

V3132

REPORT NUMBER: SNCAP-CAL-99-6

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST**

**VOLVO GOTHENBURG SWEDEN
1999 VOLVO S80
4-DOOR SEDAN**

NHTSA NUMBER: VO002

VERIDIAN ENGINEERING TEST NUMBER: 8526-1

**VERIDIAN ENGINEERING
TRANSPORTATION SCIENCES CENTER
P.O. BOX 400
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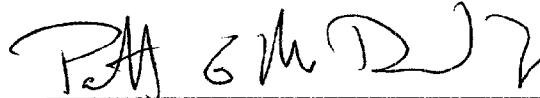
June 23, 1999

FINAL REPORT

**U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Safety Performance Standards
Office of Crashworthiness Standards
Mail Code: NPS-10
400 Seventh Street, SW, Room No. 5313
Washington, DC 20590**

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Prepared By:



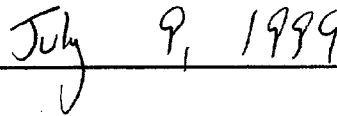
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Approved By:



David J. Travale, Program Manager
Transportation Sciences Center

Approval Date:



FINAL REPORT ACCEPTANCE BY:

Accepted By: _____

Acceptance Date: _____

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4. Title and Subtitle Final Report of new Car Assessment Program Side Impact Testing of a 1999 Volvo S80 4-Door Sedan NHTSA No.: VO002				5. Report Date June 23, 1999																															
				6. Performing Organization Code CAL																															
7. Author(s) Patrick MacDiarmid, Project Engineer David J. Travale, Program Manager				8. Performing Organization Report No. 8526-1																															
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12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards Mail Code: NPS-10 400 Seventh , SW, Room 5313 Washington, D.C. 20590				13. Type of Report and Period Covered Final Report, June-July 1999																															
				14. Sponsoring Agency Code																															
15. Supplementary Notes																																			
16. Abstract A 55/28 kph 90° Impact Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 1999 Volvo S80 4-Door Sedan in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. This test was conducted at the Veridian Engineering Crash Test Facility in Buffalo, New York, on June 23, 1999. The impact velocity of the Moving Deformable Barrier (MDB) was 61.8 kph, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 25.6°C. The target vehicle post-test maximum crush was 346 mm at level 2. The test or target vehicle's performance is given below: <table border="0"> <thead> <tr> <th></th> <th align="center"><u>Front SID</u></th> <th></th> <th align="center"><u>Rear SID</u></th> <th></th> </tr> </thead> <tbody> <tr> <td>Left Upper Rib Acceleration:</td> <td align="center"><u>47</u></td> <td align="center">g's</td> <td align="center"><u>56</u></td> <td align="center">g's</td> </tr> <tr> <td>Left Lower Rib Acceleration:</td> <td align="center"><u>45</u></td> <td align="center">g's</td> <td align="center"><u>66</u></td> <td align="center">g's</td> </tr> <tr> <td>Lower Spine Acceleration:</td> <td align="center"><u>66</u></td> <td align="center">g's</td> <td align="center"><u>42</u></td> <td align="center">g's</td> </tr> <tr> <td>Thoracic Trauma Index (TTI):</td> <td align="center"><u>56</u></td> <td align="center">g's</td> <td align="center"><u>54</u></td> <td align="center">g's</td> </tr> <tr> <td>Pelvis Acceleration (PEV):</td> <td align="center"><u>69</u></td> <td align="center">g's</td> <td align="center"><u>59</u></td> <td align="center">g's</td> </tr> </tbody> </table> The two 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.							<u>Front SID</u>		<u>Rear SID</u>		Left Upper Rib Acceleration:	<u>47</u>	g's	<u>56</u>	g's	Left Lower Rib Acceleration:	<u>45</u>	g's	<u>66</u>	g's	Lower Spine Acceleration:	<u>66</u>	g's	<u>42</u>	g's	Thoracic Trauma Index (TTI):	<u>56</u>	g's	<u>54</u>	g's	Pelvis Acceleration (PEV):	<u>69</u>	g's	<u>59</u>	g's
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17. Key Words New Car Assessment Program (NCAP) Side Impact MDB Side Impact Dummy (SID)			18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Reference Division Room 5108 (NAD-52) 400 Seventh St., S.W. Washington, D.C. 20590 Telephone No. (202) 366-4946 ATTN: Robert Hornicle																																
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SECTION 1

PURPOSE AND TEST PROCEDURE

This side impact test is part of the FY99 New Car Assessment Program Side Impact Protection sponsored under Contract No. S0680. The purpose of this test was to generate comparative side impact performance in a 1999 Volvo S80 4-Door Sedan. The test was conducted in accordance with the Office of Crashworthiness Standards's Laboratory Test Procedure dated July, 1997.

SECTION 2

SUMMARY OF SIDE IMPACT TEST

A 1999 Volvo S80 4-Door Sedan was impacted on the left or driver's side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the monorail at a velocity of 61.8 kph (38.4 mph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by the Veridian Engineering Transportation Sciences Center in Buffalo, New York on June 23, 1999. Pre- and post-test photographs of the test vehicle, the moving deformable barrier (MDB), and the side impact dummies (SIDs) are included in appendix A.

Two restrained Side Impact Dummies (SIDs) were placed in the driver (Pos. #1) and left rear (Pos. #4) designated seating positions according to the instructions specified in the OCWS Side Impact Laboratory Test Procedure which is dated July, 1997. The side impact test was documented by one real-time camera and 9 high-speed cameras. Camera locations and other pertinent camera information are included in this report.

The SIDs were instrumented with the following accelerometers:

1. Left Upper Rib (LUR) uniaxial and redundant accelerometer (Y-direction)
2. Left Lower Rib (LLR) uniaxial and redundant accelerometer (Y-direction)
3. Lower Thoracic Spine (T₁₂) uniaxial and redundant accelerometer (Y-direction)
4. Pelvic (PEV) section uniaxial and redundant accelerometer (Y-direction)

A summary of the side impact dummy (SID) configuration and verification test data can be found in Appendix C. A total of 44 channels of data were recorded. Appendix B contains the vehicle, MDB and dummy response data traces.

The following table summarizes the results of the test.

Injury Criteria	Front SID	Rear SID
TTI (g)	56	54
PEV (g)	69	59

SECTION 3

SUMMARY OF TEST RESULTS

DATA SHEET 1

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1999 Volvo S80 4-Door Sedan
 Vehicle Body Color: Red VIN: YV1TS90D8X1051484
 Vehicle NHTSA No.: VO002 Month & Year of Manufacture: 03/99
 Engine Data: 6 Cylinders; - CID; 2.8 Liters; - cc
 Engine Placement: X Longitudinal; or - Lateral
 Transmission: 4 Speed; - Manual; X Automatic; X Overdrive
 Final Drive: - Rear Wheel Drive; X Front Wheel Drive; - Four Wheel
 Odometer Reading 1070 km
 Options: X A/C; X Power Steering; X Pwr.Brakes; X Pwr. Windows

DATA FROM TIRE PLACARD

Tire Pressure* (at capacity); 269 kPa FRONT
269 kPa REAR

Recommended Tire Size: 225/50R17
 Tires on Test Vehicle: 225/50R17 ; Manufacturer: Michelin

Vehicle Capacity Data:
 Number of Occupants: 2 Front; 3 Rear; - 3rd Seat; 5 Total
 Type of Front Seats: X Bucket; - Bench; - Split Bench
 Type of Front Seat Back: - Fixed; X Adjustable with X Lever or - Knob
 Vehicle Max Capacity Loading = 403.25 kg (A)
 No. of Occupants x 68.04 kg. = 340.2 kg (B)
 Vehicle Cargo Capacity = 63.1 kg (A-B)

TEST VEHICLE DELIVERED WEIGHT WITH MAXIMUM FLUIDS:

Left Front	=	<u>496.0</u> kg	Left Rear	=	<u>350.5</u> kg
Right Front	=	<u>501.5</u> kg	Right Rear	=	<u>329.0</u> kg
TOTAL FRONT	=	<u>997.5</u> kg	TOTAL REAR	=	<u>679.5</u> kg
% of Total Weight	=	<u>59.5</u> %	% of Total Weight	=	<u>40.5</u> %
TOTAL WEIGHT	=	<u>1677.0</u> kg			

* Tire pressure used in test.

DATA SHEET 1 (continued)

GENERAL TEST VEHICLE PARAMETER DATA

Vehicle: 1999 Volvo S80

NHTSA No. VO002

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Max. Fluids	=	<u>1677.0</u>	kg (A)
Maximum Cargo Carrying Capacity of Test Vehicle	=	<u>63.1</u>	kg (B)
Weight of instrumented Side Impact Dummies (1 or 2 X <u>81.2</u> kg)	=	<u>162.4</u>	kg (C)
TEST VEHICLE TARGET WEIGHT:	=	<u>1902.5</u>	kg (A+B+C)

FULLY LOADED TEST VEHICLE (UDVW + 1 or 2 SID(s) + CARGO):

Left Front	=	<u>553.0</u>	kg	Left Rear	=	<u>446.0</u>	kg
Right Front	=	<u>507.0</u>	kg	Right Rear	=	<u>401.0</u>	kg
TOTAL FRONT	=	<u>1060.0</u>	kg	TOTAL REAR	=	<u>847.0</u>	kg
% of Total Weight	=	<u>55.6</u>	%	% of Total Weight	=	<u>44.4</u>	%
TOTAL TEST WEIGHT	=	<u>1907.0</u>	kg				

AS TESTED WEIGHT OF TEST VEHICLE (1 OR 2 SID(s) + CARGO + EQUIPMENT & INSTRUMENTATION):

Left Front	=	<u>548.0</u>	kg	Left Rear	=	<u>440.5</u>	kg
Right Front	=	<u>499.5</u>	kg	Right Rear	=	<u>406.0</u>	kg
TOTAL FRONT	=	<u>1047.5</u>	kg	TOTAL REAR	=	<u>846.5</u>	kg
% of Total Weight	=	<u>55.3</u>	%	% of Total Weight	=	<u>44.7</u>	%
TOTAL TEST WEIGHT	=	<u>1894.0</u>	kg				

TEST VEHICLE ATTITUDE (all dimensions in millimeters):

AS DELIVERED:

Left Front	<u>711</u>	Right Front	<u>711</u>	Left Rear	<u>720</u>	Right Rear	<u>722</u>
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FULLY LOADED:

Left Front	<u>693</u>	Right Front	<u>704</u>	Left Rear	<u>678</u>	Right Rear	<u>696</u>
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READY FOR TEST:

Left Front	<u>695</u>	Right Front	<u>708</u>	Left Rear	<u>680</u>	Right Rear	<u>696</u>
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Test Vehicle Wheelbase: 2790 millimeters

C.G. = 1247.0 millimeters rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side	=	<u>4733</u>	millimeters
Left Side	=	<u>4730</u>	millimeters
Centerline	=	<u>4812</u>	millimeters

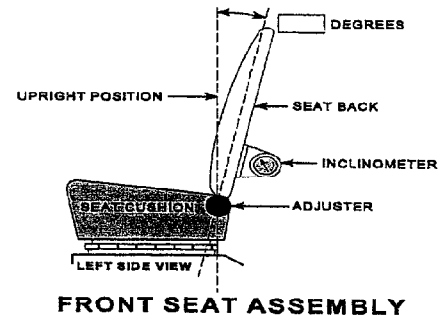
DATA SHEET 1 (continued)

GENERAL TEST VEHICLE PARAMETER DATA

Vehicle: 1999 Volvo S80

NHTSA No. VO002

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



FRONT SEAT CUSHION PLACEMENT: Seat was set at full down in electronic mid-position (140 mm)

Total Length of Adjustment Travel: 280 millimeters

Total Number of Adjustment Positions or Detents: The seat adjuster was electronic

FRONT SEAT BACK ADJUSTMENT POSITION: Recline seatback until inclinometer registers 19° on center line

Seat Back Torso Angle: 19 degrees

SECOND POSITION SEAT:

Total Length of Fore/Aft Adjustment Travel: 0 millimeters

Seat Back Adjustment Position: Fixed

ADJUSTABLE STEERING COLUMN POSITION:

WINDOW POSITIONS: Left Front: Closed Left Rear: Closed

Right Front: Open Right Rear: Open

Note: Windows will be in closed position on struck side of test vehicle and in open position on opposite side.

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

80.0 liters (Fuel Tank Usable Capacity)

73.6 liters used for test (92%-94% of Fuel Tank Usable Capacity)

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

Wheelbase = 2790 millimeters

Impact Point is 455 millimeters rearward of front axle centerline

(which is 940 millimeters forward of the wheelbase midpoint)

Actual Impact Point is 443 millimeters rearward of front axle centerline

DATA SHEET 2

TEST VEHICLE SUMMARY OF RESULTS

VEHICLE IDENTIFICATION:

Vehicle Year/Make/Model: 1999 Volvo S80

Body Style: 4-Door Sedan

VIN: YV1TS90D8X1051484

NHTSA No.: VO002

Test Date: June 23, 1999

Overall Length = 4812 millimeters; Overall Width = 1805 millimeters

VEHICLE TEST WEIGHT (Pre-Test):

Left Front = 548.0 kg Left Rear = 440.5 kg

Right Front = 499.5 kg Right Rear = 406.0 kg

TOTAL FRONT = 1047.5 kg TOTAL REAR = 846.5 kg

TOTAL VEHICLE WEIGHT 1894.0 kg

Wheelbase = 2790 millimeters

Longitudinal C.G. from Center of Front Axle = 1247.0 millimeters

Impact Angle with Respect to Impactor = 90 degrees

ACTUAL IMPACT POINT

Actual Impact Point is 12 mm forward of nominal impact ref. line (Lateral)

Actual Impact Point is 1 mm below nominal impact point (Vertical)

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (320 mm above ground) = 264 millimeters

2. LEVEL 2 (489 mm above ground) = 346 millimeters

3. LEVEL 3 (606 mm above ground) = 323 millimeters

4. LEVEL 4 (838 mm above ground) = 315 millimeters

5. LEVEL 5 (1367 mm above ground) = 58 millimeters

Maximum Post-Test Intrusion = 346 millimeters

OCCUPANTS:

Front Passenger:

Rear Passenger:

Dummy Identification 016

027

Restraints Used Seatbelt, Airbag, Side Curtain

Seatbelt, Side Curtain

INSTRUMENTATION:

Number of Vehicle Data Channels: = 39

Number of Cameras: Onboard = 3

Offboard = 7

TOTAL = 10

DATA SHEET 3

MOVING DEFORMABLE BARRIER (MDB) SUMMARY

Vehicle: 1999 Volvo S80

NHTSA No. VO002

MDB FACE MANUFACTURER AND SERIAL NUMBER:

Plascore Inc. 125B0597-4 134A0497 4800-D1

POSITION OF IMPACT (MDB) ON MONORAIL:

Crabbed 27° to left

MDB DETAILS:

Overall Width of Framework Carriage	=	<u>1250</u>	millimeters
Overall Length of MDB (incl. honeycomb impact face)	=	<u>4120</u>	millimeters
Wheelbase of Framework Carriage	=	<u>2590</u>	millimeters
Tread of Framework Carriage (Front & Rear)	=	<u>1875</u>	millimeters
C.G. Location Rearward of Front Axle	=	<u>1104</u>	millimeters

MDB WEIGHT:

Left Front	=	<u>409.5</u>	kg	Left Rear	=	<u>281.5</u>	kg
Right Front	=	<u>372.5</u>	kg	Right Rear	=	<u>299.0</u>	kg
TOTAL FRONT	=	<u>782.0</u>	kg	TOTAL REAR	=	<u>580.5</u>	kg
TOTAL MDB WEIGHT	=	<u>1362.5</u>	kg				
Impact Angle (MDB C/L to Target Vehicle C/L)	=	<u>90</u>	degrees				
Impact Speed	=	<u>61.8</u>	kph				

