

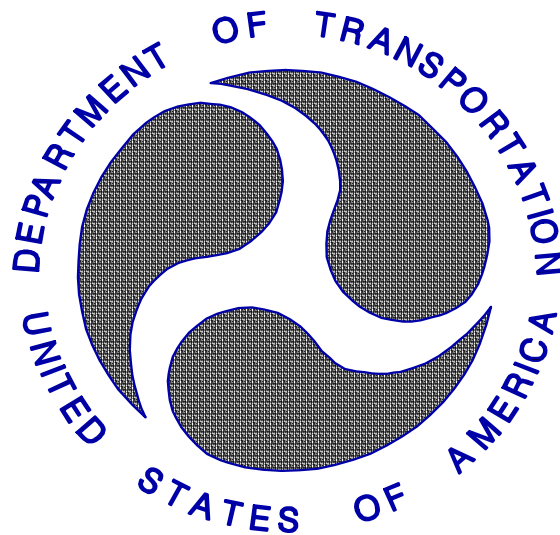
REPORT NO. MCW-DOT-04SN03

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TESTING**

GENERAL MOTORS CORPORATION
2004 SATURN ION QUAD COUPE

NHTSA NUMBER: M40113

MEDICAL COLLEGE OF WISCONSIN
5000 WEST NATIONAL AVENUE
MILWAUKEE, WI 53295



16 DECEMBER 2003

FINAL REPORT

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
RULEMAKING
OFFICE OF CRASHWORTHINESS STANDARDS
ROOM 5307, NVS-111
400 SEVENTH STREET, SW
WASHINGTON, DC 20590

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16. Abstract <p>A 55/28 km/h 90° Impact Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2004 Saturn Ion in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for generation of consumer information on vehicle side crash protection. This test was conducted at the Medical College of Wisconsin Vehicle Crashworthiness Lab in Milwaukee, Wisconsin, on 16 December 2003.</p> <p>The impact velocity of the Moving Deformable Barrier (MDB) was 62.1 km/h, and the ambient temperature at the struck side (driver's) of the target vehicle at the time of impact was 22.4° C. The target vehicle post-test maximum crush was 327 mm at Level 2. The test vehicle's performance follows:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th align="center"><u>DRIVER</u></th> <th align="center"><u>PASSENGER</u></th> </tr> </thead> <tbody> <tr> <td>Left Upper Rib Acceleration G</td> <td align="center">49.0</td> <td align="center">76.9</td> </tr> <tr> <td>Left Lower Rib Acceleration G</td> <td align="center">57.1</td> <td align="center">76.0</td> </tr> <tr> <td>Lower Spine Acceleration G</td> <td align="center">67.0</td> <td align="center">60.1</td> </tr> <tr> <td>Thoracic Trauma Index TTI</td> <td align="center">62</td> <td align="center">68</td> </tr> <tr> <td>Pelvis Acceleration G</td> <td align="center">72</td> <td align="center">55</td> </tr> </tbody> </table> <p>The doors on the struck side of the vehicle did not separate from the body at the hinges or latches, and the opposite doors did not open during the side impact event.</p>					<u>DRIVER</u>	<u>PASSENGER</u>	Left Upper Rib Acceleration G	49.0	76.9	Left Lower Rib Acceleration G	57.1	76.0	Lower Spine Acceleration G	67.0	60.1	Thoracic Trauma Index TTI	62	68	Pelvis Acceleration G	72	55
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SECTION 1

PURPOSE AND TEST PROCEDURE

This side impact test was part of the FY04 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-01-D-02003. The purpose of this test was to evaluate side impact protection of a 2004 Saturn Ion Quad Coupe. This side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated November 2002.

The Medical College of Wisconsin does not endorse or certify products. The manufacturer's name appears solely for identification purposes only.

SECTION 2

SUMMARY OF SIDE IMPACT TEST

A 2004 Saturn Ion Quad Coupe was impacted on the left or driver's side by a Moving Deformable Barrier (MDB) that was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.1 km/h (38.6 mph). The target vehicle was stationary and positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by the Medical College of Wisconsin in Milwaukee, Wisconsin, on 16 December 2003.

Two restrained Side Impact Hybrid III Dummies (SID H3's) were placed in the driver and left rear designated seating positions, according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated May 1999. The side impact event was documented by six high-speed video cameras, three high-speed film cameras, and one real-time camera. Camera locations and other pertinent camera information can be found in this report.

The SID H3s were instrumented with the following accelerometers.

1. Left Upper Rib (LUR) Primary and Redundant uniaxial accelerometers (Y-direction)
2. Left Lower Rib (LLR) Primary and Redundant uniaxial accelerometers (Y-direction)
3. Lower Thoracic Spine (T₁₂) Primary and Redundant uniaxial accelerometers (Y-direction)
4. Pelvic (PEV) section Primary and Redundant uniaxial accelerometers (Y-direction)
5. Head Center of Gravity triaxial accelerometers (X-, Y-, and Z-direction)
6. Upper Neck (NKU) six axis load cell (Fx, Fy, Fz, Mx, My, and Mz)

Pre- and post-test photographs of the test vehicle, the MDB, and the side impact dummies (SID H3s) are included in Appendix A. Appendix B contains the vehicle, MDB, and dummy response data traces. A summary of the side impact dummy configuration and performance verification test data is shown in Appendix C. Dummy and vehicle calibration data can be found in Appendix D of this report.

The following table summarizes the results of this test.

Injury Criteria	Front SID H3	Rear SID H3
TTI (G)	62	68
PELVIS (G)	72	55
HIC36	597.4	651.6

The vehicle's airbag information is summarized in the following table

	Frontal	Side-Torso	Side-Torso/Head	Side-Head
Driver	Yes-Steering wheel	None	None	None
Front Passenger	Yes- Dashboard	None	None	None
Left Rear Passenger	None	None	None	None

SECTION 3
SUMMARY OF TEST RESULTS

DATA SHEET NO. 1

GENERAL VEHICLE TEST PARAMETER DATA

TEST VEHICLE INFORMATION

Year/ Make/ Model/ Body Style	2004 Saturn Ion Quad Coupe					
Vehicle NHTSA NO.	<u>M40113</u>		VIN	<u>1G8AM12F54Z126995</u>		
Vehicle Body Color	<u>Red</u>		Build Date	<u>September 2003</u>		
Engine Data	<u>4</u> Cylinders	<u> </u> CID	<u>2.2</u> Liter	<u> </u> cc		
Placement	<u> </u> Longitudinal	<u>X</u> Lateral				
Transmission	<u>5</u> Speed	<u>X</u> Manual	<u> </u> Automatic	<u>X</u> Overdrive		
Final Drive	<u> </u> Rear Wheel Drive	<u>X</u> Front Wheel Drive	<u> </u> Four Wheel Drive			
Odometer Reading	<u>95</u>	Date	<u>05 December 2004</u>			
Options	<u>X</u> A/C	<u>X</u> Power Steering	<u>X</u> Power Brakes	<u> </u> Power Windows		
	<u> </u> Cruise Control	<u>X</u> Tilt Wheel	<u>X</u> Power Locks			

DATA FROM TIRE PLACARD:

Tire Pressure (at Capacity)	<u>30</u> PSI Front
	<u>30</u> PSI Rear
Recommended Tire Size	<u>P19560R15</u>
Tires on Test Vehicle	<u>P19560R15</u> Manufacturer <u>Firestone</u>

TEST VEHICLE AIRBAG INFORMATION:

	<u>Frontal</u>	<u>Side-Torso</u>	<u>Side-Torso/Head</u>	<u>Side-Head</u>
Driver	Yes-Steering wheel	None	None	None
Front Passenger	Yes- Dashboard	None	None	None
Left Rear Passenger	None	None	None	None

VEHICLE CAPACITY DATA:

Number of Occupants:	<u>2</u> Front	<u>2</u> Rear	<u> </u> 3 rd Seat	<u>4</u> Total
Type of Front Seats	<u>X</u> Bucket	<u> </u> Bench	<u> </u> Split Bench	
Type of Front Seat Back	<u> </u> Fixed	<u>X</u> Adjustable w/	<u>X</u> Lever	<u> </u> Knob
Vehicle Max Capacity Loading	<u>340.2</u>		kg	(A)
No. of Occupants X 68.04 kg	<u>272.2</u>		kg	(B)
Cargo Capacity (A) – (B)	<u>68.0</u>		kg	

TEST VEHICLE DELIVERED WEIGHT WITH MAXIMUM FLUIDS:

Left Front	=	<u>374.7</u> kg	Left Rear	=	<u>261.7</u> kg
Right Front	=	<u>371.9</u> kg	Right Rear	=	<u>265.8</u> kg
TOTAL FRONT	=	<u>746.6</u> kg	TOTAL REAR	=	<u>527.5</u> kg
% Total Weight	=	<u>58.6</u> %	%Total Weight	=	<u>41.4</u> %
TOTAL WEIGHT	=	<u>1274.1</u> kg			

DATA SHEET 1 (continued)

GENERAL VEHICLE TEST PARAMETER DATA

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Max Fluids	=	<u>1274.1</u>	kg	(A)
Maximum Cargo Carrying Capacity of Test Vehicle	=	<u>68.0</u>	kg	(B)
Weight of (2) instrumented Side Impact Dummies	=	<u>161.1</u>	kg	(C)
TEST VEHICLE TARGET WEIGHT	=	<u>1503.2</u>	kg	(A+B+C)

FULLY LOADED TEST VEHICLE (UDVW + 1 OR 2 SID H3(s) + CARGO)

Left Front	=	<u>428.2</u>	kg	Left Rear	=	<u>357</u>	kg
Right Front	=	<u>374.2</u>	kg	Right Rear	=	<u>343.8</u>	kg
TOTAL FRONT	=	<u>802.4</u>	kg	TOTAL REAR	=	<u>700.8</u>	kg
% Total Weight	=	<u>53.4</u>	%	%Total Weight	=	<u>46.6</u>	%
TOTAL WEIGHT	=	<u>1503.2</u>	kg				

AS TESTED WEIGHT OF TEST VEHICLE (UDVW+ SID H3(s)+CARGO+EQUIPMENT & INSTRUMENTATION)

Left Front	=	<u>425.5</u>	kg	Left Rear	=	<u>355.2</u>	kg
Right Front	=	<u>373.8</u>	kg	Right Rear	=	<u>343.4</u>	kg
TOTAL FRONT	=	<u>799.3</u>	kg	TOTAL REAR	=	<u>698.6</u>	kg
% Total Weight	=	<u>53.4</u>	%	%Total Weight	=	<u>46.6</u>	%
TOTAL WEIGHT	=	<u>1497.9</u>	kg				

TEST VEHICLE ATTITUDE (all dimensions in millimeters):

AS DELIVERED

Left Front	<u>718</u>	Right Front	<u>718</u>	Left Rear	<u>734</u>	Right Rear	<u>730</u>
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FULLY LOADED

Left Front	<u>700</u>	Right Front	<u>701</u>	Left Rear	<u>681</u>	Right Rear	<u>689</u>
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AS TESTED

Left Front	<u>701</u>	Right Front	<u>702</u>	Left Rear	<u>685</u>	Right Rear	<u>693</u>
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Test Vehicle Wheelbase 2620 mm

As Tested CG = 1221 mm rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side	=	<u>4230</u>	mm
Left Side	=	<u>4230</u>	mm
Centerline	=	<u>4718</u>	mm

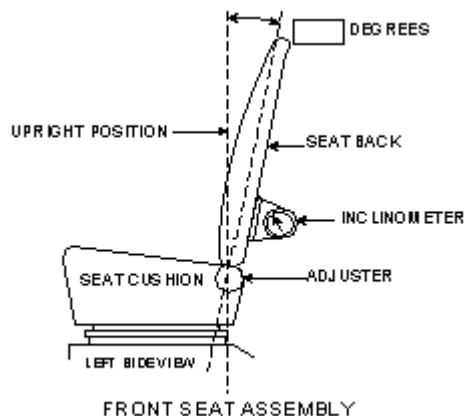
DATA SHEET 1 (continued)

GENERAL TEST VEHICLE PARAMETER DATA

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113

Nominal Design Riding Position for adjustable driver and passenger seats. Please describe how to position the inclinometer to measure the seat back angle. Include a description of the adjustment latch detent if applicable



FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel		<u>260 mm</u>
Total Number of Detents	<u>27</u>	Test Position <u>Mid-Position (14th detent)</u>

FRONT SEAT BACK ADJUSTMENT:

Seat Back Angle	<u>9.5 degrees measured at head rest with SID H3 in seat</u>
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REAR SEAT POSITION:

Total Length Fore/Aft Adjustment	<u>N/A</u>
Seat Back Adjustment Position	<u>N/A</u>

ADJUSTABLE STEERING COLUMN POSITION:

<u>17.9 degrees from vertical (mid-position)</u>
--

WINDOW POSITIONS:

Left Front	<u>Up</u>	Right Front	<u>Removed</u>
Left Rear	<u>Up</u>	Right Rear	<u>Removed</u>

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

Fuel System usable Capacity	<u>51.48 L</u>	
Test Volume	<u>47.85 L</u>	<u>92.9% usable capacity</u>

LOCATIONS OF IMPACT POINT ON TEST VEHICLE SIDE TO BE IMPACTED:

Wheelbase	<u>2620 mm</u>	
Impact Point is	<u>370 mm rearward</u>	of front axle centerline
Actual Impact Point is	<u>350 mm rearward</u>	of front axle centerline

DATA SHEET 2
TEST VEHICLE SUMMARY

VEHICLE IDENTIFICATION:

Year/Make/Model/Body Style	2004 Saturn Ion Quad Coupe		
Body Color	Red	VIN	1G8AM12F54Z126995
NHTSA No.	M40113	Test Date	16 December 2003
Overall Length	4718 mm	Overall Width	1702 mm

VEHICLE TEST WEIGHT (Pre-Test):

Left Front	=	<u>425.5</u>	kg	Left Rear	=	<u>355.2</u>	kg
Right Front	=	<u>373.8</u>	kg	Right Rear	=	<u>343.4</u>	kg
TOTAL FRONT	=	<u>799.3</u>	kg	TOTAL REAR	=	<u>698.6</u>	kg
% Total Weight	=	<u>53.4</u>	%	%Total Weight	=	<u>46.6</u>	%
TOTAL WEIGHT	=	<u>1497.9</u>	kg				
Wheelbase	=				=	<u>2620</u>	mm
Longitudinal CG from Center of Front Axle	=				=	<u>1221</u>	mm
Impact Angle with Respect to Impactor	=				=	<u>90°</u>	

ACTUAL IMPACT POINT

Actual Impact Point is 20 mm forward and 12 mm below nominal

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1	(260 mm above ground)	=	<u>175</u>	mm
2. LEVEL 2	(472 mm above ground)	=	<u>327</u>	mm
3. LEVEL 3	(593 mm above ground)	=	<u>297</u>	mm
4. LEVEL 4	(909 mm above ground)	=	<u>229</u>	mm
5. LEVEL 5	(1308 mm above ground)	=	<u>51</u>	mm

Maximum Post-Test intrusion at Level 2 is 327 mm

OCCUPANTS

	<u>Left Front Passenger</u>	<u>Left Rear Passenger</u>
Dummy Identification	<u>SIDH3/056</u>	<u>SIDH3/058</u>
Restraints Used	<u>3-Point Belt</u>	<u>3-Point Belt</u>

INSTRUMENTATION:

Number of Vehicle Data Channels		<u>25</u>
Number of Cameras	Onboard	<u>3</u>
	Off board	<u>4</u>
	Real Time	<u>1</u>
	MDB	<u>2</u>
	TOTAL	<u>10</u>

DATA SHEET NO. 3

MOVING DEFORMABLE BARRIER (MDB) SUMMARY

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113

MDB FACE MANUFACTURER AND SERIAL NUMBER:

Plascore Serial Number Plascore Serial Number:024B0703-033A0703

POSITION OF IMPACT (MDB) ON TOW SYSTEM

Crabbed 27° to the left

MDB DETAILS:

Overall Width of Framework Carriage	=	<u>1250 mm</u>
Overall Length of MDB (incl. honeycomb impact face)	=	<u>4116 mm</u>
Wheelbase of Framework Carriage	=	<u>2578 mm</u>
Tread of Framework Carriage (Front & Rear)	=	<u>1880 mm</u>
C.G. Location Rearward of Front Axle	=	<u>1135 mm</u>
C.G. Location From Center Line	=	<u>-10 mm</u>
C.G. Location Above Ground Level	=	<u>480.4 mm</u>

MDB WEIGHT:

Left Front	=	<u>458.0</u>	kg	Left Rear	=	<u>228.9</u>	kg
Right Front	=	<u>307.2</u>	kg	Right Rear	=	<u>365.6</u>	kg
TOTAL FRONT	=	<u>765.2</u>	kg	TOTAL REAR	=	<u>594.5</u>	kg
% Total Weight	=	<u>56.3</u>	%	%Total Weight	=	<u>43.7</u>	%
TOTAL WEIGHT	=	<u>1359.7</u>	kg				

MDB IMPACT:

Impact Angle (MDB C/L to Target Vehicle)		<u>270°</u>	
Impact Speed	Primary	<u>62.1 km/h</u>	<u>38.6 mph</u>
	Secondary	<u>62.0 km/h</u>	<u>38.5 mph</u>
	On-Board	<u>62.1 km/h</u>	<u>38.6 mph</u>

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

1. Row A Center of Bumper	=	<u>187</u>	mm
2. Row B Top of Bumper	=	<u>125</u>	mm
3. Row C Mid-Level	=	<u>113</u>	mm
4. Row D Top of Stack	=	<u>151</u>	mm

INSTRUMENTATION:

Number of MDB Data Channels	=	<u>5</u>
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DATA SHEET NO. 4

POST-TEST OBSERVATIONS

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113

VISIBLE DUMMY CONTACT POINTS:

	<u>LEFT FRONT SID H3</u>	<u>LEFT REAR SID H3</u>
Head	<u>To window sill 285 mm forward of B-Pillar</u>	<u>To side header and C-Pillar</u>
Upper Torso	<u>140 mm to left front door panel above arm rest</u>	<u>To C-Pillar trim 140 mm below window sill</u>
Lower Torso	<u>To left front door panel at arm rest</u>	<u>To C-Pillar trim just above arm rest</u>
Left Knee	<u>To left front door panel starting 190 mm below arm rest and ending at window crank</u>	<u>To left rear door panel starting in the middle of the arm rest and ending 280 mm below window sill</u>
Left Leg	<u>To left front door panel just in from of window crank</u>	<u>To left rear door panel 110 mm in from of arm rest and 290 mm below window sill</u>

DOOR OPENING:

	<u>LEFT DOOR</u>	<u>RIGHT DOOR</u>
Front	<u>Closed/latched/inoperable</u>	<u>Closed/latched/operable</u>
Rear	<u>Closed/latched/inoperable</u>	<u>Closed/latched/operable</u>

MDB DISTANCE FROM TARGET IMPACT POINT:

Horizontal	<u>20 mm forward</u>	Vertical	<u>12 mm below</u>
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ARM REST LOCATIONS:

Front	<u>275 mm below window sill</u>
Rear	<u>340 mm below window sill</u>

SEAT MOVEMENT:

Front	<u>Seat crush ~ 55 mm, seat back crush ~45 mm</u>
Rear	<u>Seat crush ~160 mm, seat back crush ~5 mm</u>

GLAZING DAMAGE

Windshield	<u>Radial crack pattern starting from the lower 1/3 of driver A-Pillar to 170 mm inboard. Additional cracks from roof liner to passenger A-Pillar and dashboard</u>
Window	<u>Front and rear left hand side windows shattered on impact</u>

PILLAR PERFORMANCE:

None Noted

SILL SEPARATION

Separation of pinch welds on left hand side under B-Pillar

AIRBAG DEPLOYMENT STATUS:

	<u>DRIVER</u>	<u>FRONT PASSENGER</u>	<u>REAR PASSENGER</u>
<u>FRONT</u>	<u>Deployed</u>	<u>Deployed</u>	<u>N/A</u>
<u>SIDE</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>

OTHER NOTABLE IMPACT EFFECTS:

Left hand side outer door skin cracked and fell off of test vehicle during impact. (See page A-8)

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET 5

SID H3 INSTRUMENTATION DATA

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113

	Front Dummy ID SID H3/056				Rear Dummy ID SID H3/058			
	Max		Min		Max		Min	
	G's	msec	G's	msec	G's	msec	G's	msec
HEAD ACCELERATIONS								
Longitudinal (X)	18.4	34.2	-43.5	68.9	4.0	174.1	-13.7	84.3
Lateral (Y)	53.3	68.9	-6.6	155.0	43.5	56.2	-15.3	38.6
Vertical (Z)	59.6	52.1	-3.3	19.8	12.3	41.0	-117.2	51.0
Resultant (R)	68.8	68.9			118.9	51.0		
HIC36	597.4				651.6			
RIB ACCELERATIONS								
Upper Rib Lateral (Y)	49.0	30.6	-19.6	71.3	76.9	36.9	-2.8	156.3
Upper Rib Lateral (Y _R)	50.4	30.0	-18.8	71.3	75.8	36.9	-2.8	156.3
Lower Rib Lateral (Y)	57.1	32.5	-13.1	70.0	76.0	35.6	-5.9	60.0
Lower Rib Lateral (Y _R)	57.1	32.5	-12.9	70.0	73.8	36.3	-5.4	60.0
SPINE ACCELERATIONS								
Lower Lateral (Y)	67.0	33.8	-23.3	63.1	60.1	40.6	-11.6	68.8
Lower Lateral (Y _R)	66.7	33.8	-23.7	63.1	59.7	40.6	-12.3	68.8
PELVIS ACCELERATIONS								
Lateral (Y)	72.1	28.1	-12.5	48.8	55.2	31.9	-5.7	71.3
Lateral (Y _R)	71.8	28.1	-13.2	48.8	55.1	31.9	-6.0	71.3

REFERENCE:

Positive Direction -	Anterior/Posterior	+(X) = anterior
	Lateral	+(Y) = right
	Superior/Inferior	+(Z) = inferior
Negative Direction	Anterior/Posterior	-(X) = posterior
	Lateral	-(Y) = left
	Superior/Inferior	-(Z) = superior

All the above data (except head accelerations) has been filtered using FIR (Version 1.0; July 16, 1990)

Head Accelerations have been filtered at SAE Class 1000

Y_R denotes redundant Y-direction accelerometer

DATA SHEET 5 (continued)

SID H3 INSTRUMENTATION DATA

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113

	Front Dummy ID SID H3/056				Rear Dummy ID SID H3/058			
	Max		Min		Max		Min	
	N	msec	N	msec	N	msec	N	msec
NECK FORCES								
Longitudinal (X)	66.2	192.7	-954.5	62.9	164.3	55.8	157.0	95.4
Lateral (Y)	776.1	47.1	-229.5	30.6	250.6	51.0	-596.0	65.8
Vertical (Z)	1991.2	63.0	-100.2	19.8	1166.0	45.6	-1202.5	56.5
NECK MOMENTS								
	Nm	msec	Nm	msec	Nm	msec	Nm	msec
Lateral Bending (X)	65.2	57.3	-67.0	43.2	14.1	139.0	-174.9	53.4
Flexion/Extension (Y)	1.0	19.9	-32.8	46.7	17.5	113.4	-29.4	59.3
Rotation (Z)	13.0	65.4	-12.9	41.5	30.3	82.3	-17.8	52.5

REFERENCE:

Upper neck load cell polarity follows the dummy manipulation table A-1 in the NHTSA Test Reference Guide version 5

Force

- Fx positive response: Head rearward, chest forward
- Fy positive response: Head leftward, chest rightward
- Fz positive response: Head upward, chest downward

Moment

- Mx positive response: Left ear to left shoulder
- My positive response: Chin to sternum
- Mz positive response: Chin to left shoulder

Neck forces have been filtered at SAE Class 1000

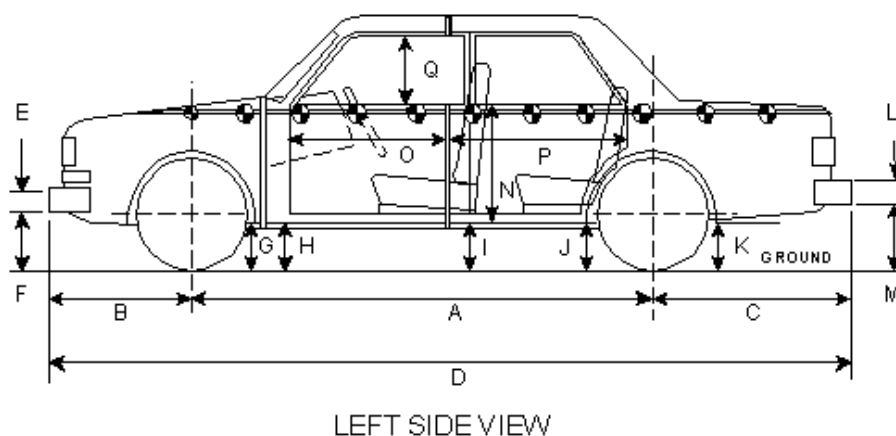
Neck moments have been filtered at SAE Class 600

DATA SHEET 6

VEHICLE PRE- AND POST- MEASUREMENTS

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113



	PRE-TEST As delivered (mm)	PRE-TEST As Tested (mm)	POST-TEST (mm)	Δ CHANGE (mm)
A	2620	-	2598	-22
B	738	-	736	-2
C	872	-	852	-20
D	4718	-	4703	-15
E	250	-	250	0
F	292	290	322	32
G	263	241	300	59*
H	264	240	300	60*
I	268	235	255	20*
J1	213	172	175	3
J2	272	229	215	-14
K	305	252	270	18
L	237	-	237	0
M	433	377	390	13
N	705	-	688	-17
O	1245	-	1244	-1
P	725	-	665	-60
Q	370	-	375	5
R	4230	-	4236	6
S	4230	-	4186	-44
T	1702	-	1474	-228

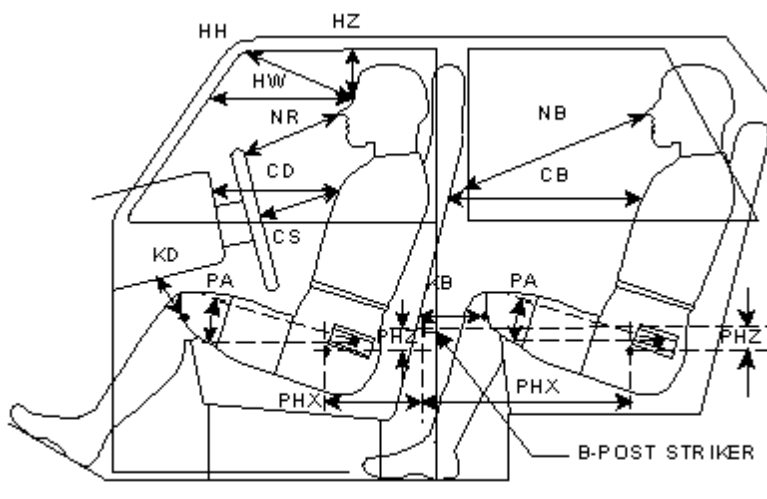
* Estimated measurements. Trim panel containing these points cracked and fell off during impact.

DATA SHEET 7

SID H3 LONGITUDINAL CLEARANCE DIMENSIONS

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113



LEFT SIDE VIEW

NOTE: All dimensions are in millimeters with tolerance of ± 3 mm

	DRIVER ID# SIDH3/056	LEFT REAR PASSENGER ID# SIDH3/058
HH	393	-
HW	791	-
HZ	213	145
NR/NB	462	526
CD/CB	779	479
CS	386	-
KDL(KDA°)/KBL(KDA°)	150/25.9	177/17.2
KDR(KDA°)/KBR(KDA°)	132/29.8	177/12.3
PA°	23.4	24.9
PHX	2394	1531
PHZ	194	178

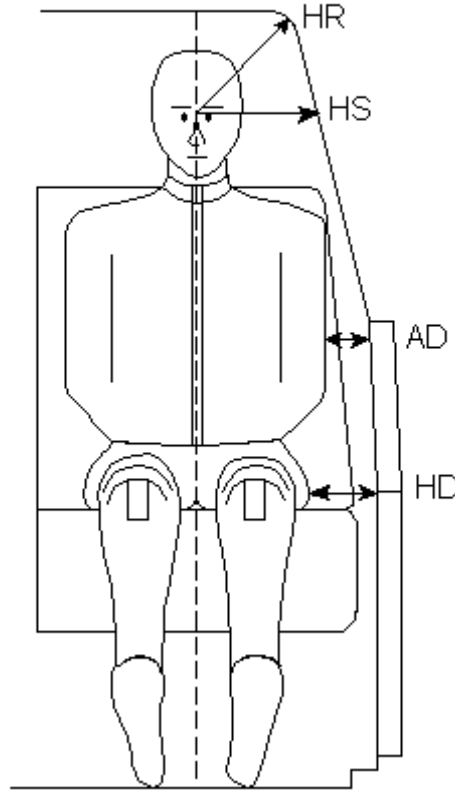
PHX and PHZ referenced from middle of test vehicle's rear bumper

DATASHEET 8

SID H3 LATERAL CLEARANCE DIMENSIONS

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113



NOTE: All dimensions are in millimeters with tolerance of ± 3 mm

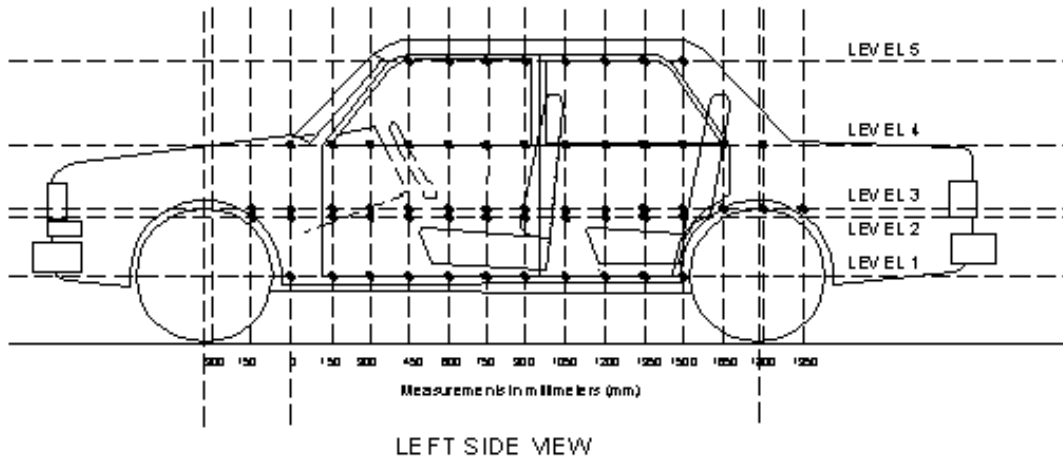
	DRIVER ID# SIDH3/056		LEFT REAR PASSENGER ID# SIDH3/058	
HR	196		197	
HS	378		363	
AD	Upper 125	Lower 55	Upper 61	Lower 88
HD	127		117	

DATA SHEET 9

VEHICLE SIDE MEASUREMENTS

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113



- LEVEL 5 = WINDOW TOP
- LEVEL 4 = WINDOW SILL
- LEVEL 3 = MID-DOOR
- LEVEL 2 = OCCUPANT H-POINT
- LEVEL 1 = AXLE CENTERLINE HEIGHT OR SILL TOP HEIGHT

MEASUREMENTS ARE TAKEN WHEN THE VEHICLE IS IN THE “AS TESTED” CONFIGURATION
 Measurements along the Vertical 750 mm line as shown

Level 5 @ Window Top	1308 mm
Level 4 @ Window Sill	909 mm
Level 3 @ Mid-Door	593 mm
Level 2 @ Occupant H-Point	472 mm
Level 1 @ Axle Centerline or Sill Top Height	260 mm

DATA SHEET 10

VEHICLE EXTERIOR CRUSH PROFILES – ALL LEVELS

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113

Note: All Dimensions are in millimeters with a tolerance of ± 3 mm

		DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT																											
HEIGHT		-900	-750	-600	-450	-300	-150	0	150	300	450	600	750	900	1050	1200	1350	1500	1650	1800	1950	2100	2250	2400	2550	2700	2850	3000	
260 LEVEL 1	PRE								253	249	246	245	244	244	243	243	244	246	248	252									
	POST								390	395	396	400	410	405	415	418	404	370	317	244									
	CRUSH								137	146	150	155	166	161	172	175	160	124	69	-8									
472 LEVEL 2	PRE	265	230					217	218	213	210	208	209	210	213	219	224	220	217	217						250	261		
	POST	277	244					280	480	525	534	535	520	523	539	540	482	463	435	272					260	269			
	CRUSH	12	14					63	262	312	324	327	311	313	326	321	258	243	218	55					10	8			
593 LEVEL 3	PRE	284	249					221	220	213	209	206	205	204	205	206	208	210	212	212	212	210	212	212	209	232	252	274	
	POST	290	260					285	469	450	449	463	465	472	502	497	473	454	413	273	249	249		231	250	270	285		
	CRUSH	6	11					64	249	237	240	257	260	268	297	291	265	244	201	61	39			22	18	18	11		
909 LEVEL 4	PRE		346	328	317	306	297	286	283	270	272	269	269	270	270	272	275	280	285	294	303	313	323	333	343	356			
	POST		355	344	338	334	333	335	364	404	436	444	454	468	487	501	501	480	452	413	370	360	356	361	366	374			
	CRUSH		9	16	21	28	36	49	81	134	164	175	185	198	217	229	226	200	167	119	67	47	33	28	23	18			
1308 LEVEL 5	PRE											453	475	483	490	495	495	491	484	478	472	462	455						
	POST											493	522	531	541	540	546	529	521	513	496	4880	477						
	CRUSH											40	47	48	51	45	51	38	37	35	24	26	22						

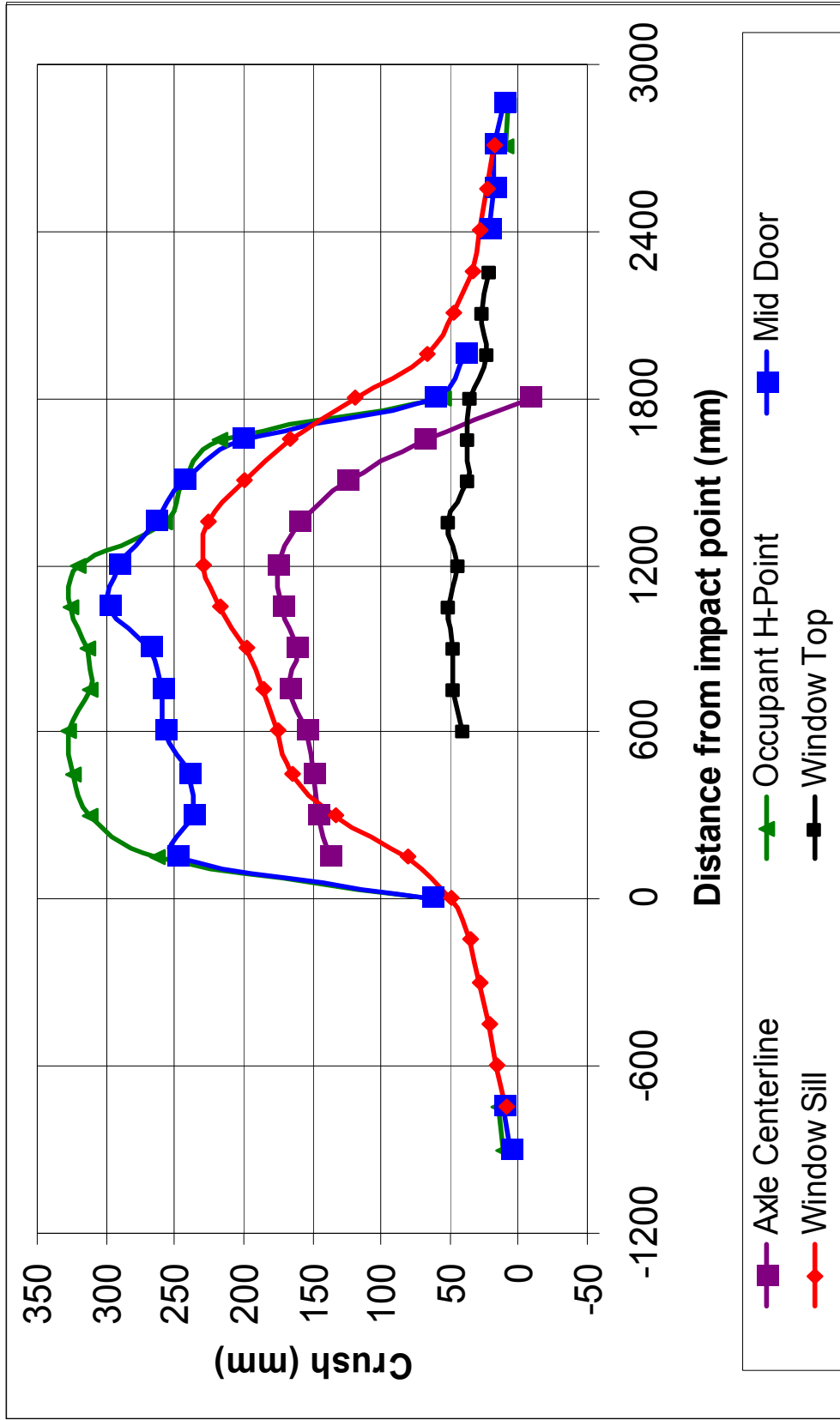
* Posttest measurements are approximations. The plastic outer shell of the struck side door cracked and fell off the test vehicle during impact.

DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES ALL LEVELS

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113

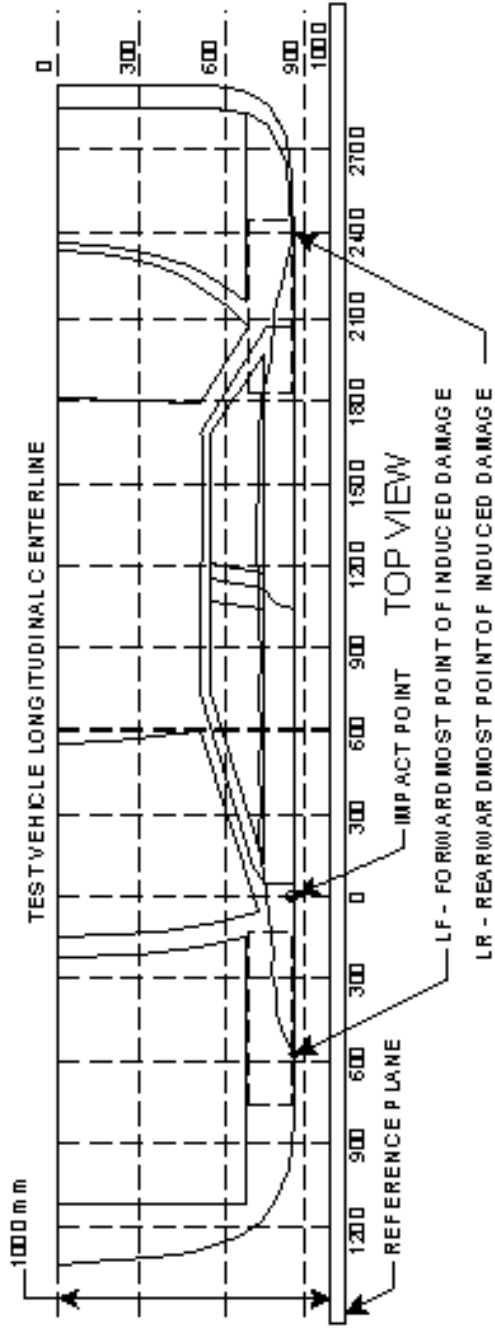


DATA SHEET 11

VEHICLE DAMAGE PROFILE DISTANCES

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113



DPD MEASUREMENTS (mm)	POST-TEST (mm)	PRE-TEST (mm)	STATIC CRUSH (mm)
1	235	235	0
2	509	235	274
3	530	235	295
4	535	235	300
5	464	237	227
6	235	235	0

DATA SHEET 12

**STATIC CRUSH OF IMPACTOR FACE
(Grid as looking at MDB from front)**

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113

Note: All Dimensions are in millimeters with a tolerance of ±3 mm

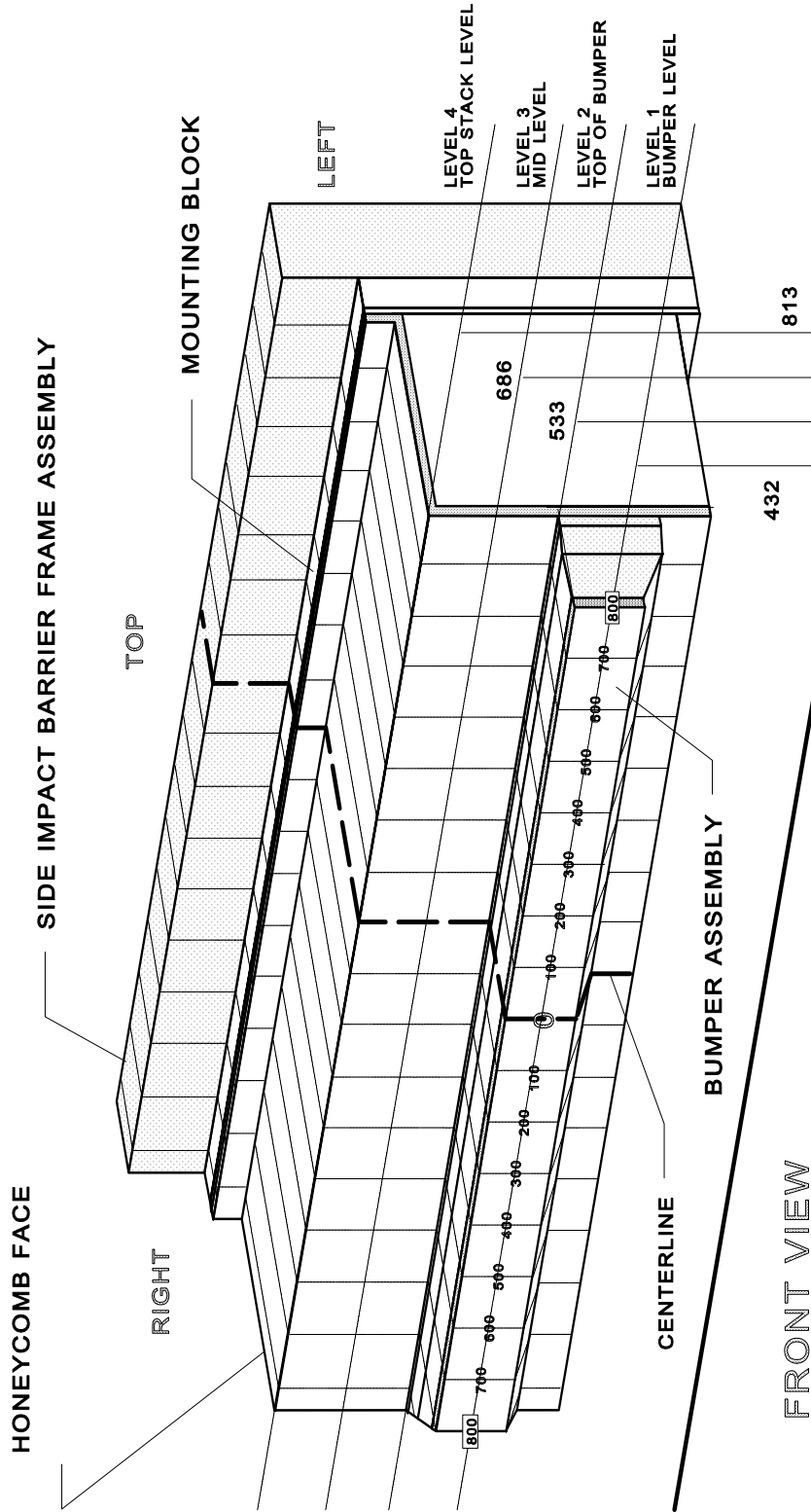
LEVEL	HEIGHT AT CL (mm)	DISTANCE LEFT OF CENTER								DISTANCE RIGHT OF CENTER								
		800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
LEVEL 4 TOP STACK	810	PRE-	528	528	529	529	529	529	529	529	529	529	529	530	530	530	531	531
		POST-	609	524	535	552	563	550	539	540	537	543	549	564	574	606	646	682
		CRUSH	81	-4	6	23	34	21	10	11	8	14	20	34	44	76	115	151
LEVEL 3 MID- LEVEL	685	PRE-	527	527	527	526	526	527	527	527	527	528	528	528	528	529	529	529
		POST-	614	553	549	564	556	537	533	532	532	534	538	547	550	560	597	642
		CRUSH	87	26	22	38	30	10	6	5	5	7	10	19	22	31	68	113
LEVEL 2 TOP BUMPER	560	PRE-	523	523	523	523	524	524	524	525	525	525	526	526	526	526	526	526
		POST-	648	634	621	604	569	566	561	561	560	559	558	564	562	570	585	610
		CRUSH	125	111	98	81	45	42	37	37	35	34	33	38	36	44	59	84
LEVEL 1 MID- BUMPER	432	PRE-	431	419	419	419	419	419	419	420	420	420	421	421	421	421	422	434
		POST-	618	585	573	558	517	486	470	455	443	436	431	435	445	460	483	493
		CRUSH	187	166	154	139	98	67	51	35	23	16	11	14	24	39	61	59

DATA SHEET 12 (continued)

STATIC CRUSH OF IMPACTOR FACE

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113



NOTE: Dimensions shown in millimeters, mm

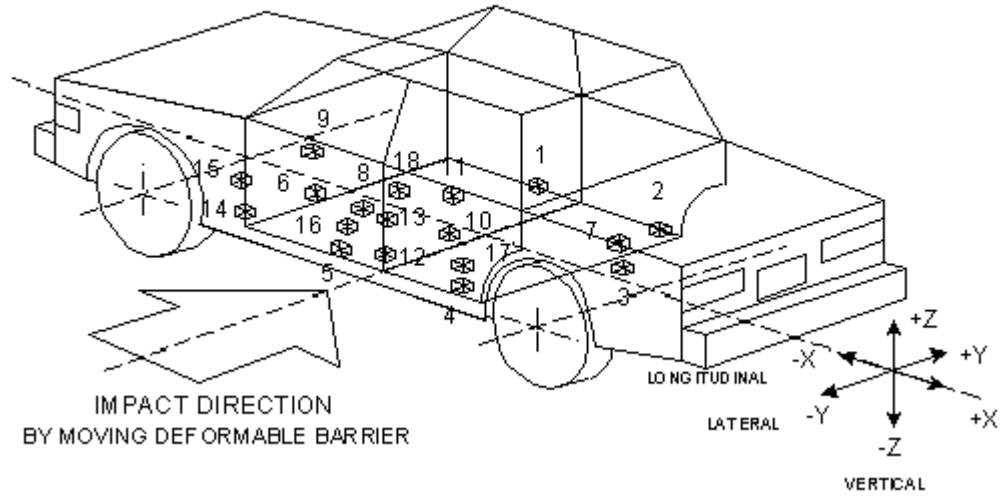
Note: Top of Bumper static crush measurements made 560 mm above ground to avoid glue at bumper/barrier interface.

DATA SHEET 13

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113



1. Right Side Sill at Front Seat	10. Mid-rear of Left Rear Door
2. Right Side Sill at Rear Seat	11. Left Rear Door Upper Centerline
3. Rear Floorpan Above Axle	12. Left Lower B-Pillar
4. Left Side Sill at Rear Seat	13. Left Middle B-Pillar
5. Left Side Sill at Front Seat	14. Left Lower A-Pillar
6. Left Front Door on Centerline	15. Left Middle A-Pillar
7. Right Rear Occupant Compartment	16. Front Seat Track
8. Mid-rear of Left Front Door	17. Rear Seat Track
9. Left Front Door Upper Centerline	18. Vehicle CG

DATASHEET 13 (continued)

VEHICLE ACCELEROMETER LOCATIONS AND SUMMARY DATA

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113

Location	Coordinates			Longitudinal (X)			Lateral (Y)			Vertical (Z)			Resultant		
	X mm	Y mm	Z mm	Max G's	Max msec	Min G's	Max G's	Max msec	Min G's	Max G's	Max msec	Min G's	Min msec	Max G's	Max msec
1 Right Side Sill at Front Seat	2667	687	469	1.8	61.0	-6.3	28.8	6.5	-2.3	133.3	8.9	34.6	-17.1	8.5	6.9
2 Right Side Sill at Rear Seat	1832	697	460	2.0	59.8	-7.2	27.6	7.3	-2.7	129.8	9.2	34.2	-10.1	8.3	7.5
3 Rear Floorpan Above Axle	1029	5	355	3.5	88.5	-14.8	26.1	40.7	-6.9	86.6	9.5	98.3	-20.4	32.3	38.6
4 Left Side Sill at Rear Seat	1873	-696	455				56.6	5.8	-13.6	18.4					
5 Left Side Sill at Front Seat	2706	-698	463				48.6	15.8	-6.0	141.5					
6 Left Front Door on Centerline	2530	-719	139				200.1	4.9	-137.1	20.0					
7 Right Rear Occupant Compartment	1890	322	332				23.8	6.3	-2.4	130.2					
8 Midrear of Left Front Door				Accelerometer not requested											
9 Left Front Door Upper Centerline	2544	-709	-3				148.0	9.0	-218.4	20.6					
10 Midrear of Left Rear Door	1604	701	39				206.0	4.9	-143.8	17.4					

Axis Origin X – Point L

Y – Point L

Z – Point L

Axis Orientation

+ (X) Forward where x axis is the vector from middle of rear bumper to mid front bumper

+ (Y) Right where y axis is parallel to ground reference plane

+ (Z) Down where z axis is cross product of +(X) and +(Y)

DATASHEET 13 (continued)

VEHICLE ACCELEROMETER LOCATIONS AND SUMMARY DATA

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113

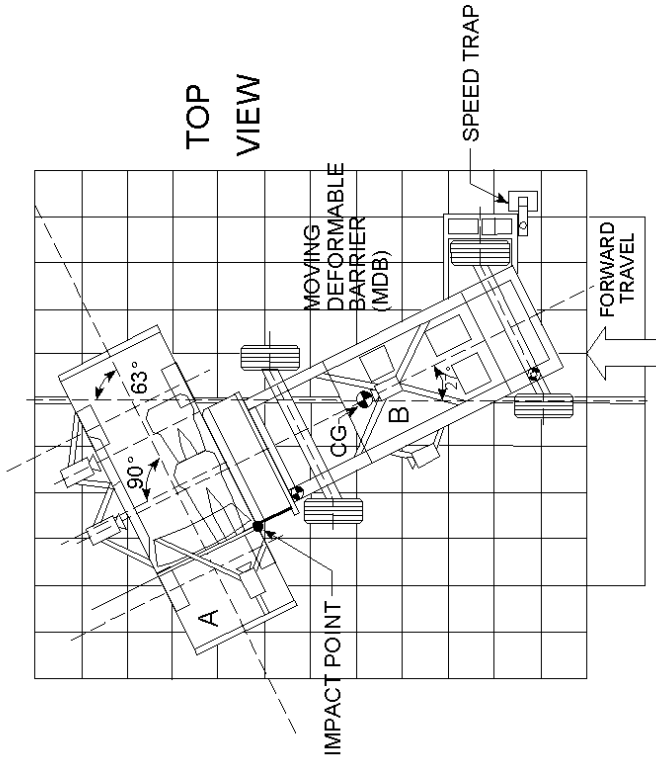
Location	Coordinates			Longitudinal (X)			Lateral (Y)			Vertical (Z)			Resultant	
	X mm	Y mm	Z mm	Max G's	msec	Min msec	Max G's	msec	Min msec	Max G's	msec	Min msec	Max G's	Max msec
11 Left Rear Door Upper Centerline	1750	-694	38	199.8	3.6	18.2	416.6	3.6	-70.6	19.8	3.6	18.2		
12 Left Lower B-Pillar	2011	-690	118	119.4	3.4	18.7	416.6	3.4	-113.9	119.4	3.4	18.7		
13 Left Middle B-Pillar	2010	-692	-96	108.3	3.2	15.6	416.6	3.8	-43.1	416.6	3.8	48.7		
14 Left Lower A-Pillar	3166	-657	273	23.6	3.5	7.0	108.3	3.2	-14.4	108.3	3.2	15.6		
15 Left Middle A-Pillar	3117	-705	-49	36.6	10.5	16.3	23.6	3.5	-16.8	36.6	10.5	16.3		
16 Front Seat Track	2358	-549	390	31.8	20.3	131.2	36.6	10.5	-121.5	31.8	20.3	131.2		
17 Rear Seat Track	1895	-287	320	5.8	5.2	11.4	22.4	5.5	-2.1	22.4	5.5	130.6	19.8	14.9
18 Vehicle CG	2592	19	328	5.8	5.2	11.4	22.4	5.5	-2.1	22.4	5.5	130.6	19.8	14.9
Axis Origin				Axis Orientation										

X – Point L
Y – Point L
Z – Point L

+(X) Forward where x axis is the vector from middle of rear bumper to mid front bumper
+(Y) Right where y axis is parallel to ground reference plane
+(Z) Down where z axis is cross product of +(X) and +(Y)

DATA SHEET 14

MDB ACCELEROMETER LOCATIONS AND DATA SUMMARY



Location	Coordinates			Longitudinal (X)			Lateral (Y)			Vertical (Z)			Resultant				
	X mm	Y mm	Z mm	Max msec	G's	Min msec	Max msec	G's	Min msec	Max msec	G's	Min msec	G's	Max msec			
1 MDB Center of Gravity	1113	-1	311	2.1	130.1	25.4	40.5	3.4	53.1	-10.3	24.7	13.7	50.2	-4.4	82.7	26.3	40.6
2 MDB Rear Frame Member	2812	-614	585	2.2	78.7	-21.2	32.0	4.7	20.6	-2.6	57.7						

Axis Origin X – Rear Bumper
 Y – Vehicle Centerline
 Z – Middle of rear bumper

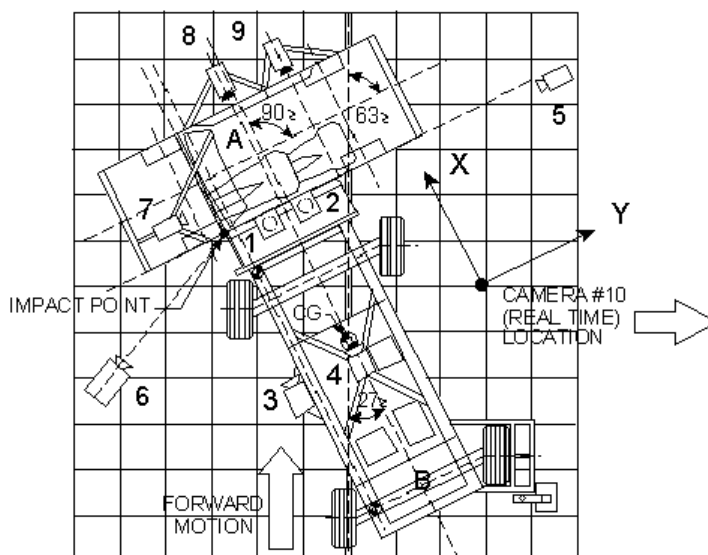
Axis Orientation
 +(X) Forward
 +(Y) Right
 +(Z) Down

DATA SHEET 15

HIGH-SPEED CAMERA LOCATIONS AND DATA SUMMARY

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113



Camera No.	View	Coordinates (mm)*			Angle wrt Horiz.	Lens (mm)	Film Speed (fps)
		X	Y	Z			
1	Overhead view of test vehicle	150	992	4663	-90	10	1000
2	Overhead close-up view of impact plane	30	305	4669	-90	13	1000
3	MDB onboard close-up view of impact point	-2333	-60	-38	0	35	1000
4	MDB onboard view of driver dummy	-2262	840	740	-5	13	1000
5	Right side ground level overall view	10195	670	542	-5	62	1000
6	Left side ground level overall view	7994	-870	682	-10	35	1000
7	Test vehicle onboard driver front view	3824	-383	-399	-5	10	1000
8	Test vehicle onboard driver side view	2313	836	-387	-7	7.5	1000
9	Test vehicle onboard passenger side view	1607	796	-425	-10	7.5	1000
10	Real-time film coverage of test	-	-	-	-	-	-

* Reference: Middle of rear bumper on test vehicle (Point L)
 +(X) Forward where x axis is the vector from middle of rear bumper to mid front bumper
 +(Y) Right where y axis is parallel to ground reference plane
 +(Z) Down where z axis is cross product of +(X) and +(Y)

SECTION 5
FUEL SYSTEM INTEGRITY

DATA SHEET 16

FUEL SYSTEM INTEGRITY DATA

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113

TEST REQUIREMENTS:

Drain the test vehicle's fuel system and operate the engine until the fuel system is dry. Add Stoddard solvent, which has been dyed purple, until 92-94% of the stated usable capacity is reached. Operate the engine to assure the Stoddard solvent is present throughout the entire fuel system.

TEST VEHICLE IMPACT TYPE: Side impacting Moving Deformable Barrier contacting the driver side.

FUEL SPILLAGE MEASUREMENT:

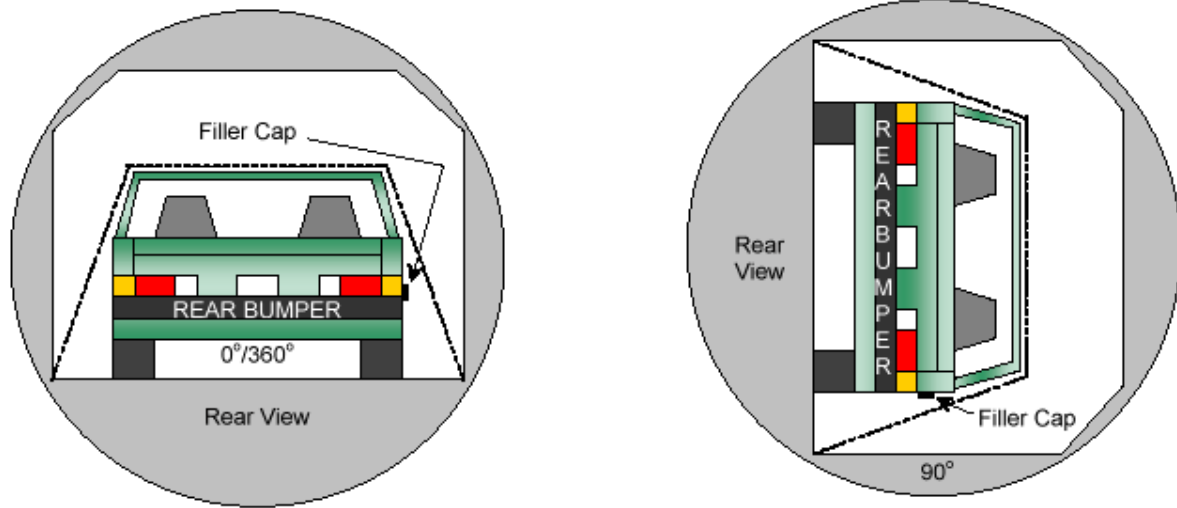
POST IMPACT TEST	TEST RESULTS	MAXIMUM ALLOWABLE
1. From impact until vehicle motion ceases	0	1 oz.
2. For 5 minute period after vehicle motion ceases	0	5 oz.
3. For next 25 minutes	0	1 oz./minute

FUEL SPILLAGE LOCATION(S): None

DATA SHEET 17
ROLLOVER DATA

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113



0° TO 90°

DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time	1	minutes	3	seconds
(Spec Range =1 to 3 minutes)				
FMVSS 301 Position Hold Time	5	minutes	2	seconds
TOTAL	6	minutes	5	seconds
Next whole minute interval	7	minutes		

FUEL SPILLAGE MEASUREMENT:

0° TO 90° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0	5 oz.
2. Sixth Minute From Onset of Rotation	0	1 oz.
3. Seventh Minute From Onset of Rotation	0	1 oz.
4. Eighth Minute if Required	-	1 oz.

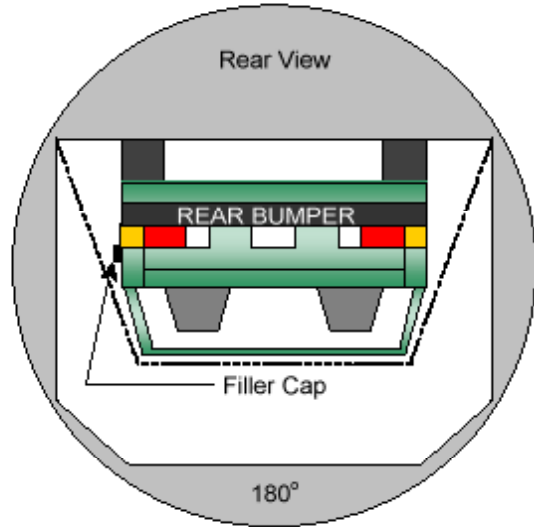
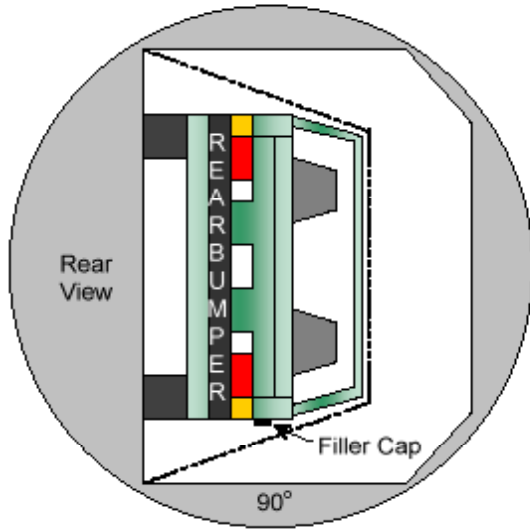
FUEL SPILLAGE LOCATION(S): None

DATA SHEET 17 (continued)

ROLLOVER VEHICLE

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113



90° TO 180°

DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time	<u>1</u> minutes	<u>7</u> seconds
(Spec Range =1 to 3 minutes)		
FMVSS 301 Position Hold Time	<u>5</u> minutes	<u>1</u> seconds
TOTAL	<u>6</u> minutes	<u>8</u> seconds
Next whole minute interval	<u>7</u> minutes	

FUEL SPILLAGE MEASUREMENT:

90° TO 180° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0	5 oz.
2. Sixth Minute From Onset of Rotation	0	1 oz.
3. Seventh Minute From Onset of Rotation	0	1 oz.
4. Eighth Minute if Required	-	1 oz.

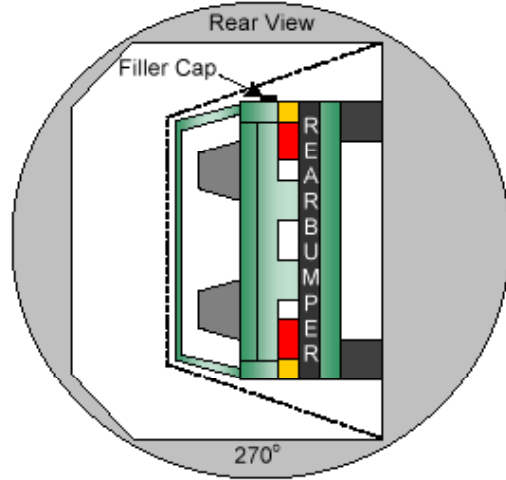
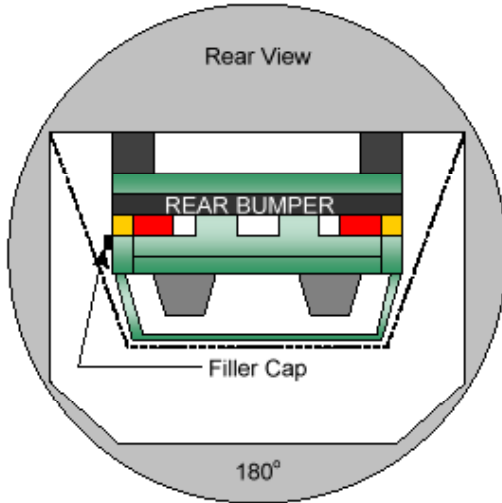
FUEL SPILLAGE LOCATION(S): None

DATA SHEET 17 (continued)

ROLLOVER VEHICLE

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113



180° TO 270°

DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time	<u>1</u> minutes	<u>5</u> seconds
(Spec Range =1 to 3 minutes)		
FMVSS 301 Position Hold Time	<u>5</u> minutes	<u>0</u> seconds
TOTAL	<u>6</u> minutes	<u>5</u> seconds
Next whole minute interval	<u>7</u> minutes	

FUEL SPILLAGE MEASUREMENT:

180° TO 270° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0	5 oz.
2. Sixth Minute From Onset of Rotation	0	1 oz.
3. Seventh Minute From Onset of Rotation	0	1 oz.
4. Eighth Minute From Onset of Rotation	-	1 oz.

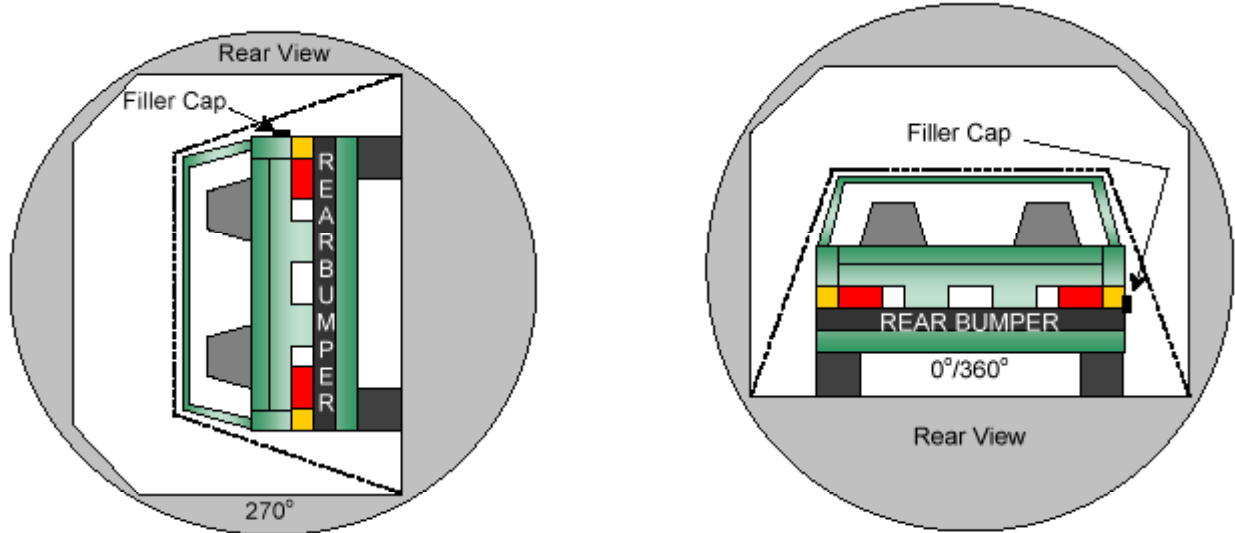
FUEL SPILLAGE LOCATION(S): None

DATA SHEET 17 (continued)

ROLLOVER VEHICLE

Vehicle: 2004 Saturn Ion Quad Coupe

NHTSA No.: M40113



270° TO 360°

DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time	<u>1</u> minutes	<u>2</u> seconds
(Spec Range =1 to 3 minutes)		
FMVSS 301 Position Hold Time	<u>5</u> minutes	<u>0</u> seconds
TOTAL	<u>6</u> minutes	<u>2</u> seconds
Next whole minute interval	<u>7</u> minutes	

FUEL SPILLAGE MEASUREMENT:

270° TO 360° ROTATION	TEST RESULTS	MAXIMUM ALLOWABLE
1. First 5 Minutes From Onset of Rotation	0	5 oz.
2. Sixth Minute From Onset of Rotation	0	1 oz.
3. Seventh Minute From Onset of Rotation	0	1 oz.
4. Eighth Minute if Required	-	1 oz.

FUEL SPILLAGE LOCATION(S): None

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PHOTOGRAPHS

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Figure A-1: PRE-TEST FRONTAL VIEW OF TEST VEHICLE



Figure A-2: POST-TEST FRONTAL VIEW OF TEST VEHICLE



Figure A-3: PRE-TEST LEFT FRONT VIEW OF TEST VEHICLE



Figure A-4: POST-TEST LEFT FRONT VIEW OF TEST VEHICLE (OUTER DOOR SKIN FELL OFF DURING IMPACT)



Figure A-5: PRE-TEST LEFT SIDE VIEW OF TEST VEHICLE



Figure A-6: POST-TEST LEFT SIDE VIEW OF TEST VEHICLE (OUTER DOOR SKIN FELL OFF DURING IMPACT)
(TRUNK OPENED POST -TEST TO ACCESS DATA)



Figure A-7: PRE-TEST LEFT REAR VIEW OF TEST VEHICLE



Figure A-8: POST-TEST LEFT REAR VIEW OF TEST VEHICLE (OUTER DOOR SKIN FELL OFF DURING IMPACT)
(TRUNK OPENED POST -TEST TO ACCESS DATA)



Figure A-9: PRE-TEST REAR VIEW OF TEST VEHICLE



Figure A-10: POST-TEST REAR VIEW OF TEST VEHICLE (TRUNK OPENED POST -TEST TO ACCESS DATA)



Figure A-11 PRE-TEST RIGHT REAR VIEW OF TEST VEHICLE



Figure A-12 POST-TEST RIGHT REAR VIEW OF TEST VEHICLE (TRUNK OPENED POST –TEST TO ACCESS DATA)



Figure A-13: PRE-TEST RIGHT SIDE VIEW OF TEST VEHICLE



Figure A-14: POST-TEST RIGHT SIDE VIEW OF TEST VEHICLE (TRUNK OPENED POST –TEST TO ACCESS DATA)



Figure A-15: PRE-TEST FRONT RIGHT VIEW OF TEST VEHICLE



Figure A-16: POST-TEST FRONT RIGHT VIEW OF TEST VEHICLE (HOOD OPENED POST –TEST TO DISCONNECT BATTERY)



Figure A-17: PRE-TEST RIGHT OCCUPANT COMPARTMENT VIEW OF FRONT SID



Figure A-18: POST-TEST RIGHT OCCUPANT COMPARTMENT VIEW OF FRONT SID (SID H3 SKIN FELL OFF DURING IMPACT)

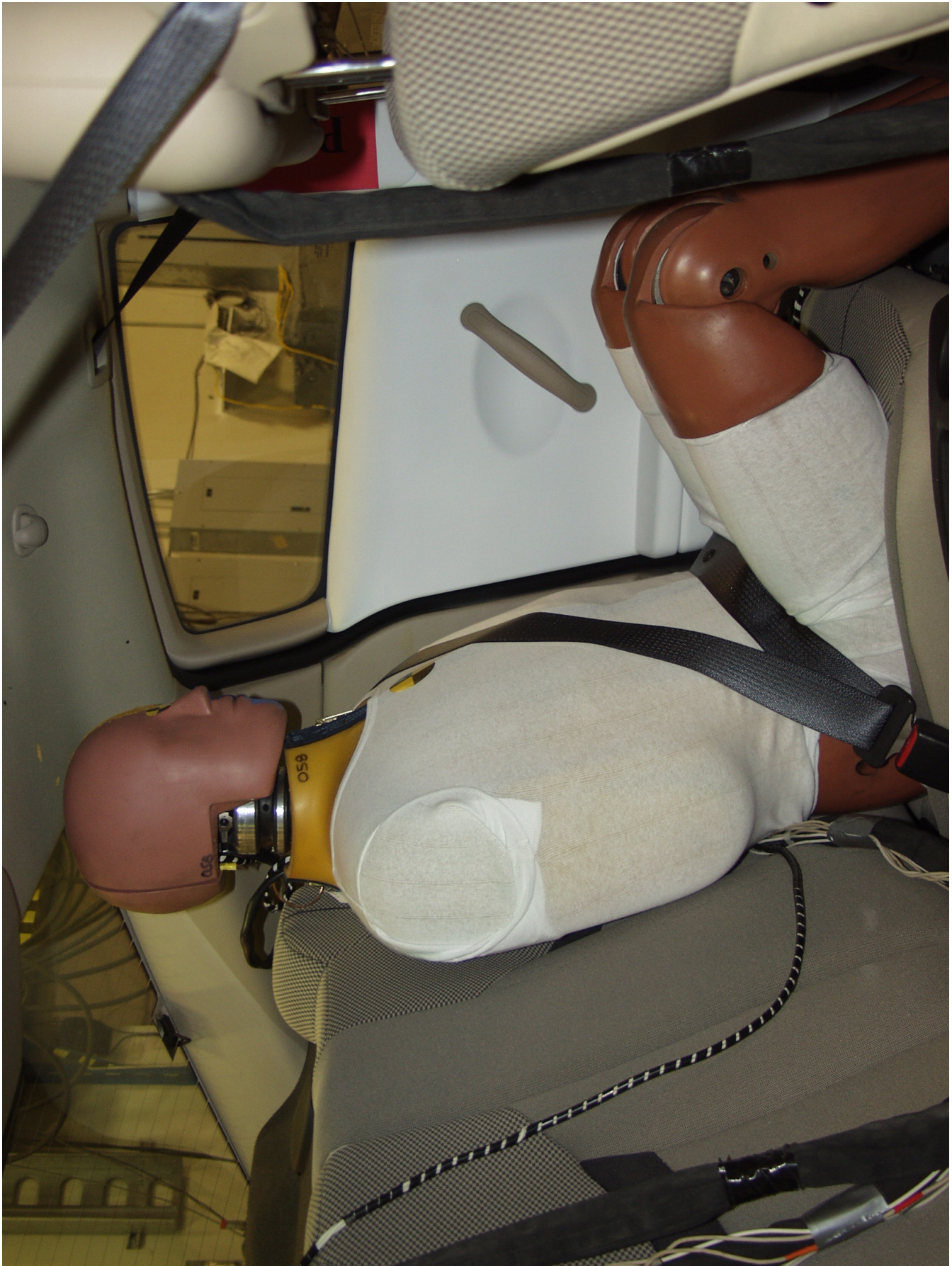


Figure A-19: PRE-TEST RIGHT OCCUPANT COMPARTMENT VIEW OF REAR SID H3



Figure A-20: POST-TEST RIGHT OCCUPANT COMPARTMENT VIEW OF REAR SID H3



Figure A-21: PRE-TEST LEFT OCCUPANT COMPARTMENT VIEW OF FRONT SID H3



Figure A-22: POST-TEST LEFT OCCUPANT COMPARTMENT VIEW OF FRONT SID H3 SKIN FELL OFF DURING IMPACT)



Figure A-23: PRE-TEST LEFT OCCUPANT COMPARTMENT VIEW OF REAR SID H3



Figure A-24: POST-TEST LEFT OCCUPANT COMPARTMENT VIEW OF REAR SID H3



Figure A-25: PRE-TEST INTERIOR OF FRONT DOOR



Figure A-26: POST-TEST INTERIOR OF FRONT DOOR SHOWING SID H3 IMPACT LOCATIONS



Figure A-27: POST-TEST INTERIOR OF FRONT DOOR SHOWING SID H3 IMPACT LOCATIONS 2



Figure A-28: PRE-TEST INTERIOR OF REAR PASSENGER COMPARTMENT



Figure A-29: POST-TEST INTERIOR OF REAR PASSENGER COMPARTMENT



Figure A-30: POST-TEST INTERIOR OF REAR DOOR SHOWING SID H3 IMPACT LOCATIONS 2



Figure A-31: PRE-TEST LEFT SIDE VIEW OF MDB IN IMPACT POSITION



Figure A-32: POST-TEST LEFT SIDE VIEW OF MDB



Figure A-33: PRE-TEST RIGHT SIDE VIEW OF MDB IN IMPACT POSITION



Figure A-34: POST-TEST FRONT RIGHT VIEW OF MDB (TRUNK OPENED POST TEST TO ACCESS DATA)



NHTSA # M4 0113
S5/28 KPH 90° SIDE IMPACT
16 DEC 03
MCW 04SN03
2004 SATURN ION

Figure A-35: PRE-TEST OVERHEAD VIEW OF MDB IN IMPACT POSITION



Figure A-36: POST-TEST OVERHEAD VIEW OF MDB (TRUNK OPENED POST TEST TO ACCESS DATA)



Figure A-37: PRE-TEST CLOSE-UP OF IMPACT POINT TARGET SHOWING WELDING ROD



Figure A-38: POST-TEST CLOSE-UP OF IMPACT POINT TARGET



TIRE-LOADING INFORMATION

OCCUPANTS VEHICLE CAPACITY WT.

