

REPORT NUMBER KAR22001-13

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

**TOYOTA MOTOR CORPORATION
2002 TOYOTA HIGHLANDER
4WD SUV**

NHTSA NUMBER: M25107

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



JUNE 15, 2002

FINAL REPORT

**PREPARED FOR:
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Date of Acceptance

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16. Abstract A 35 mph (56.3 km/h) frontal barrier impact was conducted on a 2002 Toyota Highlander 4WD SUV at KARCO Engineering, LLC on 5/29/02. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The impact velocity is 55.82 km/h. The ambient temperature at the barrier face at the time of impact is 31.1 degrees Celcius. The vehicle's maximum post test static crush is 518 mm 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: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 35%;">Measurement Description</th> <th style="width: 15%;">Units</th> <th style="width: 15%;">Threshold</th> <th style="width: 20%;">Driver ATD</th> <th style="width: 15%;">Passenger ATD</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC)</td> <td>N/A</td> <td>1000</td> <td>581.1</td> <td>466.8</td> </tr> <tr> <td>Max. Thorax Accel. (3 msec Clip)</td> <td>G's</td> <td>60</td> <td>47.9</td> <td>49.7</td> </tr> <tr> <td>Left Femur force</td> <td>Newtons</td> <td>10000</td> <td>-2277.4</td> <td>-1884.7</td> </tr> <tr> <td>Right Femur Force</td> <td>Newtons</td> <td>10000</td> <td>-3457.3</td> <td>-3095.0</td> </tr> </tbody> </table>				Measurement Description	Units	Threshold	Driver ATD	Passenger ATD	Head Injury Criteria (HIC)	N/A	1000	581.1	466.8	Max. Thorax Accel. (3 msec Clip)	G's	60	47.9	49.7	Left Femur force	Newtons	10000	-2277.4	-1884.7	Right Femur Force	Newtons	10000	-3457.3	-3095.0
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SECTION 1

PURPOSE AND SUMMARY OF TEST M25107

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 Toyota Highlander 4WD SUV at a velocity of 55.82 km/h. The test was performed at Karco Engineering, LLC on May 29, 2002. 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, six-axis upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also placed 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.

One Hundred and Nine (109) channels of data were recorded using 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. Appendix G contains the Nine Accelerometer Head Array data.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the impact event. There was Stoddard solvent leakage during the static rollover as noted in Data Sheets No. 13, pages 21 and 22.

On Thursday, May 30, 2002, the fuel tank was removed from the 2002 Toyota Highlander. This was performed by Karco personnel, as directed by Brian Park. Michiteru Kato and Tatsuya Komamura of Toyota were both present for the removal of the tank.

The rear seat and carpet were removed first. This uncovered two access panels, the access panels were removed, but no evidence of the leak was detected. The vehicle was then placed on the lift to remove the fuel tank. The exhaust system was removed first. Then the drive shaft was removed followed by three metal shields that covered the fuel tank. The Stoddard Solvent was drained and the fuel lines were cut to allow easy removal of the tank. The tank was then removed

Upon removal, it was discovered that the leak originated from a broken fuel line on top of the tank (see Figure 2.). There was a broken plastic nipple still clamped to the rubber fuel line. There was also solvent residue on the tank suggesting that the leak was from the tank side of the break. There were several dents and scuffs on the underside of the vehicle suggesting that this was where the fuel line contacted the underside of the body during impact (see Figures 5 and 6). There was a hose clamp on the fuel line that also showed evidence of having contacted the underside of the body. The tabs of the hose clamp protruded higher than the safety shield surrounding the fuel line (see Figure 4). It appears that if the safety shield had been $\frac{1}{4}$ inch higher, or if the hose clamp had been rotated 90 °, the leak may not have occurred.

The maximum static crush of the vehicle was 518 mm and both the driver and the passenger side doors remained closed latched during the impact event and were operable without the aid of tools after the impact.

The driver's visible contact points were as follows: The driver ATD head contacted the airbag and headrest, its chest contacted the airbag and no contact of the abdomen, and both knees contacted the knee bolster/steering column.

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

Occupant injury data is 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	581.1	47.9	-35.3	-2277.4	-3457.3	194.1
Passenger	466.8	49.7	-30.4	-1884.7	-3095.0	187.3

SECTION 2

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2002 Toyota Highlander 4WD SUV

NHTSA No.: M25107

Test Program: 2002 NHTSA 35mph NCAP

Test Date: 5/29/02

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 Toyota Highlander 4WD SUV
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
Test Date: 5/29/02

PRIMARY IMPACT DATA

Measured Parameter	Units	Value
Velocity at Impact	km/h	55.82
Test Weight	kg	2021
Impact Angle	degrees	0
Average Rebound	mm	772
Maximum Static Crush	mm	518

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Front Door Opening	Remained closed & latched, opened w/o the aid of tools	Remained closed & latched, opened w/o the aid of tools
Rear Door Opening	Remained closed & latched, opened w/o the aid of tools	Remained closed & latched, opened w/o the aid of tools
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
Chest Contact	Airbag	Airbag
Abdomen Contact	None	Airbag
Left Knee Contact	Knee Bolster/Steering Column	Glove Box
Right Knee Contact	Knee Bolster/Steering Column	Glove Box

16mm MOVIE COVERAGE

High Speed	16
Real Time	1
Total	17

DATA CHANNELS

Driver ATD Sensors	46
Passenger ATD Sensors	46
Belt Assessment Sensors	8
Vehicle Structure Accelerometers	9
Rigid Barrier Load Cells	24
Total	133

DATA SHEET NO. 2
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2002 Toyota Highlander 4WD SUV
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
 Test Date: 5/29/02

TEST VEHICLE INFORMATION

Make	Toyota
Model	Highlander
Body Style	4WD SUV
NHTSA No.	M25107
VIN	JTEHF21A020075171
Color	Red
Delivery Date	5/22/02
Odometer Reading (mi.)	200
Dealer	Soutars Toyota
Transmission	4-Speed Automatic
Final Drive	4WD
Type/No. Cylinders	V-6
Engine Displacement (L)	3.0
Engine Placement	Transverse
Front Seat Side Airbag	No

TEST VEHICLE OPTIONS

Driver Front Airbag	Yes
Pass. Front Airbag	Yes
Power Windows	Yes
Pre-Tensioners	Yes
Power Door Locks	Yes
Tilt Wheel	Yes
Air Conditioning	Yes
Power Brakes	Yes
Disc Brakes, Front	Yes
Disc Brakes, Rear	Yes
Anti-lock Brakes	Yes
Head Airbag	No
Load Limiter	Yes
Cruise Control	Yes
Bucket Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Company	GVWR (kg)	2261
Date of Manufacture	April-02	GAWR Front (kg)	1300
		GAWR Rear (kg)	1241

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	210	210
Cold Pressure (kPa)	210	210
Recommend Tire Size	P225/70R16	P225/70R16
Tire Size on Vehicle	P225/70R16	P225/70R16
Tire Manufacturer	Bridgestone	Bridgestone

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	None	
Number of Occupants	2	3	0	5
Capacity Wt. (VCW) (kg)				479
Cargo Weight (RCLW) (kg)				80

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

Test Vehicle: 2002 Toyota Highlander 4WD SUV
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
 Test Date: 5/29/02

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	510	396		561	465	
Right	kg	507	381		550	445	
Ratio	%	56.7	43.3		55.0	45.0	
Totals	kg	1017	777	1794	1111	910	2021

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1794
Weight of 2 P572 ATD's	kg	152
Rated Cargo/Luggage Weight (RCLW)	kg	80
Calculated Vehicle Target Weight (TVTW)	kg	2026

TEST VEHICLE ATTITUDE AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	800	801	804	805	1177
As Tested	mm	788	792	790	794	1223

Vehicle Wheel base (mm): 2718

Weight of Ballast secured in cargo area (kg): 0

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): 75.0

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: Purple

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 Toyota Highlander 4WD SUV
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
Test Date: 5/29/02

SPEED TRAP DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	55.51 to 57.12	55.82
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	55.85
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	4540	4123	-417
Center	mm	4685	4167	-518
Right Side	mm	4540	4164	-376

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	829
Center	mm	738
Right Side	mm	749
Average	mm	772

DATA SHEET NO. 4
TEST VEHICLE INFORMATION

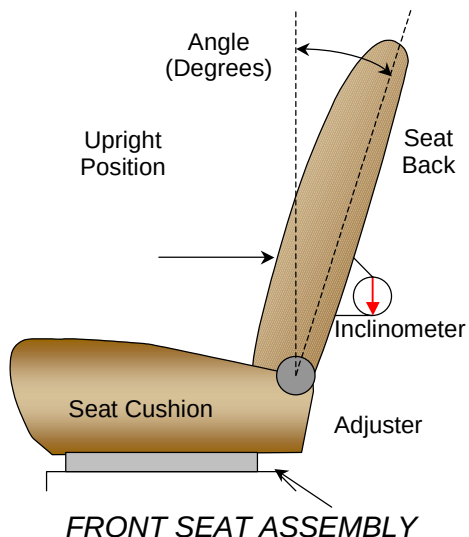
Test Vehicle: 2002 Toyota Highlander 4WD SUV
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
Test Date: 5/29/02

NOMINAL DESIGN RIDING POSITION

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

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



SEAT FORE/AFT POSITIONS

Driver seat is power operated and has a total of 242mm of travel. Passenger seat is manually operated and has 17 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: 242mm of total travel
Driver seat fore/aft position: set at 121mm at the midpoint
Passenger seat fore/aft total travel: 17 seating positions or detents
Passenger seat fore/aft position: 9th 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**

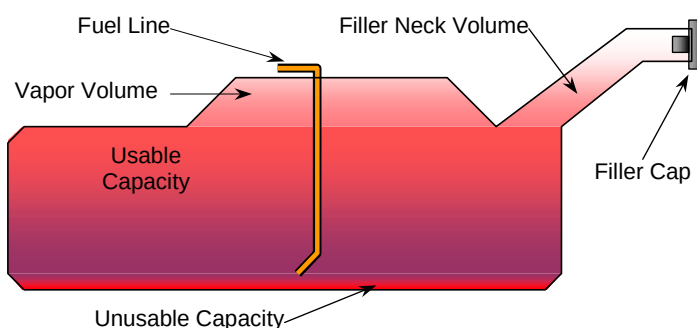
Test Vehicle: 2002 Toyota Highlander 4WD SUV
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
 Test Date: 5/29/02

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>N/A</u>	liters
"Usable Capacity" used for certification tests FMVSS 301 requirements:	<u>68.9 to 70.4</u>	liters
Actual amount of Stoddard solvent added to vehicle for certification test:	<u>69.7</u>	liters

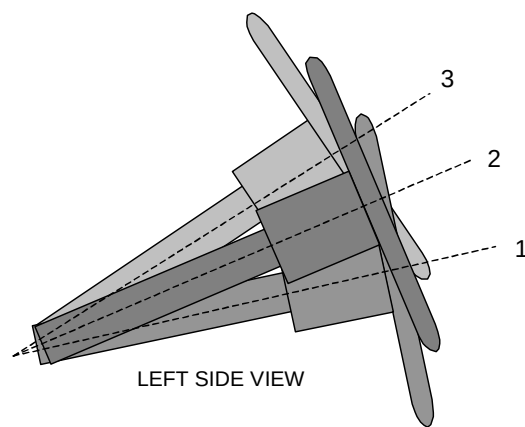
The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the left rear fender. The standard fuel tank occupies the area under the rear seat. Fuel lines run inside the frame rail to the engine compartment.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when 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. The steering column has seven (7) positions or detents and is set in the fourth (4) detent as indicated by the diagram at right and the angle below.



STEERING COLUMN ASSEMBLY

Lowermost; position 1:	<u>24°</u>
Geometric center; position 2:	<u>28°</u>
Uppermost position 3:	<u>30°</u>

DATA SHEET NO. 5
DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2002 Toyota Highlander 4WD SUV
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
Test Date: 5/29/02

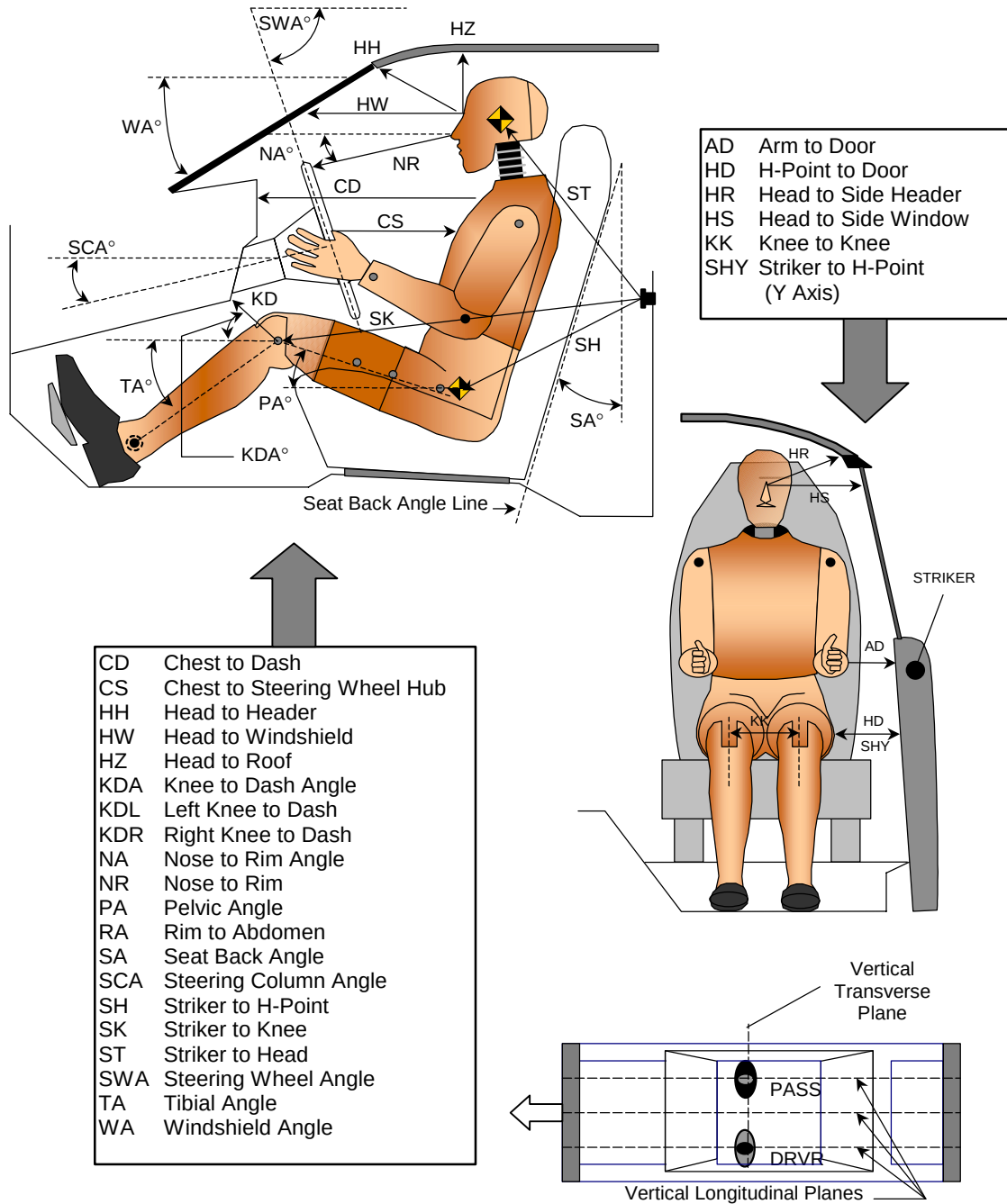
TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		32		
SWA	Steering Wheel Angle		62		
SCA	Steering Column Angle		28		
SA	Seat Back Angle		19		19
HZ	Head to Roof (Z)	210	90	197	90
HH	Head to Header	401		391	
HW	Head to Windshield	620		615	
HR	Head to Side Header (Y)	284		288	
NR	Nose to Rim	444	14		
CD	Chest to Dash	566		588	
CS	Chest to Steering Hub	307			
RA	Rim to Abdomen	217			
KDL	Left Knee to Dash	160	38	139	
KDR	Right Knee to Dash	168		138	38
PA	Pelvic Angle		25		24
TA	Tibia Angle		43		42
KK	Knee to Knee (Y)	323		270	
ST	Striker to Head	584	4	618	10
SK	Striker to Knee	538	79	535	76
SH	Striker to H-Point	245	42	261	35
SHY	Striker to H-Point (Y)	272		262	
HS	Head to Side Window	330		335	
HD	H-Point to Door (Y)	179		186	
AD	Arm to Door (Y)	125		42	

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

Test Vehicle: 2002 Toyota Highlander 4WD SUV
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
 Test Date: 5/29/02



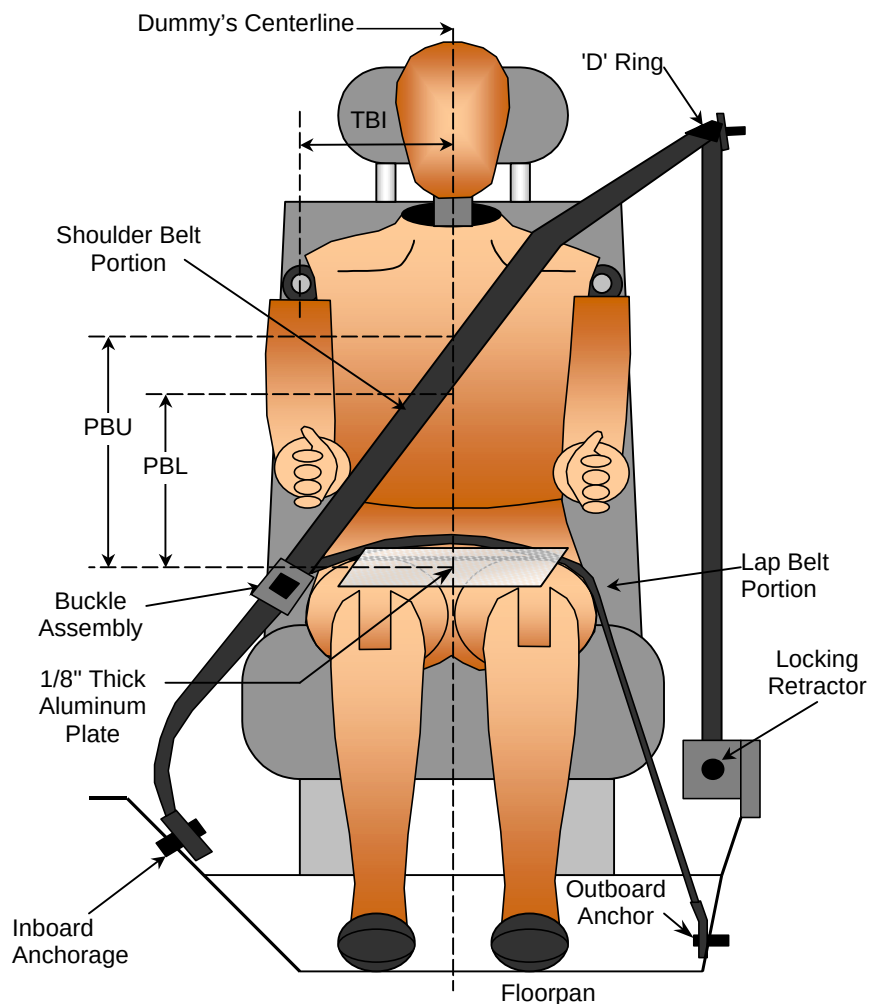
DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS

DATA SHEET NO. 6

SEATBELT POSITIONING DATA

Test Vehicle: 2002 Toyota Highlander 4WD SUV
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
 Test Date: 5/29/02



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
TBI - Dummy C/L to Lap/Shoulder Belt Intersect	mm	220	225
PBU - Top surface of reference to belt upper edge	mm	375	355
PBL - Top surface of reference to belt lower edge	mm	310	260
Lap Belt tension	Newton's	10	10
Shoulder Belt tension	N/A	Retractor	Retractor

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

Test Vehicle: 2002 Toyota Highlander 4WD SUV

NHTSA No.: M25107

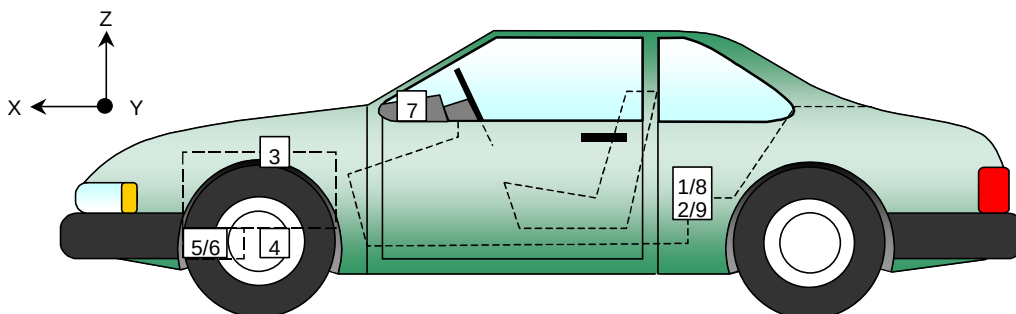
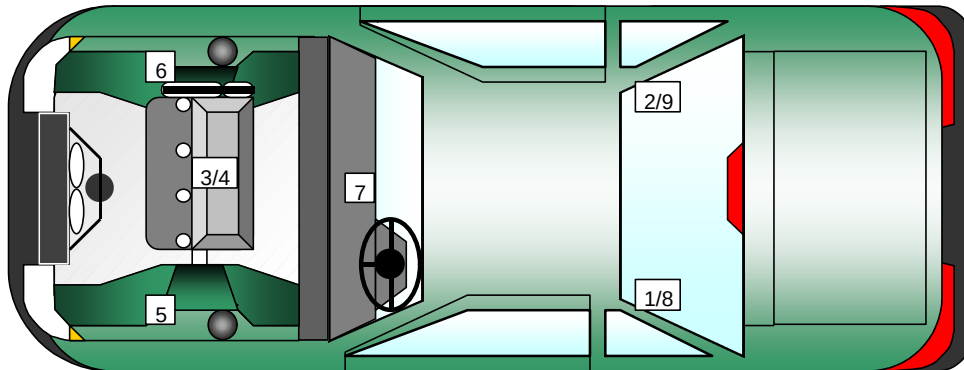
Test Program: 2002 NHTSA 35mph NCAP

Test Date: 5/29/02

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	1880	-720	460	G's	2.0	99.9	-55.8	42.0
2	Right Rear X-Member	1880	715	460	G's	2.0	101.8	-53.8	42.5
3	Engine Top	4020	-135	840	G's	29.2	42.5	-134.3	30.2
4	Engine Bottom	4050	270	215	G's	53.4	36.7	-119.5	27.9
5	Left Brake Caliper	3840	-750	270	G's	49.5	67.5	-127.1	41.1
6	Right Brake Caliper	3840	750	270	G's	52.2	34.6	-119.1	42.0
7	Instrument Panel	3100	0	1255	G's	18.5	79.3	-54.6	66.3
8	Left Rear X-Member (Z-Axis)	1850	-735	460	G's	10.4	8.5	-10.0	40.1
9	Right Rear X-Member (Z-Axis)	1850	735	460	G's	10.2	53.4	-11.3	24.8

Reference Planes: X=From Rear Surface of Vehicle, Y=Vehicle Centerline, Z=Ground Plane



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

Test Vehicle: 2002 Toyota Highlander 4WD SUV

NHTSA No.: M25107

Test Program: 2002 NHTSA 35mph NCAP

Test Date: 5/29/02

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	11.6	228.6	-65.2	78.8	4.8	238.3	-64.4	78.3
Head CG	Y	G's	11.7	90.2	-3.4	226.3	3.5	29.7	-8.2	74.8
Head CG	Z	G's	29.3	59.6	-18.3	94.6	28.9	59.9	-4.3	117.0
Head CG Resultant	N/A	G's	65.4	78.8			66.7	78.3		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	2.0	143.3	-47.3	60.0	2.6	150.2	-53.4	69.2
Chest CG	Y	G's	5.2	77.0	-3.2	34.4	3.0	79.2	-7.6	69.1
Chest CG	Z	G's	13.1	51.3	-19.1	99.6	12.6	58.0	-9.9	105.8
Chest CG Resultant	N/A	G's	48.7	60.0			54.1	69.2		

FEMUR PEAK FORCES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Femur	Z	Newtons	1415.2	48.7	-2277.4	54.3	739.1	37.2	-1884.7	55.4
Right Femur	Z	Newtons	1515.9	49.1	-3457.3	56.5	826.3	64.4	-3095.0	56.7

SEAT BELT SENSOR PEAK VALUES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Shoulder Belt Pullout	N/A	MM	194.1	88.4	-74.4	34.3	187.3	86.0	-57.3	31.3
Shoulder Belt Stretch	N/A	MM/CM	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
Lap Belt Force	N/A	Newtons	10605.1	57.9	-0.3	0.0	7110.4	54.4	-11.3	132.1
Shoulder Belt Force	N/A	Newtons	4807.1	69.1	-37.2	5.6	4942.5	69.0	-68.1	298.8

1.) Not used with pre-tensioner

PRIMARY HEAD INJURY CRITERIA (HIC)

Location	Driver				Passenger			
	HIC	T ¹	T ²	Avg G	HIC	T ¹	T ²	Avg G
Head CG Primary	581.1	58.8	94.7	48.2	466.8	58.0	93.9	44.2

PRIMARY CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Primary	47.9	58.9	61.9	49.7	68.6	71.6

DATA SHEET NO. 8...(continued)

Test Vehicle: 2002 Toyota Highlander 4WD SUV

NHTSA No.: M25107

Test Program: 2002 NHTSA 35mph NCAP

Test Date: 5/29/02

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Pelvis	X	G's	10.4	85.4	-75.8	55.7	7.8	114.7	-60.6	55.1
Pelvis	Y	G's	12.0	70.7	-5.8	57.5	6.9	45.6	-6.5	79.4
Pelvis	Z	G's	3.1	266.1	-30.1	61.4	4.0	34.5	-25.0	60.8
Pelvis Resultant	N/A	G's	79.0	55.7			63.5	55.1		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	Newtons	506.4	72.8	-547.7	134.2	196.3	241.9	-713.0	77.9
Neck Force	Y	Newtons	157.2	111.4	-157.2	84.0	116.6	292.2	-169.5	73.7
Neck Force	Z	Newtons	1552.7	66.2	-504.6	101.2	1201.4	59.3	-393.2	98.5
Neck Force Resultant	N/A	Newtons	1603.8	66.2			1266.5	78.2		
Neck Moment	X	N•m	12.4	119.3	-11.3	94.0	6.3	73.5	-8.4	164.5
Neck Moment	Y	N•m	44.5	128.6	-27.9	248.0	45.2	94.3	-67.2	77.9
Neck Moment	Z	N•m	6.5	138.5	-13.1	94.4	8.4	111.6	-5.1	170.6
Neck Moment Resultant	N/A	N•m	45.3	128.6			67.3	77.9		

FOOT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Foot Aft	X	G's	12.9	75.1	-25.3	56.6	31.3	76.1	-179.1	43.1
Left Foot Aft	Z	G's	5.1	124.8	-45.4	38.9	10.3	35.3	-70.5	46.5
Left Foot Fore	Z	G's	0.0	0.0	0.0	0.0	91.3	43.3	-184.8	32.5
Right Foot Aft	X	G's	48.6	56.8	-186.5	48.0	16.5	64.4	-135.1	41.4
Right Foot Aft	Z	G's	12.7	64.0	-114.6	48.2	14.2	65.7	-66.3	45.1
Right Foot Fore	Z	G's	21.6	59.6	-170.0	47.7	14.7	66.4	-84.8	44.1

1.) Driver side failed, no data

UPPER AND LOWER TIBIA PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Upper Moment	X	N•m	46.1	36.0	-20.0	279.2	44.9	67.2	-22.9	47.2
Left Upper Moment	Y	N•m	23.3	107.6	-103.4	59.3	64.5	42.4	-94.5	51.8
Right Upper Moment	X	N•m	60.0	54.0	-15.5	200.9	34.2	42.3	-17.3	78.5
Right Upper Moment	Y	N•m	23.1	99.9	-143.6	49.5	99.1	41.0	-63.9	36.1
Left Lower Moment	X	N•m	21.9	35.1	-44.6	81.3	10.0	52.5	-18.2	84.4
Left Lower Moment	Y	N•m	41.1	76.2	-33.6	54.9	30.4	54.1	-49.5	46.5
Left Lower Force	Z	Newtons	251.0	210.4	-1700.1	76.8	90.0	26.4	-2654.5	52.3
Right Lower Moment	X	N•m	26.6	53.3	-81.6	56.7	19.5	41.9	-32.2	52.2
Right Lower Moment	Y	N•m	82.7	55.3	-114.4	47.6	57.5	46.2	-26.3	35.0
Right Lower Force	Z	Newtons	169.8	166.1	-4220.4	56.2	154.8	25.6	-2943.5	45.6

DATA SHEET NO. 8...(continued)Test Vehicle: 2002 Toyota Highlander 4WD SUVNHTSA No.: M25107Test Program: 2002 NHTSA 35mph NCAPTest Date: 5/29/02**CHEST PEAK DISPLACEMENTS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	MM	0.2	2.9	-35.3	67.1	0.3	4.6	-30.4	63.4

HEAD REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	12.8	227.8	-65.3	79.7	4.9	241.3	-64.8	77.8
Head CG	Y	G's	10.1	91.3	-3.5	225.0	3.7	29.6	-7.8	73.2
Head CG	Z	G's	29.5	59.7	-17.9	93.2	28.3	59.1	-3.9	118.9
Head CG Resultant	N/A	G's	66.1	79.7			67.1	77.8		

CHEST REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	2.3	140.4	-47.6	60.3	2.7	150.3	-53.9	69.1
Chest CG	Y	G's	6.4	77.1	-3.2	34.6	3.5	78.8	-6.3	69.0
Chest CG	Z	G's	12.9	51.3	-18.1	100.1	12.3	60.9	-10.2	105.8
Chest CG Resultant	N/A	G's	49.0	60.3			54.4	69.1		

REDUNDANT HEAD INJURY CRITERIA (HIC)

Location	Driver				Passenger			
	HIC	T ¹	T ²	Avg G	HIC	T ¹	T ²	Avg G
Head CG Redundant	579.6	58.8	94.7	48.2	470.0	58.1	94.0	44.3

REDUNDANT CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Redundant	48.2	59.1	62.1	49.8	68.5	71.5

DATA SHEET NO. 9
SEATBELT ASSESSMENT TEST DATA

Test Vehicle: 2002 Toyota Highlander 4WD SUV
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
Test Date: 5/29/02

SEAT BELT PLACEMENT MEASUREMENTS

Measurement Description	Units	Driver	Passenger
TBI - Dummy C/L to Lap/Shoulder Belt Intersect	mm	220	225
PBU - Top surface of reference to belt upper edge	mm	375	355
PBL - Top surface of reference to belt lower edge	mm	310	260
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	745	745
Shoulder belt length as measured on ATD	mm	860	880
Lap belt length as measured on ATD	mm	905	910
Remainder of belt on reel	mm	620	825
Total belt length for continuous webbing systems	mm	3130	3360

SHOULDER BELT SPOOL-OFF DATA

Measurement Description	Units	Driver	Passenger
As determined mechanically	mm	162.0	148.0
As determined electronically	mm	194.1	187.3
As determined by photography	mm	unk.	unk.

BELT STRETCH DATA

Measurement Description	Units	Driver	Passenger
Electronically between shoulder belt load cell and "D" ring	mm/cm	*	*
Mechanically	mm/cm	None	None

*Not used with shoulder belt pre-tensioner systems.

DATA SHEET NO. 10
SUMMARY OF FMVSS 212 DATA

Test Vehicle: 2002 Toyota Highlander 4WD SUV
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
 Test Date: 5/29/02

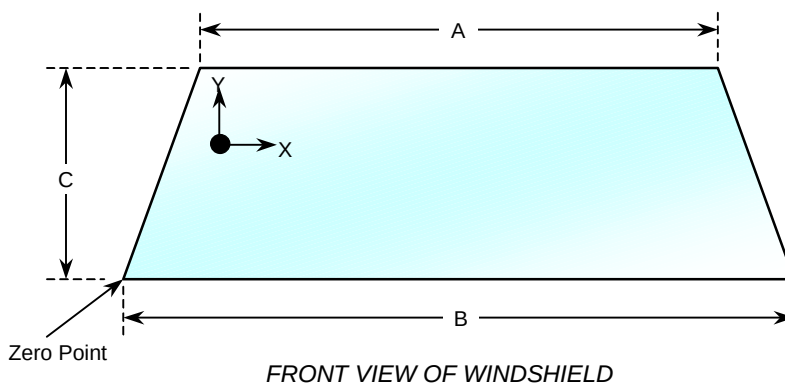
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with a rubber type adhesive. No molding covers the windshield periphery at any point.

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	2112	2112	100
Right Side	2112	2112	100
Total	4224	4224	100



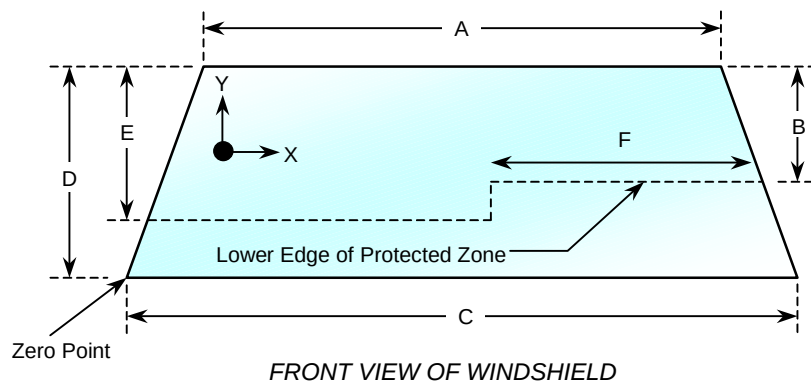
WINDSHIELD DIMENSIONS

Item	Units	Segment Length	Molding Width
A	mm	1214	14
B	mm	1510	10
C	mm	750	23

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

Test Vehicle: 2002 Toyota Highlander 4WD SUV
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
 Test Date: 5/29/02



**WINDSHIELD AND
PROTECTED ZONE**

Item	Units	Value
A	mm	1214
B	mm	481
C	mm	1510
D	mm	750
E	mm	457
F	mm	488

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 Toyota Highlander 4WD SUV
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
Test Date: 5/29/02

Test Time: 12:29 P.M.

Temperature at Time of Impact 31.1Deg. C

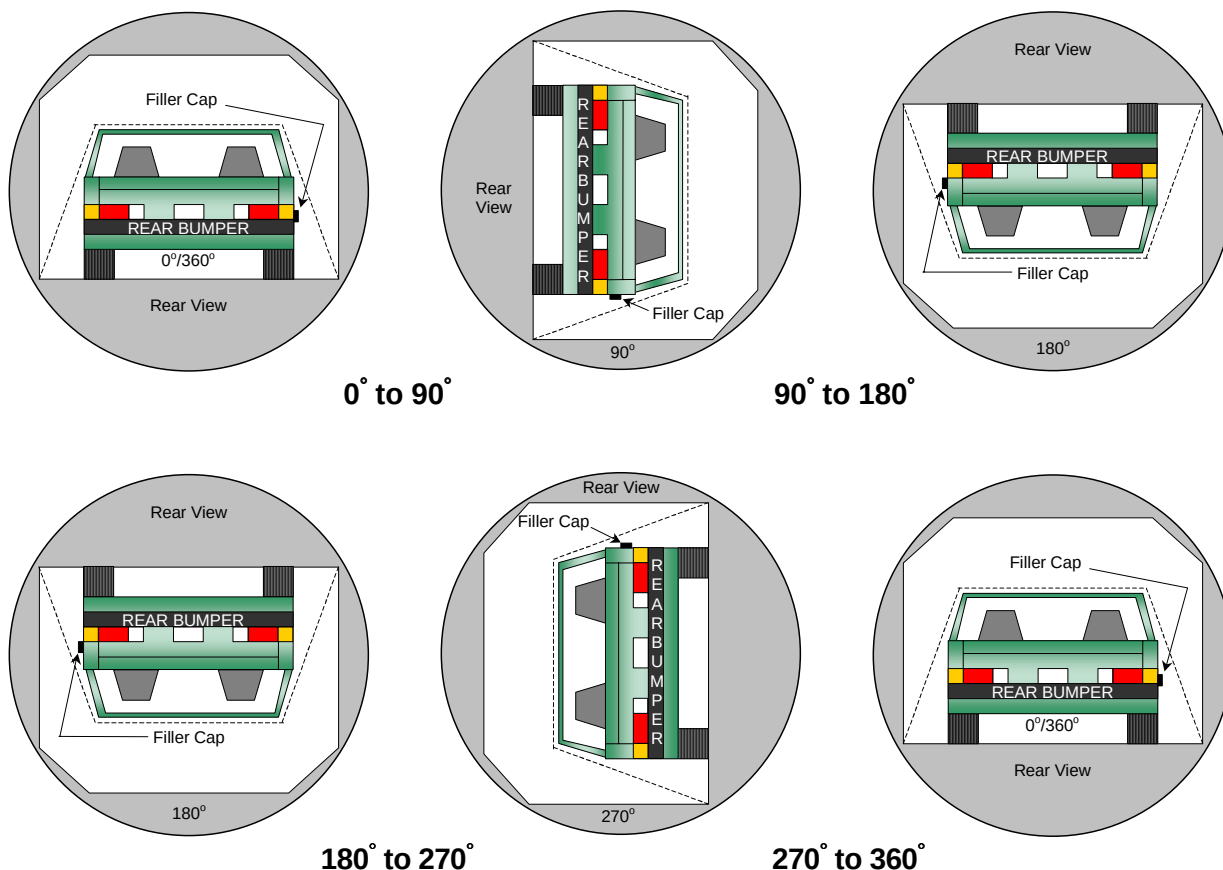
STODDARD SOLVENT SPILLAGE MEASUREMENTS

- 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

Test Vehicle: 2002 Toyota Highlander 4WD SUV
 Test Program: 2002 NHTSA 35mph NCAP (Rollover No. 1)

NHTSA No.: M25107
 Test Date: 5/29/02



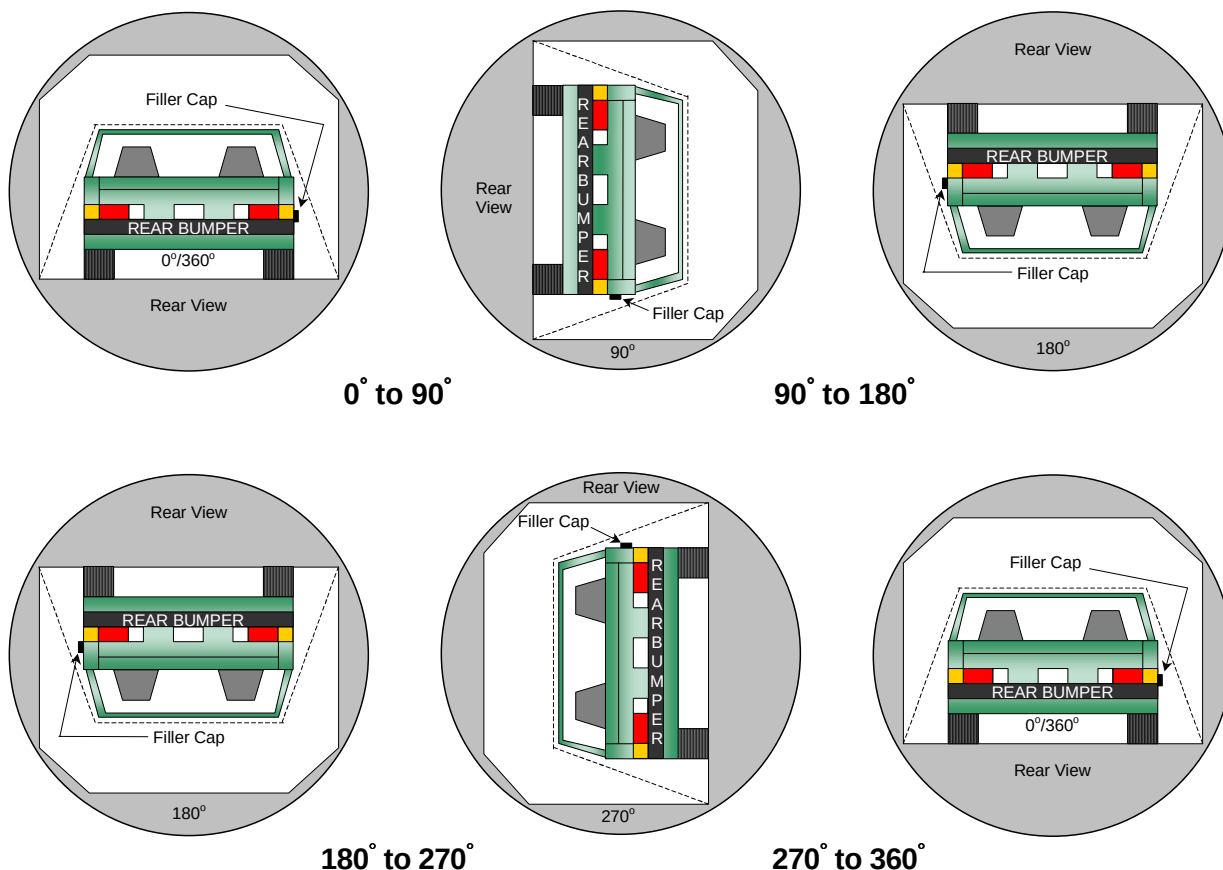
1. The specified fixture rollover rate for each 90° of rotation is 60 to 120 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Solvent leakage occurred during the rollover at 180° to 270°. During the roll, 3.25 ounces of solvent were collected. The leak appeared to stop during the 5 minute hold time at 270°. It was also realized that the leak was located at the top of the fuel tank. A second roll over was performed to confirm that the Toyota Highlander was a failure for the FMVSS 301 (Fuel System Integrity) portion of the NHTSA frontal NCAP test. (See notes in Section 1 of report)

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° to 90°	83	300	0.00
90° to 180°	79	300	0.00
180° to 270°	80	300	3.25
270° to 360°	79	300	0.00

DATA SHEET NO. 13 FMVSS 301 STATIC ROLLOVER DATA... (CONTINUED)

Test Vehicle: 2002 Toyota Highlander 4WD SUV
 Test Program: 2002 NHTSA 35mph NCAP (Rollover No. 2)

NHTSA No.: M25107
 Test Date: 5/29/02



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. Solvent leakage occurred again during the rollover at 180°. During the roll, 6.74 ounces of solvent were collected during the first 5 minutes. This confirmed that the vehicle had already exceeded the limits of FMVSS 301 for fuel leakage and there was no evidence that the leak was going to stop. The vehicle was rotated to 270°, during rotation an additional 4.0 ounces of solvent were collected. The leak appeared to stop once the vehicle was in the 270° position. (See notes in Section 1 of report)

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° to 90°	82	300	0.00
90° to 180°	80	300	0.00
180° to 270°	81	300	10.74
270° to 360°	80	300	0.00

DATA SHEET NO. 14
VEHICLE MEASUREMENTS

Test Vehicle: 2002 Toyota Highlander 4WD SUV
Test Program: 2002 NHTSA 35mph NCAP

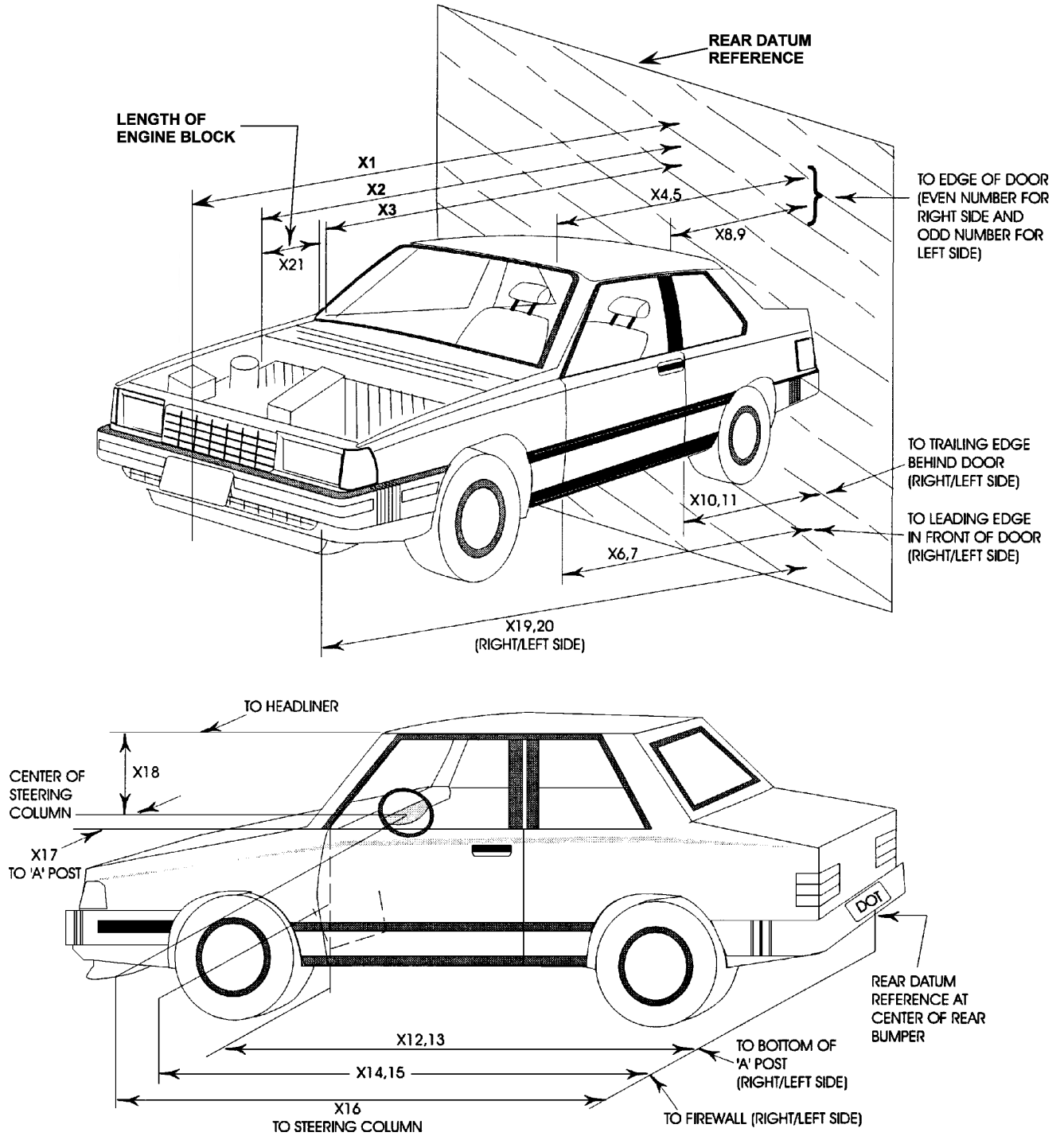
NHTSA No.: M25107
Test Date: 5/29/02

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	4685	4167	-518
2	RSOV to front of engine	mm	4175	3952	-223
3	RSOV to firewall centerline	mm	3635	3521	-114
4	RSOV to leading edge of right door	mm	3213	3220	7
5	RSOV to leading edge of left door	mm	3217	3220	3
6	RSOV to lower leading edge of right door	mm	3182	3172	-10
7	RSOV to lower leading edge of left door	mm	3186	3180	-6
8	RSOV to upper trailing edge of right door	mm	2199	2209	10
9	RSOV to upper trailing edge of left door	mm	2204	2209	5
10	RSOV to lower trailing edge of right door	mm	2186	2182	-4
11	RSOV to lower trailing edge of left door	mm	2190	2176	-14
12	RSOV to bottom of right 'A' pillar	mm	3204	3205	1
13	RSOV to bottom of left 'A' pillar	mm	3205	3209	4
14	RSOV to firewall on right side	mm	3556	3509	-47
15	RSOV to firewall of left side	mm	3555	3568	13
16	RSOV to steering column	mm	2869	2820	-49
17	Center of steering column to left 'A' pillar	mm	414	392	-22
18	Center of steering column to headlining	mm	445	460	15
19	RSOV to right side of front bumper	mm	4540	4164	-376
20	RSOV to left side of front bumper	mm	4540	4123	-417
21	Length of engine block	mm	370	370	0
RD	RSOV to right side of dash panel	mm	2979	2964	-15
CD	RSOV to center of dash panel	mm	3031	3044	13
LD	RSOV to left side of dash panel	mm	2980	2976	-4

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

Test Vehicle: 2002 Toyota Highlander 4WD SUV
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
 Test Date: 5/29/02



DATA SHEET NO. 15
CAMERA LOCATIONS

Test Vehicle: 2002 Toyota Highlander 4WD SUV
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
Test Date: 5/29/02

No.	Camera View	Location (mm)			Angle (Deg.)	Film Plane to Head	Lens (mm)	Speed (fps)
		X	Y	Z				
1	Right Side, Real Time	3454	10973	1245	0	1651	Zoom	24
2	Left Side, No. 1	2000	-8250	1270	0	7878	13	1040
3	Left Side, No. 2	1060	-6370	1630	-1	6130	25	1010
4	Left Side, No. 3	6500	-10580	4640	-16	11488	65	990
5	Left Side, No. 4	1460	-8250	3340	-17	8158	19	1000
6	Left Side, No. 5	1460	-8250	2970	-16	8077	19	900
7	Right Side, No. 1	240	8150	1590	-2	7773	19	N/A
8	Right Side, No. 2	1000	7180	1590	0	6934	35	Failed
9	Right Side, No. 3	7860	8900	2800	-9	10251	80	960
10	Right Side, No. 4	2750	9600	1520	0	9230	50	1030
11	Overhead Overall	250	0	4460	-86	N/A	13	1070
12	Front View, Driver	2970	-380	1330	-36	N/A	12	870
13	Front View, Passenger	2970	380	1330	-37	N/A	13	1030
14	Pit Camera, Engine	650	0	-1360	-90	N/A	10	N/A
15	Pit Camera, Fuel Tank	3760	0	-1820	-55	N/A	10	1150
16	Driver Belt	3230	-290	1380	-5	N/A	13	900
17	Passenger Belt	3230	200	1380	-5	N/A	13	Failed
18	Left Side Extra	N/A	N/A	N/A	N/A	N/A	N/A	N/A

X - Barrier Face Y - Monorail Centerline Z - Ground

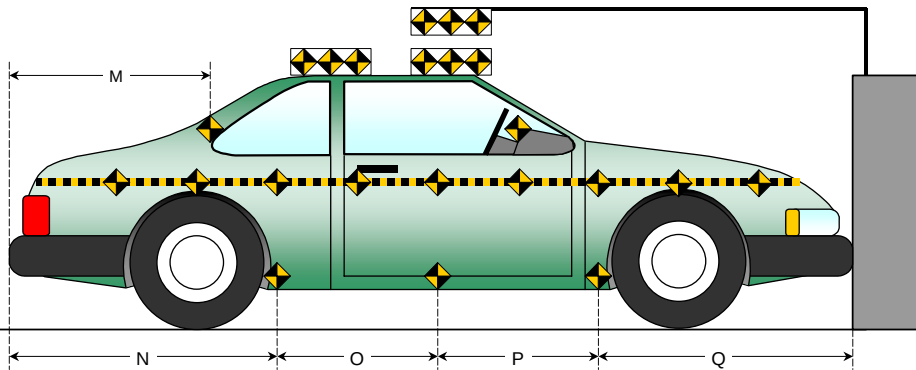
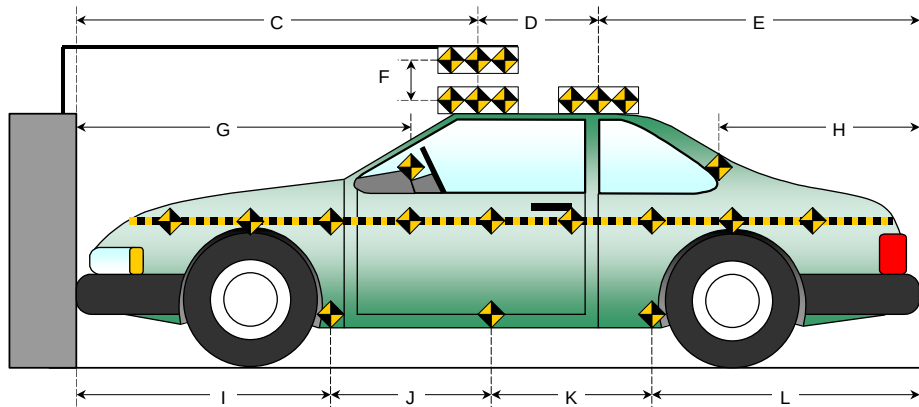
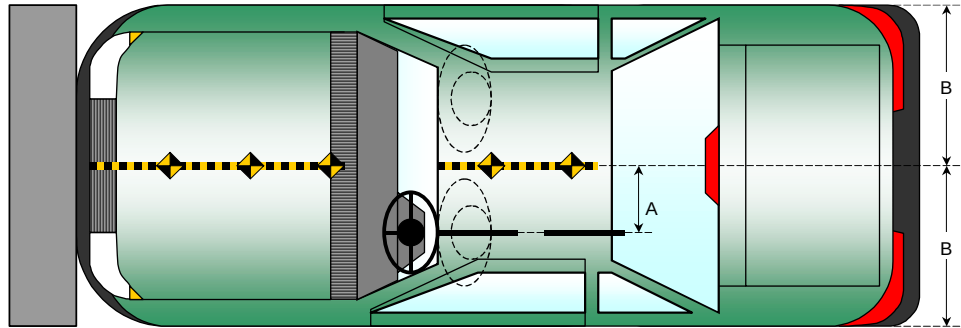
DATA SHEET NO. 16
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2002 Toyota Highlander 4WD SUV
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
 Test Date: 5/29/02

All Dimensions
 in mm

Item	Value
A	373
B	915
C	2107
D	608
E	1968
F	155
G	1680
H	1254
I	1534
J	823
K	823
L	1531
M	1253
N	1531
O	830
P	830
Q	1514



DATA SHEET NO. 17
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2002 Toyota Highlander 4WD SUV
Test Program: 2002 NHTSA 35mph NCAP

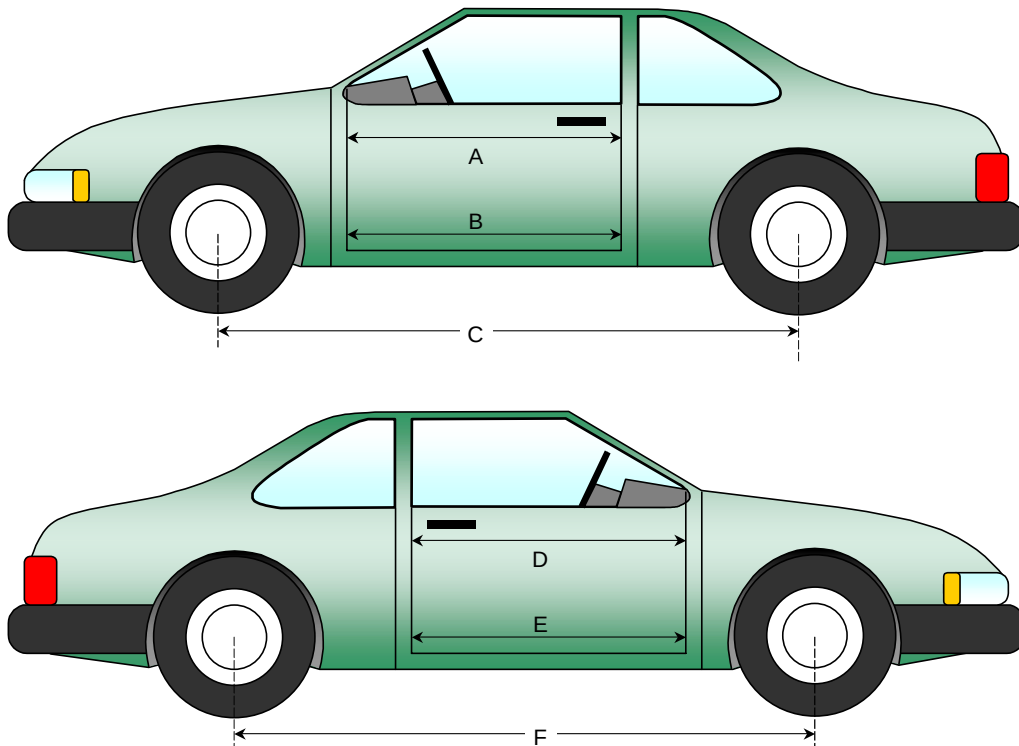
NHTSA No.: M25107
Test Date: 5/29/02

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	933	931	-2
B	Left Side Lower	mm	846	844	-2
D	Right Side Upper	mm	933	932	-1
E	Right Side Lower	mm	846	844	-2

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheel base	mm	2718	2668	-50
F	Right Side Wheel base	mm	2718	2656	-62



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

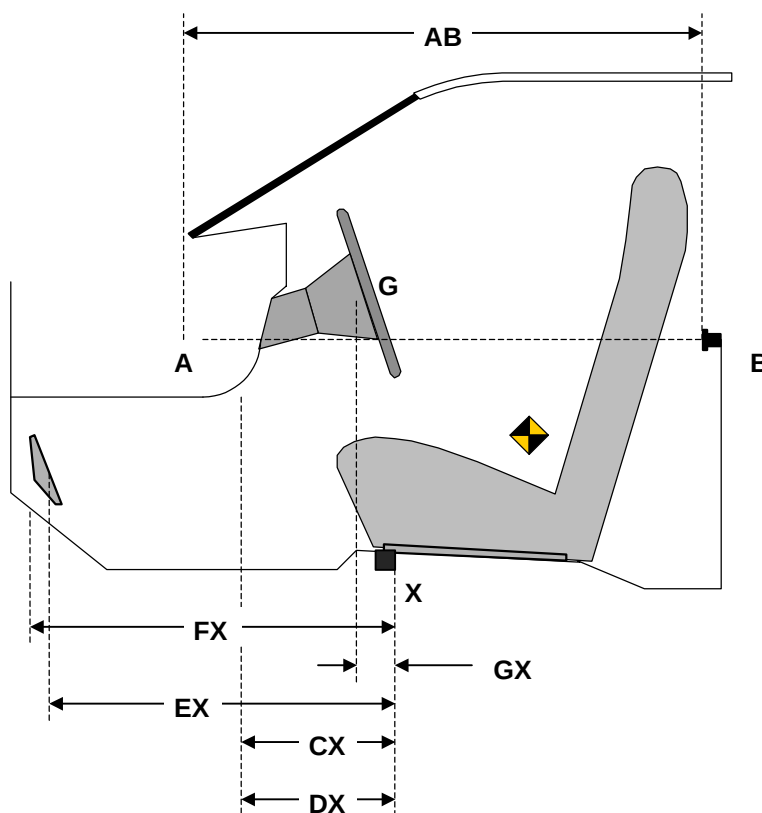
Test Vehicle: 2002 Toyota Highlander 4WD SUV
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
 Test Date: 5/29/02

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	933	931	-2
CX	Left Knee Bolster to X	mm	302	273	-29
DX	Right Knee Bolster to X	mm	306	284	-22
EX	Brake Pedal to X	mm	576	600	24
FX	Foot Rest to X	mm	587	550	-37
GX	Center of Steering Wheel Hub to X	mm	96	102	6

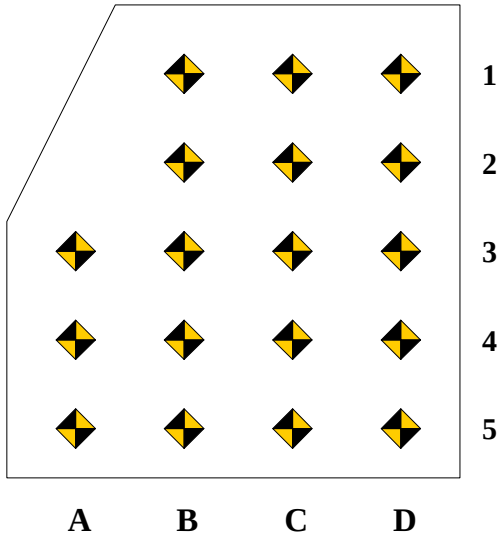
X = Left Front Seat Outboard Anchor Bolt Head



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

Test Vehicle: 2002 Toyota Highlander 4WD SUV
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
 Test Date: 5/29/02



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		576	668	673		670	678	683		94	10	10
2		486	583	578		592	592	591		106	9	13
3	491	383	483	478	482	488	492	491	-9	105	9	13
4	396	388	383	378	382	390	390	386	-14	2	7	8
5	293	283	283	278	282	285	287	286	-11	2	4	8

DRIVER FLOOR PAN Z-AXIS

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1		-20	-10	-31		0	0	-5		20	10	26
2		-70	-60	-85		-58	-45	-55		12	15	30
3	-84	-83	-65	-73	-68	-65	-42	-69	16	18	23	4
4	-75	-77	-60	-71	-75	-70	-56	-69	0	7	4	2
5	-85	-88	-55	-55	-88	-78	-58	-60	-3	10	-3	-5

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

Test Vehicle: 2002 Toyota Highlander 4WD SUV
 Test Program: 2002 NHTSA 35mph NCAP

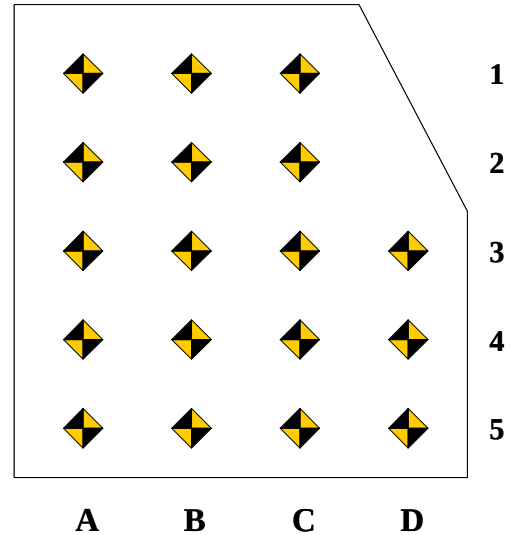
NHTSA No.: M25107
 Test Date: 5/29/02

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	681	777	754		680	677	672		-1	-100	-82	
2	676	677	676		600	602	600		-76	-75	-76	
3	576	578	578	579	500	507	503	505	-76	-71	-75	-74
4	473	474	475	477	397	401	400	403	-76	-73	-75	-74
5	373	373	375	379	300	302	300	301	-73	-71	-75	-78

PASSENGER FLOOR PAN Z-AXIS

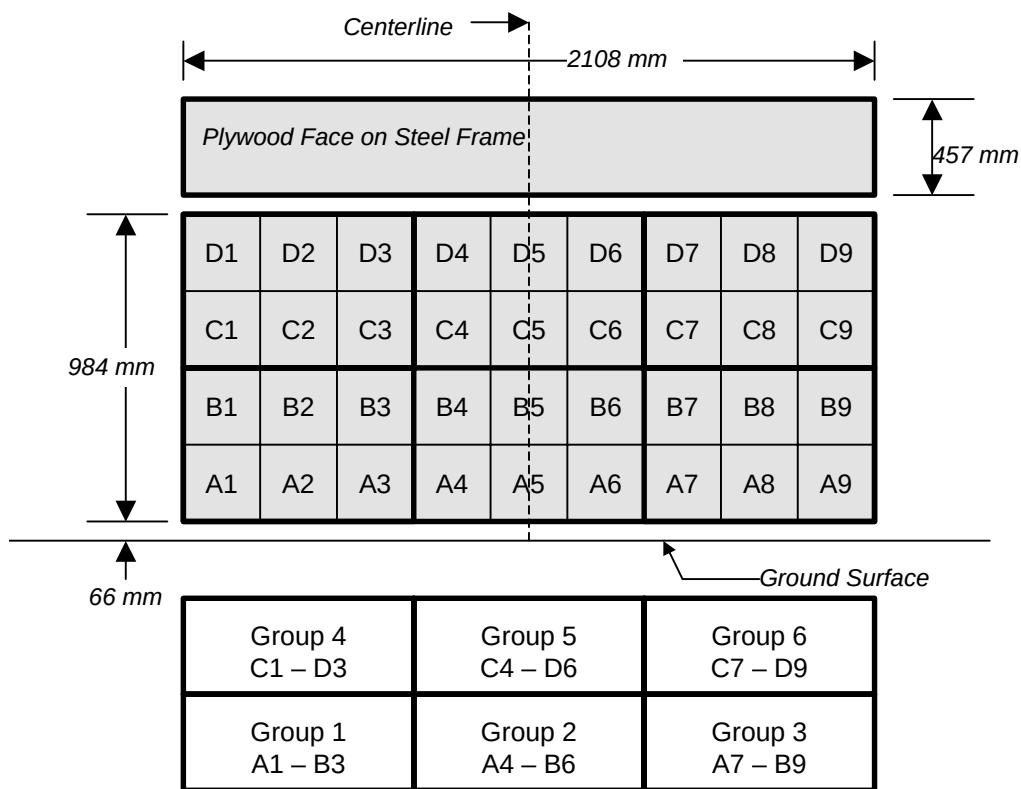
	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	-27	-6	1		-25	-11	7		2	-5	6	
2	-81	-76	-55		-82	-78	-59		-1	-2	-4	
3	-91	-73	-68	-67	-90	-82	-65	-80	1	-9	3	-13
4	-88	-65	-58	-78	-82	-83	-66	-76	6	-18	-8	2
5	-83	-66	-56	-72	-82	-70	-62	-75	1	-4	-6	-3

DATA SHEET NO. 18
FIXED BARRIER LOAD CELL LOCATIONS

Test Vehicle: 2002 Toyota Highlander 4WD SUV
 Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
 Test Date: 5/29/02

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 Toyota Highlander 4WD SUV
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
Test Date: 5/29/02

VEHICLE INFORMATION

VIN: JTEHF21A020075171
Vehicle Size Category: 4-Door SUV

Wheel base (mm): 2718
Test Weight (kg): 2021

ACCELEROMETER DATA

Accelerometer Location: Left rear floor pan

Cal. Procedure/Interval: 6 months / drop test

Integration Algorithm: NHTSA Standard

Linearity: Good

Impact Velocity (km/h): 55.82

Velocity Change (km/h): 62.1

Time of Separation (msec): 66.8

CRUSH PROFILE

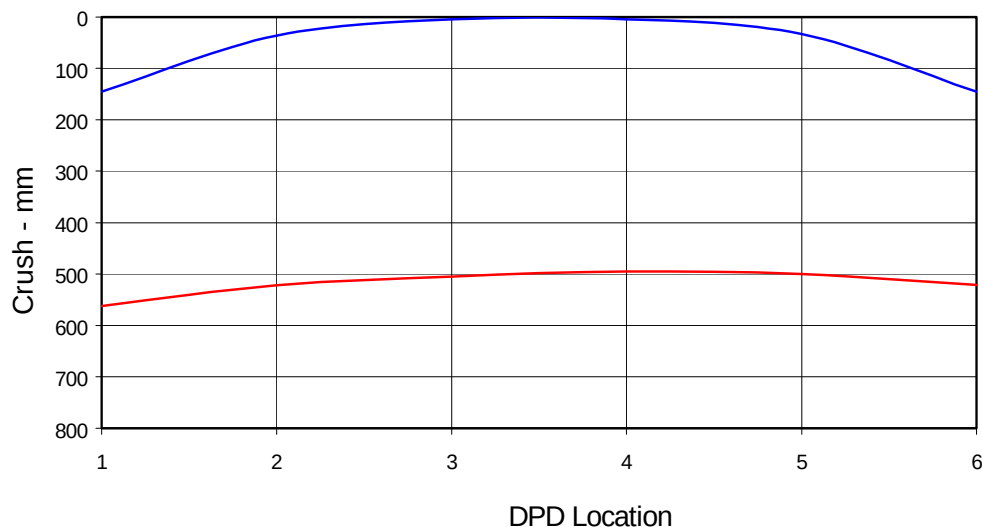
Collision Deformation Classification: 12FDEW6

Midpoint of Damage: Vehicle Centerline

Damage Region Length (mm): 1436

Impact Mode: Full Frontal

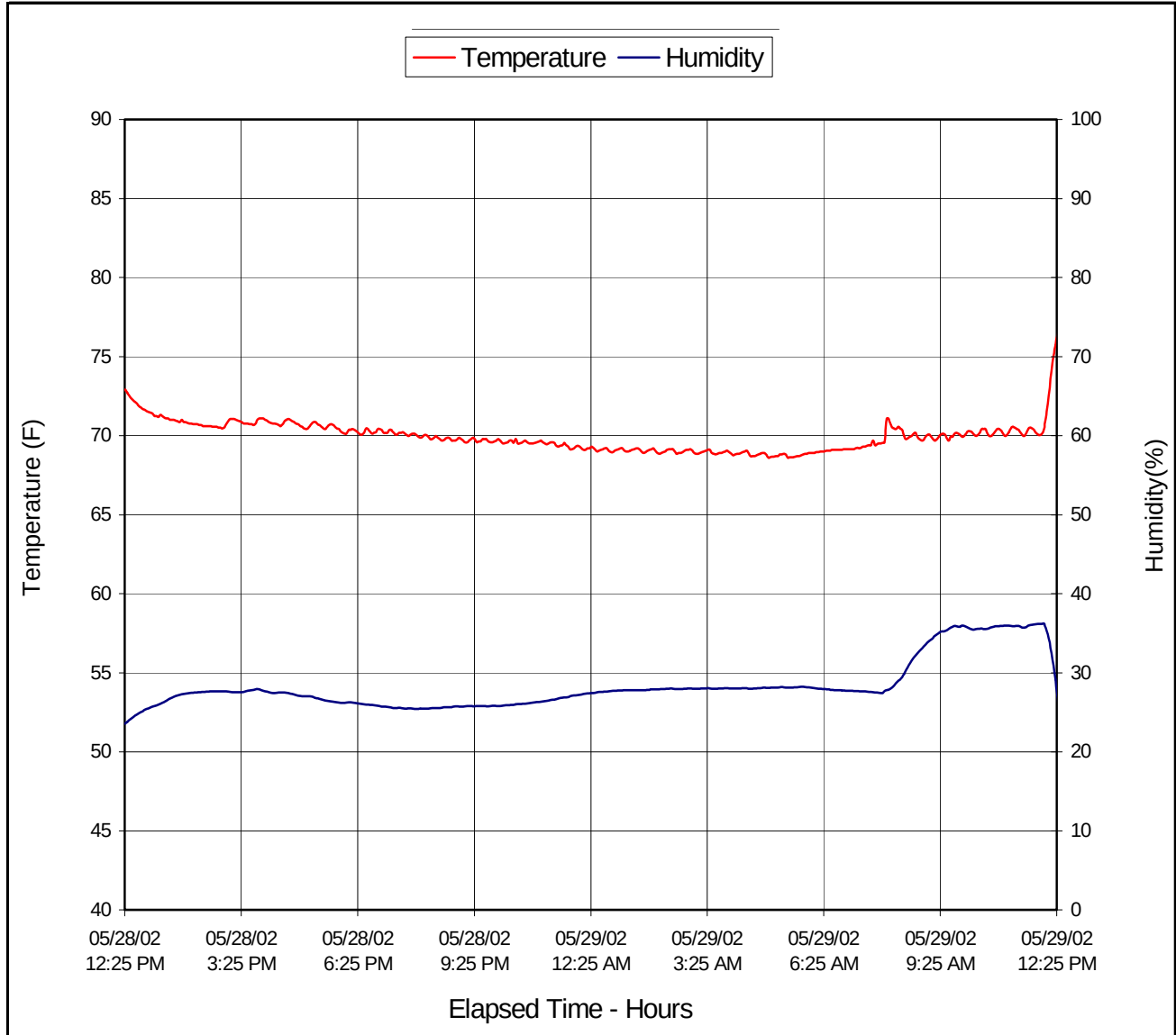
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	145	562	-417
C2	Crush zone 2 on left side	mm	36	522	-486
C3	Crush zone 3 on left side	mm	5	505	-500
C4	Crush zone 4 on right side	mm	4	495	-491
C5	Crush zone 5 on right side	mm	33	500	-467
C6	Crush zone 6 at right side	mm	145	521	-376



DATA SHEET NO. 20
DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2002 Toyota Highlander 4WD SUV
Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107
Test Date: 5/29/02



APPENDIX A

PHOTOGRAPHS

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Figure A-1: Right Front, as Received



Figure A-2: Left Rear, as Received

*

MFD. BY: TOYOTA MOTOR CORPORATION

DATE 04/02

GVWR: 2260KG (4985LB)

GAWR: FRT. 1300KG (2865LB) WITH P225/70R16 TIRES.

16X6 1/2JJ RIMS. AT 210KPA (30PSI) COLD.

RR. 1240KG (2735LB) WITH P225/70R16 TIRES.

16X6 1/2JJ RIMS. AT 210KPA (30PSI) COLD.

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

JTEHF21A020075171

MPV

MCU25L-BWPNKA

C/TR 3N8/FG04

A/TM -03A/

U140F

MADE IN JAPAN

NO. 975



*

Figure A-3: Vehicle Certification Label

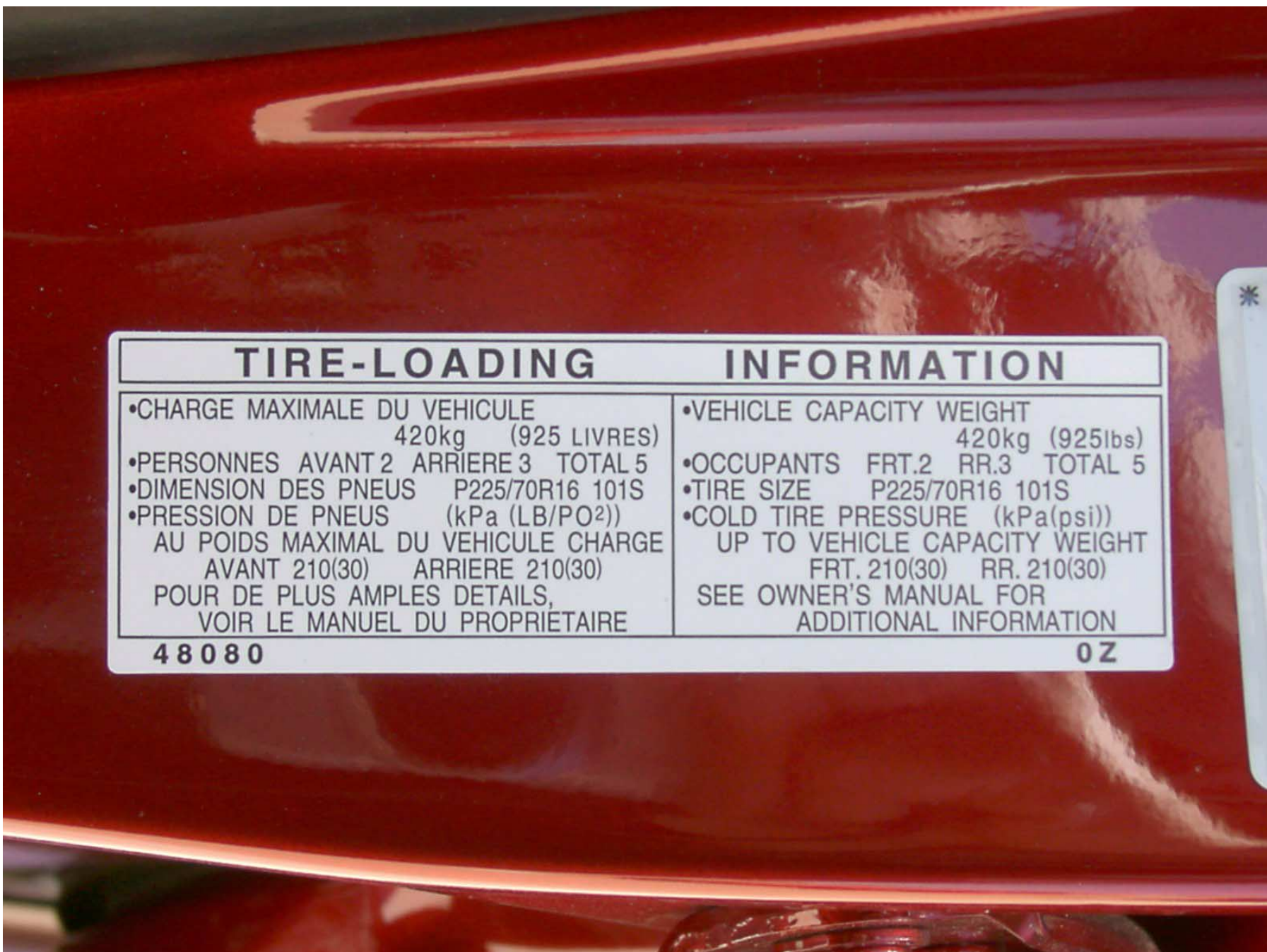


Figure A-4: Vehicle Tire Label



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

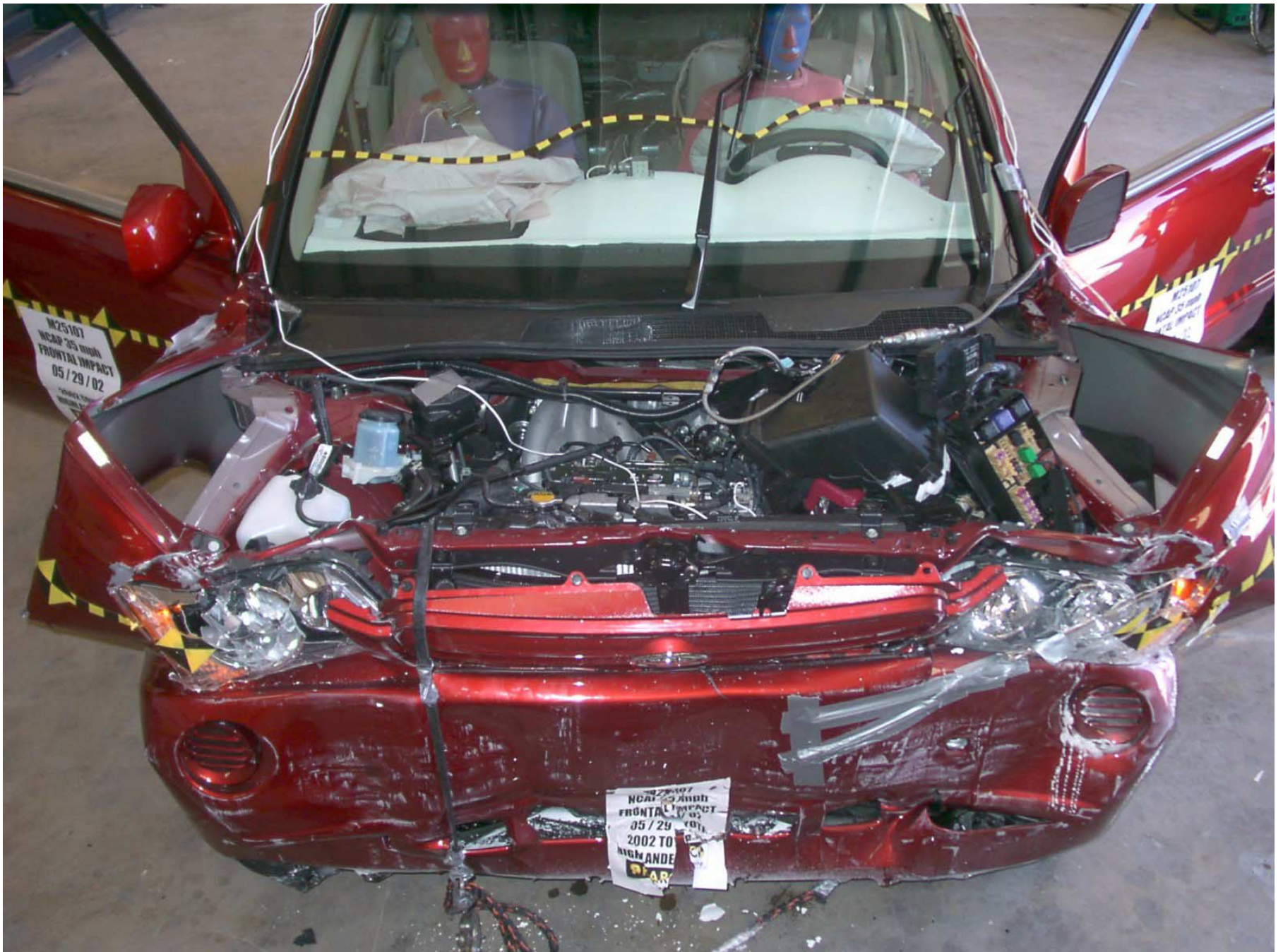


Figure A-18: Engine Compartment, Post-Test



Figure A-19: Fuel Cap, Pre-test



Figure A-20: Fuel Cap, Post-Test

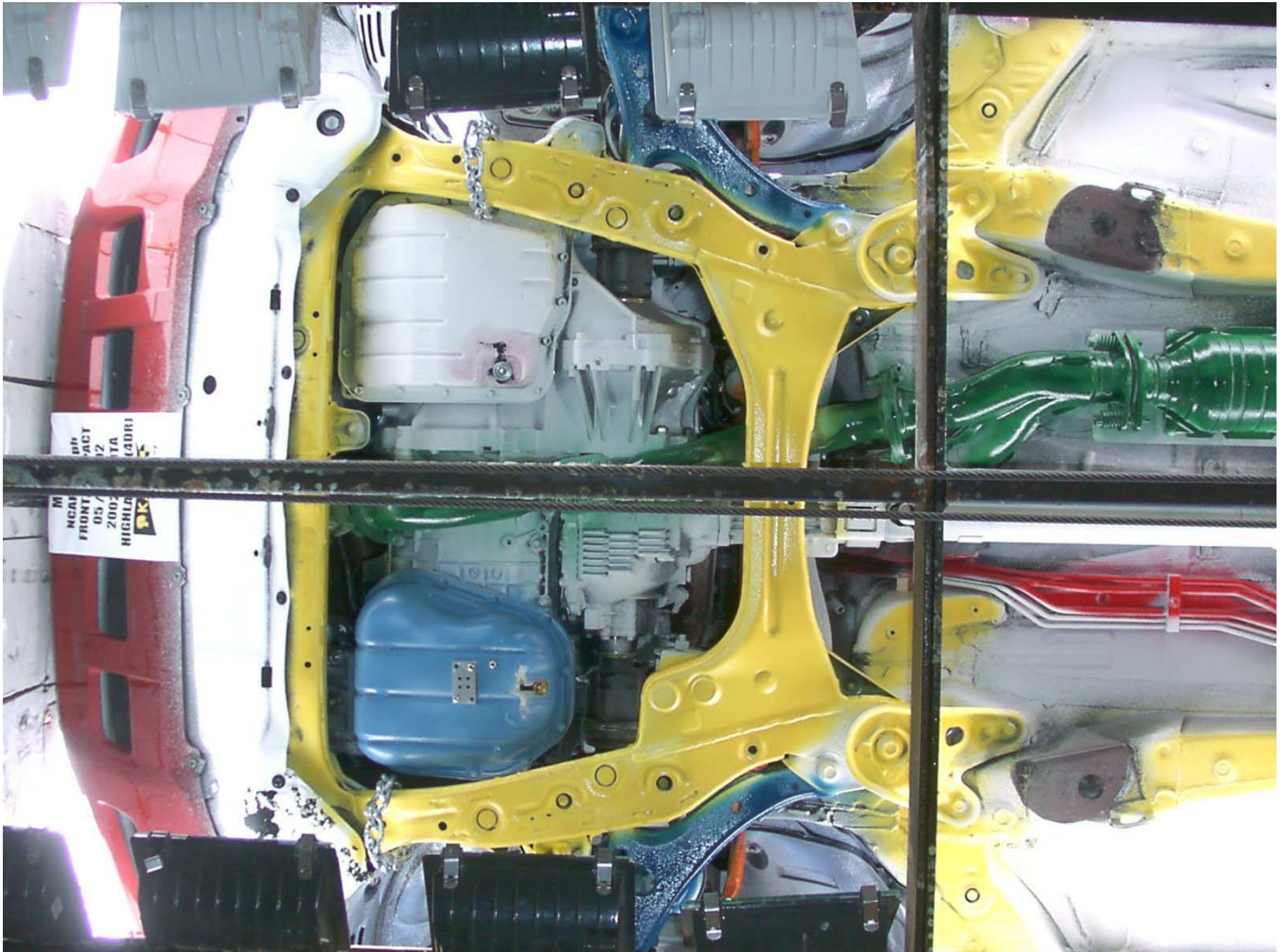


Figure A-21: Front Underside, Pre-Test

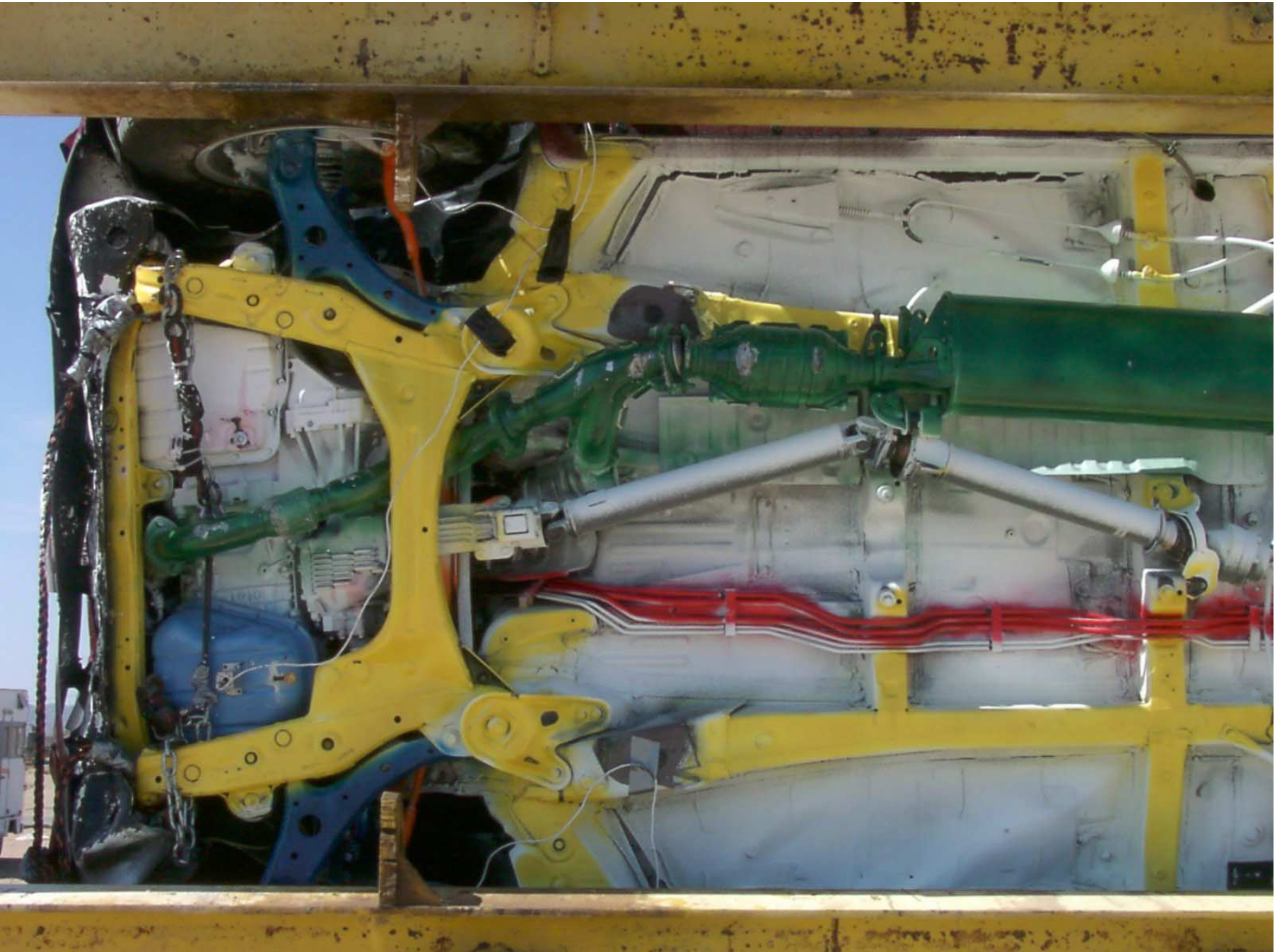


Figure A-22: Front Underside, Post-Test

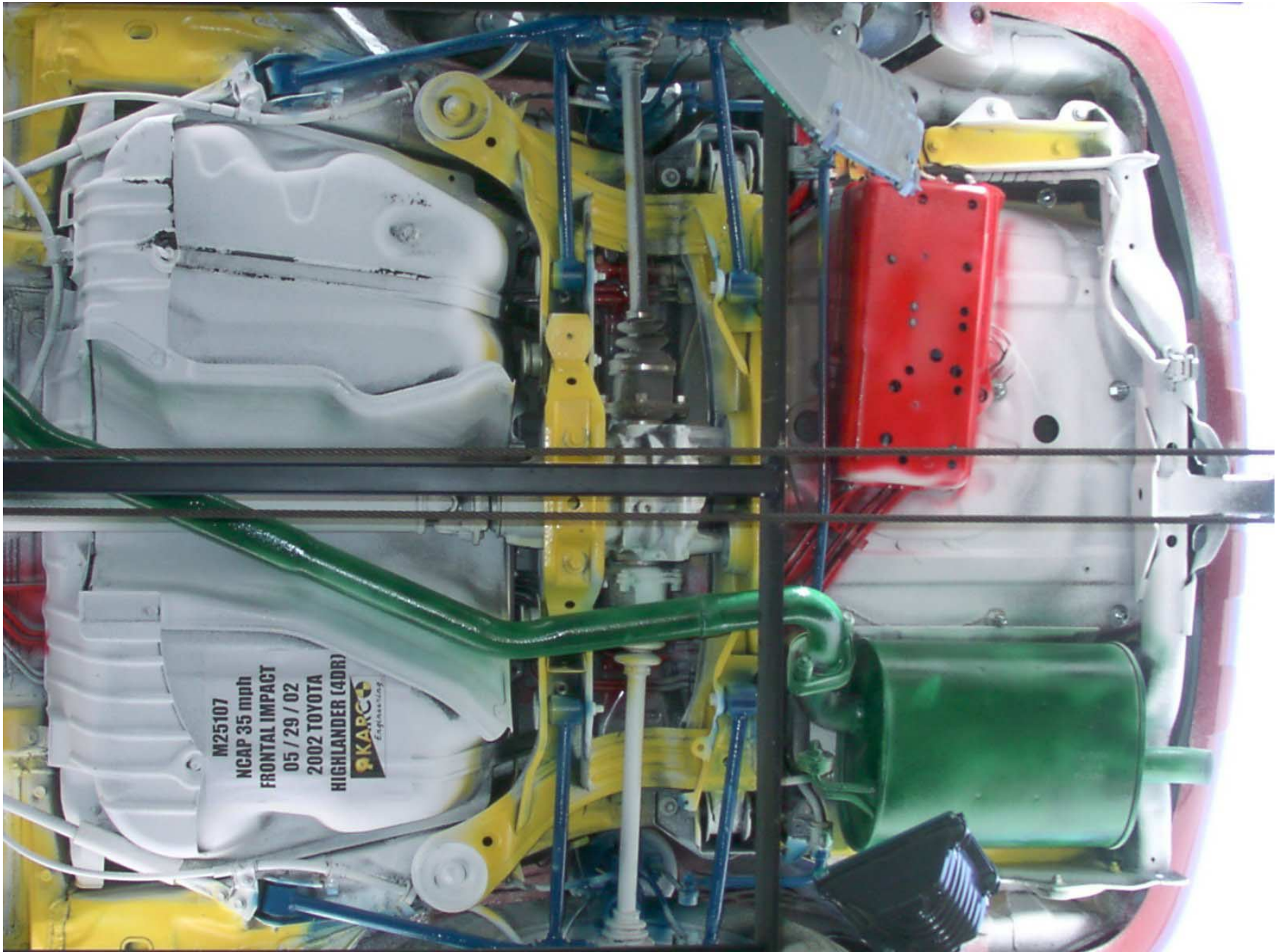


Figure A-23: Rear Underside, Pre-Test

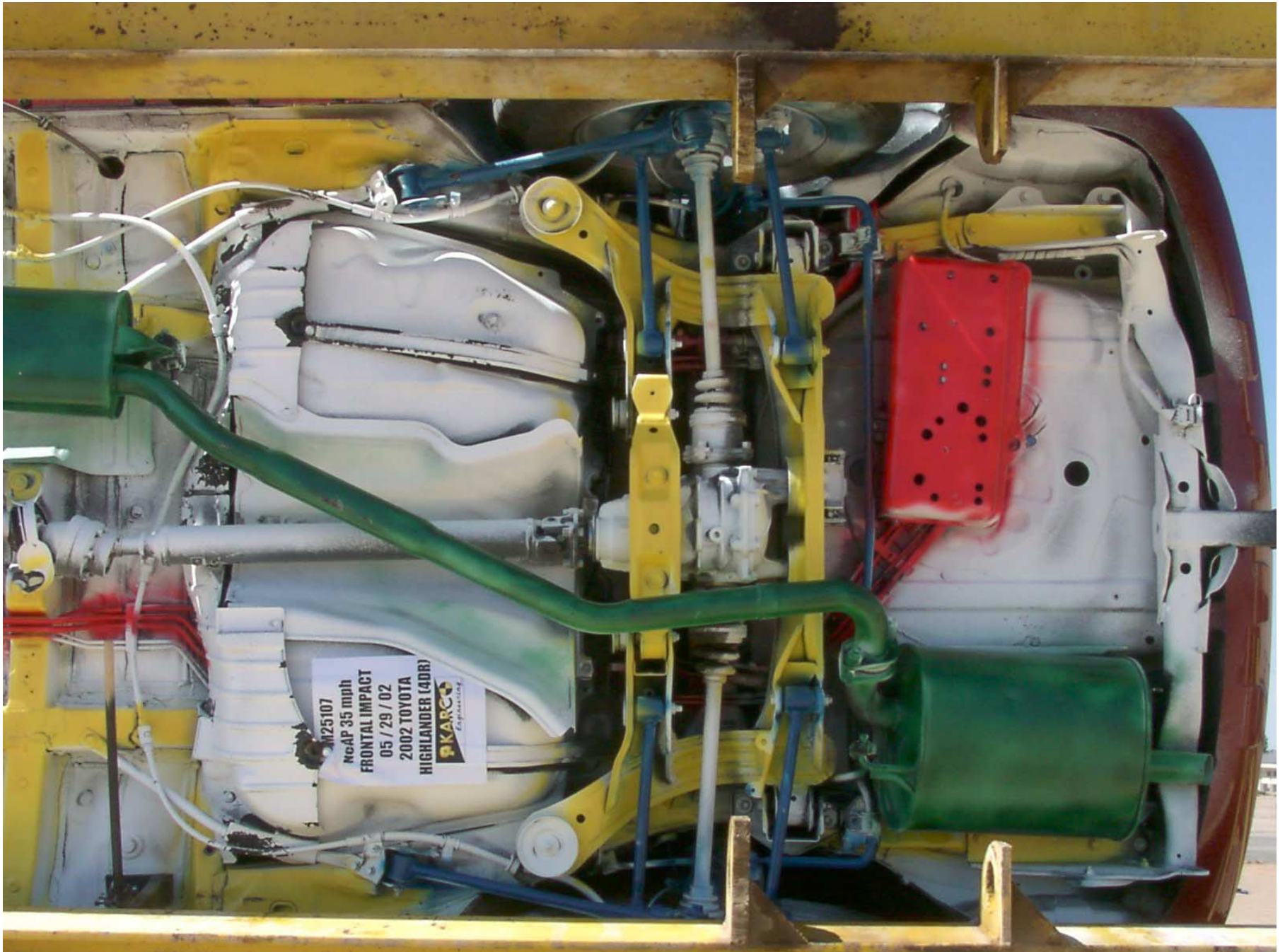


Figure A-24: Rear Underside, Post-Test



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



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

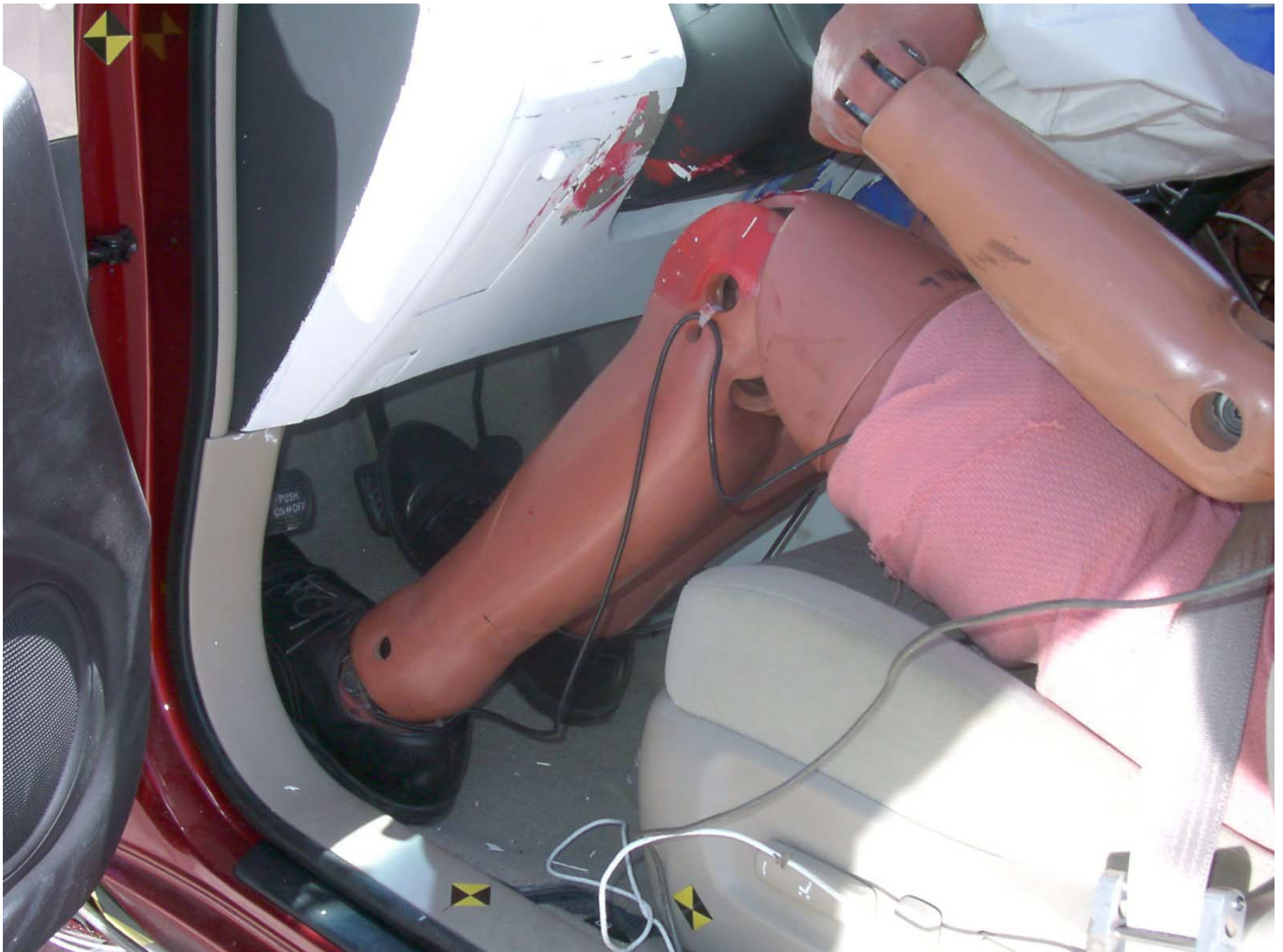


Figure A-34: Driver Dummy Feet and Knee Contact, Post-Test



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

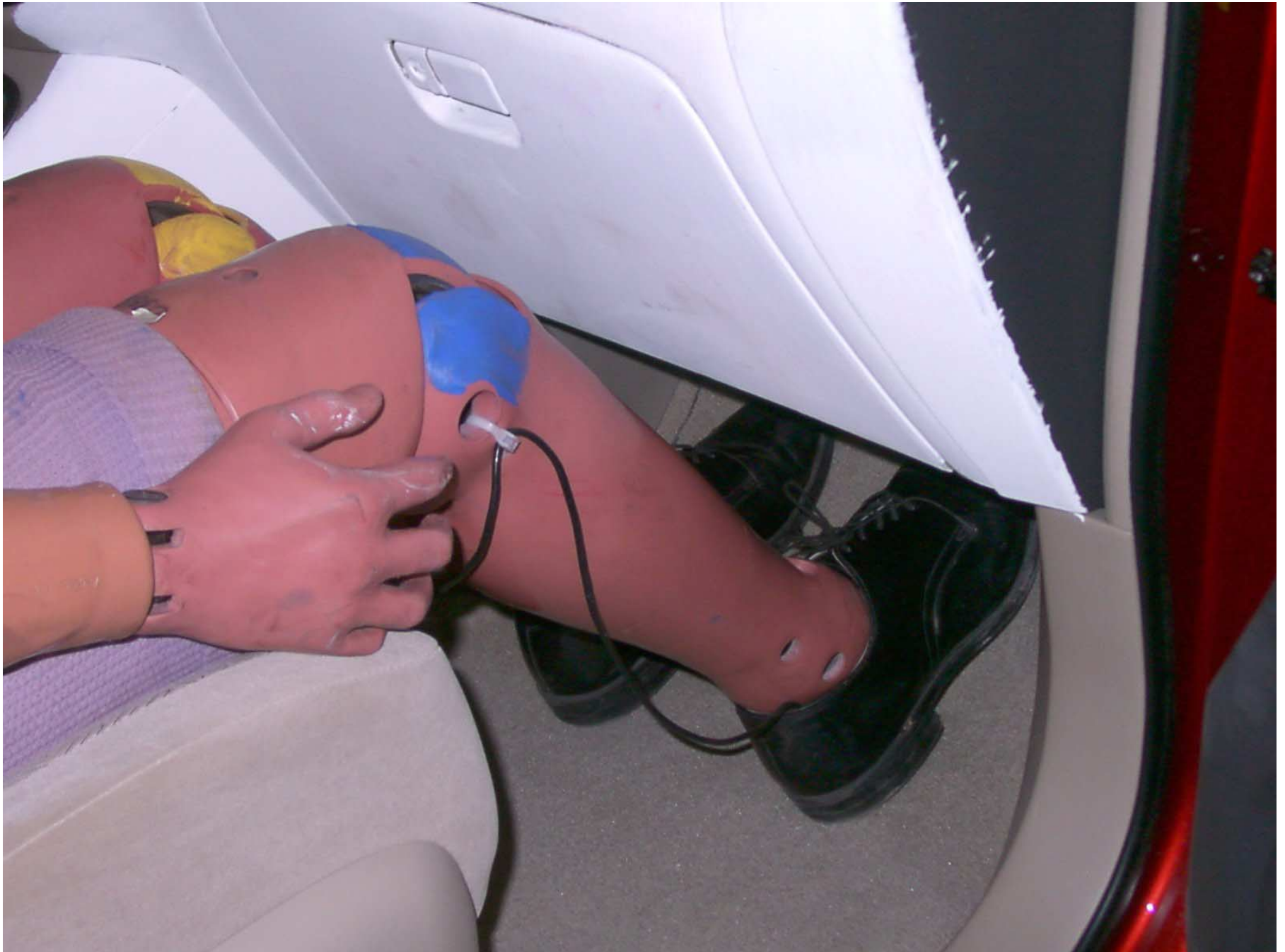


Figure A-49: Passenger Dummy Feet, Pre-Test



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: ³/₄ Left Rear View of Doors Closed After Impact



Figure A-58: ³/₄Right Rear View of Doors Closed After Impact



Figure A-59: Vehicle on Rollover Device

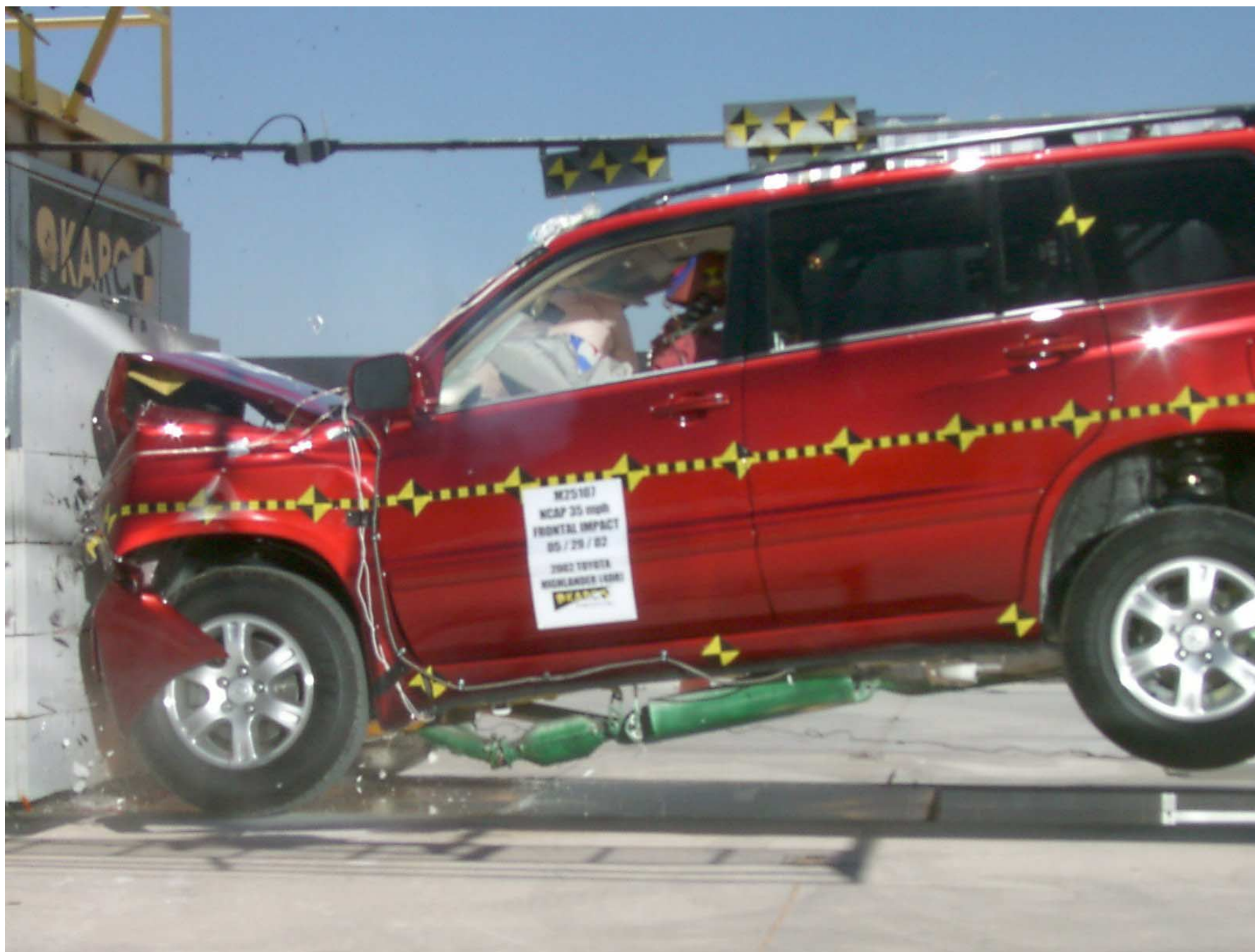


Figure A-60: Vehicle During Impact



Figure A-61: Damage to Fuel System, Post-test

APPENDIX B

DATA PLOTS

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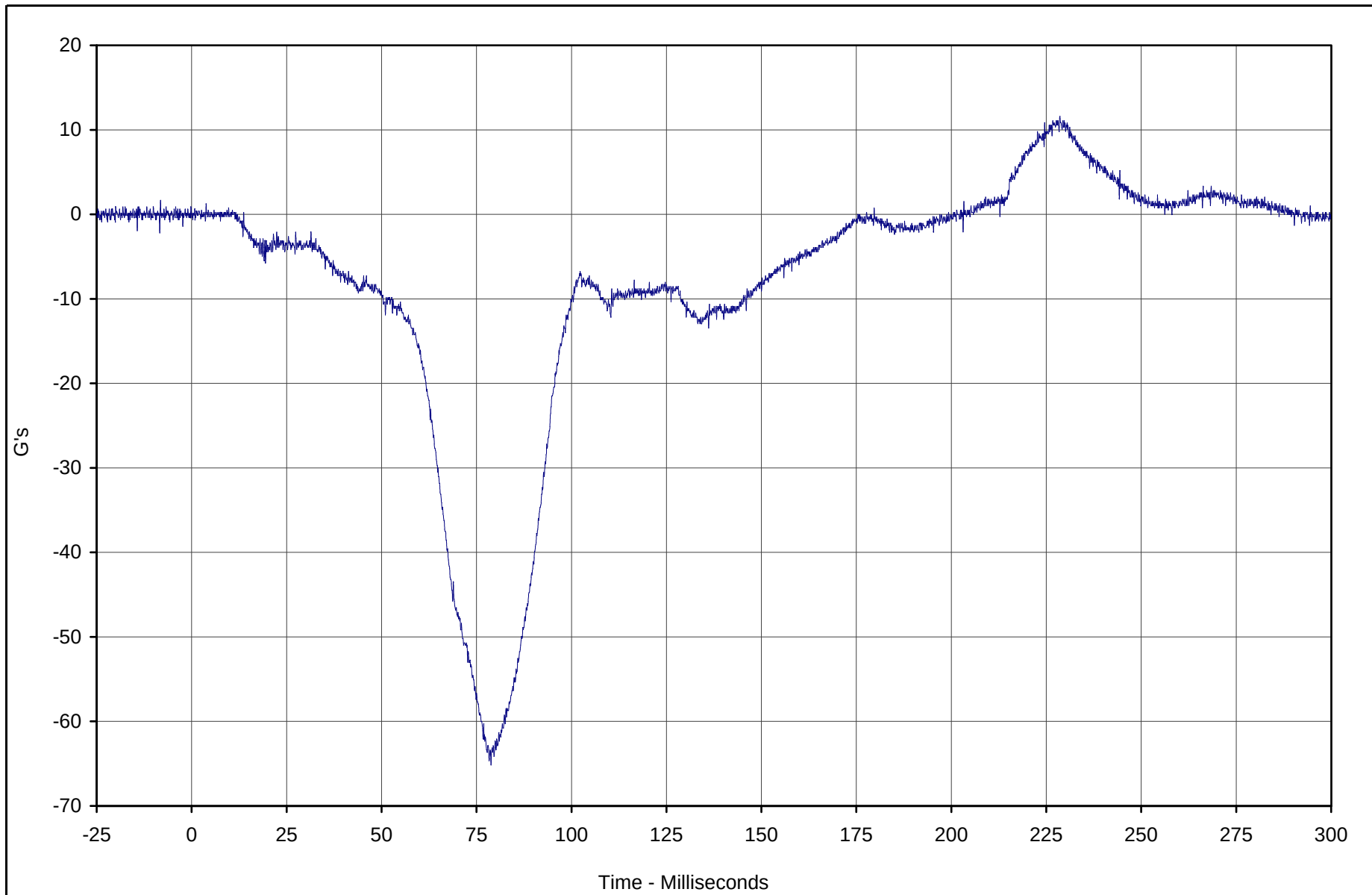
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Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Primary X	001	FIL	G's	11.6	228.6	-65.2	78.8	1000

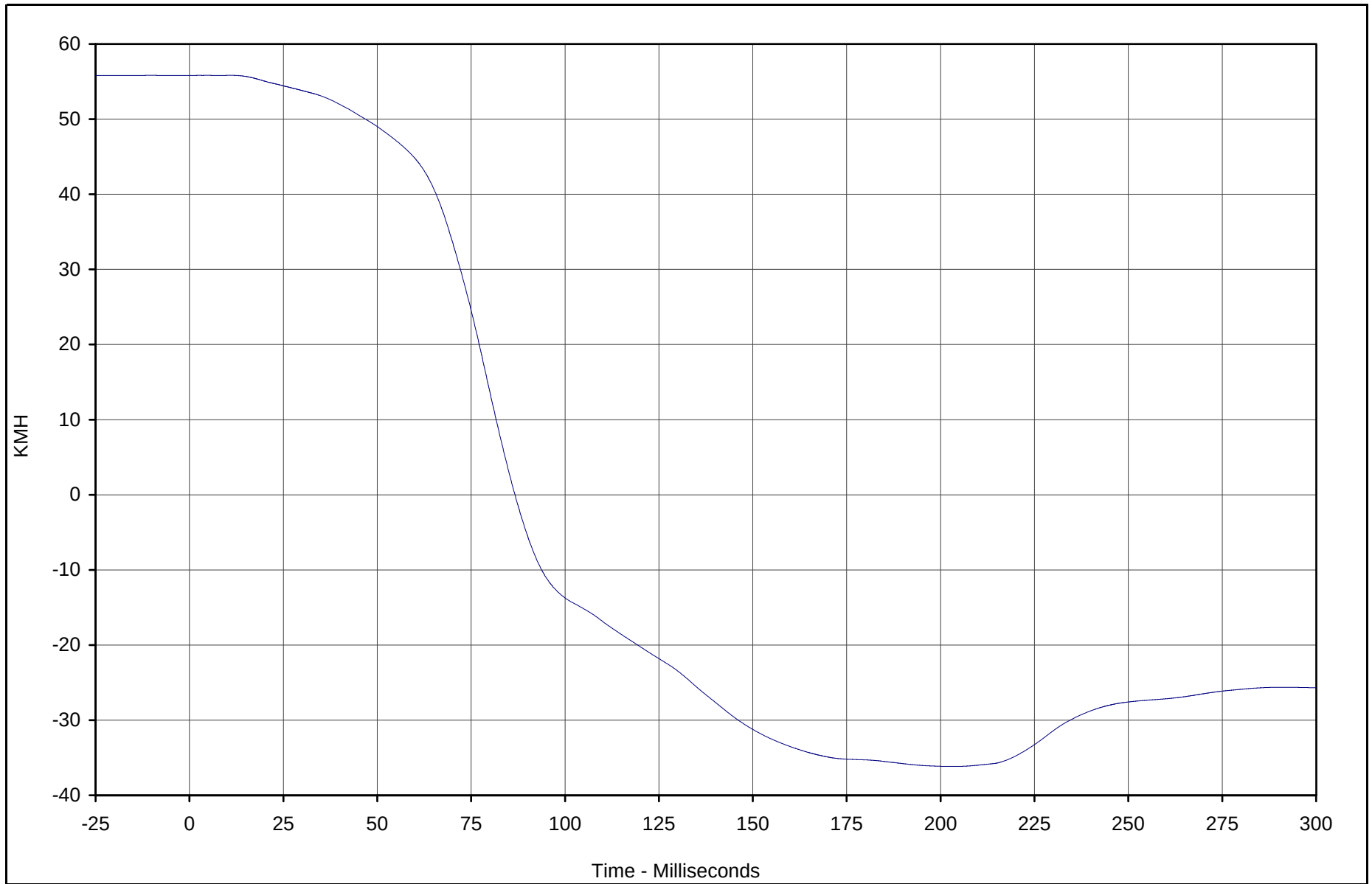


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Primary X Velocity	001	IN1	KMH	55.8	11.2	-36.2	203.3	180

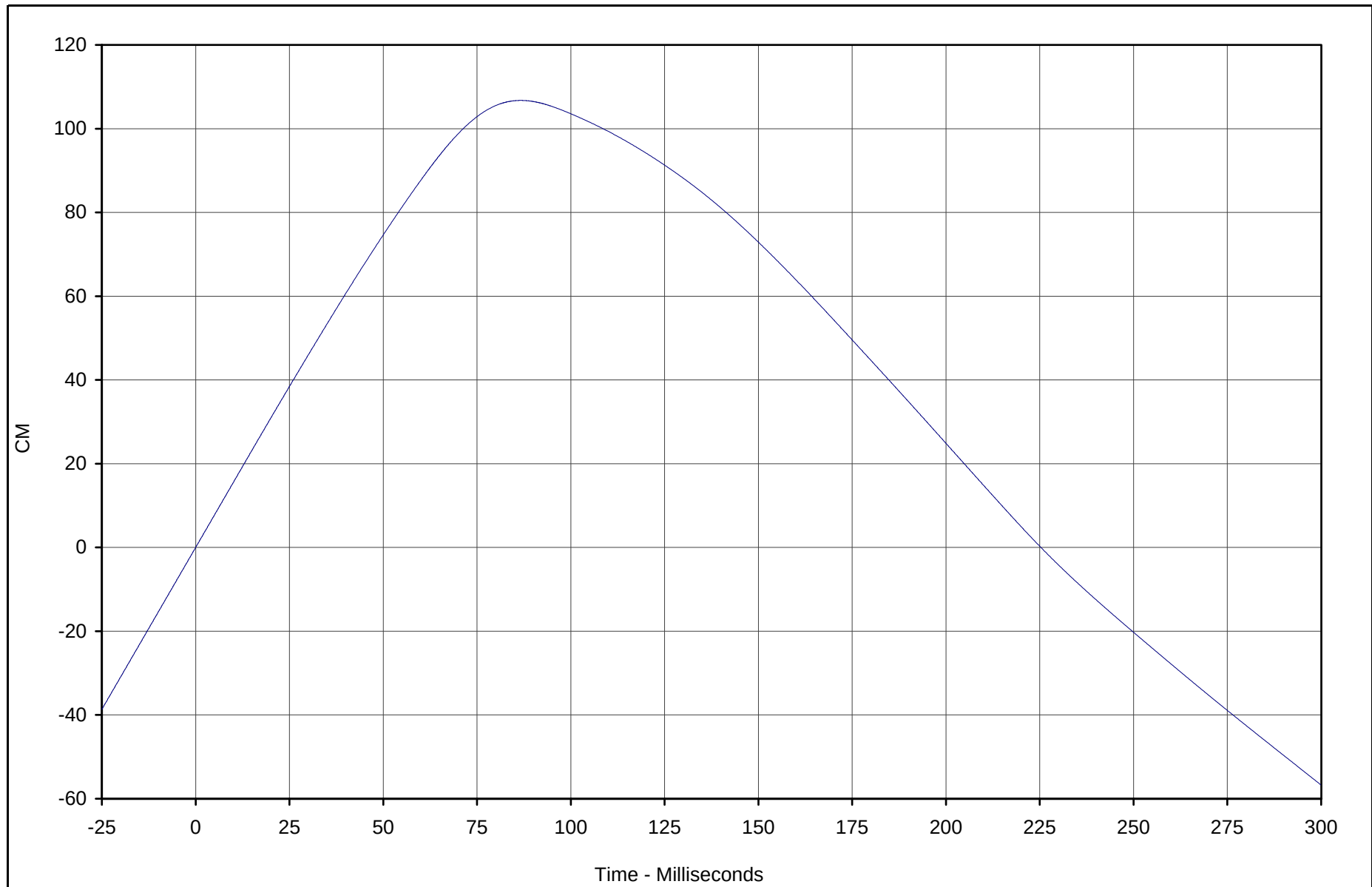


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Primary X Displ.	001	IN2	CM	106.7	86.7	-56.7	299.9	180

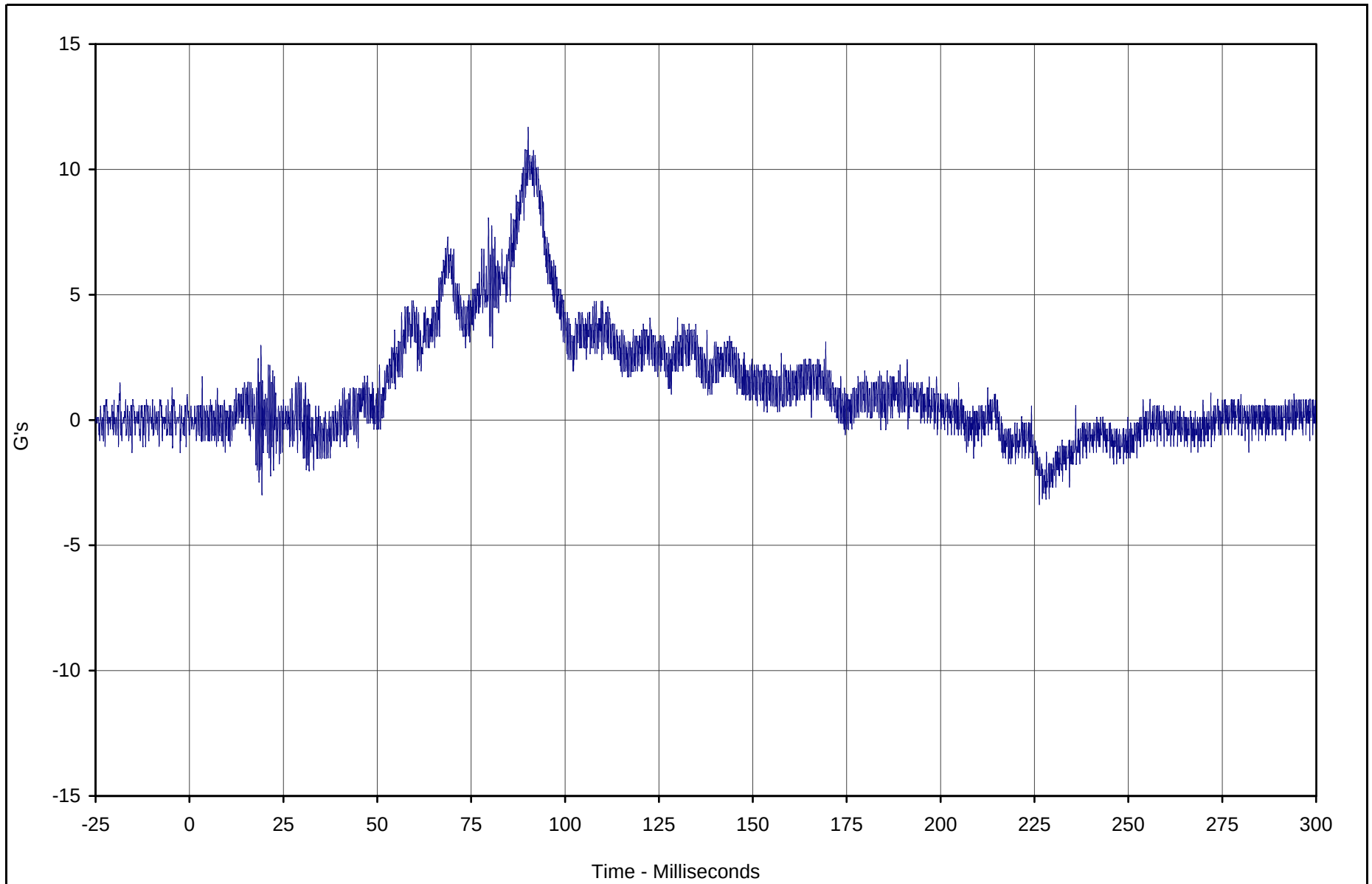


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Primary Y	002	FIL	G's	11.7	90.2	-3.4	226.3	1000