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

1. Row A at Center of Bumper Level	=	<u>139</u>	millimeters
2. Row B at Top of Bumper Level	=	<u>115</u>	millimeters
3. Row C at Mid Level	=	<u>92</u>	millimeters
4. Row D at Top of Stack Level	=	<u>157</u>	millimeters

INSTRUMENTATION:

Number of MDB Data Channels	=	<u>5</u>
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DATA SHEET 4

POST-TEST OBSERVATIONS

Vehicle: 1999 Volvo S80

NHTSA No. VO002

VISIBLE DUMMY CONTACT POINTS:

	<u>LEFT FRONT SID</u>	<u>LEFT REAR SID</u>
Head:	<u>Side of head to side curtain airbag</u>	<u>Side and top of head to side curtain airbag</u>
Upper Torso:	<u>Seat bolster mounted airbag</u>	<u>Interior door trim panel</u>
Lower Torso:	<u>Seat bolster mounted airbag</u>	<u>Interior door trim panel</u>
Left Knee:	<u>None</u>	<u>Interior door trim panel</u>
Right Knee:	<u>None</u>	<u>None</u>

DOOR OPENING:

	<u>LEFT DOOR</u>	<u>RIGHT DOOR</u>
Front:	<u>Closed/Inoperable</u>	<u>Closed/Operable</u>
Rear:	<u>Closed/Inoperable</u>	<u>Closed/Operable</u>

MDB DISTANCE FROM TARGET IMPACT POINT:

<u>Vertical: 1 mm above</u>
<u>Horizontal: 12 mm forward</u>

ARM REST LOCATIONS:

Front:	<u>The driver's armrest moved inward and down during the event</u>
Rear:	<u>The rear passenger's armrest moved inward and down during the event</u>

SEAT MOVEMENT:

Front:	<u>The lower seat cushion was moved inboard</u>
Rear:	<u>The rear seat back and seat cushion moved inboard</u>

GLAZING DAMAGE:

Windshield:	<u>The windshield cracked along the left A-pillar</u>
Window:	<u>The laminated side glass cracked during impact but remained in tact</u>

PILLAR PERFORMANCE:

There were no visible tears or separations

SILL SEPARATION:

No visible tears or separation was present after the event

AIR BAG DEPLOYMENT STATUS:

	<u>DRIVER</u>	<u>FRONT PASSENGER</u>	<u>REAR PASSENGER</u>
<u>FRONT</u>	<u>YES</u>	<u>YES</u>	<u>N/A</u>
<u>SIDE</u>	<u>YES</u>	<u>NO</u>	<u>N/A</u>

OTHER NOTABLE IMPACT EFFECTS:

This vehicle was equipped with a side curtain airbag. The side curtain bag deployed on the struck side of the vehicle and did not deploy on the unstruck side.

SECTION 4

OCCUPANT AND VEHICLE INFORMATION

DATA SHEET 5

SID INSTRUMENTATION DATA

Vehicle: 1999 Volvo S80

NHTSA No. VO002

	Front Dummy ID# 016				Rear Dummy ID# 027			
	Pos. Direction		Neg. Direction		Pos. Direction		Neg. Direction	
	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
RIB ACCELERATIONS:								
Upper Rib Lateral . Y	46.7	39.3	-4.9	165.6	56.2	46.2	-7.7	113.1
Upper Rib Lateral . Y(R)	42.4	38.8	-10.9	26.9	55.5	46.2	-7.4	113.2
Lower Rib Lateral . Y	45.1	38.2	-6.5	68.1	65.8	44.4	-9.1	74.3
Lower Rib Lateral . Y(R)	46.2	38.1	-7.6	68.1	62.6	44.4	-9.5	75.0
SPINE ACCELERATIONS:								
Lower Lateral Y	66.3	33.1	-9.9	99.3	41.9	45.0	-16.9	68.1
Lower Lateral Y(R)	72.3	33.1	-11.2	99.3	40.9	45.0	-16.9	68.1
PELVIC ACCELERATIONS:								
Lateral Y	69.3	26.9	-12.5	50.0	58.7	33.7	-14.9	64.4
Lateral Y(R)	69.8	26.9	-13.3	50.0	60.0	33.7	-15.7	64.4

REFERENCE: Positive Direction - Longitudinal (X) = forward
 Lateral (Y) = to right
 Vertical (Z) = up
 Negative Direction - Longitudinal (X) = rearward
 Lateral (Y) = to left
 Vertical (Z) = down

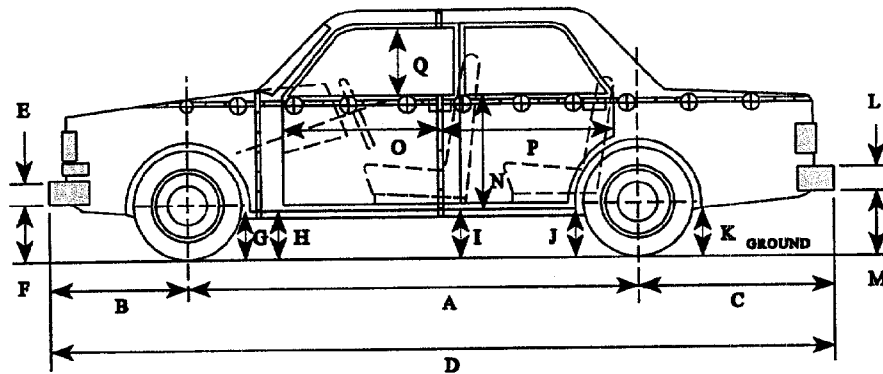
Note: Above data has been FIR filtered, Y(R) denotes redundant Y direction accelerometer.

DATA SHEET 6

VEHICLE SIDE MEASUREMENTS

Vehicle: 1999 Volvo S80

NHTSA No. VO002



LEFT SIDE VIEW

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

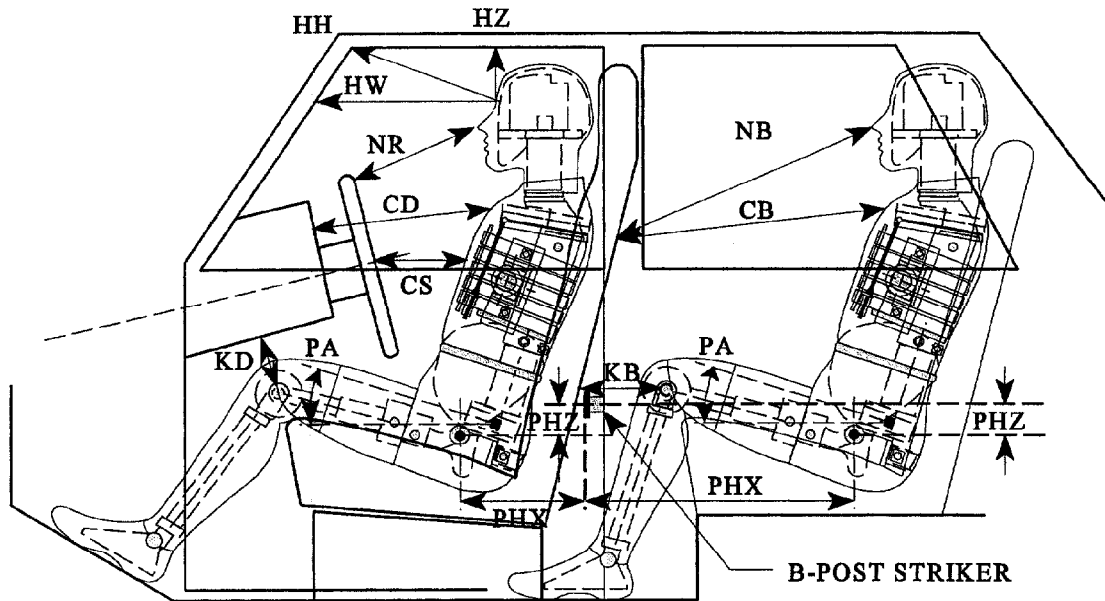
	PRE-TEST (as delivered)	PRE-TEST (as tested)	POST-TEST (as tested)	Δ CHANGE
A	2790	-	2734	-56
B	972	-	891	-81
C	1050	-	1055	5
D	4812	-	4797	-15
E	185	-	185	0
F	367	364	380	16
G	204	183	202	19
H	210	187	213	26
I	226	196	237	41
J1	212	184	154	-30
J2	215	187	171	-16
K	280	237	252	15
L	270	-	270	0
M	347	318	345	27
N	700	-	651	-49
O	1080	-	1078	-2
P	960	-	864	-96
Q	475	-	460	-15
R	4733	-	4724	-9
S	4730	-	4680	-50
T	1805	-	1640	-165

DATA SHEET 7

SID LONGITUDINAL CLEARANCE DIMENSIONS

Vehicle: 1999 Volvo S80

NHTSA No. VO002



LEFT SIDE VIEW

NOTE: 2-DOOR VEHICLE SHOWN.
REAR DUMMY PHX & PHZ
MEASUREMENTS FOR A 4-DOOR
VEHICLE WOULD USE THE C-POST
STRIKER AS A REFERENCE POINT

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

	DRIVER ID# <u>016</u>	LEFT REAR PASS. ID# <u>027</u>
HH	362	N/A
HW	676	N/A
HZ	173	192
NR/NB	417	650
CD/CB	532	587
CS	259	N/A
KDL(KDA°)/KBL(KDA°)	193 / (32°)	262 / (46°)
KDR(KBA°)/KBR(KBA°)	195 / (37°)	238 / (22°)
PA°	23.5°	24.0°
PHX	211	238
PHZ	224	249

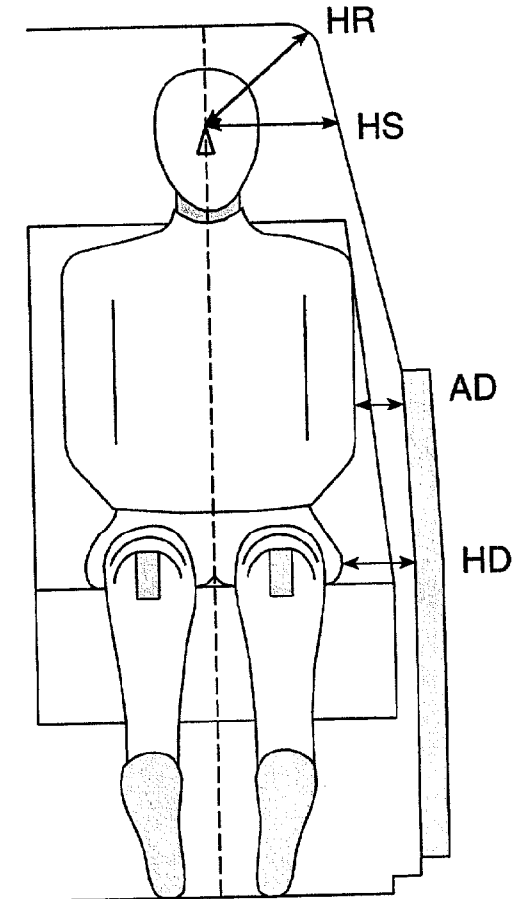
Note: 2-door vehicle shown. Rear dummy PHX & PHZ measurements for 4-door vehicle would use the C-post striker as a reference point.

DATA SHEET 8

SID LATERAL CLEARANCE DIMENSIONS

Vehicle: 1999 Volvo S80

NHTSA No. VO002



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

	DRIVER ID # <u>016</u>		LEFT REAR PASS. ID # <u>027</u>	
HR	217		202	
HS	342		279	
AD*	LOWER: 160	UPPER: 119	LOWER: 79	UPPER: 98
HD	152		160	

* Lower measurement is taken laterally at the center of the lower rib accelerometer height from the SID arm segment to the closest part of the vehicle side.

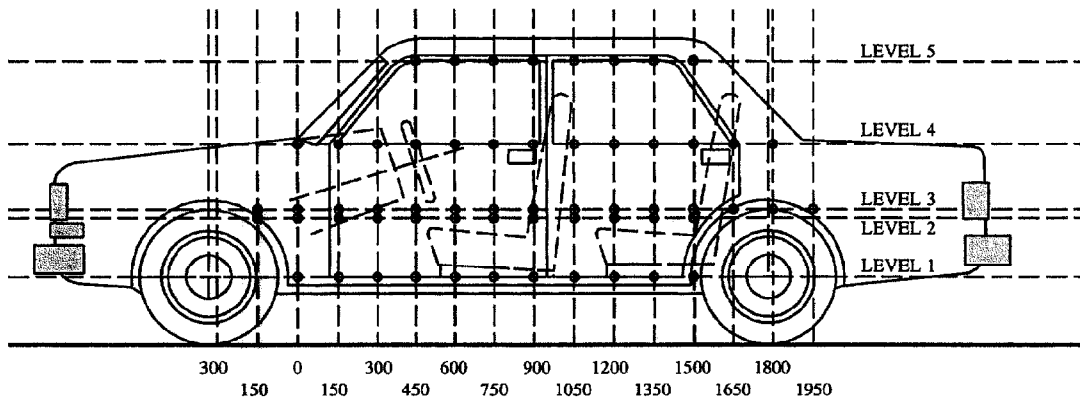
Upper measurement is taken laterally at the center of the upper rib accelerometer height from the SID arm segment to the closest part of the vehicle side.

DATA SHEET 9

VEHICLE SIDE MEASUREMENTS

Vehicle: 1999 Volvo S80

NHTSA No. VO002



LEFT SIDE VIEW

NOTE: All measurements are in millimeters (mm)

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 Shown Above:

Level 5 @ Window Top	=	<u>1367</u>	millimeters
Level 4 @ Window Sill	=	<u>838</u>	millimeters
Level 3 @ Mid Door	=	<u>606</u>	millimeters
Level 2 @ Occupant H-Point	=	<u>489</u>	millimeters
Level 1 @ Axle Centerline Height (or Sill Top Height)	=	<u>320</u>	millimeters