FRT. CTR. RR. TOTAL LBS KG.
2 0 2 4 750 340

MAXIMUM LOADING AT CURB:
SAME AS VEHICLE CAPACITY WEIGHT

1G8AM12F54Z126995

MODEL: ZAU37

COLD TIRE PRESSURE

TIRE SIZE	SPEED RATING	PSI/KPA
P195/60R15	S	30/210
P195/60R15	S	30/210
T115/70R14	M	60/420

IF TIRES ARE HOT, ADD 4 PSI (28 KPA)

SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION



Figure A-39: VEHICLE TIRE PLACARD



MFD BY SATURN CORPORATION
 DATE 09/03 GVMR
 3587LB
 1627KG

GAWR FRT 1861LB
 GAWR RR 1726LB
 0844KG 0783KG

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

1GBAM12F54Z126995 PASS CAR



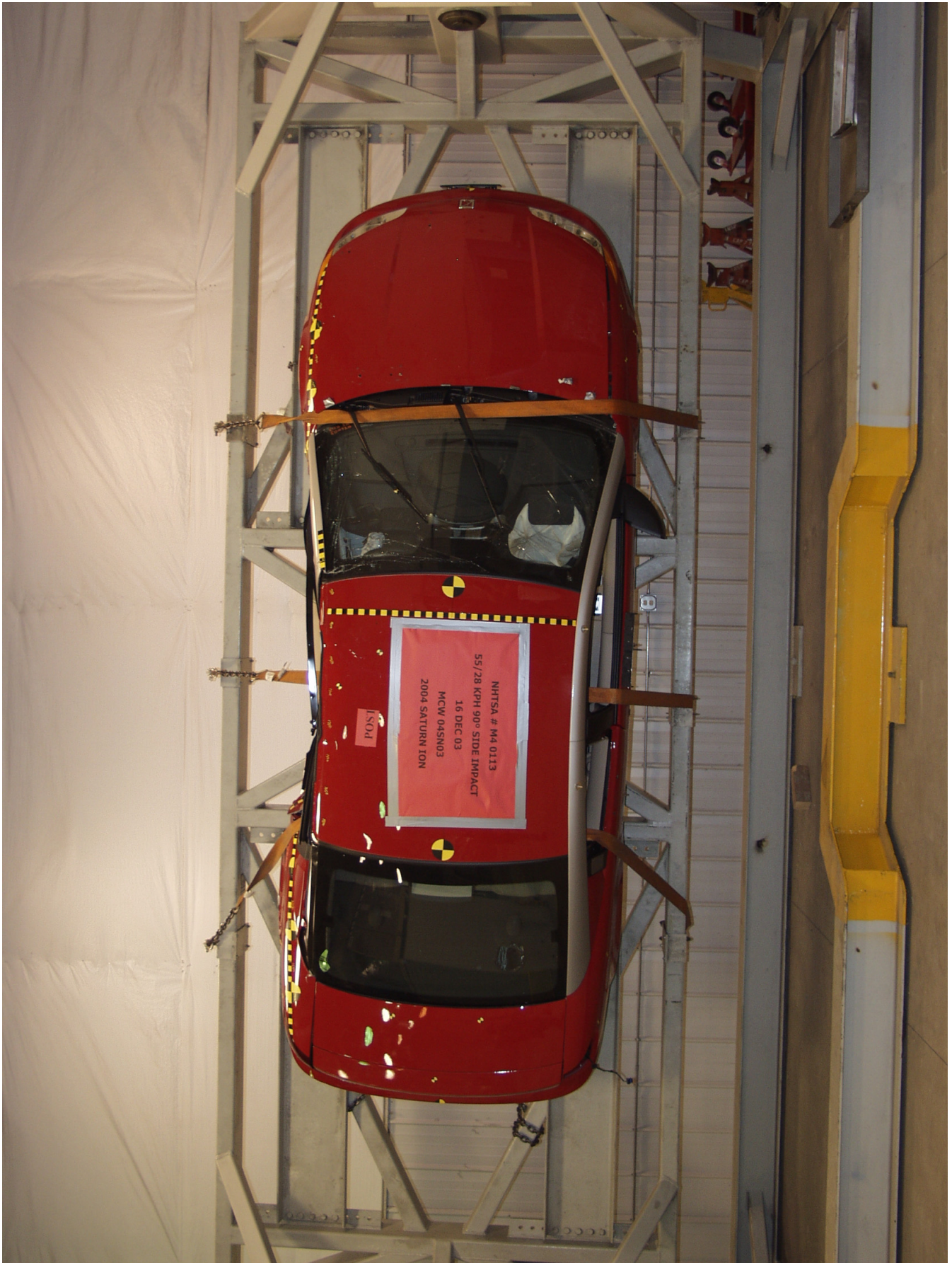
Figure A-40: VEHICLE CERTIFICATION LABEL



Figure A-41: IMPACT



Figure A-42: ROLLOVER 0 DEGREES



NHTSA # M4 0113
55/28 KPH 90° SIDE IMPACT
16 DEC 03
MCW 04SN03
2004 SATURN ION

POS1

Figure A-43: ROLLOVER 90 DEGREES



Figure A-44: ROLLOVER 180 DEGREES

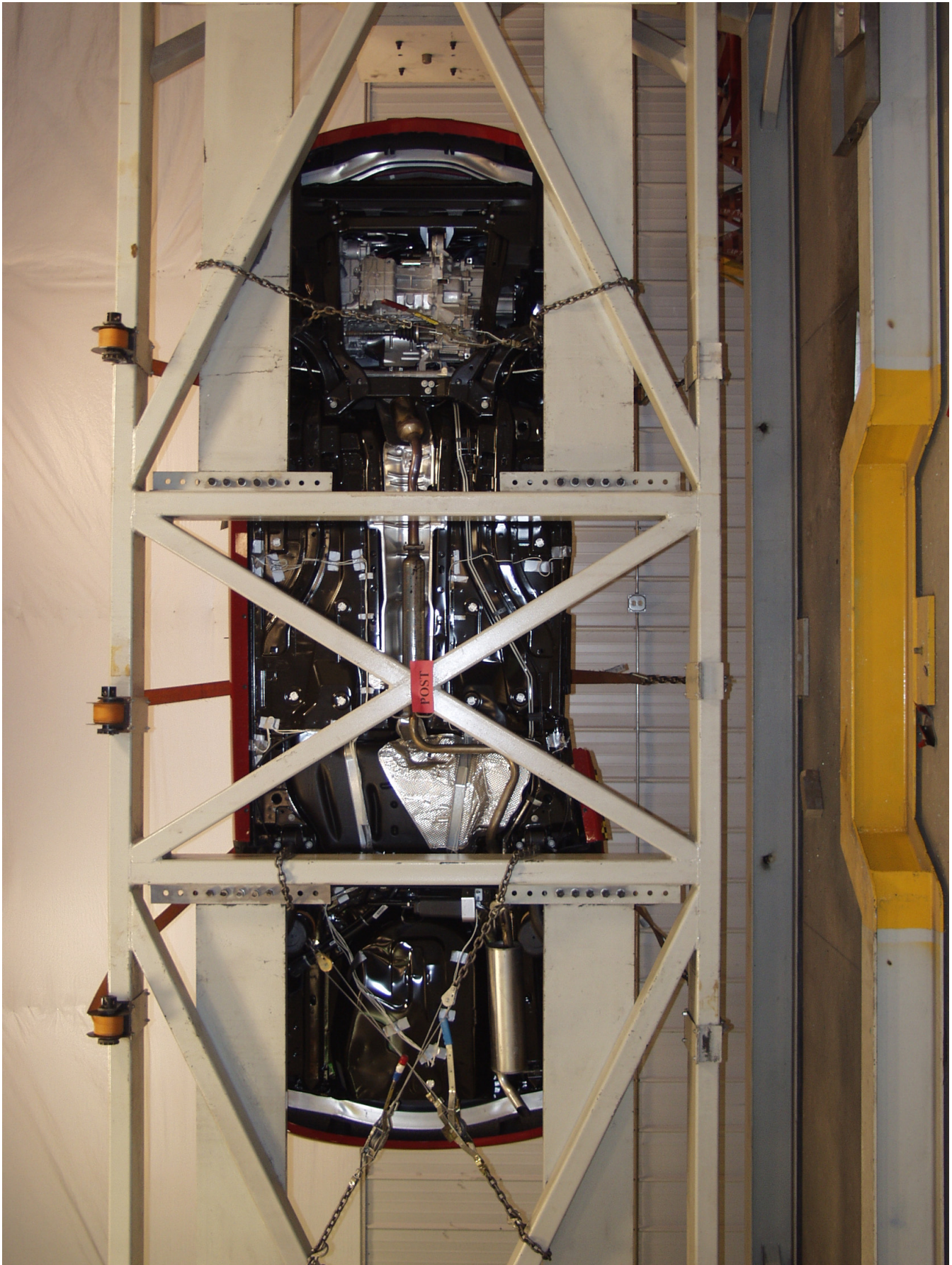


Figure A-45: ROLLOVER 270 DEGREES



Figure A-46: ROLLOVER 360 DEGREES



DO NOT REMOVE THIS LABEL FROM THE
ALUMINUM BARRIER
DATE: 11/11/11

Figure A-47: PRE-TEST ALUMINUM BARRIER FRONT



Figure A-48: POST-TEST ALUMINUM BARRIER FRONT

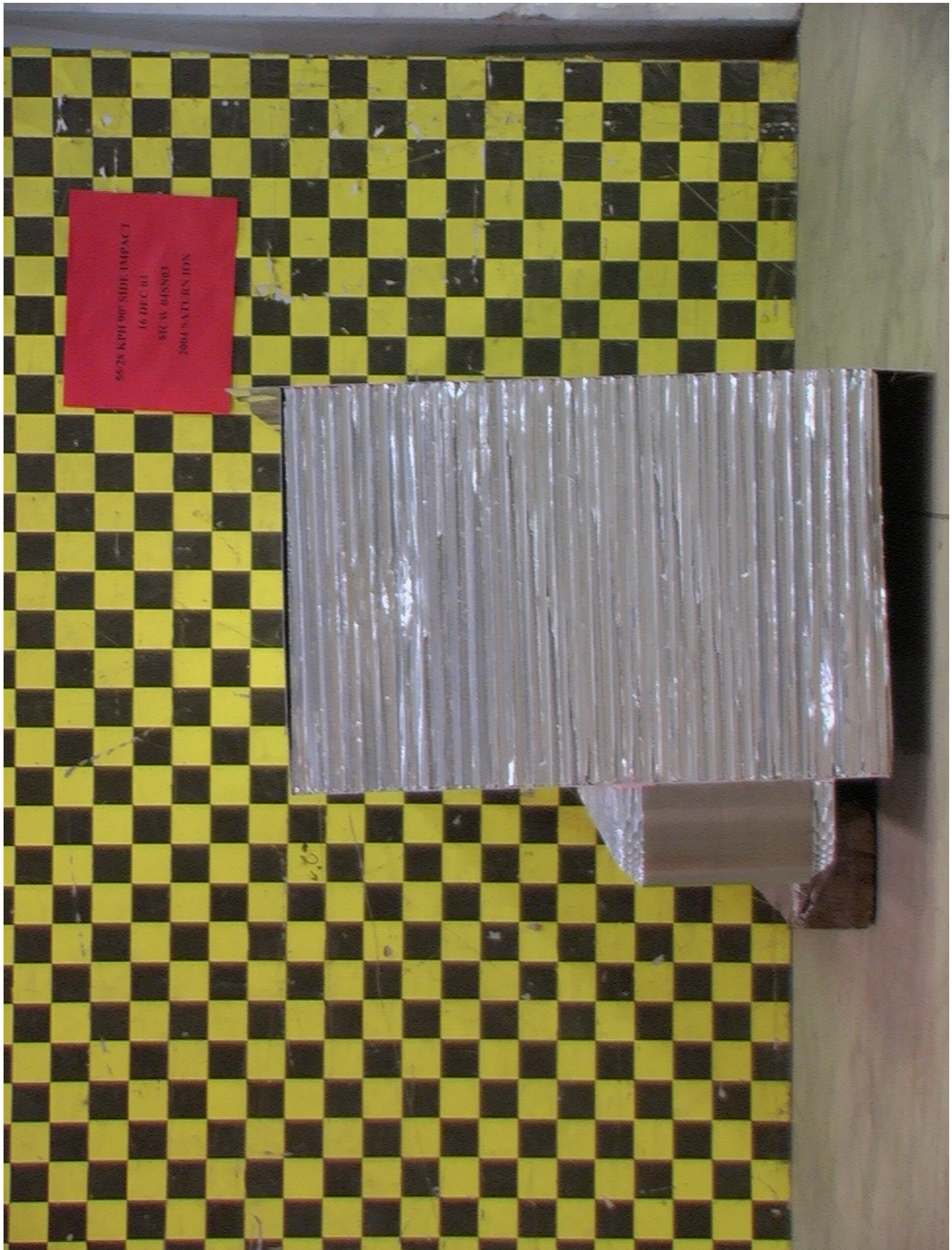


Figure A-49: PRE-TEST ALUMINUM BARRIER LEFT SIDE



Figure A-50: POST-TEST ALUMINUM BARRIER LEFT SIDE



Figure A-51: PRE-TEST ALUMINUM BARRIER RIGHT SIDE

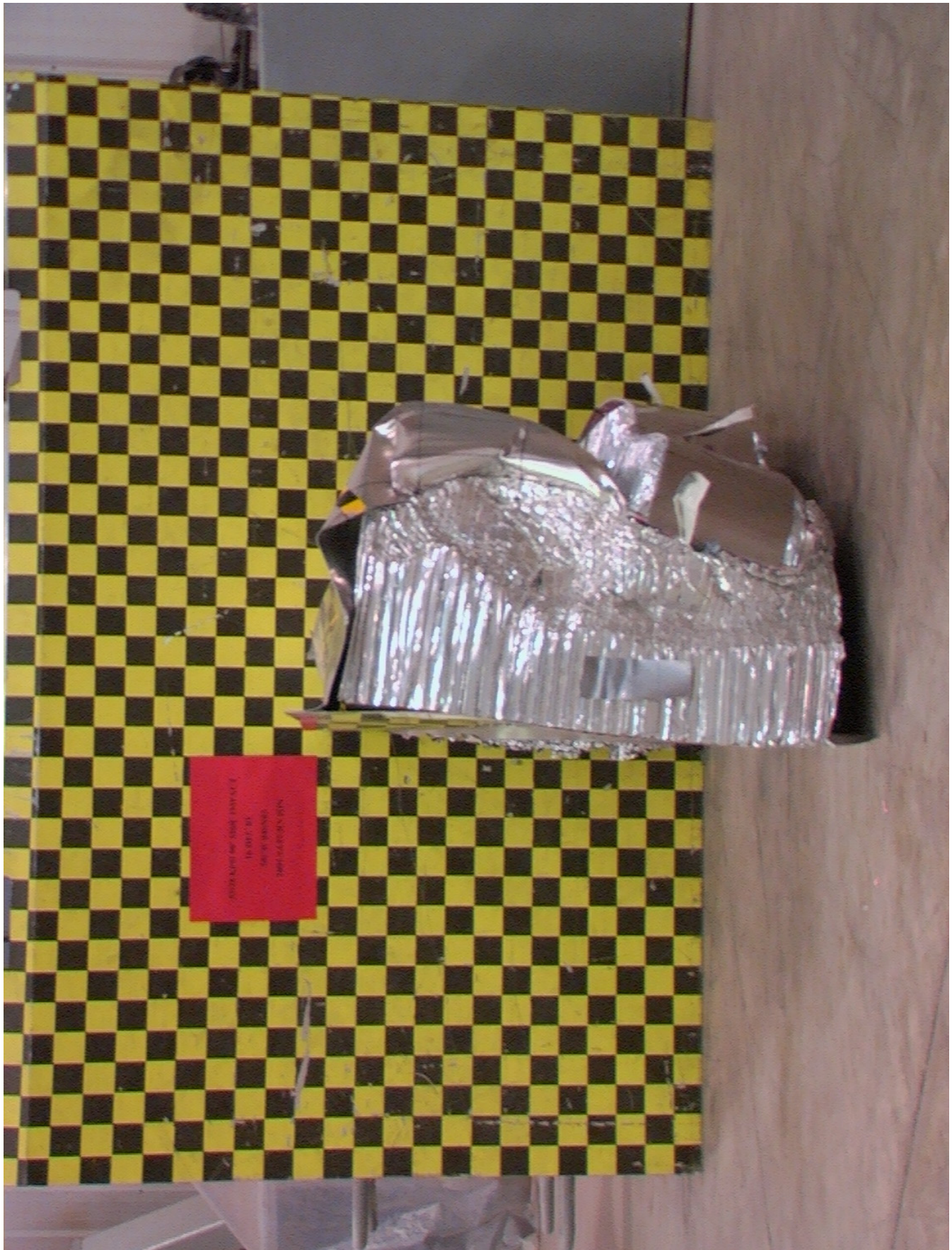


Figure A-52: POST-TEST ALUMINUM BARRIER RIGHT SIDE



Figure A-53: PRE-TEST ALUMINUM BARRIER TOP



DO NOT TOUCH THE IMPACT
POINTS BY
HANDS
DURING THE TEST

Figure A-54: POST-TEST ALUMINUM BARRIER TOP

APPENDIX B

VEHICLE, MDB, AND SID RESPONSE DATA

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 UPPER NECK FORCES – FILTER CLASS 1000; UPPER NECK MOMENTS FILTER CLASS 600
 INTEGRATION DATA FILTER CLASS 180

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DRIVER AND PASSENGER DUMMY INSTRUMENTATION PLOTS

ACCELERATION DATA – FIR FILTERED

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49	PASSENGER LOWER SPINE (Y) ACCELERATION	B-54
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54	RIGHT SIDE SILL AT FRONT SEAT (Y) VELOCITY	B-59
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56	RIGHT SIDE SILL AT FRONT SEAT (Z) VELOCITY	B-61
57	RIGHT SIDE SILL AT FRONT SEAT RESULTANT ACCELERATION	B-62
58	RIGHT SIDE SILL AT REAR SEAT (X) ACCELERATION	B-63
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MDB INSTRUMENTATION PLOTS
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INTEGRATION DATA – FILTER CLASS 180

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108	MDB CENTER OF GRAVITY (Y) VELOCITY	B-113
109	MDB CENTER OF GRAVITY (Z) ACCELERATION	B-114
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DRIVER AND PASSENGER DUMMY INSTRUMENTATION PLOTS (REDUNDANT)
 ACCELERATION DATA – FILTER CLASS 1000, LOWER SPINE FILTER CLASS 180
 INTEGRATION DATA FILTER CLASS 180

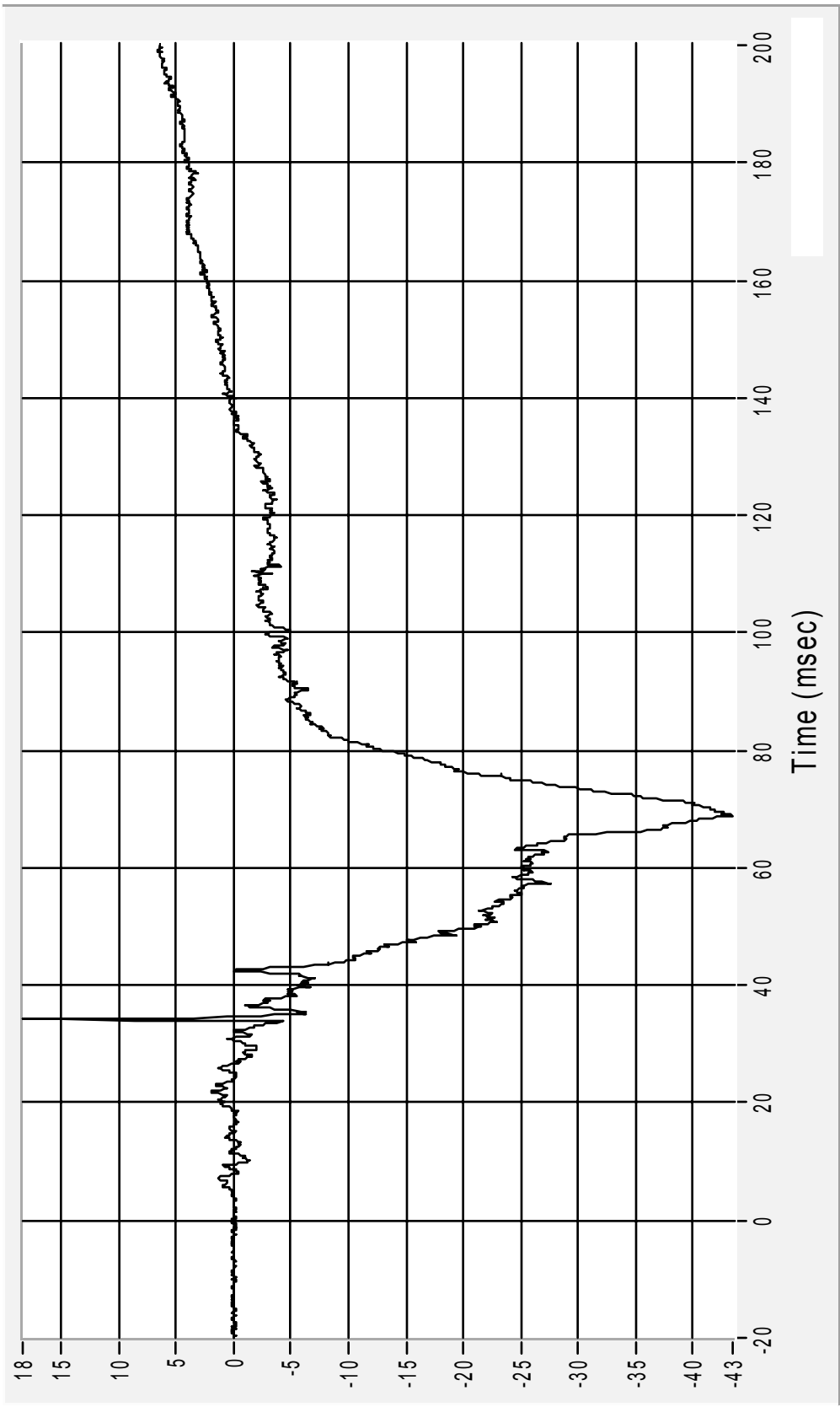
<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
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122	DRIVER PELVIC (Y) ACCELERATION-REDUNDANT	B-127
123	DRIVER PELVIC (Y) VELOCITY-REDUNDANT	B-128
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126	PASSENGER LOWER RIB (Y) ACCELERATION-REDUNDANT	B-131
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129	PASSENGER LOWER SPINE (Y) VELOCITY-REDUNDANT	B-134
130	PASSENGER PELVIC (Y) ACCELERATION-REDUNDANT	B-135
131	PASSENGER PELVIC (Y) VELOCITY-REDUNDANT	B-136

DRIVER AND PASSENGER DUMMY INSTRUMENTATION PLOT (REDUNDANT)
 ACCELERATION DATA – FIR FILTERED

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133	DRIVER LOWER RIB (Y) ACCELERATION-REDUNDANT	B-138
134	DRIVER LOWER SPINE (Y) ACCELERATION-REDUNDANT	B-139
135	DRIVER PELVIC (Y) ACCELERATION-REDUNDANT	B-140
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139	PASSENGER PELVIC (Y) ACCELERATION-REDUNDANT	B-144

Driver Head CG (X) Acceleration
 Acceleration (G's) CFC1000

Max	18.4	G	at	34.2	msec
Min	-43.5	G	at	68.9	msec



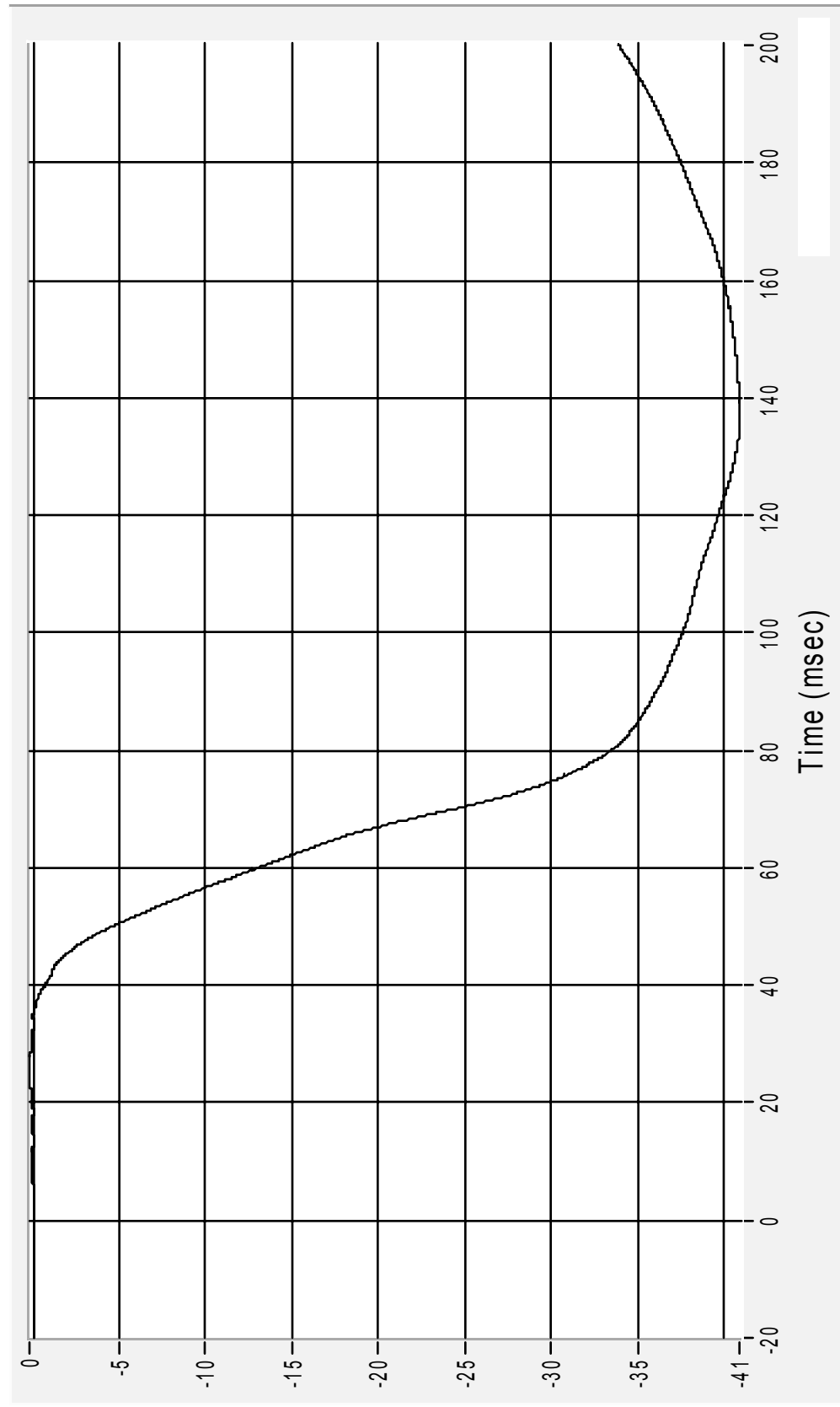
04SN03 - 2004 SATURN ION QUAD COUPE
 16 December 2003

Medical College of Wisconsin
 Vehicle Crashworthiness Lab

Max 0.2 km/h at 26.7 msec
Min -40.9 km/h at 137.4 msec

Driver Head CG (X) Velocity

Velocity (km/h) CFC180

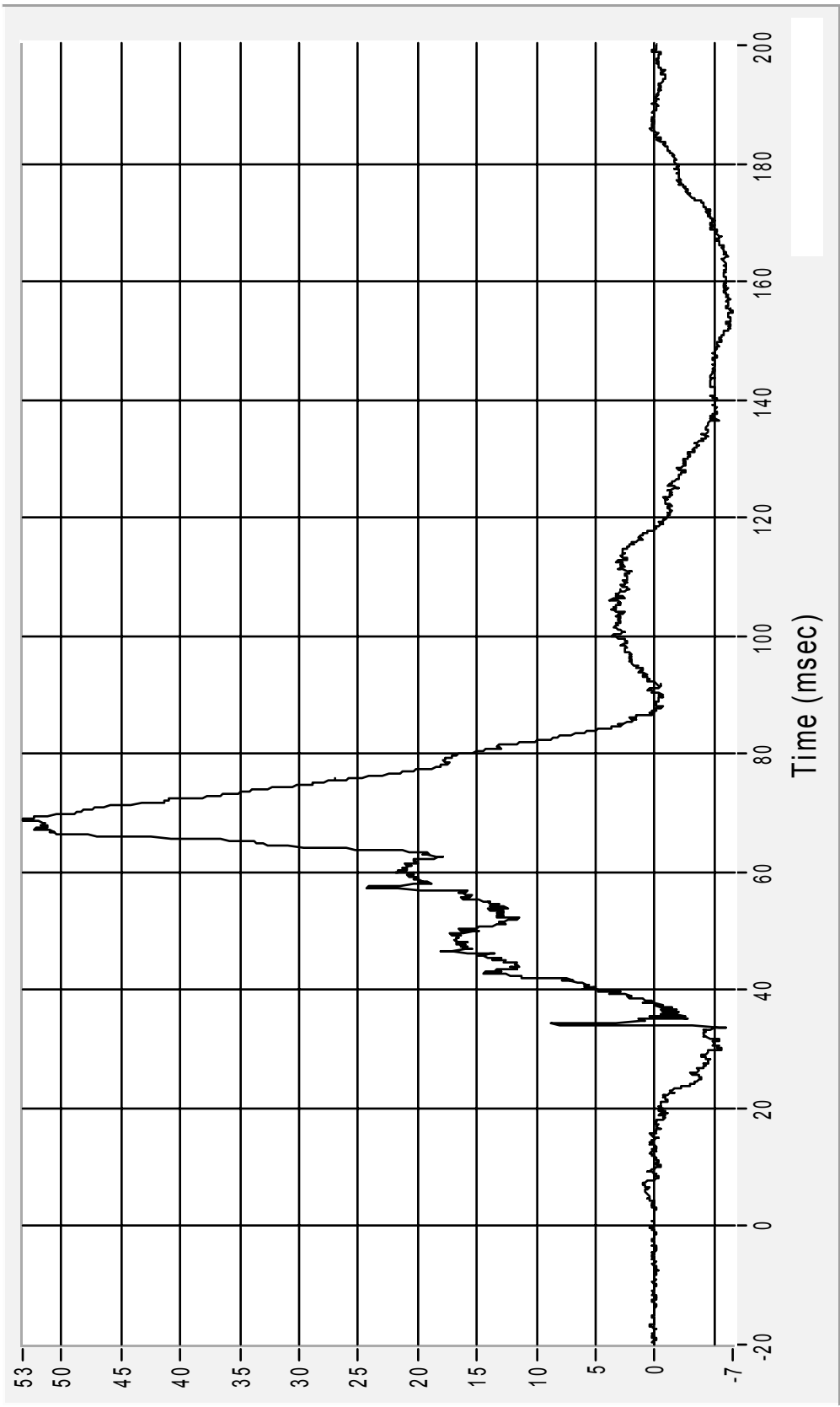


04SN03 - 2004 SATURN ION QUAD COUPE
16 December 2003

Medical College of Wisconsin
Vehicle Crashworthiness Lab

Driver Head CG (Y) Acceleration
 Acceleration (G's) CFC1000

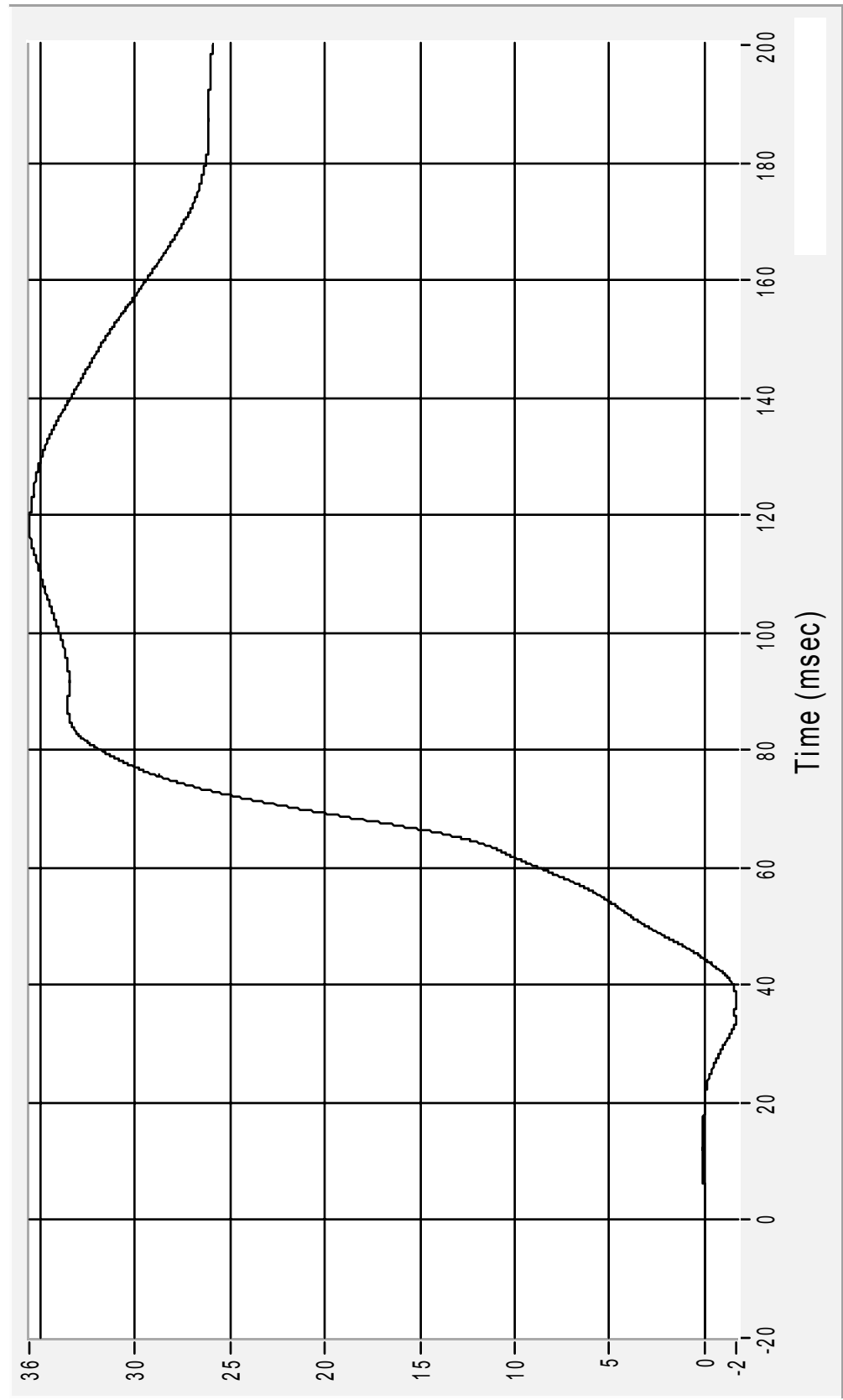
Max	53.3	G	at	68.9	msec
Min	-6.6	G	at	155.0	msec



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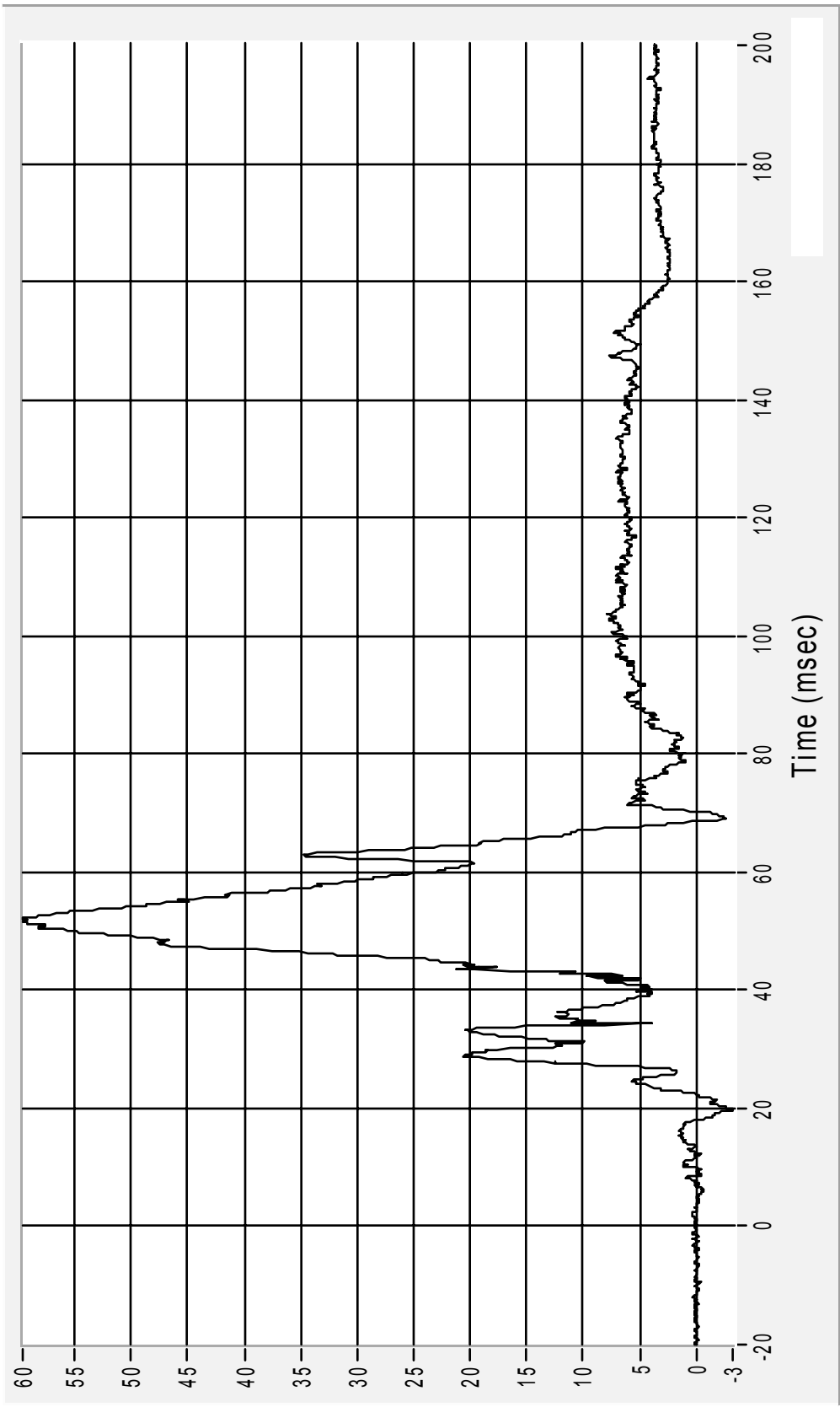
Driver Head CG (Y) Velocity CFC180
 Velocity (km/h) Max 35.6 km/h at 118.1 msec
 Min -1.7 km/h at 37.8 msec



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Driver Head CG (Z) Acceleration
 Acceleration (G's) CFC1000

Max	59.6	G	at	52.1	msec
Min	-3.3	G	at	19.8	msec



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Driver Head CG (Z) Velocity
 Velocity (km/h) CFC180
 Max 59.1 km/h at 199.9 msec
 Min 0.0 km/h at 22.2 msec

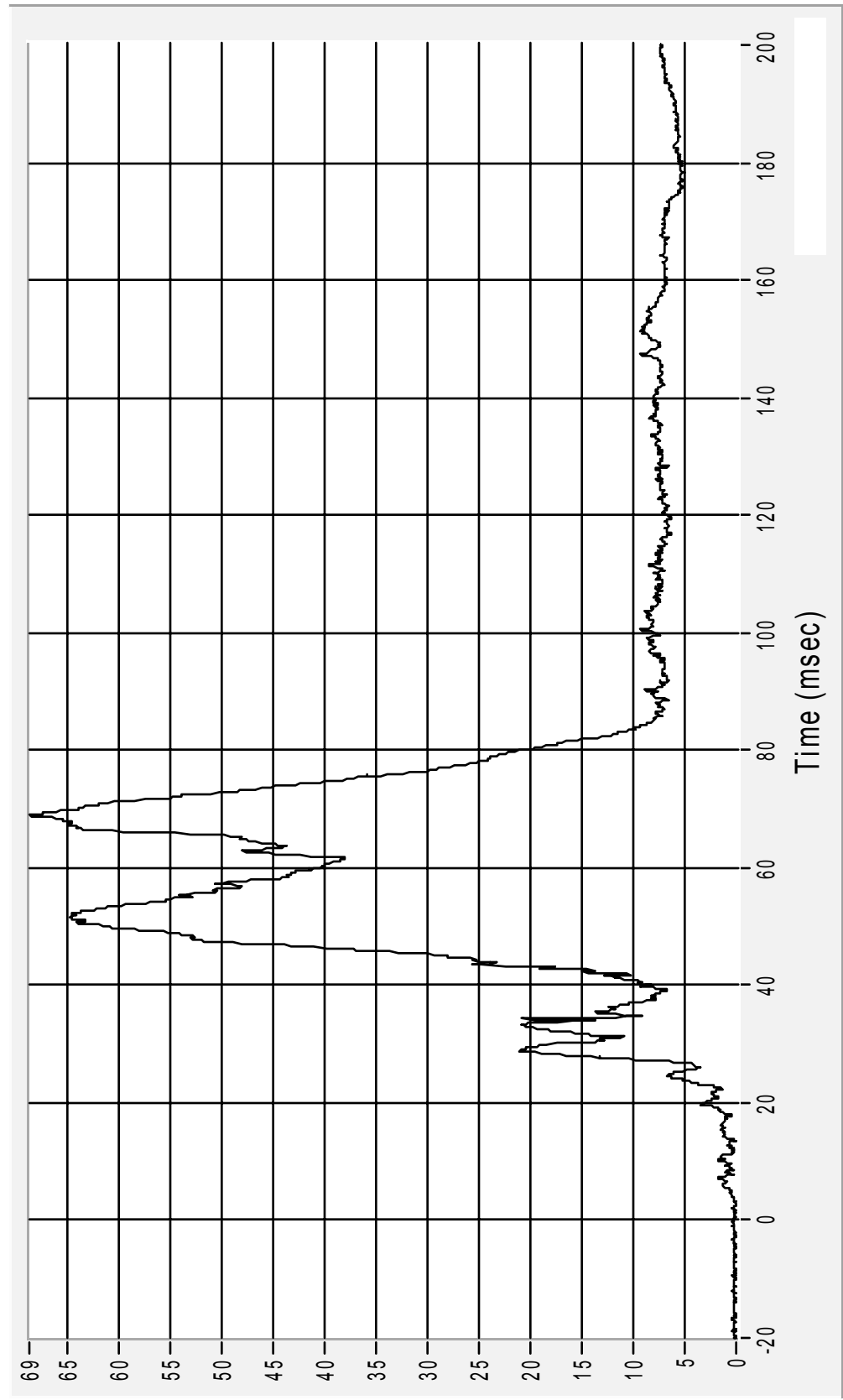


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Max 68.8 G's at 68.9 msec
 Min 0.0 G's at 1.2 msec

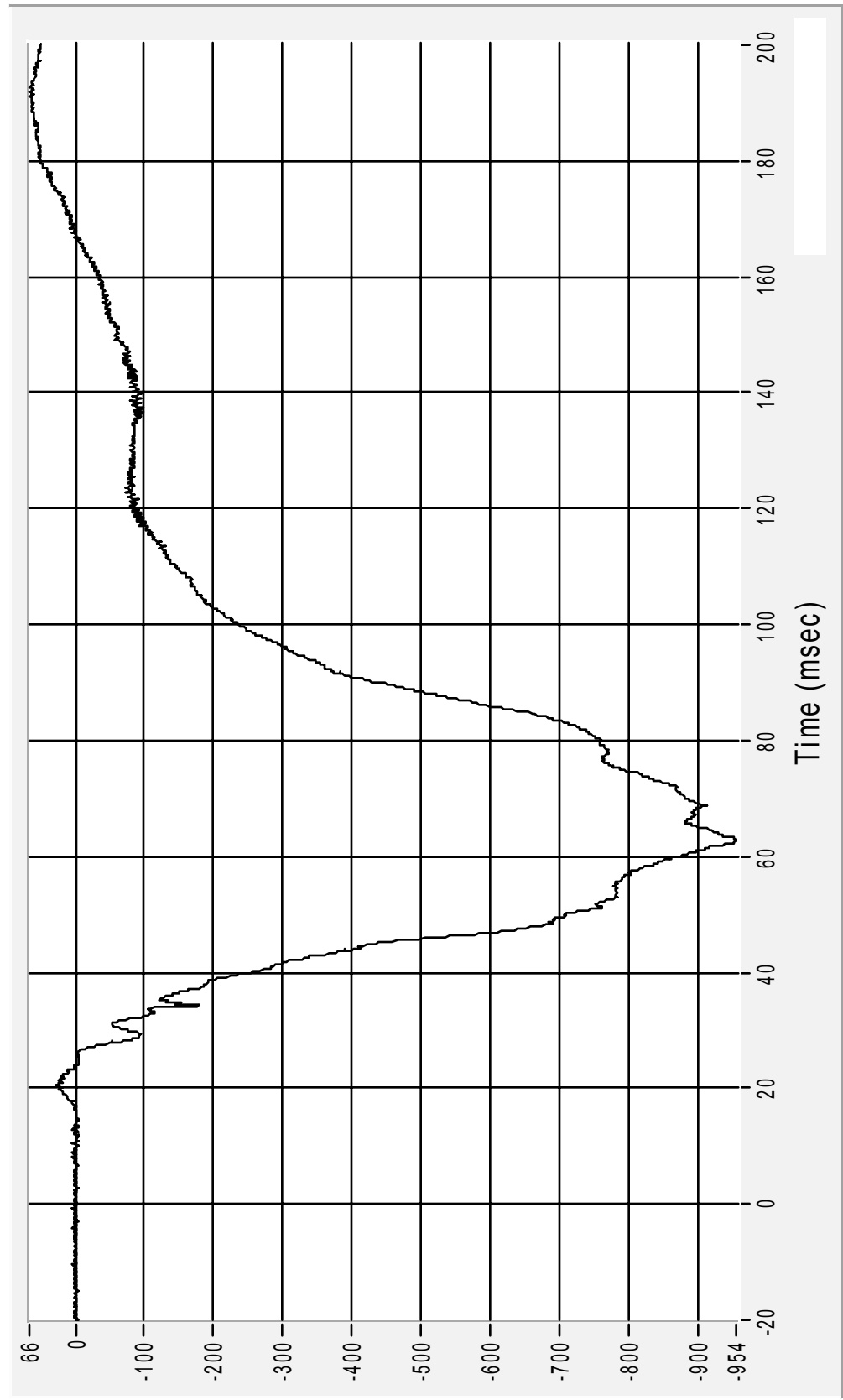
Driver Head Resultant Acceleration
 Acceleration (G's) CFC1000



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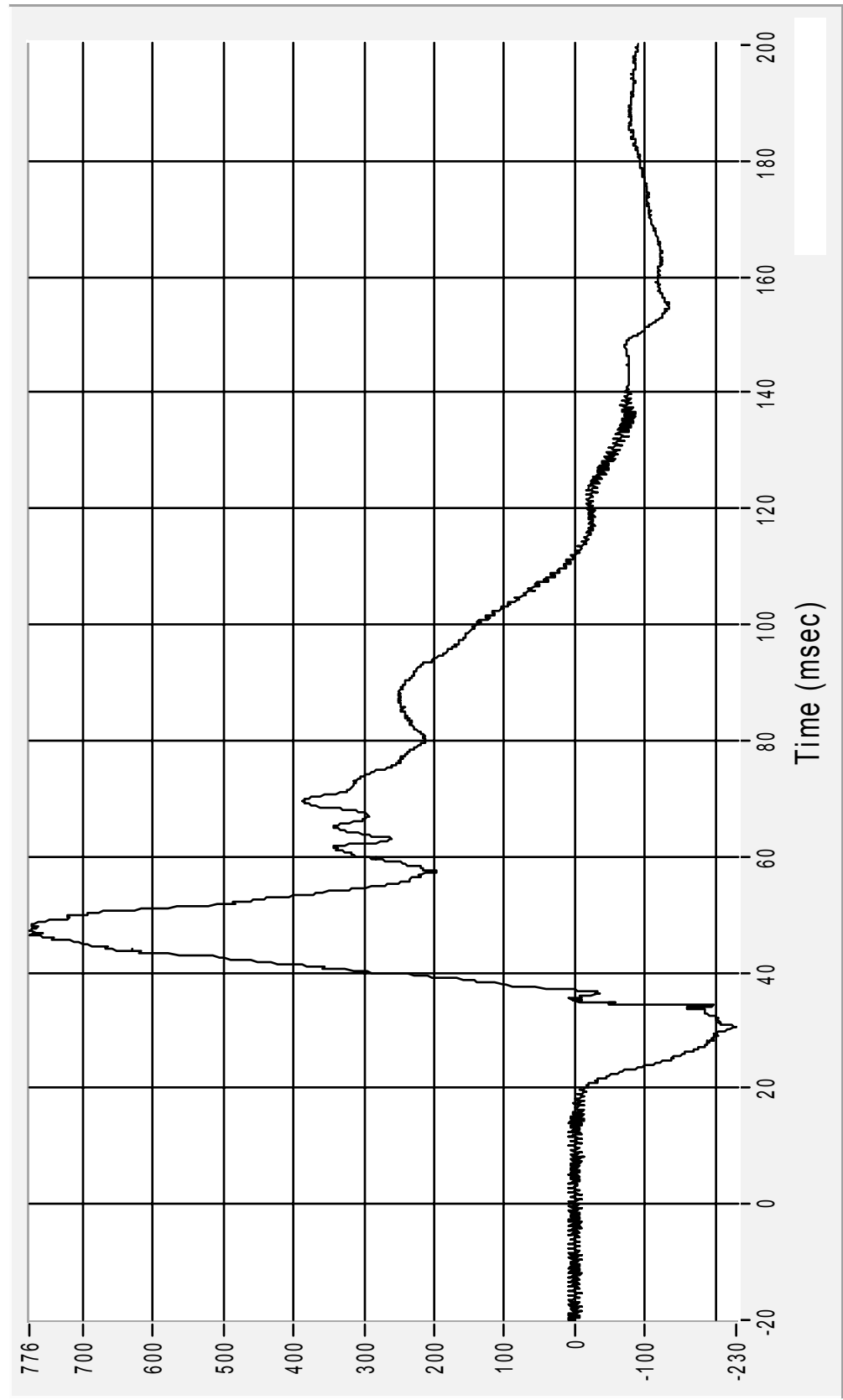
Driver Upper Neck (X) Force
 Force (N) CFC1000
 Max 66.2 N at 192.7 msec
 Min -954.5 N at 62.9 msec



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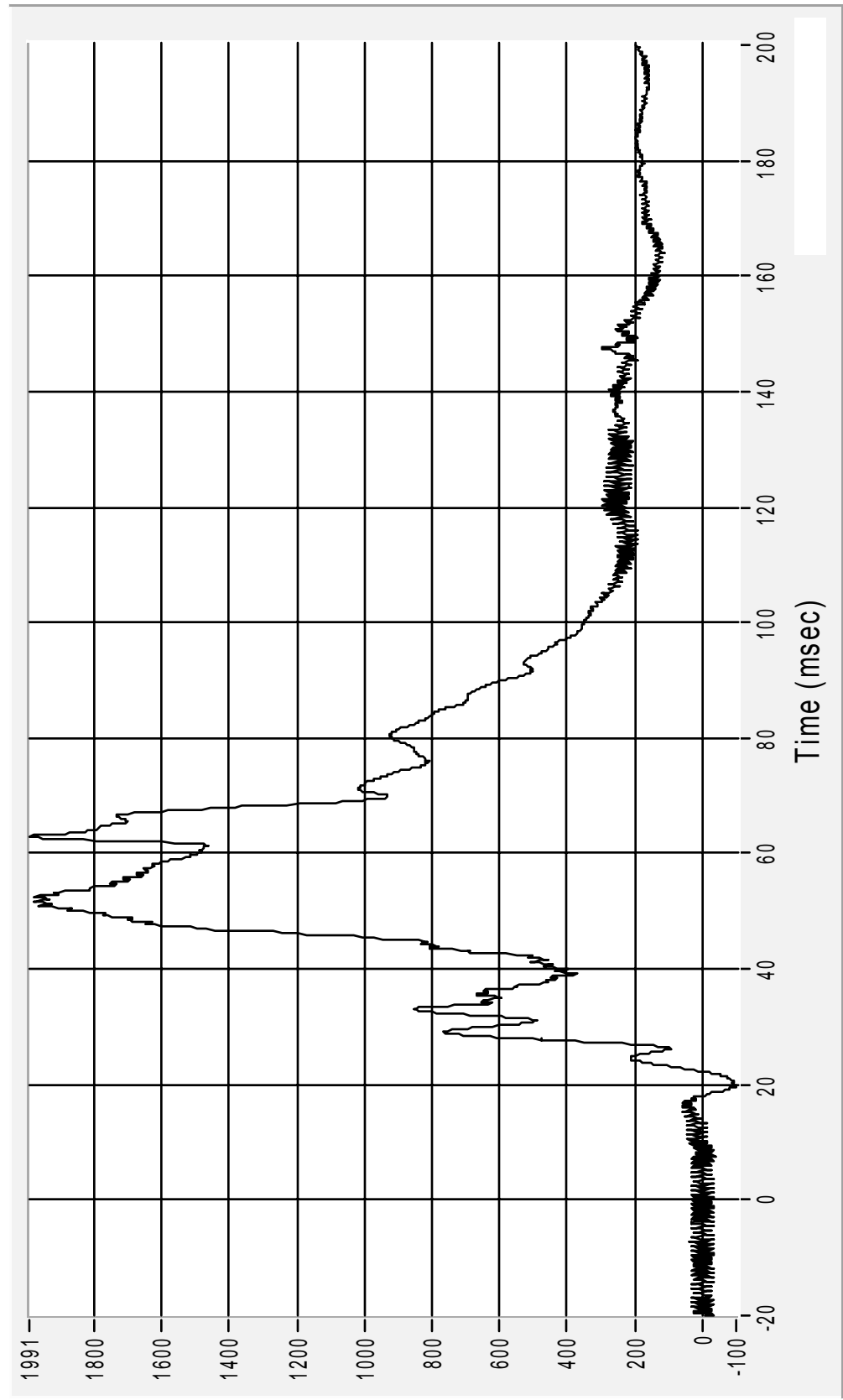
Driver Upper Neck (Y) Force
 Force (N) CFC1000
 Max 776.1 N at 47.1 msec
 Min -229.5 N at 30.6 msec



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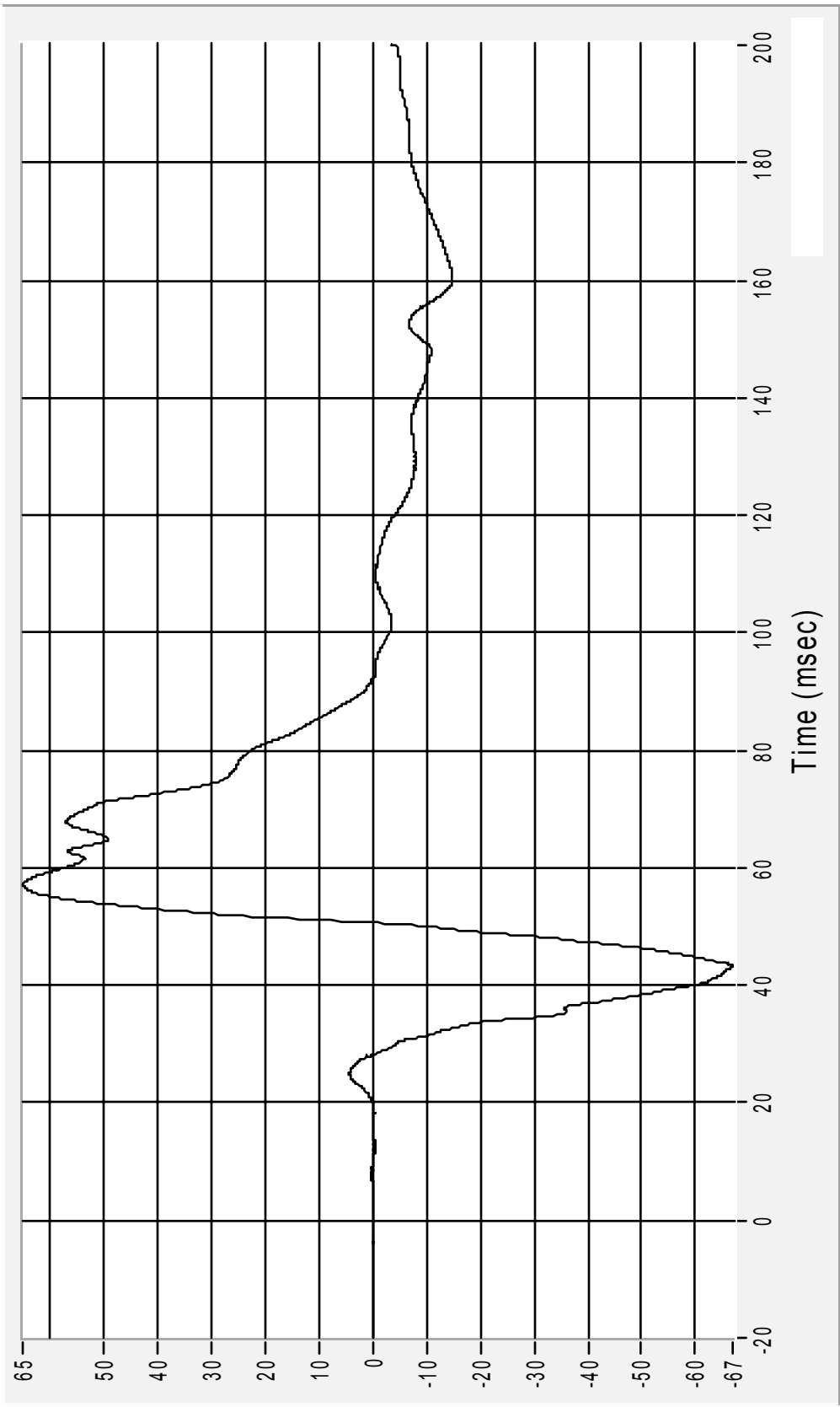
Driver Upper Neck (Z) Force
 Force (N) CFC1000
 Max 1991.2 N at 63.0 msec
 Min -100.2 N at 19.8 msec



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Driver Upper Neck (X) Moment
 Moment (Nm) CFC600

Max	65.2	Nm	at	57.3	msec
Min	-67.0	Nm	at	43.2	msec

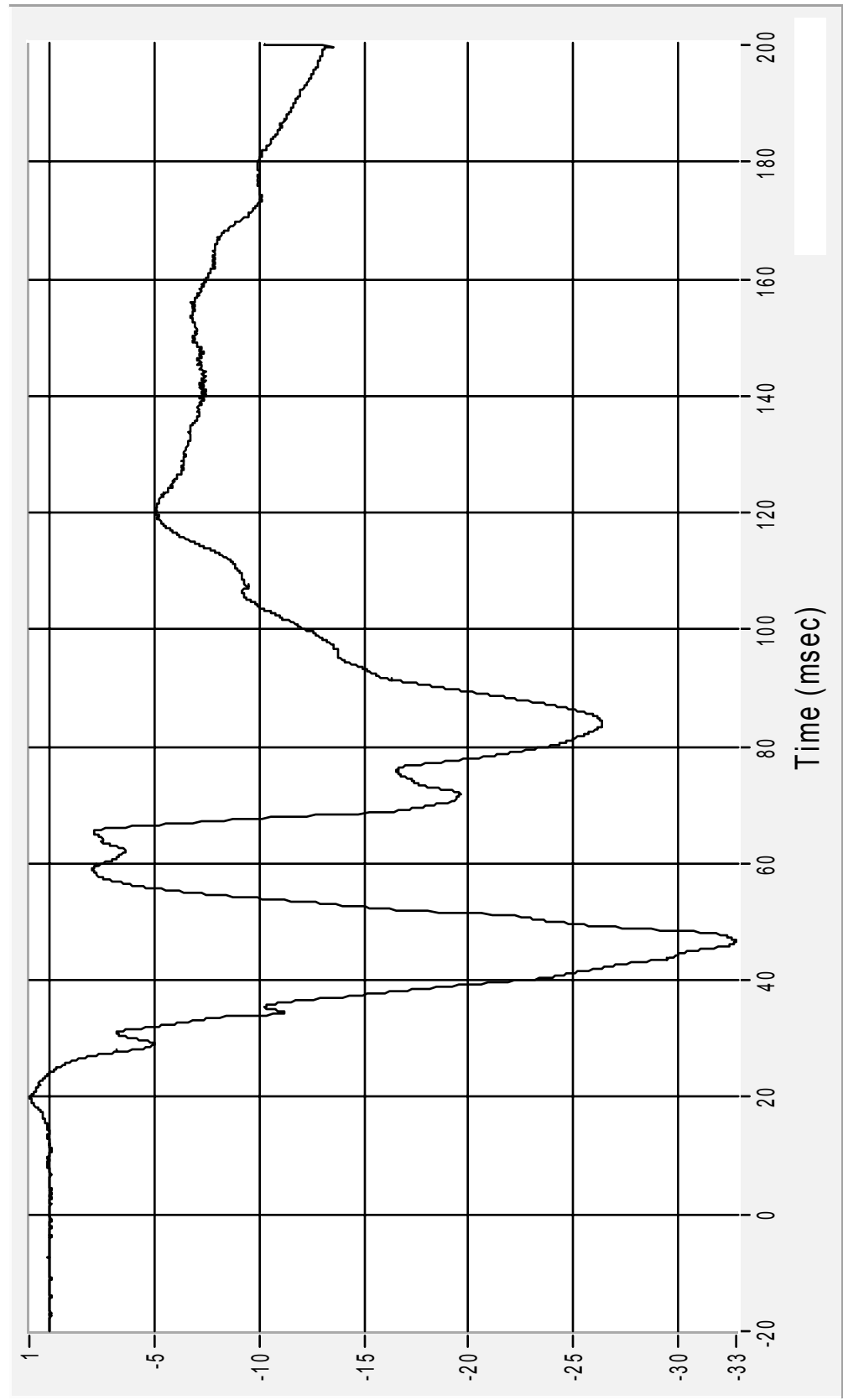


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Driver Upper Neck (Y) Moment
 Moment (Nm) CFC600

Max	1.0	Nm	at	19.9	msec
Min	-32.8	Nm	at	46.7	msec

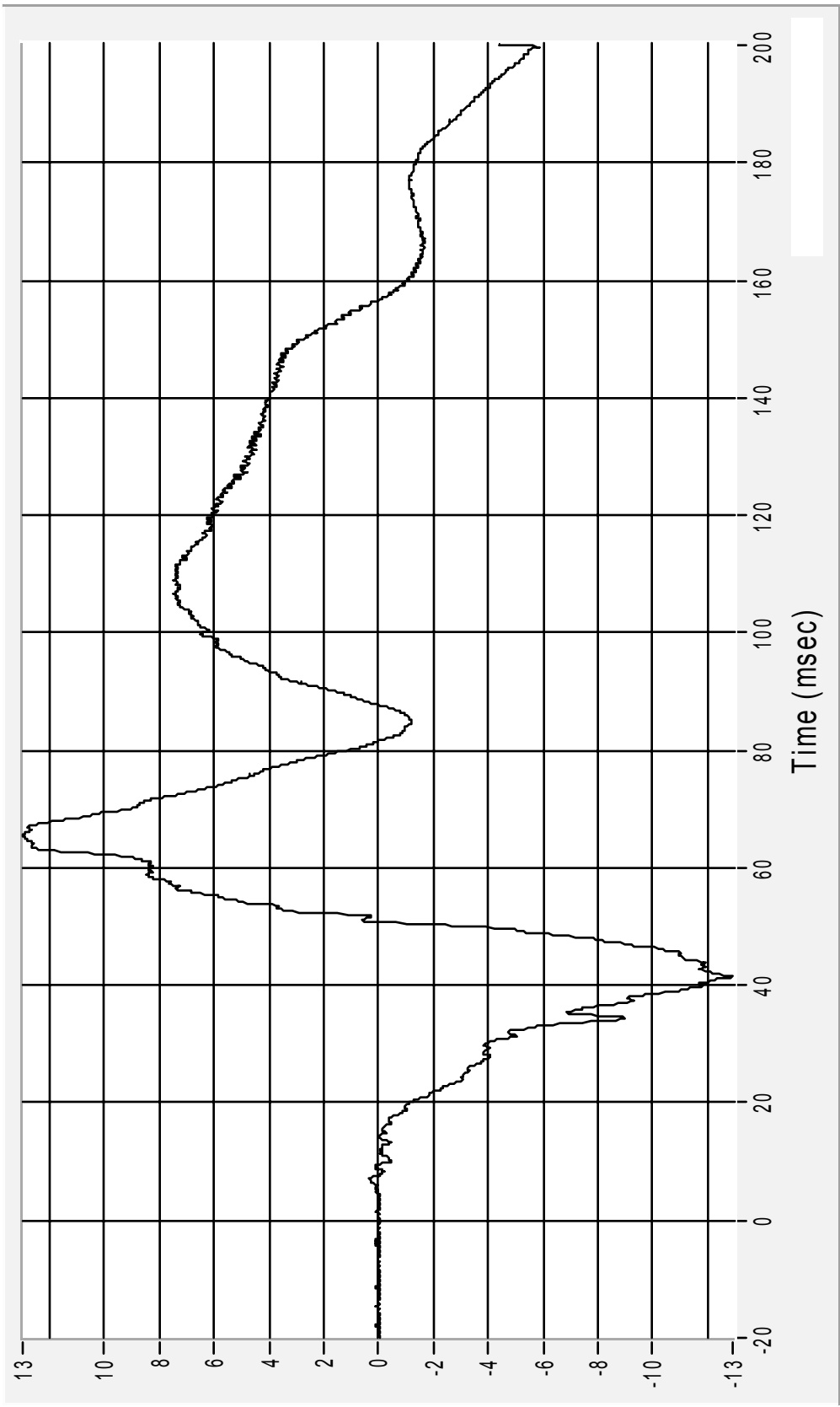


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Driver Upper Neck (Z) Moment
 Moment (Nm) CFC600

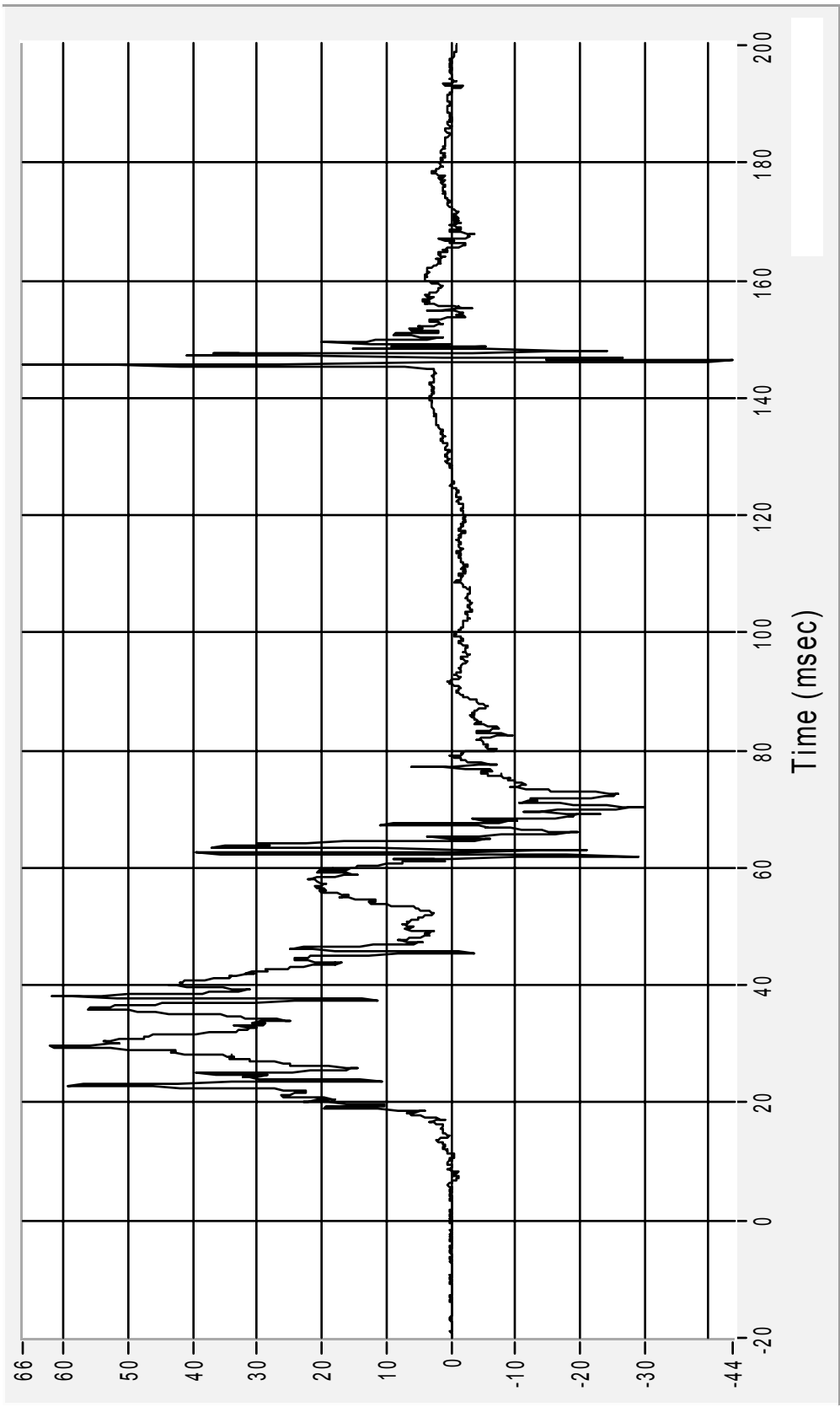
Max	13.0	Nm	at	65.4	msec
Min	-12.9	Nm	at	41.5	msec



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Driver Upper Rib (Y) Acceleration
 Acceleration (G's) CFC1000

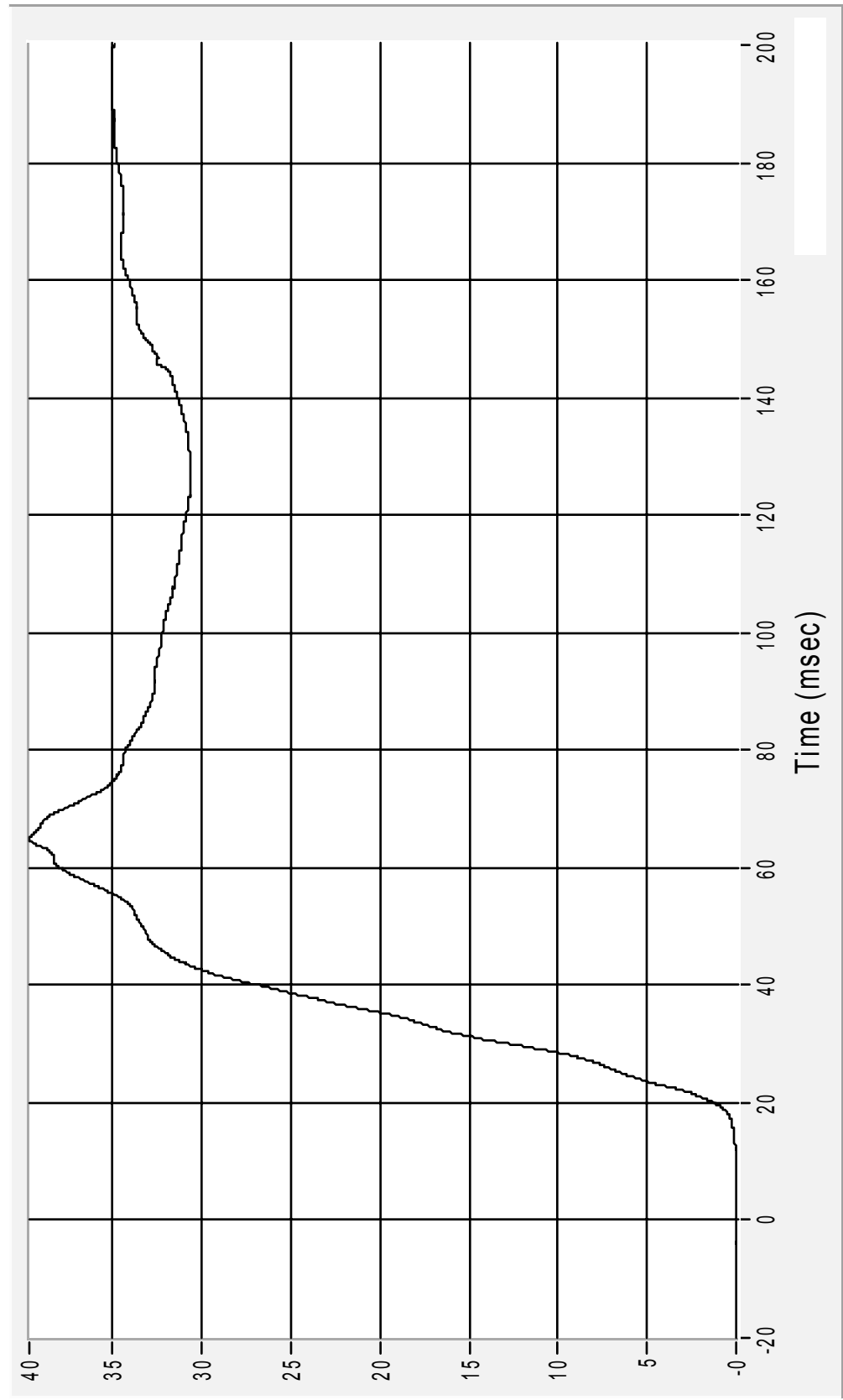
Max	66.4	G	at	145.7	msec
Min	-43.7	G	at	146.3	msec



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Driver Upper Rib (Y) Velocity CFC180
 Velocity (km/h)

Max	39.7	km/h at	65.0	msec
Min	0.0	km/h at	8.6	msec

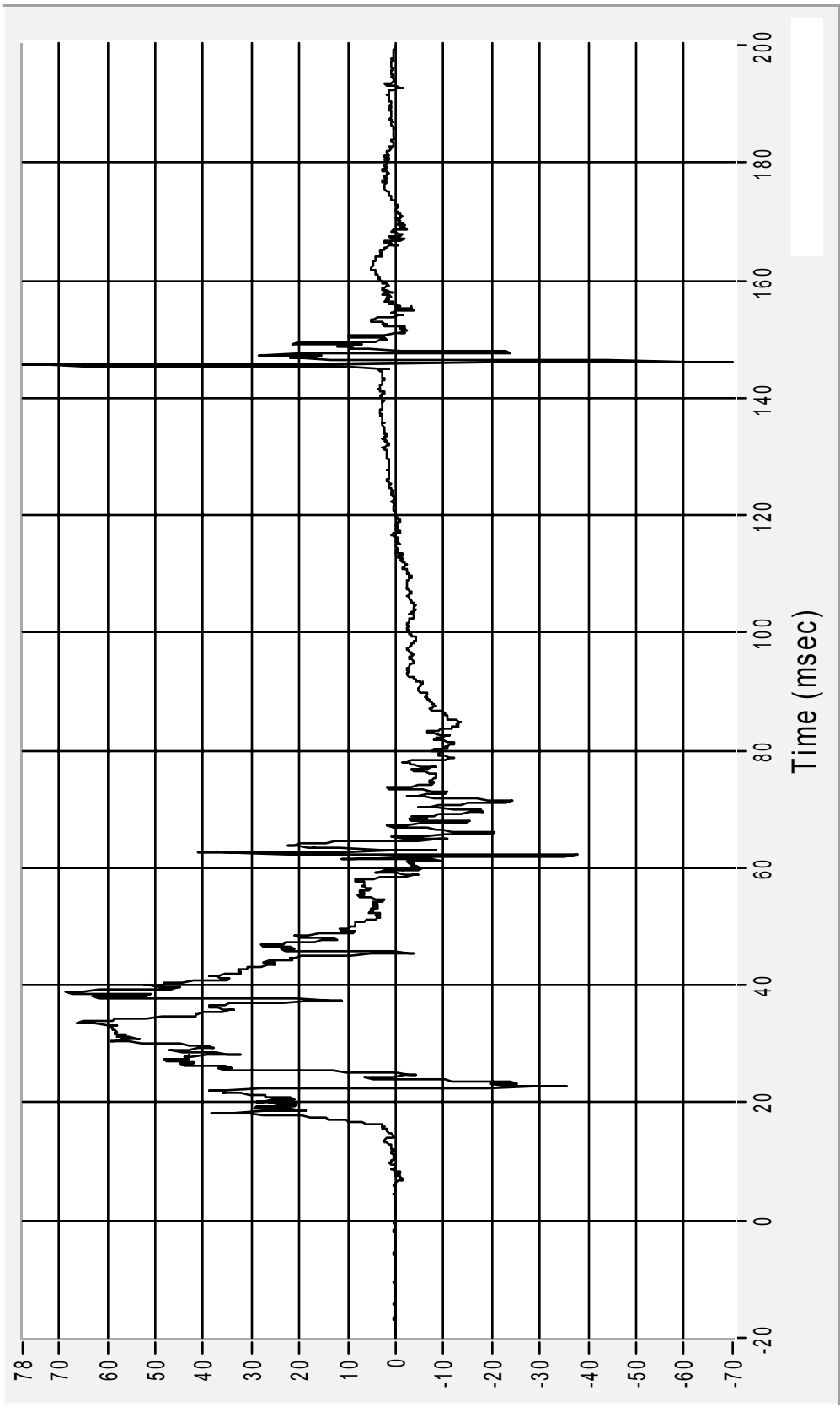


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Driver Lower Rib (Y) Acceleration
 Acceleration (G's) CFC1000

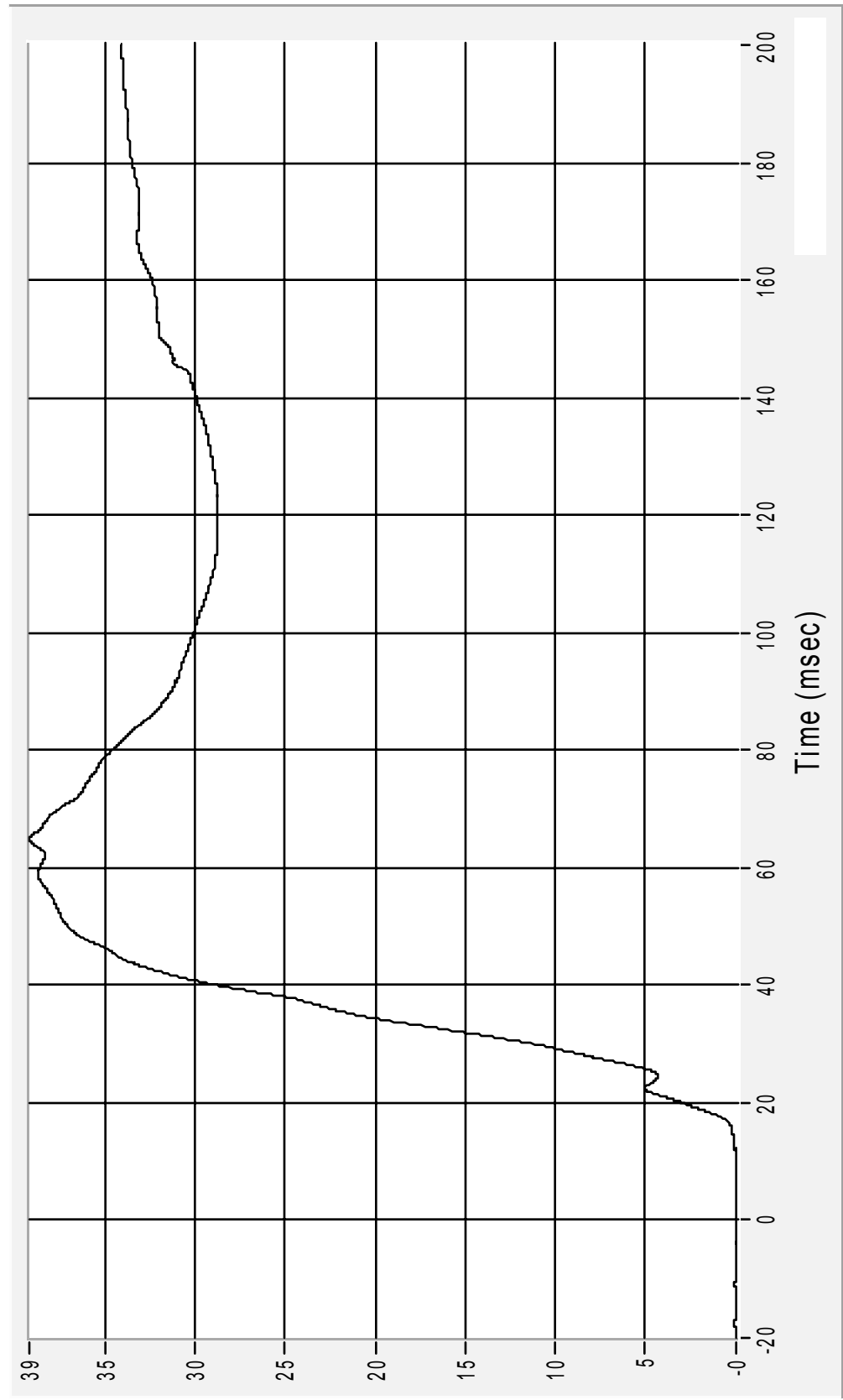
Max	77.6	G	at	145.6	msec
Min	-70.1	G	at	146.2	msec



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Driver Lower Rib (Y) Velocity
 Velocity (km/h) CFC180
 Max 39.2 km/h at 64.7 msec
 Min 0.0 km/h at 8.6 msec

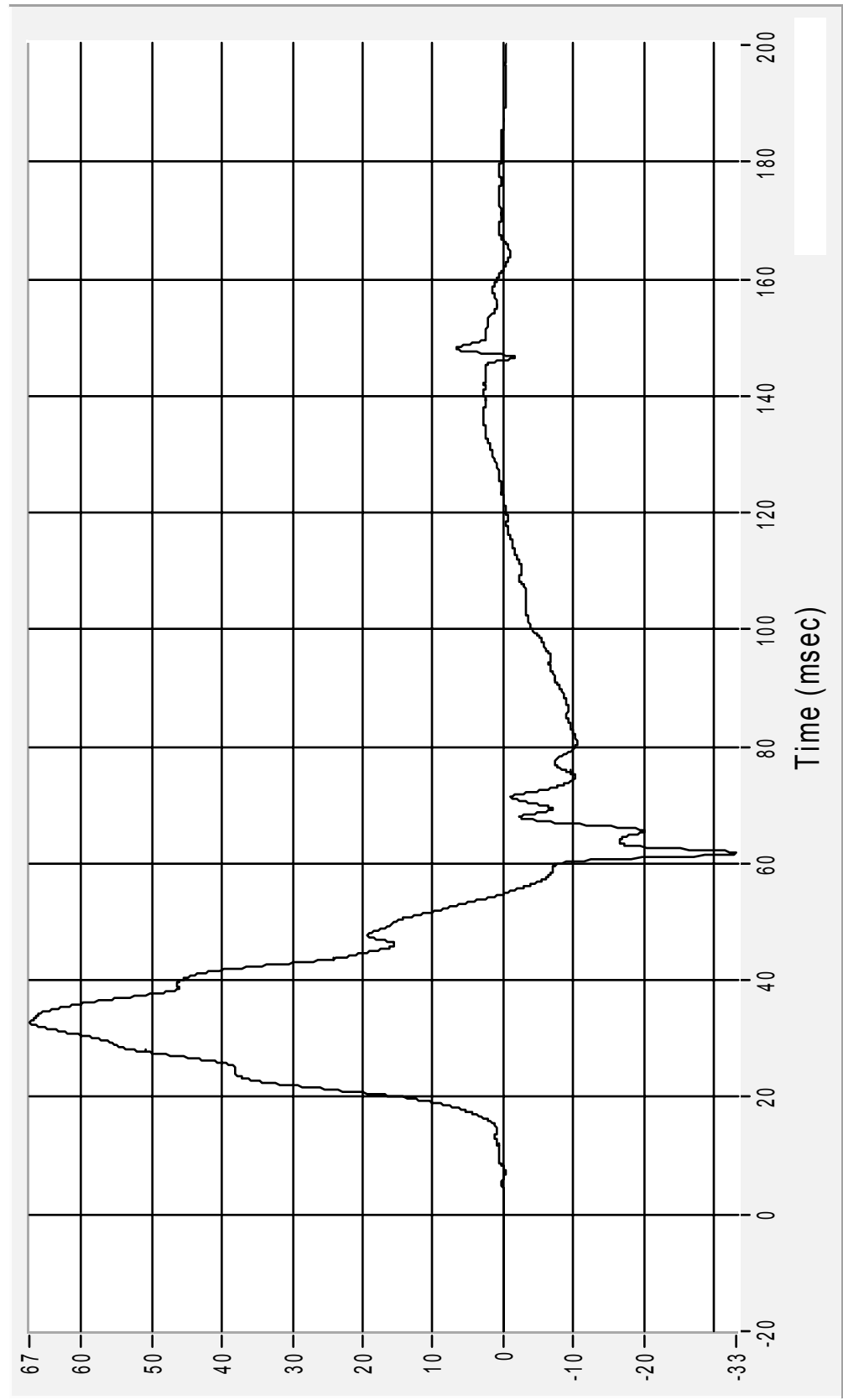


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Driver Lower Spine (Y) Acceleration
 Acceleration (G's) CFC180

