

**REPORT NUMBER: NCAP-MGA-2001-011**

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

**General Motors Corporation  
2001 Chevrolet Suburban 4 door  
NHTSA NUMBER: M10107**

**PREPARED BY:  
MGA RESEARCH CORPORATION  
5000 WARREN ROAD  
BURLINGTON, WI 53105**



**February 5, 2001**

**FINAL REPORT**

**PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
OFFICE OF CRASHWORTHINESS STANDARDS  
400 SEVENTH STREET, SW, ROOM 5311  
WASHINGTON, D.C. 20590**

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16. <i>Abstract</i> A 35 mph (56.3 km/h) frontal barrier impact was conducted on a 2001 Chevrolet Suburban 4 door at MGA Research Corporation on February 5, 2001. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The impact velocity was 56.5 km/h. The ambient temperature at the barrier face at the time of impact was 21 degrees Celsius. The vehicle's maximum post test static crush is 647mm located to the right of the vehicle centerline. The test vehicle is equipped with a 3-point continuous belt system and a frontal airbag in both front outboard seating positions. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows:																												
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Measurement Description</u></th> <th style="text-align: left;"><u>Units</u></th> <th style="text-align: left;"><u>Threshold</u></th> <th style="text-align: left;"><u>Driver ATD</u></th> <th style="text-align: left;"><u>Pass. ATD</u></th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC)</td> <td>N/A</td> <td>1000</td> <td>659</td> <td>467</td> </tr> <tr> <td>Max. Thorax Accel. (3msec Clip)</td> <td>G's</td> <td>60</td> <td>43</td> <td>53</td> </tr> <tr> <td>Left Femur force</td> <td>Newtons</td> <td>10009</td> <td>5493</td> <td>5339</td> </tr> <tr> <td>Right Femur force</td> <td>Newtons</td> <td>10009</td> <td>9758</td> <td>5945</td> </tr> </tbody> </table>				<u>Measurement Description</u>	<u>Units</u>	<u>Threshold</u>	<u>Driver ATD</u>	<u>Pass. ATD</u>	Head Injury Criteria (HIC)	N/A	1000	659	467	Max. Thorax Accel. (3msec Clip)	G's	60	43	53	Left Femur force	Newtons	10009	5493	5339	Right Femur force	Newtons	10009	9758	5945
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## SECTION 1

### PURPOSE AND TEST PROCEDURE

#### 1.1 PURPOSE

This 35 mph (56.3 km/h) frontal barrier impact test is part of the FY' 01 New Car Assessment Program (NCAP) frontal barrier crashworthiness evaluation program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract Number DTNH22-01-D-12005. The purpose of this test is to obtain vehicle crashworthiness, occupant restraint system performance, lower leg data, and child seat research data for frontal barrier impacts. The impact velocity used in this test is in excess of the current 30 mph (48.3 km/h) FMVSS 208/212/219/301 requirements.

#### 1.2 TEST PROCEDURE

This 56.3 km/h frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards (OCS) New Car Assessment Program (NCAP) Laboratory Test Procedure, dated December 1999 and the corresponding MGA Research Corporation Test Procedure NHTSA3, dated January 5, 2001. Data was obtained indicant of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Retention"; FMVSS 219, "Windshield Zone Intrusion (Partial)"; and FMVSS 301, "Fuel System Integrity" performance. Procedures for receiving, inspection, and reporting of test results are described in the test procedures and are not repeated in this report.

The test was conducted at MGA Research Corporation on February 5, 2001 at a speed of 56.5 km/h. The test vehicle was instrumented with nine (9) accelerometers to measure longitudinal axis accelerations. The driver's and passenger's restraint systems were instrumented with four(4) seat belt load cells to measure lap and shoulder belt tension. The specified impact velocity range was 55.5 to 57.1 km/h. The frontal barrier impact event was documented by one (1) real-time panning motion picture camera and sixteen (16) high-speed motion picture cameras. The pre- and post-test conditions were recorded by one (1) real-time motion picture camera. Camera locations and pertinent camera information is documented in the data sheets. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The test vehicle contained three anthropomorphic test devices (ATDs). Two (2) part 572E 50th percentile adult male ATDs and one (1) part 572P 3 year old ATD. The left rear seat did not contain an ATD due to vehicle seat belt damage. Both adult ATDs were instrumented with head, chest, and pelvic tri-axial accelerometers, left and right femur load cells, upper and lower tibia sensors, and foot accelerometers. In addition, chest displacement and upper neck six-axis force and moment sensors were utilized. The adult ATDs were positioned in the front outboard seating positions according to the dummy placement procedures specified in the Laboratory Indicant Test Procedure. The child ATD was instrumented with head, chest, and pelvic tri-axial accelerometers, and upper and lower neck load cells. The child ATD was positioned in the right rear seating position according to the child seat manufacturer's instructions. One hundred twenty-one (121) channels of data were recorded with an EME on-board data acquisition system. The data was digitally sampled at 10,000 samples per second and processed per section IP11 of the Laboratory Test Procedure.

The driver (Serial No. 065) and the right-front passenger (Serial No. 066) were calibrated prior to this test. FMVSS 208 "Occupant Crash Protection" injury criteria were not exceeded by either ATD during this frontal barrier impact test.

### **1.3 SUMMARY OF FRONTAL IMPACT TEST**

A rigid load cell barrier was impacted by a 2001 Chevrolet Suburban 4 door at a velocity of 56.5 km/h. The test vehicle weight was 2868.1 kilograms with two (2) part 572E 50th percentile adult male ATDs and one (1) part 572P 3 year old ATD. Six (6) load cell barrier data channels were obtained in conducting the NCAP Test. The test vehicle is equipped with a longitudinally mounted 5.3-liter, 8-cylinder engine and an automatic transmission.

The driver Head Injury Criteria (HIC) was 659. The maximum resultant chest deceleration over three (3) milliseconds was 43 g's. The left and right femur loads were 5493 and 9758 Newtons, respectively. Chest deflection for the driver ATD peaked at 27 mm. The driver ATD head contacted the airbag and headrest, its chest and abdomen contacted the airbag, and the left and right knees contacted the knee bolster.

The right front passenger's HIC was 467. The maximum resultant chest deceleration over three (3) milliseconds was 53 g's. The left and right femur loads were 5339 and 5945 Newtons, respectively. Chest deflection for the passenger ATD peaked at 24 mm. The passenger ATD head contacted the airbag and headrest, the chest and abdomen contacted the airbag, and the left and right knees contacted the glovebox.

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

The test vehicle sustained a maximum static crush of 647 mm located 167 mm to the right of the vehicle centerline. Both the driver and passenger side front doors did not open without the aid of tools.

### **1.4 GENERAL COMMENTS**

The 2001 Chevrolet Suburban 4 door passed the requirements of FMVSS 208, FMVSS 212, FMVSS 219, and FMVSS 301-75. Data pertaining to these standards are presented in the data sheets.

The vehicle, occupant, camera, and measurement data are presented in Section 2. Appendix A contains the still photograph prints. Appendix B Contains the dummy and vehicle response data traces. Appendix C contains the dummy calibration data. Appendix D contains the instrumentation calibration data and Appendix E contains the owner's manual instructions for the occupant seating and restraint systems and Appendix F contains the child data and photos.

## SECTION 2

### OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

#### CONVERSION FACTORS USED IN THIS REPORT\*

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

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

**DATA SHEET NO. 1****CRASH TEST SUMMARY**Test Vehicle: 2001/Chevrolet/Suburban/4 doorNHTSA No.: M10107Test Program: NCAPTest Date: February 5, 2001**PRIMARY IMPACT DATA**

Measured Parameter	Units	Value
Velocity at Impact	km/h	56.5
Test Weight	kg	2868.1
Impact Angle	degrees	90
Average Rebound	mm	827
Maximum Static Crush	mm	647

**DOOR OPENING AND SEAT TRACK INFORMATION**

Description	Driver	Passenger
Front Door Opening	no	no
Rear Door Opening	yes	yes
Seat Track Shift (mm)	5 forward	0
Seat Back Failure	none	none

**TEST DUMMY INFORMATION**

Description	Driver	Passenger
Dummy Type / Serial No.	HIII/065	HIII/066
Head Contact	airbag, headrest	airbag, headrest
Chest Contact	airbag	airbag
Abdomen Contact	airbag	airbag
Left Knee Contact	knee bolster	glovebox
Right Knee Contact	knee bolster	glovebox

**16mm MOVIE COVERAGE**

High Speed	16
Real Time	1
Total	17

Driver ATD Sensors	42
Passenger ATD Sensors	42
Belt Assessment Sensors	4
Vehicle Structure Accelerometers	9
Rigid Barrier Load Cells	6
Total	103

**DATA SHEET NO. 2  
GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

**TEST VEHICLE INFORMATION**

Manufacturer	Chevrolet
Model	Suburban
Body Style	4 door
NHTSA No.	M10107
VIN	1GNFK16T31J112502
Color	Charcoal gray
Delivery Date	1/9/01
Odometer Reading (mile)	40
Dealer	Lynch
Transmission	Automatic
Final Drive	4WD
Number of Cylinders	8
Engine Displacement (L)	5.3
Engine Placement	longitudinal

**TEST VEHICLE OPTIONS**

Driver Airbag	yes
Passenger Airbag	yes
Power Windows	yes
Power Steering	yes
Power Door Locks	yes
Tilt Wheel	yes
Air Conditioning	yes
Power Brakes	yes
Disc Brakes, Front	yes
Disc Brakes, Rear	yes
Anti-lock Brakes	yes
AM/FM/Cd	yes
Anti-theft System	no
Cruise Control	yes

**DATA FROM CERTIFICATION LABEL**

Manufactured By	General Motors Corp.	GVWR (kg)	3266
Date of Manufacture	08/00	GAWR Front (kg)	1613
		GAWR Rear (kg)	1814

**DATA FROM TIRE PLACARD**

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	240	240
Cold Pressure (kPa)	240	240
Recommended Tire Size	P265/70R16	P265/70R16
Tire Size on Vehicle	P265/70R16	P265/70R16
Tire Manufacturer	Firestone	Firestone

Measured Parameter	Front	Rear	Third	Total
Type of Seats	bucket	bench	bench	
Number of Occupants	2	3	3	8
Capacity Wt. (VCW) (kg)				680.4
Cargo Weight (RCLW) (kg)				136.1

**DATA SHEET NO. 2...(continued)**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	679.5	646.8		748.0	707.6	
Right	kg	668.6	590.1		703.1	709.4	
Ratio	%	52.2	47.8		50.6	49.4	
Totals	kg	1348.1	1236.9	2585.0	1451.1	1417.0	2868.1

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2585.0
Weight of 2 P572E ATDs	kg	156.0
Rated Cargo/Luggage Weight (RCLW)	kg	136.1
Calculated Vehicle Target Weight (TVTW)	kg	2877.1

**TEST VEHICLE ATTITUDES AND CG**

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	904	913	926	935	1584
As Tested	mm	890	892	897	906	1635
Post Test	mm	910	595	1010	845	

Vehicle Wheelbase (mm): 3310

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

Vehicle Components Removed: None

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

**FUEL SYSTEM DATA**

Fuel System Capacity From Owner's Manual (L): 123.0

Usable Capacity Figure Furnished by COTR (L): 116.5

Actual Test Volume (L): 106.0

Test Fluid Type: Stoddard Solvent ; Specific Gravity: 0.77

Is Vehicle Fuel Pump Electric or Mechanical?: Electric

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

Fuel System Particulars: When the ignition is turned on, the fuel pump runs for 2 seconds and then stops. Afterwards, the pump runs when the engine is running.

**DATA SHEET NO. 3**

**POST IMPACT DATA**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	55.5 - 57.1	56.5
Trap No. 1 Entry Distance	mm	<1524	1300
Trap No. 1 Exit Distance	mm	<1524	300
Trap No. 2 Velocity (Redundant)	km/h	55.5 - 57.1	56.5
Trap No. 2 Entry Distance	mm	<1524	1425
Trap No. 2 Exit Distance	mm	<1524	425

**VEHICLE STATIC CRUSH**

Measured Parameter	Units	Pre-Test	Post-Test	Difference
Left Side	mm	5396	4948	448
Center	mm	5569	4896	673
Right Side	mm	5397	4877	520

**VEHICLE REBOUND FROM BARRIER**

Measured Parameter	Units	Value
Left Side	mm	800
Center	mm	839
Right Side	mm	841
Average	mm	827

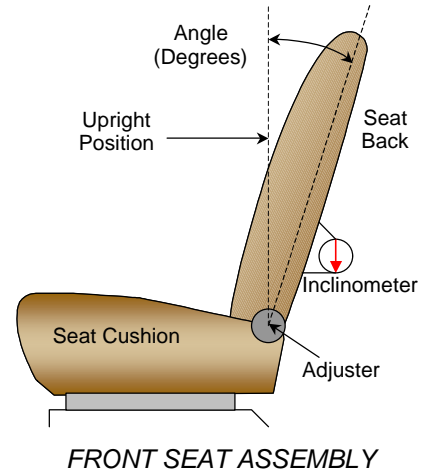
**DATA SHEET NO. 4**  
**TEST VEHICLE INFORMATION**

Test Vehicle: 2001/Chevrolet/Suburban/4 door  
Test Program: NCAP

NHTSA No.: M10107  
Test Date: February 5, 2001

**NORMAL DESIGN RIDING POSITION**

The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows:  
With the cloth and foam cutaway, place the inclinometer at the middle of the seat back metal tower tube. The seat back angle shall be 15.5 degrees.



Driver seat back angle: 15.4 degrees  
Passenger seat back angle: 15.5 degrees

**SEAT FORE/AFT POSITIONS**

Both driver and passenger seats are power operated. The total travel on the driver and the passenger seat is 220 mm. The fore/aft position is set at the middle position for both driver and passenger.

Driver seat fore/aft total travel: 220 mm  
Passenger seat fore/aft total travel: 220 mm  
Driver seat fore/aft position: 110 mm  
Passenger seat fore/aft position: 110 mm

**SEAT BELT UPPER ANCHORAGE**

The front outboard seats contained an integrated seat belt. There was no adjustable seat belt anchorage.

**DATA SHEET NO. 4...(continued)**

**TEST VEHICLE INFORMATION**

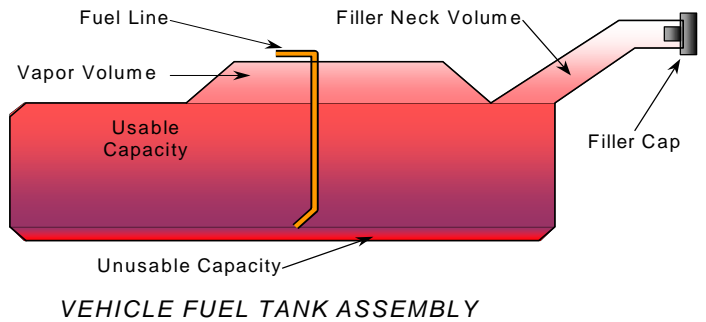
Test Vehicle: 2001/Chevrolet/Suburban/4 door  
Test Program: NCAP

NHTSA No.: M10107  
Test Date: February 5, 2001

**FUEL TANK CAPACITY DATA**

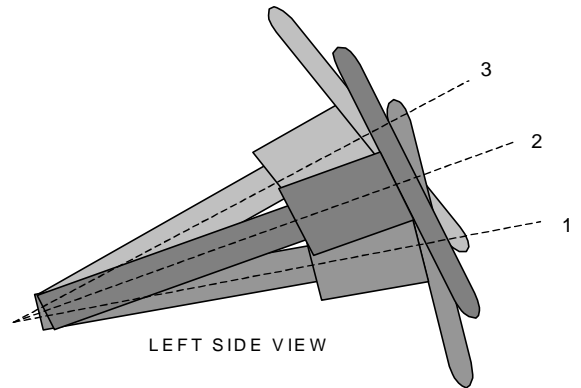
The "Usable Capacity" of the standard equipment fuel tank is: 116.5 liters  
The "Usable Capacity" of any optional equipment fuel tank is: n/a liters  
The "Usable Capacity" used for certification to FMVSS 301 requirements: 116.5 liters  
Actual amount of Stoddard solvent added to vehicle for certification test: 106.0 liters

The test vehicle is equipped with an electric fuel pump. When the ignition is turned on, the fuel pump runs for 2 seconds and then stops. Afterwards, the pump runs when the engine is running.



**STEERING COLUMN ADJUSTMENT**

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes, when it is moved through its full range of motion. A metal plate is placed across the rim of the steering wheel, and inclinometer is placed onto the plate and the angle is measured.



Lowermost, position 1: 12.2°  
Geometric center, position 2: 21.9°  
Uppermost, position 3: 31.7°

# DATA SHEET NO. 5

## DUMMY POSITIONING IN VEHICLE

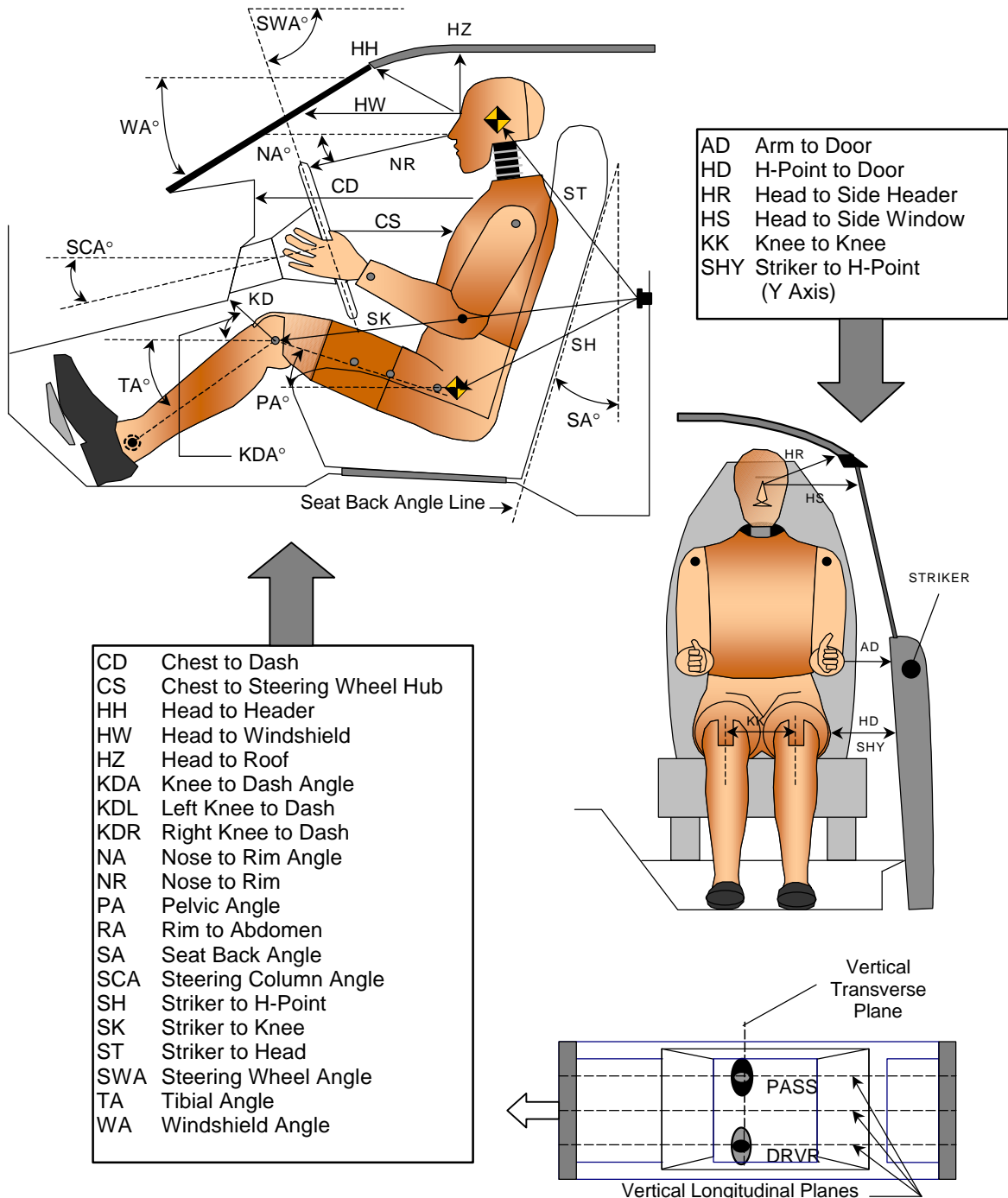
Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

### DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



**DATA SHEET NO. 5...(continued)**

**DUMMY POSITIONING IN VEHICLE**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

**TEST DUMMY POSITION MEASUREMENTS**

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		37.1		
SWA	Steering Wheel Angle		68.1		
SCA	Steering Column Angle		27.6		
SA	Seat Back Angle		15.4		15.5
HZ	Head to Roof (Z)	231	90.0	220	90.0
HH	Head to Header	489	22.3	465	22.1
HW	Head to Windshield	690	0.0	657	0.0
HR	Head to Side Header (Y)	314		267	
NR	Nose to Rim	350	9.8		
CD	Chest to Dash	537		470	
CS	Chest to Steering Hub	301	7.9		
RA	Rim to Abdomen	174	0.0		
KDL	Left Knee to Dash	149	0.0	118	
KDR	Right Knee to Dash	156		164	0.0
PA	Pelvic Angle		24.0		23.3
TA	Tibia Angle		48.5		50.0
KK	Knee to Knee (Y)	284		245	
SK	Striker to Knee	711	87.6	725	89.0
ST	Striker to Head	641	16.6	670	25.1
SH	Striker to H-Point	315	89.4	320	87.3
SHY	Striker to H-Point (Y)	260		265	
HS	Head to Side Window	359		330	
HD	H-Point to Door (Y)	151		145	
AD	Arm to Door (Y)	123		131	
AA	Ankle to Ankle	281		218	

**DATA SHEET NO. 6**

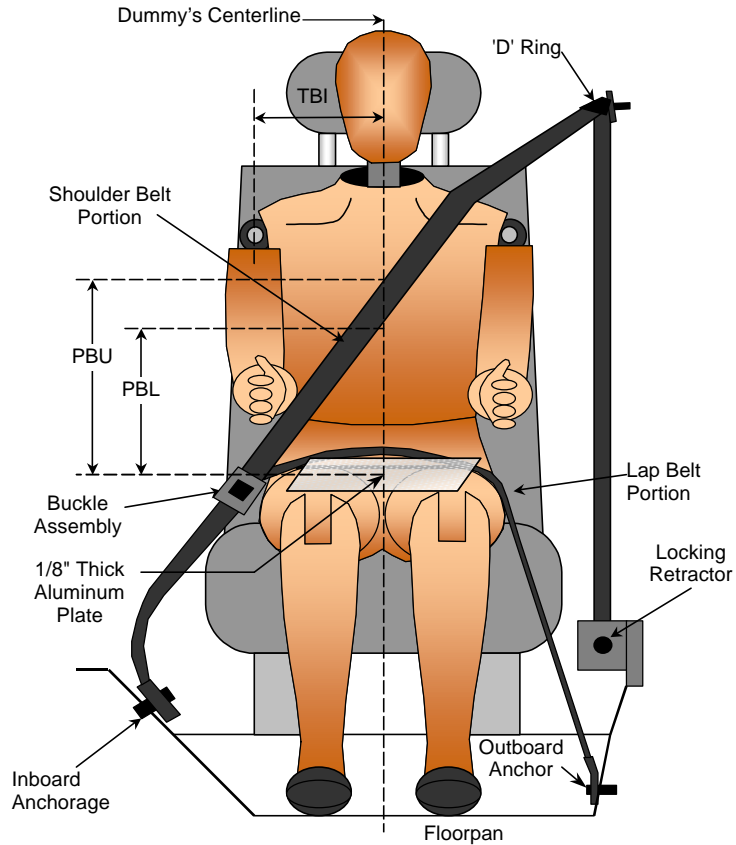
**SEAT BELT POSITIONING DATA**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001



**SEAT BELT POSITIONING MEASUREMENTS**

Measurement Description	Units	Driver	Passenger
TBI - Dummy centerline to shoulder bolt	mm	192	191
PBU - Top surface of reference to belt upper edge	mm	342	341
PBL - To surface of reference to belt lower edge	mm	274	273

**DATA SHEET NO. 7**

**VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

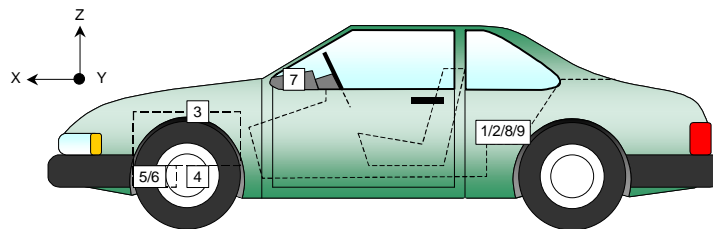
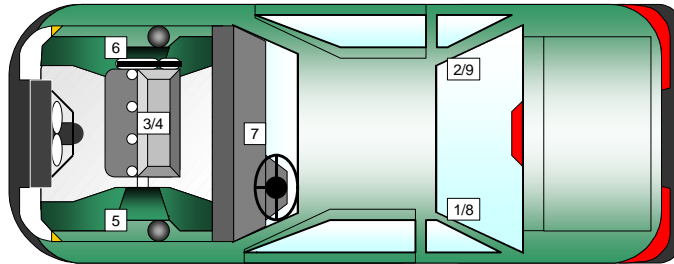
**VEHICLE X-AXIS ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS**

No.	Accelerometer Location	Measurements (mm)			Peak Values				
		X	Y	Z	Units	Max	Time	Min	Time
1	Left Rear X-Member (Primary)	2322	-700	512	G's	1.6	184	28.7	61
2	Right Rear X-Member (Primary)	2322	700	514	G's	1.4	182	30.9	61
3	Engine Top	4596	130	1006	G's	12.3	75	94.4	37
4	Engine Bottom	4310	0	330	G's	12.8	62	74.5	45
5	Left Brake Caliper	4506	-685	267	G's	**	**	**	**
6	Right Brake Caliper	4506	685	262	G's	85.4	28	173.3	18
7	Instrument Panel	3858	-10	1405	G's	9.3	119	59.6	64
8	Left Rear X-Member (Redundant)	2322	-700	512	G's	1.7	184	30.4	61
9	Right Rear X-Member (Redundant)	2322	700	514	G's	1.3	182	32.3	61

Reference Points: X - From Rear Surface of Vehicle (+ forward)    \*\* No valid data collected

Y - Vehicle Centerline (+ to right)

Z - Ground Plane (+ up)



**DATA SHEET NO. 8**

**HYBRID III ATD INJURY CRITERIA AND SENSOR DATA**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

**HEAD PRIMARY PEAK ACCELERATIONS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	3.5	26	73.7	84	1.5	43	41.3	86
Head CG	Y	G's	12.3	84	9.9	83	11.6	103	3.7	59
Head CG	Z	G's	28.0	61	24.0	83	34.7	81	2.5	127
Head CG Resultant	N/A	G's	76.5	83			53.2	82		

**CHEST PRIMARY PEAK ACCELERATIONS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	3.4	146	41.4	84	1.0	176	53.1	76
Chest CG	Y	G's	8.7	82	2.7	57	3.3	47	6.1	70
Chest CG	Z	G's	20.2	72	12.5	124	20.5	67	14.9	137
Chest CG Resultant	N/A	G's	44.0	70			54.9	76		

**FEMUR PEAK FORCES**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Femur	Z	Newtons	264	40	5493	57	324	195	5339	55
Right Femur	Z	Newtons	373	140	9758	55	198	40	5945	53

**SEAT BELT SENSOR PEAK VALUES**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Lap Belt Force	N/A	Newtons	4024	55			4074	54		
Shoulder Belt Force	N/A	Newtons	4192	83			4849	78		

**HEAD INJURY CRITERIA (HIC)**

Location	Driver				Passenger			
	HIC	Avg G's	T <sup>1</sup>	T <sup>2</sup>	HIC	Avg G's	T <sup>1</sup>	T <sup>2</sup>
Head CG Primary	659	50.7	60.3	96.3	467	44.2	71.7	107.7

**CHEST CLIP (3MSEC)**

Location	Driver			Passenger		
	CLIP	T <sup>1</sup>	T <sup>2</sup>	CLIP	T <sup>1</sup>	T <sup>2</sup>
Chest CG Primary	43.3	67.1	70.2	52.6	75.4	78.5

**DATA SHEET NO. 8...(continued)**  
**HYBRID III ATD INJURY CRITERIA AND SENSOR DATA**

Test Vehicle: 2001/Chevrolet/Suburban/4 door  
 Test Program: NCAP

NHTSA No.: M10107  
 Test Date: February 5, 2001

**PELVIC PEAK ACCELERATIONS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Pelvis	X	G's	4.0	132	93.2	56	3.2	141	67.4	56
Pelvis	Y	G's	9.9	56	24.1	52	4.1	142	8.1	78
Pelvis	Z	G's	9.6	54	18.9	117	5.4	95	16.6	127

**UPPER NECK PEAK FORCES AND MOMENTS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	Newtons	1117	83	413	150	339	76	833	153
Neck Force	Y	Newtons	263	155	273	80	160	128	121	57
Neck Force	Z	Newtons	2236	71	469	112	1864	83	155	133
Neck Moment	X	N•m	21.6	68	13.6	103	7.7	126	7.1	60
Neck Moment	Y	N•m	51.3	82	11.7	116	6.5	107	56.1	164
Neck Moment	Z	N•m	9.3	160	7.9	98	6.7	166	14.2	109

**FOOT PEAK ACCELERATIONS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Foot Aft	X	G's	22.8	58	132.8	47	35.4	64	152.9	45
Left Foot Aft	Z	G's	48.4	44	80.0	49	12.9	41	66.2	55
Left Foot Fore	Z	G's	113.8	44	208.8	48	78.6	57	146.0	48
Right Foot Aft	X	G's	12.4	62	327.7	52	7.9	69	126.0	50
Right Foot Aft	Z	G's	55.0	59	225.8	52	6.1	62	95.5	55
Right Foot Fore	Z	G's	110.4	59	375.7	50	31.6	60	152.8	55

**UPPER AND LOWER TIBIA PEAK FORCES AND MOMENTS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Lower Moment	X	N•m	9.7	102	25.8	75	40.8	54	8.7	129
Left Lower Moment	Y	N•m	67.7	42	107.5	55	43.3	65	29.6	49
Left Lower Force	Z	Newtons	1309	48	149	193	2112	53	197	66
Left Upper Moment	X	N•m	30.4	56	37.6	65	75.8	54	20.0	164
Left Upper Moment	Y	N•m	131.0	45	187.8	54	55.7	42	163.6	53
Left Upper Force	Z	Newtons	1347	48	367	43	2445	48	120	19
Right Lower Moment	X	N•m	132.9	61	51.3	52	43.7	56	96.1	60
Right Lower Moment	Y	N•m	67.1	69	119.8	53	41.1	60	14.3	43
Right Lower Force	Z	Newtons	13155	53	351	180	5134	55	159	96
Right Upper Moment	X	N•m	64.1	61	62.1	57	104.7	57	31.4	101
Right Upper Moment	Y	N•m	7.9	169	404.1*	53	75.3	47	32.5	56
Right Upper Force	Z	Newtons	11366	53	295	112	4604	54	193	96

\* clipped signal

**DATA SHEET NO. 8...(continued)**

**HYBRID III ATD INJURY CRITERIA AND SENSOR DATA**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

**CHEST PEAK DISPLACEMENTS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	mm			27.2	70			23.9	77

**HEAD REDUNDANT PEAK ACCELERATIONS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	3.2	26	73.1	83	1.9	30	42.3	85
Head CG	Y	G's	16.6	84	5.1	27	13.9	107	3.0	59
Head CG	Z	G's	27.6	61	24.9	83	35.0	82	3.5	133
Head CG Resultant	N/A	G's	76.9	83			53.1	83		

**CHEST REDUNDANT PEAK ACCELERATIONS**

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	3.6	145	41.9	80	0.9	178	53.0	76
Chest CG	Y	G's	10.1	85	2.0	57	3.3	47	8.4	70
Chest CG	Z	G's	20.4	72	12.5	123	22.6	68	14.9	137
Chest CG Resultant	N/A	G's	44.0	68			55.1	78		

**REDUNDANT HEAD INJURY CRITERIA (HIC)**

Location	Driver				Passenger			
	HIC	Avg G's	T <sup>1</sup>	T <sup>2</sup>	HIC	Avg G's	T <sup>1</sup>	T <sup>2</sup>
Head CG Primary Redundant	637	50.0	60.4	96.4	441	43.2	71.3	107.3

**REDUNDANT CHEST CLIP (3MSEC)**

Location	Driver			Passenger		
	CLIP	T <sup>1</sup>	T <sup>2</sup>	CLIP	T <sup>1</sup>	T <sup>2</sup>
Chest CG Primary Redundant	43.5	69.5	72.6	53.0	75.4	78.5

**DATA SHEET NO. 9**

**SEAT BELT PERFORMANCE ASSESSMENT TEST DATA**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

**SEAT BELT PLACEMENT MEASUREMENTS**

Measurement Description	Units	Driver	Passenger
TBI - Dummy centerline to shoulder bolt	mm	192	191
PBU - Top surface of reference to belt upper edge	mm	342	341
PBL - Top surface of reference to belt lower edge	mm	274	273

**BELT LENGTH DATA**

Measurement Description	Units	Driver	Passenger
Retractor reel to "D" ring	mm	0	0
Shoulder belt length as measured on ATD	mm	800	799
Lap belt length as measured on ATD	mm	558	549
Total belt length for continuous webbing systems	mm	1358	1348

**SHOULDER BELT SPOOL-OUT DATA**

Measurement Description	Units	Driver	Passenger
As determined mechanically	mm	**	**
As determined electronically	mm	**	**

\*\* Not recorded due to integrated seatbelt

**DATA SHEET NO. 10**

**SUMMARY OF FMVSS 212 DATA**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

Windshield Mounting Details:

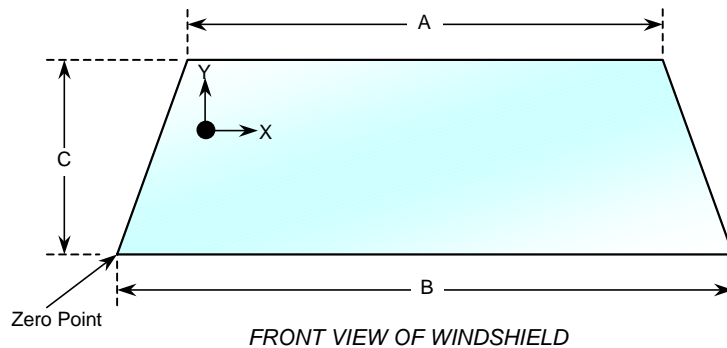
Windshield glass is secured to the vehicle frame with rubber trim and glue.

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

Temperature of windshield molding during test: 21 °C

**WINDSHIELD PERIPHERY MEASUREMENTS**

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2249	2249	100
Right Side	2249	2249	100
Total	4498	4498	100



**WINDSHIELD DIMENSIONS**

Item	Units	Segment Length	Molding Width
A	mm	1402	19
B	mm	1762	16
C	mm	667	27

**DATA SHEET NO. 11**

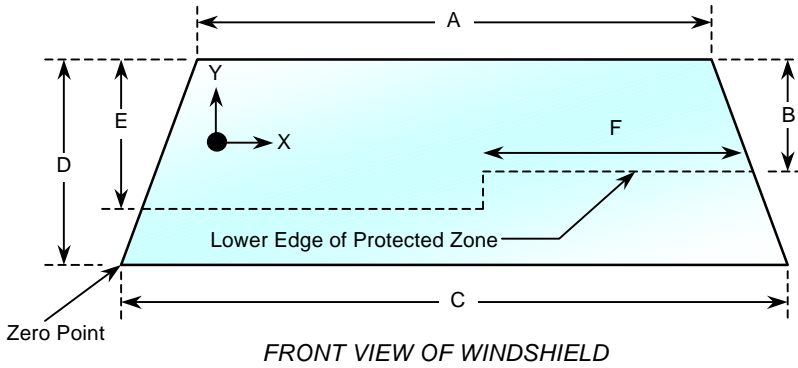
**WINDSHIELD ZONE INTRUSION FMVSS 219 (Partial) DATA**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001



Item	Units	Value
A	mm	1402
B	mm	356
C	mm	1762
D	mm	667
E	mm	437
F	mm	1035

**AREA OF PROTECTED ZONE FAILURES - NONE**

- A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one that is normally in contact with the windshield. **None**

X	Y

- B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component. **None**

X	Y

**DATA SHEET NO. 12**

**FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

Test Time: 4:15 PM

Temperature at Time of Impact: 21 °C

**Stoddard Solvent Spillage Measurements**

- A. From impact until vehicle motion ceases: 0 oz.  
(Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: 0 oz.  
(Maximum Allowable = 5 ounces)
- C. For the following 25 minutes: 0 oz.  
(Maximum Allowable = 1 oz./minute)
- D. Spillage Details: None

**DATA SHEET NO. 13**

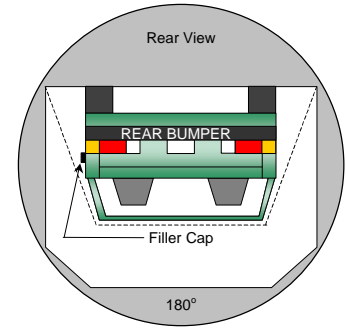
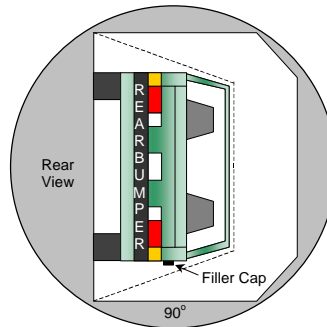
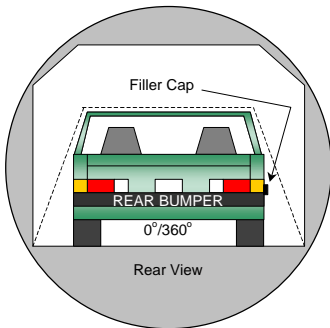
**FMVSS 301 STATIC ROLLOVER DATA**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

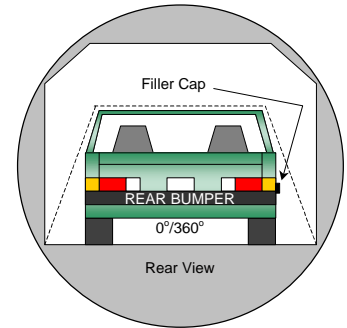
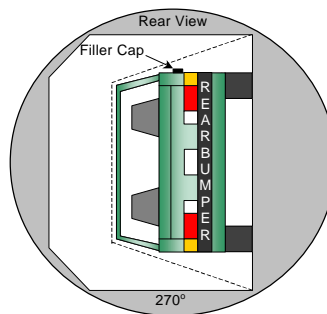
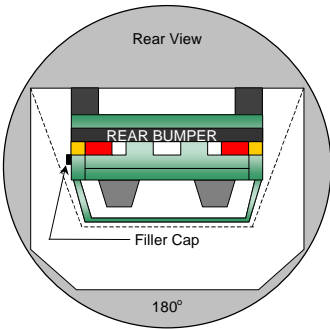
Test Program: NCAP

Test Date: February 5, 2001



0° TO 90°

90° TO 180°



180° TO 270°

270° TO 360°

1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent spillage locations:

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° TO 90°	165	300	0
90° TO 180°	154	300	0
180° TO 270°	139	300	0
270° TO 360°	153	300	0

**DATA SHEET NO. 14**  
**VEHICLE MEASUREMENTS**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	5569	4896	673
2	RSOV to front of engine	mm	4750	4693	57
3	RSOV to firewall centerline	mm	4366	4347	19
4	RSOV to leading edge of right door	mm	4057	4045	12
5	RSOV to leading edge of left door	mm	4055	4035	20
6	RSOV to lower leading edge of right door	mm	4029	4027	2
7	RSOV to lower leading edge of left door	mm	4030	3999	31
8	RSOV to upper leading edge of right door	mm	2892	2888	4
9	RSOV to upper leading edge of left door	mm	2888	2871	17
10	RSOV to lower trailing edge of right door	mm	2880	2881	-1
11	RSOV to lower trailing edge of left door	mm	2885	2852	33
12	RSOV to bottom of right 'A' pillar	mm	4034	4027	7
13	RSOV to bottom of left 'A' pillar	mm	4035	3990	45
14	RSOV to firewall on right side	mm	4280	4263	17
15	RSOV to firewall on left side	mm	4311	4114	197
16	RSOV to steering column	mm	3546	3559	-13
17	Center of steering column to left 'A' pillar	mm	382	481	-99
18	Center of steering column to headlining	mm	444	402	42
19	RSOV to right side of front bumper	mm	5397	4877	520
20	RSOV to left side of front bumper	mm	5396	4948	448
21	Length of engine block	mm	460	460	0
RD	RSOV to right side of dash panel	mm	3740	3667	73
CD	RSOV to center of dash panel	mm	3730	3723	7
LD	RSOV to left side of dash panel	mm	3737	3716	21

RSOV = Rear Surface of Vehicle

DATA SHEET NO. 14 . . (Continued)

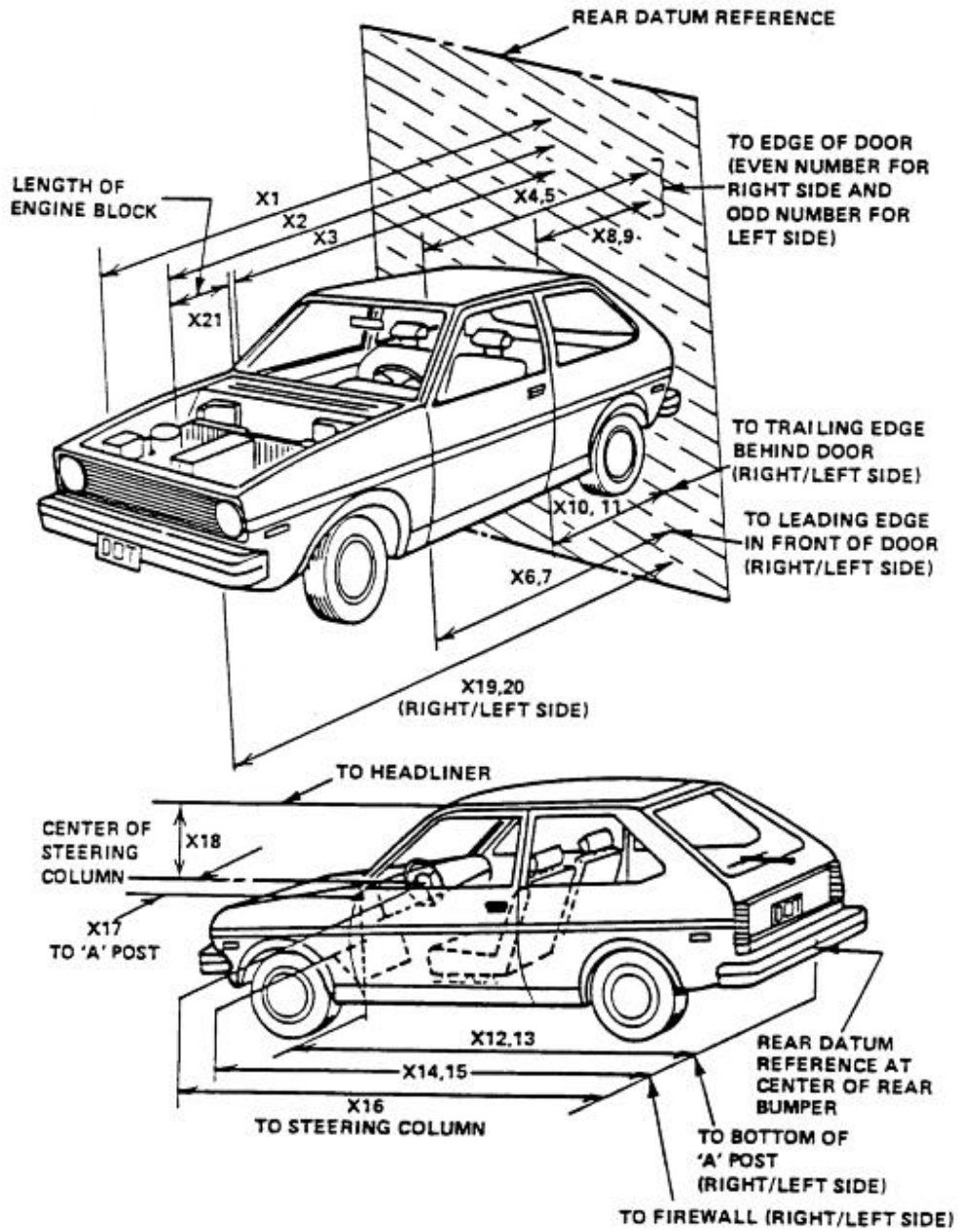
VEHICLE MEASUREMENTS

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001



**DATA SHEET NO. 15**  
**CAMERA LOCATIONS**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

No.	Camera View	Location (mm) *			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side View				18	32
2	Left Front View	1000	-8000	1570	25	1081
3	Steering Column Top	2000	-8320	1500	25	1020
4	Steering Column Bottom	2000	-8320	1030	25	957
5	Driver Close-up	1500	-10100	1470	25	943
6	Driver Angle	4790	-5150	2030	50	1047
7	Onboard Driver				8	513
8	Onboard Passenger				8	504
9	Right Overall	2630	8270	1540	13	**
10	Right Passenger Half	1180	8780	1490	25	1026
11	Right Close-up	1800	10540	1350	75	1058
12	Right Angle	4940	5640	2120	50	1053
13	Windshield	-450	0	2710	13	1020
14	Top Driver	70	-440	1780	13	1010
15	Top Passenger	80	400	1770	13	1010
16	Pit Front	1140	0	-3200	13	1005
17	Pit Rear	2820	0	-3200	13	1005

\*COORDINATES:

+X = film plane rearward of barrier

+Y = film plane to right of monorail centerline

+Z = film plane to above ground level

ORIGIN: For X and Y it is the Impact Point. For Z it is the Floor.

\*\* No Timing Marks

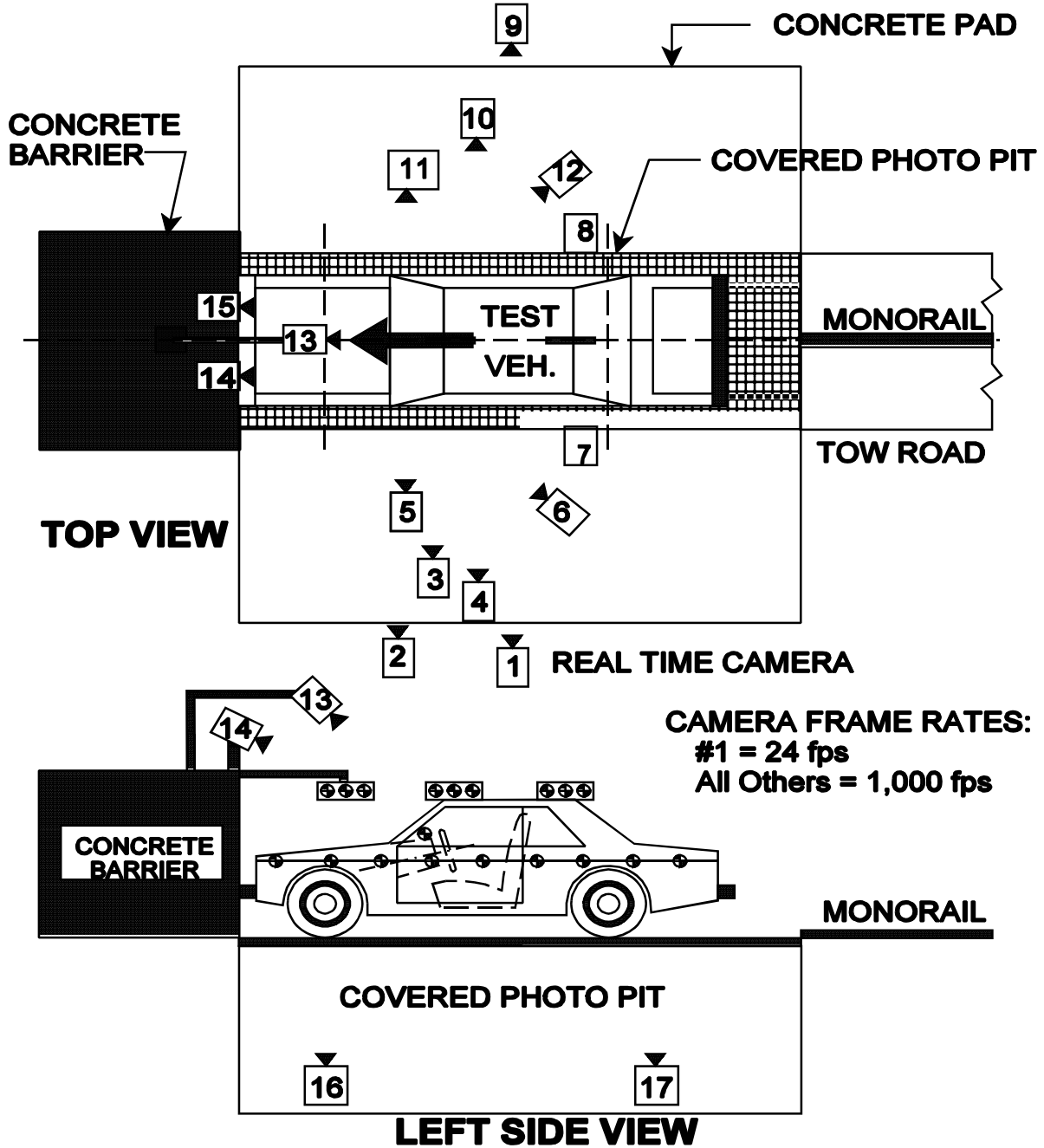
CAMERA LOCATIONS

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001



DATA SHEET NO. 16

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

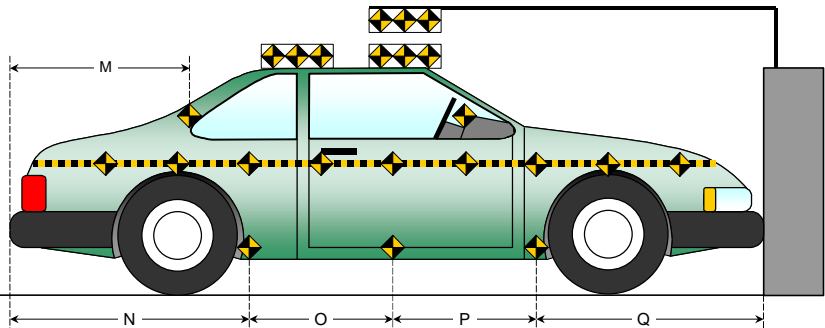
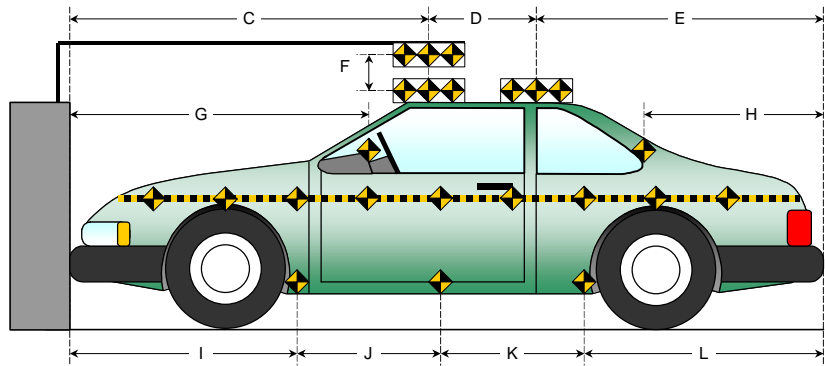
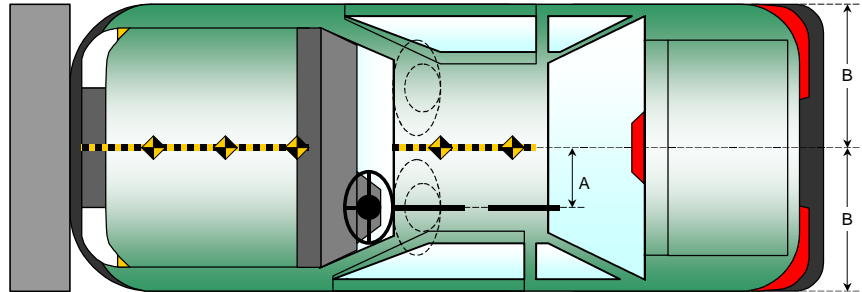
Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

Item	Value
A	430
B	1810
C	2255
D	610
E	2704
F	310
G	1775
H	1905
I	1532
J	1006
K	1004
L	2027
M	1901
N	1983
O	1004
P	1004
Q	1578



**DATA SHEET NO. 17**

**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

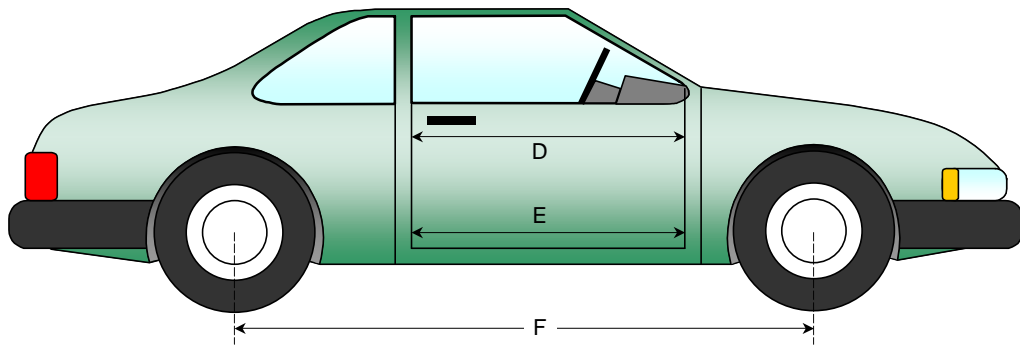
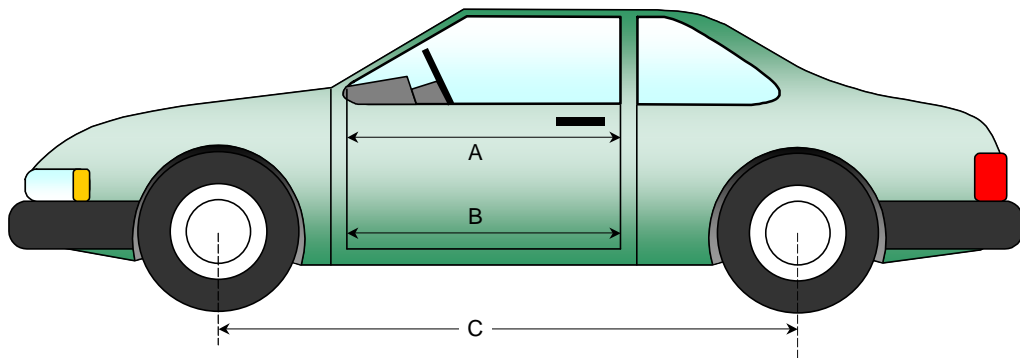
Test Date: February 5, 2001

**DOOR OPENING WIDTH**

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1136	1115	21
B	Left Side Lower	mm	1129	1115	14
D	Right Side Upper	mm	1136	1117	19
E	Right Side Lower	mm	1131	1120	11

**WHEELBASE MEASUREMENTS**

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	3310	3190	120
F	Right Side Wheelbase	mm	3310	3095	215



**DATA SHEET NO. 17...(continued)**  
**VEHICLE INTRUSION MEASUREMENTS**

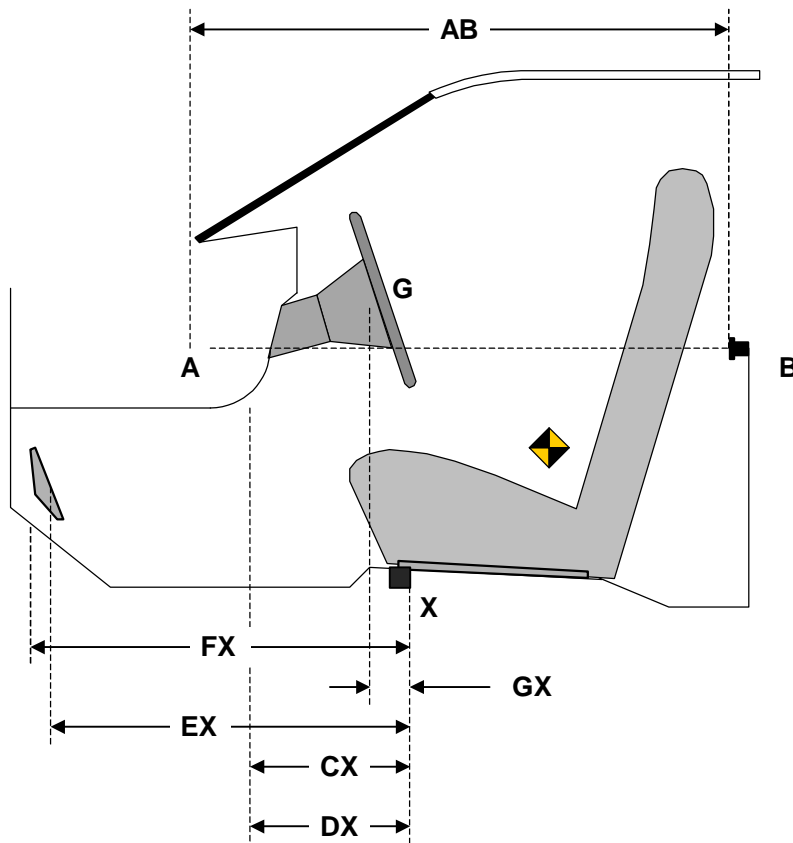
Test Vehicle: 2001/Chevrolet/Suburban/4 door  
 Test Program: NCAP

NHTSA No.: M10107  
 Test Date: February 5, 2001

**DRIVER COMPARTMENT INTRUSION**

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	1129	1119	10
CX	Left Knee Bolster to X	mm	346	317	29
DX	Right Knee Bolster to X	mm	334	292	42
EX	Brake Pedal to X	mm	566	449	117
FX	Foot Rest to X	mm	N/A	N/A	N/A
GX	Center of Steering Column Wheel Hub to X	mm	124	143	-19

X = Left Front Seat Front Outboard Anchor Bolt Head

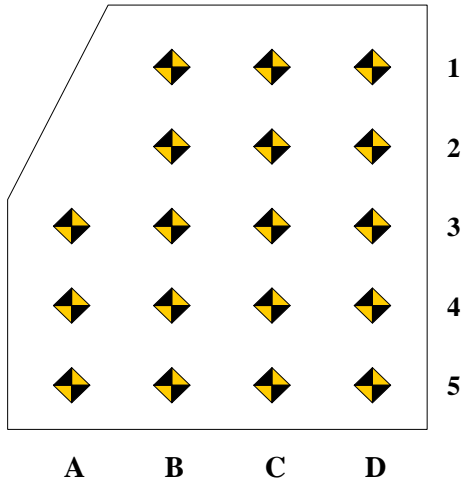


**DRIVER COMPARTMENT**

**DATA SHEET NO. 17...(continued)**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2001/Chevrolet/Suburban/4 door  
 Test Program: NCAP

NHTSA No.: M10107  
 Test Date: February 5, 2001



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		776	798	754		644	613	564		132	185	190
2		698	702	675		560	524	503		138	178	172
3	604	602	603	583	579	561	576	491	25	41	27	92
4	404	396	402	405	396	386	388	387	8	10	14	18
5	203	198	204	204	196	190	189	187	7	8	15	17

**DRIVER FLOOR PAN Z-AXIS**

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1		65	21	49		39	72	93		-26	51	44
2		-28	-23	-14		16	13	19		44	36	33
3	-83	-83	-81	-79	-84	-98	-59	-55	-1	-15	22	24
4	-85	-85	-77	-78	-75	-72	-106	-95	10	13	-29	-17
5	-83	-82	-81	-78	-75	-95	-107	-125	8	-13	-26	-47

**DATA SHEET NO. 17...(continued)**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2001/Chevrolet/Suburban/4 door  
 Test Program: NCAP

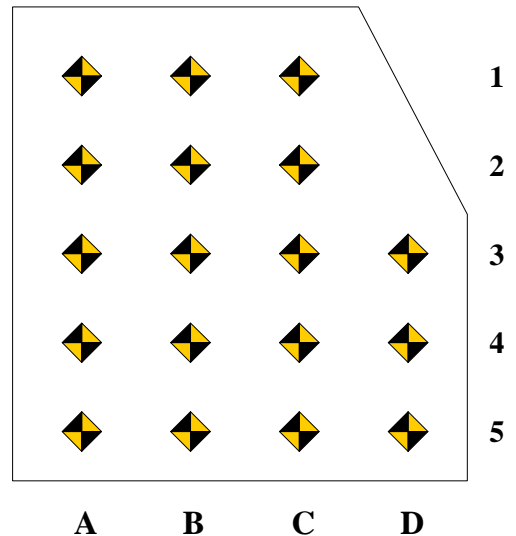
NHTSA No.: M10107  
 Test Date: February 5, 2001

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	707	723	721		536	605	658		171	118	63	
2	633	636	637		485	551	610		148	85	27	
3	551	547	550		505	521	540		46	26	10	
4	377	373	377		364	359	376		13	14	1	
5	206	204	203		199	197	202		7	7	1	

**PASSENGER FLOOR PAN Z-AXIS**

	Pre-Test				Post-Test				Difference			
	A	B	C	D	A	B	C	D	A	B	C	D
1	54	57	66		109	90	102		55	33	36	
2	-11	-16	-11		24	16	5		35	32	16	
3	-78	-81	-76		-82	-90	-69		-4	-9	7	
4	-78	-85	-79		-60	-50	-82		18	35	-3	
5	-79	-80	-80		-68	-84	-78		11	-4	2	

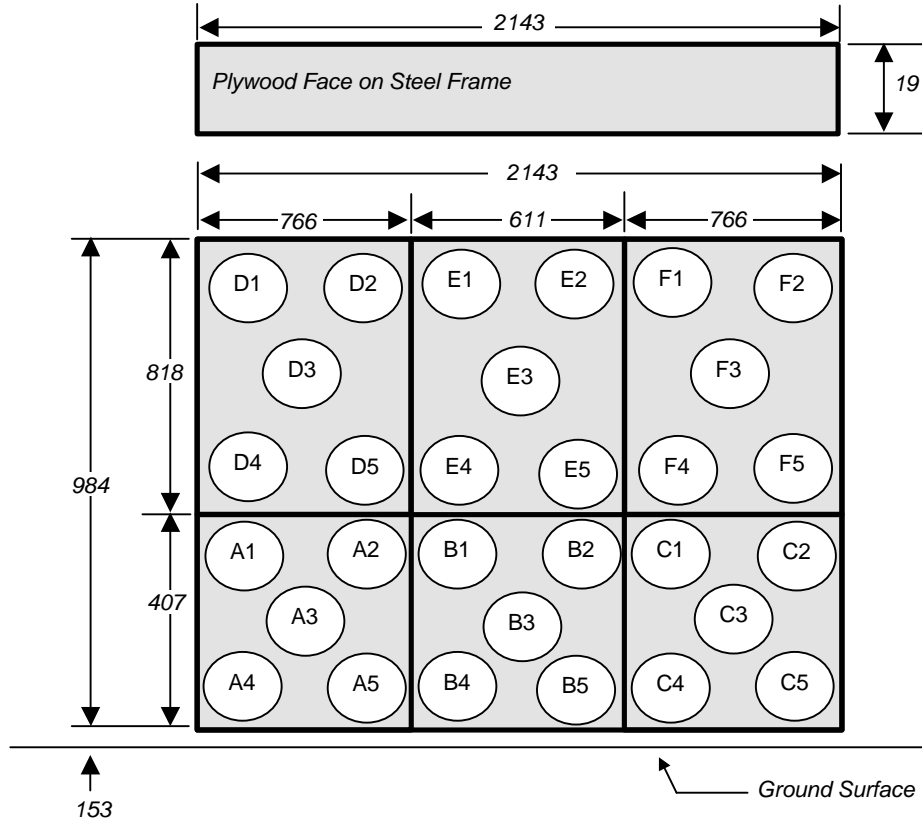
**DATA SHEET NO. 18**

**LOAD CELL LOCATIONS ON FIXED BARRIER**

Test Vehicle: 2001/Chevrolet/Suburban/4 door  
 Test Program: NCAP

NHTSA No.: M10107  
 Test Date: February 5, 2001

**30 Load Cell Rigid Barrier**  
**Load Cell Locations on Fixed Barrier**



Group 4 D1-D5	Group 5 E1-E5	Group 6 F1-F5
Group 1 A1-A5	Group 2 B1-B5	Group 3 C1-C5

6 Groups of 5 Load Cells Each

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

1. Data from 30 individual load cells
2. Sum data from 6 groupings shown above (5 cells/group)
3. Total or sum of all 30 individual load cells

**DATA SHEET NO. 19**

**ACCIDENT INVESTIGATION DIVISION DATA**

Test Vehicle: 2001/Chevrolet/Suburban/4 door  
 Test Program: NCAP

NHTSA No.: M10107  
 Test Date: February 5, 2001

**VEHICLE INFORMATION**

VIN: 1GNFK16T31J112502 Wheelbase (mm): 3310  
 Vehicle Size Category: SUV Test Weight (kg): 2868.1

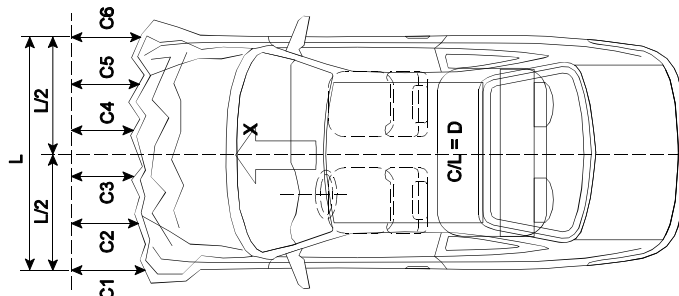
**ACCELEROMETER DATA**

Accelerometer Locations: As per measurements on page 13  
 Cal. Procedure/Interval: MGA procedure / 6 month  
 Integration Algorithm: Trapezoidal Linearity: >99.9%  
 Impact Velocity (km/h): 56.5  
 Velocity Change (km/h): 62.1 Time of Separation (msec): 165

**CRUSH PROFILE**

Collision Deformation Classification: Frontal Midpoint of Damage: Vehicle Centerline  
 Damage Region Length (mm): 1678 Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	5396	4948	448
C2	Crush zone 2 at left side	mm	5493	4928	565
C3	Crush zone 3 at left side	mm	5549	4911	638
C4	Crush zone 4 at right side	mm	5546	4899	647
C5	Crush zone 5 at right side	mm	5494	4887	607
C6	Crush zone 6 at right side	mm	5397	4877	520



DATA SHEET NO. 20

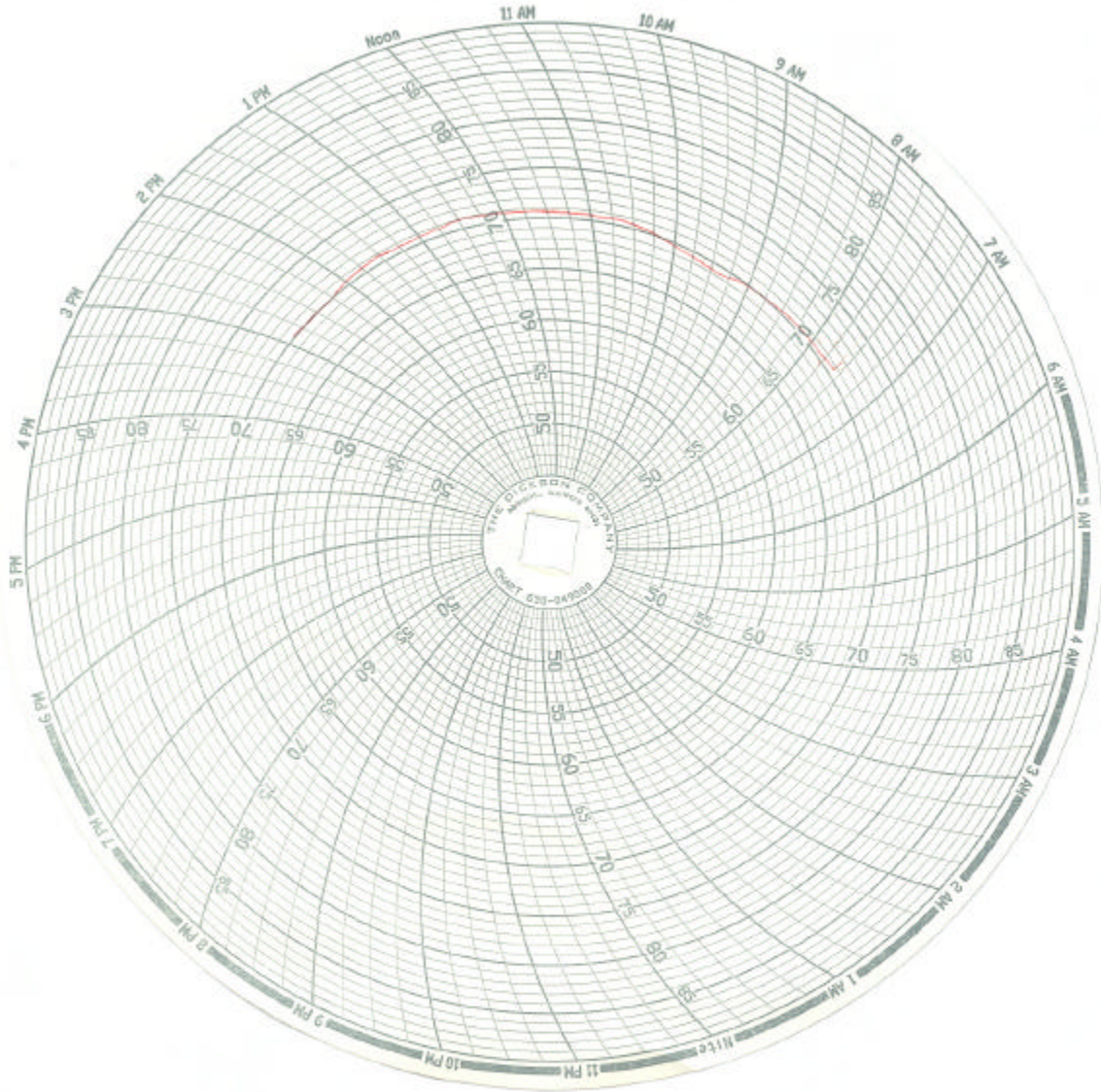
DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001



A = Dummies installed in vehicle at 7:30 a.m.

B = Test conducted at 4:15 p.m.

**APPENDIX A**  
**PHOTOGRAPHS**

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Photo No. A-1 - Pre-Test Front View of Test Vehicle

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Photo No. A-2 - Post-Test Front View of Test Vehicle

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Photo No. A-3 - Post-Test Rear View of Test Vehicle

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Photo No. A-4 - Pre-Test Left Side View of Test Vehicle

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Photo No. A-5 - Post-Test Left Side View of Test Vehicle

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Photo No. A-6 - Pre-Test Left Rear Three-Quarter View of Test Vehicle

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Photo No. A-7 - Post-Test Left Rear Three-Quarter View of Test Vehicle

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Photo No. A-8 - Pre-Test Right Side View of Test Vehicle

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Photo No. A-9 - Post-Test Right Side View of Test Vehicle

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Photo No. A-10 - Pre-Test Right Front Three-Quarter View of Test Vehicle

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Photo No. A-11 - Post-Test Right Front Three-Quarter View of Test Vehicle

 **mga**  
mga research corporation  
**PRE-TEST**  
NCAP 35 MPH FRONTAL  
2001 CHEVROLET SUBURBAN  
M10107 01020501



A-12

Photo No. A-12 - Pre-Test Fuel Filler Cap View

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Photo No. A-13 - Pre-Test Engine Compartment View



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Photo No. A-14 - Post-Test Engine Compartment View

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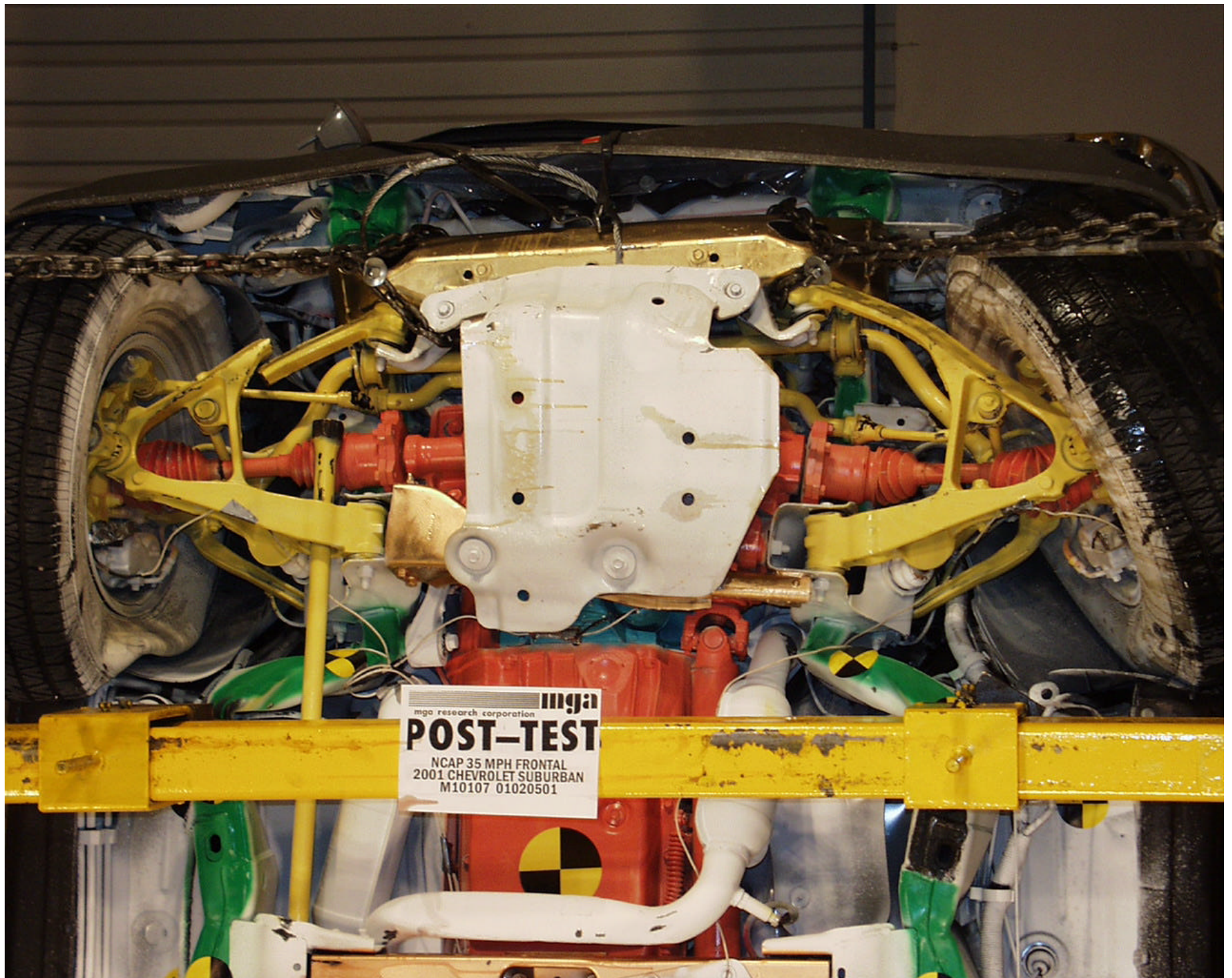


Photo No. A-15 - Post-Test Front Underbody View



Photo No. A-16 - Post-Test Rear Underbody View

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Photo No. A-17 - Pre-Test Windshield View

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Photo No. A-18 - Post-Test Windshield View

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Photo No. A-19 - Pre-Test Driver Dummy Position Left Side View

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Photo No. A-20 - Post-Test Driver Dummy Position Left Side View

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Photo No. A-21 - Pre-Test Driver Dummy Position Left Side View (Door Open)



Photo No. A-22 - Post-Test Driver Dummy Position Left Side View (Door Open)

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Photo No. A-23 - Pre-Test Driver Seat Position View

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Photo No. A-24 - Post-Test Driver Seat Position View

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Photo No. A-25 - Pre-Test Driver Dummy Knee Position



Photo No. A-26 - Post-Test Driver Dummy Knee Position

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Photo No. A-27 - Post-Test Driver Airbag Contact



Photo No. A-28 - Post-Test Driver Head Contact View (headrest)

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Photo No. A-29 - Post-Test Driver Knee Contact View

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Photo No. A-30 - Pre-Test Driver Windshield View



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Photo No. A-31 - Post-Test Driver Windshield View

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Photo No. A-32 - Post-Test Passenger Dummy Position Right Side View

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Photo No. A-33 - Pre-Test Passenger Dummy Position Right Side View (Door Open)

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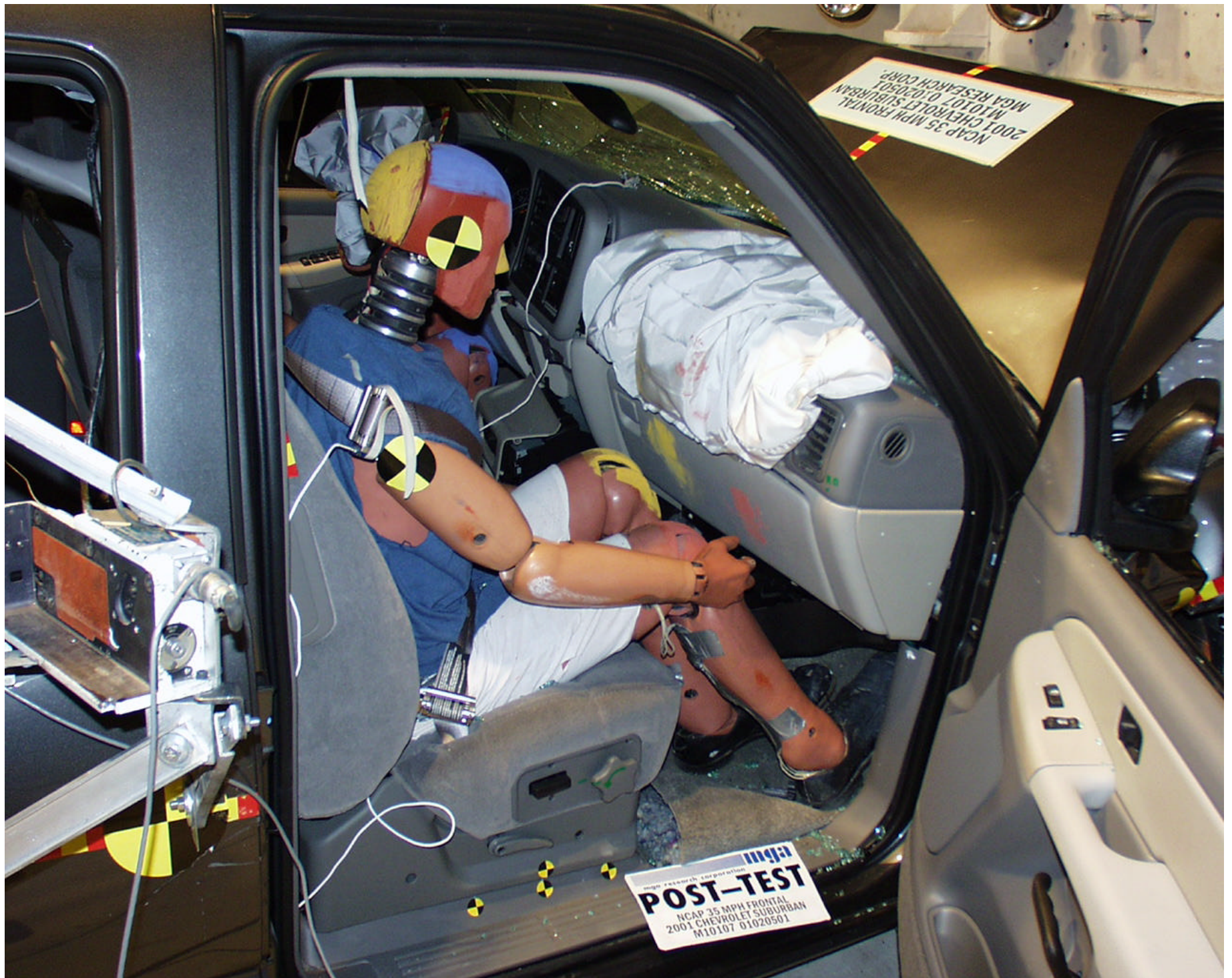


Photo No. A-34 - Post-Test Passenger Dummy Position Right Side View (Door Open)

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Photo No. A-35 - Pre-Test Passenger Seat Position View

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Photo No. A-36 - Post-Test Passenger Seat Position View

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Photo No. A-37 - Pre-Test Passenger Dummy Knee Position

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Photo No. A-38 - Post-Test Passenger Dummy Knee Position

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Photo No. A-39 - Post-Test Passenger Airbag Contact



Photo No. A-40 - Post-Test Passenger Head Contact View (headrest)

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Photo No. A-41 - Post-Test Passenger Head Contact View (visor)



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Photo No. A-42 - Post-Test Passenger Knee Contact View

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Photo No. A-43 - Pre-Test Passenger Windshield View



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Photo No. A-44 - Post-Test Passenger Windshield View

A-45

 MFD BY GENERAL MOTORS CORP 08/00

GVWR 3266KG(7200LB) GAWR FRT 1633KG(3600LB) GAWR RR 1814KG(4000LB)

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

**1GNFK16T31J112502** TYPE: M.P.V.

MODEL: K15906

KPAC	TIRE SIZE	SPEED RTG	RIM	COLD TIRE PRESSURE
FRT	P265/70R16	S	16X7/6.5J	240KPA(35PSI)
RR	P265/70R16	S	16X7/6.5J	240KPA(35PSI)

SEE OWNER'S MANUAL FOR MORE INFORMATION. F 300 T 306

Photo No. A-45 - Vehicle Certification Label and Tire Placard

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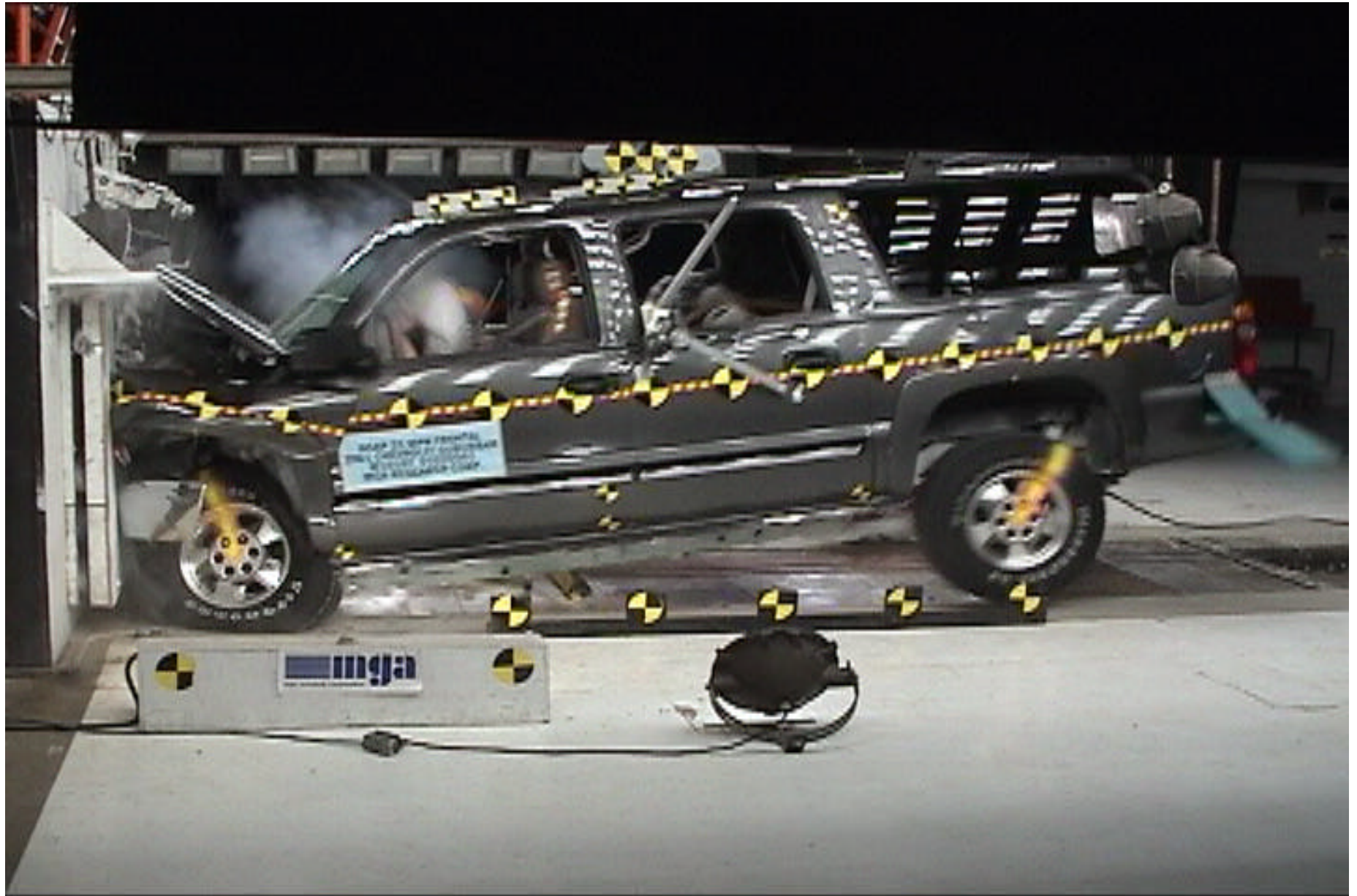


Photo No. A-46 - Vehicle Impact

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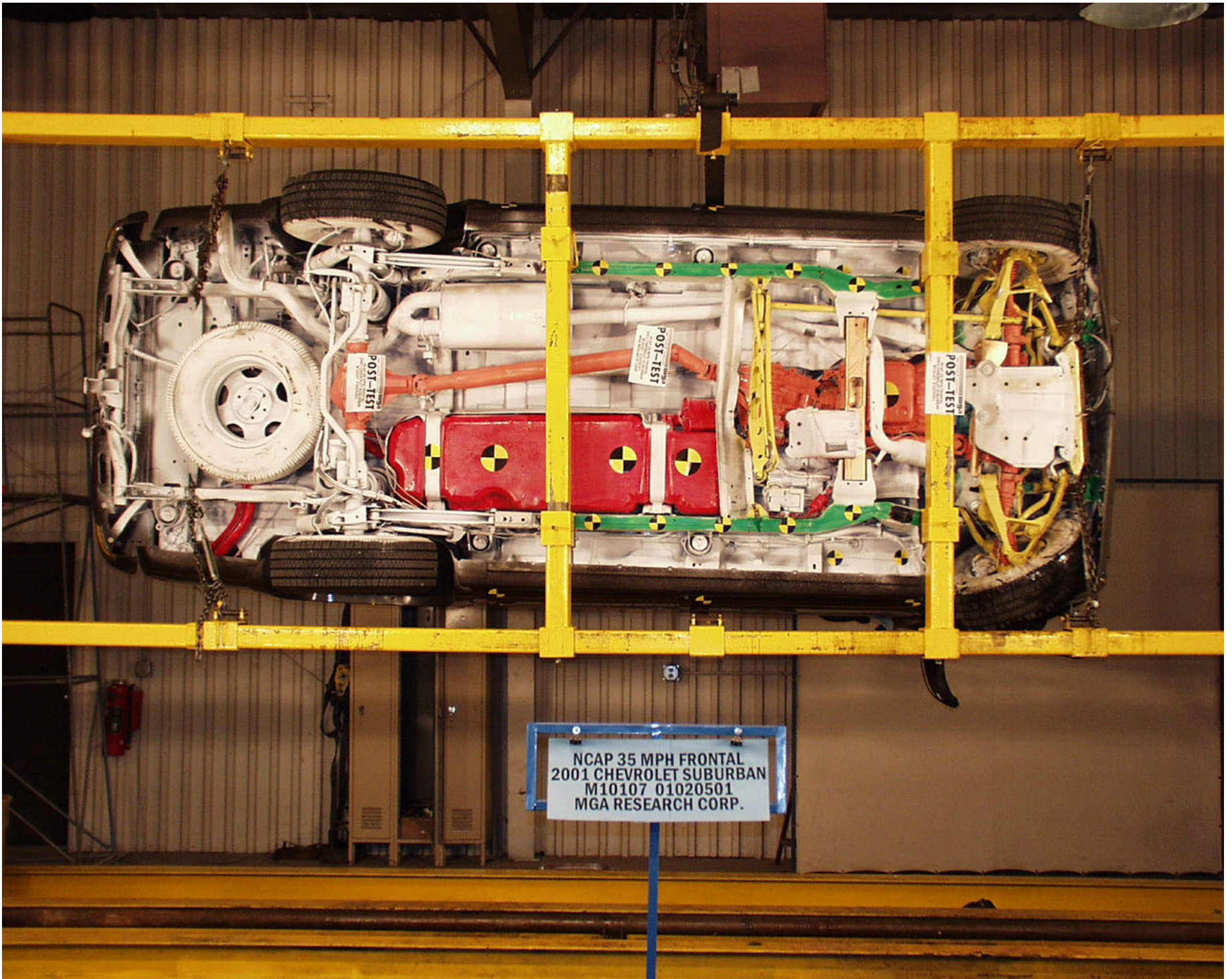


Photo No. A-47 - Rollover 90E

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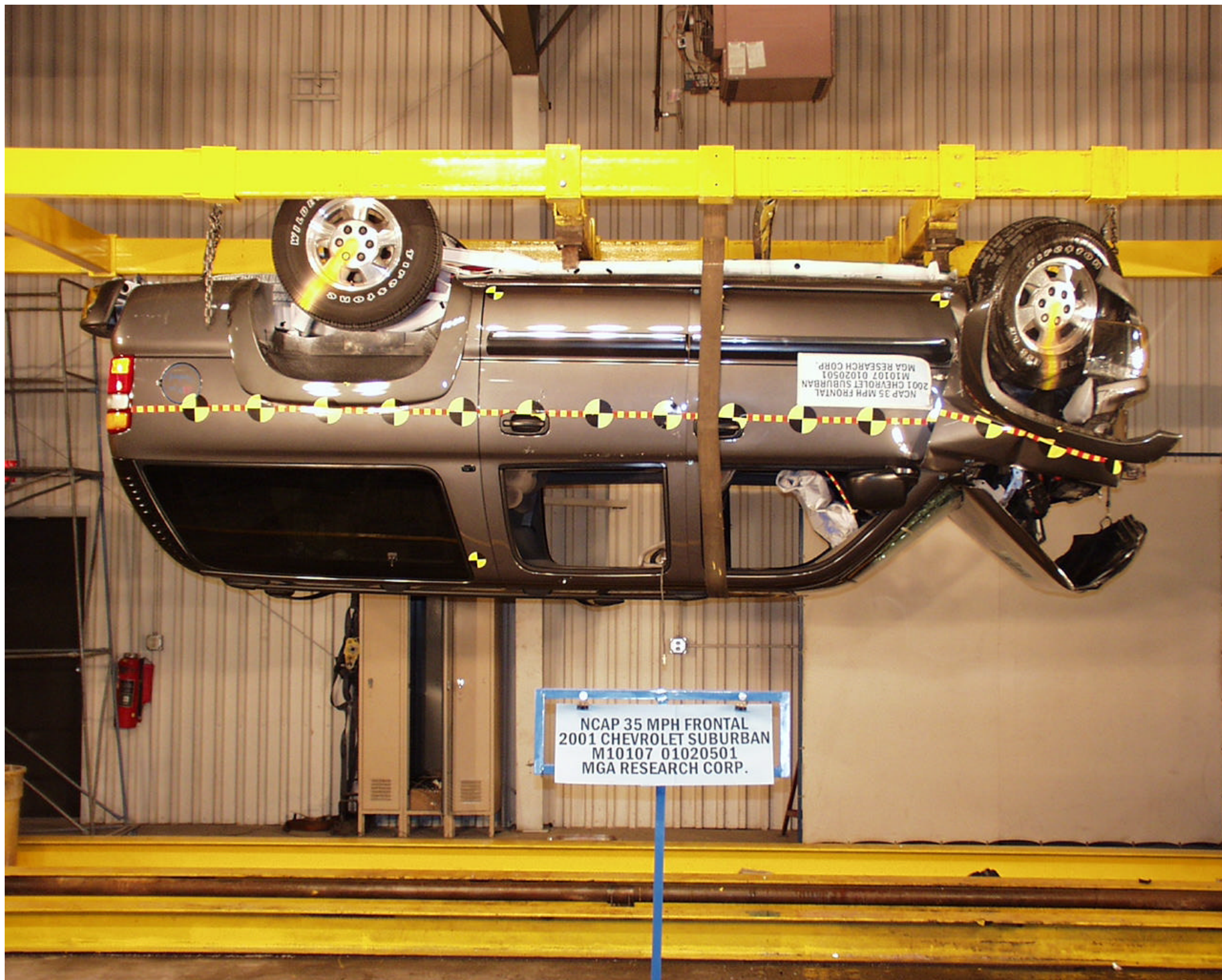


Photo No. A-48 - Rollover 180E

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Photo No. A-49 - Rollover 270E

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Photo No. A-50 - Rollover 360E

## **APPENDIX B**

### **DUMMY AND VEHICLE RESPONSE DATA TRACES**

## TABLE OF DATA PLOTS

### VEHICLE DATA FILTER CHANNEL CLASS

Head Accelerations 1000 (1650 Hz)

Chest Accelerations 180 (300 Hz)

Vehicle Accelerations 60 (100 Hz)

Barrier Load Cells 60 (100 Hz)

Femur Load Cells 600 (1000 Hz)

Lap and Torso Belts 60 (100 Hz)

Tibia Load Cells 600 (1000Hz)

Foot Accelerations 180 (300Hz)

### Occupant Data

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\* clipped signal

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\* No Valid Data Collected



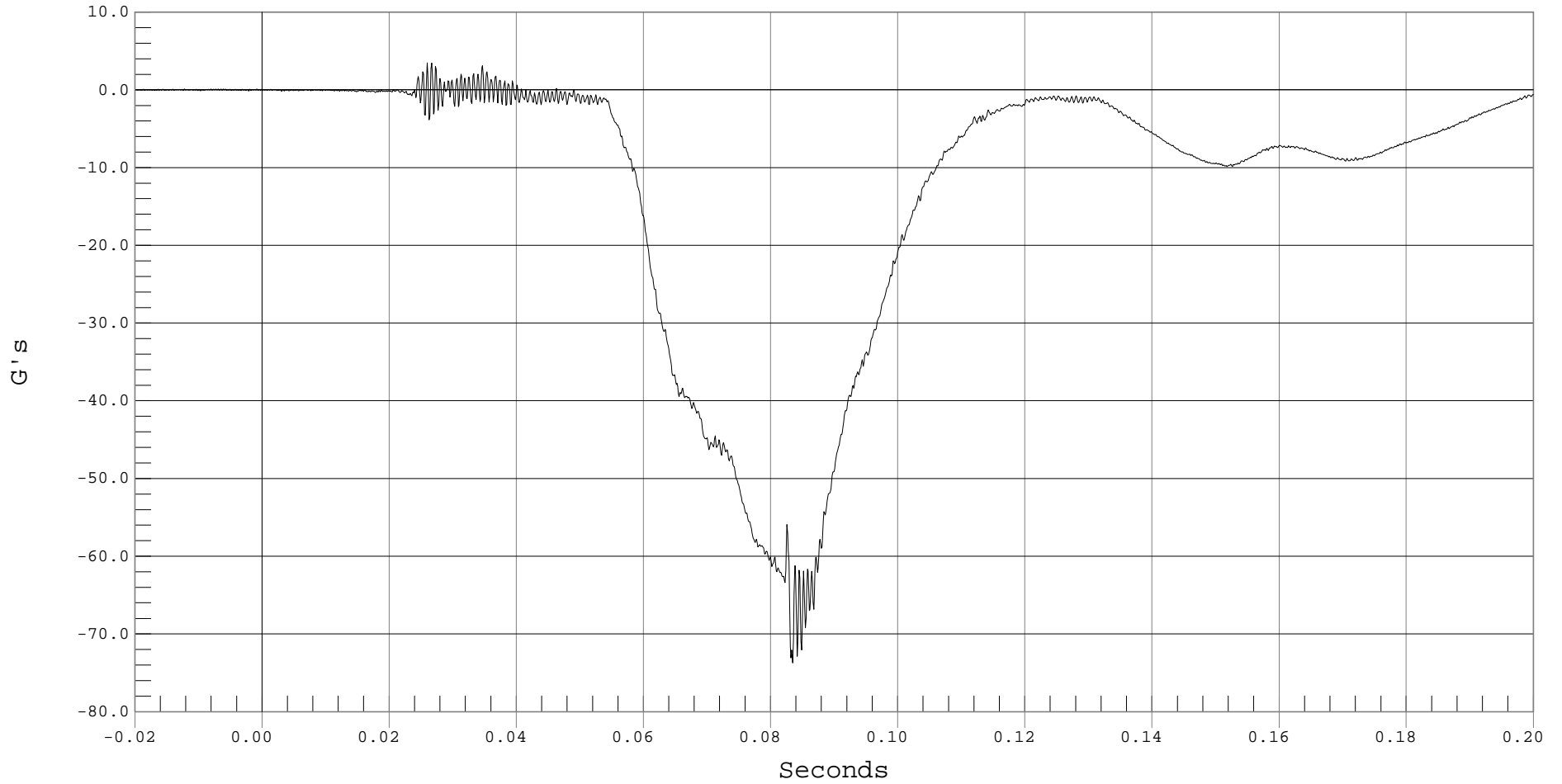
### DRIVER HEAD X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER HEAD X, B01012AT.A01

Ymin = -73.74 G's @ 0.0835 Seconds, Ymax = 3.49 G's @ 0.0260 Seconds



B-1



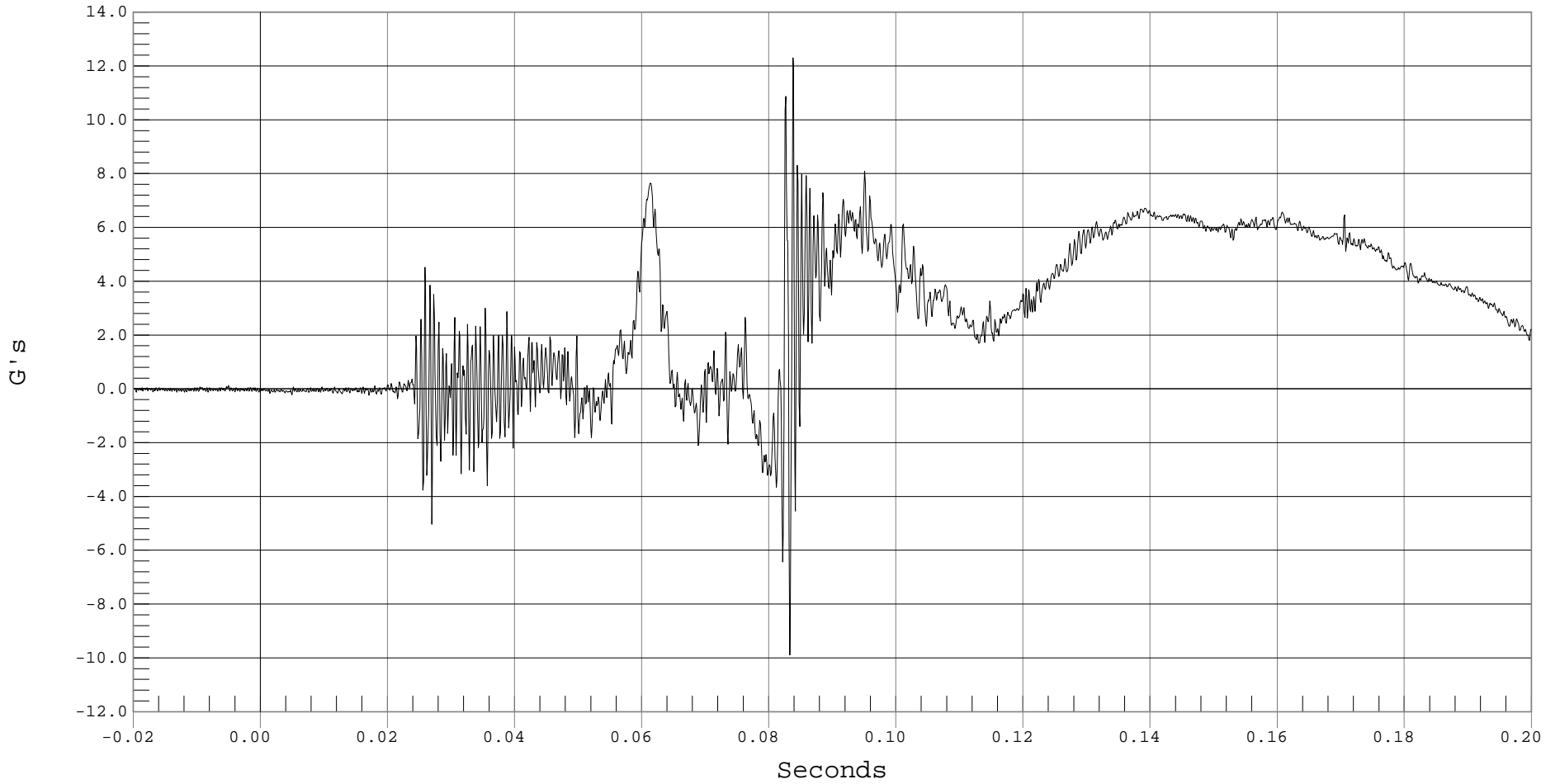
### DRIVER HEAD Y ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER HEAD Y, B01012AT.A02

Ymin = -9.89 G's @ 0.0833 Seconds, Ymax = 12.31 G's @ 0.0838 Seconds



B-2



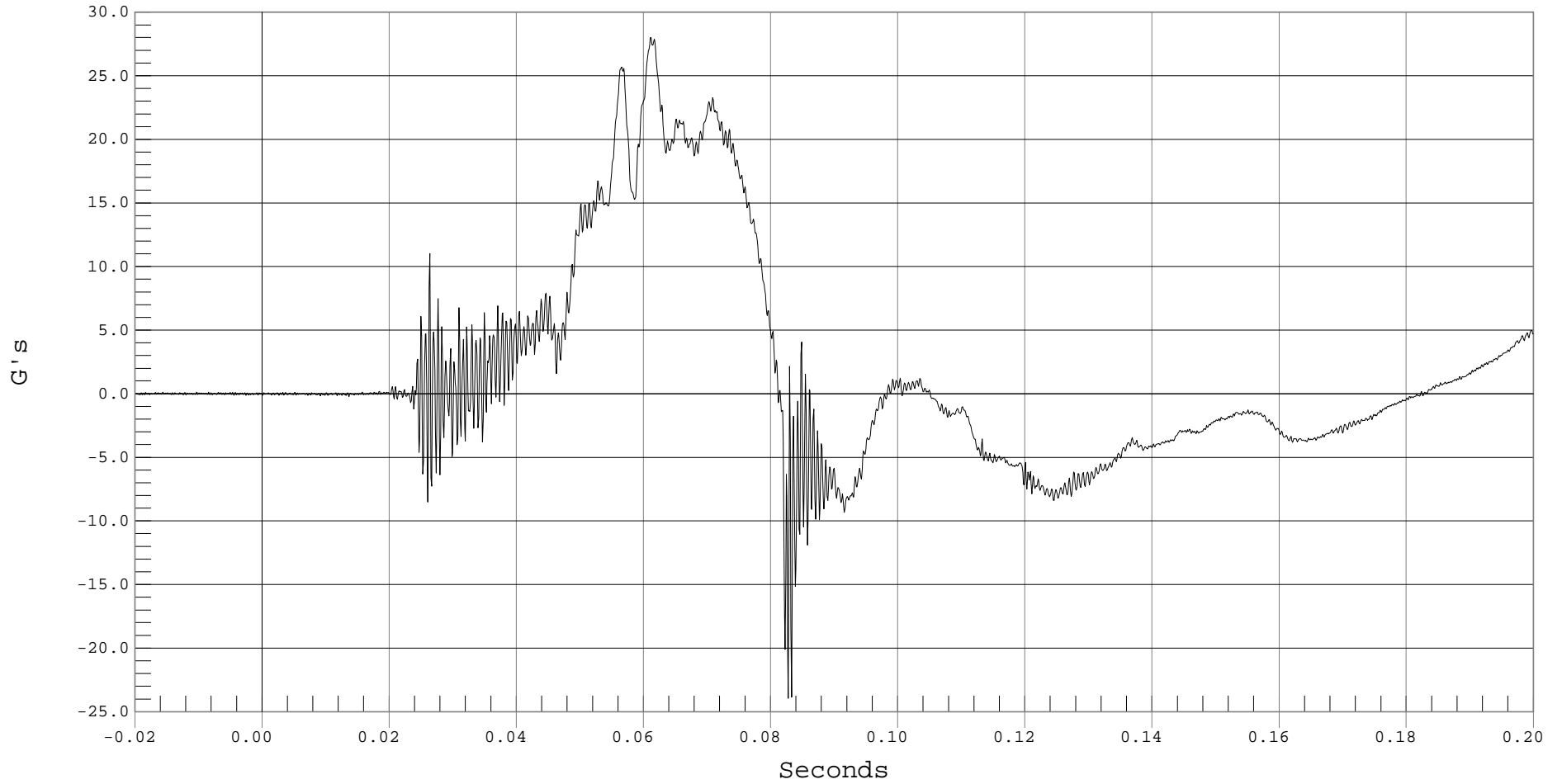
### DRIVER HEAD Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER HEAD Z, B01012AT.A03

Ymin = -23.96 G's @ 0.0828 Seconds, Ymax = 28.02 G's @ 0.0612 Seconds



B-3



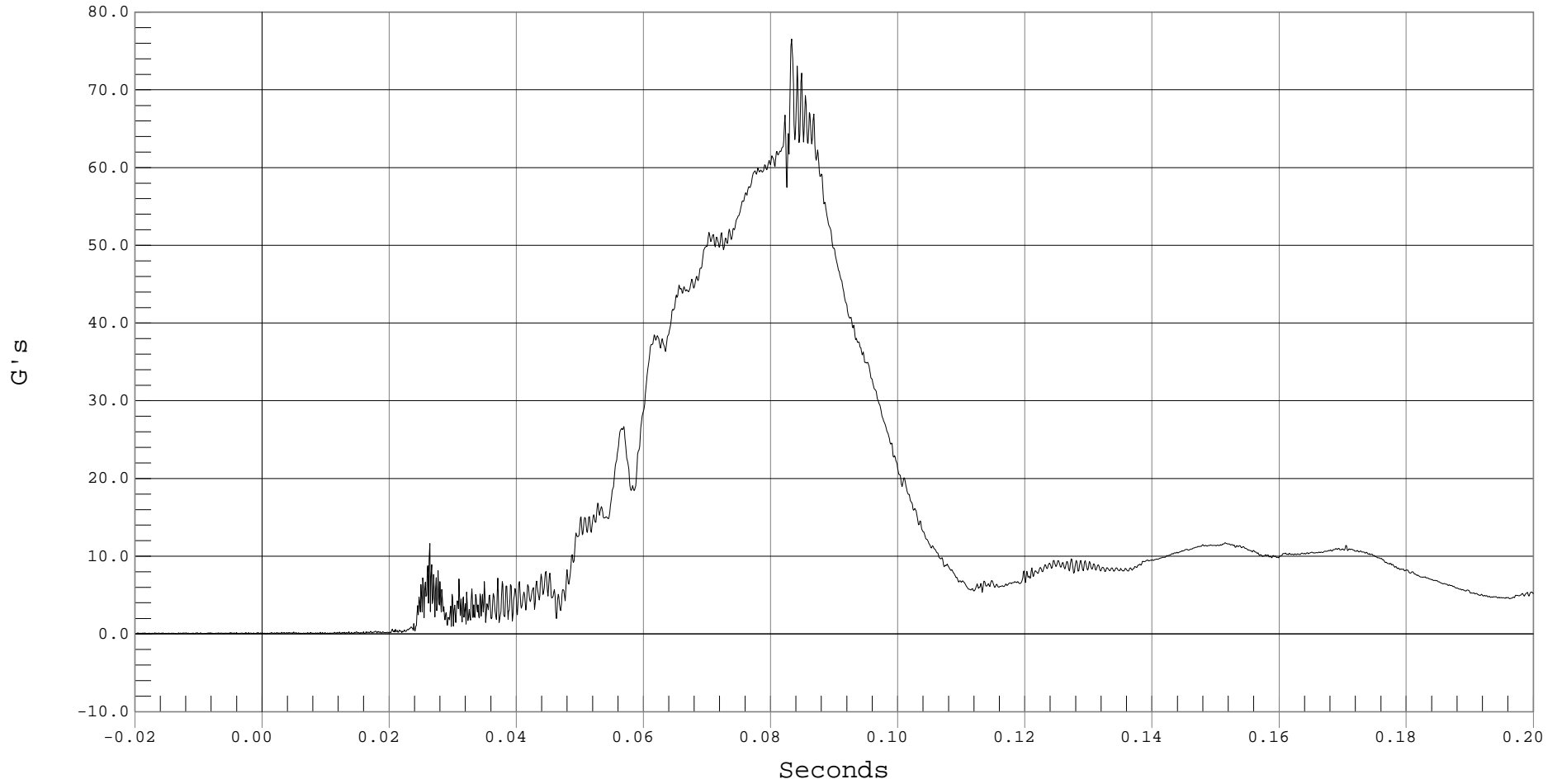
### DRIVER HEAD RESULTANT ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER HEAD RESULTANT ACCELERATION, B01012AV.A01

Ymin = .01 G's @ 0.0060 Seconds, Ymax = 76.54 G's @ 0.0833 Seconds





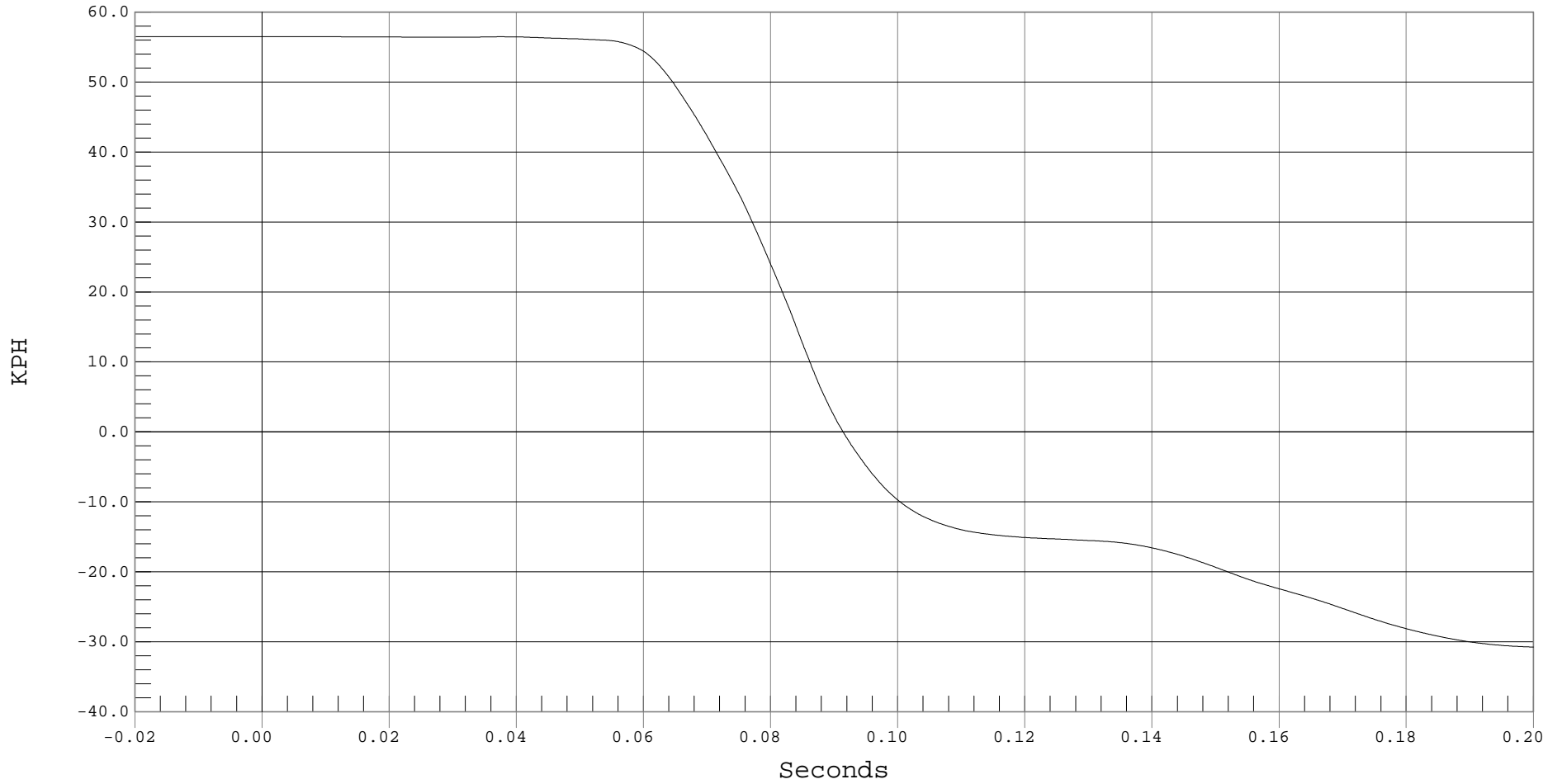
### DRIVER HEAD X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER HEAD X VELOCITY, B01012AI.V01

Ymin = -30.76 KPH @ 0.2001 Seconds, Ymax = 56.5 KPH @ -0.0054 Seconds





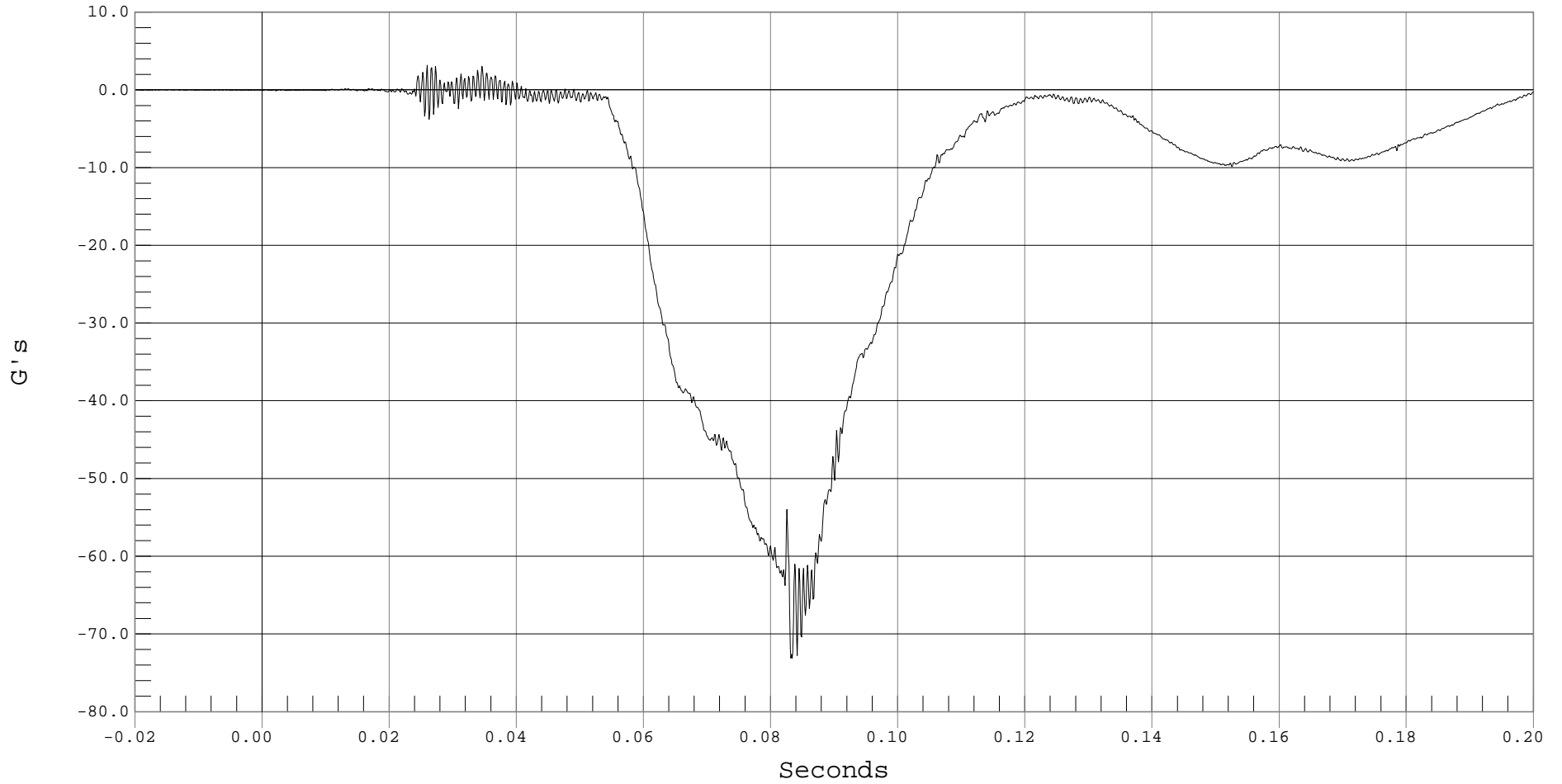
### DRIVER HEAD REDUNDANT X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER HEAD Xr, B01012AT.A33

Ymin = -73.14 G's @ 0.0834 Seconds, Ymax = 3.16 G's @ 0.0260 Seconds



B-6



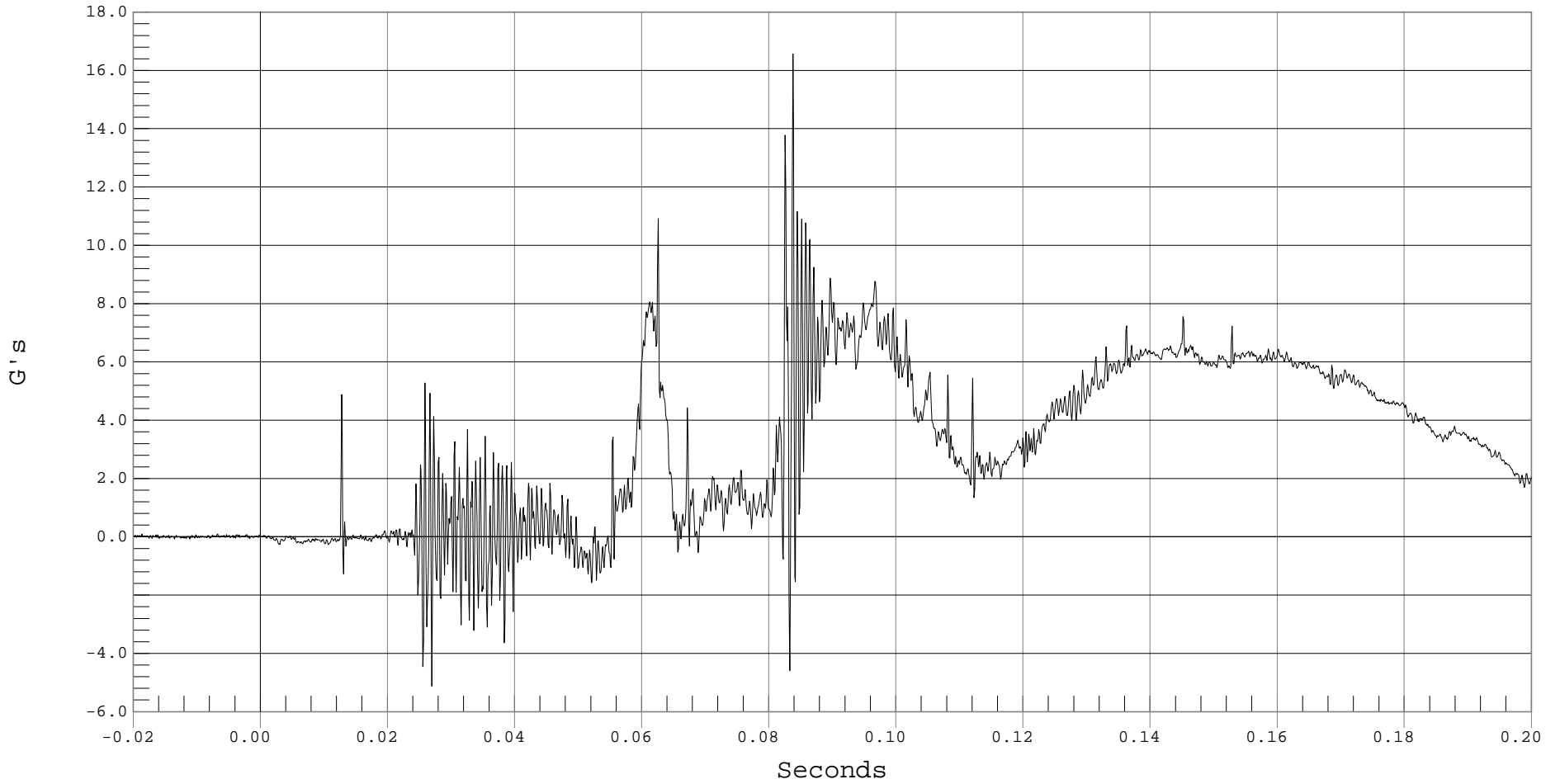
### DRIVER HEAD REDUNDANT Y ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER HEAD Yr, B01012AT.A34

Ymin = -5.13 G's @ 0.0270 Seconds, Ymax = 16.57 G's @ 0.0838 Seconds



B-7



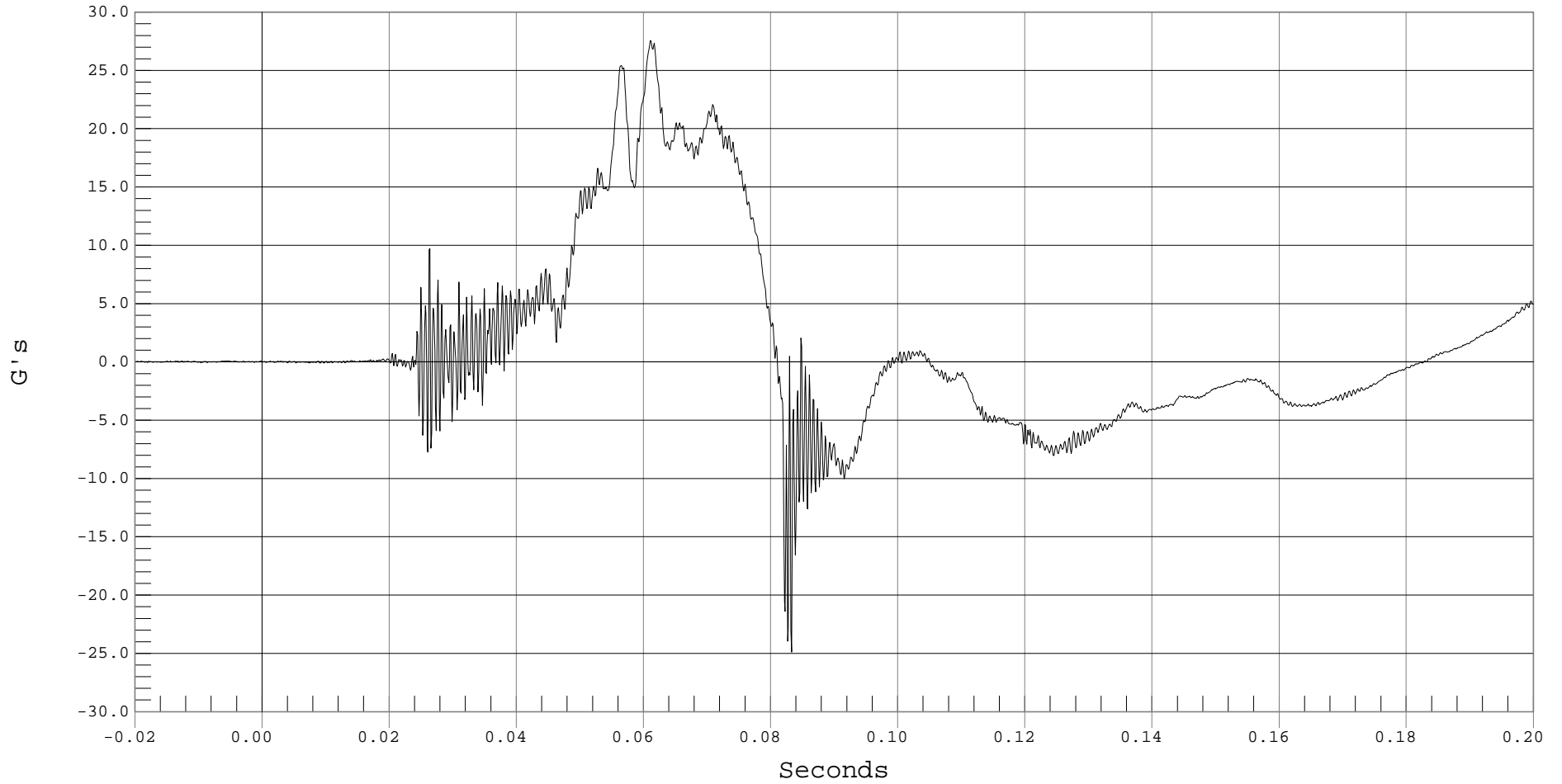
### DRIVER HEAD REDUNDANT Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER HEAD Zr, B01012AT.A35

Ymin = -24.89 G's @ 0.0833 Seconds, Ymax = 27.55 G's @ 0.0611 Seconds



B-8



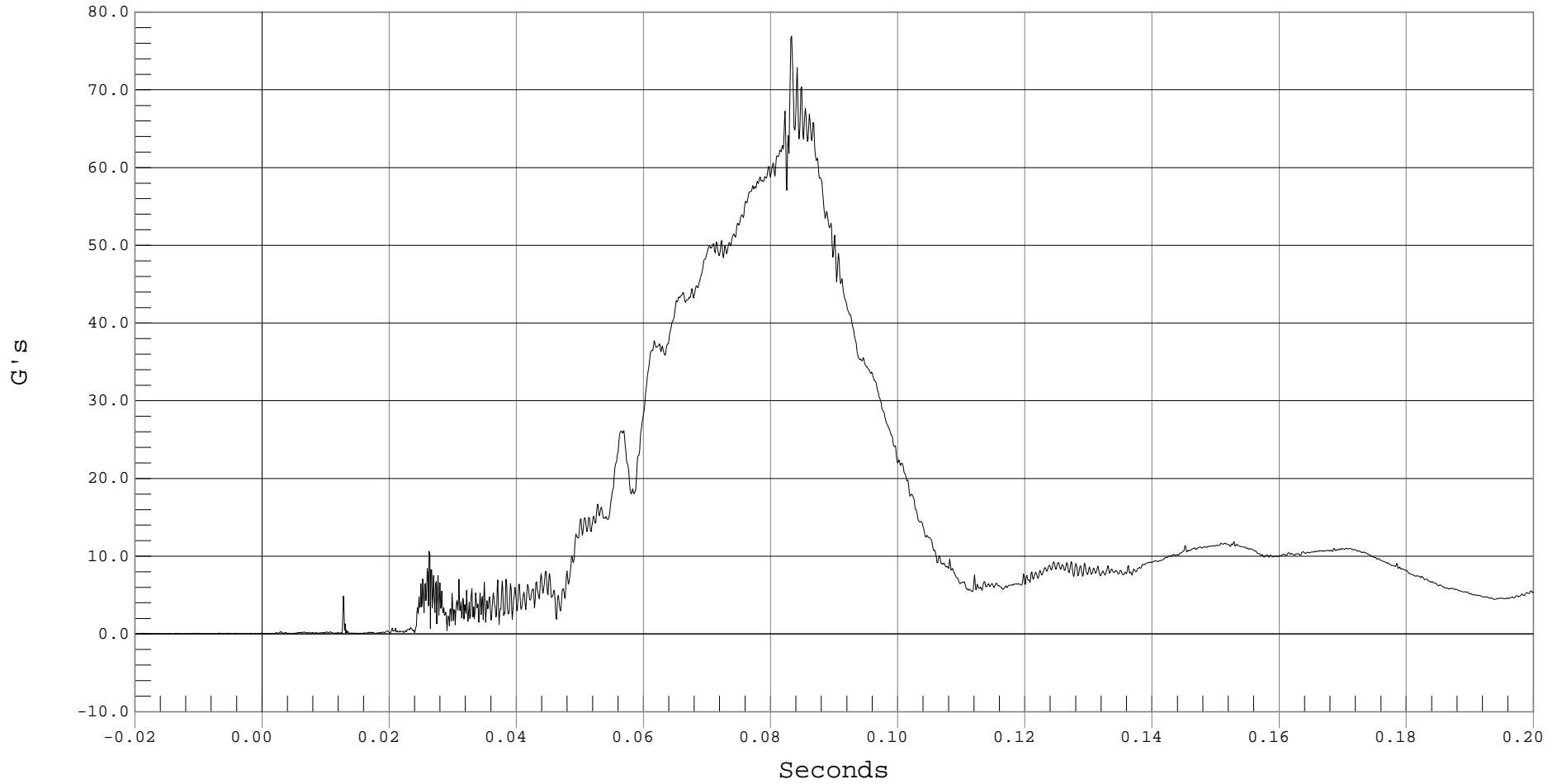
### DRIVER HEAD REDUNDANT RESULTANT ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER HEAD REDUNDANT RESULTANT ACCELERATION, B01012AV.A33