DATA SHEET 10

VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS

NHTSA No. VO002

Vehicle: 1999 Volvo S80

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

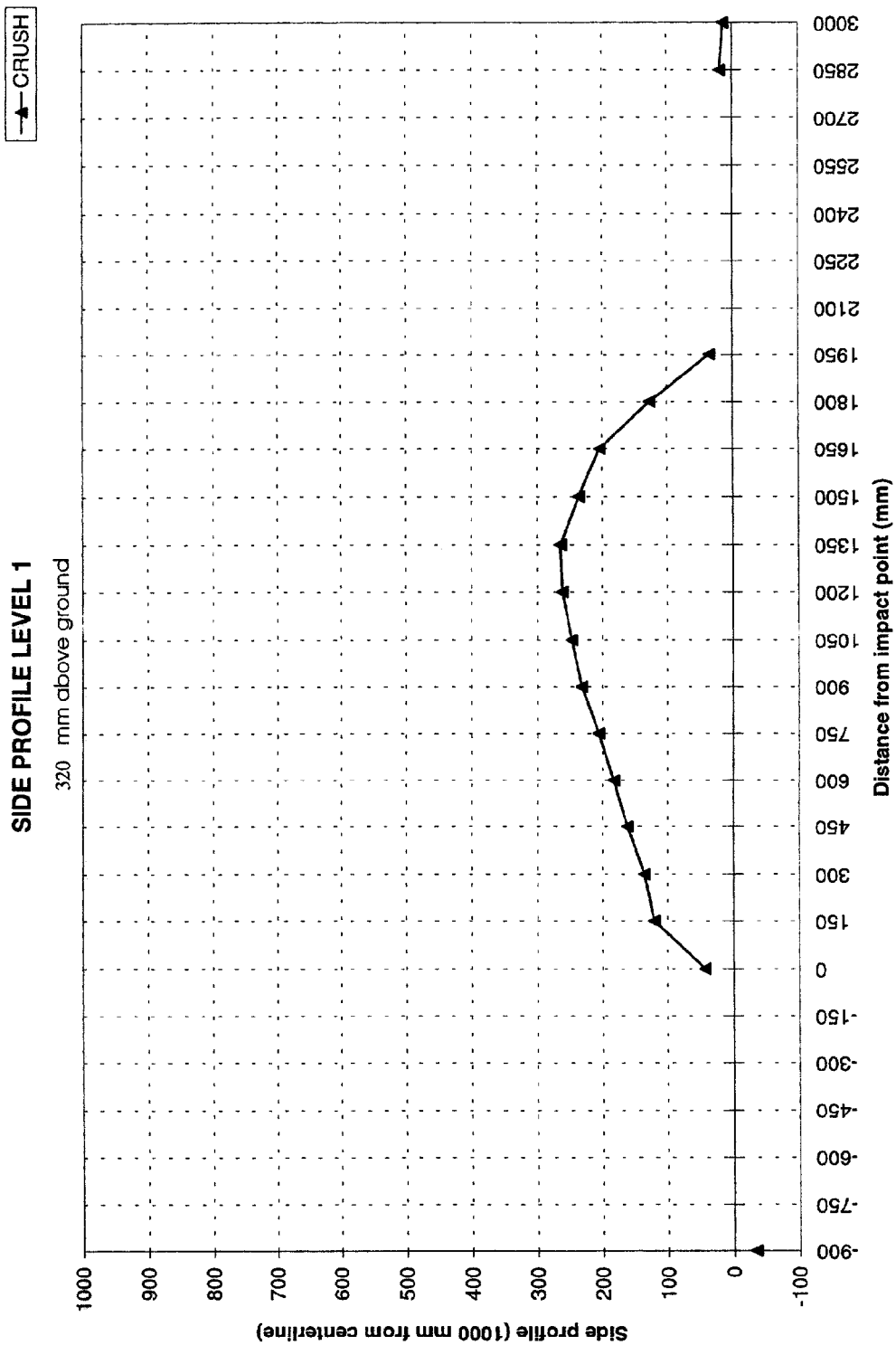
		DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT																											
LEVEL	HEIGHT (mm)	-900	-750	-600	-450	-300	-150	0	150	300	450	600	750	900	1050	1200	1350	1500	1650	1800	1950	2100	2250	2400	2550	2700	2850	3000	
LEVEL 1 SIDE SILL		141	-	-	-	-	-	131	134	137	139	142	144	141	143	142	142	145	144	143	143	-	-	-	-	-	-	210	246
	PRE																												
	POST	107	-	-	-	-	-	174	255	273	301	325	350	373	390	403	406	381	348	270	178	-	-	-	-	-	229	260	
LEVEL 2 H POINT		-34	N/A	N/A	N/A	N/A	N/A	43	121	136	162	183	206	232	247	261	264	236	204	127	35	N/A	N/A	N/A	N/A	N/A	N/A	19	14
	PRE	122	-	-	-	-	-	98	99	101	98	103	100	101	101	103	108	110	110	113	116	-	-	-	-	-	140	175	200
	POST	84	-	-	-	-	-	157	274	326	355	373	393	411	430	437	454	445	425	314	193	-	-	-	-	153	193	210	
LEVEL 3 MID DOOR		-38	N/A	N/A	N/A	N/A	N/A	59	175	225	257	270	293	310	329	334	346	335	315	201	77	N/A	N/A	N/A	N/A	N/A	13	18	10
	PRE	123	95	-	-	-	-	85	90	89	89	95	89	91	93	93	96	99	103	110	111	107	-	-	113	138	155	174	
	POST	79	60	-	-	-	-	104	153	246	298	313	324	338	349	369	385	405	426	367	243	137	-	-	124	155	168	188	
LEVEL 4 WINDOW SILL		-44	-35	N/A	N/A	N/A	N/A	19	156	209	210	218	235	247	256	276	289	306	323	257	132	30	N/A	N/A	N/A	11	17	13	14
	PRE	376	281	195	144	117	104	95	88	86	85	83	83	85	88	88	93	96	99	105	111	118	125	134	137	156	171	191	
	POST	328	236	158	130	115	112	115	182	223	248	271	289	311	324	347	383	402	414	315	204	125	160	158	164	166	180	195	
LEVEL 5 WINDOW TOP		-48	-45	-37	-14	-2	8	20	94	137	163	188	206	226	236	259	290	306	315	210	93	7	35	24	27	10	9	4	
	PRE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	POST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LEVEL 6 WINDOW TOP		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	PRE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	POST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LEVEL 7 WINDOW TOP		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	PRE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	POST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES