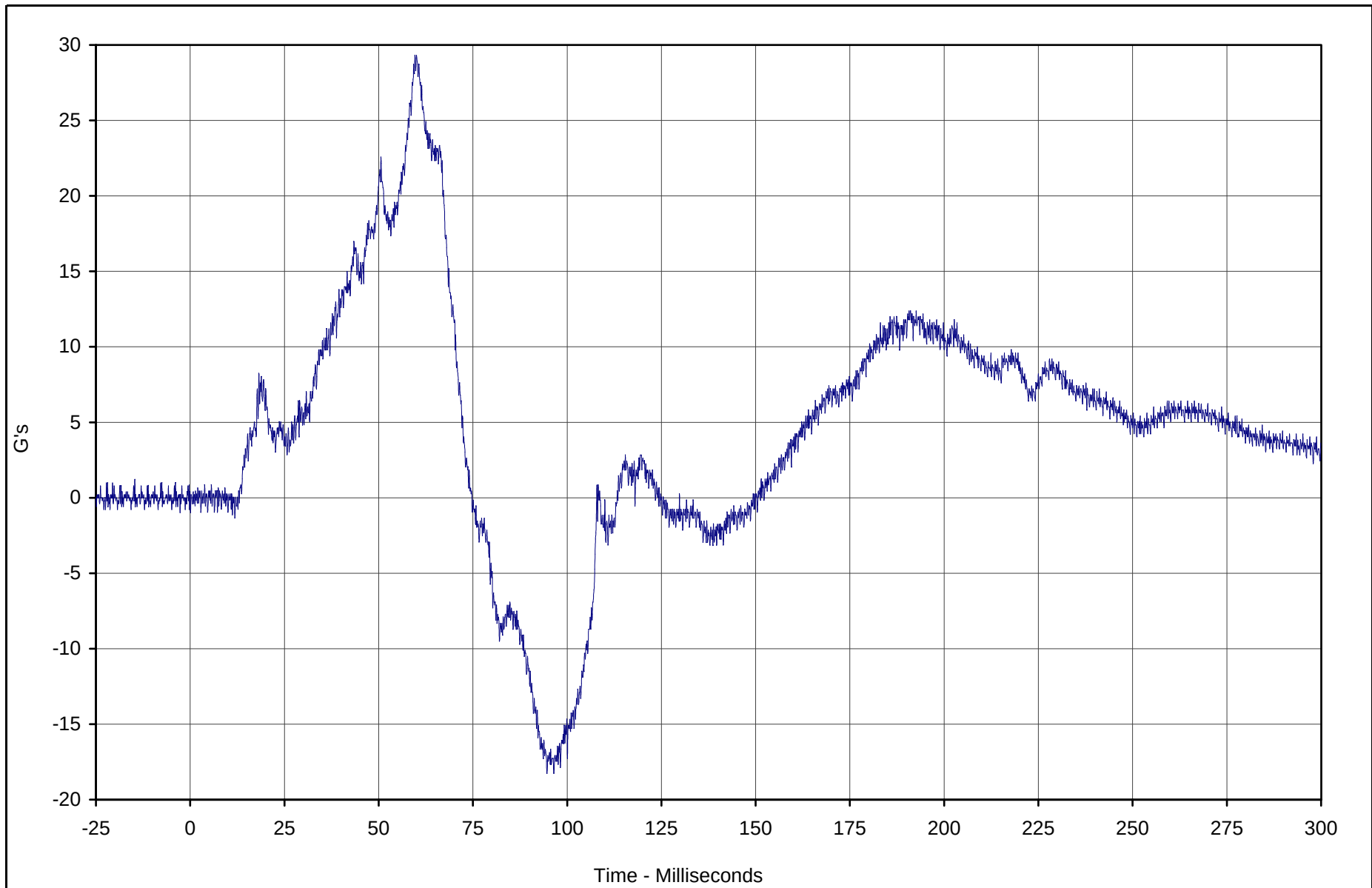


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Primary Z	003	FIL	G's	29.3	59.6	-18.3	94.6	1000

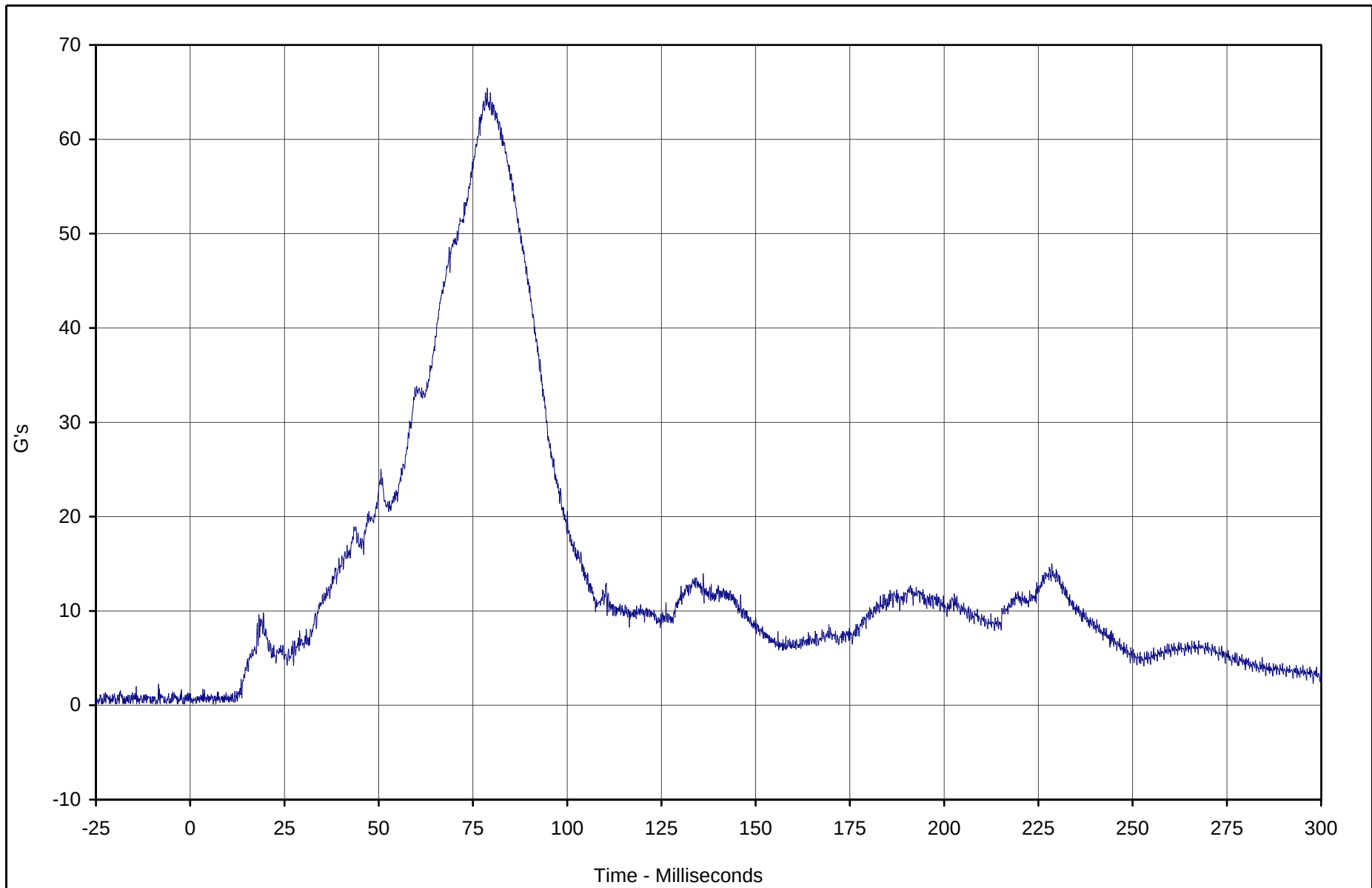


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Resultant Primary	001	RES	G's	65.4	78.8	0.1	6.1	1000

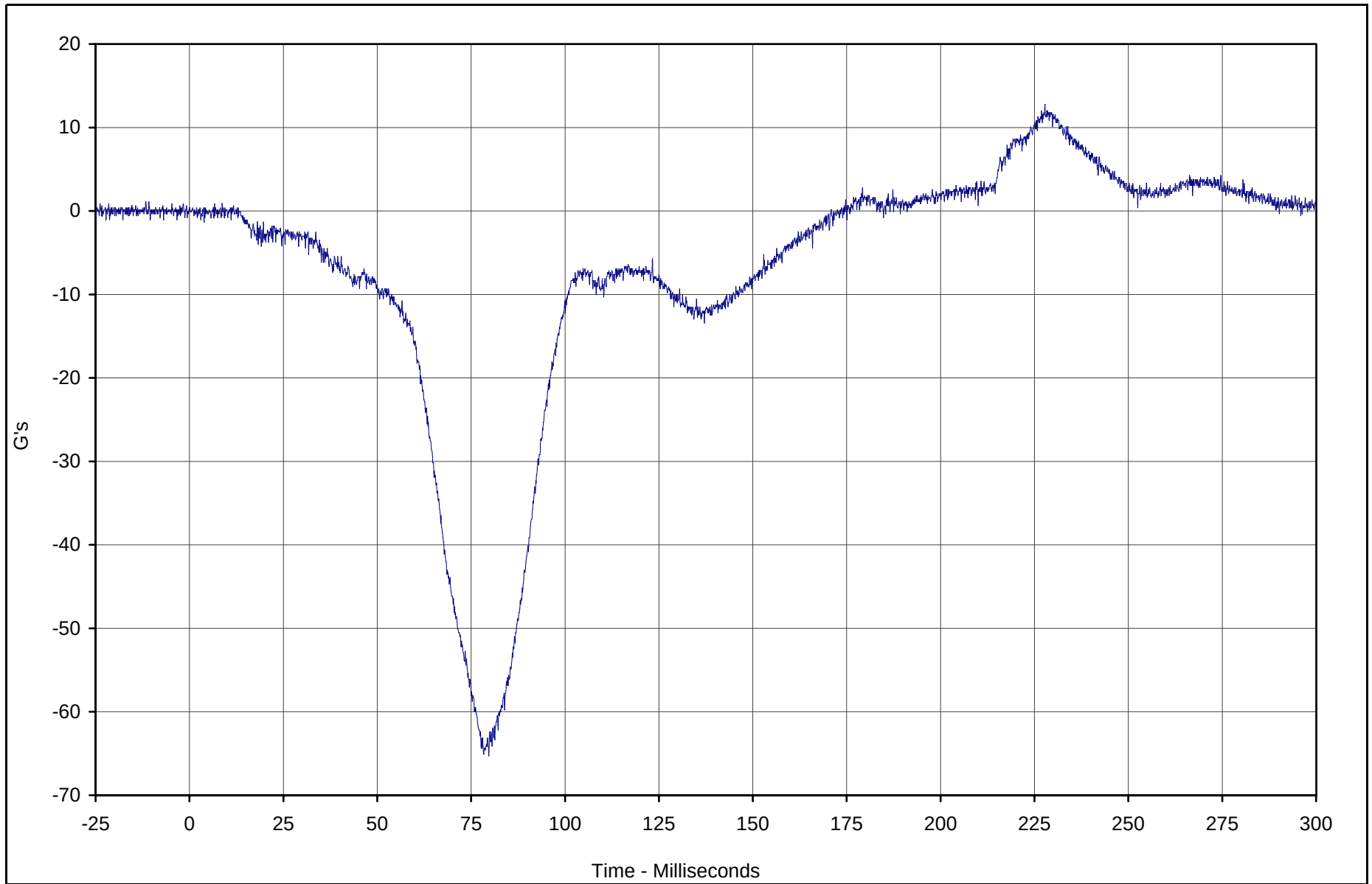


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Redundant X	004	FIL	G's	12.8	227.8	-65.3	79.7	1000

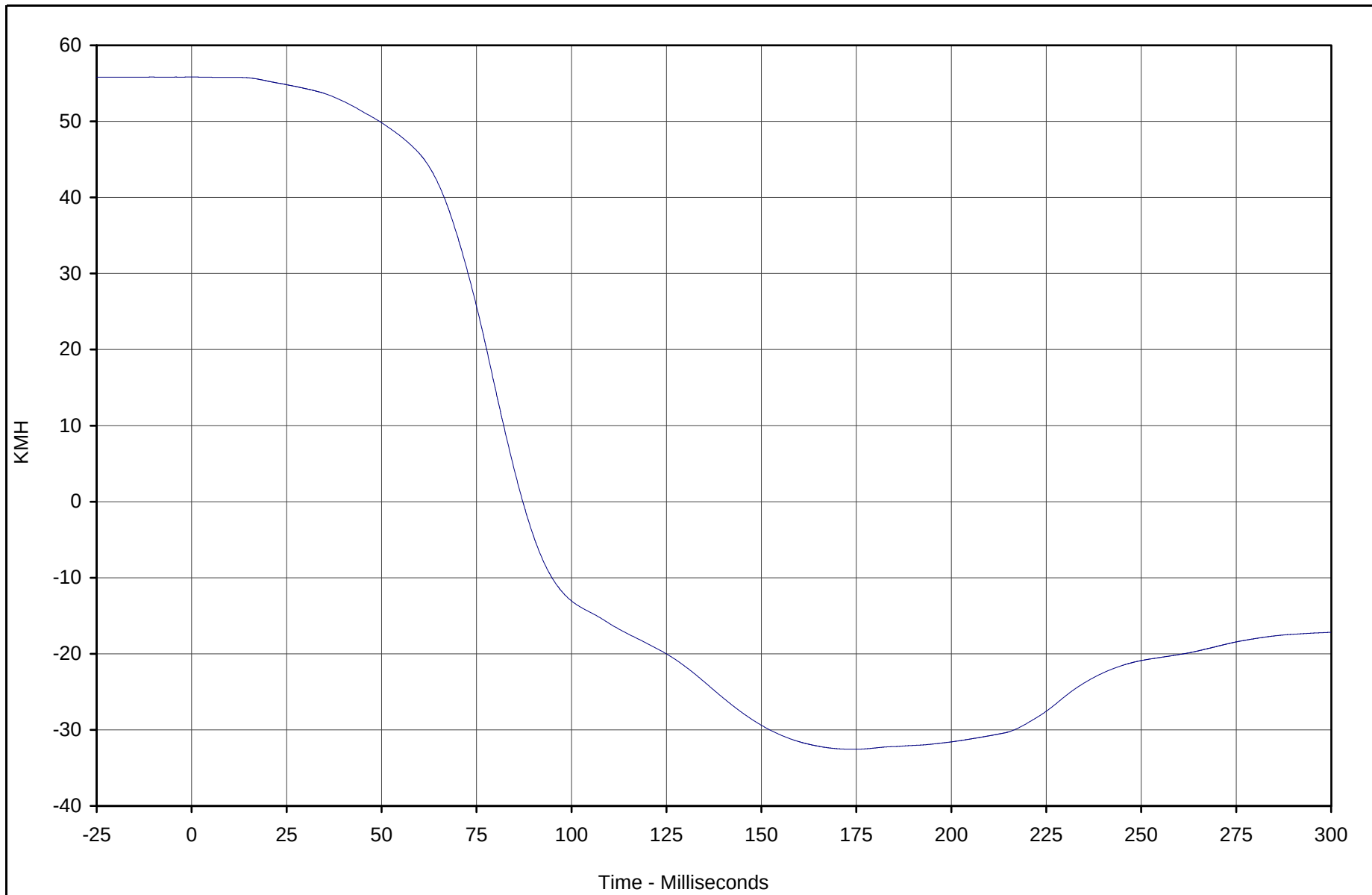


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Redundant X Velocity	004	IN1	KMH	55.8	0.9	-32.5	174.0	180

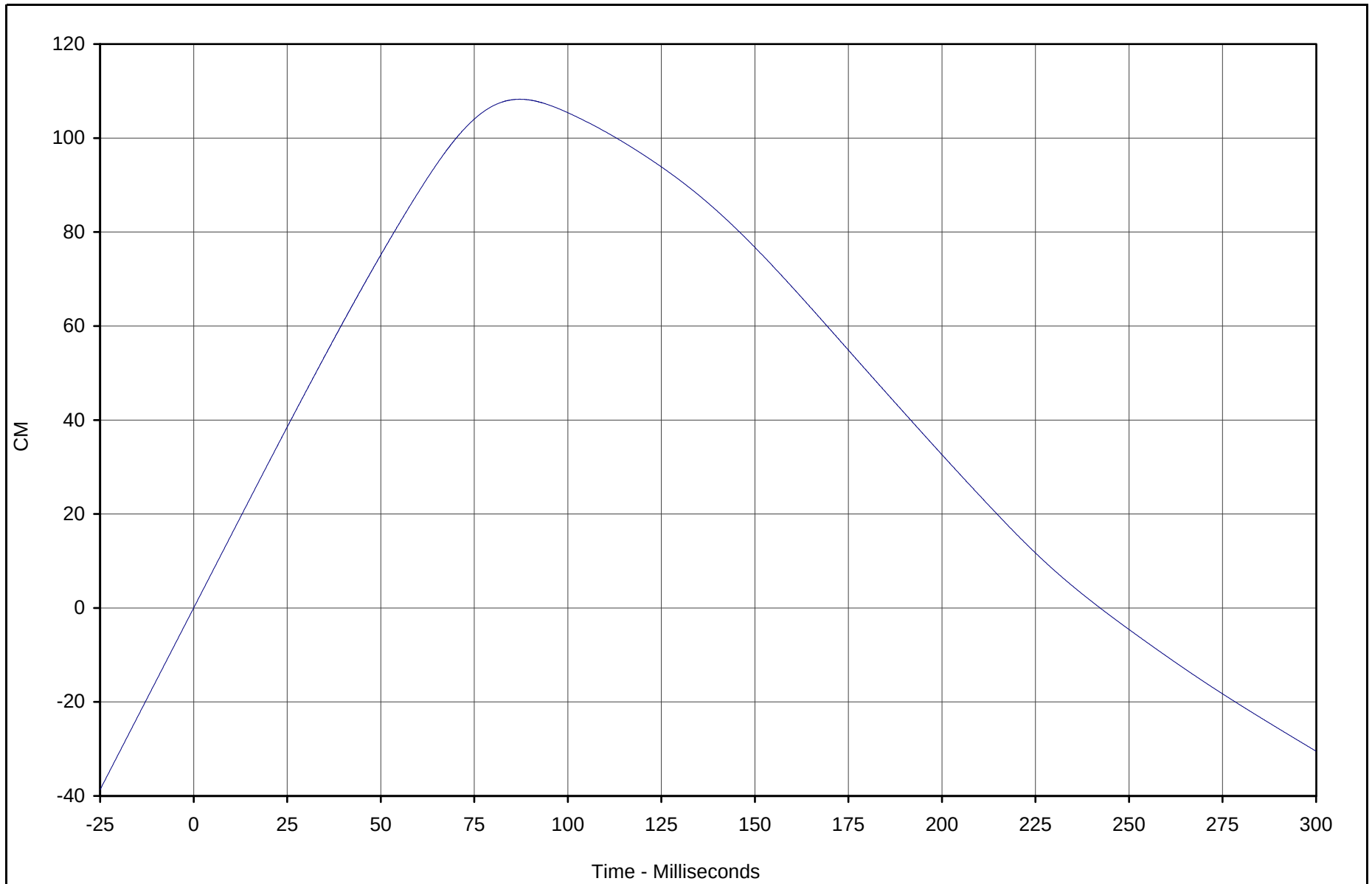


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Redundant X Displ.	004	IN2	CM	108.3	87.2	-30.4	299.9	180

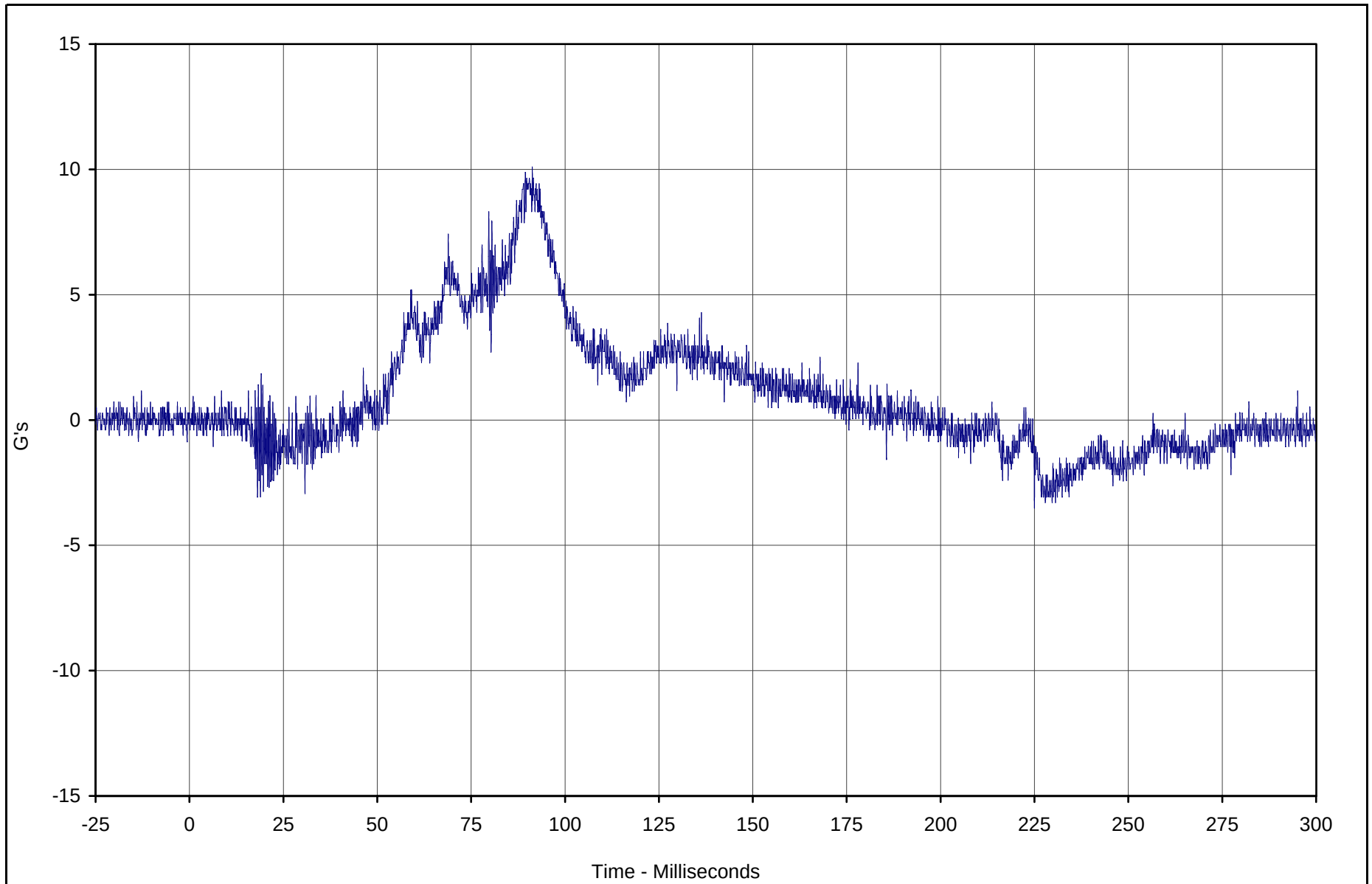


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Redundant Y	005	FIL	G's	10.1	91.3	-3.5	225.0	1000

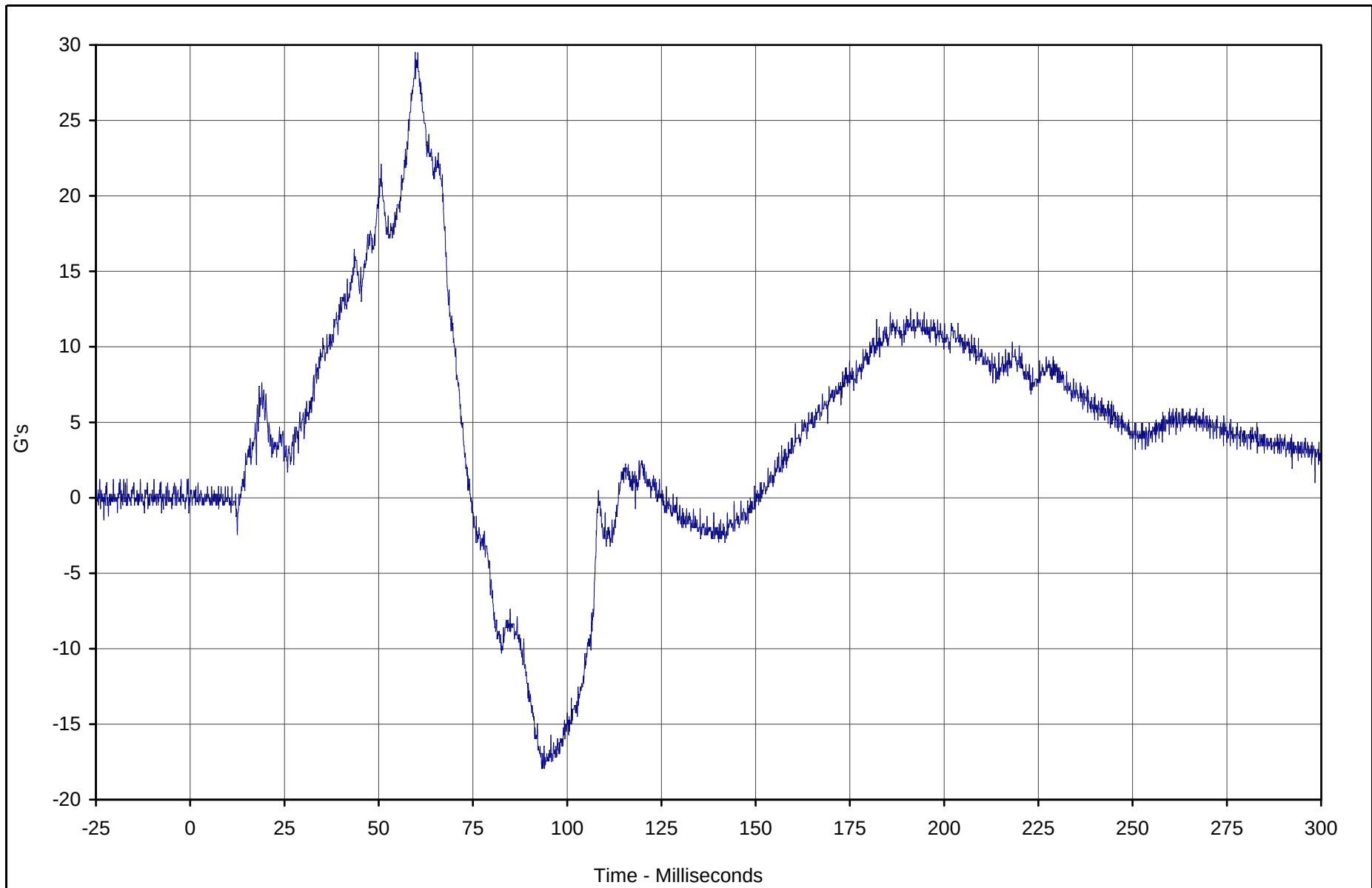


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Redundant Z	006	FIL	G's	29.5	59.7	-17.9	93.2	1000

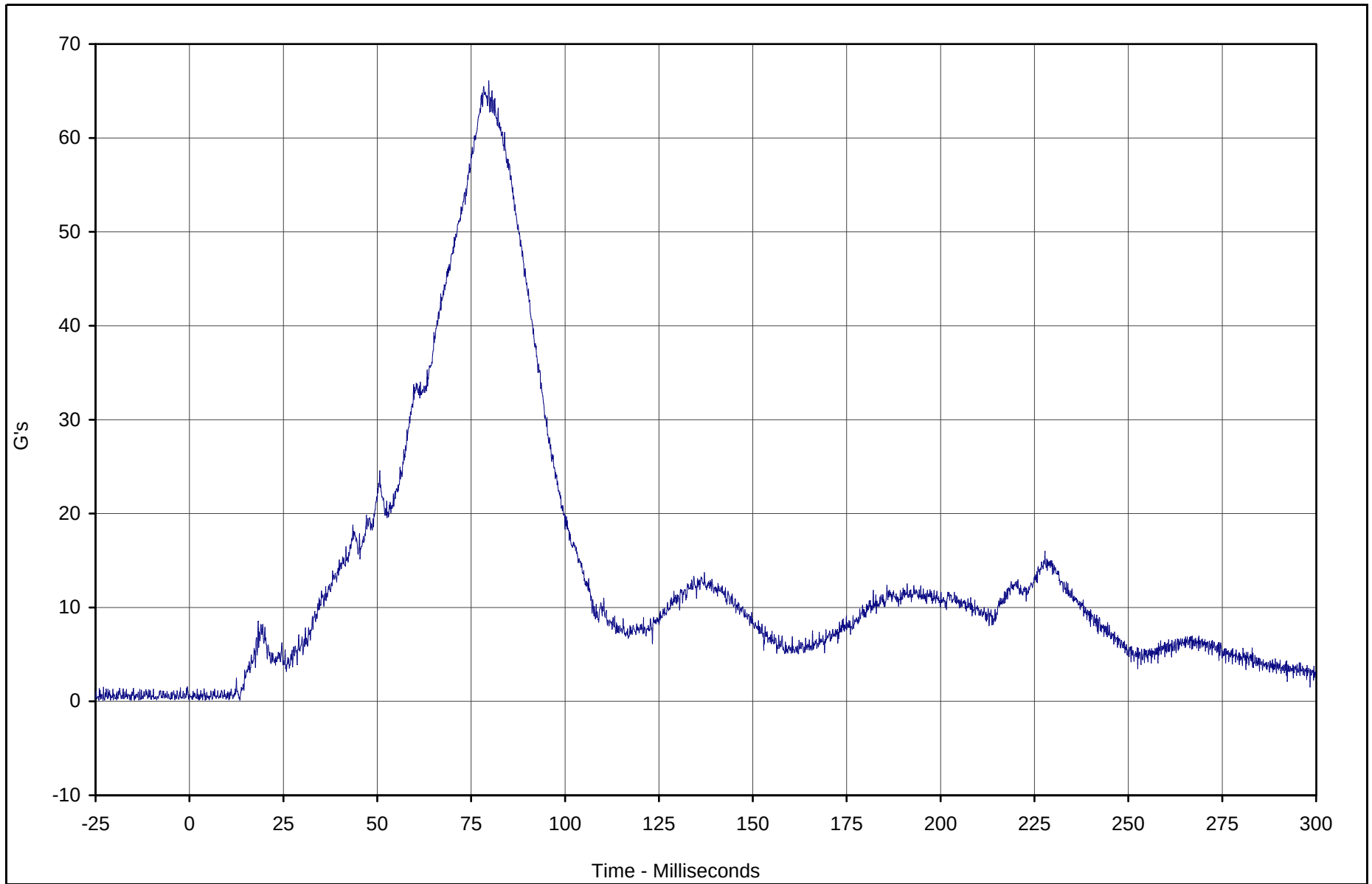


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Resultant Redundant	004	RES	G's	66.1	79.7	0.1	4.2	1000

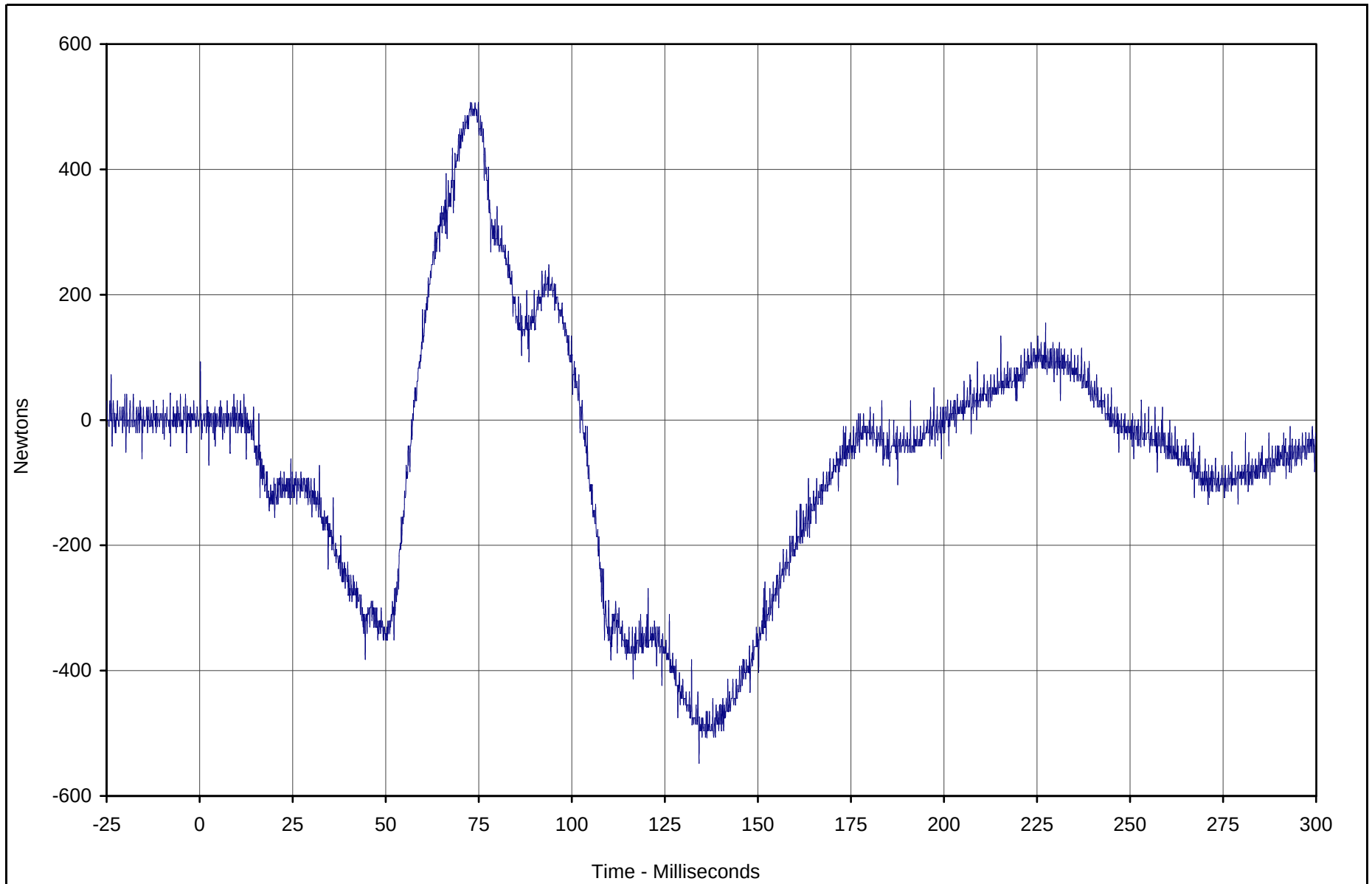


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Neck Force X	007	FIL	Newtons	506.4	72.8	-547.7	134.2	1000

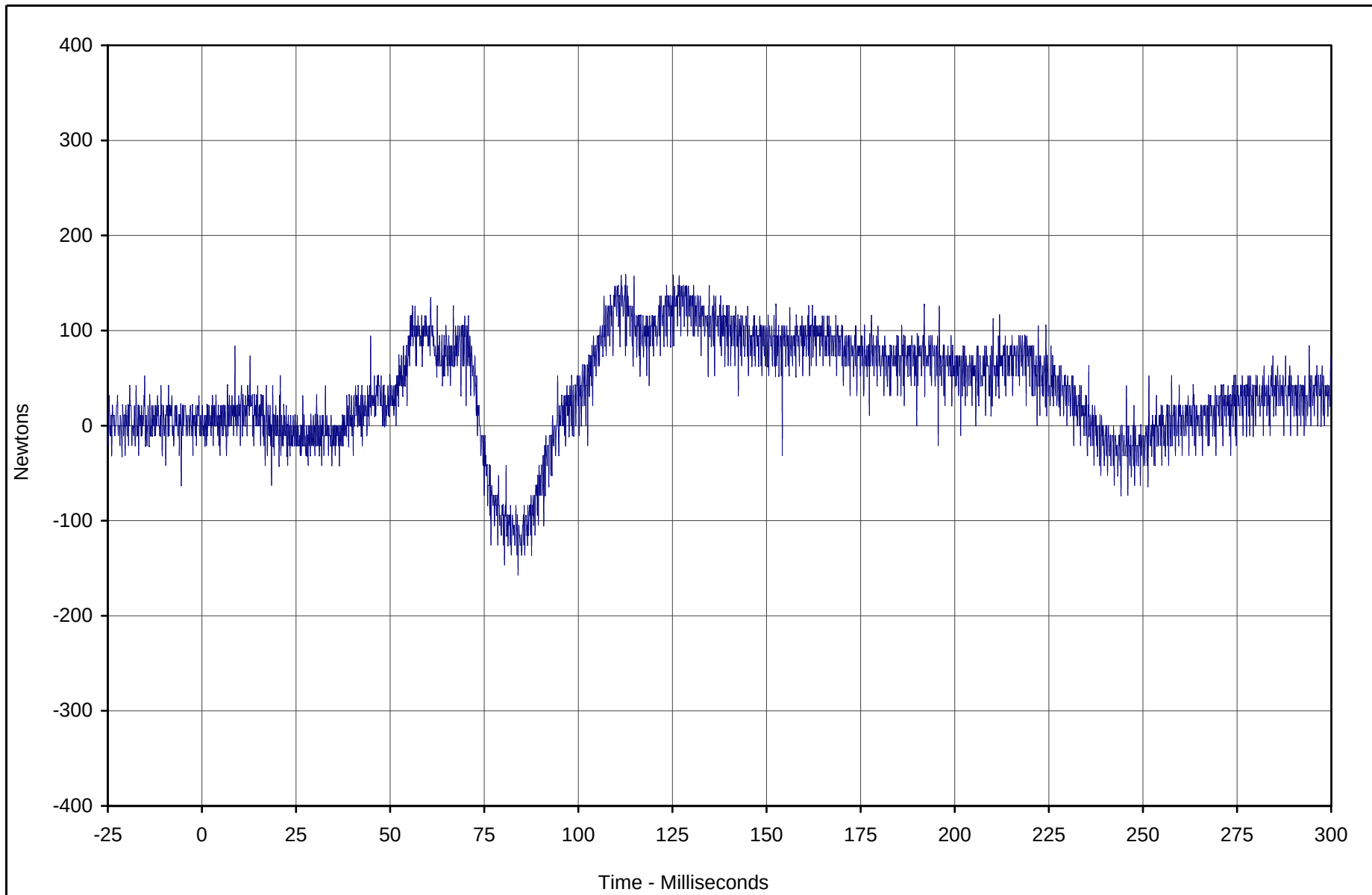


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Neck Force Y	008	FIL	Newtons	157.2	111.4	-157.2	84.0	1000

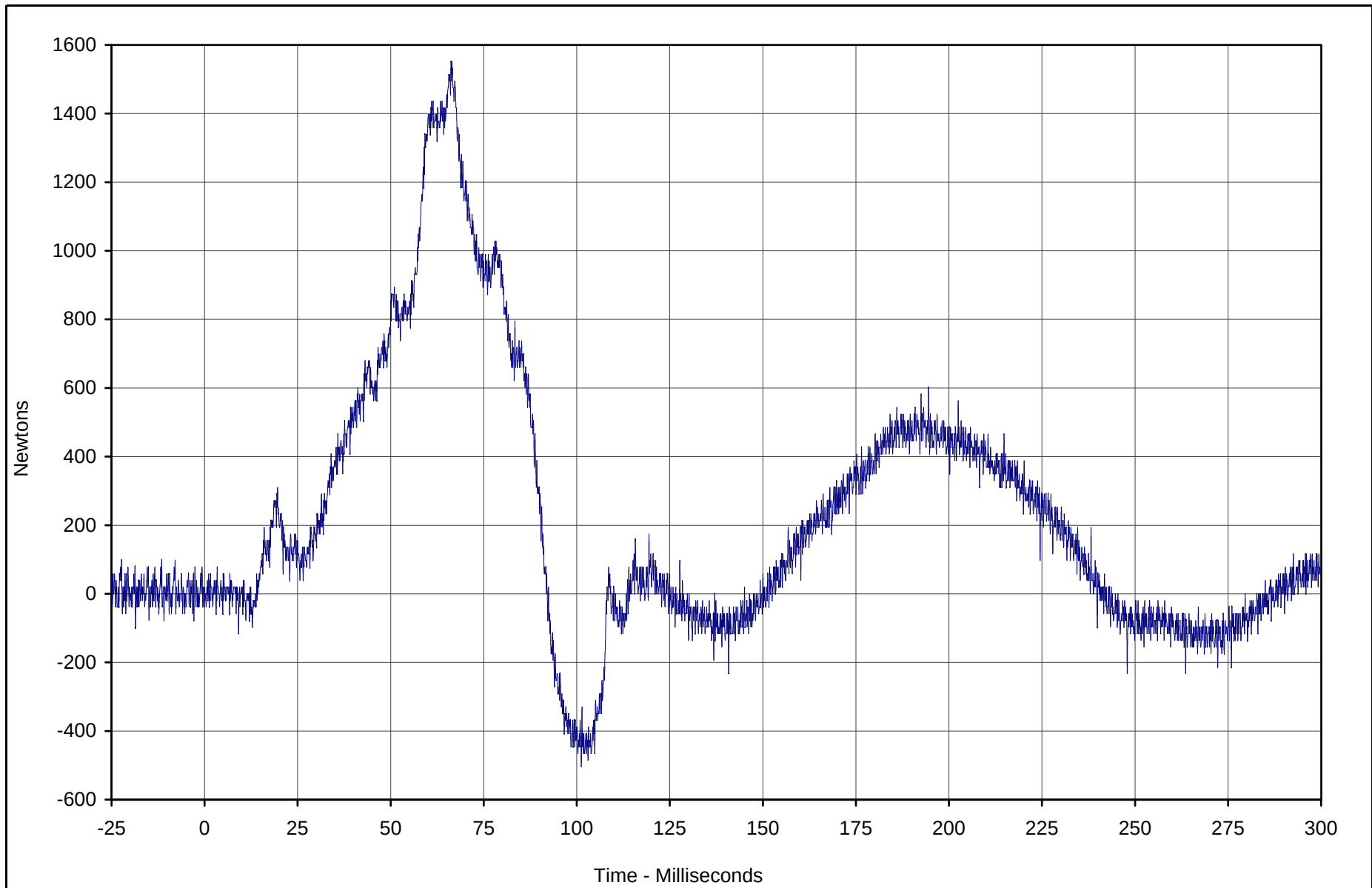


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Neck Force Z	009	FIL	Newtons	1552.7	66.2	-504.6	101.2	1000

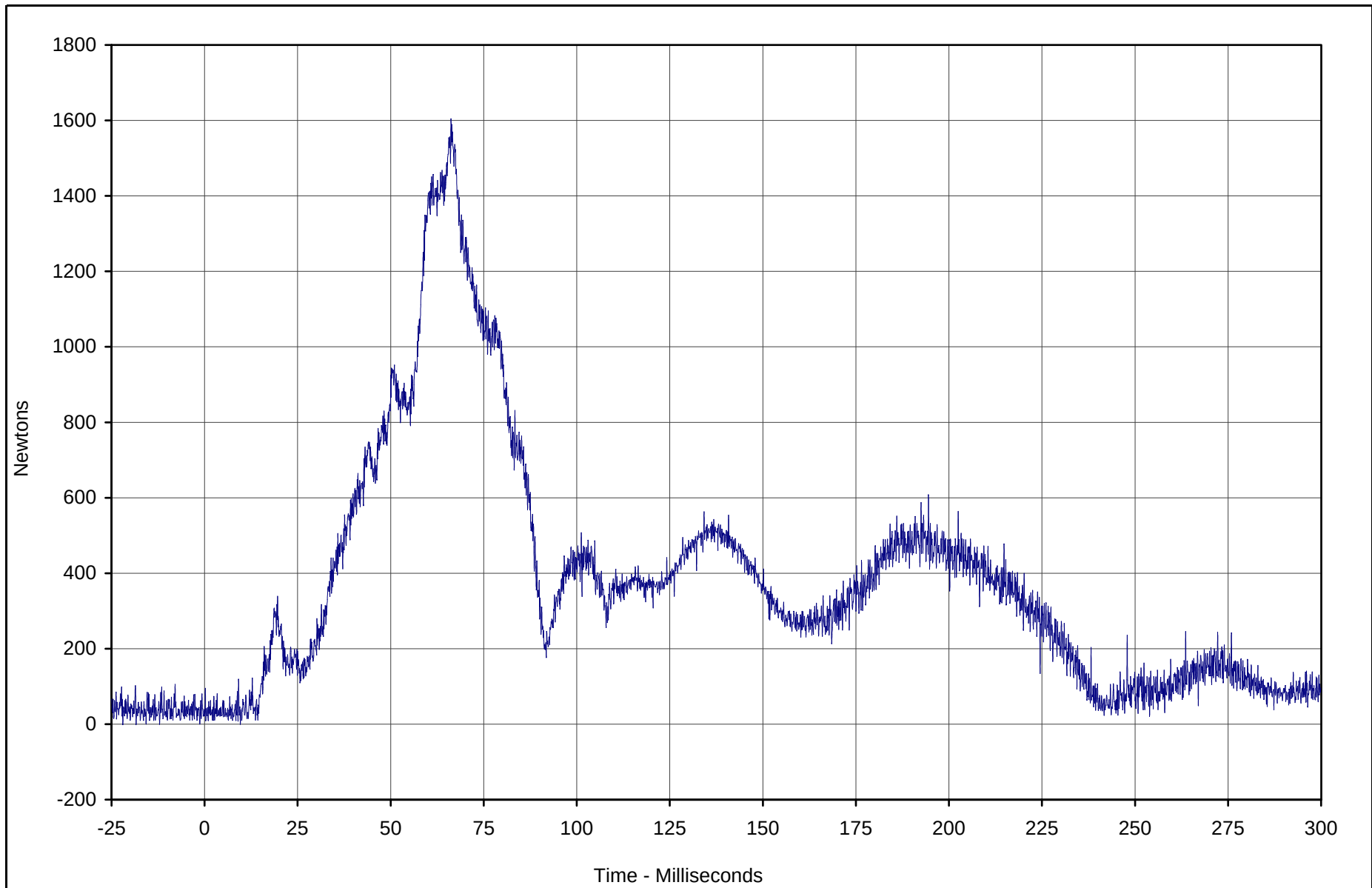


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Neck Force Resultant	007	RES	Newtons	1603.8	66.2	0.0	9.6	1000

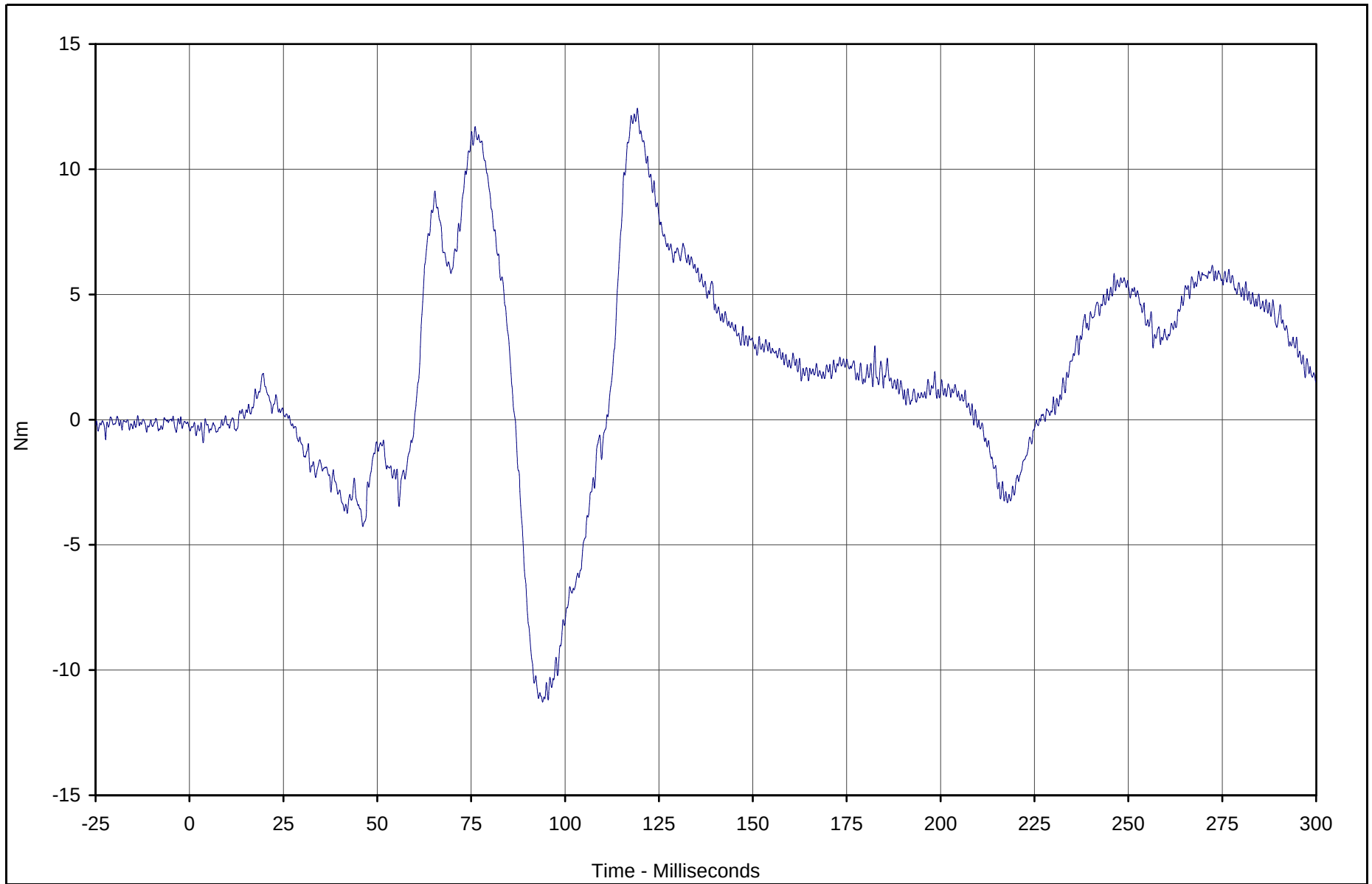


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Neck Moment X	010	FIL	Nm	12.4	119.3	-11.3	94.0	600

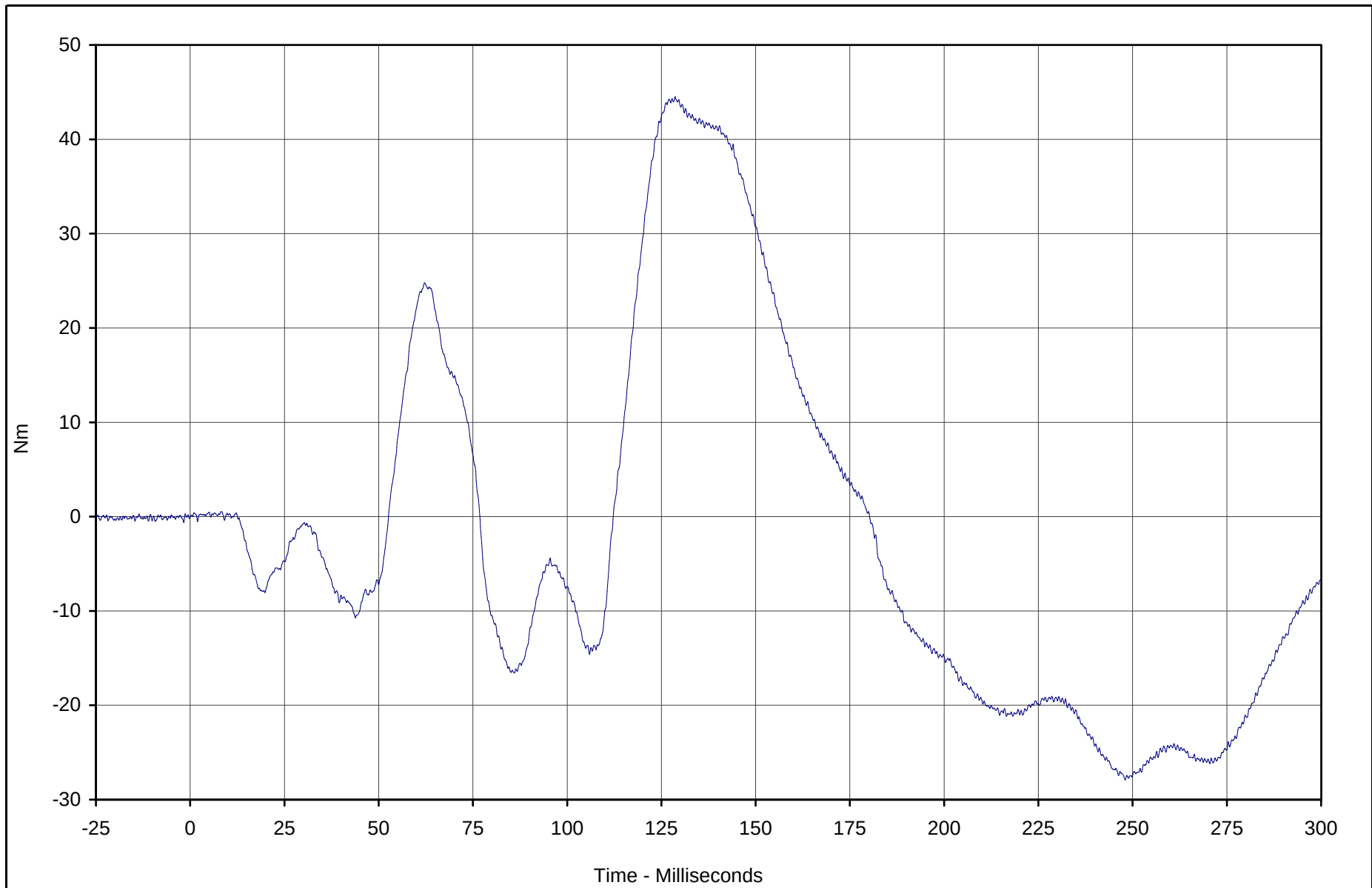


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Neck Moment Y	011	FIL	Nm	44.5	128.6	-27.9	248.0	600

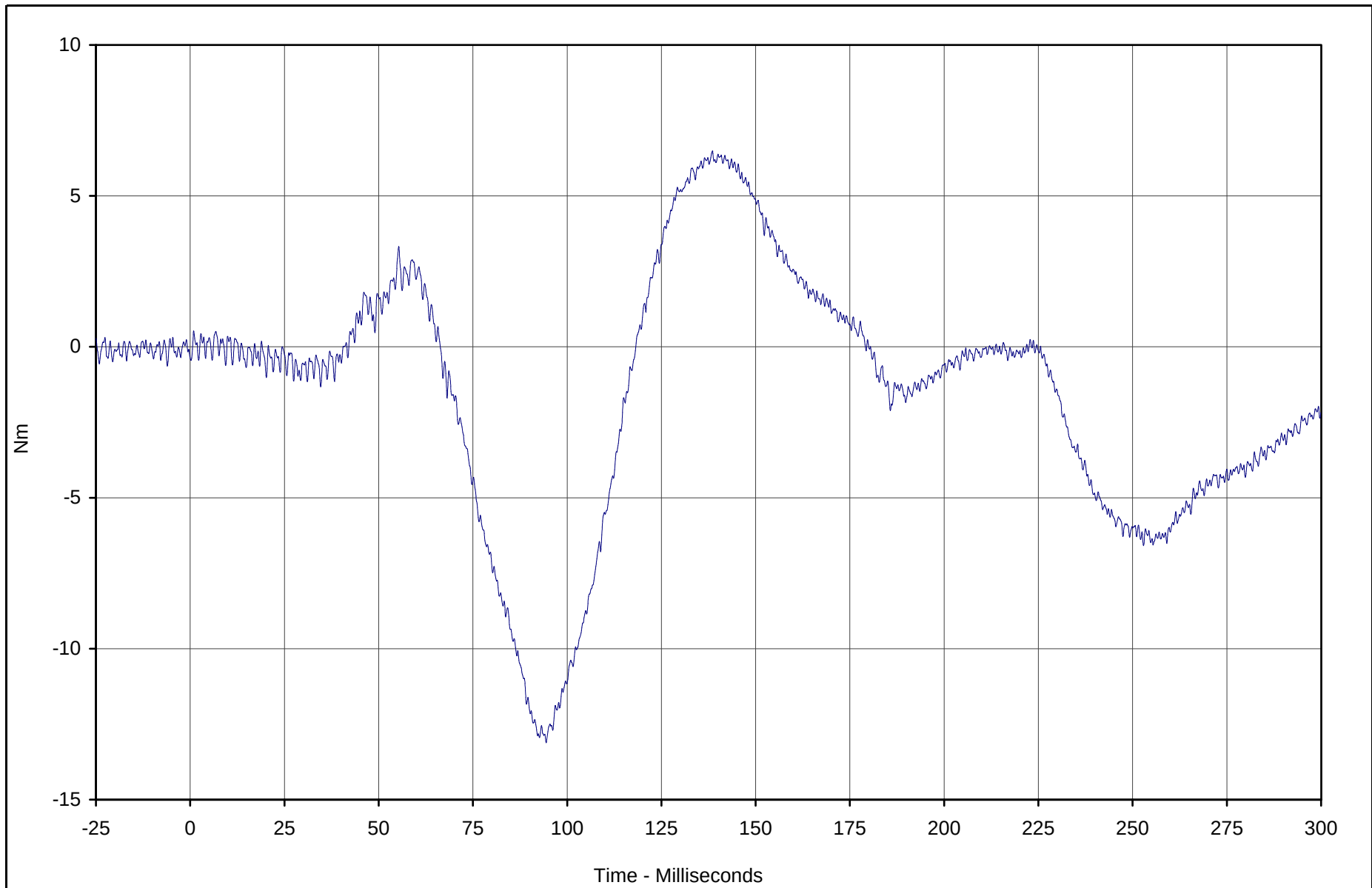


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Neck Moment Z	012	FIL	Nm	6.5	138.5	-13.1	94.4	600

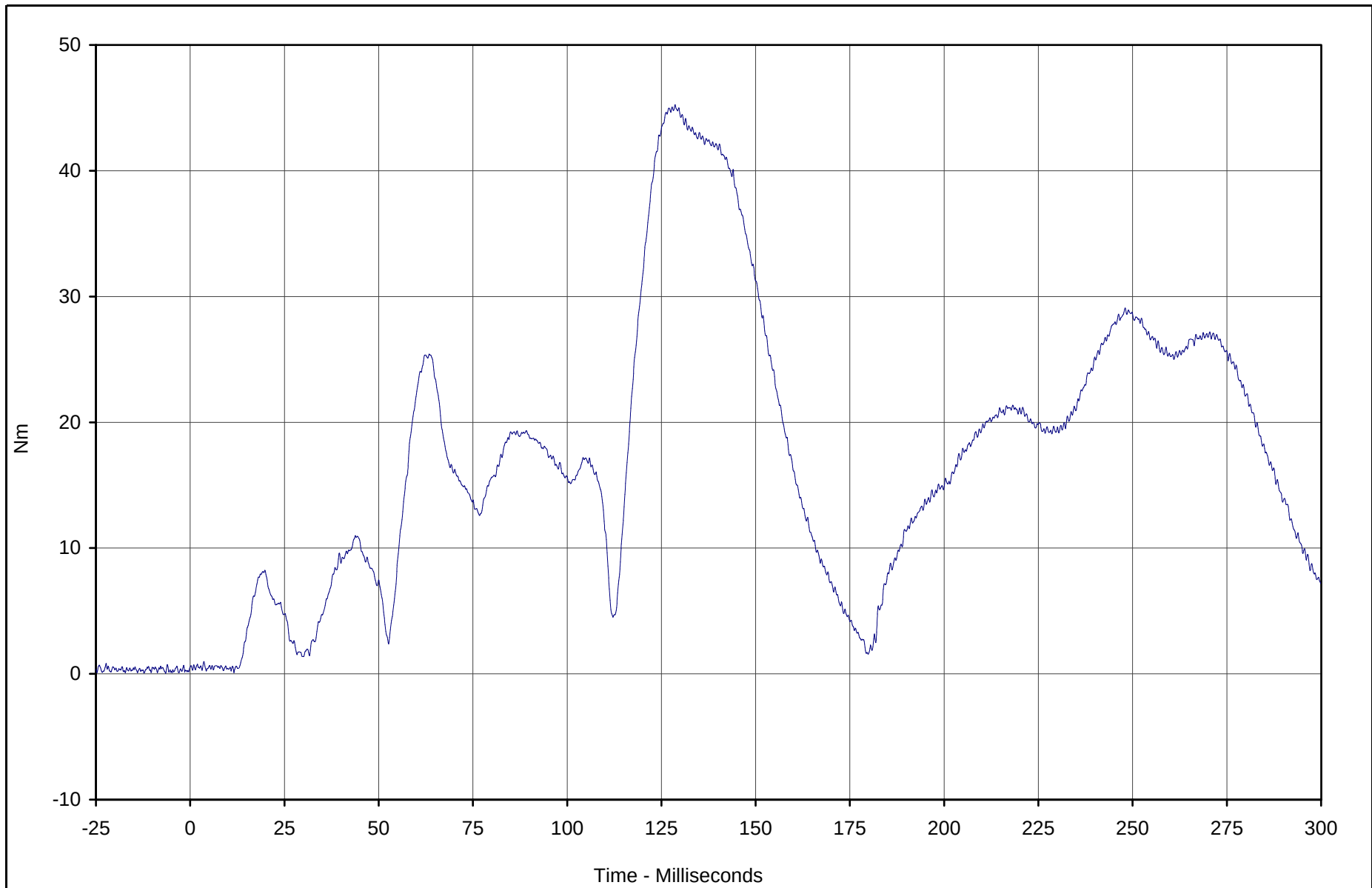


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Neck Moment Resultant	010	RES	Nm	45.3	128.6	0.1	11.6	600

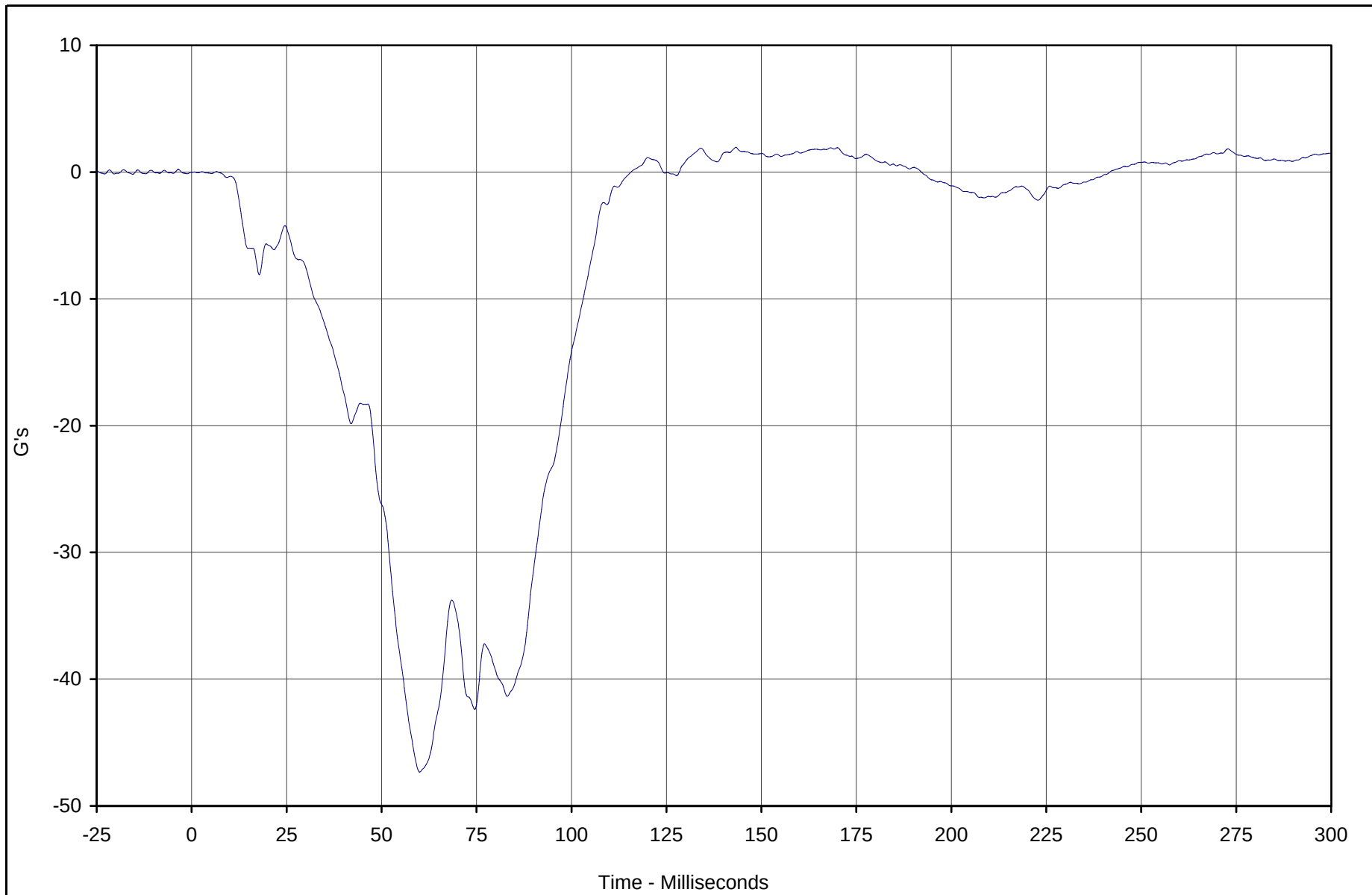


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Chest Primary X	013	FIL	G's	2.0	143.3	-47.3	60.0	180

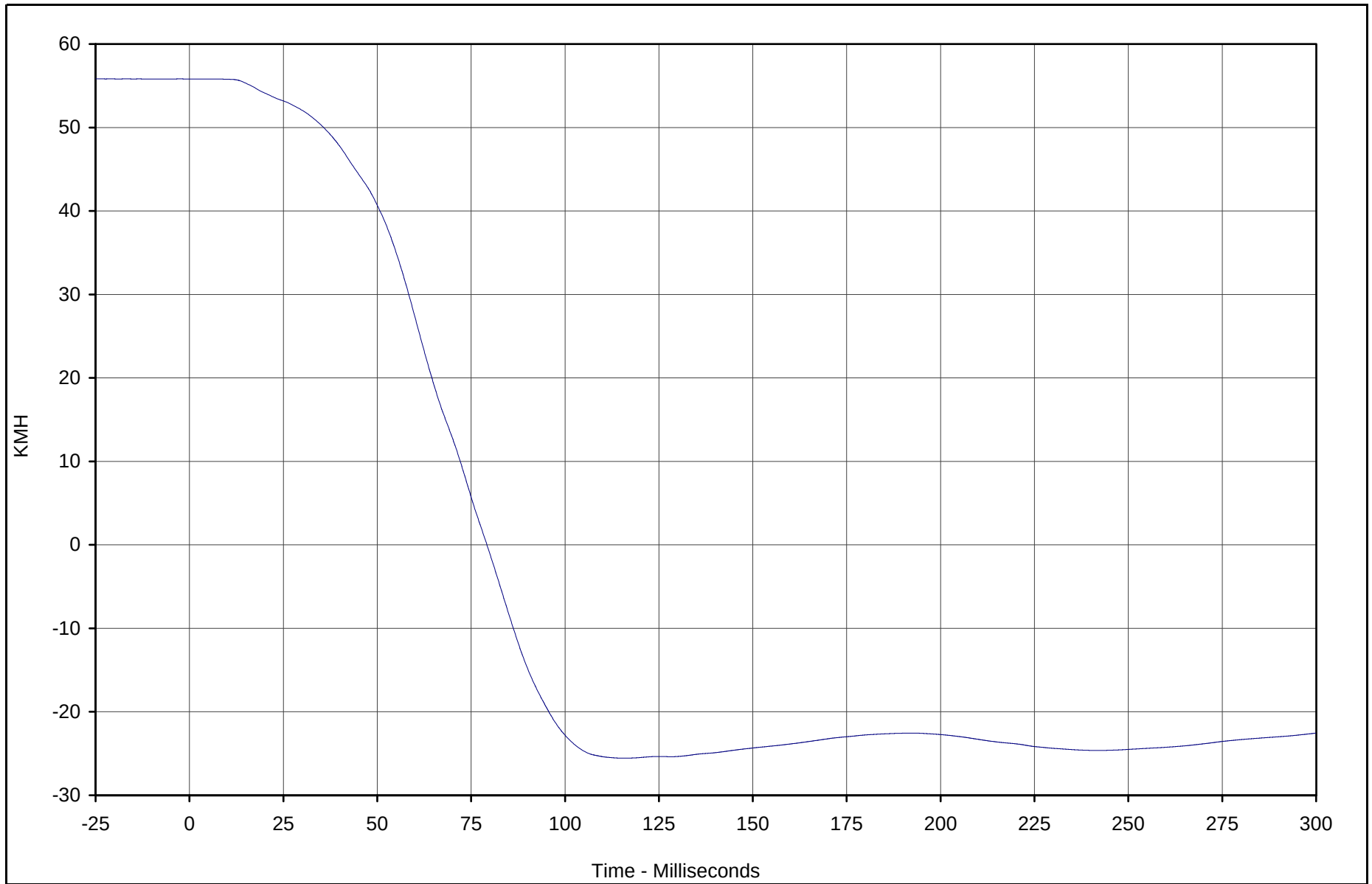


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Chest Primary X Velocity	013	IN1	KMH	55.8	0.0	-25.6	115.6	180

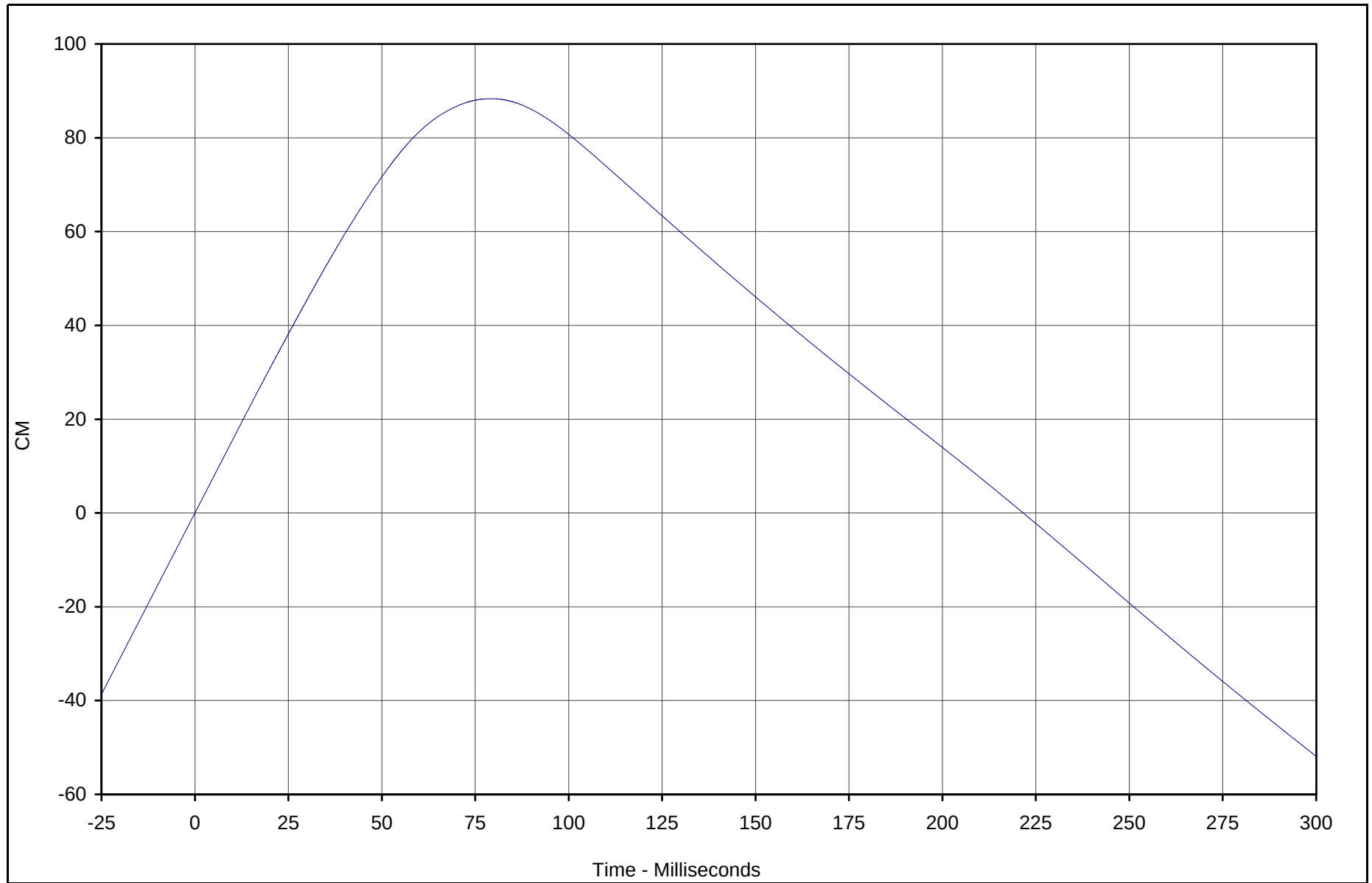


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Chest Primary X Displ.	013	IN2	CM	88.3	79.2	-51.8	299.9	180

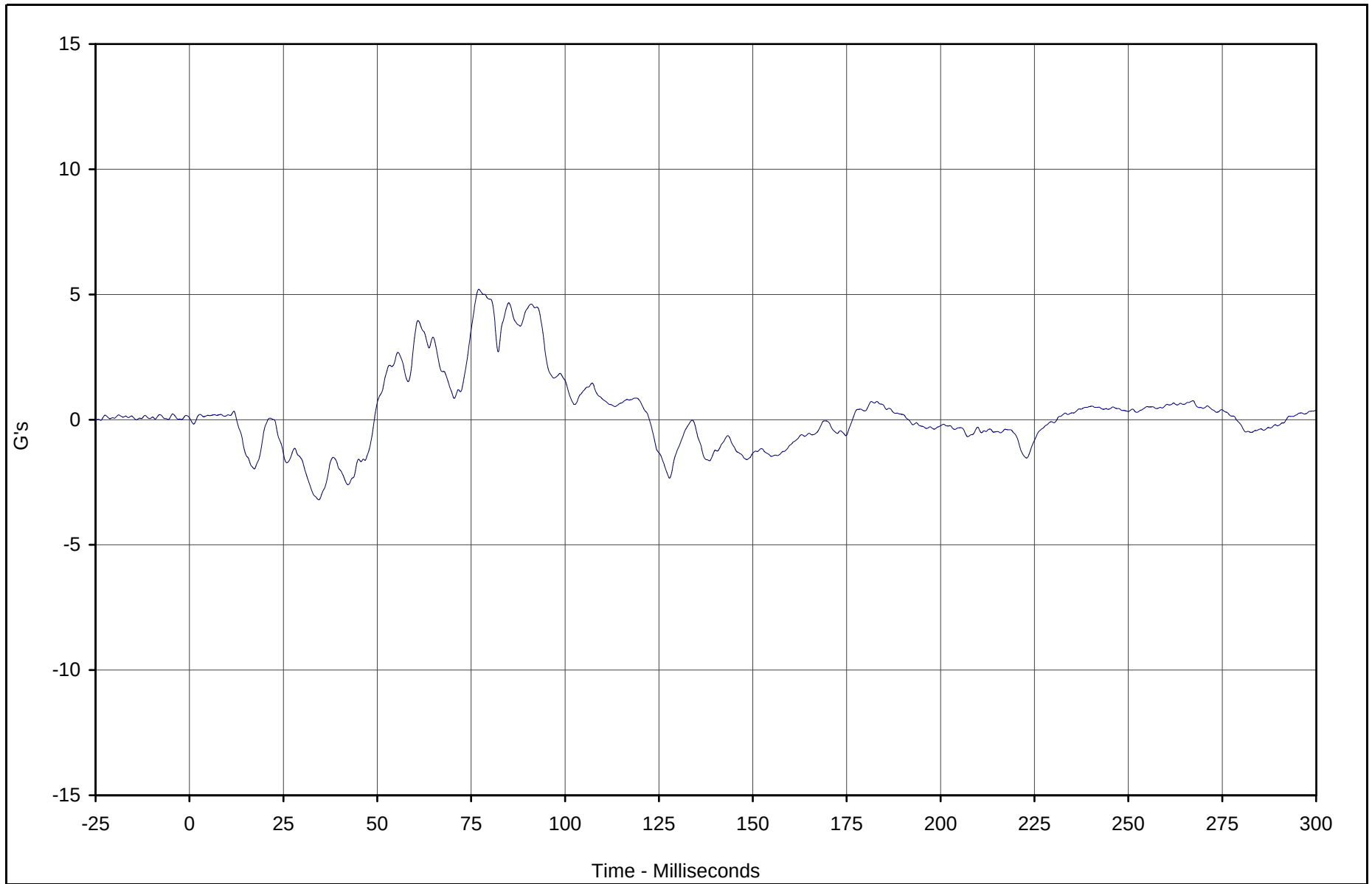


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Chest Primary Y	014	FIL	G's	5.2	77.0	-3.2	34.4	180

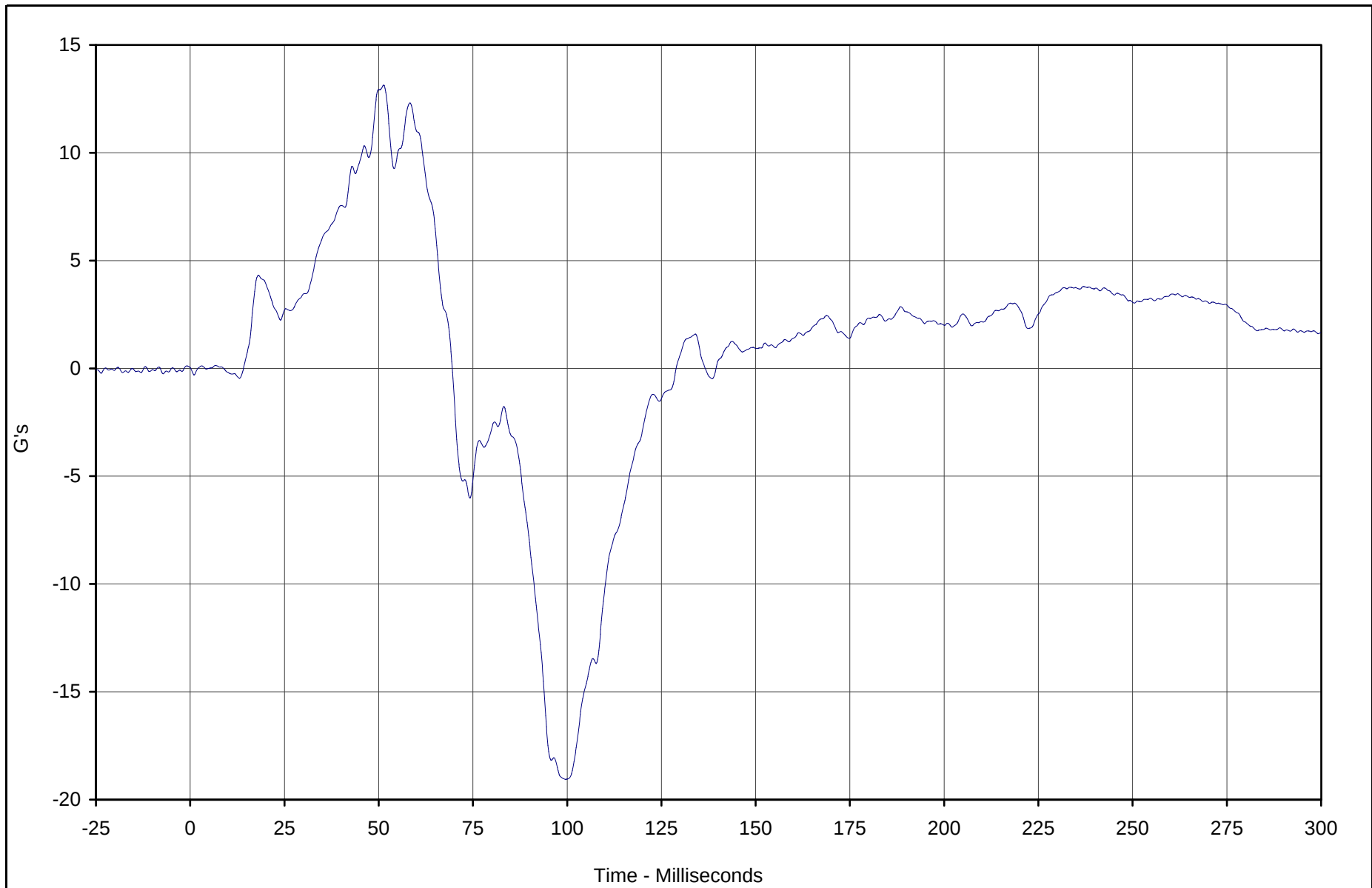


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Chest Primary Z	015	FIL	G's	13.1	51.3	-19.1	99.6	180

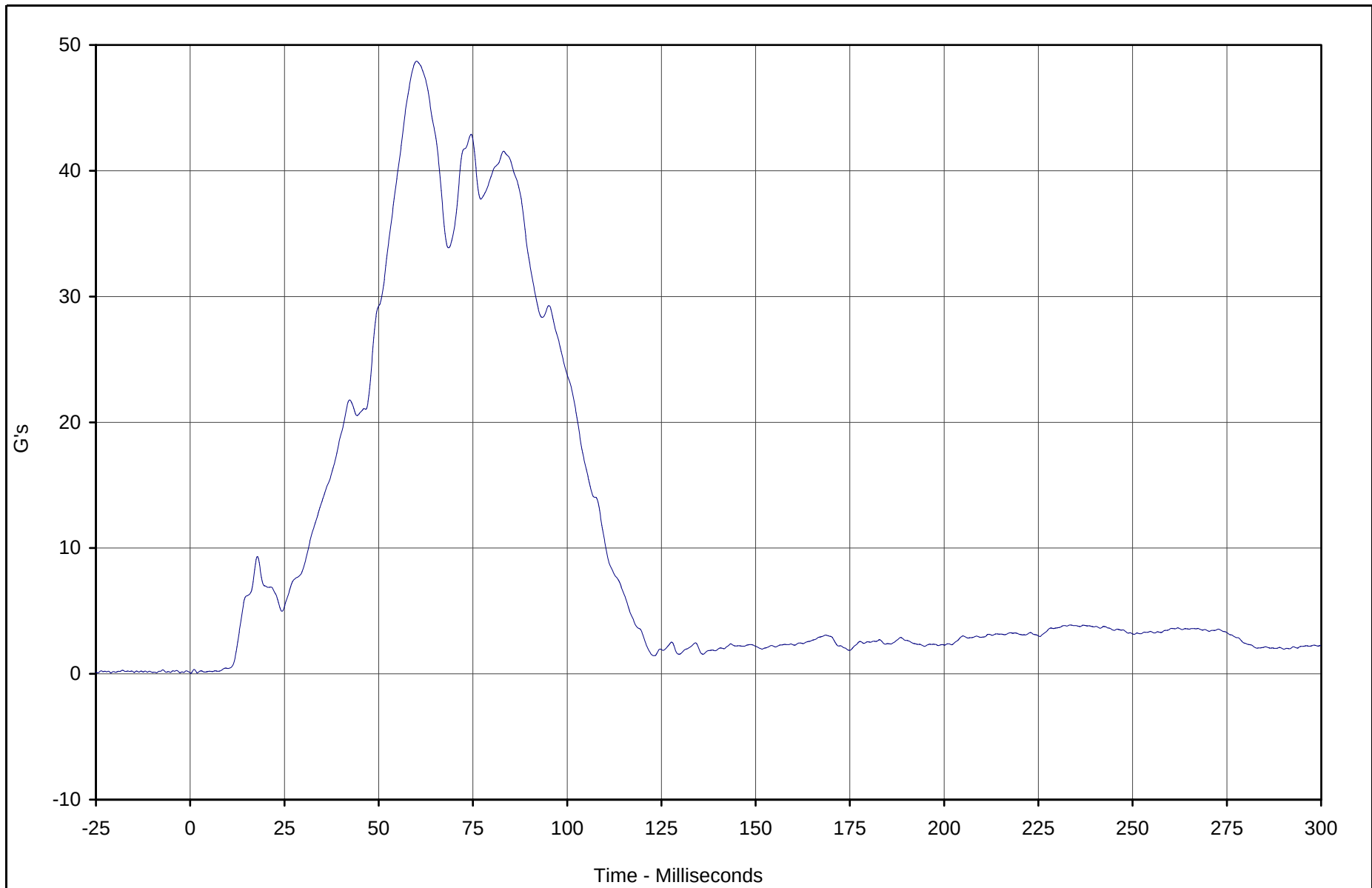


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Chest Resultant Primary	013	RES	G's	48.7	60.0	0.0	0.2	180

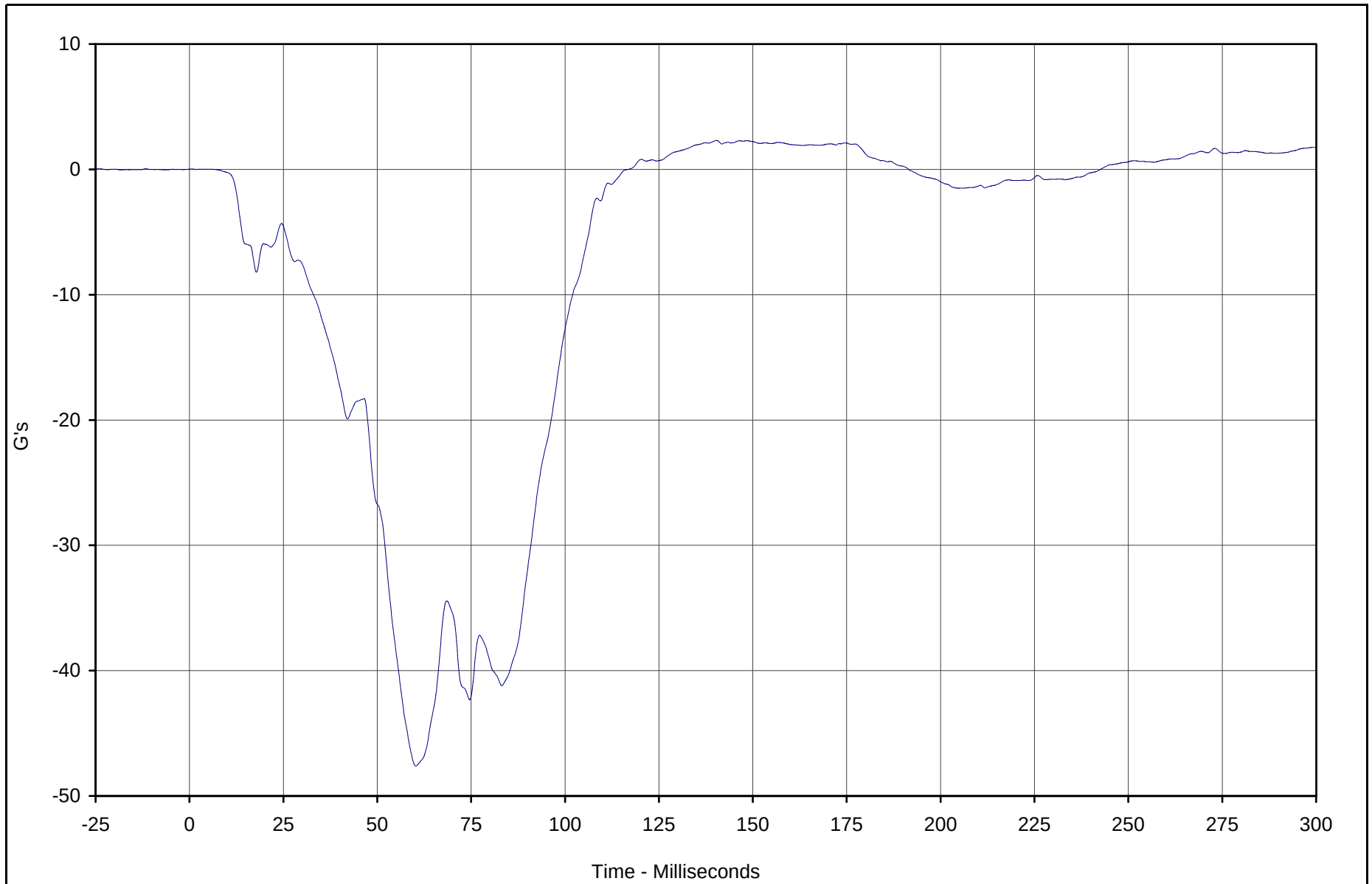


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Chest Redundant X	016	FIL	G's	2.3	140.4	-47.6	60.3	180

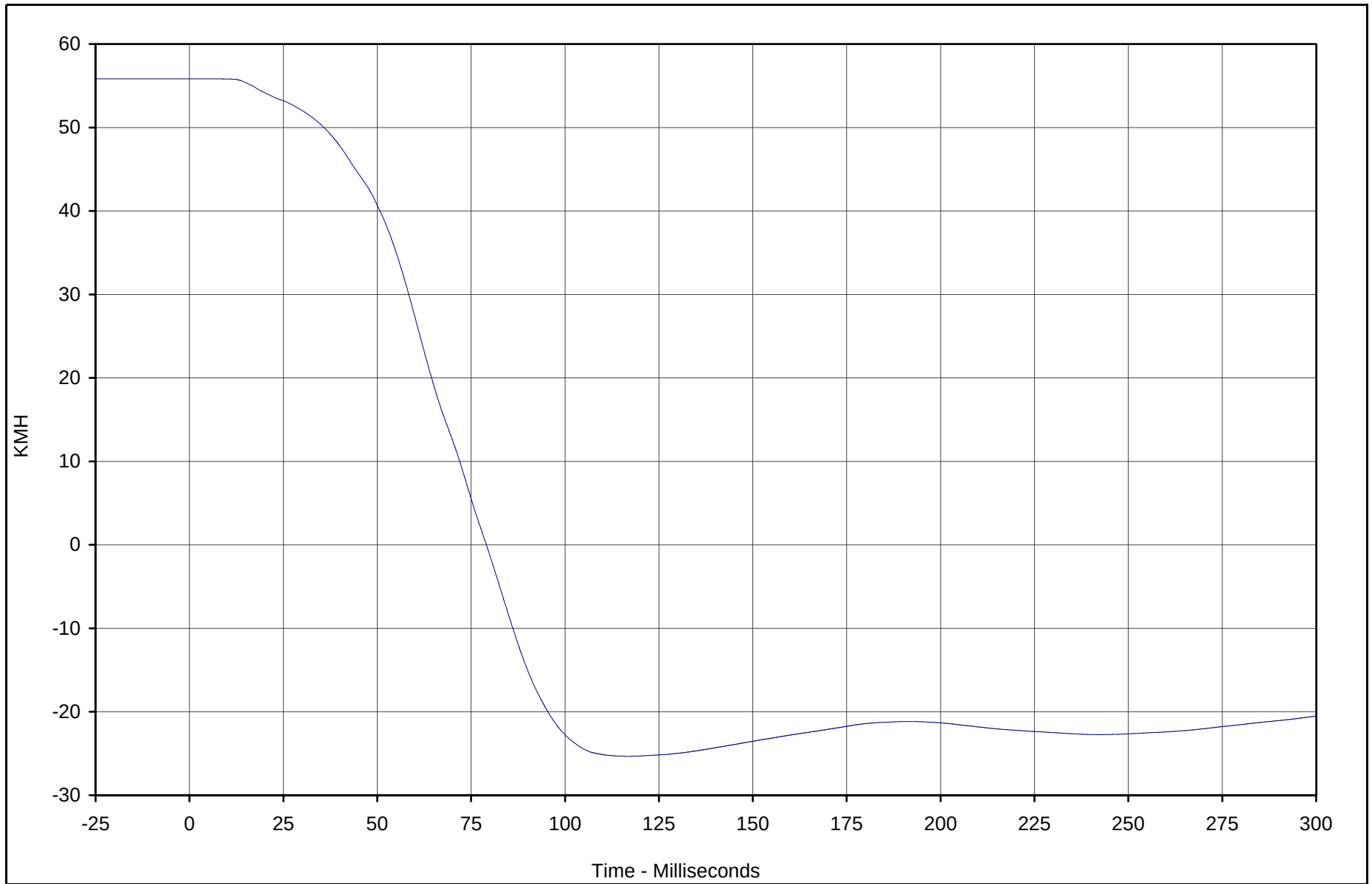


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Chest Redundant X Velocity	016	IN1	KMH	55.8	6.5	-25.3	116.8	180

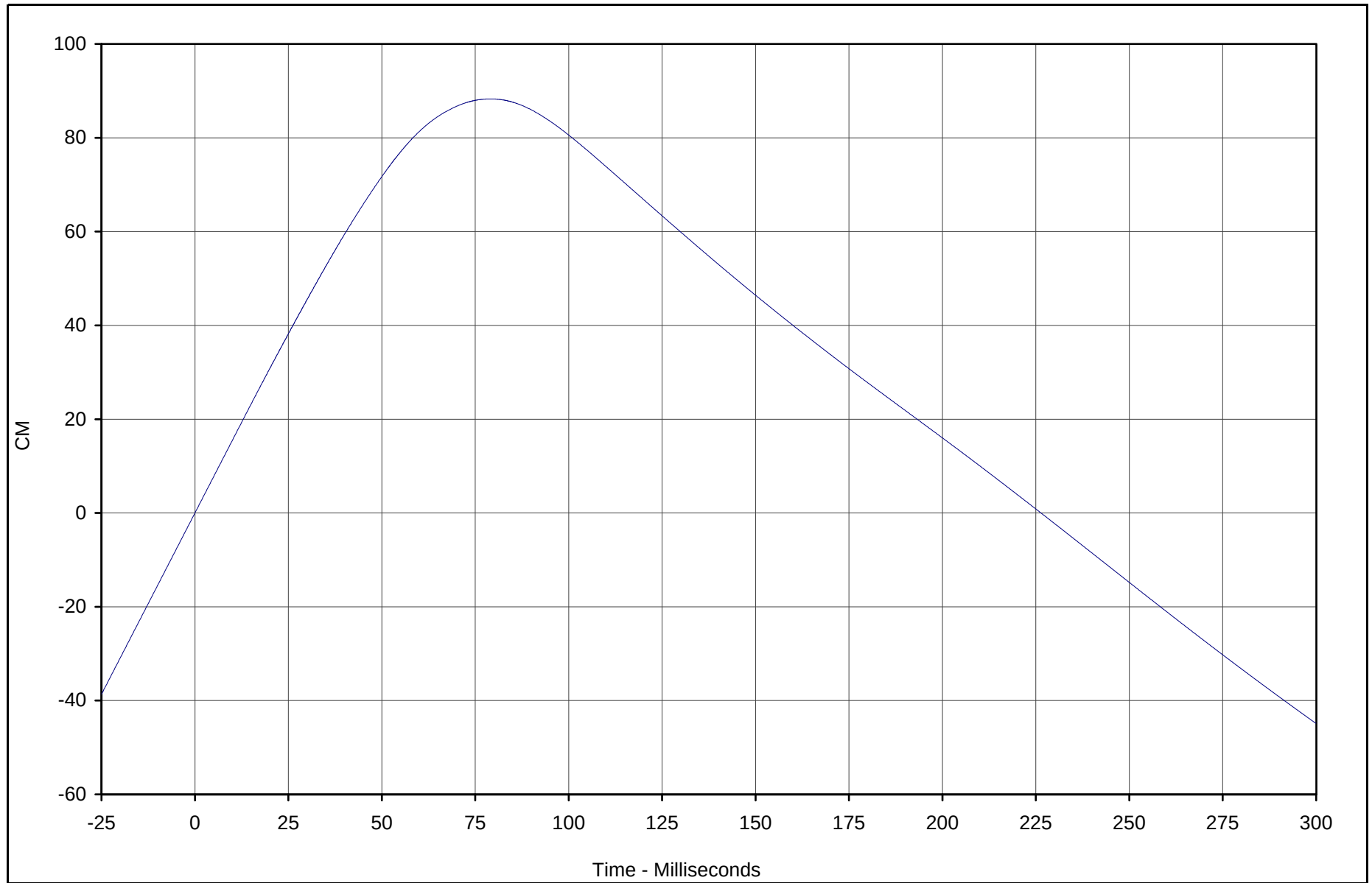


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Chest Redundant X Displ.	016	IN2	CM	88.3	79.1	-44.8	299.9	180



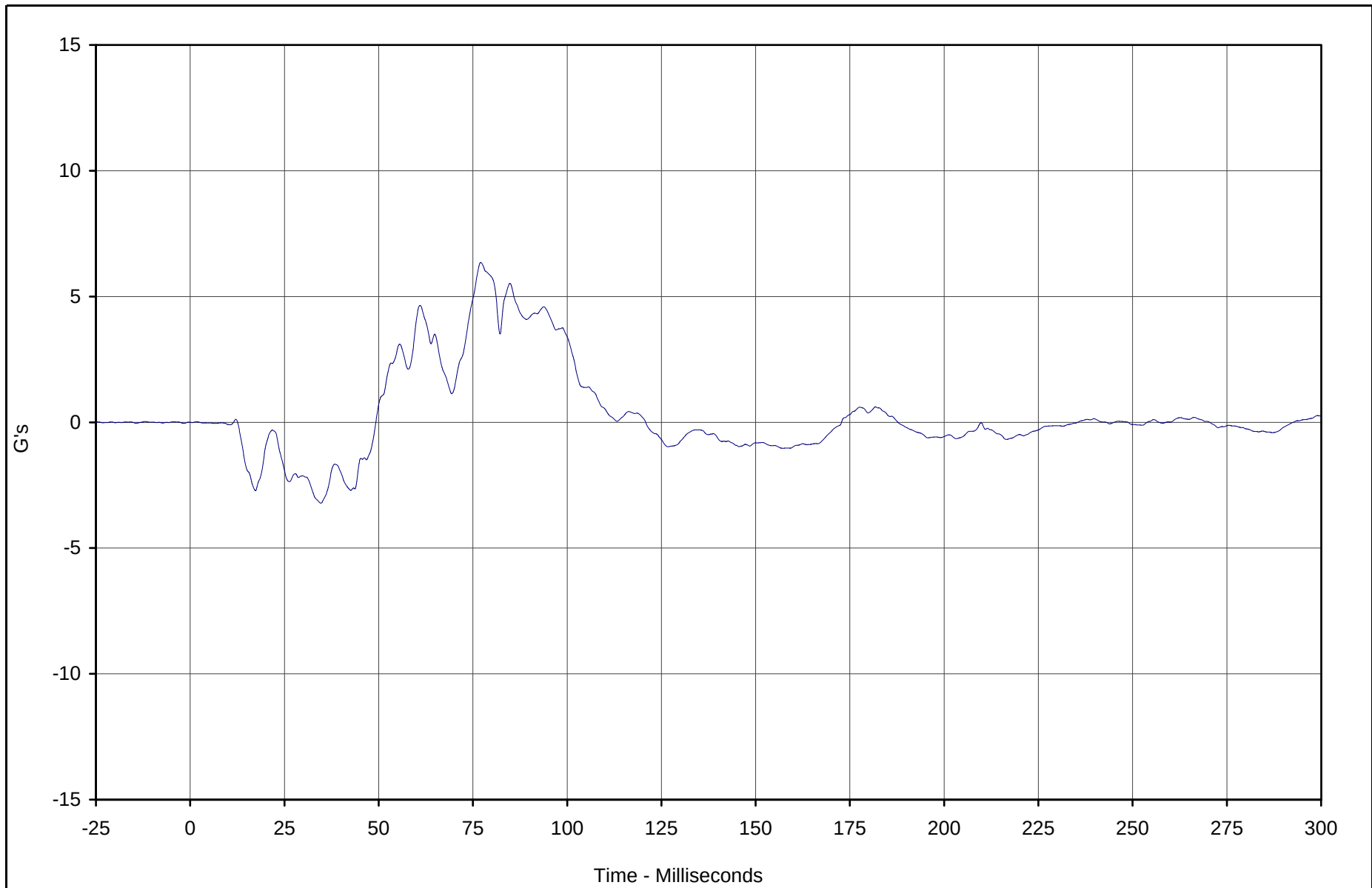
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

B-30



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Chest Redundant Y	017	FIL	G's	6.4	77.1	-3.2	34.6	180



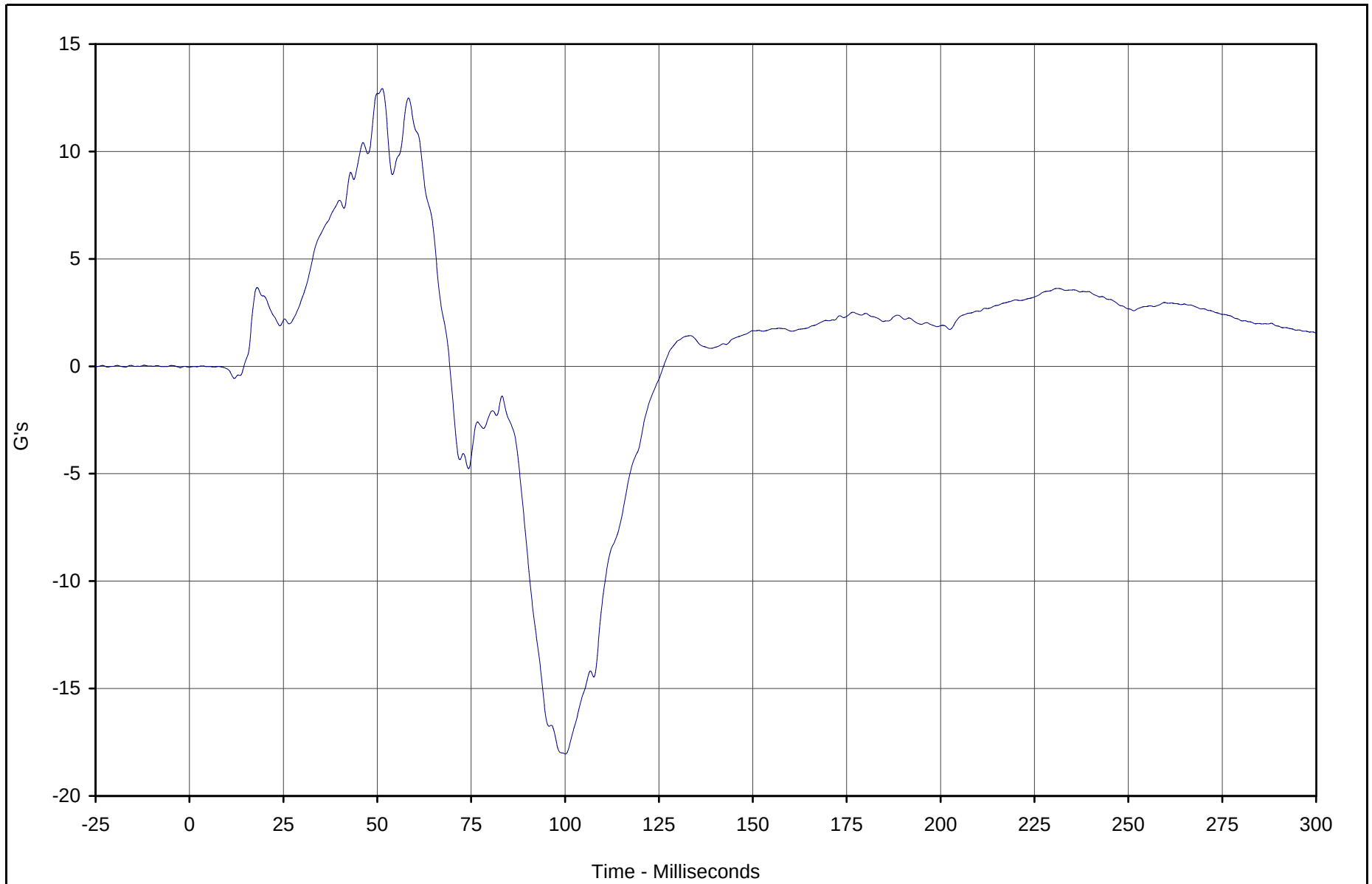
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Chest Redundant Z	018	FIL	G's	12.9	51.3	-18.1	100.1	180

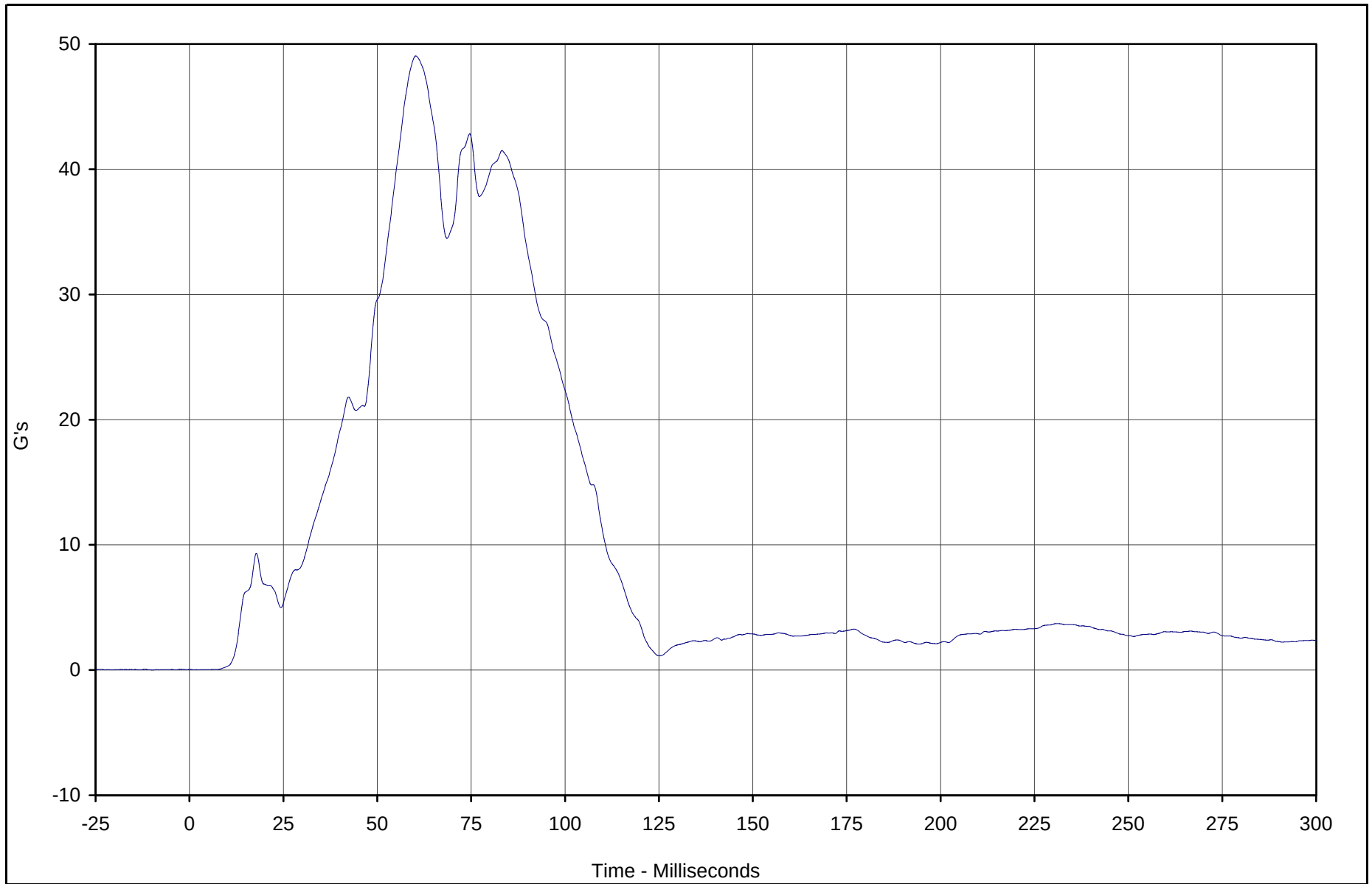


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Chest Resultant Redundant	016	RES	G's	49.0	60.3	0.0	2.4	180

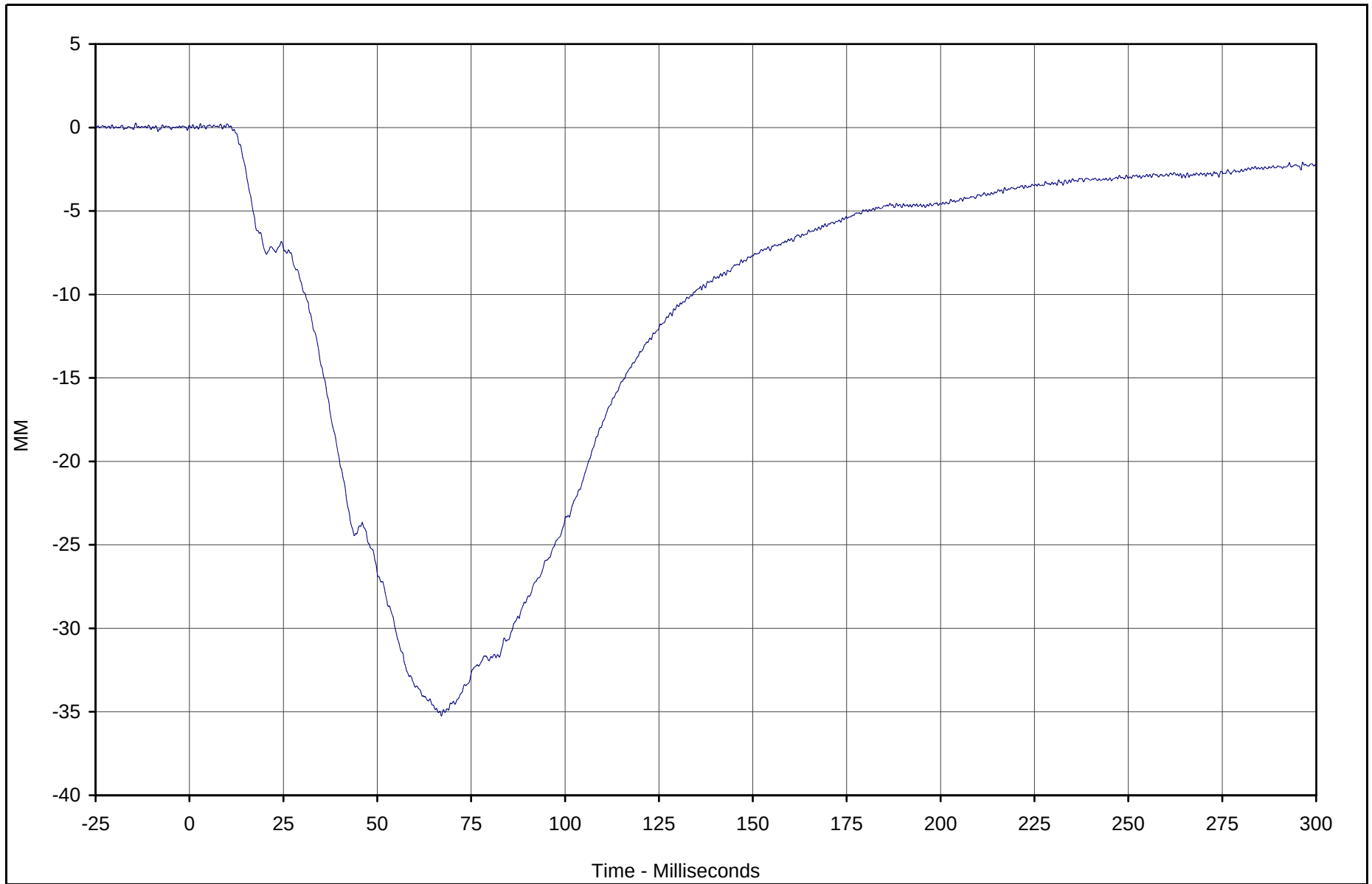


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Chest Displacement X	019	FIL	MM	0.2	2.9	-35.3	67.1	600

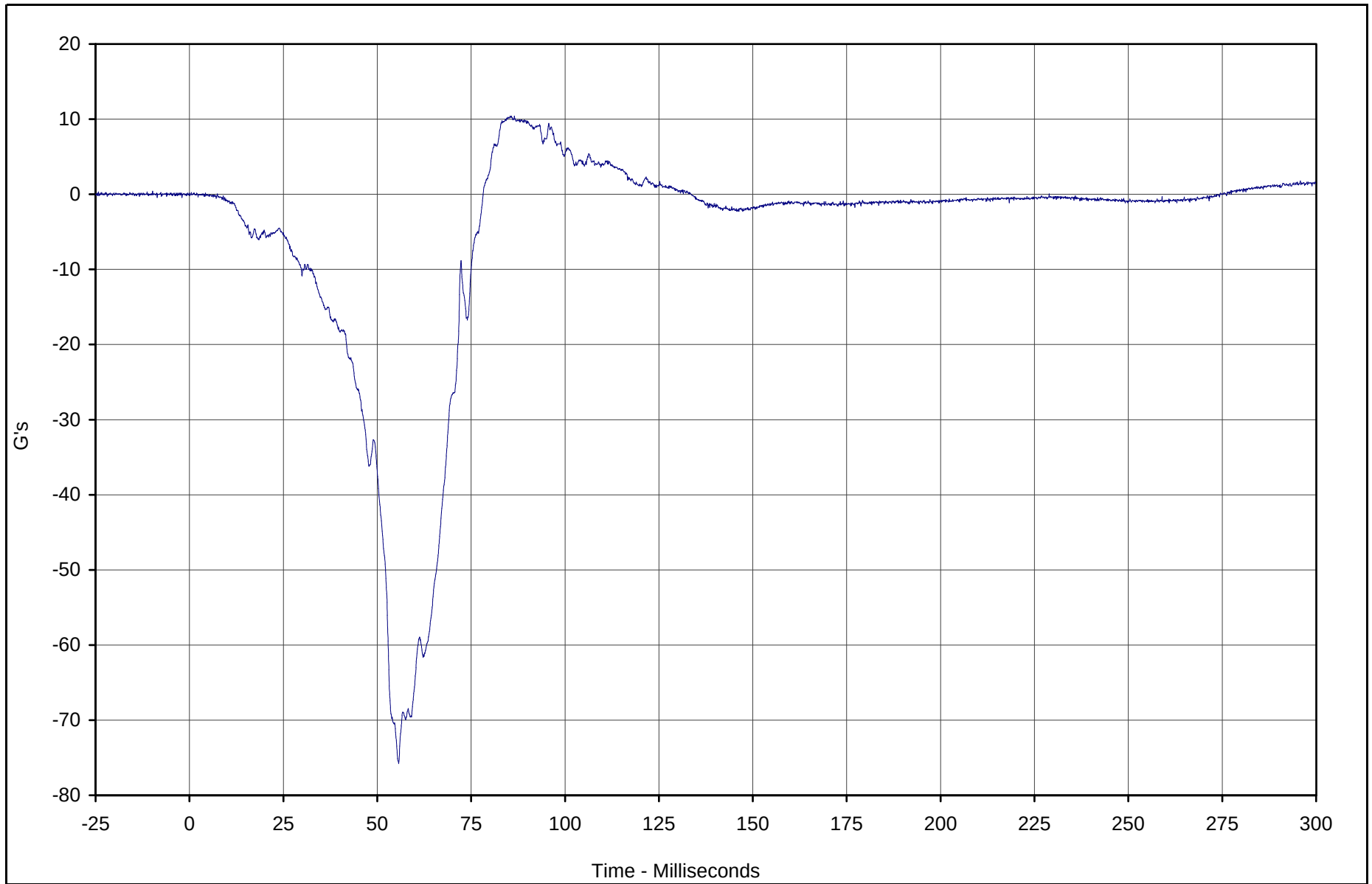


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Pelvis X	020	FIL	G's	10.4	85.4	-75.8	55.7	1000

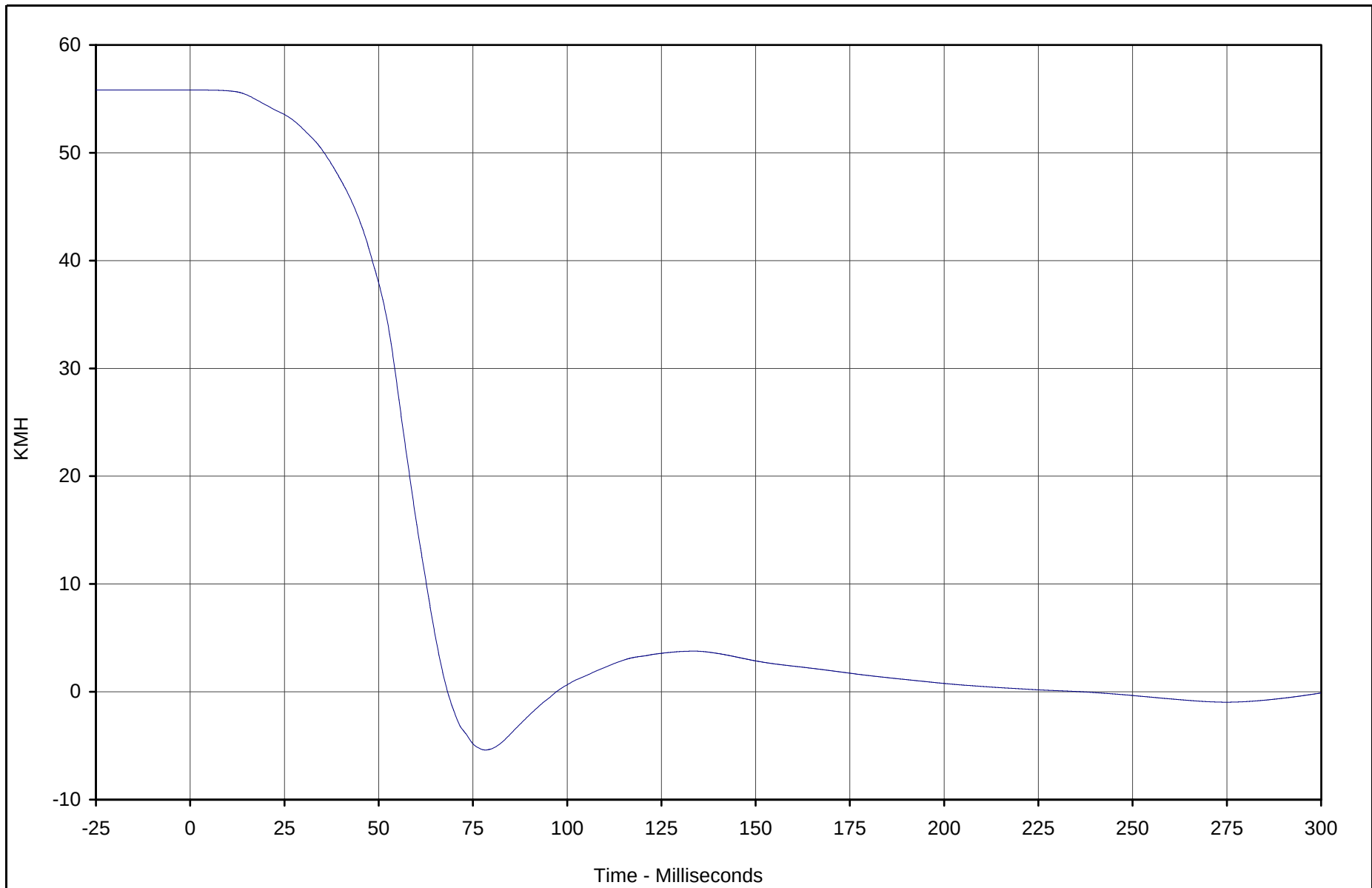


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Pelvis X Velocity	020	IN1	KMH	55.8	1.4	-5.4	78.3	180

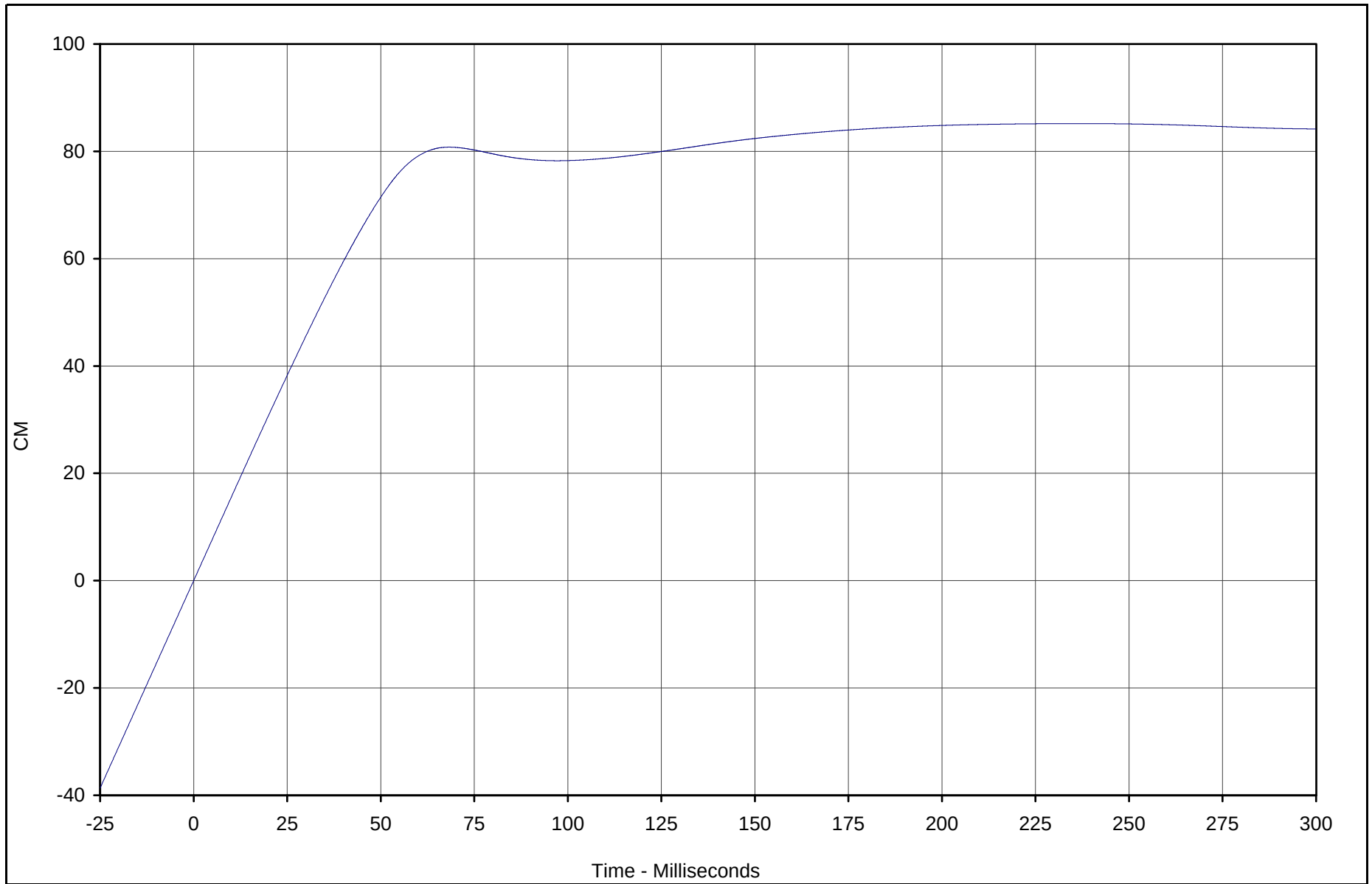


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Pelvis X Displ.	020	IN2	CM	85.2	236.5	0.0	0.0	180