Ymin = .01 G's @ -0.0113 Seconds, Ymax = 76.93 G's @ 0.0833 Seconds





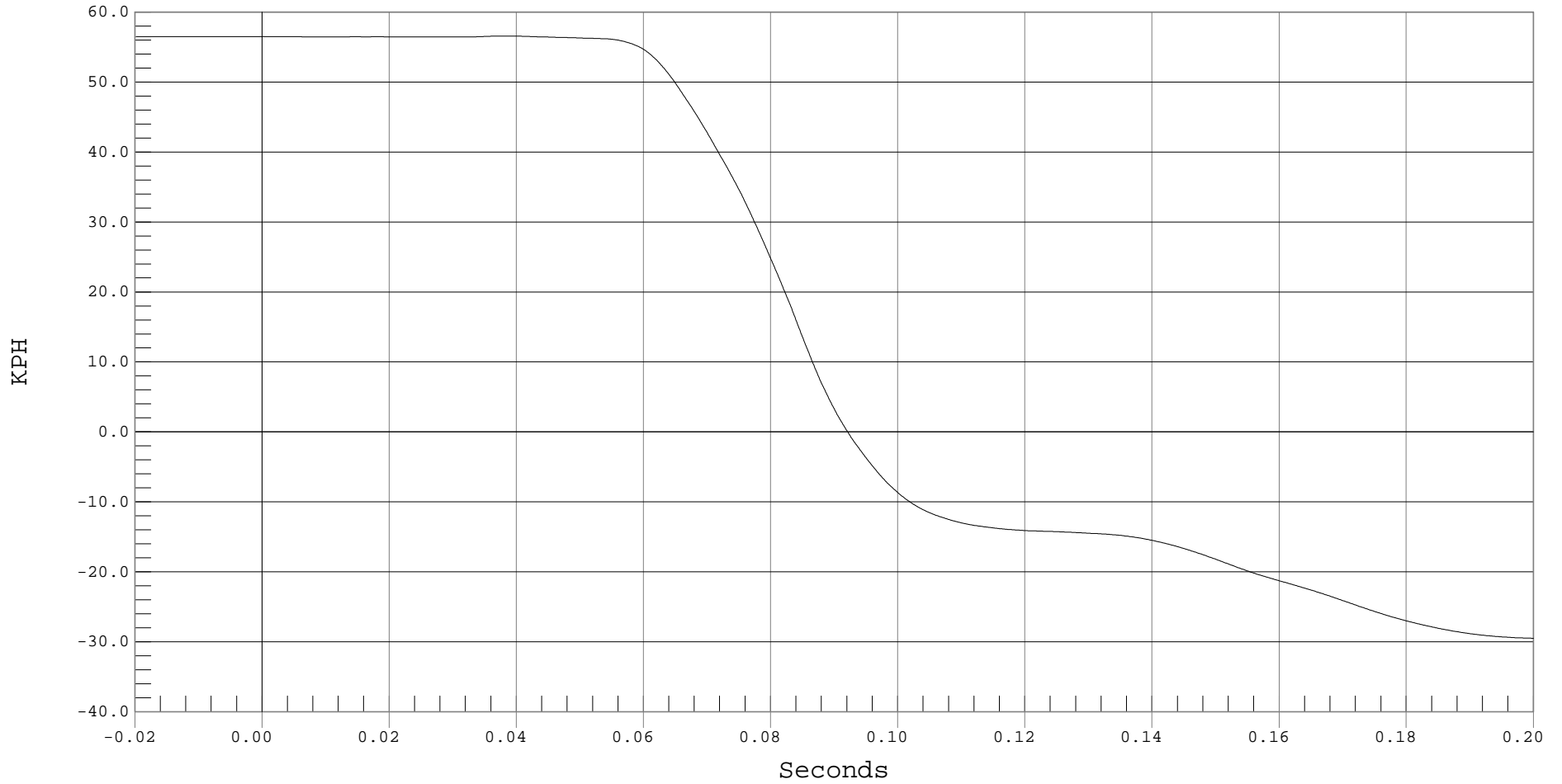
### DRIVER HEAD REDUNDANT X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER HEAD REDUNDANT X VELOCITY, B01012AI.V33

Ymin = -29.51 KPH @ 0.2001 Seconds, Ymax = 56.57 KPH @ 0.0377 Seconds



B-10



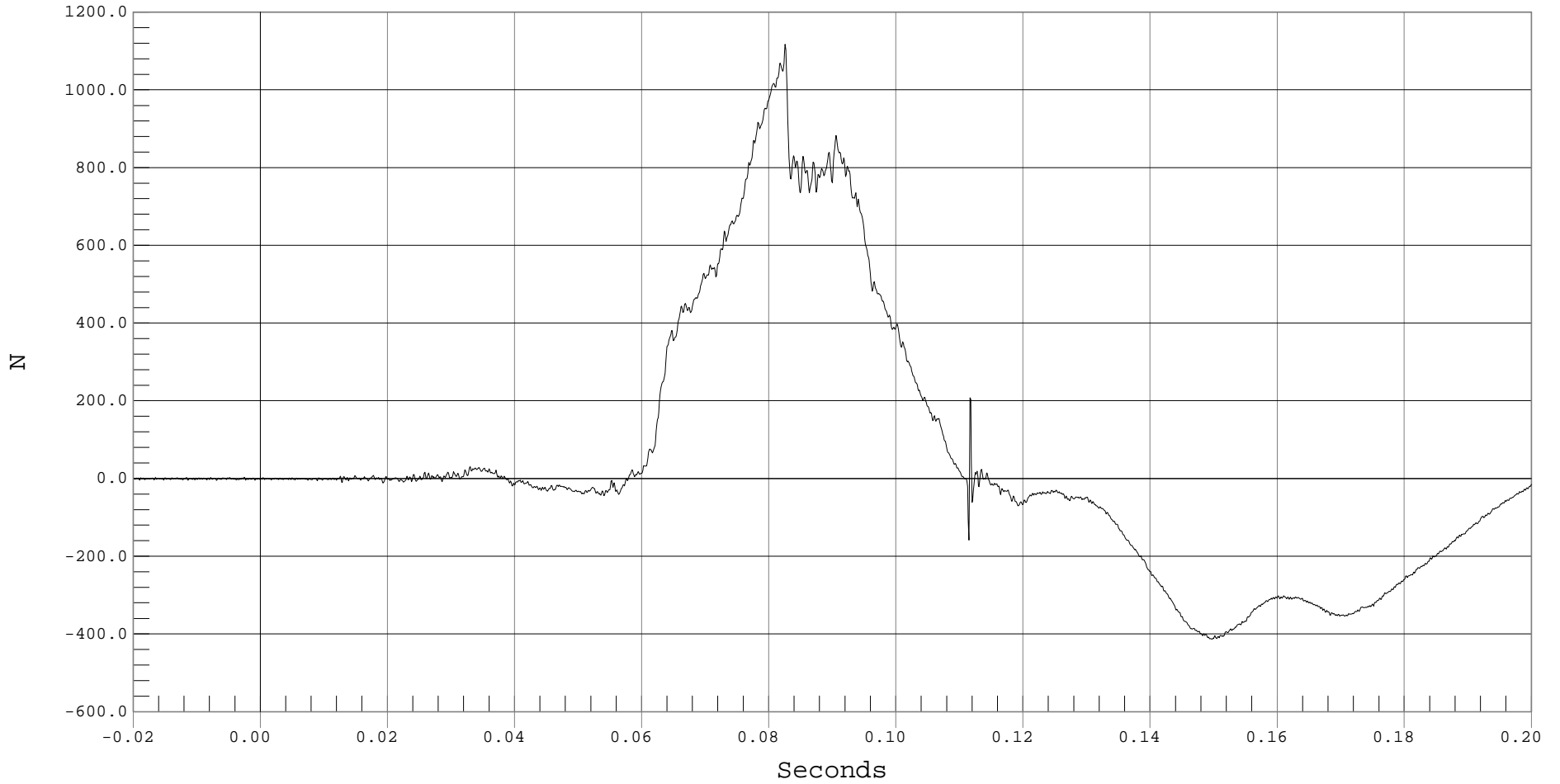
### DRIVER NECK FORCE X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER NECK FX, B01012FT.F04

Ymin = -413.43 N @ 0.1497 Seconds, Ymax = 1117.06 N @ 0.0826 Seconds



B-11



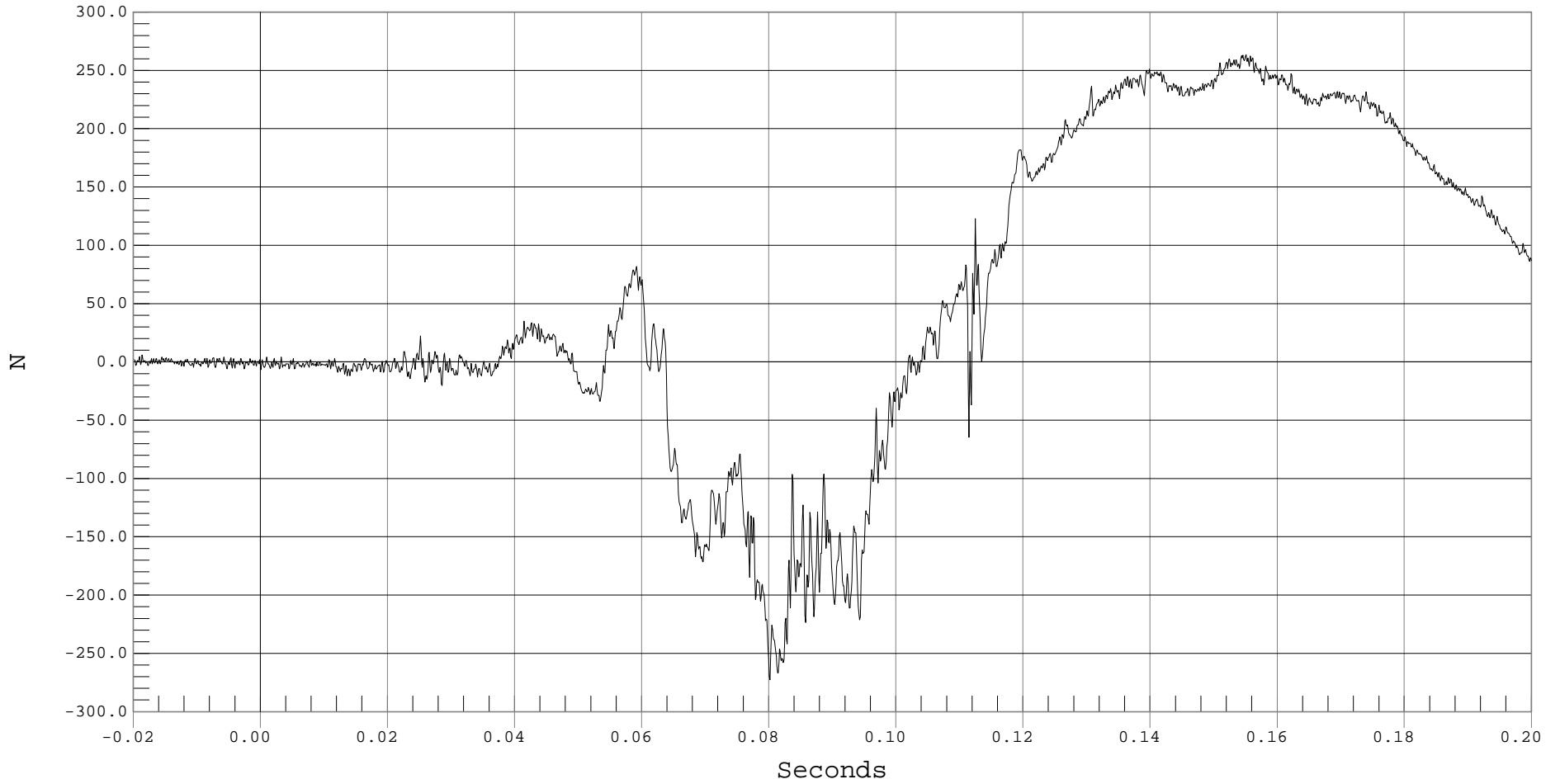
### DRIVER NECK FORCE Y

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER NECK FY, B01012FT.F05

Ymin = -272.58 N @ 0.0802 Seconds, Ymax = 263.44 N @ 0.1551 Seconds



B-12



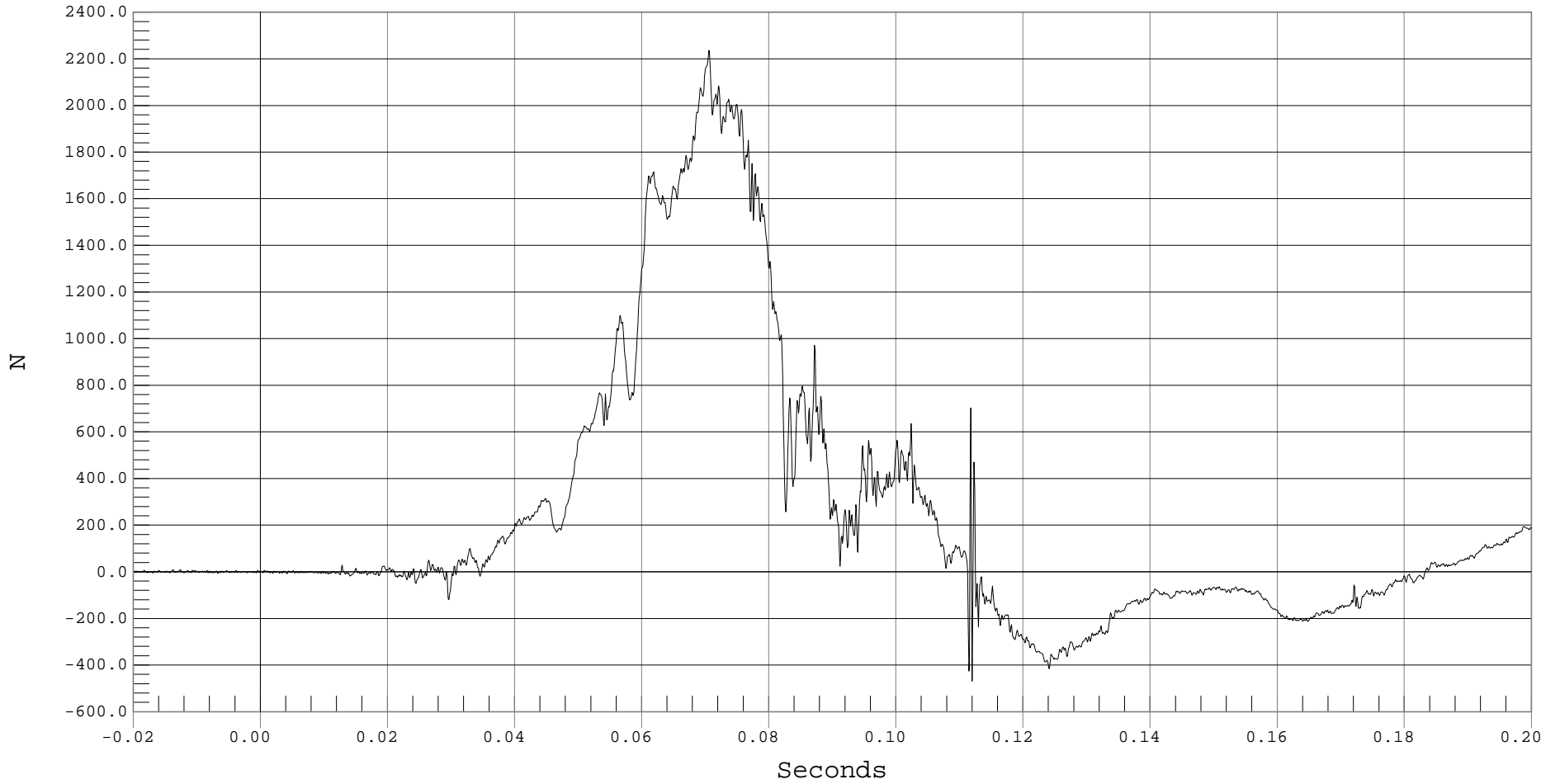
### DRIVER NECK FORCE Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER NECK FZ, B01012FT.F06

Ymin = -468.63 N @ 0.1120 Seconds, Ymax = 2236.02 N @ 0.0706 Seconds



B-13



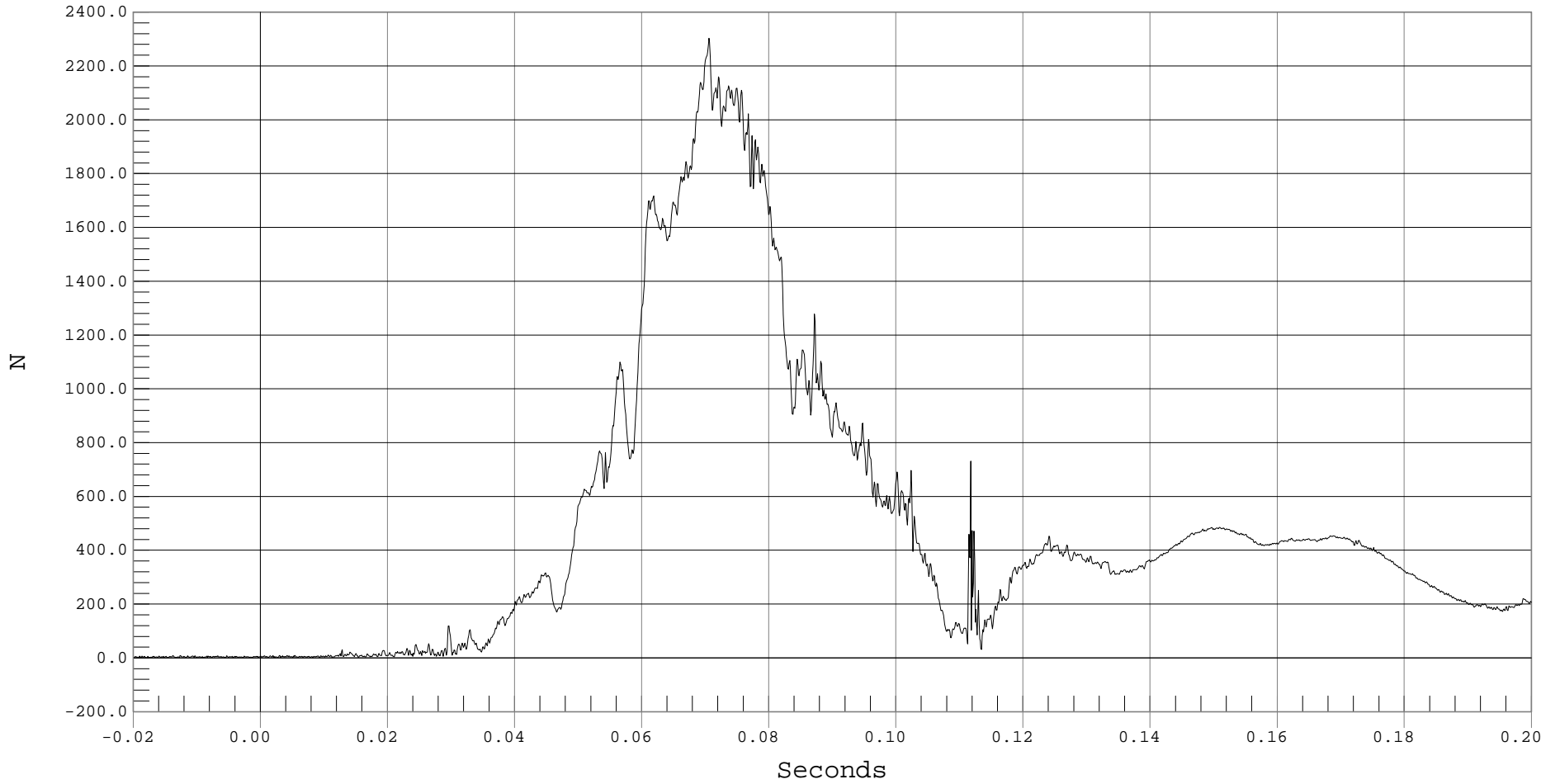
### DRIVER NECK FORCE RESULTANT

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER NECK FORCE RESULTANT, B01012FV.F04

Ymin = .24 N @ -0.0178 Seconds, Ymax = 2303.49 N @ 0.0706 Seconds





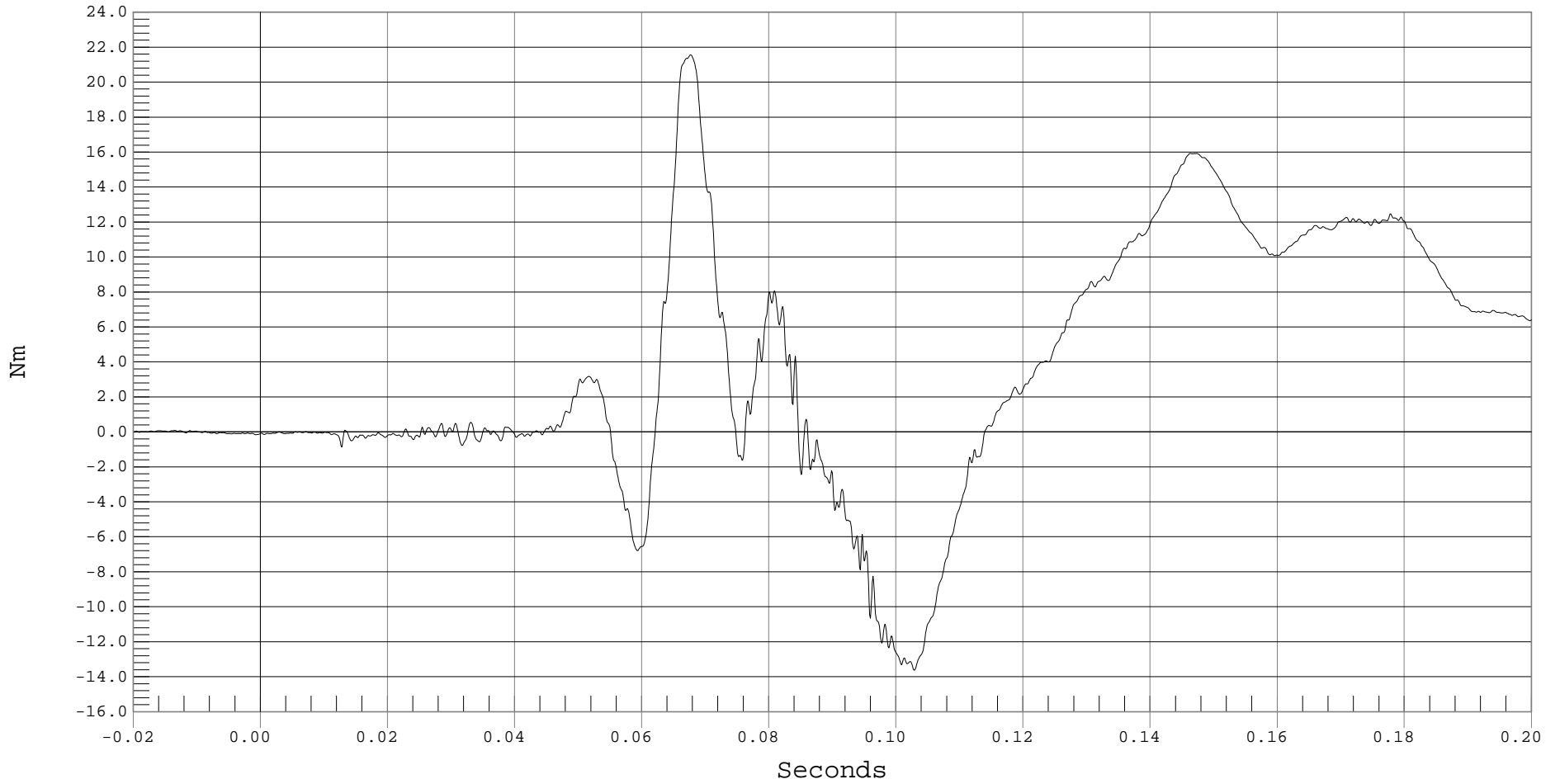
### DRIVER NECK MOMENT X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER NECK MX, B01012MF.M07

Ymin = -13.64 Nm @ 0.1029 Seconds, Ymax = 21.55 Nm @ 0.0677 Seconds





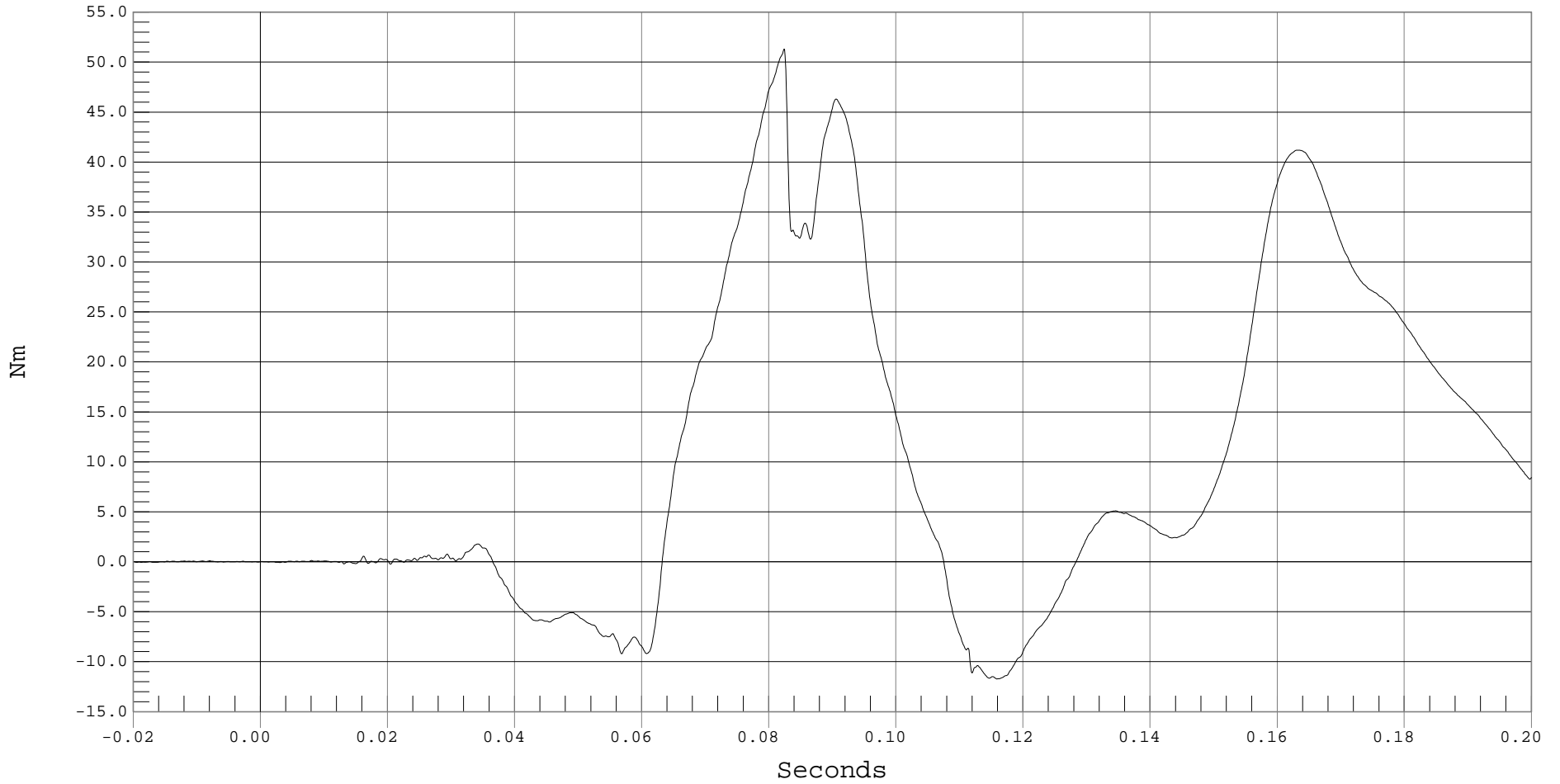
### DRIVER NECK MOMENT Y

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER NECK MY, B01012MF.M31

Ymin = -11.72 Nm @ 0.1159 Seconds, Ymax = 51.32 Nm @ 0.0824 Seconds





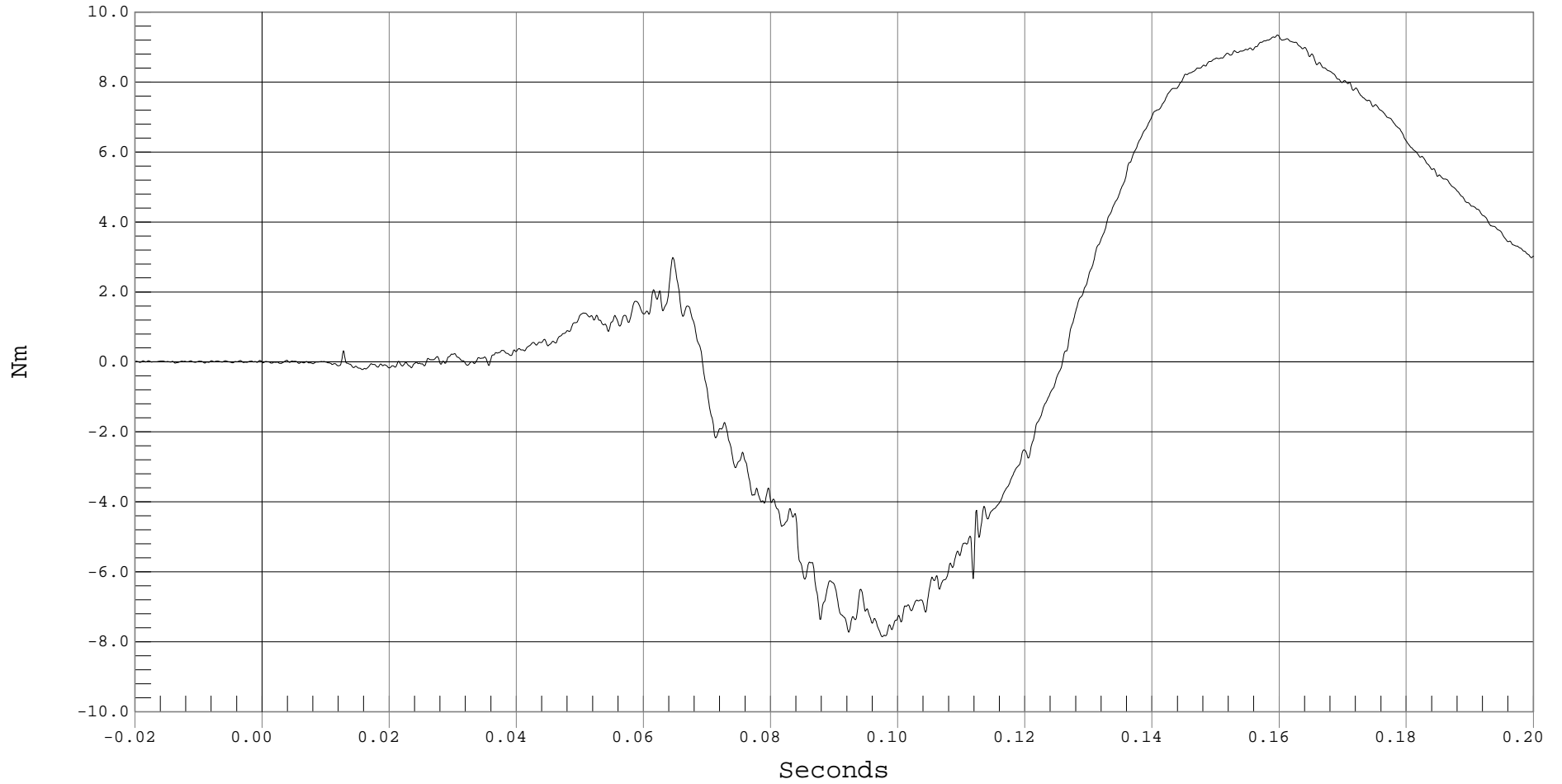
### DRIVER NECK MOMENT Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER NECK MZ, B01012MF.M09

Ymin = -7.86 Nm @ 0.0976 Seconds, Ymax = 9.34 Nm @ 0.1597 Seconds



B-17



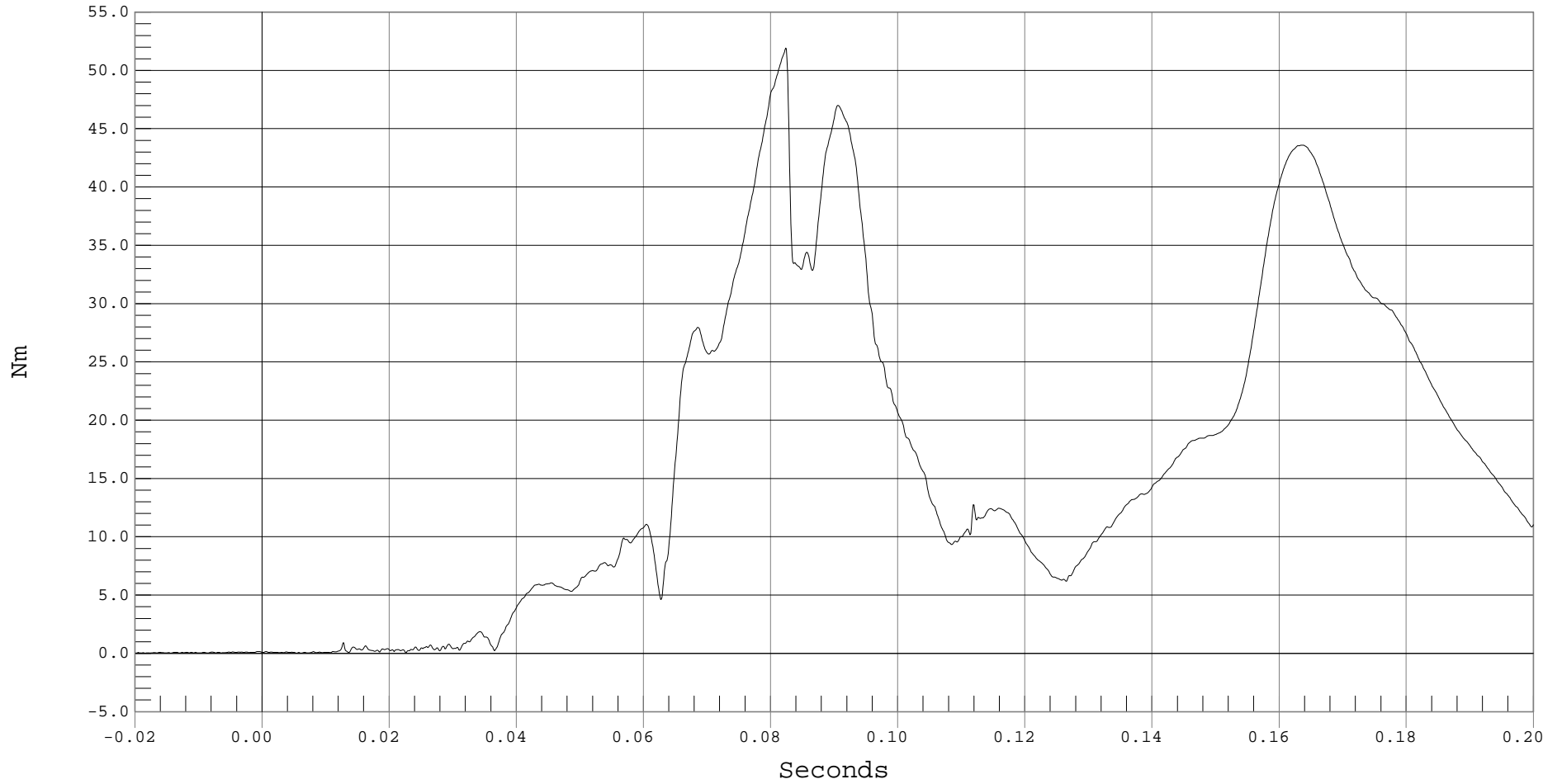
### DRIVER NECK MOMENT RESULTANT

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER NECK MOMENT RESULTANT, B01012MV.M07

Ymin = .01 Nm @ -0.0143 Seconds, Ymax = 51.93 Nm @ 0.0824 Seconds



B-18



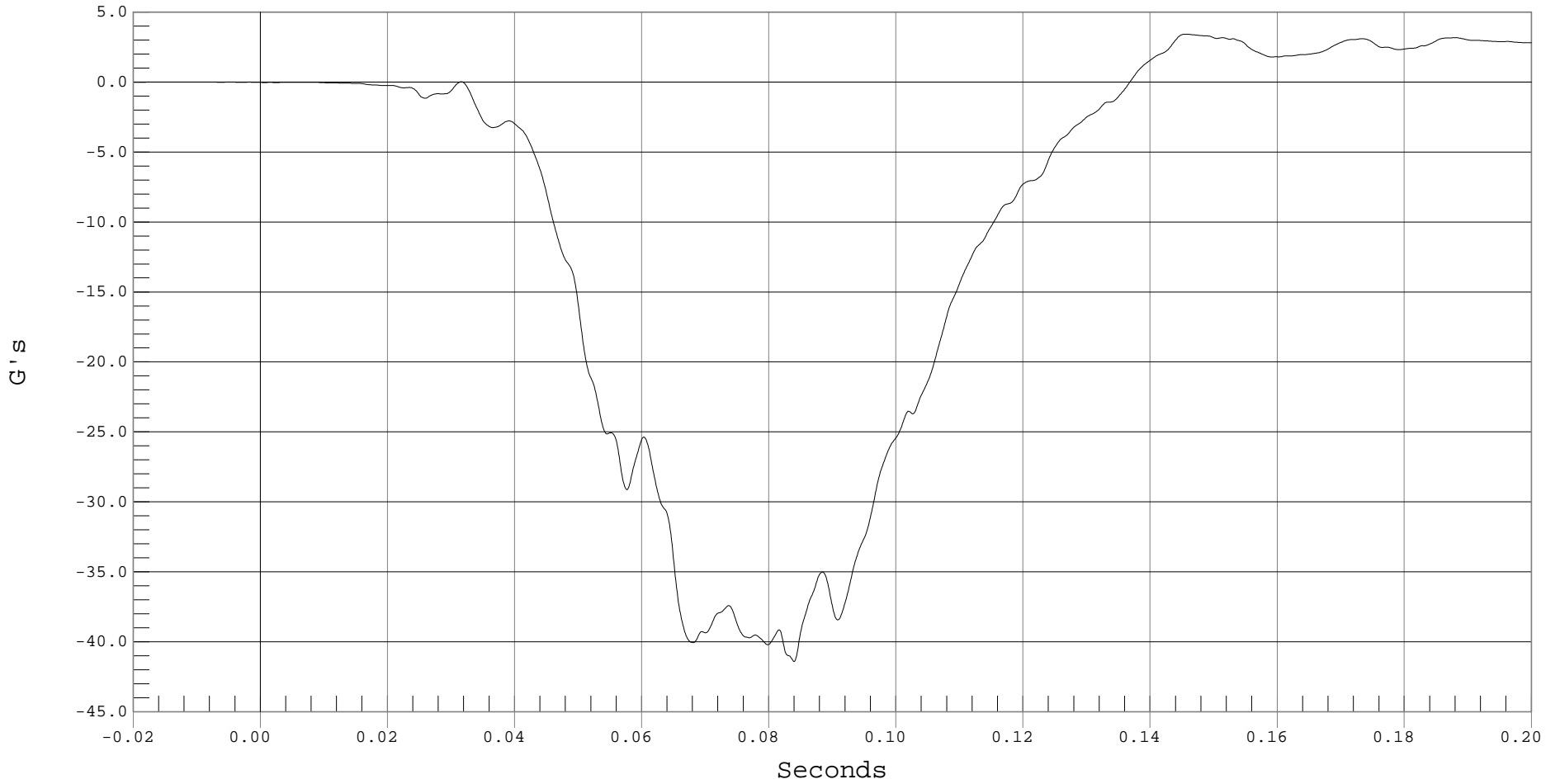
### DRIVER CHEST X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER CHEST X, B01012AF.A10

Ymin = -41.41 G's @ 0.0840 Seconds, Ymax = 3.43 G's @ 0.1456 Seconds



B-19



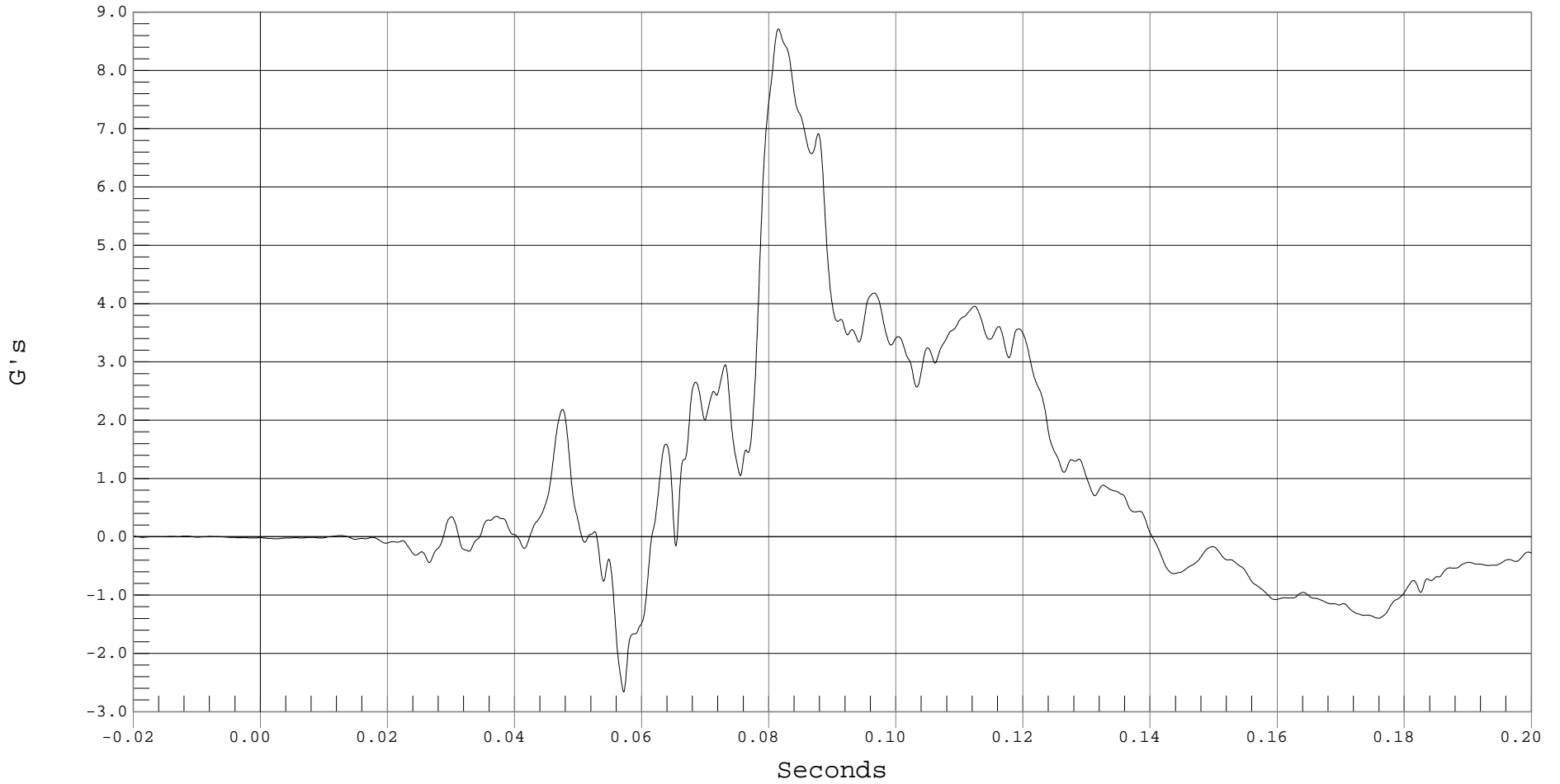
### DRIVER CHEST Y ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER CHEST Y, B01012AF.A11

Ymin = -2.66 G's @ 0.0572 Seconds, Ymax = 8.71 G's @ 0.0815 Seconds



B-20



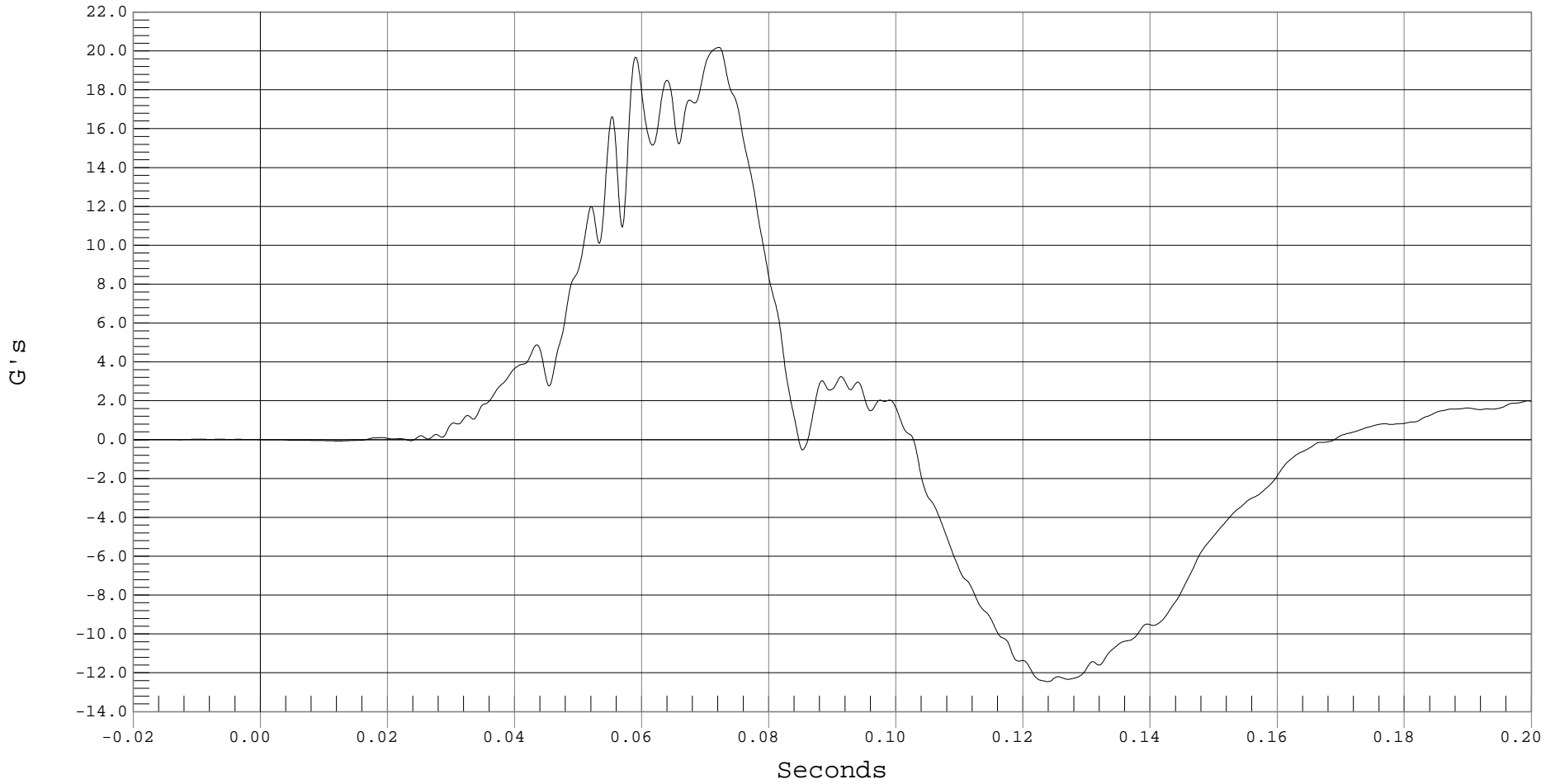
### DRIVER CHEST Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER CHEST Z, B01012AF.A12

Ymin = -12.45 G's @ 0.1239 Seconds, Ymax = 20.19 G's @ 0.0721 Seconds



B-21



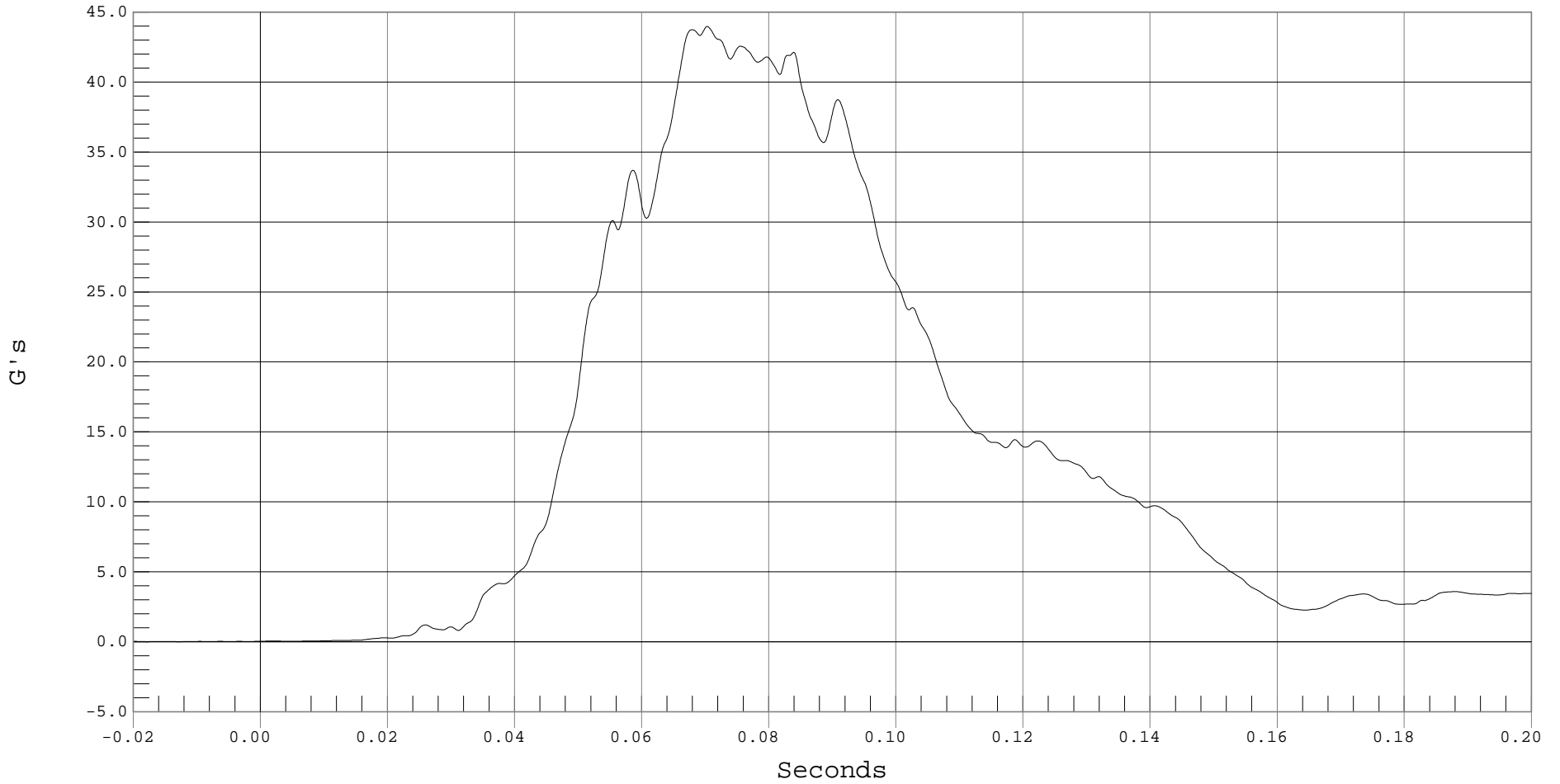
### DRIVER CHEST RESULTANT ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER CHEST RESULTANT ACCELERATION, B01012AV.A10

Ymin = 0 G's @ -0.0128 Seconds, Ymax = 43.98 G's @ 0.0703 Seconds



B-22



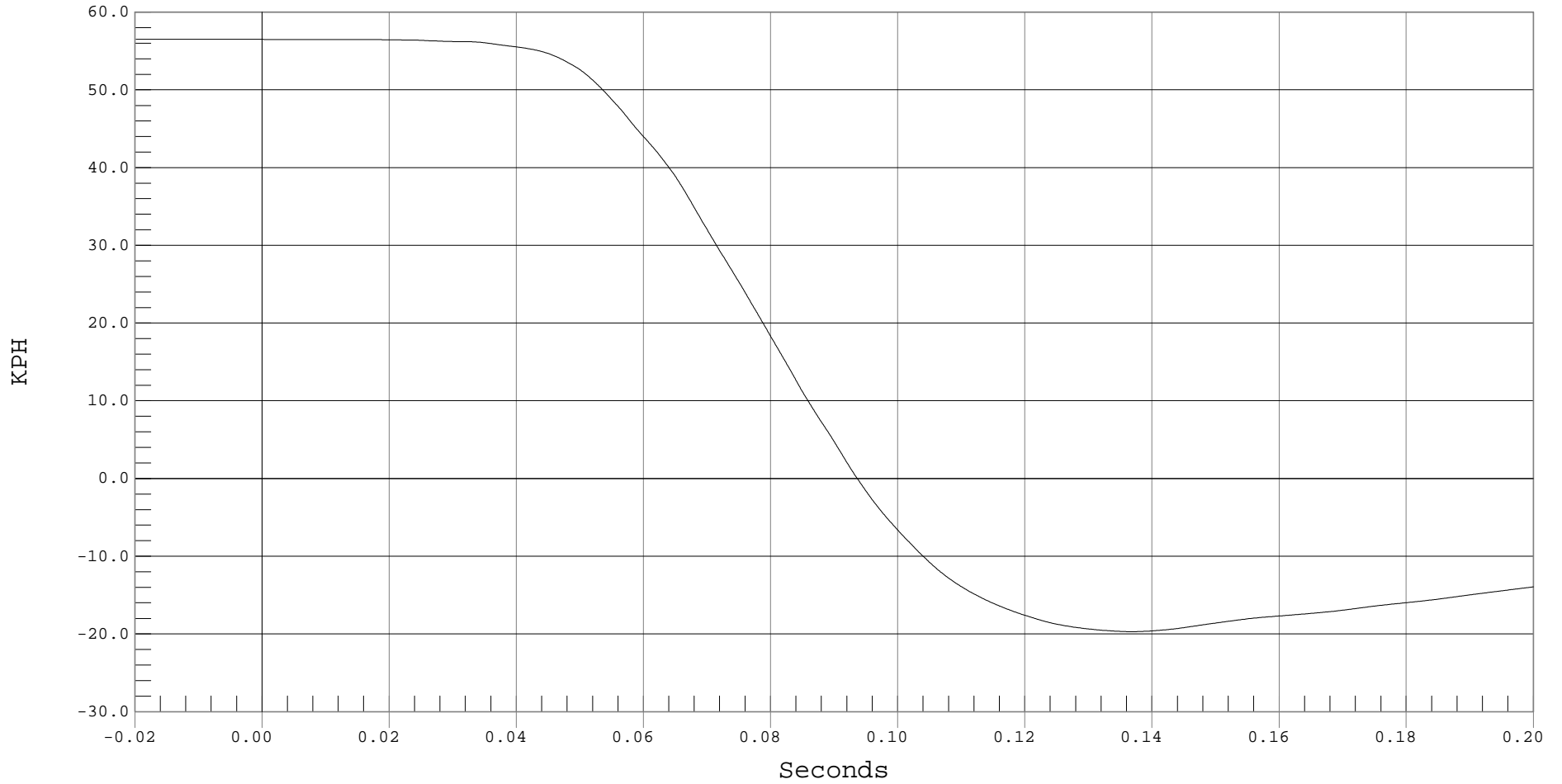
### DRIVER CHEST X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER CHEST X VELOCITY, B01012AI.V10

Ymin = -19.7 KPH @ 0.1368 Seconds, Ymax = 56.5 KPH @ -0.0198 Seconds





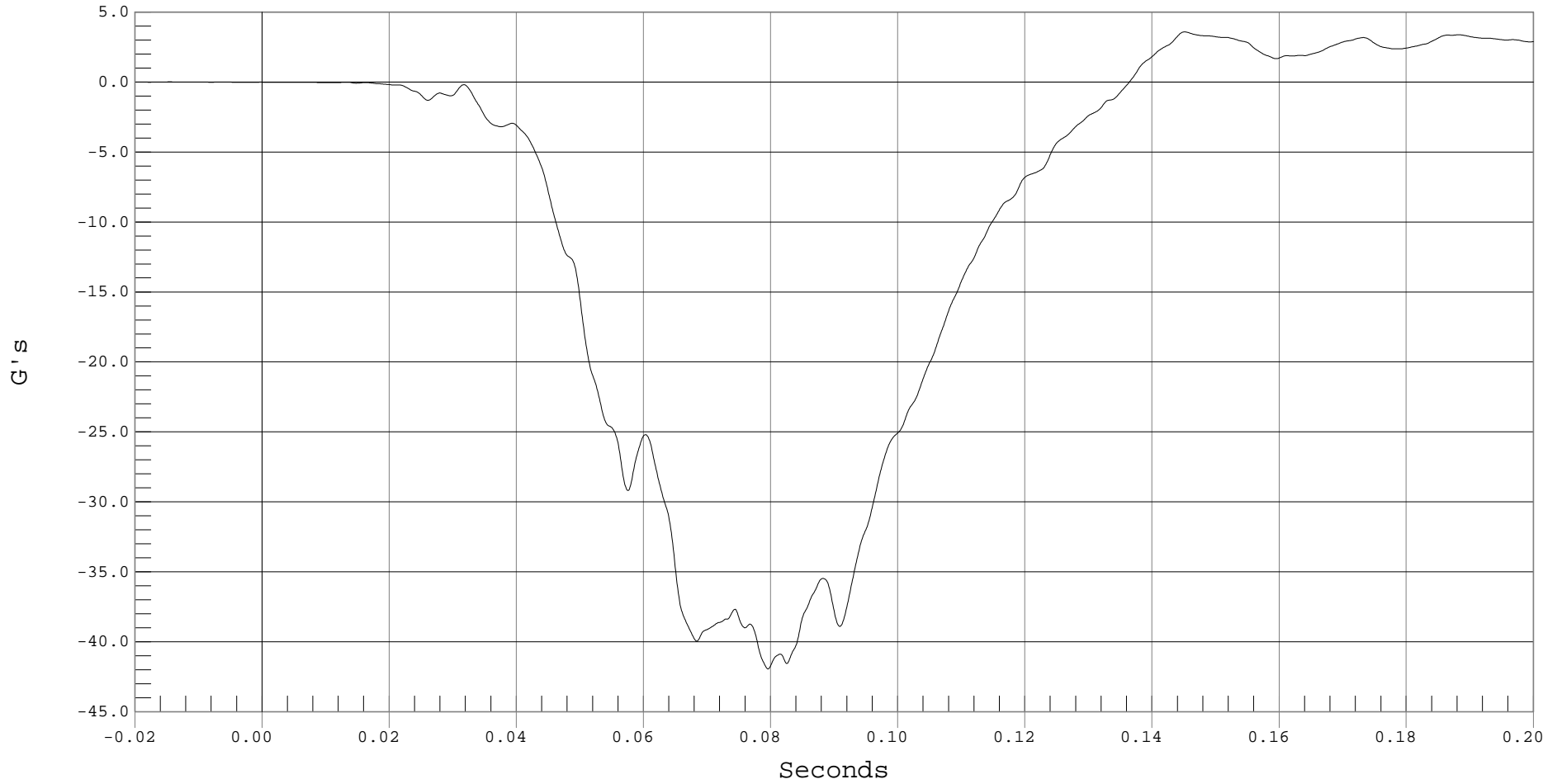
### DRIVER CHEST REDUNDANT X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER CHEST Xr, B01012AF.A36

Ymin = -41.94 G's @ 0.0796 Seconds, Ymax = 3.59 G's @ 0.1451 Seconds





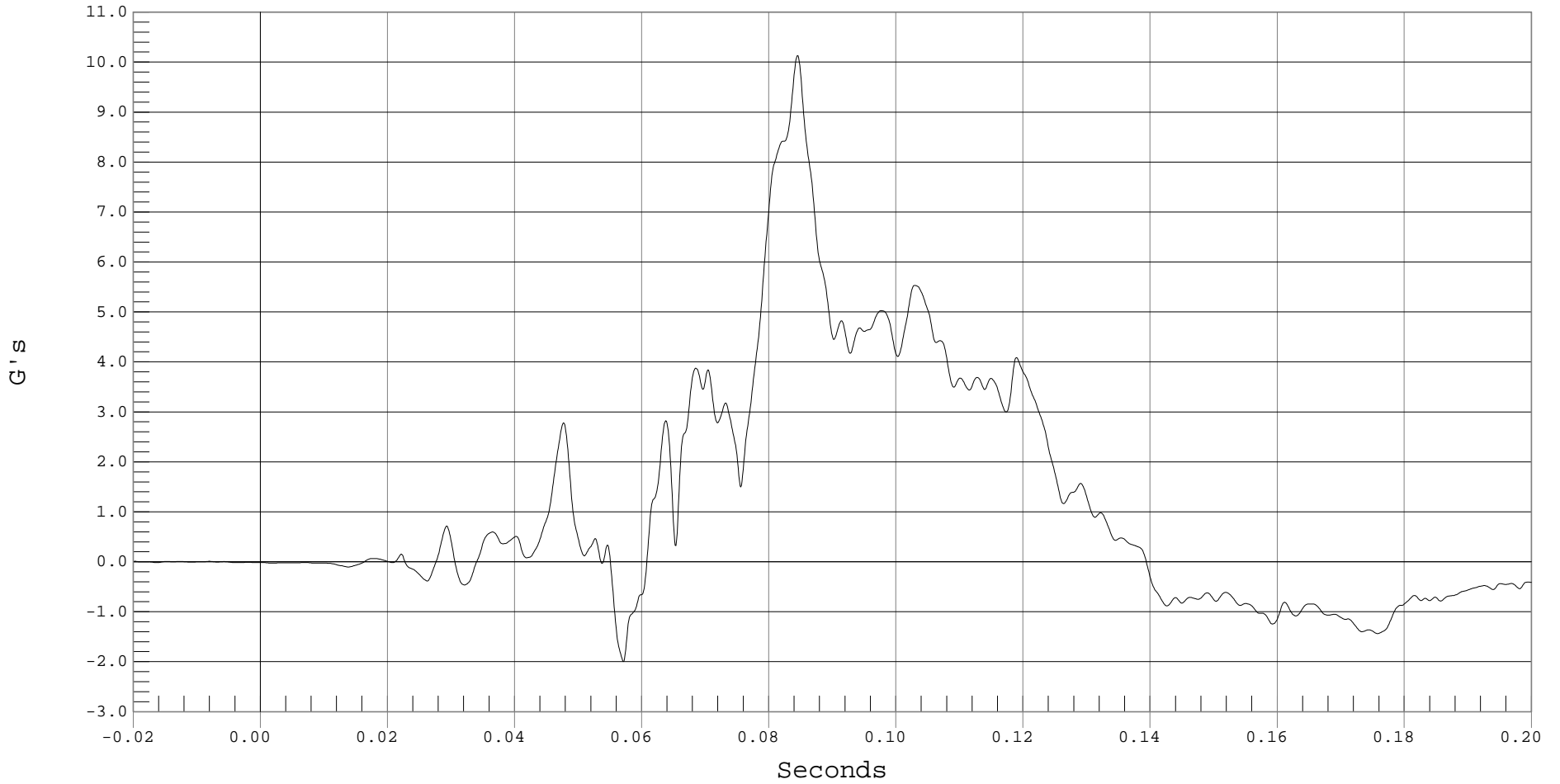
### DRIVER CHEST REDUNDANT Y ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER CHEST Yr, B01012AF.A37

Ymin = -2 G's @ 0.0571 Seconds, Ymax = 10.13 G's @ 0.0845 Seconds



B-25



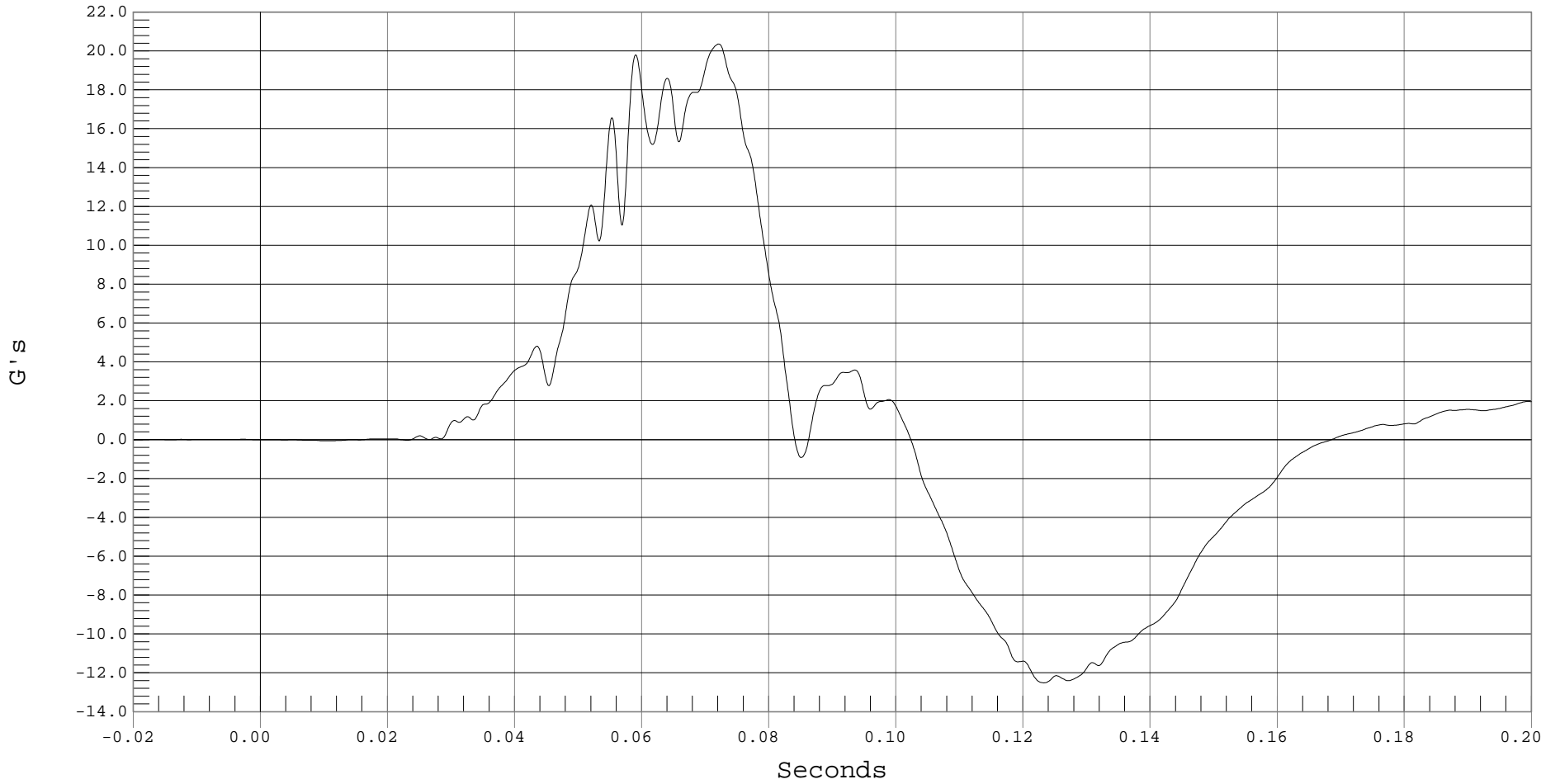
### DRIVER CHEST REDUNDANT Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER CHEST Zr, B01012AF.A38

Ymin = -12.52 G's @ 0.1233 Seconds, Ymax = 20.36 G's @ 0.0721 Seconds



B-26



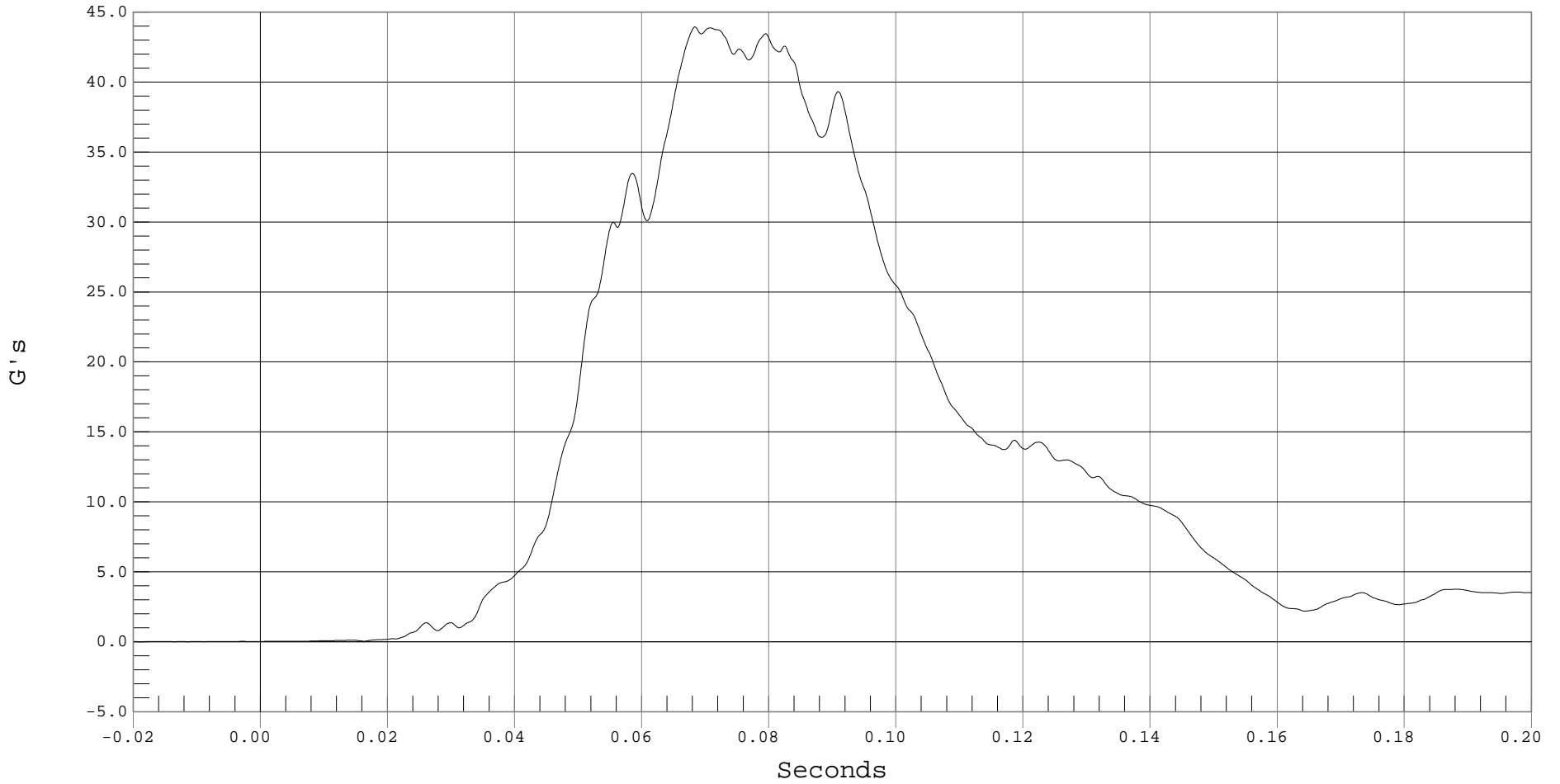
### DRIVER CHEST REDUNDANT RESULTANT ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER CHEST REDUNDANT RESULTANT ACCELERATION, B01012AV.A36

Ymin = 0 G's @ -0.0188 Seconds, Ymax = 43.95 G's @ 0.0684 Seconds



B-27



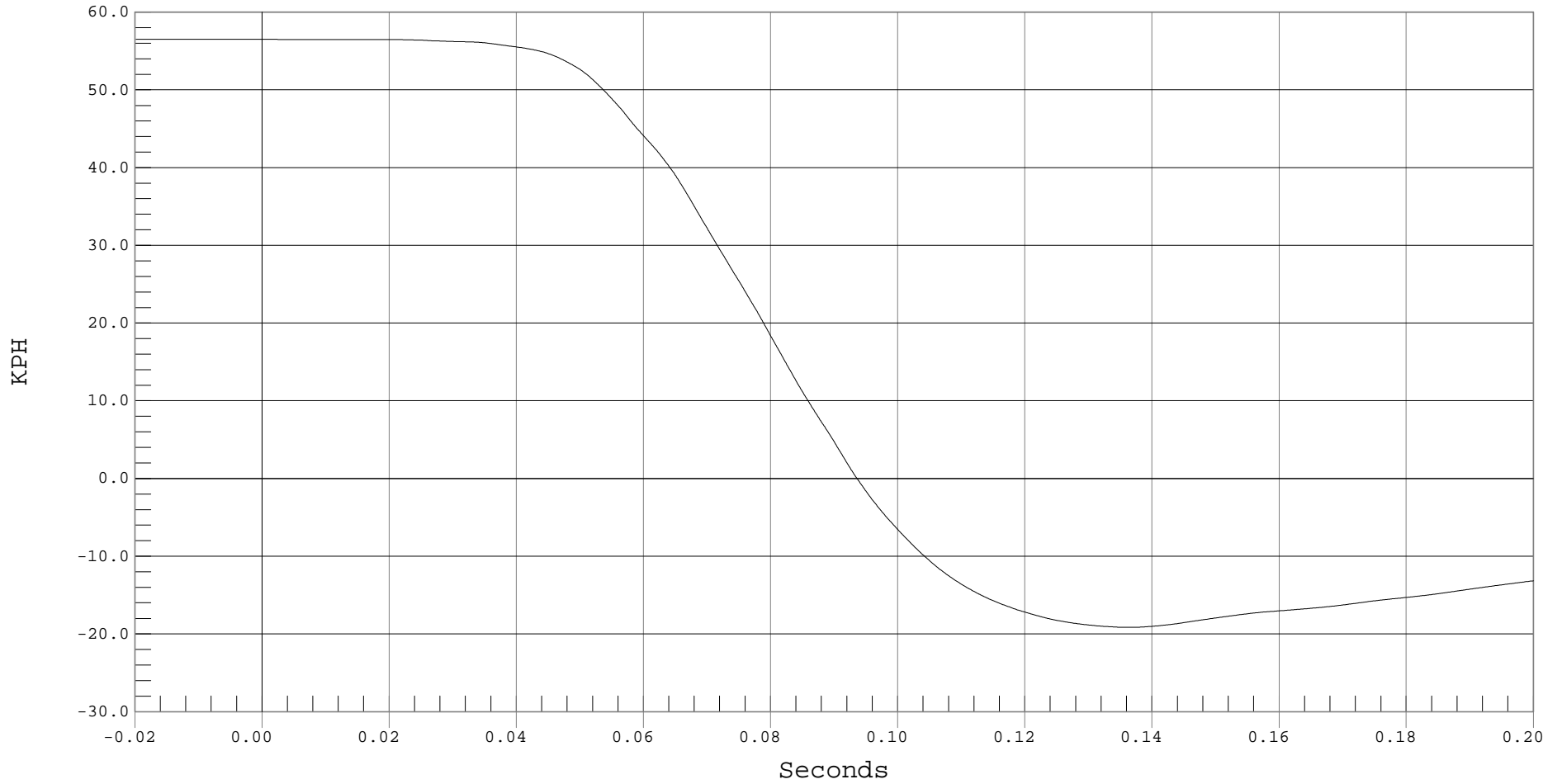
### DRIVER CHEST REDUNDANT X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER CHEST REDUNDANT X VELOCITY, B01012AI.V36

Ymin = -19.15 KPH @ 0.1364 Seconds, Ymax = 56.5 KPH @ -0.0089 Seconds





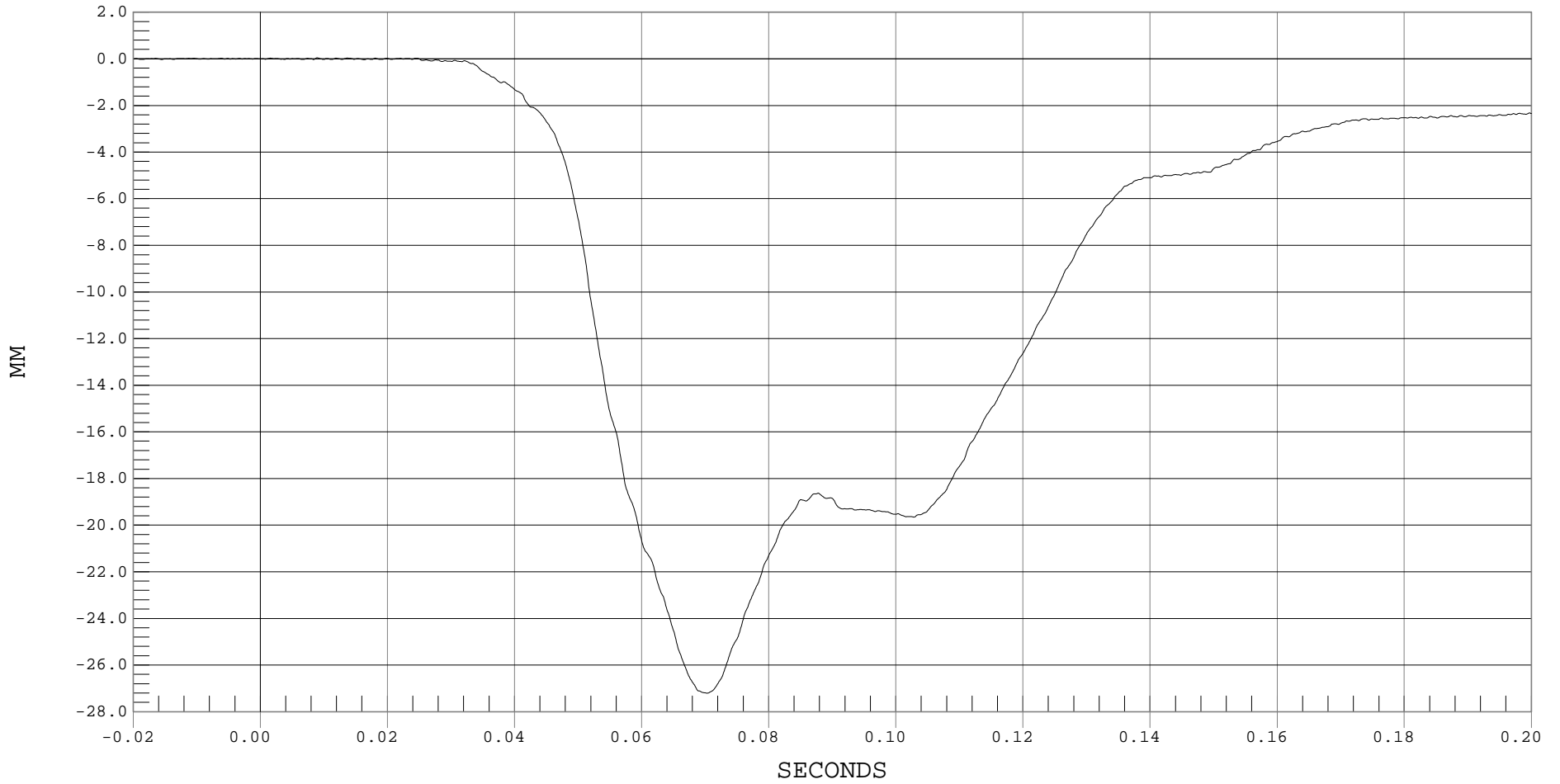
### DRIVER CHEST COMPRESSION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER CHEST DISP, B01012DF.D13

Ymin = -27.2 MM @ 0.0703 SECONDS, Ymax = .04 MM @ 0.0089 SECONDS





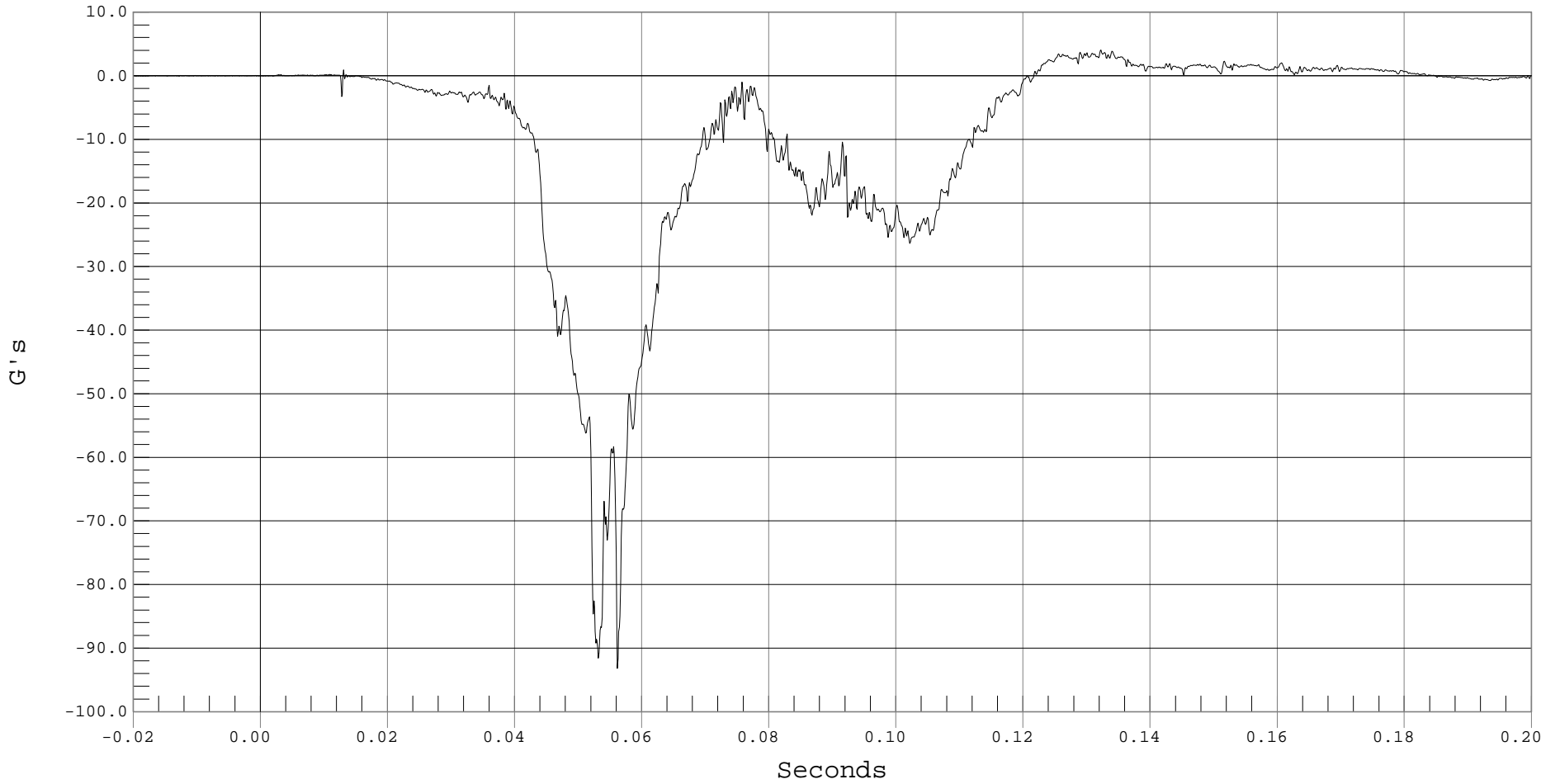
### DRIVER PELVIS X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER PELVIS X, B01012AT.A14

Ymin = -93.2 G's @ 0.0562 Seconds, Ymax = 4.01 G's @ 0.1322 Seconds



B-30



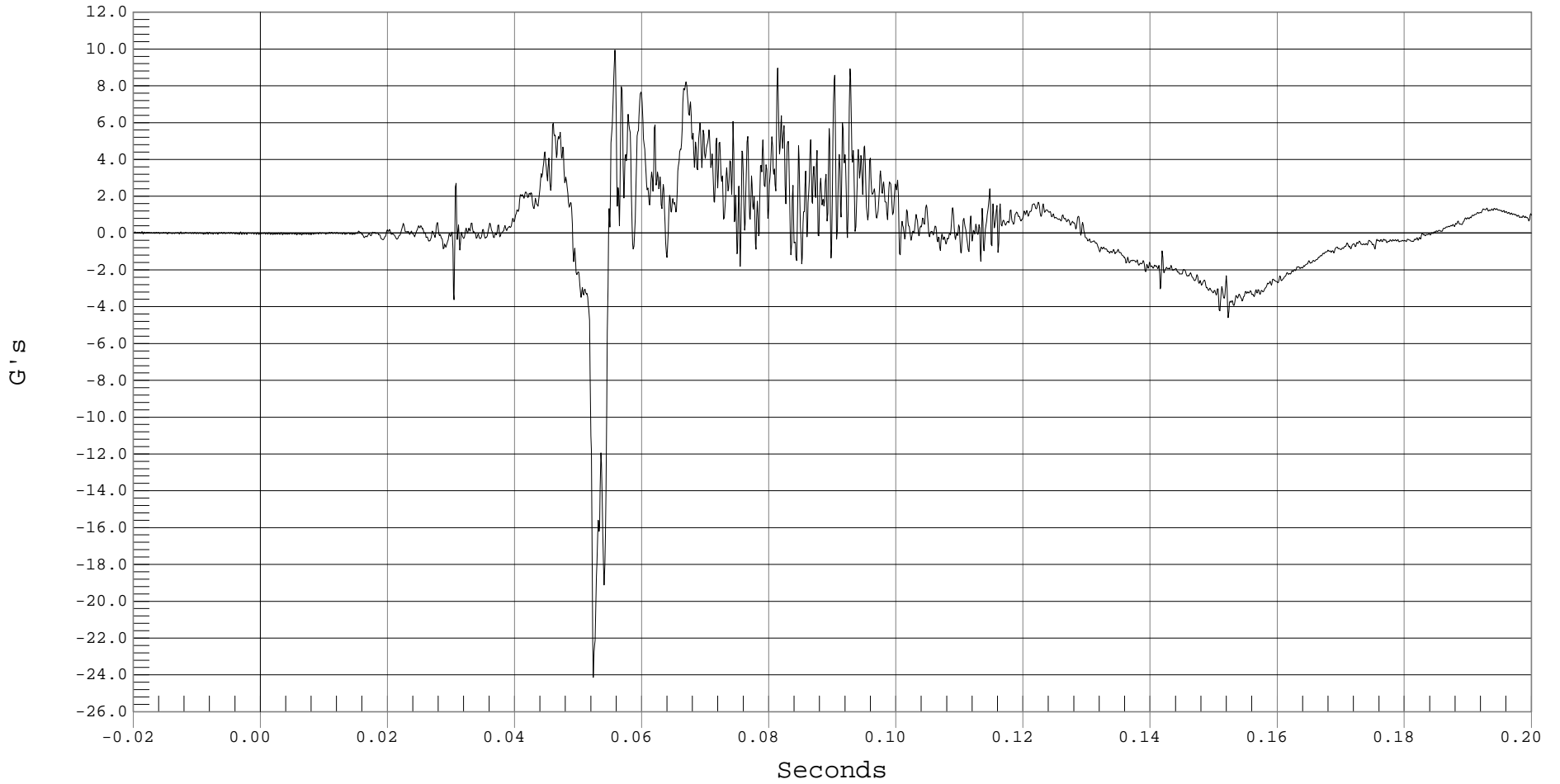
### DRIVER PELVIS Y ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER PELVIS Y, B01012AT.A15

Ymin = -24.14 G's @ 0.0524 Seconds, Ymax = 9.93 G's @ 0.0558 Seconds



B-31



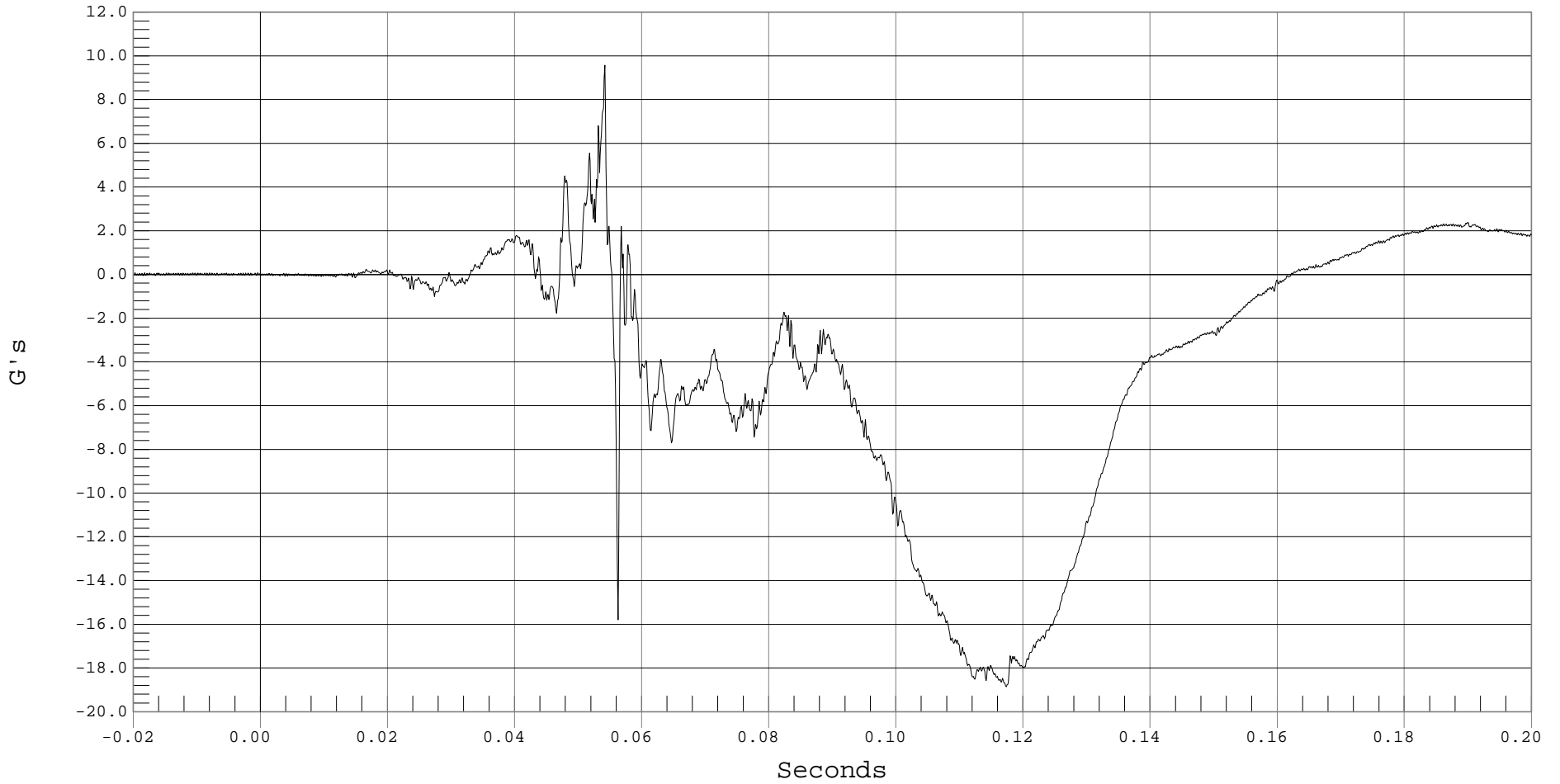
### DRIVER PELVIS Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER PELVIS Z, B01012AT.A16

Ymin = -18.86 G's @ 0.1174 Seconds, Ymax = 9.57 G's @ 0.0542 Seconds



B-32



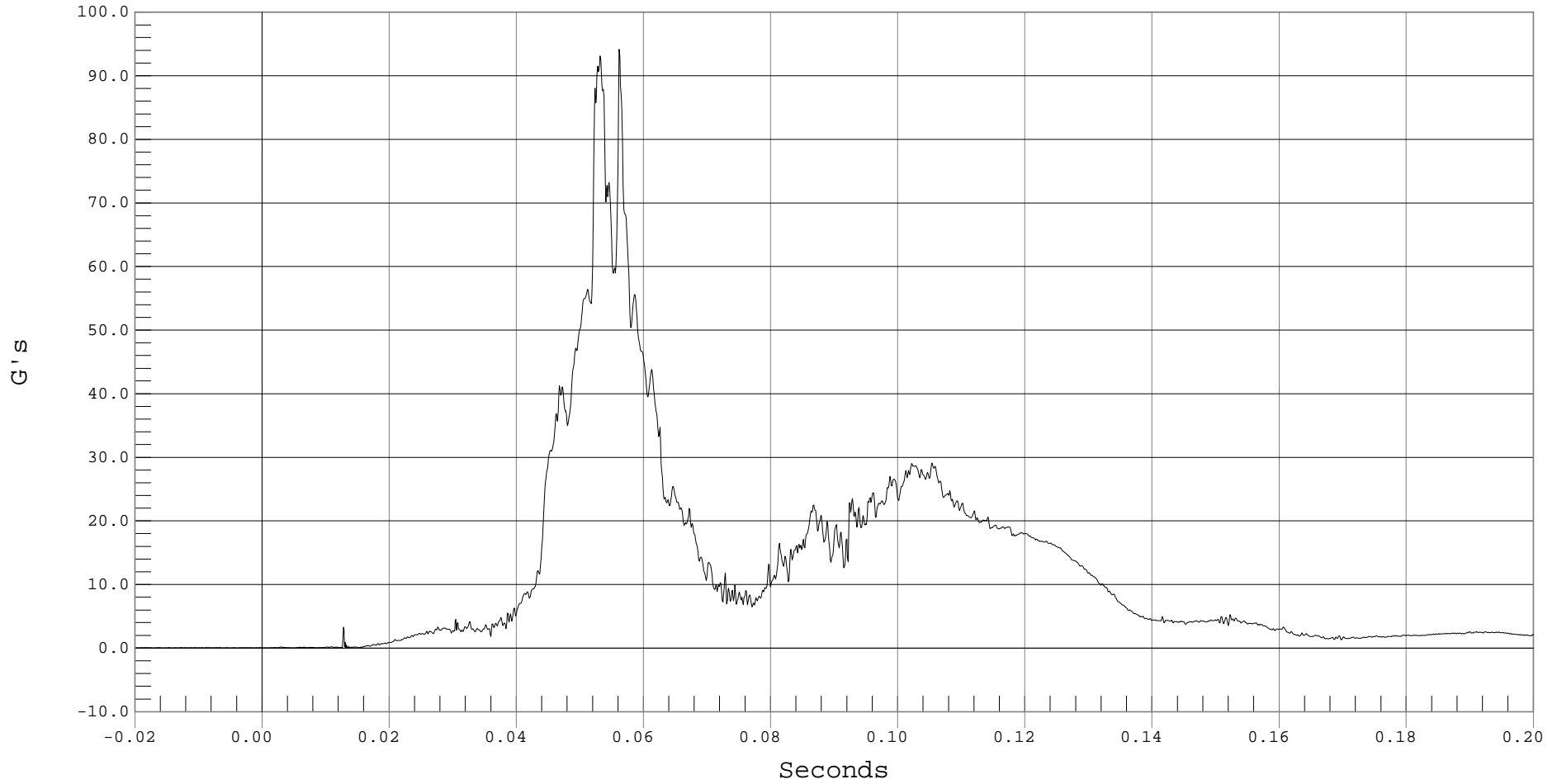
### DRIVER PELVIS RESULTANT ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 DRIVER PELVIS RESULTANT ACCELERATION, B01012AV.A14

Ymin = .01 G's @ -0.0151 Seconds, Ymax = 94.15 G's @ 0.0562 Seconds





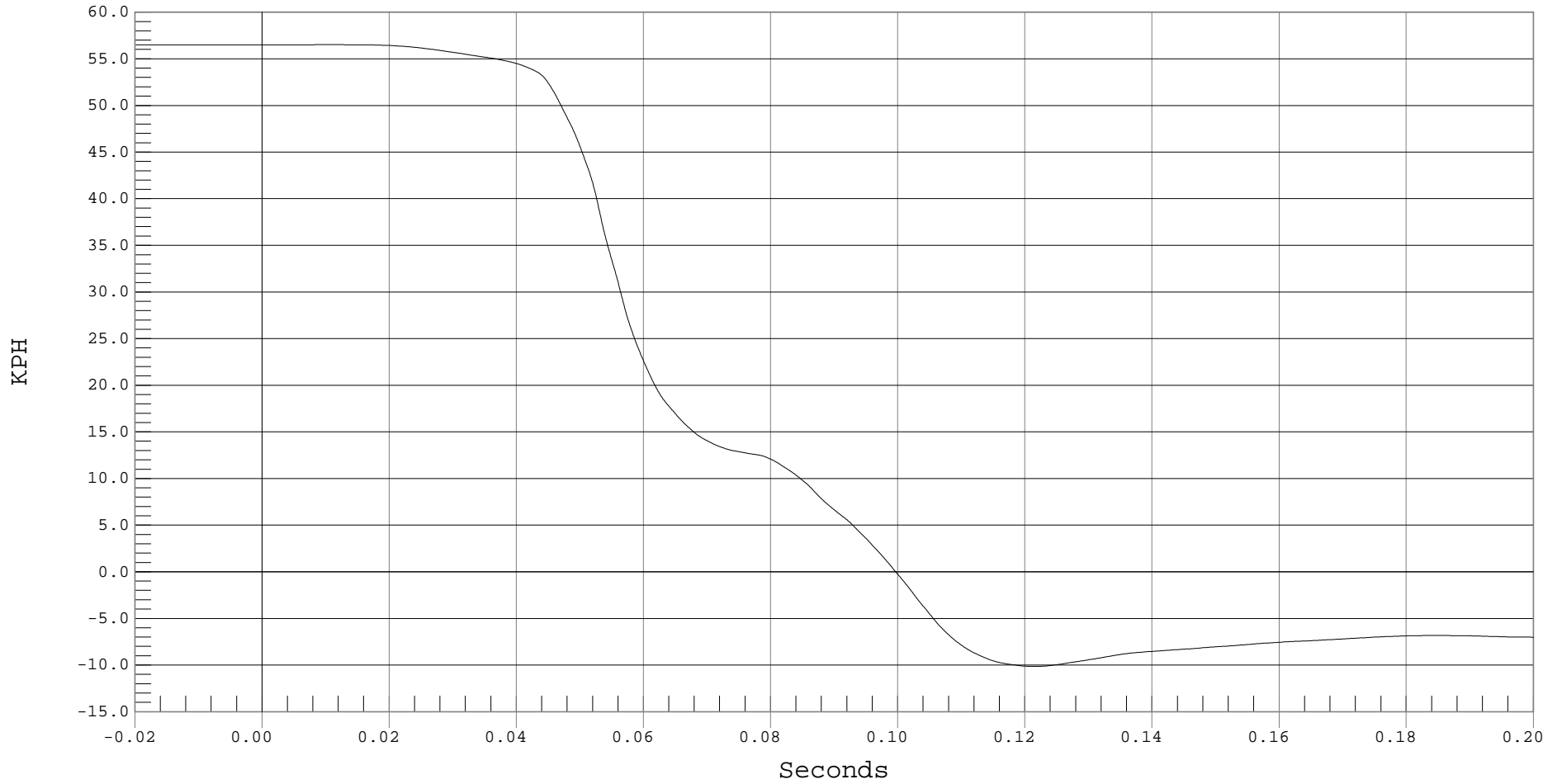
### DRIVER PELVIS X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER PELVIS X VELOCITY, B01012AI.V14

Ymin = -10.15 KPH @ 0.1217 Seconds, Ymax = 56.53 KPH @ 0.0118 Seconds





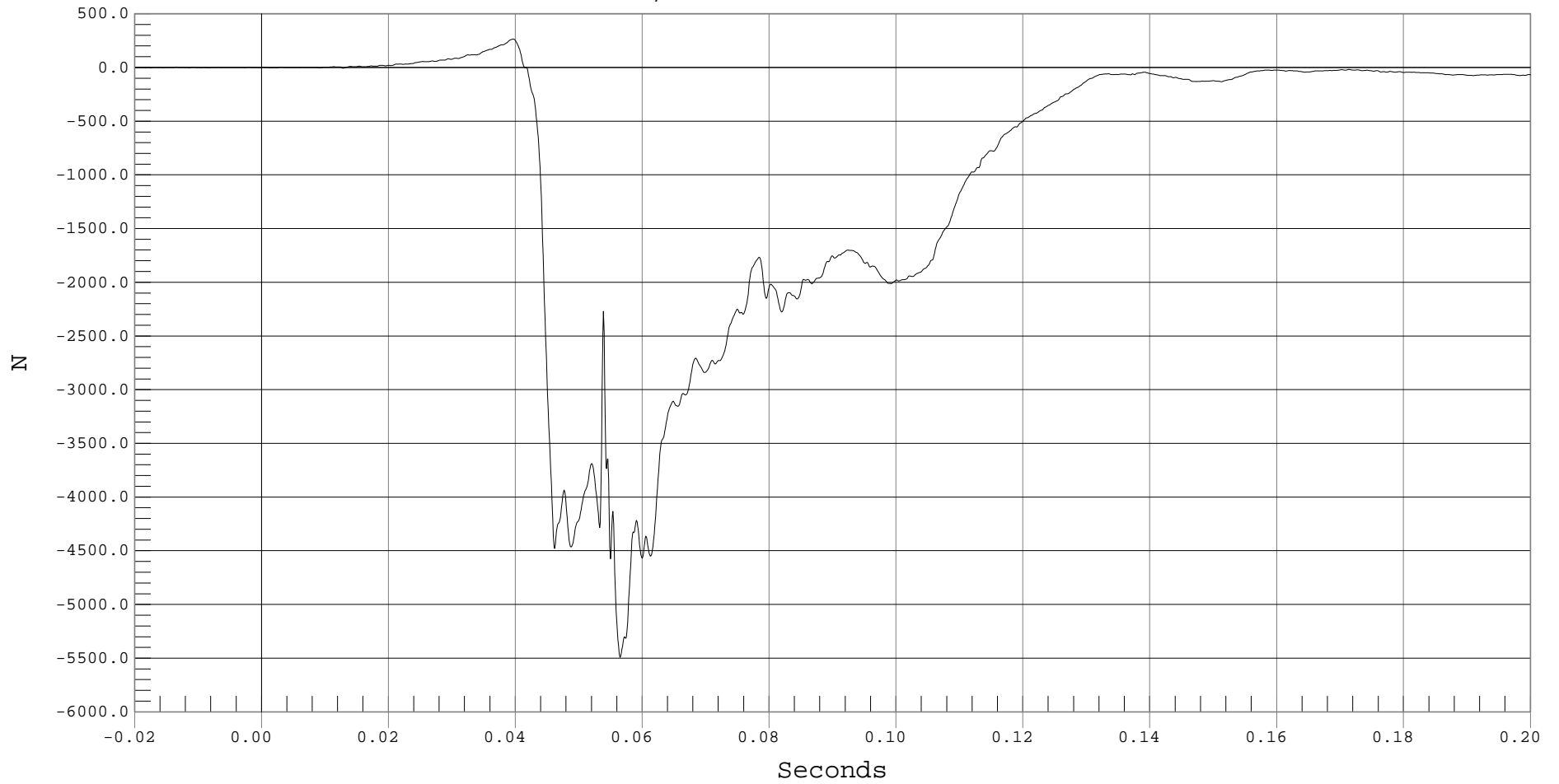
### DRIVER LEFT FEMUR FORCE

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER LEFT FEMUR, B01012FF.F18

Ymin = -5492.55 N @ 0.0565 Seconds, Ymax = 264.1 N @ 0.0397 Seconds





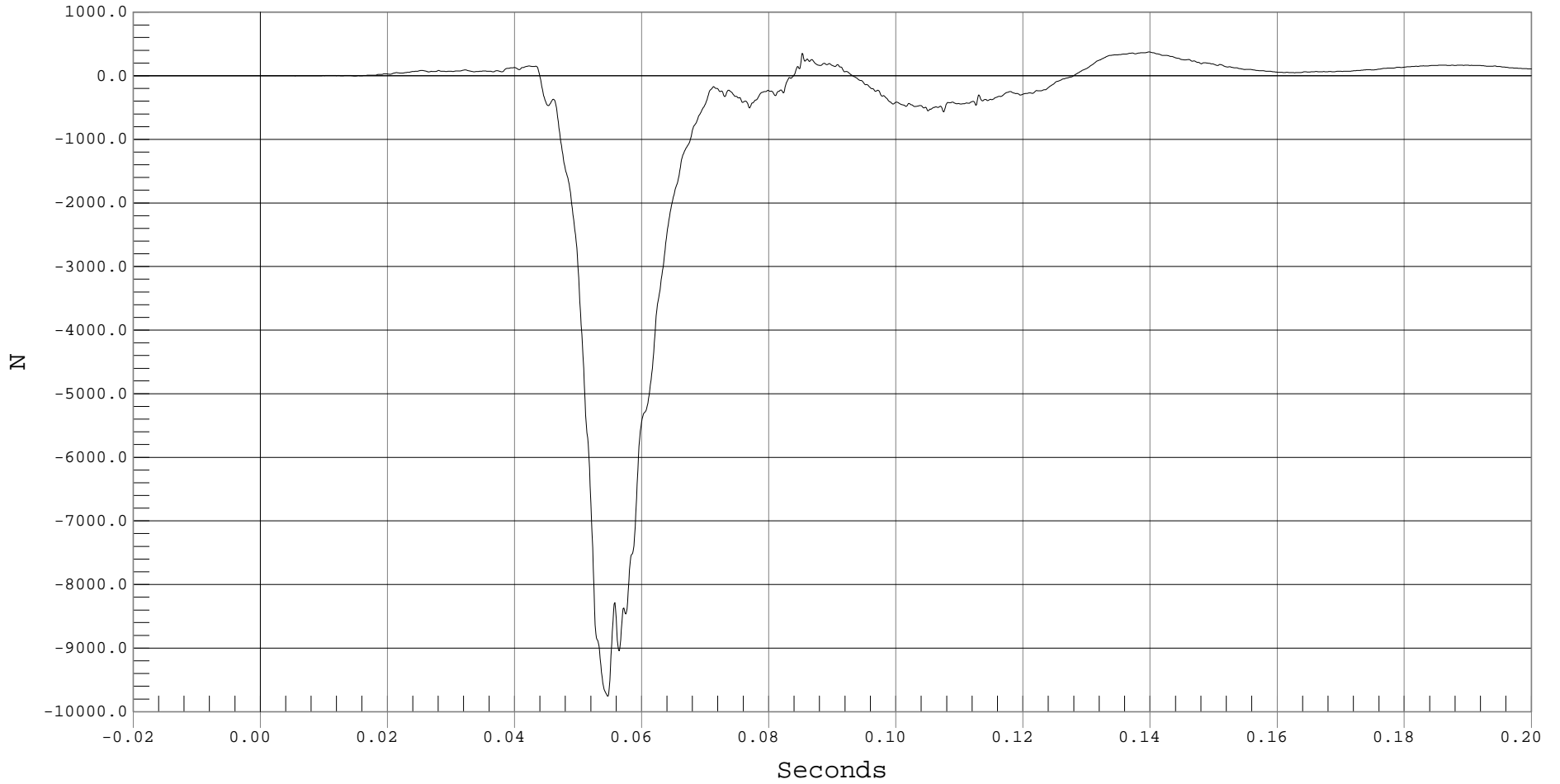
### DRIVER RIGHT FEMUR FORCE

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER RIGHT FEMUR, B01012FF.F17

Ymin = -9758.11 N @ 0.0547 Seconds, Ymax = 372.9 N @ 0.1399 Seconds



B-36



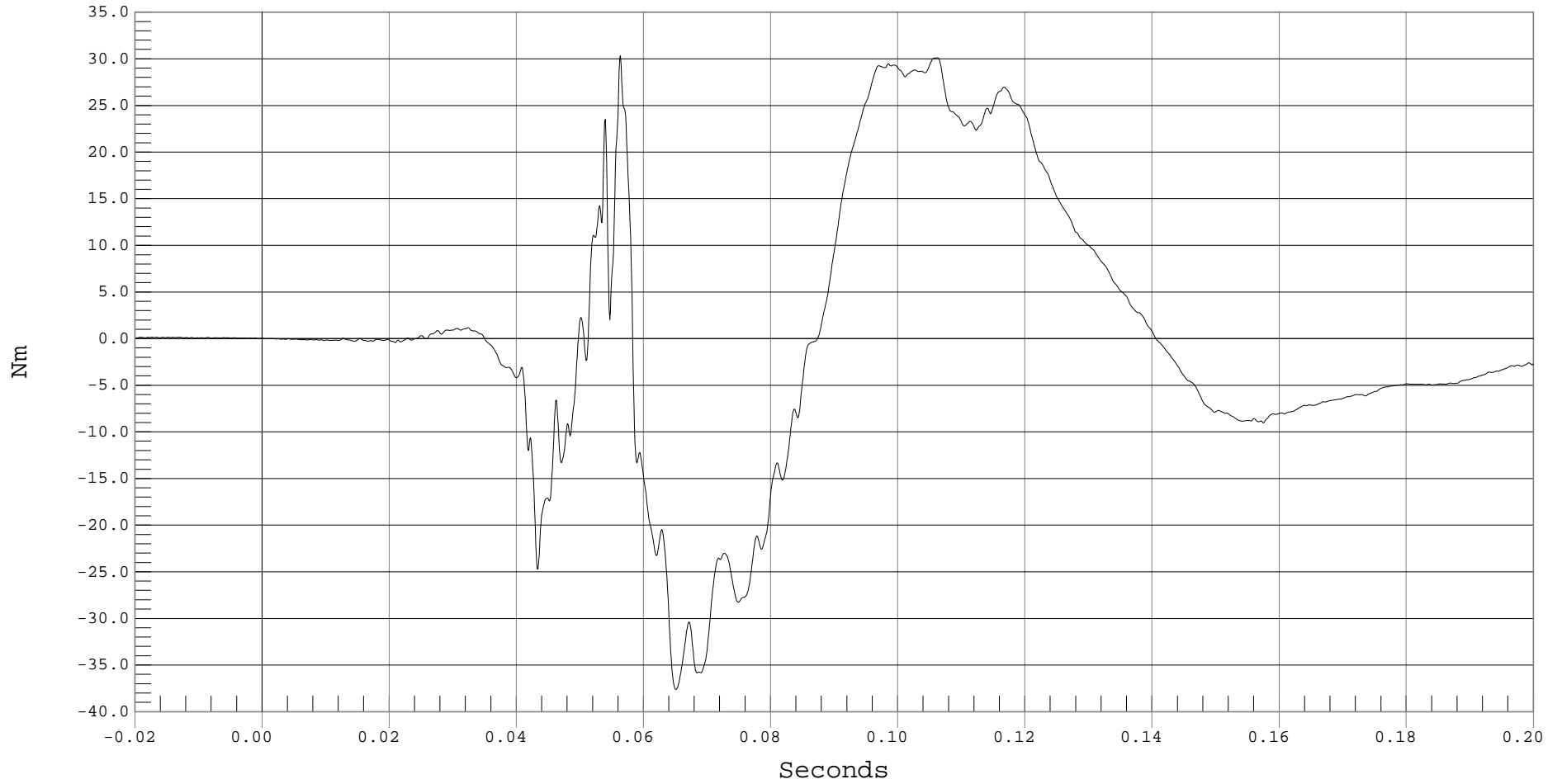
### DRIVER LEFT UPPER TIBIA MOMENT X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER LEFT UPPER TIBIA MX, B01012MF.M75

Ymin = -37.62 Nm @ 0.0651 Seconds, Ymax = 30.35 Nm @ 0.0564 Seconds





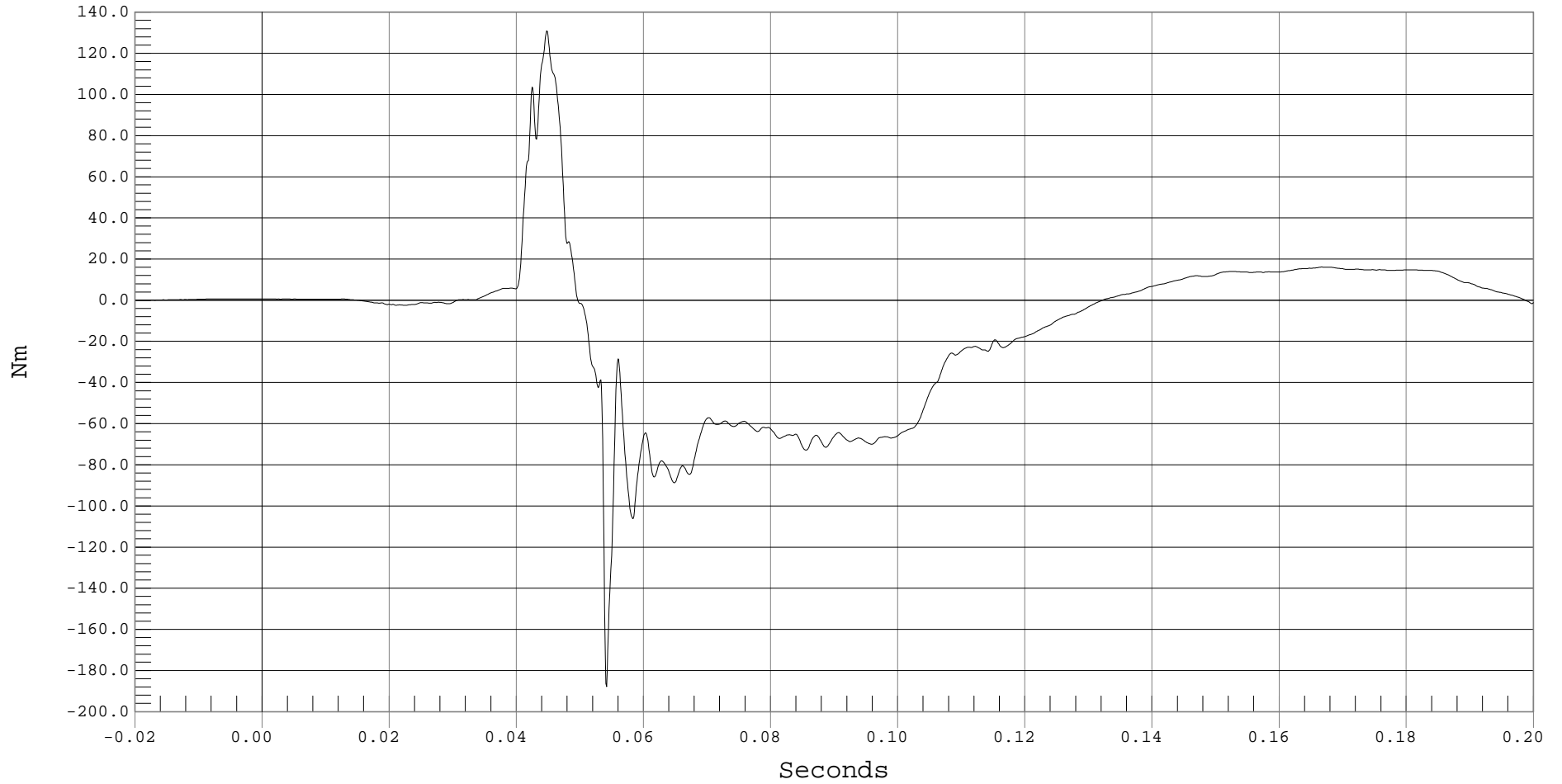
### DRIVER LEFT UPPER TIBIA MOMENT Y

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER LEFT UPPER TIBIA MY, B01012MF.M76

Ymin = -187.78 Nm @ 0.0542 Seconds, Ymax = 130.98 Nm @ 0.0448 Seconds



B-38



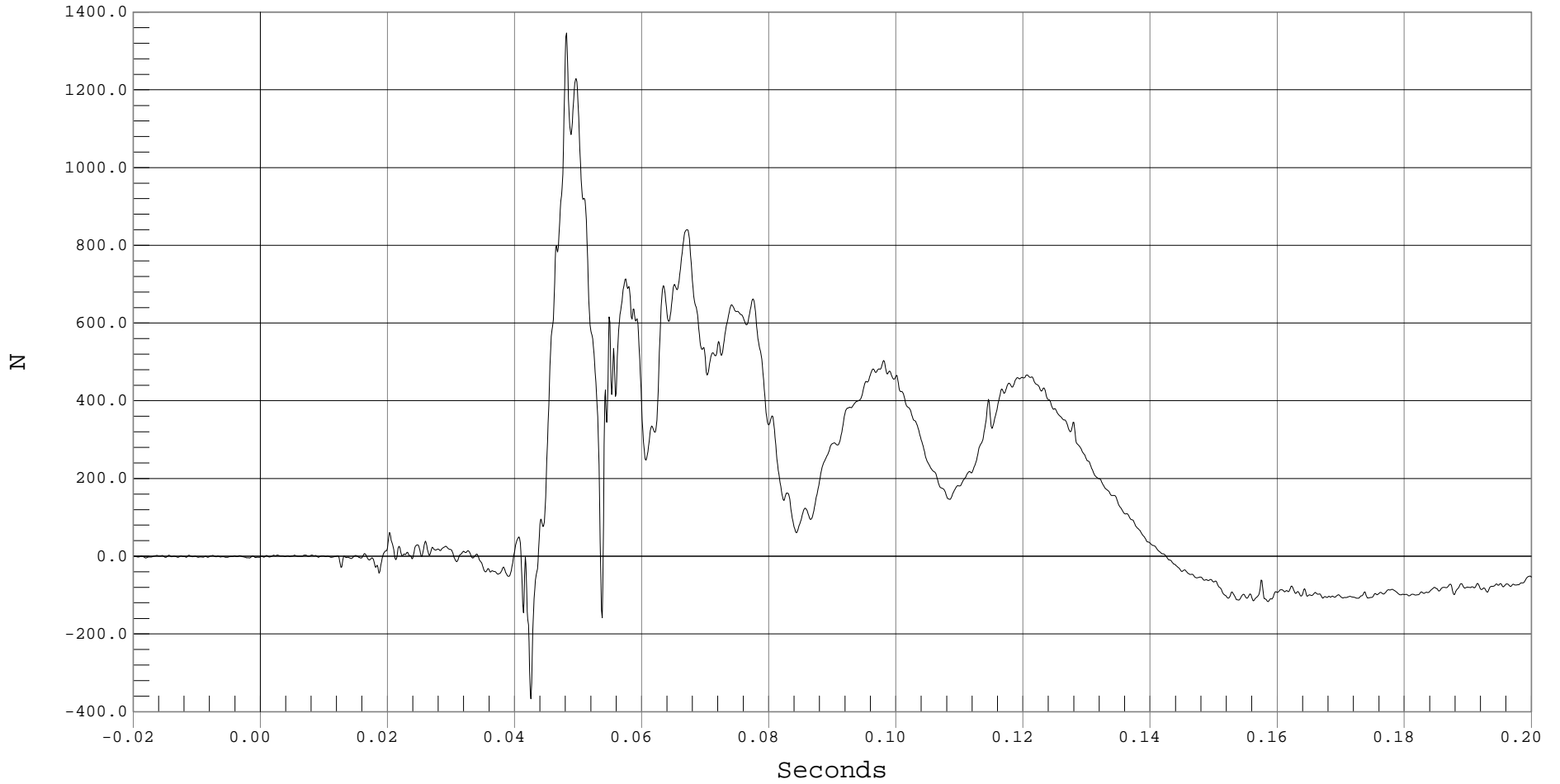
DRIVER LEFT UPPER TIBIA FORCE Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER LEFT UPPER TIBIA FZ, B01012FF.F77

Ymin = -367.01 N @ 0.0426 Seconds, Ymax = 1346.88 N @ 0.0482 Seconds





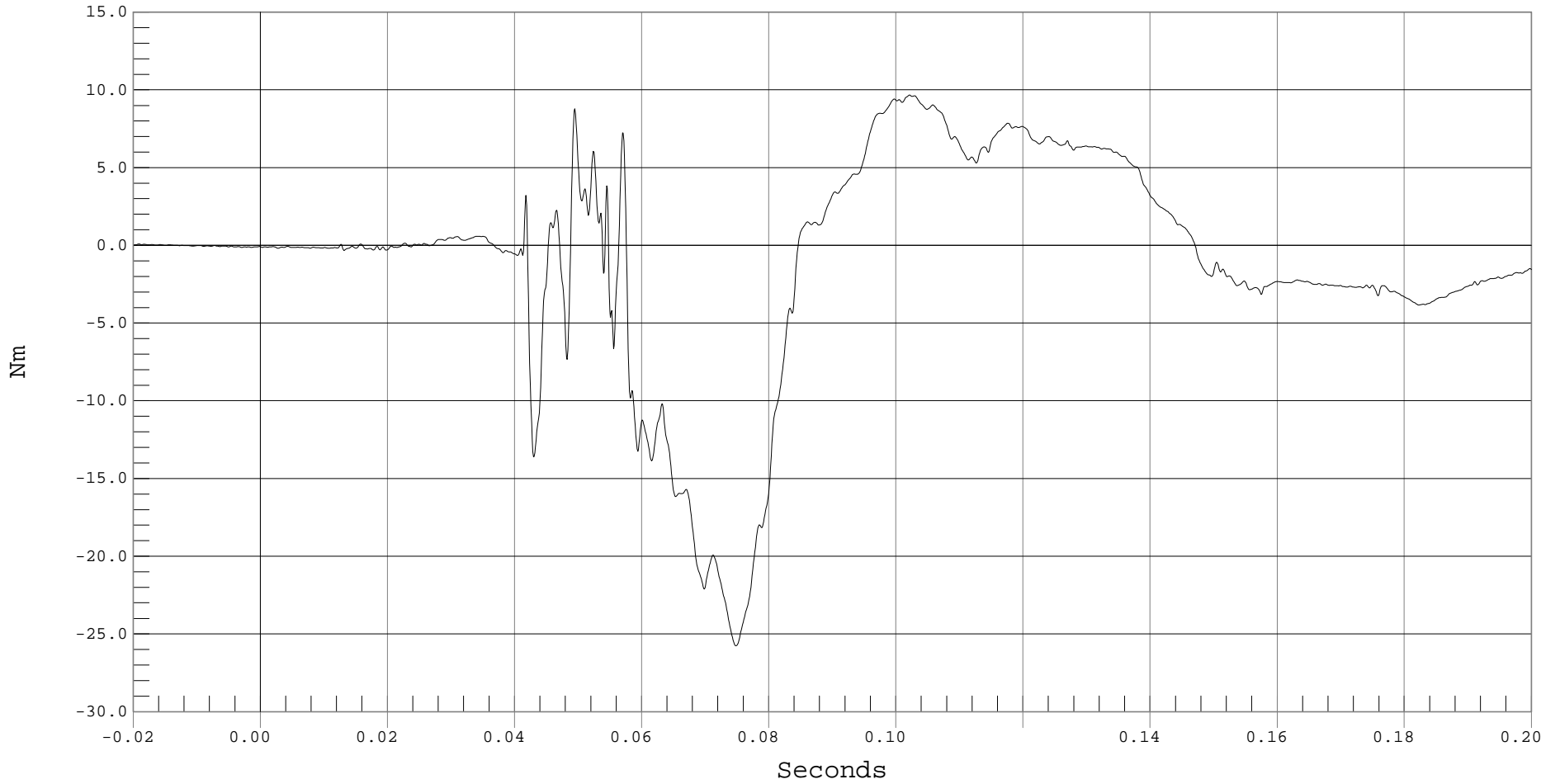
### DRIVER LEFT LOWER TIBIA MOMENT X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER LEFT LOWER TIBIA MX, B01012MF.M78

Ymin = -25.76 Nm @ 0.0748 Seconds, Ymax = 9.66 Nm @ 0.1021 Seconds



B-40



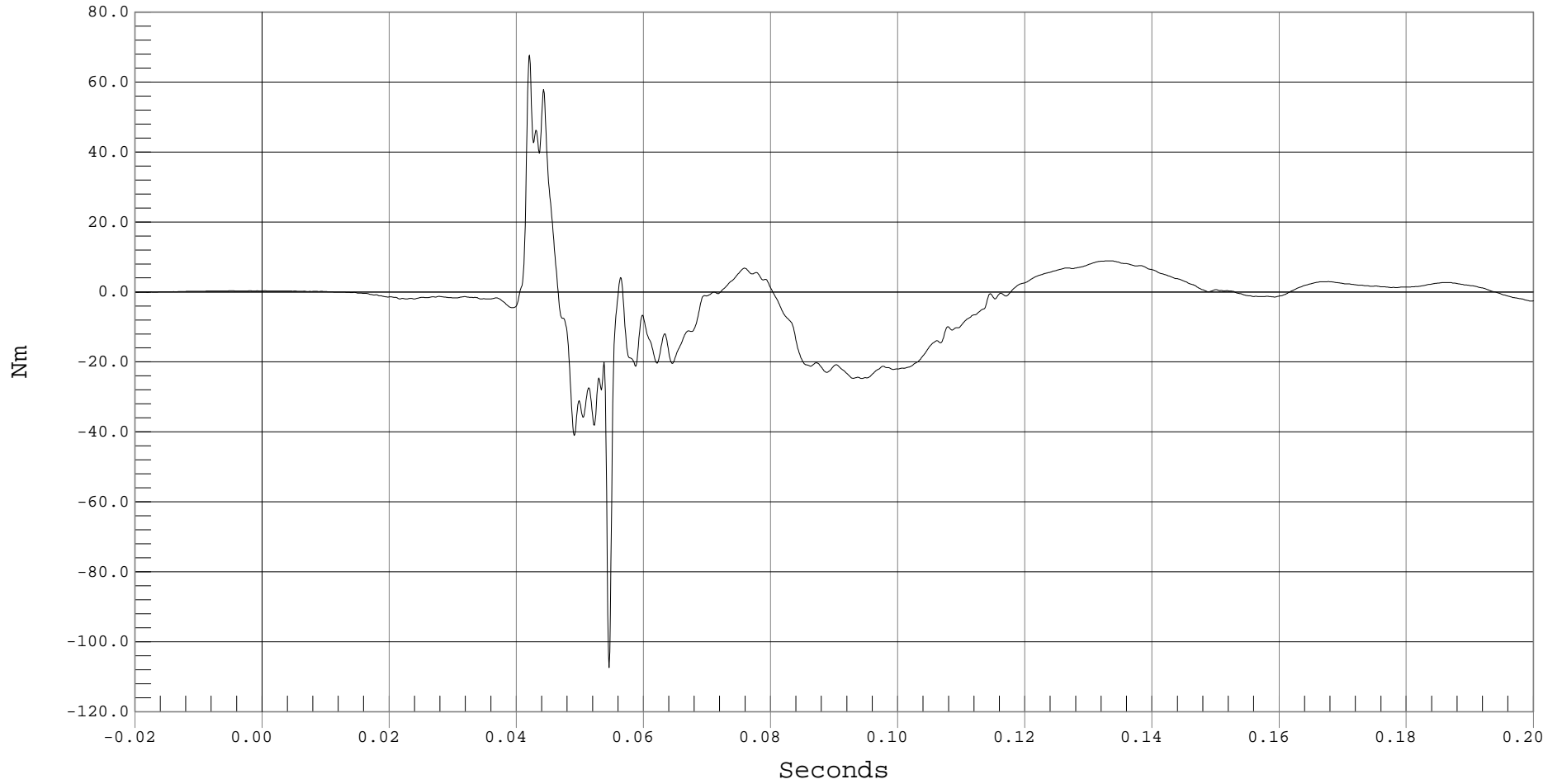
### DRIVER LEFT LOWER TIBIA MOMENT Y

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER LEFT LOWER TIBIA MY, B01012MF.M79

Ymin = -107.45 Nm @ 0.0546 Seconds, Ymax = 67.72 Nm @ 0.0421 Seconds



B-41



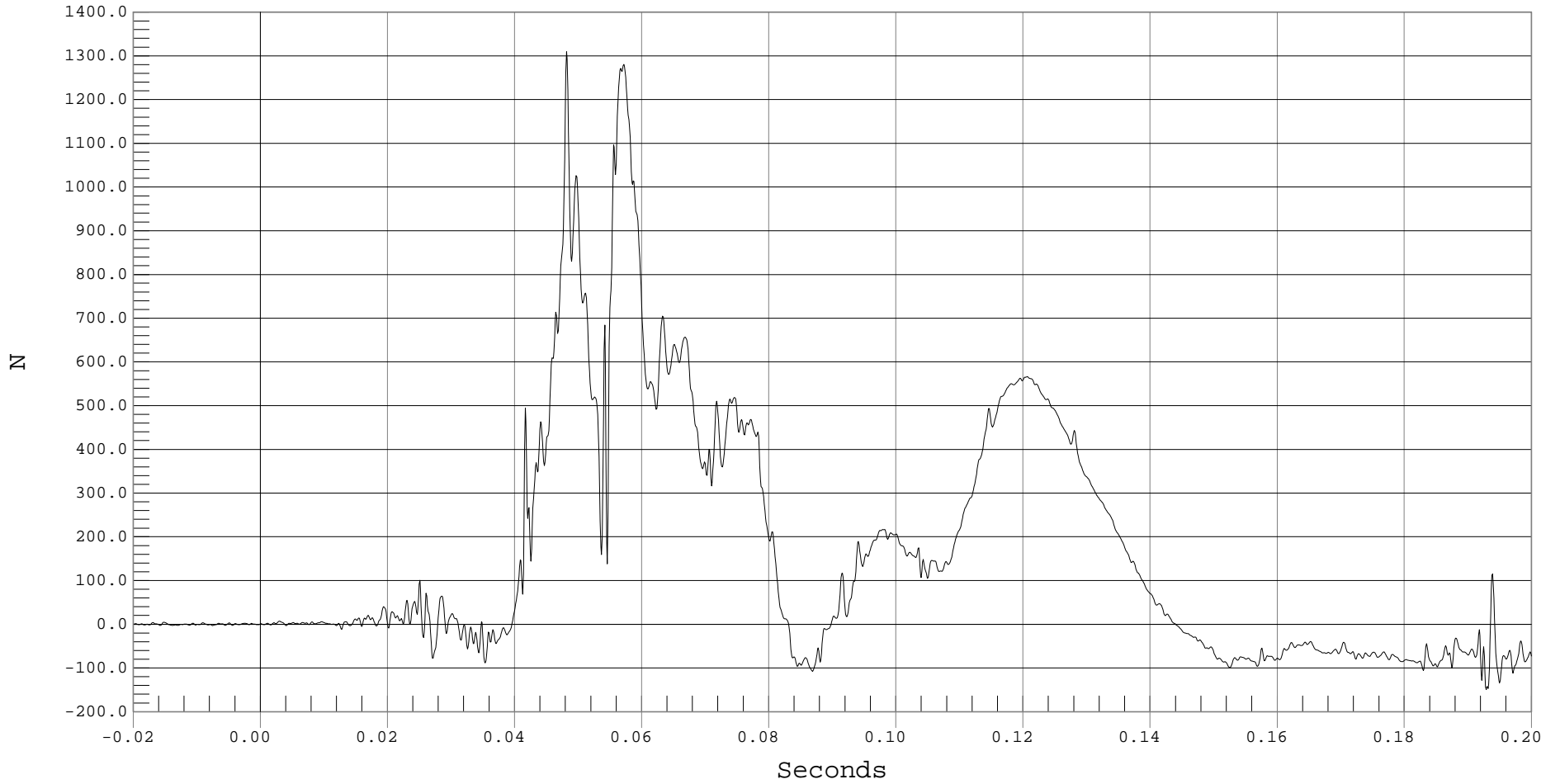
### DRIVER LEFT LOWER TIBIA FORCE Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER LEFT LOWER TIBIA FZ, B01012FF.F80

Ymin = -149.35 N @ 0.1929 Seconds, Ymax = 1309.41 N @ 0.0482 Seconds



B-42



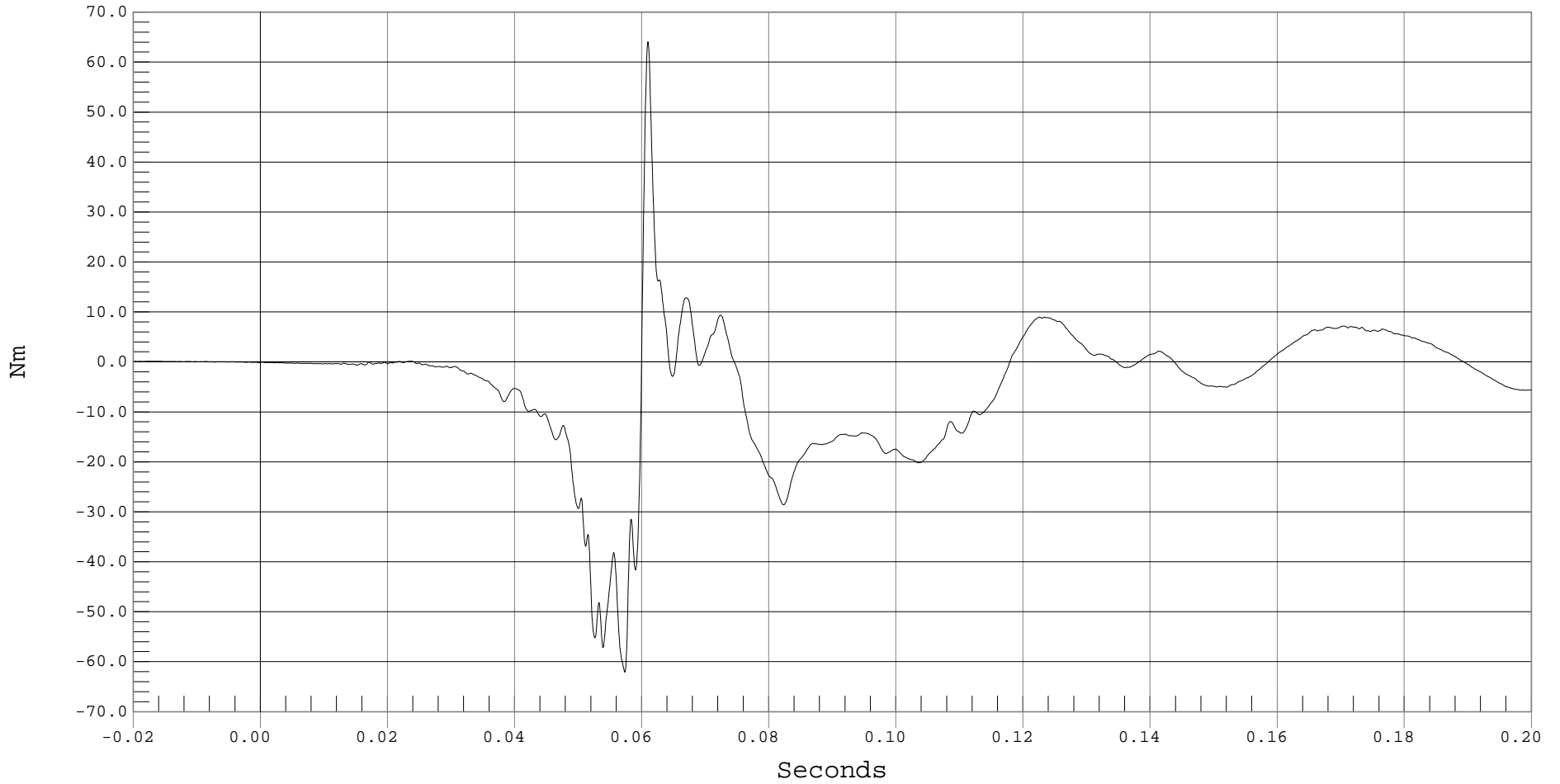
### DRIVER RIGHT UPPER TIBIA MOMENT X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER RIGHT UPPER TIBIA MX, B01012MF.M69

Ymin = -62.06 Nm @ 0.0574 Seconds, Ymax = 64.1 Nm @ 0.0610 Seconds





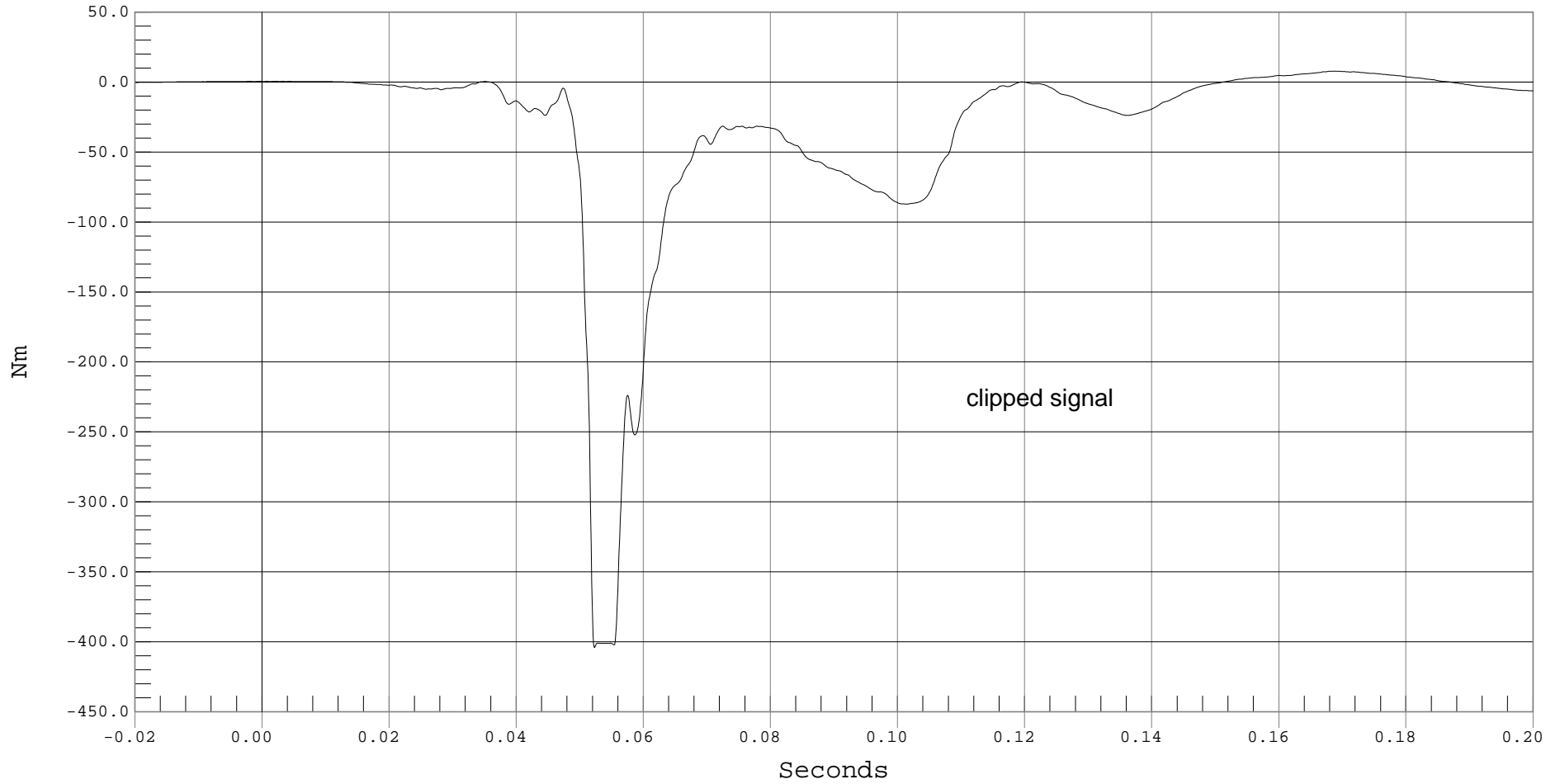
DRIVER RIGHT UPPER TIBIA MOMENT Y (DATA CLIPPED FROM 49 TO 56 MSEC.)