Vehicle: 1999 Volvo S80

NHTSA No. VO002

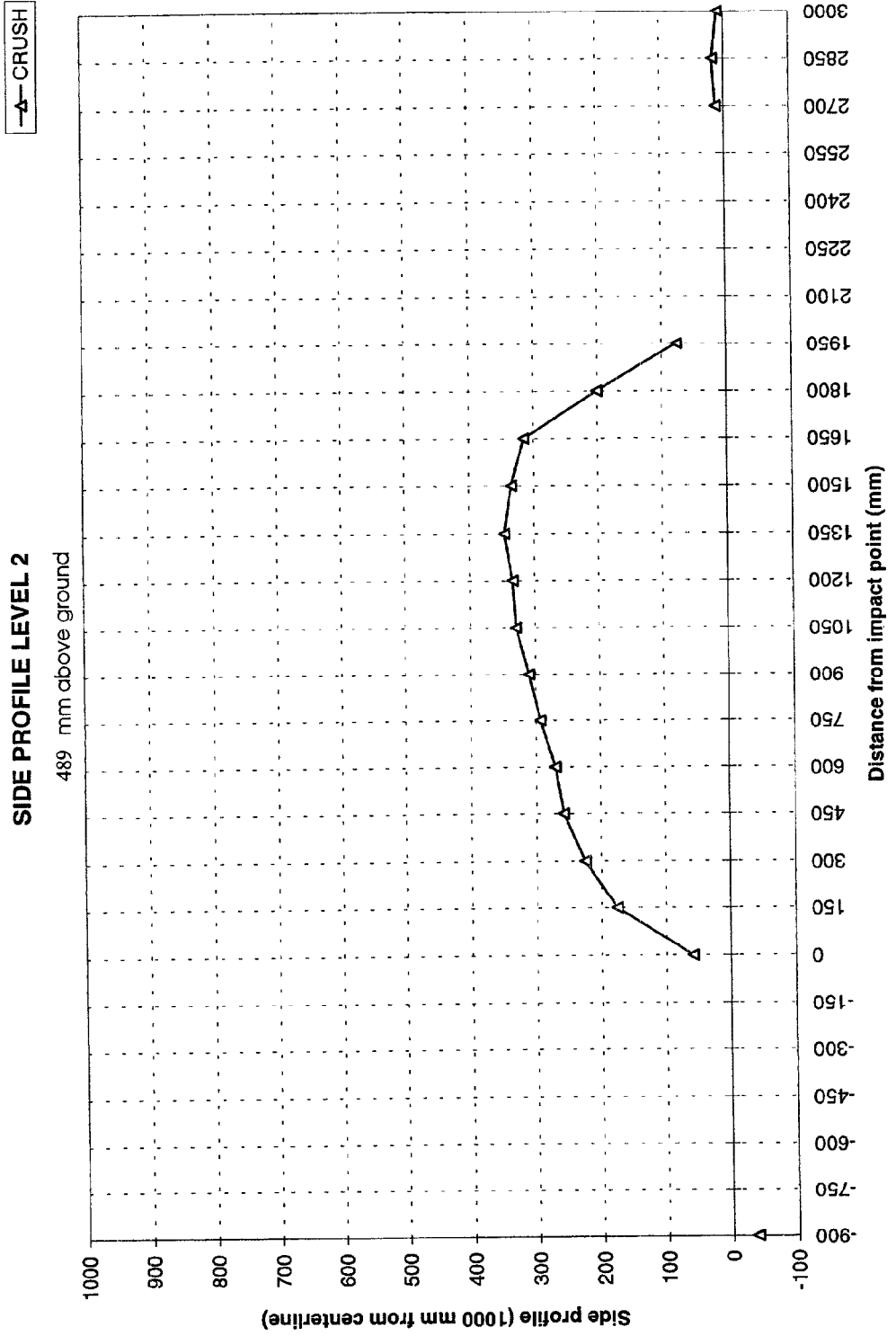


DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES

NHTSA No. VO002

Vehicle: 1999 Volvo S80

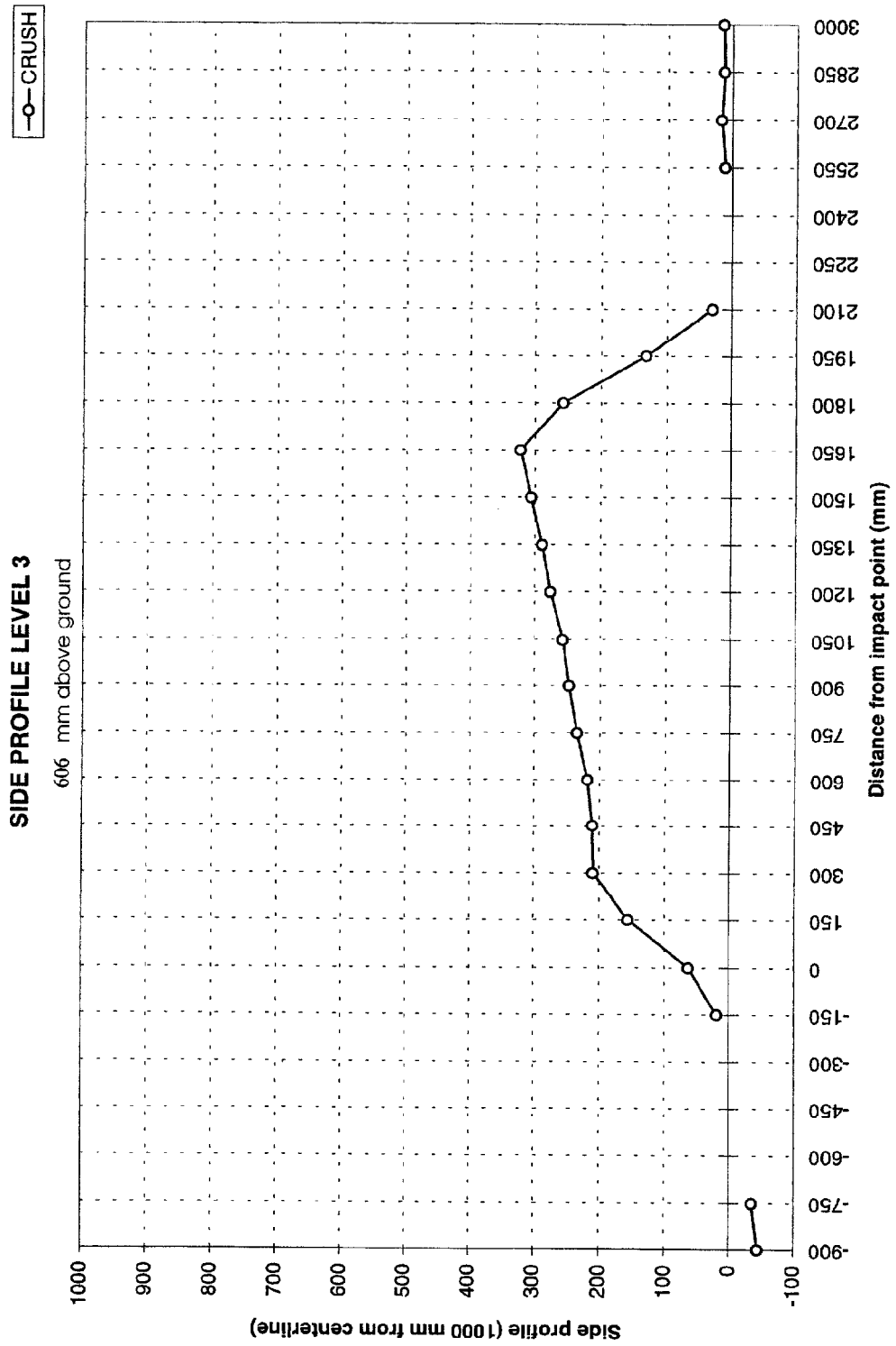


DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES

Vehicle: 1999 Volvo S80

NHTSA No. VO002



DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES

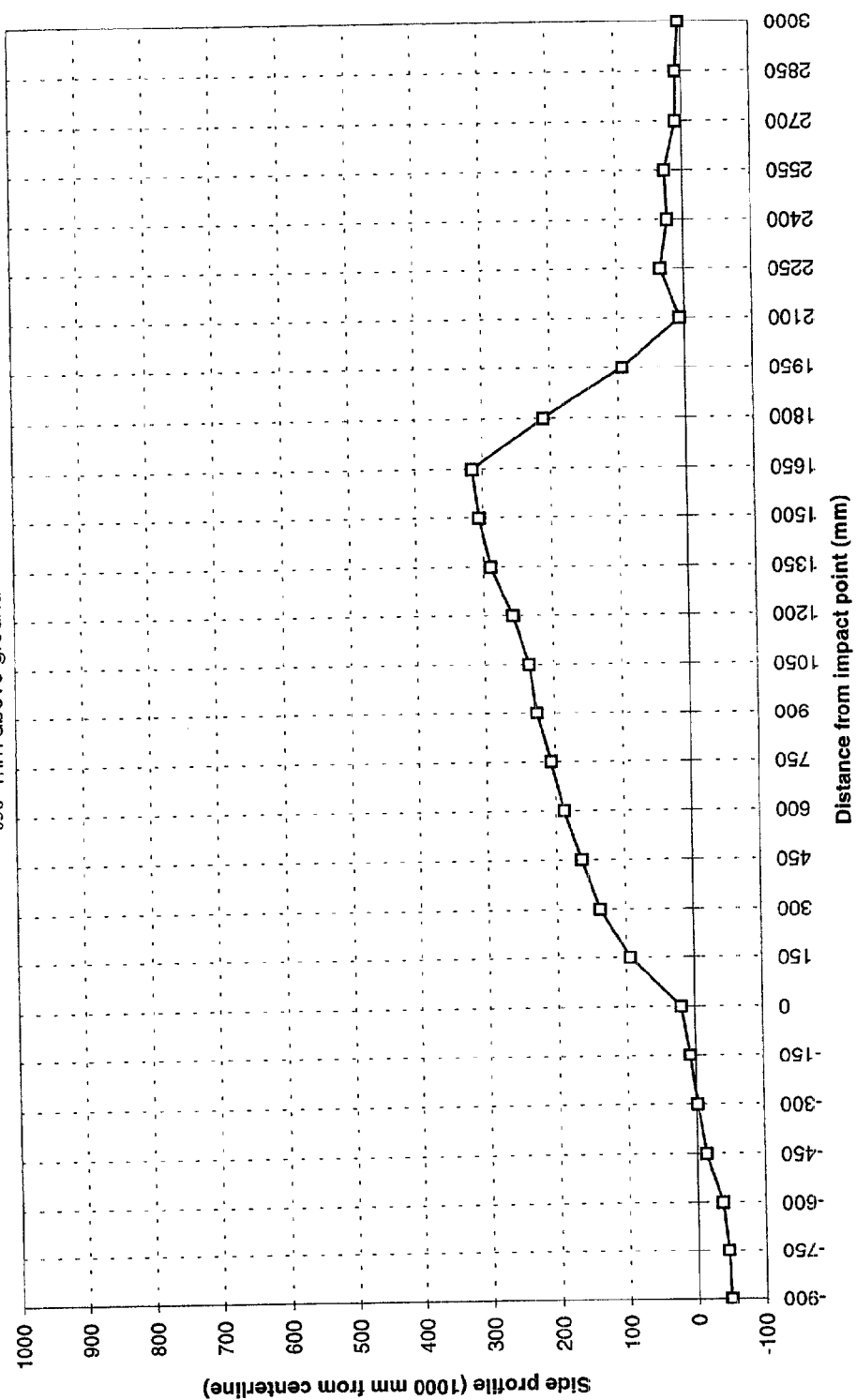
NHTSA No. VO002

Vehicle: 1999 Volvo S80

—□— CRUSH

SIDE PROFILE LEVEL 4

838 mm above ground

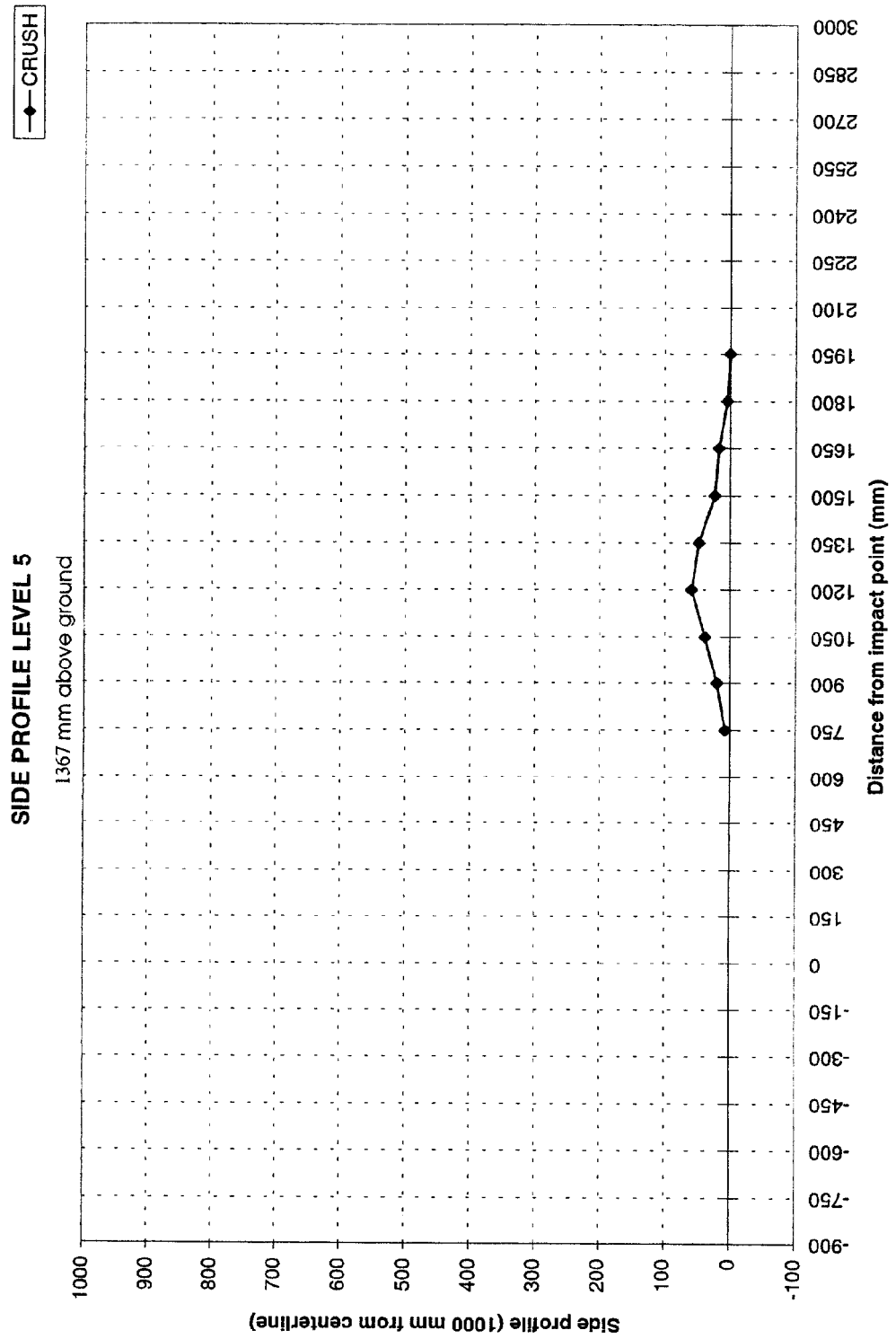


DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES

Vehicle: 1999 Volvo S80

NHTSA No. VO002

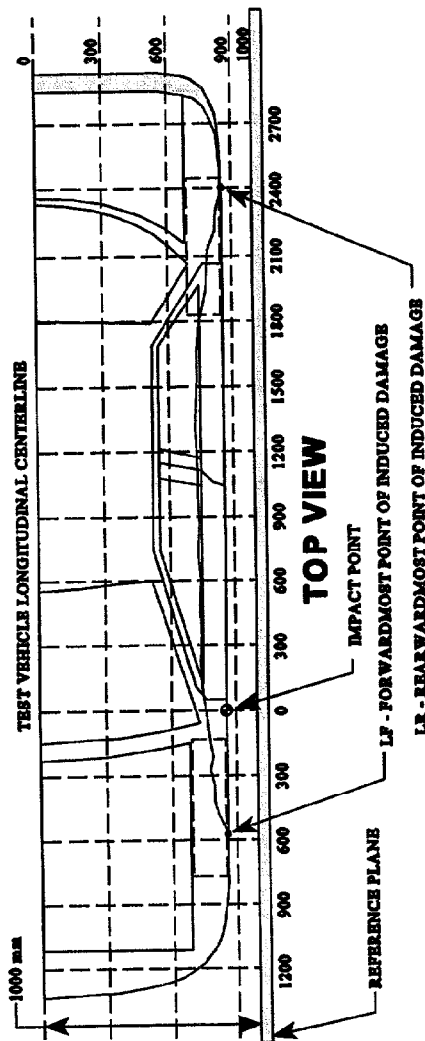


DATA SHEET 11

VEHICLE DAMAGE PROFILE DISTANCES

NHTSA No. VO002

Vehicle: 1999 Volvo S80



MEASUREMENT CONVENTIONS:

Forward of the impact point (towards front of vehicle) is considered negative (—).
Rearward of the impact point (toward rear of vehicle) is considered positive (+).

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

DPD MEASUREMENTS		POST TEST (mm)	PRETEST (mm)	STATIC CRUSH (mm)
1	(LF = -200 mm)	113	108	5
2	420	349	99	250
3	1040	429	101	328
4	1660	422	103	319
5	2280	160	127	33
6	(LR = 2900 mm)	239	222	17

DATA SHEET 12

EXTERIOR STATIC CRUSH FOR IMPACTOR FACE (Grid as looking at MDB from front)

Vehicle: 1999 Volvo S80

NHTSA No. VO002

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

		DISTANCE RIGHT OF CENTER (mm)									DISTANCE LEFT OF CENTER (mm)							
		800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
LEVEL 4	HEIGHT AT CL (mm)*																	
PRE	813	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619
POST		638	613	612	617	630	655	652	645	642	648	656	660	672	689	709	746	776
CRUSH		19	-6	-7	-2	11	36	33	26	23	29	37	41	53	70	90	127	157
LEVEL 3																		
PRE	686	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619
POST		607	613	617	620	624	630	635	637	639	642	641	644	651	662	677	694	711
CRUSH		-12	-6	-2	1	5	11	16	18	20	23	22	25	32	43	58	75	92
LEVEL 2																		
PRE	533	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619
POST		682	670	657	652	653	653	654	658	662	665	667	672	677	681	691	714	734
CRUSH		63	51	38	33	34	34	35	39	43	46	48	53	58	62	72	95	115
LEVEL 1																		
PRE	432	535	519	518	518	518	518	518	518	518	518	518	518	518	518	518	519	535
POST		632	609	591	578	573	576	574	578	580	582	585	587	590	596	609	639	674
CRUSH		97	90	73	60	55	58	56	60	62	64	67	69	72	78	91	120	139

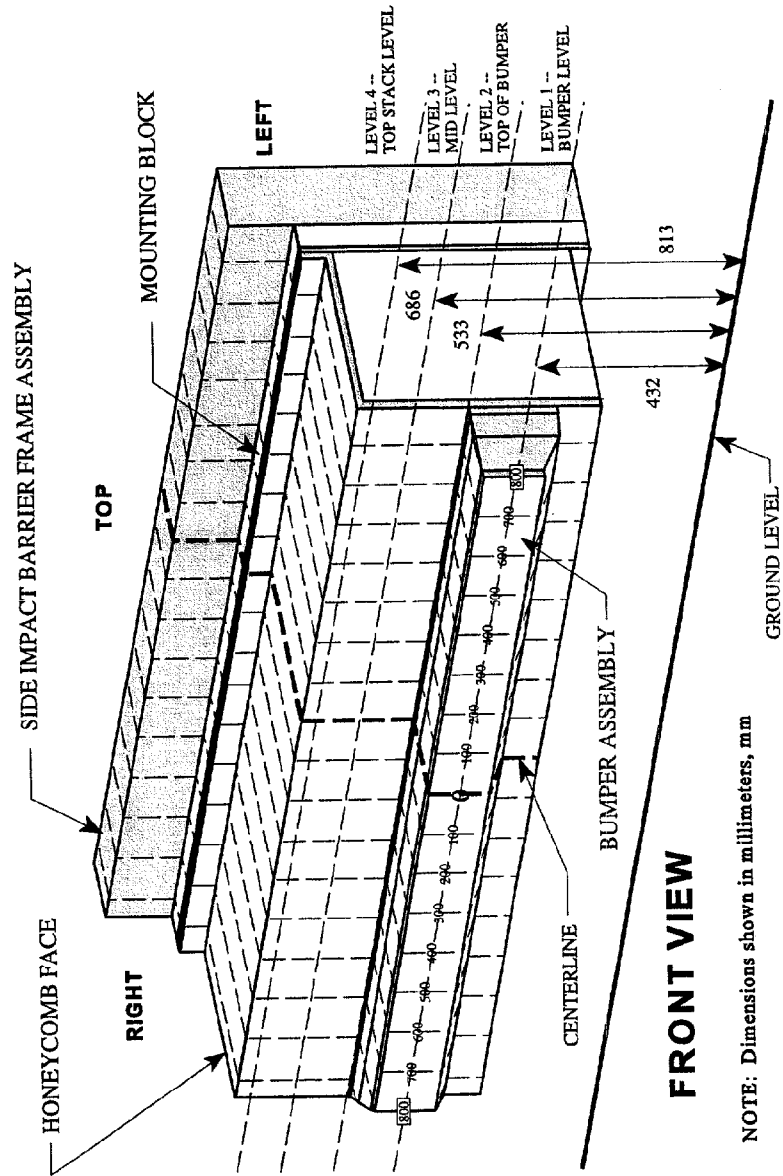
*Heights measured above ground level.

DATA SHEET 12 (continued)

EXTERIOR STATIC CRUSH FOR IMPACTOR FACE

NHTSA No. VO002

Vehicle: 1999 Volvo S80

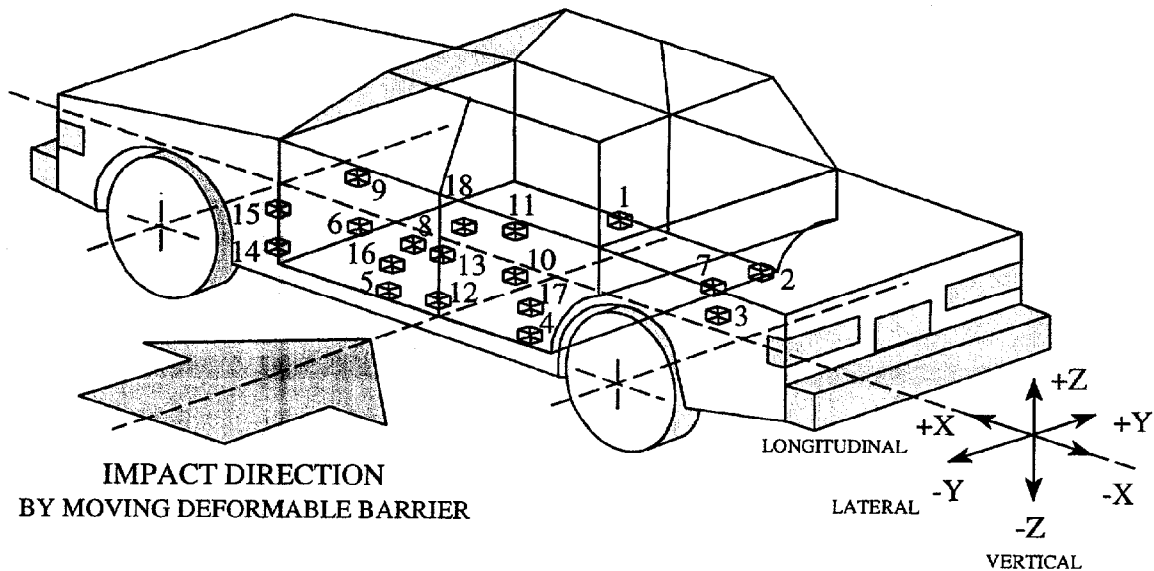


DATA SHEET 13

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Vehicle: 1999 Volvo S80

NHTSA No. VO002



- 1-Right Side Sill @ Front Seat
- 2-Right Side Sill @ Rear Seat
- 3-Rear Floorpan Above Axle
- 4-Left Side Sill @ Rear Seat
- 5-Left Side Sill @ Front Seat
- 6-Left Front Door on Centerline
- 7-Right Rear Occupant Compartment
- 8-Midrear of Left Front Door
- 9-Left Front Door Upper Centerline

- 10-Midrear of Left Rear Door
- 11-Left Rear Door Upper Centerline
- 12-Left Lower B-Pillar
- 13-Left Middle B-Pillar
- 14-Left Lower A-Pillar
- 15-Left Middle A-Pillar
- 16-Front Seat Track
- 17-Rear Seat Track
- 18-Vehicle CG

DATA SHEET 13 (continued)

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

NHTSA No. VO002

Vehicle: 1999 Volvo S80

Accel. No.	Location	Coordinates (mm) ±3			Long. (x)		Lat. (y)		Vert. (z)		Resultant		
		mm			Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	
		X*	Y*	Z*									
1	Right Side Sill at Front Seat	3073	718	219	pos.	4.2	32.1	26.8	6.6	3.9	72.2	27.8	6.6
					neg.	-7.5	12.0	-4.6	31.9	-6.7	7.6	0.0	-77.5
2	Right Side Sill at Rear Seat	2183	718	221	pos.	4.5	32.4	26.5	6.8	4.3	31.0	26.8	6.8
					neg.	-6.6	12.3	-4.0	65.4	-4.3	9.9	0.0	-58.3
3	Rear Floorpan Above Axle	1024	0	513	pos.	7.5	32.2	25.2	6.6	41.5	25.6	47.2	25.6
					neg.	-11.5	8.0	-2.3	127.1	-20.7	22.6	0.0	-30.1
4	Left Side Sill at Rear Seat	2183	-655	523	pos.	-	-	52.3	7.4	-	-	-	-
					neg.	-	-	-23.6	22.8	-	-	-	-
5	Left Side Sill at Front Seat	3073	-655	237	pos.	-	-	49.8	4.2	-	-	-	-
					neg.	-	-	-7.0	22.6	-	-	-	-
6	Left Front Door on Centerline	-	-	-	pos.	-	-	-	-	-	-	-	-
					neg.	-	-	-	-	-	-	-	-
7	Right Rear Occupant Compartment	2024	322	185	pos.	-	-	21.8	6.7	-	-	-	-
					neg.	-	-	-3.8	65.9	-	-	-	-
8	Midrear of Left Front Door	-	-	-	pos.	-	-	-	-	-	-	-	-
					neg.	-	-	-	-	-	-	-	-
9	Left Front Door Upper Centerline	-	-	-	pos.	-	-	-	-	-	-	-	-
					neg.	-	-	-	-	-	-	-	-
10	Midrear of Left Rear Door	1527	-765	611	pos.	-	-	452.3 A	45.8 A	-	-	-	-
					neg.	-	-	-366.9 A	68.4 A	-	-	-	-
11	Left Rear Door Upper Centerline	1442	-769	826	pos.	-	-	1052.0 B	46.2 B	-	-	-	-
					neg.	-	-	-107.9 B	37.8 B	-	-	-	-

*Reference: X - Rear Bumper (+ Forward)

Y - Vehicle Centerline (+ To Right)

Z - Ground Level (+ Up)

**Accelerometer was not requested by COTR.

A - Data not accurate after 15 ms.