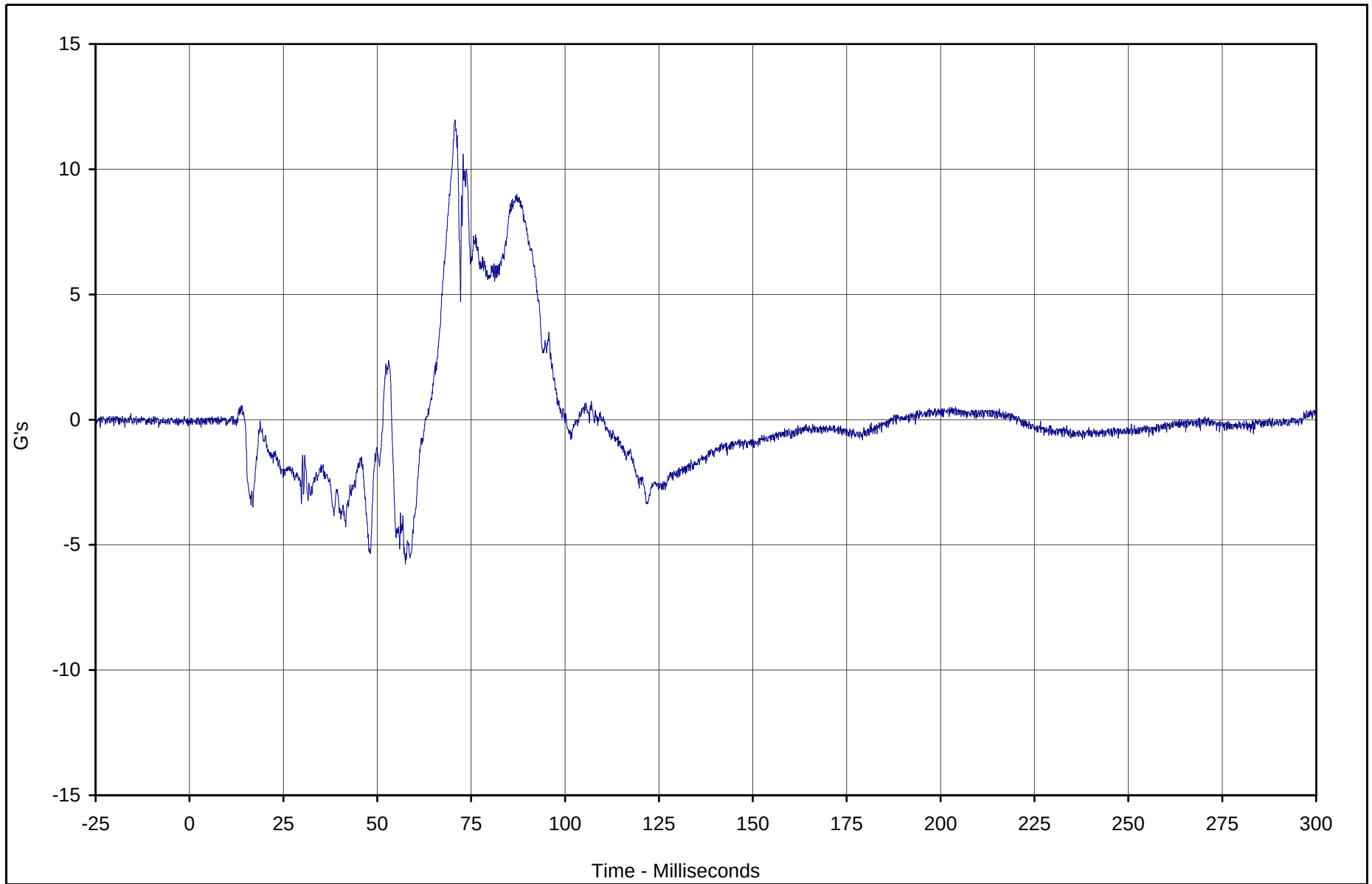


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Pelvis Y	021	FIL	G's	12.0	70.7	-5.8	57.5	1000

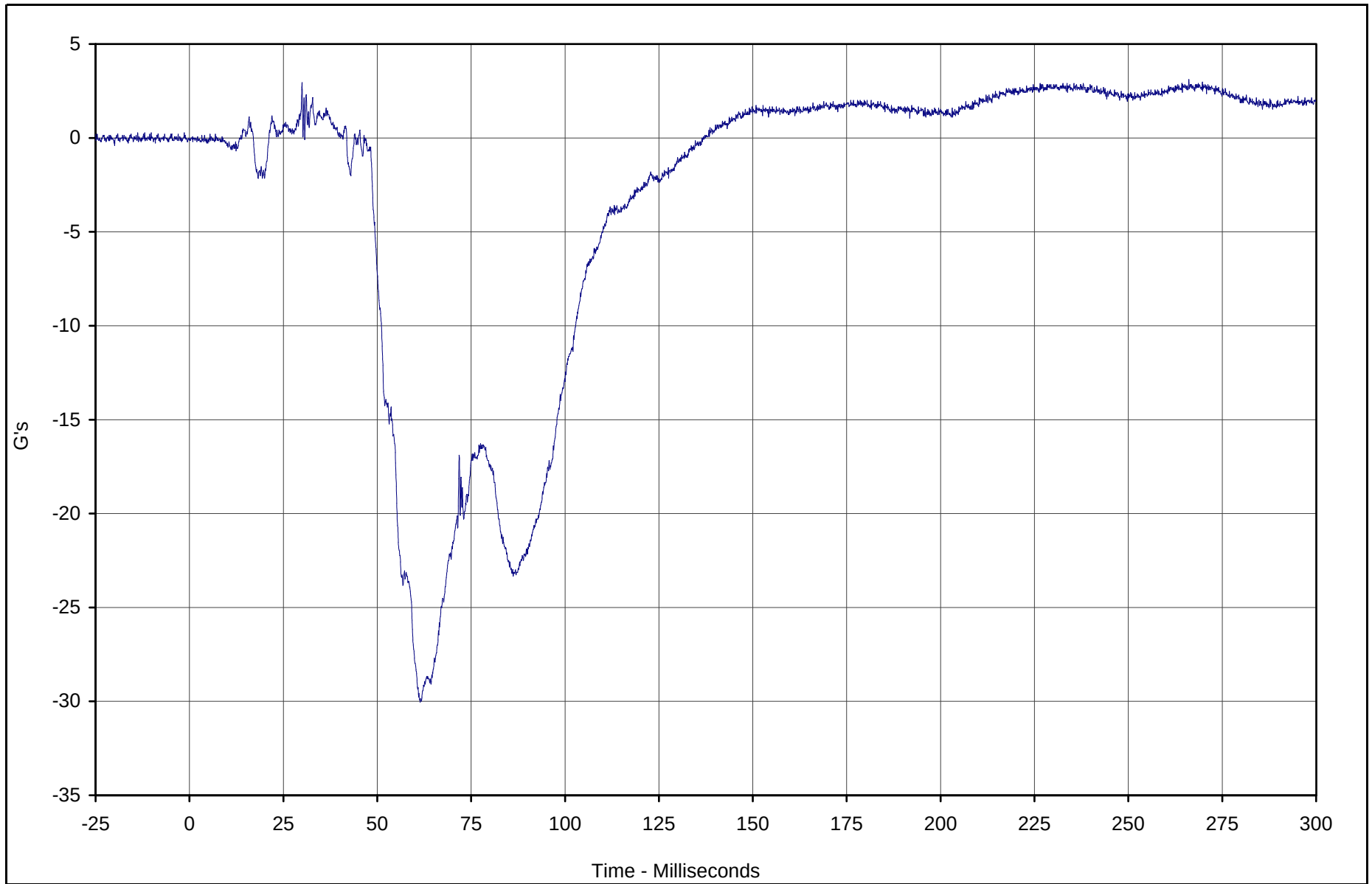


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Pelvis Z	022	FIL	G's	3.1	266.1	-30.1	61.4	1000

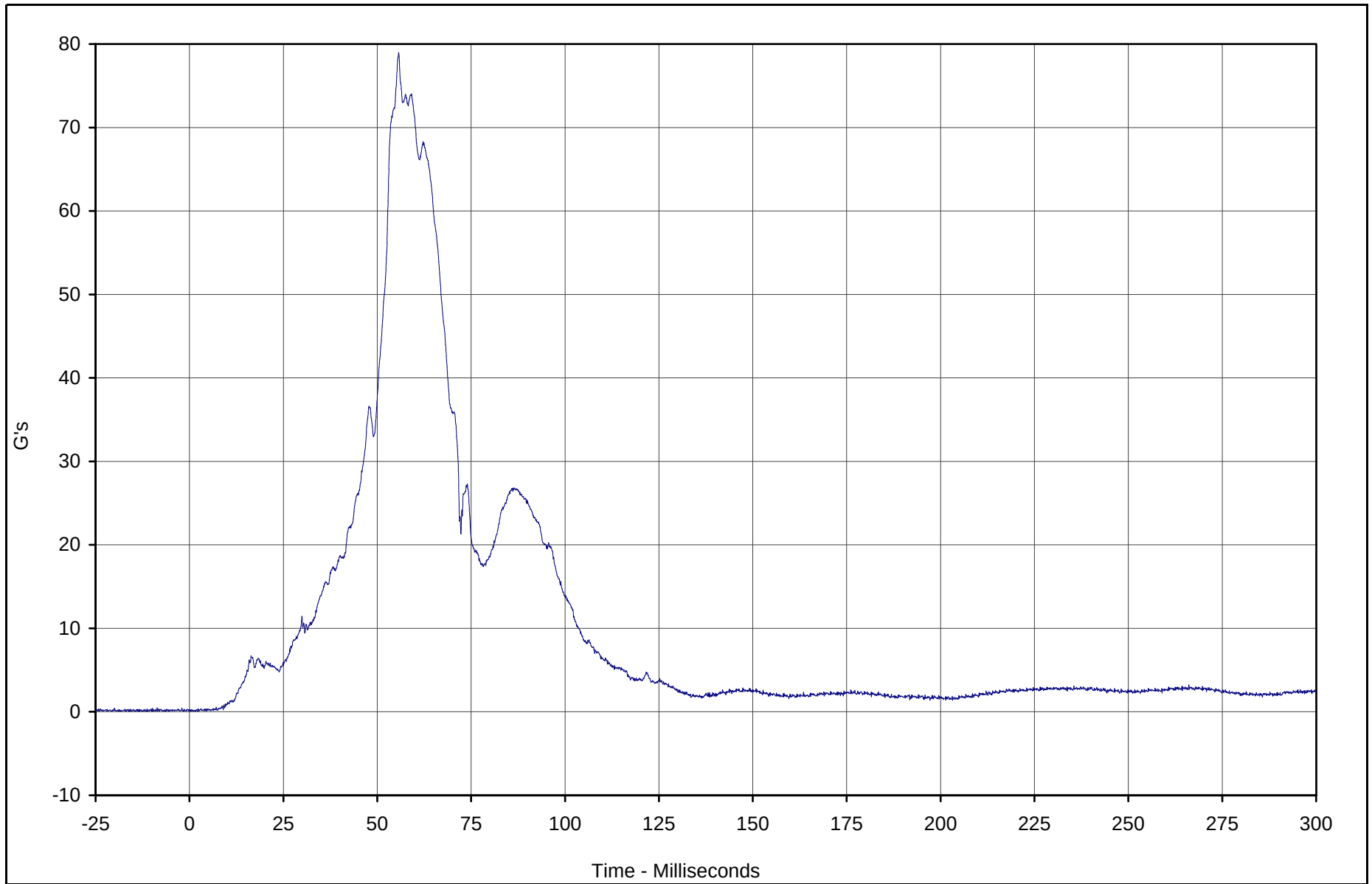


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Pelvis Resultant	023	RES	G's	79.0	55.7	0.1	1.6	1000

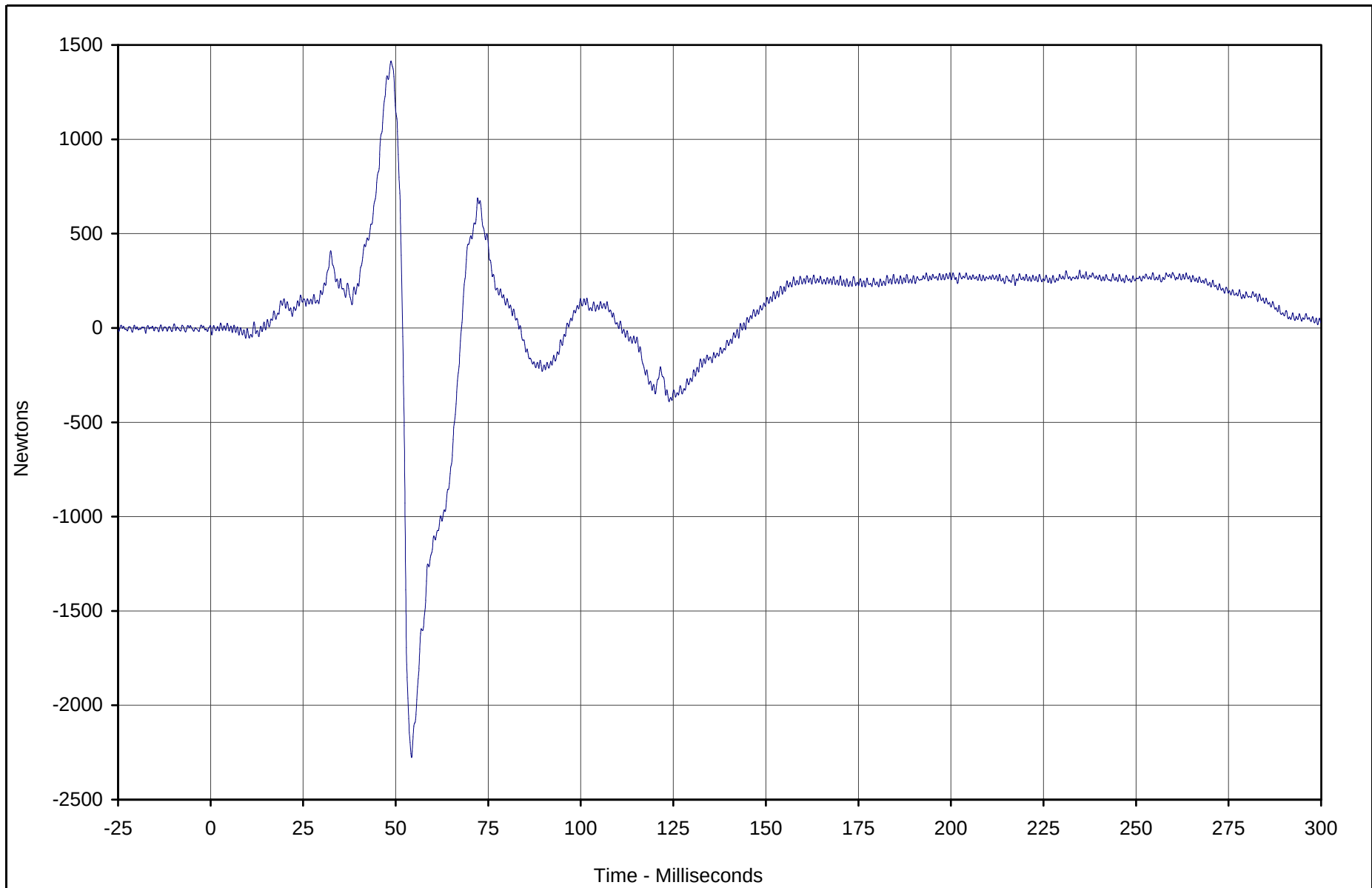


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Left Femur Force	023	FIL	Newtons	1415.2	48.7	-2277.4	54.3	600

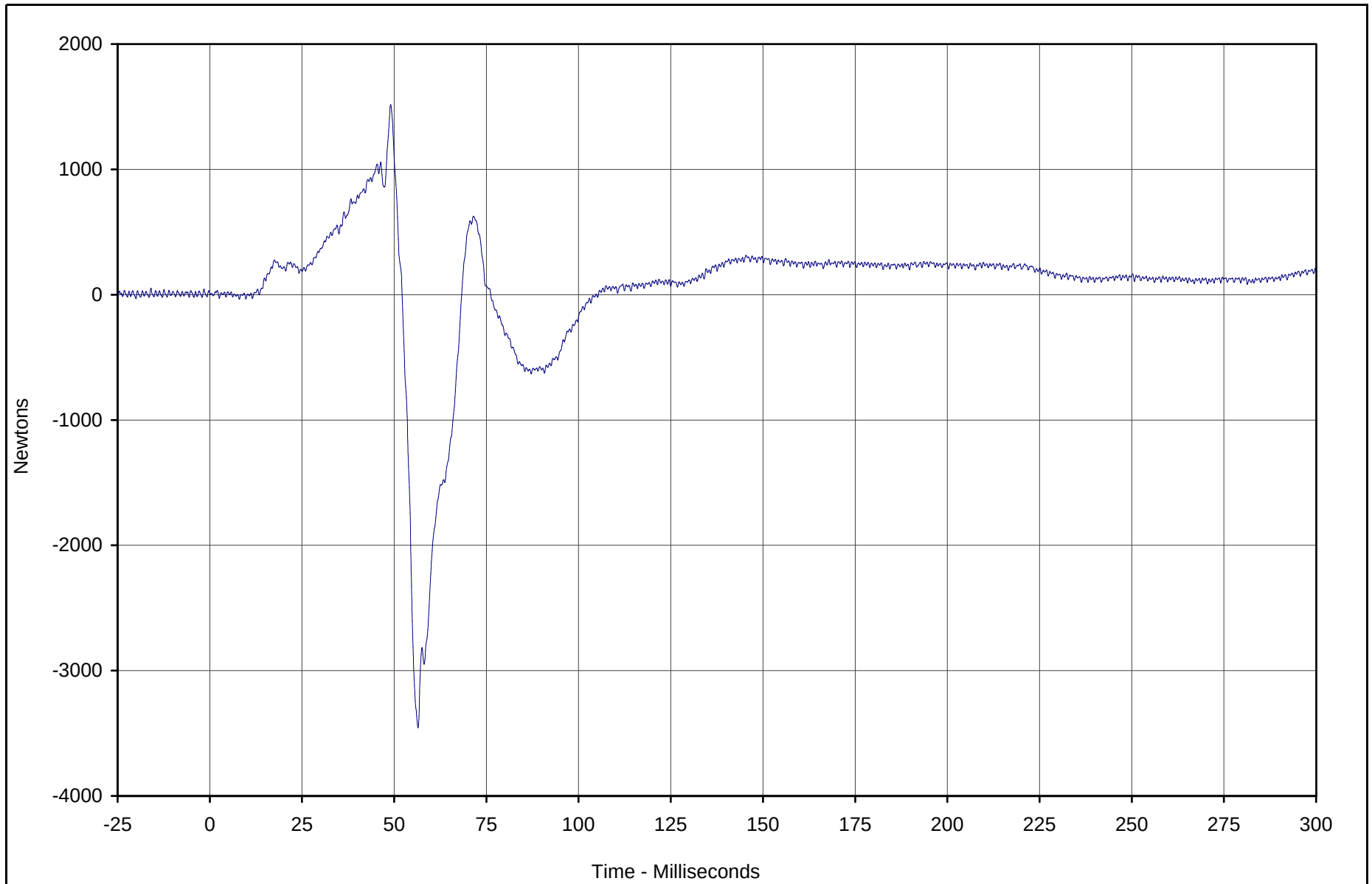


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Right Femur Force	024	FIL	Newtons	1515.9	49.1	-3457.3	56.5	600

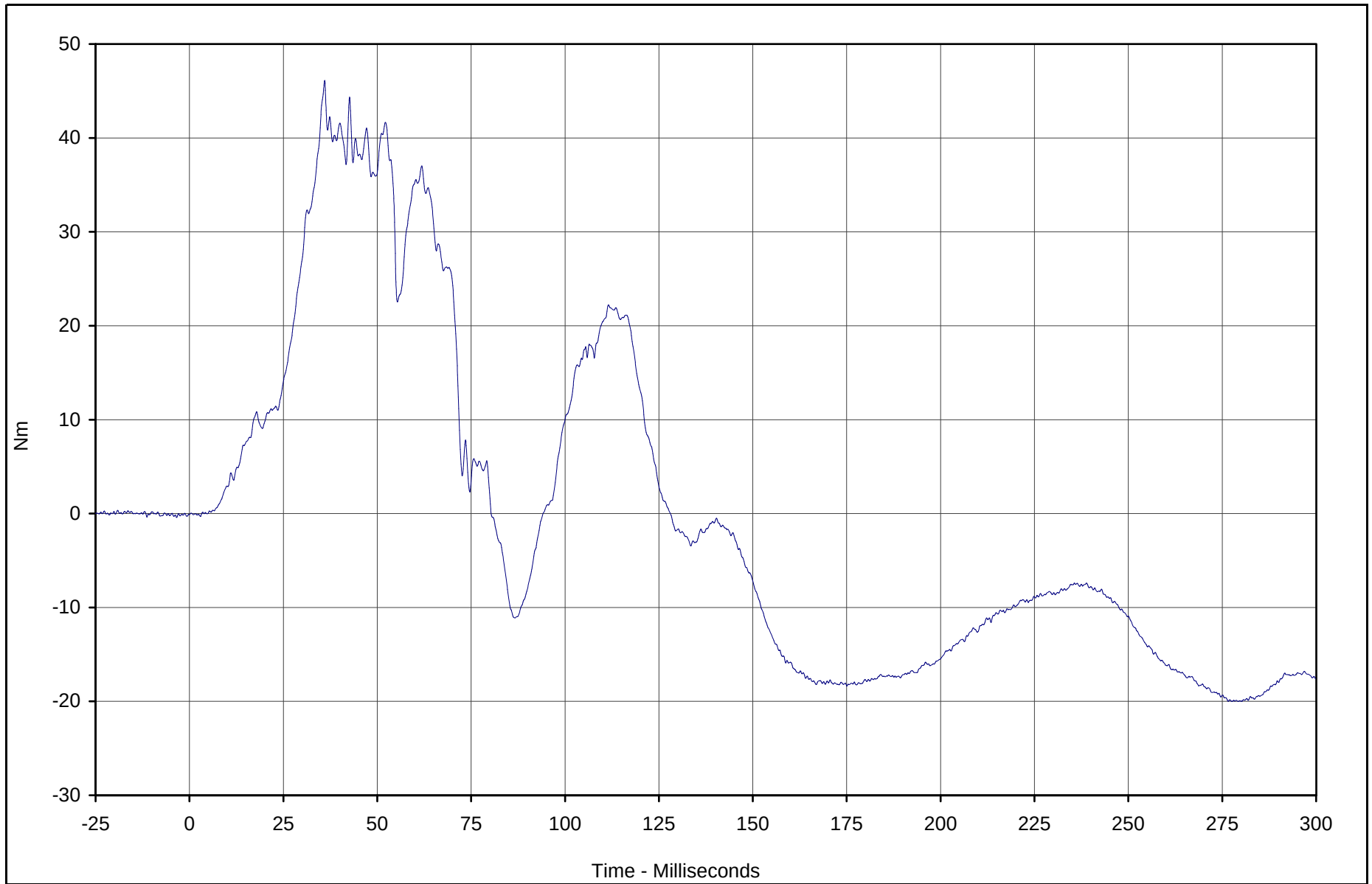


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Left Upper Tibia Moment X	025	FIL	Nm	46.1	36.0	-20.0	279.2	600

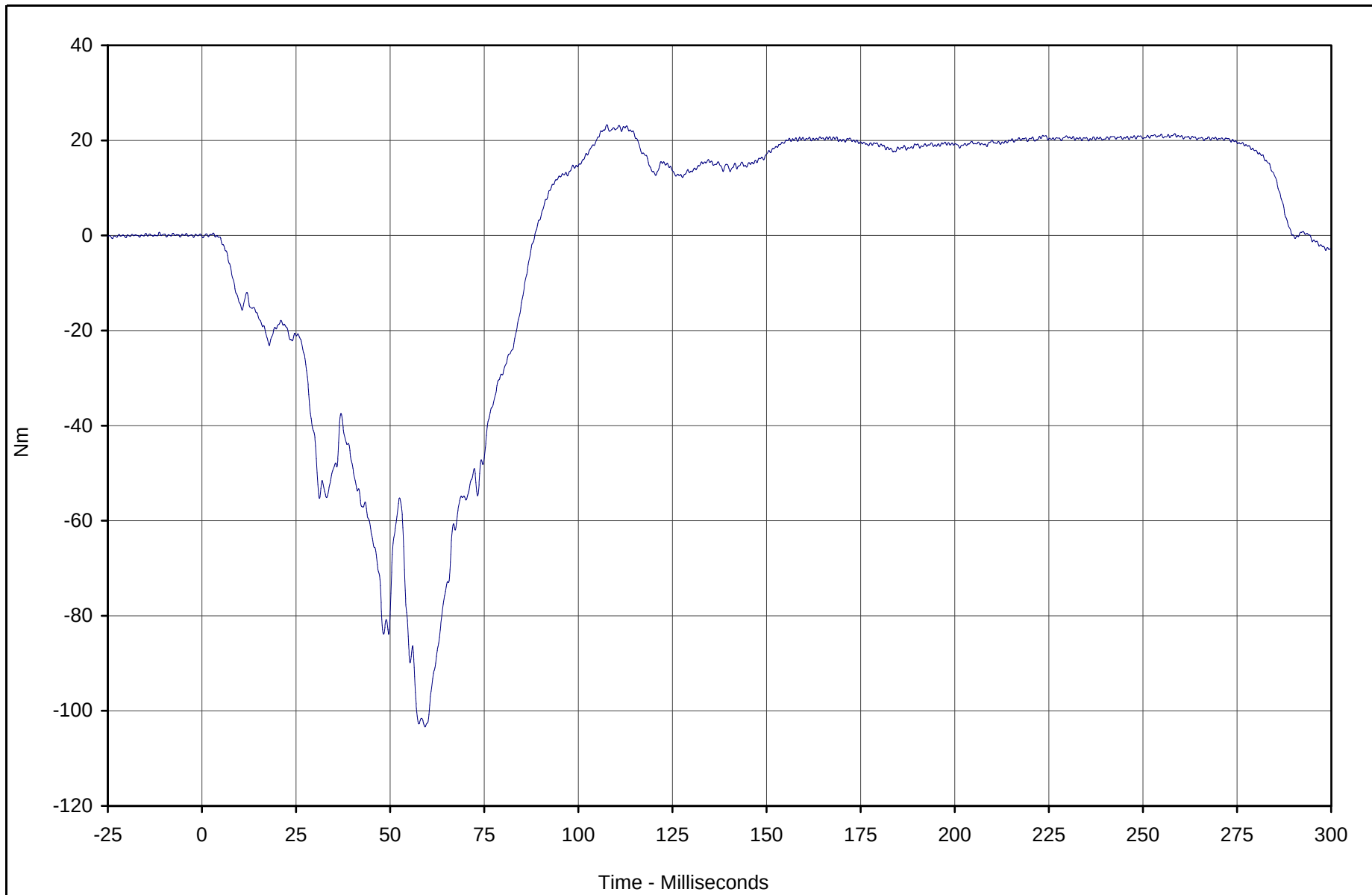


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Left Upper Tibia Moment Y	026	FIL	Nm	23.3	107.6	-103.4	59.3	600

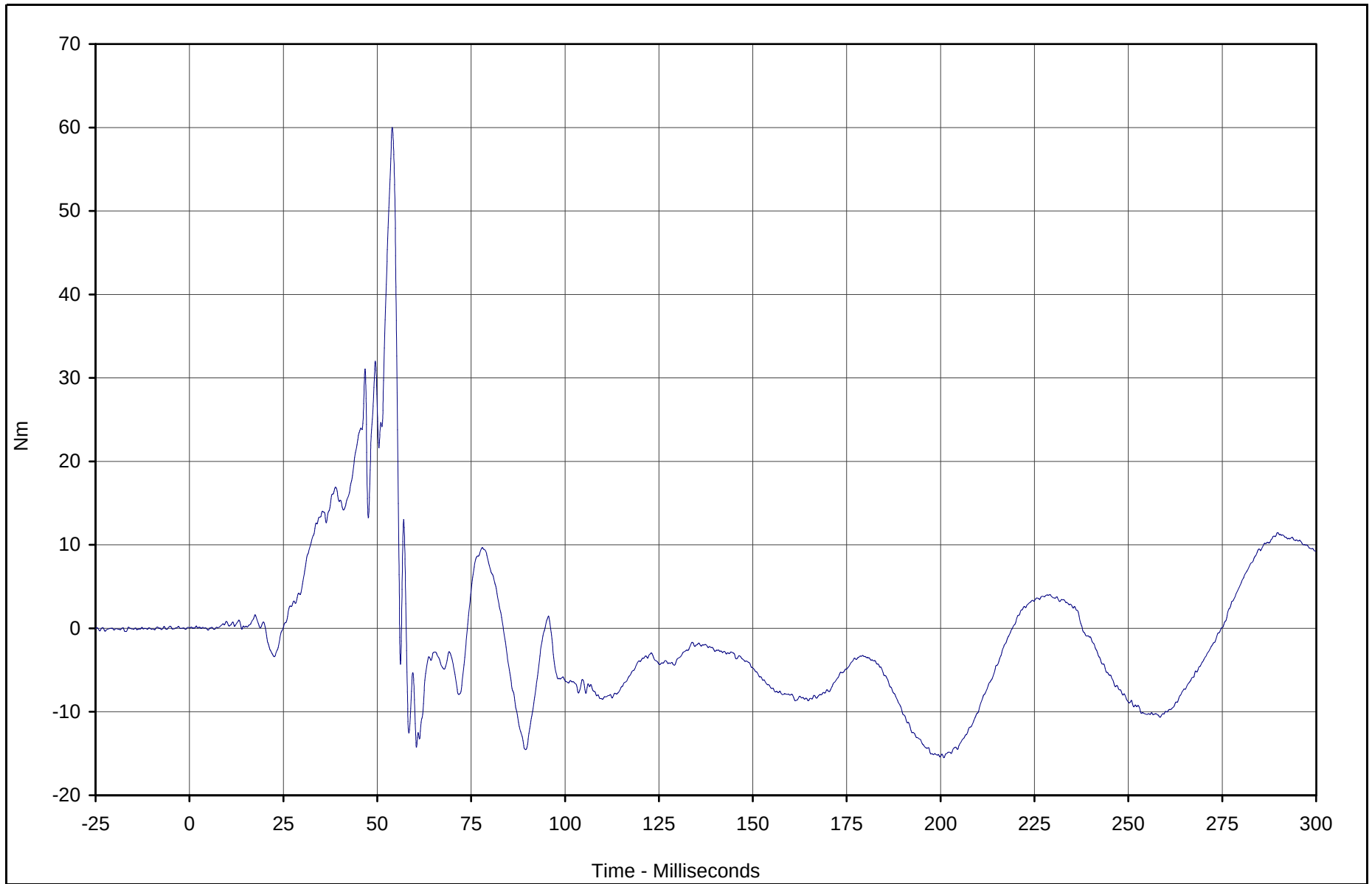


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Right Upper Tibia Moment X	027	FIL	Nm	60.0	54.0	-15.5	200.9	600



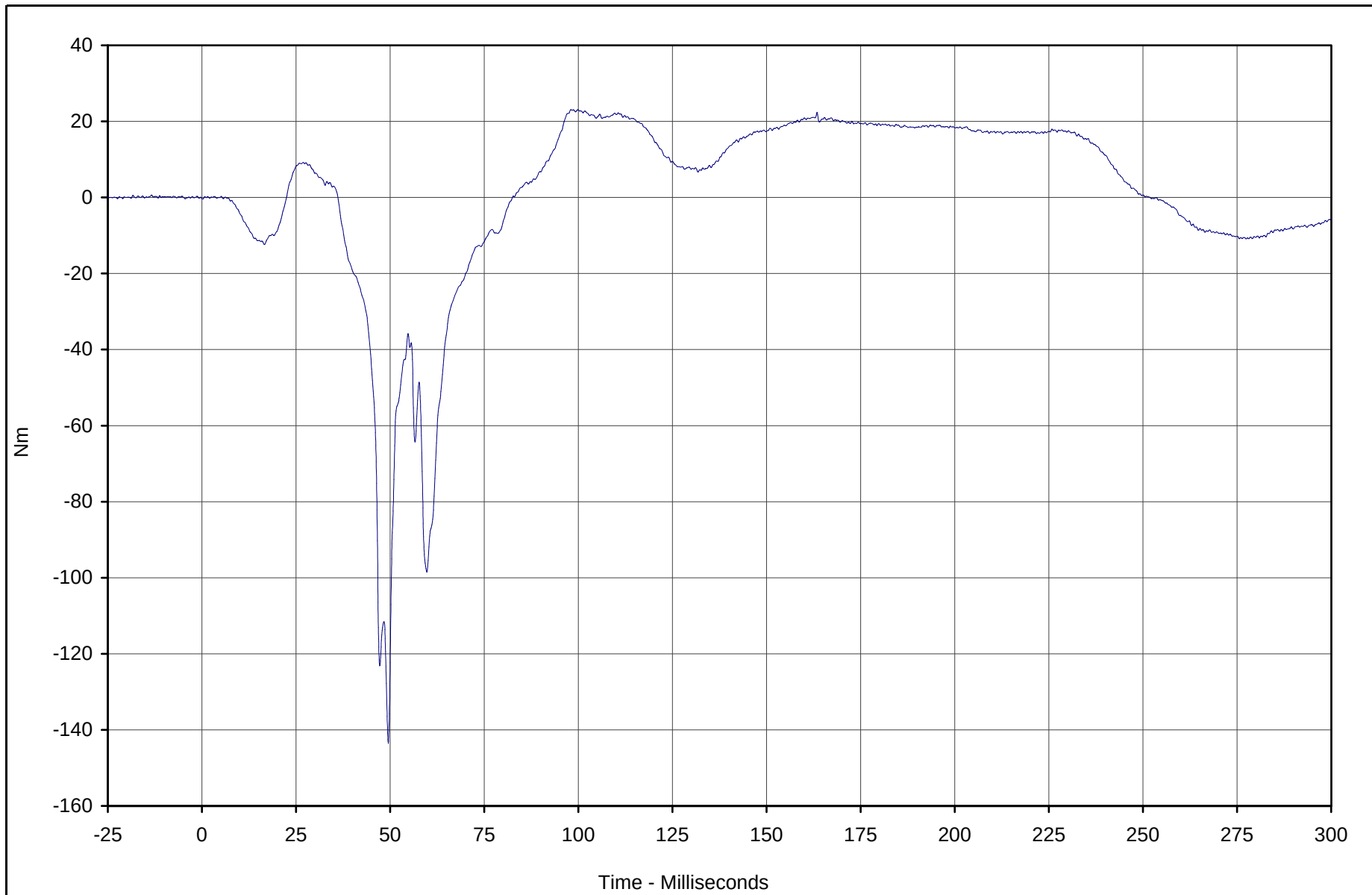
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

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Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Right Upper Tibia Moment Y	028	FIL	Nm	23.1	99.9	-143.6	49.5	600



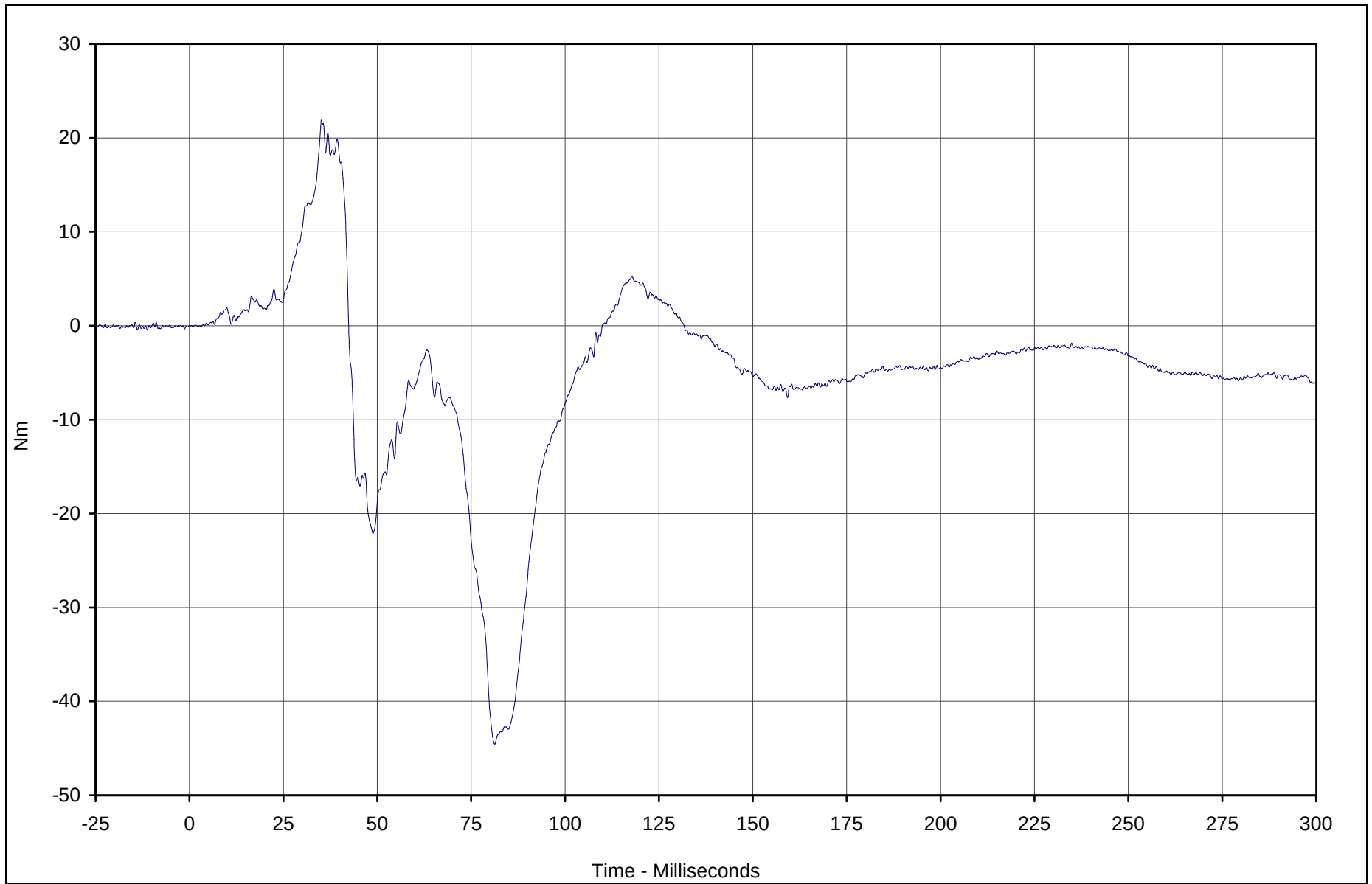
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Left Lower Tibia Moment X	029	FIL	Nm	21.9	35.1	-44.6	81.3	600

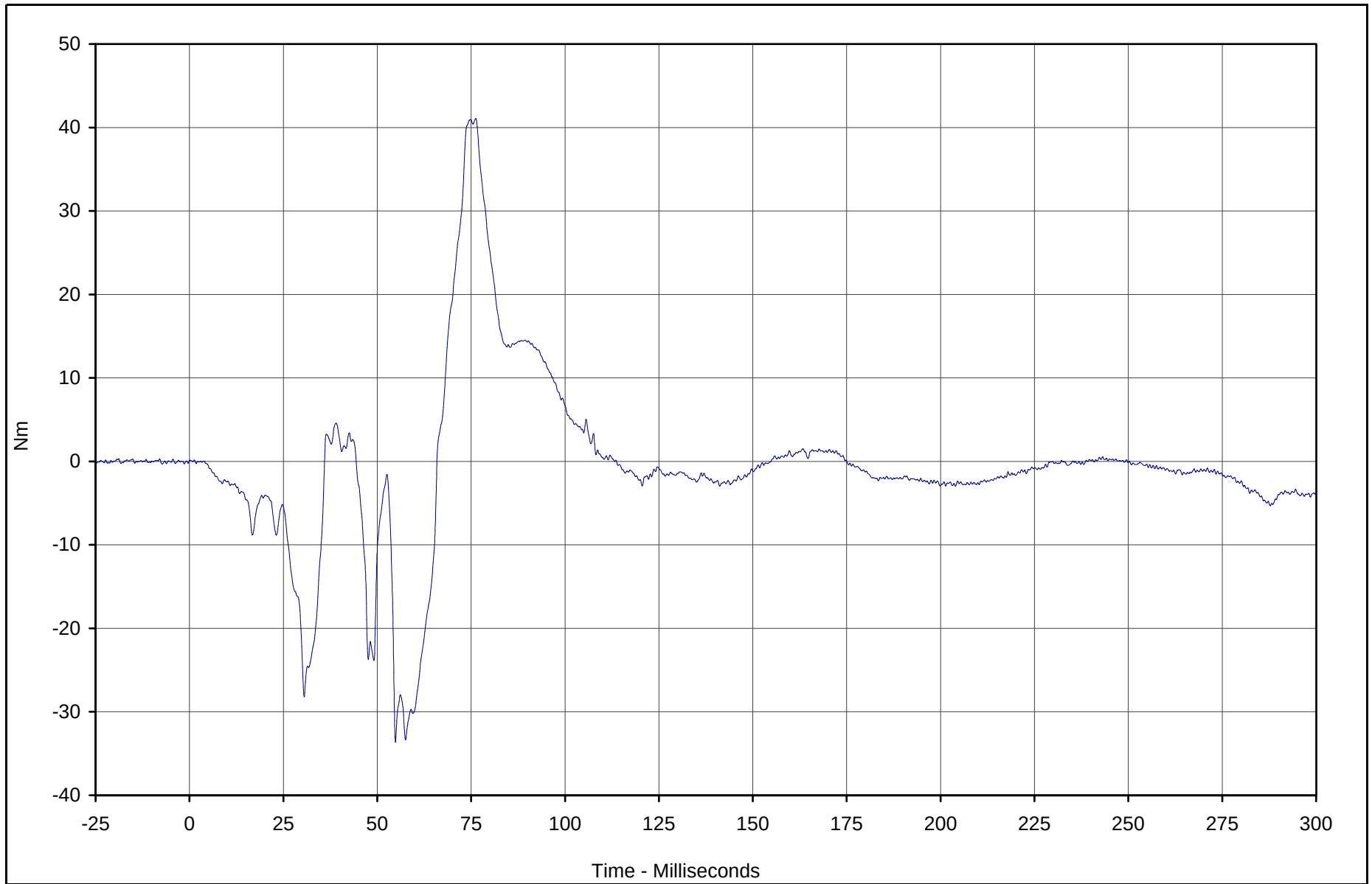


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Left Lower Tibia Moment Y	030	FIL	Nm	41.1	76.2	-33.6	54.9	600

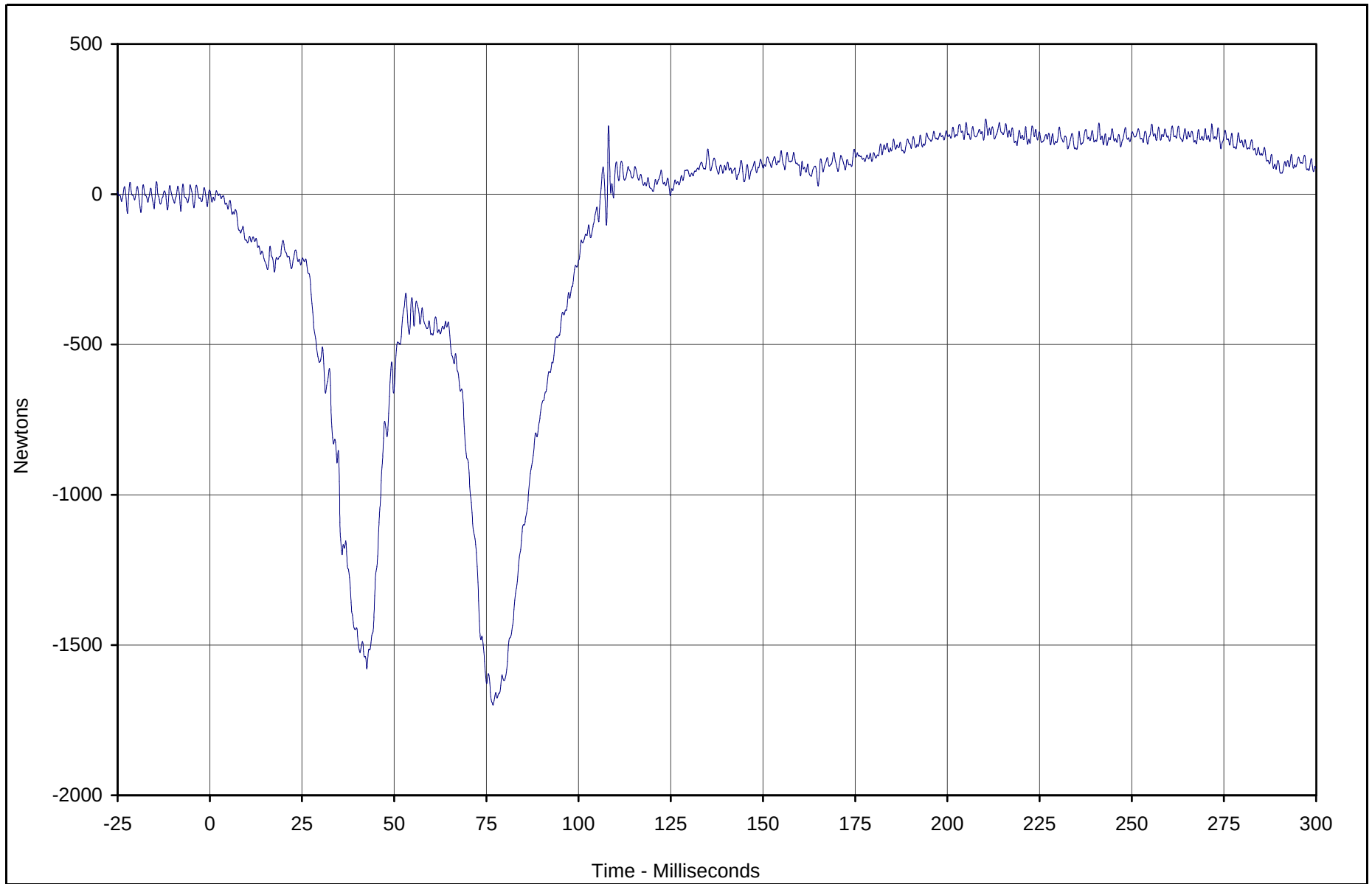


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Left Lower Tibia Force Z	031	FIL	Newtons	251.0	210.4	-1700.1	76.8	600

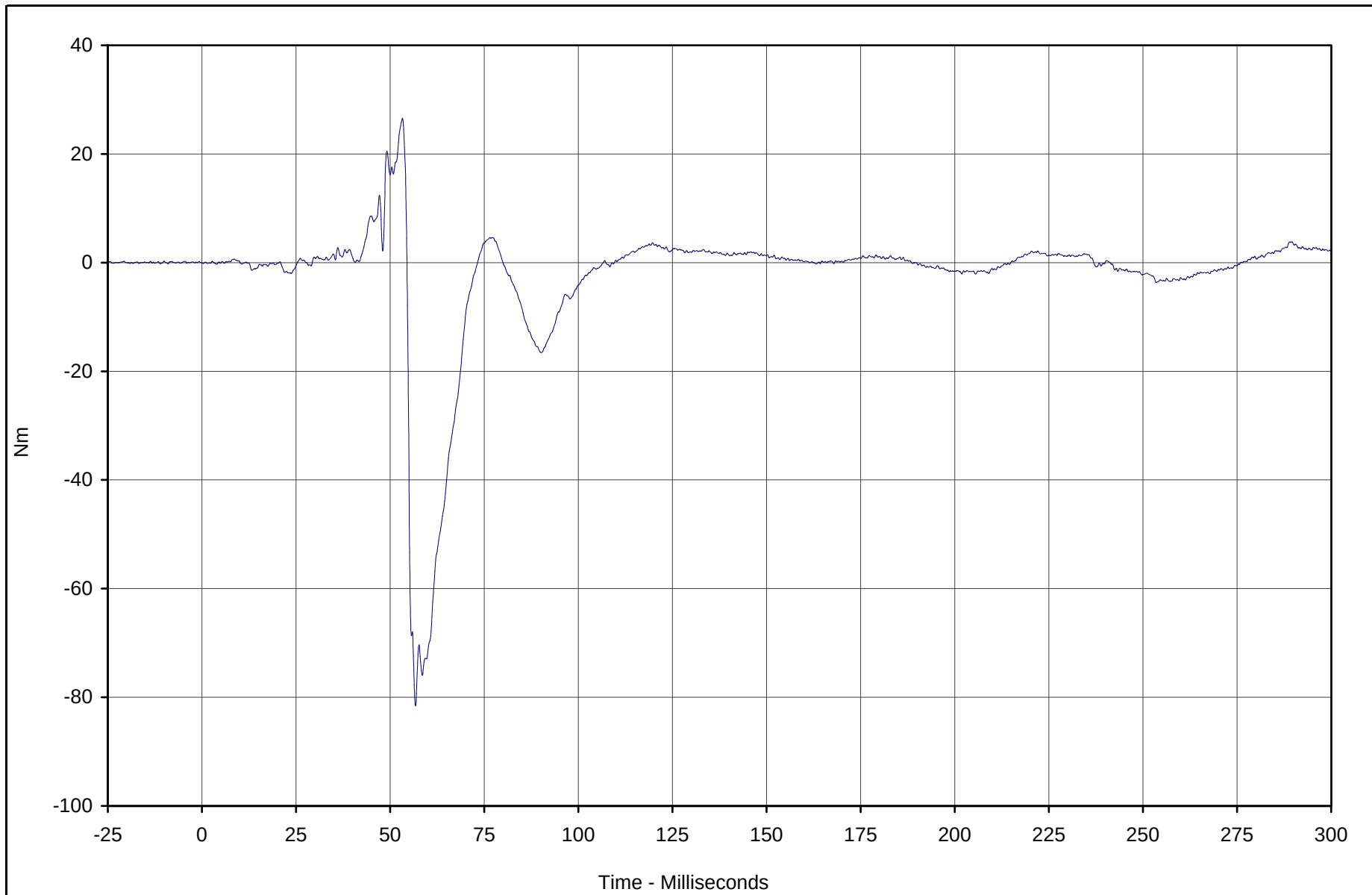


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Right Lower Tibia Moment X	032	FIL	Nm	26.6	53.3	-81.6	56.7	600

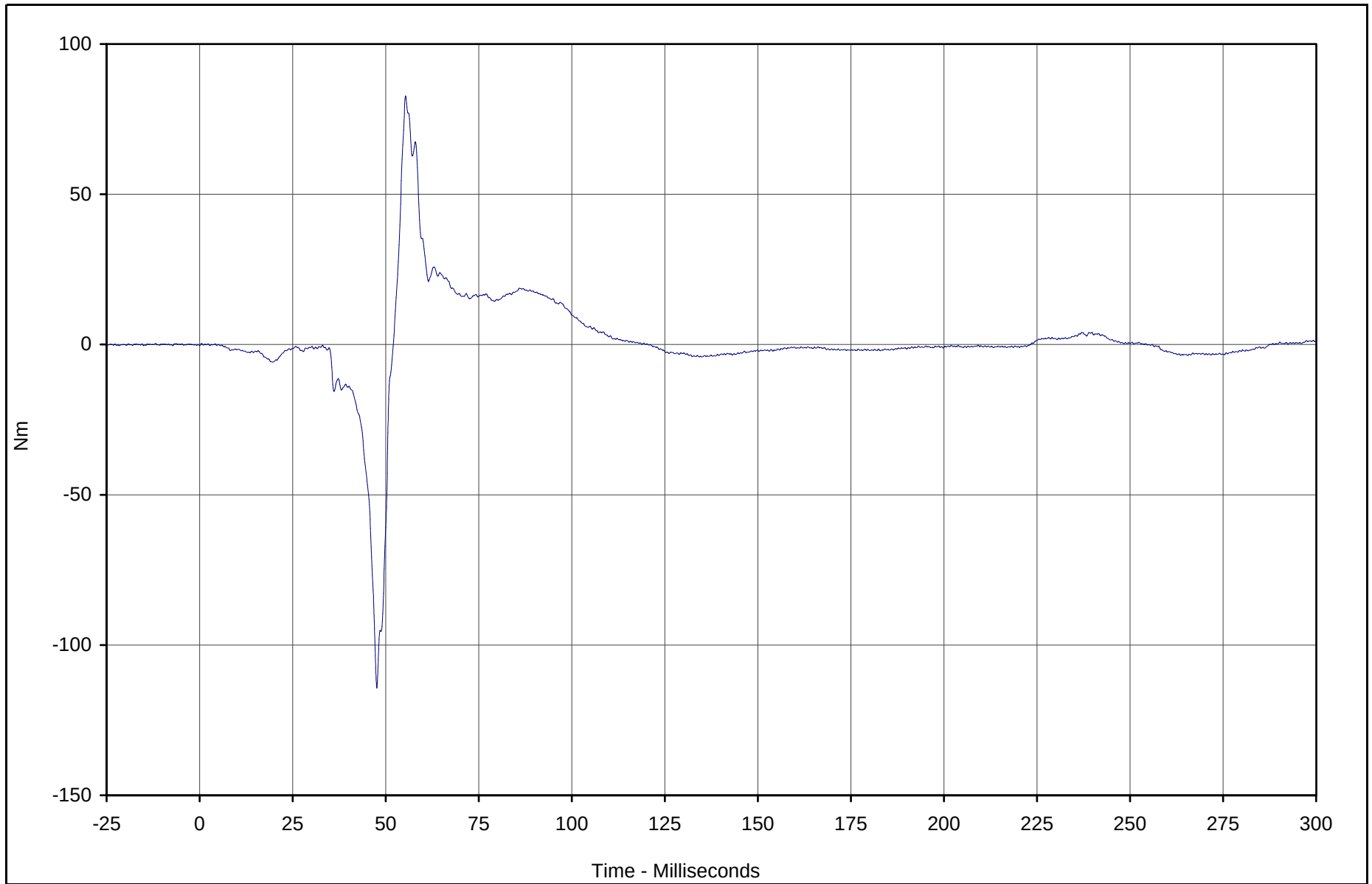


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Right Lower Tibia Moment Y	033	FIL	Nm	82.7	55.3	-114.4	47.6	600

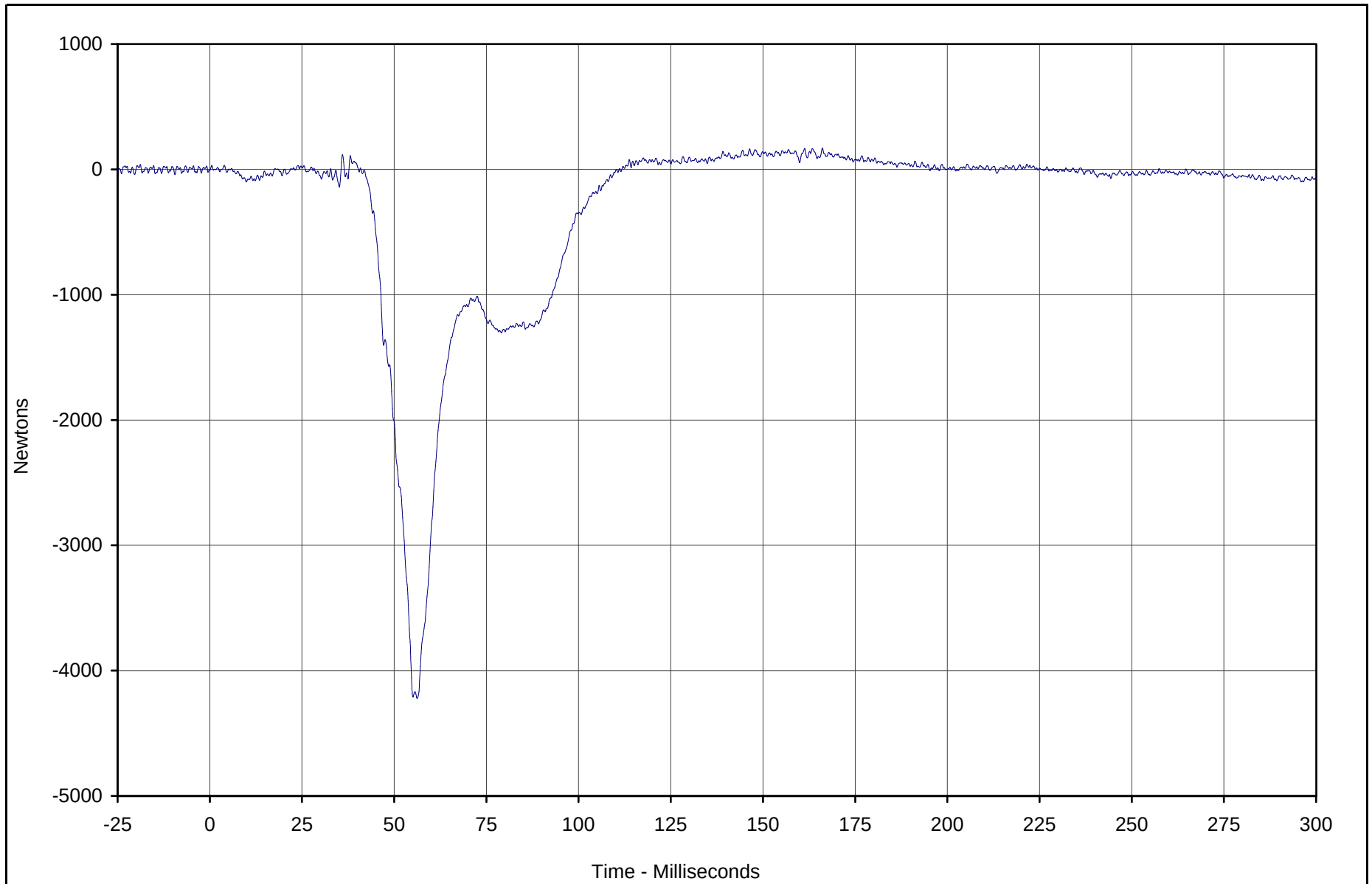


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Right Lower Tibia Force Z	034	FIL	Newtons	169.8	166.1	-4220.4	56.2	600

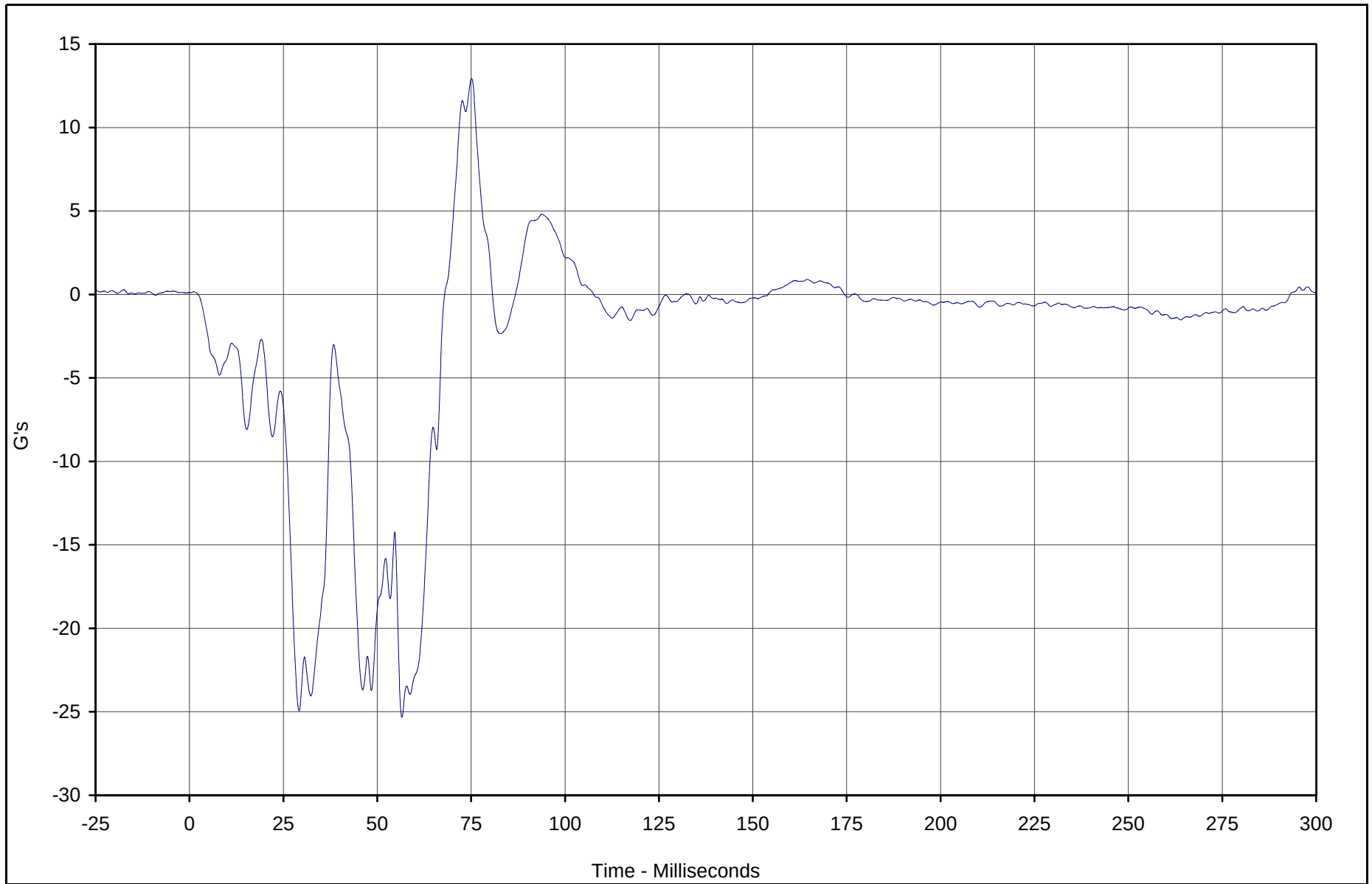


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Left Foot Aft X	035	FIL	G's	12.9	75.1	-25.3	56.6	180

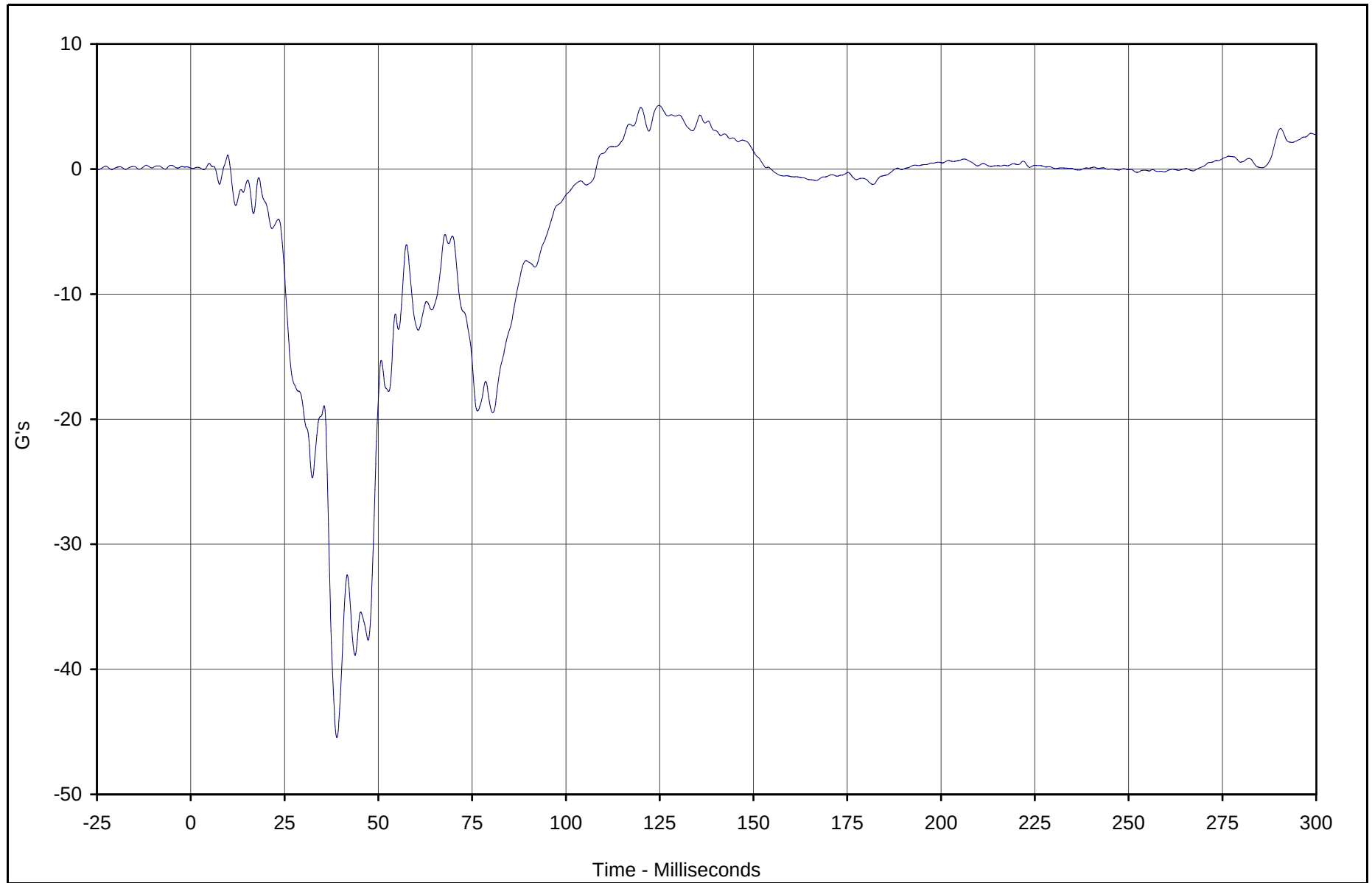


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Left Foot Aft Z	036	FIL	G's	5.1	124.8	-45.4	38.9	180

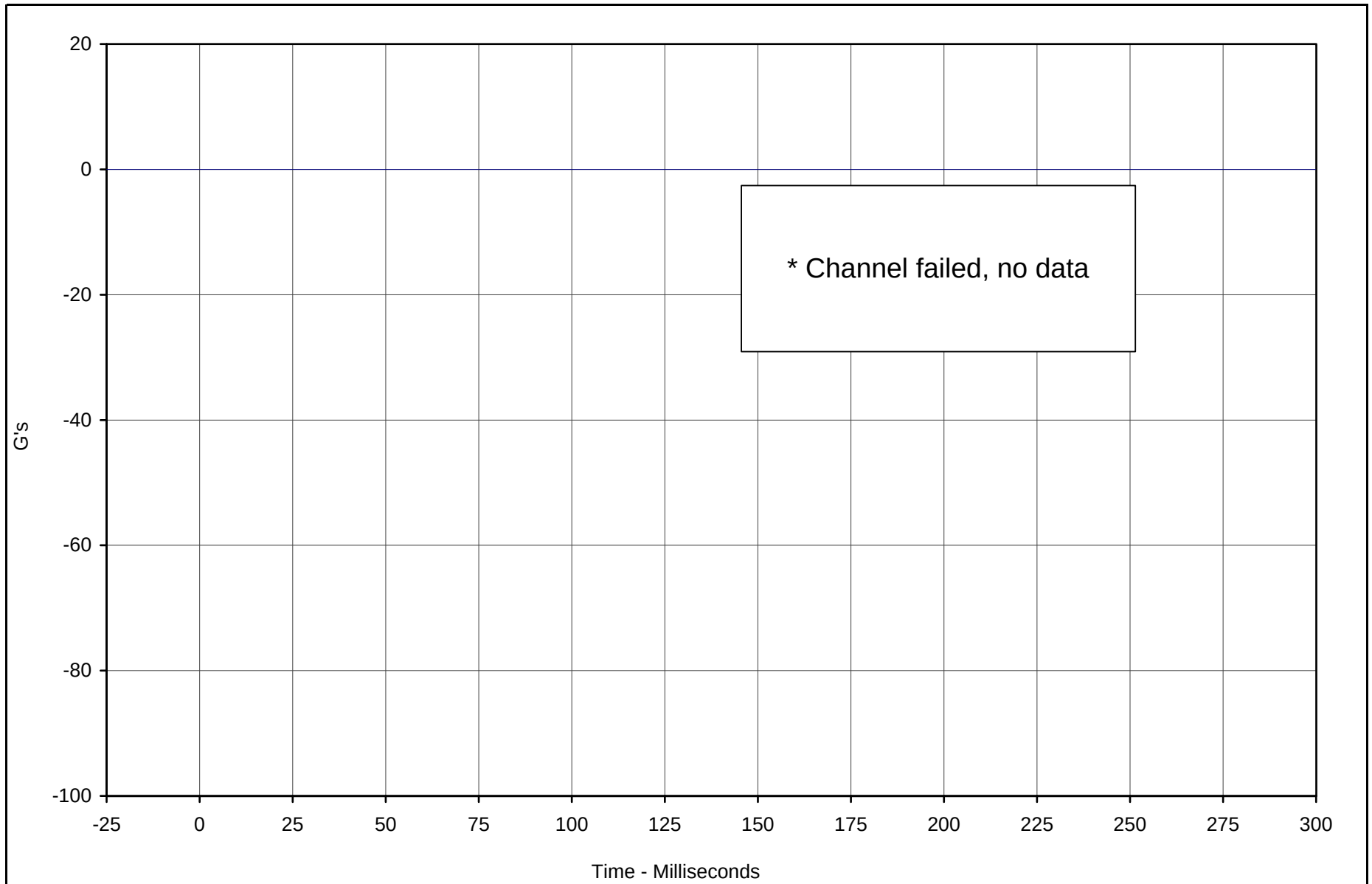


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



* Channel failed, no data

Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Left Foot Fore Z	037	FIL	G's	0.0	0.0	0.0	0.0	180



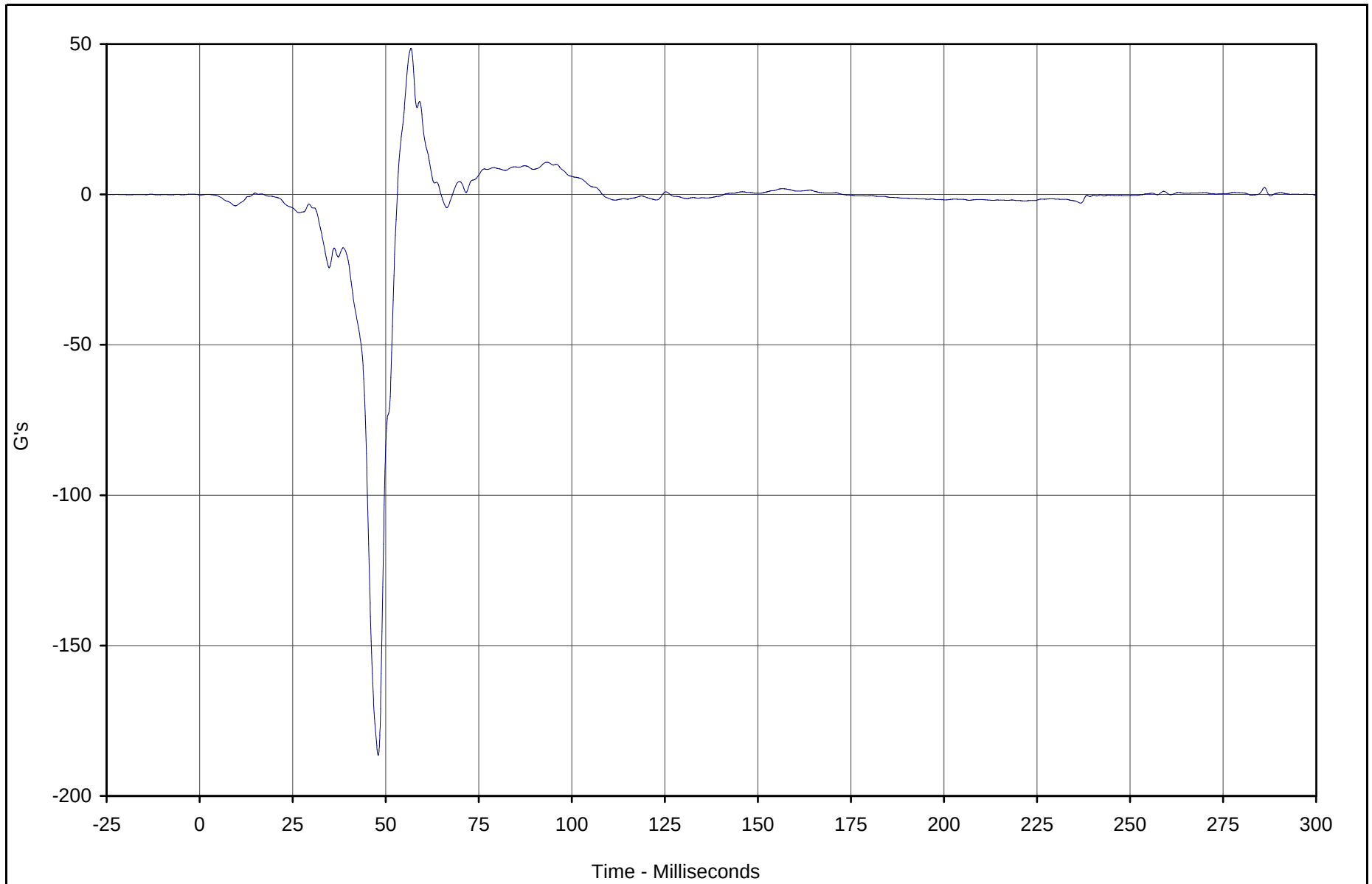
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

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Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Right Foot Aft X	038	FIL	G's	48.6	56.8	-186.5	48.0	180



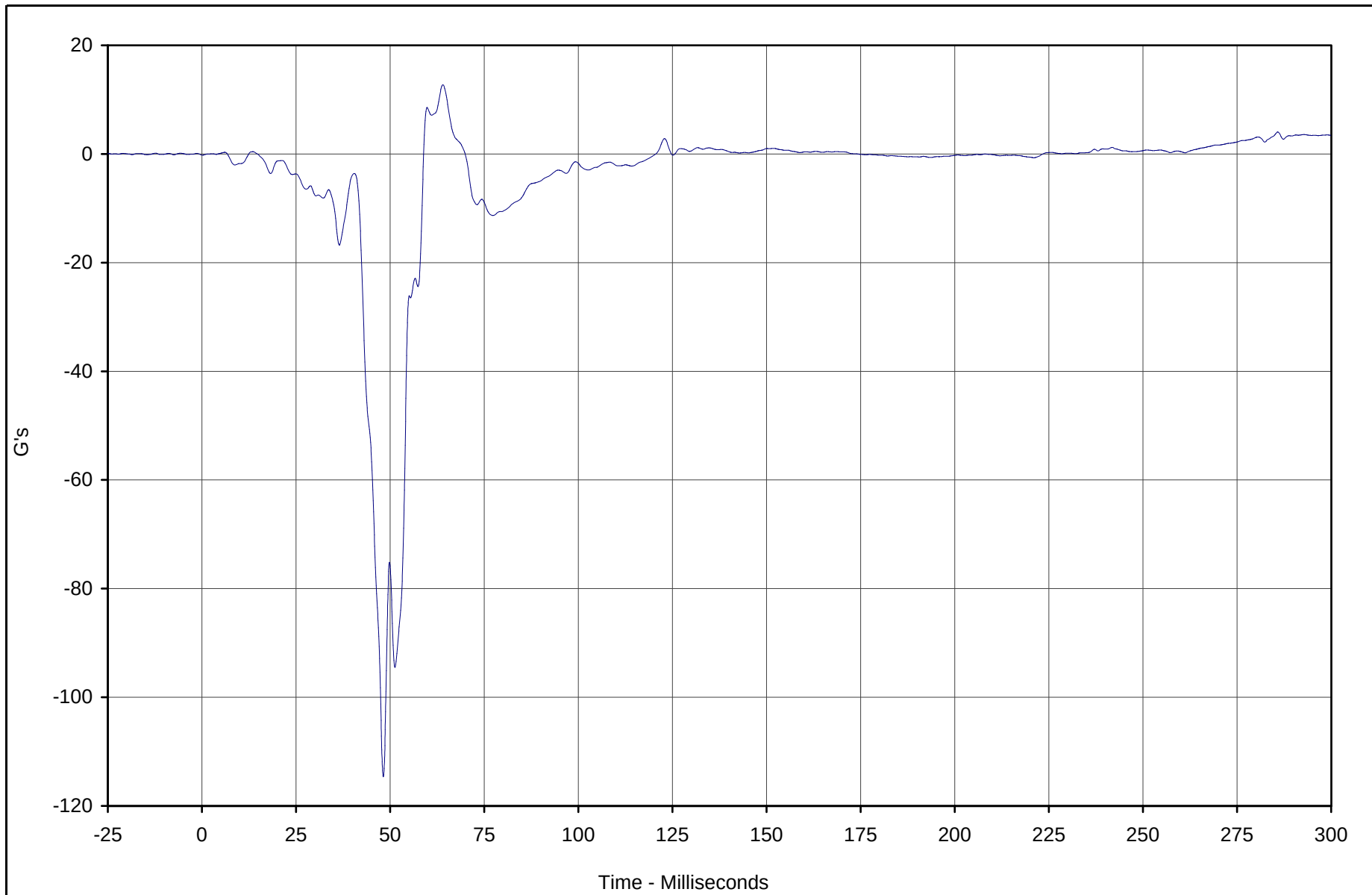
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Right Foot Aft Z	039	FIL	G's	12.7	64.0	-114.6	48.2	180

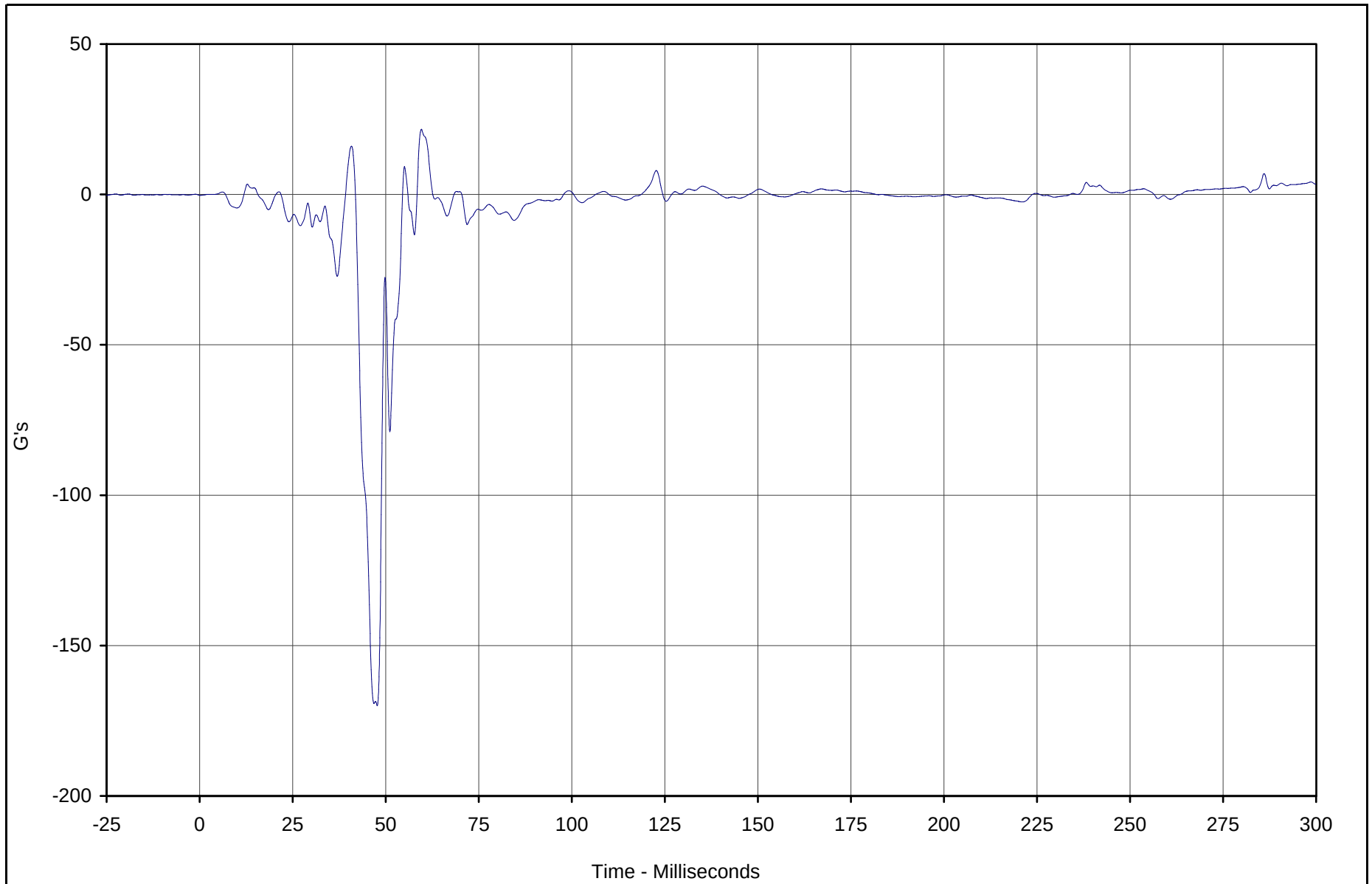


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Right Foot Fore Z	040	FIL	G's	21.6	59.6	-170.0	47.7	180

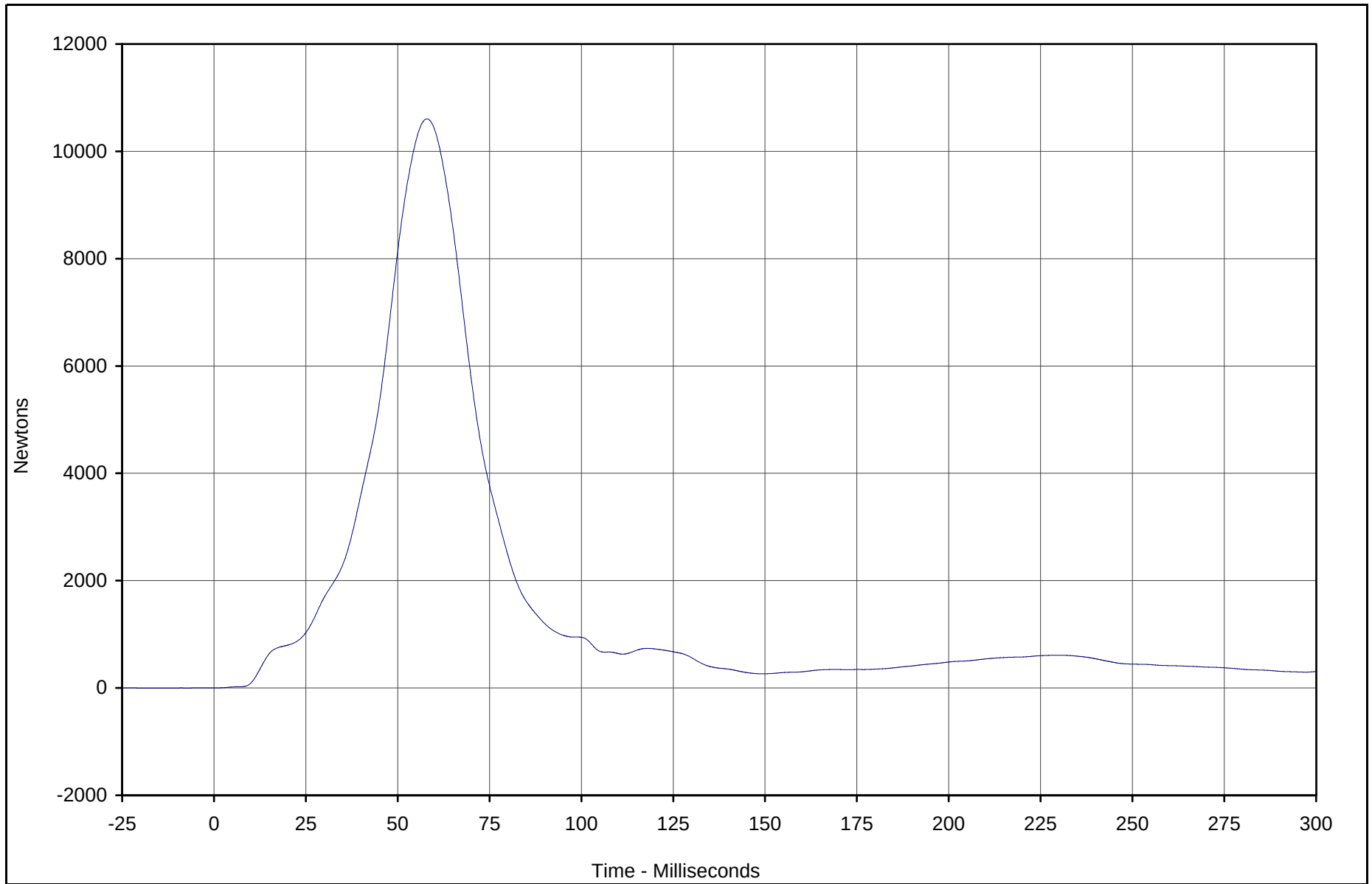


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Lap Belt Force	041	FIL	Newtons	10605.1	57.9	-0.3	0.0	60

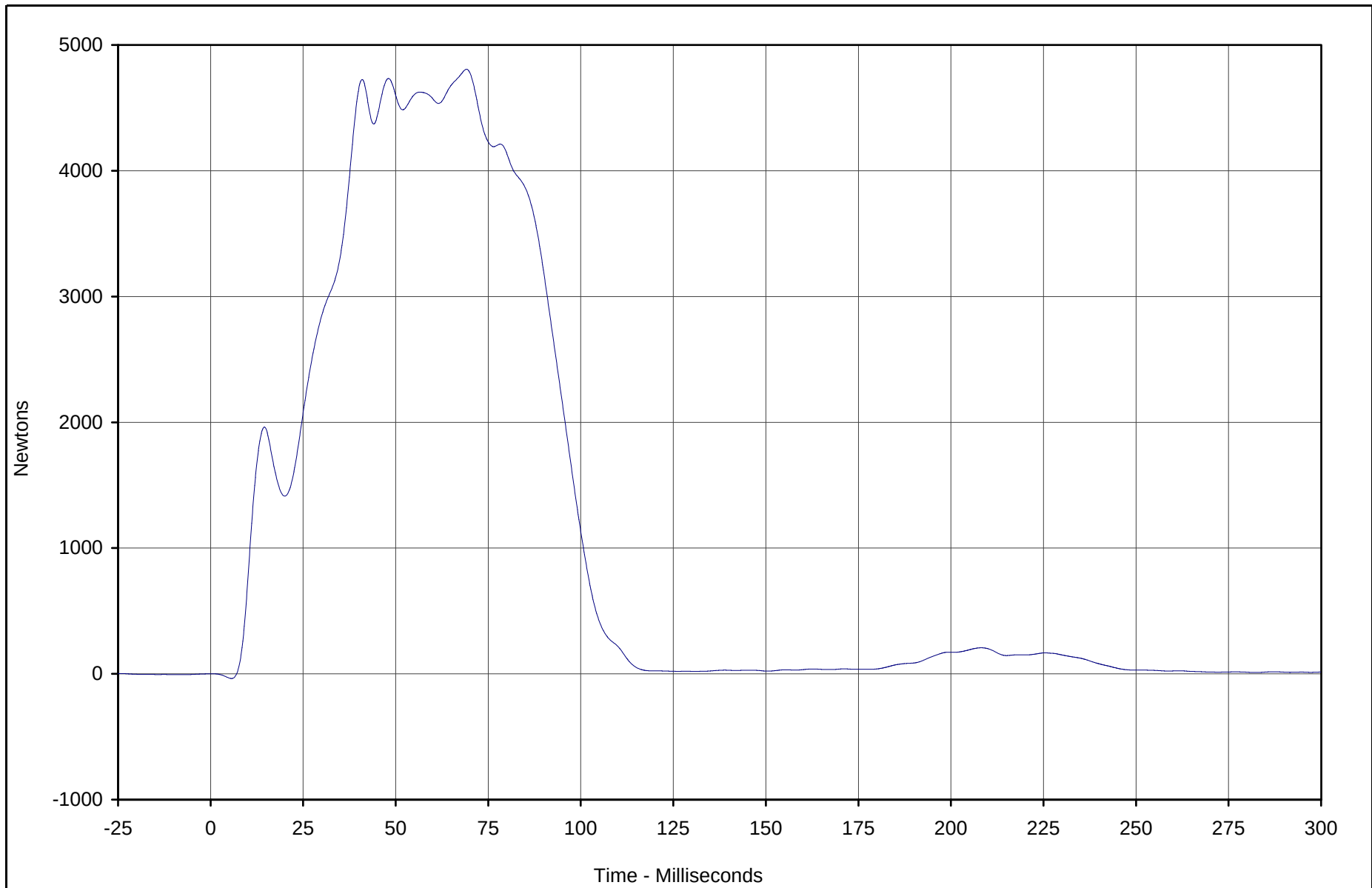


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Shoulder Belt Force	042	FIL	Newtons	4807.1	69.1	-37.2	5.6	60



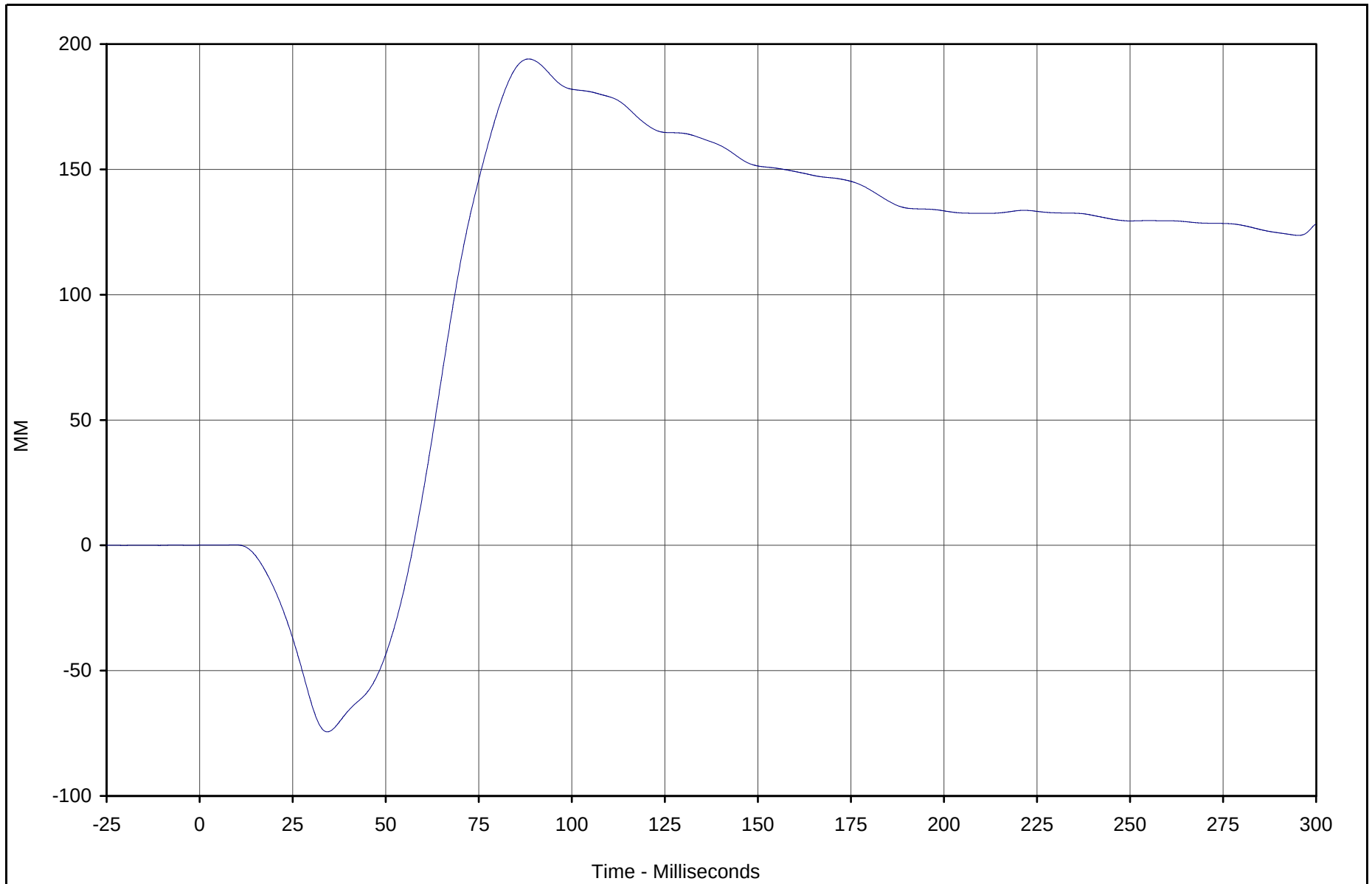
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

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Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Shoulder Belt Pullout	043	FIL	MM	194.1	88.4	-74.4	34.3	60



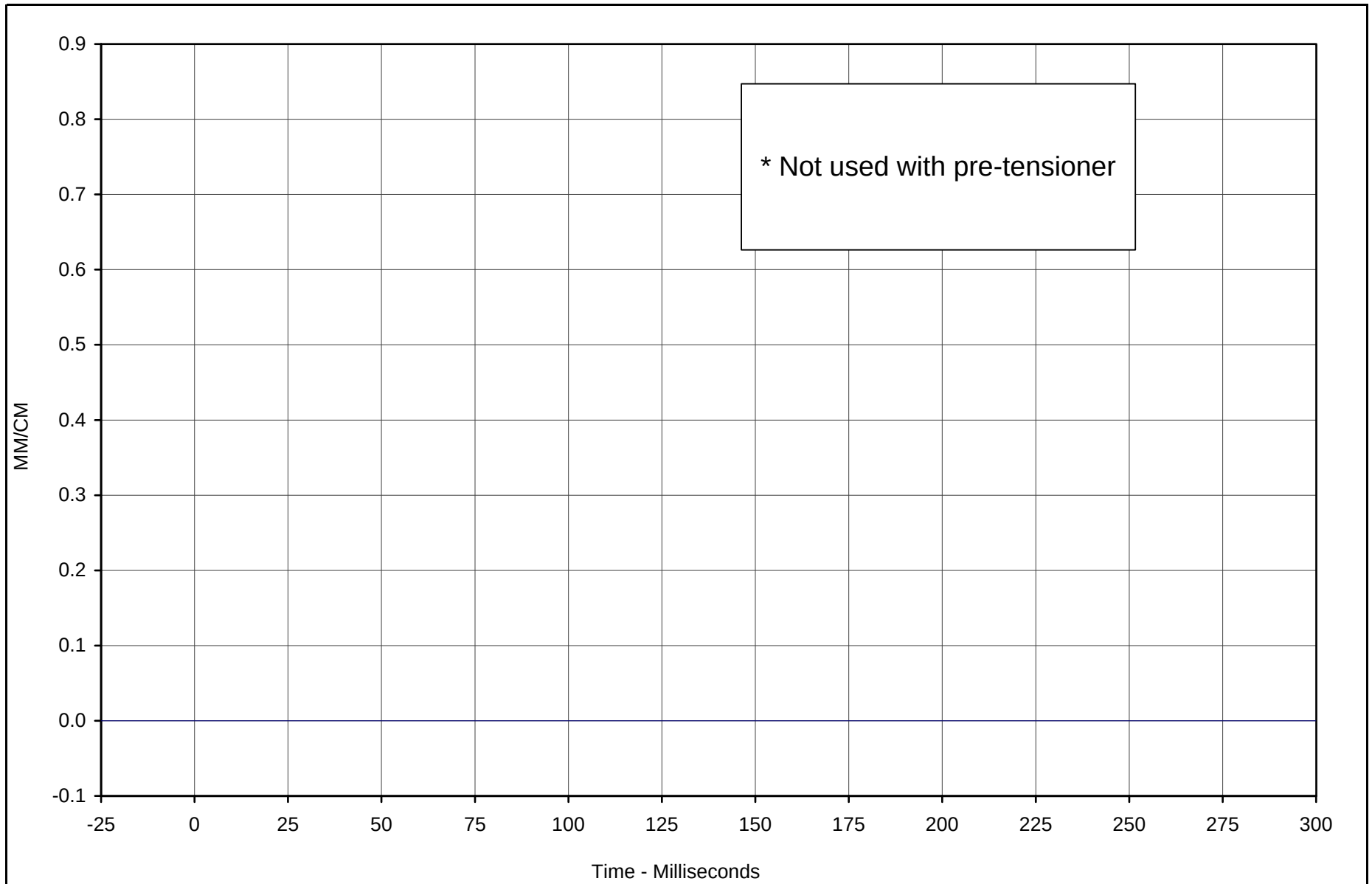
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



* Not used with pre-tensioner

Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Shoulder Belt Elongation	044	FIL	MM/CM	0.00	0.0	0.00	0.0	60

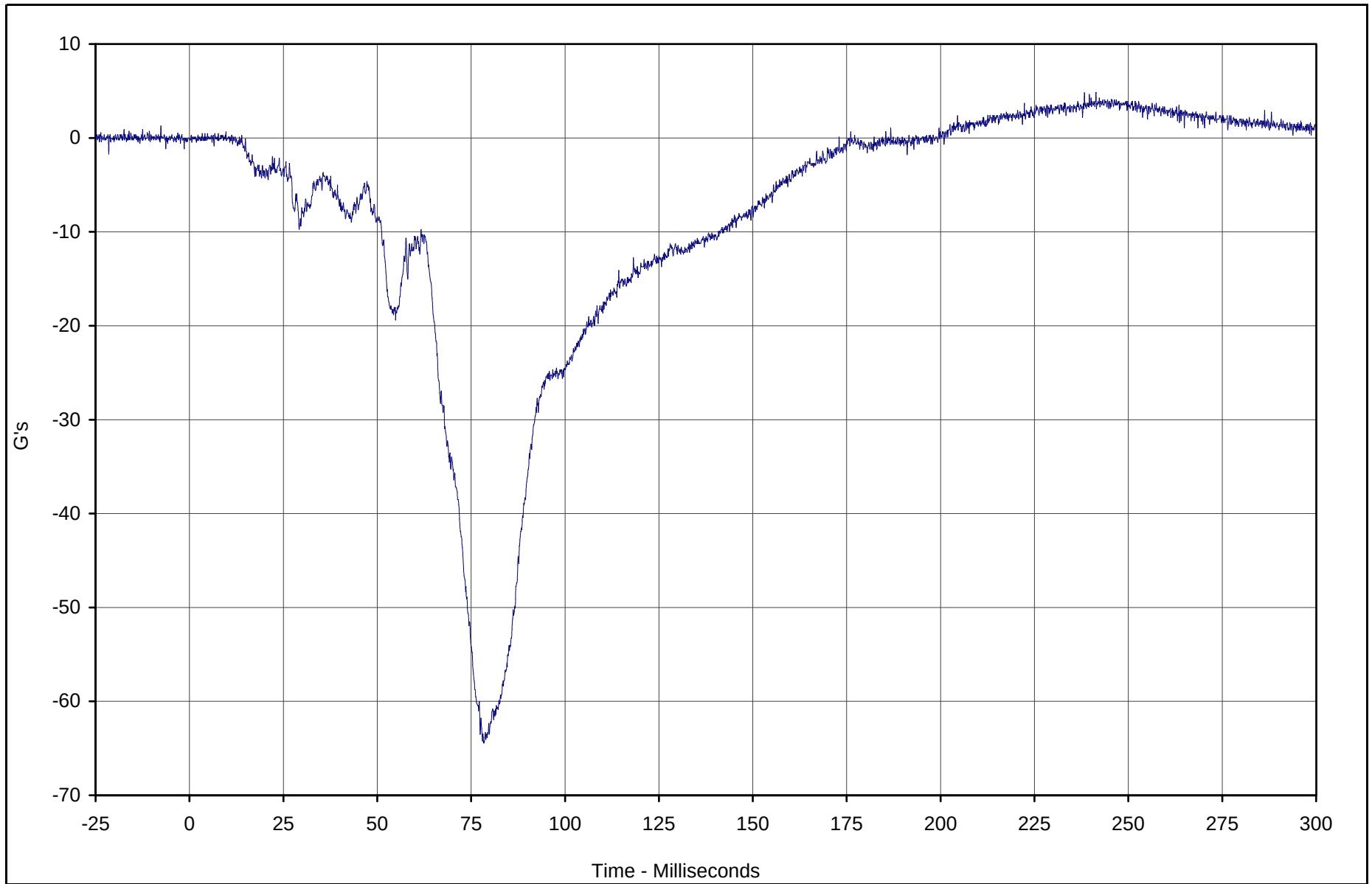


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Primary X	045	FIL	G's	4.8	238.3	-64.4	78.3	1000



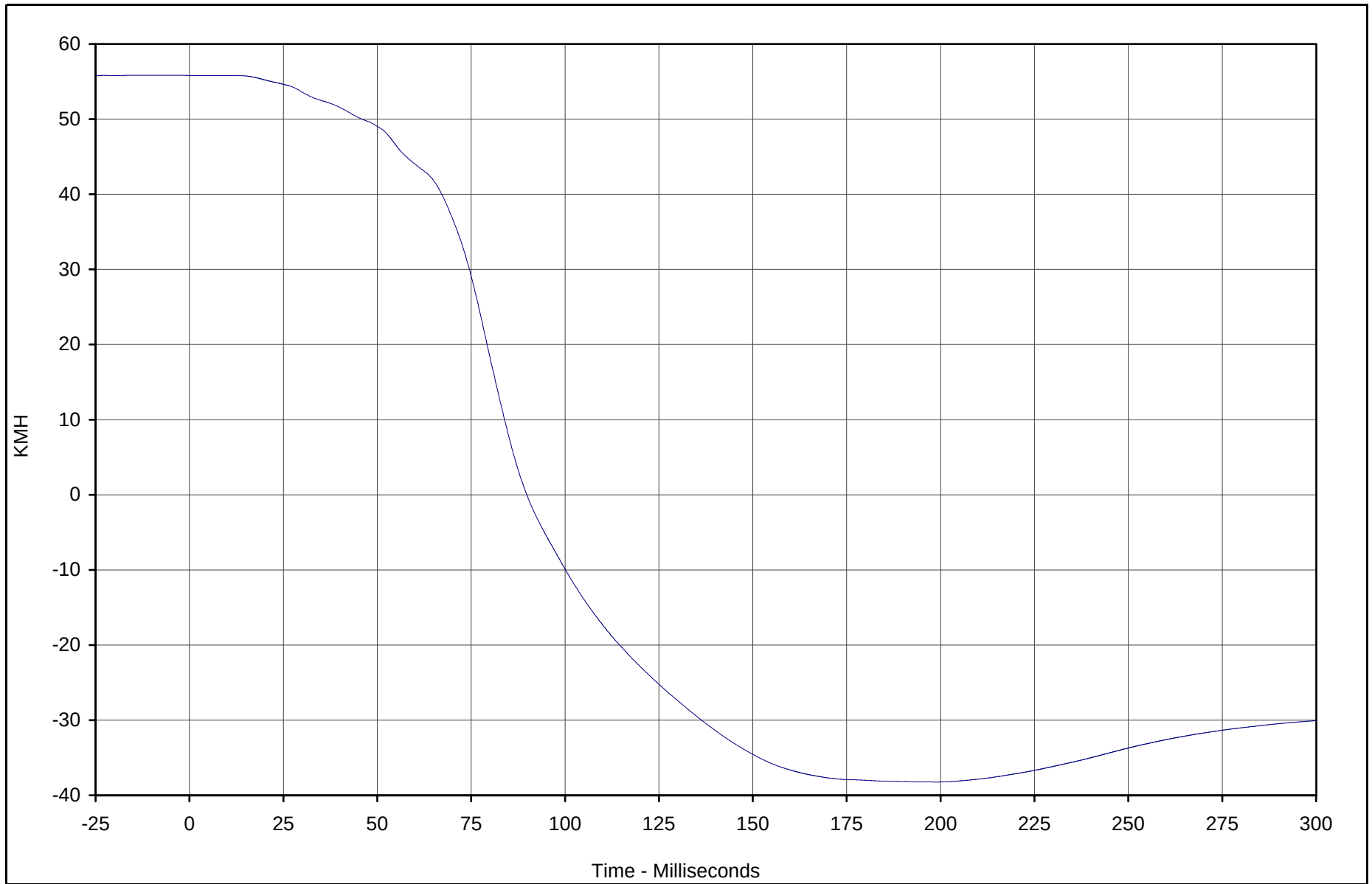
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

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Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Primary X Velocity	045	IN1	KMH	55.8	0.0	-38.2	198.9	180



Test Vehicle: 2002 Toyota Highlander 4WD SUV

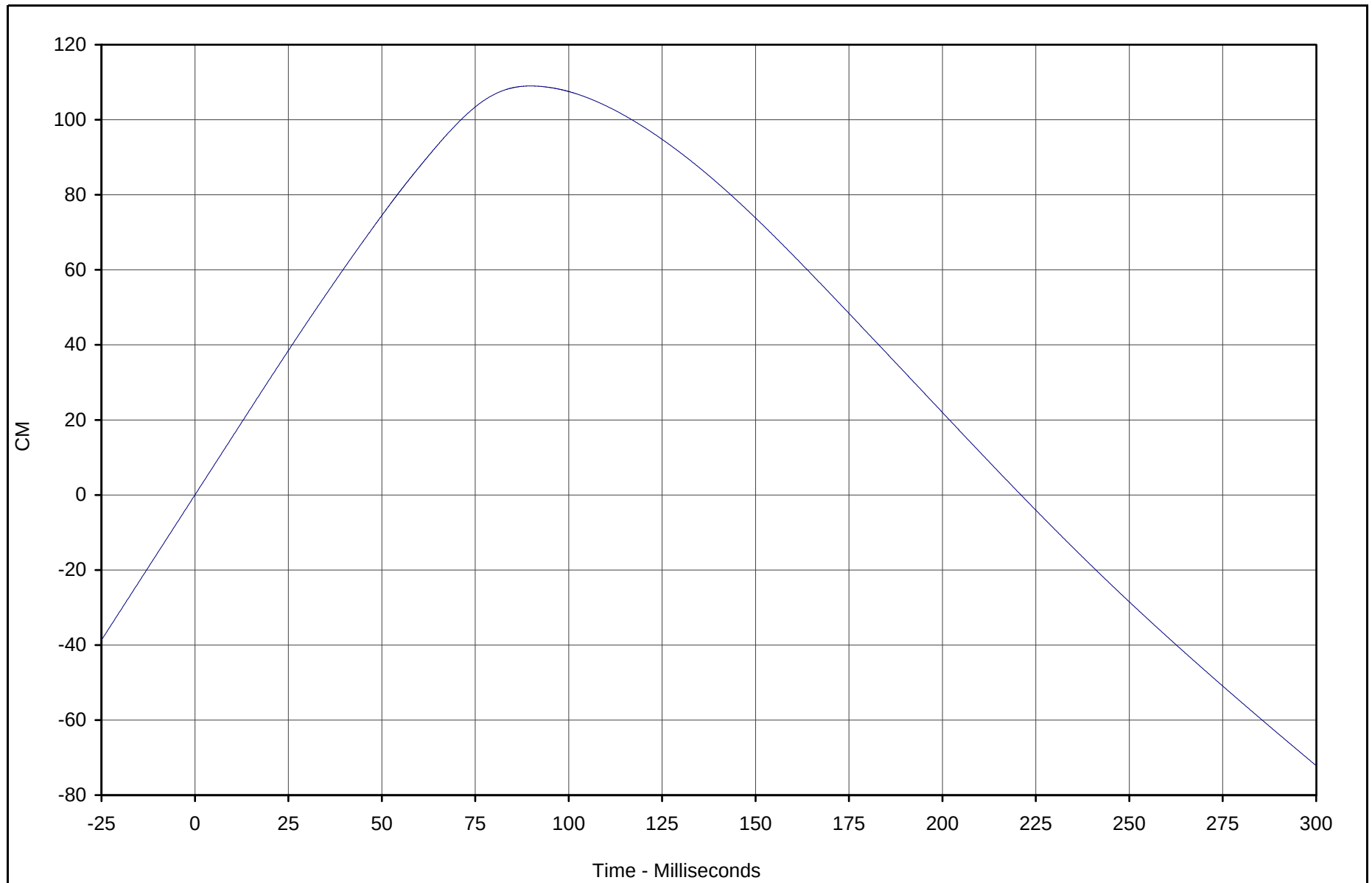
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

B-64



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Primary X Displ.	045	IN2	CM	109.0	89.8	-72.1	299.9	180



Test Vehicle: 2002 Toyota Highlander 4WD SUV

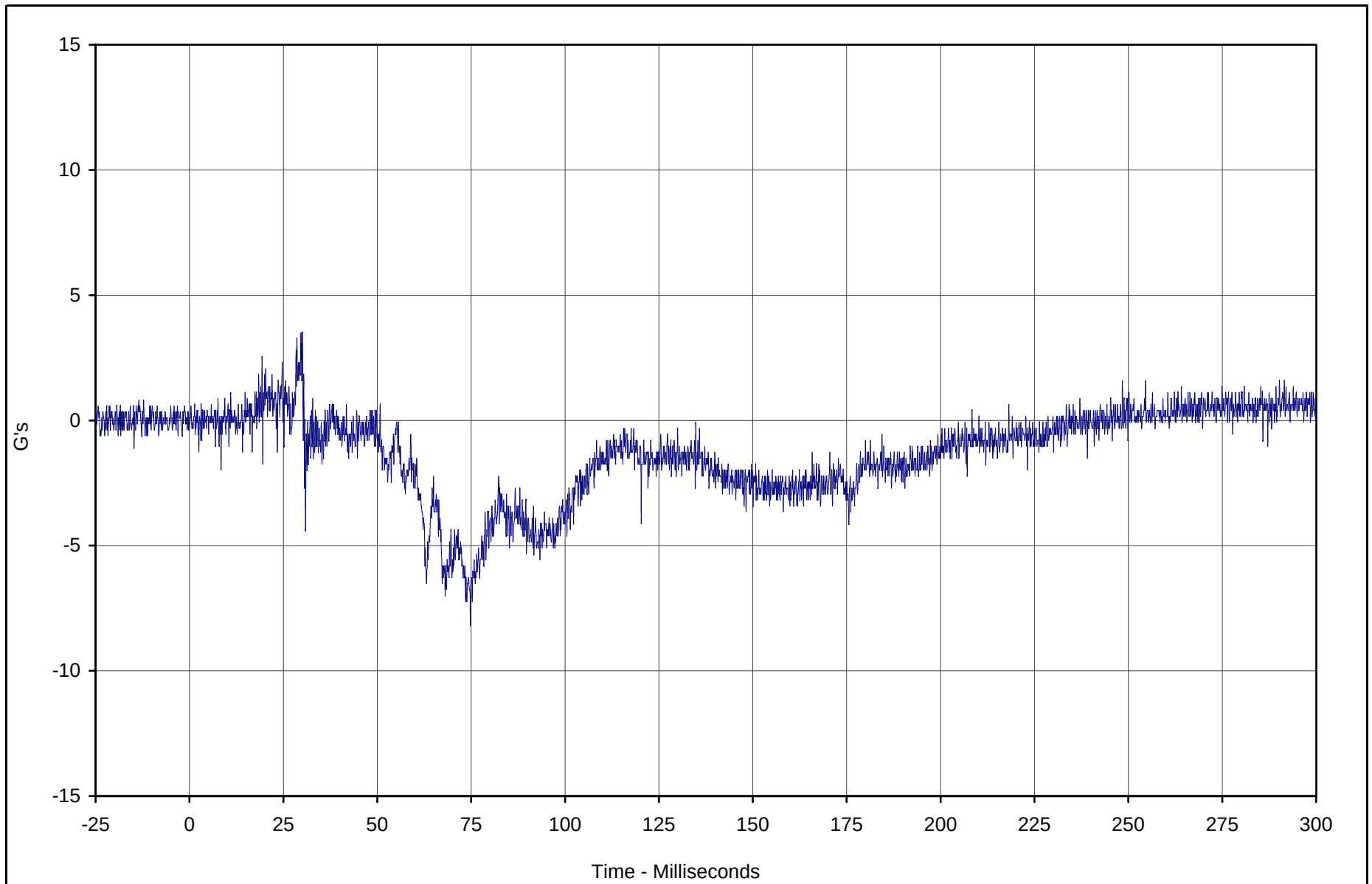
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

B-65



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Primary Y	046	FIL	G's	3.5	29.7	-8.2	74.8	1000



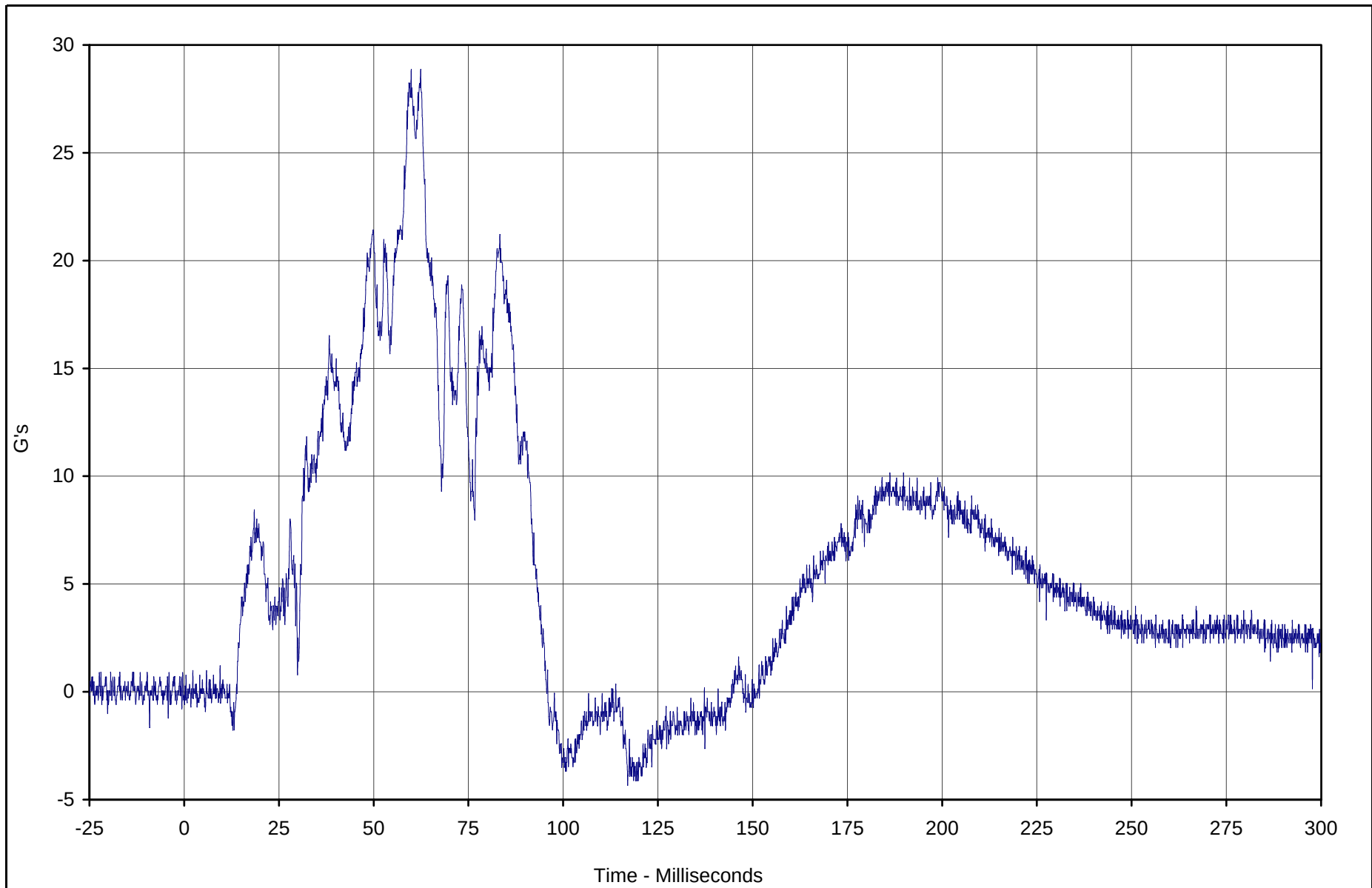
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Primary Z	047	FIL	G's	28.9	59.9	-4.3	117.0	1000

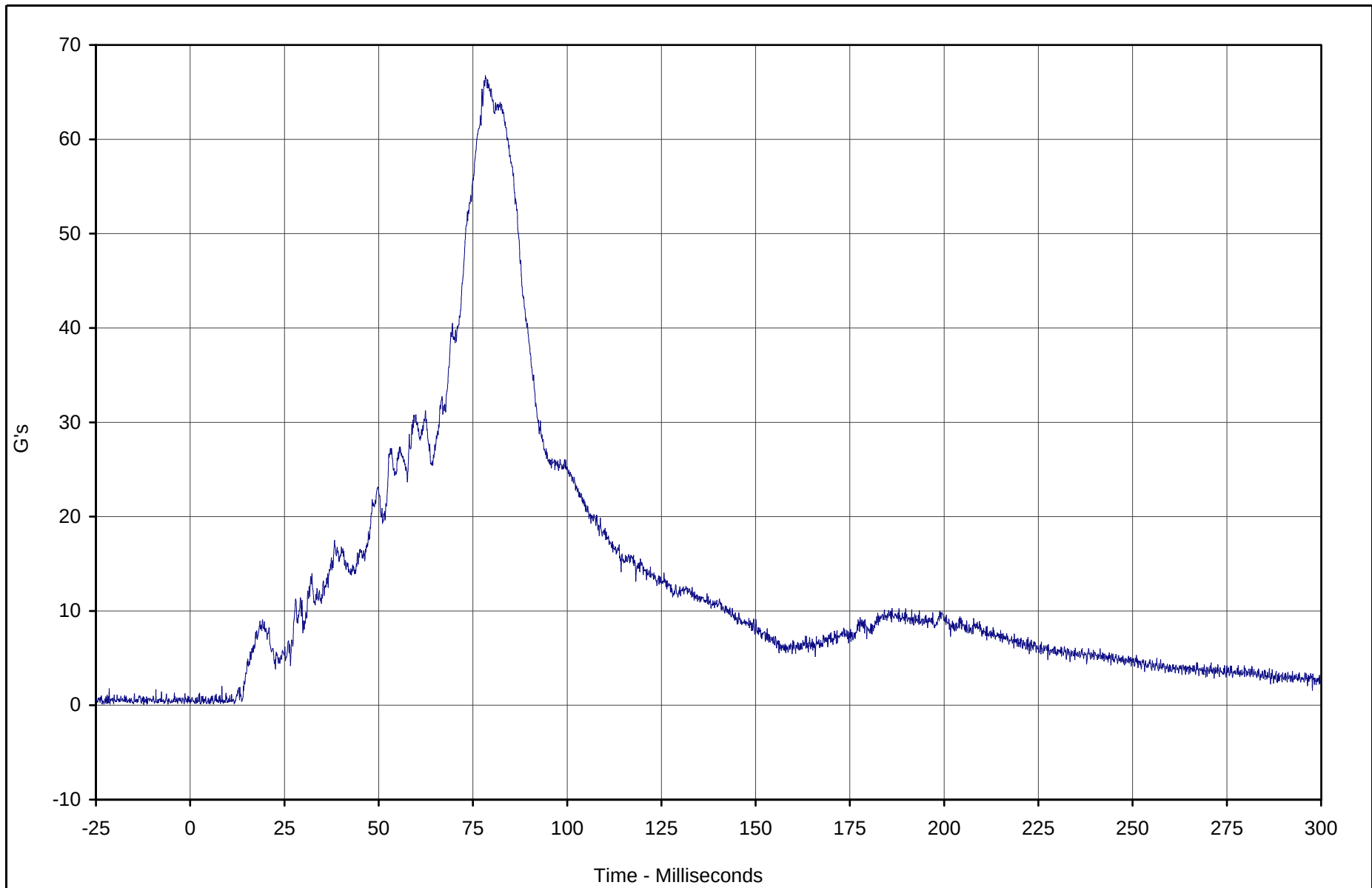


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Resultant Primary	045	RES	G's	66.7	78.3	0.1	2.8	1000

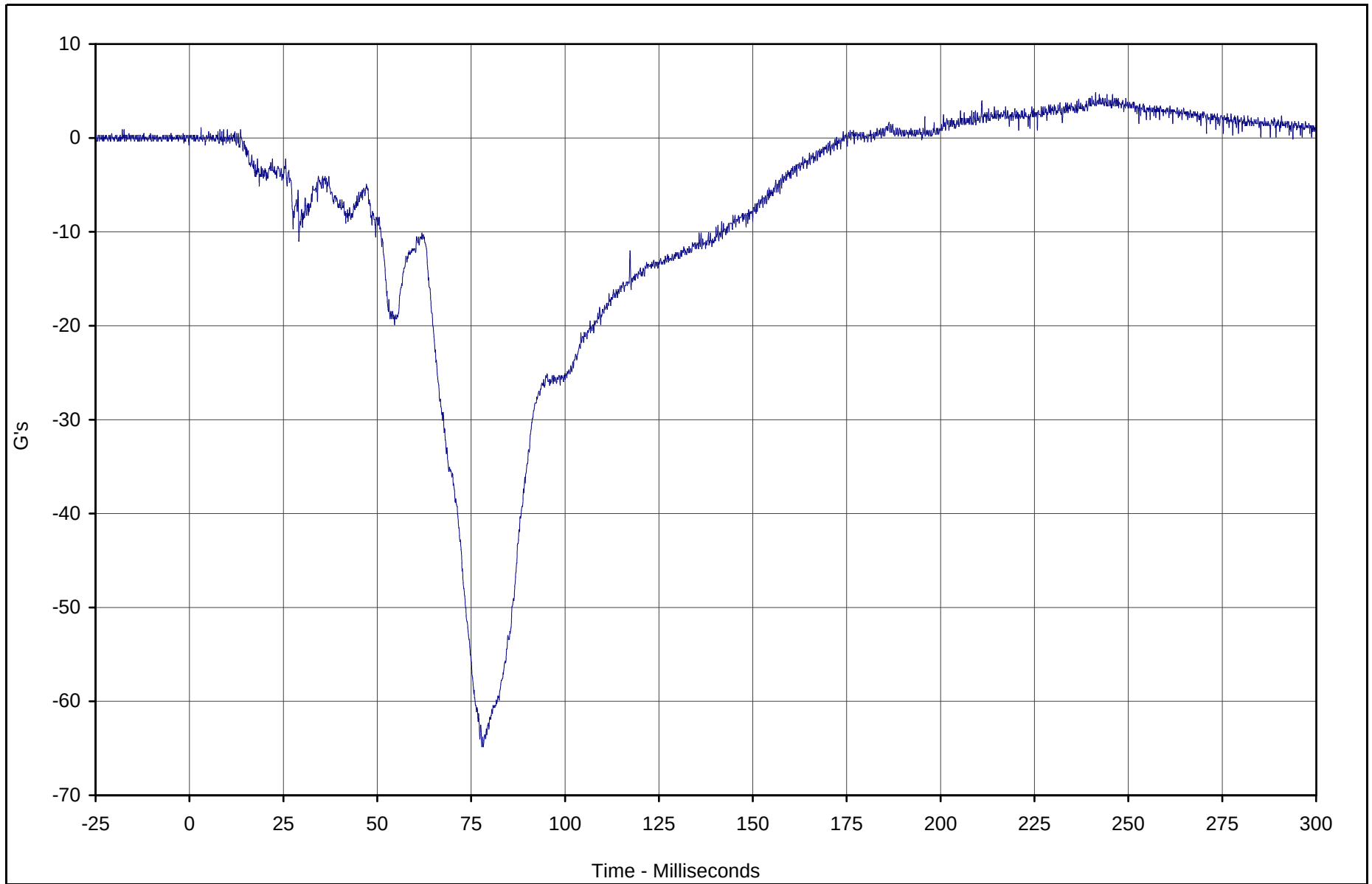


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Redundant X	048	FIL	G's	4.9	241.3	-64.8	77.8	1000