Max	67.4	G	at	32.8	msec
Min	-33.1	G	at	61.8	msec

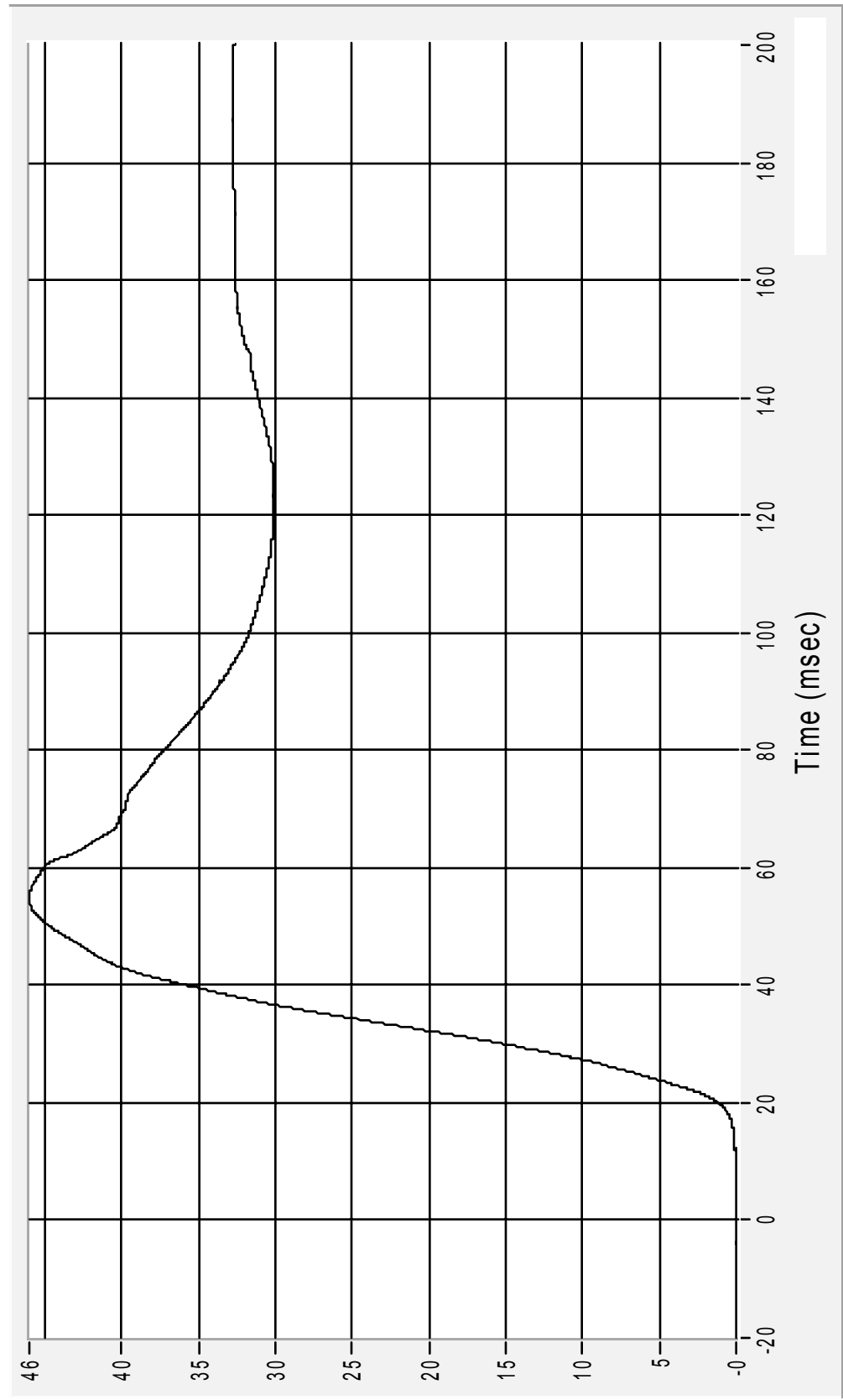


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Max 46.0 km/h at 54.8 msec
Min 0.0 km/h at 8.1 msec

Driver Lower Spine (Y) Velocity
 Velocity (km/h) CFC180

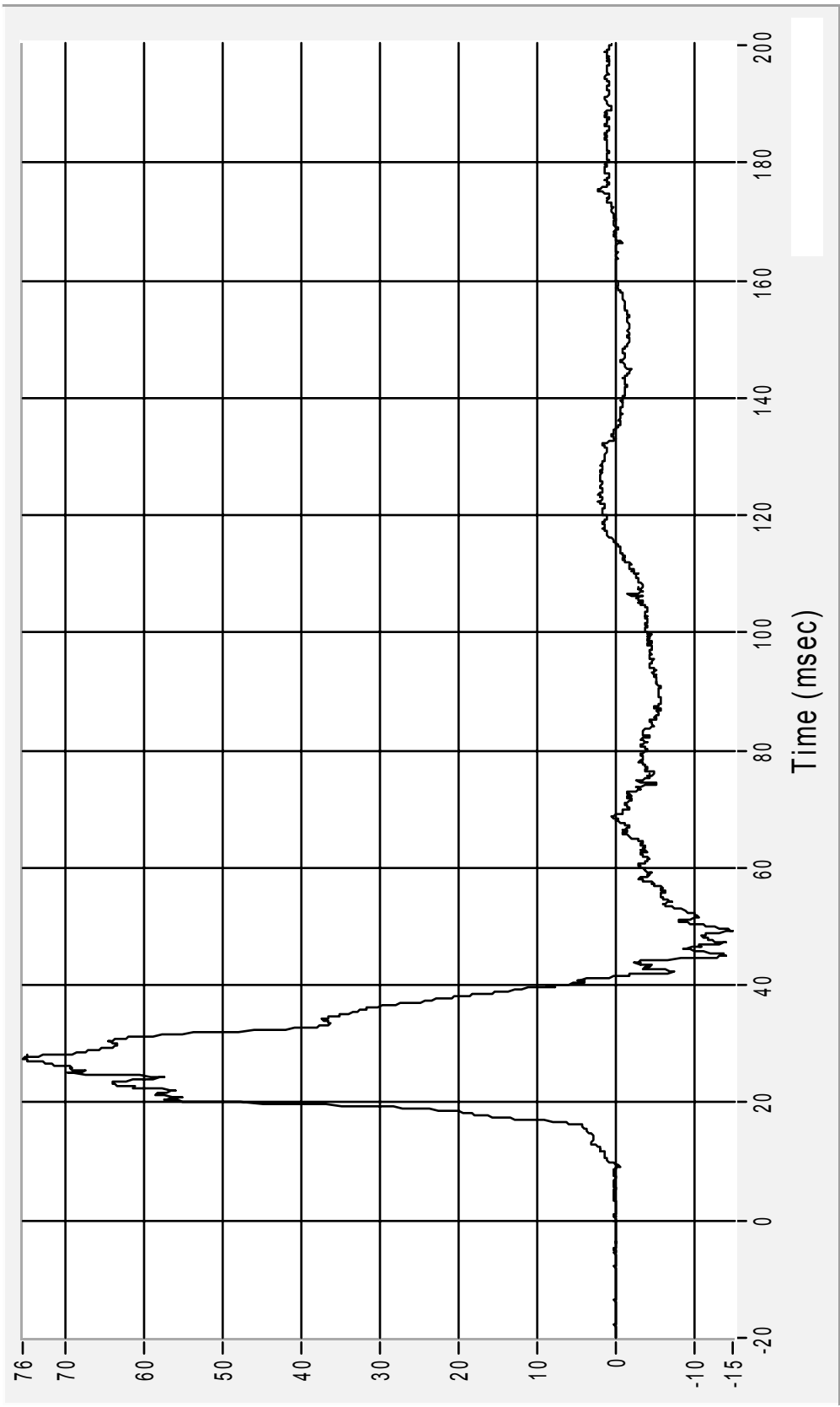


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Driver Pelvic (Y) Acceleration
 Acceleration (G's) CFC1000

Max	75.6	G	at	27.6	msec
Min	-15.0	G	at	49.3	msec

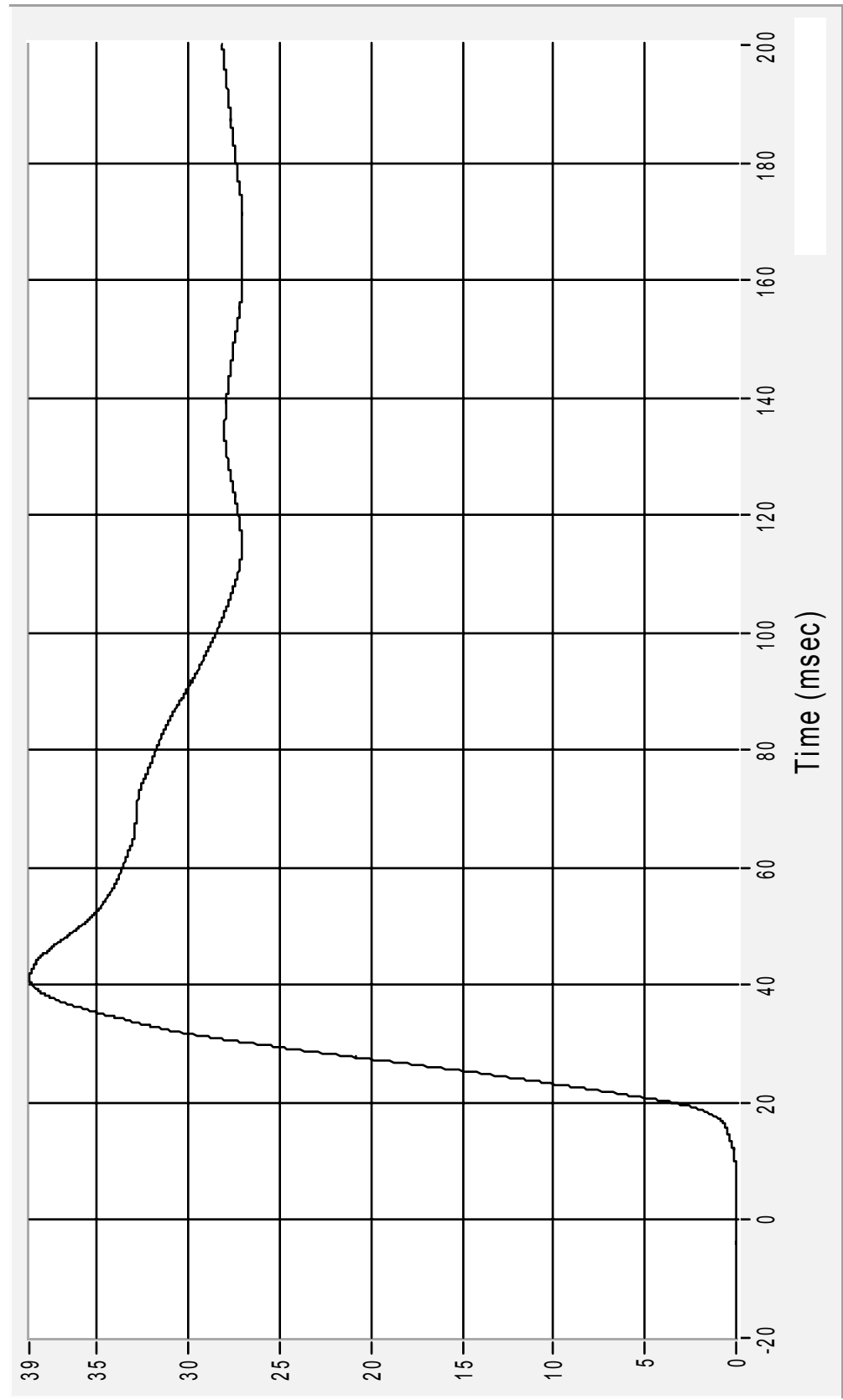


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Driver Pelvic (Y) Velocity
 Velocity (km/h) CFC180

Max	38.7	km/h	at	41.4	msec
Min	0.0	km/h	at	0.0	msec

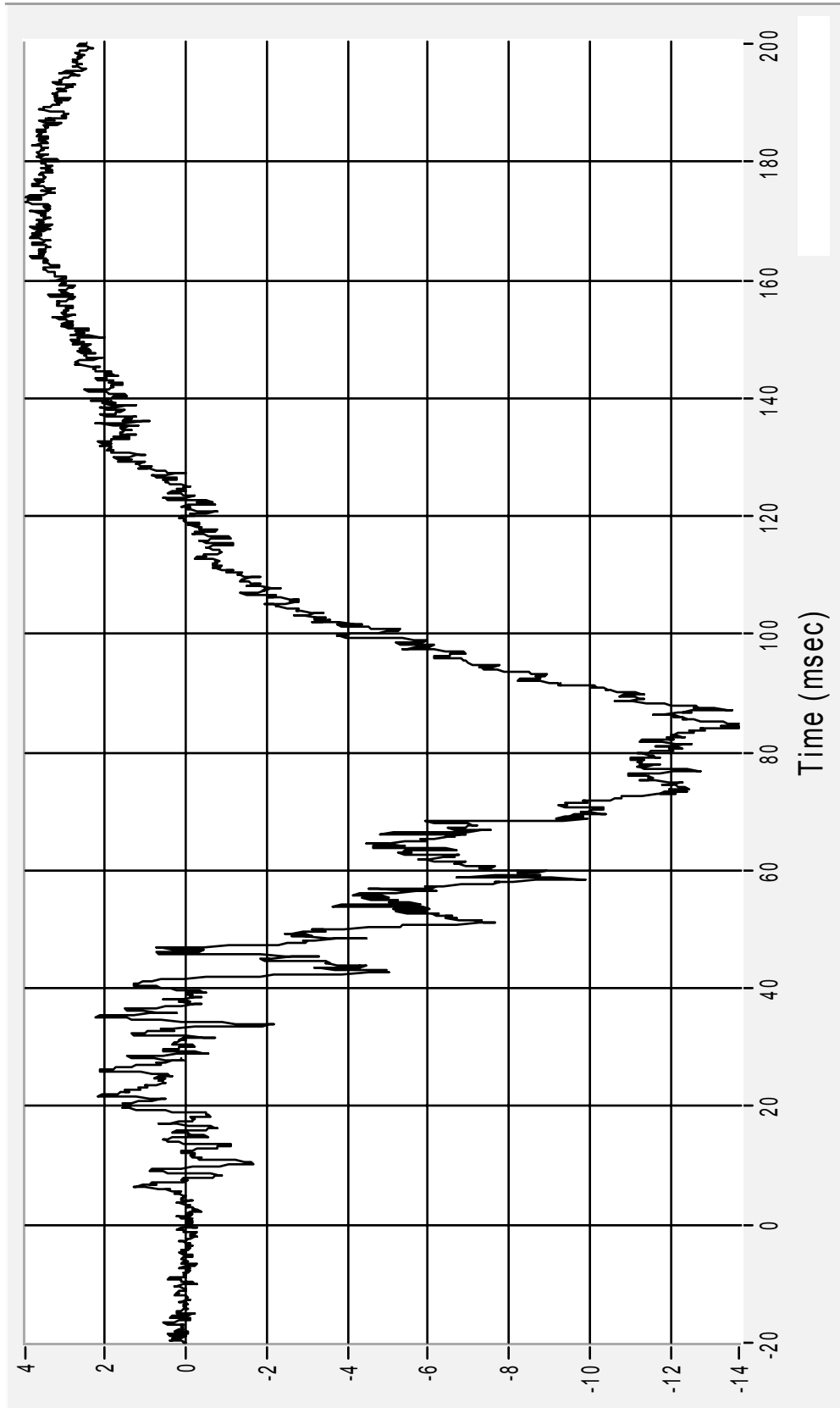


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Passenger Head CG (X) Acceleration
 Acceleration (G's) CFC1000

Max	4.0	G	at	174.2	msec
Min	-13.7	G	at	84.3	msec

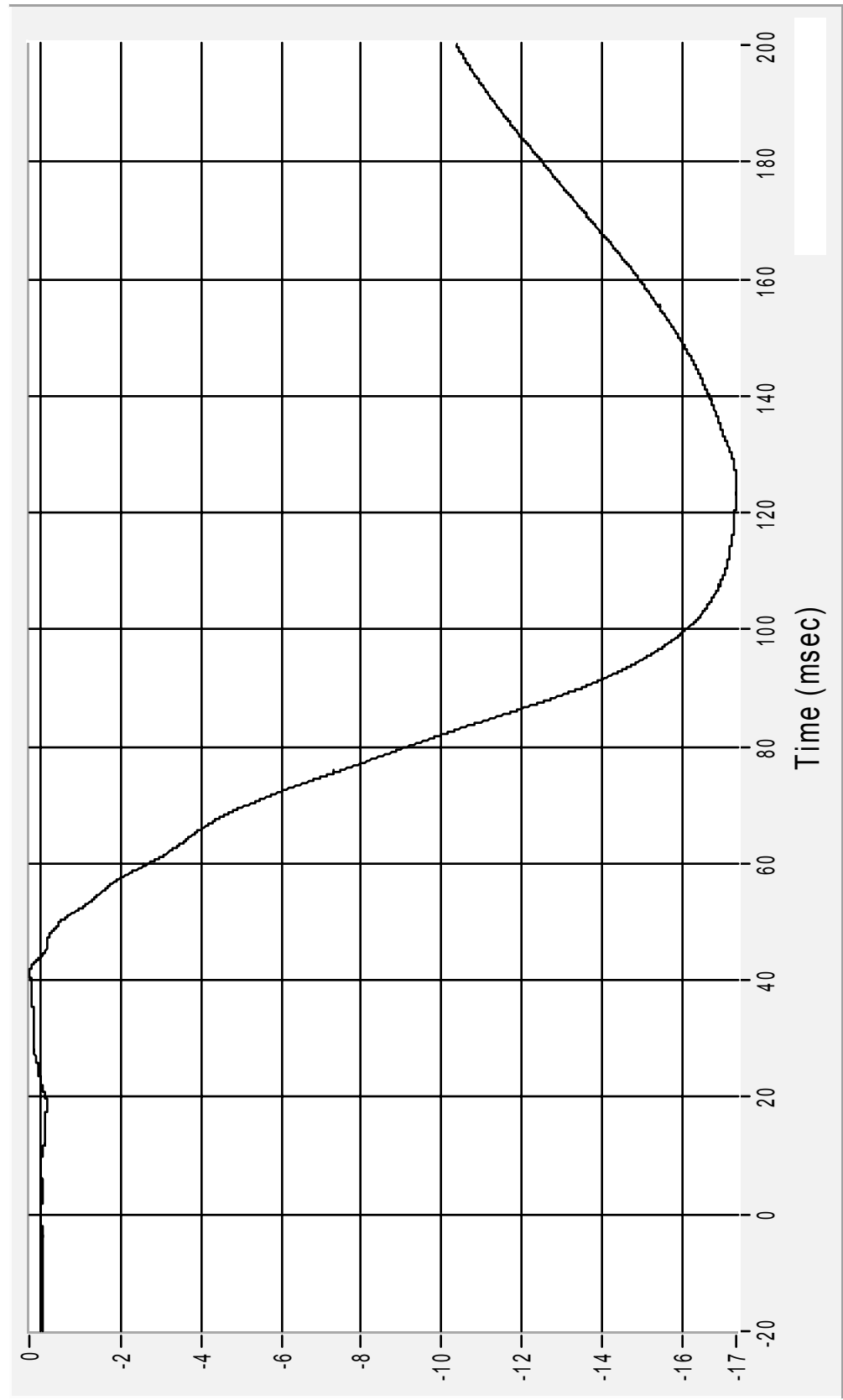


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Passenger Head CG (X) Velocity
 Velocity (km/h) CFC180

Max	0.3	km/h	at	41.4	msec
Min	-17.4	km/h	at	123.0	msec

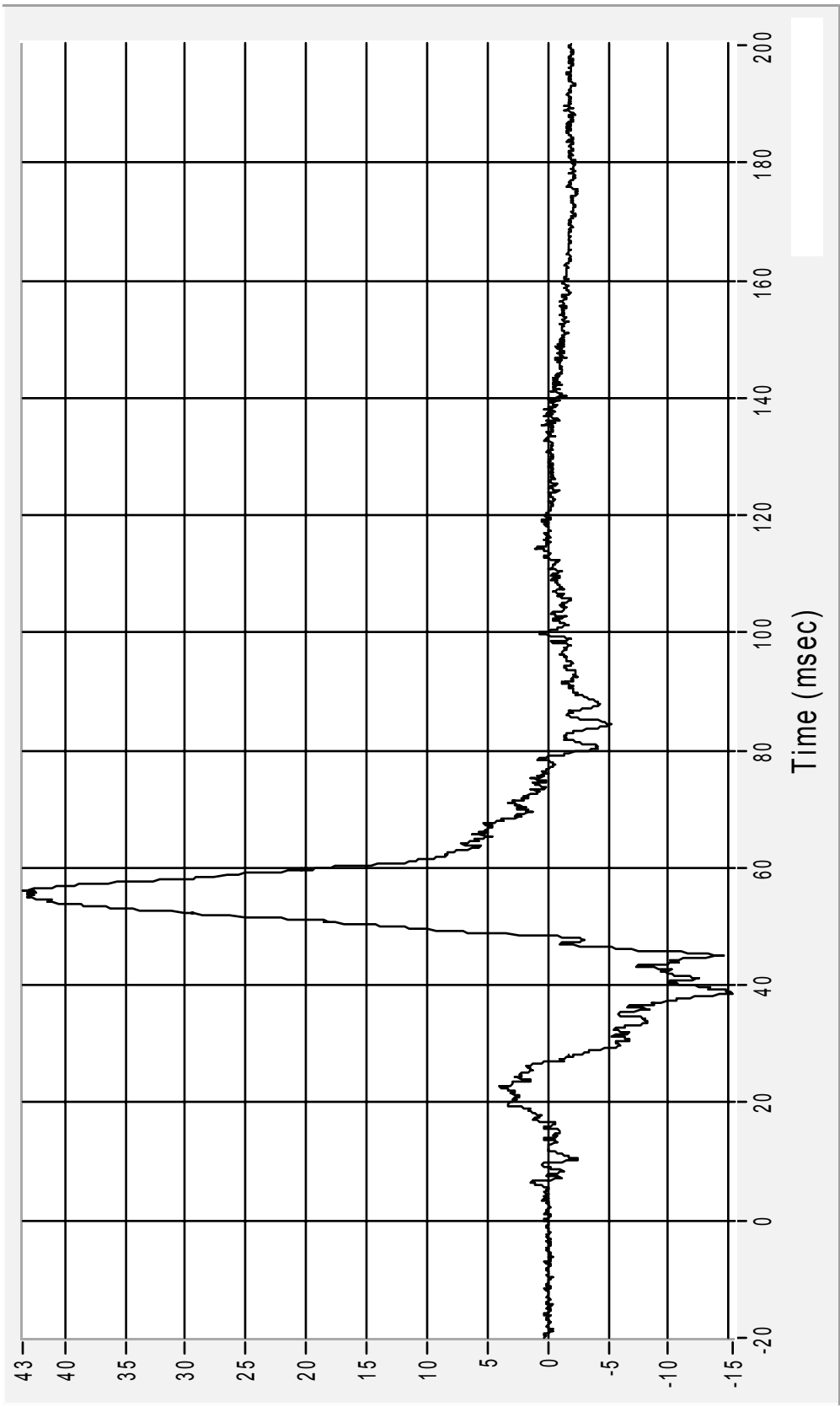


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Passenger Head CG (Y) Acceleration
 Acceleration (G's) CFC1000

Max	43.5	G	at	56.2	msec
Min	-15.3	G	at	38.6	msec

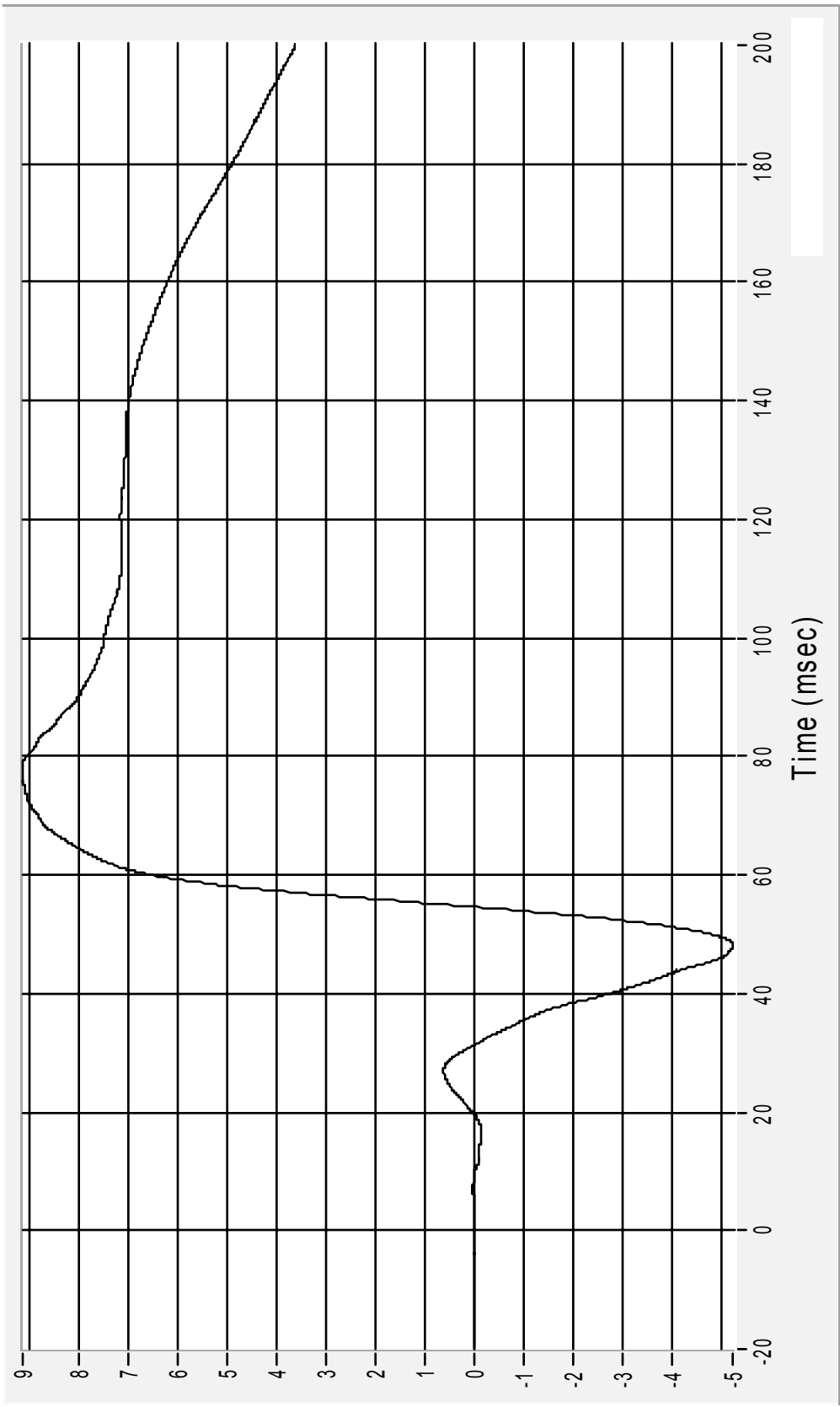


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Passenger Head CG (Y) Velocity
 Velocity (km/h) CFC180

Max	9.1	km/h	at	78.6	msec
Min	-5.2	km/h	at	48.2	msec

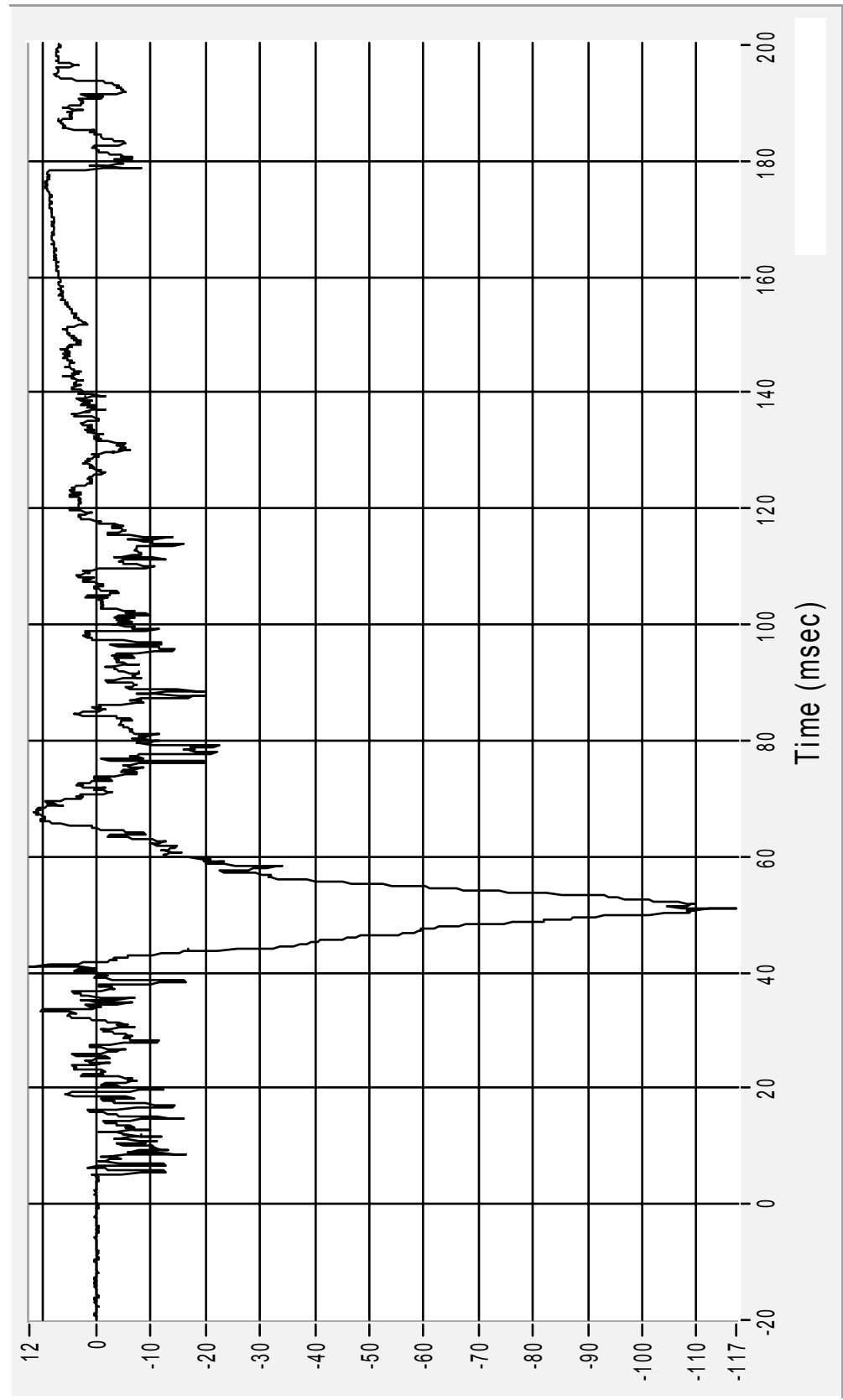


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Passenger Head CG (Z) Acceleration
 Acceleration (G's) CFC1000

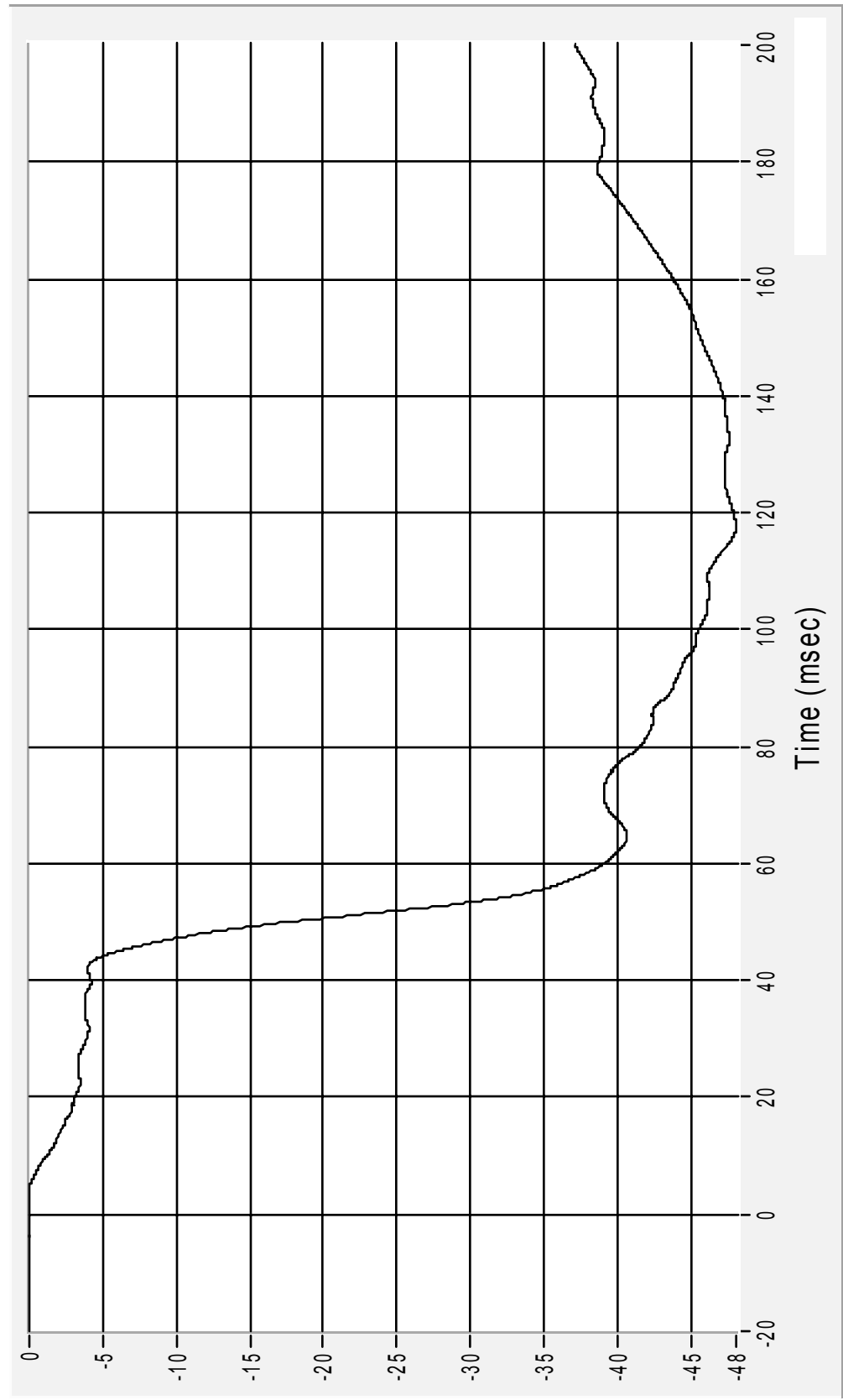
Max	12.3	G	at	41.0	msec
Min	-117.2	G	at	51.0	msec



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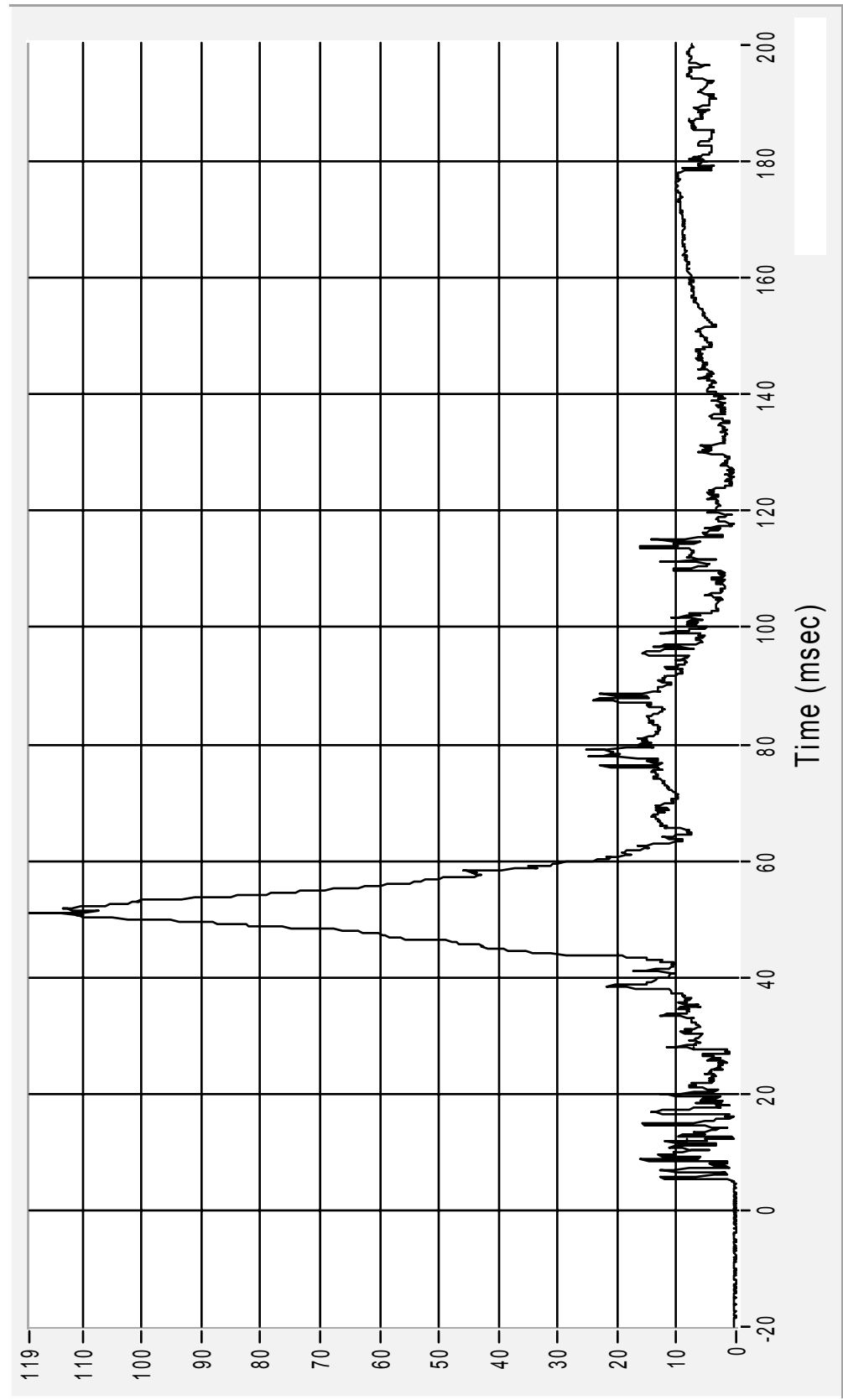
Passenger Head CG (Z) Velocity
 Velocity (km/h) CFC180
 Max 0.0 km/h at 3.8 msec
 Min -48.1 km/h at 117.8 msec



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Max 118.9 G's at 51.0 msec
 Min 0.0 G's at 3.0 msec

Passenger Head Resultant Acceleration
 Acceleration (G's) CFC1000

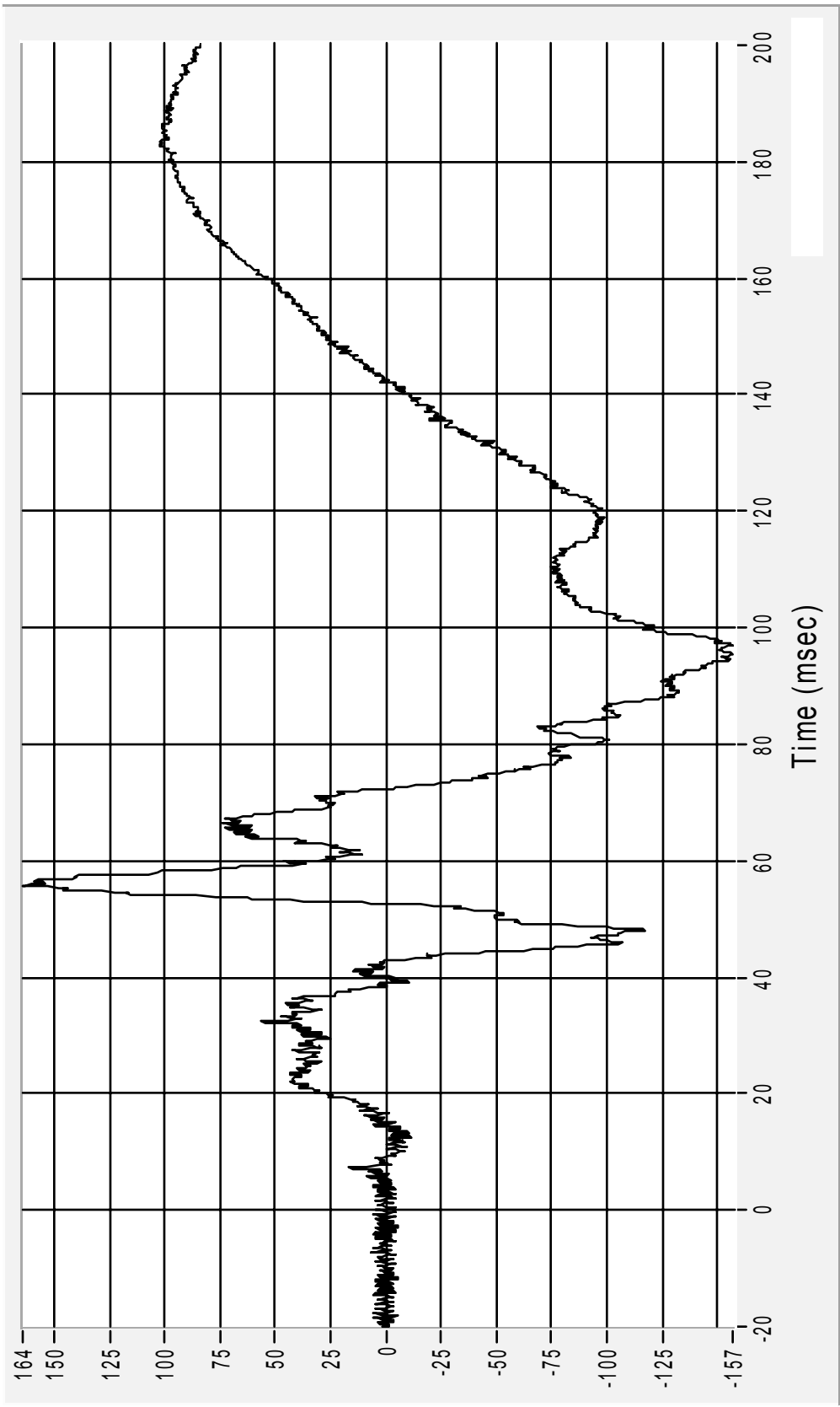


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Passenger Upper Neck (X) Force
 Force (N) CFC1000

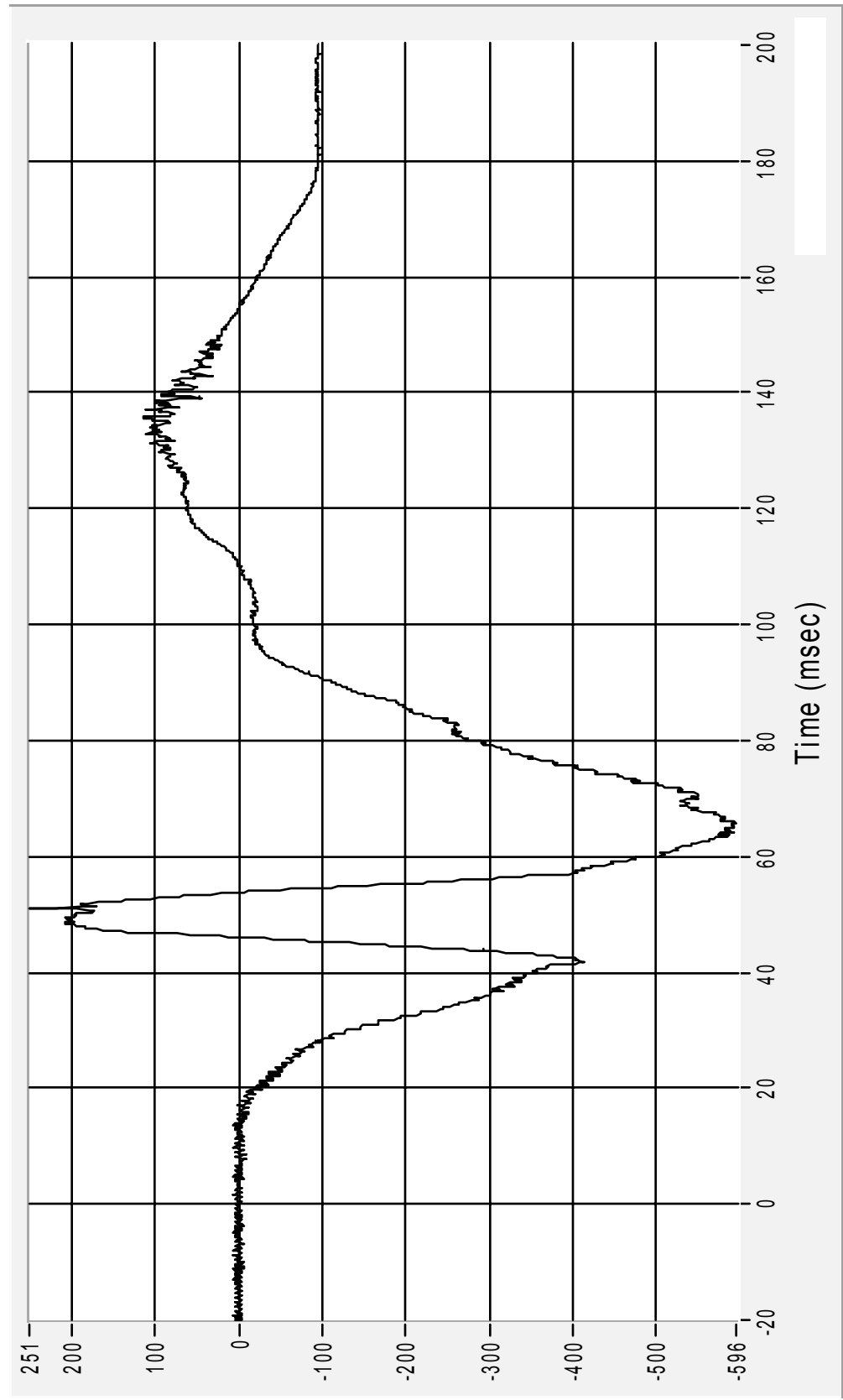
Max	164.3	N	at	55.8	msec
Min	-157.0	N	at	95.4	msec



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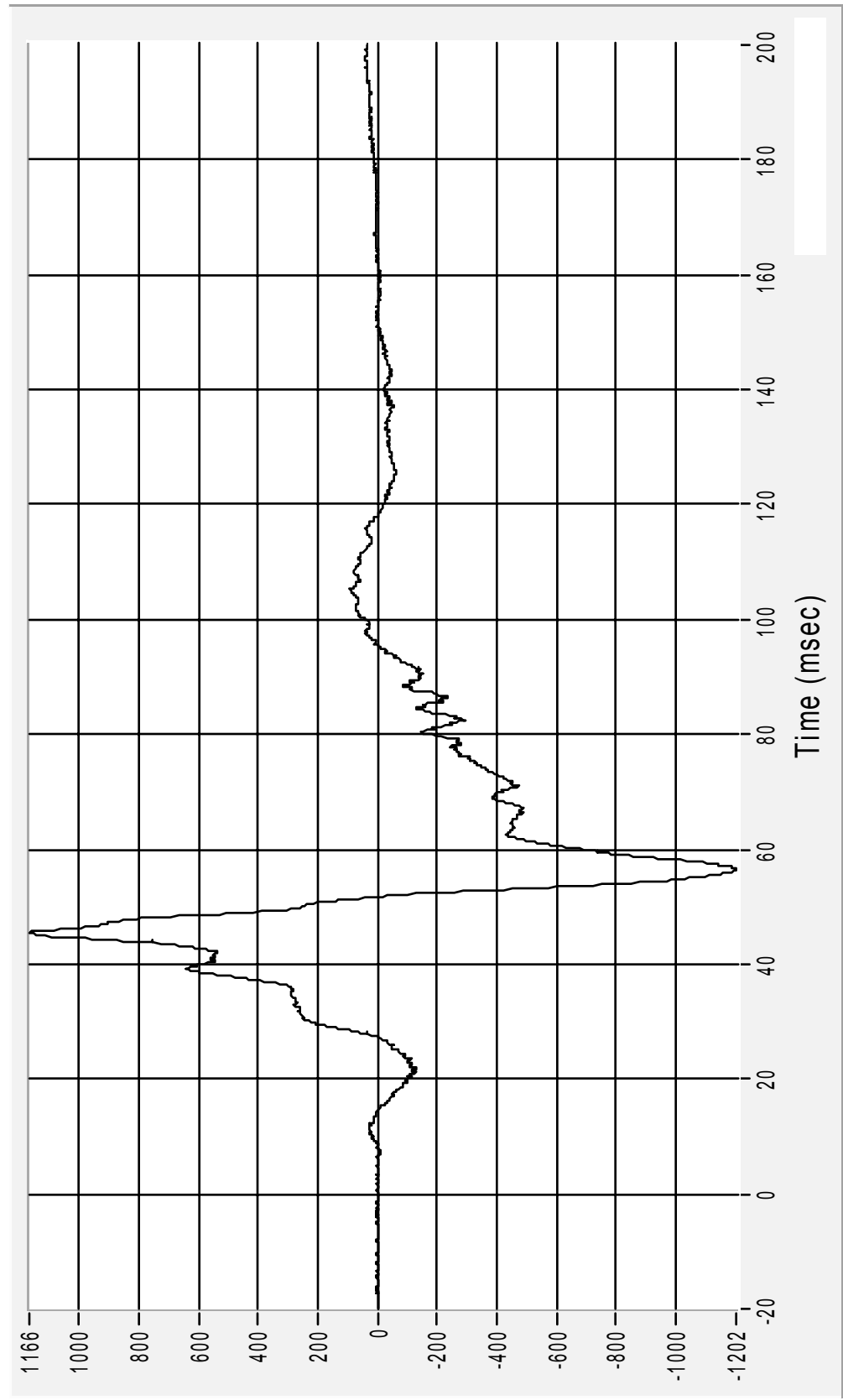
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Passenger Upper Neck (Y) Force
 CFC1000
 Max 250.6 N at 51.0 msec
 Min -596.0 N at 65.8 msec



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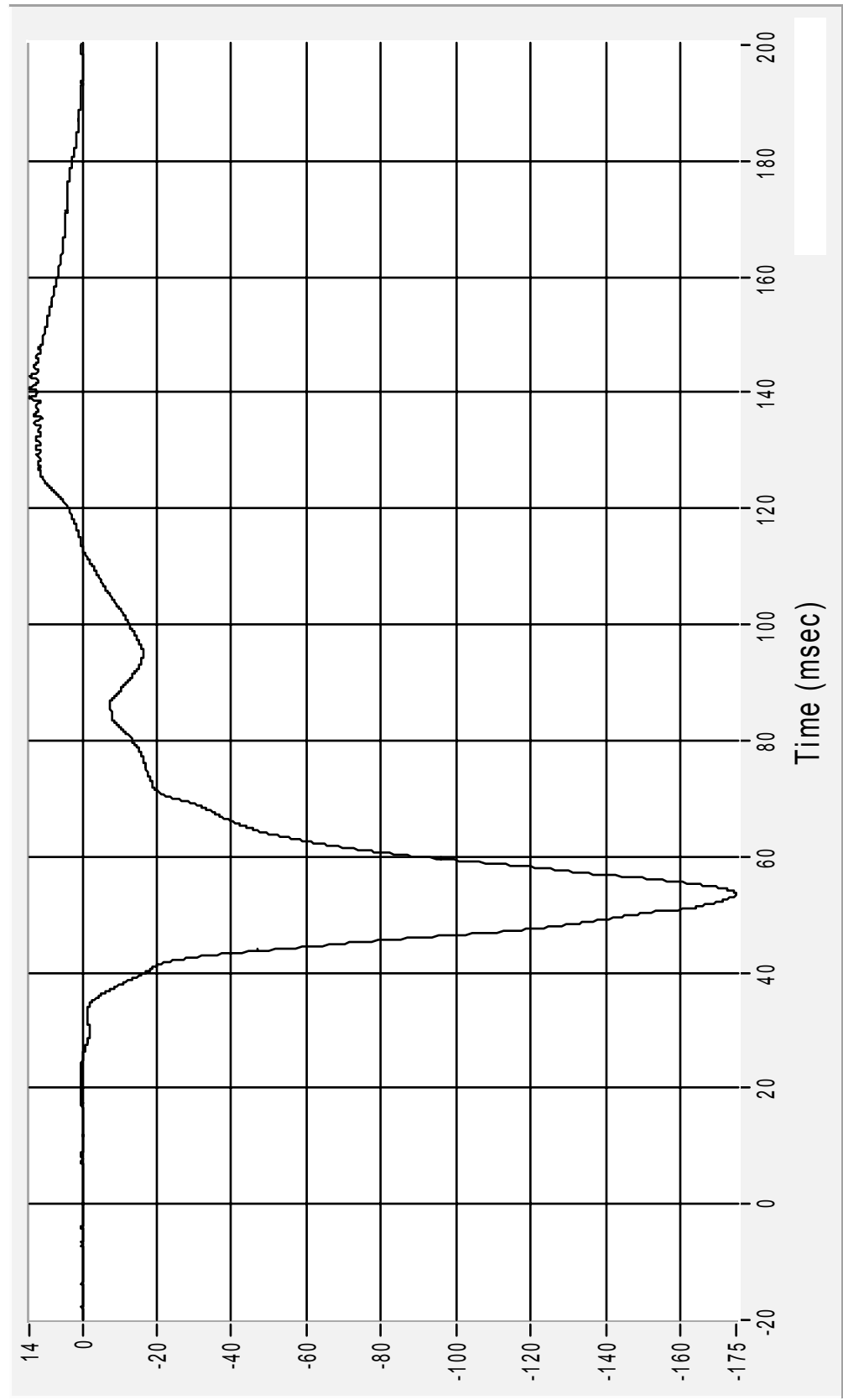
Passenger Upper Neck (Z) Force
 Force (N) CFC1000
 Max 1166.0 N at 45.6 msec
 Min -1202.5 N at 56.5 msec



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Passenger Upper Neck (X) Moment
 Moment (Nm) CFC600

Max	14.1	Nm	at	139.0	msec
Min	-174.9	Nm	at	53.4	msec

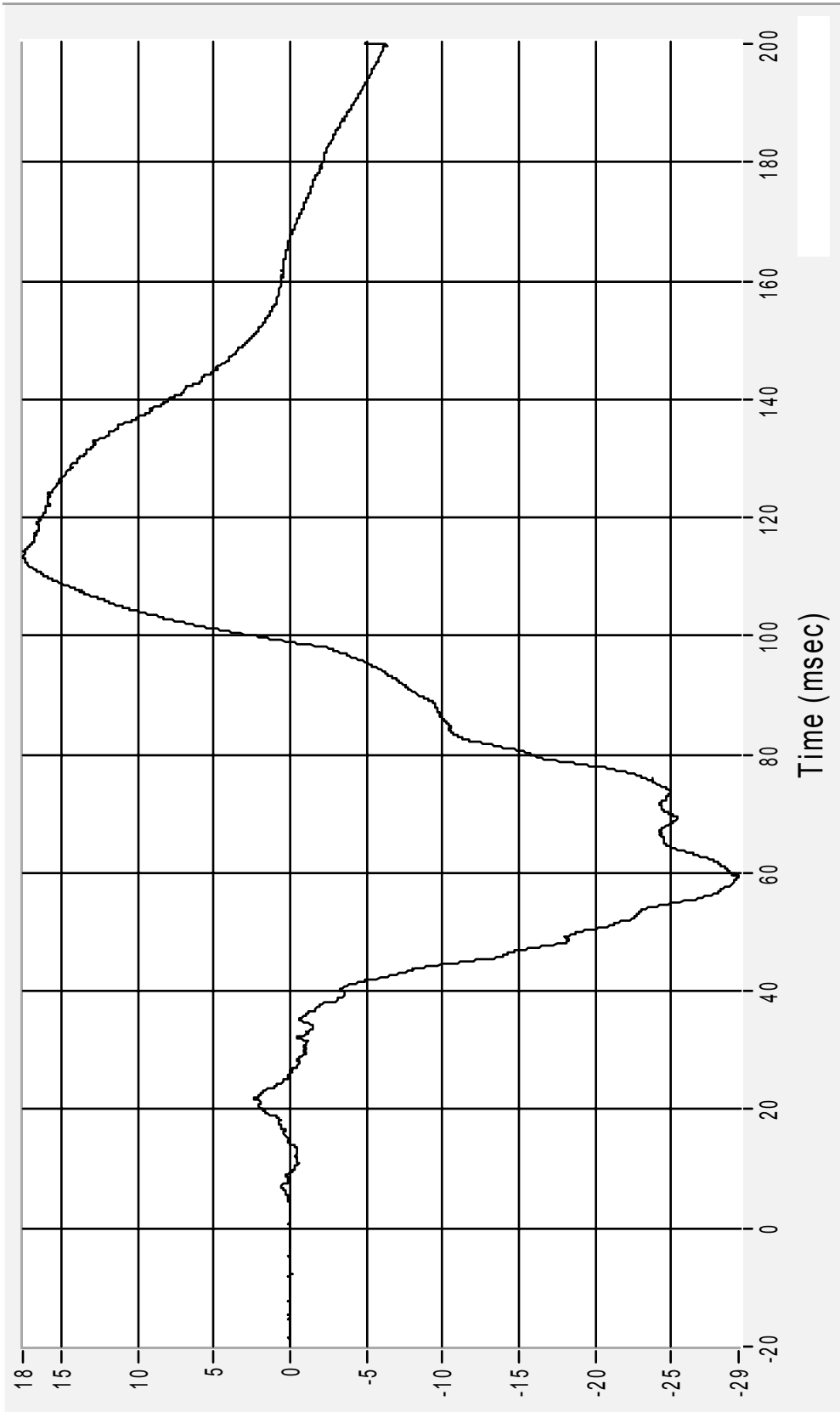


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Passenger Upper Neck (Y) Moment
CFC600

Max 17.5 Nm at 113.4 msec
Min -29.4 Nm at 59.3 msec

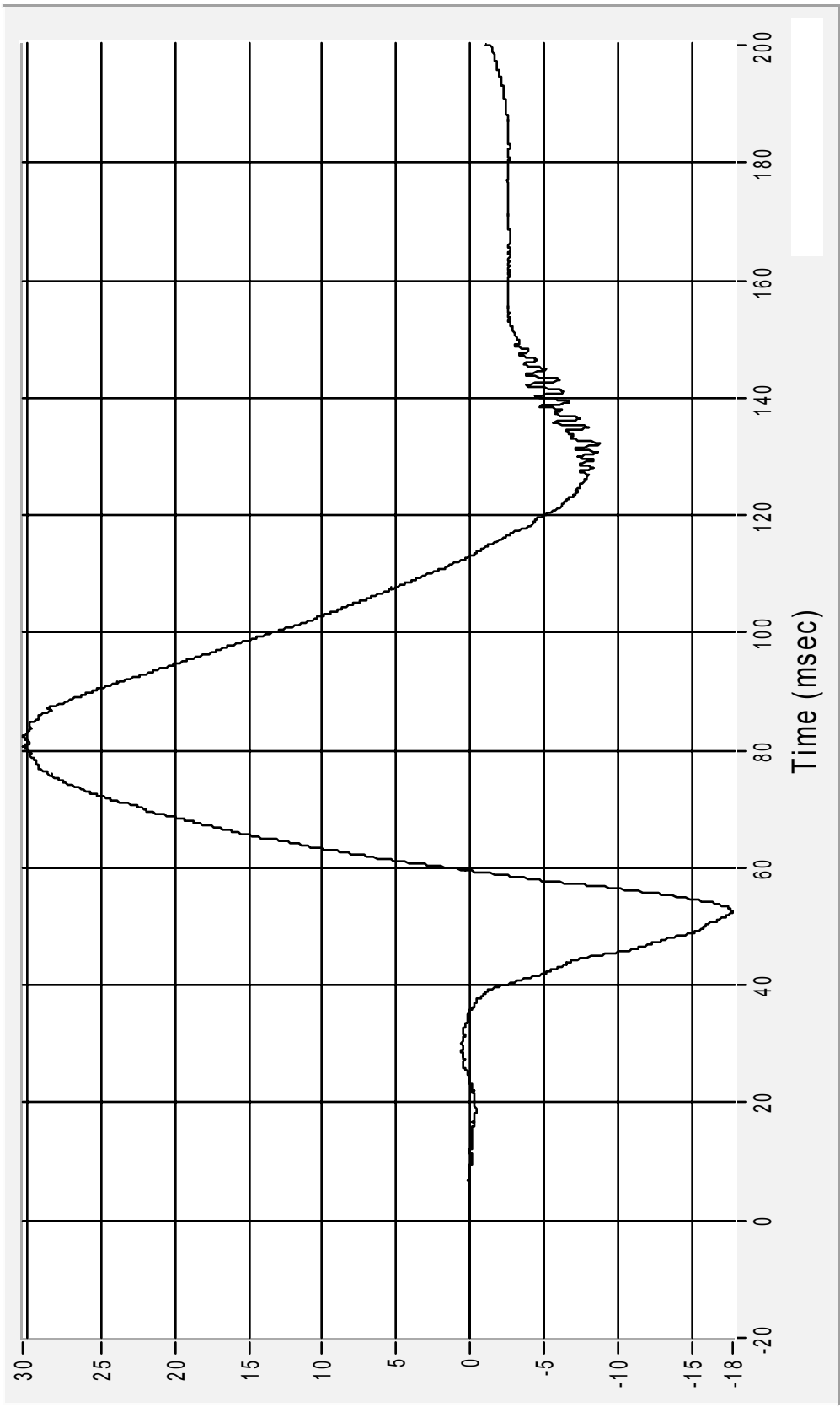


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Passenger Upper Neck (Z) Moment
 Moment (Nm) CFC600

Max	30.3	Nm	at	82.3	msec
Min	-17.8	Nm	at	52.5	msec

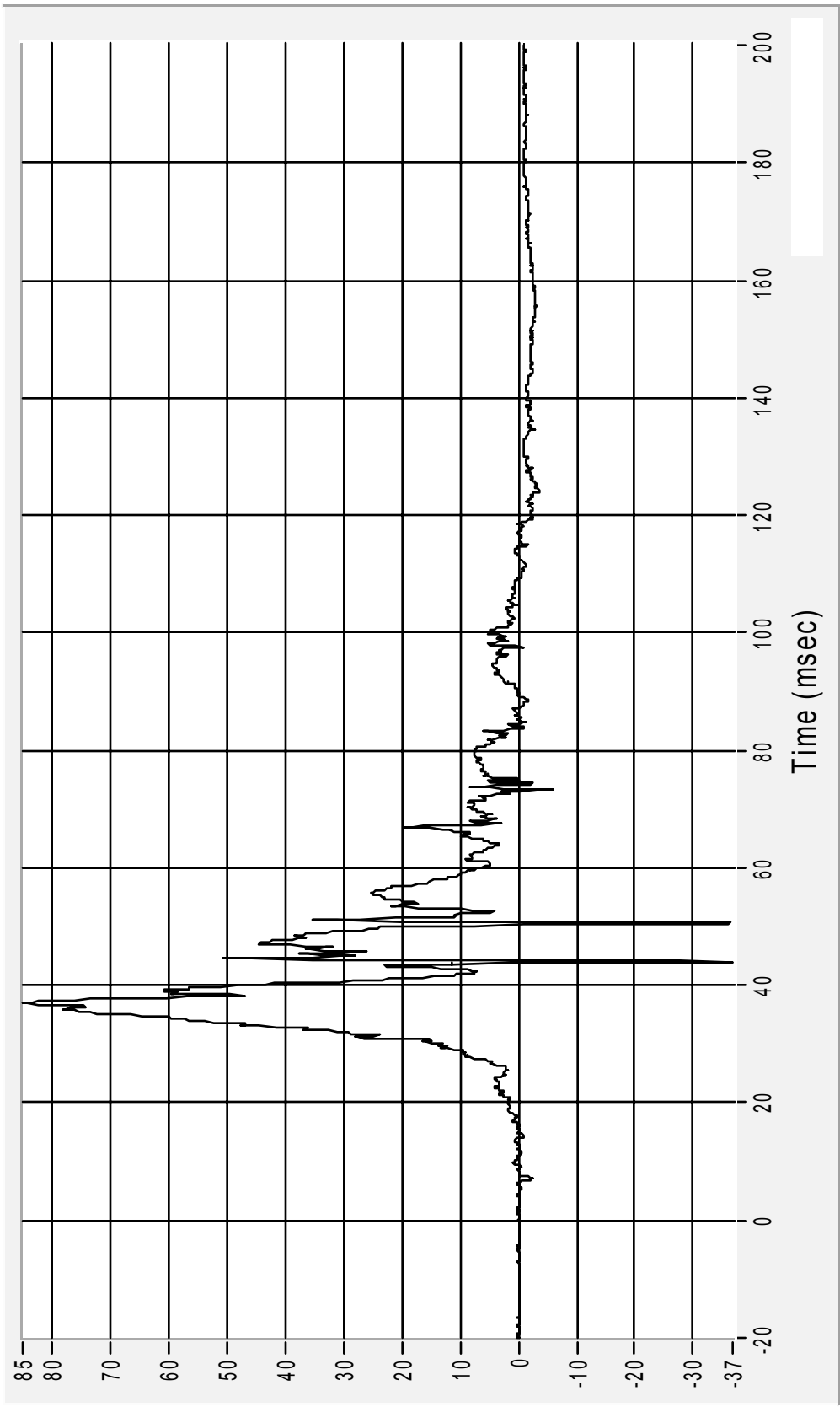


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Passenger Upper Rib (Y) Acceleration
 Acceleration (G's) CFC1000

Max	85.1	G	at	37.0	msec
Min	-36.8	G	at	44.1	msec

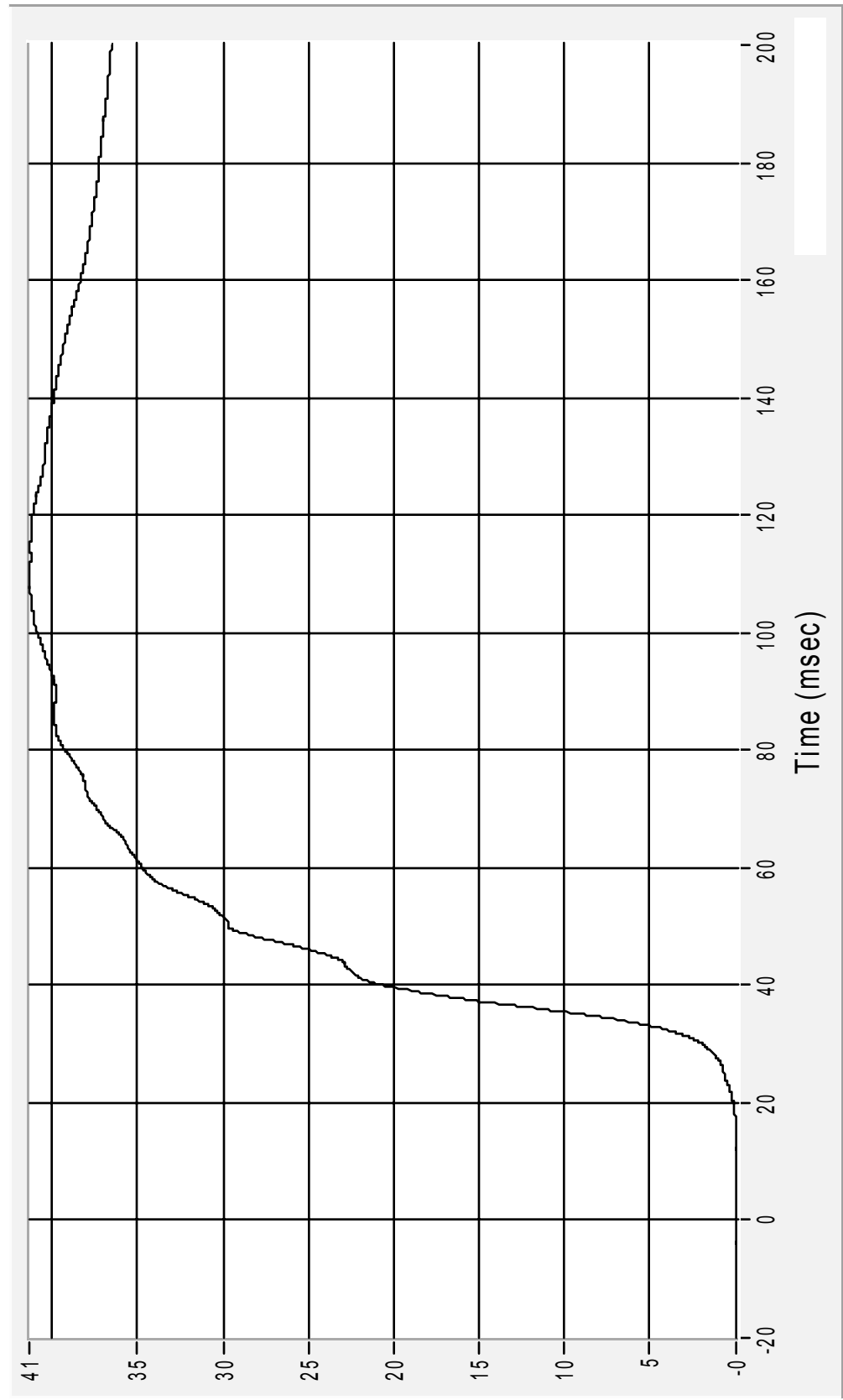


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Max 41.3 km/h at 109.3 msec
Min 0.0 km/h at 8.6 msec

Passenger Upper Rib (Y) Velocity
CFC180

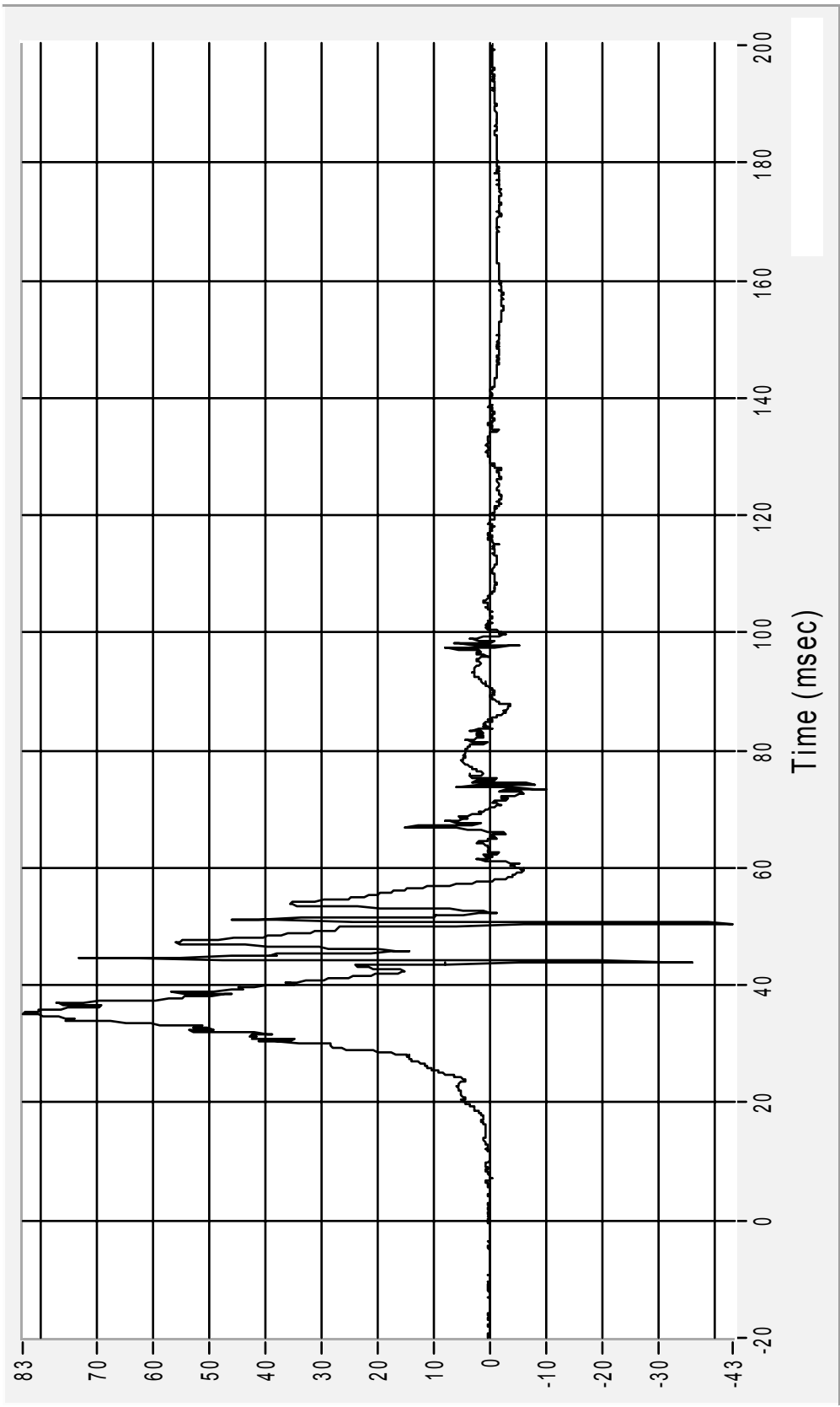


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Passenger Lower Rib (Y) Acceleration
 Acceleration (G's) CFC1000

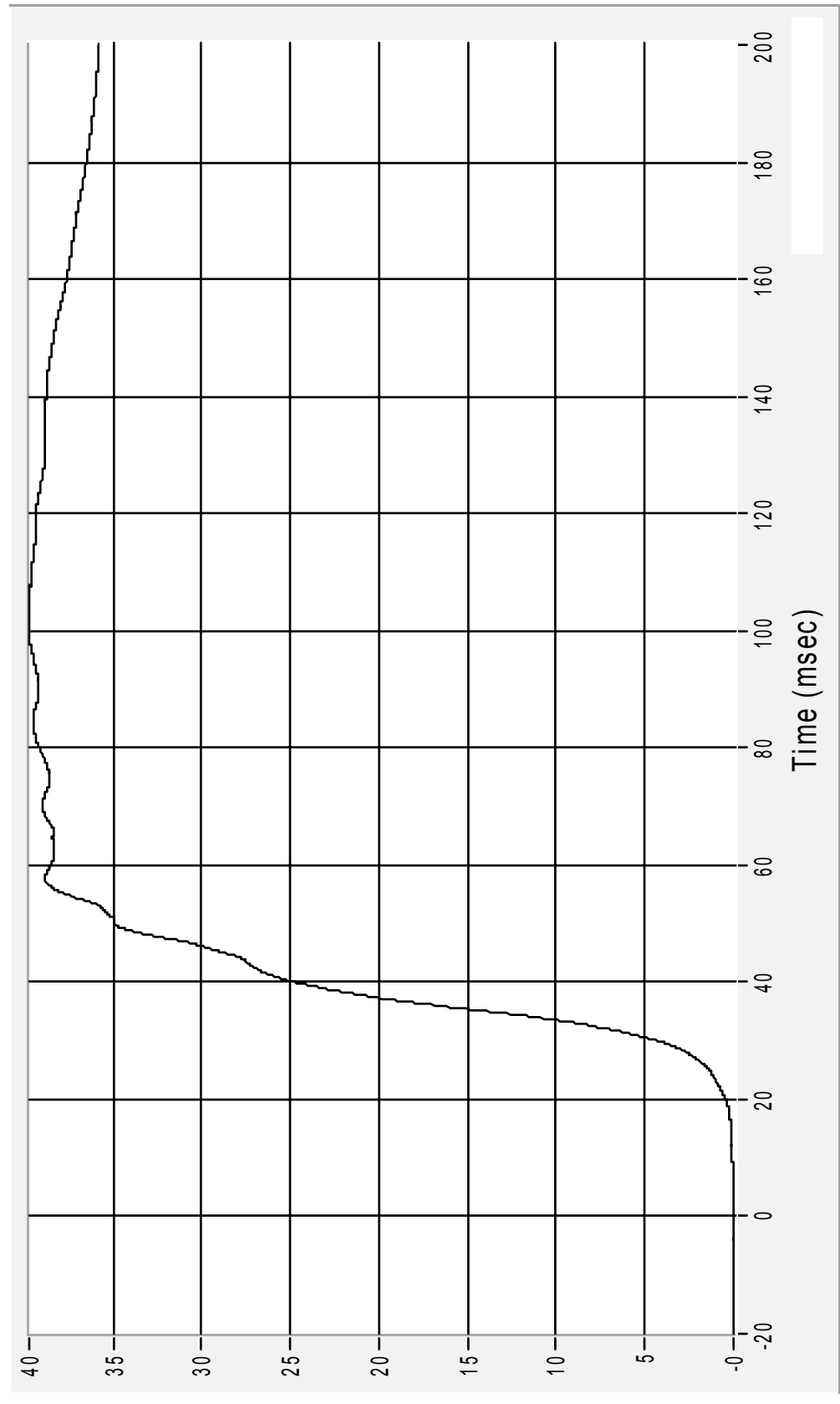
Max	83.1	G	at	35.3	msec
Min	-43.4	G	at	50.6	msec



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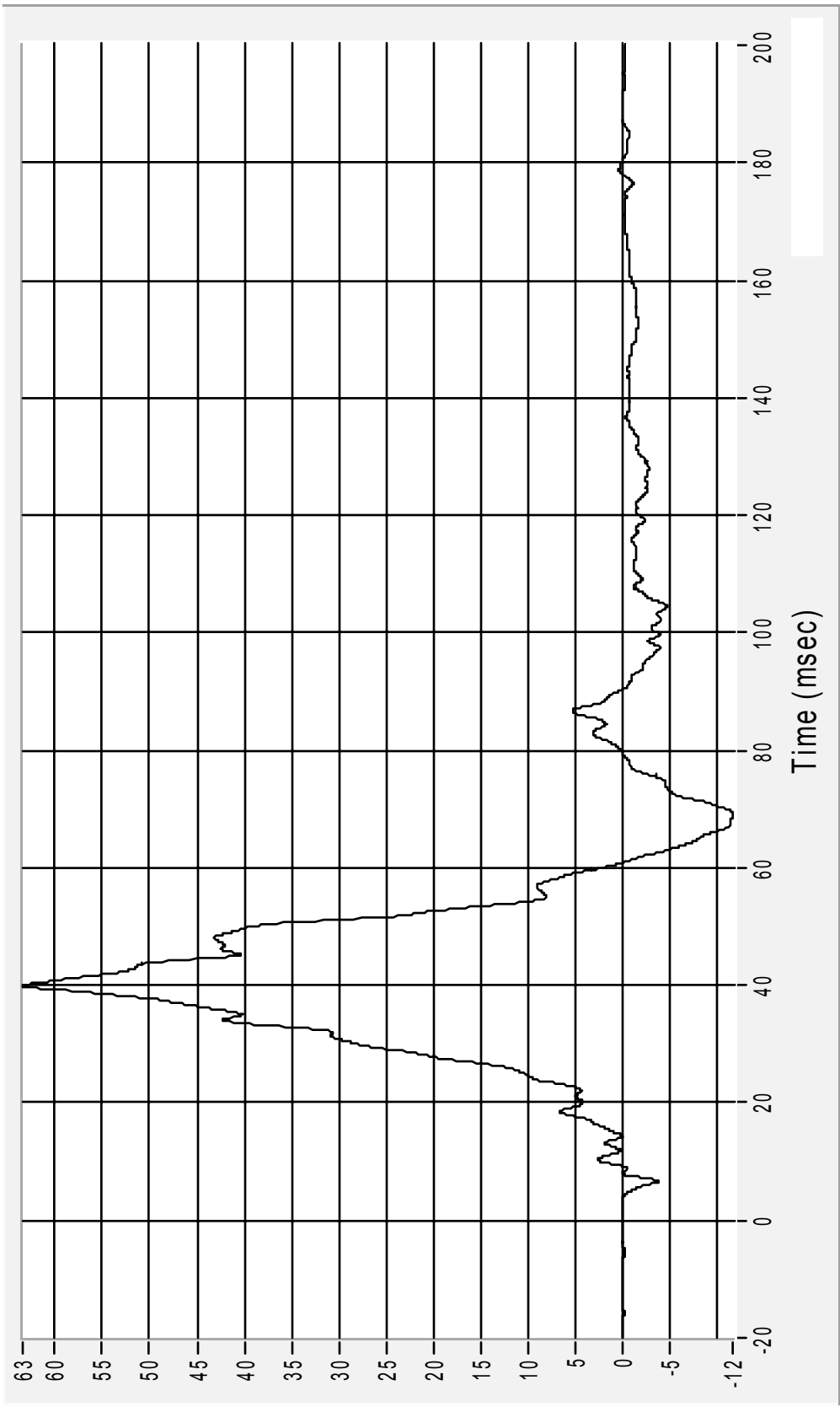
Passenger Lower Rib (Y) Velocity
 Velocity (km/h) CFC180
 Max 39.7 km/h at 99.1 msec
 Min 0.0 km/h at 0.0 msec



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Passenger Lower Spine (Y) Acceleration
 Acceleration (G's) CFC180

