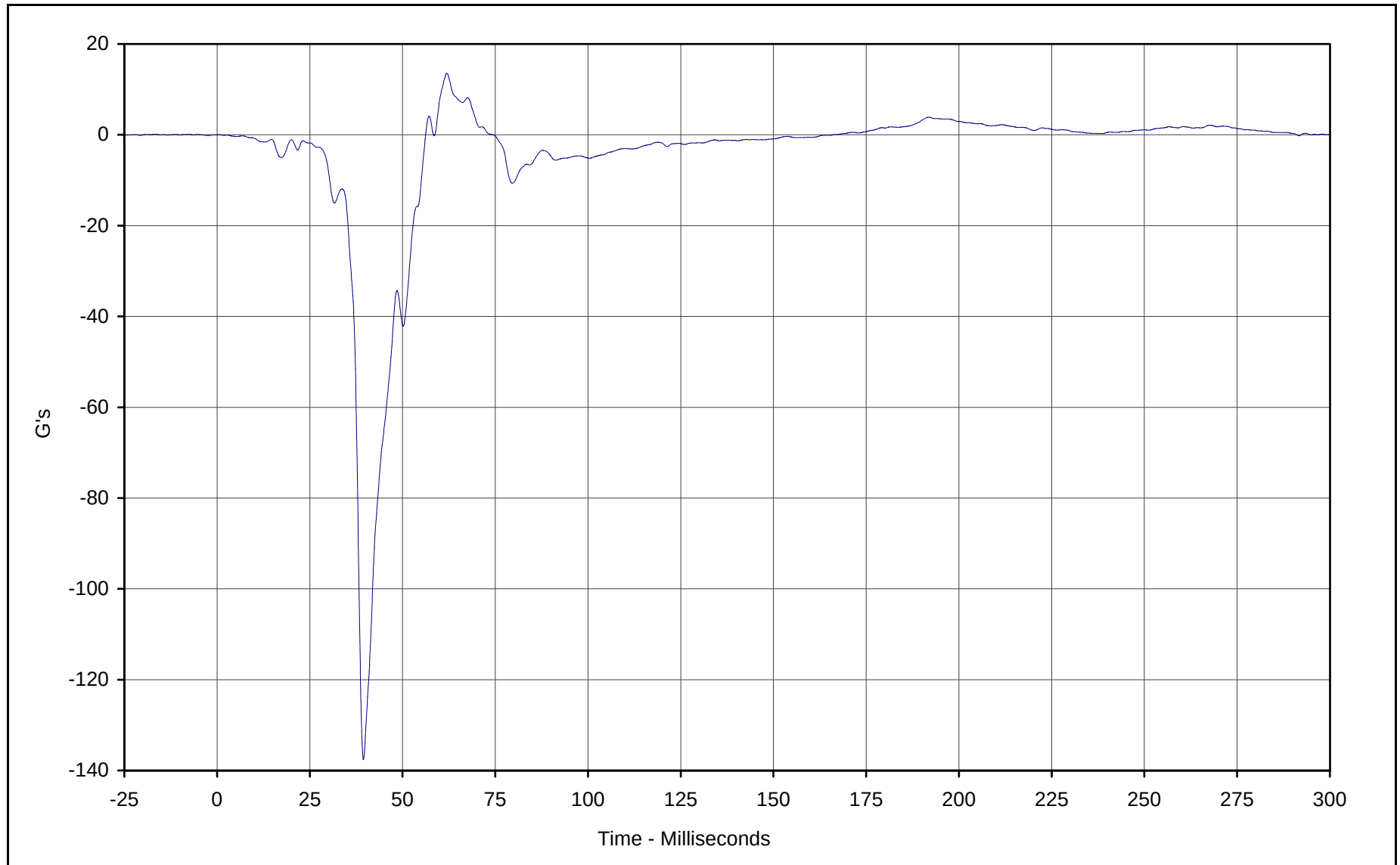


Curve Description: Driver Right Foot Aft X
Maximum Value: 13.6 at 73.5 Milliseconds
Minimum Value: -131.3 at 41.1 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-040

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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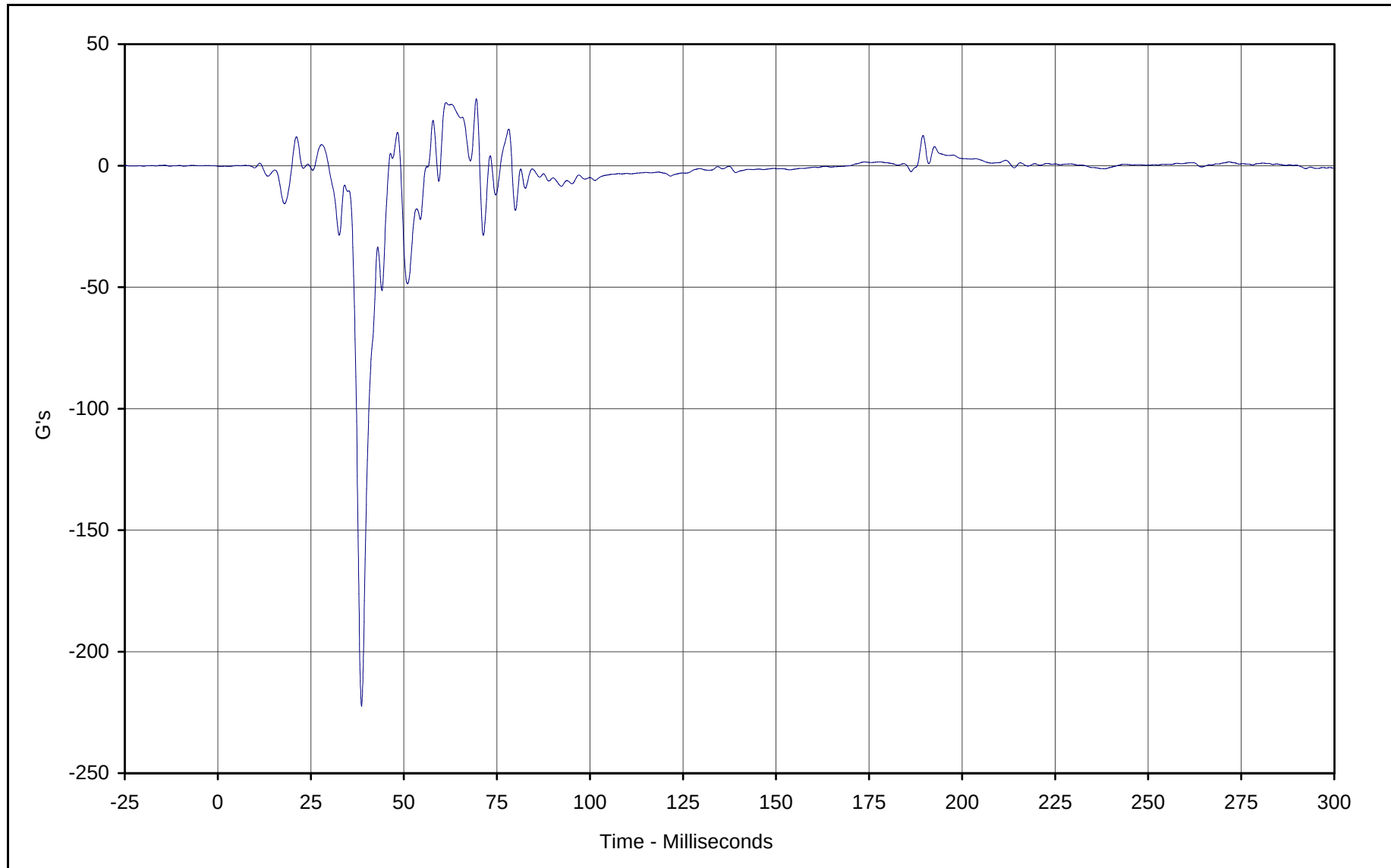
Curve Description: Driver Right Foot Aft Z
Maximum Value: 13.5 at 61.9 Milliseconds
Minimum Value: -137.6 at 39.5 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-041

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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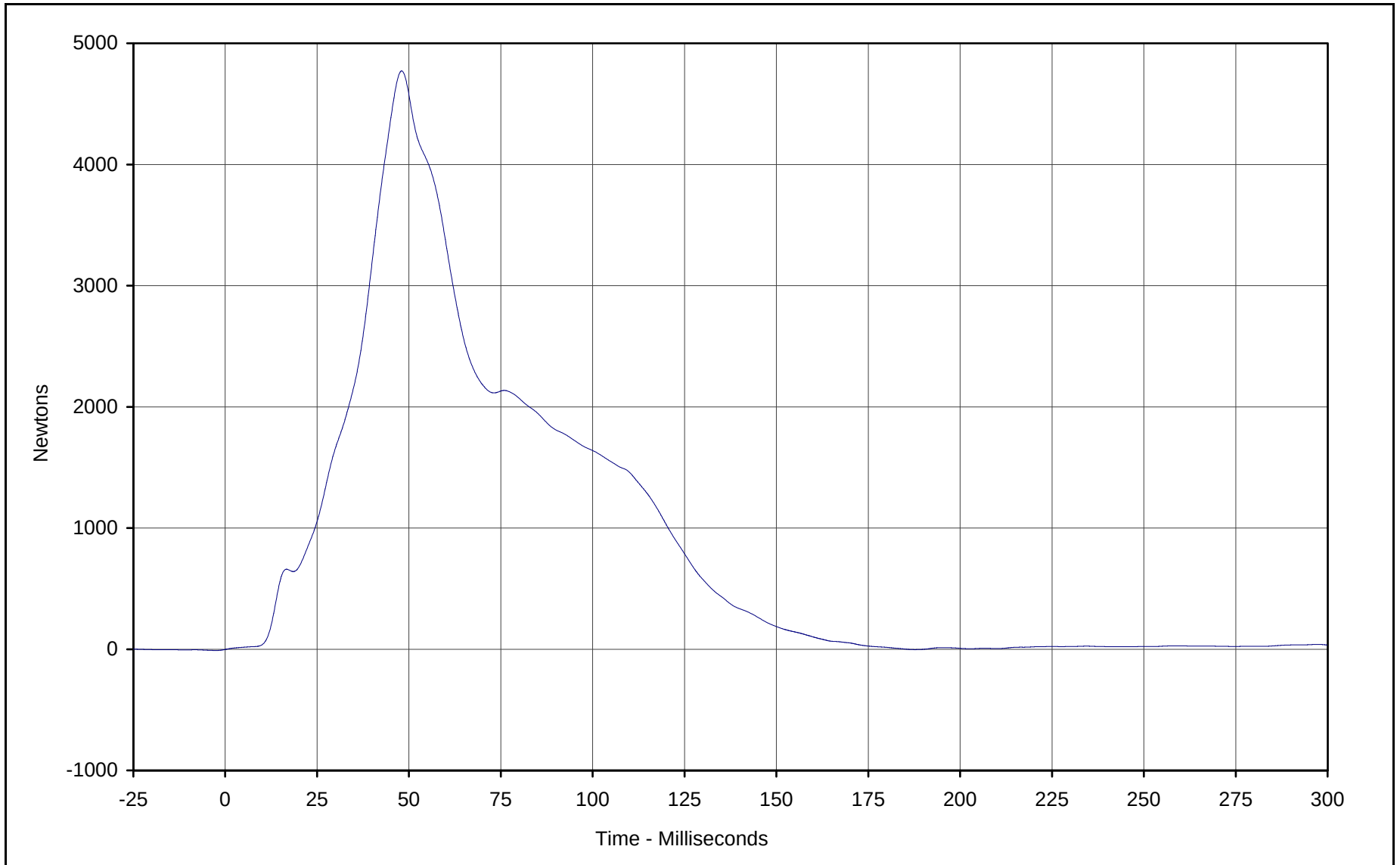
Curve Description: Driver Right Foot Fore Z
Maximum Value: 27.5 at 69.5 Milliseconds
Minimum Value: -222.5 at 38.6 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-042

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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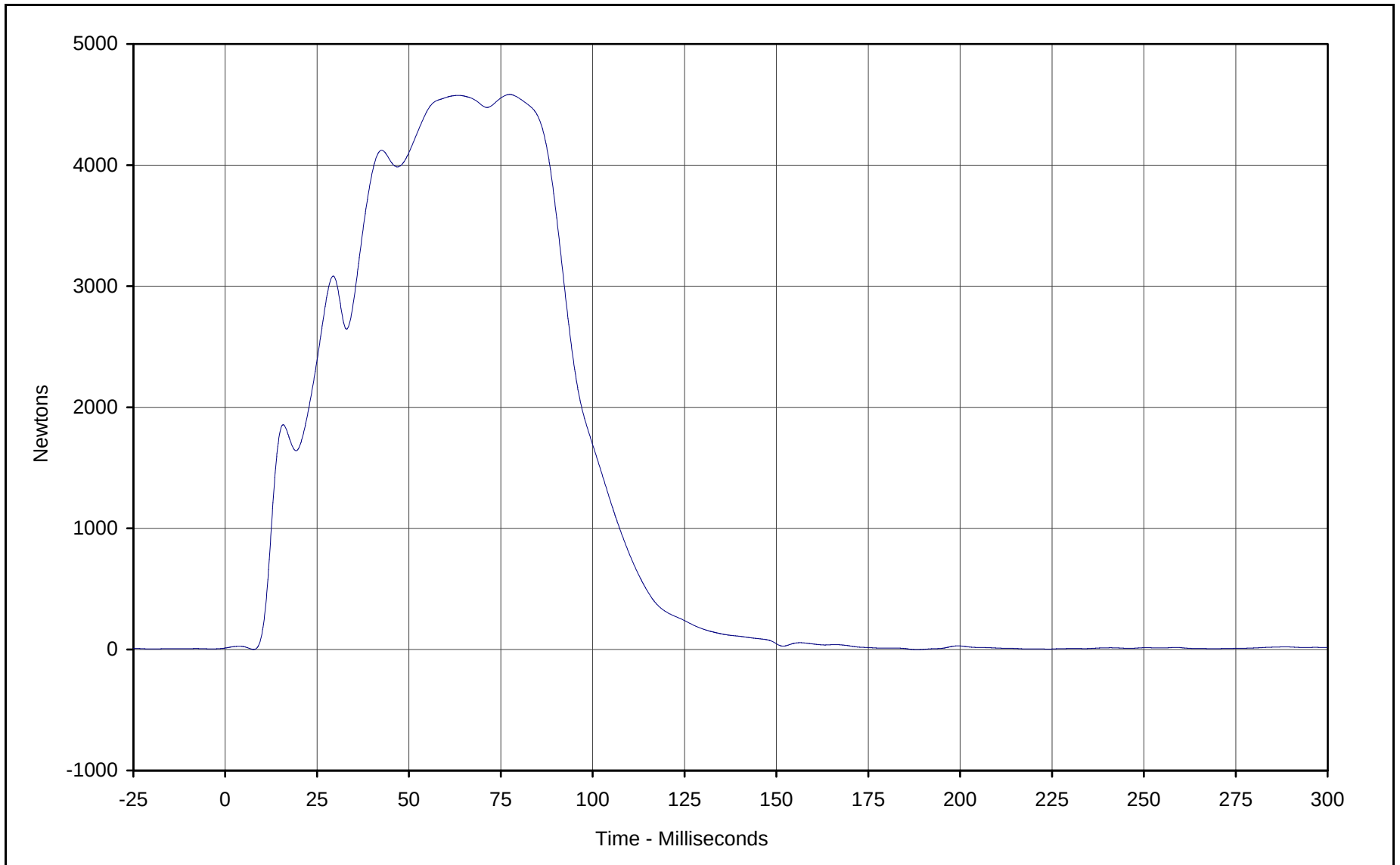
Curve Description: Driver Lap Belt Force
Maximum Value: 4771.8 at 48.0 Milliseconds
Minimum Value: -3.4 at 187.7 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-043

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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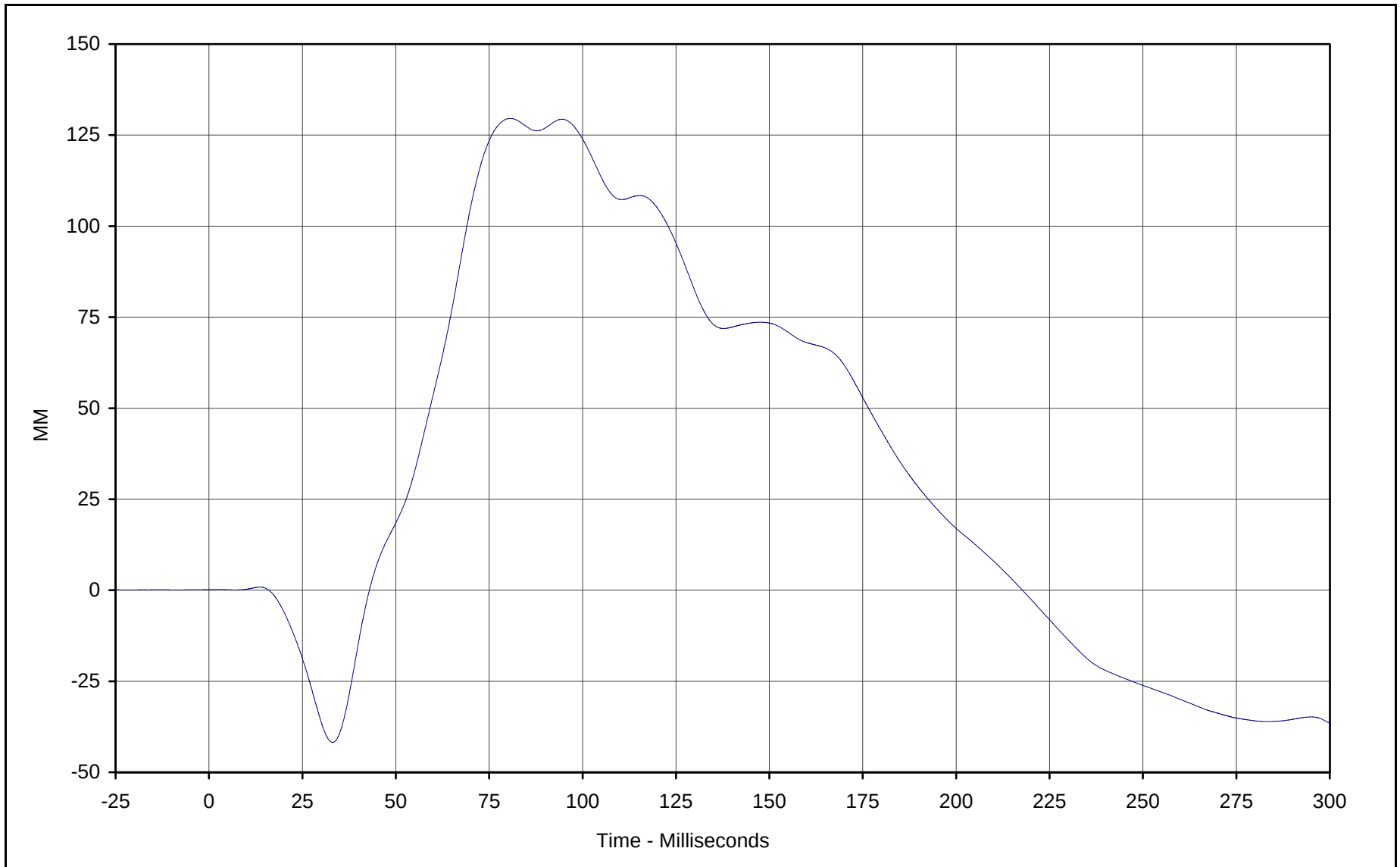
Curve Description: Driver Shoulder Belt Force
Maximum Value: 4583.1 at 77.4 Milliseconds
Minimum Value: -2.6 at 188.2 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-044

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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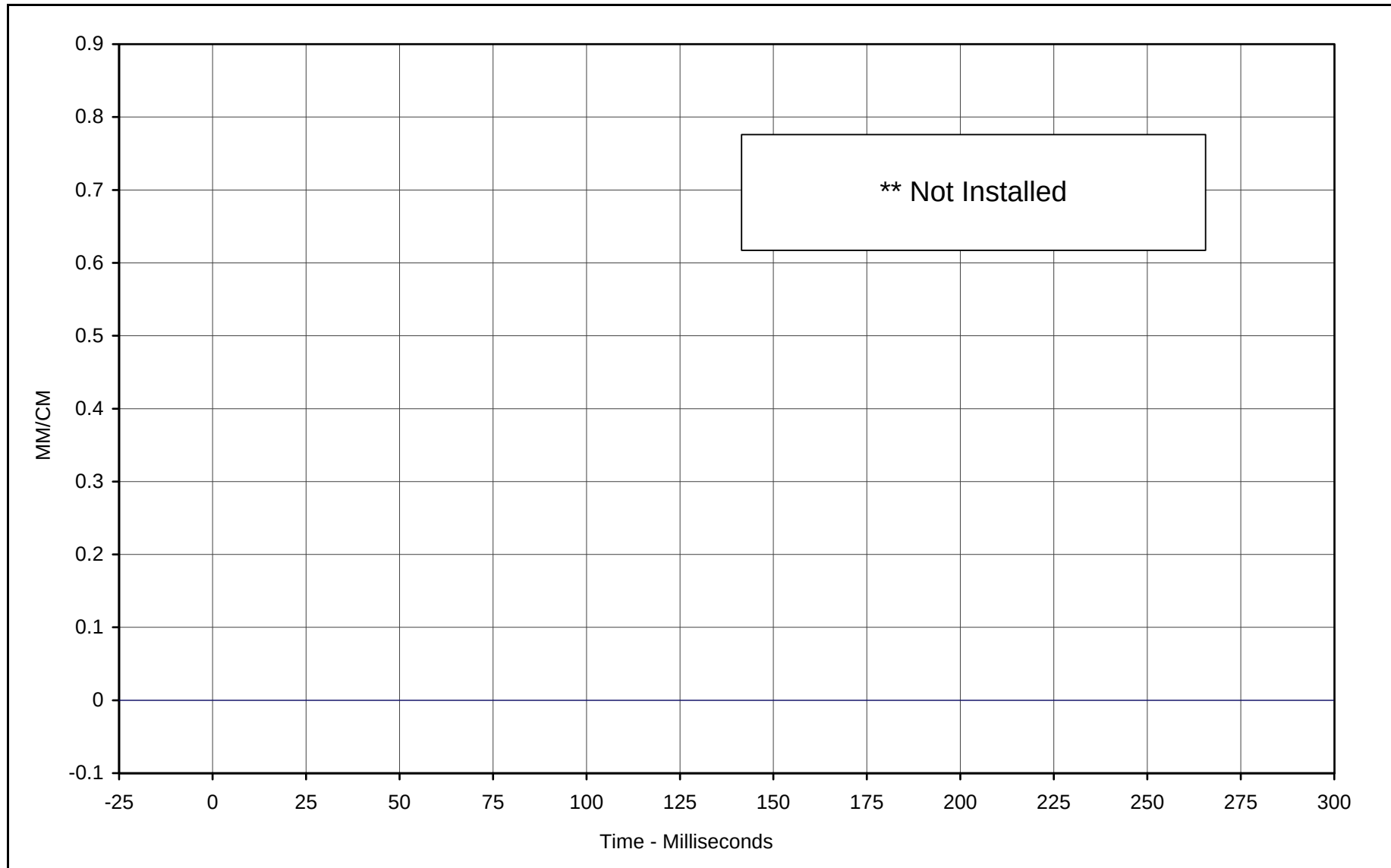


Curve Description: Driver Shoulder Belt Pullout
Maximum Value: 129.6 at 80.6 Milliseconds
Minimum Value: -41.8 at 33.1 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-045

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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Curve Description: Driver Shoulder Belt Elongation **

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Maximum Value: 0.0 at 0.0 Milliseconds

Test Vehicle: 2002 Kia Sedona LX Minivan

Minimum Value: 0.0 at 0.0 Milliseconds

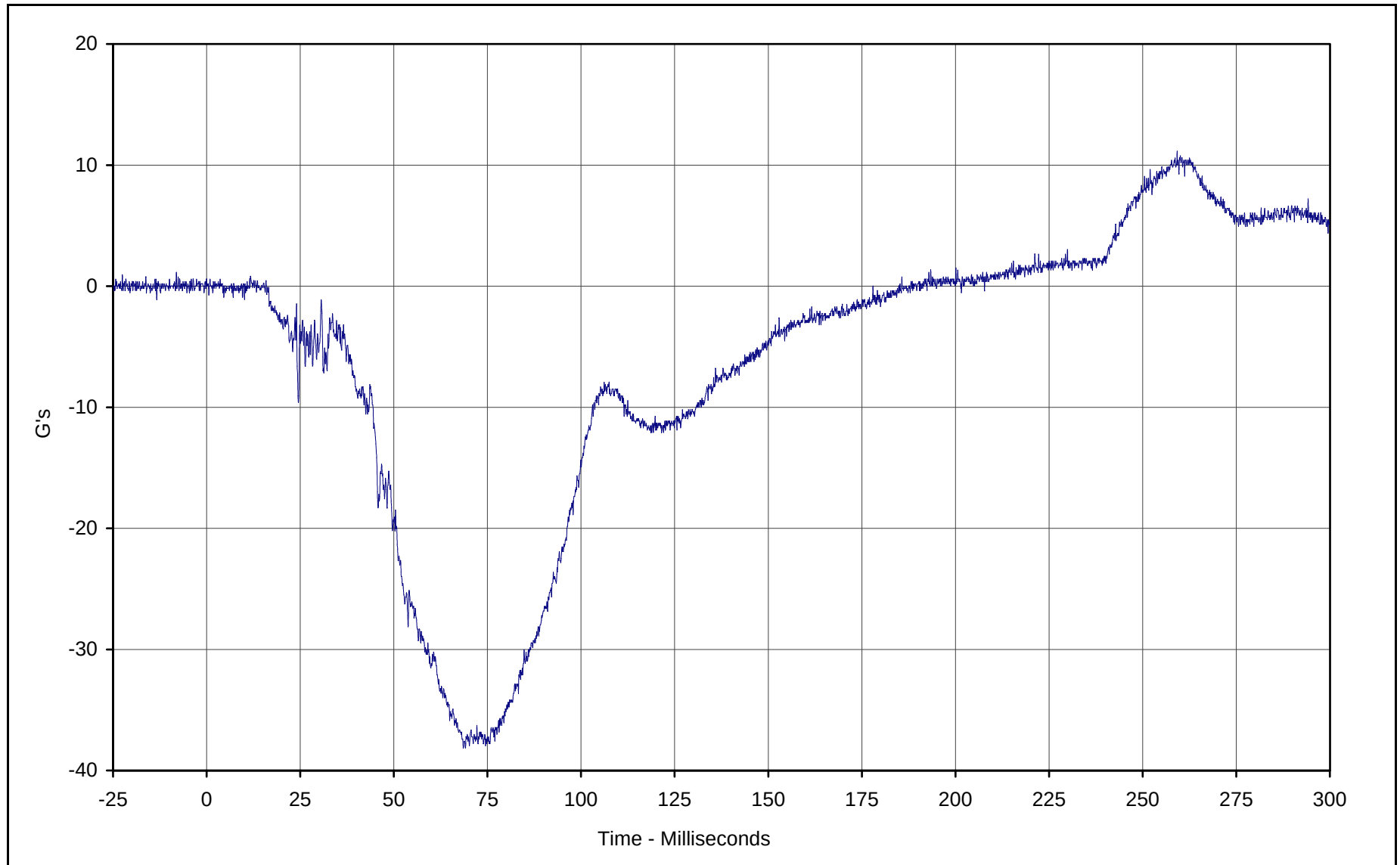
SAE Filter Class: 60

Date of Test: 12/7/01

Curve Number: FIL-046

** Not installed



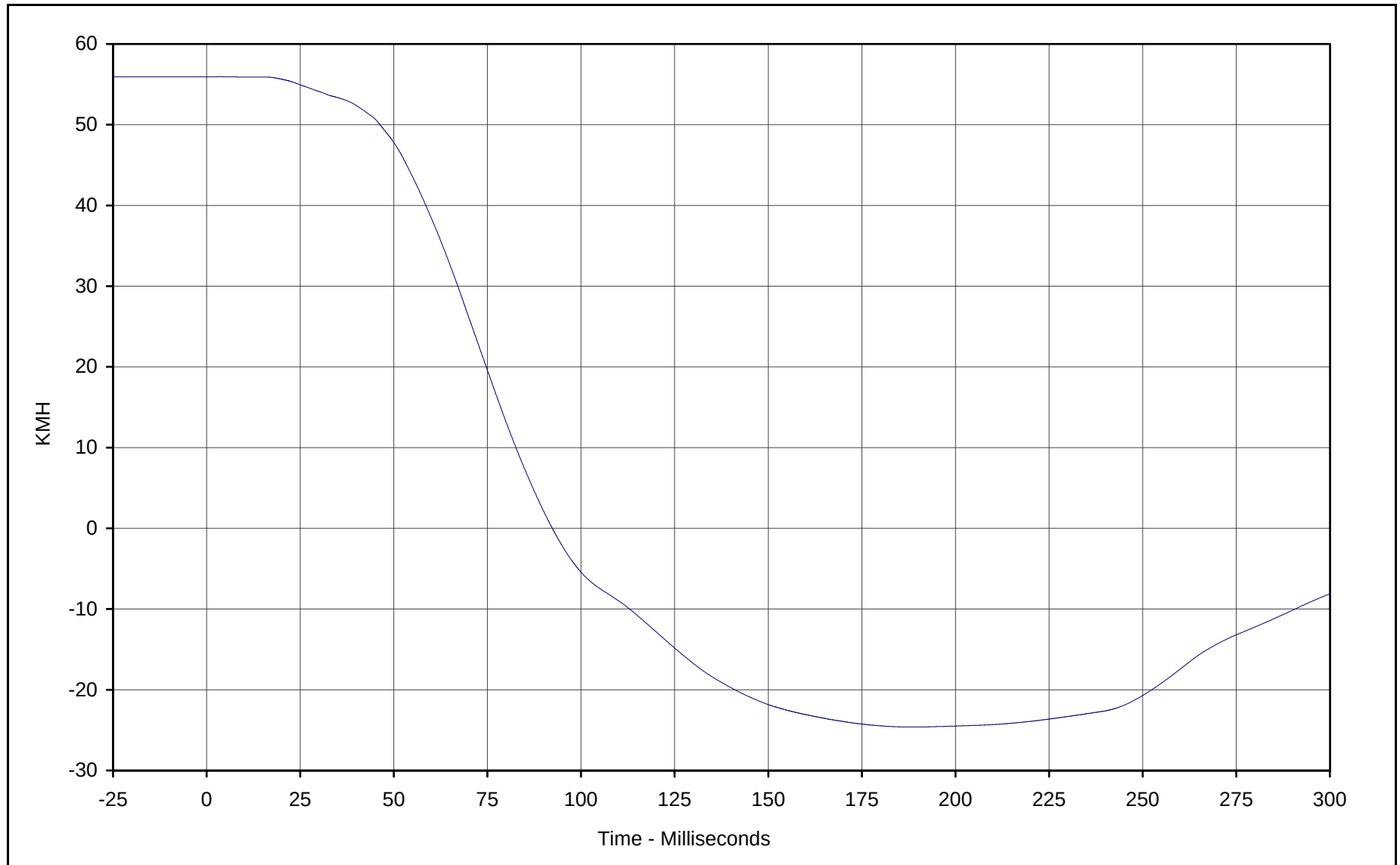


Curve Description: Passenger Head Primary X
Maximum Value: 11.2 at 259.2 Milliseconds
Minimum Value: -38.2 at 68.5 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-047

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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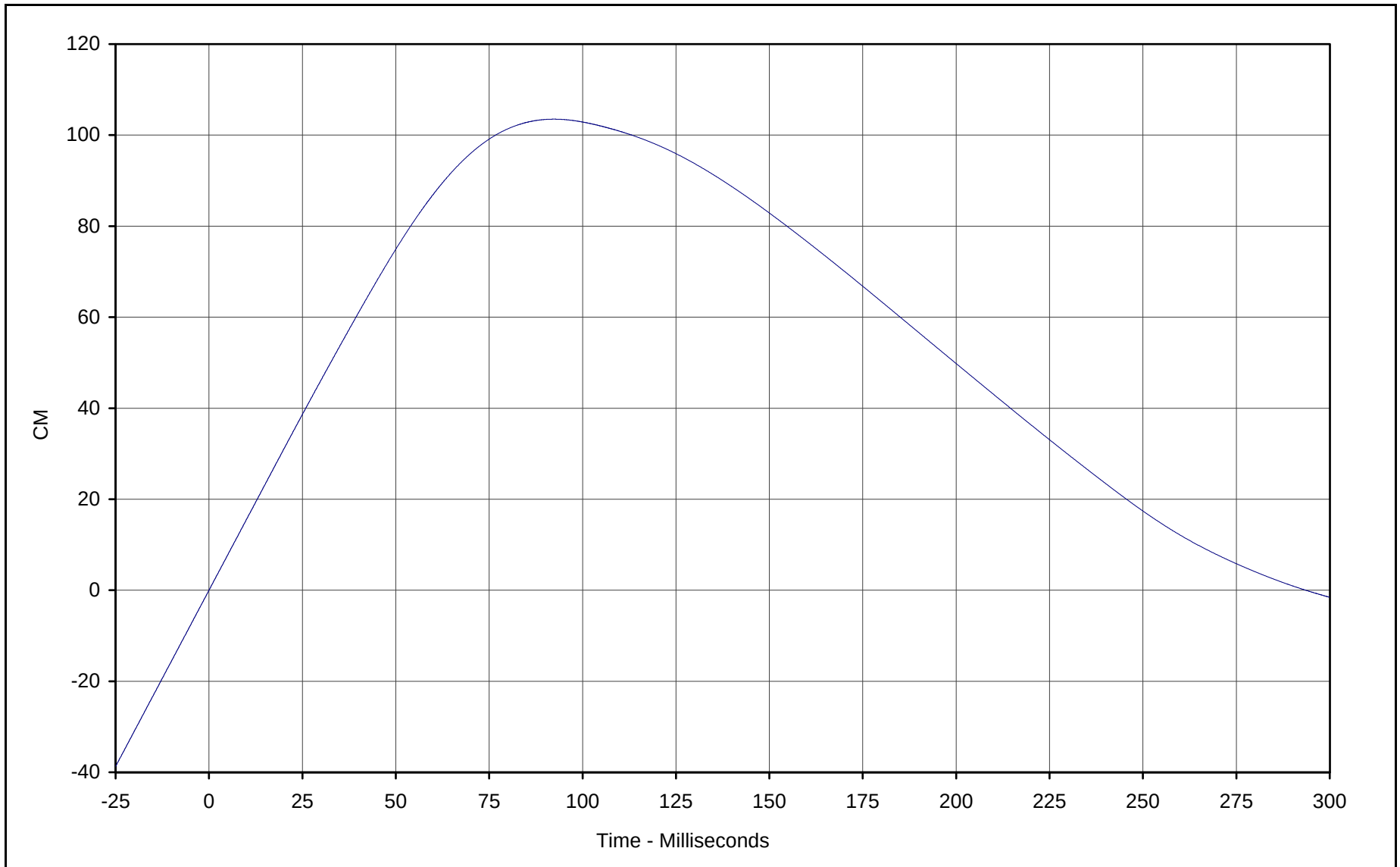


Curve Description: Passenger Head Primary X Velocity
Maximum Value: 55.9 at 3.9 Milliseconds
Minimum Value: -24.6 at 188.4 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN1-047

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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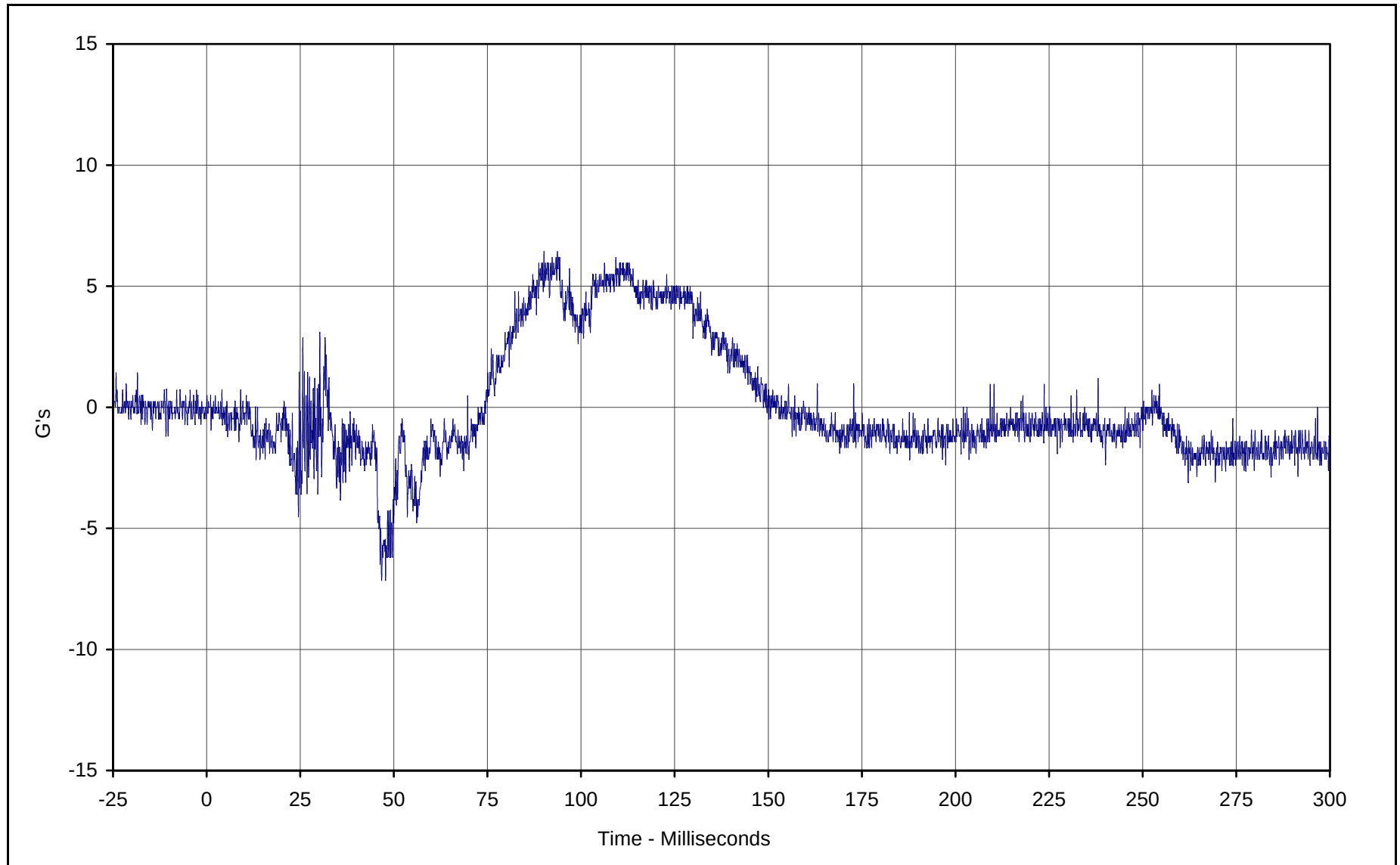


Curve Description: Passenger Head Primary X Displ.
Maximum Value: 103.5 at 92.3 Milliseconds
Minimum Value: -1.5 at 299.9 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN2-047

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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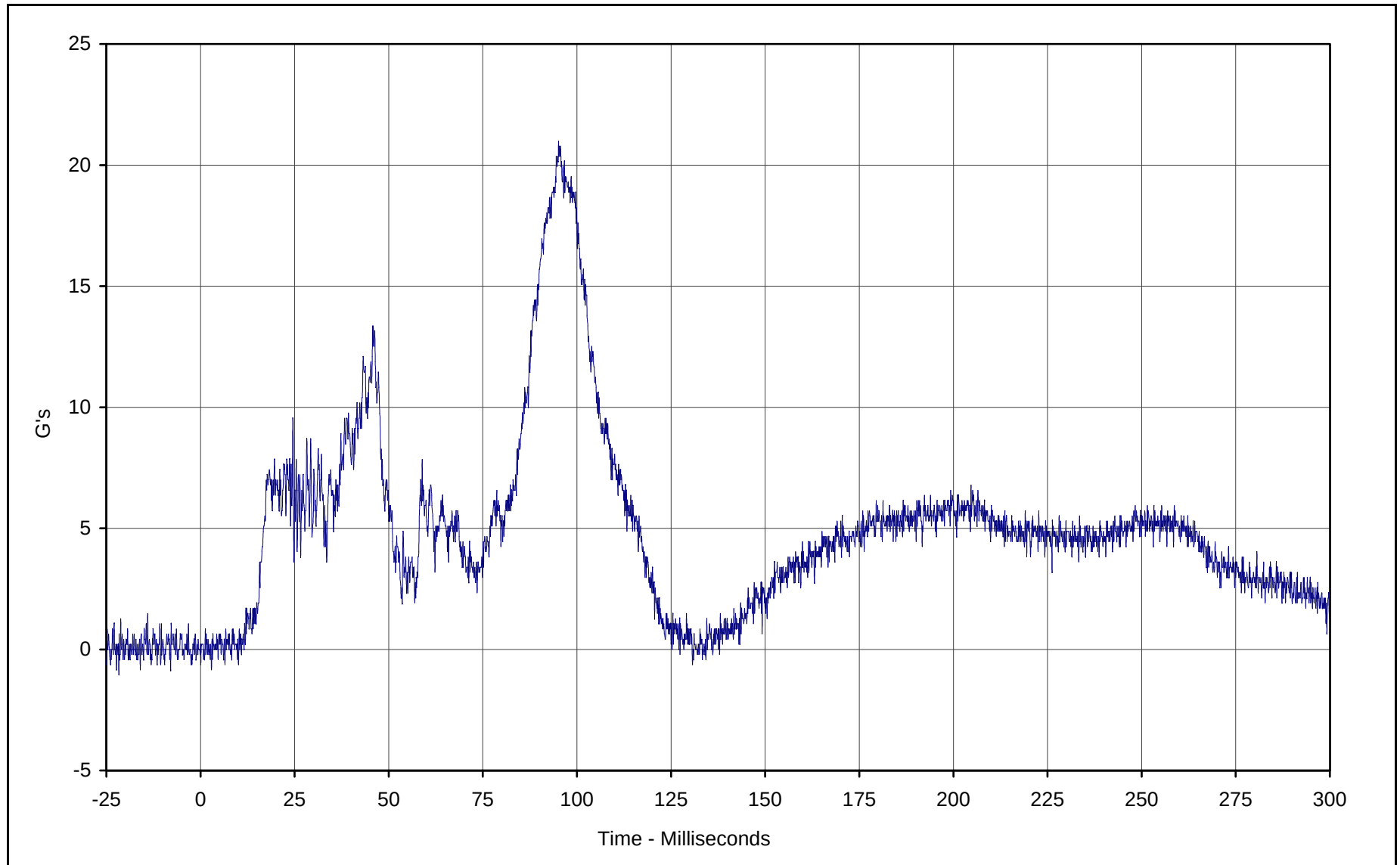
Curve Description: Passenger Head Primary Y
Maximum Value: 6.4 at 90.1 Milliseconds
Minimum Value: -7.1 at 46.7 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-048

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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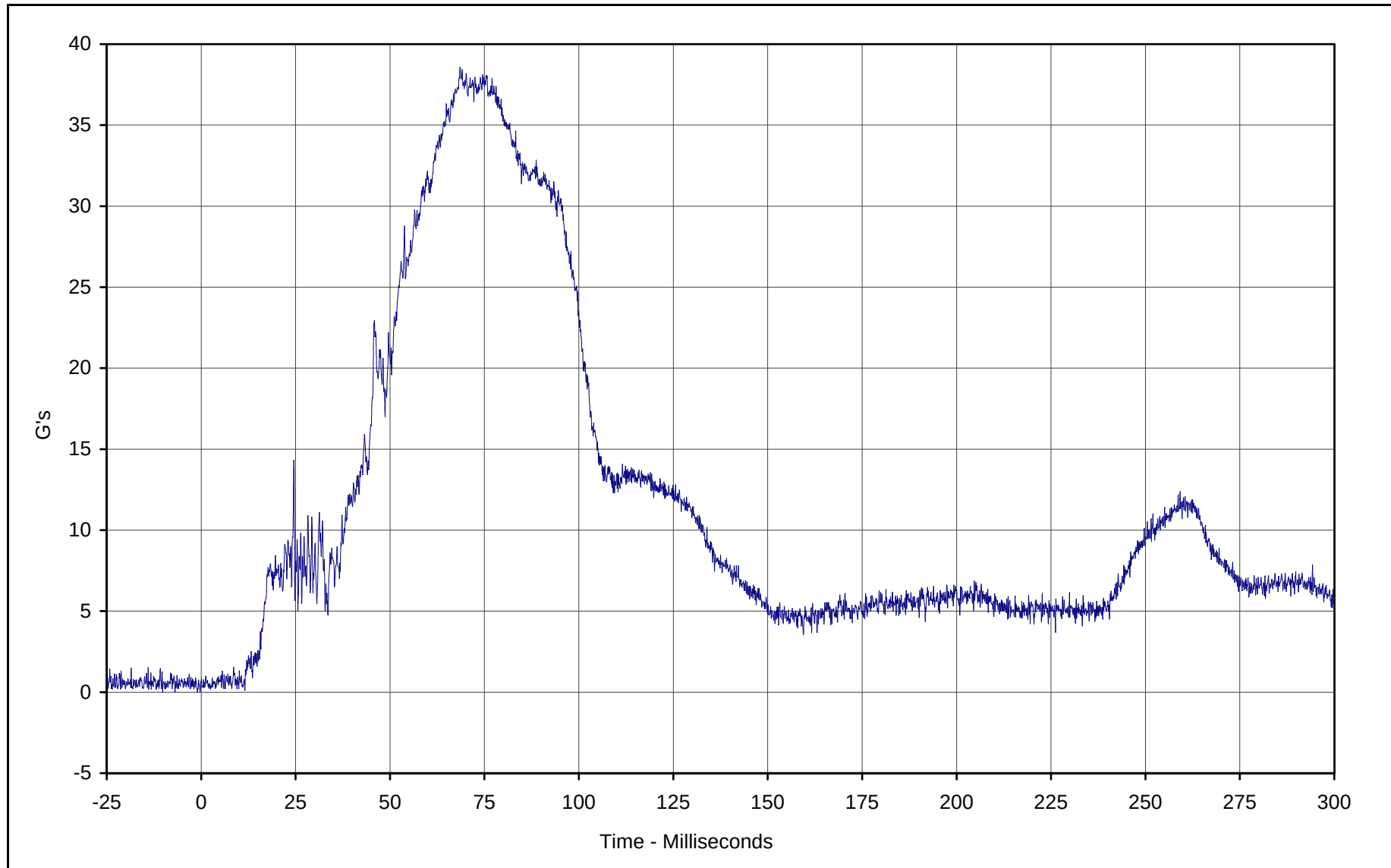
Curve Description: Passenger Head Primary Z
Maximum Value: 21.0 at 95.1 Milliseconds
Minimum Value: -0.8 at 2.9 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-048

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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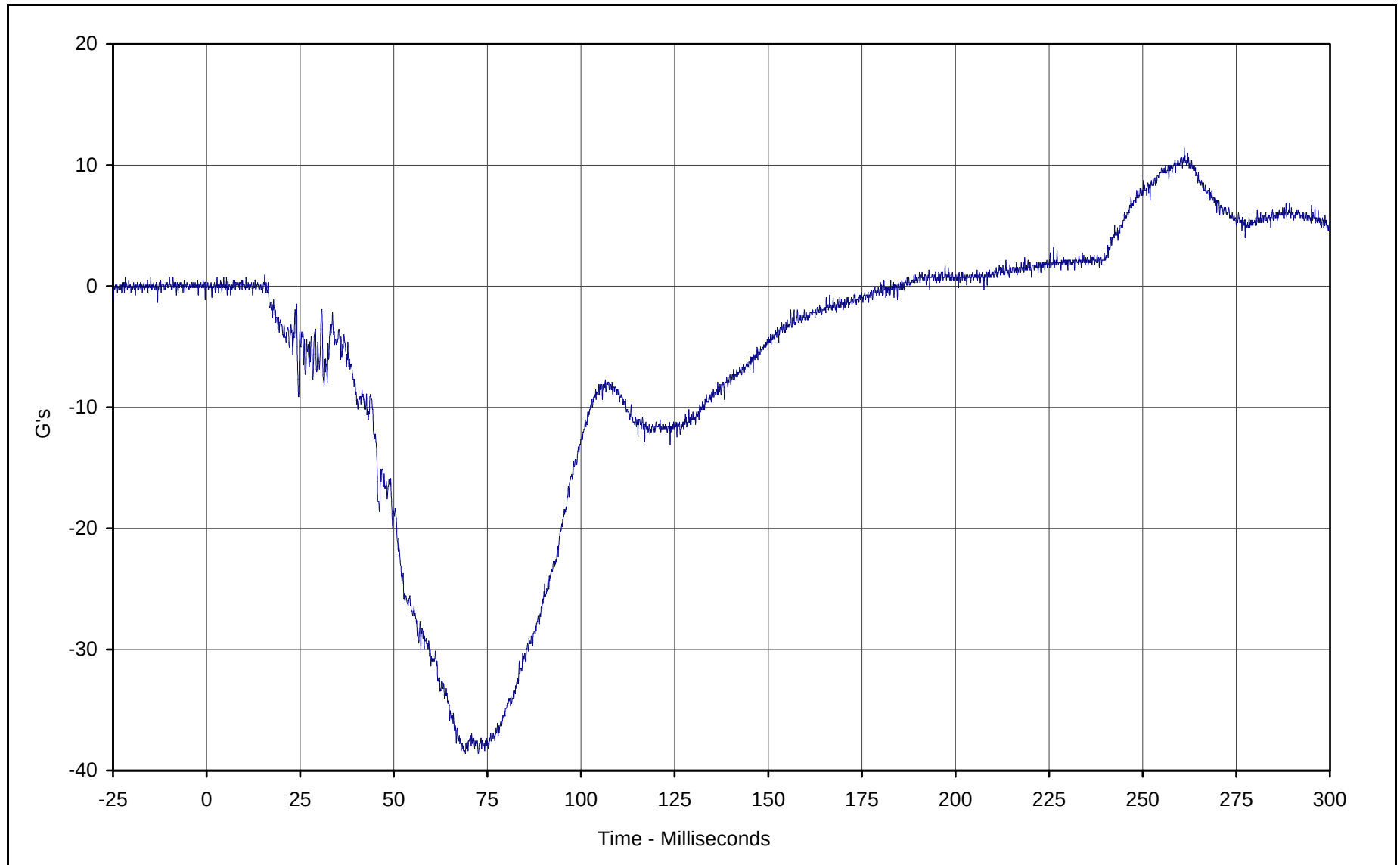
Curve Description: Passenger Head Resultant Primary
Maximum Value: 38.6 at 68.5 Milliseconds
Minimum Value: 0.1 at 11.6 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: RES-047

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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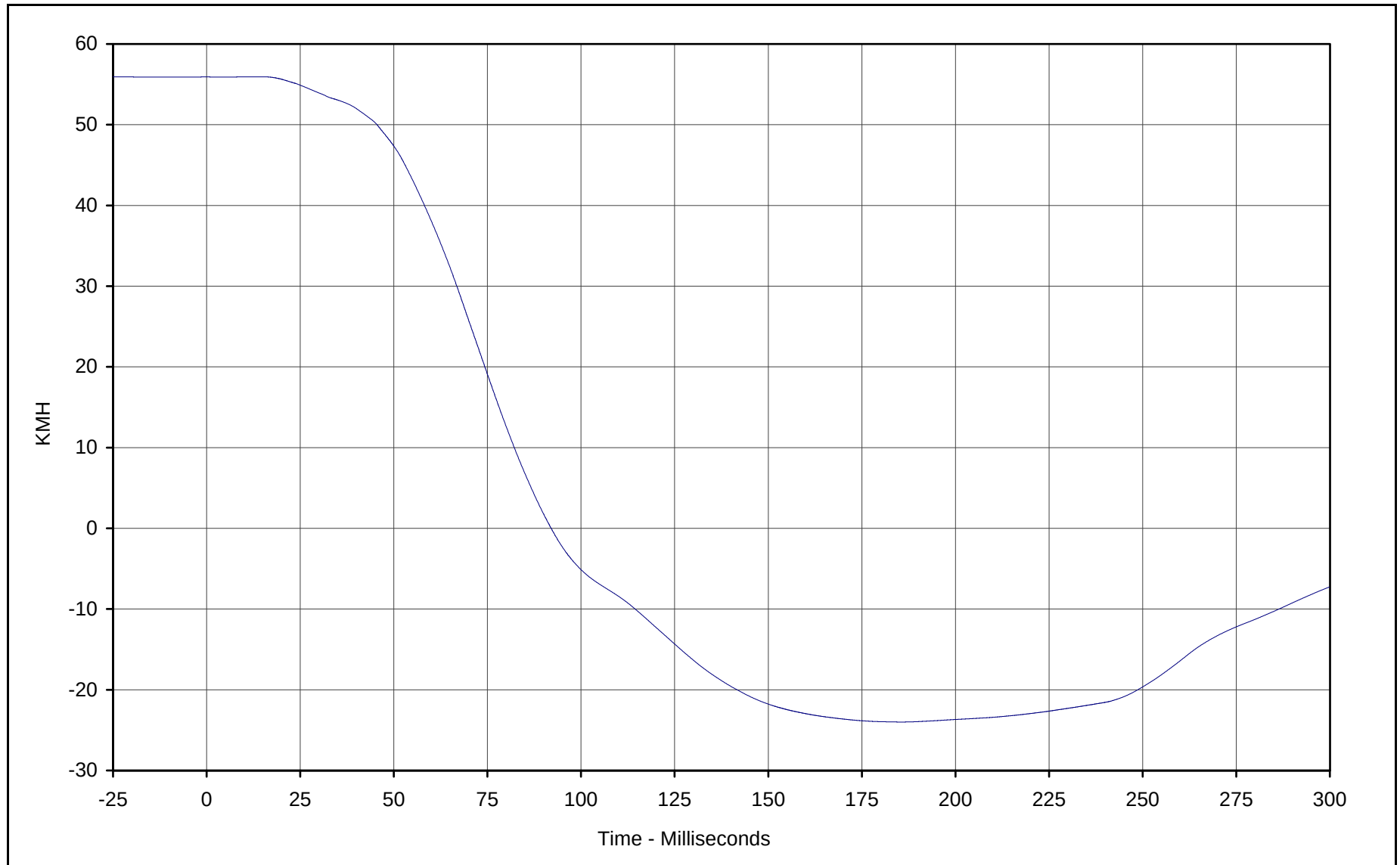
Curve Description: Passenger Head Redundant X
Maximum Value: 11.4 at 261.1 Milliseconds
Minimum Value: -38.6 at 69.1 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-050

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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Curve Description: Passenger Head Redundant X Velocity

Maximum Value: 55.9 at 11.6 Milliseconds

Minimum Value: -24.0 at 185.5 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

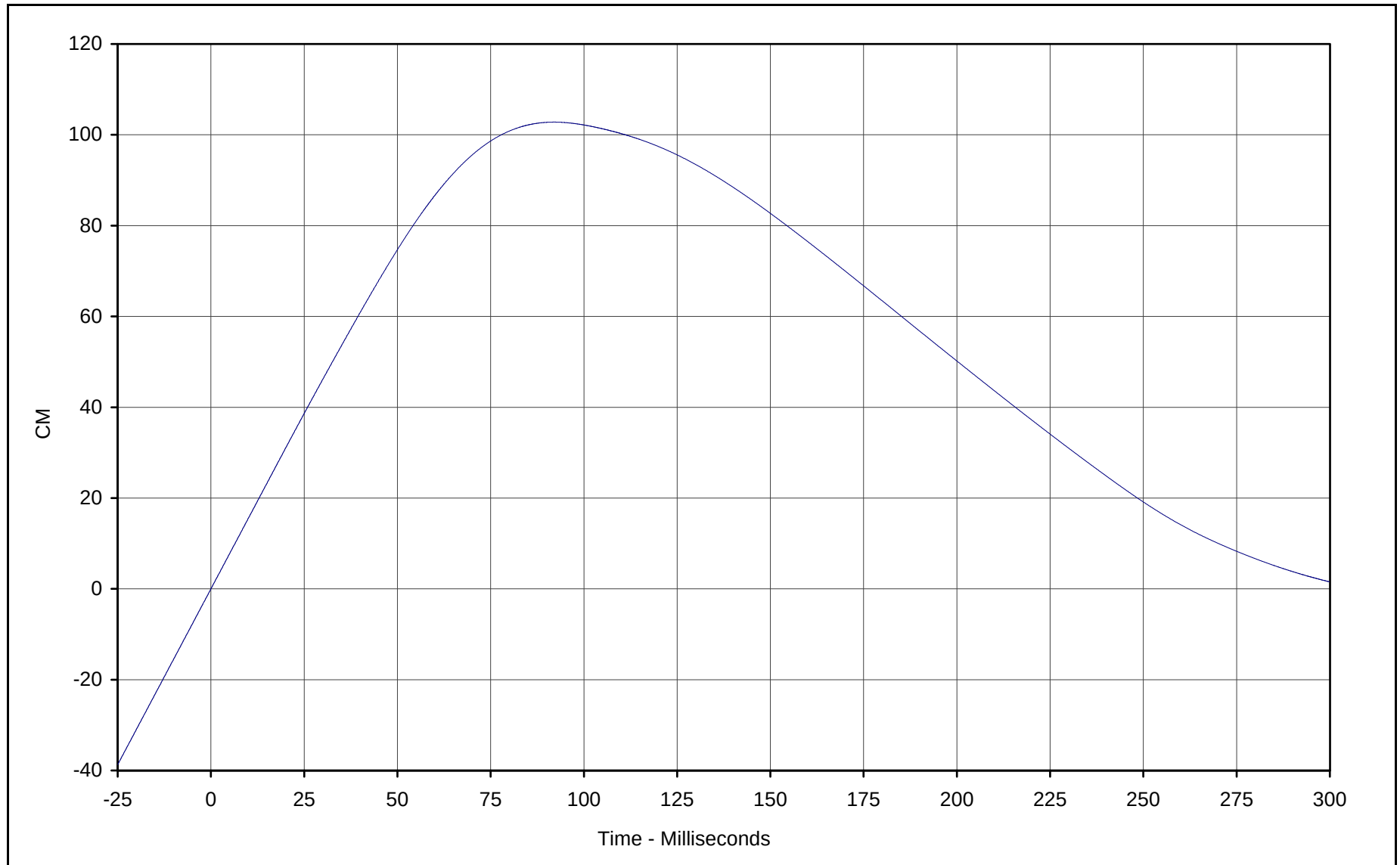
Curve Number: IN1-050

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



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Curve Description: Passenger Head Redundant X Displ.

Maximum Value: 102.8 at 92.0 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

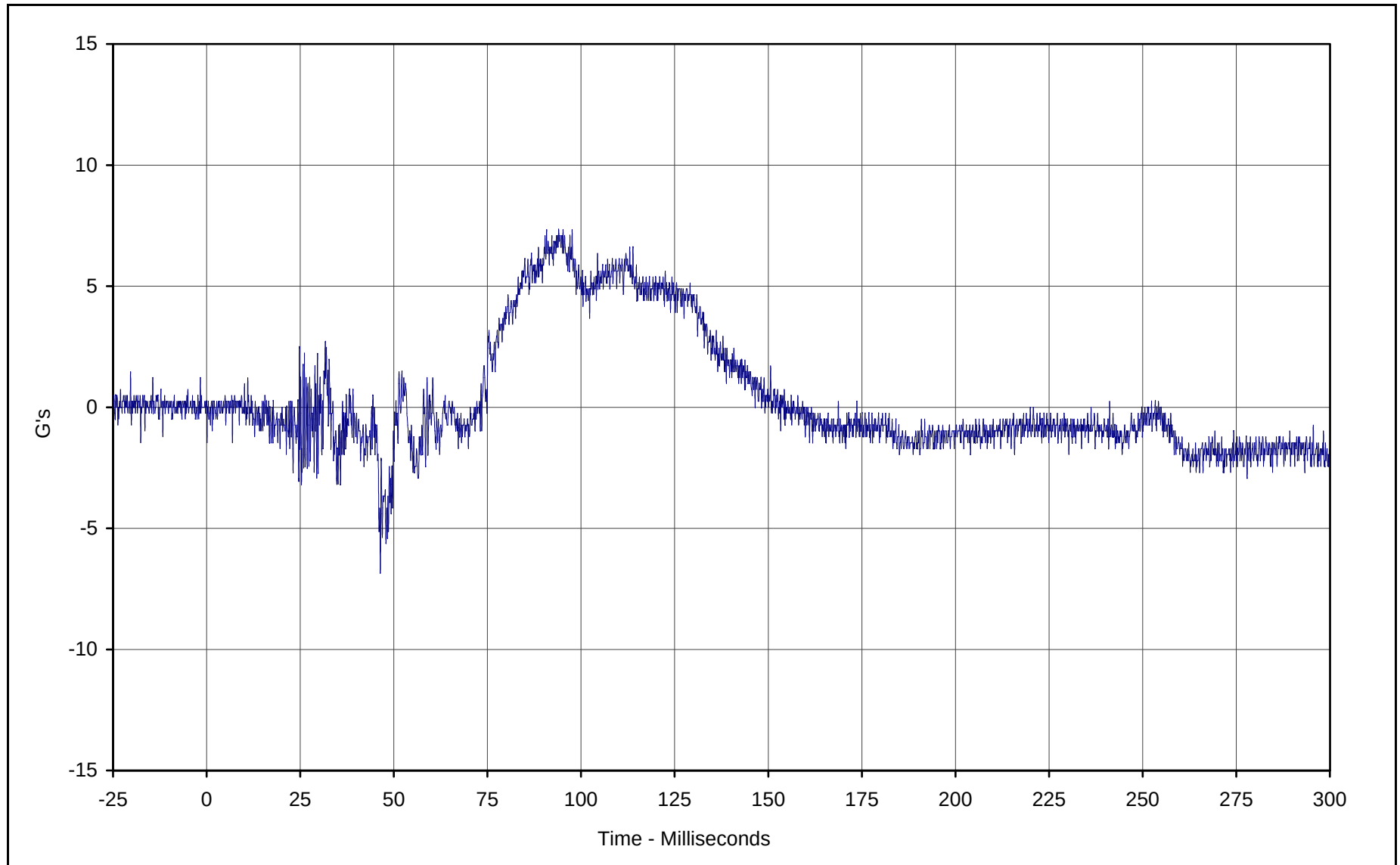
Curve Number: IN2-050

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



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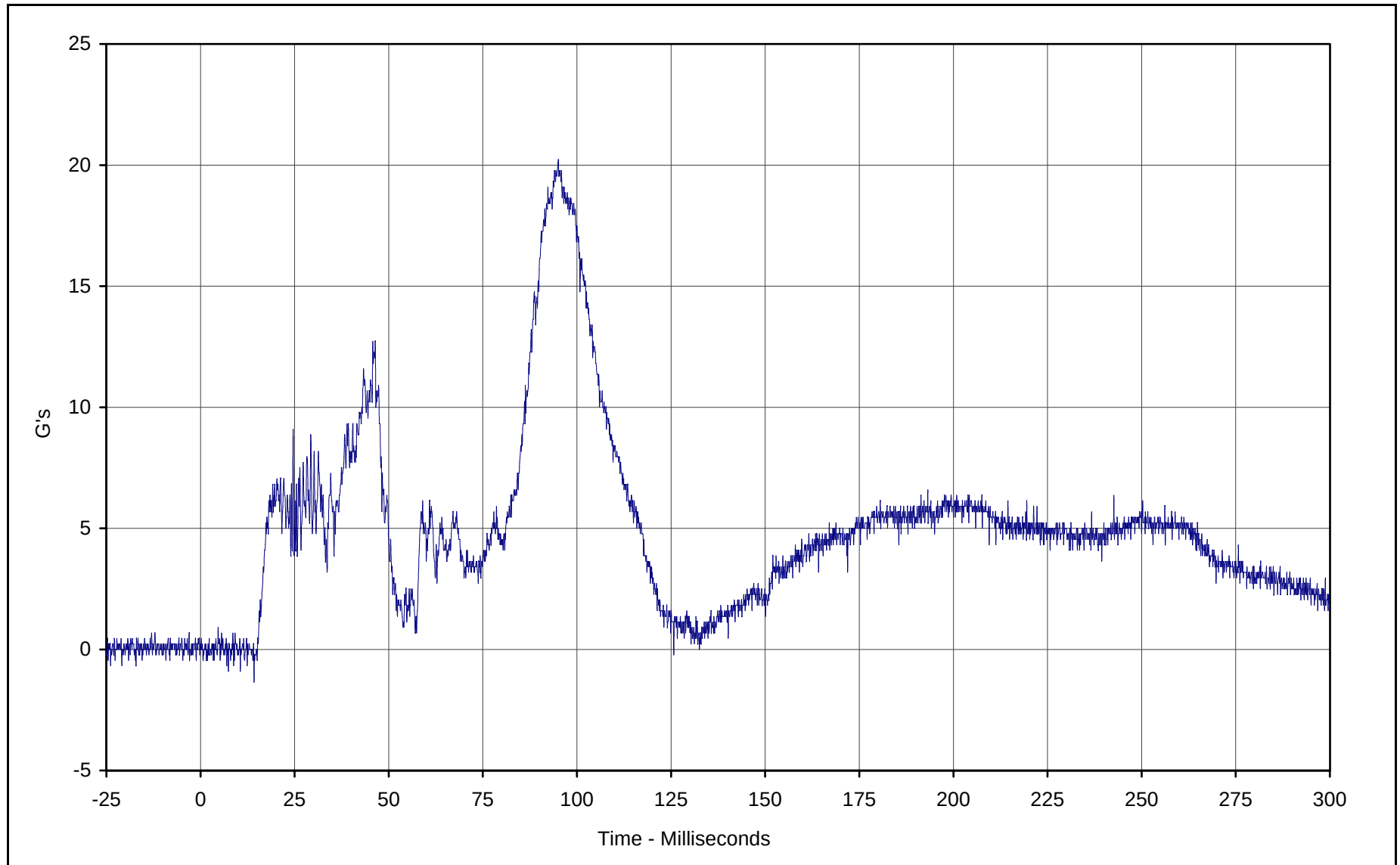
Curve Description: Passenger Head Redundant Y
Maximum Value: 7.3 at 90.8 Milliseconds
Minimum Value: -6.8 at 46.4 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-051

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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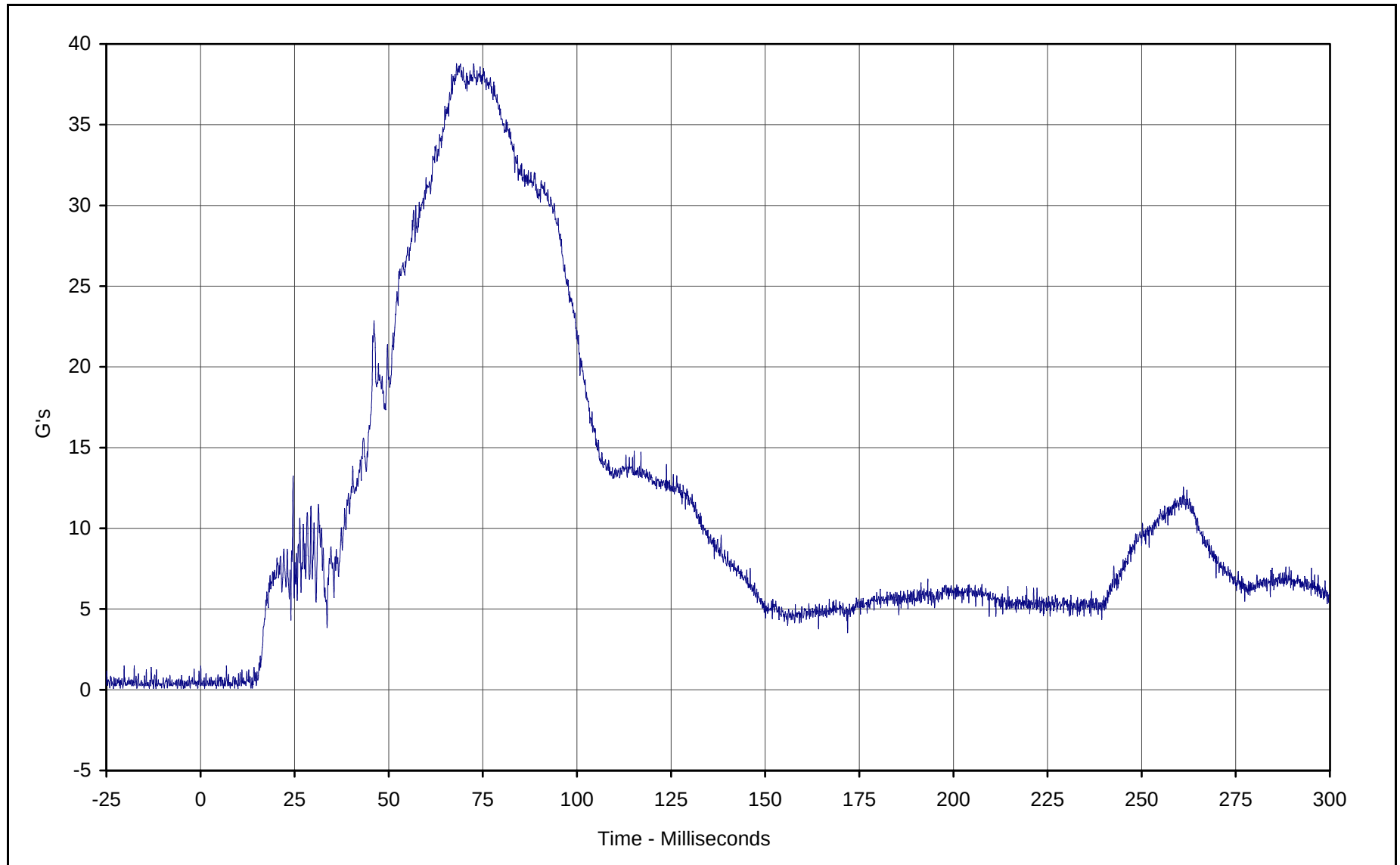
Curve Description: Passenger Head Redundant Z
Maximum Value: 20.2 at 95.0 Milliseconds
Minimum Value: -1.4 at 14.2 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-052

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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Curve Description: Passenger Head Resultant Redundant

Maximum Value: 38.8 at 68.0 Milliseconds

Minimum Value: 0.1 at 4.2 Milliseconds

SAE Filter Class: 1000

Date of Test: 12/7/01

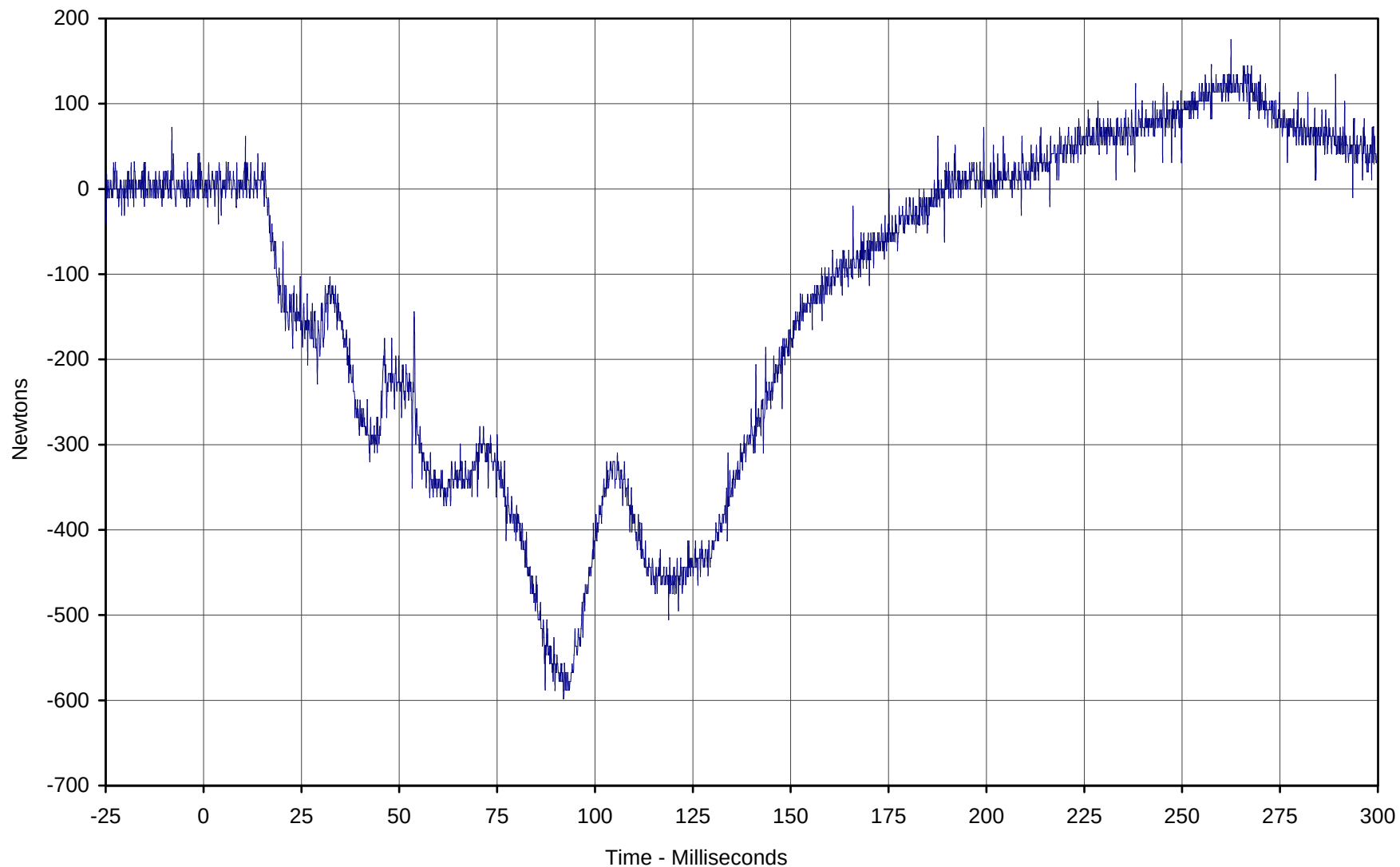
Curve Number: RES-050

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



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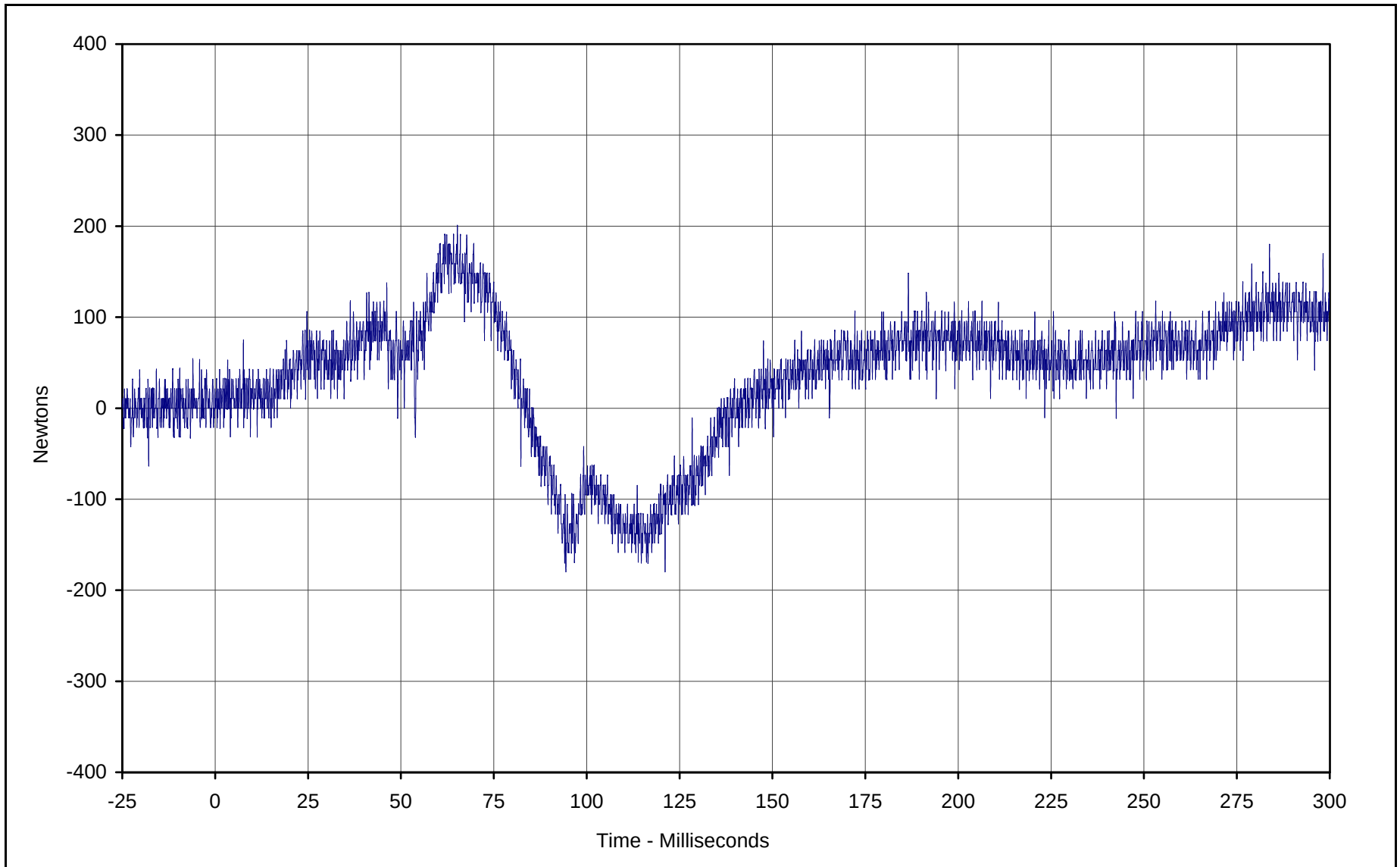


Curve Description: Passenger Neck Force X
Maximum Value: 175.4 at 262.5 Milliseconds
Minimum Value: -598.4 at 91.9 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-053

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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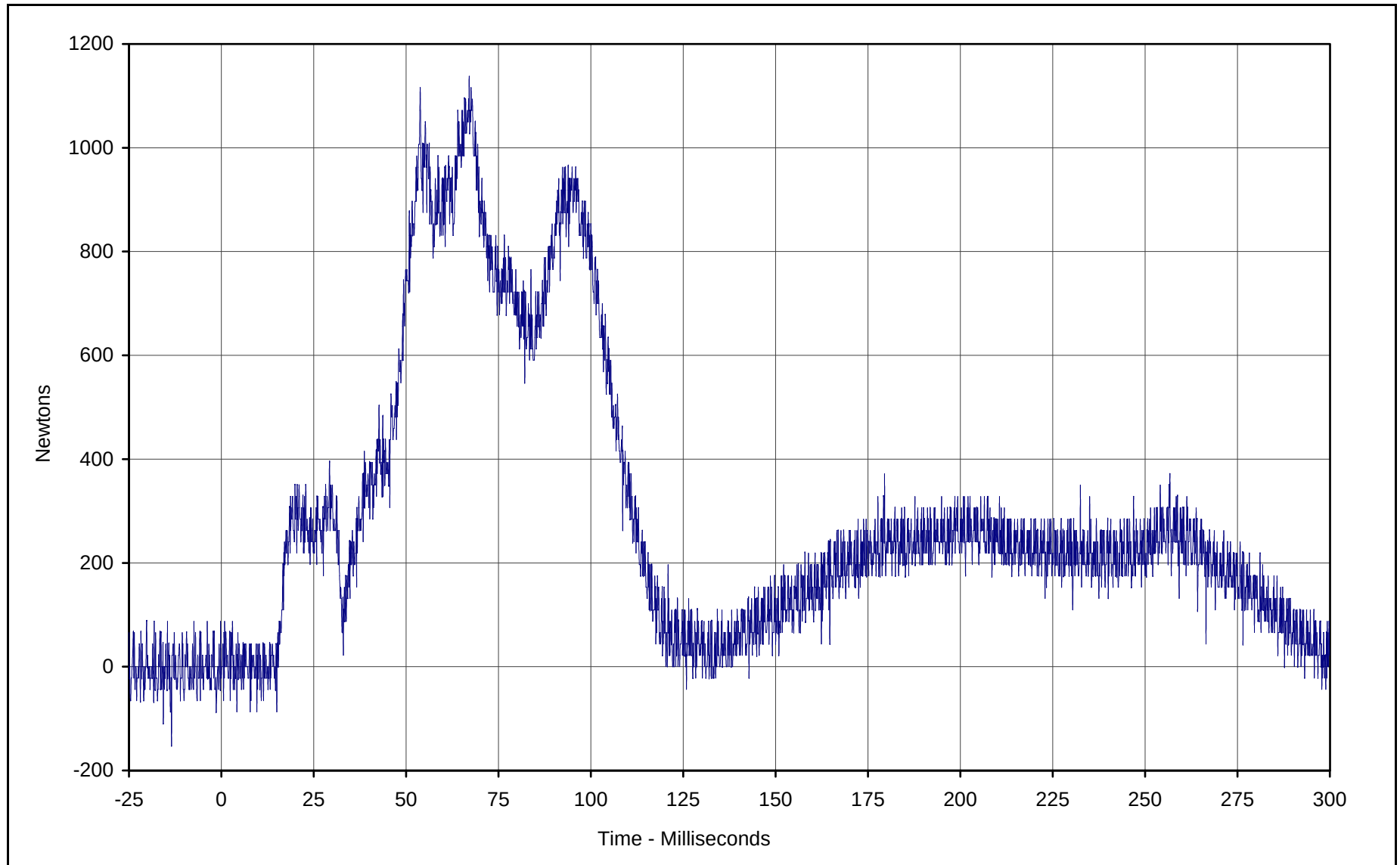


Curve Description: Passenger Neck Force Y
Maximum Value: 201.0 at 65.2 Milliseconds
Minimum Value: -179.9 at 94.4 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-054

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



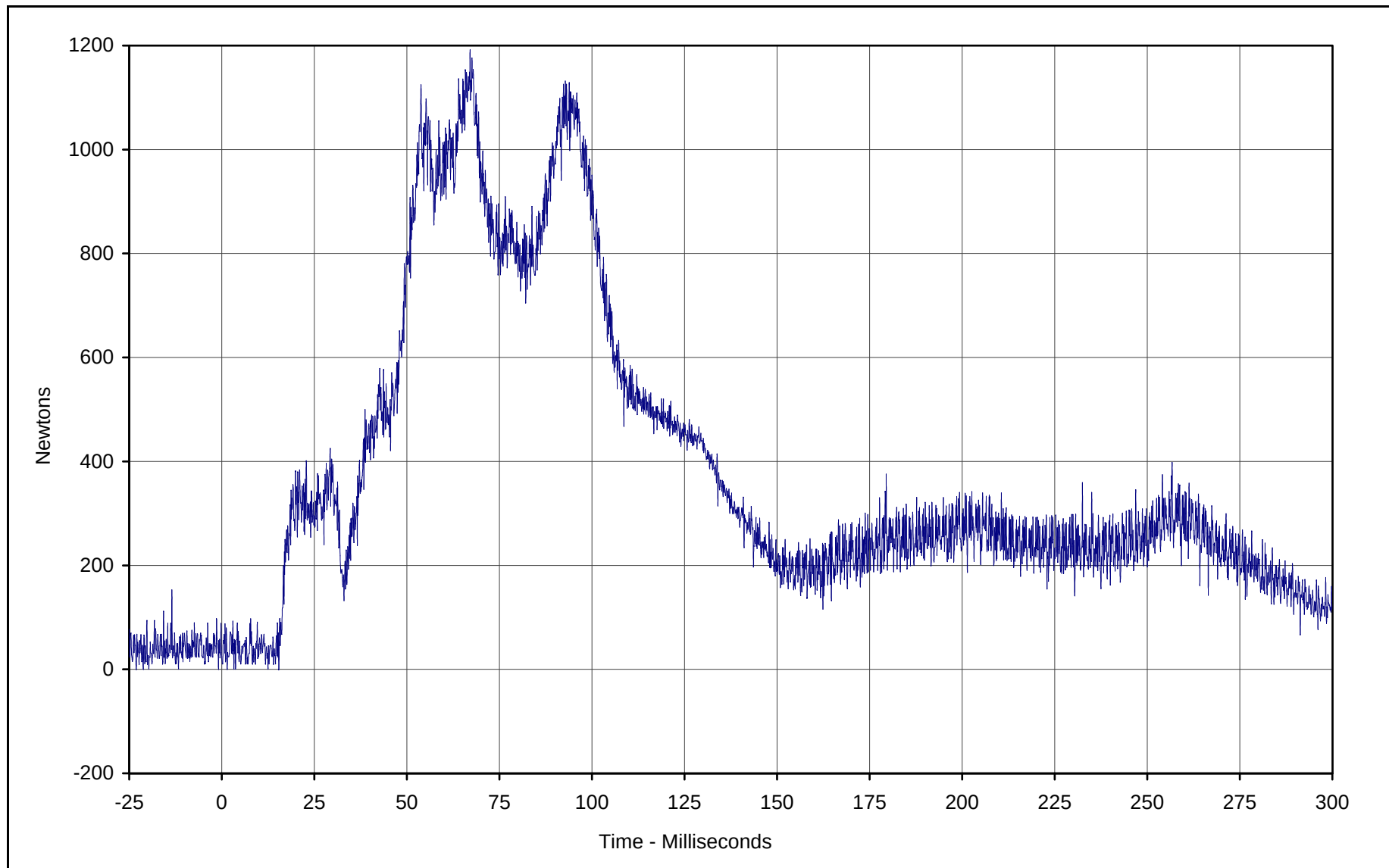
KAR22001-01



Curve Description: Passenger Neck Force Z
Maximum Value: 1137.6 at 67.1 Milliseconds
Minimum Value: -87.5 at 4.2 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-055

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



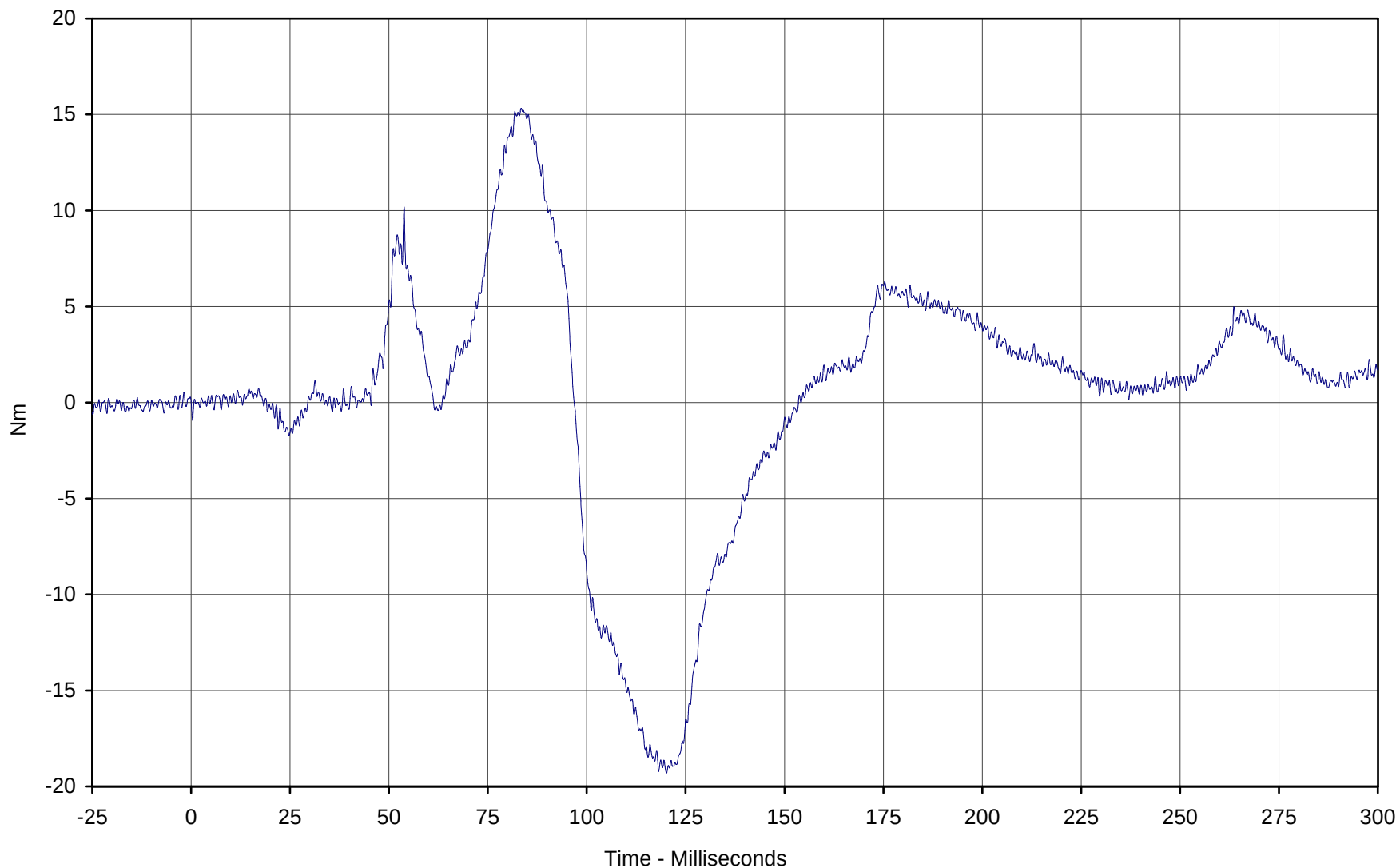


Curve Description: Passenger Neck Force Resultant
Maximum Value: 1191.3 at 67.1 Milliseconds
Minimum Value: 0.0 at 1.5 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: RES-053