B - Data not accurate after 30 ms.

DATA SHEET 13 (continued)

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Vehicle: 1999 Volvo S80

NHTSA No. VO002

Accel. No.	Location	Coordinates (mm) ±3			Lat. (y)			Vert. (z)			Resultant	
		X*	Y*	Z*	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
12	Left Lower B-Pillar	2338	-725	328	pos.	-	102.6	7.4	-	-	-	-
					neg.	-	-44.1	21.4	-	-	-	-
13	Left Middle B-Pillar	2442	-725	455	pos.	-	141.9	6.9	-	-	-	-
					neg.	-	-39.3	21.2	-	-	-	-
14	Left Lower A-Pillar	3307	-722	445	pos.	-	111.6 C	60.7 C	-	-	-	-
					neg.	-	-3.6 C	55.0 C	-	-	-	-
15	Left Middle A-Pillar	3976	-700	768	pos.	-	21.2	23.8	-	-	-	-
					neg.	-	-2.1	190.9	-	-	-	-
16	Front Seat Track	2422	-625	255	pos.	-	71.1	17.0	-	-	-	-
					neg.	-	-16.0	23.3	-	-	-	-
17	Rear Seat Track	1346	-721	840	pos.	-	27.6	19.8	-	-	-	-
					neg.	-	-4.5	204.9	-	-	-	-
18	Vehicle CG	3988	0	442	pos.	11.6	132.2	21.9	43.3	27.7	132.2	21.9
					neg.	-22.3	-40.9	31.8	-26.6	19.6	0.0	-13.9

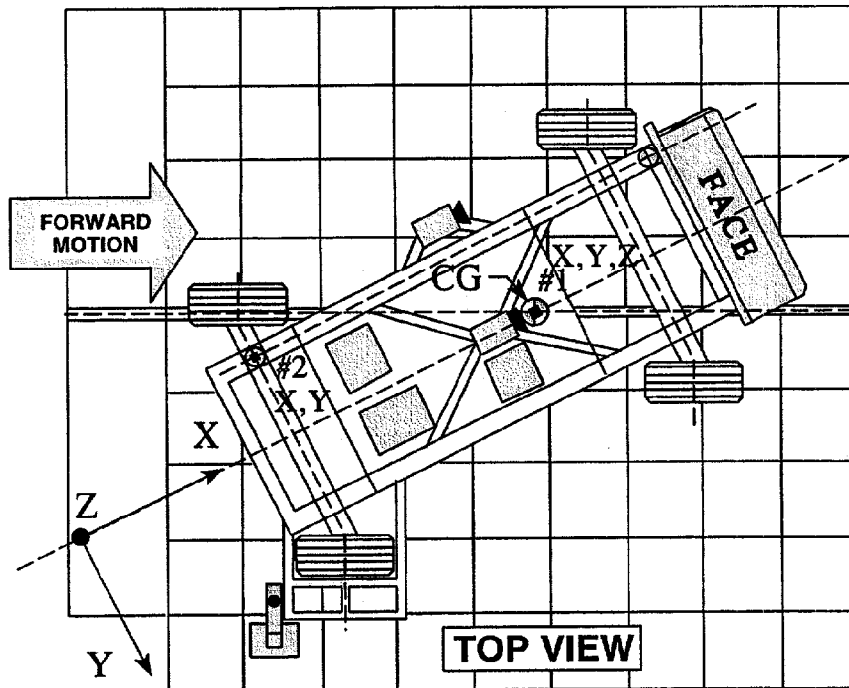
*Reference: X - Rear Bumper (+ Forward) Y - Vehicle Centerline (+ To Right) Z - Ground Level (+ Up)
C - Data is questionable

DATA SHEET 14

MDB ACCELEROMETER LOCATIONS AND DATA SUMMARY

Vehicle: 1999 Volvo S80

NHTSA No. VO002



Accel. No.	Location	Coordinates (millimeters)			Pos. Direct.		Neg. Direct.	
		X*	Y*	Z*	Max (g)	Time (msec)	Max (g)	Time (msec)
1	MDB Center of Gravity							
	Longitudinal... X	1859	0	330	1.2	166.0	-22.7	27.0
	Lateral..... Y				1.3	131.2	-10.3	13.0
	Vertical..... Z				13.3	66.4	-12.6	59.1
	Resultant..... R				24.6	41.6	-	-
2	Rear Frame Member							
	Longitudinal... X	386	-660	660	2.0	104.5	-23.5	29.3
	Lateral..... Y				2.1	126.1	-7.2	17.4

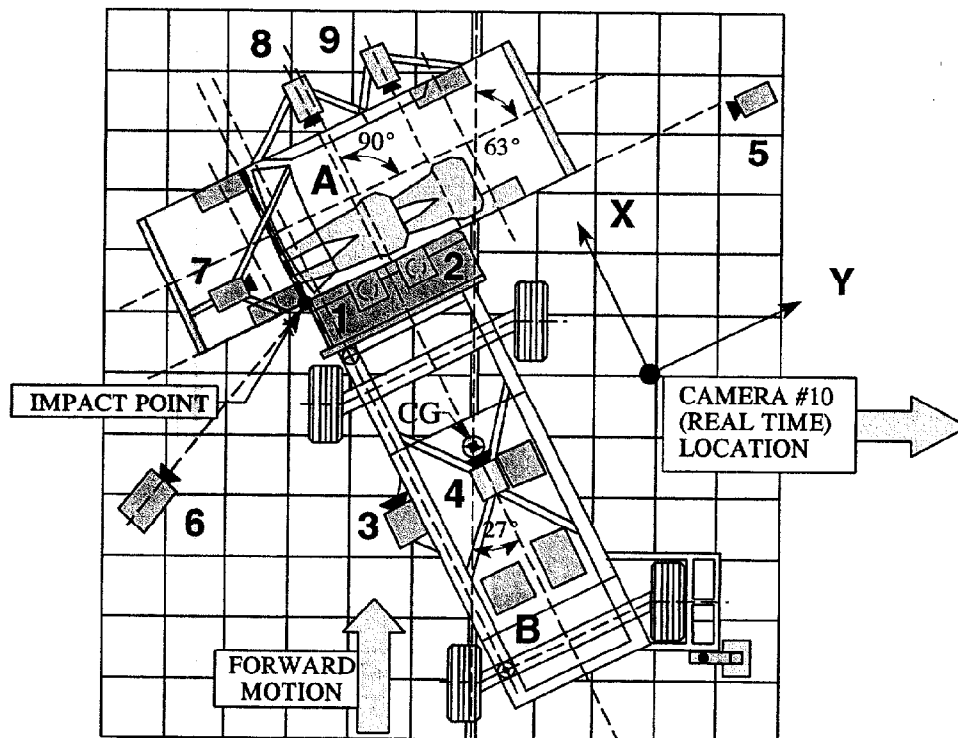
*Reference: X = Rear Bumper (+ Forward)
Y = Vehicle Centerline (+ To Right)
Z = Ground Level (+ Up)
All measurements accurate to within ± 3 mm.

DATA SHEET 15

HIGH SPEED CAMERA LOCATIONS AND DATA SUMMARY

Vehicle: 1999 Volvo S80

NHTSA No. VO002



Camera No.	View	Coordinates (millimeters)			Angle (deg.)	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Overhead view of test vehicle	39	974	4880	-90	8	1000
2	Overhead closeup view of impact plane	325	768	4880	-90	12.5	1000
3	MDB onboard closeup view of impact point	1470	0	847	0	13	1000
4	MDB onboard view of driver dummy	1140	838	1586	-17	7.5	1000
5	Right side ground level overall view	-72	9017	1064	-4	25	1000
6	Left side ground level overall view	-1957	-1771	1038	-6	13	1000
7	Test vehicle onboard driver front view	580	-452	1276	-15	13	1000
8	Test vehicle onboard driver side view	1786	778	981	-9	8	1000
9	Test vehicle onboard passenger side view	1738	1723	1018	-15	8	950
10	Real time film coverage of test	-	-	-	-	-	24

* Reference (from point of impact); all measurements accurate to within ± 6 mm.

+X = Forward

+Y = To Right

+Z = Upward

SECTION 5

FUEL SYSTEM INTEGRITY

DATA SHEET 16

FMVSS 301 FUEL SYSTEM INTEGRITY DATA

NHTSA No.: VO002

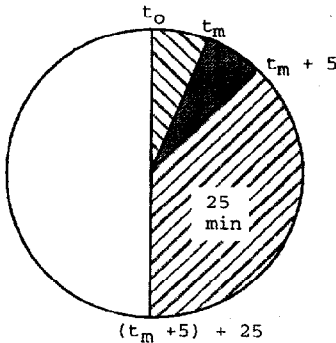
TEST DATE: June 23, 1999

Vehicle Mfr./Make/Model : 1999 Volvo S80 4-Door Sedan

TEST VEHICLE IMPACT TYPE :

- Frontal (48.28 kph)
- Oblique (48.28 kph) with ° barrier face first
contacting the side
(driver/passenger)
- Rear Moving Barrier (48.28 kph)
- Lateral Moving Barrier (32.19 kph)
- X Side Impact Moving Deformable Barrier (62.0 kph)
contacting the driver side side
(driver/passenger)

FUEL SPILLAGE MEASUREMENT:



1. From impact until vehicle motion ceases
2. For five minute period after vehicle motion ceases
3. For next 25 minutes

ACTUAL	MAX ALLOWED
0 g	28 g
0 g	142 g
0 g	28 g/1 min.

SOLVENT SPILLAGE DETAILS :

None

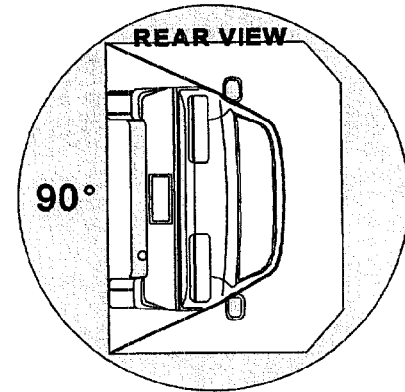
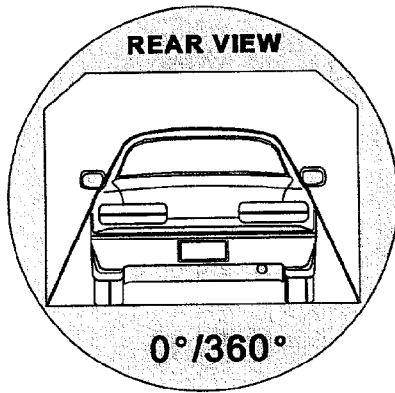
DATA SHEET 17

ROLLOVER DATA

Vehicle: 1999 Volvo S80

NHTSA No. VO002

0 - 90 Degrees



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD :

Rollover Fixture 90° Rotation Time	<u>1</u> minutes <u>19</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>19</u> seconds
Next whole minute interval	<u>7</u> minutes

II. FMVSS 301 REQUIREMENTS :

(1) Time Period

First 5 minutes FROM onset of rotation	6th min.	7th min.	8th min. (if required)
--	----------	----------	------------------------

(2) Maximum Allowable Solvent Spillage

142 g	28 g	28 g	28 g
-------	------	------	------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0 g	0 g	0 g	N/A
-----	-----	-----	-----

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S) :

None

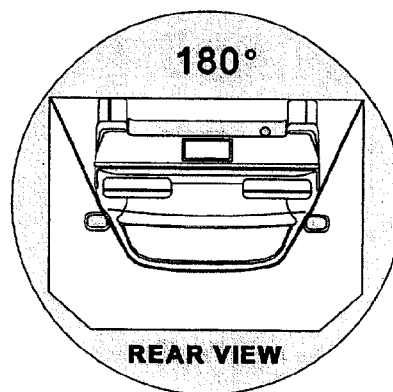
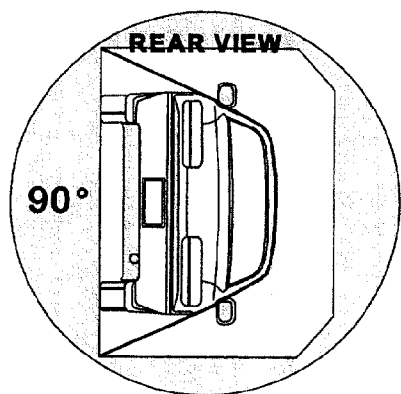
DATA SHEET 17 (continued)

ROLLOVER DATA

Vehicle: 1999 Volvo S80

NHTSA No. VO002

90 - 180 Degrees



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD :

Rollover Fixture 90° Rotation Time	<u>1</u> minutes <u>02</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

II. FMVSS 301 REQUIREMENTS :

(1) Time Period

First 5 minutes FROM onset of rotation	6th min.	7th min.	8th min. (if required)
--	----------	----------	------------------------

(2) Maximum Allowable Solvent Spillage

142 g	28 g	28 g	28 g
-------	------	------	------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0 g	0 g	0 g	N/A
-----	-----	-----	-----

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S) :

None

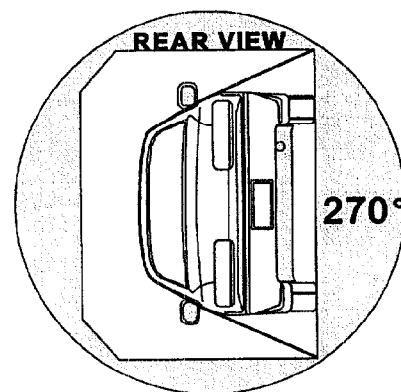
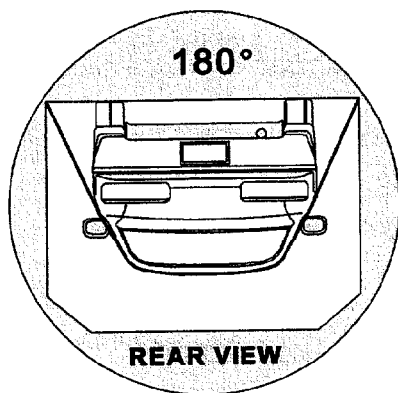
DATA SHEET 17 (continued)

ROLLOVER DATA

Vehicle: 1999 Volvo S80

NHTSA No. VO002

180 - 270 Degrees



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD :

Rollover Fixture 90° Rotation Time	<u>1</u> minutes <u>02</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

II. FMVSS 301 REQUIREMENTS :

(1) Time Period

First 5 minutes FROM onset of rotation	6th min.	7th min.	8th min. (if required)
--	----------	----------	------------------------

(2) Maximum Allowable Solvent Spillage

142 g	28 g	28 g	28 g
-------	------	------	------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0 g	0 g	0 g	N/A
-----	-----	-----	-----

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S) :

None

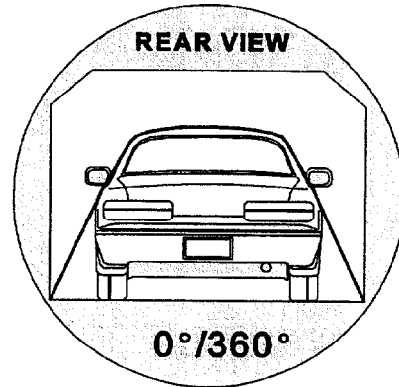
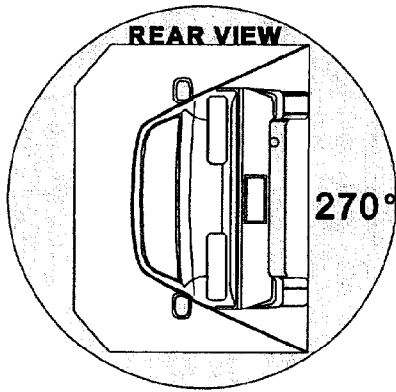
DATA SHEET 17 (continued)