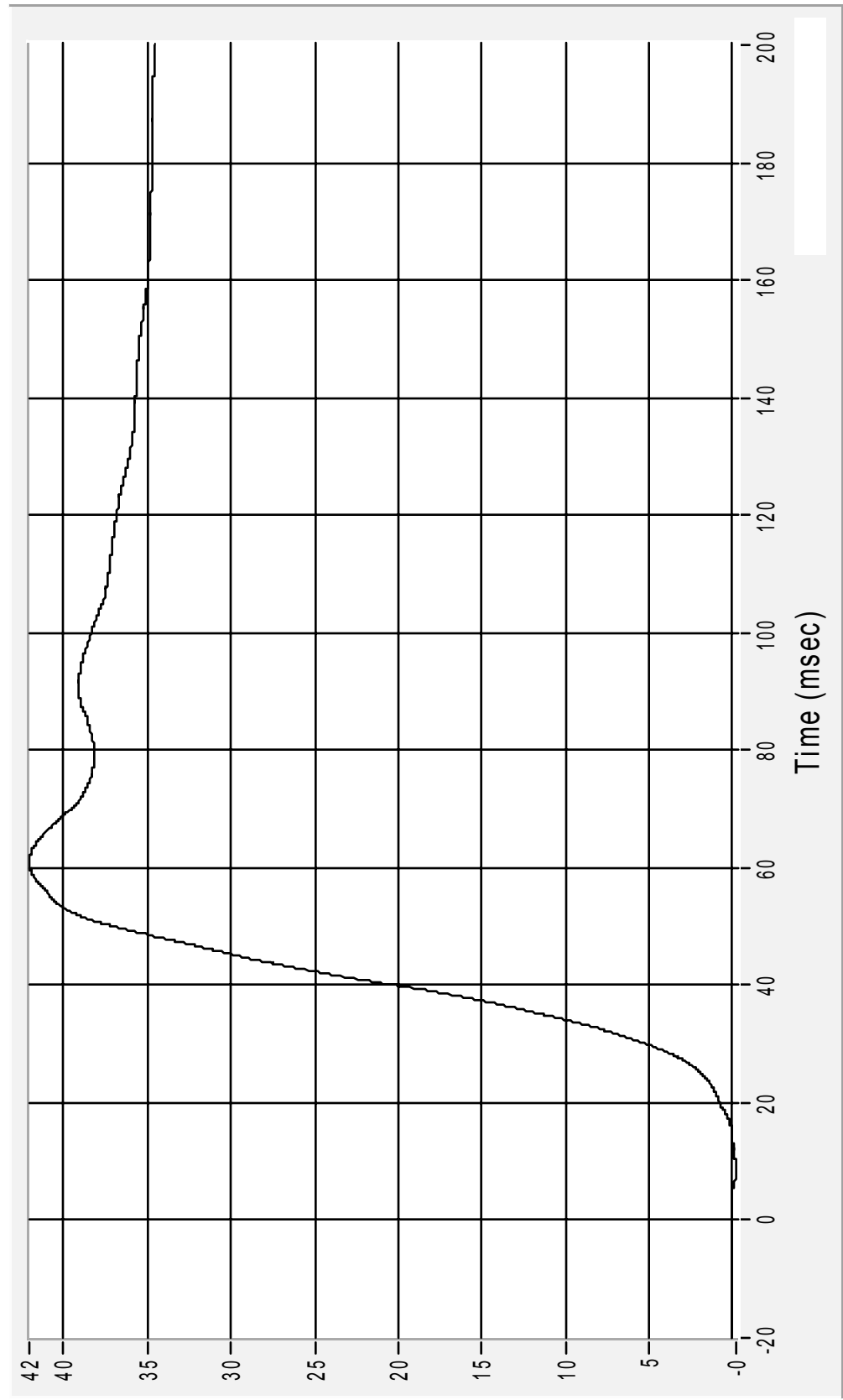
Max	63.4	G	at	39.9	msec
Min	-11.6	G	at	69.4	msec



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Passenger Lower Spine (Y) Velocity
 Velocity (km/h) CFC180

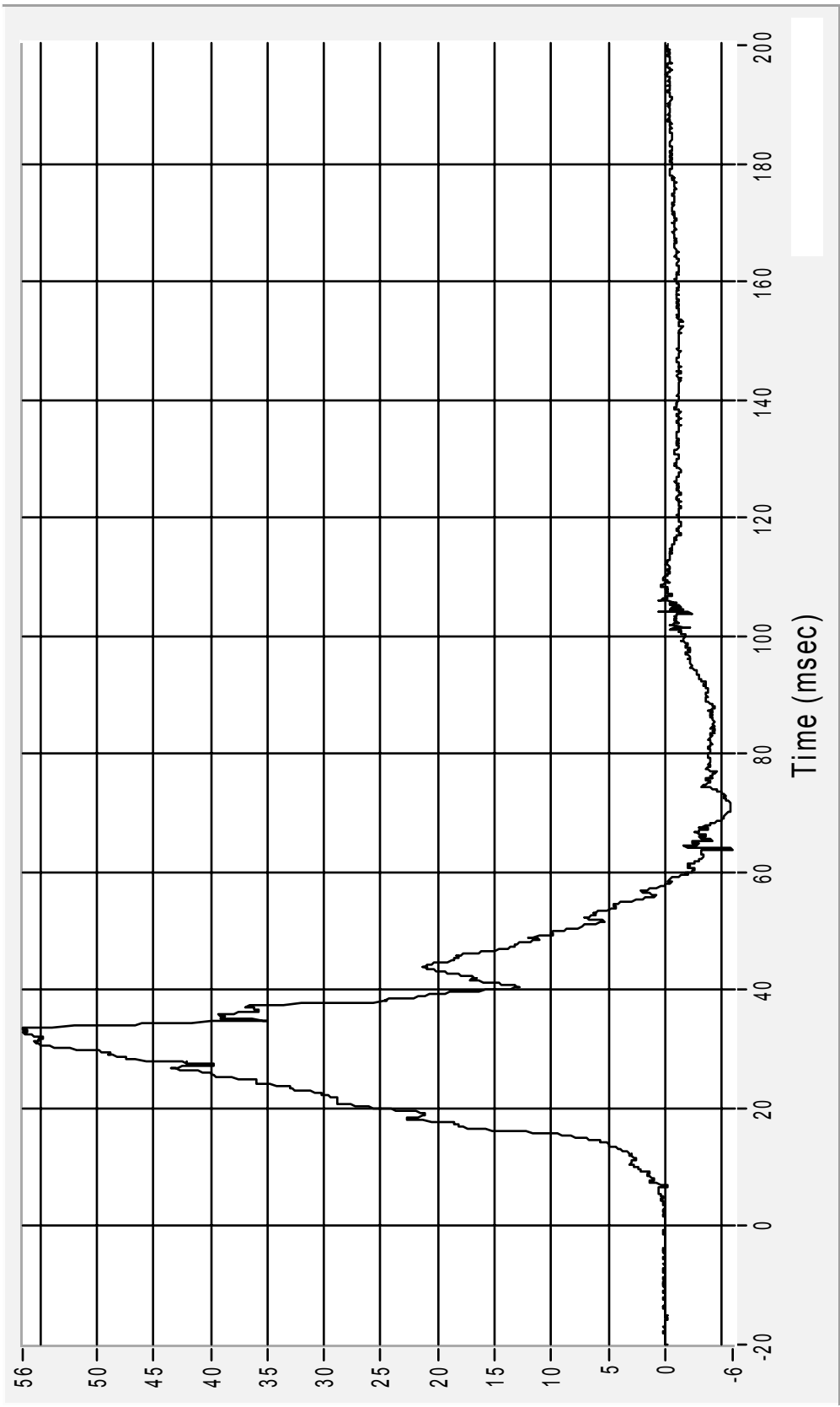
Max	42.1	km/h	at	60.9	msec
Min	-0.2	km/h	at	9.2	msec



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Passenger Pelvic (Y) Acceleration
 Acceleration (G's) CFC1000

Max	56.5	G	at	33.5	msec
Min	-5.9	G	at	63.9	msec

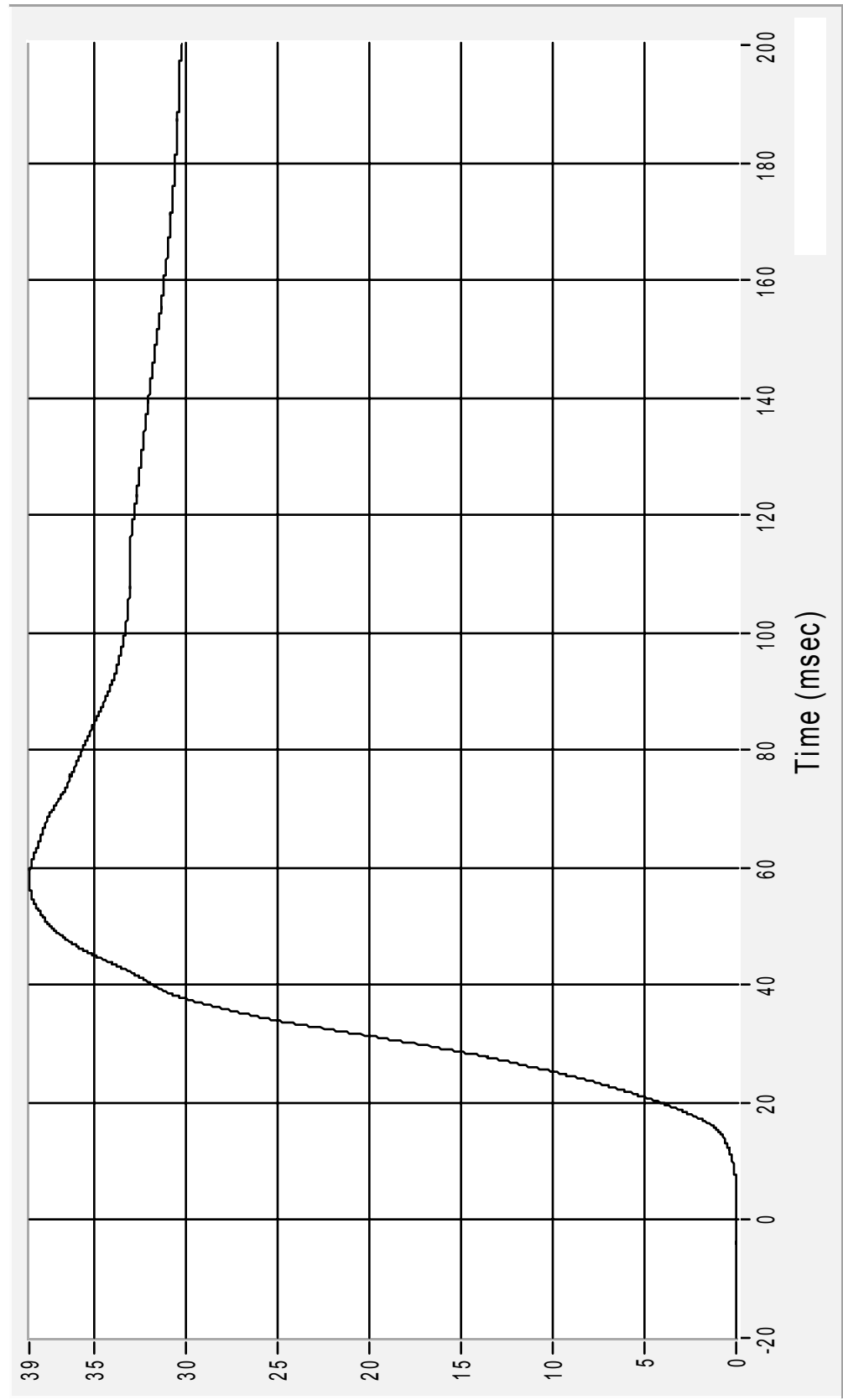


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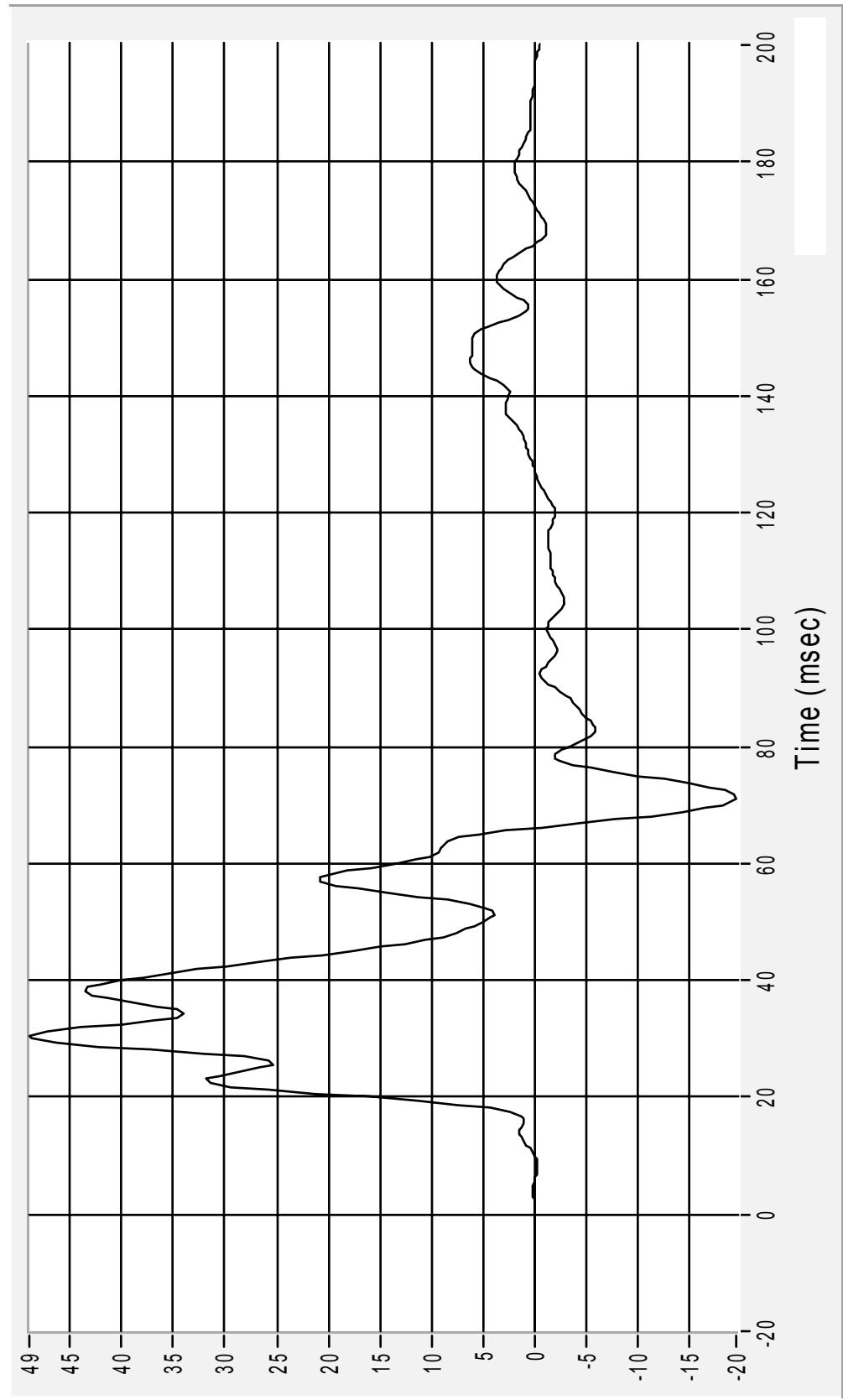
Passenger Pelvic (Y) Velocity
 Velocity (km/h) CFC180

Max	38.6	km/h	at	57.9	msec
Min	0.0	km/h	at	0.0	msec



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Driver Upper Rib (Y) Acceleration
 Acceleration (G's) FIR100
 Max 49.0 G at 30.6 msec
 Min -19.6 G at 71.2 msec

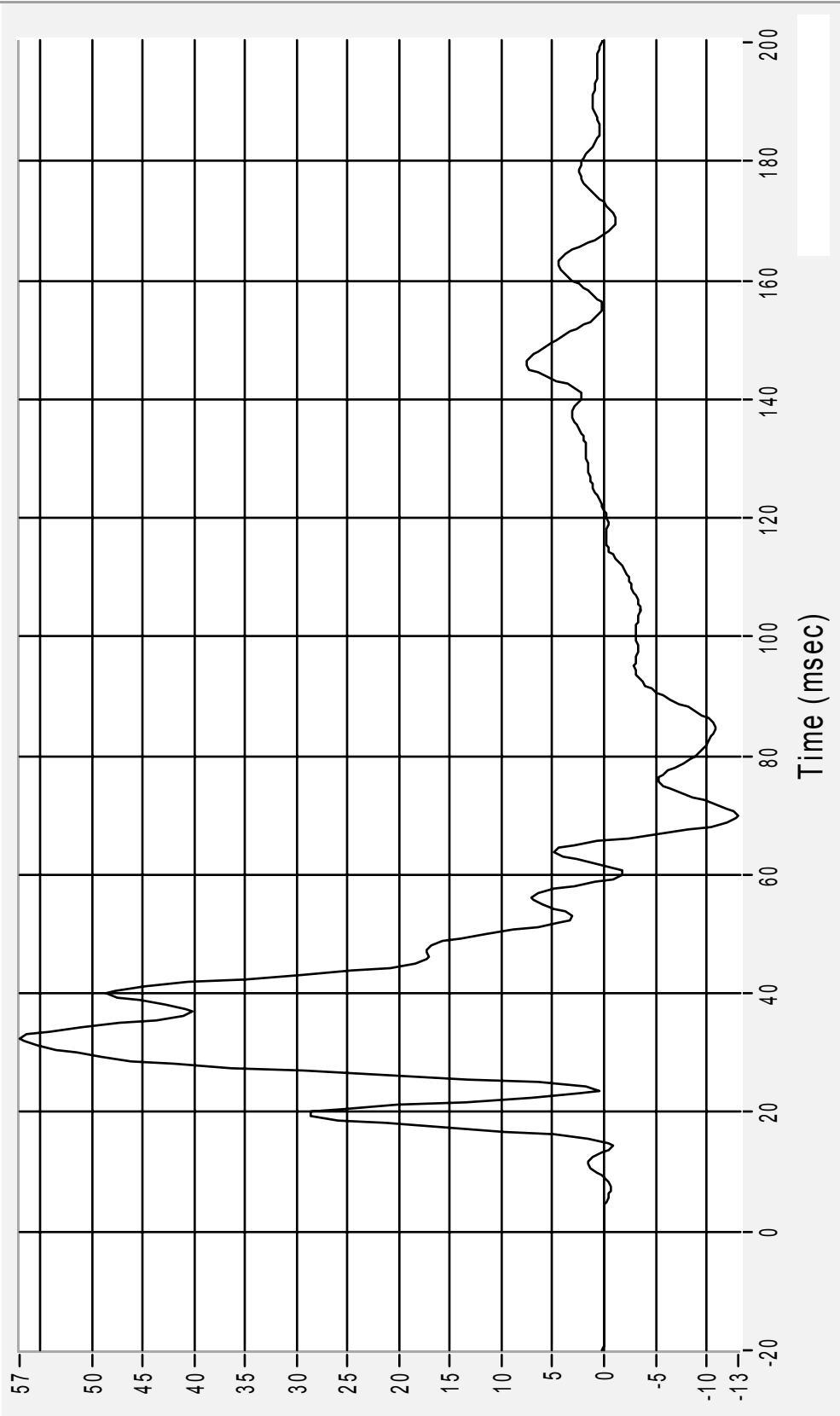


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Driver Lower Rib (Y) Acceleration

Acceleration (G's) FIR100

Max 57.1 G at 32.5 msec
Min -13.1 G at 70.0 msec



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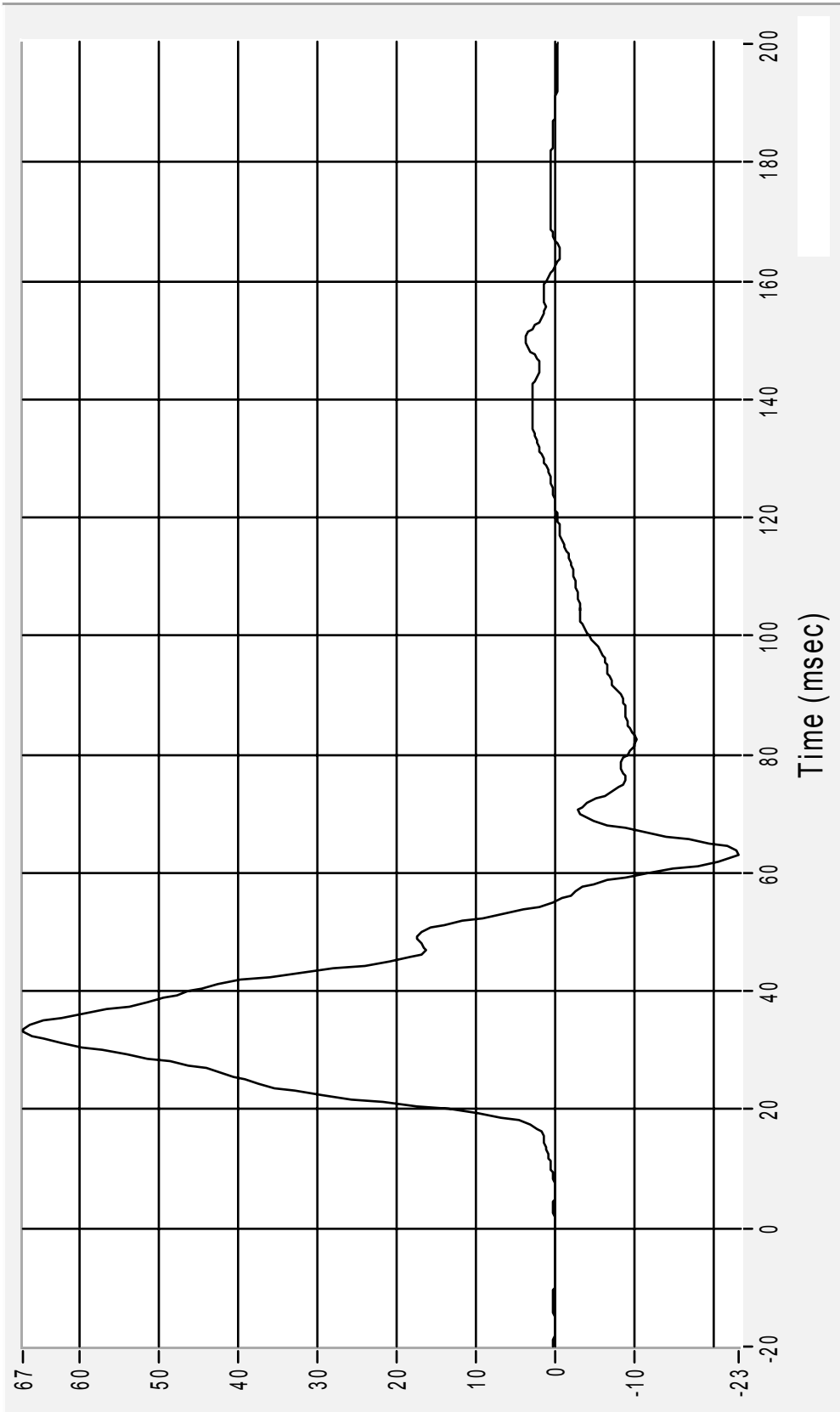
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Driver Lower Spine (Y) Acceleration

Acceleration (G's) FIR100

Max 67.0 G at 33.8 msec
Min -23.3 G at 63.1 msec

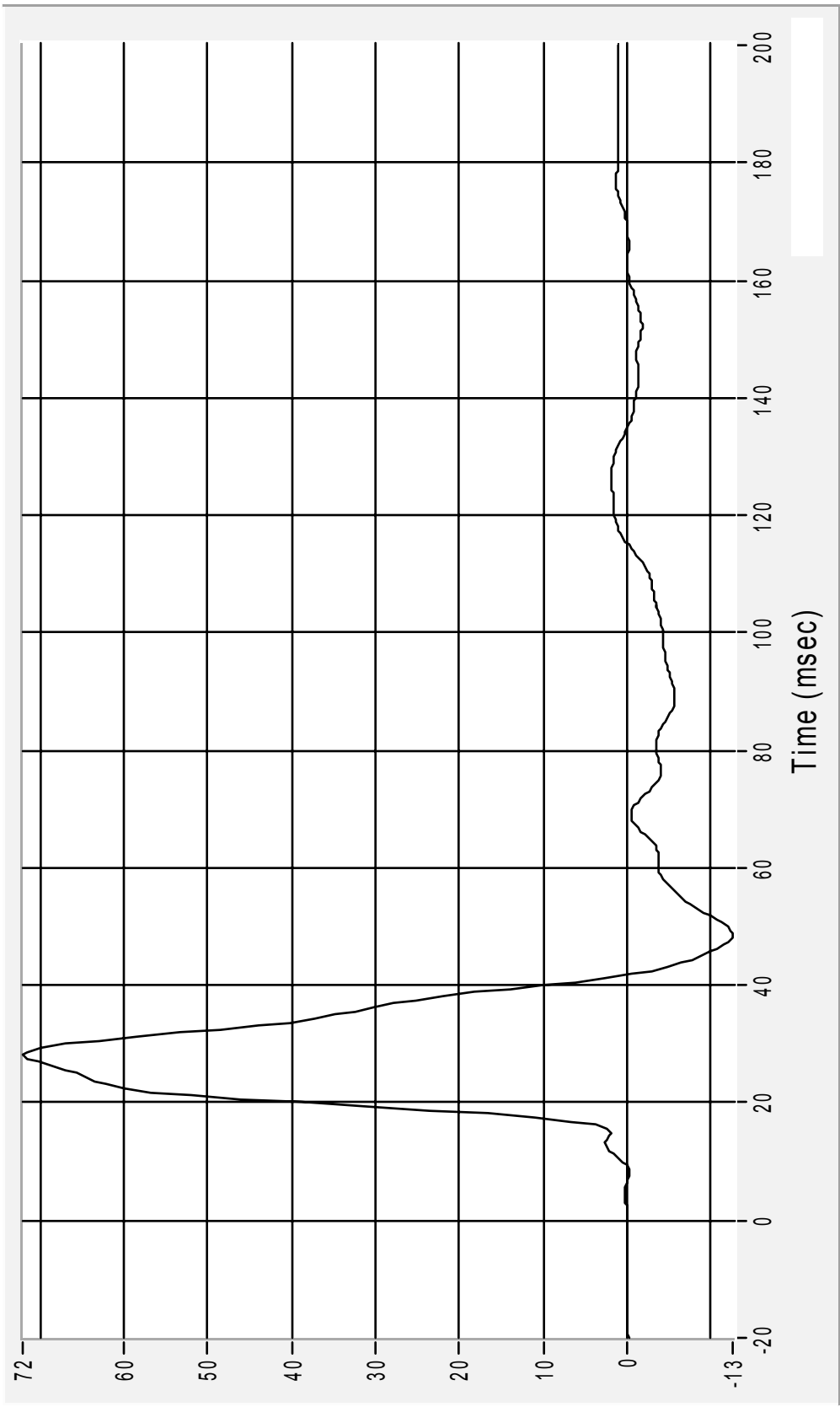


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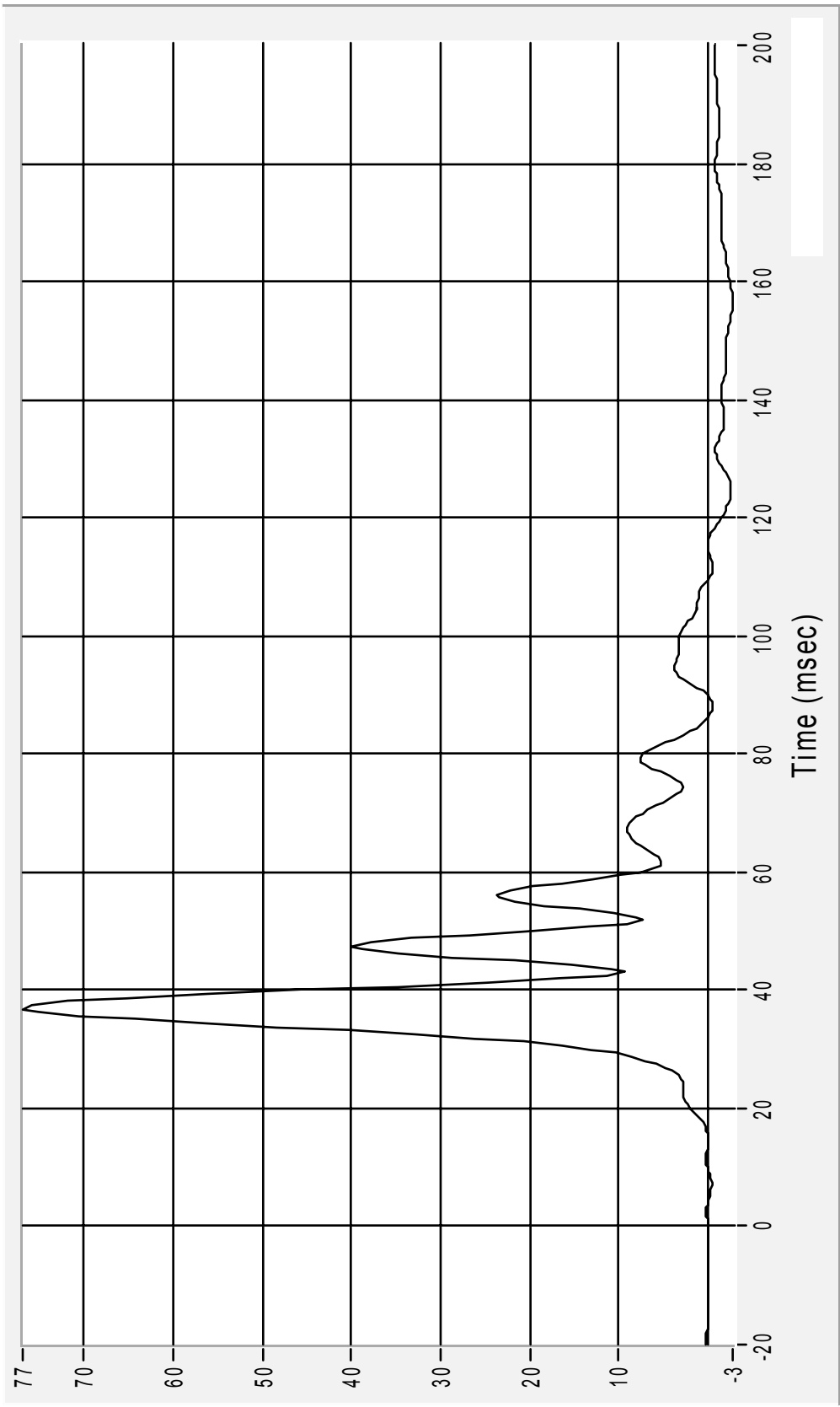
Driver Pelvic (Y) Acceleration
 Acceleration (G's) FIR100
 Max 72.1 G at 28.1 msec
 Min -12.5 G at 48.8 msec



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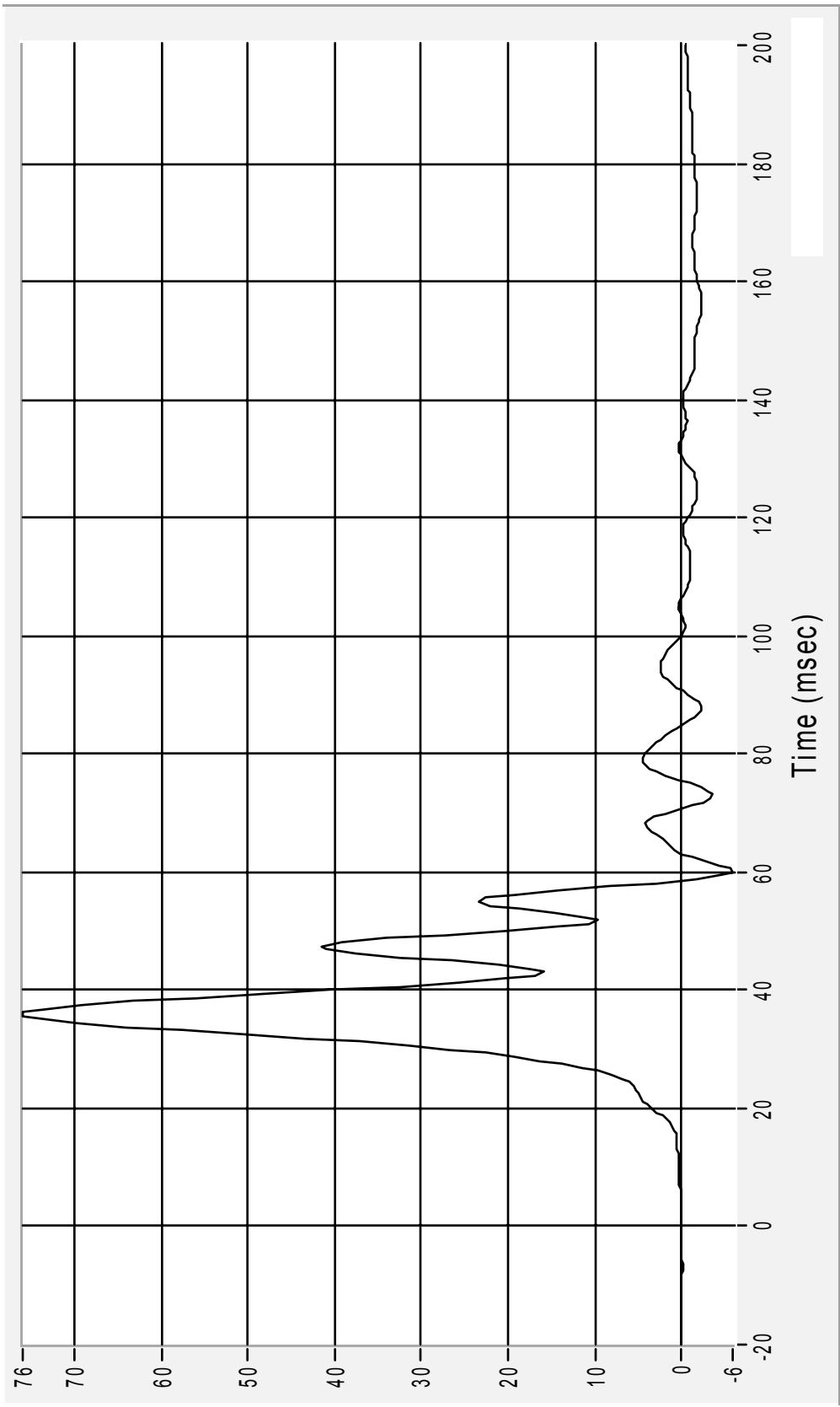
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Passenger Upper Rib (Y) Acceleration
 Acceleration (G's) FIR100
 Max 76.9 G at 36.9 msec
 Min -2.8 G at 156.2 msec



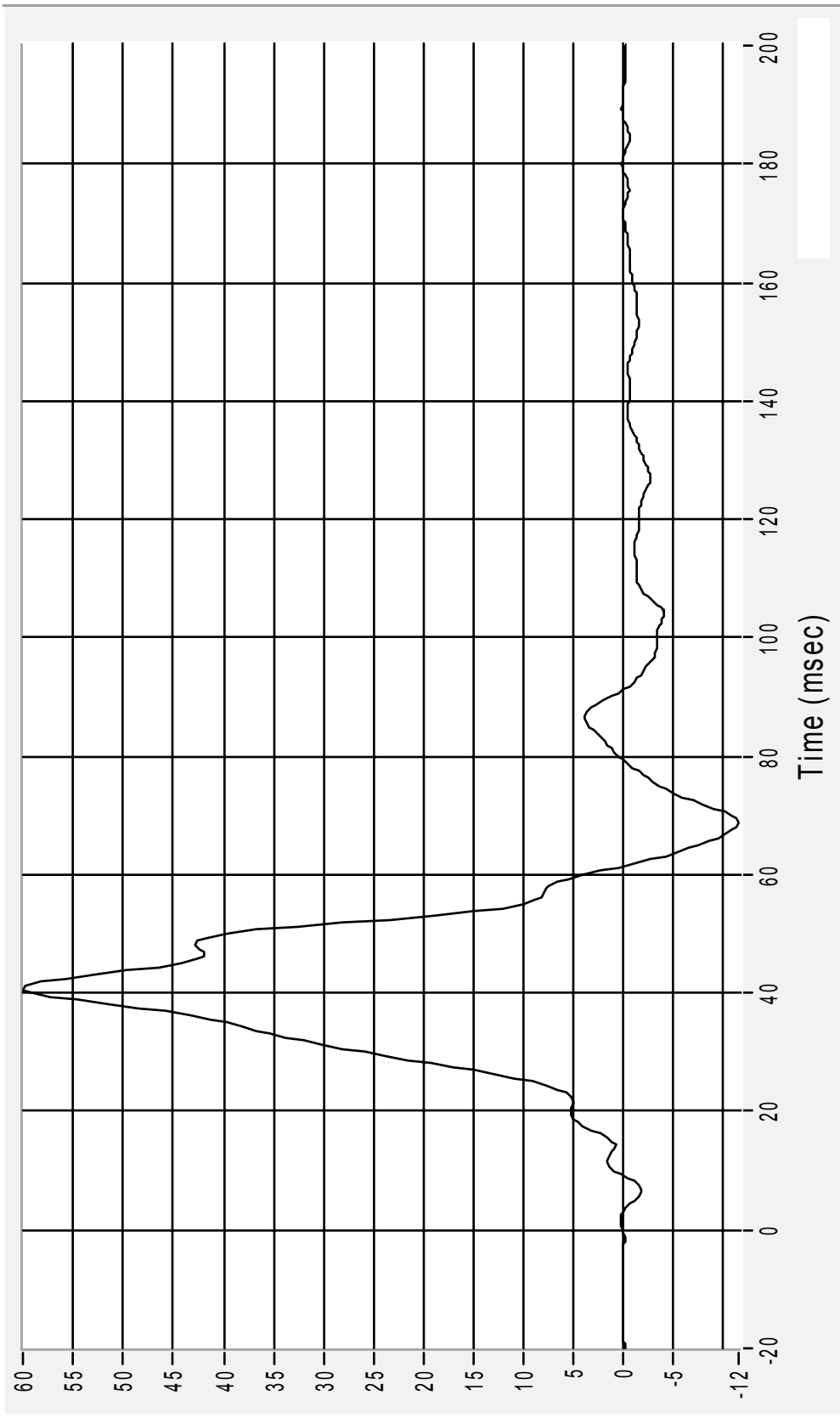
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Passenger Lower Rib (Y) Acceleration
 Acceleration (G's) FIR100
 Max 76.0 G at 35.6 msec
 Min -5.9 G at 60.0 msec



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Passenger Lower Spine (Y) Acceleration
 Acceleration (G's) FIR100
 Max 60.1 G at 40.6 msec
 Min -11.6 G at 68.8 msec

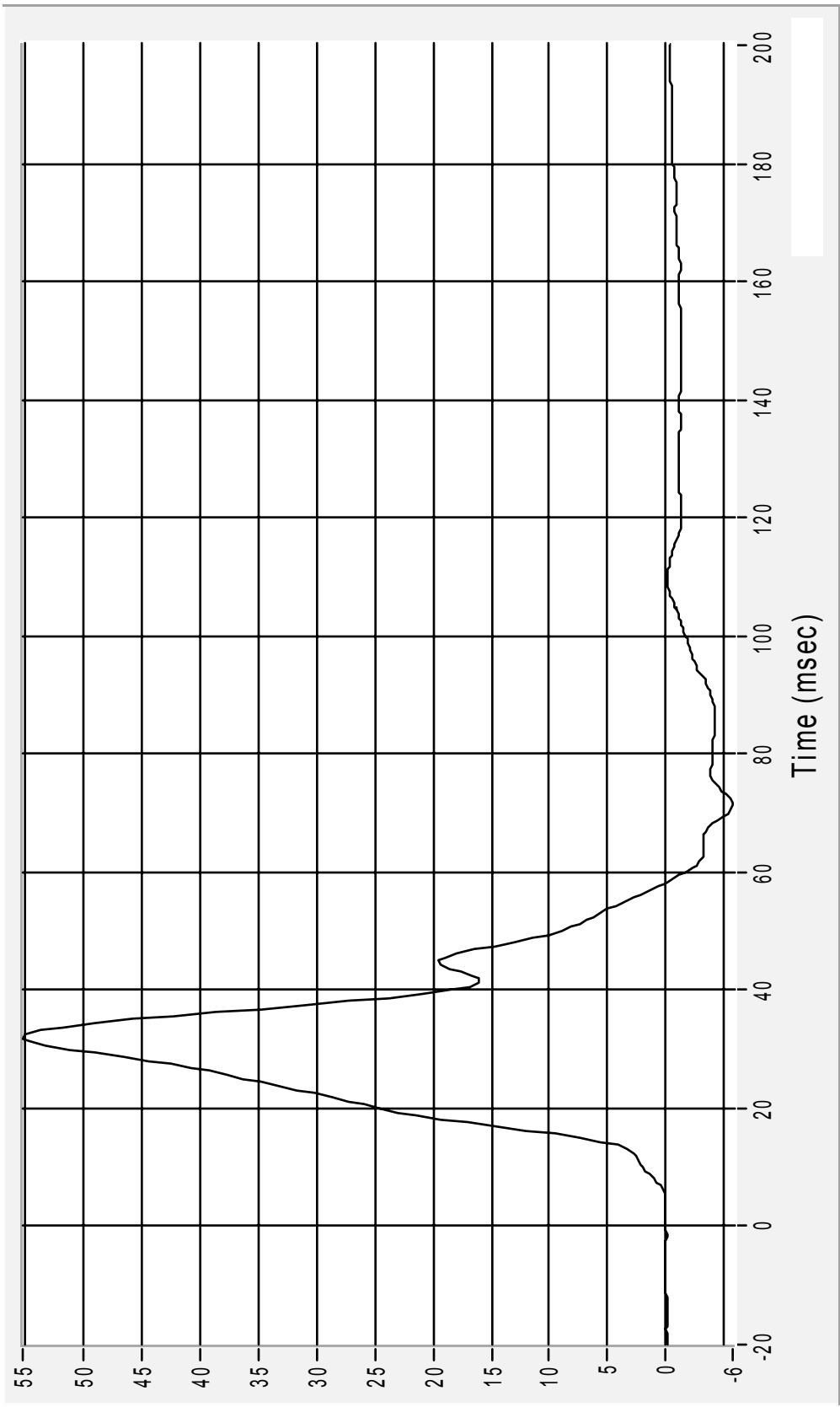


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Max 55.2 G at 31.9 msec
 Min -5.7 G at 71.2 msec

Passenger Pelvic (Y) Acceleration
 Acceleration (G's) FIR100



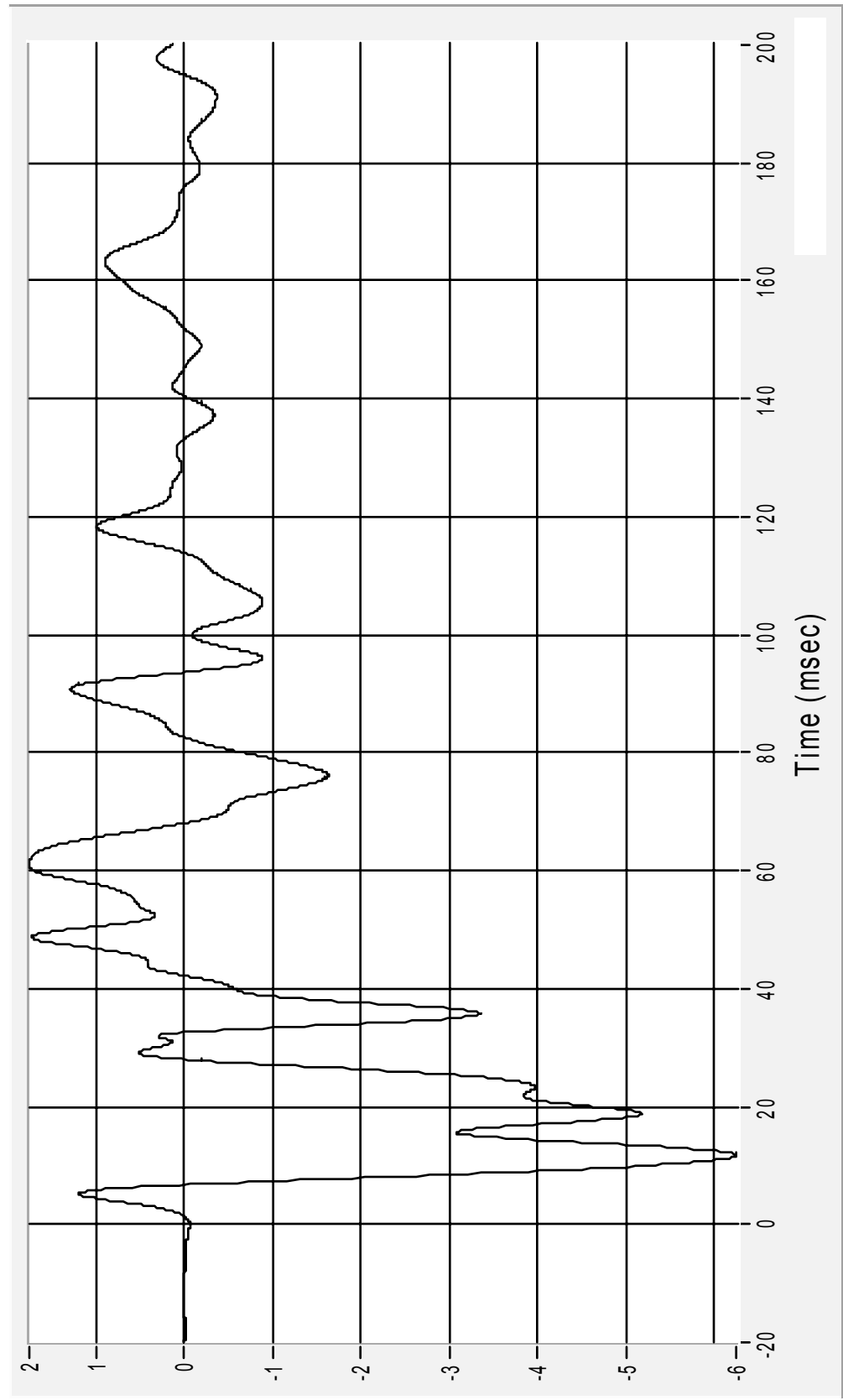
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 16 December 2003

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 Vehicle Crashworthiness Lab

Max 1.8 G at 61.0 msec
Min -6.3 G at 11.8 msec

Right Side Sill at Front Seat (X) Acceleration

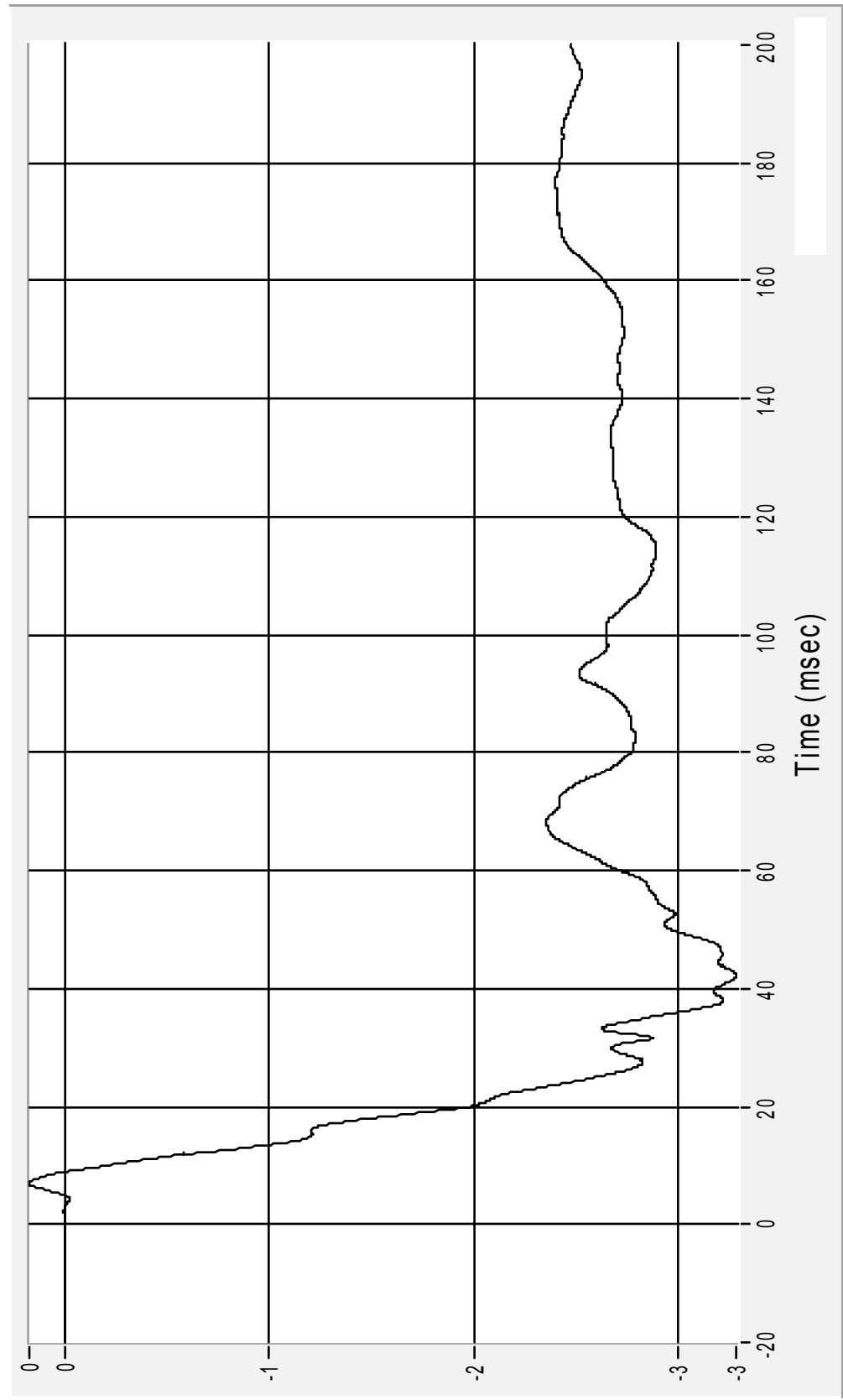
Acceleration (G's) CFC60



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Right Side Sill at Front Seat (X) Velocity
 Velocity (km/h) CFC180
 Max 0.2 km/h at 7.0 msec
 Min -3.3 km/h at 42.2 msec



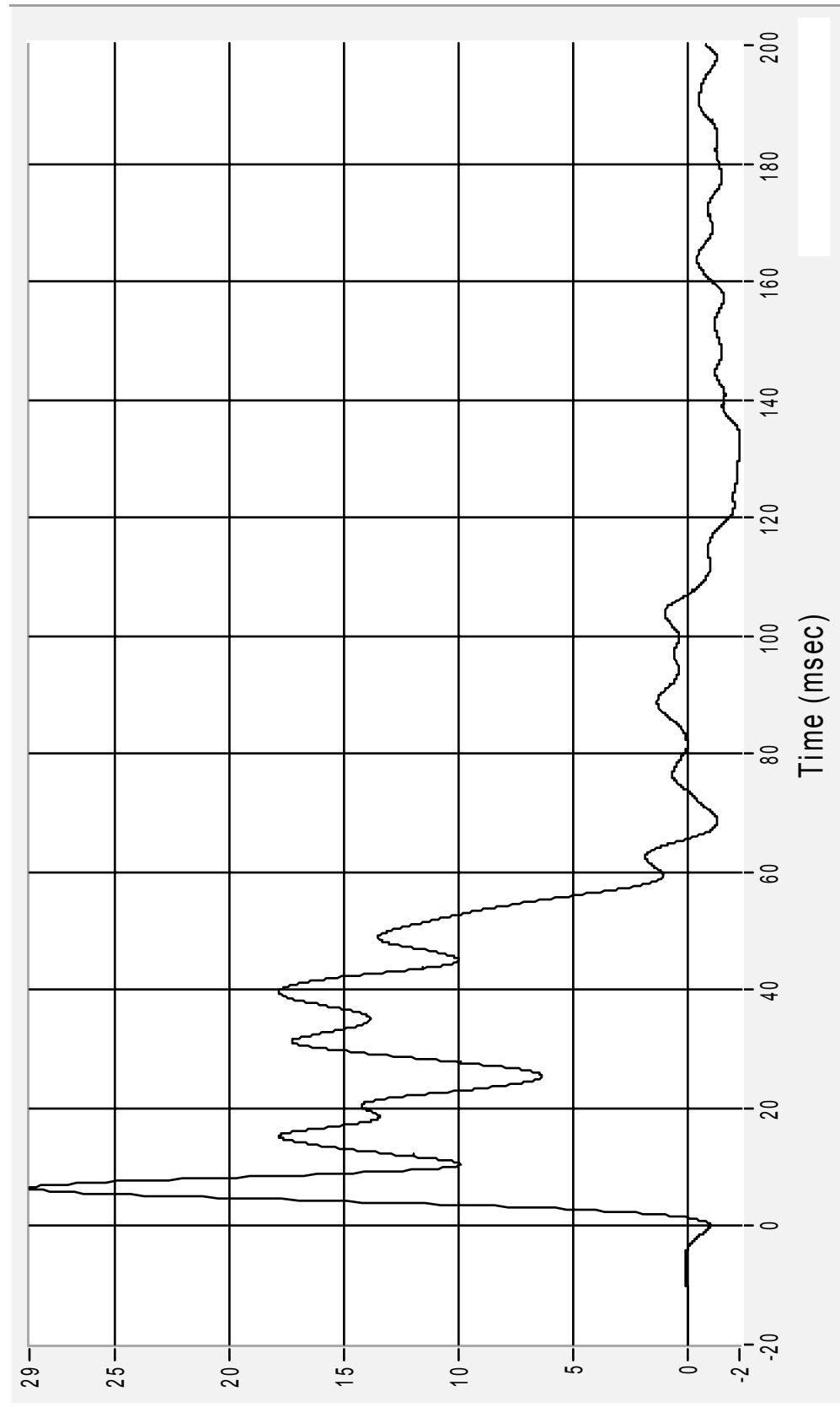
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Max 28.8 G at 6.5 msec
 Min -2.3 G at 133.3 msec

Right Side Sill at Front Seat (Y) Acceleration

Acceleration (G's) CFC60



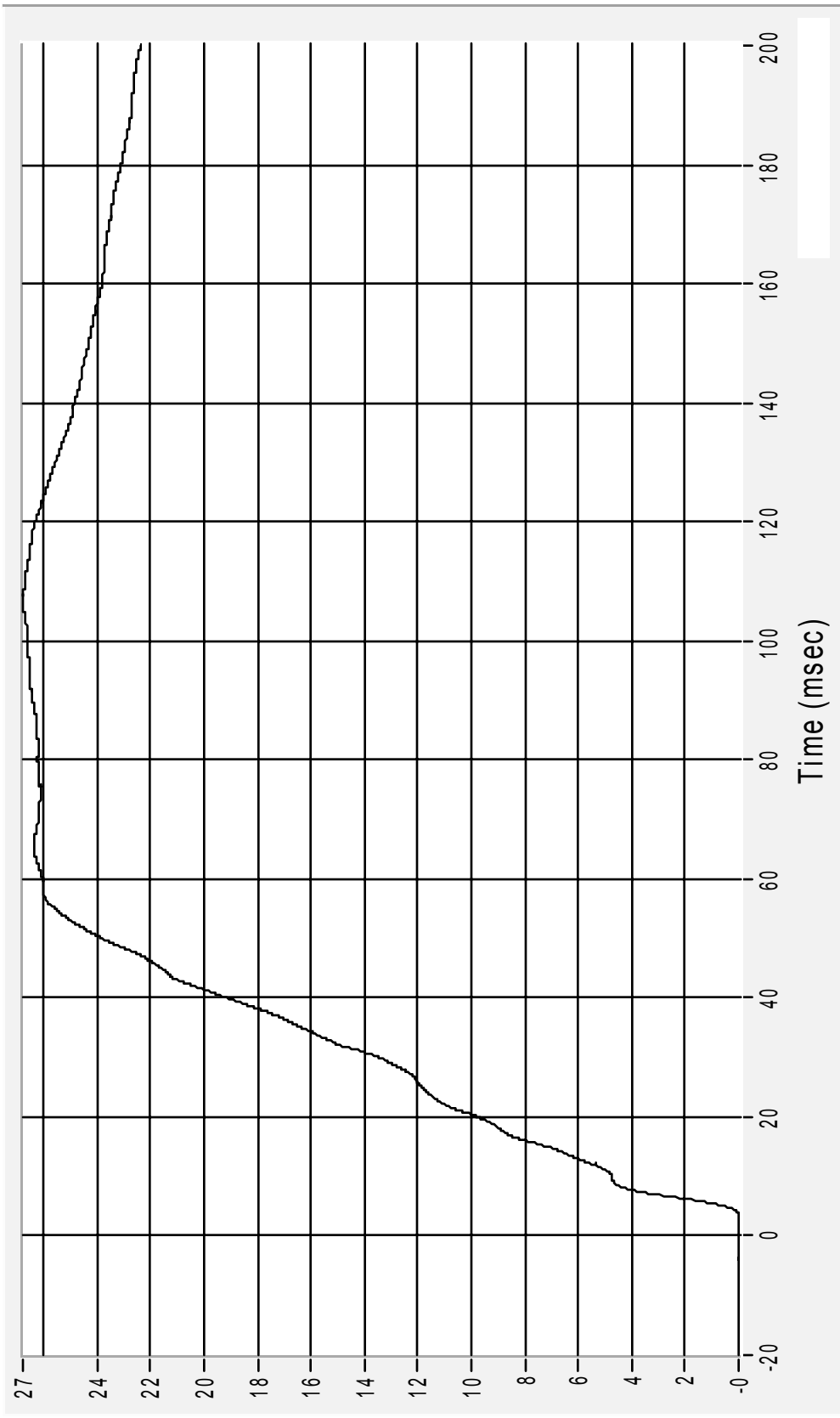
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Max 26.8 km/h at 106.2 msec
 Min 0.0 km/h at 3.0 msec

Right Side Sill at Front Seat (Y) Velocity

Velocity (km/h) CFC180



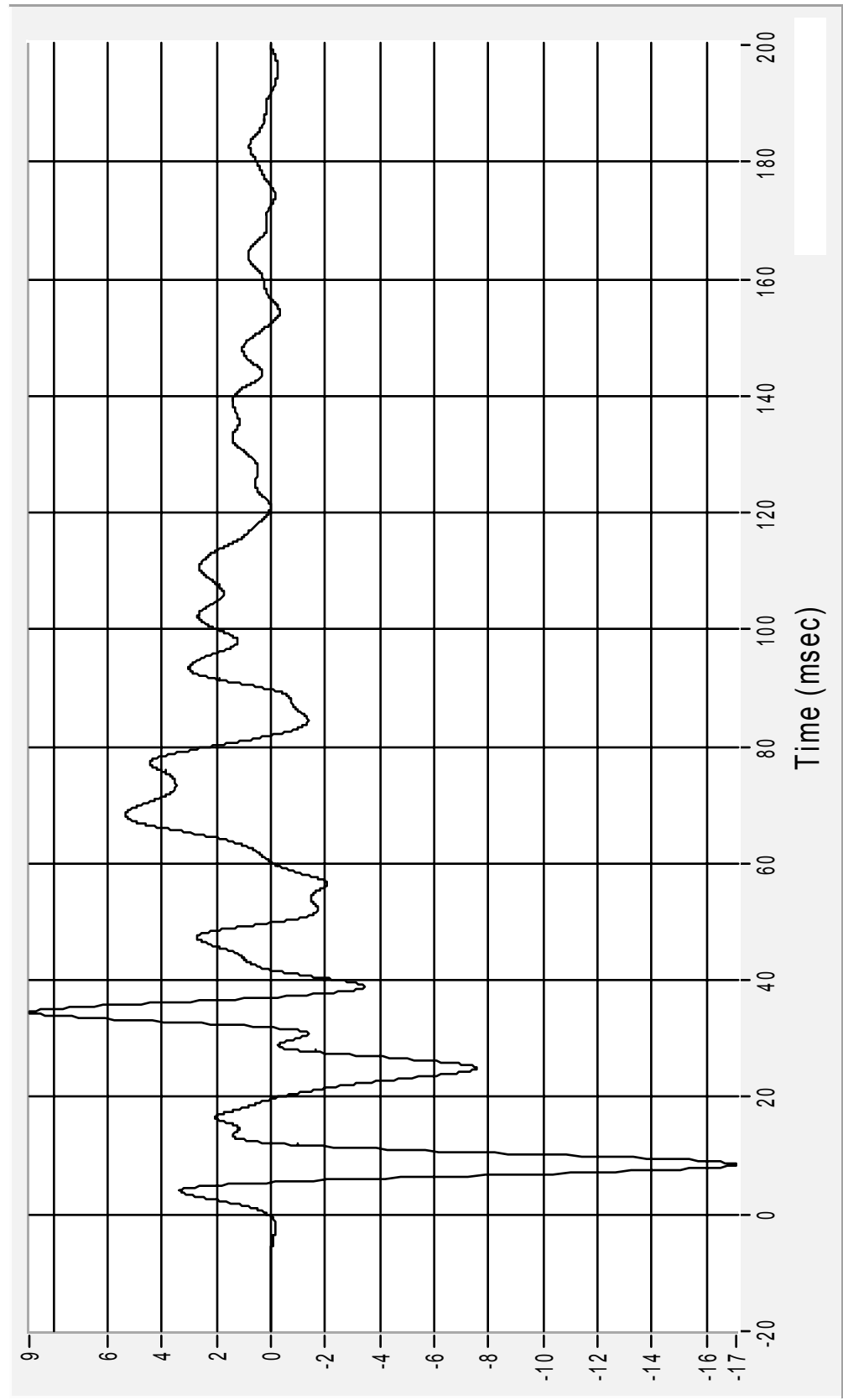
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Max 8.9 G at 34.6 msec
Min -17.1 G at 8.5 msec

Right Side Sill at Front Seat (Z) Acceleration

Acceleration (G's) CFC60



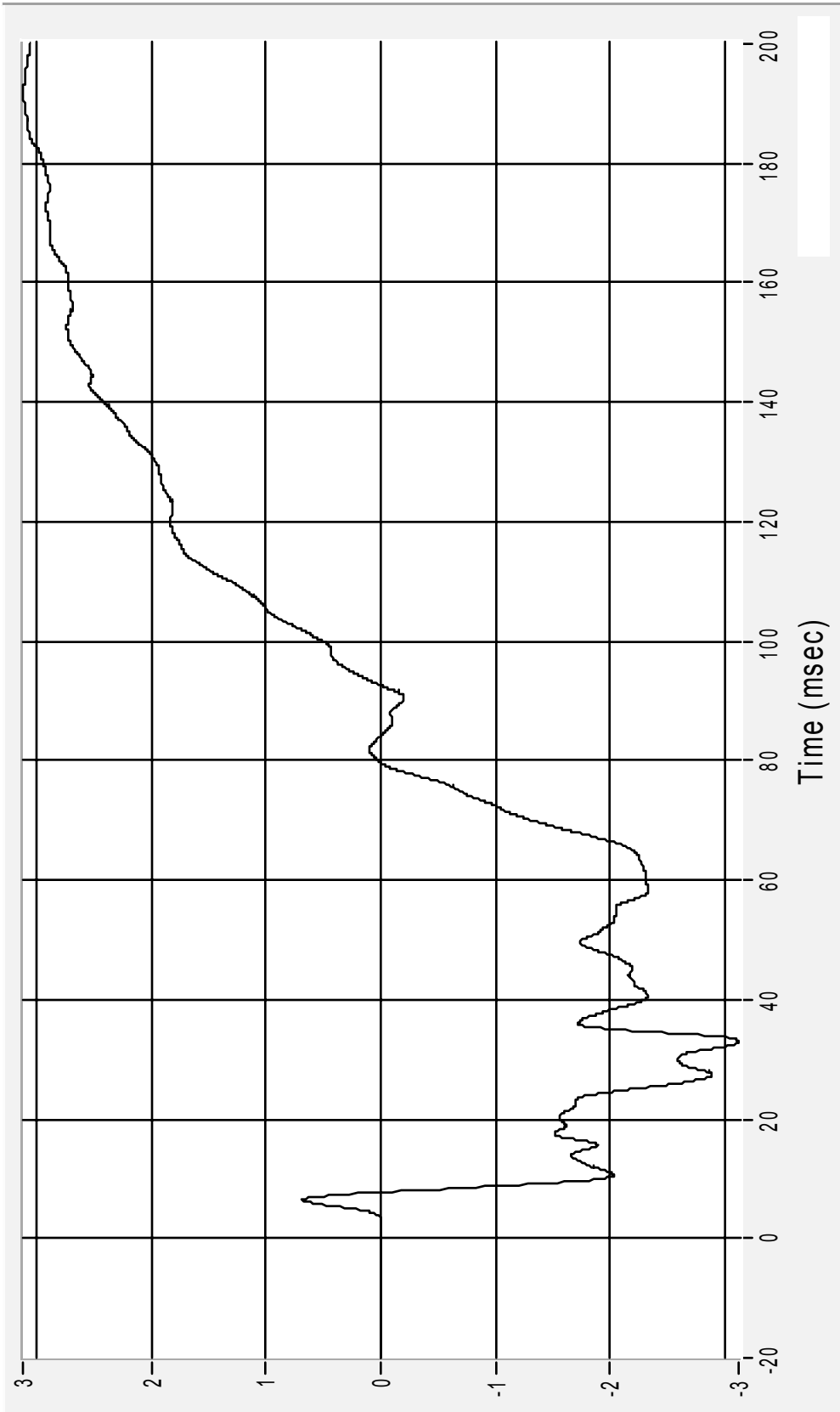
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Right Side Sill at Front Seat (Z) Velocity

Velocity (km/h) CFC180

Max 3.1 km/h at 191.4 msec
Min -3.1 km/h at 33.0 msec



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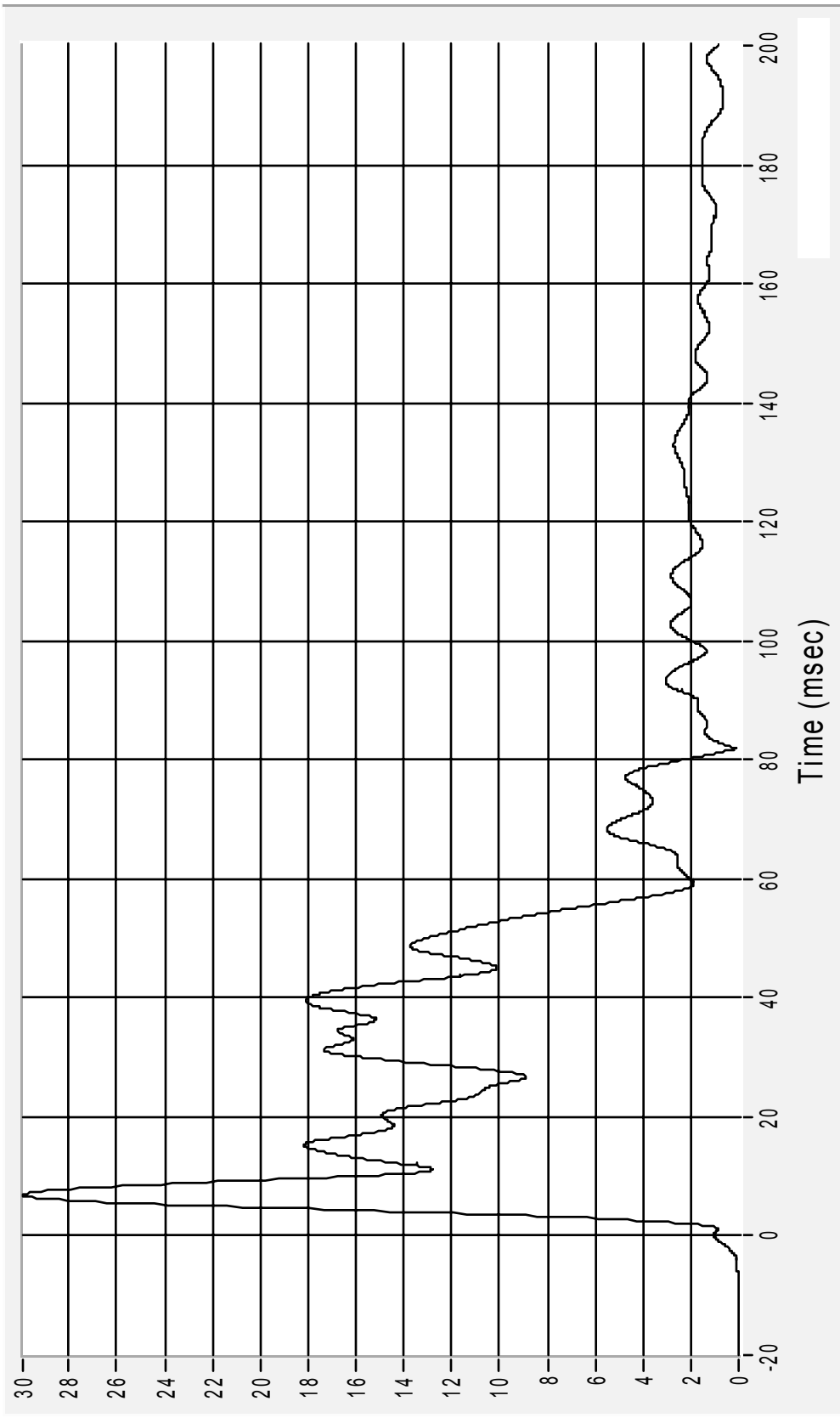
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Vehicle Crashworthiness Lab

Right Side Sill at Front Seat Resultant Acceleration

Acceleration (G's) CFC60

Max 29.9 G's at 6.9 msec
Min 0.1 G's at 81.9 msec



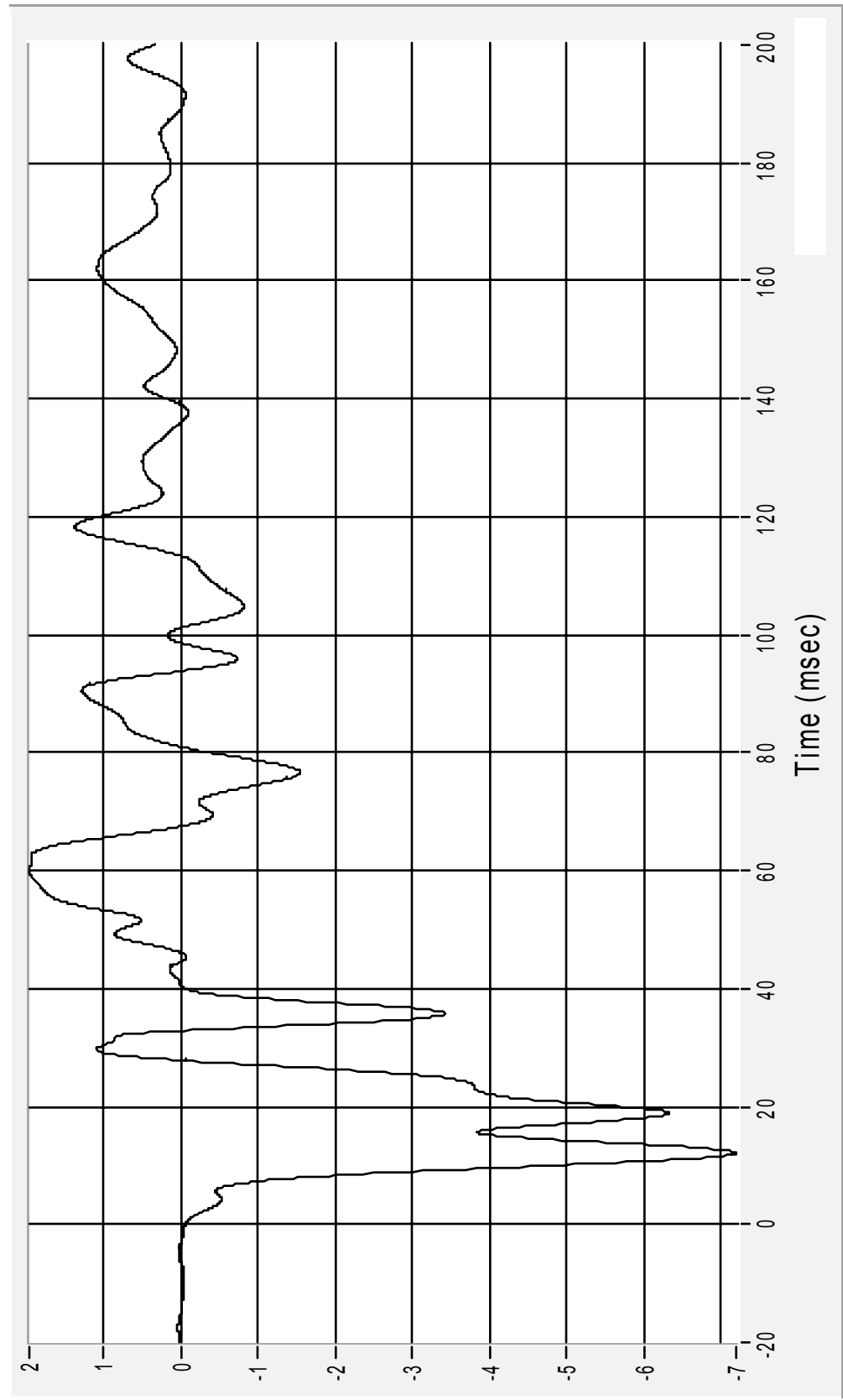
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Vehicle Crashworthiness Lab

Max 2.0 G at 59.8 msec
 Min -7.2 G at 12.1 msec

Right Side Sill at Rear Seat (X) Acceleration

Acceleration (G's) CFC60



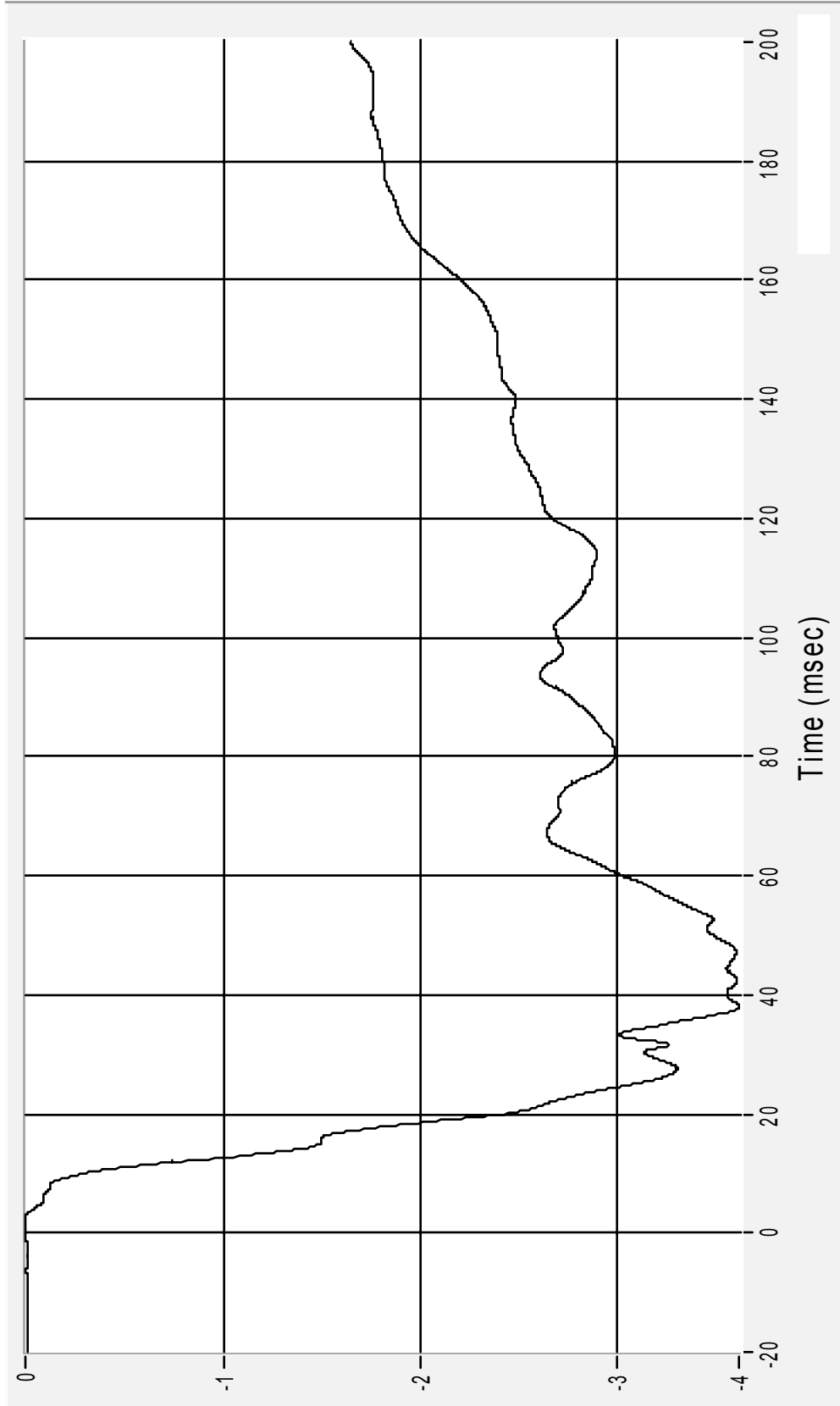
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Right Side Sill at Rear Seat (X) Velocity

Velocity (km/h) CFC180

Max 0.0 km/h at 2.2 msec
Min -3.6 km/h at 38.0 msec



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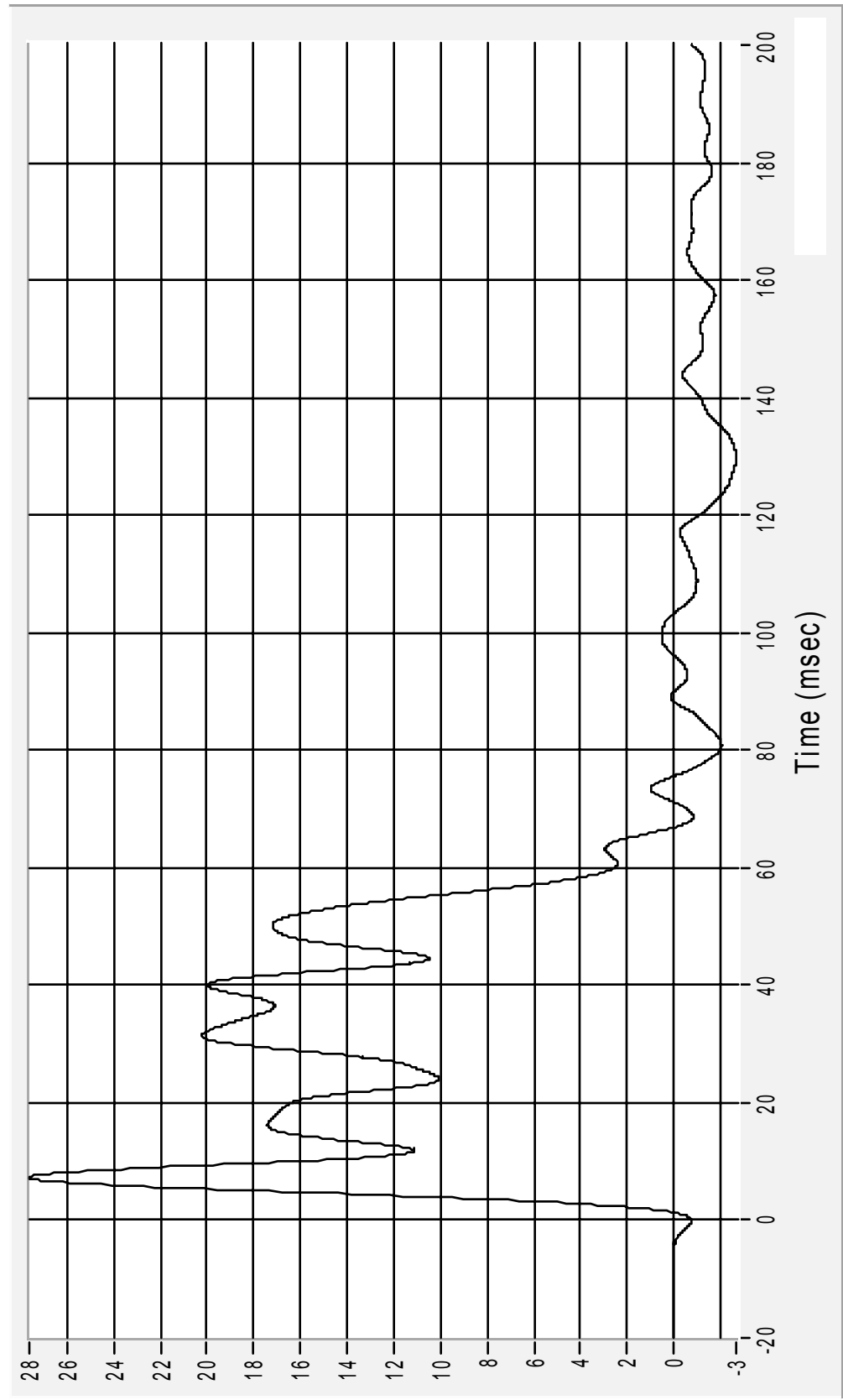
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Max 27.6 G at 7.3 msec
 Min -2.7 G at 129.8 msec