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER RIGHT UPPER TIBIA MY, B01012MF.M70

Ymin = -404.1 Nm @ 0.0523 Seconds, Ymax = 7.89 Nm @ 0.1688 Seconds





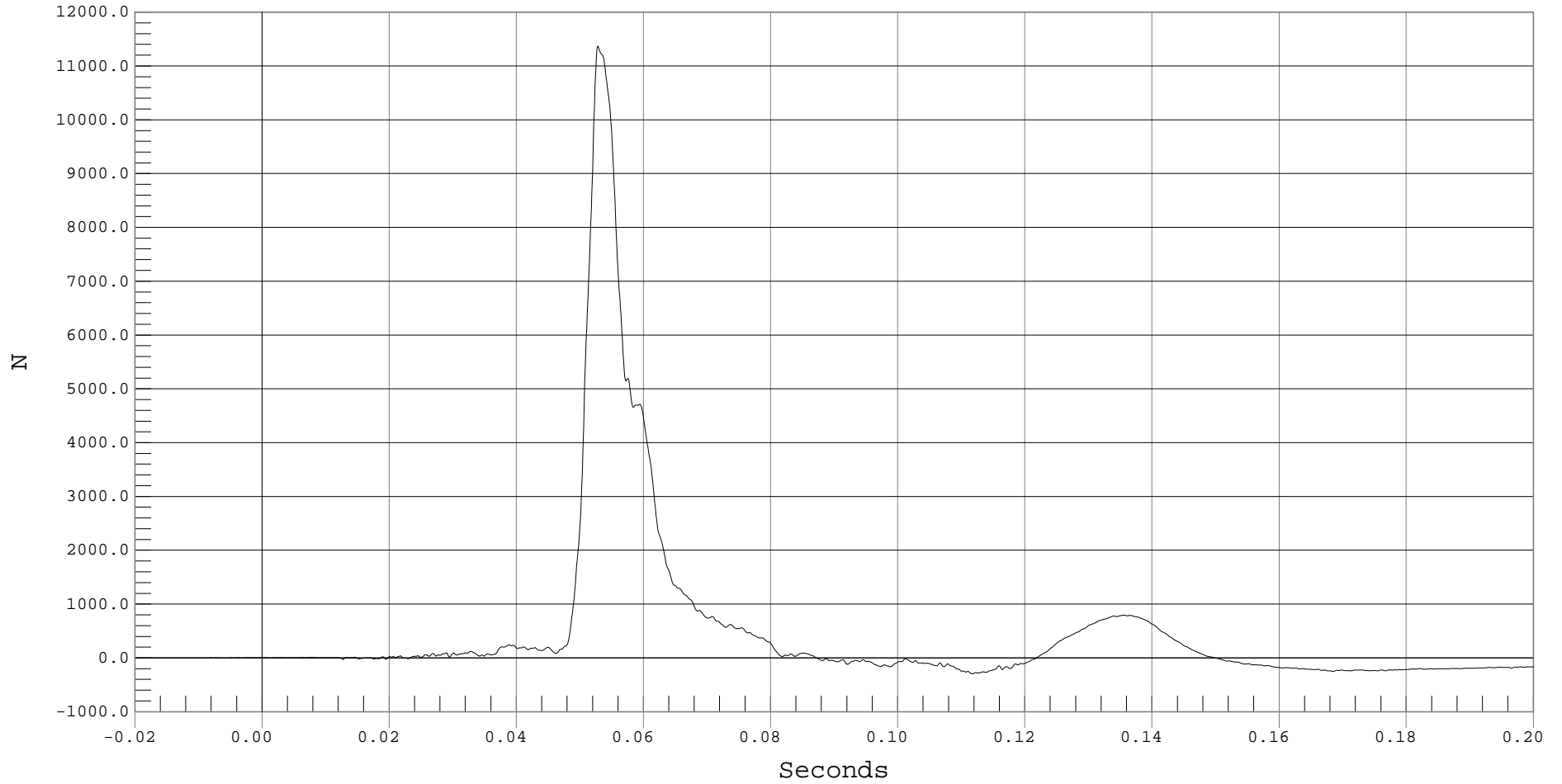
### DRIVER RIGHT UPPER TIBIA FORCE Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER RIGHT UPPER TIBIA FZ, B01012FF.F71

Ymin = -294.98 N @ 0.1118 Seconds, Ymax = 11365.88 N @ 0.0528 Seconds



B-45



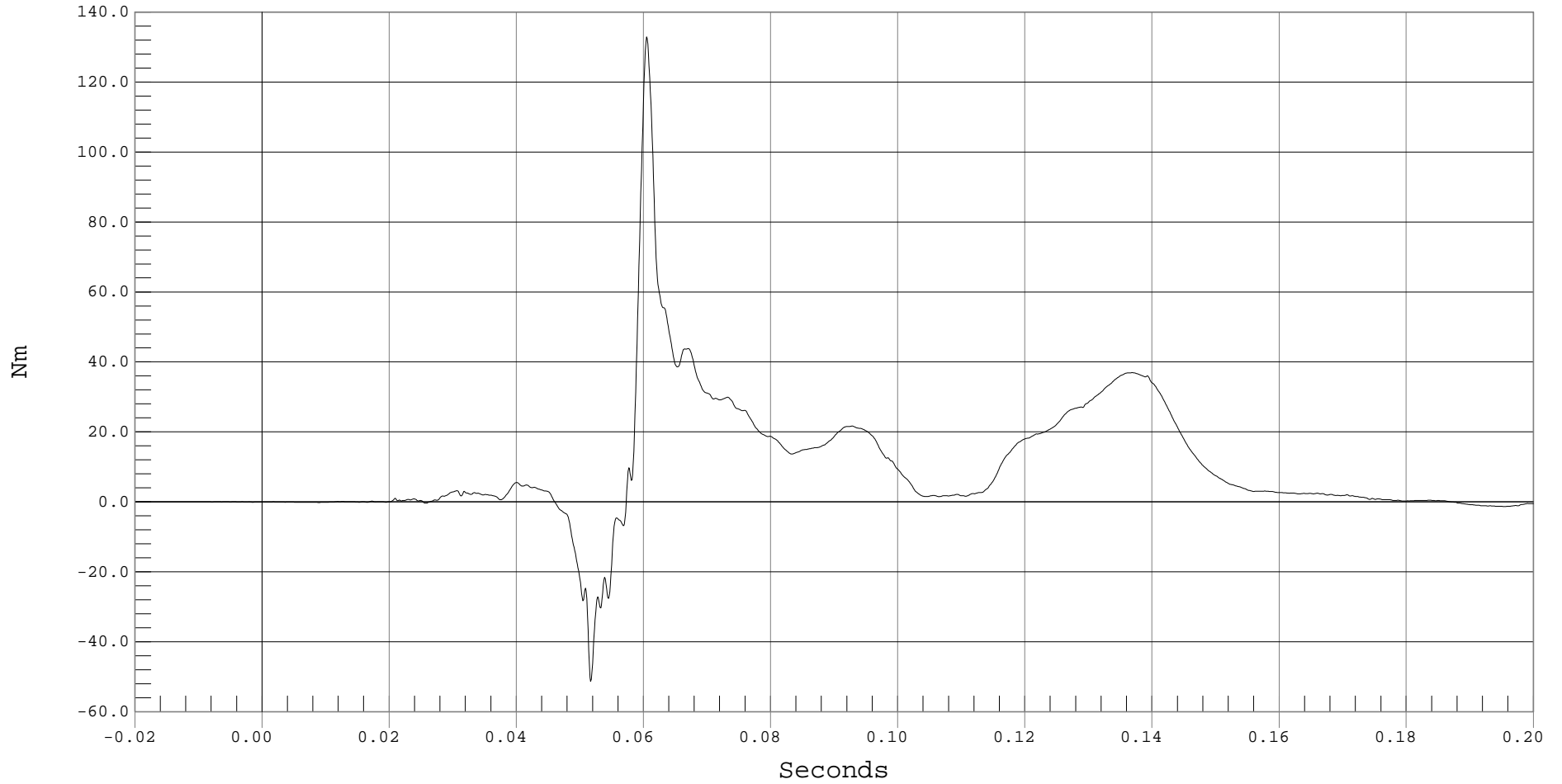
### DRIVER RIGHT LOWER TIBIA MOMENT X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER RIGHT LOWER TIBIA MX, B01012MF.M72

Ymin = -51.34 Nm @ 0.0517 Seconds, Ymax = 132.93 Nm @ 0.0605 Seconds



B-46



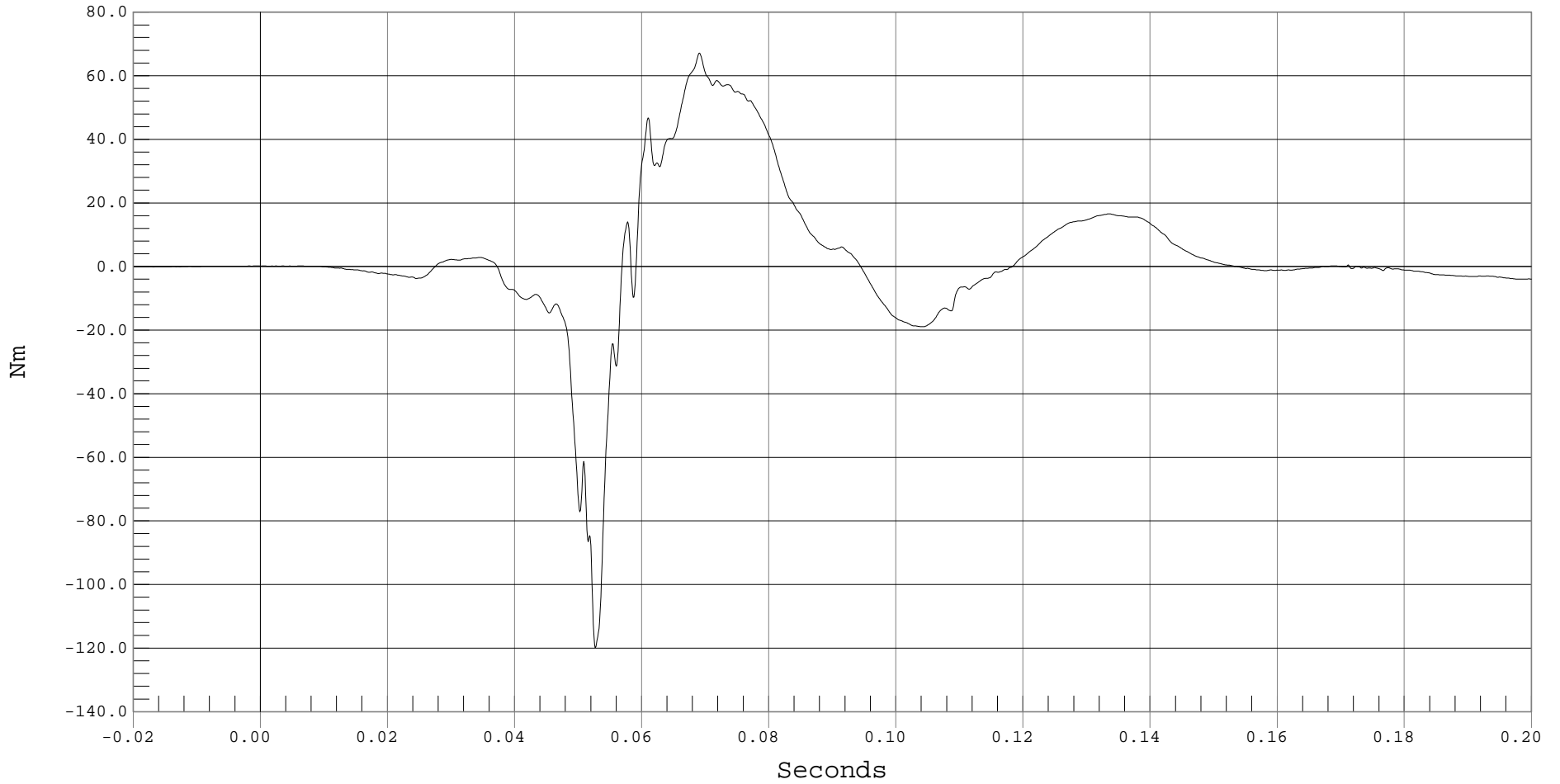
### DRIVER RIGHT LOWER TIBIA MOMENT Y

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER RIGHT LOWER TIBIA MY, B01012MF.M73

Ymin = -119.83 Nm @ 0.0527 Seconds, Ymax = 67.12 Nm @ 0.0691 Seconds



B-47



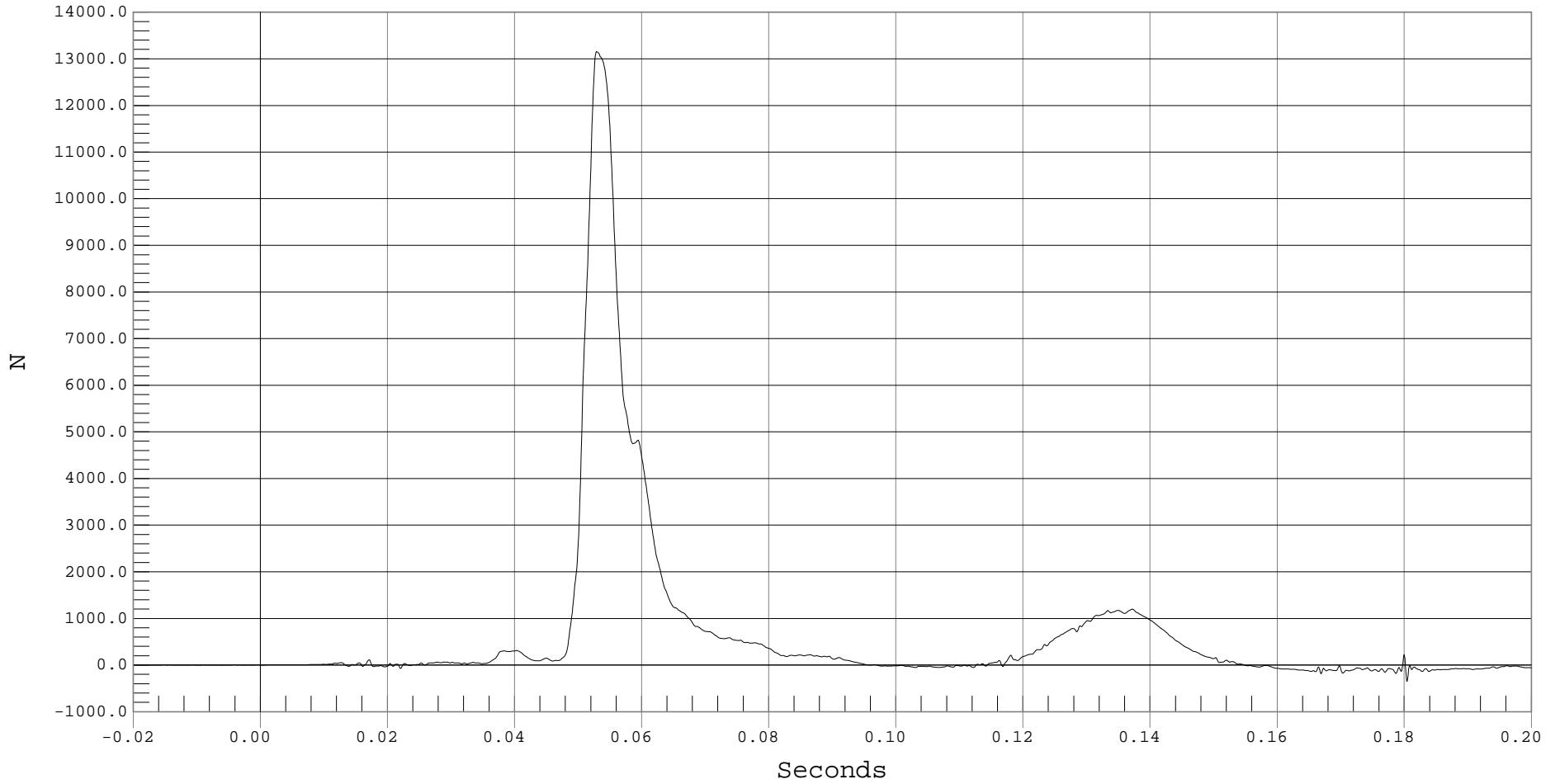
### DRIVER RIGHT LOWER TIBIA FORCE Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DRIVER RIGHT LOWER TIBIA FZ, B01012FF.F74

Ymin = -351.31 N @ 0.1804 Seconds, Ymax = 13154.63 N @ 0.0529 Seconds



B-48



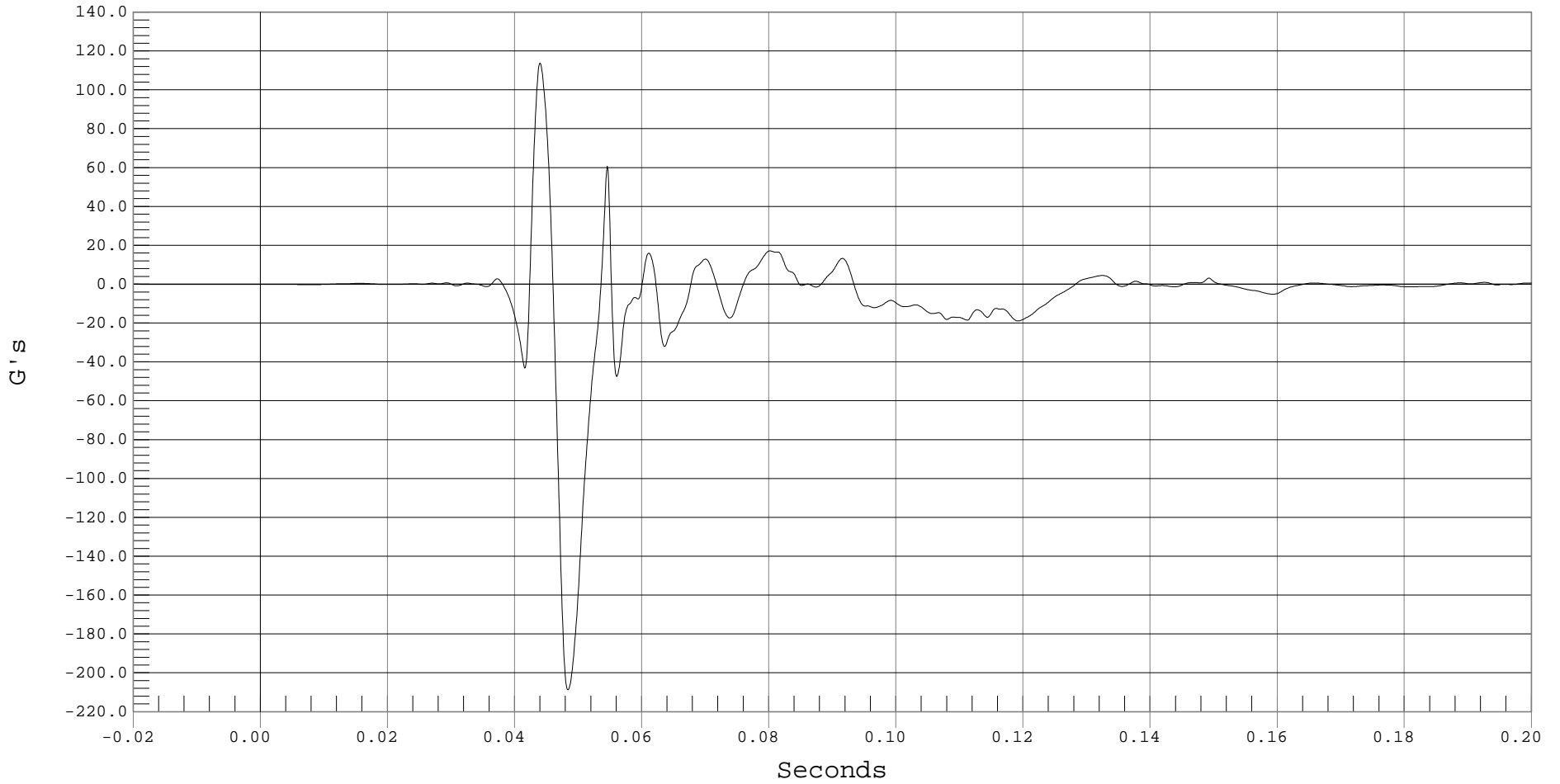
### DRIVER LEFT FOOT @ BALL Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER LEFT FOOT @ BALL Z, C01012AF.A12

Ymin = -208.79 G's @ 0.0484 Seconds, Ymax = 113.83 G's @ 0.0440 Seconds





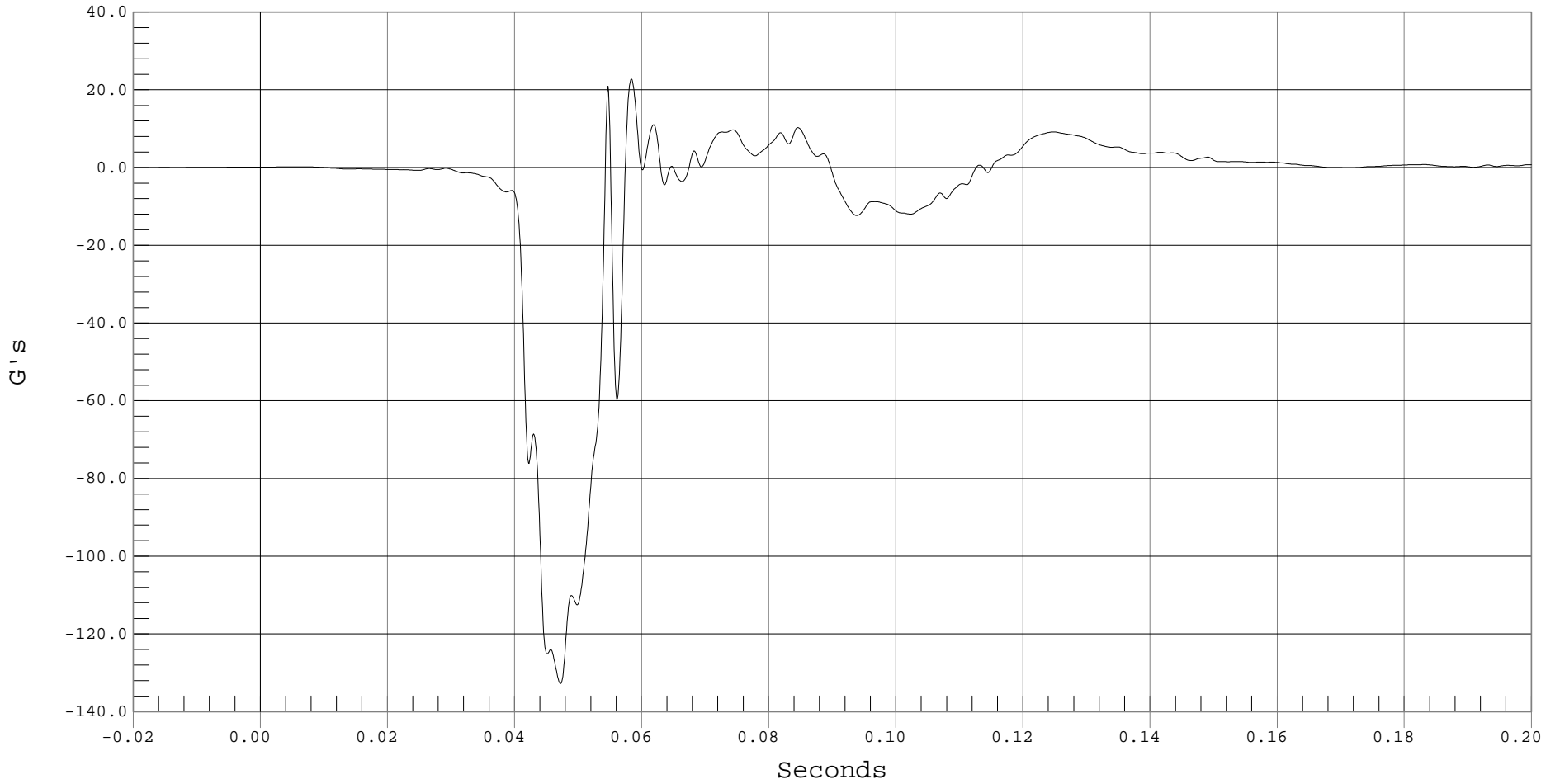
### DRIVER LEFT FOOT @ HEEL X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER LEFT FOOT @ HEEL X, C01012AF.A10

Ymin = -132.79 G's @ 0.0472 Seconds, Ymax = 22.84 G's @ 0.0584 Seconds



B-50



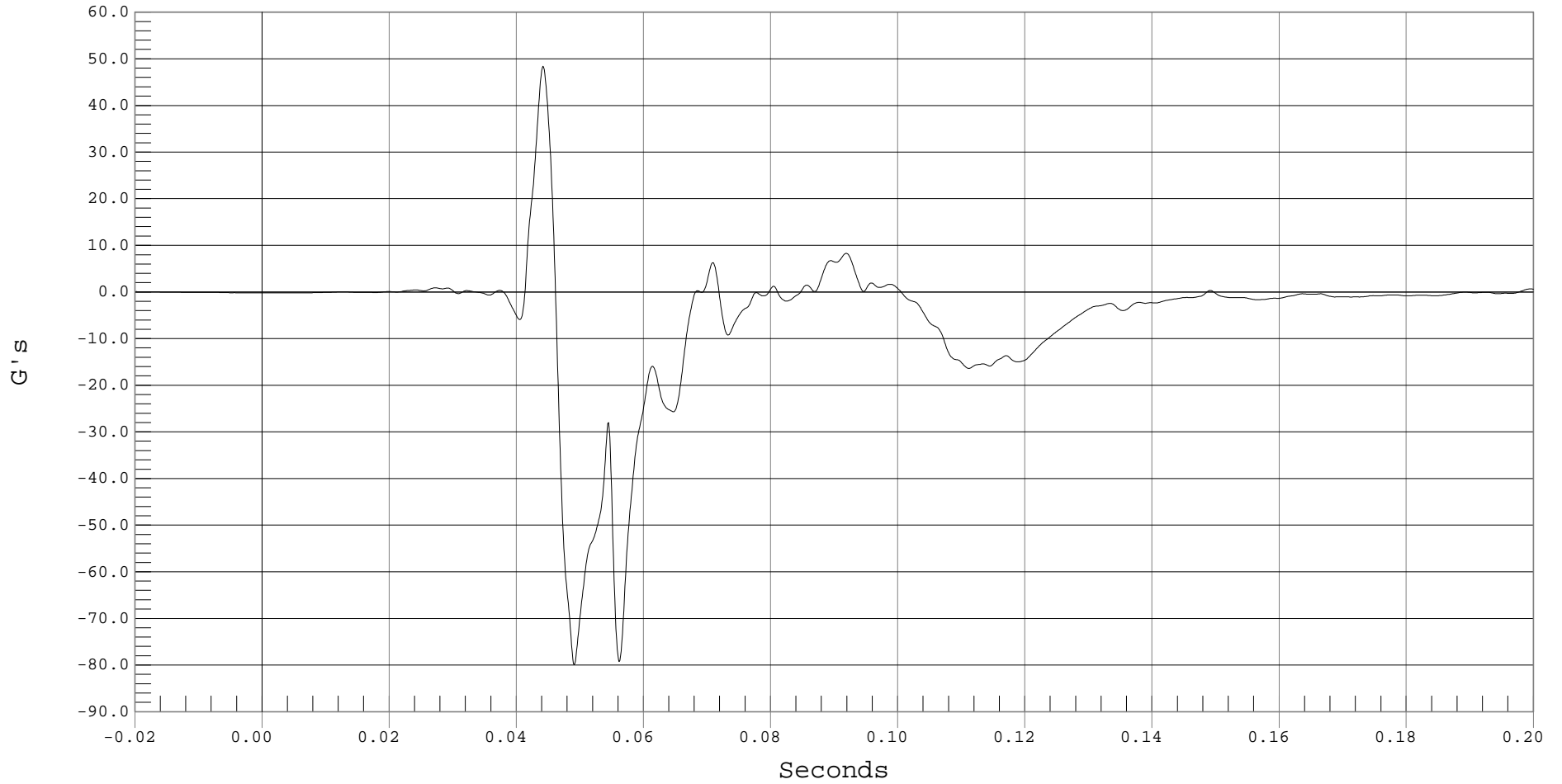
### DRIVER LEFT FOOT @ HEEL Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER LEFT FOOT @ HEEL Z, C01012AF.A11

Ymin = -79.97 G's @ 0.0491 Seconds, Ymax = 48.42 G's @ 0.0442 Seconds



B-51



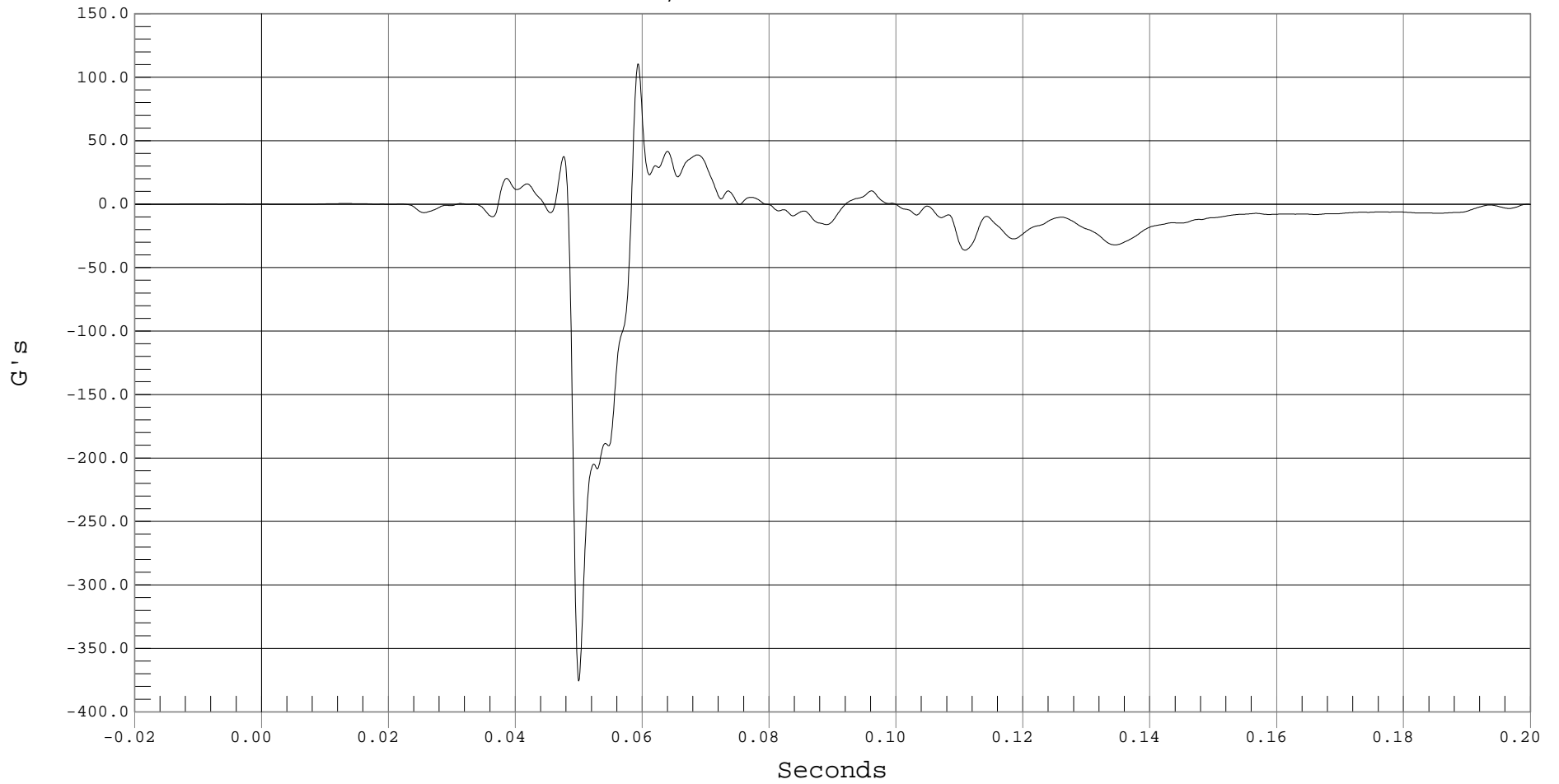
### DRIVER RIGHT FOOT @ BALL Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER RIGHT FOOT @ BALL Z, B01012AF.A95

Ymin = -375.74 G's @ 0.0500 Seconds, Ymax = 110.4 G's @ 0.0594 Seconds



B-52



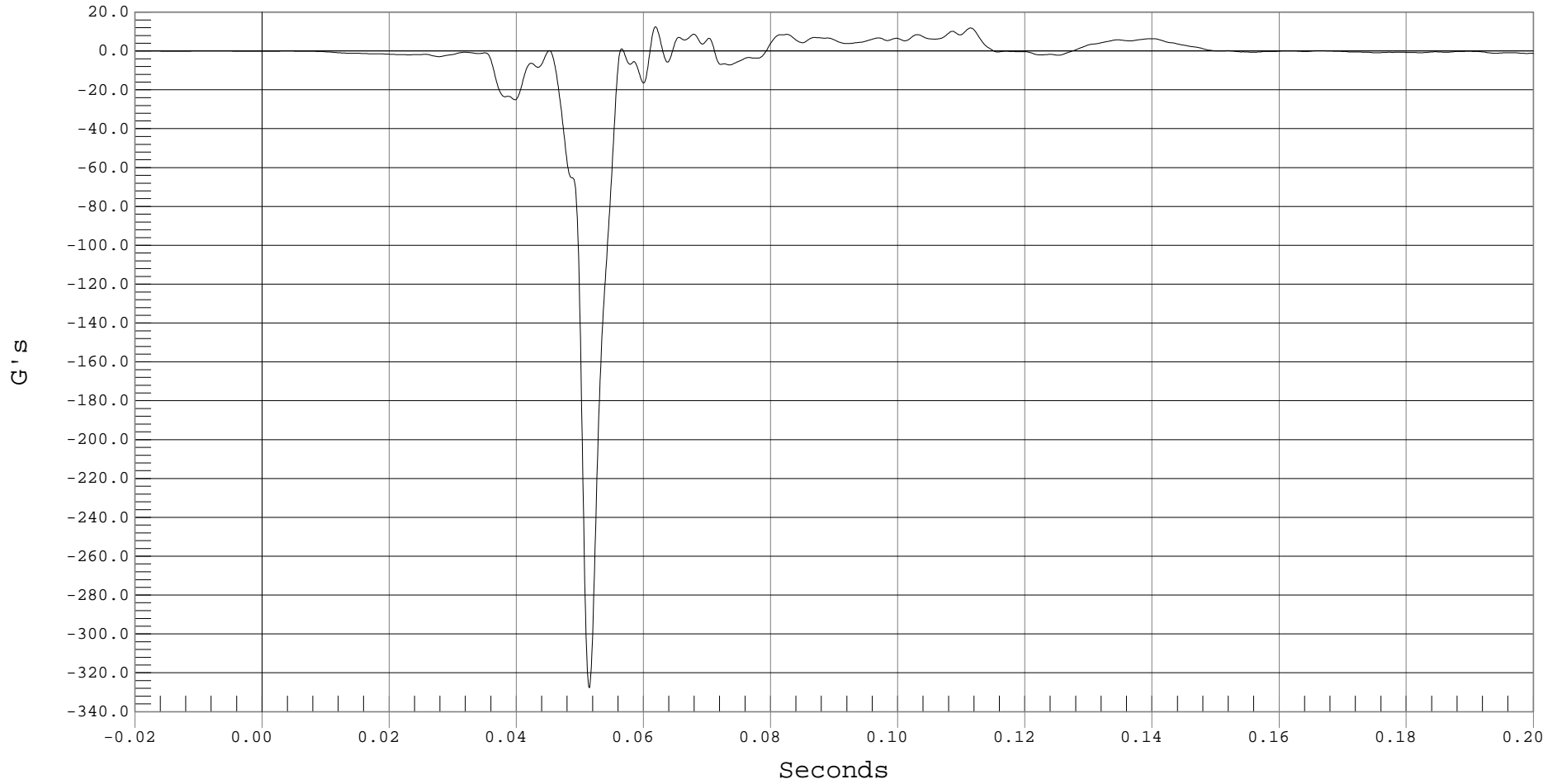
### DRIVER RIGHT FOOT @ HEEL X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER RIGHT FOOT @ HEEL X, B01012AF.A93

Ymin = -327.72 G's @ 0.0515 Seconds, Ymax = 12.43 G's @ 0.0619 Seconds





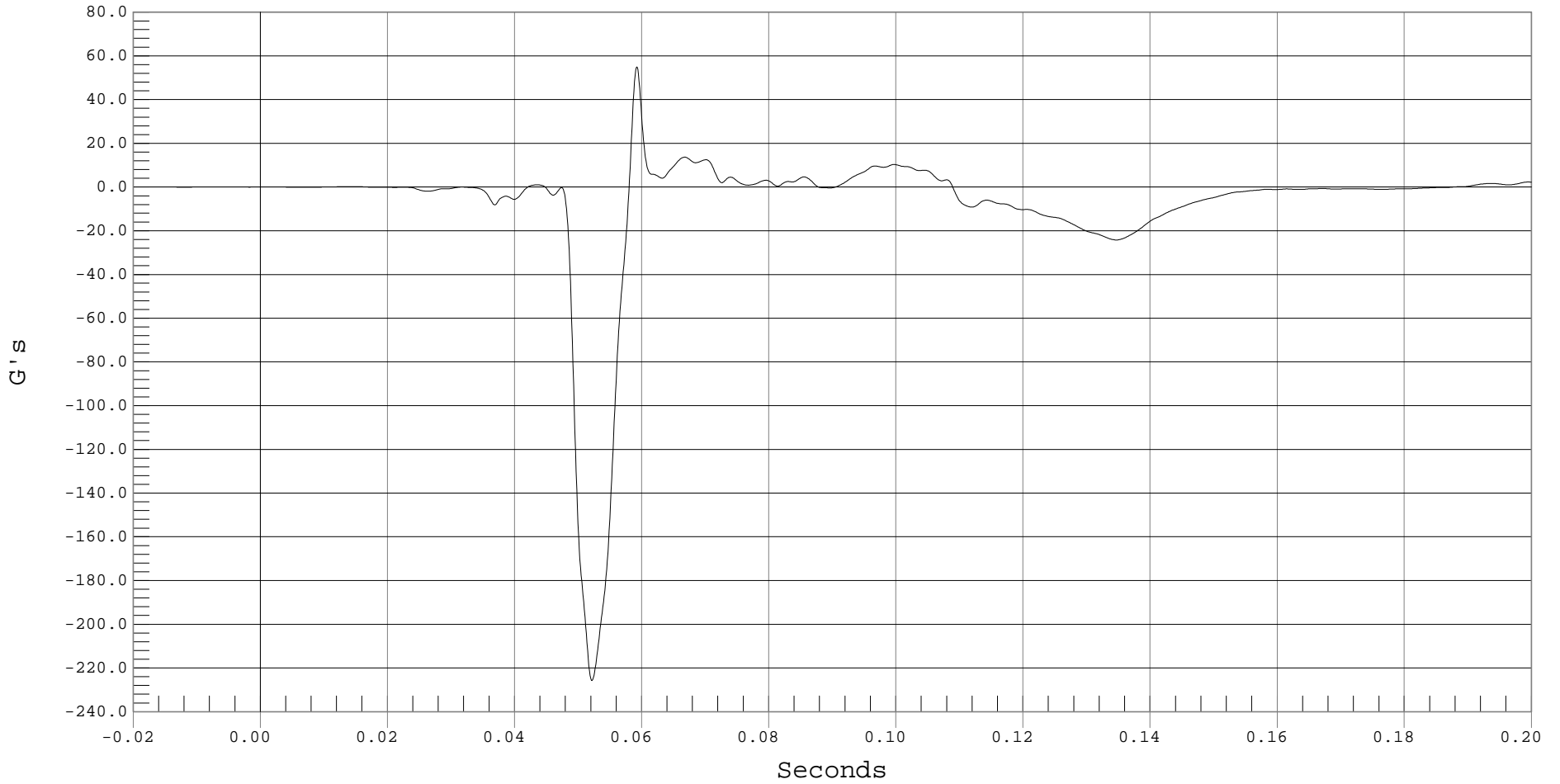
### DRIVER RIGHT FOOT @ HEEL Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 DRIVER RIGHT FOOT @ HEEL Z, B01012AF.A94

Ymin = -225.76 G's @ 0.0522 Seconds, Ymax = 54.95 G's @ 0.0592 Seconds



B-54



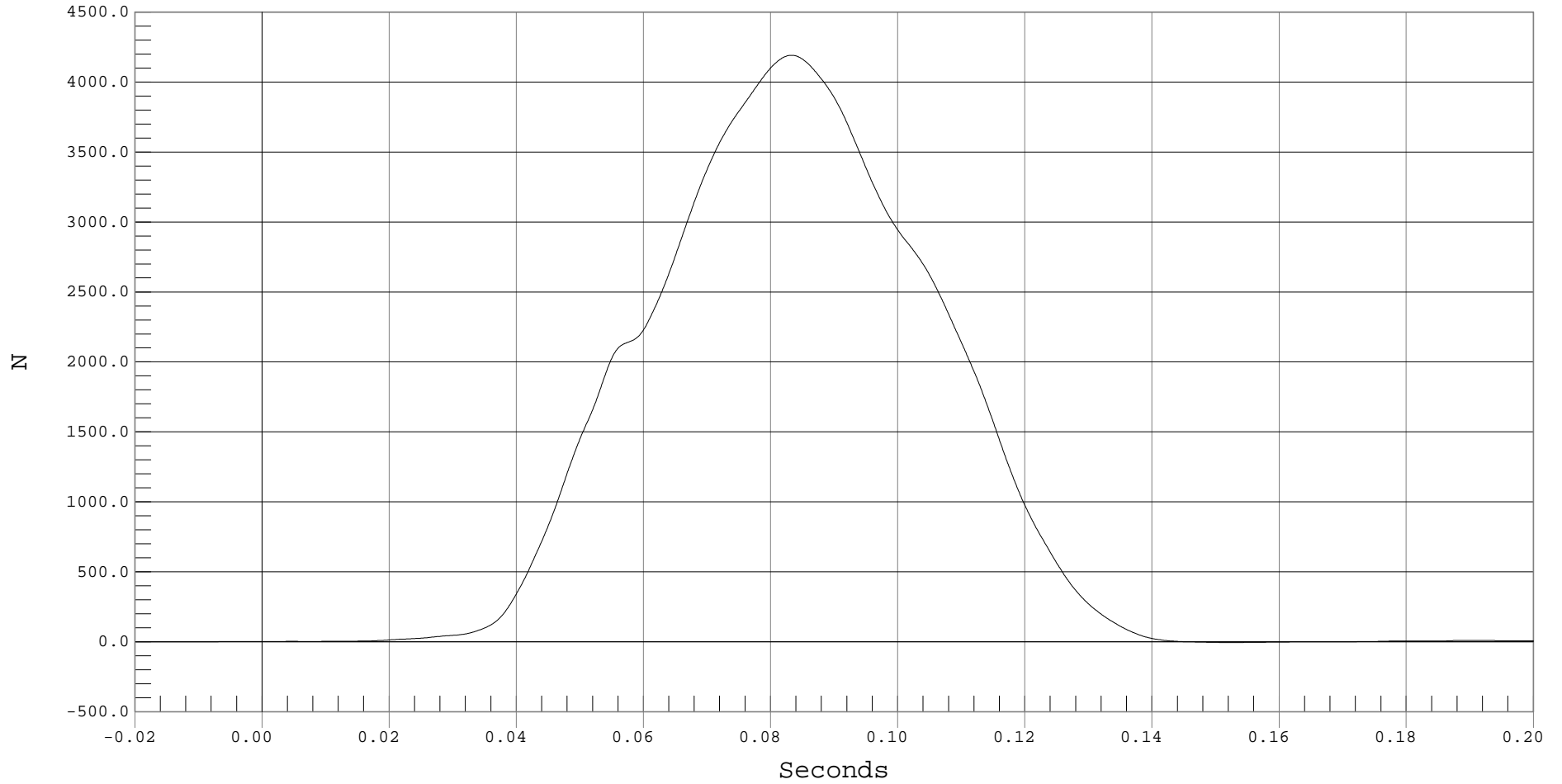
### DRIVER SHOULDER BELT FORCE

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 DRIVER SHOULDER BELT, B01012FF.F65

Ymin = -6.23 N @ 0.1522 Seconds, Ymax = 4191.87 N @ 0.0833 Seconds



B-55



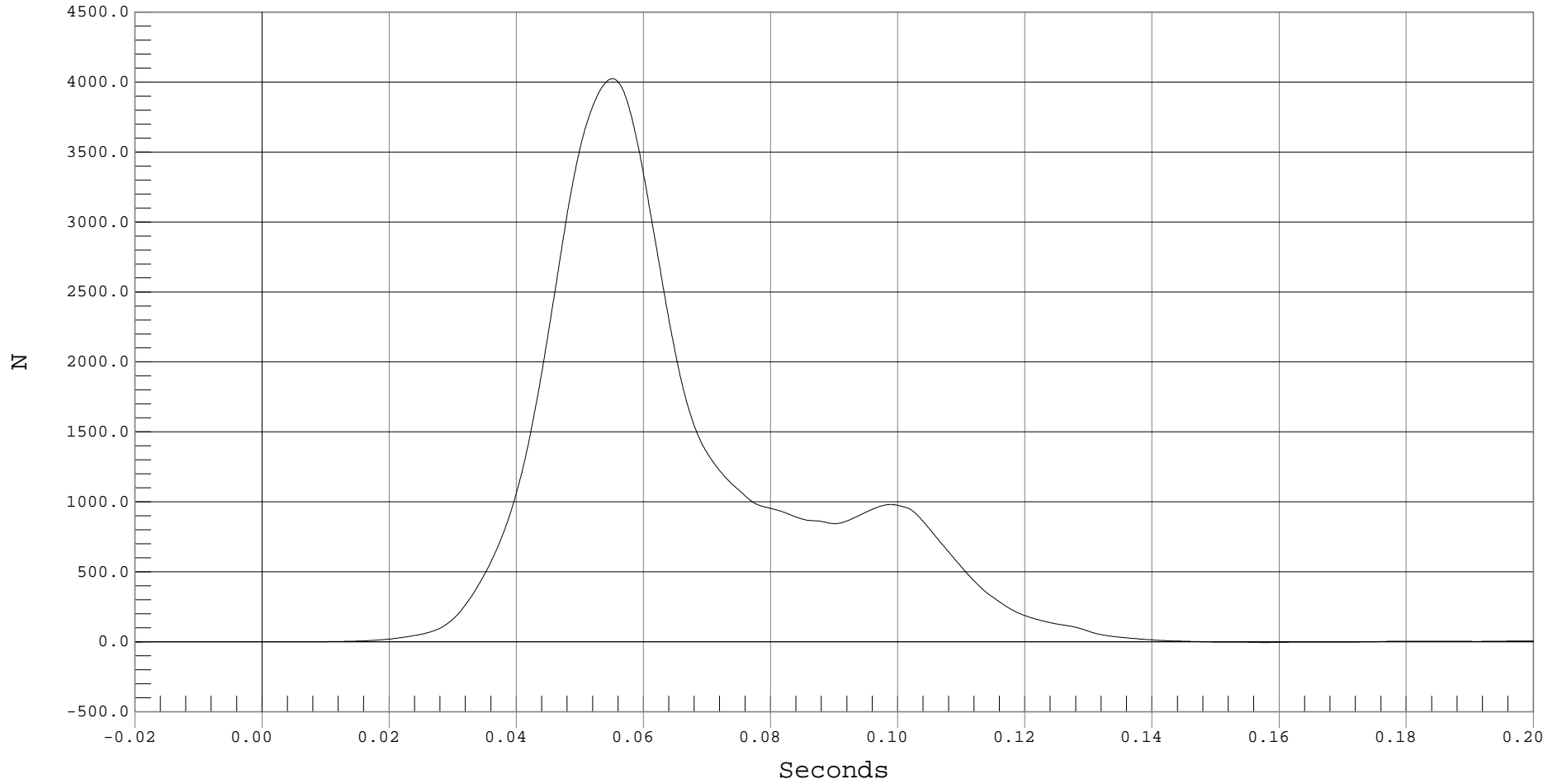
### DRIVER LAP BELT FORCE

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 DRIVER LAP BELT, B01012FF.F66

Ymin = -5.71 N @ 0.1577 Seconds, Ymax = 4024.43 N @ 0.0551 Seconds



B-56



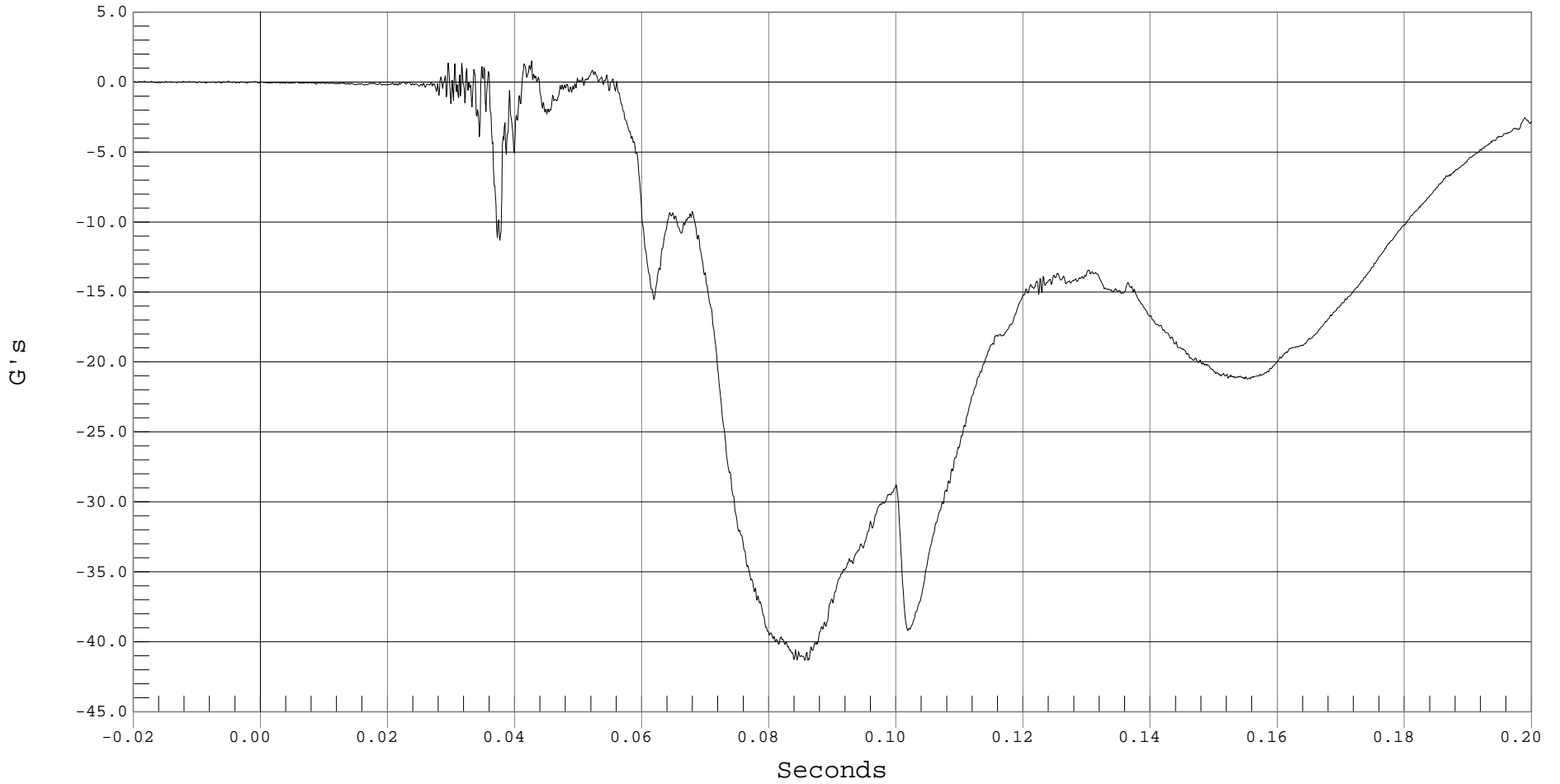
### PASSENGER HEAD X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER HEAD X, B01012AT.A19

Ymin = -41.33 G's @ 0.0857 Seconds, Ymax = 1.52 G's @ 0.0427 Seconds



B-57



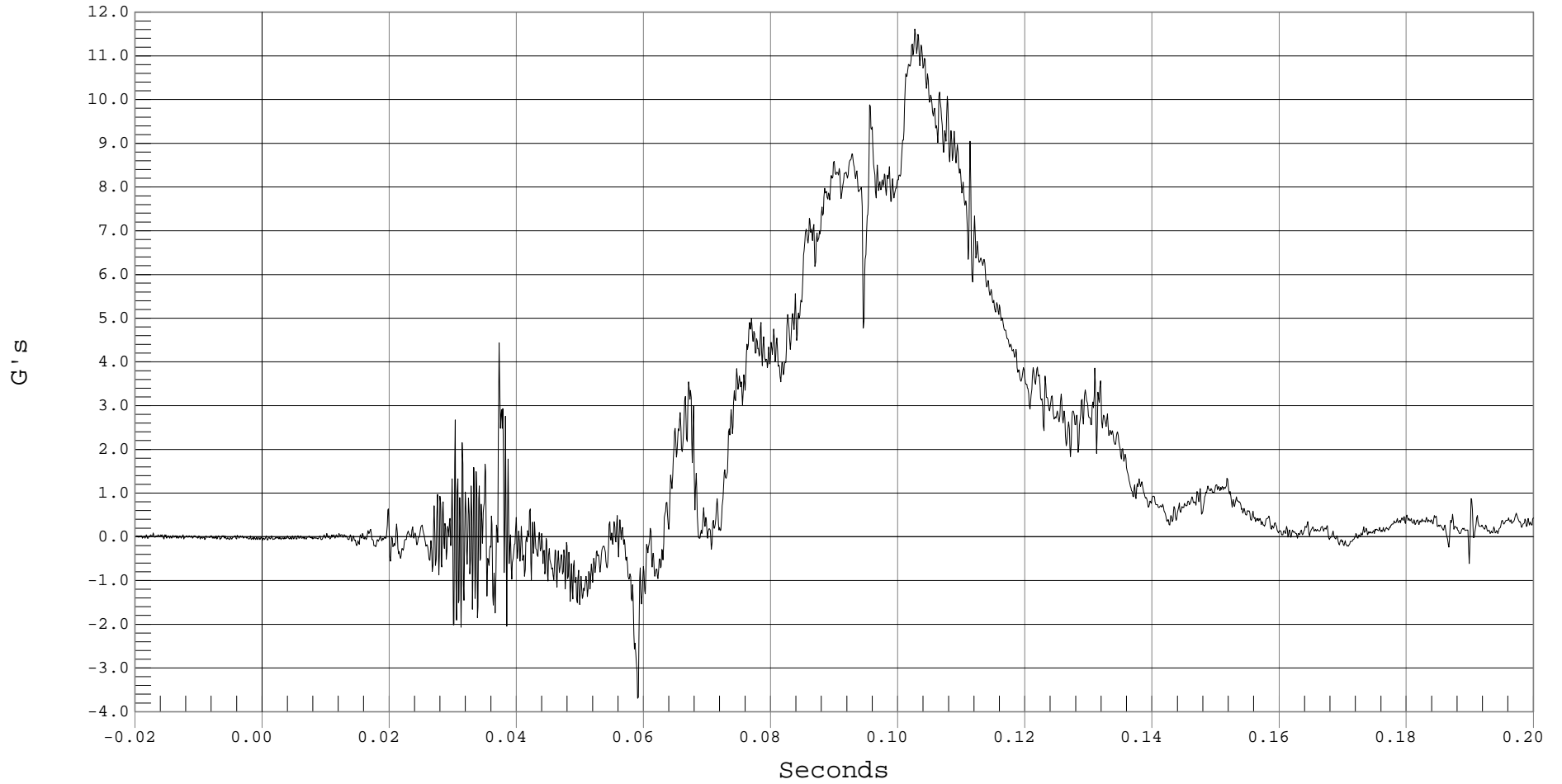
### PASSENGER HEAD Y ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER HEAD Y, B01012AT.A20

Ymin = -3.69 G's @ 0.0591 Seconds, Ymax = 11.62 G's @ 0.1027 Seconds



B-58



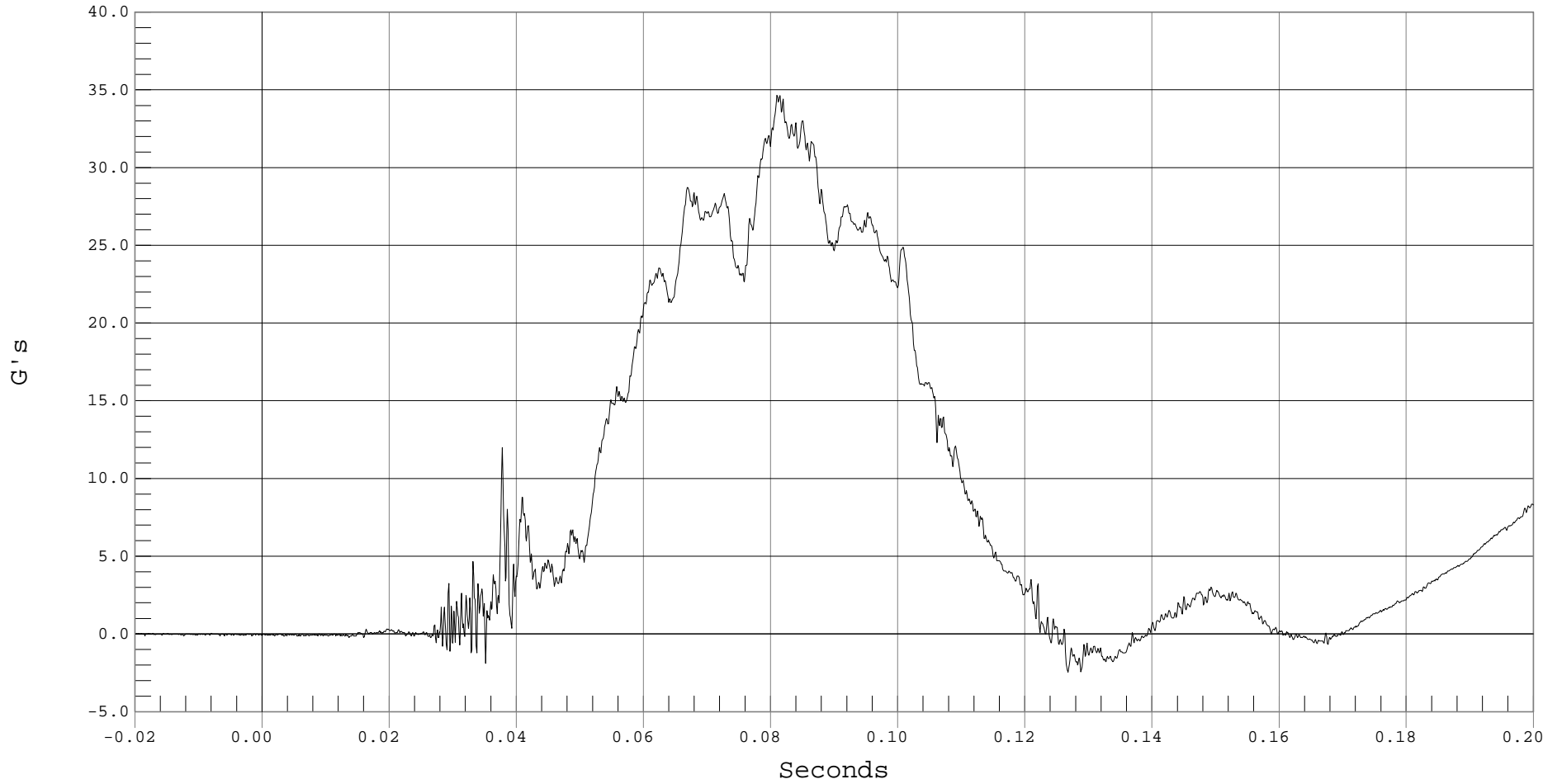
### PASSENGER HEAD Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER HEAD Z, B01012AT.A21

Ymin = -2.47 G's @ 0.1268 Seconds, Ymax = 34.66 G's @ 0.0810 Seconds



B-59



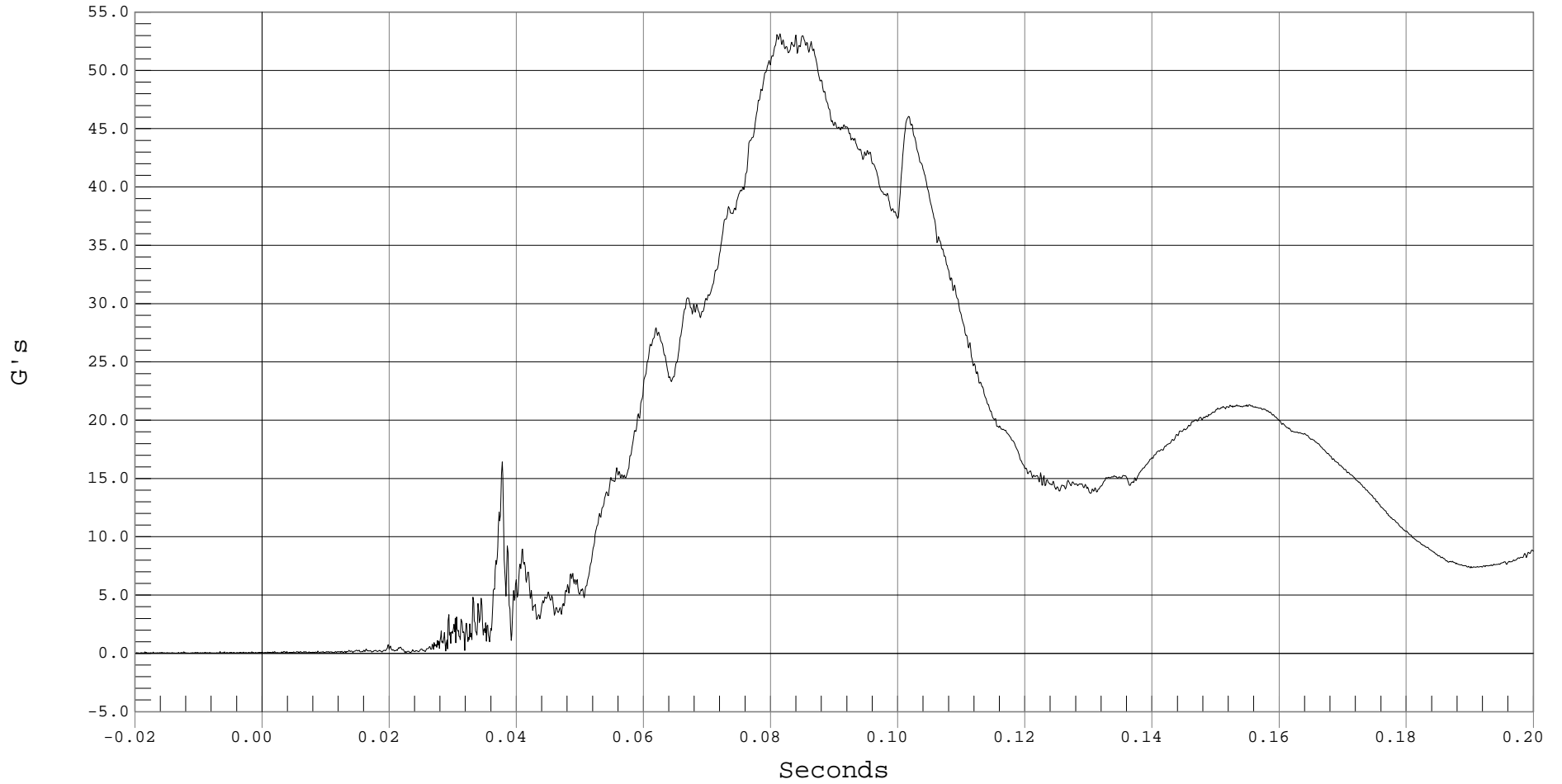
### PASSENGER HEAD RESULTANT ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER HEAD RESULTANT ACCELERATION, B01012AV.A19

Ymin = .02 G's @ -0.0186 Seconds, Ymax = 53.15 G's @ 0.0815 Seconds



B-60



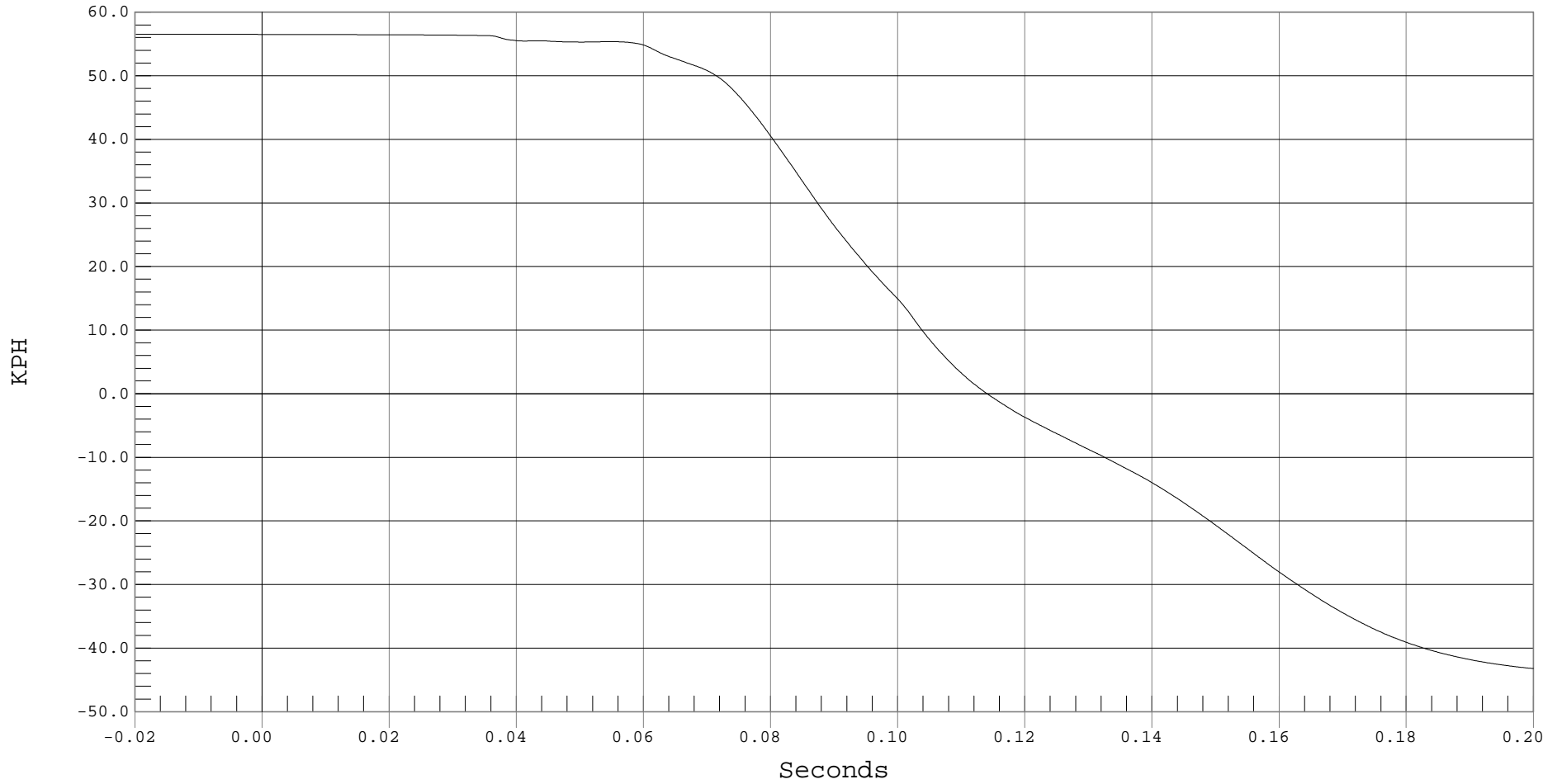
### PASSENGER HEAD X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER HEAD X VELOCITY, B01012AI.V19

Ymin = -43.23 KPH @ 0.2001 Seconds, Ymax = 56.5 KPH @ -0.0170 Seconds



B-61



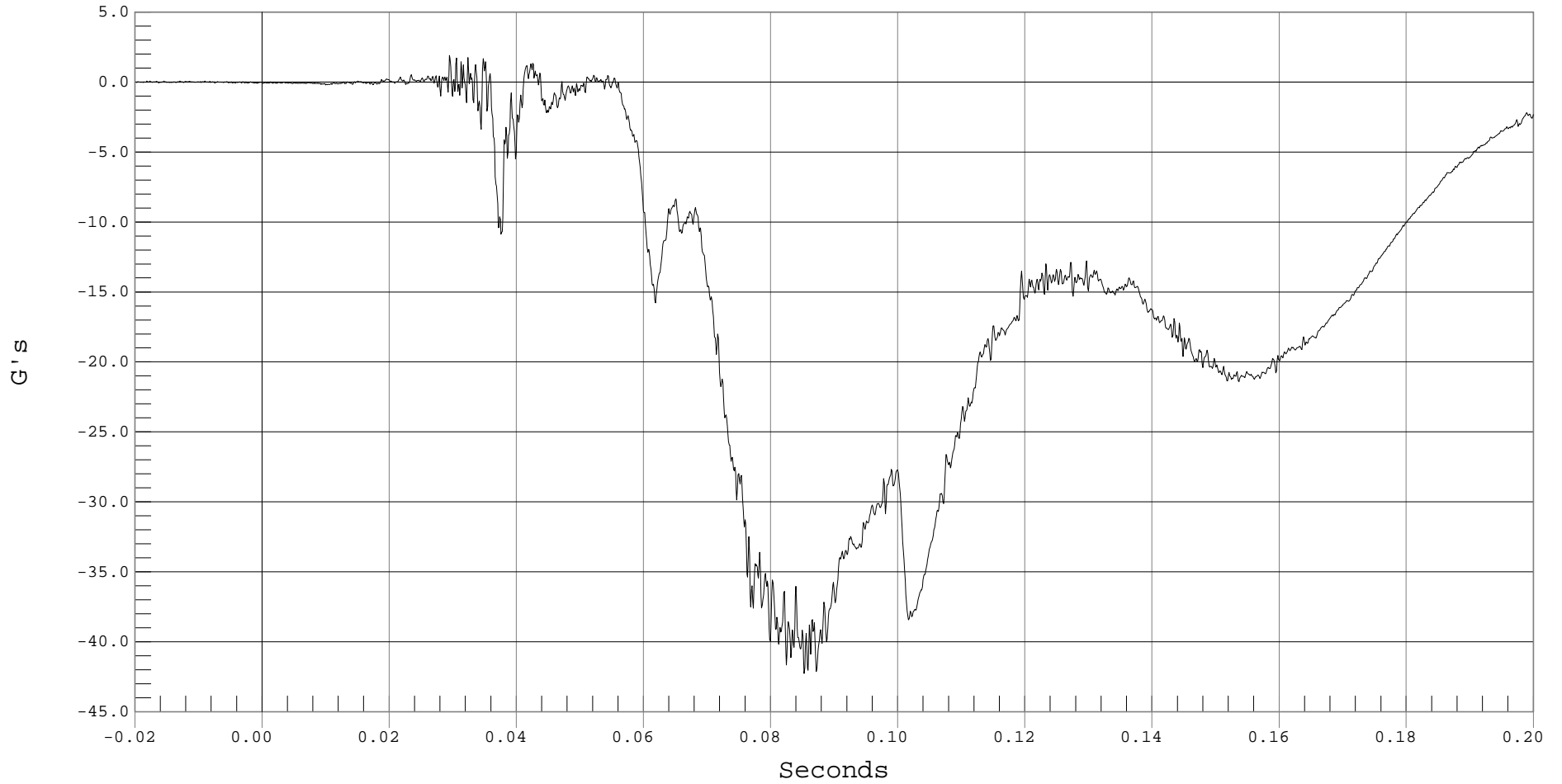
### PASSENGER HEAD REDUNDANT X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER HEAD Xr, B01012AT.A41

Ymin = -42.26 G's @ 0.0853 Seconds, Ymax = 1.91 G's @ 0.0295 Seconds



B-62



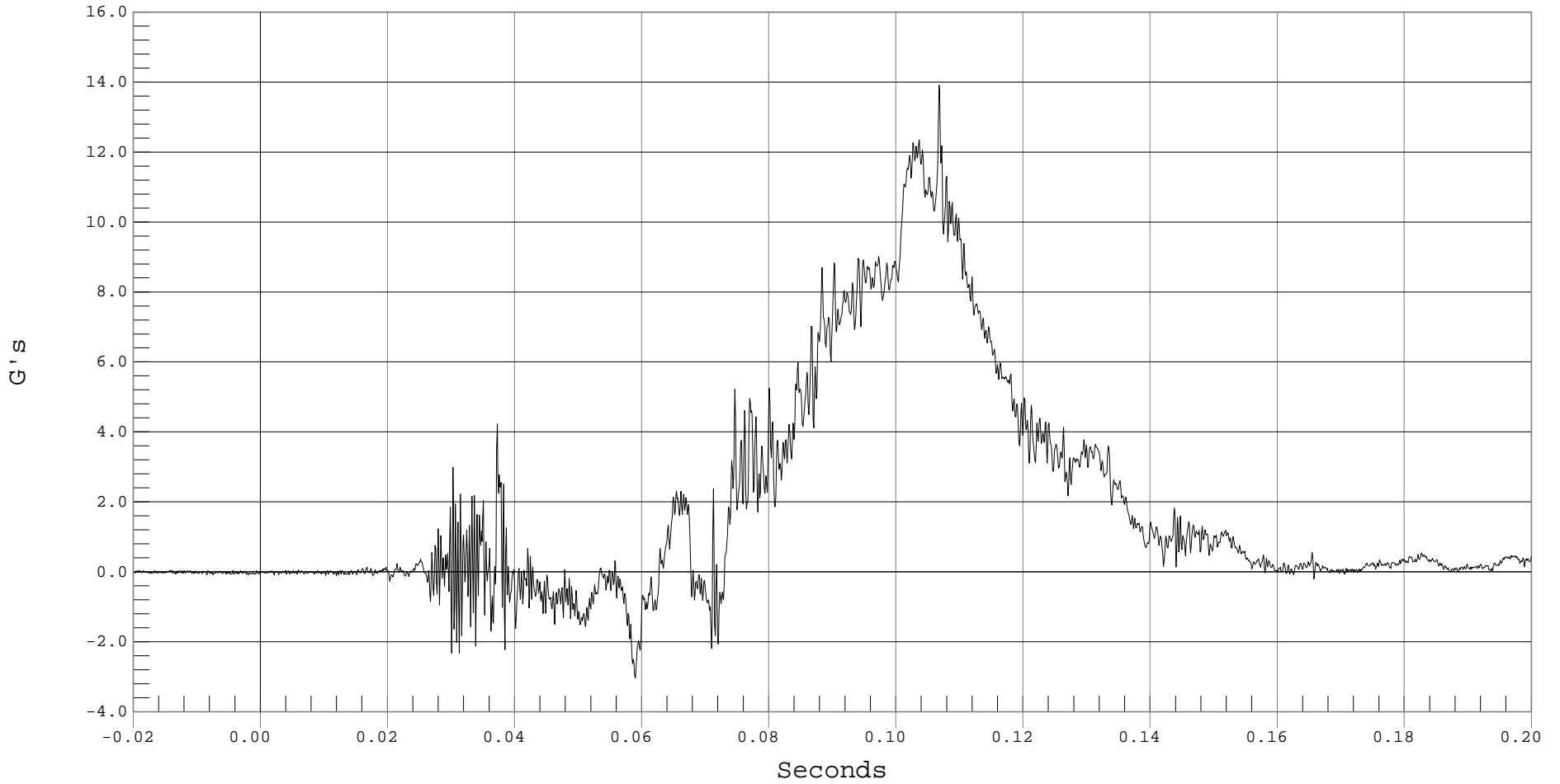
### PASSENGER HEAD REDUNDANT Y ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER HEAD Yr, B01012AT.A42

Ymin = -3.04 G's @ 0.0590 Seconds, Ymax = 13.92 G's @ 0.1068 Seconds





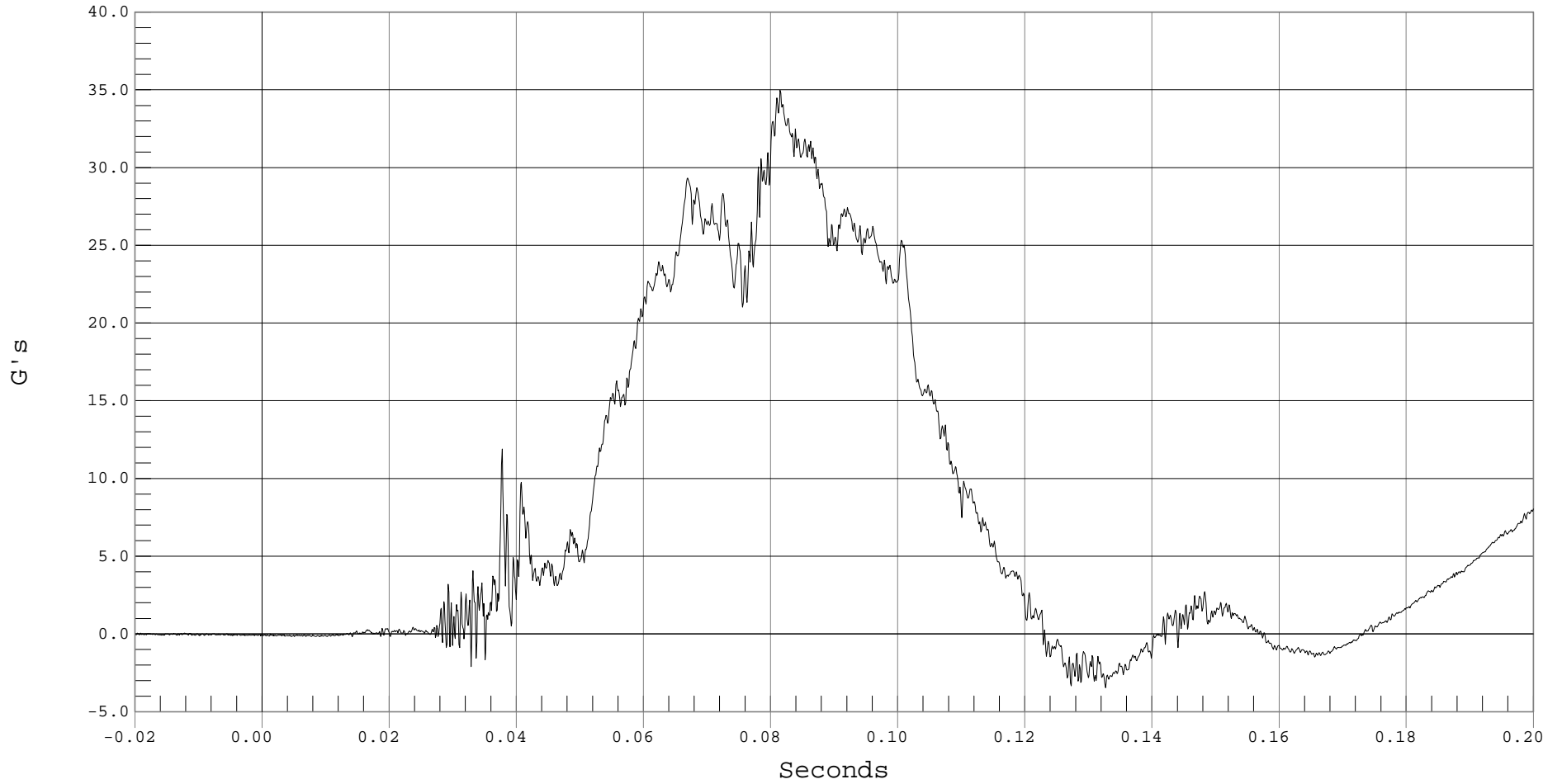
### PASSENGER HEAD REDUNDANT Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER HEAD Zr, B01012AT.A43

Ymin = -3.46 G's @ 0.1327 Seconds, Ymax = 34.98 G's @ 0.0815 Seconds



B-64



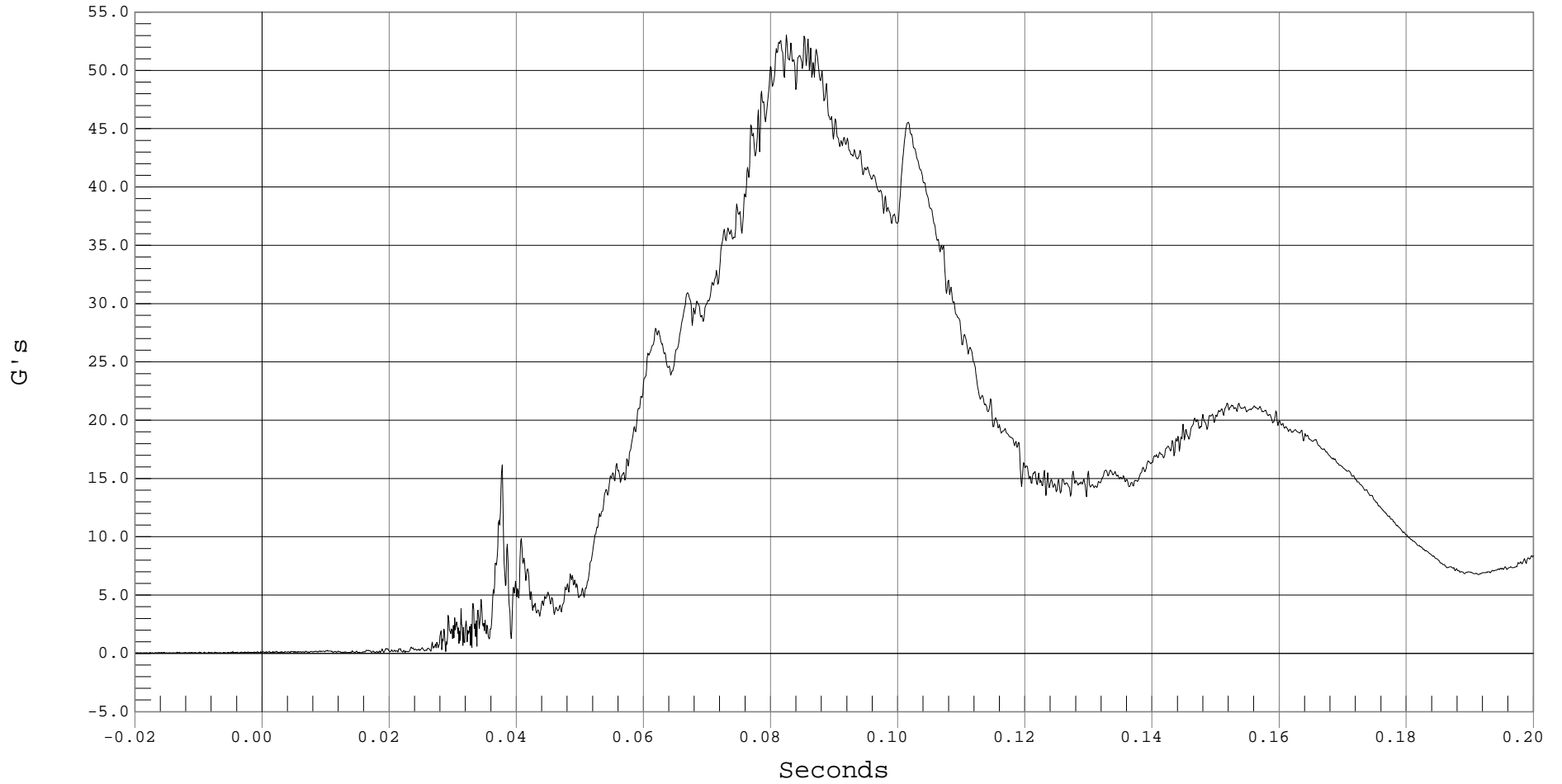
### PASSENGER HEAD REDUNDANT RESULTANT ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER HEAD REDUNDANT RESULTANT ACCELERATION, B01012AV.A41

Ymin = .01 G's @ -0.0149 Seconds, Ymax = 53.06 G's @ 0.0825 Seconds



B-65



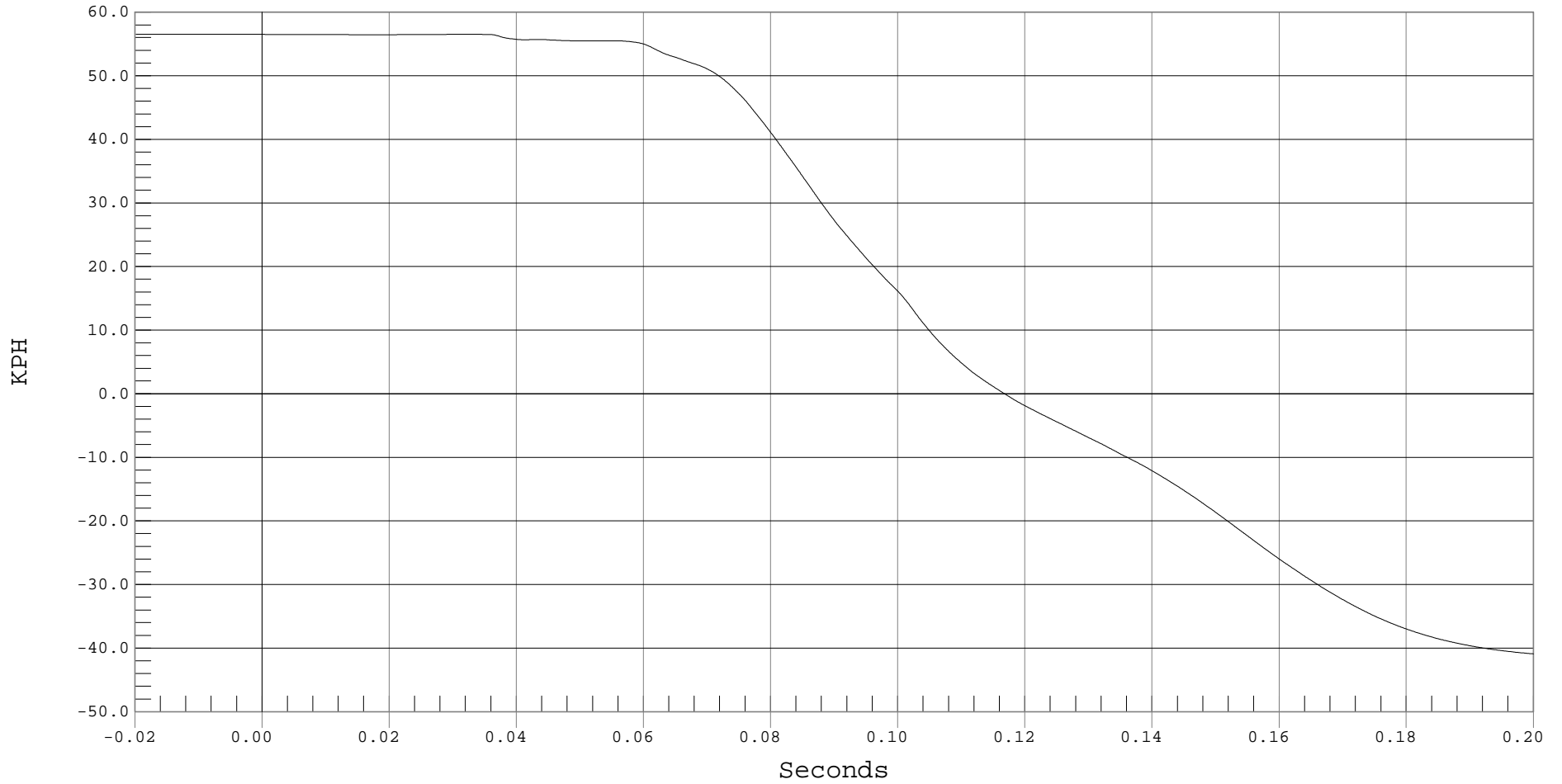
### PASSENGER HEAD REDUNDANT X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER HEAD REDUNDANT X VELOCITY, B01012AI.V41

Ymin = -40.92 KPH @ 0.2001 Seconds, Ymax = 56.52 KPH @ 0.0330 Seconds



B-66



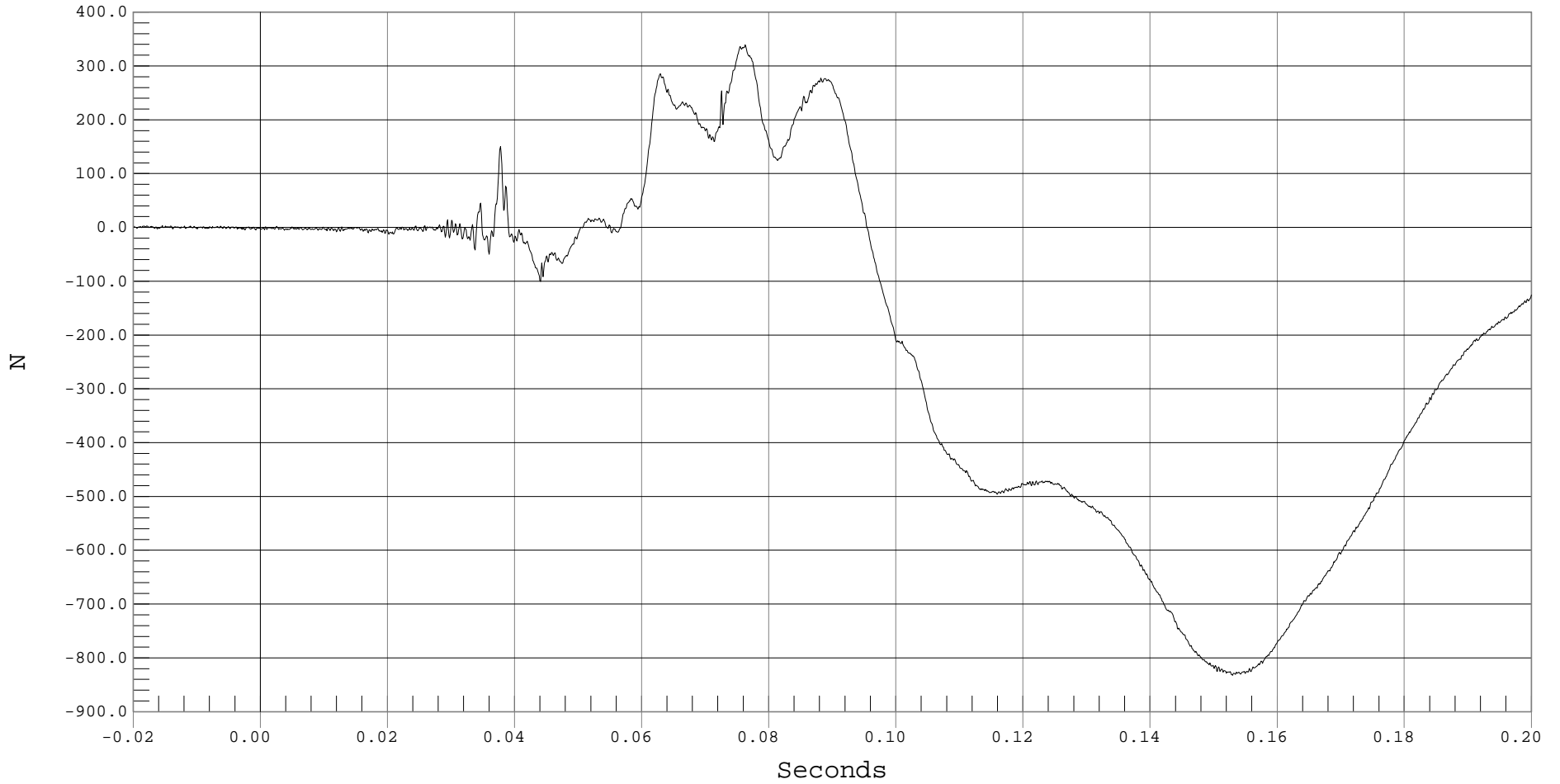
### PASSENGER NECK FORCE X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER NECK FX, B01012FT.F44

Ymin = -832.69 N @ 0.1530 Seconds, Ymax = 339.15 N @ 0.0763 Seconds



B-67



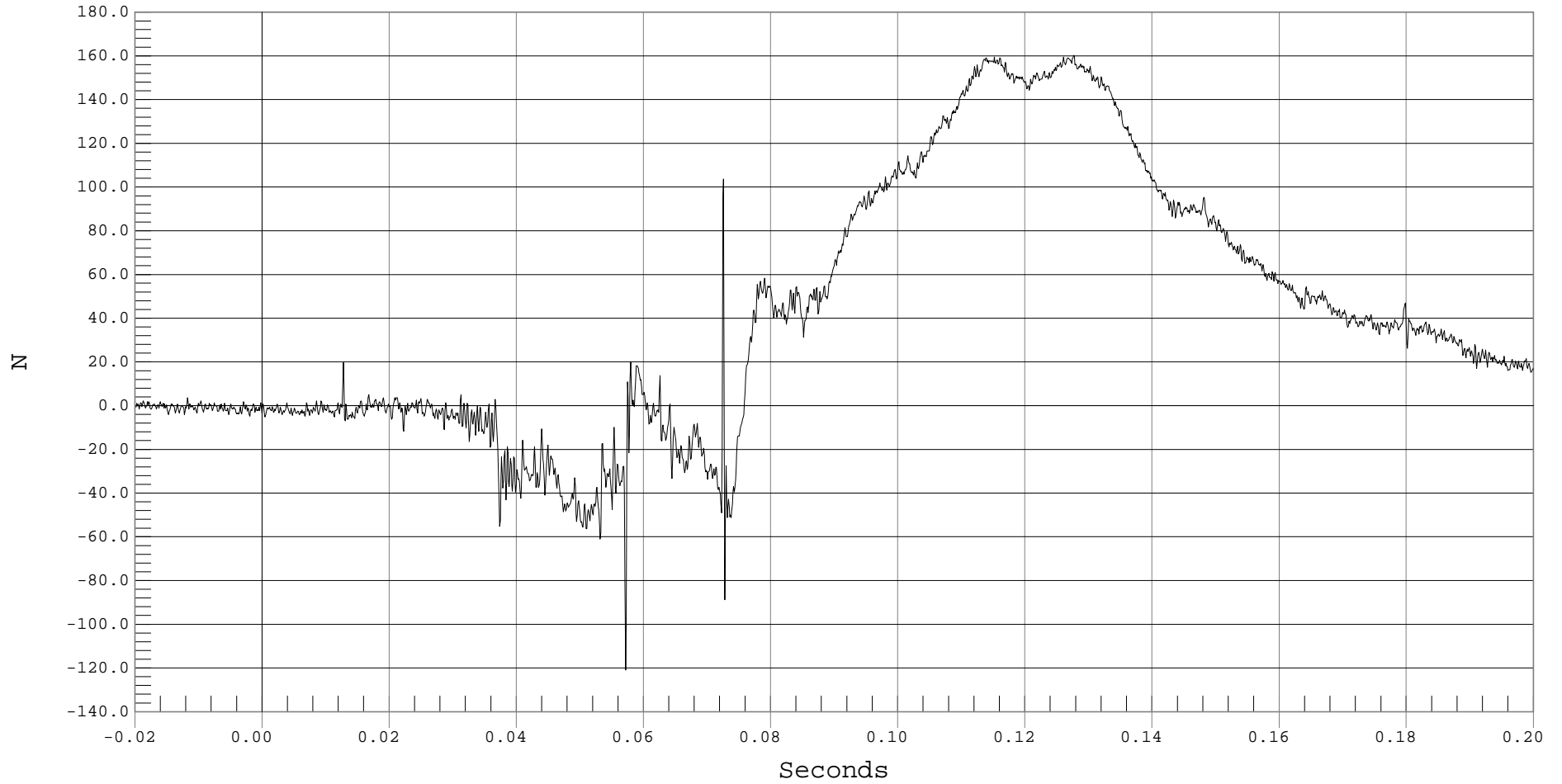
### PASSENGER NECK FORCE Y

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER NECK FY, B01012FT.F40

Ymin = -120.95 N @ 0.0572 Seconds, Ymax = 160.27 N @ 0.1277 Seconds



B-68



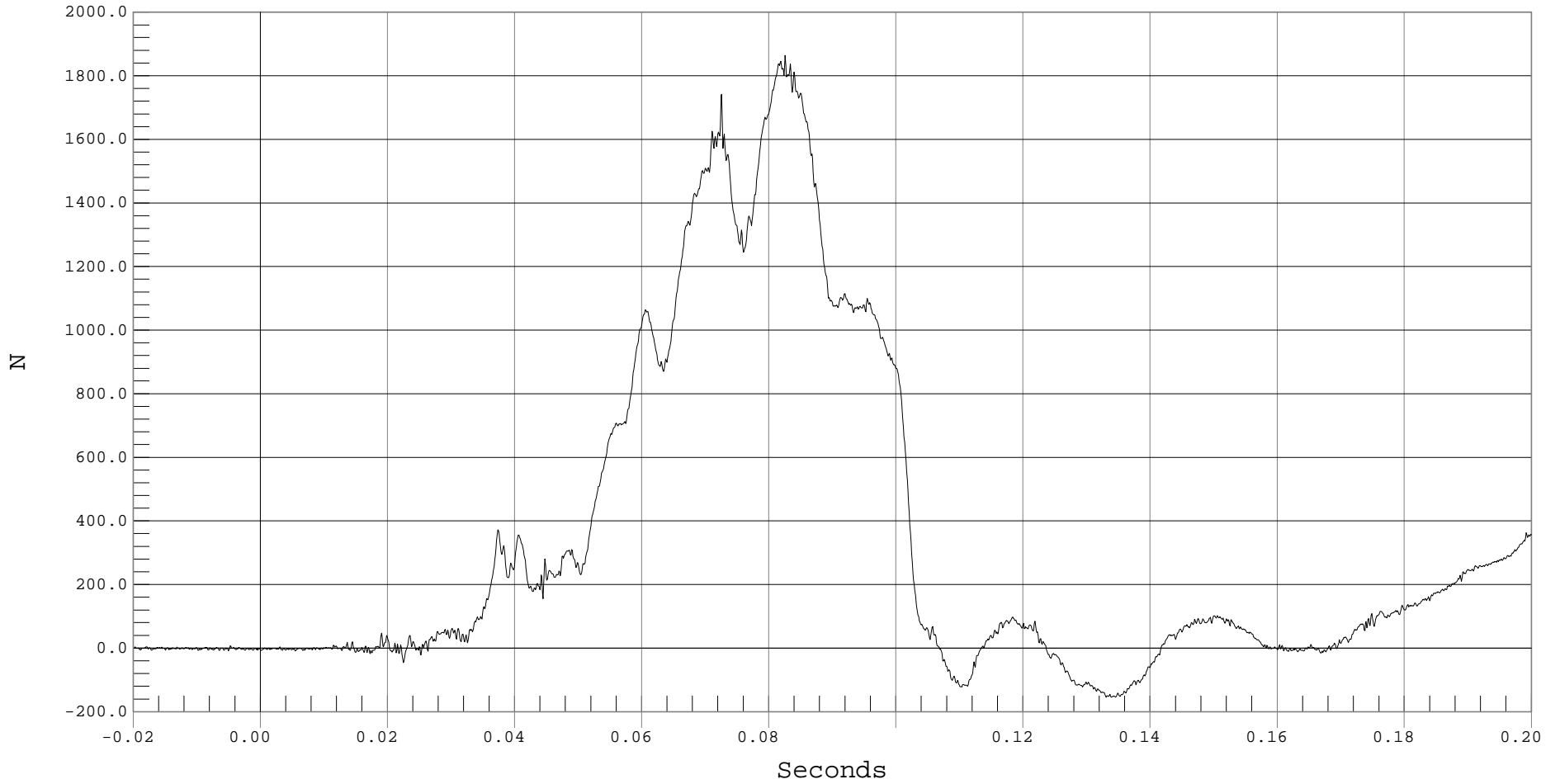
### PASSENGER NECK FORCE Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER NECK FZ, B01012FT.F46

Ymin = -154.98 N @ 0.1331 Seconds, Ymax = 1863.94 N @ 0.0826 Seconds



B-69



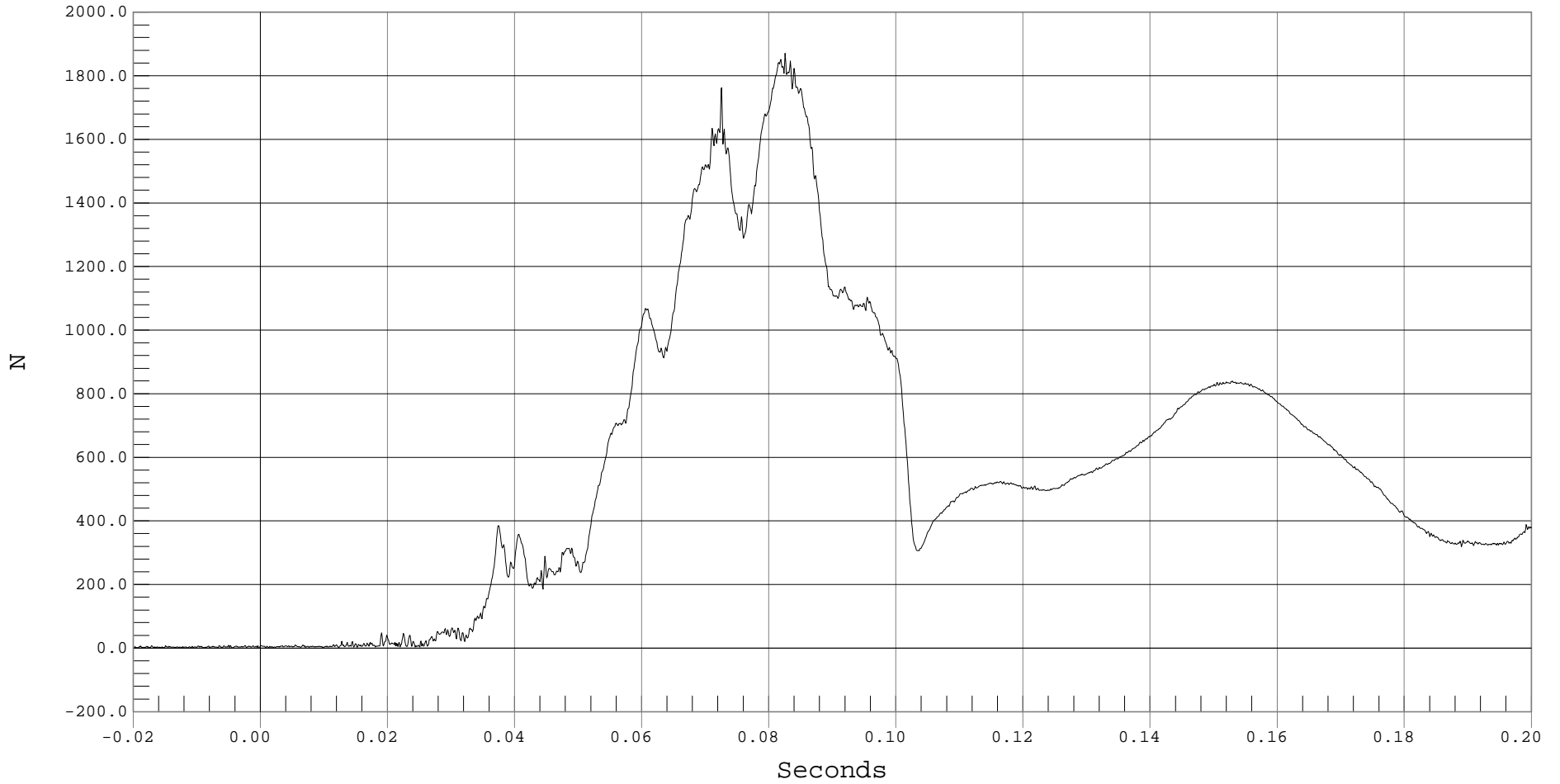
### PASSENGER NECK FORCE RESULTANT

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER NECK FORCE RESULTANT, B01012FV.F40

Ymin = .56 N @ -0.0168 Seconds, Ymax = 1870.42 N @ 0.0826 Seconds



B-70



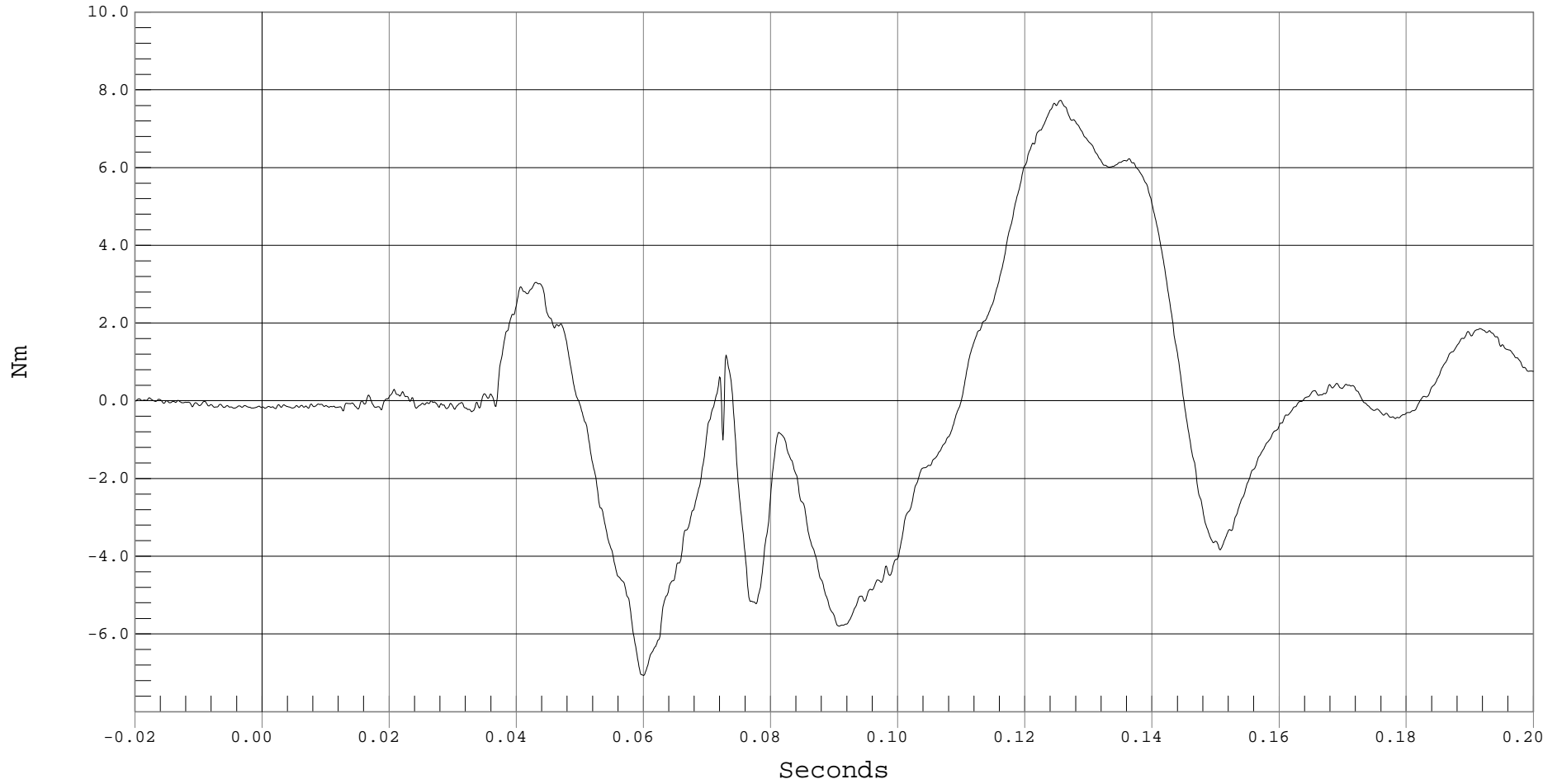
### PASSENGER NECK MOMENT X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER NECK MX, B01012MF.M47

Ymin = -7.07 Nm @ 0.0600 Seconds, Ymax = 7.73 Nm @ 0.1256 Seconds



B-71



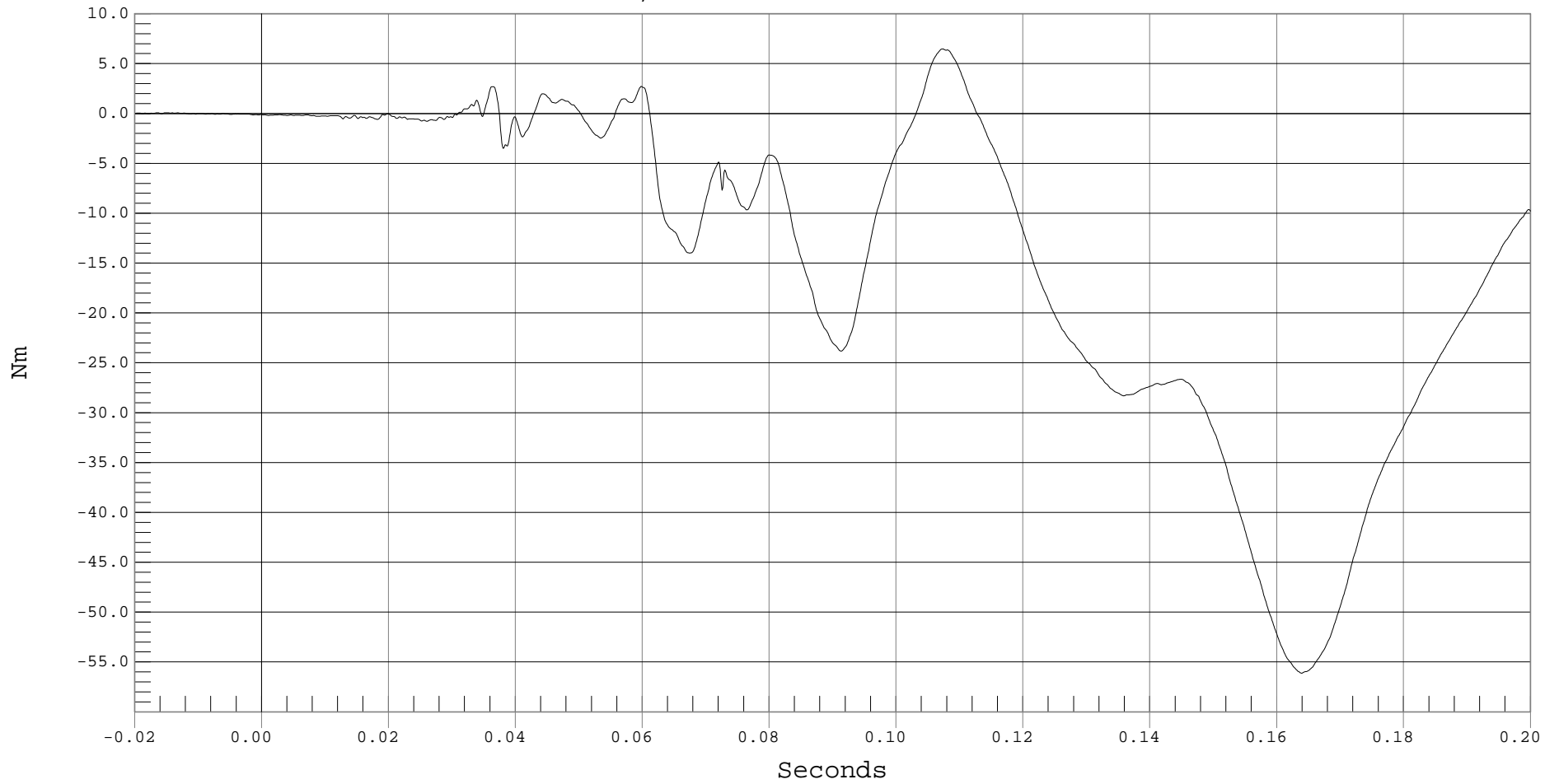
### PASSENGER NECK MOMENT Y

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER NECK MY, B01012MF.M48

Ymin = -56.13 Nm @ 0.1639 Seconds, Ymax = 6.48 Nm @ 0.1073 Seconds



B-72



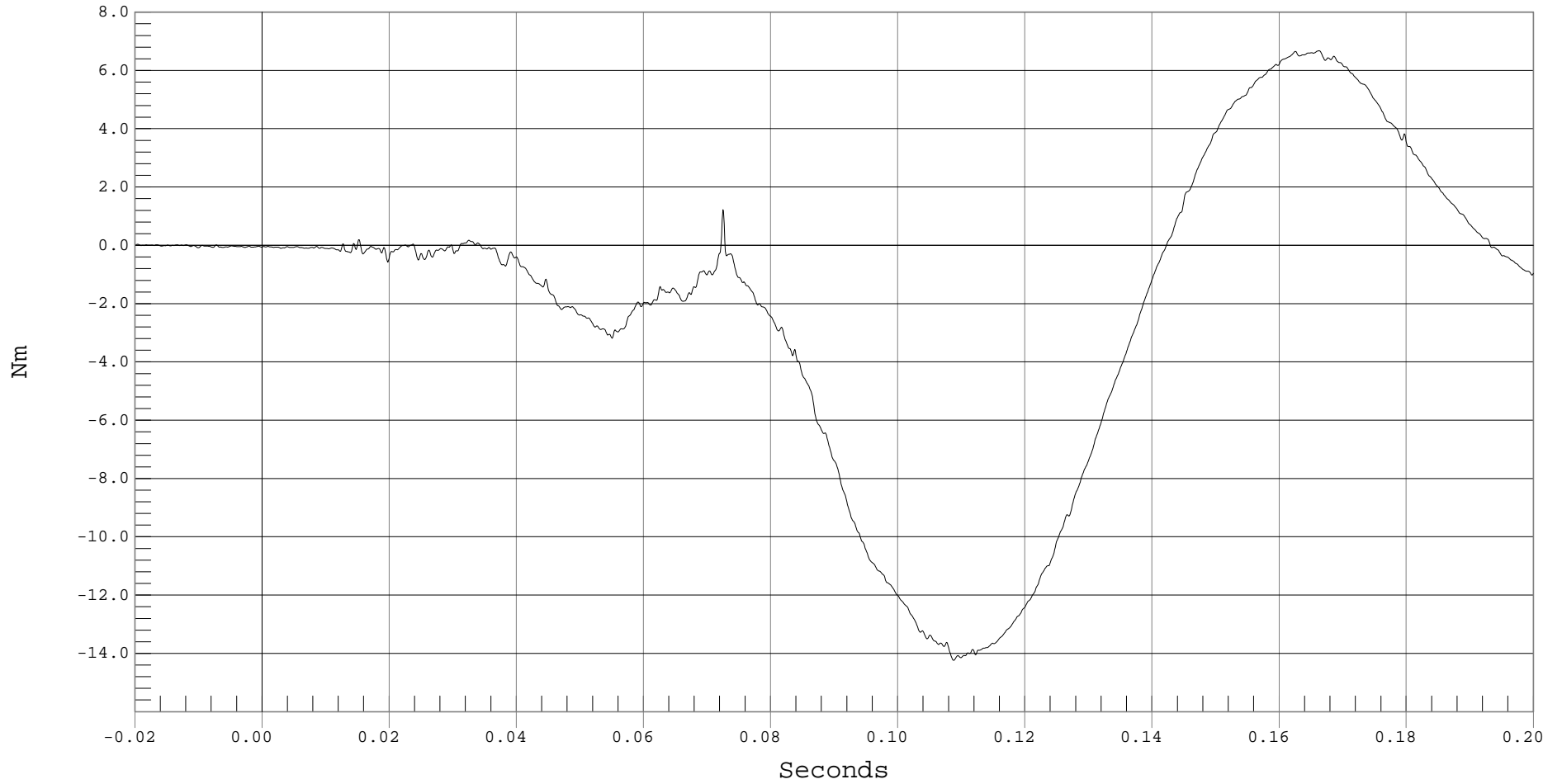
### PASSENGER NECK MOMENT Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER NECK MZ, B01012MF.M49

Ymin = -14.24 Nm @ 0.1088 Seconds, Ymax = 6.67 Nm @ 0.1663 Seconds



B-73



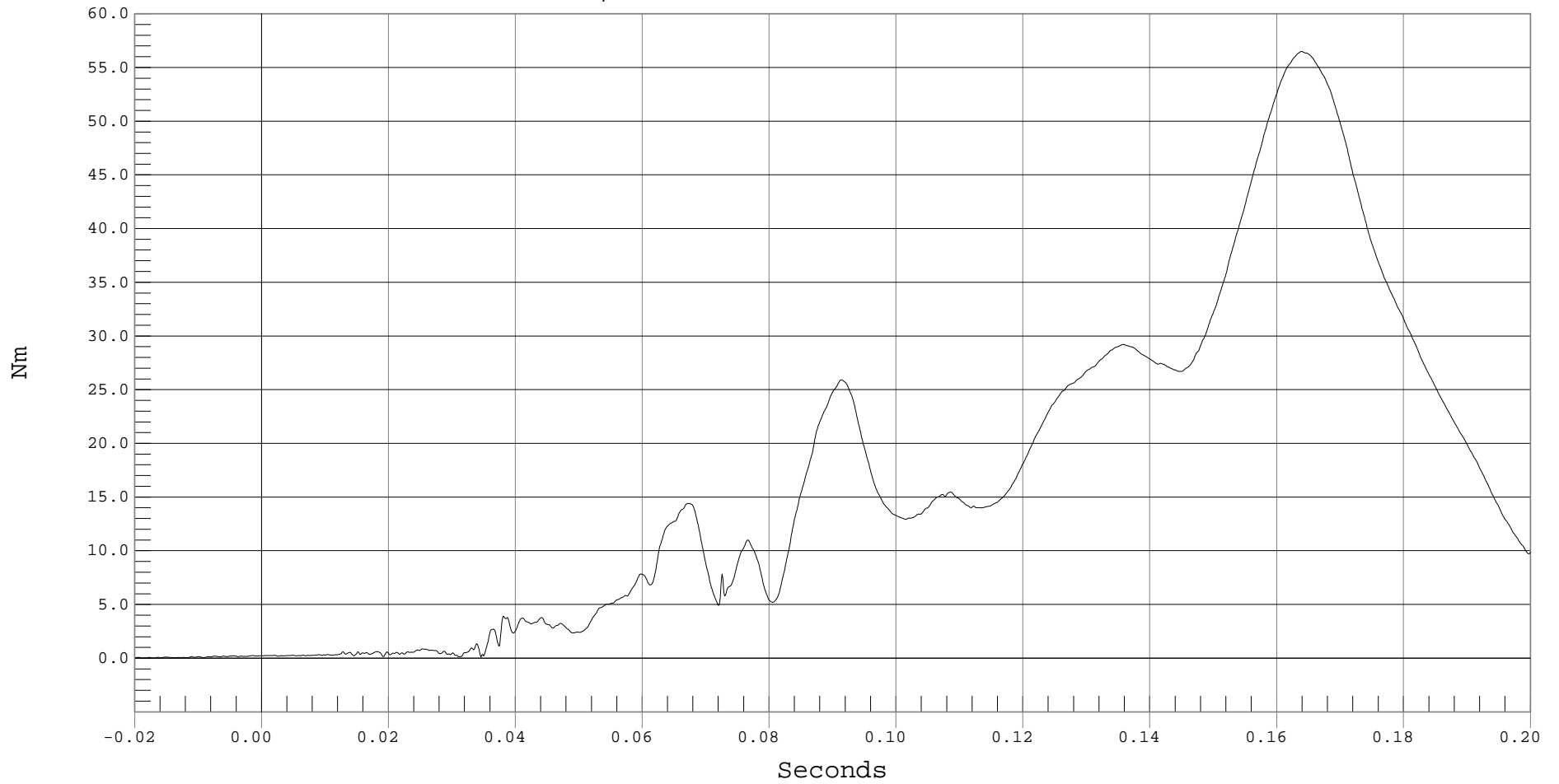
### PASSENGER NECK MOMENT RESULTANT

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER NECK MOMENT RESULTANT, B01012MV.M47