ROLLOVER DATA

Vehicle: 1999 Volvo S80

NHTSA No. VO002

270 - 360 Degrees



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD :

Rollover Fixture 90° Rotation Time	<u>1</u> minutes <u>12</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>12</u> seconds
Next whole minute interval	<u>7</u> minutes

II. FMVSS 301 REQUIREMENTS :

(1) Time Period

First 5 minutes FROM onset of rotation	6th min.	7th min.	8th min. (if required)
--	----------	----------	------------------------

(2) Maximum Allowable Solvent Spillage

142 g	28 g	28 g	28 g
-------	------	------	------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0 g	0 g	0 g	N/A
-----	-----	-----	-----

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S) :

None

APPENDIX A

PHOTOGRAPHS

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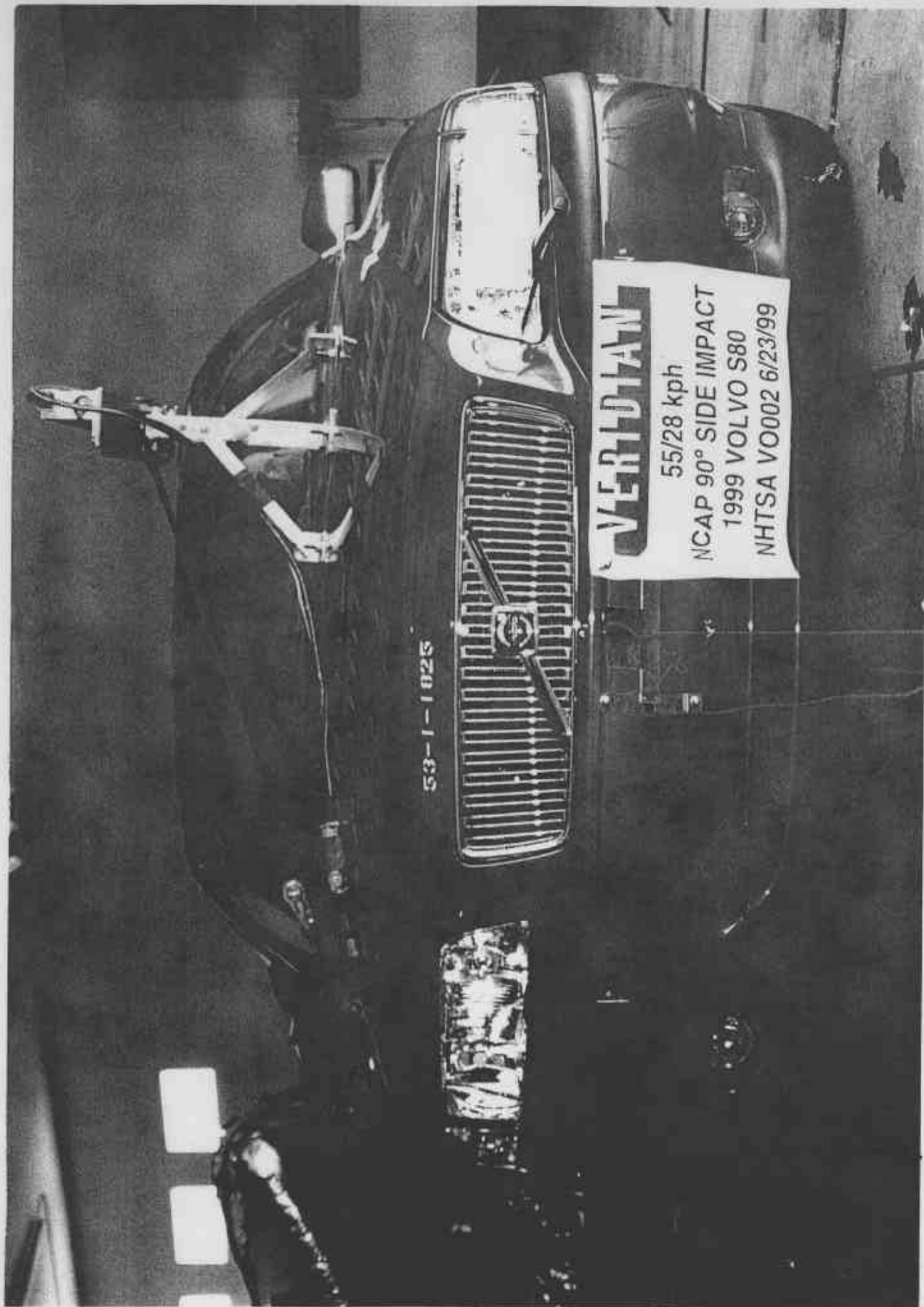