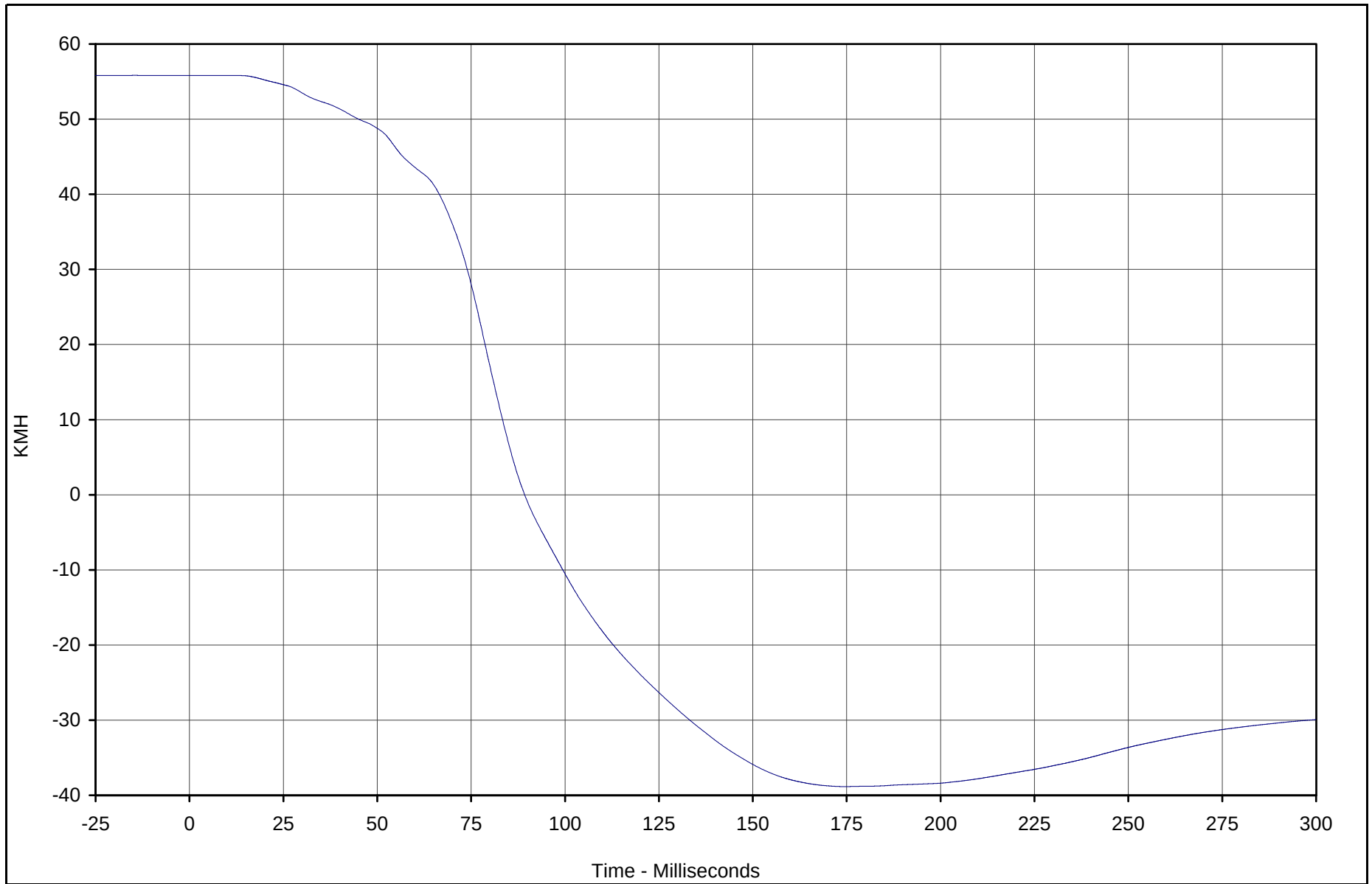


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Redundant X Velocity	048	IN1	KMH	55.8	1.3	-38.8	174.3	180



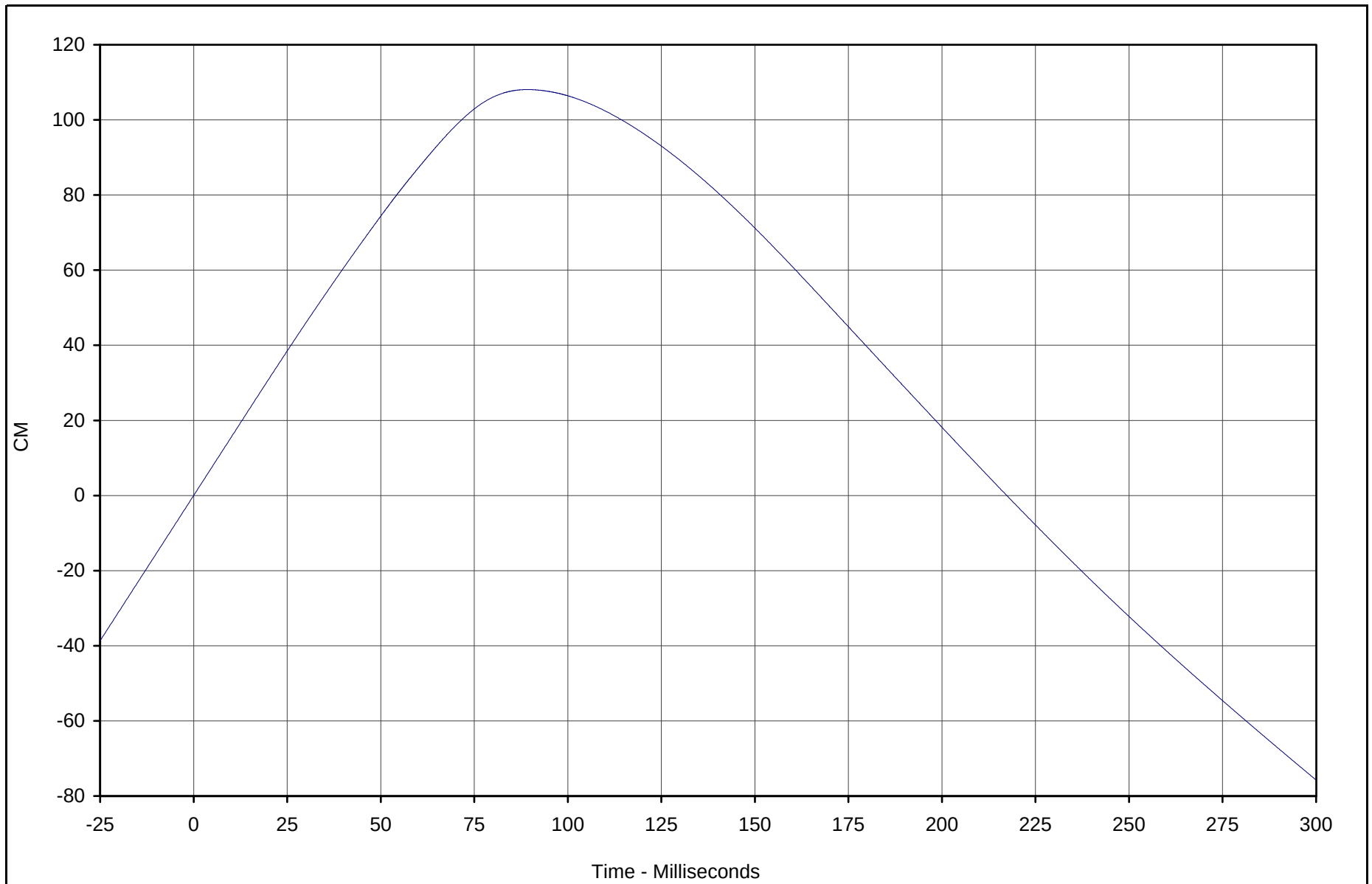
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

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Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Redundant X Displ.	048	IN2	CM	108.1	89.3	-75.7	299.9	180



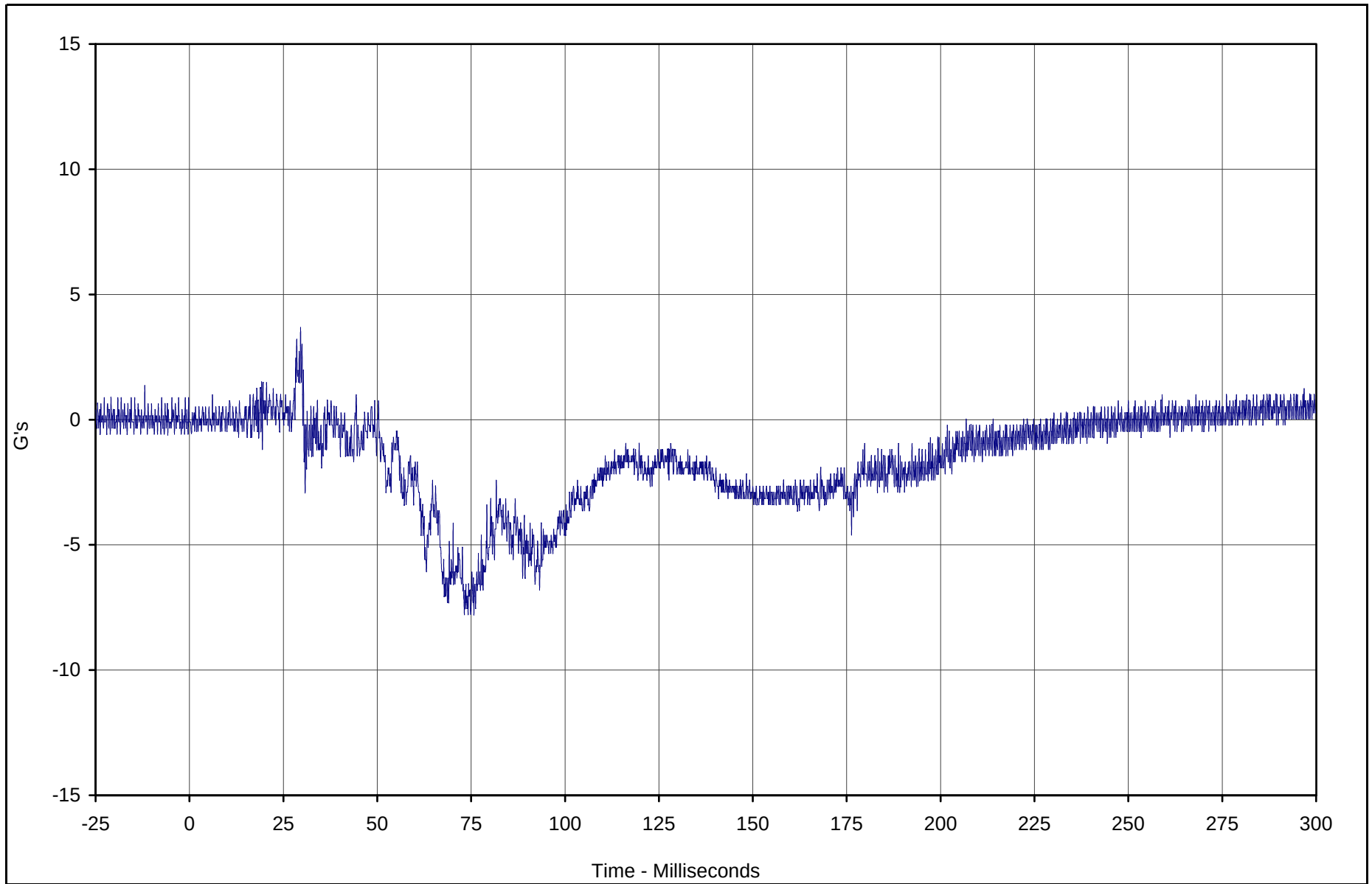
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Redundant Y	049	FIL	G's	3.7	29.6	-7.8	73.2	1000

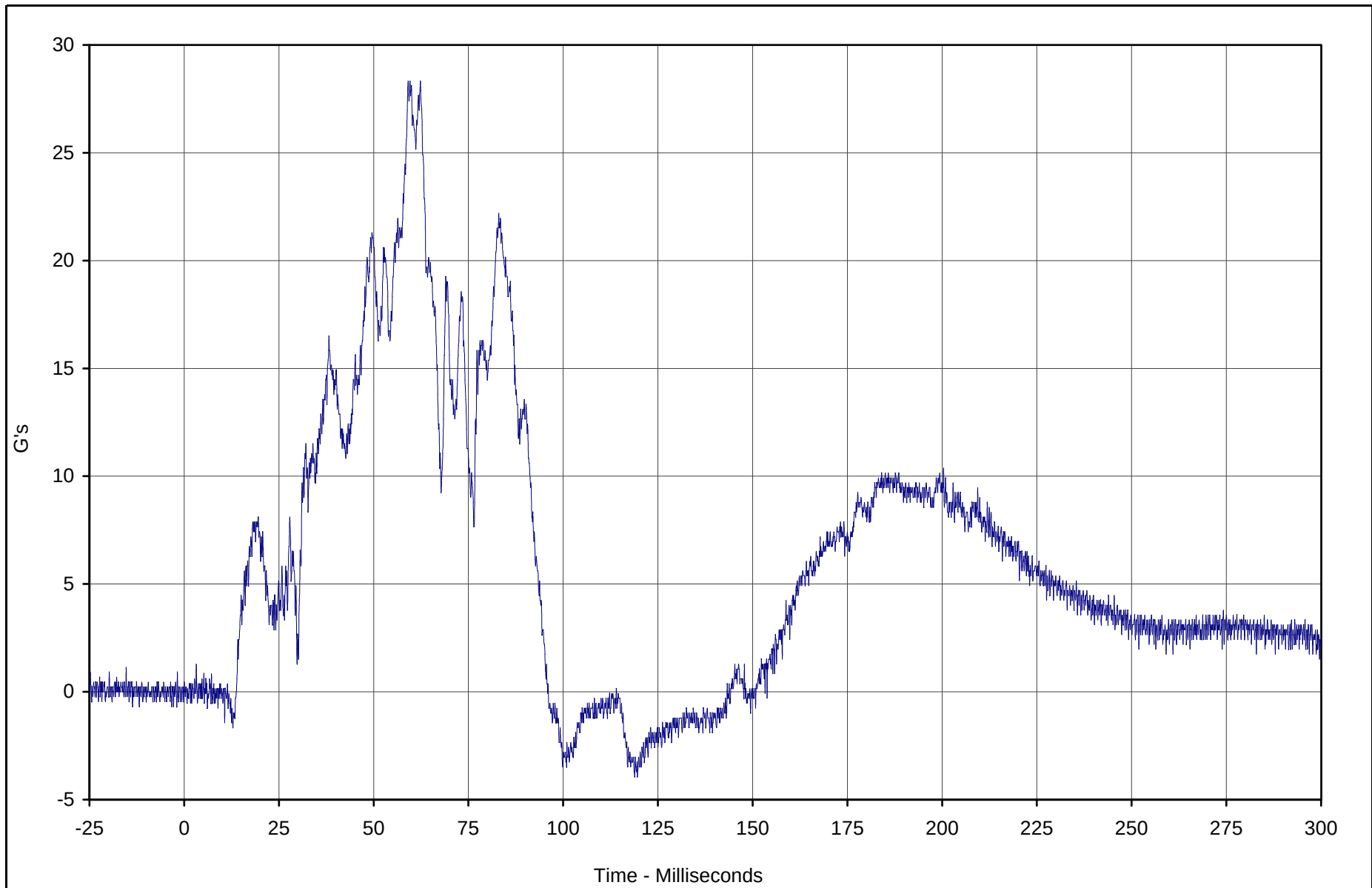


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Redundant Z	050	FIL	G's	28.3	59.1	-3.9	118.9	1000

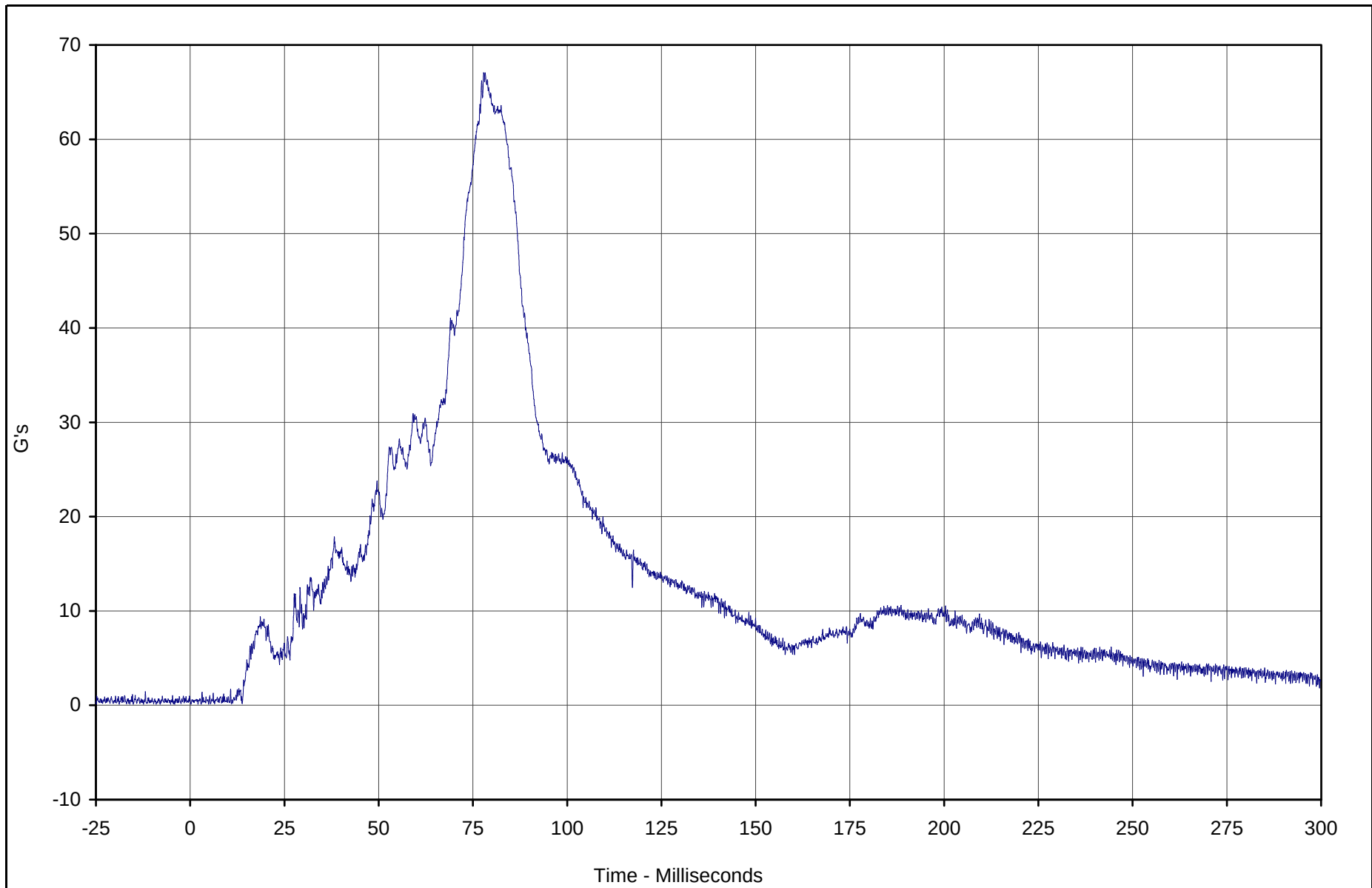


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Resultant Redundant	048	RES	G's	67.1	77.8	0.1	2.1	1000

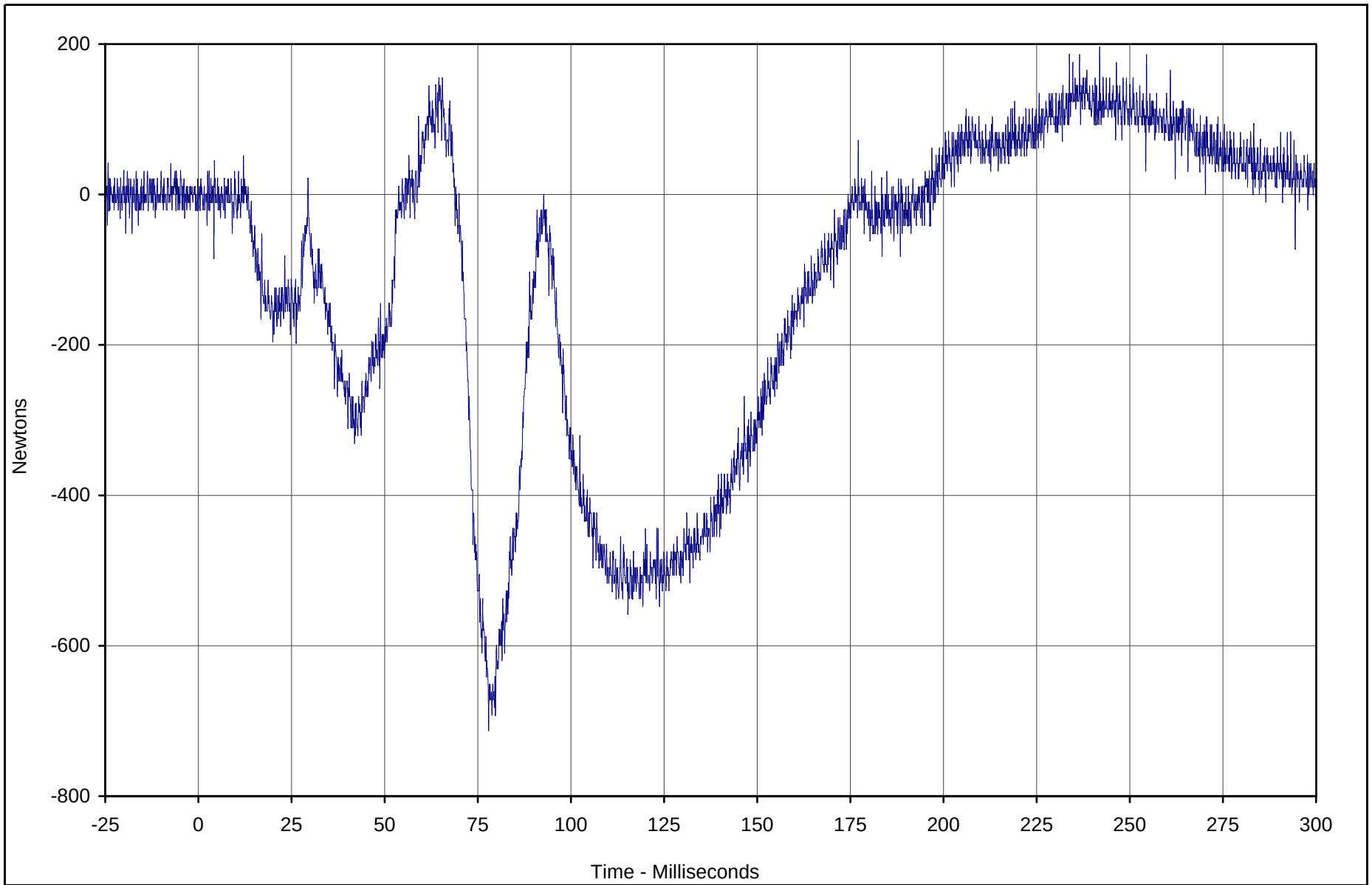


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Neck Force X	051	FIL	Newtons	196.3	241.9	-713.0	77.9	1000

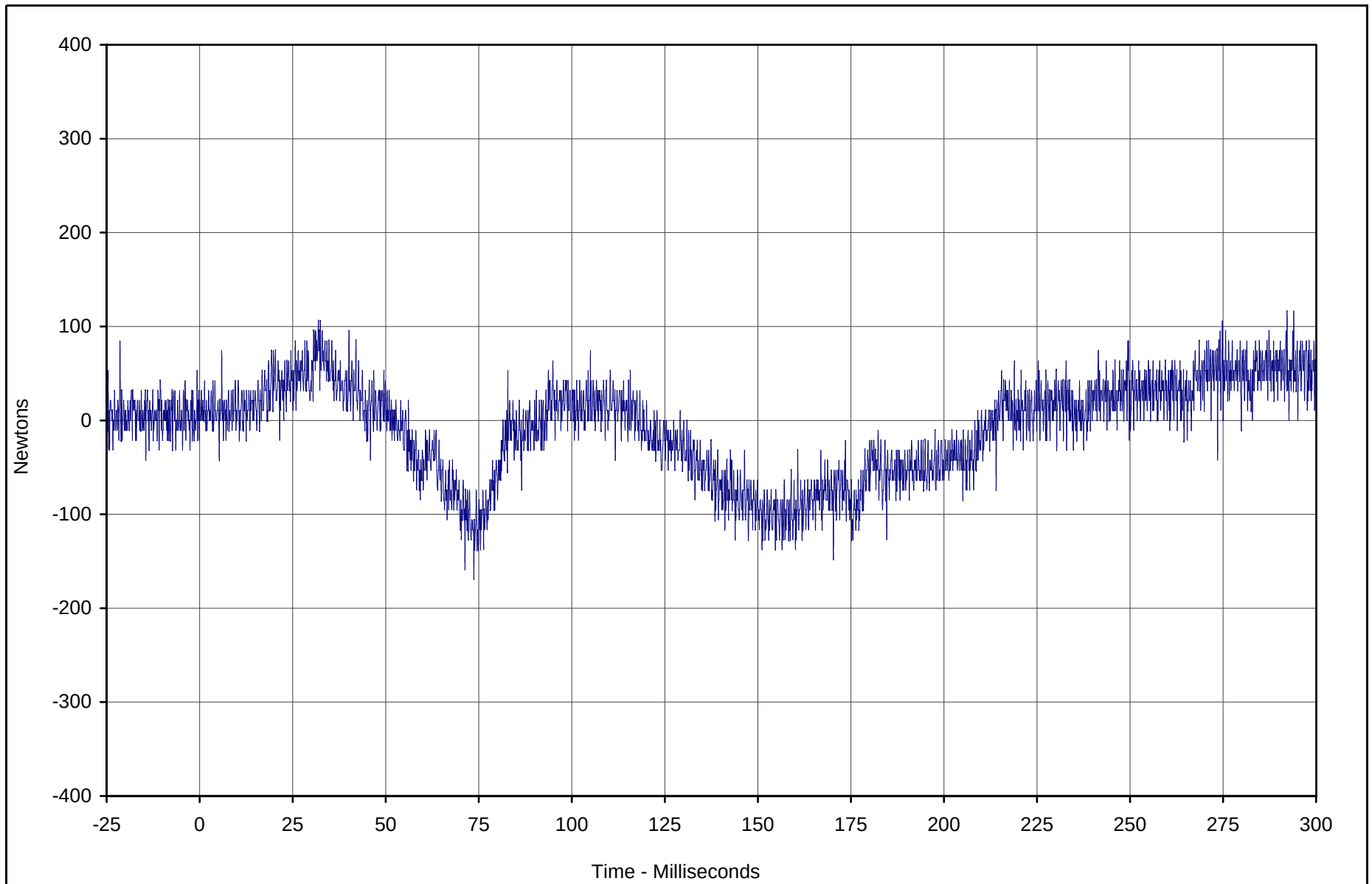


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Neck Force Y	052	FIL	Newtons	116.6	292.2	-169.5	73.7	1000

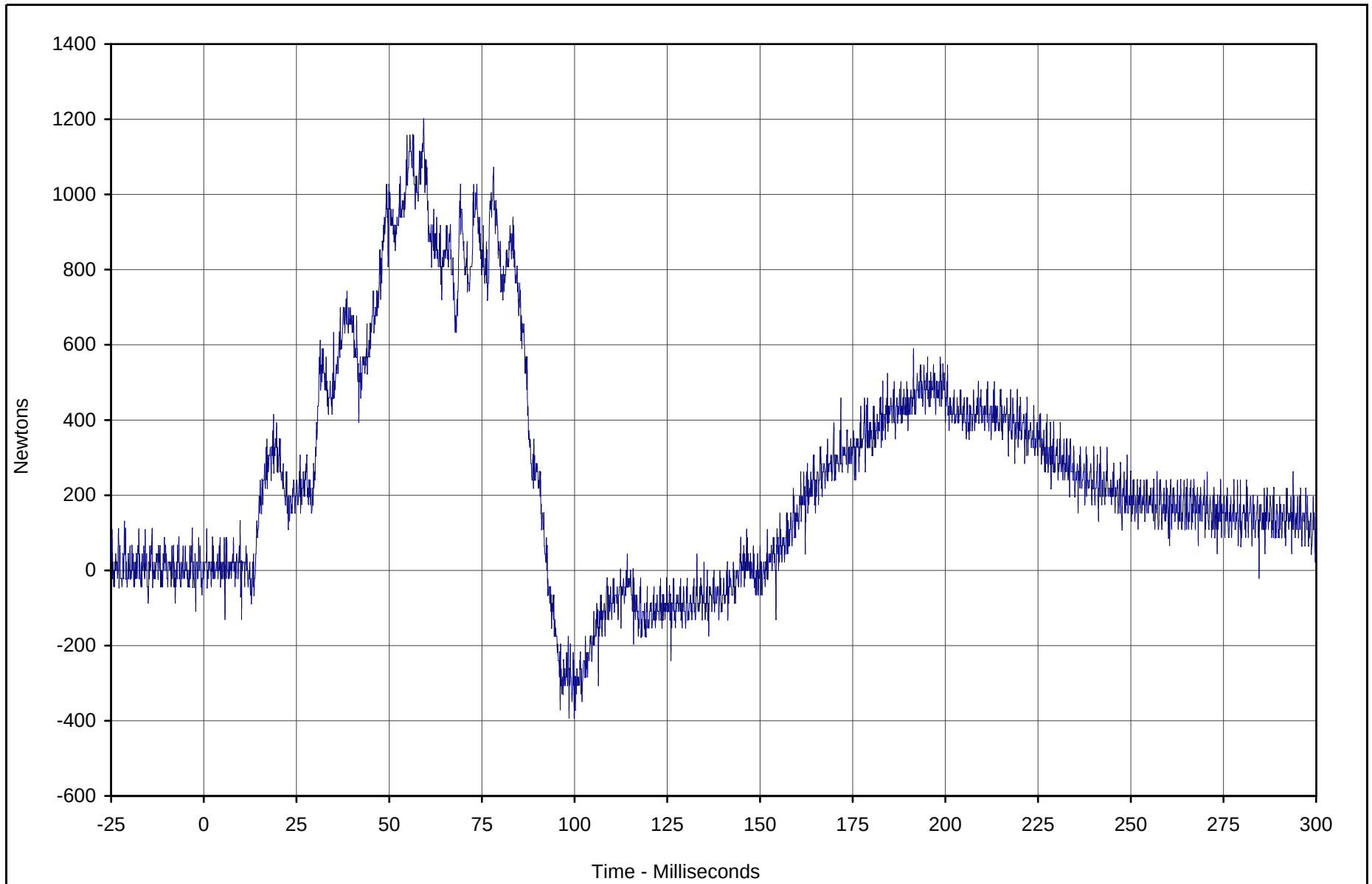


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Neck Force Z	053	FIL	Newtons	1201.4	59.3	-393.2	98.5	1000

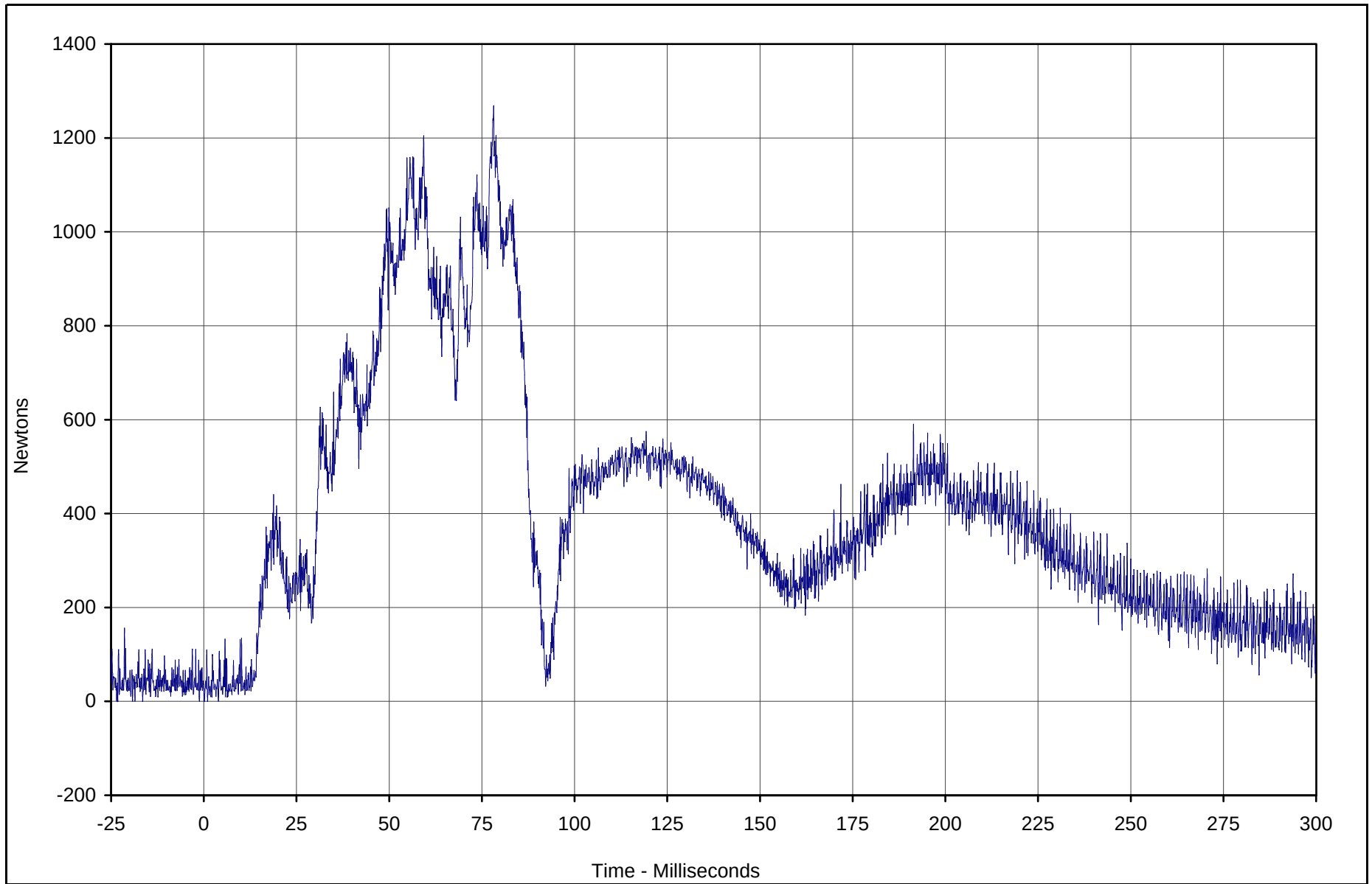


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Neck Force Resultant	051	RES	Newtons	1266.5	78.2	0.0	0.1	1000

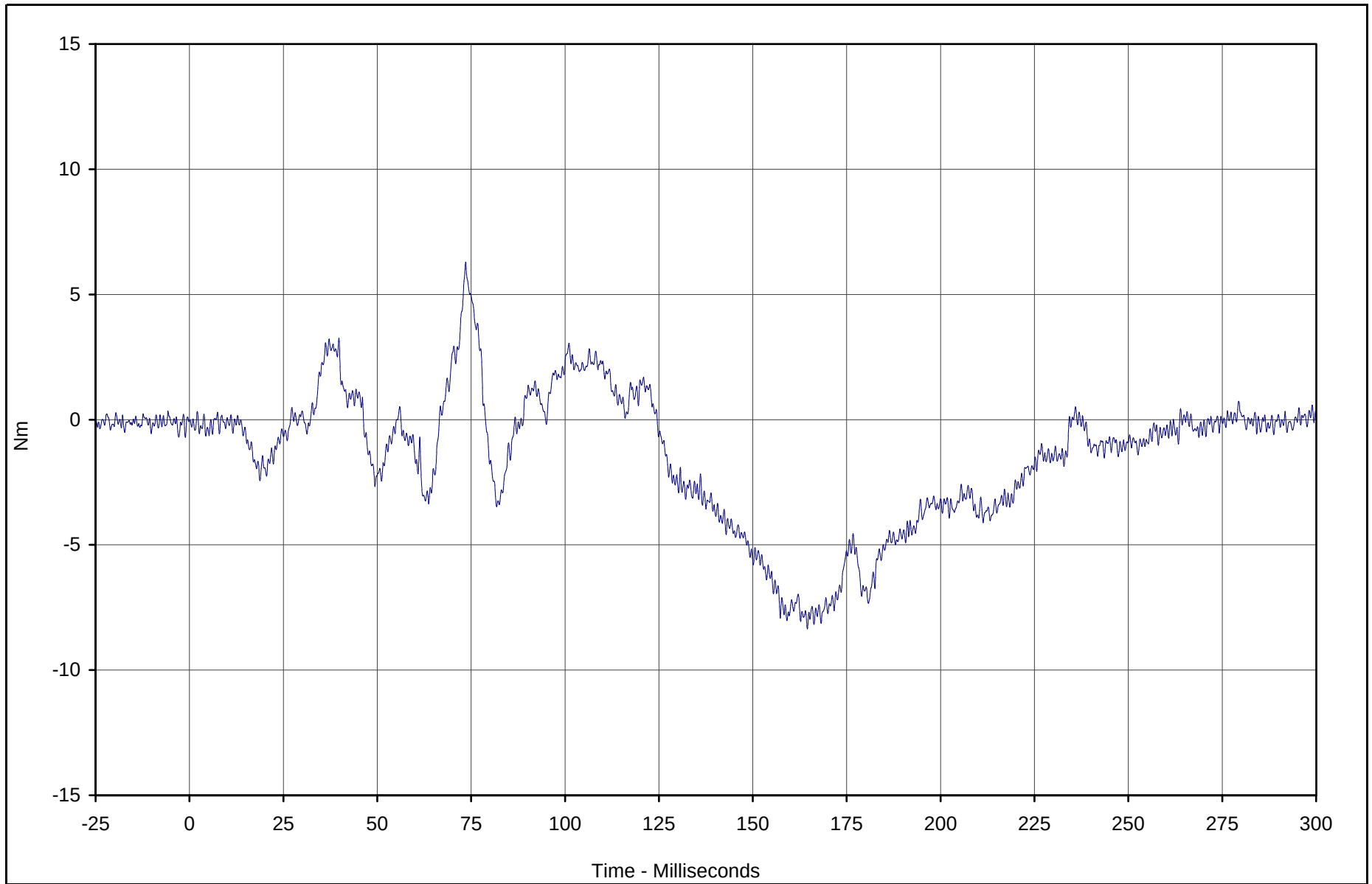


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Neck Moment X	054	FIL	Nm	6.3	73.5	-8.4	164.5	600

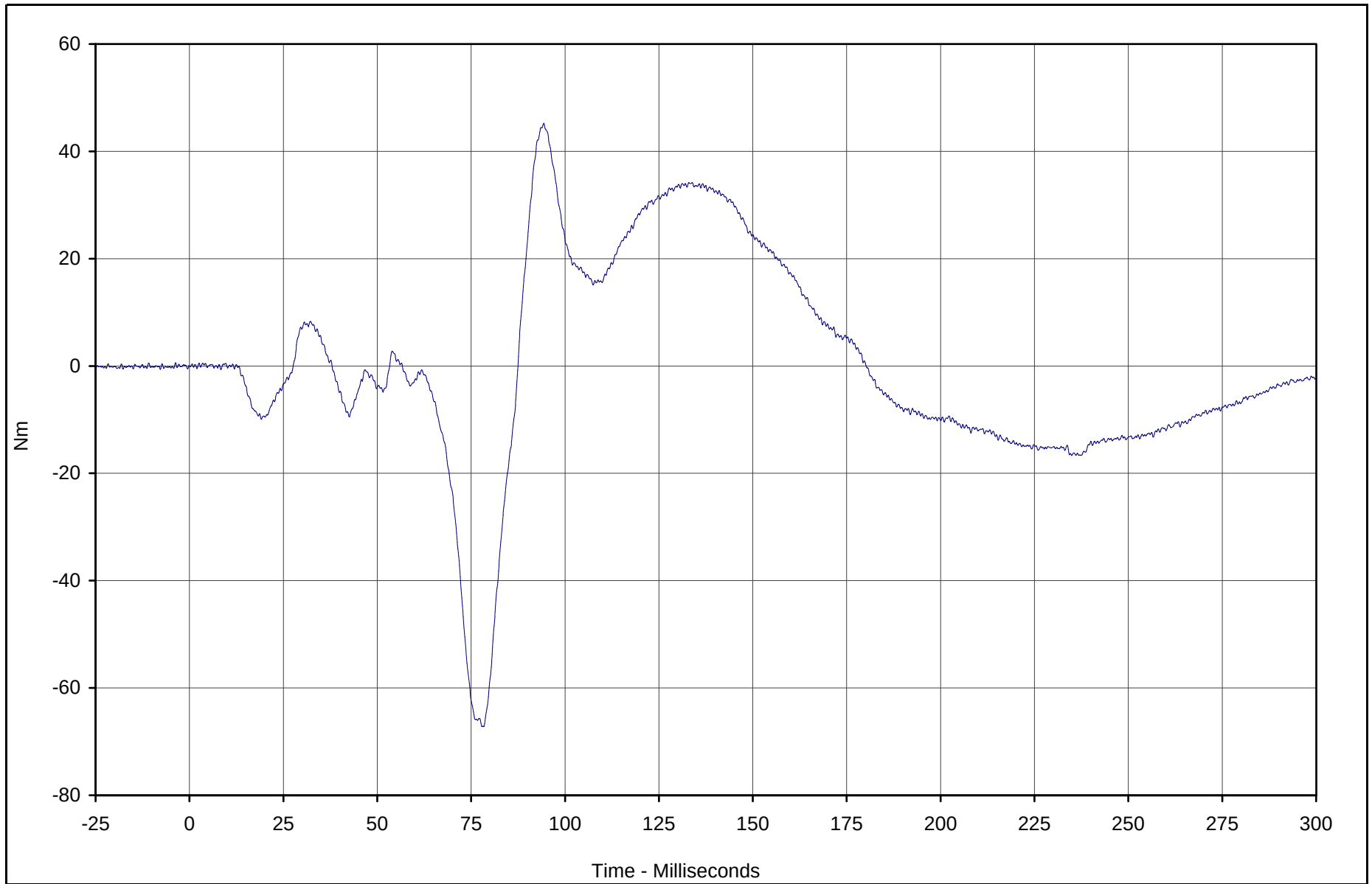


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Neck Moment Y	055	FIL	Nm	45.2	94.3	-67.2	77.9	600

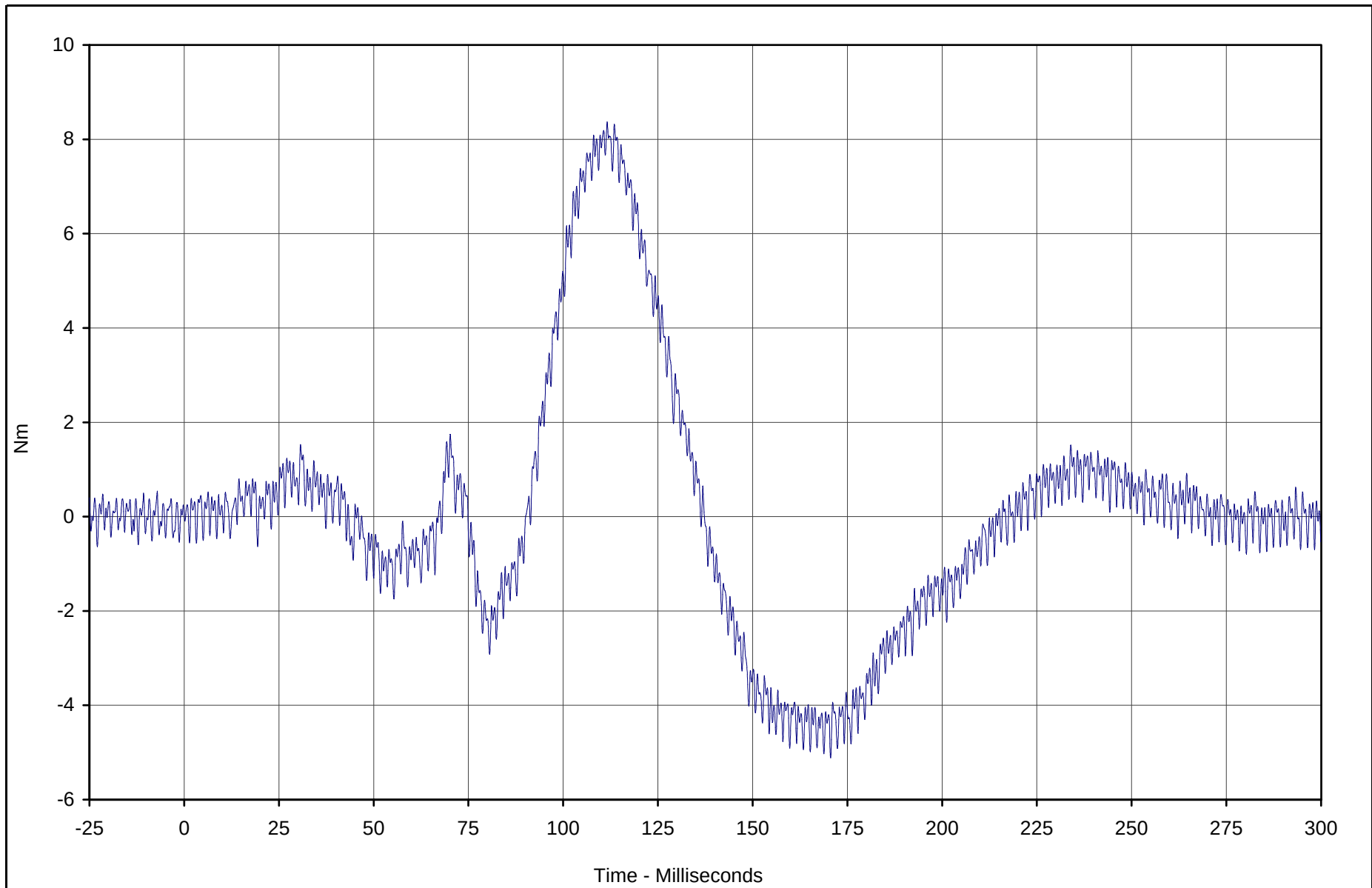


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Neck Moment Z	056	FIL	Nm	8.4	111.6	-5.1	170.6	600

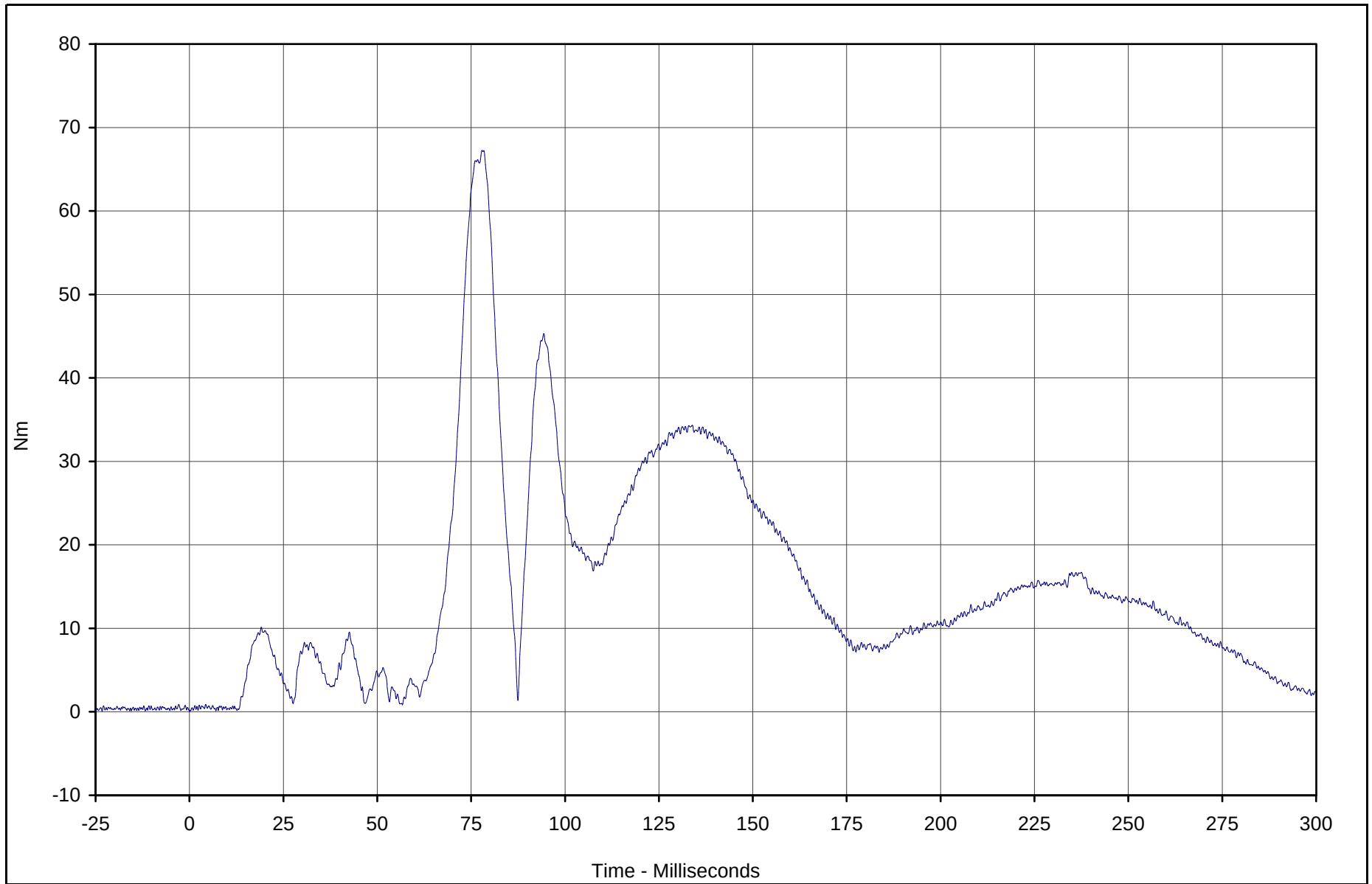


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Neck Moment Resultant	054	RES	Nm	67.3	77.9	0.1	0.0	600



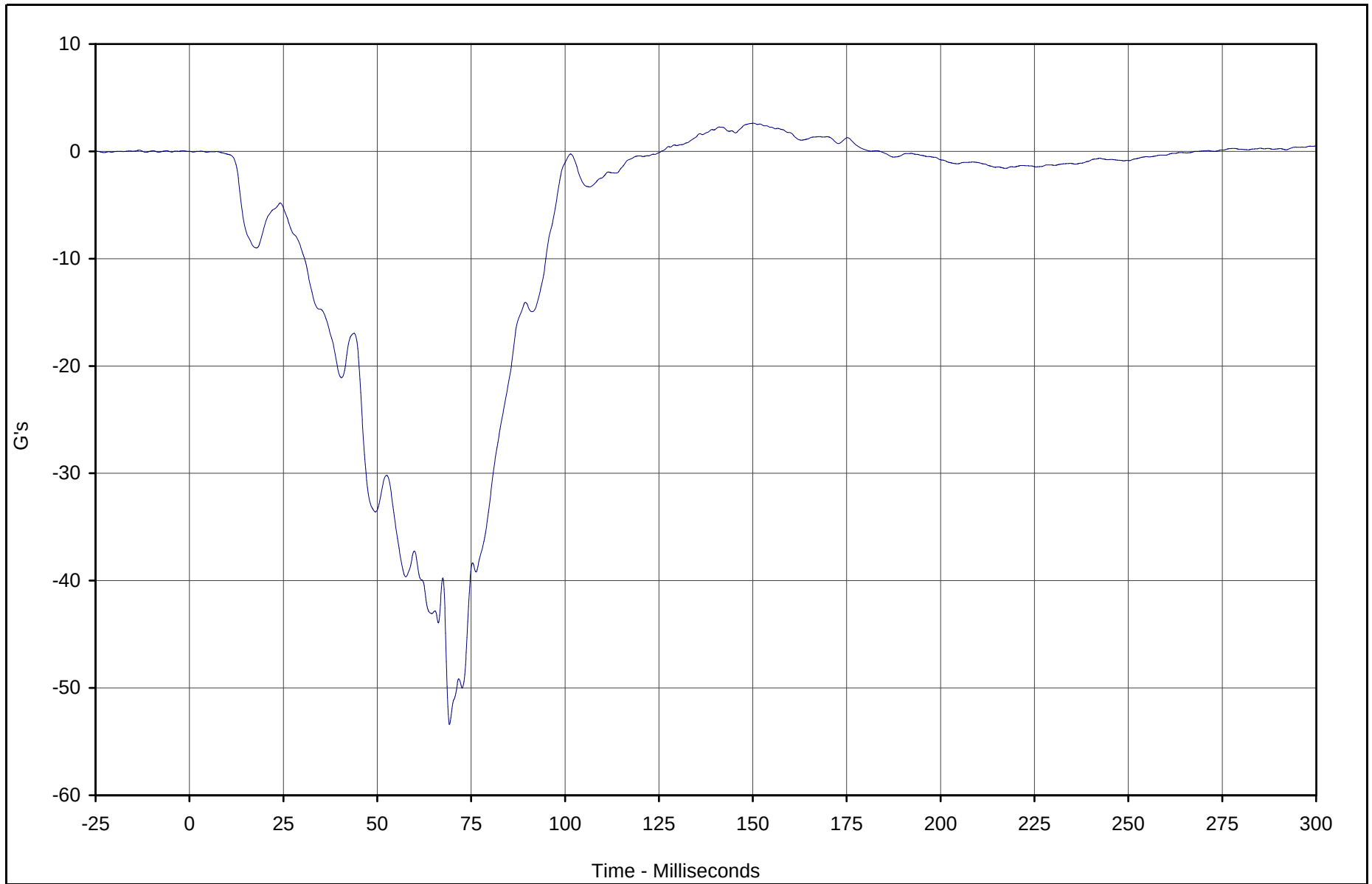
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

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Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Chest Primary X	057	FIL	G's	2.6	150.2	-53.4	69.2	180



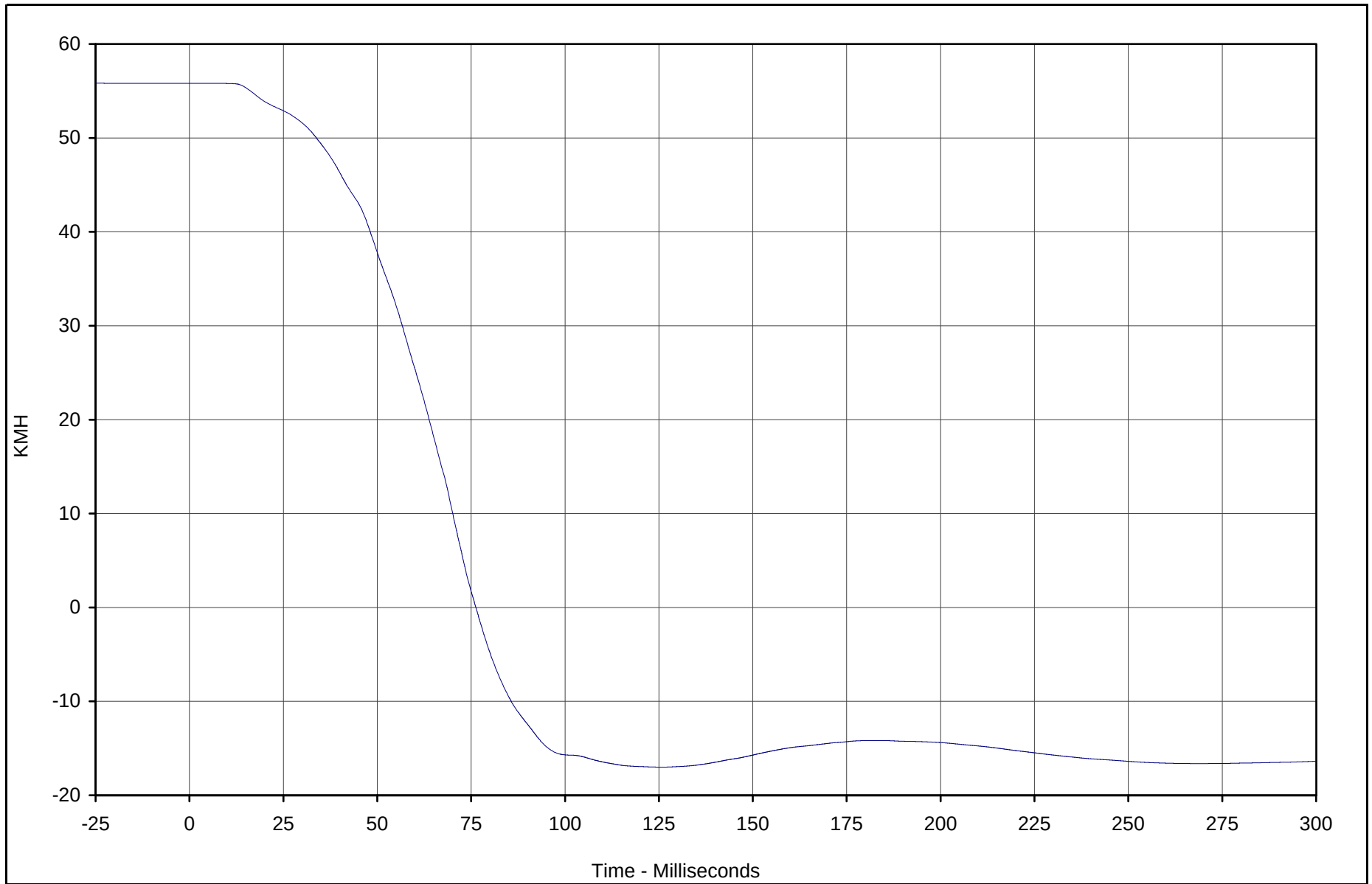
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Chest Primary X Velocity	057	IN1	KMH	55.8	0.0	-17.0	125.6	180

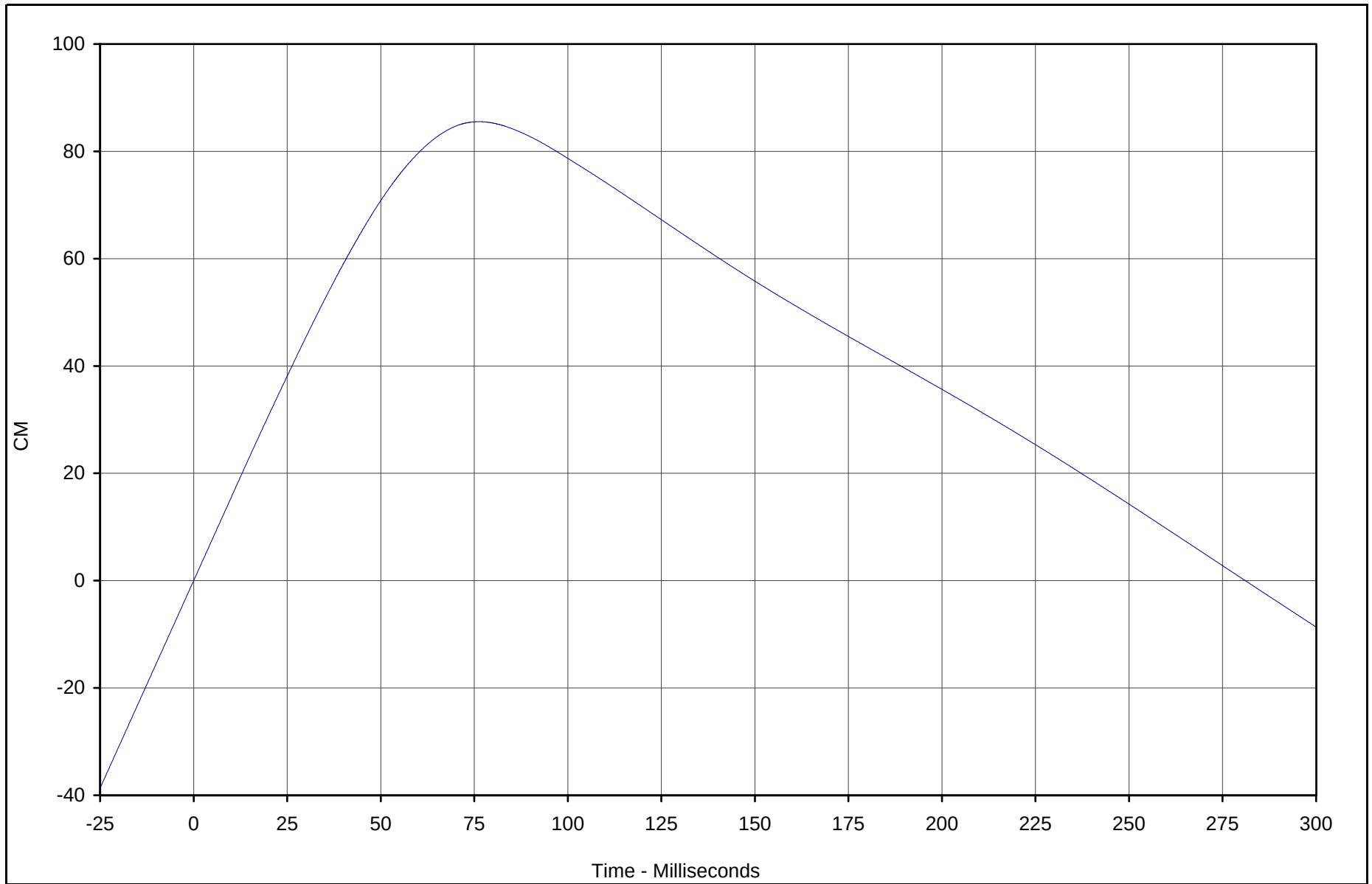


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Chest Primary X Displ.	057	IN2	CM	85.5	76.3	-8.6	299.9	180



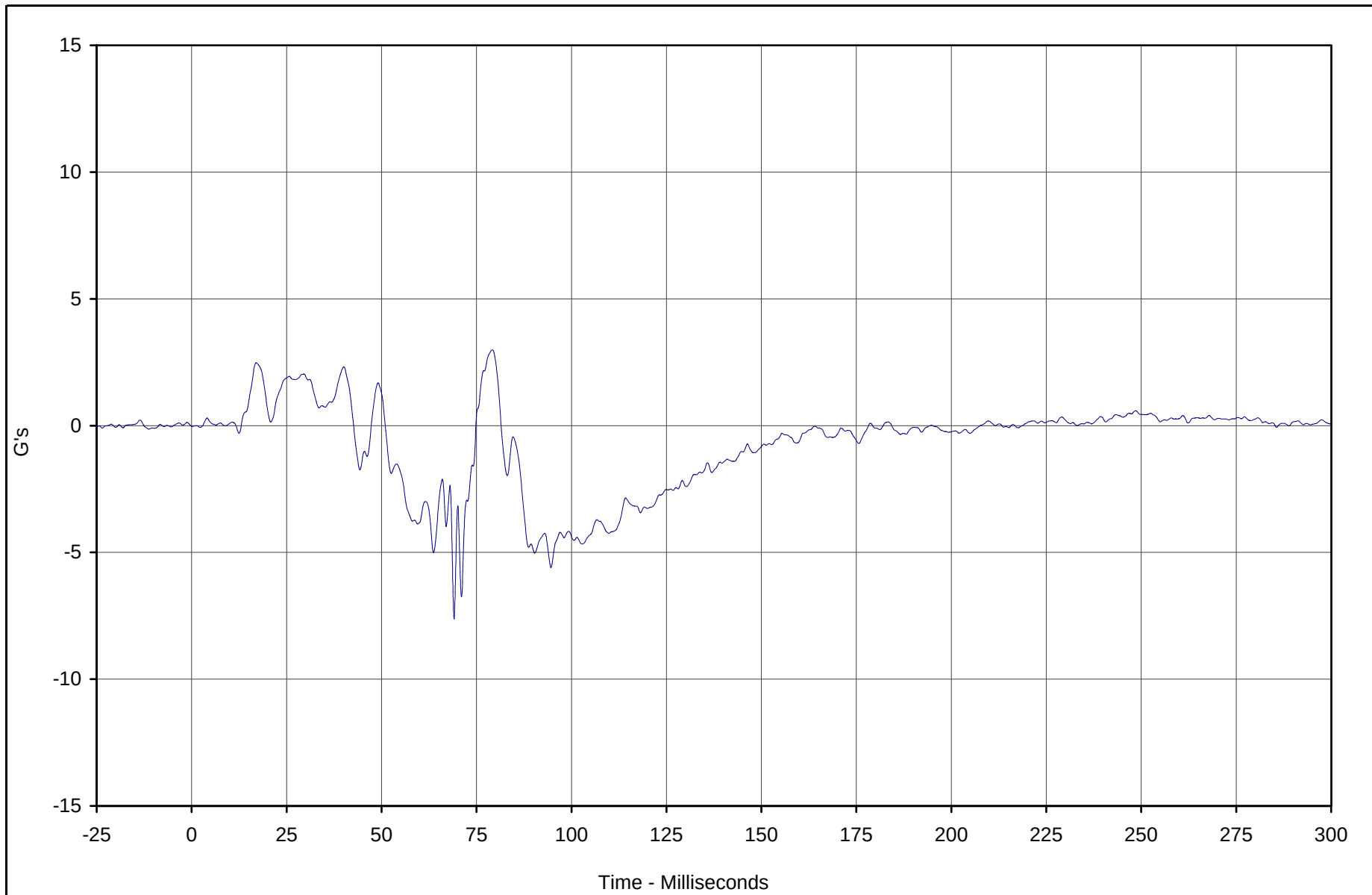
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

B-85



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Chest Primary Y	058	FIL	G's	3.0	79.2	-7.6	69.1	180



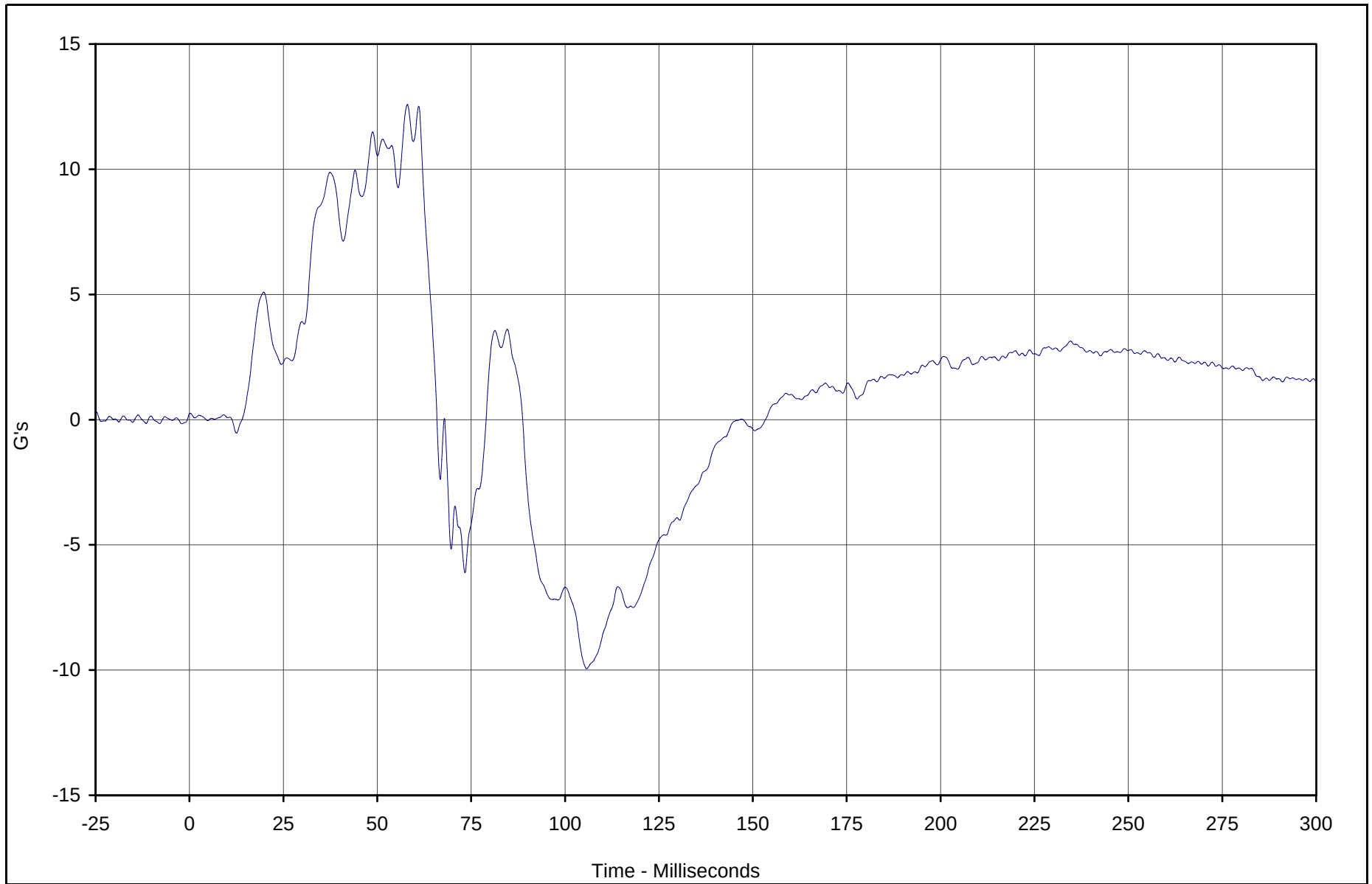
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Chest Primary Z	059	FIL	G's	12.6	58.0	-9.9	105.8	180

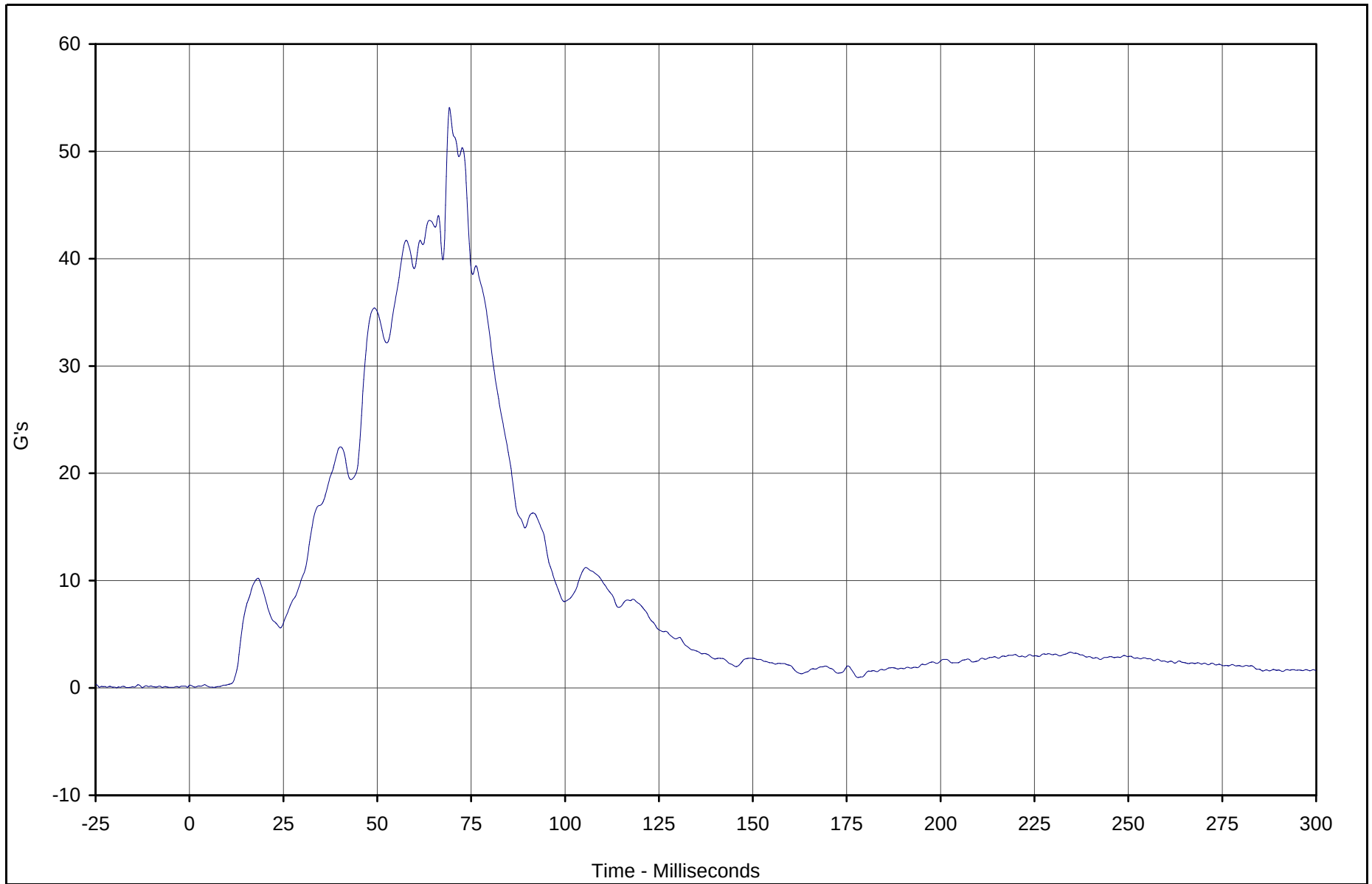


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Chest Resultant Primary	057	RES	G's	54.1	69.2	0.1	6.5	180



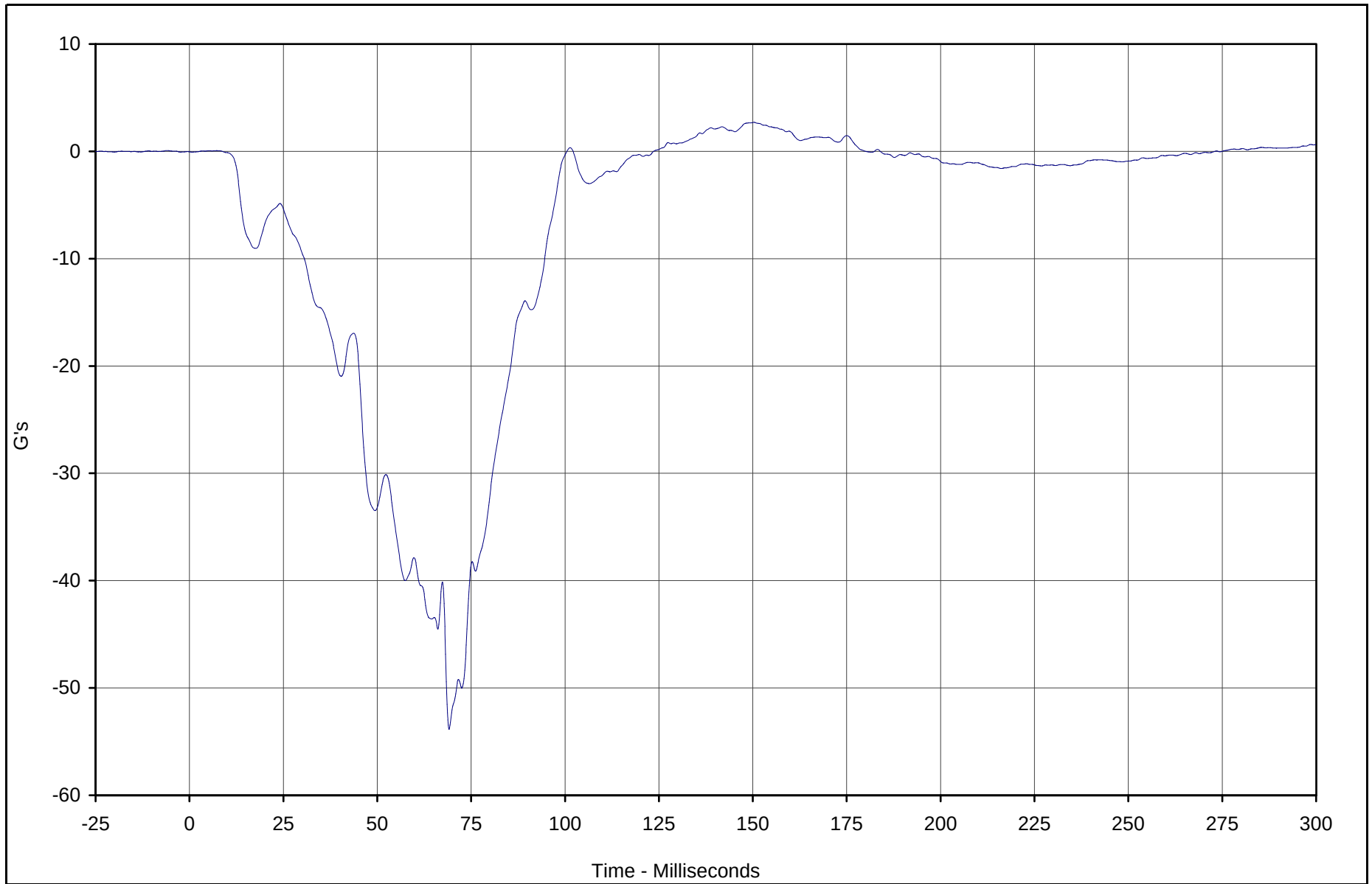
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

B-88



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Chest Redundant X	060	FIL	G's	2.7	150.3	-53.9	69.1	180



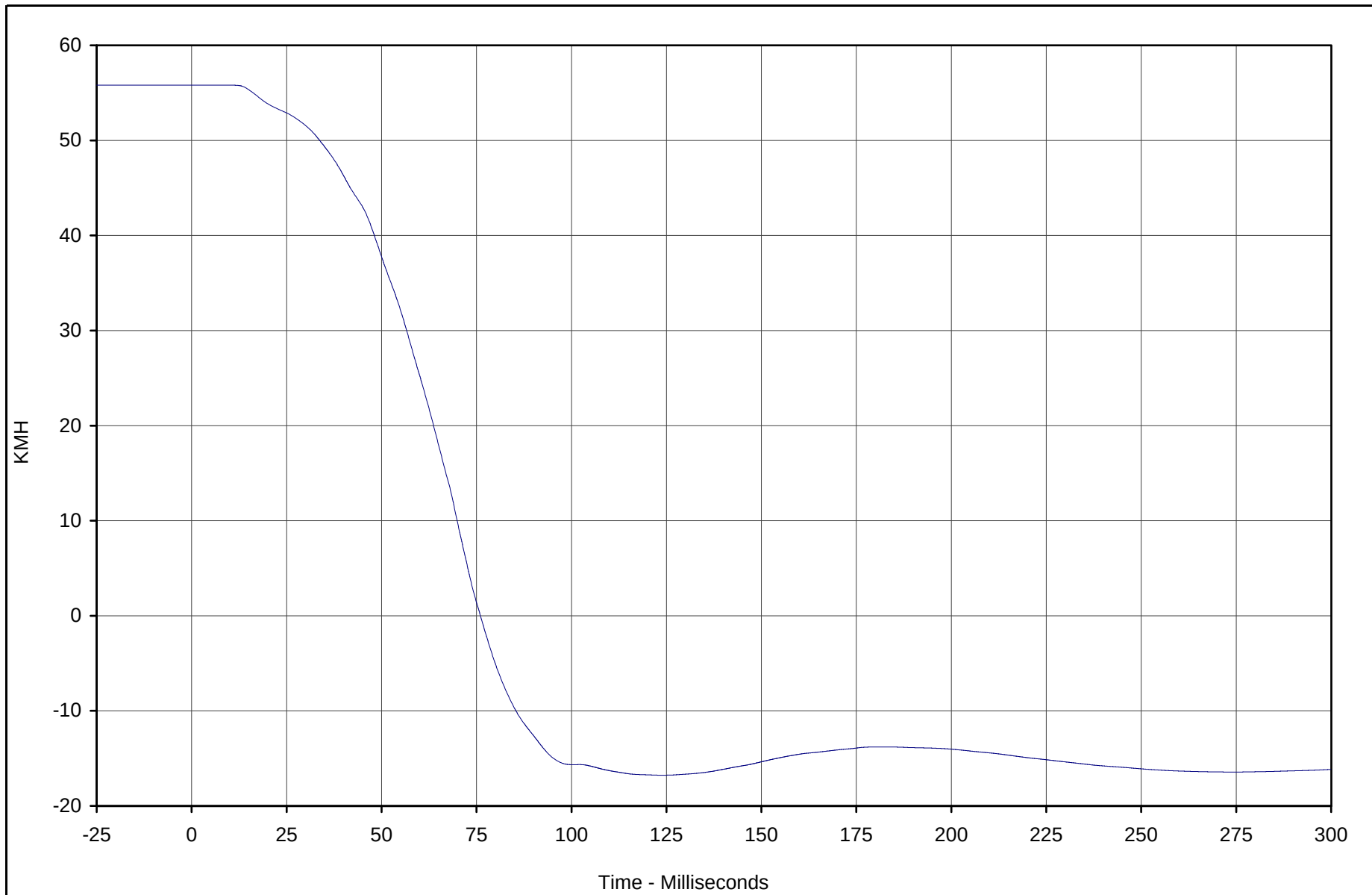
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Chest Redundant X Velocity	060	IN1	KMH	55.8	8.7	-16.8	123.6	180



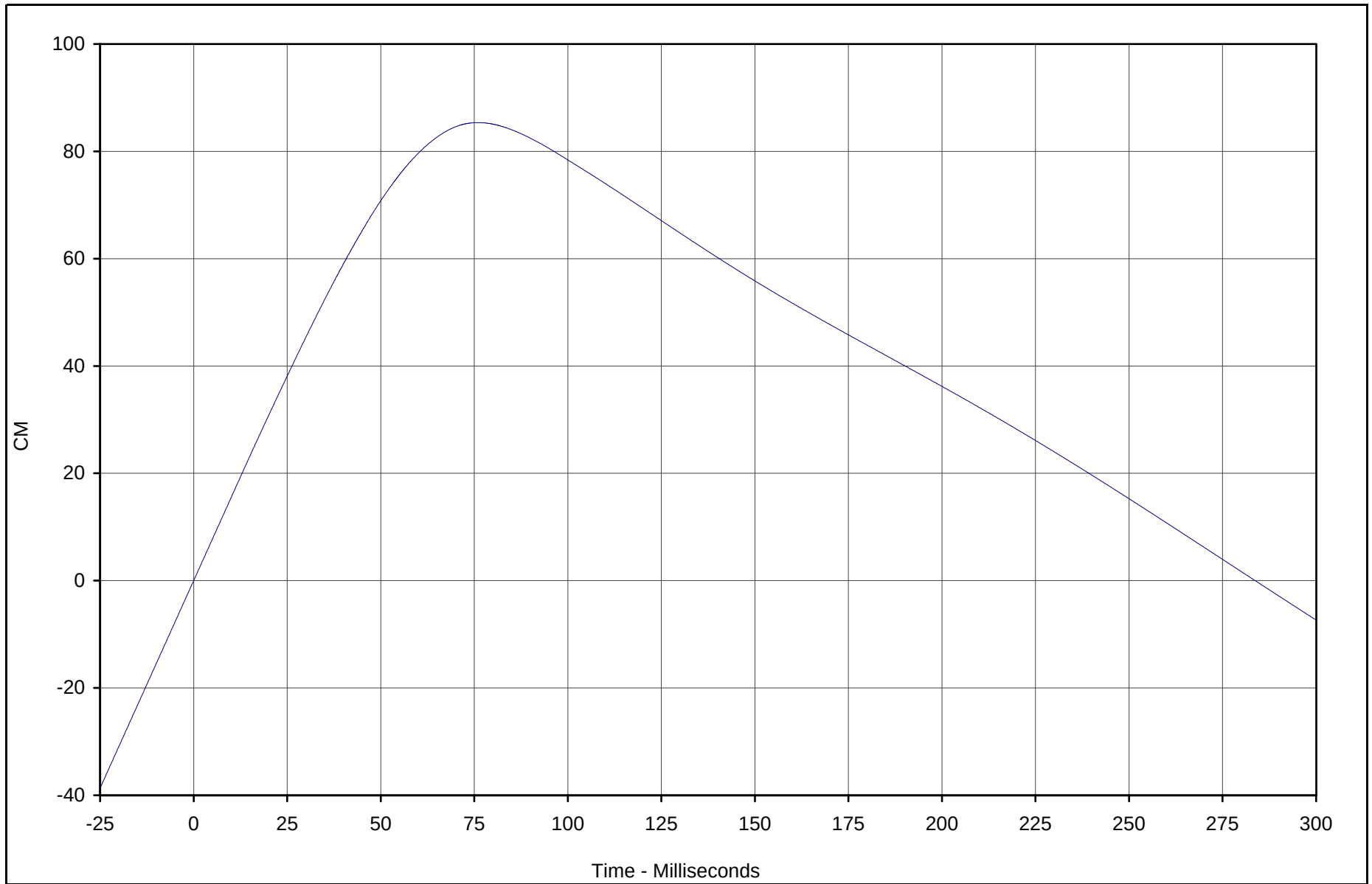
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

B-90



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Chest Redundant X Displ.	060	IN2	CM	85.4	76.0	-7.3	299.9	180



Test Vehicle: 2002 Toyota Highlander 4WD SUV

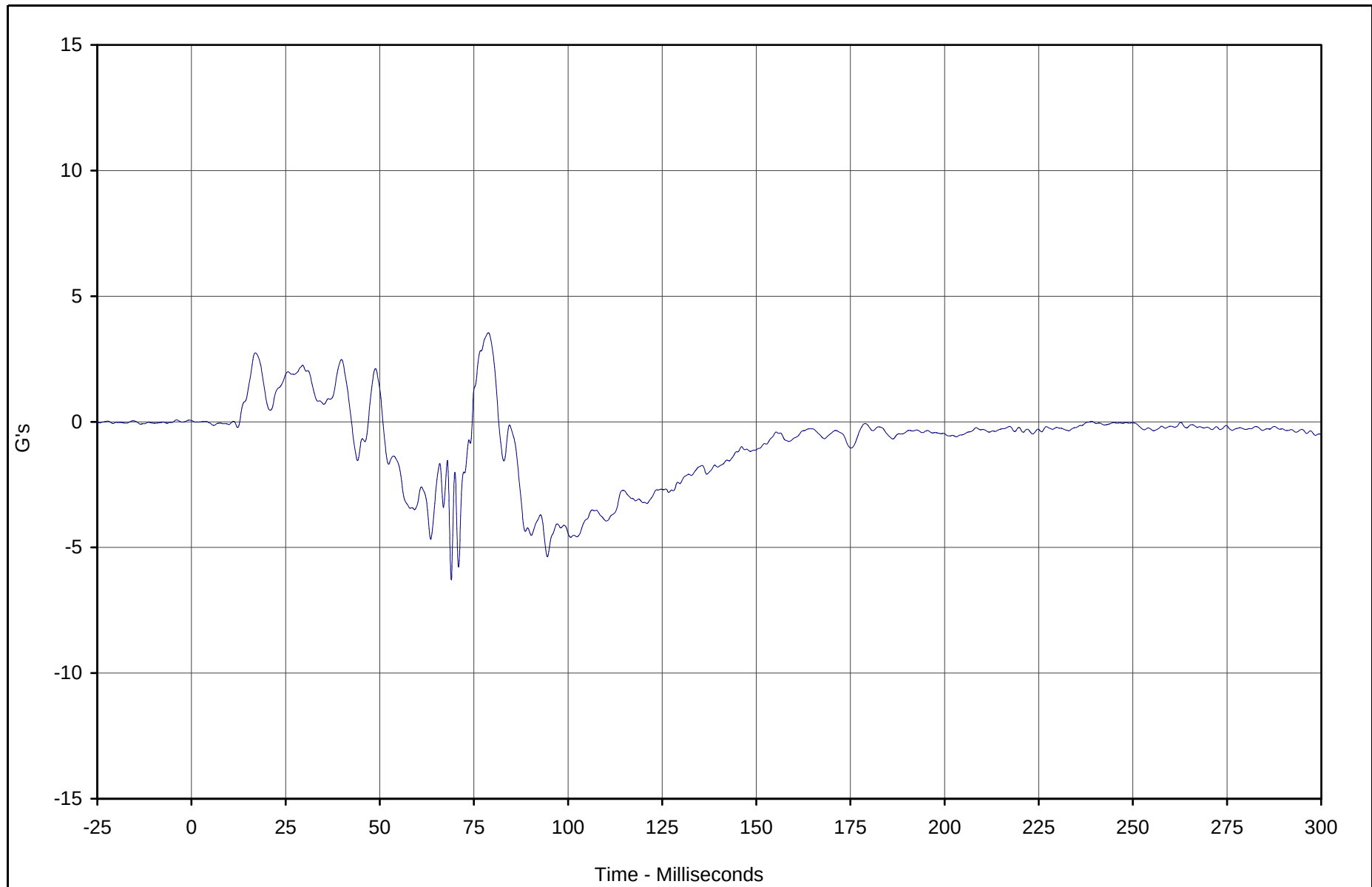
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

B-91



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Chest Redundant Y	061	FIL	G's	3.5	78.8	-6.3	69.0	180



Test Vehicle: 2002 Toyota Highlander 4WD SUV

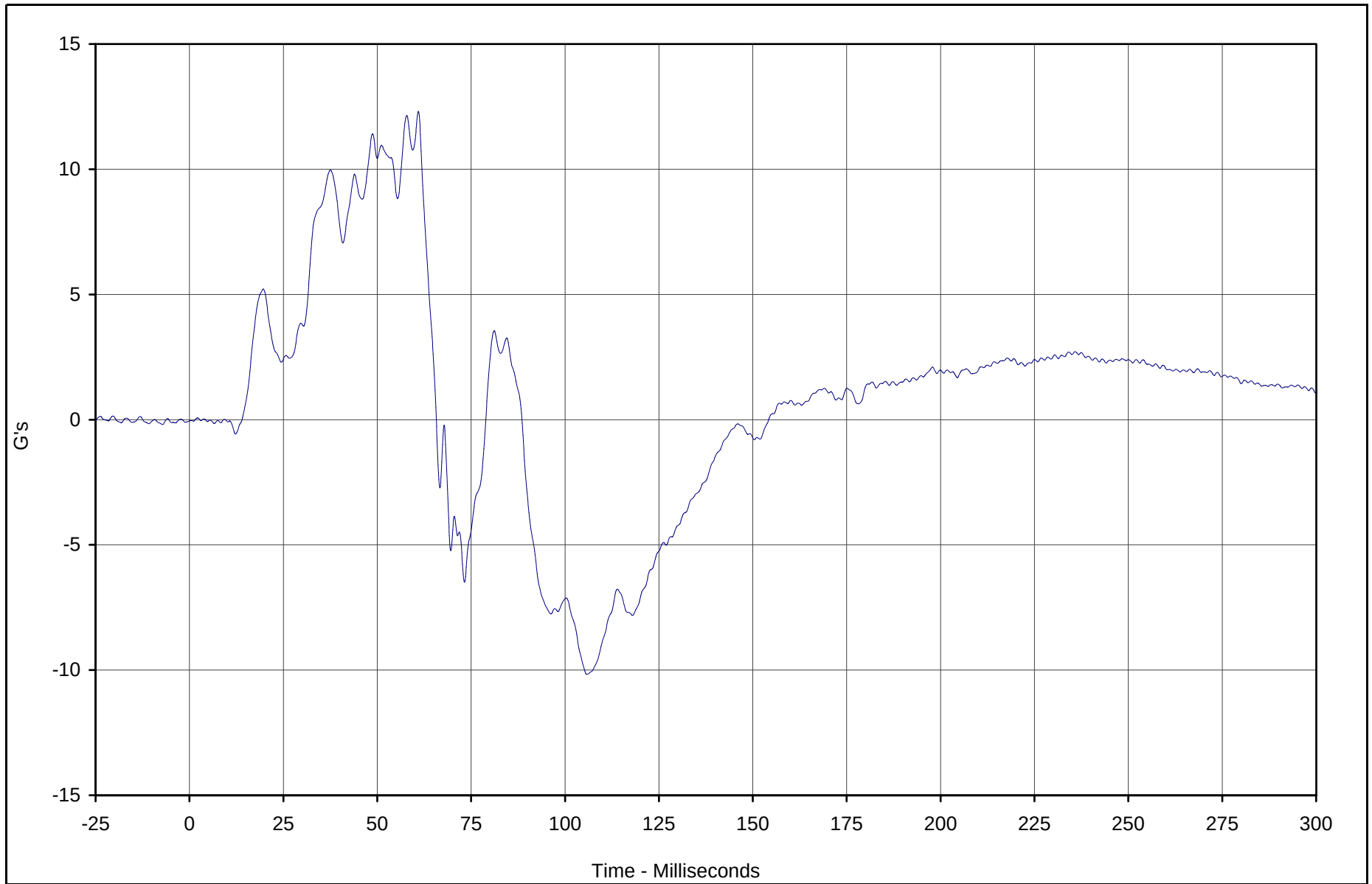
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

B-92



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Chest Redundant Z	062	FIL	G's	12.3	60.9	-10.2	105.8	180



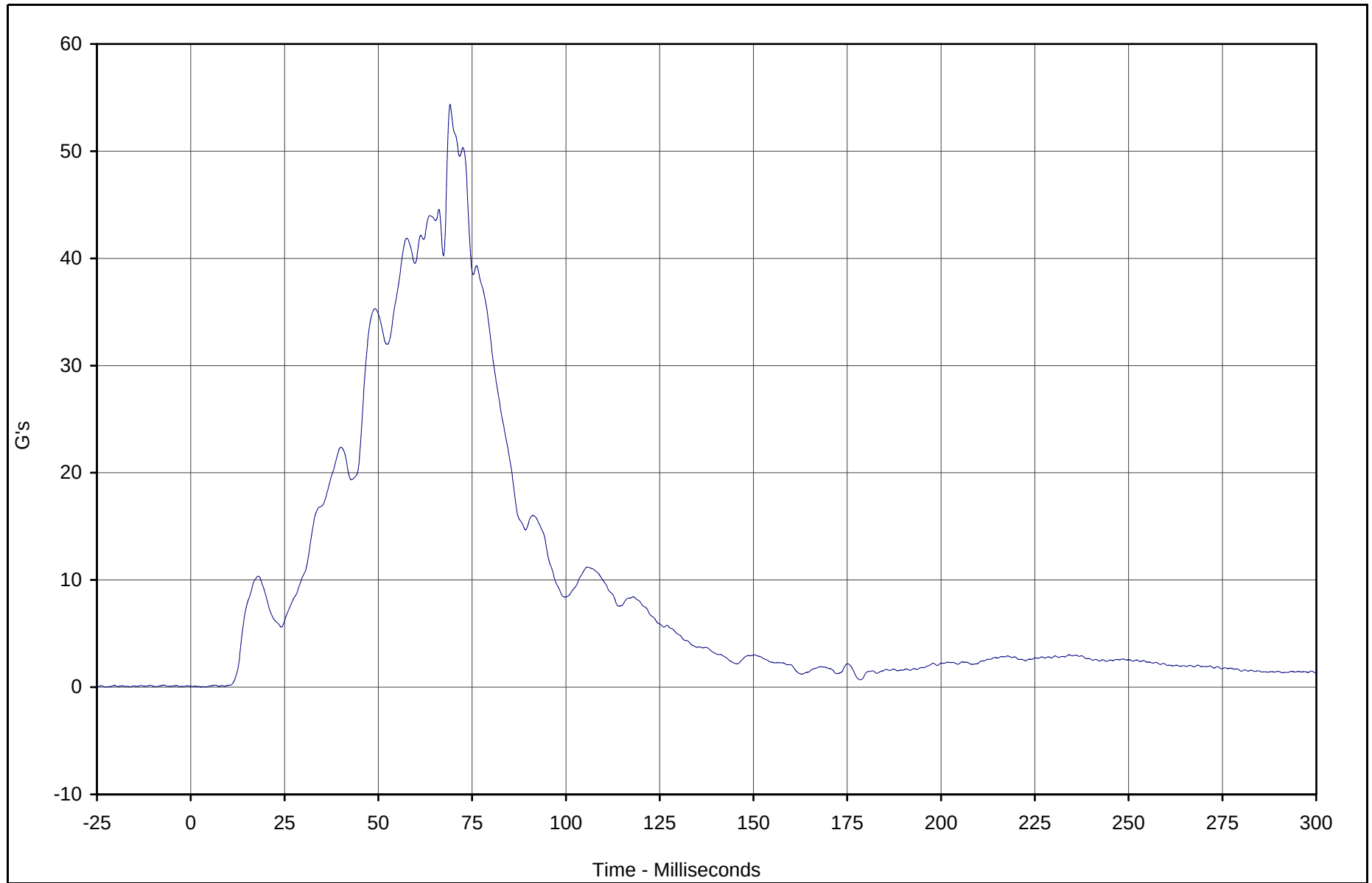
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Chest Resultant Redundant	060	RES	G's	54.4	69.1	0.0	2.7	180

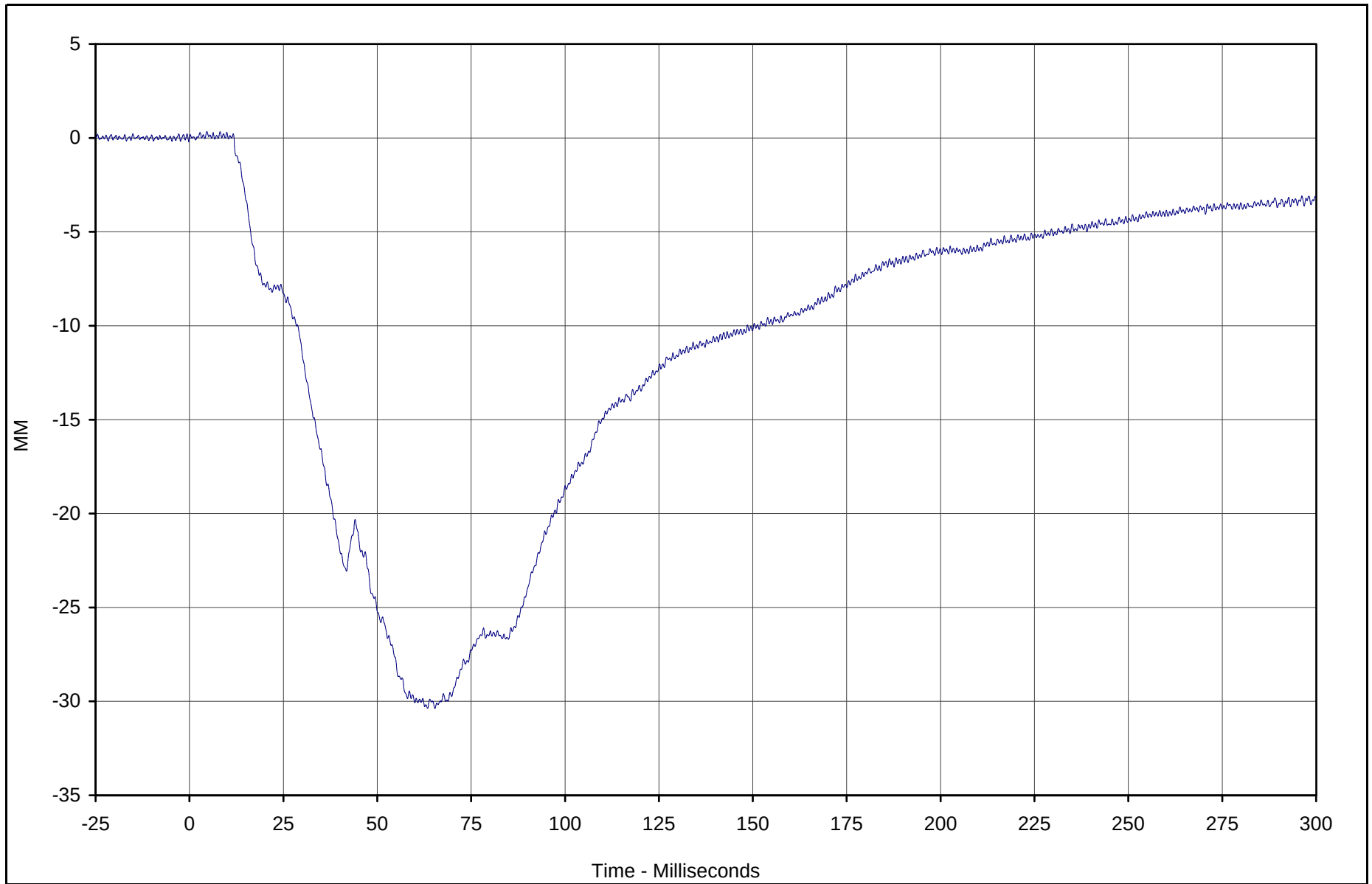


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Chest Displacement X	063	FIL	MM	0.3	4.6	-30.4	63.4	600

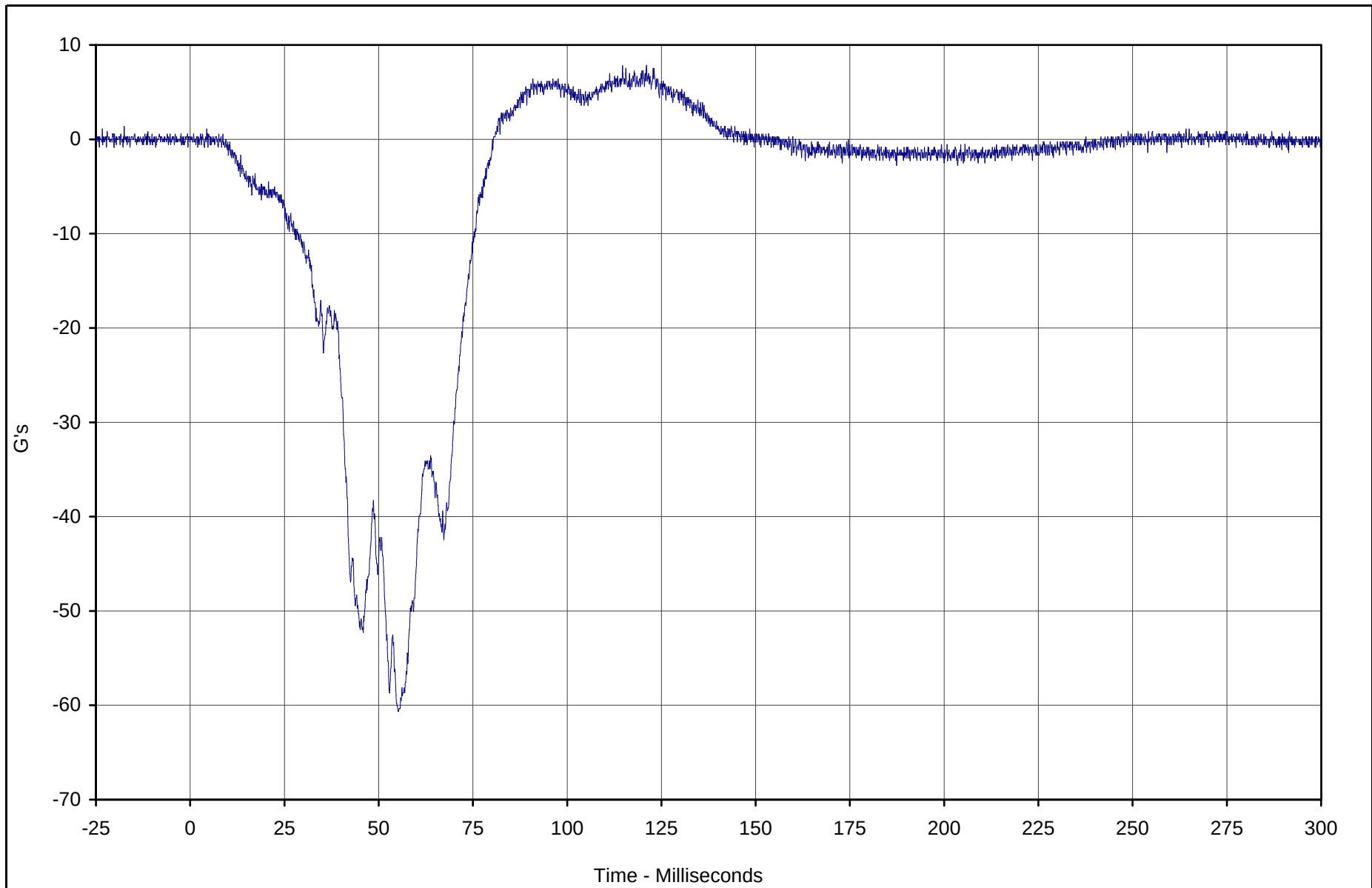


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Pelvis X	064	FIL	G's	7.8	114.7	-60.6	55.1	1000

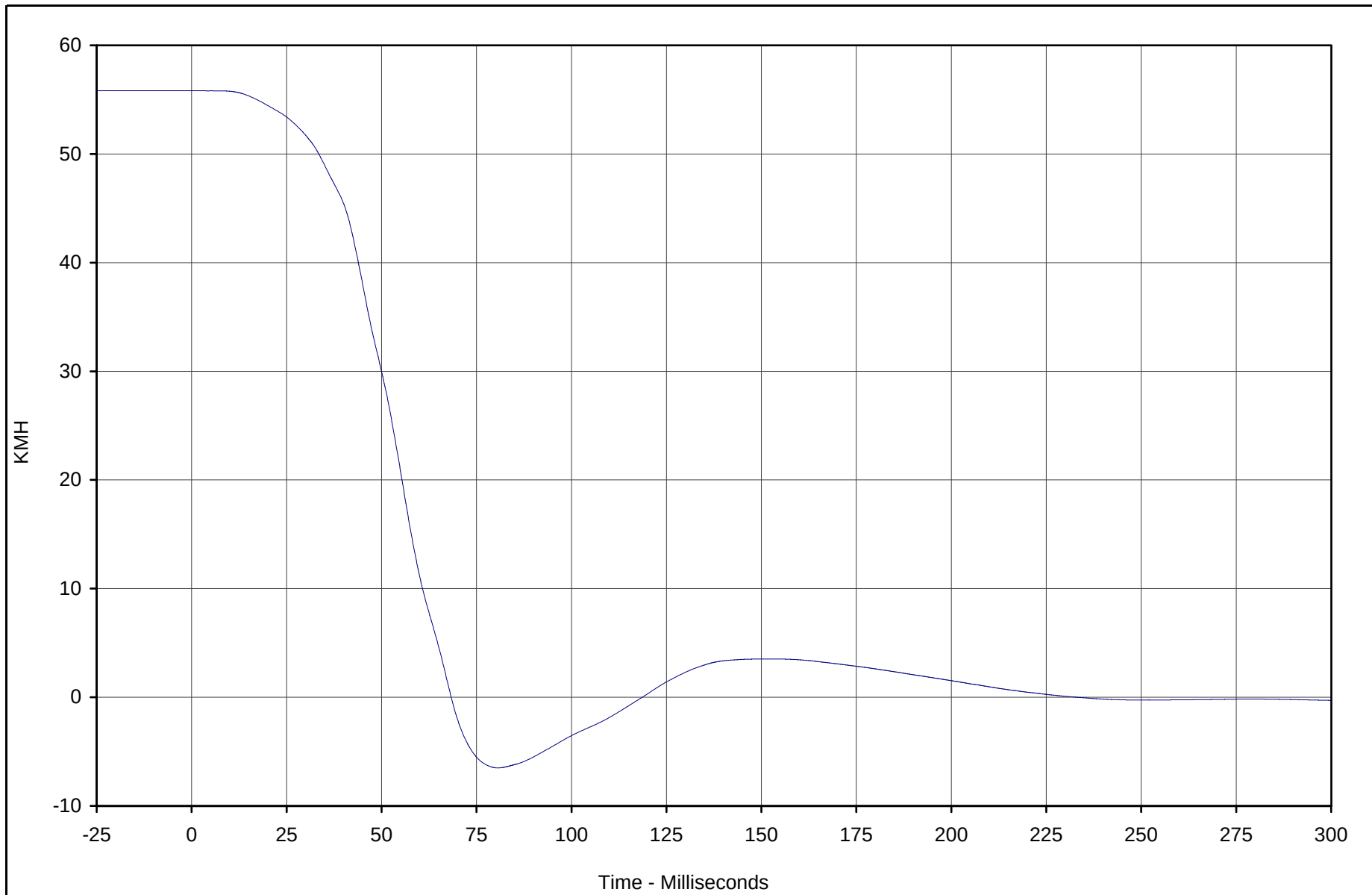


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Pelvis X Velocity	064	IN1	KMH	55.8	0.4	-6.5	80.6	180

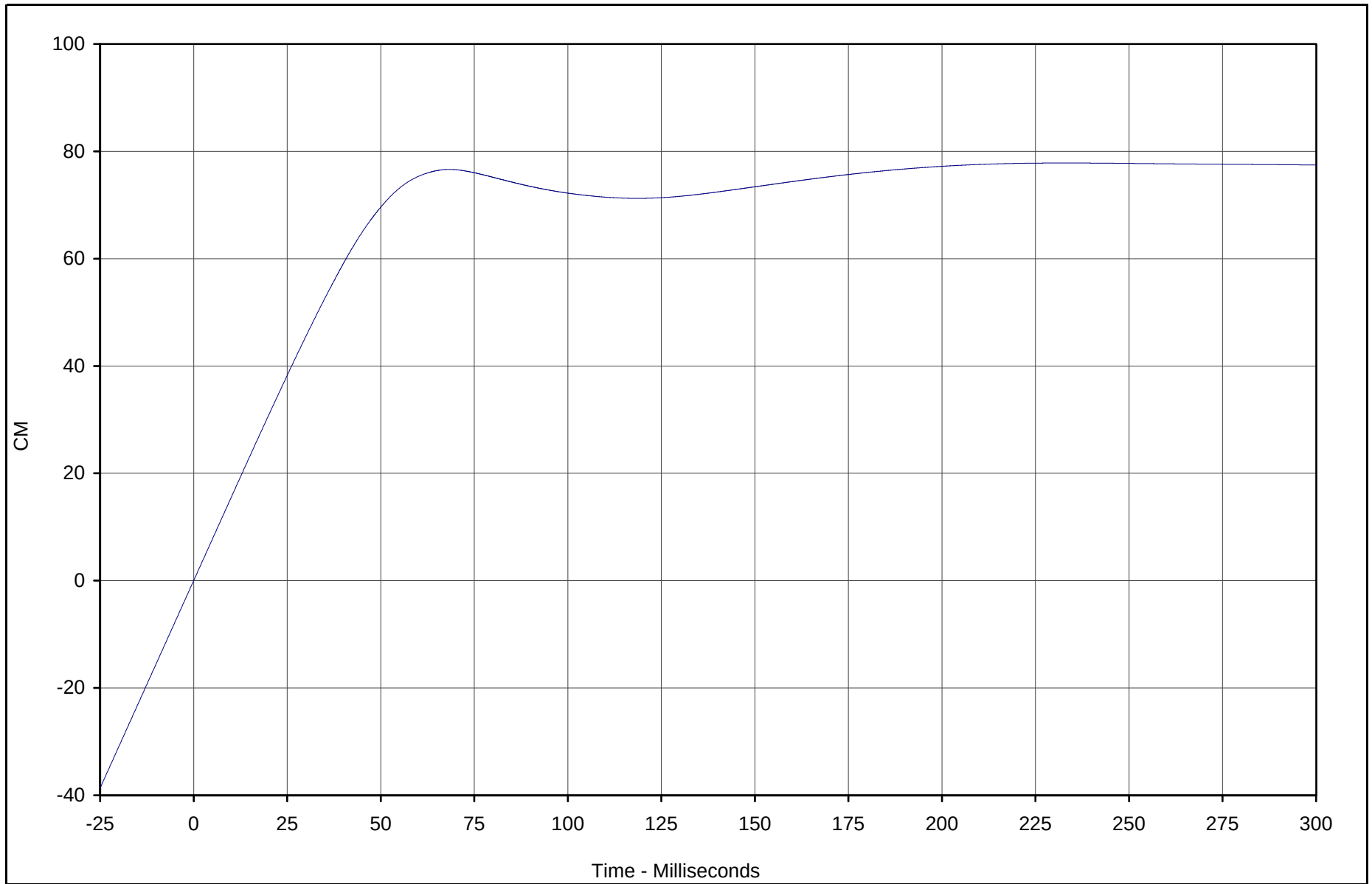


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Pelvis X Displ.	064	IN2	CM	77.8	233.0	0.0	0.0	180

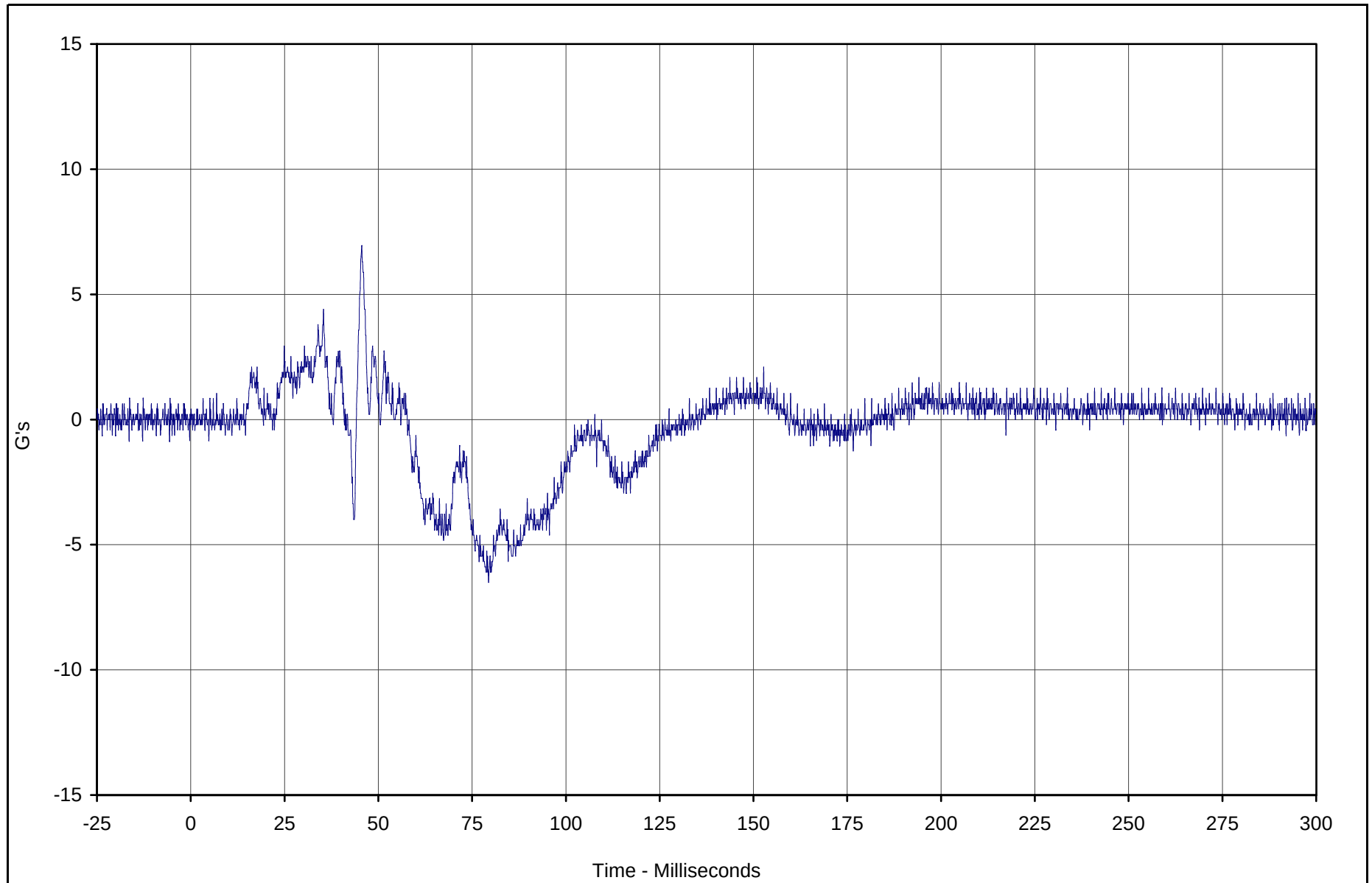


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Pelvis Y	065	FIL	G's	6.9	45.6	-6.5	79.4	1000

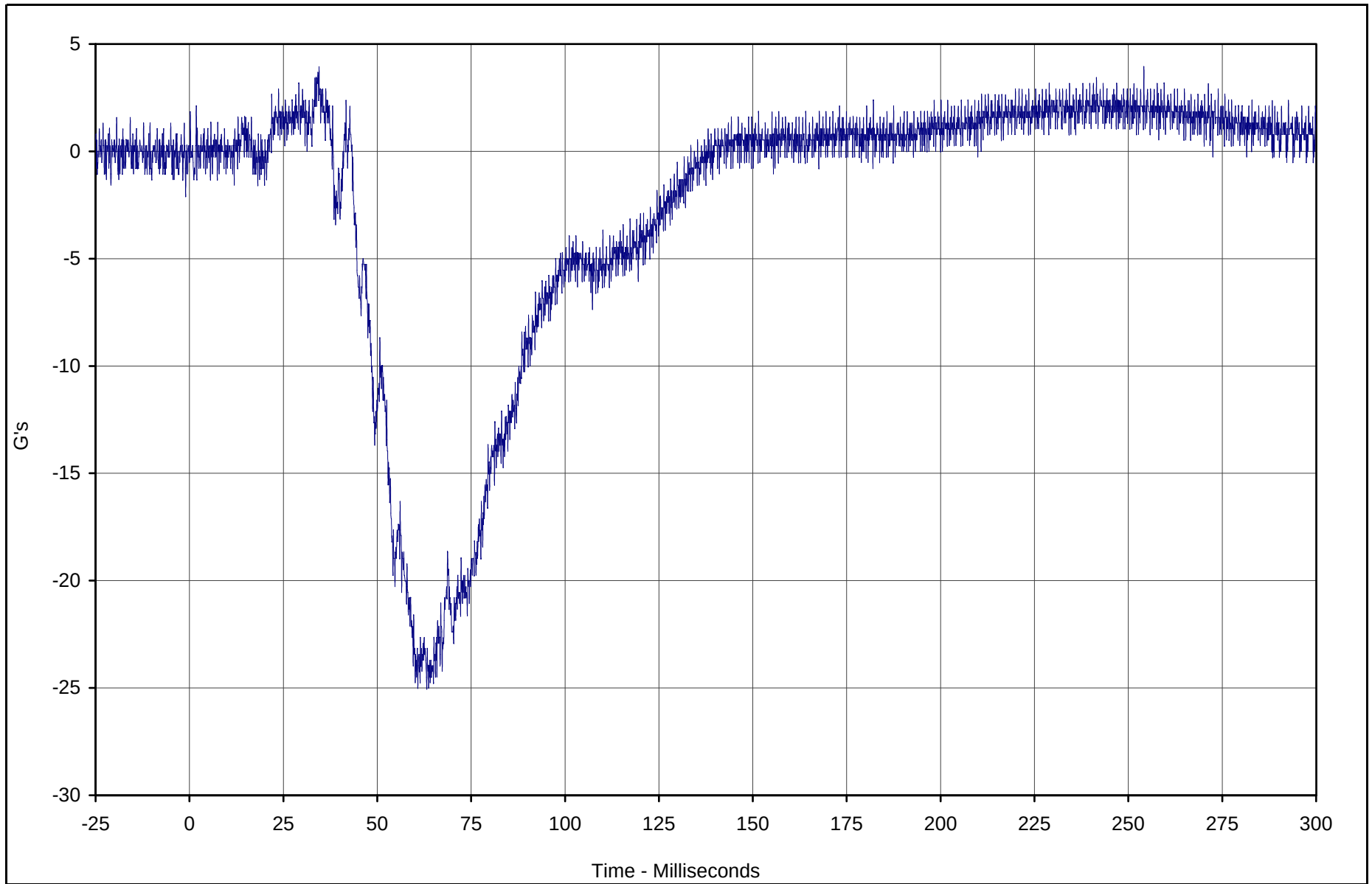


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Pelvis Z	066	FIL	G's	4.0	34.5	-25.0	60.8	1000