Ymin = 0 Nm @ -0.0189 Seconds, Ymax = 56.51 Nm @ 0.1639 Seconds



B-74



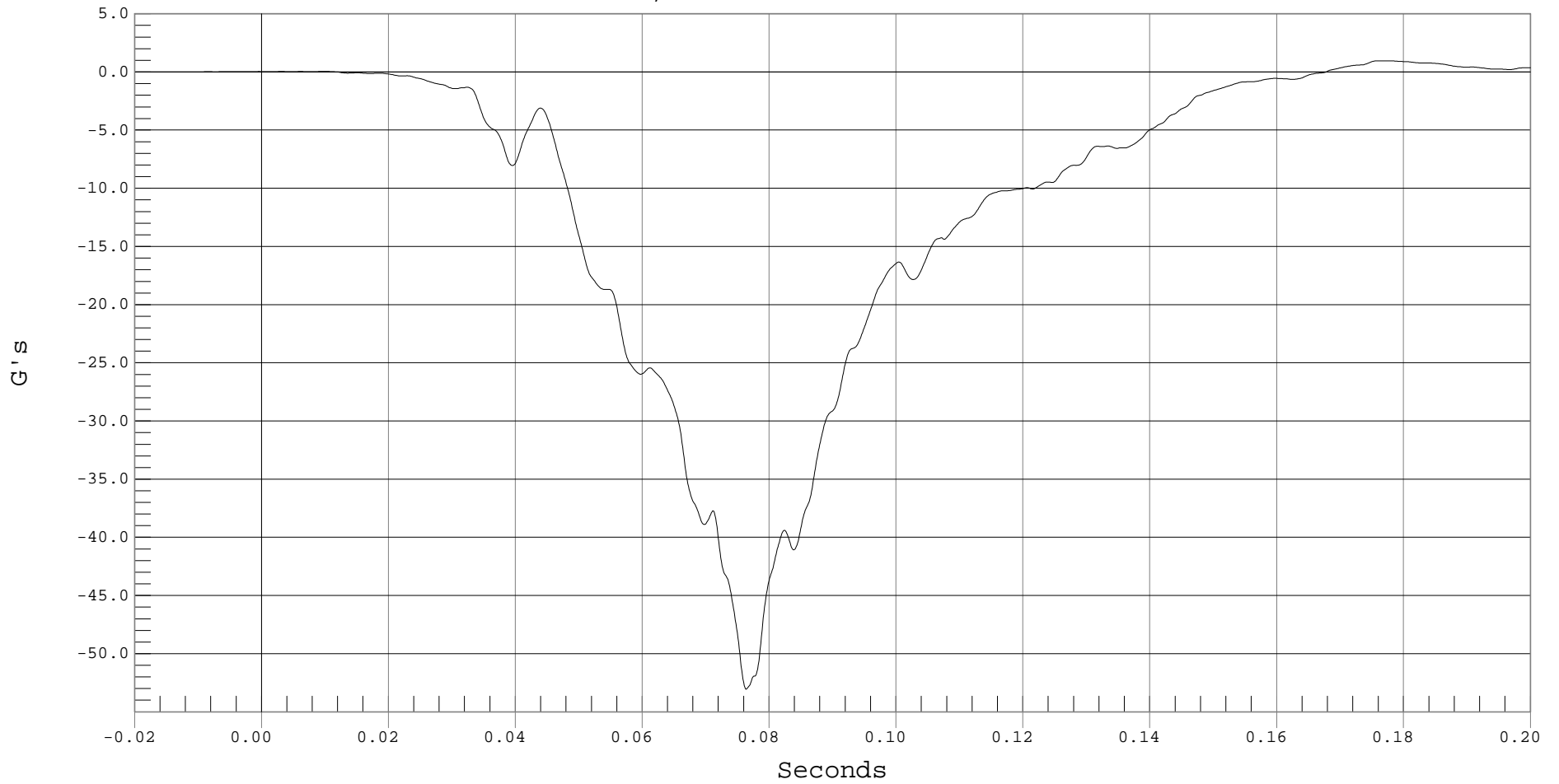
### PASSENGER CHEST X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER CHEST X, B01012AF.A22

Ymin = -53.05 G's @ 0.0764 Seconds, Ymax = .96 G's @ 0.1761 Seconds



B-75



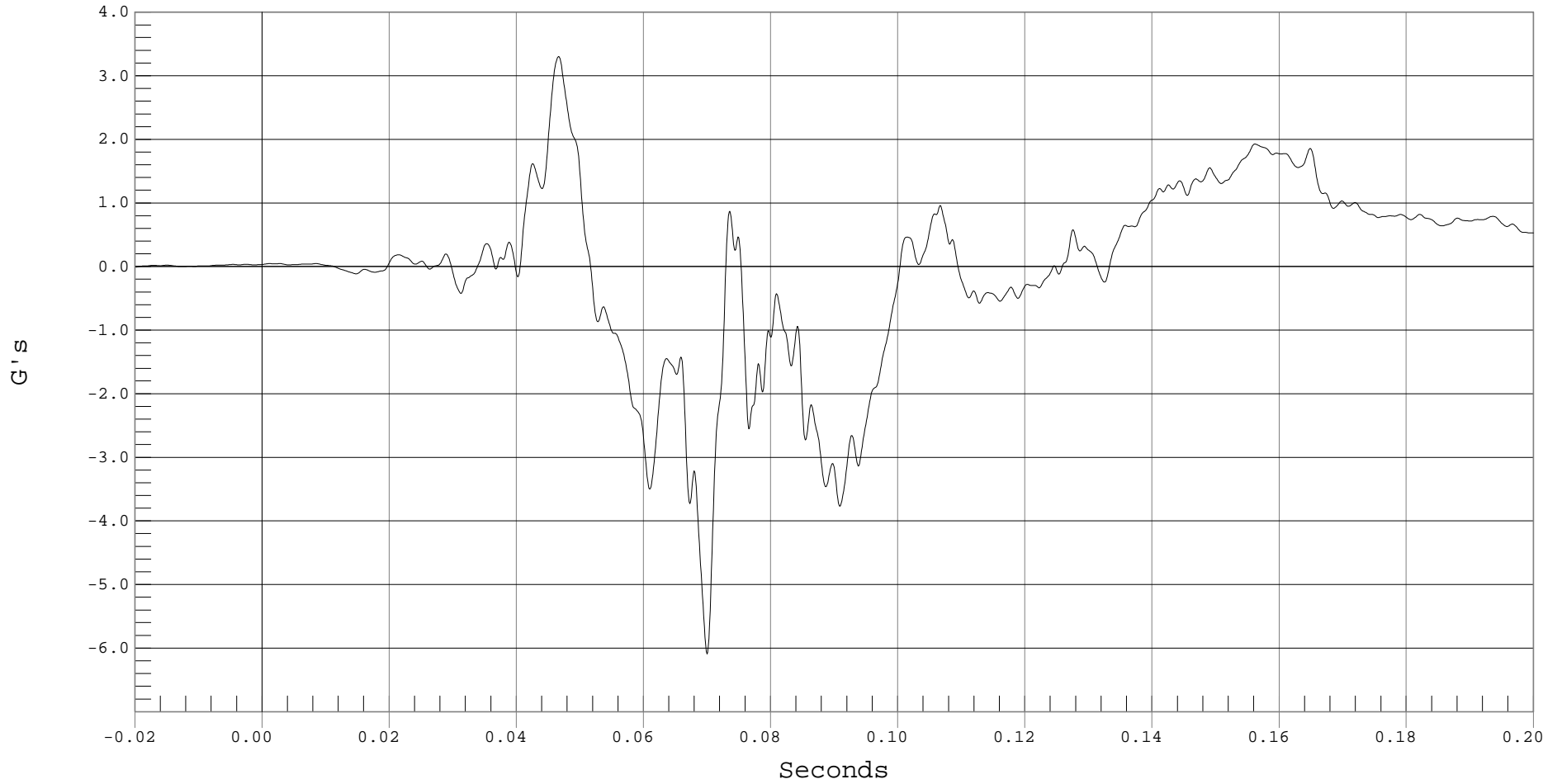
### PASSENGER CHEST Y ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER CHEST Y, B01012AF.A23

Ymin = -6.09 G's @ 0.0700 Seconds, Ymax = 3.3 G's @ 0.0467 Seconds



B-76



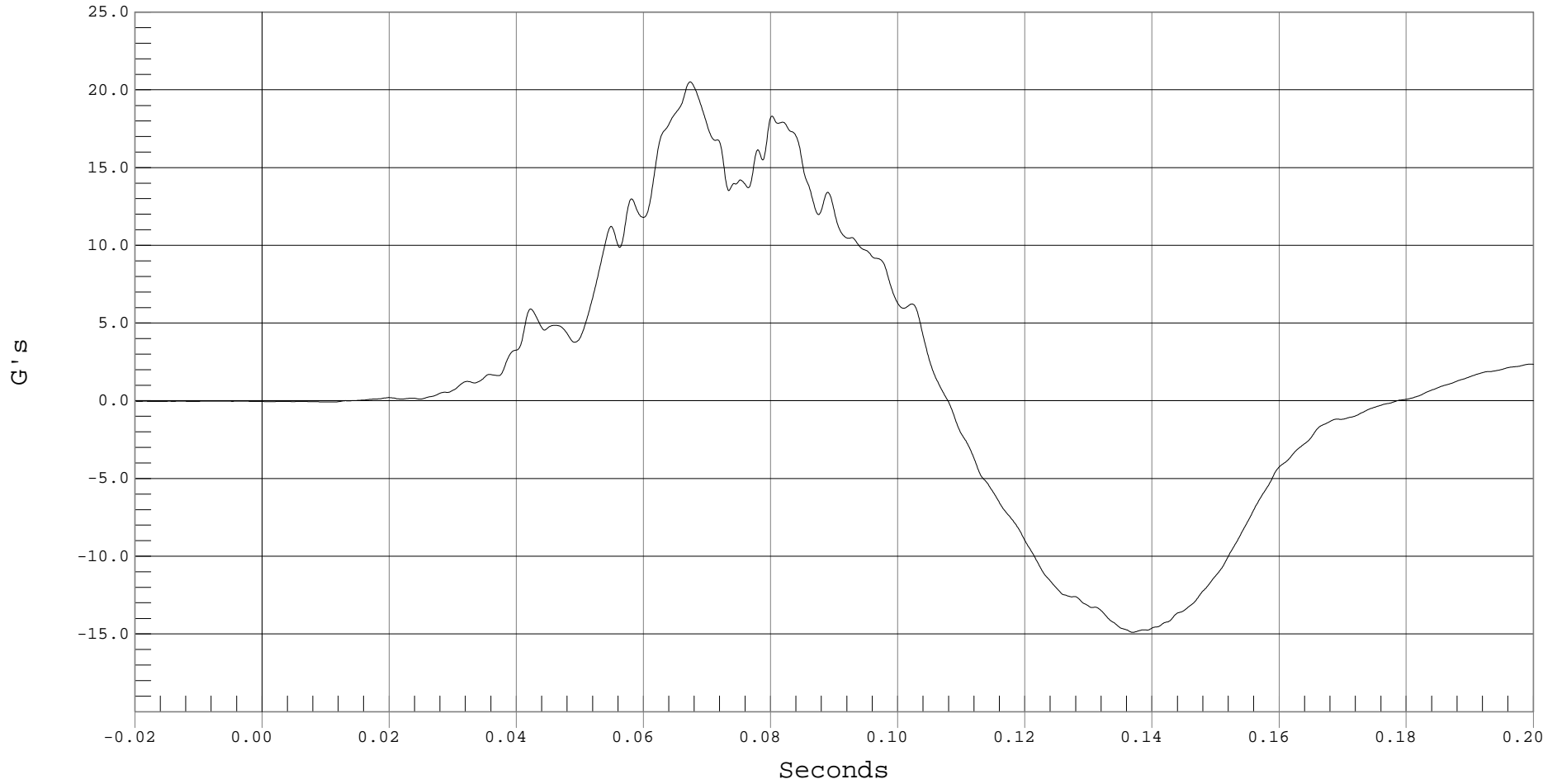
### PASSENGER CHEST Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER CHEST Z, B01012AF.A53

Ymin = -14.89 G's @ 0.1370 Seconds, Ymax = 20.51 G's @ 0.0673 Seconds



B-77



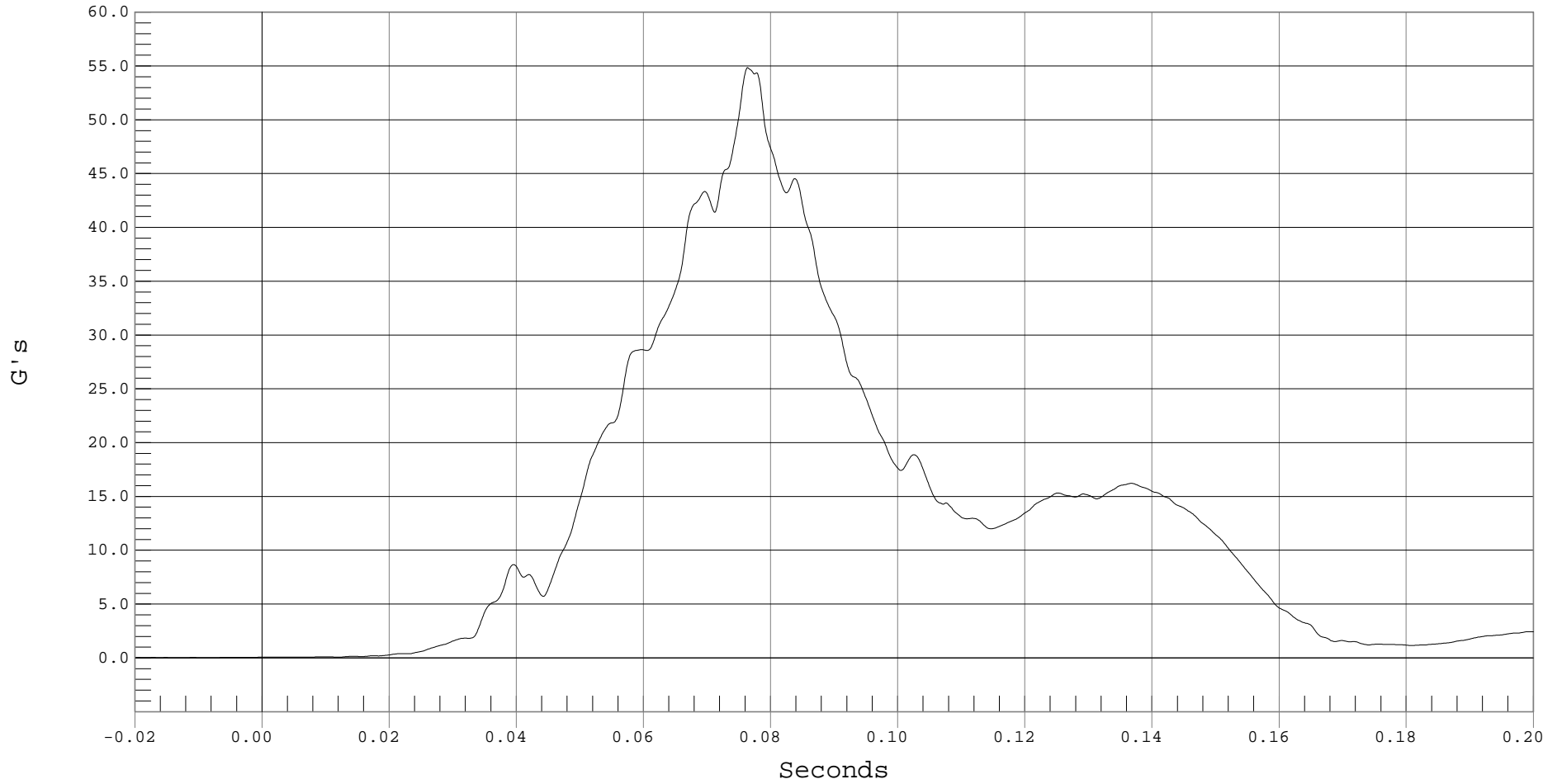
### PASSENGER CHEST RESULTANT ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER CHEST RESULTANT ACCELERATION, B01012AV.A22

Ymin = .03 G's @ -0.0127 Seconds, Ymax = 54.85 G's @ 0.0764 Seconds



B-78



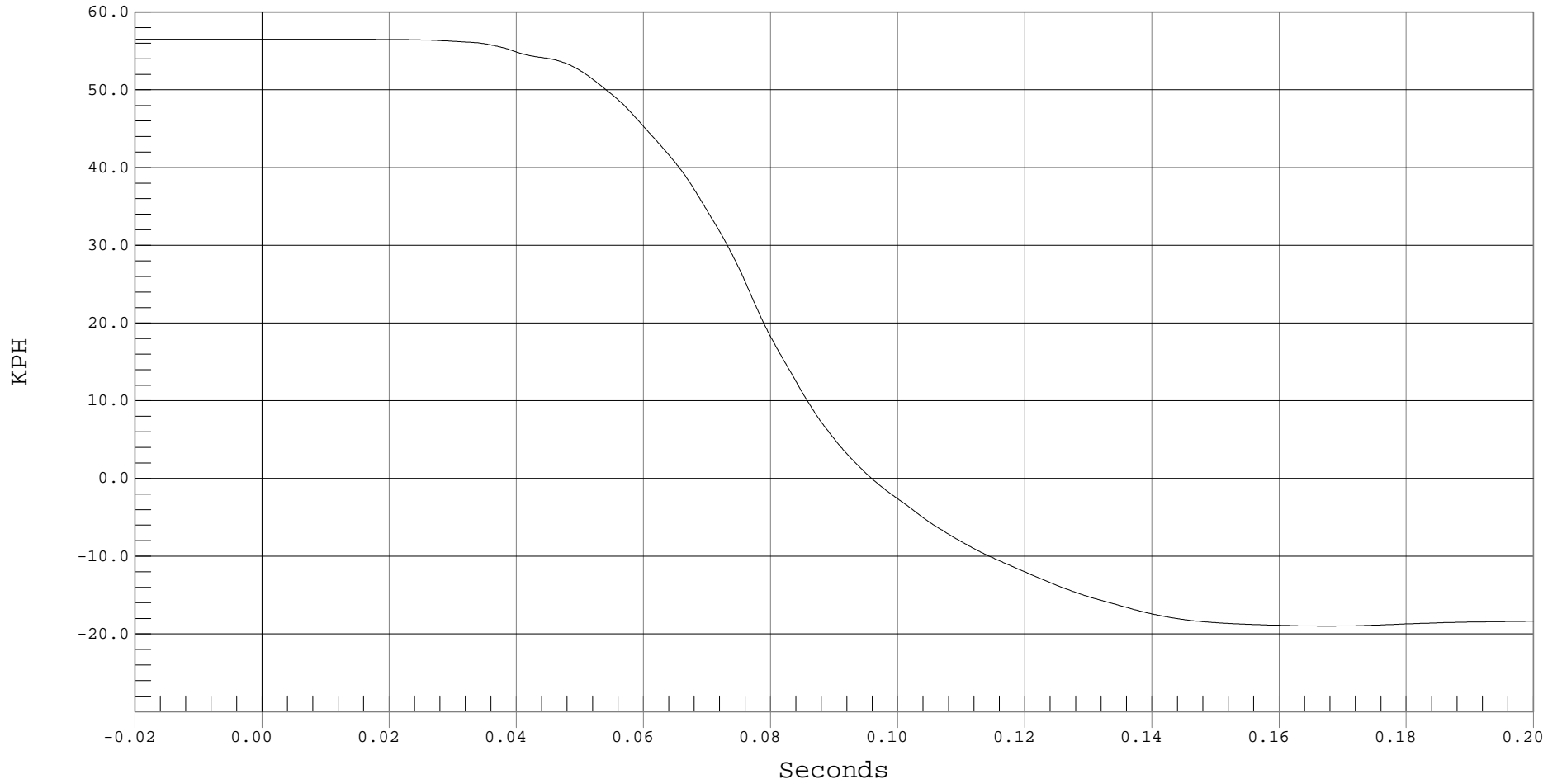
### PASSENGER CHEST X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER CHEST X VELOCITY, B01012AI.V22

Ymin = -18.99 KPH @ 0.1678 Seconds, Ymax = 56.52 KPH @ 0.0118 Seconds





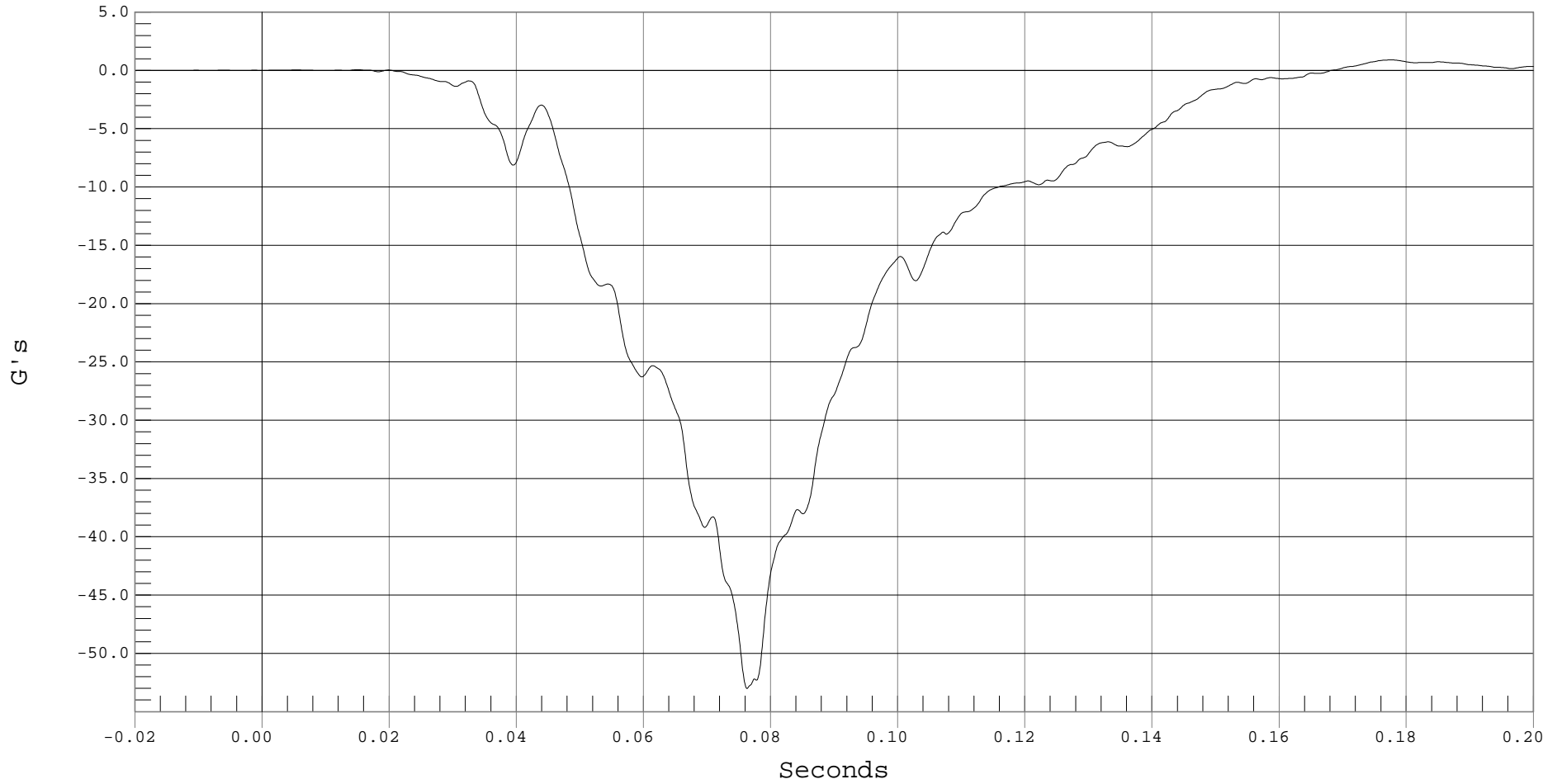
### PASSENGER CHEST REDUNDANT X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER CHEST Xr, B01012AF.A50

Ymin = -53.03 G's @ 0.0763 Seconds, Ymax = .9 G's @ 0.1777 Seconds



B-80



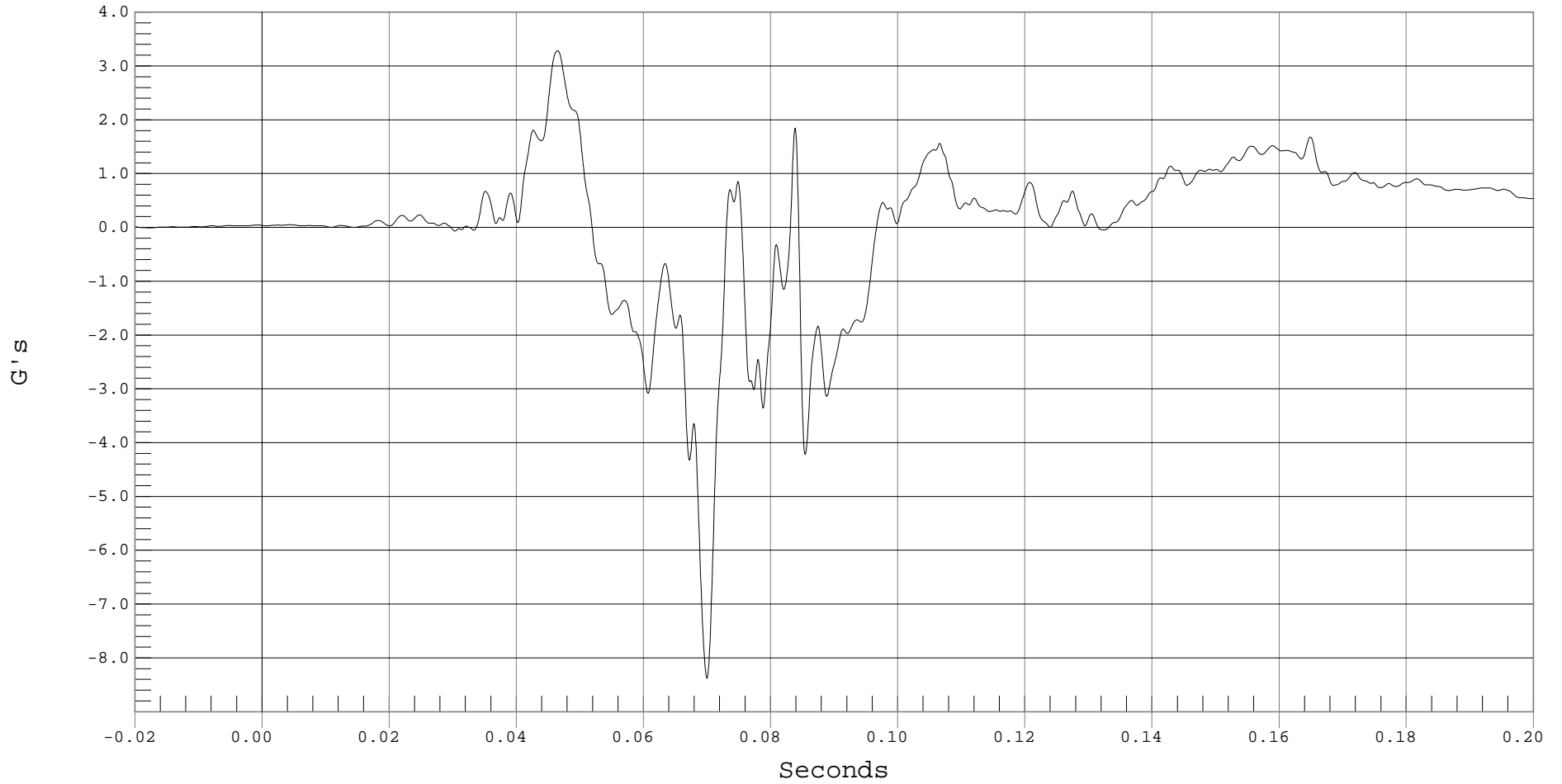
### PASSENGER CHEST REDUNDANT Y ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER CHEST Yr, B01012AF.A51

Ymin = -8.38 G's @ 0.0700 Seconds, Ymax = 3.28 G's @ 0.0465 Seconds



B-81



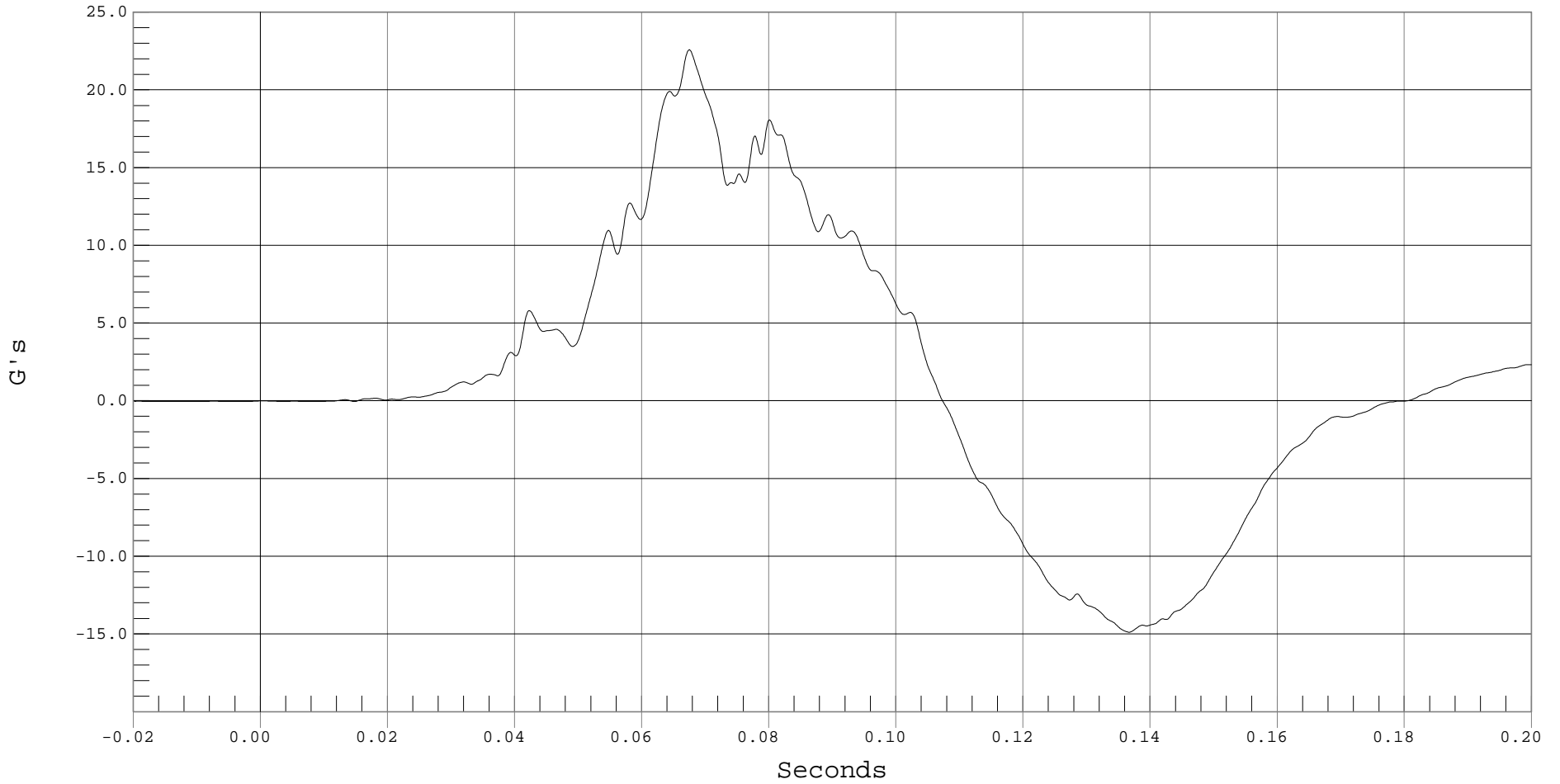
### PASSENGER CHEST REDUNDANT Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER CHEST Zr, B01012AF.A52

Ymin = -14.89 G's @ 0.1367 Seconds, Ymax = 22.58 G's @ 0.0675 Seconds



B-82



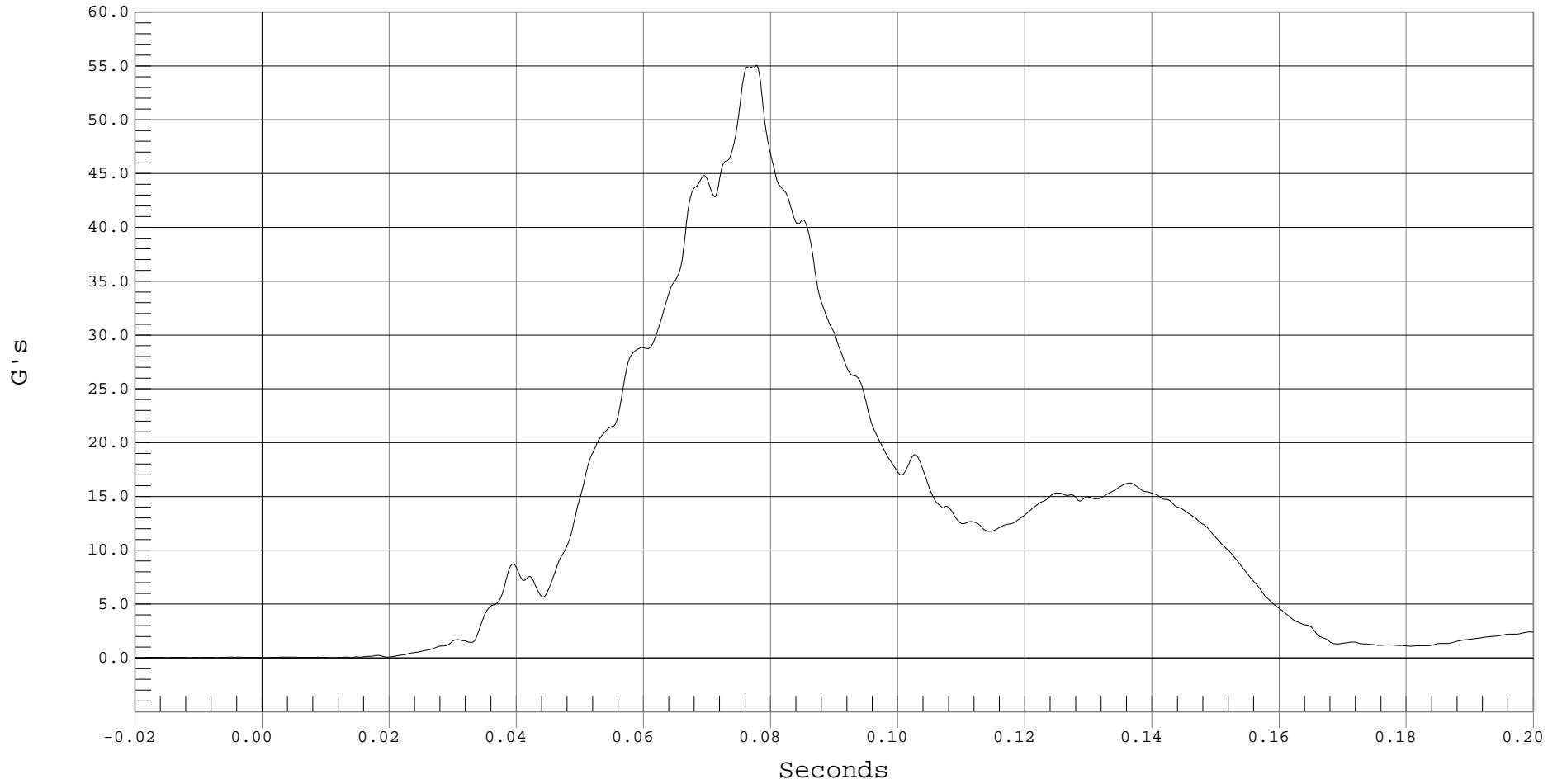
### PASSENGER CHEST REDUNDANT RESULTANT ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER CHEST REDUNDANT RESULTANT ACCELERATION, B01012AV.A50

Ymin = .03 G's @ 0.0111 Seconds, Ymax = 55.06 G's @ 0.0778 Seconds





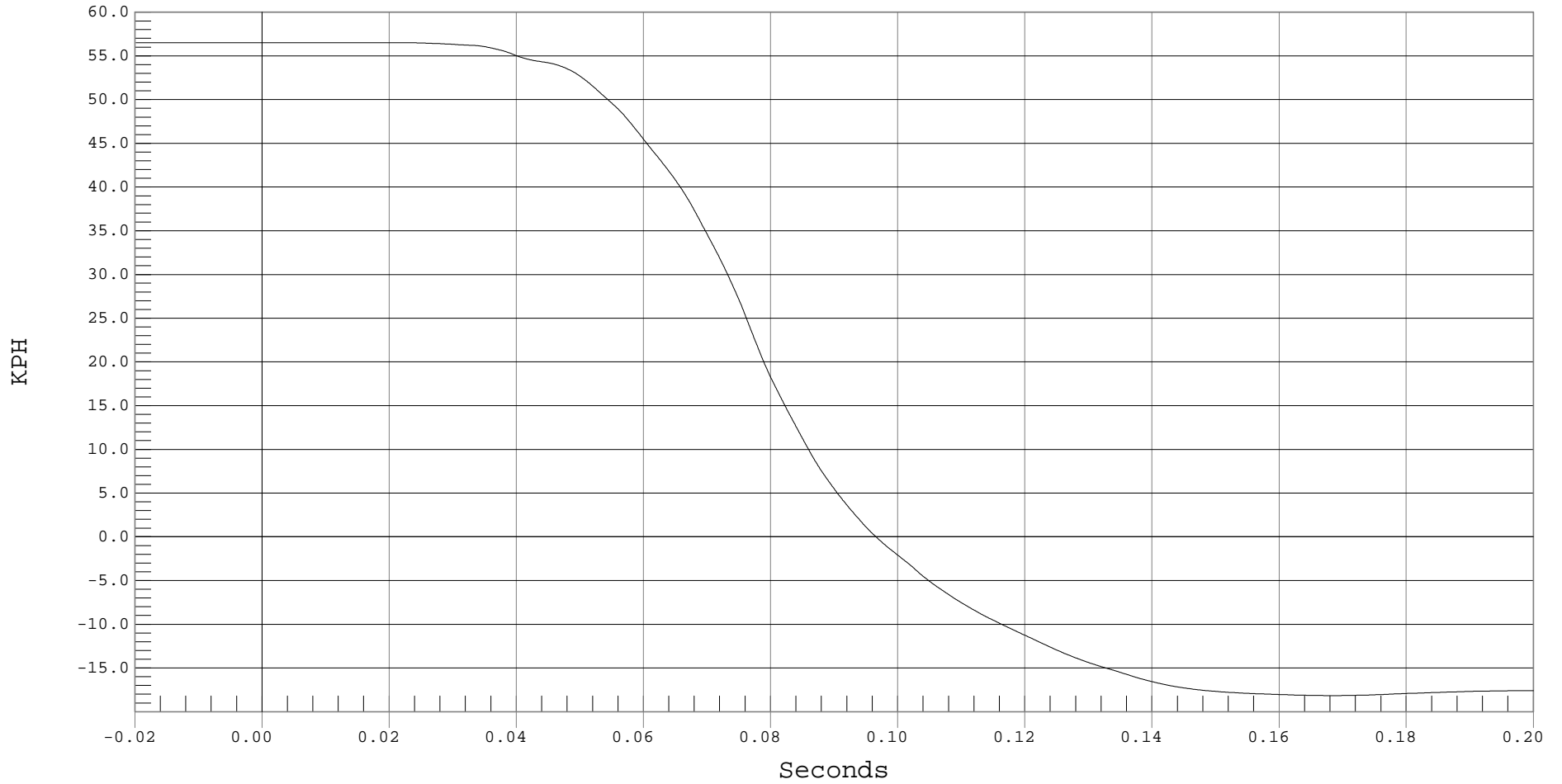
### PASSENGER CHEST REDUNDANT X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER CHEST REDUNDANT X VELOCITY, B01012AI.V50

Ymin = -18.16 KPH @ 0.1681 Seconds, Ymax = 56.52 KPH @ 0.0172 Seconds





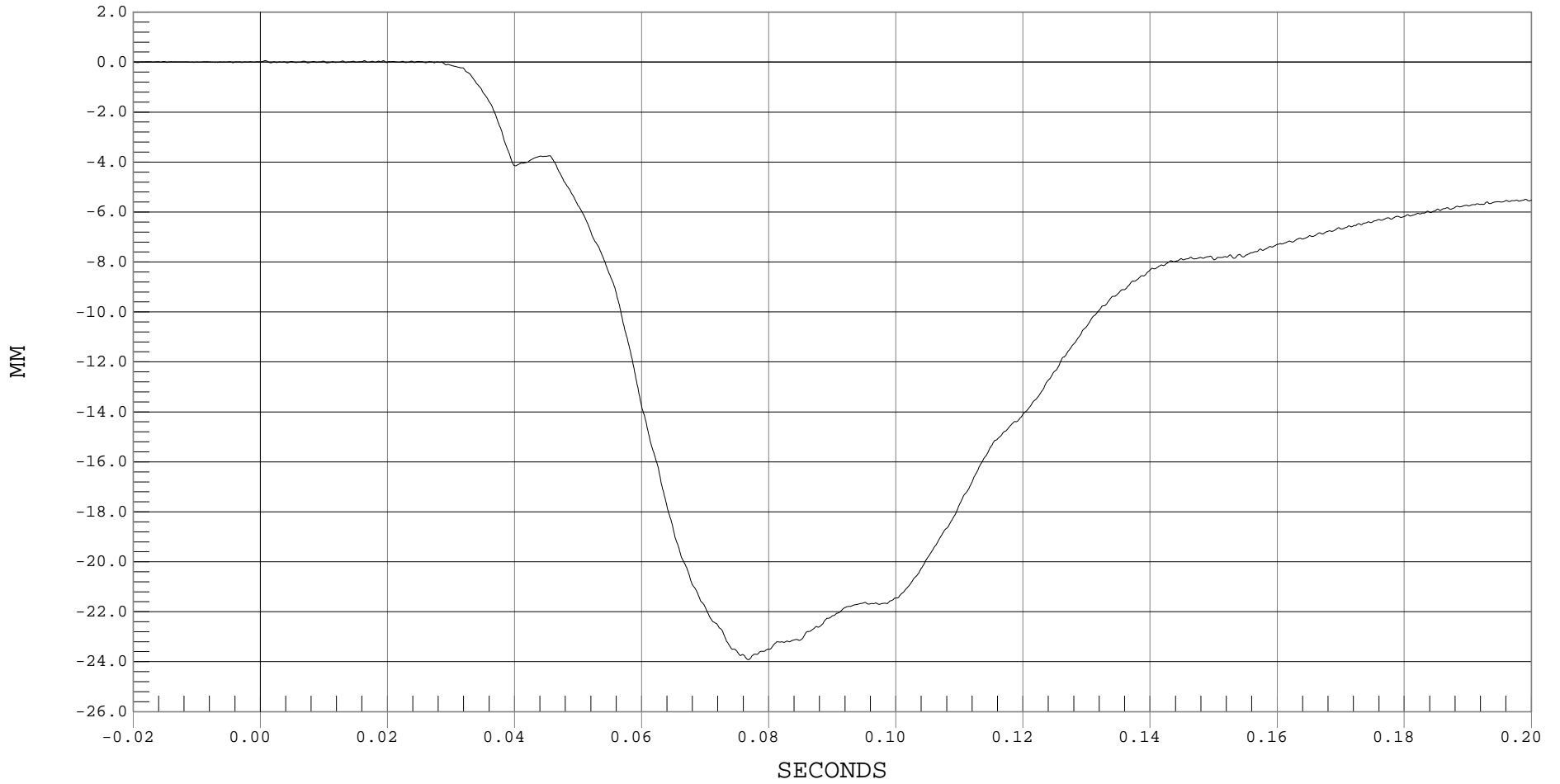
### PASSENGER CHEST COMPRESSION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER CHEST DISPLACEMENT, B01012DF.D25

Ymin = -23.92 MM @ 0.0768 SECONDS, Ymax = .06 MM @ 0.0008 SECONDS



B-85



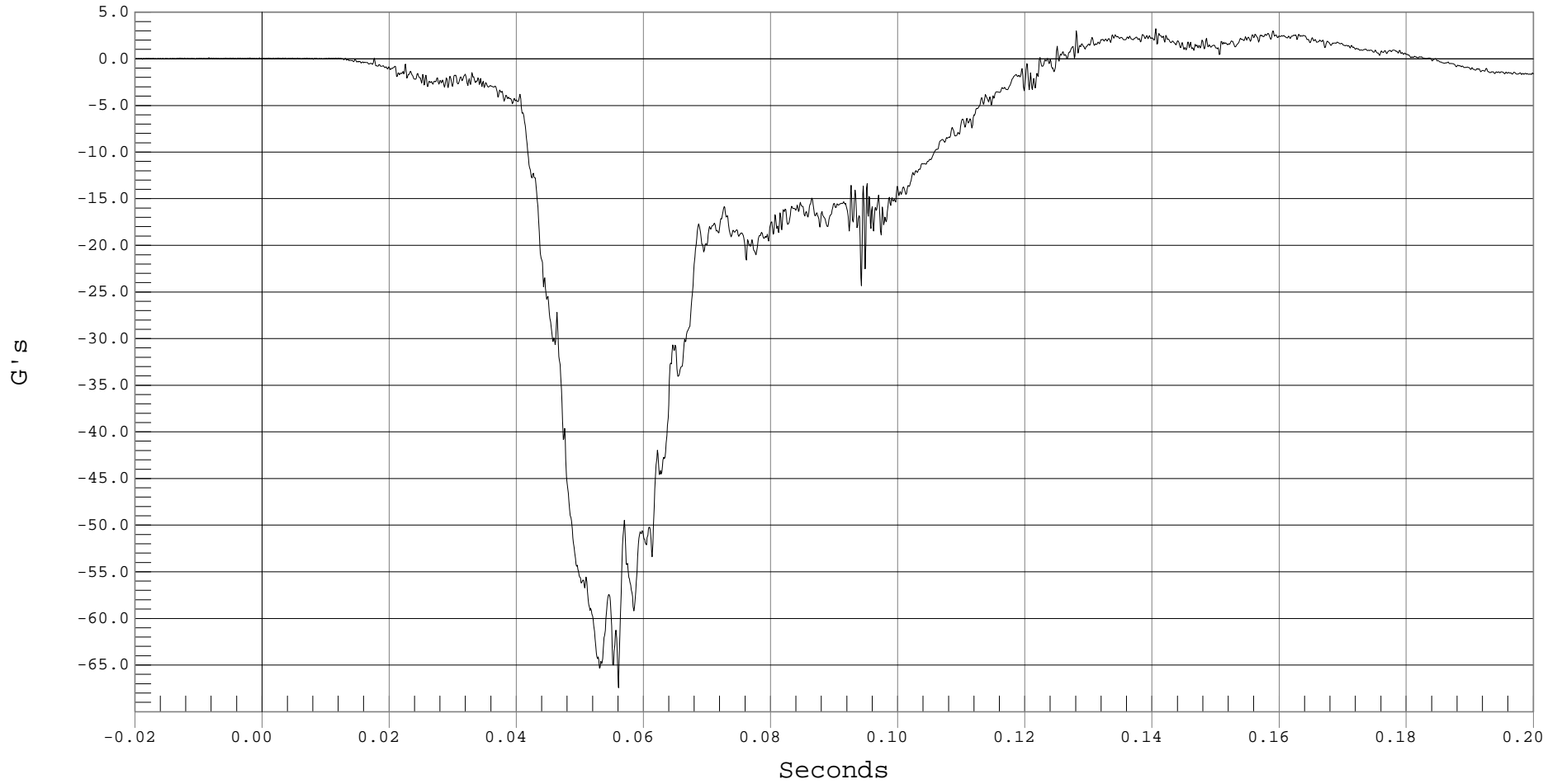
### PASSENGER PELVIS X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER PELVIS X, B01012AT.A26

Ymin = -67.44 G's @ 0.0561 Seconds, Ymax = 3.22 G's @ 0.1406 Seconds



B-86



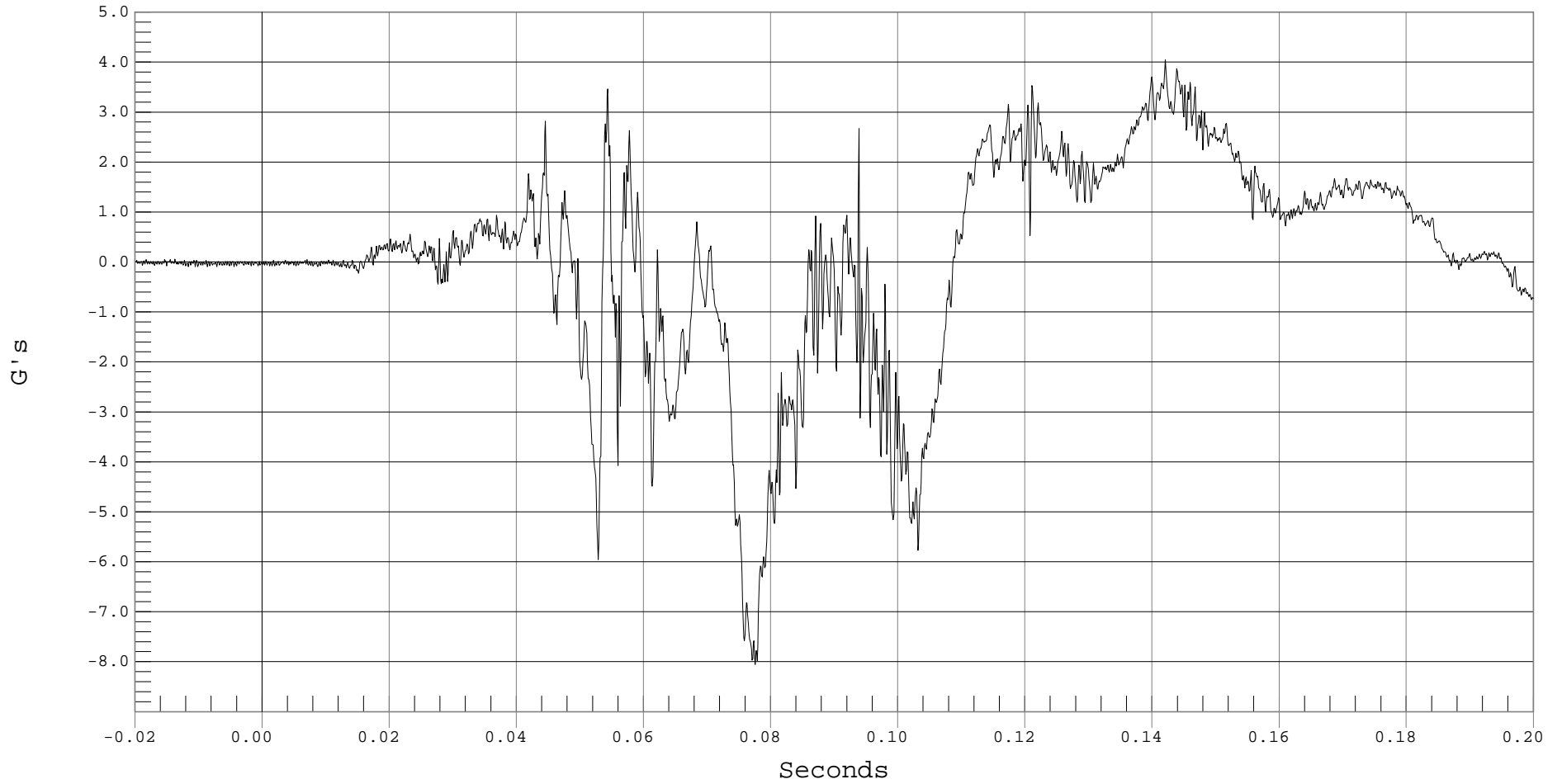
### PASSENGER PELVIS Y ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER PELVIS Y, B01012AT.A27

Ymin = -8.06 G's @ 0.0776 Seconds, Ymax = 4.05 G's @ 0.1421 Seconds





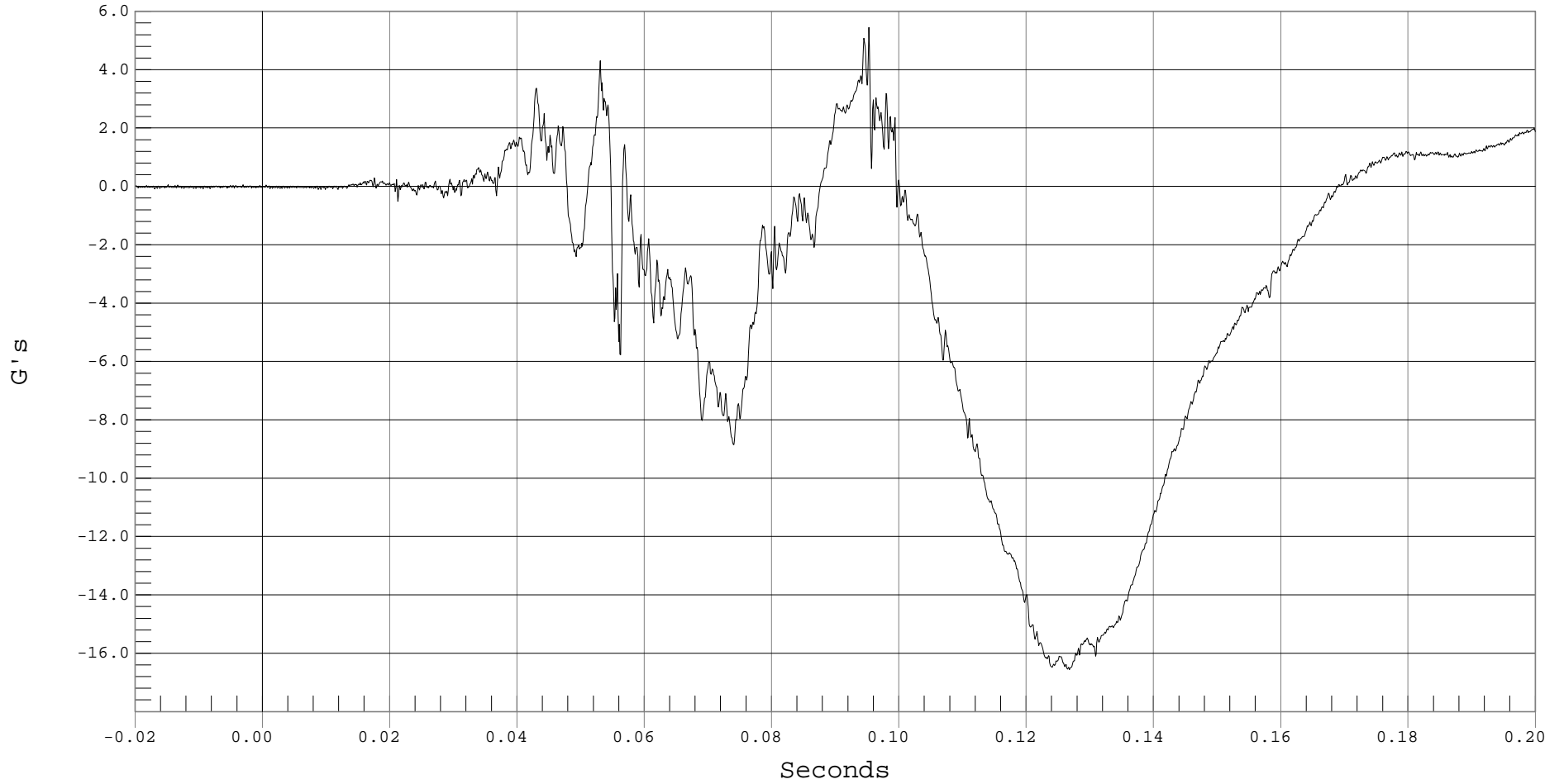
### PASSENGER PELVIS Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER PELVIS Z, B01012AT.A28

Ymin = -16.56 G's @ 0.1268 Seconds, Ymax = 5.44 G's @ 0.0953 Seconds



B-88



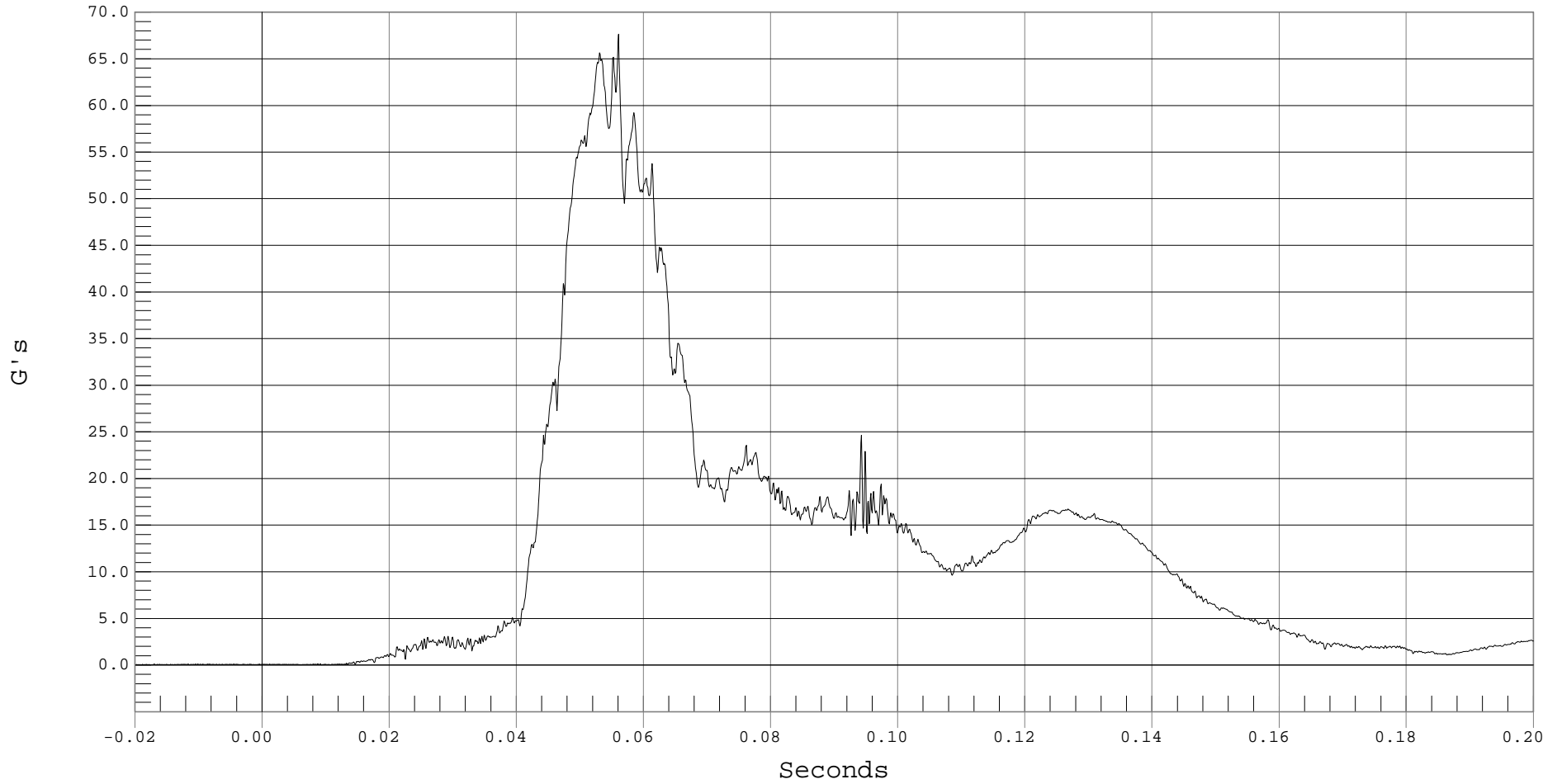
### PASSENGER PELVIS RESULTANT ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 PASSENGER PELVIS RESULTANT ACCELERATION, B01012AV.A26

Ymin = .02 G's @ 0.0040 Seconds, Ymax = 67.64 G's @ 0.0561 Seconds





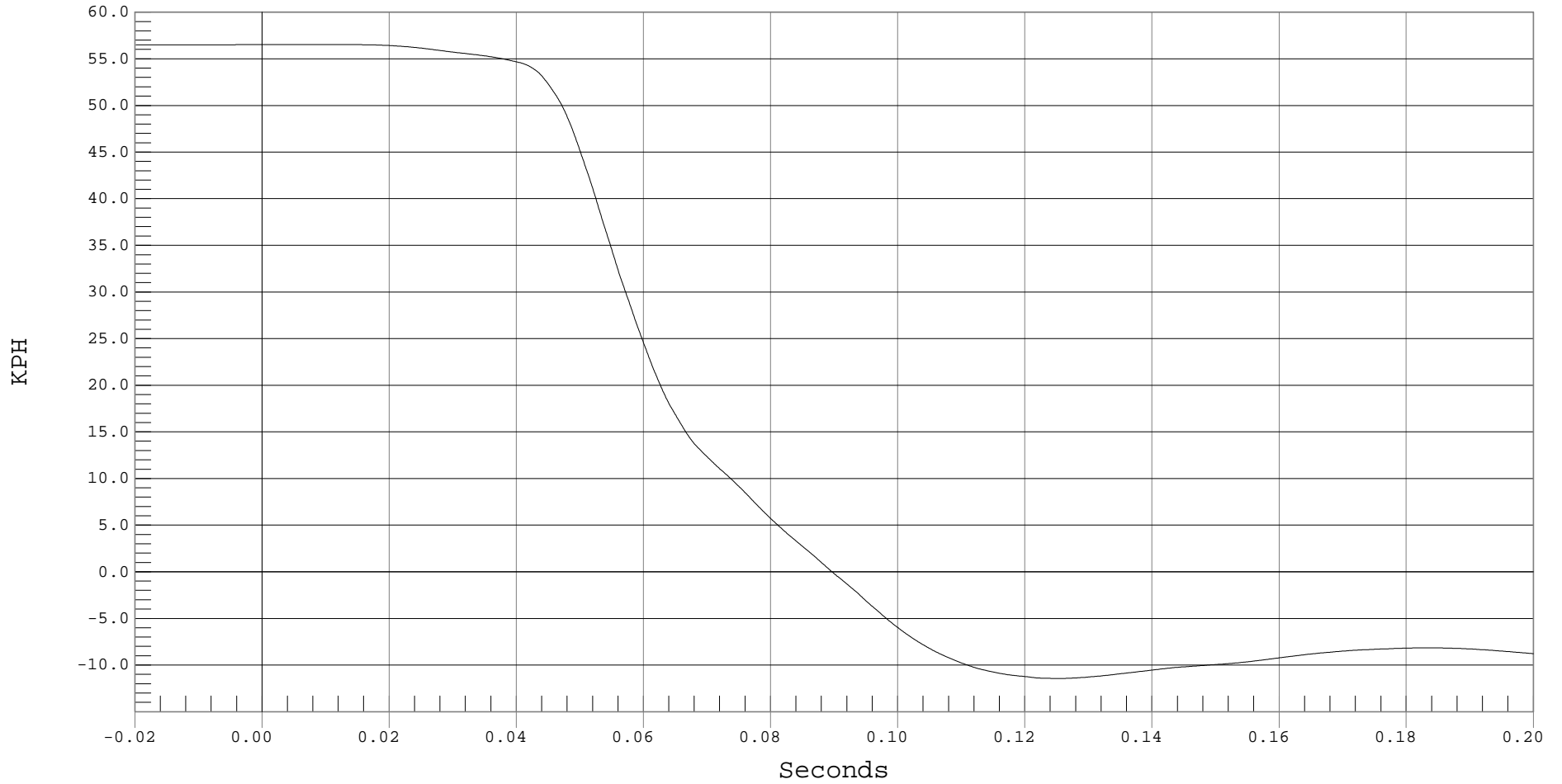
### PASSENGER PELVIS X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER PELVIS X VELOCITY, B01012AI.V26

Ymin = -11.44 KPH @ 0.1251 Seconds, Ymax = 56.53 KPH @ 0.0126 Seconds



B-90



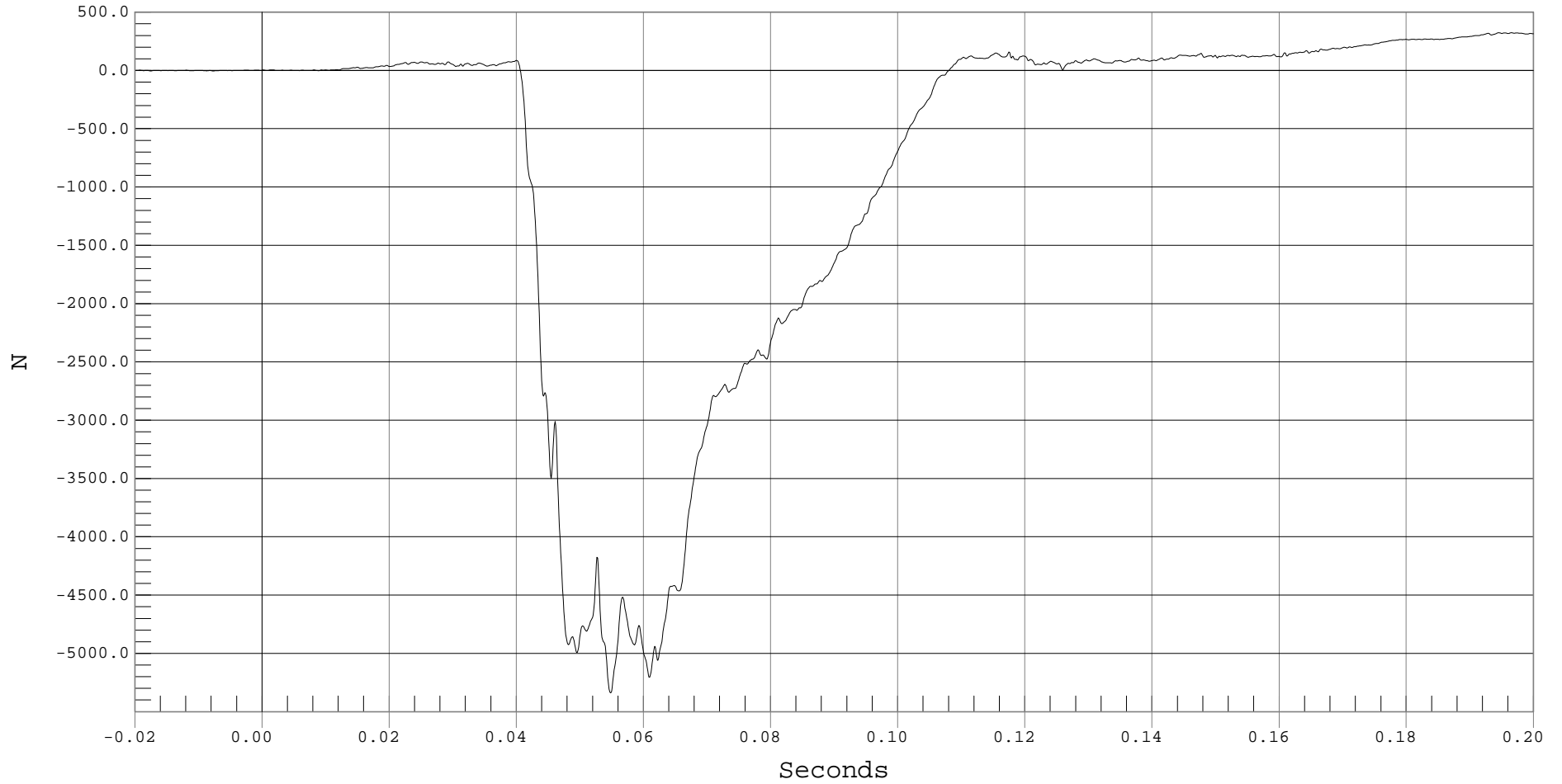
### PASSENGER LEFT FEMUR FORCE

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER LEFT FEMUR X, B01012FF.F30

Ymin = -5338.86 N @ 0.0548 Seconds, Ymax = 323.93 N @ 0.1945 Seconds



B-91



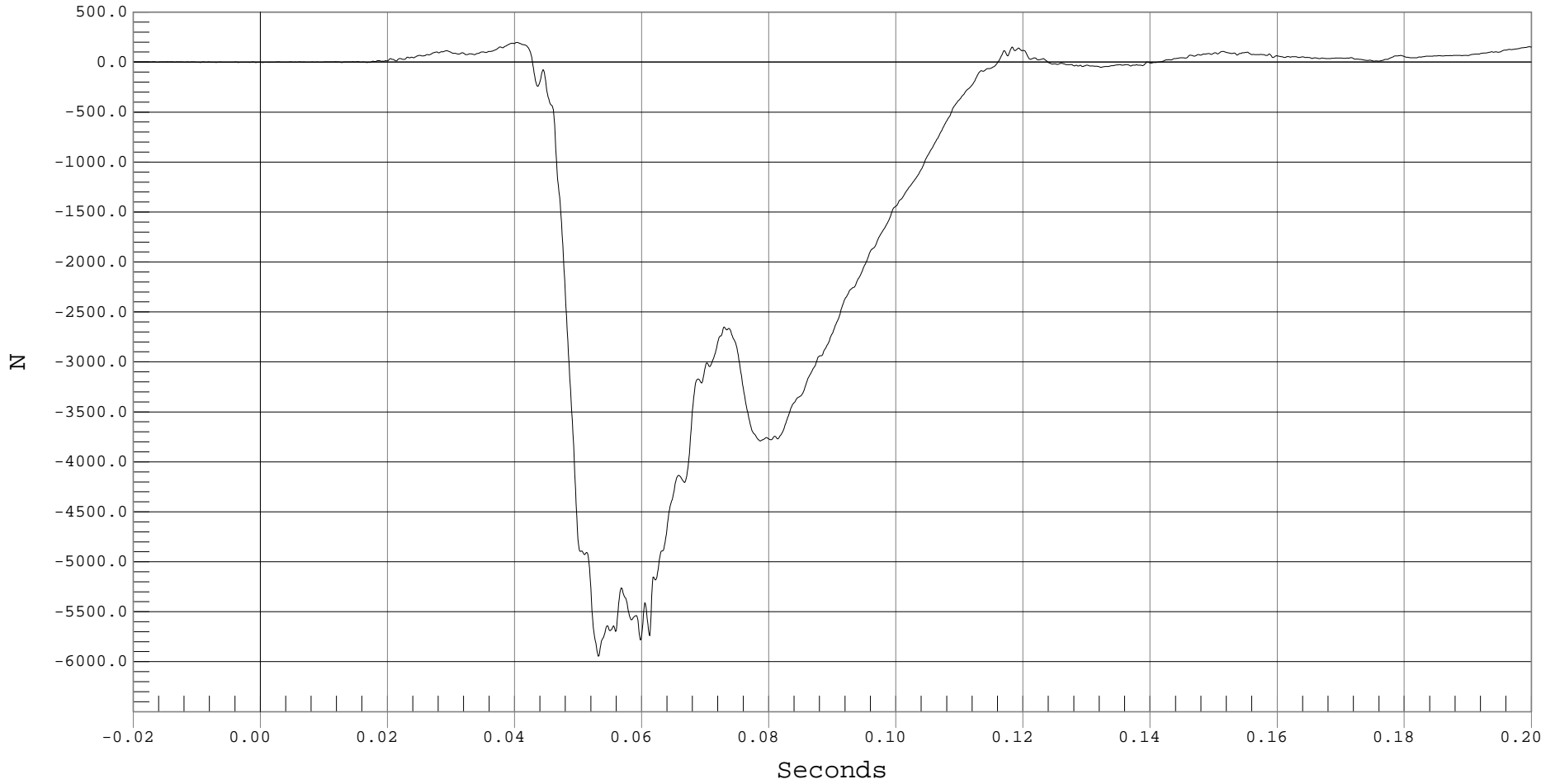
### PASSENGER RIGHT FEMUR FORCE

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER RIGHT FEMUR X, B01012FF.F29

Ymin = -5945.27 N @ 0.0532 Seconds, Ymax = 197.58 N @ 0.0404 Seconds



B-92



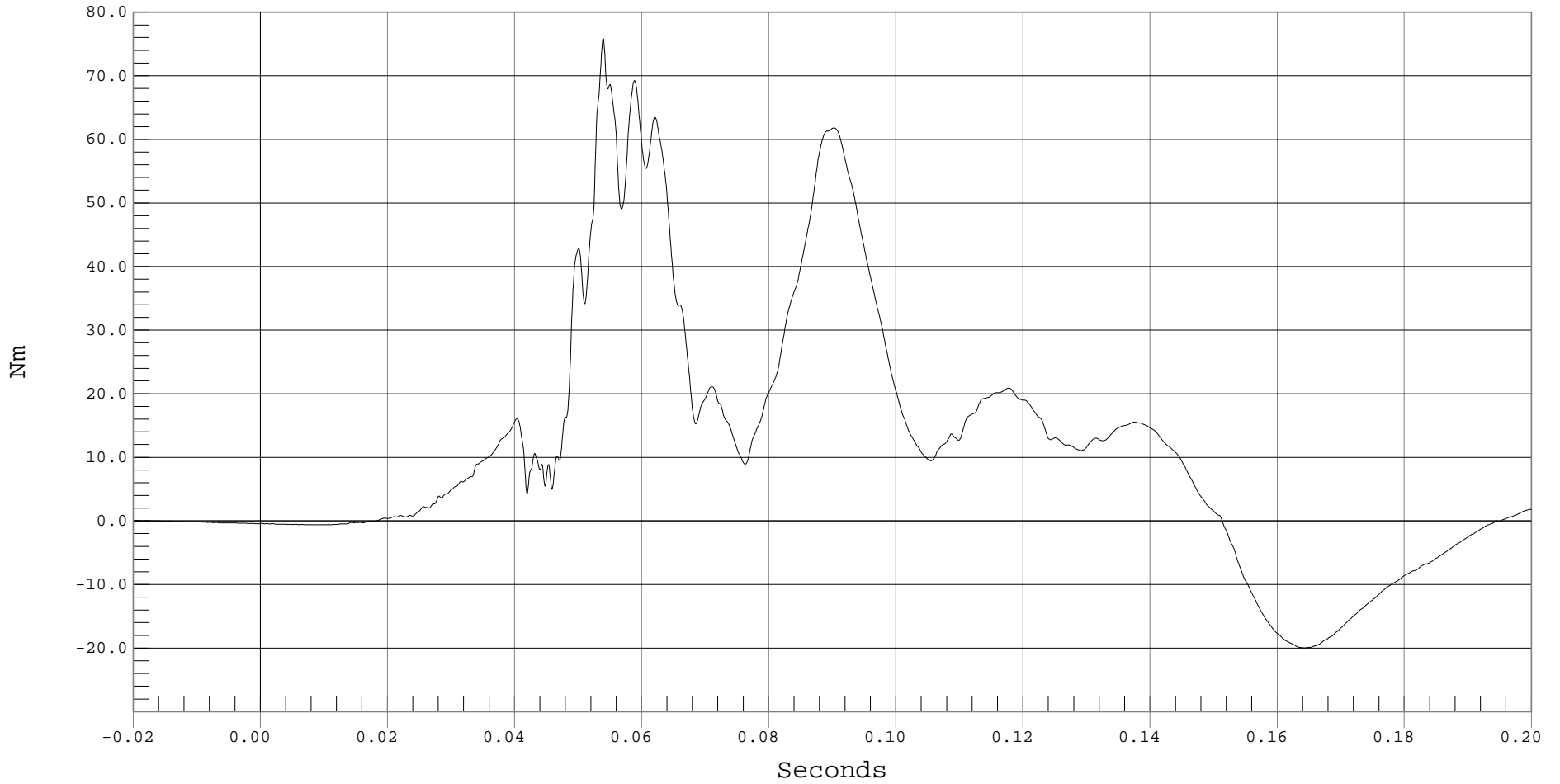
### PASSENGER LEFT UPPER TIBIA MOMENT X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER LEFT UPPER TIBIA MX, B01012MF.M87

Ymin = -19.97 Nm @ 0.1643 Seconds, Ymax = 75.82 Nm @ 0.0540 Seconds





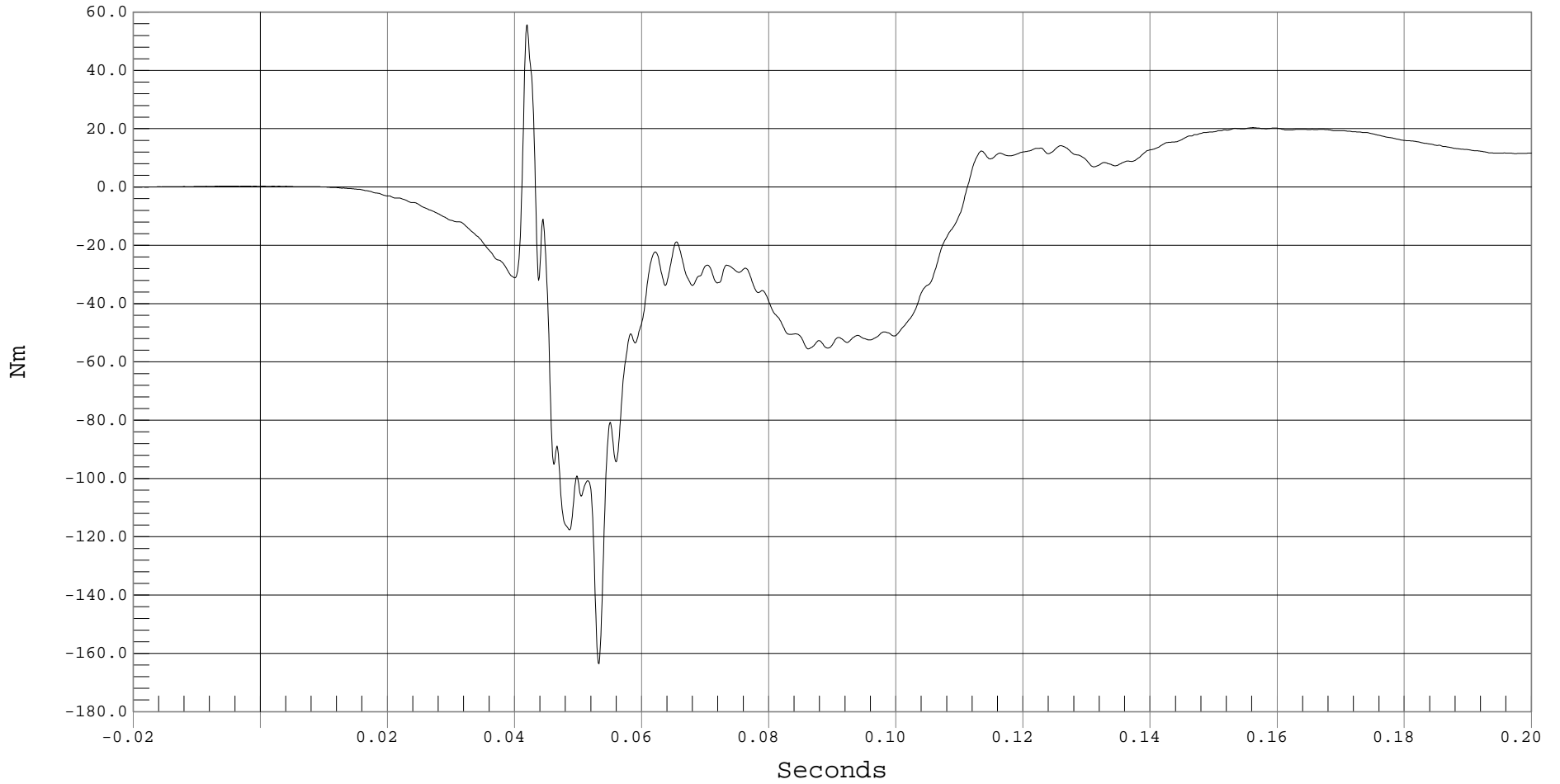
### PASSENGER LEFT UPPER TIBIA MOMENT Y

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER LEFT UPPER TIBIA MY, B01012MF.M88

Ymin = -163.55 Nm @ 0.0533 Seconds, Ymax = 55.68 Nm @ 0.0420 Seconds



B-94



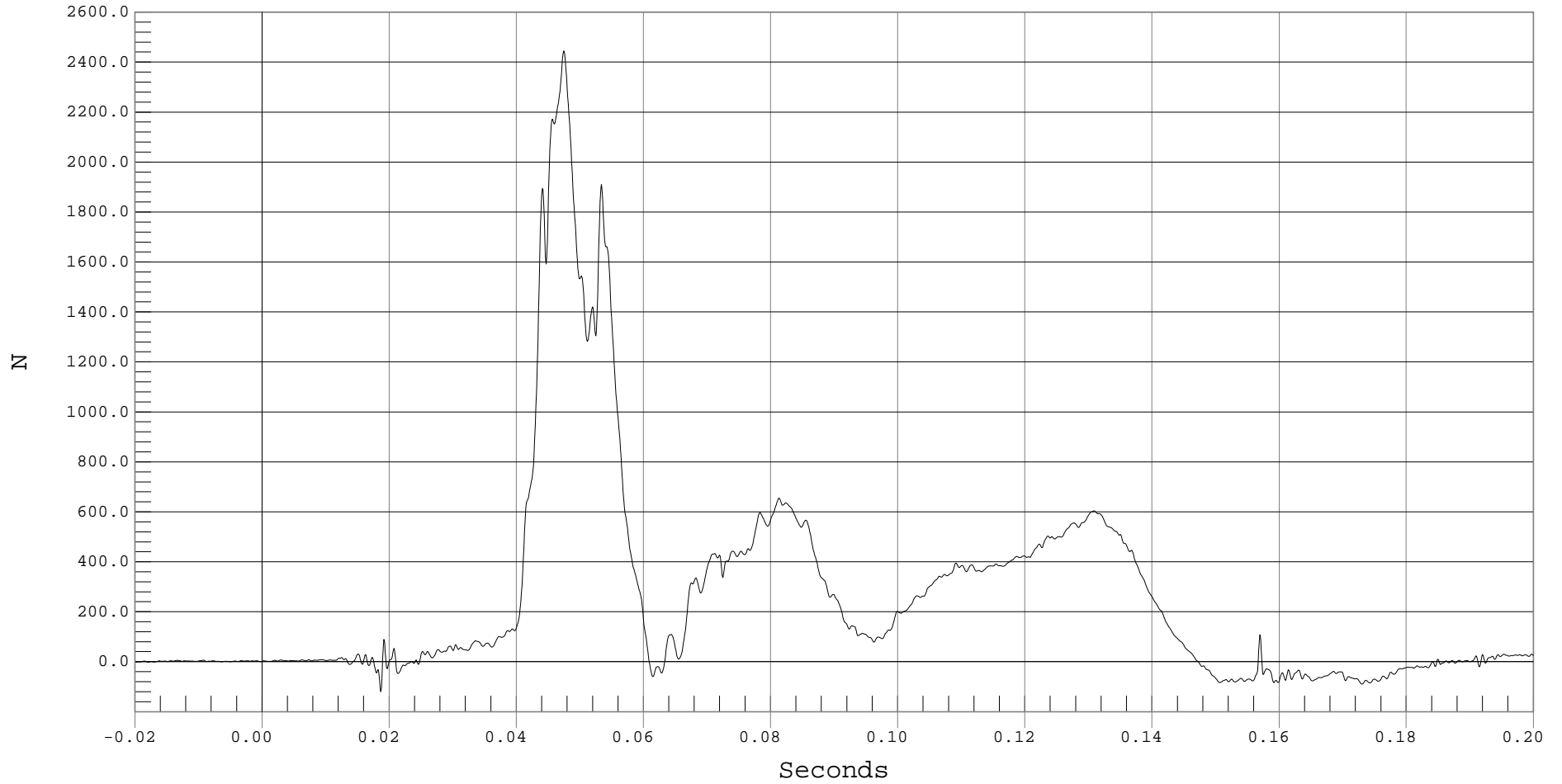
PASSENGER LEFT UPPER TIBIA FORCE Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER LEFT UPPER TIBIA FZ, B01012FF.F89

Ymin = -120.33 N @ 0.0187 Seconds, Ymax = 2444.54 N @ 0.0475 Seconds



B-95



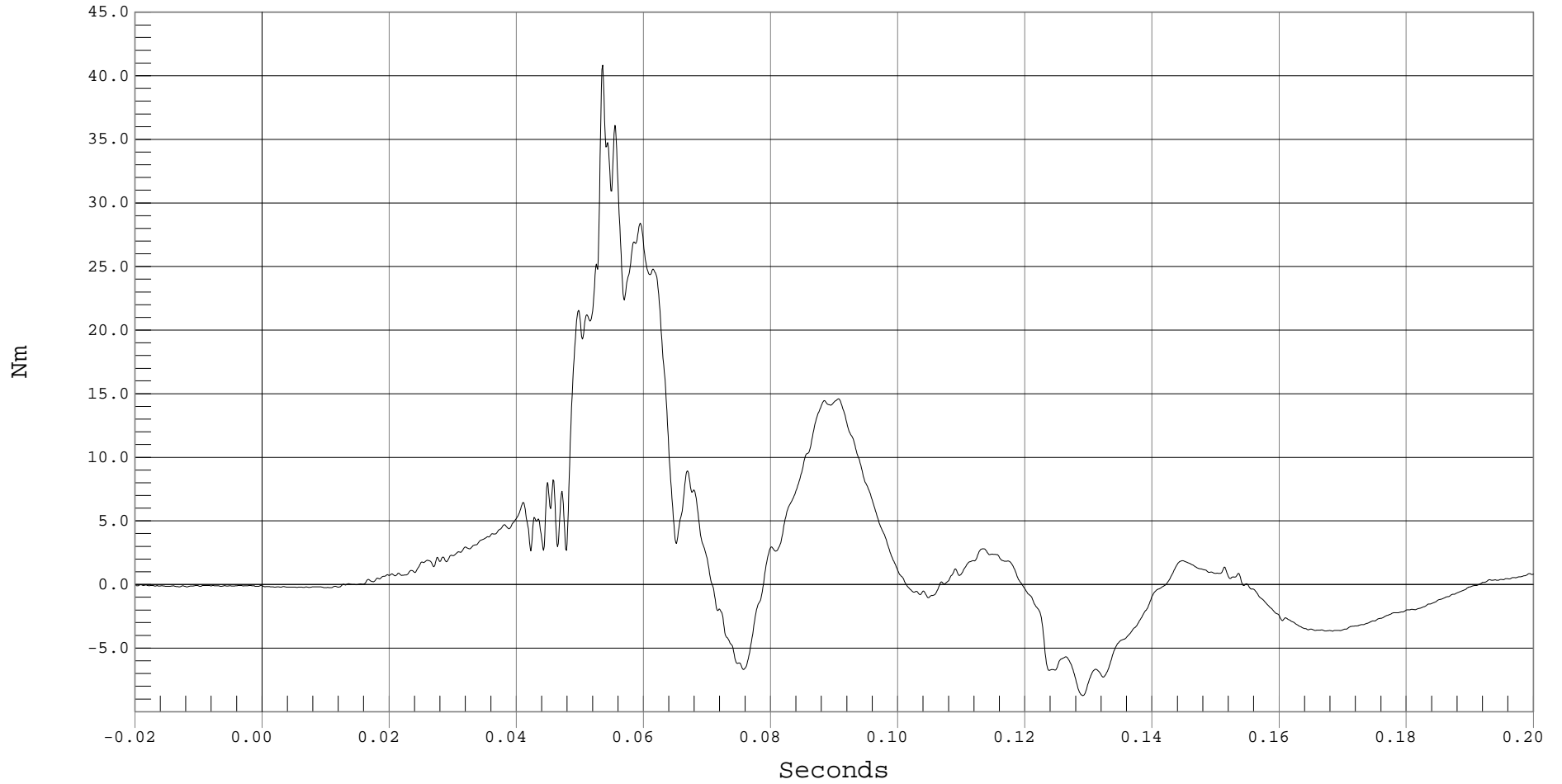
### PASSENGER LEFT LOWER TIBIA MOMENT X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER LEFT LOWER TIBIA MX, B01012MF.M90

Ymin = -8.73 Nm @ 0.1291 Seconds, Ymax = 40.82 Nm @ 0.0536 Seconds





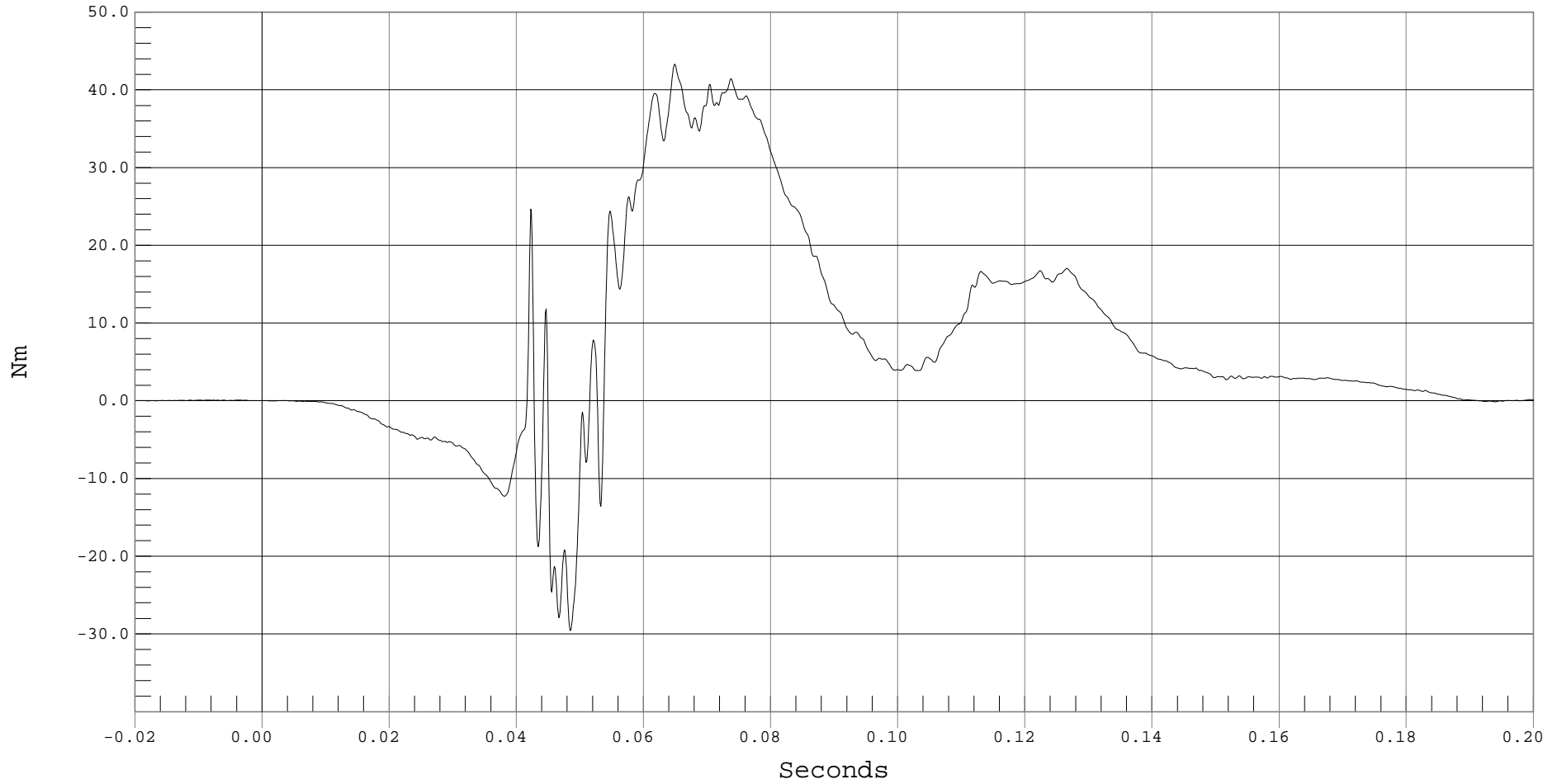
### PASSENGER LEFT LOWER TIBIA MOMENT Y

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER LEFT LOWER TIBIA MY, B01012MF.M91

Ymin = -29.59 Nm @ 0.0485 Seconds, Ymax = 43.3 Nm @ 0.0649 Seconds



B-97



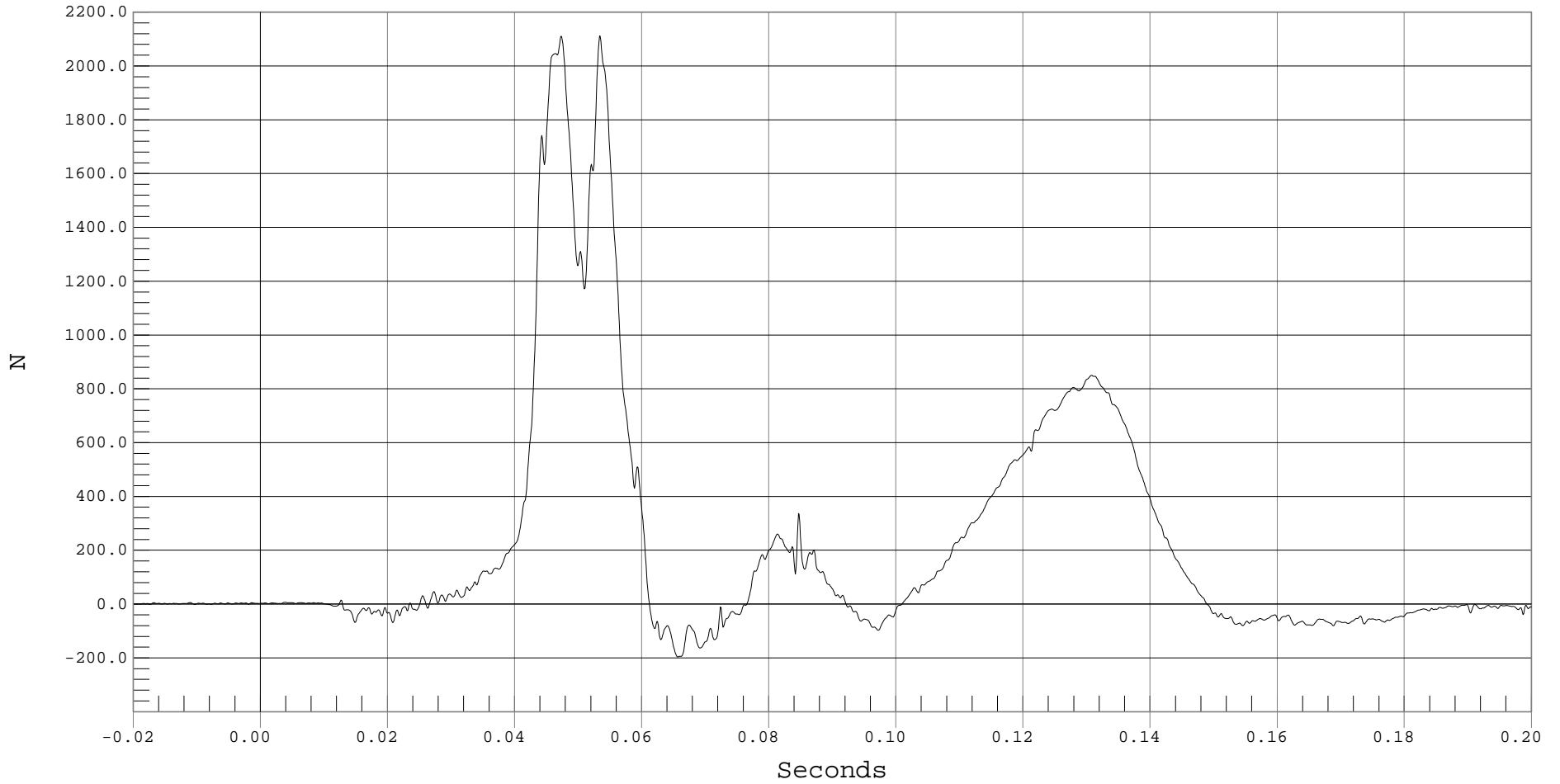
### PASSENGER LEFT LOWER TIBIA FORCE Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER LEFT LOWER TIBIA FZ, B01012FF.F92

Ymin = -196.52 N @ 0.0657 Seconds, Ymax = 2111.58 N @ 0.0534 Seconds



B-98



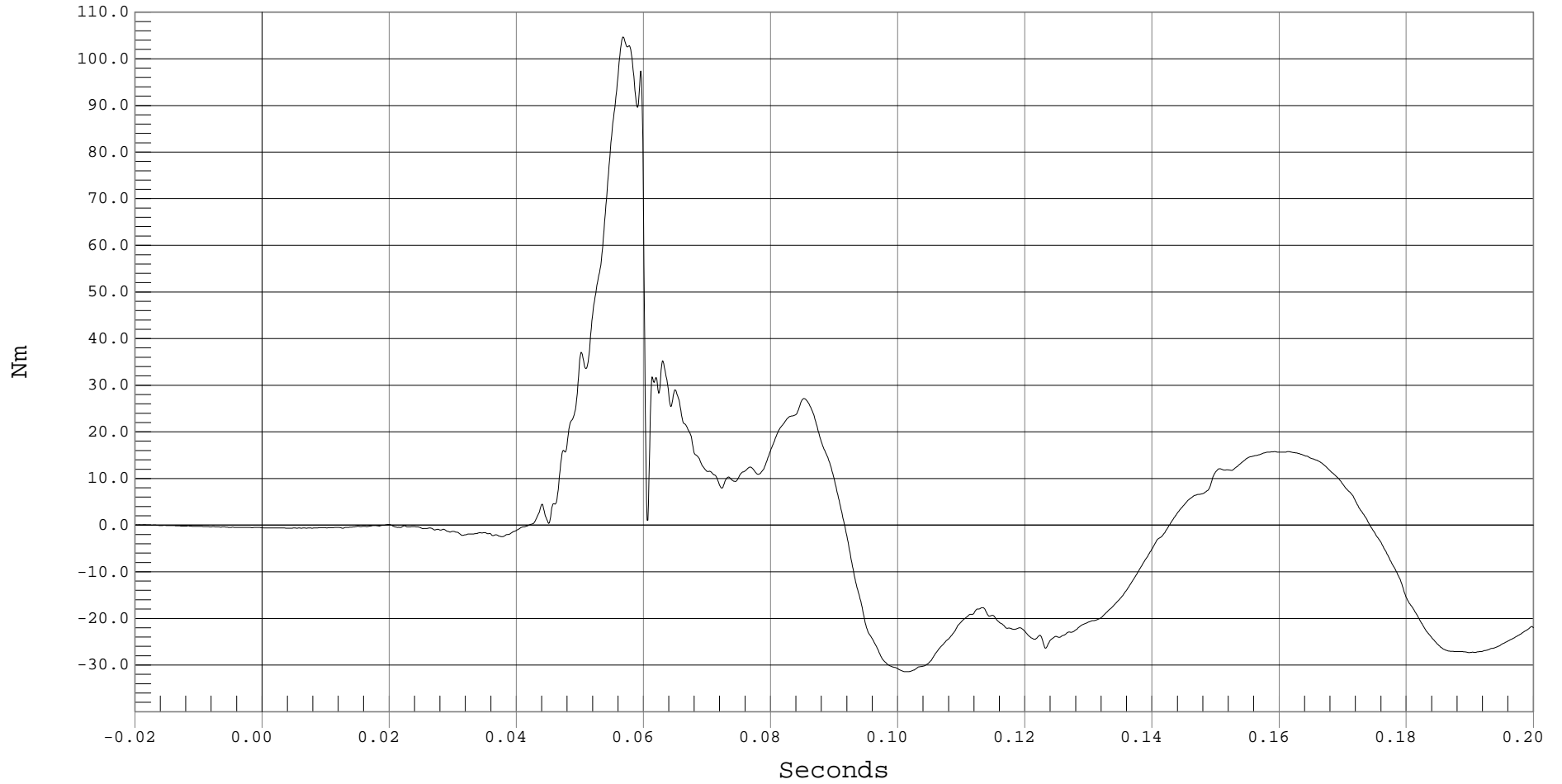
### PASSENGER RIGHT UPPER TIBIA MOMENT X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER RIGHT UPPER TIBIA MX, B01012MF.M81

Ymin = -31.44 Nm @ 0.1013 Seconds, Ymax = 104.67 Nm @ 0.0568 Seconds





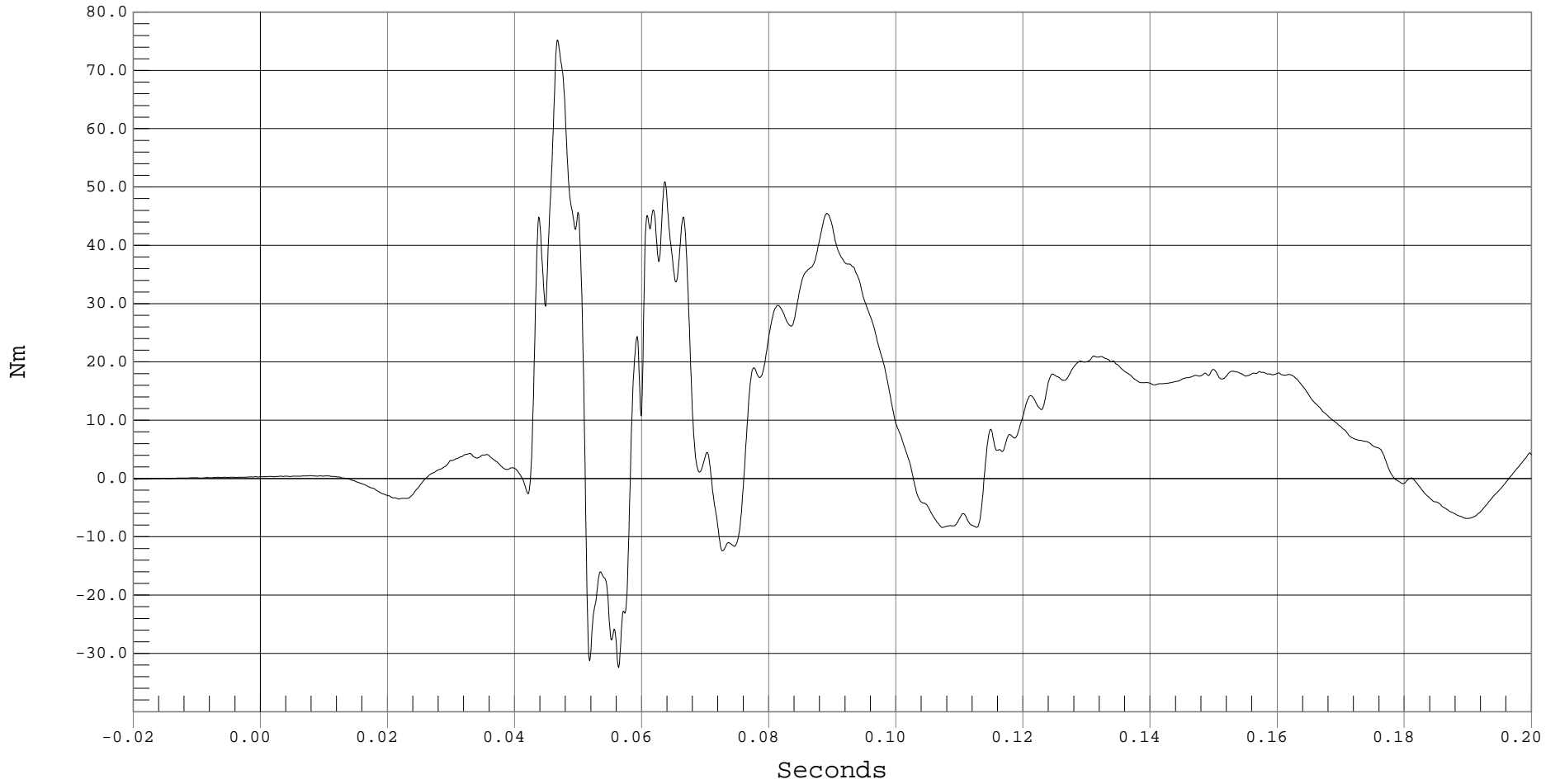
### PASSENGER RIGHT UPPER TIBIA MOMENT Y

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER RIGHT UPPER TIBIA MY, B01012MF.M82

Ymin = -32.46 Nm @ 0.0564 Seconds, Ymax = 75.26 Nm @ 0.0468 Seconds



B-100



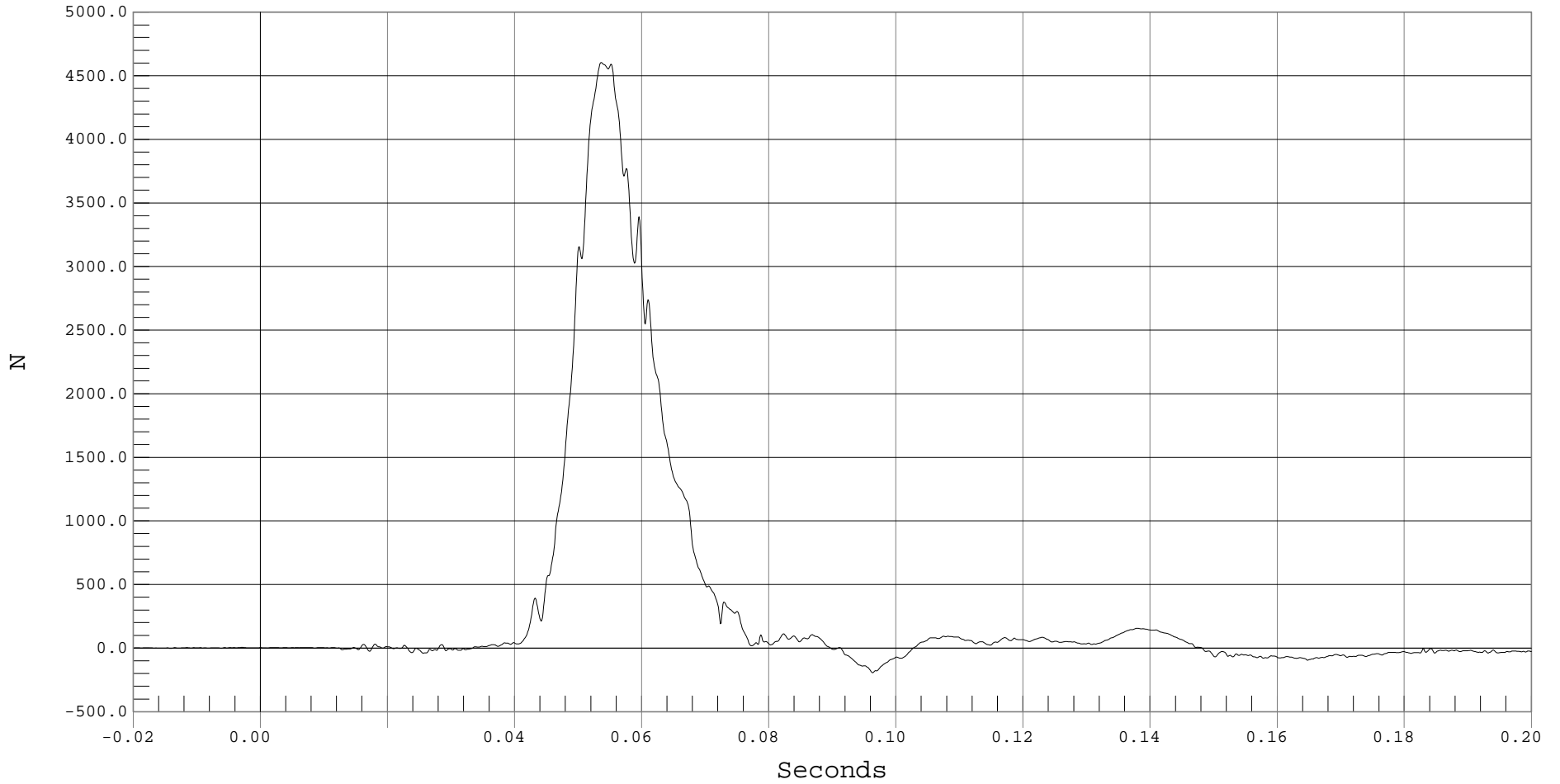
PASSENGER RIGHT UPPER TIBIA FORCE Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER RIGHT UPPER TIBIA FZ, B01012FF.F83

Ymin = -192.73 N @ 0.0963 Seconds, Ymax = 4604.1 N @ 0.0536 Seconds



B-101



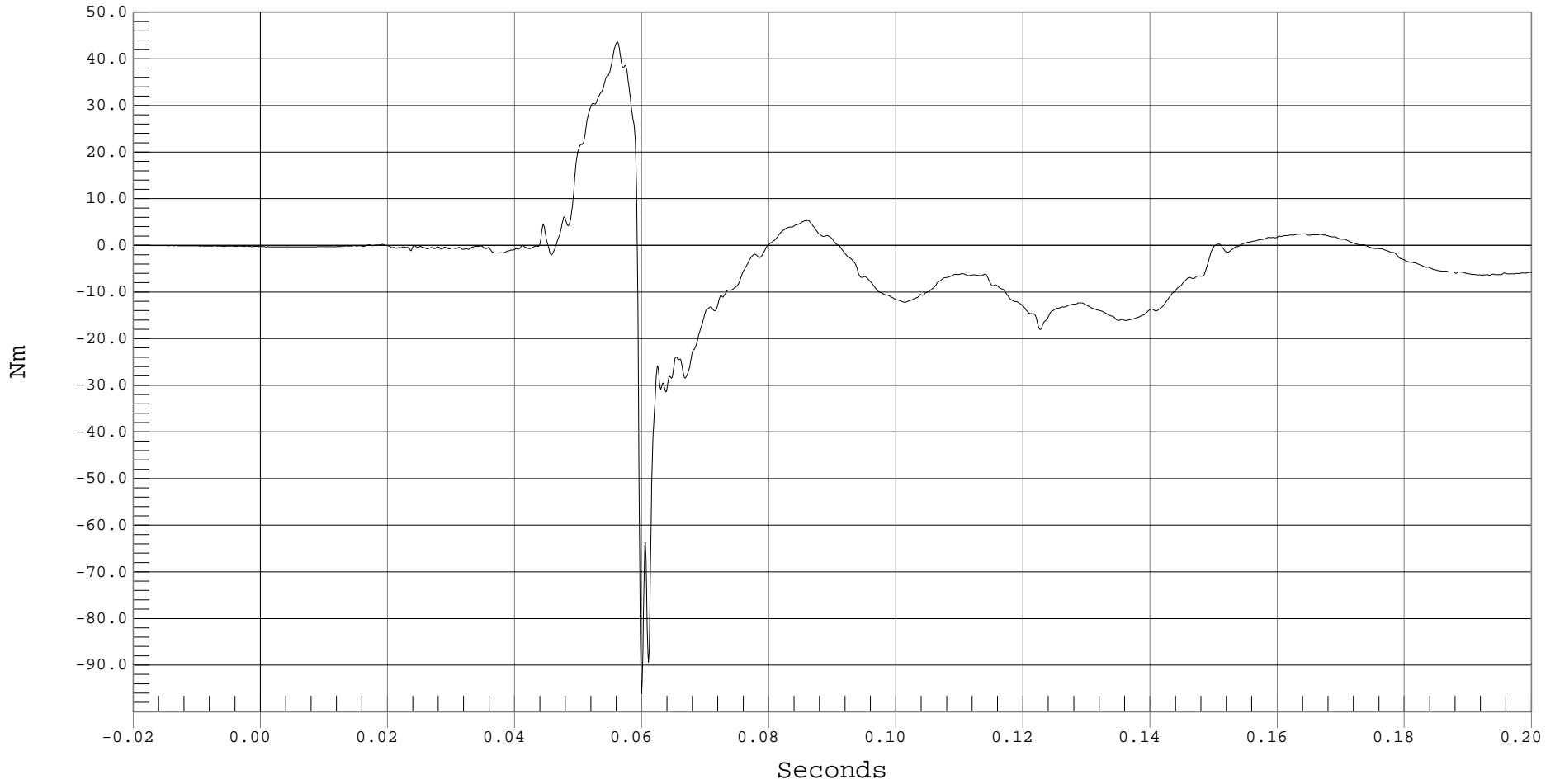
### PASSENGER RIGHT LOWER TIBIA MOMENT X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER RIGHT LOWER TIBIA MX, B01012MF.M84

Ymin = -96.12 Nm @ 0.0600 Seconds, Ymax = 43.67 Nm @ 0.0562 Seconds





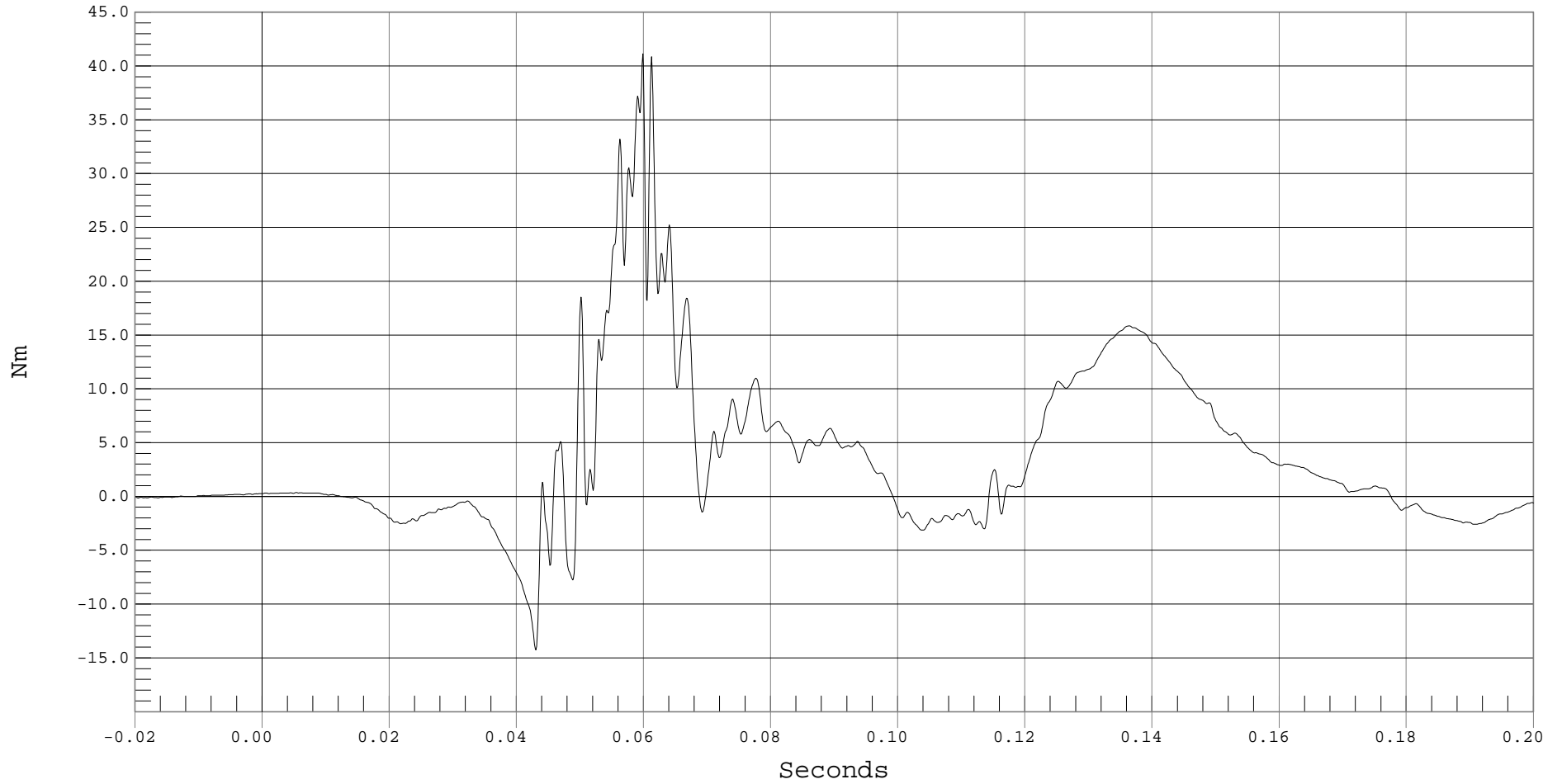
### PASSENGER RIGHT LOWER TIBIA MOMENT Y

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER RIGHT LOWER TIBIA MY, B01012MF.M85

Ymin = -14.27 Nm @ 0.0431 Seconds, Ymax = 41.14 Nm @ 0.0599 Seconds





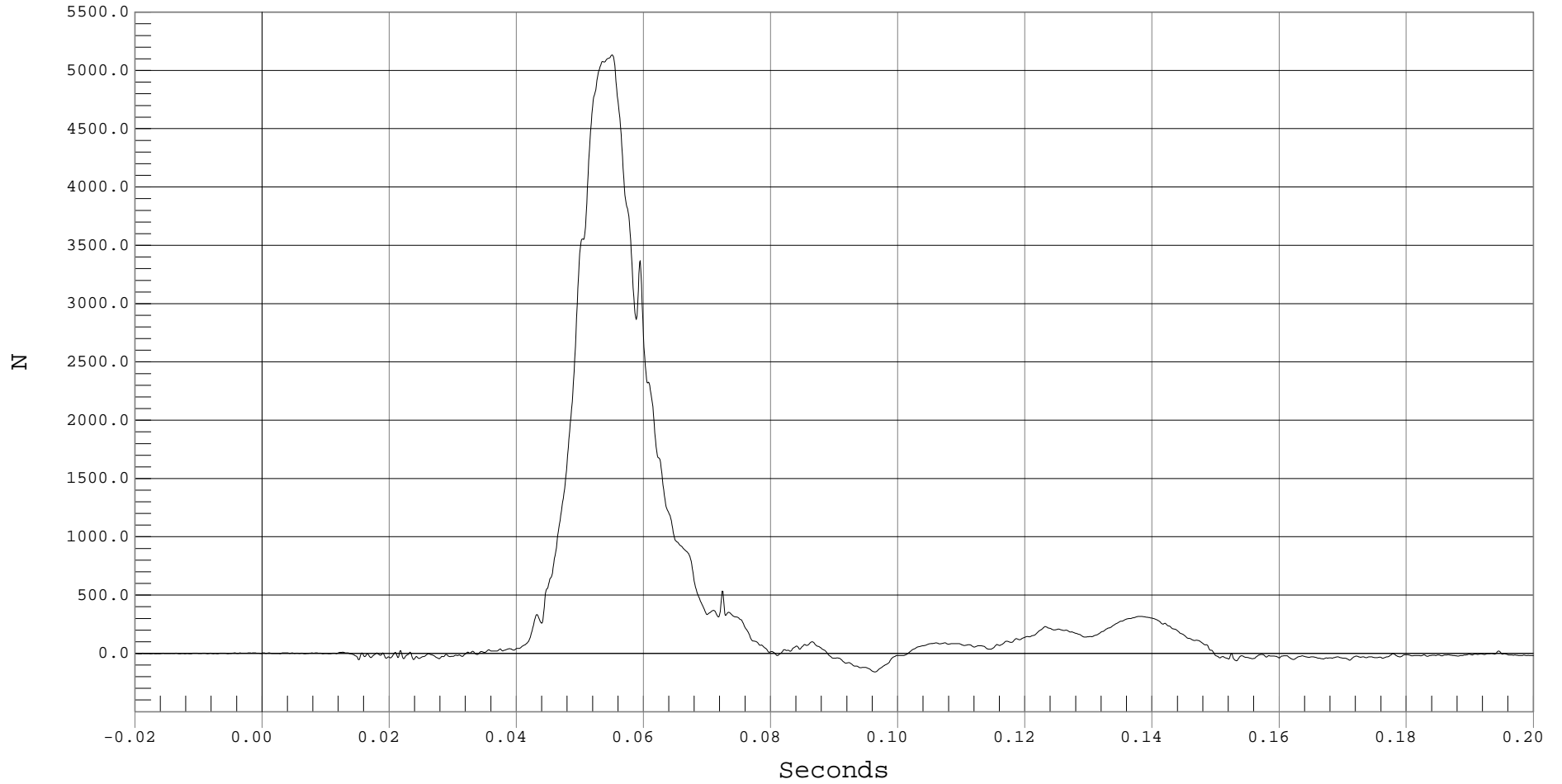
PASSENGER RIGHT LOWER TIBIA FORCE Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 PASSENGER RIGHT LOWER TIBIA FZ, B01012FF.F86

Ymin = -159.22 N @ 0.0964 Seconds, Ymax = 5134.12 N @ 0.0551 Seconds



B-104



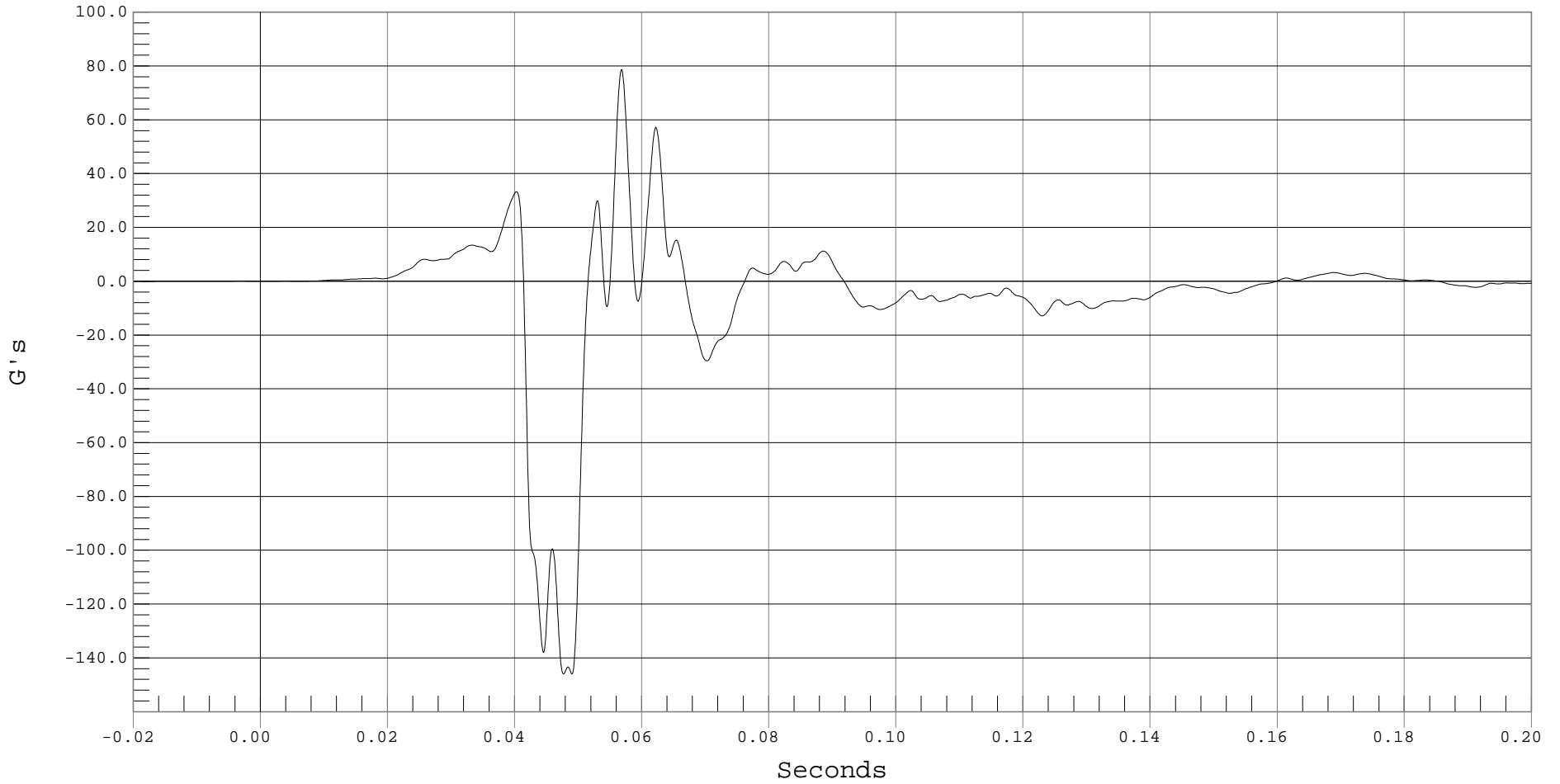
PASSENGER LEFT FOOT @ BALL Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER LEFT FOOT @ BALL Z, C01012AF.A09

Ymin = -146.03 G's @ 0.0477 Seconds, Ymax = 78.59 G's @ 0.0568 Seconds



B-105



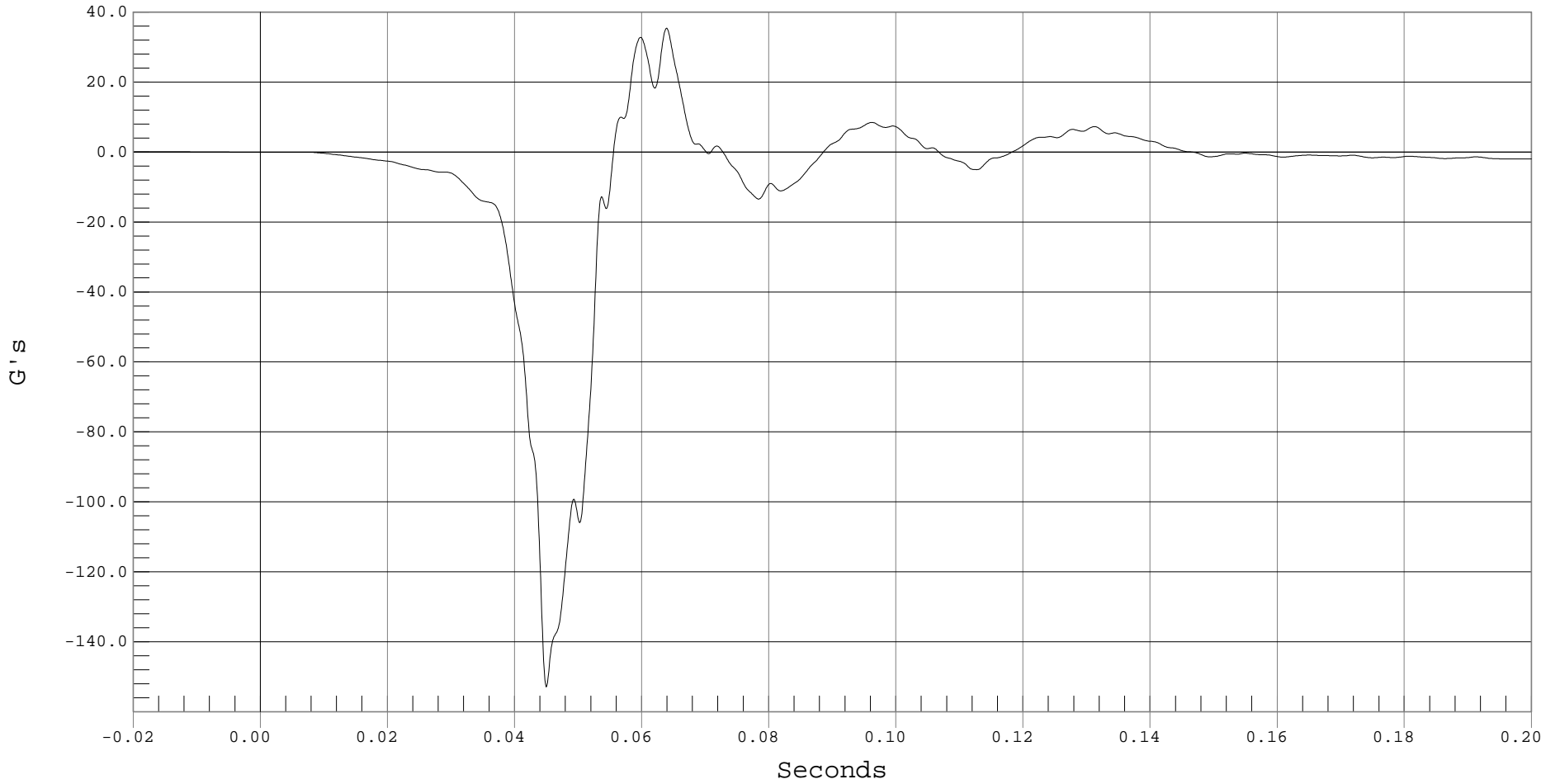
### PASSENGER LEFT FOOT @ HEEL X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER LEFT FOOT @ HEEL X, C01012AF.A07