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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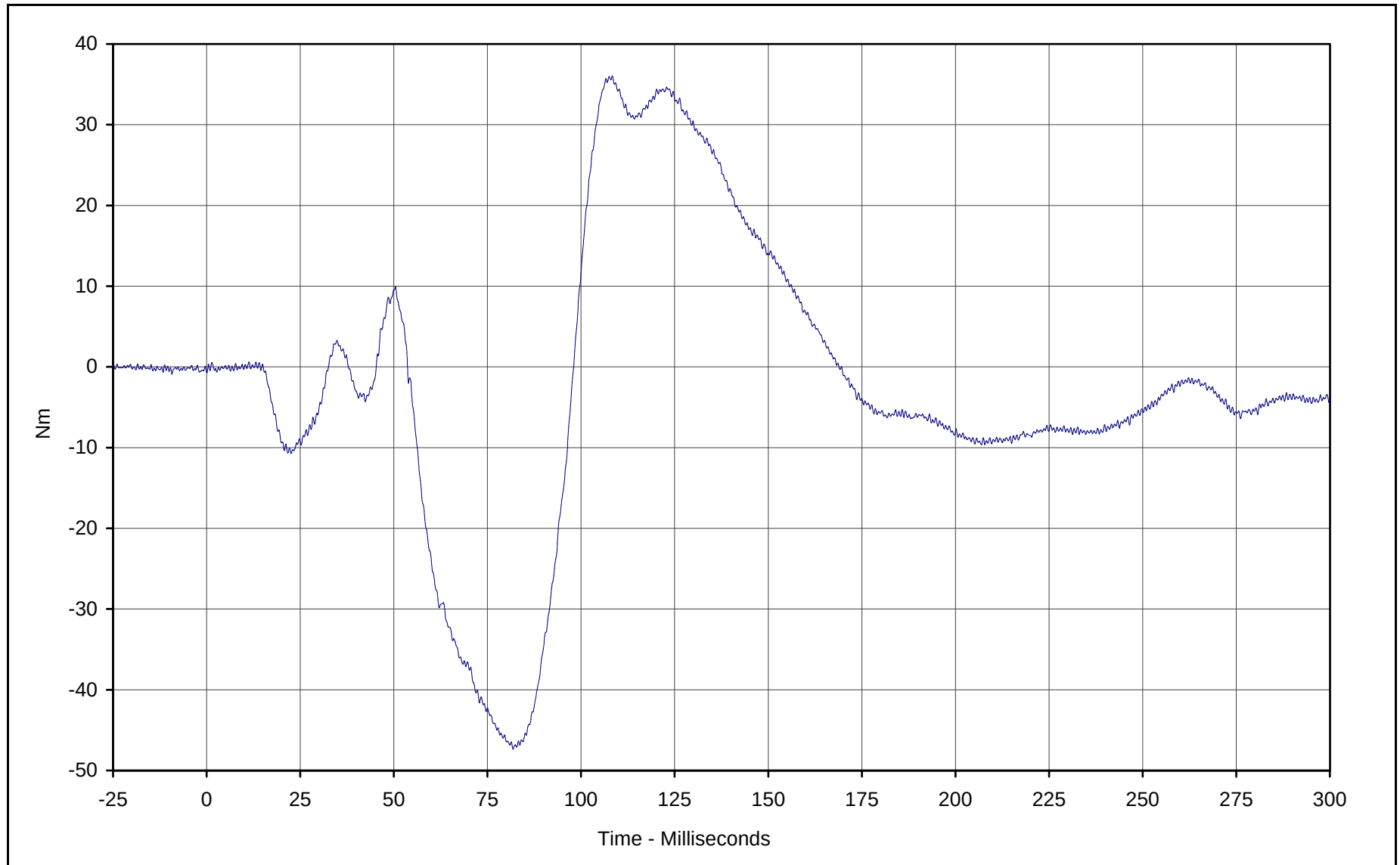
Curve Description: Passenger Neck Moment X
Maximum Value: 15.3 at 83.4 Milliseconds
Minimum Value: -19.3 at 120.2 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-056

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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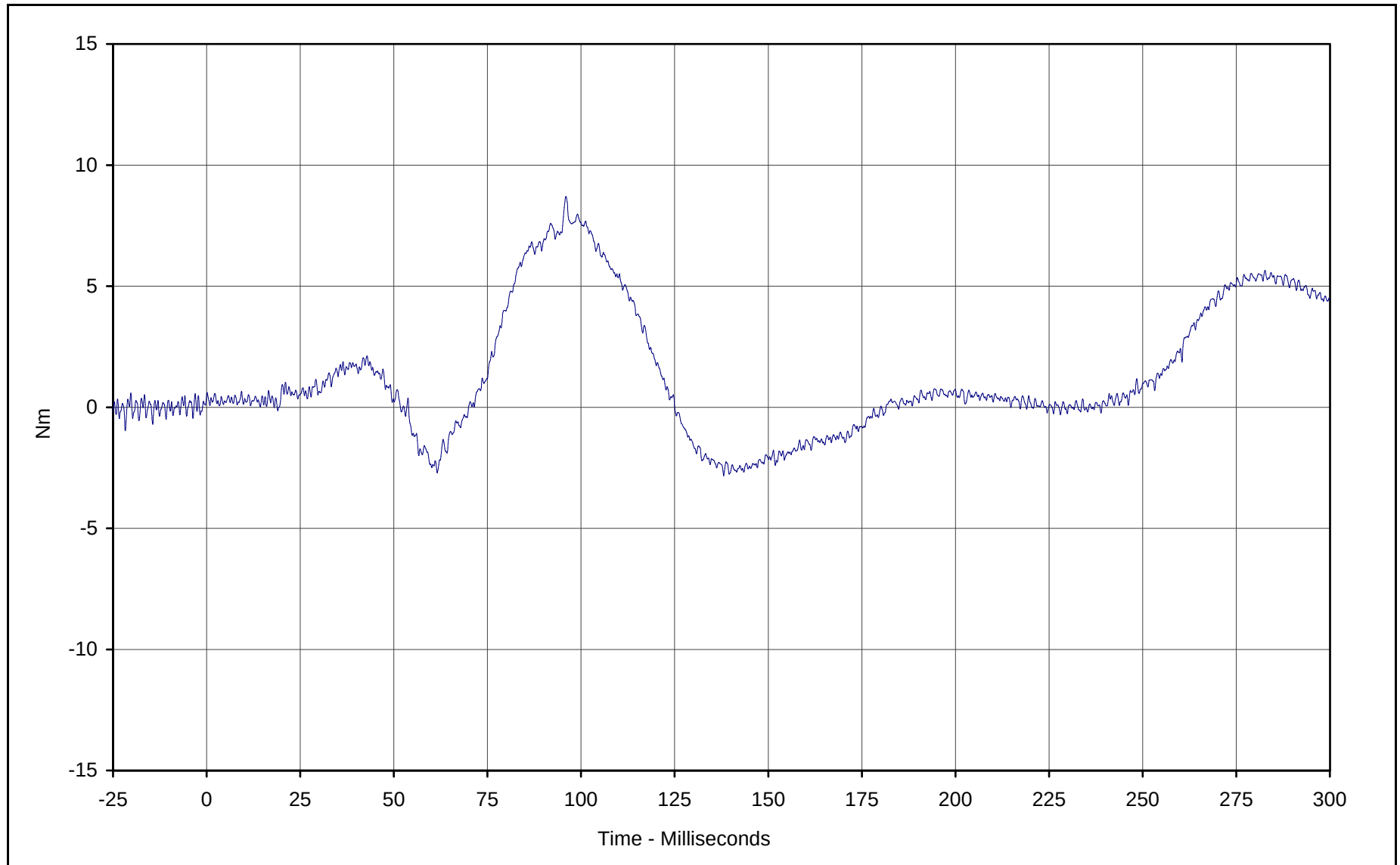


Curve Description: Passenger Neck Moment Y
Maximum Value: 36.0 at 108.4 Milliseconds
Minimum Value: -47.4 at 81.8 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-057

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



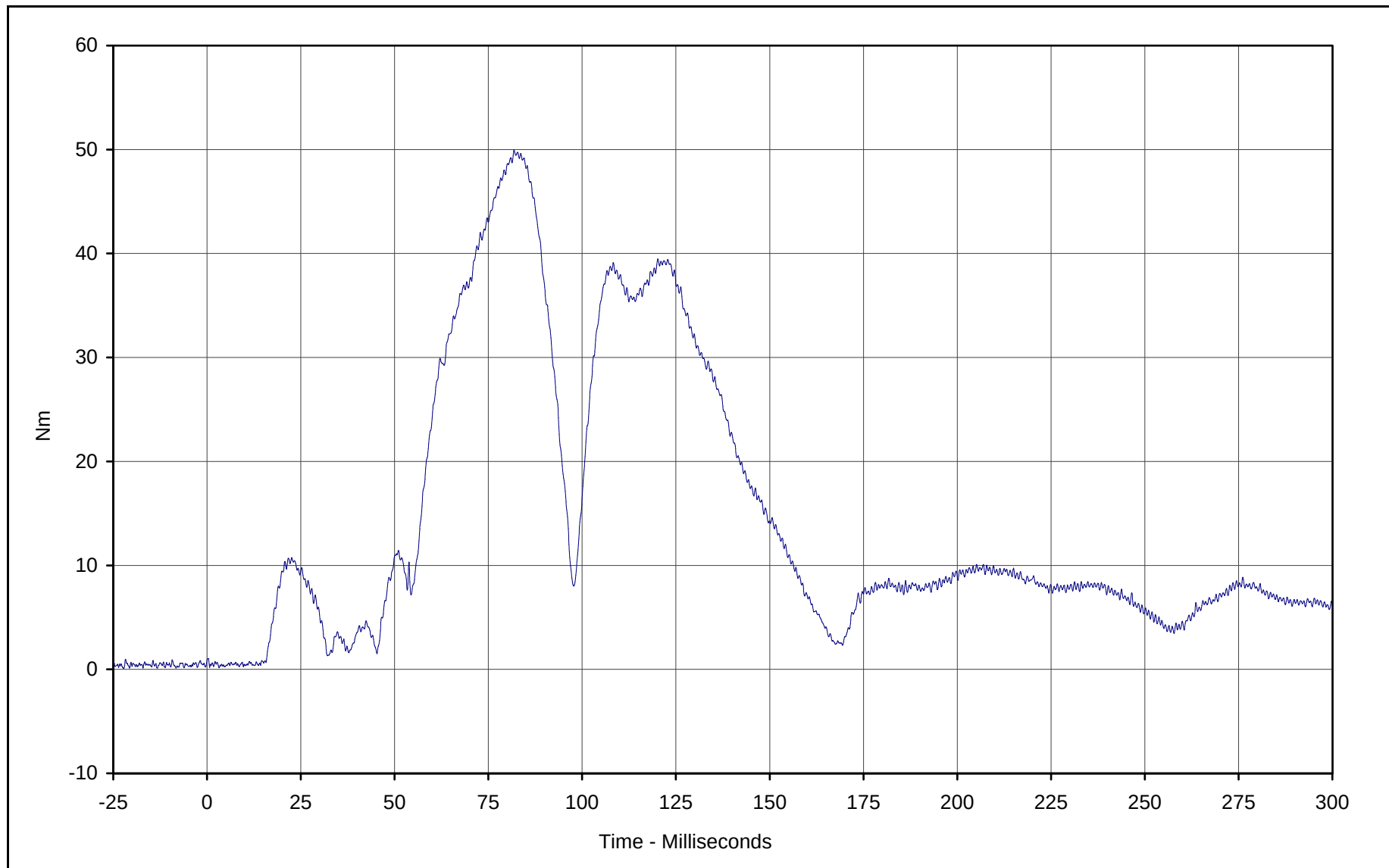
KAR22001-01



Curve Description: Passenger Neck Moment Z
Maximum Value: 8.7 at 96.0 Milliseconds
Minimum Value: -2.8 at 138.1 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-058

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



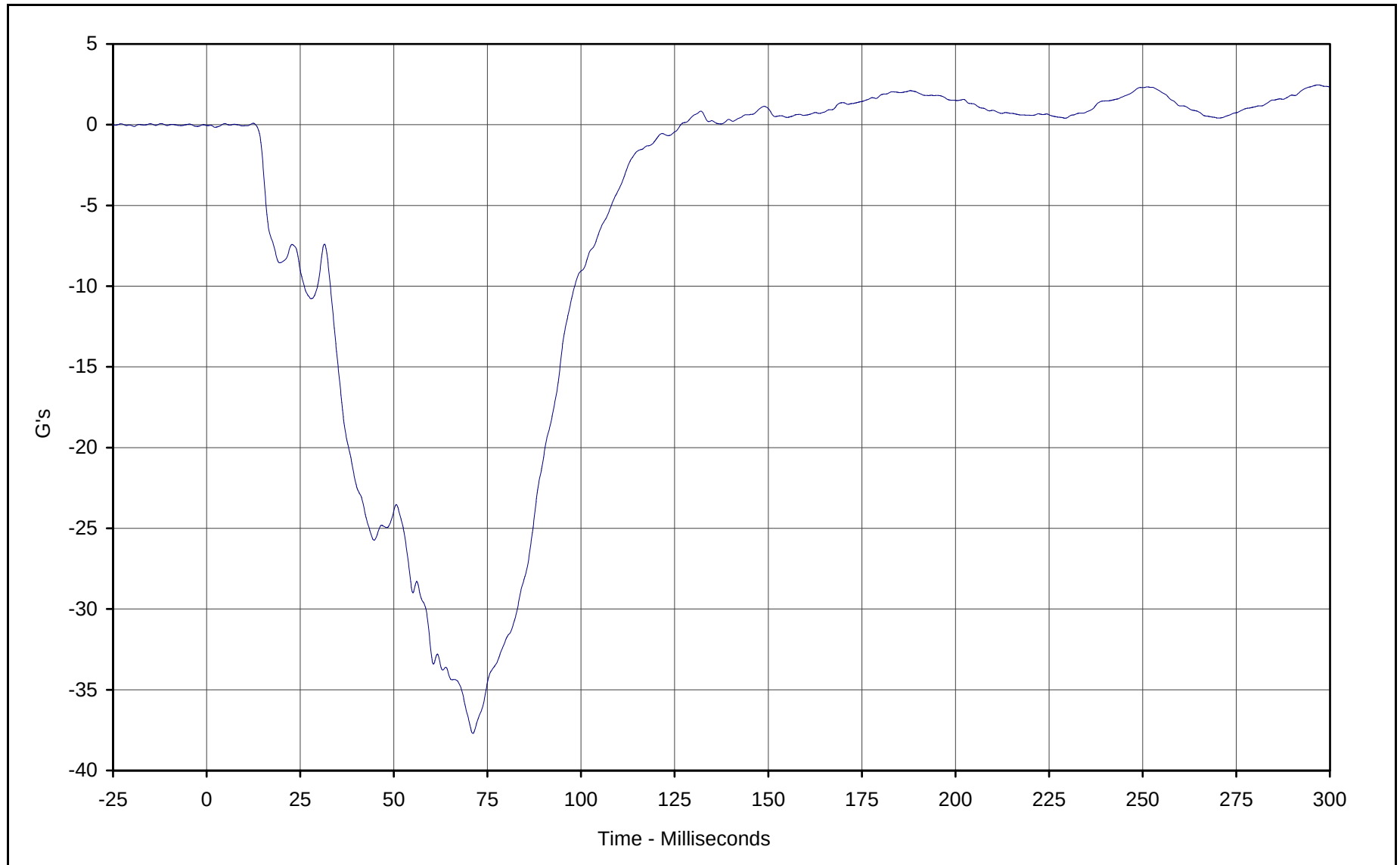


Curve Description: Passenger Neck Moment Resultant
Maximum Value: 50.0 at 81.8 Milliseconds
Minimum Value: 0.2 at 3.3 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: RES-056

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



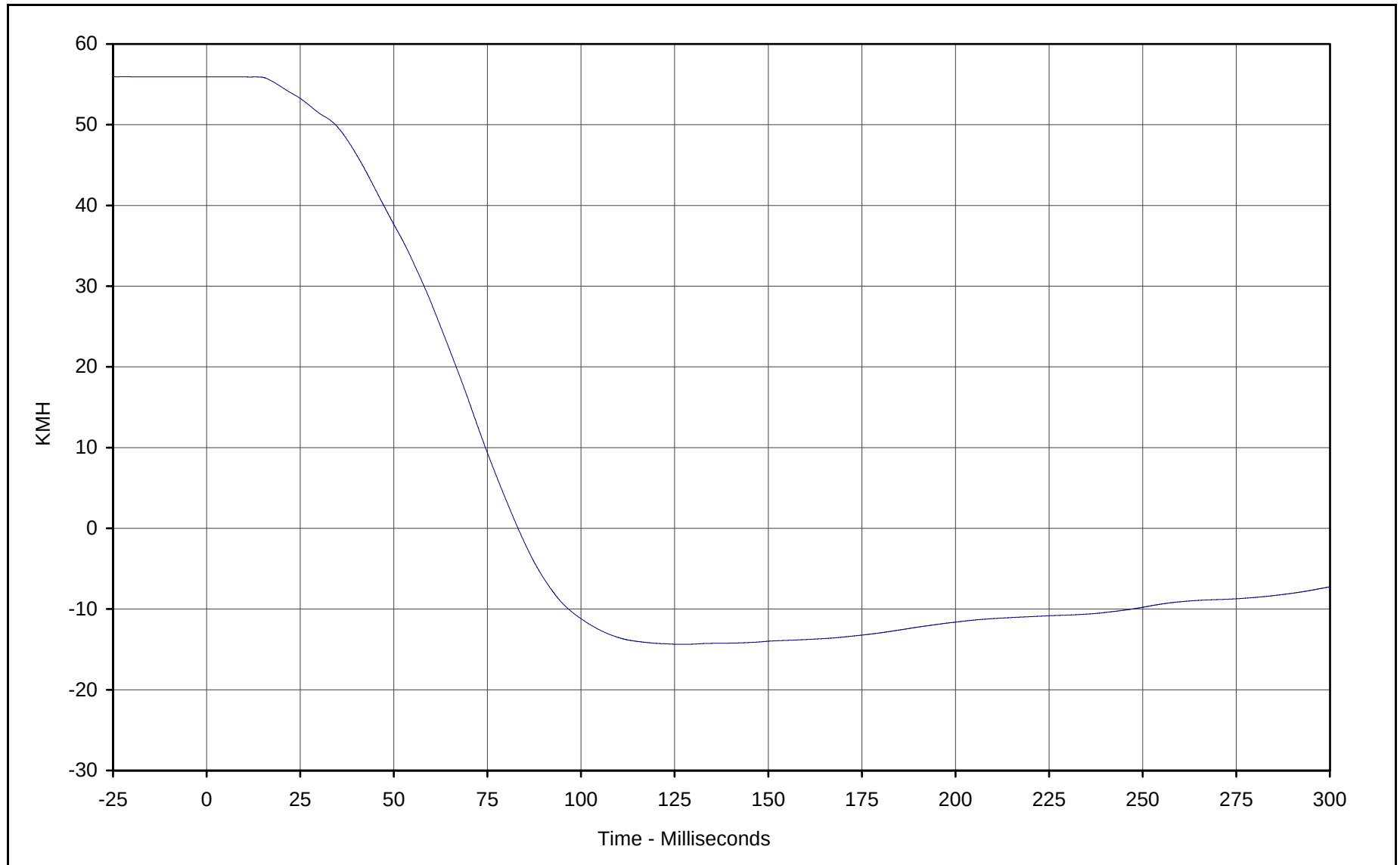


Curve Description: Passenger Chest Primary X
Maximum Value: 2.5 at 296.9 Milliseconds
Minimum Value: -37.7 at 71.1 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-059

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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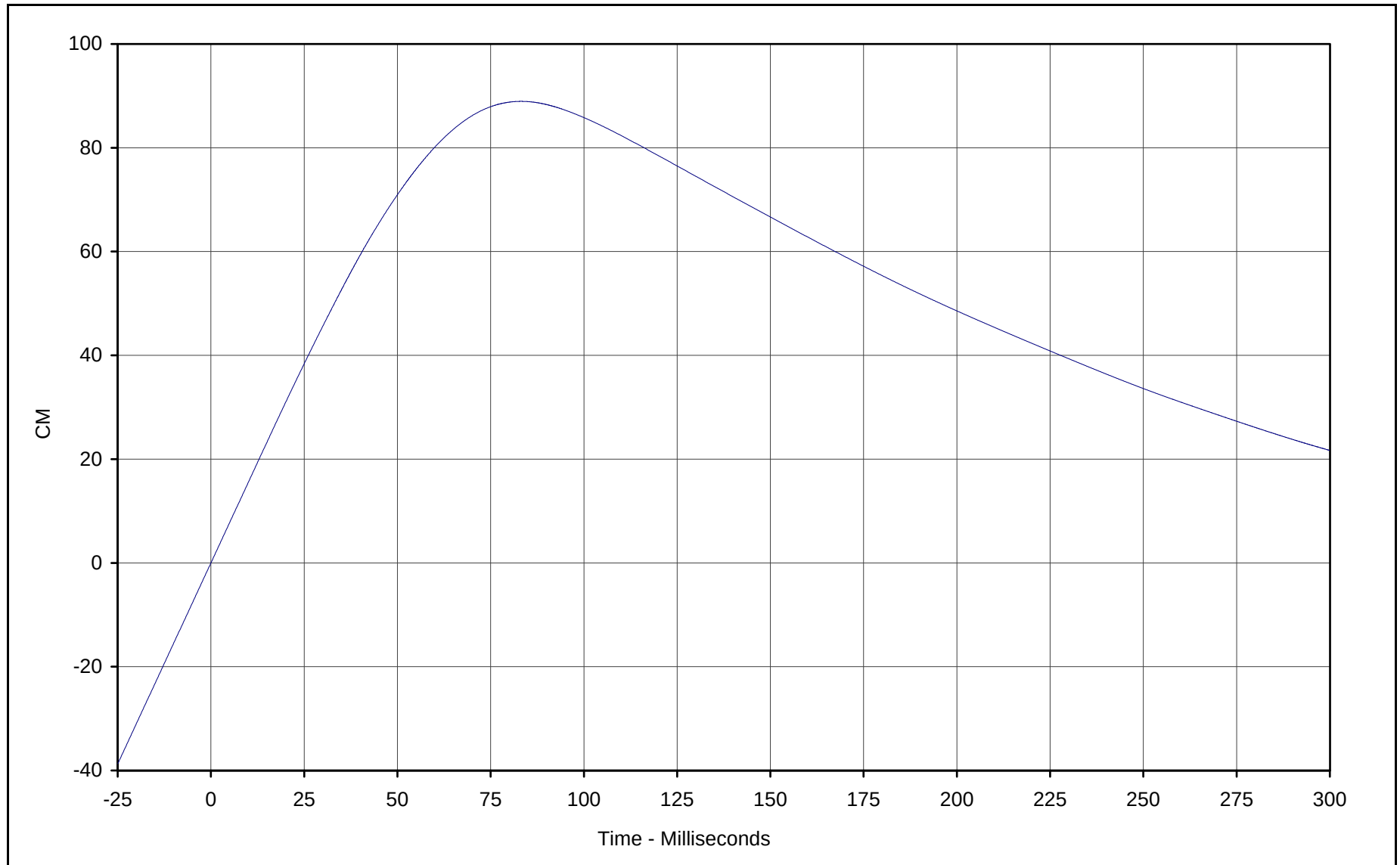


Curve Description: Passenger Chest Primary X Velocity
Maximum Value: 55.9 at 0.0 Milliseconds
Minimum Value: -14.4 at 126.6 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN1-059

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

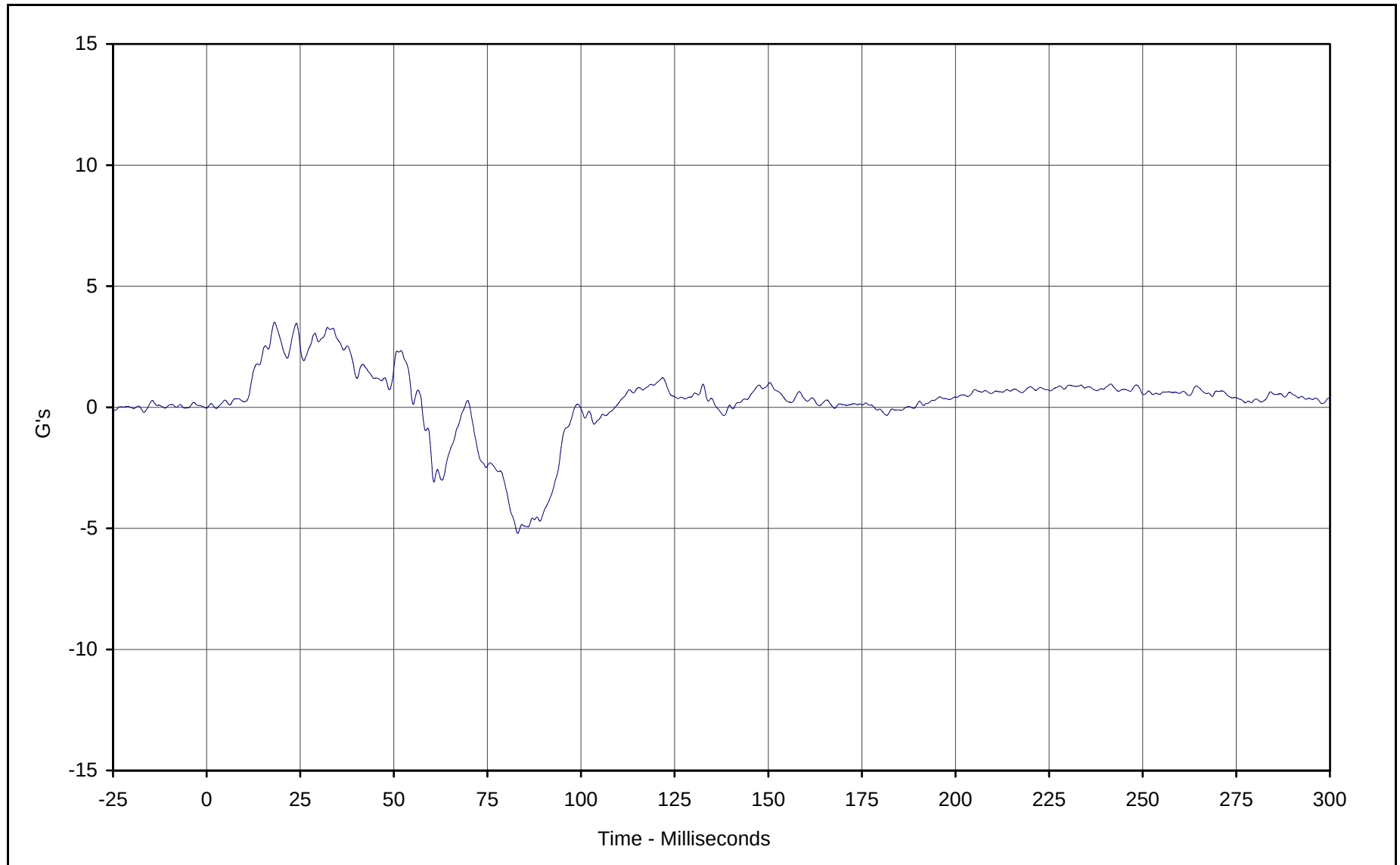


Curve Description: Passenger Chest Primary X Displ.
Maximum Value: 88.9 at 83.2 Milliseconds
Minimum Value: 0.0 at 0.0 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN2-059

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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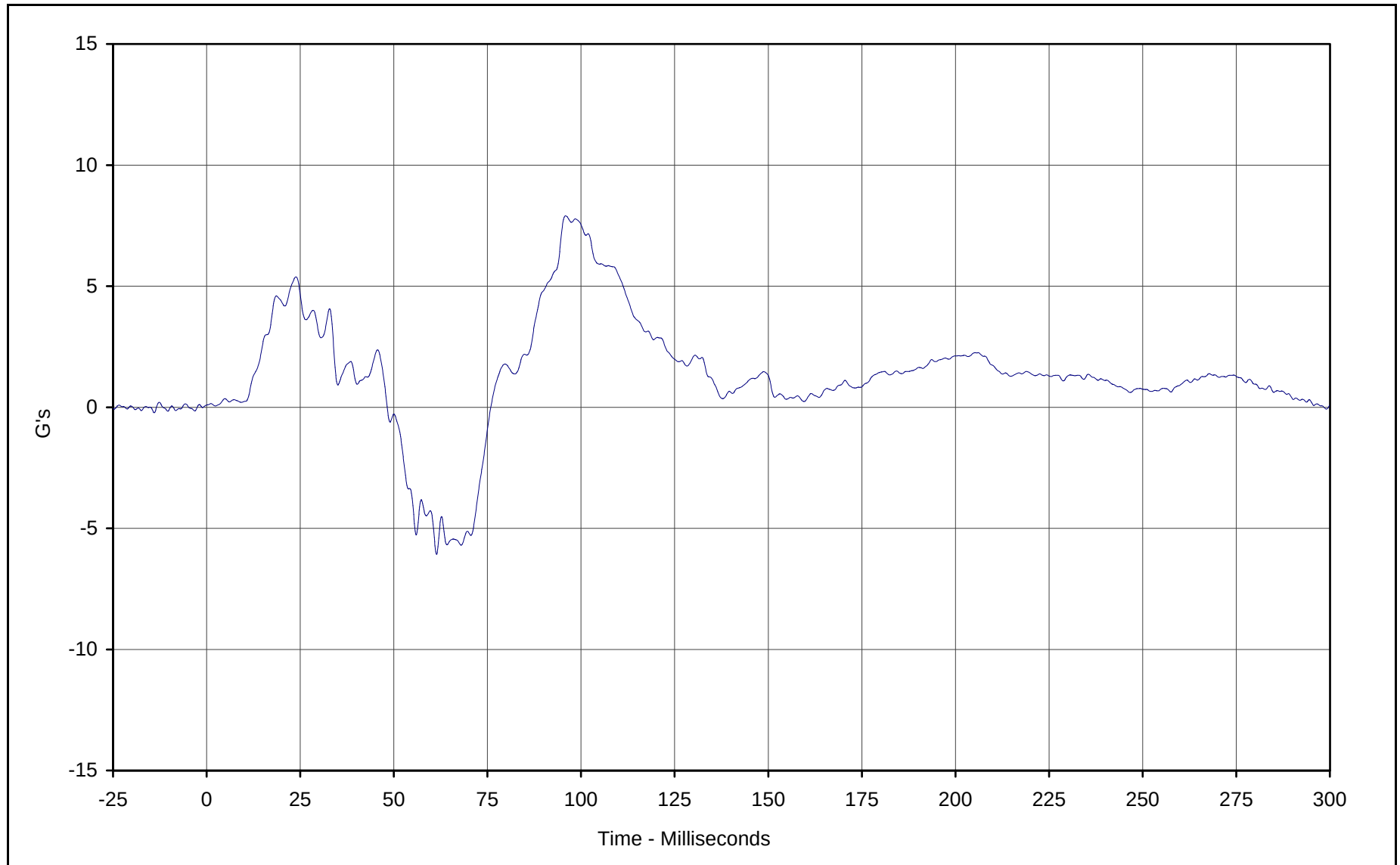
Curve Description: Passenger Chest Primary Y
Maximum Value: 3.5 at 18.2 Milliseconds
Minimum Value: -5.2 at 83.1 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-060

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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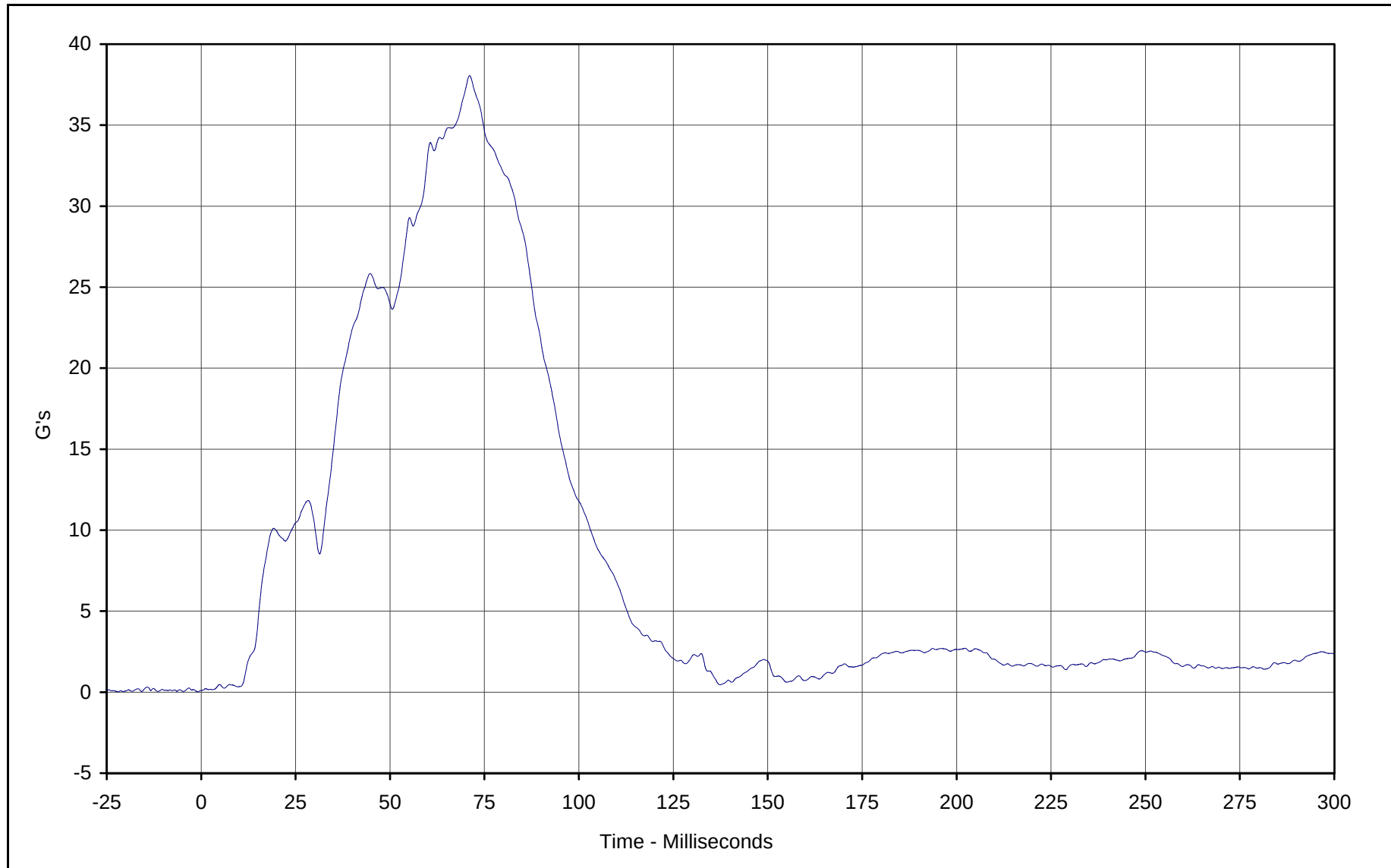
Curve Description: Passenger Chest Primary Z
Maximum Value: 7.9 at 95.8 Milliseconds
Minimum Value: -6.1 at 61.4 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-061

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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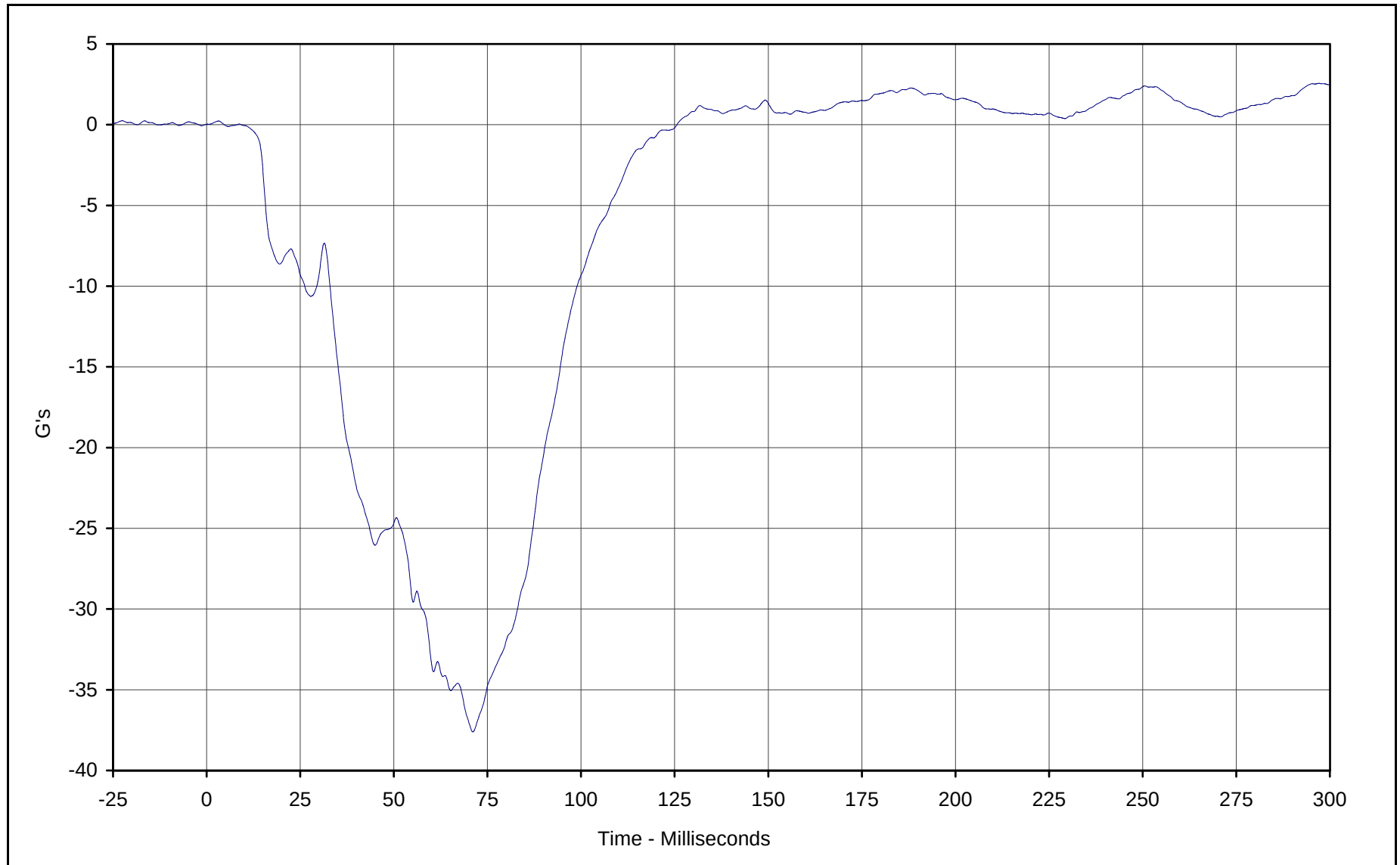
Curve Description: Passenger Chest Resultant Primary
Maximum Value: 38.1 at 71.1 Milliseconds
Minimum Value: 0.1 at 0.0 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: RES-059

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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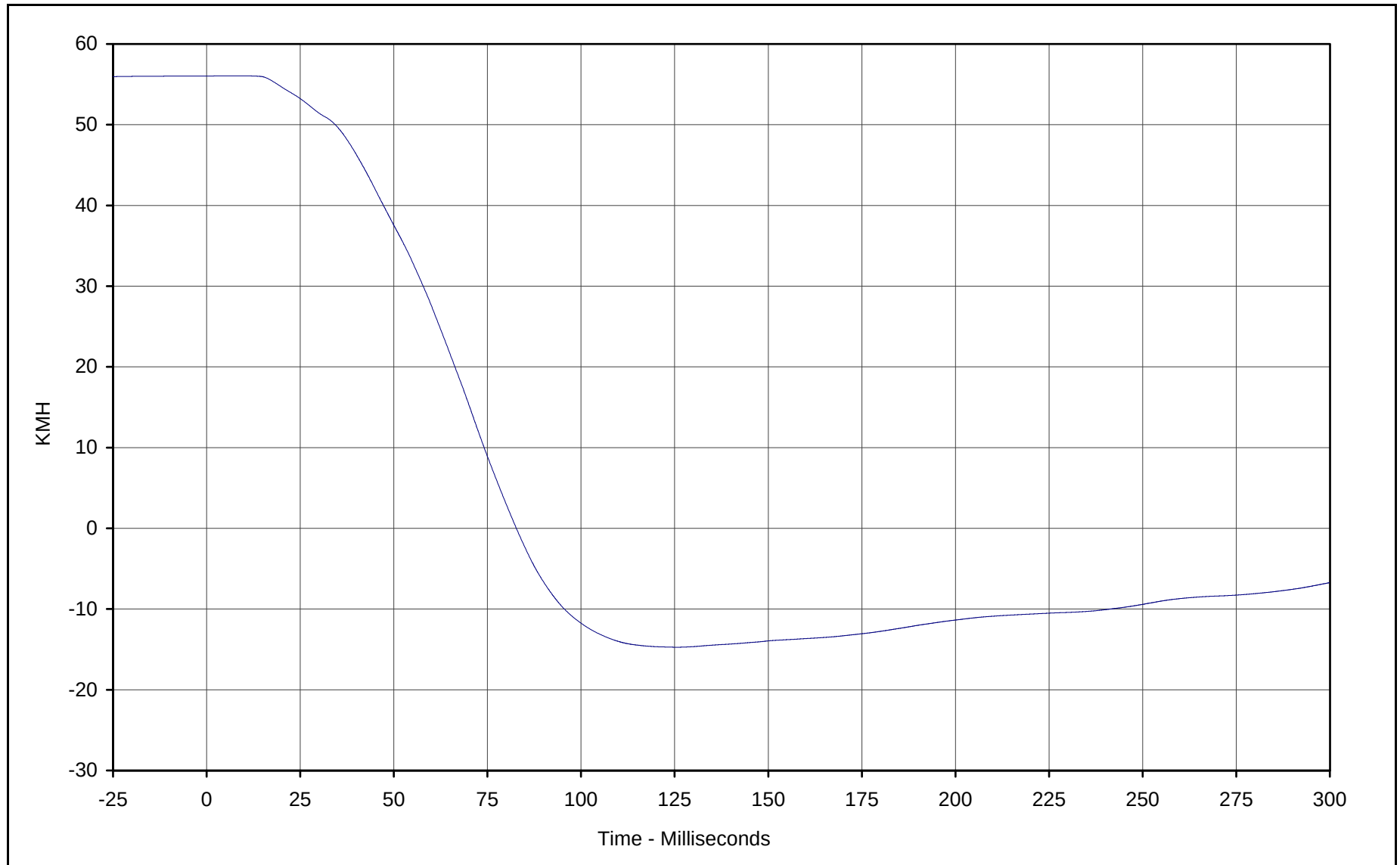
Curve Description: Passenger Chest Redundant X
Maximum Value: 2.6 at 297.0 Milliseconds
Minimum Value: -37.6 at 71.1 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-062

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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Curve Description: Passenger Chest Redundant X Velocity

Maximum Value: 56.1 at 4.7 Milliseconds

Minimum Value: -14.7 at 125.6 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

Curve Number: IN1-062

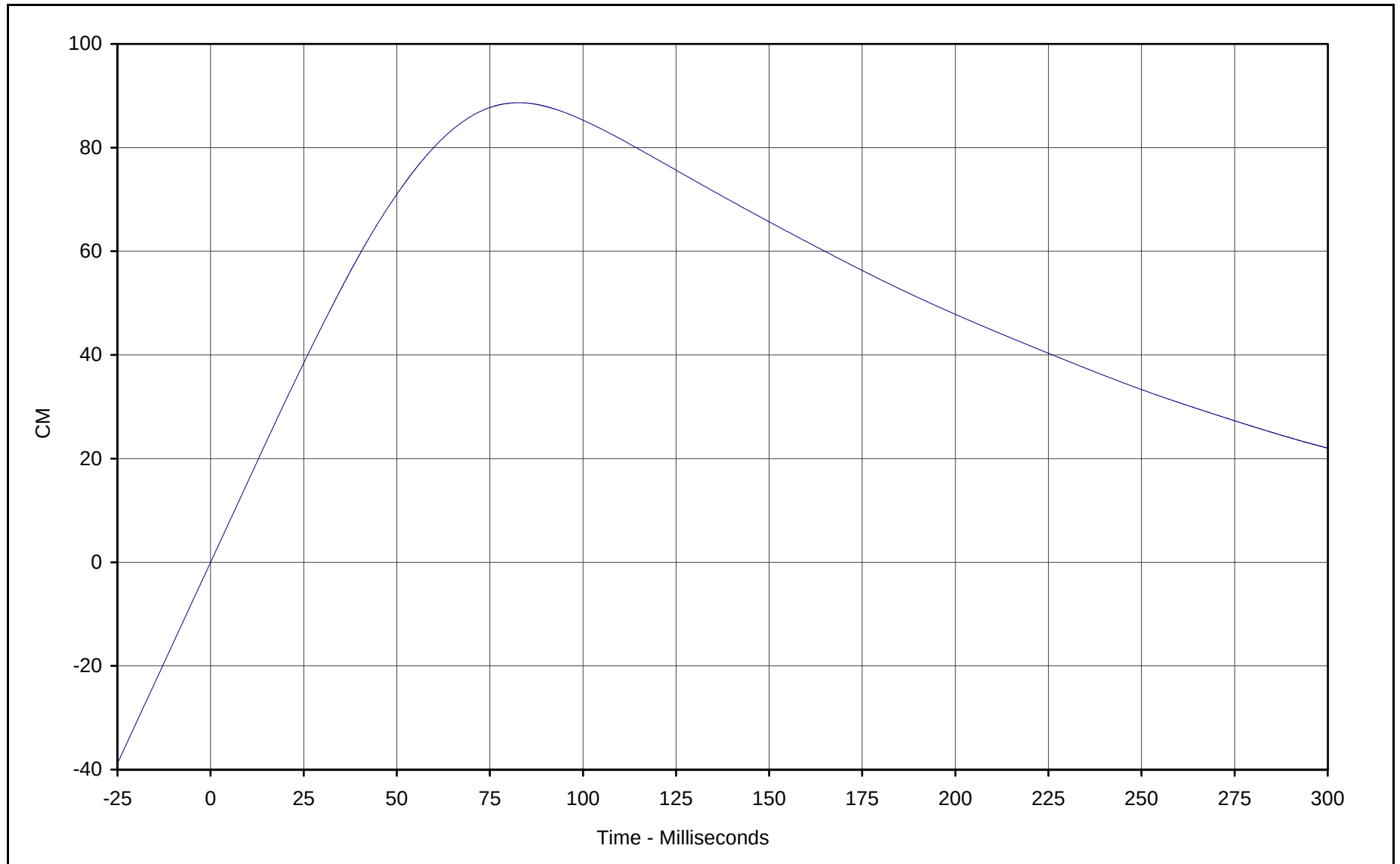
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



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Curve Description: Passenger Chest Redundant X Displ.

Maximum Value: 88.7 at 82.7 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

Curve Number: IN2-062

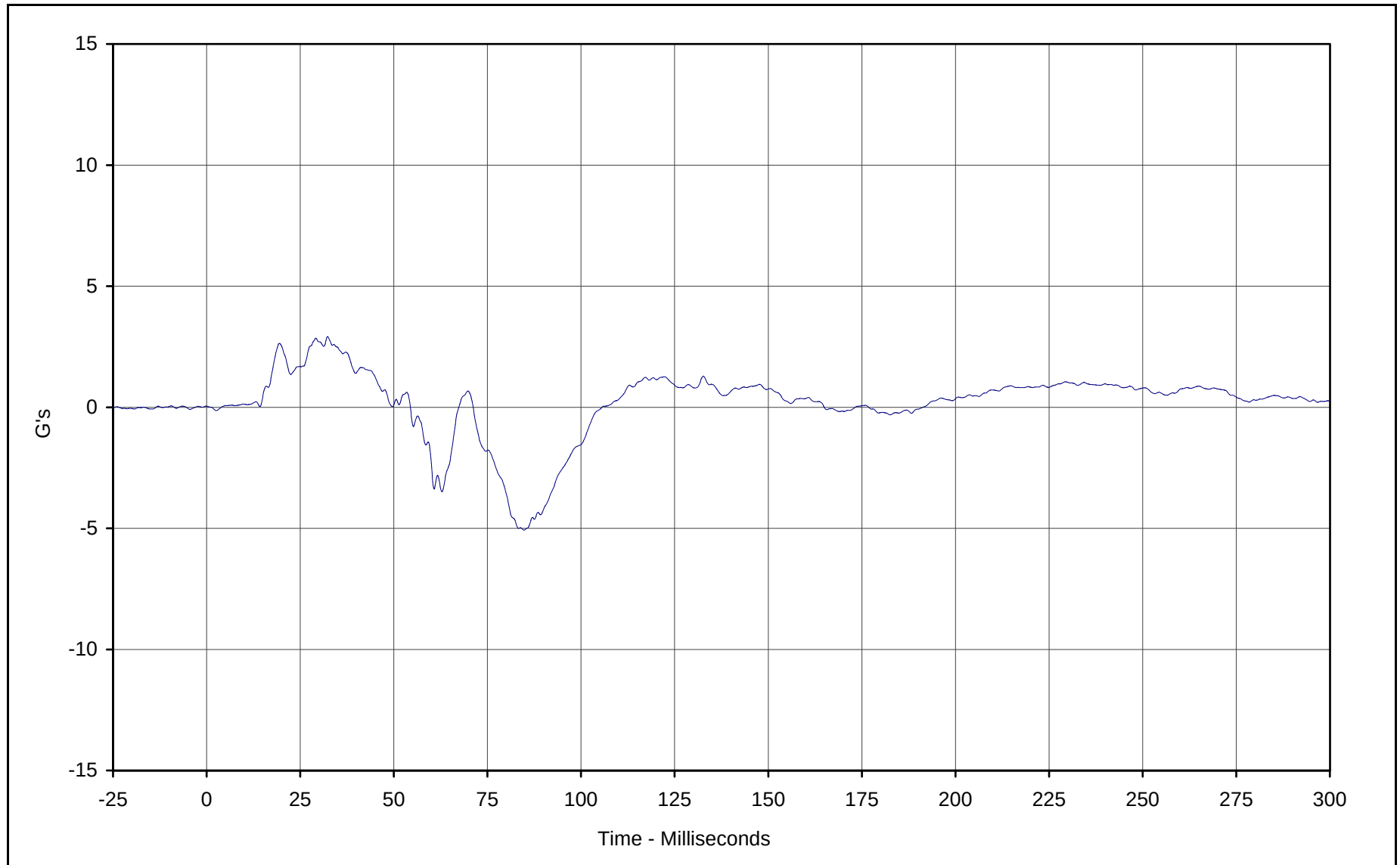
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



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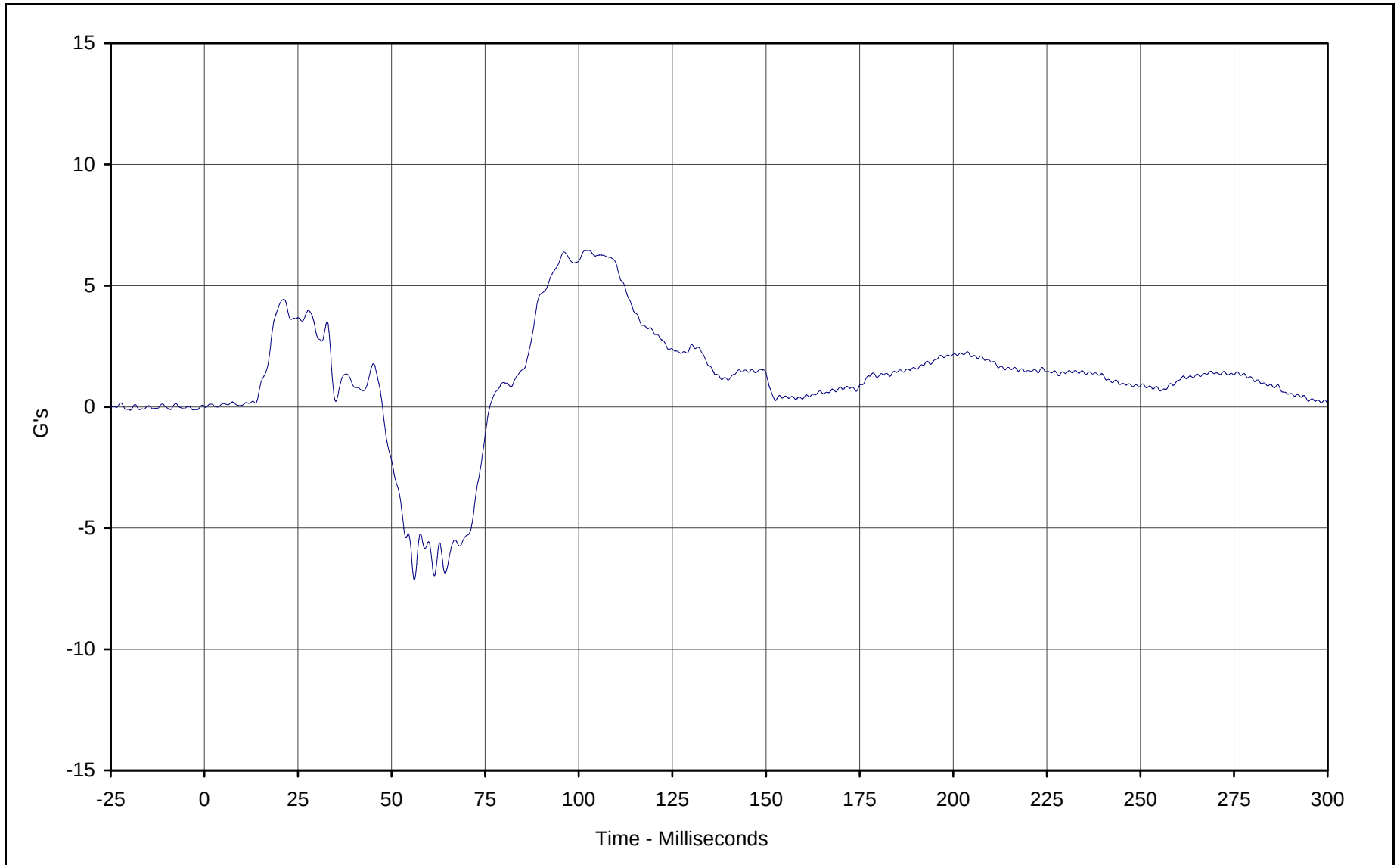
Curve Description: Passenger Chest Redundant Y
Maximum Value: 2.9 at 32.3 Milliseconds
Minimum Value: -5.1 at 84.7 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-063

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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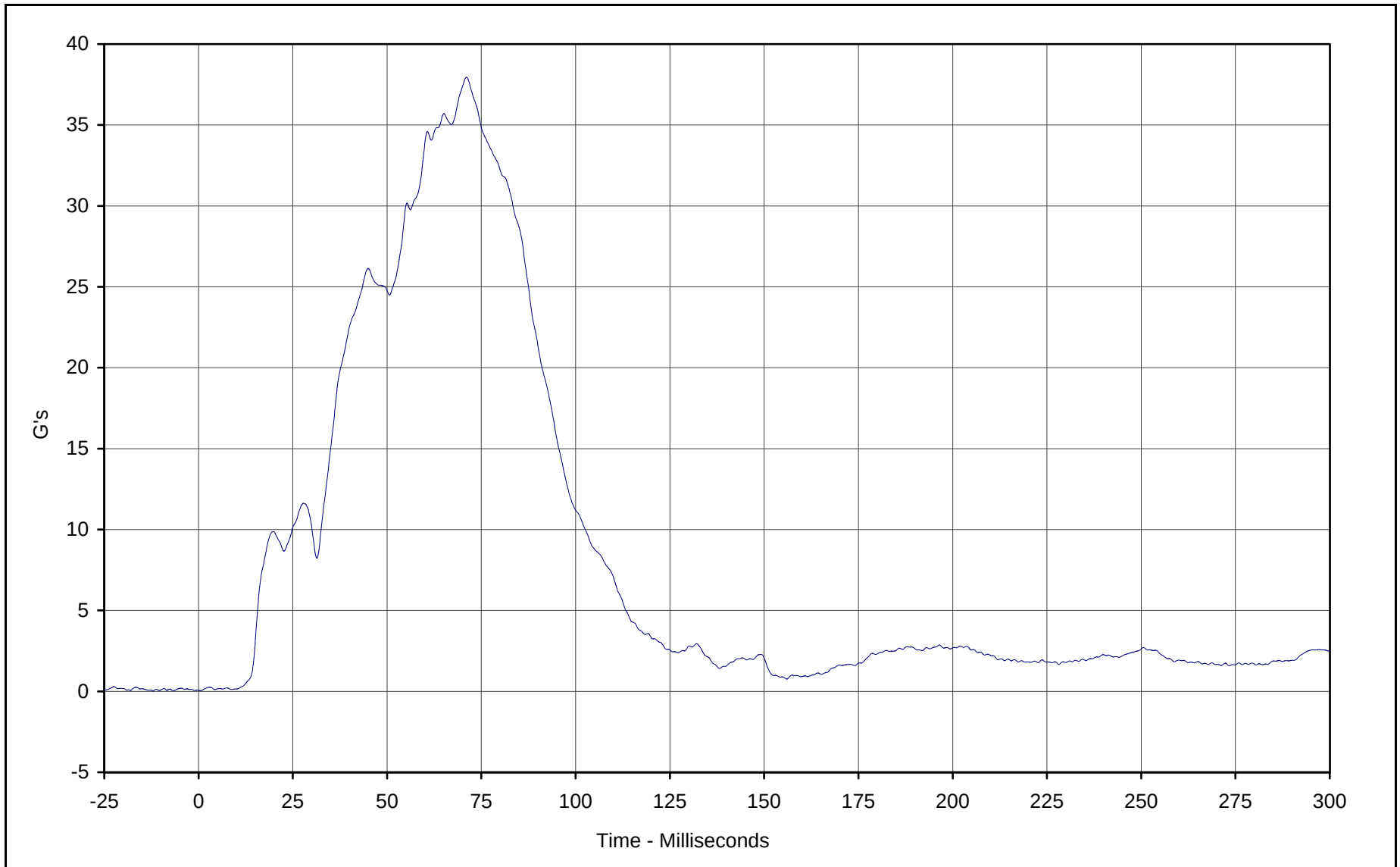
Curve Description: Passenger Chest Redundant Z
Maximum Value: 6.5 at 102.6 Milliseconds
Minimum Value: -7.2 at 56.1 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-064

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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Curve Description: Passenger Chest Resultant Redundant

Maximum Value: 38.0 at 71.1 Milliseconds

Minimum Value: 0.0 at 0.6 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

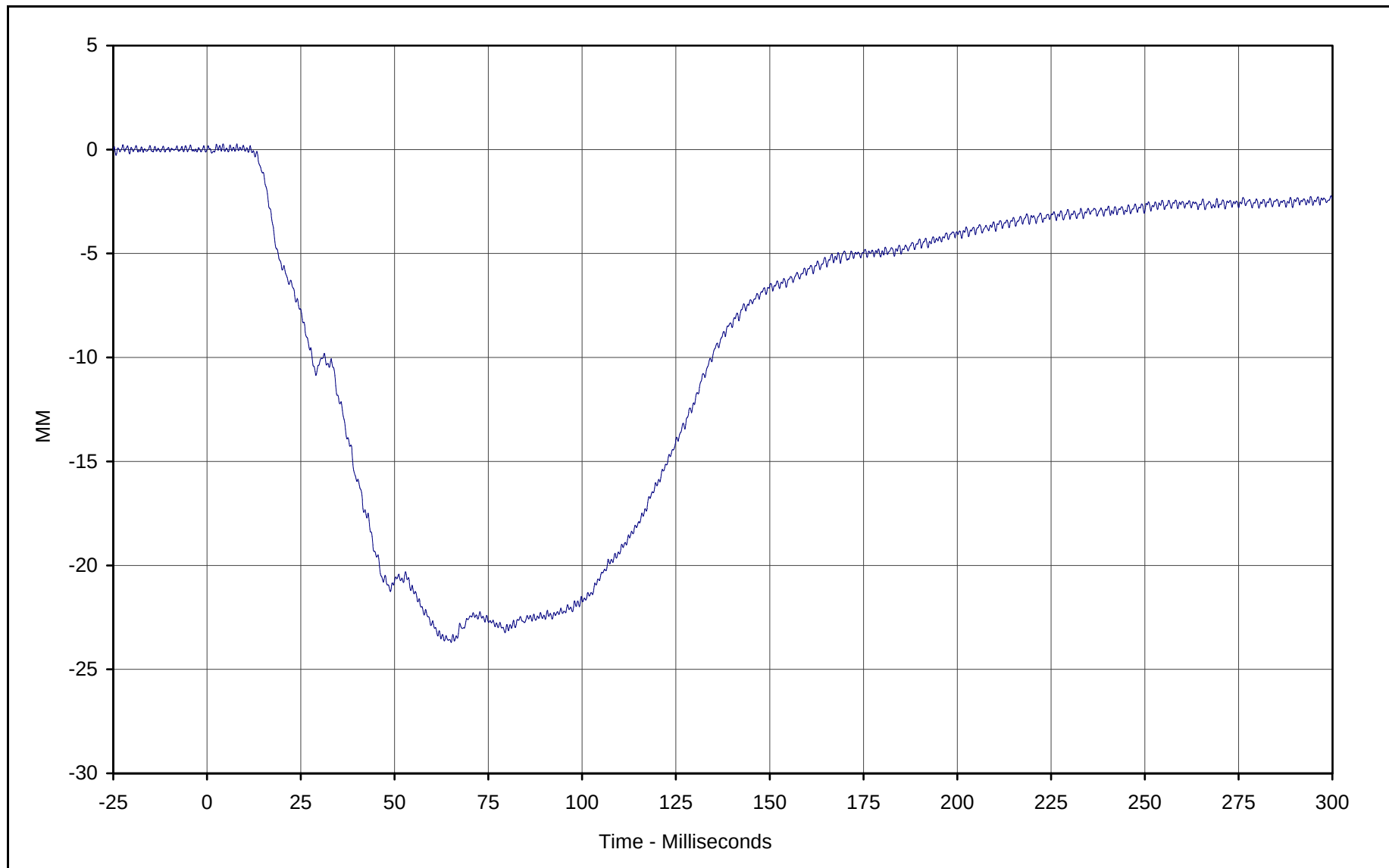
Curve Number: RES-062

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

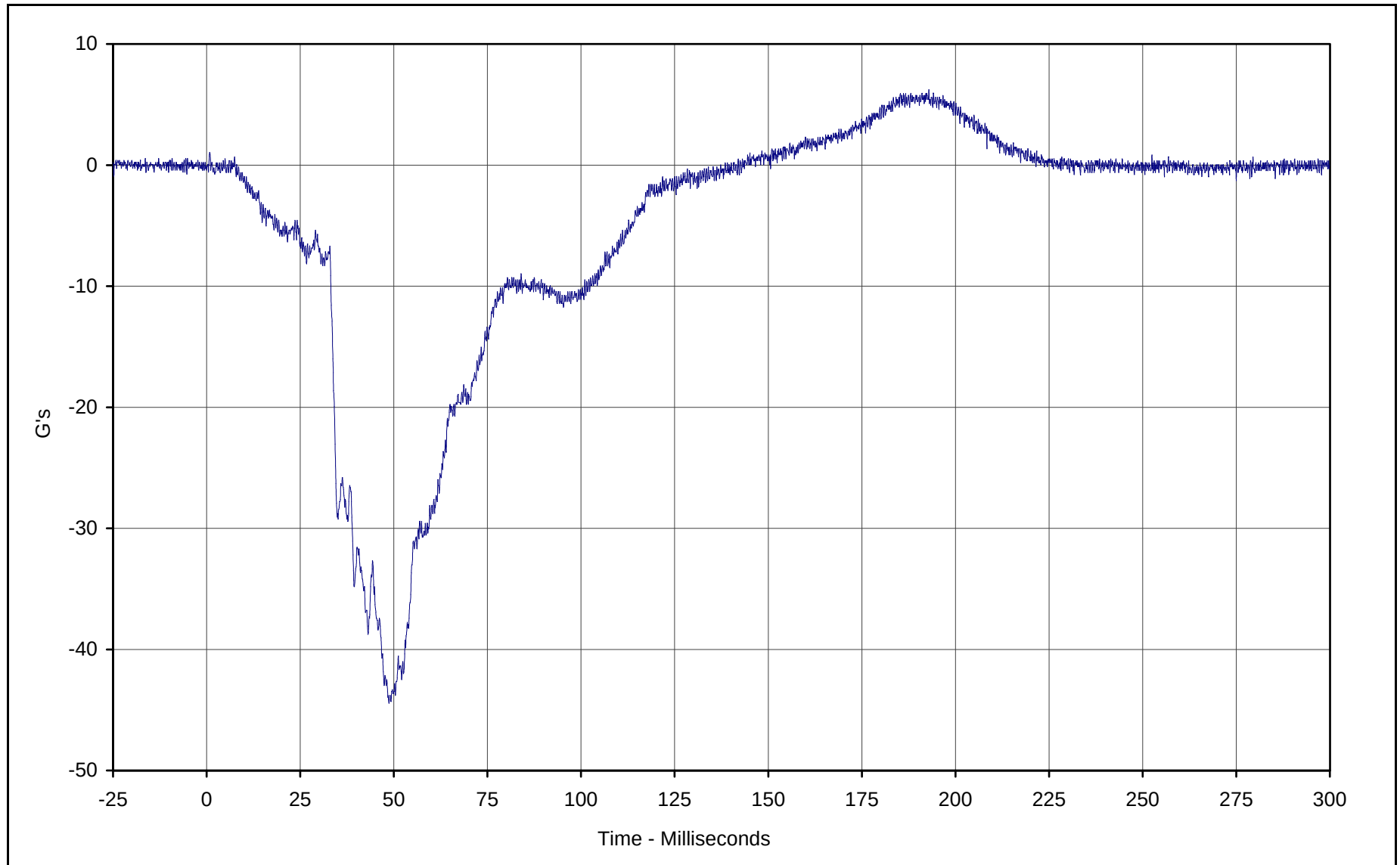


Curve Description: Passenger Chest Displacement X
Maximum Value: 0.3 at 4.3 Milliseconds
Minimum Value: -23.7 at 65.1 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-065

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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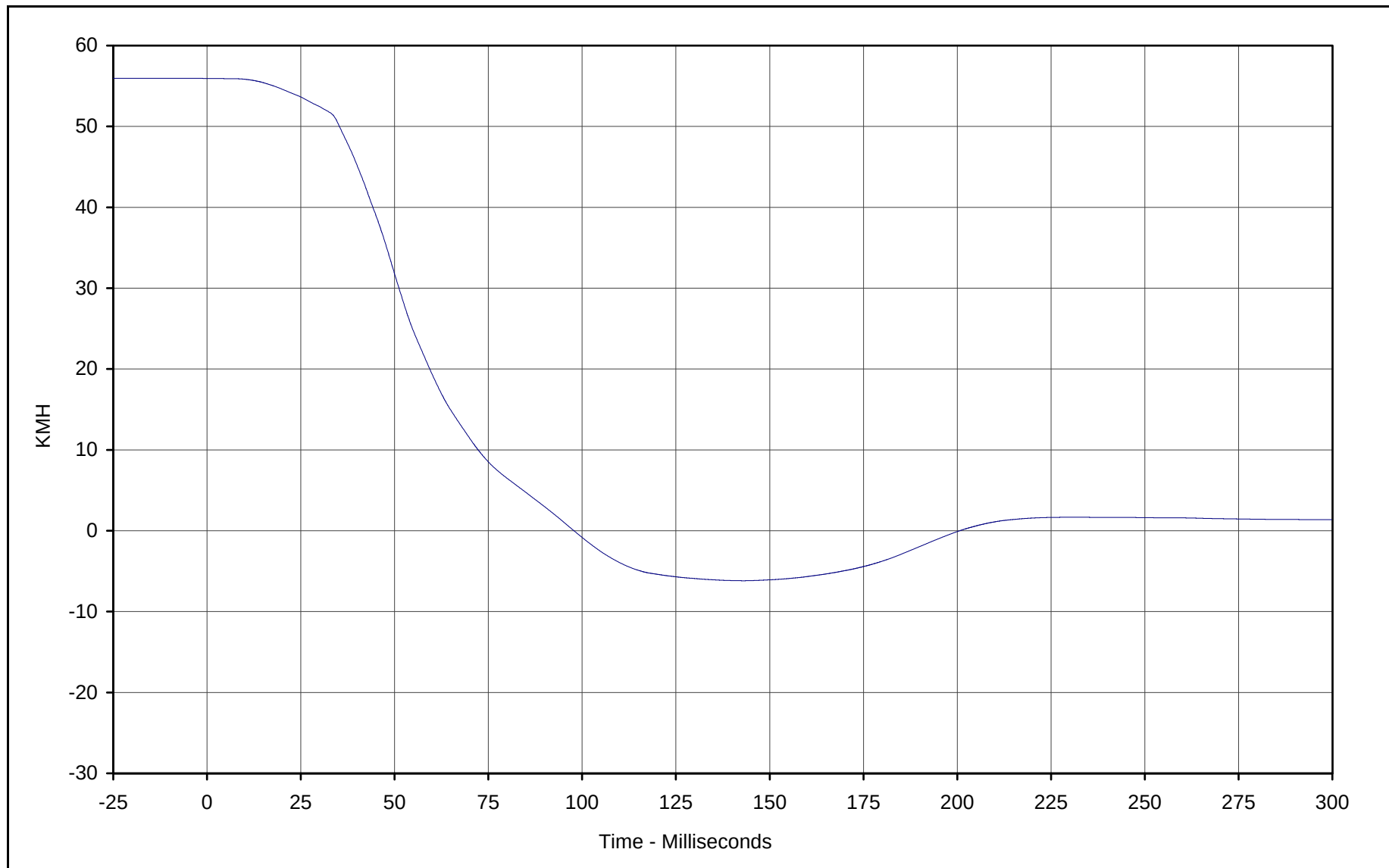
Curve Description: Passenger Pelvis X
Maximum Value: 6.2 at 192.9 Milliseconds
Minimum Value: -44.5 at 48.7 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-066

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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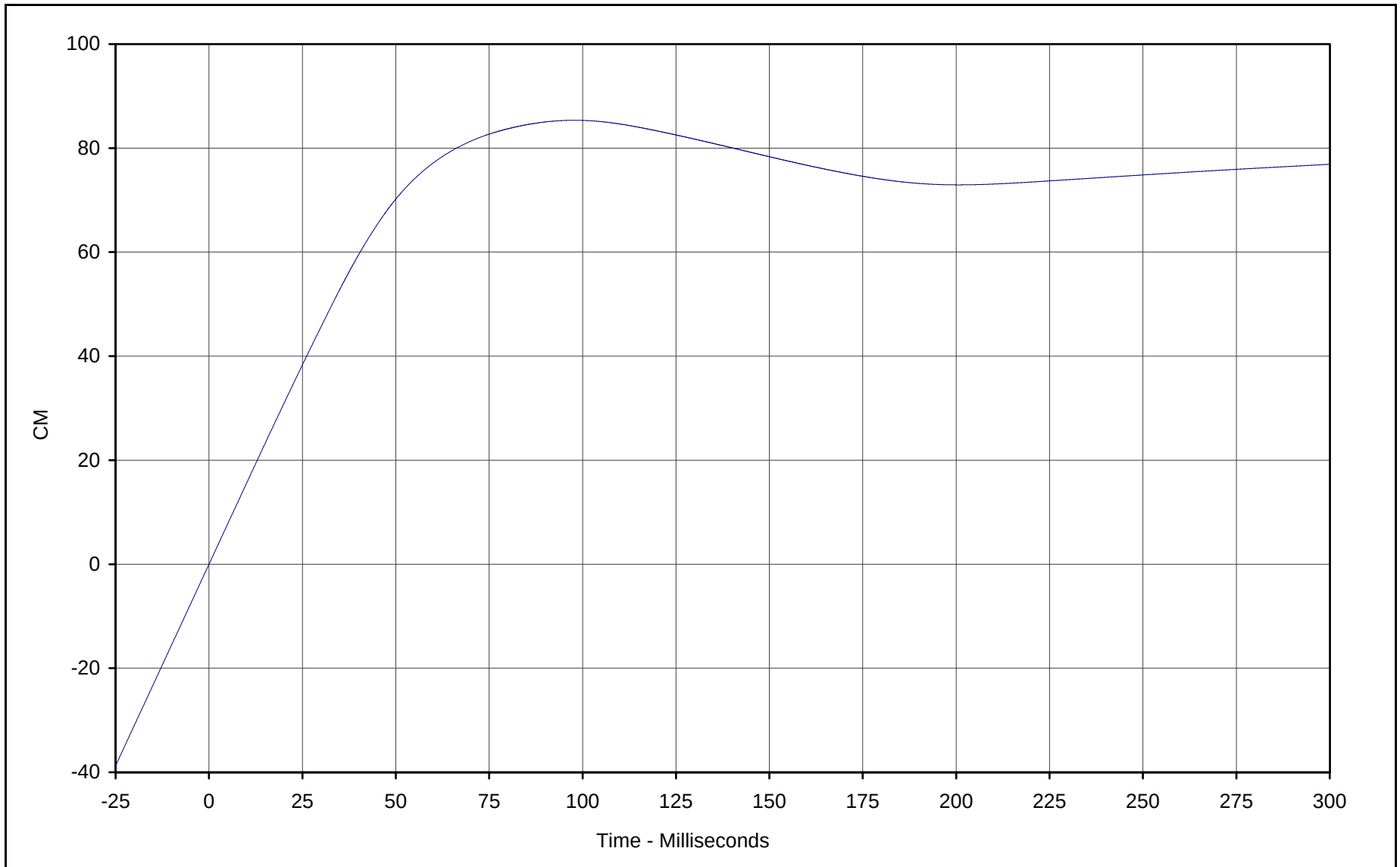
Curve Description: Passenger Pelvis X Velocity
Maximum Value: 55.9 at 1.3 Milliseconds
Minimum Value: -6.2 at 143.0 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN1-066

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

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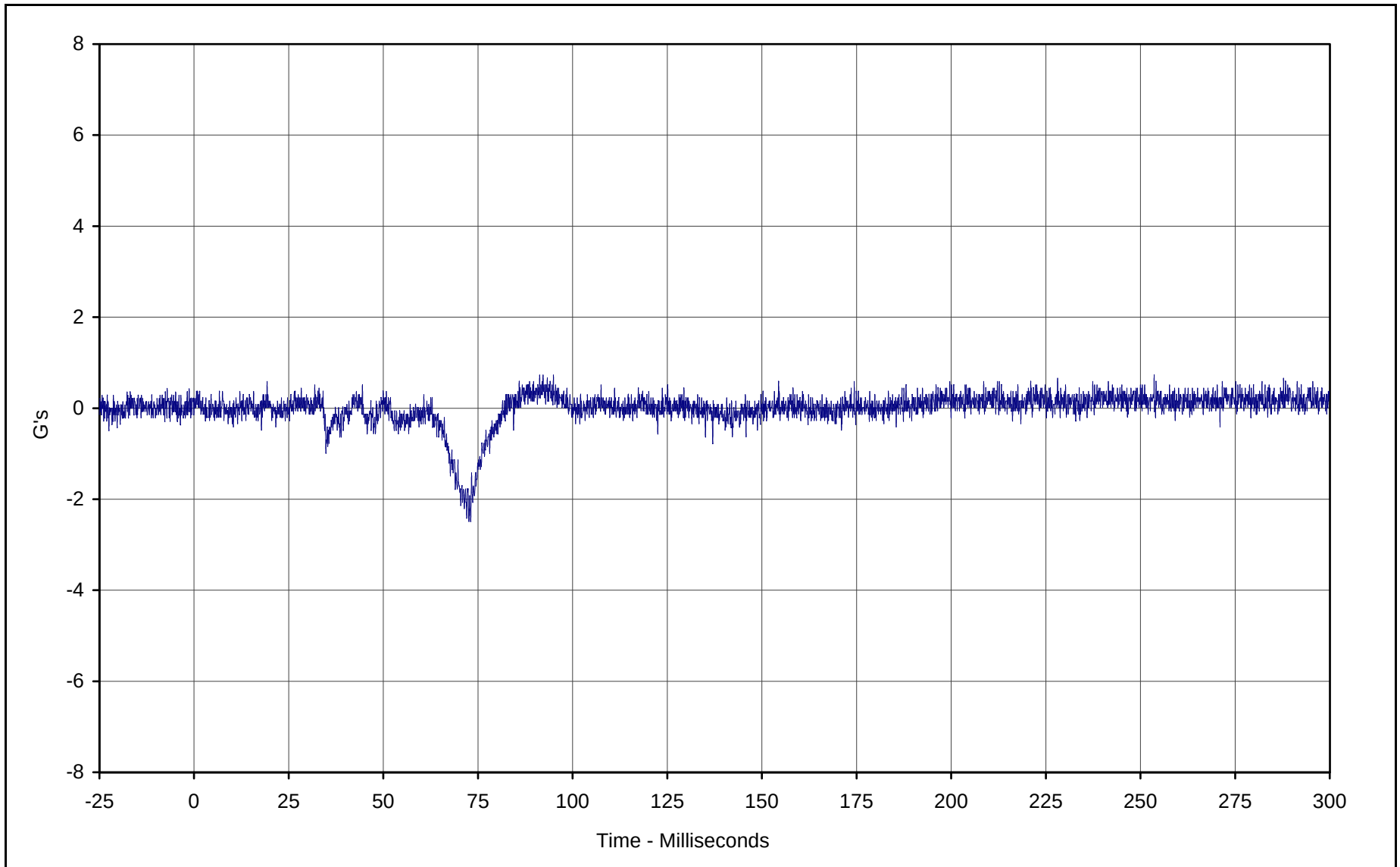
Curve Description: Passenger Pelvis X Displ.
Maximum Value: 85.4 at 97.8 Milliseconds
Minimum Value: 0.0 at 0.0 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN2-066

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

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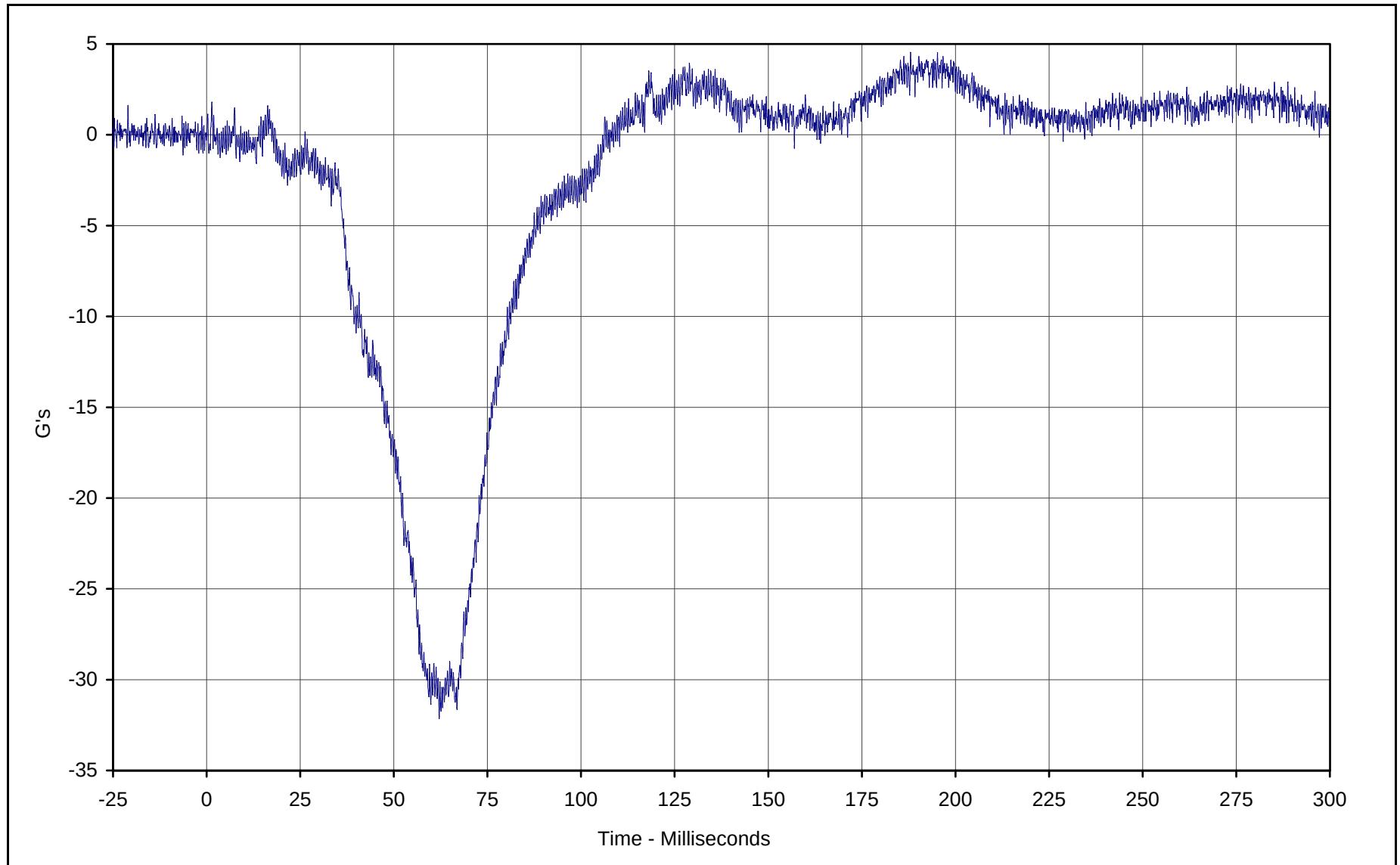
Curve Description: Passenger Pelvis Y
Maximum Value: 0.7 at 91.3 Milliseconds
Minimum Value: -2.5 at 72.6 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-067

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

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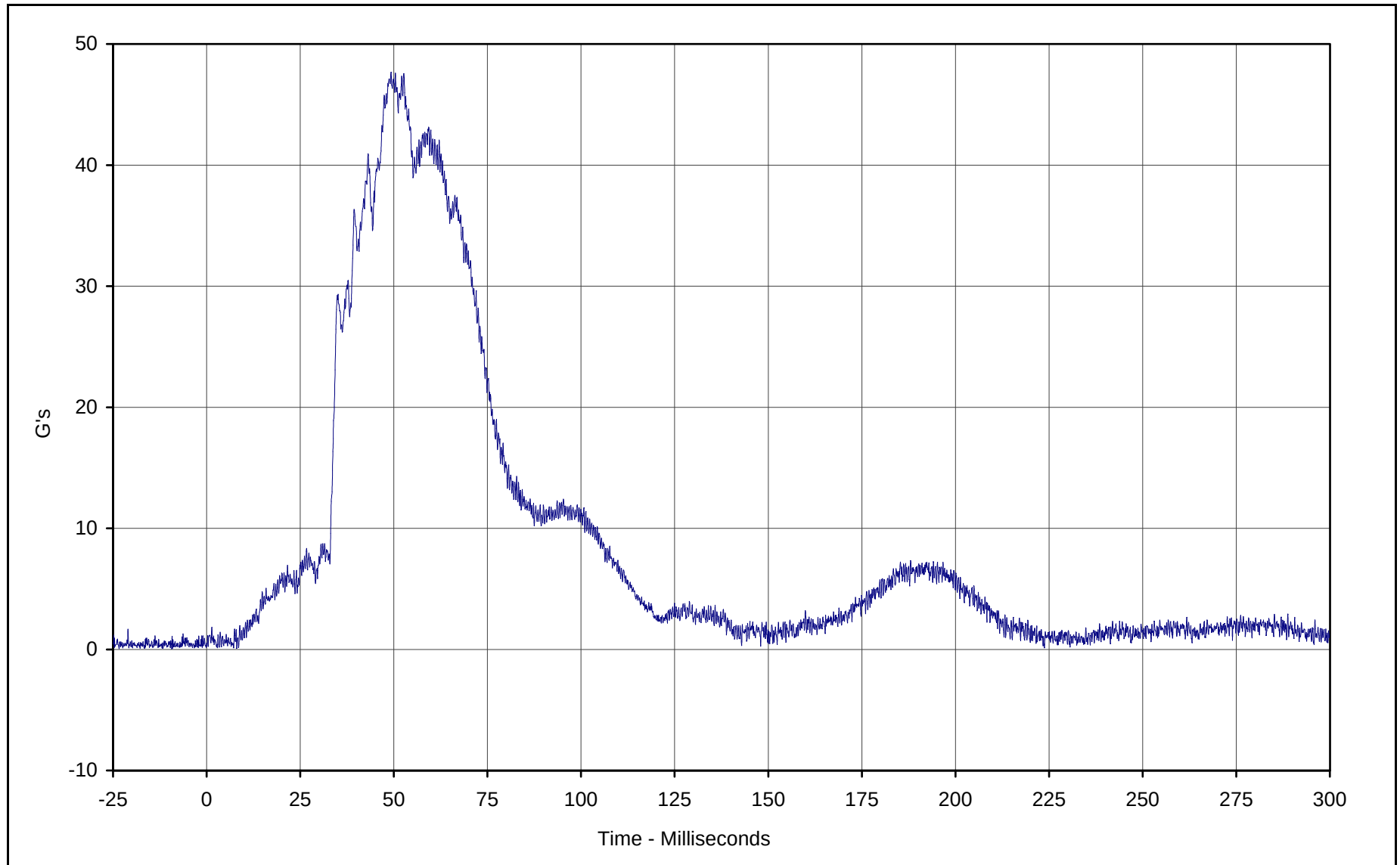


Curve Description: Passenger Pelvis Z
Maximum Value: 4.5 at 188.0 Milliseconds
Minimum Value: -32.2 at 62.1 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: FIL-068

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



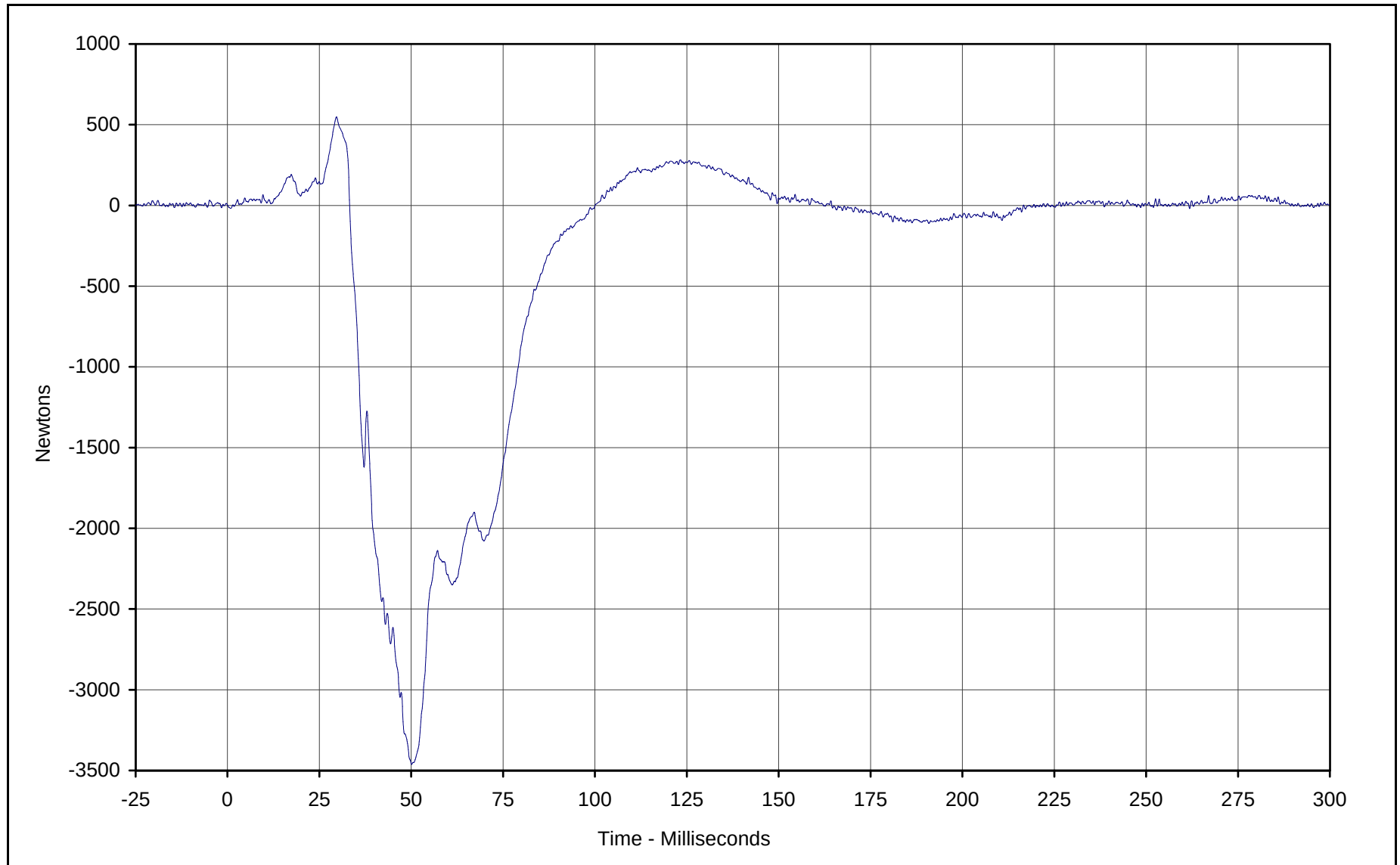
KAR22001-01



Curve Description: Passenger Pelvis Resultant
Maximum Value: 47.7 at 49.3 Milliseconds
Minimum Value: 0.1 at 8.0 Milliseconds
SAE Filter Class: 1000
Date of Test: 12/7/01
Curve Number: RES-066