Right Side Sill at Rear Seat (Y) Acceleration

Acceleration (G's) CFC60



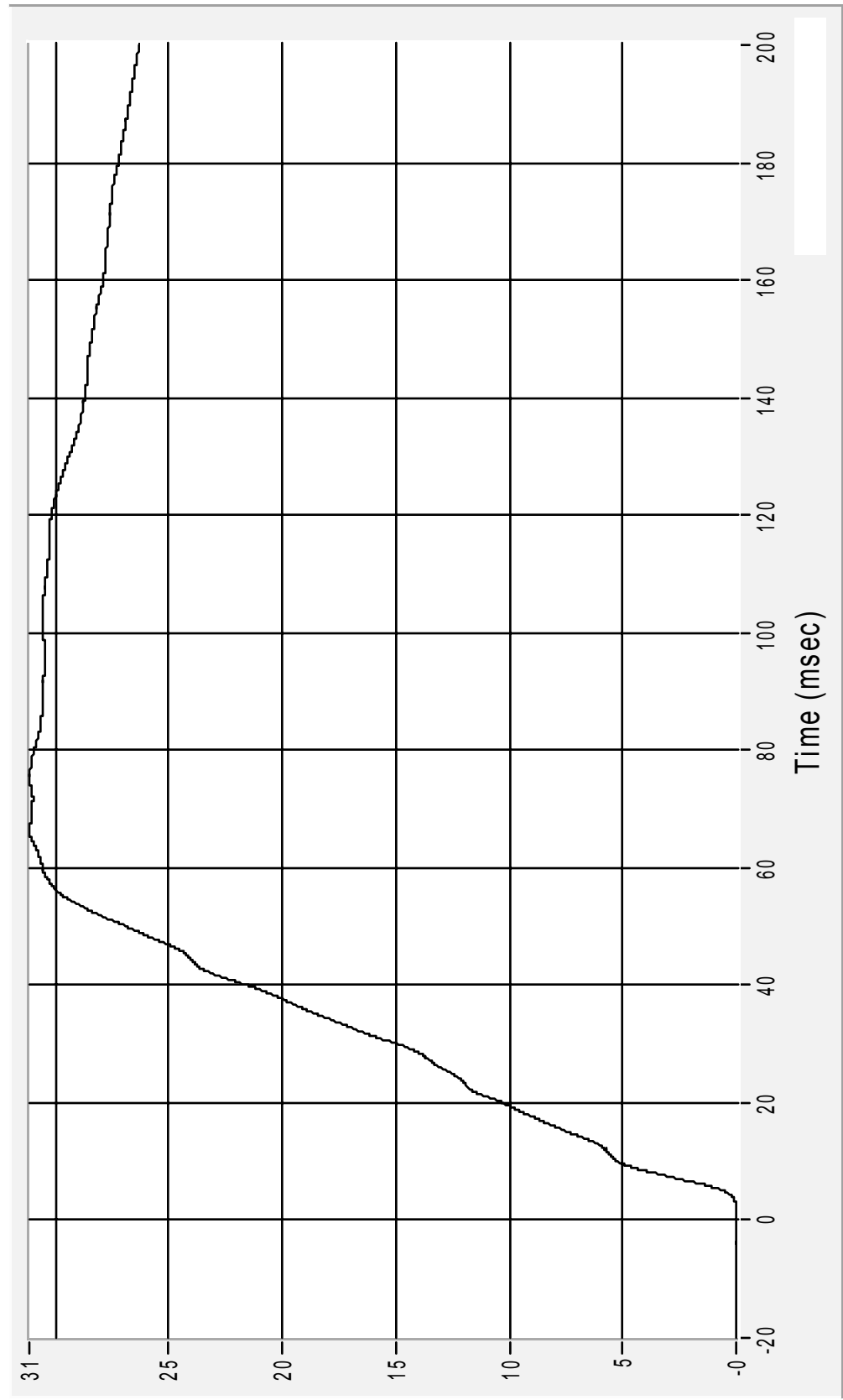
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Max 31.1 km/h at 75.0 msec
 Min 0.0 km/h at 2.2 msec

Right Side Sill at Rear Seat (Y) Velocity

Velocity (km/h) CFC180



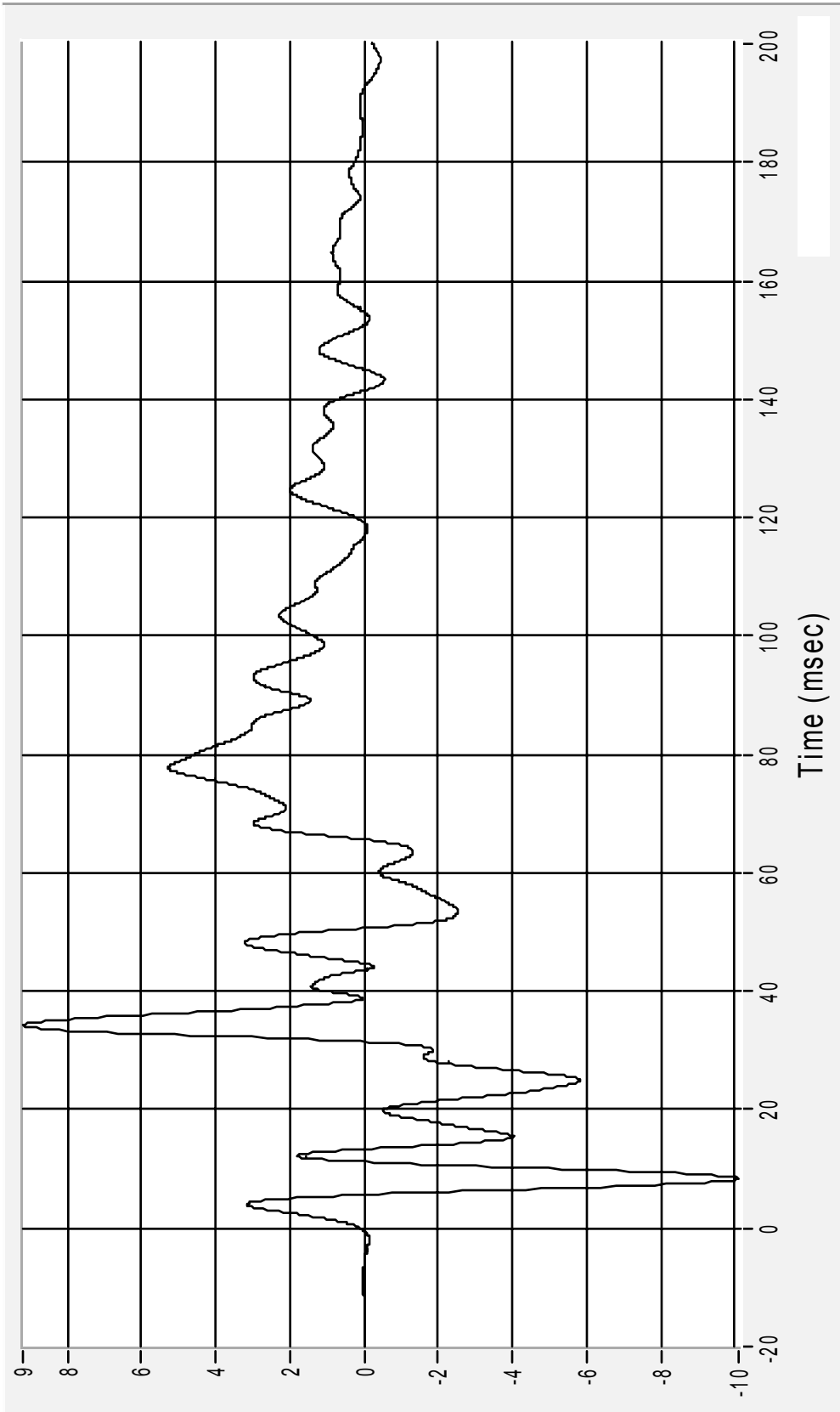
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Right Side Sill at Rear Seat (Z) Acceleration

Acceleration (G's) CFC60

Max 9.2 G at 34.2 msec
Min -10.1 G at 8.3 msec



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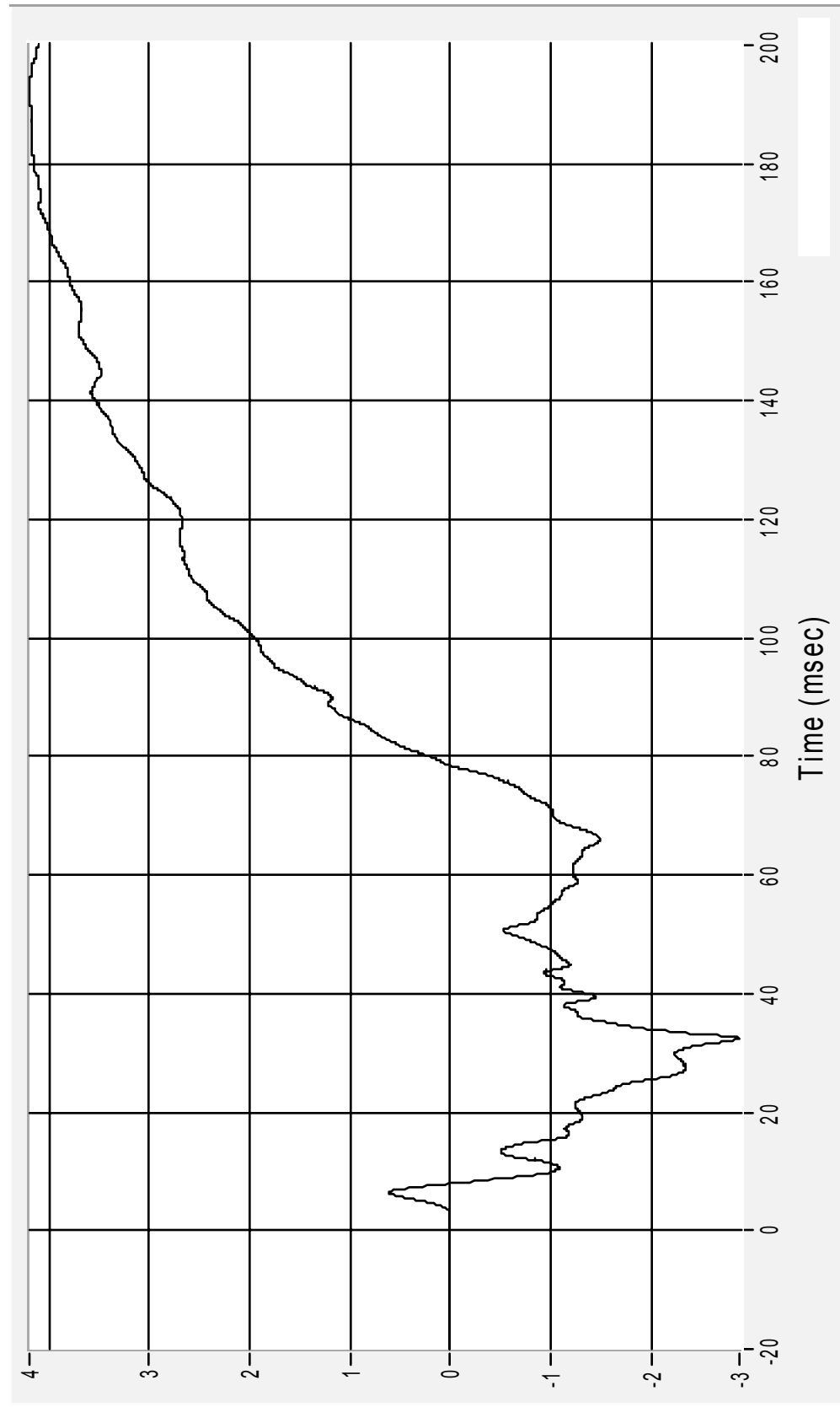
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Vehicle Crashworthiness Lab

Max 4.2 km/h at 193.1 msec
Min -2.9 km/h at 32.4 msec

Right Side Sill at Rear Seat (Z) Velocity

Velocity (km/h) CFC180



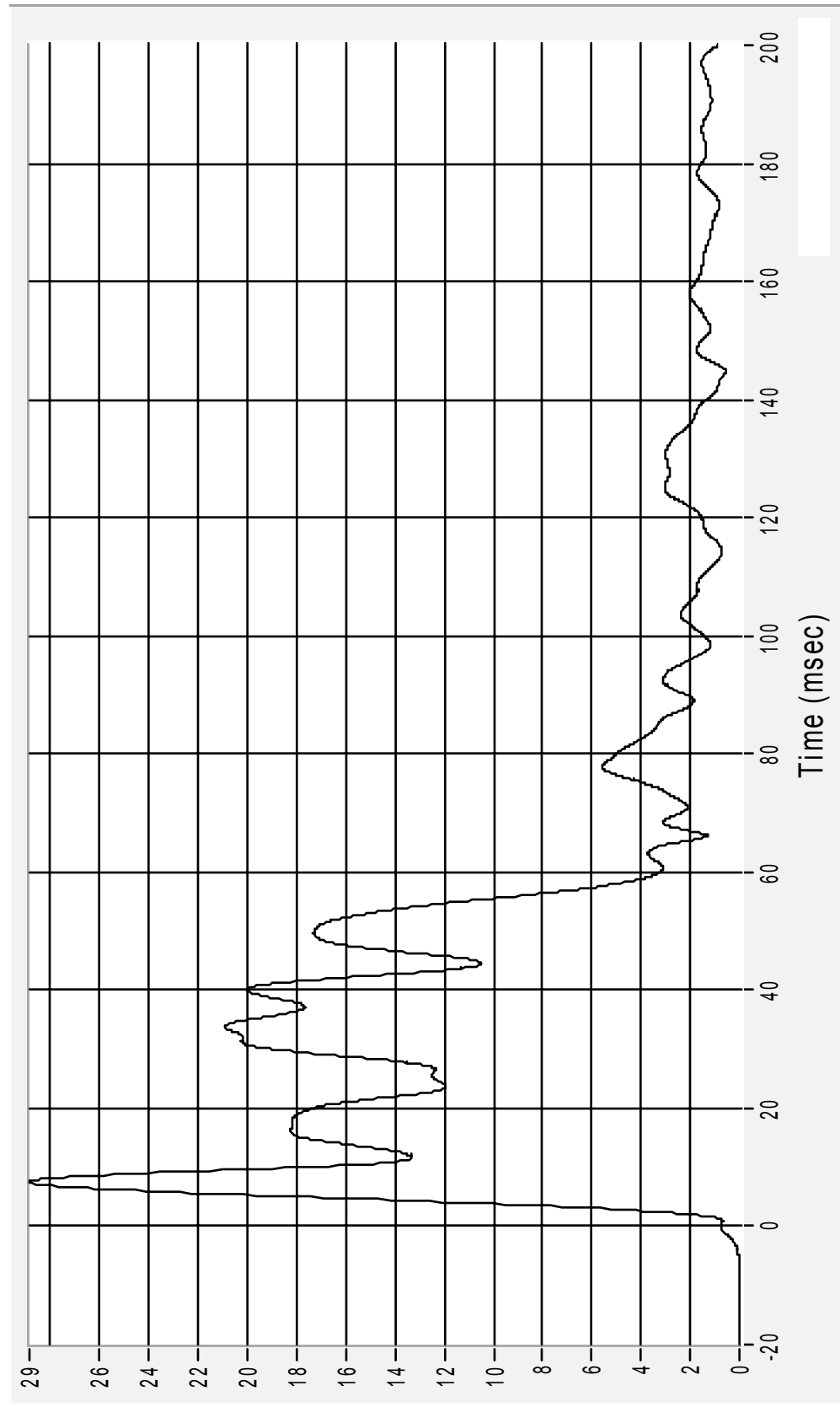
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Medical College of Wisconsin
Vehicle Crashworthiness Lab

Max 28.9 G's at 7.5 msec
 Min 0.5 G's at 144.7 msec

Right Side Sill at Rear Seat Resultant Acceleration

Acceleration (G's) CFC60



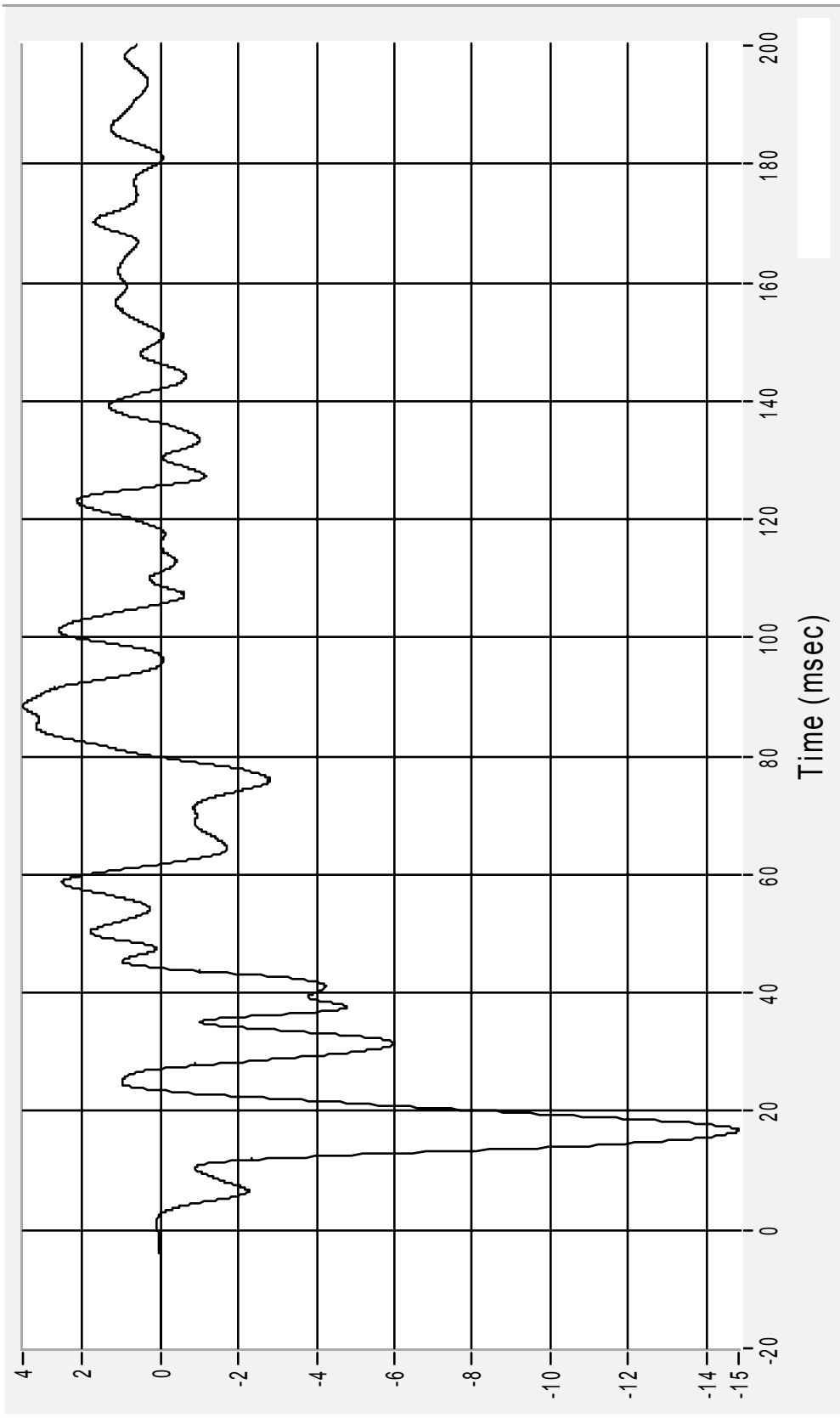
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 Vehicle Crashworthiness Lab

Rear Floorpan Above Axle (X) Acceleration

Acceleration (G's) CFC60

Max 3.5 G at 88.5 msec
Min -14.8 G at 16.8 msec



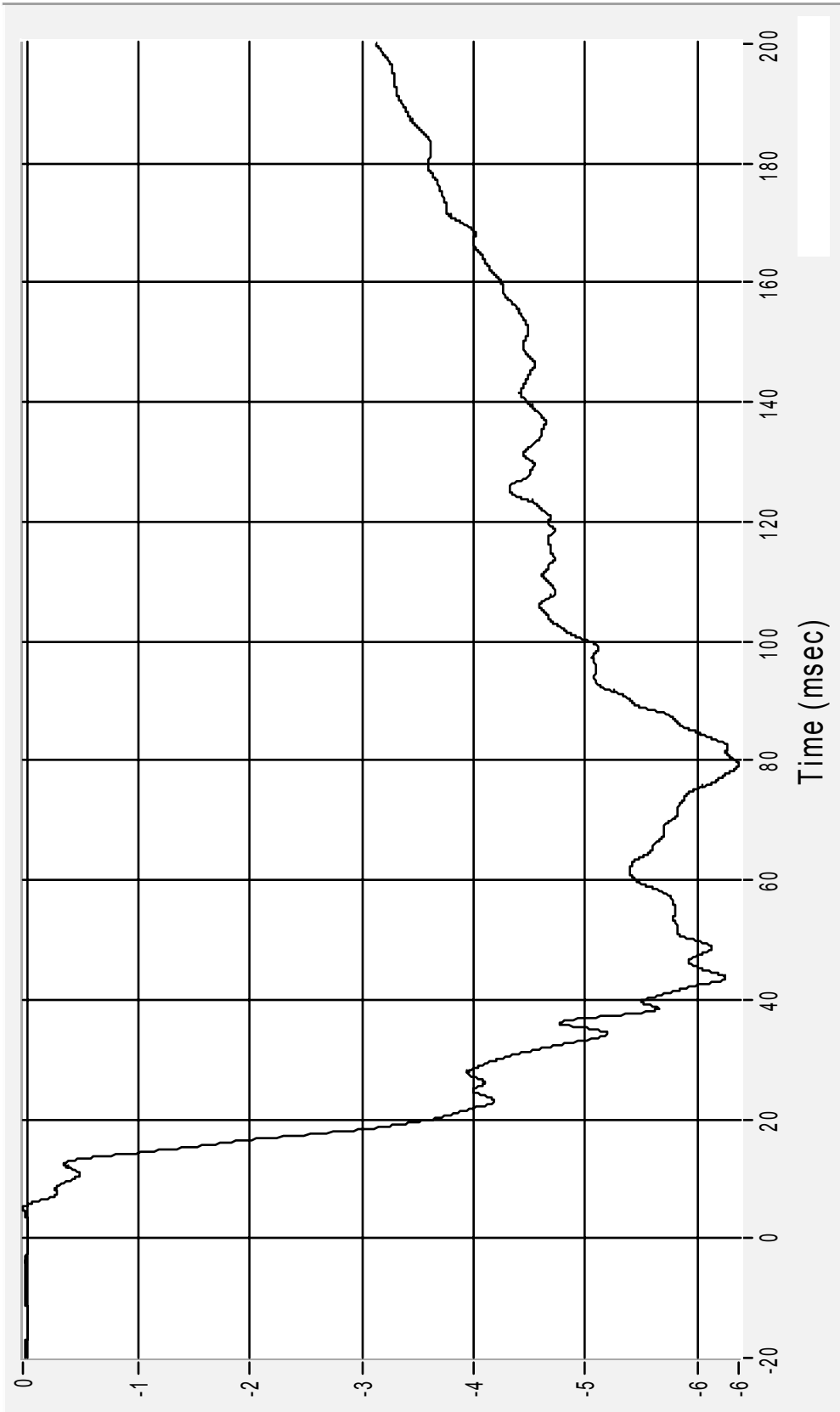
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Vehicle Crashworthiness Lab

Rear Floorpan Above Axle (X) Velocity

Velocity (km/h) CFC180

Max 0.0 km/h at 5.0 msec
Min -6.4 km/h at 79.4 msec



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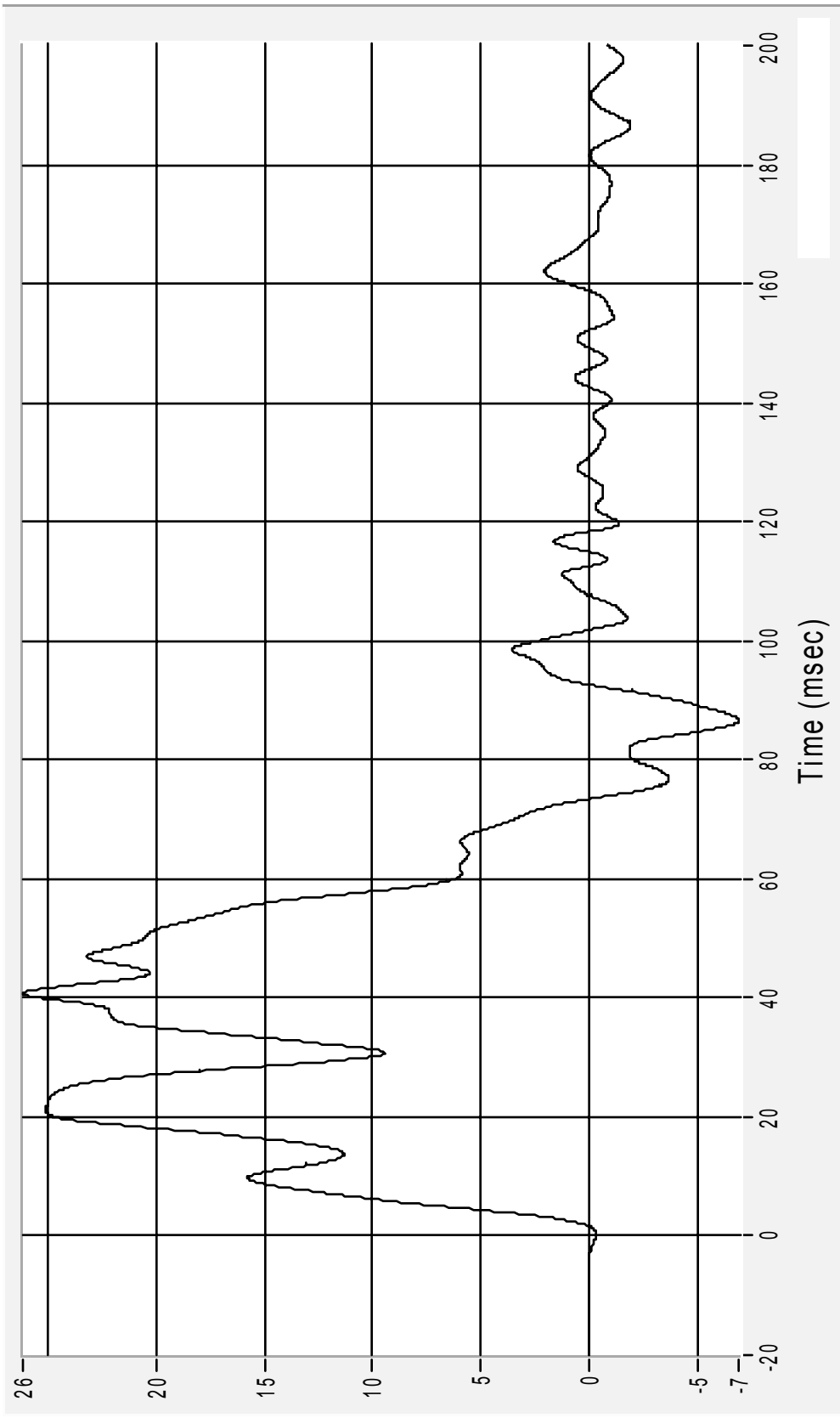
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Vehicle Crashworthiness Lab

Rear Floorpan Above Axle (Y) Acceleration

Acceleration (G's) CFC60

Max 26.1 G at 40.7 msec
Min -6.9 G at 86.6 msec



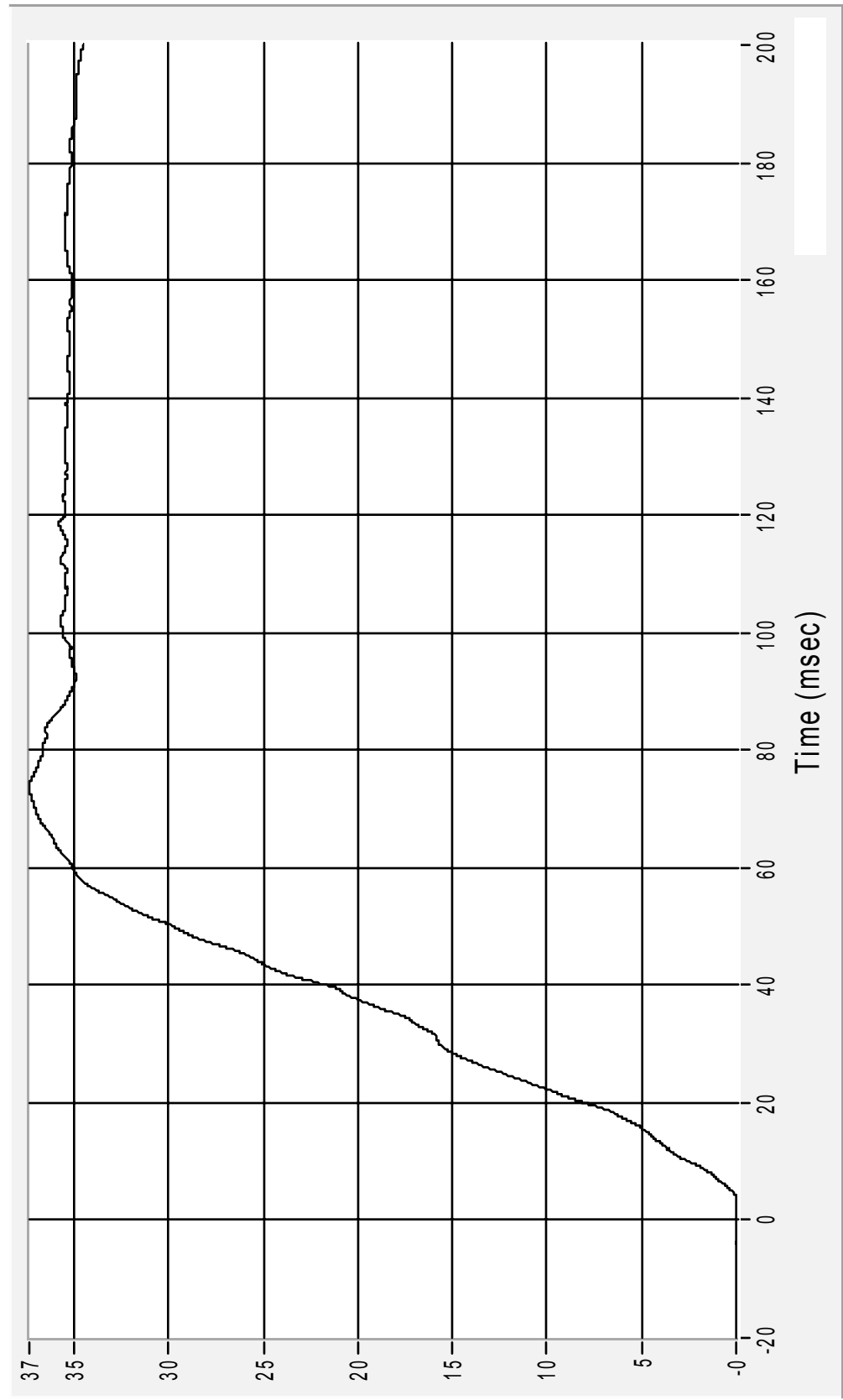
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Vehicle Crashworthiness Lab

Max 37.4 km/h at 73.8 msec
Min 0.0 km/h at 3.1 msec

Rear Floorpan Above Axle (Y) Velocity

Velocity (km/h) CFC180



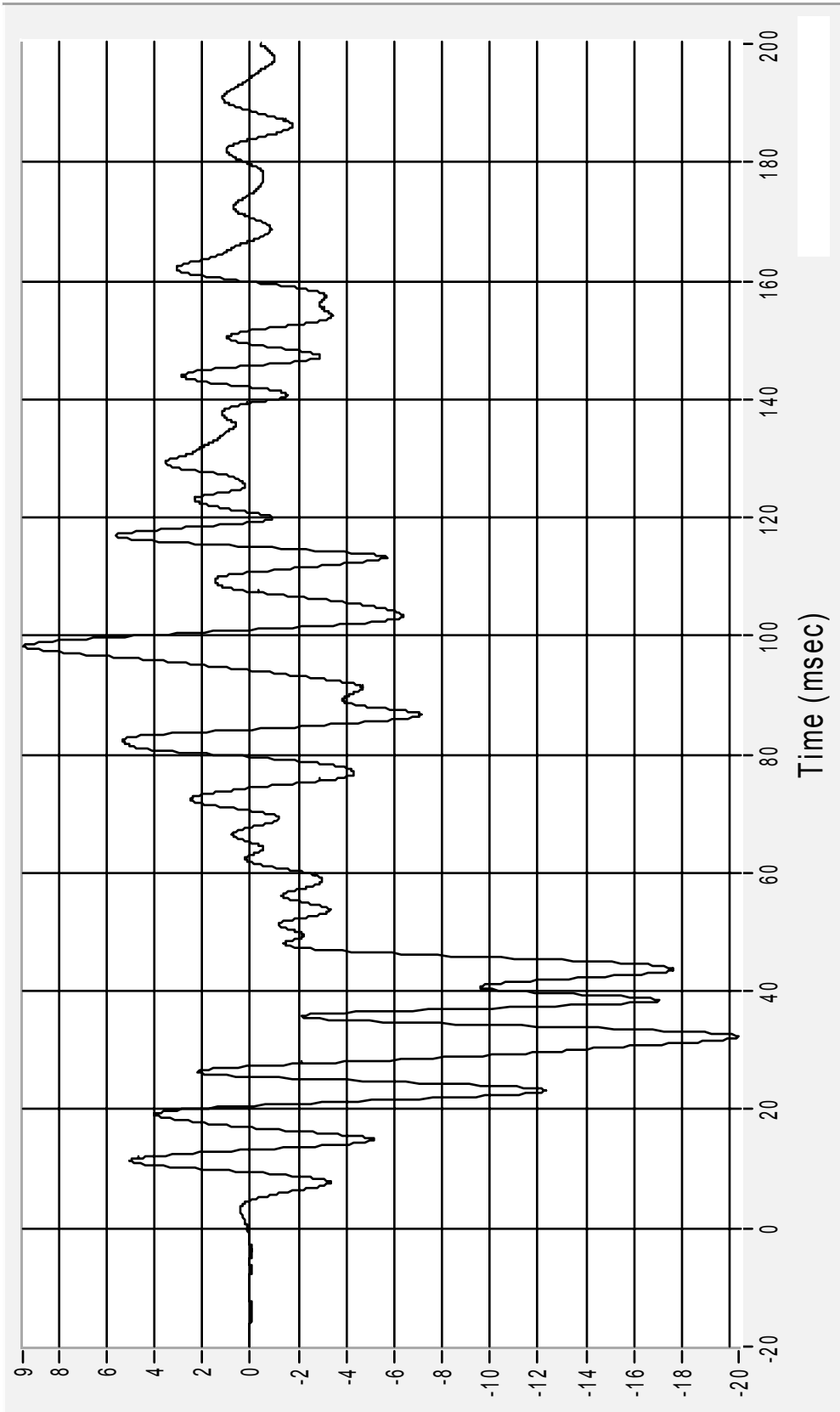
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Rear Floorpan Above Axle (Z) Acceleration

Acceleration (G's) CFC60

Max 9.5 G at 98.3 msec
Min -20.4 G at 32.3 msec



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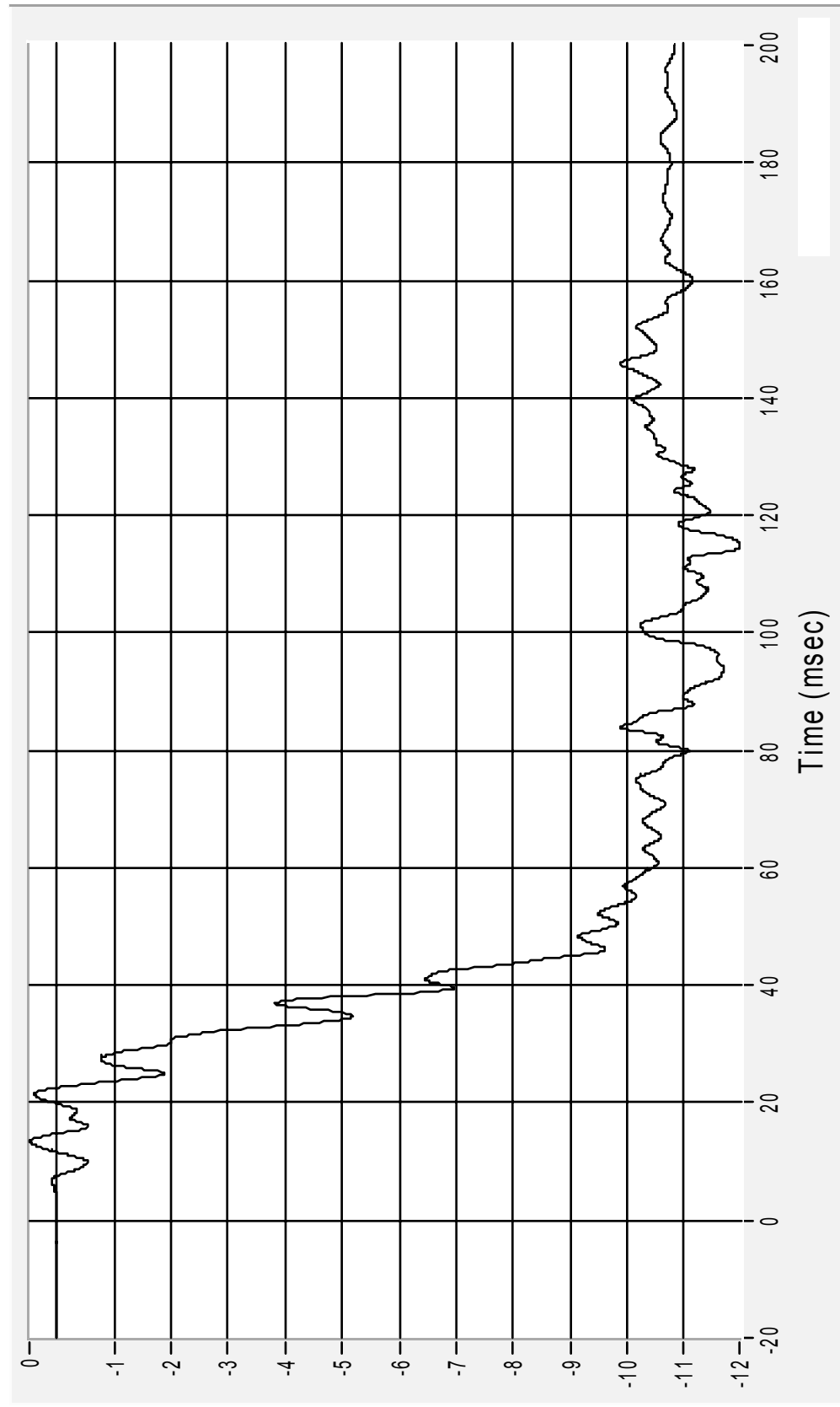
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Vehicle Crashworthiness Lab

Max 0.5 km/h at 13.4 msec
Min -12.0 km/h at 114.8 msec

Rear Floorpan Above Axle (Z) Velocity

Velocity (km/h) CFC180



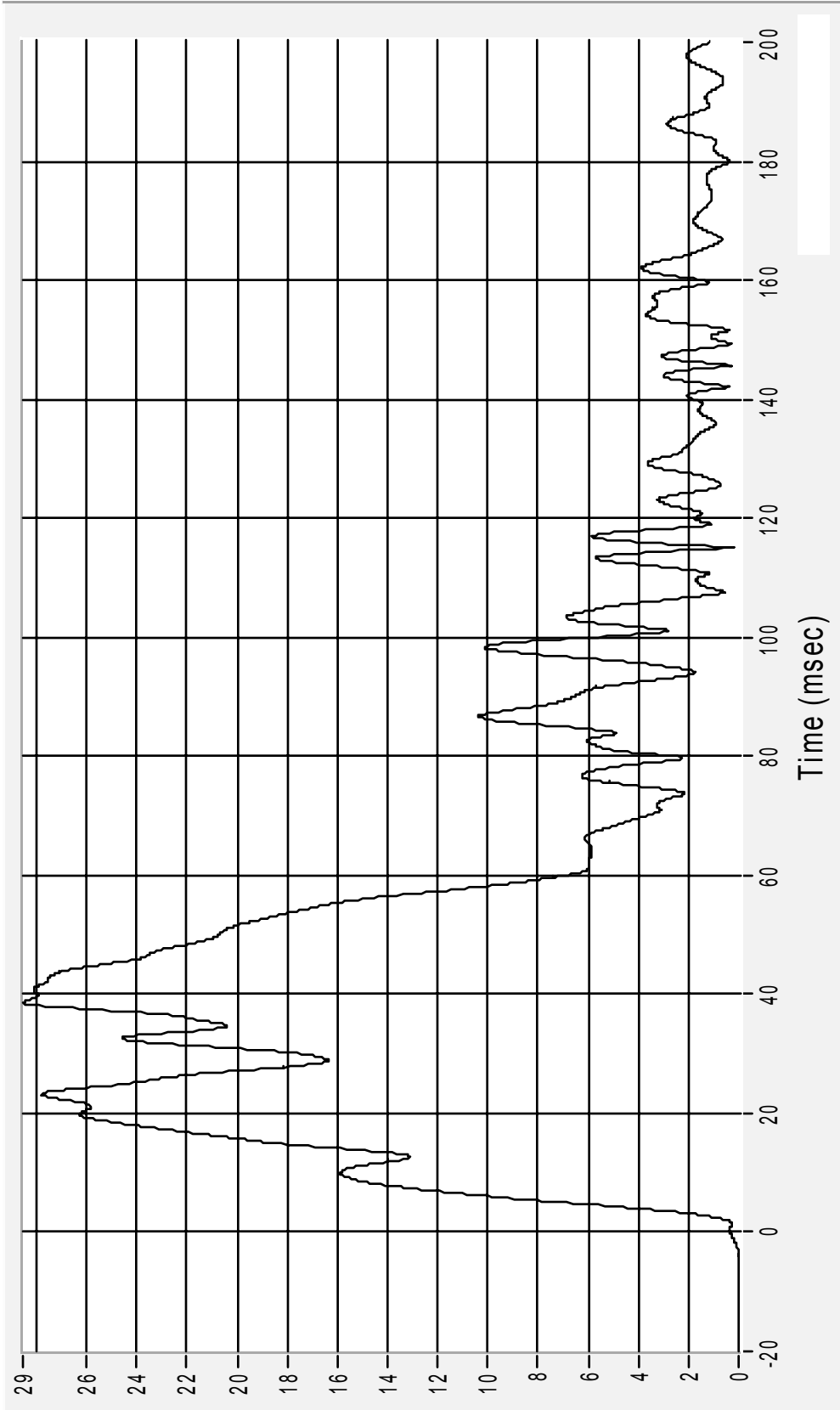
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Rear Floorpan Above Axle Resultant Acceleration

Acceleration (G's) CFC60

Max 28.5 G's at 38.6 msec
Min 0.2 G's at 115.0 msec



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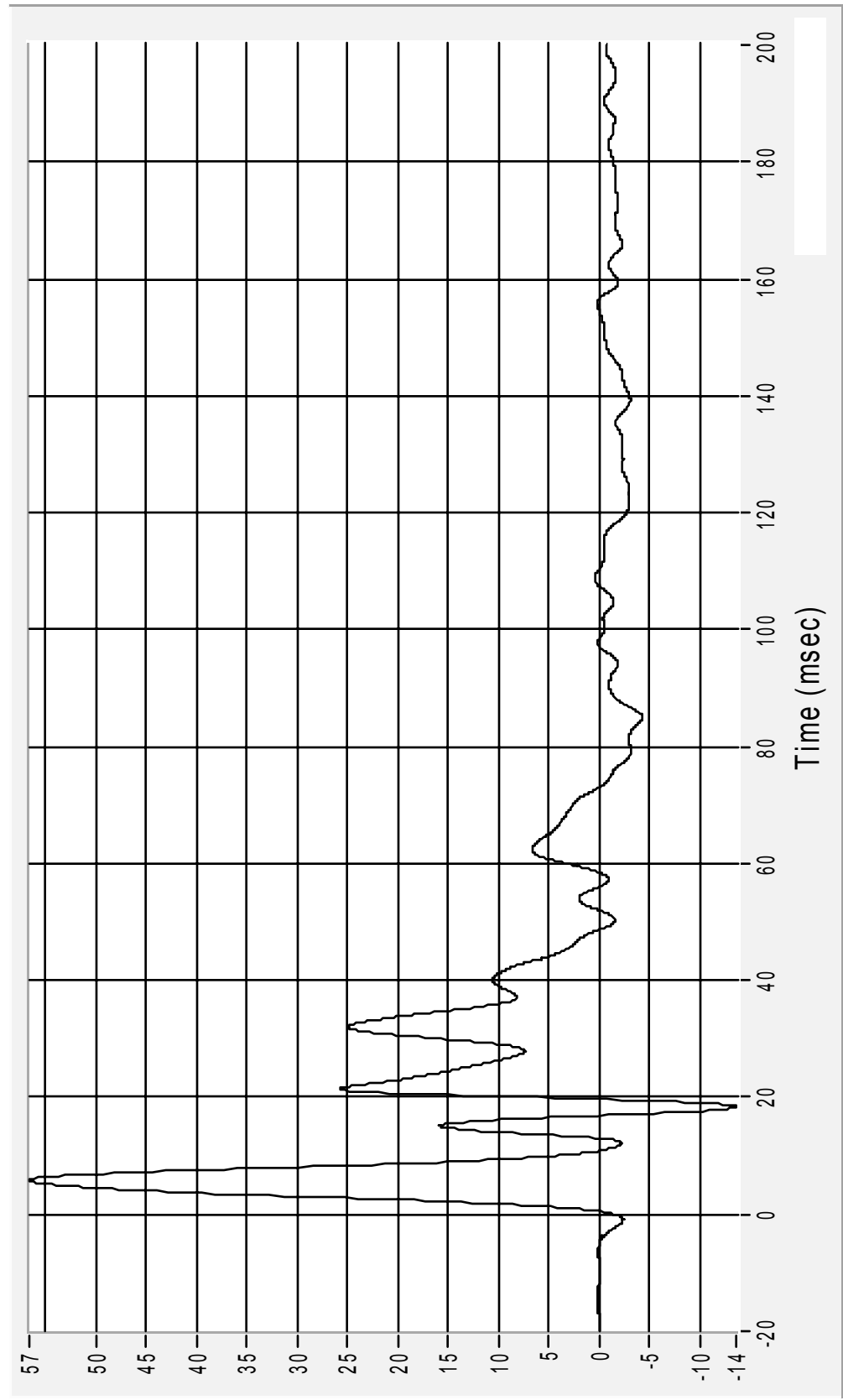
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Vehicle Crashworthiness Lab

Max 56.6 G at 5.8 msec
Min -13.6 G at 18.4 msec

Left Side Sill at Rear Seat (Y) Acceleration

Acceleration (G's) CFC60



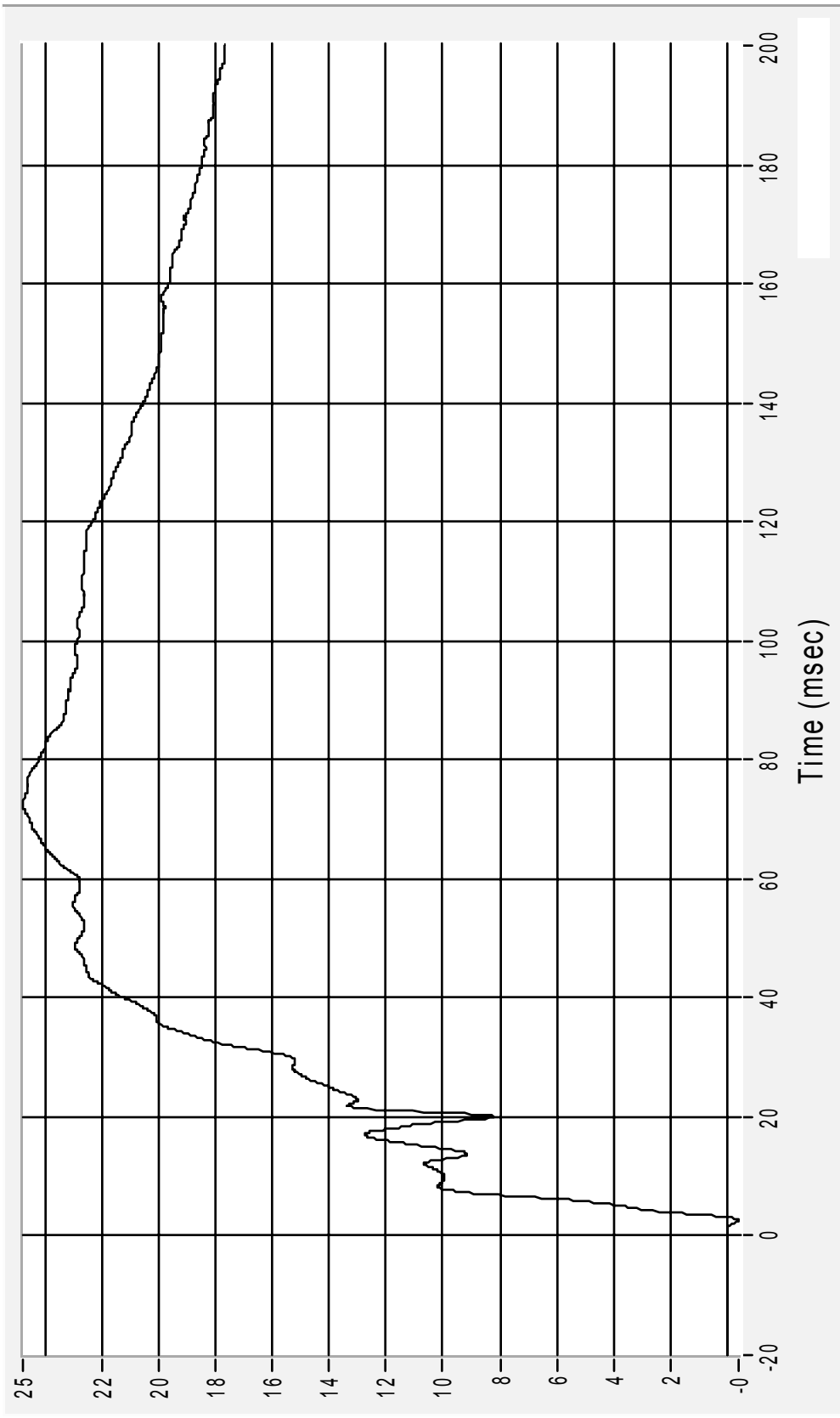
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Vehicle Crashworthiness Lab

Max 24.8 km/h at 72.8 msec
Min -0.4 km/h at 2.6 msec

Left Side Sill at Rear Seat (Y) Velocity

Velocity (km/h) CFC180



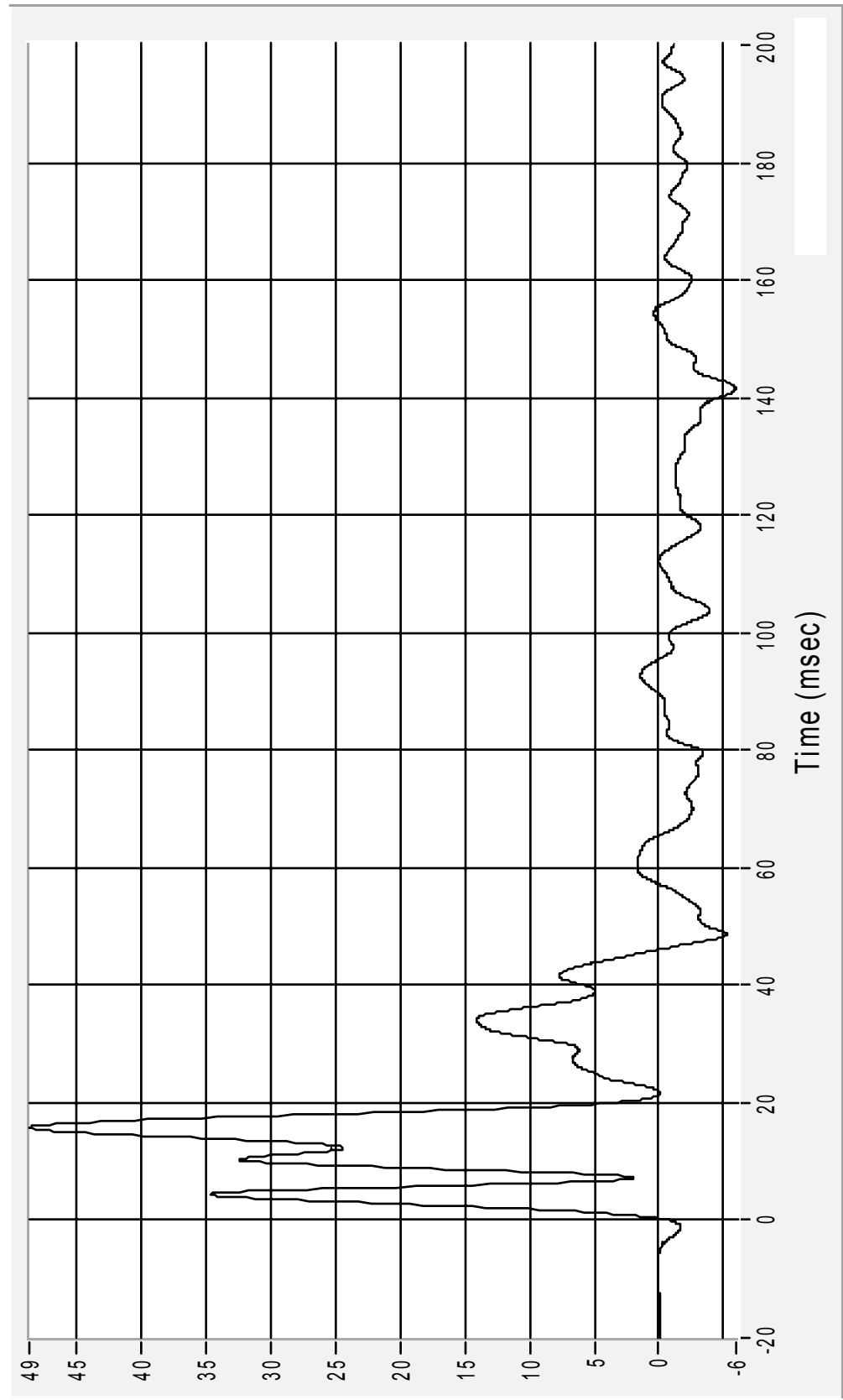
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Vehicle Crashworthiness Lab

Max 48.6 G at 15.8 msec
Min -6.0 G at 141.5 msec

Left Side Sill at Front Seat (Y) Acceleration

Acceleration (G's) CFC60



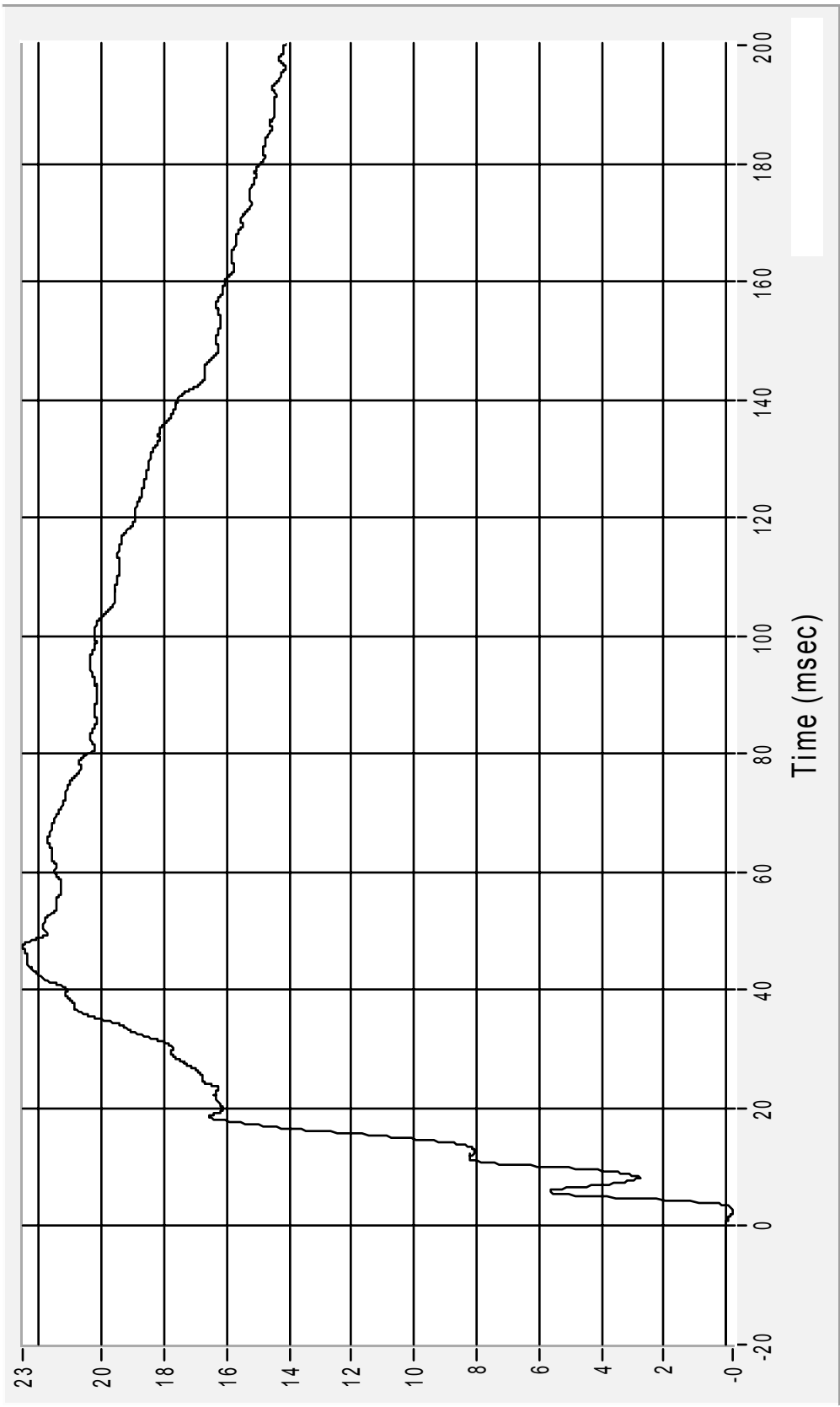
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Vehicle Crashworthiness Lab

Max 22.5 km/h at 47.5 msec
 Min -0.2 km/h at 2.6 msec

Left Side Sill at Front Seat (Y) Velocity

Velocity (km/h) CFC180



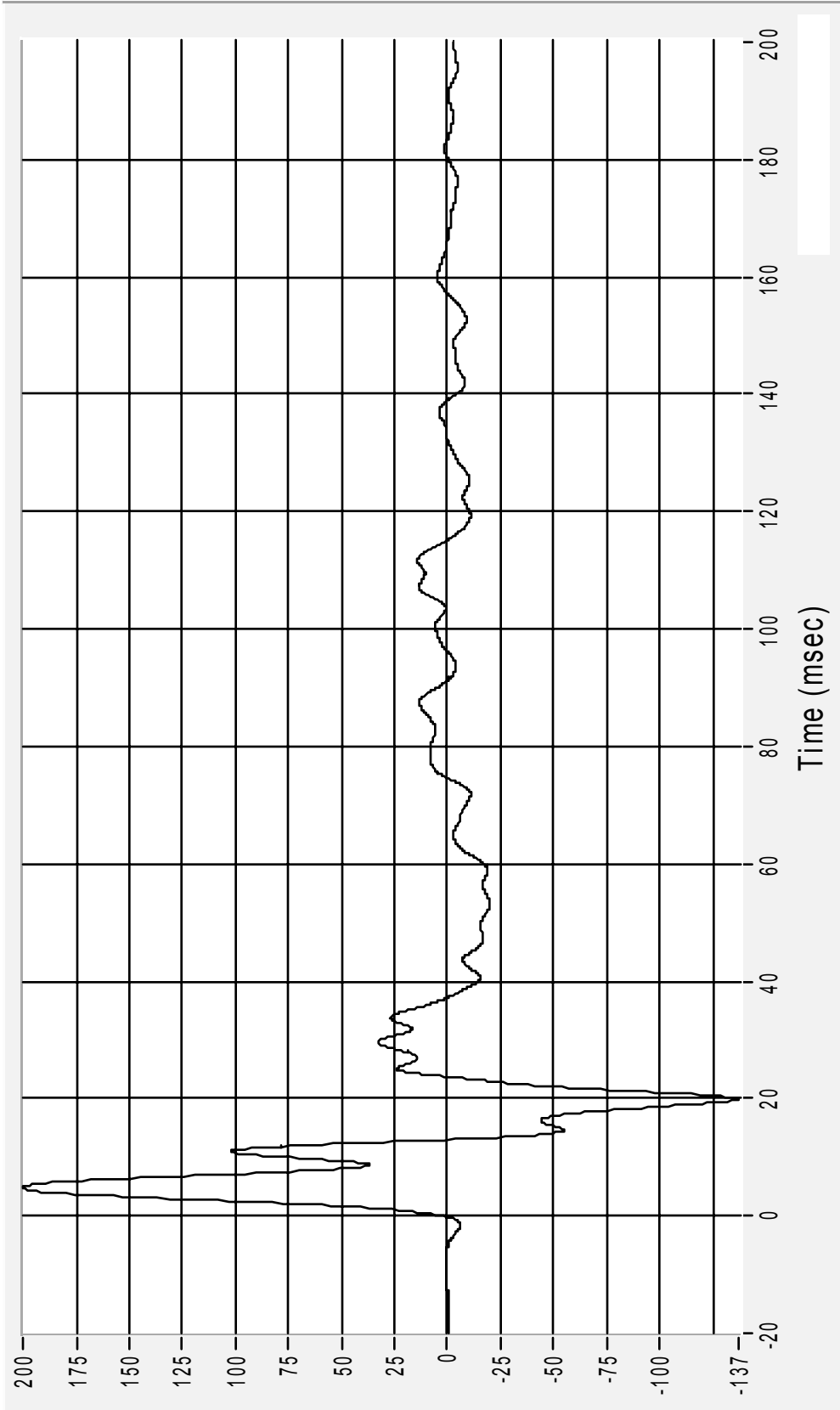
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 Vehicle Crashworthiness Lab

Left Front Door on Centerline (Y) Acceleration

Acceleration (G's) CFC60

Max 200.1 G at 4.9 msec
Min -137.1 G at 19.9 msec



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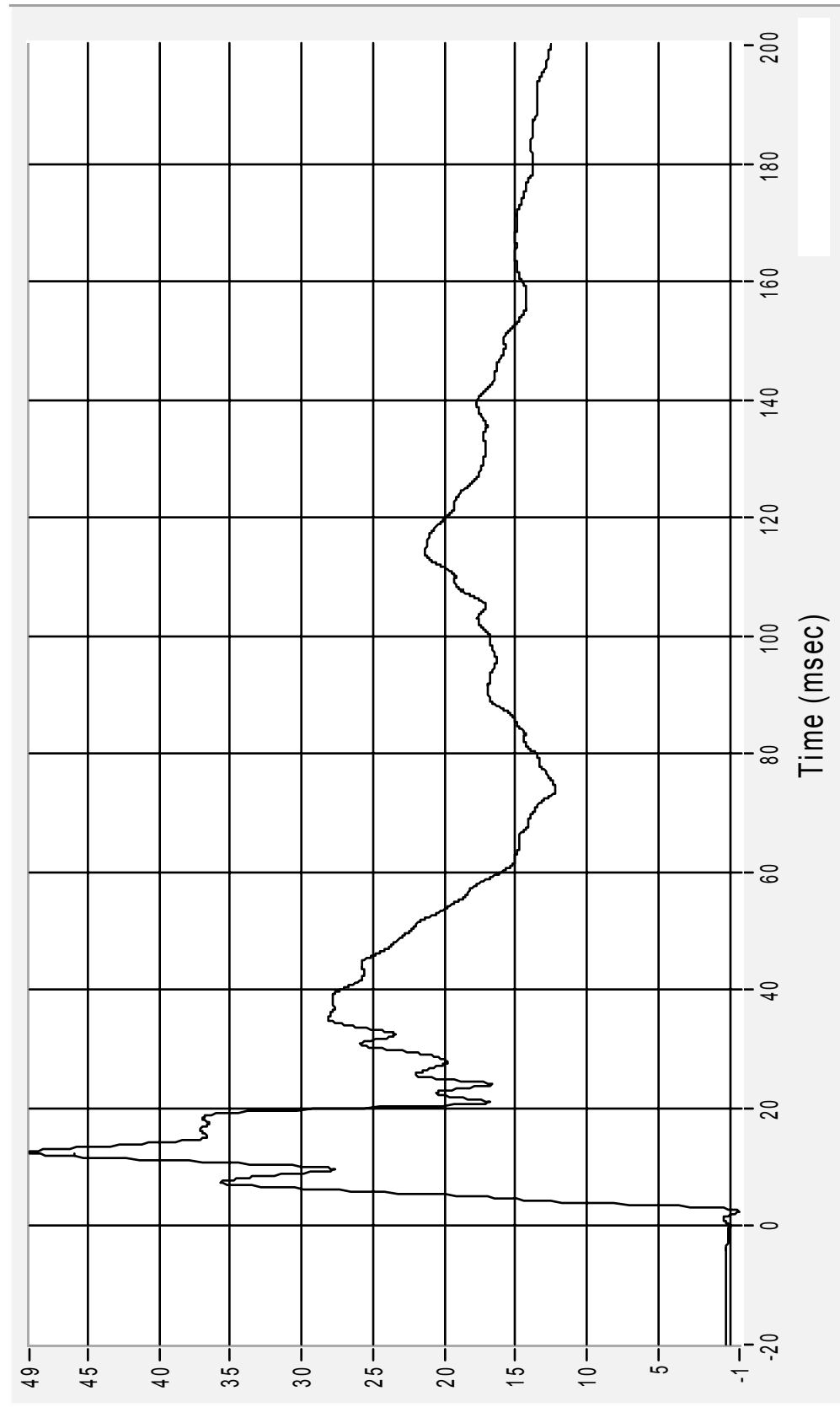
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Vehicle Crashworthiness Lab

Max 49.1 km/h at 12.6 msec
Min -0.7 km/h at 2.6 msec

Left Front Door on Centerline (Y) Velocity

Velocity (km/h) CFC180



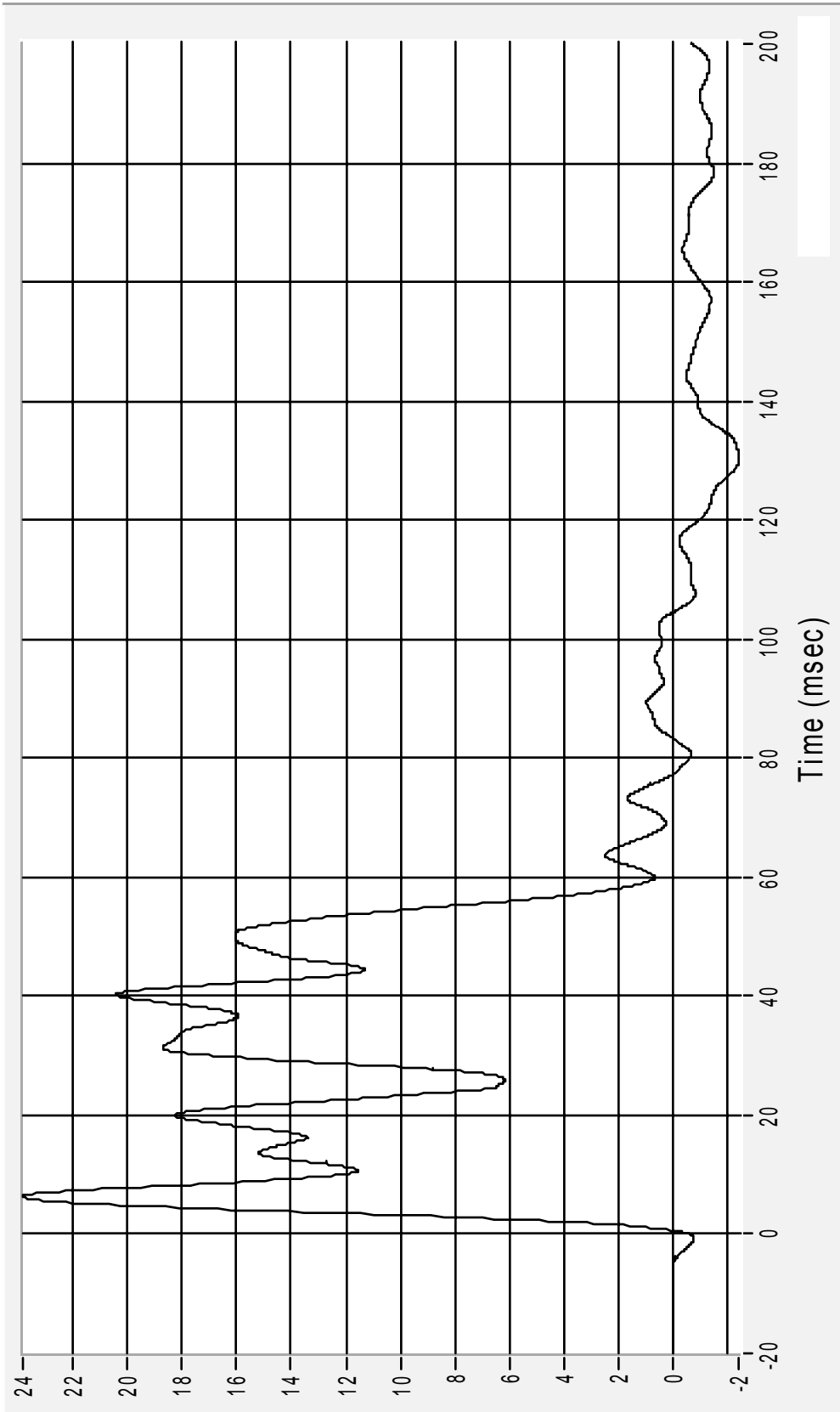
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 Vehicle Crashworthiness Lab

Right Rear Occupant Compartment (Y) Acceleration

Acceleration (G's) CFC60

Max 23.8 G at 6.3 msec
Min -2.4 G at 130.2 msec



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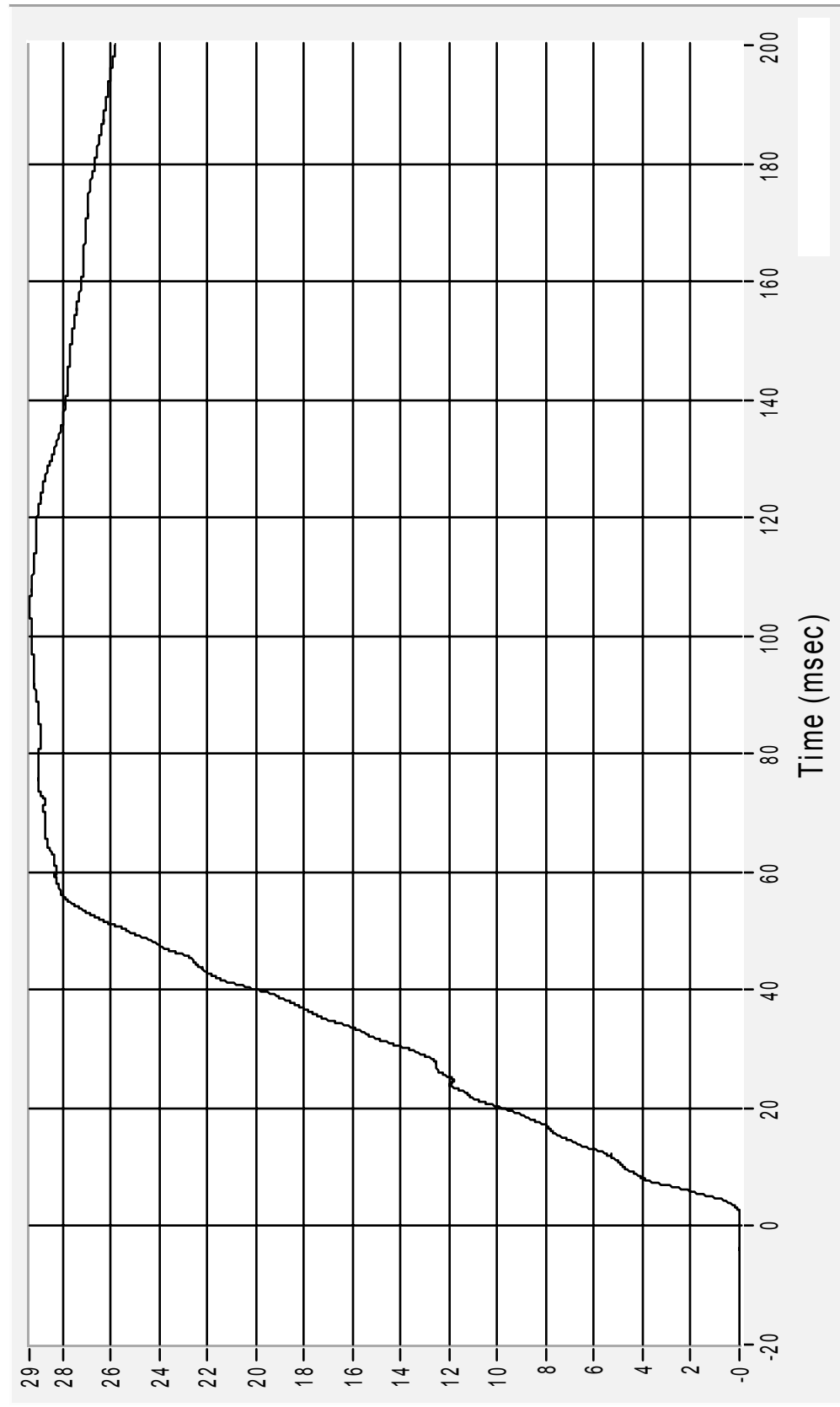
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Vehicle Crashworthiness Lab

Max 29.4 km/h at 104.2 msec
Min 0.0 km/h at 2.2 msec

Right Rear Occupant Compartment (Y) Velocity

Velocity (km/h) CFC180



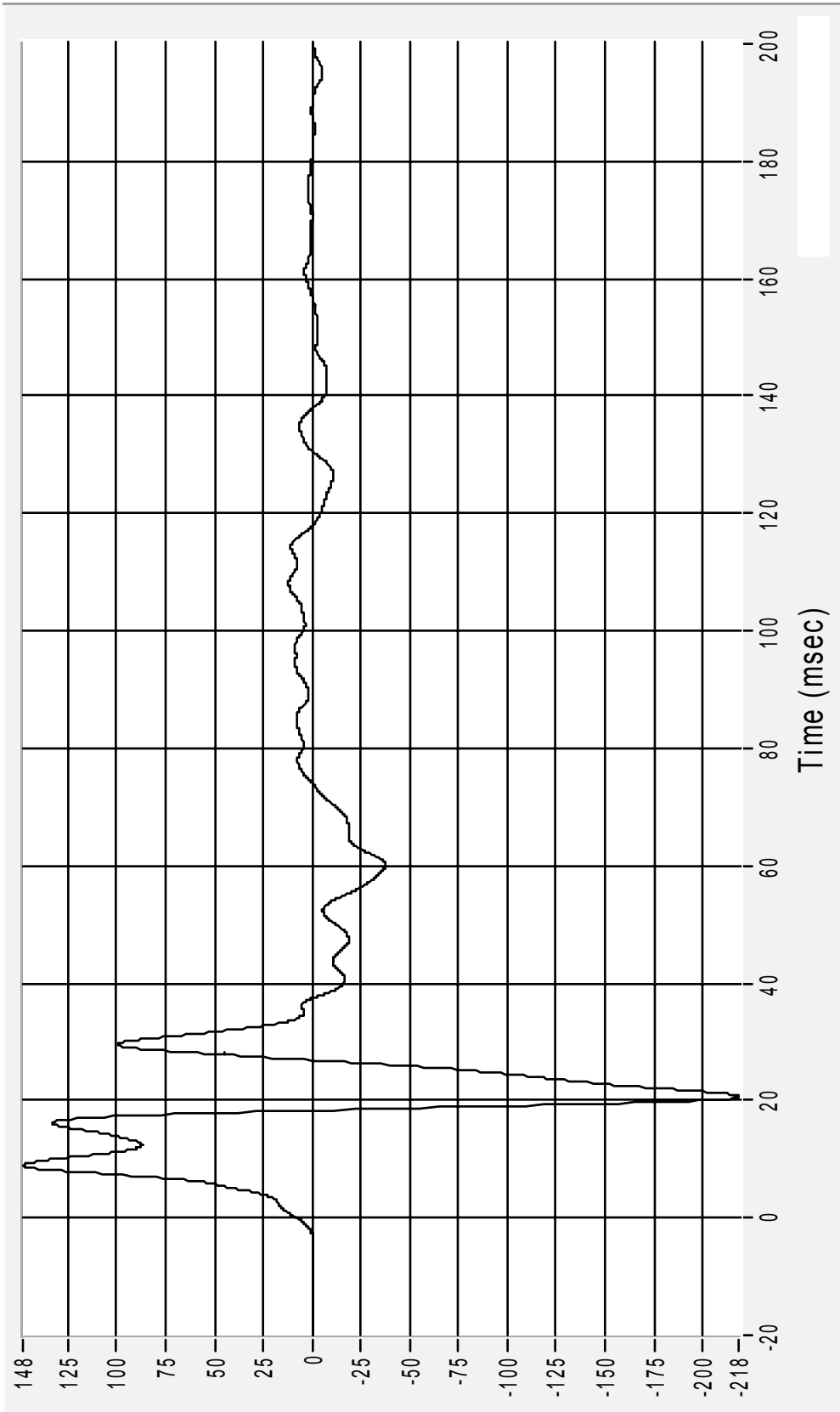
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Left Front Door Upper Centerline (Y) Acceleration

Acceleration (G's) CFC60

Max 148.0 G at 9.0 msec
Min -218.5 G at 20.6 msec



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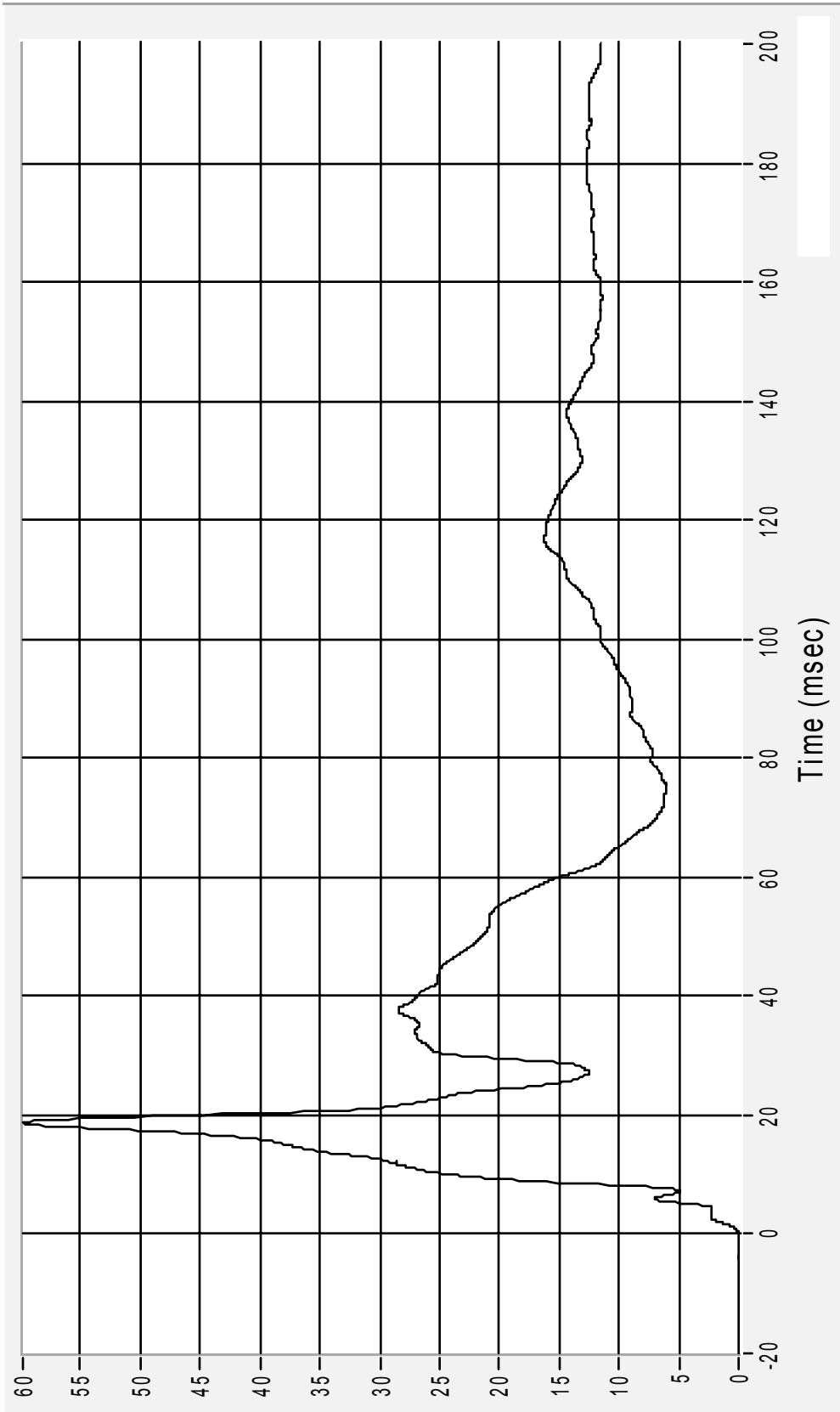
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Vehicle Crashworthiness Lab