Ymin = -152.92 G's @ 0.0450 Seconds, Ymax = 35.39 G's @ 0.0639 Seconds





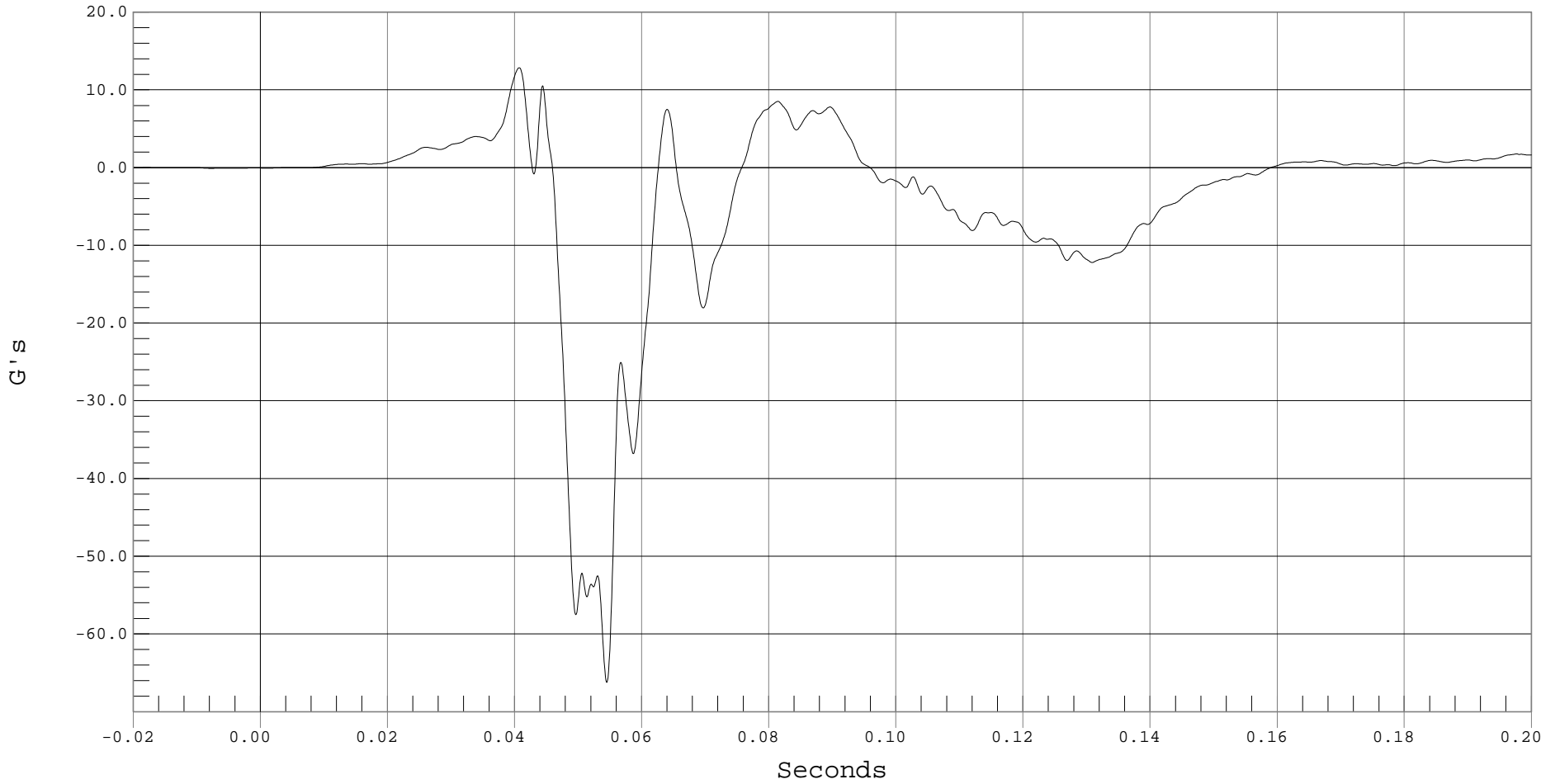
PASSENGER LEFT FOOT @ HEEL Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER LEFT FOOT @ HEEL Z, C01012AF.A08

Ymin = -66.23 G's @ 0.0545 Seconds, Ymax = 12.85 G's @ 0.0407 Seconds



B-107



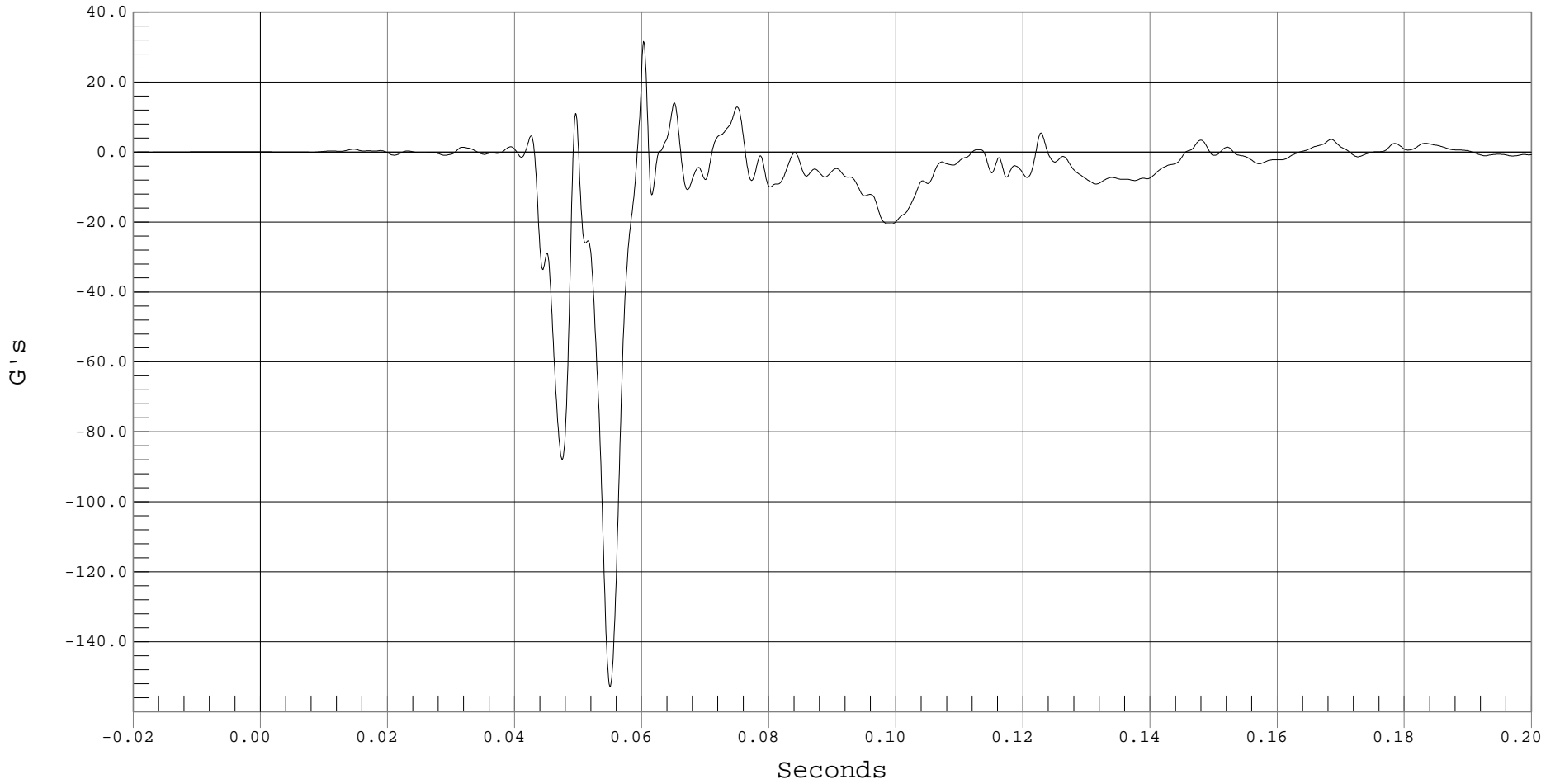
### PASSENGER RIGHT FOOT @ BALL Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER RIGHT FOOT @ BALL Z, C01012AF.A06

Ymin = -152.82 G's @ 0.0550 Seconds, Ymax = 31.64 G's @ 0.0603 Seconds



B-108



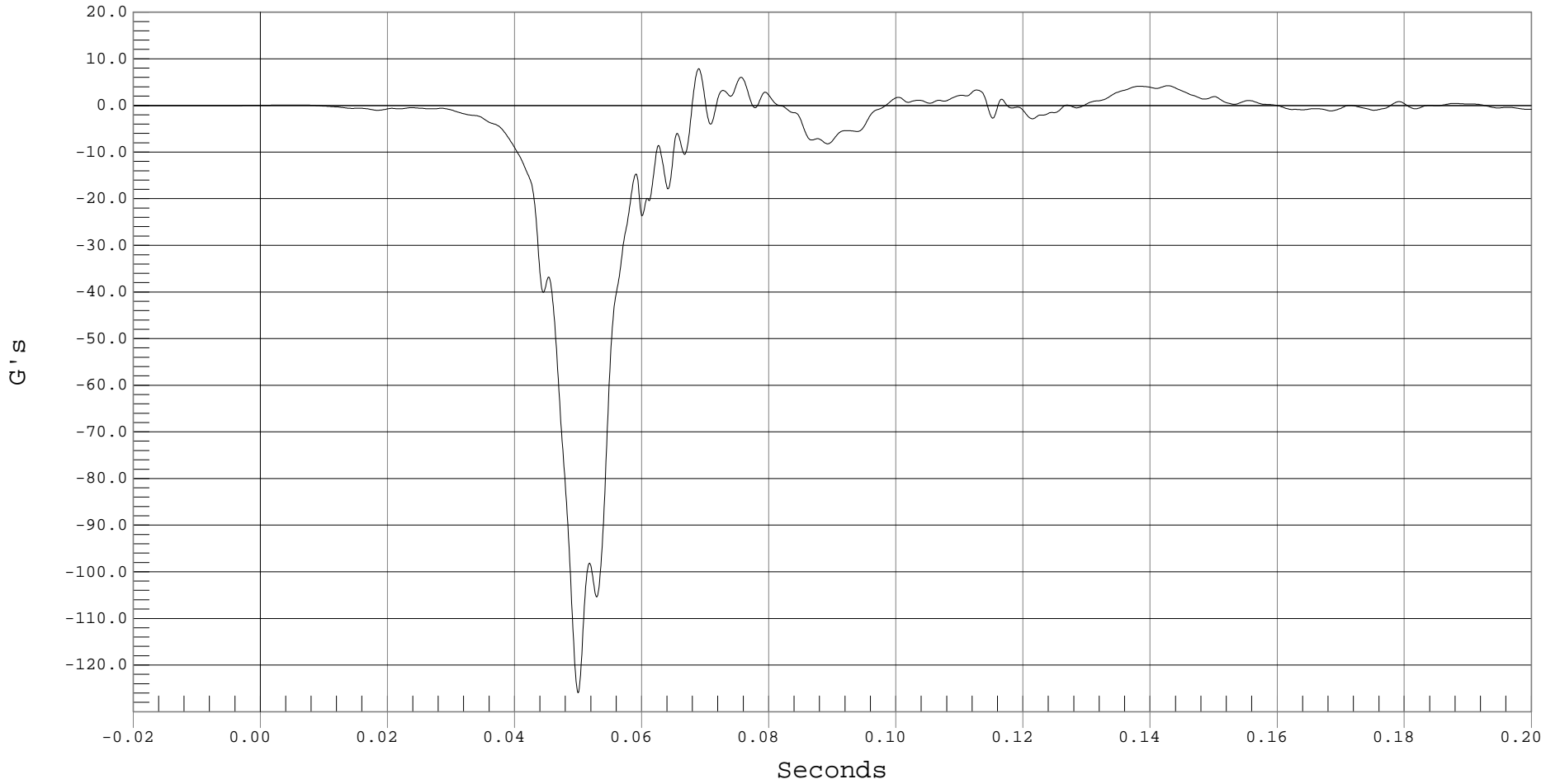
### PASSENGER RIGHT FOOT @ HEEL X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER RIGHT FOOT @ HEEL X, C01012AF.A04

Ymin = -125.95 G's @ 0.0500 Seconds, Ymax = 7.88 G's @ 0.0690 Seconds



B-109



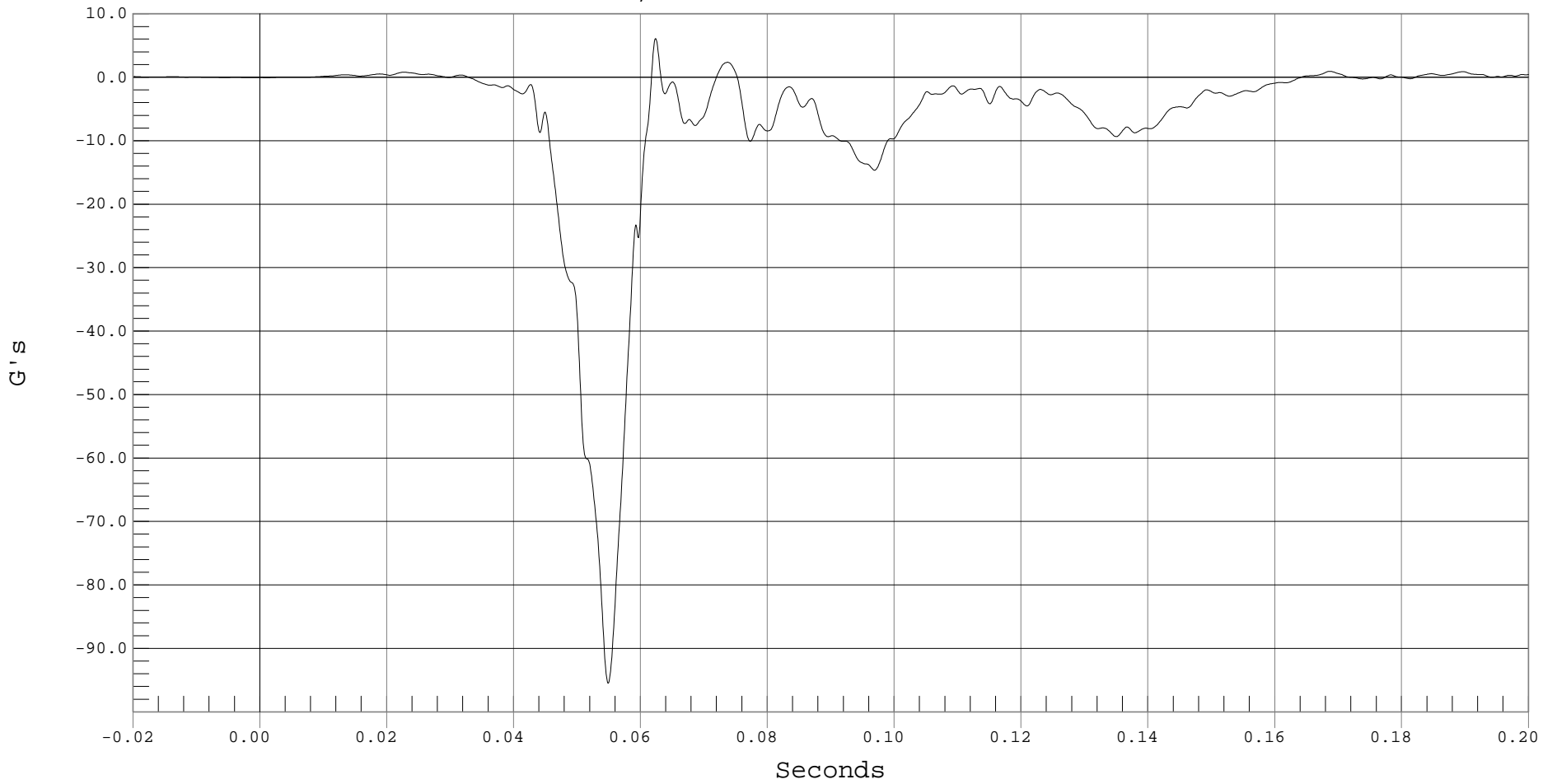
### PASSENGER RIGHT FOOT @ HEEL Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 PASSENGER RIGHT FOOT @ HEEL Z, C01012AF.A05

Ymin = -95.5 G's @ 0.0549 Seconds, Ymax = 6.12 G's @ 0.0624 Seconds



B-110



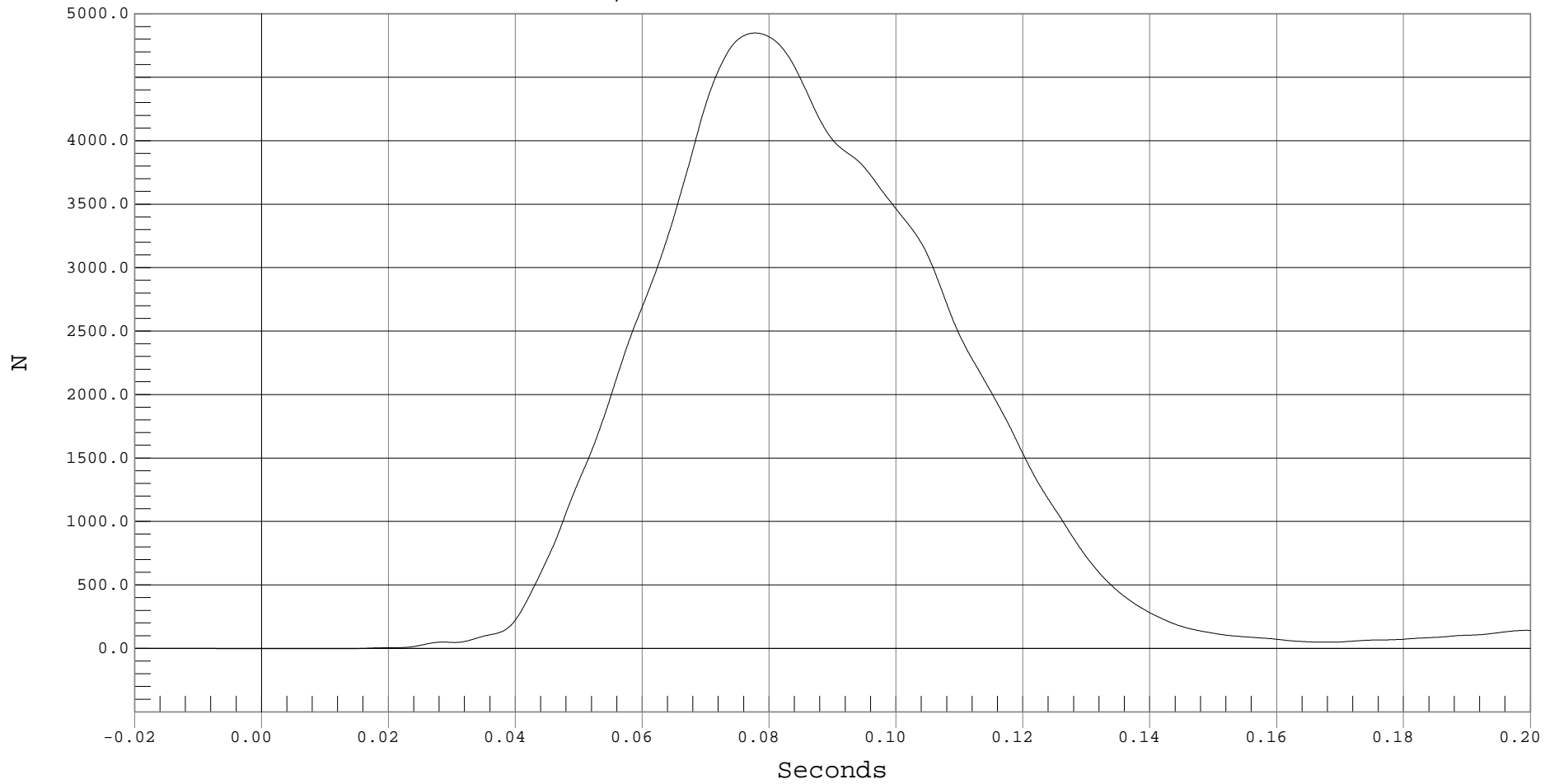
### PASSENGER SHOULDER BELT FORCE

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 PASSENGER SHOULDER BELT, B01012FF.F67

Ymin = -3.05 N @ 0.0123 Seconds, Ymax = 4848.62 N @ 0.0778 Seconds



B-111



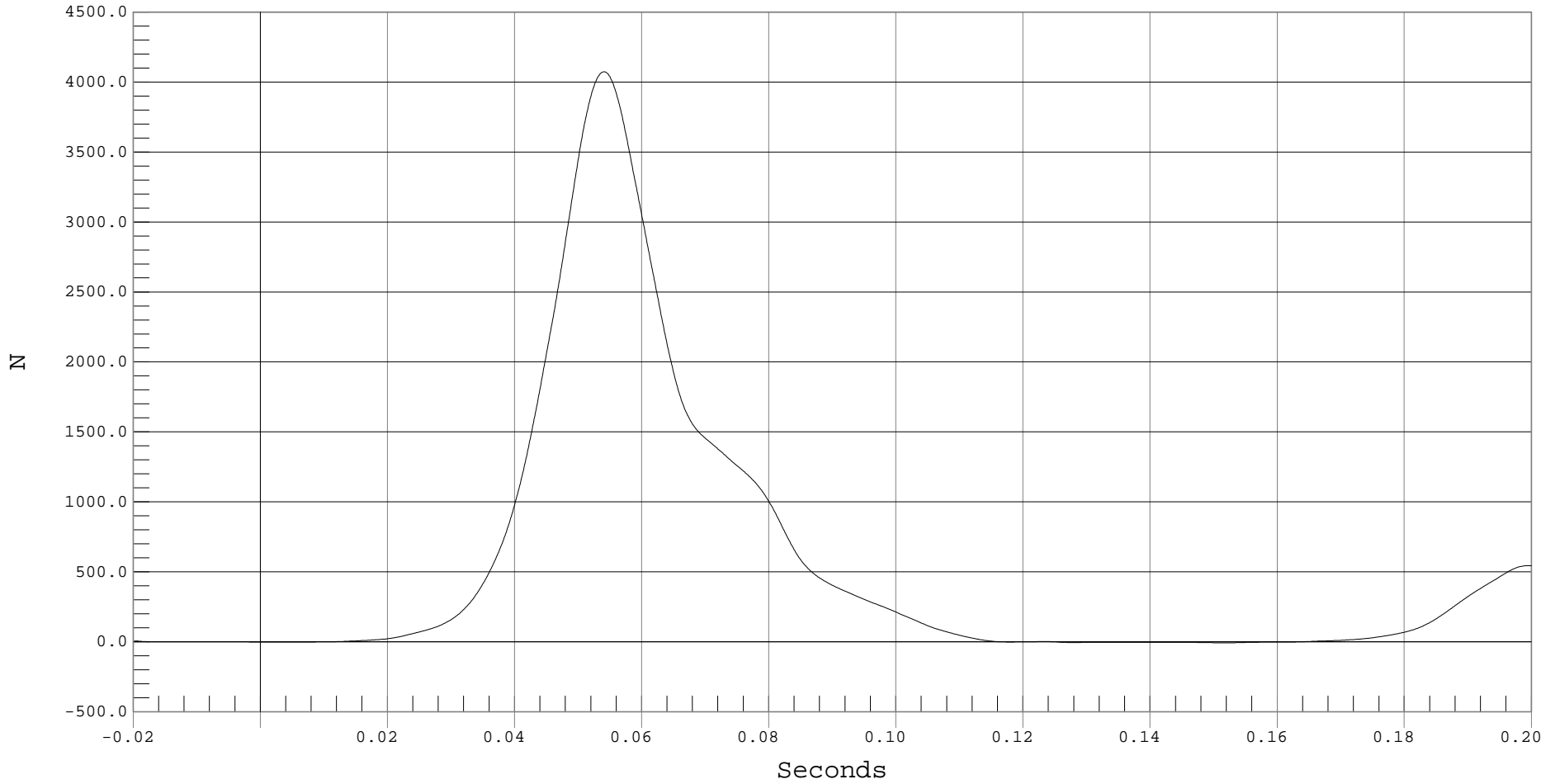
### PASSENGER LAP BELT FORCE

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 PASSENGER LAP BELT, B01012FF.F68

Ymin = -7.77 N @ 0.1517 Seconds, Ymax = 4073.86 N @ 0.0541 Seconds



B-112



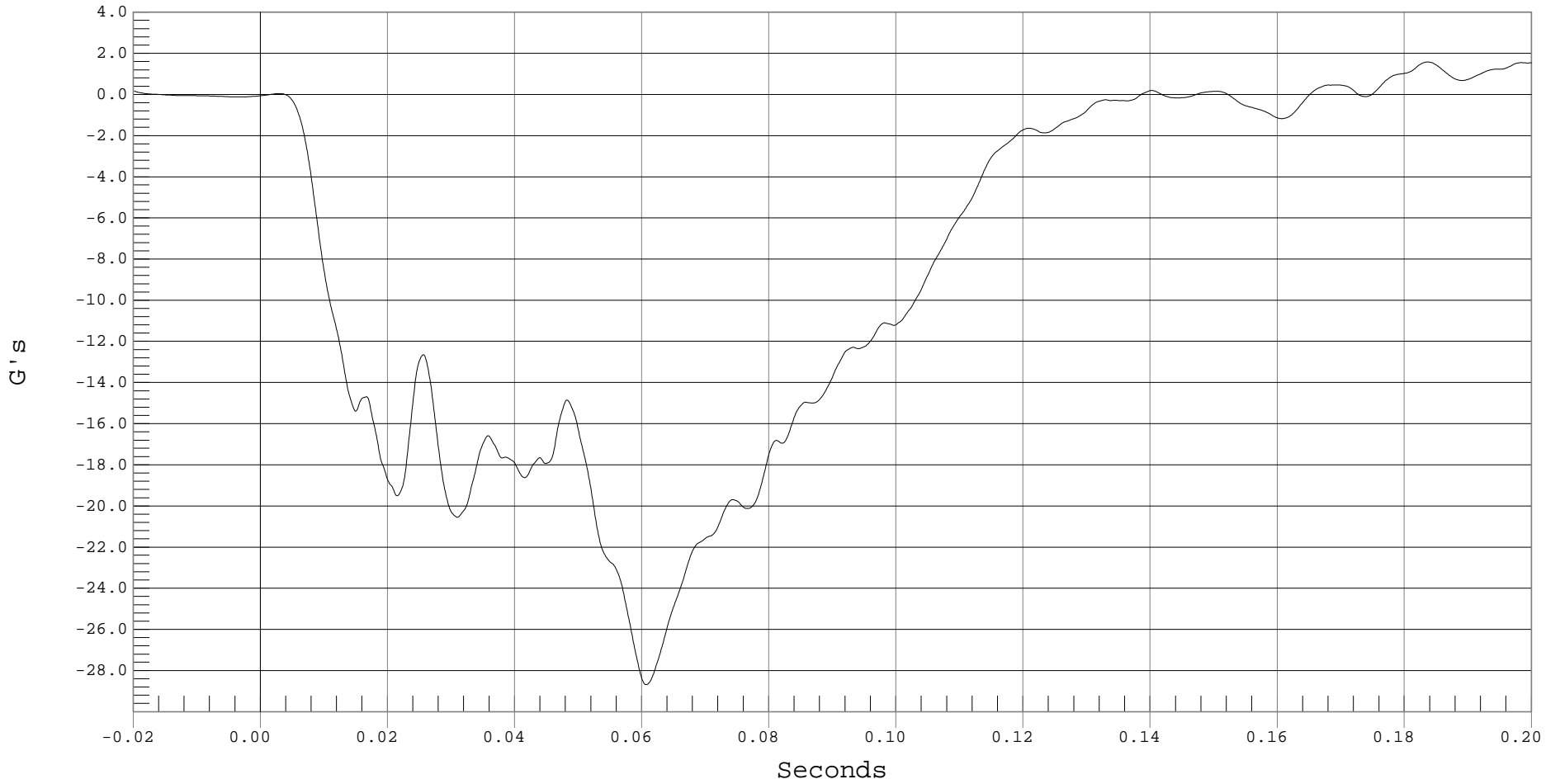
### LEFT REAR SEAT CROSSMEMBER X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 LEFT REAR SEAT CROSSMEMBER X, B01012AF.A59

Ymin = -28.69 G's @ 0.0607 Seconds, Ymax = 1.58 G's @ 0.1837 Seconds



B-113



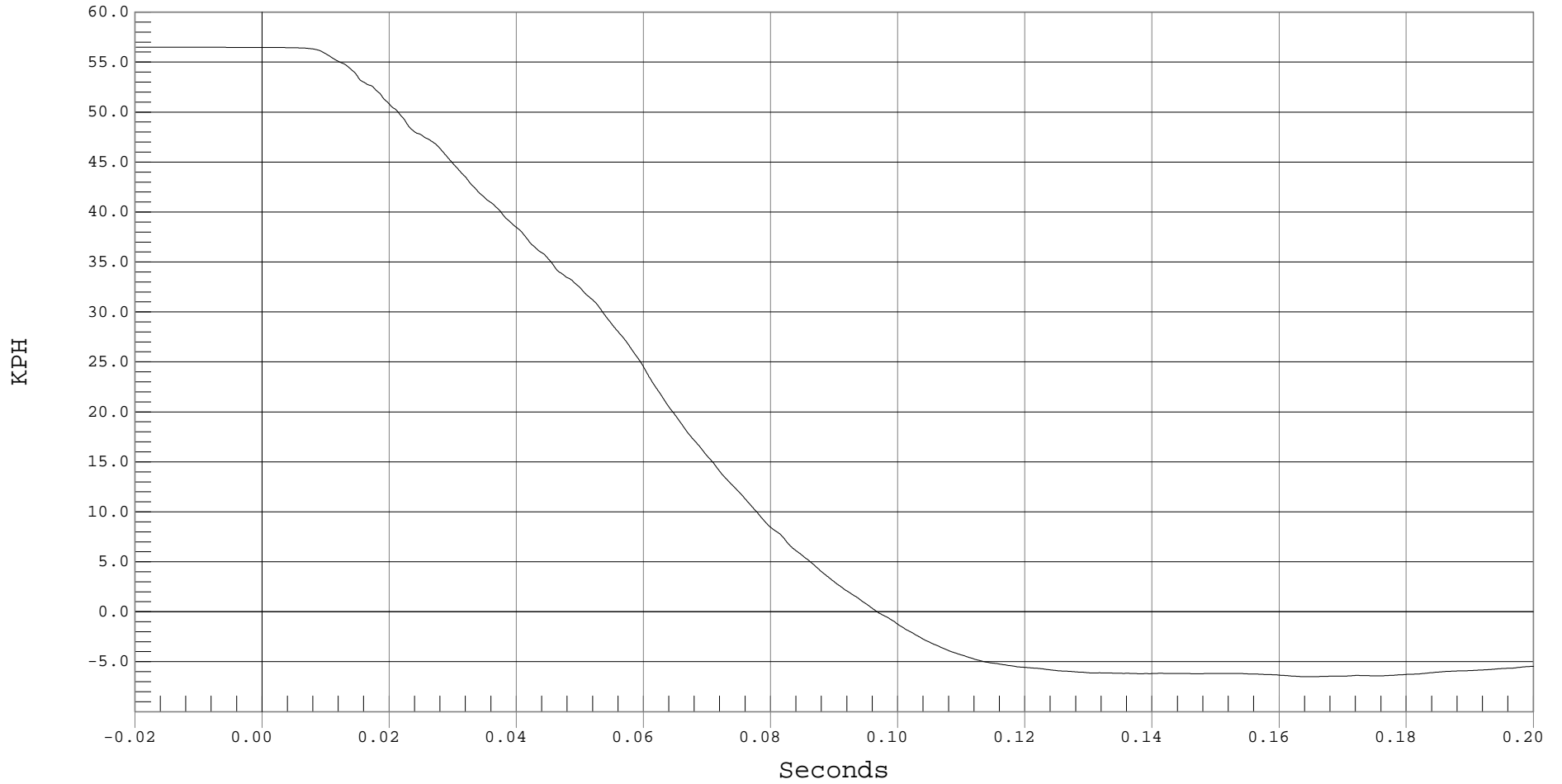
### LEFT REAR SEAT CROSSMEMBER X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 LEFT REAR SEAT CROSSMEMBER X VELOCITY, B01012AI.V59

Ymin = -6.5 KPH @ 0.1648 Seconds, Ymax = 56.5 KPH @ -0.0154 Seconds



B-114



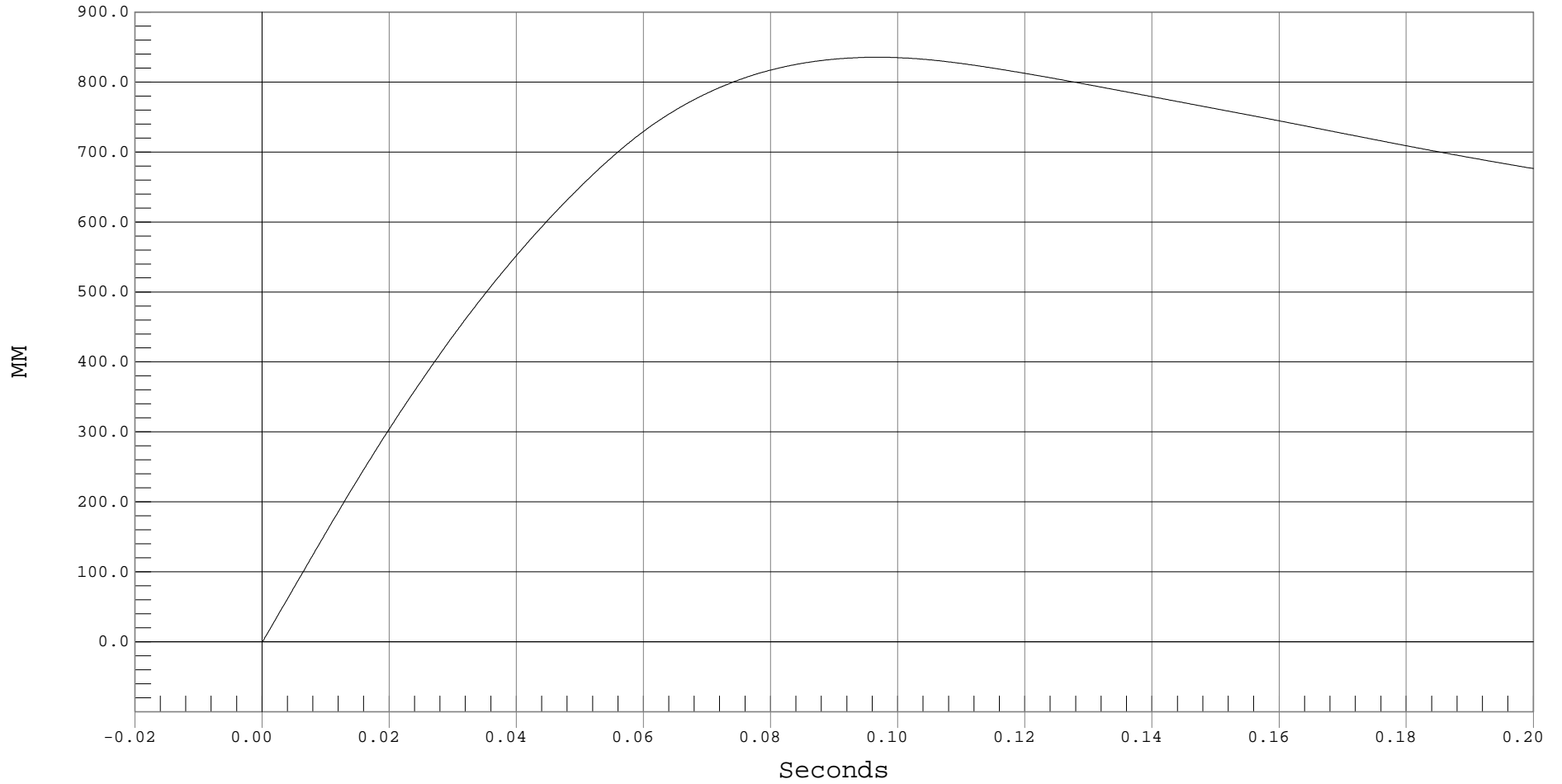
### LEFT REAR SEAT CROSSMEMBER X DISPLACEMENT

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 LEFT REAR SEAT CROSSMEMBER X DISPLACEMENT, B01012AI.D59

Ymin = 0 MM @ 0.0001 Seconds, Ymax = 835.51 MM @ 0.0967 Seconds



B-115



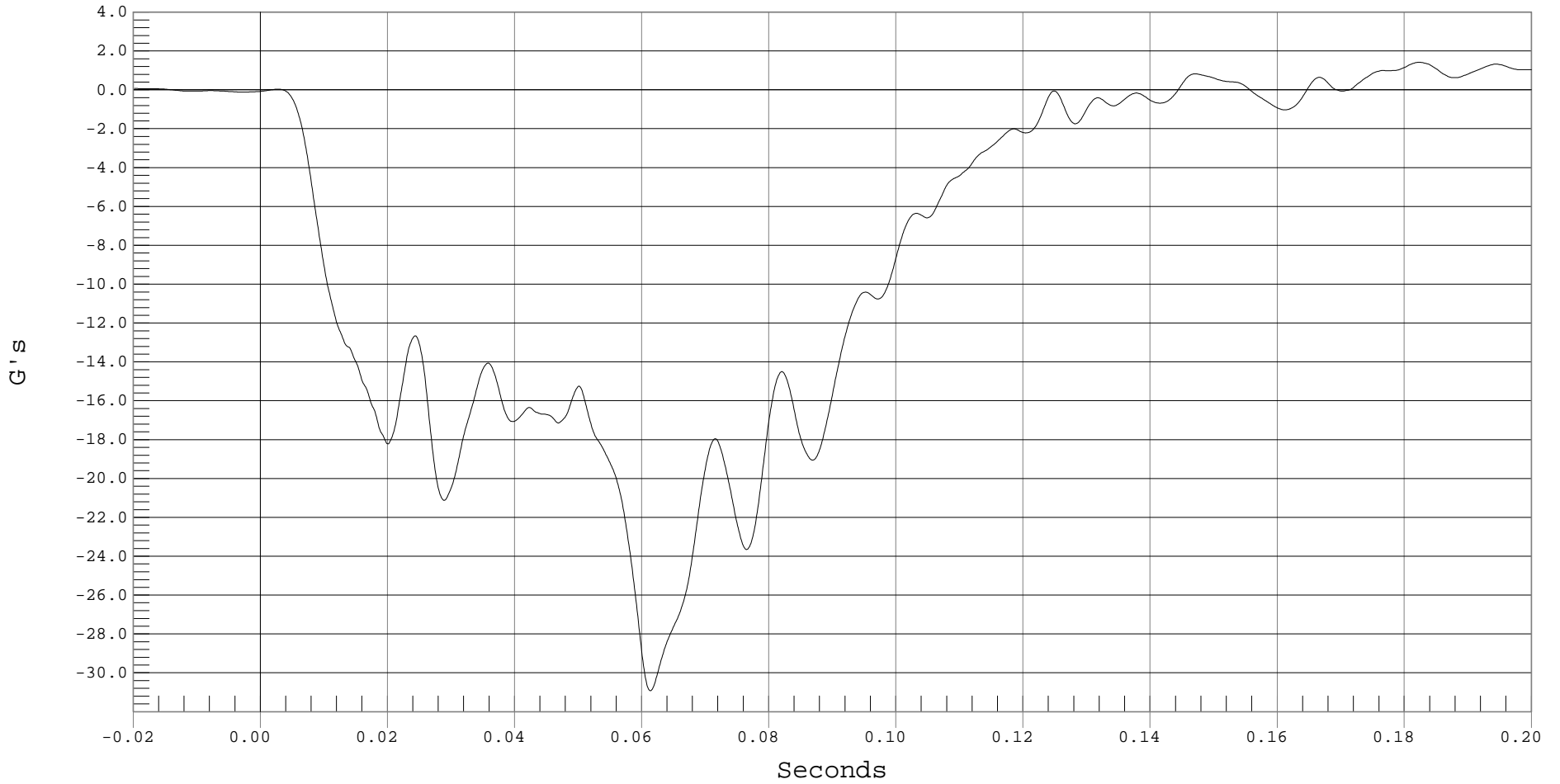
### RIGHT REAR SEAT CROSSMEMBER X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 RIGHT REAR SEAT CROSSMEMBER X, B01012AF.A58

Ymin = -30.92 G's @ 0.0614 Seconds, Ymax = 1.43 G's @ 0.1824 Seconds



B-116



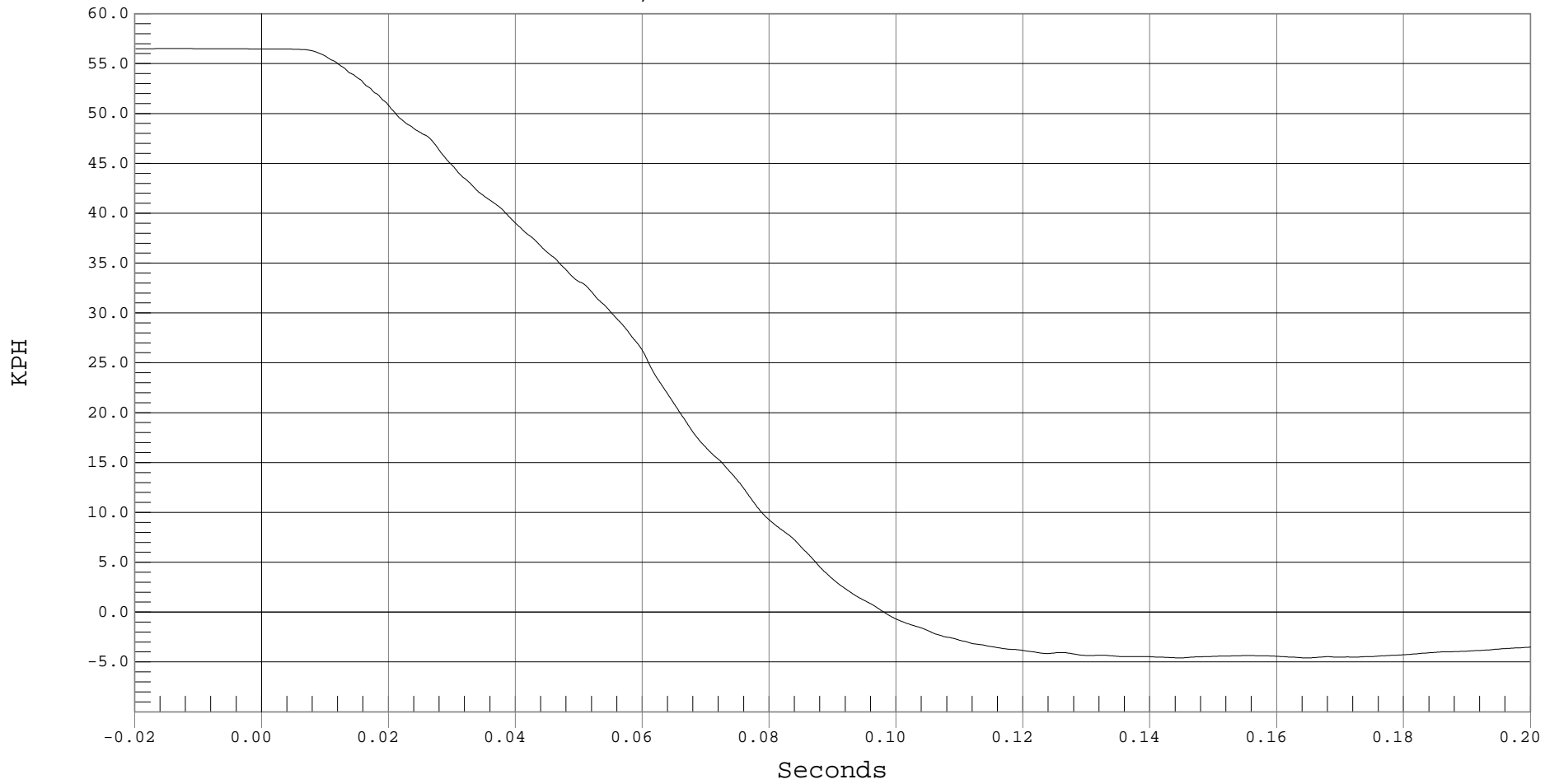
### RIGHT REAR SEAT CROSSMEMBER X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 RIGHT REAR SEAT CROSSMEMBER X VELOCITY, B01012AI.V58

Ymin = -4.59 KPH @ 0.1647 Seconds, Ymax = 56.51 KPH @ -0.0132 Seconds



B-117



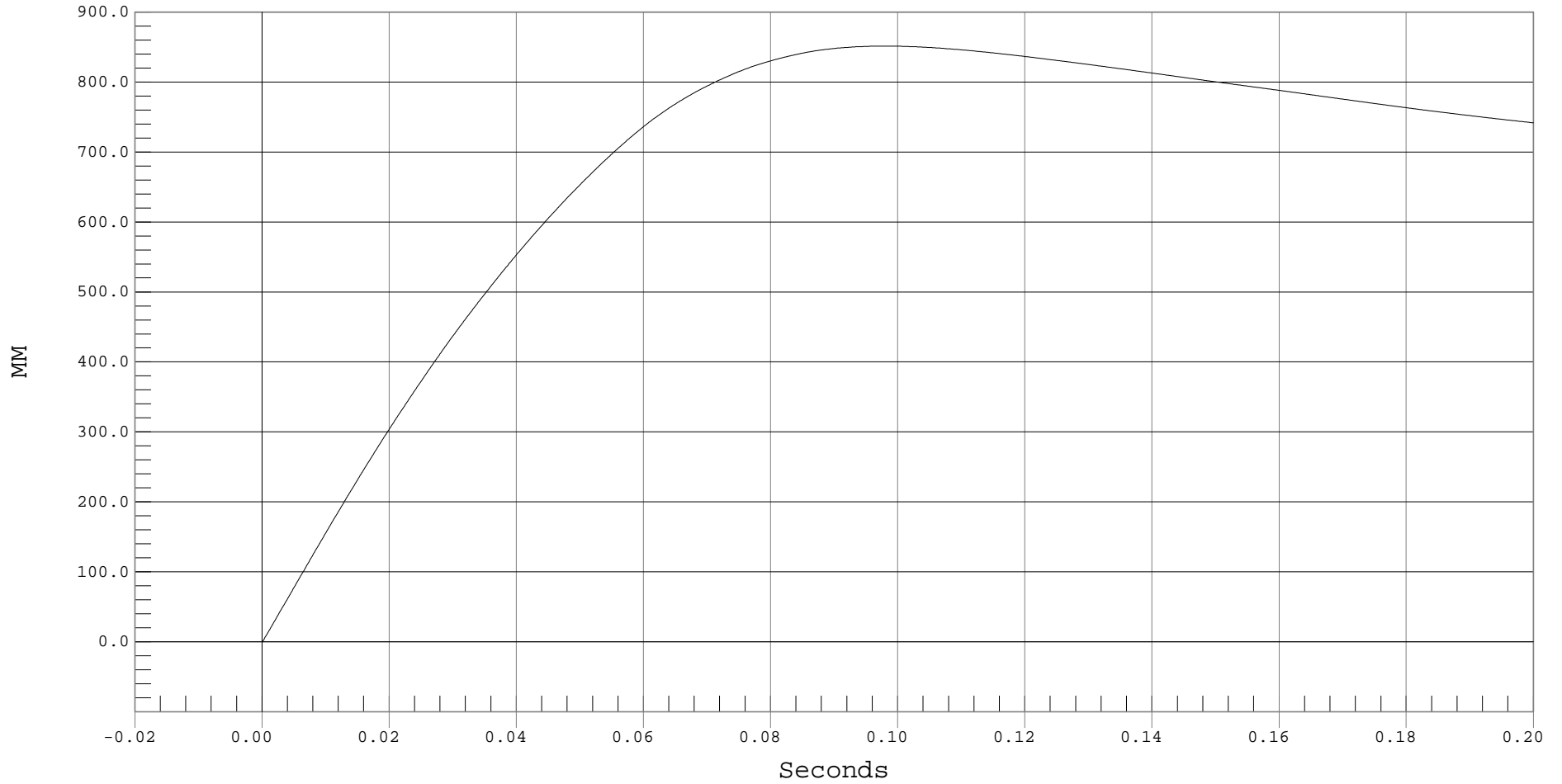
### RIGHT REAR SEAT CROSSMEMBER X DISPLACEMENT

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 RIGHT REAR SEAT CROSSMEMBER X DISPLACEMENT, B01012AI.D58

Ymin = 0 MM @ 0.0001 Seconds, Ymax = 851.52 MM @ 0.0980 Seconds



B-118



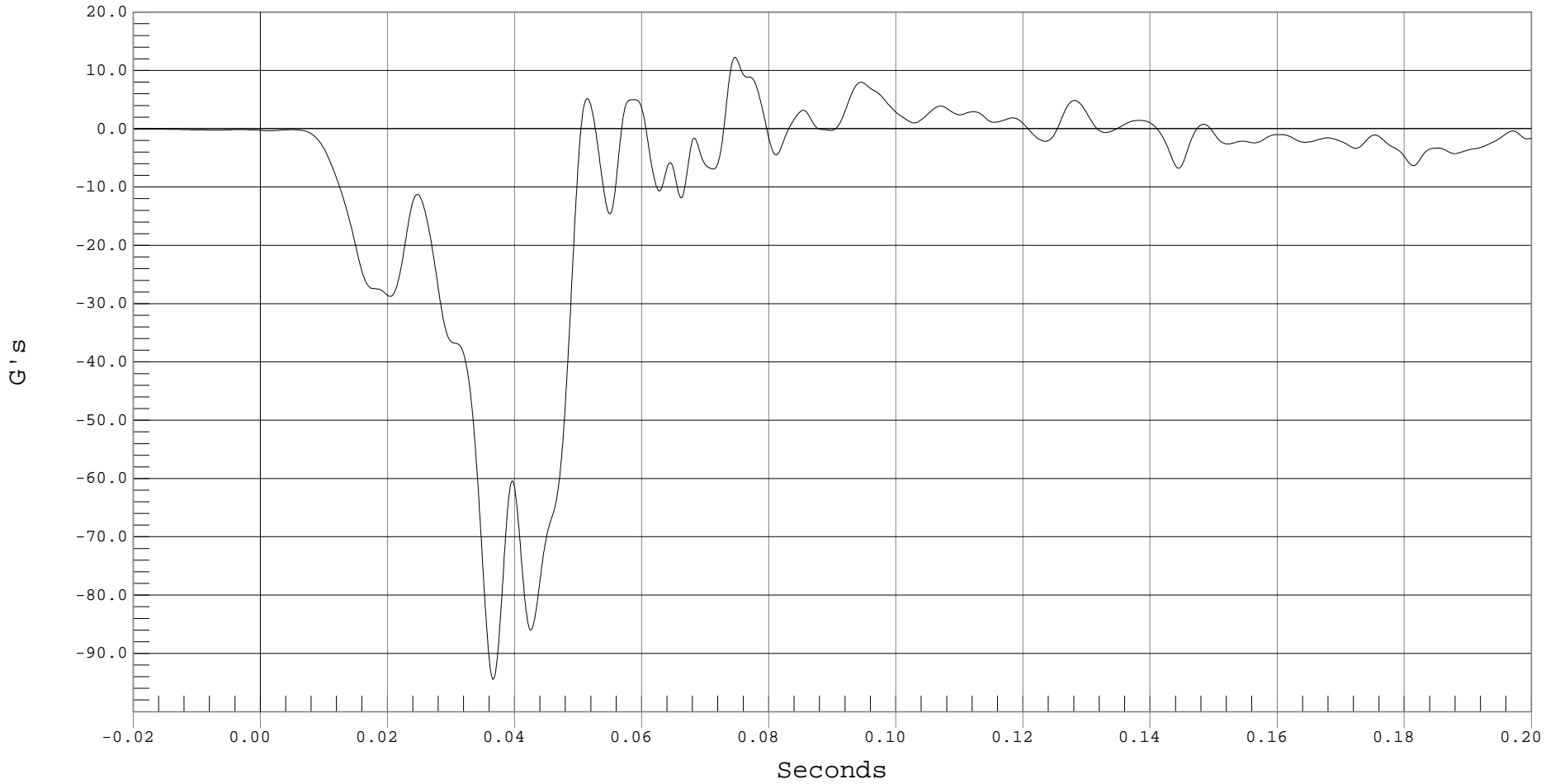
### UPPER ENGINE X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 ENGINE UPPER X, B01012AF.A55

Ymin = -94.42 G's @ 0.0366 Seconds, Ymax = 12.26 G's @ 0.0747 Seconds



B-119



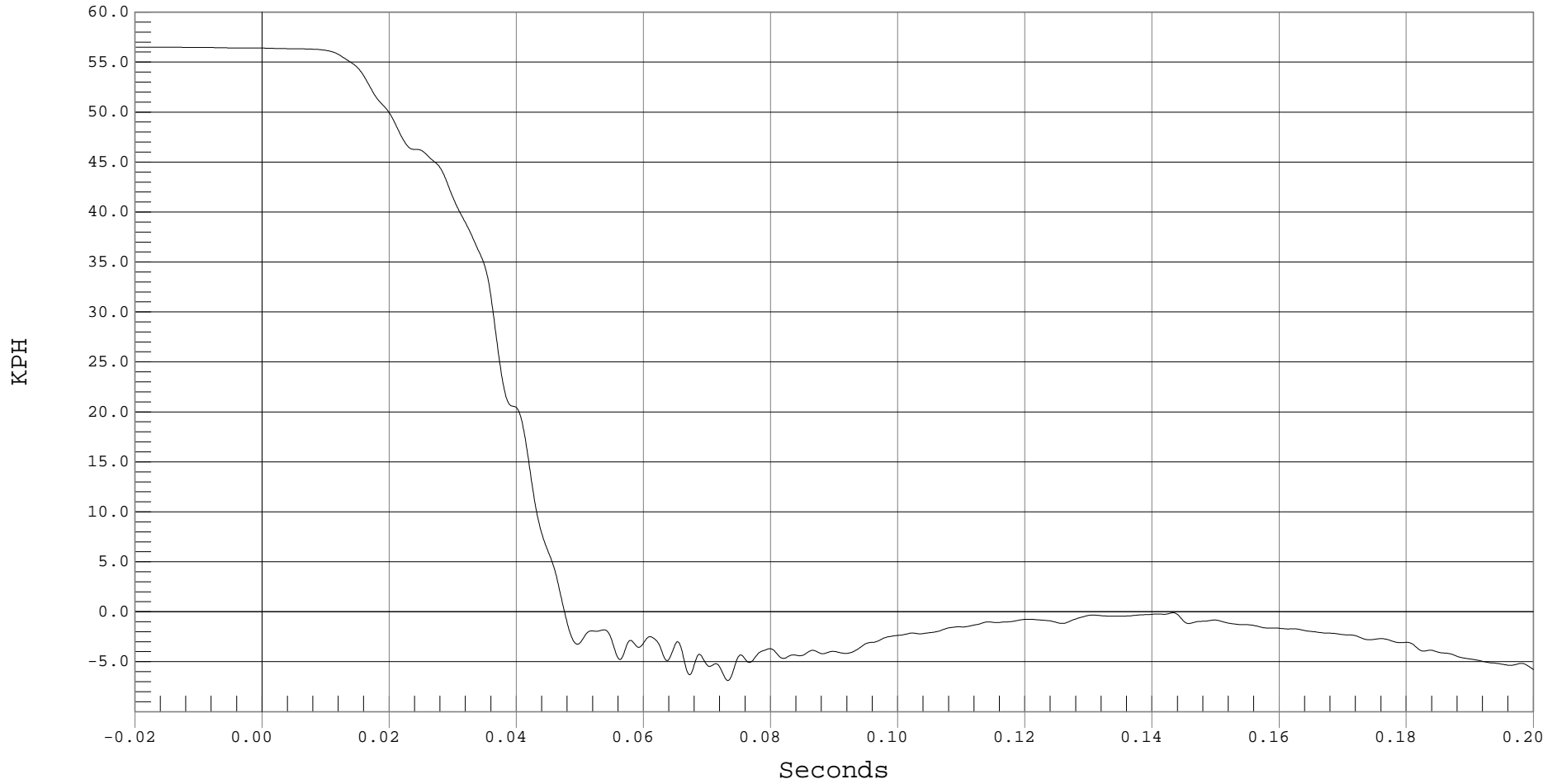
### UPPER ENGINE X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 TOP OF ENGINE BLOCK X VELOCITY, B01012AI.V55

Ymin = -6.88 KPH @ 0.0733 Seconds, Ymax = 56.5 KPH @ -0.0198 Seconds



B-120



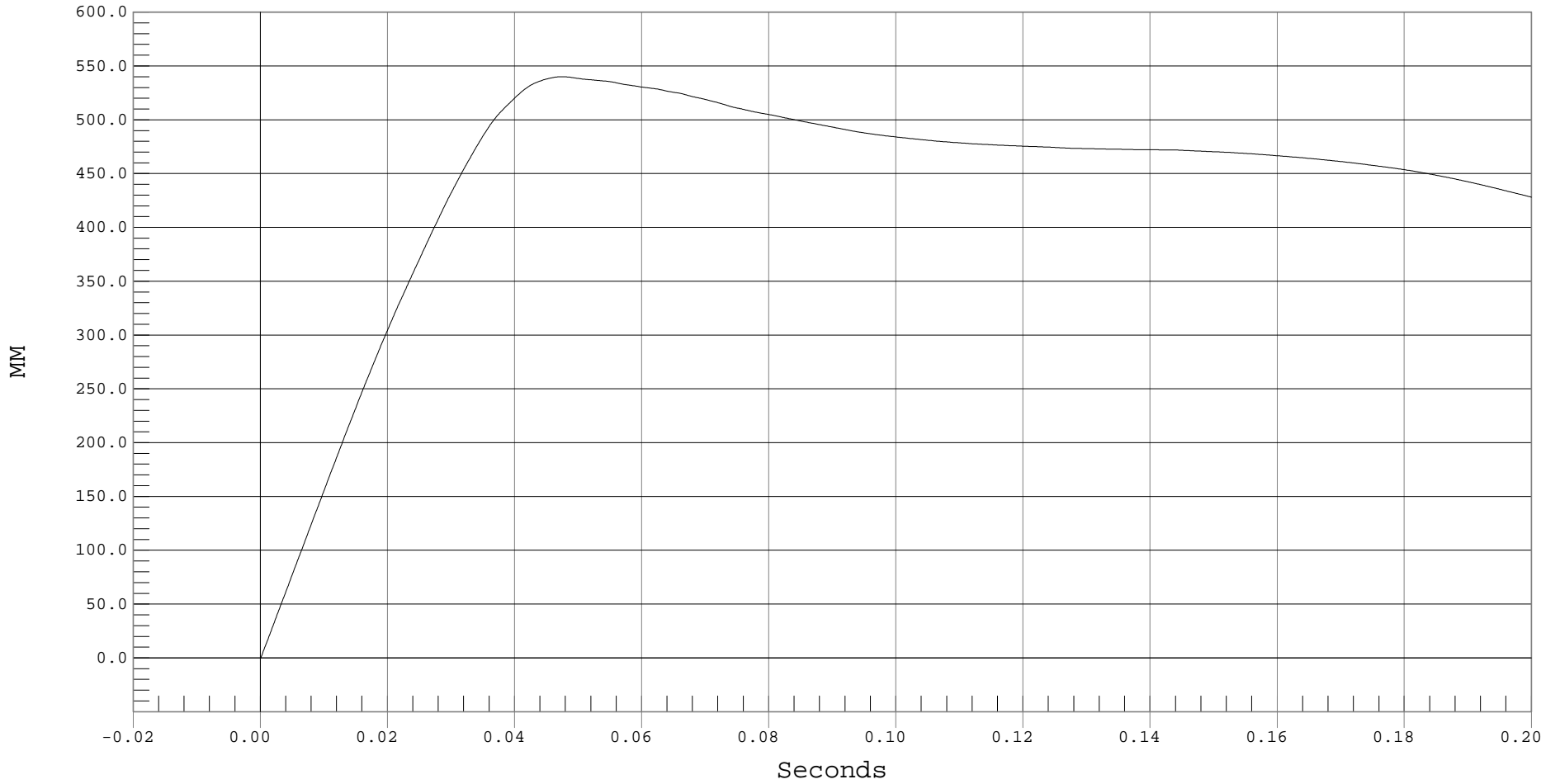
### UPPER ENGINE X DISPLACEMENT

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 TOP OF ENGINE BLOCK X DISPLACEMENT, B01012AI.D55

Ymin = 0 MM @ 0.0001 Seconds, Ymax = 540.02 MM @ 0.0475 Seconds



B-121



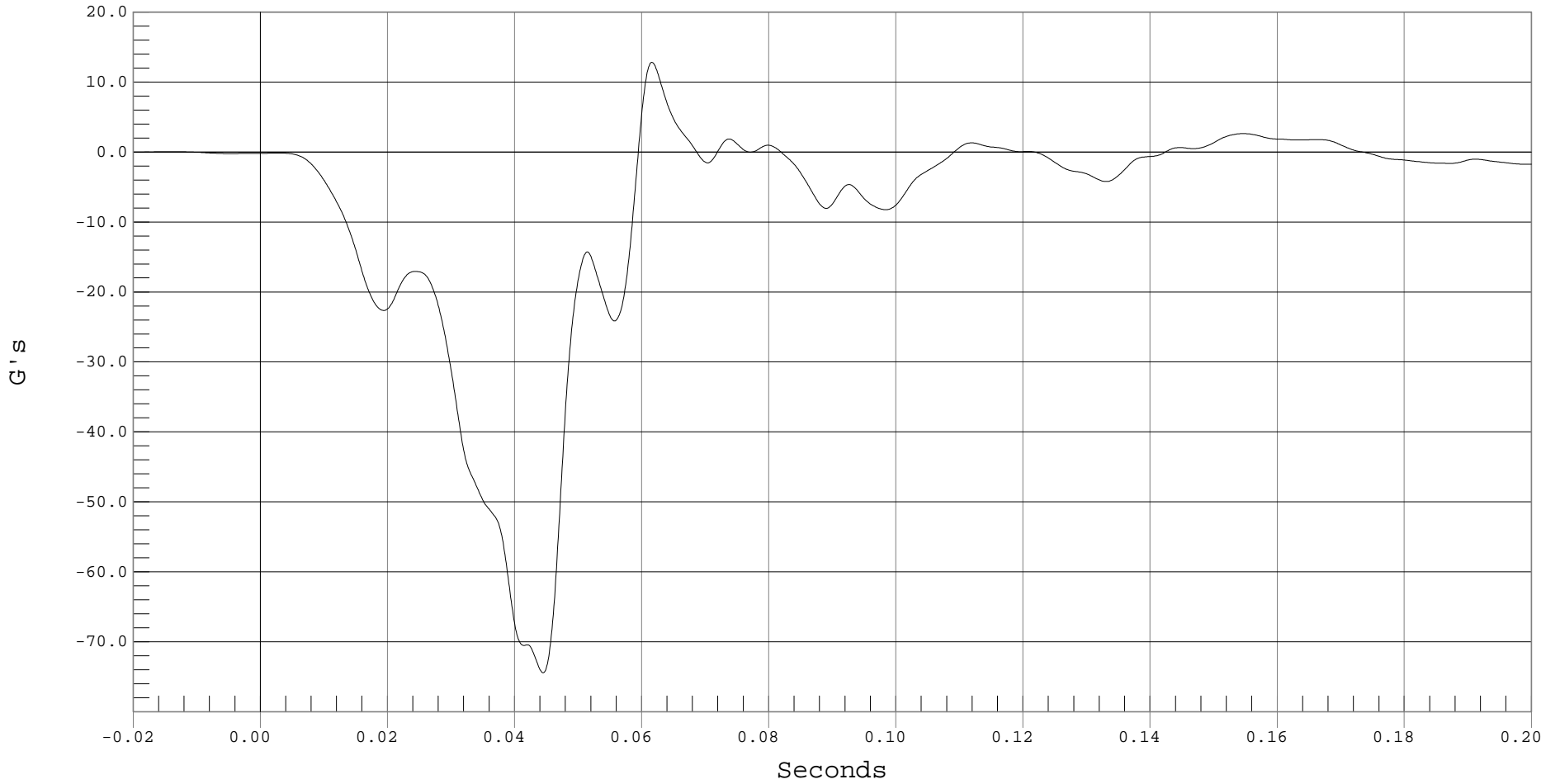
### LOWER ENGINE X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 ENGINE LOWER X, B01012AF.A56

Ymin = -74.45 G's @ 0.0445 Seconds, Ymax = 12.83 G's @ 0.0616 Seconds



B-122



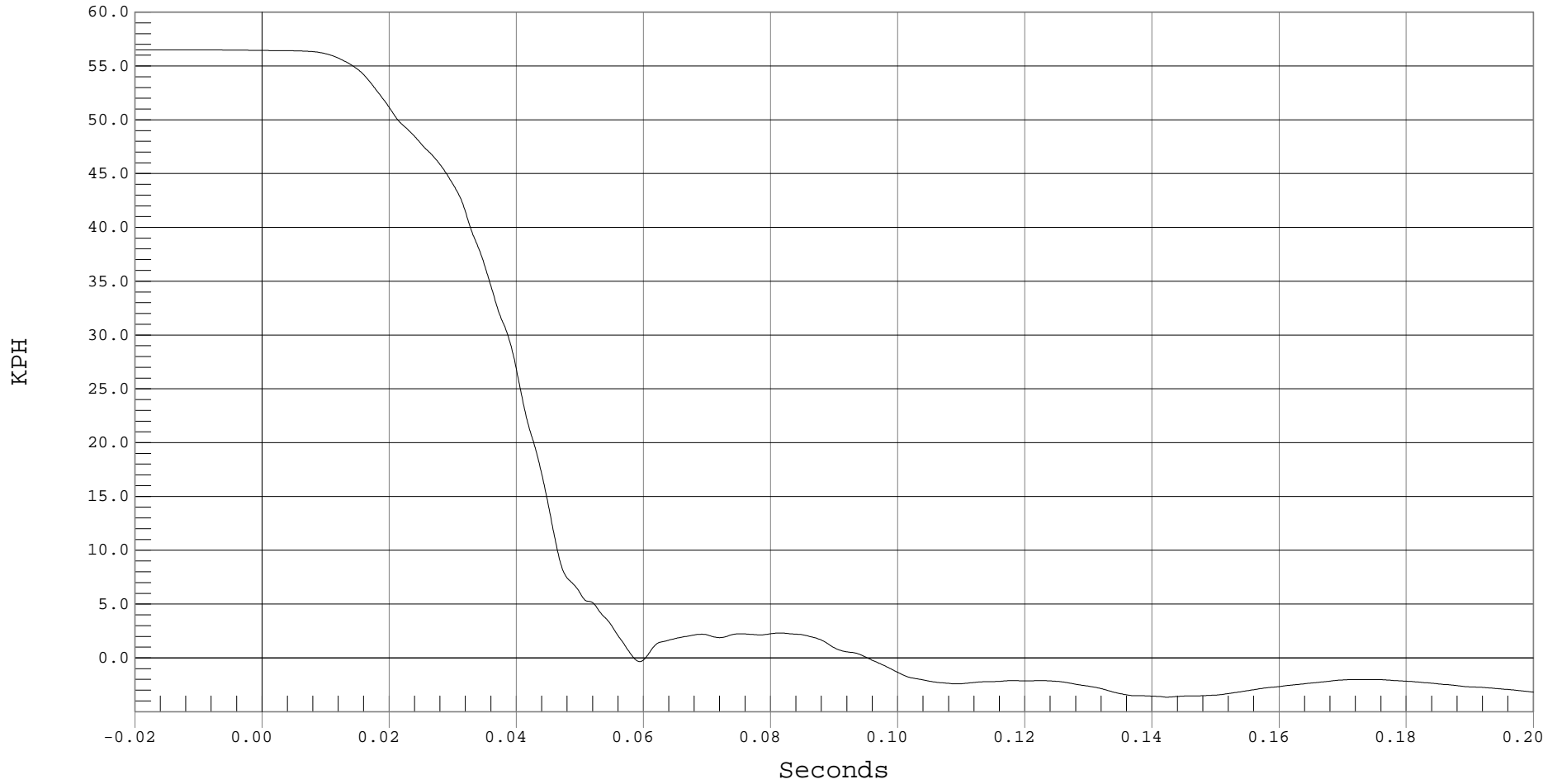
### LOWER ENGINE X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 BOTTOM OF ENGINE X VELOCITY, B01012AI.V56

Ymin = -3.65 KPH @ 0.1423 Seconds, Ymax = 56.5 KPH @ -0.0104 Seconds



B-123



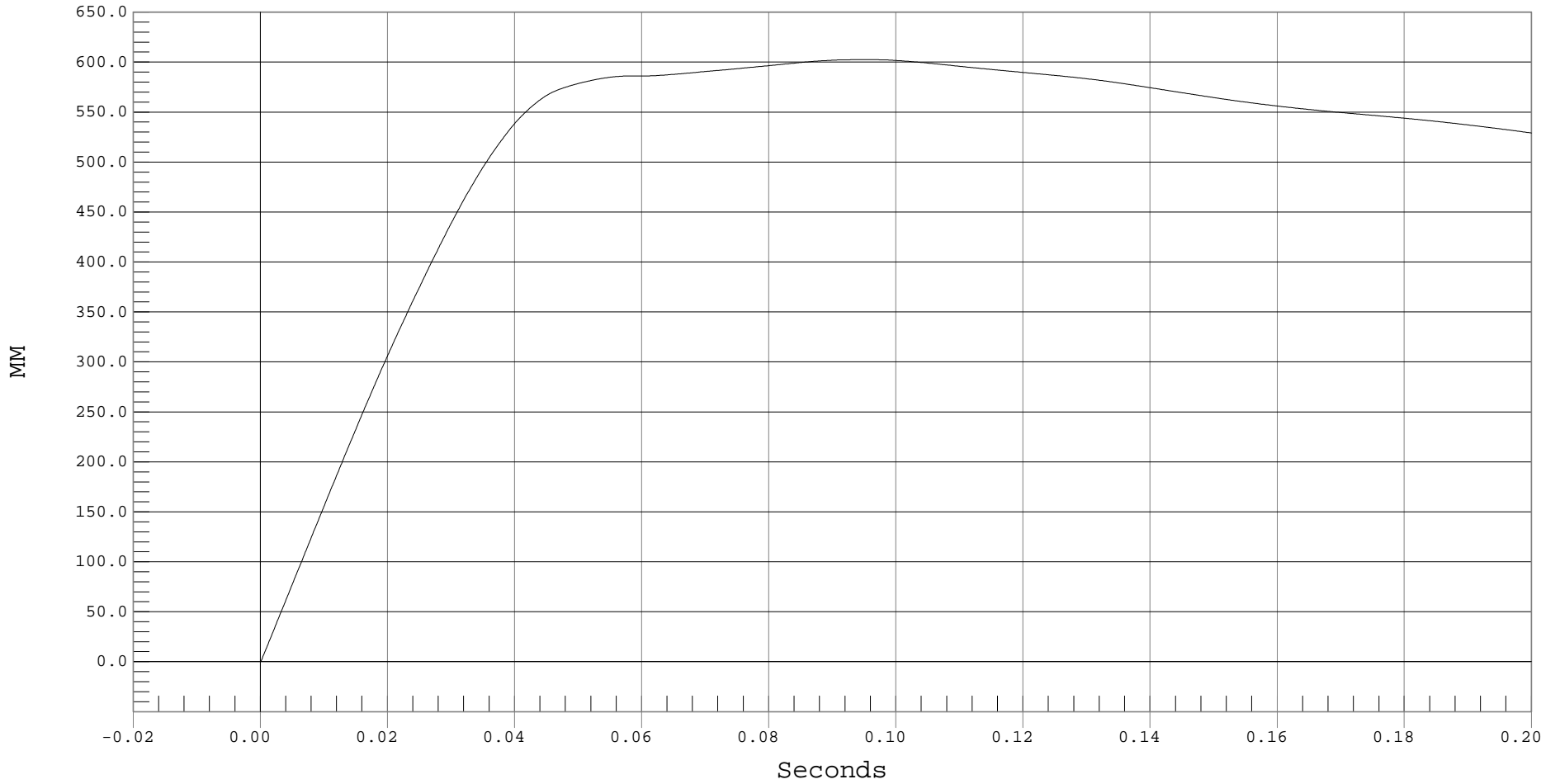
### LOWER ENGINE X DISPLACEMENT

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 BOTTOM OF ENGINE X DISPLACEMENT, B01012AI.D56

Ymin = 0 MM @ 0.0001 Seconds, Ymax = 602.57 MM @ 0.0951 Seconds



B-124

LEFT BRAKE CALIPER X ACCELERATION VS. TIME

NO VALID DATA COLLECTED



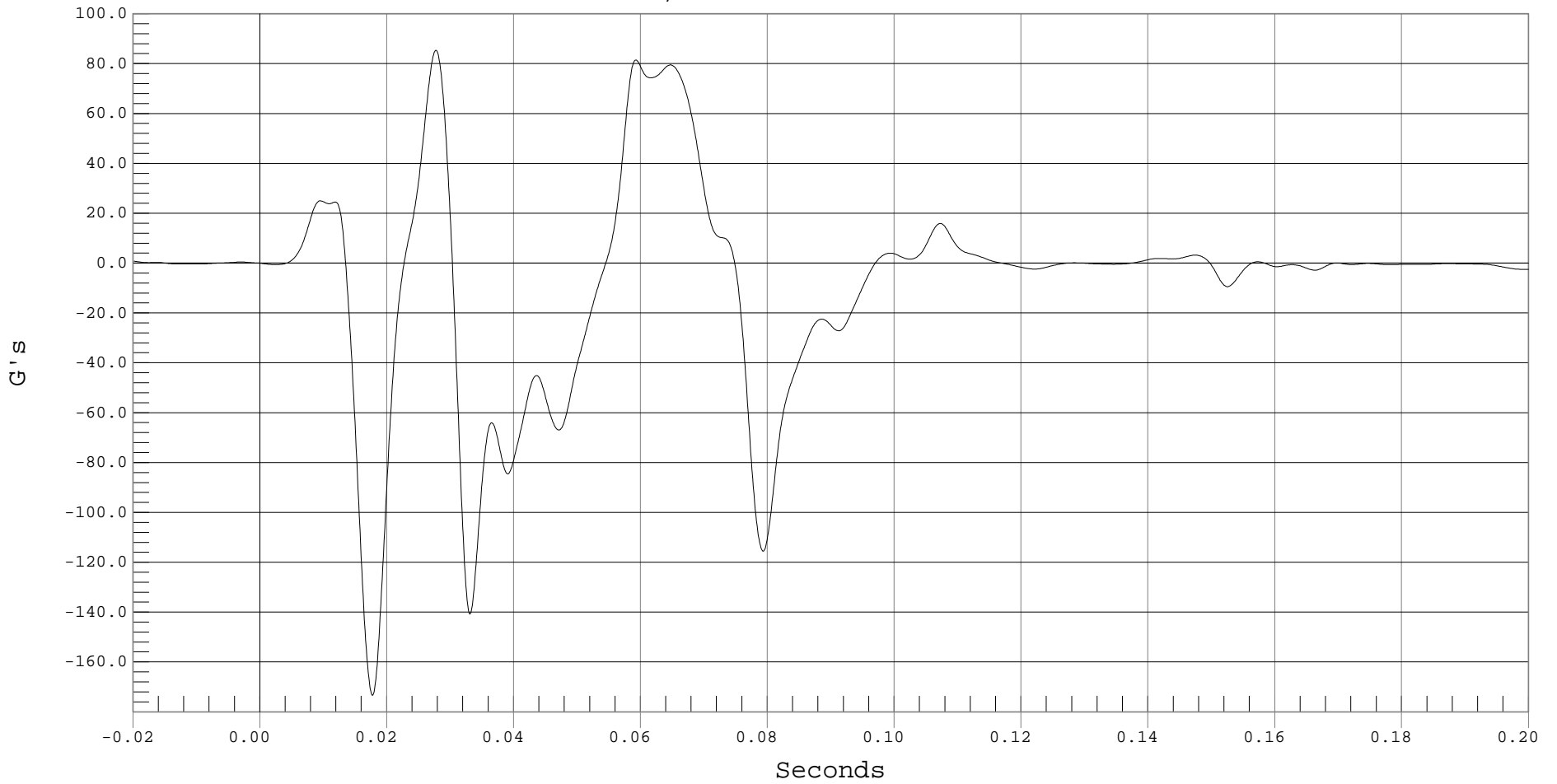
### RIGHT BRAKE CALIPER X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 RIGHT BRAKE CALIPER X, B01012AF.A60

Ymin = -173.33 G's @ 0.0178 Seconds, Ymax = 85.4 G's @ 0.0278 Seconds



B-126



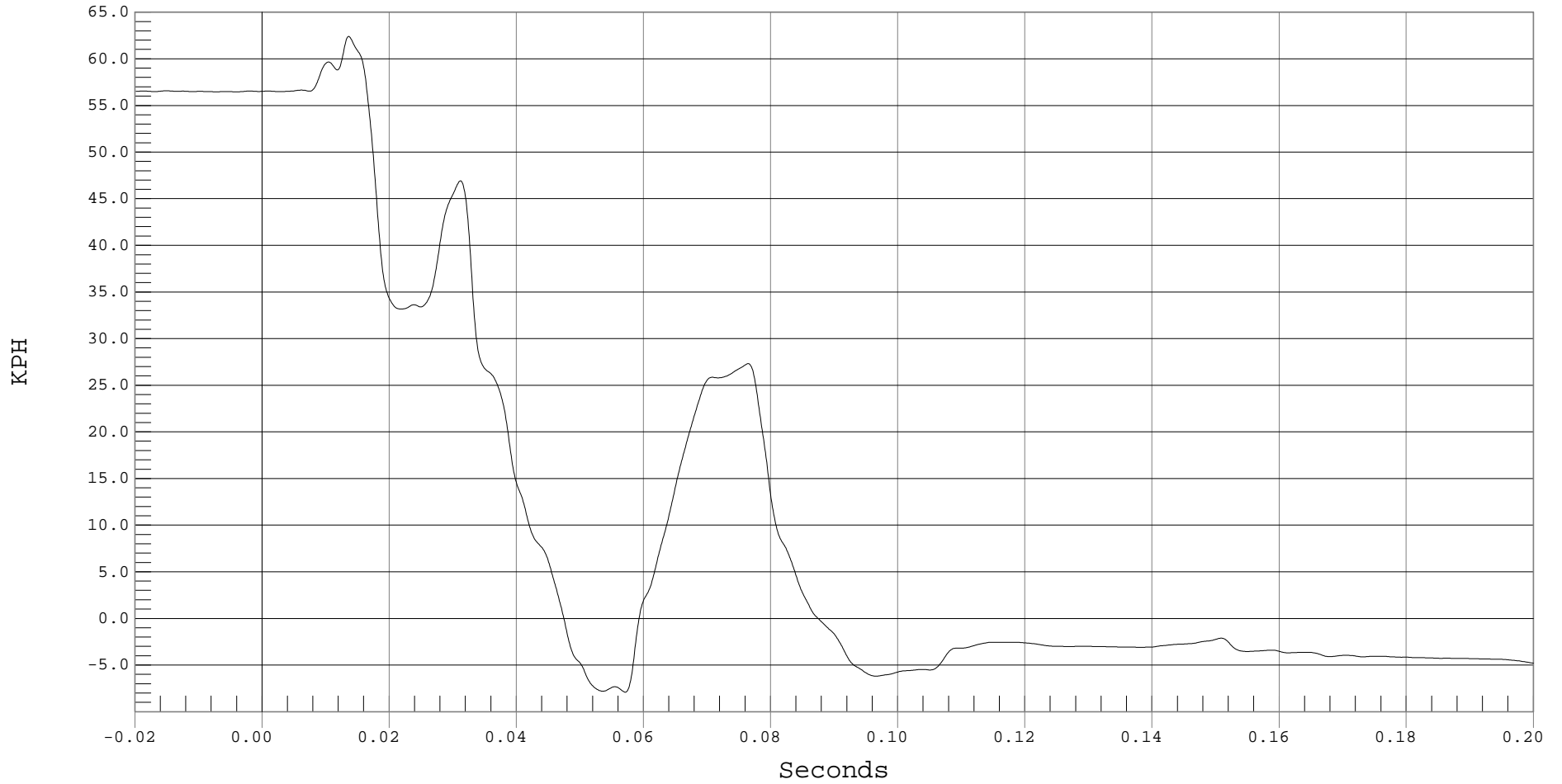
### RIGHT BRAKE CALIPER X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 RIGHT BRAKE CALIPER X VELOCITY, B01012AI.V60

Ymin = -7.91 KPH @ 0.0571 Seconds, Ymax = 62.4 KPH @ 0.0136 Seconds





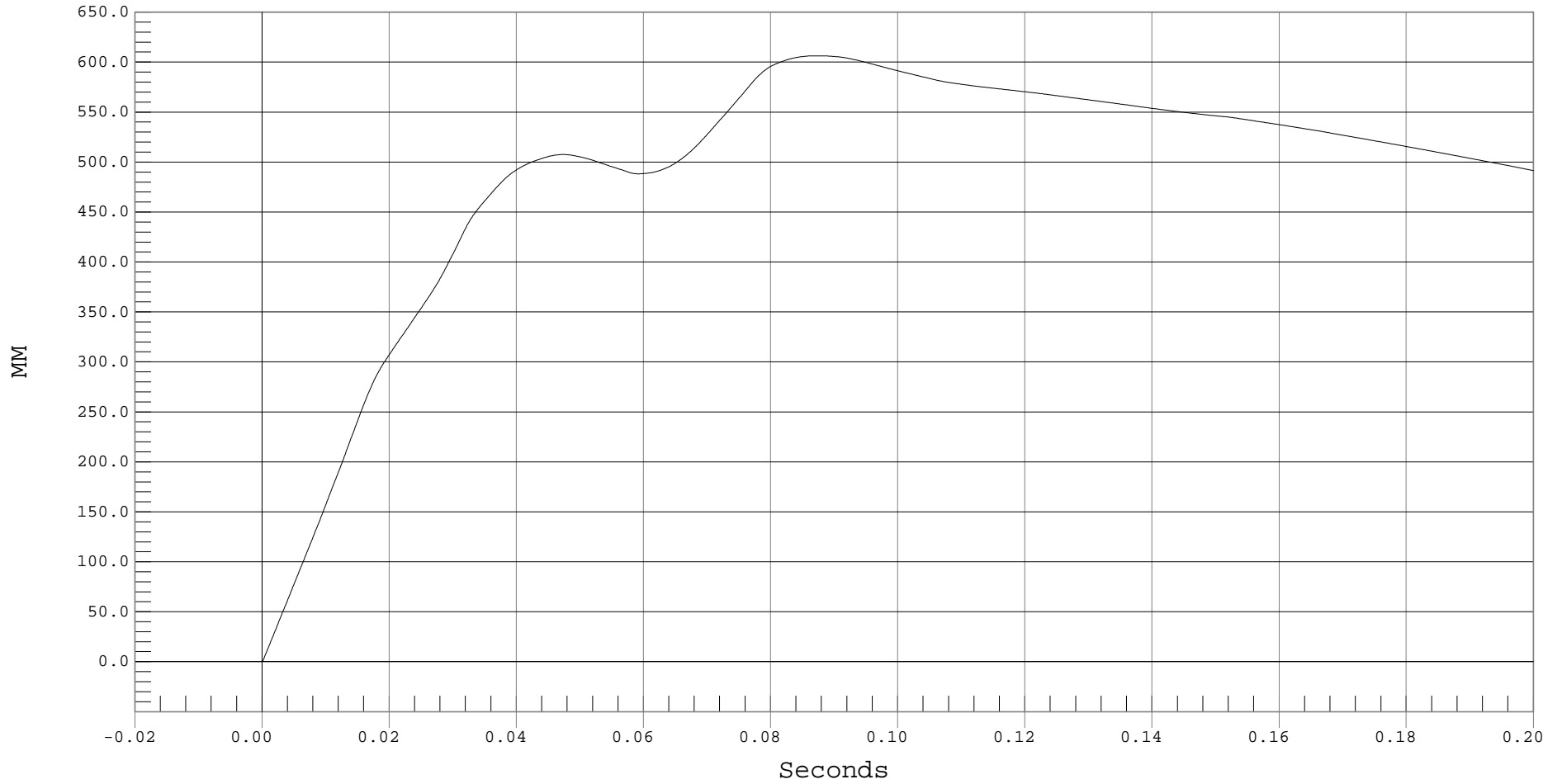
### RIGHT BRAKE CALIPER X DISPLACEMENT

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 RIGHT BRAKE CALIPER X DISPLACEMENT, B01012AI.D60

Ymin = 0 MM @ 0.0001 Seconds, Ymax = 606.28 MM @ 0.0874 Seconds



B-128



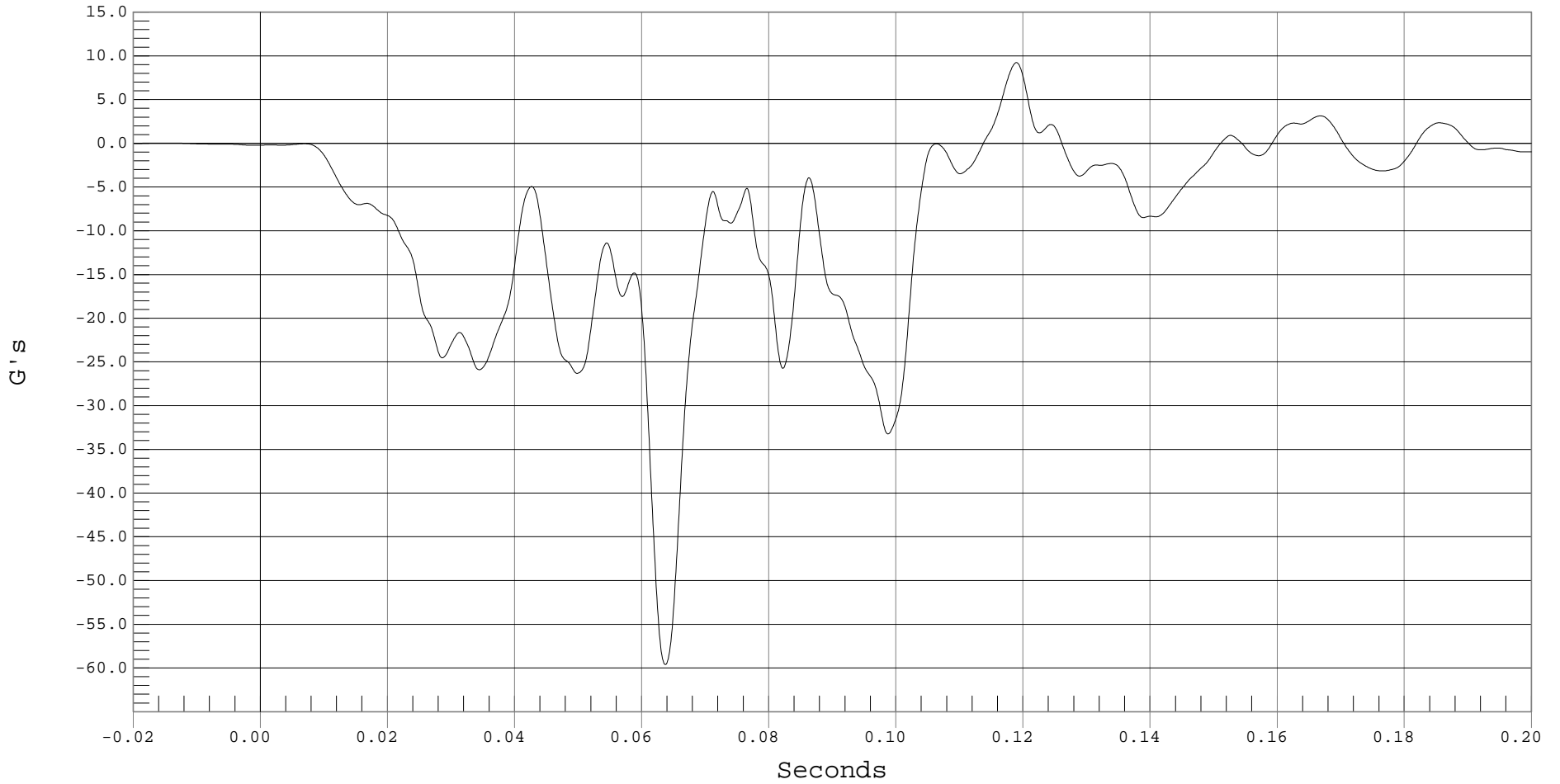
### INSTRUMENT PANEL X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 INSTRUMENT PANEL X, B01012AF.A57

Ymin = -59.62 G's @ 0.0638 Seconds, Ymax = 9.23 G's @ 0.1190 Seconds



B-129



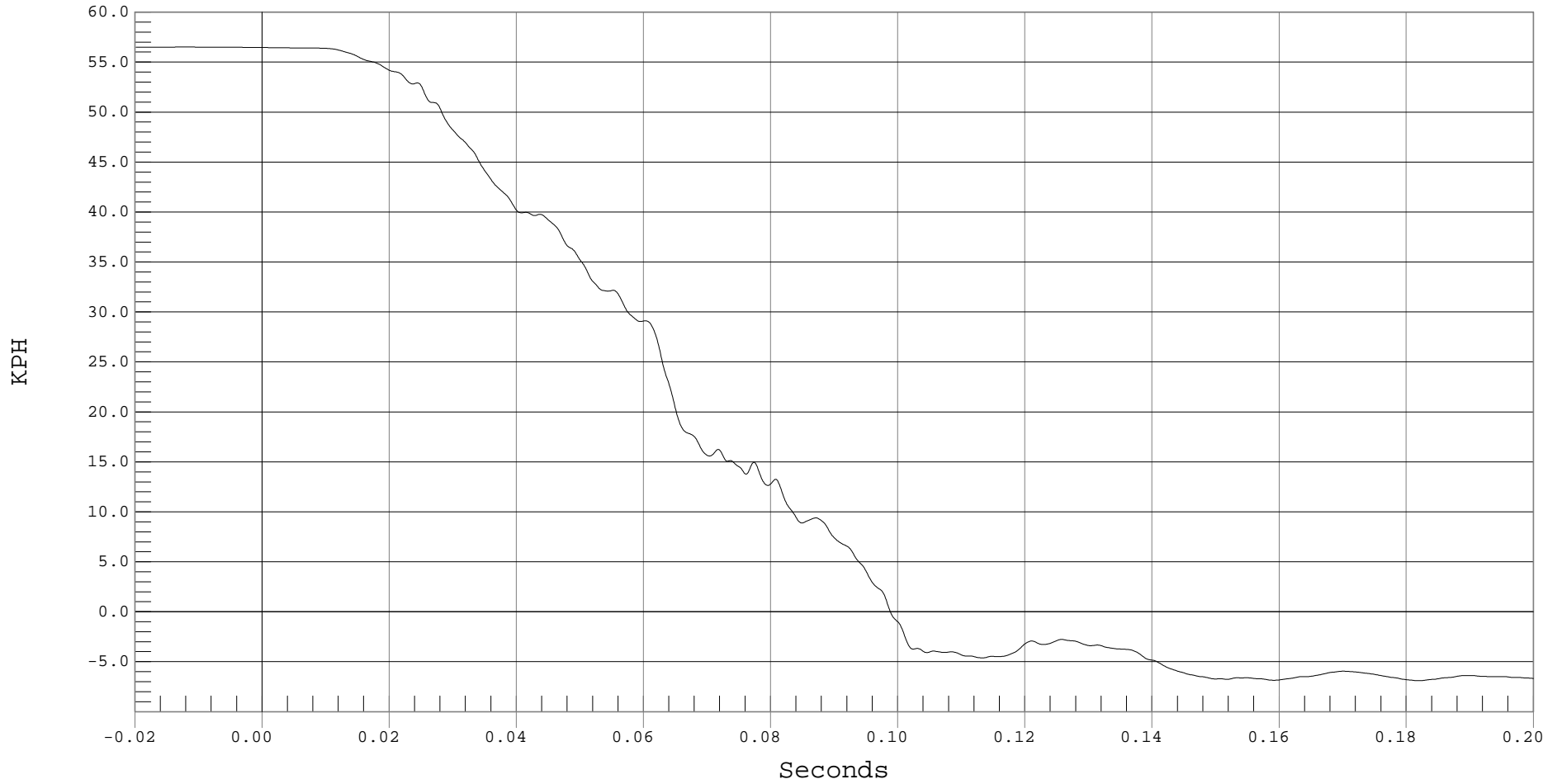
### INSTRUMENT PANEL X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 INSTRUMENT PANEL X VELOCITY, B01012AI.V57

Ymin = -6.9 KPH @ 0.1819 Seconds, Ymax = 56.51 KPH @ -0.0114 Seconds



B-130



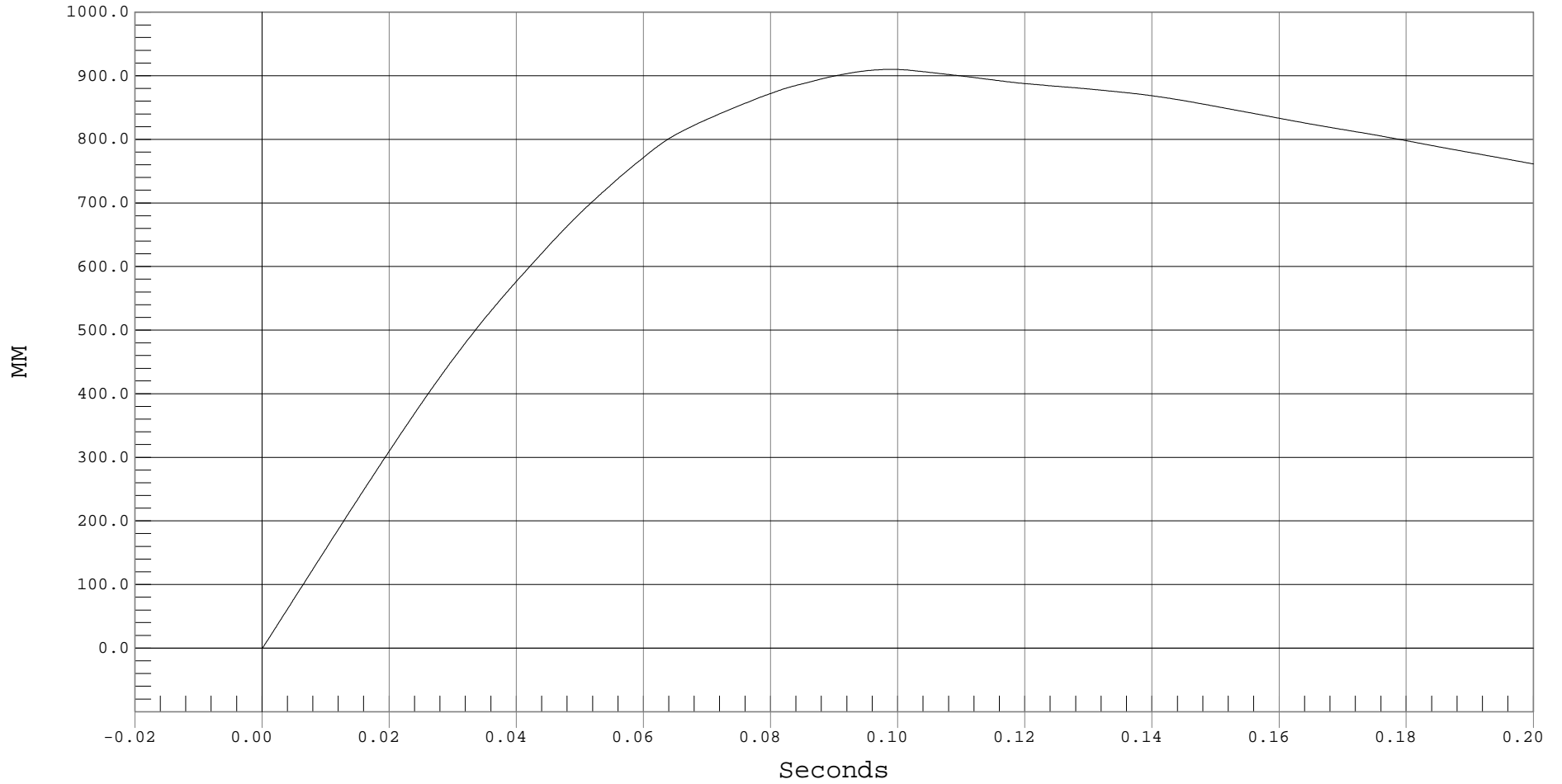
### INSTRUMENT PANEL X DISPLACEMENT

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 INSTRUMENT PANEL X DISPLACEMENT, B01012AI.D57

Ymin = 0 MM @ 0.0001 Seconds, Ymax = 910.06 MM @ 0.0987 Seconds



B-131



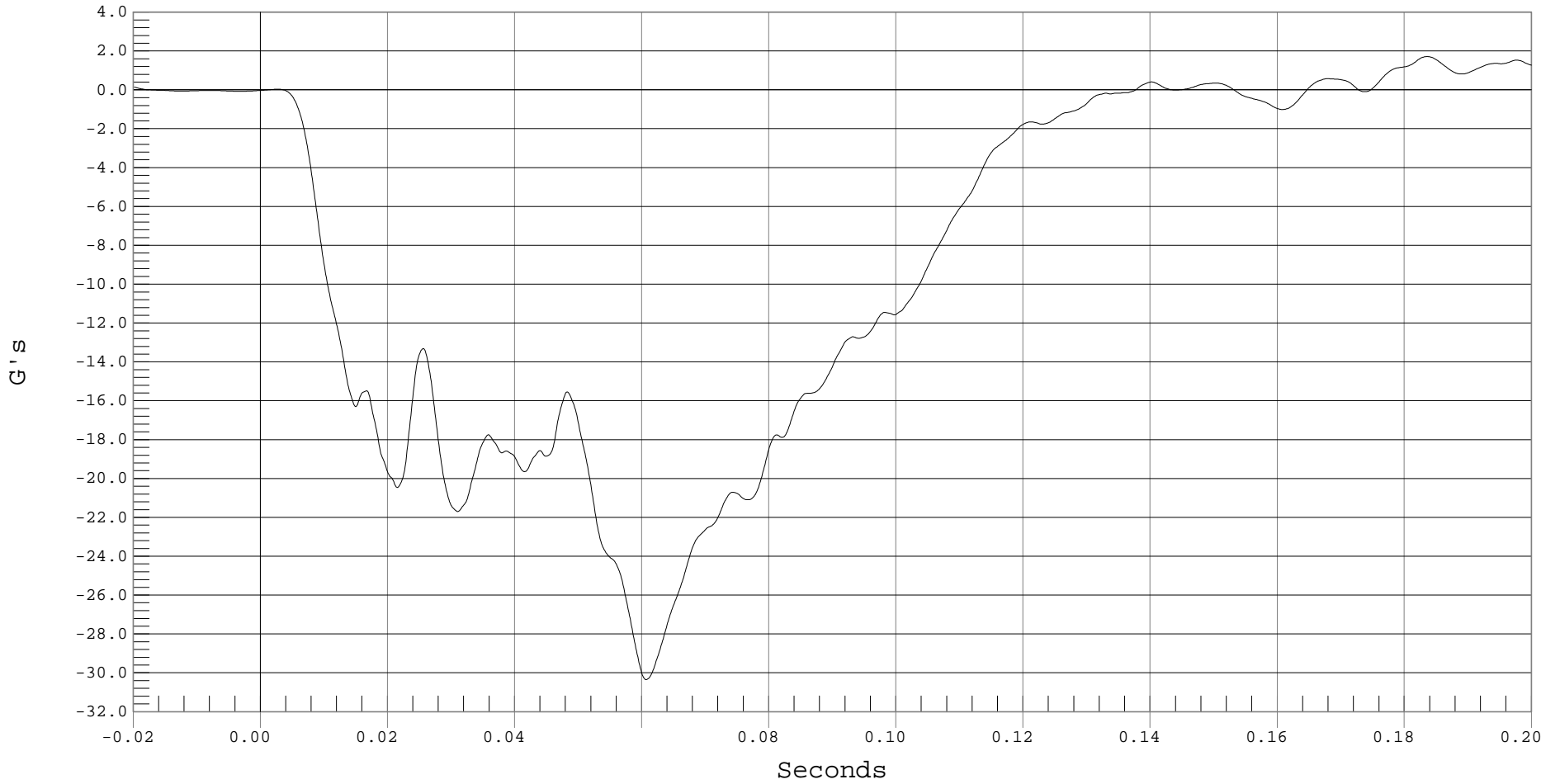
### LEFT REAR SEAT CROSSMEMBER REDUNDANT X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 LEFT REAR SEAT X-MEMBER Xr, C01012AF.A03

Ymin = -30.35 G's @ 0.0607 Seconds, Ymax = 1.72 G's @ 0.1836 Seconds



B-132



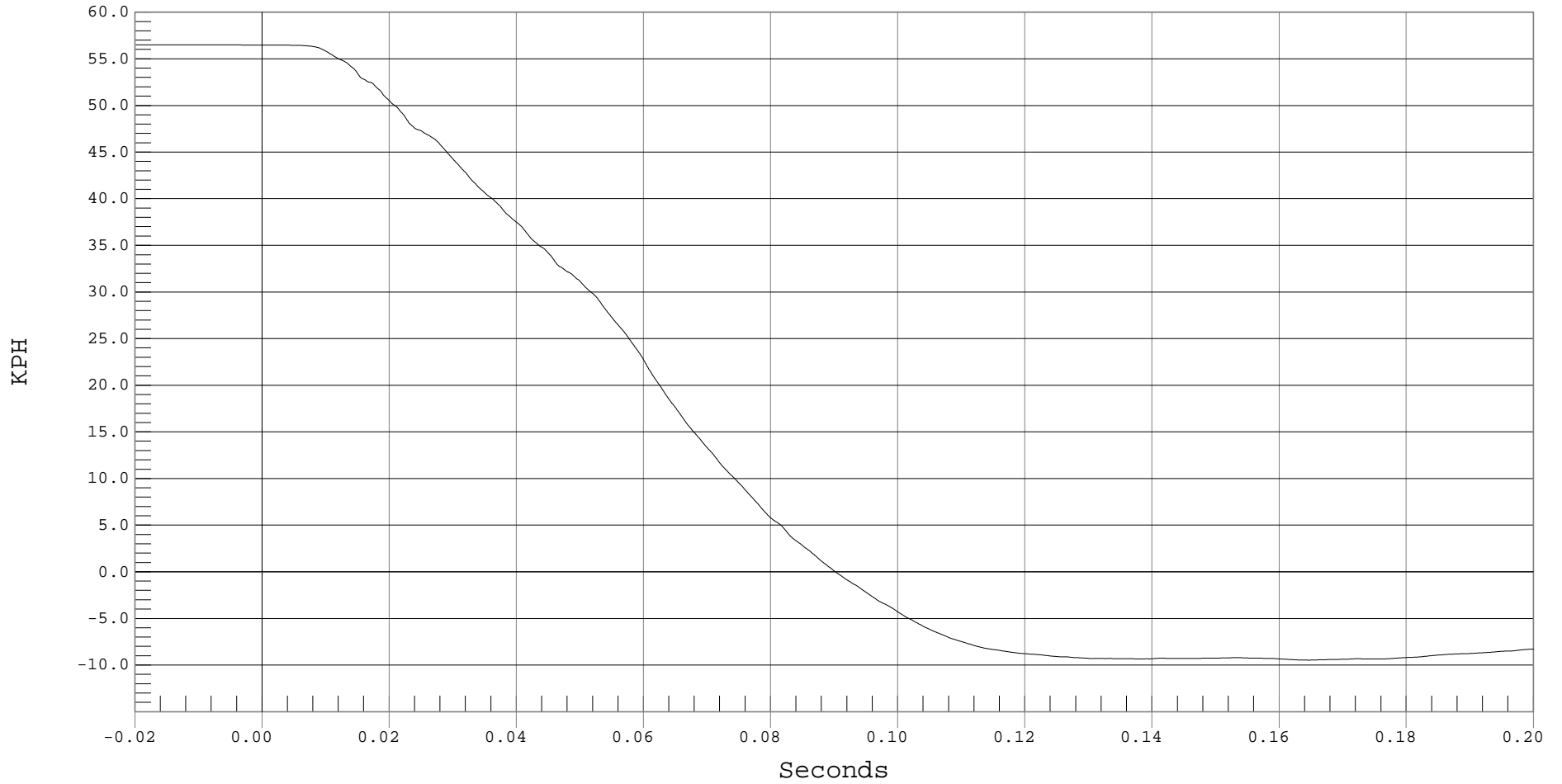
### LEFT REAR SEAT CROSSMEMBER REDUNDANT X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 LEFT REAR SEAT CROSSMEMBER REDUNDANT X VELOCITY, C01012AI.V03

Ymin = -9.47 KPH @ 0.1647 Seconds, Ymax = 56.5 KPH @ -0.0196 Seconds





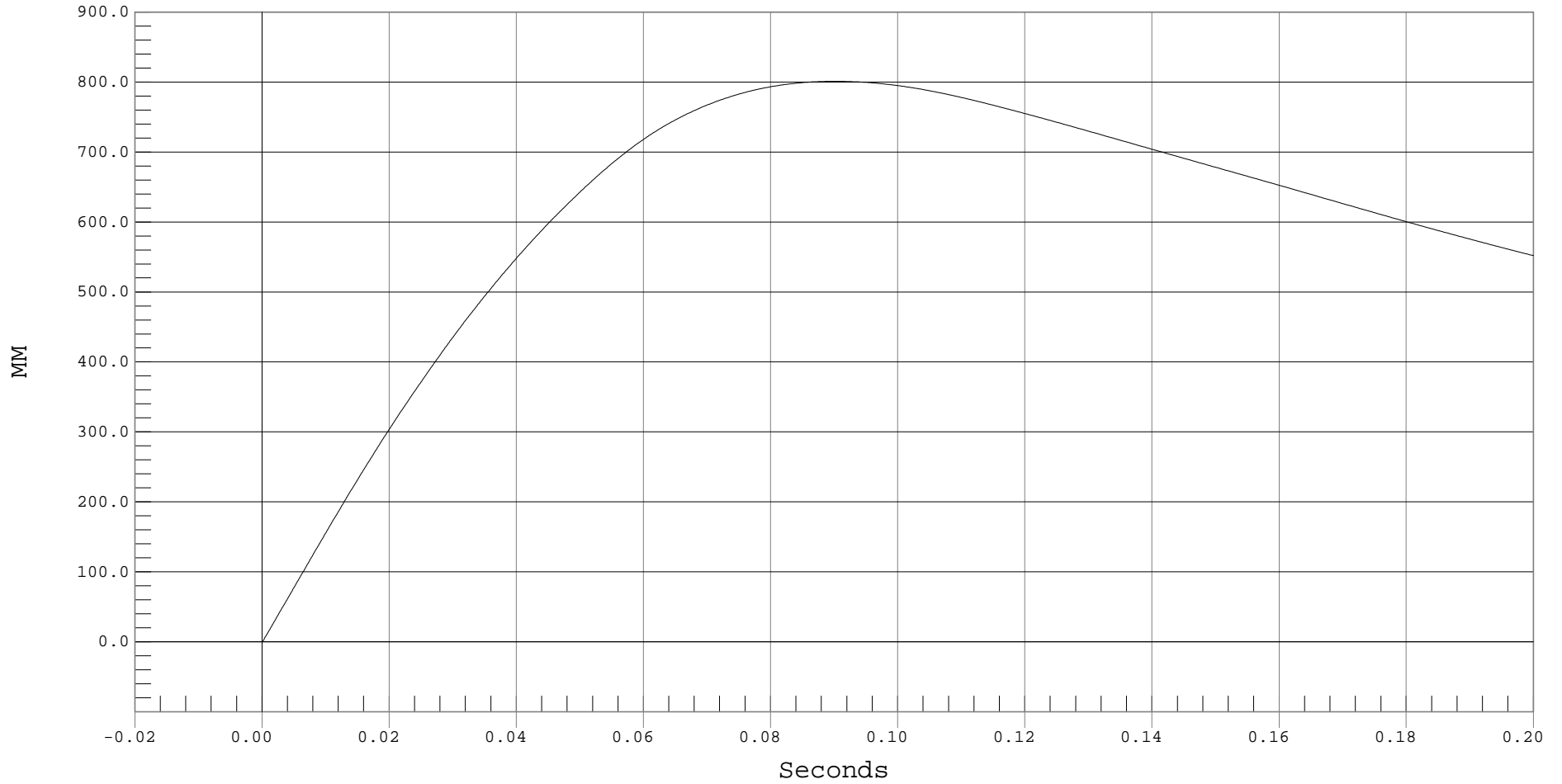
### LEFT REAR SEAT CROSSMEMBER REDUNDANT X DISPLACEMENT

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 LEFT REAR SEAT CROSSMEMBER REDUNDANT X DISPLACEMENT, C01012AI.D03

Ymin = 0 MM @ 0.0001 Seconds, Ymax = 801.16 MM @ 0.0901 Seconds



B-134



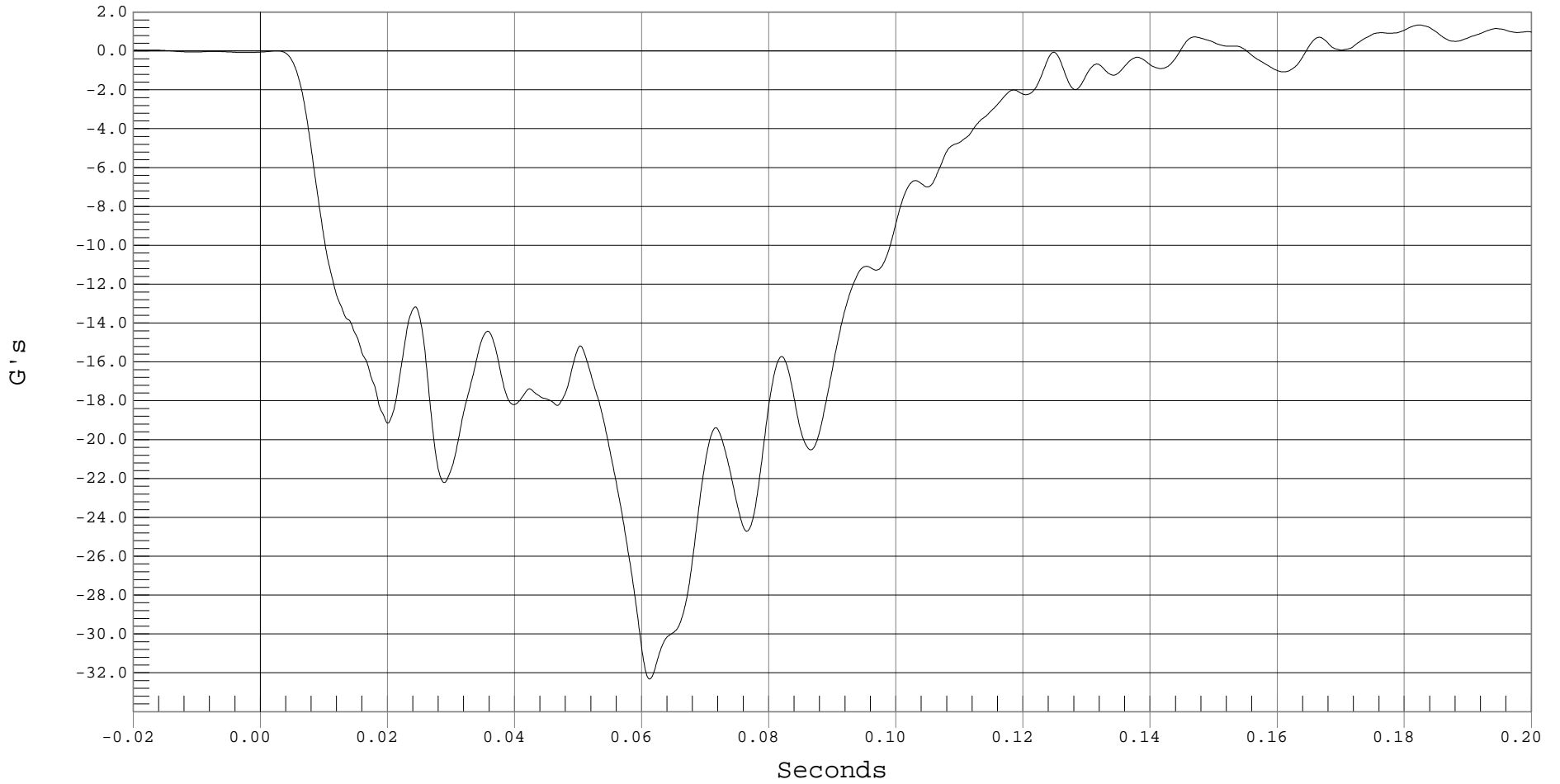
### RIGHT REAR SEAT CROSSMEMBER REDUNDANT X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 RIGHT REAR SEAT X-MEMBER Xr, C01012AF.A02

Ymin = -32.32 G's @ 0.0613 Seconds, Ymax = 1.34 G's @ 0.1824 Seconds



B-135



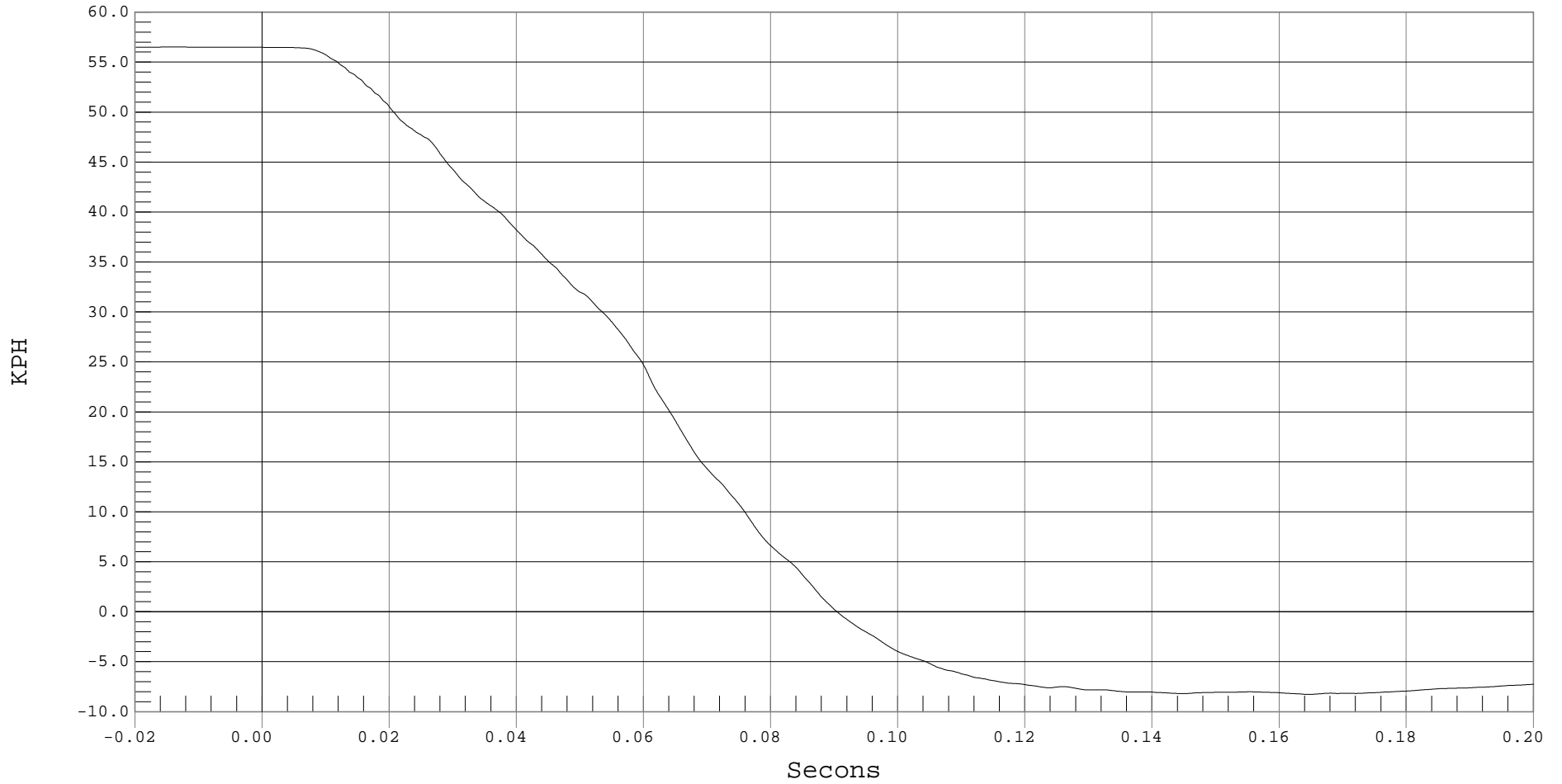
### RIGHT REAR SEAT CROSSMEMBER REDUNDANT X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 RIGHT REAR SEAT CROSSMEMBER REDUNDANT X VELOCITY, C01012AI.V02

Ymin = -8.27 KPH @ 0.1646 Secons, Ymax = 56.51 KPH @ -0.0132 Secons





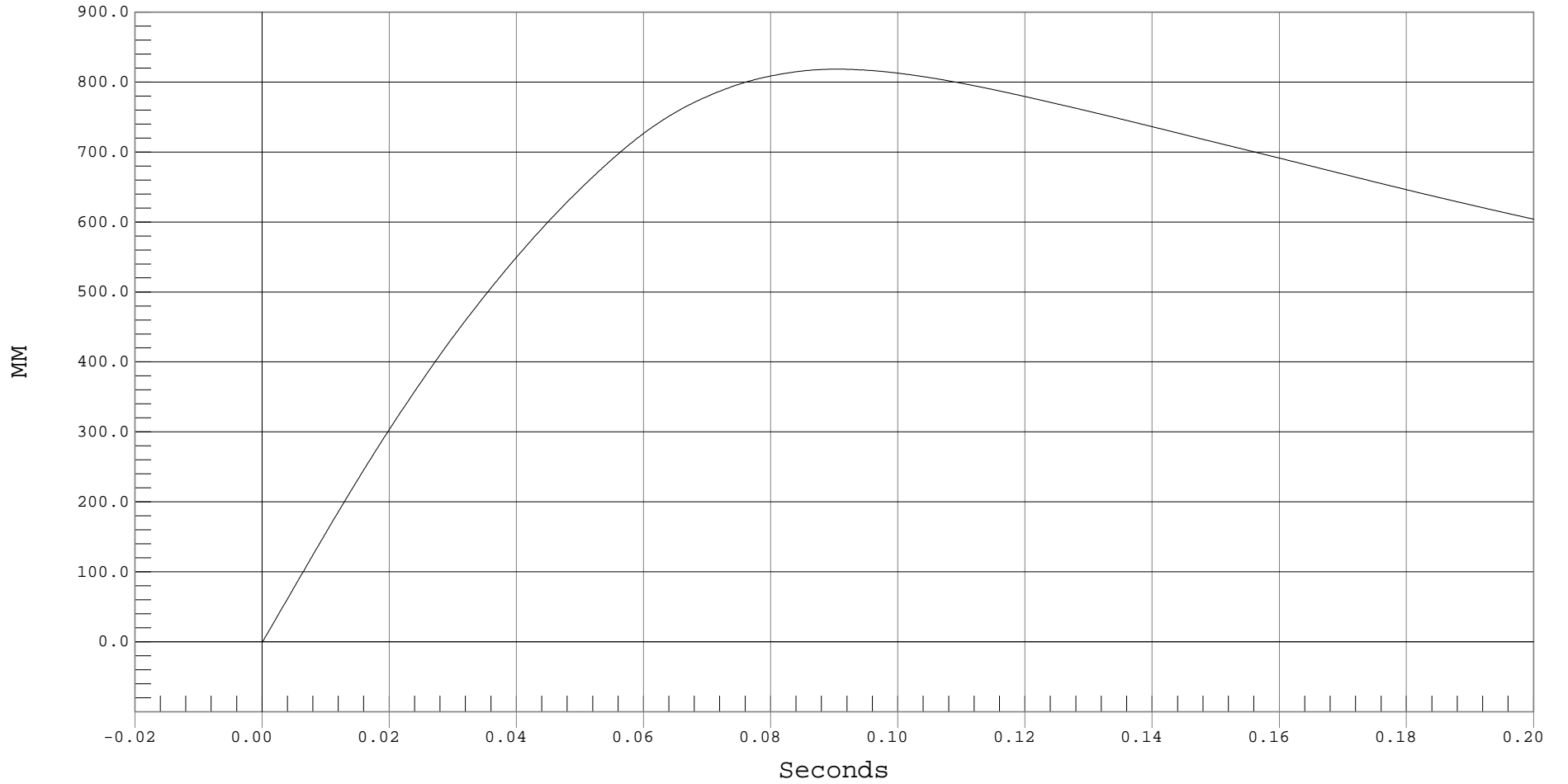
### RIGHT REAR SEAT CROSSMEMBER REDUNDANT X DISPLACEMENT

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 RIGHT REAR SEAT CROSSMEMBER REDUNDANT X DISPLACEMENT, C01012AI.D02

Ymin = 0 MM @ 0.0001 Seconds, Ymax = 818.45 MM @ 0.0904 Seconds



B-137



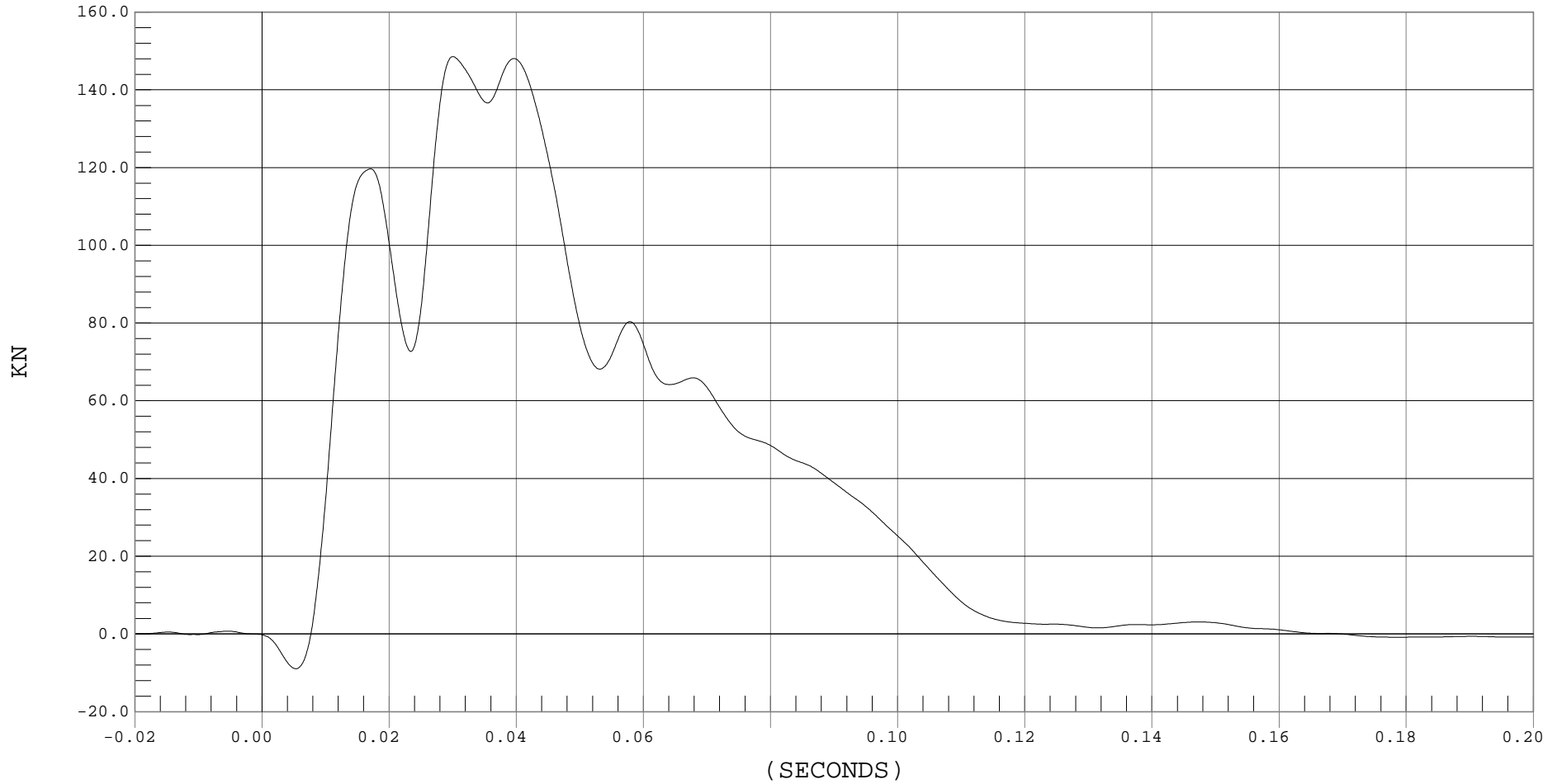
### UPPER LEFT BARRIER FORCE

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 BARRIER UPPER LEFT, C01012FF.F02

Ymin = -8.96 KN @ 0.0053 SECONDS, Ymax = 148.55 KN @ 0.0300 SECONDS





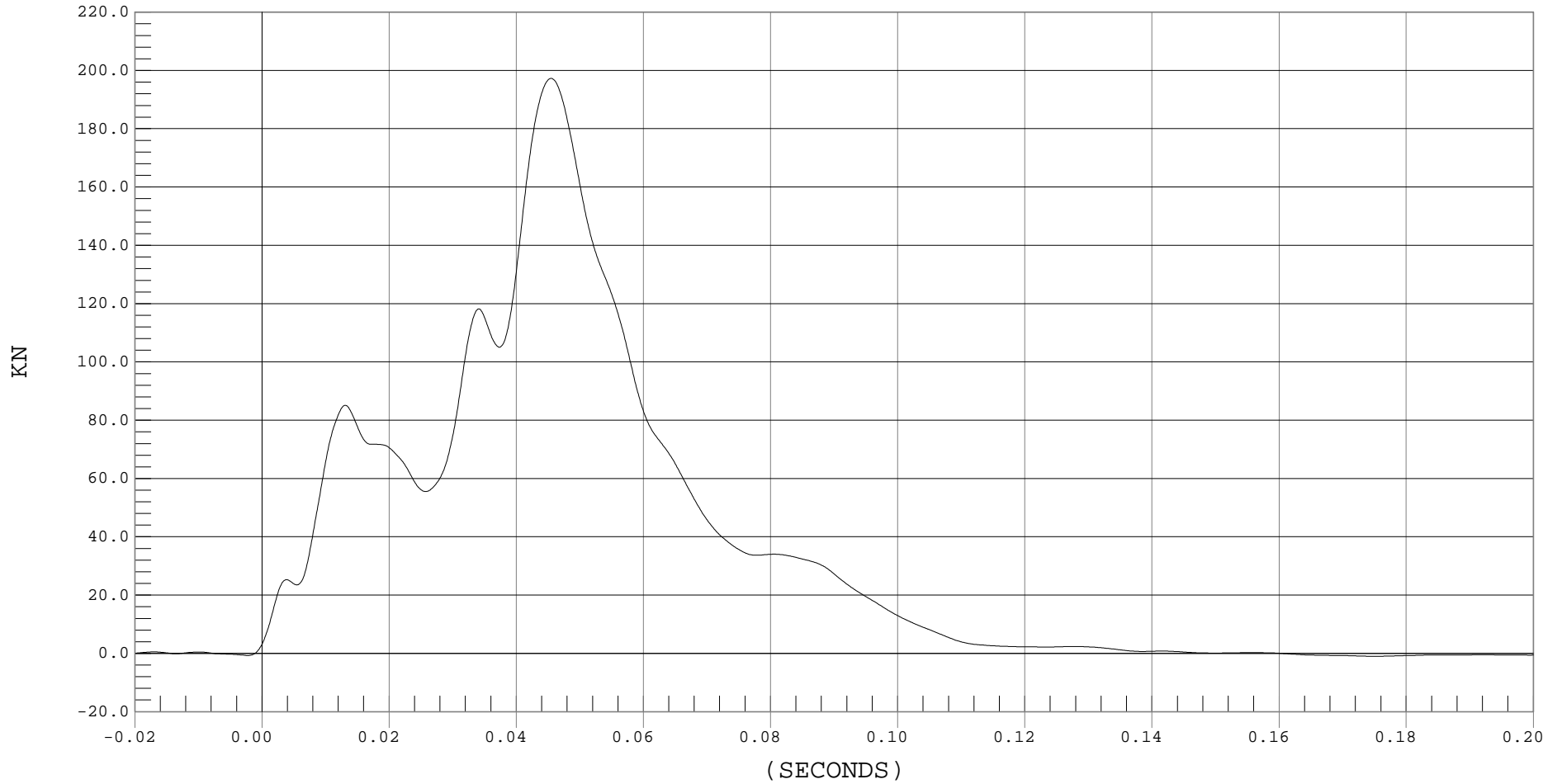
### UPPER CENTER BARRIER FORCE

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 BARRIER UPPER CENTER, C01012FF.F03