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan

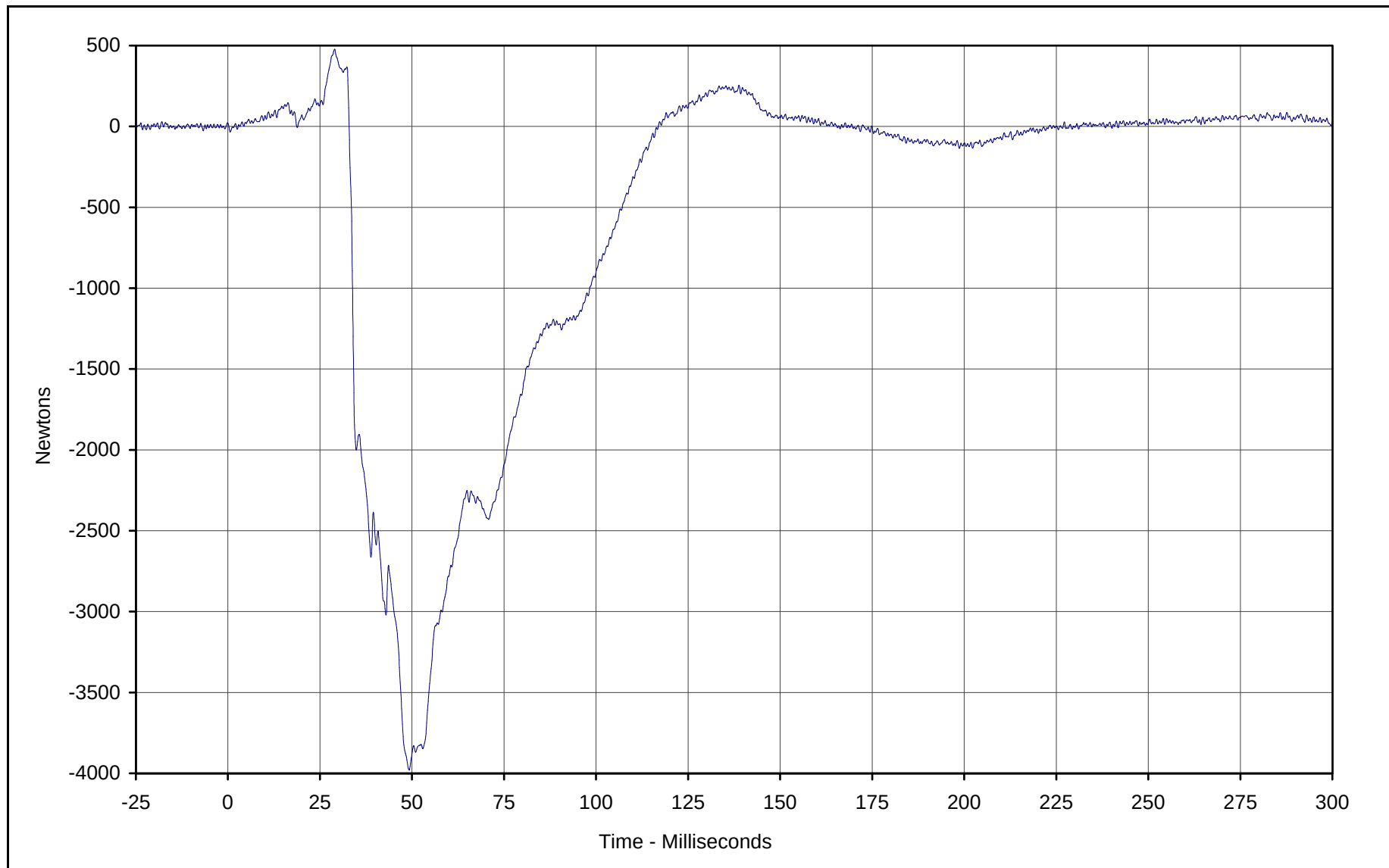




Curve Description: Passenger Left Femur Force
Maximum Value: 548.4 at 29.7 Milliseconds
Minimum Value: -3462.4 at 50.1 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-069

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



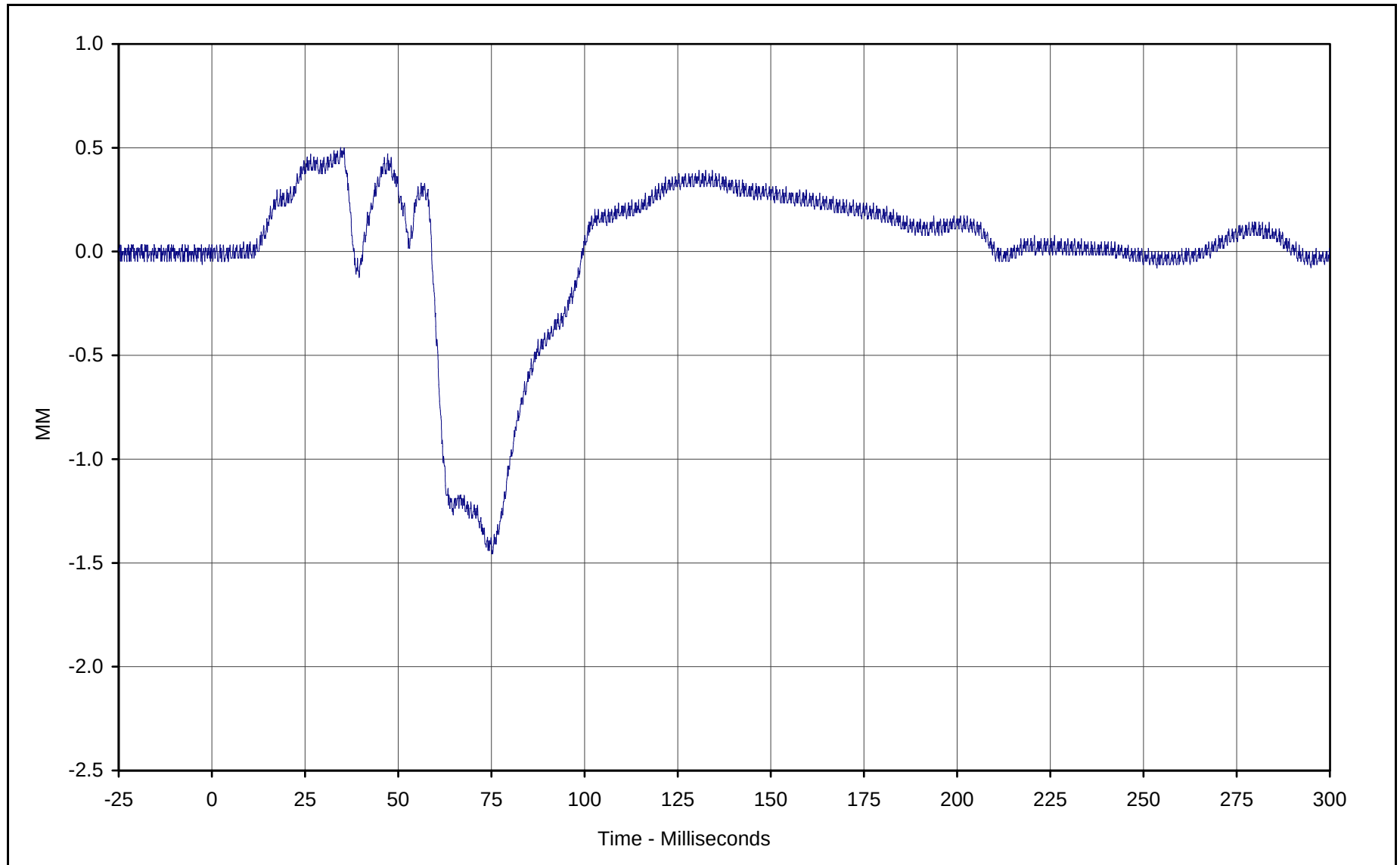


Curve Description: Passenger Right Femur Force
Maximum Value: 477.6 at 29.0 Milliseconds
Minimum Value: -3980.5 at 49.2 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-070

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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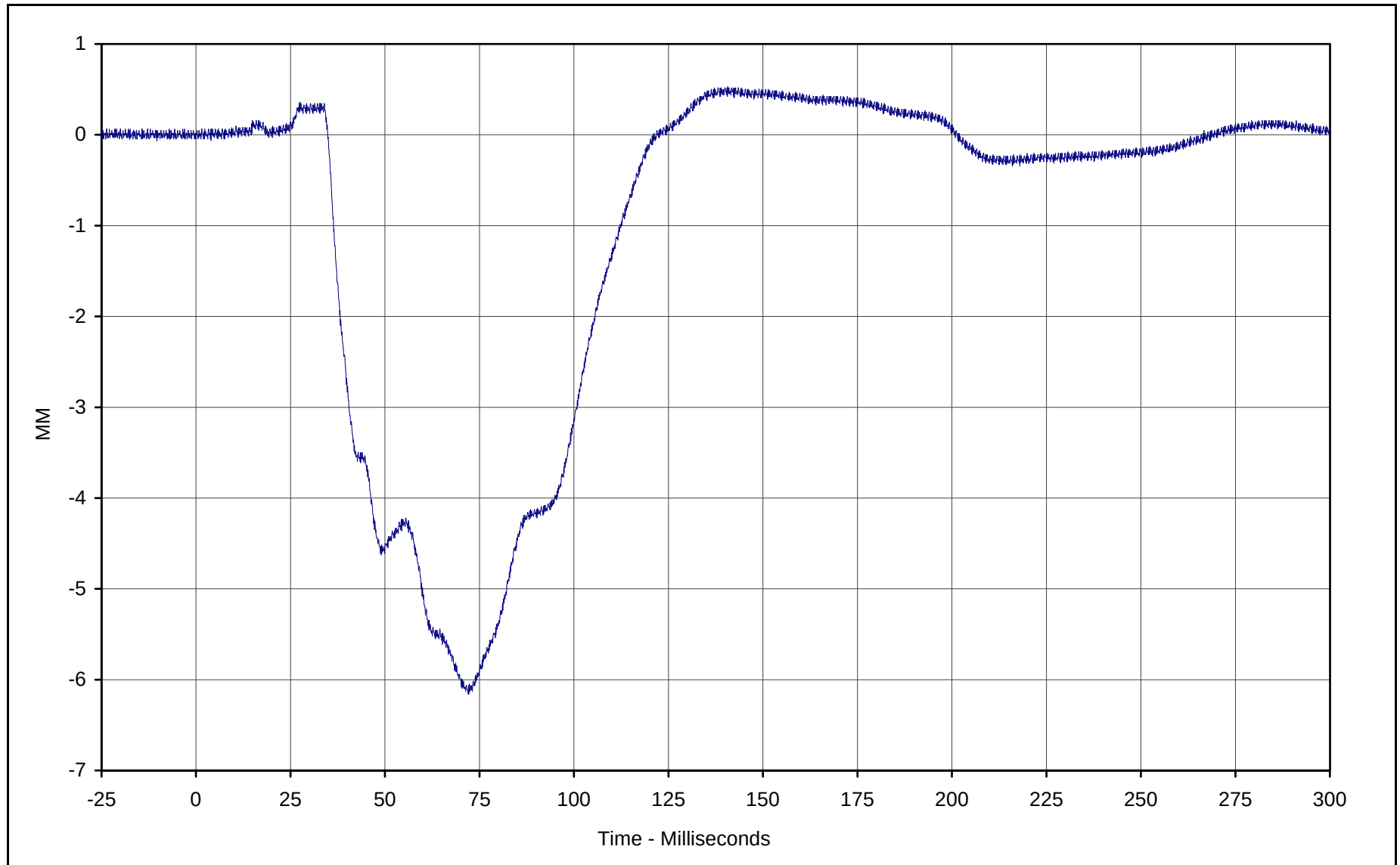


Curve Description: Passenger Left Knee Slider
Maximum Value: 0.50 at 34.6 Milliseconds
Minimum Value: -1.46 at 75.1 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-071

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

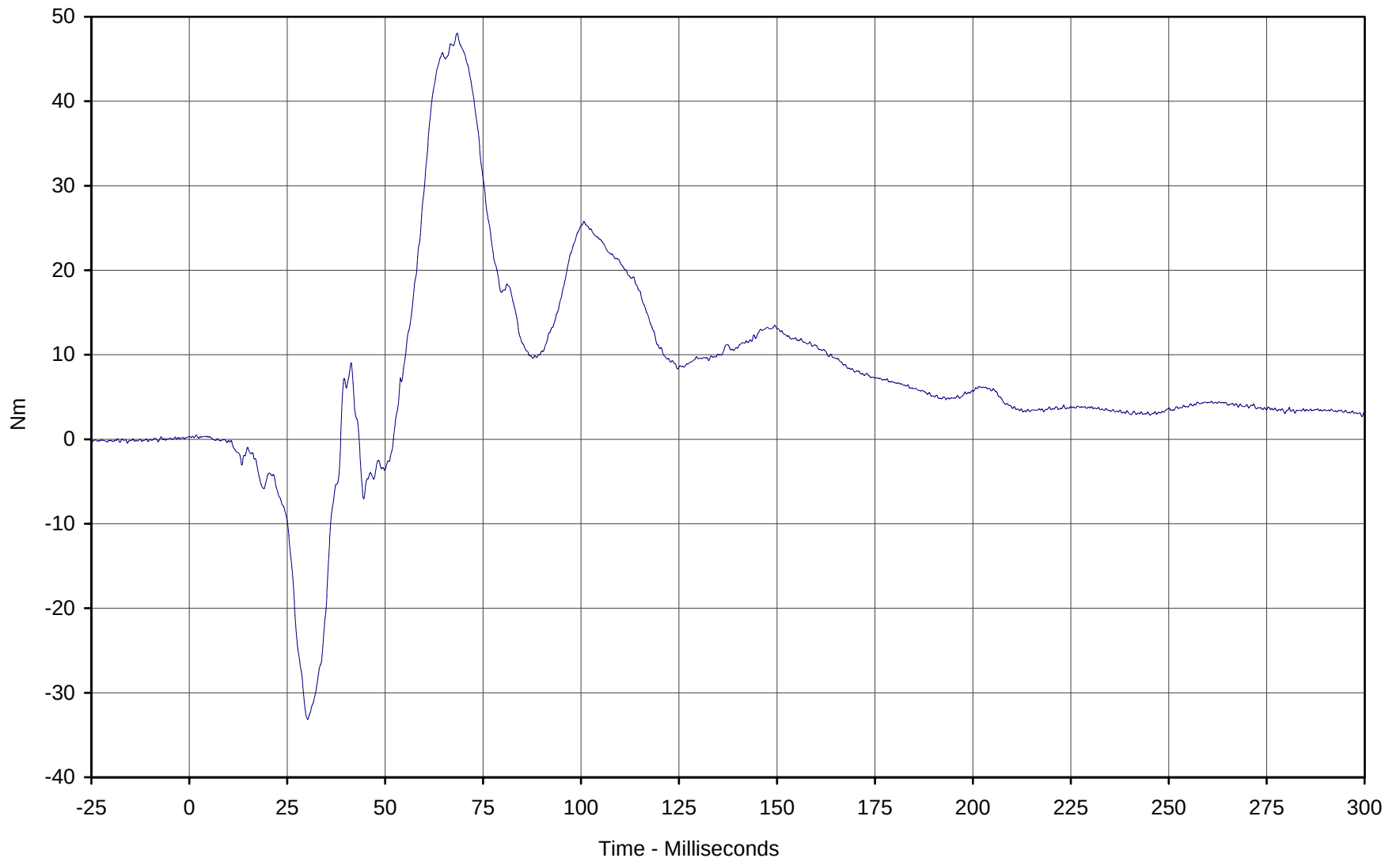


Curve Description: Passenger Right Knee Slider
Maximum Value: 0.53 at 140.7 Milliseconds
Minimum Value: -6.16 at 72.0 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-072

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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Curve Description: Passenger Left Upper Tibia Moment X

Maximum Value: 48.0 at 68.4 Milliseconds

Minimum Value: -33.1 at 30.2 Milliseconds

SAE Filter Class: 600

Date of Test: 12/7/01

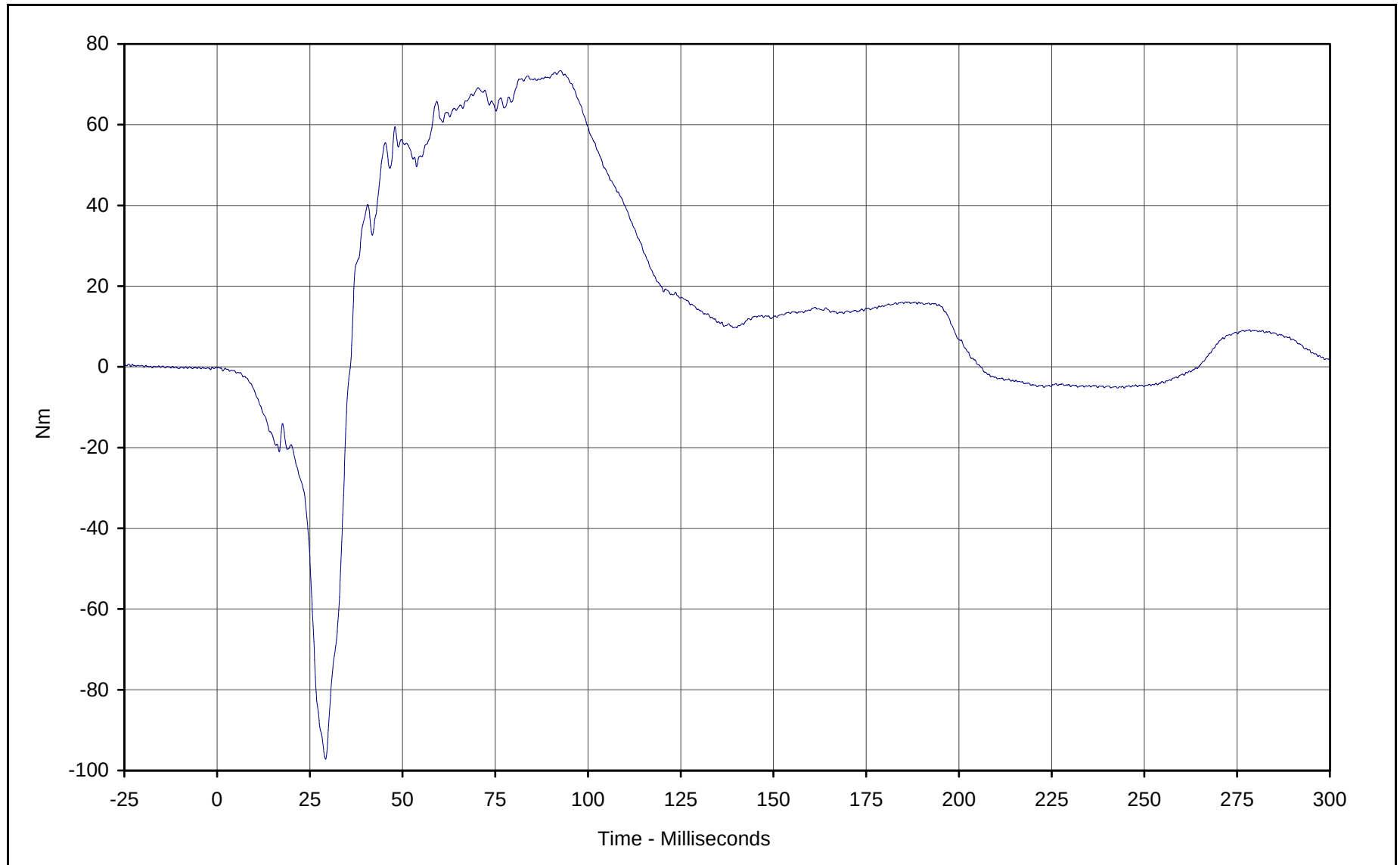
Curve Number: FIL-073

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01



Curve Description: Passenger Left Upper Tibia Moment Y

Maximum Value: 73.4 at 92.5 Milliseconds

Minimum Value: -97.2 at 29.3 Milliseconds

SAE Filter Class: 600

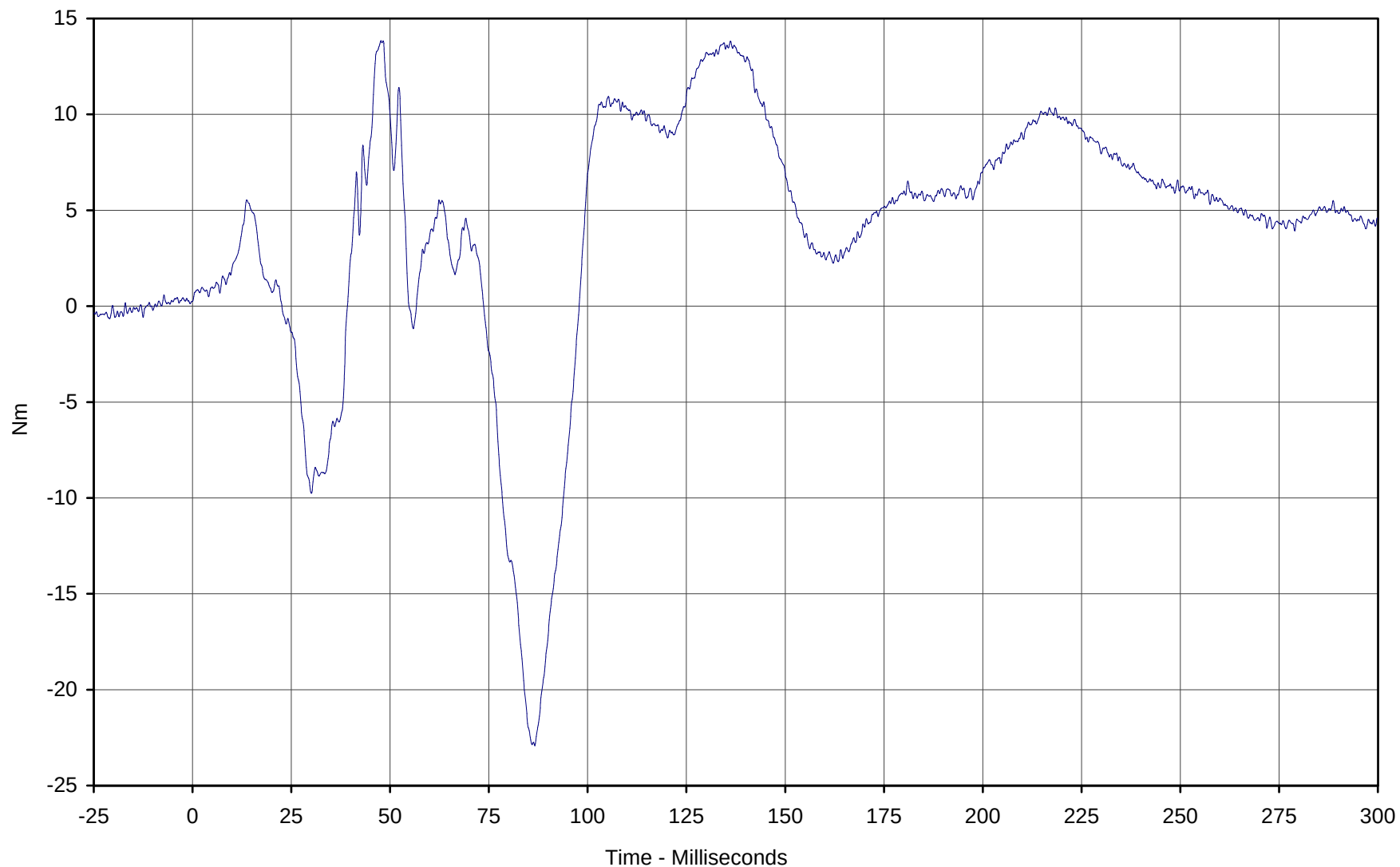
Date of Test: 12/7/01

Curve Number: FIL-074

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan





Curve Description: Passenger Right Upper Tibia Moment X

Maximum Value: 13.8 at 47.7 Milliseconds

Minimum Value: -22.9 at 86.6 Milliseconds

SAE Filter Class: 600

Date of Test: 12/7/01

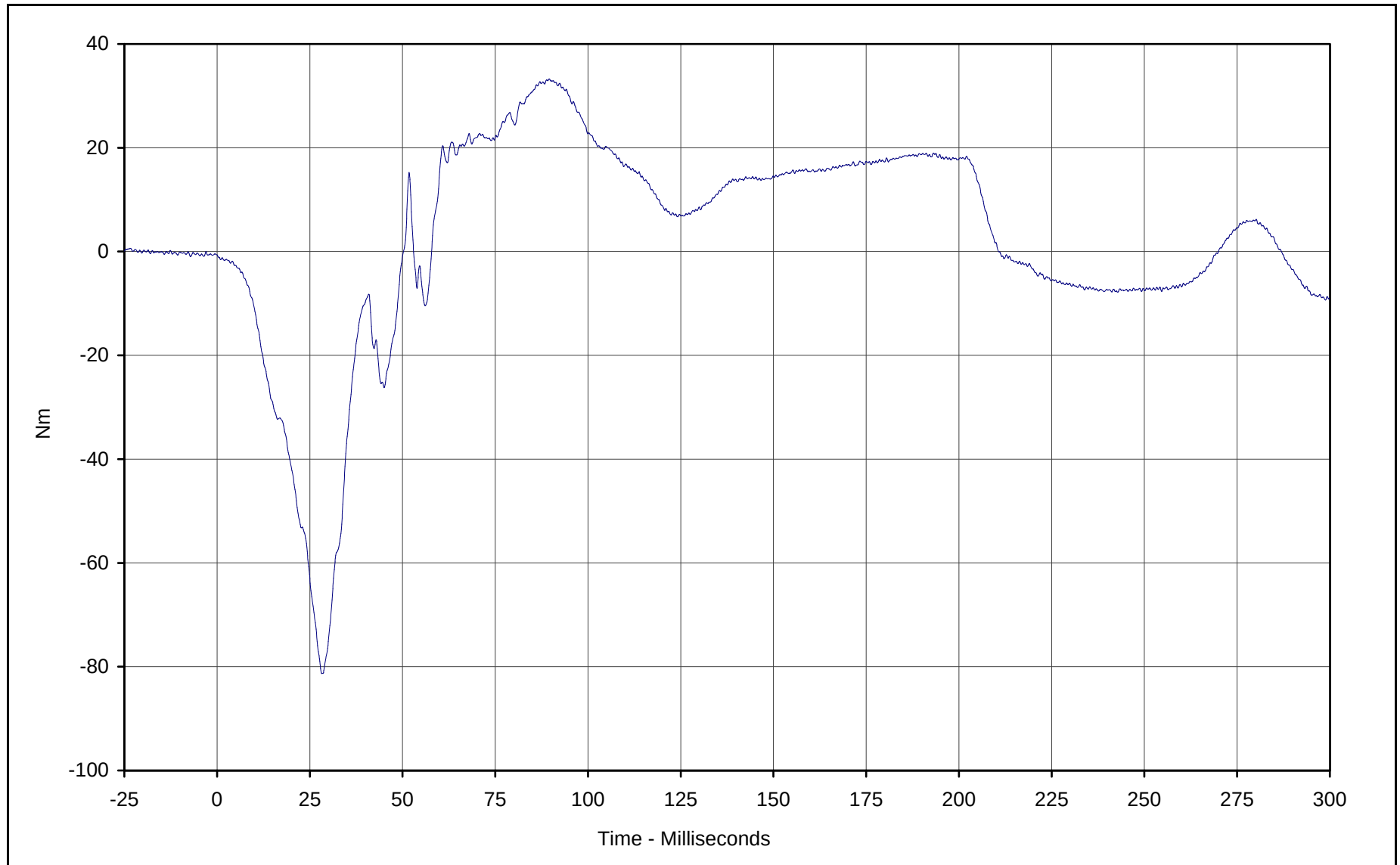
Curve Number: FIL-075

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



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Curve Description: Passenger Right Upper Tibia Moment Y

Maximum Value: 33.3 at 89.6 Milliseconds

Minimum Value: -81.3 at 28.2 Milliseconds

SAE Filter Class: 600

Date of Test: 12/7/01

Curve Number: FIL-076

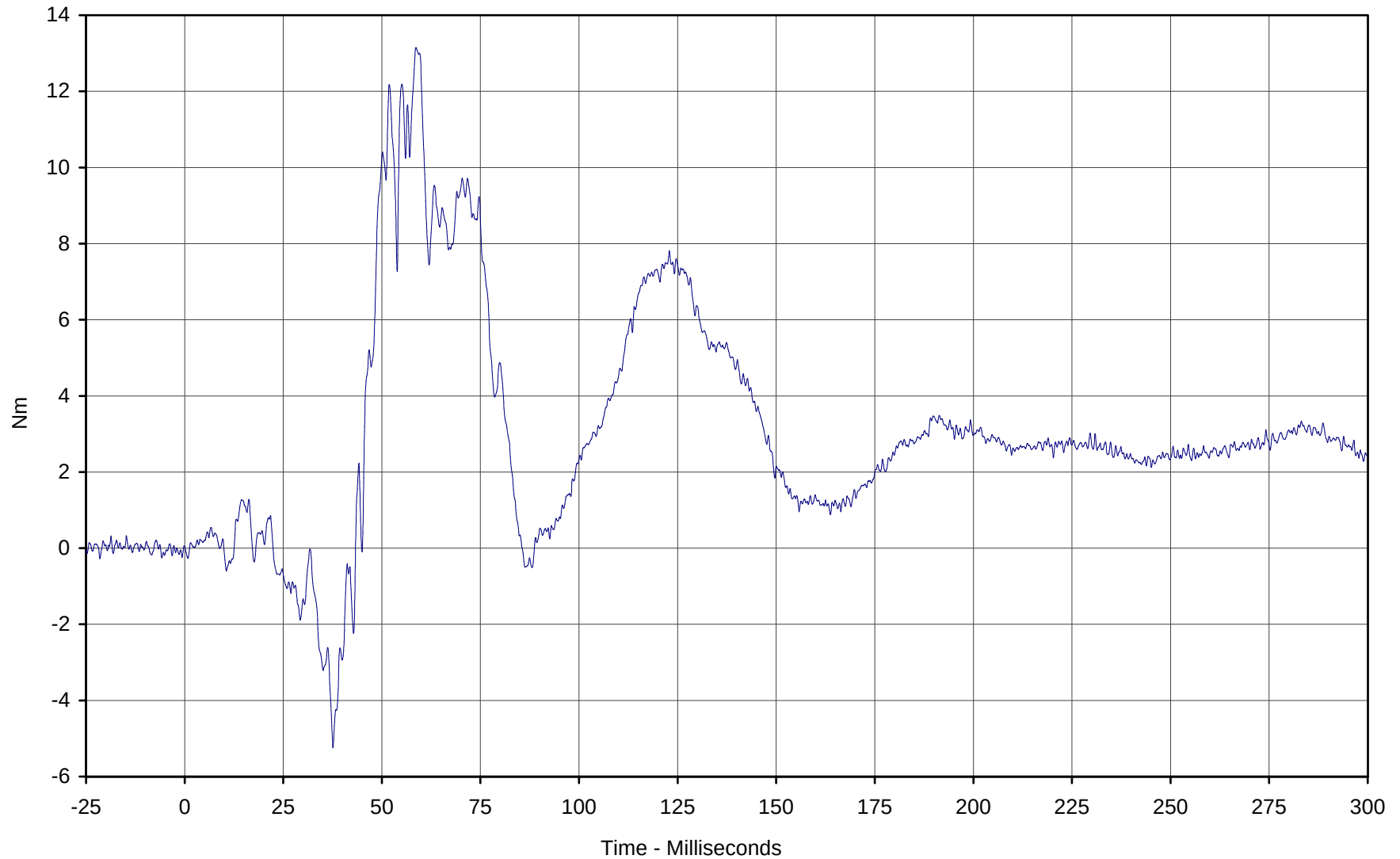
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

B-111



Curve Description: Passenger Left Lower Tibia Moment X

Maximum Value: 13.2 at 58.7 Milliseconds

Minimum Value: -5.2 at 37.6 Milliseconds

SAE Filter Class: 600

Date of Test: 12/7/01

Curve Number: FIL-077

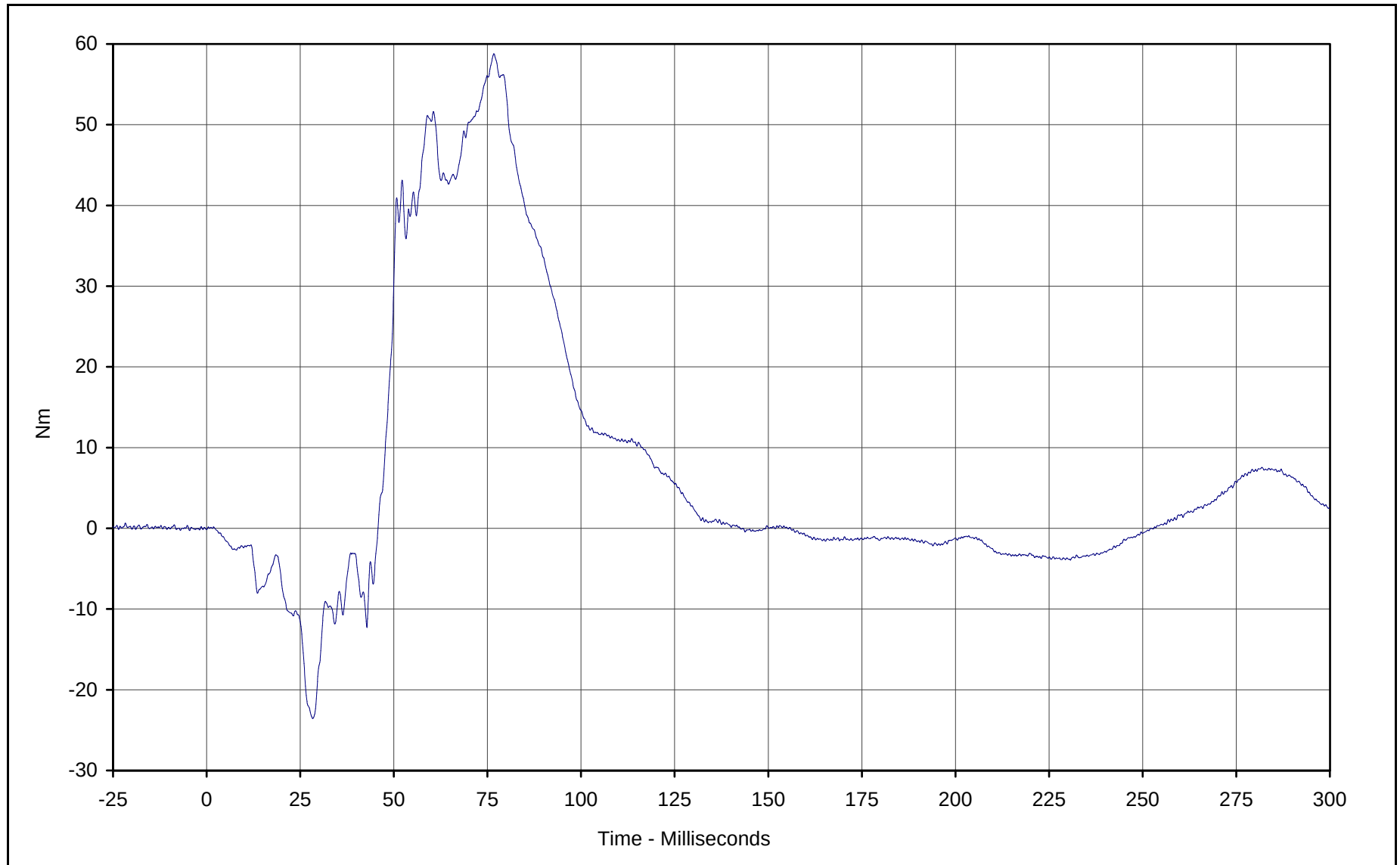
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

B-112



Curve Description: Passenger Left Lower Tibia Moment Y

Maximum Value: 58.8 at 76.7 Milliseconds

Minimum Value: -23.5 at 28.4 Milliseconds

SAE Filter Class: 600

Date of Test: 12/7/01

Curve Number: FIL-078

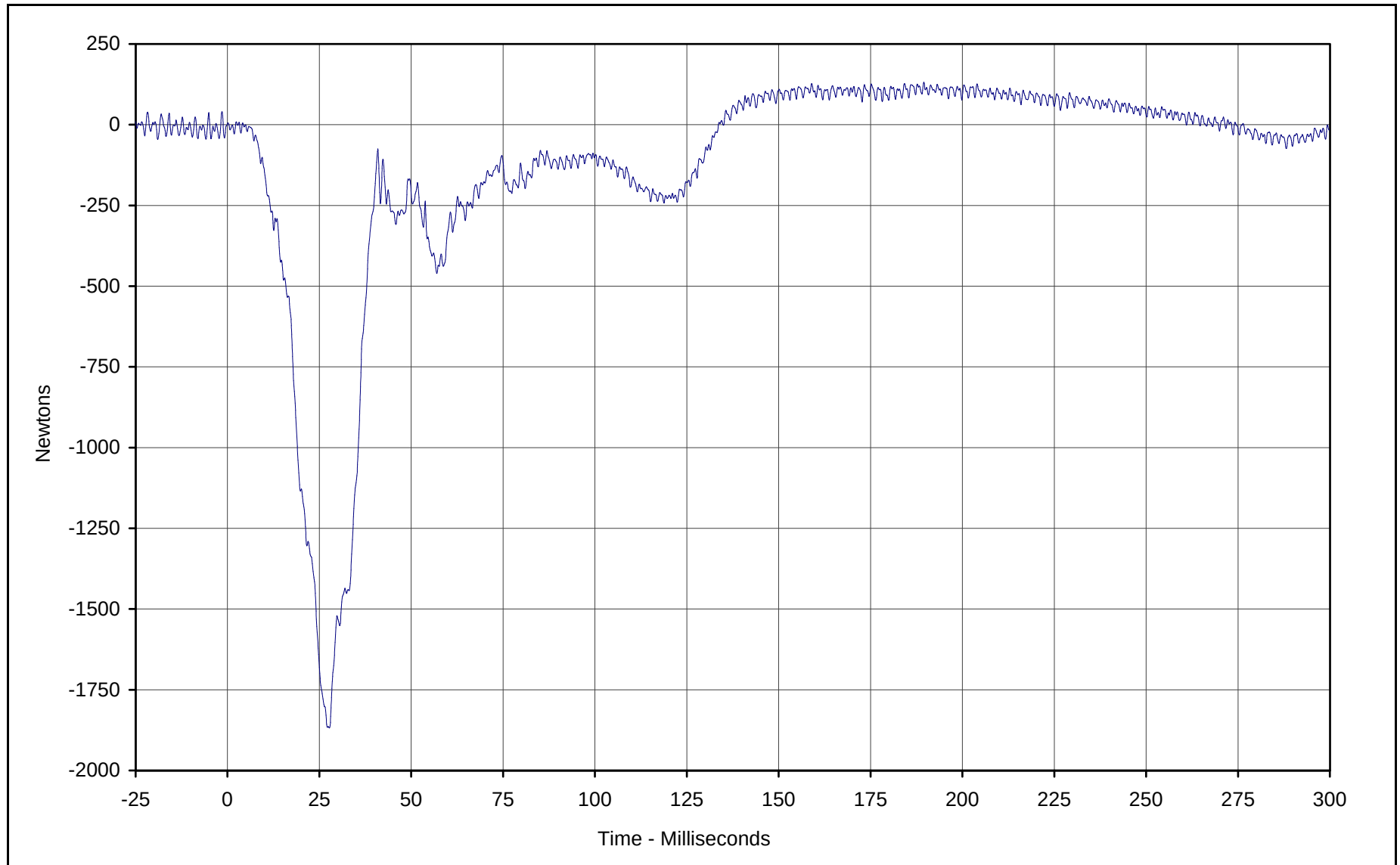
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



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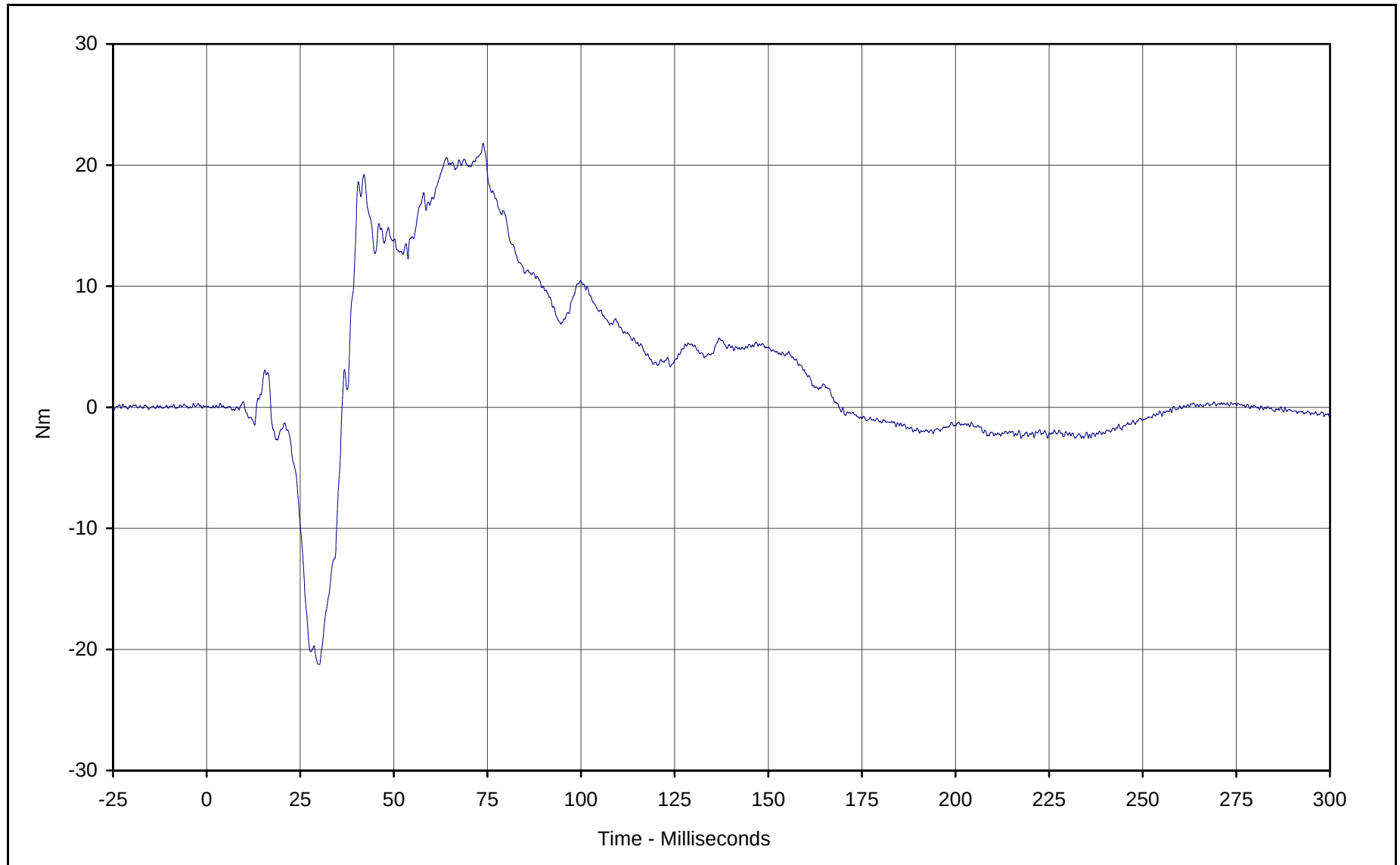
Curve Description: Passenger Left Lower Tibia Force Z
Maximum Value: 131.8 at 189.5 Milliseconds
Minimum Value: -1867.9 at 27.7 Milliseconds
SAE Filter Class: 600
Date of Test: 12/7/01
Curve Number: FIL-079

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

B-114



Curve Description: Passenger Right Lower Tibia Moment X

Maximum Value: 21.8 at 73.8 Milliseconds

Minimum Value: -21.2 at 30.1 Milliseconds

SAE Filter Class: 600

Date of Test: 12/7/01

Curve Number: FIL-080

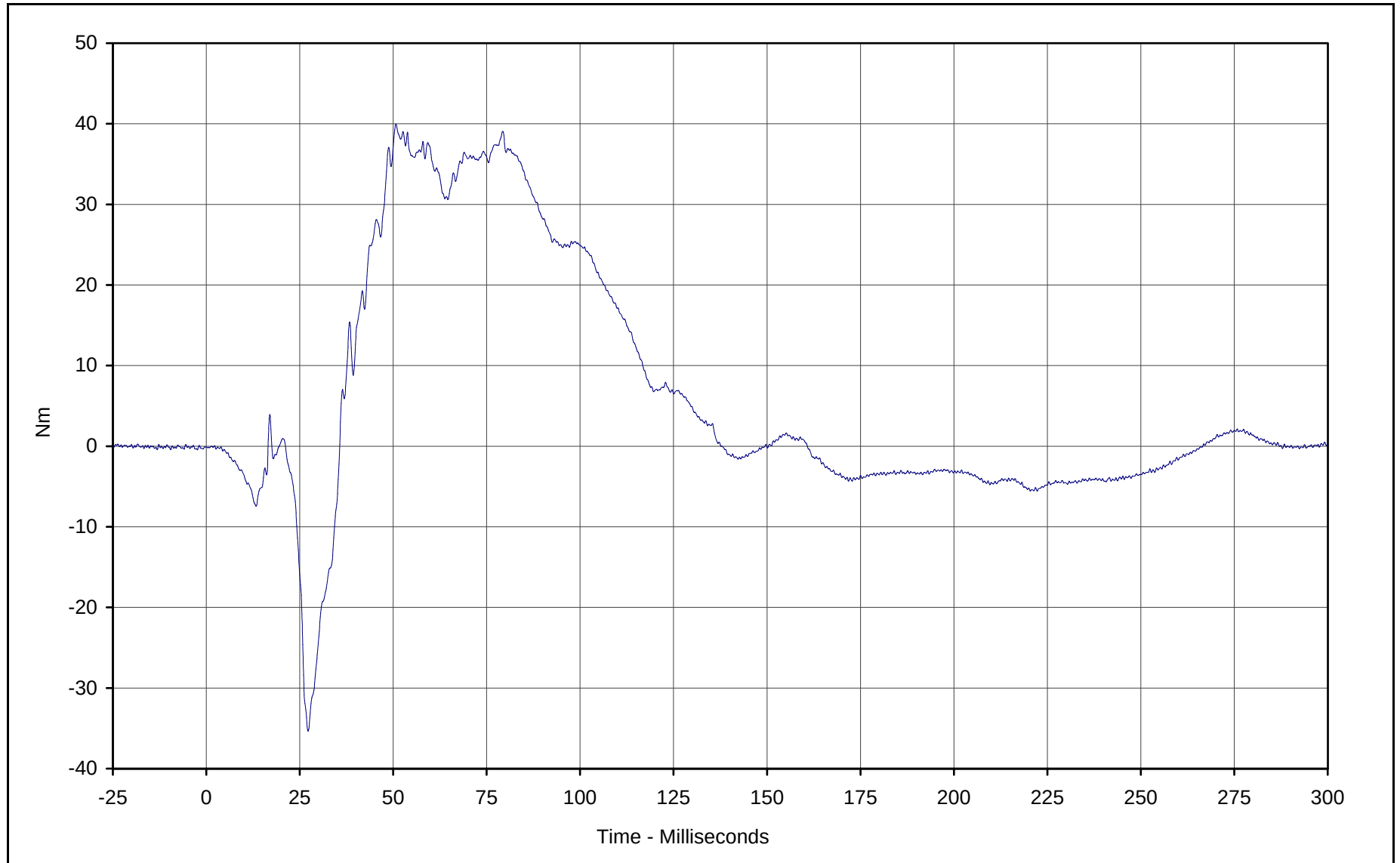
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



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Curve Description: Passenger Right Lower Tibia Moment Y

Maximum Value: 40.0 at 50.7 Milliseconds

Minimum Value: -35.4 at 27.2 Milliseconds

SAE Filter Class: 600

Date of Test: 12/7/01

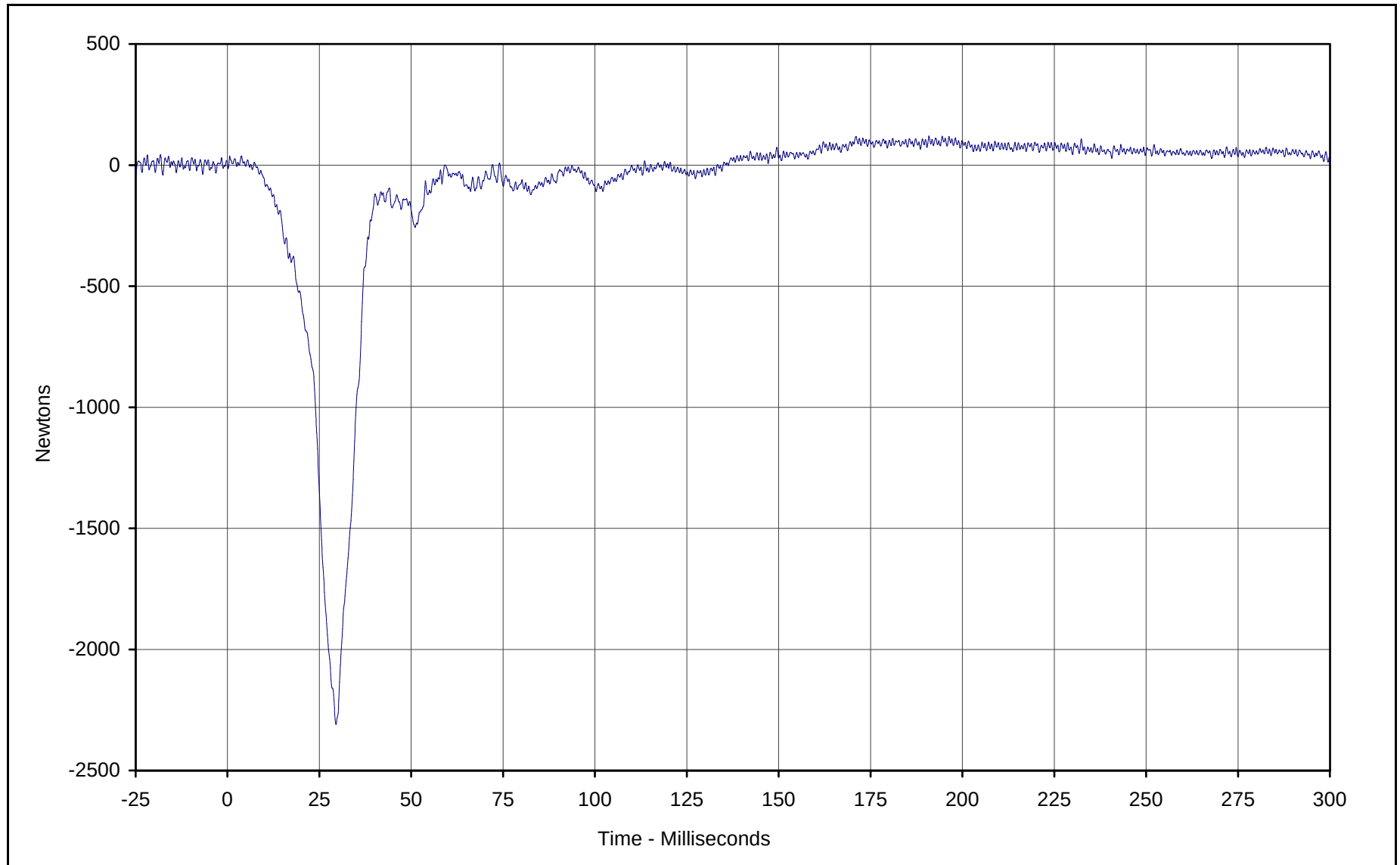
Curve Number: FIL-081

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01



Curve Description: Passenger Right lower Tibia Force Z

Maximum Value: 120.0 at 190.9 Milliseconds

Minimum Value: -2310.1 at 29.5 Milliseconds

SAE Filter Class: 600

Date of Test: 12/7/01

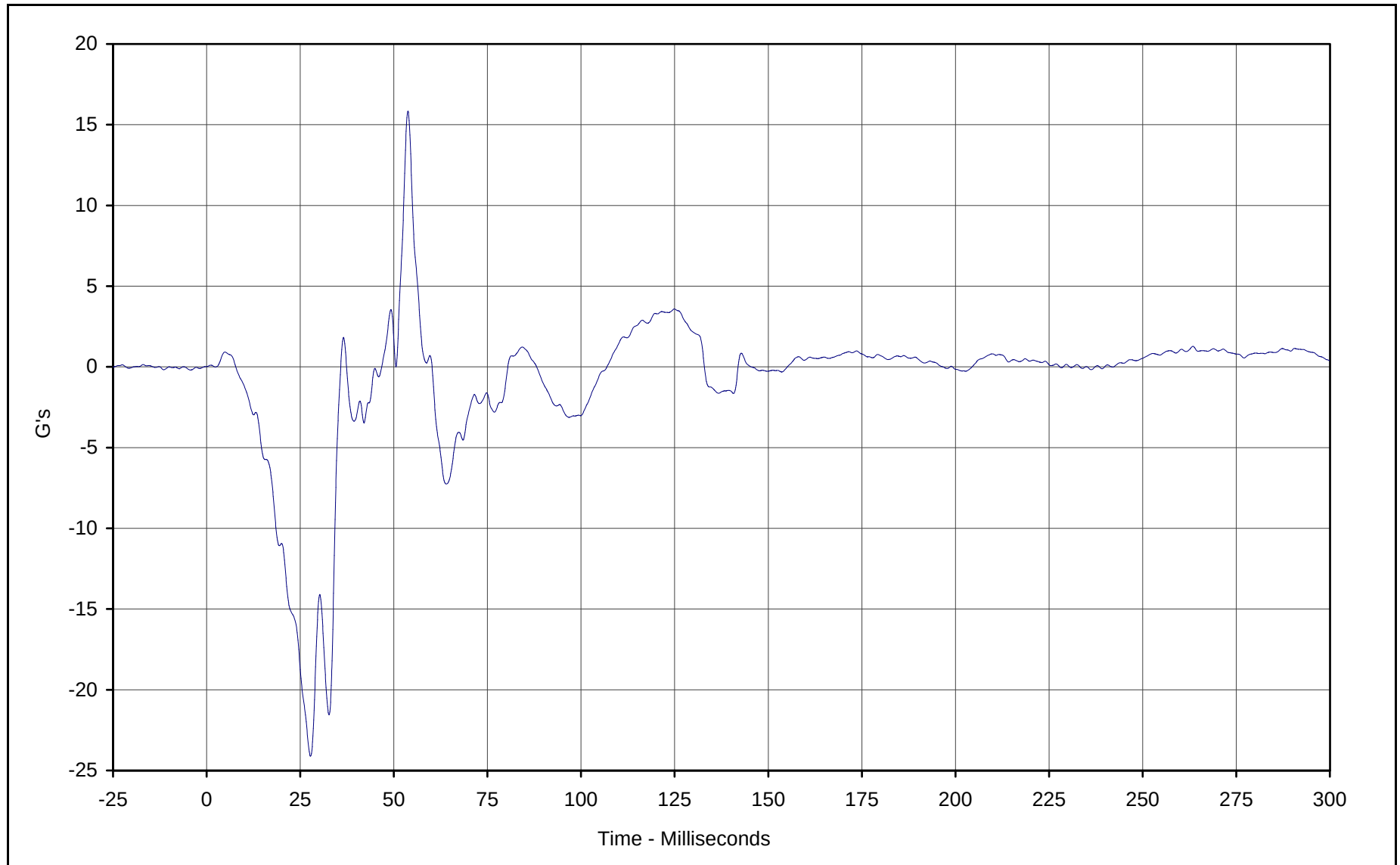
Curve Number: FIL-082

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



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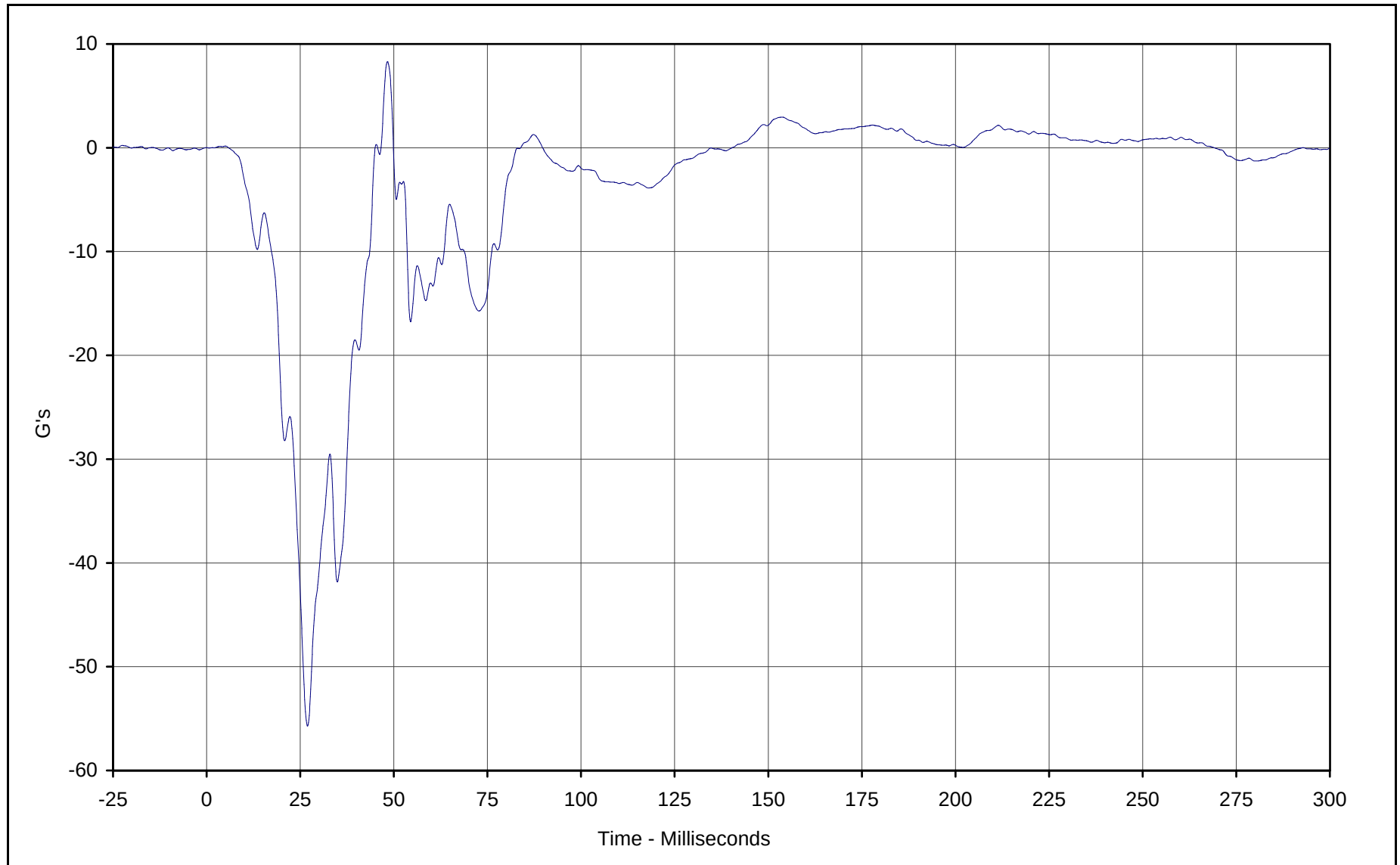
Curve Description: Passenger Left Foot Aft X
Maximum Value: 15.8 at 53.8 Milliseconds
Minimum Value: -24.1 at 27.7 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-083

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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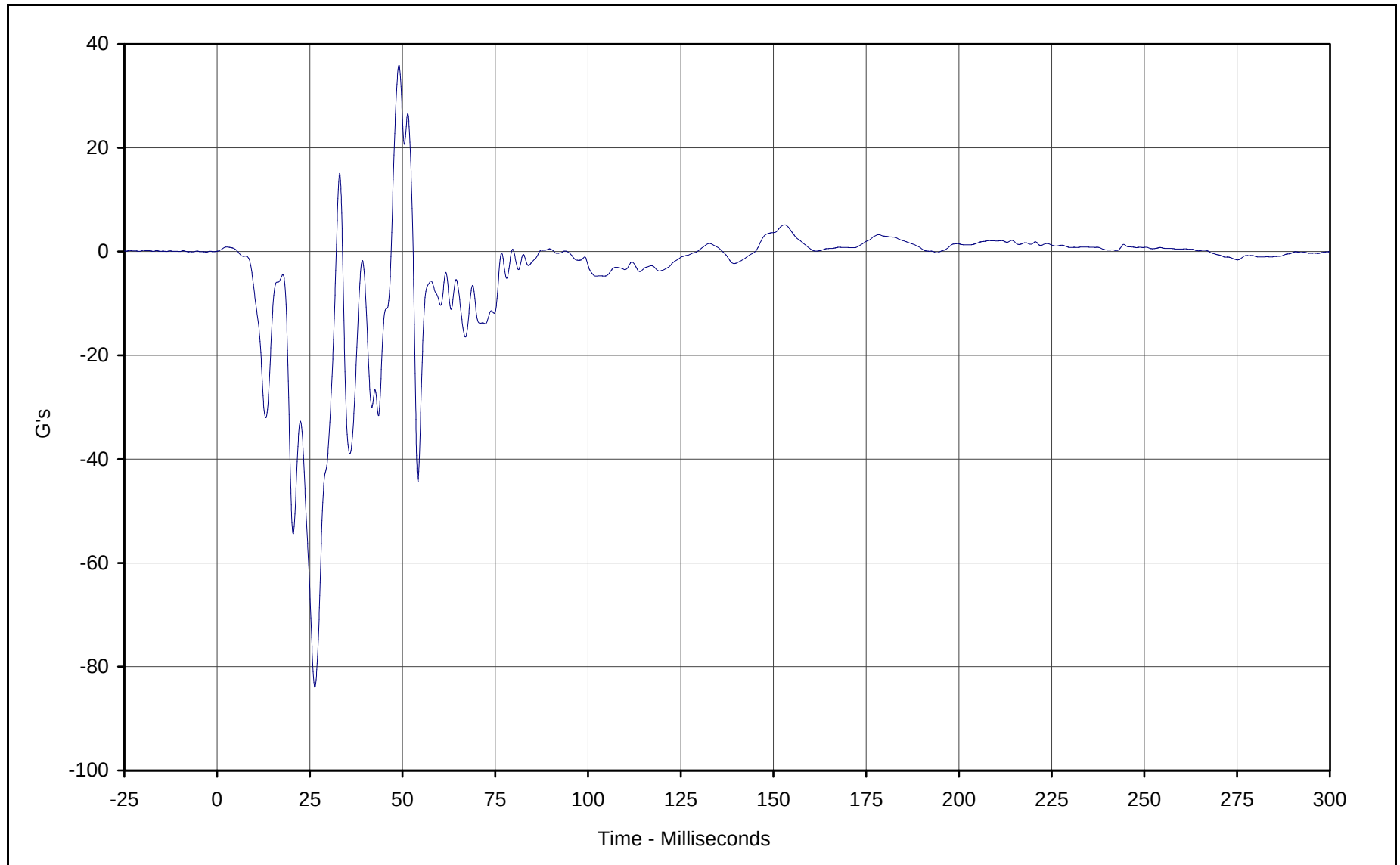
Curve Description: Passenger Left Foot Aft Z
Maximum Value: 8.3 at 48.3 Milliseconds
Minimum Value: -55.7 at 26.9 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-084

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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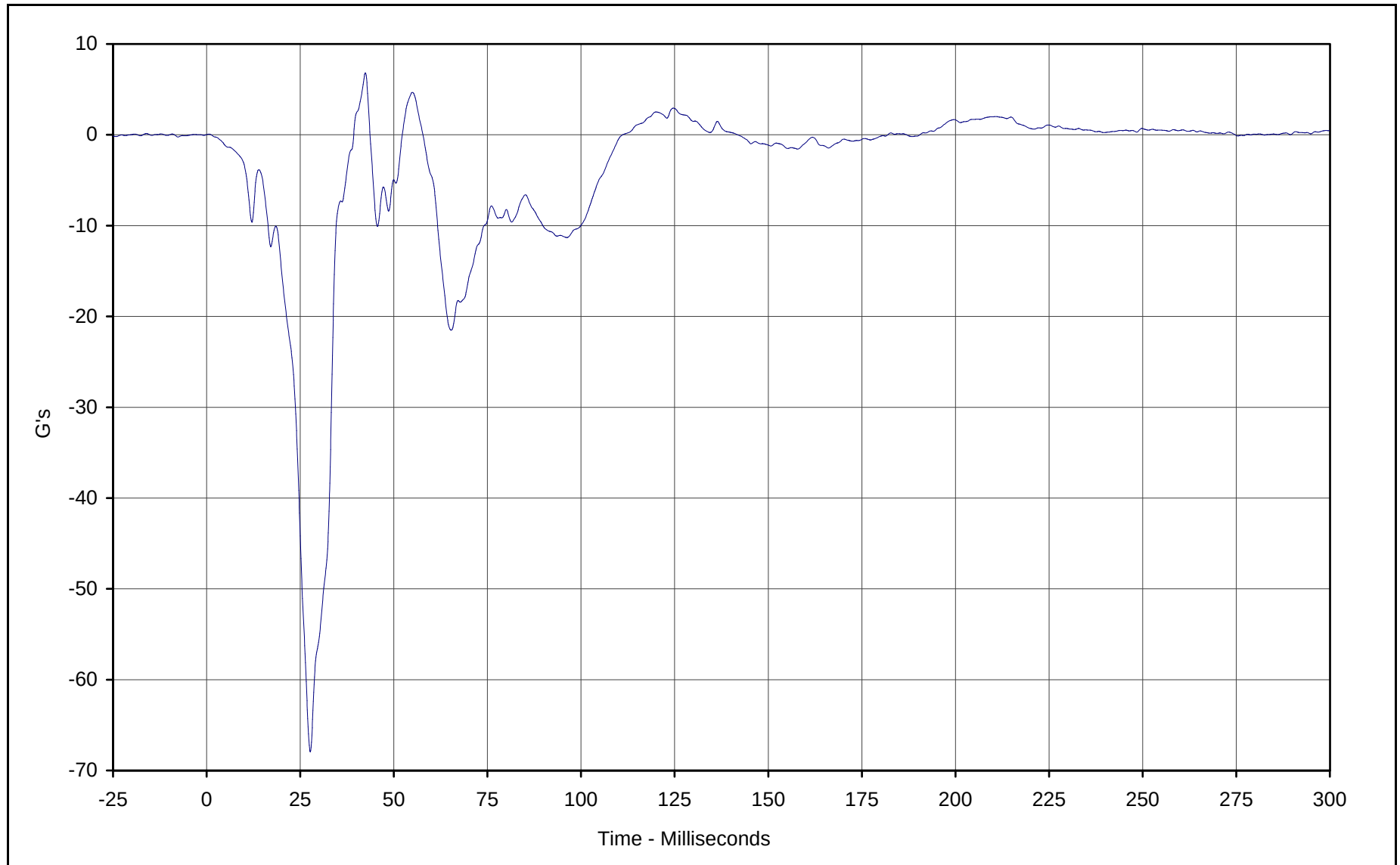
Curve Description: Passenger Left Foot Fore Z
Maximum Value: 35.9 at 49.0 Milliseconds
Minimum Value: -84.0 at 26.4 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-085

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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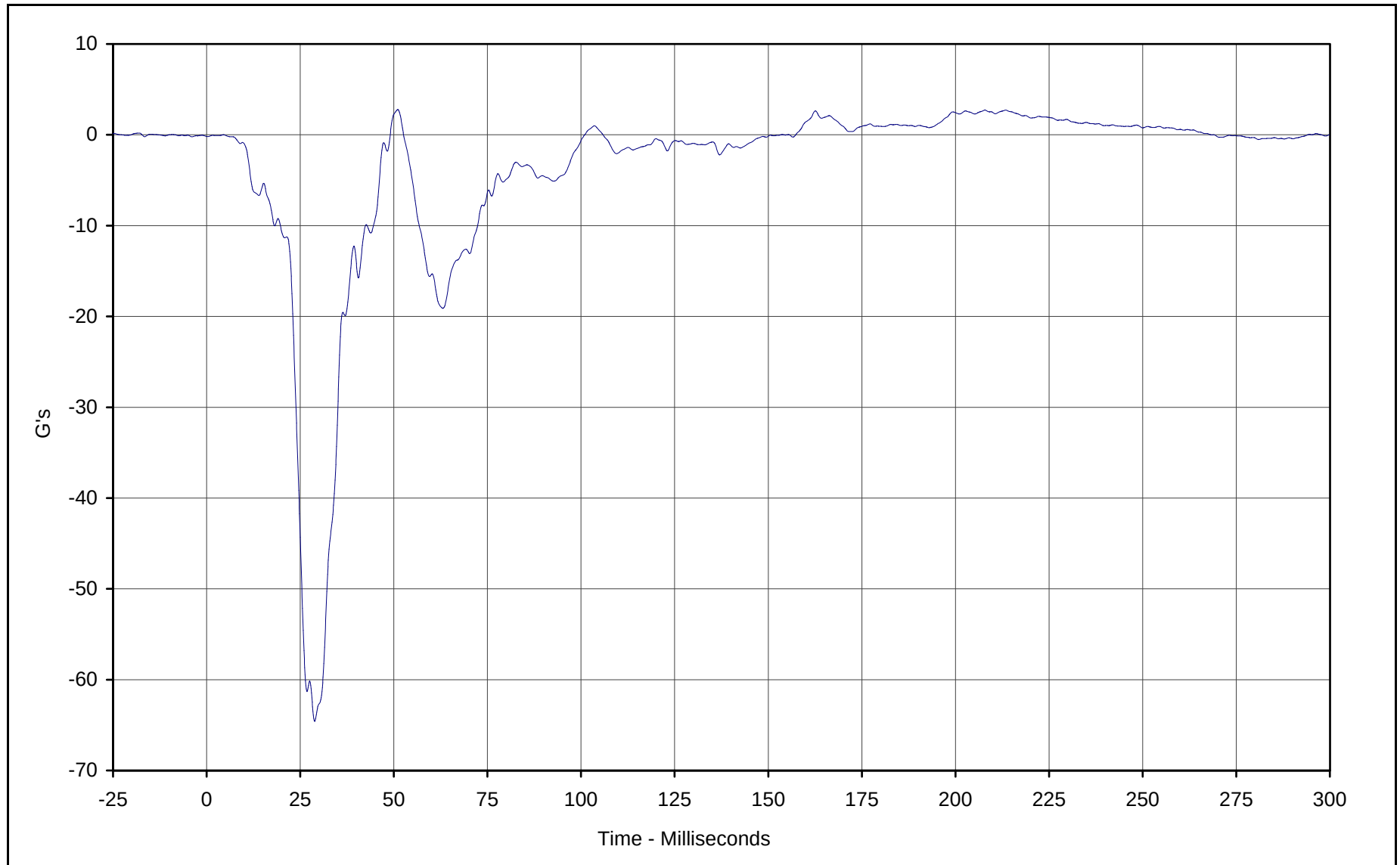
Curve Description: Passenger Right Foot Aft X
Maximum Value: 6.8 at 42.4 Milliseconds
Minimum Value: -68.0 at 27.7 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-086

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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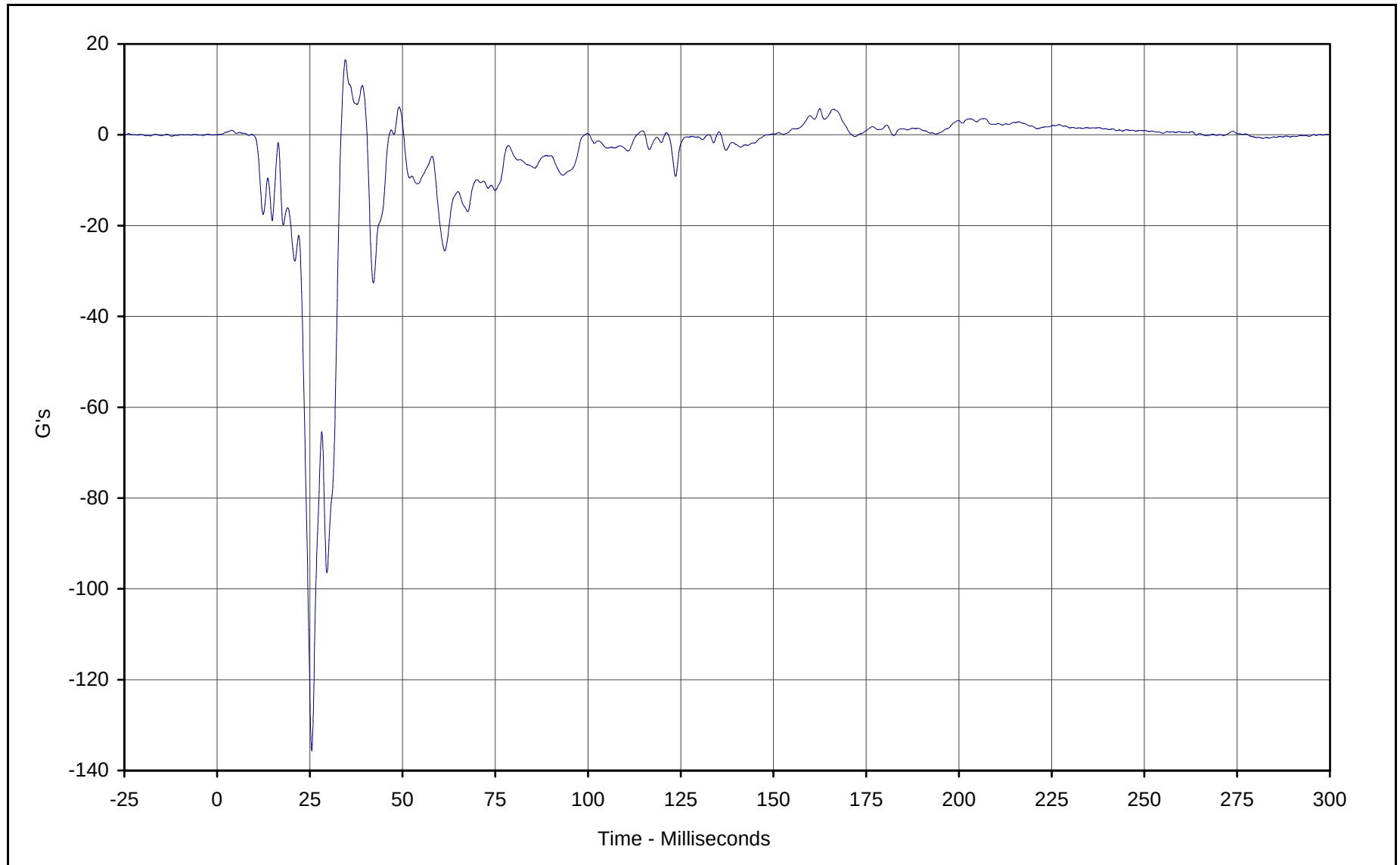
Curve Description: Passenger Right Foot Aft Z
Maximum Value: 2.8 at 51.1 Milliseconds
Minimum Value: -64.6 at 28.9 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-087

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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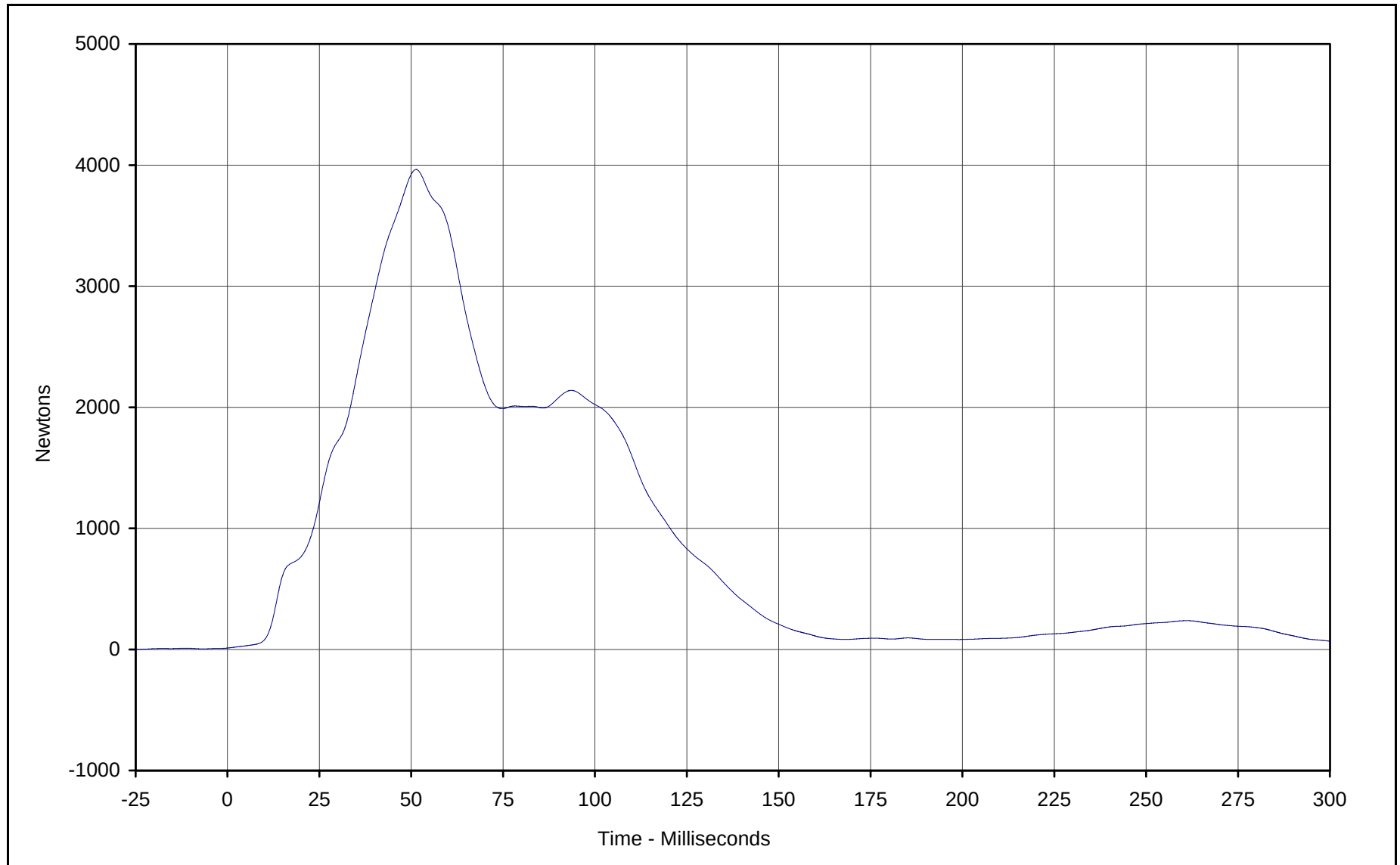
Curve Description: Passenger Right Foot Fore Z
Maximum Value: 16.5 at 34.6 Milliseconds
Minimum Value: -135.7 at 25.5 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: FIL-088

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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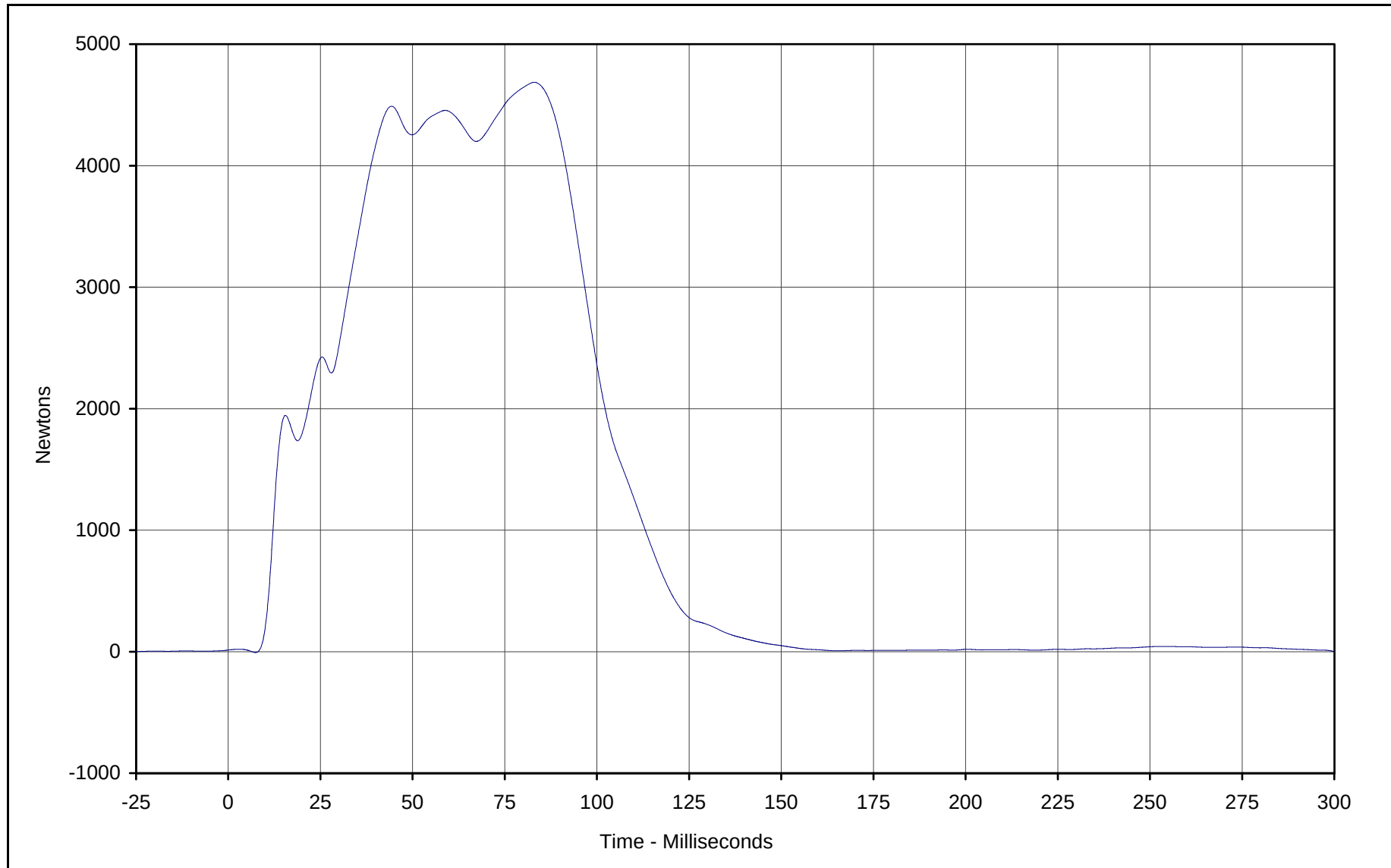
Curve Description: Passenger Lap Belt Force
Maximum Value: 3963.8 at 51.3 Milliseconds
Minimum Value: 11.2 at 0.0 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-089

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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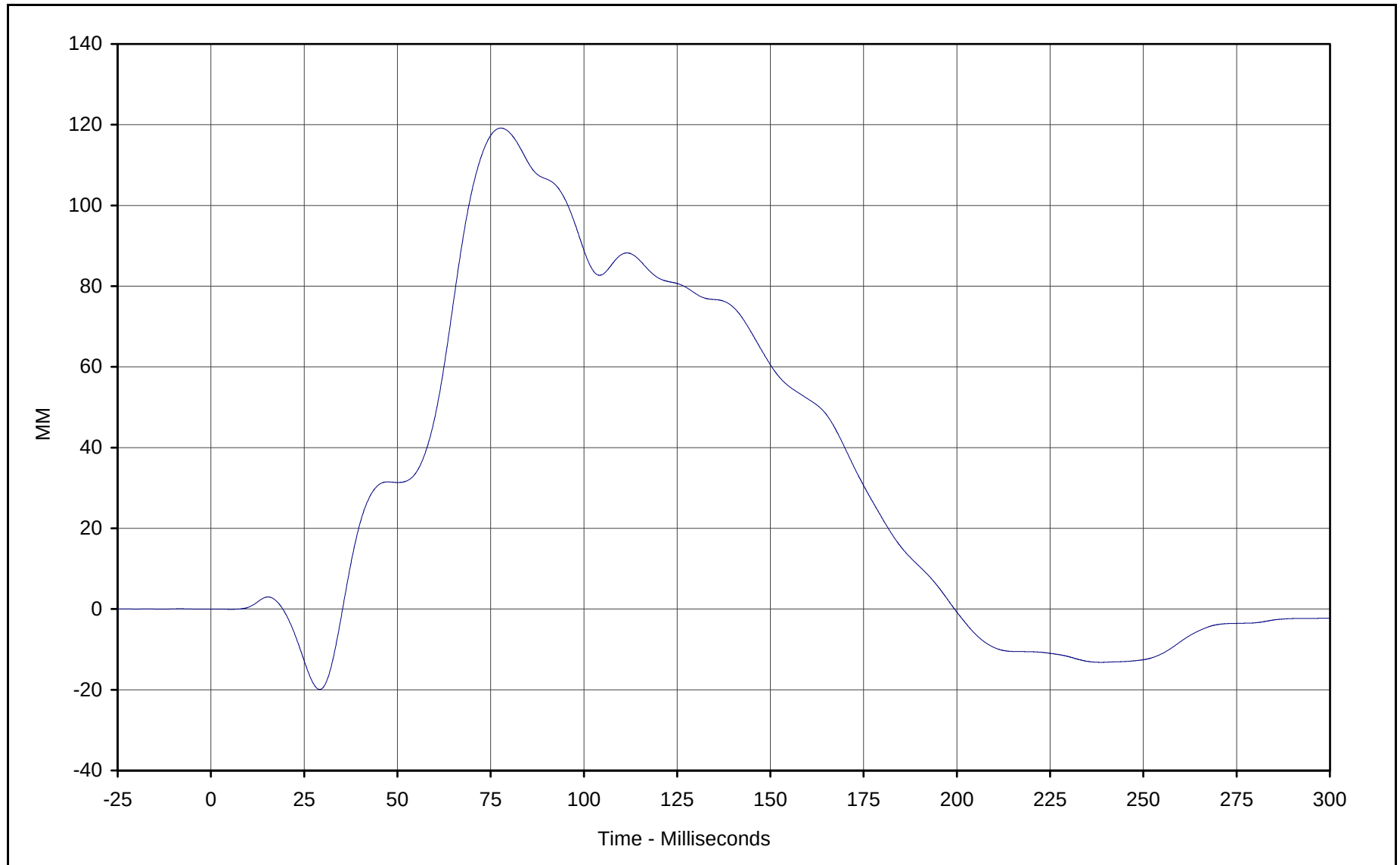
Curve Description: Passenger Shoulder Belt Force
Maximum Value: 4685.8 at 83.0 Milliseconds
Minimum Value: -7.0 at 7.4 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-090

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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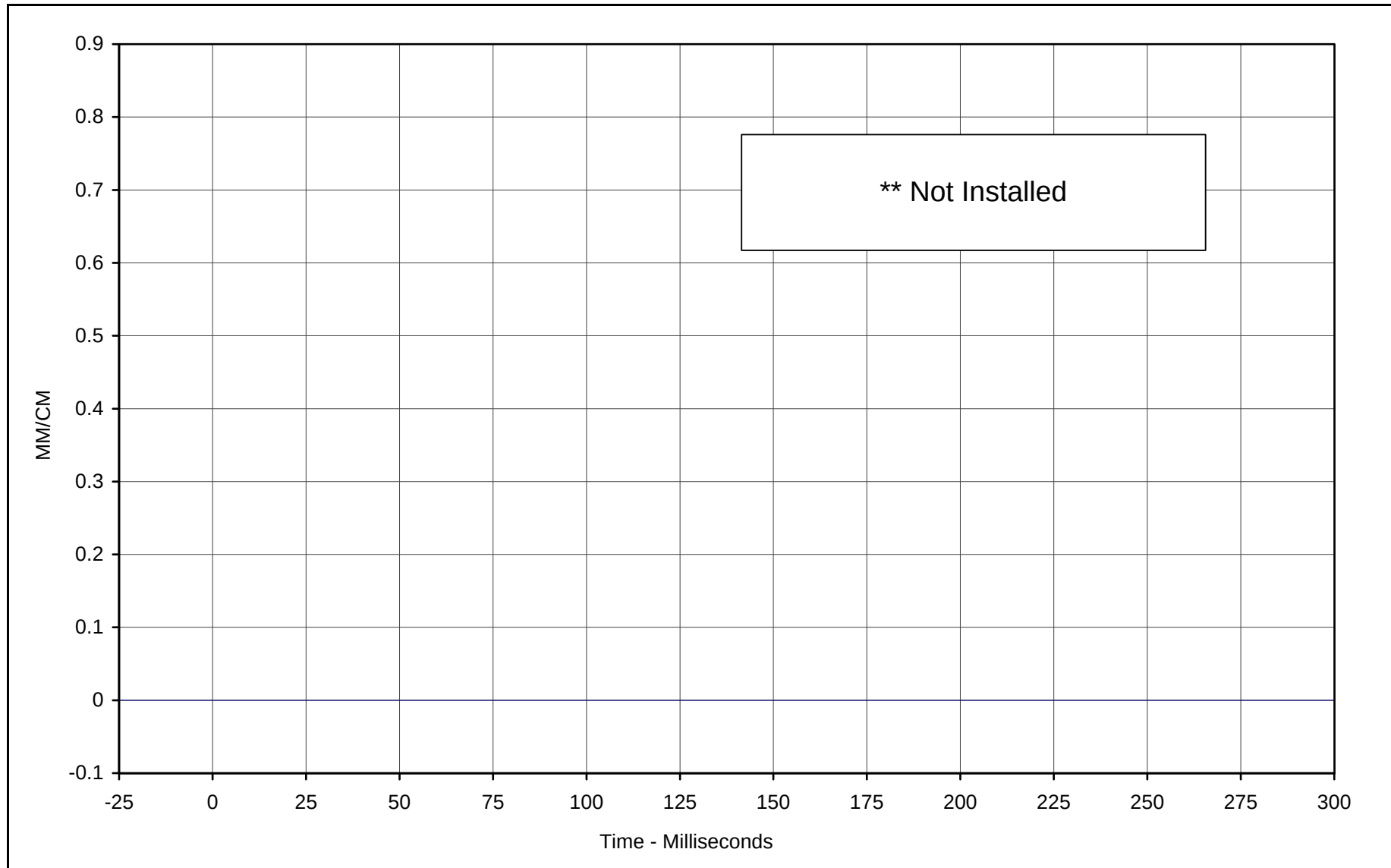