Left Front Door Upper Centerline (Y) Velocity

Velocity (km/h) CFC180

Max 59.8 km/h at 18.7 msec
Min 0.0 km/h at 0.0 msec



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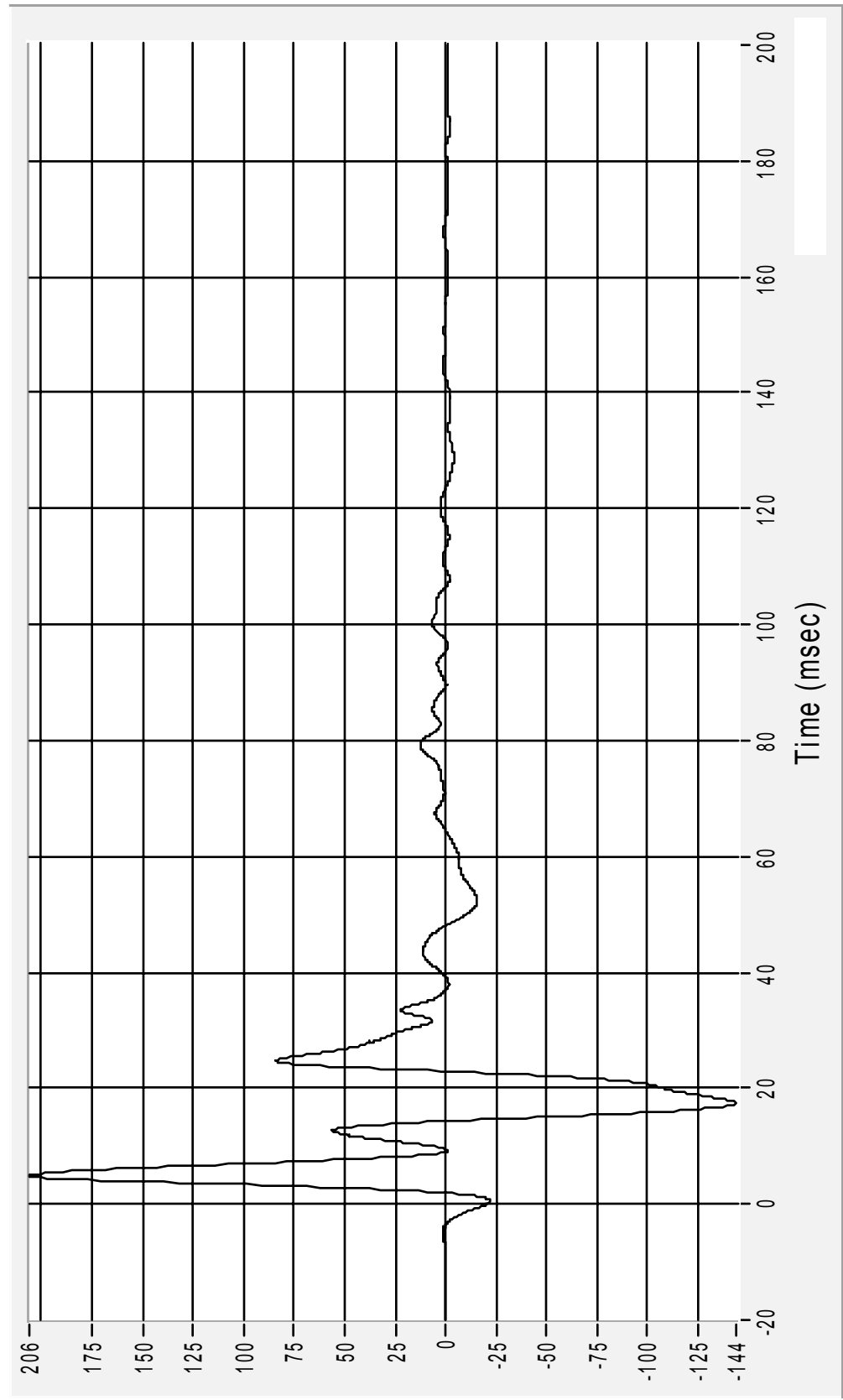
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Max 206.0 G at 4.9 msec
Min -143.8 G at 17.4 msec

Mid-Rear of Left Rear Door (Y) Acceleration

Acceleration (G's) CFC60



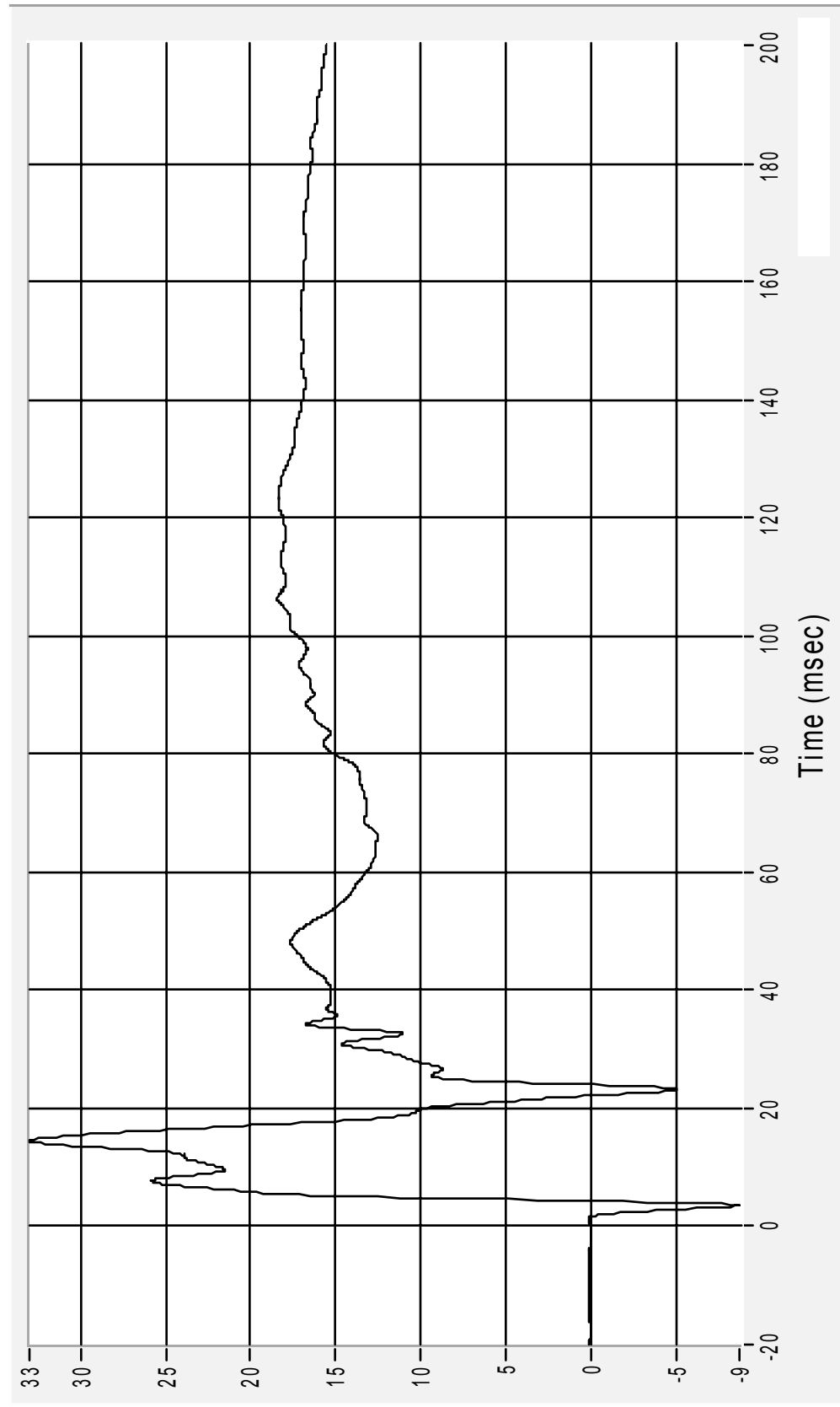
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Max 33.0 km/h at 14.5 msec
 Min -8.7 km/h at 3.6 msec

Mid-Rear of Left Rear Door (Y) Velocity

Velocity (km/h) CFC180



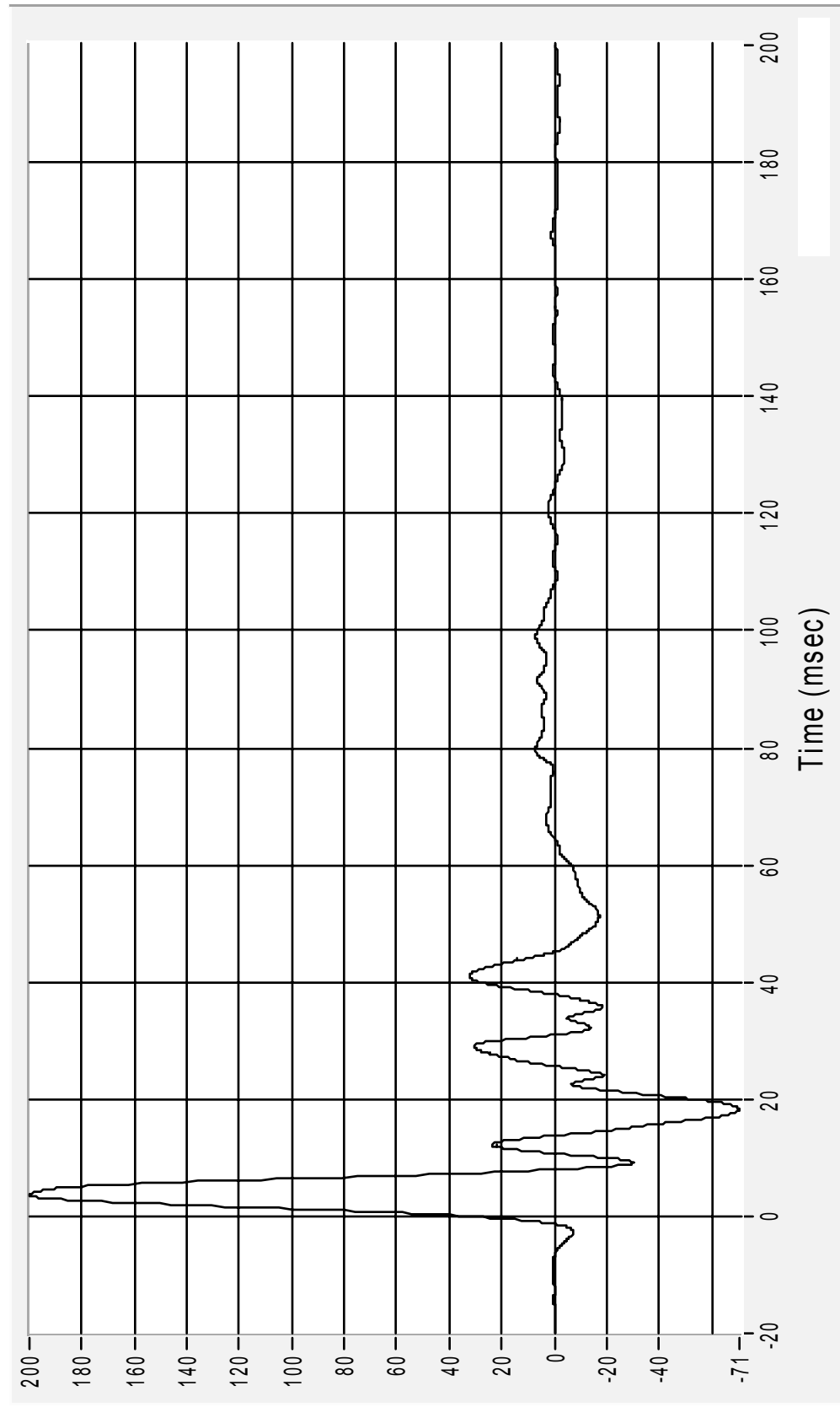
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Max 199.8 G at 3.6 msec
Min -70.6 G at 18.2 msec

Left Rear Door Upper Centerline (Y) Acceleration

Acceleration (G's) CFC60



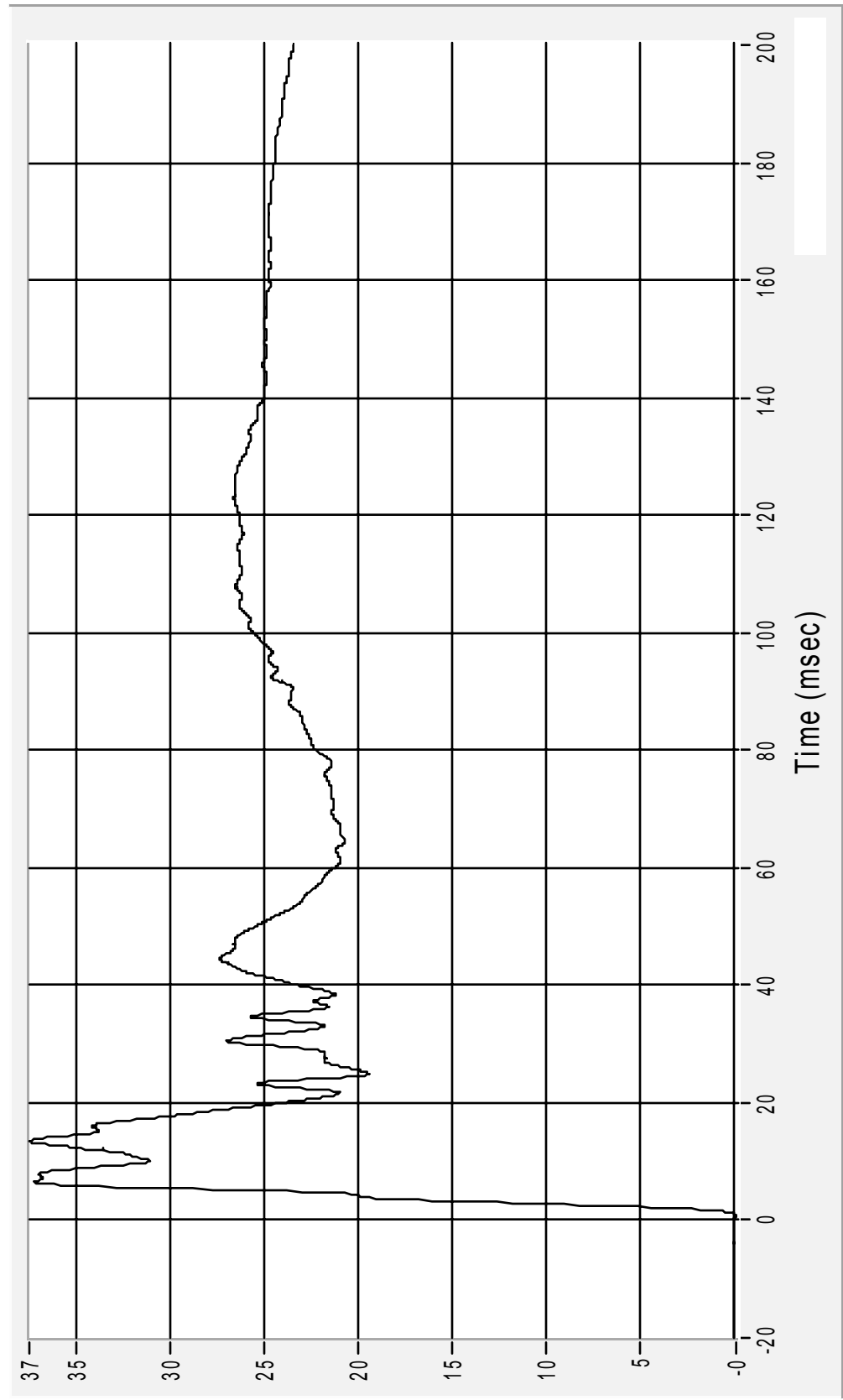
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Vehicle Crashworthiness Lab

Max 37.5 km/h at 13.5 msec
Min -0.2 km/h at 0.8 msec

Left Rear Door Upper Centerline (Y) Velocity

Velocity (km/h) CFC180

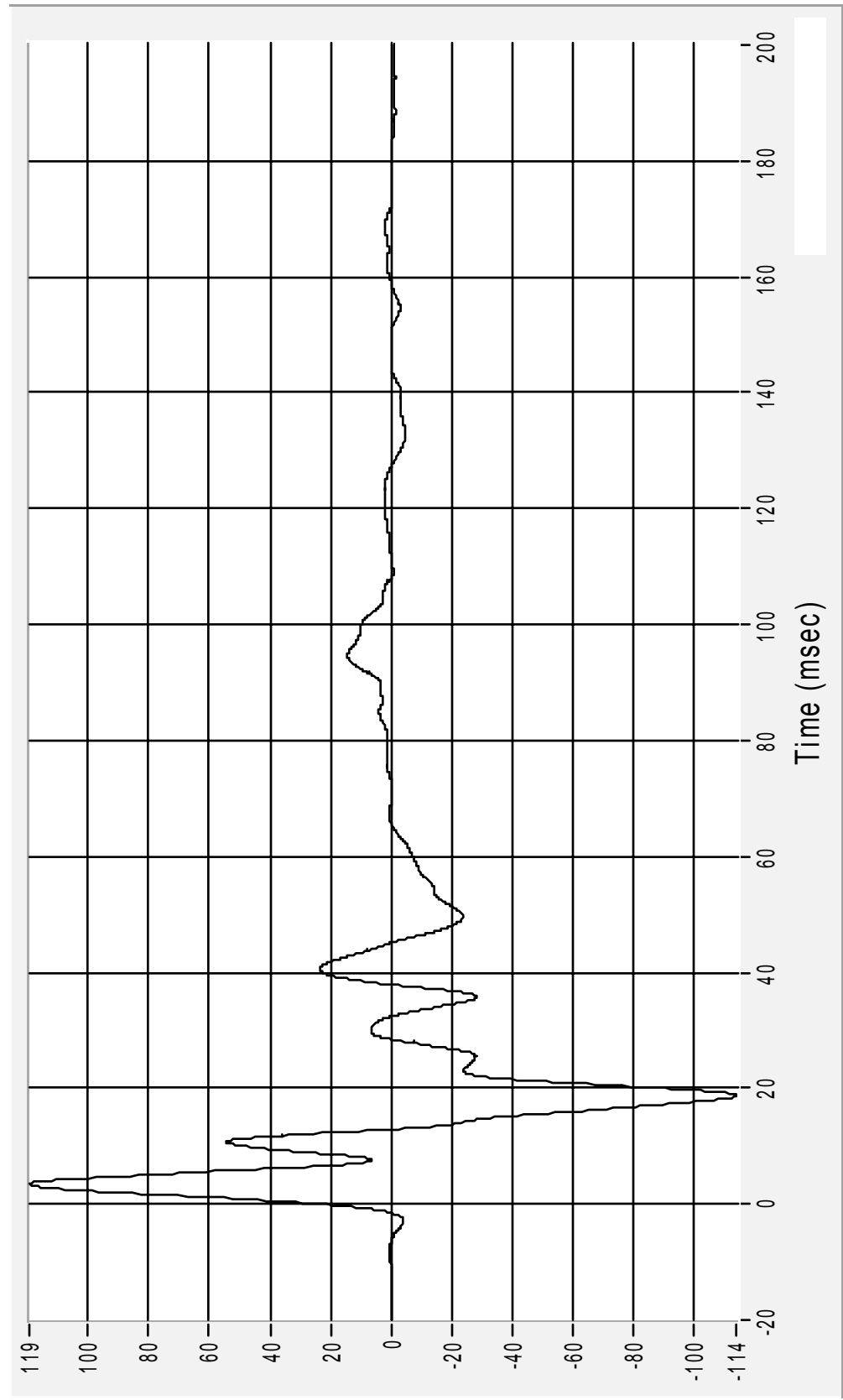


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Max 119.4 G at 3.4 msec
Min -113.9 G at 18.7 msec

Left Lower B-Pillar (Y) Acceleration
Acceleration (G's) CFC60

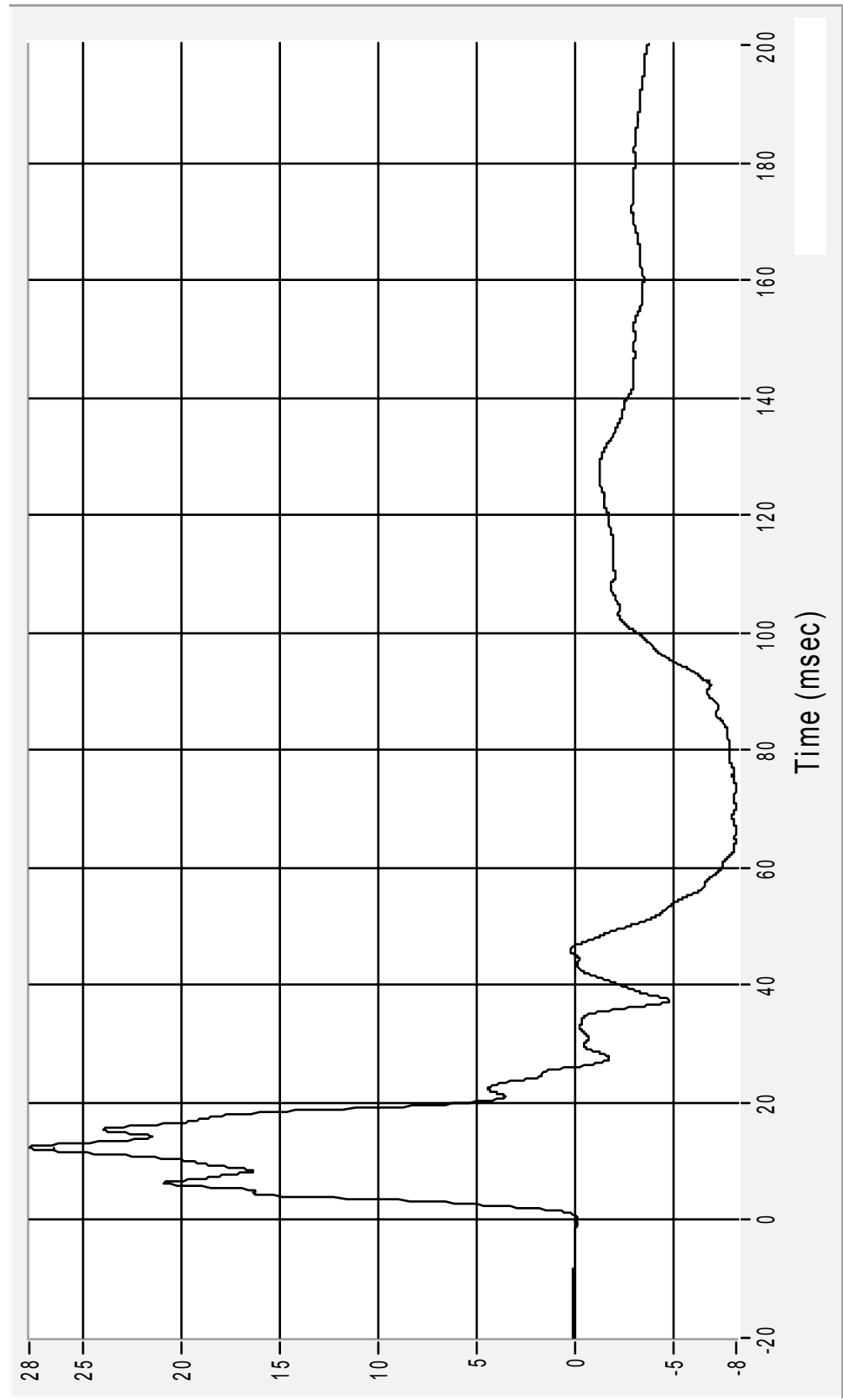


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Vehicle Crashworthiness Lab

Max 27.7 km/h at 12.4 msec
 Min -8.1 km/h at 73.5 msec

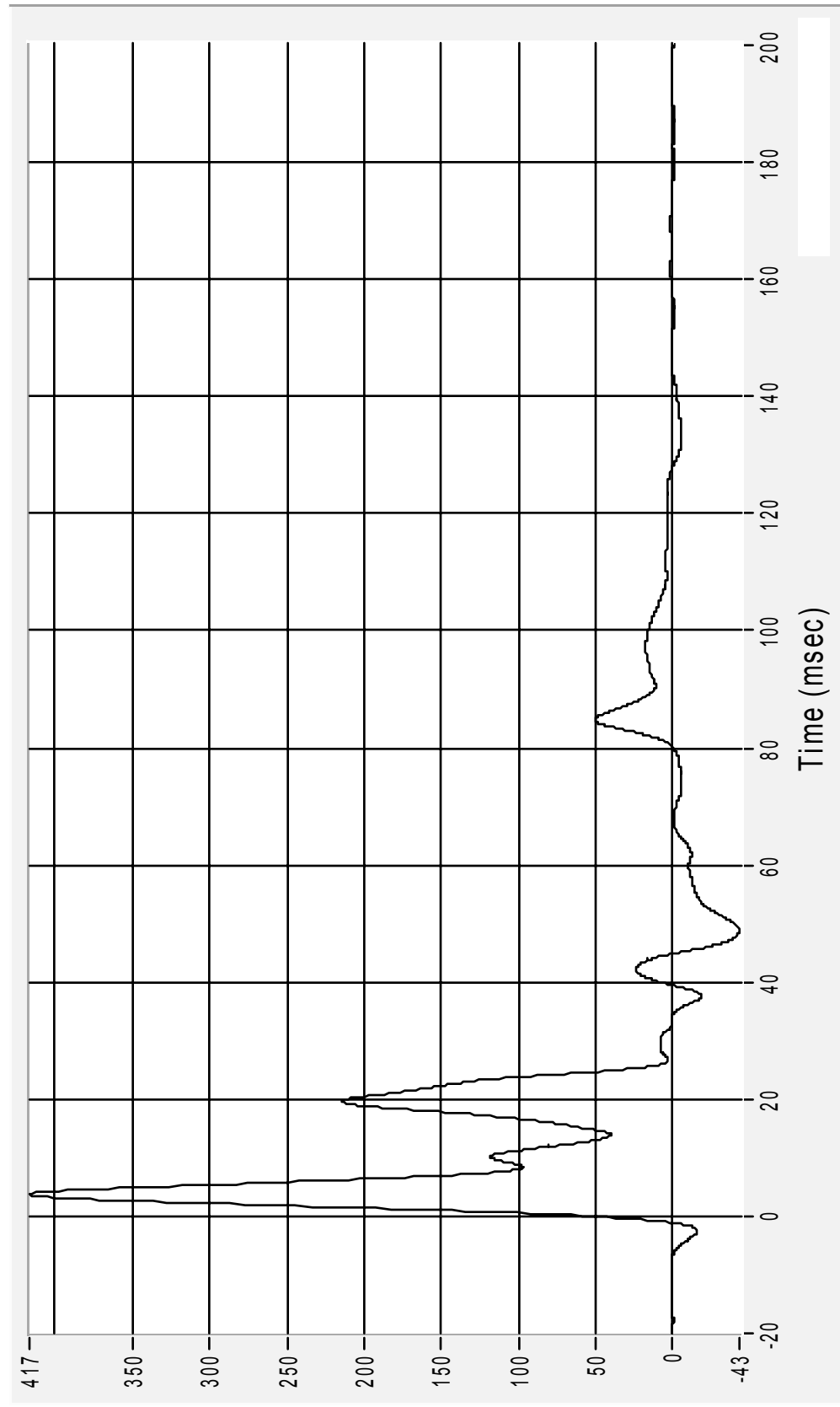
Left Lower B-Pillar (Y) Velocity
 CFC180
 Velocity (km/h)



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 Vehicle Crashworthiness Lab

Max 416.6 G at 3.8 msec
 Min -43.1 G at 48.7 msec

Left Middle B-Pillar (Y) Acceleration
 Acceleration (G's) CFC60

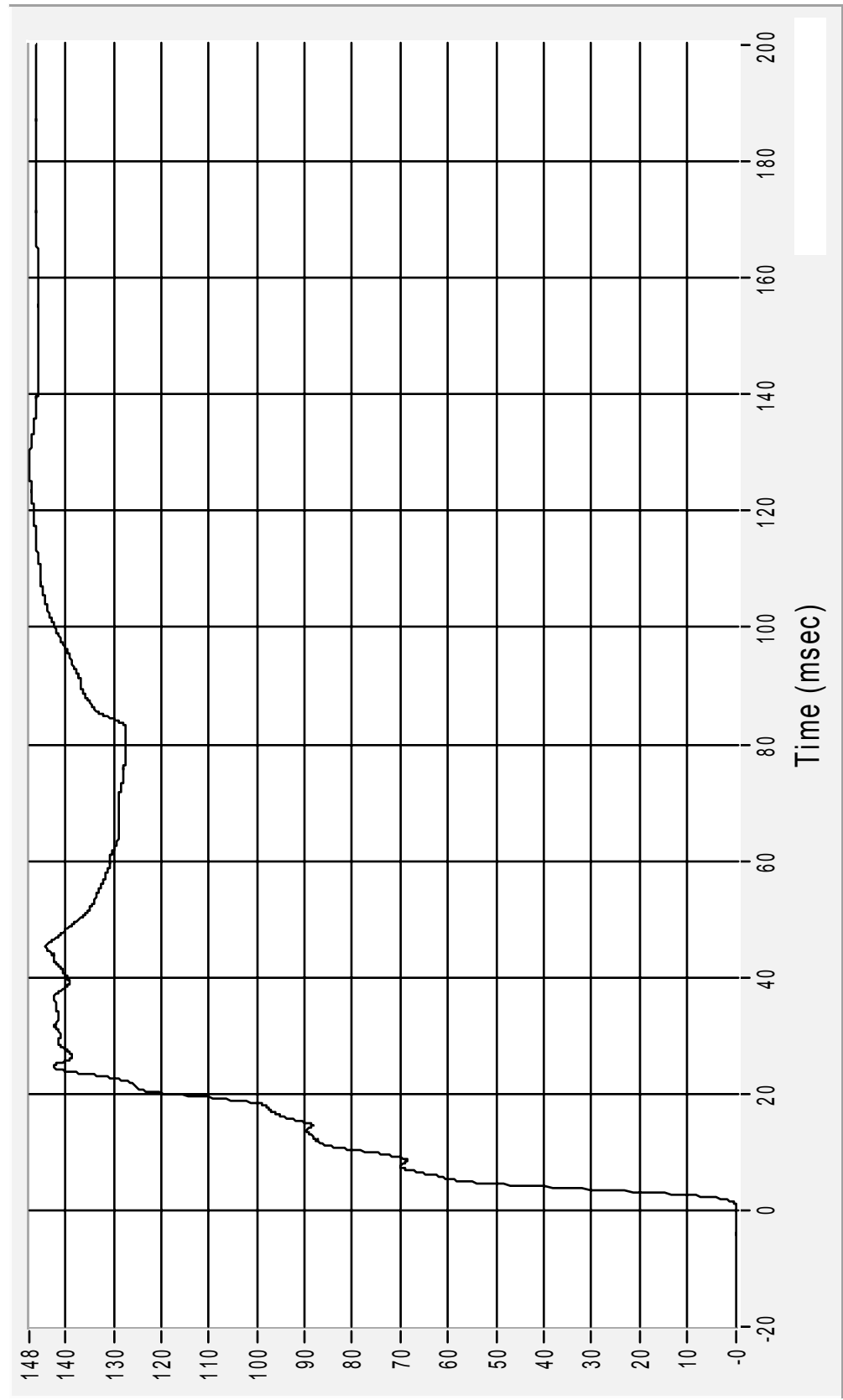


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Medical College of Wisconsin
 Vehicle Crashworthiness Lab

Max 147.5 km/h at 128.3 msec
Min -0.2 km/h at 0.7 msec

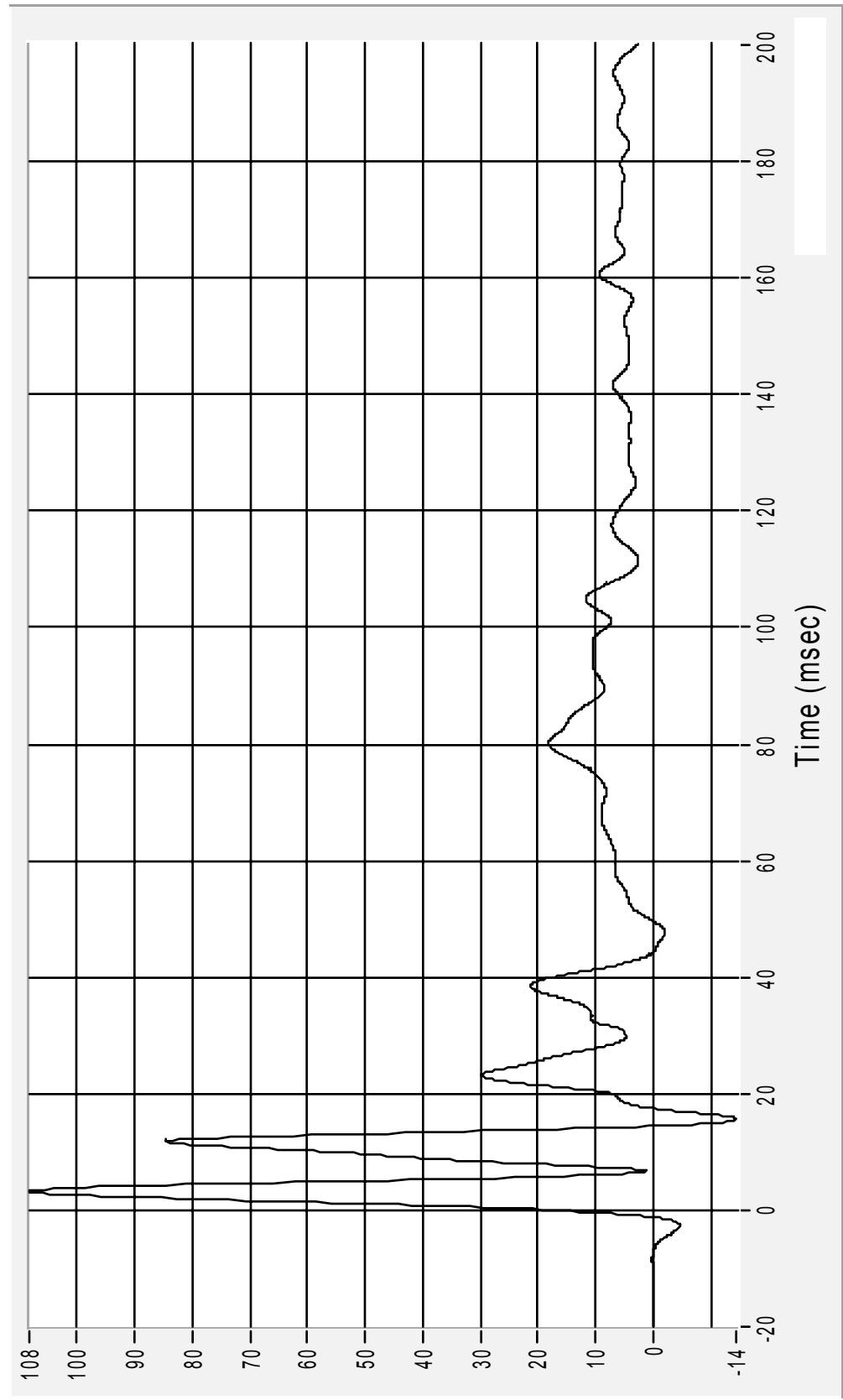
Left Middle B-Pillar (Y) Velocity
CFC180



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Max 108.3 G at 3.2 msec
Min -14.4 G at 15.6 msec

Left Lower A-Pillar (Y) Acceleration
Acceleration (G's) CFC60

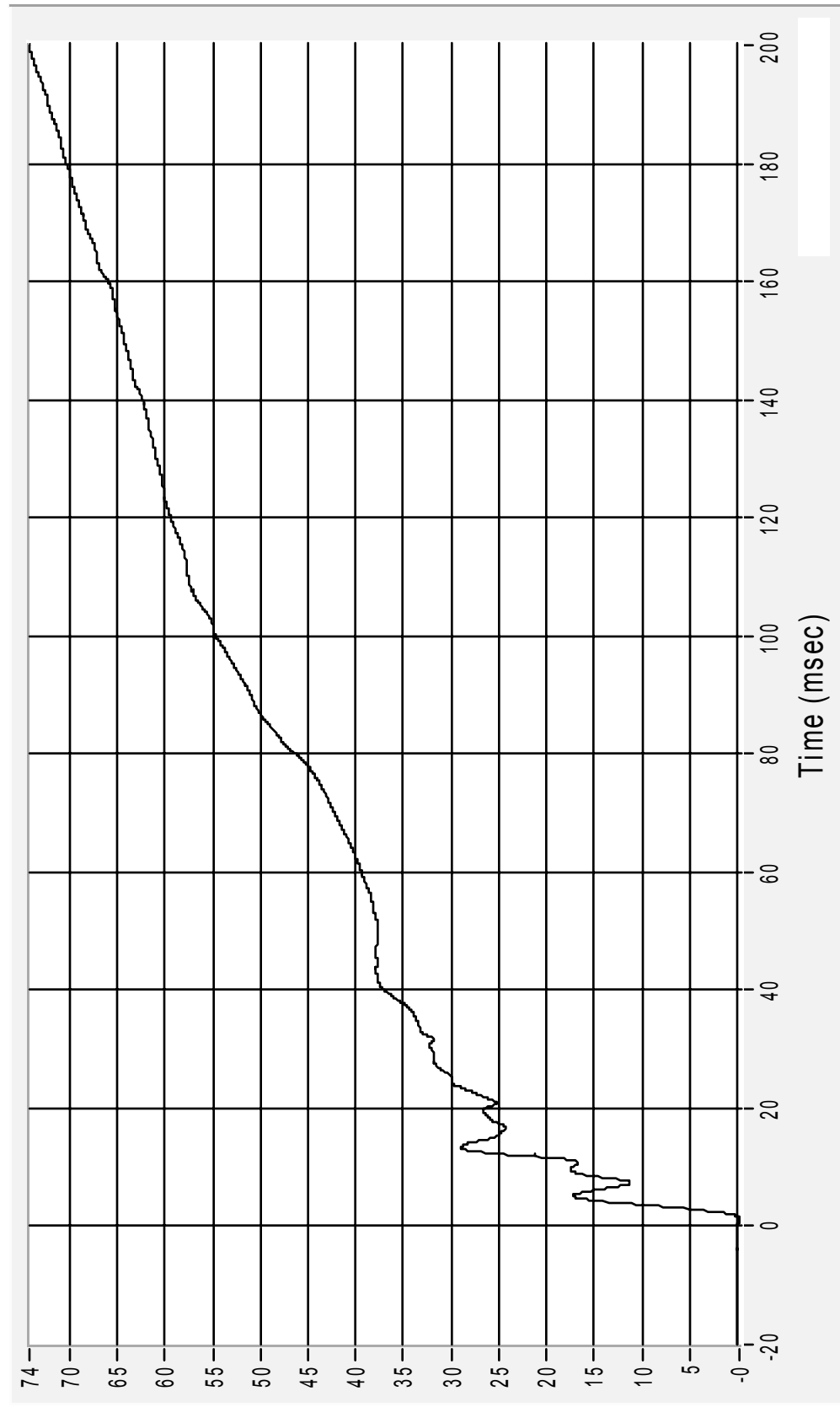


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Vehicle Crashworthiness Lab

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Max 74.2 km/h at 199.9 msec
 Min -0.2 km/h at 1.3 msec

Left Lower A-Pillar (Y) Velocity
 CFC180

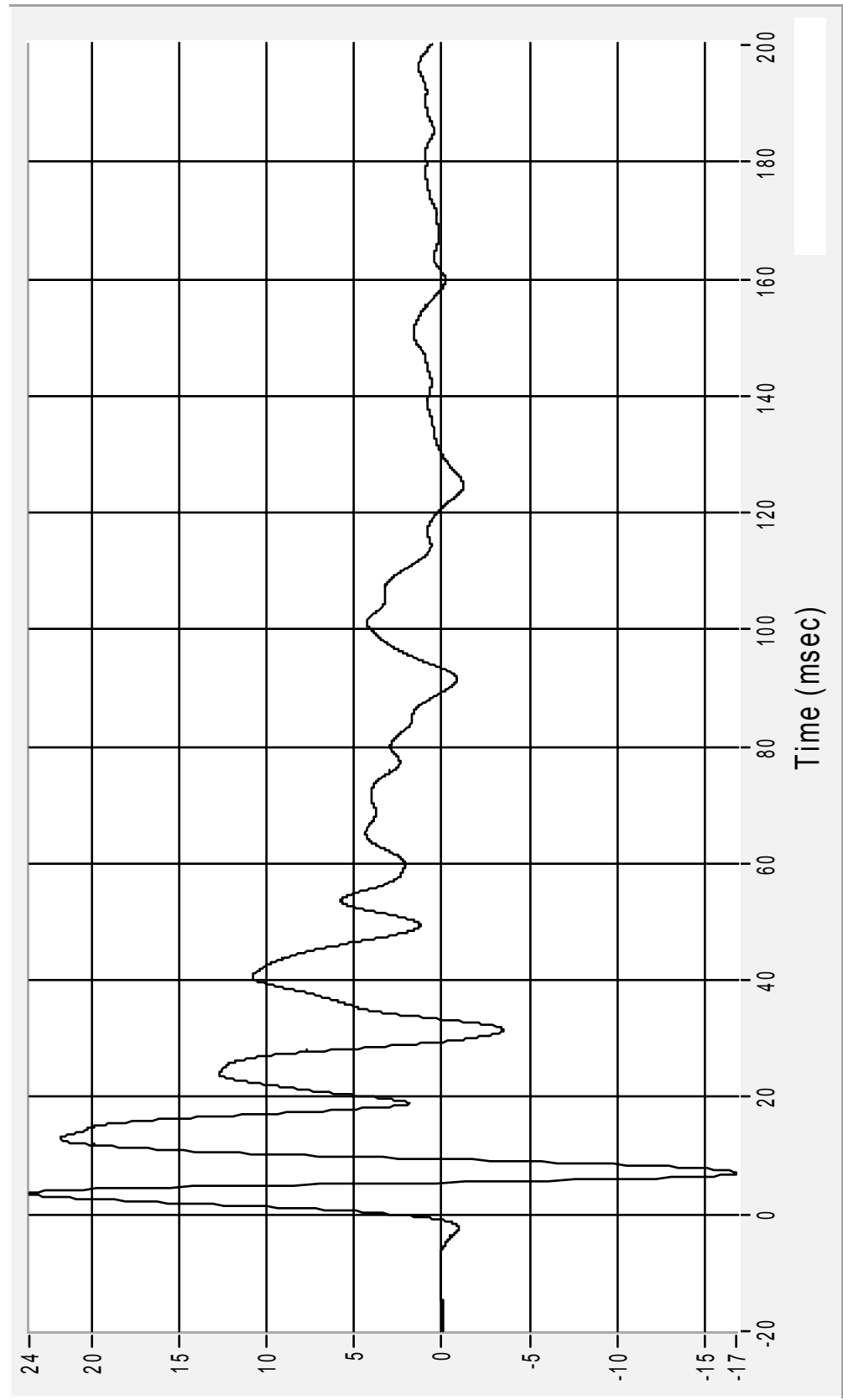


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 Vehicle Crashworthiness Lab

Left Middle A-Pillar (Y) Acceleration
 Acceleration (G's) CFC60

Max	23.6	G	at	3.5	msec
Min	-16.8	G	at	7.0	msec

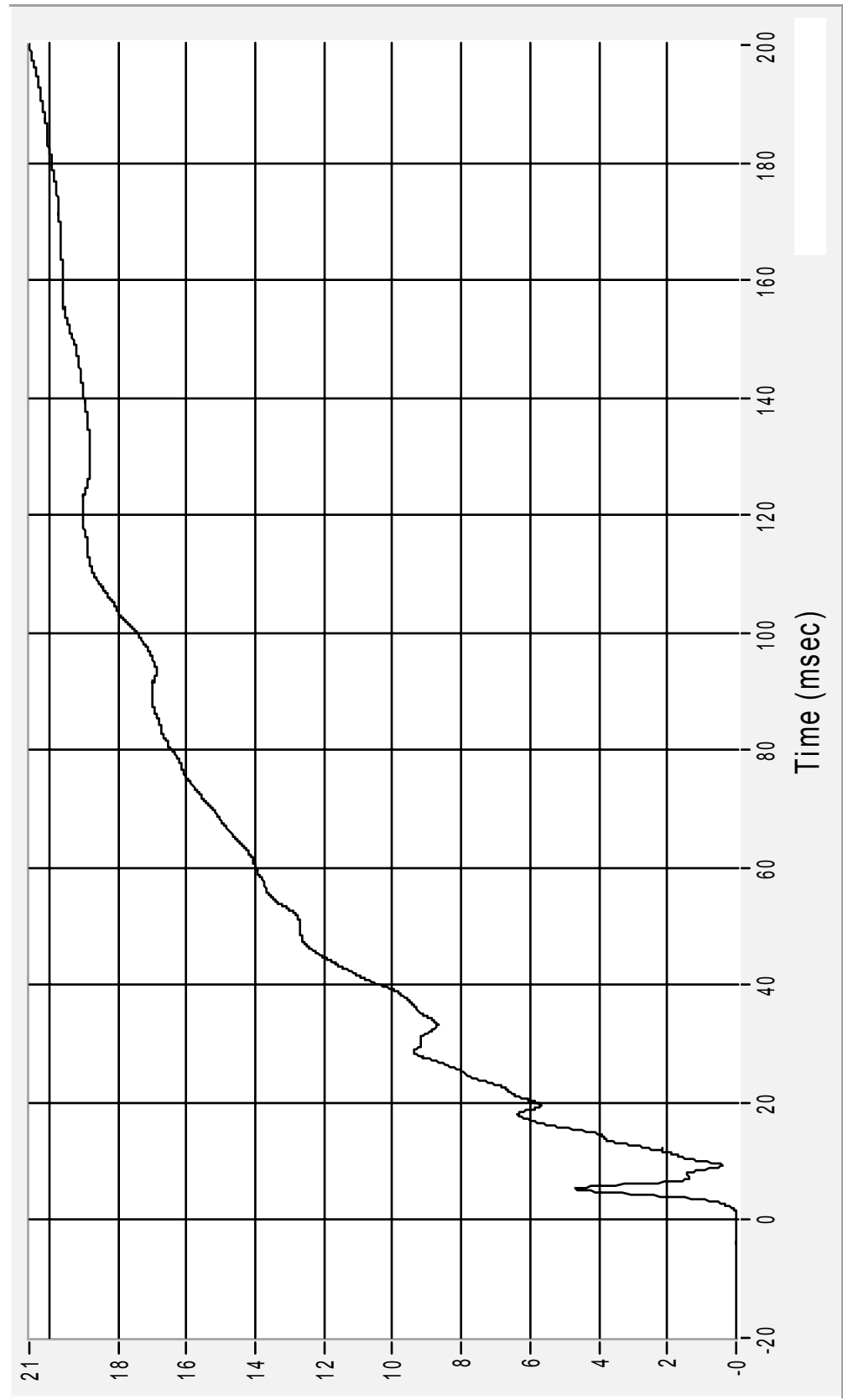


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Medical College of Wisconsin
 Vehicle Crashworthiness Lab

Max 20.6 km/h at 199.9 msec
Min 0.0 km/h at 0.9 msec

Left Middle A-Pillar (Y) Velocity
CFC180

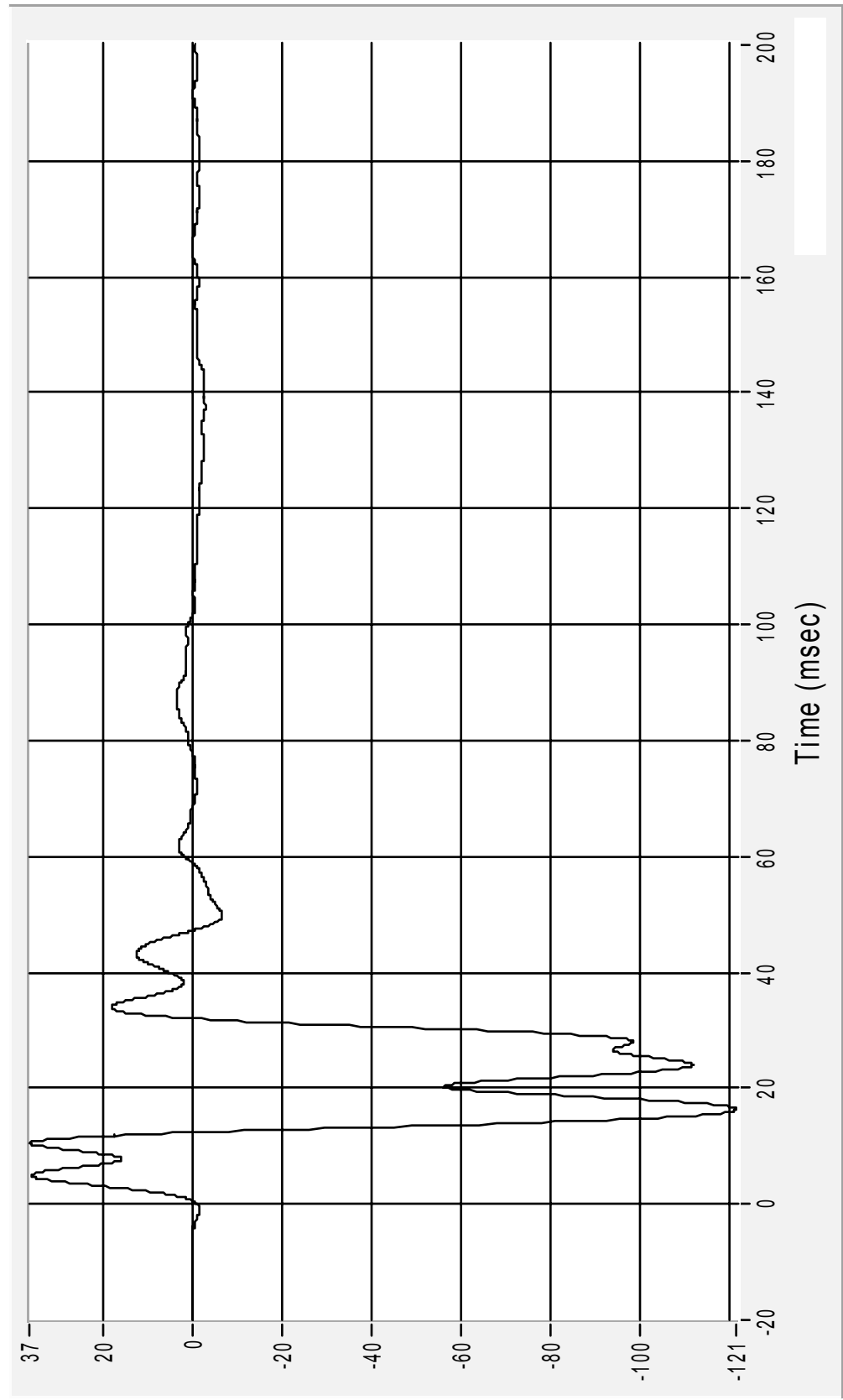


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Vehicle Crashworthiness Lab

Front Seat Track (Y) Acceleration
 Acceleration (G's) CFC60

Max	36.6	G	at	10.5	msec
Min	-121.5	G	at	16.3	msec



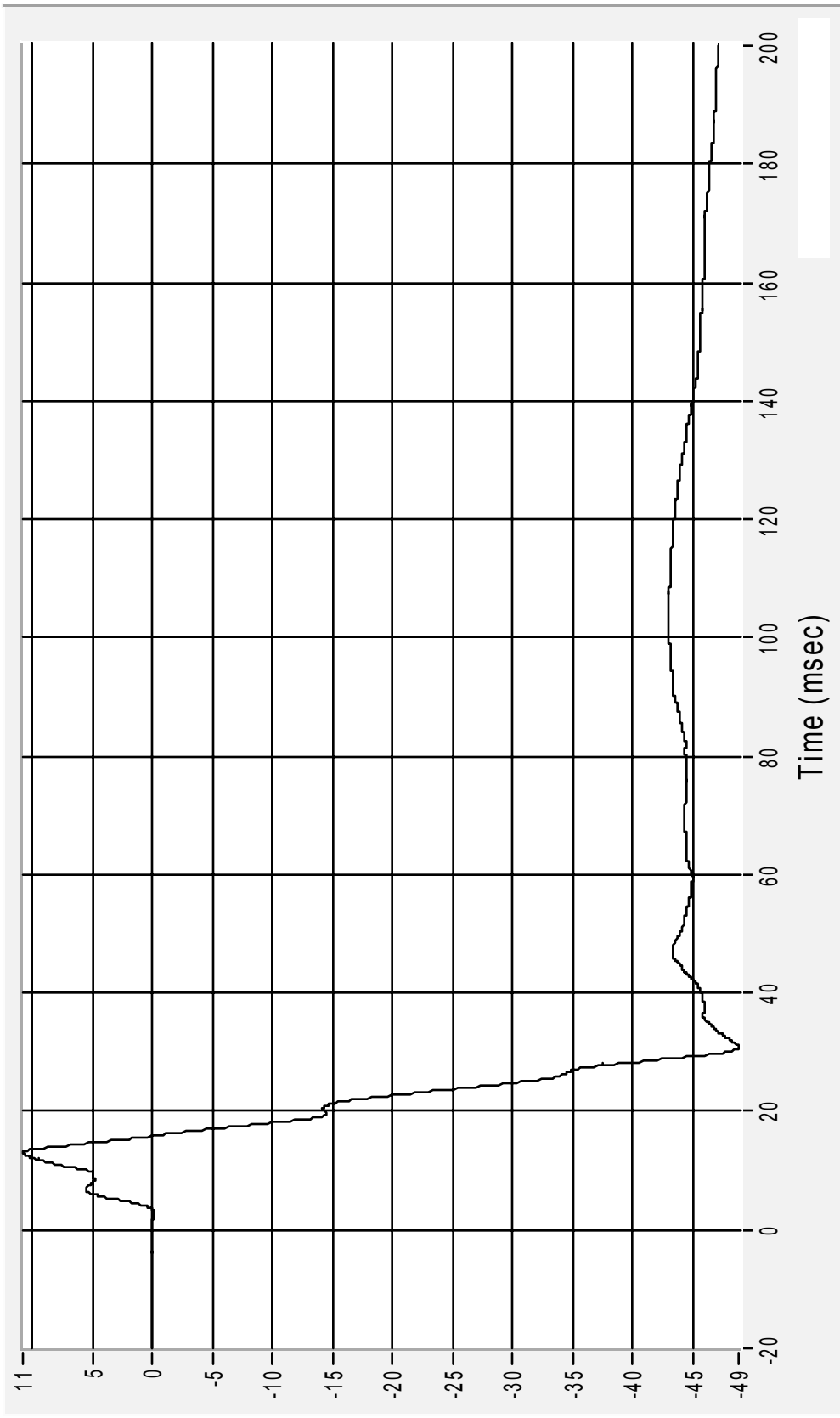
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 Vehicle Crashworthiness Lab

Max 10.8 km/h at 13.0 msec
Min -48.8 km/h at 30.9 msec

Front Seat Track (Y) Velocity

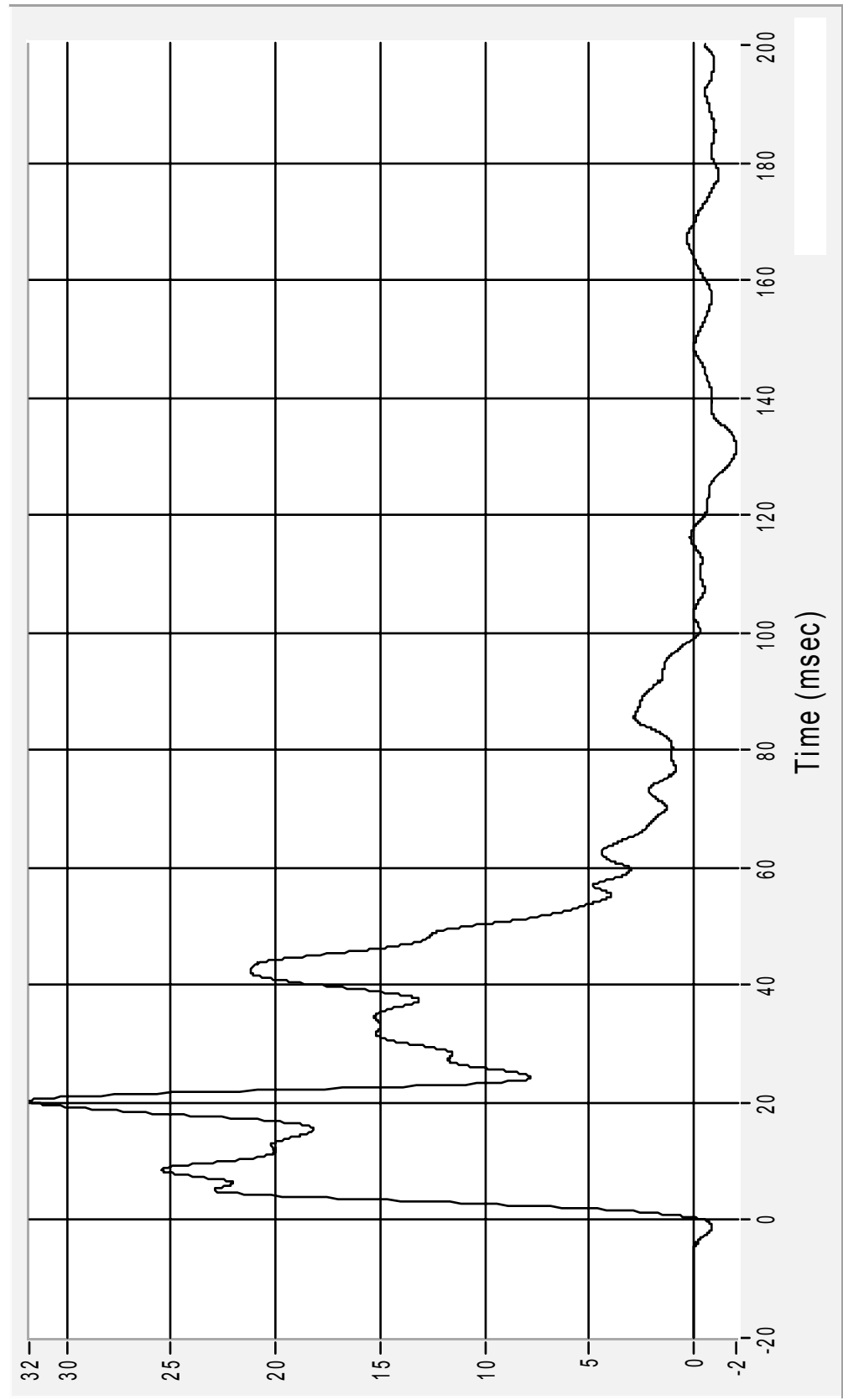
Velocity (km/h) CFC180



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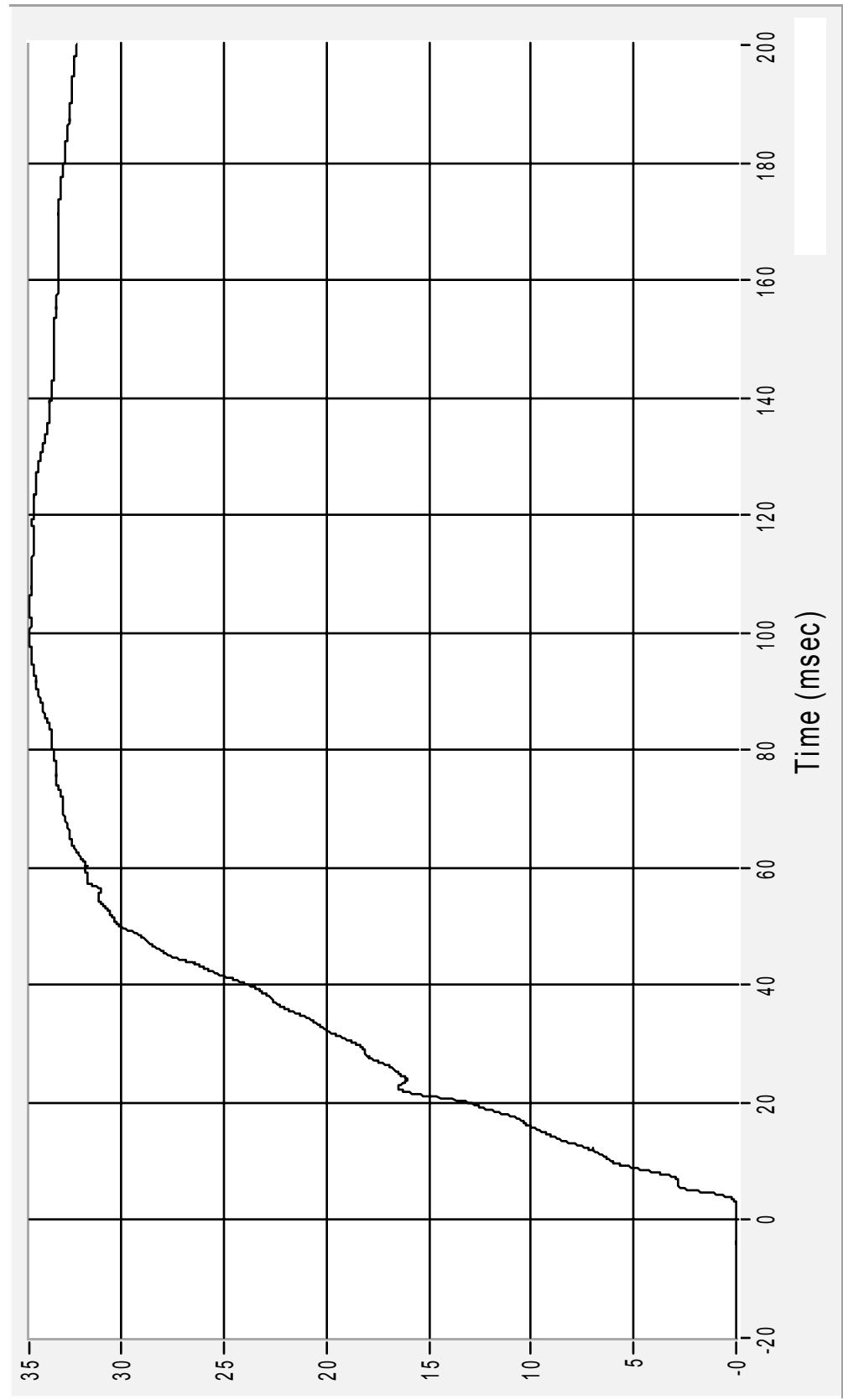
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Rear Seat Track (Y) Acceleration Max 31.8 G at 20.3 msec
 Acceleration (G's) CFC60 Min -2.0 G at 131.2 msec



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 Vehicle Crashworthiness Lab

Rear Seat Track (Y) Velocity CFC180
 Velocity (km/h) Max 34.5 km/h at 98.8 msec
 Min 0.0 km/h at 2.3 msec

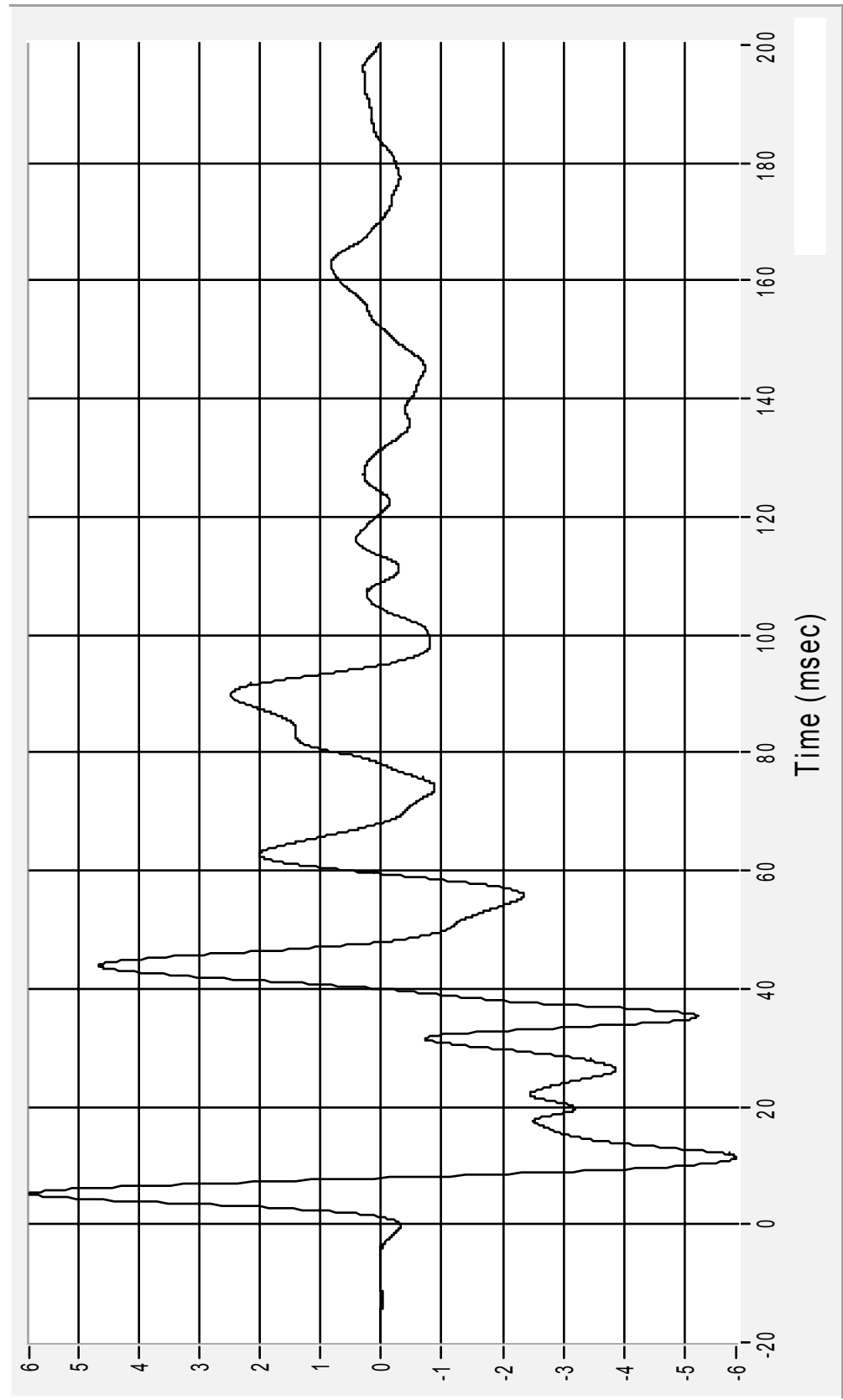


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 Vehicle Crashworthiness Lab

Vehicle Center of Gravity (X) Acceleration
 Acceleration (G's) CFC60

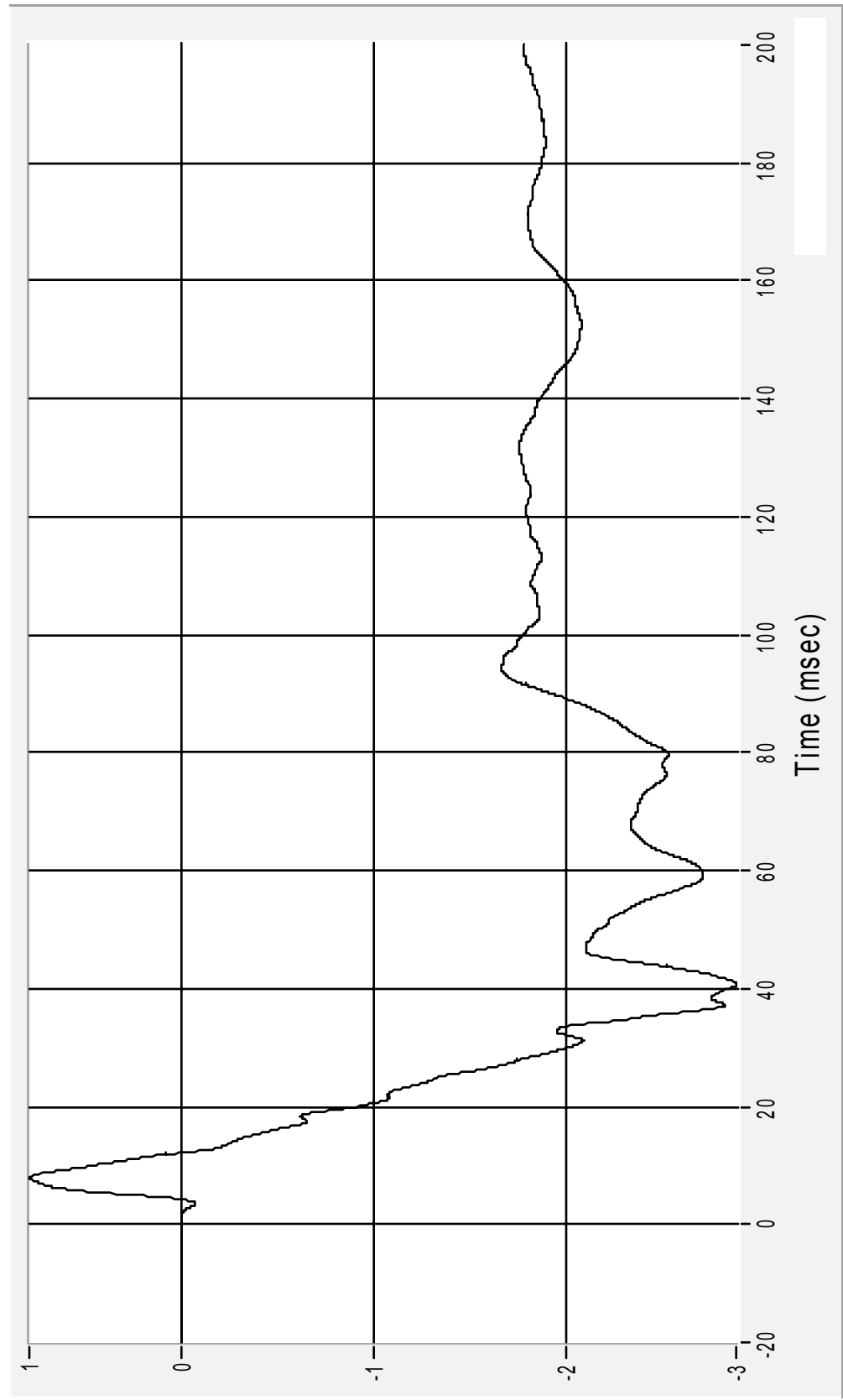
Max	5.8	G	at	5.2	msec
Min	-5.9	G	at	11.4	msec



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Max 0.8 km/h at 7.9 msec
Min -2.9 km/h at 40.7 msec

Vehicle Center of Gravity (X) Velocity
 CFC180
 Velocity (km/h)

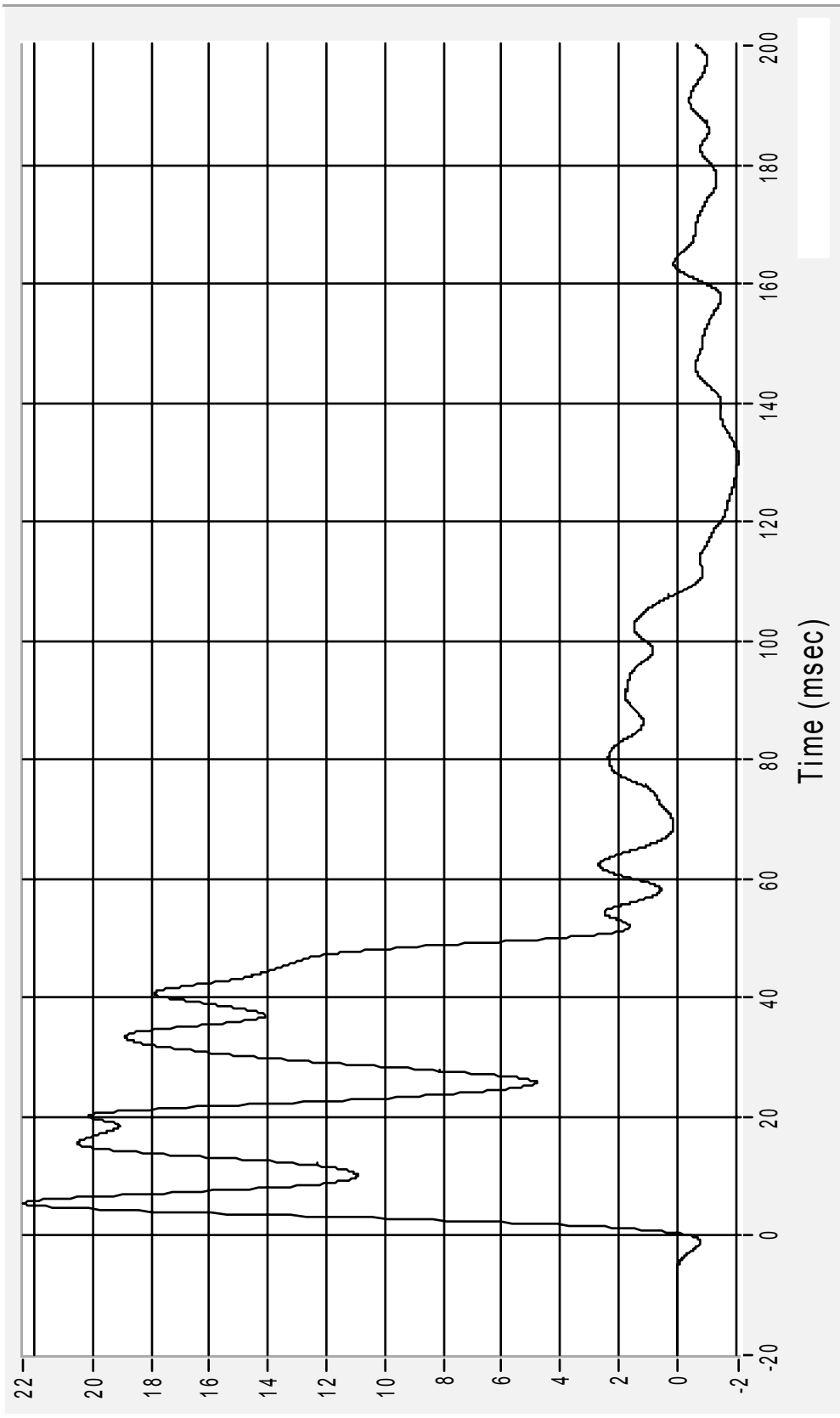


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 Vehicle Crashworthiness Lab

Max 22.4 G at 5.5 msec
Min -2.1 G at 130.6 msec

Vehicle Center of Gravity (Y) Acceleration

Acceleration (G's) CFC60

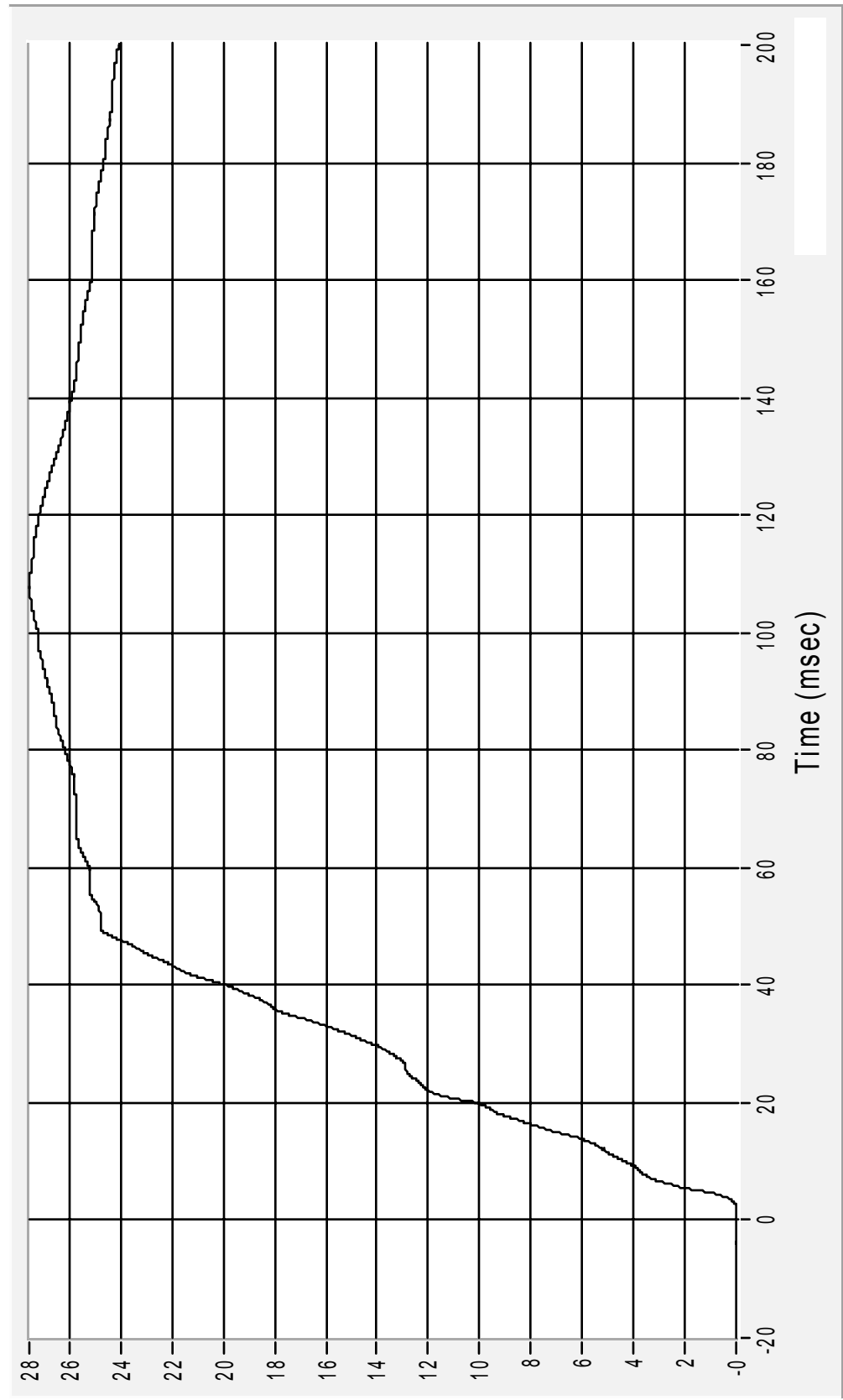


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 Vehicle Crashworthiness Lab

Max 27.6 km/h at 108.2 msec
 Min 0.0 km/h at 2.1 msec

Vehicle Center of Gravity (Y) Velocity
 CFC180

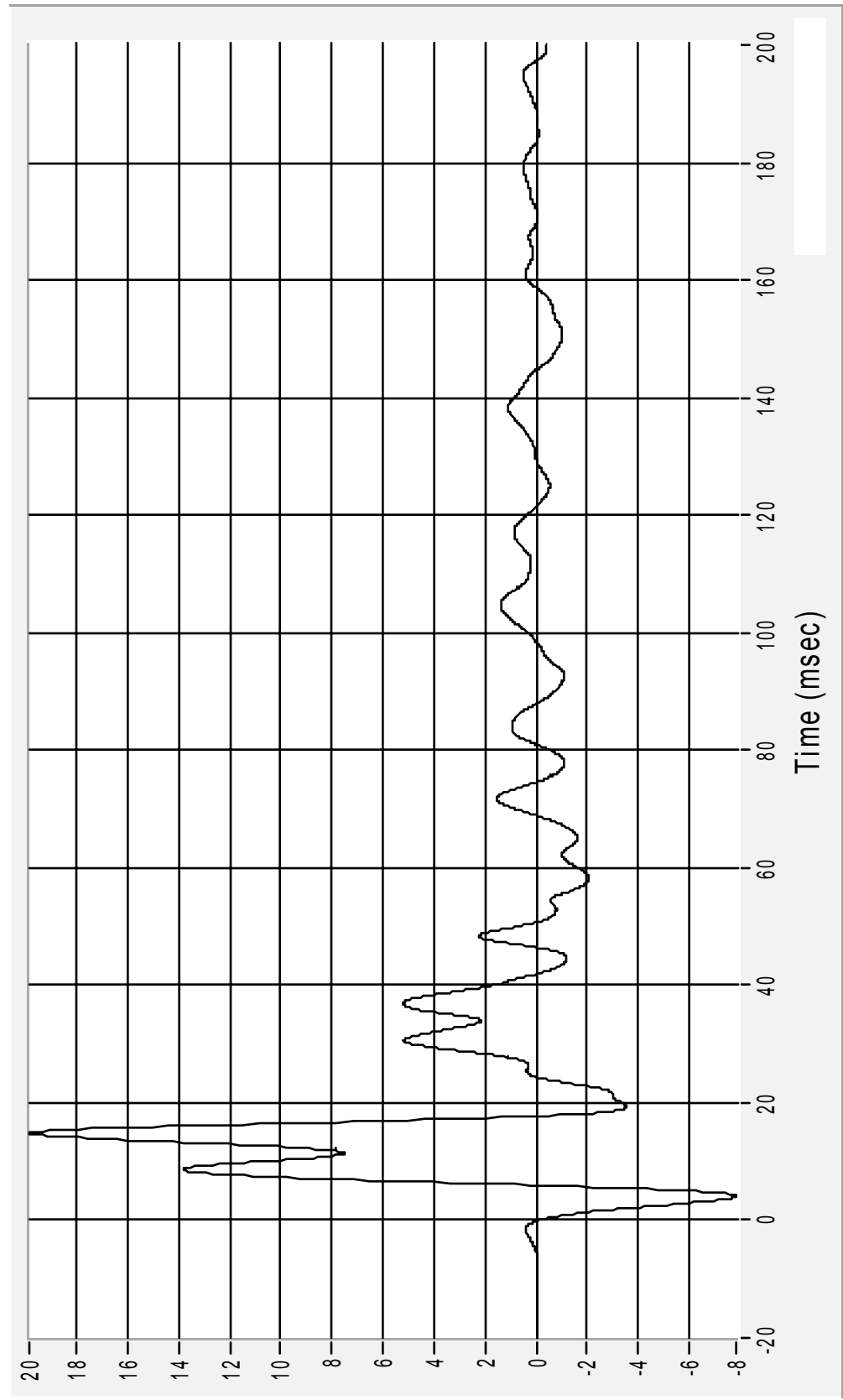


Medical College of Wisconsin
 Vehicle Crashworthiness Lab

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Vehicle Center of Gravity (Z) Acceleration
 Acceleration (G's) CFC60