Ymin = -0.98 KN @ 0.1751 SECONDS, Ymax = 197.29 KN @ 0.0455 SECONDS





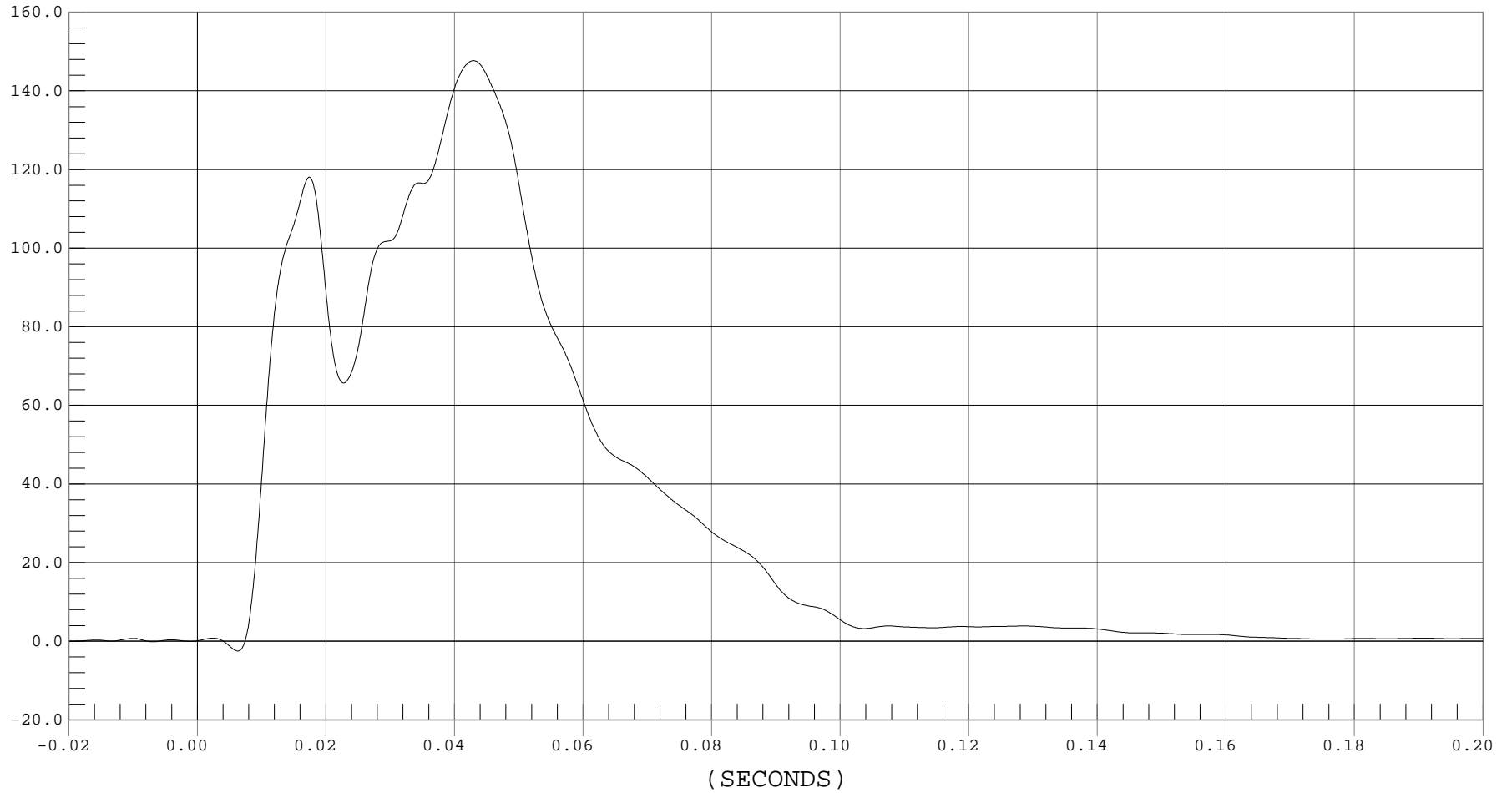
UPPER RIGHT BARRIER FORCE

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 BARRIER UPPER RIGHT, C01012FF.F04

Ymin = -2.48 KN @ 0.0063 SECONDS, Ymax = 147.67 KN @ 0.0430 SECONDS



B-140



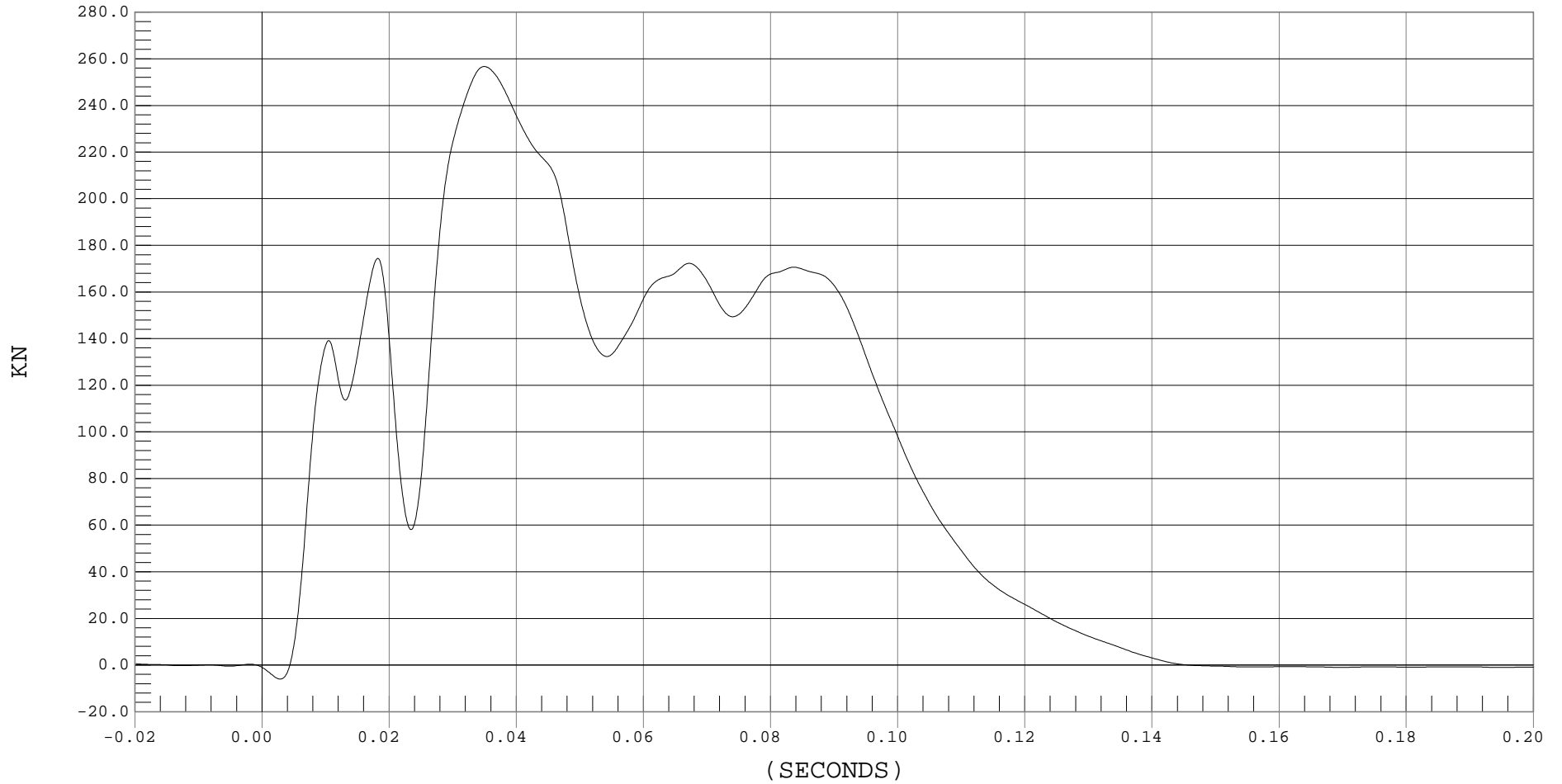
### LOWER LEFT BARRIER FORCE

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 BARRIER LOWER LEFT, C01012FF.F05

Ymin = -6.04 KN @ 0.0029 SECONDS, Ymax = 256.69 KN @ 0.0350 SECONDS





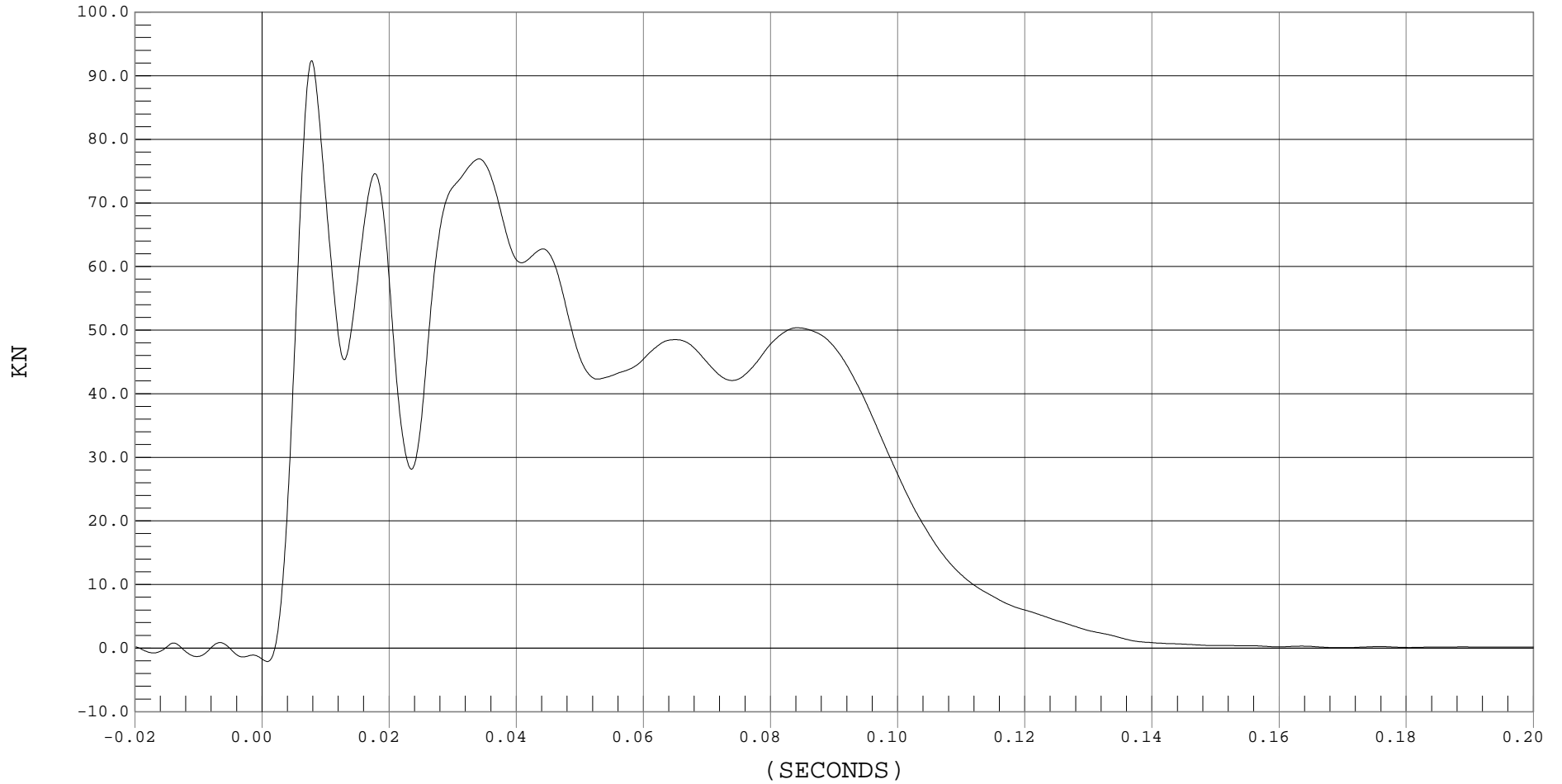
### LOWER CENTER BARRIER FORCE

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 BARRIER LOWER CENTER, C01012FF.F06

Ymin = -2.11 KN @ 0.0008 SECONDS, Ymax = 92.38 KN @ 0.0078 SECONDS





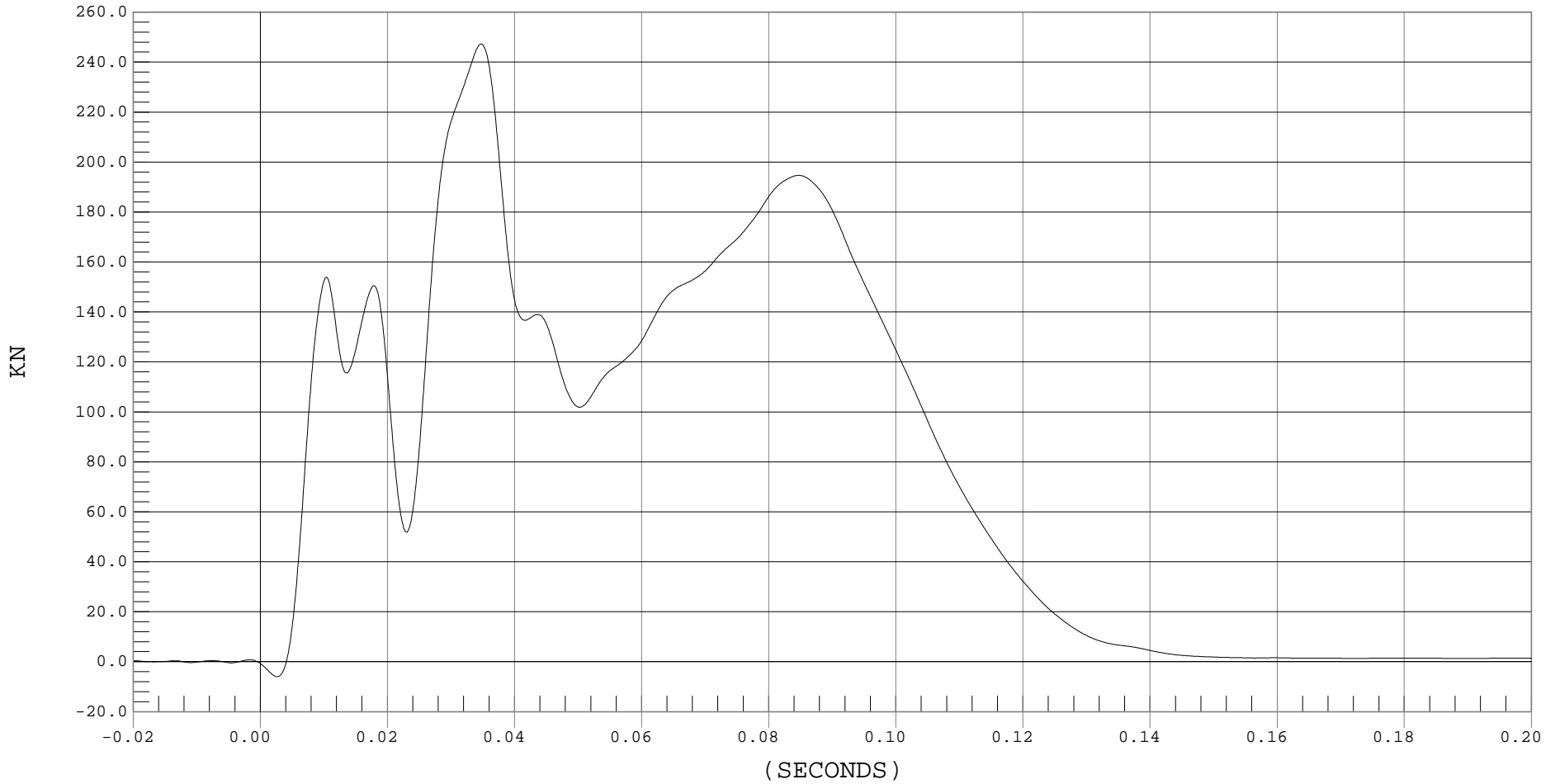
LOWER RIGHT BARRIER FORCE

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 BARRIER LOWER RIGHT, C01012FF.F07

Ymin = -6.01 KN @ 0.0027 SECONDS, Ymax = 247.22 KN @ 0.0348 SECONDS



B-143



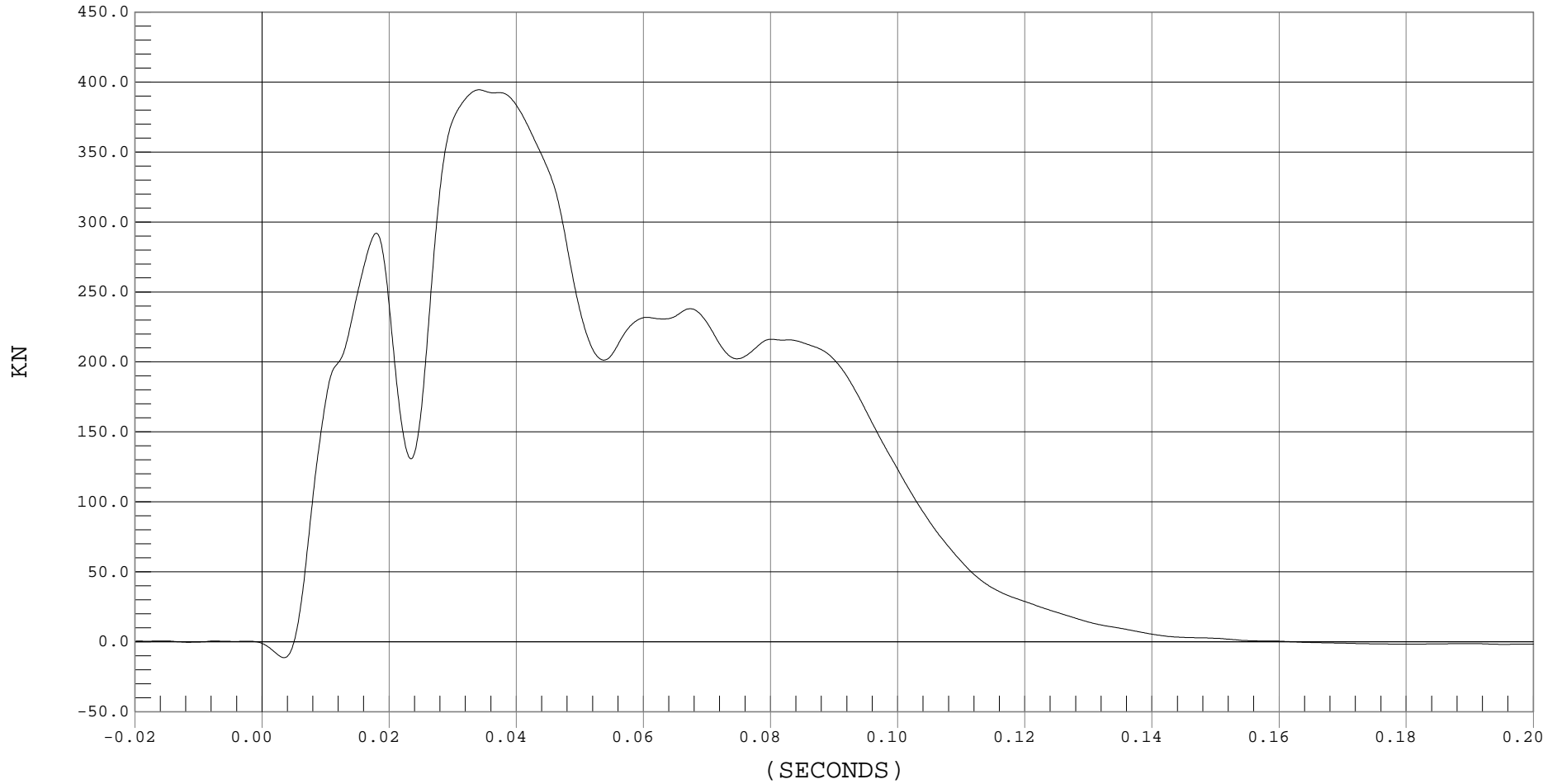
### SUM OF LEFT BARRIER FORCES

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 SUM OF LEFT BARRIER FORCES, C01012FU.F02

Ymin = -11.36 KN @ 0.0035 SECONDS, Ymax = 394.49 KN @ 0.0341 SECONDS





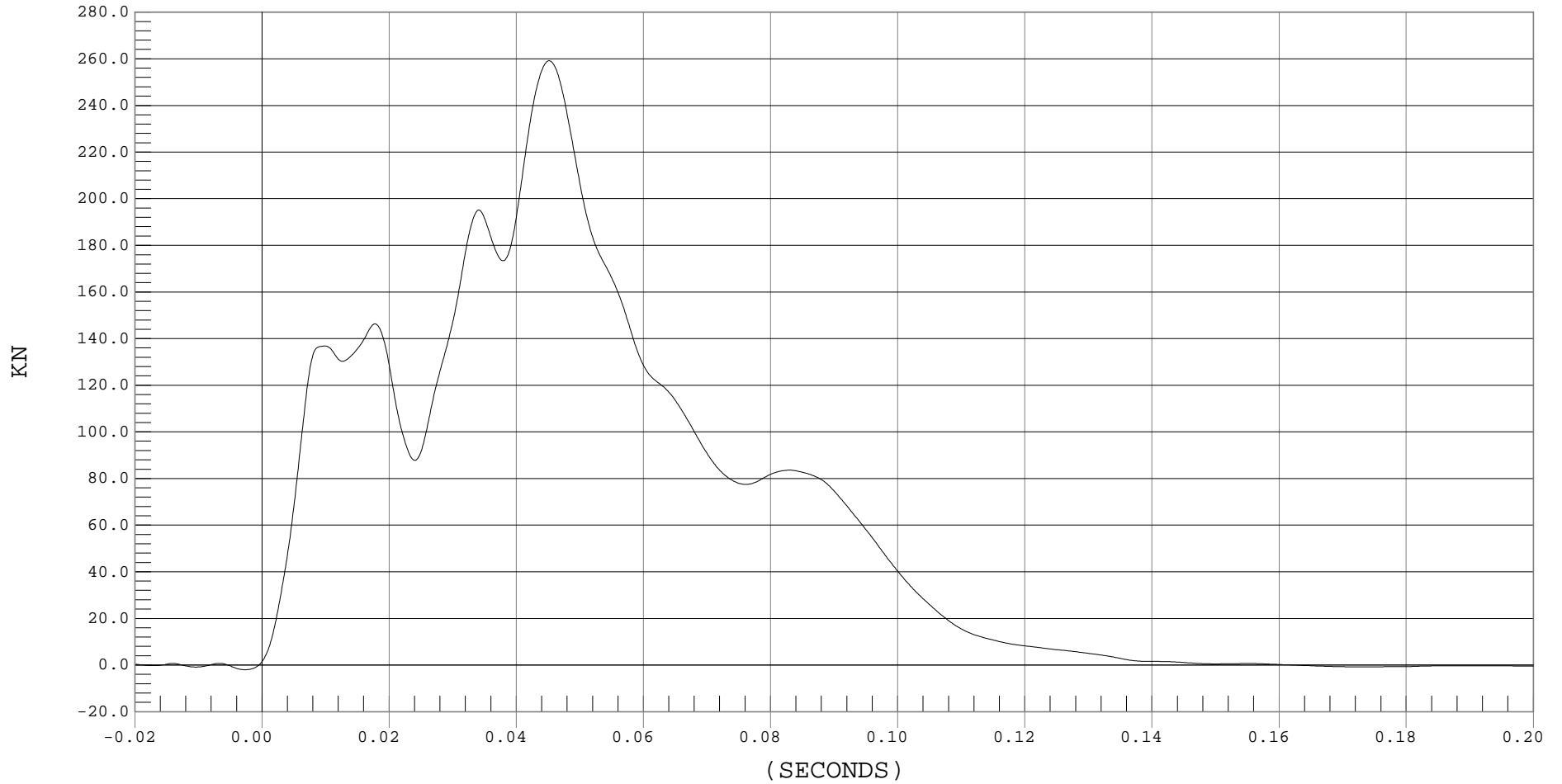
### SUM OF CENTER BARRIER FORCES

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 SUM OF CENTER BARRIER FORCES, C01012FU.F03

Ymin = -2.02 KN @ -0.0027 SECONDS, Ymax = 259.15 KN @ 0.0452 SECONDS



B-145



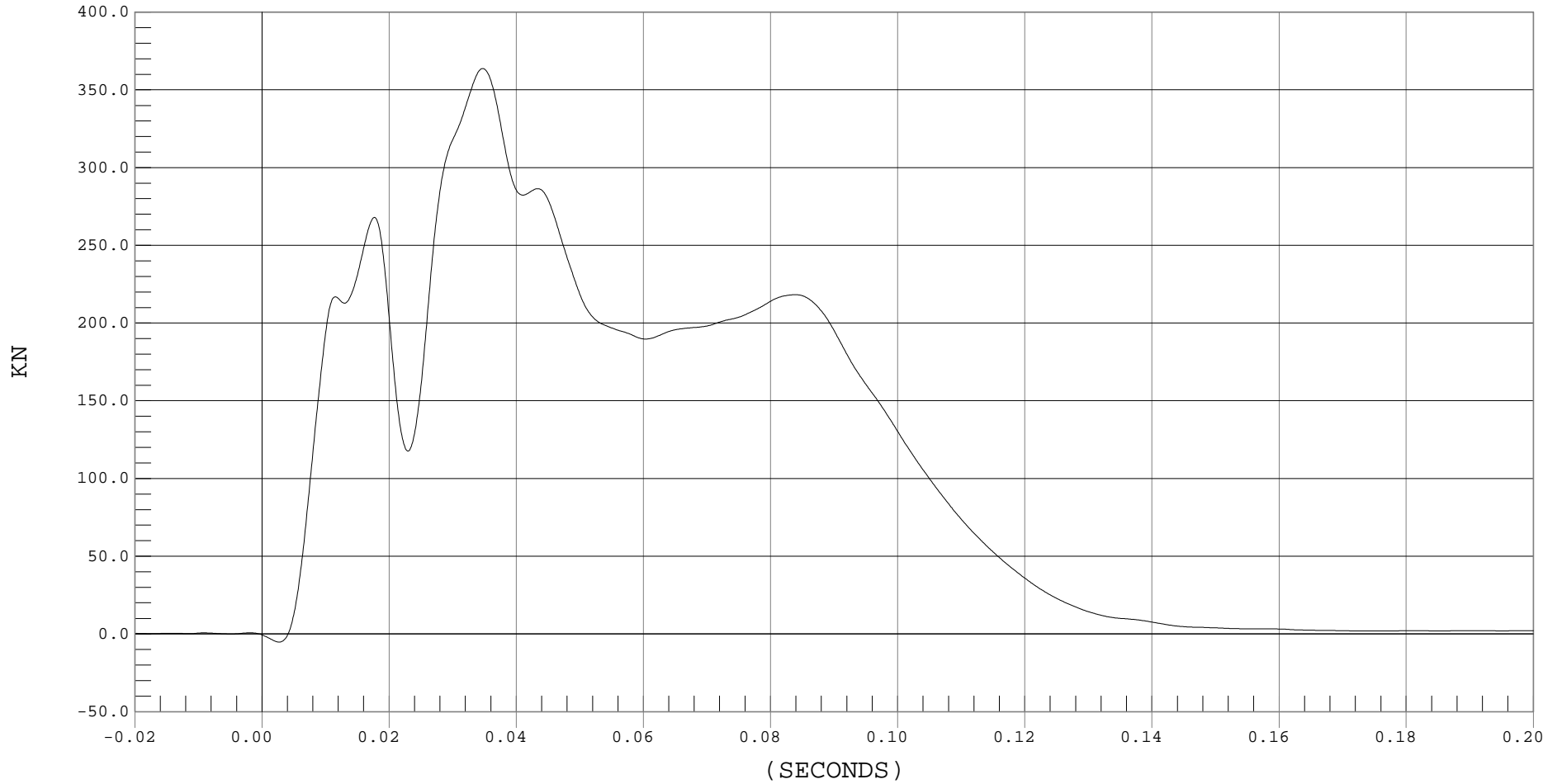
### SUM OF RIGHT BARRIER FORCES

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 SUM OF RIGHT BARRIER FORCES, C01012FU.F04

Ymin = -5.23 KN @ 0.0027 SECONDS, Ymax = 363.77 KN @ 0.0347 SECONDS





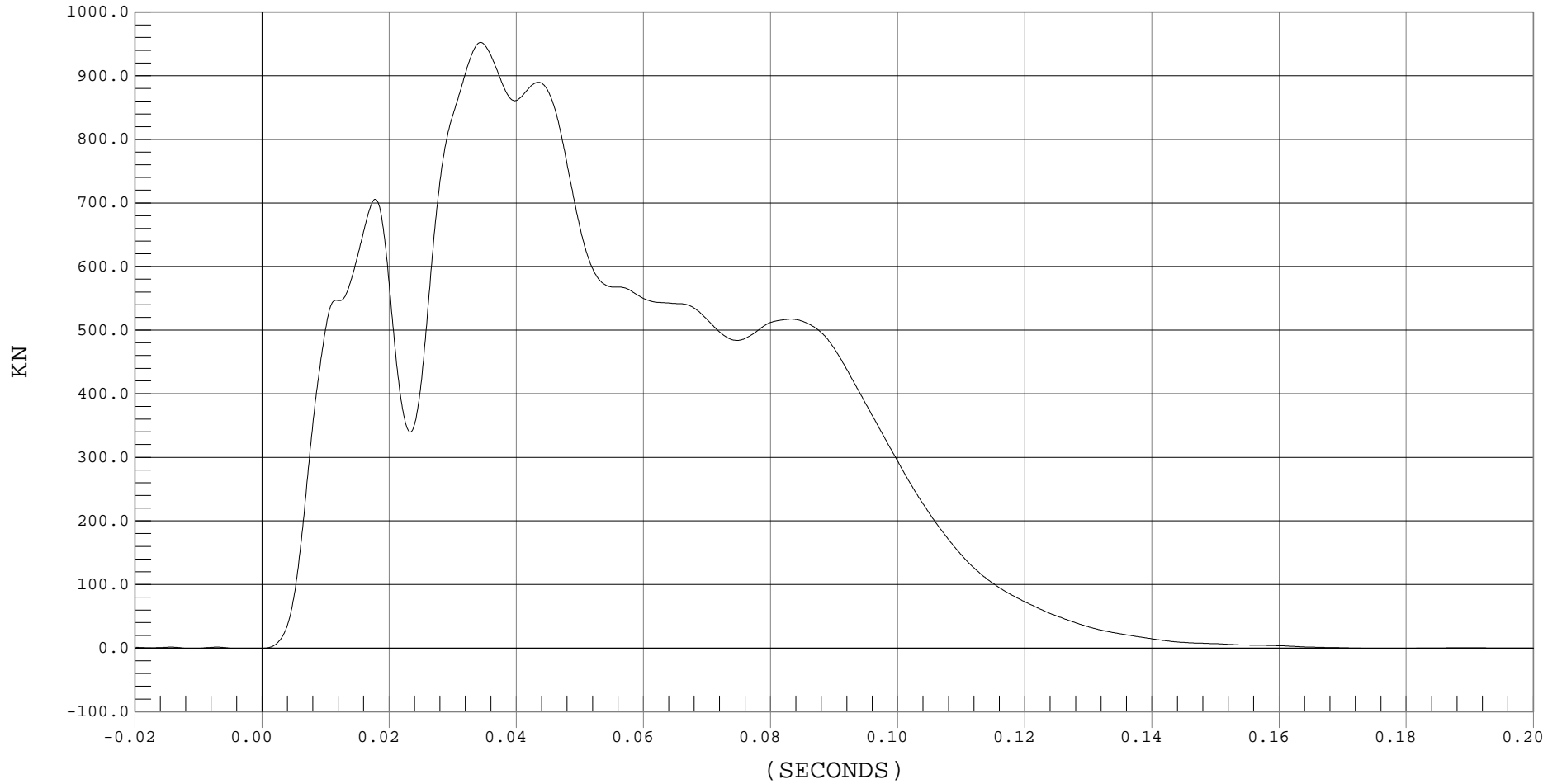
### SUM OF BARRIER FORCES

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 60

— 1 SUM OF BARRIER FORCES, C01012FU.F05

Ymin = -1.31 KN @ -0.0035 SECONDS, Ymax = 952.37 KN @ 0.0344 SECONDS



## **APPENDIX C**

### **DUMMY CALIBRATION DATA TRACES AND TABLES**

**Hybrid III Calibration Data Sheet**  
**50<sup>th</sup> Percentile Male**  
**Left Knee Impact Test**

ATD Serial No.: 065

Test I.D.: D01086

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.1°	PASS
Laboratory Relative Humidity	%	10 to 70	24%	PASS
Probe Velocity	m/s	2.07 to 2.13	2.09	PASS
Peak Probe Force	Newtons	4715 to 5782	5087	PASS
Overall Test Results				PASS

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 Test Date

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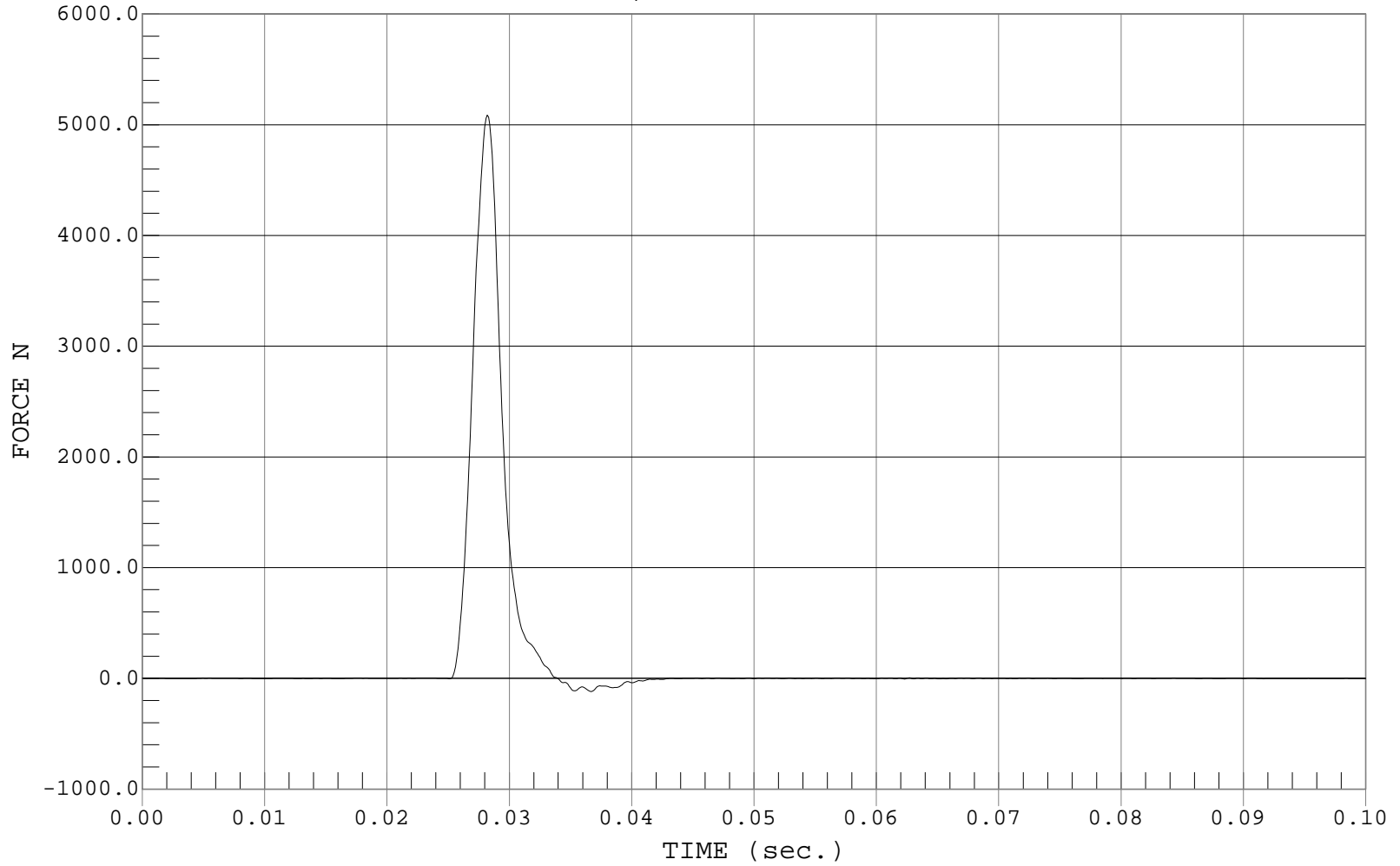
### LEFT KNEE IMPACT

Test Desc.: Dummy Calibration - Left Knee Impact  
Component: Dummy #065

Test Date: 01-23-01  
Speed: 6.87 FT/SEC, 2.09 M/SEC

— 1 FORCE, D01086FF.F09

Ymin = -118.83 N @ 0.0367 sec., Ymax = 5086.92 N @ 0.0282 sec.



**Hybrid III Calibration Data Sheet**  
**50<sup>th</sup> Percentile Male**  
**Right Knee Impact Test**

ATD Serial No.: 065

Test I.D.: D01085

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.1°	PASS
Laboratory Relative Humidity	%	10 to 70	24%	PASS
Probe Velocity	m/s	2.07 to 2.13	2.09	PASS
Peak Probe Force	Newtons	4715 to 5782	5243	PASS
Overall Test Results				PASS

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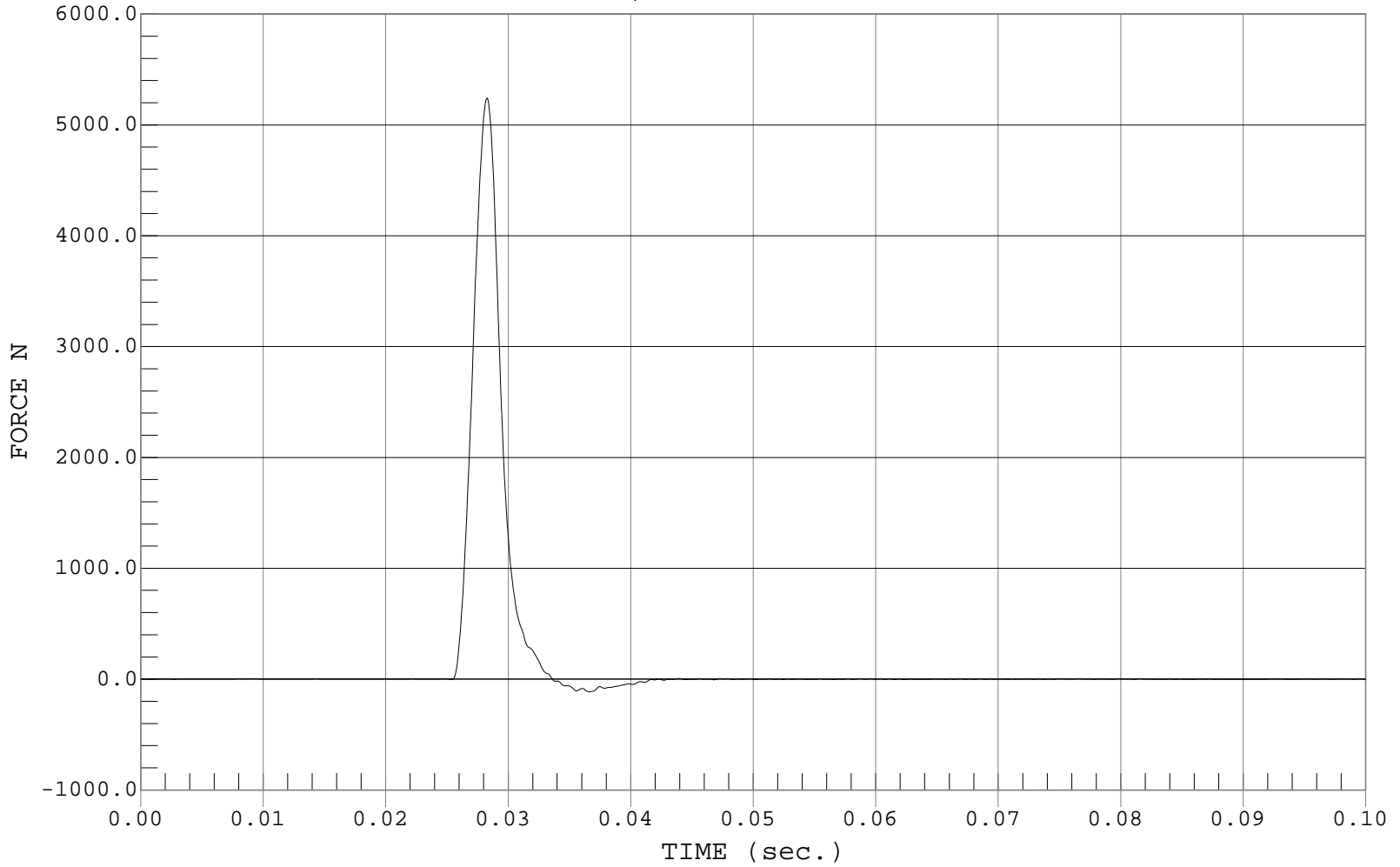
### RIGHT KNEE IMPACT

Test Desc.: Dummy Calibration - Right Knee Impact  
Component: Dummy #065

Test Date: 01-23-01  
Speed: 6.86 FT/SEC, 2.09 M/SEC

— 1 FORCE, D01085FF.F09

Ymin = -114.01 N @ 0.0366 sec., Ymax = 5242.83 N @ 0.0283 sec.



**Hybrid III Calibration Data Sheet**  
**50<sup>th</sup> Percentile Male**  
**Head Drop Calibration**

ATD Serial No.: 065

Test I.D.: D01081

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.3°	PASS
Laboratory Relative Humidity	%	10 to 70	22%	PASS
Peak Resultant Acceleration	G's	225.0 to 275.0	251.3	PASS
Peak Probe Force	G's	≤15.0	7.6	PASS
Is Acceleration Unimodal?	Yes/No	Yes	Yes	PASS
Overall Test Results				PASS

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 Test Date

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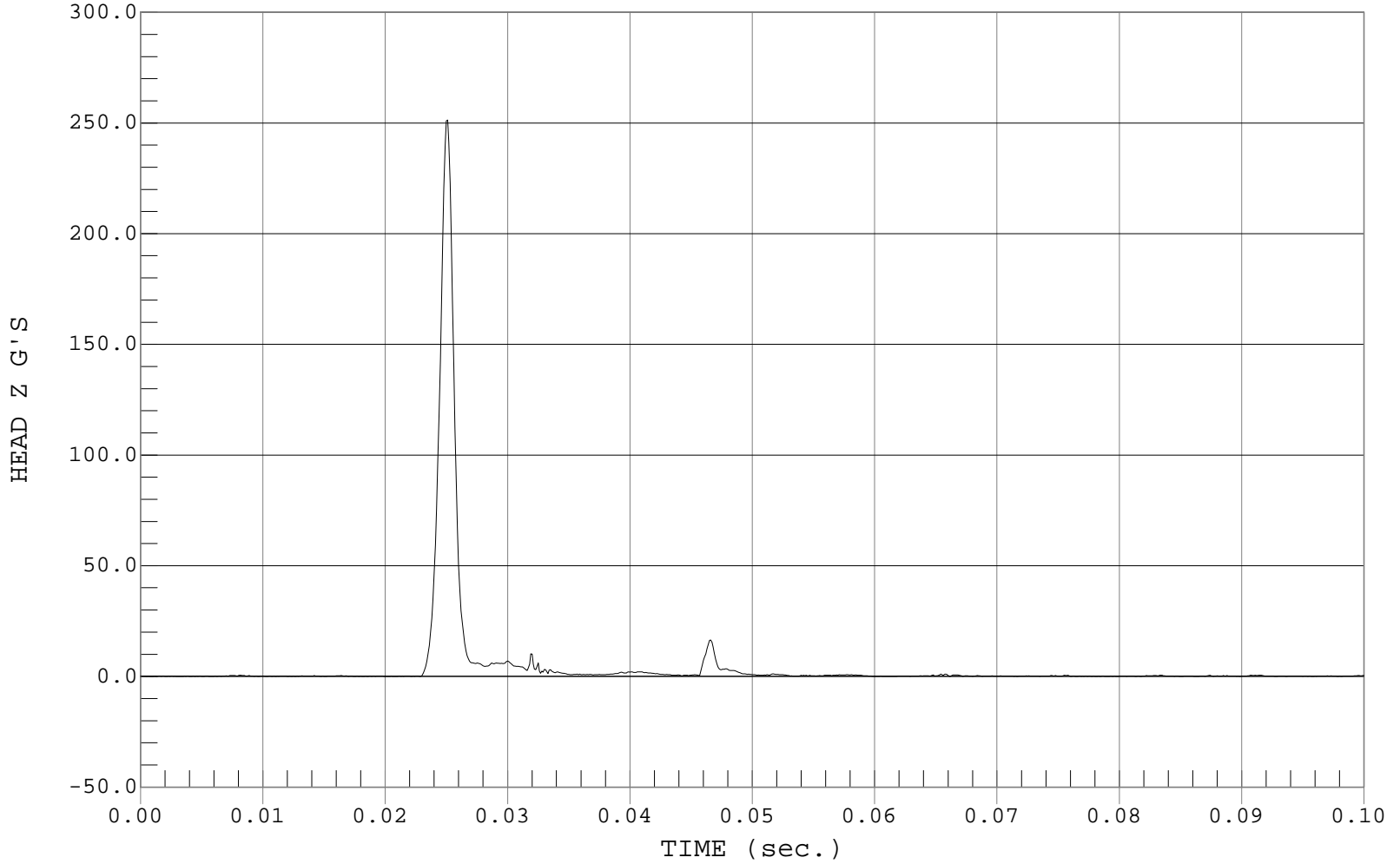
PEAK RESULTANT ACCELERATION

Test Desc.: Dummy Calibration - Head Drop  
Component: Dummy #065

Test Date: 01-22-01  
Speed: 0.00 FT/SEC, 0.00 M/SEC

— 1 HEAD Z, D01081AV.A01

Ymin = .03 G'S @ 0.0010 sec., Ymax = 251.29 G'S @ 0.0251 sec.





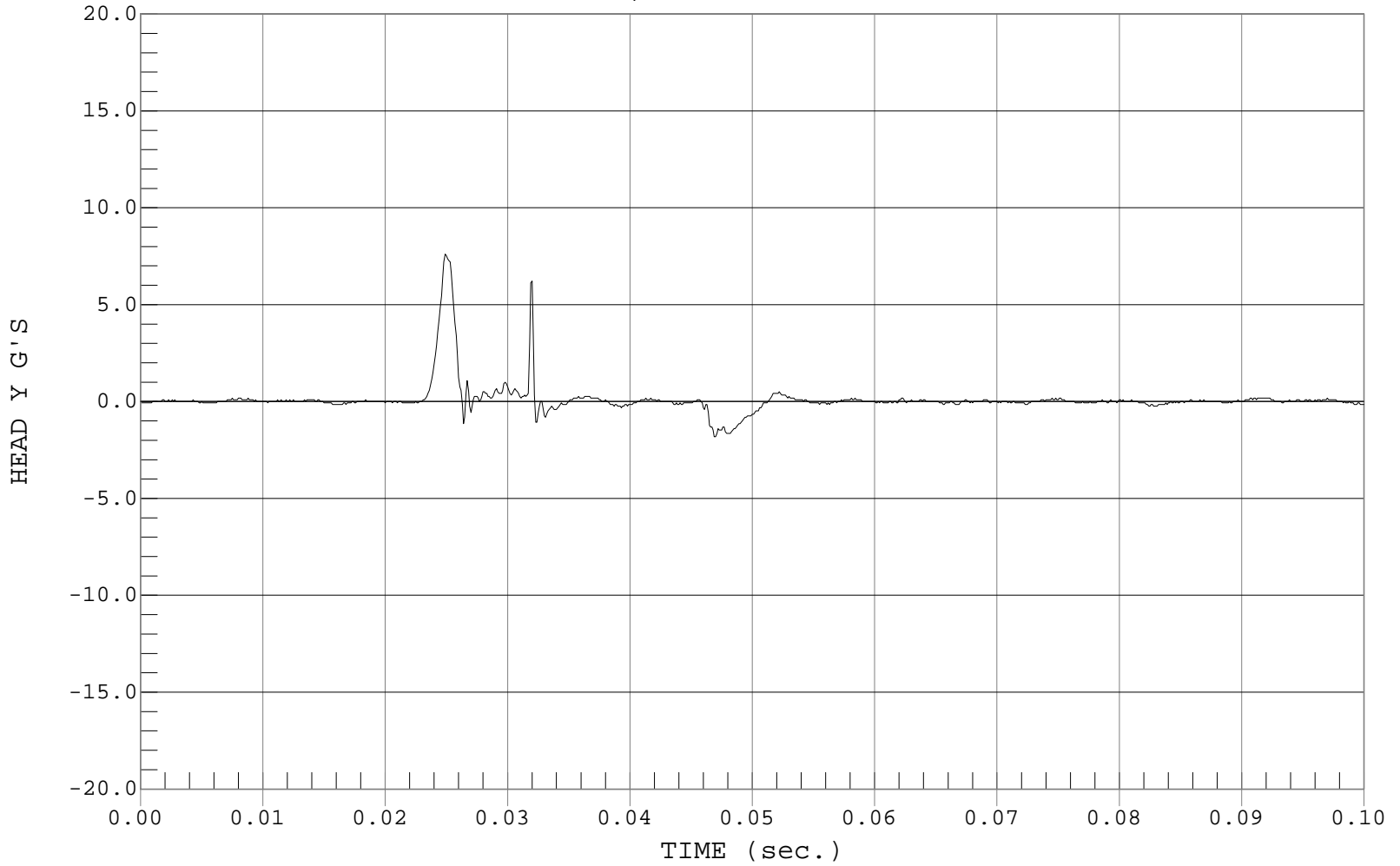
### PEAK LATERAL ACCELARATION

Test Desc.: Dummy Calibration - Head Drop  
Component: Dummy #065

Test Date: 01-22-01  
Speed: 0.00 FT/SEC, 0.00 M/SEC

— 1 HEAD Y, D01081AR.A02

Ymin = -1.81 G'S @ 0.0469 sec., Ymax = 7.61 G'S @ 0.0249 sec.



**Hybrid III Calibration Data Sheet**  
**50<sup>th</sup> Percentile Male**  
**Thorax Impact Test**

ATD Serial No.: 065

Test I.D.: D01084

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1°	PASS
Laboratory Relative Humidity	%	10 to 70	26%	PASS
Probe Velocity	m/s	6.58 to 6.82	6.65	PASS
Peak Probe Force	Newtons	5159 to 5893	5617	PASS
Peak Sternum Displacement	cm	6.35 to 7.26	6.99	PASS
Internal Hysteresis	%	69 to 85	71%	PASS
Overall Test Results				PASS

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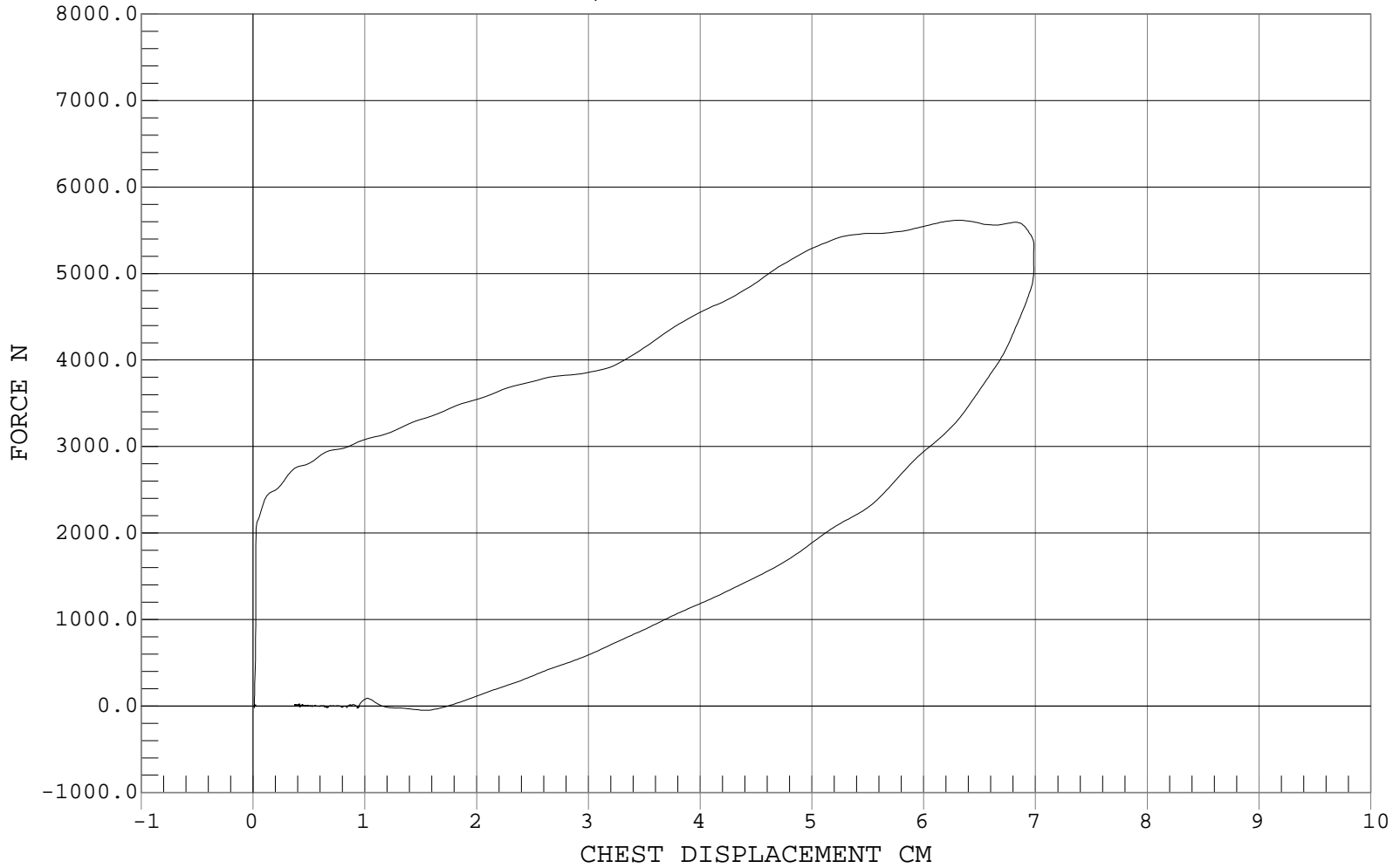
### THORAX IMPACT

Test Desc.: Dummy Calibration - Chest Impact  
Component: Dummy #065

Test Date: 01-23-01  
Speed: 21.82 FT/SEC, 6.65 M/SEC

— 1 FORCE, D01084CH.FVD

Ymin = -50.32 N @ 1.5322 CM, Ymax = 5616.76 N @ 6.3019 CM



**Hybrid III Calibration Data Sheet**  
**50<sup>th</sup> Percentile Male**  
**Neck Flexion Test**

ATD Serial No.: 065

Test I.D.: D01082

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1°	PASS
Laboratory Relative Humidity		%	10 to 70	23%	PASS
Pendulum Velocity		m/s	6.89 to 7.13	7.01	PASS
Pendulum Deceleration	10 Msec.	G's	22.50 to 27.50	24.79	PASS
	20 Msec.	G's	17.60 to 22.60	20.45	PASS
	30 Msec.	G's	12.50 to 18.50	15.21	PASS
Peak Pendulum Decel. After 30 Msec.		G's	≤29.0	15.2	PASS
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	35.5	PASS
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	76.1	PASS
	Time	Msec.	57.0 to 64.0	58.3	PASS
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	114.5	PASS
Moment About Occipital Condyle	Maximum	N· m	84.1 to 108.5	96.2	PASS
	Time	Msec.	47.0 to 58.0	49.0	PASS
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	100.3	PASS
				Overall Test Results	PASS

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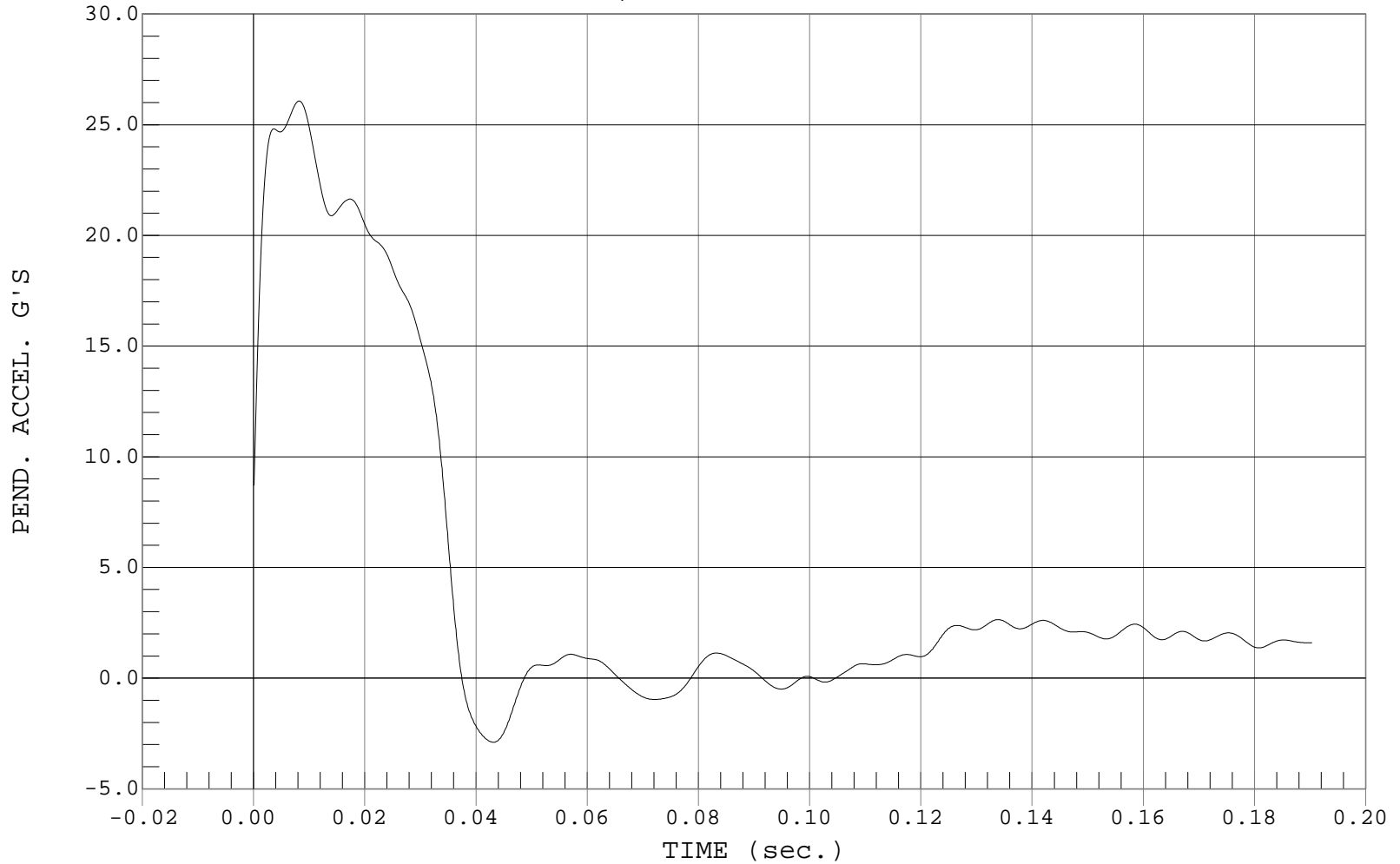
### PENDULUM DECELERATION

Test Desc.: Dummy Calibration - Neck Flexion  
Component: Dummy #065

Test Date: 01-23-01  
Speed: 22.99 FT/SEC, 7.01 M/SEC

— 1 PEND. ACCEL., D01082AF.A04

Ymin = -2.9 G'S @ 0.0431 sec., Ymax = 26.07 G'S @ 0.0082 sec.





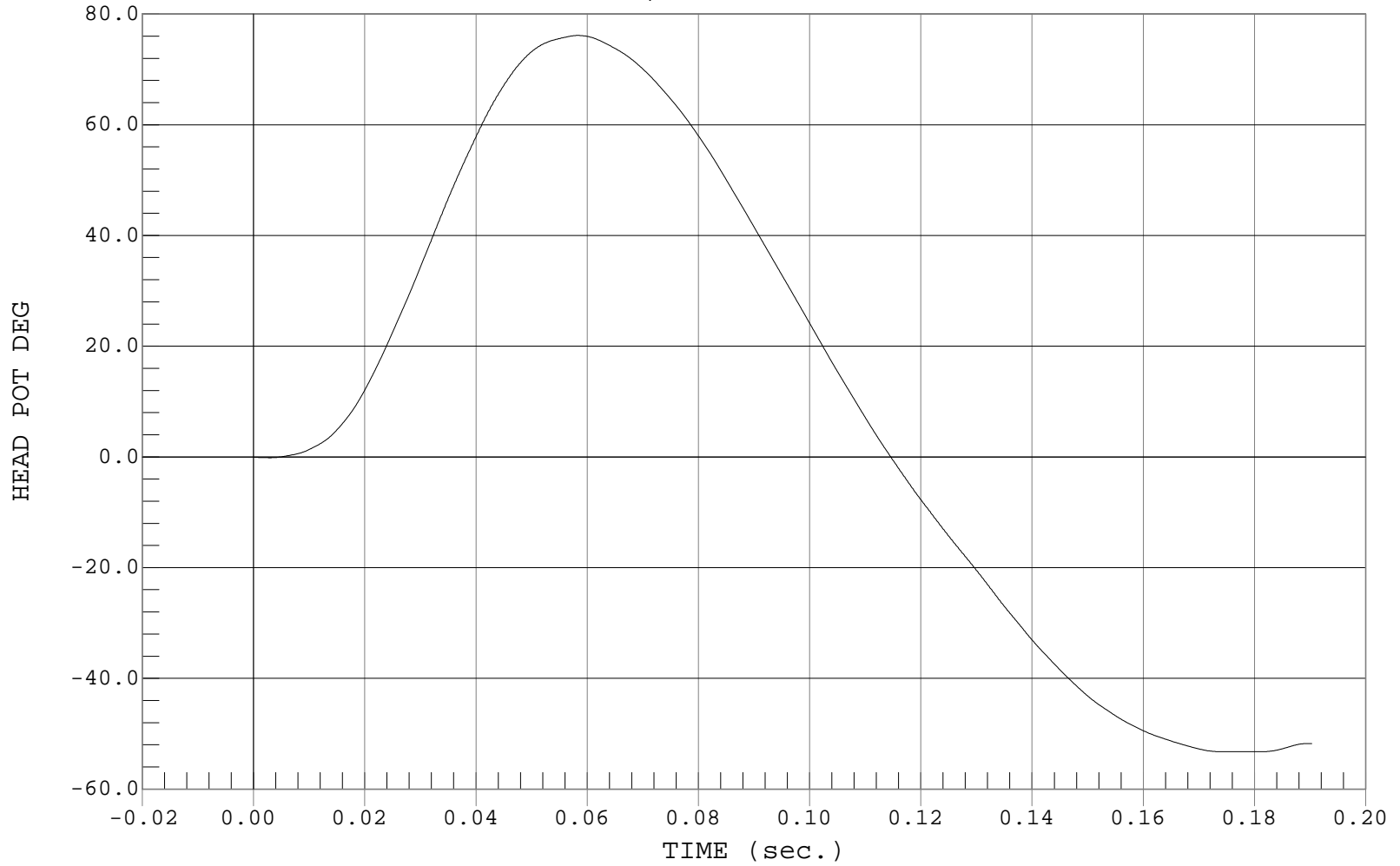
### NECK ROTATION

Test Desc.: Dummy Calibration - Neck Flexion  
Component: Dummy #065

Test Date: 01-23-01  
Speed: 22.99 FT/SEC, 7.01 M/SEC

— 1 HEAD POT, D01082DU.D05

Ymin = -53.26 DEG @ 0.1806 sec., Ymax = 76.13 DEG @ 0.0583 sec.





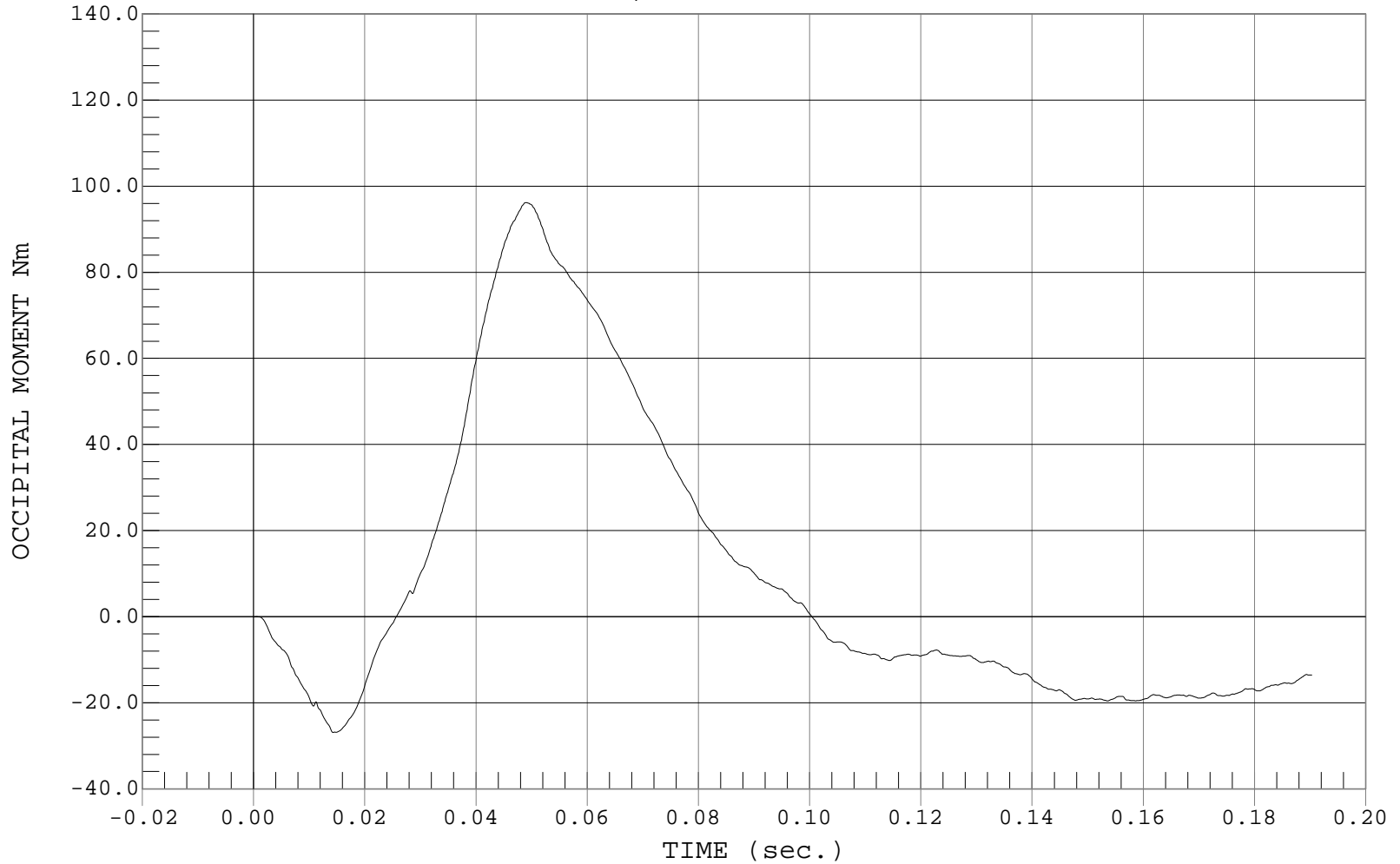
### OCCIPITAL MOMENT

Test Desc.: Dummy Calibration - Neck Flexion  
Component: Dummy #065

Test Date: 01-23-01  
Speed: 22.99 FT/SEC, 7.01 M/SEC

— 1 OCCIPITAL MOMENT, D01082NK.MNT

Ymin = -26.89 Nm @ 0.0143 sec., Ymax = 96.17 Nm @ 0.0490 sec.



**Hybrid III Calibration Data Sheet**  
**50<sup>th</sup> Percentile Male**  
**Neck Extension Test**

ATD Serial No.: 065

Test I.D.: D01083

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.0°	PASS
Laboratory Relative Humidity		%	10 to 70	23%	PASS
Pendulum Velocity		m/s	65.95 to 6.19	6.07	PASS
Pendulum Deceleration	10 Msec.	G's	17.20 to 21.20	17.68	PASS
	20 Msec.	G's	14.00 to 19.00	15.67	PASS
	30 Msec.	G's	11.00 to 16.00	12.37	PASS
Peak Pendulum Decel. After 30 Msec.		G's	≤22.0	12.4	PASS
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	43.3	PASS
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	99.8	PASS
	Time	Msec.	72.0 to 82.0	79.7	PASS
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	158.5	PASS
Moment About Occipital Condyle	Maximum	N· m	-52.9 to -79.9	-62.6	PASS
	Time	Msec.	65.0 to 79.0	74.7	PASS
Negative Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	147.6	PASS
				Overall Test Results	PASS

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Laboratory Technician

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Test Date

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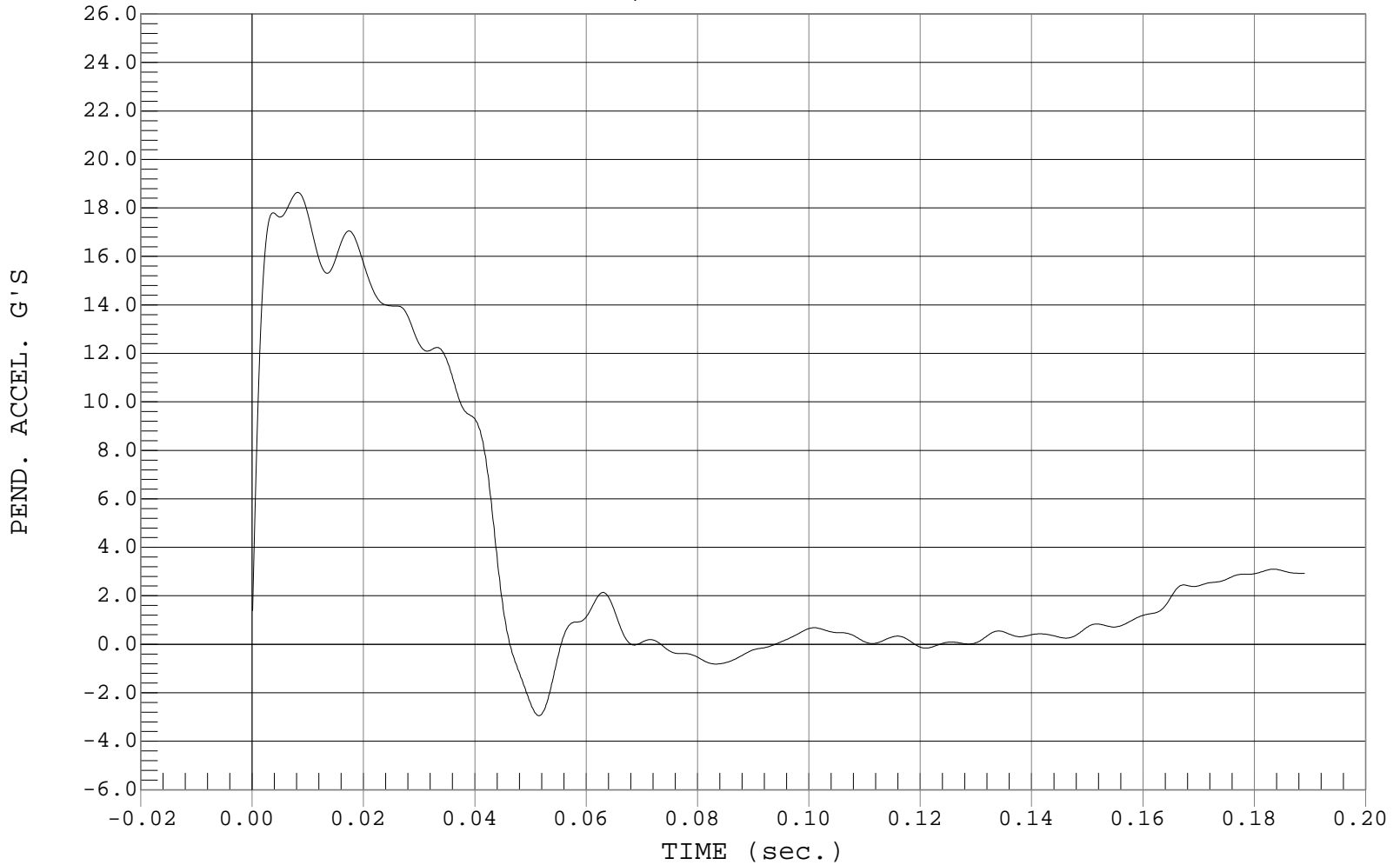
### PENDULUM DECELERATION

Test Desc.: Dummy Calibration - Neck Extension  
Component: Dummy #065

Test Date: 01-23-01  
Speed: 19.90 FT/SEC, 6.07 M/SEC

— 1 PEND. ACCEL., D01083AF.A04

Ymin = -2.95 G'S @ 0.0515 sec., Ymax = 18.64 G'S @ 0.0082 sec.





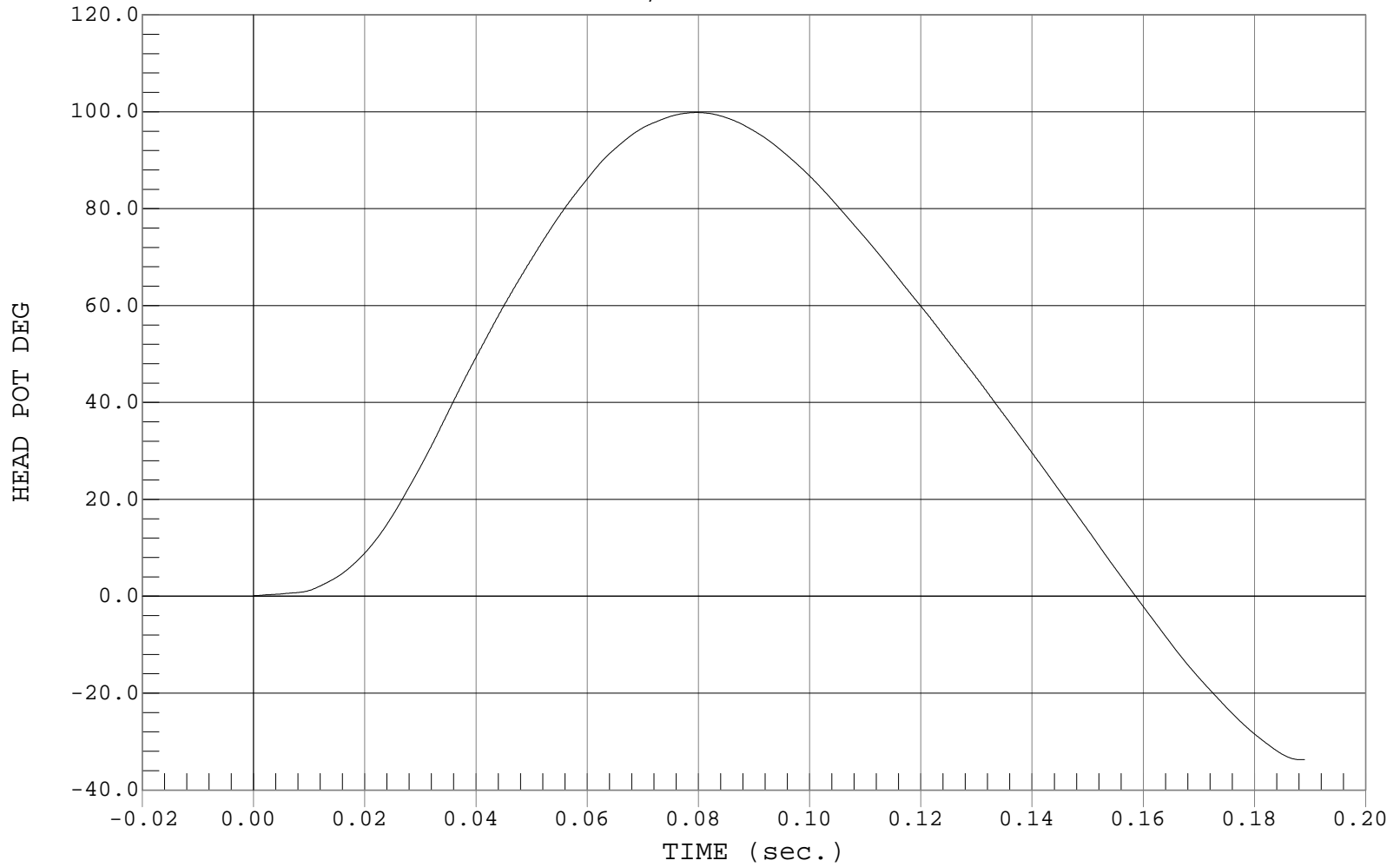
### NECK ROTATION

Test Desc.: Dummy Calibration - Neck Extension  
Component: Dummy #065

Test Date: 01-23-01  
Speed: 19.90 FT/SEC, 6.07 M/SEC

— 1 HEAD POT, D01083DU.D05

Ymin = -33.71 DEG @ 0.1883 sec., Ymax = 99.84 DEG @ 0.0797 sec.





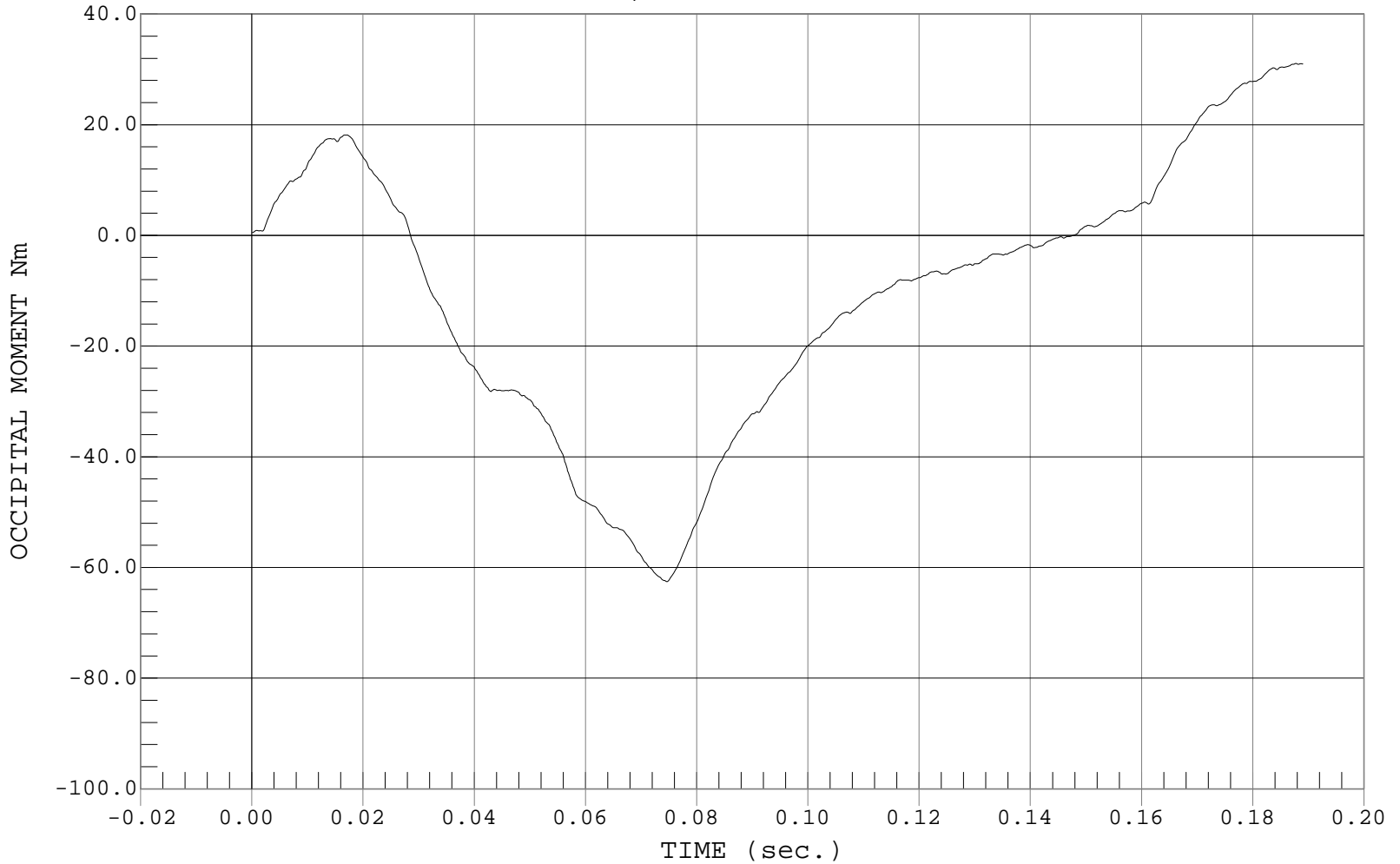
### OCCIPITAL MOMENT

Test Desc.: Dummy Calibration - Neck Extension  
Component: Dummy #065

Test Date: 01-23-01  
Speed: 19.90 FT/SEC, 6.07 M/SEC

— 1 OCCIPITAL MOMENT, D01083NK.MNT

Ymin = -62.56 Nm @ 0.0747 sec., Ymax = 31.08 Nm @ 0.1878 sec.



**Hybrid III Calibration Data Sheet**  
**50<sup>th</sup> Percentile Male**  
**Hip-Femur Flexion Test**

ATD Serial No.: 065

Test I.D.: D01089/0

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Temperature	°C	18.9 to 25.6	21.0°	21.0°	PASS
Relative Humidity	%	10 to 70	25%	25%	PASS
Rotation Rate	deg/sec	5 – 10	Yes	Yes	PASS
30 Degrees	Nm	94.9 Nm Max.	70.3	63.5	PASS
150 ft-lbf / 203.4 Nm	Deg	40 – 50 Degree Max. rotation	45°	44°	PASS
Overall Test Results					PASS

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Laboratory Technician

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Test Date

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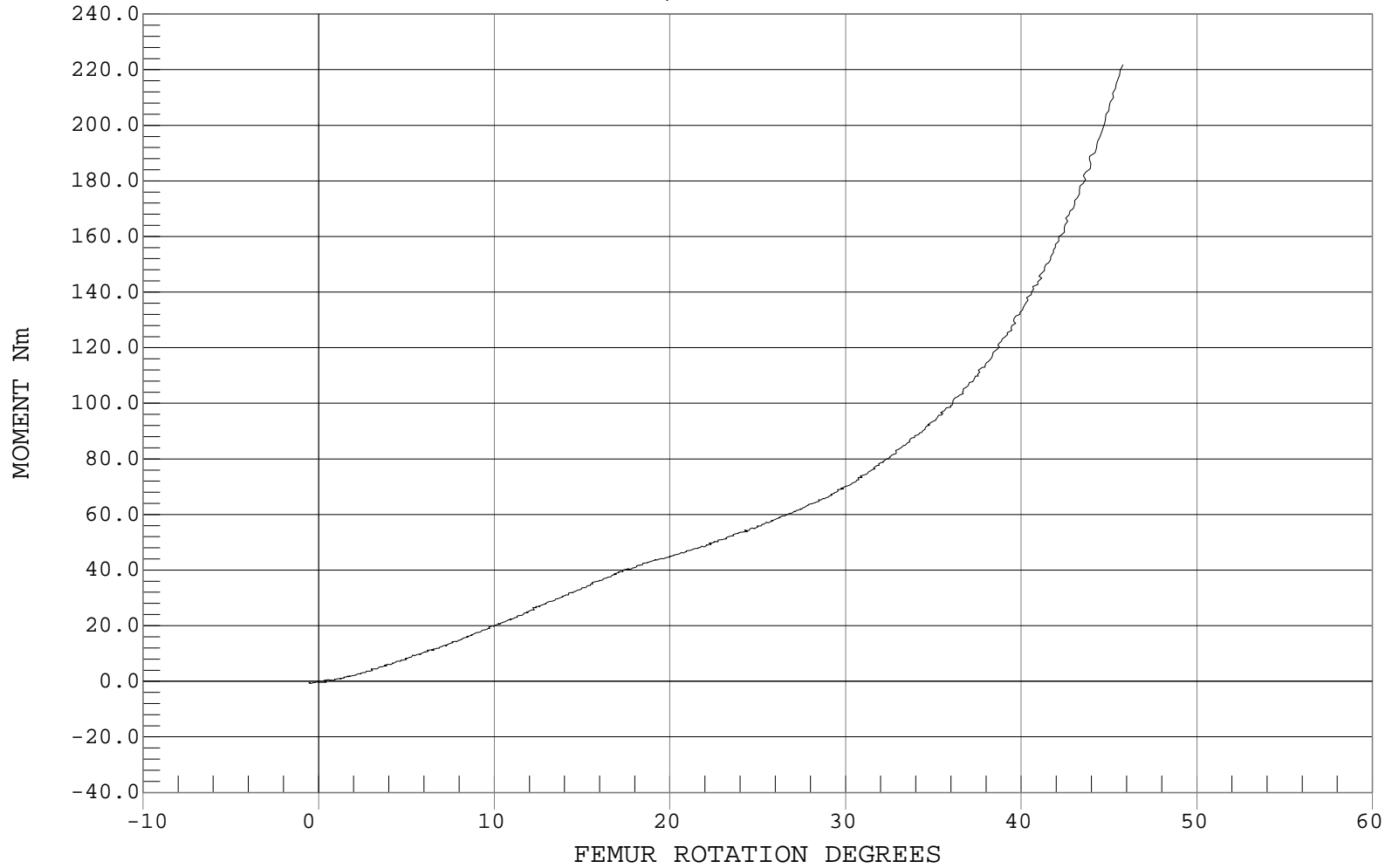
### HIP-FEMUR FLEXION

Test Desc.: DUMMY CALIBRATION - HIP-FEMUR FLEXION  
Component: DUMMY # 065 RIGHT FEMUR

Test Date: 01-23-01  
Speed: 0.00 FT/SEC, 0.00 M/SEC

— 1 MOMENT, D01089FC.F14

Ymin =  $-0.77$  Nm @  $-0.3888$  DEGREES, Ymax =  $221.72$  Nm @  $45.7971$  DEGREES





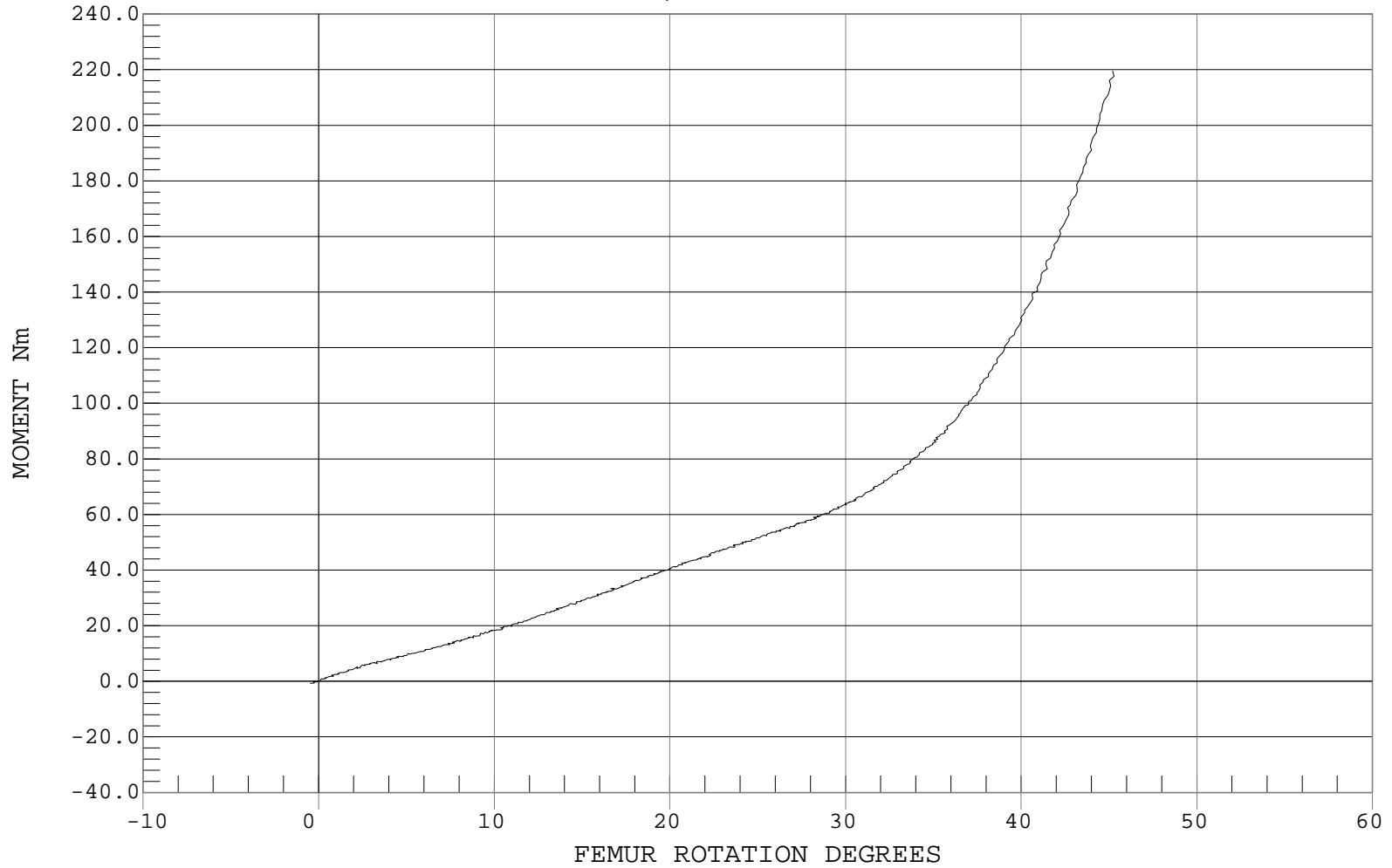
### HIP-FEMUR FLEXION

Test Desc.: DUMMY CALIBRATION - HIP-FEMUR FLEXION  
Component: DUMMY # 065 LEFT FEMUR

Test Date: 01-23-01  
Speed: 0.00 FT/SEC, 0.00 M/SEC

— 1 MOMENT, D01080FC.F14

Ymin =  $-0.75$  Nm @  $-0.4665$  DEGREES, Ymax =  $219.56$  Nm @  $45.2139$  DEGREES



## Hybrid III Calibration Data Sheet

### 50<sup>th</sup> Percentile Male

#### External Measurements

ATD Serial No.: 065

Test I.D.: D0108

External Measurement Data				
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.4 to 22.1	21.1°	PASS
Laboratory Relative Humidity	%	10 to 70	33%	PASS
A – Total sitting height	mm	878 to 889	884	PASS
B – Shoulder pivot height	mm	506 to 521	516	PASS
C – “H” point height	mm	84 to 89	86	PASS
D – “H” point from seat back	mm	135 to 140	137	PASS
E – Shoulder pivot from back	mm	84 to 94	86	PASS
F – Thigh clearance	mm	140 to 155	150	PASS
G – Elbow back to wrist pivot	mm	290 to 305	292	PASS
H – Skull cap to back line	mm	41 to 46	43	PASS
I – Shoulder to elbow length	mm	330 to 345	335	PASS
J – Elbow rest height	mm	191 to 211	206	PASS
K – Buttock to knee length	mm	579 to 605	597	PASS
L – Popliteal length	mm	429 to 455	452	PASS
M – Knee pivot height	mm	485 to 500	493	PASS
N – Buttock popliteal length	mm	452 to 478	472	PASS
O – Chest depth	mm	213 to 229	216	PASS
P – Foot breadth	mm	252 to 267	264	PASS
V – Shoulder breadth	mm	422 to 437	434	PASS
W – Foot length	mm	91 to 107	99	PASS
Y – Chest circumference	mm	970 to 1001	993	PASS
Z – Waist circumference	mm	836 to 866	851	PASS
AA – Location for chest circumference	mm	429 to 434	432	PASS
BB – Location for waist circumference	mm	226 to 231	229	PASS
Overall Test Results				PASS

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Laboratory Technician

1/23/01  
Test Date

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Approved By

**Hybrid III Calibration Data Sheet**

**50<sup>th</sup> Percentile Male**

**Left Knee Impact Test**

ATD Serial No.: 066

Test I.D.: D01096

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.1°	PASS
Laboratory Relative Humidity	%	10 to 70	25%	PASS
Probe Velocity	m/s	2.07 to 2.13	2.11	PASS
Peak Probe Force	Newtons	4715 to 5782	4757	PASS
Overall Test Results				PASS

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Laboratory Technician

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Test Date

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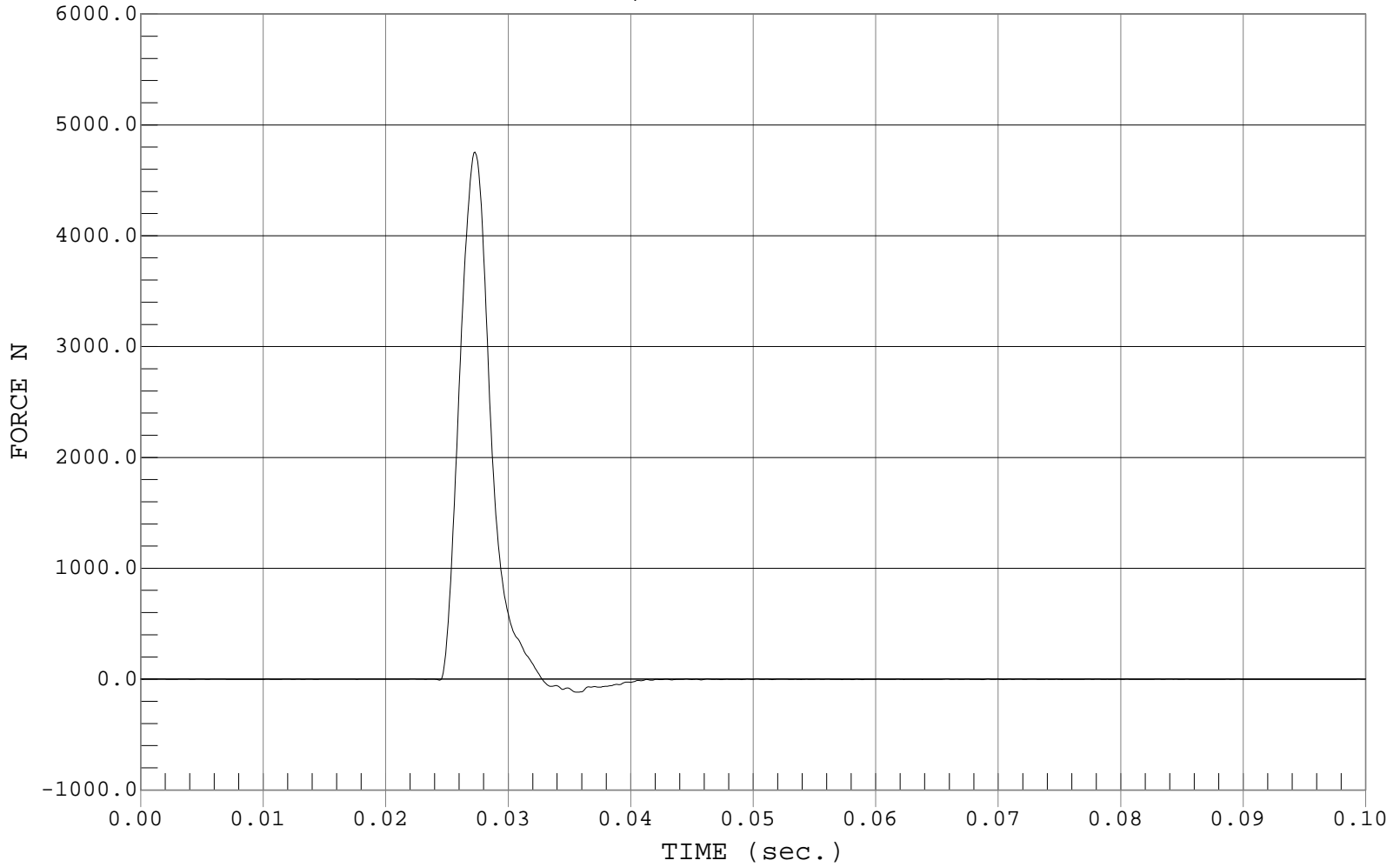
LEFT KNEE IMPACT

Test Desc.: Dummy Calibration - Left Knee Impact  
Component: Dummy #066

Test Date: 01-23-01  
Speed: 6.91 FT/SEC, 2.11 M/SEC

— 1 FORCE, D01096FF.F09

Ymin = -117.82 N @ 0.0356 sec., Ymax = 4756.62 N @ 0.0273 sec.



**Hybrid III Calibration Data Sheet**  
**50<sup>th</sup> Percentile Male**  
**Right Knee Impact Test**

ATD Serial No.: 066

Test I.D.: D01095

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.2°	PASS
Laboratory Relative Humidity	%	10 to 70	25%	PASS
Probe Velocity	m/s	2.07 to 2.13	2.11	PASS
Peak Probe Force	Newtons	4715 to 5782	4776	PASS
Overall Test Results				PASS

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 Laboratory Technician

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 1/23/01  
 Test Date

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 Approved By



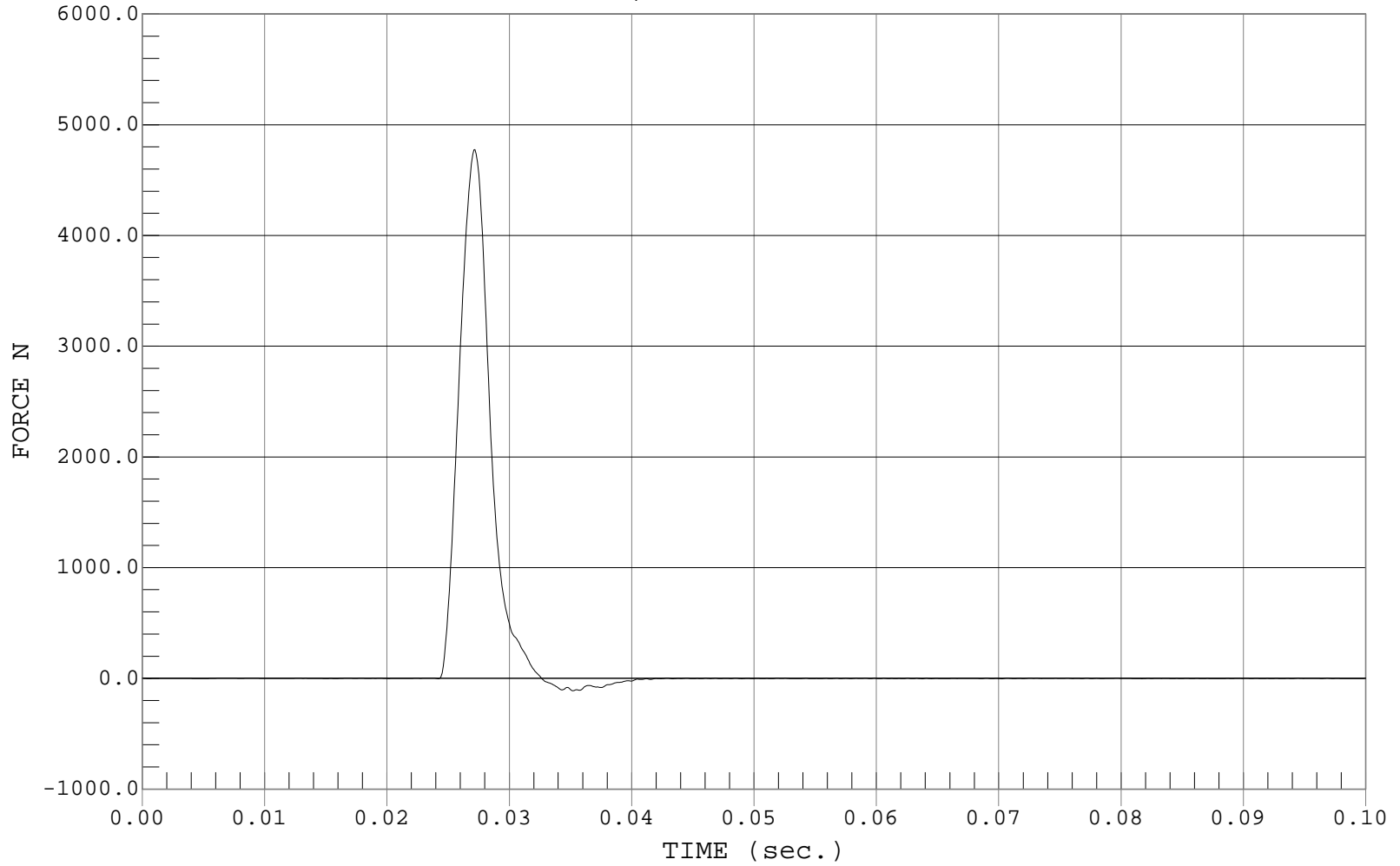
### RIGHT KNEE IMPACT

Test Desc.: Dummy Calibration - Right Knee Impact  
Component: Dummy #066

Test Date: 01-23-01  
Speed: 6.91 FT/SEC, 2.11 M/SEC

— 1 FORCE, D01095FF.F09

Ymin = -112.61 N @ 0.0352 sec., Ymax = 4775.63 N @ 0.0272 sec.



**Hybrid III Calibration Data Sheet**  
**50<sup>th</sup> Percentile Male**  
**Head Drop Calibration**

ATD Serial No.: 066

Test I.D.: D01091

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.3°	PASS
Laboratory Relative Humidity	%	10 to 70	23%	PASS
Peak Resultant Accel.	G's	225.0 to 275.0	262.9	PASS
Peak Lateral Accel.	G's	≤±15.0	10.0	PASS
Is Acceleration Unimodal?	Yes/No	Yes	Yes	PASS
Overall Test Results				PASS

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 Laboratory Technician

1/22/01  
 Test Date

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 Approved By



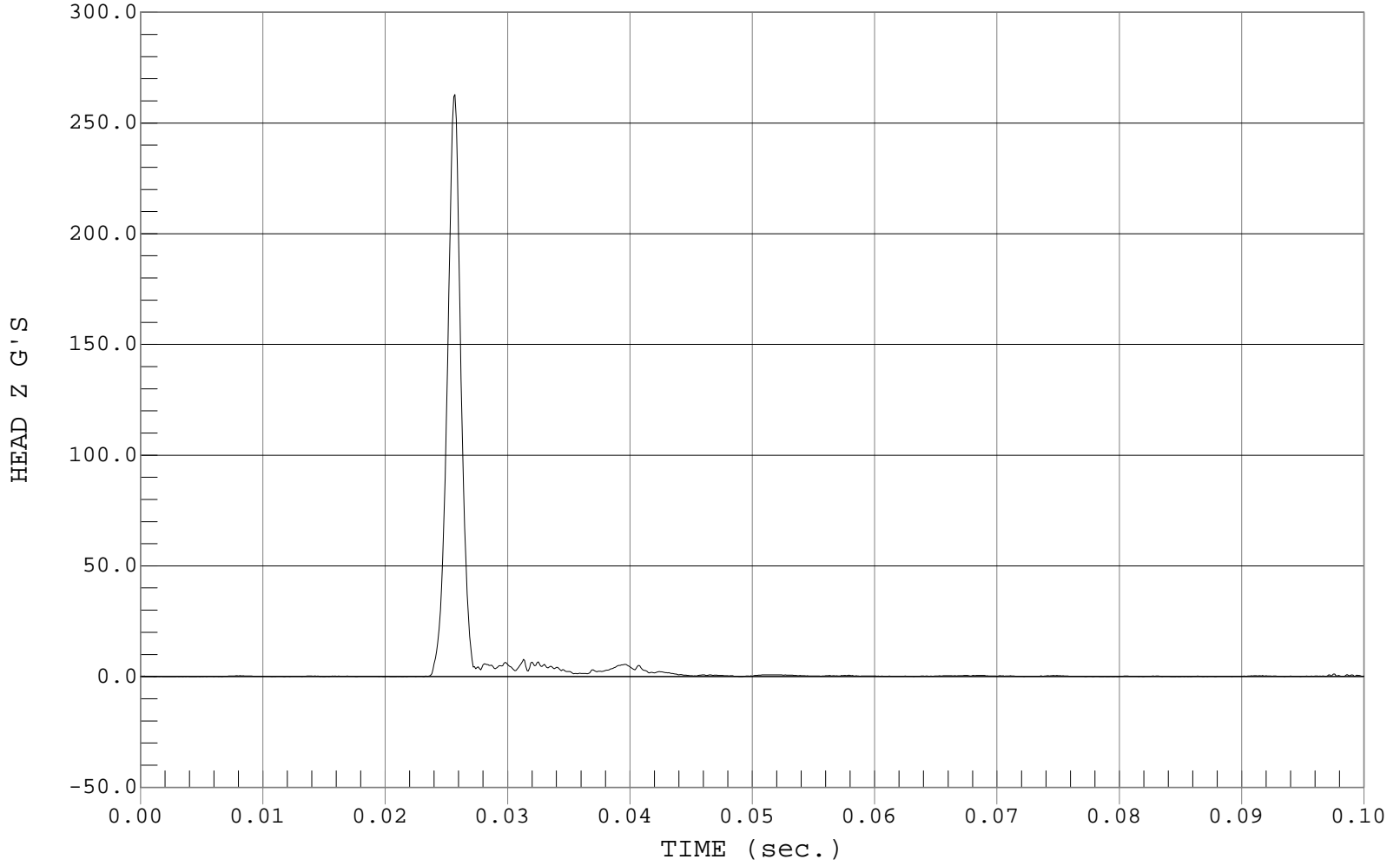
PEAK RESULTANT ACCELERATION

Test Desc.: Dummy Calibration - Head Drop  
Component: Dummy #066

Test Date: 01-22-01  
Speed: 0.00 FT/SEC, 0.00 M/SEC

— 1 HEAD Z, D01091AV.A01

Ymin = .04 G'S @ 0.0012 sec., Ymax = 262.89 G'S @ 0.0257 sec.





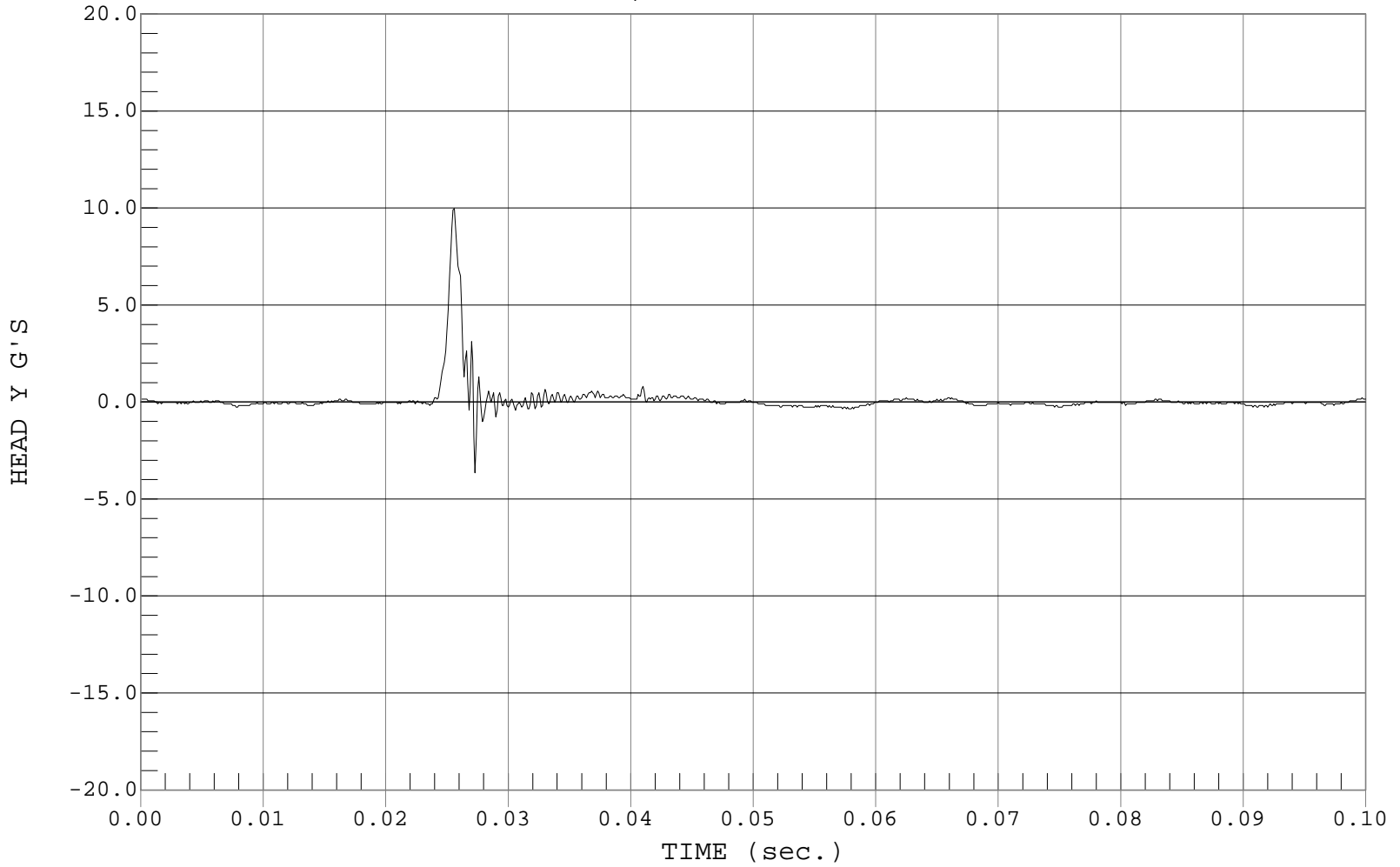
### PEAK LATERAL ACCELARATION

Test Desc.: Dummy Calibration - Head Drop  
Component: Dummy #066

Test Date: 01-22-01  
Speed: 0.00 FT/SEC, 0.00 M/SEC

— 1 HEAD Y, D01091AR.A02

Ymin = -3.65 G'S @ 0.0273 sec., Ymax = 9.98 G'S @ 0.0256 sec.



**Hybrid III Calibration Data Sheet**  
**50<sup>th</sup> Percentile Male**  
**Thorax Impact Test**

ATD Serial No.: 066

Test I.D.: D01094

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1°	PASS
Laboratory Relative Humidity	%	10 to 70	26%	PASS
Probe Velocity	m/s	6.58 to 6.82	6.64	PASS
Peak Probe Force	Newtons	5159 to 5893	5678	PASS
Peak Sternum Displacement	cm	6.35 to 7.26	6.51	PASS
Internal Hysteresis	%	69 to 85	75%	PASS
<b>Overall Test Results</b>				<b>PASS</b>

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 Laboratory Technician

1/23/01  
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 Test Date

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 Approved By



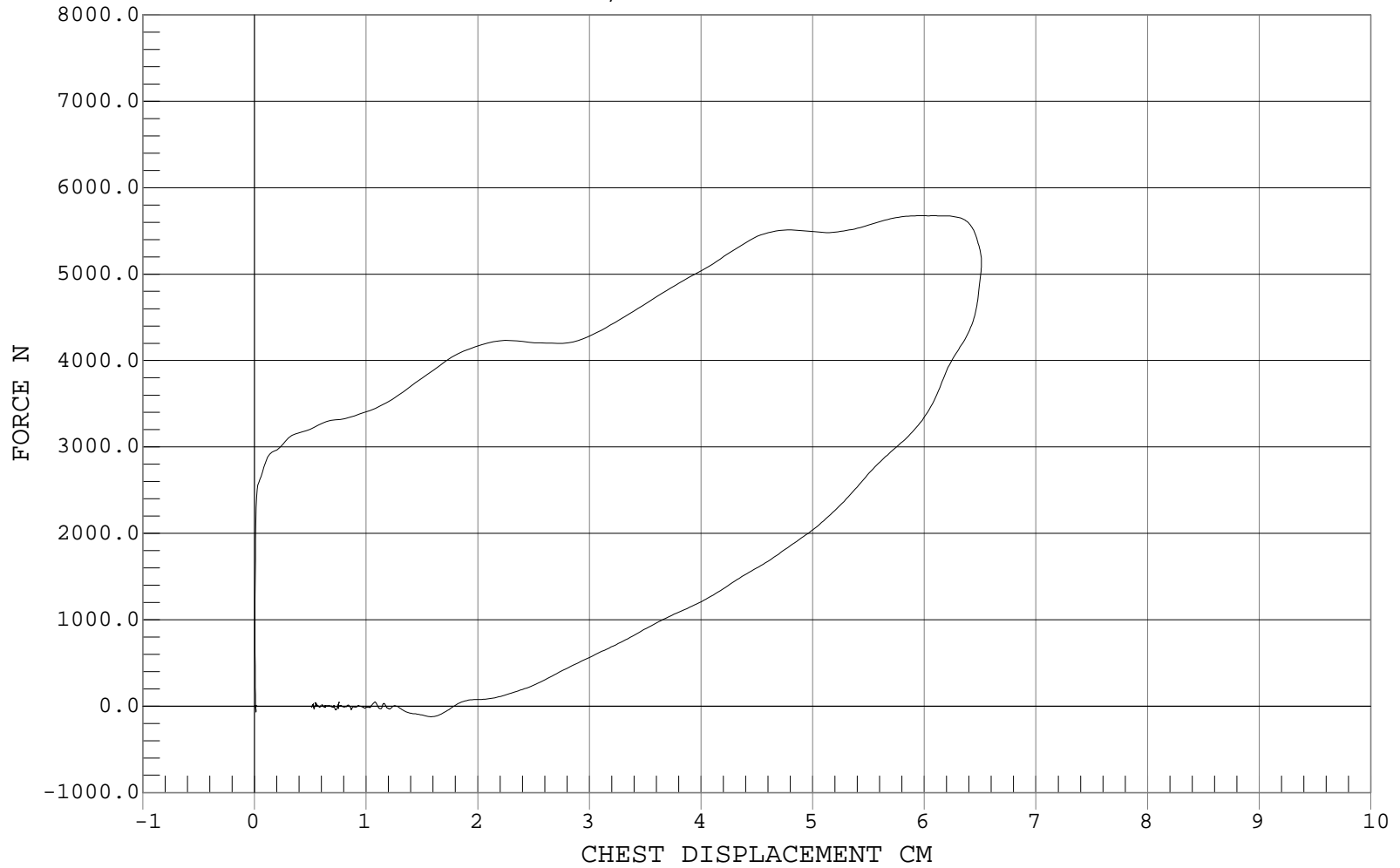
### THORAX IMPACT

Test Desc.: Dummy Calibration - Chest Impact  
Component: Dummy #066

Test Date: 01-23-01  
Speed: 21.78 FT/SEC, 6.64 M/SEC

— 1 FORCE, D01094CH.FVD

Ymin = -122.95 N @ 1.5877 CM, Ymax = 5677.85 N @ 5.9673 CM



C-30

**Hybrid III Calibration Data Sheet**  
**50<sup>th</sup> Percentile Male**  
**Neck Flexion Test**

ATD Serial No.: 066

Test I.D.: D01092

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1°	PASS
Laboratory Relative Humidity		%	10 to 70	23%	PASS
Pendulum Velocity		m/s	6.89 to 7.13	7.02	PASS
Pendulum Deceleration	10 Msec.	G's	22.50 to 27.50	24.52	PASS
	20 Msec.	G's	17.60 to 22.60	20.14	PASS
	30 Msec.	G's	12.50 to 18.50	15.10	PASS
Peak Pendulum Decel. After 30 Msec.		G's	≤29.0	15.1	PASS
Deceleration Decay, Time to Cross 5 G's		Msec.	34.0 to 42.0	35.8	PASS
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	72.7	PASS
	Time	Msec.	57.0 to 64.0	57.5	PASS
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	113.0 to 128.0	113.8	PASS
Moment About Occipital Condyle	Maximum	N· m	84.1 to 108.5	99.7	PASS
	Time	Msec.	47.0 to 58.0	49.9	PASS
Positive Moment Decay, Time To Zero Crossing		Msec.	97.0 to 107.0	98.4	PASS
				Overall Test Results	PASS

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Laboratory Technician

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1/23/01  
Test Date

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Approved By



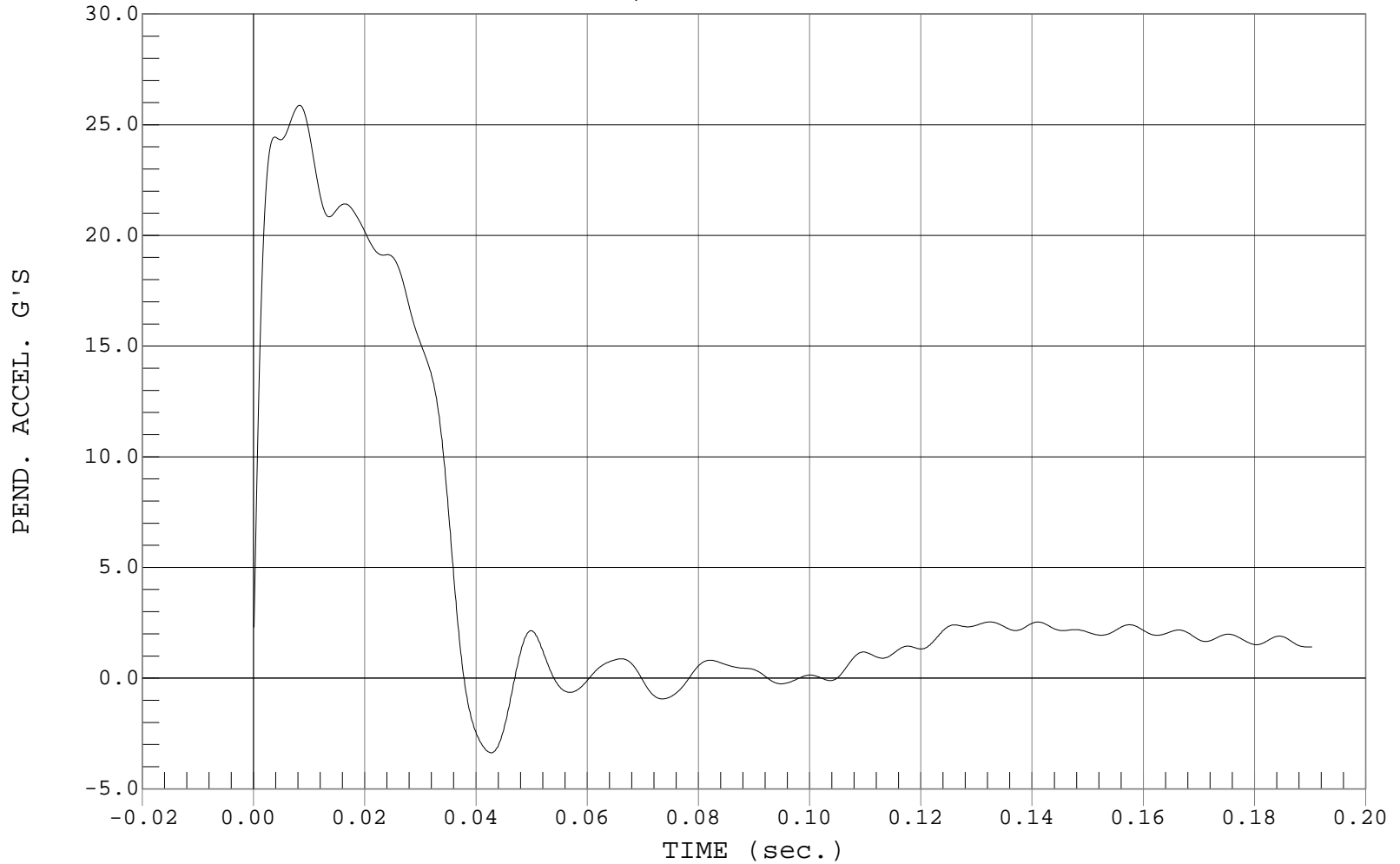
### PENDULUM DECELERATION

Test Desc.: Dummy Calibration - Neck Flexion  
Component: Dummy #066

Test Date: 01-23-01  
Speed: 23.04 FT/SEC, 7.02 M/SEC

— 1 PEND. ACCEL., D01092AF.A04

Ymin = -3.37 G'S @ 0.0427 sec., Ymax = 25.88 G'S @ 0.0083 sec.





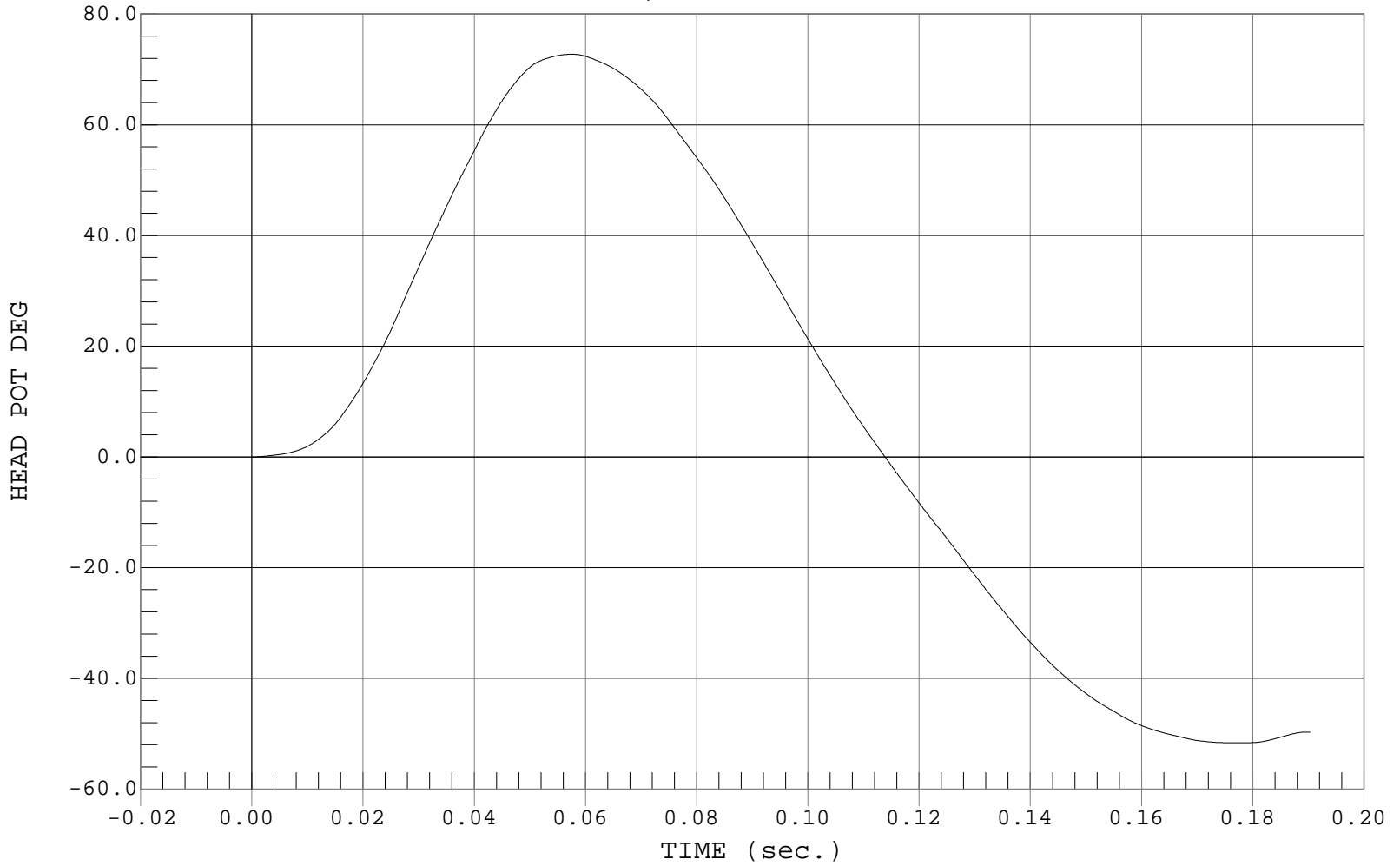
### NECK ROTATION

Test Desc.: Dummy Calibration - Neck Flexion  
Component: Dummy #066

Test Date: 01-23-01  
Speed: 23.04 FT/SEC, 7.02 M/SEC

— 1 HEAD POT, D01092DU.D05

Ymin = -51.65 DEG @ 0.1779 sec., Ymax = 72.73 DEG @ 0.0575 sec.





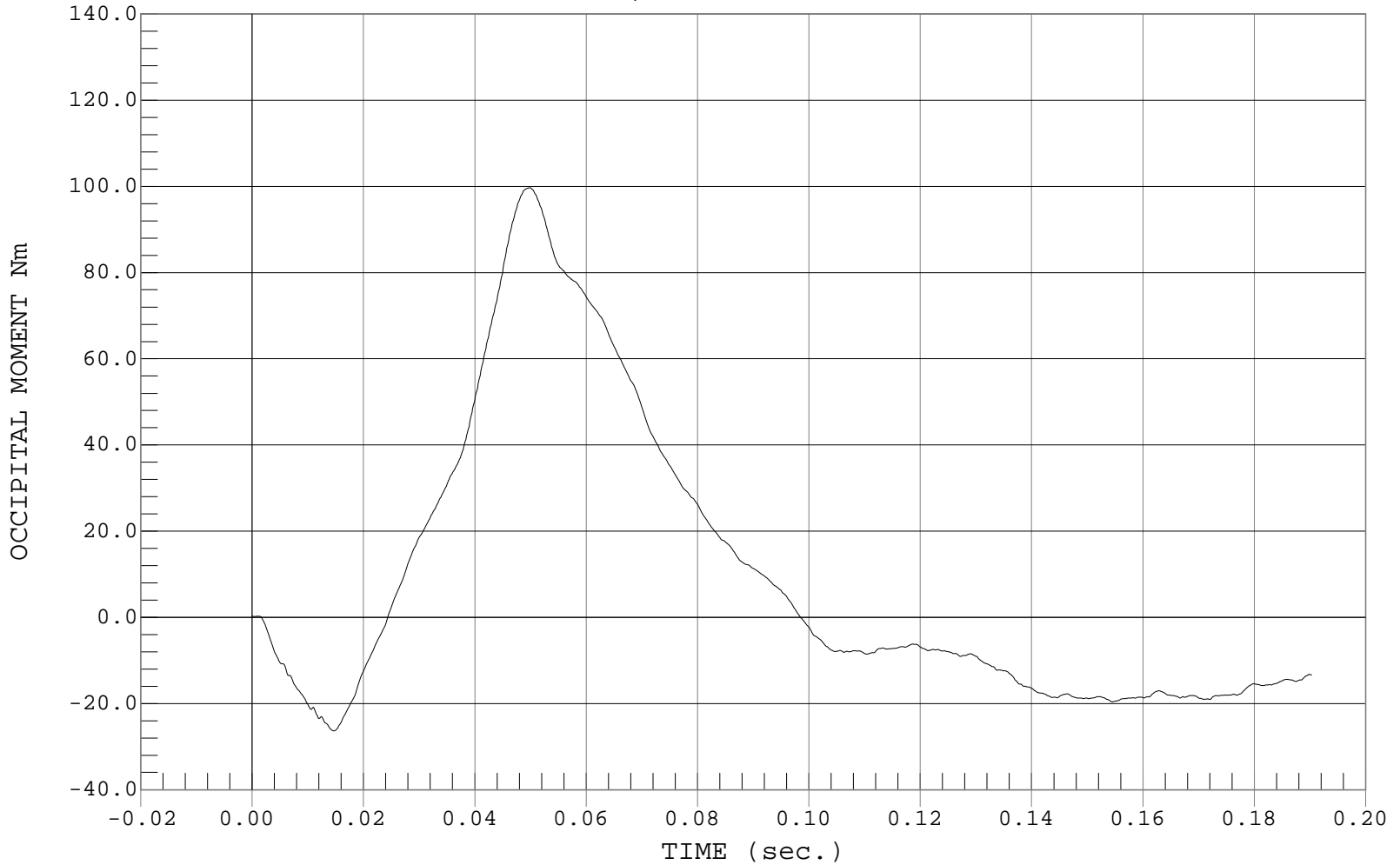
### OCCIPITAL MOMENT

Test Desc.: Dummy Calibration - Neck Flexion  
Component: Dummy #066

Test Date: 01-23-01  
Speed: 23.04 FT/SEC, 7.02 M/SEC

— 1 OCCIPITAL MOMENT, D01092NK.MNT

Ymin = -26.34 Nm @ 0.0147 sec., Ymax = 99.69 Nm @ 0.0499 sec.