Curve Description: Passenger Shoulder Belt Pullout
Maximum Value: 119.2 at 77.7 Milliseconds
Minimum Value: -19.9 at 29.2 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-091

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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Curve Description: Passenger Shoulder Belt Elongation **

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Maximum Value: 0.0 at 0.0 Milliseconds

Test Vehicle: 2002 Kia Sedona LX Minivan

Minimum Value: 0.0 at 0.0 Milliseconds

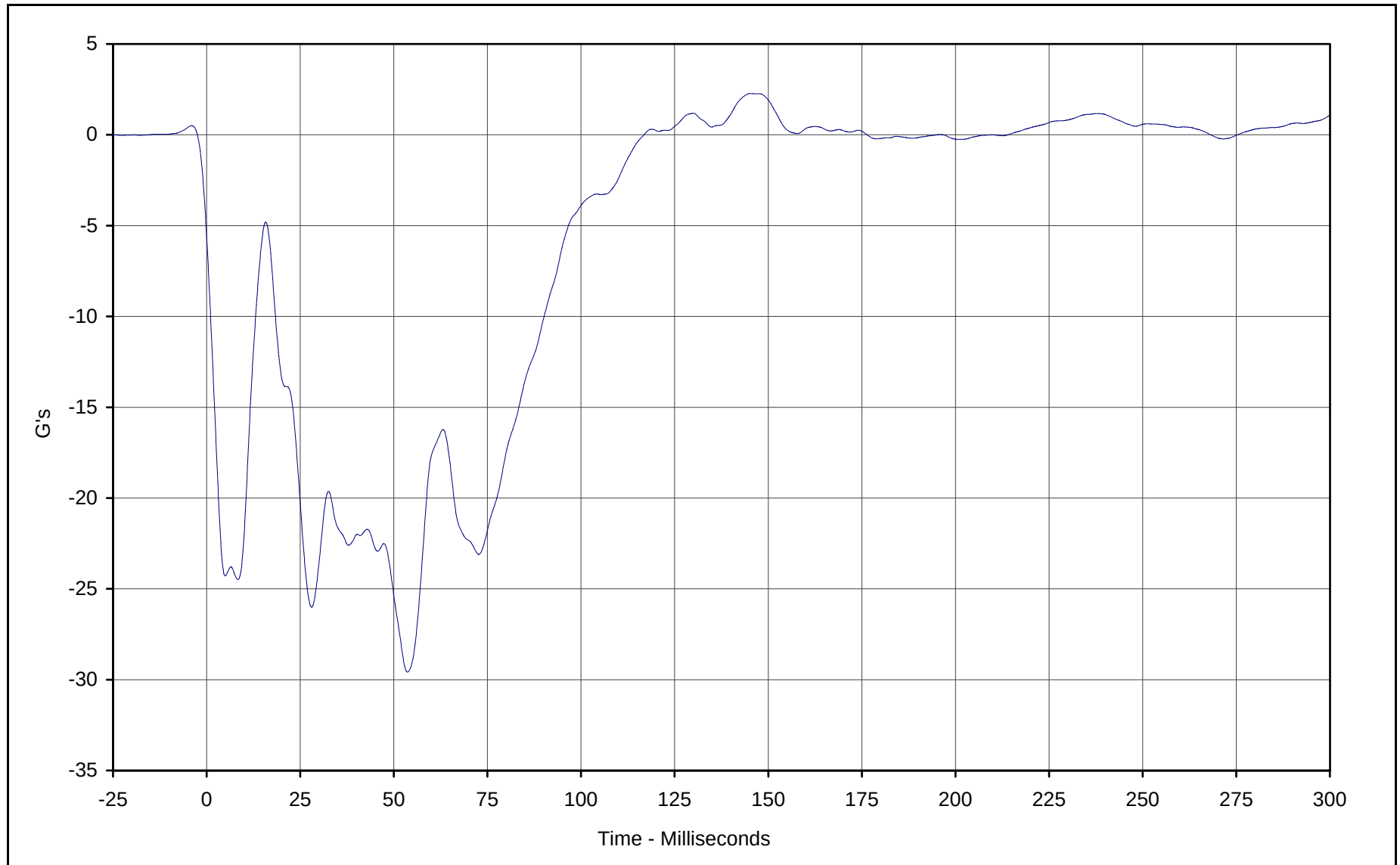
SAE Filter Class: 60

Date of Test: 12/7/01

Curve Number: FIL-092

** Not installed



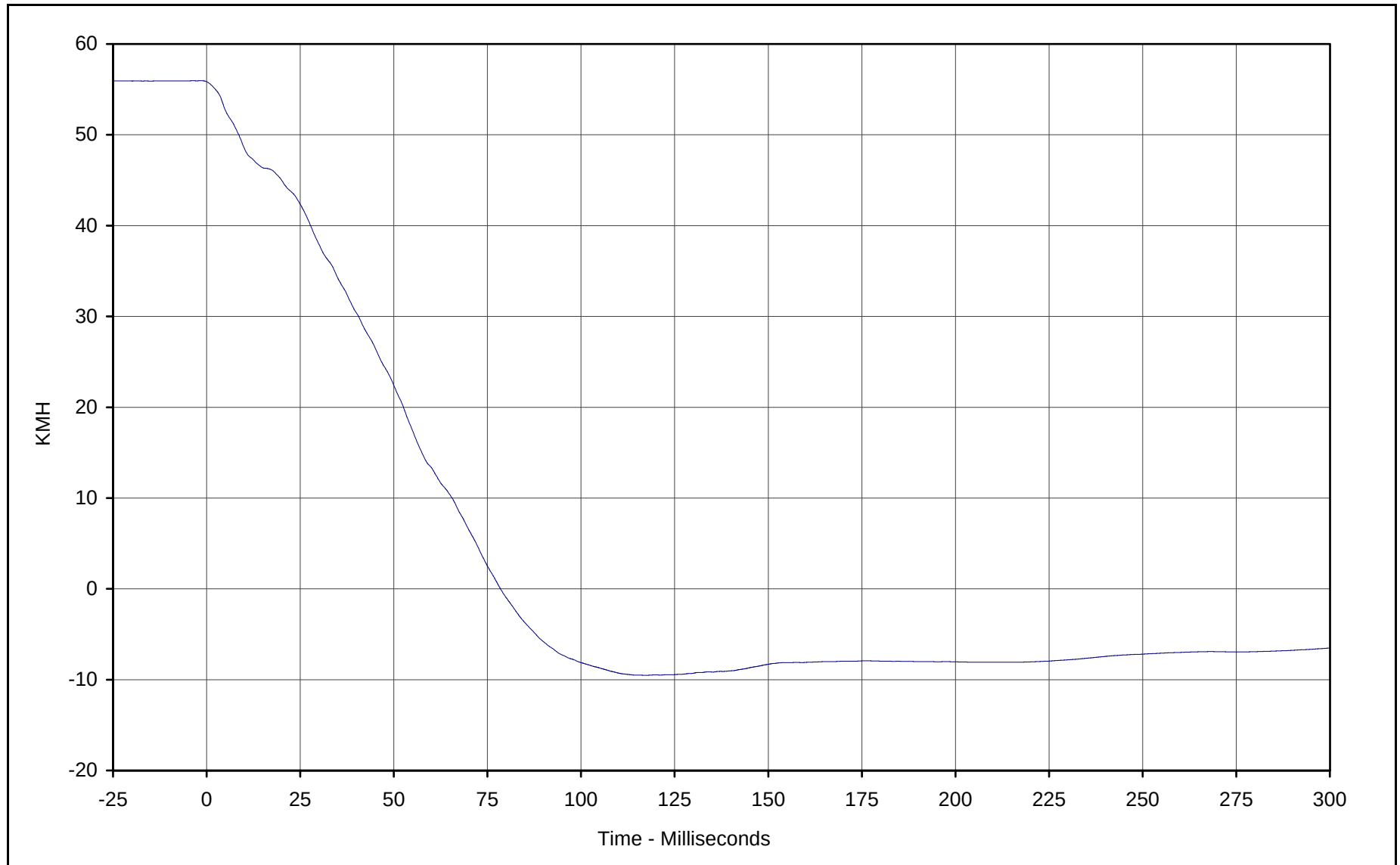


Curve Description: Vehicle Left Rear X
Maximum Value: 2.3 at 145.3 Milliseconds
Minimum Value: -29.6 at 53.6 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-093

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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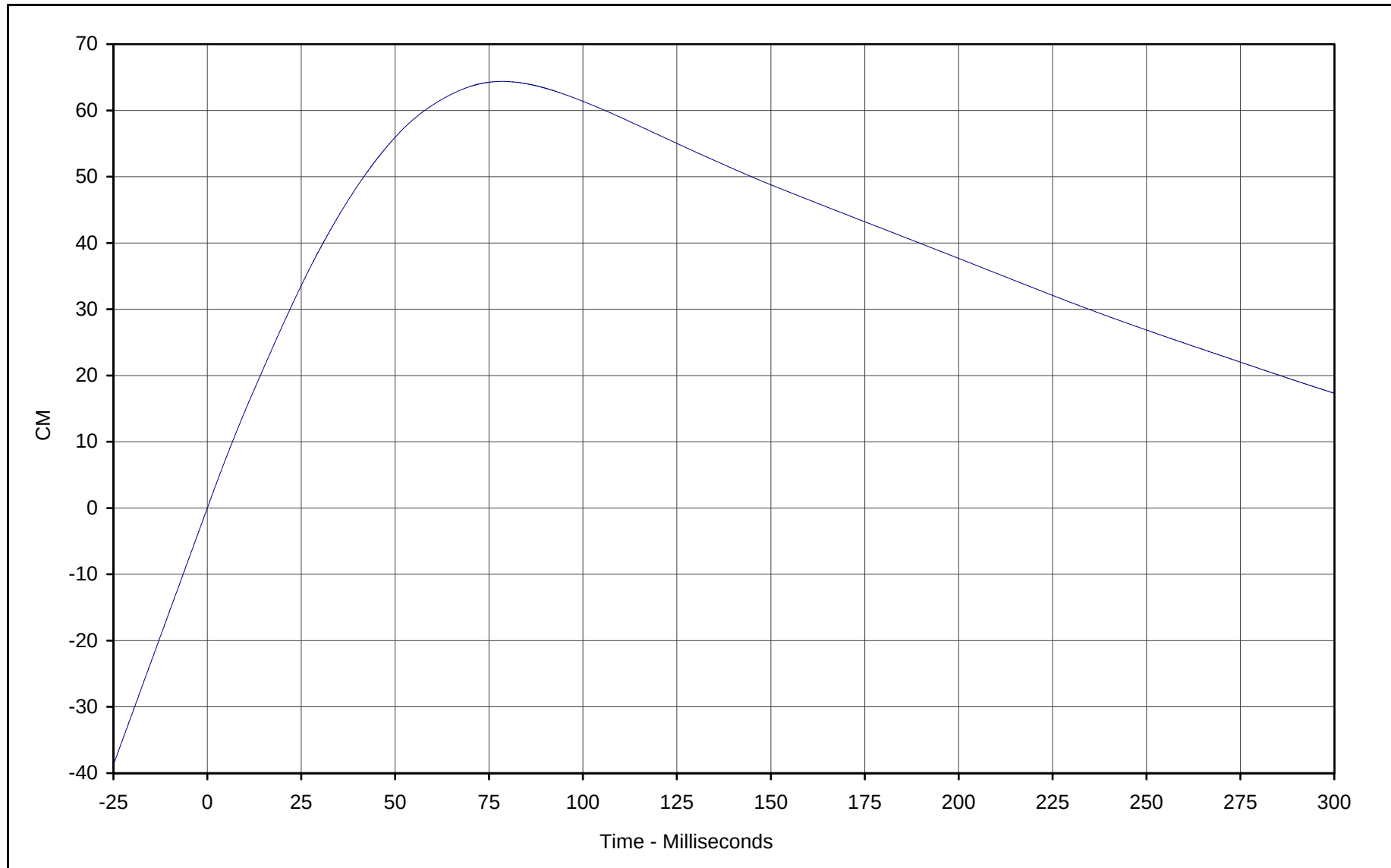
Curve Description: Vehicle Left Rear X Velocity
Maximum Value: 55.8 at 0.0 Milliseconds
Minimum Value: -9.5 at 117.3 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN1-093

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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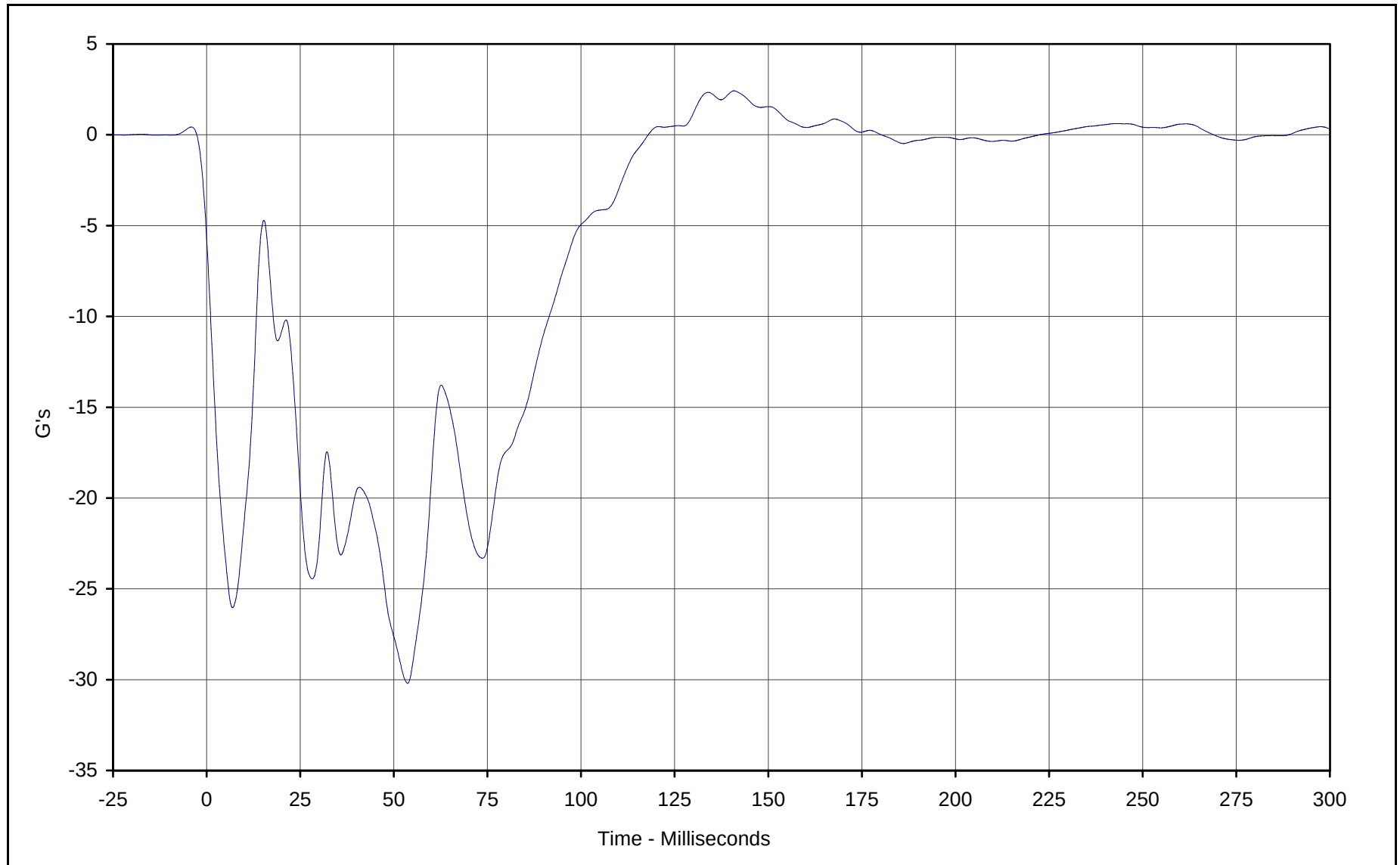
Curve Description: Vehicle Left Rear X Displ.
Maximum Value: 64.4 at 78.5 Milliseconds
Minimum Value: 0.0 at 0.0 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN2-093

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

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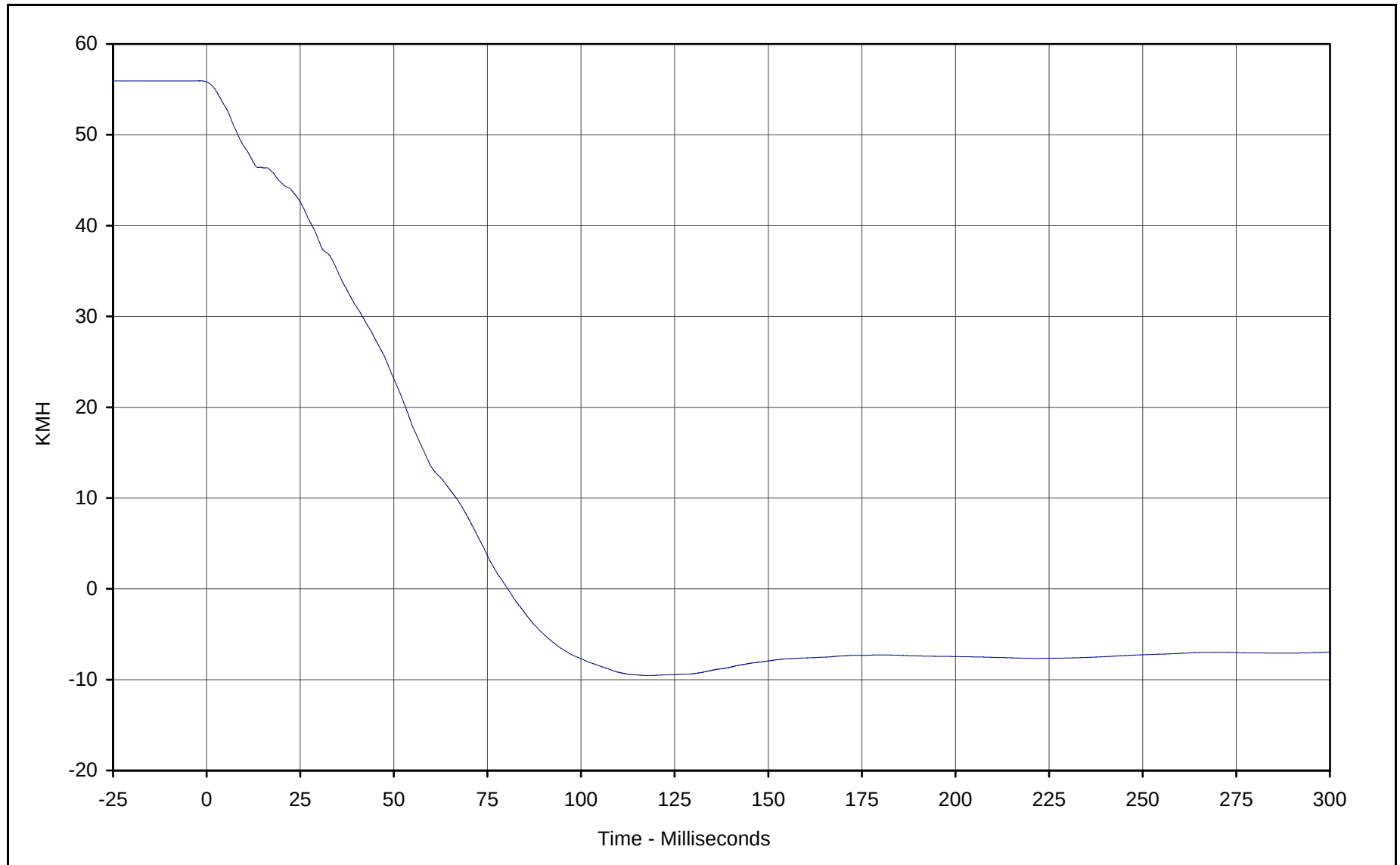
Curve Description: Vehicle Right Rear X
Maximum Value: 2.4 at 140.9 Milliseconds
Minimum Value: -30.2 at 53.7 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-094

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



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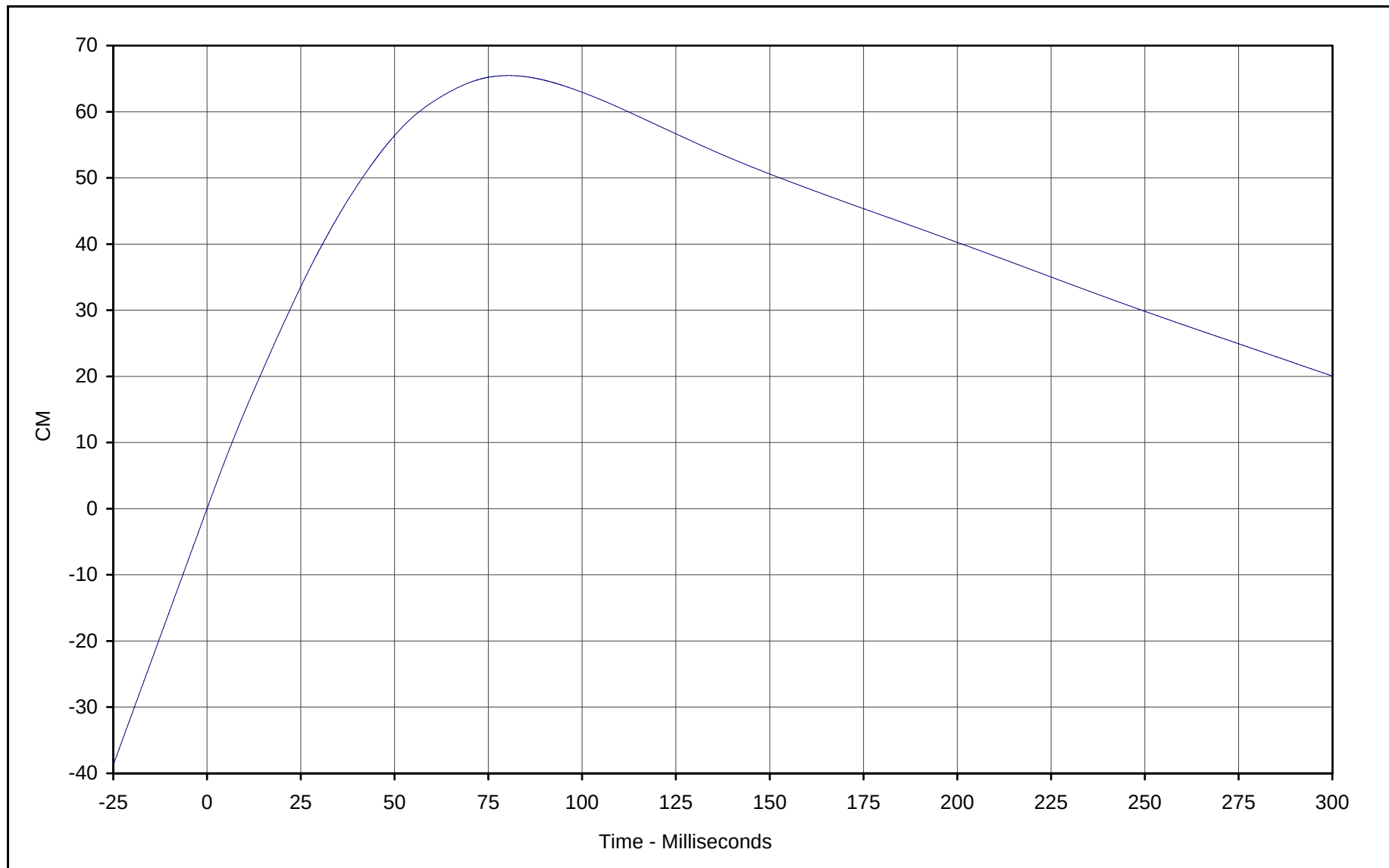
Curve Description: Vehicle Right Rear X Velocity
Maximum Value: 55.8 at 0.0 Milliseconds
Minimum Value: -9.5 at 118.5 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN1-094

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

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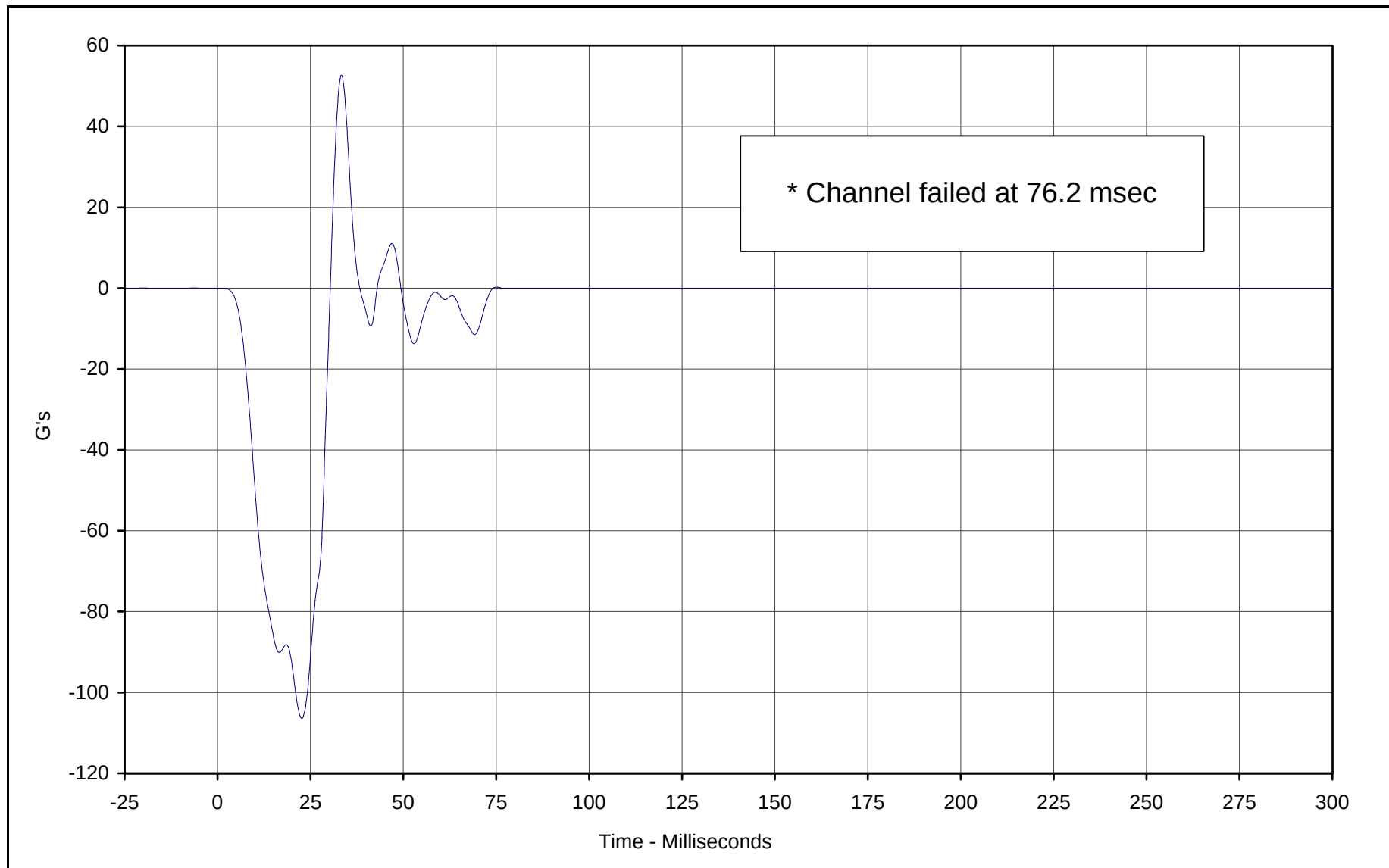
Curve Description: Vehicle Right Rear X Displ.
Maximum Value: 65.5 at 80.4 Milliseconds
Minimum Value: 0.0 at 0.0 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN2-094

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

B-133



Curve Description: Vehicle Engine Top *

Maximum Value: 52.7 at 33.3 Milliseconds

Minimum Value: -106.4 at 22.7 Milliseconds

SAE Filter Class: 60

Date of Test: 12/7/01

Curve Number: FIL-095

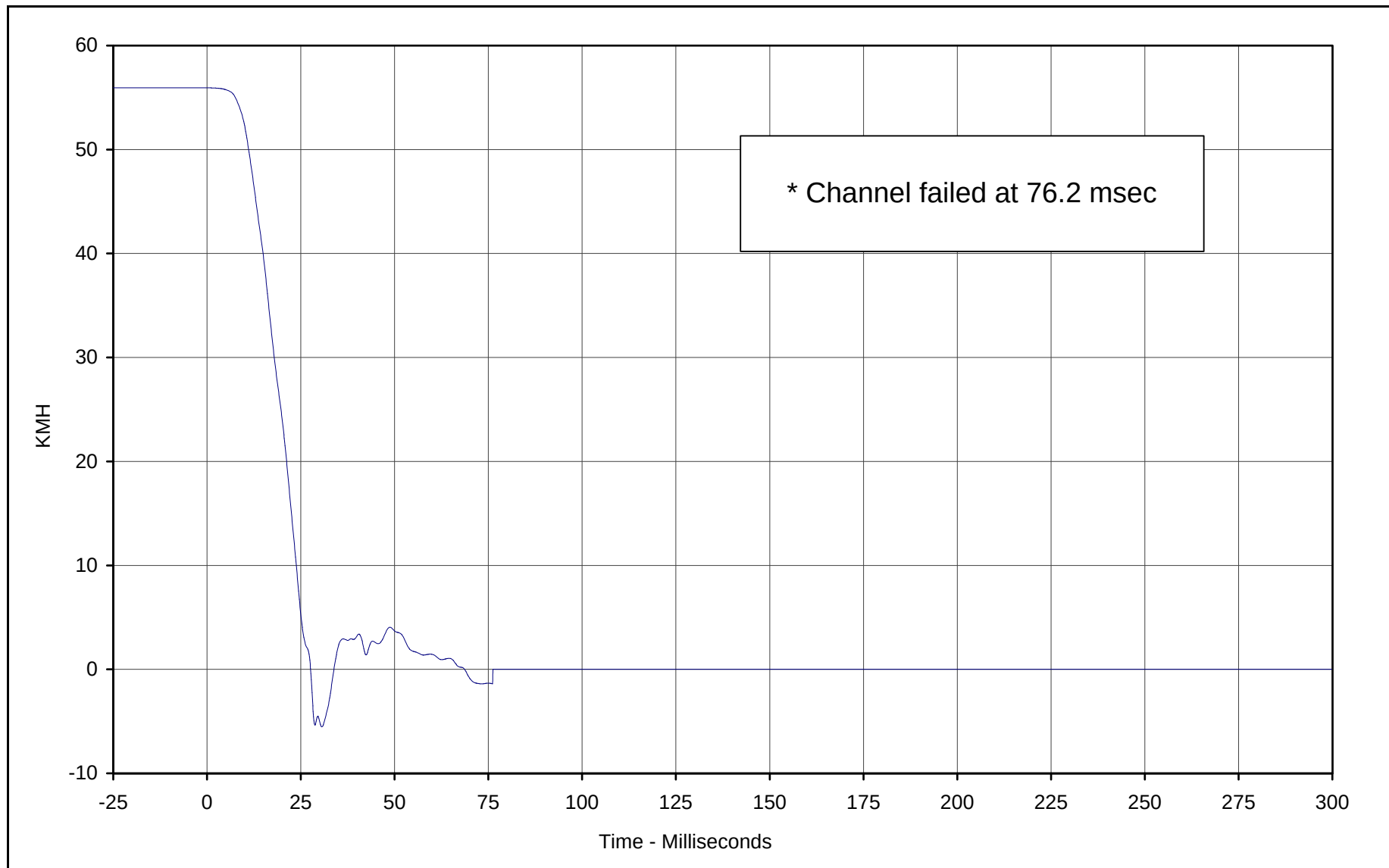
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan

* Channel failed at 76.2 msec



KAR22001-01



Curve Description: Vehicle Engine Top Velocity *

Maximum Value: 55.9 at 0.0 Milliseconds

Minimum Value: -5.5 at 30.6 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

Curve Number: IN1-095

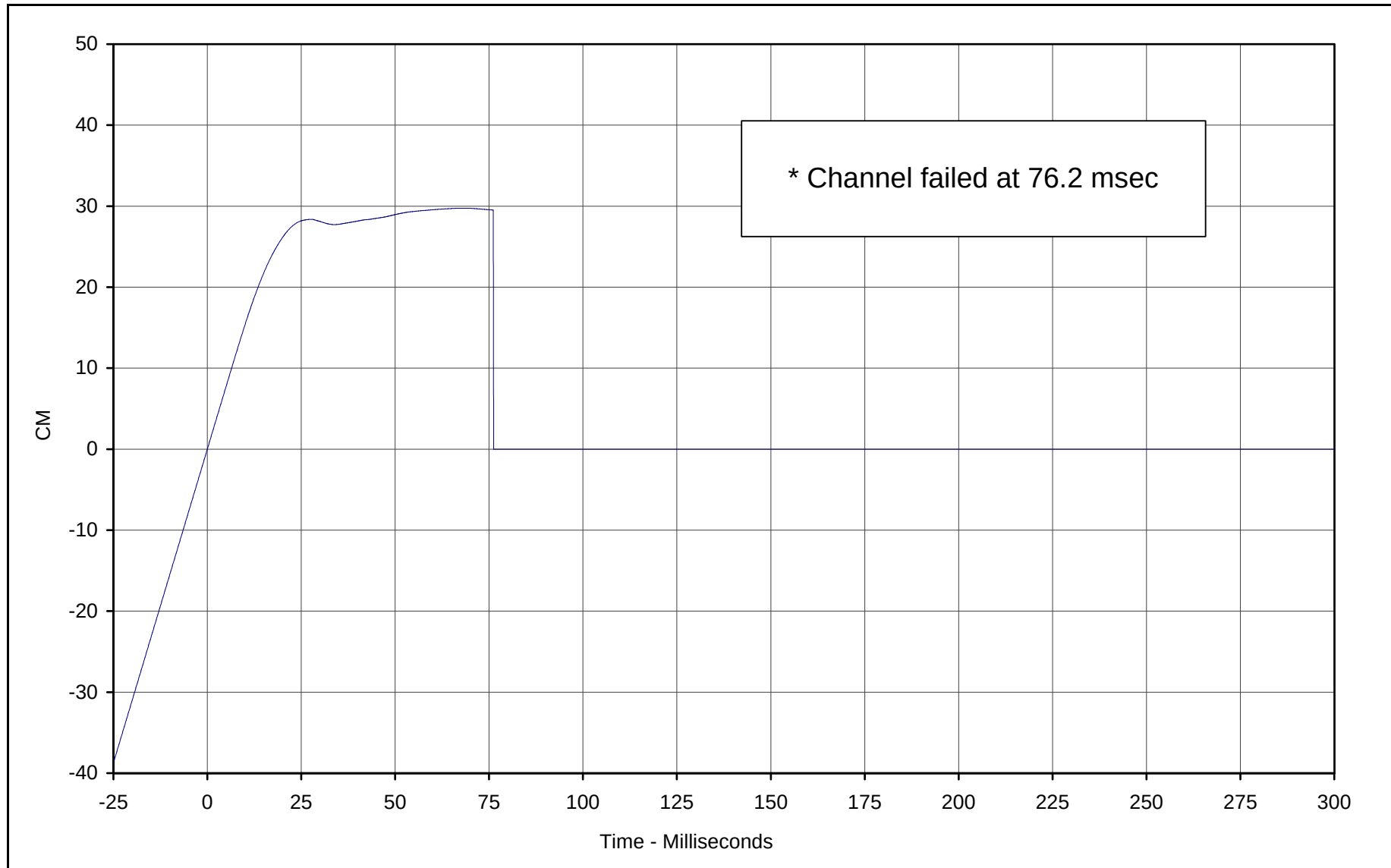
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan

* Channel failed at 76.2 msec



B-135



Curve Description: Vehicle Engine Top Displacement *

Maximum Value: 29.8 at 68.7 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

Curve Number: IN2-095

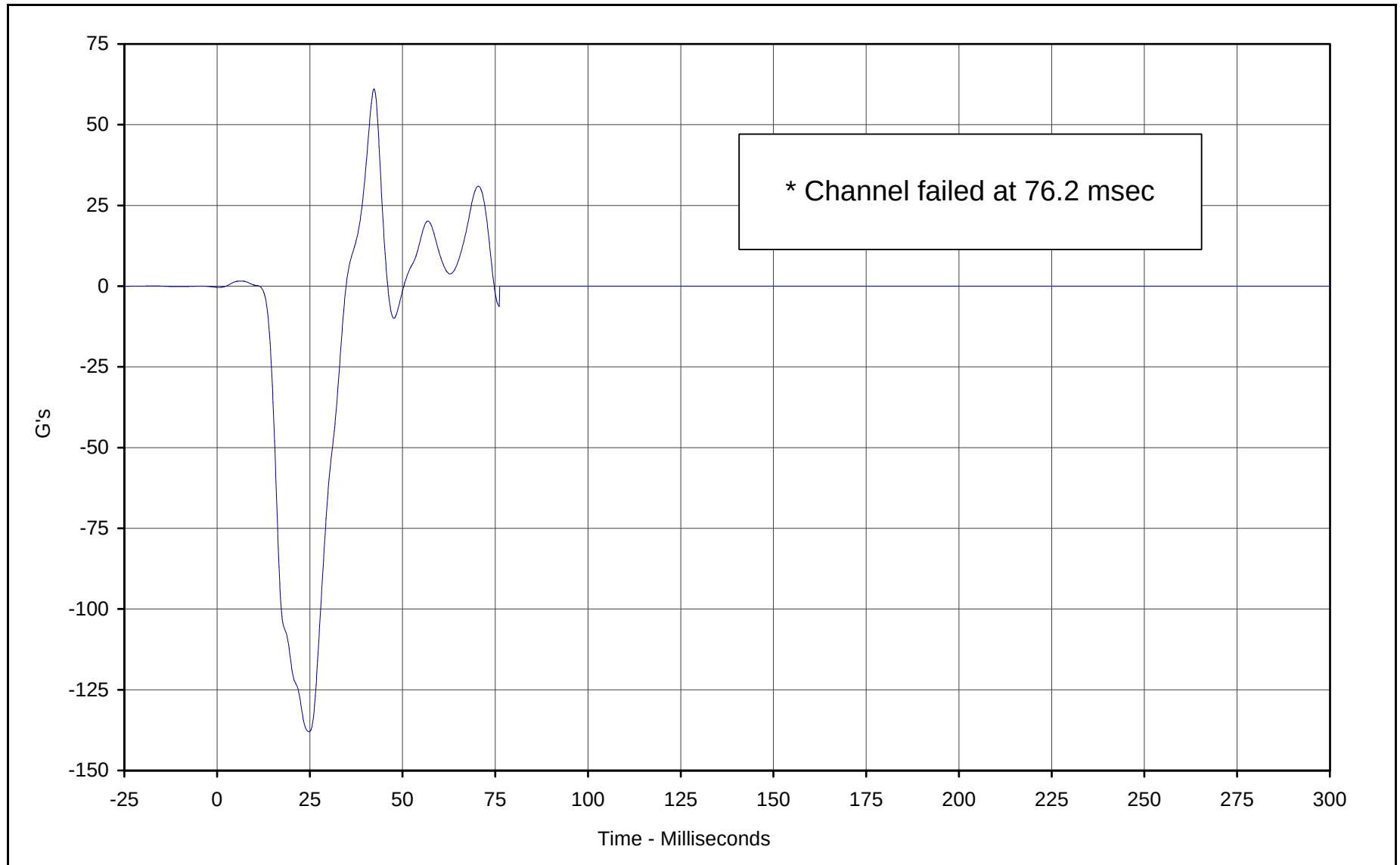
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan

* Channel failed at 76.2 msec



KAR22001-01



Curve Description: Vehicle Engine Bottom *

Maximum Value: 61.1 at 42.3 Milliseconds

Minimum Value: -138.0 at 24.8 Milliseconds

SAE Filter Class: 60

Date of Test: 12/7/01

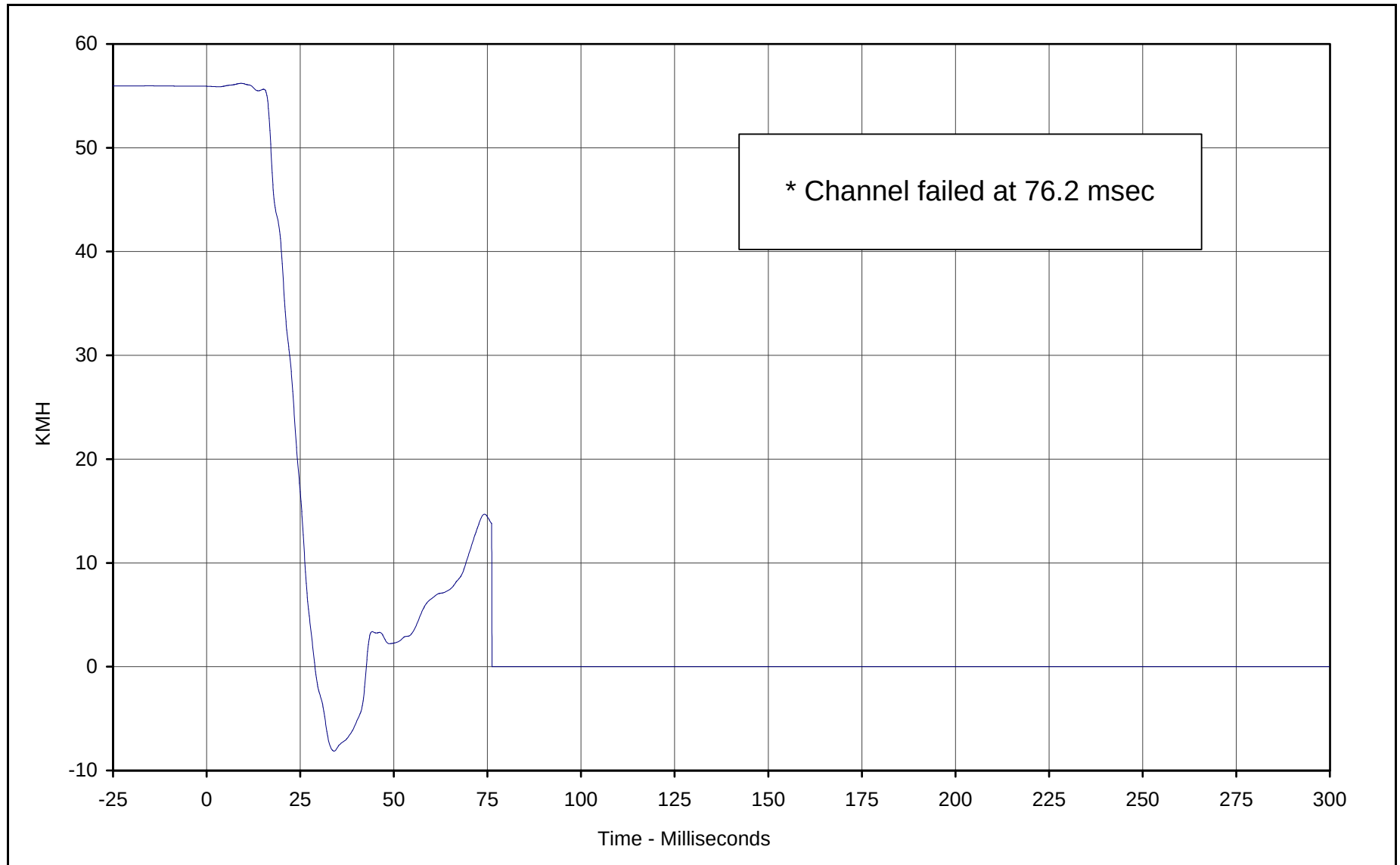
Curve Number: FIL-096

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan

* Channel failed at 76.2 msec





Curve Description: Vehicle Engine Bottom Velocity *

Maximum Value: 56.2 at 9.2 Milliseconds

Minimum Value: -8.1 at 34.0 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

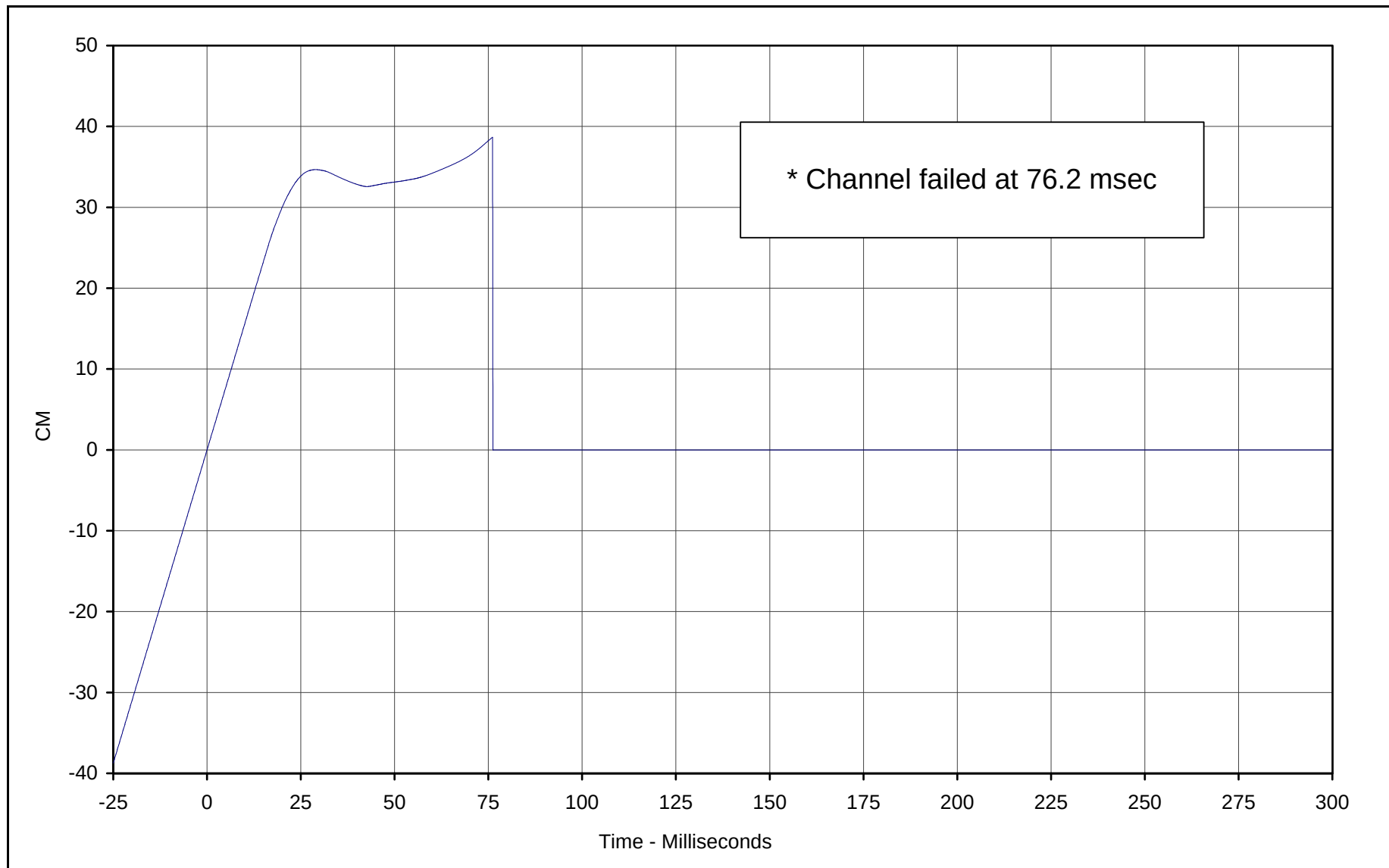
Curve Number: IN1-096

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan

* Channel failed at 76.2 msec





Curve Description: Vehicle Engine Bottom Displacement *

Maximum Value: 38.7 at 76.1 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

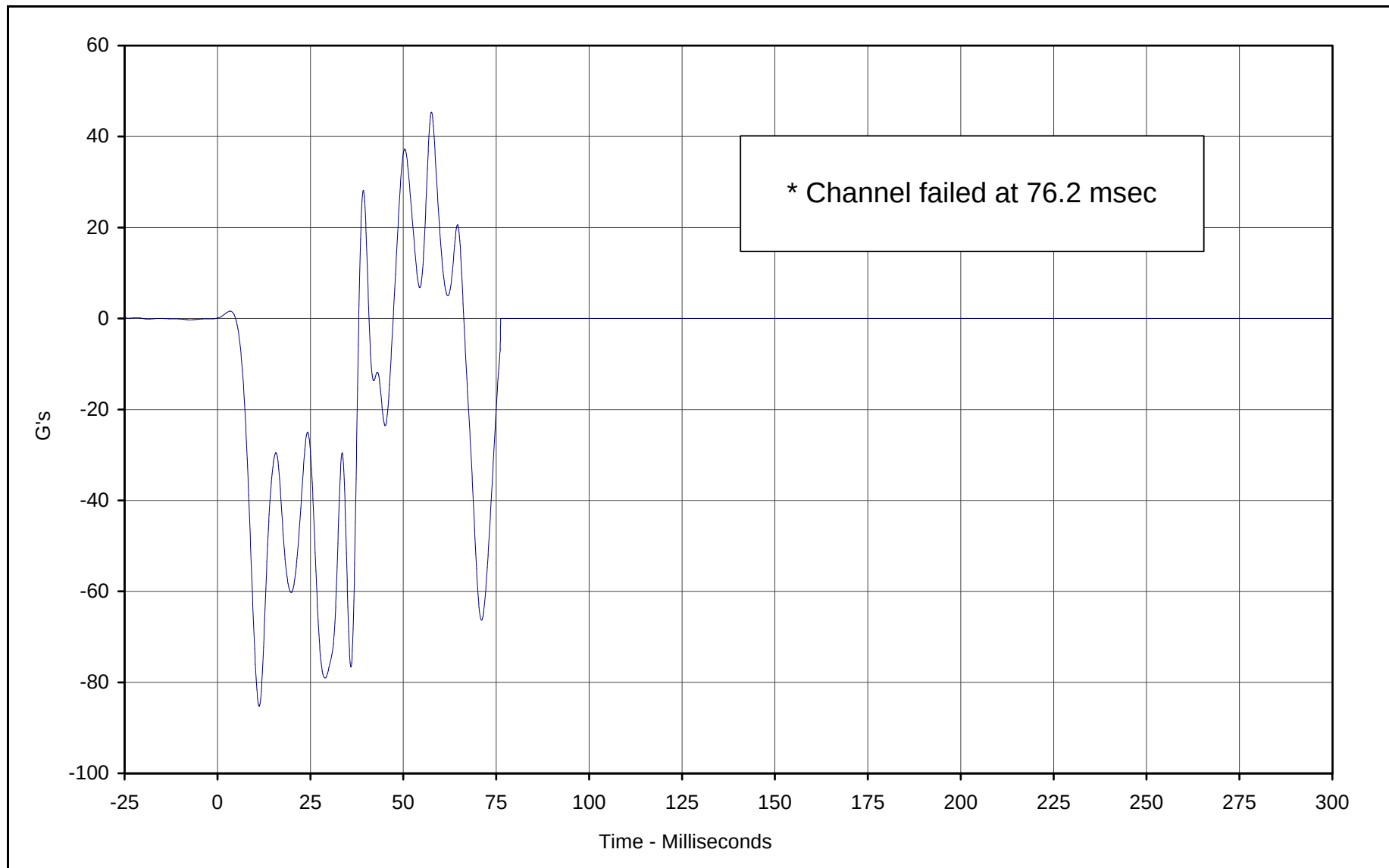
Curve Number: IN2-096

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan

* Channel failed at 76.2 msec





Curve Description: Vehicle Left Brake Caliper *

Maximum Value: 45.3 at 57.6 Milliseconds

Minimum Value: -85.3 at 11.2 Milliseconds

SAE Filter Class: 60

Date of Test: 12/7/01

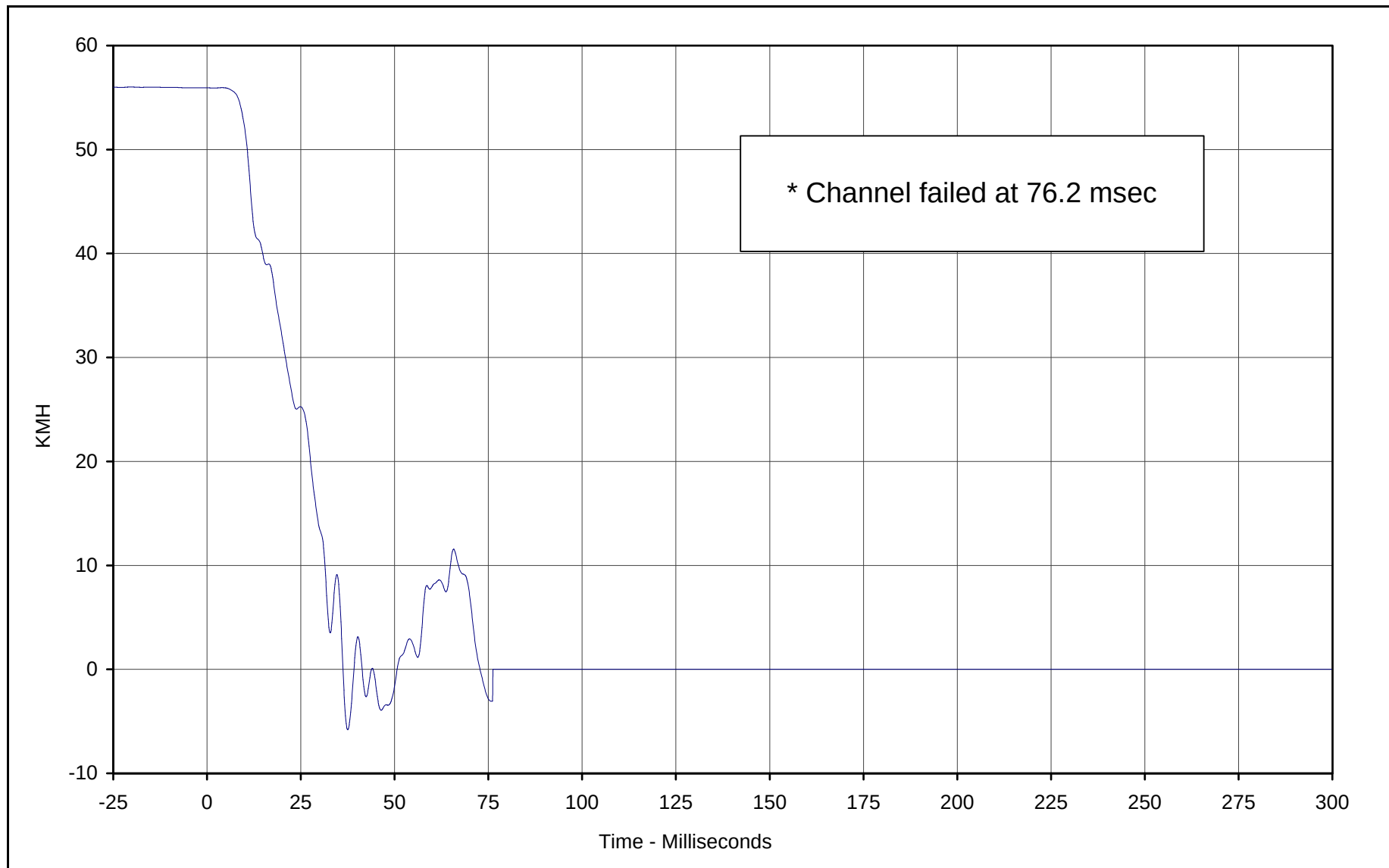
Curve Number: FIL-097

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan

* Channel failed at 76.2 msec





Curve Description: Vehicle Left Brake Caliper Velocity *

Maximum Value: 56.0 at 4.0 Milliseconds

Minimum Value: -5.8 at 37.5 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

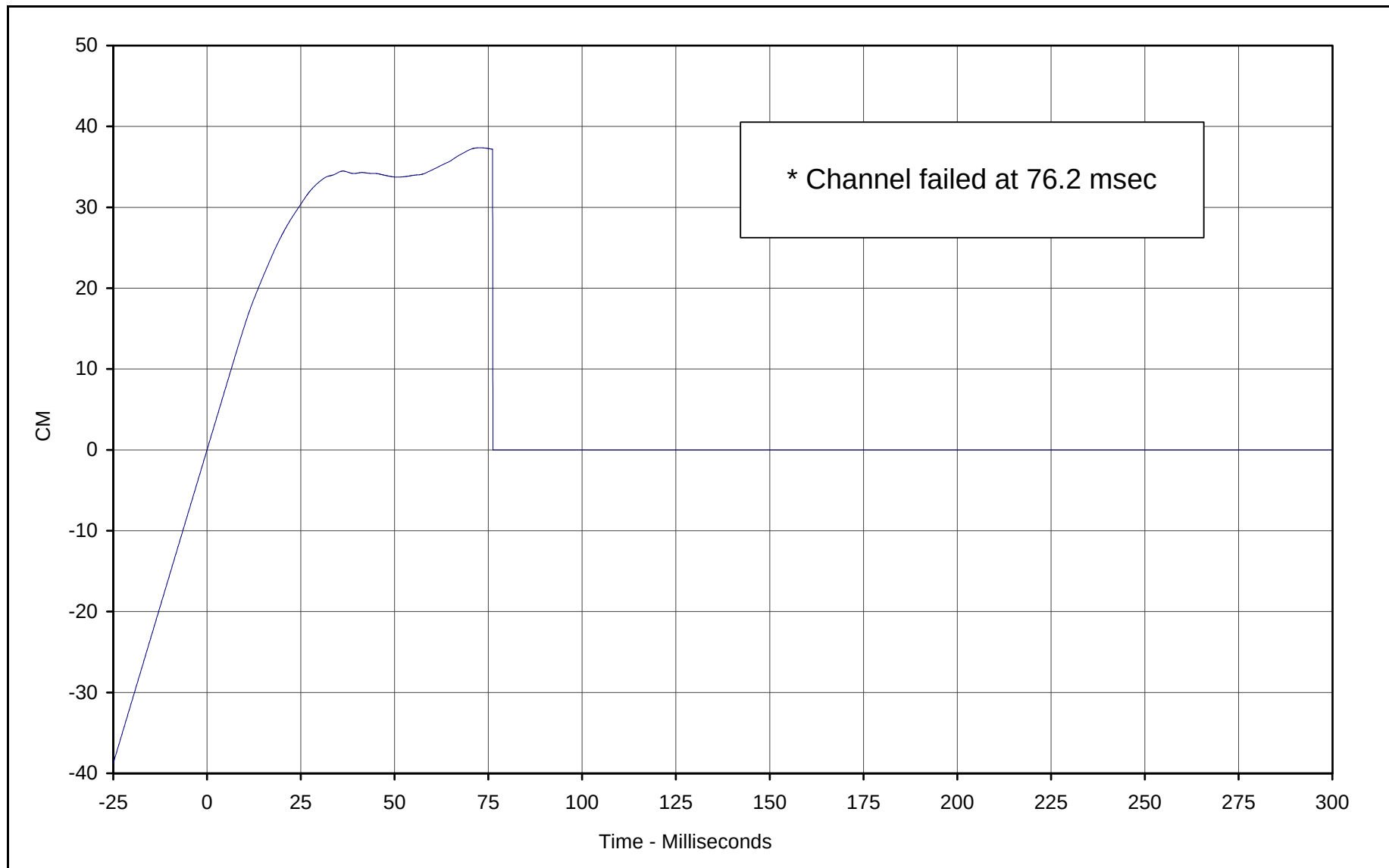
Curve Number: IN1-097

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan

* Channel failed at 76.2 msec





Curve Description: Vehicle Left Brake Caliper Displ. *

Maximum Value: 37.4 at 72.8 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

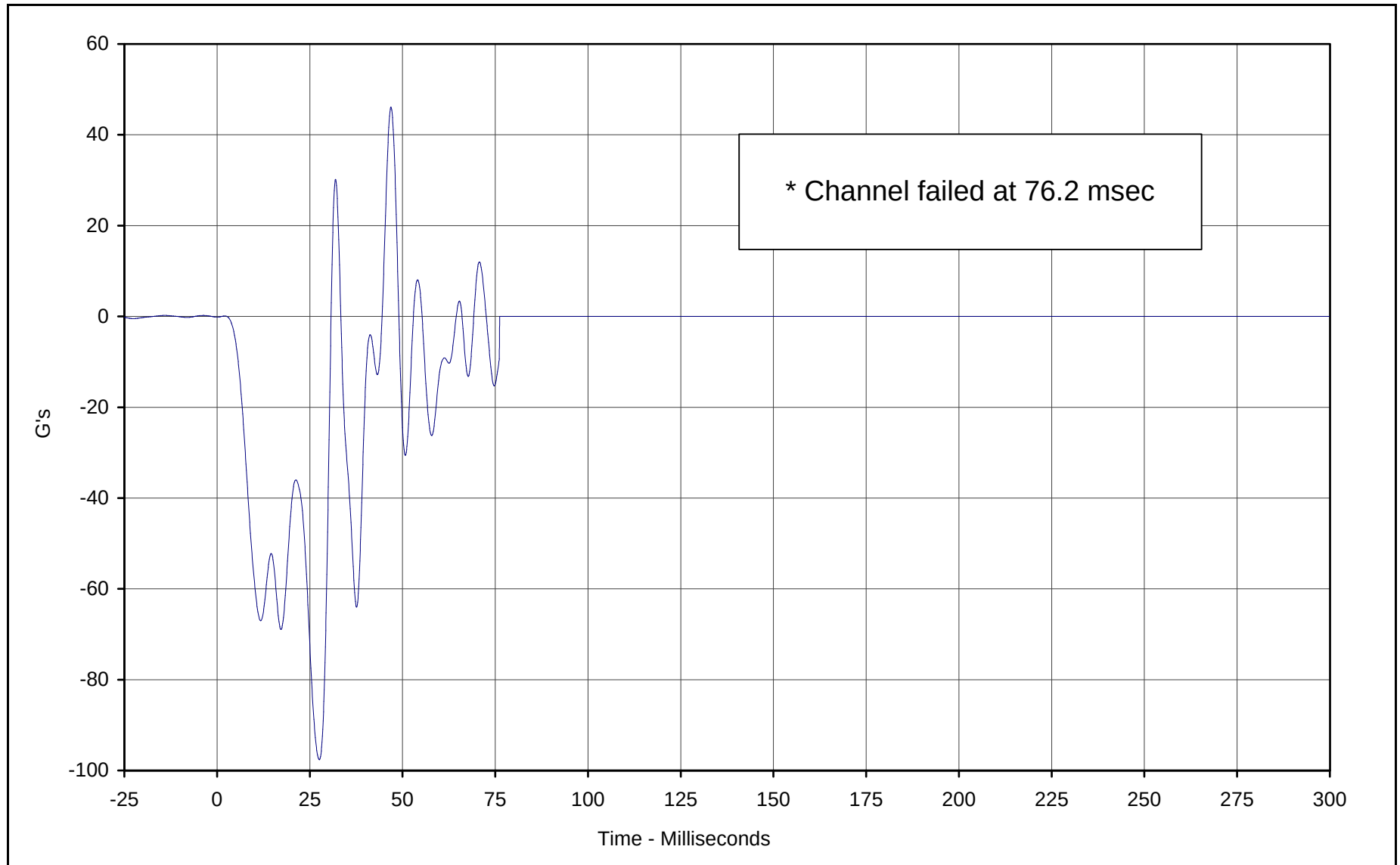
Curve Number: IN2-097

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan

* Channel failed at 76.2 msec





Curve Description: Vehicle Right Brake Caliper *

Maximum Value: 46.1 at 46.9 Milliseconds

Minimum Value: -97.6 at 27.6 Milliseconds

SAE Filter Class: 60

Date of Test: 12/7/01

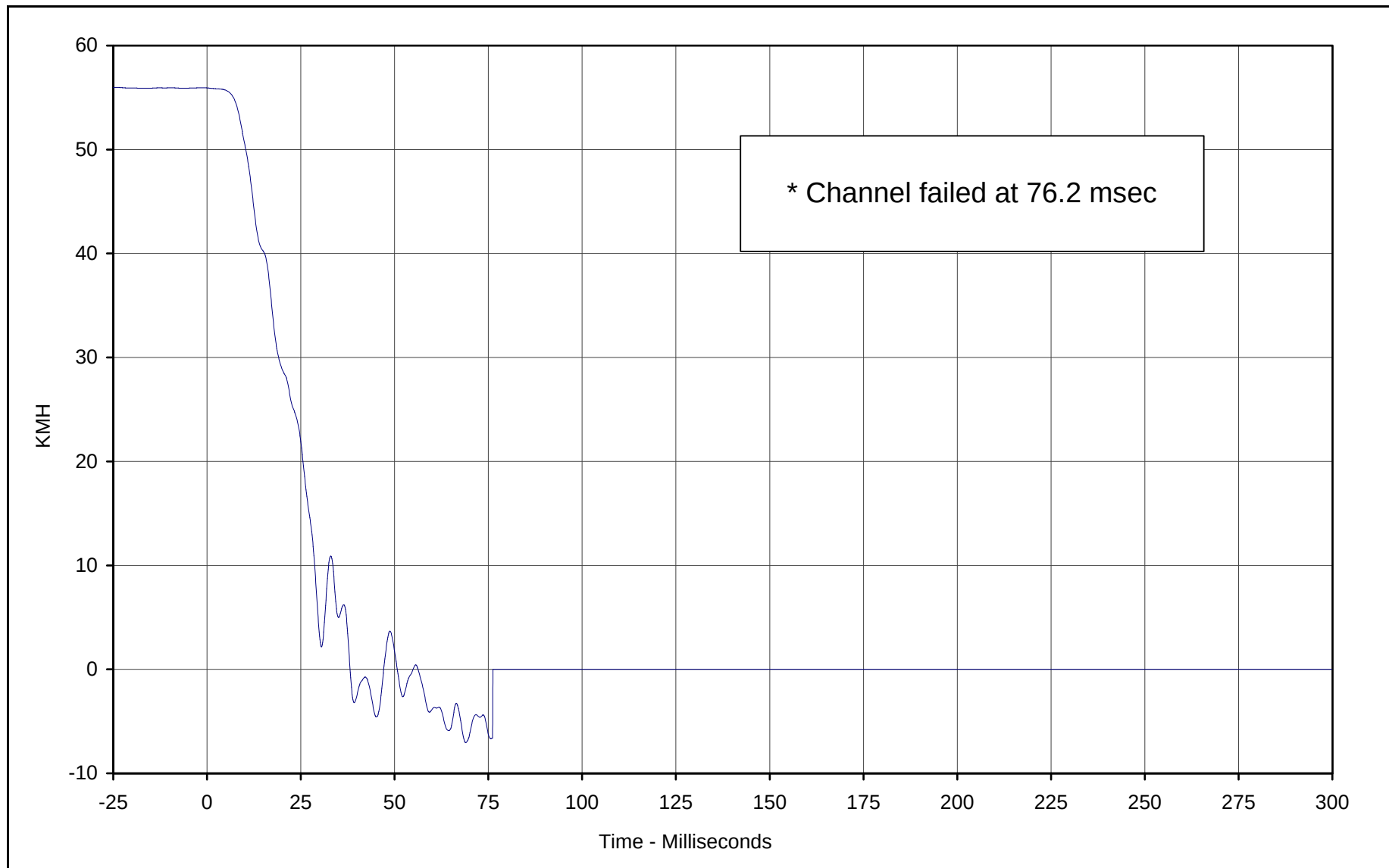
Curve Number: FIL-098

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan

* Channel failed at 76.2 msec





Curve Description: Vehicle Right Brake Caliper Velocity *

Maximum Value: 55.9 at 0.0 Milliseconds

Minimum Value: -7.0 at 69.0 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

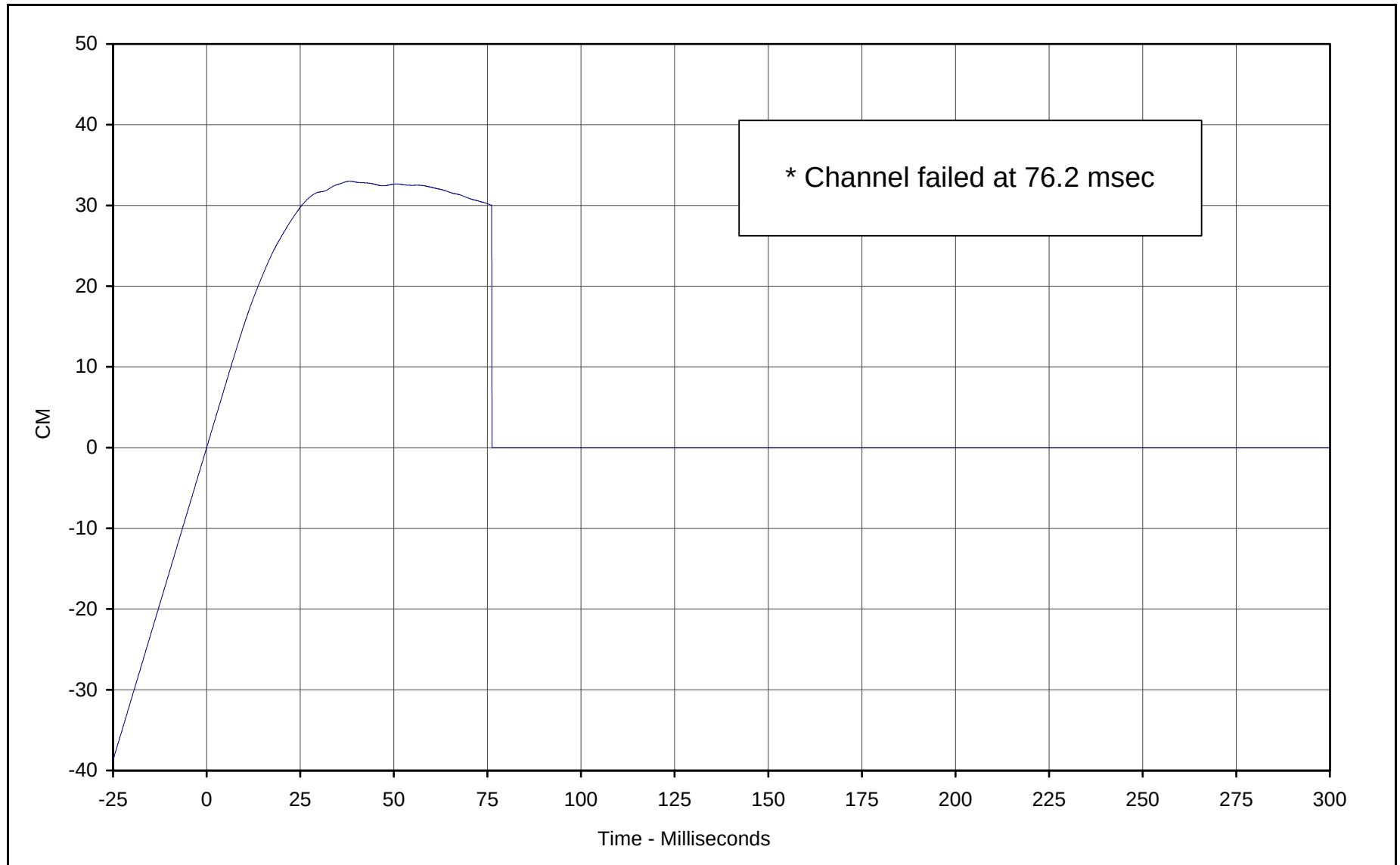
Curve Number: IN1-098

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan

* Channel failed at 76.2 msec





Curve Description: Vehicle Right Brake Caliper Displ. *

Maximum Value: 33.0 at 38.1 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

Curve Number: IN2-098

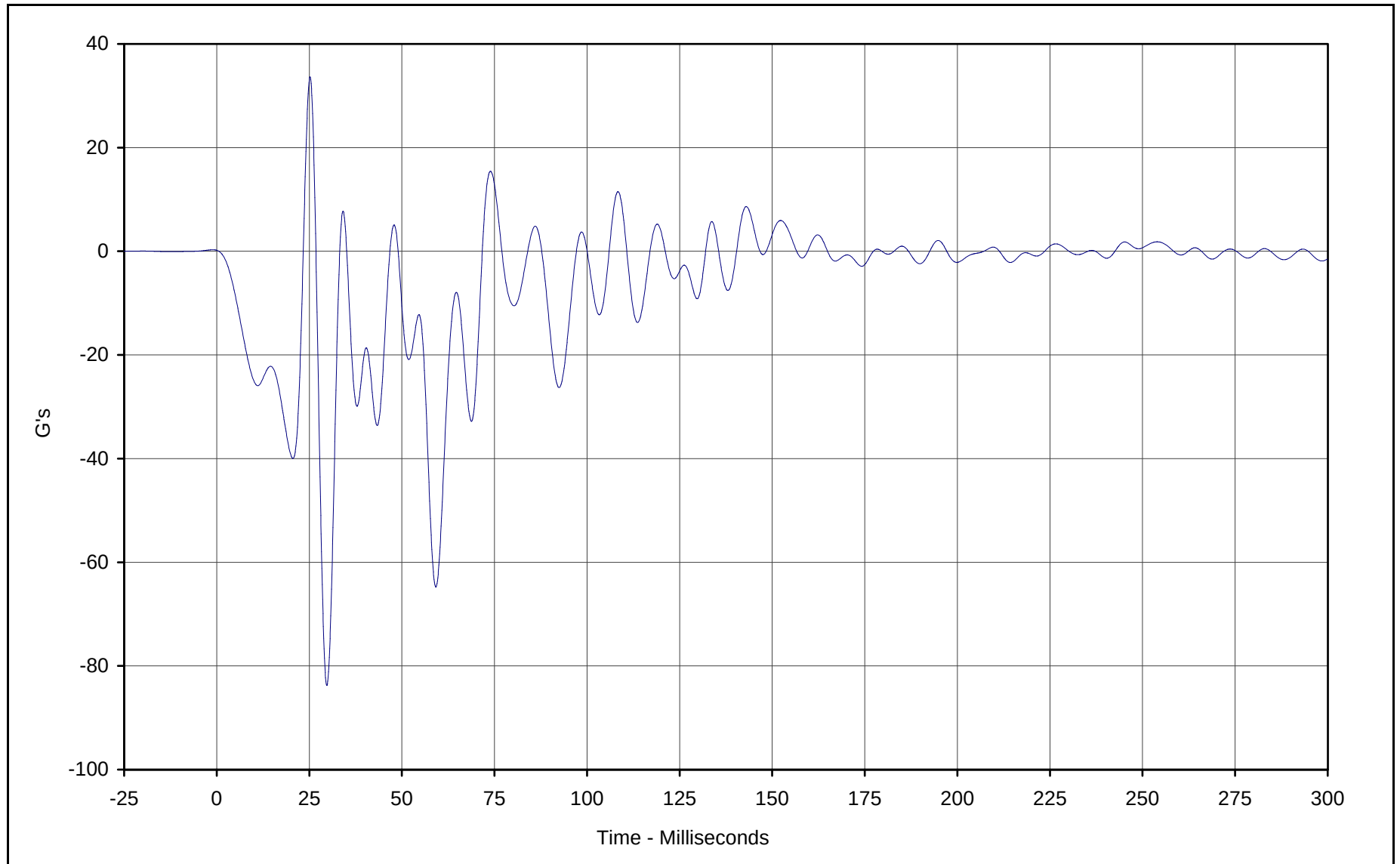
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan

* Channel failed at 76.2 msec



B-145



Curve Description: Vehicle Instrument Panel

Maximum Value: 33.7 at 25.2 Milliseconds

Minimum Value: -83.8 at 29.7 Milliseconds

SAE Filter Class: 60

Date of Test: 12/7/01

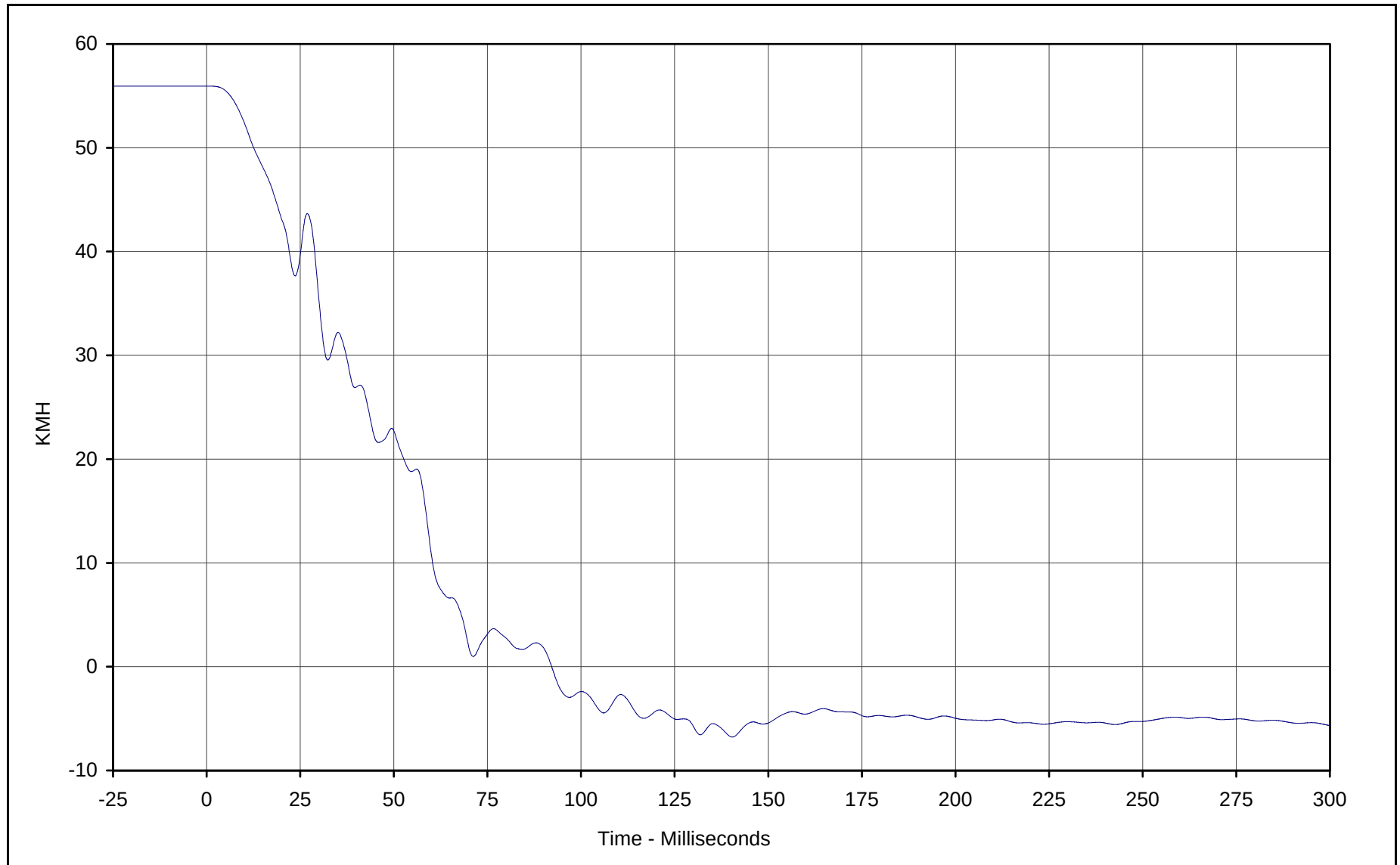
Curve Number: FIL-099

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01



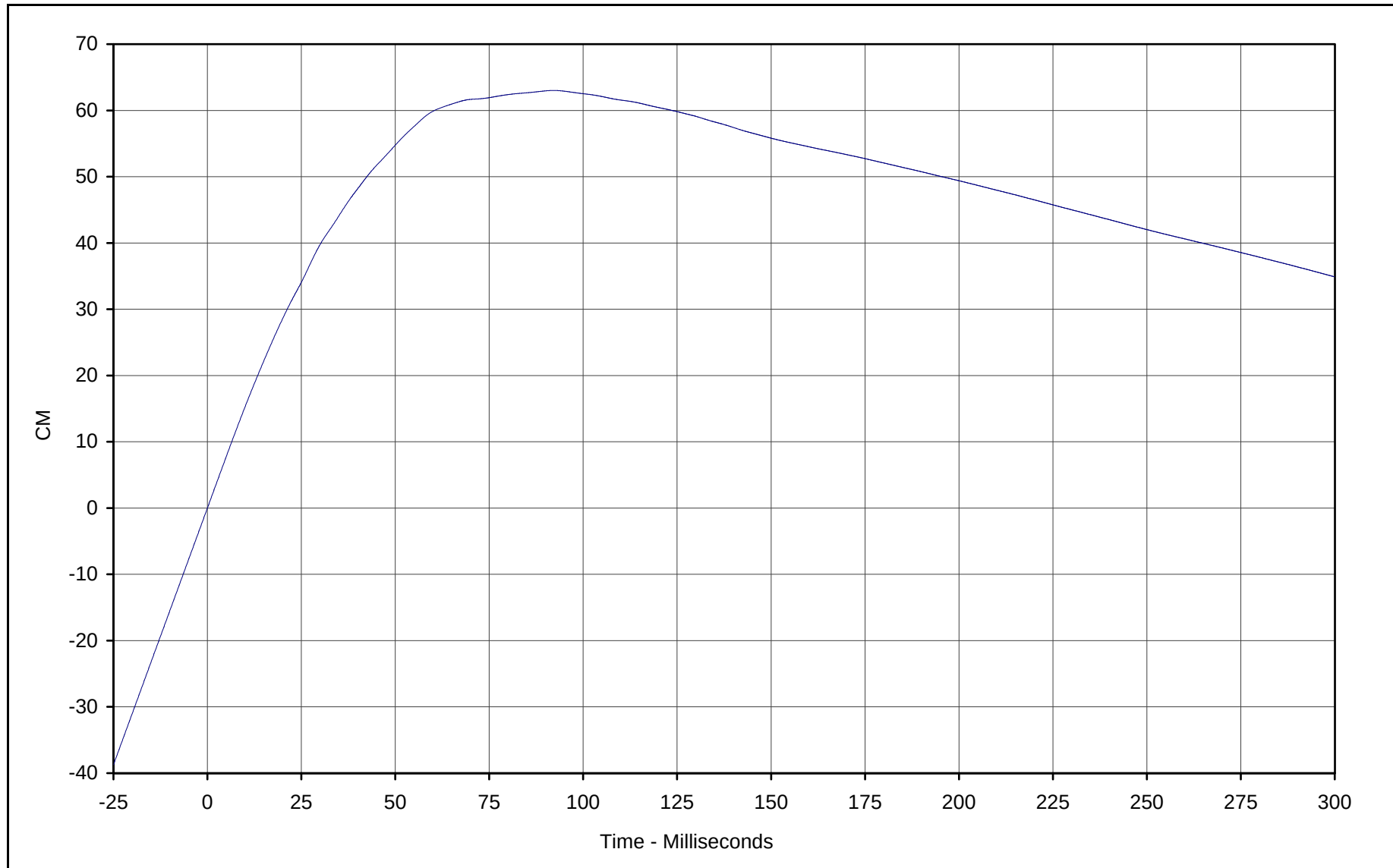
Curve Description: Vehicle Instrument Panel Velocity
Maximum Value: 55.9 at 0.5 Milliseconds
Minimum Value: -6.8 at 140.4 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN1-099

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



B-147



Curve Description: Vehicle Instrument Panel Displacement

Maximum Value: 63.0 at 92.2 Milliseconds

Minimum Value: 0.0 at 0.0 Milliseconds

SAE Filter Class: 180

Date of Test: 12/7/01

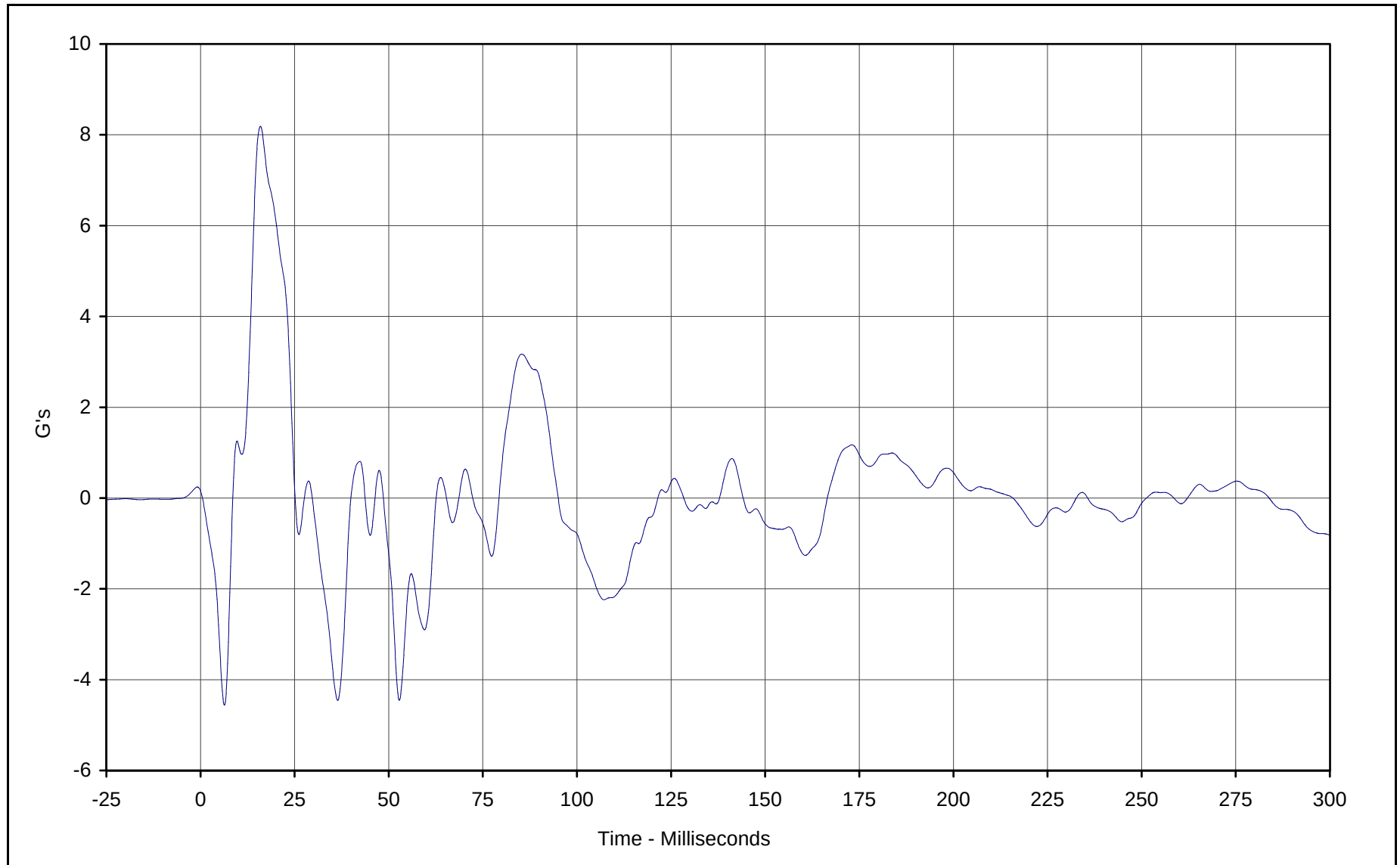
Curve Number: IN2-099

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



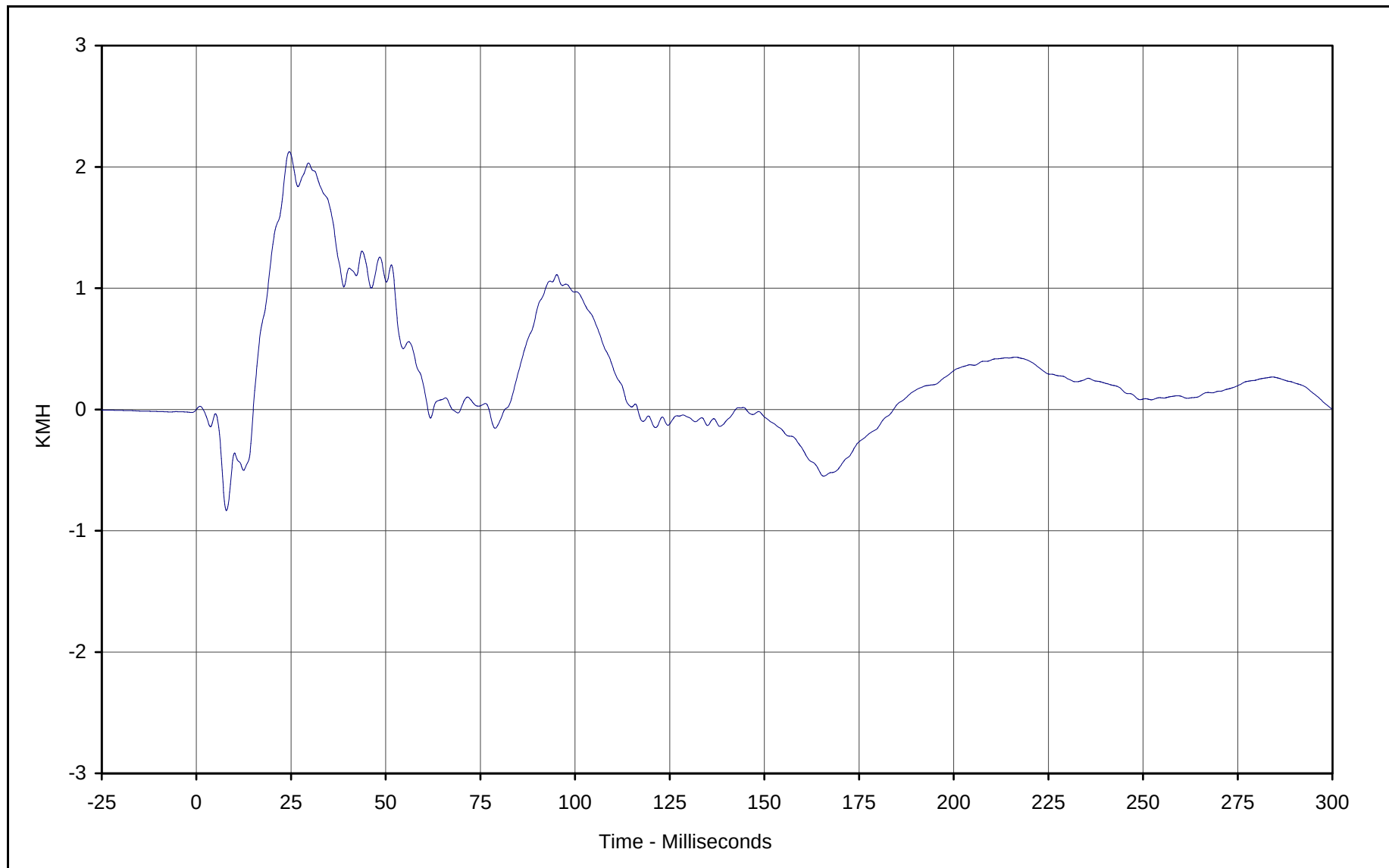
KAR22001-01



Curve Description: Vehicle Left Rear Z
Maximum Value: 8.2 at 15.9 Milliseconds
Minimum Value: -4.6 at 6.4 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-100