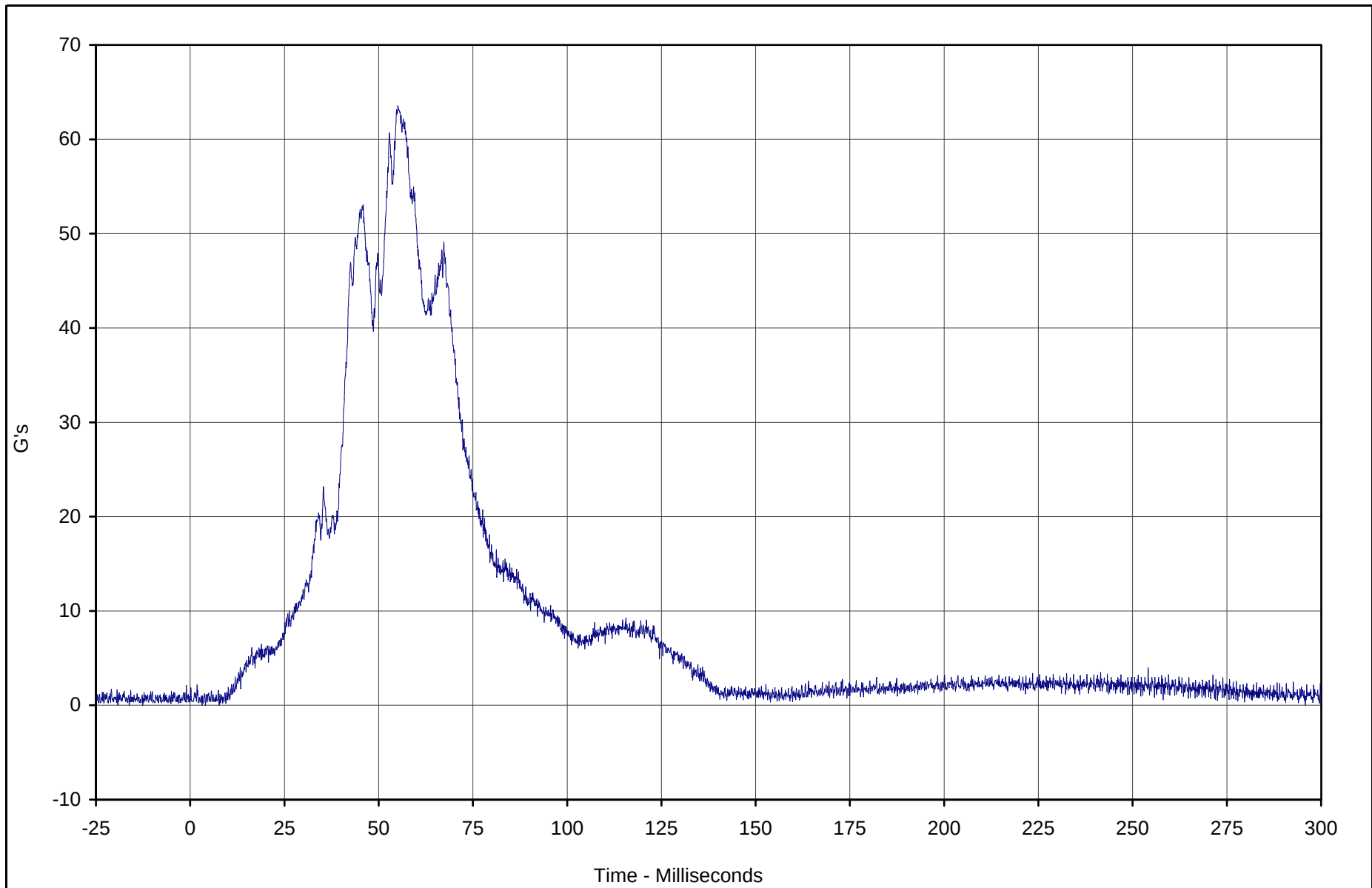


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Pelvis Resultant	066	RES	G's	63.5	55.1	0.0	3.2	1000

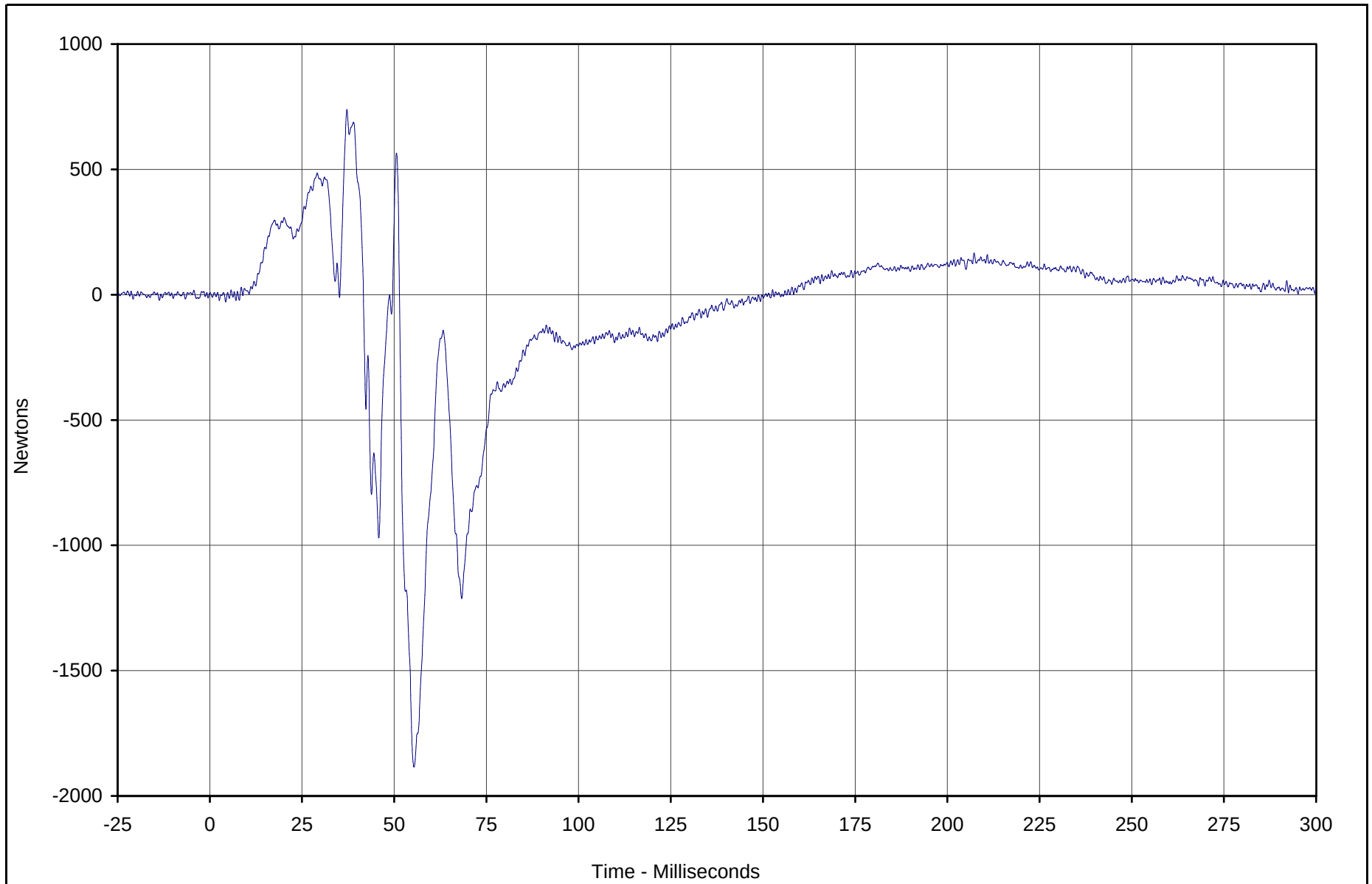


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Left Femur Force	067	FIL	Newtons	739.1	37.2	-1884.7	55.4	600

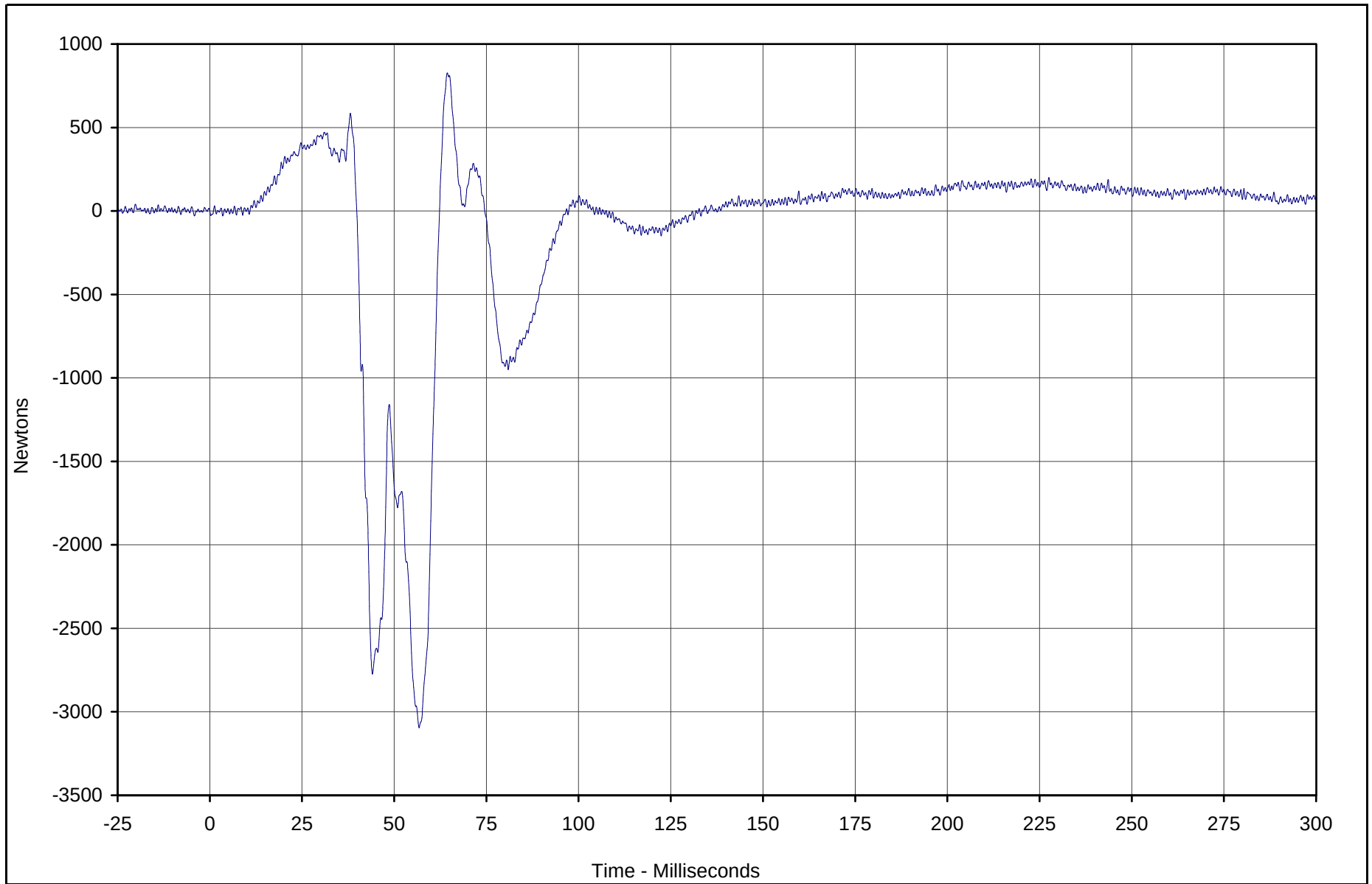


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Right Femur Force	068	FIL	Newtons	826.3	64.4	-3095.0	56.7	600

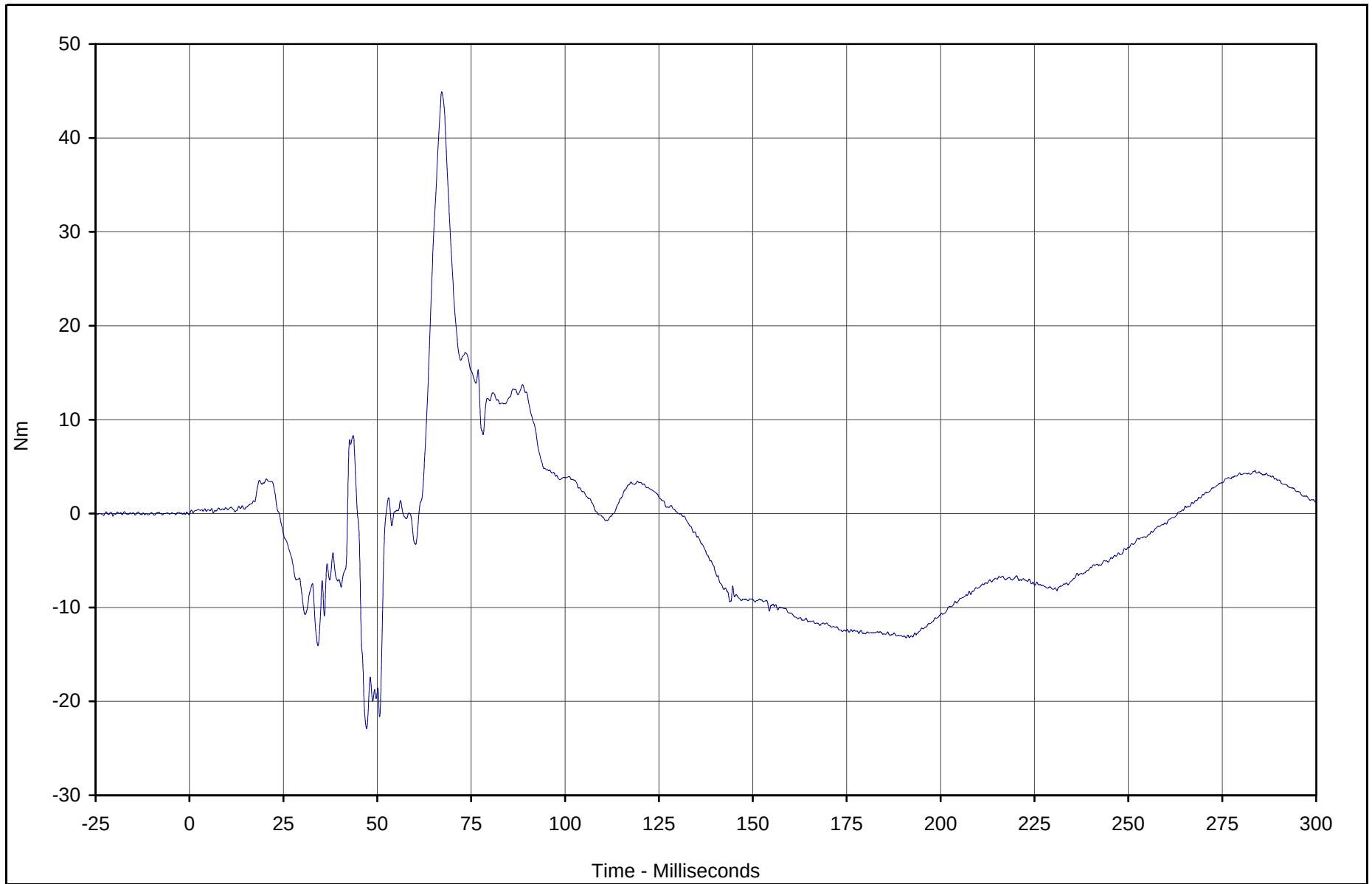


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Left Upper Tibia Moment X	069	FIL	Nm	44.9	67.2	-22.9	47.2	600

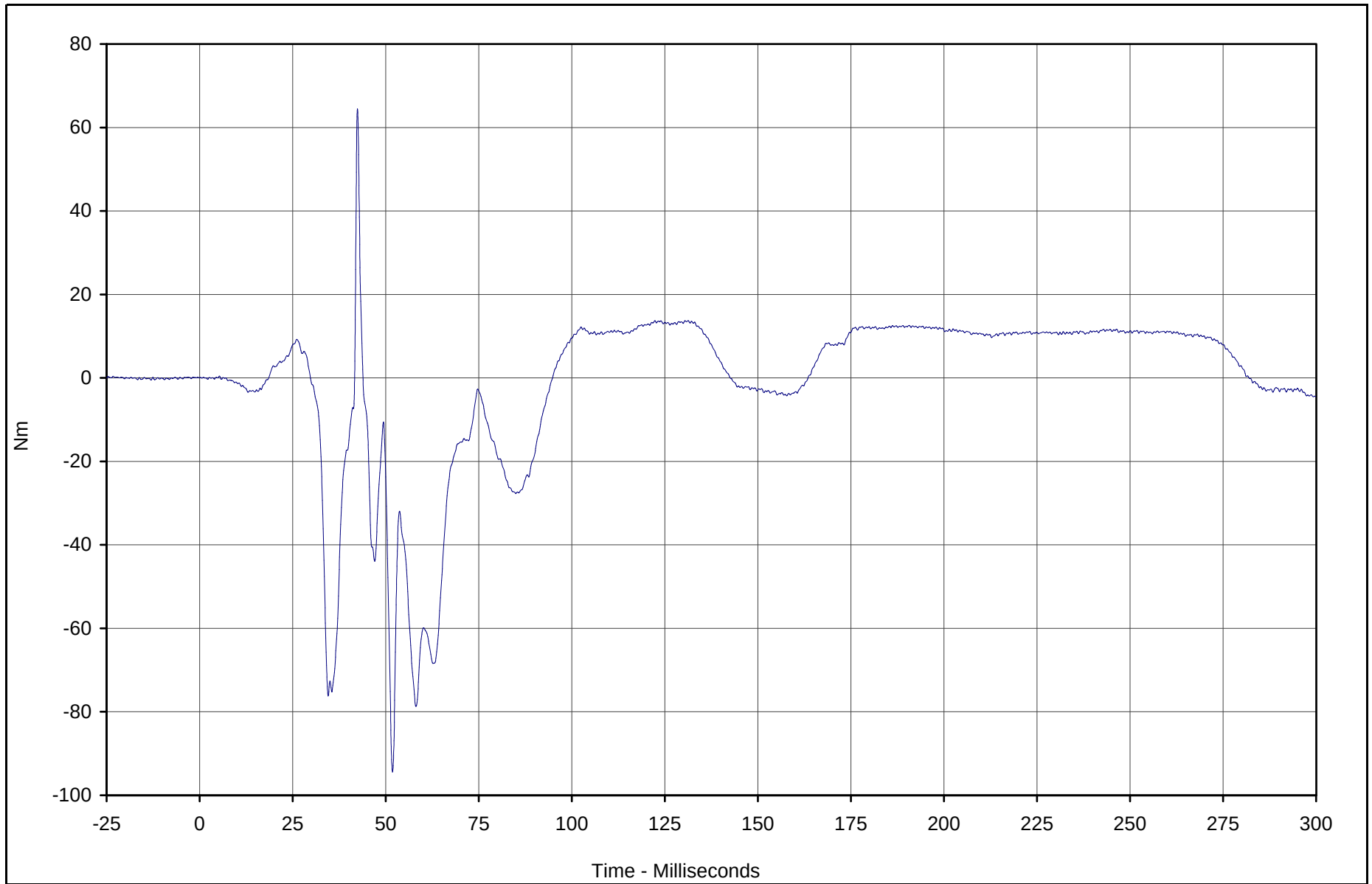


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Left Upper Tibia Moment Y	070	FIL	Nm	64.5	42.4	-94.5	51.8	600

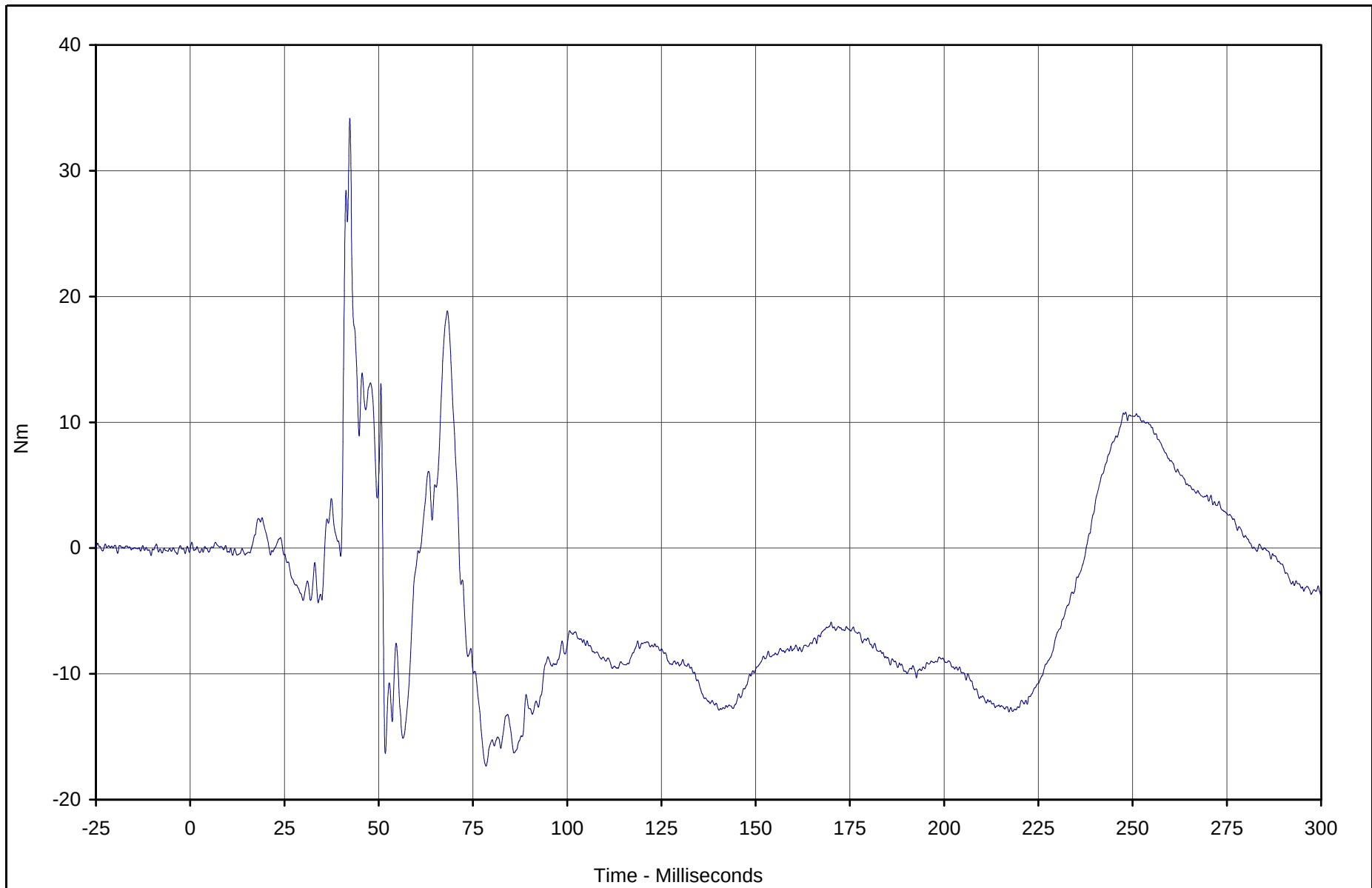


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Right Upper Tibia Moment X	071	FIL	Nm	34.2	42.3	-17.3	78.5	600

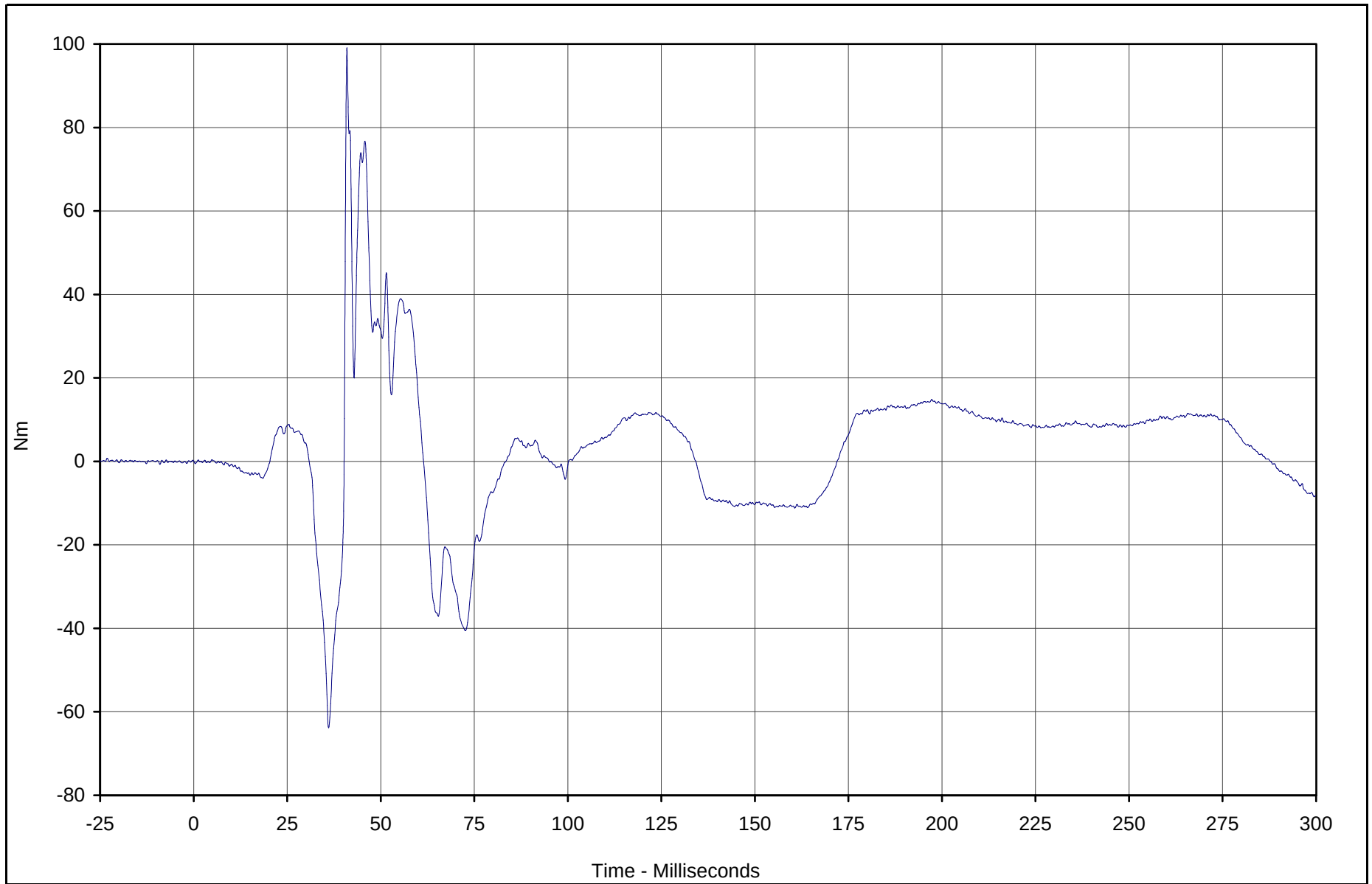


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Right Upper Tibia Moment Y	072	FIL	Nm	99.1	41.0	-63.9	36.1	600

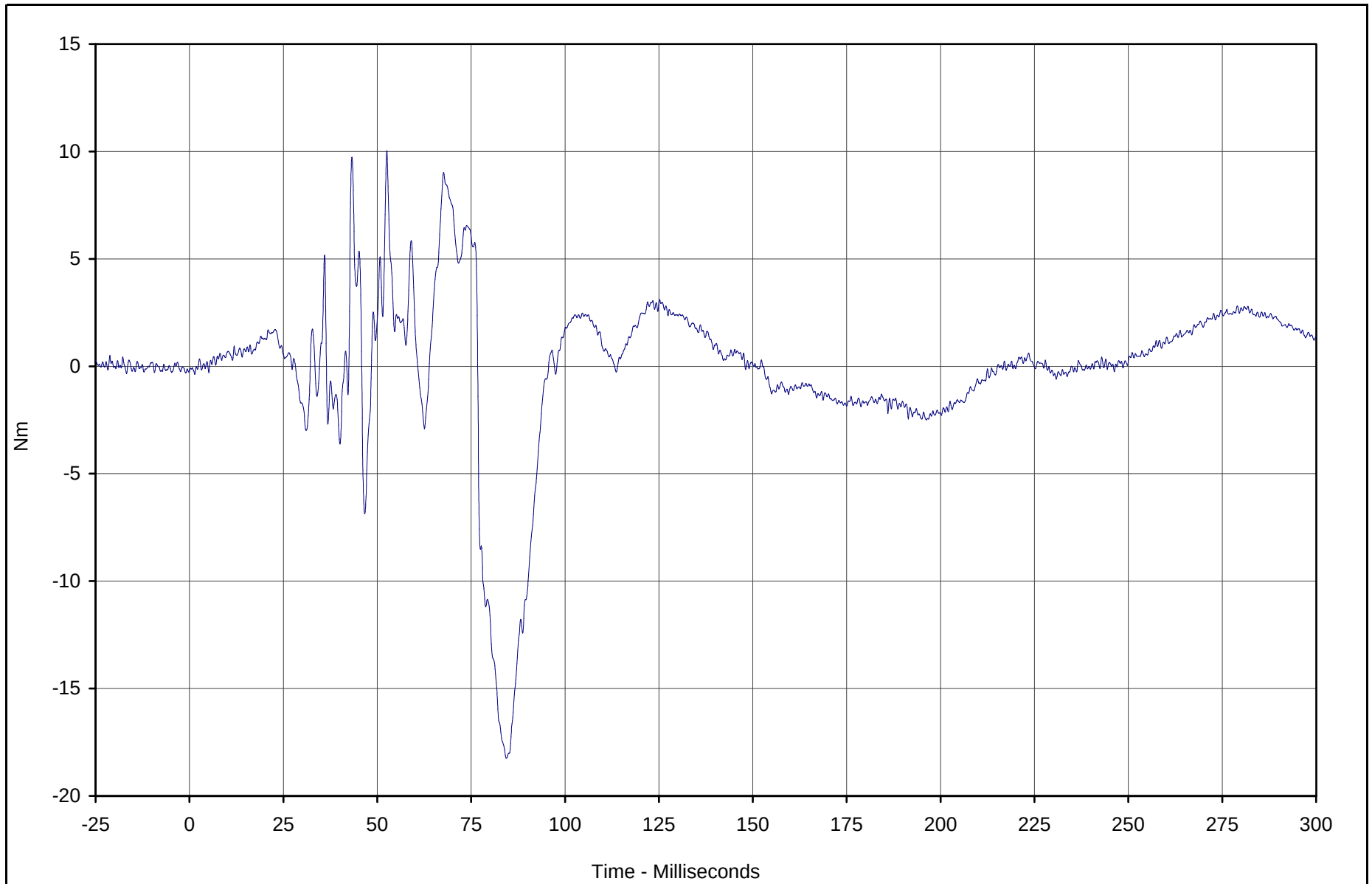


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Left Lower Tibia Moment X	073	FIL	Nm	10.0	52.5	-18.2	84.4	600

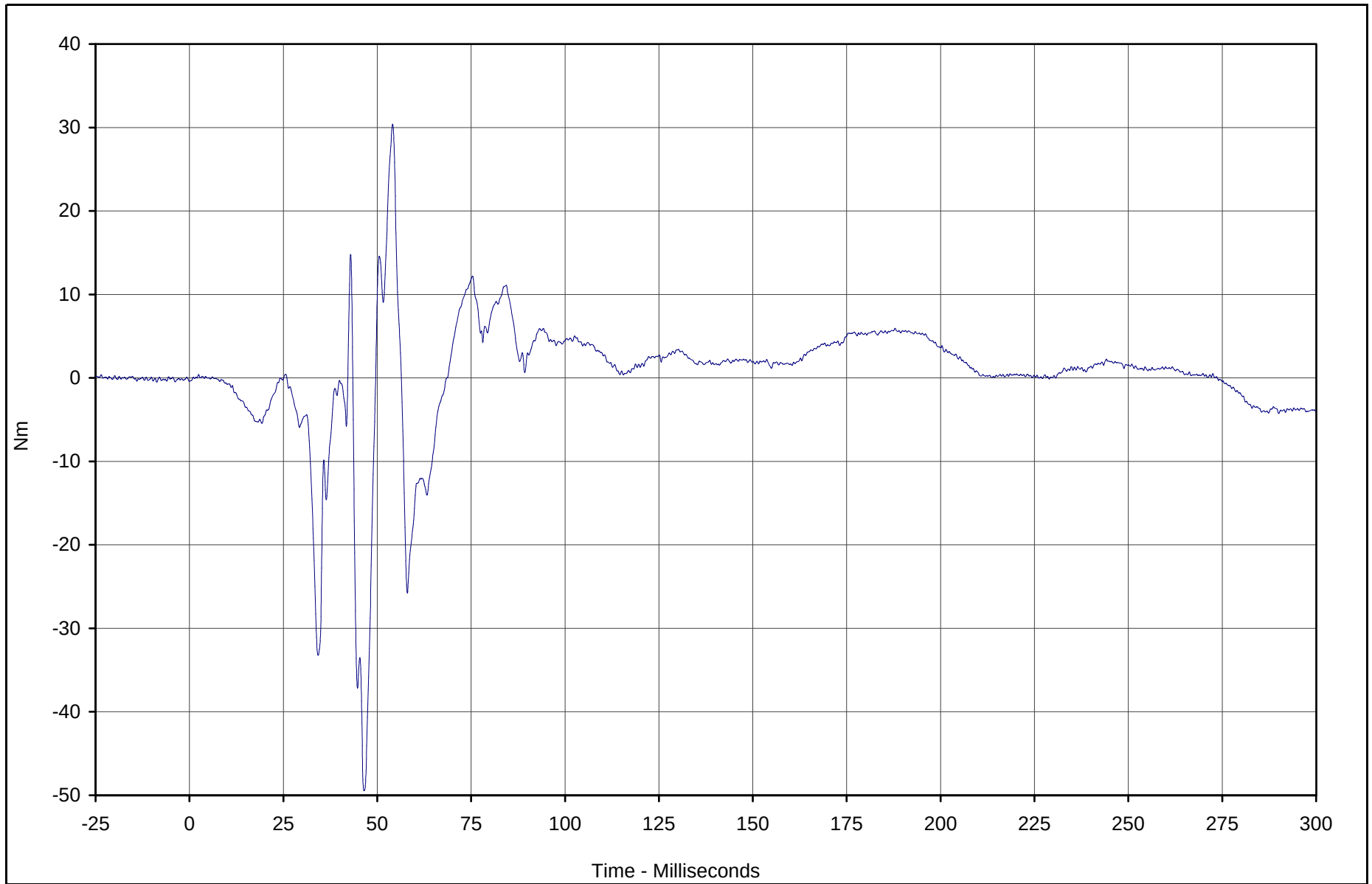


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Left Lower Tibia Moment Y	074	FIL	Nm	30.4	54.1	-49.5	46.5	600

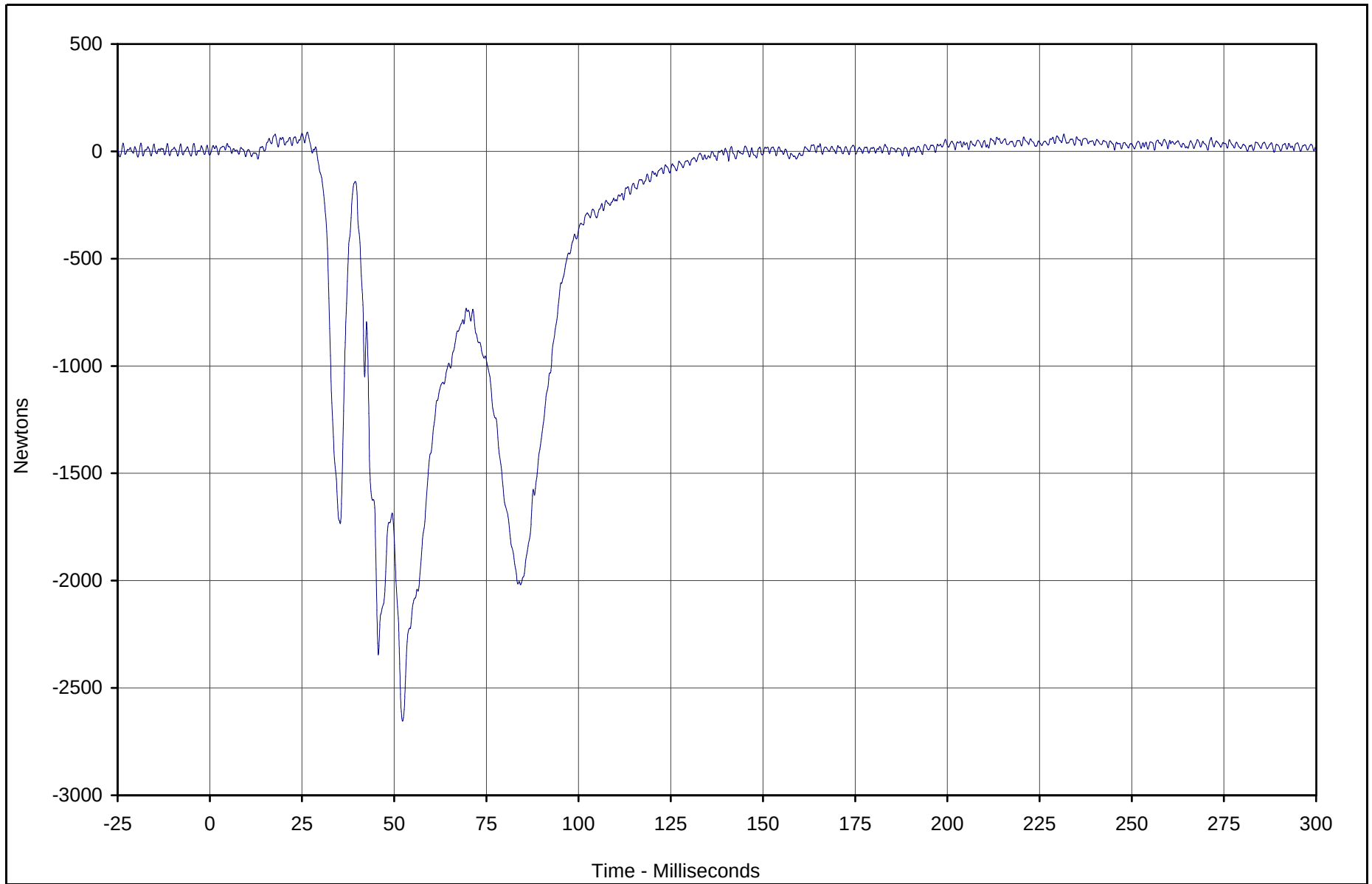


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Left Lower Tibia Force Z	075	FIL	Newtons	90.0	26.4	-2654.5	52.3	600

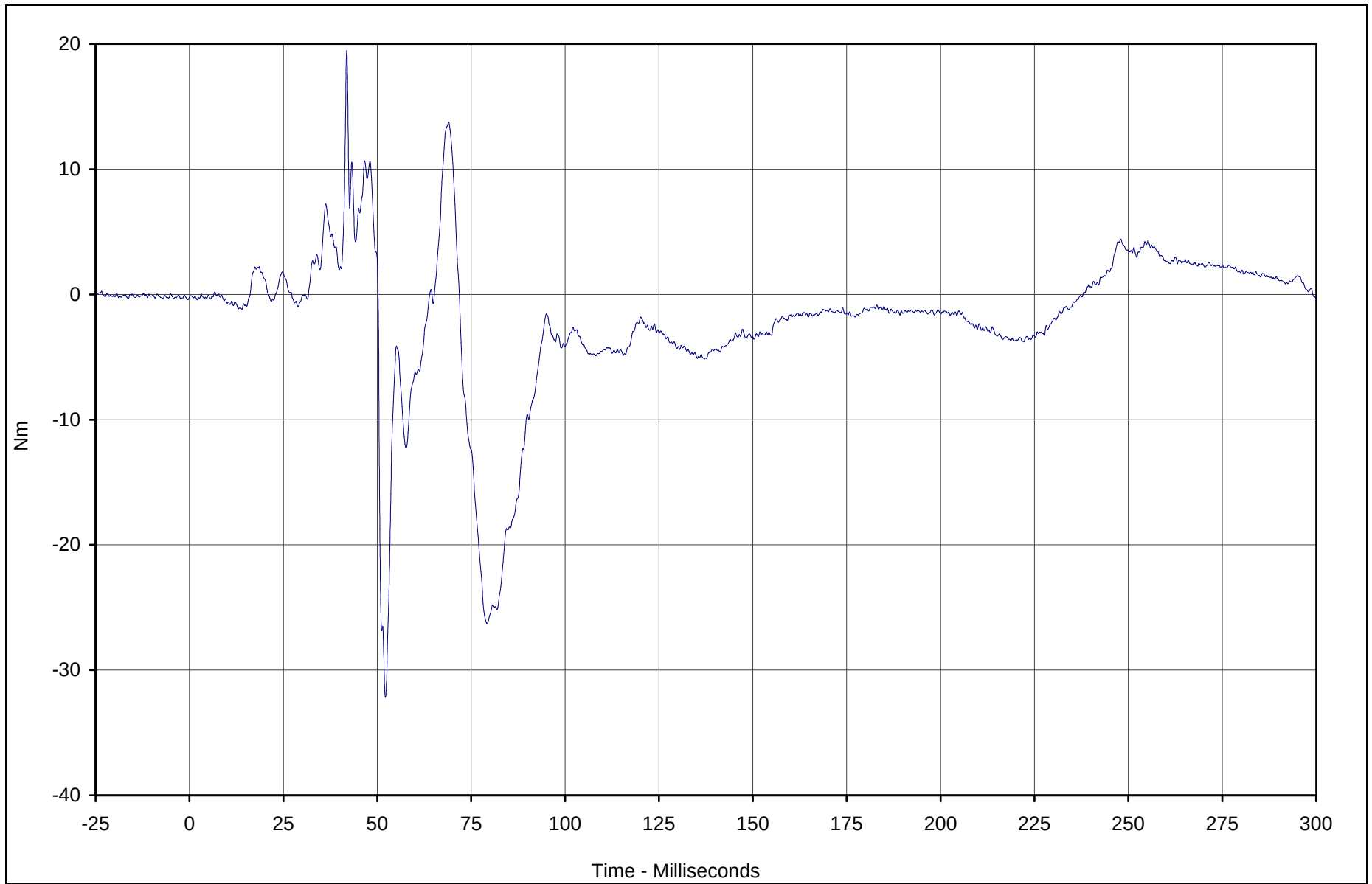


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Right Lower Tibia Moment X	076	FIL	Nm	19.5	41.9	-32.2	52.2	600

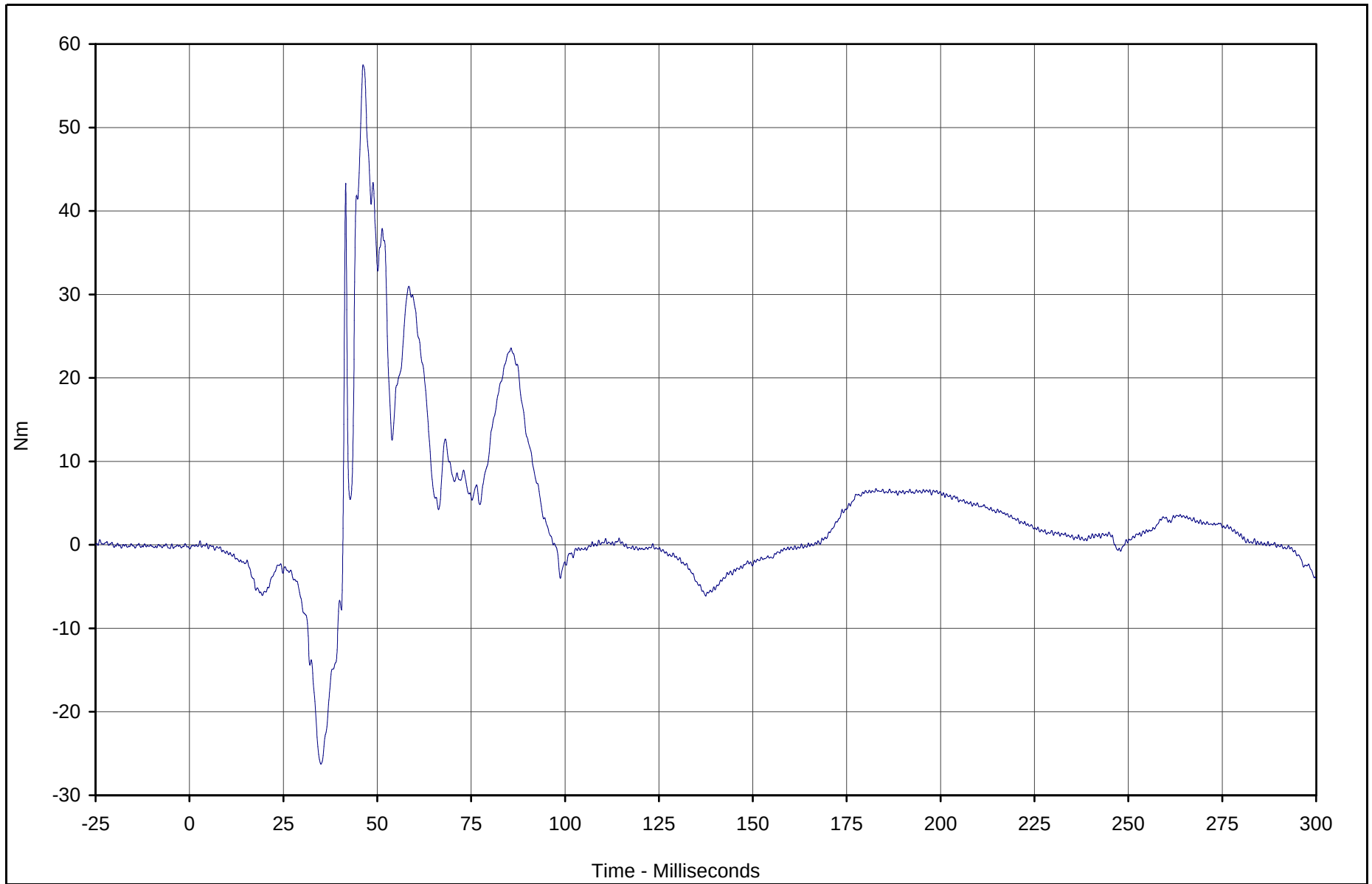


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Right Lower Tibia Moment Y	077	FIL	Nm	57.5	46.2	-26.3	35.0	600

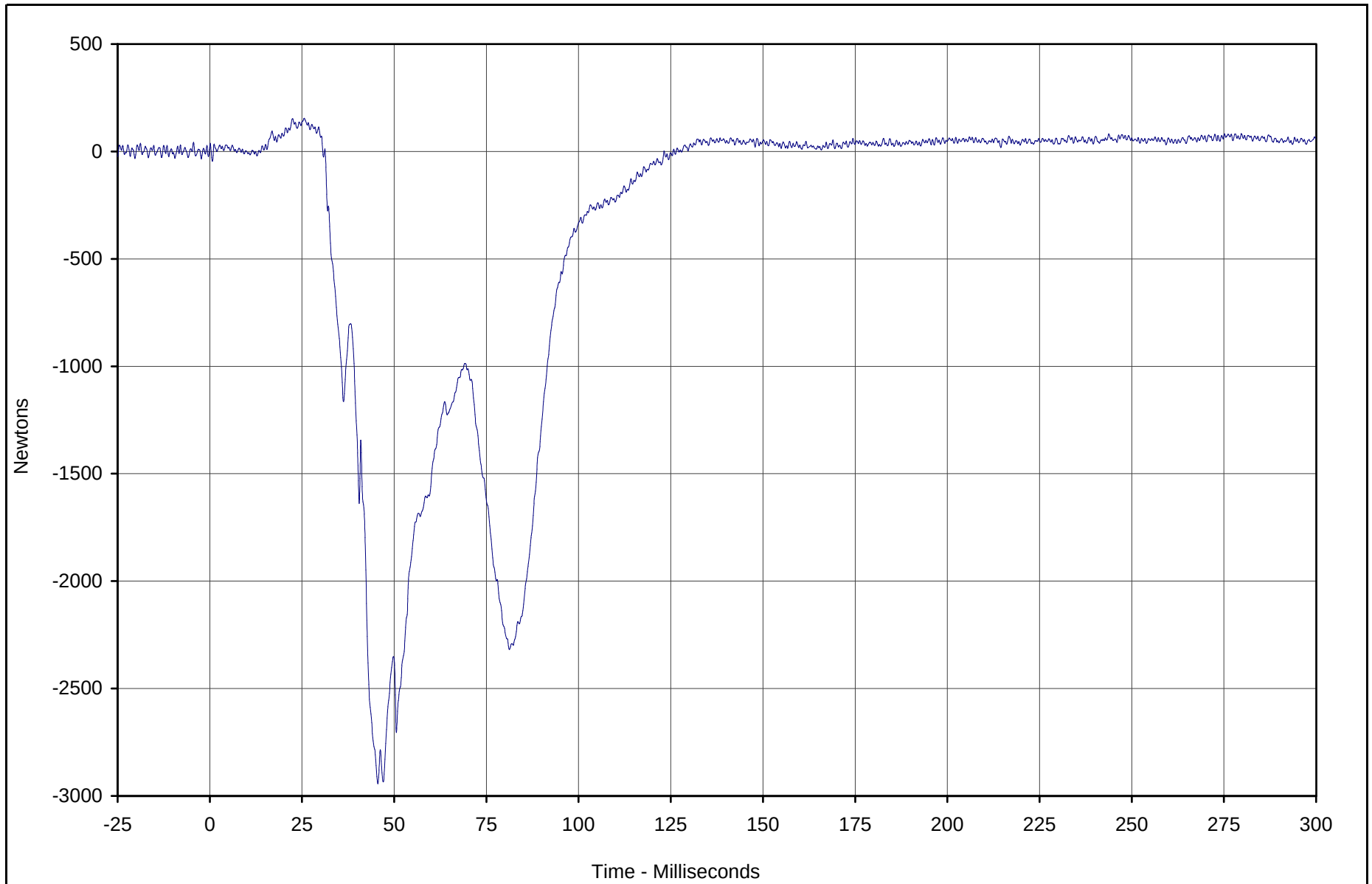


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Right lower Tibia Force Z	078	FIL	Newtons	154.8	25.6	-2943.5	45.6	600



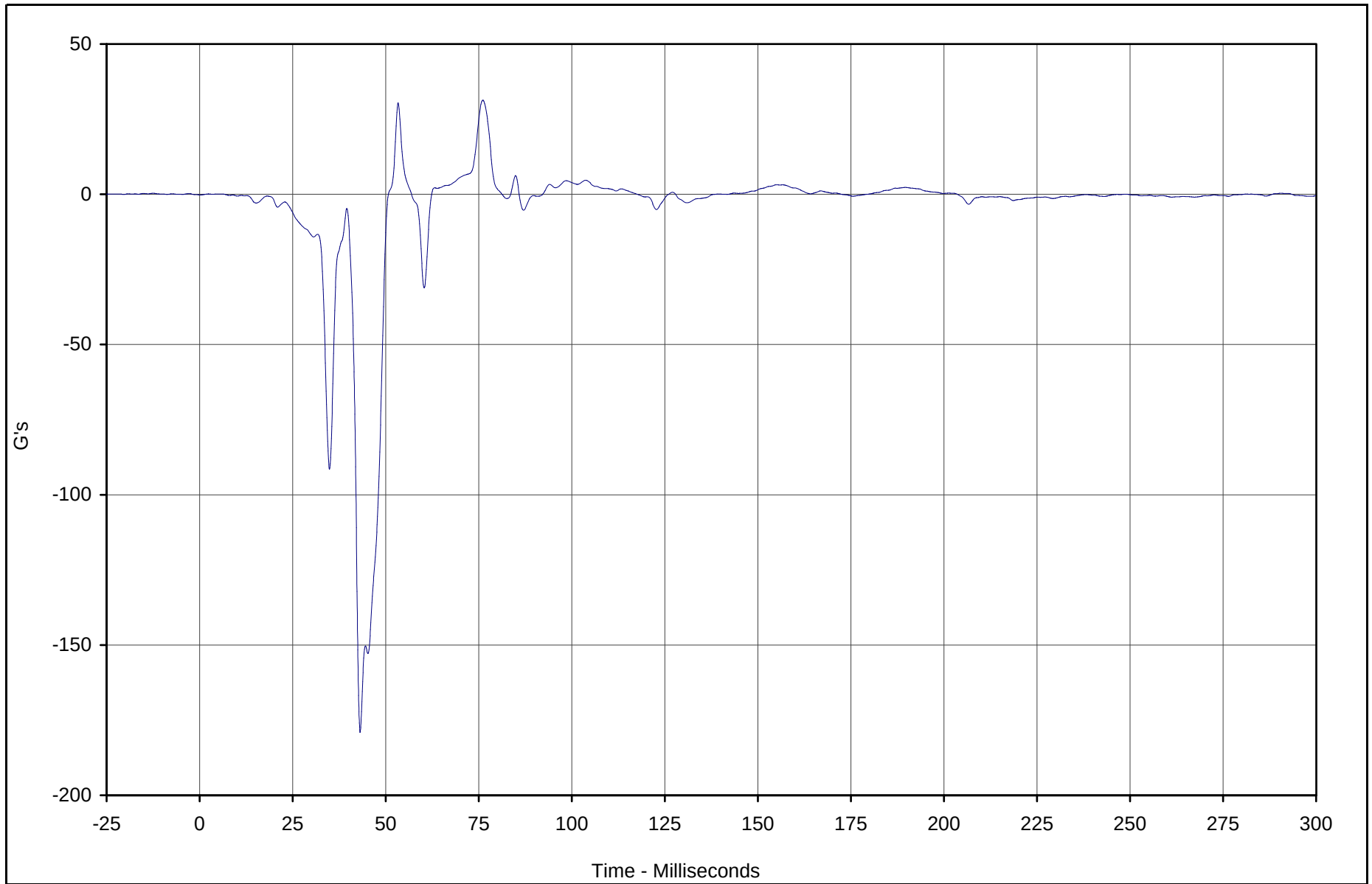
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

B-113



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Left Foot Aft X	079	FIL	G's	31.3	76.1	-179.1	43.1	180



Test Vehicle: 2002 Toyota Highlander 4WD SUV

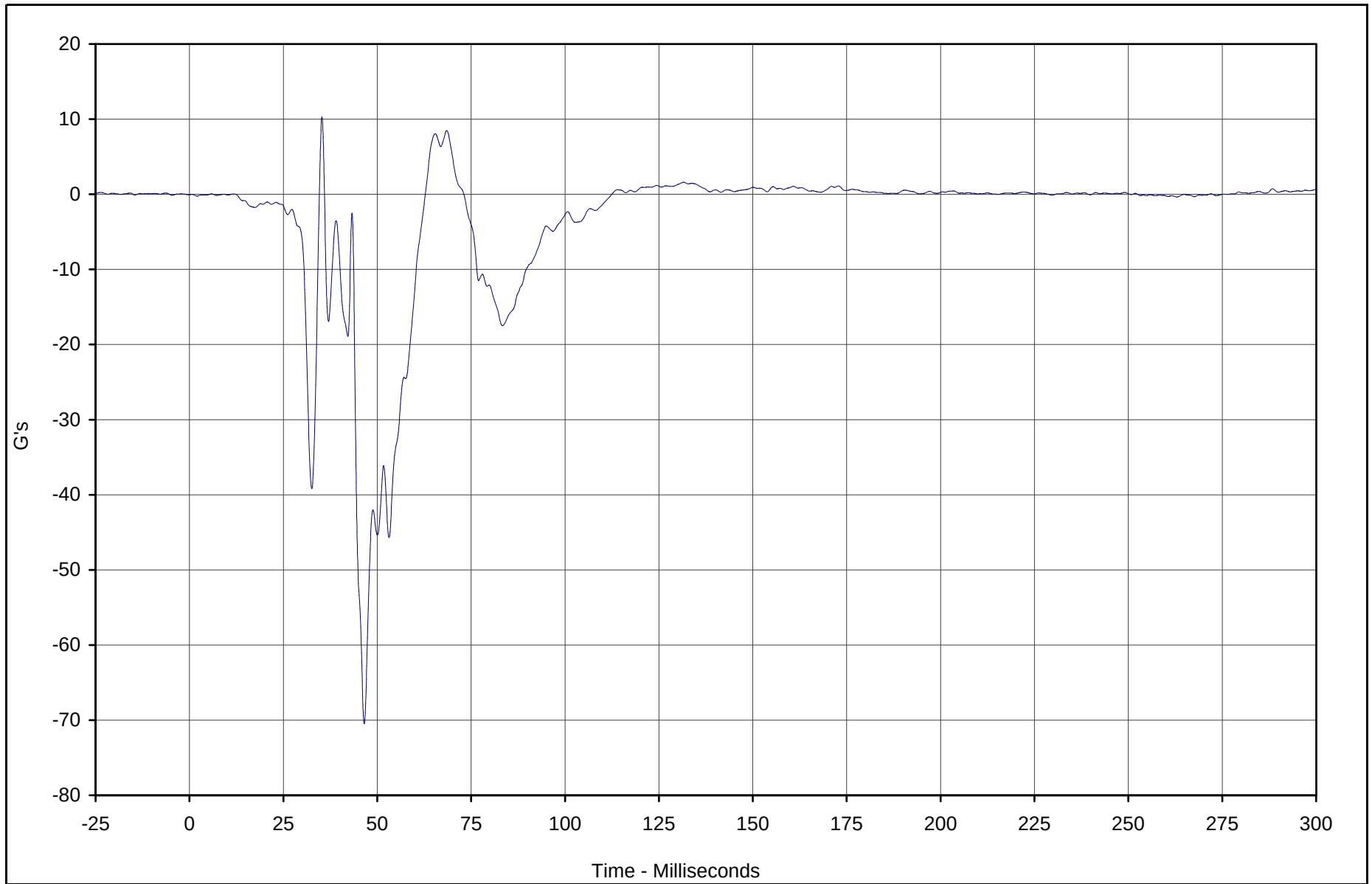
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

B-114



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Left Foot Aft Z	080	FIL	G's	10.3	35.3	-70.5	46.5	180



Test Vehicle: 2002 Toyota Highlander 4WD SUV

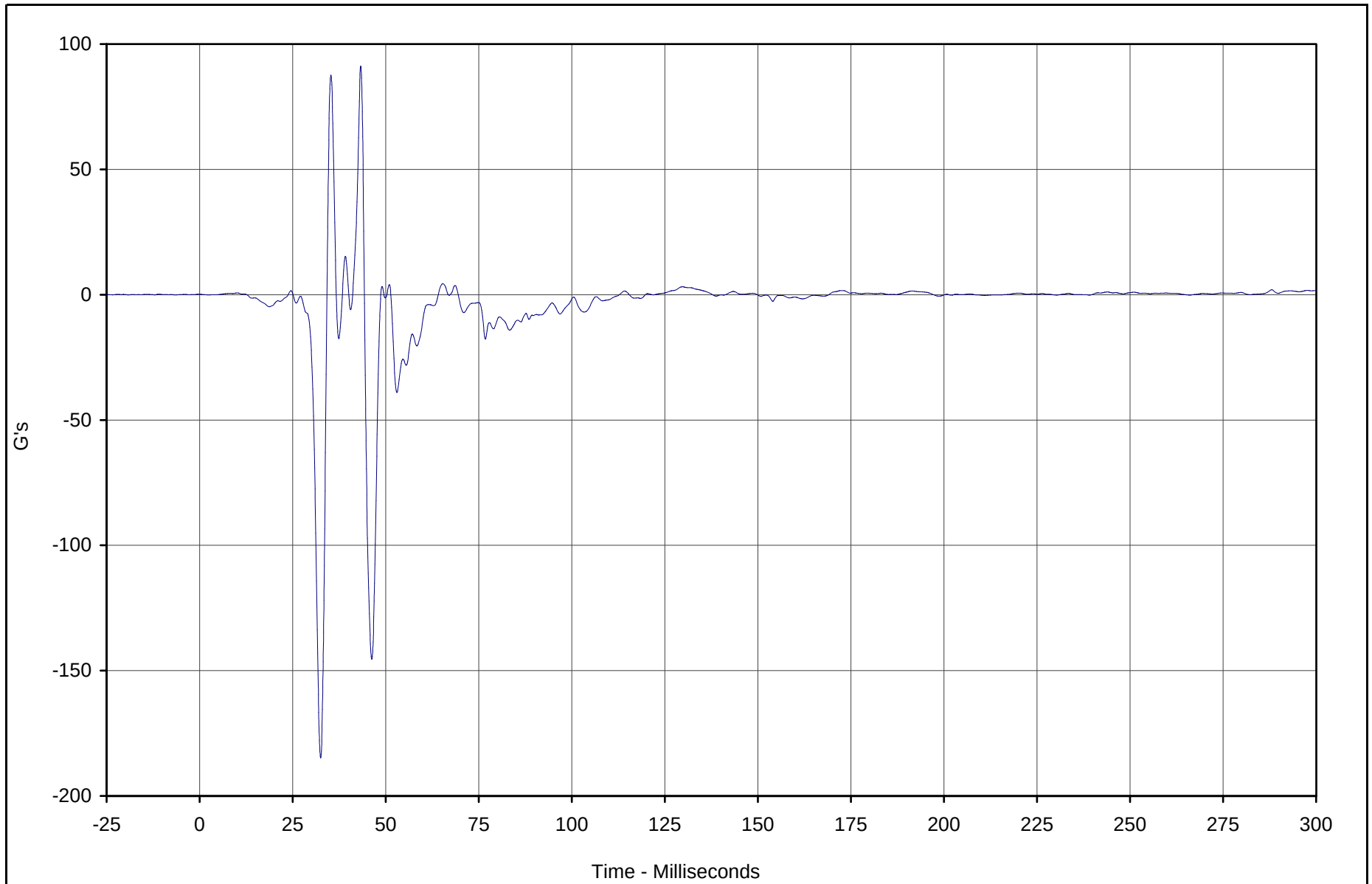
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

B-115



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Left Foot Fore Z	081	FIL	G's	91.3	43.3	-184.8	32.5	180



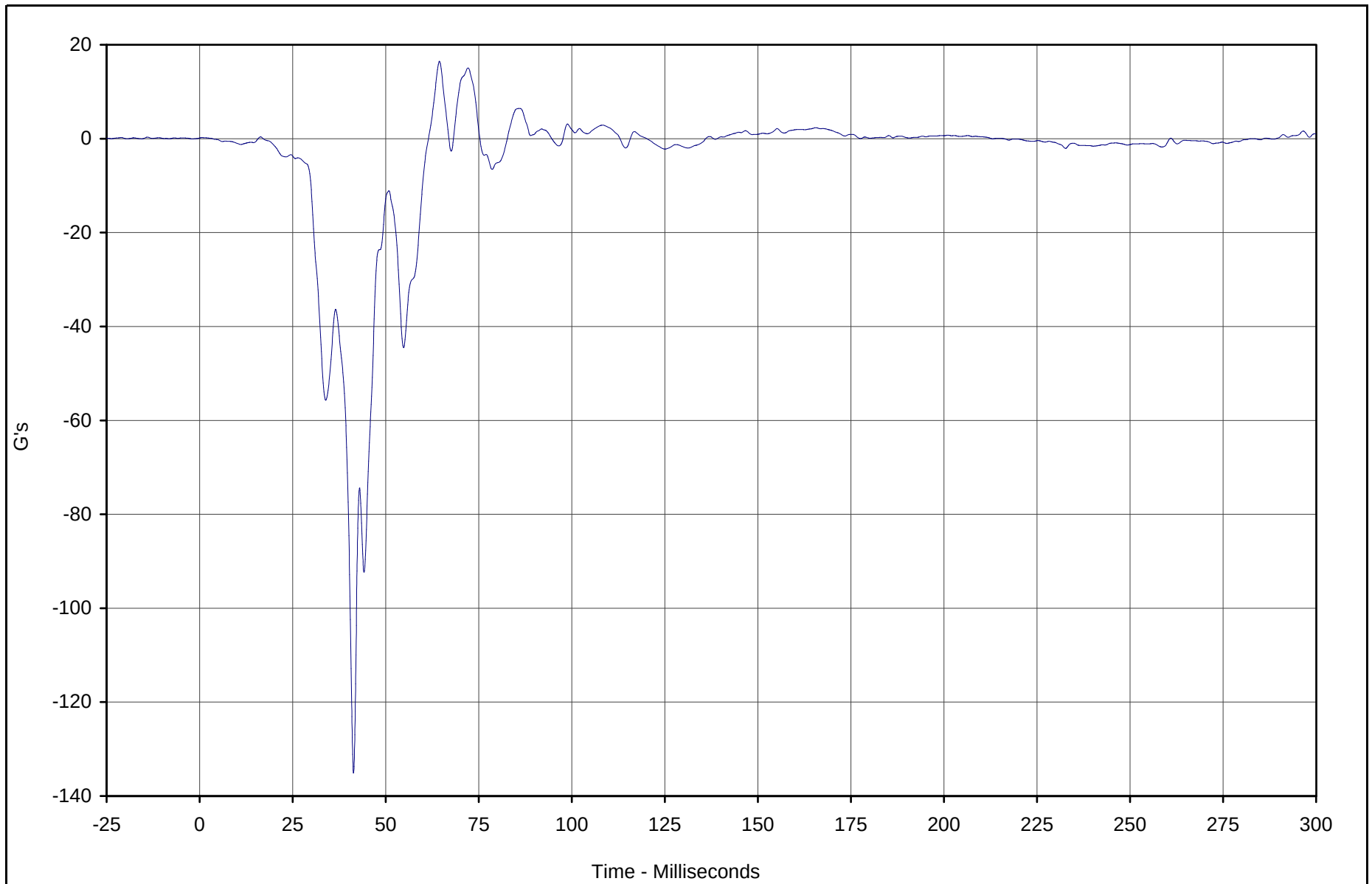
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Right Foot Aft X	082	FIL	G's	16.5	64.4	-135.1	41.4	180

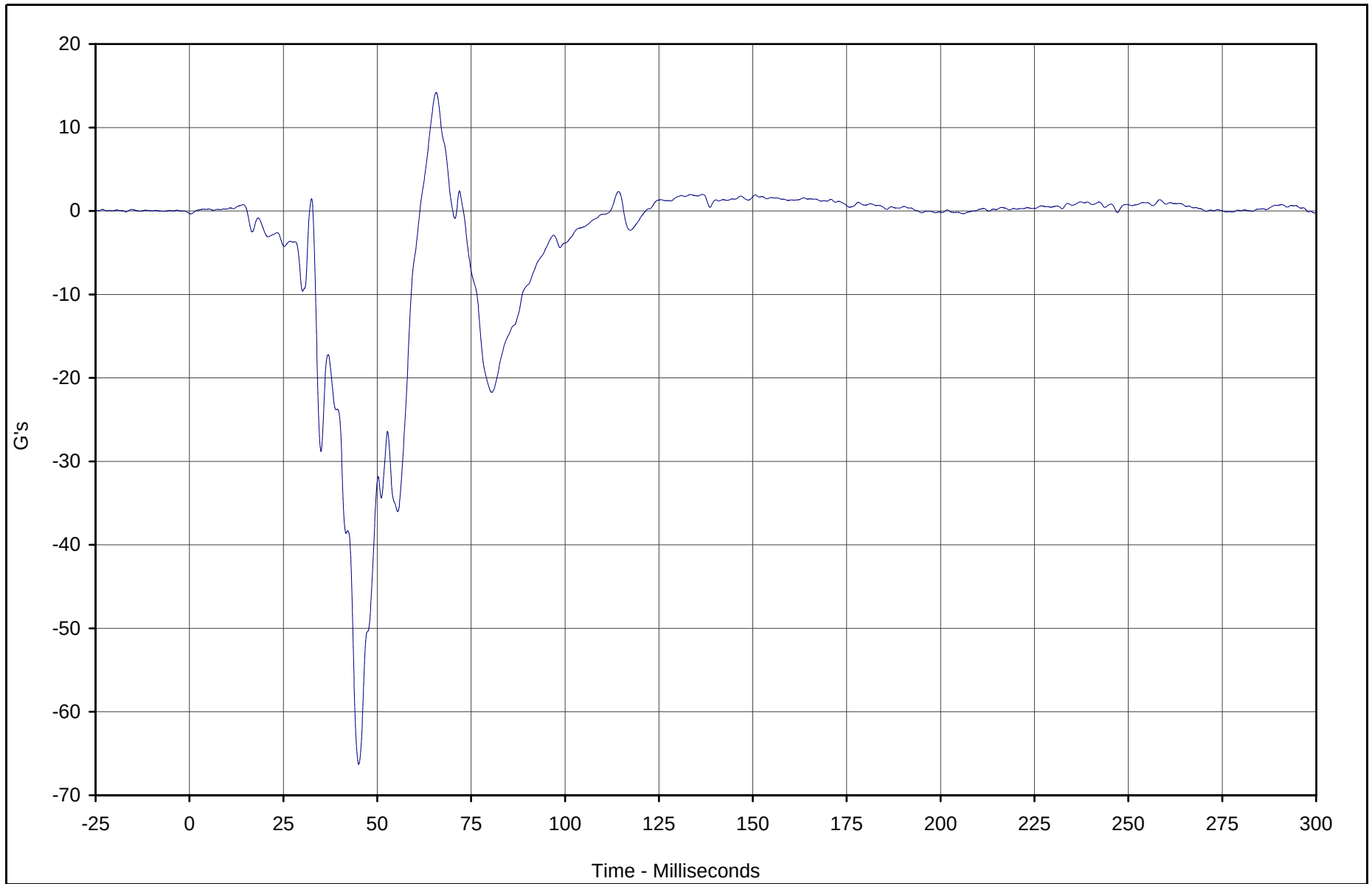


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Right Foot Aft Z	083	FIL	G's	14.2	65.7	-66.3	45.1	180

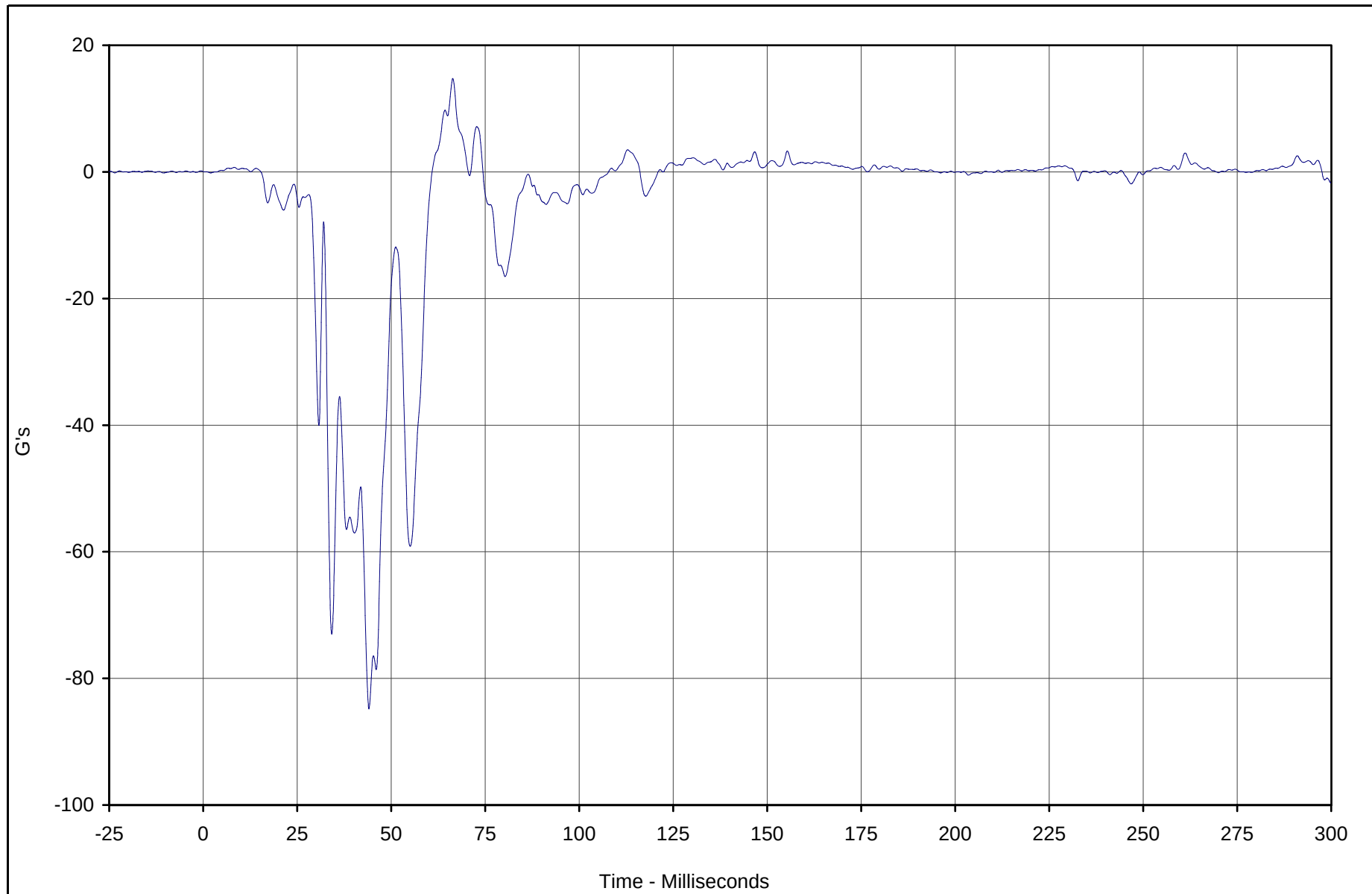


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Right Foot Fore Z	084	FIL	G's	14.7	66.4	-84.8	44.1	180

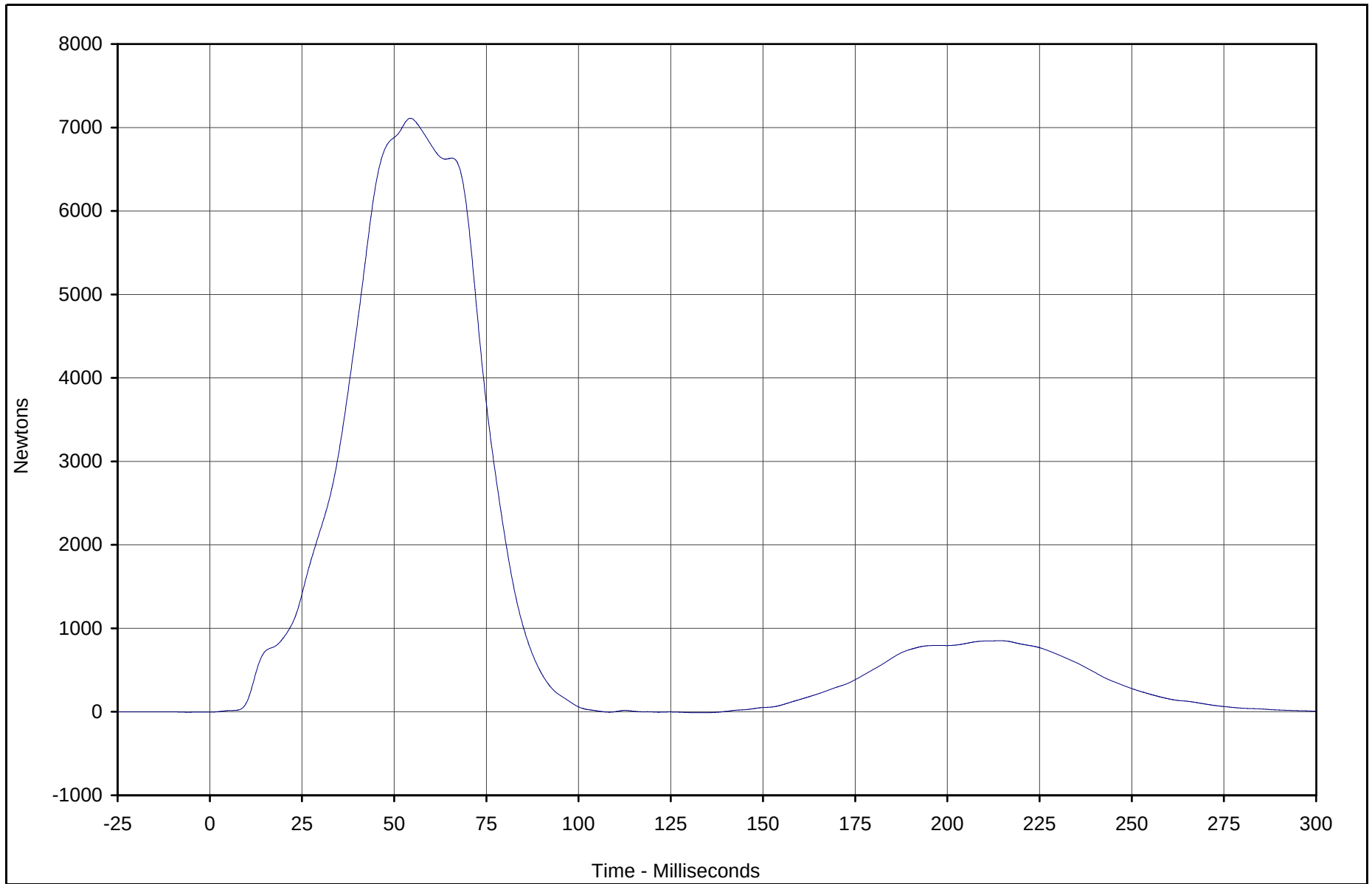


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Lap Belt Force	085	FIL	Newtons	7110.4	54.4	-11.3	132.1	60



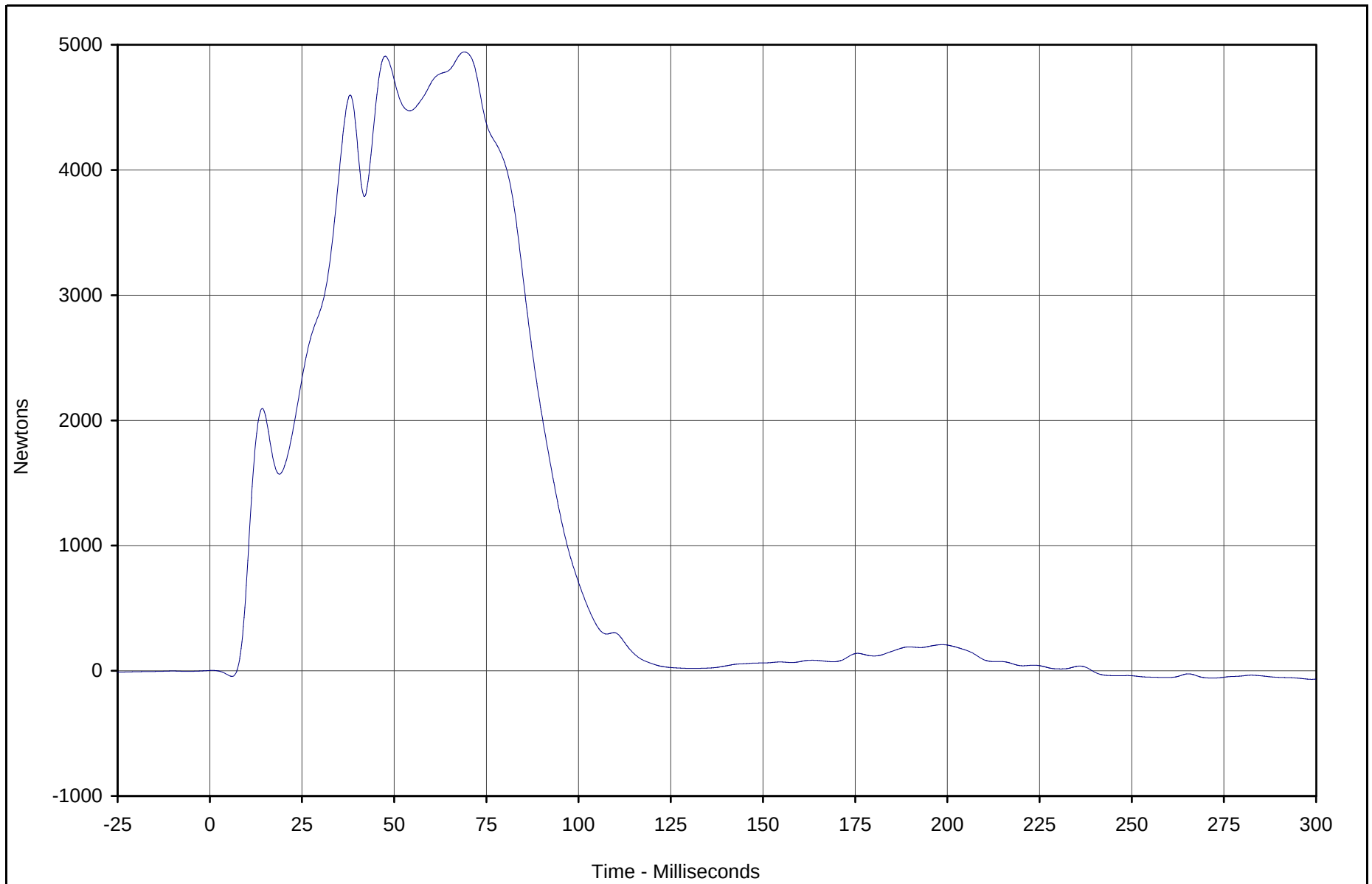
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

B-120



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Shoulder Belt Force	086	FIL	Newtons	4942.5	69.0	-68.1	298.8	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

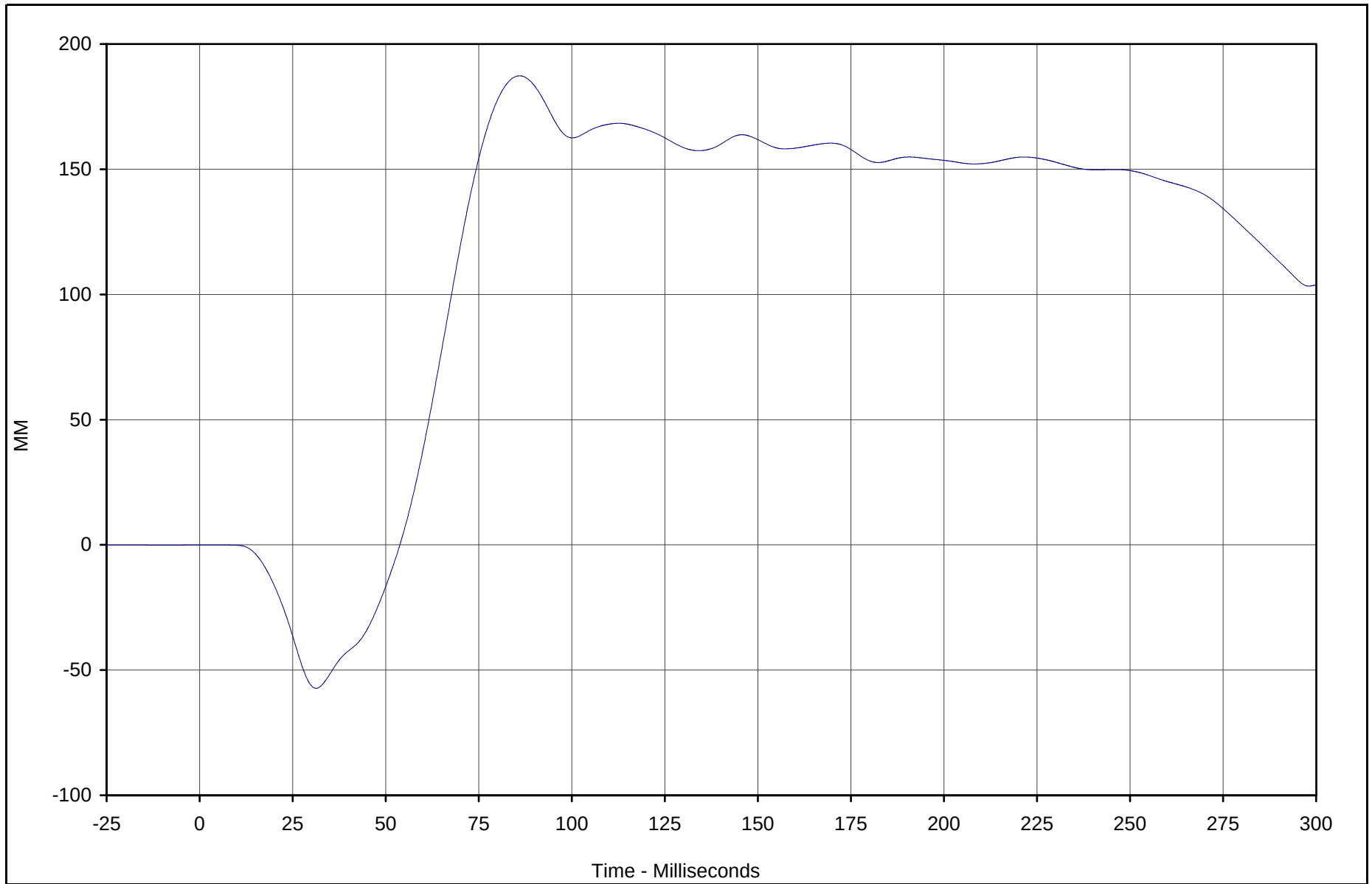
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

B-121



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Shoulder Belt Pullout	087	FIL	MM	187.3	86.0	-57.3	31.3	60



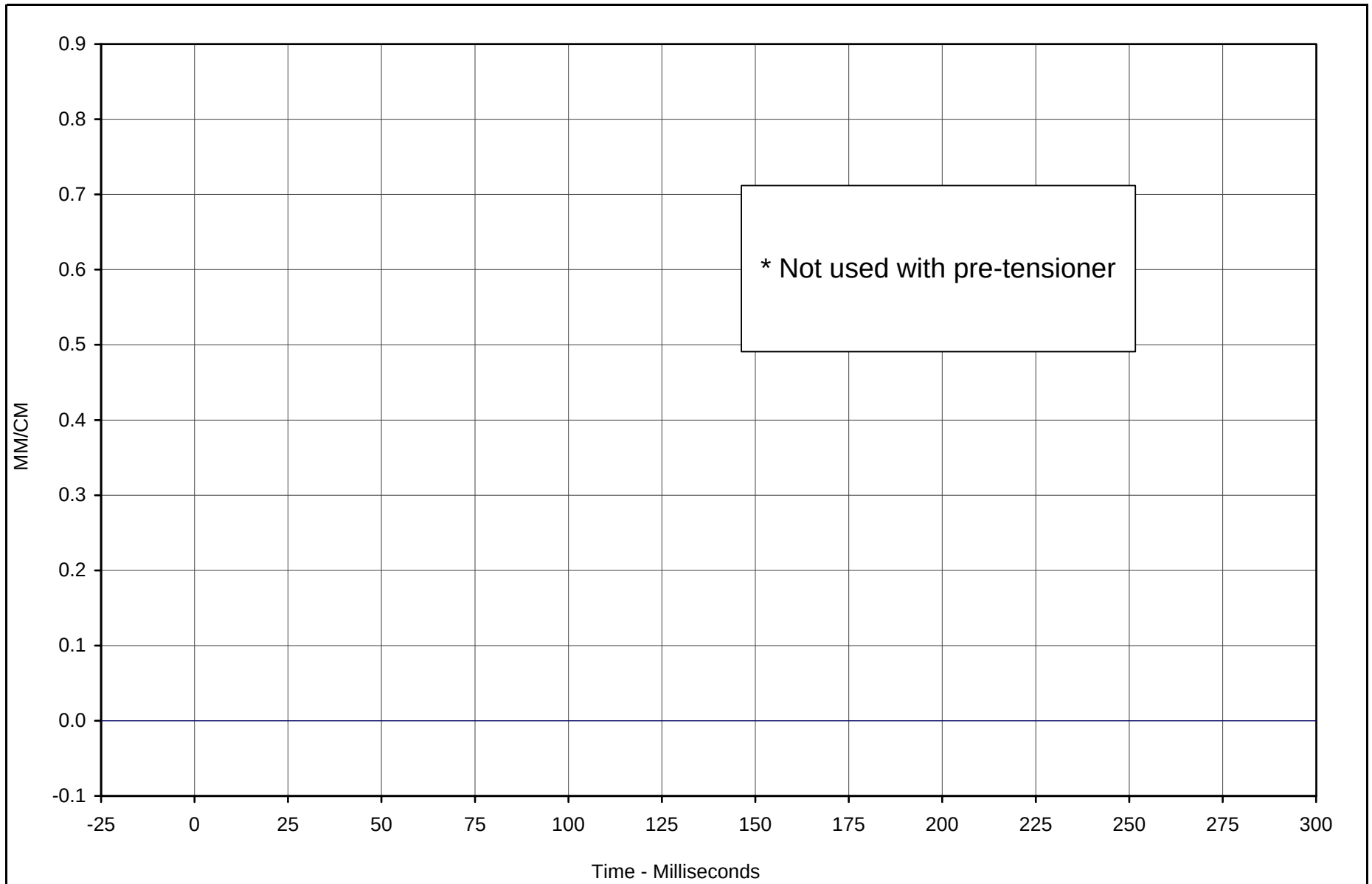
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



* Not used with pre-tensioner

Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Shoulder Belt Elongation	088	FIL	MM/CM	0.00	0.0	0.00	0.0	60

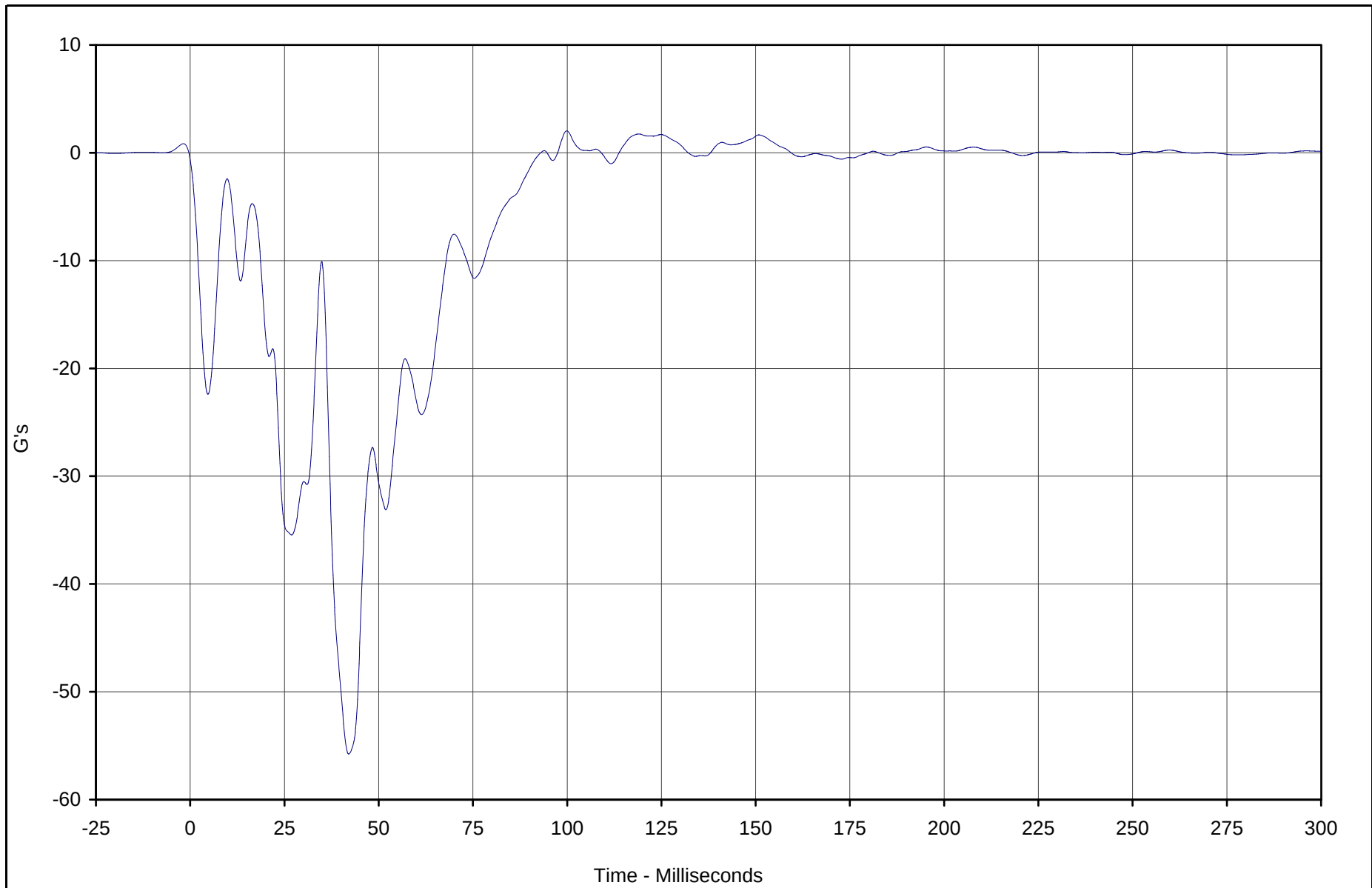


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Left Rear X	089	FIL	G's	2.0	99.9	-55.8	42.0	60



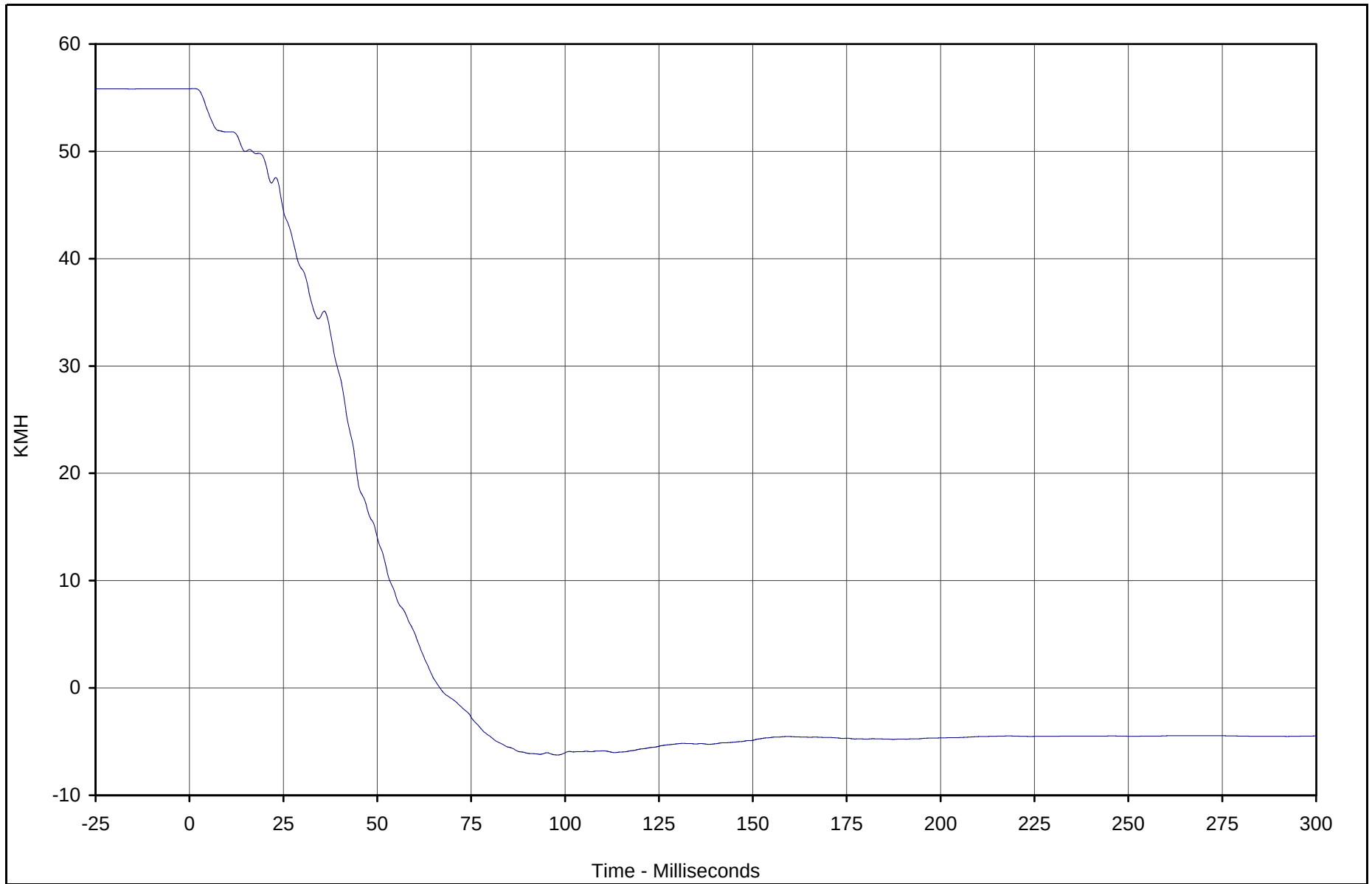
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

B-124



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Left Rear X Velocity	089	IN1	KMH	55.8	1.3	-6.3	98.0	180



Test Vehicle: 2002 Toyota Highlander 4WD SUV

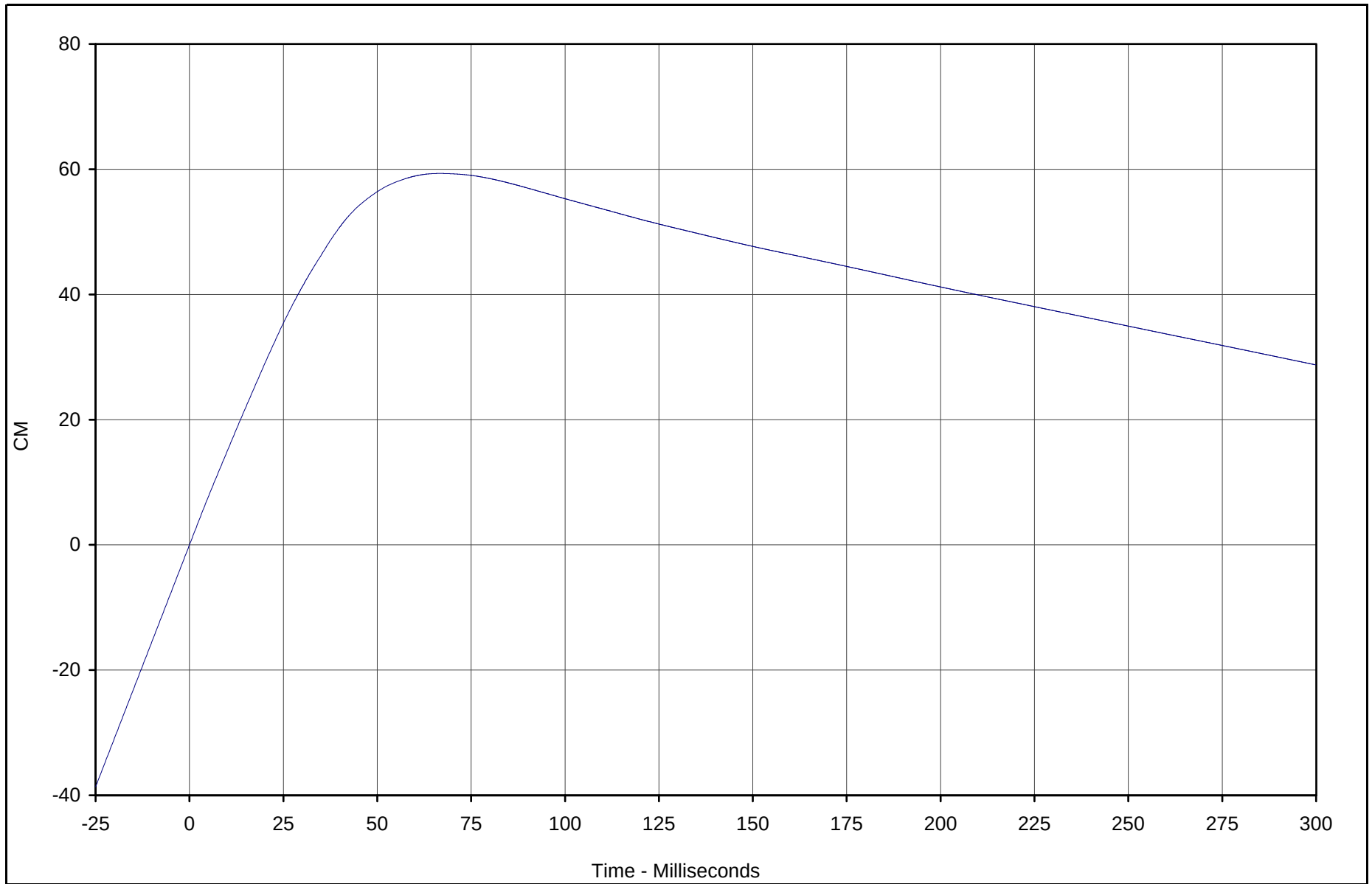
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

B-125



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Left Rear X Displ.	089	IN2	CM	59.3	66.7	0.0	0.0	180



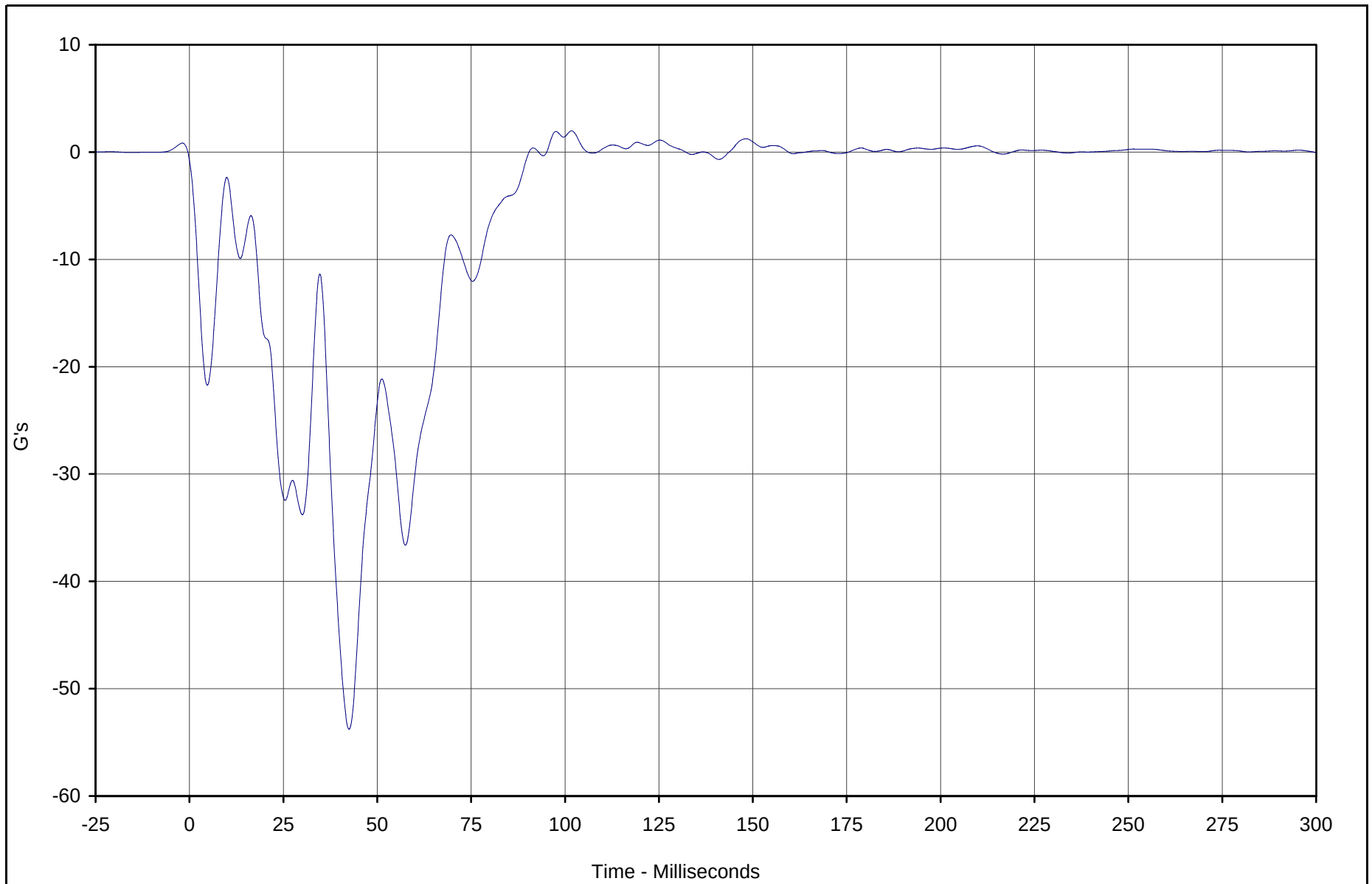
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Right Rear X	090	FIL	G's	2.0	101.8	-53.8	42.5	60



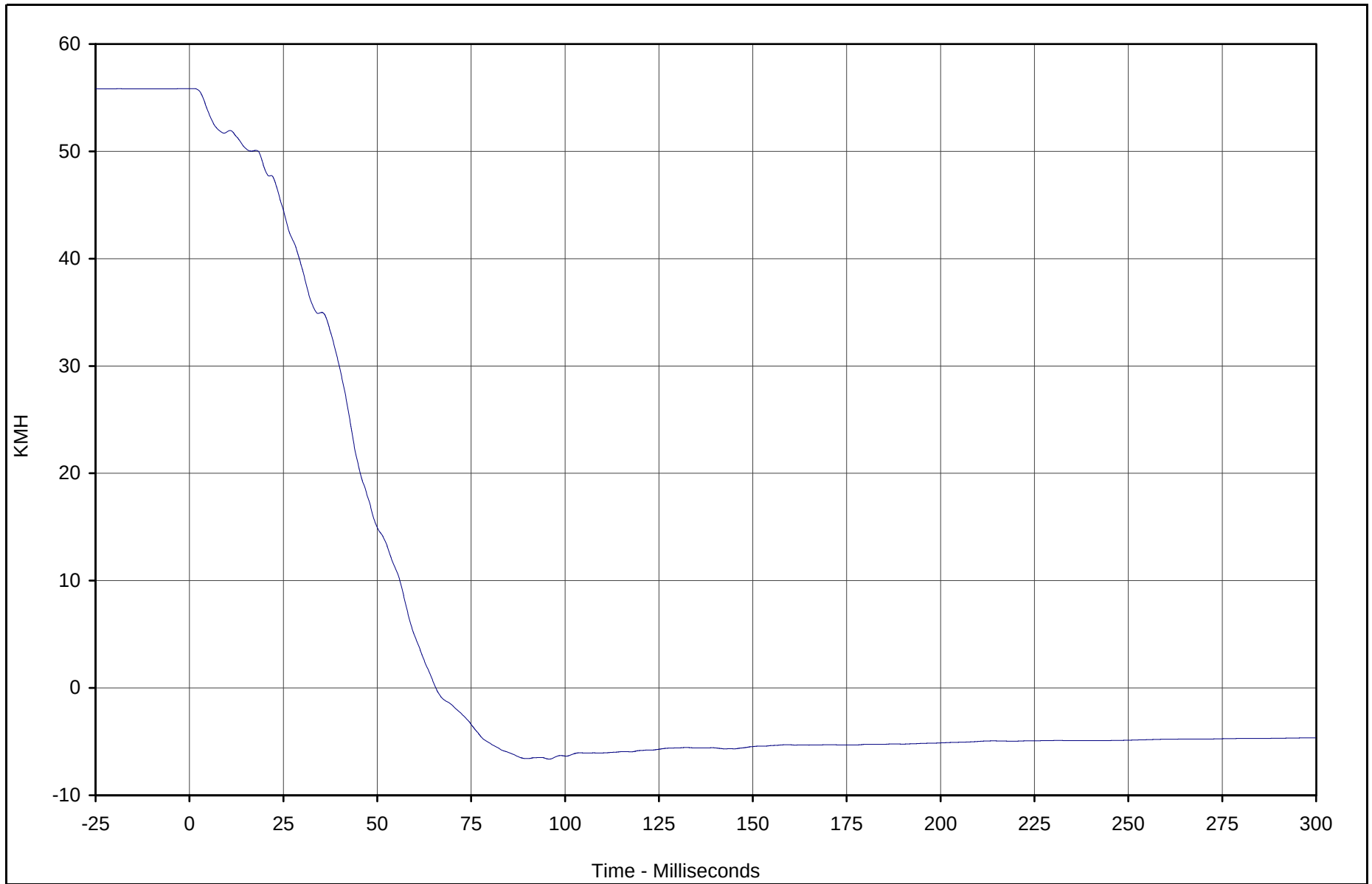
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

B-127



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Right Rear X Velocity	090	IN1	KMH	55.8	1.0	-6.6	95.8	180



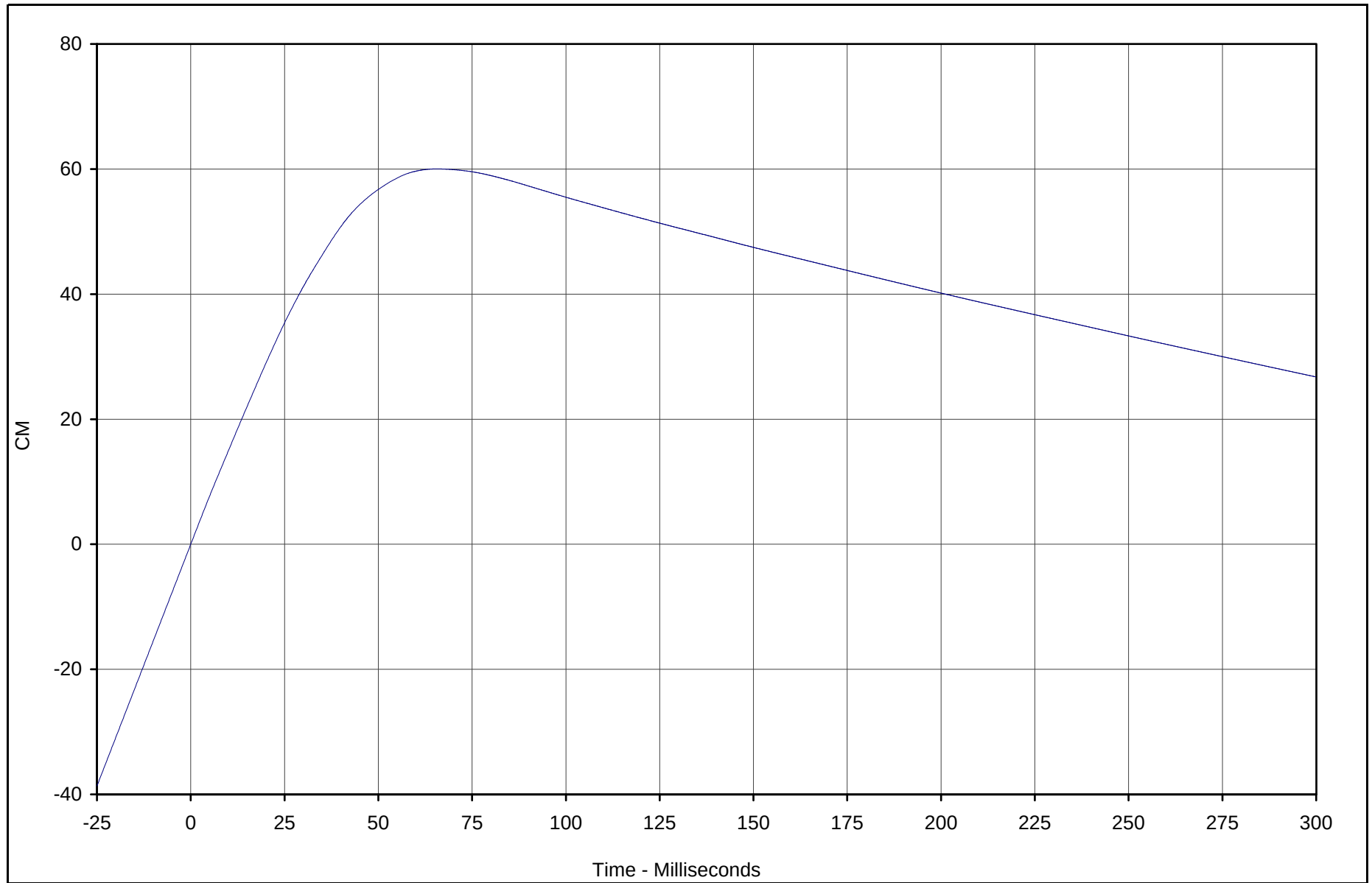
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Right Rear X Displ.	090	IN2	CM	60.0	65.6	0.0	0.0	180



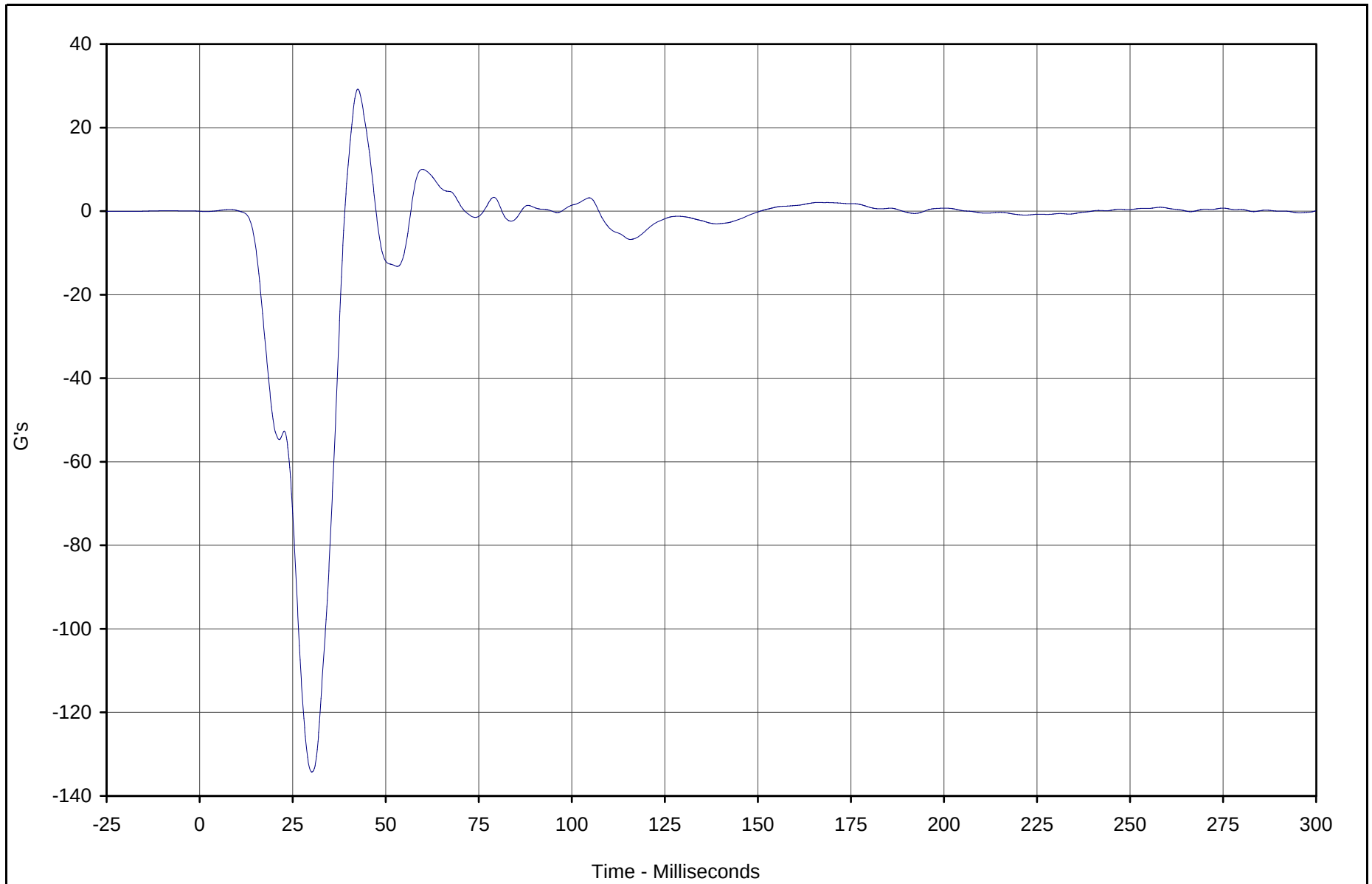
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

B-129



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Engine Top	091	FIL	G's	29.2	42.5	-134.3	30.2	60



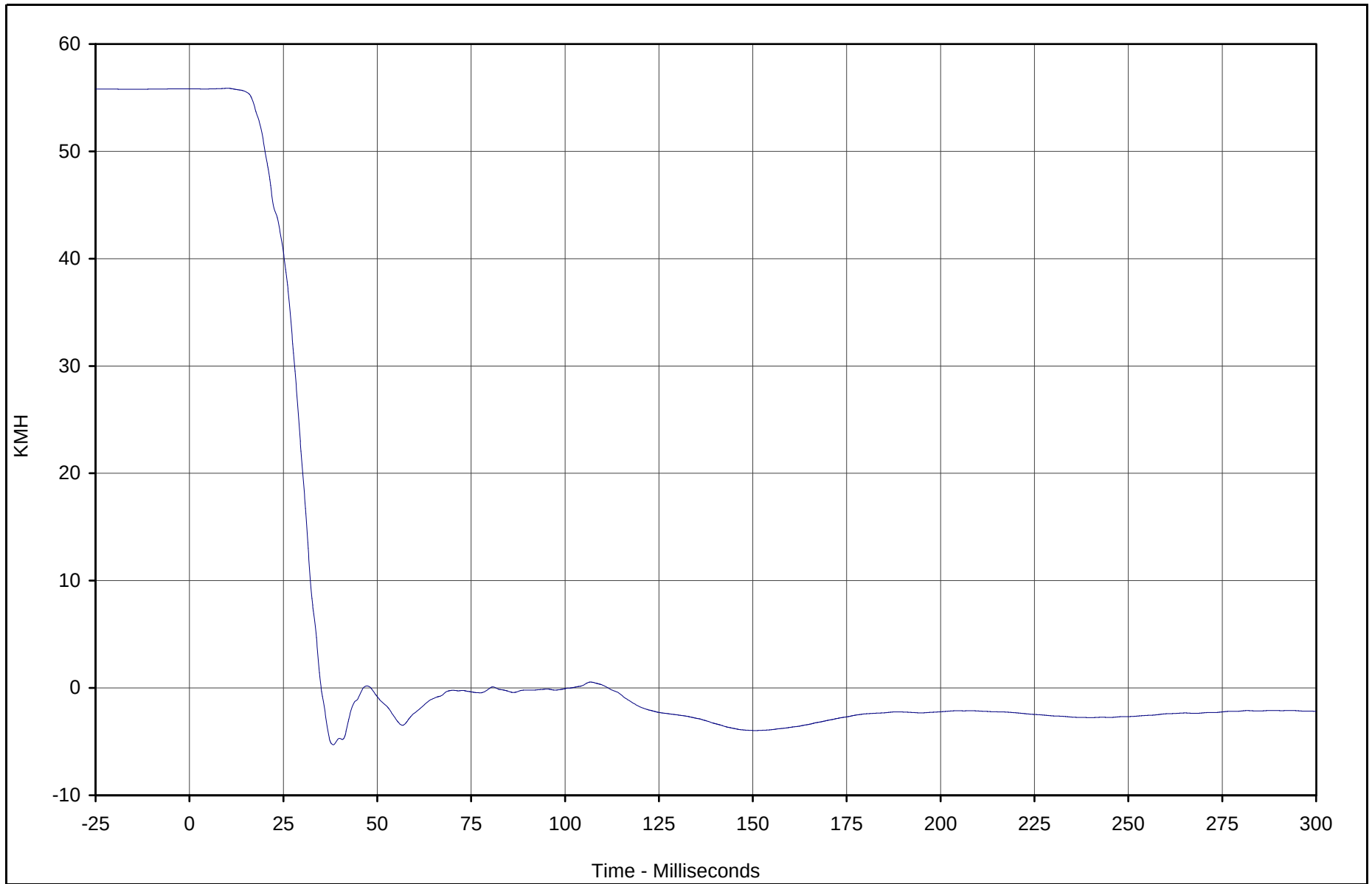
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Engine Top Velocity	091	IN1	KMH	55.9	10.2	-5.3	38.3	180

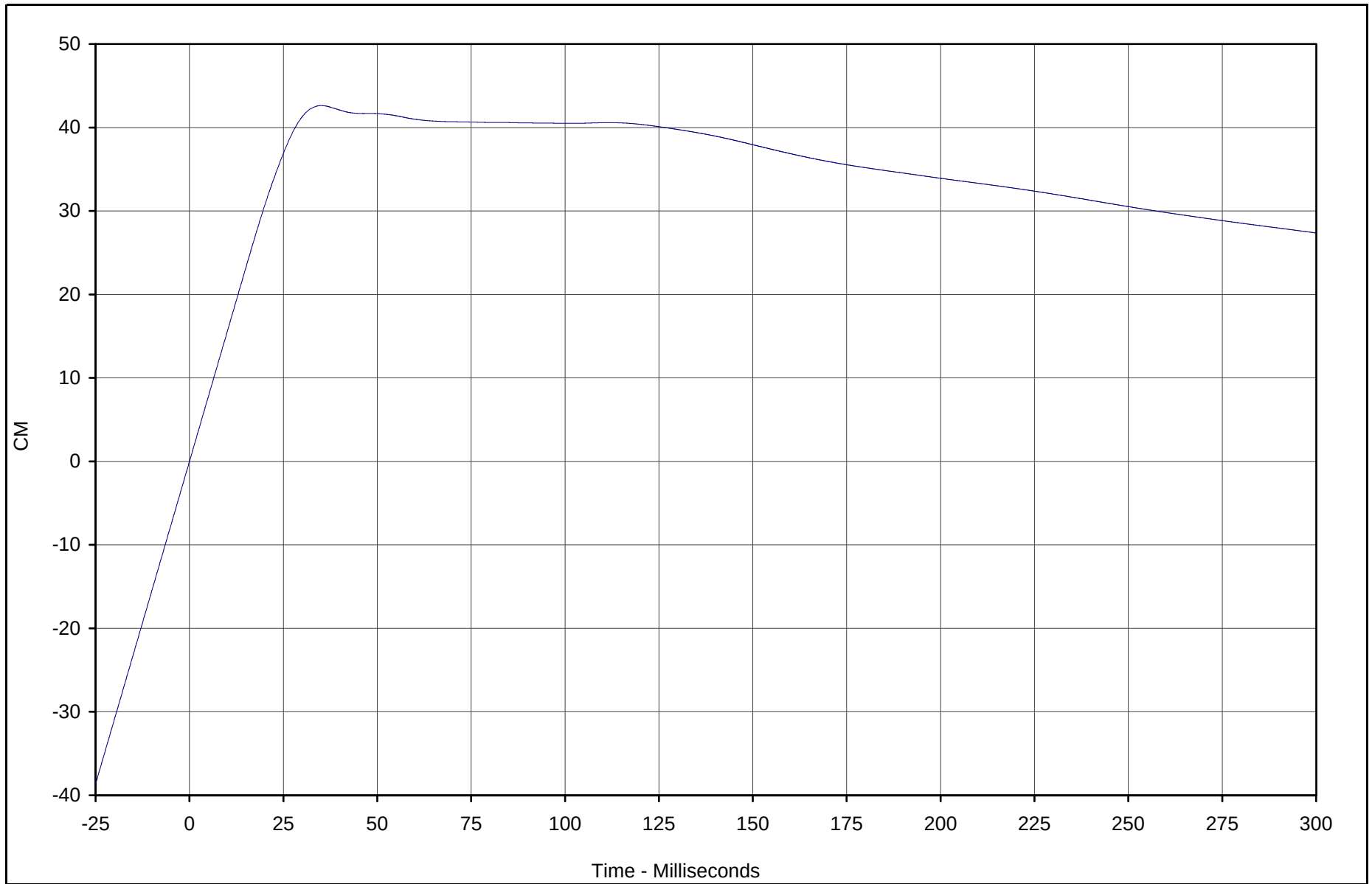


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Engine Top Displacement	091	IN2	CM	42.6	35.1	0.0	0.0	180