Max	19.8	G	at	14.9	msec
Min	-7.8	G	at	4.1	msec

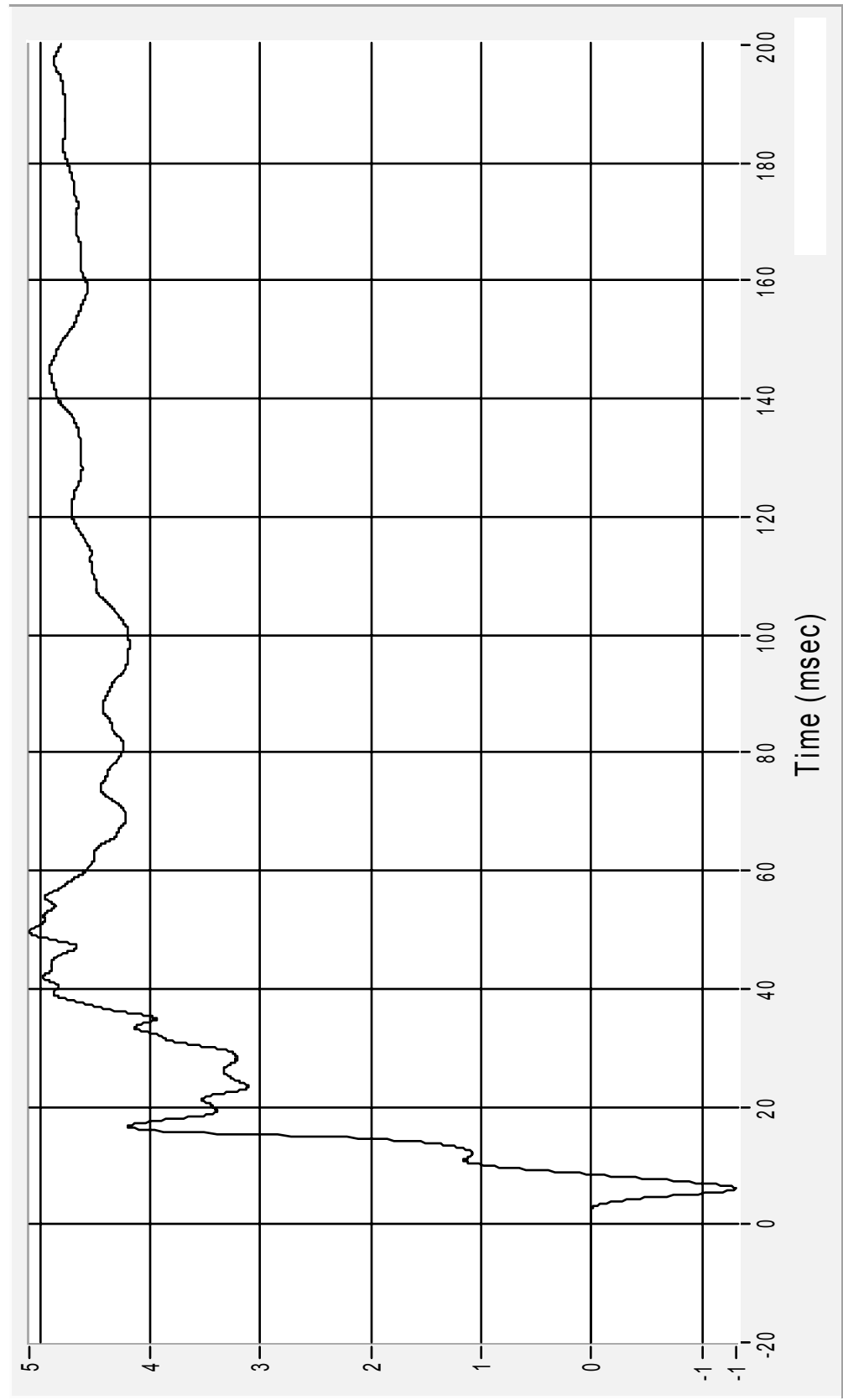


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 Vehicle Crashworthiness Lab

Max 5.1 km/h at 49.6 msec
 Min -1.3 km/h at 6.1 msec

Vehicle Center of Gravity (Z) Velocity
 Velocity (km/h) CFC180

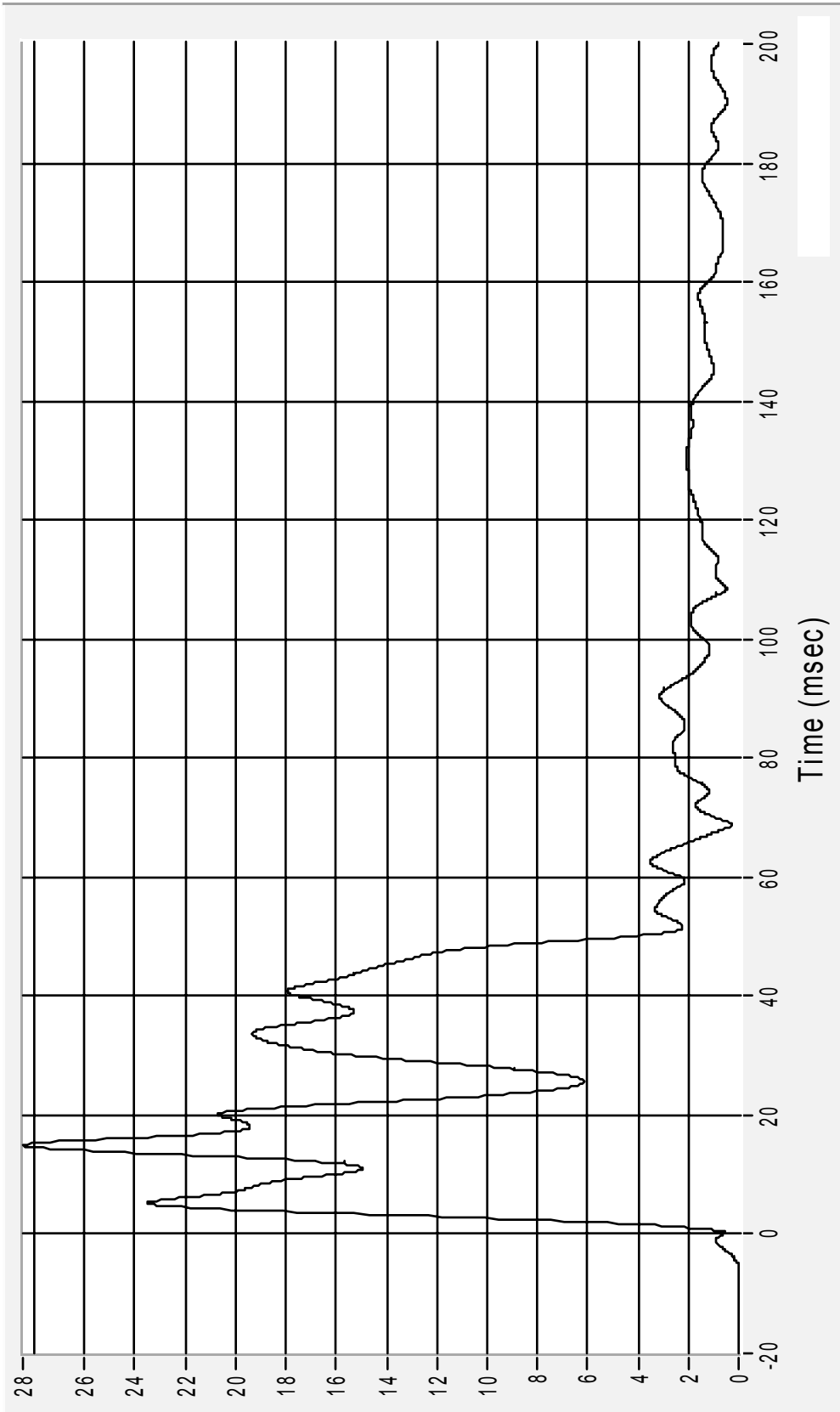


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 Vehicle Crashworthiness Lab

Vehicle Center of Gravity Resultant Acceleration

Acceleration (G's) CFC60

Max 28.4 G's at 15.0 msec
Min 0.3 G's at 68.8 msec



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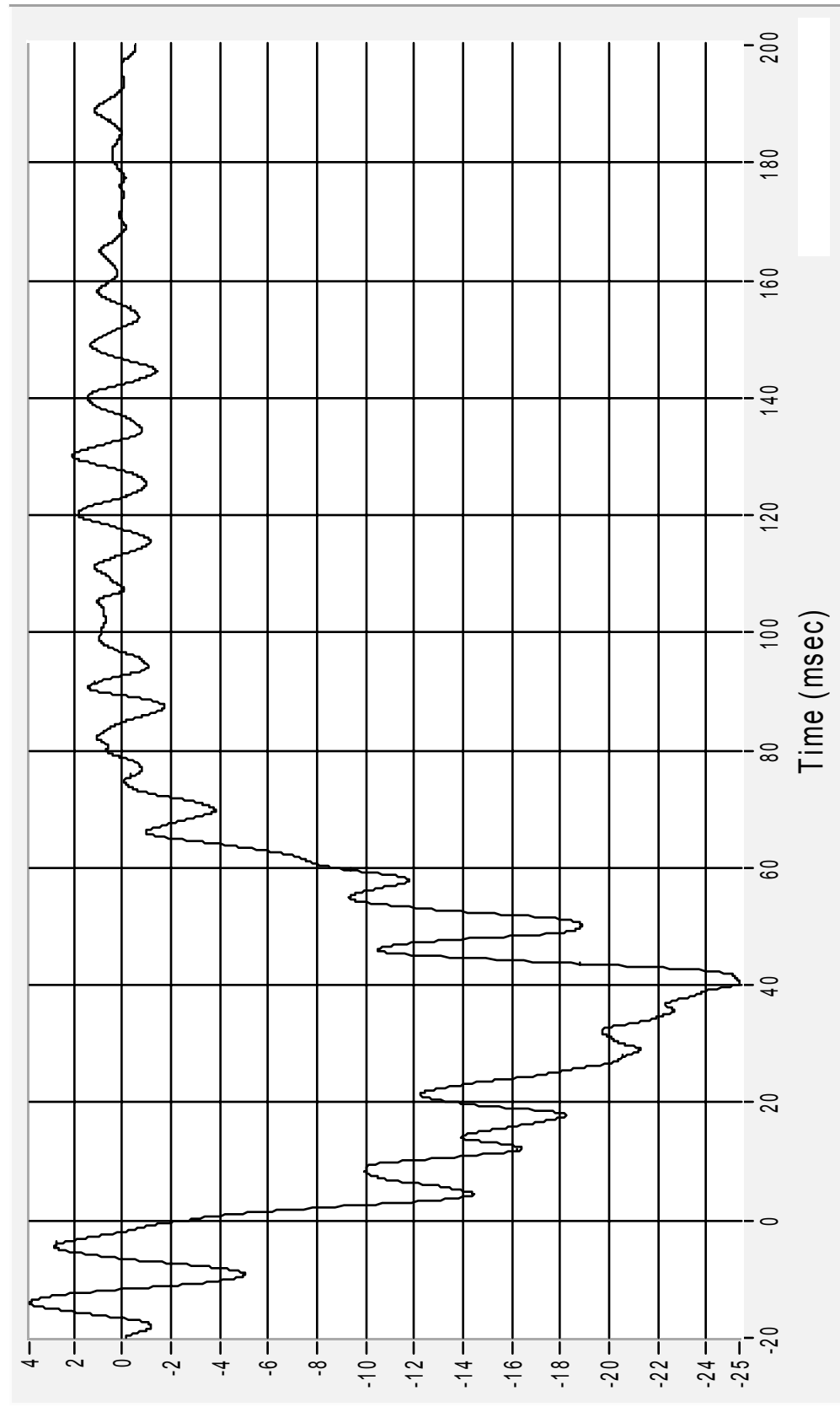
16 December 2003

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Vehicle Crashworthiness Lab

Max 2.1 G at 130.1 msec
Min -25.4 G at 40.5 msec

MDB Center of Gravity (X) Acceleration

Acceleration (G's) CFC60

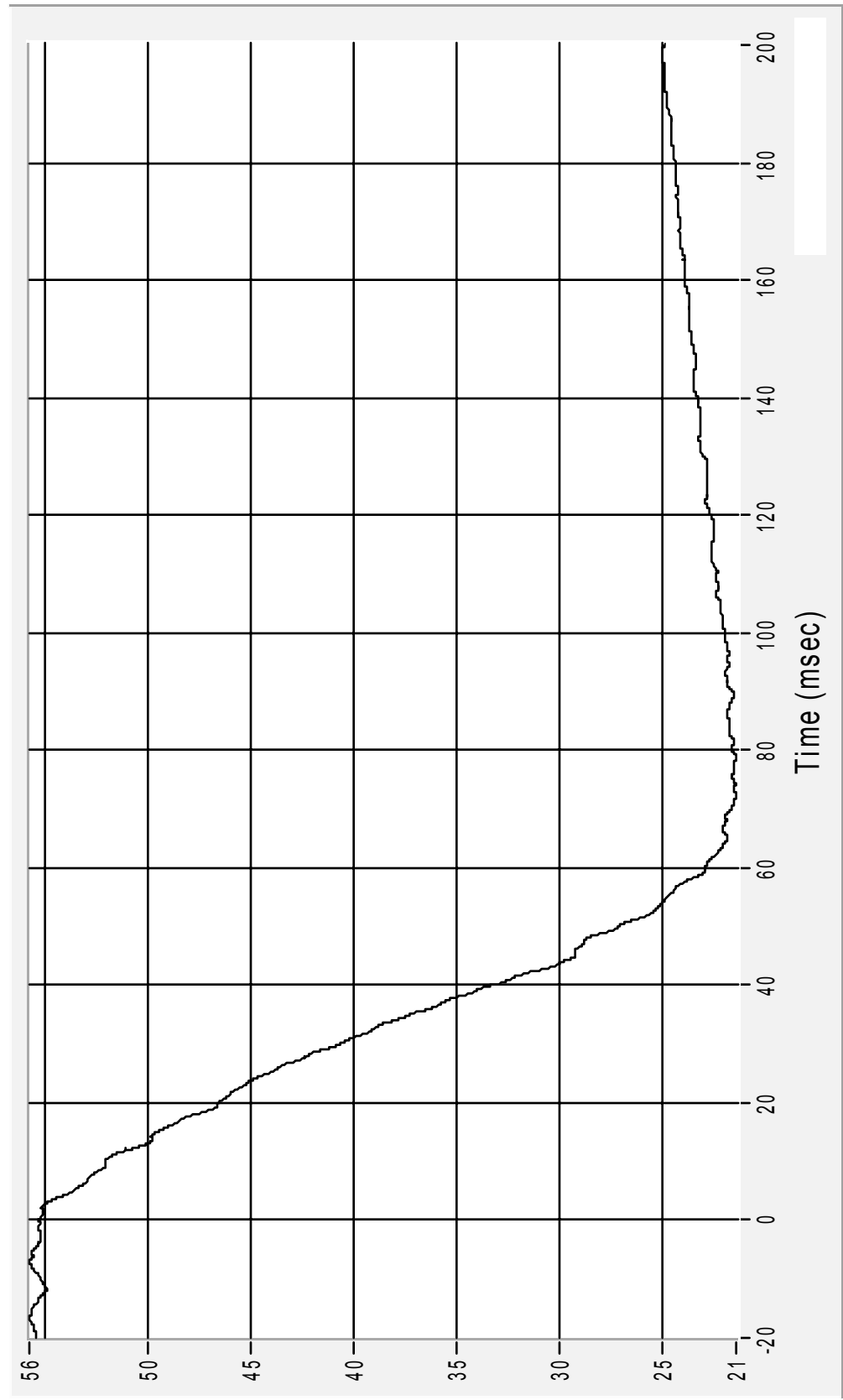


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Vehicle Crashworthiness Lab

Max 55.3 km/h at 0.0 msec
Min 21.4 km/h at 72.3 msec

MDB Center of Gravity (X) Velocity
 Velocity (km/h) CFC180



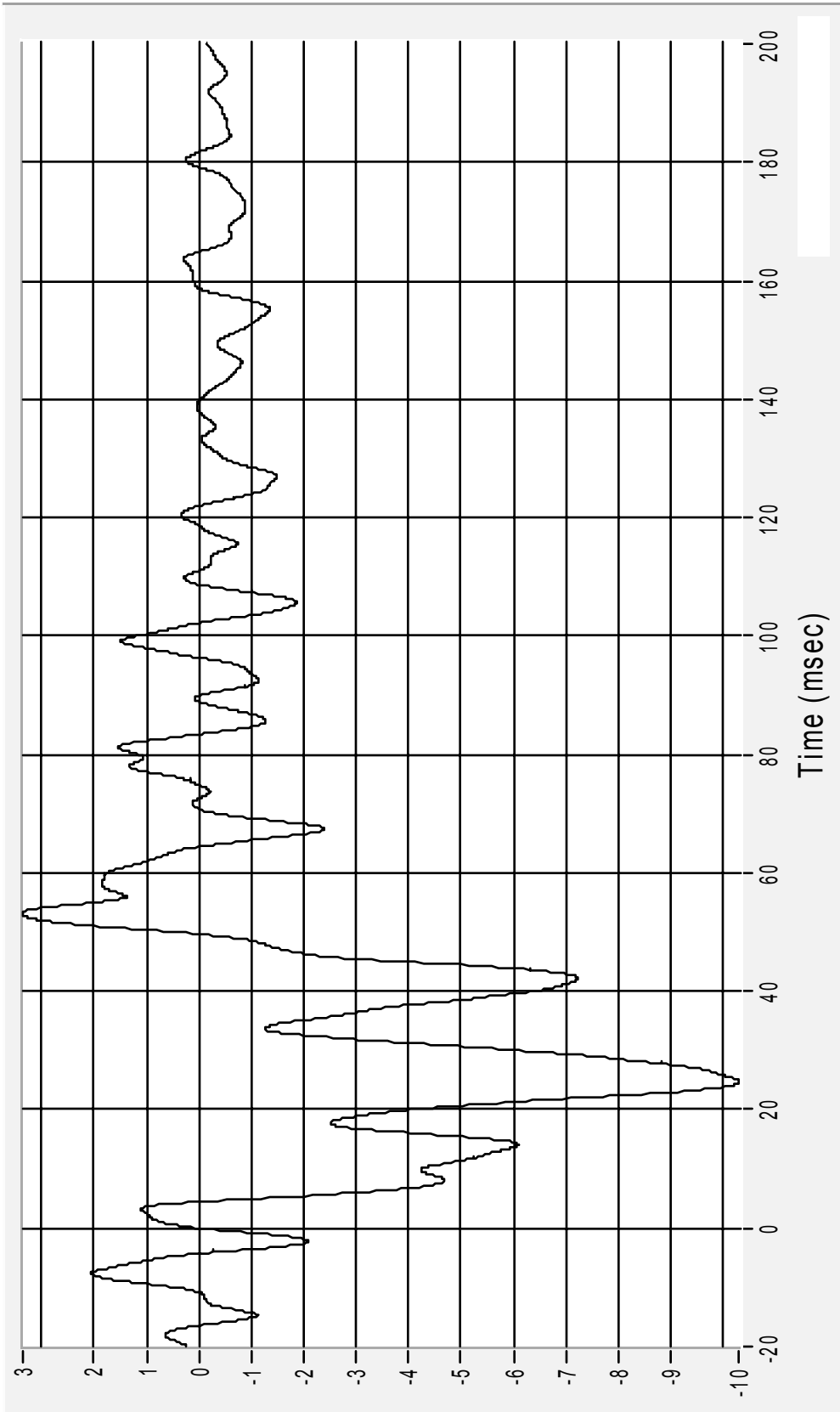
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 16 December 2003

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 Vehicle Crashworthiness Lab

MDB Center of Gravity (Y) Acceleration

Acceleration (G's) CFC60

Max 3.4 G at 53.1 msec
Min -10.3 G at 24.7 msec



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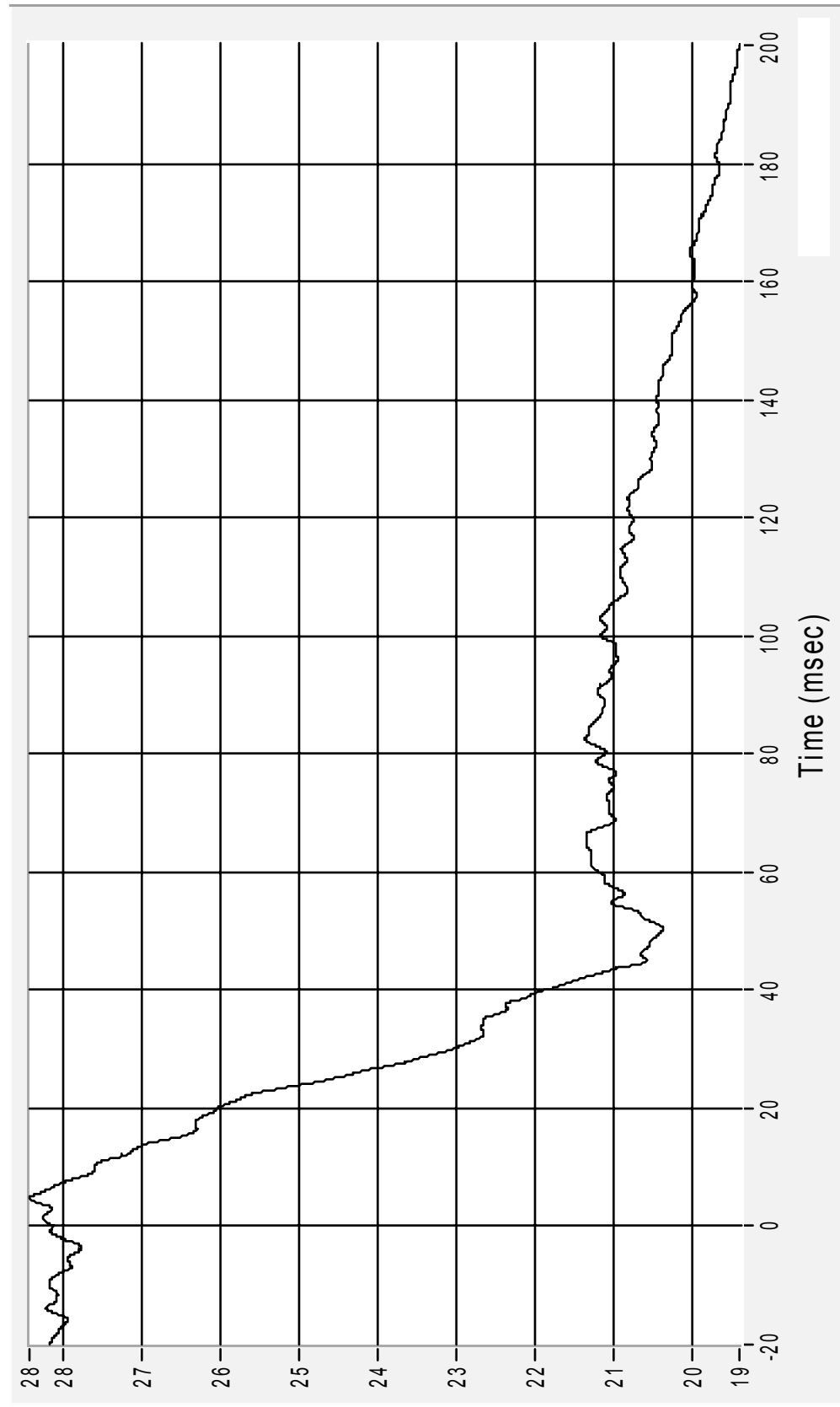
16 December 2003

Medical College of Wisconsin
Vehicle Crashworthiness Lab

Max 28.4 km/h at 4.7 msec
Min 19.4 km/h at 199.9 msec

MDB Center of Gravity (Y) Velocity

Velocity (km/h) CFC180

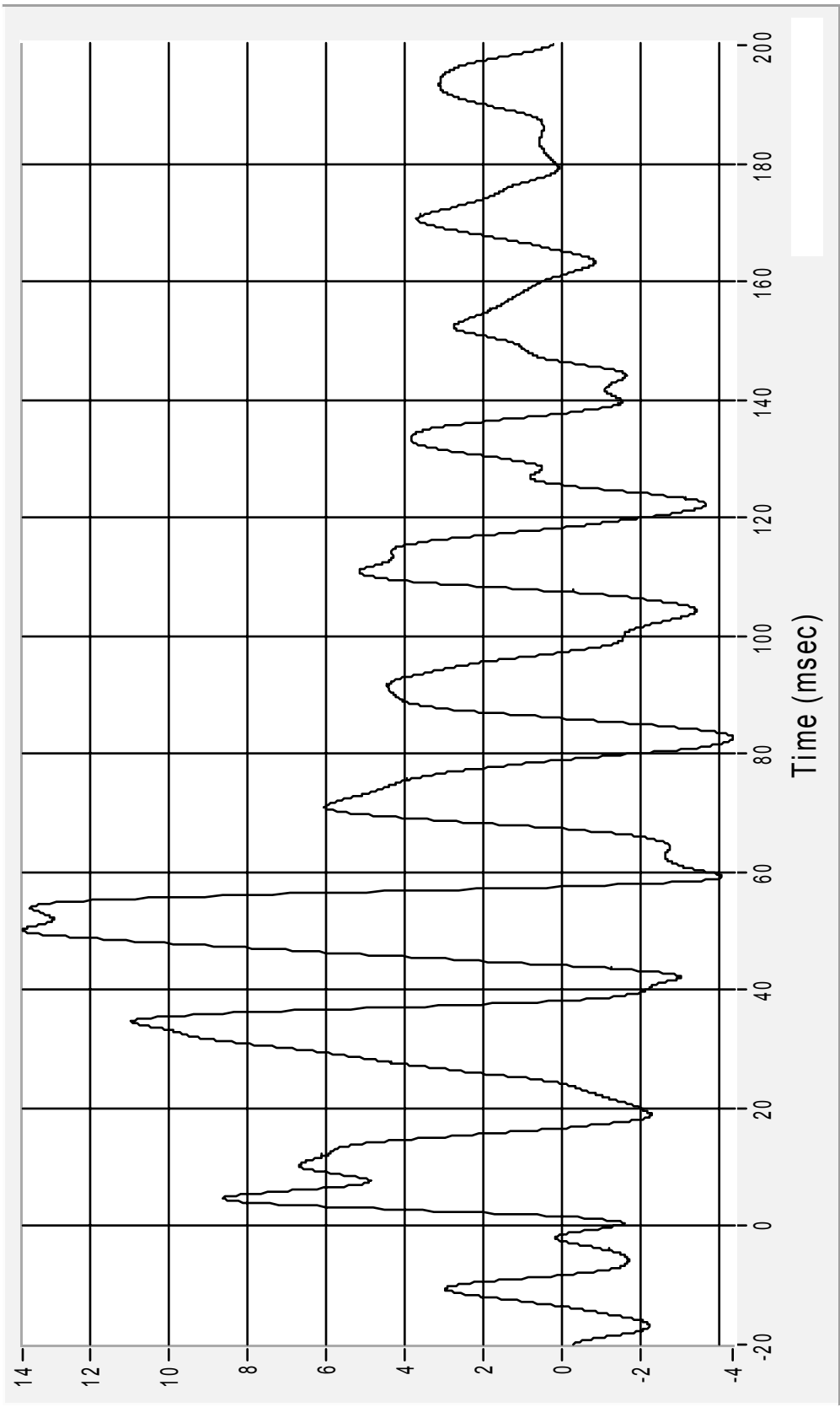


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 16 December 2003

Medical College of Wisconsin
 Vehicle Crashworthiness Lab

MDB Center of Gravity (Z) Acceleration
 Acceleration (G's) CFC60

Max	13.7	G	at	50.2	msec
Min	-4.4	G	at	82.7	msec

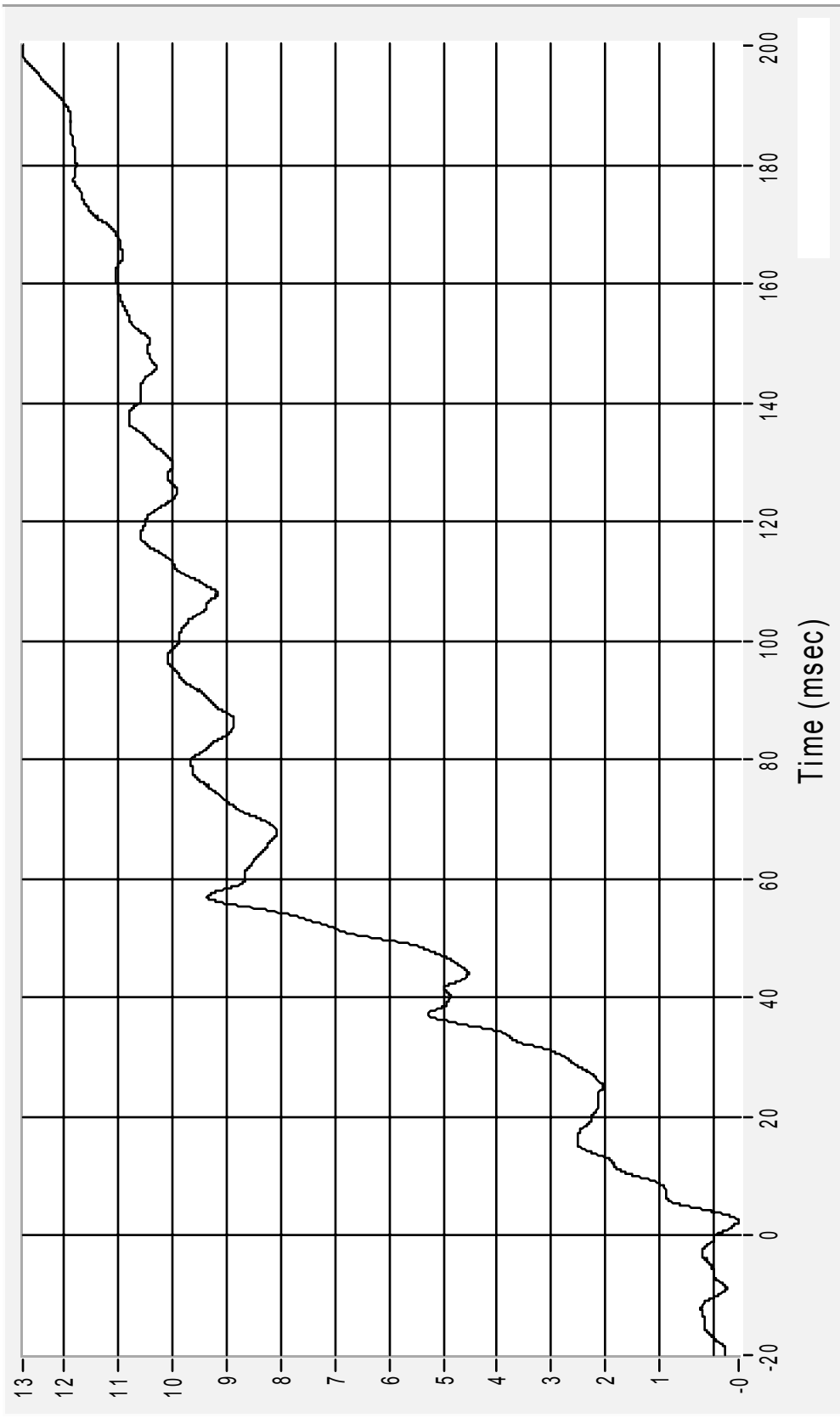


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 16 December 2003

Medical College of Wisconsin
 Vehicle Crashworthiness Lab

Max 12.8 km/h at 198.6 msec
Min -0.5 km/h at 2.6 msec

MDB Center of Gravity (Z) Velocity
CFC180
Velocity (km/h)



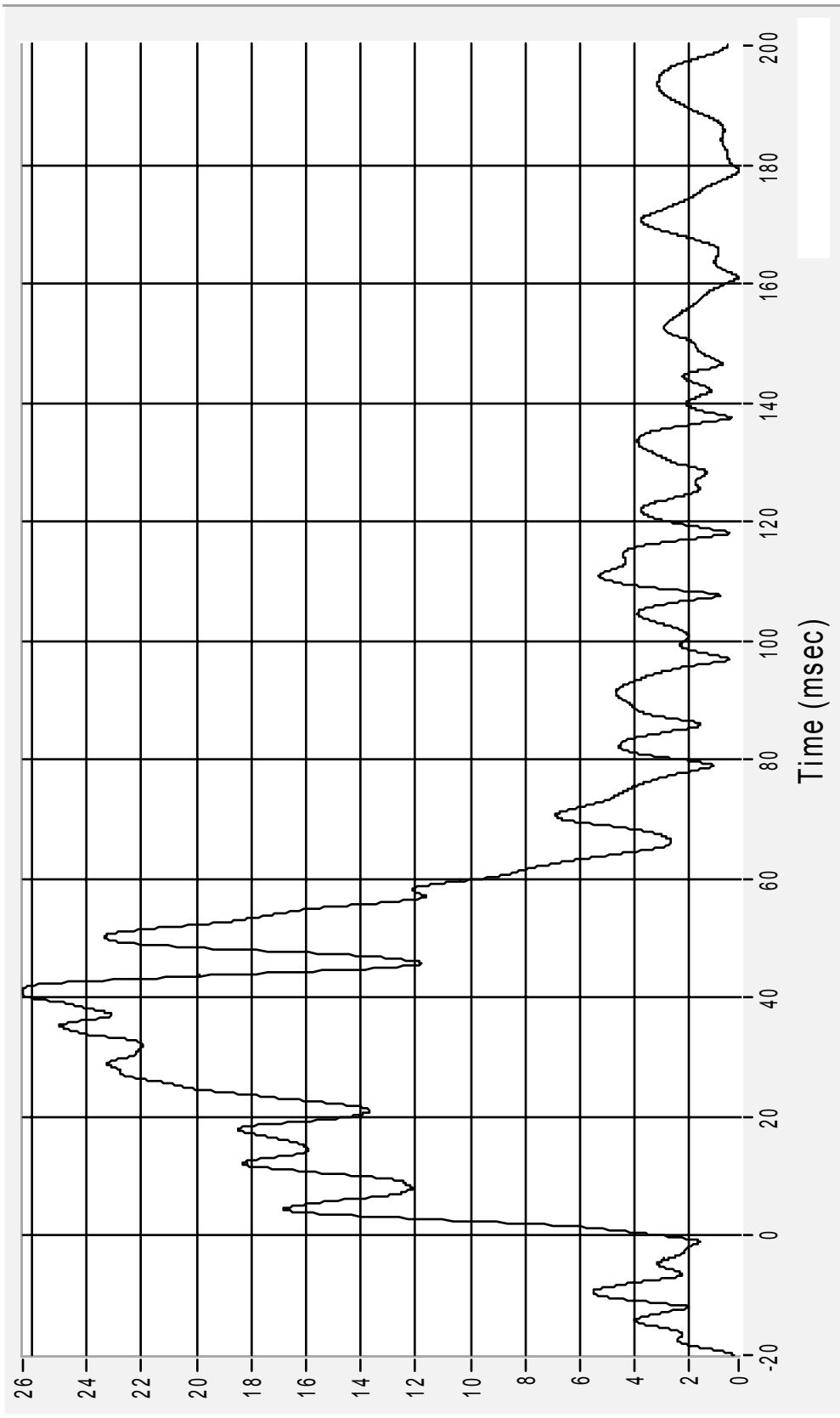
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Vehicle Crashworthiness Lab

Max 26.3 G's at 40.6 msec
Min 0.2 G's at 179.0 msec

MDB Center of Gravity Resultant Acceleration

Acceleration (G's) CFC60

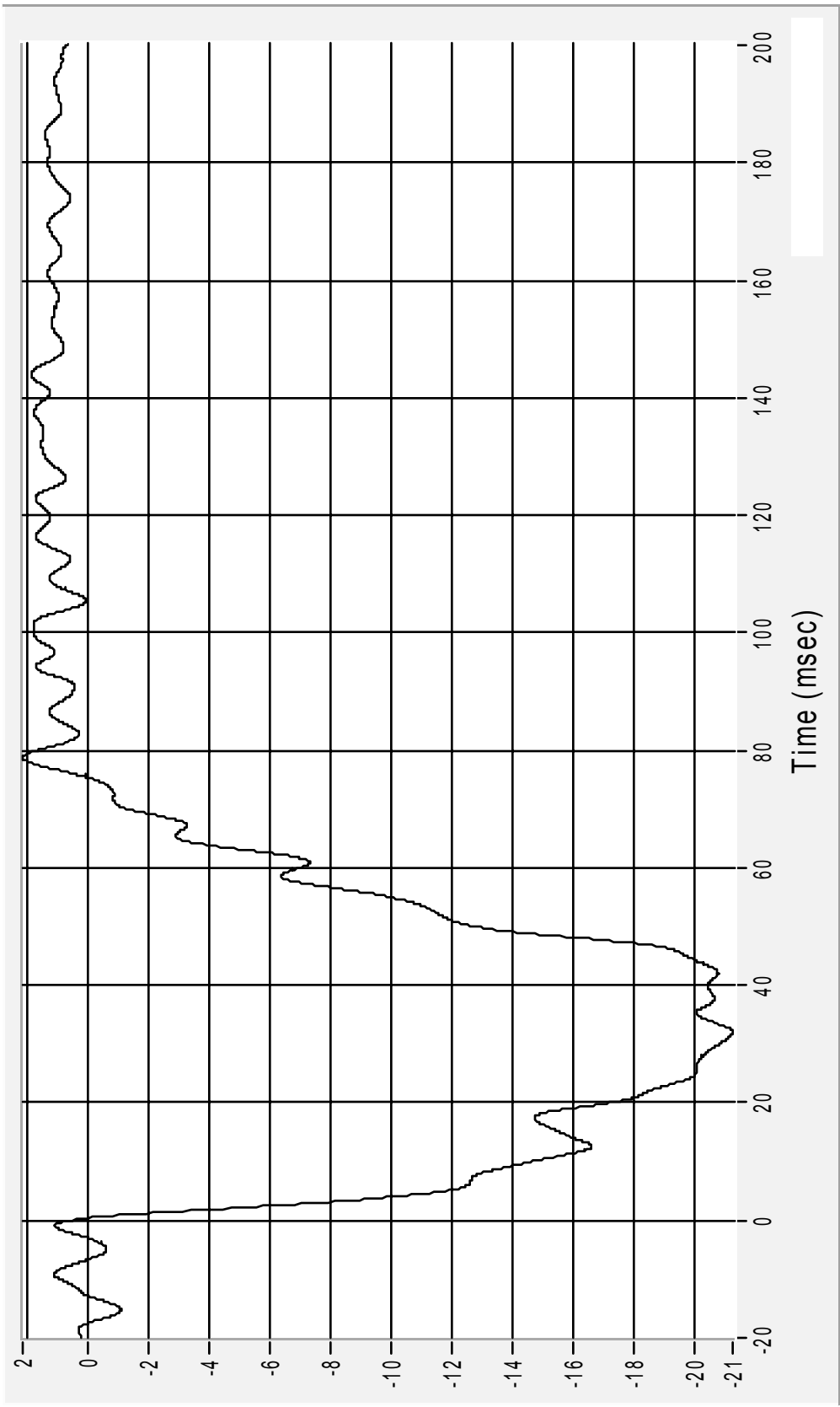


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 16 December 2003

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 Vehicle Crashworthiness Lab

MDB Rear (X) Acceleration CFC60
 Acceleration (G's)

Max 2.2 G at 78.7 msec
 Min -21.2 G at 32.0 msec

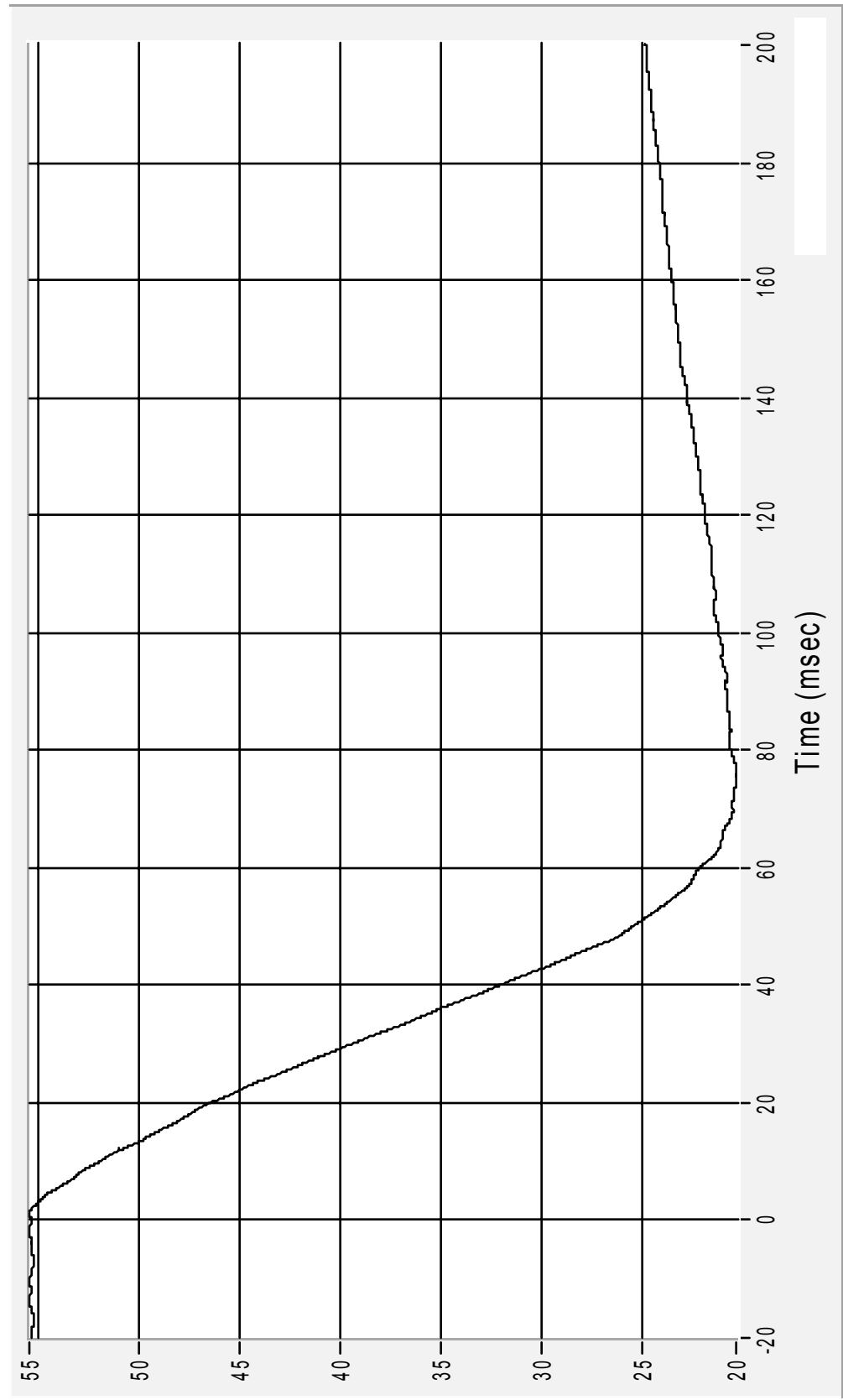


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 16 December 2003

Medical College of Wisconsin
 Vehicle Crashworthiness Lab

MDB Rear (X) Velocity
 Velocity (km/h) CFC180

Max	55.4	km/h	at	1.3	msec
Min	20.4	km/h	at	76.4	msec

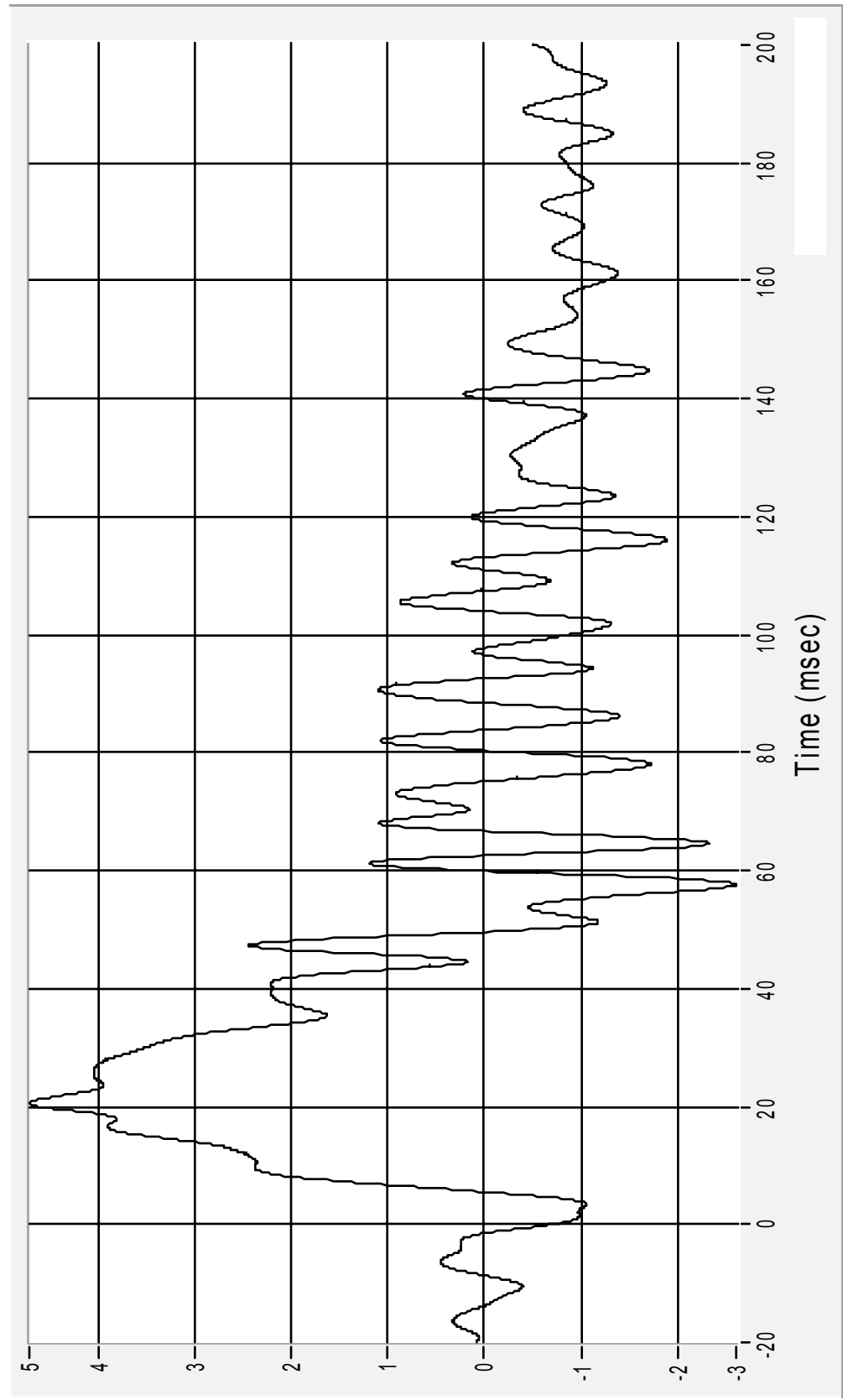


04SN03 - 2004 SATURN ION QUAD COUPE
 16 December 2003

Medical College of Wisconsin
 Vehicle Crashworthiness Lab

MDB Rear (Y) Acceleration CFC60
 Acceleration (G's)

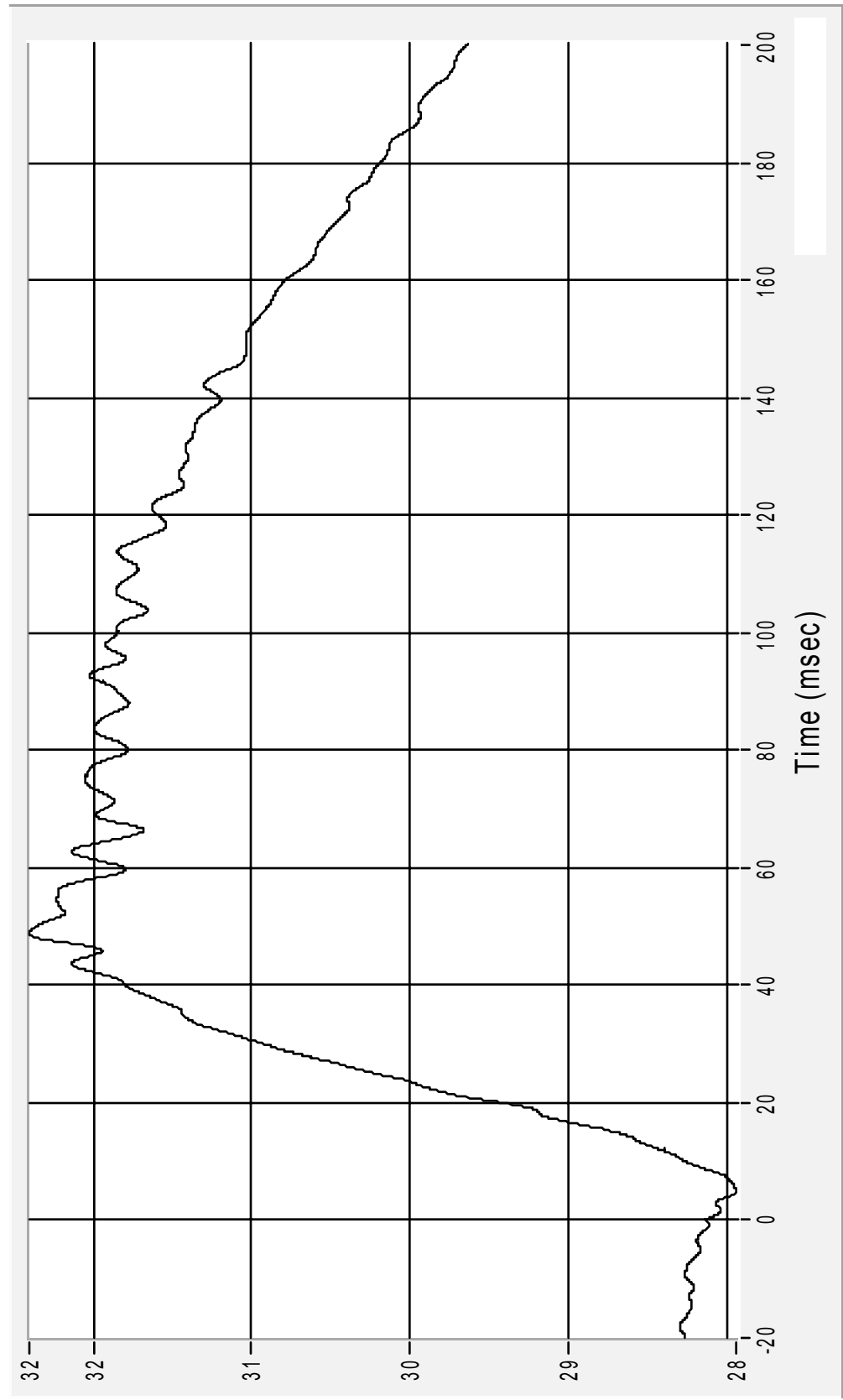
Max	4.7	G	at	20.6	msec
Min	-2.6	G	at	57.7	msec



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 16 December 2003
 Medical College of Wisconsin
 Vehicle Crashworthiness Lab

MDB Rear (Y) Velocity
 Velocity (km/h) CFC180

Max	32.4	km/h	at	49.0	msec
Min	27.9	km/h	at	5.0	msec



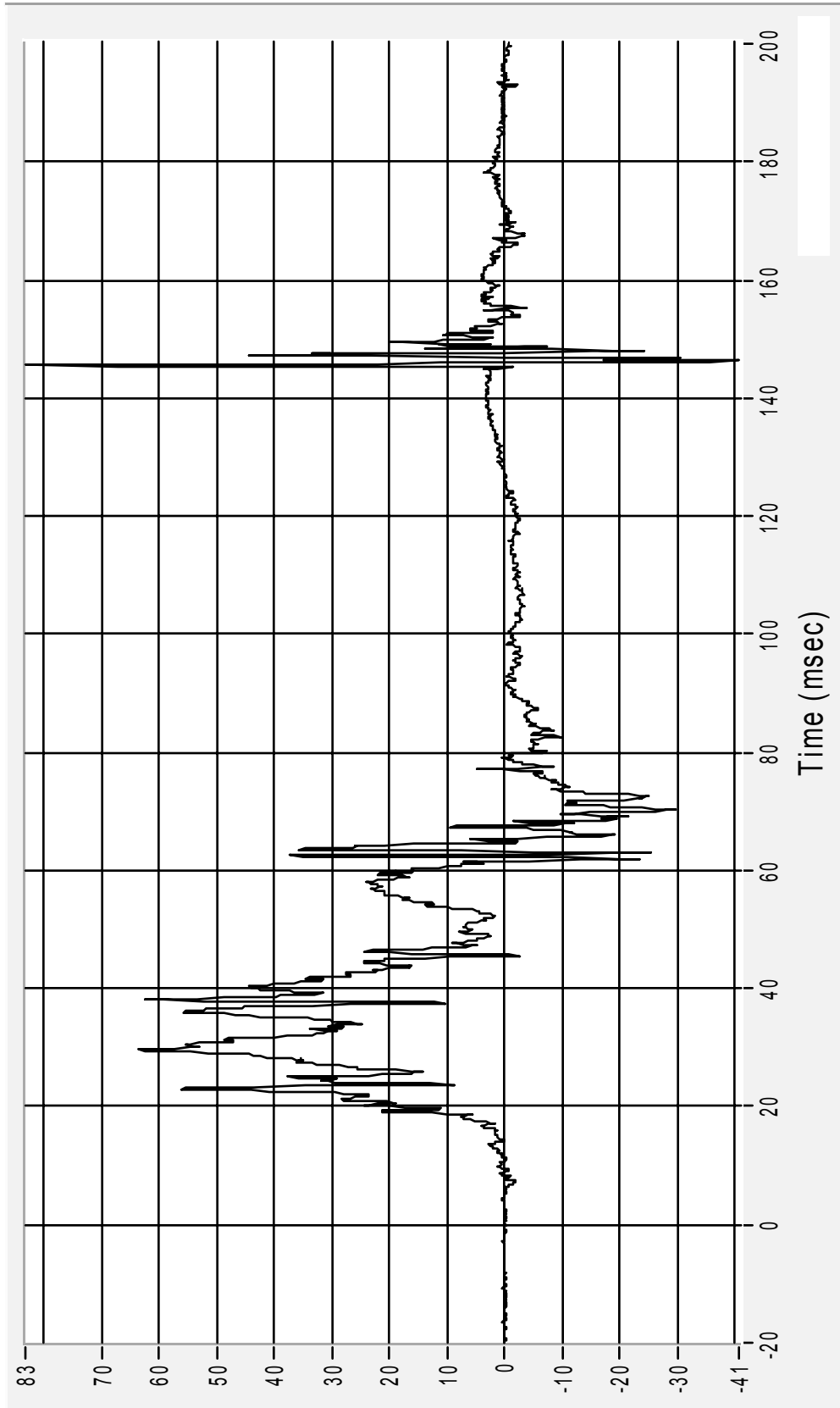
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 16 December 2003

Medical College of Wisconsin
 Vehicle Crashworthiness Lab

Driver Upper Rib (Y) - Redundant Acceleration

Acceleration (G's) CFC1000

Max 83.3 G at 145.5 msec
Min -40.6 G at 146.3 msec



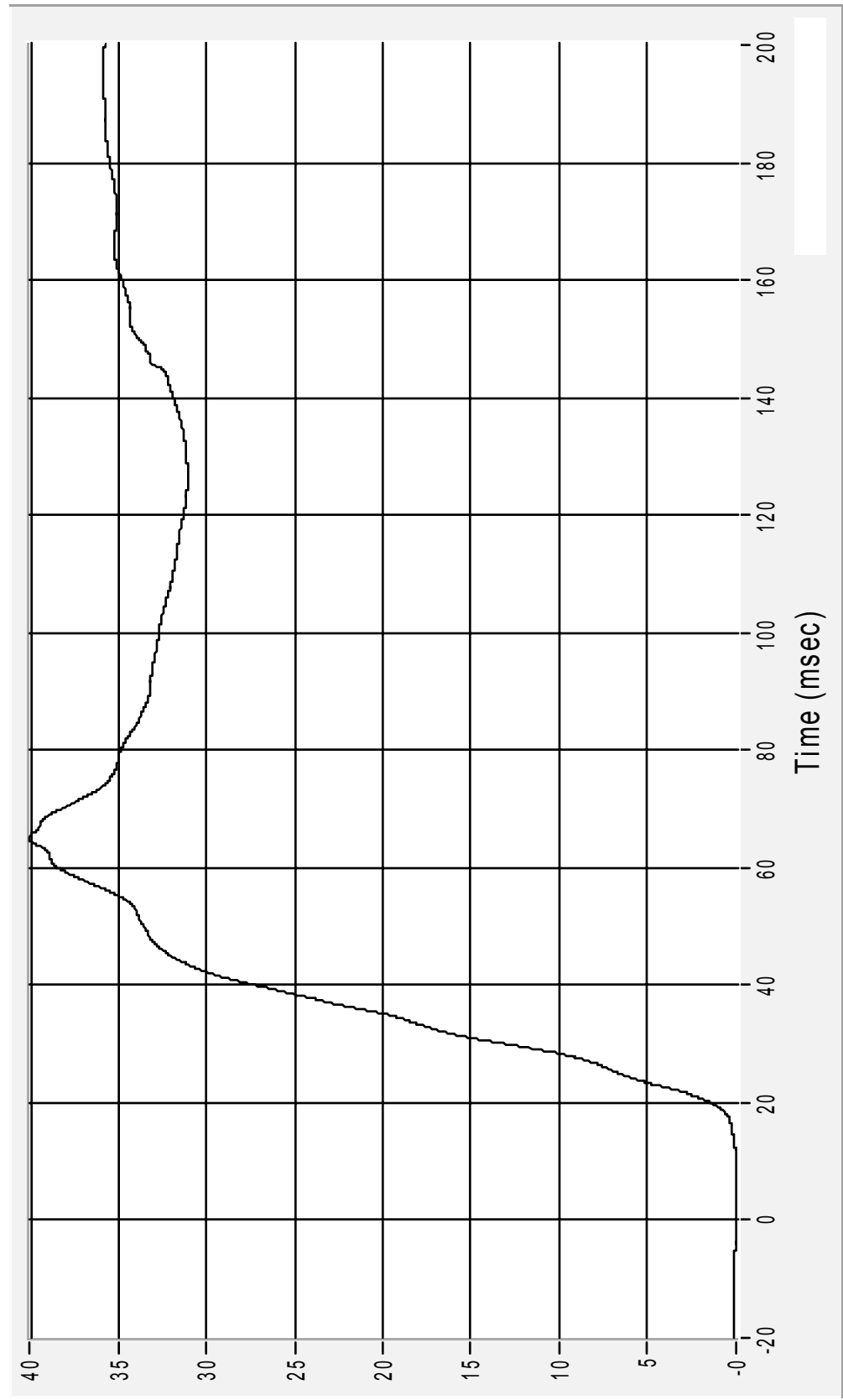
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Medical College of Wisconsin
Vehicle Crashworthiness Lab

Driver Upper Rib (Y) Velocity - Redundant
 Velocity (km/h) CFC180

Max	40.1	km/h	at	65.0	msec
Min	0.0	km/h	at	8.5	msec



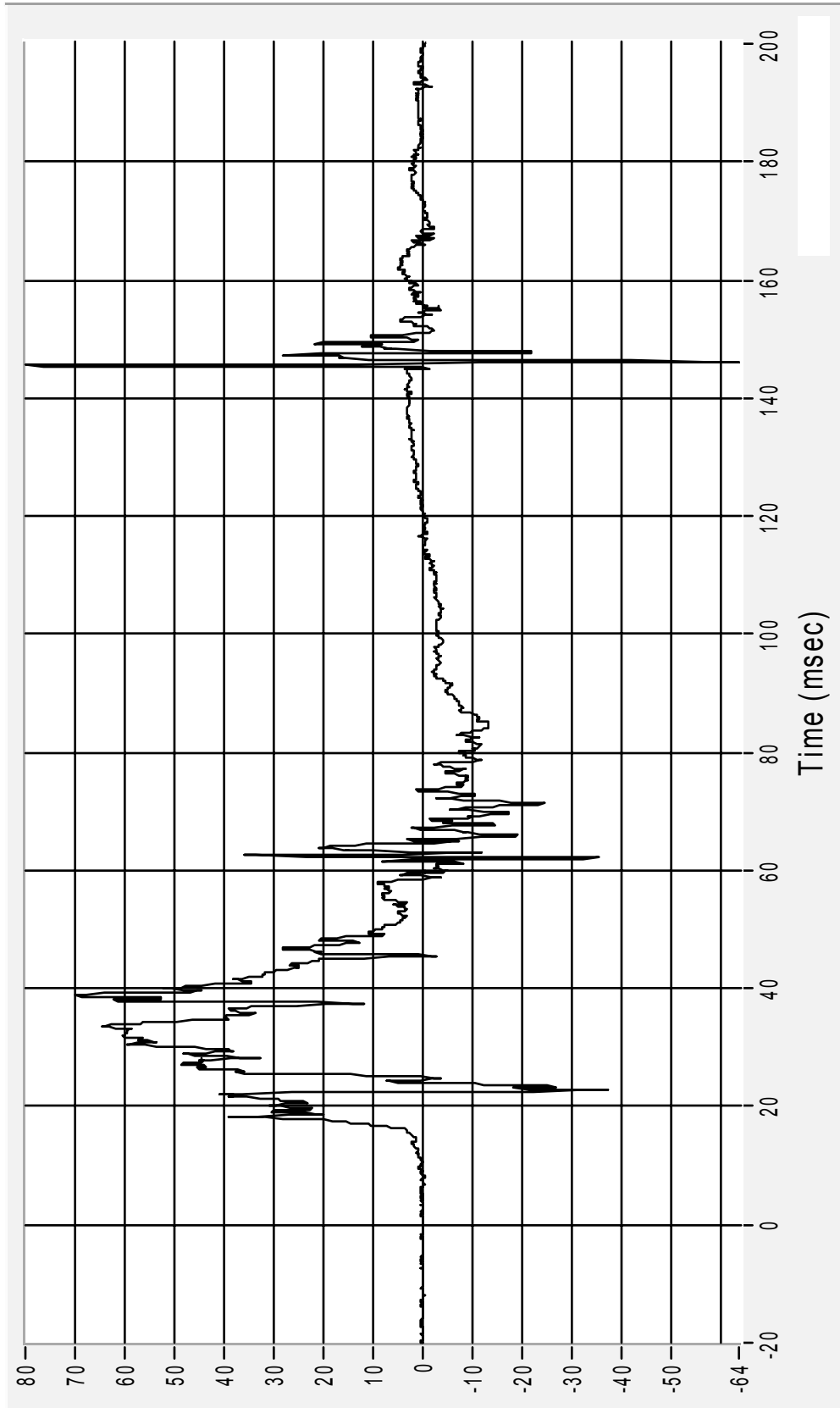
04SN03 - 2004 SATURN ION QUAD COUPE
 16 December 2003

Medical College of Wisconsin
 Vehicle Crashworthiness Lab

Driver Lower Rib (Y) - Redundant Acceleration

Acceleration (G's) CFC1000

Max 80.0 G at 145.5 msec
Min -63.8 G at 146.2 msec



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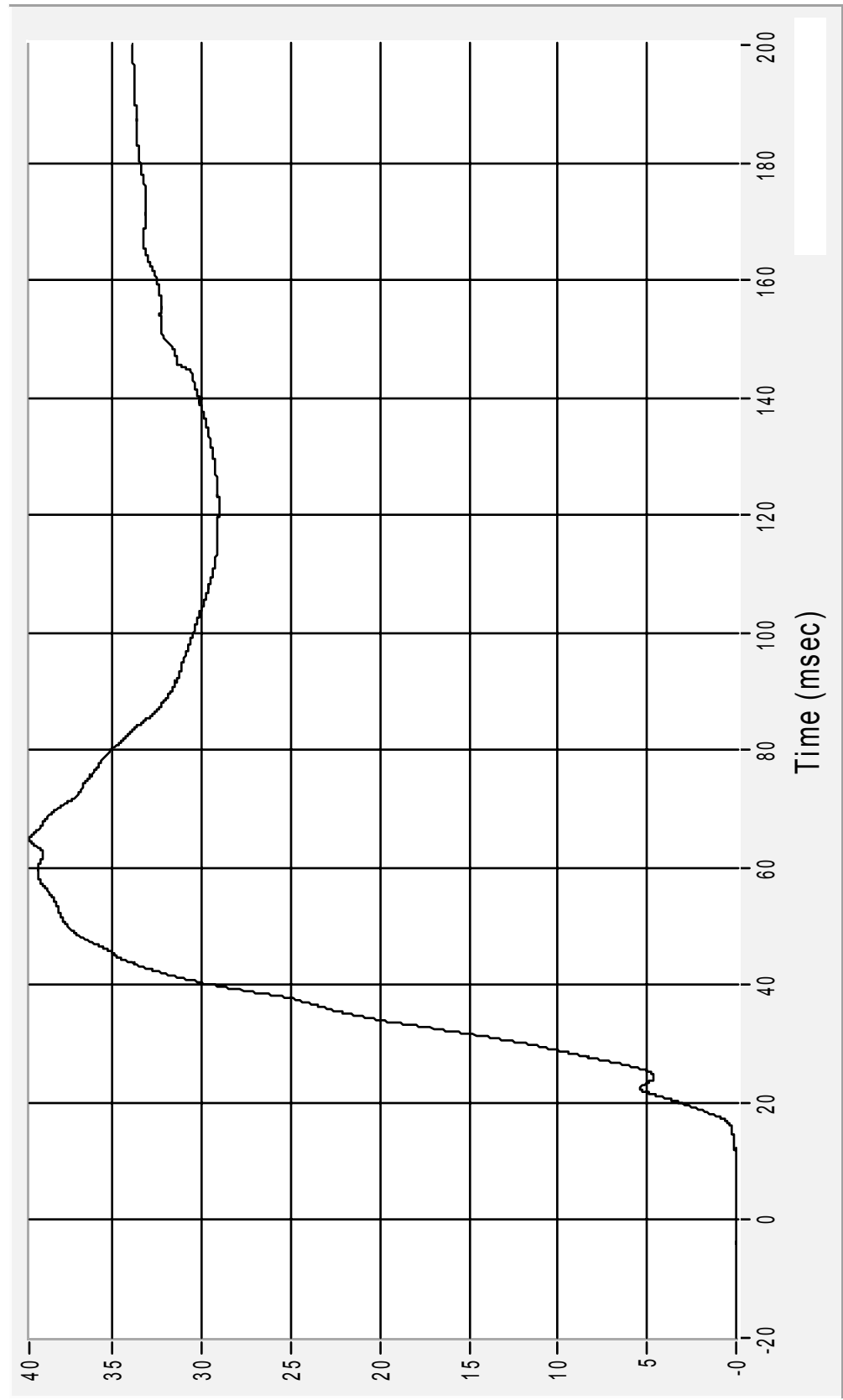
16 December 2003

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Vehicle Crashworthiness Lab

Max 39.7 km/h at 64.8 msec
 Min 0.0 km/h at 2.0 msec

Driver Lower Rib (Y) Velocity - Redundant

Velocity (km/h) CFC180



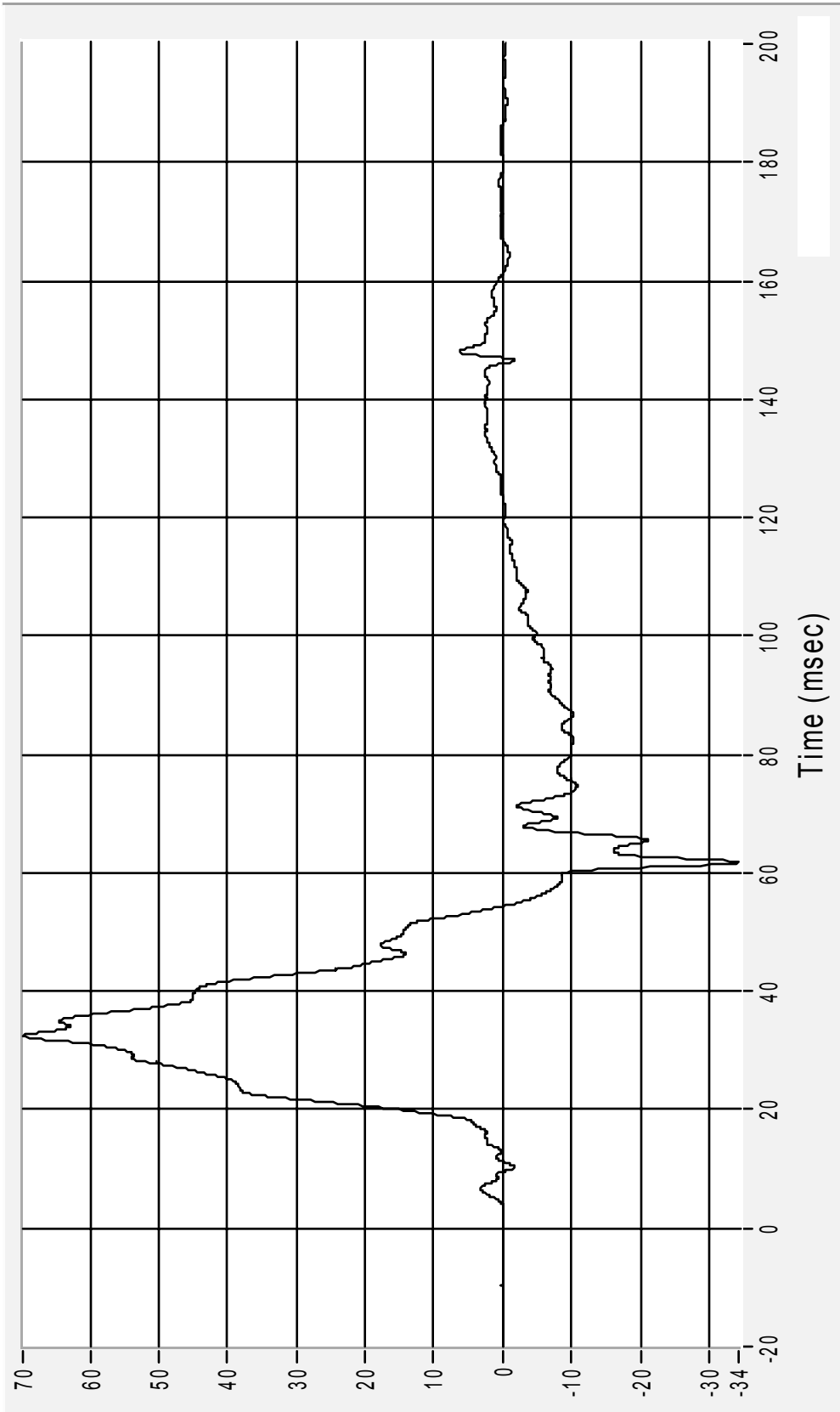
04SN03 - 2004 SATURN ION QUAD COUPE
 16 December 2003

Medical College of Wisconsin
 Vehicle Crashworthiness Lab

Driver Lower Spine (Y) - Redundant Acceleration

Acceleration (G's) CFC180

Max 69.8 G at 32.5 msec
Min -34.3 G at 61.8 msec



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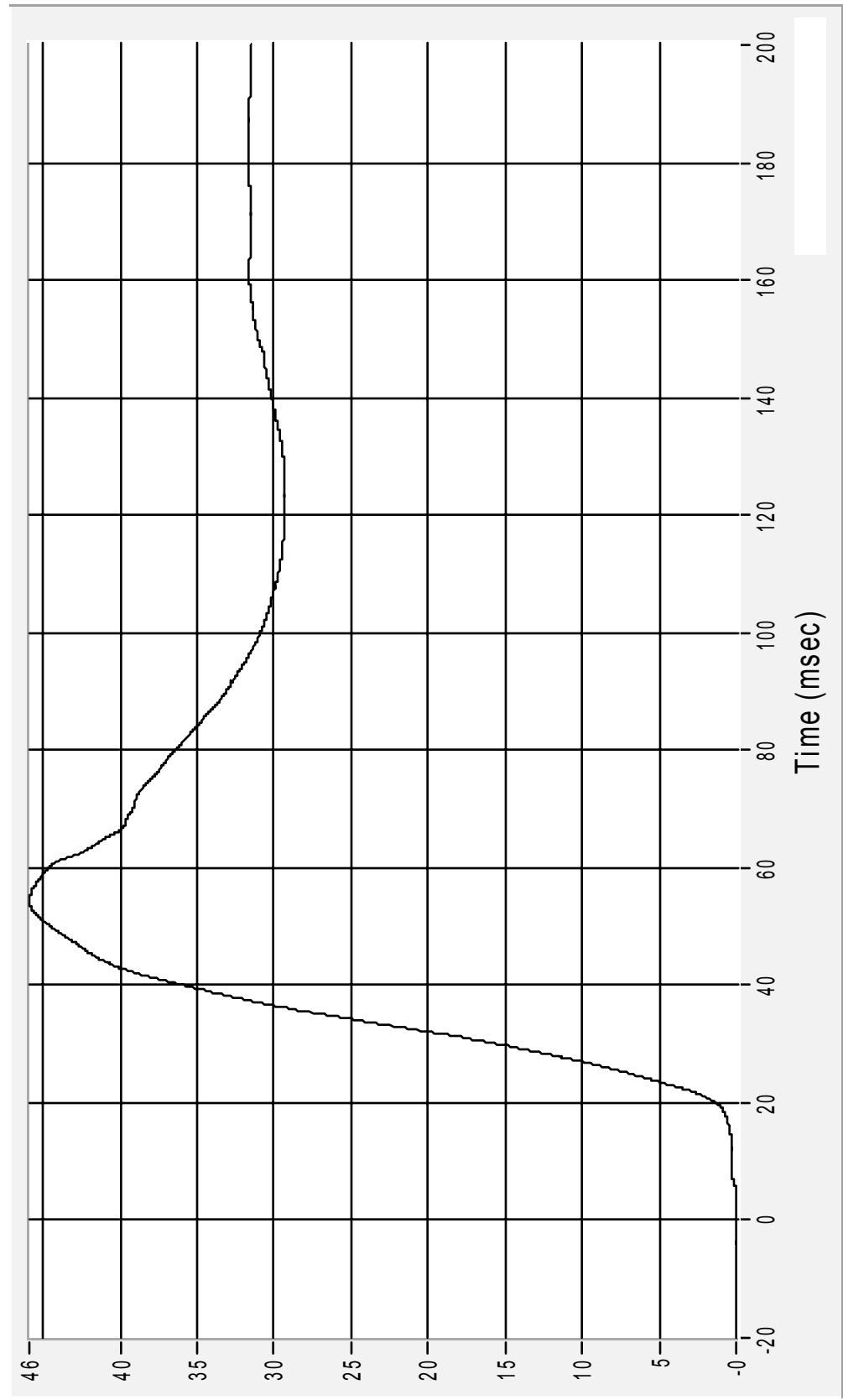
16 December 2003

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Vehicle Crashworthiness Lab

Max 45.9 km/h at 54.4 msec
 Min 0.0 km/h at 1.4 msec

Driver Lower Spine (Y) Velocity - Redundant

Velocity (km/h) CFC180

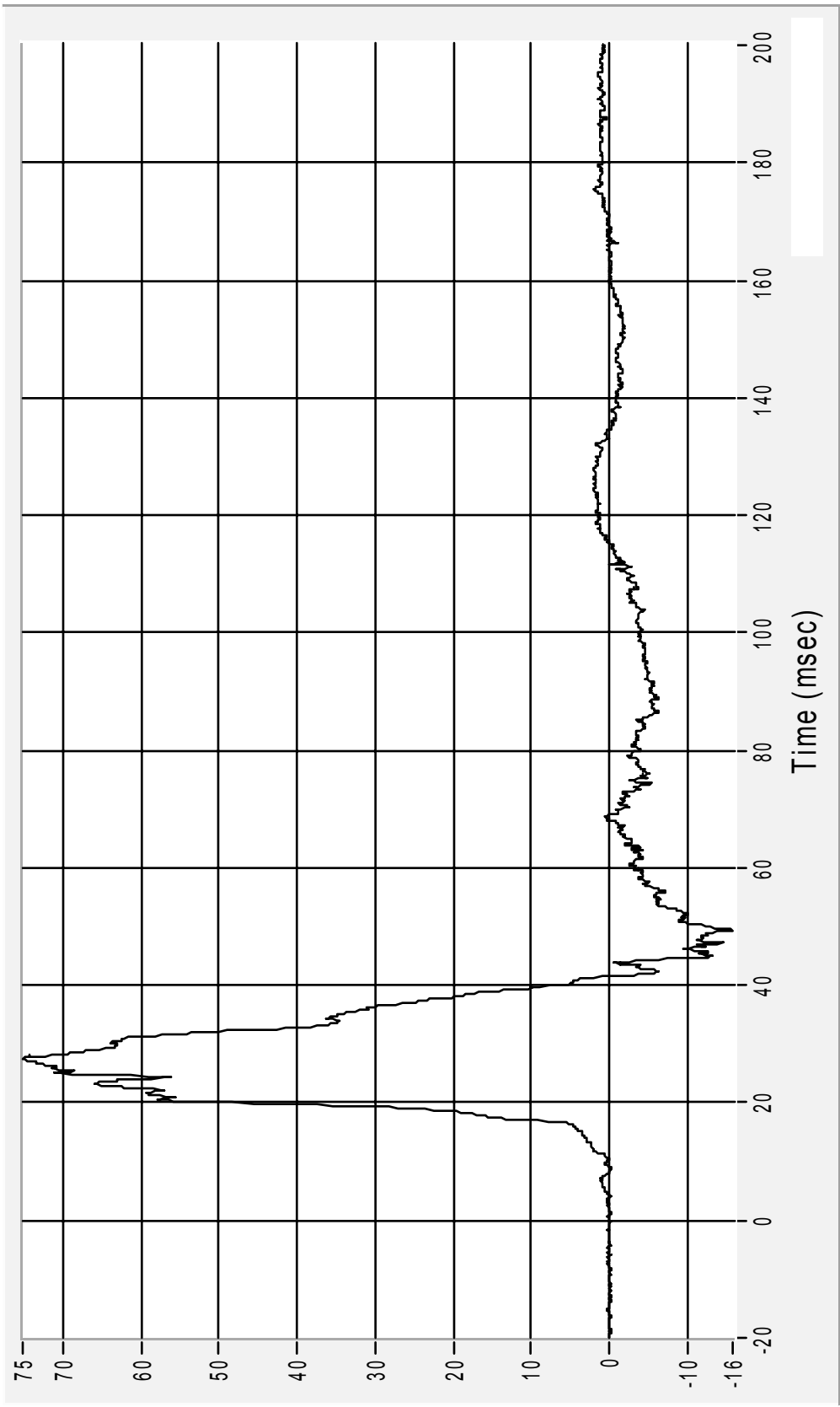


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 16 December 2003

Medical College of Wisconsin
 Vehicle Crashworthiness Lab

Driver Pelvic (Y) - Redundant Acceleration
 Acceleration (G's) CFC1000

Max	75.1	G	at	27.5	msec
Min	-15.8	G	at	49.4	msec



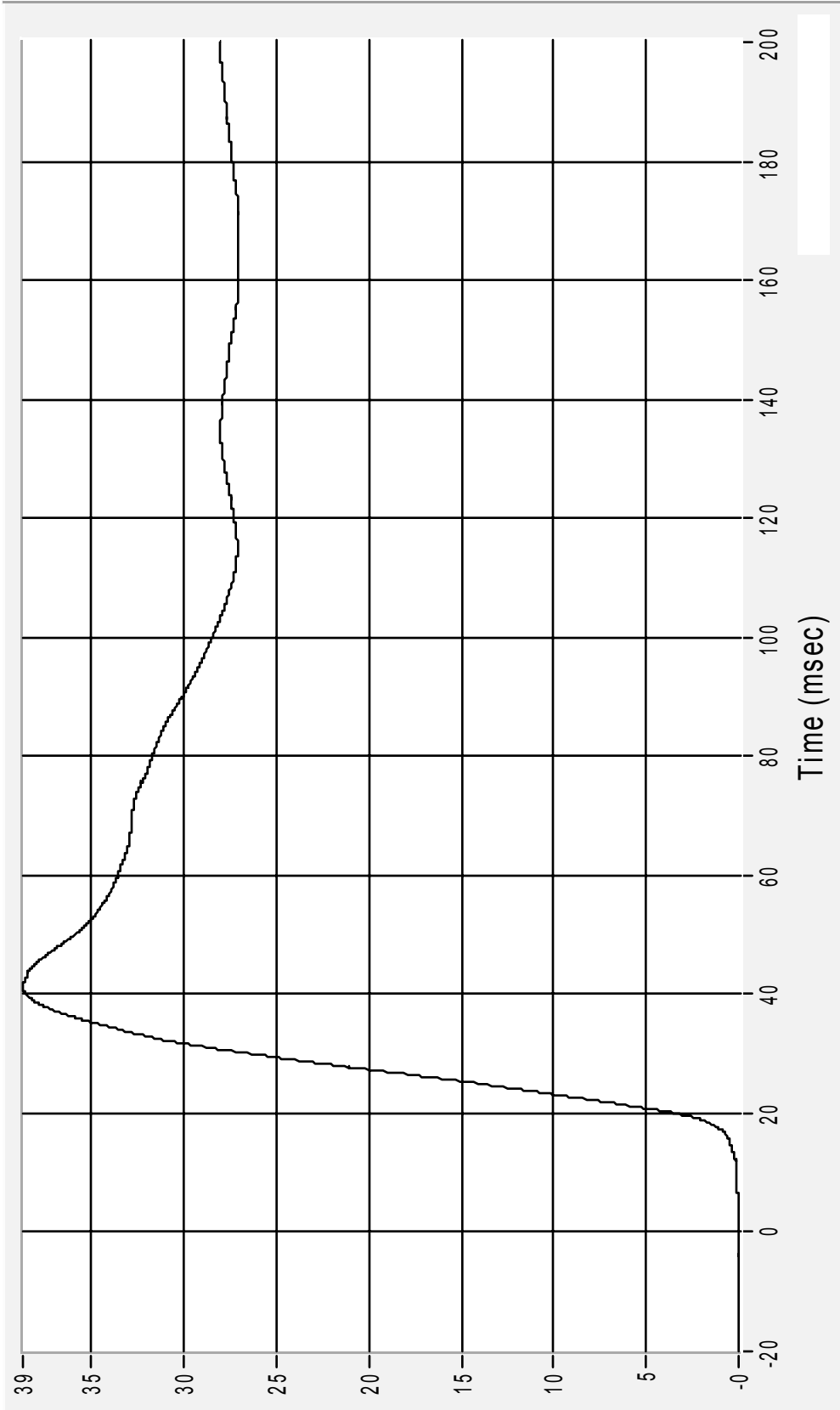
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 16 December 2003