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



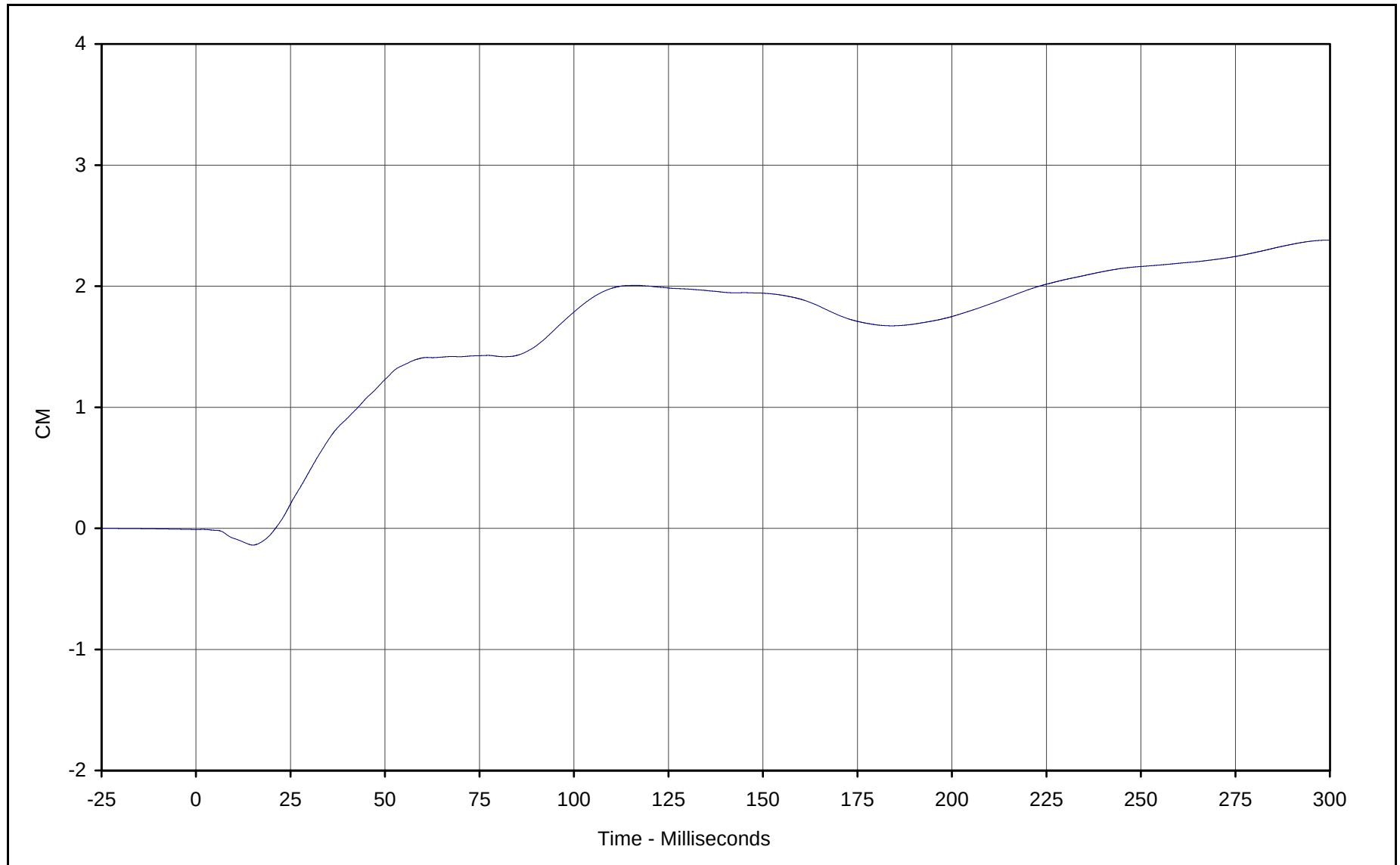


Curve Description: Vehicle Left Rear Z Velocity
Maximum Value: 2.1 at 24.5 Milliseconds
Minimum Value: -0.8 at 7.9 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN1-100

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



B-150



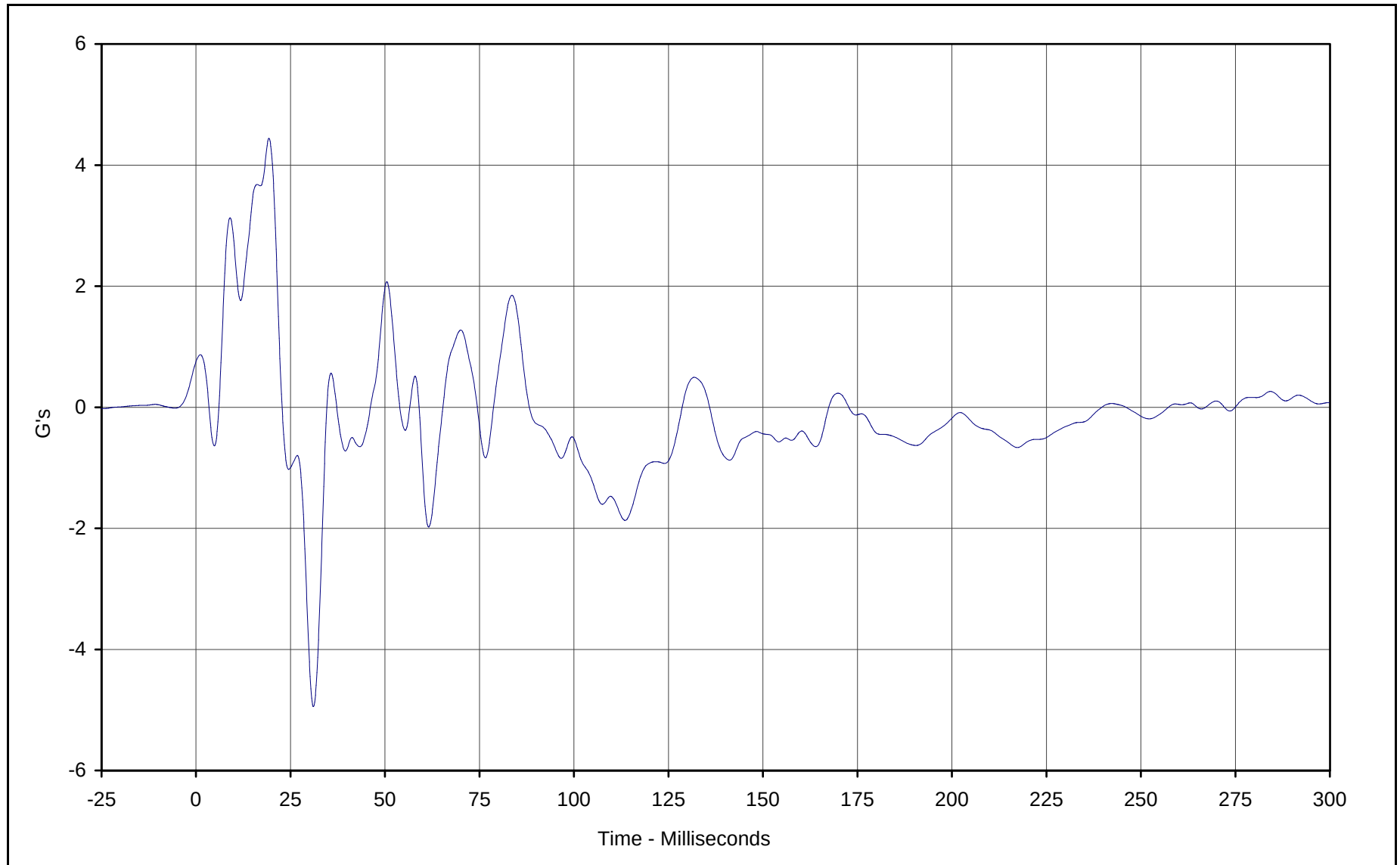
Curve Description: Vehicle Left Rear Z Displ.
Maximum Value: 2.4 at 299.9 Milliseconds
Minimum Value: -0.1 at 15.0 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN2-100

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

B-151



Curve Description: Vehicle Right Rear Z

Maximum Value: 4.4 at 19.3 Milliseconds

Minimum Value: -4.9 at 31.1 Milliseconds

SAE Filter Class: 60

Date of Test: 12/7/01

Curve Number: FIL-101

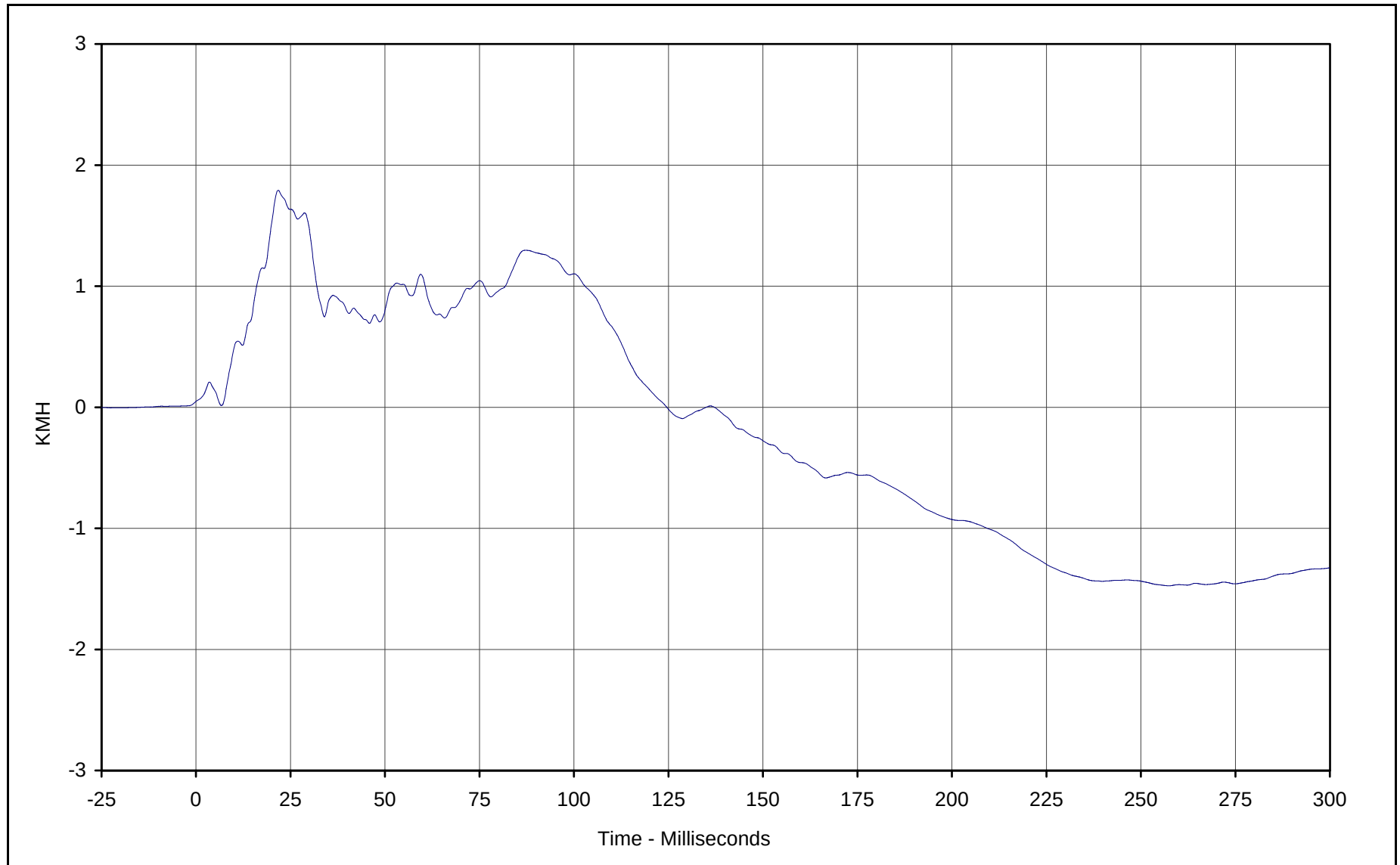
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

B-152



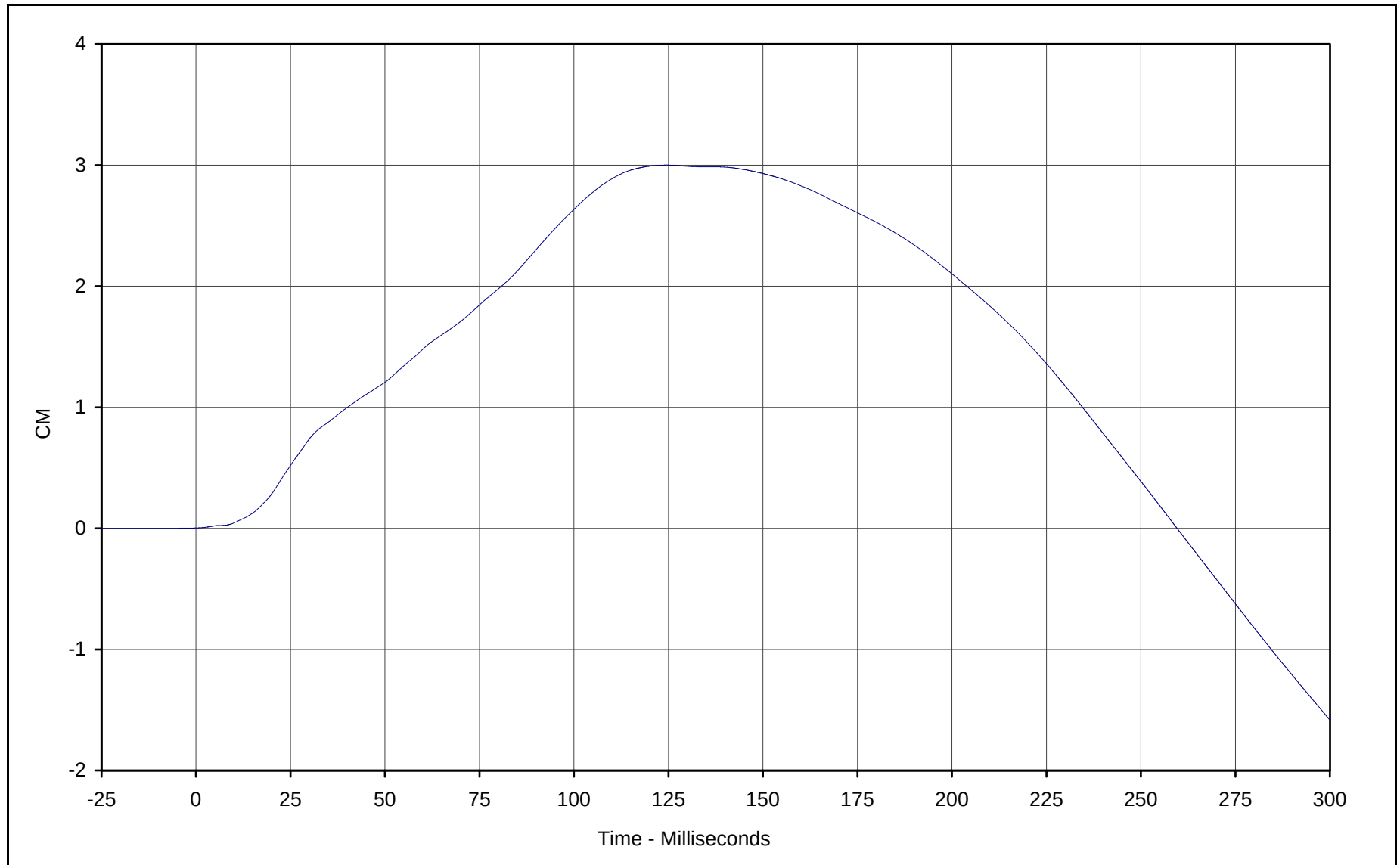
Curve Description: Vehicle Right Rear Z Velocity
Maximum Value: 1.8 at 21.7 Milliseconds
Minimum Value: -1.5 at 257.5 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN1-101

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

B-153



Curve Description: Vehicle Right Rear Z Displ.
Maximum Value: 3.0 at 124.5 Milliseconds
Minimum Value: -1.6 at 299.9 Milliseconds
SAE Filter Class: 180
Date of Test: 12/7/01
Curve Number: IN2-101

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan

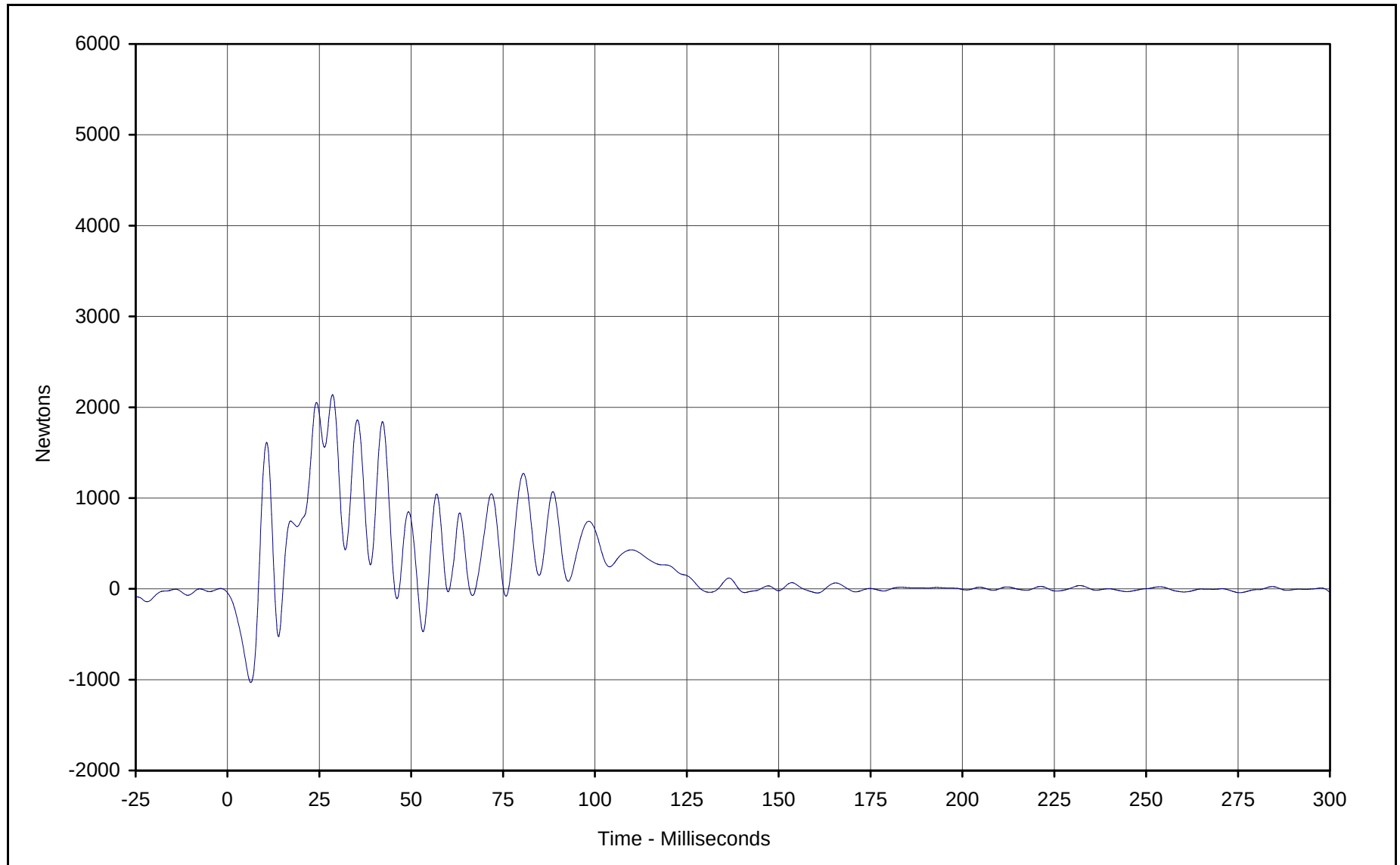


KAR22001-01

APPENDIX C

LOAD CELL BARRIER DATA PLOTS

C-1



Curve Description: Barrier Force A2

Maximum Value: 2138.8 at 28.6 Milliseconds

Minimum Value: -1030.0 at 6.3 Milliseconds

SAE Filter Class: 60

Date of Test: 12/7/01

Curve Number: FIL-103

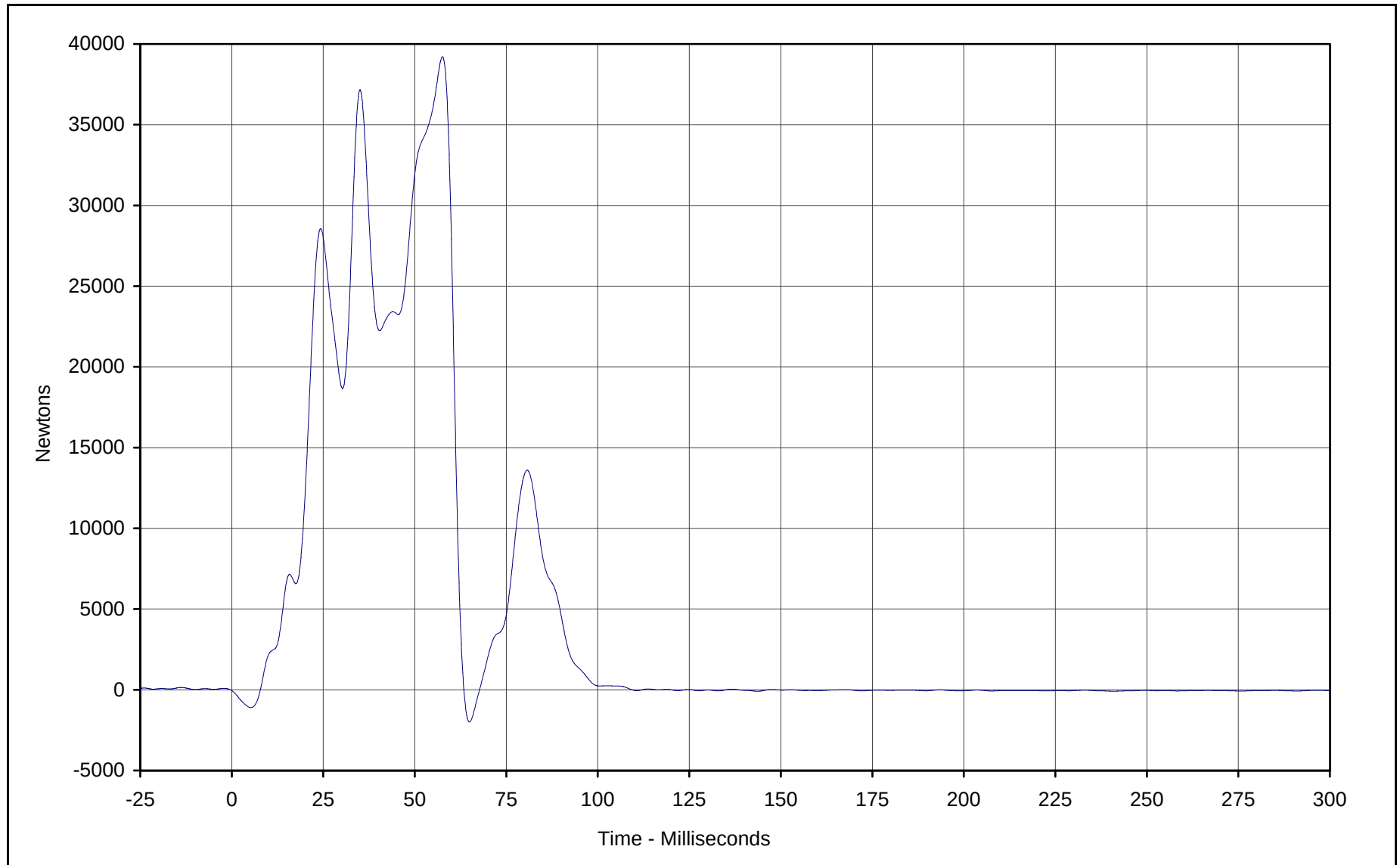
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-2



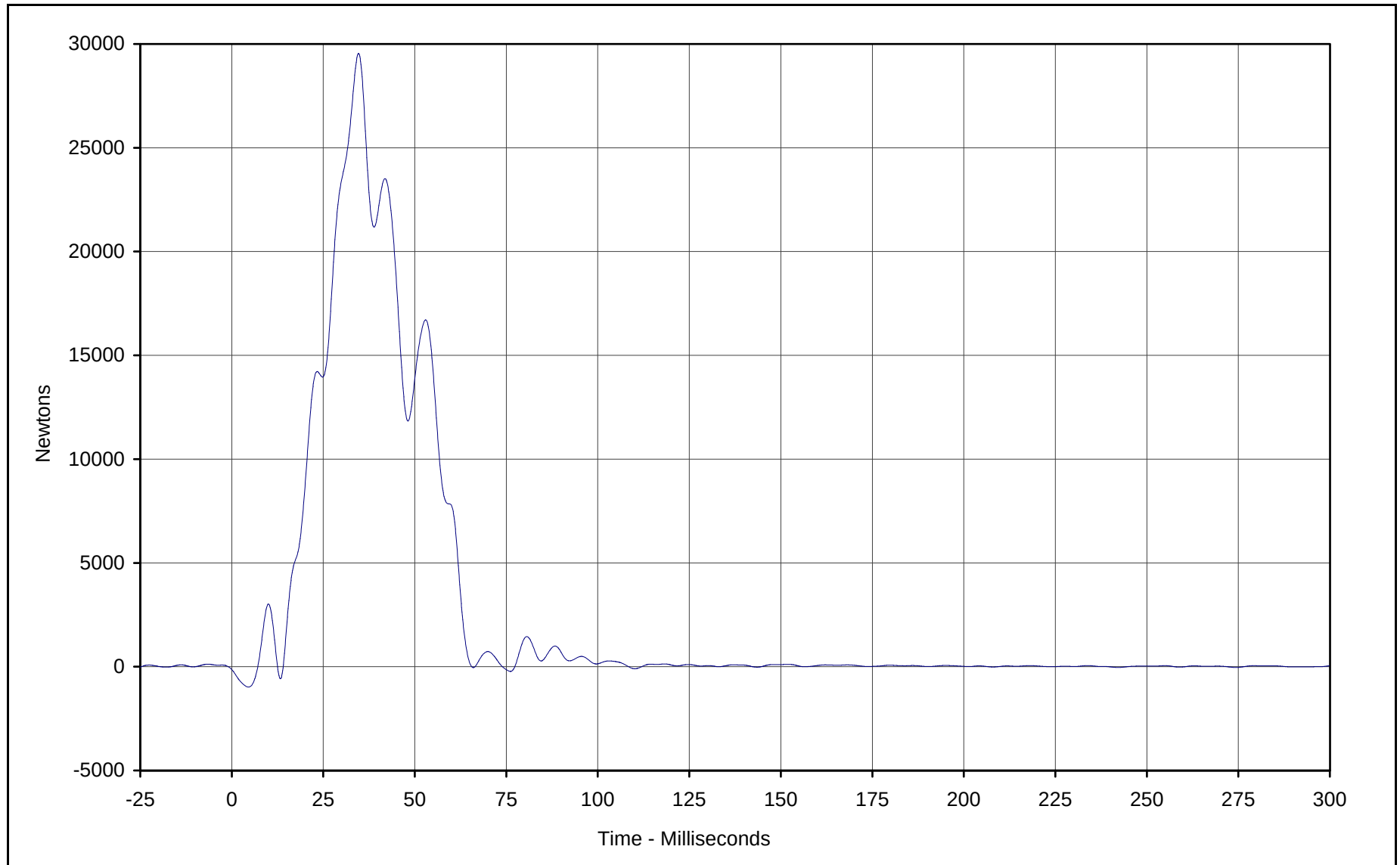
Curve Description: Barrier Force A3
Maximum Value: 39213.9 at 57.6 Milliseconds
Minimum Value: -1995.7 at 64.9 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-104

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-3



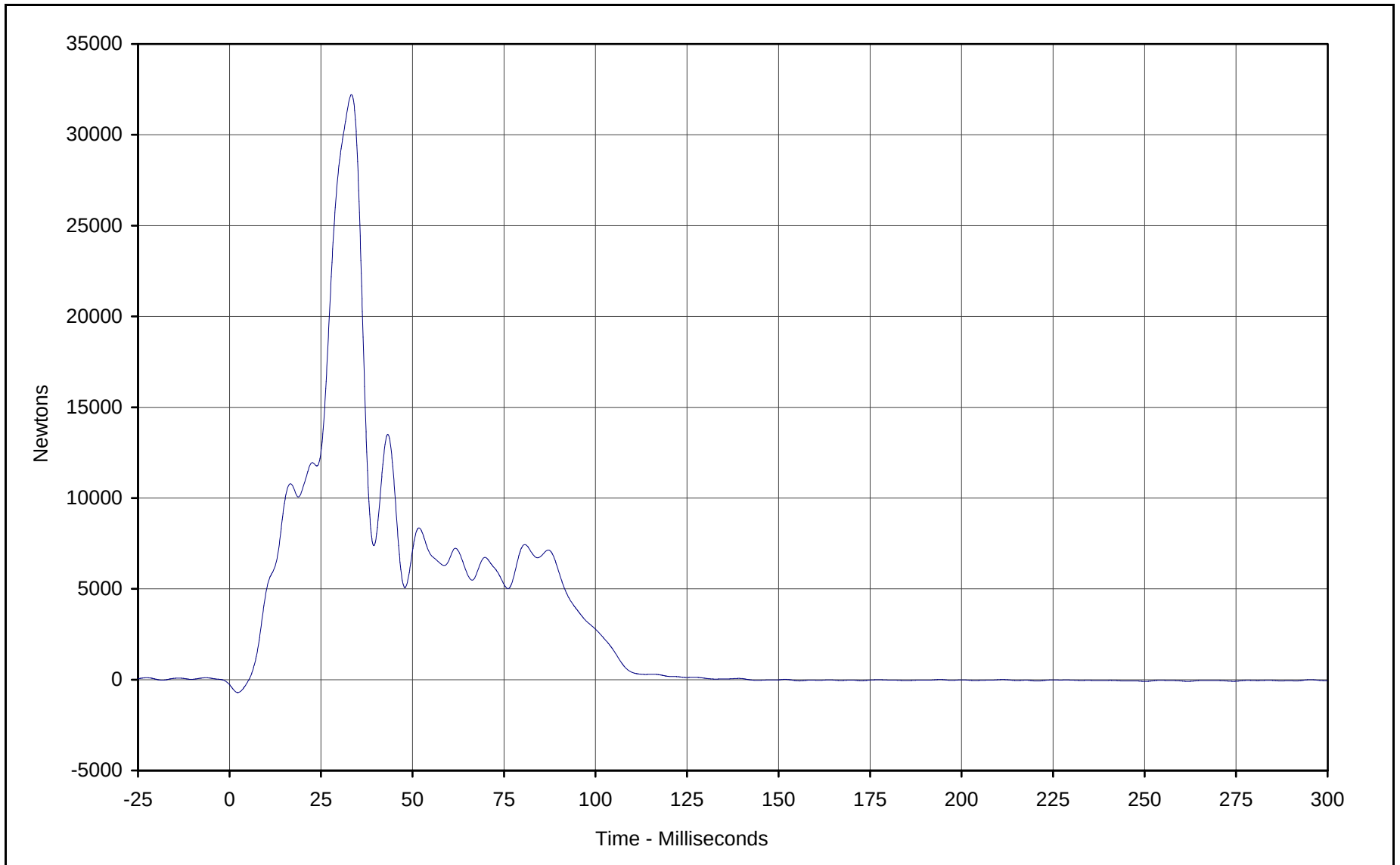
Curve Description: Barrier Force A4
Maximum Value: 29549.6 at 34.6 Milliseconds
Minimum Value: -982.0 at 4.6 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-105

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-4



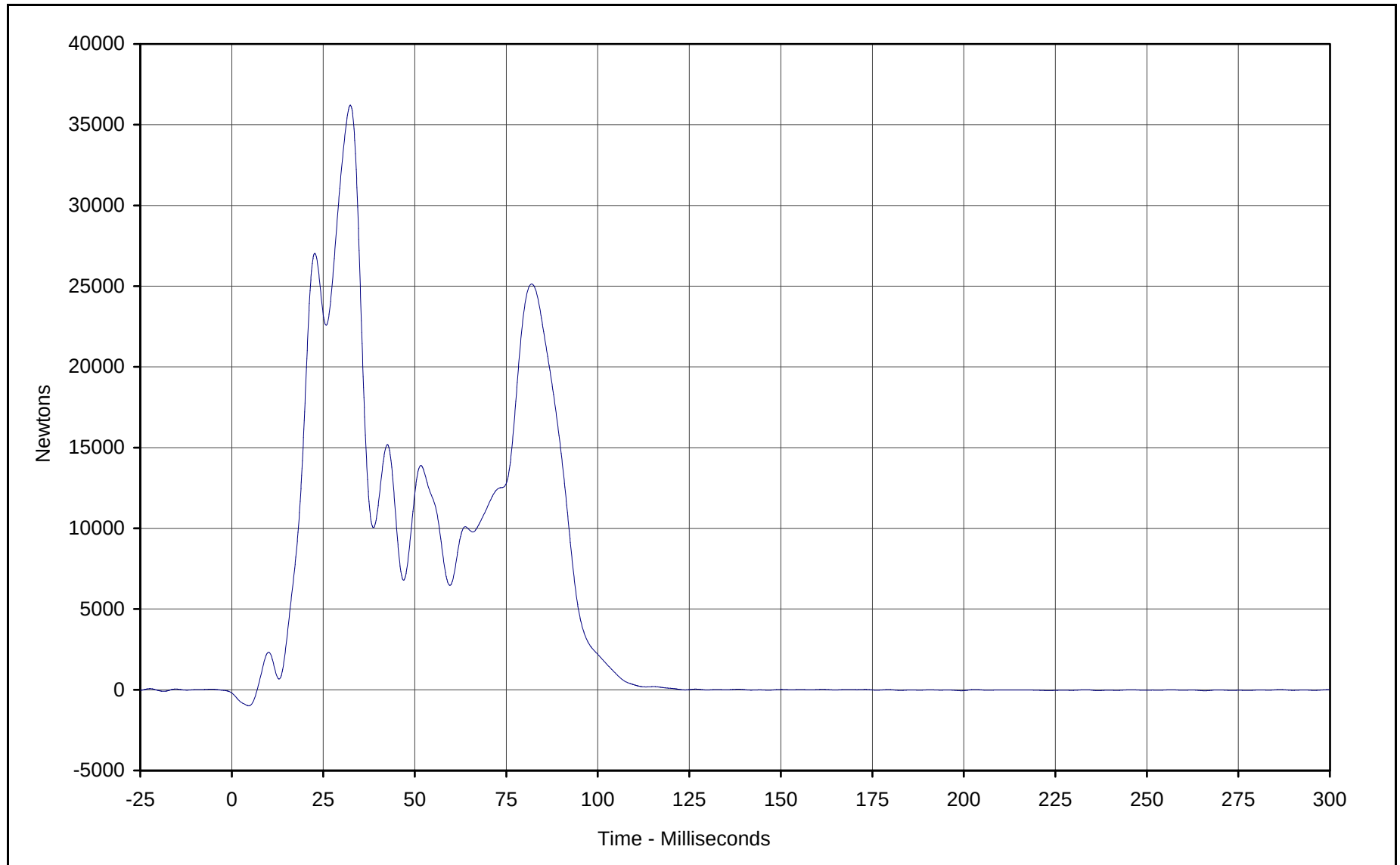
Curve Description: Barrier Force A5
Maximum Value: 32212.9 at 33.3 Milliseconds
Minimum Value: -709.6 at 2.3 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-106

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-5



Curve Description: Barrier Force A6

Maximum Value: 36210.8 at 32.4 Milliseconds

Minimum Value: -990.5 at 4.6 Milliseconds

SAE Filter Class: 60

Date of Test: 12/7/01

Curve Number: FIL-107

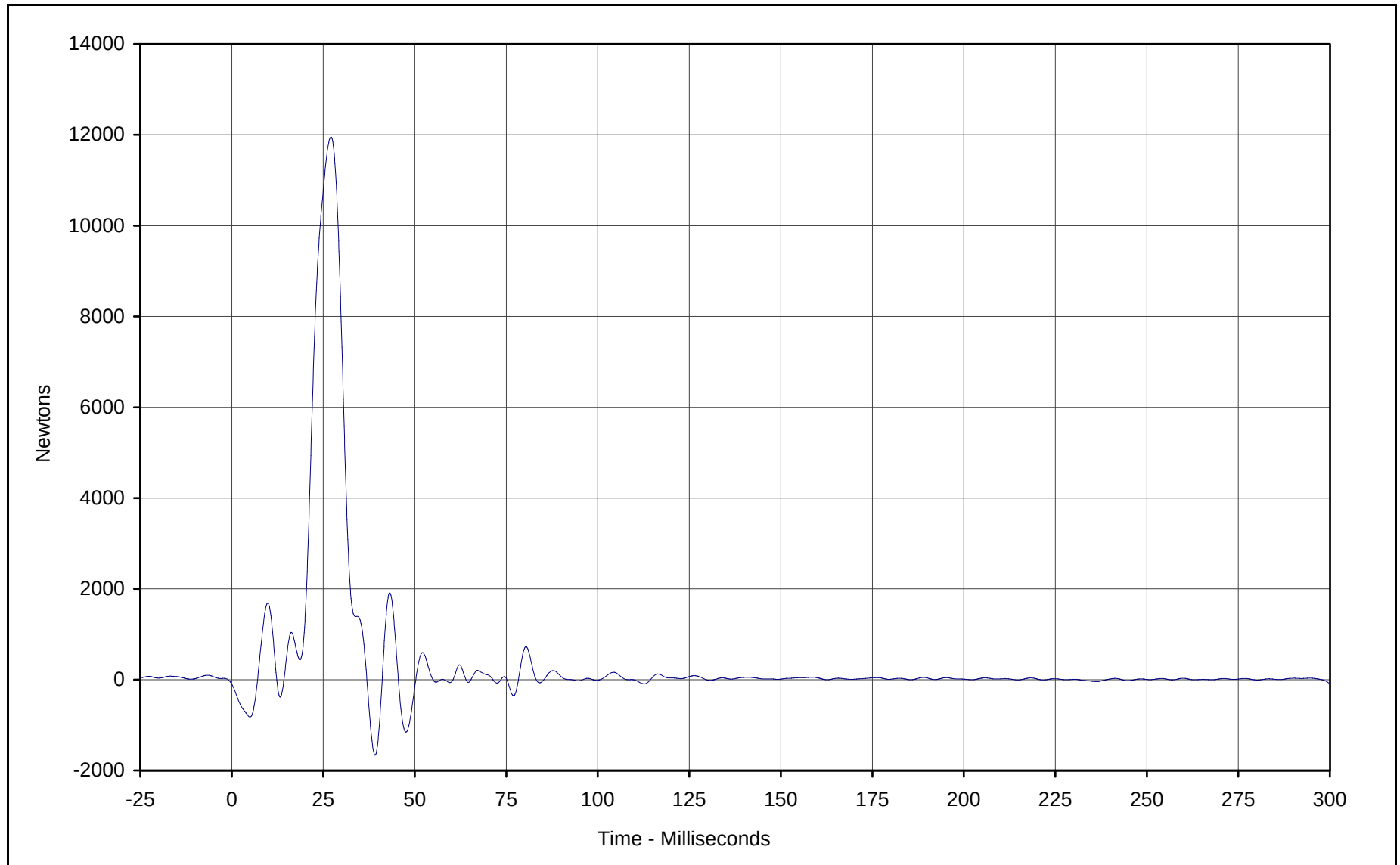
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-6



Curve Description: Barrier Force A7

Maximum Value: 11953.9 at 27.1 Milliseconds

Minimum Value: -1660.5 at 39.1 Milliseconds

SAE Filter Class: 60

Date of Test: 12/7/01

Curve Number: FIL-108

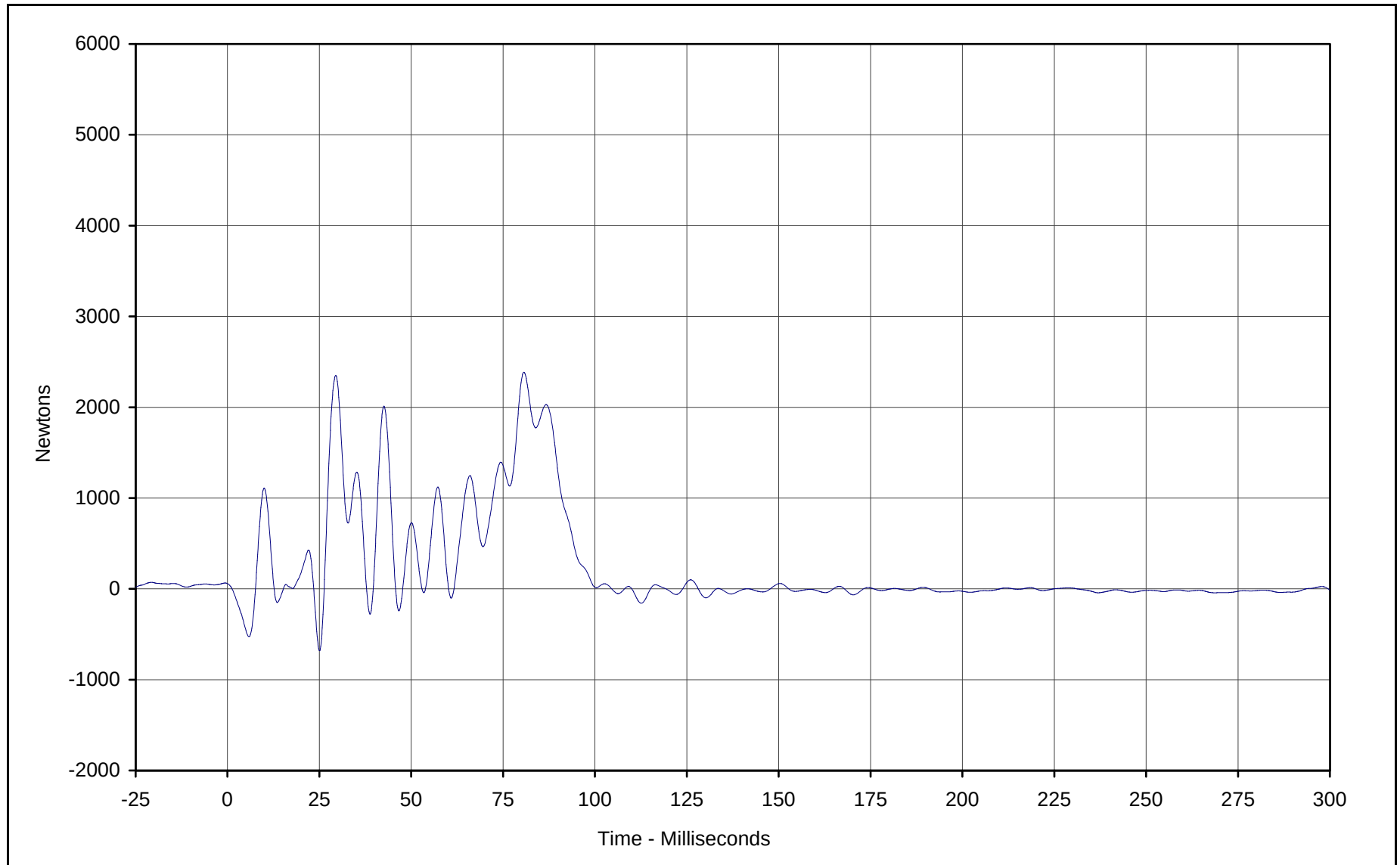
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-7



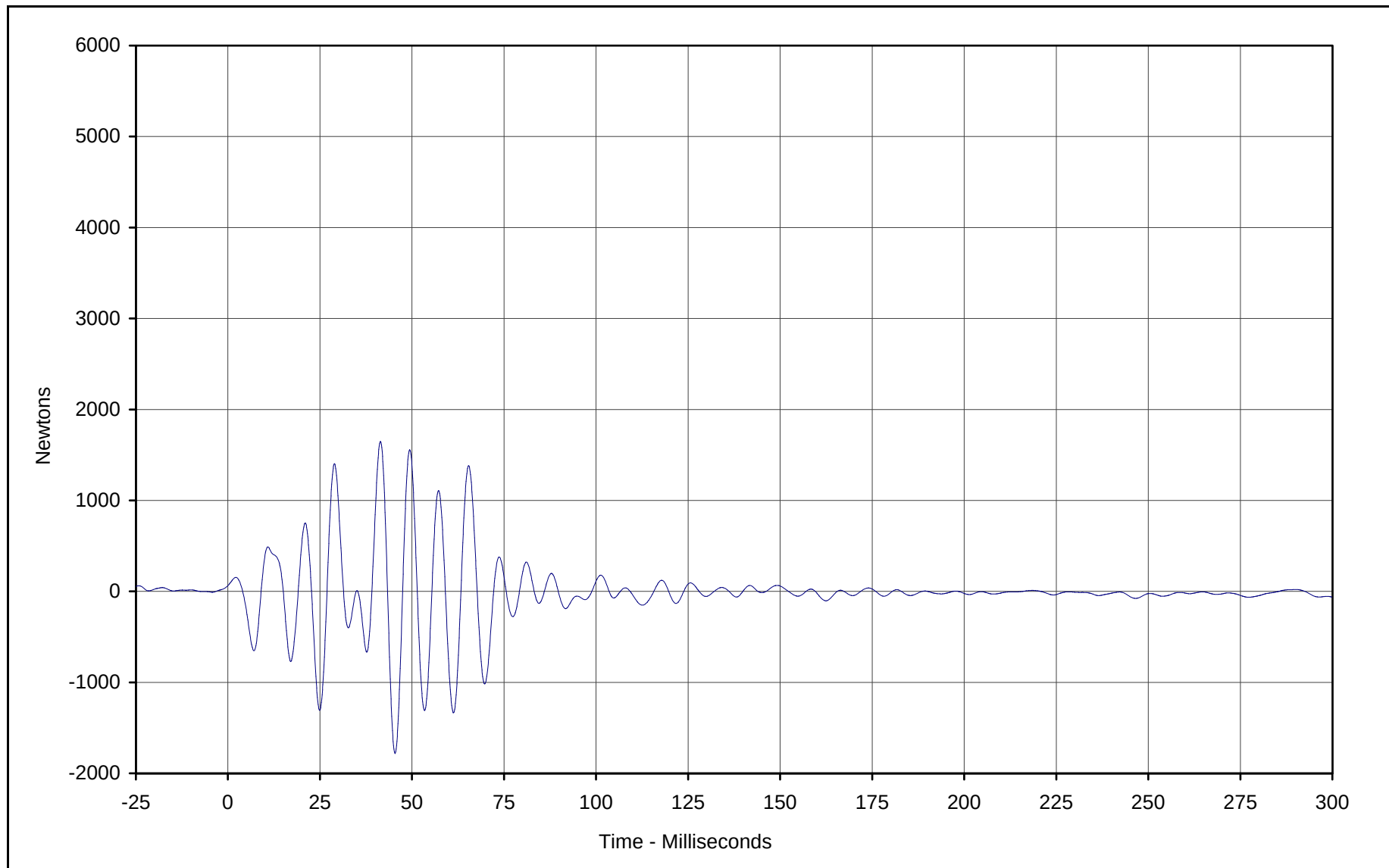
Curve Description: Barrier Force A8
Maximum Value: 2386.1 at 80.7 Milliseconds
Minimum Value: -681.6 at 25.1 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-109

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-8



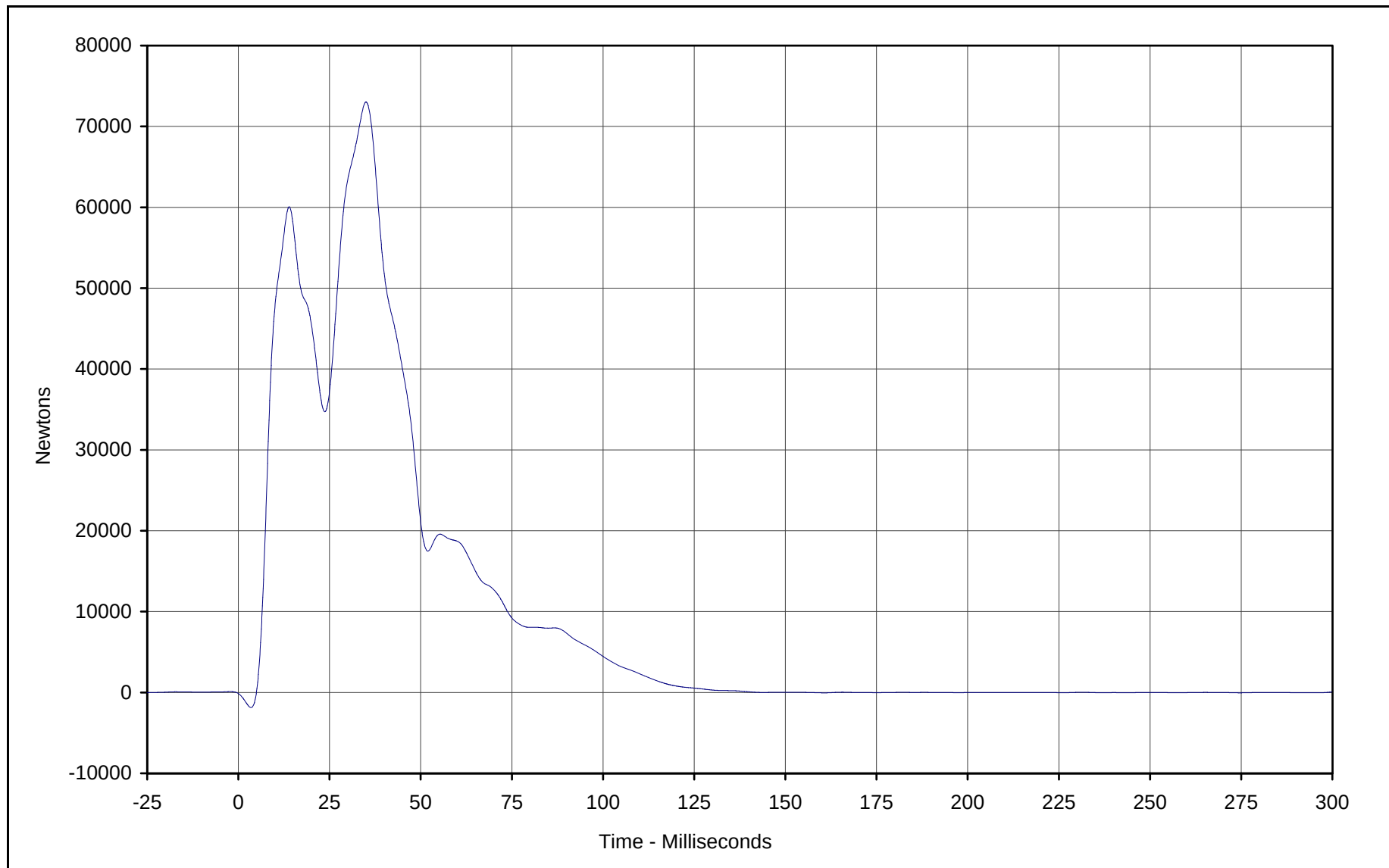
Curve Description: Barrier Force A9
Maximum Value: 1648.2 at 41.4 Milliseconds
Minimum Value: -1781.3 at 45.4 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-110

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-9



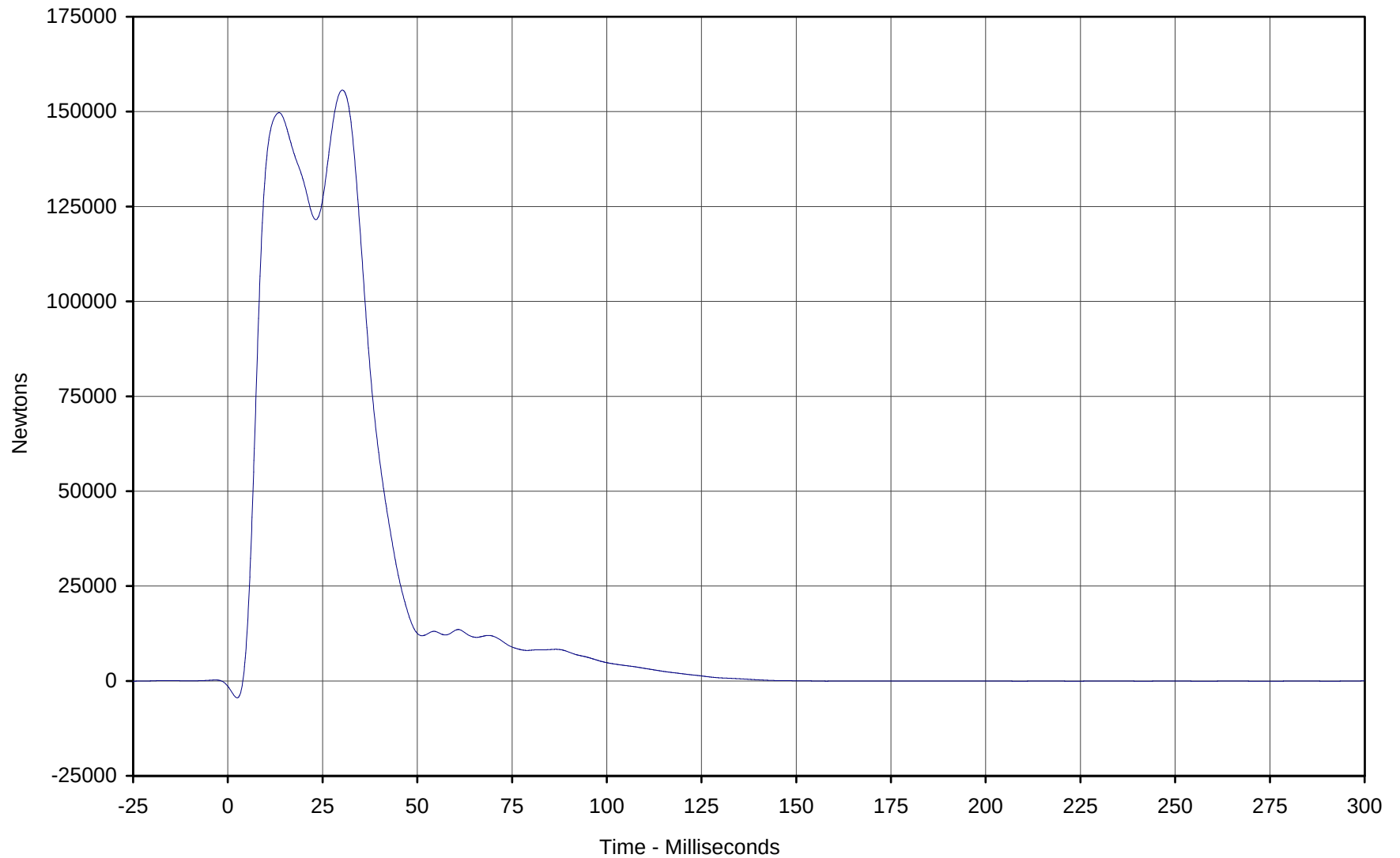
Curve Description: Barrier Force B2
Maximum Value: 73024.8 at 35.0 Milliseconds
Minimum Value: -1865.0 at 3.5 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-112

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-10



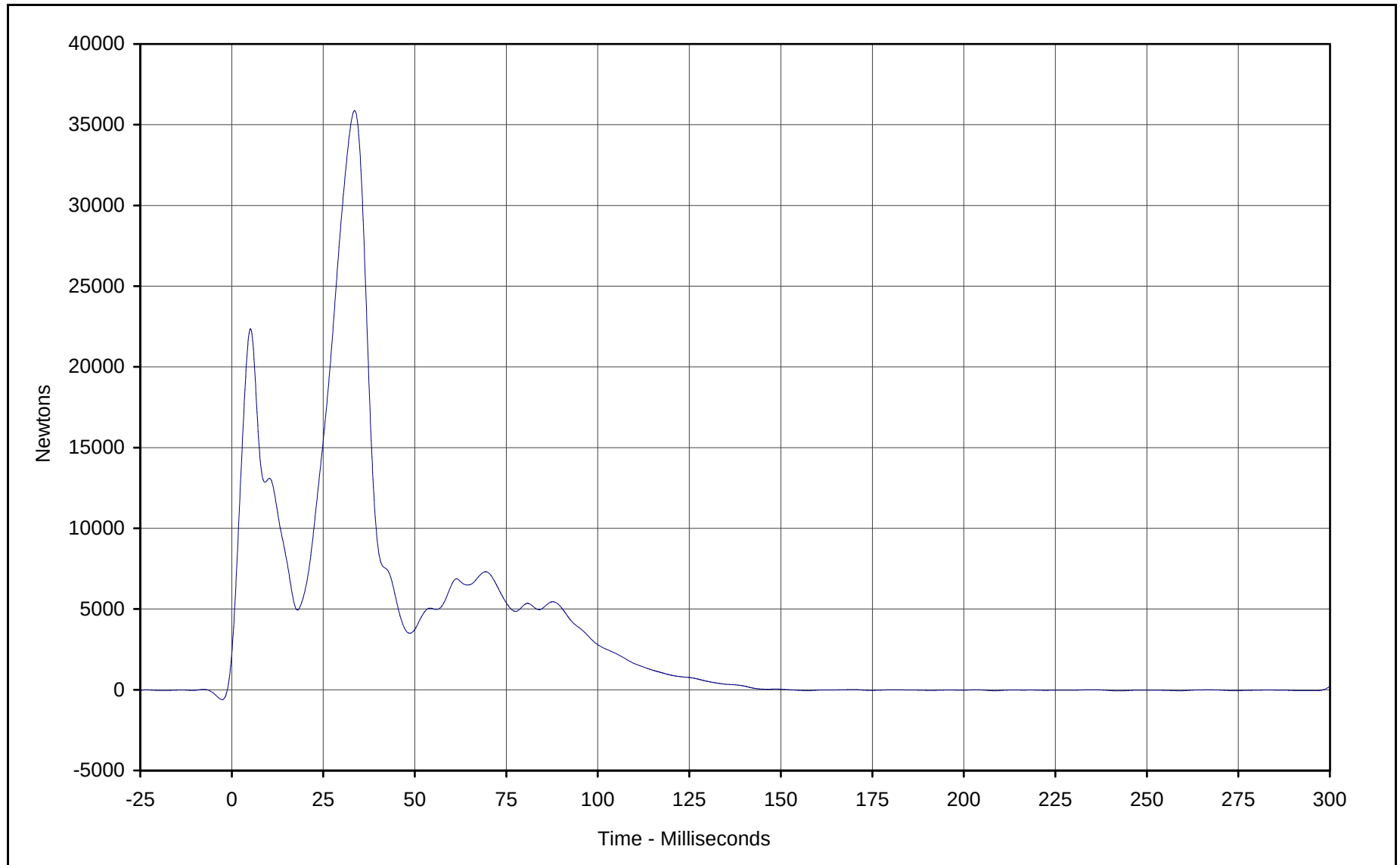
Curve Description: Barrier Force B3
Maximum Value: 155682.1 at 30.2 Milliseconds
Minimum Value: -4437.5 at 2.5 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-113

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-11



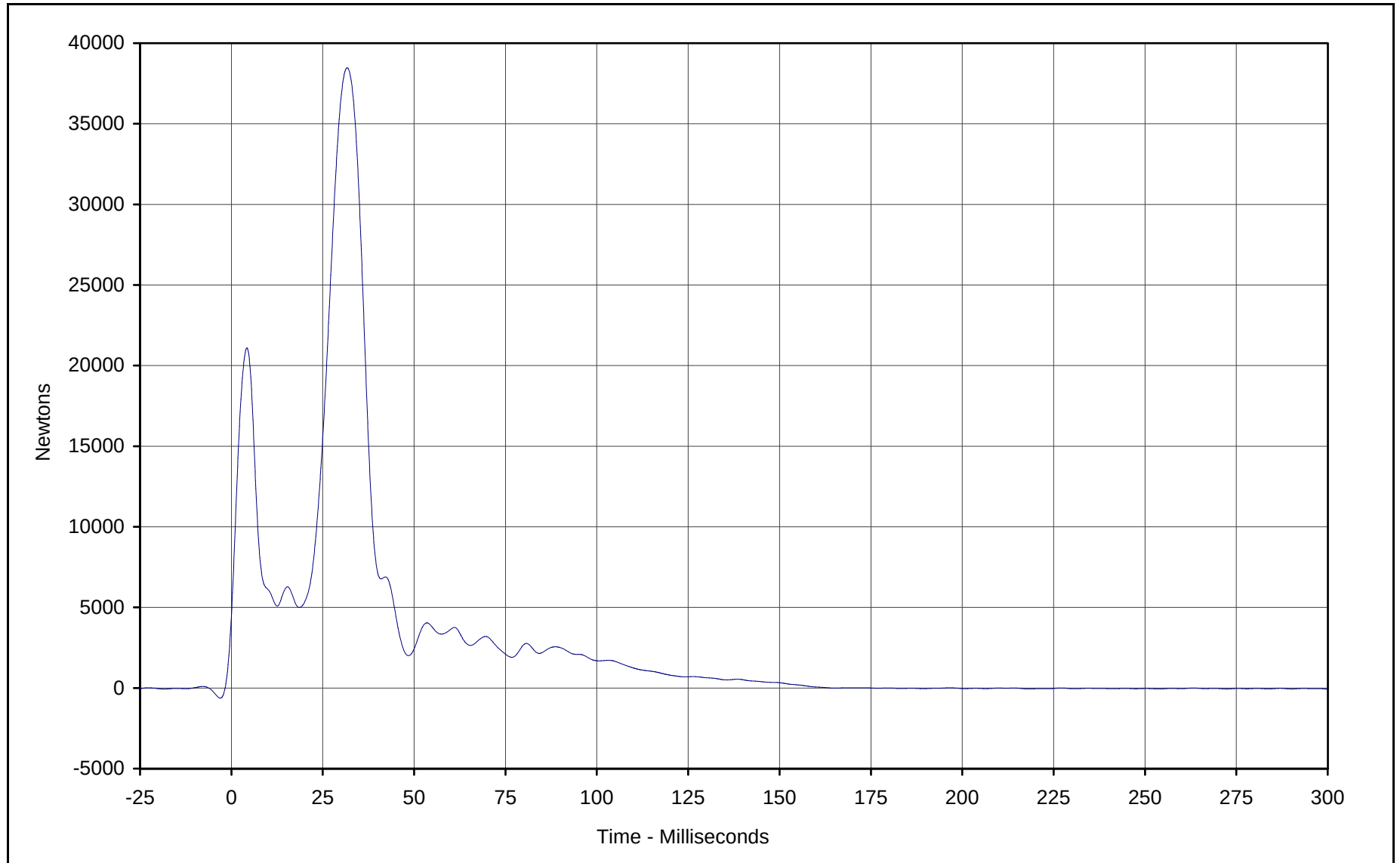
Curve Description: Barrier Force B4
Maximum Value: 35872.2 at 33.6 Milliseconds
Minimum Value: -67.9 at 242.3 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-114

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-12

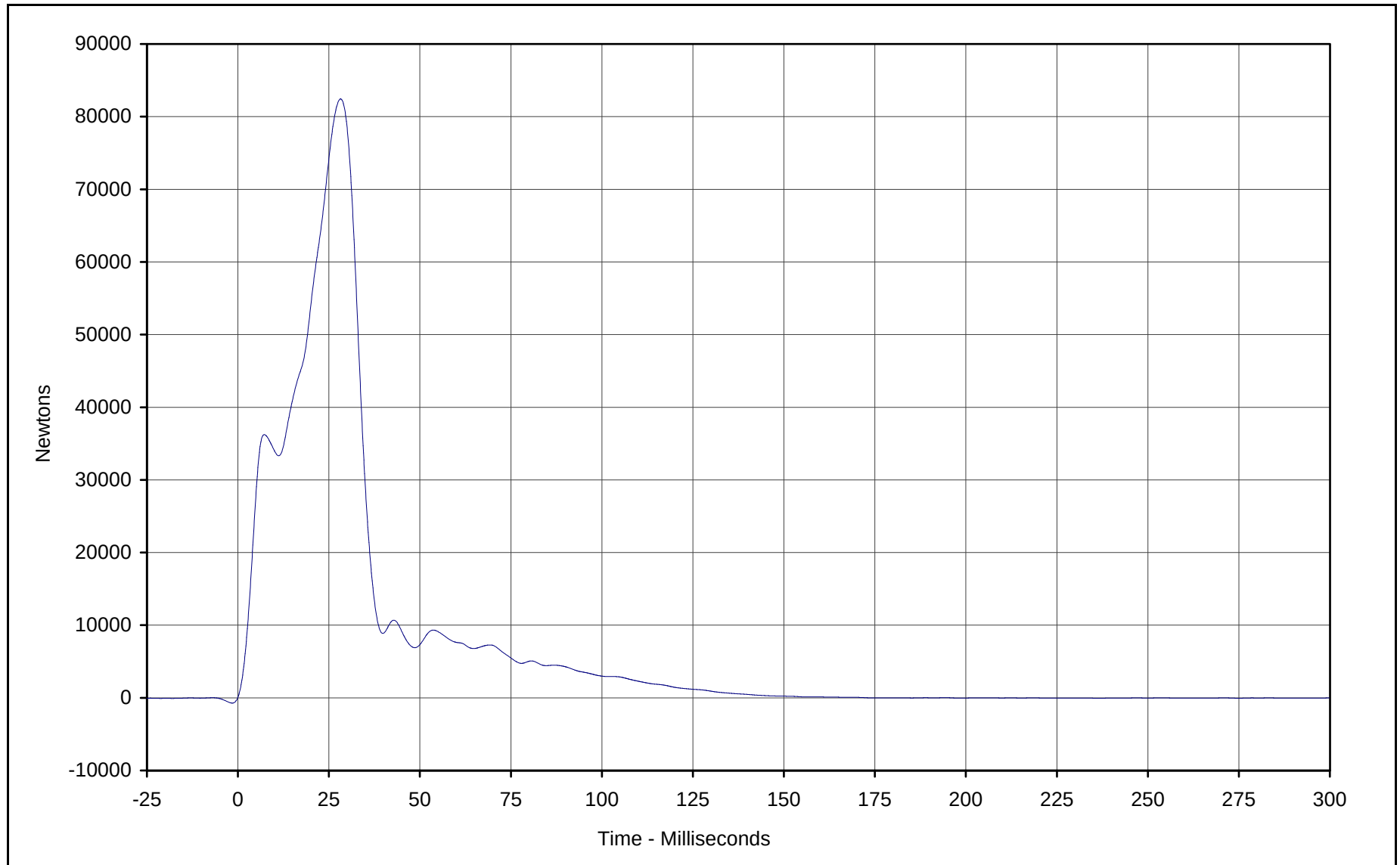


Curve Description: Barrier Force B5
Maximum Value: 38474.4 at 31.7 Milliseconds
Minimum Value: -80.8 at 299.9 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-115

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01



Curve Description: Barrier Force B6

Maximum Value: 82439.9 at 28.2 Milliseconds

Minimum Value: -60.6 at 236.5 Milliseconds

SAE Filter Class: 60

Date of Test: 12/7/01

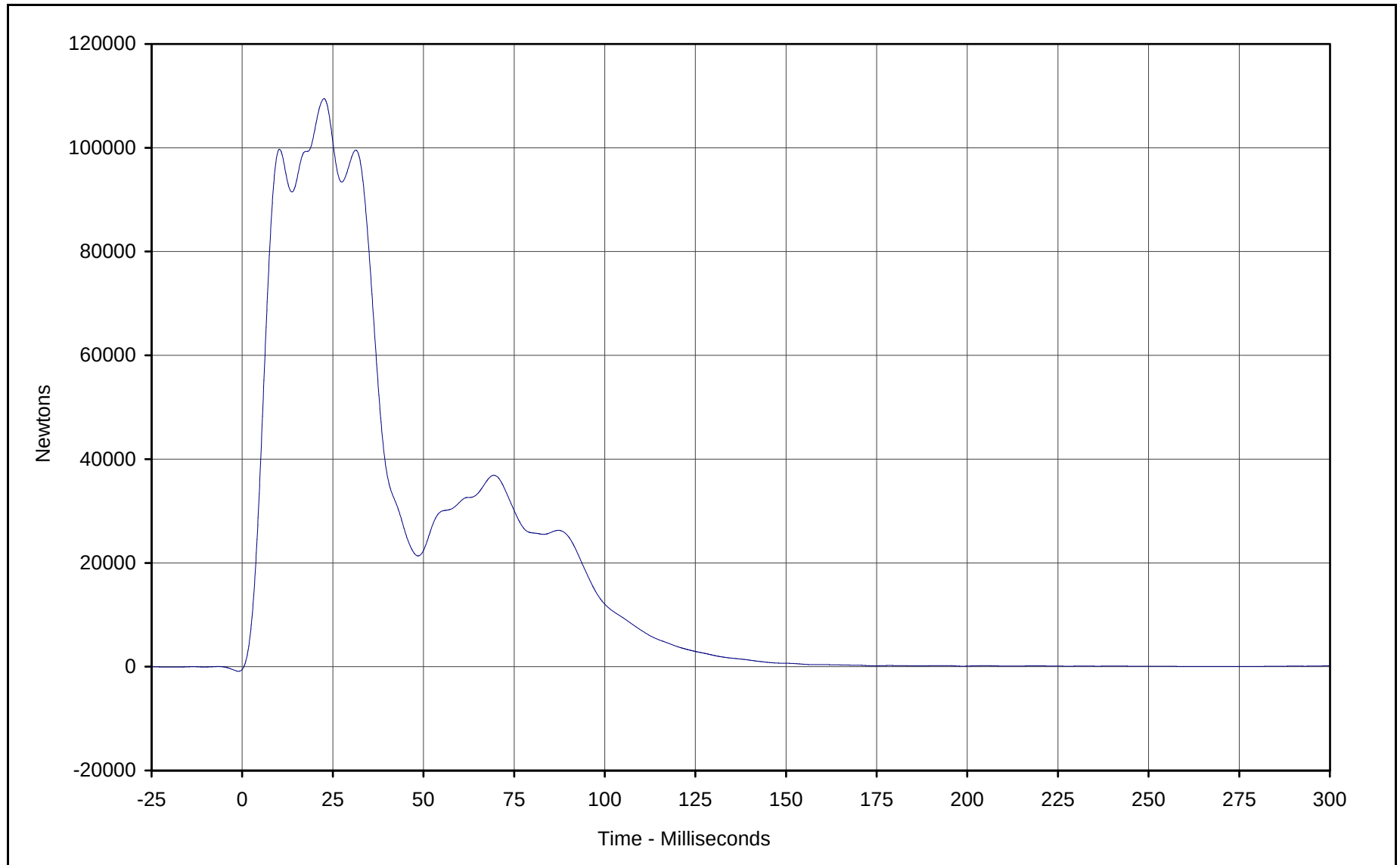
Curve Number: FIL-116

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



C-14



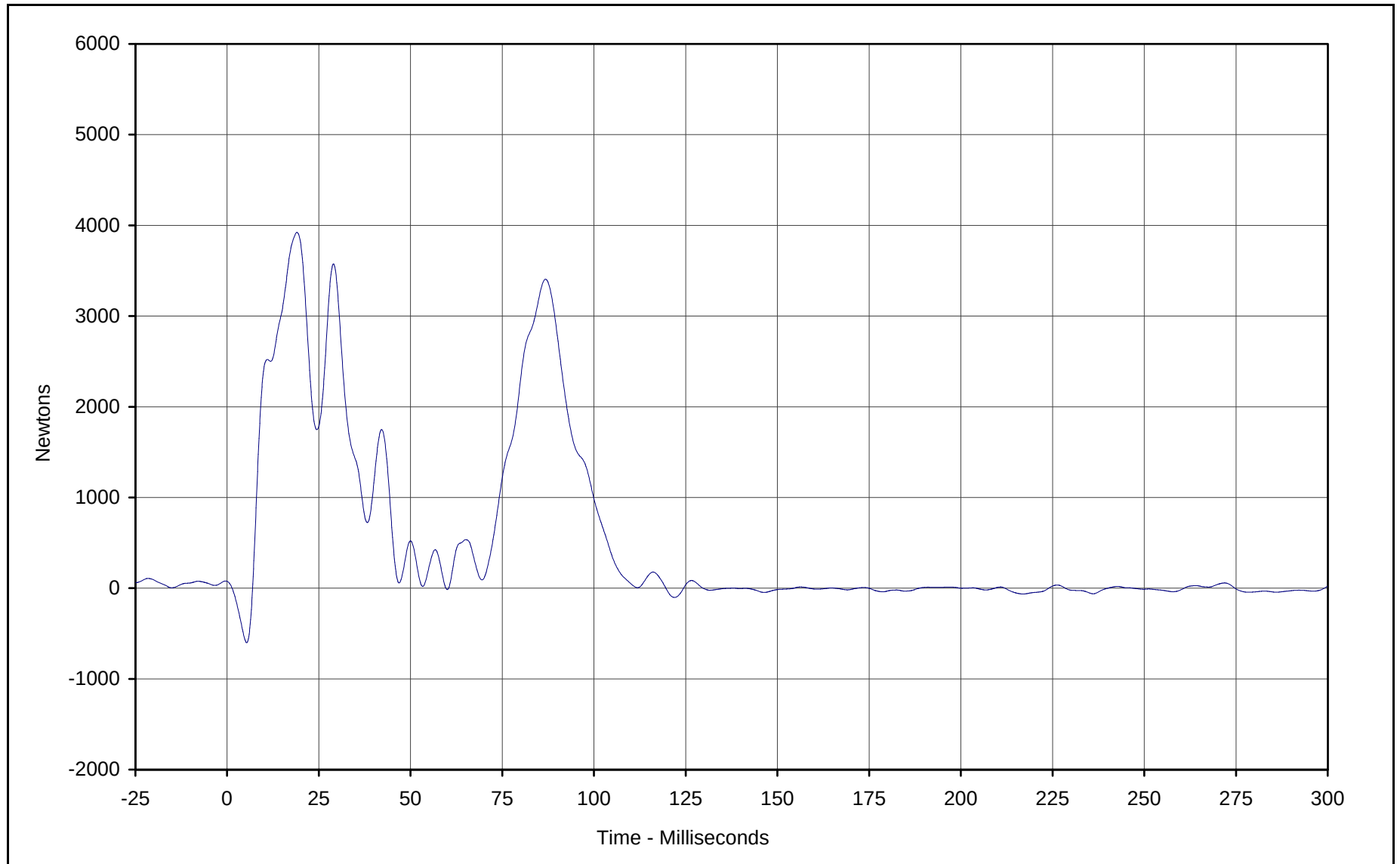
Curve Description: Barrier Force B7
Maximum Value: 109455.9 at 22.6 Milliseconds
Minimum Value: -531.7 at 0.0 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-117

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-15

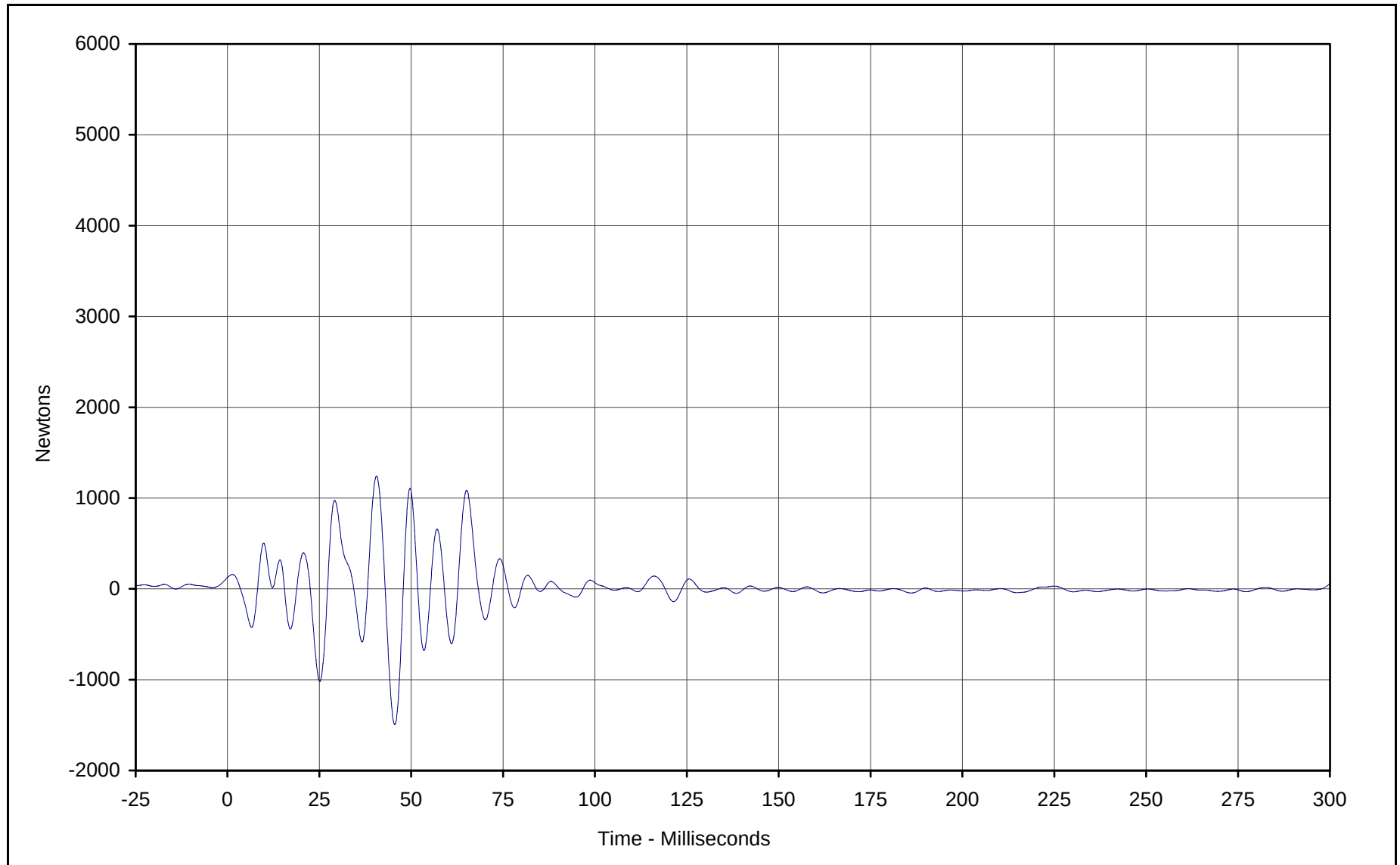


Curve Description: Barrier Force B8
Maximum Value: 3923.4 at 19.0 Milliseconds
Minimum Value: -601.8 at 5.3 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-118

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



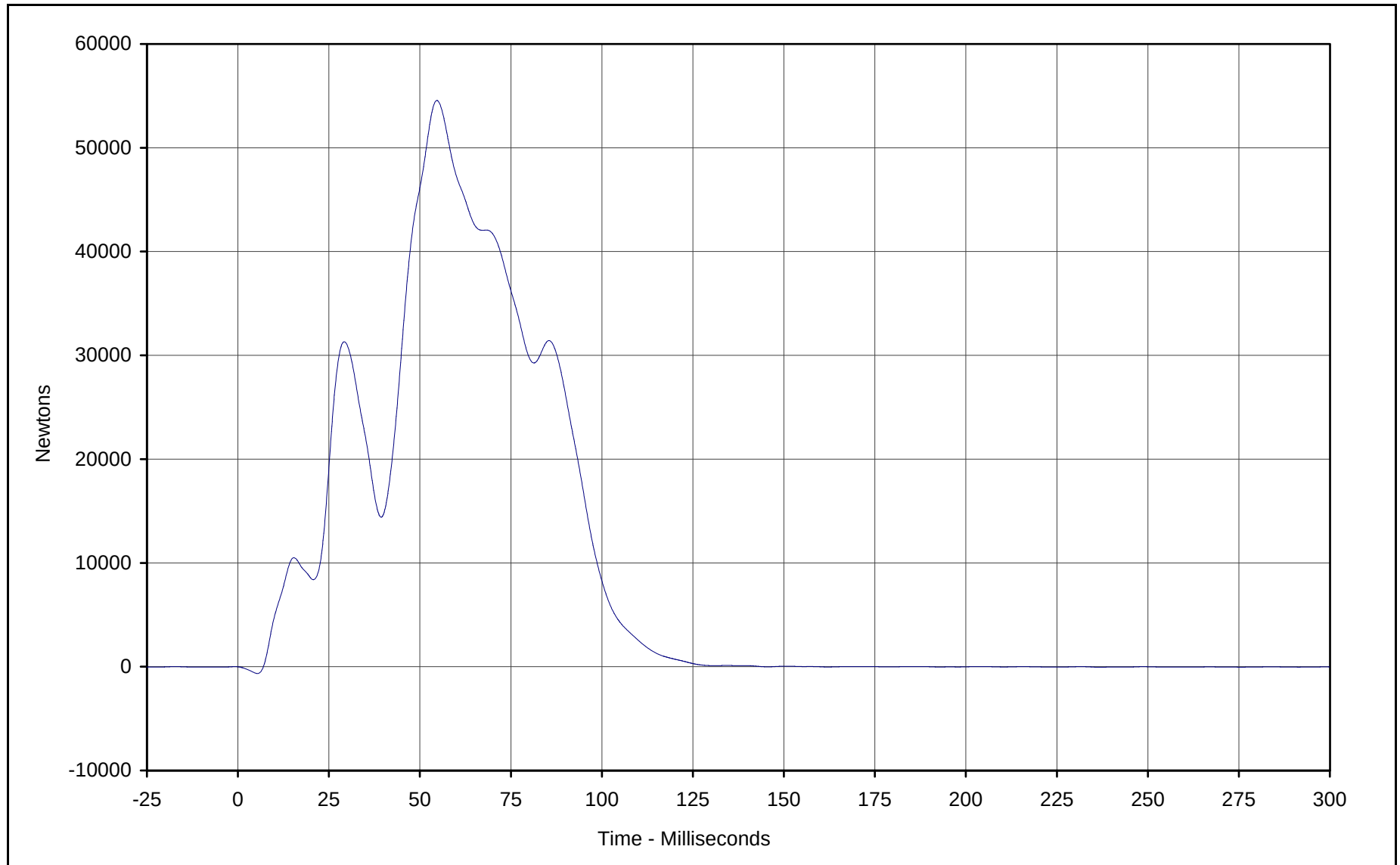
KAR22001-01



Curve Description: Barrier Force B9
Maximum Value: 1240.6 at 40.5 Milliseconds
Minimum Value: -1495.9 at 45.5 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-119

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan

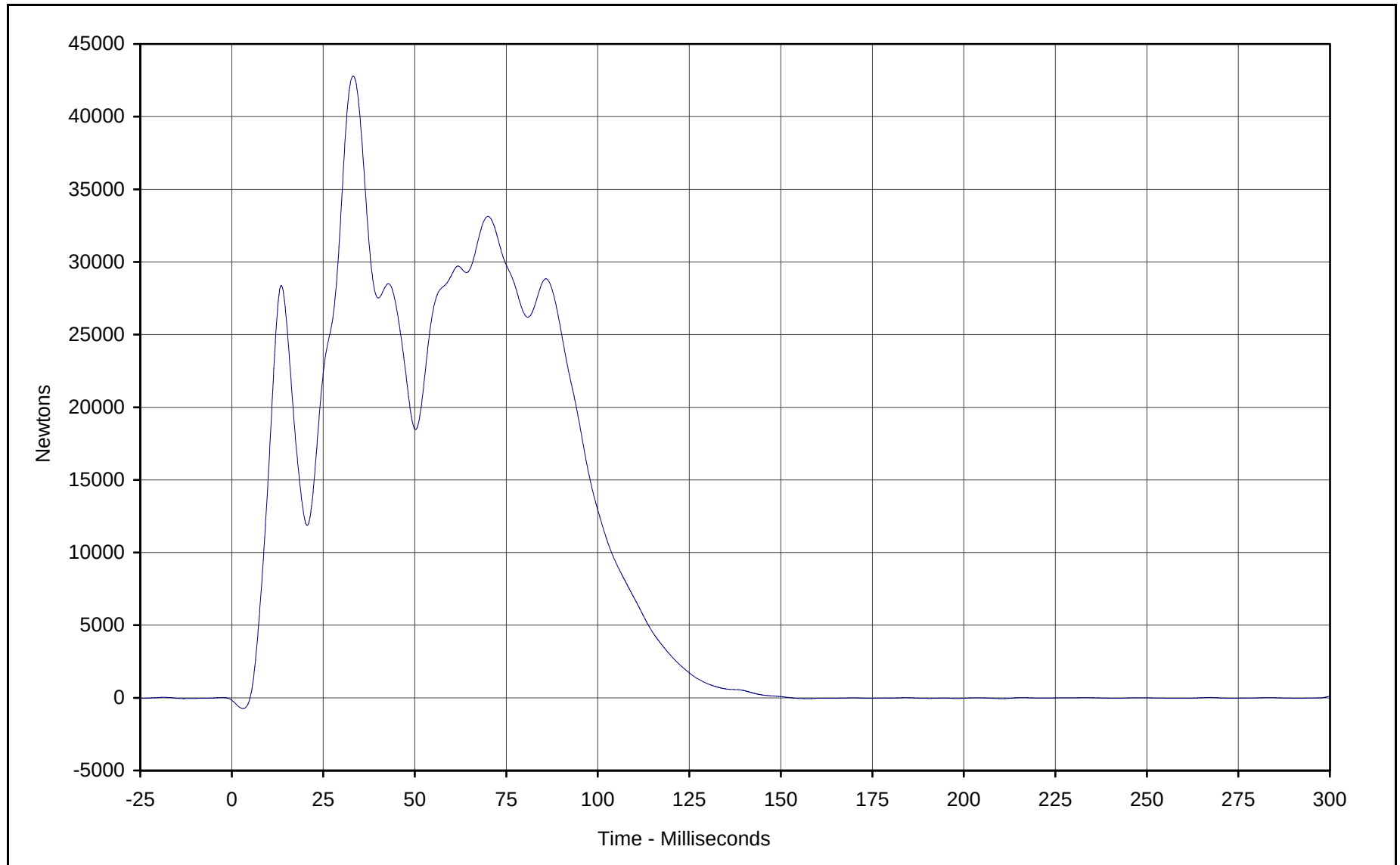




Curve Description: Barrier Force C2
Maximum Value: 54560.9 at 54.7 Milliseconds
Minimum Value: -654.9 at 5.4 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-121