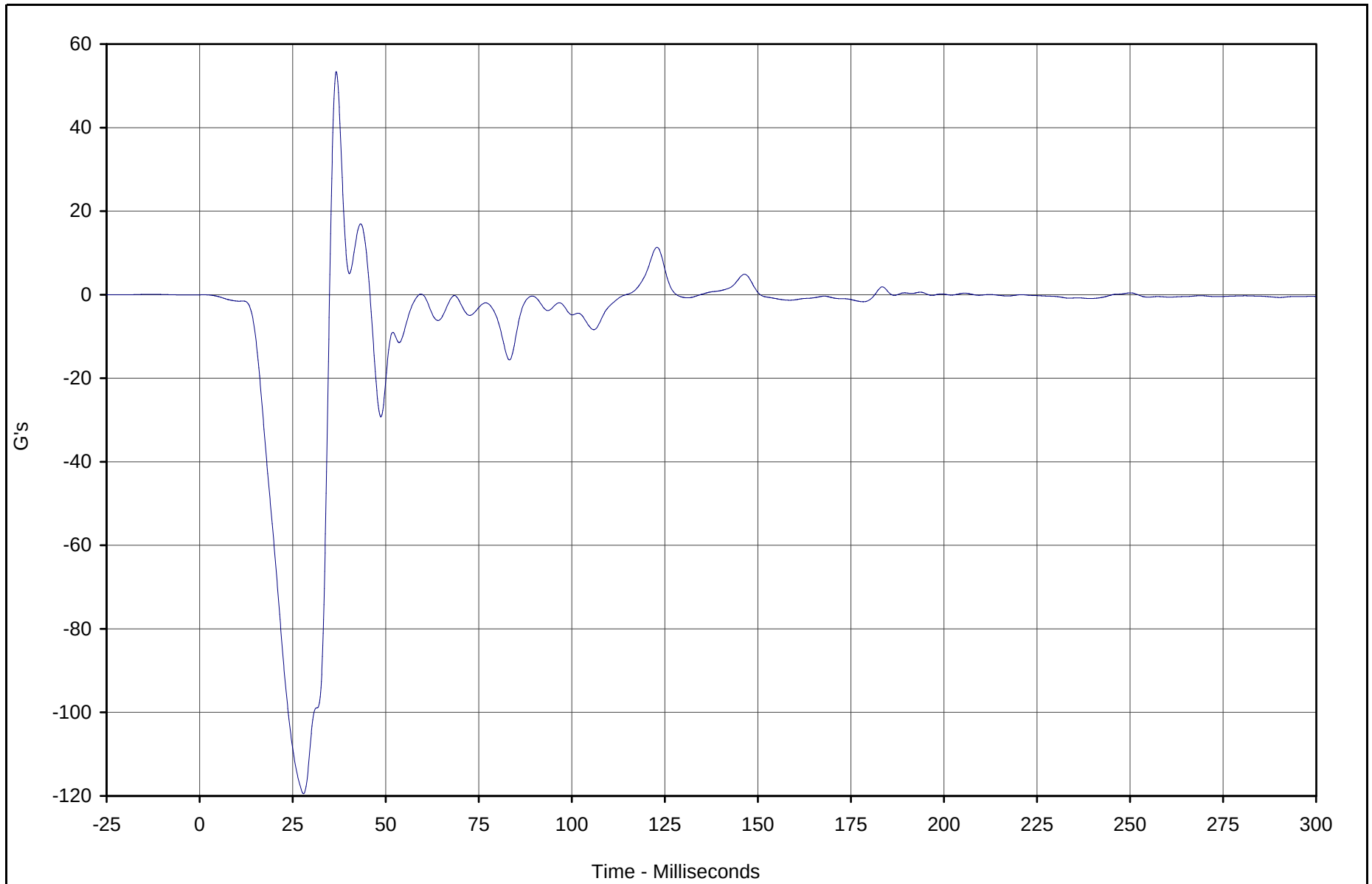
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

B-132



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Engine Bottom	092	FIL	G's	53.4	36.7	-119.5	27.9	60



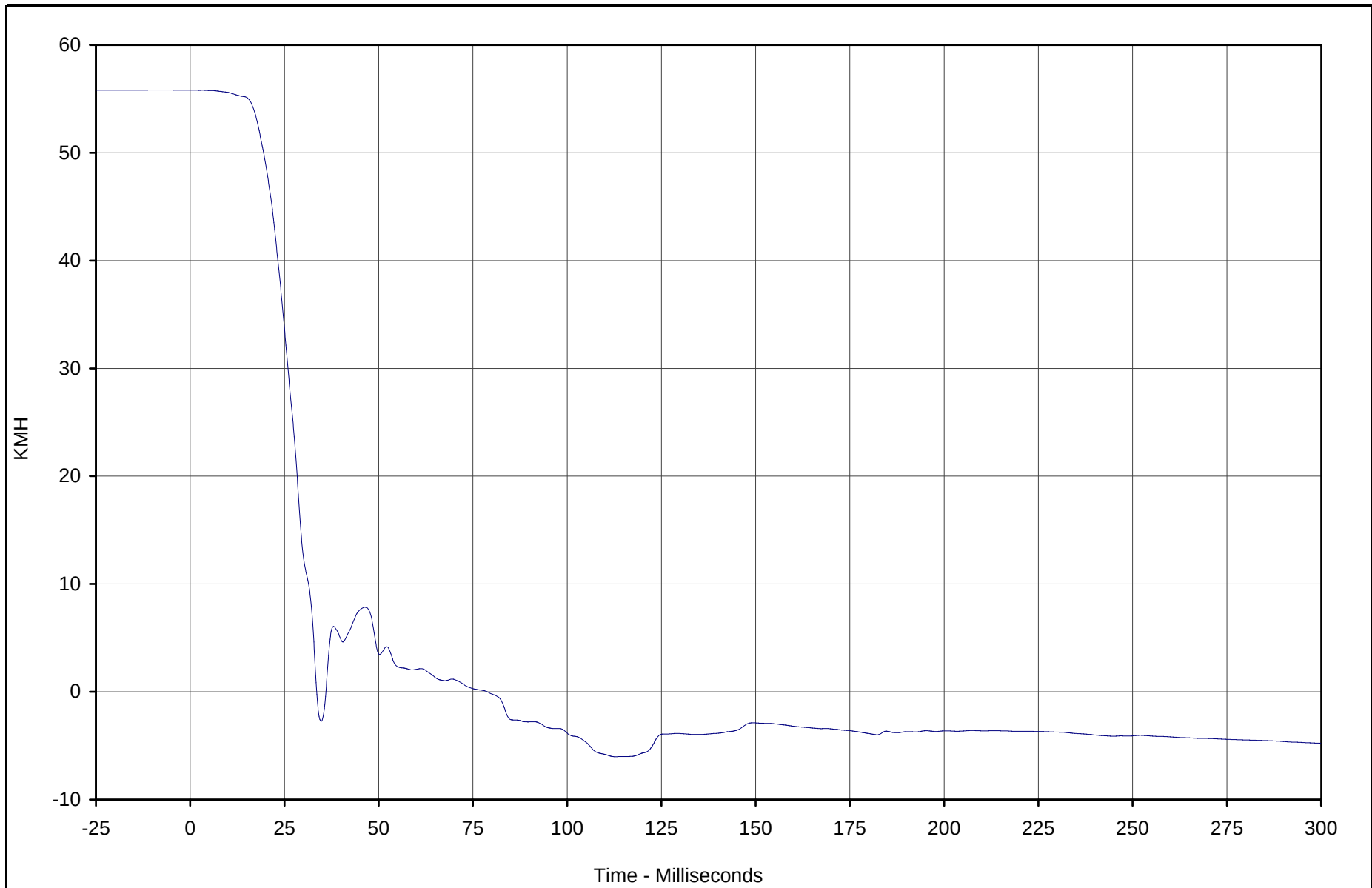
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Engine Bottom Velocity	092	IN1	KMH	55.8	1.1	-6.0	112.8	180

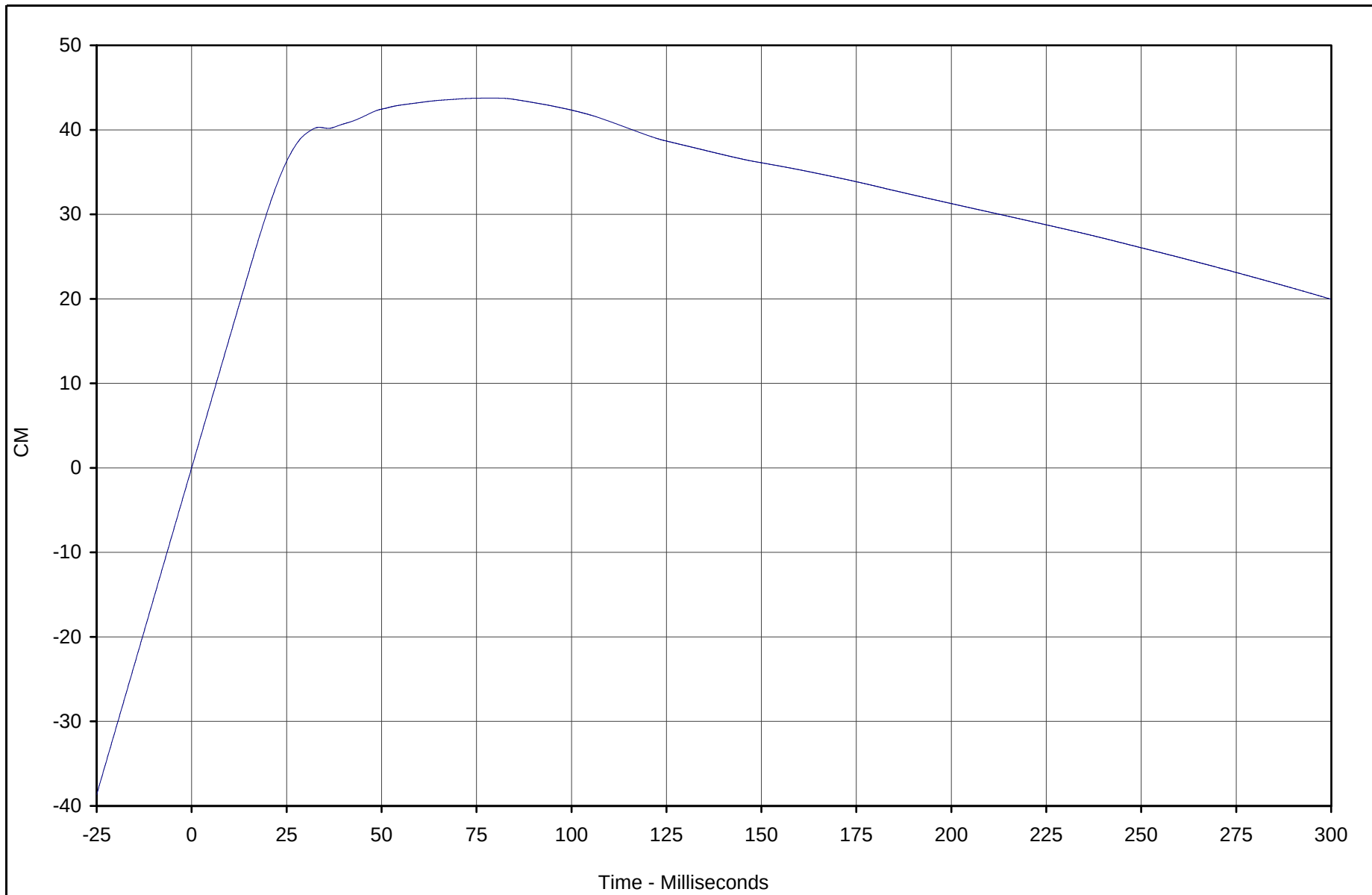


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Engine Bottom Displacement	092	IN2	CM	43.8	78.8	0.0	0.0	180



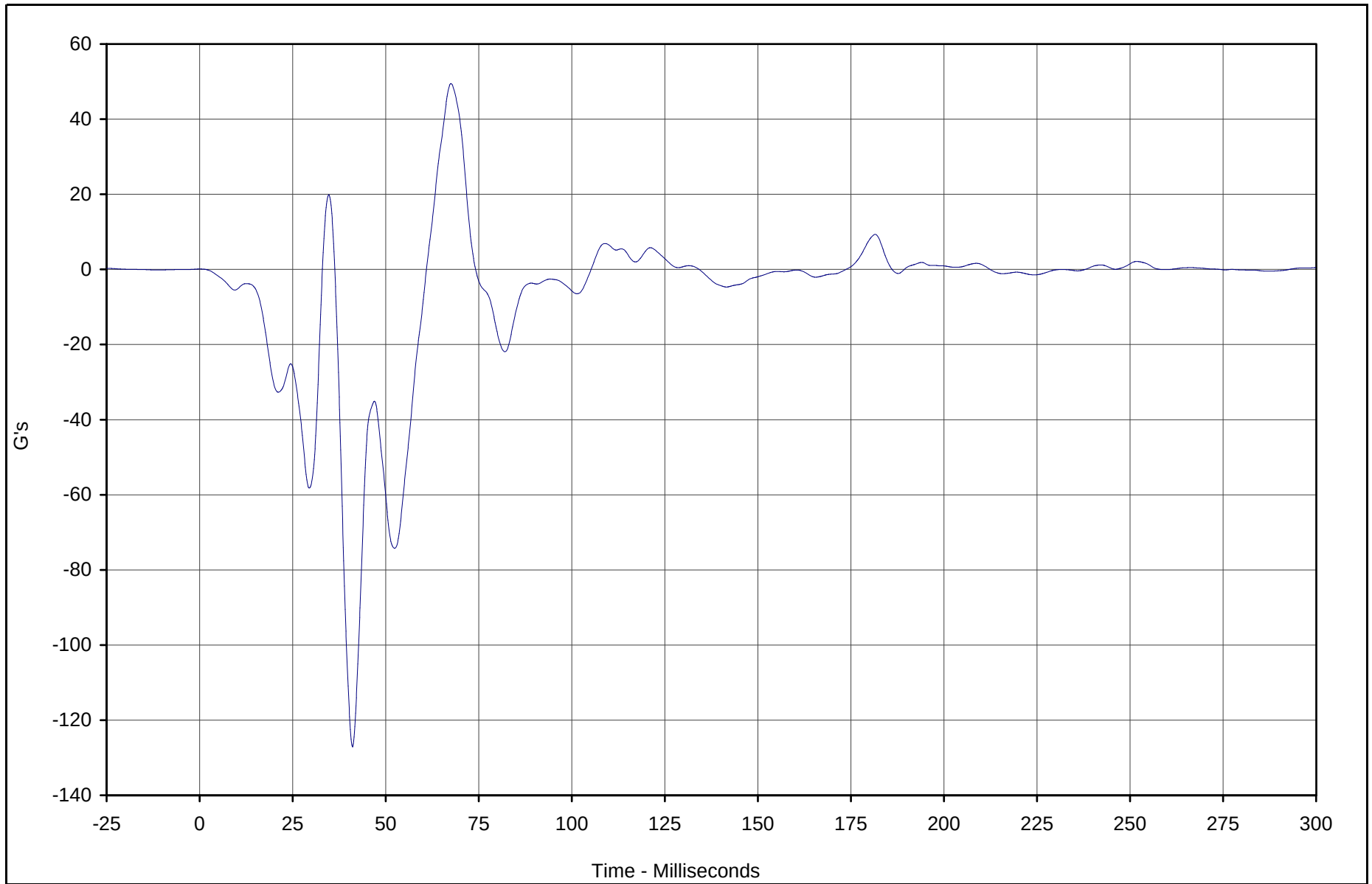
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

B-135



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Left Brake Caliper	093	FIL	G's	49.5	67.5	-127.1	41.1	60



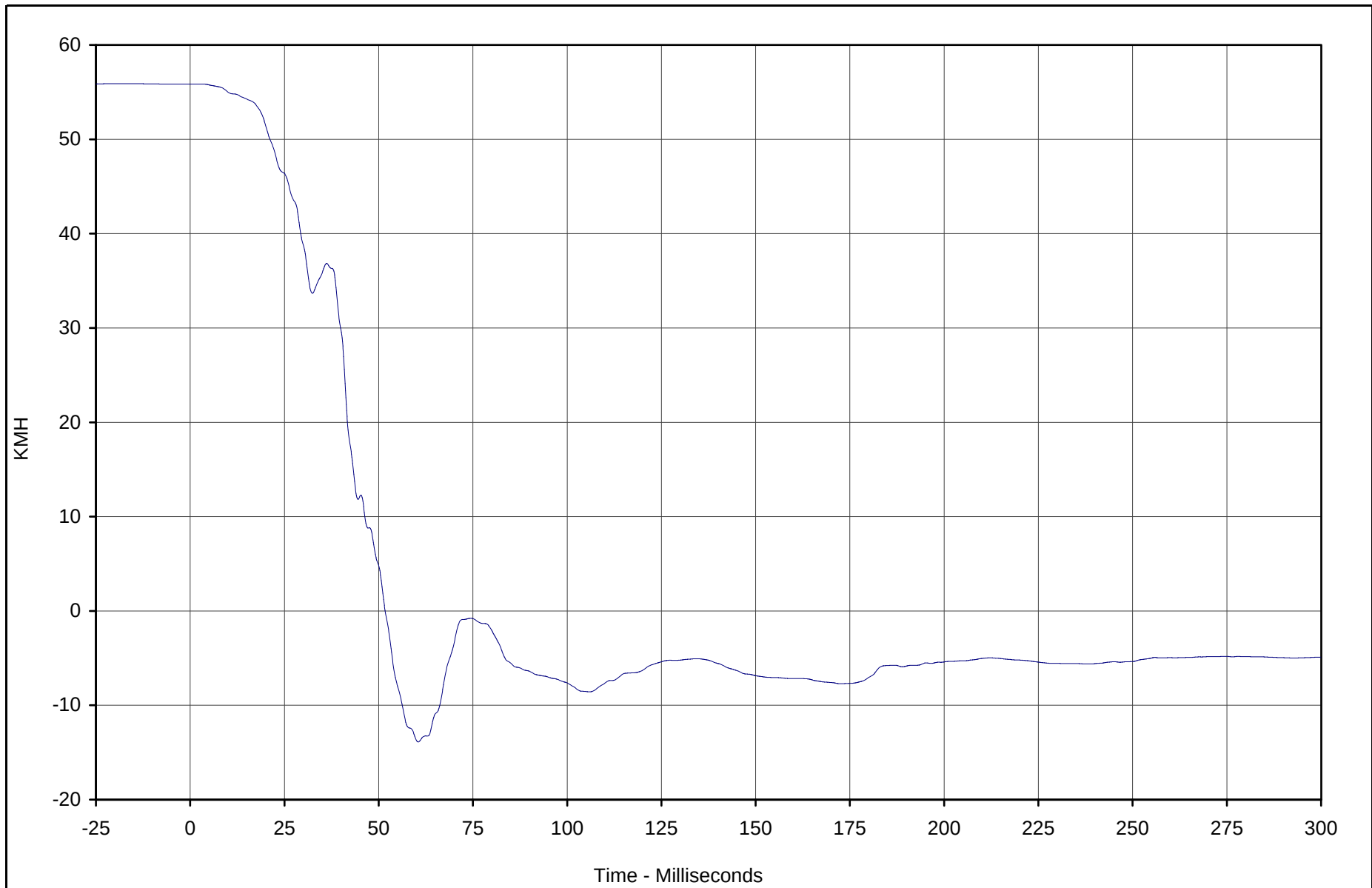
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Left Brake Caliper Velocity	093	IN1	KMH	55.9	3.1	-13.9	60.5	180

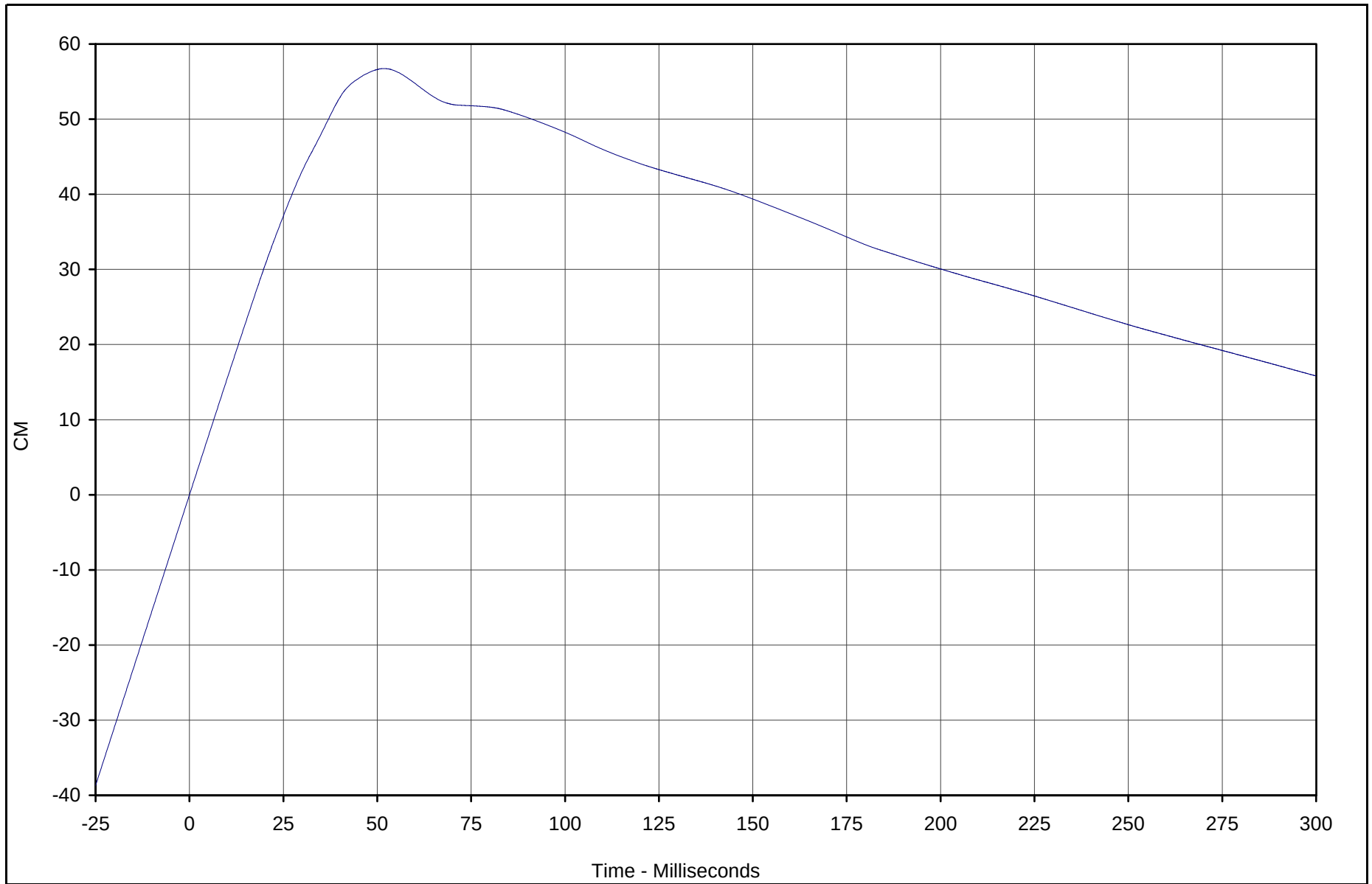


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Left Brake Caliper Displ.	093	IN2	CM	56.7	51.7	0.0	0.0	180



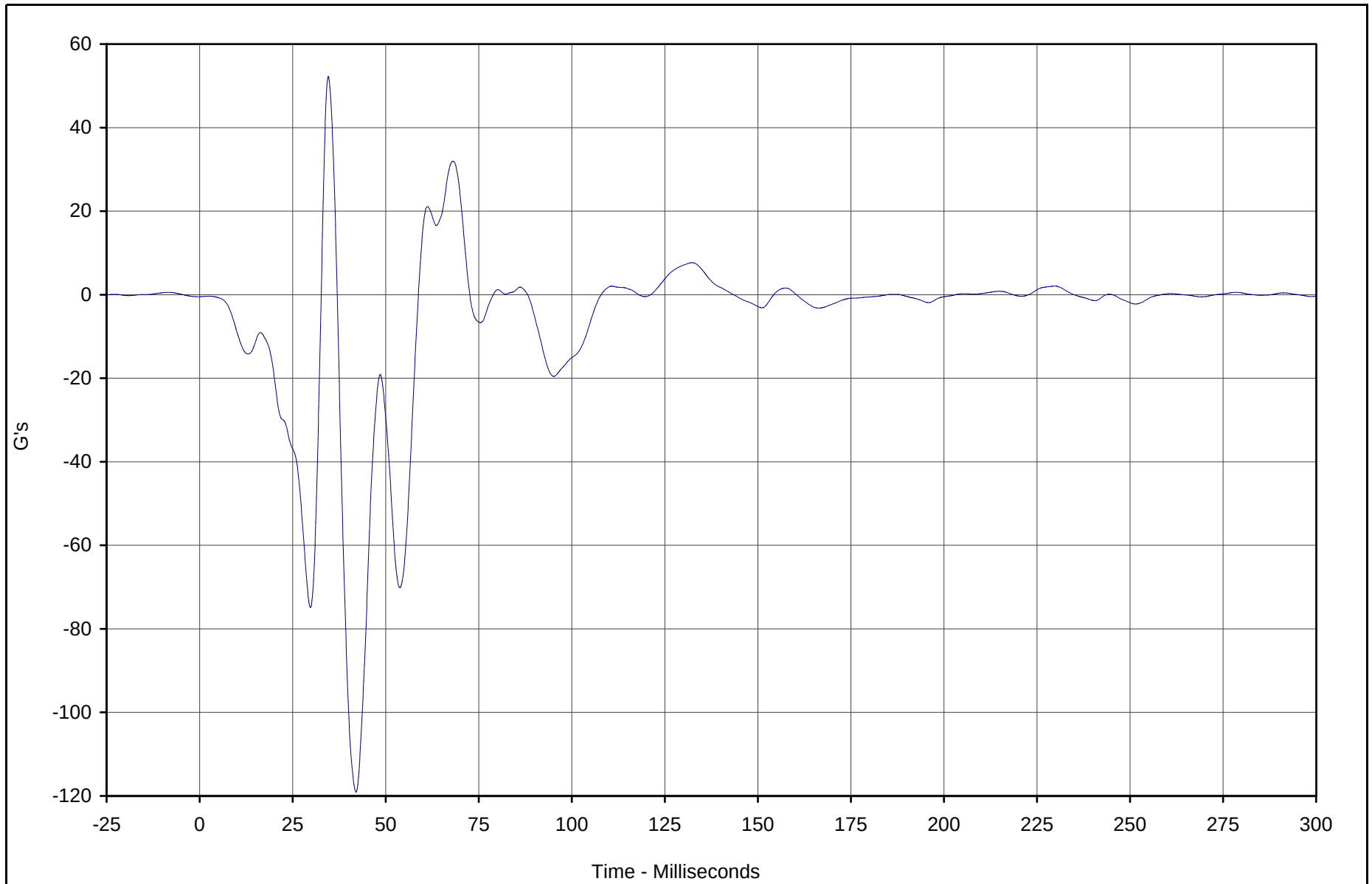
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

B-138



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Right Brake Caliper	094	FIL	G's	52.2	34.6	-119.1	42.0	60



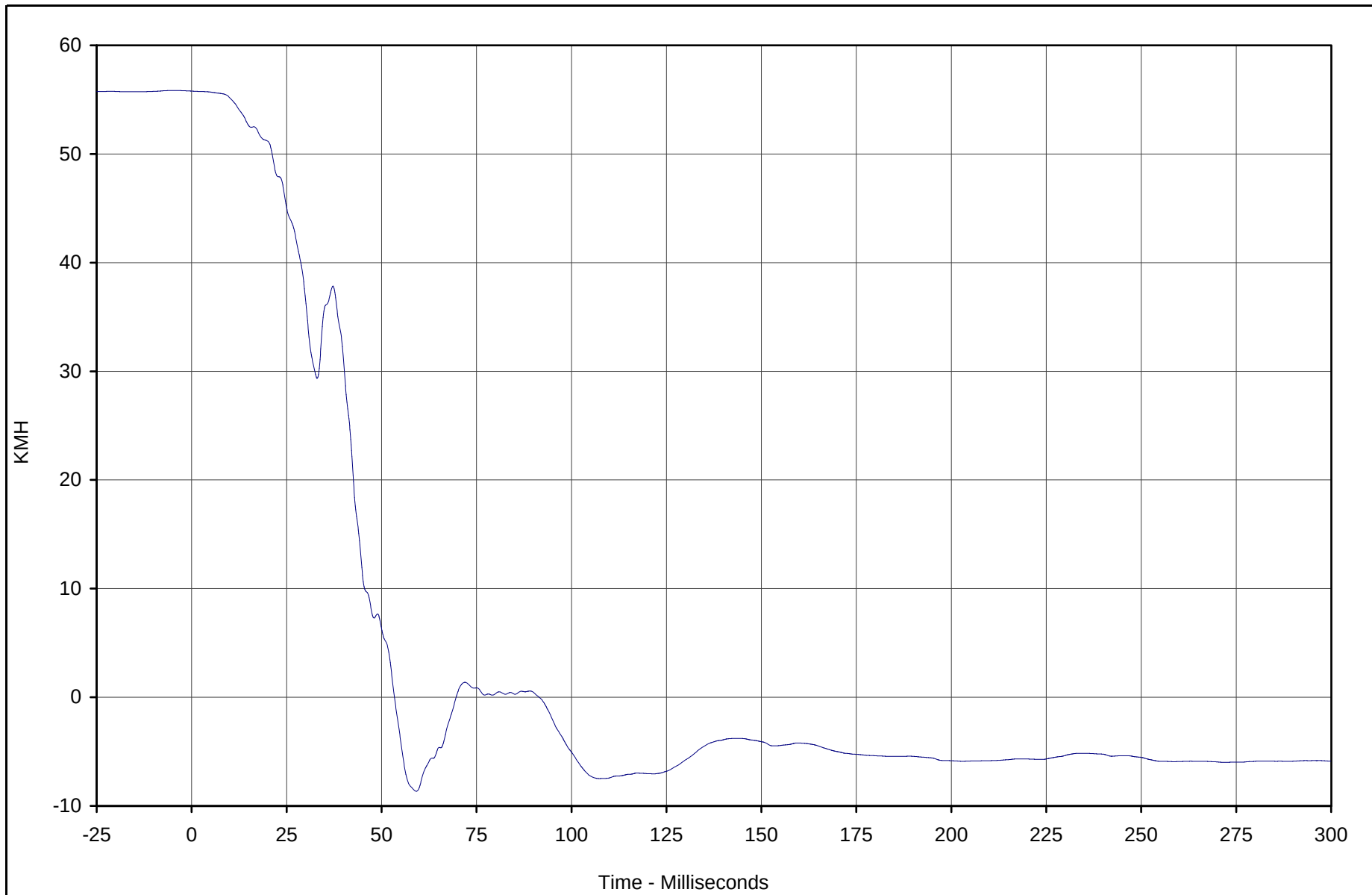
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Right Brake Caliper Velocity	094	IN1	KMH	55.8	0.0	-8.7	59.1	180



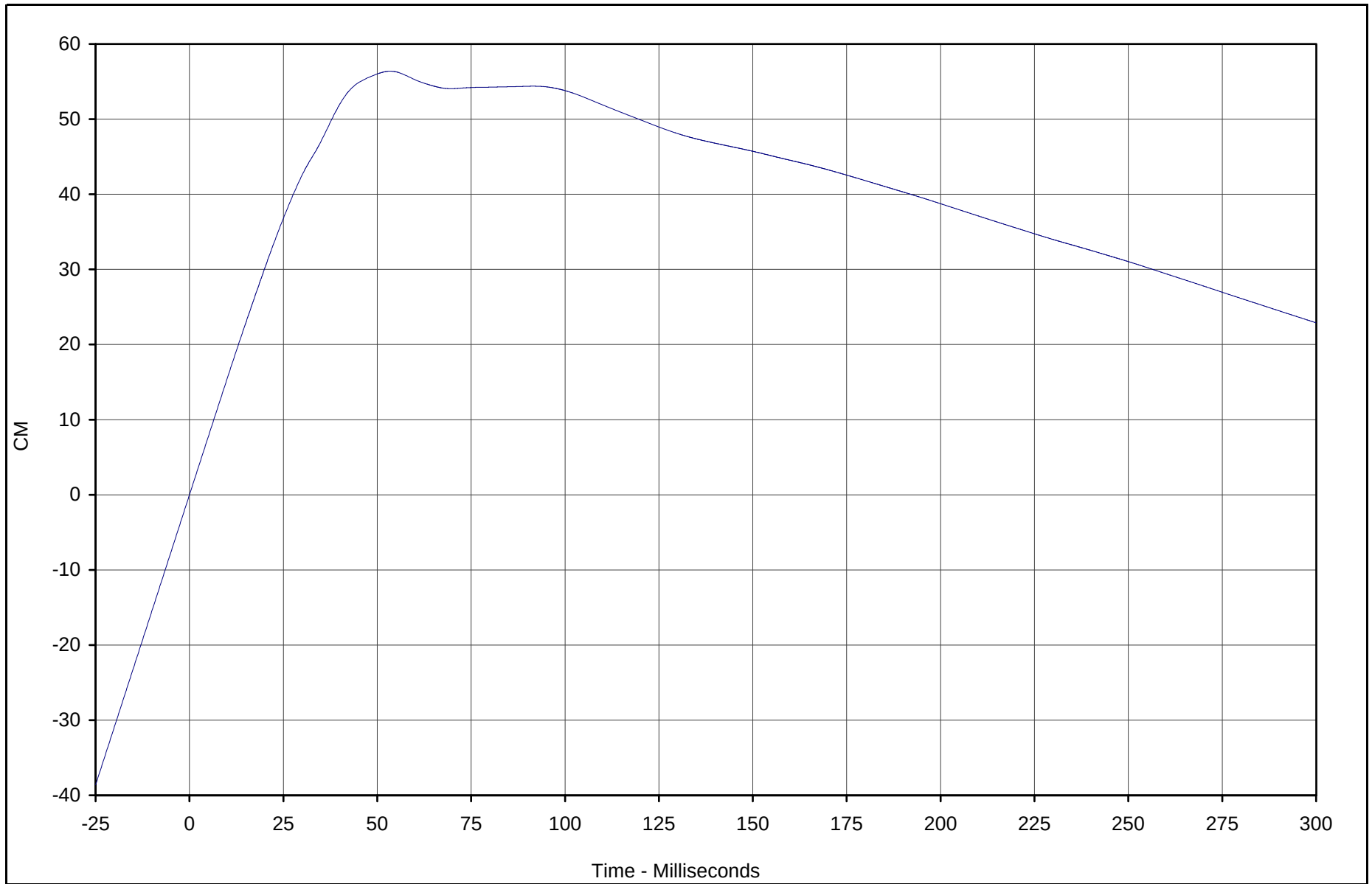
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

B-140



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Right Brake Caliper Displ.	094	IN2	CM	56.4	53.4	0.0	0.0	180



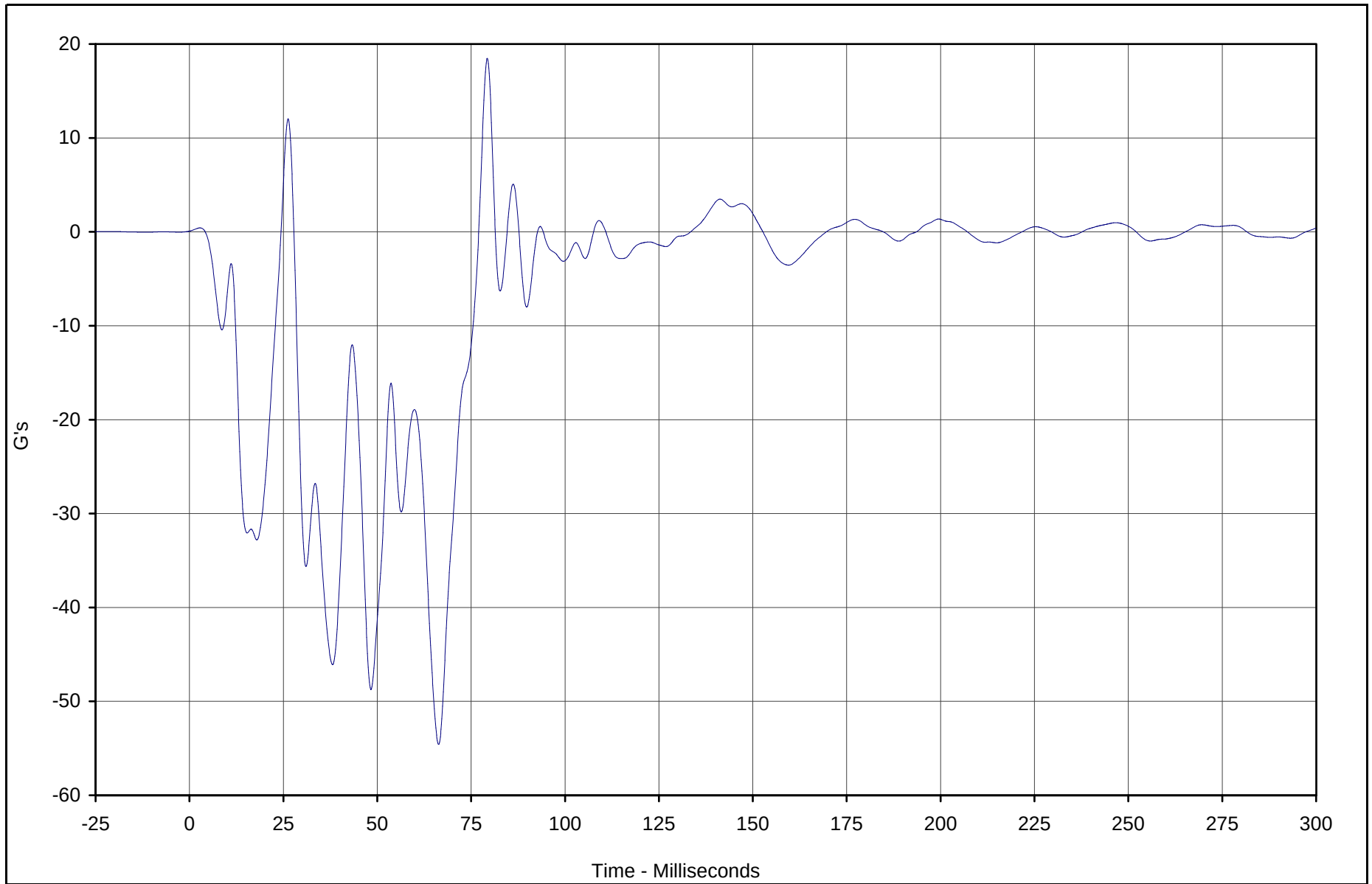
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Instrument Panel	095	FIL	G's	18.5	79.3	-54.6	66.3	60

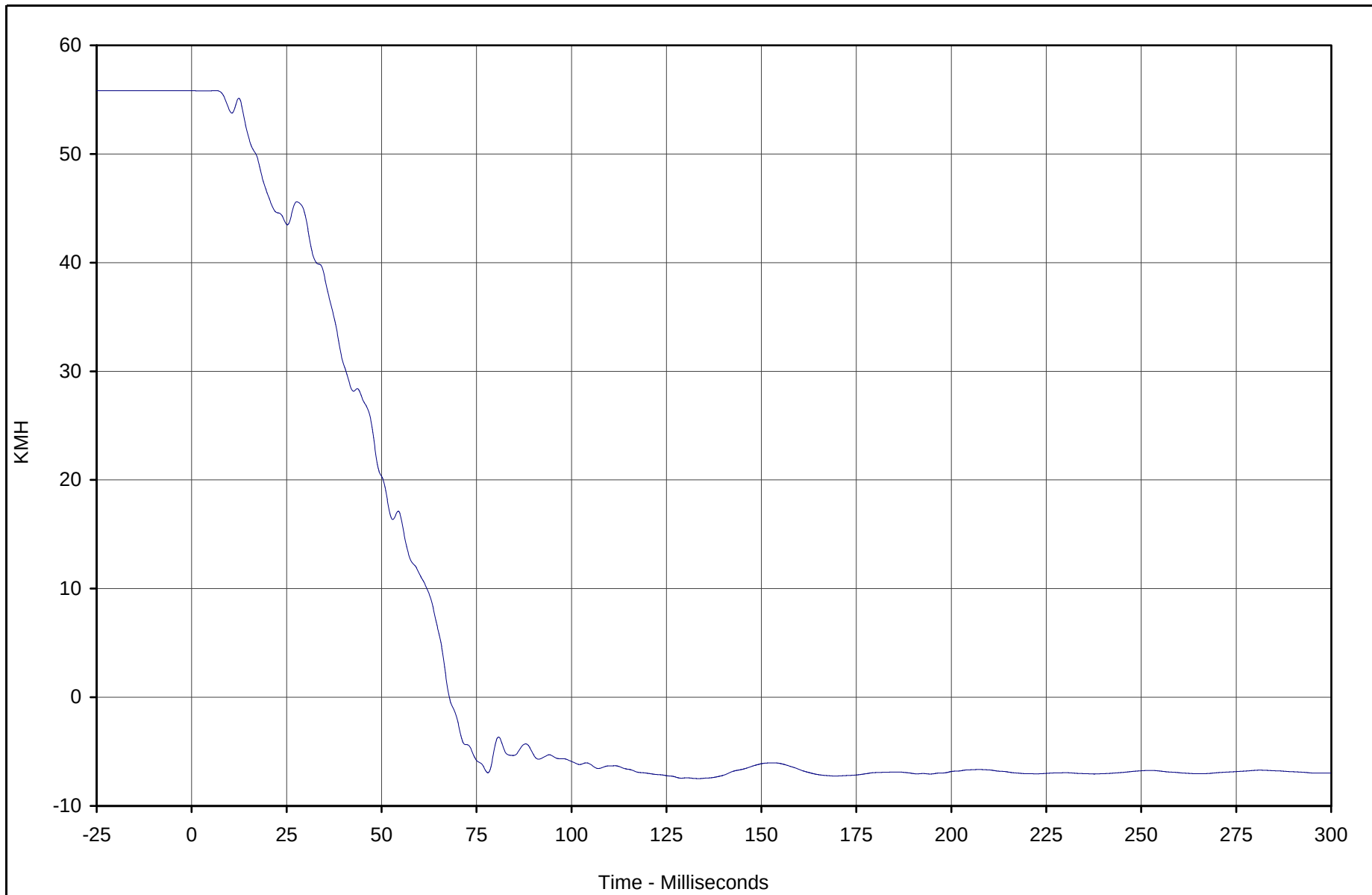


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Instrument Panel Velocity	095	IN1	KMH	55.8	6.4	-7.5	133.5	180

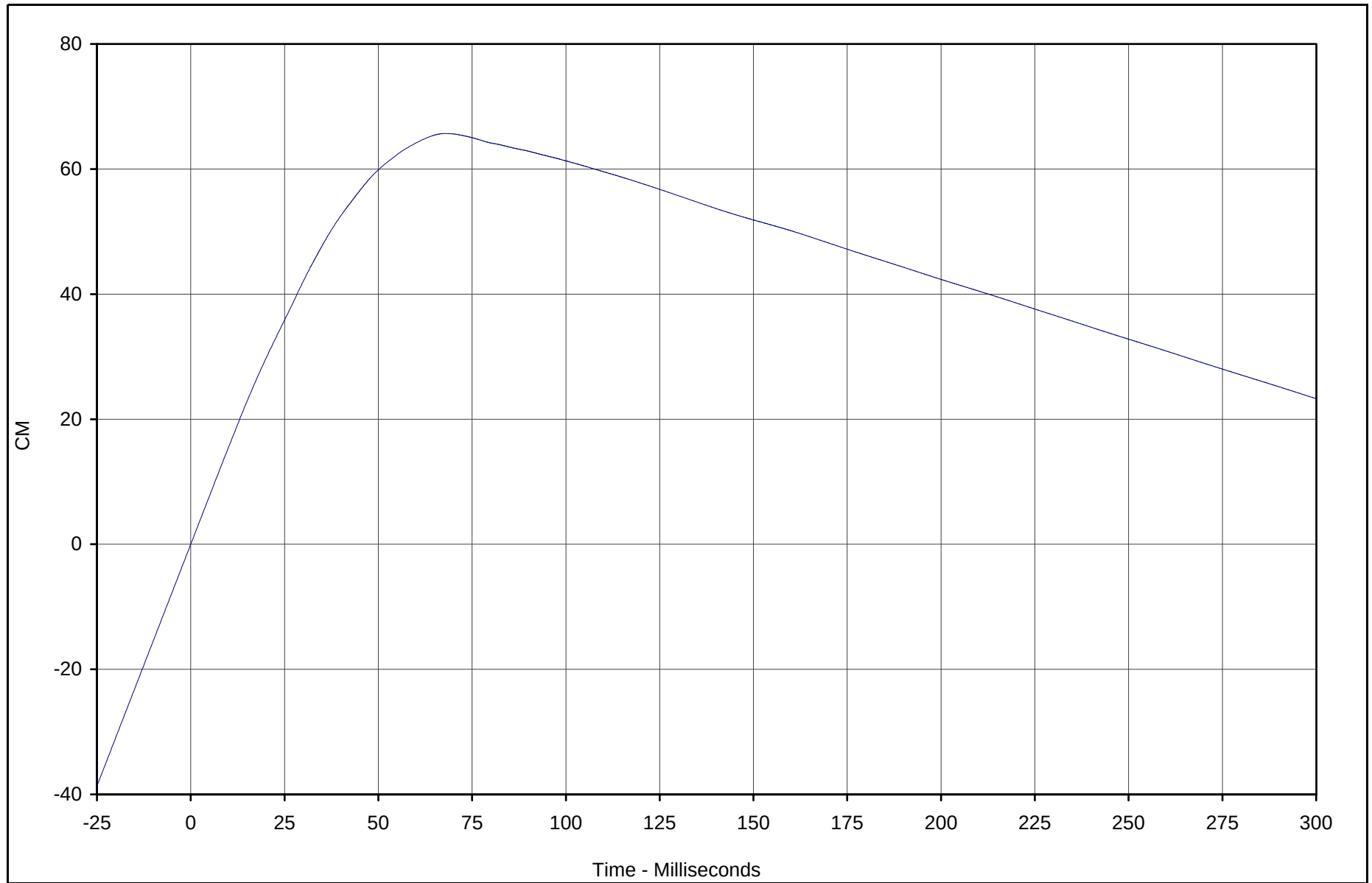


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Instrument Panel Displacement	095	IN2	CM	65.7	67.8	0.0	0.0	180

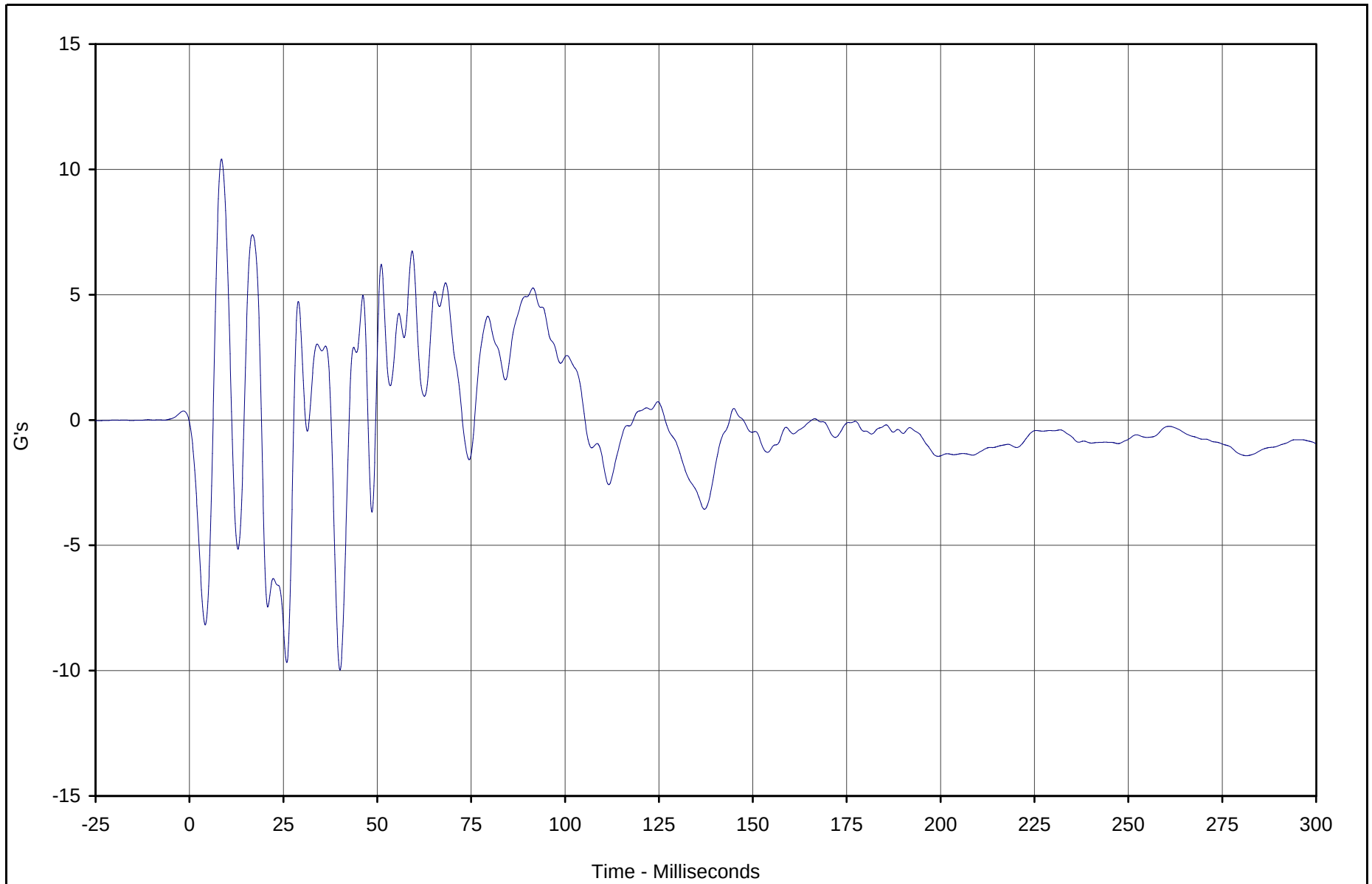


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Left Rear Z	096	FIL	G's	10.4	8.5	-10.0	40.1	60



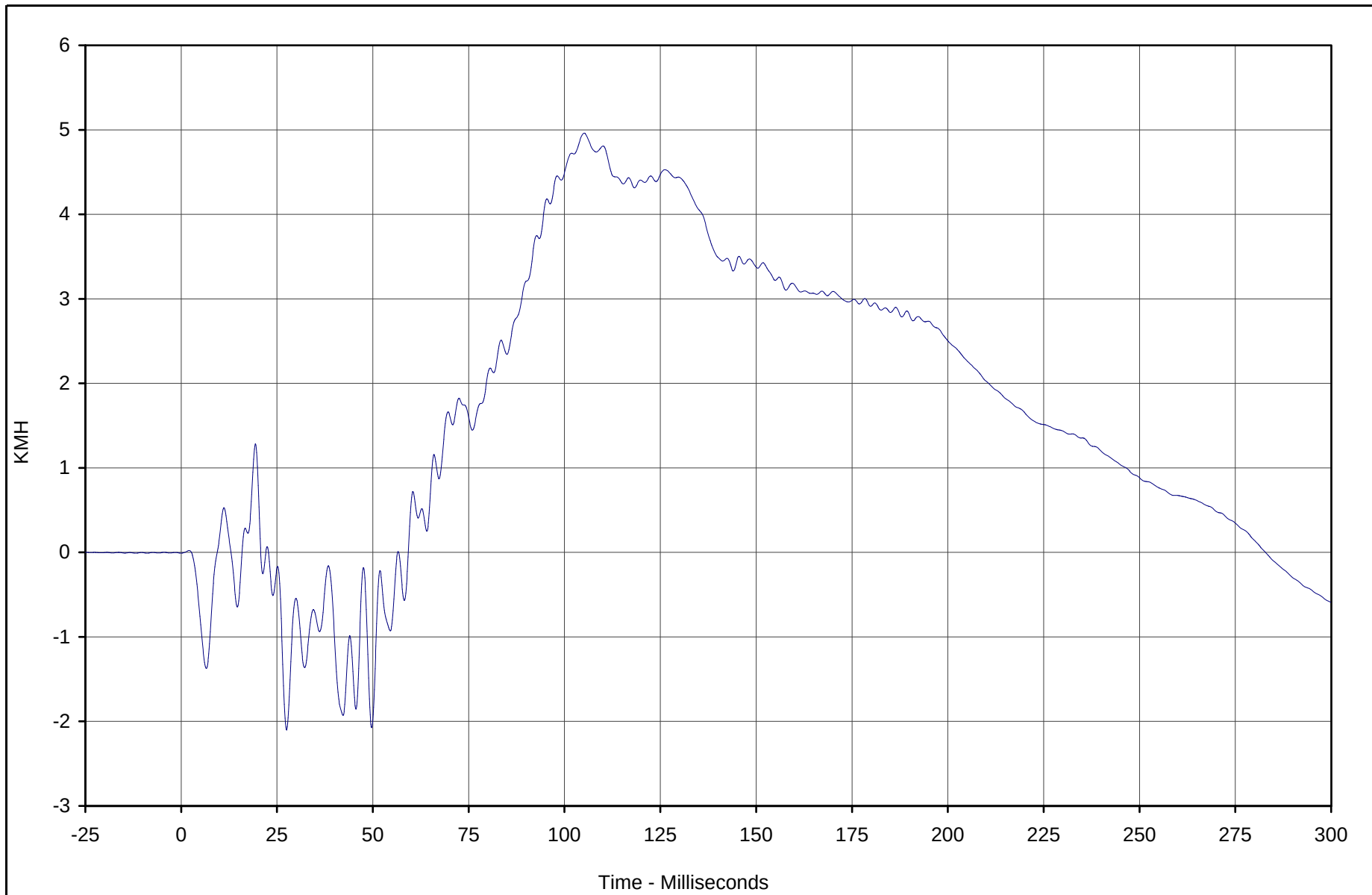
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

B-145



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Left Rear Z Velocity	096	IN1	KMH	5.0	105.2	-2.1	27.5	180



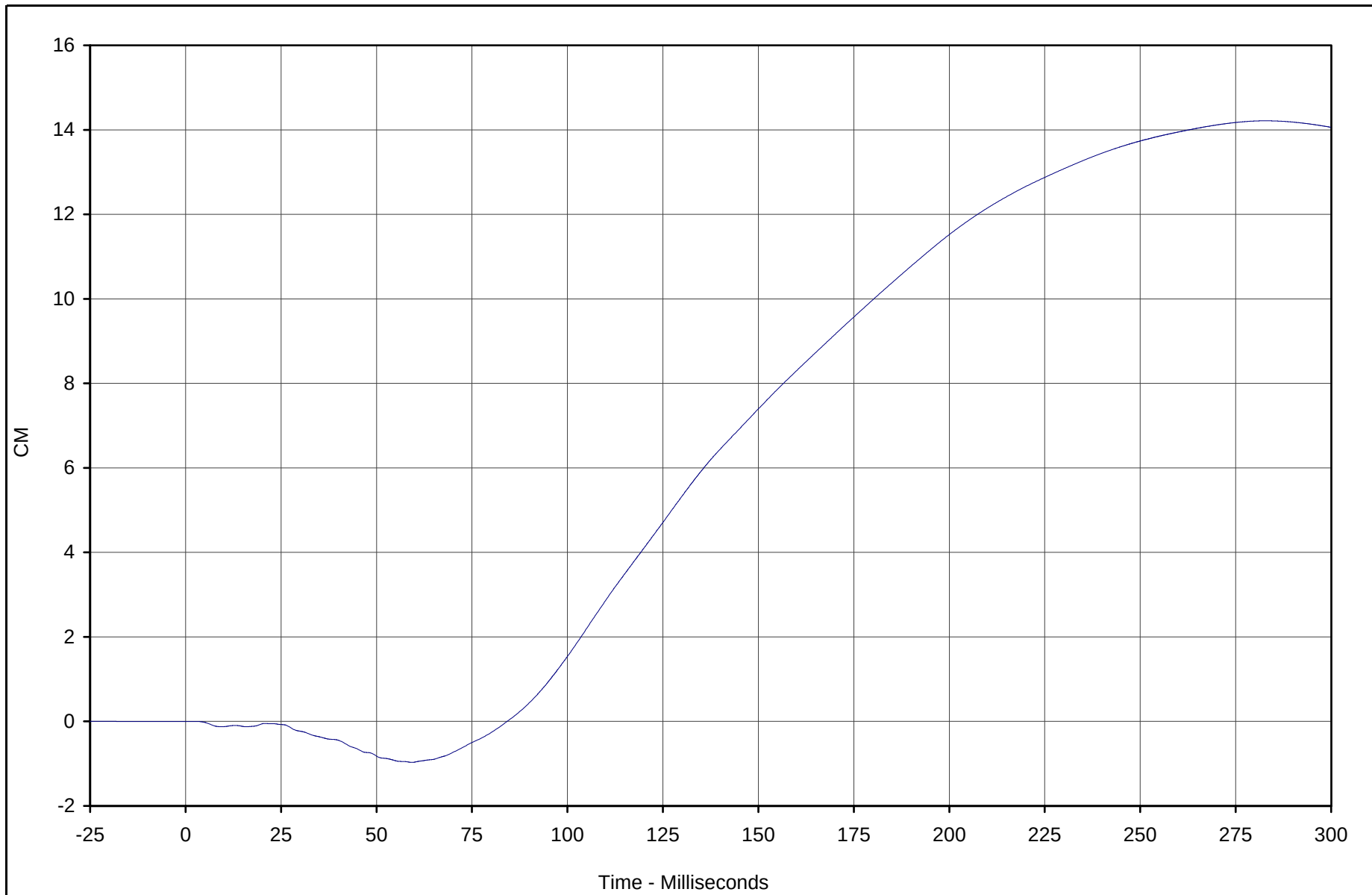
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Left Rear Z Displ.	096	IN2	CM	14.2	282.9	-1.0	59.3	180



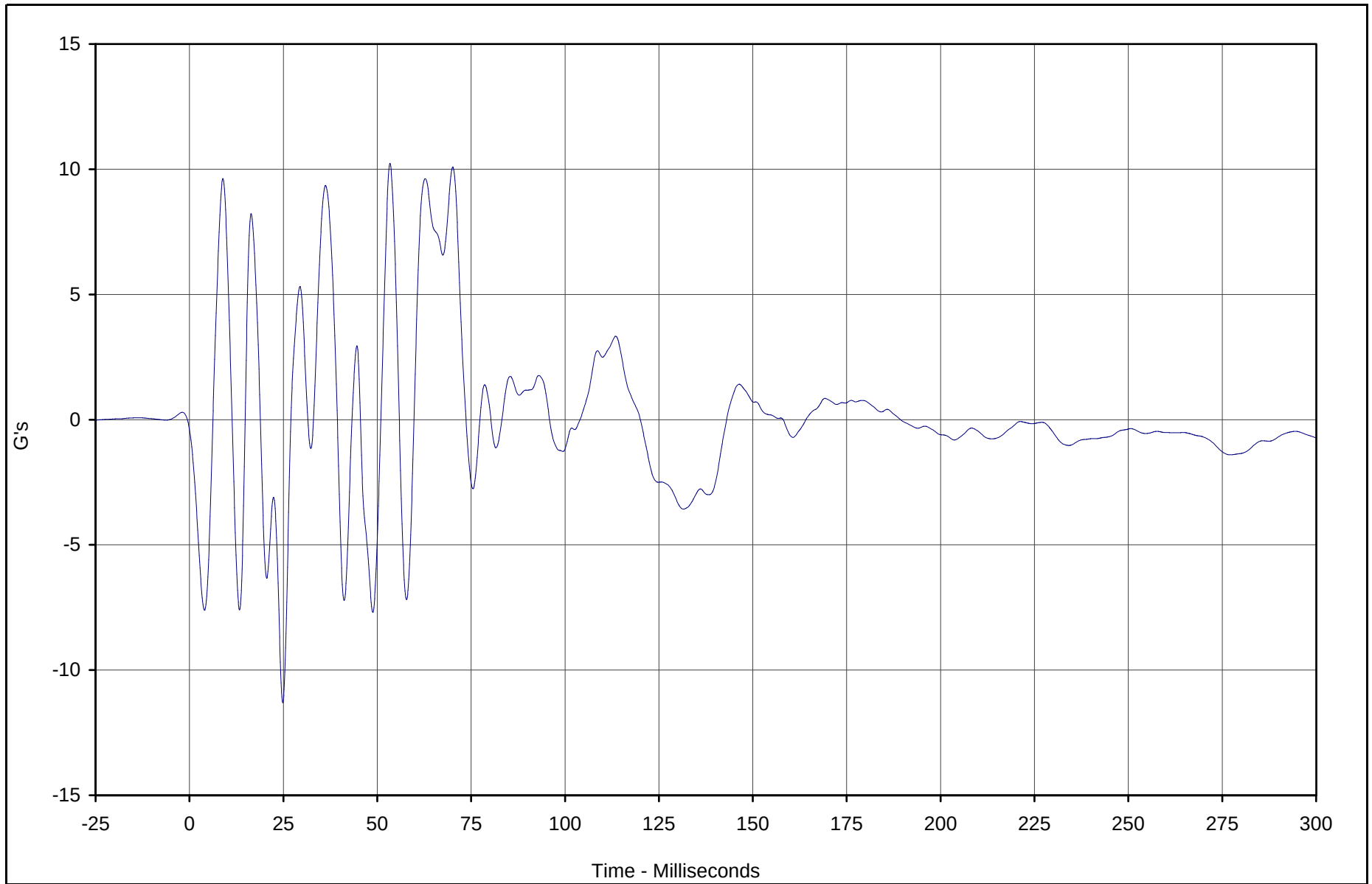
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

B-147



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Right Rear Z	097	FIL	G's	10.2	53.4	-11.3	24.8	60



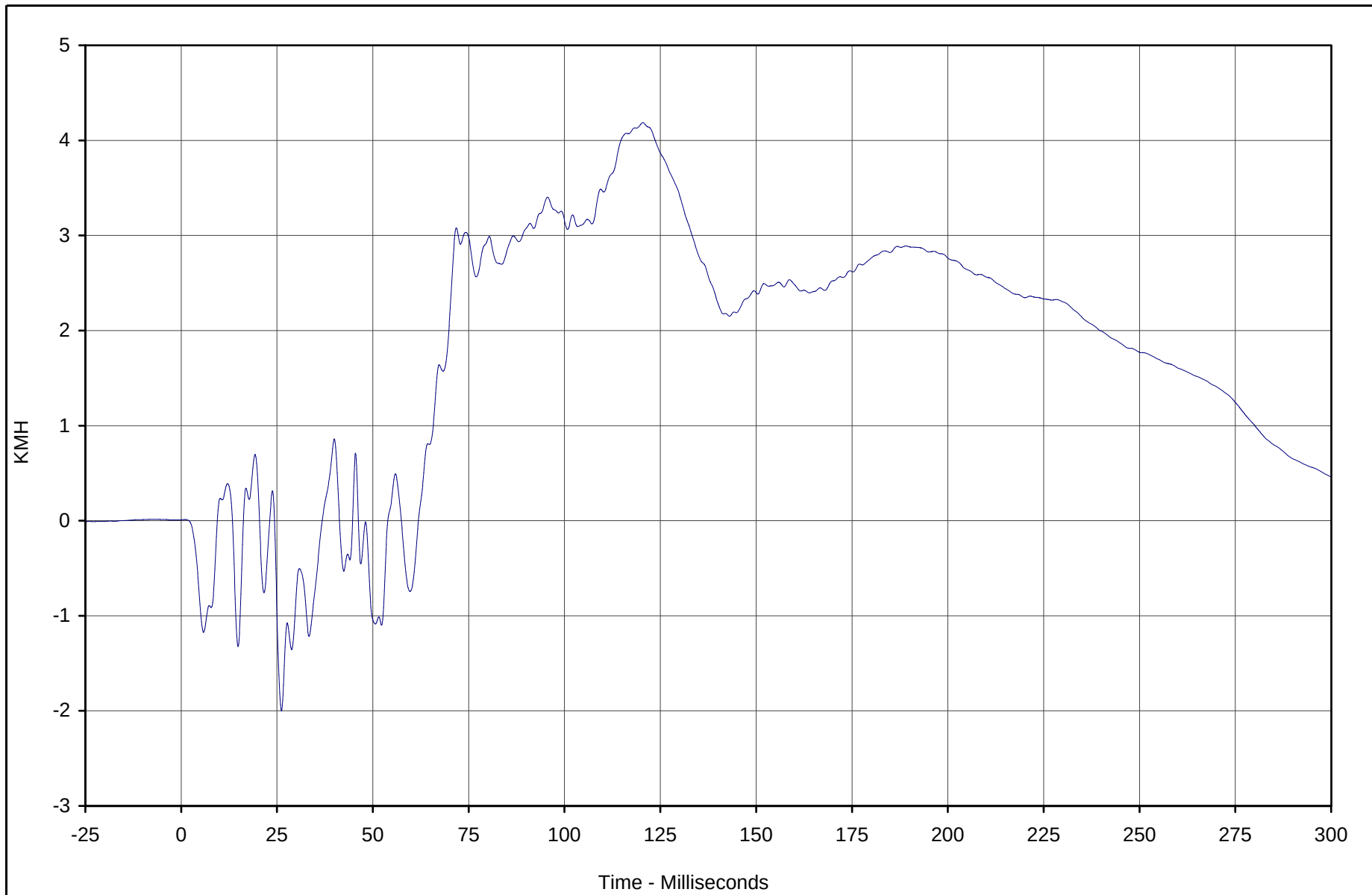
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Right Rear Z Velocity	097	IN1	KMH	4.2	120.5	-2.0	26.2	180

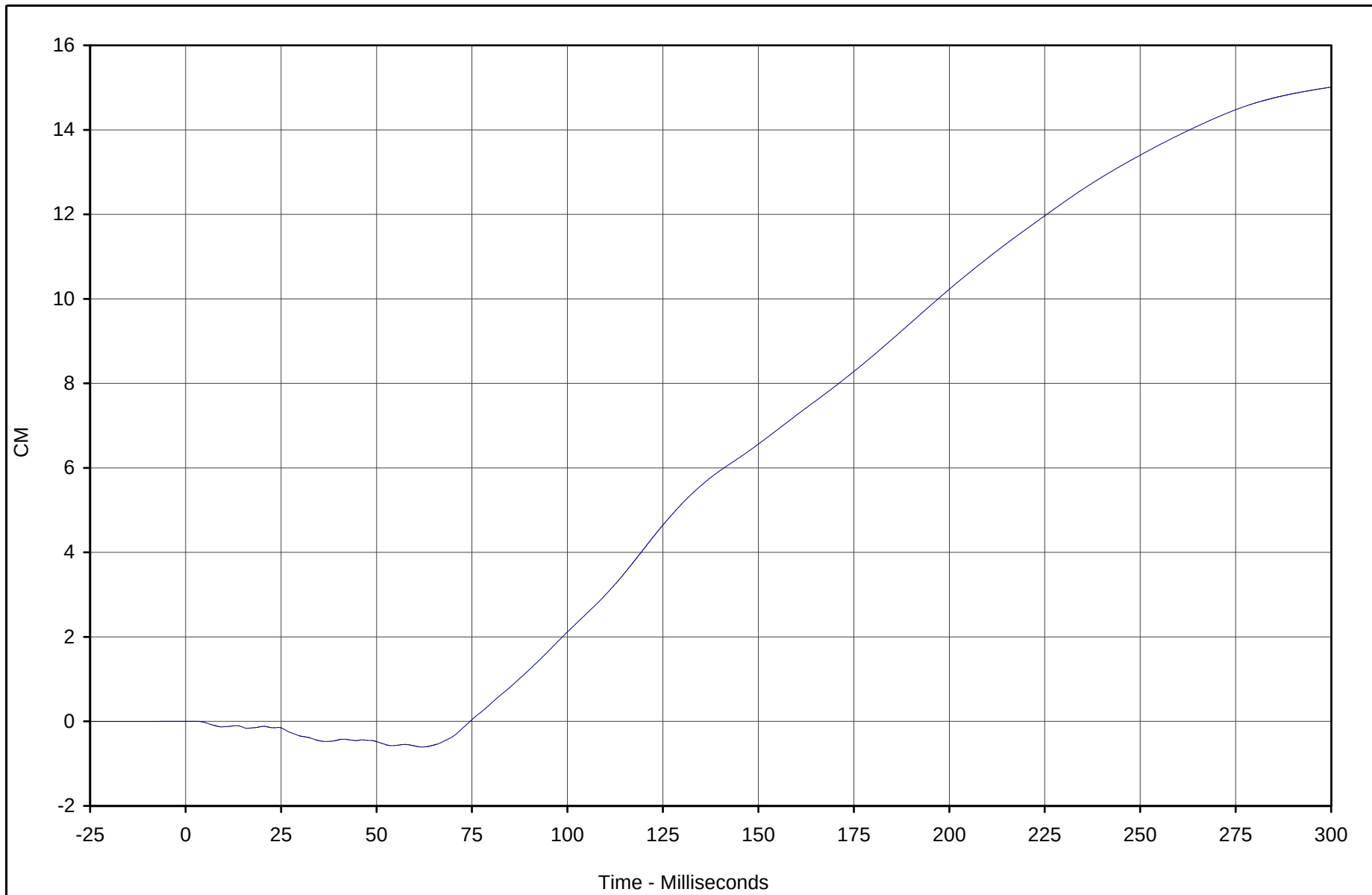


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Vehicle Right Rear Z Displ.	097	IN2	CM	15.0	299.9	-0.6	61.9	180



Test Vehicle: 2002 Toyota Highlander 4WD SUV

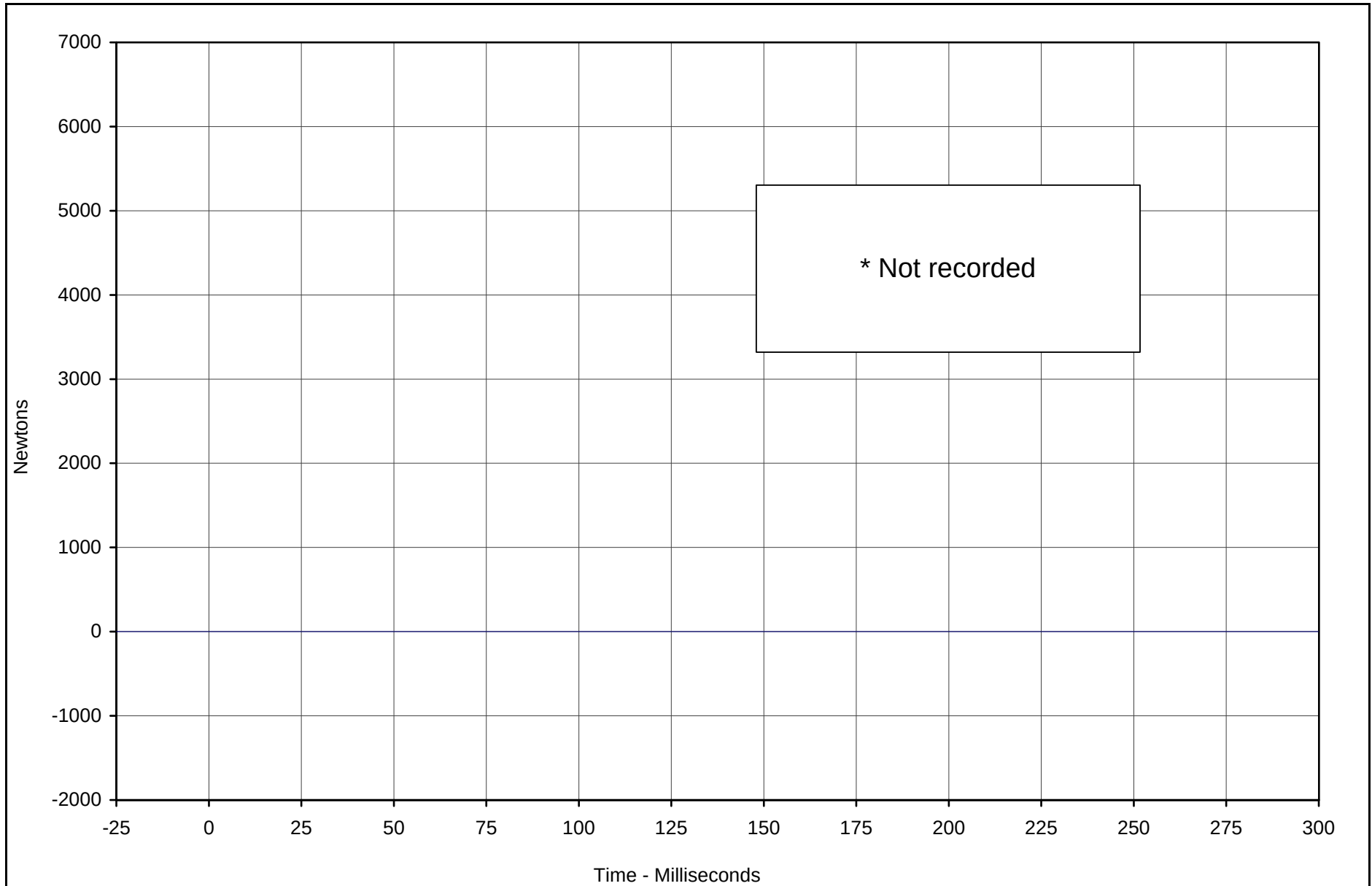
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

APPENDIX C

LOAD CELL BARRIER DATA PLOTS



* Not recorded

Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force A1	098	FIL	Newtons	0.0	0.0	0.0	0.0	60



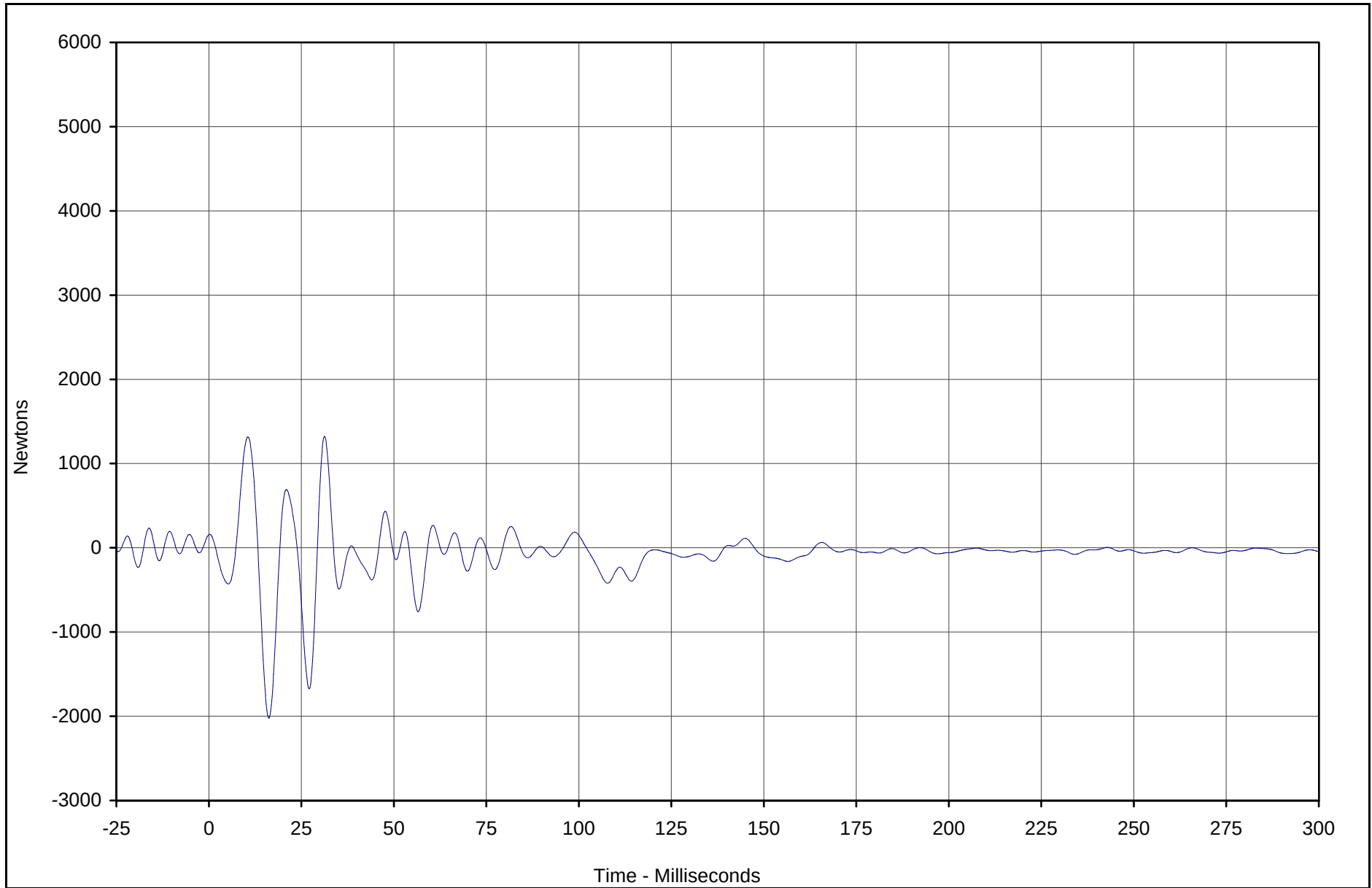
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

C-2



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force A2	099	FIL	Newtons	1322.5	31.3	-2023.0	16.2	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

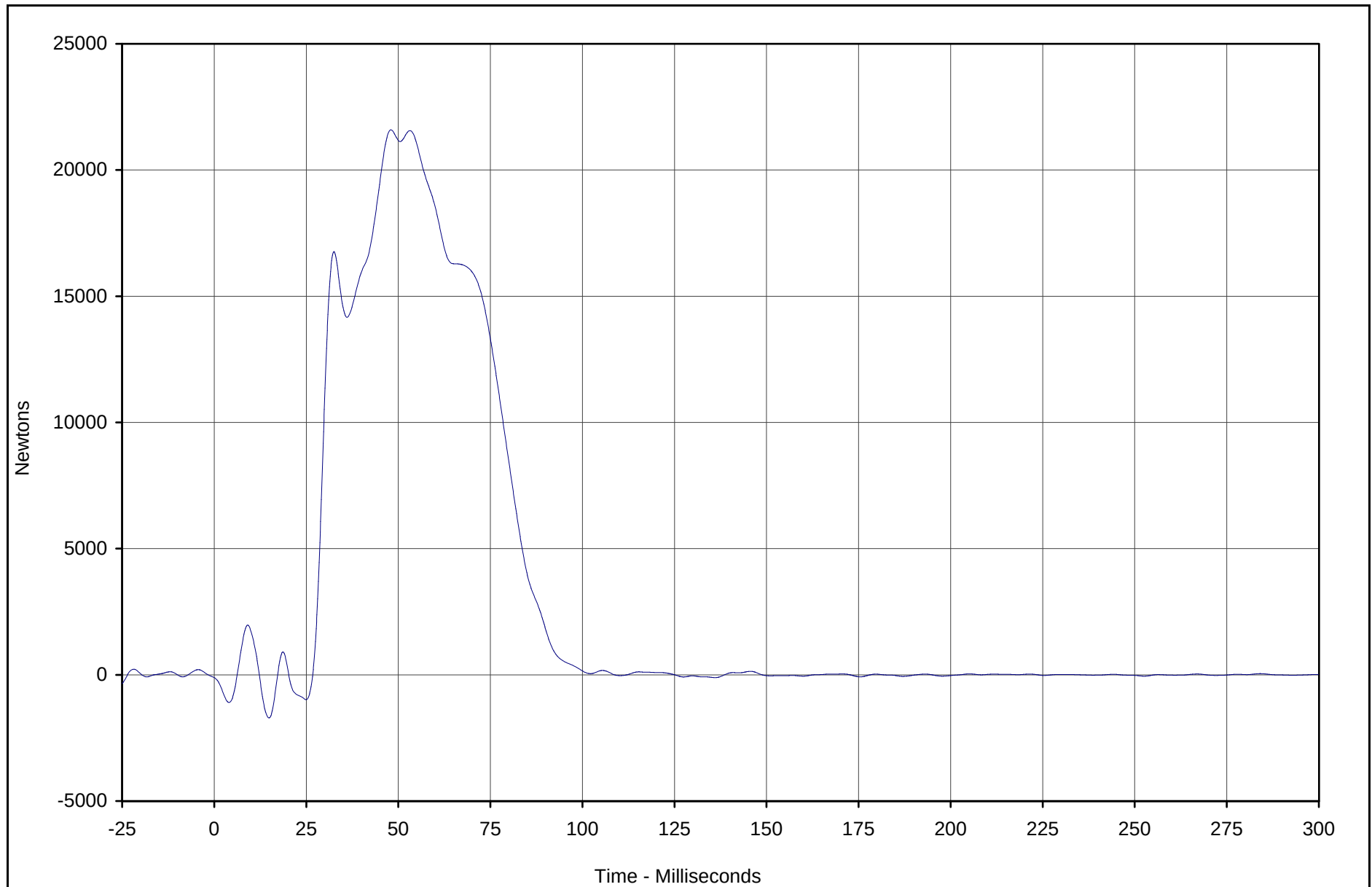
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-3



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force A3	100	FIL	Newtons	21594.9	48.0	-1707.8	14.9	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

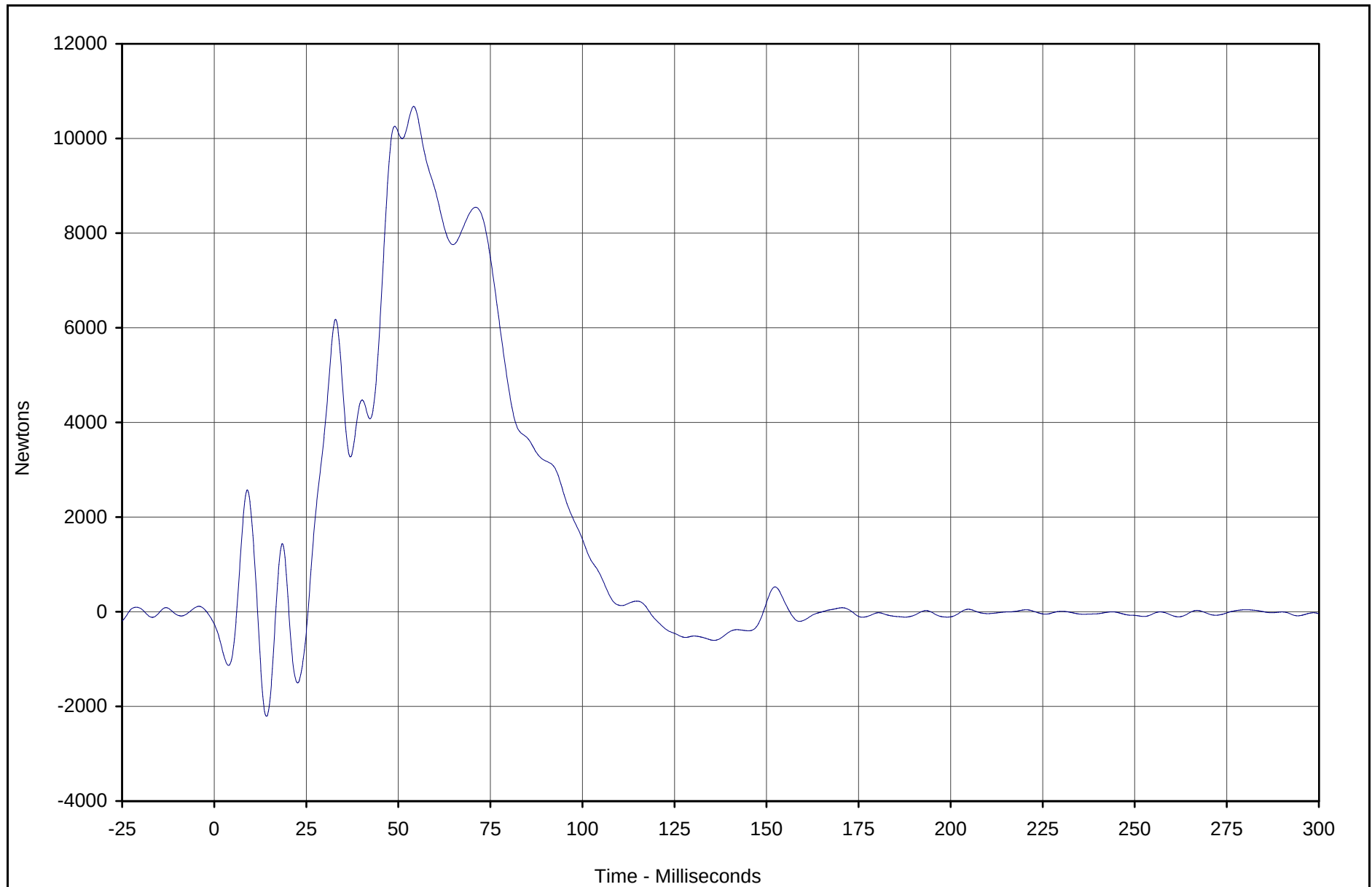
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-4



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force A4	101	FIL	Newtons	10677.0	54.2	-2210.6	14.2	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

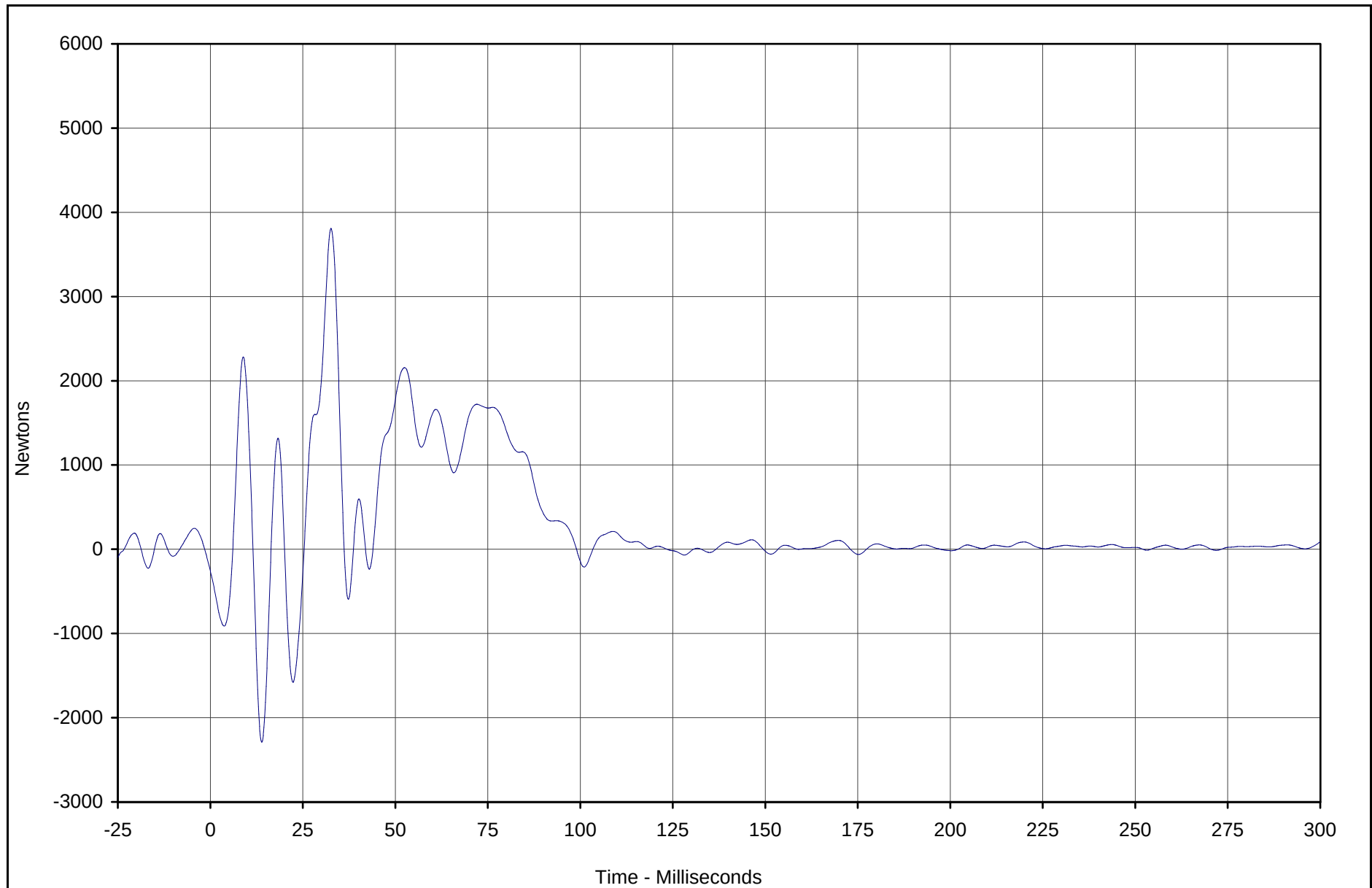
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-5



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force A5	102	FIL	Newtons	3809.4	32.6	-2290.3	13.9	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

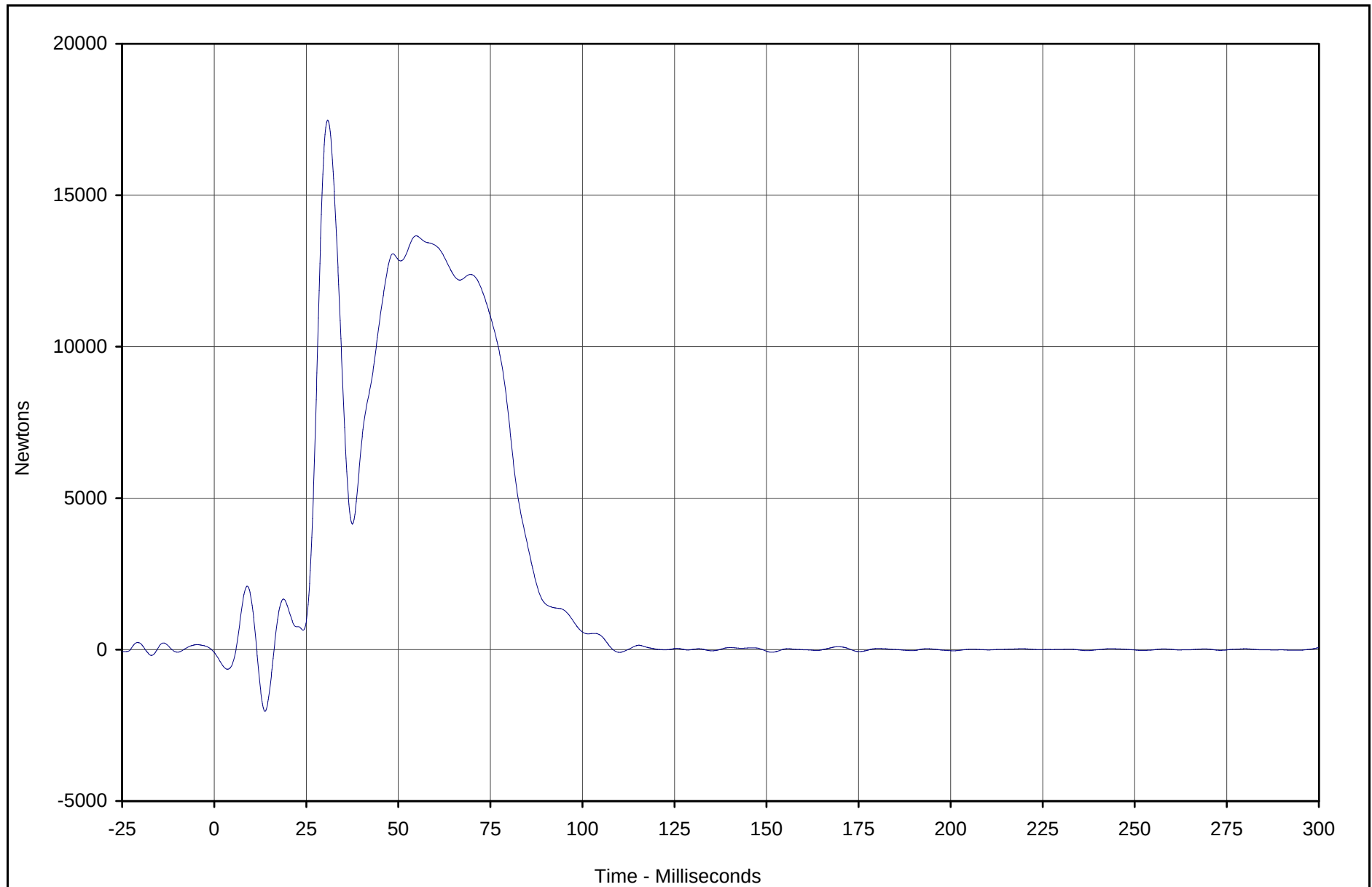
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-6



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force A6	103	FIL	Newtons	17479.8	30.8	-2040.2	13.8	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

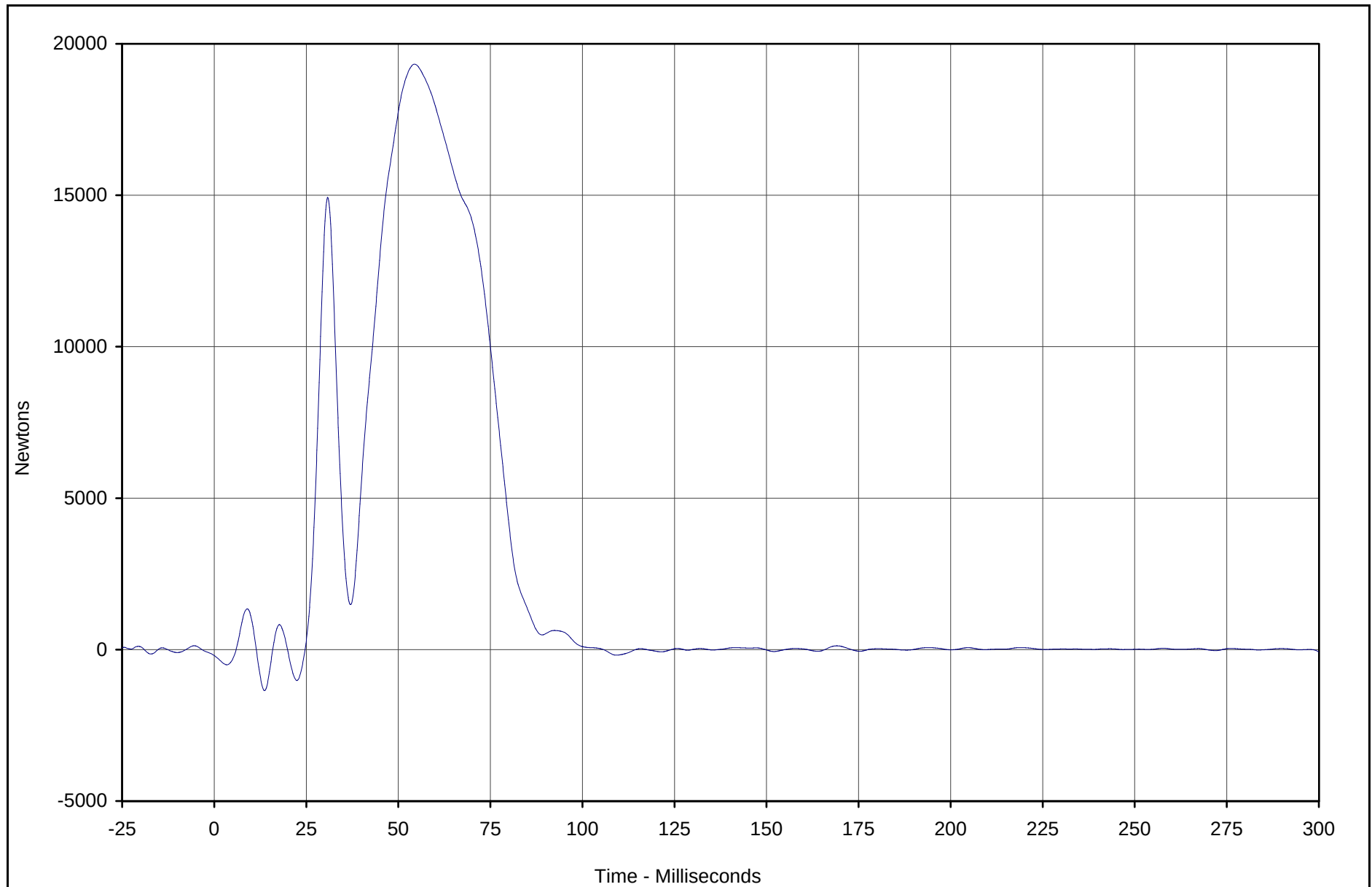
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-7



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force A7	104	FIL	Newtons	19328.5	54.4	-1357.9	13.7	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

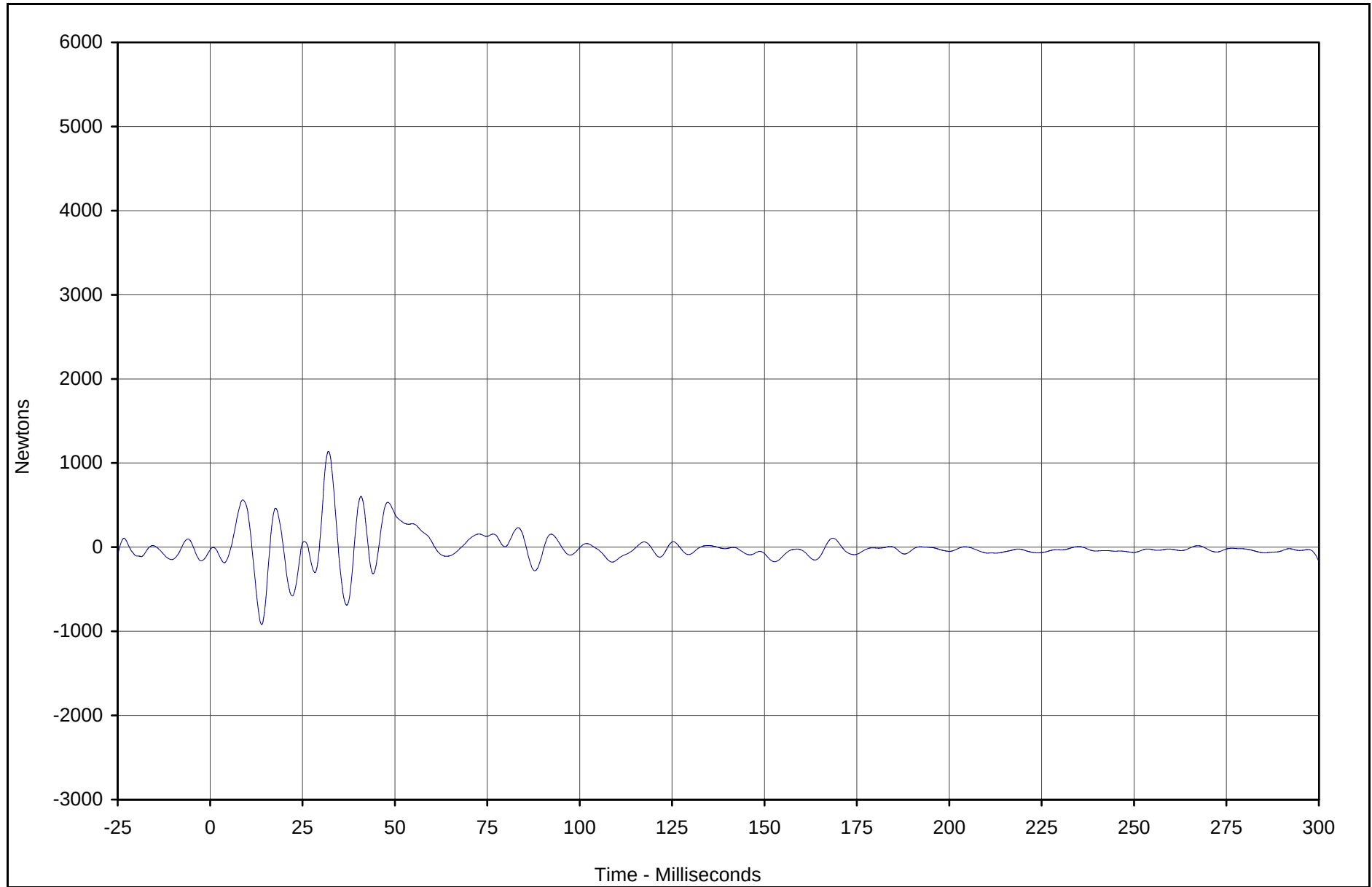
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-8



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force A8	105	FIL	Newtons	1138.3	32.0	-918.0	13.9	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

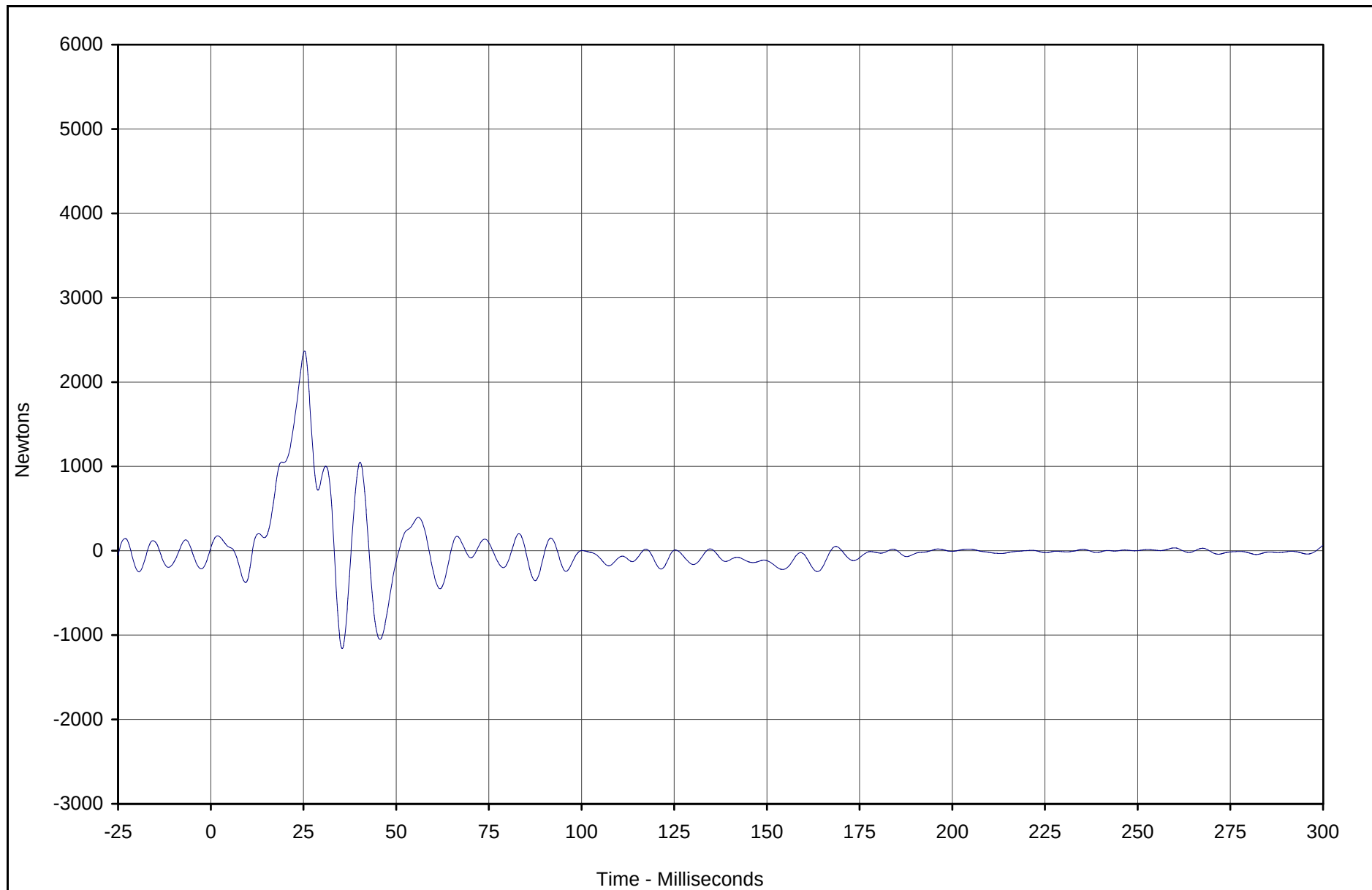
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-9



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force A9	106	FIL	Newtons	2369.2	25.3	-1159.3	35.4	60

Test Vehicle: 2002 Toyota Highlander 4WD SUV

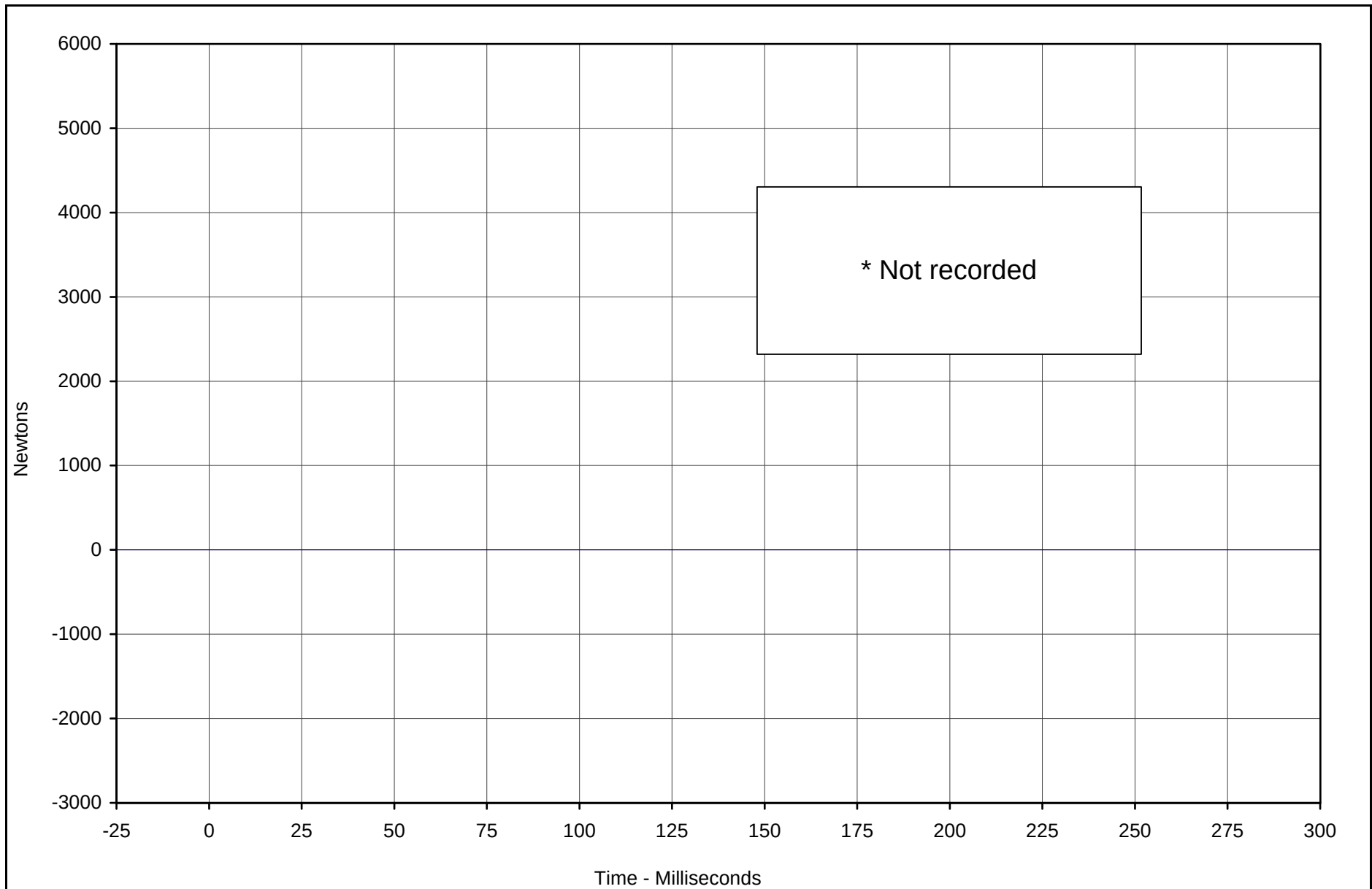
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



KAR22001-13



* Not recorded

Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force B1	107	FIL	Newtons	0.0	0.0	0.0	0.0	60



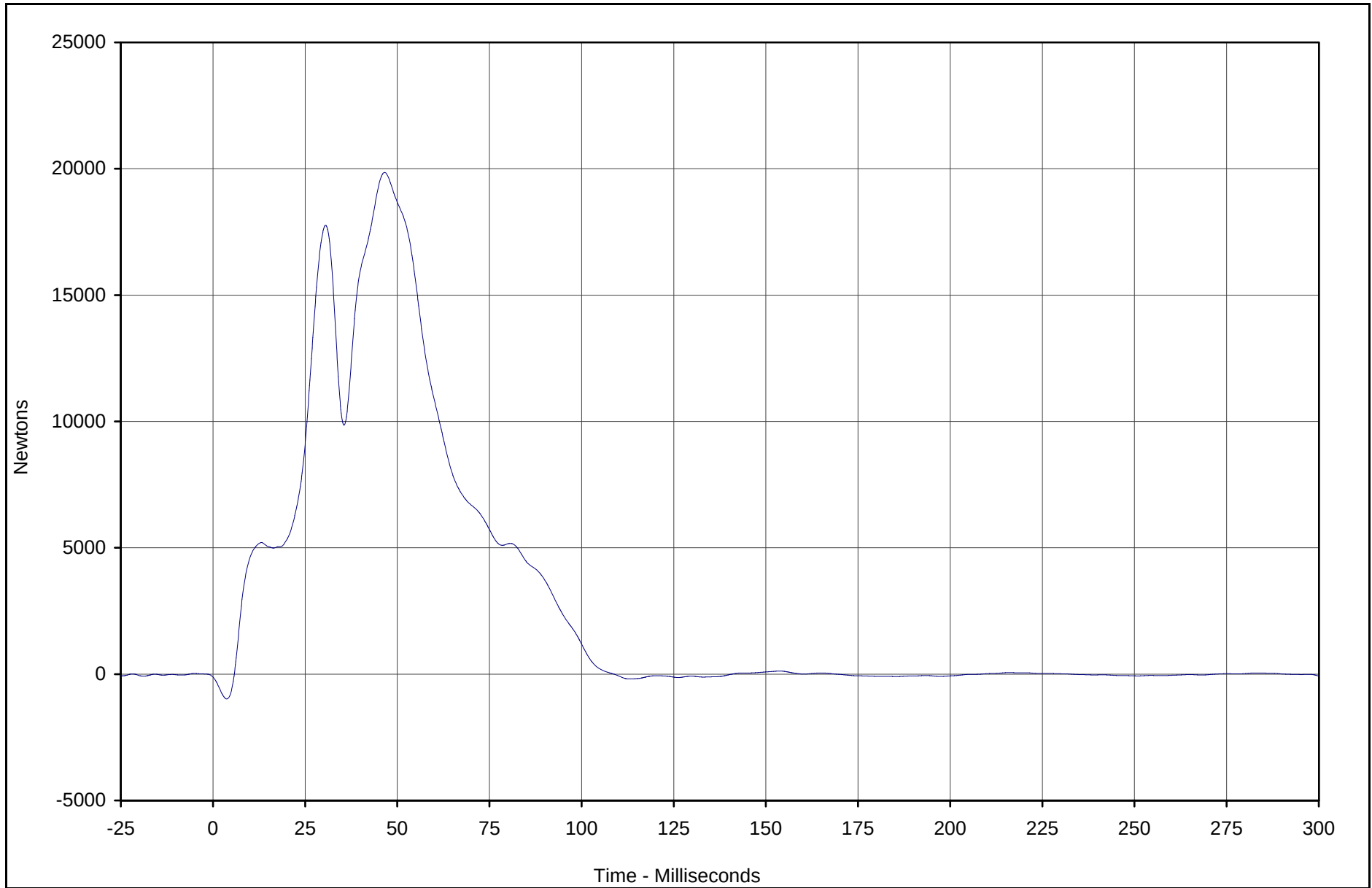
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

C-11



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force B2	108	FIL	Newtons	19854.4	46.6	-979.2	3.7	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

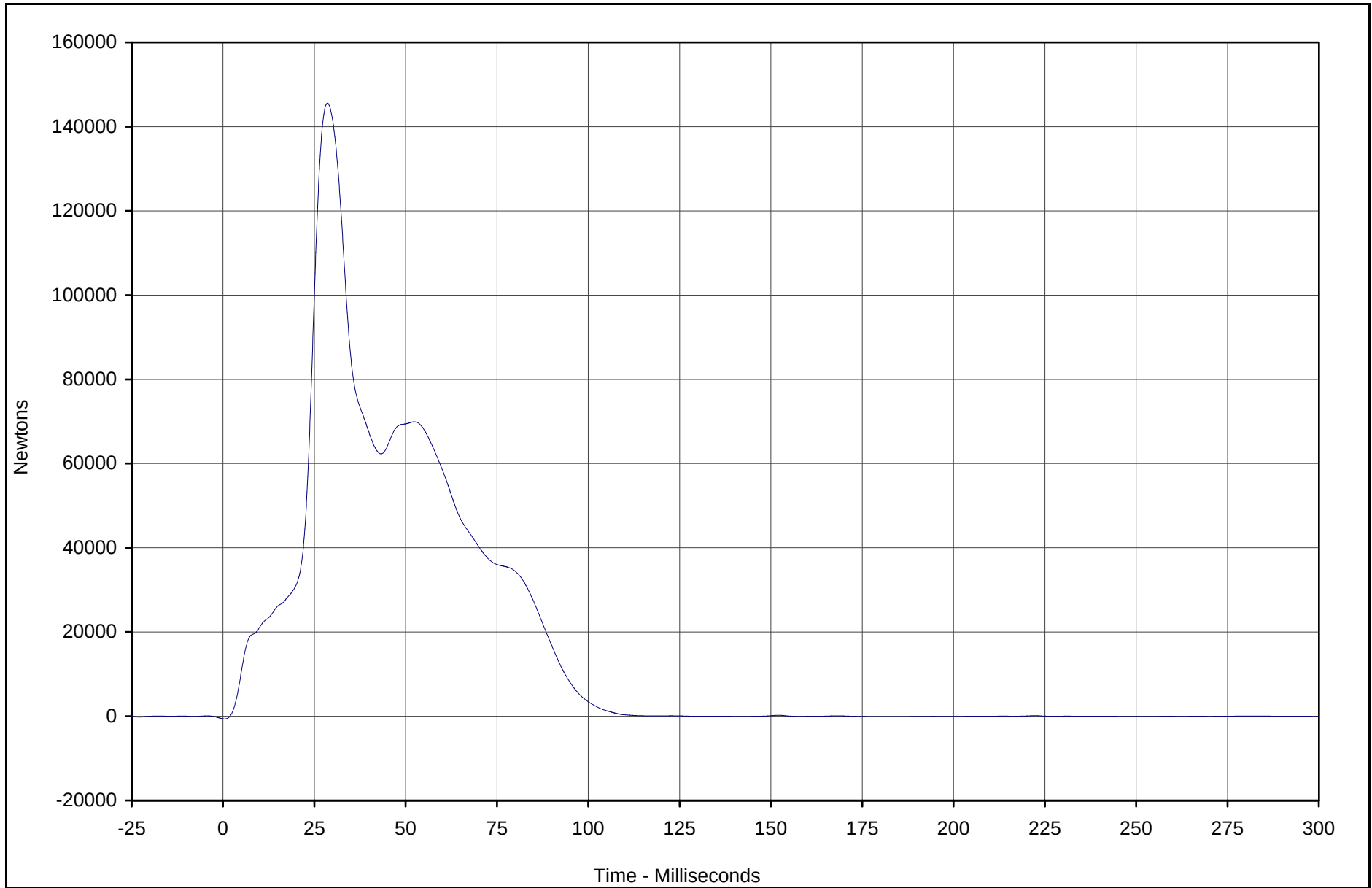
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-12



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force B3	109	FIL	Newtons	145584.0	28.6	-629.7	0.4	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

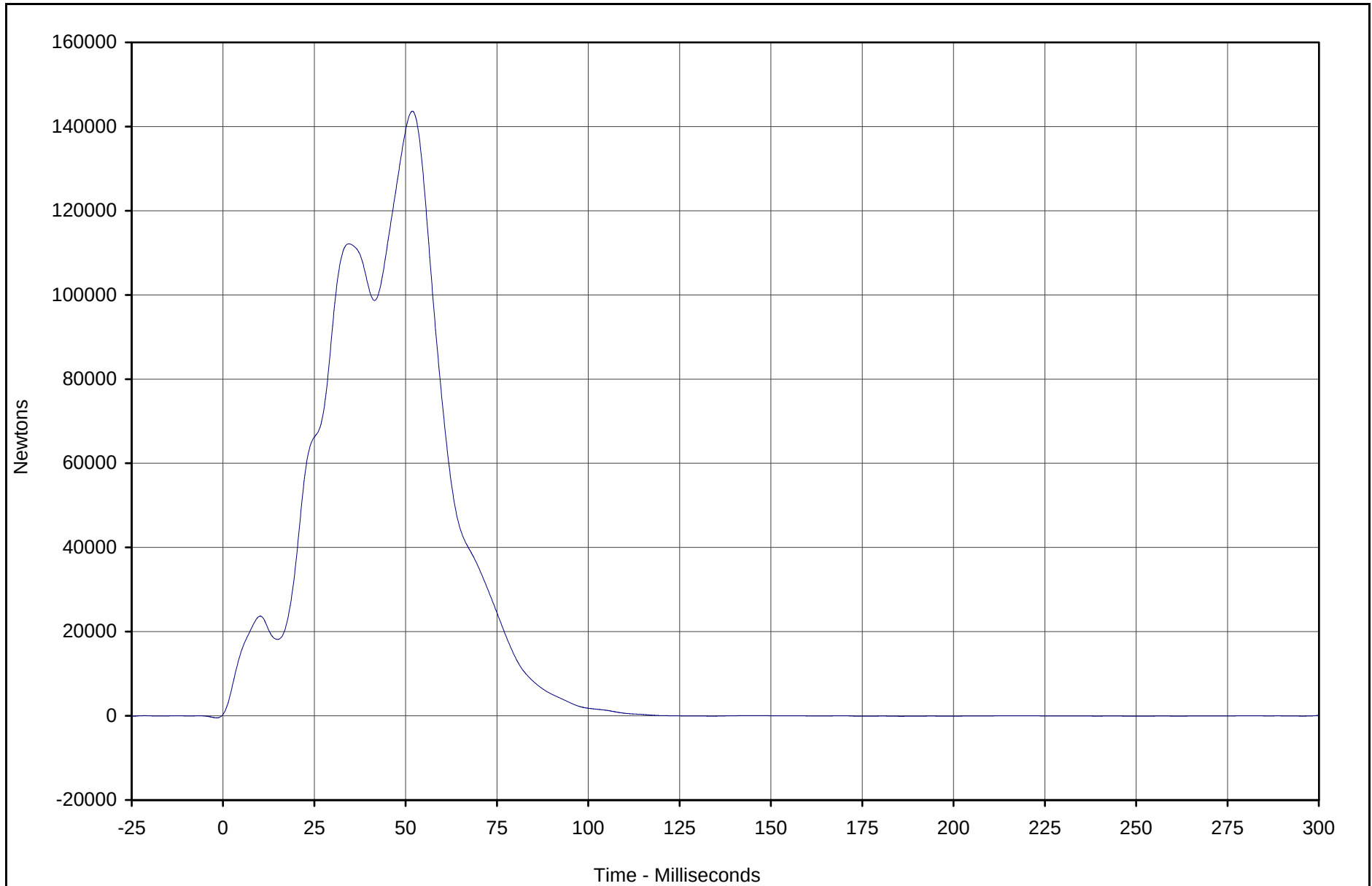
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-13



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force B4	110	FIL	Newtons	143653.5	51.8	-113.6	185.6	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

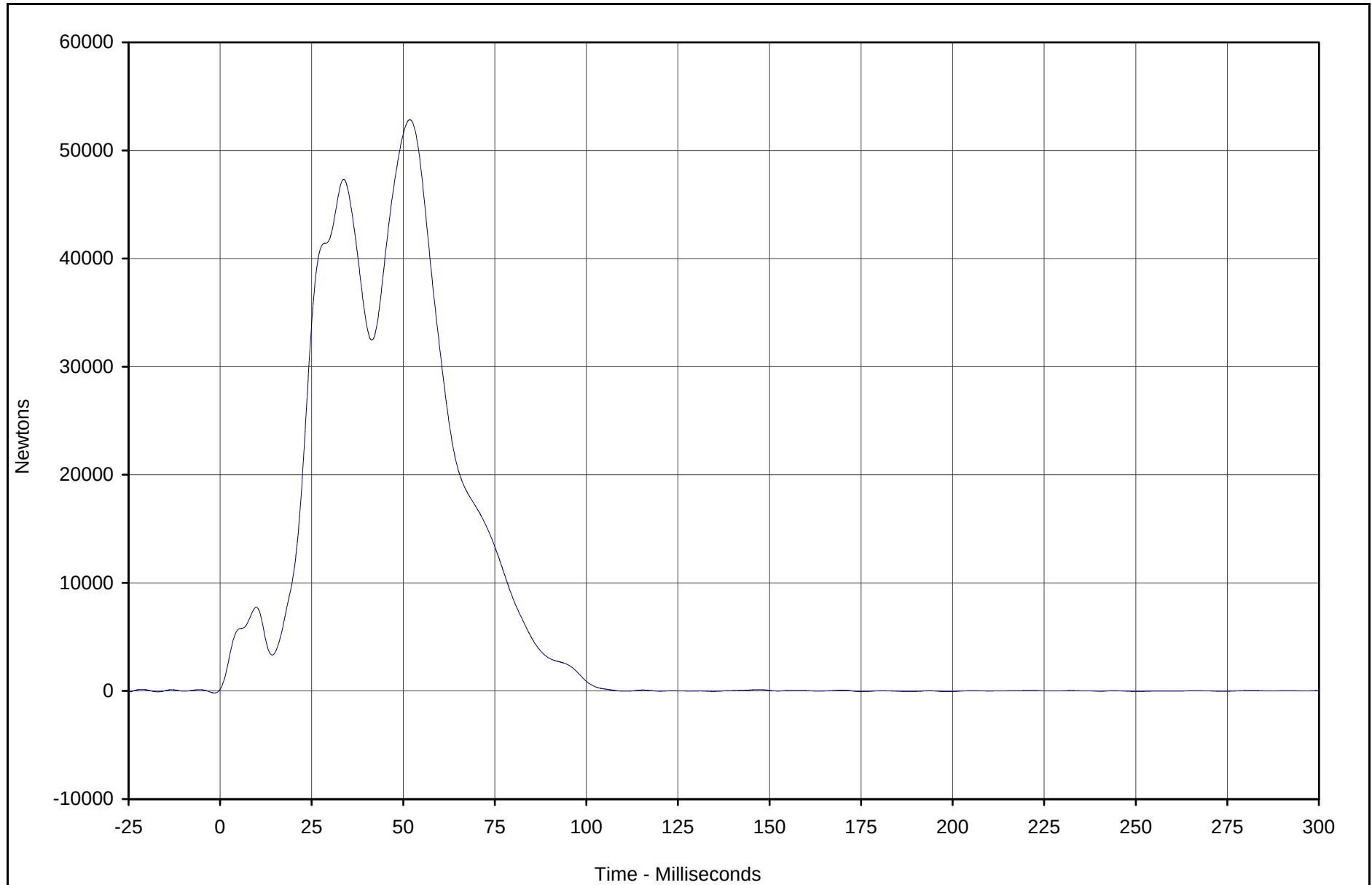
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-14