**Hybrid III Calibration Data Sheet**  
**50<sup>th</sup> Percentile Male**  
**Neck Extension Test**

ATD Serial No.: 066

Test I.D.: D01093

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1°	PASS
Laboratory Relative Humidity		%	10 to 70	23%	PASS
Pendulum Velocity		m/s	65.95 to 6.19	6.12	PASS
Pendulum Deceleration	10 Msec.	G's	17.20 to 21.20	18.17	PASS
	20 Msec.	G's	14.00 to 19.00	16.31	PASS
	30 Msec.	G's	11.00 to 16.00	13.85	PASS
Peak Pendulum Decel. After 30 Msec.		G's	≤22.0	13.9	PASS
Deceleration Decay, Time to Cross 5 G's		Msec.	38.0 to 46.0	40.3	PASS
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	95.7	PASS
	Time	Msec.	72.0 to 82.0	78.6	PASS
"D" Plane Rotation Decay, Time To Zero Crossing		Msec.	147.0 to 174.0	157.2	PASS
Moment About Occipital Condyle	Minimum	N· m	-52.9 to -79.9	-65.5	PASS
	Time	Msec.	65.0 to 79.0	72.4	PASS
Negative Moment Decay, Time To Zero Crossing		Msec.	120.0 to 148.0	142.3	PASS
				Overall Test Results	PASS

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Laboratory Technician

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Test Date

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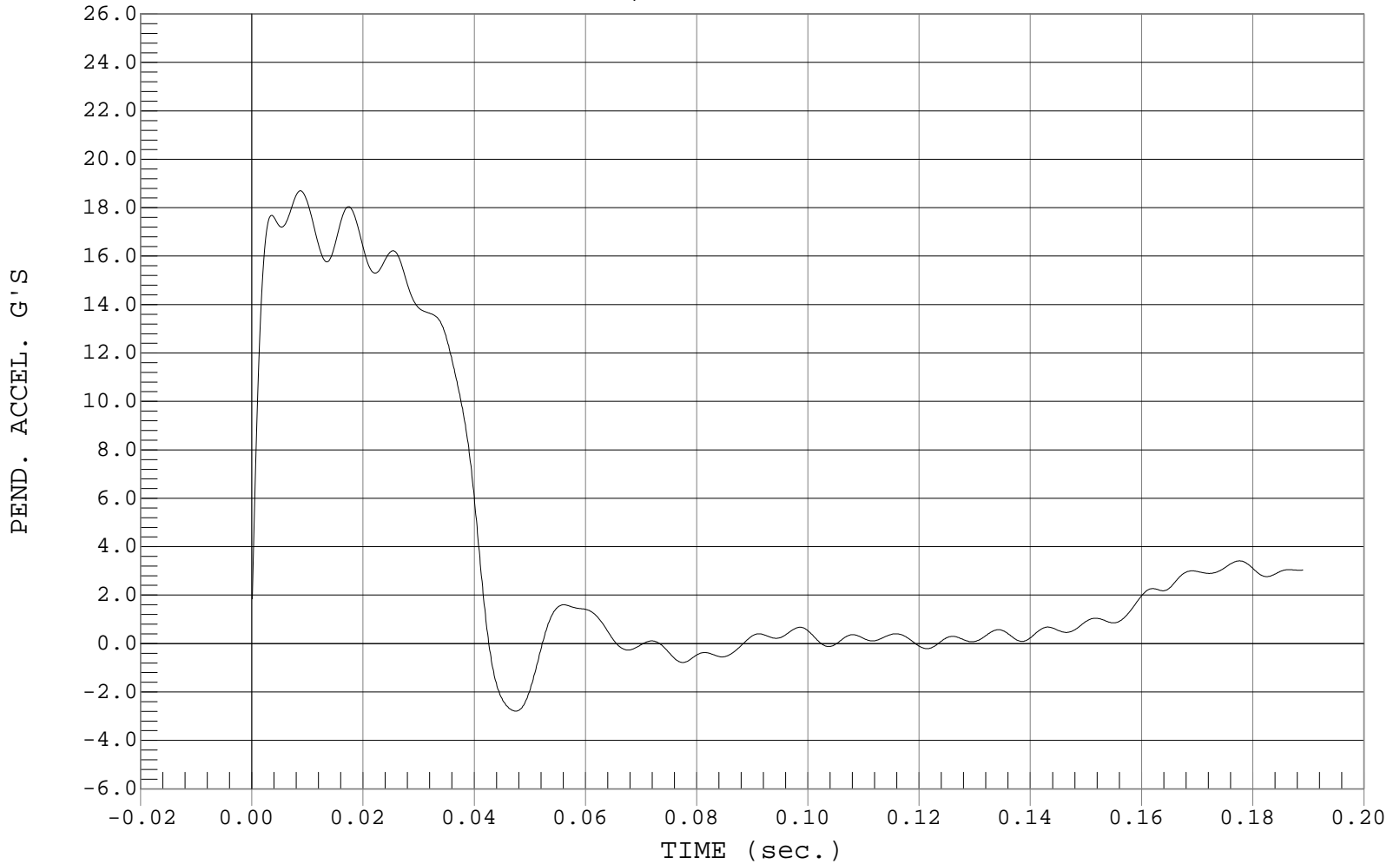
### PENDULUM DECELERATION

Test Desc.: Dummy Calibration - Neck Extension  
Component: Dummy #066

Test Date: 01-23-01  
Speed: 20.07 FT/SEC, 6.12 M/SEC

— 1 PEND. ACCEL., D01093AF.A04

Ymin = -2.79 G'S @ 0.0475 sec., Ymax = 18.7 G'S @ 0.0087 sec.





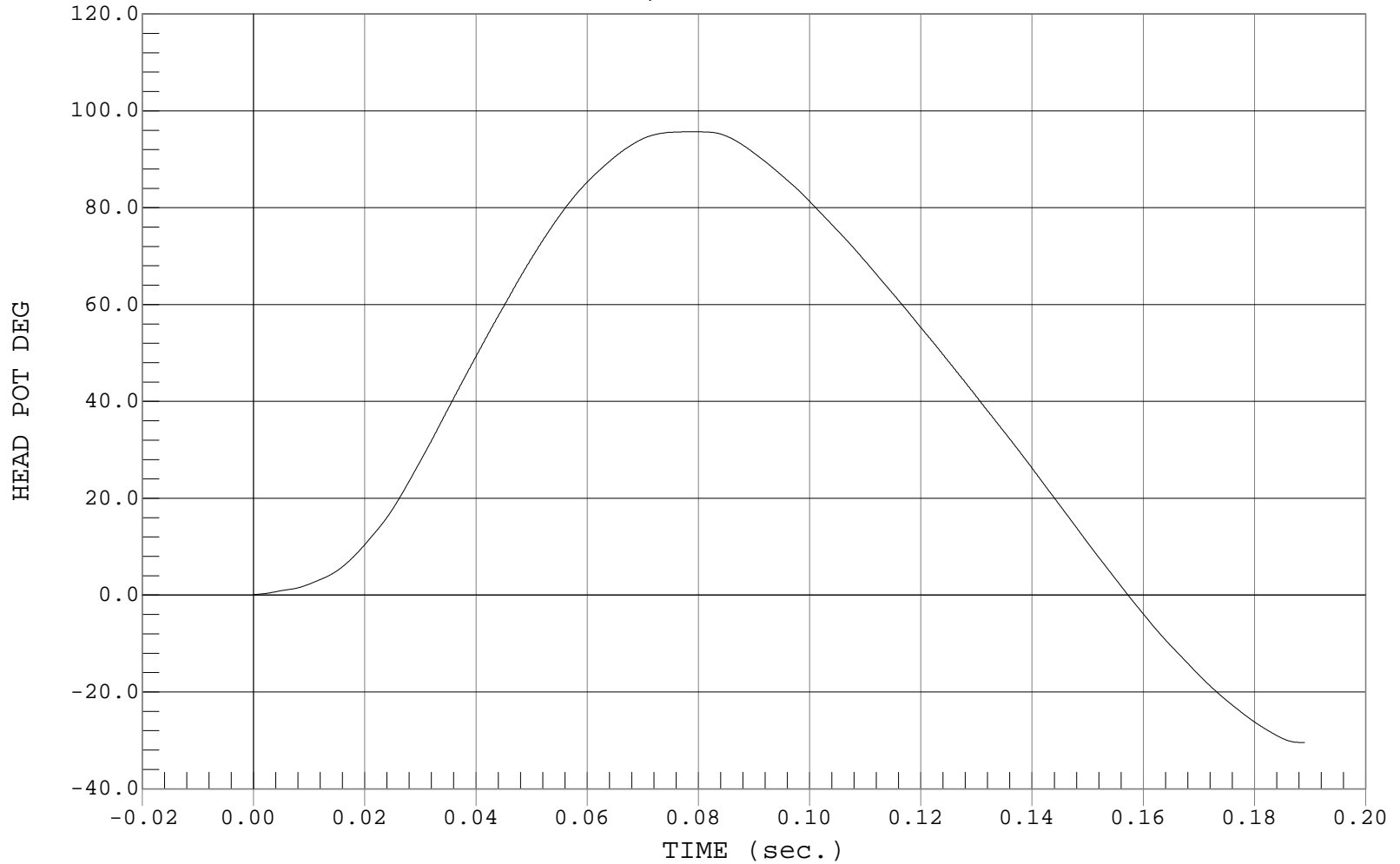
### NECK ROTATION

Test Desc.: Dummy Calibration - Neck Extension  
Component: Dummy #066

Test Date: 01-23-01  
Speed: 20.07 FT/SEC, 6.12 M/SEC

— 1 HEAD POT, D01093DU.D05

Ymin = -30.43 DEG @ 0.1883 sec., Ymax = 95.67 DEG @ 0.0786 sec.





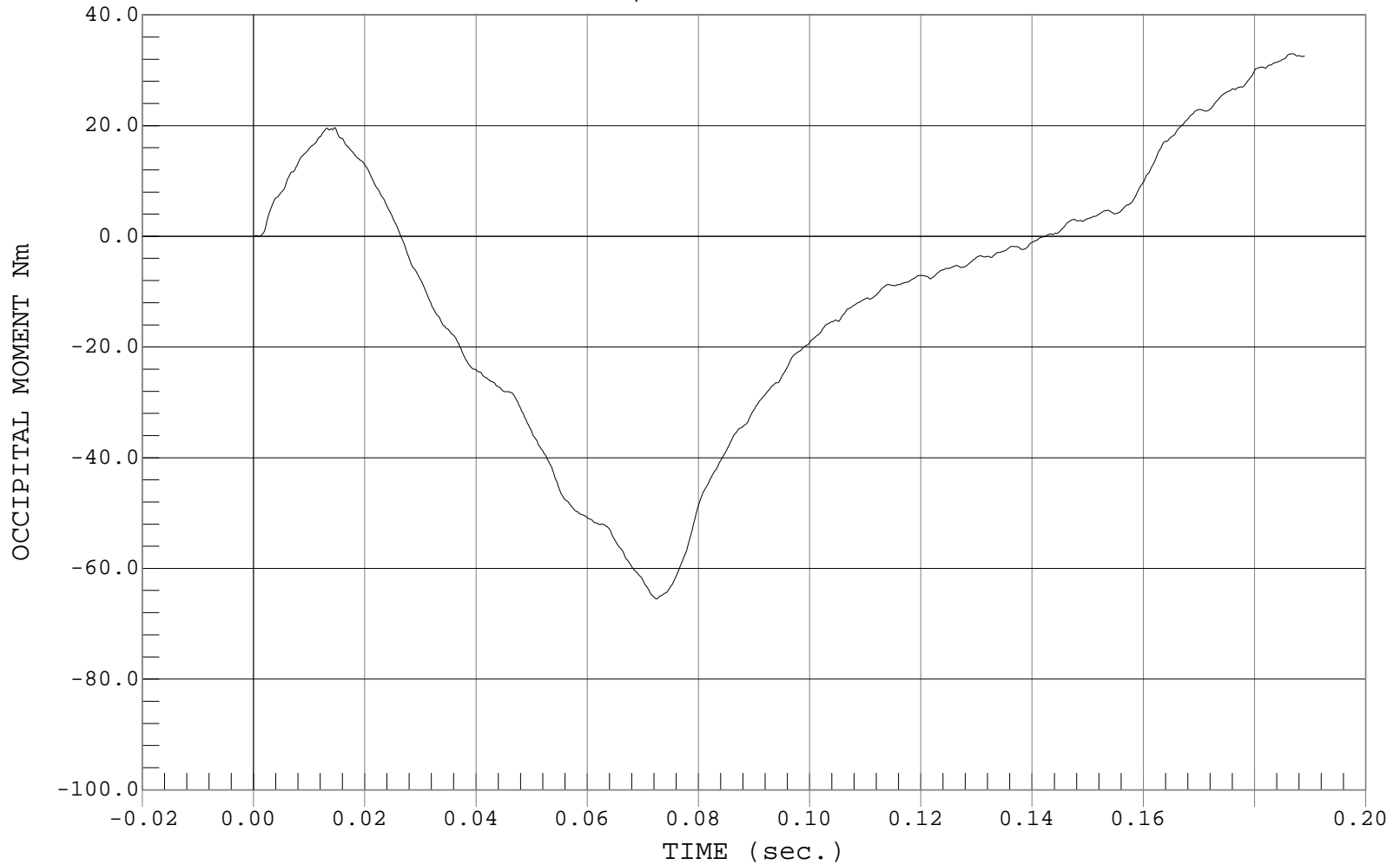
### OCCIPITAL MOMENT

Test Desc.: Dummy Calibration - Neck Extension  
Component: Dummy #066

Test Date: 01-23-01  
Speed: 20.07 FT/SEC, 6.12 M/SEC

— 1 OCCIPITAL MOMENT, D01093NK.MNT

Ymin = -65.51 Nm @ 0.0724 sec., Ymax = 32.99 Nm @ 0.1869 sec.



**Hybrid III Calibration Data Sheet**  
**50<sup>th</sup> Percentile Male**  
**Hip-Femur Flexion Test**

ATD Serial No.: 066

Test I.D.: D01099/0

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Temperature	°C	18.9 to 25.6	21.0°	21.0°	PASS
Relative Humidity	%	10 to 70	25%	25%	PASS
Rotation Rate	deg/sec	5 – 10	Yes	Yes	PASS
30 Degrees	Nm	94.9 Nm Max.	70.5	68.0	PASS
150 ft-lbf / 203.4 Nm	Deg	40 – 50 Degree Max. rotation	46°	44°	PASS
Overall Test Results					PASS

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 Laboratory Technician

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 1/23/01  
 Test Date

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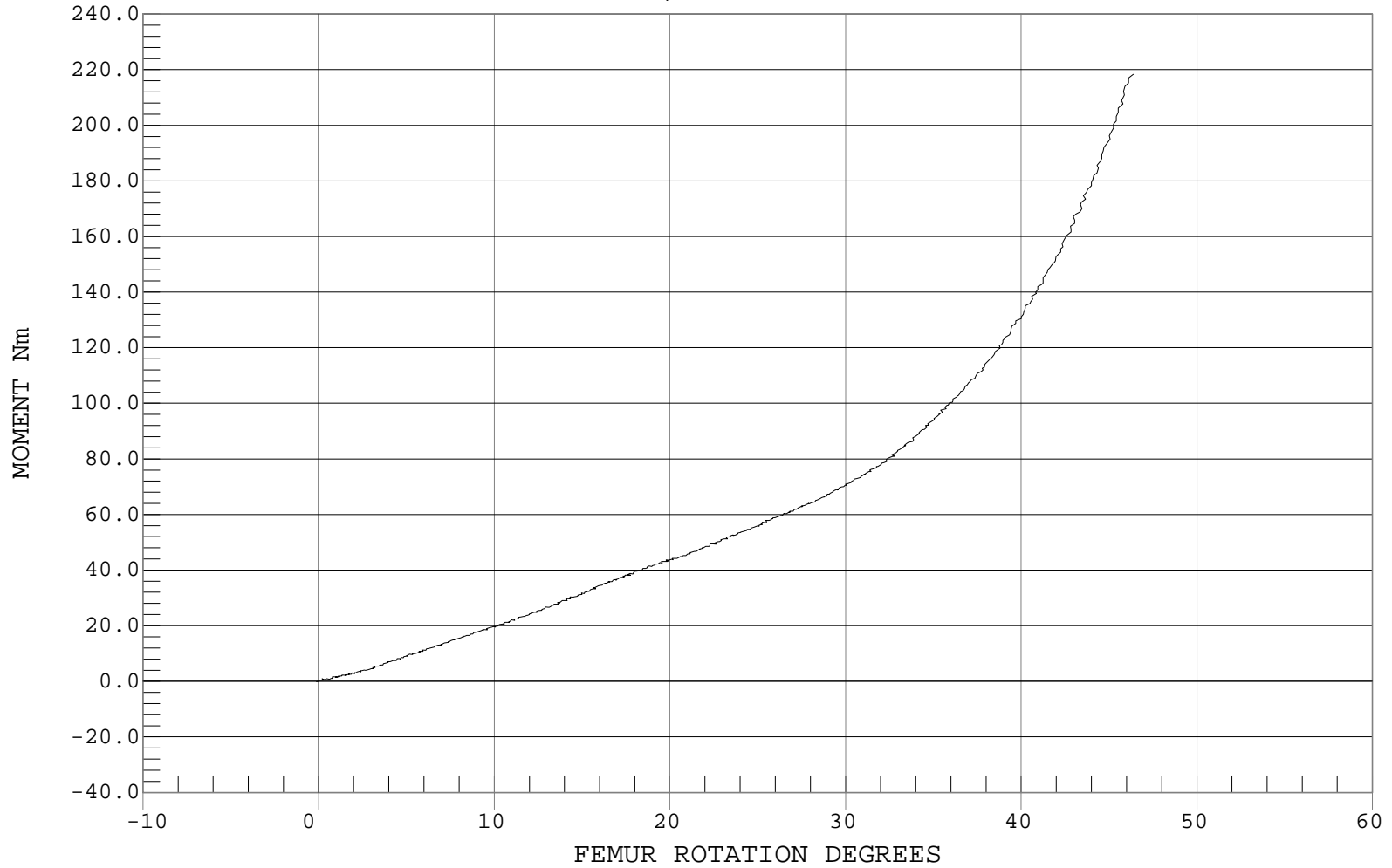
### HIP-FEMUR FLEXION

Test Desc.: DUMMY CALIBRATION - HIP-FEMUR FLEXION  
Component: DUMMY # 066 RIGHT FEMUR

Test Date: 01-23-01  
Speed: 0.00 FT/SEC, 0.00 M/SEC

— 1 MOMENT, D01099FC.F14

Ymin =  $-0.15$  Nm @  $-0.1166$  DEGREES, Ymax =  $218.38$  Nm @  $46.3802$  DEGREES





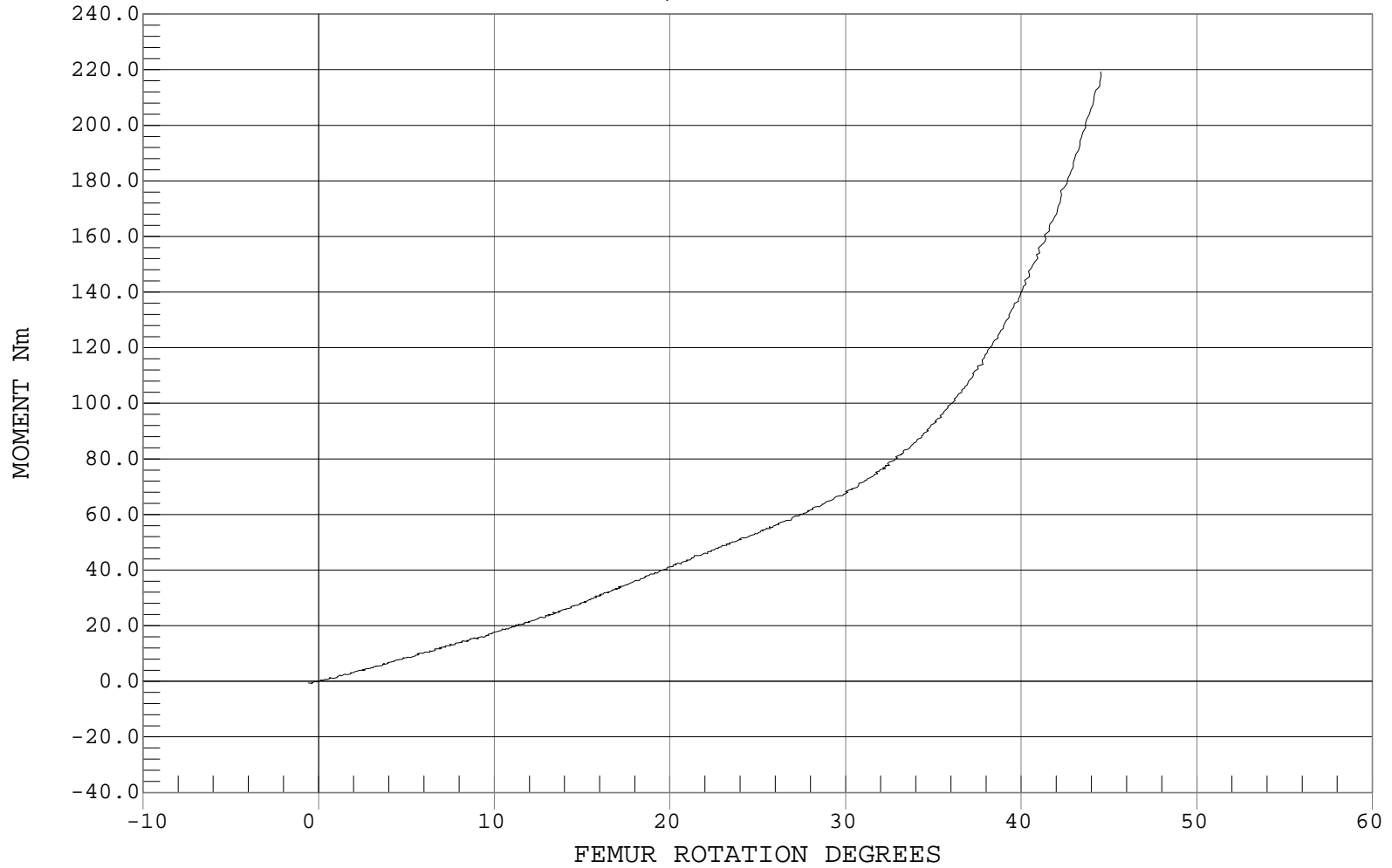
### HIP-FEMUR FLEXION

Test Desc.: DUMMY CALIBRATION - HIP-FEMUR FLEXION  
Component: DUMMY # 066 LEFT FEMUR

Test Date: 01-23-01  
Speed: 0.00 FT/SEC, 0.00 M/SEC

— 1 MOMENT, D01090FC.F14

Ymin =  $-0.75$  Nm @  $-0.3499$  DEGREES, Ymax =  $219.27$  Nm @  $44.5141$  DEGREES



## Hybrid III Calibration Data Sheet

### 50<sup>th</sup> Percentile Male

#### External Measurements

ATD Serial No.: 066

Test I.D.: D0109

External Measurement Data				
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.4 to 22.1	21.1°	PASS
Laboratory Relative Humidity	%	10 to 70	33%	PASS
A – Total sitting height	mm	879 to 889	881	PASS
B – Shoulder pivot height	mm	506 to 521	513	PASS
C – “H” point height	mm	84 to 89	86	PASS
D – “H” point from seat back	mm	135 to 140	140	PASS
E – Shoulder pivot from back	mm	84 to 94	89	PASS
F – Thigh clearance	mm	140 to 155	145	PASS
G – Elbow back to wrist pivot	mm	290 to 305	295	PASS
H – Skull cap to back line	mm	41 to 46	43	PASS
I – Shoulder to elbow length	mm	330 to 345	338	PASS
J – Elbow rest height	mm	191 to 211	193	PASS
K – Buttock to knee length	mm	579 to 605	599	PASS
L – Popliteal length	mm	429 to 455	442	PASS
M – Knee pivot height	mm	485 to 500	495	PASS
N – Buttock popliteal length	mm	452 to 478	467	PASS
O – Chest depth	mm	213 to 229	221	PASS
P – Foot breadth	mm	252 to 267	264	PASS
V – Shoulder breadth	mm	422 to 437	432	PASS
W – Foot length	mm	91 to 107	102	PASS
Y – Chest circumference	mm	970 to 1001	996	PASS
Z – Waist circumference	mm	836 to 866	859	PASS
AA – Location for chest circumference	mm	429 to 434	432	PASS
BB – Location for waist circumference	mm	226 to 231	229	PASS
Overall Test Results				PASS

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Laboratory Technician

1/23/01  
Test Date

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Approved By

## **APPENDIX D**

### **TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION**

DUMMY, VEHICLE, AND LABORATORY INSTRUMENT CALIBRATION  
INSTRUMENTS FOR DUMMY NO. 065

INSTRUMENTS FOR DRIVER DUMMY NO. 065			
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	AAMN8	Endevco	8/30/00
Head Y	ACC61	Endevco	8/30/00
Head Z	ACCW9	Endevco	8/30/00
Head X Redundant	AJ621	Endevco	8/30/00
Head Y Redundant	AJ619	Endevco	8/30/00
Head Z Redundant	AHY54	Endevco	8/30/00
Chest X	ACCY1	Endevco	8/30/00
Chest Y	ACCC8	Endevco	8/30/00
Chest Z	ACCT7	Endevco	8/30/00
Chest X Redundant	AJ9D4	Endevco	8/30/00
Chest Y Redundant	AJ9F3	Endevco	8/30/00
Chest Z Redundant	AJ9D3	Endevco	8/30/00
Right Femur Load Cell	261	Denton	10/16/00
Left Femur Load Cell	262	Denton	10/16/00
Pelvis X	AHTR2	Endevco	9/19/00
Pelvis Y	AGTE9	Endevco	9/19/00
Pelvis Z	AJ9B0	Endevco	9/19/00
Neck Force X	606	Denton	11/30/00
Neck Force Y	606	Denton	11/30/00
Neck Force Z	606	Denton	11/30/00
Neck Moment X	606	Denton	11/30/00
Neck Moment Y	606	Denton	11/30/00
Neck Moment Z	606	Denton	11/30/00
Chest Deflection Gauge	066	Servo	10/12/00
Lap Belt Load Cell	192	Denton	10/6/00

DUMMY, VEHICLE, AND LABORATORY INSTRUMENT CALIBRATION  
INSTRUMENTS FOR DUMMY NO. 065

INSTRUMENTS FOR DRIVER DUMMY NO. 065			
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Right Tibia Moment X	106	Denton	10/11/00
Upper Right Tibia Moment Y	106	Denton	10/11/00
Upper Right Tibia Force Z	106	Denton	10/11/00
Lower Right Tibia Moment X	135	Denton	10/11/00
Lower Right Tibia Moment Y	135	Denton	10/11/00
Lower Right Tibia Force Z	135	Denton	10/11/00
Upper Left Tibia Moment X	109	Denton	10/11/00
Upper Left Tibia Moment Y	109	Denton	10/11/00
Upper Left Tibia Force Z	109	Denton	10/11/00
Lower Left Tibia Moment X	138	Denton	10/11/00
Lower Left Tibia Moment Y	138	Denton	10/11/00
Lower Left Tibia Force Z	138	Denton	10/11/00
Left Foot Ball Z Acceleration	ALDD6	Endevco	11/16/00
Left Heel X Acceleration	J20392	Endevco	11/16/00
Left Heel Z Acceleration	AGT18	Endevco	11/16/00
Right Foot Ball Z Acceleration	AH0A5	Endevco	11/16/00
Right Heel X Acceleration	AJ9C4	Endevco	11/16/00
Right Heel Z Acceleration	AN8A4	Endevco	11/16/00

DUMMY, VEHICLE, AND LABORATORY INSTRUMENT CALIBRATION  
INSTRUMENTS FOR DUMMY NO. 066

	INSTRUMENTS FOR PASSENGER DUMMY NO. 066		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	ACCY6	Endevco	10/3/00
Head Y	ACCH1	Endevco	10/3/00
Head Z	AAMW5	Endevco	10/3/00
Head X Redundant	AJ9D2	Endevco	10/3/00
Head Y Redundant	AH1E2	Endevco	10/3/00
Head Z Redundant	AJ7K3	Endevco	10/3/00
Chest X	ACC78	Endevco	10/3/00
Chest Y	ACCE6	Endevco	10/3/00
Chest Z	ACCY3	Endevco	10/3/00
Chest X Redundant	AJ9J7	Endevco	10/3/00
Chest Y Redundant	AJ7A2	Endevco	10/3/00
Chest Z Redundant	AJ819	Endevco	10/3/00
Right Femur Load Cell	259	Denton	10/13/00
Left Femur Load Cell	260	Denton	10/13/00
Pelvis X	AM748	Endevco	9/19/00
Pelvis Y	ALCH7	Endevco	9/19/00
Pelvis Z	AALH1	Endevco	9/19/00
Neck Force X	443	Denton	11/11/00
Neck Force Y	443	Denton	11/11/00
Neck Force Z	443	Denton	11/11/00
Neck Moment X	443	Denton	11/11/00
Neck Moment Y	443	Denton	11/11/00
Neck Moment Z	443	Denton	11/11/00
Chest Deflection Gauge	065	Servo	10/12/00
Lap Belt Load Cell	196	Denton	10/6/00

DUMMY, VEHICLE, AND LABORATORY INSTRUMENT CALIBRATION  
INSTRUMENTS FOR DUMMY NO. 066

INSTRUMENTS FOR PASSENGER DUMMY NO. 066			
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Right Tibia Moment X	103	Denton	10/11/00
Upper Right Tibia Moment Y	103	Denton	10/11/00
Upper Right Tibia Force Z	103	Denton	10/11/00
Lower Right Tibia Moment X	133	Denton	10/11/00
Lower Right Tibia Moment Y	133	Denton	10/11/00
Lower Right Tibia Force Z	133	Denton	10/11/00
Upper Left Tibia Moment X	105	Denton	10/11/00
Upper Left Tibia Moment Y	105	Denton	10/11/00
Upper Left Tibia Force Z	105	Denton	10/11/00
Lower Left Tibia Moment X	134	Denton	10/11/00
Lower Left Tibia Moment Y	134	Denton	10/11/00
Lower Left Tibia Force Z	134	Denton	10/11/00
Left Foot Ball Z Acceleration	AP2D6	Endevco	11/16/00
Left Heel X Acceleration	J11548	Endevco	11/16/00
Left Heel Z Acceleration	J10866	Endevco	11/16/00
Right Foot Ball Z Acceleration	AGMT2	Endevco	11/16/00
Right Heel X Acceleration	AH0A2	Endevco	11/16/00
Right Heel Z Acceleration	AJ837	Endevco	11/16/00

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	F12-G09	Entran	8/18/00
Right Rear Seat Crossmember X	J13-F22	Entran	11/17/00
Top of Engine Block X	I25-J02	Entran	9/14/00
Bottom of Engine X	K16-X06	Entran	9/12/00
Left Brake Caliper X	G13-B03	Entran	10/2/00
Right Brake Caliper X	E13-D06	Entran	8/8/00
Instrument Panel X	G13-F07	Entran	8/15/00
Redundant Left Rear Seat Crossmember X	E10-F18	Entran	1/11/01
Redundant Right Rear Seat Crossmember X	J04-F10	Entran	8/10/00

	LABORATORY INSTRUMENTS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Bending Pendulum Accelerometer	C12885	Endevco	1/17/01
Neck Bending Head Rotary Potentiometer	018	Spectrol	10/2/00
Neck Bending Pendulum Rotary Potentiometer	019	Spectrol	10/2/00
Chest Probe Accelerometer	J14396	Endevco	1/11/01
Knee Impact Accelerometer	J14398	Endevco	1/11/01

## **APPENDIX E**

### **VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT INSTRUCTIONS**

## How to Wear Safety Belts Properly

### Adults

This part is only for people of adult size.

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

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

We'll start with the driver position.

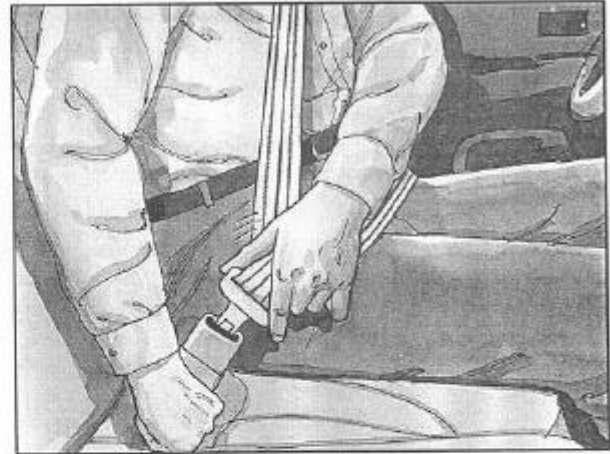
### Driver Position

This part describes the driver's restraint system.

#### Lap-Shoulder Belt

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

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



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

The shoulder belt may lock if you pull the belt across you very quickly. If this happens, let the belt go back slightly to unlock it. Then pull the belt across you more slowly.

1-21

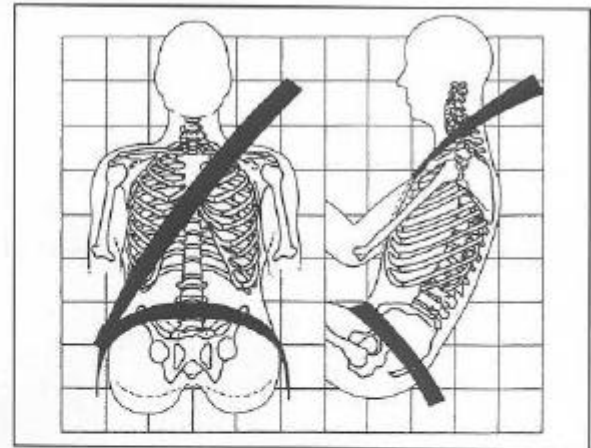
4. Push the latch plate into the buckle until it clicks.

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

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



5. To make the lap part tight, pull down on the buckle end of the belt as you pull up on the shoulder belt.

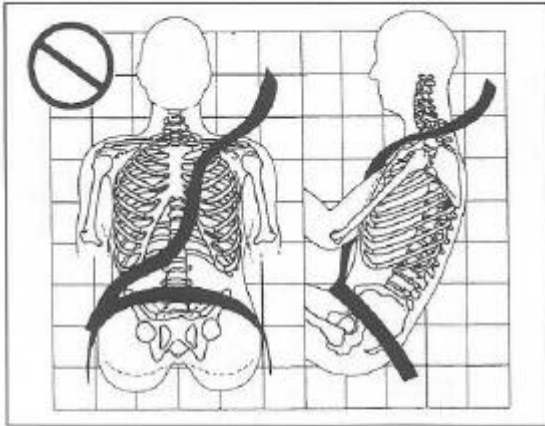


The lap part of the belt should be worn low and snug on the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even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

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

1-22

**Q:** What's wrong with this?



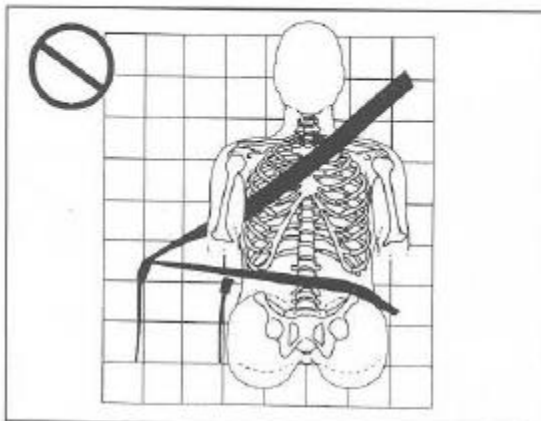
**⚠ CAUTION:**

You can be seriously hurt if your shoulder belt is too loose. In a crash, you would move forward too much, which could increase injury. The shoulder belt should fit against your body.

**A:** The shoulder belt is too loose. It won't give nearly as much protection this way.

1-23

**Q:** What's wrong with this?



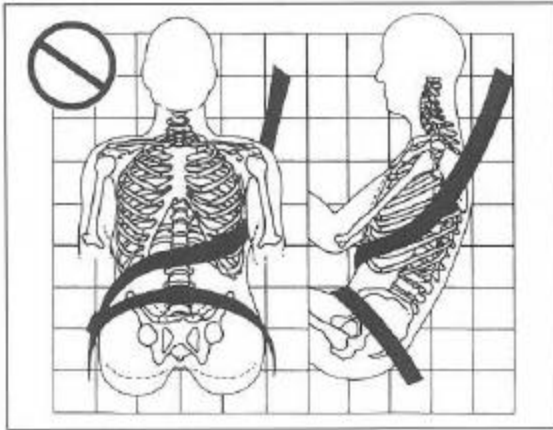
**⚠ CAUTION:**

You can be seriously injured if your belt is buckled in the wrong place like this. In a crash, the belt would go up over your abdomen. The belt forces would be there, not at the pelvic bones. This could cause serious internal injuries. Always buckle your belt into the buckle nearest you.

**A:** The belt is buckled in the wrong place.

1-24

**Q:** What's wrong with this?



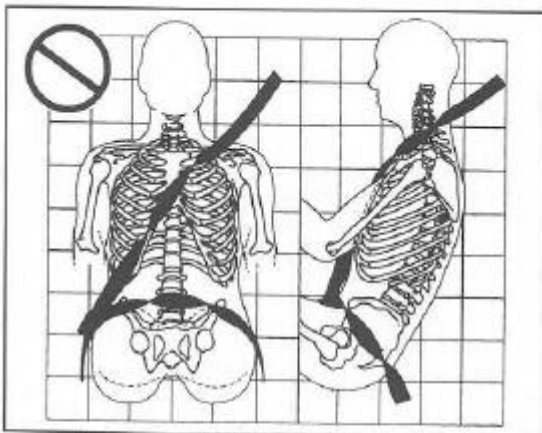
**A:** The shoulder belt is worn under the arm. It should be worn over the shoulder at all times.

**⚠ CAUTION:**

You can be seriously injured if you wear the shoulder belt under your arm. In a crash, your body would move too far forward, which would increase the chance of head and neck injury. Also, the belt would apply too much force to the ribs, which aren't as strong as shoulder bones. You could also severely injure internal organs like your liver or spleen.

1-25

**Q:** What's wrong with this?

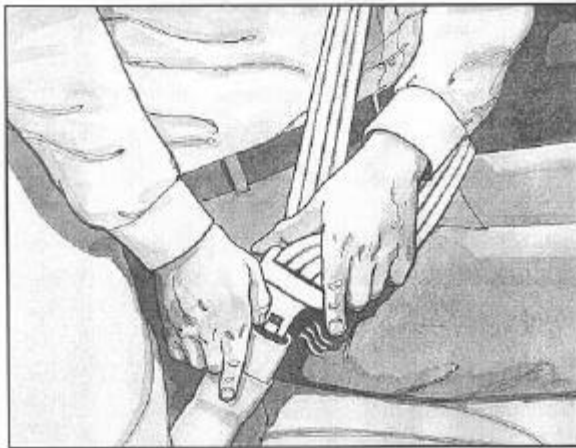


**A:** The belt is twisted across the body.

**⚠ CAUTION:**

You can be seriously injured by a twisted belt. In a crash, you wouldn't have the full width of the belt to spread impact forces. If a belt is twisted, make it straight so it can work properly, or ask your dealer to fix it.

1-26

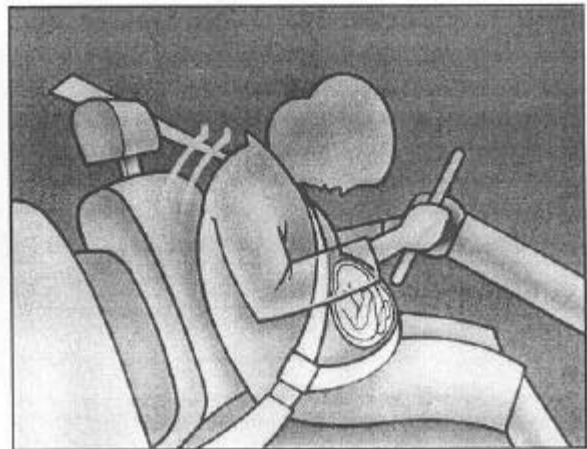


To unfasten the belt, just push the button on the buckle. The belt should go back out of the way.

Before you close the door, be sure the belt is out of the way. If you slam the door on it, you can damage both the belt and your vehicle.

## Safety Belt Use During Pregnancy

Safety belts work for everyone, including pregnant women. Like all occupants, they are more likely to be seriously injured if they don't wear safety belts.



A pregnant woman should wear a lap-shoulder belt, and the lap portion should be worn as low as possible, below the rounding, throughout the pregnancy.

1-27

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

### Right Front Passenger Position

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

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

### Air Bag Systems

This part explains the frontal and side impact air bag systems.

Your vehicle has four air bags -- a frontal air bag for the driver, another frontal air bag for the right front passenger, a side impact air bag for the driver, and another side impact air bag for the right front passenger.

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

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

#### CAUTION:

**You can be severely injured or killed in a crash if you aren't wearing your safety belt -- even if you have air bags. Wearing your safety belt during a crash helps reduce your chance of hitting things inside the vehicle or being ejected from it. Air bags are "supplemental restraints" to the safety belts. All air bags are designed to work with safety belts but don't replace them.**

**CAUTION: (Continued)**

1-28

**CAUTION: (Continued)**

Frontal air bags for the driver and right front passenger are designed to work only in moderate to severe crashes where the front of your vehicle hits something. They aren't designed to inflate at all in rollover, rear, side or low-speed frontal crashes. And, for unrestrained occupants, frontal air bags may provide less protection in frontal crashes than more forceful air bags have provided in the past. The side impact air bags for the driver and right front passenger are designed to inflate only in moderate to severe crashes where something hits the side of your vehicle. They aren't designed to inflate in frontal, in rollover or in rear crashes. Everyone in your vehicle should wear a safety belt properly -- whether or not there's an air bag for that person.

 **CAUTION:**

Both frontal and side impact air bags inflate with great force, faster than the blink of an eye. If you're too close to an inflating air bag, as you would be if you were leaning forward, it could seriously injure you. Safety belts help keep you in position for air bag inflation before and during a crash. Always wear your safety belt, even with frontal air bags. The driver should sit as far back as possible while still maintaining control of the vehicle. Front occupants should not lean on or sleep against the door.

 **CAUTION:**

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



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

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

## How the Air Bag Systems Work

### Where are the air bags?



The driver's frontal air bag is in the middle of the steering wheel.



The right front passenger's frontal air bag is in the instrument panel on the passenger's side.

The driver's side impact air bag is in the side of the driver's seatback closest to the door.

1-31



The right front passenger's side impact air bag is in the side of the passenger's seatback closest to the door.

### CAUTION:

If something is between an occupant and an air bag, the bag might not inflate properly or it might force the object into that person. The path of an inflating air bag must be kept clear. Don't put anything between an occupant and an air bag, and don't attach or put anything on the steering wheel hub or on or near any other air bag covering and don't let seat covers block the inflation path of a side impact air bag.

1-32

### **When should an air bag inflate?**

The driver's and right front passenger's frontal air bags are designed to inflate in moderate to severe frontal or near-frontal crashes. But they are designed to inflate only if the impact speed is above the system's designed "threshold level."

If your vehicle goes straight into a wall that doesn't move or deform, the threshold level is about 9 to 16 mph (14 to 26 km/h). The threshold level can vary, however, with specific vehicle design, so that it can be somewhat above or below this range.

If your vehicle strikes something that will move or deform, such as a parked car, the threshold level will be higher. The driver's and right front passenger's frontal air bags are not designed to inflate in rollovers, side impacts, or rear impacts, because inflation would not help the occupant.

The side impact air bags are designed to inflate in moderate to severe side crashes. A side impact air bag will inflate if the crash severity is above the system's designed "threshold level." The threshold level can vary with specific vehicle design. Side impact air bags are not designed to inflate in frontal or near-frontal impacts, rollovers or rear impacts, because inflation would not help the occupant. A side impact air bag will only deploy on the side of the vehicle that is struck.

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

The air bag system is designed to work properly under a wide range of conditions, including off-road usage. Observe safe driving speeds, especially on rough terrain. As always, wear your safety belt. See "Off-Road Driving" in the Index for more tips on off-road driving.

### **What makes an air bag inflate?**

In an impact of sufficient severity, the air bag sensing system detects that the vehicle is in a crash. For both frontal and side impact air bags, the sensing system triggers a release of gas from the inflator, which inflates the air bag. The inflator, air bag and related hardware are all part of the air bag modules inside the steering wheel, instrument panel and the side of the front seatbacks closest to the door.

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1-33

### **How does an air bag restrain?**

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

### **What will you see after an air bag inflates?**

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

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1-34

 **CAUTION:**

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

In many crashes severe enough to inflate an air bag, windshields are broken by vehicle deformation. Additional windshield breakage may also occur from the right front passenger air bag.

- Air bags are designed to inflate only once. After an air bag inflates, you'll need some new parts for your air bag system. If you don't get them, the air bag system won't be there to help protect you in another crash. A new system will include air bag modules and possibly other parts. The service manual for your vehicle covers the need to replace other parts.

- Your vehicle is equipped with a crash sensing and diagnostic module, which records information about the frontal air bag system. The module records information about the readiness of the system, when the system commands air bag inflation and driver's safety belt usage at deployment. The module also records speed, engine rpm, brake and throttle data.
- Let only qualified technicians work on your air bag systems. Improper service can mean that an air bag system won't work properly. See your dealer for service.

**NOTICE:**

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

1-35

### Servicing Your Air Bag-Equipped Vehicle

Air bags affect how your vehicle should be serviced. There are parts of the air bag systems in several places around your vehicle. Your dealer and the service manual have information about servicing your vehicle and the air bag systems. To purchase a service manual, see "Service and Owner Publications" in the Index.

 **CAUTION:**

For up to two minutes after the ignition key is turned off and the battery is disconnected, an air bag can still inflate during improper service. You can be injured if you are close to an air bag when it inflates. Avoid yellow connectors. They are probably part of the air bag systems. Be sure to follow proper service procedures, and make sure the person performing work for you is qualified to do so.

The air bag systems do not need regular maintenance.

1-36

### Adding Equipment to Your Air Bag-Equipped Vehicle

**Q:** If I add a push bumper or bicycle rack to the front of my vehicle, will it keep the air bags from working properly?

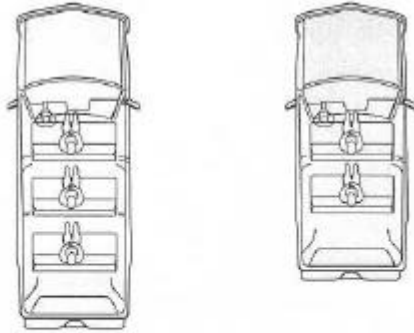
**A:** As long as the push bumper or bicycle rack is attached to your vehicle so that the vehicle's basic structure isn't changed, it's not likely to keep the air bags from working properly in a crash.

**Q:** Is there anything I might add to the front or sides of the vehicle that could keep the air bags from working properly?

**A:** Yes. If you add things that change your vehicle's frame, bumper system, front end or side sheet metal or height, they may keep the air bag system from working properly. Also, the air bag system may not work properly if you relocate any of the air bag sensors. If you have any questions about this, you should contact Customer Assistance before you modify your vehicle. The phone numbers and addresses for Customer Assistance are in Step Two of the Customer Satisfaction Procedure in this manual. See "Customer Satisfaction Procedure" in the Index.

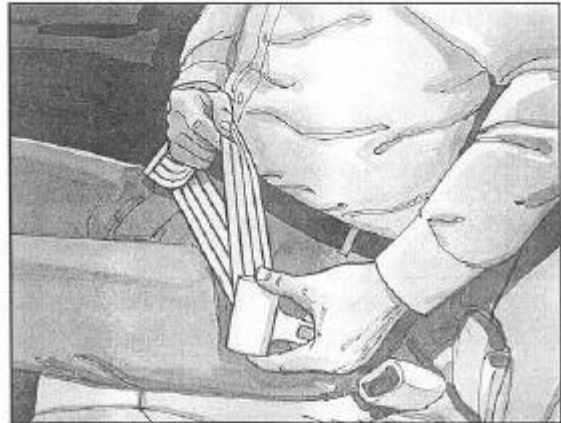
**Q:** What if I add a snow plow? Will it keep the air bags from working properly?

**A:** We've designed our air bag systems to work properly under a wide range of conditions, including snow plowing with vehicles equipped with the optional Snow Plow Prep Package (RPO VYU). But don't change or defeat the snow plow's "tripping mechanism." If you do, it can damage your snow plow and your vehicle, and it may cause an air bag inflation.



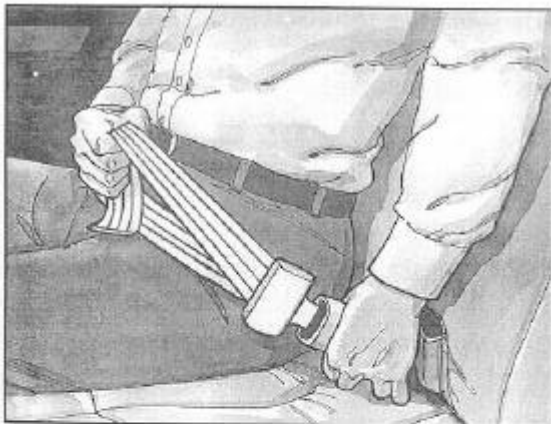
## Lap Belt

If your vehicle has front and rear bench seats, someone can sit in the center positions.



When you sit in a center seating position, you have a lap safety belt, which has no retractor. To make the belt longer, tilt the latch plate and pull it along the belt.

1-37



To make the belt shorter, pull its free end as shown until the belt is snug.

Buckle, position and release it the same way as the lap part of a lap-shoulder belt. If the belt isn't long enough, see "Safety Belt Extender" at the end of this section.

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

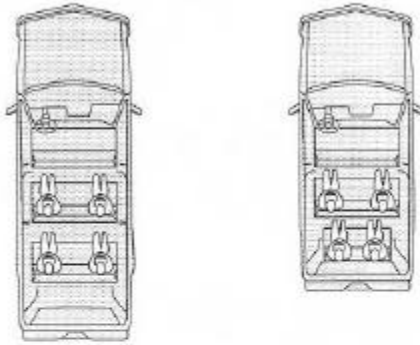
## Rear Seat Passengers

It's very important for rear seat passengers to buckle up! Accident statistics show that unbelted people in the rear seat are hurt more often in crashes than those who are wearing safety belts.

Rear passengers who aren't safety belted can be thrown out of the vehicle in a crash. And they can strike others in the vehicle who are wearing safety belts.

1-38

## Rear Seat Outside Passenger Positions



## Lap-Shoulder Belt

The positions next to the windows have lap-shoulder belts. Here's how to wear one properly.



1. Pick up the latch plate and pull the belt across you. Don't let it get twisted.
2. Push the latch plate into the buckle until it clicks. Pull up on the latch plate to make sure it is secure.

1-39

When the shoulder belt is pulled out all the way, it will lock. If it does, let it go back all the way and start again.

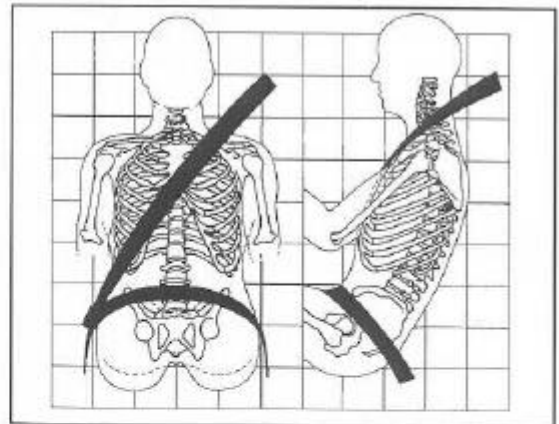
If the belt is not long enough, see "Safety Belt Extender" at the end of this section.

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



3. To make the lap part tight, pull down on the buckle end of the belt as you pull up on the shoulder part.

1-40

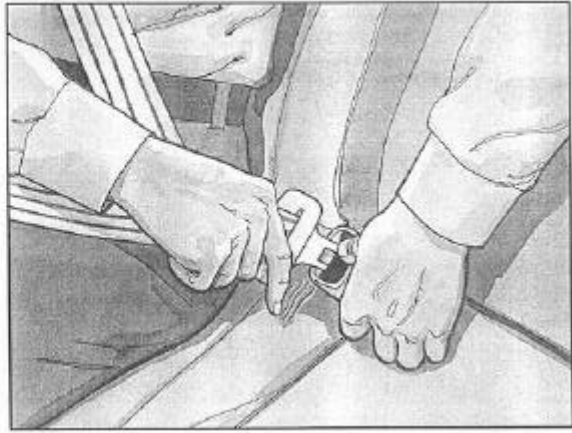


The lap part of the belt should be worn low and snug on the hips, just touching the thighs. In a crash, this applies force to the strong pelvic bones. And you'd be less likely to slide under the lap belt. If you slid under it, the belt would apply force at your abdomen. This could cause serious or even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

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

**⚠ CAUTION:**

You can be seriously hurt if your shoulder belt is too loose. In a crash, you would move forward too much, which could increase injury. The shoulder belt should fit against your body.



To unlatch the belt, just push the button on the buckle.

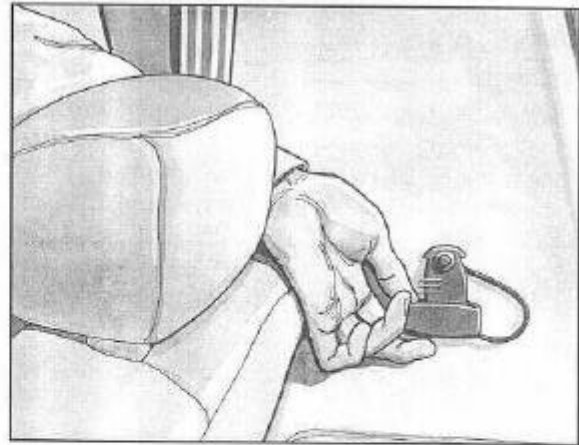
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1-41

### Rear Safety Belt Comfort Guides for Children and Small Adults

Rear shoulder belt comfort guides will provide added safety belt comfort for older children who have outgrown booster seats and for small adults. When installed on a shoulder belt, the comfort guide better positions the belt away from the neck and head.

There is one guide for each outside passenger position in the rear seats. To provide added safety belt comfort for children who have outgrown child restraints and for smaller adults, the comfort guides may be installed on the shoulder belts. Here's how to install a comfort guide and use the safety belt:

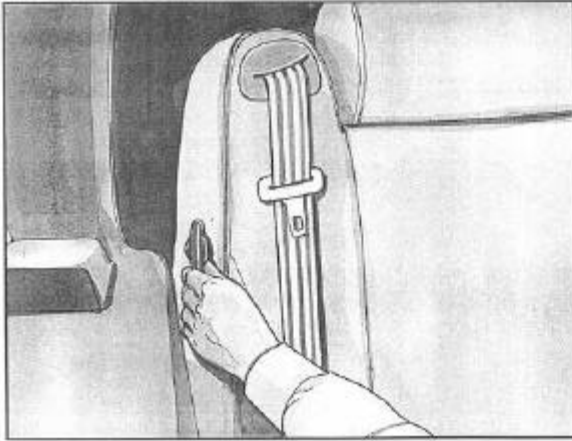


#### Second Row Seat

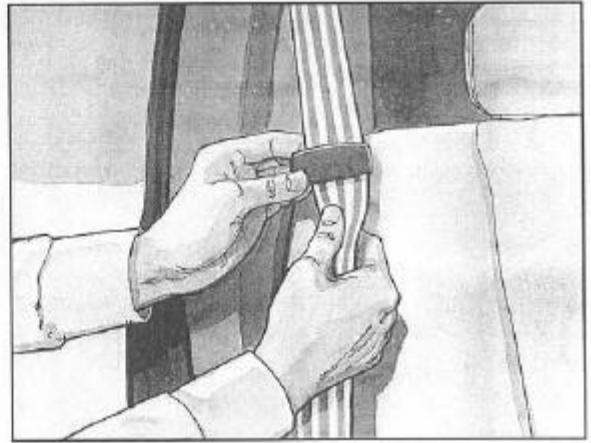
1. For the second row, remove the guide from its storage clip on the trim panel near the side of the seatback. For the third row, remove the guide from its storage clip on the side of the seatback.

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1-42



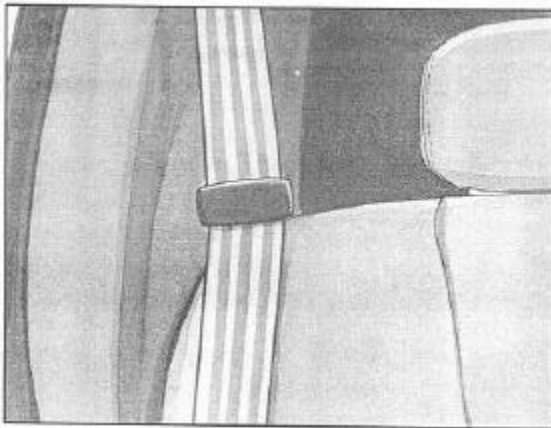
**Third Row Seat**



2. Place the guide over the belt and insert the two edges of the belt into the slots of the guide.

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1-43



3. Be sure that the belt is not twisted and it lies flat. The guide must be on top of the belt.



**Second Row Seat**

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1-44



#### Third Row Seat

4. Buckle, position and release the safety belt as described in "Rear Seat Outside Passenger Positions" earlier in this section. Make sure that the shoulder belt crosses the shoulder.

To remove and store the comfort guides, squeeze the belt edges together so that you can take them out from the guides. Make sure you remove the comfort guide from the belt before you fold a rear seat down or use an easy-entry seat, if your vehicle has one.

## Children

Everyone in a vehicle needs protection! This includes infants and all other children. Neither the distance traveled nor the age and size of the traveler changes the need, for everyone, to use safety restraints. In fact, the law in every state in the United States and in every Canadian province says children up to some age must be restrained while in a vehicle.

### Infants and Young Children

Every time infants and young children ride in vehicles, they should have the protection provided by the appropriate restraint. Young children should not use the vehicle's safety belts, unless there is no other choice.

1-45



### CAUTION:

People should never hold a baby in their arms while riding in a vehicle. A baby doesn't weigh much -- until a crash. During a crash a baby will become so heavy it is not possible to hold it. For example, in a crash at only 25 mph (40 km/h), a 12-lb. (5.5 kg) baby will suddenly become a 240-lb. (110 kg) force on a person's arms. A baby should be secured in an appropriate restraint.

1-46



**⚠ CAUTION:**

Children who are up against, or very close to, any air bag when it inflates can be seriously injured or killed. Air bags plus lap-shoulder belts offer outstanding protection for adults and older children, but not for young children and infants. Neither the vehicle's safety belt system nor its air bag system is designed for them. Young children and infants need the protection that a child restraint system can provide.

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1-47

**Q:** What are the different types of add-on child restraints?

**A:** Add-on child restraints, which are purchased by the vehicle's owner, are available in four basic types. Selection of a particular restraint should take into consideration not only the child's weight, height and age but also whether or not the restraint will be compatible with the motor vehicle in which it will be used.

For most basic types of child restraints, there are many different models available. When purchasing a child restraint, be sure it is designed to be used in a motor vehicle. If it is, the restraint will have a label saying that it meets federal motor vehicle safety standards.

The restraint manufacturer's instructions that come with the restraint state the weight and height limitations for a particular child restraint. In addition, there are many kinds of restraints available for children with special needs.

**⚠ CAUTION:**

Newborn infants need complete support, including support for the head and neck. This is necessary because a newborn infant's neck is weak and its head weighs so much compared with the rest of its body. In a crash, an infant in a rear-facing seat settles into the restraint, so the crash forces can be distributed across the strongest part of an infant's body, the back and shoulders. Infants always should be secured in appropriate infant restraints.

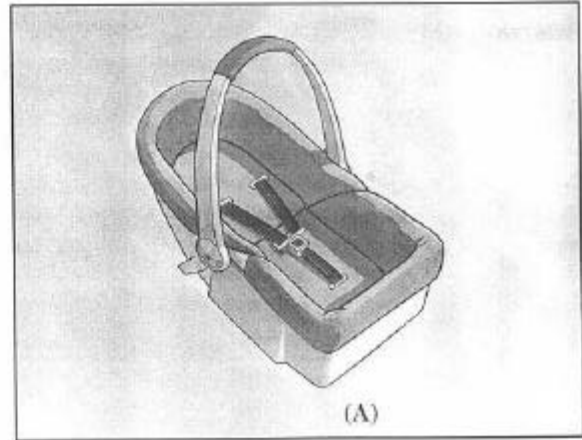
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1-48

**⚠ CAUTION:**

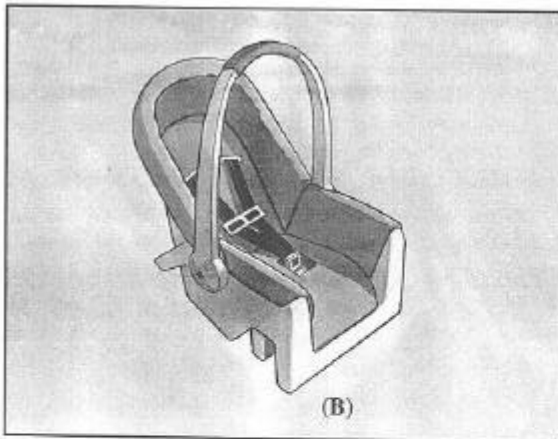
The body structure of a young child is quite unlike that of an adult or older child, for whom the safety belts are designed. A young child's hip bones are still so small that vehicle's regular safety belt may not remain low on the hip bones, as it should. Instead, it may settle up around the child's abdomen. In a crash, the belt would apply force on a body area that's unprotected by any bony structure. This alone could cause serious or fatal injuries. Young children always should be secured in appropriate child restraints.

## Restraint Systems for Children

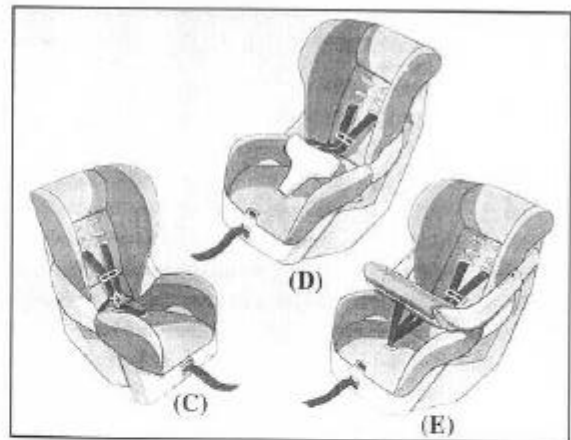


An infant car bed (A), a special bed made for use in a motor vehicle, is an infant restraint system designed to restrain or position a child on a continuous flat surface. Make sure that the infant's head rests toward the center of the vehicle.

1-49

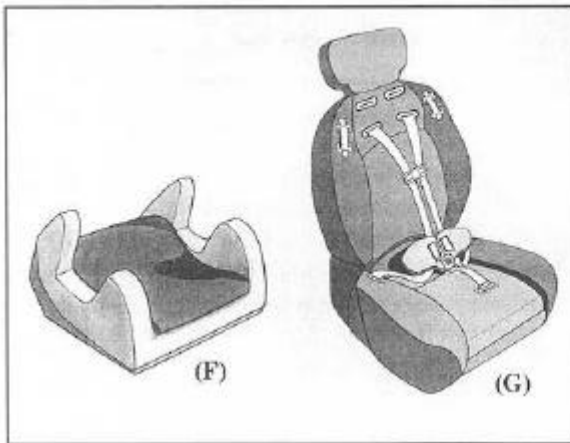


A rear-facing infant seat (B) provides restraint with the seating surface against the back of the infant. The harness system holds the infant in place and, in a crash, acts to keep the infant positioned in the restraint.



A forward-facing child seat (C-E) provides restraint for the child's body with the harness and also sometimes with surfaces such as T-shaped or shelf-like shields.

1-50



A booster seat (F-G) is a child restraint designed to improve the fit of the vehicle's safety belt system. Some booster seats have a shoulder belt positioner, and some high-back booster seats have a five-point harness. A booster seat can also help a child to see out the window.

**Q: How do child restraints work?**

**A:** A child restraint system is any device designed for use in a motor vehicle to restrain, seat, or position children. A built-in child restraint system is a permanent part of the motor vehicle. An add-on child restraint system is a portable one, which is purchased by the vehicle's owner.

For many years, add-on child restraints have used the adult belt system in the vehicle. To help reduce the chance of injury, the child also has to be secured within the restraint. The vehicle's belt system secures the add-on child restraint in the vehicle, and the add-on child restraint's harness system holds the child in place within the restraint.


One system, the three-point harness, has straps that come down over each of the infant's shoulders and buckle together at the crotch. The five-point harness system has two shoulder straps, two hip straps and a crotch strap. A shield may take the place of hip straps. A T-shaped shield has shoulder straps that are attached to a flat pad which rests low against the child's body. A shelf- or armrest-type shield has straps that are attached to a wide, shelf-like shield that swings up or to the side.

When choosing a child restraint, be sure the child restraint is designed to be used in a vehicle. If it is, it will have a label saying that it meets federal motor vehicle safety standards.

Then follow the instructions for the restraint. You may find these instructions on the restraint itself or in a booklet, or both. These restraints use the belt system in your vehicle, but the child also has to be secured within the restraint to help reduce the chance of personal injury. When securing an add-on child restraint, refer to the instructions that come with the restraint which may be on the restraint itself or in a booklet, or both, and to this manual. The child restraint instructions are important, so if they are not available, obtain a replacement copy from the manufacturer.

**Where to Put the Restraint**

Accident statistics show that children are safer if they are restrained in the rear rather than the front seat. General Motors, therefore, recommends that child restraints be secured in a rear seat including an infant riding in a rear-facing infant seat, a child riding in a forward-facing child seat and an older child riding in a booster seat. *Never* put a rear-facing child restraint in the right front passenger seat. Here's why:

 <b>CAUTION:</b>
<p>A child in a rear-facing child restraint can be seriously injured or killed if the right front passenger's air bag inflates. This is because the back of the rear-facing child restraint would be very close to the inflating air bag. Always secure a rear-facing child restraint in a rear seat.</p> <p>You may secure a forward-facing child restraint in the right front seat, but before you do, always move the front passenger seat as far back as it will go. It's better to secure the child restraint in a rear seat.</p>

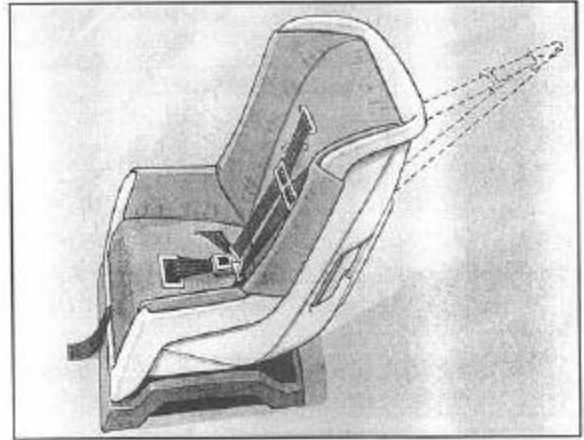
Wherever you install it, be sure to secure the child restraint properly.

Keep in mind that an unsecured child restraint can move around in a collision or sudden stop and injure people in the vehicle. Be sure to properly secure any child restraint in your vehicle -- even when no child is in it.

## Top Strap

Some child restraints have a top strap, or "top tether." It can help restrain the child restraint during a collision. For it to work, a top strap must be properly anchored to the vehicle.

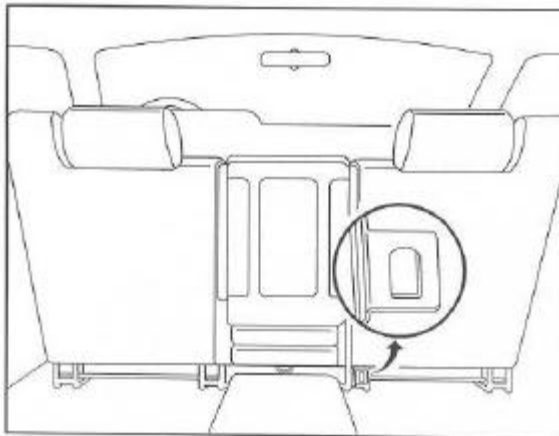
If the child restraint does not have a top strap, one can be obtained, in kit form, for many child restraints. Ask the child restraint manufacturer whether or not a kit is available.



In Canada, the law requires that forward-facing child restraints have a top strap, and that the strap be anchored. In the United States, some child restraints also have a top strap. If your child restraint has a top strap, it should be anchored.

1-53

**Suburban/Yukon XL models without rear seats:** Top strap anchor loops are located at the bottom rear of the front seat cushion for the right front passenger's position.



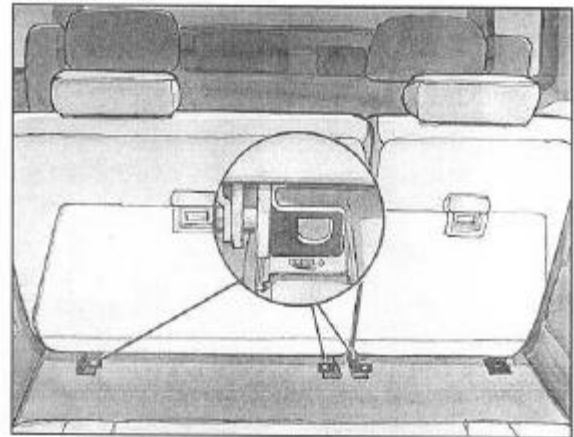
### Suburban/Yukon XL Models Without Rear Seats

Anchor the top strap to this bracket. Once you have the top strap anchored, you'll be ready to secure the child restraint itself.

**Suburban/Yukon XL models with rear seats:**

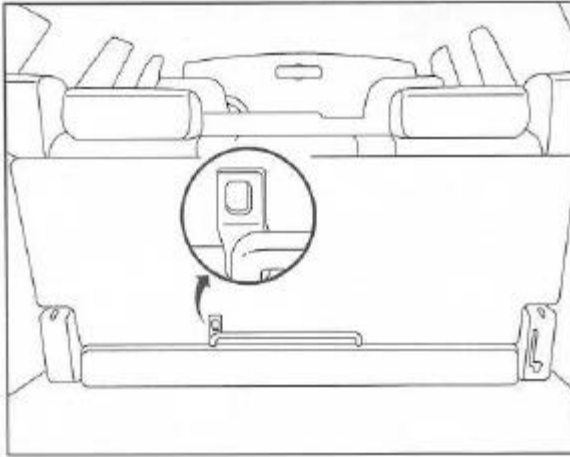
A child restraint with a top strap should only be used in the second or third row. Don't use a child restraint with a top strap in the front seat because there's no place to anchor the top strap.

An anchor loop bracket for a top strap is located at the bottom rear of the seat cushion for each seating position in the second row, and for the center seating position in the third row.



Suburban/Yukon XL Second Row Seat.  
Bucket seats similar.

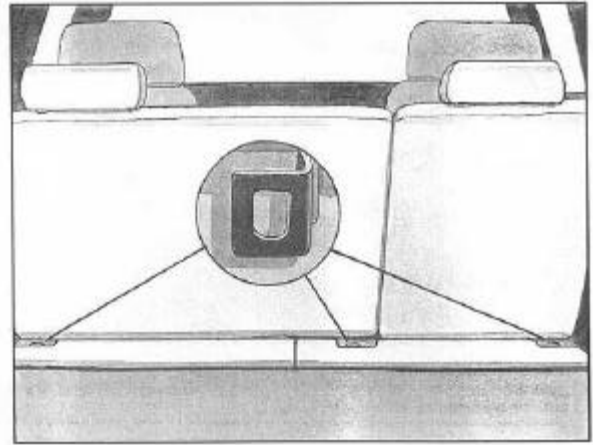
1-54



**Suburban/Yukon XL Third Row Seat**

**Utility models:** A child restraint with a top strap should only be used in the second row. Don't use a child restraint with a top strap in the right front passenger's position or in the third row, because there's no place to anchor the top strap.

An anchor loop bracket for a top strap is located at the bottom rear of the seat cushion for each seating position in the second row.



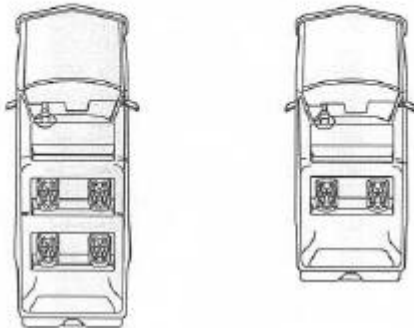
**Utility Second Row Seat**

Anchor the top strap to one of these anchor points. Be sure to use an anchor point located on the same side of the vehicle as the seating position where the child restraint will be placed. Raise the head restraint and route the top strap under it.

Once you have the top strap anchored, you'll be ready to secure the child restraint itself. Tighten the top strap when and as the child restraint manufacturer's instructions say.

1-55

### Securing a Child Restraint in a Rear Outside Seat Position



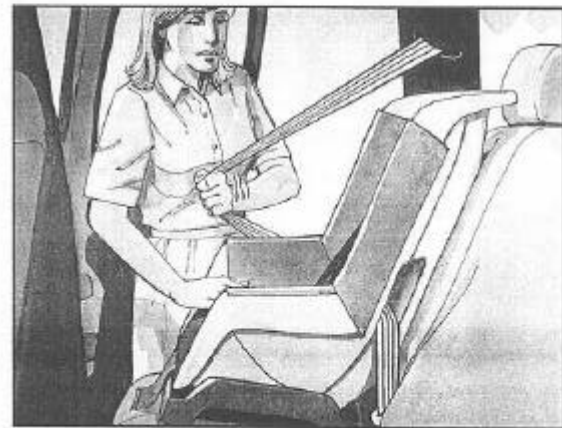
You'll be using the lap-shoulder belt. See the earlier part about the top strap if the child restraint has one. Be sure to follow the instructions that came with the child restraint. Secure the child in the child restraint when and as the instructions say.

1. Put the restraint on the seat.

2. Pick up the latch plate, and run the lap and shoulder portions of the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.

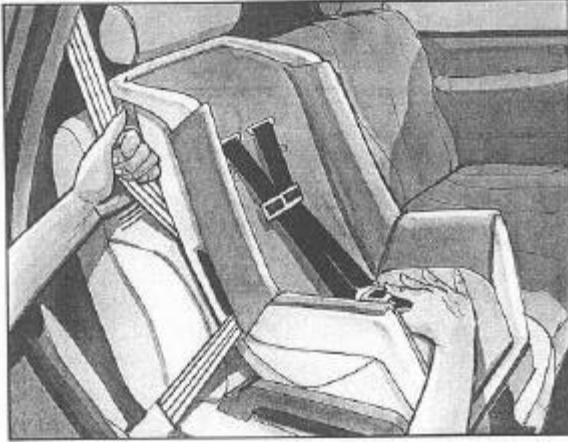
If the shoulder belt goes in front of the child's face or neck, put it behind the child restraint.

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



1-56

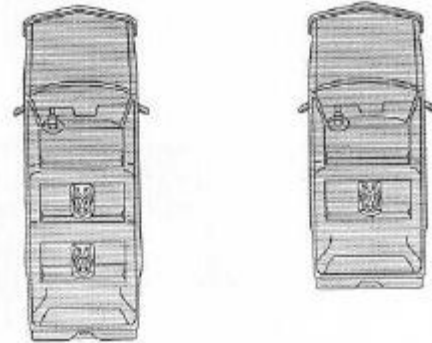
4. Pull the rest of the shoulder belt all the way out of the retractor to set the lock.



5. To tighten the belt, feed the shoulder belt back into the retractor while you push down on the child restraint. If you're using a forward-facing child restraint, you may find it helpful to use your knee to push down on the child restraint as you tighten the belt.
6. Push and pull the child restraint in different directions to be sure it is secure.

To remove the child restraint, just unbuckle the vehicle's safety belt and let it go back all the way. The safety belt will move freely again and be ready to work for an adult or larger child passenger.

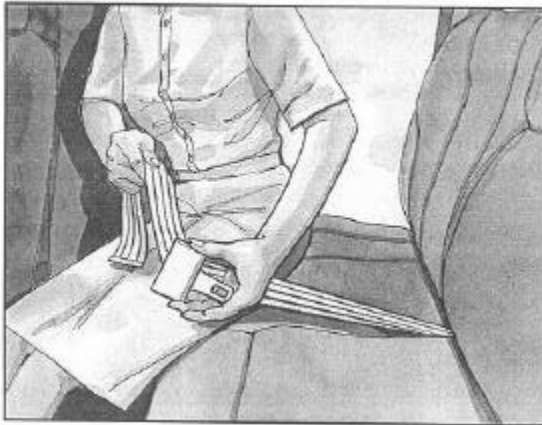
### Securing a Child Restraint in a Center Rear Seat Position



You'll be using the lap belt. Be sure to follow the instructions that came with the child restraint. Secure the child in the child restraint when and as the instructions say.

See the earlier part about the top strap if the child restraint has one.

1-57



1. Make the belt as long as possible by tilting the latch plate and pulling it along the belt.
2. Put the restraint on the seat.
3. Run the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.



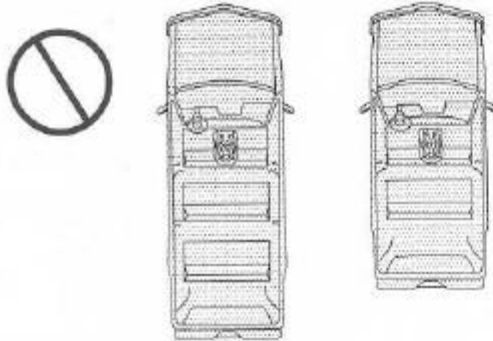
4. Buckle the belt. Make sure the release button is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.
5. To tighten the belt, pull its free end while you push down on the child restraint. If you're using a forward-facing child restraint, you may find it helpful to use your knee to push down on the child restraint as you tighten the belt.

1-58

6. Push and pull the child restraint in different directions to be sure it is secure.

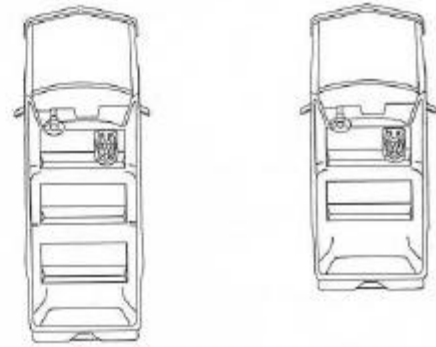
To remove the child restraint, just unbuckle the vehicle's safety belt. It will be ready to work for an adult or larger child passenger.

### Securing a Child Restraint in the Center Front Seat Position



Don't use child restraints in this position. The restraints won't work properly.

### Securing a Child Restraint in the Right Front Seat Position



Your vehicle has a right front passenger air bag. *Never* put a rear-facing child restraint in this seat. Here's why:

#### CAUTION:

A child in a rear-facing child restraint can be seriously injured or killed if the right front passenger's air bag inflates. This is because the back of the rear-facing child restraint would be very close to the inflating air bag. Always secure a rear-facing child restraint in the rear seat.

Although a rear seat is a safer place, you can secure a forward-facing child restraint in the right front seat.

You'll be using the lap-shoulder belt. See the earlier part about the top strap if the child restraint has one. Be sure to follow the instructions that came with the child restraint. Secure the child in the child restraint when and as the instructions say.

1. Because your vehicle has a right front passenger air bag, always move the seat as far back as it will go before securing a forward-facing child restraint. See "Seats" in the Index.
2. Put the restraint on the seat.

3. Pick up the latch plate, and run the lap and shoulder portions of the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.

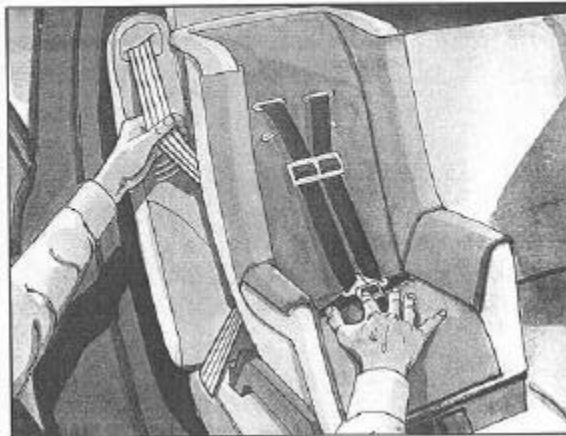
If the shoulder belt goes in front of the child's face or neck, put it behind the child restraint.



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



5. Pull the rest of the shoulder belt all the way out of the retractor to set the lock.



6. To tighten the belt, feed the shoulder belt back into the retractor while you push down on the child restraint. You may find it helpful to use your knee to push down on the child restraint as you tighten the belt.
7. Push and pull the child restraint in different directions to be sure it is secure.

To remove the child restraint, just unbuckle the vehicle's safety belt and let it go back all the way. The safety belt will move freely again and be ready to work for an adult or larger child passenger.

1-61

## Older Children



Older children who have outgrown booster seats should wear the vehicle's safety belts.

If you have the choice, a child should sit next to a window so the child can wear a lap-shoulder belt and get the additional restraint a shoulder belt can provide.

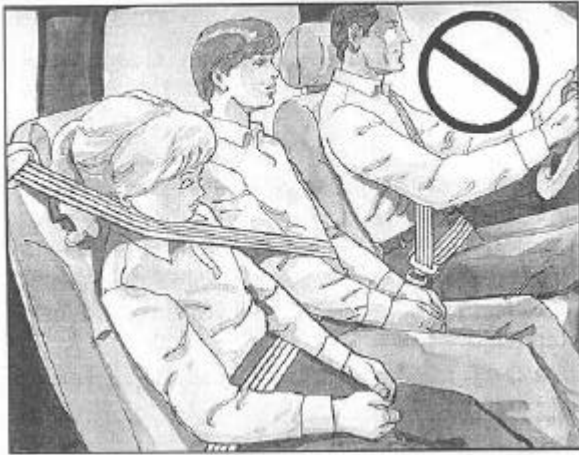
**Q:** What is the proper way to wear safety belts?

**A:** If possible, an older child should wear a lap-shoulder belt and get the additional restraint a shoulder belt can provide. The shoulder belt should not cross the face or neck. The lap belt should fit snugly below the hips, just touching the top of the thighs. It should never be worn over the abdomen, which could cause severe or even fatal internal injuries in a crash.

Accident statistics show that children are safer if they are restrained in the rear seat.

In a crash, children who are not buckled up can strike other people who are buckled up, or can be thrown out of the vehicle. Older children need to use safety belts properly.

1-62



**⚠ CAUTION:**

Never do this.

Here two children are wearing the same belt. The belt can't properly spread the impact forces. In a crash, the two children can be crushed together and seriously injured. A belt must be used by only one person at a time.

**Q:** What if a child is wearing a lap-shoulder belt, but the child is so small that the shoulder belt is very close to the child's face or neck?

**A:** Move the child toward the center of the vehicle, but be sure that the shoulder belt still is on the child's shoulder, so that in a crash the child's upper body would have the restraint that belts provide. If the child is sitting in a rear seat outside position, see "Rear Safety Belt Comfort Guides" in the Index. If the child is so small that the shoulder belt is still very close to the child's face or neck, you might want to place the child in a seat that has a lap belt, if your vehicle has one.

1-63



**⚠ CAUTION:**

Never do this.

Here a child is sitting in a seat that has a lap-shoulder belt, but the shoulder part is behind the child. If the child wears the belt in this way, in a crash the child might slide under the belt. The belt's force would then be applied right on the child's abdomen. That could cause serious or fatal injuries.

Wherever the child sits, the lap portion of the belt should be worn low and snug on the hips, just touching the child's thighs. This applies belt force to the child's pelvic bones in a crash.

1-64

## Safety Belt Extender

If the vehicle's safety belt will fasten around you, you should use it.

But if a safety belt isn't long enough to fasten, your dealer will order you an extender. It's free. When you go in to order it, take the heaviest coat you will wear, so the extender will be long enough for you. The extender will be just for you, and just for the seat in your vehicle that you choose. Don't let someone else use it, and use it only for the seat it is made to fit. To wear it, just attach it to the regular safety belt.

## Checking Your Restraint Systems

Now and then, make sure the safety belt reminder light and all your belts, buckles, latch plates, retractors and anchorages are working properly. Look for any other loose or damaged safety belt system parts. If you see anything that might keep a safety belt system from doing its job, have it repaired.

Torn or frayed safety belts may not protect you in a crash. They can rip apart under impact forces. If a belt is torn or frayed, get a new one right away.

Also look for any opened or broken air bag covers, and have them repaired or replaced. (The air bag system does not need regular maintenance.)

## Replacing Restraint System Parts After a Crash

If you've had a crash, do you need new belts?

After a very minor collision, nothing may be necessary. But if the belts were stretched, as they would be if worn during a more severe crash, then you need new belts.

If belts are cut or damaged, replace them. Collision damage also may mean you will need to have safety belt or seat parts repaired or replaced. New parts and repairs may be necessary even if the belt wasn't being used at the time of the collision.

If an air bag inflates, you'll need to replace air bag system parts. See the part on the air bag system earlier in this section.

# **APPENDIX F**

## **CHILD SEAT**

## POST-TEST OBSERVATIONS

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

	Right Rear Passenger
Child Seat	Britax Roundabout no latch
Child Seat Mass (kg)	5.9
Belt Fraying	ok
Stress Marks	ok
Cracks	ok
Buckle Stress	ok
Latch Hooks	ok
Contact	Feet to front seat

### HYBRID III 3 YEAR OLD ATD INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

#### HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Right Rear Passenger			
			Max	Time	Min	Time
Head CG	X	G's	41.9	226	45.2	113
Head CG	Y	G's	18.5	110	21.5	113
Head CG	Z	G's	68.2	100	2.0	58
Head CG Resultant	N/A	G's	71.3	100		

#### CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Right Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	G's	8.3	239	32.9	94
Chest CG	Y	G's	5.0	99	5.5	119
Chest CG	Z	G's	19.3	103	22.2	79
Chest CG Resultant	N/A	G's	37.8	79		

#### HEAD INJURY CRITERIA (HIC)

Location	Right Rear Passenger			
	HIC	Avg G's	T <sup>1</sup>	T <sup>2</sup>
Head CG Primary (36 msec)	884	56.5	83.6	119.6
Head CG Primary (15 msec)	564	67.6	89.8	104.8

#### CHEST CLIP (3 MSEC)

Location	Right Rear Passenger		
	CLIP	T <sup>1</sup>	T <sup>2</sup>
Chest CG Primary	37.5	77.2	80.3

**HYBRID III 3 YEAR OLD ATD INJURY CRITERIA AND SENSOR DATA...(continued)**

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

**PELVIC PEAK ACCELERATIONS**

Location	Axis	Units	Right Rear Passenger			
			Max	Time	Min	Time
Pelvis	X	G's	9.0	129	42.8	78
Pelvis	Y	G's	4.8	53	8.2	116
Pelvis	Z	G's	11.2	231	34.4	78

**UPPER NECK PEAK FORCES AND MOMENTS**

Location	Axis	Units	Right Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	818	119	9	25
Neck Force	Y	Newtons	56	144	85	91
Neck Force	Z	Newtons	137	240	1870	99
Neck Moment	X	N*m	3.0	123	7.3	98
Neck Moment	Y	N*m	6.2	106	20.5	236
Neck Moment	Z	N*m	2.9	216	2.9	90

**LOWER NECK PEAK FORCES AND MOMENTS**

Location	Axis	Units	Right Rear Passenger			
			Max	Time	Min	Time
Neck Force	X	Newtons	145	223	1184	100
Neck Force	Y	Newtons	138	126	125	94
Neck Force	Z	Newtons	1483	95	176	137
Neck Moment	X	N*m	22.3	94	9.7	141
Neck Moment	Y	N*m	**	**	**	**
Neck Moment	Z	N*m	8.2	125	10.3	94

\*\* No valid data collected

**CHEST PEAK DISPLACEMENTS**

Location	Axis	Units	Right Rear Passenger			
			Max	Time	Min	Time
Chest CG	X	mm			15.8	117

### DUMMY DIMENSIONS

Test Vehicle: 2001/Chevrolet/Suburban/4 door

NHTSA No.: M10107

Test Program: NCAP

Test Date: February 5, 2001

Measurement Description	Right Rear Passenger
	Length (mm)
Head to Roof (Z)	300
Head to Seatback (X)	603
Chest to Door (Y)	400
Left Foot to Seatback	108
Right Foot to Seatback	106

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Photo 1 - Pre-Test RRS 3 Year Old Right Side View



Photo 2 - Post-Test RRS 3 Year Old Right Side View

F-9



Photo 3 - Pre-Test RRS 3 Year Old Right Side View (Door Open)



Photo 4 - Post-Test RRS 3 Year Old Right Side View (Door Open)



Photo 5 - Post-Test RRS 3 Year Old Right Side View Foot Contact



F-12

Photo 6 - LRS Vehicle Seat Belt Damage



Photo 7 - LRS Vehicle Seat Belt Damage

## CHILD DATA PLOTS

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\* No Valid Data Collected



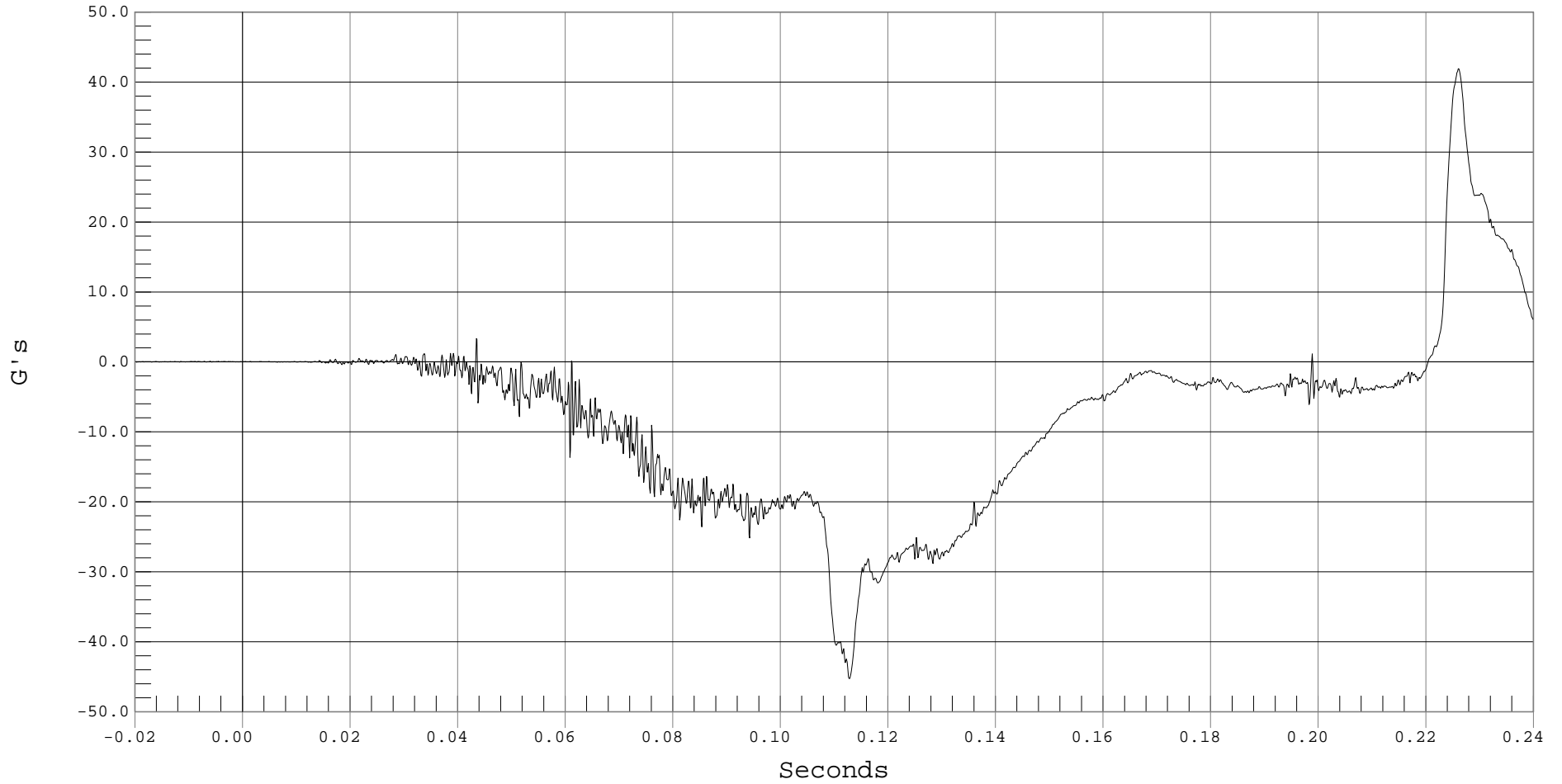
### RRS 3 YR OLD HEAD X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS CHILD HEAD X, B01012AT.A37

Ymin = -45.24 G's @ 0.1128 Seconds, Ymax = 41.94 G's @ 0.2261 Seconds



F-16



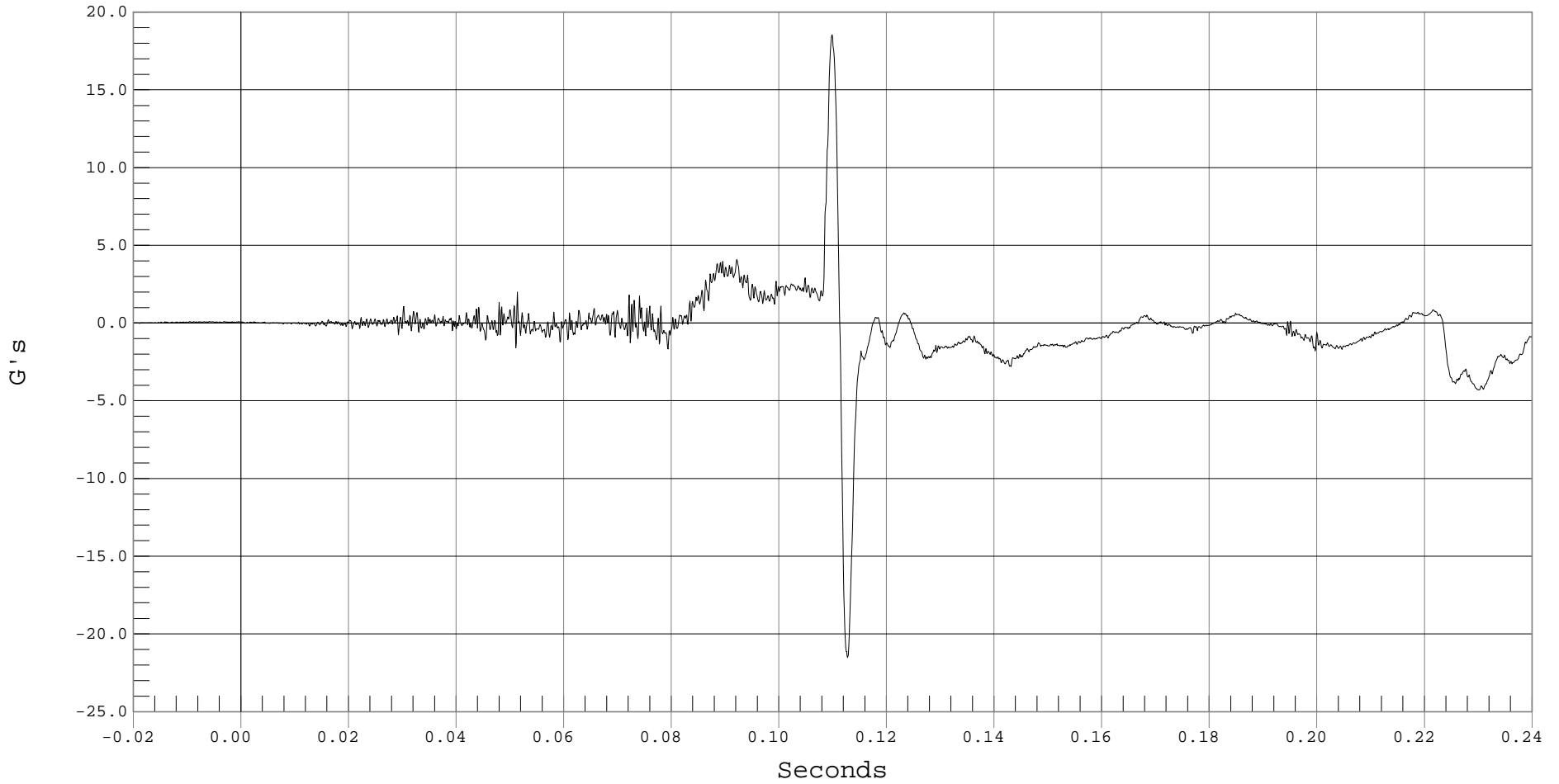
### RRS 3 YR OLD HEAD Y ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS CHILD HEAD Y, B01012AT.A38

Ymin = -21.51 G's @ 0.1128 Seconds, Ymax = 18.54 G's @ 0.1099 Seconds



F-17



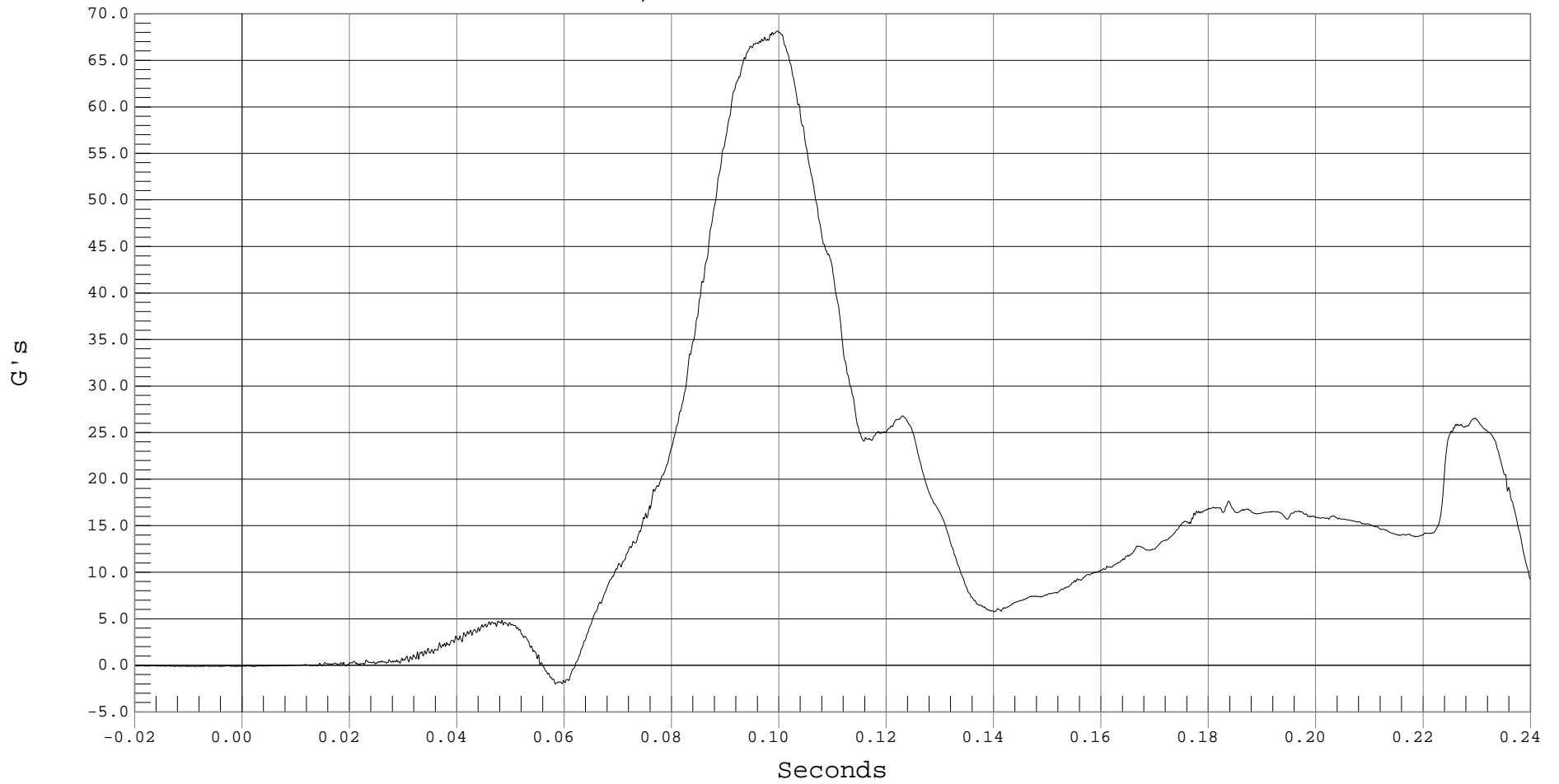
### RRS 3 YR OLD HEAD Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS CHILD HEAD Z, B01012AT.A39

Ymin = -2.01 G's @ 0.0584 Seconds, Ymax = 68.17 G's @ 0.0998 Seconds





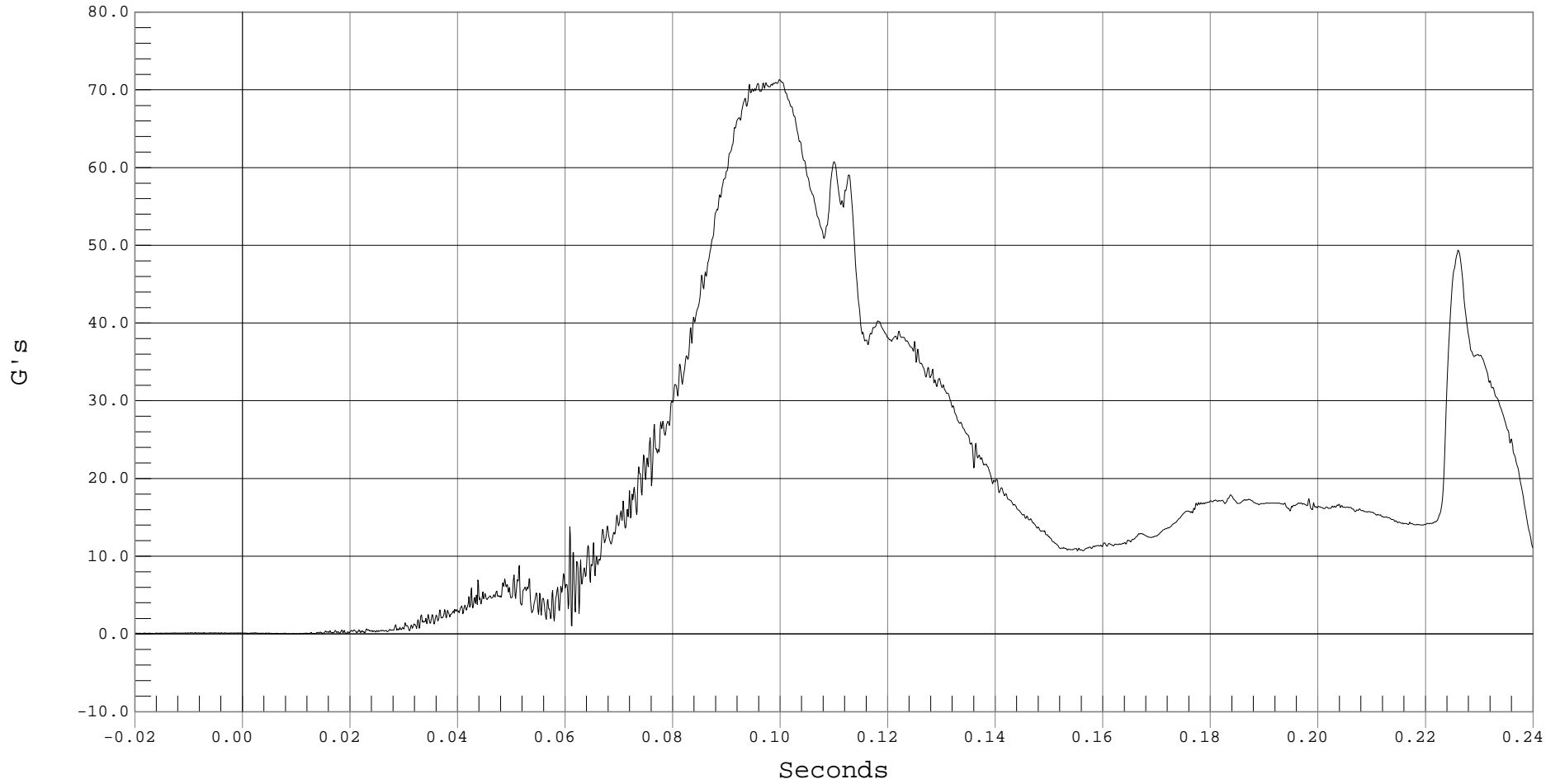
### RRS 3 YR OLD HEAD RESULTANT ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS 3 YR OLD HEAD RESULTANT ACCELERATION, B01012AV.A37

Ymin = .02 G's @ 0.0099 Seconds, Ymax = 71.32 G's @ 0.0998 Seconds





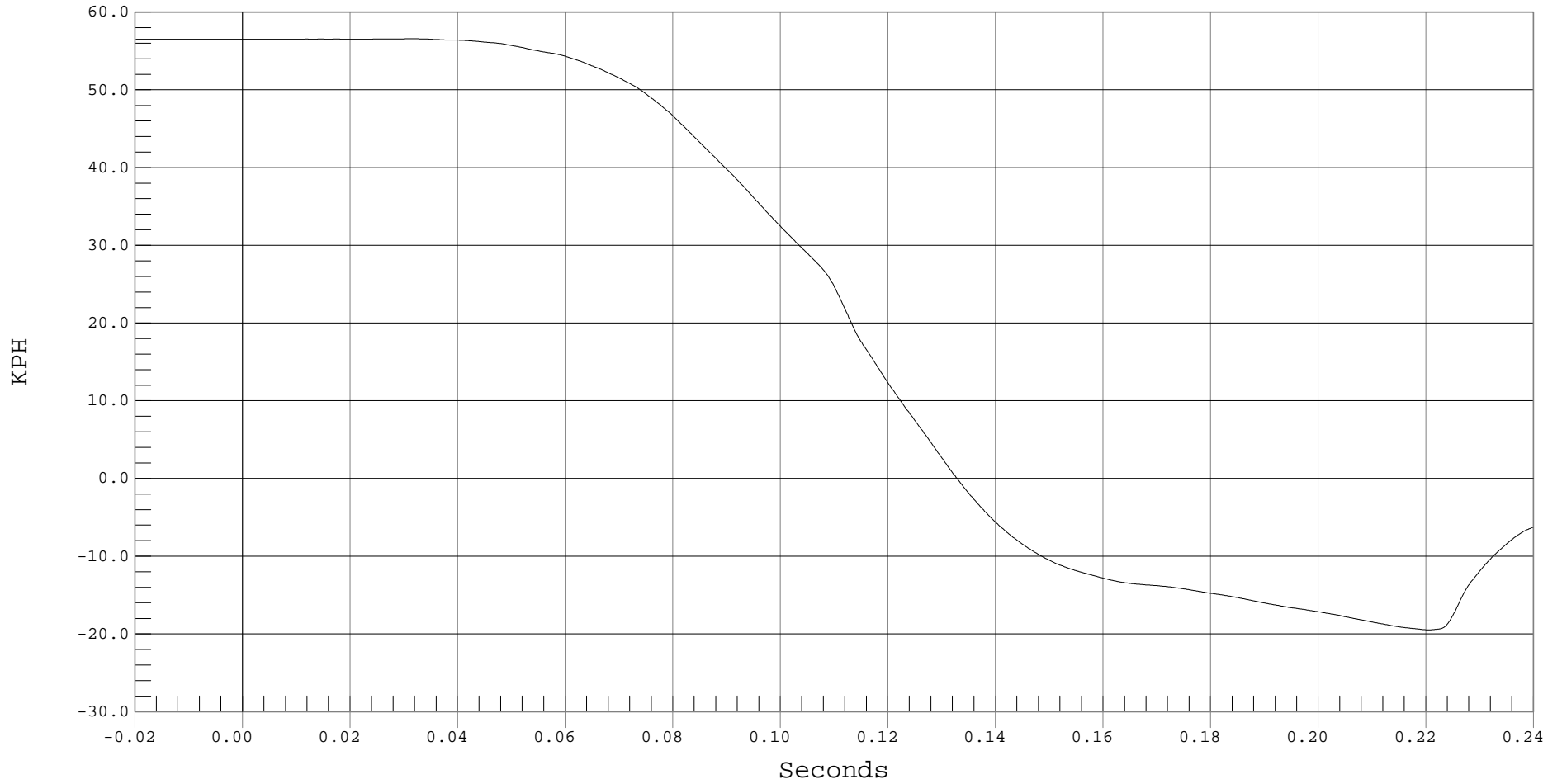
### RRS 3 YR OLD HEAD X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 RRS 3 YR OLD HEAD X VELOCITY, B01012AI.V37

Ymin = -19.46 KPH @ 0.2204 Seconds, Ymax = 56.56 KPH @ 0.0316 Seconds



F-20



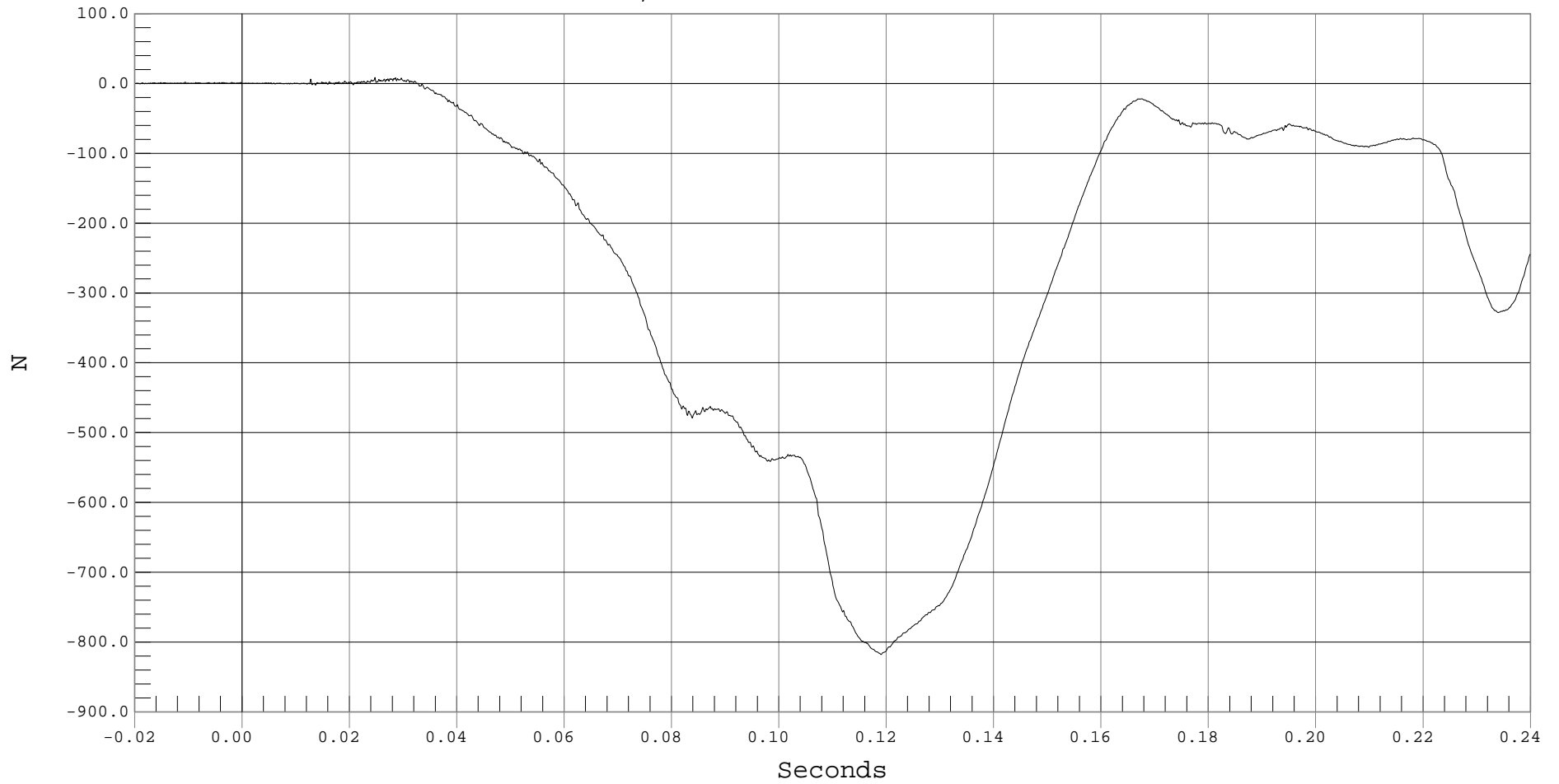
### RRS 3 YR OLD UPPER NECK FORCE X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS CHILD UPPER NECK FORCE X, B01012FT.F40

Ymin = -817.73 N @ 0.1189 Seconds, Ymax = 8.7 N @ 0.0247 Seconds



F-21



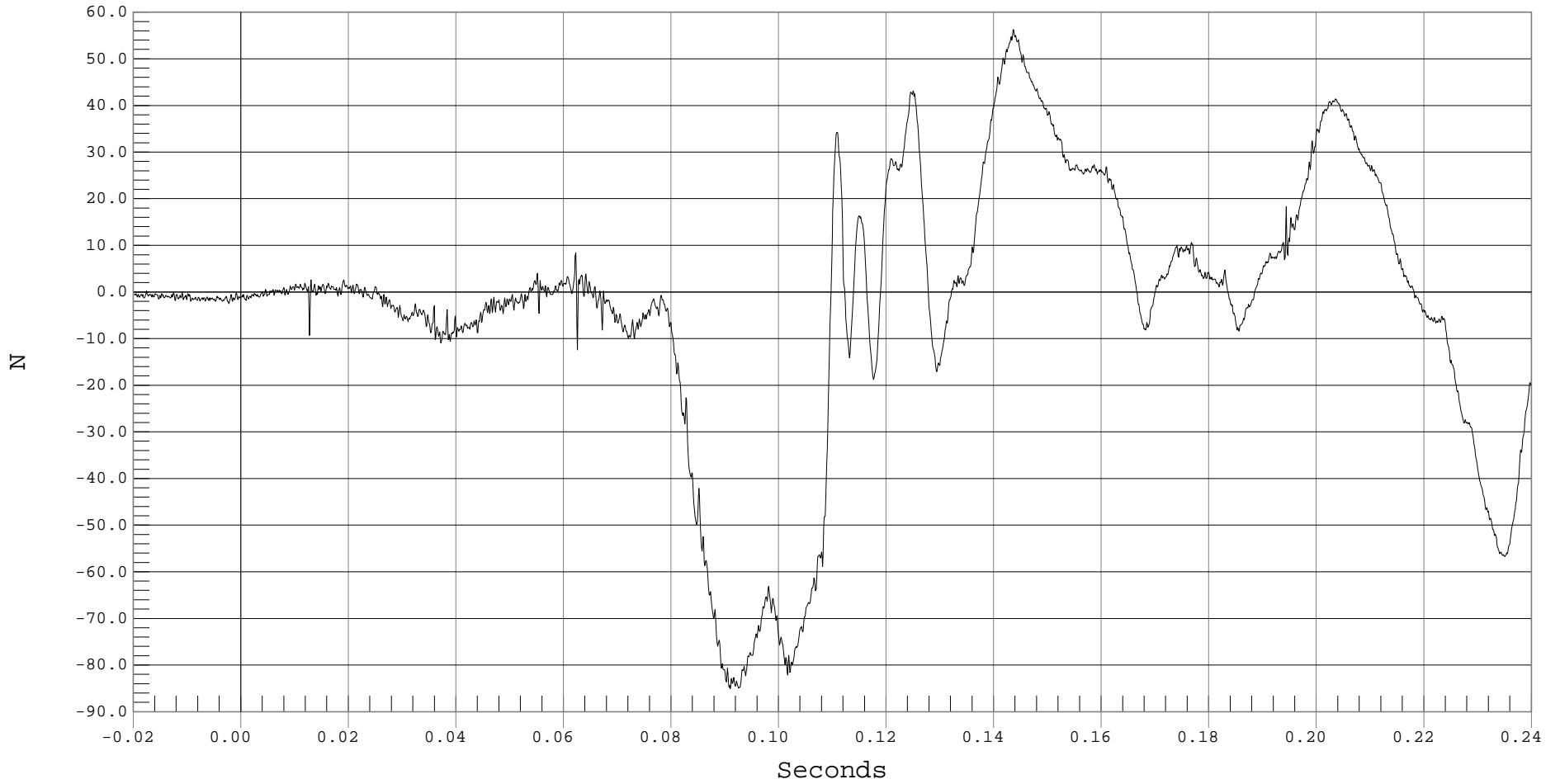
### RRS 3 YR OLD UPPER NECK FORCE Y

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS CHILD UPPER NECK FORCE Y, B01012FT.F41

Ymin = -85.08 N @ 0.0910 Seconds, Ymax = 56.24 N @ 0.1437 Seconds



F-22



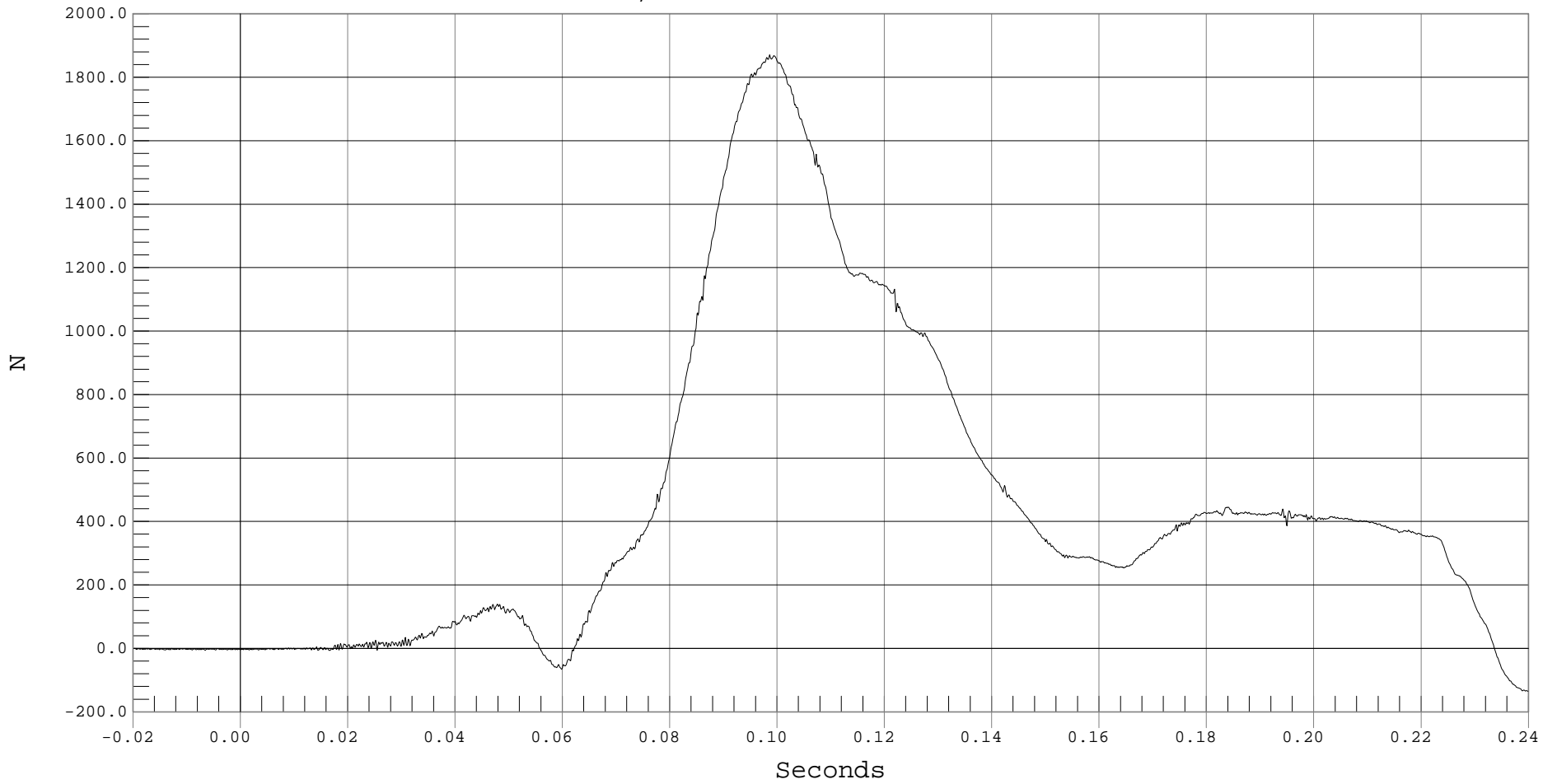
### RRS 3 YR OLD UPPER NECK FORCE Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS CHILD UPPER NECK FORCE Z, B01012FT.F42

Ymin = -137.37 N @ 0.2400 Seconds, Ymax = 1870.19 N @ 0.0985 Seconds



F-23



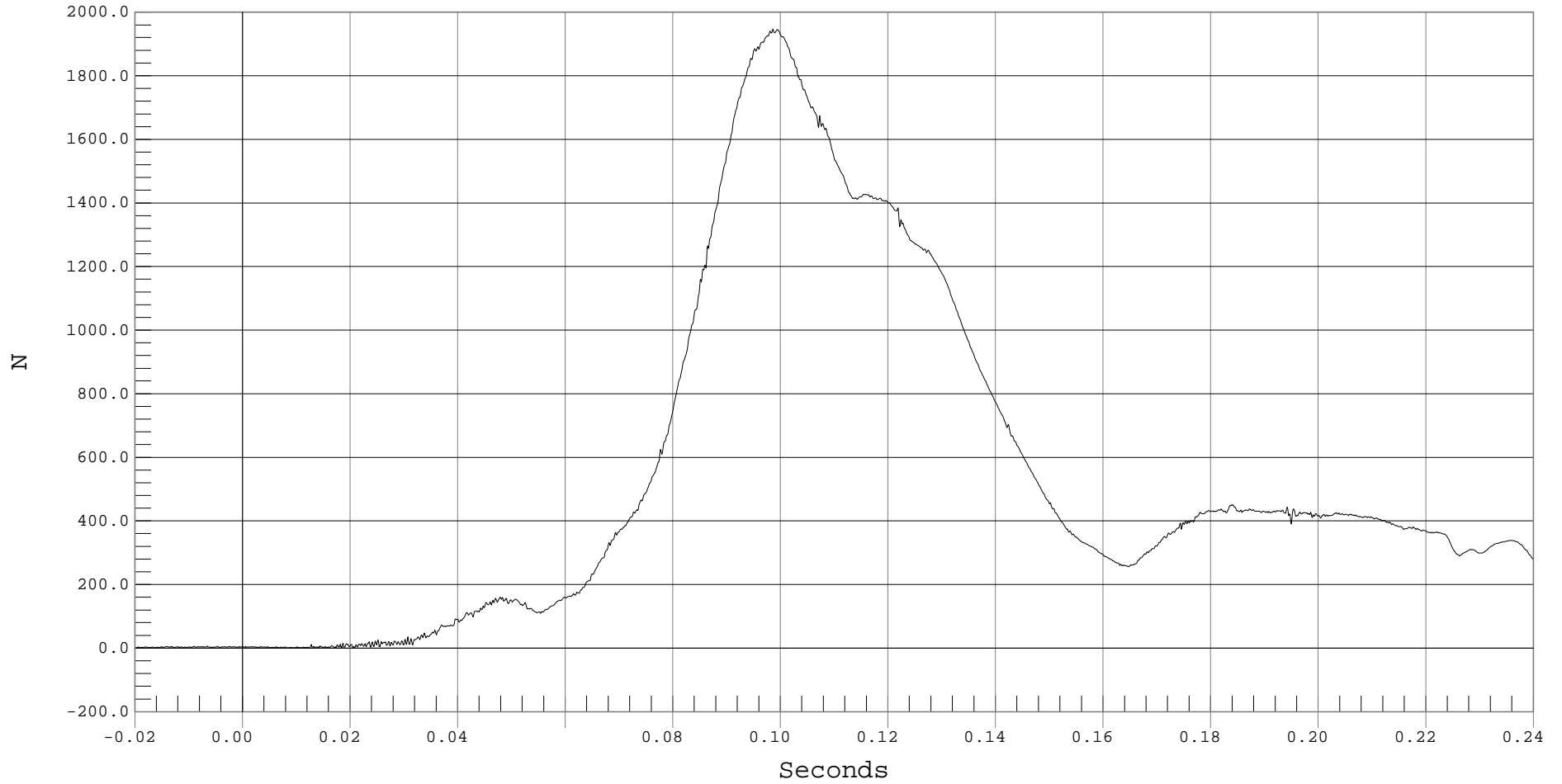
### RRS 3 YR OLD UPPER NECK FORCE RESULTANT

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS 3 YR OLD UPPER NECK FORCE RESULTANT, B01012FV.F40

Ymin = .22 N @ 0.0185 Seconds, Ymax = 1947.46 N @ 0.0986 Seconds



F-24



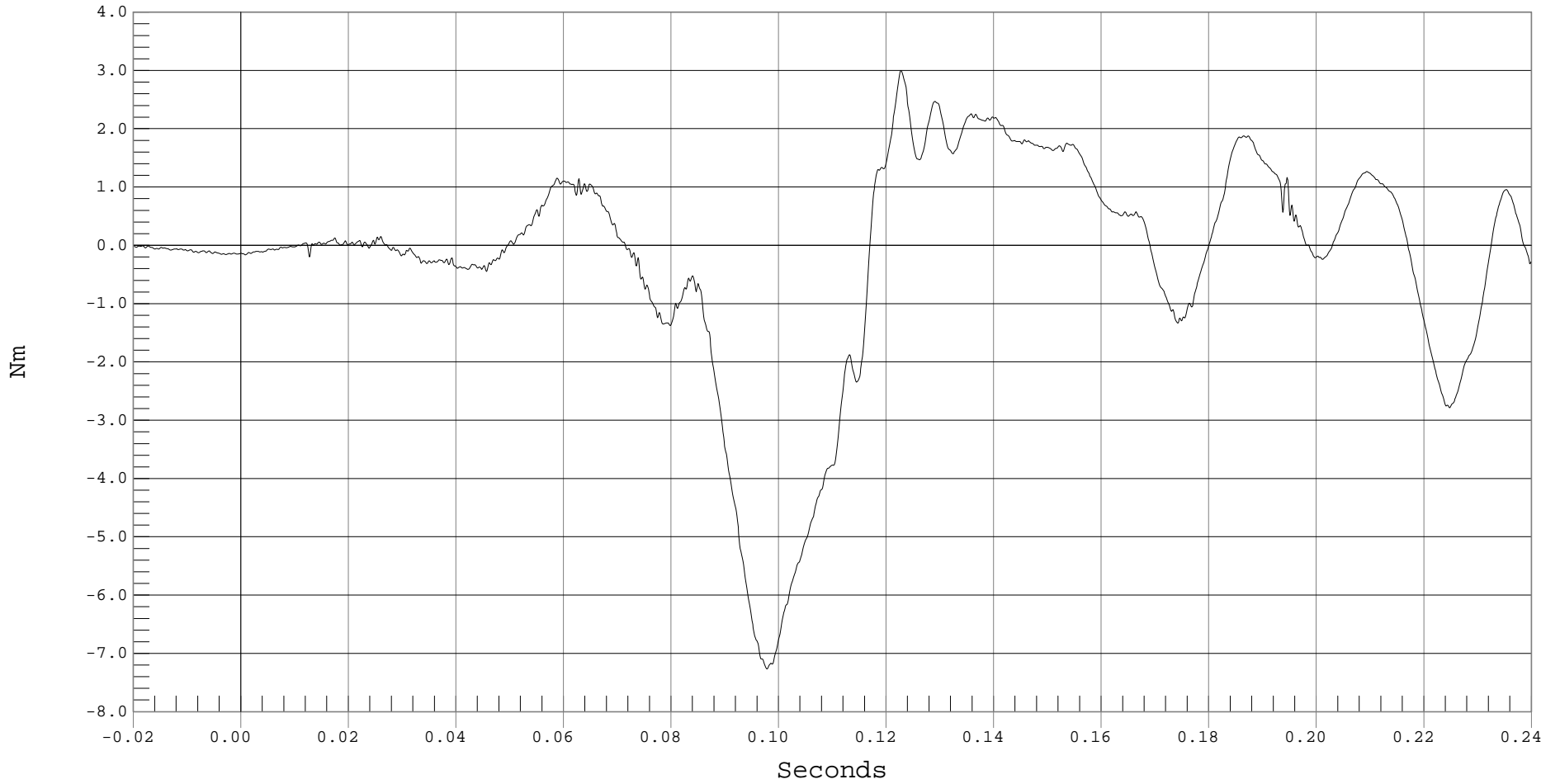
### RRS 3 YR OLD UPPER NECK MOMENT X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 RRS CHILD UPPER NECK MOMENT X, B01012MF.M43