Figure A-1 PRE-TEST FRONTAL VIEW OF TEST VEHICLE



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

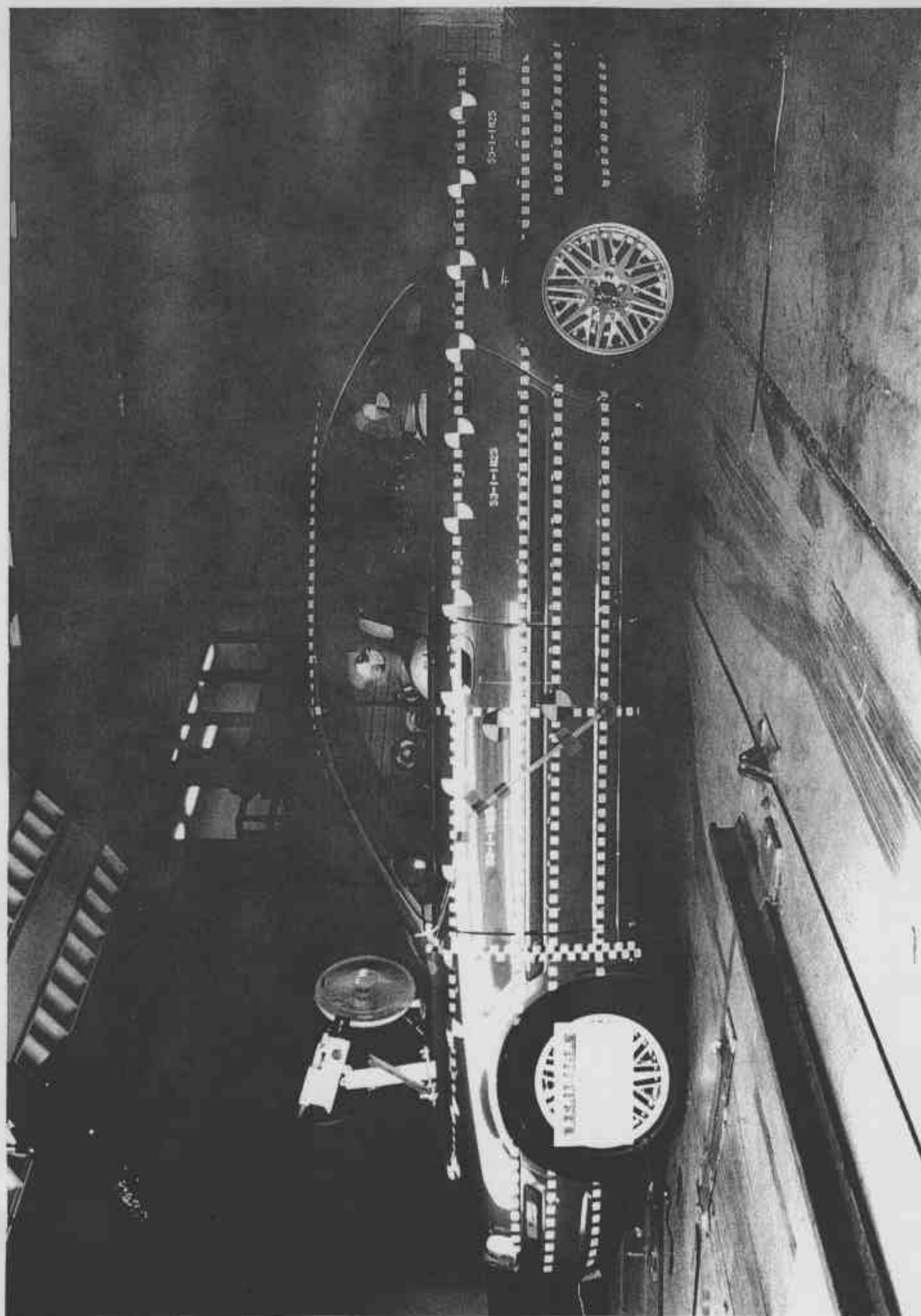


Figure A-3 PRE-TEST REAR VIEW OF TEST VEHICLE

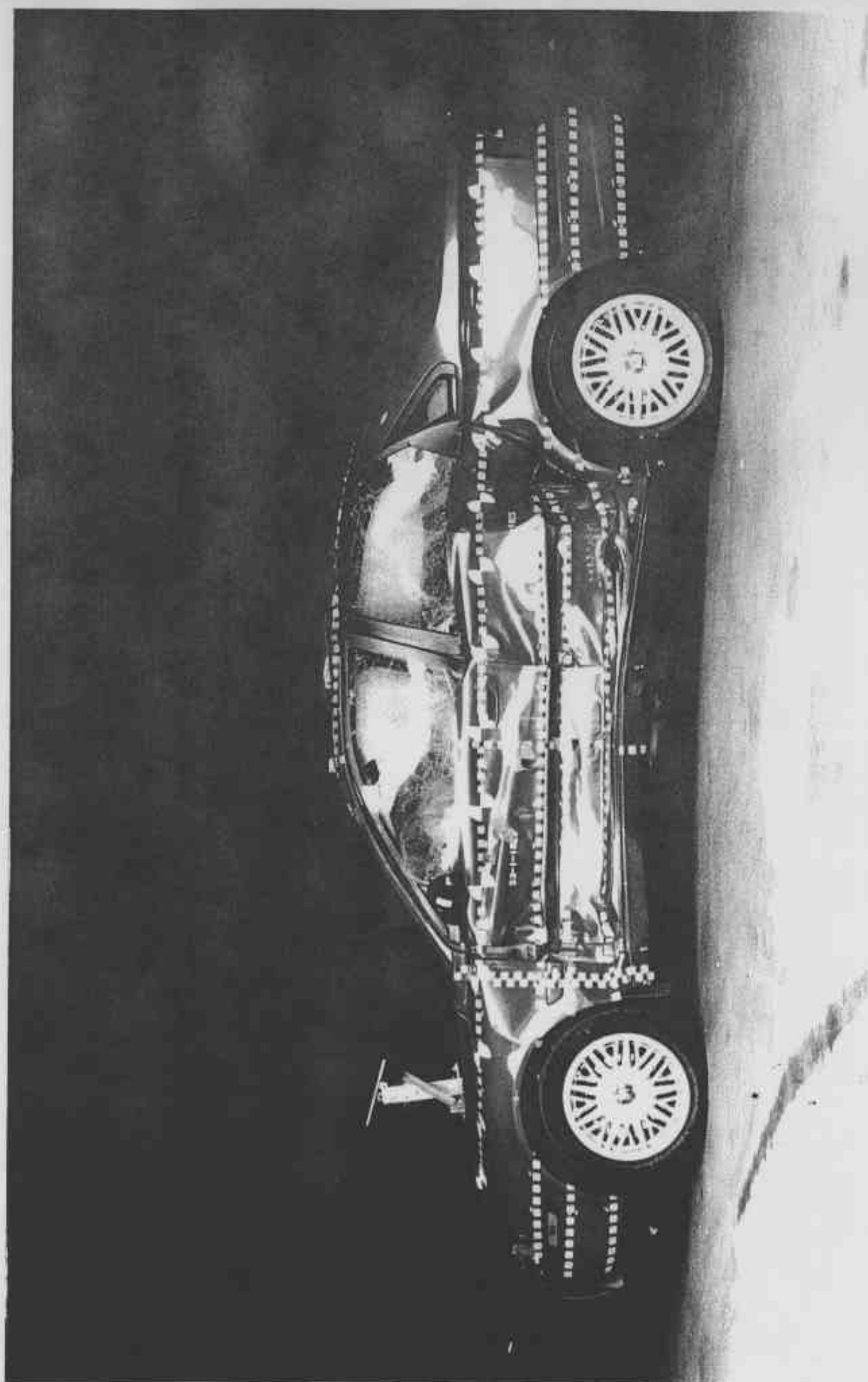


Figure A-4 POST-TEST REAR VIEW OF TEST VEHICLE

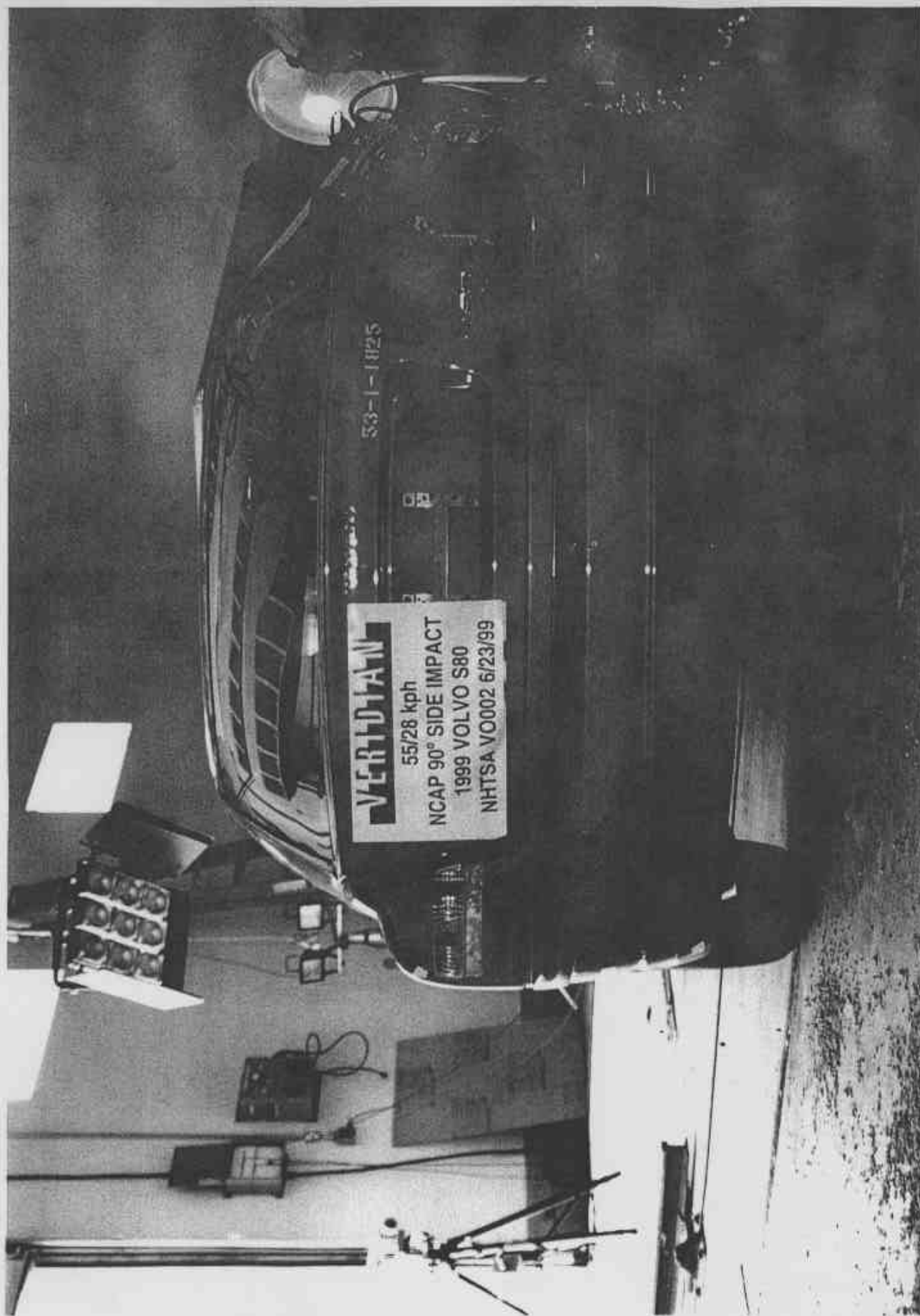


Figure A-5 PRE-TEST IMPACTED SIDE VIEW OF TEST VEHICLE



Figure A-6 POST-TEST IMPACTED SIDE VIEW OF TEST VEHICLE

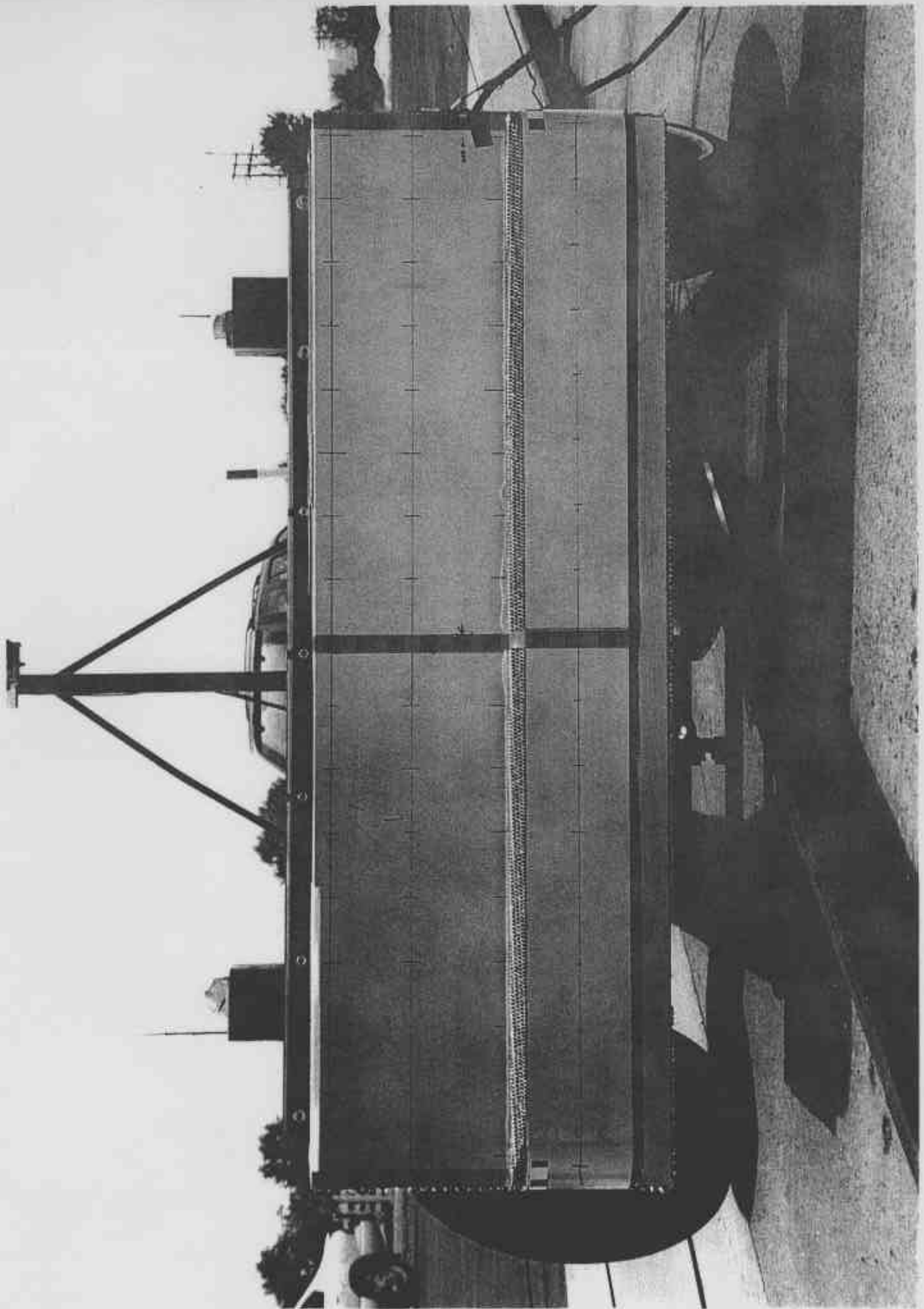


Figure A-7 PRE-TEST FRONTAL VIEW OF IMPACTOR FACE

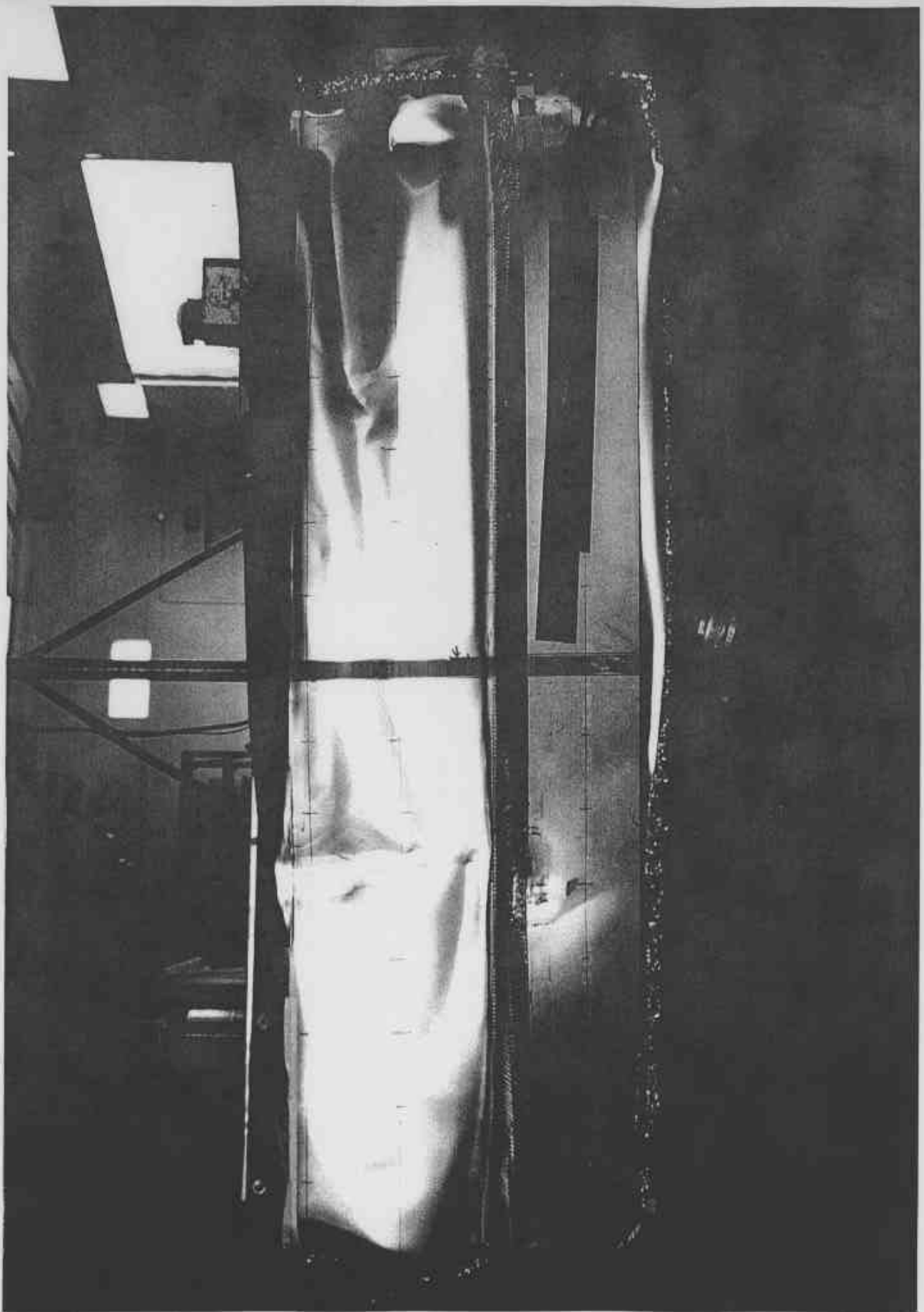


Figure A-8 POST-TEST FRONTAL VIEW OF IMPACTOR FACE

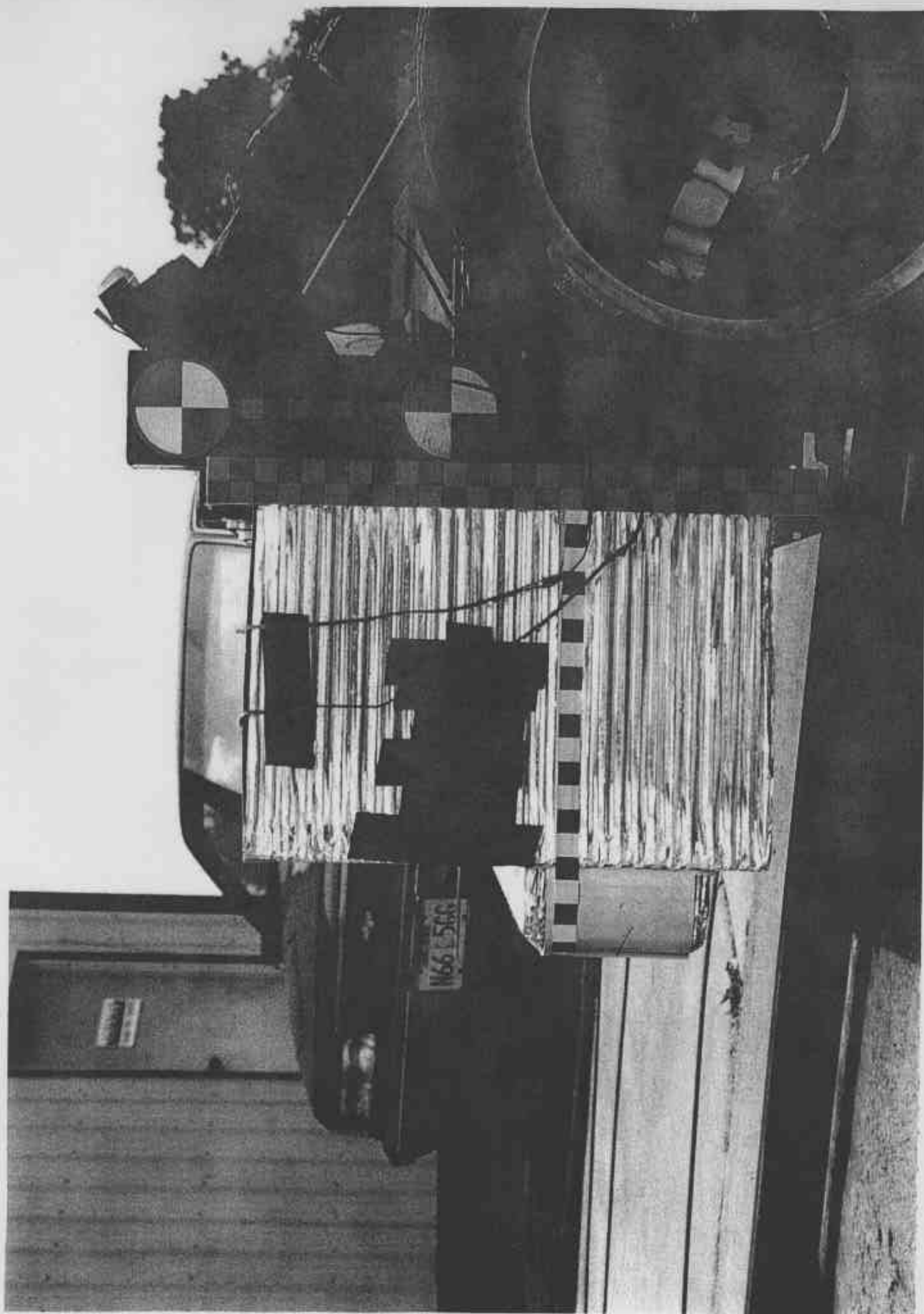


Figure A-9 PRE-TEST LEFT SIDE VIEW OF IMPACTOR FACE

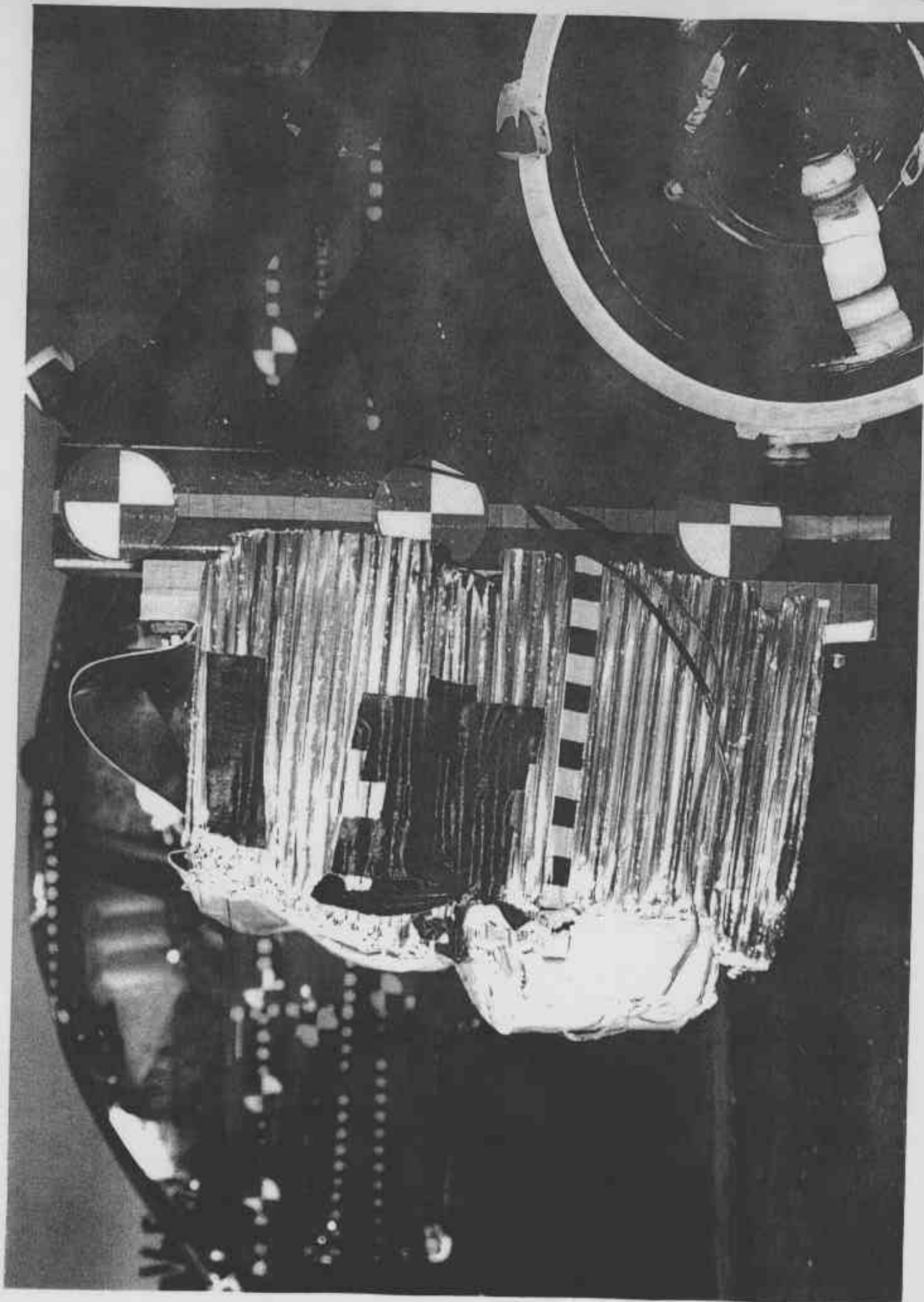


Figure A-10 POST-TEST LEFT SIDE VIEW OF IMPACTOR FACE