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan

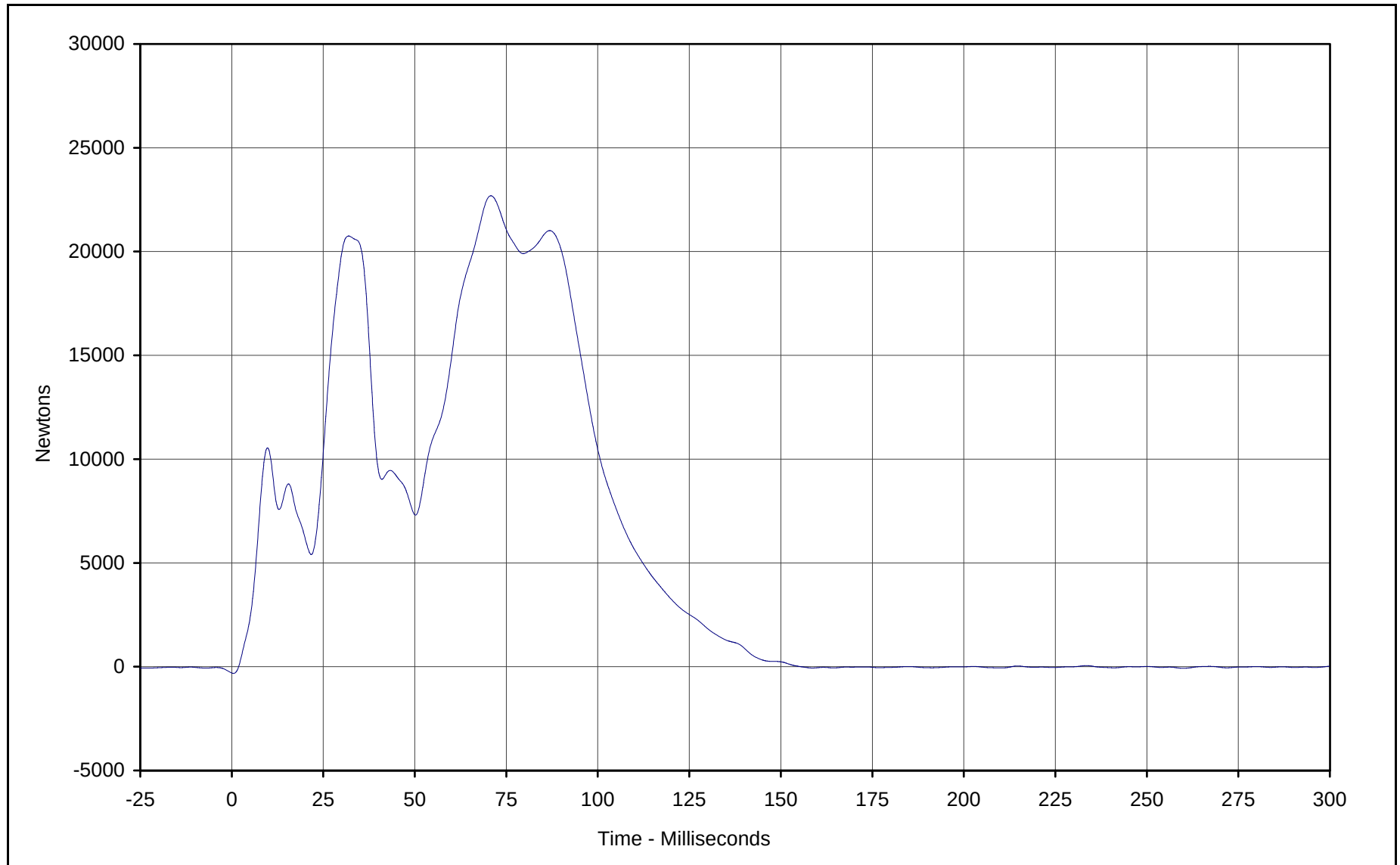




Curve Description: Barrier Force C3
Maximum Value: 42798.7 at 33.2 Milliseconds
Minimum Value: -729.6 at 3.1 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-122

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



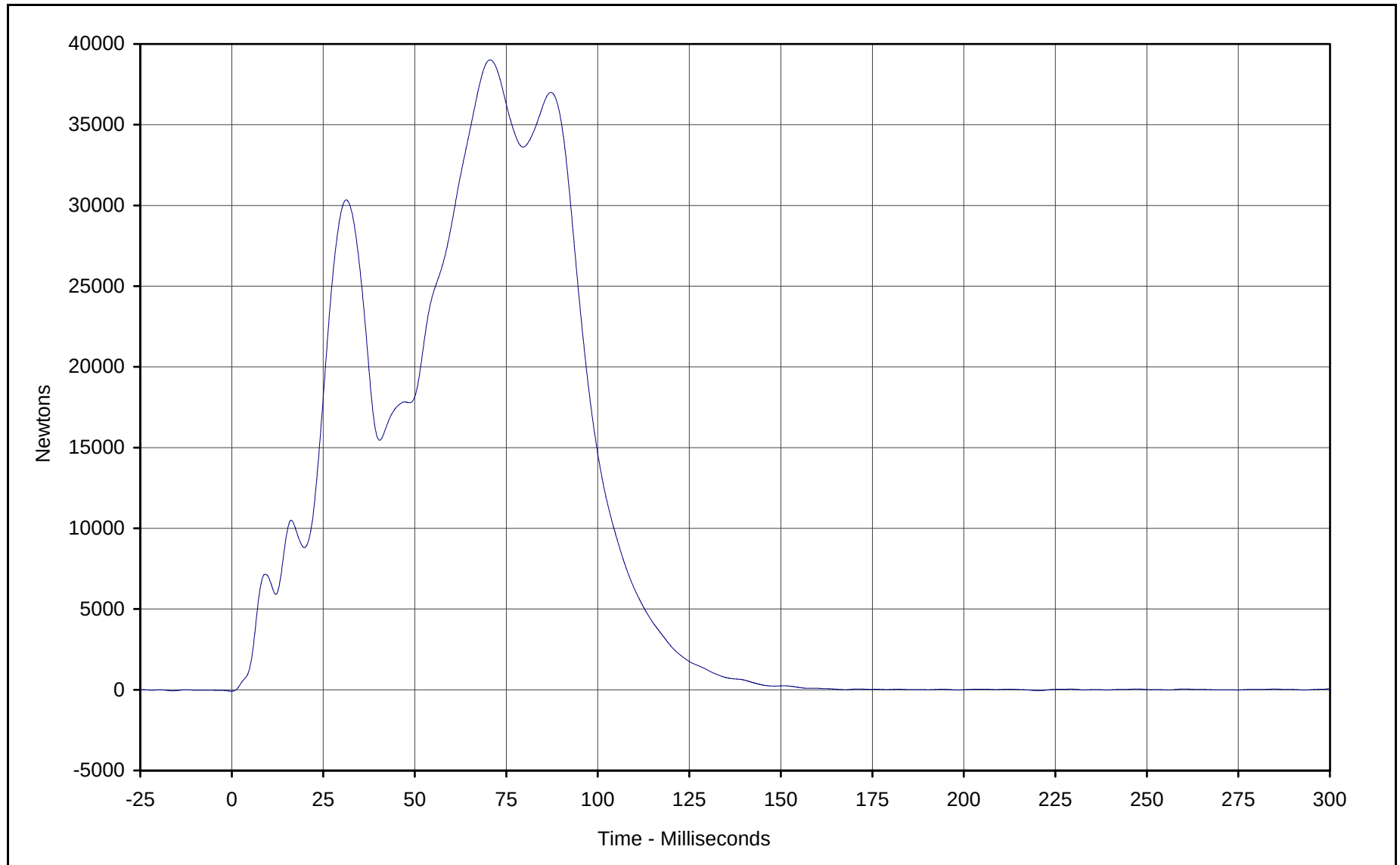


Curve Description: Barrier Force C4
Maximum Value: 22690.8 at 70.8 Milliseconds
Minimum Value: -321.7 at 0.4 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-123

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



C-20

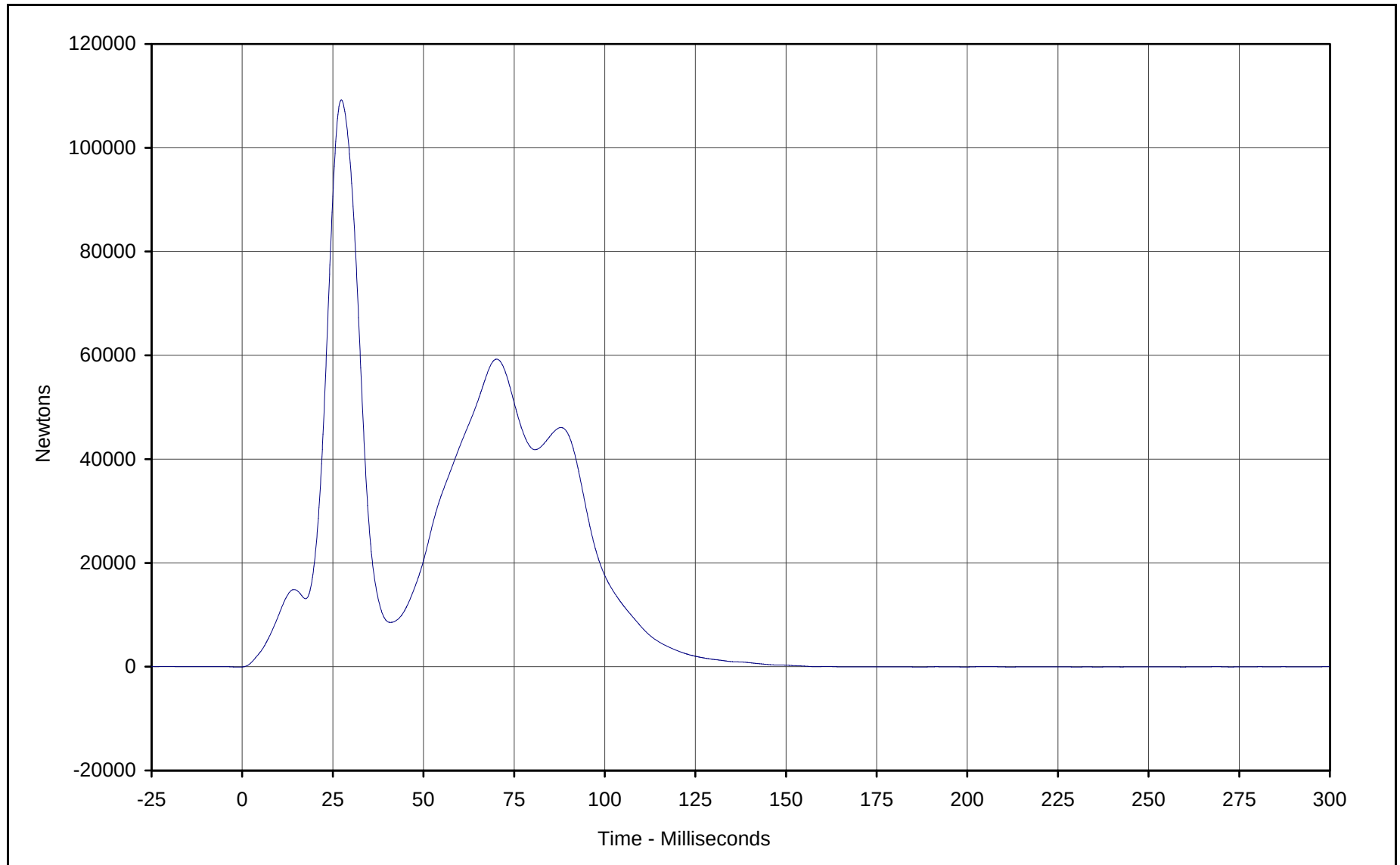


Curve Description: Barrier Force C5
Maximum Value: 39014.4 at 70.6 Milliseconds
Minimum Value: -88.4 at 0.0 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-124

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

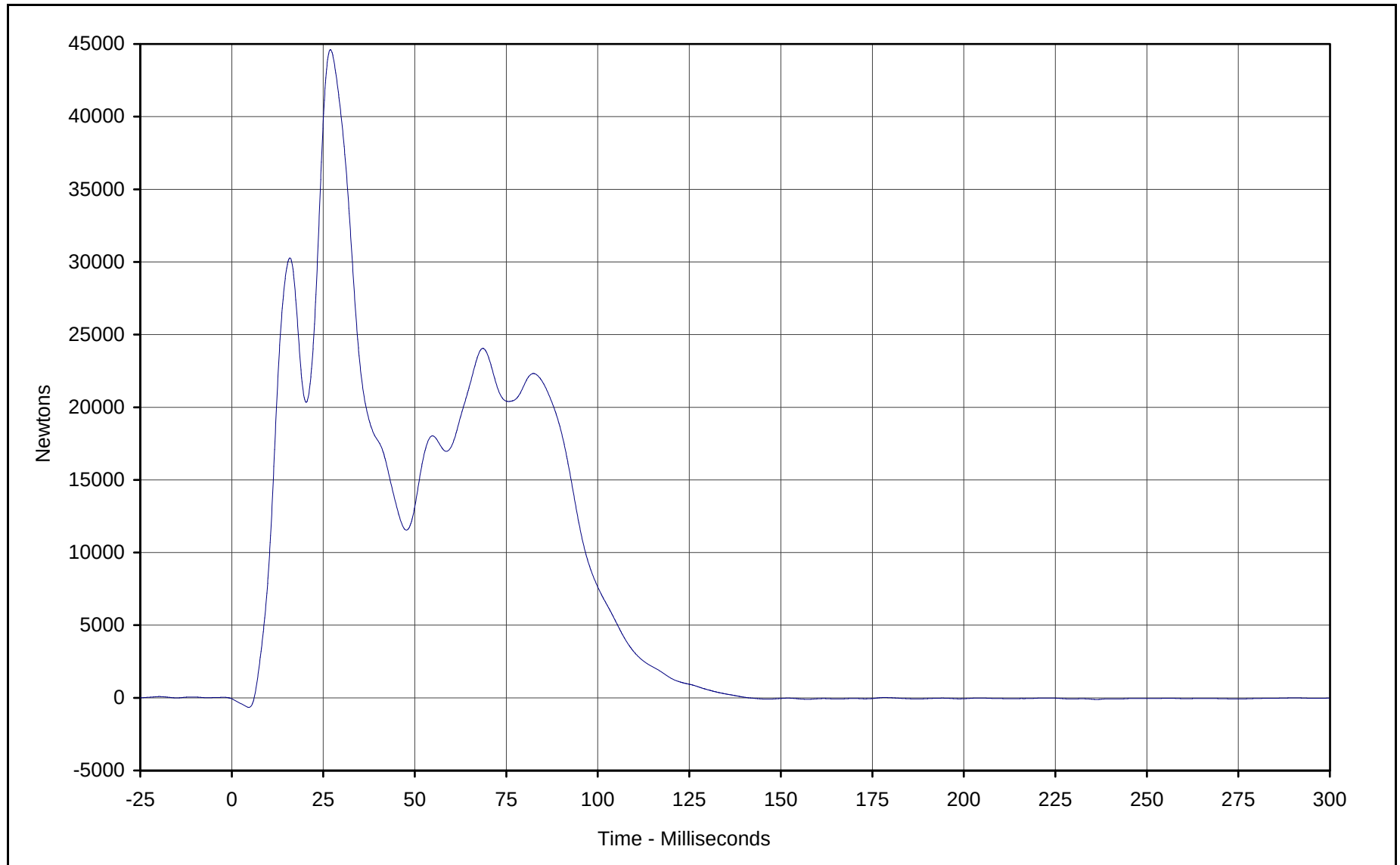


Curve Description: Barrier Force C6
Maximum Value: 109242.8 at 27.3 Milliseconds
Minimum Value: -70.8 at 236.1 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-125

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



C-22



Curve Description: Barrier Force C7

Maximum Value: 44605.6 at 27.0 Milliseconds

Minimum Value: -654.6 at 4.6 Milliseconds

SAE Filter Class: 60

Date of Test: 12/7/01

Curve Number: FIL-126

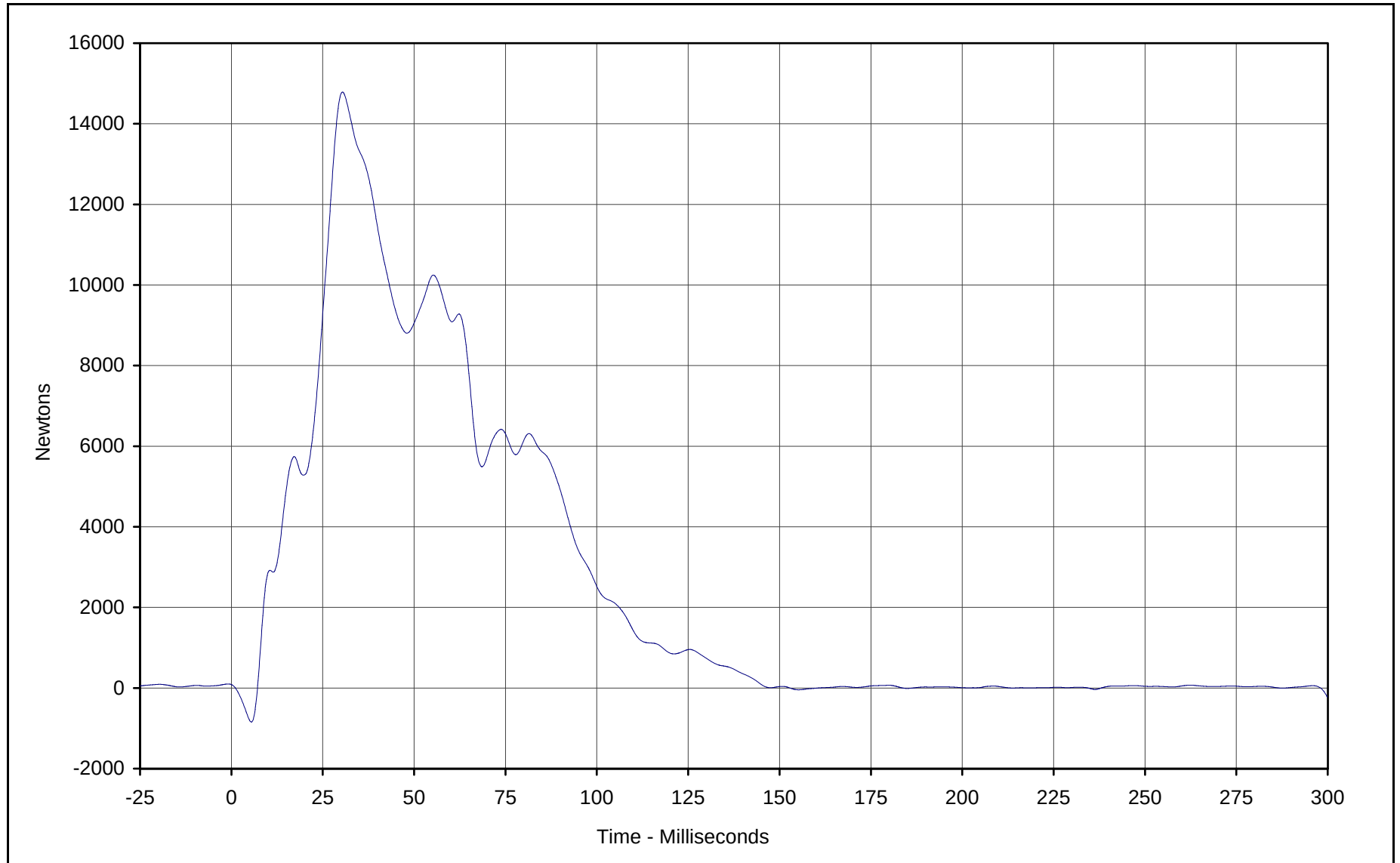
Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-23



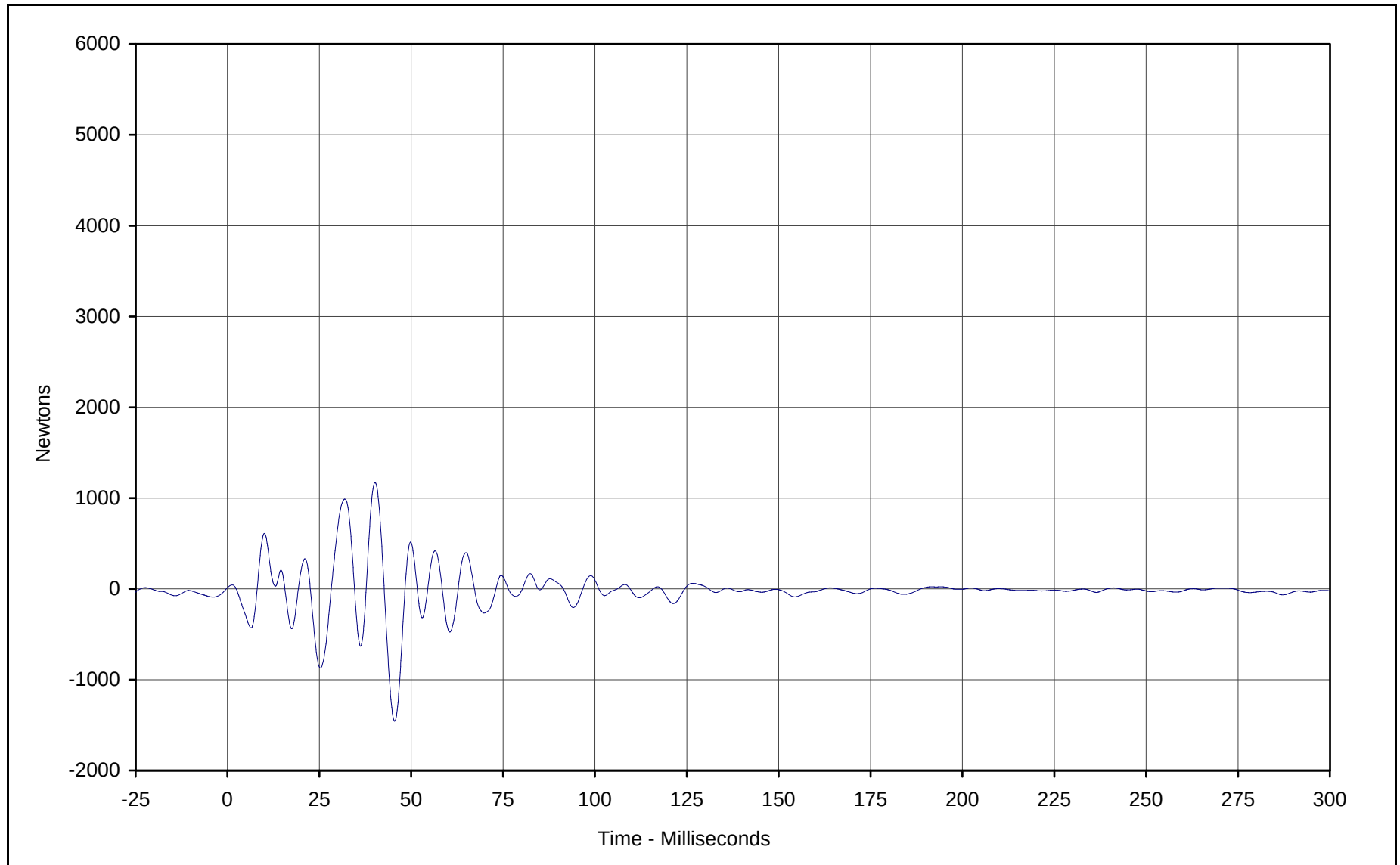
Curve Description: Barrier Force C8
Maximum Value: 14787.9 at 30.4 Milliseconds
Minimum Value: -843.7 at 5.5 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-127

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-24



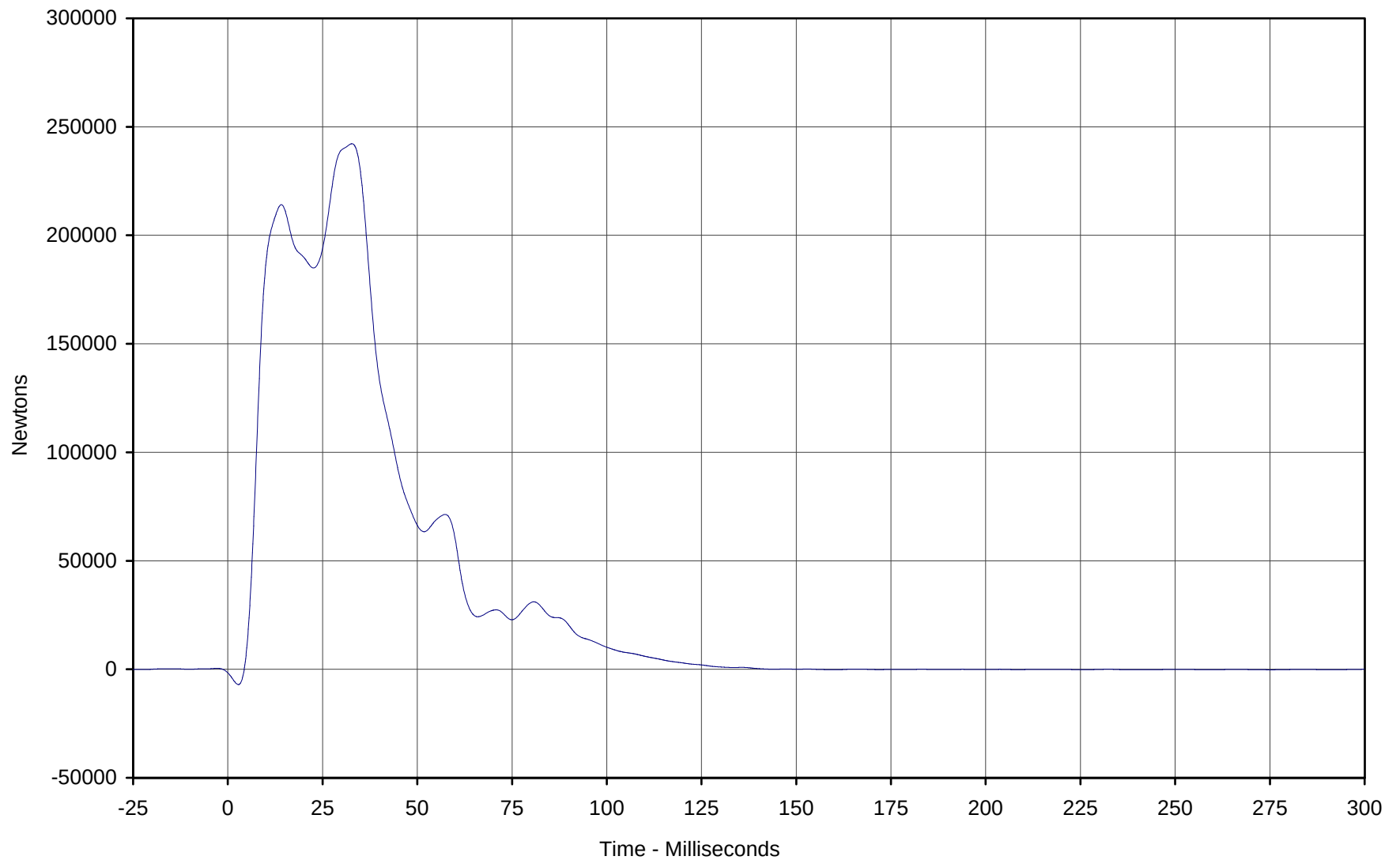
Curve Description: Barrier Force C9
Maximum Value: 1172.1 at 40.2 Milliseconds
Minimum Value: -1457.3 at 45.5 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: FIL-128

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-25

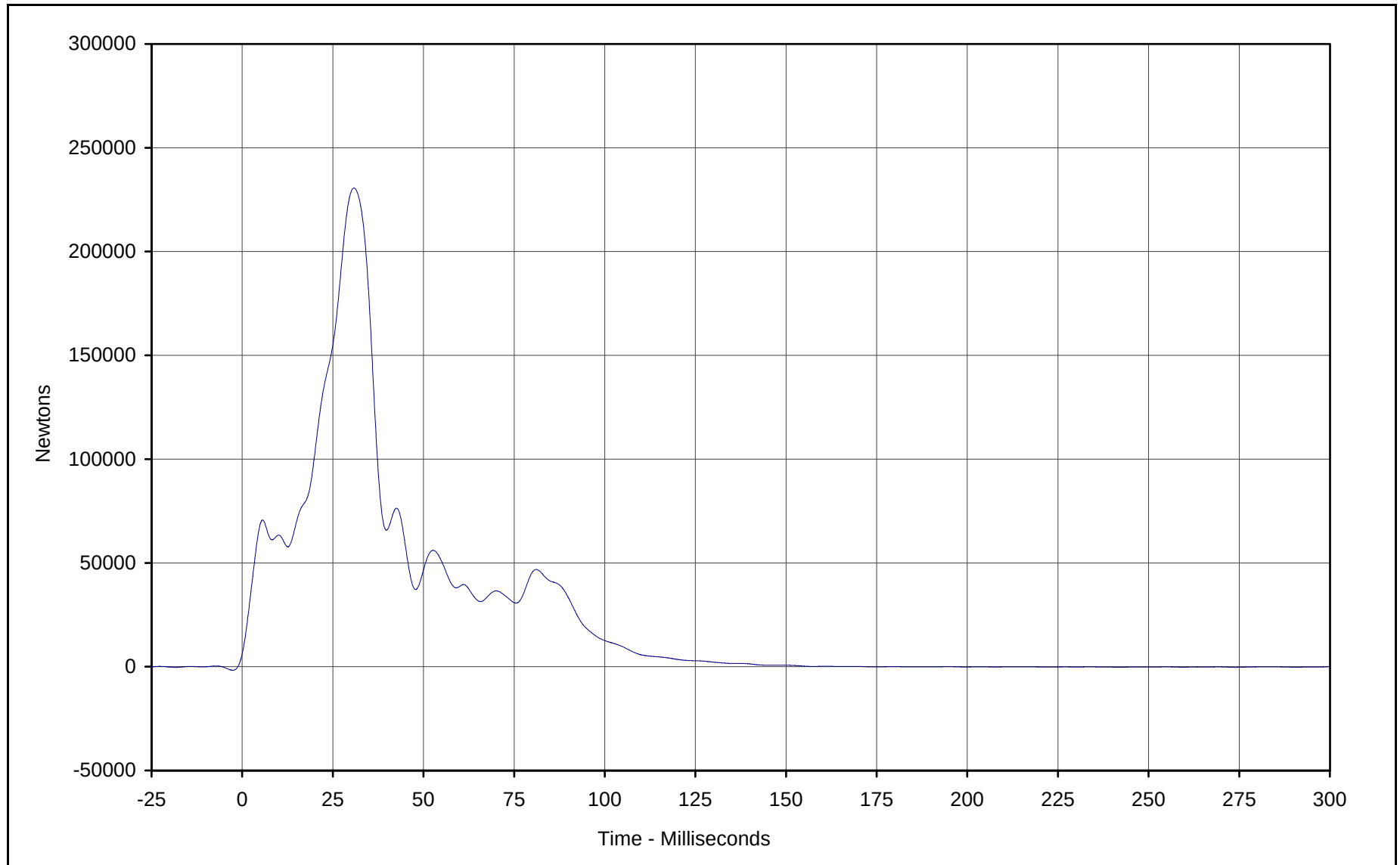


Curve Description: Barrier Force Sum Group 1
Maximum Value: 242209.8 at 32.7 Milliseconds
Minimum Value: -7031.3 at 2.8 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: SUM-001

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



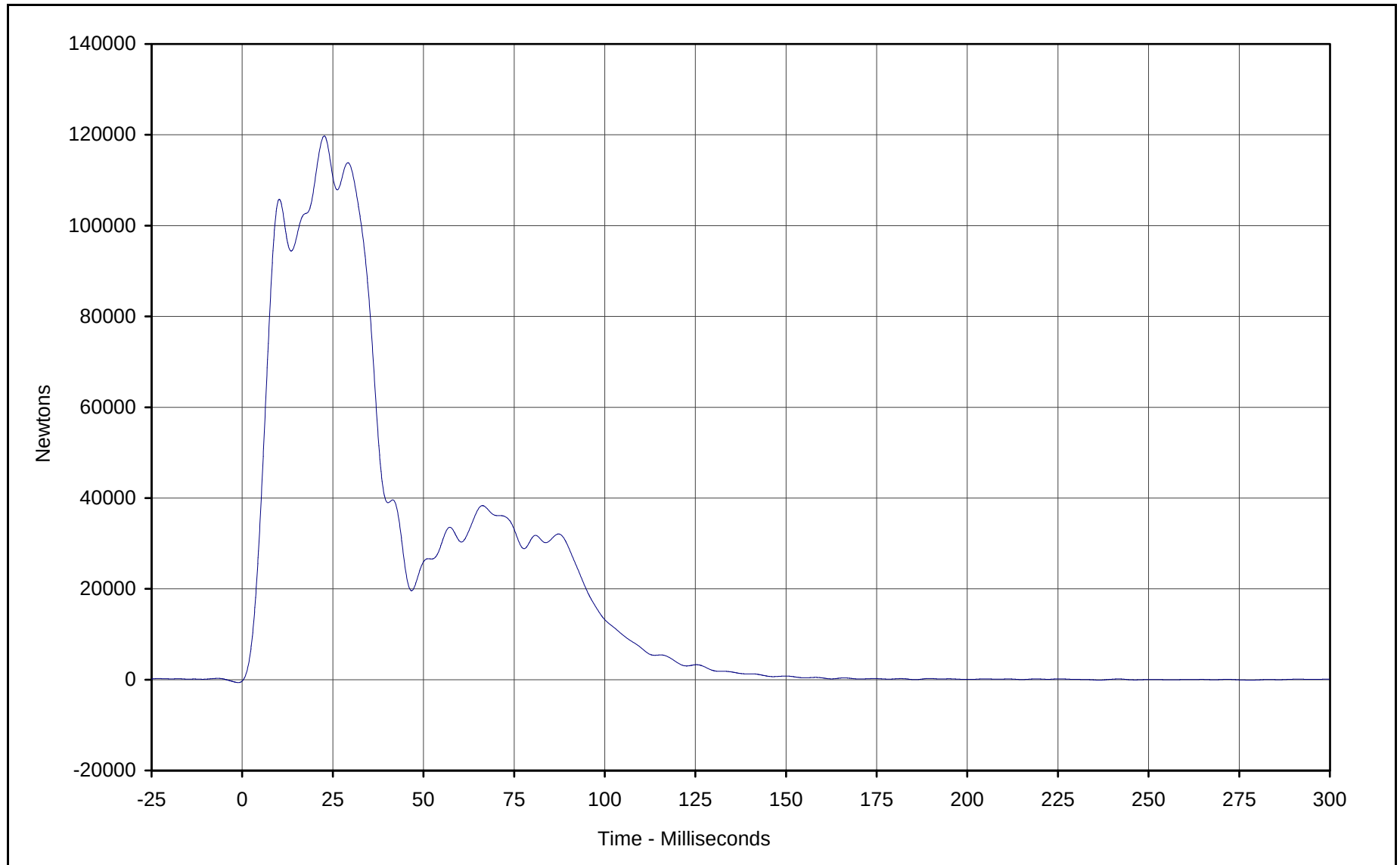
KAR22001-01



Curve Description: Barrier Force Sum Group 2
Maximum Value: 230616.5 at 30.8 Milliseconds
Minimum Value: -316.4 at 274.0 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: SUM-002

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan

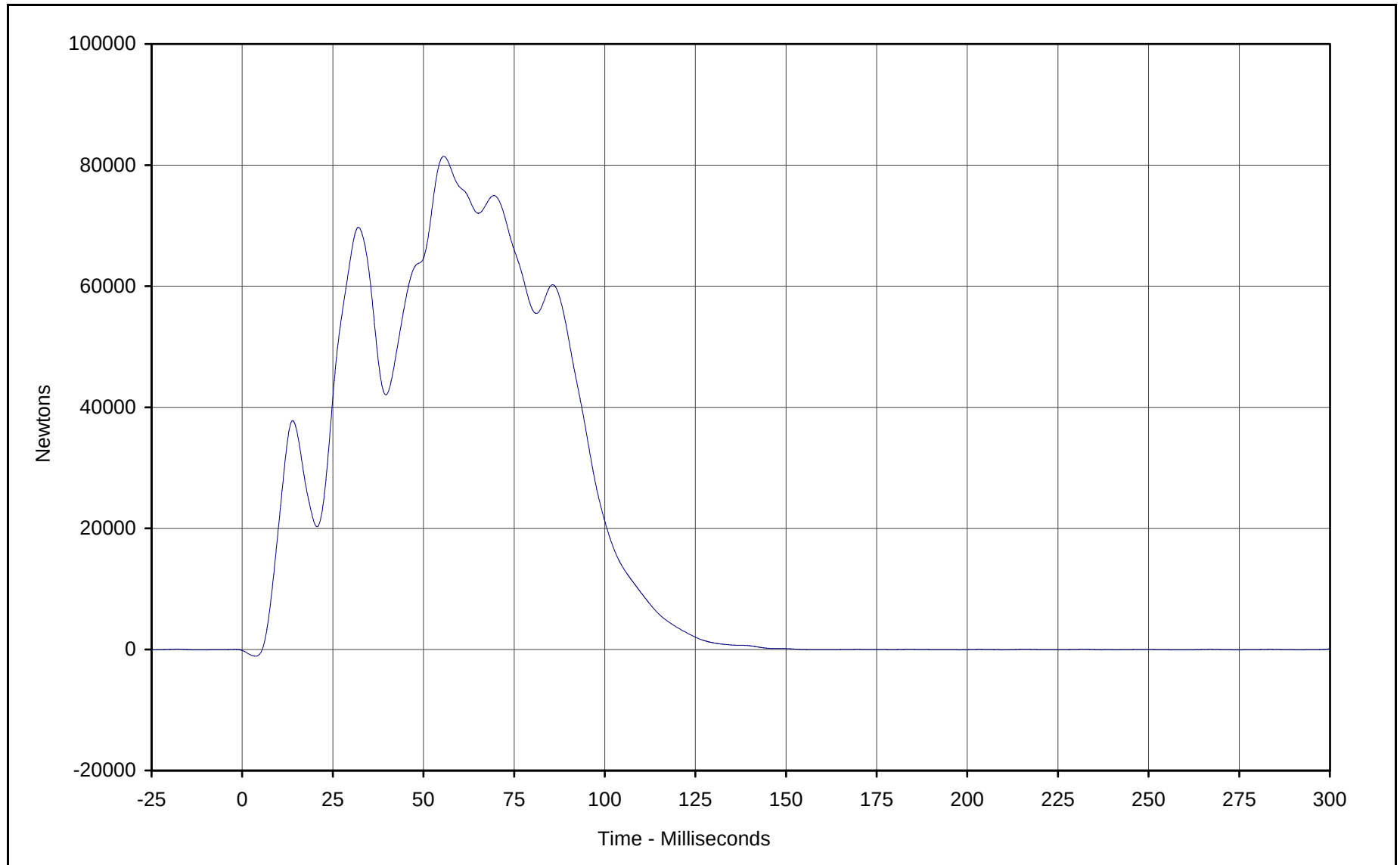




Curve Description: Barrier Force Sum Group 3
Maximum Value: 119750.1 at 22.6 Milliseconds
Minimum Value: -307.4 at 0.0 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: SUM-003

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan

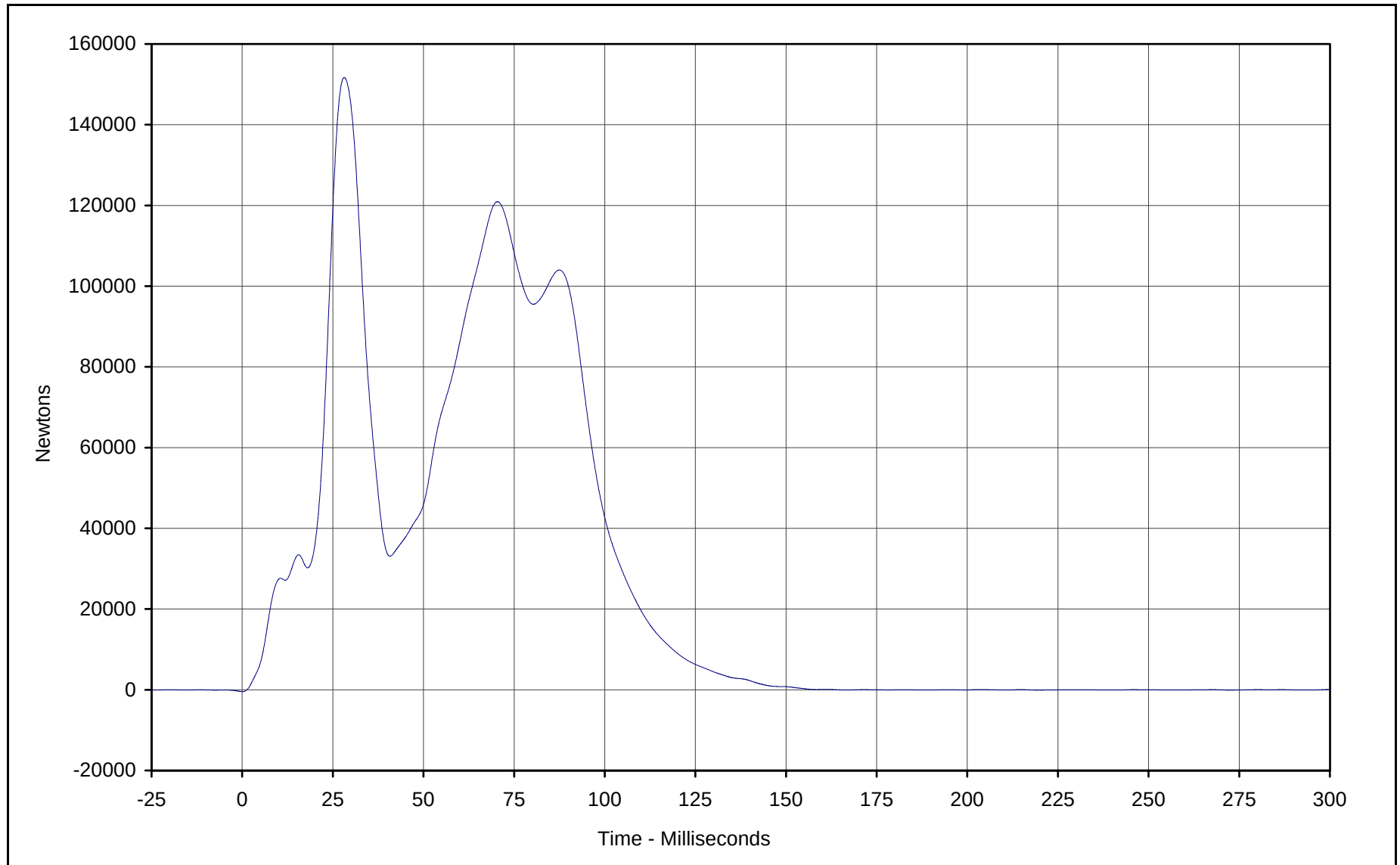




Curve Description: Barrier Force Sum Group 4
Maximum Value: 81444.2 at 55.6 Milliseconds
Minimum Value: -1120.7 at 3.7 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: SUM-004

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



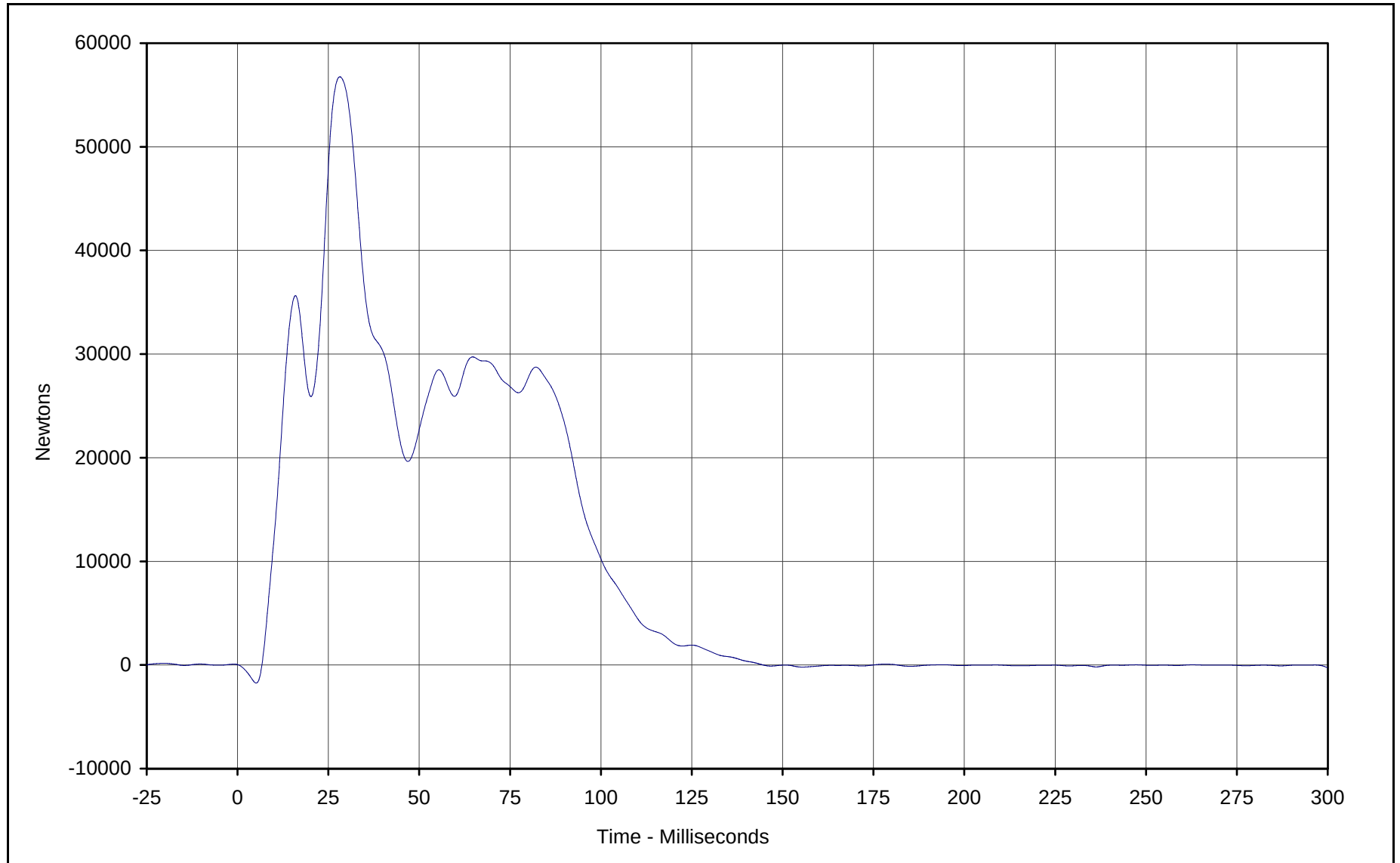


Curve Description: Barrier Force Sum Group 5
Maximum Value: 151714.4 at 28.1 Milliseconds
Minimum Value: -448.7 at 0.0 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: SUM-005

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



C-30



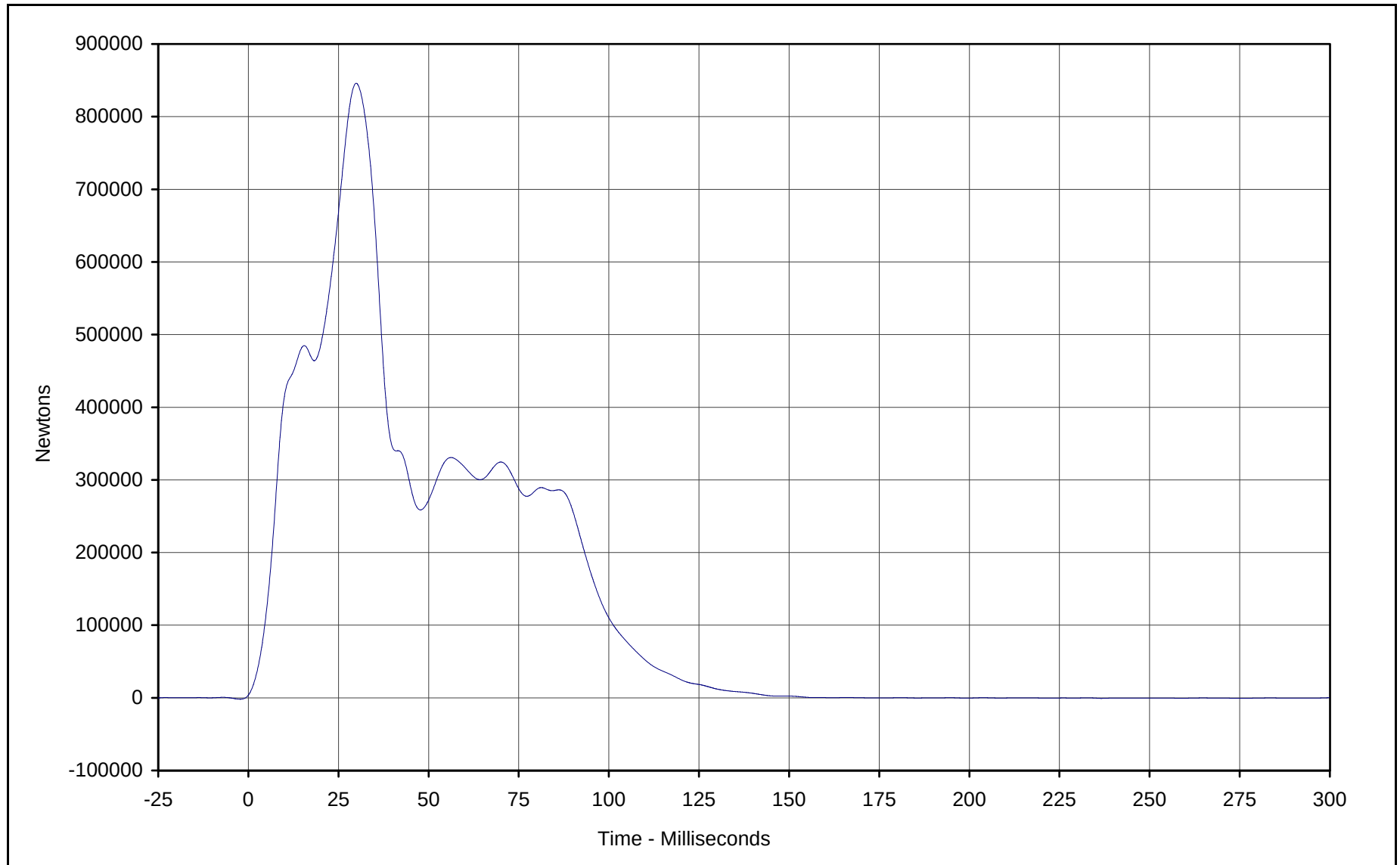
Curve Description: Barrier Force Sum Group 6
Maximum Value: 56754.1 at 28.2 Milliseconds
Minimum Value: -1743.2 at 5.1 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: SUM-006

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01

C-31

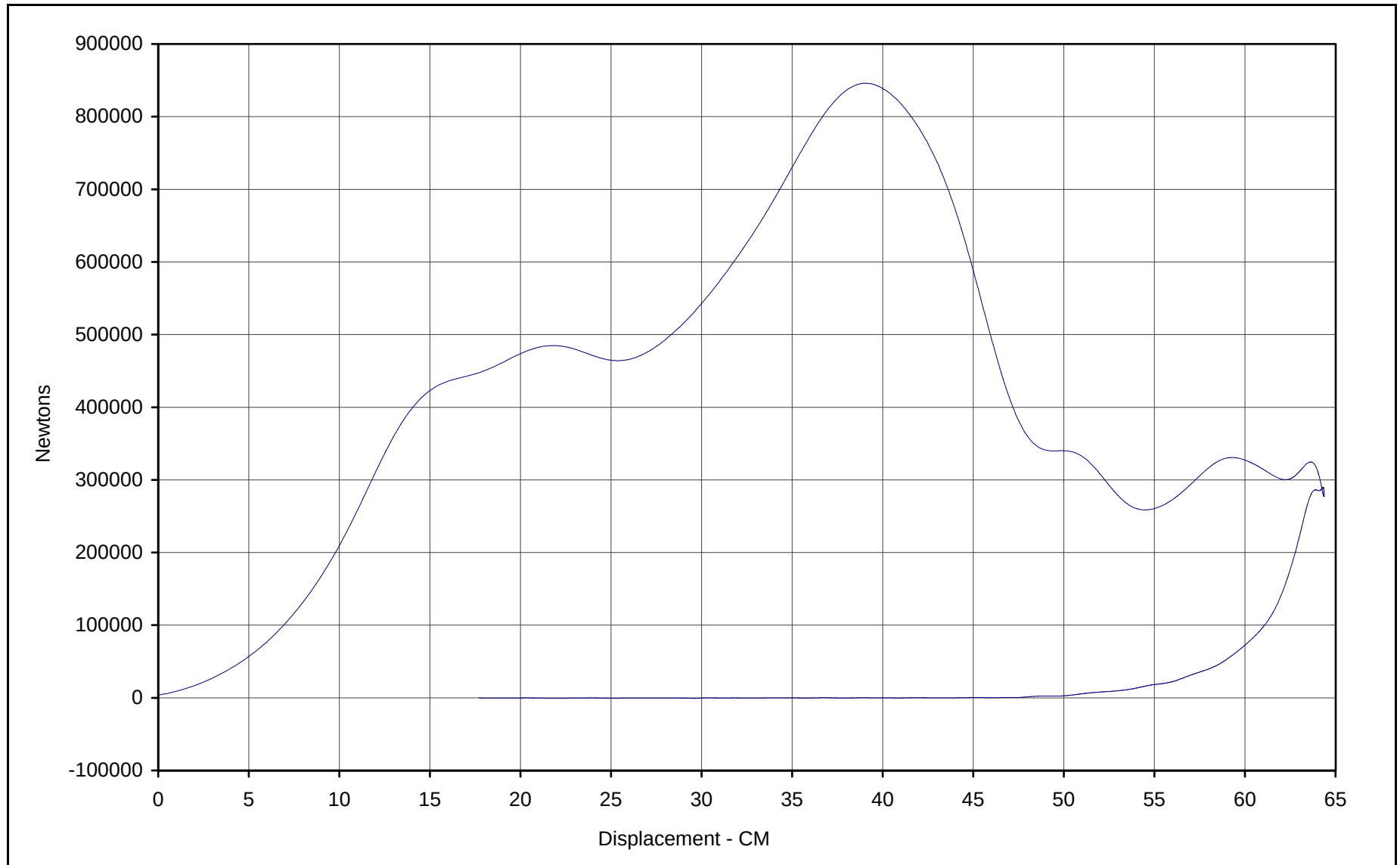


Curve Description: Barrier Force Sum Total
Maximum Value: 845927.4 at 29.9 Milliseconds
Minimum Value: -789.1 at 236.6 Milliseconds
SAE Filter Class: 60
Date of Test: 12/7/01
Curve Number: SUM-007

Test Program: 2002 NHTSA 35mph NCAP No.: M25009
Test Vehicle: 2002 Kia Sedona LX Minivan



KAR22001-01



Curve Description: Sum Force Total vs. Dynamic Crush

Maximum Displ.: 64.4 at 78.5 Milliseconds

Maximum Force: 845,927 at 29.9 Milliseconds

Measured Energy: 258,575 joules

Date of Test: 12/7/01

Curve Number: XVY-001

Test Program: 2002 NHTSA 35mph NCAP No.: M25009

Test Vehicle: 2002 Kia Sedona LX Minivan



BARRIER LOAD CELL SUMMARY DATATest Vehicle: 2002 Kia Sedona LX MinivanNHTSA No.: M25009Test Program: 2002 NHTSA 35mph NCAPTest Date: 12/7/01**BARRIER LOAD CELL PEAK FORCES**

Location	Units	Max	Time	Min	Time
Barrier Force A2	Newtons	2138.8	28.6	-1030.0	6.3
Barrier Force A3	Newtons	39213.9	57.6	-1995.7	64.9
Barrier Force A4	Newtons	29549.6	34.6	-982.0	4.6
Barrier Force A5	Newtons	32212.9	33.3	-709.6	2.3
Barrier Force A6	Newtons	36210.8	32.4	-990.5	4.6
Barrier Force A7	Newtons	11953.9	27.1	-1660.5	39.1
Barrier Force A8	Newtons	2386.1	80.7	-681.6	25.1
Barrier Force A9	Newtons	1648.2	41.4	-1781.3	45.4
Barrier Force B2	Newtons	73024.8	35.0	-1865.0	3.5
Barrier Force B3	Newtons	155682.1	30.2	-4437.5	2.5
Barrier Force B4	Newtons	35872.2	33.6	-67.9	242.3
Barrier Force B5	Newtons	38474.4	31.7	-80.8	299.9
Barrier Force B6	Newtons	82439.9	28.2	-60.6	236.5
Barrier Force B7	Newtons	109455.9	22.6	-531.7	0.0
Barrier Force B8	Newtons	3923.4	19.0	-601.8	5.3
Barrier Force B9	Newtons	1240.6	40.5	-1495.9	45.5
Barrier Force C2	Newtons	54560.9	54.7	-654.9	5.4
Barrier Force C3	Newtons	42798.7	33.2	-729.6	3.1
Barrier Force C4	Newtons	22690.8	70.8	-321.7	0.4
Barrier Force C5	Newtons	39014.4	70.6	-88.4	0.0
Barrier Force C6	Newtons	109242.8	27.3	-70.8	236.1
Barrier Force C7	Newtons	44605.6	27.0	-654.6	4.6
Barrier Force C8	Newtons	14787.9	30.4	-843.7	5.5
Barrier Force C9	Newtons	1172.1	40.2	-1457.3	45.5
Barrier Force Sum Group 1	Newtons	242209.8	32.7	-7031.3	2.8
Barrier Force Sum Group 2	Newtons	230616.5	30.8	-316.4	274.0
Barrier Force Sum Group 3	Newtons	119750.1	22.6	-307.4	0.0
Barrier Force Sum Group 4	Newtons	81444.2	55.6	-1120.7	3.7
Barrier Force Sum Group 5	Newtons	151714.4	28.1	-448.7	0.0
Barrier Force Sum Group 6	Newtons	56754.1	28.2	-1743.2	5.1
Barrier Force Sum Total	Newtons	845927.4	29.9	-789.1	236.6

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

APPENDIX D

INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

2002 NHTSA 35mph NCAP
Instrumentation Data Channel Assignments
Driver A.T.D. Serial Number 34
12/7/01
2002 Kia Sedona LX Minivan

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

2002 NHTSA 35mph NCAP
Instrumentation Data Channel Assignments
Driver A.T.D. Serial Number 34
12/7/01
2002 Kia Sedona LX Minivan

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
25	Left Knee Slider	X	SLIDER	Rotary Potentiometer	Bourns	150-0121V	MM
26	Right Knee Slider	X	SLIDER	Rotary Potentiometer	Bourns	150-0121V	MM
27	UP. TIBIA LEFT MOM.	X	GPUT09MX	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
28	UP. TIBIA LEFT MOM.	Y	GPUT09MY	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
29	UP. TIBIA RIGHT MOM.	X	GPUT09MX	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
30	UP. TIBIA RIGHT MOM.	Y	GPUT09MY	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
31	LWR. TIBIA LEFT MOM.	X	GPLT09MX	3 ch., lower tibia gage	R. A. Denton	3093	Nm
32	LWR. TIBIA LEFT MOM.	Y	GPLT09MY	3 ch., lower tibia gage	R. A. Denton	3093	Nm
33	LWR. TIBIA LEFT FORCE	Z	GPLT09FZ	3 ch., lower tibia gage	R. A. Denton	3093	N
34	LWR. TIBIA RIGHT MOM.	X	GPLT09MX	3 ch., lower tibia gage	R. A. Denton	3093	Nm
35	LWR. TIBIA RIGHT MOM.	Y	GPLT09MY	3 ch., lower tibia gage	R. A. Denton	3093	Nm
36	LWR. TIBIA RIGHT FORCE	Z	GPLT09FZ	3 ch., lower tibia gage	R. A. Denton	3093	N
37	FOOT LEFT, AFT	X	KEIC003X	Accel., Foot Triax	I.C. Sensor	3031-500	G
38	FOOT LEFT, AFT	Z	KEIC003Y	Accel., Foot Triax	I.C. Sensor	3031-500	G
39	FOOT LEFT, FORE	Z	KEIC003Z	Accel., Foot Triax	I.C. Sensor	3031-500	G
40	FOOT RIGHT, AFT	X	KEIC004X	Accel., Foot Triax	I.C. Sensor	3031-500	G
41	FOOT RIGHT, AFT	Z	KEIC004Y	Accel., Foot Triax	I.C. Sensor	3031-500	G
42	FOOT RIGHT, FORE	Z	KEIC004Z	Accel., Foot Triax	I.C. Sensor	3031-500	G
43	LAP BELT FORCE	X	KELC003	Load cell, Seat belt	Lebow	3371	N
44	SHOULDER BELT FORCE	X	KELC004	Load cell, Seat belt	Lebow	3371	N
45	SHOULDER BELT SPOOL	X	KEPP001	Pullout pot	Celesco	PTX101-0030	CM
46	SHOULDER BELT ELONG.	X	KEEP001	Linear pot., belt stretch	E.T.I.	LCP8-10 10K	MM/CM

2002 NHTSA 35mph NCAP
Instrumentation Data Channel Assignments
Passenger A.T.D. Serial Number 35
12/7/01
2002 Kia Sedona LX Minivan

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
47	HEAD, PRIMARY	X	GPAC027	Accel., 1/2 bridge	Endevco	7264-2000	G
48	HEAD, PRIMARY	Y	GPAC002	Accel., 1/2 bridge	Endevco	7264-2000	G
49	HEAD, PRIMARY	Z	GPAC003	Accel., 1/2 bridge	Endevco	7264-2000	G
50	HEAD, REDUNDANT	X	GPAC032	Accel., 1/2 bridge	Endevco	7264-2000	G
51	HEAD, REDUNDANT	Y	GPAC021	Accel., 1/2 bridge	Endevco	7264-2000	G
52	HEAD, REDUNDANT	Z	GPAC026	Accel., 1/2 bridge	Endevco	7264-2000	G
53	NECK FORCE	X	GPUN01FX	Load cell, six axis neck	R. A. Denton	1716A	N
54	NECK FORCE	Y	GPUN01FY	Load cell, six axis neck	R. A. Denton	1716A	N
55	NECK FORCE	Z	GPUN01FZ	Load cell, six axis neck	R. A. Denton	1716A	N
56	NECK MOMENT	X	GPUN01MX	Load cell, six axis neck	R. A. Denton	1716A	Nm
57	NECK MOMENT	Y	GPUN01MY	Load cell, six axis neck	R. A. Denton	1716A	Nm
58	NECK MOMENT	Z	GPUN01MZ	Load cell, six axis neck	R. A. Denton	1716A	Nm
59	CHEST , PRIMARY	X	GPAC005	Accel., 1/2 bridge	Endevco	7264-2000	G
60	CHEST , PRIMARY	Y	GPAC011	Accel., 1/2 bridge	Endevco	7264-2000	G
61	CHEST , PRIMARY	Z	GPAC010	Accel., 1/2 bridge	Endevco	7264-2000	G
62	CHEST , REDUNDANT	X	GPAC034	Accel., 1/2 bridge	Endevco	7264-2000	G
63	CHEST , REDUNDANT	Y	GPAC023	Accel., 1/2 bridge	Endevco	7264-2000	G
64	CHEST , REDUNDANT	Z	GPAC020	Accel., 1/2 bridge	Endevco	7264-2000	G
65	CHEST DISPLACEMENT	X	GPCP002	Rotary Pot Chest	Servo	14CBI	MM
66	PELVIS, PRIMARY	X	GPAC025	Accel., 1/2 bridge	Endevco	7264-2000	G
67	PELVIS, PRIMARY	Y	GPAC022	Accel., 1/2 bridge	Endevco	7264-2000	G
68	PELVIS, PRIMARY	Z	GPAC019	Accel., 1/2 bridge	Endevco	7264-2000	G
69	LEFT FEMUR FORCE	Z	KEFF003	Load cell, Femur	R.A. Denton	2121	N
70	RIGHT FEMUR FORCE	Z	KEFF004	Load cell, Femur	R.A. Denton	2121	N

2002 NHTSA 35mph NCAP
Instrumentation Data Channel Assignments
Passenger A.T.D. Serial Number 35
12/7/01
2002 Kia Sedona LX Minivan

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
71	Left Knee Slider	X	SLIDER	Rotary Potentiometer	Bourns	150-0121V	MM
72	Right Knee Slider	X	SLIDER	Rotary Potentiometer	Bourns	150-0121V	MM
73	UP. TIBIA LEFT MOM.	X	GPUT09MX	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
74	UP. TIBIA LEFT MOM.	Y	GPUT09MY	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
75	UP. TIBIA RIGHT MOM.	X	GPUT09MX	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
76	UP. TIBIA RIGHT MOM.	Y	GPUT09MY	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
77	LWR. TIBIA LEFT MOM.	X	GPLT09MX	3 ch., lower tibia gage	R. A. Denton	3093	Nm
78	LWR. TIBIA LEFT MOM.	Y	GPLT09MY	3 ch., lower tibia gage	R. A. Denton	3093	Nm
79	LWR. TIBIA LEFT FORCE	Z	GPLT09FZ	3 ch., lower tibia gage	R. A. Denton	3093	N
80	LWR. TIBIA RIGHT MOM.	X	GPLT09MX	3 ch., lower tibia gage	R. A. Denton	3093	Nm
81	LWR. TIBIA RIGHT MOM.	Y	GPLT09MY	3 ch., lower tibia gage	R. A. Denton	3093	Nm
82	LWR. TIBIA RIGHT FORCE	Z	GPLT09FZ	3 ch., lower tibia gage	R. A. Denton	3093	N
83	FOOT LEFT, AFT	X	KEIC002X	Accel., Foot Triax	I.C. Sensor	3031-500	G
84	FOOT LEFT, AFT	Z	KEIC002Y	Accel., Foot Triax	I.C. Sensor	3031-500	G
85	FOOT LEFT, FORE	Z	KEIC002Z	Accel., Foot Triax	I.C. Sensor	3031-500	G
86	FOOT RIGHT, AFT	X	KEIC001X	Accel., Foot Triax	I.C. Sensor	3031-500	G
87	FOOT RIGHT, AFT	Z	KEIC001Y	Accel., Foot Triax	I.C. Sensor	3031-500	G
88	FOOT RIGHT, FORE	Z	KEIC001Z	Accel., Foot Triax	I.C. Sensor	3031-500	G
89	LAP BELT FORCE	X	KELC001	Load cell, Seat belt	Lebow	3371	N
90	SHOULDER BELT FORCE	X	KELC002	Load cell, Seat belt	Lebow	3371	N
91	SHOULDER BELT SPOOL	X	KEPP001	Pullout pot	Celesco	PTX101-0030	MM
92	SHOULDER BELT ELONG.	X	KEEP001	Linear pot., belt stretch	E.T.I.	LCP8-10 10K	MM/CM

**2002 NHTSA 35mph NCAP
Instrumentation Data Channel Assignments
Vehicle Accelerometers
12/7/01
2002 Kia Sedona LX Minivan**

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
93	Left Rear	X	KEVA002	Accel., Pre-Amp	I.C.S/Karco	3031-500	G
94	Right Rear	X	KEVA010	Accel., Vehicle block	I.C. Sensor	3031-200	G
95	Engine Top	X	KEVA012	Accel., Vehicle block	I.C. Sensor	3031-500	G
96	Engine Bottom	X	KEVA008	Accel., Vehicle block	I.C. Sensor	3031-500	G
97	Left Brake Caliper	X	KEVA007	Accel., Vehicle block	I.C. Sensor	3031-500	G
98	Right Brake Caliper	X	KEVA001	Accel., Vehicle block	I.C. Sensor	3031-500	G
99	Instrument Panel	X	KEVA011	Accel., Vehicle block	I.C. Sensor	3031-200	G
100	Left Rear	Z	KEVA005	Accel., Vehicle block	I.C. Sensor	3031-500	G
101	Right Rear	Z	KEVA006	Accel., Vehicle block	I.C. Sensor	3031-200	G

**2002 NHTSA 35mph NCAP
Instrumentation Data Channel Assignments
Rigid Load Cell Barrier
12/7/01
2002 Kia Sedona LX Minivan**

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

2002 NHTSA 35mph NCAP
Instrumentation Data Channel Assignments
Rigid Load Cell Barrier
12/7/01
2002 Kia Sedona LX Minivan

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

2002 NHTSA 35mph NCAP
Instrumentation Data Channel Assignments
Nine Accelerometer Head Array Channels
12/7/01
2002 Kia Sedona LX Minivan

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS	
138	Driver Head CG	X	KEAC039	Accel.,1/2 bridge	Endevco	7264-2000	G	*
139	Driver Head CG	Y	KEAC038	Accel.,1/2 bridge	Endevco	7264-2000	G	*
140	Driver Head CG	Z	KEAC027	Accel.,1/2 bridge	Endevco	7264-2000	G	*
141	Driver Y-arm	Z	GPAC016	Accel., 1/2 bridge	Endevco	7264-2000	G	
142	Driver Y-arm	X	GPAC015	Accel., 1/2 bridge	Endevco	7264-2000	G	
143	Driver X-arm	Z	GPAC004	Accel., 1/2 bridge	Endevco	7264-2000	G	
144	Driver X-arm	Y	GPAC018	Accel., 1/2 bridge	Endevco	7264-2000	G	
145	Driver Z-arm	X	GPAC006	Accel., 1/2 bridge	Endevco	7264-2000	G	
146	Driver Z-arm	Y	GPAC007	Accel., 1/2 bridge	Endevco	7264-2000	G	
147	Passenger Head CG	X	GPAC027	Accel., 1/2 bridge	Endevco	7264-2000	G	*
148	Passenger Head CG	Y	GPAC002	Accel., 1/2 bridge	Endevco	7264-2000	G	*
149	Passenger Head CG	Z	GPAC003	Accel., 1/2 bridge	Endevco	7264-2000	G	*
150	Passenger Y-arm	Z	GPAC012	Accel., 1/2 bridge	Endevco	7264-2000	G	
151	Passenger Y-arm	X	GPAC001	Accel., 1/2 bridge	Endevco	7264-2000	G	
152	Passenger X-arm	Z	GPAC036	Accel., 1/2 bridge	Endevco	7264-2000	G	
153	Passenger X-arm	Y	GPAC014	Accel., 1/2 bridge	Endevco	7264-2000	G	
154	Passenger Z-arm	X	GPAC030	Accel., 1/2 bridge	Endevco	7264-2000	G	
155	Passenger Z-arm	Y	GPAC037	Accel., 1/2 bridge	Endevco	7264-2000	G	

* Duplicate of Head CG Primary Channels

APPENDIX E

DUMMY CALIBRATION DATA



Hybrid III Calibration Data Sheet

Hybrid III 50th Percentile Male

Knee Impact Test

ATD Serial No.: 034

Location: Left Knee

Test I.D.: LK05C

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	5631	Pass
Overall Test Results				Pass

ATD Serial No.: 034

Location: Right Knee

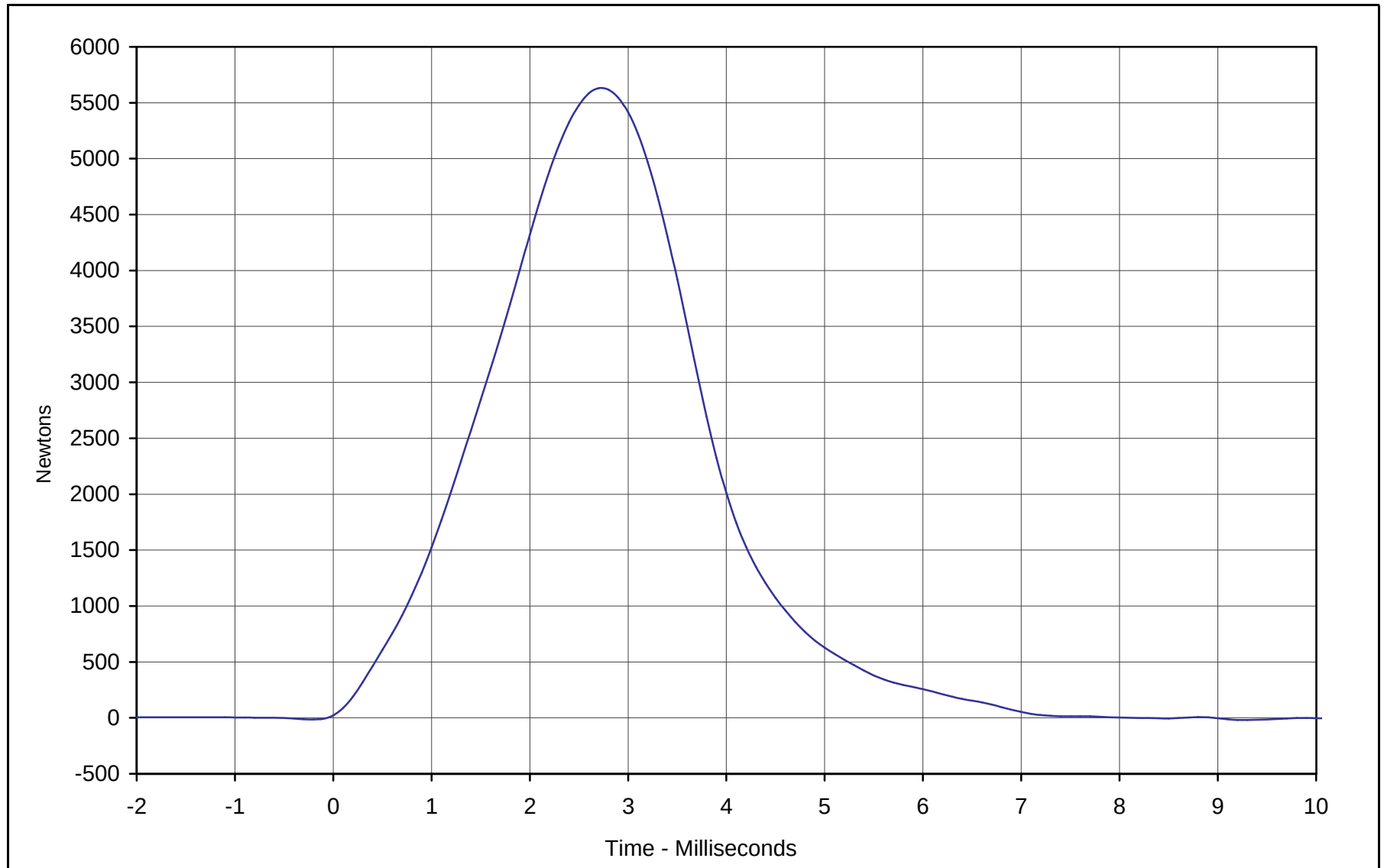
Test I.D.: RK06C

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	N	4715 to 5782	5638	Pass
Overall Test Results				Pass

Laboratory Technician

November 28, 2001

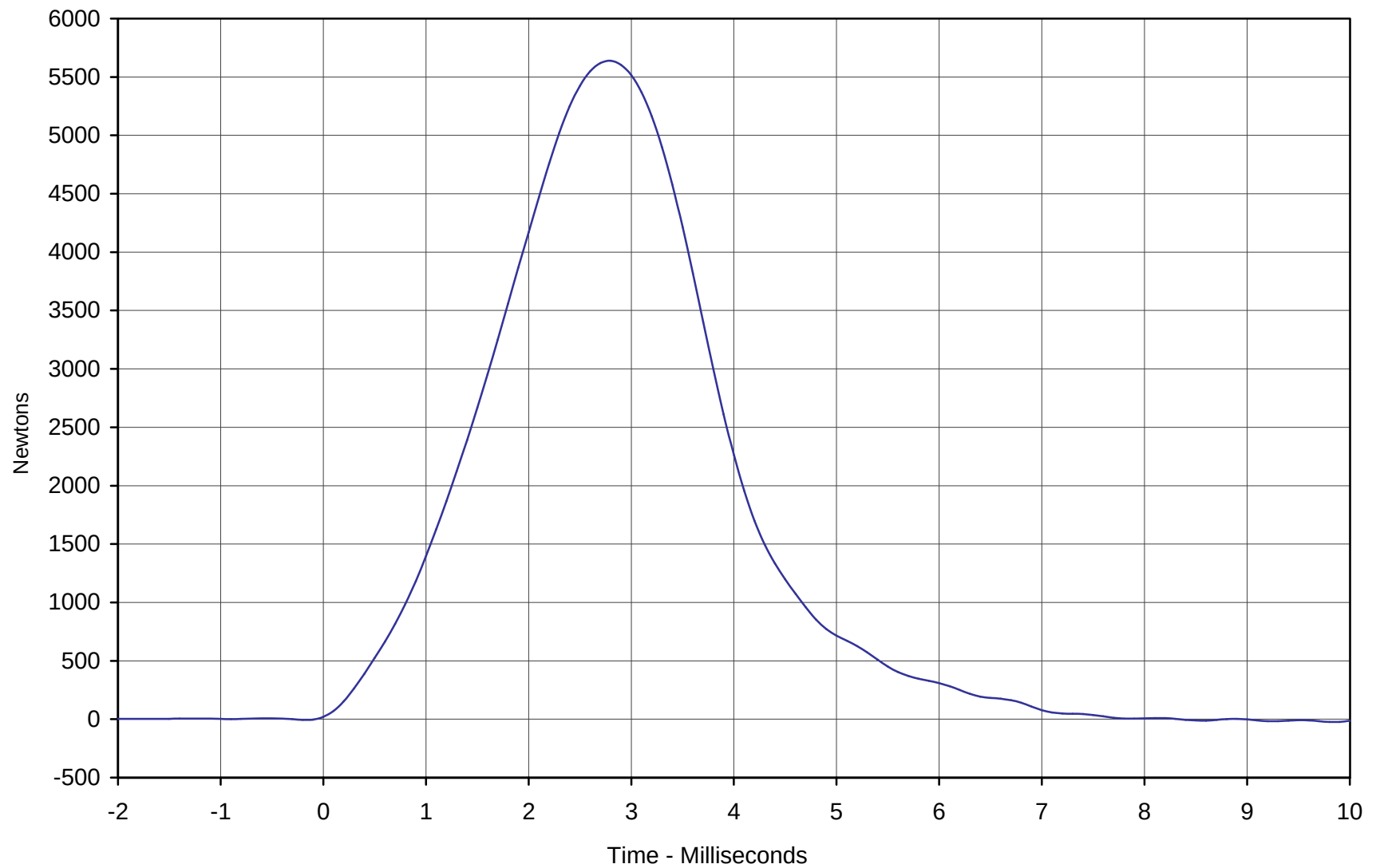
Test Date



Curve Description: Probe Force
Maximum Value: 5631.1 at 2.7 Milliseconds
Minimum Value: -15.1 at -0.2 Milliseconds
SAE Filter Class: 600
Date of Test: 11/28/01
ATD Serial No.: 034

Test Program: Hybrid III Knee Impact Test
Test Information: Location: Left Knee Test I.D.: LK05C





Curve Description: Probe Force
Maximum Value: 5638.4 at 2.8 Milliseconds
Minimum Value: -5.5 at -0.2 Milliseconds
SAE Filter Class: 600
Date of Test: 11/28/01
ATD Serial No.: 034

Test Program: Hybrid III Knee Impact Test
Test Information: Location: Right Knee Test I.D.: RK06C





Hybrid III Calibration Data Sheet

Hybrid III 50th Percentile Male

Knee Slider Test

ATD Serial No.: 034

Location: Left Knee

Test I.D.: LS07D

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity at T=0		m/sec	2.70 to 2.80	2.73	Pass
Impact Force at:	10 mm	kN	1.26 to 1.72	1.67	Pass
	18 mm	kN	2.27 to 3.096	2.99	Pass
Overall Test Results					Pass

ATD Serial No.: 034

Location: Right Knee

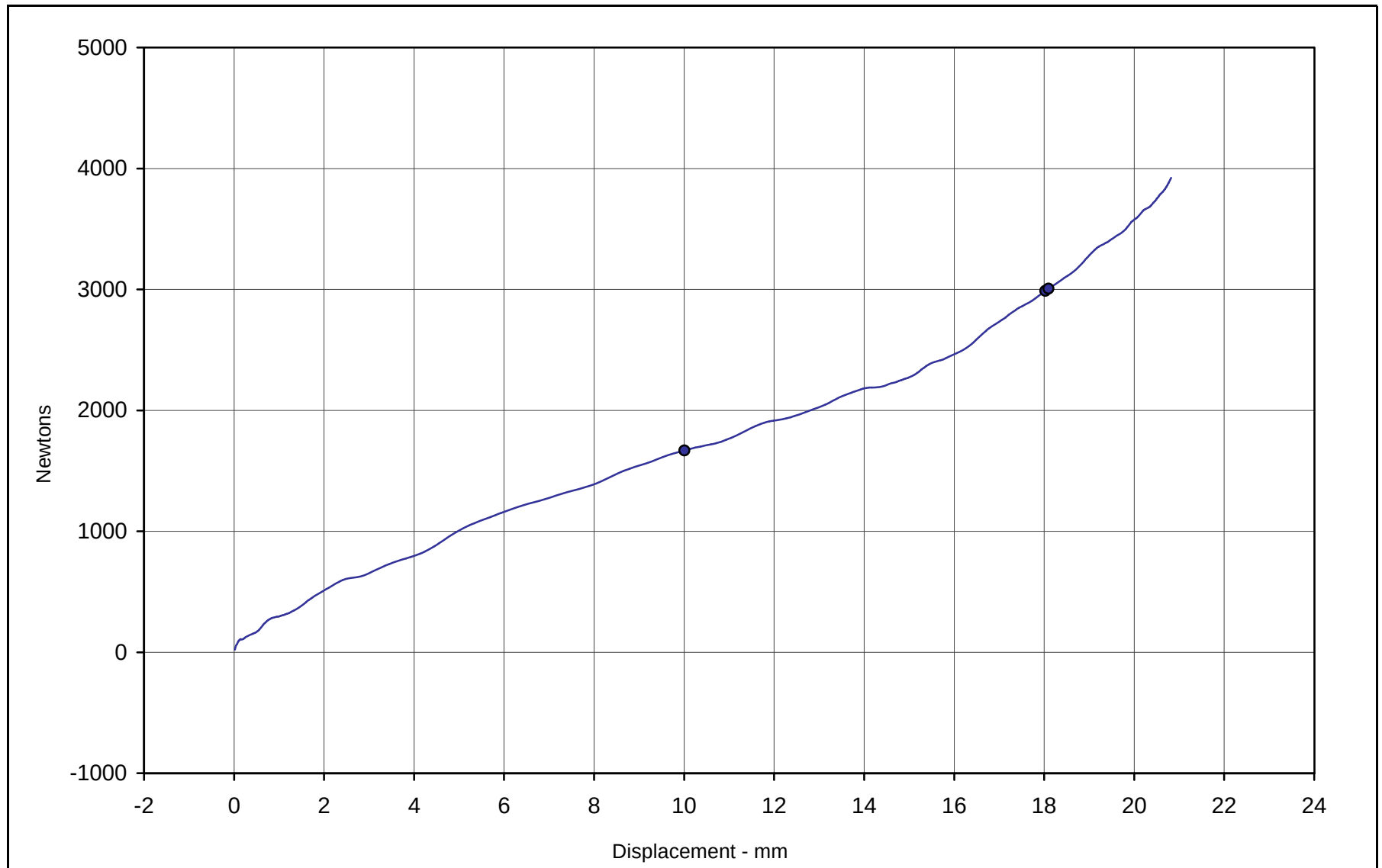
Test I.D.: LS07C

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity at T=0		m/sec	2.70 to 2.80	2.78	Pass
Impact Force at:	10 mm	kN	1.26 to 1.72	1.54	Pass
	18 mm	kN	2.27 to 3.096	2.96	Pass
Overall Test Results					Pass

Laboratory Technician

November 28, 2001

Test Date



Curve Description: Femur Force vs. Knee Displacement

Femur Force: 1669 at 10.0 mm

Femur Force: 2988 at 18.0 mm

SAE Filter Class: 600

Date of Test: 11/28/01

ATD Serial No.: 034

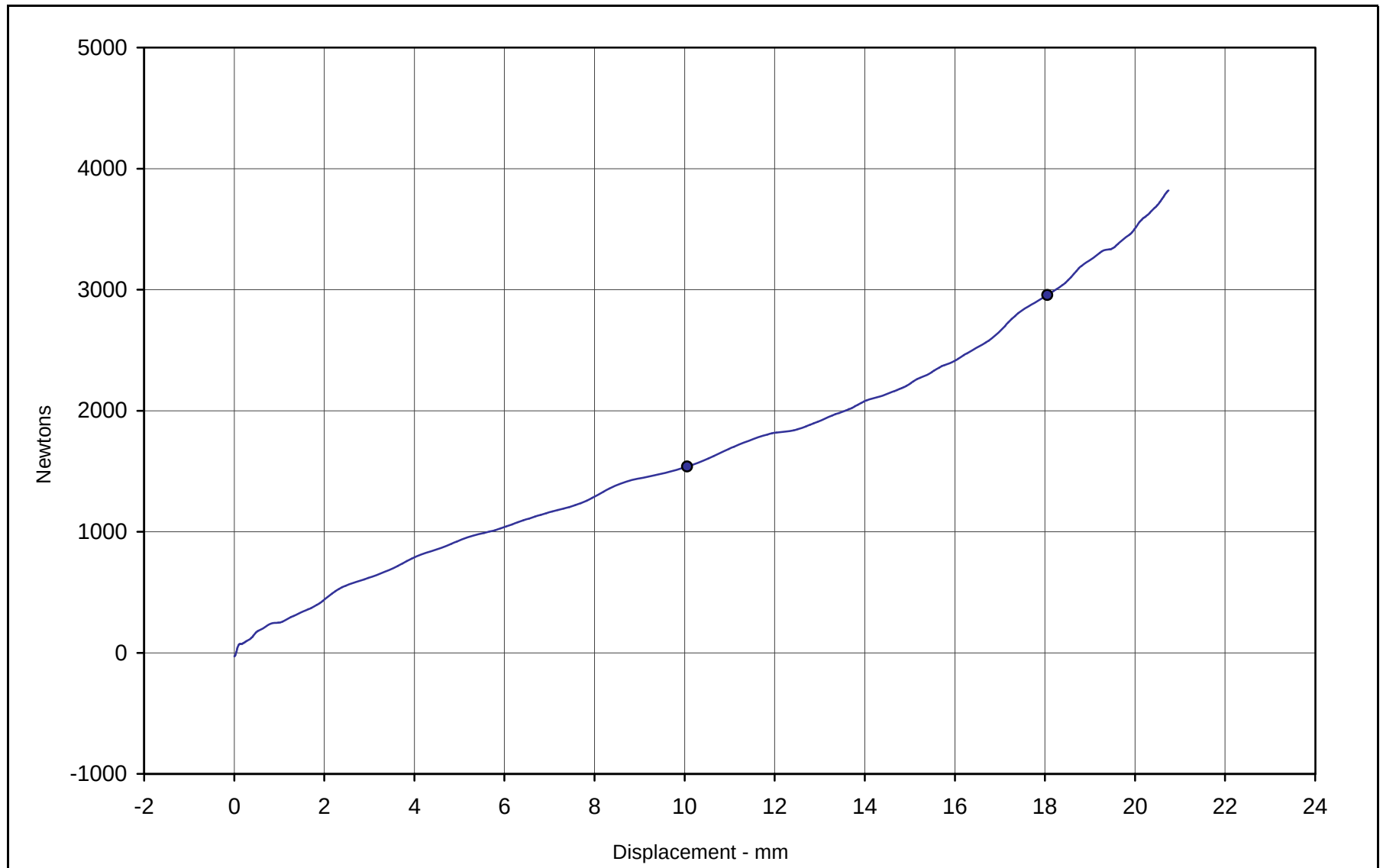
Test Program:

Hybrid III Knee Shear Test

Test Information:

Location: Left Knee Test I.D.: LS07D





Curve Description: Femur Force vs. Knee Displacement

Femur Force: 1539 at 10.0 mm

Femur Force: 2956 at 18.0 mm

SAE Filter Class: 600

Date of Test: 11/28/01

ATD Serial No.: 034

Test Program:

Hybrid III Knee Shear Test

Test Information:

Location: Right Knee Test I.D.: LS07C





Hybrid III Calibration Data Sheet

50TH Percentile Male

Head Drop Calibration

ATD Serial No.: 034

Part Serial No.: N/A

Test I.D.: HD05B

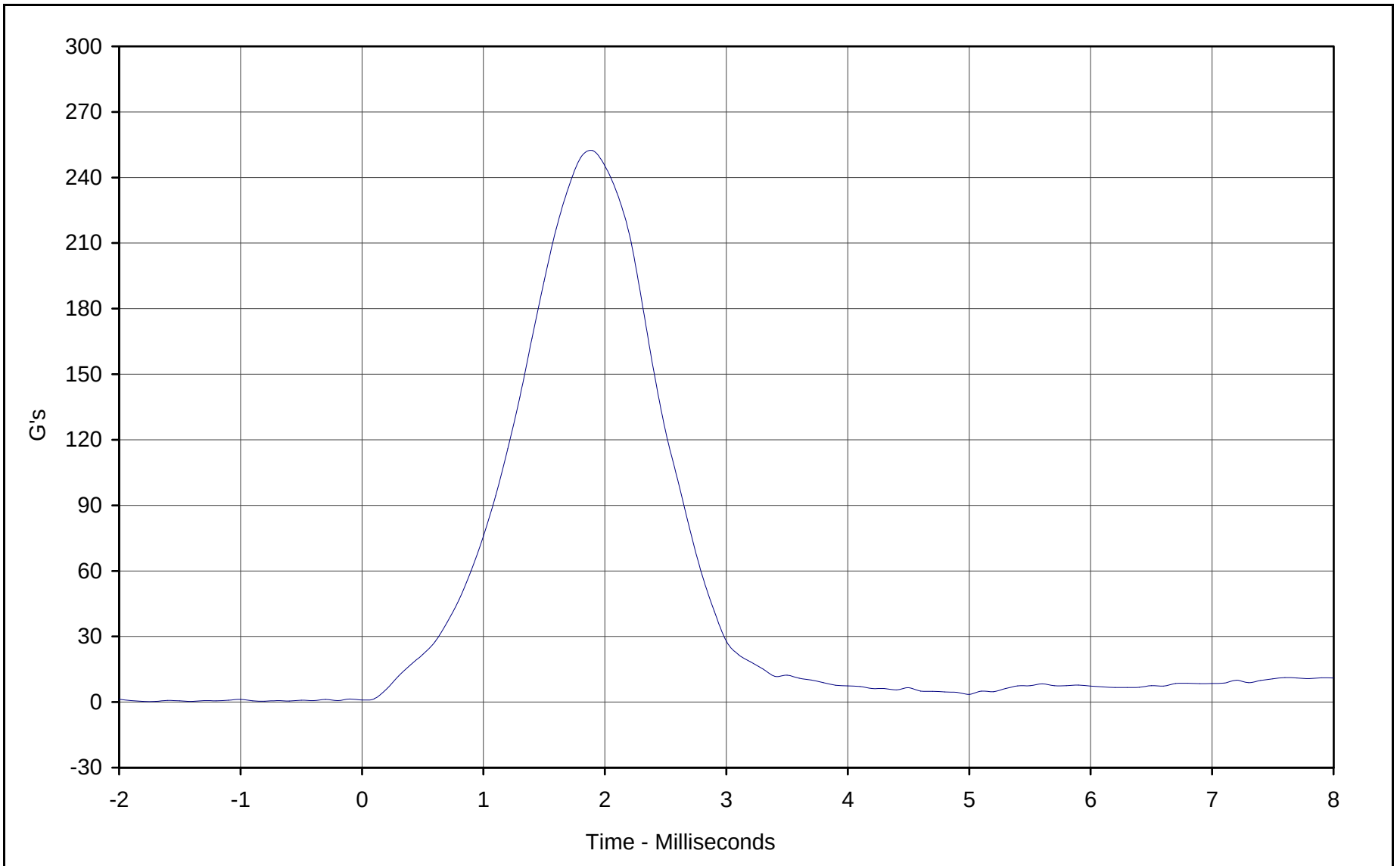
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	252.3	Pass
Peak Lateral Acceleration	G's	≤15.0	11.9	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass

Laboratory Technician

November 28, 2001

Test Date

E-8



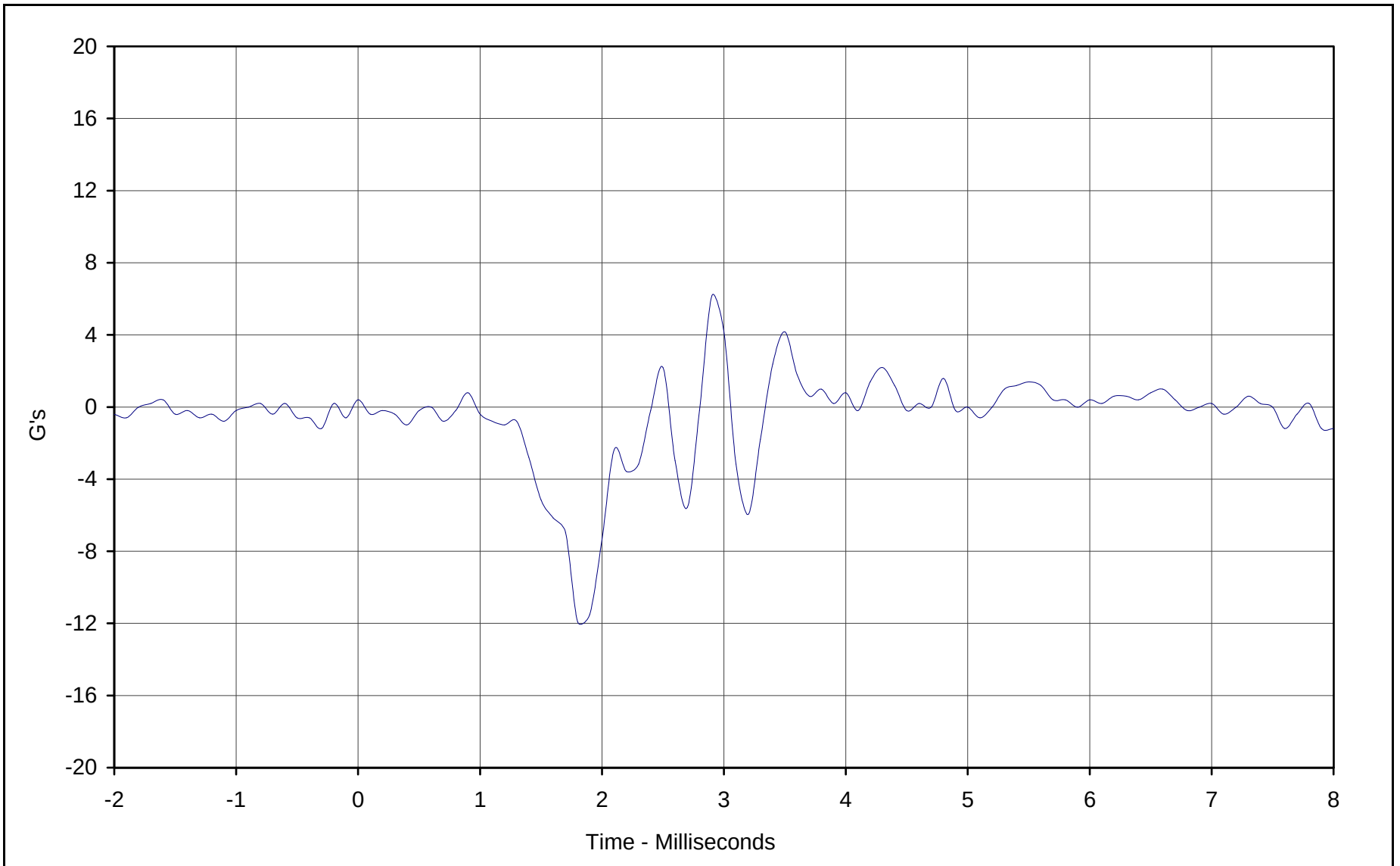
Curve Description: Head Resultant Acceleration
Maximum Value: 252.3 at 1.9 Milliseconds
Minimum Value: 0.3 at -1.7 Milliseconds
SAE Filter Class: 1000
Date of Test: 11/28/01
ATD Serial No.: 034

Testing Program: Hybrid III Head Drop Calibration (Male)
Test Information: S/N of Part: N/A Test I.D.: HD05B



KAR22001-01

E-9



Curve Description: Head Acceleration Y Axis

Maximum Value: 6.2 at 2.9 Milliseconds

Minimum Value: -11.9 at 1.8 Milliseconds

SAE Filter Class: 1000

Date of Test: 11/28/01

ATD Serial No.: 034

Testing Program: Hybrid III Head Drop Calibration (Male)

Test Information: S/N of Part: N/A Test I.D.: HD05B



KAR22001-01



Hybrid III Calibration Data Sheet

50TH Percentile Male

Thorax Impact Test

ATD Serial No.: 034

Part Serial No.: N/A

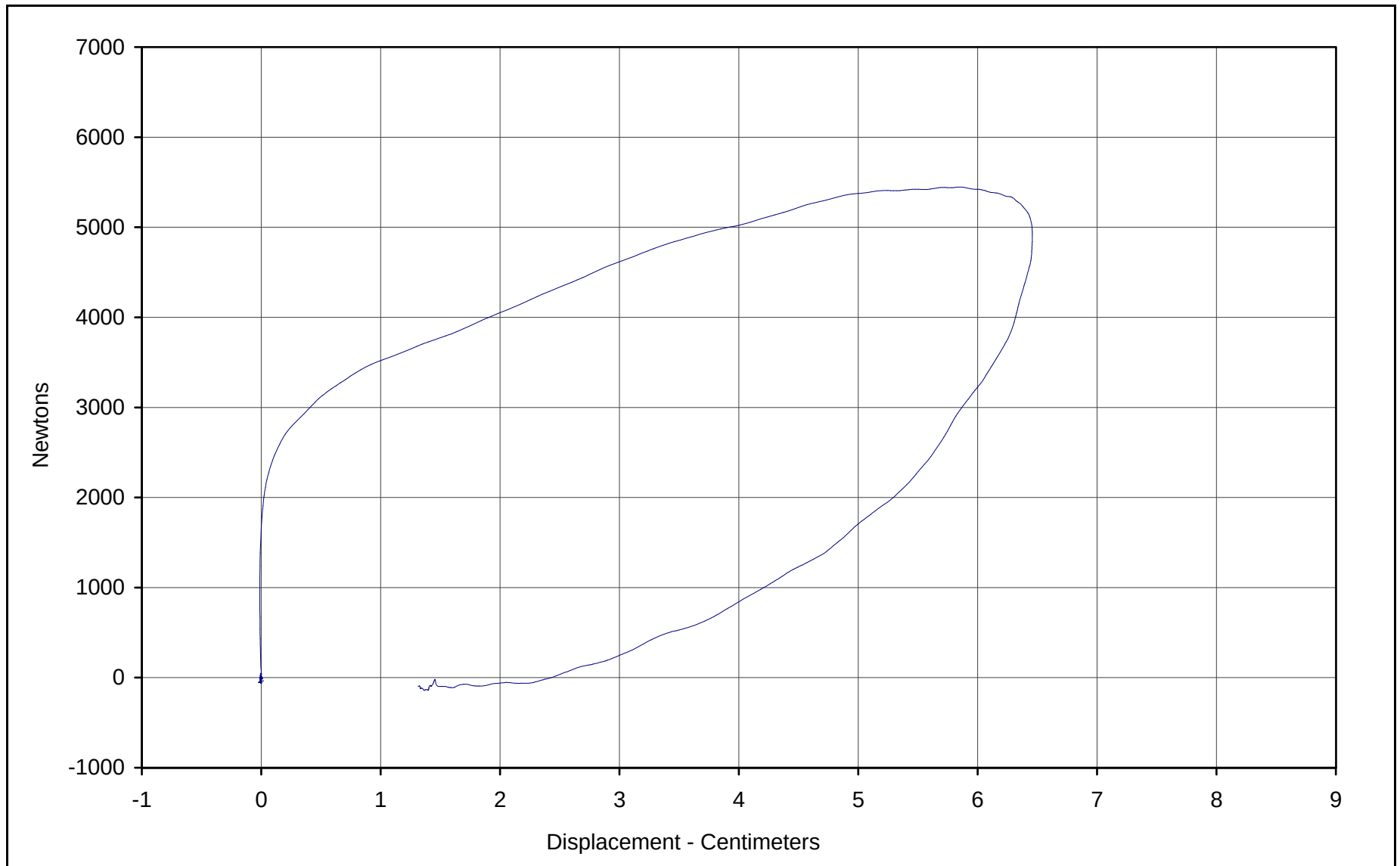
Test I.D.: CH11A

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	6.58 to 6.82	6.61	Pass
Peak Probe Force	Newtons	5159 to 5893	5447	Pass
Peak Sternum Displacement	CM	6.35 to 7.26	6.46	Pass
Internal Hysteresis	%	69 to 85	79.6	Pass
Overall Test Results				Pass

Laboratory Technician

November 29, 2001

Test Date



Curve Description: Probe Force vs. Chest Displacement

Probe Force: 5447.1 Newtons

Chest Displ.: 6.46 Centimeters

SAE Filter Class: 180

Date of Test: 11/29/01

ATD Serial No.: 034

Testing Program: Hybrid III Thorax Impact Test

Test Information: S/N of Part: N/A Test I.D.: CH11A





Hybrid III Calibration Data Sheet

50TH Percentile Male

Neck Flexion Test

ATD Serial No.: 034

Part Serial No.: N/A

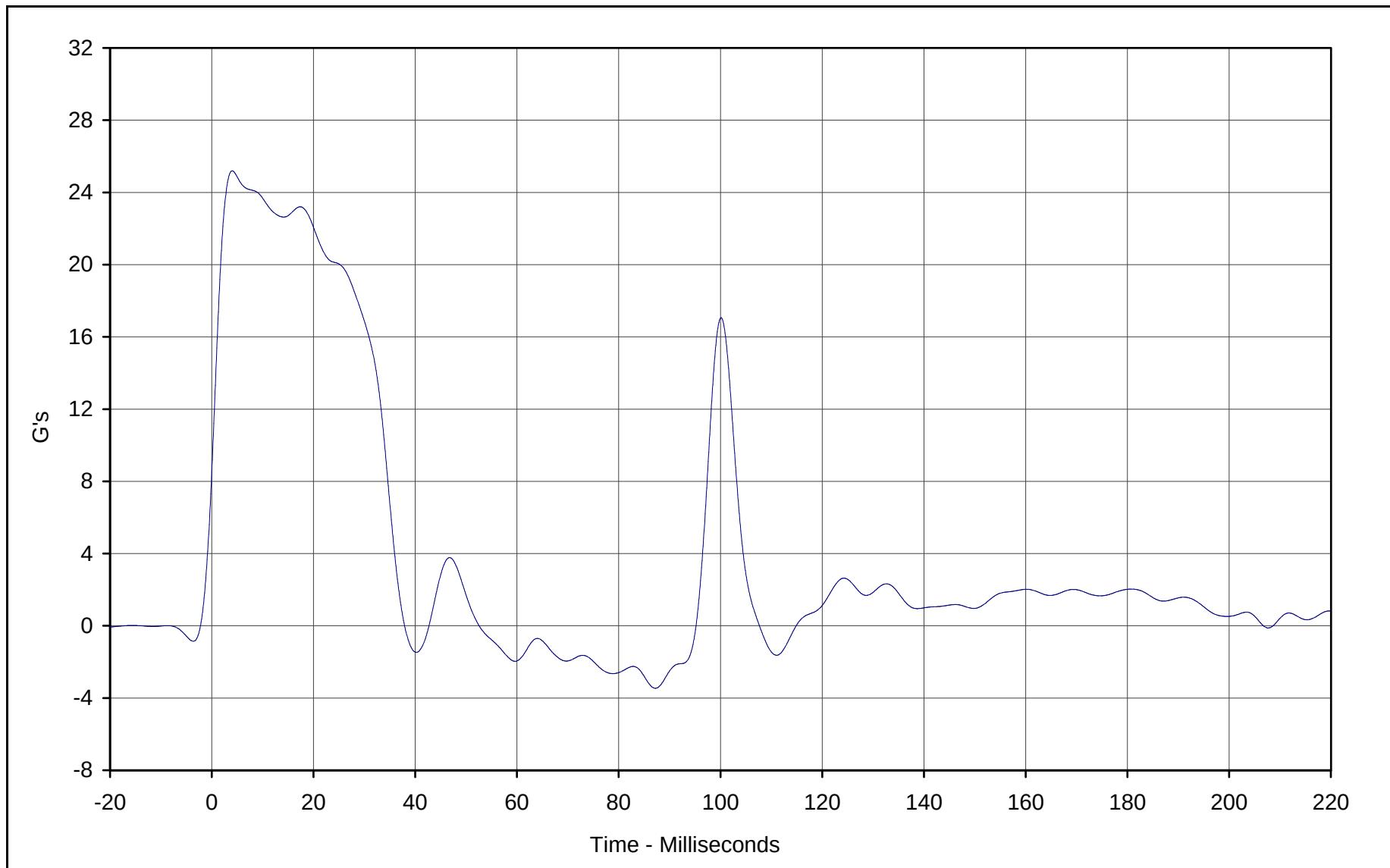
Test I.D.: NF11A

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.89	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.7	Pass
	20 Msec.	G's	17.6 to 22.6	22.1	Pass
	30 Msec.	G's	12.5 to 18.5	16.9	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	17.1	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	35.6	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	68.6	Pass
	Time	Msec.	57.0 to 64.0	60.0	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	116.4	Pass
Moment About Occipital Condyle	Maximum	N·m	84.1 to 108.5	90.3	Pass
	Time	Msec.	47.0 to 58.0	48.3	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	99.7	Pass
Overall Test Results					Pass

Laboratory Technician

November 27, 2001

Test Date



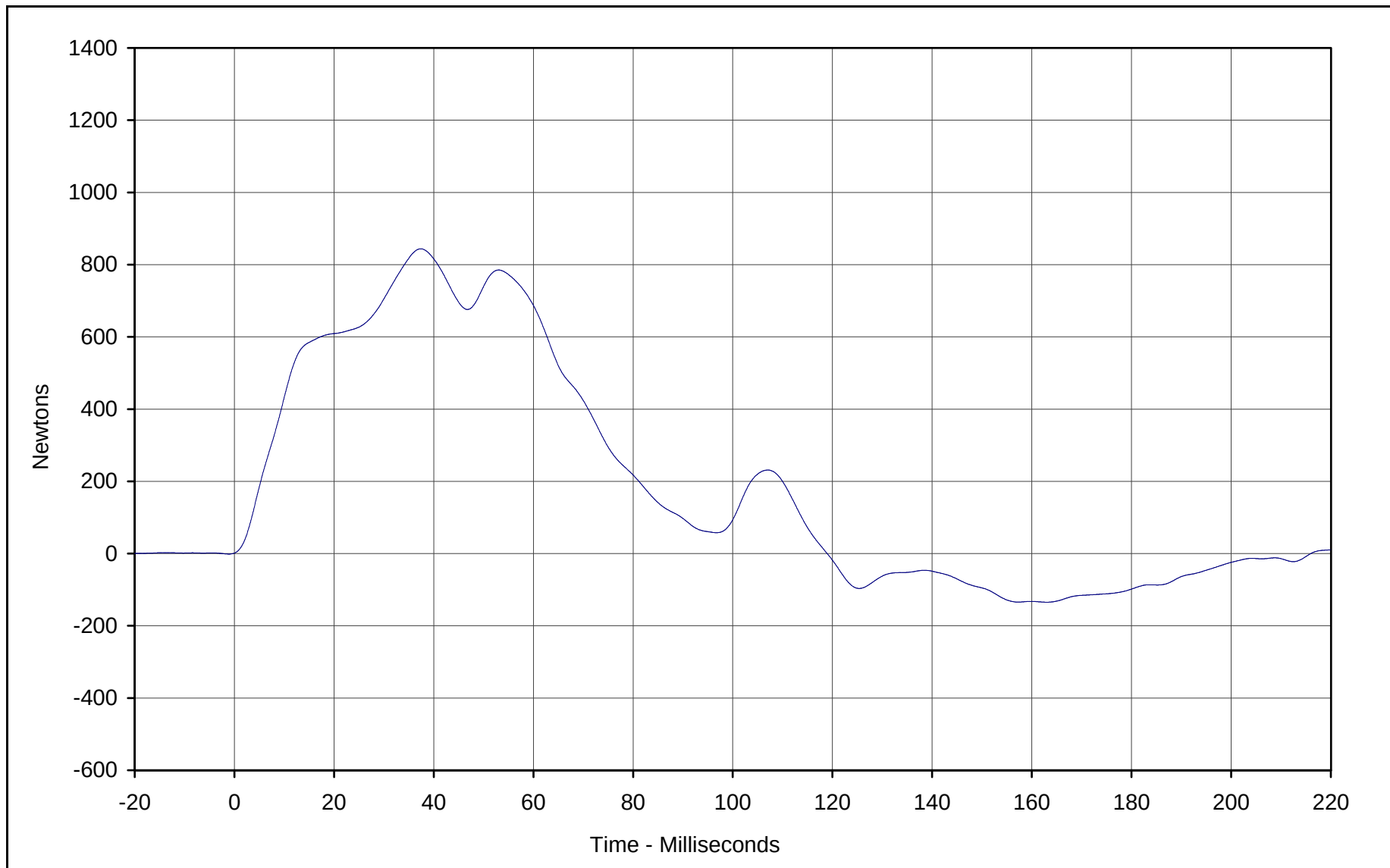
Curve Description: Pendulum Deceleration

Maximum Value:	<u>25.2</u>	at	<u>4.0</u>	Milliseconds
Minimum Value:	<u>-3.5</u>	at	<u>87.2</u>	Milliseconds
SAE Filter Class:	<u>60</u>			
Date of Test:	<u>11/27/01</u>			
ATD Serial No.:	<u>034</u>			

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF11A





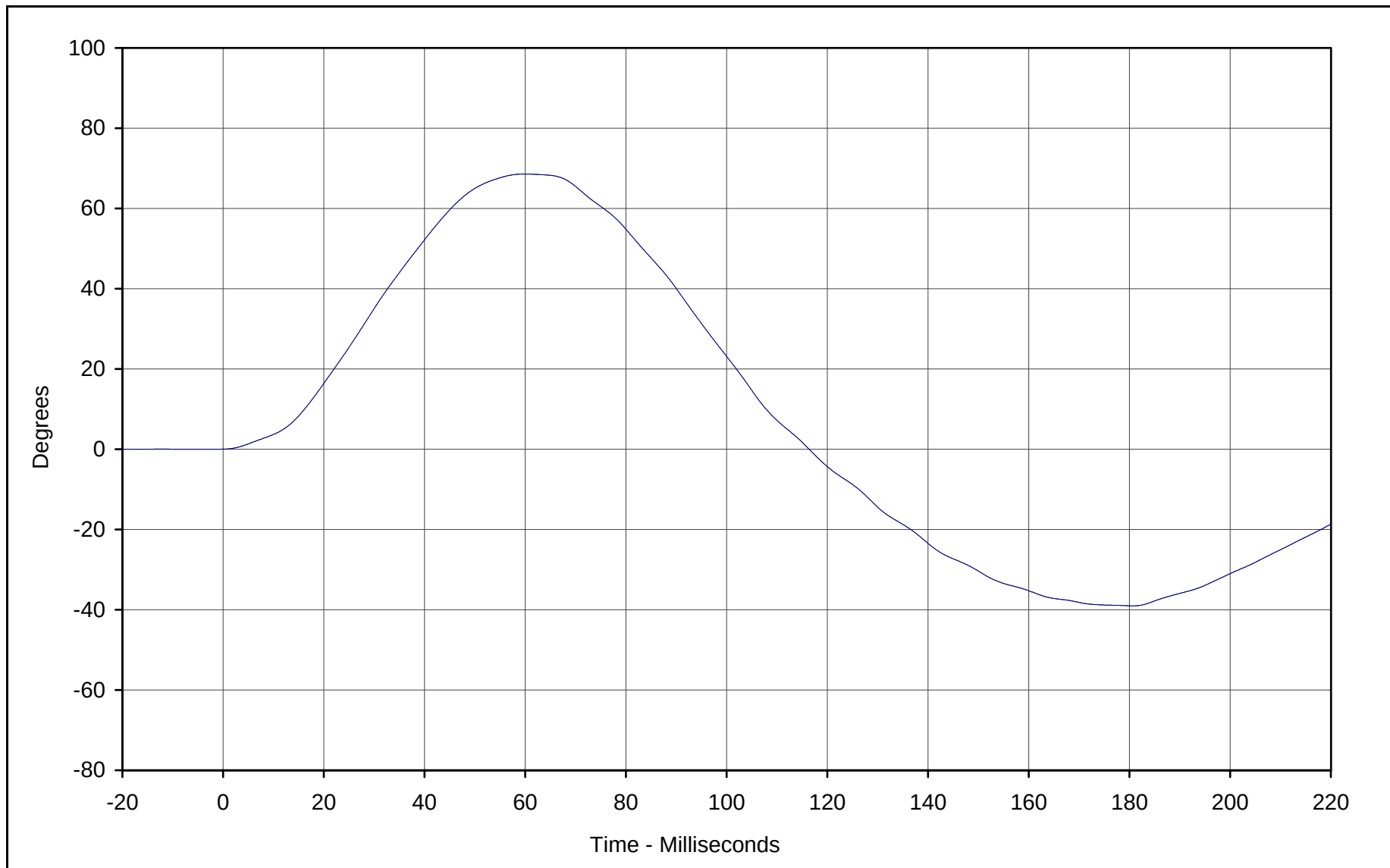
Curve Description: Neck Force X

Maximum Value:	843.8	at	37.4	Milliseconds
Minimum Value:	-134.7	at	163.0	Milliseconds
SAE Filter Class:	60			
Date of Test:	11/27/01			
ATD Serial No.:	034			

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF11A





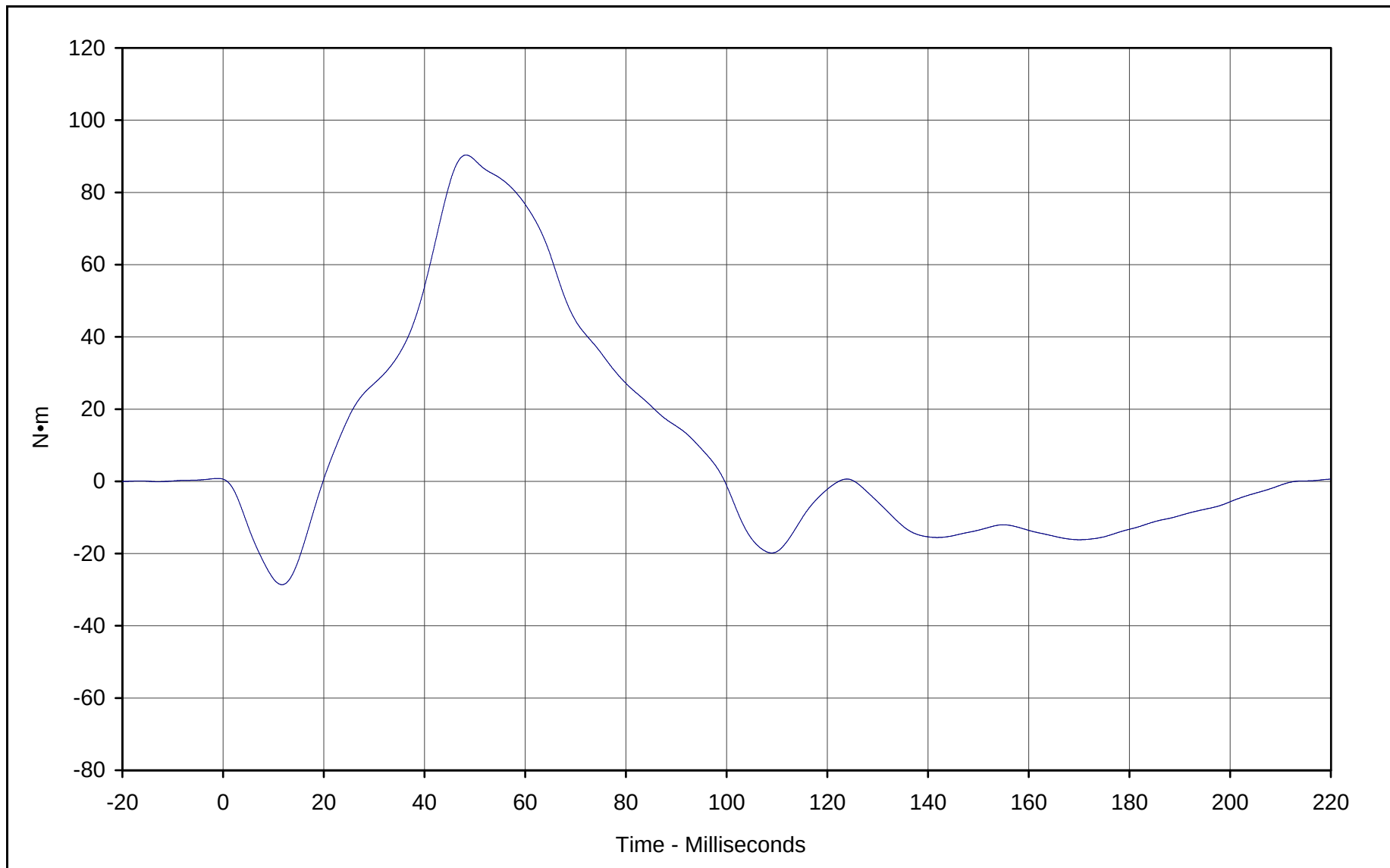
Curve Description: "D" Plane Rotation

Maximum Value:	68.6	at	60.0	Milliseconds
Minimum Value:	-39.0	at	180.7	Milliseconds
SAE Filter Class:	60			
Date of Test:	11/27/01			
ATD Serial No.:	034			

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF11A





Curve Description: Moment About Occipital Condyles

Maximum Value: 90.3 at 48.3 Milliseconds

Minimum Value: -28.6 at 11.7 Milliseconds

SAE Filter Class: 60

Date of Test: 11/27/01

ATD Serial No.: 034

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF11A





Hybrid III Calibration Data Sheet

50TH Percentile Male

Neck Extension Test

ATD Serial No.: 034

Part Serial No.: N/A

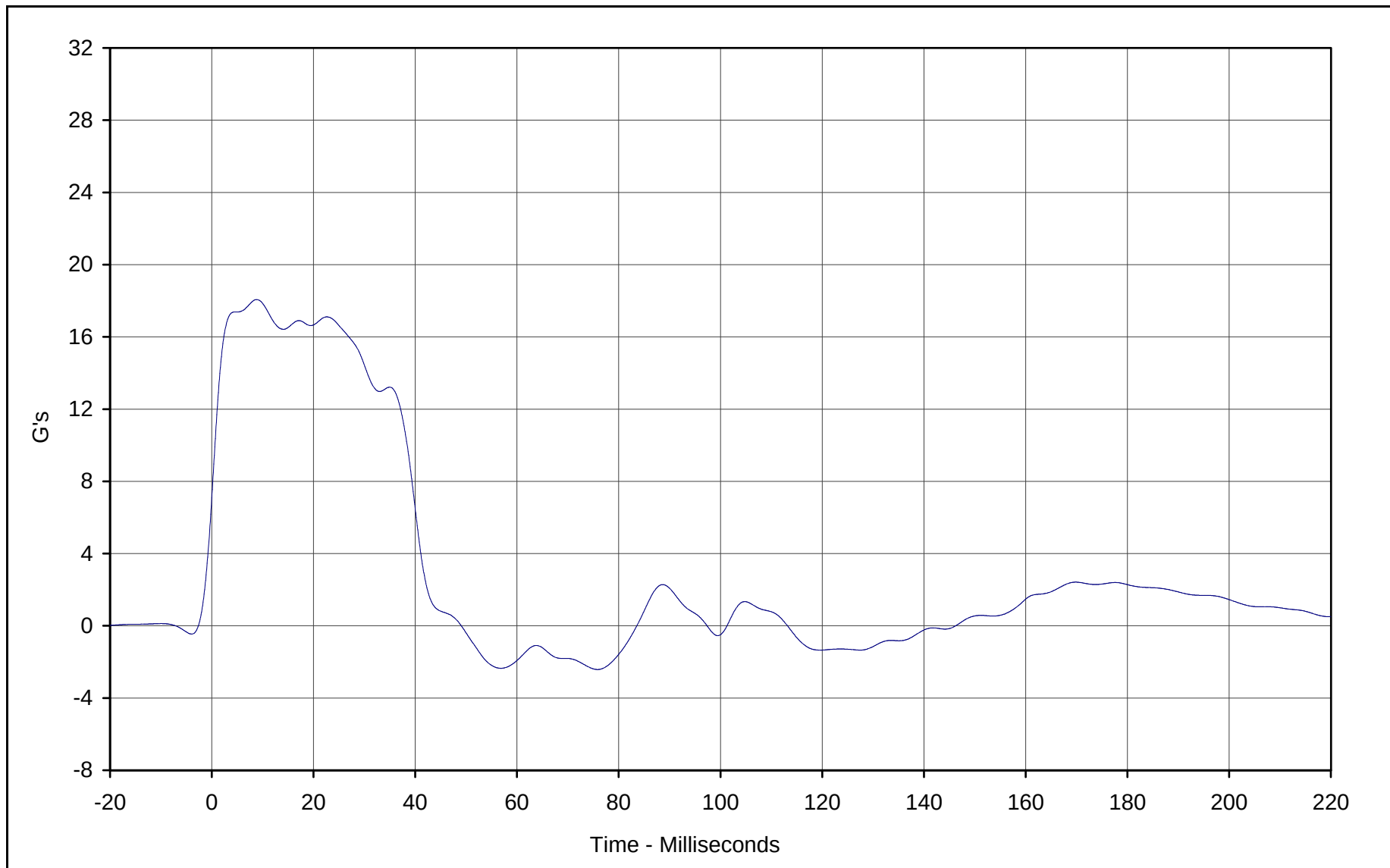
Test I.D.: NE11A

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.10	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	17.9	Pass
	20 Msec.	G's	14.0 to 19.0	16.7	Pass
	30 Msec.	G's	11.0 to 16.0	14.4	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 22.0	14.4	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	40.7	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	95.2	Pass
	Time	Msec.	72.0 to 82.0	75.2	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	156.5	Pass
Moment About Occipital Condyle	Maximum	N•m	-52.9 to- 79.9	-72.9	Pass
	Time	Msec.	65.0 to 79.0	66.6	Pass
Negative Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	137.2	Pass
Overall Test Results					Pass

Laboratory Technician

November 27, 2001

Test Date



Curve Description: Pendulum Deceleration

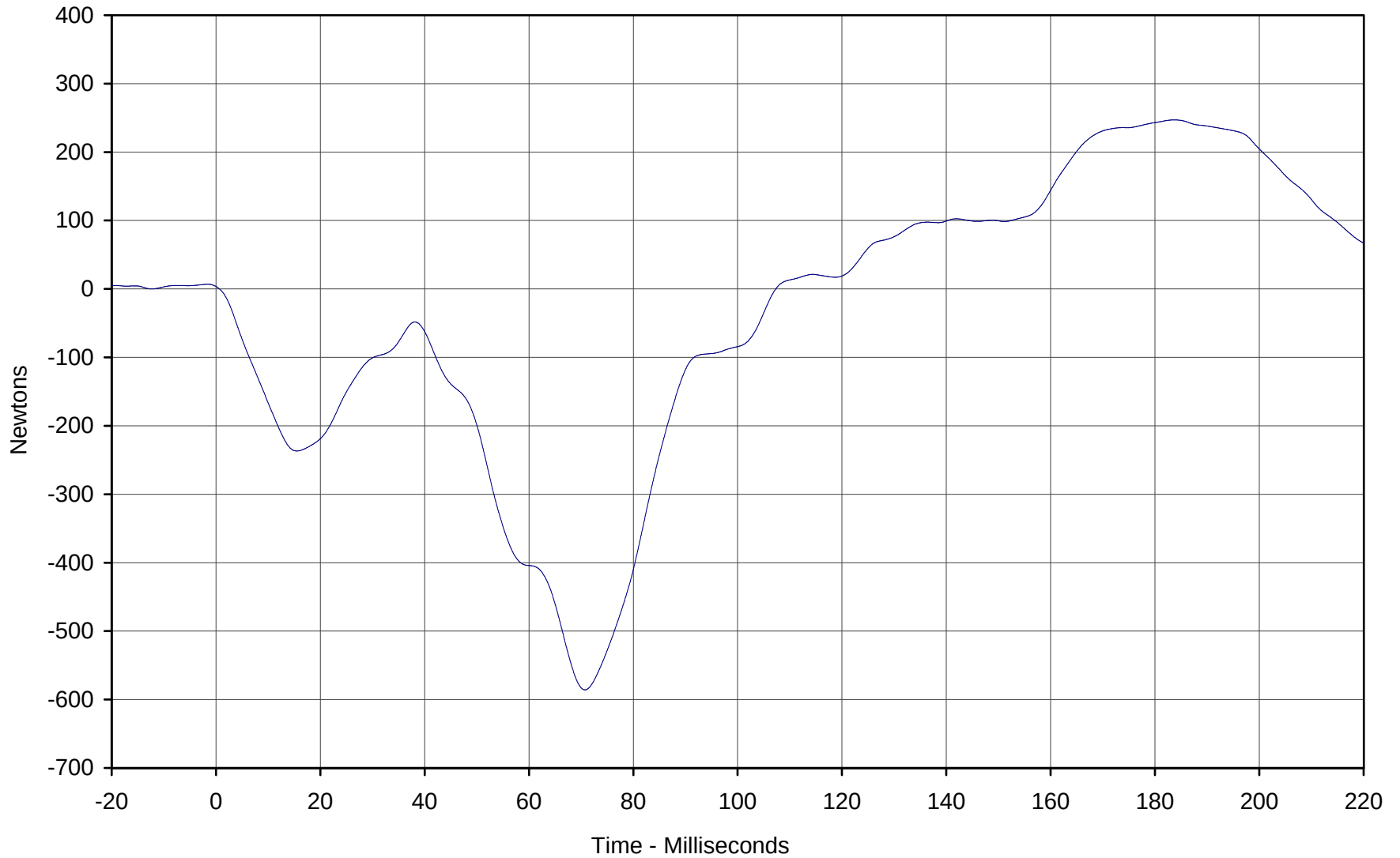
Maximum Value:	<u>18.1</u>	at	<u>8.8</u>	Milliseconds
Minimum Value:	<u>-2.4</u>	at	<u>75.8</u>	Milliseconds
SAE Filter Class:	<u>60</u>			
Date of Test:	<u>11/27/01</u>			
ATD Serial No.:	<u>034</u>			

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NE11A



E-19



Curve Description: Neck Force X

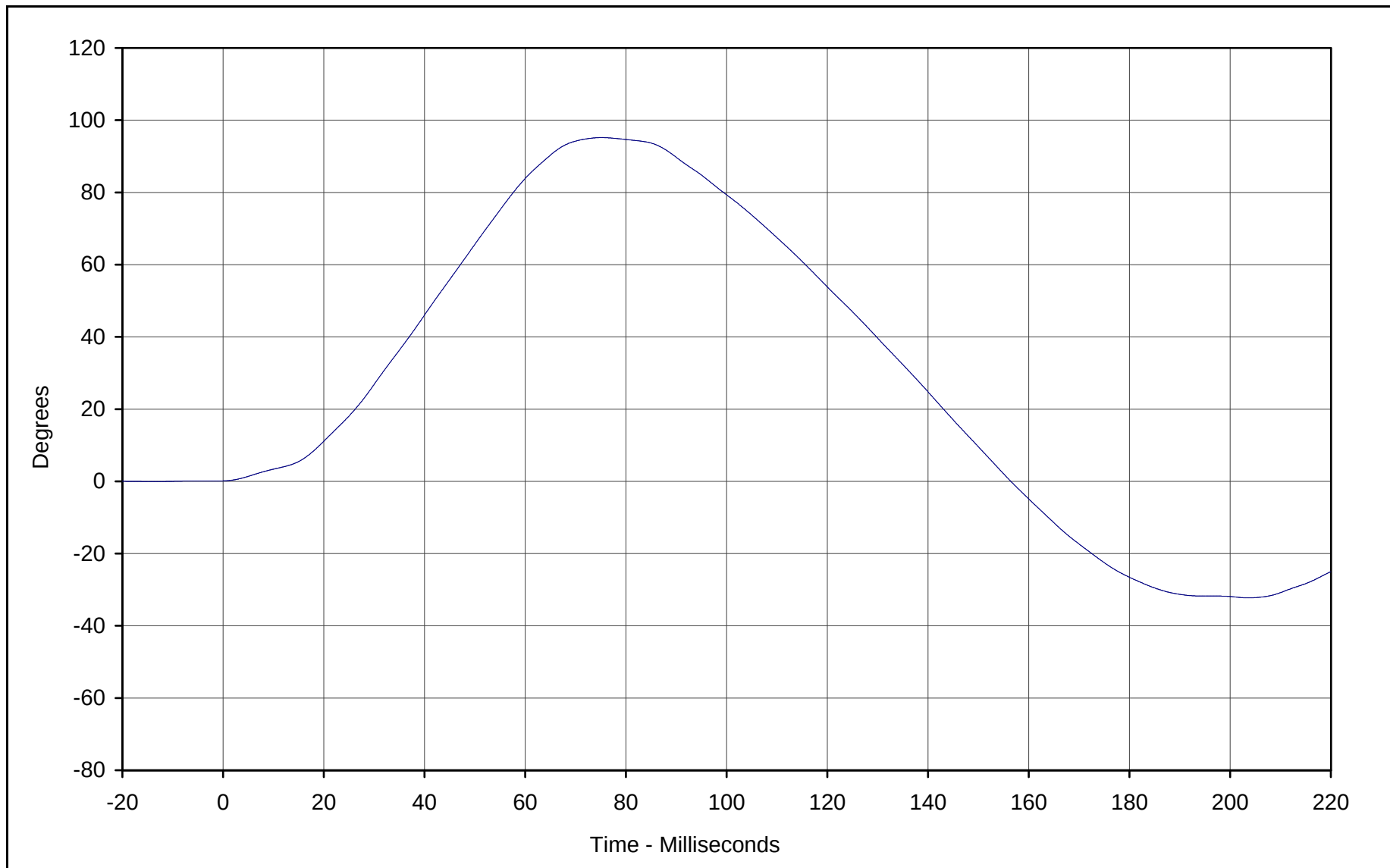
Maximum Value:	247.0	at	183.7	Milliseconds
Minimum Value:	-585.9	at	70.7	Milliseconds
SAE Filter Class:	60			
Date of Test:	11/27/01			
ATD Serial No.:	034			

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NE11A



KAR22001-01



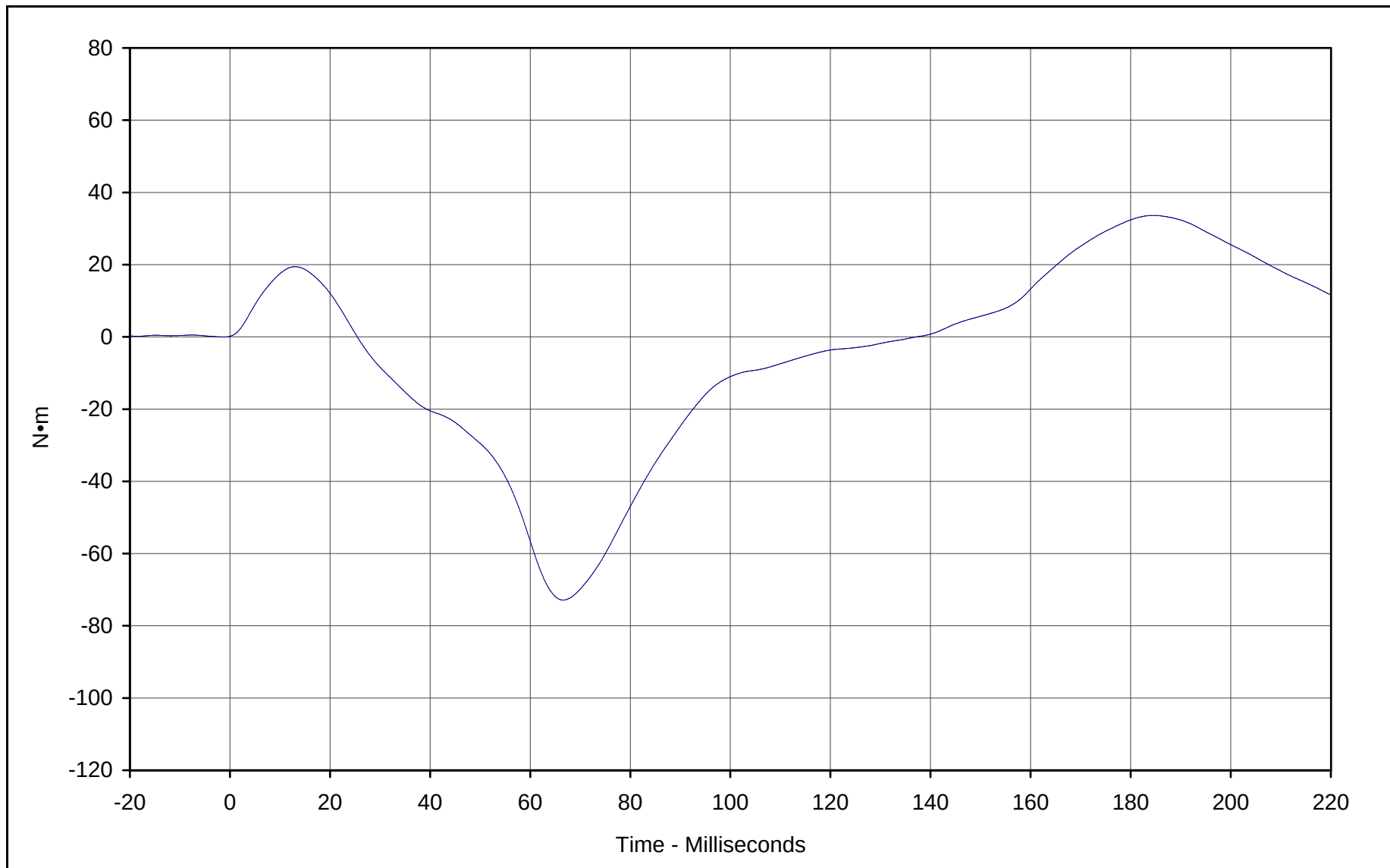
Curve Description: "D" Plane Rotation

Maximum Value:	95.2	at	75.2	Milliseconds
Minimum Value:	-32.3	at	203.6	Milliseconds
SAE Filter Class:	60			
Date of Test:	11/27/01			
ATD Serial No.:	034			

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NE11A





Curve Description: Moment About Occipital Condyles

Maximum Value: 33.6 at 184.5 Milliseconds

Minimum Value: -72.9 at 66.6 Milliseconds

SAE Filter Class: 60

Date of Test: 11/27/01

ATD Serial No.: 034

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NE11A





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	879 to 889	885	Pass
B - Shoulder pivot height	mm	505 to 521	510	Pass
C - "H" point height	mm	84 to 89	88	Pass
D - "H" point from seat back	mm	135 to 140	135	Pass
E - Shoulder pivot from back	mm	84 to 94	92	Pass
F - Thigh clearance	mm	140 to 155	145	Pass
G - Elbow back to wrist pivot	mm	290 to 305	295	Pass
H - Skull cap to back line	mm	41 to 46	45	Pass
I - Shoulder to elbow length	mm	330 to 345	342	Pass
J - Elbow rest height	mm	190 to 211	205	Pass
K - Buttock to knee length	mm	579 to 604	585	Pass
L - Popliteal length	mm	429 to 455	435	Pass
M - Knee pivot height	mm	485 to 500	490	Pass
N - Buttock popliteal length	mm	452 to 477	475	Pass
O - Chest depth	mm	213 to 229	220	Pass
P - Foot length	mm	251 to 267	265	Pass
V - Shoulder breadth	mm	422 to 437	425	Pass
W - Foot breadth	mm	91 to 107	100	Pass
Y - Chest circumference	mm	970 to 1001	985	Pass
Z - Waist circumference	mm	836 to 866	860	Pass
AA - Location for chest circumference	mm	429 to 434	430	Pass
BB - Location for waist circumference	mm	226 to 231	230	Pass
Overall Test Results				Pass

Laboratory Technician

December 3, 2001

Test Date



Hybrid III Calibration Data Sheet

Hybrid III 50th Percentile Male

Knee Impact Test

ATD Serial No.: 035

Location: Left Knee

Test I.D.: LK06A

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	5623	Pass
Overall Test Results				Pass

ATD Serial No.: 035

Location: Right Knee

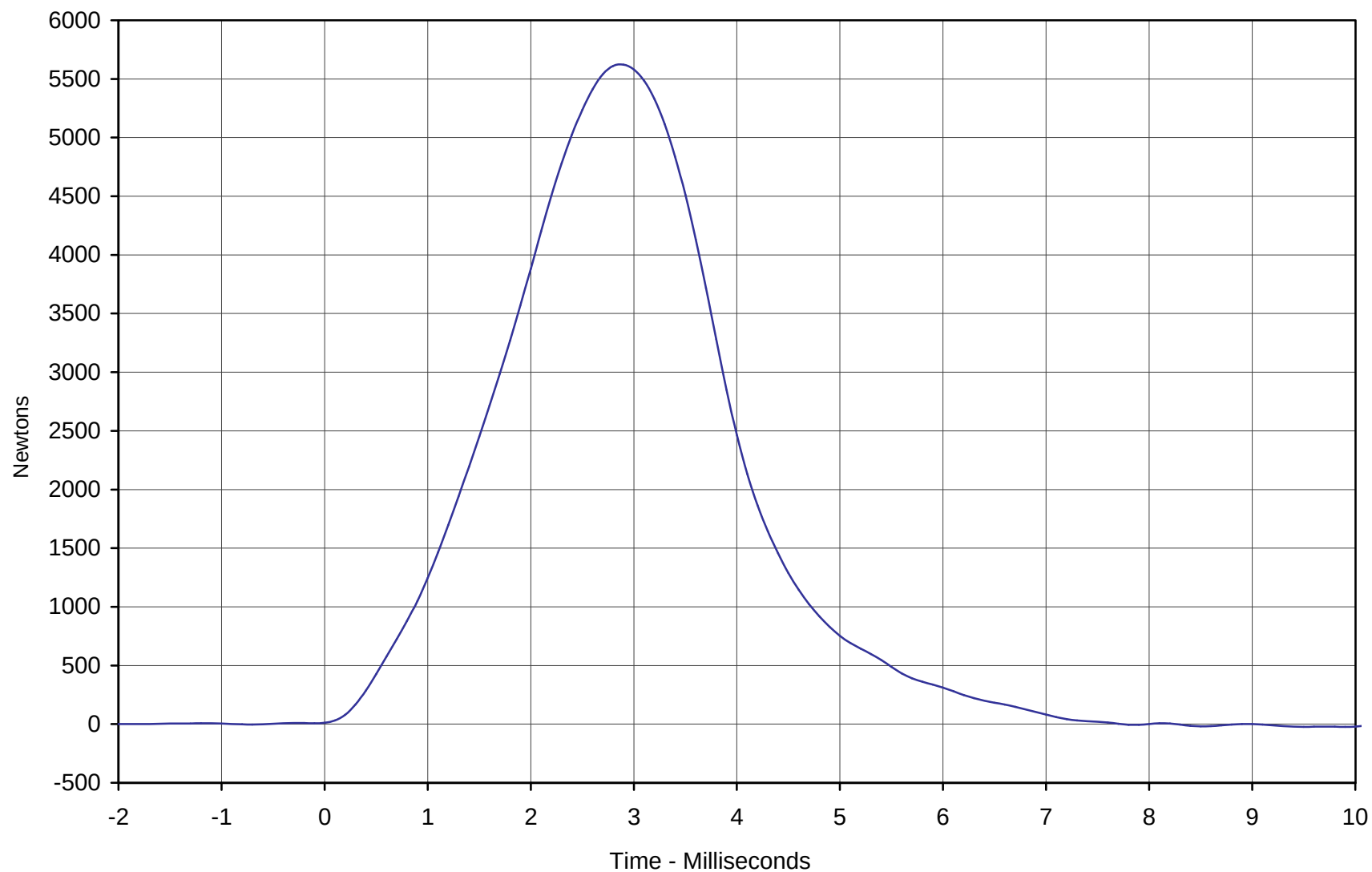
Test I.D.: RK06B

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	N	4715 to 5782	5820	Fail
Overall Test Results				Fail

Laboratory Technician

November 28, 2001

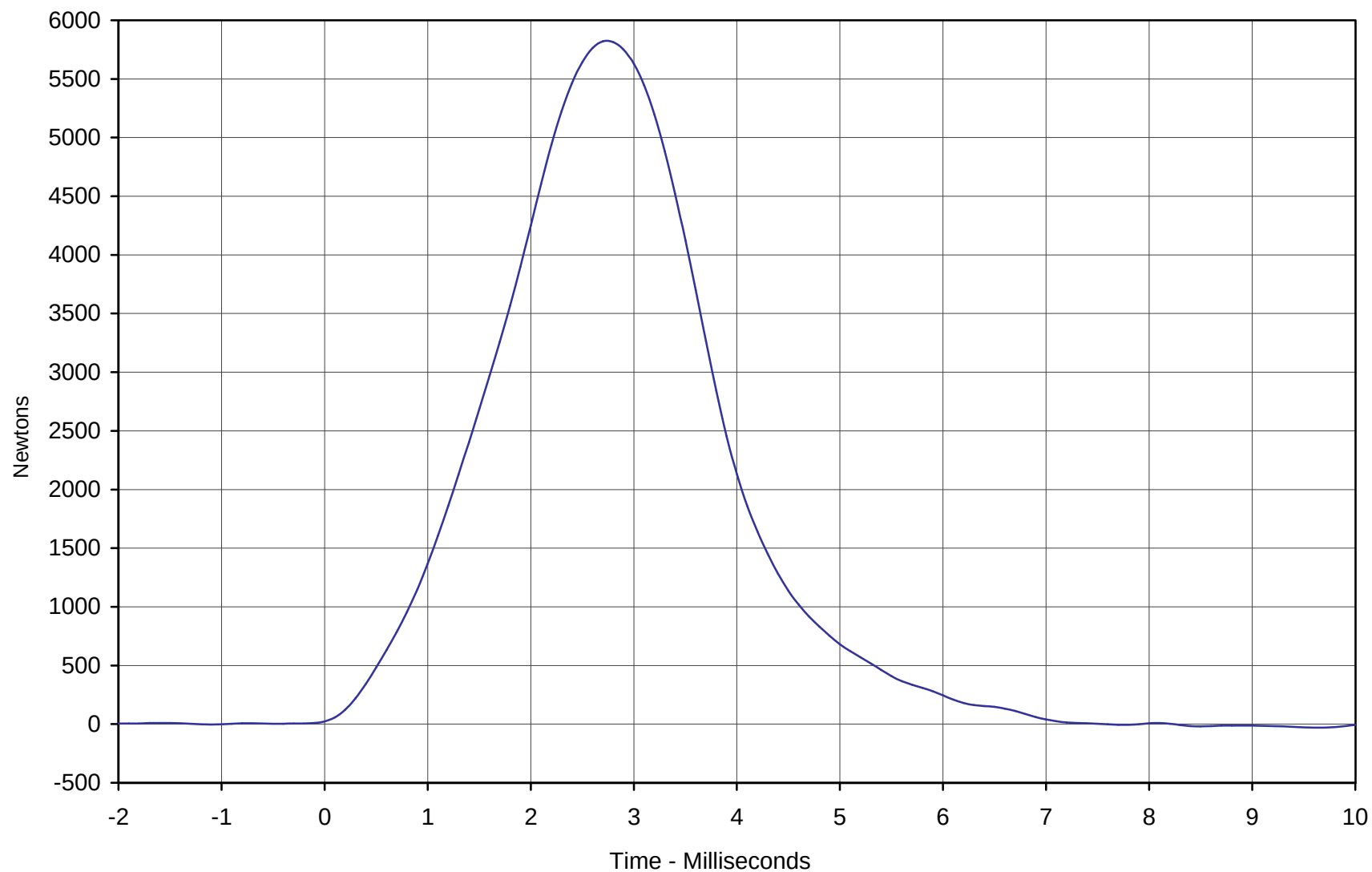
Test Date



Curve Description: Probe Force
Maximum Value: 5622.6 at 2.9 Milliseconds
Minimum Value: -6.1 at 7.9 Milliseconds
SAE Filter Class: 600
Date of Test: 11/28/01
ATD Serial No.: 035

Test Program: Hybrid III Knee Impact Test
Test Information: Location: Left Knee Test I.D.: LK06A





Curve Description: Probe Force
Maximum Value: 5820.3 at 2.7 Milliseconds
Minimum Value: -5.7 at 7.7 Milliseconds
SAE Filter Class: 600
Date of Test: 11/28/01
ATD Serial No.: 035

Test Program: Hybrid III Knee Impact Test
Test Information: Location: Right Knee Test I.D.: RK06B





Hybrid III Calibration Data Sheet

Hybrid III 50th Percentile Male

Knee Slider Test

ATD Serial No.: 035

Location: Left Knee

Test I.D.: LS07E

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity at T=0		m/sec	2.70 to 2.80	2.73	Pass
Impact Force at:	10 mm	kN	1.26 to 1.72	1.71	Pass
	18 mm	kN	2.27 to 3.096	2.93	Pass
Overall Test Results					Pass

ATD Serial No.: 035

Location: Right Knee

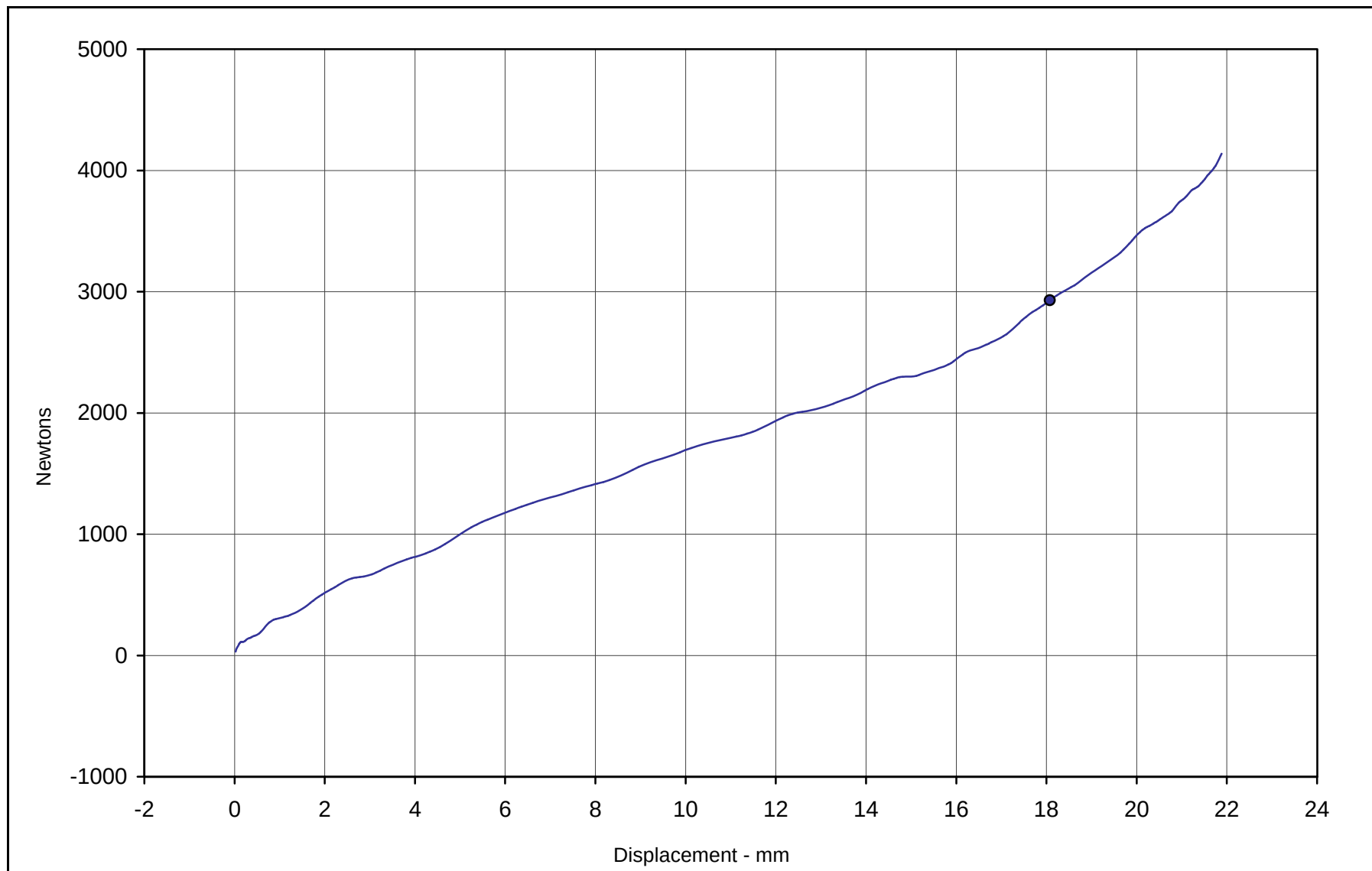
Test I.D.: RS07F

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity at T=0		m/sec	2.70 to 2.80	2.78	Pass
Impact Force at:	10 mm	kN	1.26 to 1.72	1.56	Pass
	18 mm	kN	2.27 to 3.096	2.87	Pass
Overall Test Results					Pass

Laboratory Technician

November 28, 2001

Test Date



Curve Description: Femur Force vs. Knee Displacement

Femur Force: 1711 at 10.0 mm

Femur Force: 2929 at 18.0 mm

SAE Filter Class: 600

Date of Test: 11/28/01

ATD Serial No.: 035

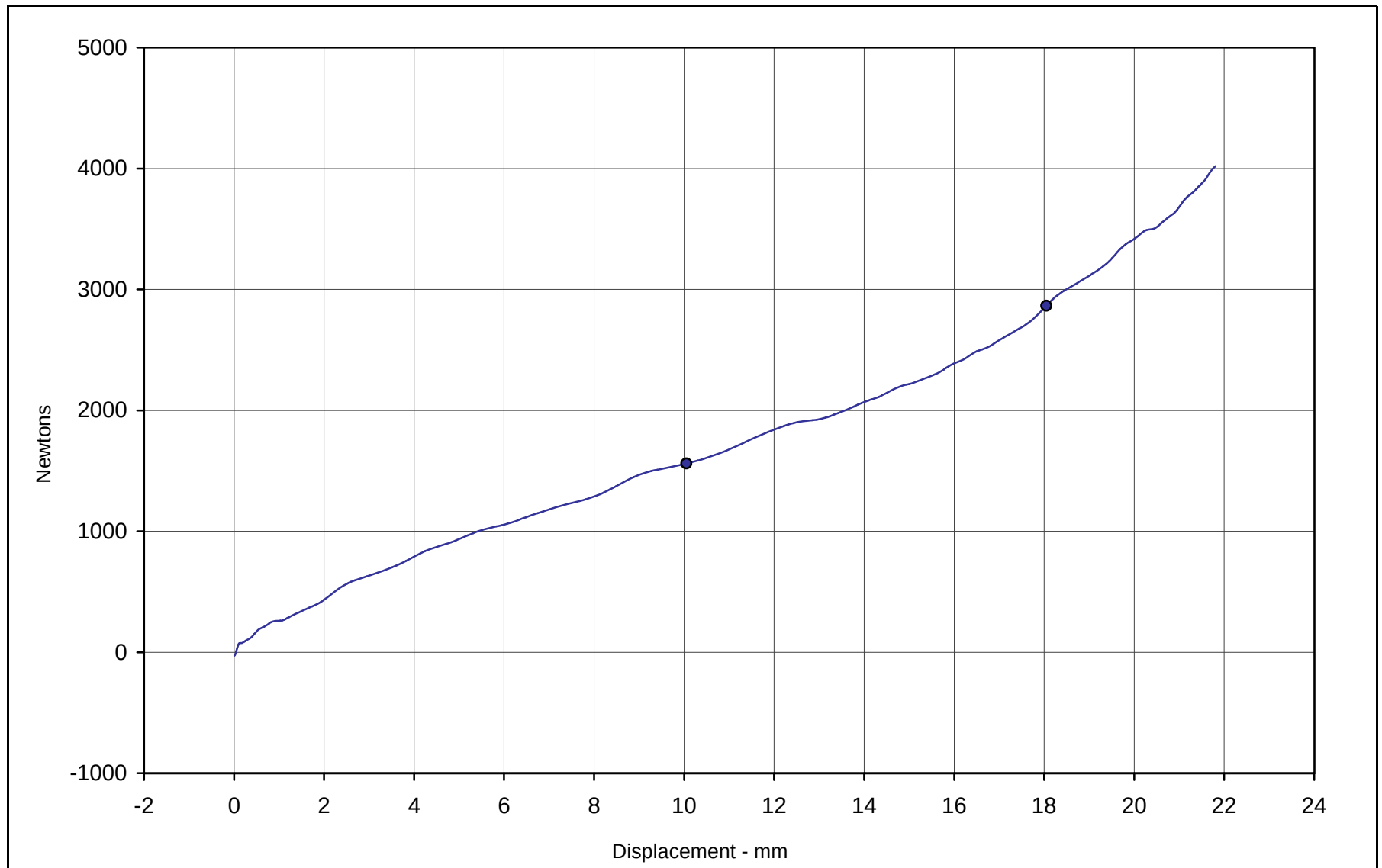
Test Program:

Hybrid III Knee Shear Test

Test Information:

Location: Left Knee Test I.D.: LS07E





Curve Description: Femur Force vs. Knee Displacement

Femur Force: 1561 at 10.0 mm

Femur Force: 2865 at 18.0 mm

SAE Filter Class: 600

Date of Test: 11/28/01

ATD Serial No.: 035

Test Program: Hybrid III Knee Shear Test

Test Information: Location: Right Knee Test I.D.: RS07F





Hybrid III Calibration Data Sheet

50TH Percentile Male

Head Drop Calibration

ATD Serial No.: 035

Part Serial No.: N/A

Test I.D.: HD05C

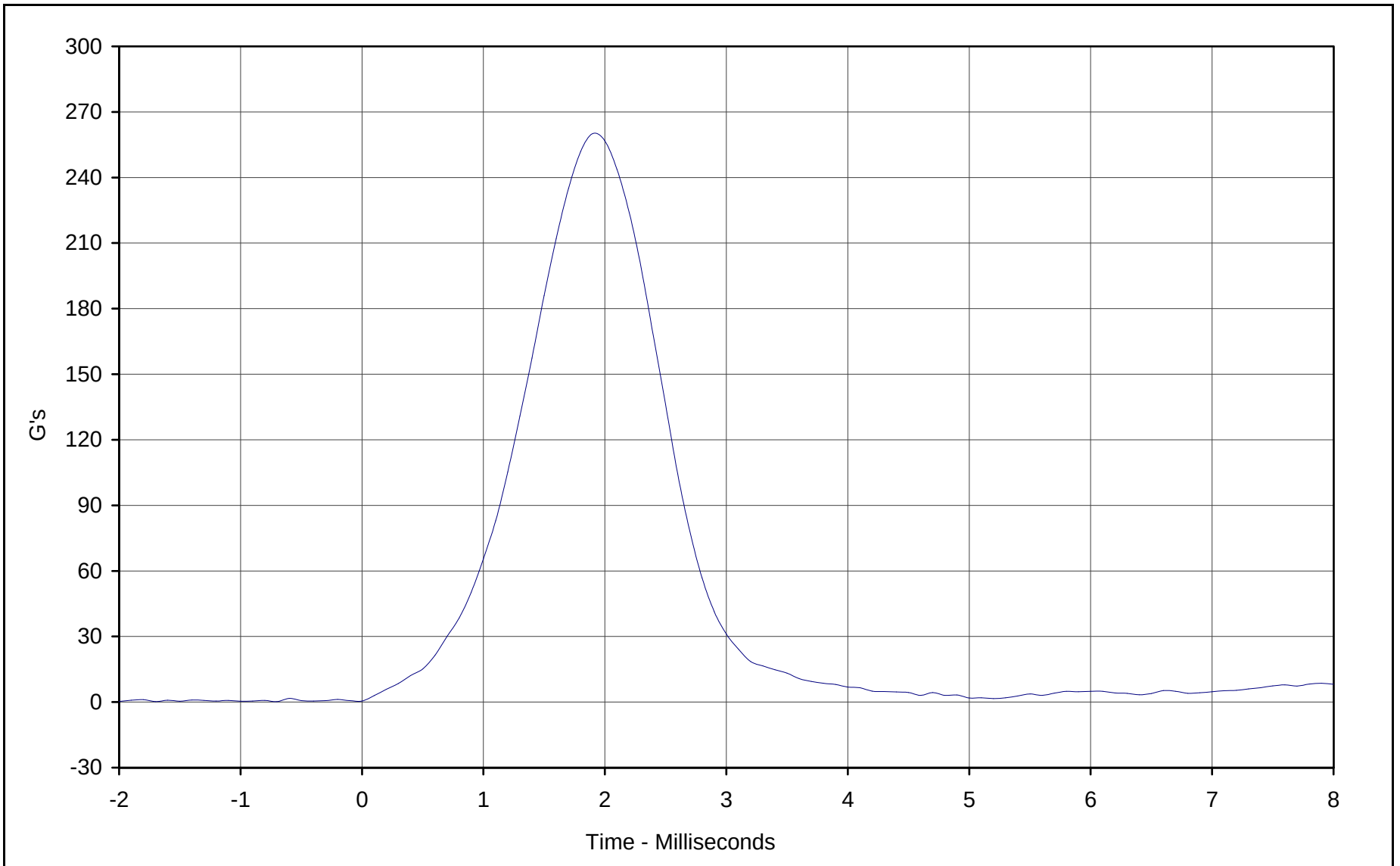
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	260.1	Pass
Peak Lateral Acceleration	G's	≤15.0	5.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass

Laboratory Technician

November 28, 2001

Test Date

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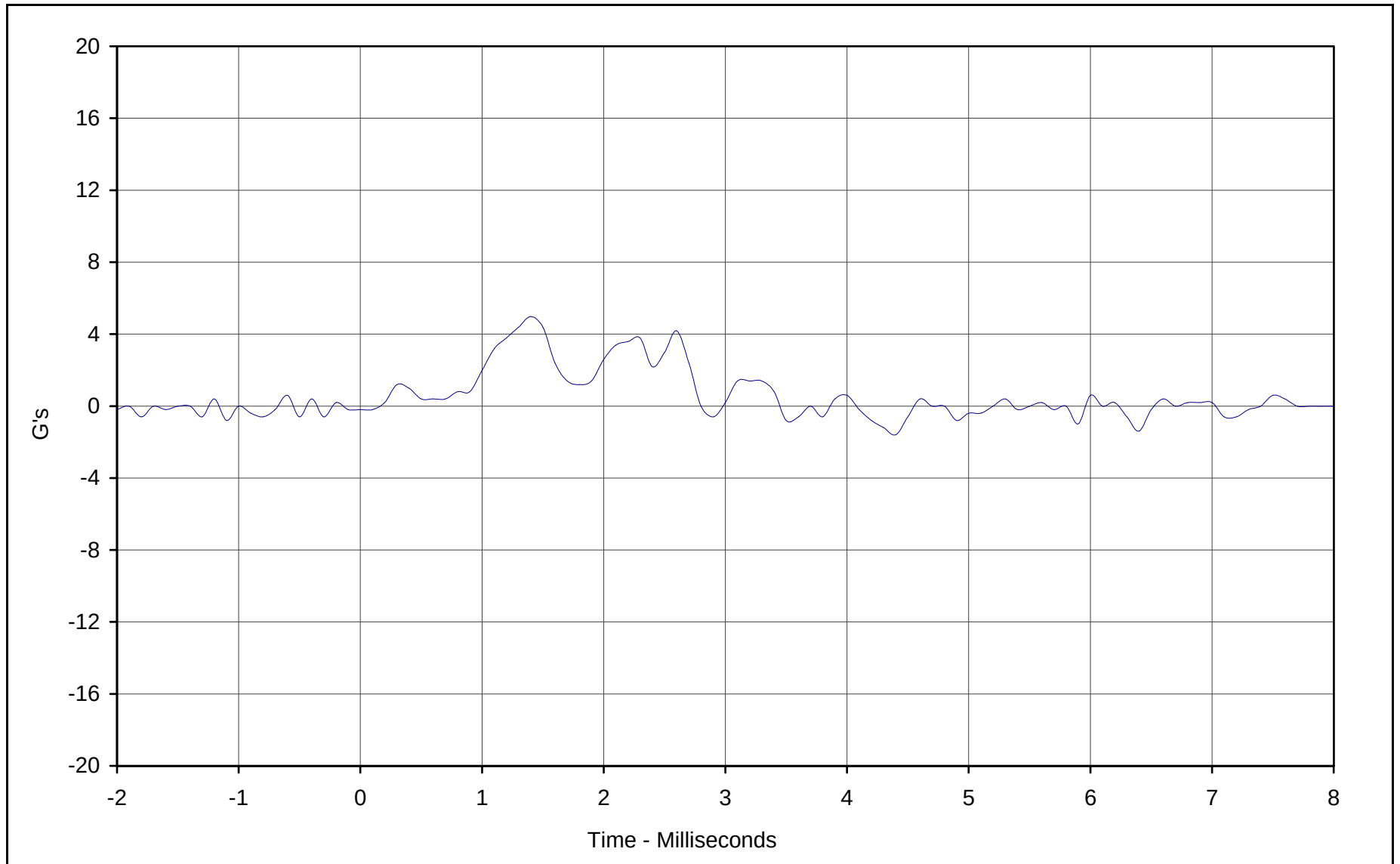


Curve Description: Head Resultant Acceleration
Maximum Value: 260.1 at 1.9 Milliseconds
Minimum Value: 0.2 at -0.7 Milliseconds
SAE Filter Class: 1000
Date of Test: 11/28/01
ATD Serial No.: 035

Testing Program: Hybrid III Head Drop Calibration (Male)
Test Information: S/N of Part: N/A Test I.D.: HD05C



KAR22001-01



Curve Description: Head Acceleration Y Axis

Maximum Value: 5.0 at 1.4 Milliseconds

Minimum Value: -1.6 at 4.4 Milliseconds

SAE Filter Class: 1000

Date of Test: 11/28/01

ATD Serial No.: 035

Testing Program: Hybrid III Head Drop Calibration (Male)

Test Information: S/N of Part: N/A Test I.D.: HD05C





Hybrid III Calibration Data Sheet

50TH Percentile Male

Thorax Impact Test

ATD Serial No.: 035

Part Serial No.: N/A

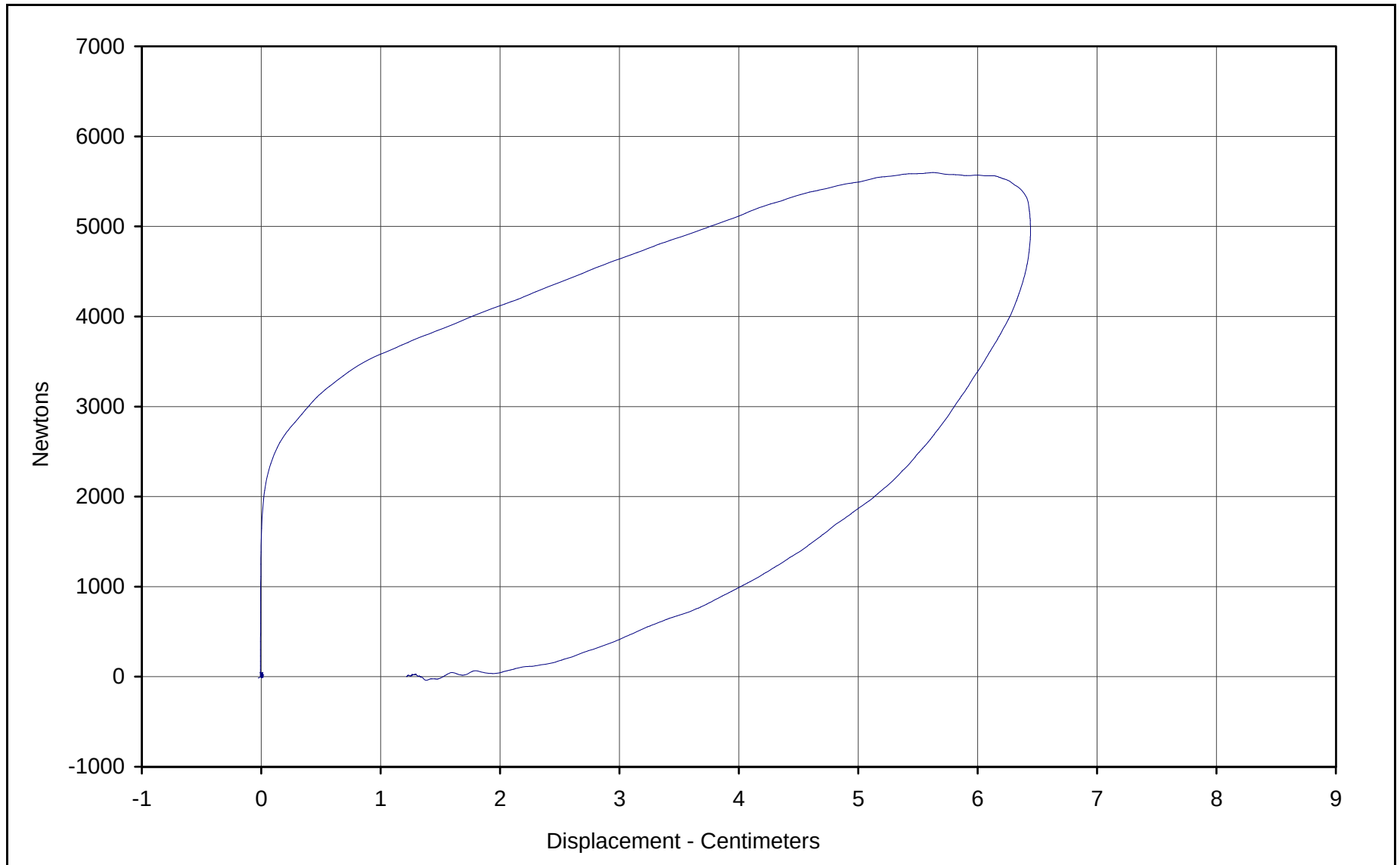
Test I.D.: CH11B

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	6.58 to 6.82	6.61	Pass
Peak Probe Force	Newtons	5159 to 5893	5597	Pass
Peak Sternum Displacement	CM	6.35 to 7.26	6.44	Pass
Internal Hysteresis	%	69 to 85	77.6	Pass
Overall Test Results				Pass

Laboratory Technician

November 29, 2001

Test Date



Curve Description: Probe Force vs. Chest Displacement

Probe Force: 5597.3 Newtons

Chest Displ.: 6.44 Centimeters

SAE Filter Class: 180

Date of Test: 11/29/01

ATD Serial No.: 035

Testing Program: Hybrid III Thorax Impact Test

Test Information: S/N of Part: N/A Test I.D.: CH11B





Hybrid III Calibration Data Sheet

50TH Percentile Male

Neck Flexion Test

ATD Serial No.: 035

Part Serial No.: N/A

Test I.D.: NF11B

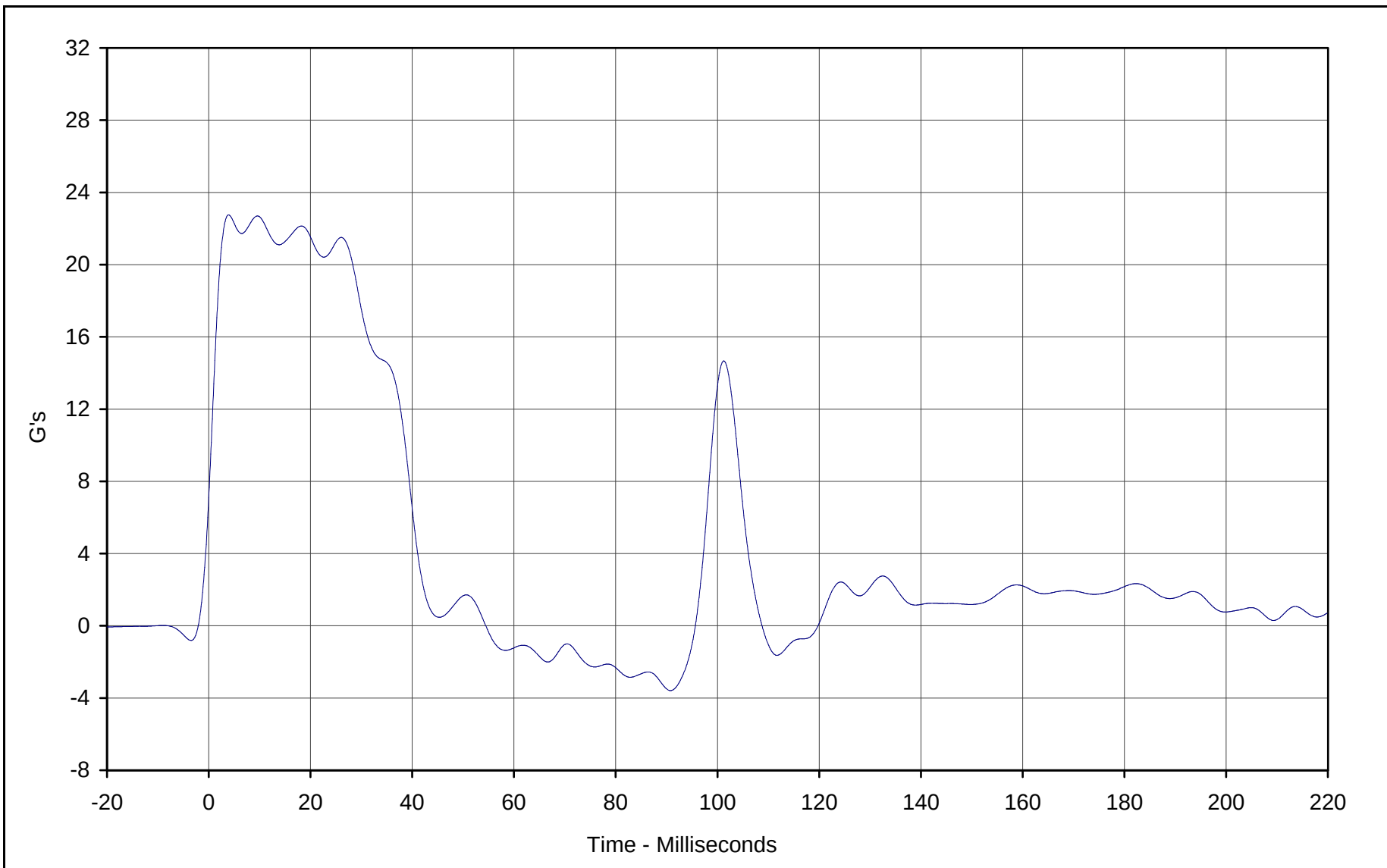
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.89	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	22.6	Pass
	20 Msec.	G's	17.6 to 22.6	21.5	Pass
	30 Msec.	G's	12.5 to 18.5	17.5	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	17.5	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	40.7	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	68.8	Pass
	Time	Msec.	57.0 to 64.0	60.0	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	119.4	Pass
Moment About Occipital Condyle	Maximum	N•m	84.1 to 108.5	89.9	Pass
	Time	Msec.	47.0 to 58.0	53.5	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	101.5	Pass
Overall Test Results					Pass

Laboratory Technician

November 27, 2001

Test Date

E-35



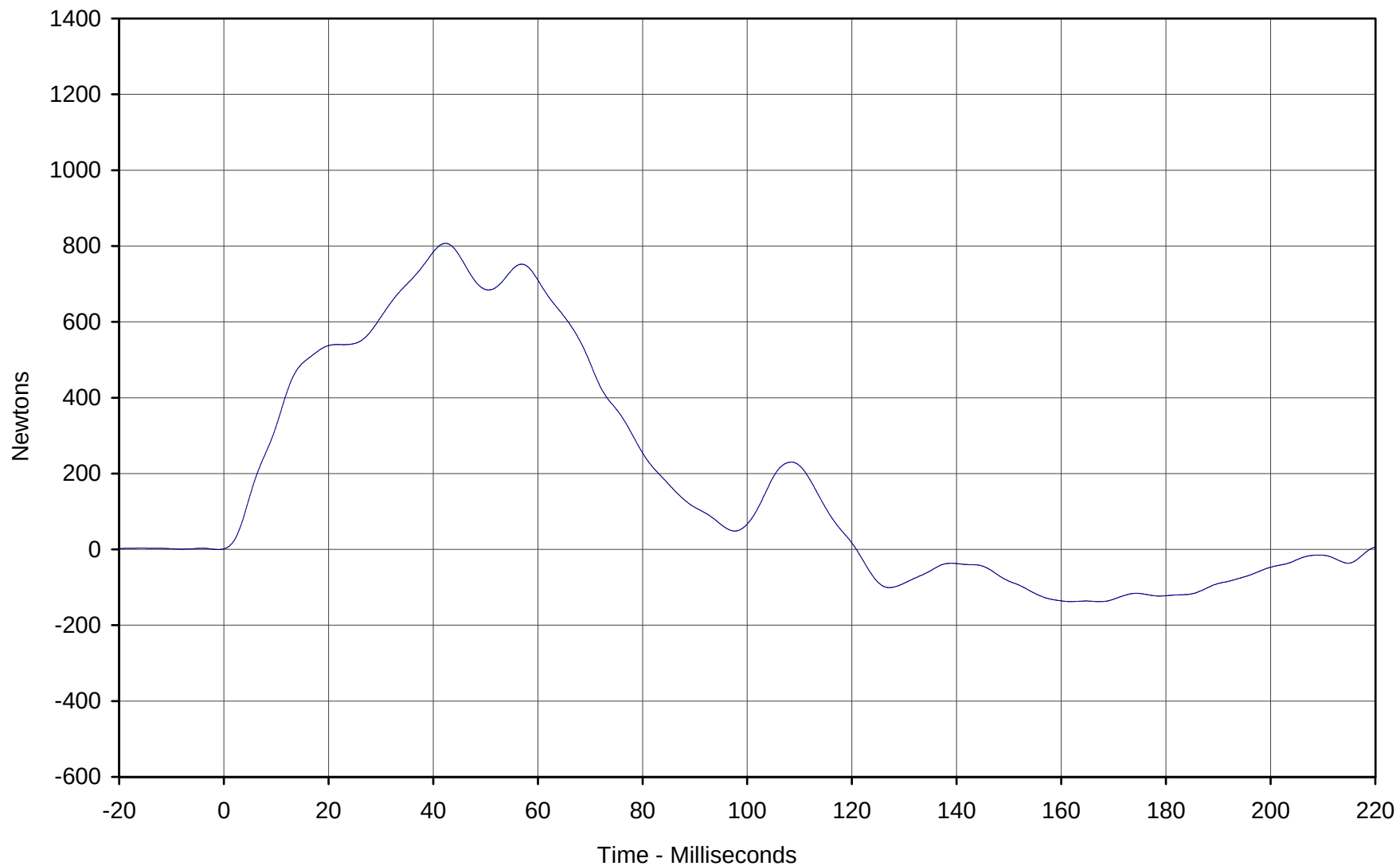
Curve Description:	Pendulum Deceleration		
Maximum Value:	22.8	at	3.9 Milliseconds
Minimum Value:	-3.6	at	90.8 Milliseconds
SAE Filter Class:	60		
Date of Test:	11/27/01		
ATD Serial No.:	035		

Testing Program:	Hybrid III Neck Flexion Test (Male)
Test Information:	S/N of Part: N/A Test I.D.: NF11B



KAR22001-01

E-36



Curve Description: Neck Force X

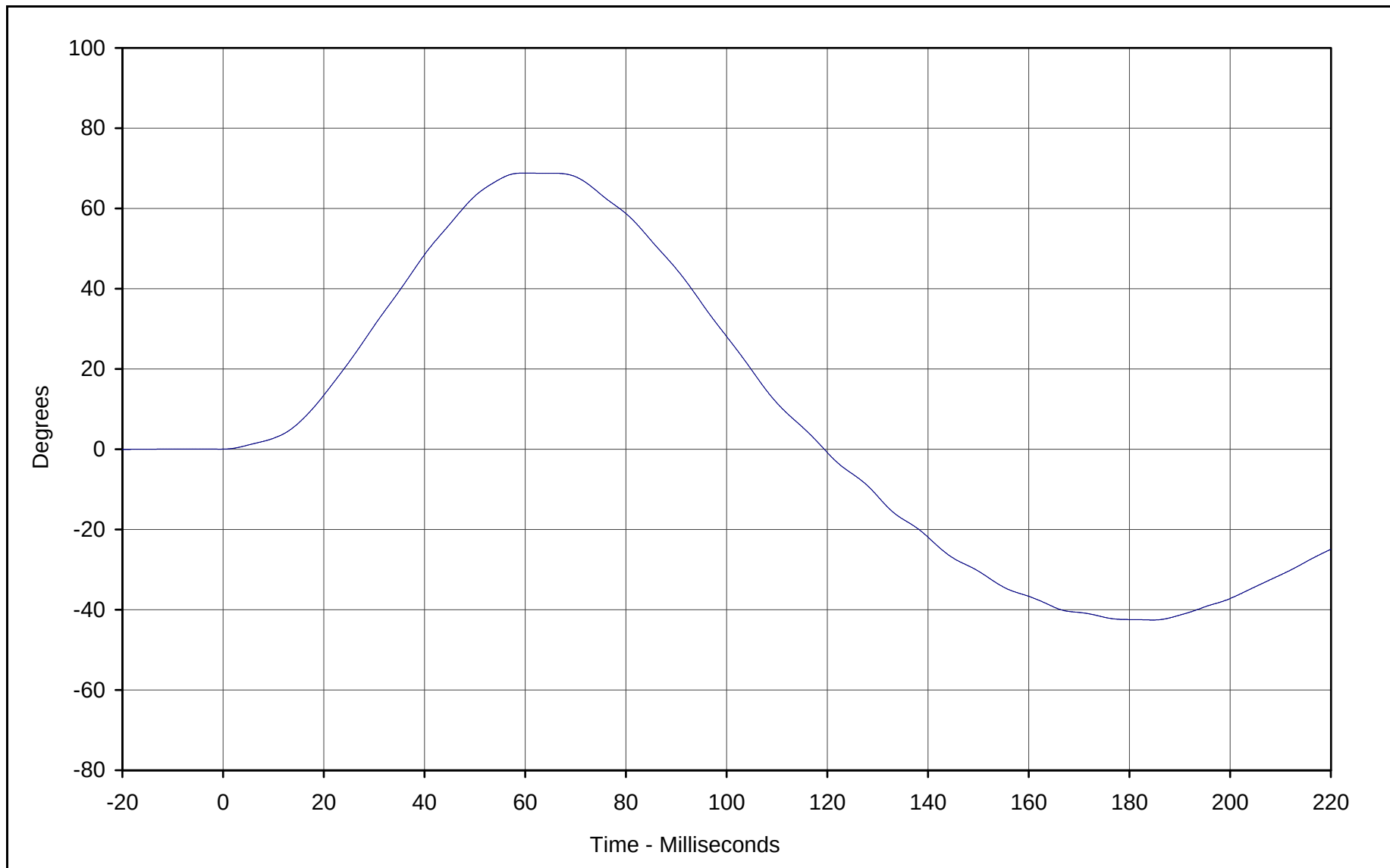
Maximum Value:	807.1	at	42.4	Milliseconds
Minimum Value:	-137.8	at	167.3	Milliseconds
SAE Filter Class:	60			
Date of Test:	11/27/01			
ATD Serial No.:	035			