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 Vehicle Crashworthiness Lab

Driver Pelvic (Y) Velocity - Redundant

Velocity (km/h) CFC180

Max 38.7 km/h at 41.4 msec
Min 0.0 km/h at 1.4 msec



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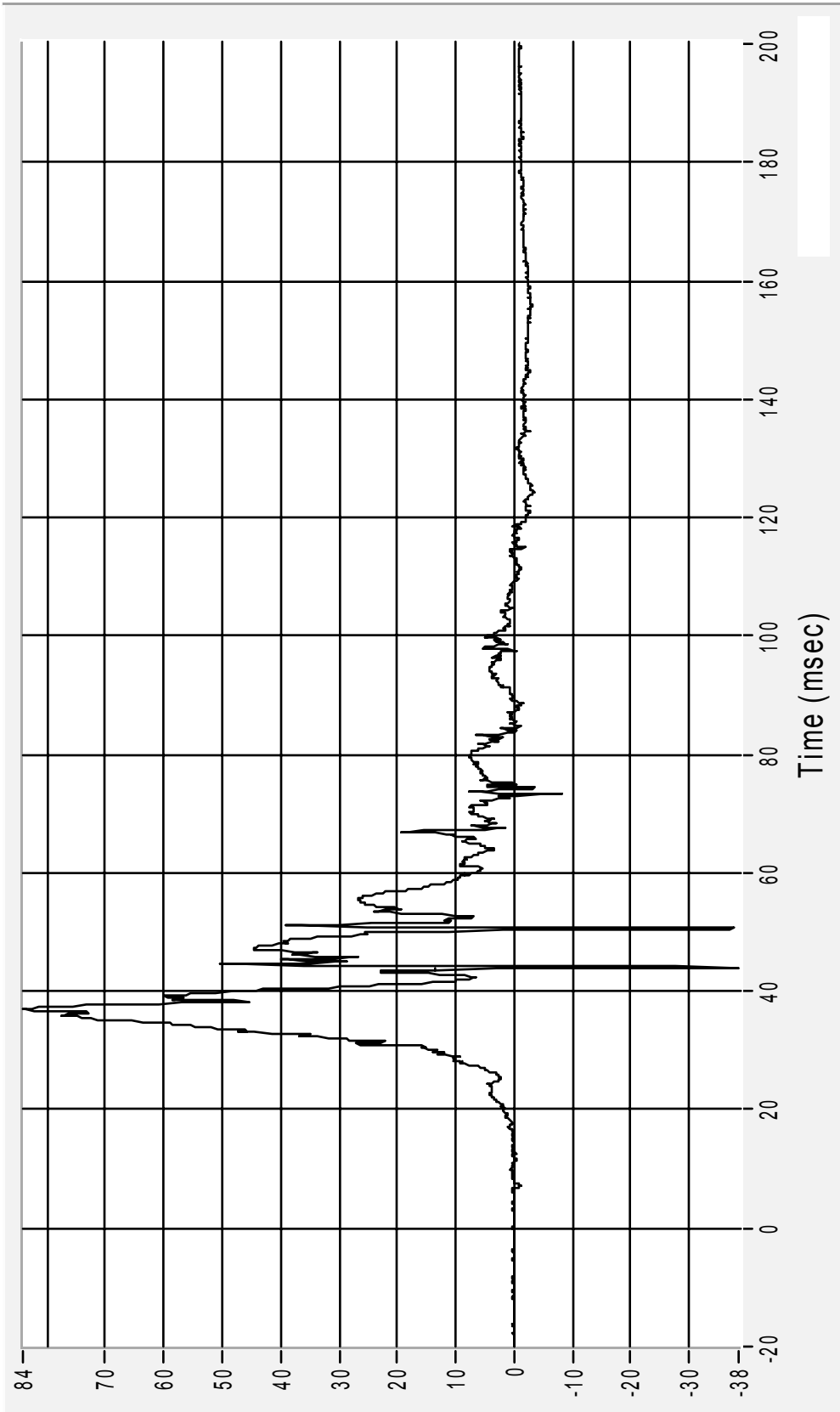
16 December 2003

Medical College of Wisconsin
Vehicle Crashworthiness Lab

Passenger Upper Rib (Y) - Redundant Acceleration

Acceleration (G's) CFC1000

Max 84.1 G at 37.0 msec
Min -38.4 G at 44.1 msec



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16 December 2003

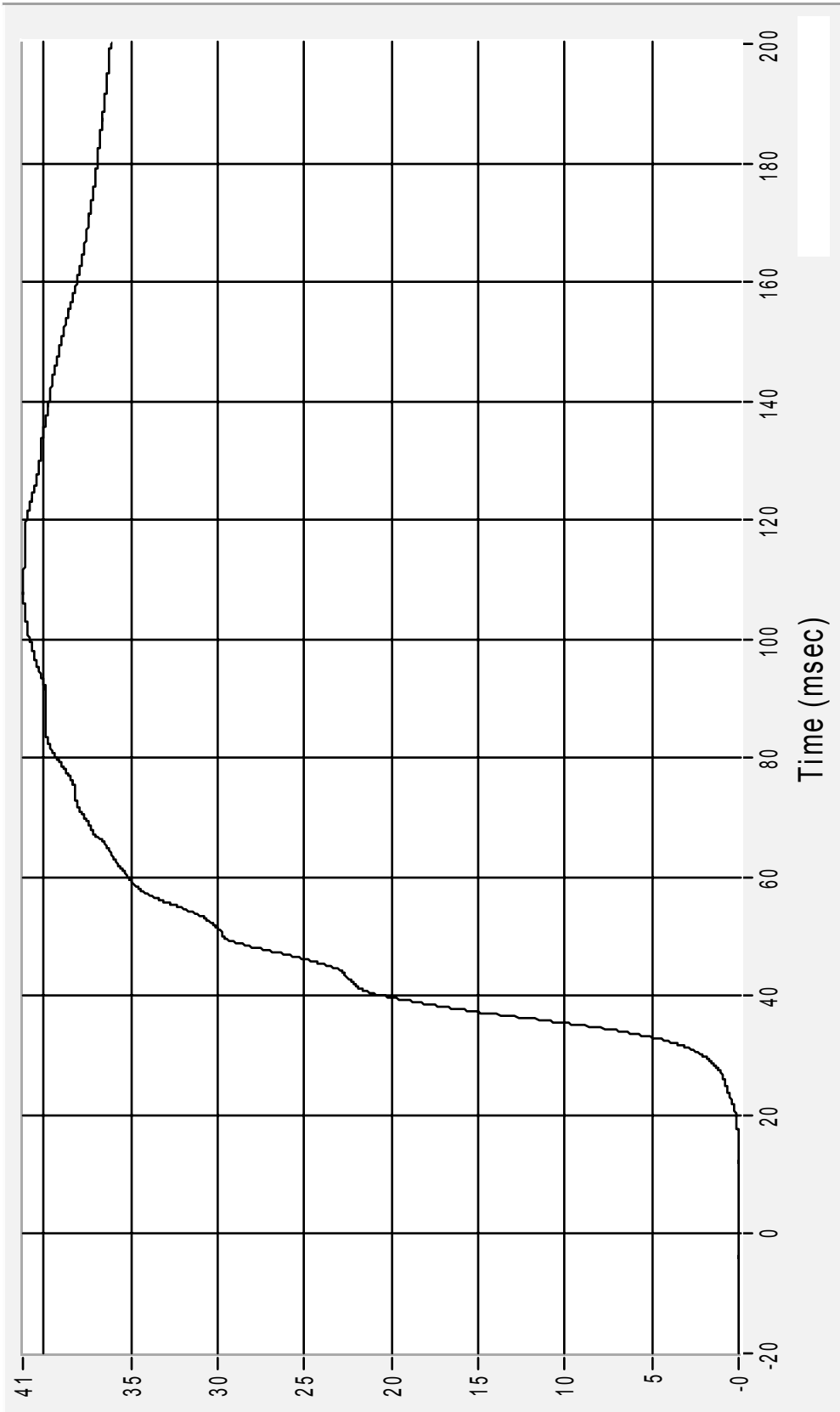
Medical College of Wisconsin
Vehicle Crashworthiness Lab

Passenger Upper Rib (Y) Velocity - Redundant

Velocity (km/h) CFC180

Max 41.2 km/h at 109.0 msec

Min 0.0 km/h at 8.1 msec



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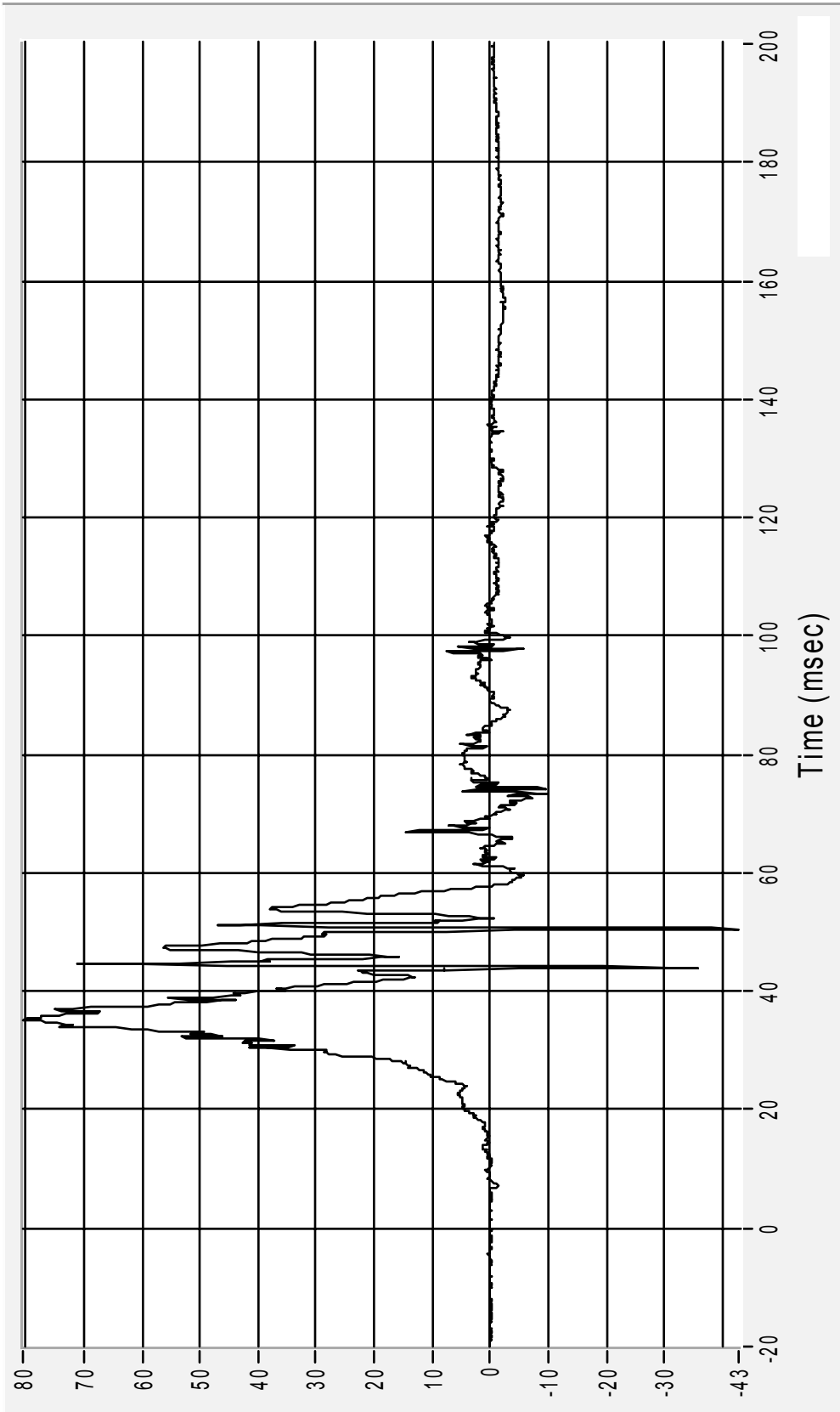
16 December 2003

Medical College of Wisconsin
Vehicle Crashworthiness Lab

Passenger Lower Rib (Y) - Redundant Acceleration

Acceleration (G's) CFC1000

Max 80.5 G at 35.3 msec
Min -42.8 G at 50.6 msec



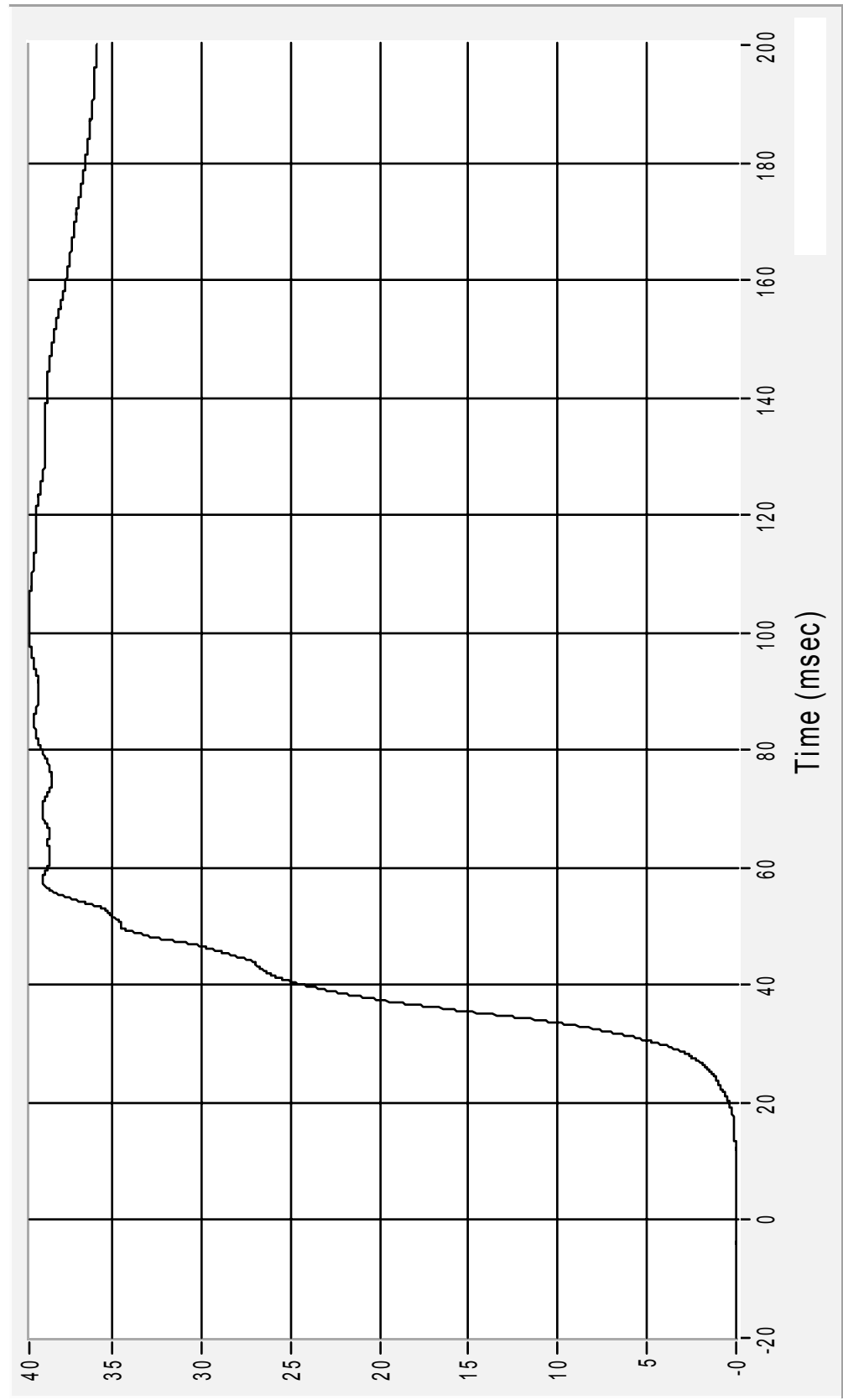
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Medical College of Wisconsin
Vehicle Crashworthiness Lab

Passenger Lower Rib (Y) Velocity - Redundant
 Velocity (km/h) CFC180

Max	39.7	km/h	at	99.1	msec
Min	0.0	km/h	at	8.2	msec



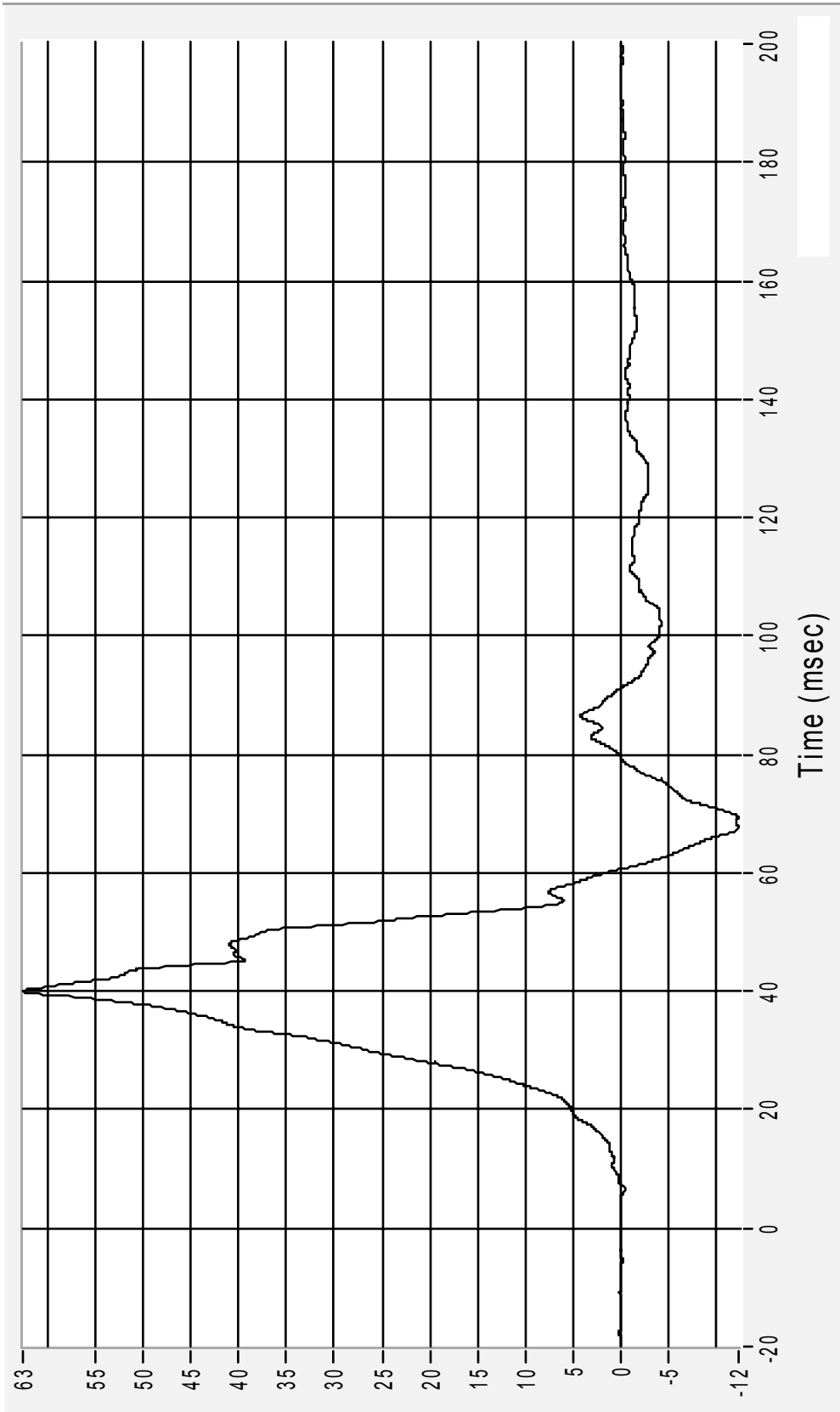
Medical College of Wisconsin
 Vehicle Crashworthiness Lab

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Passenger Lower Spine (Y) - Redundant Acceleration

Acceleration (G's) CFC180

Max 62.7 G at 40.0 msec
Min -12.4 G at 69.4 msec



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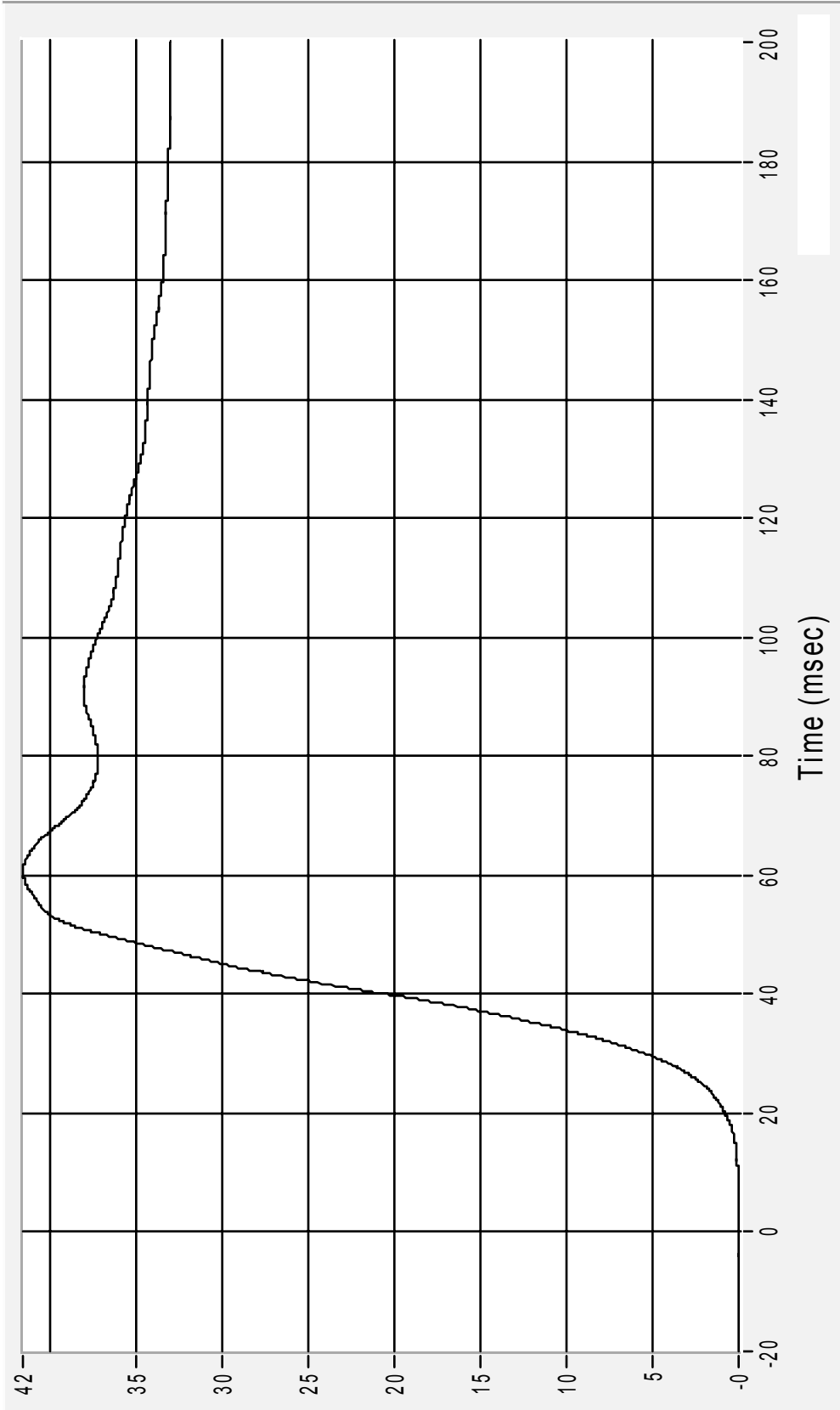
16 December 2003

Medical College of Wisconsin
Vehicle Crashworthiness Lab

Passenger Lower Spine (Y) Velocity - Redundant

Velocity (km/h) CFC180

Max 41.6 km/h at 60.6 msec
Min 0.0 km/h at 7.4 msec



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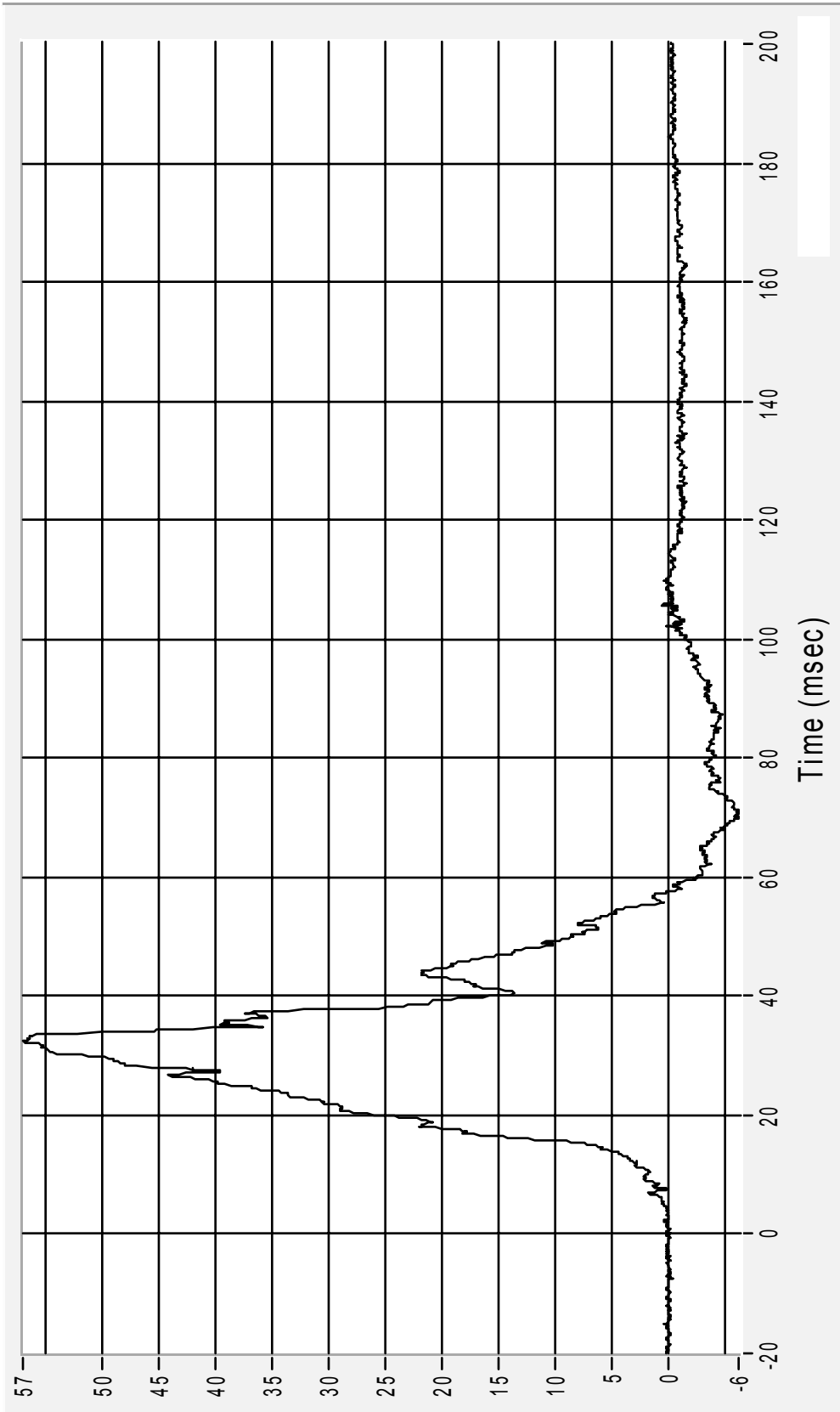
16 December 2003

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Vehicle Crashworthiness Lab

Passenger Pelvic (Y) - Redundant Acceleration

Acceleration (G's) CFC1000

Max 56.9 G at 32.5 msec
Min -6.1 G at 70.0 msec



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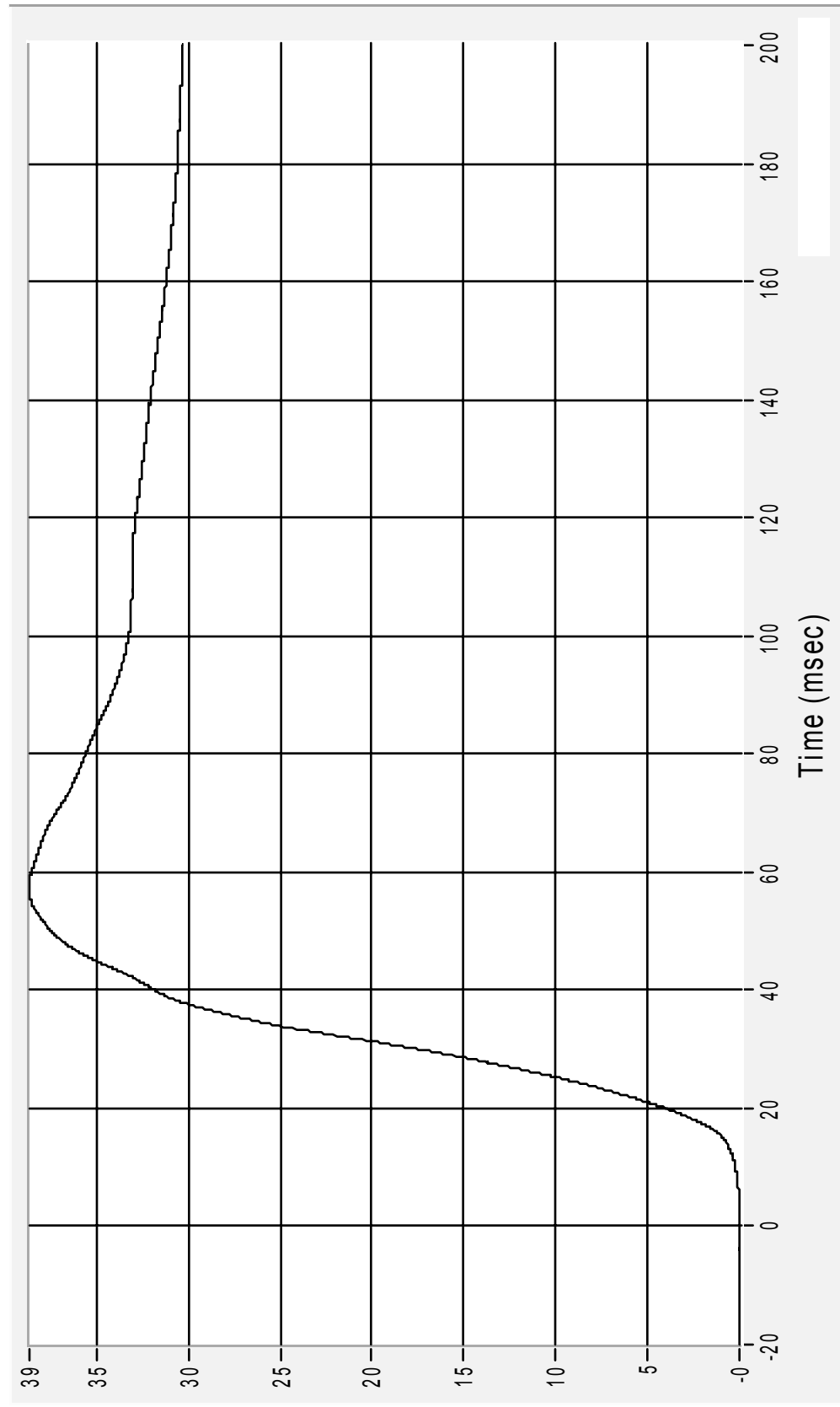
16 December 2003

Medical College of Wisconsin
Vehicle Crashworthiness Lab

Max 38.7 km/h at 57.5 msec
 Min 0.0 km/h at 0.0 msec

Passenger Pelvic (Y) Velocity - Redundant

Velocity (km/h) CFC180



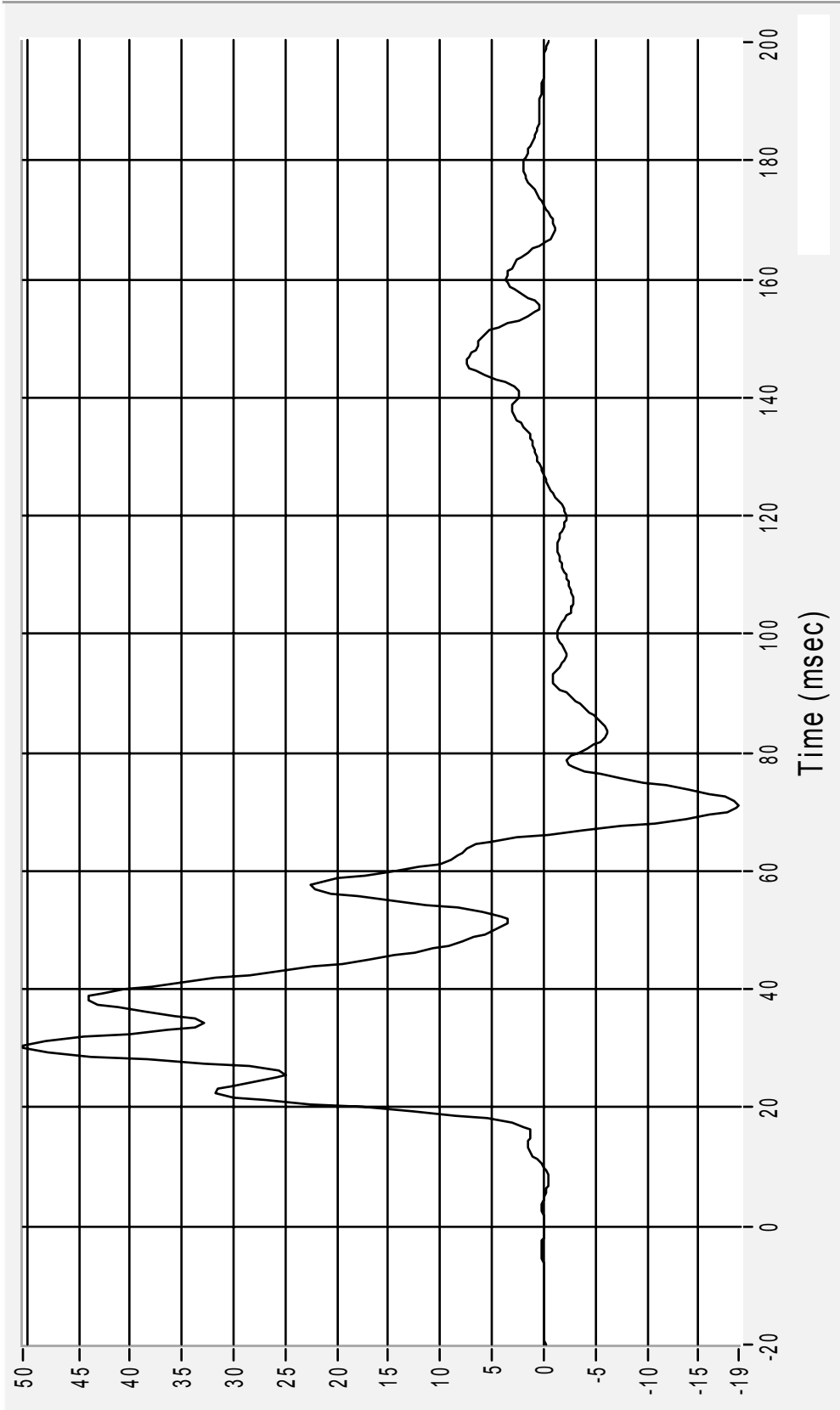
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 16 December 2003

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Driver Upper Rib (Y) - Redundant Acceleration

Acceleration (G's) FIR100

Max 50.4 G at 30.0 msec
Min -18.8 G at 71.2 msec



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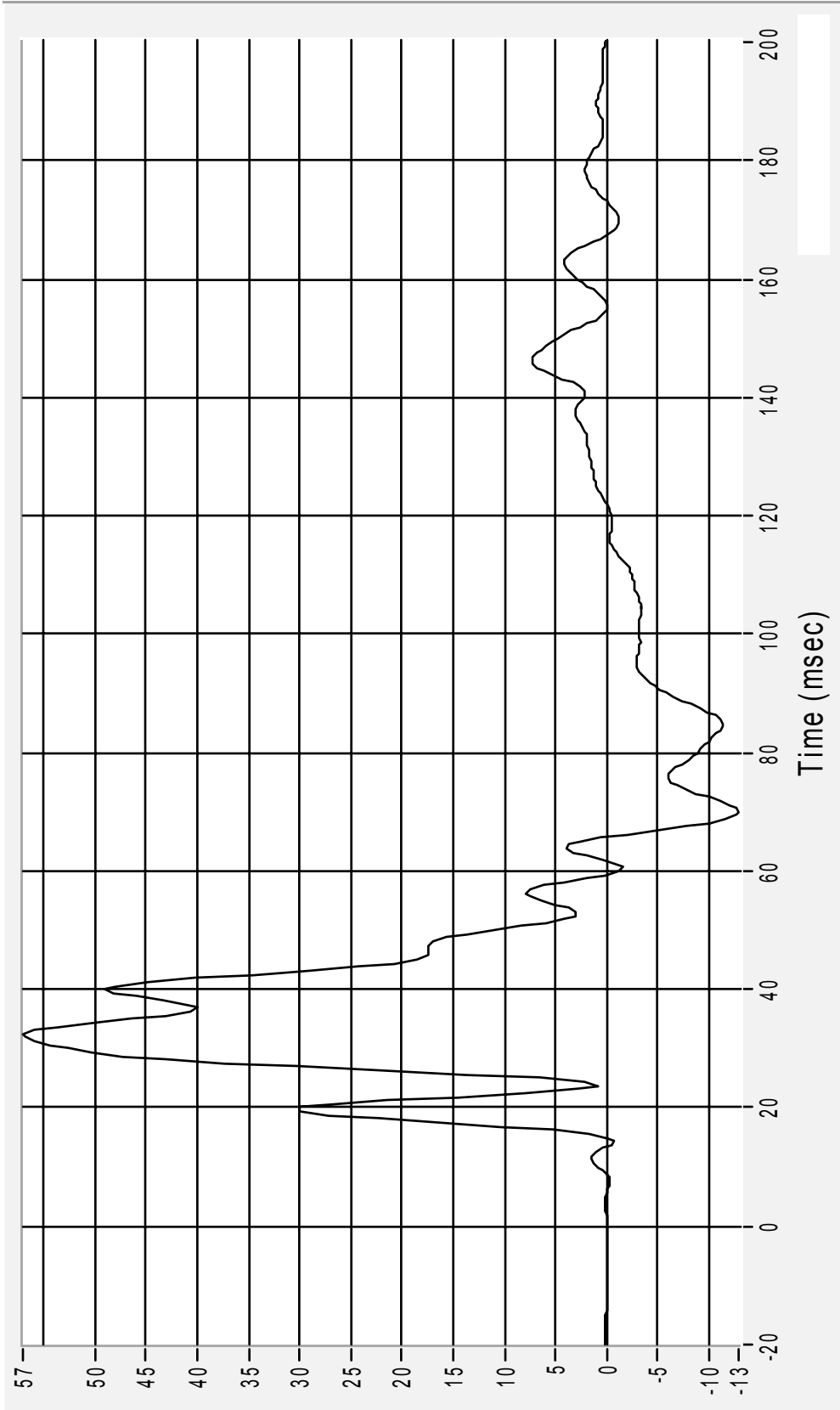
16 December 2003

Medical College of Wisconsin
Vehicle Crashworthiness Lab

Driver Lower Rib (Y) - Redundant Acceleration

Acceleration (G's) FIR100

Max 57.1 G at 32.5 msec
Min -12.9 G at 70.0 msec



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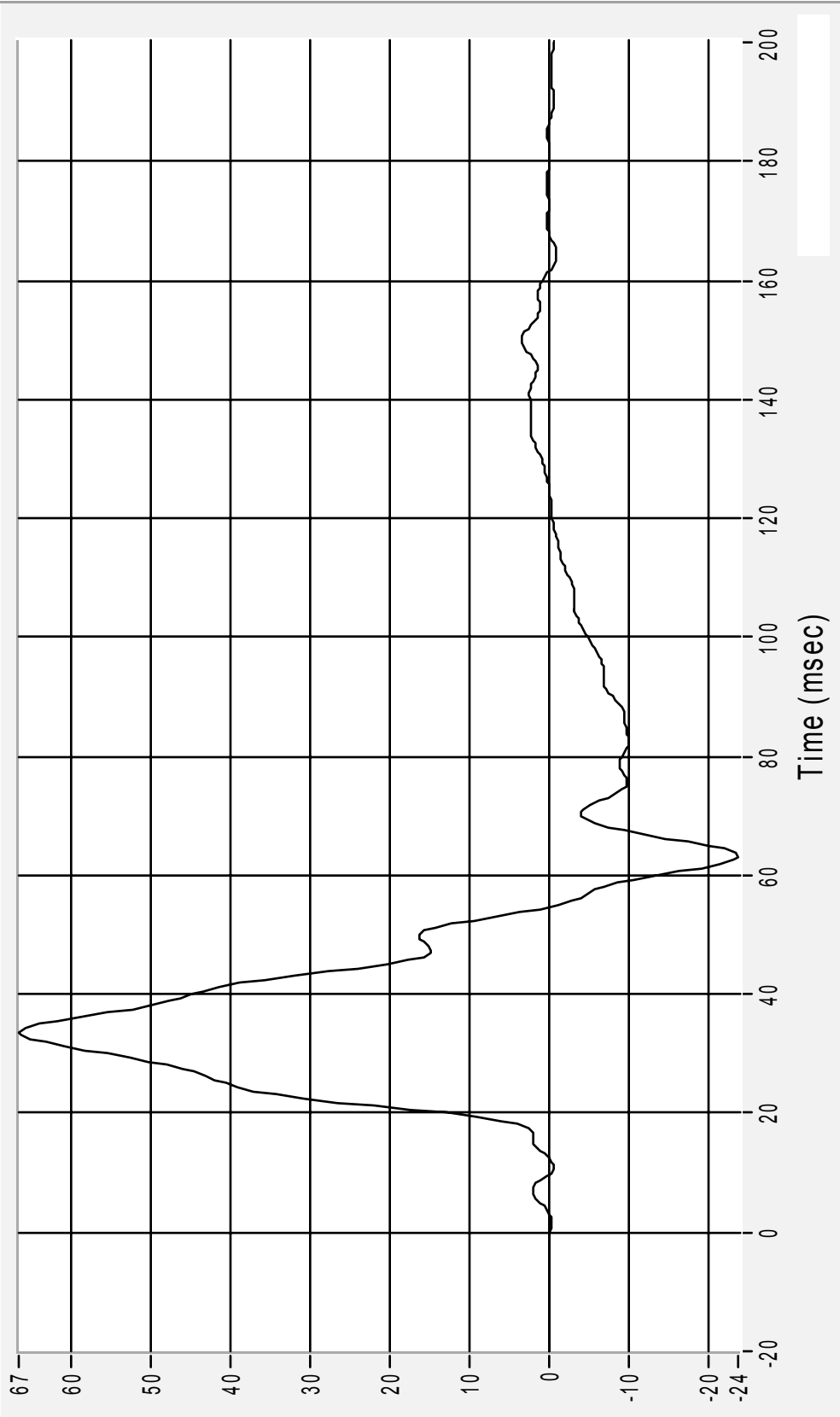
16 December 2003

Medical College of Wisconsin
Vehicle Crashworthiness Lab

Driver Lower Spine (Y) - Redundant Acceleration

Acceleration (G's) FIR100

Max 66.7 G at 33.8 msec
Min -23.7 G at 63.1 msec



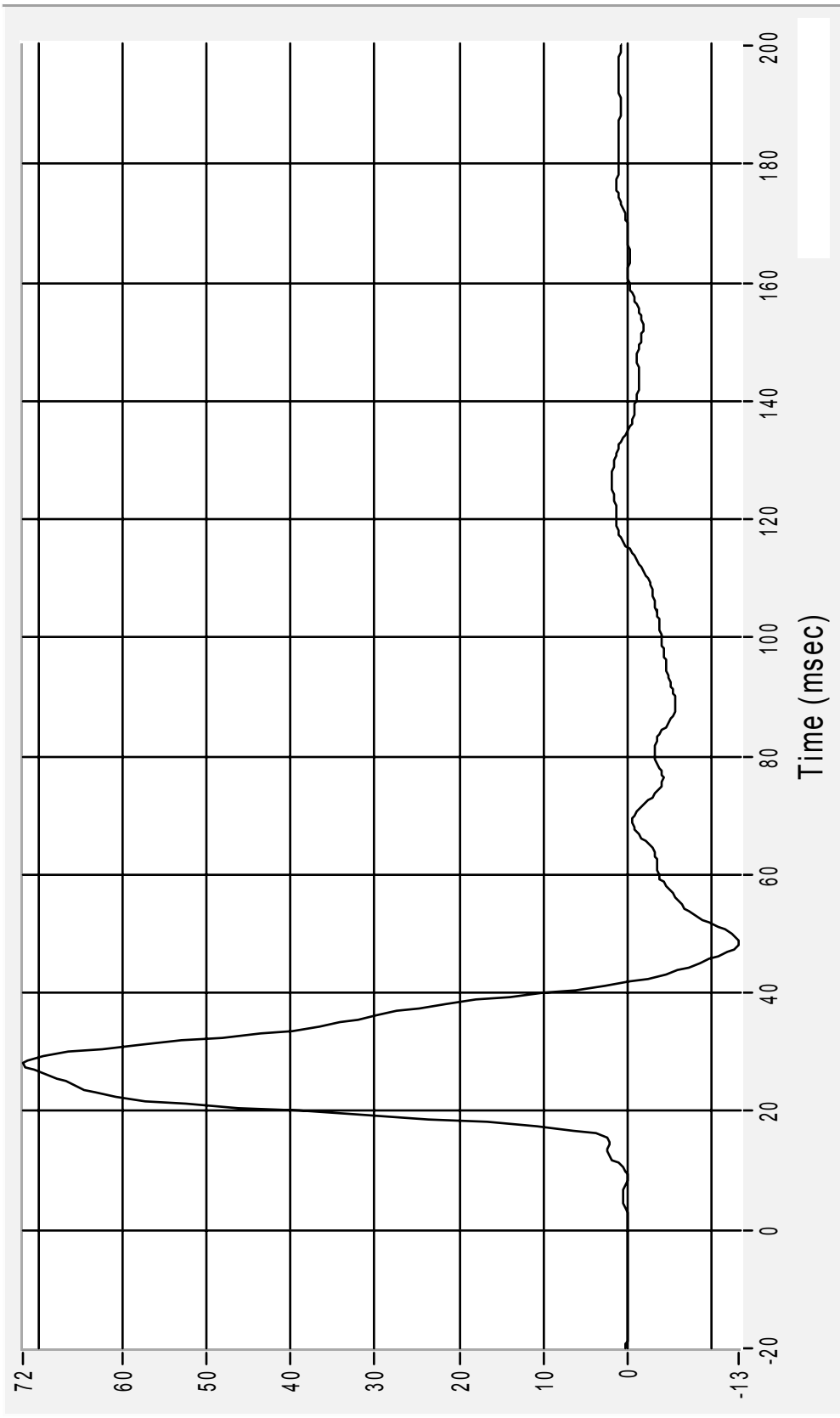
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Medical College of Wisconsin
Vehicle Crashworthiness Lab

Max 71.8 G at 28.1 msec
 Min -13.2 G at 48.8 msec

Driver Pelvic (Y) - Redundant Acceleration
 Acceleration (G's) FIR100



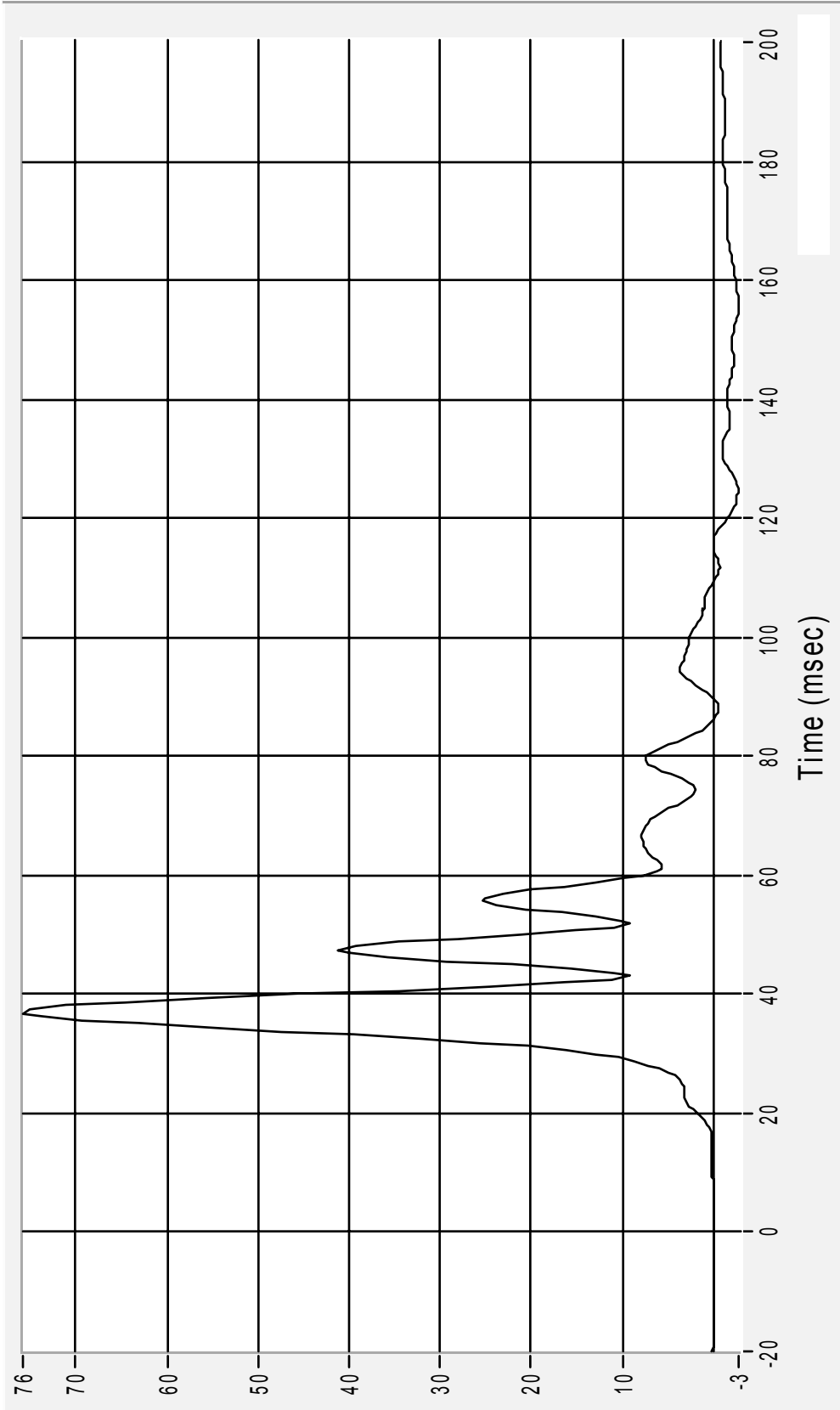
04SN03 - 2004 SATURN ION QUAD COUPE
 16 December 2003

Medical College of Wisconsin
 Vehicle Crashworthiness Lab

Passenger Upper Rib (Y) - Redundant Acceleration

Acceleration (G's) FIR100

Max 75.8 G at 36.9 msec
Min -2.8 G at 156.2 msec



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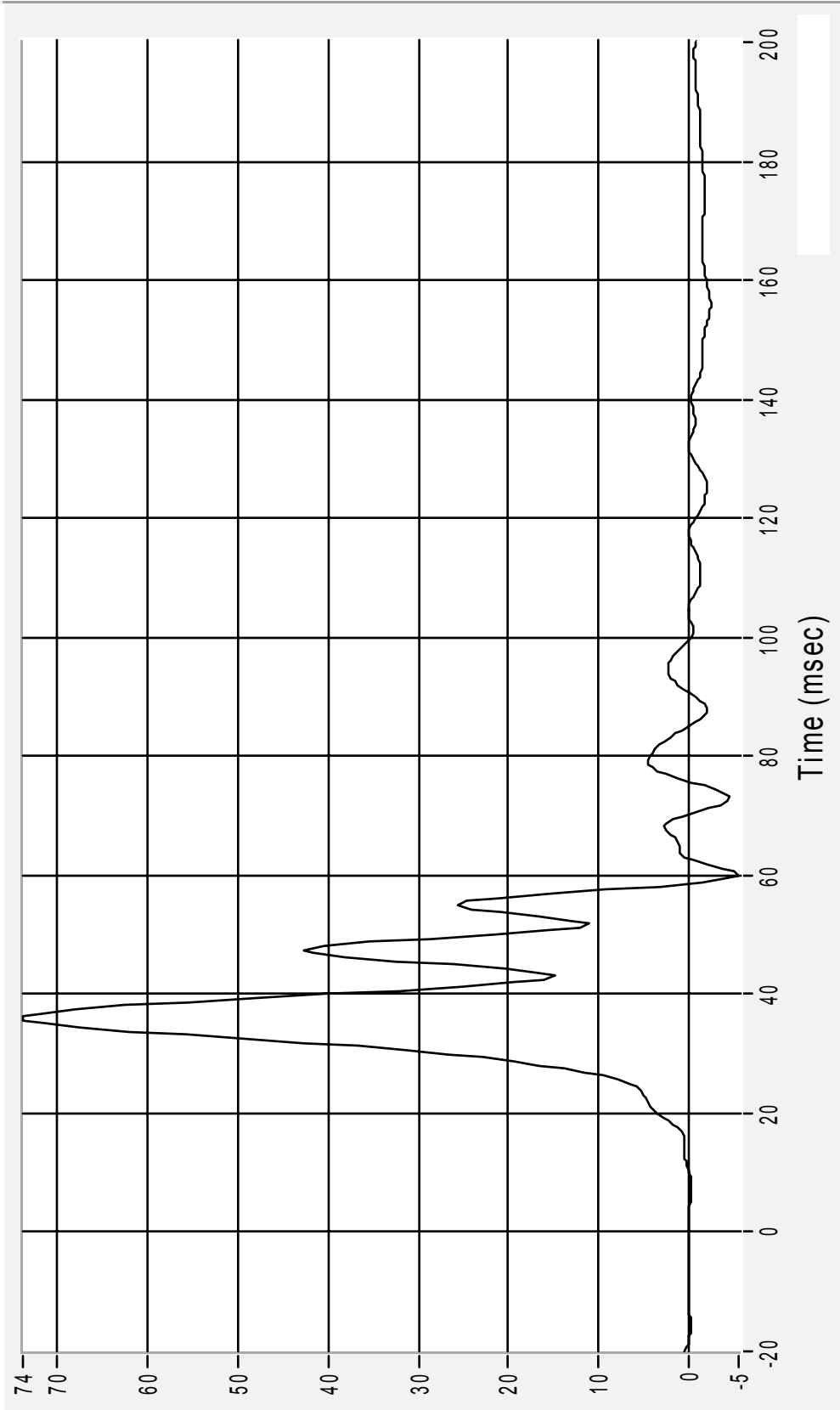
16 December 2003

Medical College of Wisconsin
Vehicle Crashworthiness Lab

Passenger Lower Rib (Y) - Redundant Acceleration

Acceleration (G's) FIR100

Max 73.8 G at 36.2 msec
Min -5.4 G at 60.0 msec



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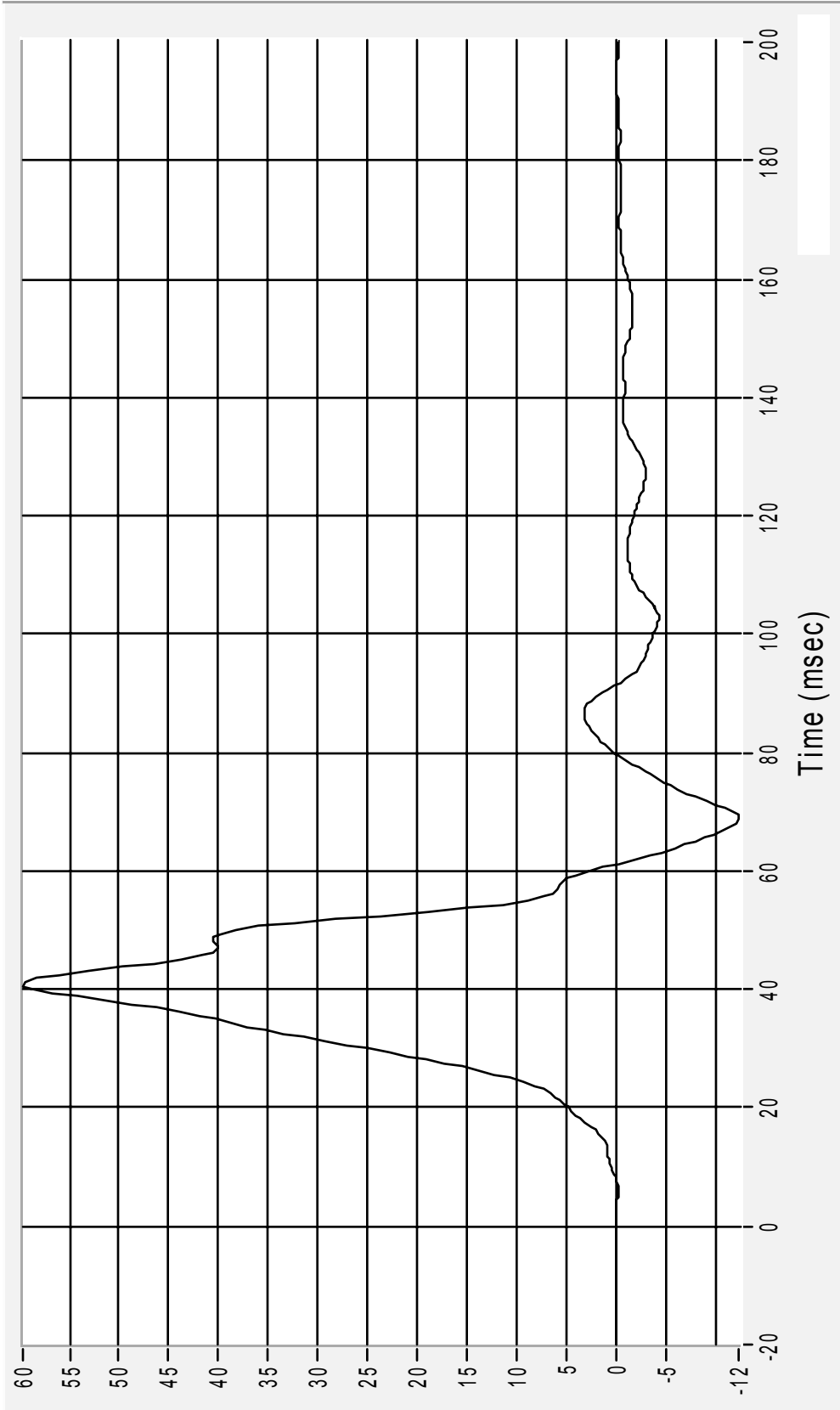
16 December 2003

Medical College of Wisconsin
Vehicle Crashworthiness Lab

Passenger Lower Spine (Y) - Redundant Acceleration

Acceleration (G's) FIR100

Max 59.7 G at 40.6 msec
Min -12.3 G at 68.8 msec



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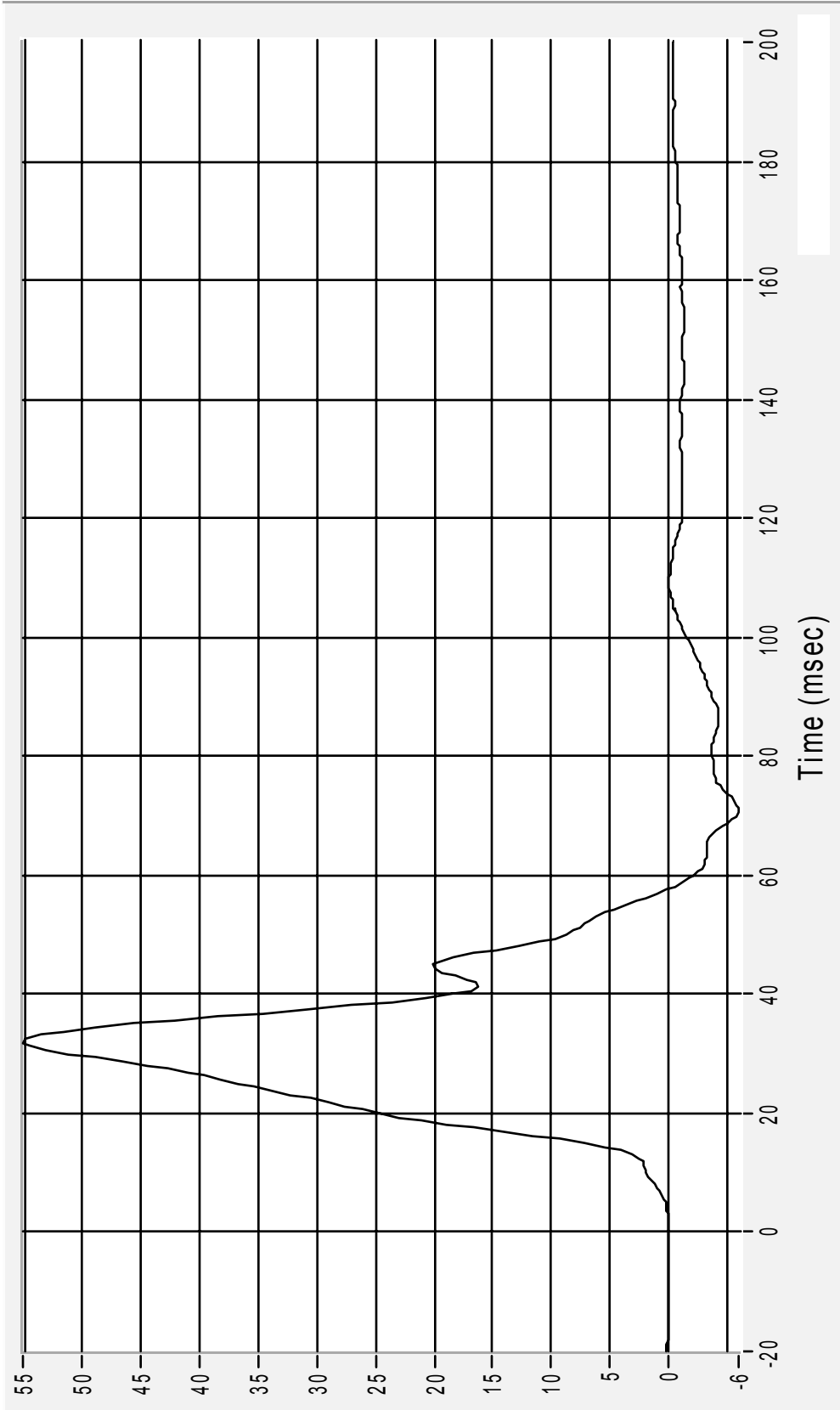
16 December 2003

Medical College of Wisconsin
Vehicle Crashworthiness Lab

Passenger Pelvic (Y) - Redundant Acceleration

Acceleration (G's) FIR100

Max 55.1 G at 31.9 msec
Min -6.0 G at 71.2 msec



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Vehicle Crashworthiness Lab

APPENDIX C

SID CONFIGURATION AND VERIFICATION RESULTS

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DUMMY INSPECTION LIST PRE AND POST TEST	C-6

**VERIFICATION TEST RESULTS SUMMARY
PRE AND POST TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial Number SID H3 056 Test Sequences 02 and 03

TEST	PRE		POST	
	COMMENTS	BY	COMMENTS	BY
EXTERNAL DIMENSIONS	Pass all requirements	Mark Meyer	Pass all requirements	Mark Meyer
THORACIC SHOCK ABSORBER TEST	Pass all requirements	Mark Meyer		
LATERAL THORAX IMPACT TEST	Pass all requirements	Mark Meyer	Pass all requirements	Mark Meyer
LATERAL PELVIS IMPACT TEST	Pass all requirements	Mark Meyer	Pass all requirements	Mark Meyer
ABDOMINAL COMPRESSION	Pass all requirements	Mark Meyer		
LUMBAR FLEXION	Pass all requirements	Mark Meyer		
HYBRID III LATERAL NECK TEST	Pass all requirements	Mark Meyer	Pass all requirements	Mark Meyer
HYBRID III LATERAL HEAD DROP	Pass all requirements	Mark Meyer	Pass all requirements	Mark Meyer

SID Serial Number SID H3 058 Test Sequences 02 and 03

TEST	PRE		POST	
	COMMENTS	BY	COMMENTS	BY
EXTERNAL DIMENSIONS	Pass all requirements	Mark Meyer	Pass all requirements	Mark Meyer
THORACIC SHOCK ABSORBER TEST	Pass all requirements	Mark Meyer		
LATERAL THORAX IMPACT TEST	Pass all requirements	Mark Meyer	Pass all requirements	Mark Meyer
LATERAL PELVIS IMPACT TEST	Pass all requirements	Mark Meyer	Pass all requirements	Mark Meyer
ABDOMINAL COMPRESSION	Pass all requirements	Mark Meyer		
LUMBAR FLEXION	Pass all requirements	Mark Meyer		
HYBRID III LATERAL NECK TEST	Pass all requirements	Mark Meyer	Pass all requirements	Mark Meyer
HYBRID III LATERAL HEAD DROP	Pass all requirements	Mark Meyer	Pass all requirements	Mark Meyer

**SUMMARY
SID PRE AND POST VERIFICATION**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial Number

SID H3 056

Test Sequences

02 and 03

SID H3 058

TEST PARAMETER	SPECIFICATION	SID H3 056		SID H3 058	
		PRE	POST	PRE	POST
MEASUREMENTS					
Date	-	03Nov03	23Dec03	04Nov03	23Dec03
Sequential Test Number	-	02	03	02	03
Temperature (°C)	18.9-25.5	19.4	22.0	20.0	19.9
Relative Humidity (%)	10-70	41.4	23.1	42.1	23.4
SH – Seated Height (mm)	889-909	906	909	907	909
RH – Rib Height (mm)	501-521	506	507	505	507
HP – Hip Pivot Height (mm)	99	99/99	99/99	99/99	99/99
RD – Rib From Back Line (mm)	229-241	229	229	229	229
KH – Knee Pivot from Back Line (mm)	511-526	520/520	518/517	518/522	517/522
KV – Knee Pivot to Floor (mm)	490-505	506/497	503/495	508/495	499/501
HW – Hip Width (mm)	356-391	366	364	356	357
THORAX IMPACTS					
Date	-	03Nov03	23Dec03	31Oct03	23Dec03
Sequential Test Number	-	02	03	02	03
Temperature (°C)	18.9-25.5	20.0	22.3	19.4	20.7
Relative Humidity (%)	10-70	42.4	22.4	41.3	23.5
Probe Speed (m/s)	4.21-4.33	4.32	4.28	4.30	4.29
Upper Rib Acceleration (G)	37-46	40.9	40.7	43.3	44.2
Lower Rib Acceleration (G)	37-46	40.6	40.9	40.6	41.6
Lower Spine Acceleration (G)	15-22	19.3	19.9	20.0	20.7
PELVIS IMPACTS					
Date	-	04Nov03	23Dec03	03Nov03	23Dec03
Sequential Test Number	-	02	03	02	03
Temperature (°C)	18.9-25.5	19.8	22.4	19.1	21.0
Relative Humidity (%)	10-70	42.3	22.0	41.5	23.5
Probe Speed (m/s)	4.21-4.33	4.31	4.28	4.31	4.27
Pelvis Acceleration (G)	40-60	51.2	50.1	44.1	47.2
THORACIC SHOCK ABSORBER					
Shock Absorber ID Number	-	1764	-	03130164	-
Damper Setting	1-10	6-1/4	-	5	-
Date	-	17Oct03	-	17Oct03	-
Sequential Test Number	-	01	-	01	-
Temperature	18.9-25.5	23.5	-	23.0	-
Relative Humidity	10-70	34.0	-	35.2	-
Probe Speed (m/s) Low	3.05	3.05	-	3.05	-
Force (N)	836 – 1125	896.7	-	1025.7	-
Displacement (mm)	30 – 35	31.2	-	30.1	-
Probe Speed (m/s) Middle	4.27	4.27	-	4.10	-
Force (N)	1730 – 2099	1815.9	-	2803.5	-
Displacement (mm)	32 – 37	34.8	-	33.2	-
Probe Speed (m/s) High	6.10	6.10	-	6.10	-
Force (N)	3741 – 4448	4116.2	-	4357.4	-
Displacement (mm)	33 - 40	37.2	-	36.2	-

TEST PARAMETER	SPECIFICATION	SID H3 056		SID H3 058	
		PRE	POST	PRE	POST
ABDOMINAL COMPRESSION					
Date	-	12Oct03	-	12Oct03	-
Sequential Test Number	-	01	-	01	-
Temperature (°C)	18.9-25.5	23.0	-	22.2	-
Relative Humidity (%)	10-70	38.0	-	38.4	-
Force at 13 mm (N)	104-162	116.8	-	114.6	-
Force at 19 mm (N)	163-221	163.8	-	163.1	-
Force at 25 mm (N)	222-280	224.8	-	233.8	-
Force at 33 mm (N)	325-391	335.1	-	362.3	-
LUMBAR FLEXION					
Date	-	15Oct03	-	15Oct03	-
Sequential Test Number	-	01	-	01	-
Temperature (°C)	18.9-25.5	23.1	-	23.4	-
Relative Humidity (%)	10-70	35.4	-	35.4	-
Force at 0° (N)	0-26.7	0	-	0	-
Force at 0° (N)	97.8-151.2	113	-	116	-
Force at 0° (N)	151.2-204.6	152	-	174	-
Force at 0° (N)	204.6-258	217	-	211	-
Return Angle	12° Maximum	5	-	5	-
HYBRID III LATERAL NECK					
Date	-	09Dec03	22Dec03	09Dec03	22Dec03
Sequential Test Number	-	02	03	02	03
Temperature (°C)	18.9-25.5	19.4	20.7	21.0	19.1
Relative Humidity (%)	10-70	30.8	27.7	31.1	28.3
Pendulum Speed (m/s)	6.89-7.13	7.10	7.09	7.11	7.08
Pendulum Pulse 10ms (m/s)	1.96-2.55	2.25	2.01	2.30	2.16
Pendulum Pulse 20ms (m/s)	4.12-5.10	4.90	4.81	5.03	4.85
Pendulum Pulse 30ms (m/s)	5.73-7.01	6.91	6.97	6.95	6.92
Pendulum Pulse 40 –70 ms (m/s)	6.27-7.64	6.95	6.84	6.86	6.90
Max Head rotation (deg)	66-82	66.5	74.8	74.6	66.1
Head angle crosses zero (ms)	58-67	59.5	65.8	66.8	58.5
Peak Moment (Nm)	73-88	73.8	74.2	78.6	85.3
Moment crosses zero (ms)	49-64	59.5	49.2	49.4	50.9
Max rotation wrt peak moment (ms)	2-15	7.6	8.3	2.3	3.2
HYBRID III LATERAL HEAD DROP					
Date	-	29Oct03	18Dec03	28Oct03	18Dec03
Sequential Test Number	-	02	03	02	03
Temperature (°C)	18.9-25.5	19.7	19.2	20.1	19.0
Relative Humidity (%)	10-70	32.7	22.7	30.1	23.0
Resultant Max (G)	120-150	147.5	121.6	125.2	139.8
Longitudinal Max (G)	<15	3.1	2.0	4.5	3.9

DUMMY INSPECTION LIST

PRE AND POST TEST

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial Number

SID H3 056
SID H3 058

Test Sequences

02 and 03

		SID H3 056		SID H3 058	
		PRE	POST	PRE	POST
	Date				
	Performed By	Mark Meyer	Mark Meyer	Mark Meyer	Mark Meyer
PART	INSPECTION	Pass	Pass	Pass	Pass
Skin	Visual	Pass	Pass	Pass	Pass
Head	Visual, Ballast, Accelerometer Mount	Pass	Pass	Pass	Pass
Neck	Visual and Palpated, Cable Torque	Pass	Pass	Pass	Pass
Spine Box	Visual, Ballast, Weldment, Accelerometer Mount	Pass	Pass	Pass	Pass
Rib Cage	Visual, Palpated, Measured, Stiffness	Pass	Pass	Pass	Pass
Sternum	Visual	Pass	Pass	Pass	Pass
Lumbar Spine	Visual	Pass	Pass	Pass	Pass
Abdomen	Visual	Pass	Pass	Pass	Pass
Pelvis	Visual, Palpated, Accelerometer Mount	Pass	Pass	Pass	Pass
Upper Legs	Visual	Pass	Pass	Pass	Pass
Knees	Visual, Stops, Inserts	Pass	Pass	Pass	Pass
Lower Legs	Visual, Range of Motion	Pass	Pass	Pass	Pass
Ankles	Visual, Range of Motion	Pass	Pass	Pass	Pass
Feet	Visual, Range of Motion	Pass	Pass	Pass	Pass
Joints	1 to 2 G Range	Pass	Pass	Pass	Pass
Other		None	None	None	None

APPENDIX D

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

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SID INSTRUMENTATION**FRONT SID H3 NO. 056**

	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
HEAD X ACCELERATION	J21551	ENDEVCO	20Aug03
HEAD Y ACCELERATION	J36659	ENDEVCO	29May03
HEAD Z ACCELERATION	J21466	ENDEVCO	29May03
SIX AXIS UPPER NECK LOAD CELL (FX, FY, FZ, MX, MY, MZ)	1591	DENTON ATD	7Apr03
UPPER RIB ACCELERATION	J43512	ENDEVCO	22Aug03
LOWER RIB ACCELERATION	J43444	ENDEVCO	22Aug03
LOWER SPINE ACCELERATION	J36603	ENDEVCO	07Aug03
PELVIS ACCELERATION	J43429	ENDEVCO	22Aug03
UPPER RIB REDUNDANT ACCELERATION	J43480	ENDEVCO	22Aug03
LOWER RIB REDUNDANT ACCELERATION	J43445	ENDEVCO	22Aug03
LOWER SPINE REDUNDANT ACCELERATION	J32665	ENDEVCO	07Aug03
PELVIS REDUNDANT ACCELERATION	J36617	ENDEVCO	07Aug03

REAR SID H3 NO. 058

	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
HEAD X ACCELERATION	P24628	ENDEVCO	08Sep03
HEAD Y ACCELERATION	P21689	ENDEVCO	20Aug03
HEAD Z ACCELERATION	P21704	ENDEVCO	05Sep03
SIX AXIS UPPER NECK LOAD CELL (FX, FY, FZ, MX, MY, MZ)	0452	DENTON	02Sep03
UPPER RIB ACCELERATION	J43513	ENDEVCO	22Aug03
LOWER RIB ACCELERATION	J43481	ENDEVCO	22Aug03
LOWER SPINE ACCELERATION	J43432	ENDEVCO	22Aug03
PELVIS ACCELERATION	J43434	ENDEVCO	22Aug03
UPPER RIB REDUNDANT ACCELERATION	J43479	ENDEVCO	22Aug03
LOWER RIB REDUNDANT ACCELERATION	J43475	ENDEVCO	22Aug03
LOWER SPINE REDUNDANT ACCELERATION	J36614	ENDEVCO	07Aug03
PELVIS REDUNDANT ACCELERATION	J43433	ENDEVCO	22Aug03

VEHICLE INSTRUMENTATION

	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
RIGHT FRONT SILL X	P19387	ENDEVCO	05Sep03
RIGHT FRONT SILL Y	P21788	ENDEVCO	08Sep03
RIGHT FRONT SILL Z	P21617	ENDEVCO	08Sep03
RIGHT REAR SILL X	P22522	ENDEVCO	21Aug03
RIGHT REAR SILL Y	P19287	ENDEVCO	22Apr03
RIGHT REAR SILL Z	P19385	ENDEVCO	05Sep03
REAR FLOORPAN ABOVE AXLE X	98G98E11-K02	ENTRAN	08Sep03
REAR FLOORPAN ABOVE AXLE Y	98B98A26-D05	ENTRAN	29May03
REAR FLOORPAN ABOVE AXLE Z	98G98D22-Z04	ENTRAN	23May03
LEFT REAR SILL Y	P22794	ENDEVCO	22Aug03
LEFT FRONT SILL Y	P24136	ENDEVCO	22Aug03
LEFT FRONT DOOR CENTERLINE Y	98F98B27-N06	ENTRAN	20Aug03
RIGHT REAR OCCUPANT COMP Y	P24562	ENDEVCO	22Aug03
MID-REAR OF LEFT FRONT DOOR Y	N/A	N/A	N/A
LEFT FRONT DOOR UPPER C/L Y	98F98E11-K11	ENTRAN	20Aug03
MID-REAR OF LEFT REAR DOOR Y	P21661	ENDEVCO	20Aug03
LEFT REAR DOOR UPPER C/L Y	P25036	ENDEVCO	22Aug03
LEFT LOWER B-PILLAR Y	P21732	ENDEVCO	20Aug03
LEFT MIDDLE B-PILLAR Y	P24556	ENDEVCO	08Sep03
LEFT LOWER A-PILLAR Y	98F98E11-K07	ENTRAN	23May03
LEFT UPPER A-PILLAR	98F98E11-K05	ENTRAN	20Aug03
FRONT SEAT TRACK Y	P13846	ENDEVCO	07Aug03
REAR SEAT TRACK Y	P24639	ENDEVCO	08Sep03
VEHICLE CG X	P14135	ENDEVCO	08Sep03
VEHICLE CG Y	P21605	ENDEVCO	05Sep03
VEHICLE CG Z	P21575	ENDEVCO	08Sep03

MDB INSTRUMENTATION

MDB CG X	P24089	ENDEVCO	05Sep03
MDB CG Y	P24733	ENDEVCO	03Sep03
MDB CG Z	P23595	ENDEVCO	29May03
MDB REAR FRAME MEMBER X	P13842	ENDEVCO	19Mar03
MDB REAR FRAME MEMBER Y	J43479	ENDEVCO	22Aug03