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force B5	111	FIL	Newtons	52843.0	51.8	-69.8	198.4	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

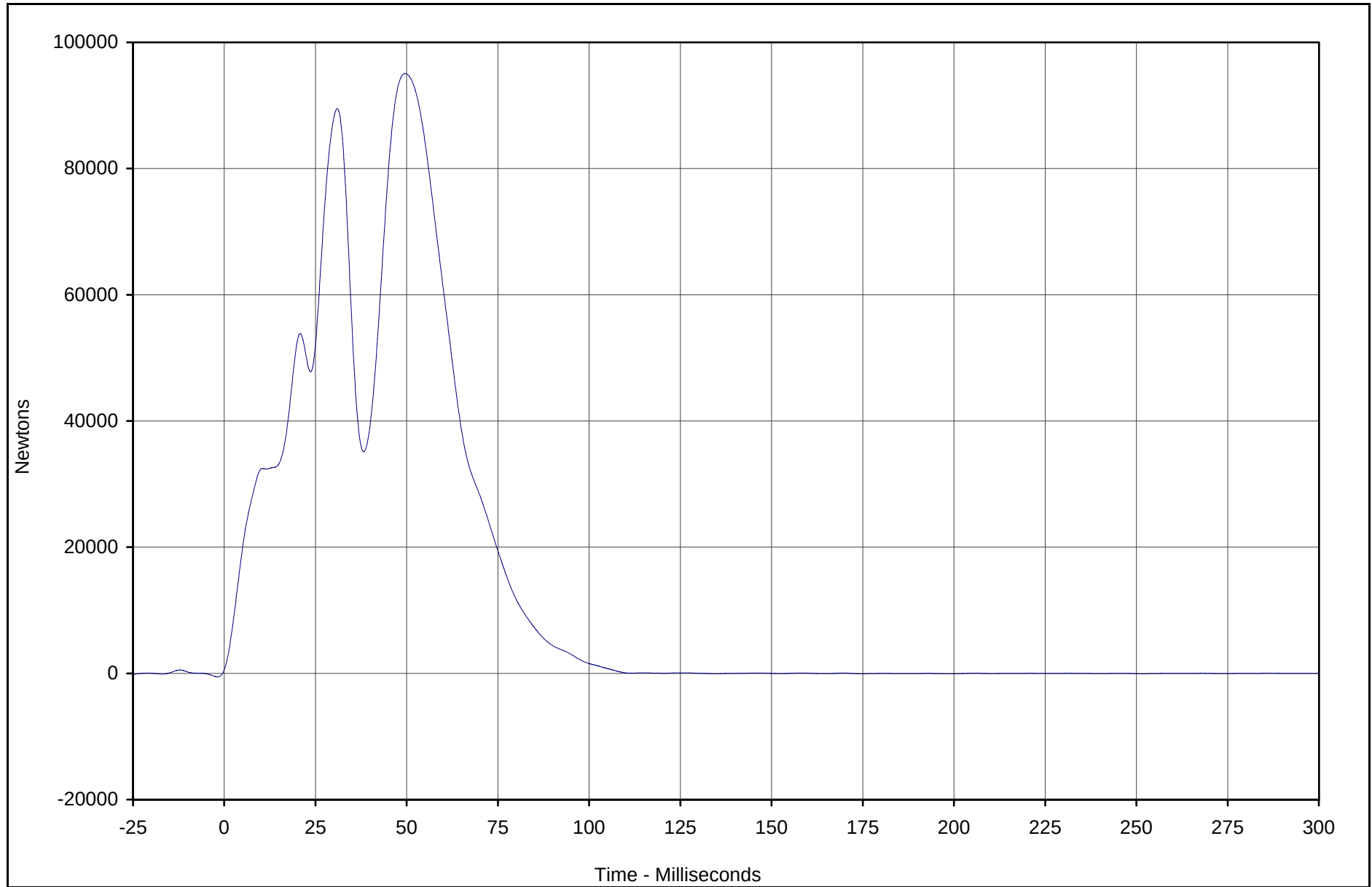
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-15



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force B6	112	FIL	Newtons	95064.2	49.6	-77.6	199.5	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

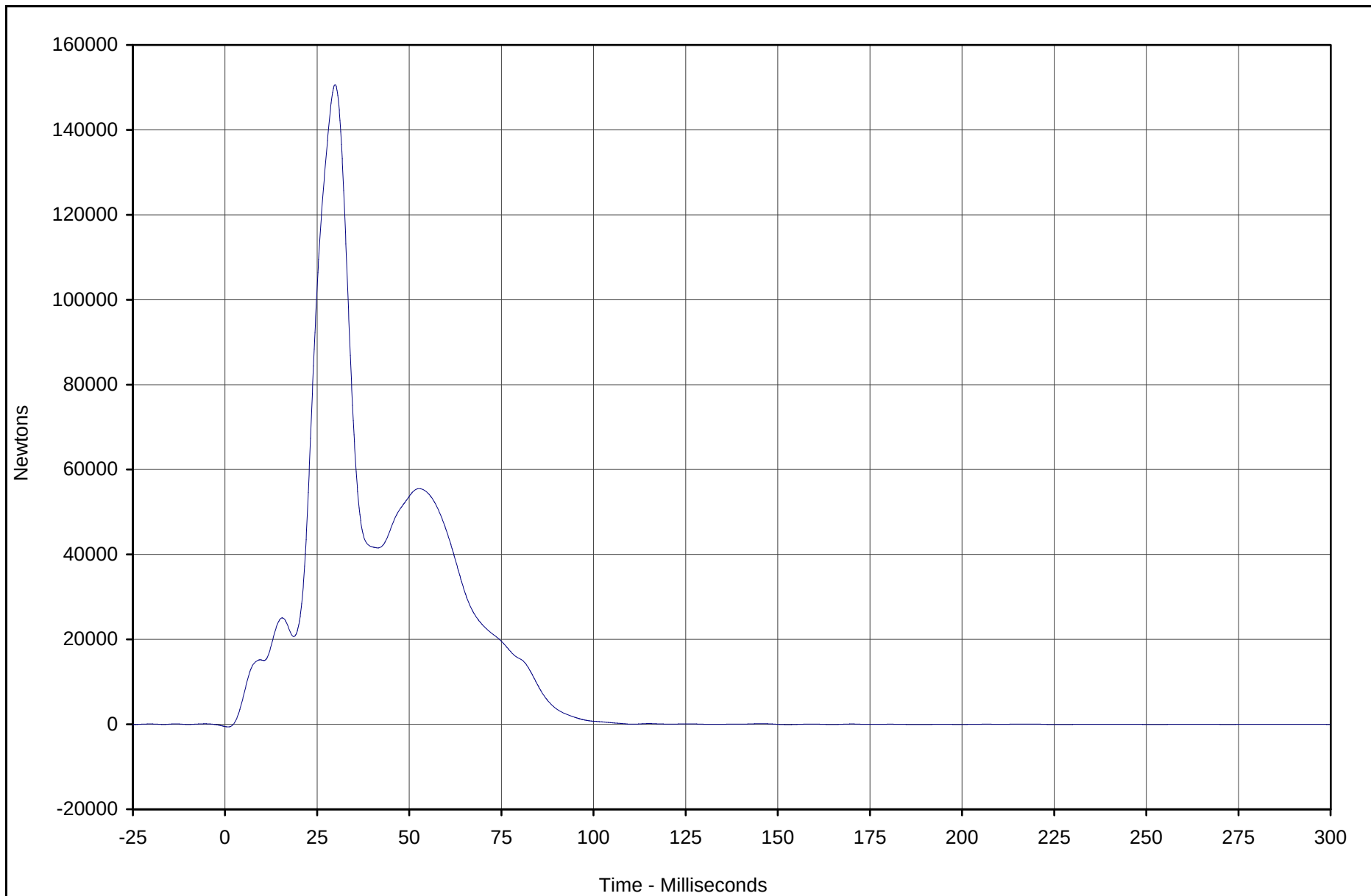
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-16



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force B7	113	FIL	Newtons	150635.7	29.9	-603.9	0.8	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

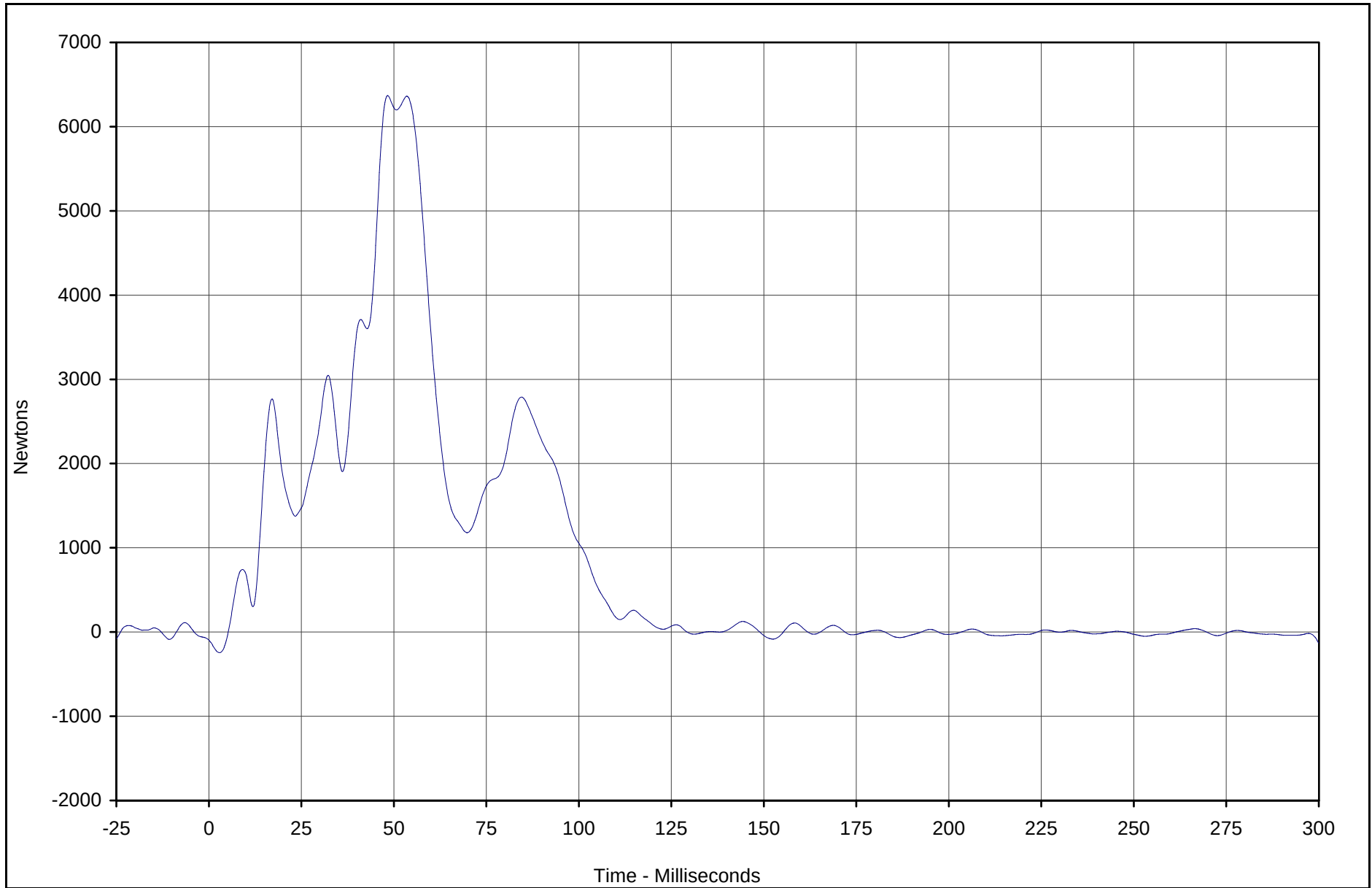
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-17



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force B8	114	FIL	Newtons	6368.5	48.3	-245.4	2.9	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

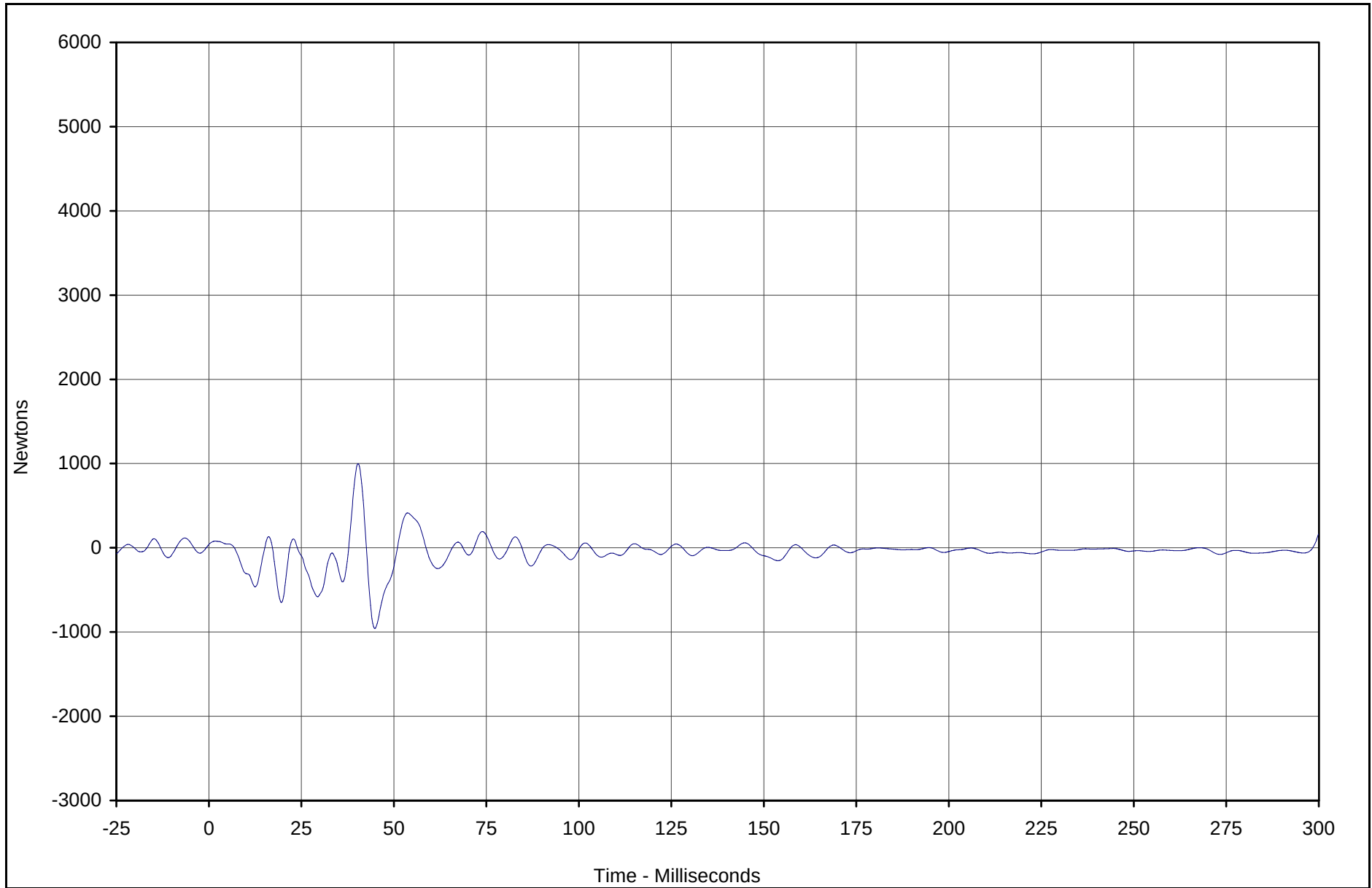
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-18



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force B9	115	FIL	Newtons	997.9	40.3	-958.1	44.9	60

Test Vehicle: 2002 Toyota Highlander 4WD SUV

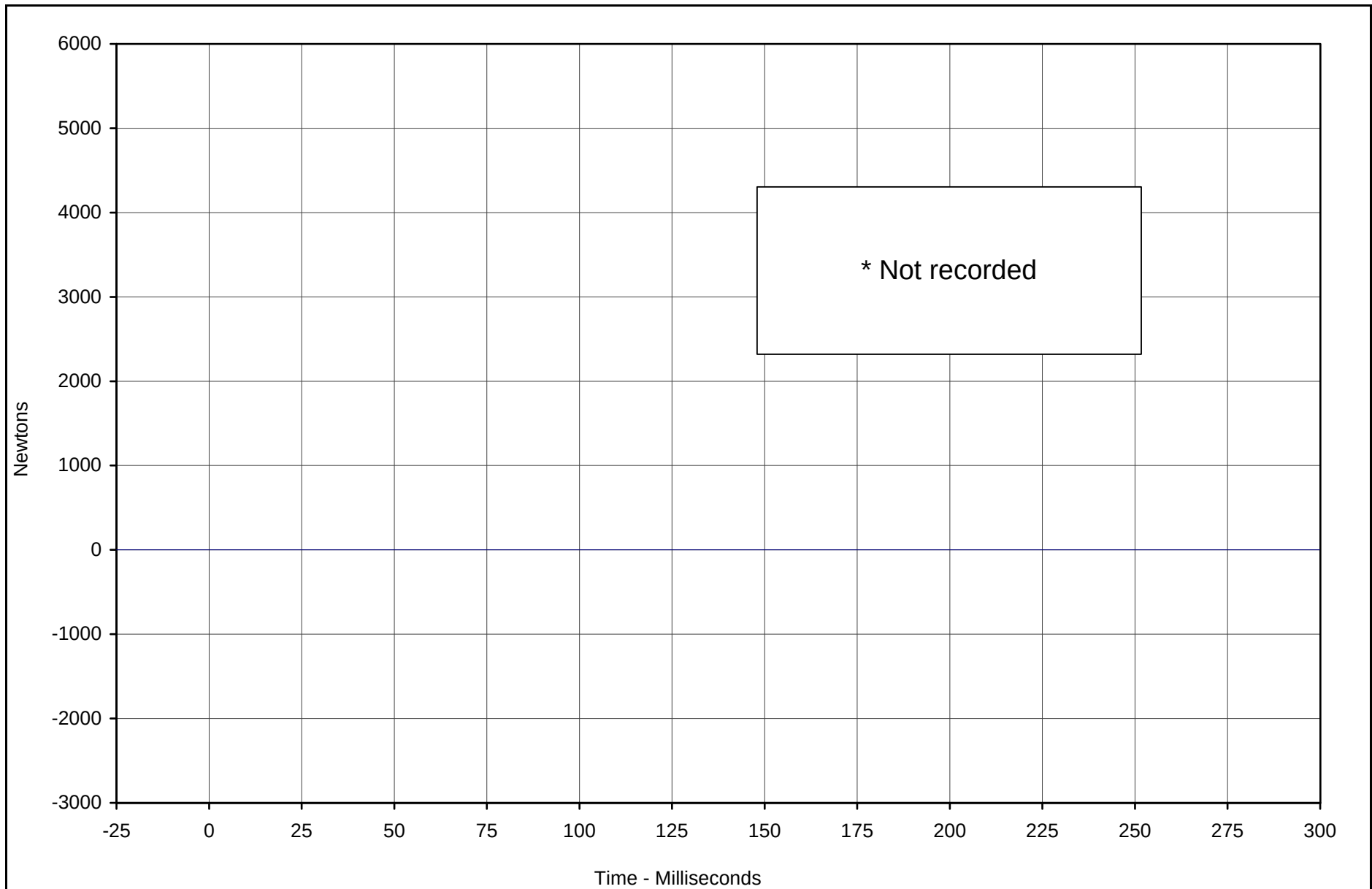
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



KAR22001-13



* Not recorded

Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force C1	116	FIL	Newtons	0.0	0.0	0.0	0.0	60



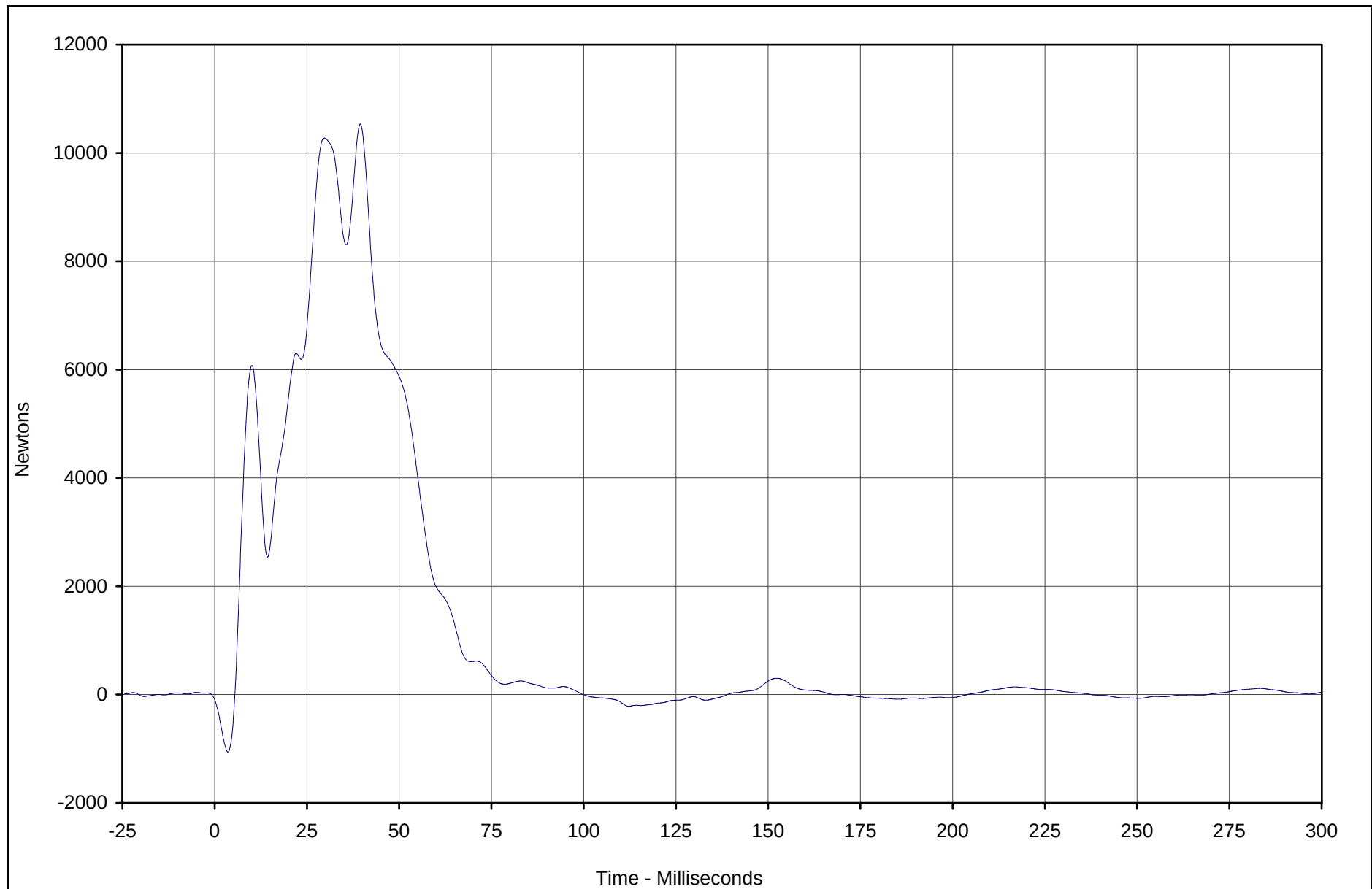
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

C-20



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force C2	117	FIL	Newtons	10534.6	39.4	-1058.1	3.6	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

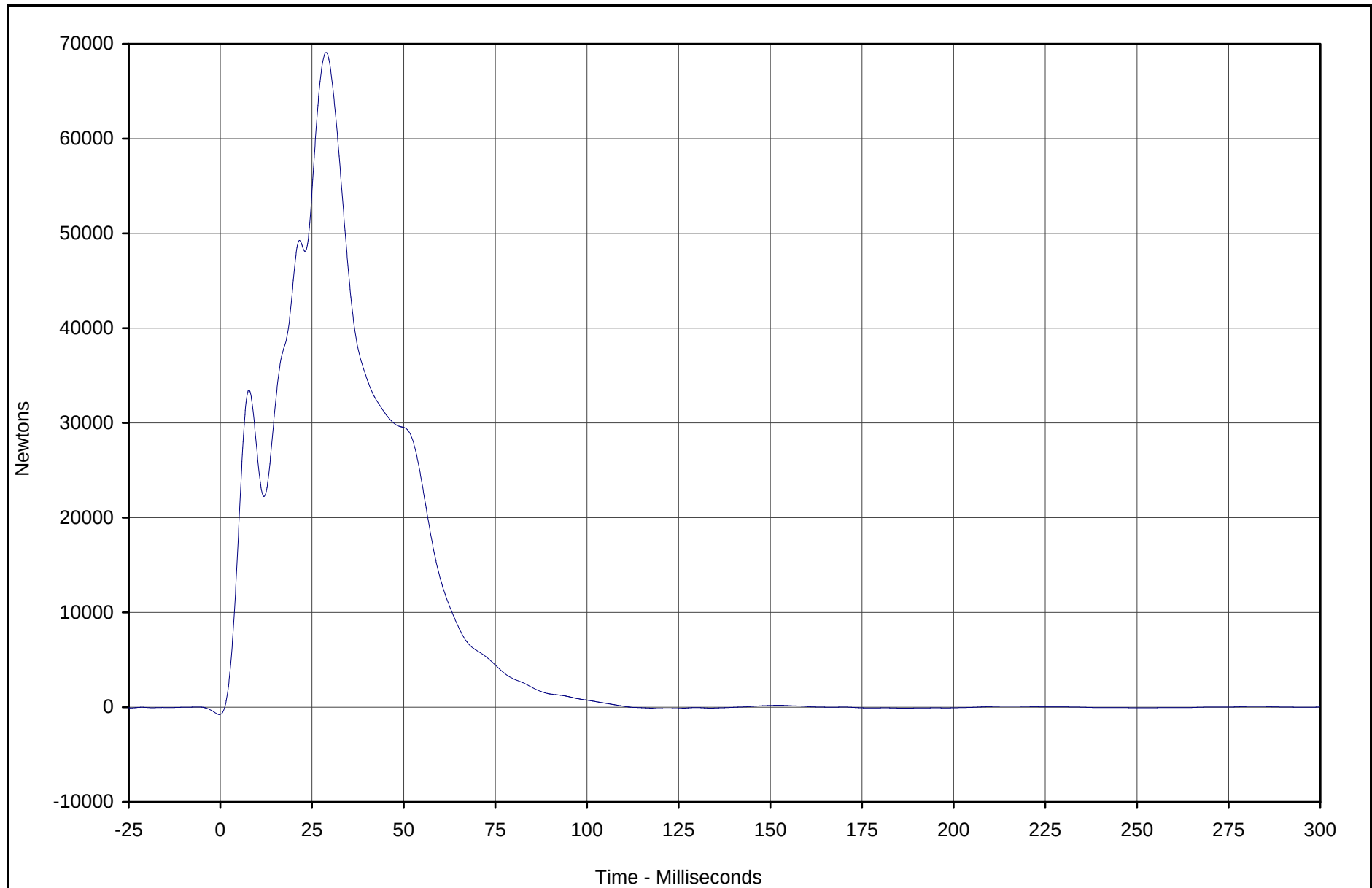
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-21



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force C3	118	FIL	Newtons	69103.2	28.8	-763.2	0.0	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

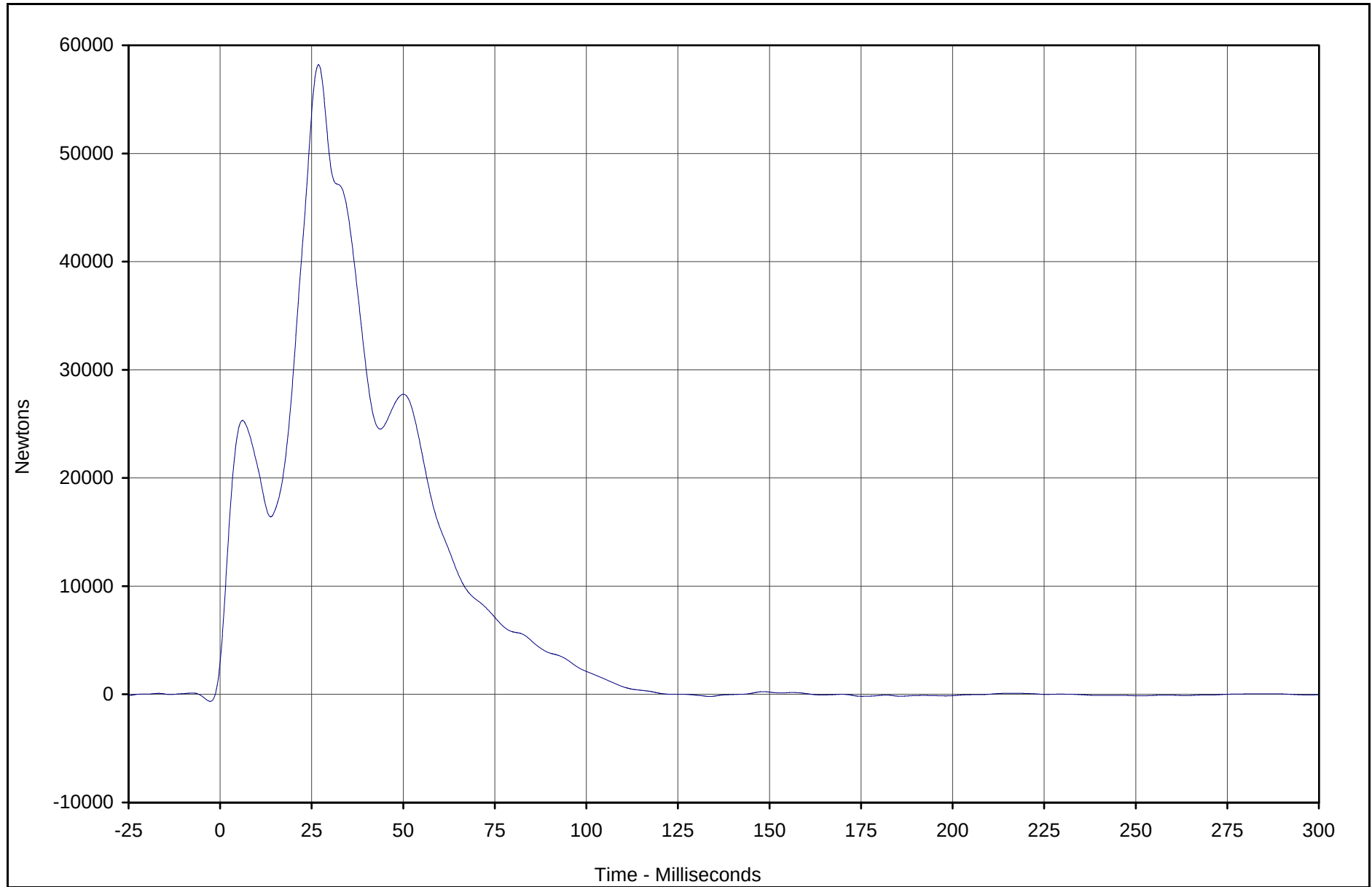
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-22



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force C4	119	FIL	Newtons	58199.1	26.9	-198.4	133.7	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

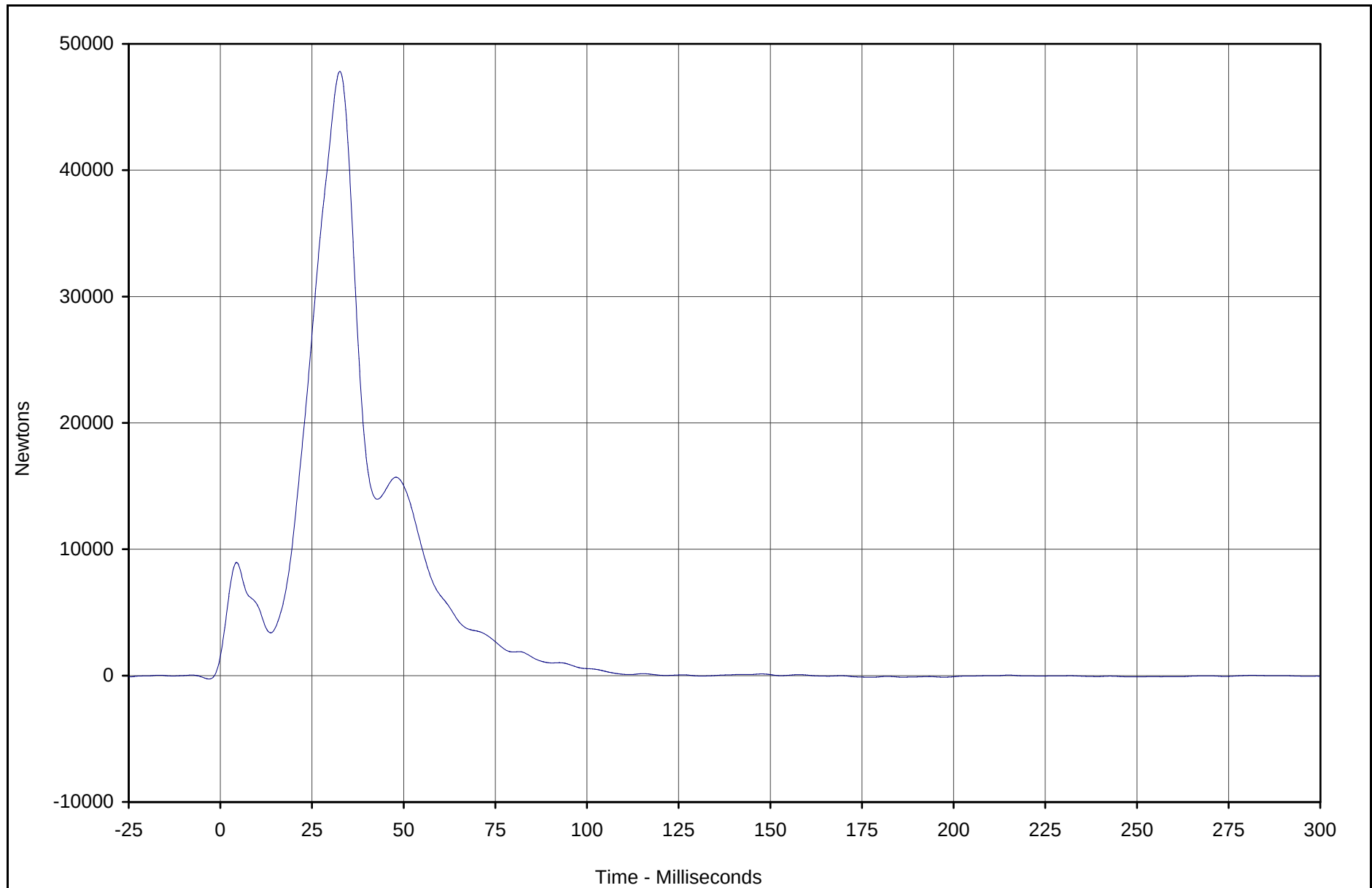
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-23



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force C5	120	FIL	Newtons	47830.2	32.6	-131.2	177.3	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

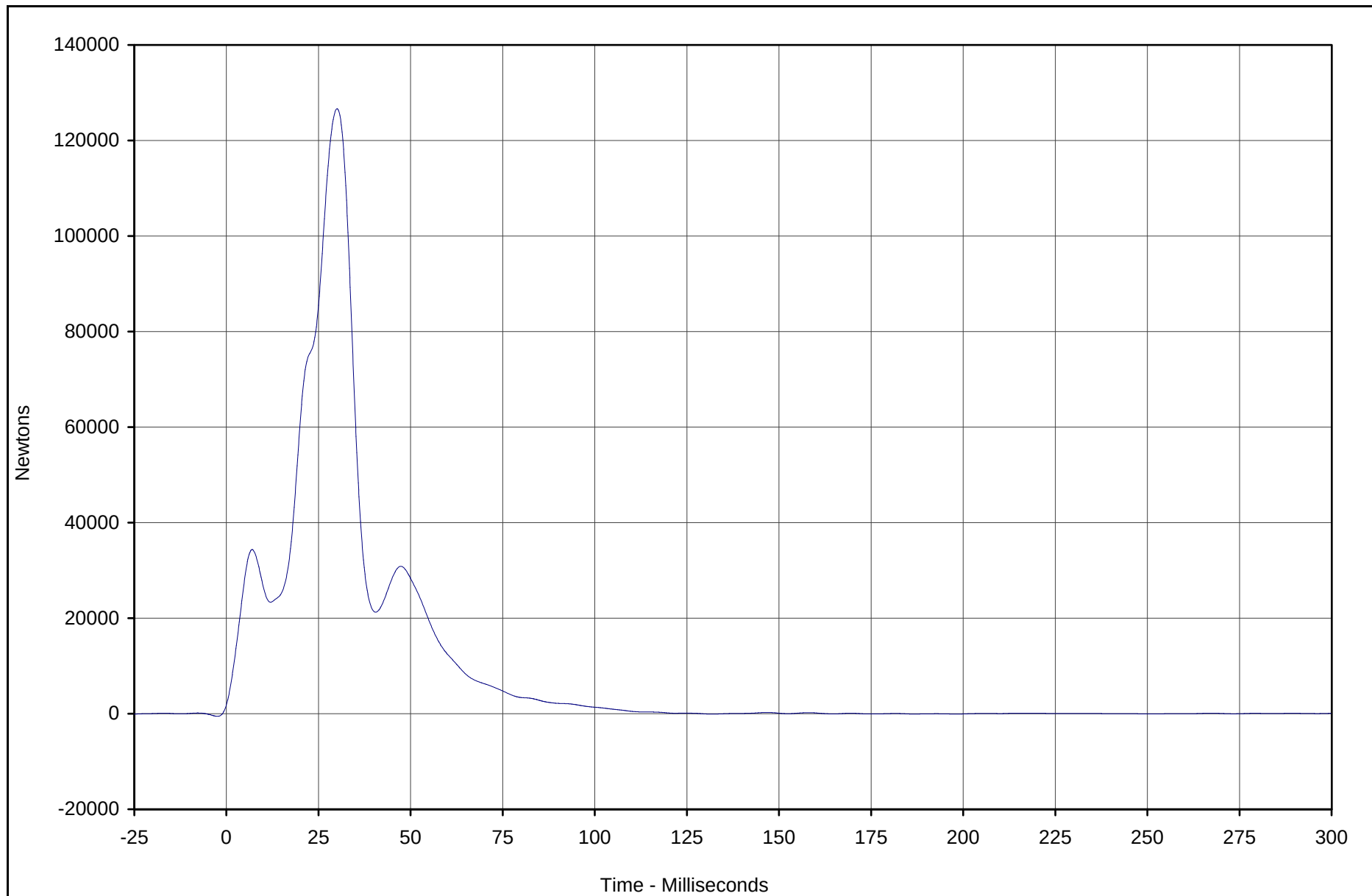
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-24



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force C6	121	FIL	Newtons	126641.9	30.0	-81.2	198.1	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

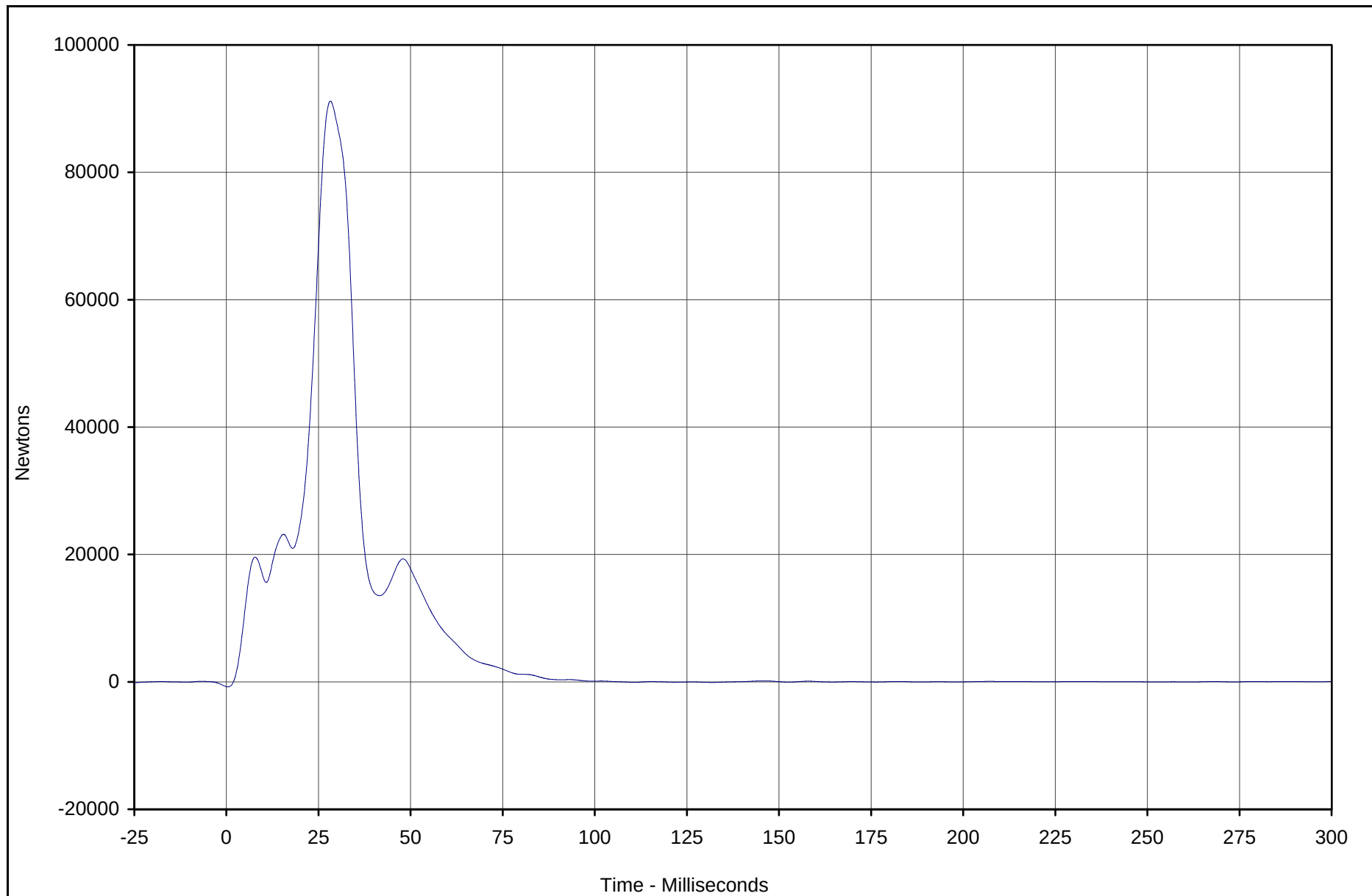
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-25



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force C7	122	FIL	Newtons	91182.6	28.2	-793.0	0.4	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

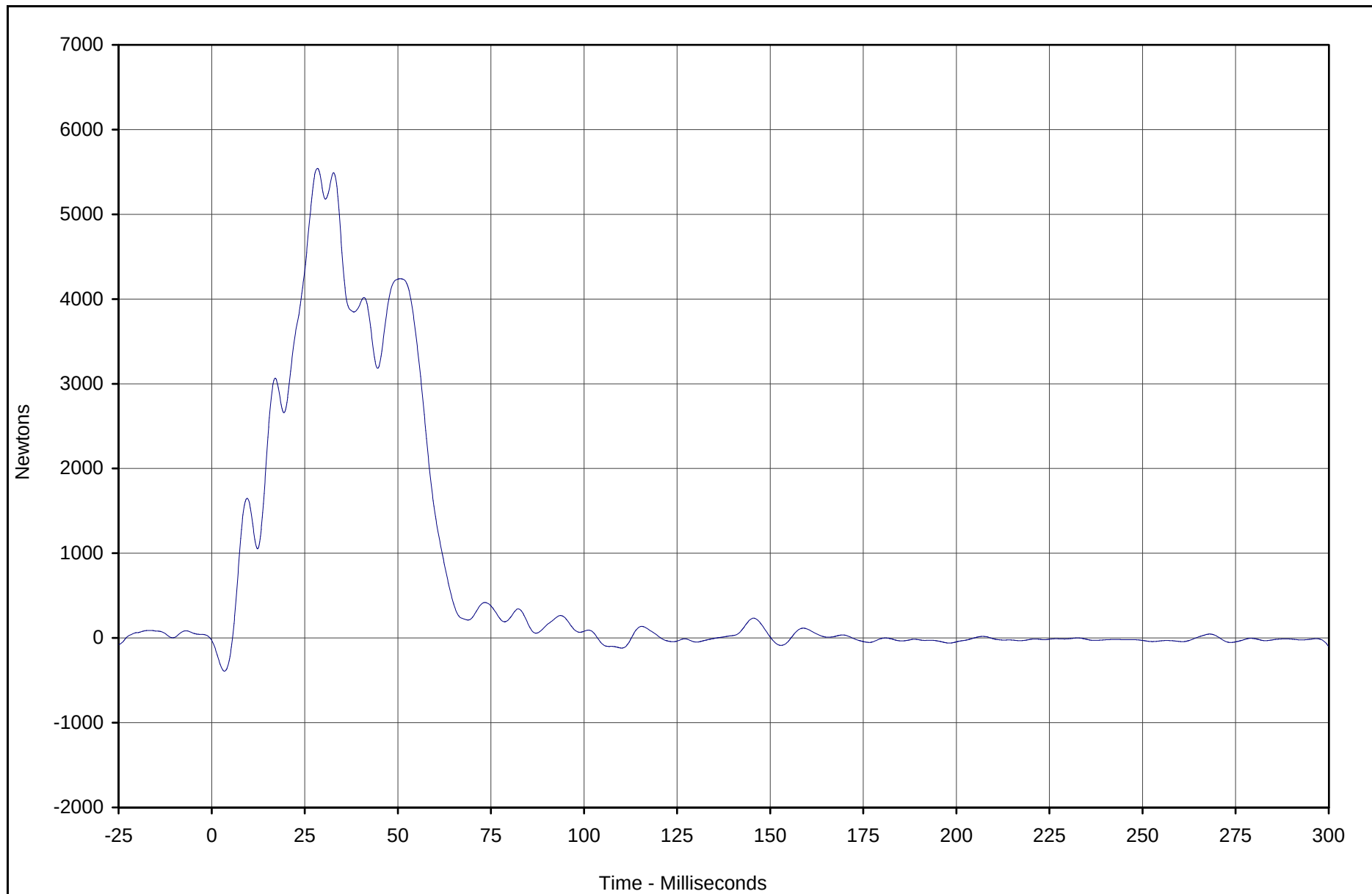
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-26



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force C8	123	FIL	Newtons	5541.9	28.4	-391.7	3.4	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

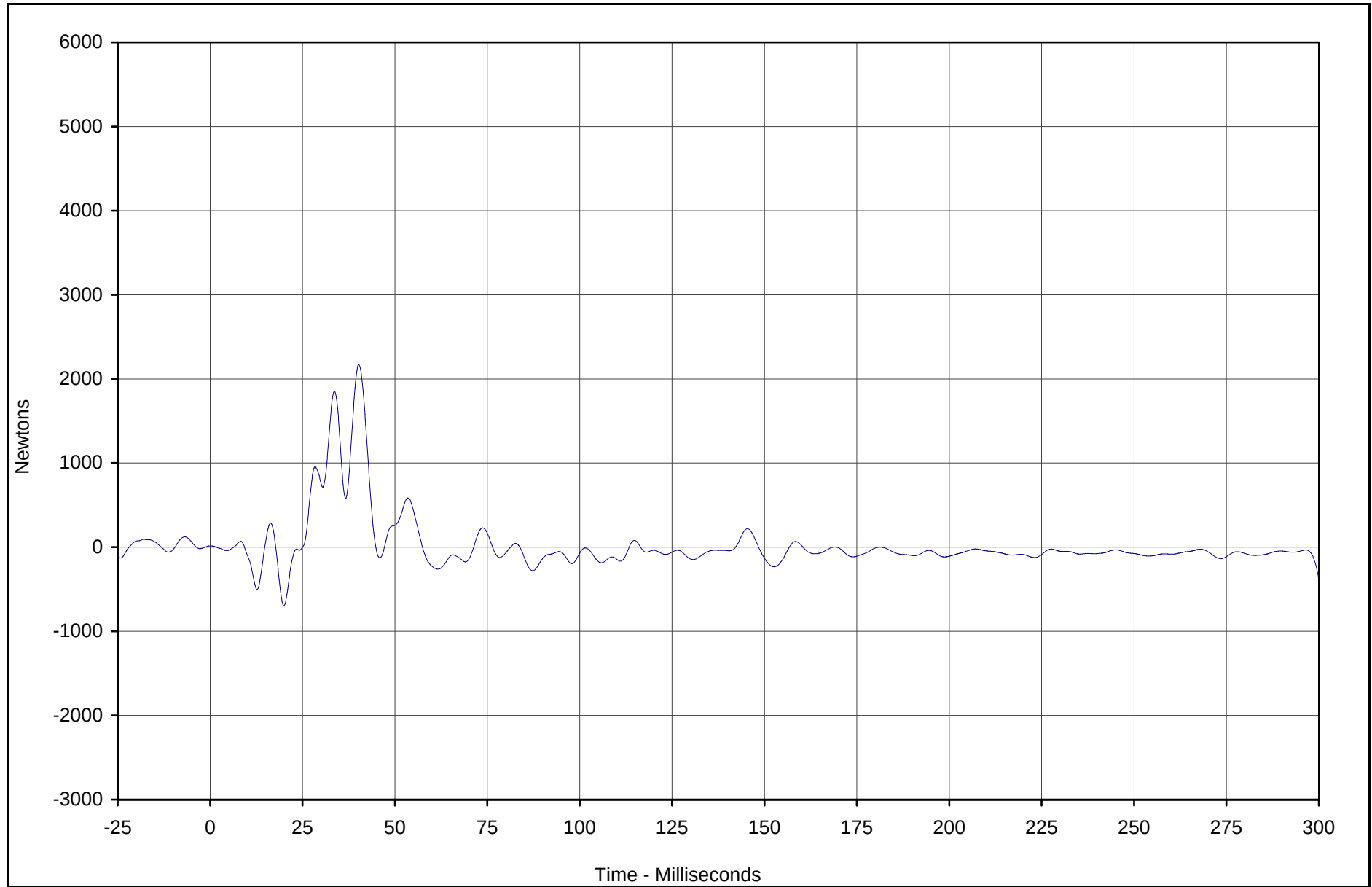
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-27



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force C9	124	FIL	Newtons	2169.0	40.2	-694.7	20.0	60



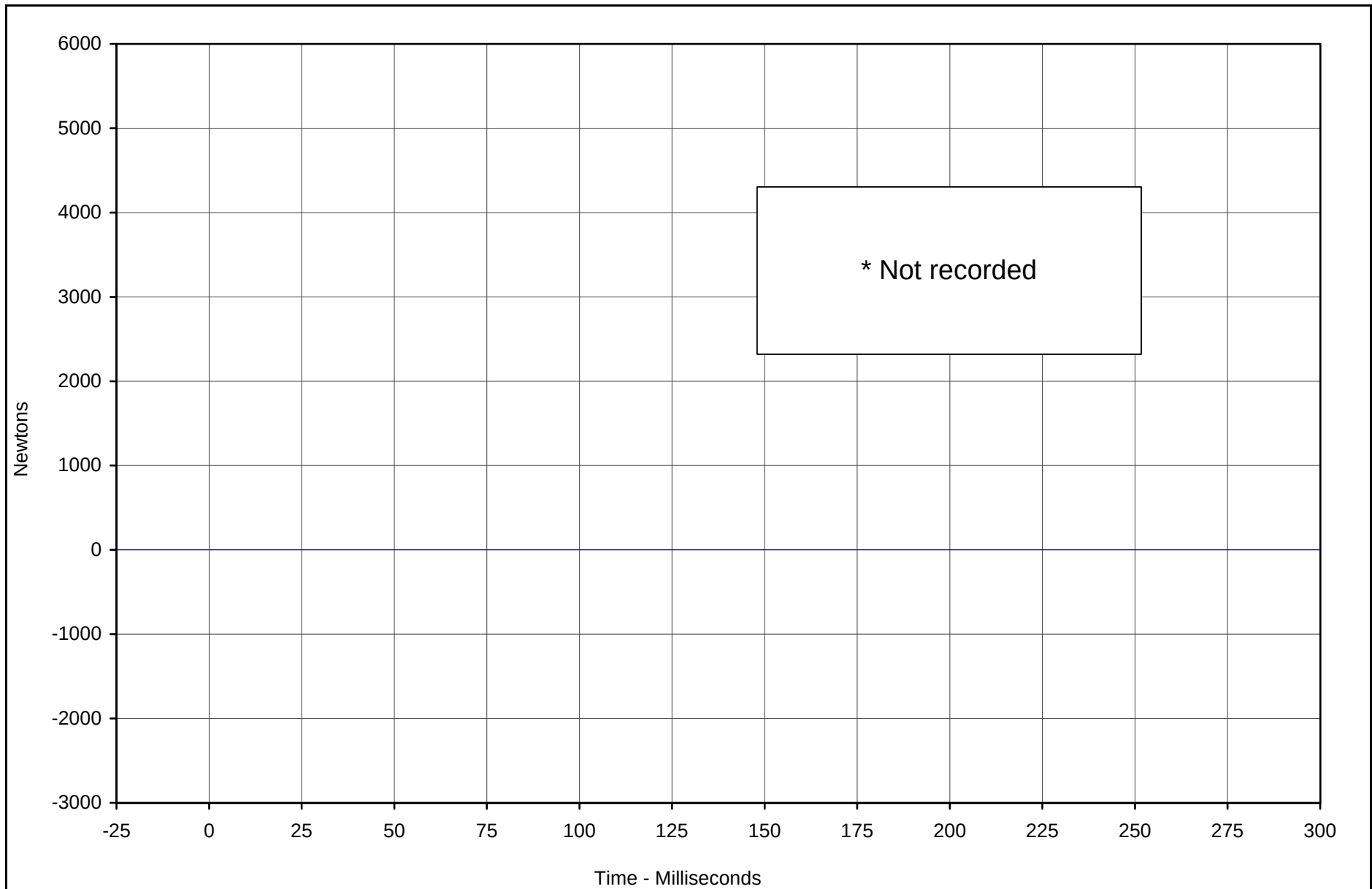
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



* Not recorded

Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force D1	125	FIL	Newtons	0.0	0.0	0.0	0.0	60



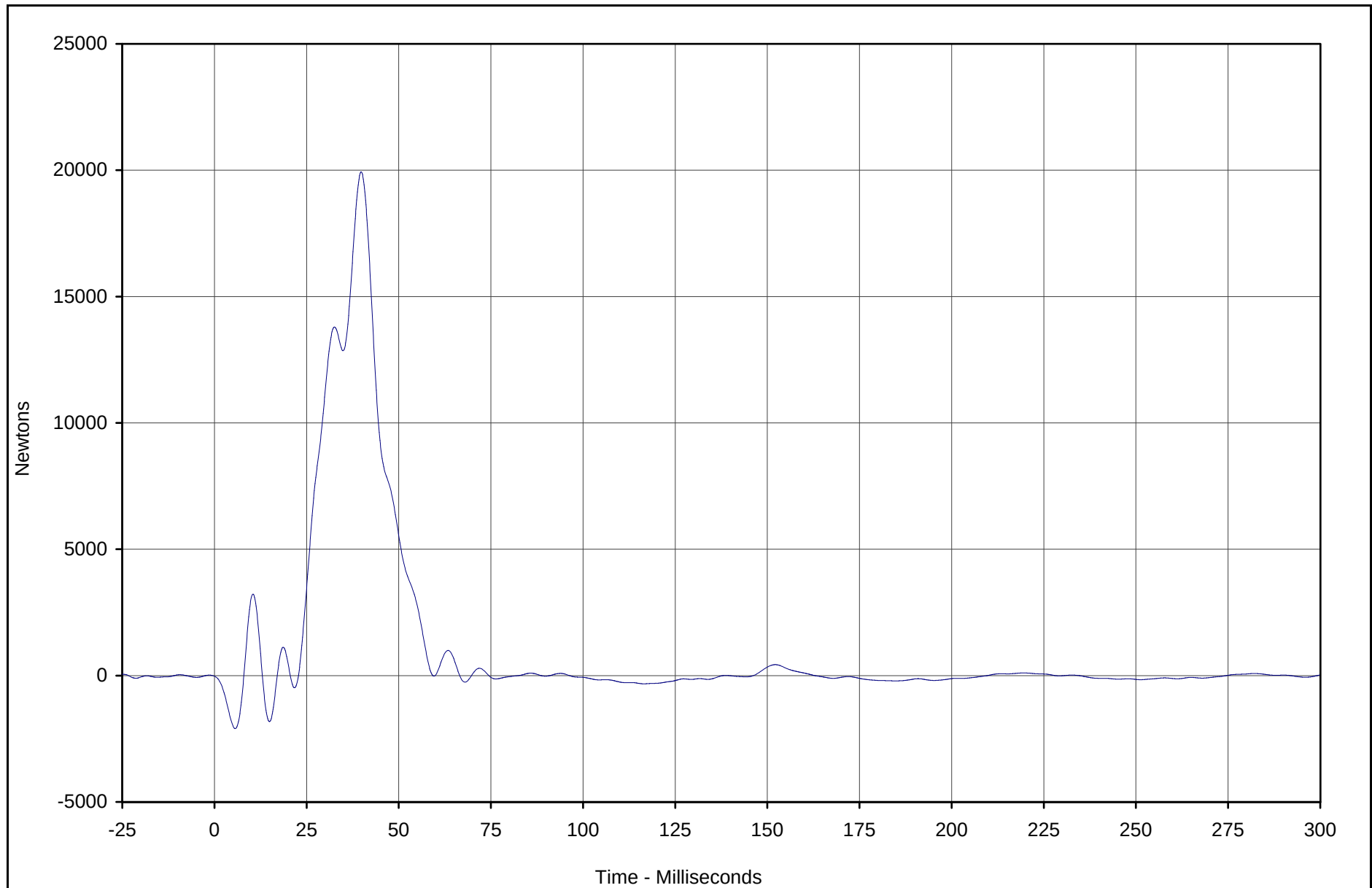
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

C-29



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force D2	126	FIL	Newtons	19935.2	39.8	-2100.5	5.6	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

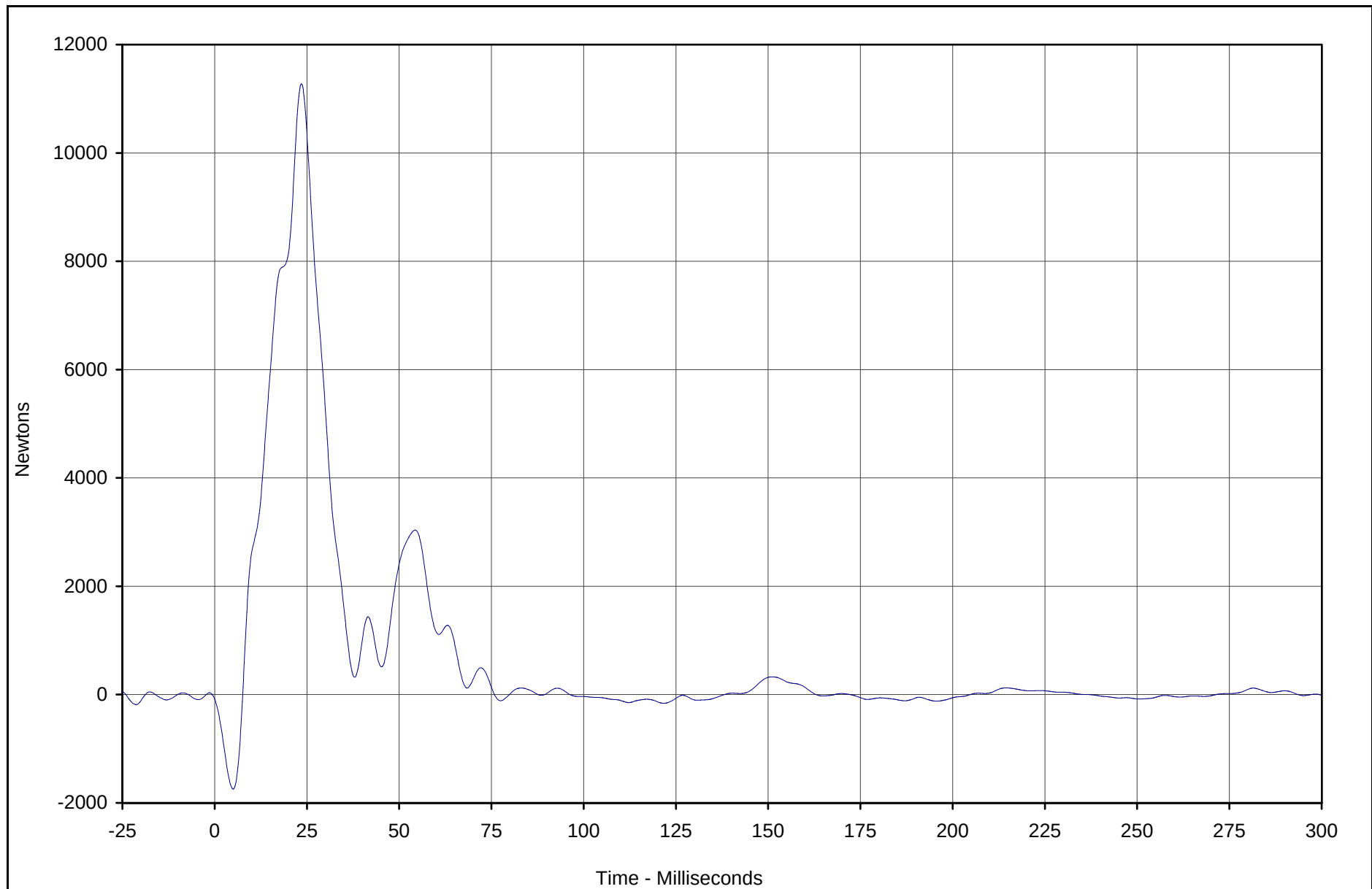
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-30



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force D3	127	FIL	Newtons	11275.5	23.5	-1744.9	5.0	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

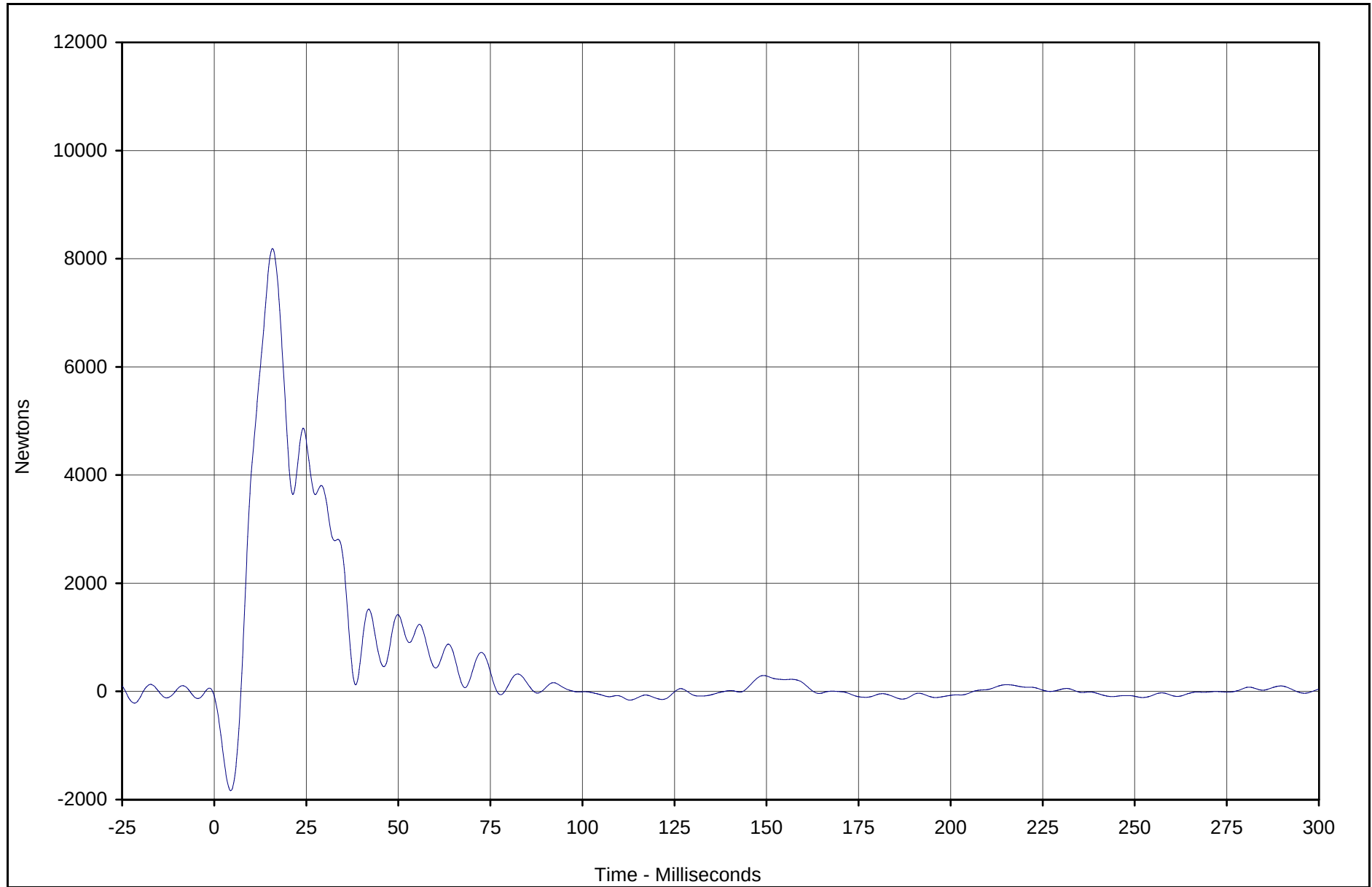
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-31



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force D4	128	FIL	Newtons	8186.0	15.8	-1834.8	4.5	60



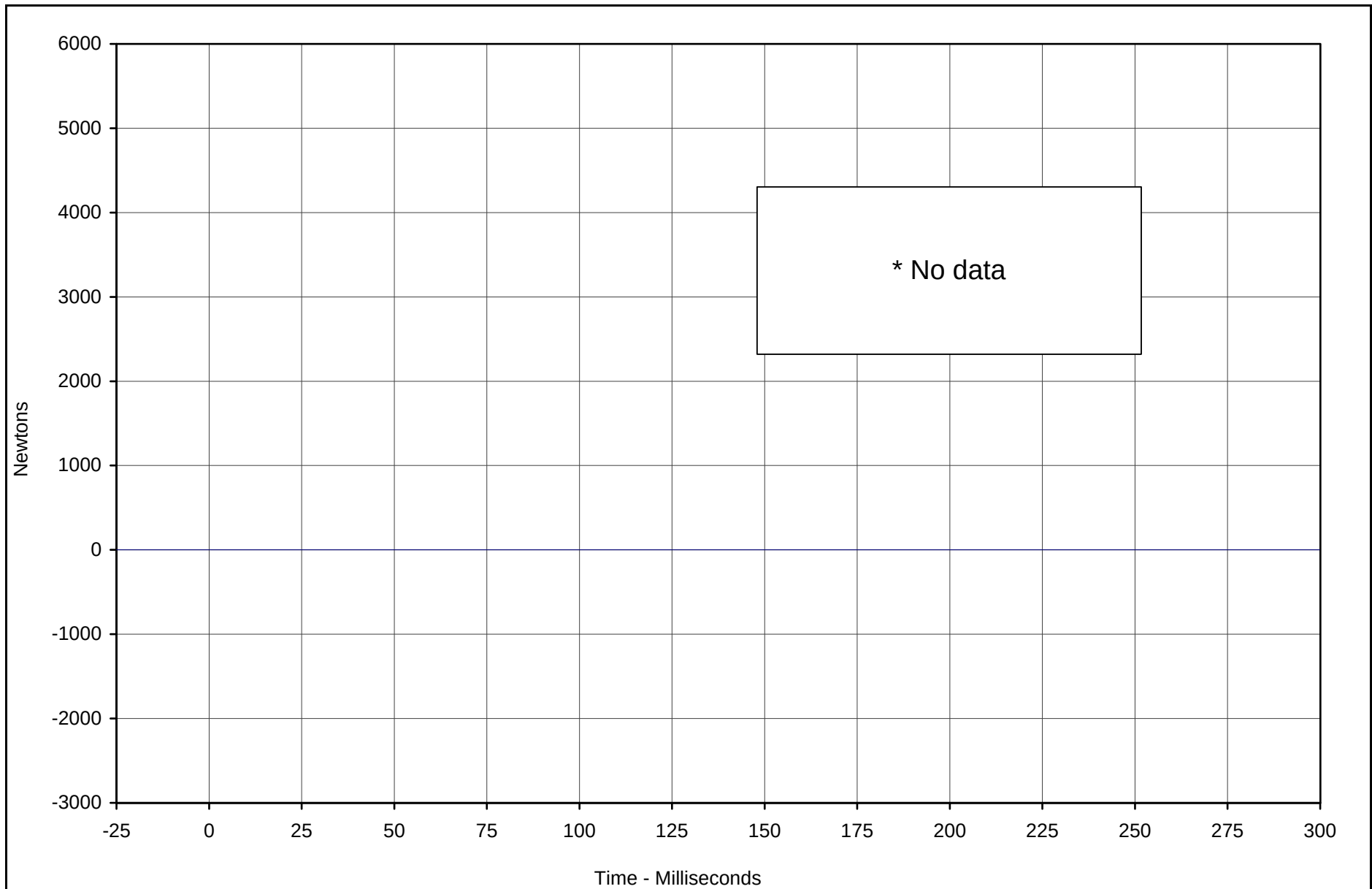
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



* No data

Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force D5	129	FIL	Newtons	0.0	0.0	0.0	0.0	60



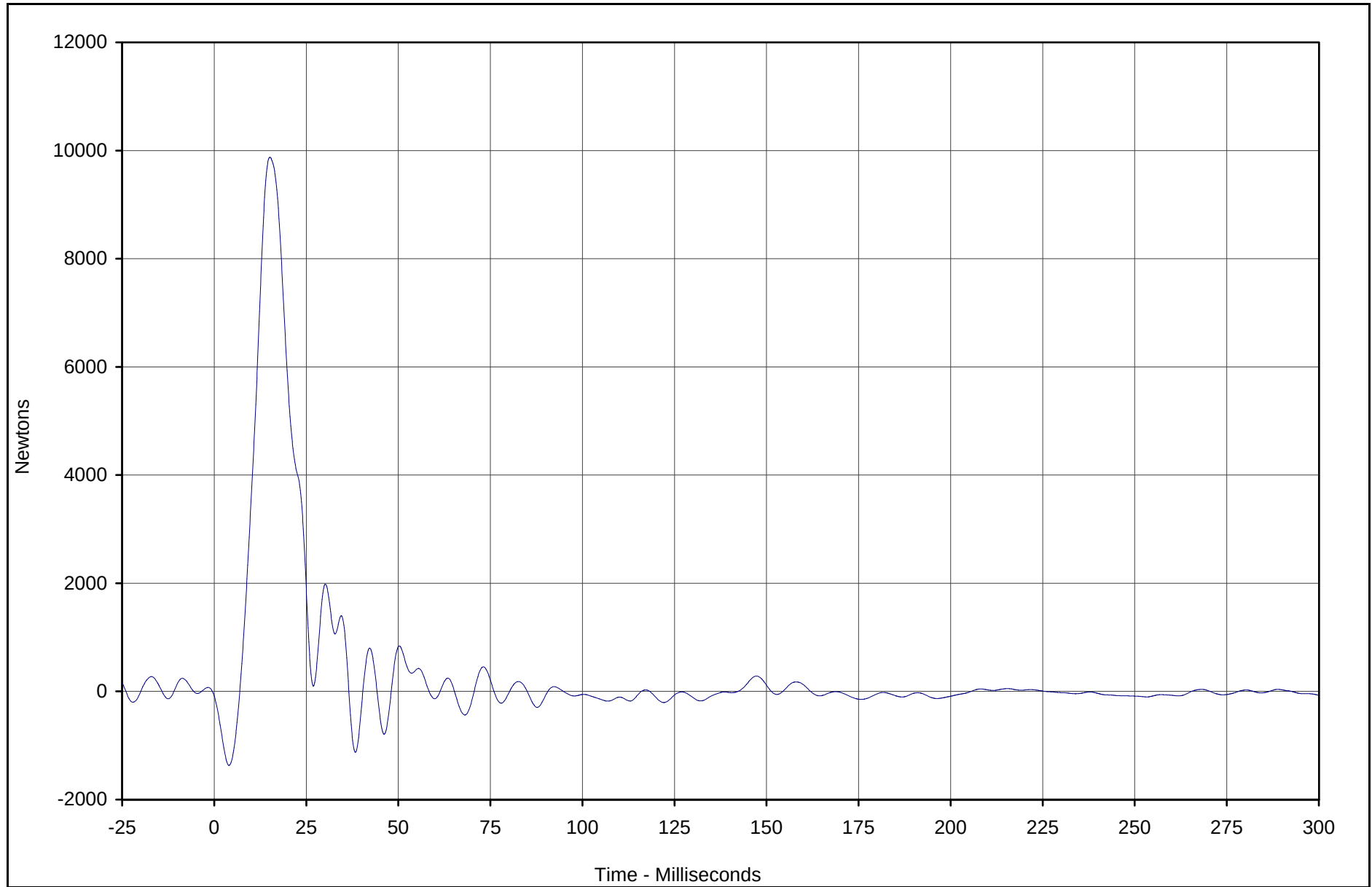
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

C-33



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force D6	130	FIL	Newtons	9875.4	15.1	-1368.8	4.0	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

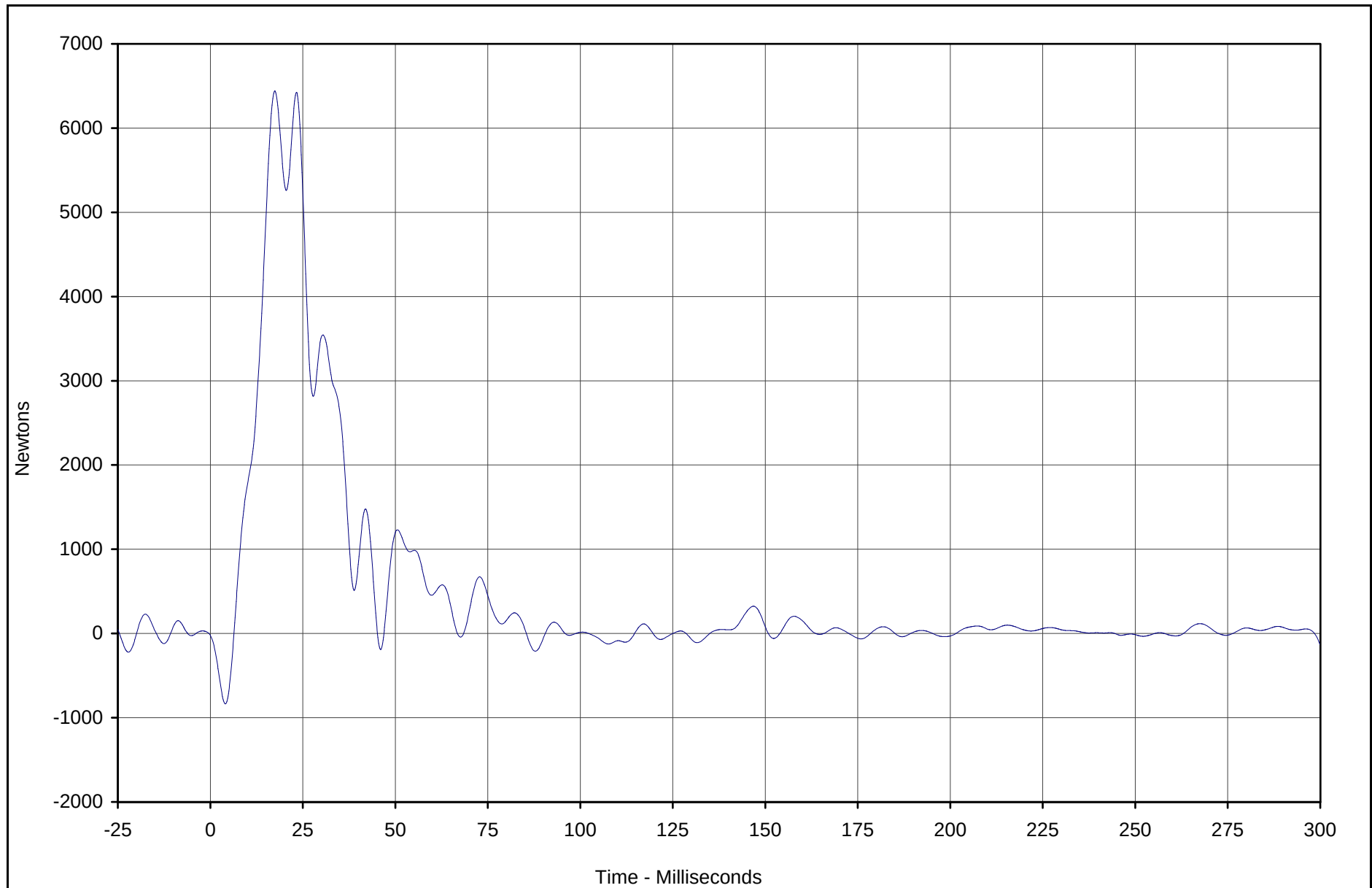
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-34



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force D7	131	FIL	Newtons	6442.4	17.4	-836.8	4.1	60



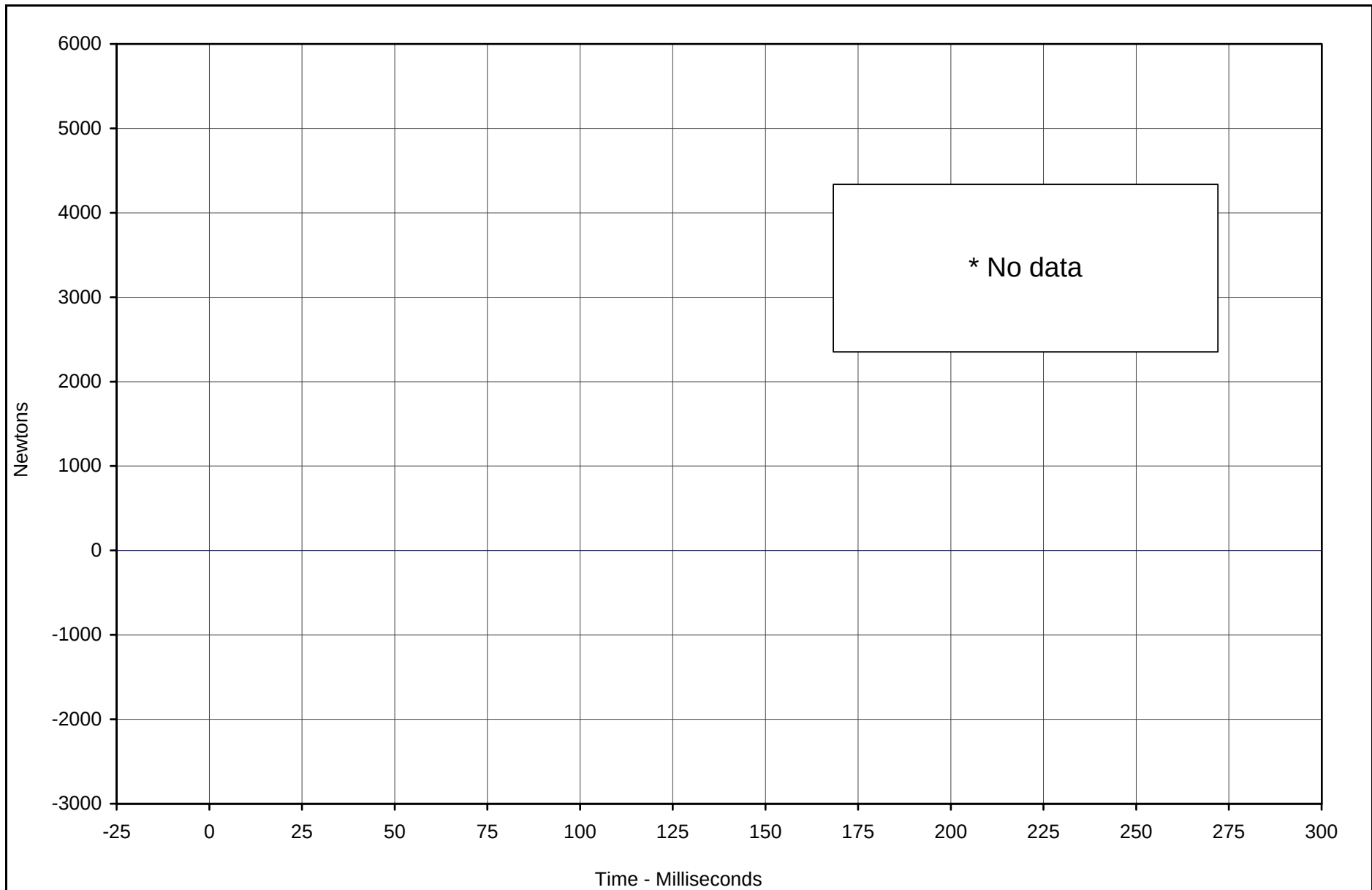
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13



* No data

Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force D8	132	FIL	Newtons	0.0	0.0	0.0	0.0	60

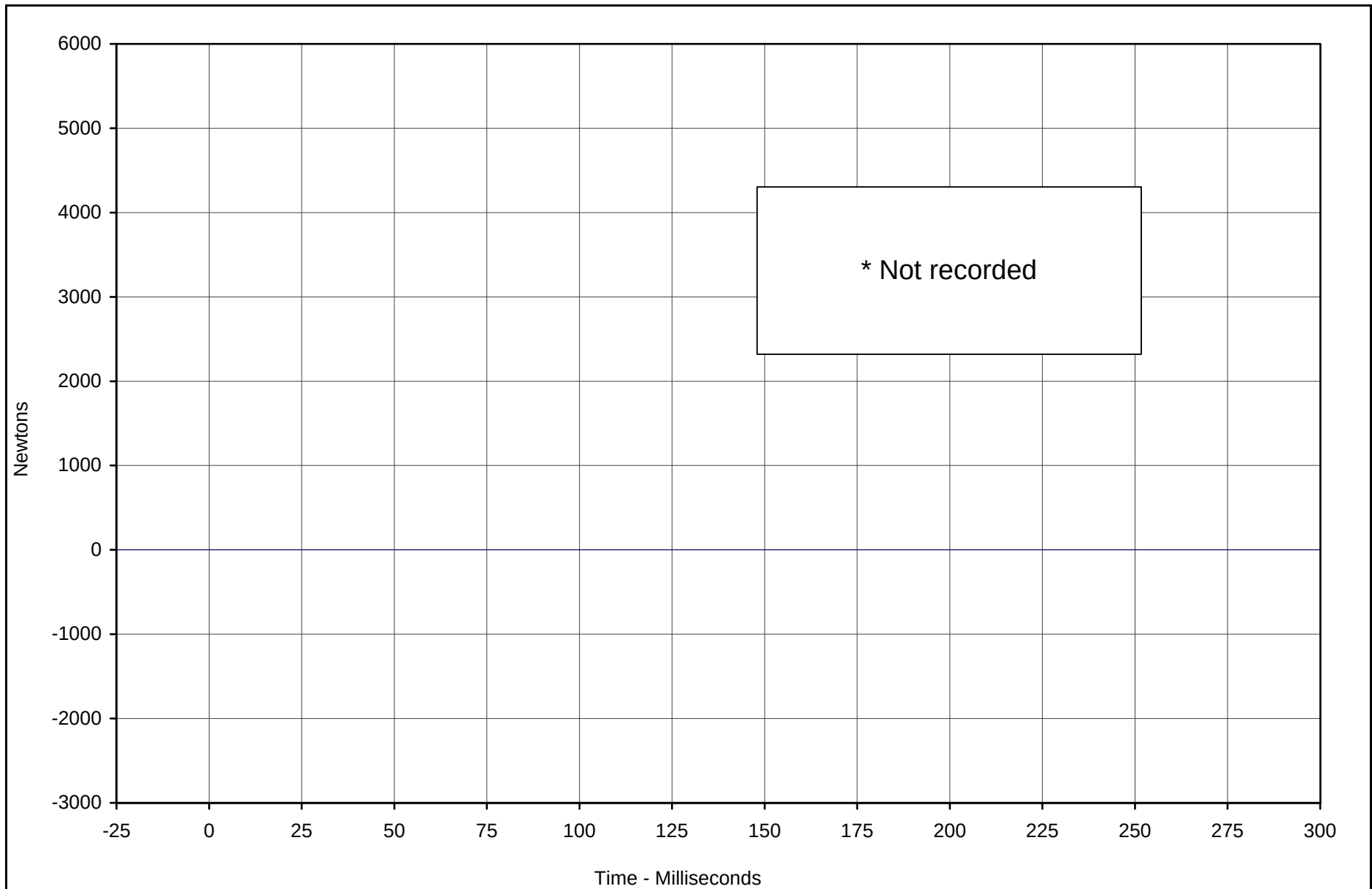


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



* Not recorded

Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force D9	133	FIL	Newtons	0.0	0.0	0.0	0.0	60



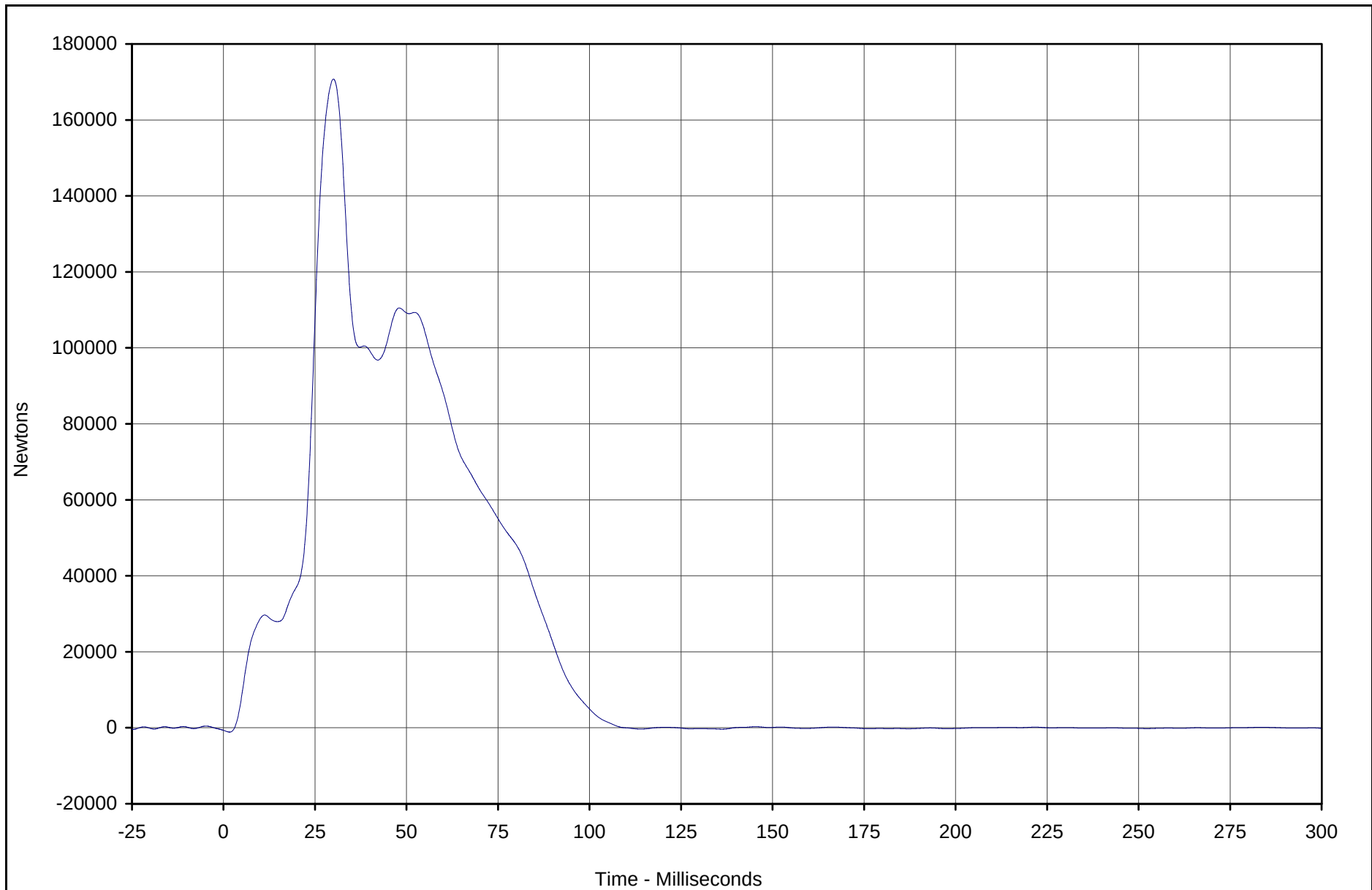
Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

C-37



Curve Description	CURN0	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force Sum Group 1	001	SUM	Newtons	170780.5	30.1	-1140.7	1.7	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

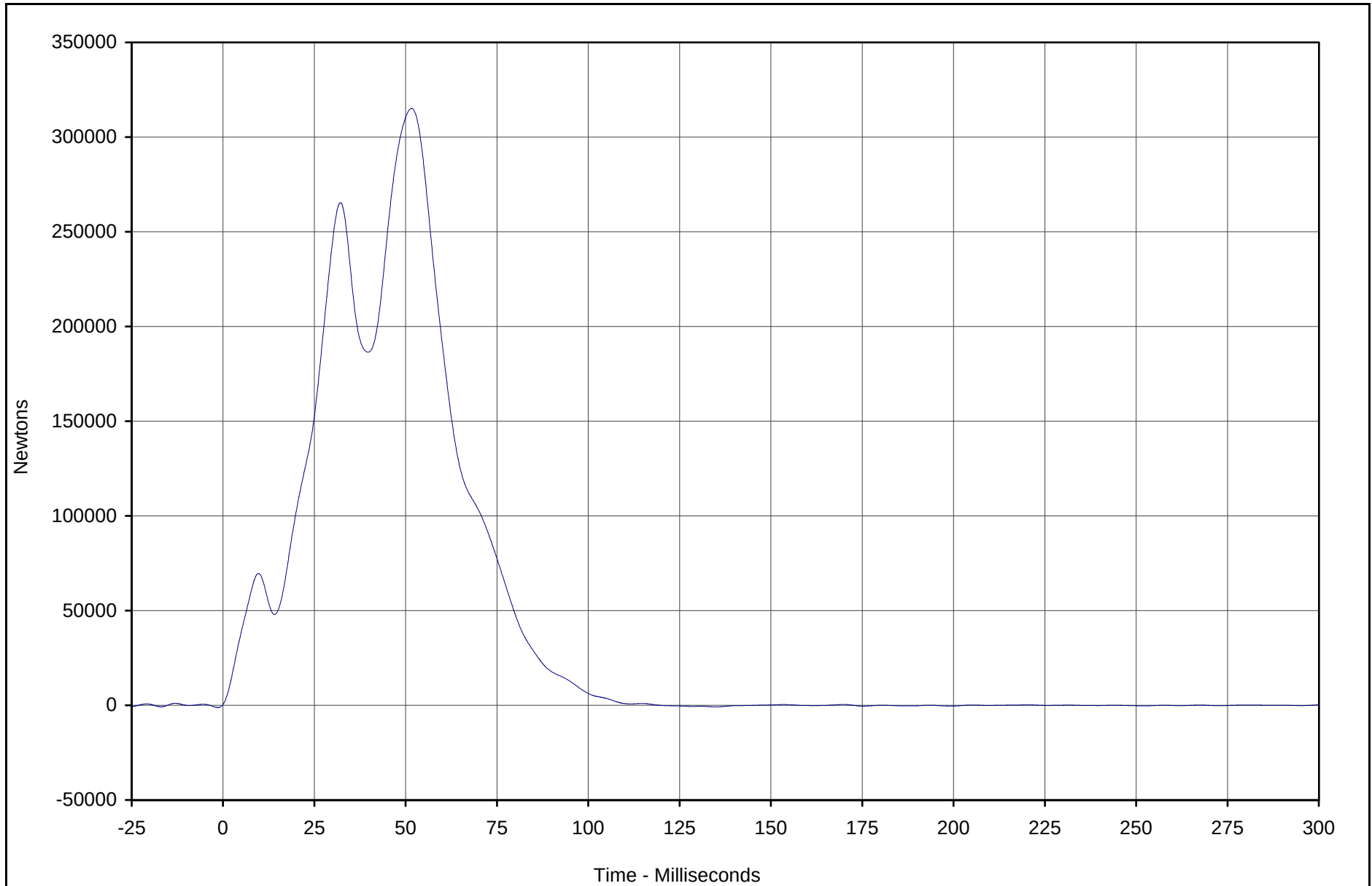
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-38



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force Sum Group 2	002	SUM	Newtons	315147.4	51.6	-849.8	135.0	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

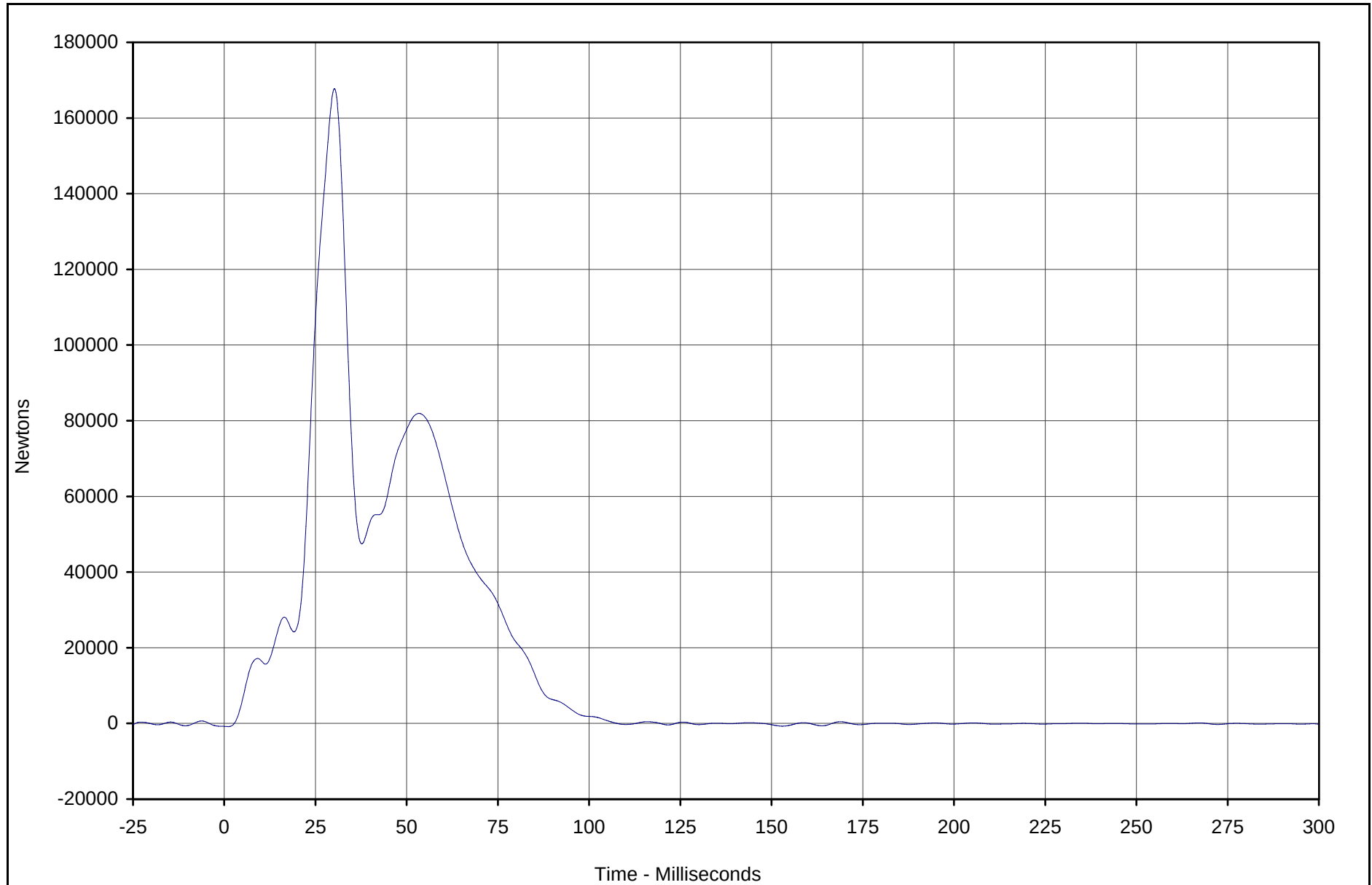
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-39



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force Sum Group 3	003	SUM	Newtons	167783.2	30.2	-832.4	1.1	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

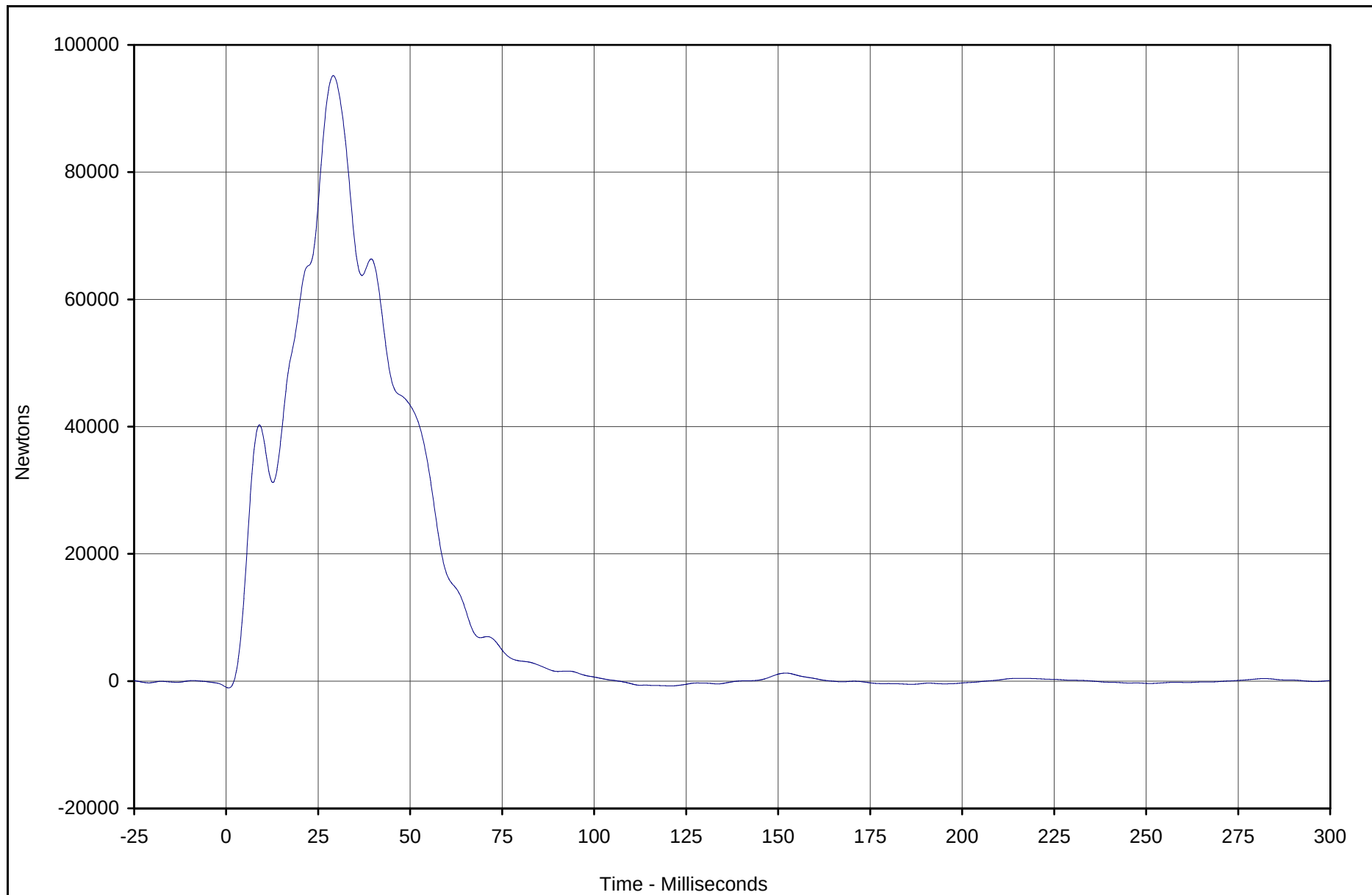
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-40



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force Sum Group 4	004	SUM	Newtons	95178.6	29.1	-1064.3	0.7	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

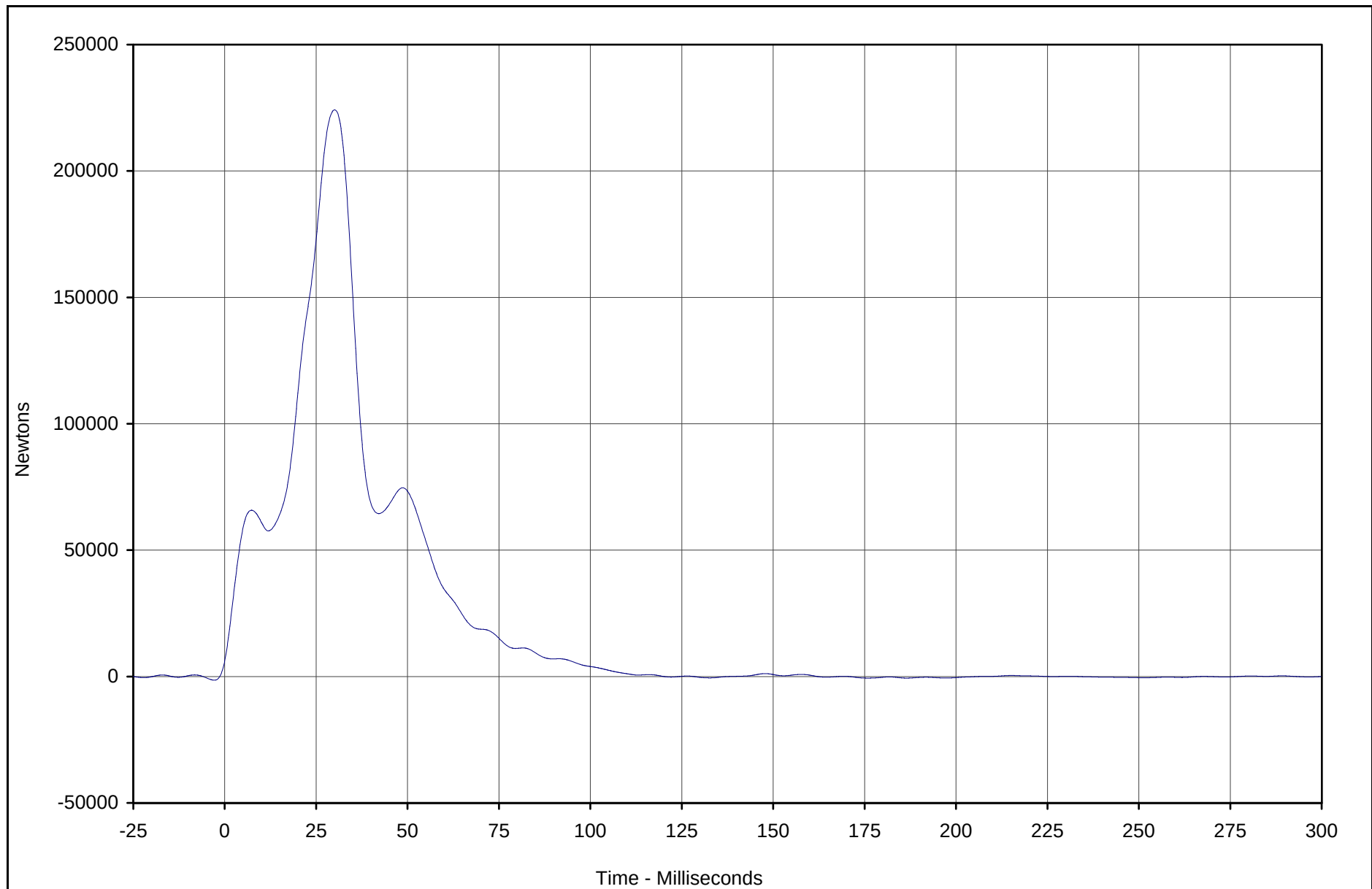
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-41



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force Sum Group 5	005	SUM	Newtons	224175.3	30.1	-619.9	186.5	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

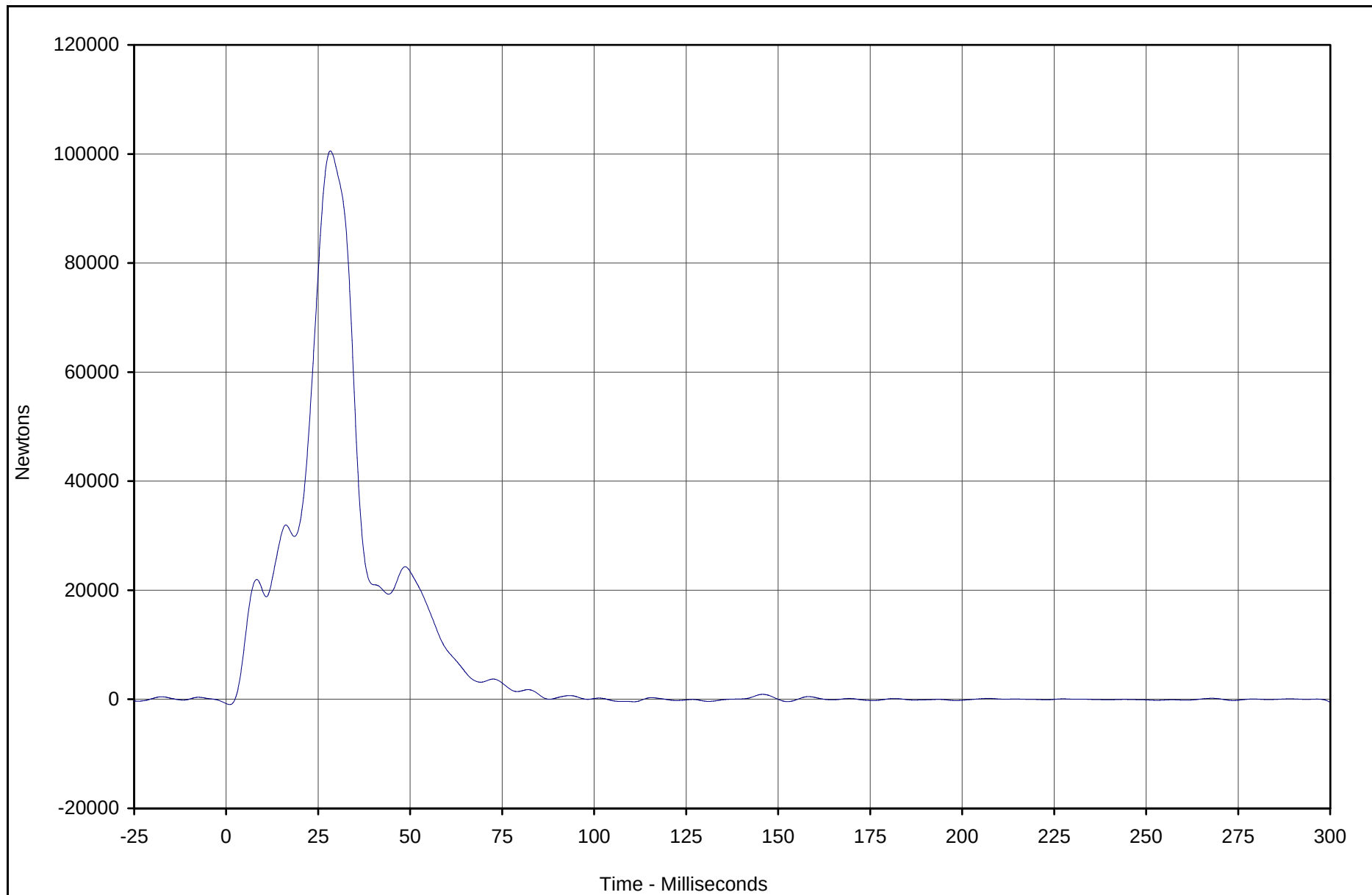
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-42



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force Sum Group 6	006	SUM	Newtons	100552.4	28.3	-968.1	1.0	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

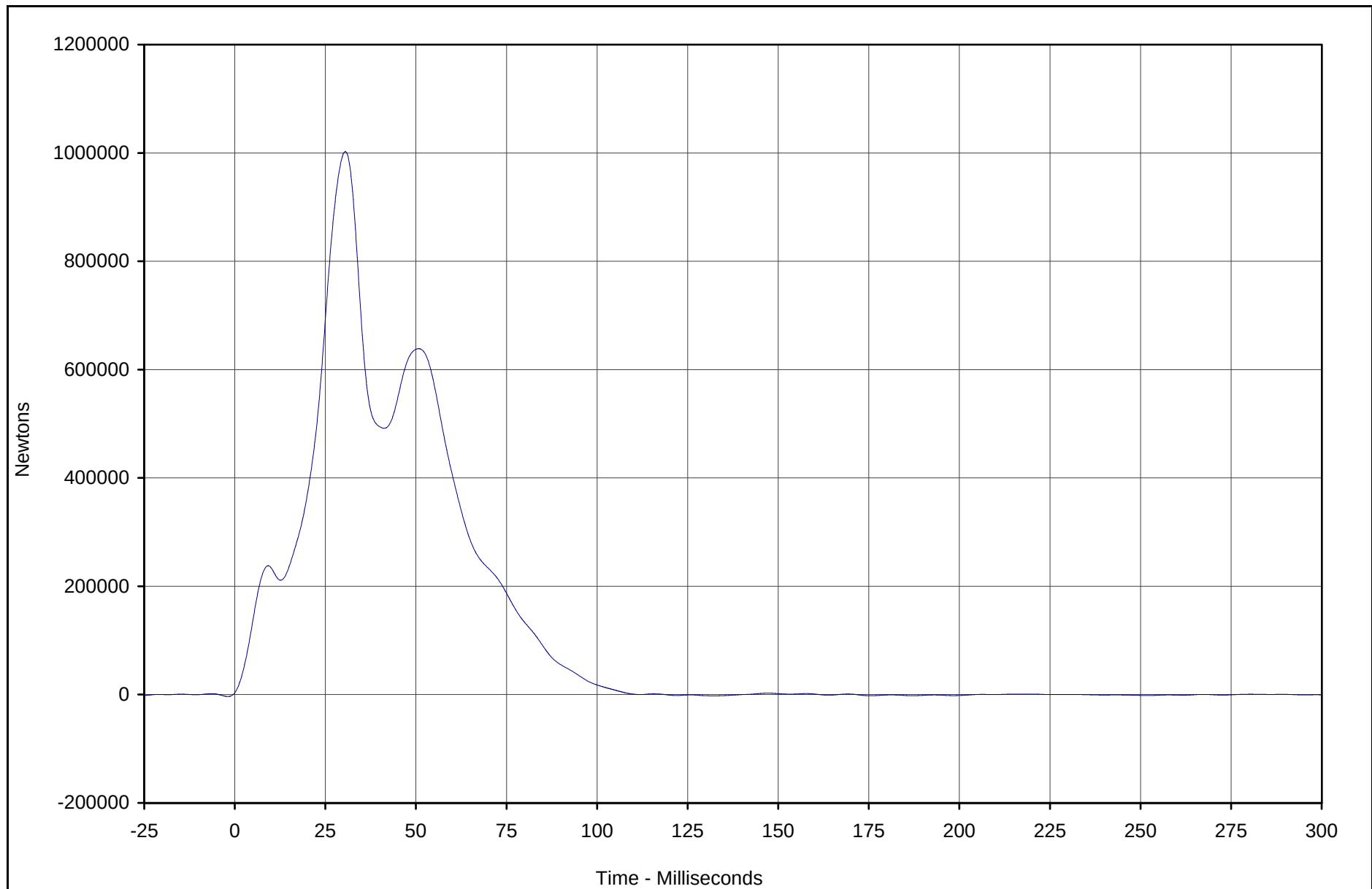
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-43



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Barrier Force Total Sum	007	SUM	Newtons	1002684	30.5	-2255.0	132.5	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

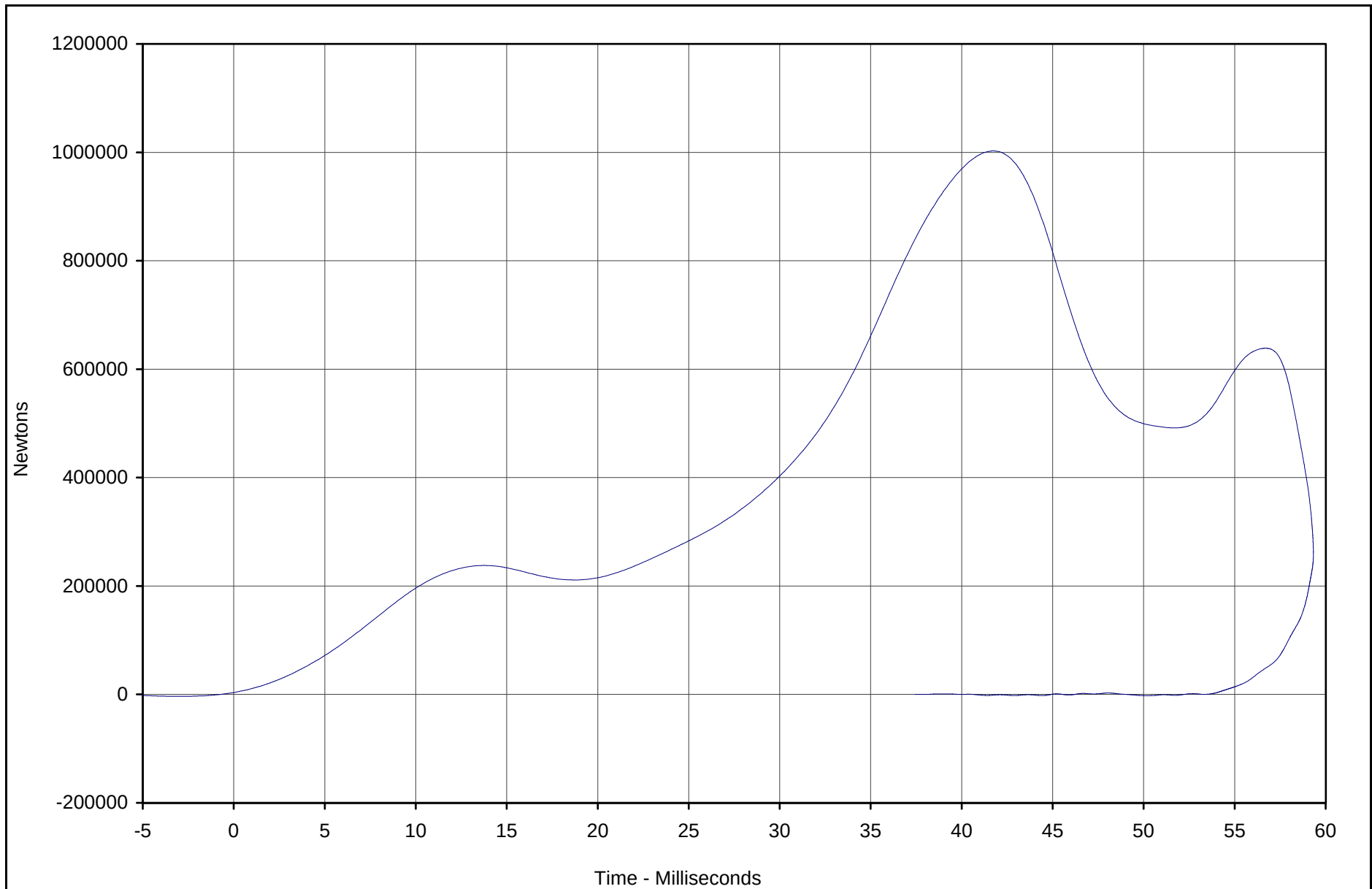
Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

C-44



Curve Description	CURNO	Type	Units	Max	CM	Energy (Joules)	SAE Class
Barrier Force Total Sum vs. Displ.	001	XVY	Newtons	1002684	41.7	251983	60



Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107

KAR22001-13

BARRIER LOAD CELL SUMMARY DATA

Test Vehicle: 2002 Toyota Highlander 4WD SUV

NHTSA No.: M25107

Test Program: 2002 NHTSA 35mph NCAP

Test Date: 5/29/02

Location	Units	Max	Time	Min	Time
Barrier Force A1	Newtons	0.0	0.0	0.0	0.0
Barrier Force A2	Newtons	1322.5	31.3	-2023.0	16.2
Barrier Force A3	Newtons	21594.9	48.0	-1707.8	14.9
Barrier Force A4	Newtons	10677.0	54.2	-2210.6	14.2
Barrier Force A5	Newtons	3809.4	32.6	-2290.3	13.9
Barrier Force A6	Newtons	17479.8	30.8	-2040.2	13.8
Barrier Force A7	Newtons	19328.5	54.4	-1357.9	13.7
Barrier Force A8	Newtons	1138.3	32.0	-918.0	13.9
Barrier Force A9	Newtons	2369.2	25.3	-1159.3	35.4
Barrier Force B1	Newtons	0.0	0.0	0.0	0.0
Barrier Force B2	Newtons	19854.4	46.6	-979.2	3.7
Barrier Force B3	Newtons	145584.0	28.6	-629.7	0.4
Barrier Force B4	Newtons	143653.5	51.8	-113.6	185.6
Barrier Force B5	Newtons	52843.0	51.8	-69.8	198.4
Barrier Force B6	Newtons	95064.2	49.6	-77.6	199.5
Barrier Force B7	Newtons	150635.7	29.9	-603.9	0.8
Barrier Force B8	Newtons	6368.5	48.3	-245.4	2.9
Barrier Force B9	Newtons	997.9	40.3	-958.1	44.9
Barrier Force C1	Newtons	0.0	0.0	0.0	0.0
Barrier Force C2	Newtons	10534.6	39.4	-1058.1	3.6
Barrier Force C3	Newtons	69103.2	28.8	-763.2	0.0
Barrier Force C4	Newtons	58199.1	26.9	-198.4	133.7
Barrier Force C5	Newtons	47830.2	32.6	-131.2	177.3
Barrier Force C6	Newtons	126641.9	30.0	-81.2	198.1
Barrier Force C7	Newtons	91182.6	28.2	-793.0	0.4
Barrier Force C8	Newtons	5541.9	28.4	-391.7	3.4
Barrier Force C9	Newtons	2169.0	40.2	-694.7	20.0
Barrier Force D1	Newtons	0.0	0.0	0.0	0.0
Barrier Force D2	Newtons	19935.2	39.8	-2100.5	5.6
Barrier Force D3	Newtons	11275.5	23.5	-1744.9	5.0
Barrier Force D4	Newtons	8186.0	15.8	-1834.8	4.5
Barrier Force D5	Newtons	0.0	0.0	0.0	0.0
Barrier Force D6	Newtons	9875.4	15.1	-1368.8	4.0
Barrier Force D7	Newtons	6442.4	17.4	-836.8	4.1
Barrier Force D8	Newtons	0.0	0.0	0.0	0.0
Barrier Force D9	Newtons	0.0	0.0	0.0	0.0
Barrier Force Sum Group 1	Newtons	170780.5	30.1	-1140.7	1.7
Barrier Force Sum Group 2	Newtons	315147.4	51.6	-849.8	135.0
Barrier Force Sum Group 3	Newtons	167783.2	30.2	-832.4	1.1
Barrier Force Sum Group 4	Newtons	95178.6	29.1	-1064.3	0.7
Barrier Force Sum Group 5	Newtons	224175.3	30.1	-619.9	186.5
Barrier Force Sum Group 6	Newtons	100552.4	28.3	-968.1	1.0
Barrier Force Total Sum	Newtons	1002684.3	30.5	-2255.0	132.5

* Not recorded, no data

APPENDIX D

INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

**2002 NHTSA 35mph NCAP
Instrumentation Data Channel Assignments
Driver A.T.D. Serial Number 34
5/29/02
2002 Toyota Highlander 4WD SUV**

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
5/29/02
2002 Toyota Highlander 4WD SUV**

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
25	UP. TIBIA LEFT MOM.	X	GPUT09MX	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
26	UP. TIBIA LEFT MOM.	Y	GPUT09MY	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
27	UP. TIBIA RIGHT MOM.	X	GPUT09MX	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
28	UP. TIBIA RIGHT MOM.	Y	GPUT09MY	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
29	LWR. TIBIA LEFT MOM.	X	GPLT09MX	3 ch., lower tibia gage	R. A. Denton	3093	Nm
30	LWR. TIBIA LEFT MOM.	Y	GPLT09MY	3 ch., lower tibia gage	R. A. Denton	3093	Nm
31	LWR. TIBIA LEFT FORCE	Z	GPLT09FZ	3 ch., lower tibia gage	R. A. Denton	3093	N
32	LWR. TIBIA RIGHT MOM.	X	GPLT09MX	3 ch., lower tibia gage	R. A. Denton	3093	Nm
33	LWR. TIBIA RIGHT MOM.	Y	GPLT09MY	3 ch., lower tibia gage	R. A. Denton	3093	Nm
34	LWR. TIBIA RIGHT FORCE	Z	GPLT09FZ	3 ch., lower tibia gage	R. A. Denton	3093	N
35	FOOT LEFT, AFT	X	KEIC003X	Accel., Foot Triax	I.C. Sensor	3031-500	G
36	FOOT LEFT, AFT	Z	KEIC003Y	Accel., Foot Triax	I.C. Sensor	3031-500	G
37	FOOT LEFT, FORE	Z	KEIC003Z	Accel., Foot Triax	I.C. Sensor	3031-500	G
38	FOOT RIGHT, AFT	X	KEIC004X	Accel., Foot Triax	I.C. Sensor	3031-500	G
39	FOOT RIGHT, AFT	Z	KEIC004Y	Accel., Foot Triax	I.C. Sensor	3031-500	G
40	FOOT RIGHT, FORE	Z	KEIC004Z	Accel., Foot Triax	I.C. Sensor	3031-500	G
41	LAP BELT FORCE	X	KELC003	Load cell, Seat belt	Lebow	3371	N
42	SHOULDER BELT FORCE	X	KELC004	Load cell, Seat belt	Lebow	3371	N
43	SHOULDER BELT SPOOL	X	KEPP001	Pullout pot	Celesco	PTX101-0030	CM
44	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
5/29/02
2002 Toyota Highlander 4WD SUV

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

**2002 NHTSA 35mph NCAP
Instrumentation Data Channel Assignments
Passenger A.T.D. Serial Number 35
5/29/02
2002 Toyota Highlander 4WD SUV**