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF11B



KAR22001-01



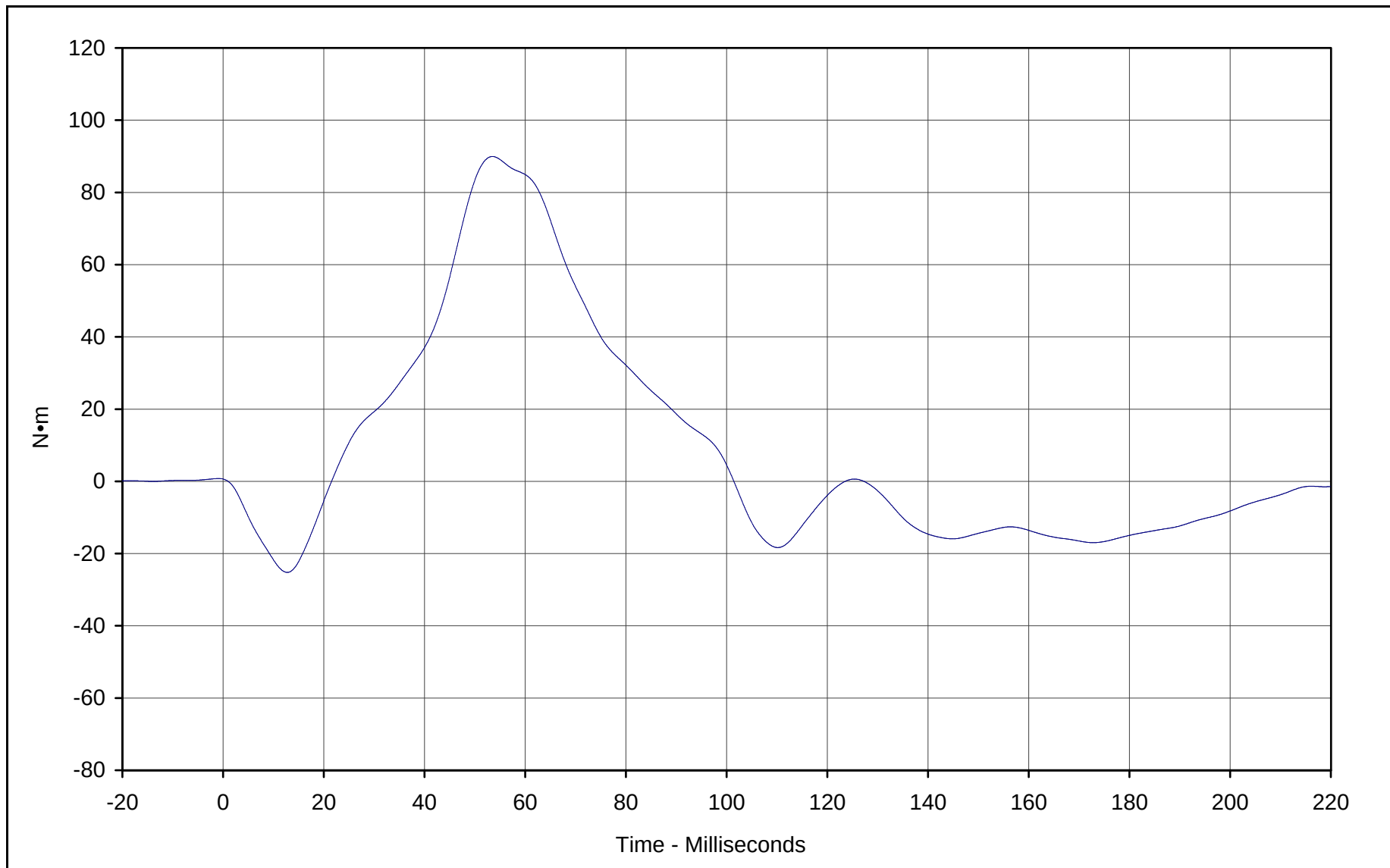
Curve Description: "D" Plane Rotation

Maximum Value:	68.8	at	60.0	Milliseconds
Minimum Value:	-42.6	at	184.6	Milliseconds
SAE Filter Class:	60			
Date of Test:	11/27/01			
ATD Serial No.:	035			

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF11B





Curve Description: Moment About Occipital Condyles

Maximum Value: 89.9 at 53.5 Milliseconds

Minimum Value: -25.2 at 12.7 Milliseconds

SAE Filter Class: 60

Date of Test: 11/27/01

ATD Serial No.: 035

Testing Program: Hybrid III Neck Flexion Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NF11B





Hybrid III Calibration Data Sheet

50TH Percentile Male

Neck Extension Test

ATD Serial No.: 035

Part Serial No.: N/A

Test I.D.: NE11B

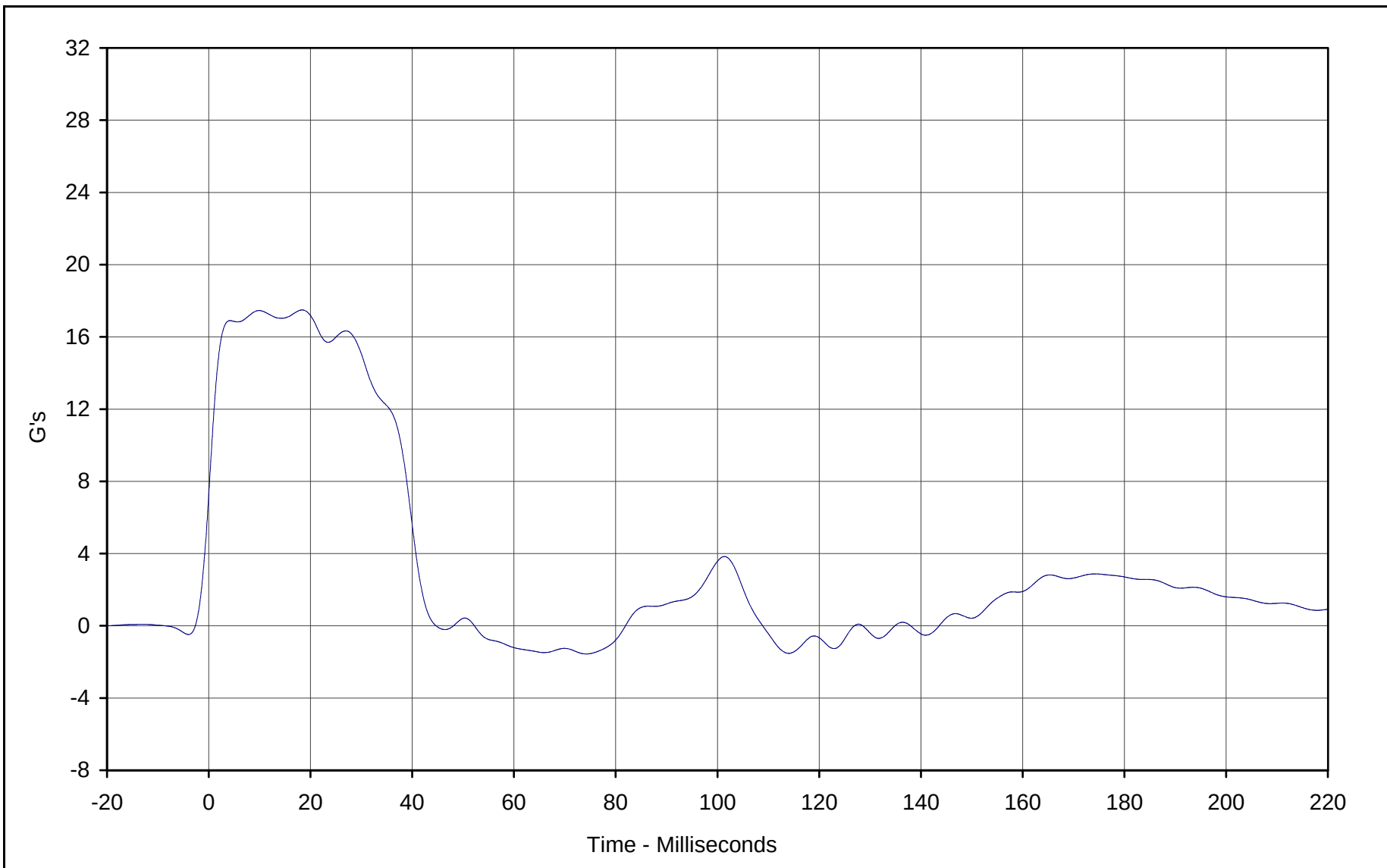
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.10	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	17.5	Pass
	20 Msec.	G's	14.0 to 19.0	17.2	Pass
	30 Msec.	G's	11.0 to 16.0	15.1	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 22.0	15.1	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	40.3	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	97.2	Pass
	Time	Msec.	72.0 to 82.0	75.1	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	154.0	Pass
Moment About Occipital Condyle	Maximum	N•m	-52.9 to- 79.9	-75.2	Pass
	Time	Msec.	65.0 to 79.0	66.4	Pass
Negative Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	136.2	Pass
Overall Test Results					Pass

Laboratory Technician

November 27, 2001

Test Date

E-40



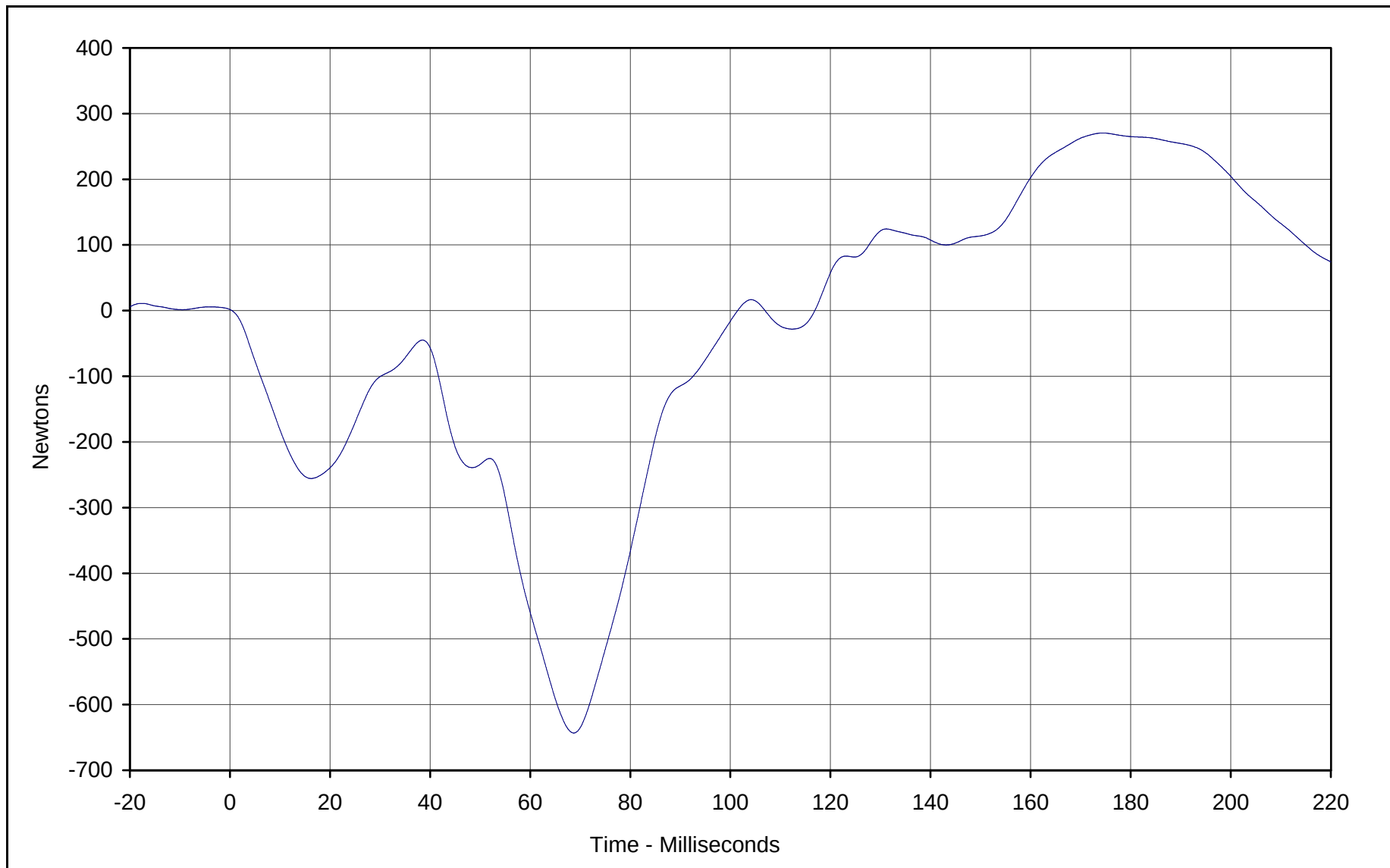
Curve Description:	Pendulum Deceleration		
Maximum Value:	17.5	at	18.3 Milliseconds
Minimum Value:	-1.6	at	74.2 Milliseconds
SAE Filter Class:	60		
Date of Test:	11/27/01		
ATD Serial No.:	035		

Testing Program:	Hybrid III Neck Extension Test (Male)
Test Information:	S/N of Part: N/A Test I.D.: NE11B



KAR22001-01

E-41



Curve Description: Neck Force X

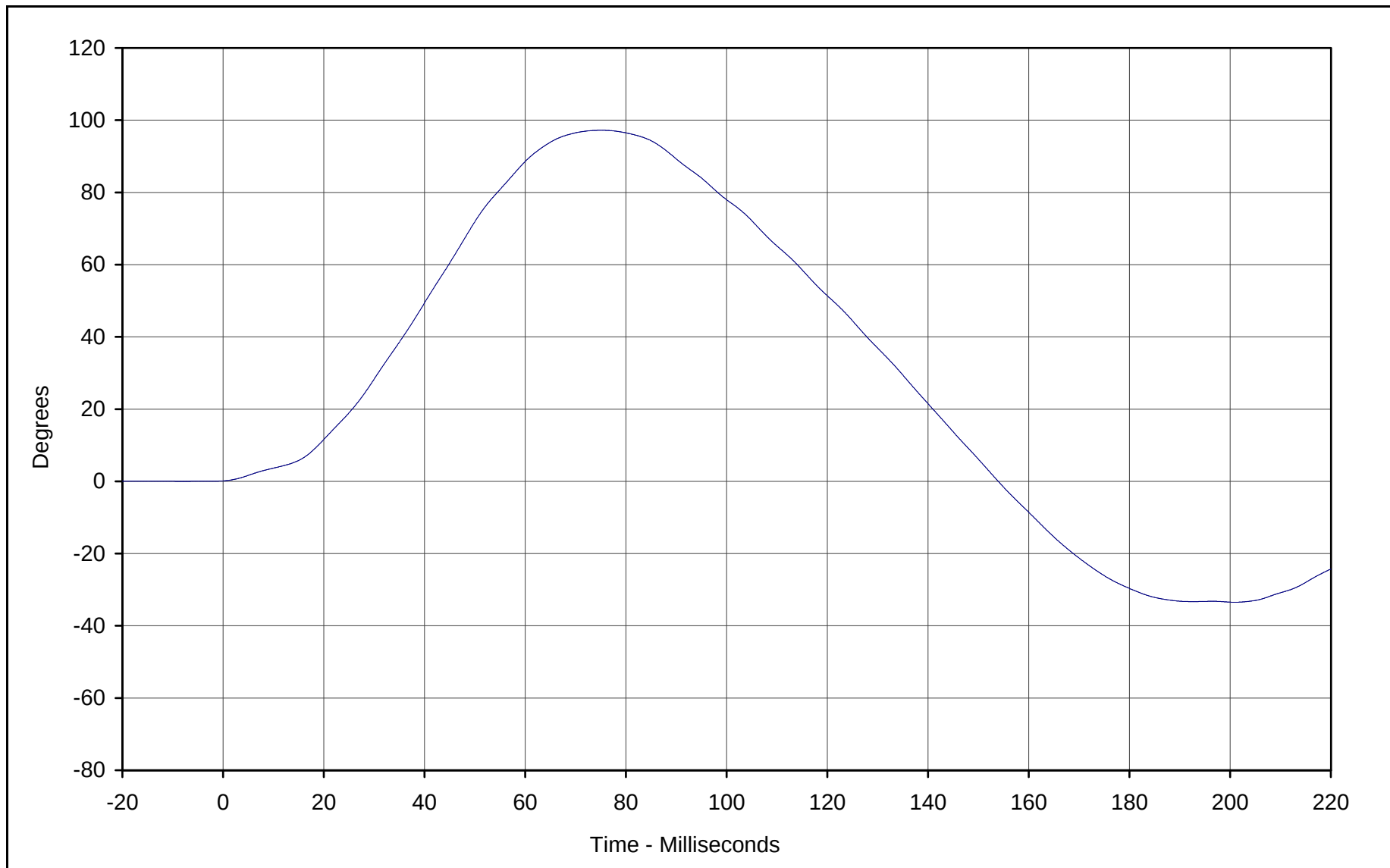
Maximum Value:	270.5	at	174.4	Milliseconds
Minimum Value:	-643.3	at	68.7	Milliseconds
SAE Filter Class:	60			
Date of Test:	11/27/01			
ATD Serial No.:	035			

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NE11B



KAR22001-01



Curve Description: "D" Plane Rotation

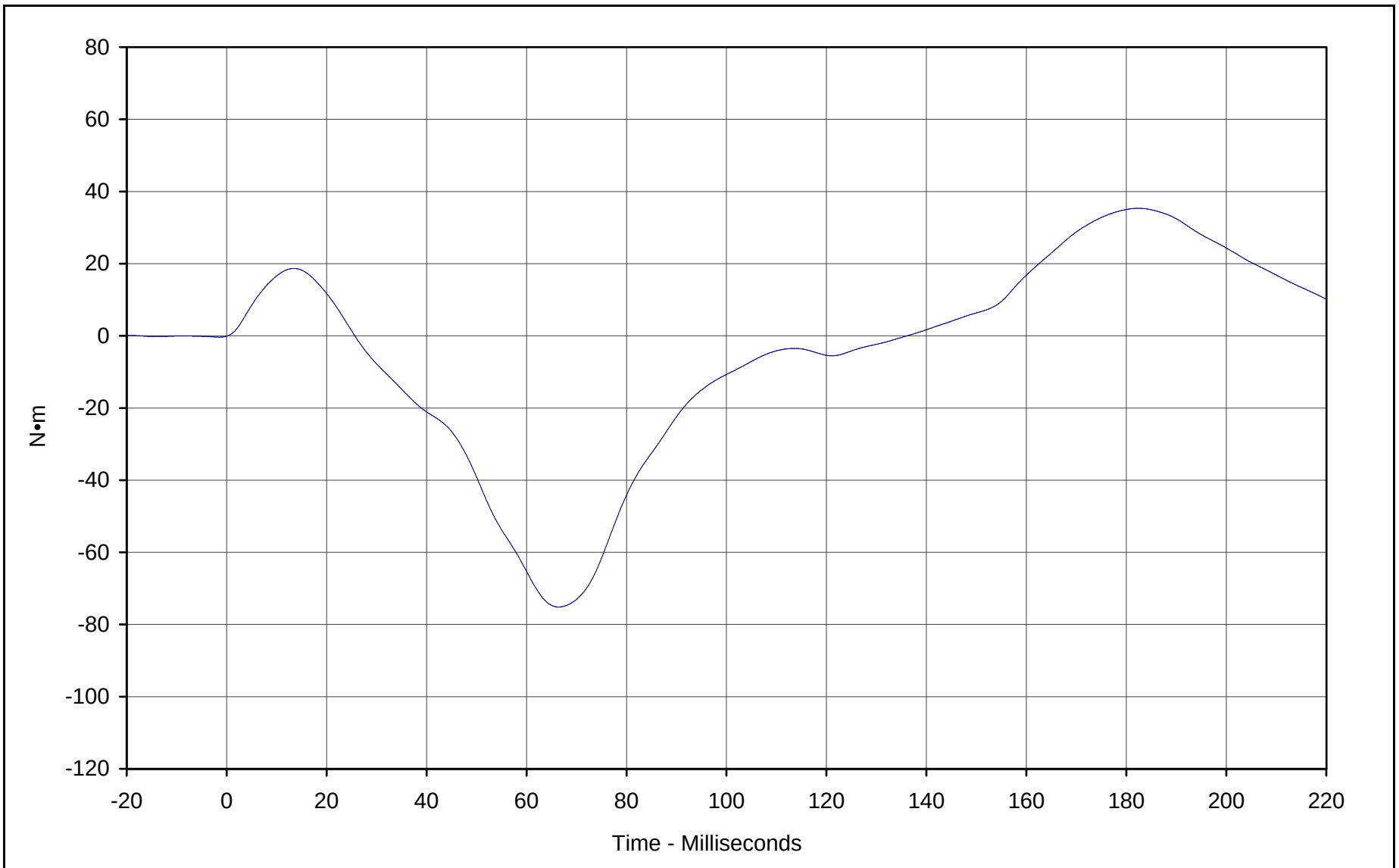
Maximum Value:	97.2	at	75.1	Milliseconds
Minimum Value:	-33.5	at	200.9	Milliseconds
SAE Filter Class:	60			
Date of Test:	11/27/01			
ATD Serial No.:	035			

Testing Program: Hybrid III Neck Extension Test (Male)

Test Information: S/N of Part: N/A Test I.D.: NE11B



E-43



Curve Description: Moment About Occipital Condyles
Maximum Value: 35.3 at 182.4 Milliseconds
Minimum Value: -75.2 at 66.4 Milliseconds
SAE Filter Class: 60
Date of Test: 11/27/01
ATD Serial No.: 035

Testing Program: Hybrid III Neck Extension Test (Male)
Test Information: S/N of Part: N/A Test I.D.: NE11B



KAR22001-01



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	879 to 889	885	Pass
B - Shoulder pivot height	mm	505 to 521	515	Pass
C - "H" point height	mm	84 to 89	85	Pass
D - "H" point from seat back	mm	135 to 140	135	Pass
E - Shoulder pivot from back	mm	84 to 94	85	Pass
F - Thigh clearance	mm	140 to 155	150	Pass
G - Elbow back to wrist pivot	mm	290 to 305	295	Pass
H - Skull cap to back line	mm	41 to 46	45	Pass
I - Shoulder to elbow length	mm	330 to 345	335	Pass
J - Elbow rest height	mm	190 to 211	210	Pass
K - Buttock to knee length	mm	579 to 604	590	Pass
L - Popliteal length	mm	429 to 455	435	Pass
M - Knee pivot height	mm	485 to 500	490	Pass
N - Buttock popliteal length	mm	452 to 477	460	Pass
O - Chest depth	mm	213 to 229	225	Pass
P - Foot length	mm	251 to 267	265	Pass
V - Shoulder breadth	mm	422 to 437	430	Pass
W - Foot breadth	mm	91 to 107	100	Pass
Y - Chest circumference	mm	970 to 1001	990	Pass
Z - Waist circumference	mm	836 to 866	850	Pass
AA - Location for chest circumference	mm	429 to 434	430	Pass
BB - Location for waist circumference	mm	226 to 231	230	Pass
Overall Test Results				Pass

Laboratory Technician

December 3, 2001

Test Date

APPENDIX F

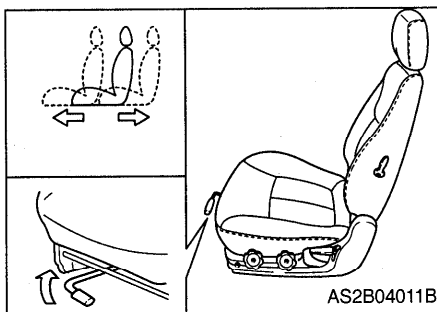
VEHICLE OWNER'S MANUAL

OCCUPANT RESTRAINT INSTRUCTIONS

FRONT SEAT

WARNING ■ Driver's Seat

- Never adjust the manual controls on the driver's seat while the vehicle is in motion. Doing so could cause loss of vehicular control and serious personal injury or death.
- Do not allow anything to interfere with the normal position of a seatback. Such interference may prevent the **seatback** from locking which could result in serious injury or death in the event of a sudden stop or collision.
- Always ride with your **seatback** upright in the normal seating position and the lap portion of the safety belt, snug and low across the hips.



Front Seat Adjustment ■ Manual

Moving the front seat forward and backward

To move the seat forward or backward:

1. Pull the seat slide adjustment lever under the front edge of the seat cushion up and hold it.
2. Slide the seat to the position you desire.
3. Release the lever and make sure the seat is locked in place.

CAUTION

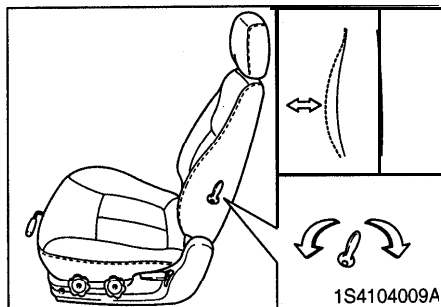
Do not place anything under the front seats. Loose objects might interfere with the seat slide mechanism or roll out from under the seat. Objects rolling around in the driver's foot area could interfere with the operation of the brake, clutch or accelerator foot pedals.

3-11

KNOWING YOUR VEHICLE

To change the height (rear portion) of the seat cushion, rotate the knob located on the outside of the seat cushion.

- To lower the seat cushion, rotate the knob toward the front of the vehicle.
- To raise the seat cushion, rotate the knob toward the rear of the vehicle.



Front Seat Adjustment ■ Power (if equipped)

The driver's seat can be adjusted by using the control knob on the left side of the seat. Before driving, adjust the seat to the proper position so as to easily control the steering wheel, pedals and switches on the instrument panel.

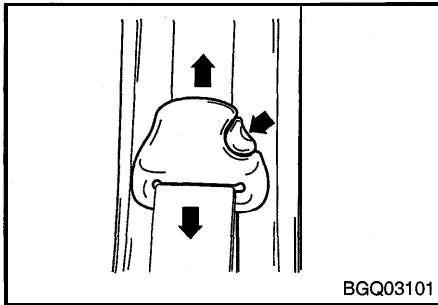
CAUTION

Do not operate two knobs at the same time.

Lumbar support (for driver's seat)

You can adjust the lumbar support by moving the lever on the side of the driver's seatback. Pivoting the lever toward the front of the vehicle increases the lumbar support. Pivoting the lever toward the rear of the vehicle decreases the lumbar support.

3-13



5. You can adjust the height of the shoulder anchor to one of the four positions. Adjust the shoulder anchor position to your size. To raise the anchor position, push the knob and push the anchor up. To lower the anchor position, push the knob and slide the anchor down. After adjustment, make sure the anchor is locked in position.

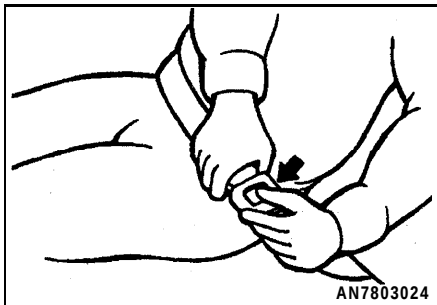
WARNING ■ Safety Belts

- The seatbacks should always remain in a comfortable, upright position while the vehicle is in motion. The safety belt system will provide the most protection with the seatbacks in an upright position.
- Never wear the shoulder portion of the safety belt under the outside arm or behind the back.
- Never wear the shoulder portion of the safety belt across the neck or face.
- Wear the lap portion of the safety belt as low on the hips as possible. Be sure the lap belt fits snugly around the hips. Never wear the lap belt over your waist.
- Never drive or ride with a twisted or jammed safety belt. If you cannot untwist or unjam the safety belt, see the nearest Kia dealer immediately.

- Never use a single belt to restrain more than one person at a time. Failure to follow these warnings will increase the risk and severity of injury in an accident.

3-40

KNOWING YOUR VEHICLE



To unfasten the lap belt:

Press the release button on buckle.

A WARNING ■ Lap Belt

Be sure the lap belt is positioned snugly around the hips, and not on the waist. Failure to position the lap belt snugly around the hips will increase the chance and severity of injury in the event of a collision.

Proper Use and Care of the Safety Belt System

To ensure that the safety belts provide the maximum protection, please follow these instructions:

- Use the belts at all times ■ even on short trips.
- If the safety belt is twisted, straighten it prior to use.
- Keep sharp edges and damaging objects away from the belts.
- Periodically inspect belt webbing, anchors, buckles and all other parts for signs of wear and damage.

- Replace damaged, excessively worn or questionable parts immediately.
- To clean the belt webbing, use any mild soap solution recommended for cleaning upholstery or carpets.
- Do not bleach or dye on the webbing. This may weaken the webbing and allow it to fail in a collision.
- Do not make modifications or additions to the safety belt.
- Do not allow the belt to get caught in the door when you close it.

3-42

AIRBAG - SUPPLEMENTAL RESTRAINT SYSTEM

What your airbag system does

Your vehicle is equipped with a dual Supplemental Restraint System (SRS), which includes an **airbag** for the driver and another **airbag** for the front passenger.

What your airbag system does not do

The **airbag** system is designed to supplement or add to the protection provided to properly belted occupants in moderate to severe frontal collisions. It is not a substitute for the driver's or front passenger's safety belt and it does not provide restraint to the lower body.

Why didn't my airbag go Off in a collision?

There are many types of accidents in which the **airbag** cannot provide additional protection. These include side or rear impacts, rollovers, and second or third impacts in **multiple**-impact accidents, as well as low speed impacts.

Remember, **airbags** are only designed to inflate when the impact would throw the occupant into the **airbags** - generally from a little to the left to a little to the right of straight ahead.

In other words, just because your vehicle is damaged and even if it is totally unusable, don't be surprised that the **airbag(s)** did not inflate.

The importance of using safety belts

There are four very important reasons to use safety belts even with an **airbag** supplemental restraint system. They:

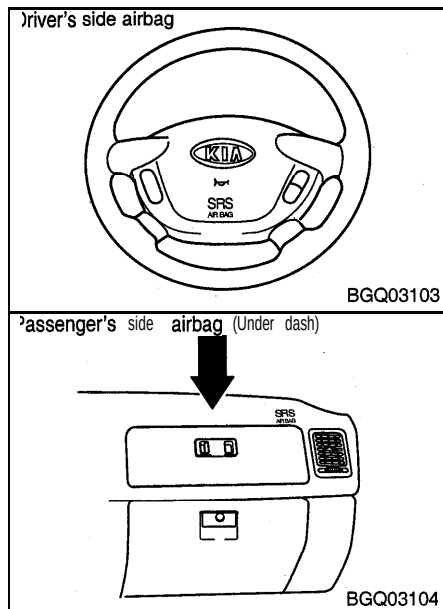
- Help keep you in the proper position (away from the **airbag**) when it inflates.
- Reduce the risk of harm in rollover, side or rear impact collisions, because an **airbag** is not designed to inflate in such situations.
- Reduce the risk of harm in frontal collisions which are not severe enough to actuate the **airbag** supplemental restraint system.
- Reduce the risk of being thrown from your vehicle.

WARNING • Airbags & Safety Belts

- **Even in vehicles with airbags, you and your passengers must always wear the safety belts provided in order to minimize the risk and severity of injury in the event of a collision or rollover.**

3-43

KNOWING YOUR VEHICLE



To indicate that your vehicle is equipped with **airbags**, the **airbag** covers on the steering wheel and on the dashboard are marked with "SRS AIRBAG".

How the Airbags System Works

The driver's **airbag** is stored in the center of the steering wheel. The passenger's side **airbag** is stored in the front instrument panel above the glove box.

If you ever have a severe frontal collision, your **airbags** will instantly inflate to help protect you from serious physical injury.

There is no single vehicle speed at which the **airbags** will inflate. Generally, **airbags** are designed to inflate in severe frontal collisions. The **airbag** Supplemental Restraint System (SRS) reacts to the severity of a collision and its direction. These two factors determine whether the sensors send out an electronic deployment or inflation signal.

3-45

Your vehicle's **airbags** provide the most protection when the vehicle occupants are seated away from the **airbags** as the collision starts. Your safety belt can help keep your occupants away from the **airbags** during heavy braking just before a collision.

Airbags are designed to inflate only in severe frontal collisions and will generally not provide protection in side or rear impacts, rollovers or less severe frontal collisions. They will not provide protection from later impacts in a multi-impact collision.

- If your vehicle has been subjected to flood conditions (e.g. soaked carpeting/standing water on the floor of the vehicle, etc.), do not attempt to start the vehicle or even put the key in the ignition. This may cause **airbag** deployment while you are too close to the **airbag**, which could result in serious personal injury or death. Have the vehicle towed to an authorized Kia dealer for inspection and necessary repairs.

Airbag System Components

The main components of your SRS are:

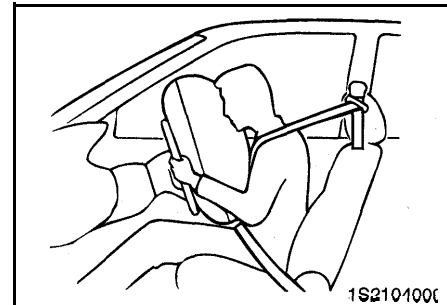
- One **airbag** in the steering wheel for the driver, and another in the dashboard for the front passenger.
- A diagnostic system that continually monitors the system operation.
- An indicator light to warn you of a possible problem with the system.
- Emergency power backup in case your car's electrical system is disconnected in a crash.

Whether the **airbags** will inflate depends on a number of factors including, but not limited to, vehicle speed, angle of impact and the density and stiffness of the vehicles or objects and the objects being impacted.

The airbags will completely inflate and deflate in less than 1/10 of one second. The speed of inflation and deflation protects the driver's ability to operate the vehicle. This is important in crashes where a vehicle continues to move after an impact and the driver still has some control of the vehicle's steering, braking, throttle and/or transmission systems.

It is virtually impossible for you to see the airbags inflate during an accident. It is much more likely that you will simply see the deflated **airbags** hanging out of their storage compartments after the collision.

In order to help provide protection in a severe collision, the **airbags** must inflate rapidly. However, that speed also causes the **airbags** to expand with a great deal of force. The speed of this inflation is necessary to reduce the likelihood of serious or life-threatening injuries and is thus a necessary part of **airbag** design. Thus, **airbag** inflation could also cause injuries which normally can include facial abrasions, bruises and broken bones.



However, there are even circumstances under which contact with the steering wheel **airbag** can cause fatal injuries, especially if the occupant is positioned excessively close to the steering wheel.

YOU MUST ALWAYS SIT AS FAR BACK FROM THE STEERING WHEEL AIRBAG AS POSSIBLE, WHILE STILL MAINTAINING A COMFORTABLE SEATING POSITION FOR GOOD VEHICLE CONTROL, IN ORDER TO REDUCE THE RISK OF INJURY OR DEATH IN A COLLISION WHEN THE AIRBAG DEPLOYS.

A WARNING - Airbag Injuries

Sit as far back from the steering wheel as possible without interfering with your control of the vehicle. Positioning yourself too close to the steering wheel can result in serious or even fatal injuries if the airbag deploys.

Never place objects over the airbag storage compartments or between the airbags and yourself. Due to the speed and force of the airbag inflation, such objects could hit your body at high speed and cause severe bodily injury and even death.

Do not put stickers or ornaments etc. on the steering wheel cover. These may interfere with the airbag's deployment.

Noise and Smoke

When the airbags inflate, they make a loud noise and they leave powder which may appear to be smoke in the air inside of the vehicle. This is normal and is a result of the ignition of the airbag inflator.

After the airbags inflate, you may feel substantial discomfort in breathing due both to the contact by your chest with both the safety belt and the airbag, as well as from breathing the smoke and powder.

WE STRONGLY URGE YOU TO OPEN YOUR DOORS AND/OR WINDOWS AS PROMPTLY AS POSSIBLE AFTER IMPACT IN ORDER TO REDUCE DISCOMFORT AND PREVENT PROLONGED EXPOSURE TO THE SMOKE AND POWDER.

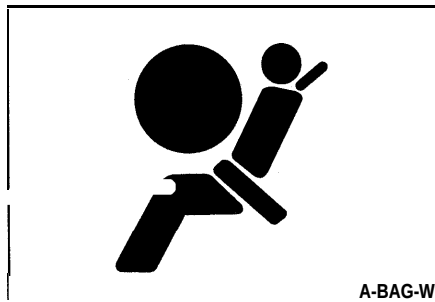
A WARNING - Hot Metal Parts

When the airbags deploy, the airbag inflators in the steering wheel and/or in the dashboard are very hot. To prevent injury, do not touch the airbag storage area's internal components immediately after an airbag has inflated.

3-47

WARNING - Rear Facing Child Seat

Never use a rear-facing child seat in the front seat. In the front seat, a rear-facing child seat would be positioned too close to where the airbags are stored and in the event an airbag deploys, the airbag would impact the rear-facing child seat and cause serious injuries or death.



Airbag Warning Light

The purpose of the airbag warning light in your instrument panel is to alert you of a potential problem with your Airbag - Supplemental Restraint System (SRS).

Have the system checked if:

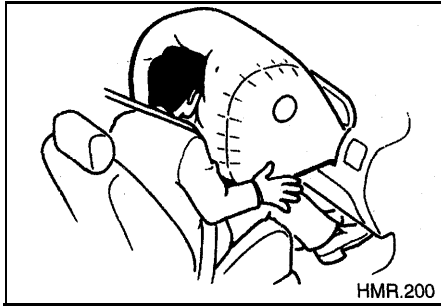
- The light does not illuminate briefly when you turn the ignition ON.
- The light stays ON after the engine starts.
- The light comes ON or flashes while you are driving.

Supplemental Restraint System Service

Your Supplemental Restraint System is virtually maintenance-free. There are no parts which you can service.

You must have the system serviced under the following circumstances:

- If an airbag ever inflates, the airbag must be replaced. Do not try to remove or discard the airbag by yourself. This must be done by an authorized Kia dealer or a qualified service technician.
- If the airbag warning indicator light alerts you of a problem, have the airbag system checked as soon as possible. Otherwise, your airbag might not inflate when you need it.



The Importance of The Passenger Being Properly Seated

A WARNING - Passenger

The front seat passenger's **airbag** is much larger than the driver's **airbag** and inflates with considerably more force. It can seriously hurt or kill a passenger who is not in the proper position and wearing the safety belt properly.

The front passenger should always move their seat as far back as practical and sit well back in the seat. It is essential that the front passenger always wear their safety belt, even when driving in a parking lot or up a driveway into a garage.

The reason for this is that in most frontal impacts there is substantial **pm-impact** braking which tends to throw the occupants forward. If the right front passenger is not using their safety belt, they will be directly in front of or even touching the **airbag** storage compartment when inflation occurs. In that situation, death or severe injury is possible.

A WARNING - Pre-Impact Braking

Pre-impact braking could throw an unbelted passenger toward or onto the **airbag** storage compartment. Upon impact in a collision, the **airbag** would rapidly inflate and possibly severely injure or kill that occupant who failed to wear their safety belt.

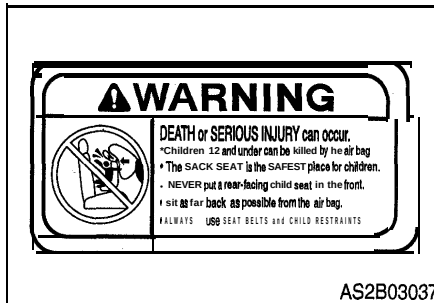
Because of the **airbag**, you must **NEVER INSTALL A REAR-FACING CHILD RESTRAINT SYSTEM IN THE FRONT PASSENGER SEAT**. There is a very significant risk of serious or fatal injuries to a child in a rear-facing child restraint if the right front passenger **airbag** inflates. We also strongly recommend that you do not put a **front-facing** child restraint system in the front passenger seat. If a front-facing child restraint system must be used in the front passenger seat, the vehicle seat should be moved as far back as possible. If the passenger's **airbag** inflates, it could seriously or fatally hurt a child who is not in the proper **positic** or properly restrained.

3-48

WARNING - SRS

Modifications

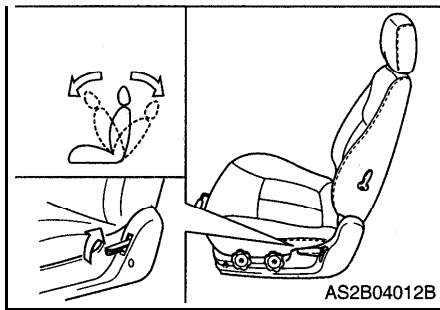
- Do not modify your steering wheel or any other part of the **airbag** system. Modification could make the system ineffective.
- Do not work on the system's components or wiring. This could cause the **airbags** to inflate inadvertently, possibly seriously injuring someone. Working on the system could also disable the system so that the **airbags** do not deploy in a collision.



Airbag warning label
(sunvisor - front side)

To remind you of the dangers of the **airbag**, **airbag** warning labels which are now required by the U.S. National Highway Traffic Safety Administration (NHTSA) are adhered to the driver's and passenger's sunvisors and attached to the glove box.

Note that these government warnings focus on the risk to children. Kia also wants you to be aware of the risks which adults are **exposed** to. Those have been described in previous pages.



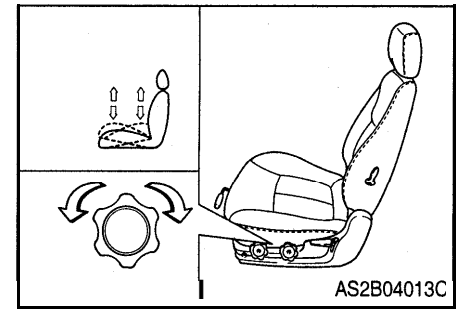
Adjusting the front **seatback** recliner

To recline the seatback:

1. Lean forward slightly and lift up on the **seatback** recline lever located on the outside of the seat, toward the rear.
2. Carefully lean back on the seat and adjust the back of the seat to the position you desire.
3. Release the lever and make sure the **seatback** is locked in place. (The lever **MUST** return to its original position for the **seatback** to lock.)

3-12

WARNING ▪ **Passengers**
To reduce the risk of sliding under the lap portion of the lap/shoulder belt, and potentially suffering severe injury or death in the event of a collision, our vehicle's restraint system is designed to provide maximum effectiveness when the **seatbelt** is worn in close proximity to the body and the **seatback** is in a normal sitting position.



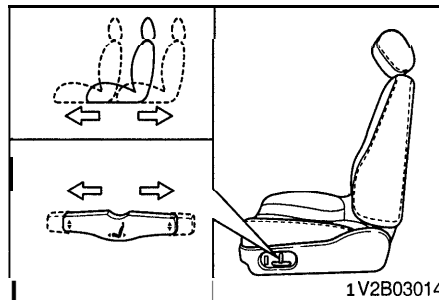
Adjusting the height of front seat **cushion**

To change the height (front portion) of the seat cushion, rotate the knob located on the outside of the seat cushion.

- To lower the seat cushion, rotate the knob toward the front of the vehicle.
- To raise the seat cushion, rotate the knob toward the rear of the vehicle.

WARNING ▪ **Driver's Seat**

- Never attempt to adjust seat while the vehicle is moving. This could result in loss of control, and an accident causing death, serious injury, or property damage.
- In order to avoid unnecessary **airbag** injuries including the possibility of severe injury or death, always sit as far back as possible from the steering wheel while still being able to maintain comfortable control of your vehicle.
- The National Highway Traffic Safety Administration (NHTSA) recommends that the driver sit at least 10 inches (250 mm) away from the steering wheel to avoid the risk of serious injury or death due to the deployment of the driver's **airbag**.
- The power seats are operable with the ignition OFF. Therefore, children should never be left unattended in the car.



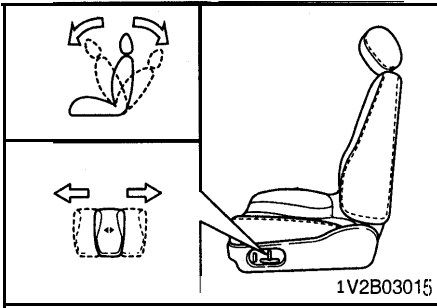
Moving the front seat forward and backward

Push the control knob forward or backward to move the seat to the desired position. Release the knob and the seat will lock in that position.

1. Reclining Control Knob
2. Sliding and Height Adjusting Control Knob

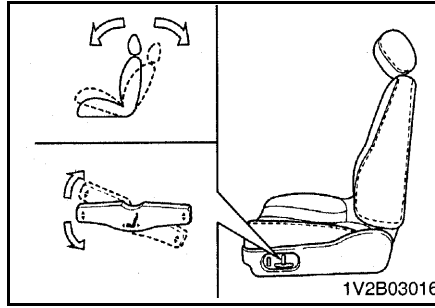
*** NOTICE**

Prior to operating the vehicle, ensure the seat is locked securely by trying to move the seat forward or backward without using the control knob. If the seat moves, it is not locked properly.



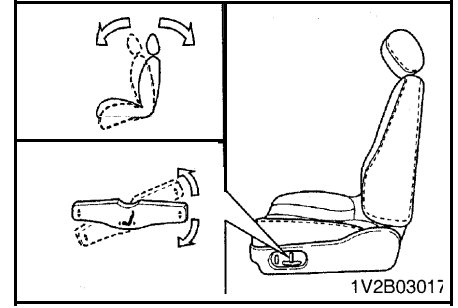
Adjusting the front **seatback** recliner

Rotate the upper portion of the control knob forward or backward to recline the **seatback** to the desired position. Release the control knob and the **seatback** will lock in position.



adjusting the height of front seat **cushion**

Front height of front seat cushion
Move the front portion of the control knob up to raise or down to lower the front part of the seat cushion.

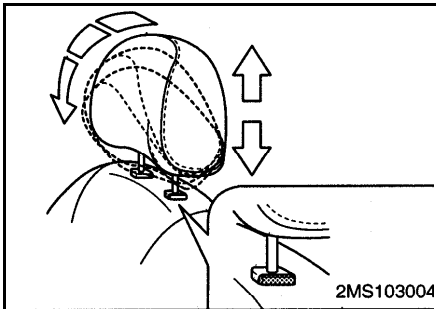


Rear height of front seat cushion

Move the rear portion of the control knob up to raise or down to lower the rear part of the seat cushion.

3-15

KNOWING YOUR VEHICLE



Headrest

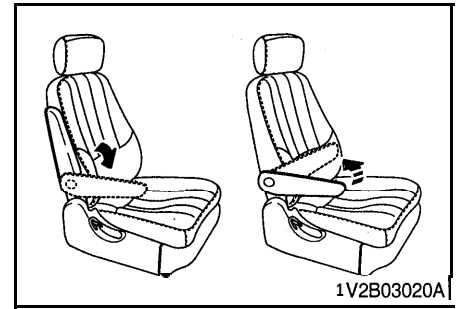
All the seat headrests provide comfort and also help protect your head and neck in the event of certain kinds of collisions.

Hold the headrest and pull up to raise it. It will lock into position. To lower the headrest, push the lock lever on the left side and push down on the headrest.

The headrest may be adjusted forward to three positions by pulling it forward. To adjust the headrest backwards, pull it forward and release it.

WARNING ■ Headrests

- Adjust the top of the headrest so that it is even with the top of your ears in order to reduce the chance of possible severe injury in the event of a collision.
- Do not operate the vehicle with the headrest removed or improperly positioned.
- Do not attempt to adjust the headrest while driving.

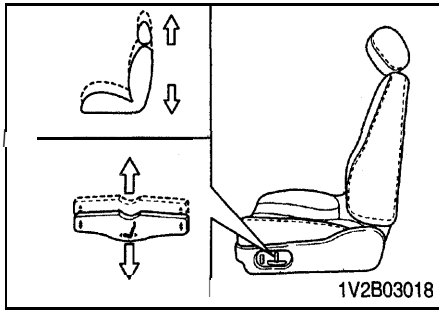


Armrest (if equipped)

Type A (adjustable armrests)

Your front seats have the armrest located on the side of seatback.

To use the armrest, swing down the armrest to the lowest position then pull it up to the desired position.

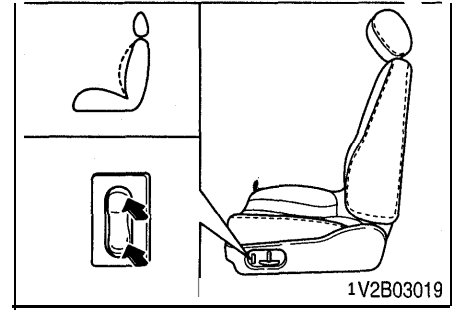


Height of front seat cushion

To raise or lower the seat cushion totally, pull up and push down on the center of the corresponding switch.

WARNING

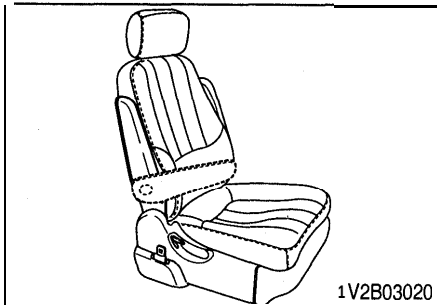
To minimize the risk of possible severe personal injury in the event of a collision, both the driver's and passenger's seatbacks should be in a normal seating position while the car is in motion. The protection provided by the vehicle's restraint system may be reduced significantly when the seatbacks are reclined. All parts of the restraint system are designed to absorb energy in an accident and this can best be accomplished if the **seatback is in a normal seating position and the seatbelt is in close proximity to the occupant.**



Lumbar support (for driver's seat)

You can adjust the lumbar support by pressing the switch located on the outside of the seat cushion. Pressing the top of the switch increases the lumbar support. Pressing the bottom of the switch decreases the lumbar support.

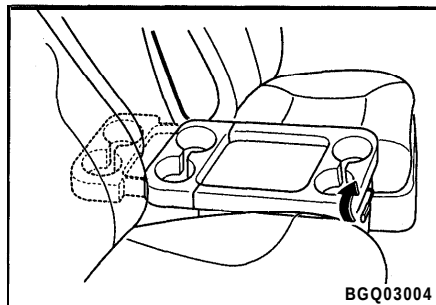
3-16



Type 5 (non-adjustable armrest)

Your second row seats have armrests located on the side seatbacks.

To use the armrests, swing them down to the lowest position.



Side Table (if equipped)

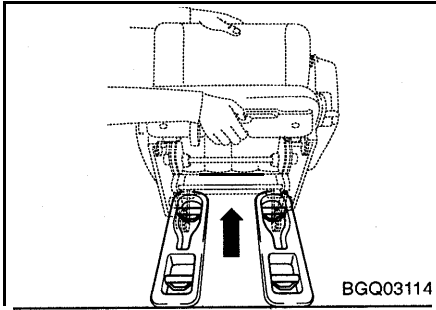
The side table is located on the inner portion of the passenger's seat.

To use the table, pull the table all the way up until it locks into place. Verify the table is locked by trying to push it down. If the table moves down, it is not locked properly.

You can extend it by pulling the rear portion backward.

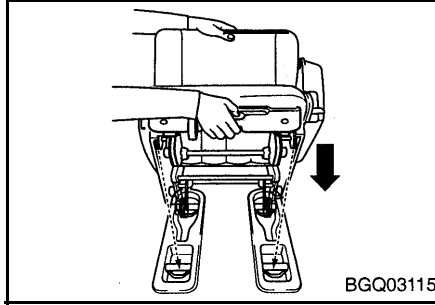
To fold down the table, pull up the release lever and press down the edge of the table.

3-18



To install a rear seat :

1. Put the front anchor strikers along the front anchors on the floor to slide the seat forward.
2. Insert two front anchor strikers into the front anchors.



3. Lift the rear portion of the seat cushion then push down firmly to lock the catches into the rear anchors until an audible "click" is heard.

4. -Make sure the catches are locked in position by moving the seat forward and backward or lifting the rear portion of the seat. If the seat moves, it is not locked properly.

3-25

CAUTION ■ Pre-tensioner
Noise and Powder

- When the pre-tensioner safety belts are activated, a loud noise may be heard and fine powder, which may appear to be smoke, may be visible in the passenger compartment. The powder is not toxic.
- The powder may cause skin irritation and should not be breathed for prolonged periods. Wash your hands and face thoroughly after an accident in which such powder has been released.

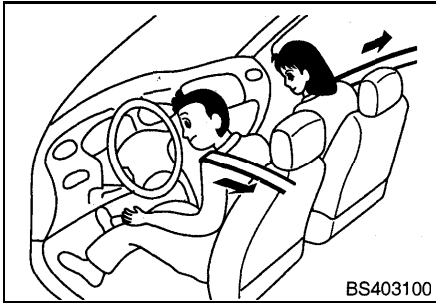
- If the pre-tensioner seat belt is not working properly, the **airbag** warning light will illuminate, since both devices are on the same electrical circuit. If the SRS **airbag** warning light does not illuminate when the ignition key is turned to "ON" or "ACC", or if it remains illuminated for more than 6 seconds, or if it illuminates while the vehicle is being driven, please have an authorized Kia dealer inspect the system as soon as possible.

WARNING ■ Pre-tensioner
Repair or Replacement

- Pre-tensioners are designed to operate once. After activation, pre-tensioner safety belts must be replaced.
- Do not attempt to inspect, repair or replace the pre-tensioner safety belts yourself. You can permanently damage the system.

3-27

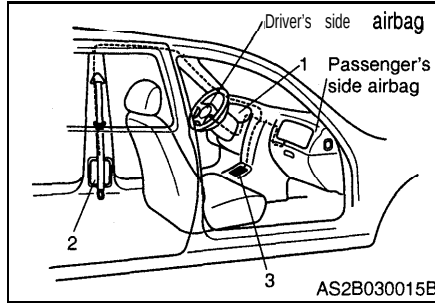
SAFETY BELTS



Pre-tensioner Seat Belt

Your vehicle is equipped with driver's and front passenger's pre-tensioner safety belts. The purpose of the pre-tensioner is to pull the safety belt snugly against the occupant's body in certain frontal collisions.

The pre-tensioner safety belts can be activated alone or, together with the **airbags**, where the frontal collision is severe enough.



When the vehicle stops suddenly, or if the occupant tries to lean forward too quickly, the seat belt retractor will lock into position. However, in certain frontal collisions, the pretensioner will also activate and pull the seat belt into tighter contact against the occupant's body.

The safety belt pre-tensioner system consists mainly of the following components.

Their locations are shown in the illustration.

1. SRS airbag warning light.
2. Seatbelt pre-tensioner assembly.
3. SRS control module.

WARNING

To obtain maximum benefit from a pre-tensioner, safety belt must be worn correctly.

3-26

KNOWING YOUR VEHICLE

Safety Belt Restraint System

WARNING ■ Safety Belts

The driver and all passengers should always use the safety belts provided in order to minimize the risk of severe bodily injury.

We strongly recommend that the driver and all passengers be properly restrained at all times by using the safety belts provided with the vehicle. Proper use of the safety belts decreases the risk of severe injury or death in accidents or sudden stops.

Safety belts provide the best restraint when :

- The **seatback** is adjusted so the occupant is in a normal seated position.
- The occupant is sitting upright (not reclined or bent over)
- The lap belt portion of the safety belt is snug and low on the hips
- The shoulder belt portion of the safety belt is snug against the chest
- The knees are straight forward

To help you remember to fasten your safety belt, a warning light will flash and a chime will sound.

All seats, except the center rear seat have lap/shoulder belts. Inertial locks in the safety belt retractors allow all of the lap/shoulder safety belts to remain unlocked during normal vehicle operation. This allows the occupants some freedom of movement and increased comfort while using the safety belts. If a force is applied to the vehicle, such as a strong stop, a sharp turn, or a collision, the safety belt retractors will automatically lock the safety belts.

Since the inertial locks do not require a collision in order to lock up, you may become aware of the safety belts locking while braking or going around sharp corners.

The center rear seat safety belt does not have an inertial lock so it is always in a locked condition.

Whenever possible, use the center rear seat position to install your child restraint. The center rear seat is the safest position for a child to sit in.

3-28

WARNING - Safety Belt Usage

- 1) Never wear the shoulder belt under the outside arm.
- 2) Never swing the safety belt around your neck to put it over the inside shoulder.
- 3) Never use a belt for more than one person.

WARNING - After a Collision

Lap/shoulder belt assemblies may be stretched or damaged when subjected to the stress and forces of a collision. The entire restraint system should be inspected following any collision. All belts, retractors, anchors and hardware damaged by a collision should be replaced before the vehicle is operated again.

WARNING - Safety Belt Care

Safety belts should be inspected periodically for excessive wear or damage. Pull out each belt fully and look for excessive fraying, cuts, burns or other damage. Make sure that the lap/shoulder belts return smoothly and easily into the retractor. Check the latches to make sure they latch and release without interference or delay. Any belt not in good condition or in good working order should be promptly replaced.

WARNING - Twisted Safety Belts

Never drive or ride with a **twisted** or **jammed** safety belt. If you cannot untwist or unjam the safety belt, see your Kia dealer immediately.

CAUTION - Damage to Safety Belts

Never close the doors on any part of the lap or shoulder belt. It can damage the safety belt or buckle which could increase the risk of injury in case of an accident.

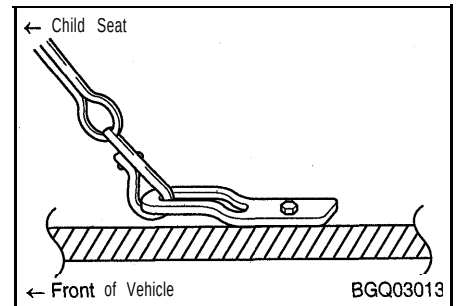
3-29

KNOWING YOUR VEHICLE

WARNING - Child Seat Anchor fitting

- Infants and small children should be restrained at all times in an approved child seat designed for use with your vehicle.
- Child seat anchorage is designed to withstand only those loads imposed by correctly fitted child seat. Under no circumstances are they to be used for adult seat belts or harnesses or for attaching other items or equipment to the vehicle.

- Check that the child seat is secured by pushing and pulling it in different directions. Incorrectly fitted child seat may swing, twist or tip thus increasing the risk of death or severe injury in an accident.



Placement of a child restraint system

To install the child seat on the rear seat, use the anchorage fitting located on the shelf behind the rear seat.

Restraint of Pregnant Women

Pregnant women should wear lap/shoulder belt assemblies whenever possible according to specific recommendations by their doctors. The lap portion of the belt should be worn AS SNUGLY AND LOW AS POSSIBLE.

WARNING ■ Pregnant Women

Pregnant women must never place the lap portion of the safety belt over the area of the abdomen where the fetus is located or above the abdomen where the belt could crush the fetus during an impact.

Restraint of Infants and Small Children

Children and infants should be restrained by an approved child-restraint system to help protect them while riding in a vehicle.

Never allow a child to stand or kneel on the seat of a moving vehicle. Never allow a safety belt to be placed around both a child and an adult or around two children at the same time.

It is best for children to be seated in the rear seats.

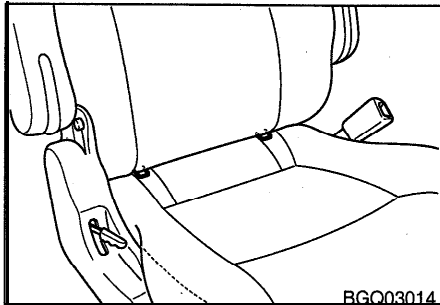
WARNING ■ Children on Laps

Never hold a child on your lap or in your arms in a moving vehicle.

Even a very strong person cannot hold onto a child in the event of even a minor collision.

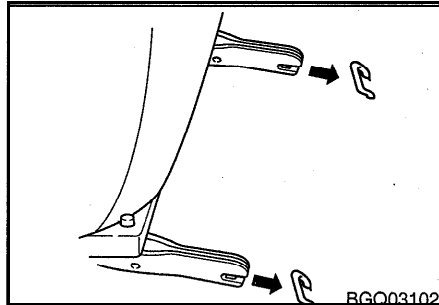
3-30

KNOWING YOUR VEHICLE

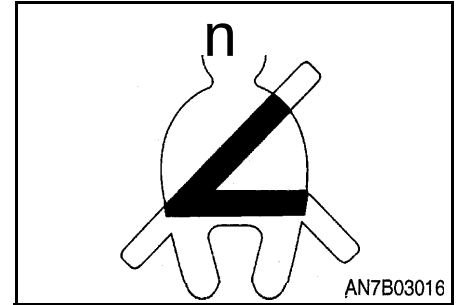


Child seat lower anchors

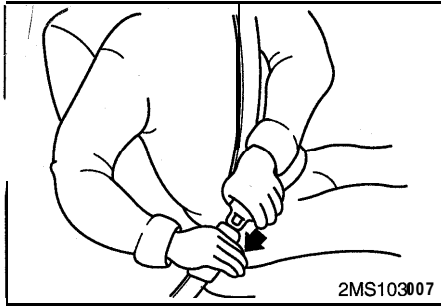
The lower anchors are located between rear seat and seatback.



To attach the child seat to the lower anchor, insert the child seat latch into the lower anchor hold. Listen for the audible "Click" sound.



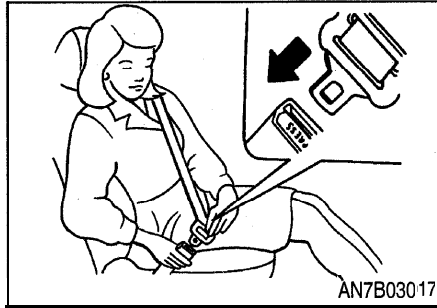
the safety belt warning chime sounds for approximately six seconds and the safety belt warning light flashes for approximately six seconds.



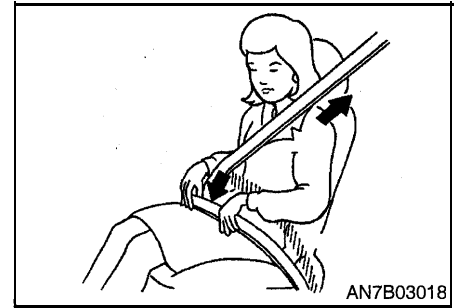
Lap/Shoulder Belt

To fasten the lap/shoulder belt :

1. Grasp the buckle and tongue plate.
2. Slowly pull the lap/shoulder belt out from the retractor.

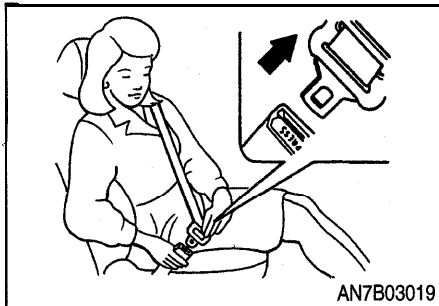


3. Insert the tongue plate into the open end of the buckle until an audible "click" is heard, indicating the belt is locked in the buckle.



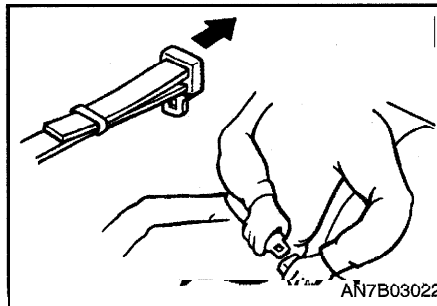
4. Position the lap portion of the belt across your lap as LOW ON THE HIPS as possible to reduce the risk of sliding under it during an accident. Adjust the belt to a SNUG FIT by pulling up on the shoulder portion of the safety belt. The belt retractor applies tension to the belt in order to take up excess webbing automatically and to maintain tension on the belt. For maximum safety, do not put any excess slack into the safety belt.

3-39



To unfasten the lap/shoulder belt:

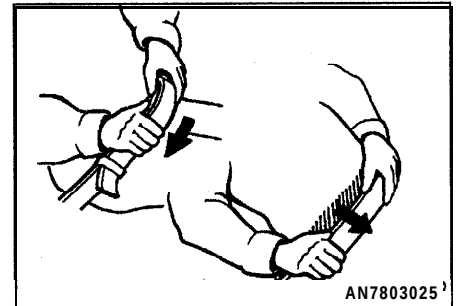
Press the release button on the buckle.



Lap Belt

To fasten the lap belt:

1. Grasp the buckle end and pull it low over the abdomen.
2. Insert the tongue plate into the open end of the buckle until an audible "click" is heard, indicating the latch is locked. Make sure the belt is not twisted.



3. Grasp the free portion of the belt webbing and pull until the belt is snug over the hips and lower abdomen. If it becomes necessary to lengthen or shorten the belt, hold the latch plate tongue at right angles to the webbing and pull.
4. Make sure that the belt is placed as LOW ON THE HIPS as possible.

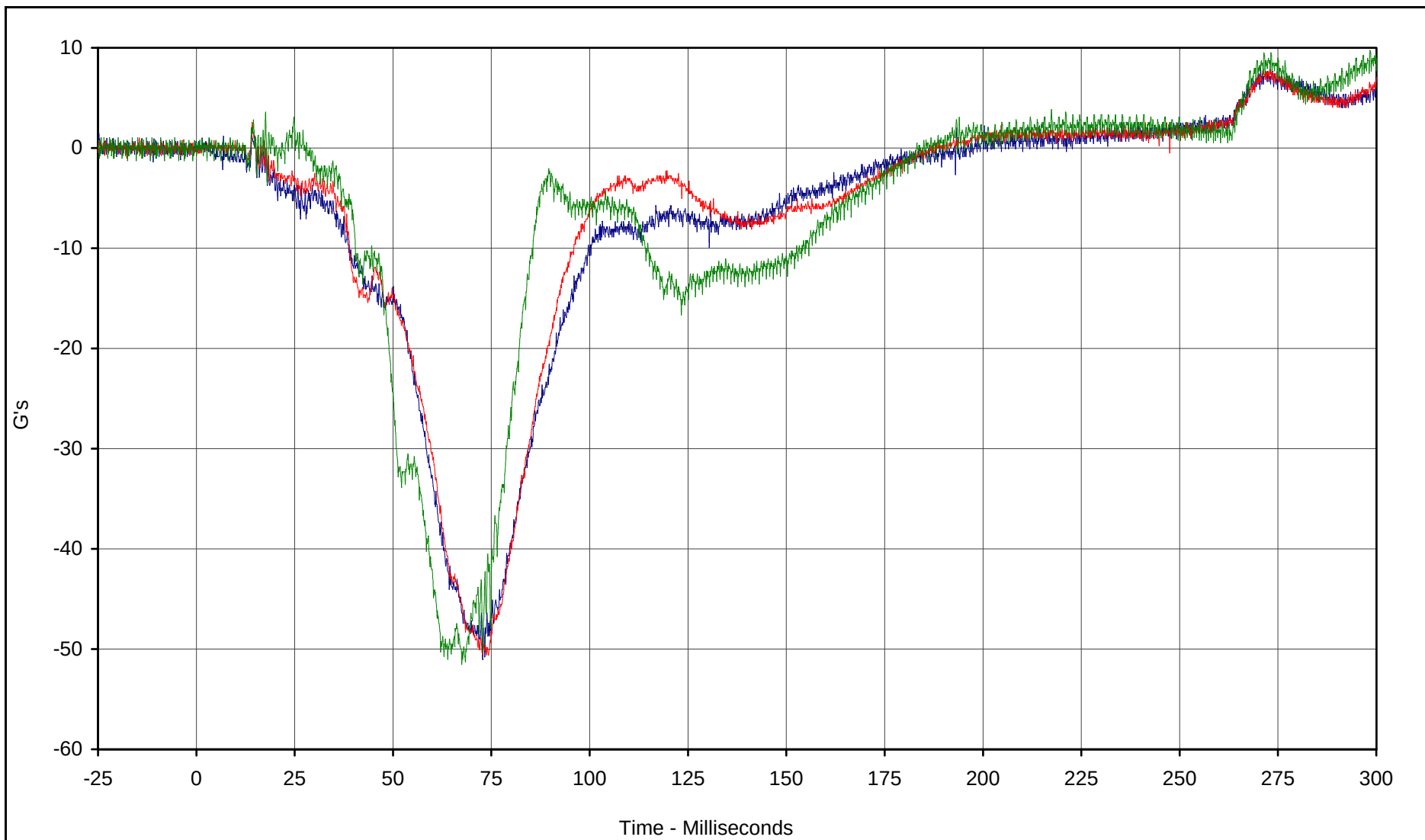
3-41

APPENDIX G

NINE ACCELEROMETER

HEAD ARRAY DATA

G-1



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Primary X	138	FIL	G's	7.9	270.6	-51.0	72.8	1000
Driver Head Left X	142	FIL	G's	7.8	271.2	-50.6	72.7	1000
Driver Head Top X	145	FIL	G's	9.7	298.4	-51.5	67.5	1000

Test Vehicle: 2002 Kia Sedona LX Minivan

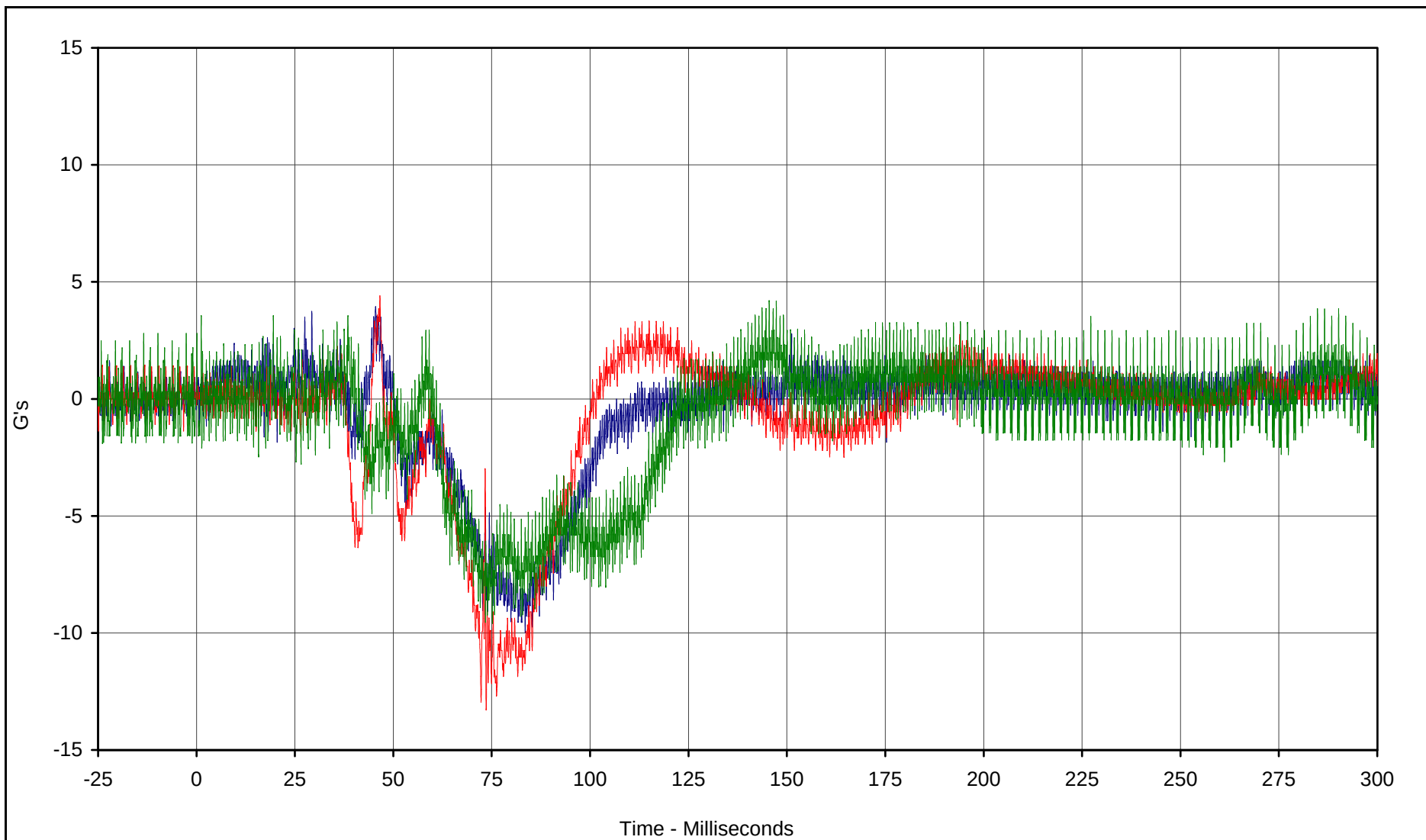
Test Date: 12/7/01

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009



KAR22001-01



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Primary Y	139	FIL	G's	3.9	45.5	-10.0	83.5	1000
Driver Head Front Y	144	FIL	G's	4.4	46.6	-13.2	73.6	1000
Driver Head Top Y	146	FIL	G's	4.2	145.5	-9.5	73.4	1000

Test Vehicle: 2002 Kia Sedona LX Minivan

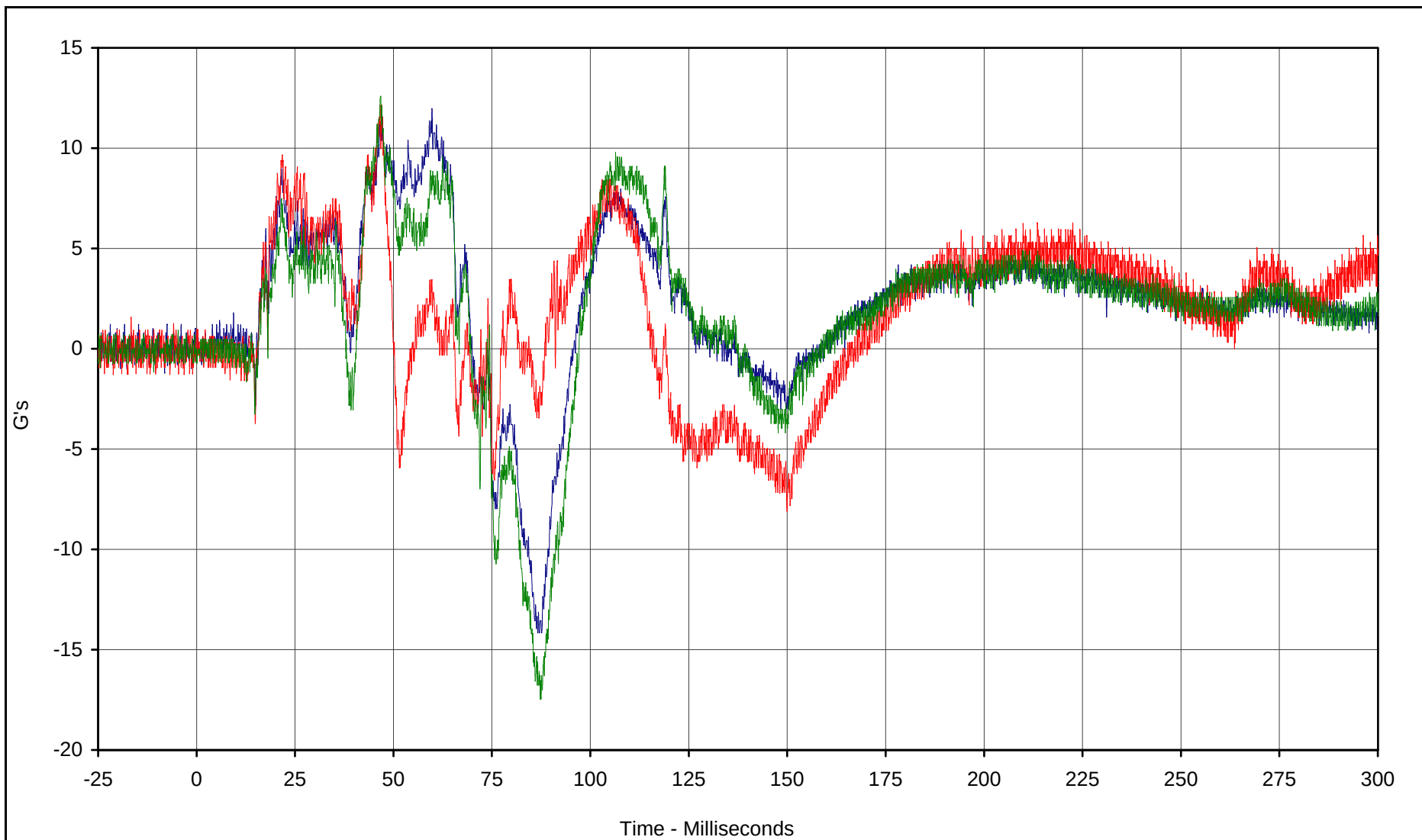
Test Date: 12/7/01

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009



G-3



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Primary Z	140	FIL	G's	12.0	59.8	-14.2	86.6	1000
Driver Head Front Z	143	FIL	G's	12.2	46.6	-8.1	150.0	1000
Driver Head Left Y	141	FIL	G's	12.6	46.7	-17.5	87.3	1000

Test Vehicle: 2002 Kia Sedona LX Minivan

Test Date: 12/7/01

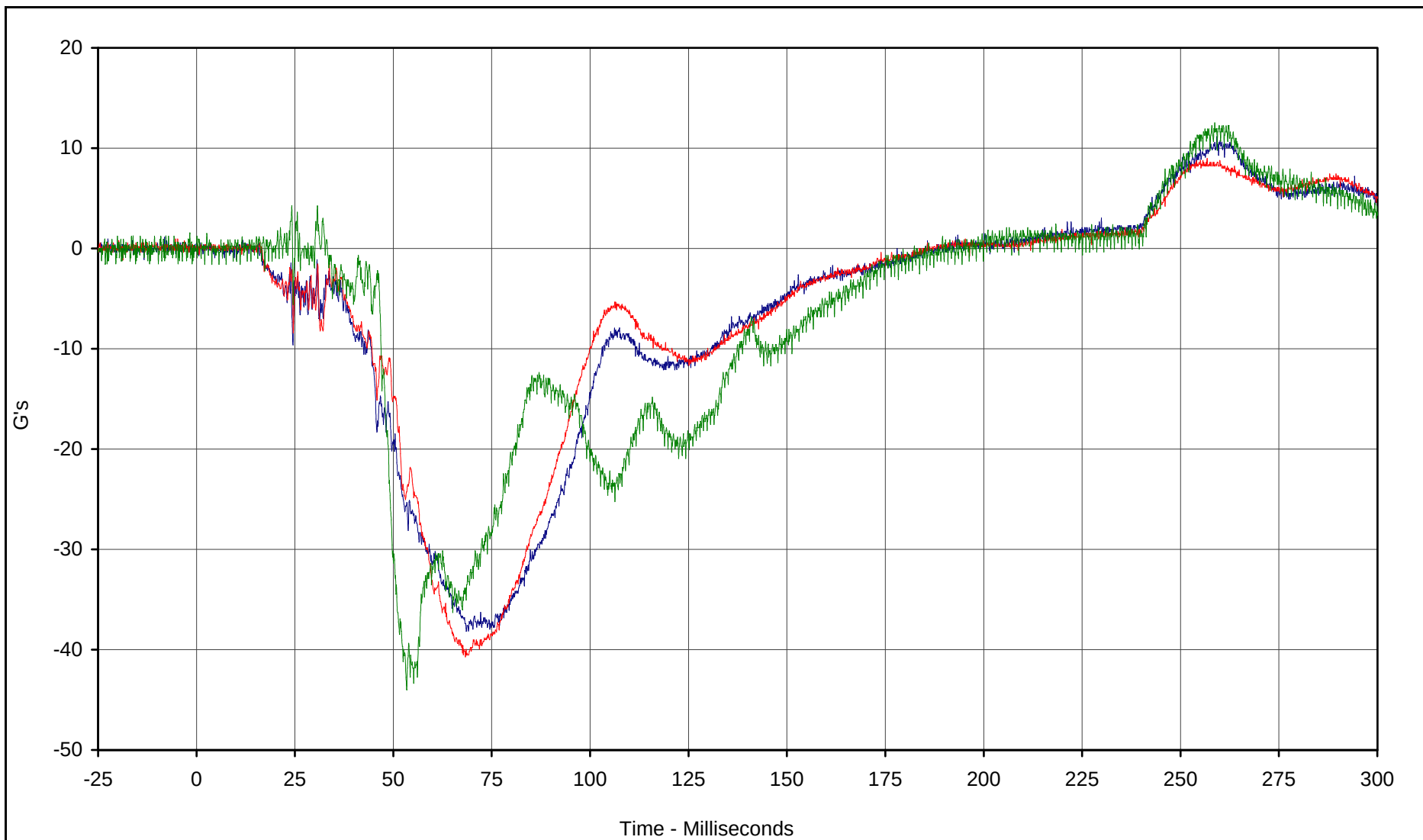
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009



KAR22001-01

G-4



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Primary X	147	FIL	G's	11.2	259.2	-38.2	68.5	1000
Passenger Head Left X	151	FIL	G's	9.0	256.8	-40.7	68.3	1000
Passenger Head Top X	154	FIL	G's	12.5	258.7	-44.0	53.4	1000

Test Vehicle: 2002 Kia Sedona LX Minivan

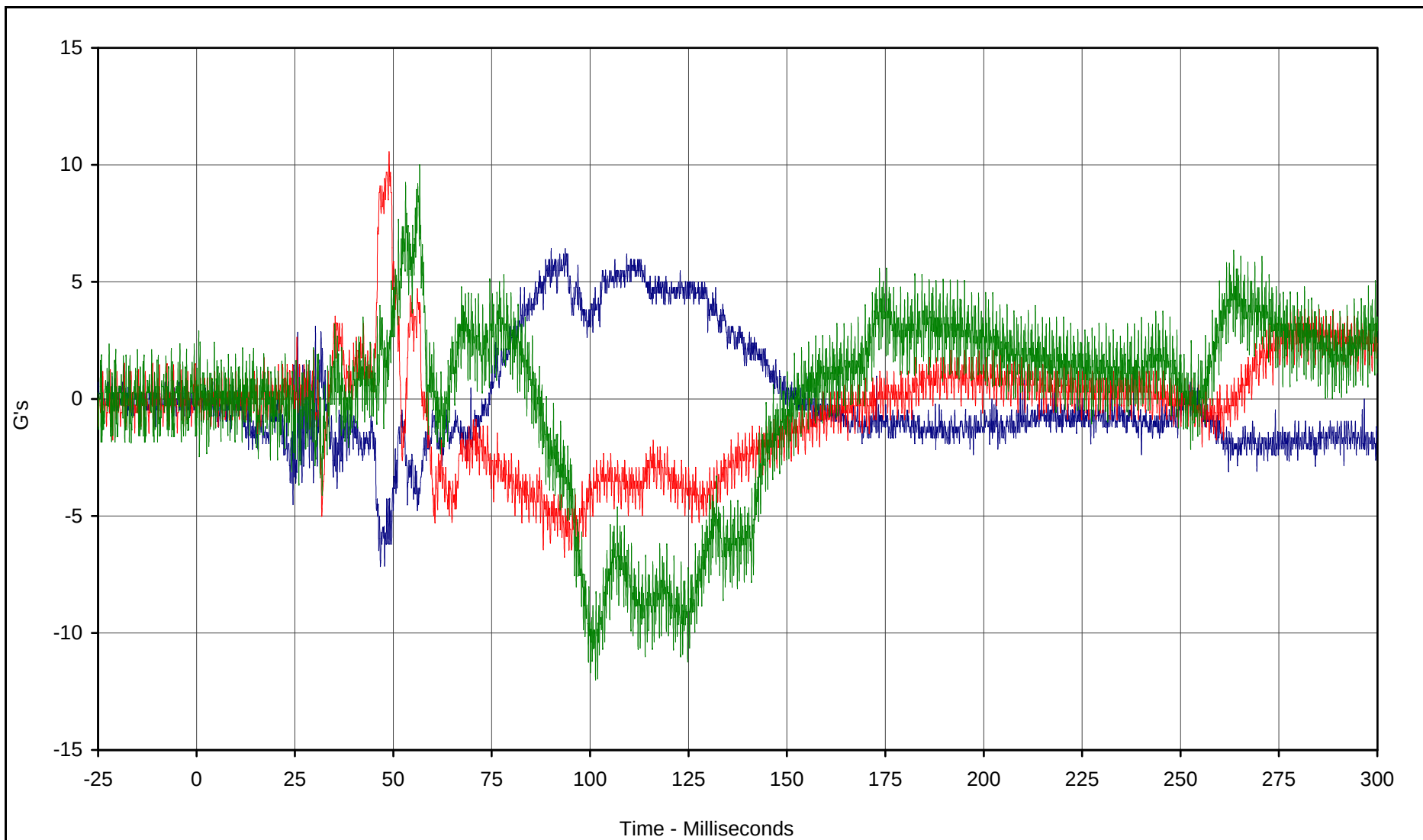
Test Date: 12/7/01

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009



KAR22001-01



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Primary Y	148	FIL	G's	6.4	90.1	-7.1	46.7	1000
Passenger Head Front Y	153	FIL	G's	10.6	48.9	-6.8	93.5	1000
Passenger Head Top Z	155	FIL	G's	10.0	56.7	-12.0	101.4	1000

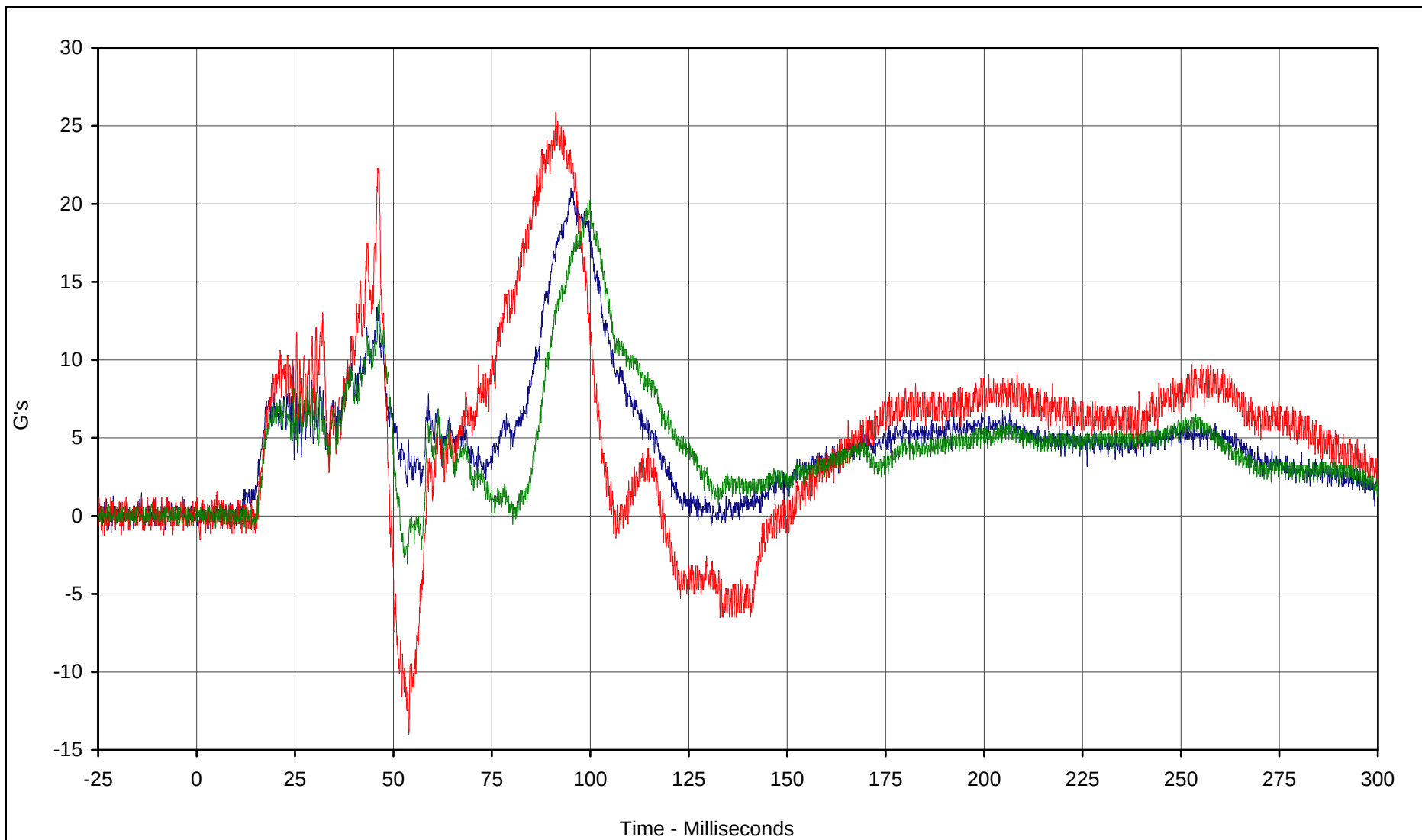
Test Vehicle: 2002 Kia Sedona LX Minivan

Test Date: 12/7/01

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009





Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Primary Z	149	FIL	G's	21.0	95.1	-0.8	2.9	1000
Passenger Head Front Z	152	FIL	G's	25.9	91.2	-14.0	53.9	1000
Passenger Head Left Y	150	FIL	G's	20.2	99.9	-3.1	53.5	1000

Test Vehicle: 2002 Kia Sedona LX Minivan

Test Date: 12/7/01

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25009