Ymin = -7.27 Nm @ 0.0979 Seconds, Ymax = 3 Nm @ 0.1228 Seconds





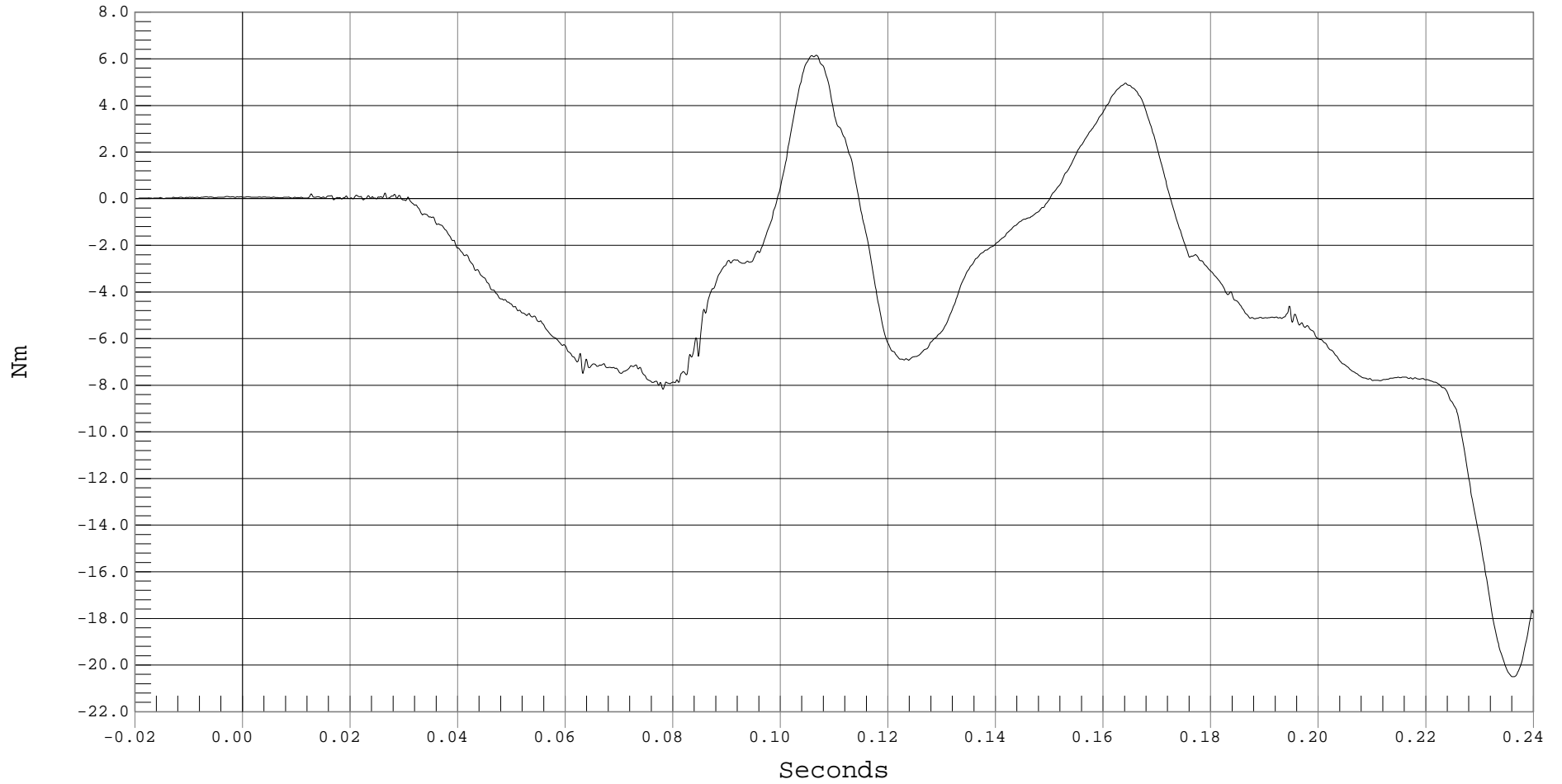
### RRS 3 YR OLD UPPER NECK MOMENT Y

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 RRS CHILD UPPER NECK MOMENT Y, B01012MF.M44

Ymin = -20.5 Nm @ 0.2362 Seconds, Ymax = 6.15 Nm @ 0.1066 Seconds





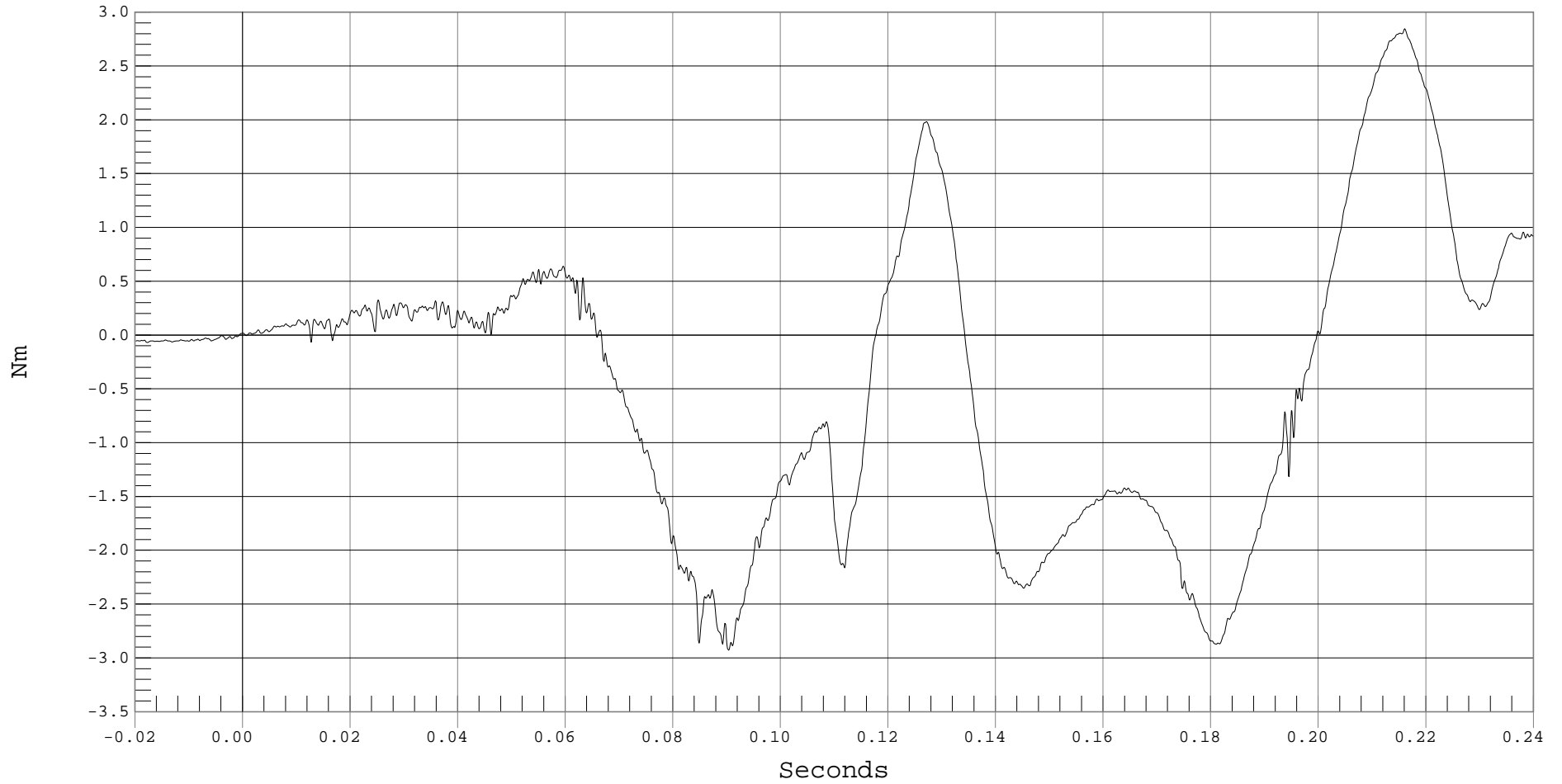
### RRS 3 YR OLD UPPER NECK MOMENT Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 RRS CHILD UPPER NECK MOMENT Z, B01012MF.M45

Ymin = -2.93 Nm @ 0.0904 Seconds, Ymax = 2.85 Nm @ 0.2161 Seconds





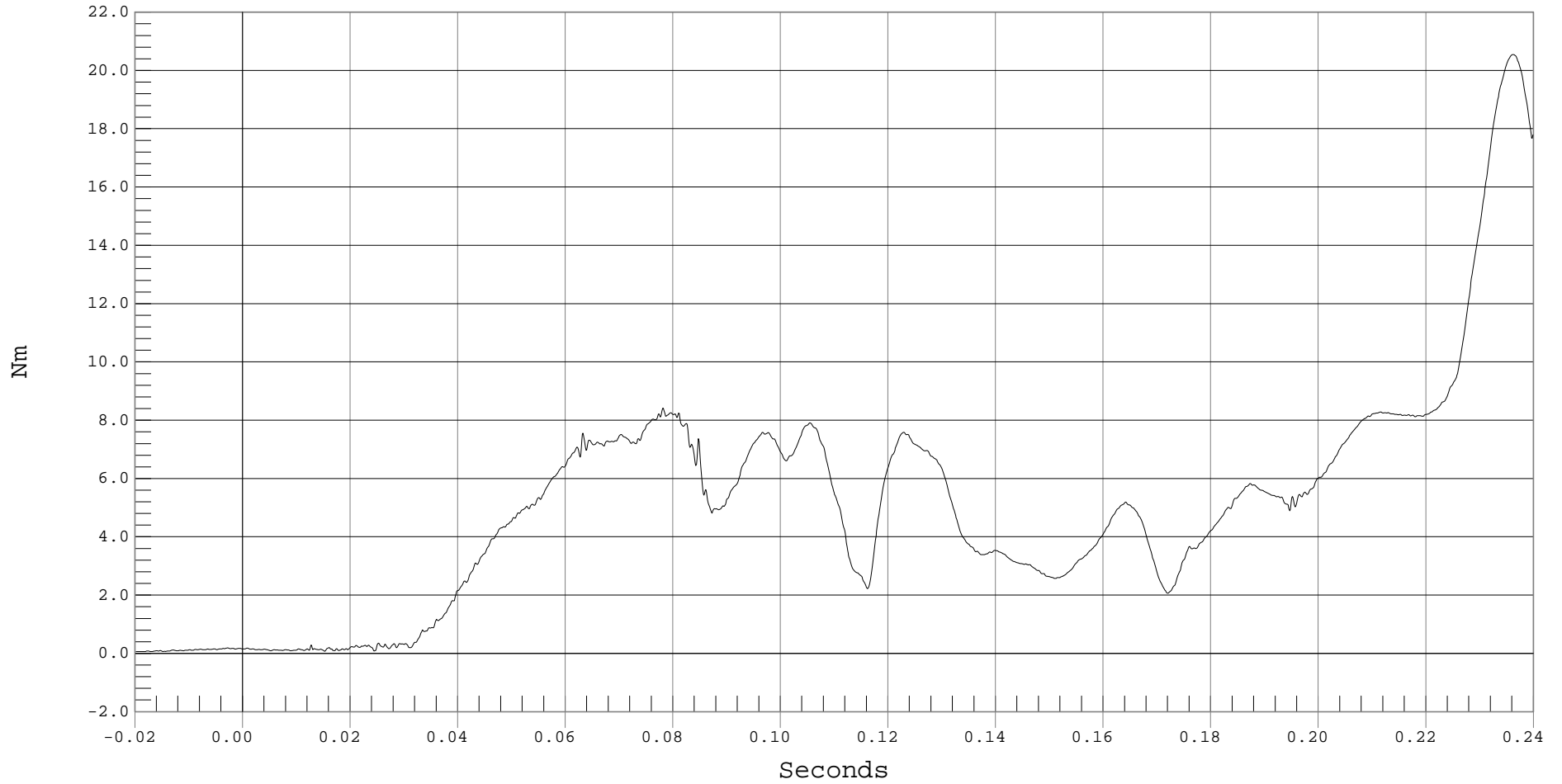
### RRS 3 YR OLD UPPER NECK MOMENT RESULTANT

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 RRS 3 YR OLD UPPER NECK MOMENT RESULTANT, B01012MV.M43

Ymin = .06 Nm @ -0.0188 Seconds, Ymax = 20.54 Nm @ 0.2363 Seconds





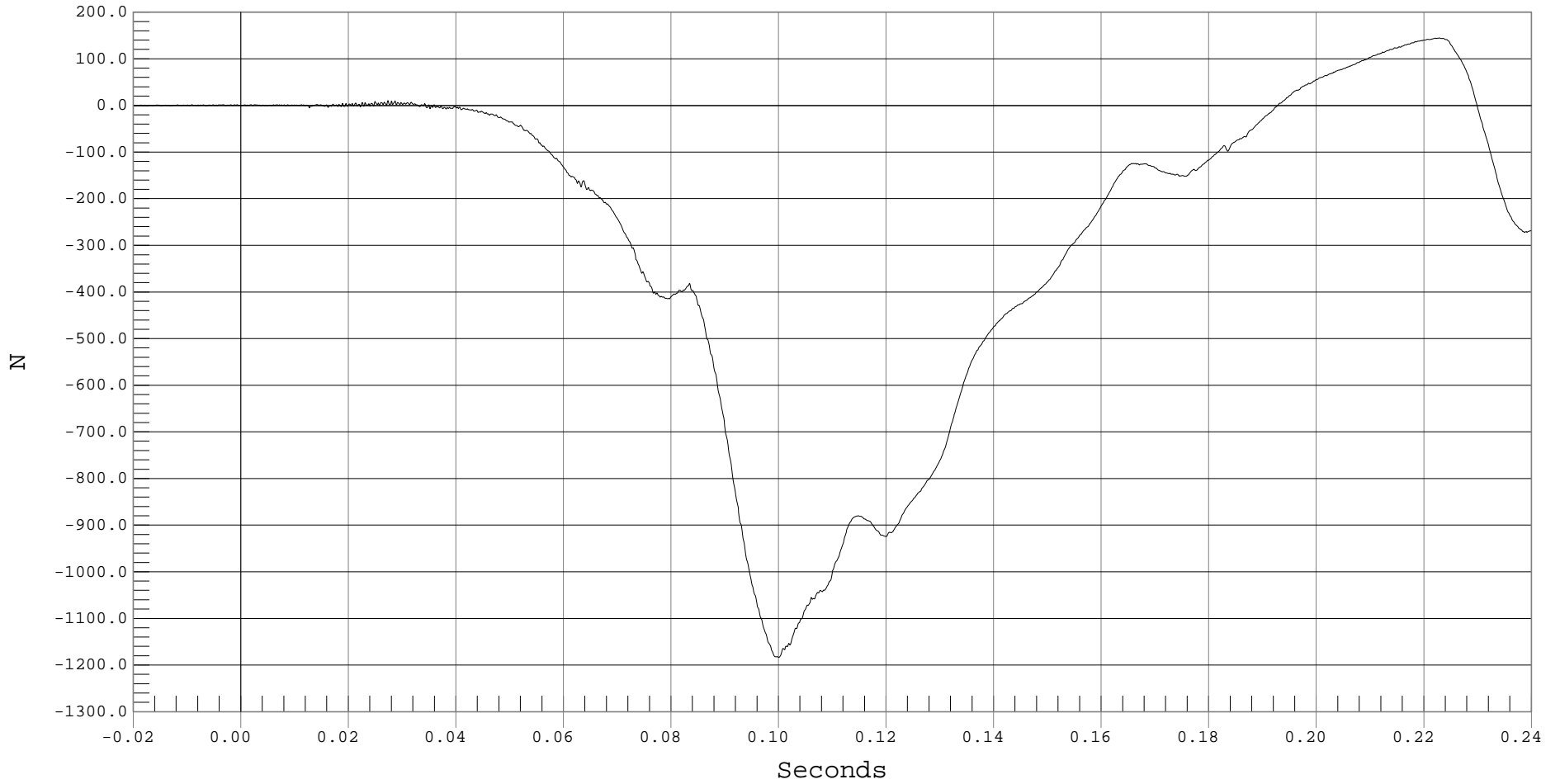
### RRS 3 YR OLD LOWER NECK FORCE X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS CHILD LOWER NECK FORCE X, B01012FT.F46

Ymin = -1183.56 N @ 0.1000 Seconds, Ymax = 144.76 N @ 0.2229 Seconds



F-29



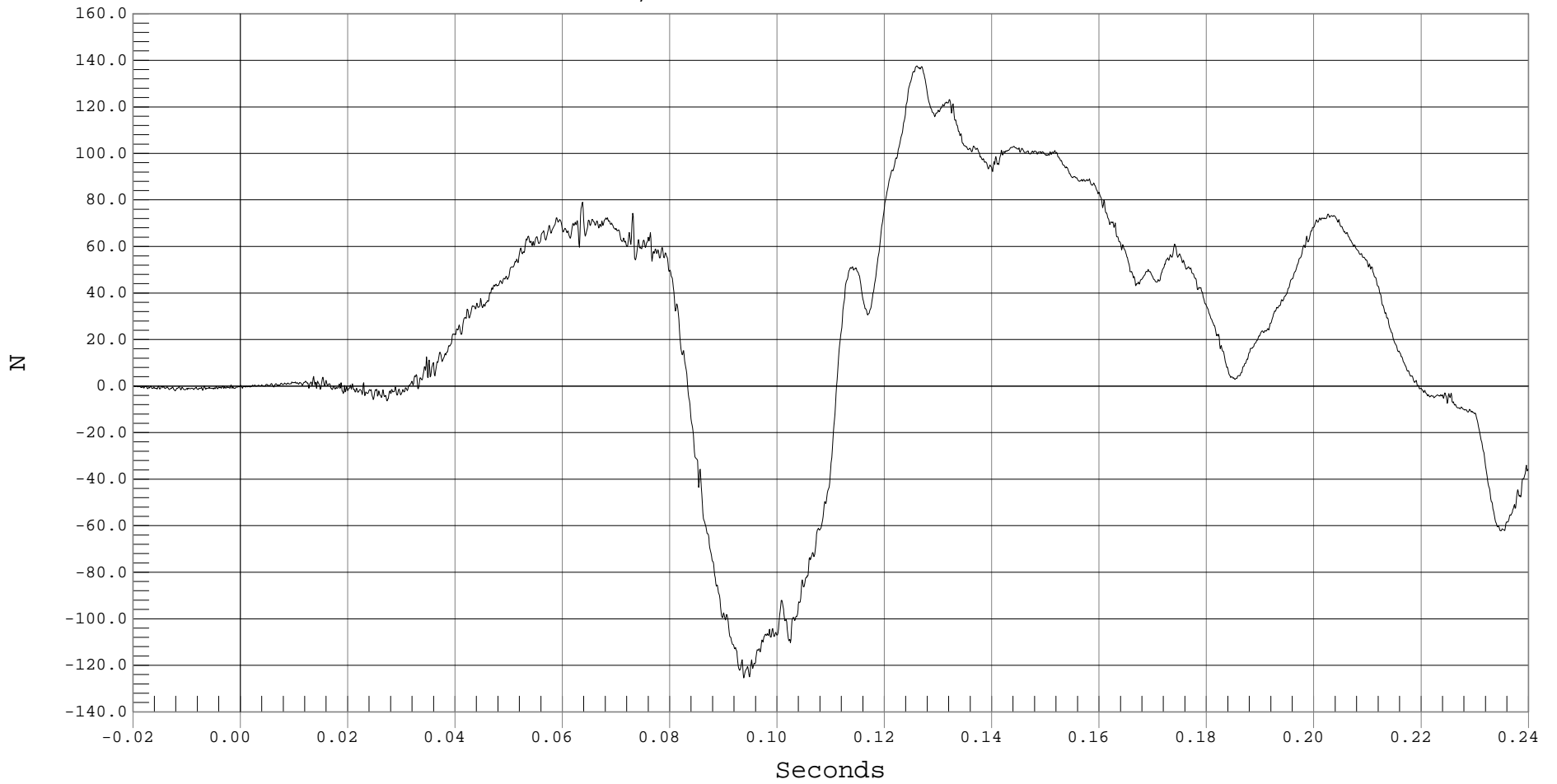
### RRS 3 YR OLD LOWER NECK FORCE Y

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS CHILD LOWER NECK FORCE Y, B01012FT.F47

Ymin = -125.48 N @ 0.0938 Seconds, Ymax = 137.64 N @ 0.1261 Seconds



F-30



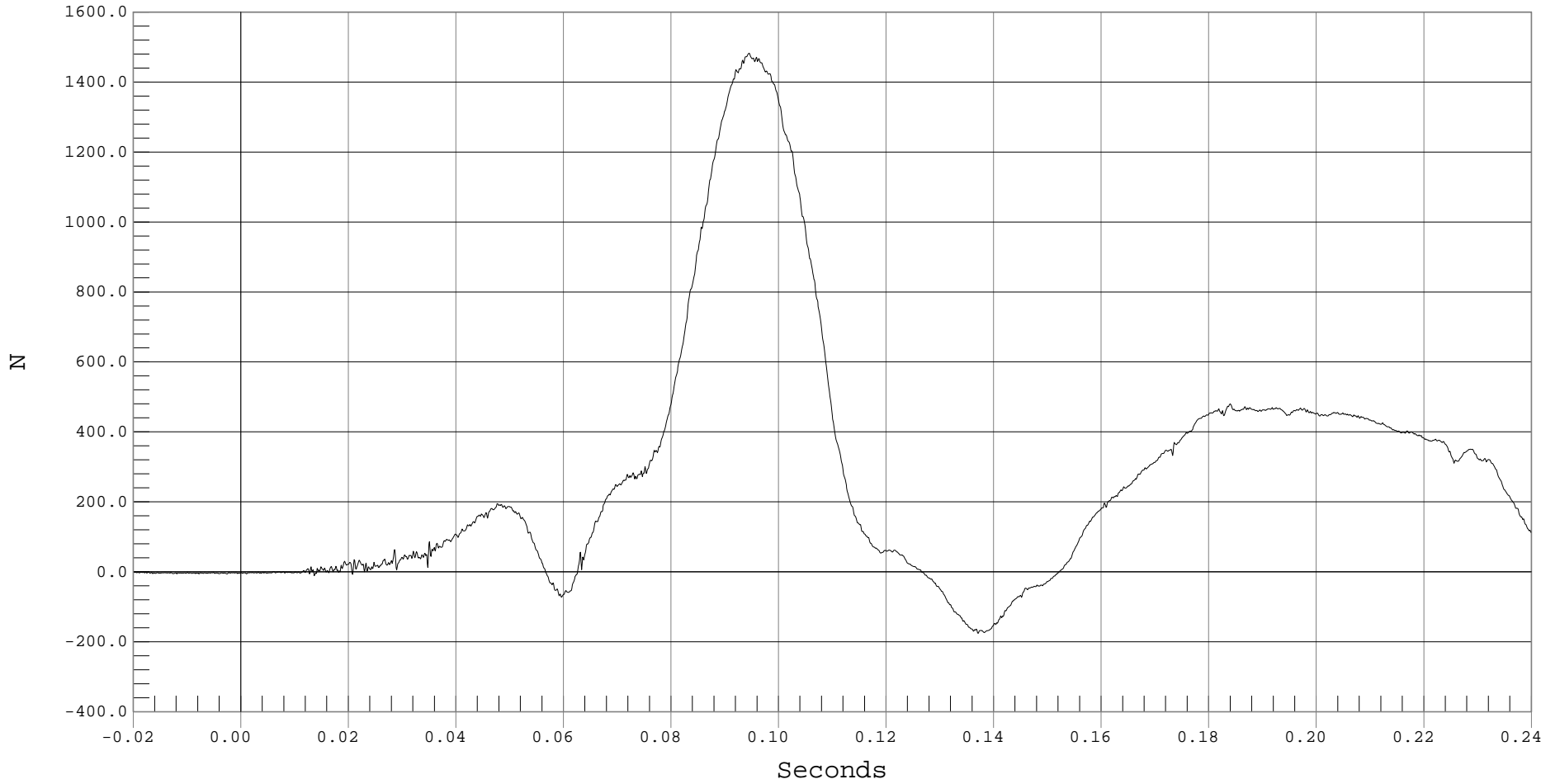
### RRS 3 YR OLD LOWER NECK FORCE Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS CHILD LOWER NECK FORCE Z, B01012FT.F48

Ymin = -176.11 N @ 0.1370 Seconds, Ymax = 1482.76 N @ 0.0944 Seconds



F-31



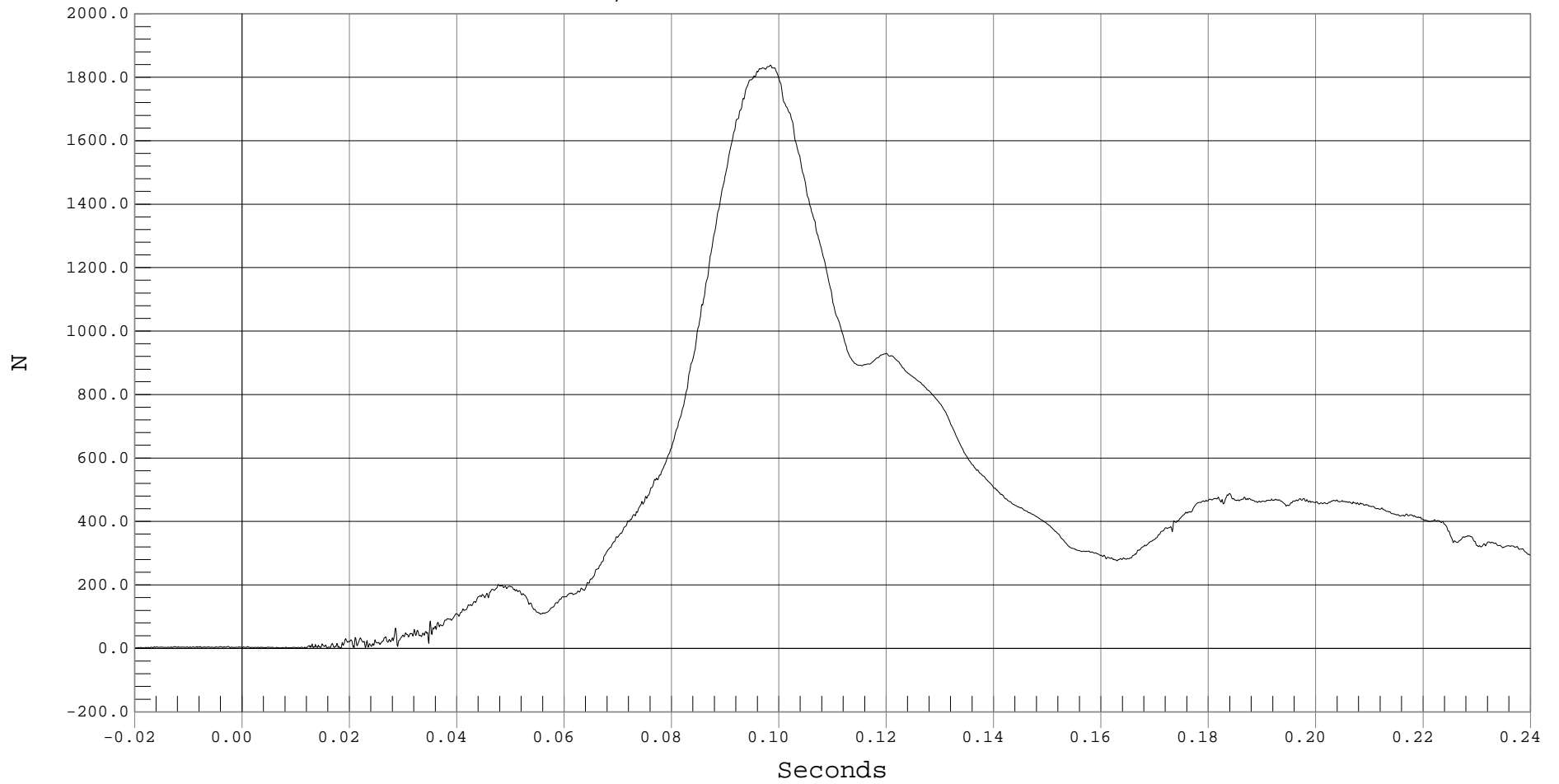
### RRS 3 YR OLD LOWER NECK FORCE RESULTANT

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS 3 YR OLD LOWER NECK FORCE RESULTANT, B01012FV.F46

Ymin = .72 N @ -0.0191 Seconds, Ymax = 1837.99 N @ 0.0984 Seconds



F-32



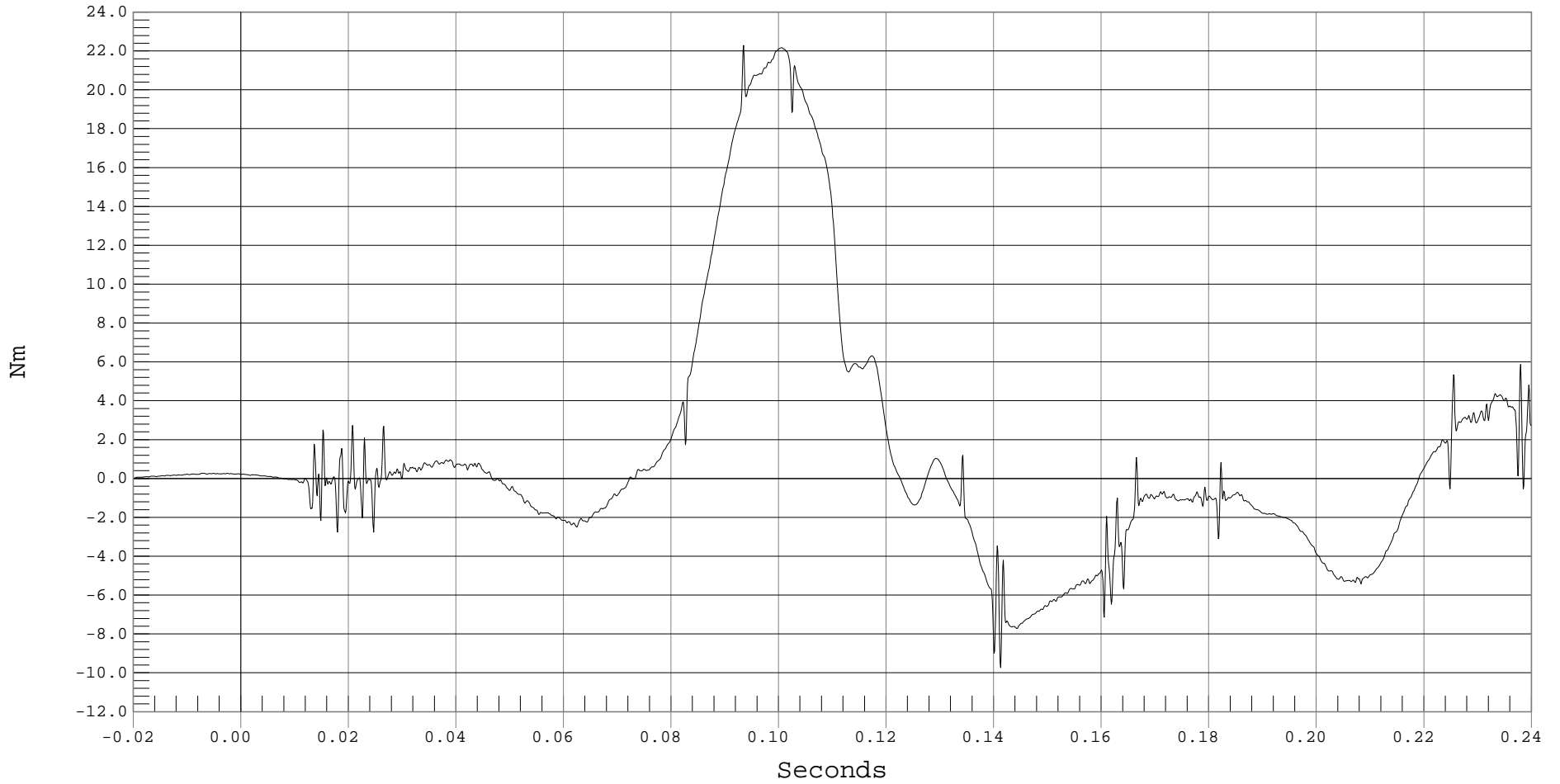
### RRS 3 YR OLD LOWER NECK MOMENT X

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 RRS CHILD LOWER NECK MOMENT X, B01012MF.M49

Ymin = -9.73 Nm @ 0.1413 Seconds, Ymax = 22.28 Nm @ 0.0935 Seconds



RRS 3 YEAR OLD LOWER NECK MOMENT Y  
NO VALID DATA COLLECTED



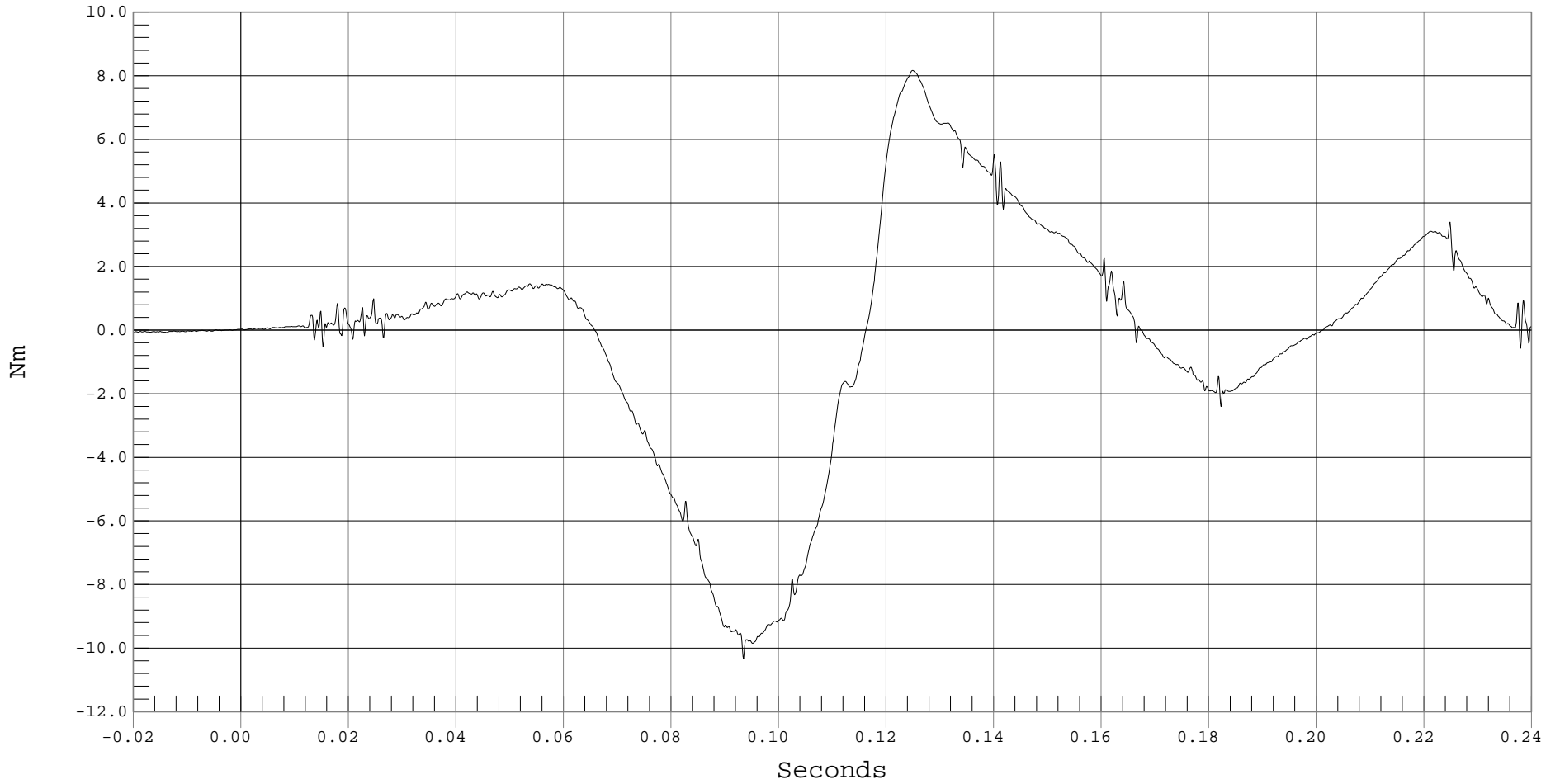
### RRS 3 YR OLD LOWER NECK MOMENT Z

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 RRS CHILD LOWER NECK MOMENT Z, B01012MF.M51

Ymin = -10.32 Nm @ 0.0935 Seconds, Ymax = 8.16 Nm @ 0.1249 Seconds



F-35



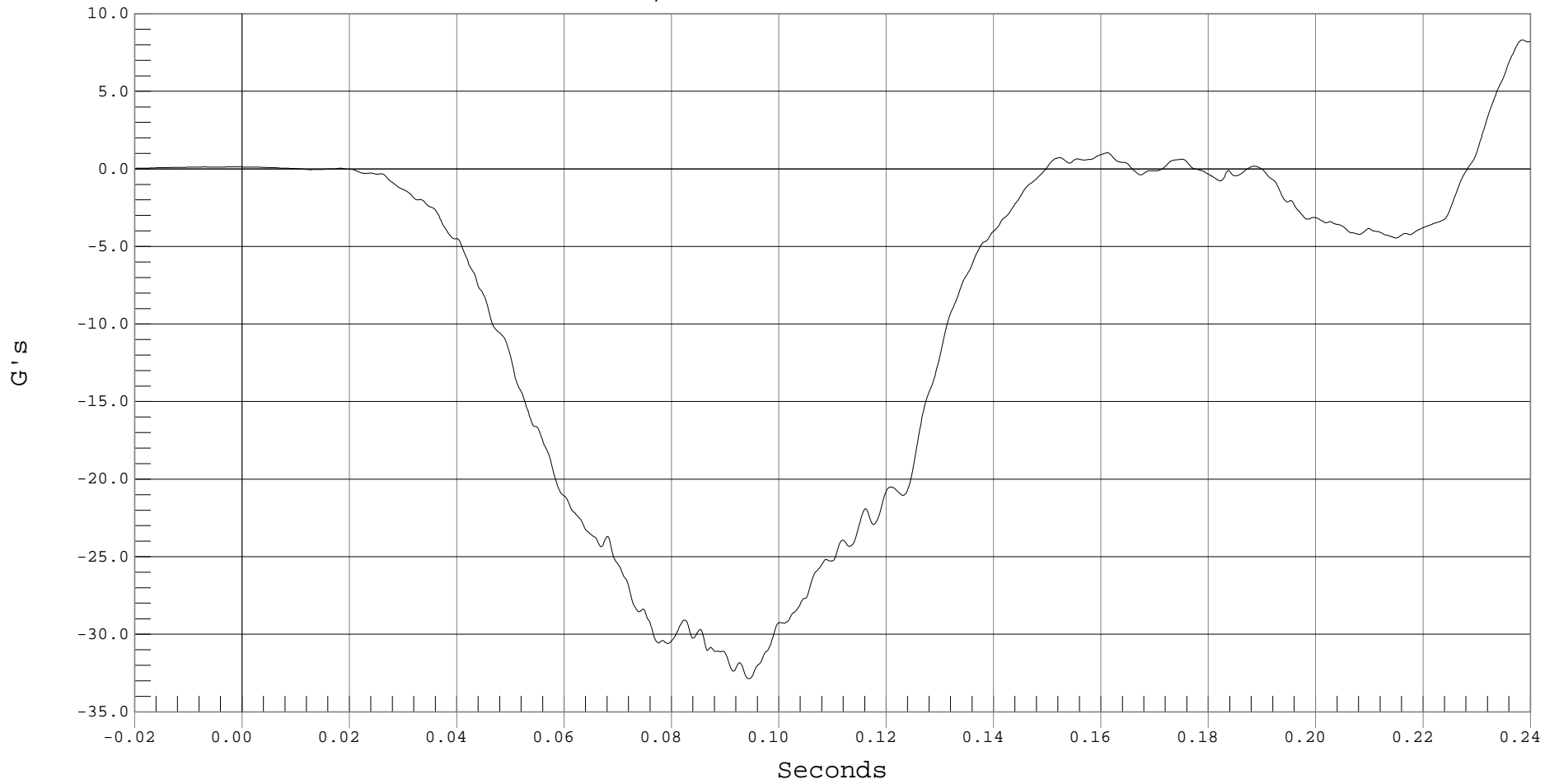
### RRS 3 YR OLD CHEST X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 RRS CHILD CHEST X, B01012AF.A52

Ymin = -32.86 G's @ 0.0944 Seconds, Ymax = 8.31 G's @ 0.2385 Seconds



F-36



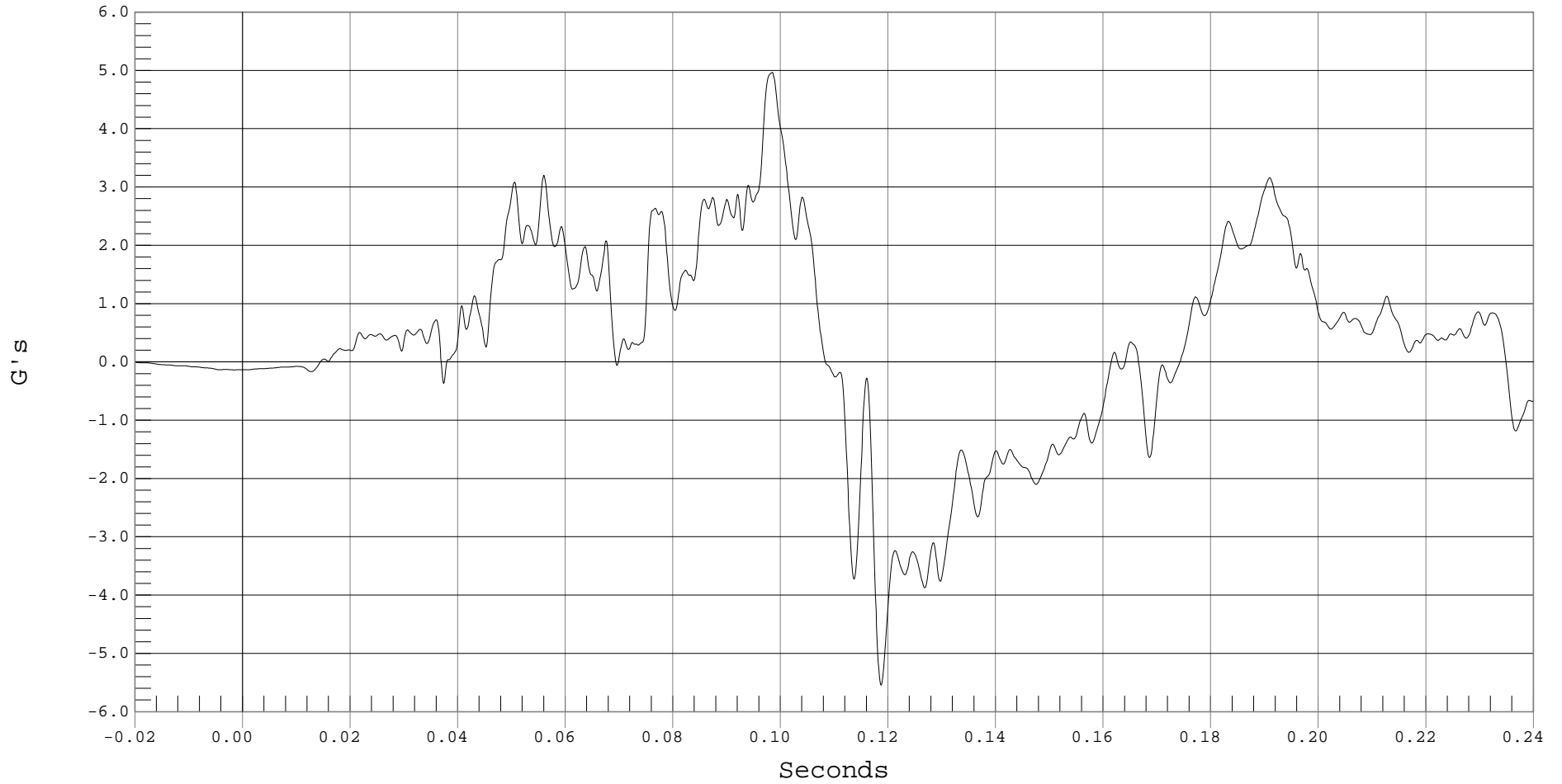
### RRS 3 YR OLD CHEST Y ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 RRS CHILD CHEST Y, B01012AF.A53

Ymin = -5.54 G's @ 0.1187 Seconds, Ymax = 4.97 G's @ 0.0985 Seconds



F-37



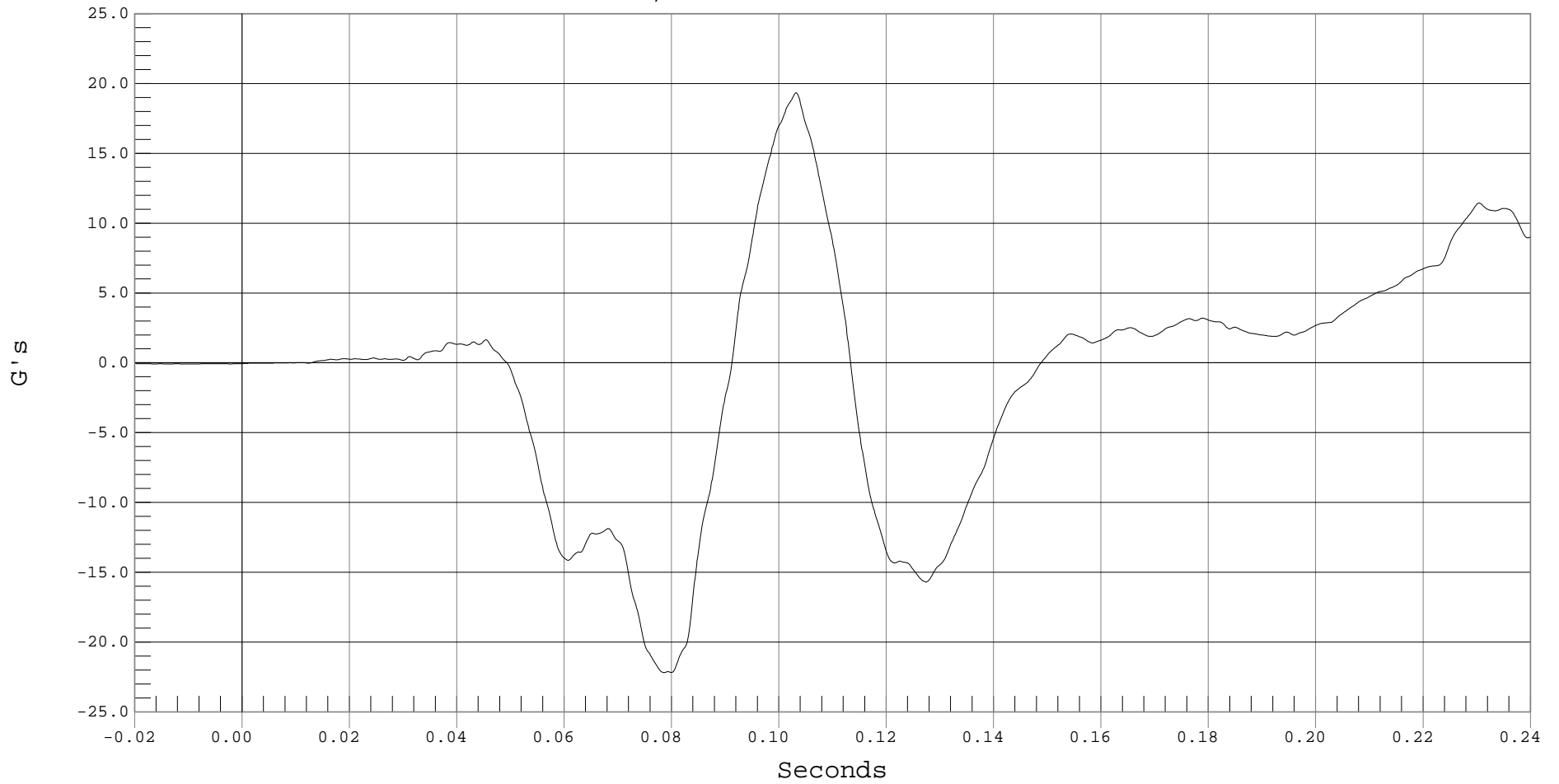
### RRS 3 YR OLD CHEST Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 RRS CHILD CHEST Z, B01012AF.A54

Ymin = -22.19 G's @ 0.0786 Seconds, Ymax = 19.34 G's @ 0.1032 Seconds





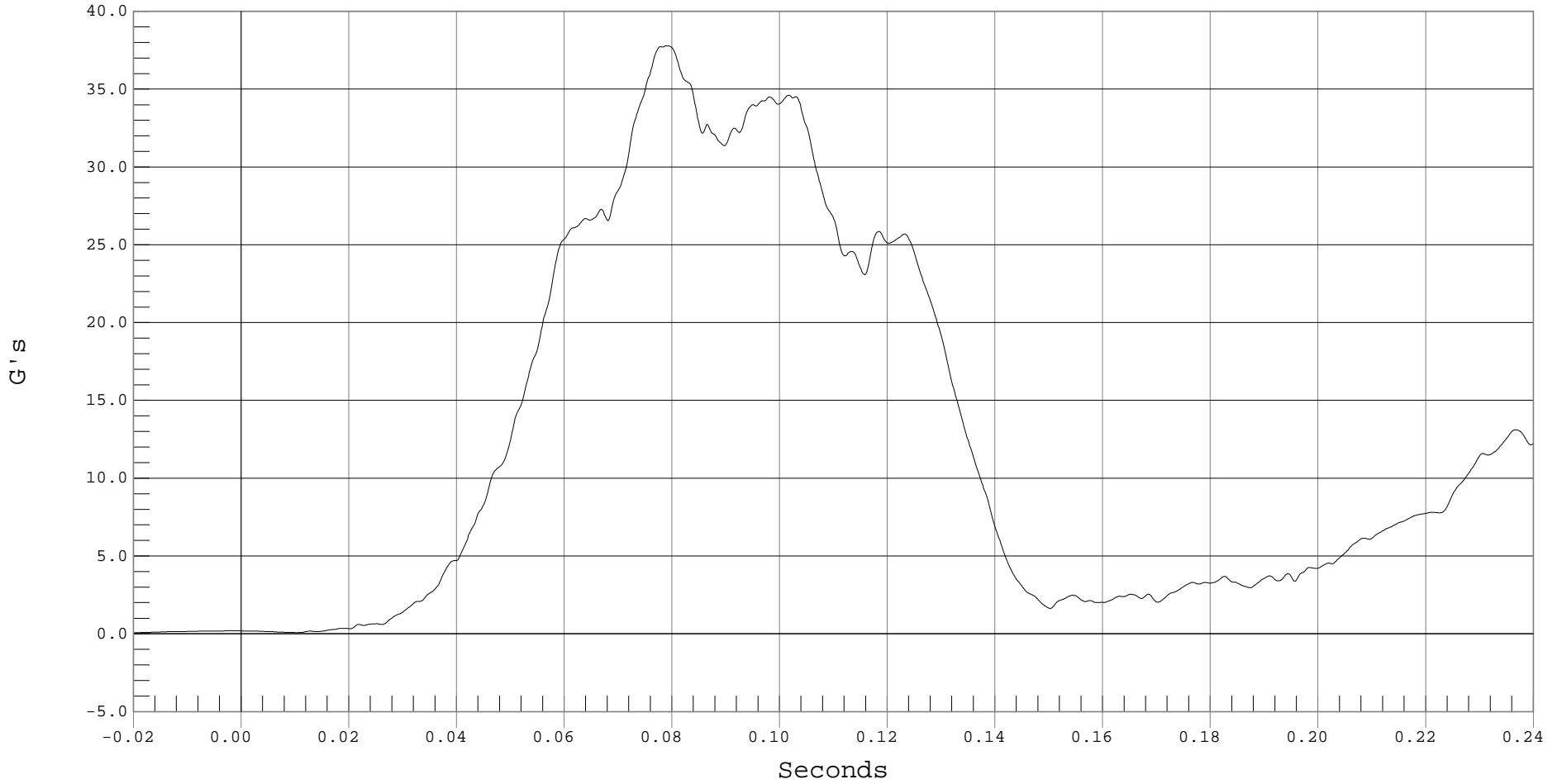
### RRS 3 YR OLD CHEST RESULTANT ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 RRS 3 YR OLD CHEST RESULTANT ACCELERATION, B01012AV.A52

Ymin = .07 G's @ -0.0198 Seconds, Ymax = 37.78 G's @ 0.0791 Seconds





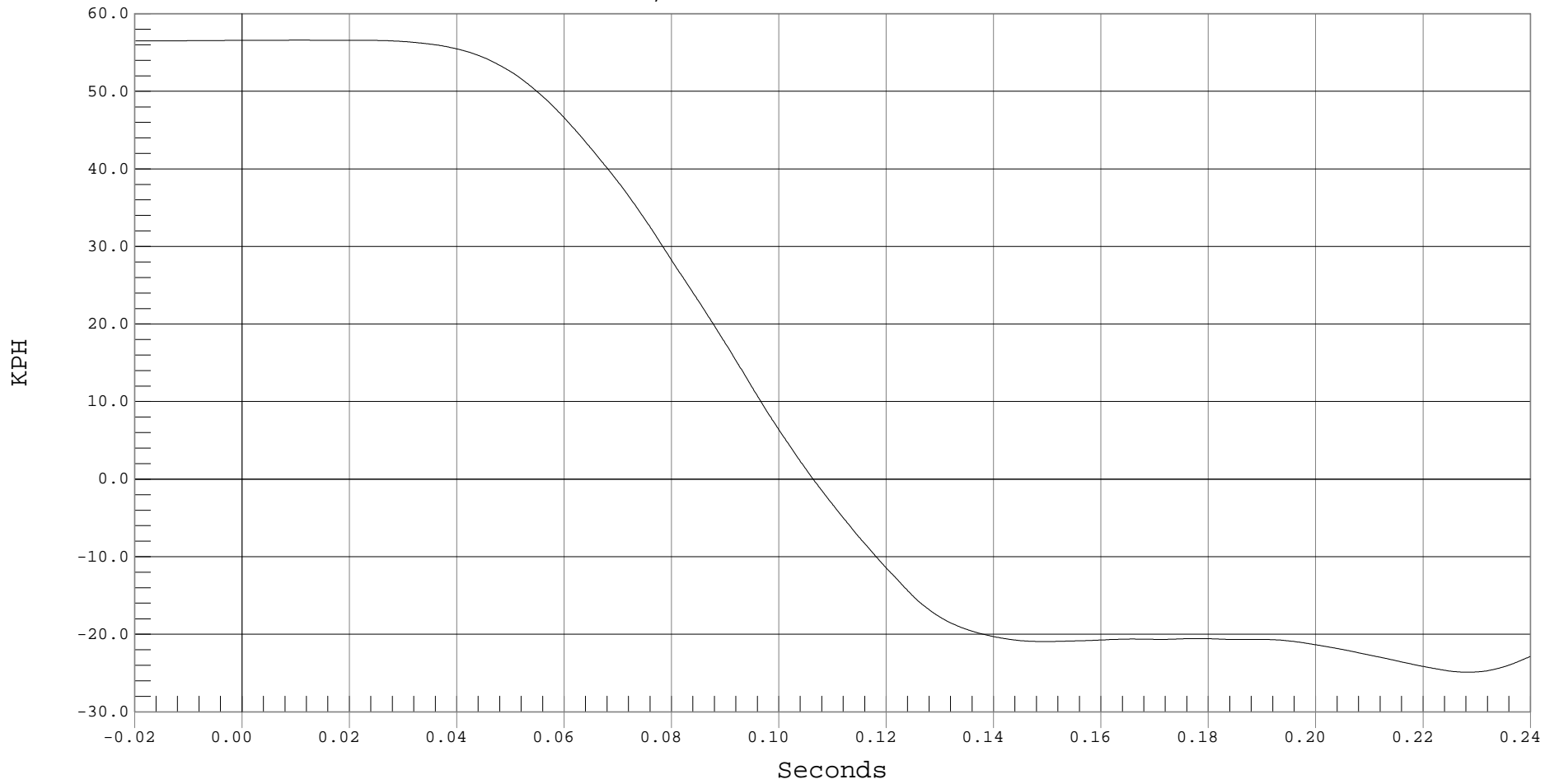
### RRS 3 YR OLD CHEST X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 RRS 3 YR OLD CHEST X VELOCITY, B01012AI.V52

Ymin = -24.88 KPH @ 0.2283 Seconds, Ymax = 56.6 KPH @ 0.0111 Seconds



F-40



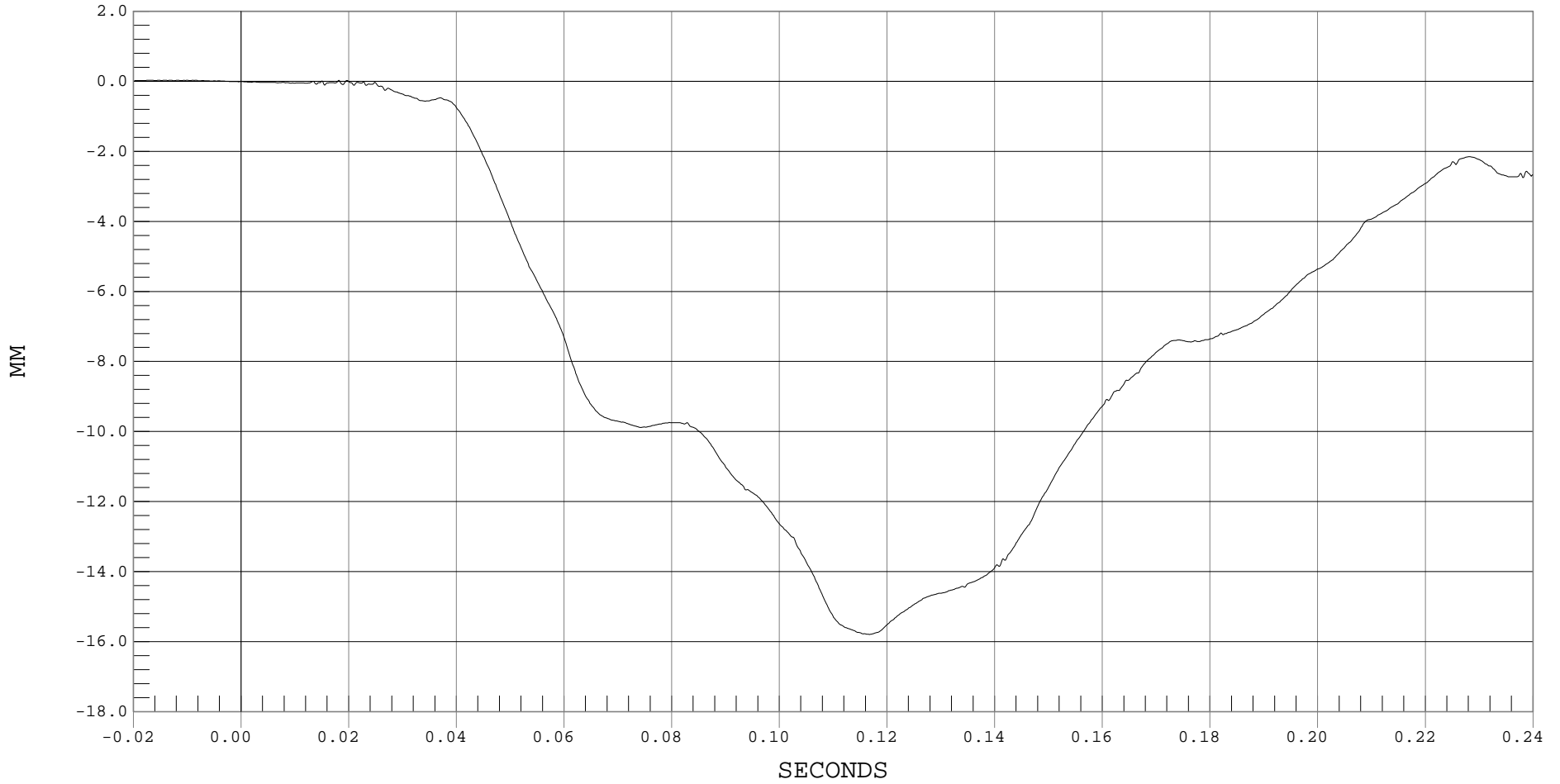
### RRS 3 YR OLD CHEST COMPRESSION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 600

— 1 DISPLACEMENT, B01012DF.D55

Ymin = -15.8 MM @ 0.1168 SECONDS, Ymax = .03 MM @ -0.0173 SECONDS



F-41



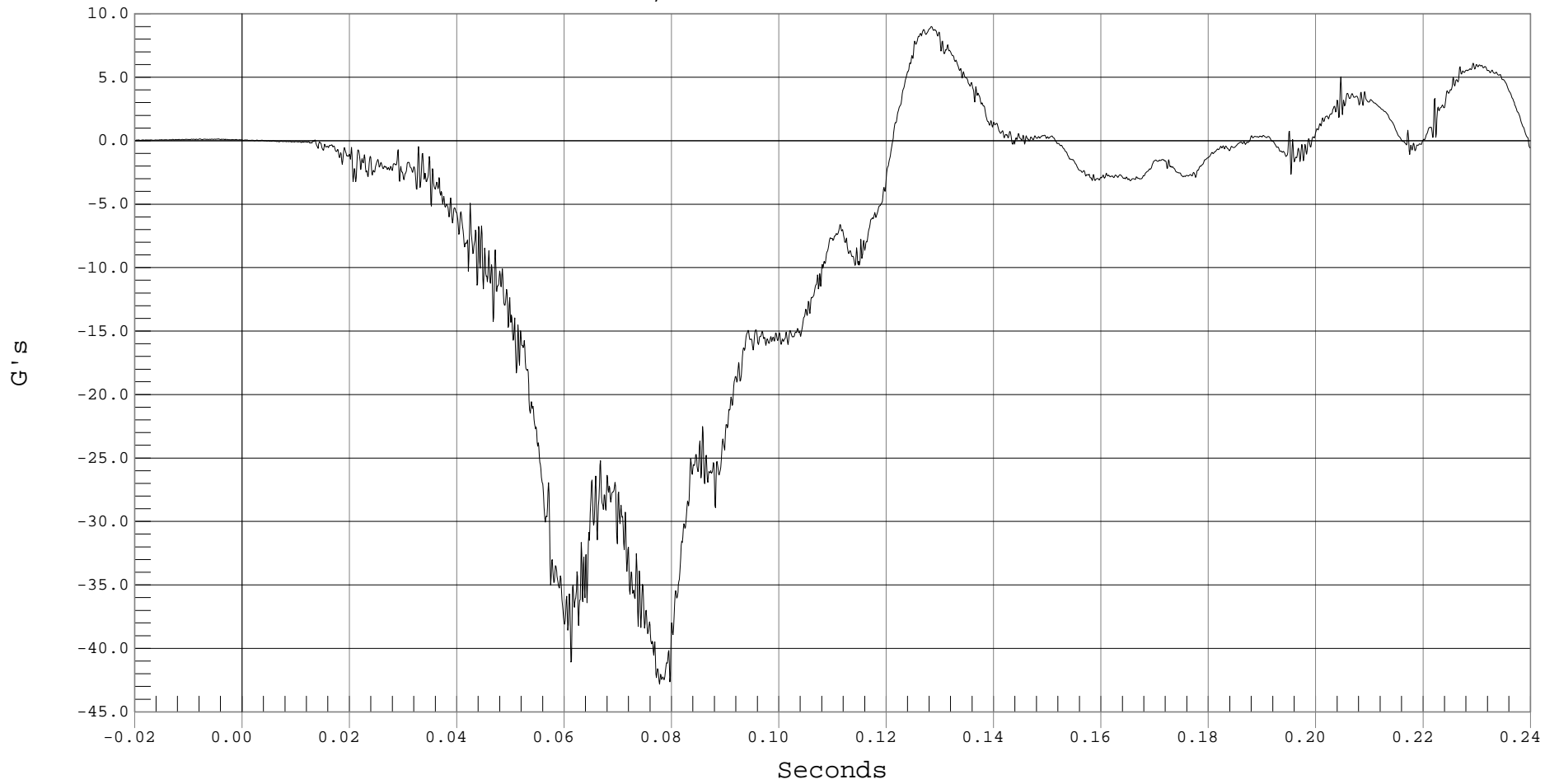
### RRS 3 YR OLD PELVIS X ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS CHILD PELVIS X, B01012AT.A56

Ymin = -42.82 G's @ 0.0778 Seconds, Ymax = 9 G's @ 0.1285 Seconds



F-42



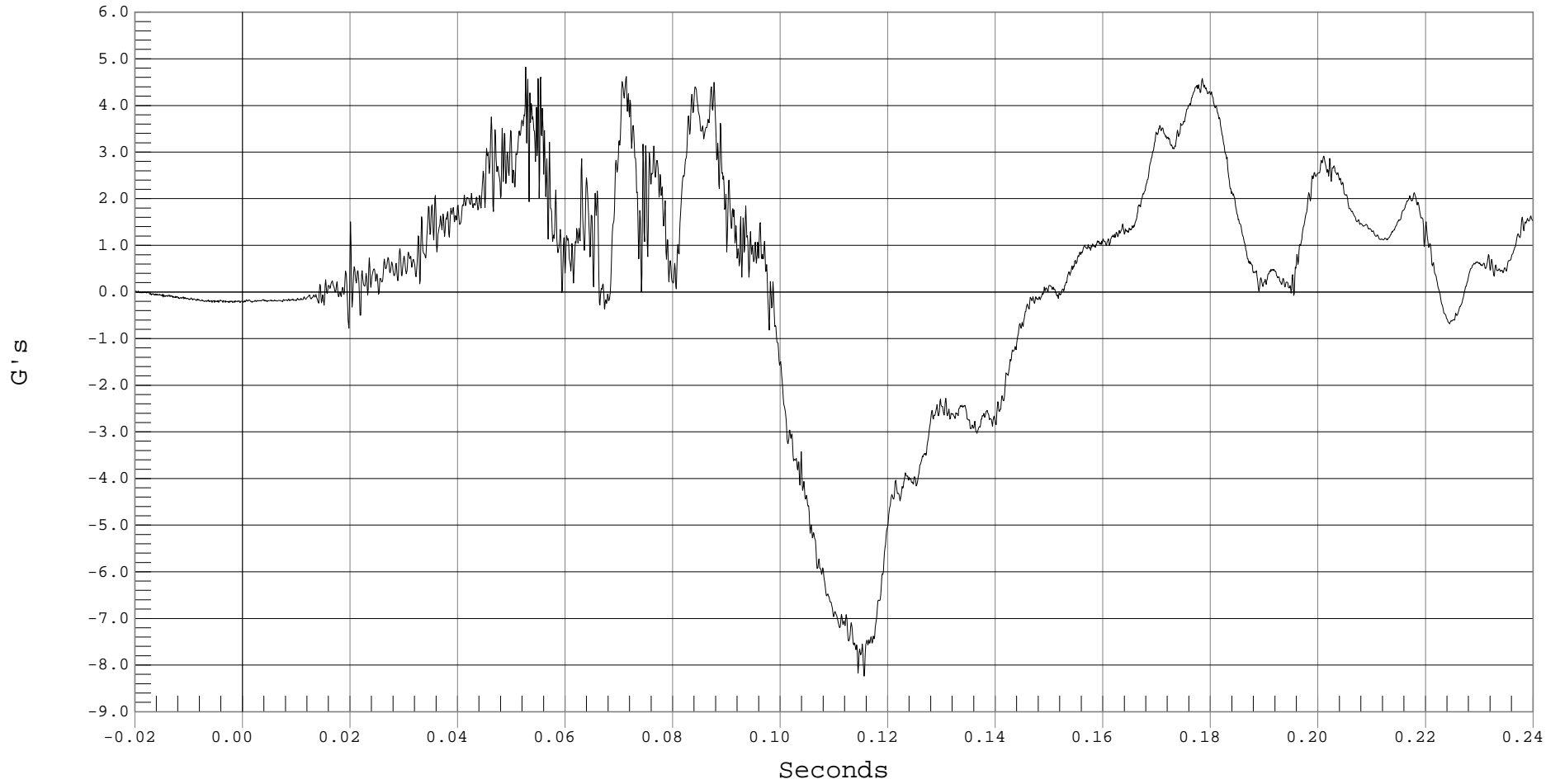
### RRS 3 YR OLD PELVIS Y ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS CHILD PELVIS Y, B01012AT.A57

Ymin = -8.24 G's @ 0.1156 Seconds, Ymax = 4.82 G's @ 0.0527 Seconds



F-43



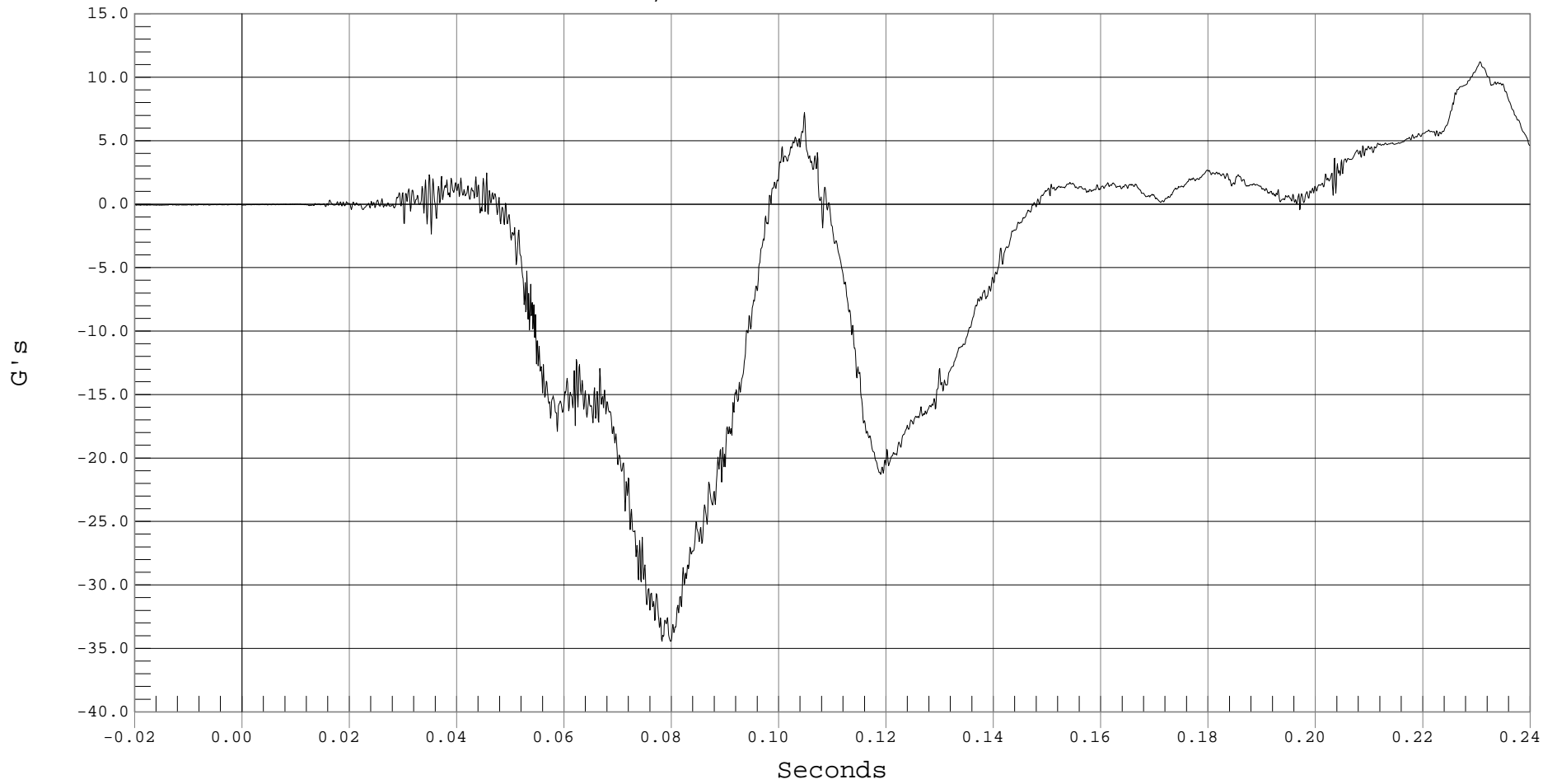
### RRS 3 YR OLD PELVIS Z ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS CHILD PELVIS Z, B01012AT.A58

Ymin = -34.43 G's @ 0.0783 Seconds, Ymax = 11.22 G's @ 0.2307 Seconds



F-44



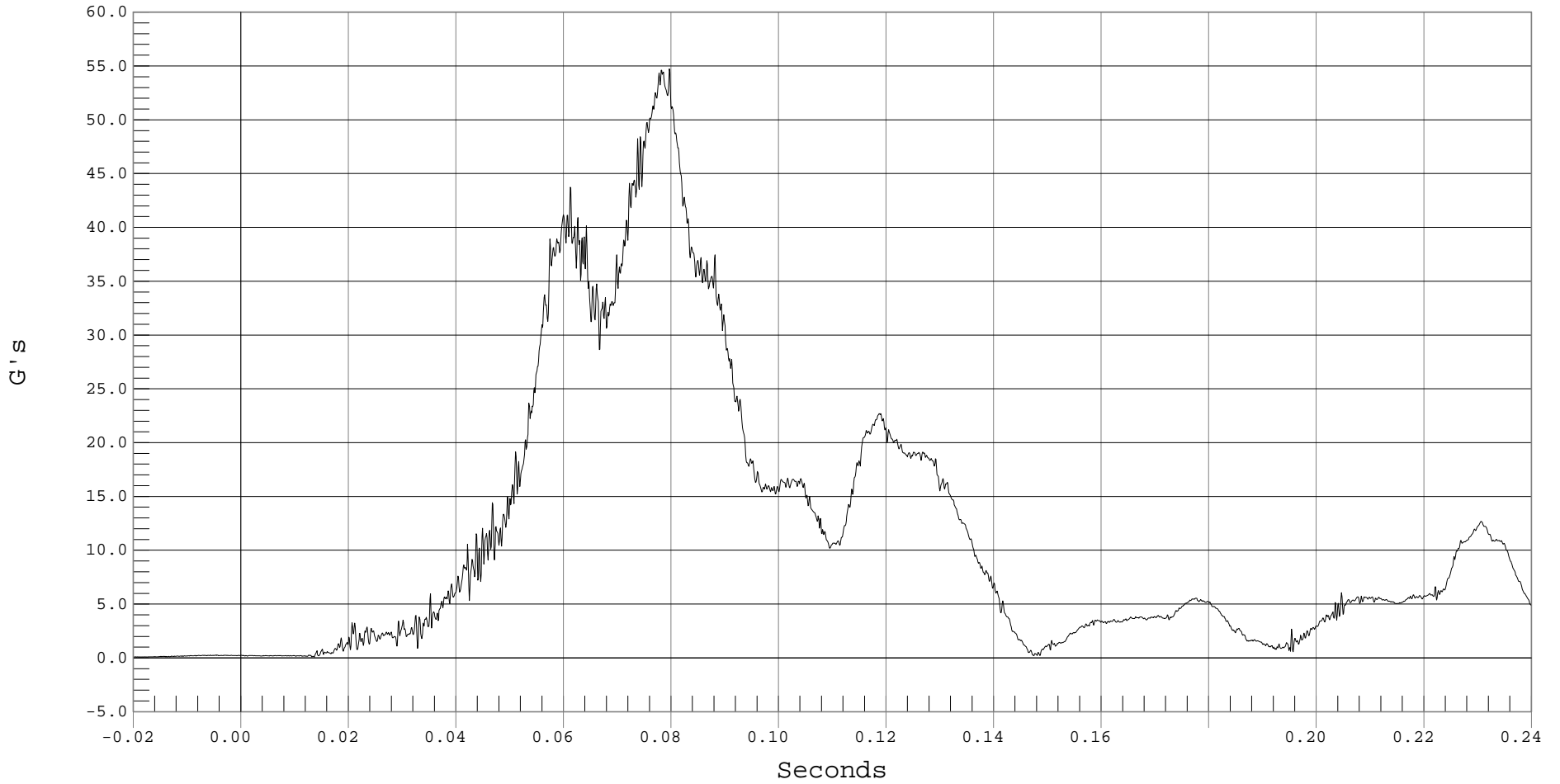
### RRS 3 YR OLD PELVIS RESULTANT ACCELERATION

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 1000

— 1 RRS 3 YR OLD PELVIS RESULTANT ACCELERATION, B01012AV.A56

Ymin = .07 G's @ -0.0176 Seconds, Ymax = 54.73 G's @ 0.0797 Seconds



F-45



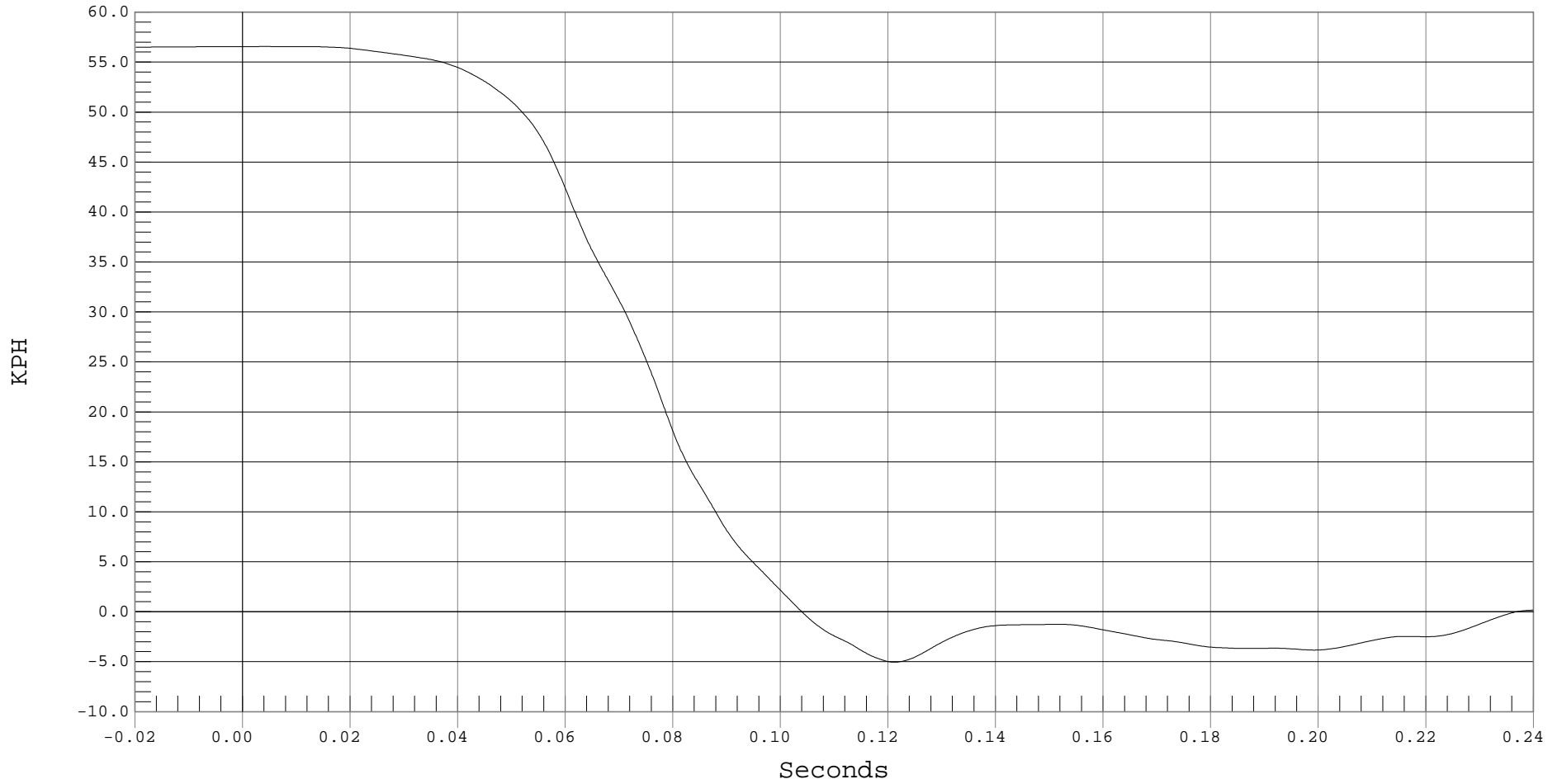
### RRS 3 YR OLD PELVIS X VELOCITY

Test Desc.: NCAP FRONTAL IMPACT  
Component: 2001 CHEVROLET SUBURBAN (M10107)  
Other Info:

Test Date: 02-05-01  
Speed: 35.1 MPH, 56.5 KPH  
Filter Class: 180

— 1 RRS 3 YR OLD PELVIS X VELOCITY, B01012AI.V56

Ymin = -5.04 KPH @ 0.1211 Seconds, Ymax = 56.56 KPH @ 0.0040 Seconds



**CHILD DUMMY CALIBRATION DATA TRACES AND TABLES**

**Hybrid III Calibration Data Sheet**  
**3 Year Old**  
**Head Drop Calibration**

ATD Serial No.: 139

Test I.D.: D01061

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.7°	PASS
Laboratory Relative Humidity	%	10 to 70	23%	PASS
Peak Resultant Acceleration	G's	250.0 to 280.0	261.7	PASS
Peak Lateral Acceleration	G's	≤ ±15.0	1.7	PASS
Is Acceleration Unimodal?	Yes/No	< 10% Peak	Yes	PASS
Overall Test Results				PASS

\_\_\_\_\_  
 Laboratory Technician

\_\_\_\_\_  
 1/11/00  
 Test Date

\_\_\_\_\_  
 Approved By



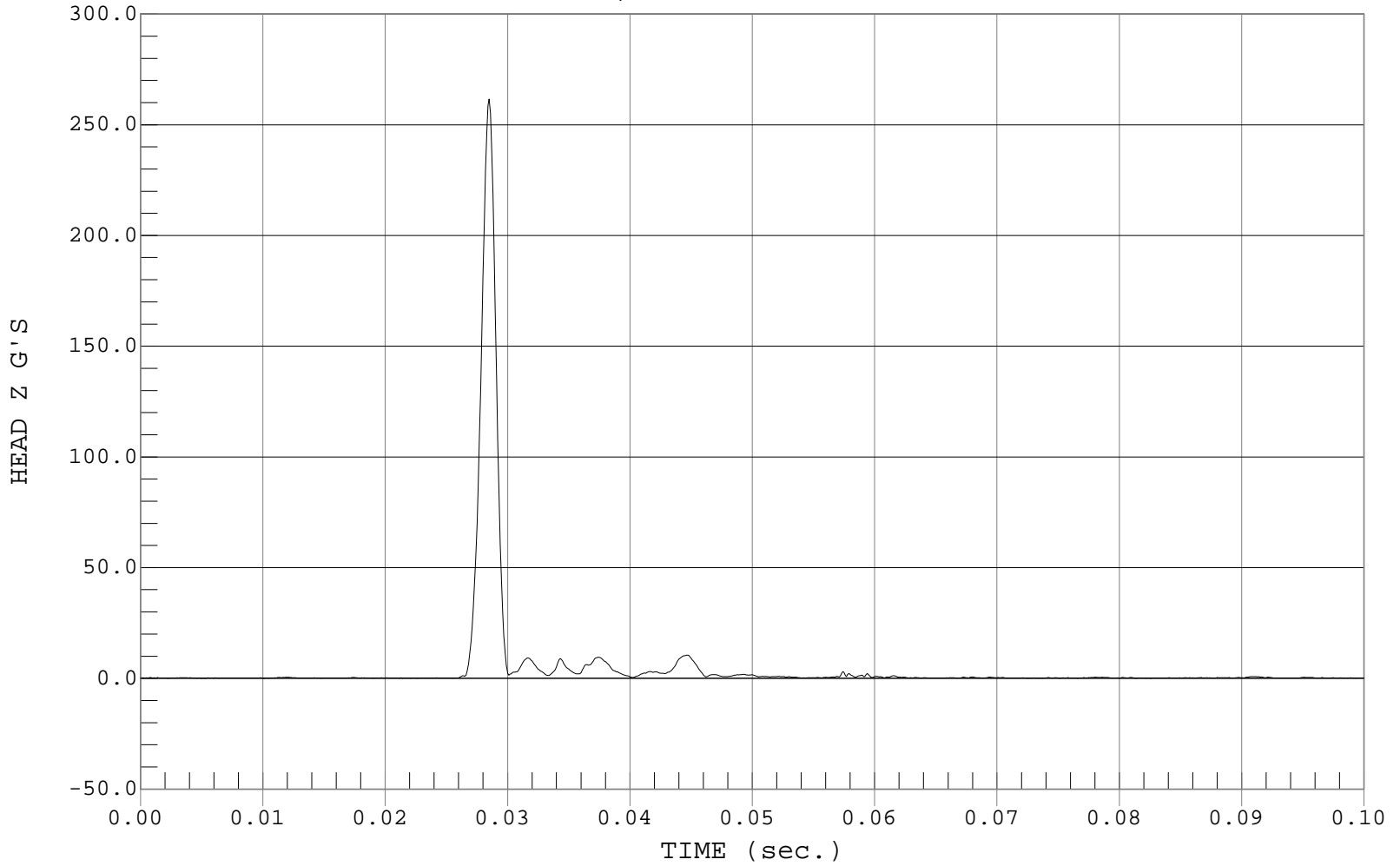
### PEAK RESULTANT ACCELERATION

Test Desc.: Dummy Calibration - Head Drop  
Component: Dummy #139

Test Date: 01-11-01  
Speed: 0.00 FT/SEC, 0.00 M/SEC

— 1 HEAD Z, D01061AV.A01

Ymin = .07 G'S @ 0.0022 sec., Ymax = 261.67 G'S @ 0.0285 sec.





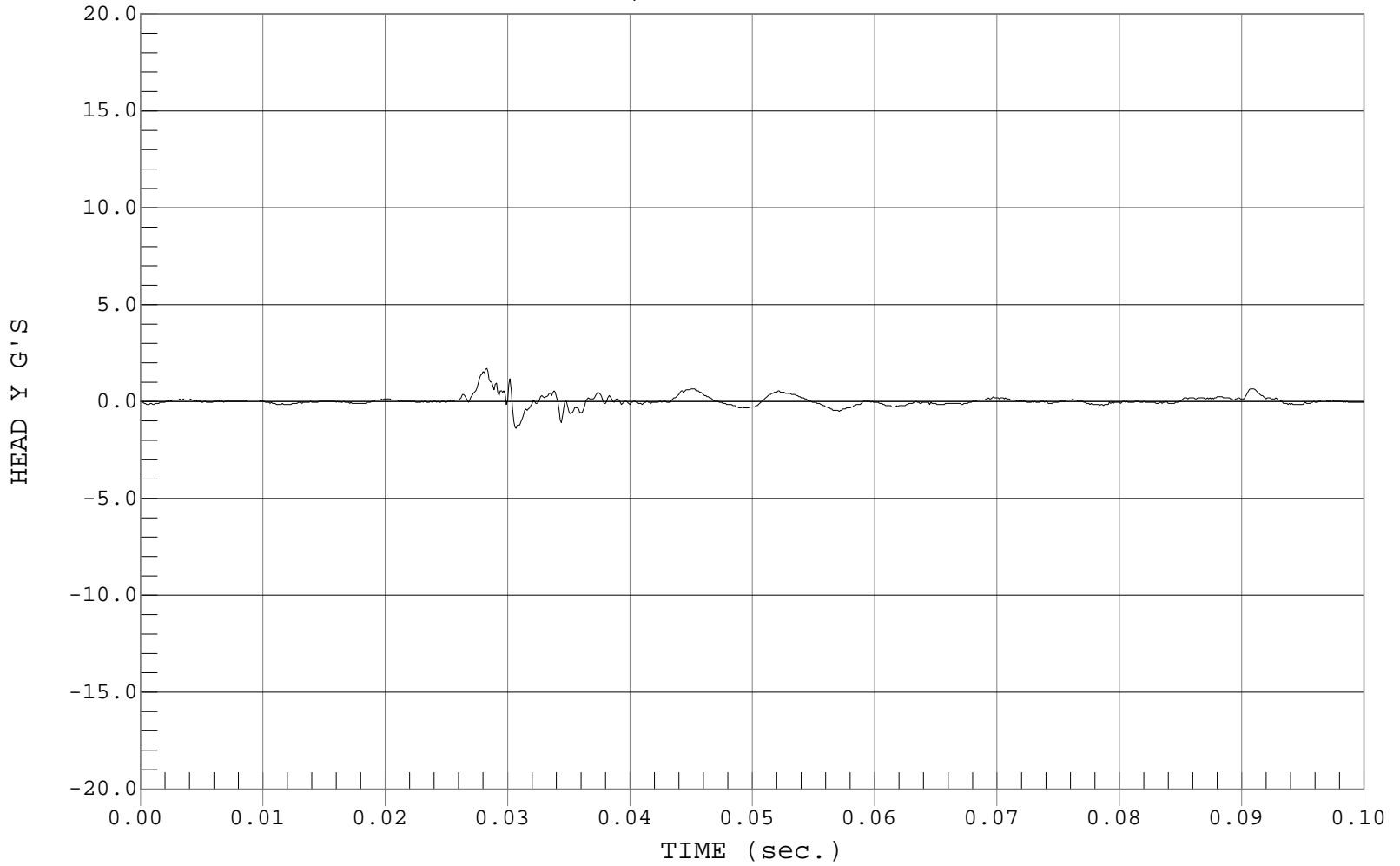
### PEAK LATERAL ACCELARATION

Test Desc.: Dummy Calibration - Head Drop  
Component: Dummy #139

Test Date: 01-11-01  
Speed: 0.00 FT/SEC, 0.00 M/SEC

— 1 HEAD Y, D01061AR.A02

Ymin = -1.38 G'S @ 0.0307 sec., Ymax = 1.71 G'S @ 0.0283 sec.



**Hybrid III Calibration Data Sheet**  
**3 Year Old**  
**Thorax Impact Test**

ATD Serial No.: 139

Test I.D.: D01064

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.7°	PASS
Laboratory Relative Humidity	%	10 to 70	29%	PASS
Probe Velocity	m/s	5.9 to 6.1	6.0	PASS
Peak Deflection	mm	32 to 38	33	PASS
Peak Resistive Force Within Deflection Corridor	kN	.68 to .81	.78	PASS
Internal Hysteresis	%	65 to 85	71%	PASS
Max Force 12.5 mm – 32 mm Deflection	kN	Max .86	.83	PASS
Overall Test Results				PASS

\_\_\_\_\_  
Laboratory Technician

\_\_\_\_\_  
1/14/01  
Test Date

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Approved By



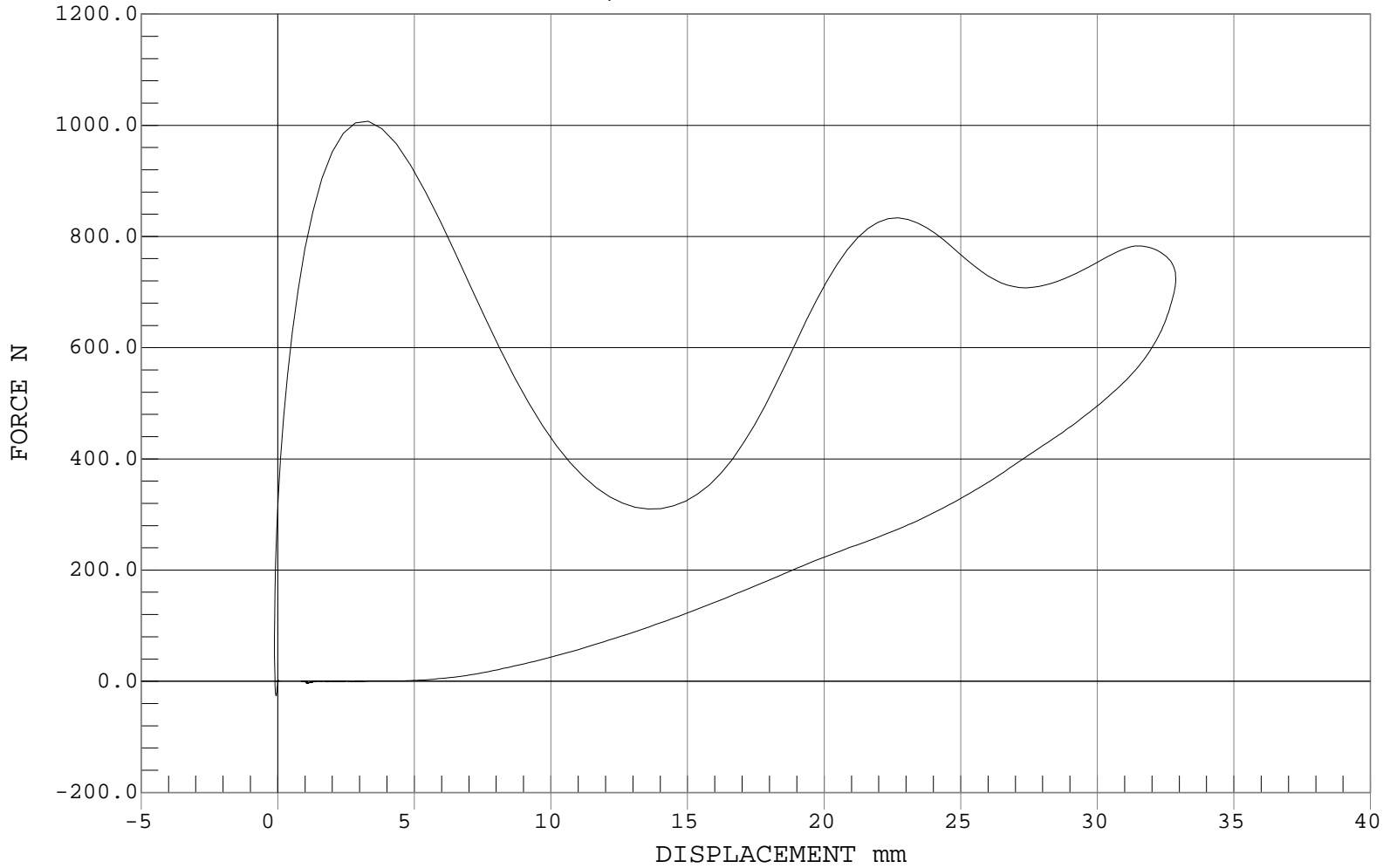
### THORAX IMPACT

Test Desc.: Dummy Calibration - Chest Impact  
Component: Dummy #139

Test Date: 01-14-01  
Speed: 19.62 FT/SEC, 5.98 M/SEC

— 1 FORCE, D01064CH.FVD

Ymin = -25.96 N @ -0.0615 mm, Ymax = 1007.07 N @ 3.3156 mm



F-52

**Hybrid III Calibration Data Sheet**  
**3 Year Old**  
**Neck Flexion Test**

ATD Serial No.: 139

Test I.D.: D01062

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.7°	PASS
Laboratory Relative Humidity		%	10 to 70	23%	PASS
Pendulum Velocity		m/s	5.4 to 5.6	5.5	PASS
Pendulum Deceleration	10 Msec.	m/s	2.0 to 2.7	2.4	PASS
	15 Msec.	m/s	3.0 to 4.0	3.5	PASS
	20 Msec.	m/s	4.0 to 5.1	4.7	PASS
"D" Plane Rotation	Maximum	Deg.	70.0 to 82.0	73.1	PASS
Moment About Occipital Condyle	Maximum	Nm	42.0 to 53.0	43.4	PASS
Positive Moment Decay Time To 10 Nm		Msec.	60.0 to 80.0	71.3	PASS
				Overall Test Results	PASS

\_\_\_\_\_  
Laboratory Technician

\_\_\_\_\_  
1/12/01  
Test Date

\_\_\_\_\_  
Approved By



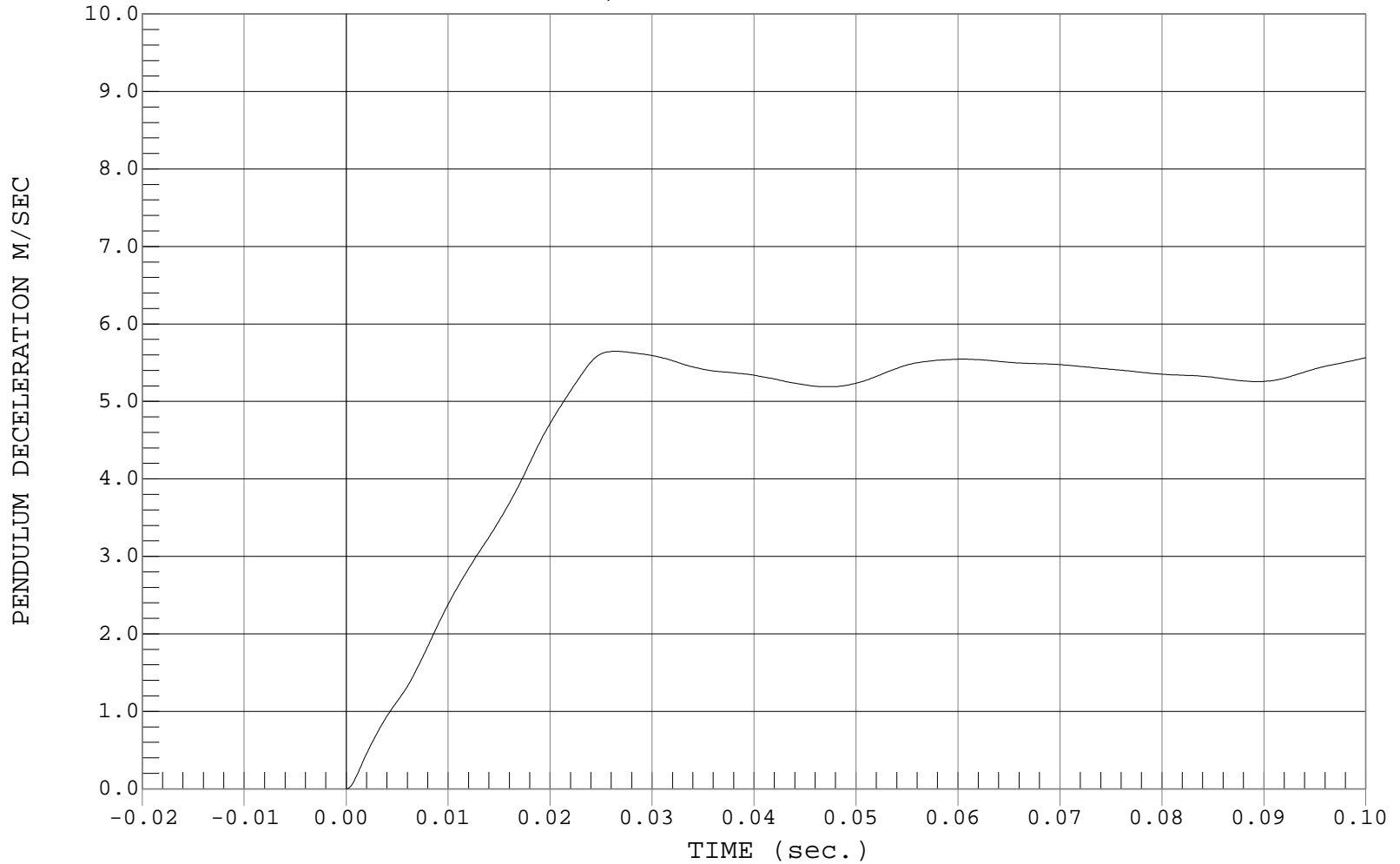
### PENDULUM DECELERATION

Test Desc.: Dummy Calibration - Neck Flexion  
Component: Dummy #139

Test Date: 01-11-01  
Speed: 18.00 FT/SEC, 5.49 M/SEC

— 1 PENDULUM DECELERATION, D01062AI.A04

Ymin = 0 M/SEC @ 0.0001 sec, Ymax = 6.06 M/SEC @ 0.1886 sec





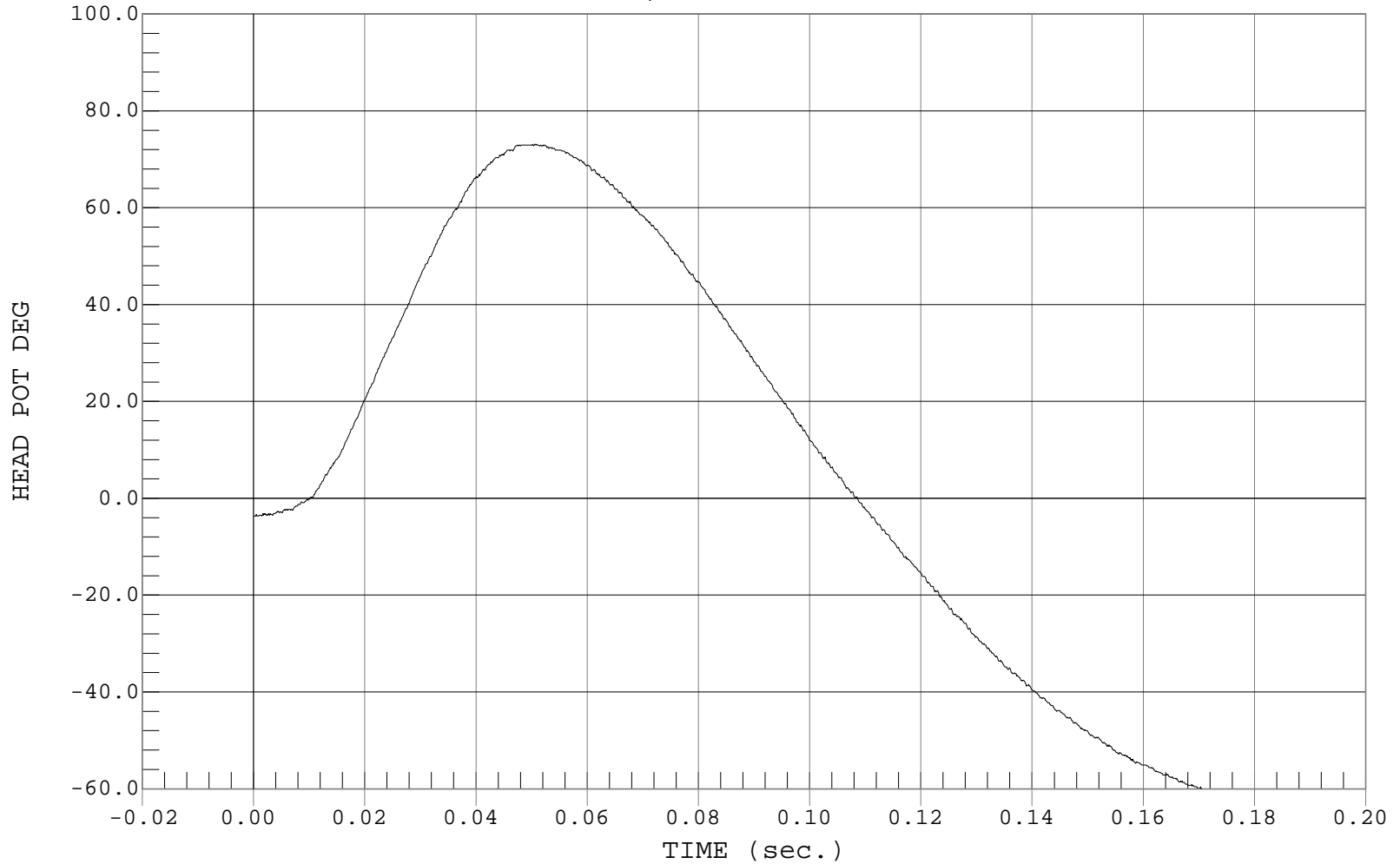
### NECK ROTATION

Test Desc.: Dummy Calibration - Neck Flexion  
Component: Dummy #139

Test Date: 01-11-01  
Speed: 18.00 FT/SEC, 5.49 M/SEC

— 1 HEAD POT, D01062DU.D05

Ymin = -62.89 DEG @ 0.1864 sec., Ymax = 73.12 DEG @ 0.0502 sec.





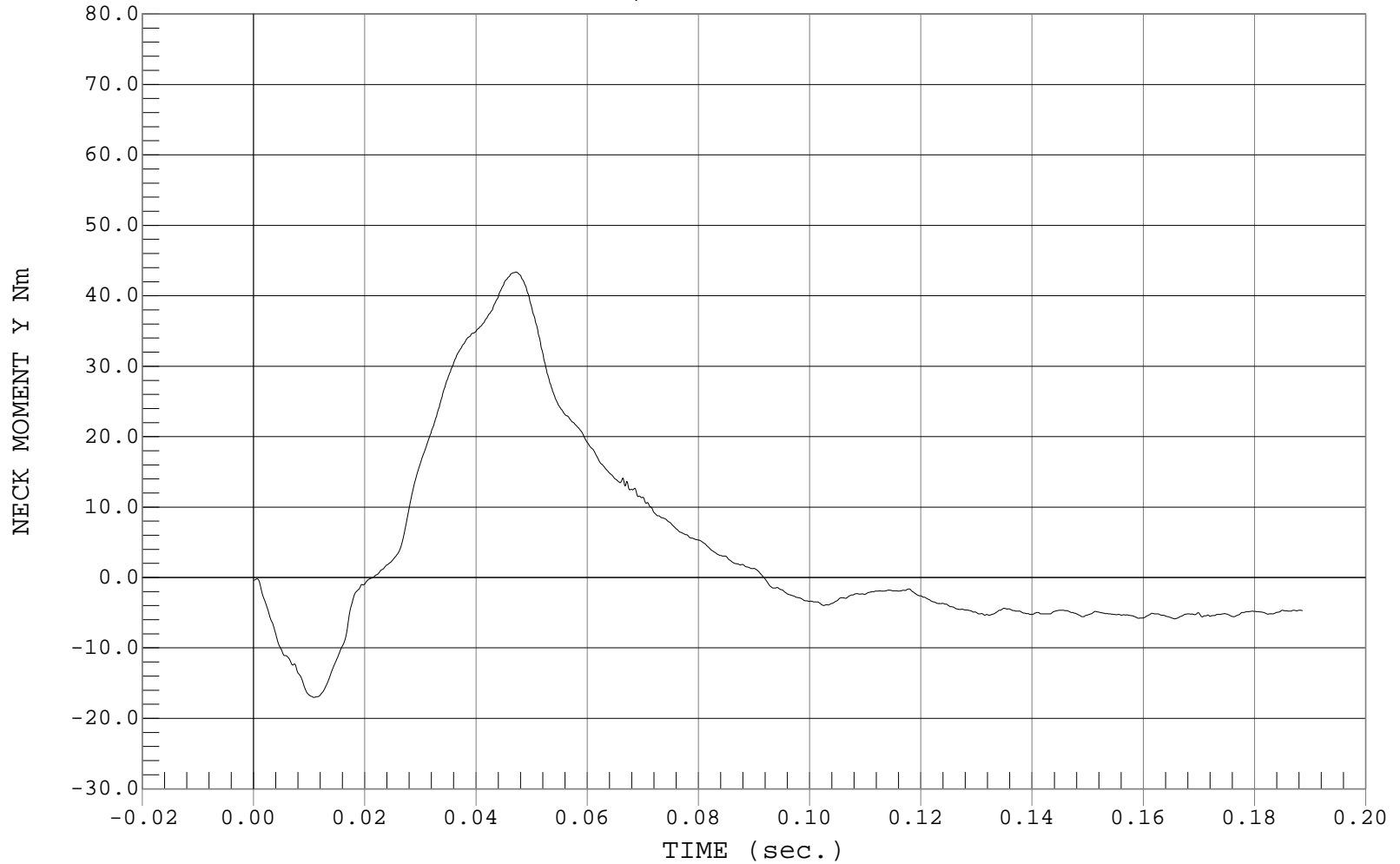
### OCCIPITAL MOMENT

Test Desc.: Dummy Calibration - Neck Flexion  
Component: Dummy #139

Test Date: 01-11-01  
Speed: 18.00 FT/SEC, 5.49 M/SEC

— 1 NECK MOMENT Y, D01062MF.M01

Ymin = -17.02 Nm @ 0.0109 sec., Ymax = 43.36 Nm @ 0.0472 sec.



## Hybrid III Calibration Data Sheet

3 Year Old

### Neck Extension Test

ATD Serial No.: 139

Test I.D.: D01063

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.5°	PASS
Laboratory Relative Humidity		%	10 to 70	24%	PASS
Pendulum Velocity		m/s	3.55 to 3.75	3.66	PASS
Pendulum Deceleration	6 Msec.	m/s	1.0 to 1.4	1.2	PASS
	10 Msec.	m/s	1.9 to 2.5	2.1	PASS
	14 Msec.	m/s	2.8 to 3.5	2.9	PASS
"D" Plane Rotation	Maximum	Deg.	83.0 to 93.0	88.5°	PASS
Moment About Occipital Condyle	Minimum	Nm	-53.3 to -43.7	-46.4	PASS
Negative Moment Decay Time To -10Nm		Msec.	60.0 to 80.0	68.9	PASS
				Overall Test Results	PASS

\_\_\_\_\_  
Laboratory Technician

1/11/01  
\_\_\_\_\_  
Test Date

\_\_\_\_\_  
Approved By



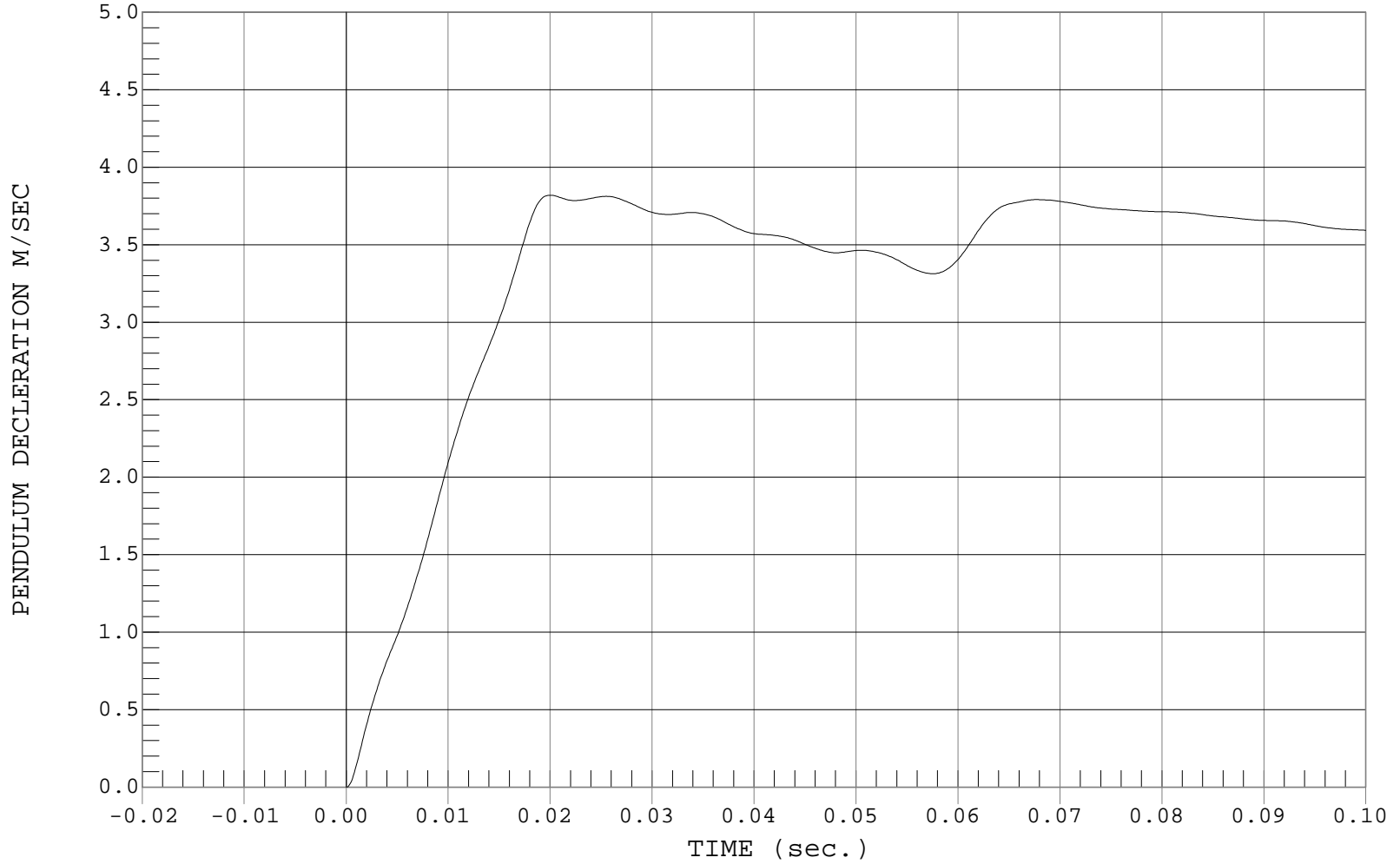
### PENDULUM DECELERATION

Test Desc.: Dummy Calibration - Neck Extension  
Component: Dummy #139

Test Date: 01-11-01  
Speed: 12.00 FT/SEC, 3.66 M/SEC

— 1 PENDULUM DECLERATION, D01063AI.A04

Ymin = 0 M/SEC @ 0.0001 sec, Ymax = 4 M/SEC @ 0.1886 sec





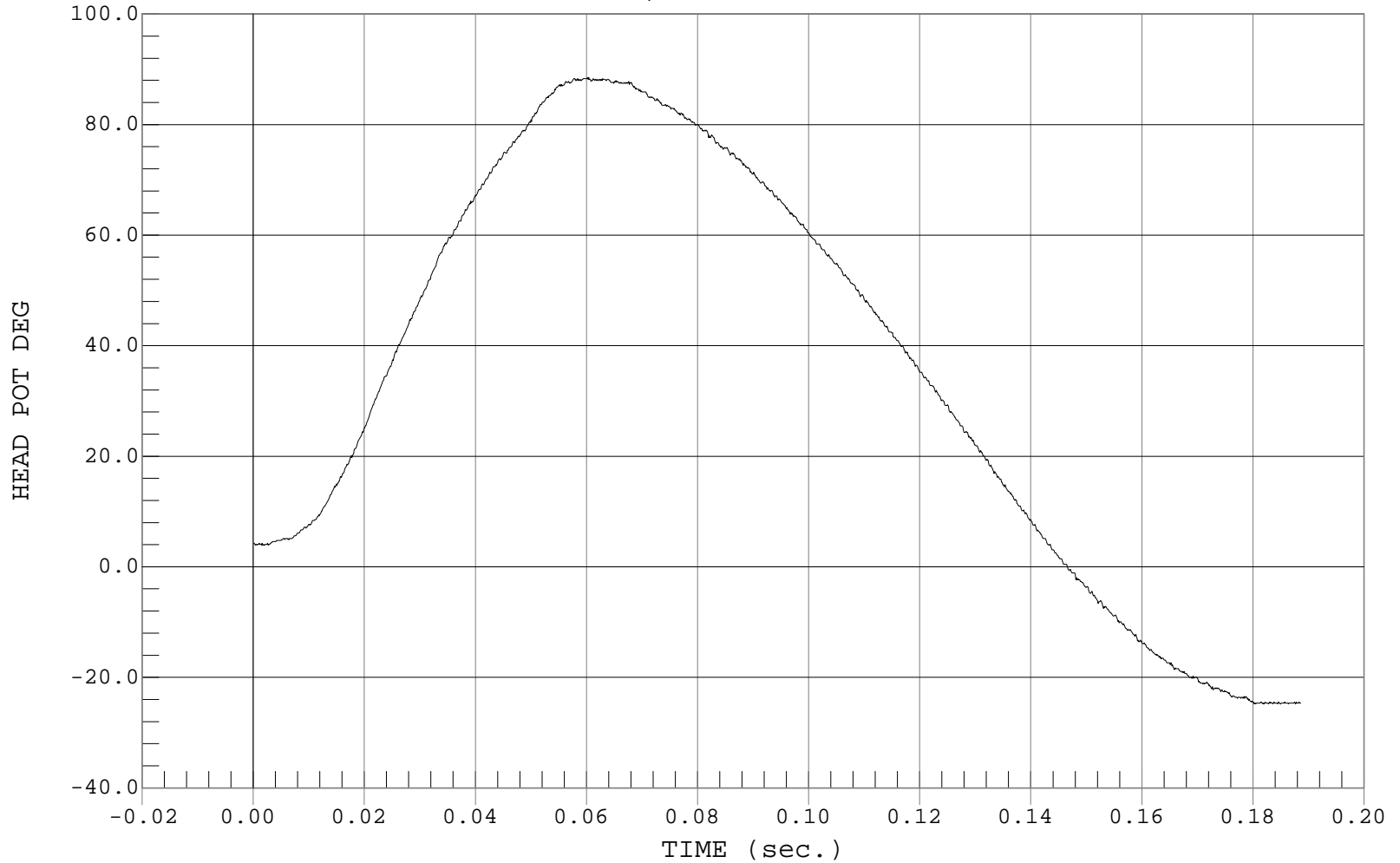
### NECK ROTATION

Test Desc.: Dummy Calibration - Neck Extension  
Component: Dummy #139

Test Date: 01-11-01  
Speed: 12.00 FT/SEC, 3.66 M/SEC

— 1 HEAD POT, D01063DU.D05

Ymin = -24.83 DEG @ 0.1805 sec., Ymax = 88.49 DEG @ 0.0602 sec.





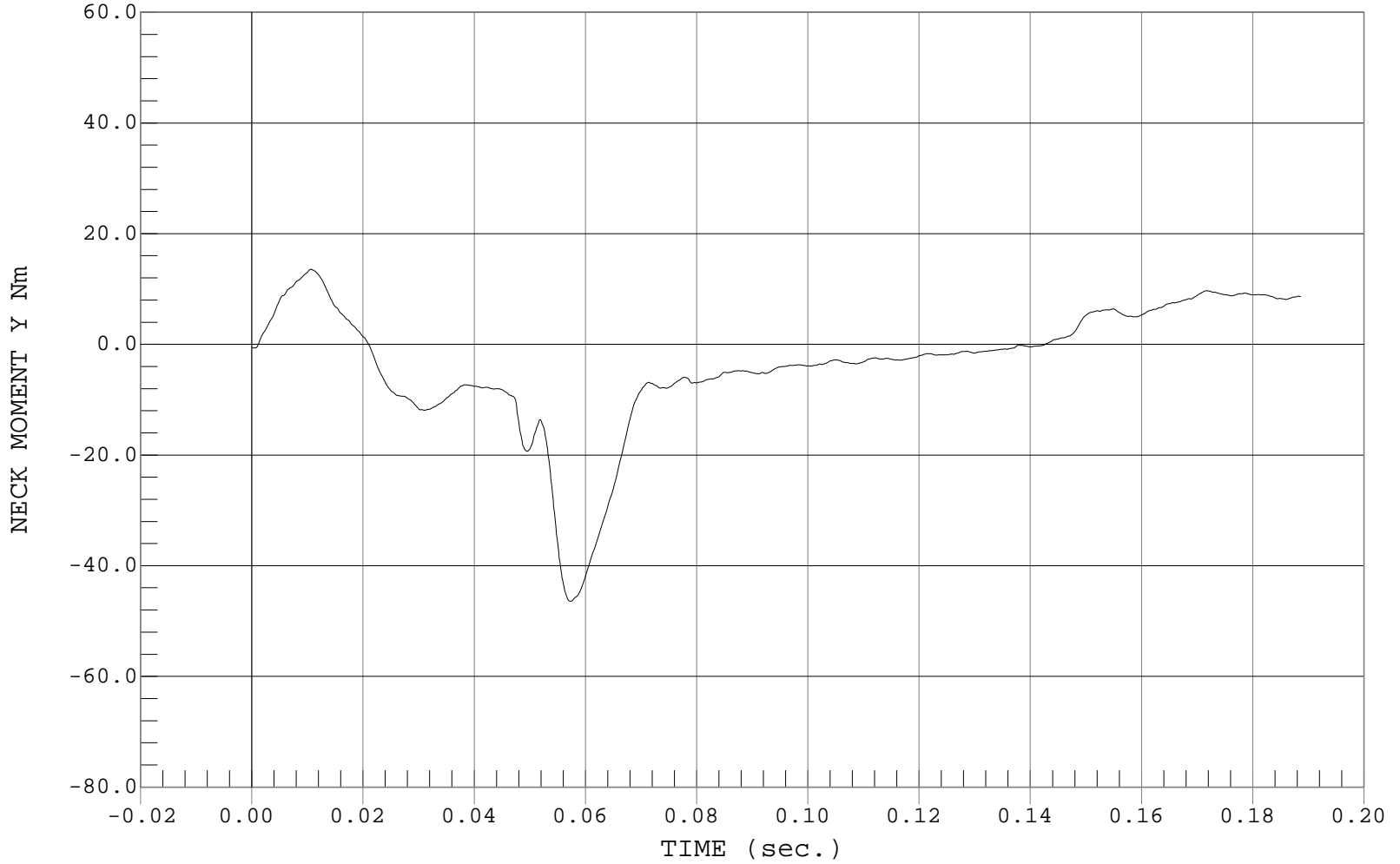
### OCCIPITAL MOMENT

Test Desc.: Dummy Calibration - Neck Extension  
Component: Dummy #139

Test Date: 01-11-01  
Speed: 12.00 FT/SEC, 3.66 M/SEC

— 1 NECK MOMENT Y, D01063MF.M01

Ymin = -46.42 Nm @ 0.0572 sec., Ymax = 13.55 Nm @ 0.0107 sec.



**Hybrid III Calibration Data Sheet**  
**3 Year Old**  
**Torso Flexion Test**

ATD Serial No.: 139

Test I.D.: D01065

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	°C	18.9 to 25.6	21.4°	PASS
Relative Humidity	%	10 to 70	24%	PASS
Force @ 45°	N	130 to 180	161	PASS
Initial Angle	Deg	0-15	10°	PASS
Return Angle	Deg	0-10	2°	PASS
Overall Test Results				PASS

\_\_\_\_\_  
 Laboratory Technician

\_\_\_\_\_  
 1/12/01  
 Test Date

\_\_\_\_\_  
 Approved By

**TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION**

DUMMY AND LABORATORY INSTRUMENT CALIBRATION  
INSTRUMENTS FOR CHILD DUMMY NO. 139

	INSTRUMENTS FOR DUMMY NO. <u>139</u>		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	AJ7F6	Endevco	1/4/01
Head Y	J19843	Endevco	1/4/01
Head Z	J19244	Endevco	1/4/01
Chest X	AJ7F7	Endevco	1/4/01
Chest Y	AJ454	Endevco	1/4/01
Chest Z	J23757	Endevco	1/4/01
Pelvis X	AJ8C0	Endevco	1/4/01
Pelvis Y	J14189	Endevco	1/4/01
Pelvis Z	J23943	Endevco	1/4/01
Upper Neck Force X	114	FTSS	11/7/00
Upper Neck Force Y	114	FTSS	11/7/00
Upper Neck Force Z	114	FTSS	11/7/00
Upper Neck Moment X	114	FTSS	11/7/00
Upper Neck Moment Y	114	FTSS	11/7/00
Upper Neck Moment Z	114	FTSS	11/7/00
Lower Neck Force X	119	FTSS	11/8/00
Lower Neck Force Y	119	FTSS	11/8/00
Lower Neck Force Z	119	FTSS	11/8/00
Lower Neck Moment X	119	FTSS	11/8/00
Lower Neck Moment Y	119	FTSS	11/8/00
Lower Neck Moment Z	119	FTSS	11/8/00
Chest Deflection Gauge	139	Servo	1/8/01

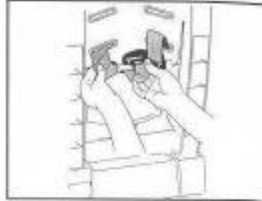
**CHILD SEAT OWNER'S MANUAL RESTRAINT INSTRUCTIONS**

## Adjusting The Roundabout To Fit Your Child

### Changing The Height Of The Shoulder Straps



1. Loosen the harness by pushing the release button in as you pull the shoulder straps out as much as possible.



2. Lift the metal yoke out from behind the seat-belt guard and unhook one shoulder strap. Pull the strap through to the front of your Roundabout. Do not remove the chest clip.



3. Re-thread the shoulder strap back through your chosen shoulder slot in the cover and shell. Make sure it is not twisted.



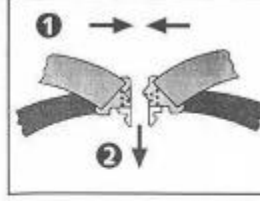
4. Hook the shoulder strap back on to the yoke.

Repeat for other strap.

8

## Adjusting The Roundabout To Fit Your Child

### Using The Compound Buckle



In order to prevent partial latching, the two halves of the buckle must be together before insertion.

#### IMPORTANT

If the buckle's tongues of your Roundabout cannot be inserted, fully press down the release button of the buckle and reinsert.

Note: Periodically clean the buckle by soaking it in warm water (if necessary, with dish washing liquid). See section "Care and Cleaning" on pages 30-32.

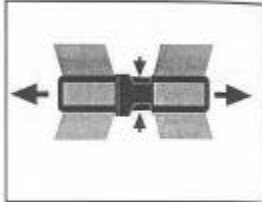
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## Adjusting The Roundabout To Fit Your Child

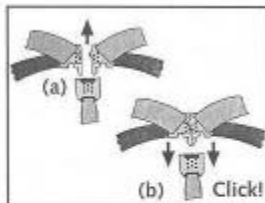
### Adjusting The Harness



1. Loosen the harness by pushing the release button in as you pull the shoulder straps forward as much as possible. Unfasten the chest clip.



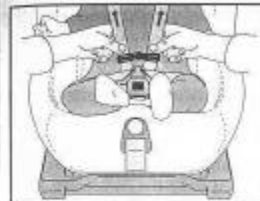
2. To open the chest clip, squeeze the middle tabs. Note that the chest clip appearance may vary. (Some chest clips have only one middle tab.) The correct height for the clip is the middle of the chest, at the level of the armpit. Always make sure that the harness is snug at each use or after any adjustments.



3. Unfasten the harness by pressing the red button down (a) and place your child in the seat. Fit the harness around your child and fasten the harness (b).

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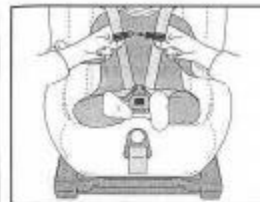
## Adjusting The Roundabout To Fit Your Child



4. With the chest clip low and unfastened, pull the harness up to tighten the lap sections which are designed to fit low down on your child's body.



5. With the chest clip low and unfastened, pull the adjuster strap forward making sure that the harness is a comfortable but SNUG fit around your child.

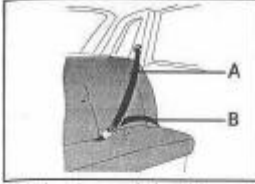


6. Fasten the chest clip and slide up to child's armpit height.

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## Securing The Roundabout Forward-Facing In Your Vehicle

### Lap and Shoulder Belt Installation



This is a lap and shoulder seat belt.  
A. Shoulder section.  
B. Lap section.



1. Place your Roundabout forward facing on the vehicle seat and pull the harness snug.



2. Pass the seat belt through both side slots.



3. Fasten the seat belt.



4. Before going any further make sure that the lap section of the seat belt passes below both lap belt guides.

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## Securing The Roundabout Forward-Facing In Your Vehicle



5. Press the red lock-off open.



6. Pull the shoulder section through the red lock-off.



7a. Carefully kneel on your Roundabout to push it into the seat. Pull the seat-belt here to tighten the lap section...



7b. ...and then pull the shoulder section of the seat-belt tight here...



7c. ...pull hard on the shoulder section then push the red lock-off in to grip the seat-belt.



8. Your Roundabout should now be secure - see "Buckle Position" on page 22. To remove your Roundabout, simply unfasten the belt and reverse the above.

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## Securing The Roundabout Forward-Facing In Your Vehicle

### Lap Belt Only Installation



This is a lap belt.



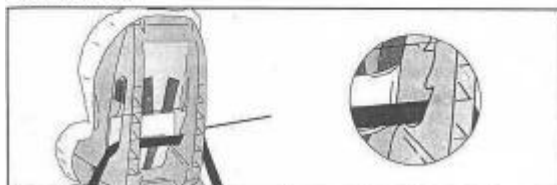
1. Place your Roundabout forward facing on the seat and pull the harness snug.



2. Pass the lap belt through both side slots.



3. Fasten the lap belt.



4. Before going any further make sure that the lap belt passes below both lap belt guides.

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## Securing The Roundabout Forward-Facing In Your Vehicle



5. Carefully kneel on your Roundabout to push it into the seat and pull the lap belt tight.



6. Your Roundabout should now be secure - see "Buckle Position" on page 22. To remove your Roundabout, simply unfasten the belt and reverse the above.

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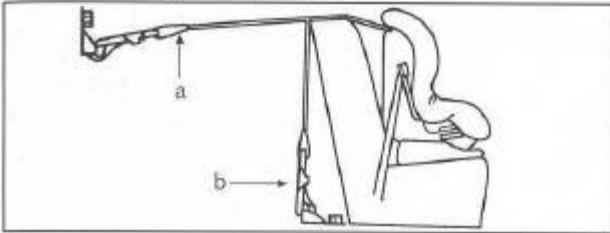
## Using Your Roundabout Versa-Tether™

### Forward Facing Mode



1. Place the restraint in the selected vehicle seating position. Follow the section "Securing the Roundabout Forward Facing in Your Vehicle" (see pages 15-18).

2. Using the Versa-Tether™ will always improve the Roundabout's performance and stability. This is particularly important in lap belt only installations.



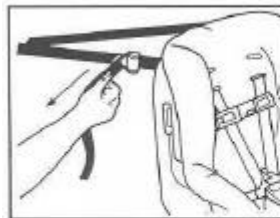
3. Locate an acceptable location for the tether to be anchored. Make sure you hook your Versa-Tether™ to a secure location. Use a or b, whichever provides a more stable and secure mounting. Check your vehicle owner's manual or contact your vehicle's manufacturer for proper tether attachment anchorages

**DO NOT** Hook the Versa-Tether™ to the bottom of a vehicle seat adjuster!

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## Using Your Roundabout Versa-Tether™

### Forward Facing Mode



3. After you attach the tether to the vehicle, tighten by pulling the strap in your Versa-Tether™ as shown above. Your Roundabout should be secure.

To release the Versa-Tether™ simply lift the tether adjuster silver metal tab and pull.

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