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
69	UP. TIBIA LEFT MOM.	X	GPUT09MX	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
70	UP. TIBIA LEFT MOM.	Y	GPUT09MY	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
71	UP. TIBIA RIGHT MOM.	X	GPUT09MX	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
72	UP. TIBIA RIGHT MOM.	Y	GPUT09MY	2 ch., Upper tibia gage	R. A. Denton	1583	Nm
73	LWR. TIBIA LEFT MOM.	X	GPLT09MX	3 ch., lower tibia gage	R. A. Denton	3093	Nm
74	LWR. TIBIA LEFT MOM.	Y	GPLT09MY	3 ch., lower tibia gage	R. A. Denton	3093	Nm
75	LWR. TIBIA LEFT FORCE	Z	GPLT09FZ	3 ch., lower tibia gage	R. A. Denton	3093	N
76	LWR. TIBIA RIGHT MOM.	X	GPLT09MX	3 ch., lower tibia gage	R. A. Denton	3093	Nm
77	LWR. TIBIA RIGHT MOM.	Y	GPLT09MY	3 ch., lower tibia gage	R. A. Denton	3093	Nm
78	LWR. TIBIA RIGHT FORCE	Z	GPLT09FZ	3 ch., lower tibia gage	R. A. Denton	3093	N
79	FOOT LEFT, AFT	X	KEIC002X	Accel., Foot Triax	I.C. Sensor	3031-500	G
80	FOOT LEFT, AFT	Z	KEIC002Y	Accel., Foot Triax	I.C. Sensor	3031-500	G
81	FOOT LEFT, FORE	Z	KEIC002Z	Accel., Foot Triax	I.C. Sensor	3031-500	G
82	FOOT RIGHT, AFT	X	KEIC001X	Accel., Foot Triax	I.C. Sensor	3031-500	G
83	FOOT RIGHT, AFT	Z	KEIC001Y	Accel., Foot Triax	I.C. Sensor	3031-500	G
84	FOOT RIGHT, FORE	Z	KEIC001Z	Accel., Foot Triax	I.C. Sensor	3031-500	G
85	LAP BELT FORCE	X	KELC001	Load cell, Seat belt	Lebow	3371	N
86	SHOULDER BELT FORCE	X	KELC002	Load cell, Seat belt	Lebow	3371	N
87	SHOULDER BELT SPOOL	X	KEPP001	Pullout pot	Celesco	PTX101-0030	MM
88	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
5/29/02
2002 Toyota Highlander 4WD SUV**

CH.	LOCATION	AXIS	IDENT. NO.	DESCRIPTION	MFR	MODEL	UNITS
89	Left Rear	X	KEVA002	Accel., Pre-Amp	I.C.S/Karco	3031-500	G
90	Right Rear	X	KEVA006	Accel., Vehicle block	I.C. Sensor	3031-200	G
91	Engine Top	X	KEVA009	Accel., Vehicle block	I.C. Sensor	3031-500	G
92	Engine Bottom	X	KEVA008	Accel., Vehicle block	I.C. Sensor	3031-500	G
93	Left Brake Caliper	X	KEVA007	Accel., Vehicle block	I.C. Sensor	3031-500	G
94	Right Brake Caliper	X	KEVA012	Accel., Vehicle block	I.C. Sensor	3031-500	G
95	Instrument Panel	X	KEVA011	Accel., Vehicle block	I.C. Sensor	3031-200	G
96	Left Rear	Z	KEVA005	Accel., Vehicle block	I.C. Sensor	3031-500	G
97	Right Rear	Z	KEVA010	Accel., Vehicle block	I.C. Sensor	3031-200	G

**2002 NHTSA 35mph NCAP
Instrumentation Data Channel Assignments
Rigid Load Cell Barrier
5/29/02
2002 Toyota Highlander 4WD SUV**

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

**2002 NHTSA 35mph NCAP
Instrumentation Data Channel Assignments
Rigid Load Cell Barrier
5/29/02
2002 Toyota Highlander 4WD SUV**

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

**2002 NHTSA 35mph NCAP
Instrumentation Data Channel Assignments
Nine Accelerometer Head Array Channels
5/29/02
2002 Toyota Highlander 4WD SUV**

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

* Duplicate of Head CG Primary Channels

APPENDIX E

DUMMY CALIBRATION DATA



Calibration Data Sheet

Hybrid III 50th Percentile Male

Knee Impact Test

ATD Serial No.: 034

Location: Left Knee

Test I.D.: KN00A

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
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	N	4715 to 5782	5174	Pass
Overall Test Results				Pass

ATD Serial No.: 034

Location: Right Knee

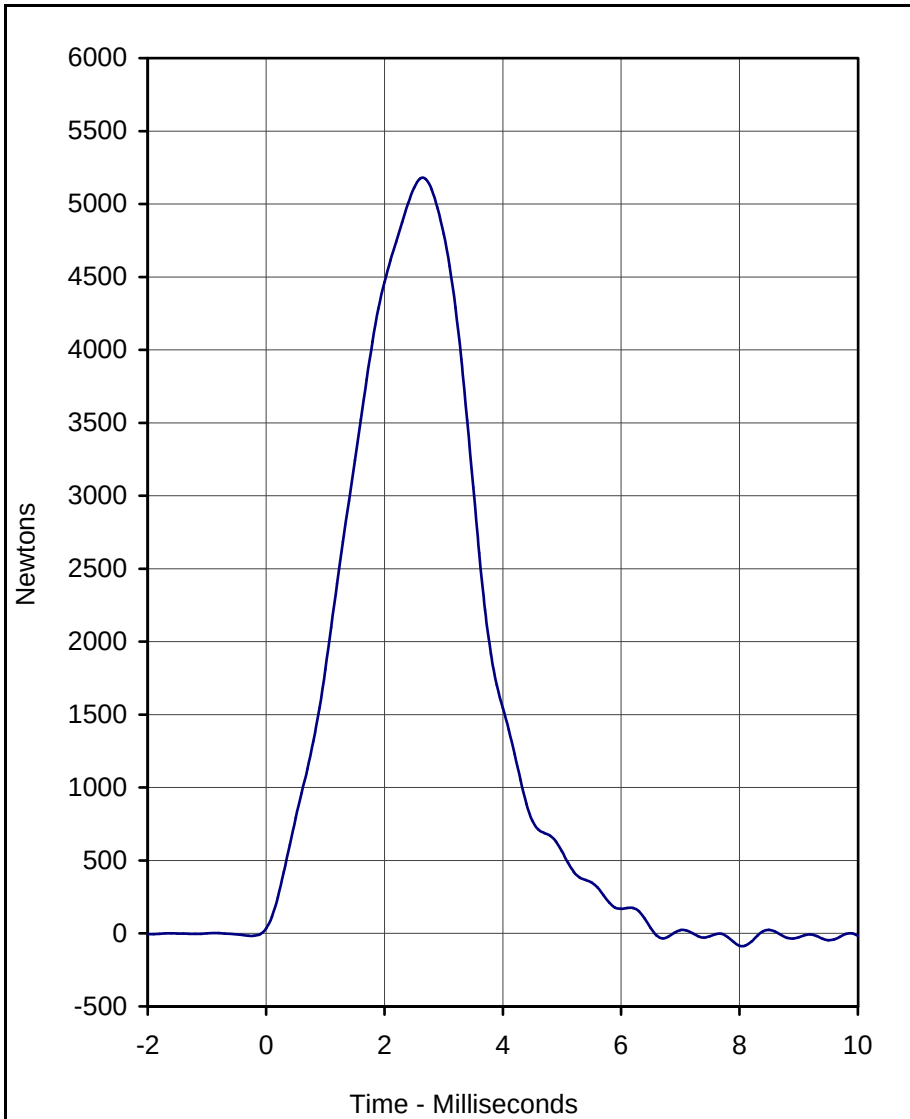
Test I.D.: KN00B

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
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	N	4715 to 5782	5312	Pass
Overall Test Results				Pass

Laboratory Technician

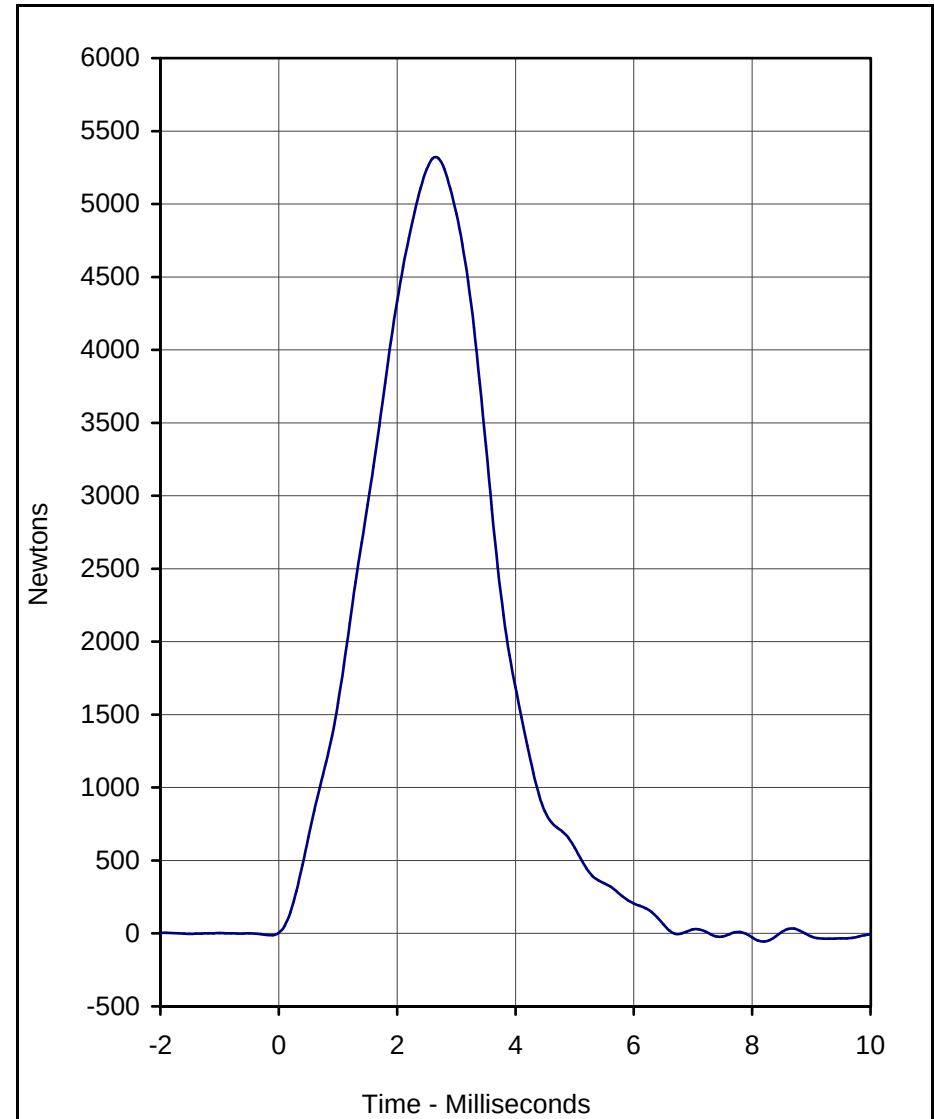
May 22, 2002

Test Date



Curve Description	Location	Test I.D.	CURNO	Type
Probe Force	Left Knee	KN00A	001	FIL

Units	Max	Time	Min	Time	SAE Class
Newtons	5173.5	2.6	-84.6	8.0	600



Curve Description	Location	Test I.D.	CURNO	Type
Probe Force	Right Knee	KN00B	002	FIL

Units	Max	Time	Min	Time	SAE Class
Newtons	5312.3	2.6	-55.0	8.2	600

Test Program: Hybrid III 50th Percentile Male Knee Impact Test
 Test Date: 5/22/02

A.T.D. Serial No.: 034





Calibration Data Sheet

Hybrid III 50th Percentile Male

Head Drop Test

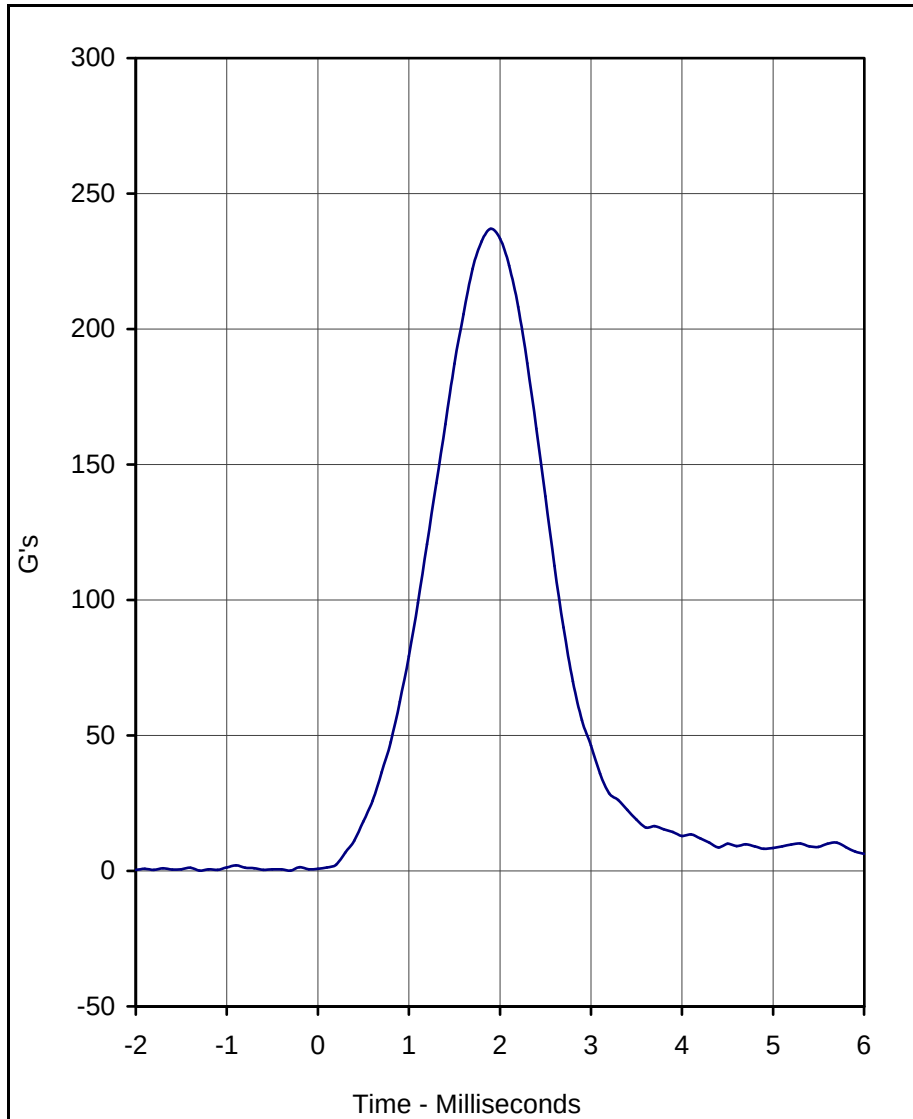
ATD Serial No.: 034

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	237.1	Pass
Peak Lateral Acceleration	G's	≤15.0	5.6	Pass
Overall Test Results				Pass

Laboratory Technician

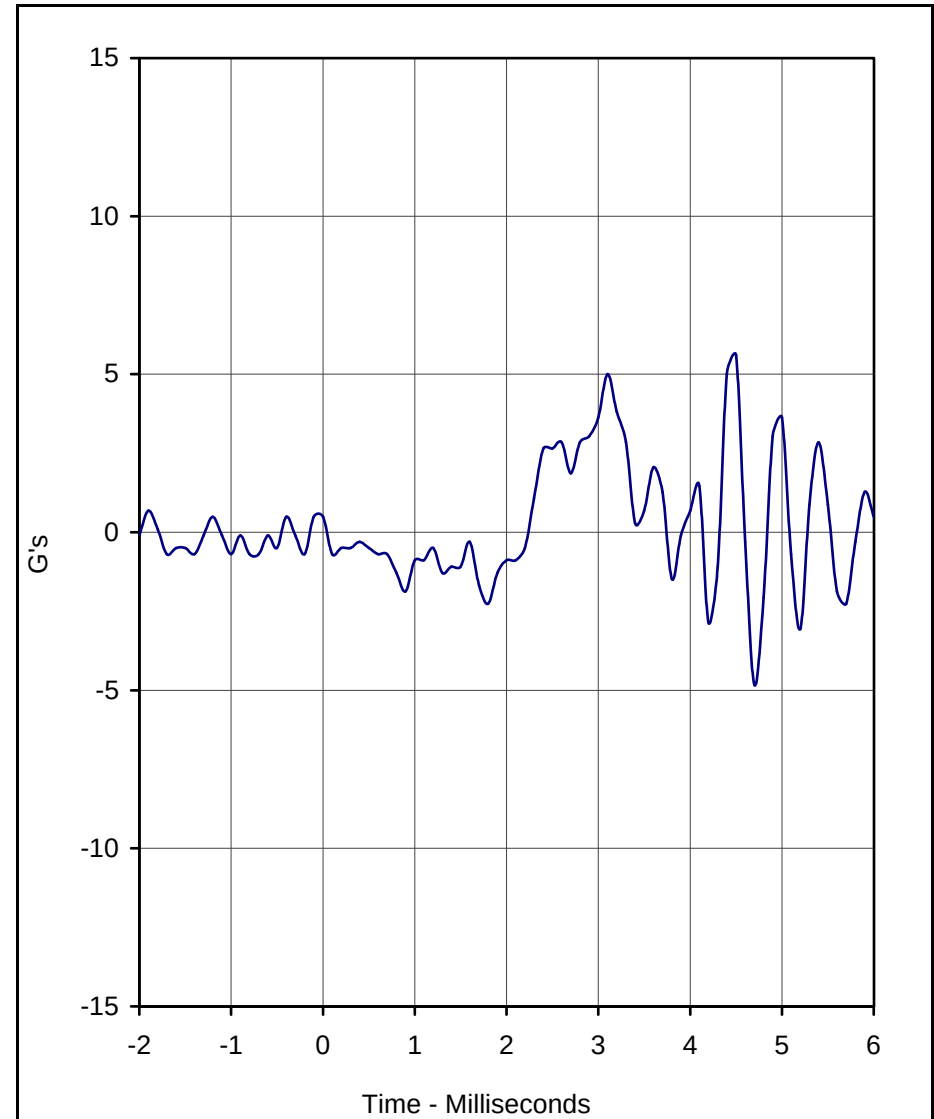
May 22, 2002
Test Date



Curve Description	CURNO	Type
Head Resultant	001	RES

Units	Max	Time	Min	Time	SAE Class
G's	237.1	1.9	0.1	-1.3	1000

Test Program: Hybrid III 50th Percentile Male Head Drop Test
 Test Date: 5/22/02



Curve Description	CURNO	Type
Head Y	002	FIL

Units	Max	Time	Min	Time	SAE Class
G's	5.6	4.5	-4.8	4.7	1000

A.T.D. Serial No.: 034
 Test I.D.: HD05B





Calibration Data Sheet

Hybrid III 50th Percentile Male

Thorax Impact Test

ATD Serial No.: 034

Test I.D.: CH00B

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
Probe Velocity	m/s	6.58 to 6.82	6.64	Pass
Peak Probe Force	Newtons	5159 to 5893	5637	Pass
Peak Sternum Displacement	CM	6.35 to 7.26	6.92	Pass
Internal Hysteresis	%	69 to 85	76.6	Pass
Overall Test Results				Pass

E-5

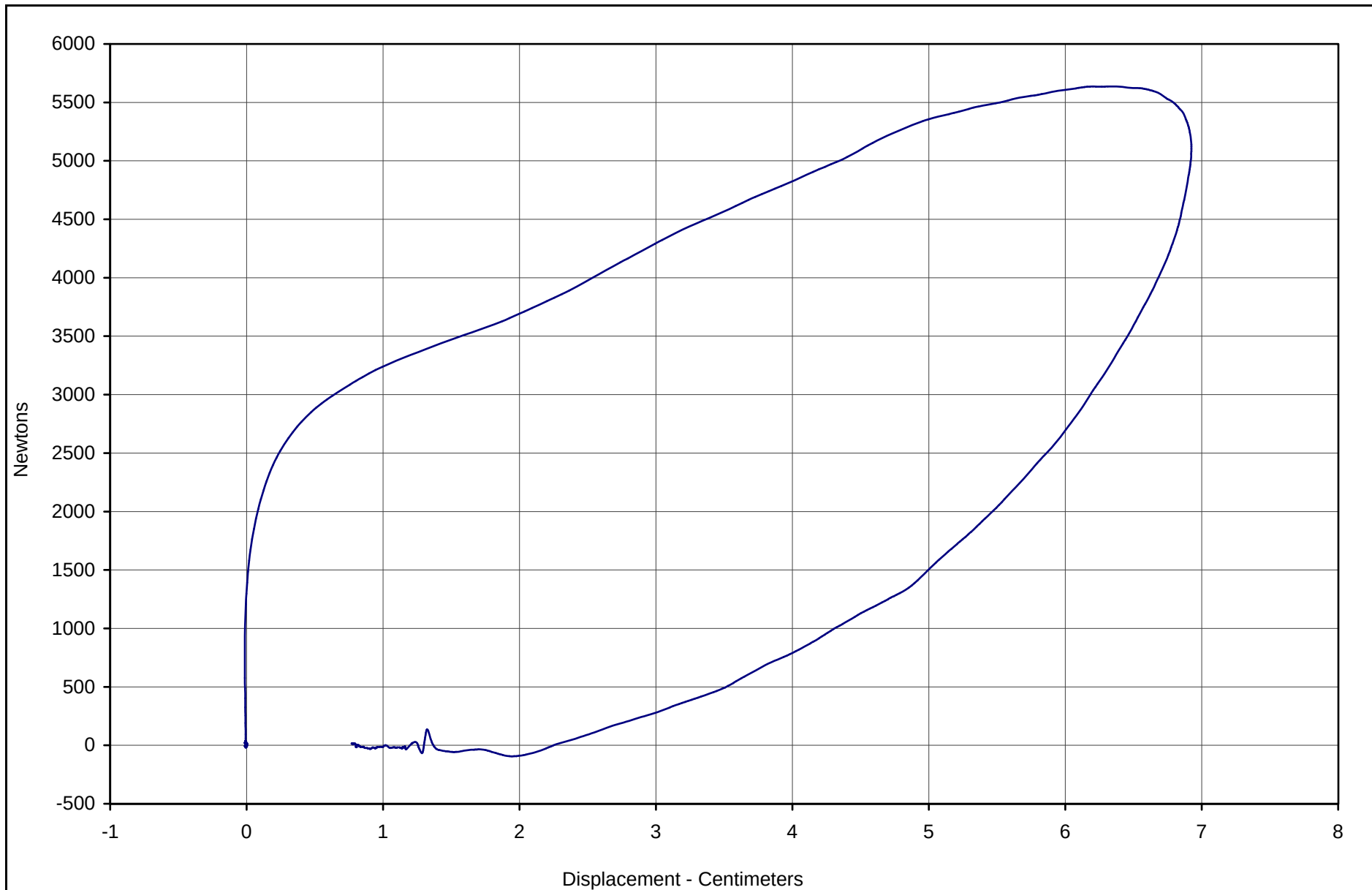
KAR22001-13

Laboratory Technician

May 22, 2002

Test Date

E-6



Curve Description	CURNO	Type	Hysteresis	Peak Chest Displ.	Peak Probe Force	SAE Class
Probe Force vs. Chest Displacement	001	FIL	76.6	6.92	5636.9	180



Test Program: Hybrid III 50th Percentile Male Thorax Impact

A.T.D. Serial No.: 034

Test Date: 5/22/02

Test I.D.: CH00B

-KAR22001-13



Calibration Data Sheet

Hybrid III 50th Percentile Male

Neck Flexion Test

ATD Serial No.: 034

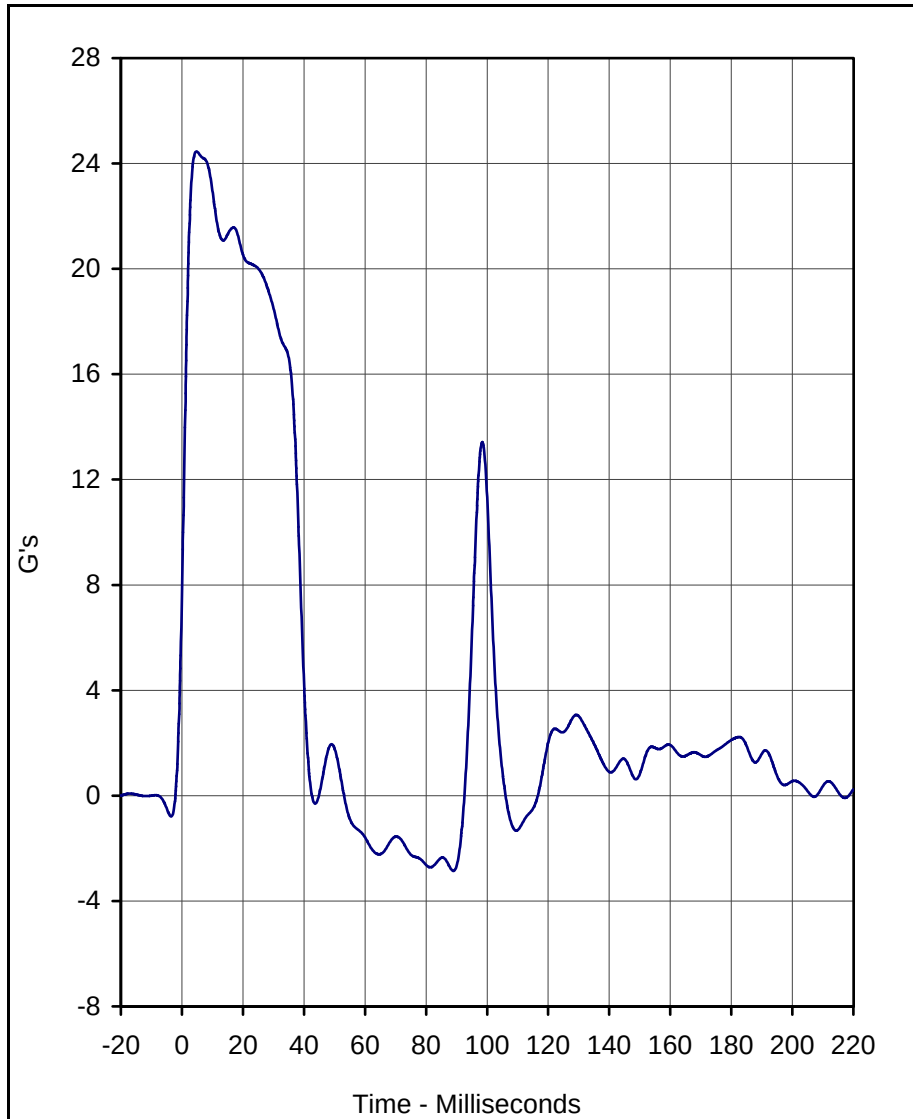
Test I.D.: NF00B

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	6.98	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.0	Pass
	20 Msec.	G's	17.6 to 22.6	20.5	Pass
	30 Msec.	G's	12.5 to 18.5	18.5	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	18.5	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	39.8	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	68.6	Pass
	Time	Msec.	57.0 to 64.0	58.9	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	114.3	Pass
Moment About Occipital Condyle	Maximum	Nm	84.1 to 108.5	88.9	Pass
	Time	Msec.	47.0 to 58.0	52.8	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	98.8	Pass
Overall Test Results					Pass

Laboratory Technician

May 22, 2002

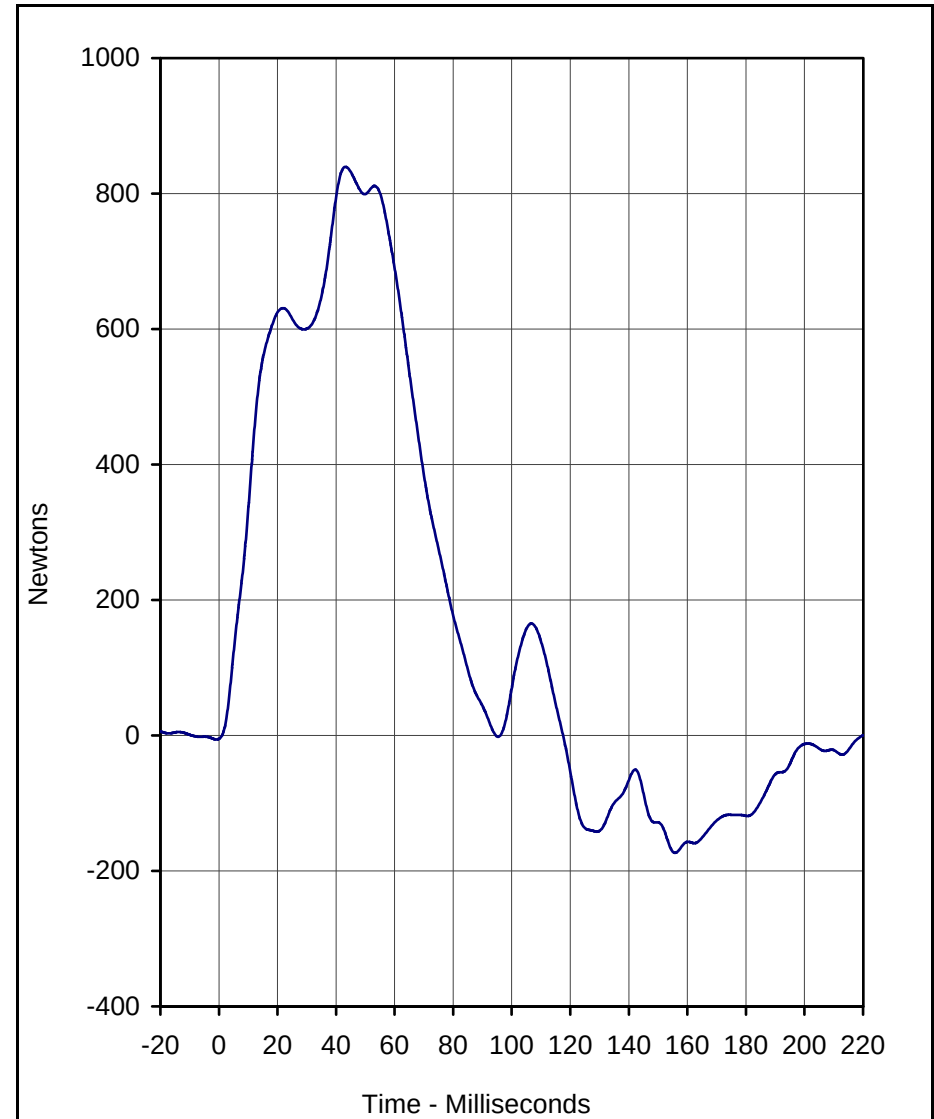
Test Date



Curve Description	CURNO	Type
Pendulum Deceleration	001	FIL

Units	Max	Time	Min	Time	SAE Class
G's	24.5	4.8	-2.9	89.0	60

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test
 Test Date: 5/22/02

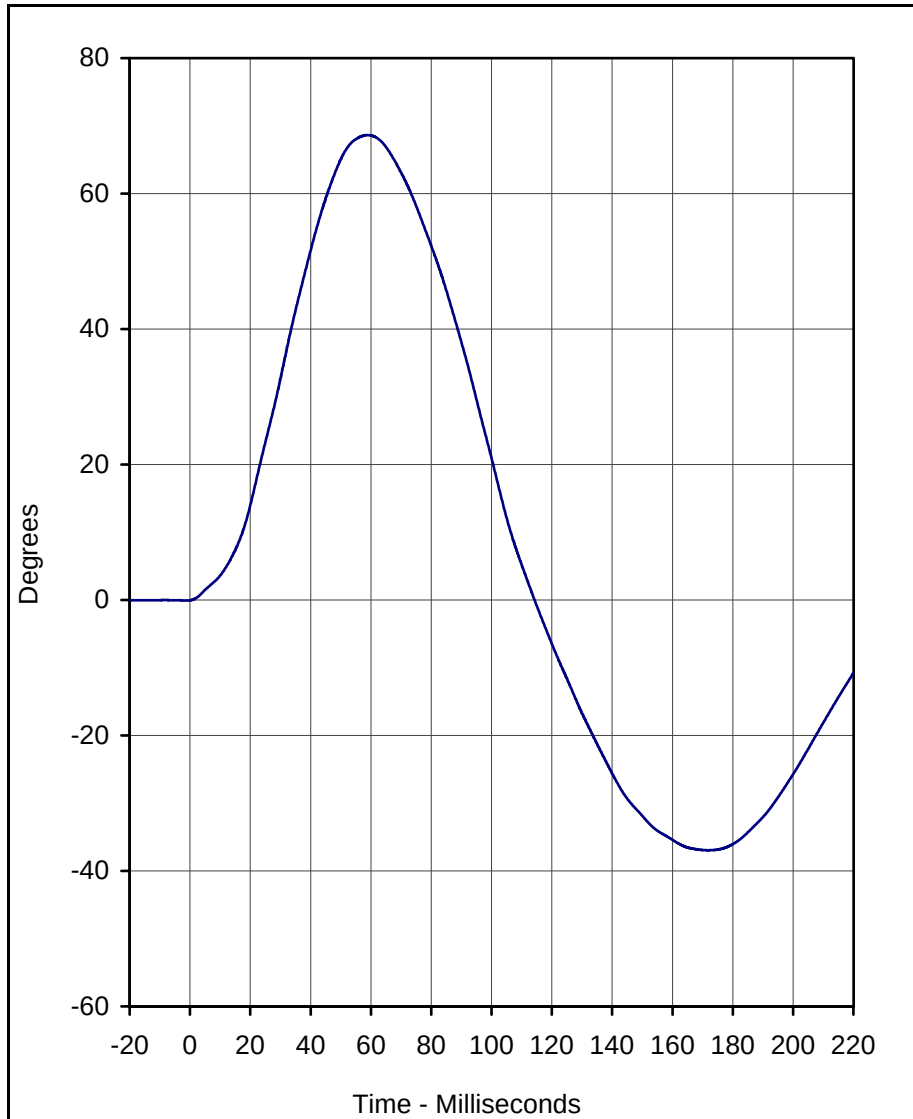


Curve Description	CURNO	Type
Neck Force X	002	FIL

Units	Max	Time	Min	Time	SAE Class
Newtons	839.5	43.2	-173.3	155.8	60

A.T.D. Serial No.: 034
 Test I.D.: NF00B

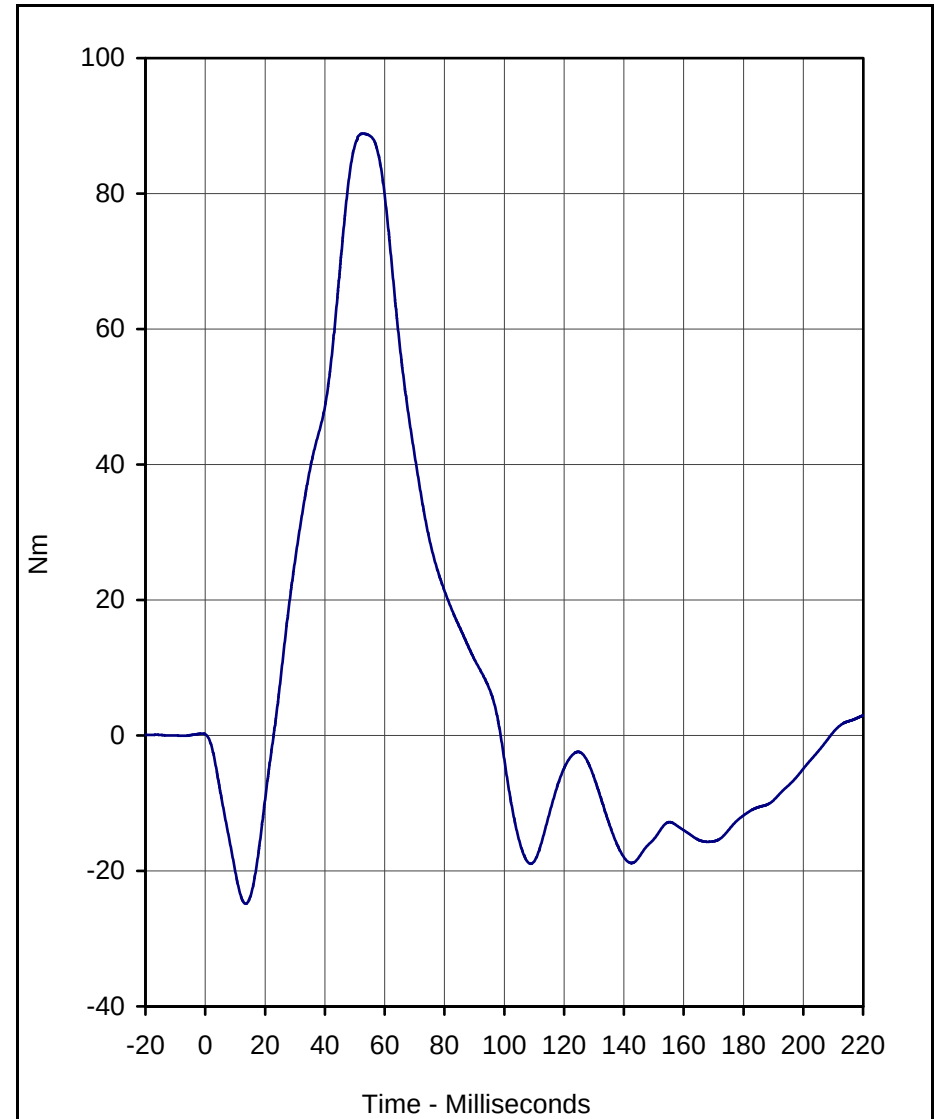




Curve Description	CURNO	Type
"D" Plane Rotation	003	FIL

Units	Max	Time	Min	Time	SAE Class
Degrees	68.6	58.9	-37.0	171.8	60

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test
 Test Date: 5/22/02



Curve Description	CURNO	Type
Moment About Occipital Condyle	004	FIL

Units	Max	Time	Min	Time	SAE Class
Nm	88.9	52.8	-24.8	13.5	60

A.T.D. Serial No.: 034
 Test I.D.: NF00B





Calibration Data Sheet

Hybrid III 50th Percentile Male

Neck Extension Test

ATD Serial No.: 034

Test I.D.: NE00B

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	5.94 to 6.19	6.09	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	17.8	Pass
	20 Msec.	G's	14.0 to 19.0	17.4	Pass
	30 Msec.	G's	11.0 to 16.0	16.0	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 22.0	16.1	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	45.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	93.1	Pass
	Time	Msec.	72.0 to 82.0	78.5	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	158.9	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to- 79.9	-70.7	Pass
	Time	Msec.	65.0 to 79.0	68.5	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	137.2	Pass
Overall Test Results					Pass

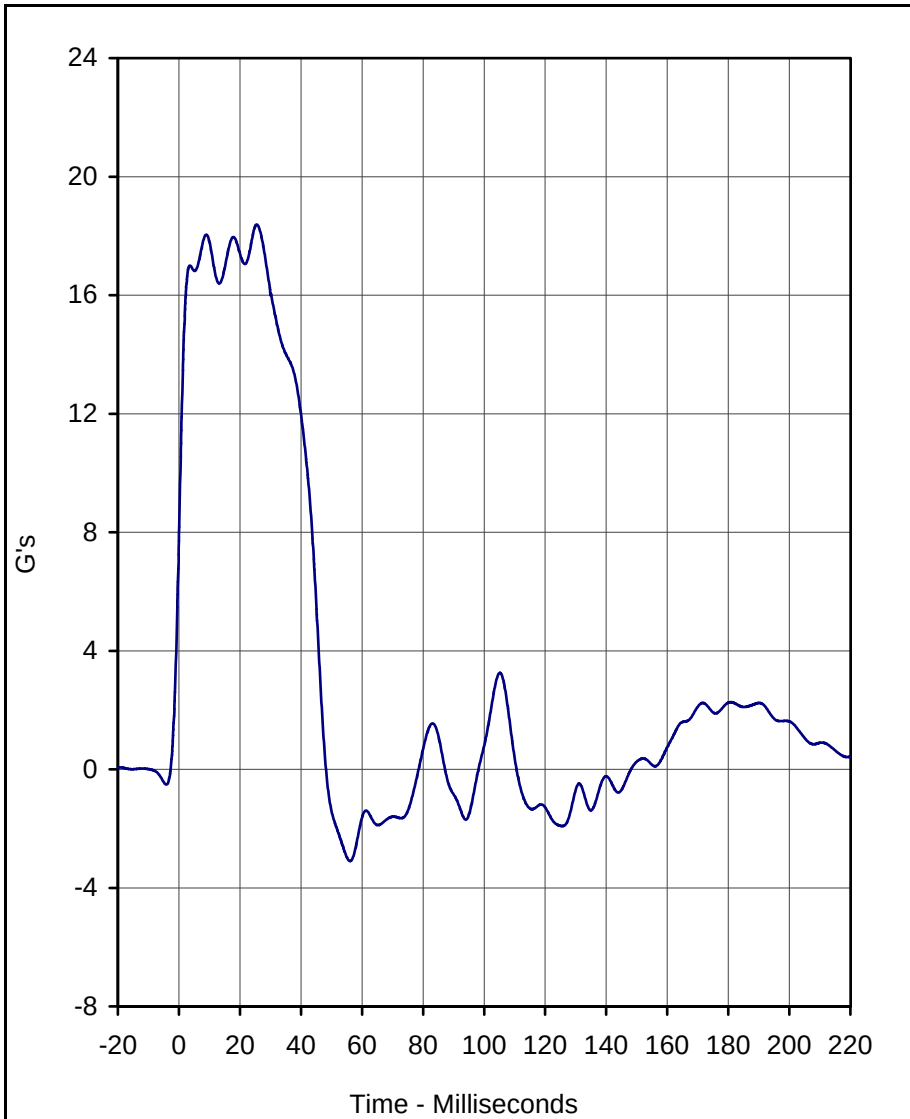
Laboratory Technician

May 22, 2002

Test Date

E-10

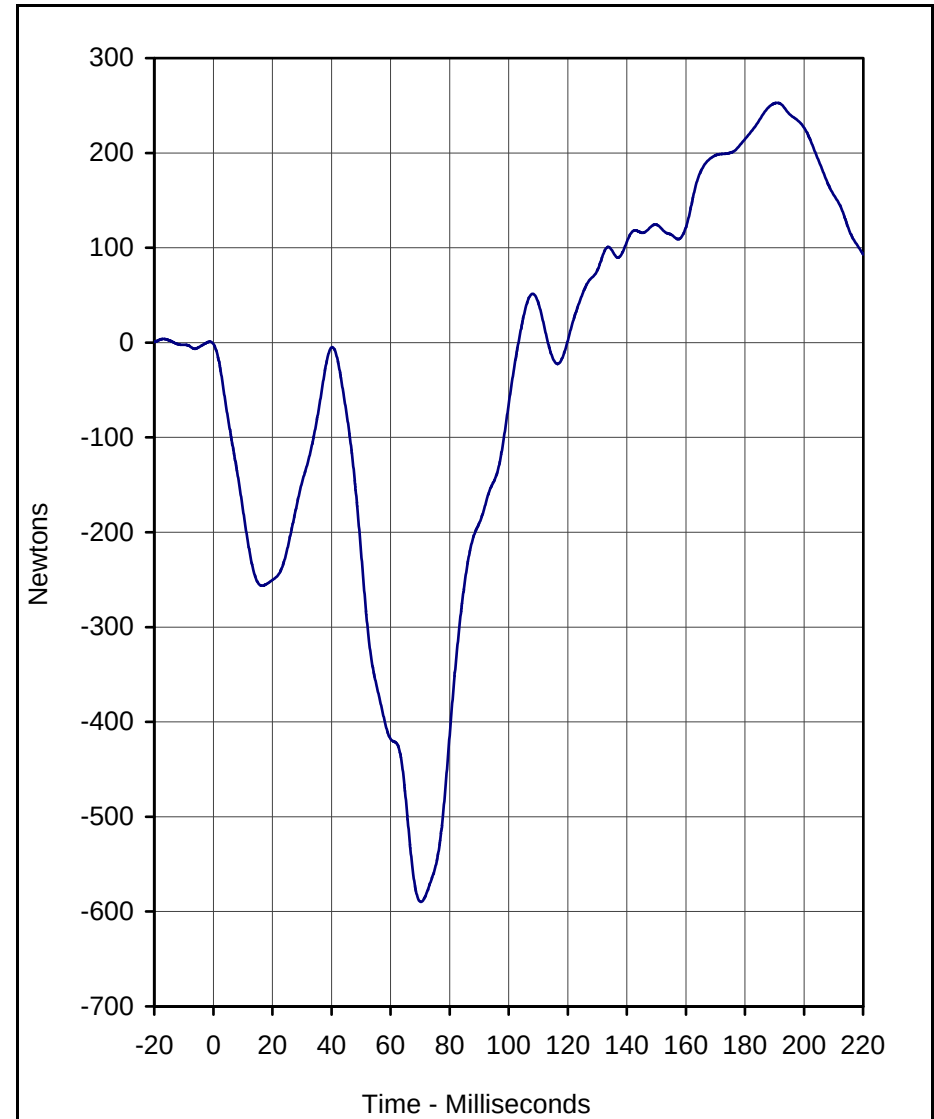
KAR22001-13



Curve Description	CURNO	Type
Pendulum Deceleration	001	FIL

Units	Max	Time	Min	Time	SAE Class
G's	18.4	25.5	-3.1	56.1	60

Test Program: Hybrid III 50th Percentile Male Neck Extension Test
 Test Date: 5/22/02

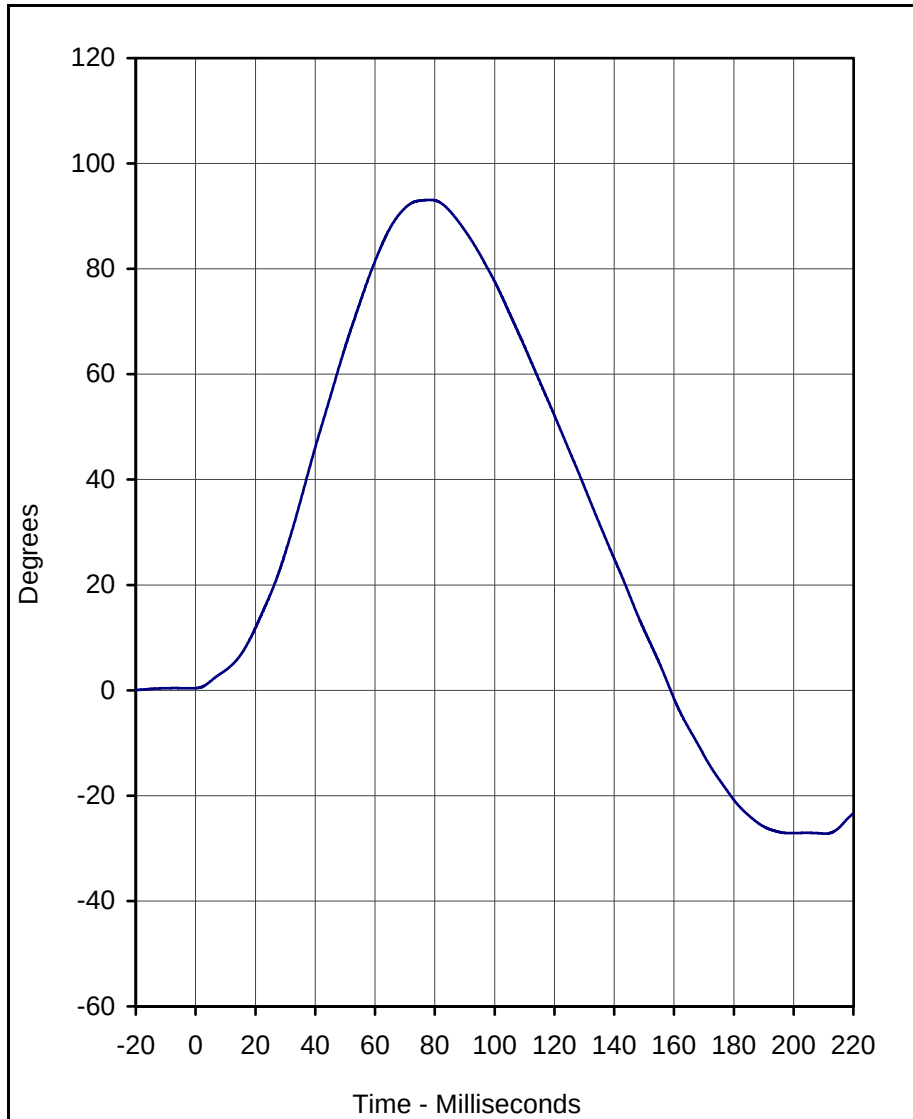


Curve Description	CURNO	Type
Neck Force X	002	FIL

Units	Max	Time	Min	Time	SAE Class
Newtons	252.9	190.9	-589.9	70.3	60

A.T.D. Serial No.: 034
 Test I.D.: NE00B

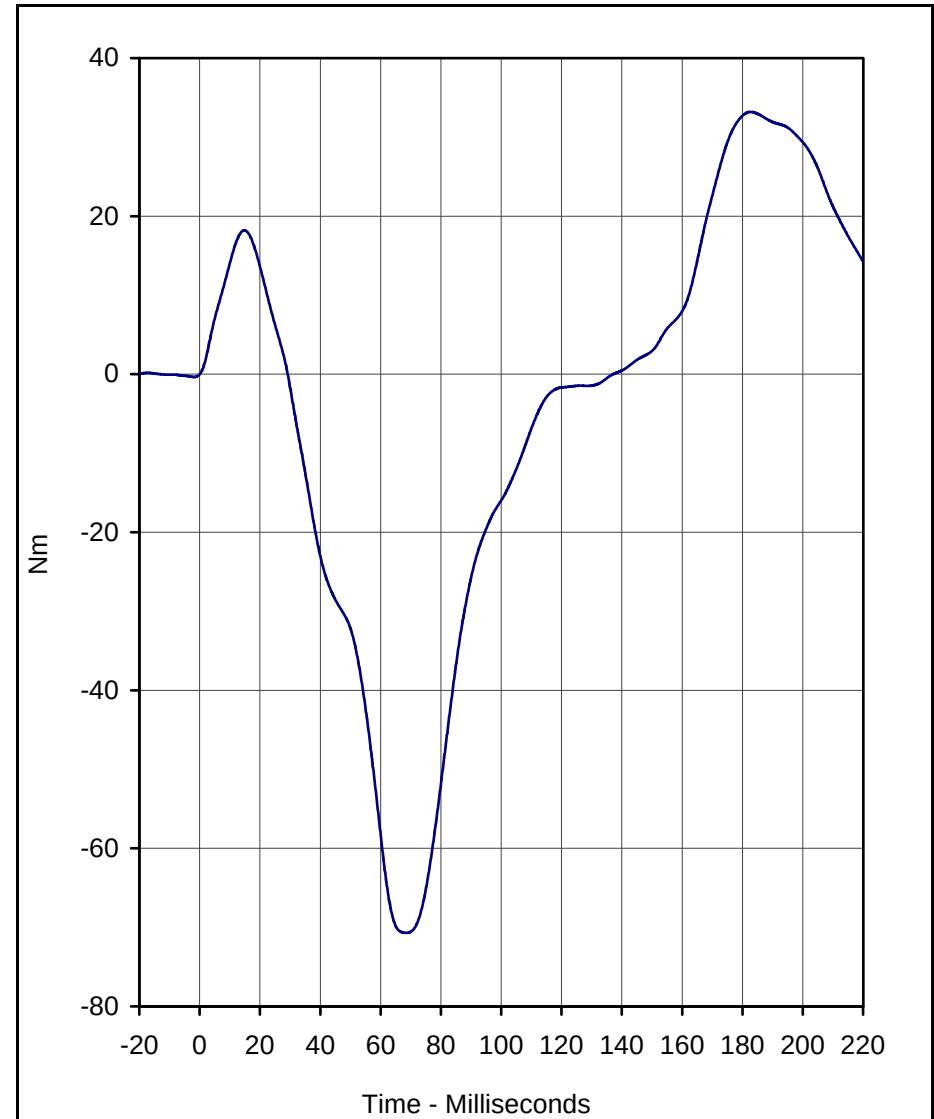




Curve Description	CURNO	Type
"D" Plane Rotation	003	FIL

Units	Max	Time	Min	Time	SAE Class
Degrees	93.1	78.5	-27.2	210.7	60

Test Program: Hybrid III 50th Percentile Male Neck Extension Test
 Test Date: 5/22/02



Curve Description	CURNO	Type
Moment About Occipital Condyle	004	FIL

Units	Max	Time	Min	Time	SAE Class
Nm	33.2	182.7	-70.7	68.5	60

A.T.D. Serial No.: 034
 Test I.D.: NE00B





Calibration Data Sheet Hybrid III 50th Percentile Male External Measurements

ATD Serial No.: 034

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
A - Total sitting height	mm	879 to 889	880	Pass
B - Shoulder pivot height	mm	505 to 521	520	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	90	Pass
F - Thigh clearance	mm	140 to 155	145	Pass
G - Elbow back to wrist pivot	mm	290 to 305	300	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	445	Pass
M - Knee pivot height	mm	485 to 500	490	Pass
N - Buttock popliteal length	mm	452 to 477	470	Pass
O - Chest depth	mm	213 to 229	220	Pass
P - Foot length	mm	251 to 267	255	Pass
V - Shoulder breadth	mm	422 to 437	430	Pass
W - Foot breadth	mm	91 to 107	105	Pass
Y - Chest circumference	mm	970 to 1001	995	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

May 22, 2002

Test Date

E-13

KAR22001-13



Calibration Data Sheet

Hybrid III 50th Percentile Male

Knee Impact Test

ATD Serial No.: 035

Location: Left Knee

Test I.D.: KN00C

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
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.13	Pass
Peak Probe Force	N	4715 to 5782	5306	Pass
Overall Test Results				Pass

ATD Serial No.: 035

Location: Right Knee

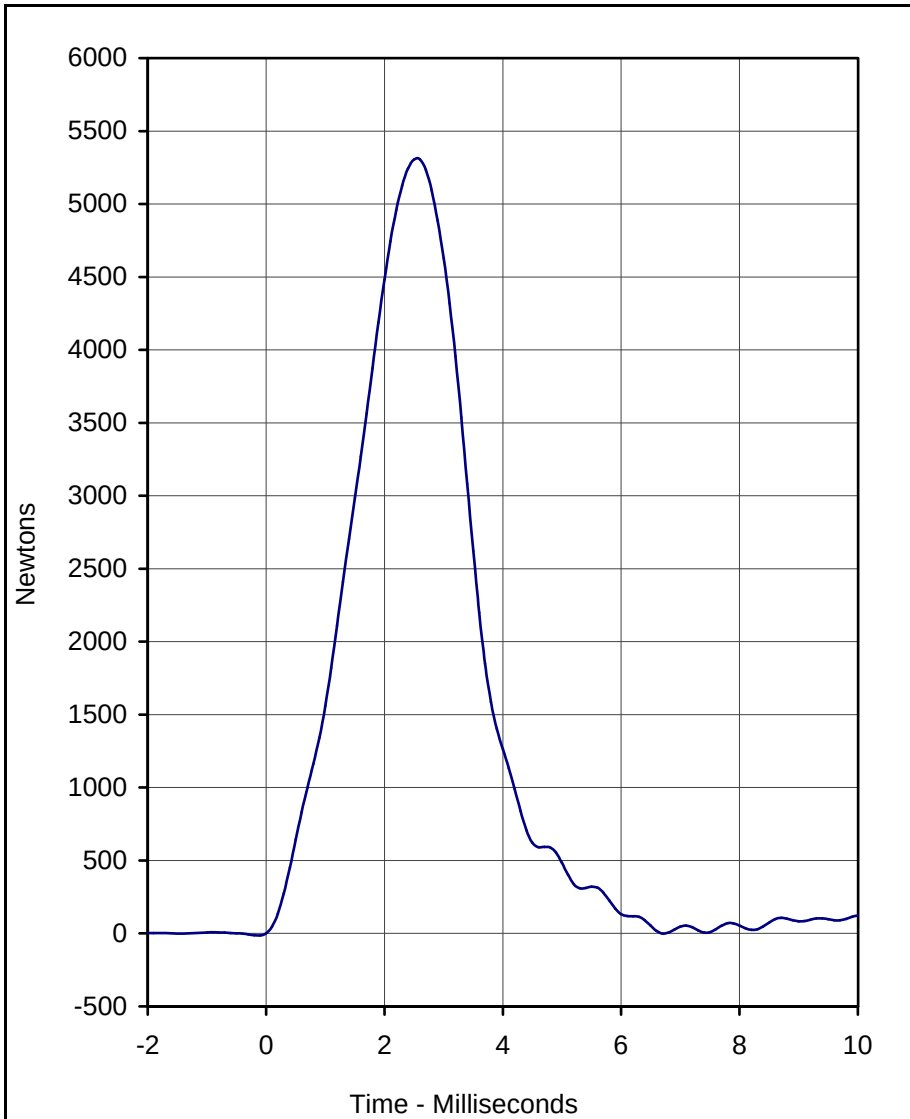
Test I.D.: KN00D

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
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.13	Pass
Peak Probe Force	N	4715 to 5782	5314	Pass
Overall Test Results				Pass

Laboratory Technician

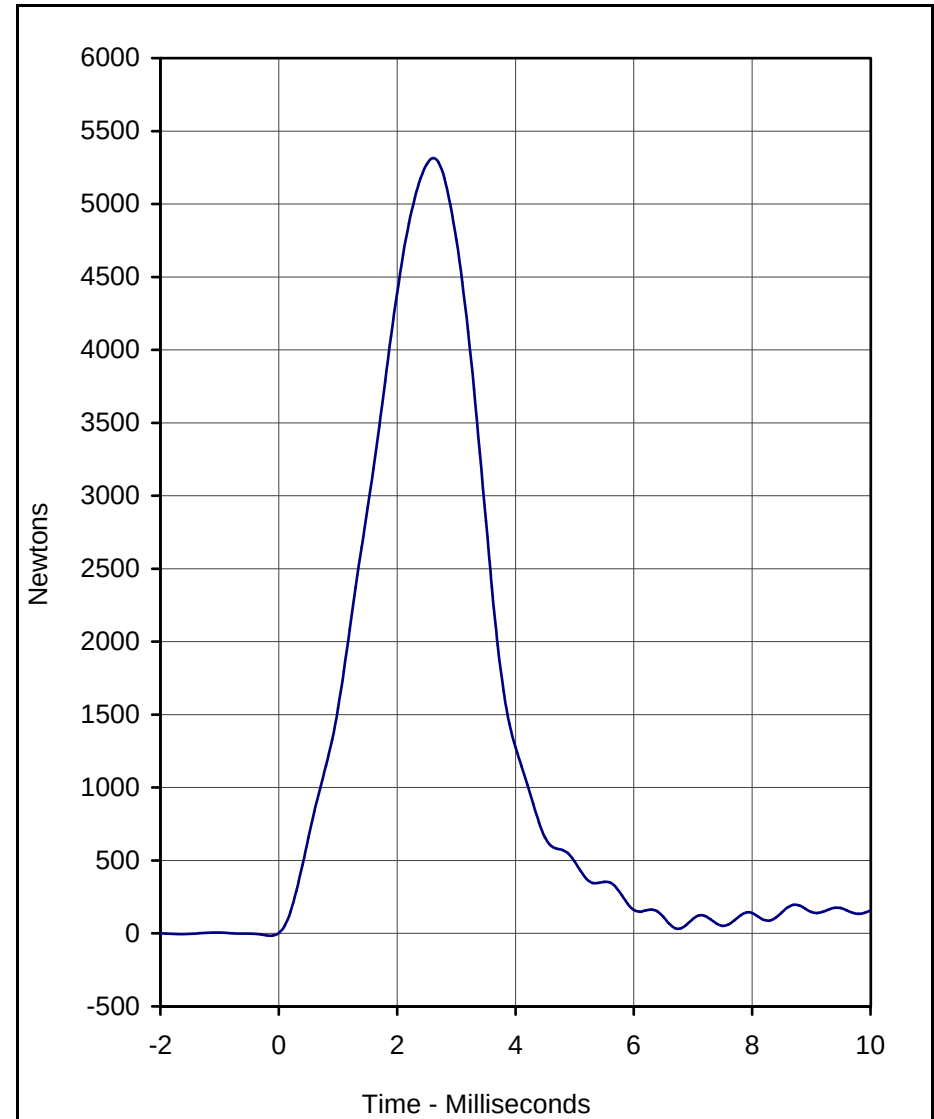
May 22, 2002

Test Date



Curve Description	Location	Test I.D.	CURNO	Type
Probe Force	Left Knee	KN00C	001	FIL

Units	Max	Time	Min	Time	SAE Class
Newtons	5305.9	2.6	-13.0	-0.1	600



Curve Description	Location	Test I.D.	CURNO	Type
Probe Force	Right Knee	KN00D	002	FIL

Units	Max	Time	Min	Time	SAE Class
Newtons	5314.2	2.6	-14.1	-0.1	600

Test Program: Hybrid III 50th Percentile Male Knee Impact Test
 Test Date: 5/22/02

A.T.D. Serial No.: 035





Calibration Data Sheet

Hybrid III 50th Percentile Male

Head Drop Test

ATD Serial No.: 035

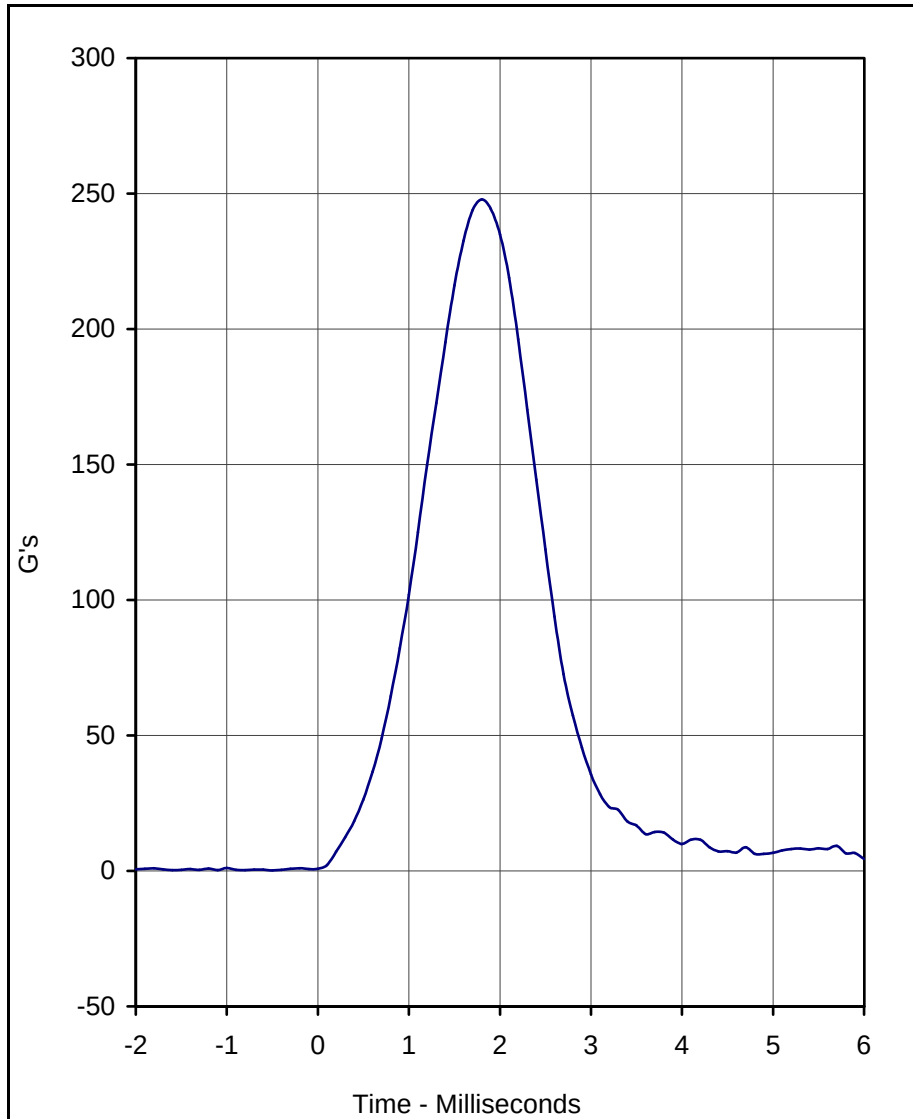
Test I.D.: HD05C

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	247.8	Pass
Peak Lateral Acceleration	G's	≤15.0	5.5	Pass
Overall Test Results				Pass

Laboratory Technician

May 22, 2002

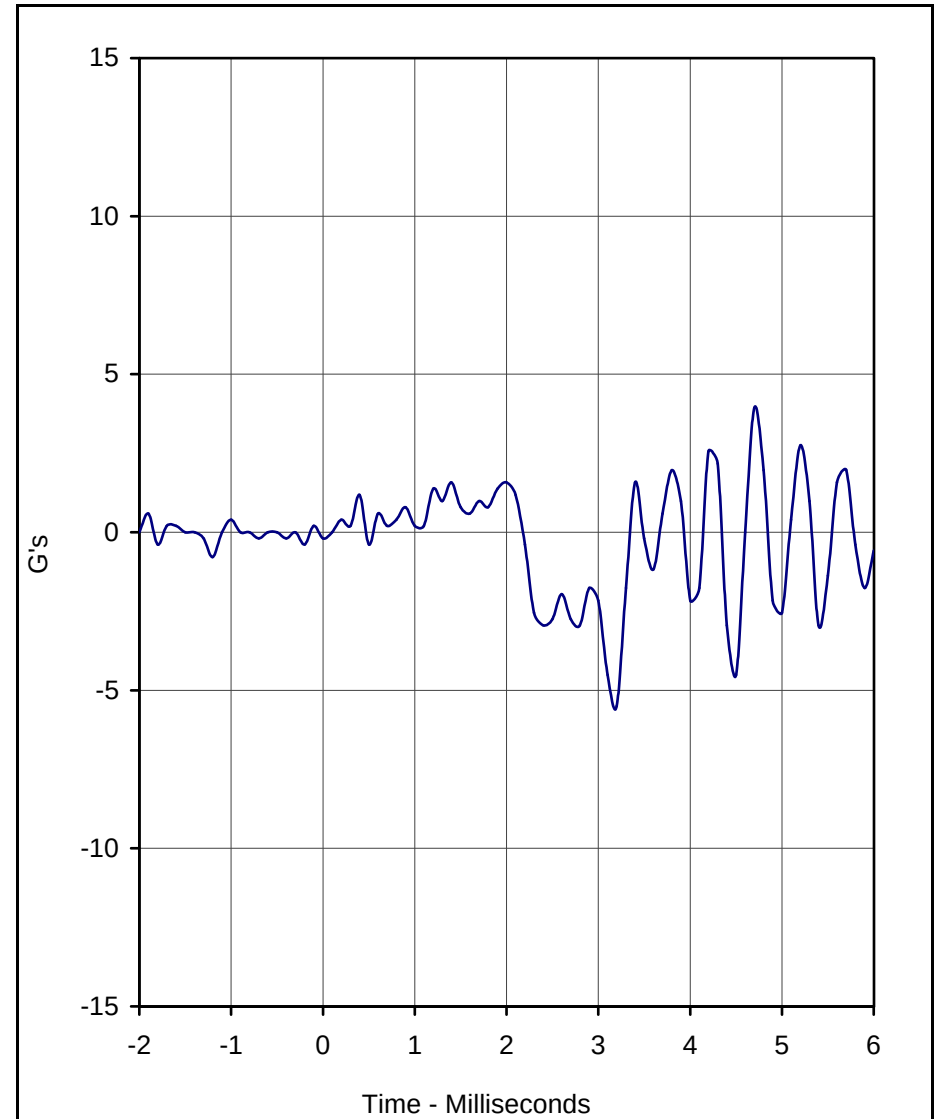
Test Date



Curve Description	CURNO	Type
Head Resultant	001	RES

Units	Max	Time	Min	Time	SAE Class
G's	247.8	1.8	0.2	-0.5	1000

Test Program: Hybrid III 50th Percentile Male Head Drop Test
 Test Date: 5/22/02



Curve Description	CURNO	Type
Head Y	002	FIL

Units	Max	Time	Min	Time	SAE Class
G's	3.9	4.7	-5.5	3.2	1000

A.T.D. Serial No.: 035
 Test I.D.: HD05C





Calibration Data Sheet

Hybrid III 50th Percentile Male

Thorax Impact Test

ATD Serial No.: 035

Test I.D.: CH00A

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
Probe Velocity	m/s	6.58 to 6.82	6.74	Pass
Peak Probe Force	Newtons	5159 to 5893	5680	Pass
Peak Sternum Displacement	CM	6.35 to 7.26	6.73	Pass
Internal Hysteresis	%	69 to 85	78.4	Pass
Overall Test Results				Pass

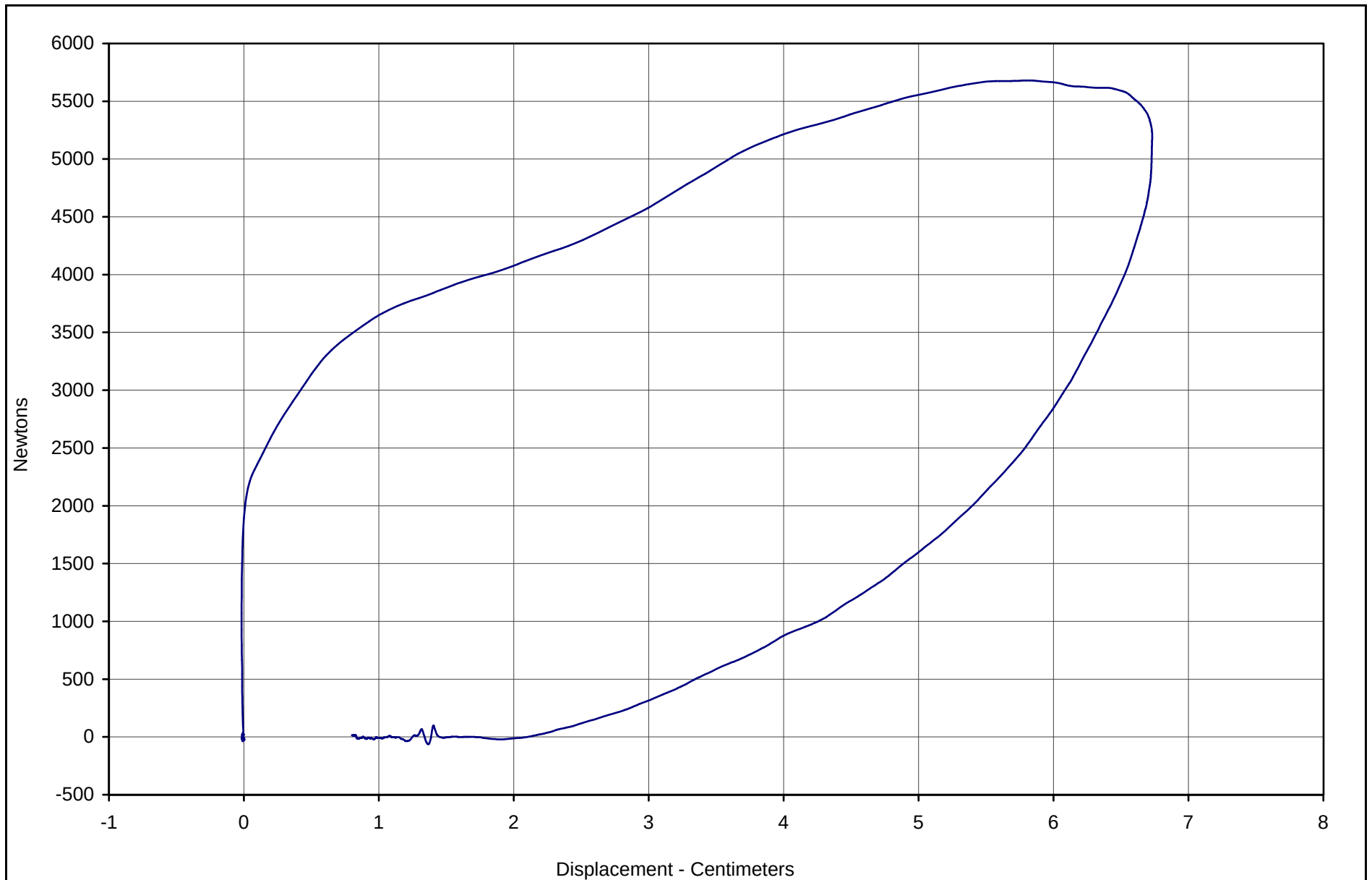
E-18

KAR22001-13

Laboratory Technician

May 22, 2002

Test Date



Curve Description	CURNO	Type	Hysteresis	Peak Chest Displ.	Peak Probe Force	SAE Class
Probe Force vs. Chest Displacement	001	FIL	78.4	6.73	5680.0	180



Test Program: Hybrid III 50th Percentile Male Thorax Impact

A.T.D. Serial No.: 035

Test Date: 5/22/02

Test I.D.: CH00A



Calibration Data Sheet

Hybrid III 50th Percentile Male

Neck Flexion Test

ATD Serial No.: 035

Test I.D.: NF00A

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	7.10	Pass
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.6	Pass
	20 Msec.	G's	17.6 to 22.6	19.8	Pass
	30 Msec.	G's	12.5 to 18.5	16.3	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 29.0	16.3	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	41.6	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	67.2	Pass
	Time	Msec.	57.0 to 64.0	63.6	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	124.3	Pass
Moment About Occipital Condyle	Maximum	Nm	84.1 to 108.5	87.4	Pass
	Time	Msec.	47.0 to 58.0	57.4	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	101.7	Pass
Overall Test Results					Pass

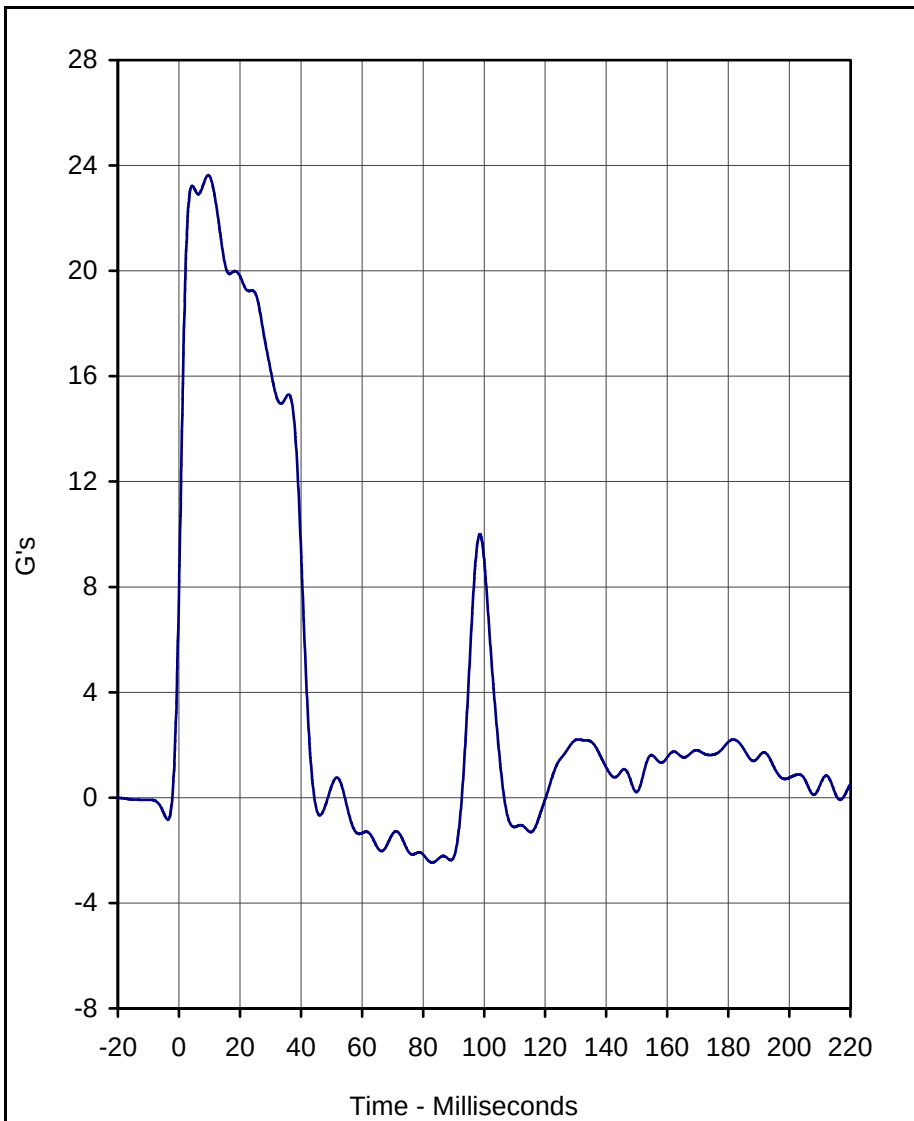
Laboratory Technician

May 22, 2002

Test Date

E-20

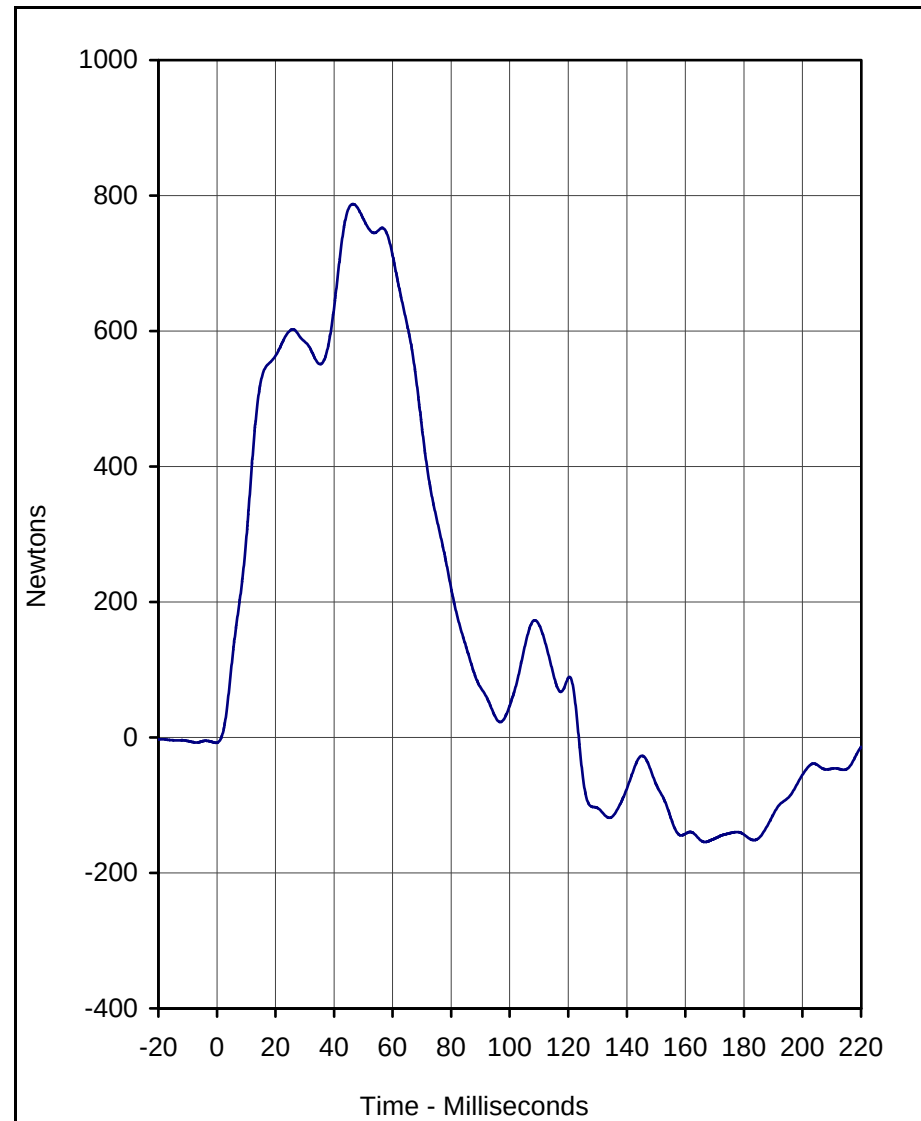
KAR22001-13



Curve Description	CURNO	Type
Pendulum Deceleration	001	FIL

Units	Max	Time	Min	Time	SAE Class
G's	23.6	9.6	-2.5	83.0	60

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test
 Test Date: 5/22/02

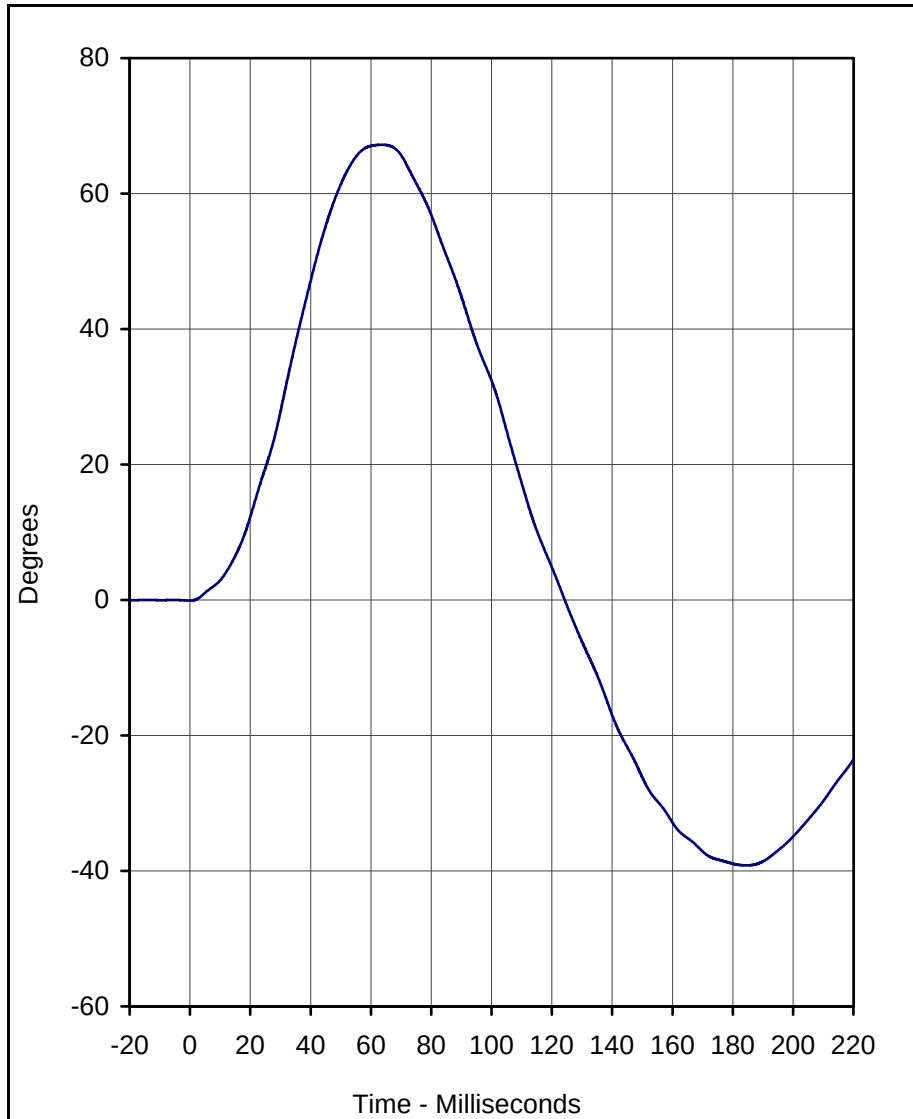


Curve Description	CURNO	Type
Neck Force X	002	FIL

Units	Max	Time	Min	Time	SAE Class
Newtons	787.5	46.4	-154.3	166.7	60

A.T.D. Serial No.: 035
 Test I.D.: NF00A

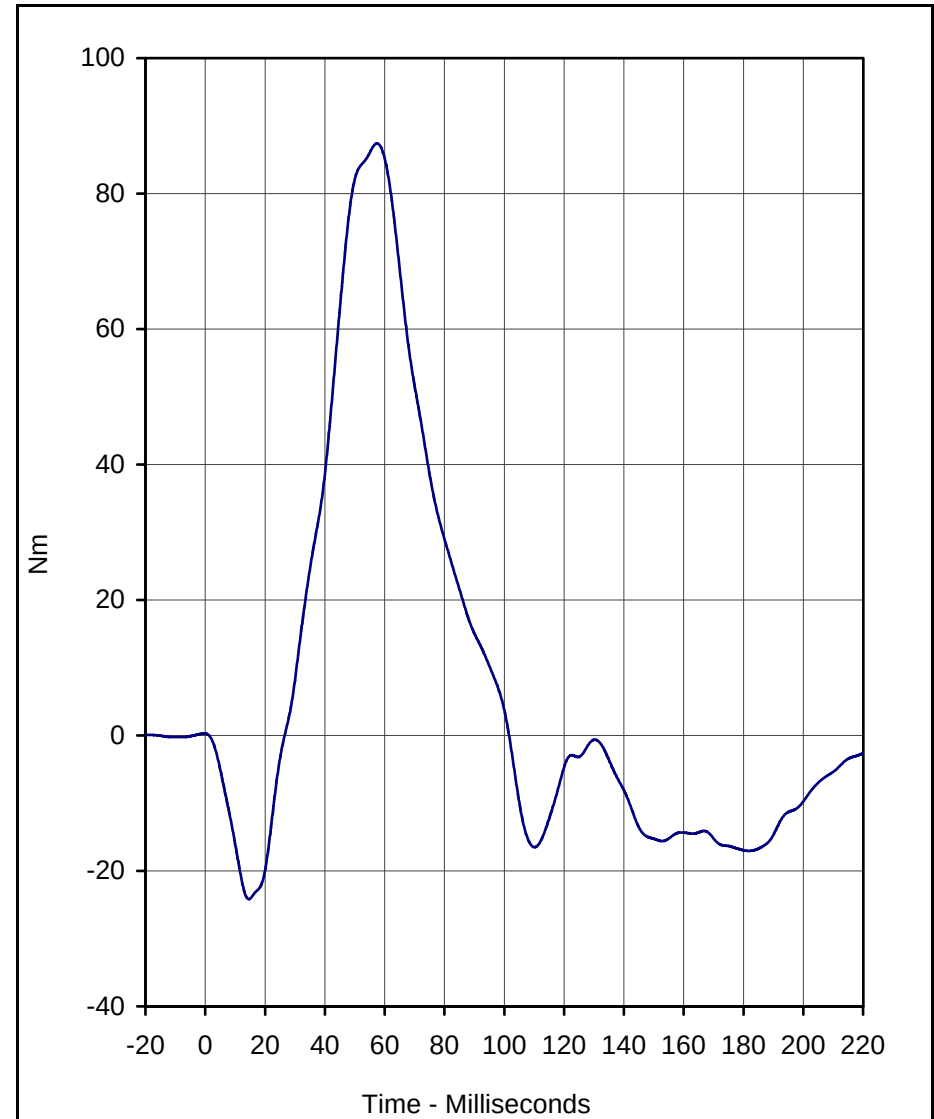




Curve Description	CURNO	Type
"D" Plane Rotation	003	FIL

Units	Max	Time	Min	Time	SAE Class
Degrees	67.2	63.6	-39.2	184.6	60

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test
 Test Date: 5/22/02



Curve Description	CURNO	Type
Moment About Occipital Condyle	004	FIL

Units	Max	Time	Min	Time	SAE Class
Nm	87.4	57.4	-24.2	14.6	60

A.T.D. Serial No.: 035
 Test I.D.: NF00A





Calibration Data Sheet

Hybrid III 50th Percentile Male

Neck Extension Test

ATD Serial No.: 035

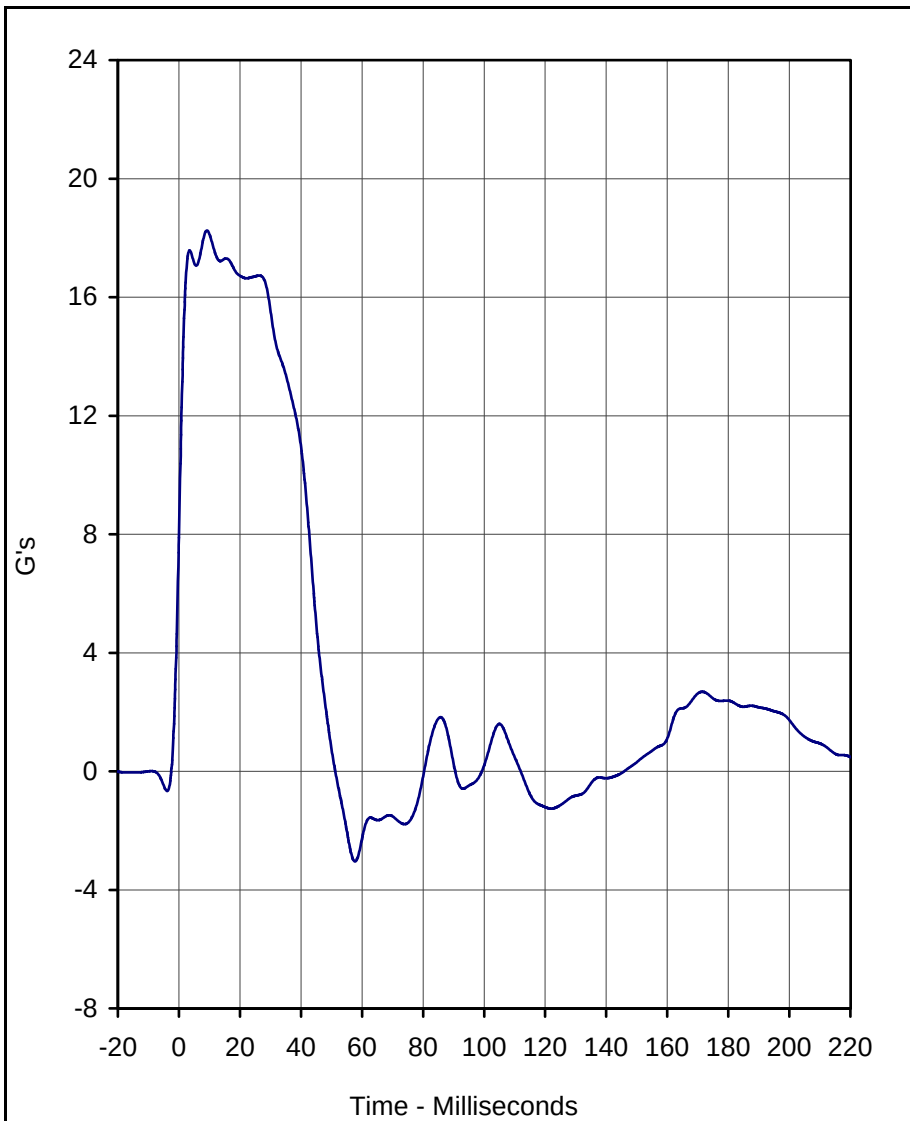
Test I.D.: NE00A

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	5.94 to 6.19	6.16	Pass
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	18.1	Pass
	20 Msec.	G's	14.0 to 19.0	16.7	Pass
	30 Msec.	G's	11.0 to 16.0	15.6	Pass
Peak Pendulum Decel. after 30 Msec.		G's	≤ 22.0	15.6	Pass
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	45.0	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	92.7	Pass
	Time	Msec.	72.0 to 82.0	80.0	Pass
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	153.6	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to- 79.9	-66.3	Pass
	Time	Msec.	65.0 to 79.0	67.0	Pass
Positive Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	139.2	Pass
Overall Test Results					Pass

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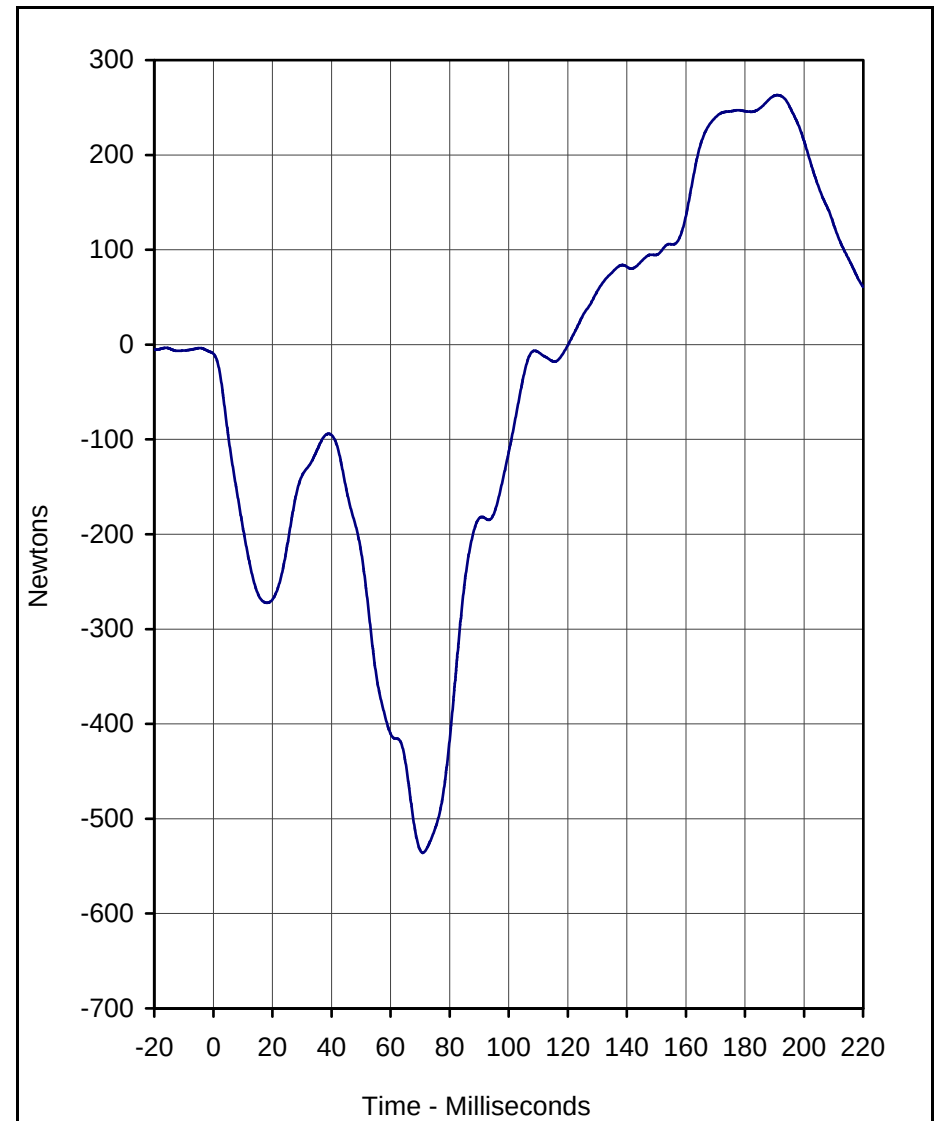
Test Date



Curve Description	CURNO	Type
Pendulum Deceleration	001	FIL

Units	Max	Time	Min	Time	SAE Class
G's	18.2	9.2	-3.0	57.7	60

Test Program: Hybrid III 50th Percentile Male Neck Extension Test
 Test Date: 5/22/02

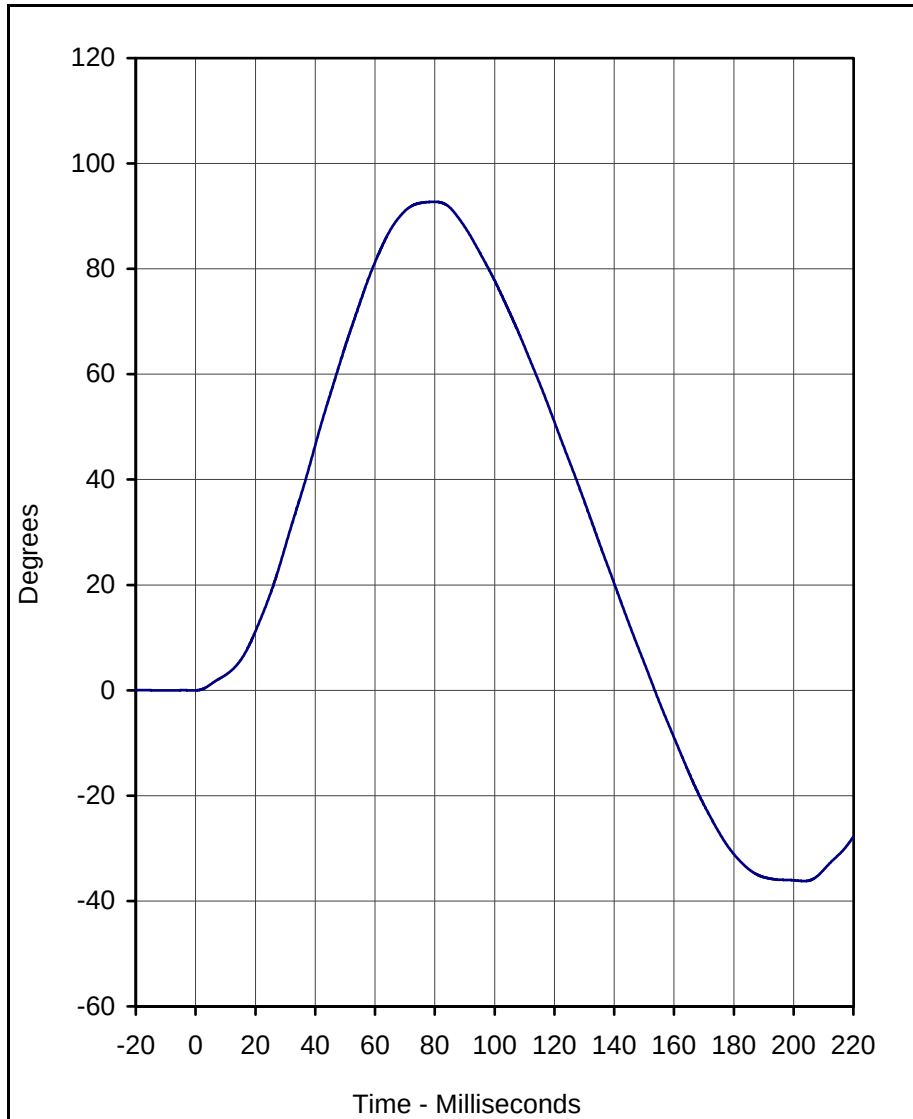


Curve Description	CURNO	Type
Neck Force X	002	FIL

Units	Max	Time	Min	Time	SAE Class
Newtons	263.1	191.0	-535.9	70.9	60

A.T.D. Serial No.: 035
 Test I.D.: NE00A

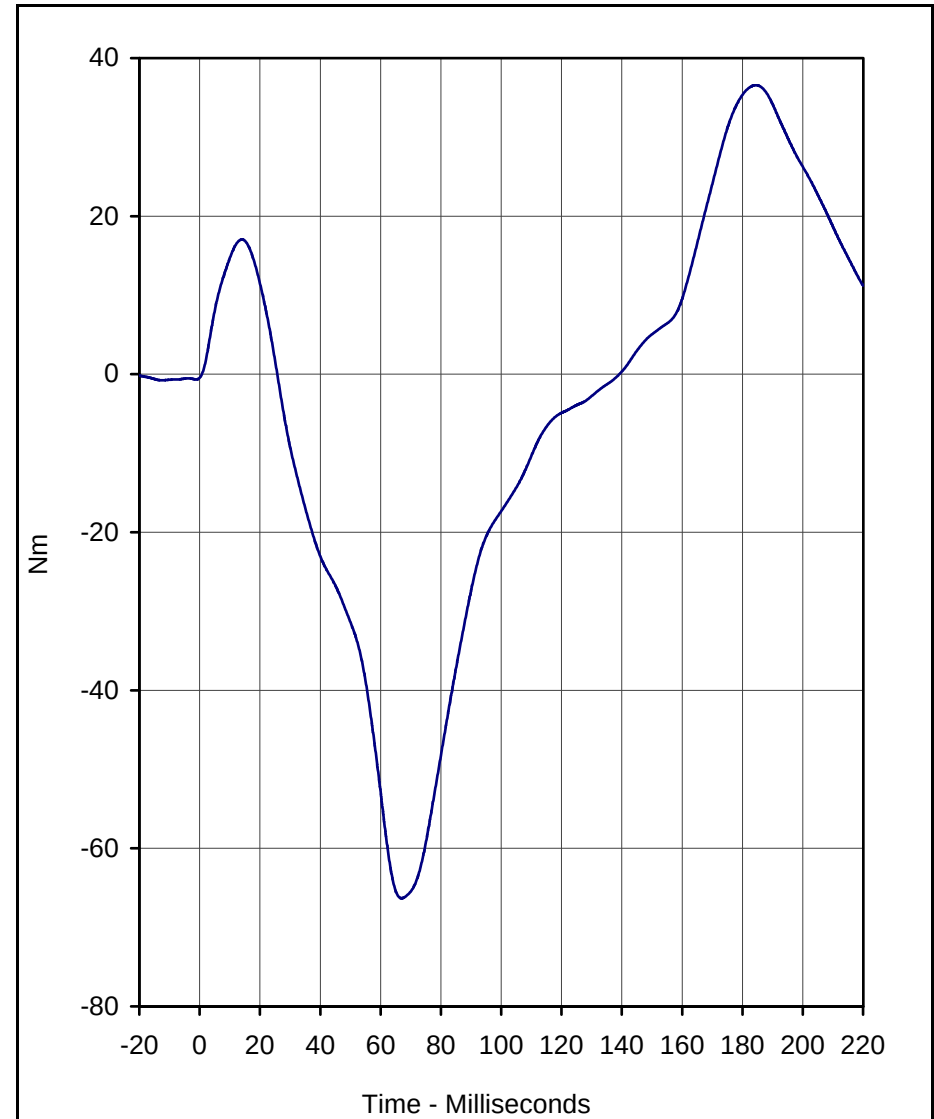




Curve Description	CURNO	Type
"D" Plane Rotation	003	FIL

Units	Max	Time	Min	Time	SAE Class
Degrees	92.7	80.0	-36.2	203.7	60

Test Program: Hybrid III 50th Percentile Male Neck Extension Test
 Test Date: 5/22/02



Curve Description	CURNO	Type
Moment About Occipital Condyle	004	FIL

Units	Max	Time	Min	Time	SAE Class
Nm	36.6	184.5	-66.3	67.0	60

A.T.D. Serial No.: 035
 Test I.D.: NE00A





Calibration Data Sheet Hybrid III 50th Percentile Male External Measurements

ATD Serial No.: 035

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
A - Total sitting height	mm	879 to 889	885	Pass
B - Shoulder pivot height	mm	505 to 521	520	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	90	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	340	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	450	Pass
M - Knee pivot height	mm	485 to 500	495	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	260	Pass
V - Shoulder breadth	mm	422 to 437	435	Pass
W - Foot breadth	mm	91 to 107	100	Pass
Y - Chest circumference	mm	970 to 1001	1000	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

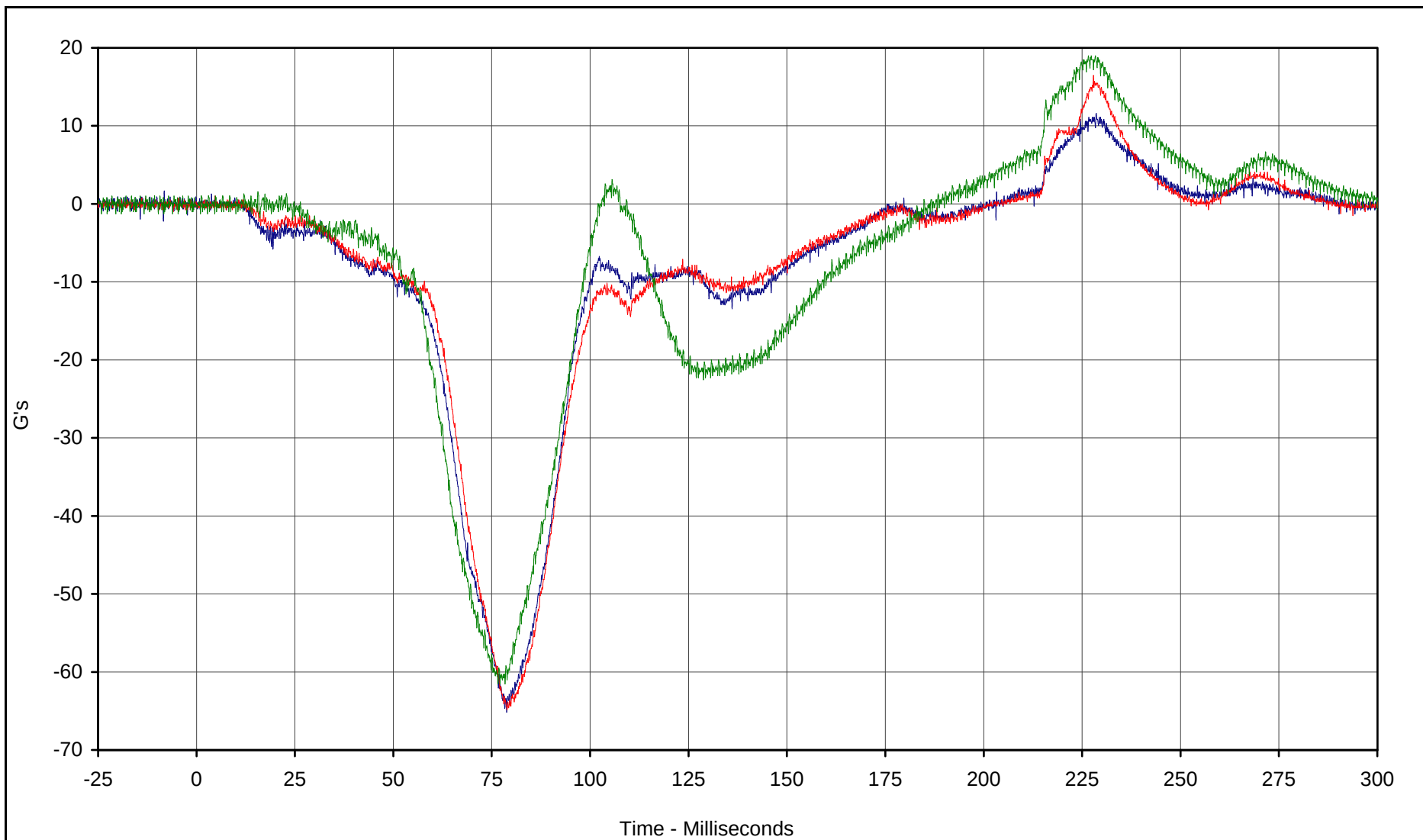
Laboratory Technician

May 22, 2002

Test Date

APPENDIX G

NINE ACCELEROMETER HEAD ARRAY DATA



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Primary X	134	FIL	G's	11.6	228.6	-65.2	78.8	1000
Driver NAHA Yarm-X	138	FIL	G's	16.5	227.9	-64.9	78.9	1000
Driver NAHA Zarm-X	141	FIL	G's	19.0	226.6	-61.5	76.6	1000

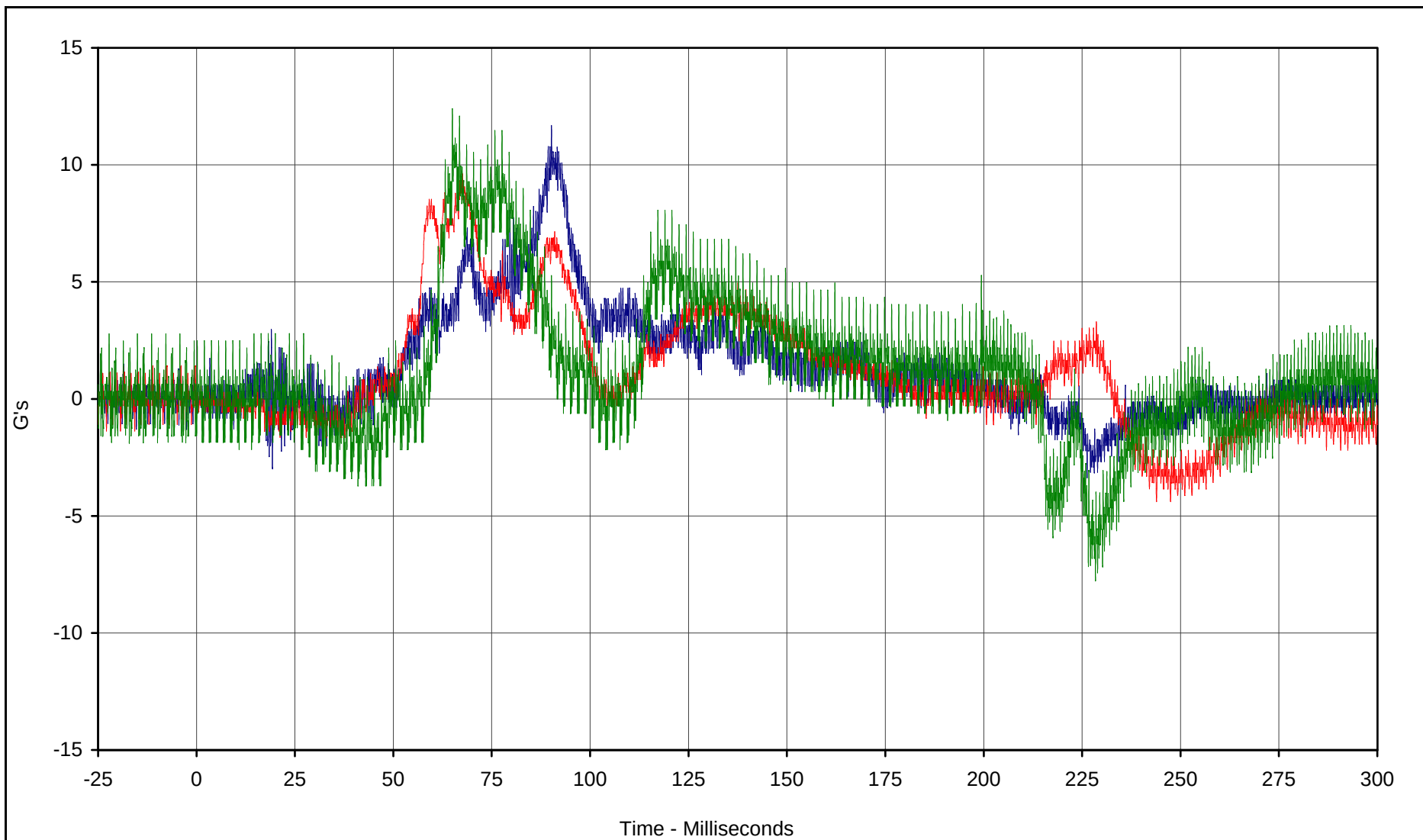


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Primary Y	135	FIL	G's	11.7	90.2	-3.4	226.3	1000
Driver NAHA Xarm-Y	140	FIL	G's	9.6	67.6	-4.4	243.9	1000
Driver NAHA Zarm-Y	142	FIL	G's	12.4	65.0	-7.7	228.4	1000

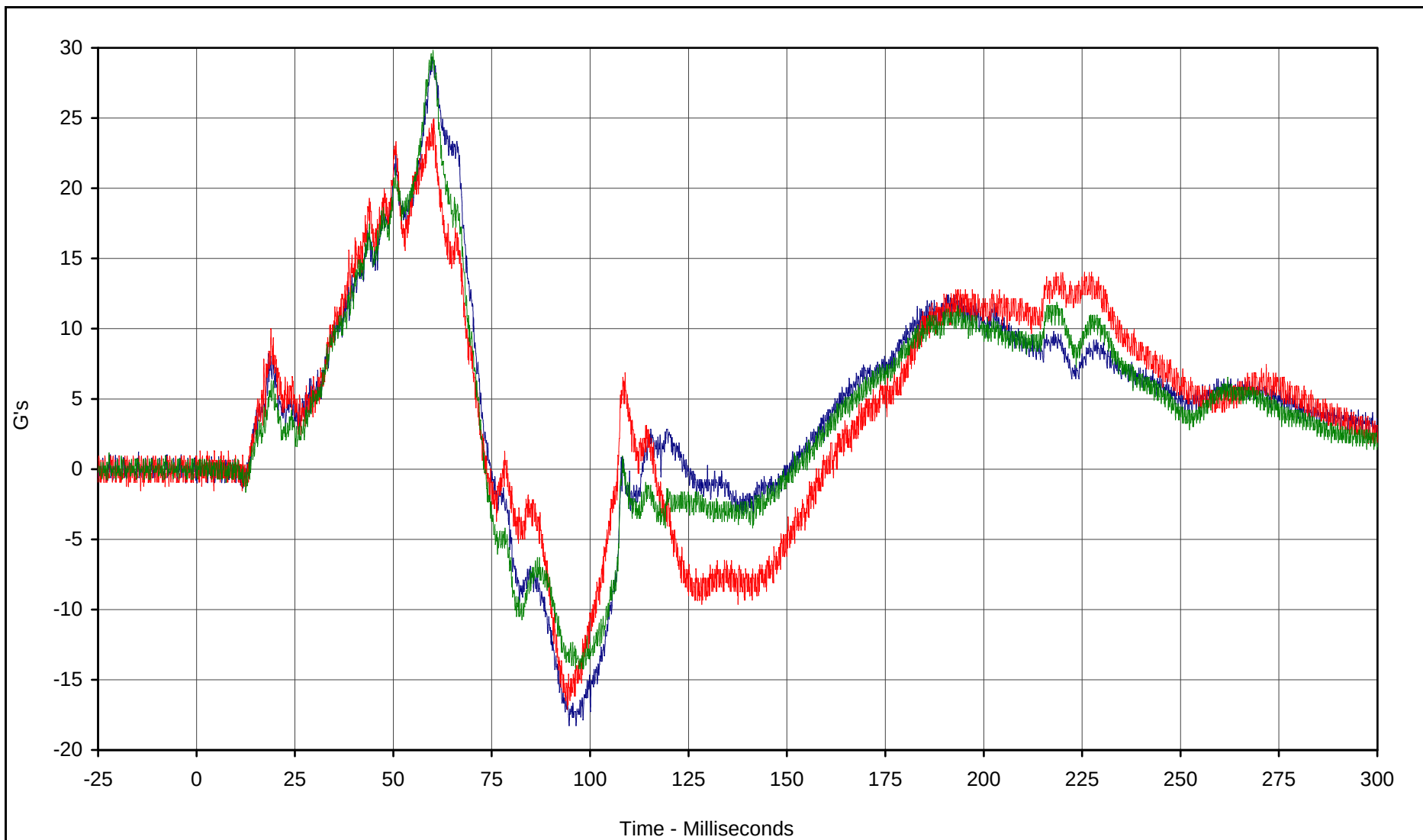


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Driver Head Primary Z	136	FIL	G's	29.3	59.6	-18.3	94.6	1000
Driver NAHA Xarm-Z	139	FIL	G's	24.9	60.1	-17.1	94.2	1000
Driver NAHA Yarm-Z	137	FIL	G's	29.8	60.1	-14.2	96.3	1000

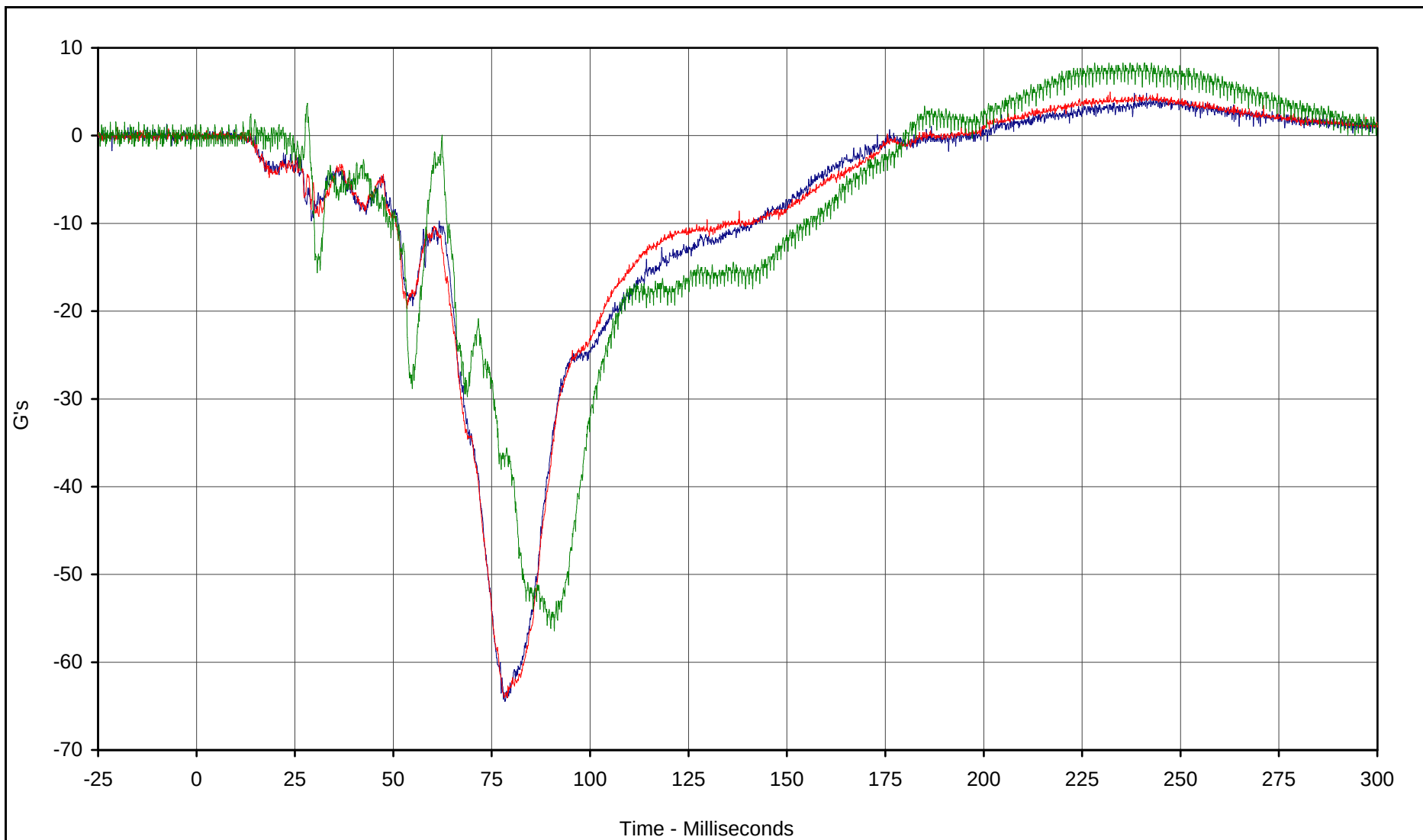


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Primary X	143	FIL	G's	4.8	238.3	-64.4	78.3	1000
Passenger NAHA Yarm-X	147	FIL	G's	5.0	232.1	-64.0	78.2	1000
Passenger NAHA Zarm-X	150	FIL	G's	8.3	228.2	-56.4	90.9	1000

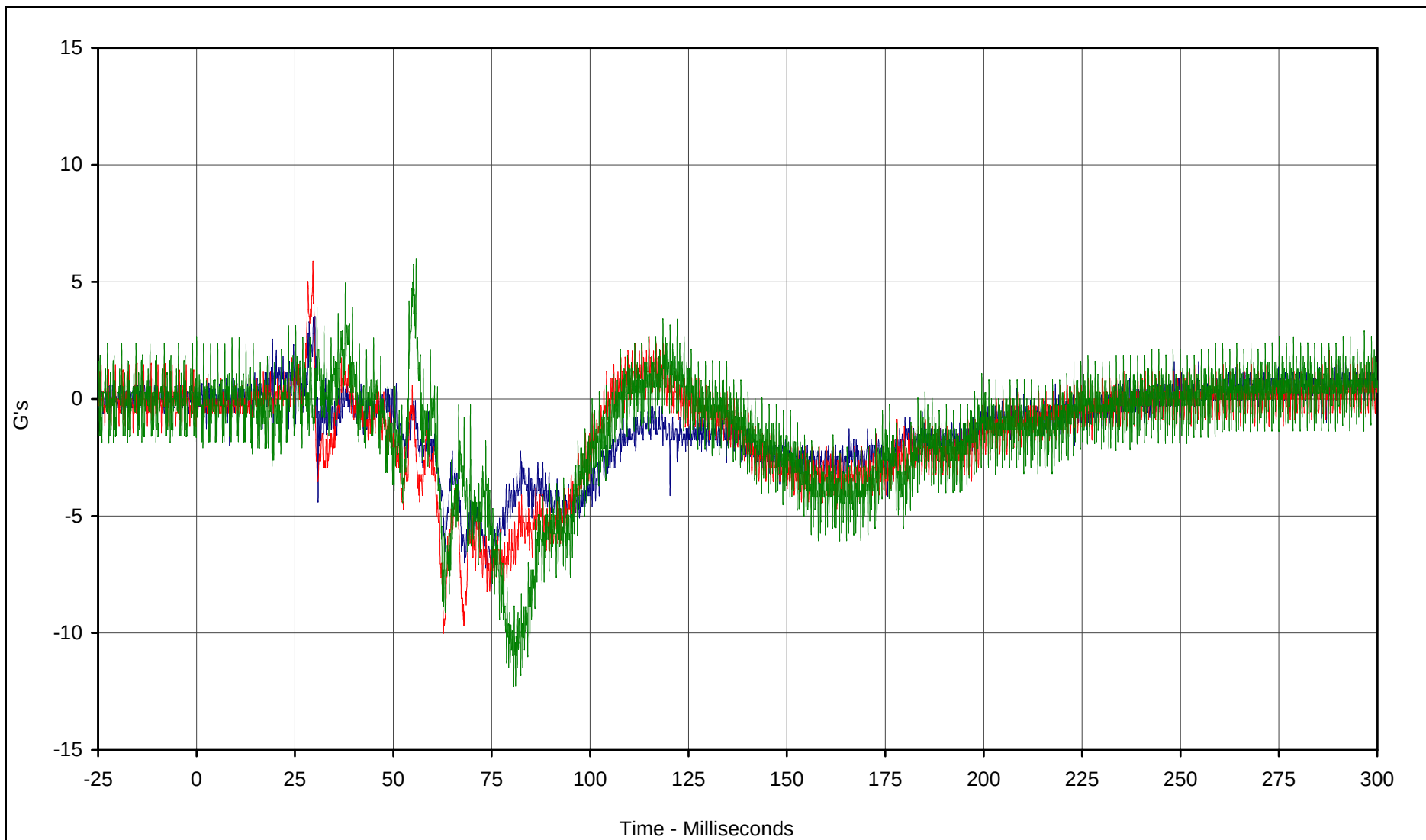


Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107



Curve Description	CURNO	Type	Units	Max	Time	Min	Time	SAE Class
Passenger Head Primary Y	144	FIL	G's	3.5	29.7	-8.2	74.8	1000
Passenger NAHA Xarm-Y	149	FIL	G's	5.9	29.6	-10.0	62.7	1000
Passenger NAHA Zarm-Y	151	FIL	G's	6.0	55.8	-12.3	80.6	1000



Test Vehicle: 2002 Toyota Highlander 4WD SUV

Test Date: 5/29/02

Test Program: 2002 NHTSA 35mph NCAP

NHTSA No.: M25107