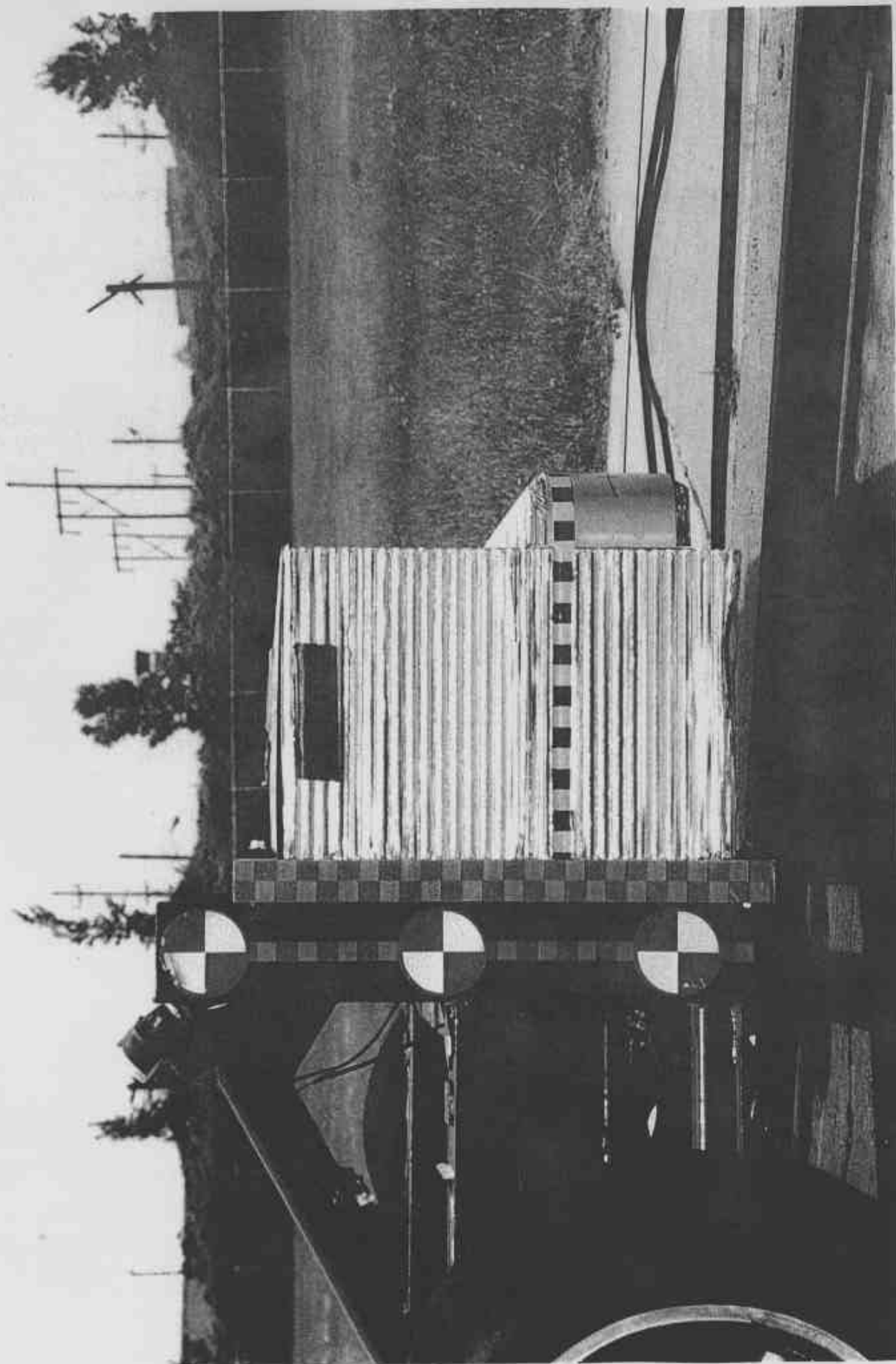


Figure A-11 PRE-TEST RIGHT SIDE VIEW OF IMPACTOR FACE

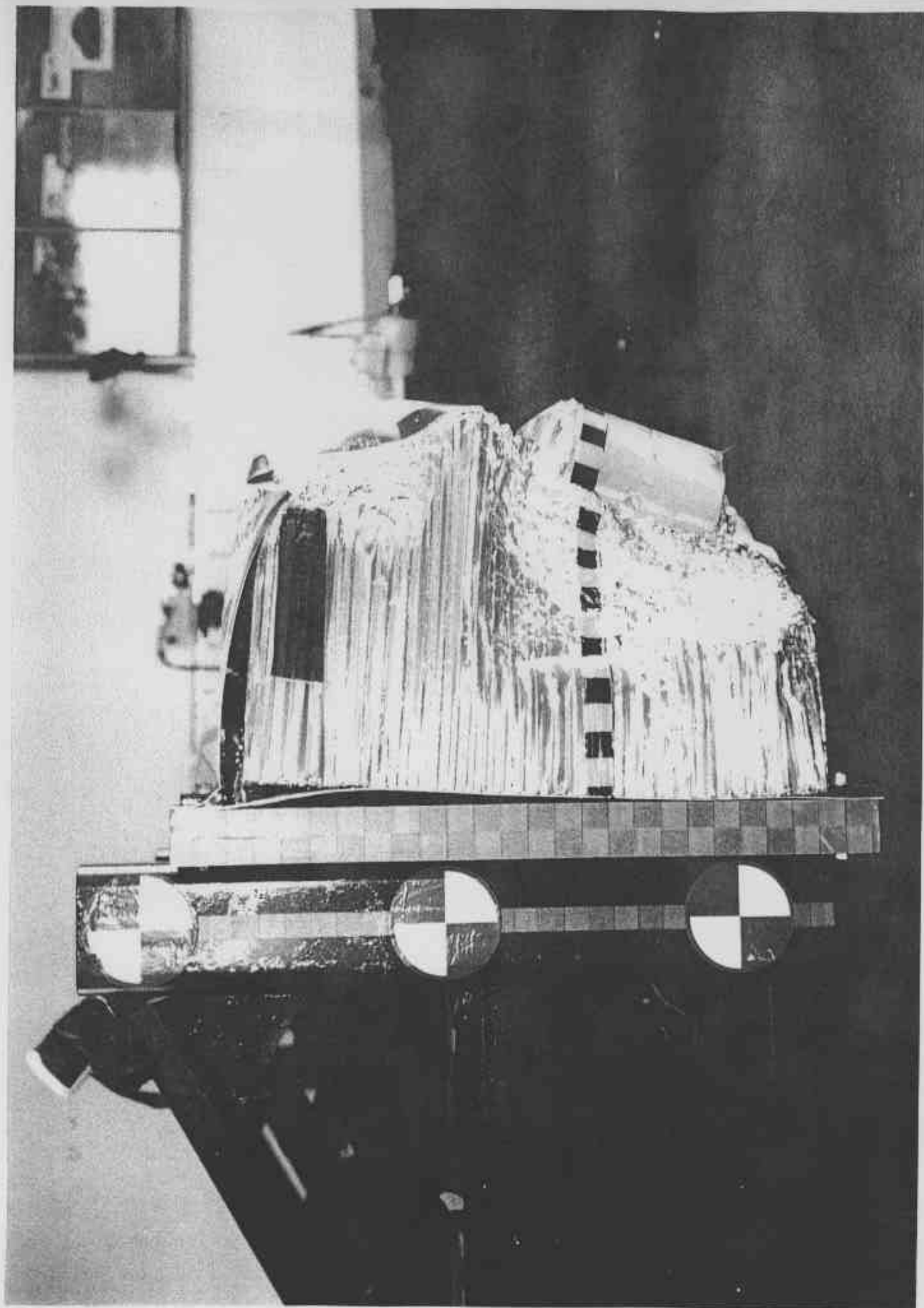


Figure A-12 POST-TEST RIGHT SIDE VIEW OF IMPACTOR FACE



Figure A-13 PRE-TEST TOP VIEW OF IMPACTOR FACE



Figure A-14 POST-TEST TOP VIEW OF IMPACTOR FACE

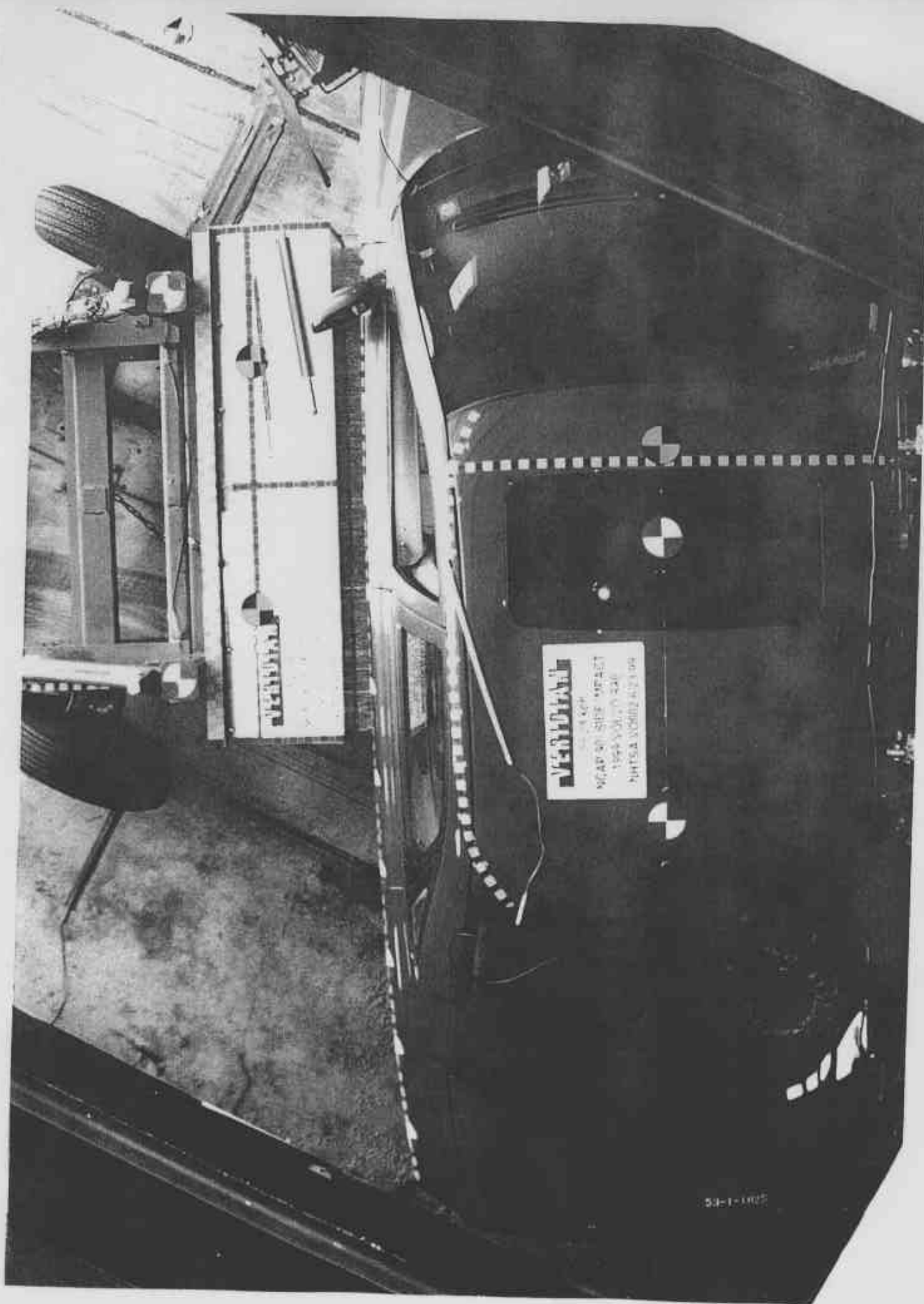


Figure A-15 PRE-TEST OVERHEAD VIEW OF ALIGNED MDB AND VEHICLE



Figure A-16 POST-TEST OVERHEAD VIEW OF MDB AND VEHICLE



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



Figure A-18 POST-TEST RIGHT OCCUPANT COMPARTMENT VIEW OF FRONT SID



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



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

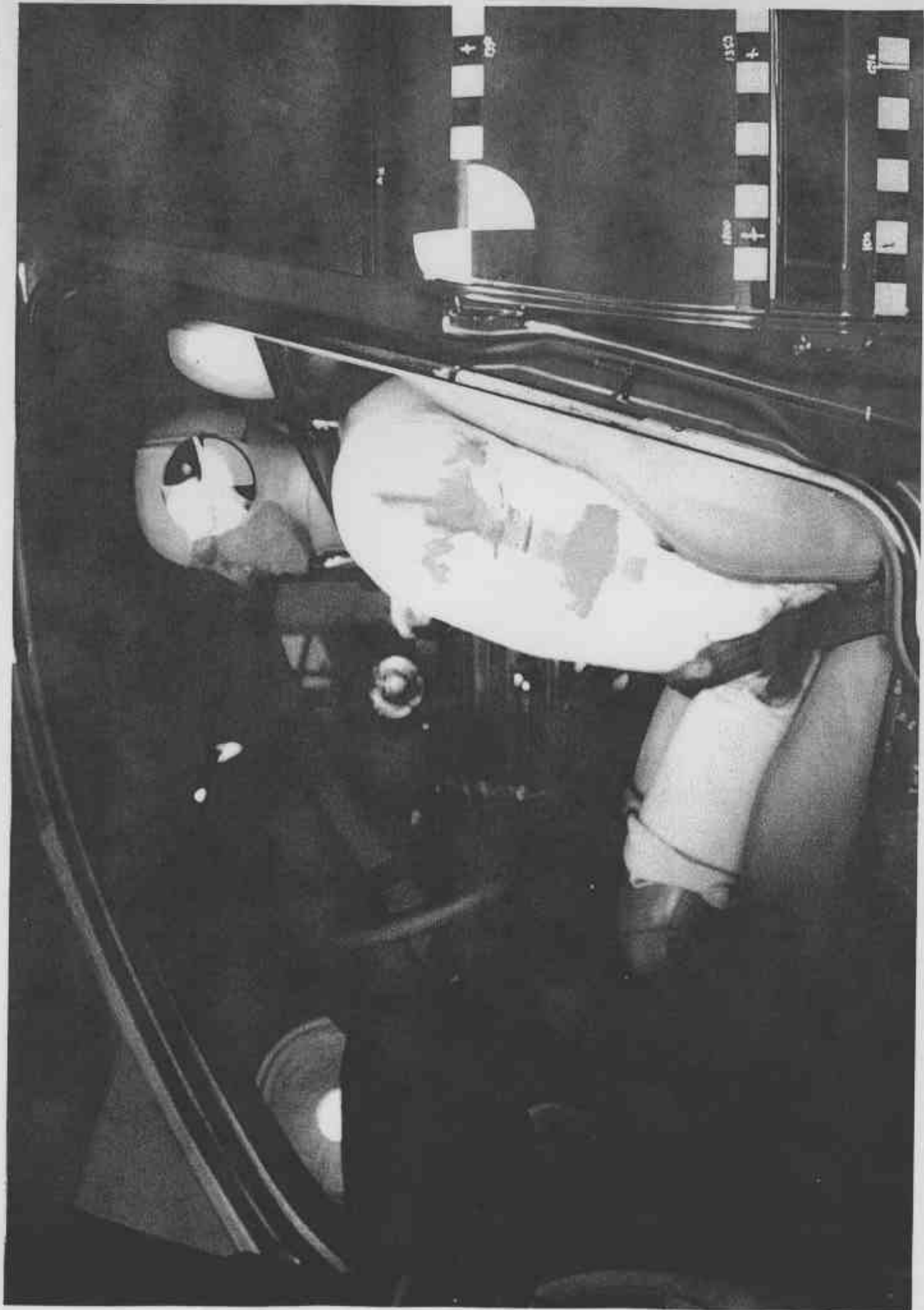


Figure A-21 PRE-TEST LEFT OCCUPANT COMPARTMENT VIEW OF FRONT SID

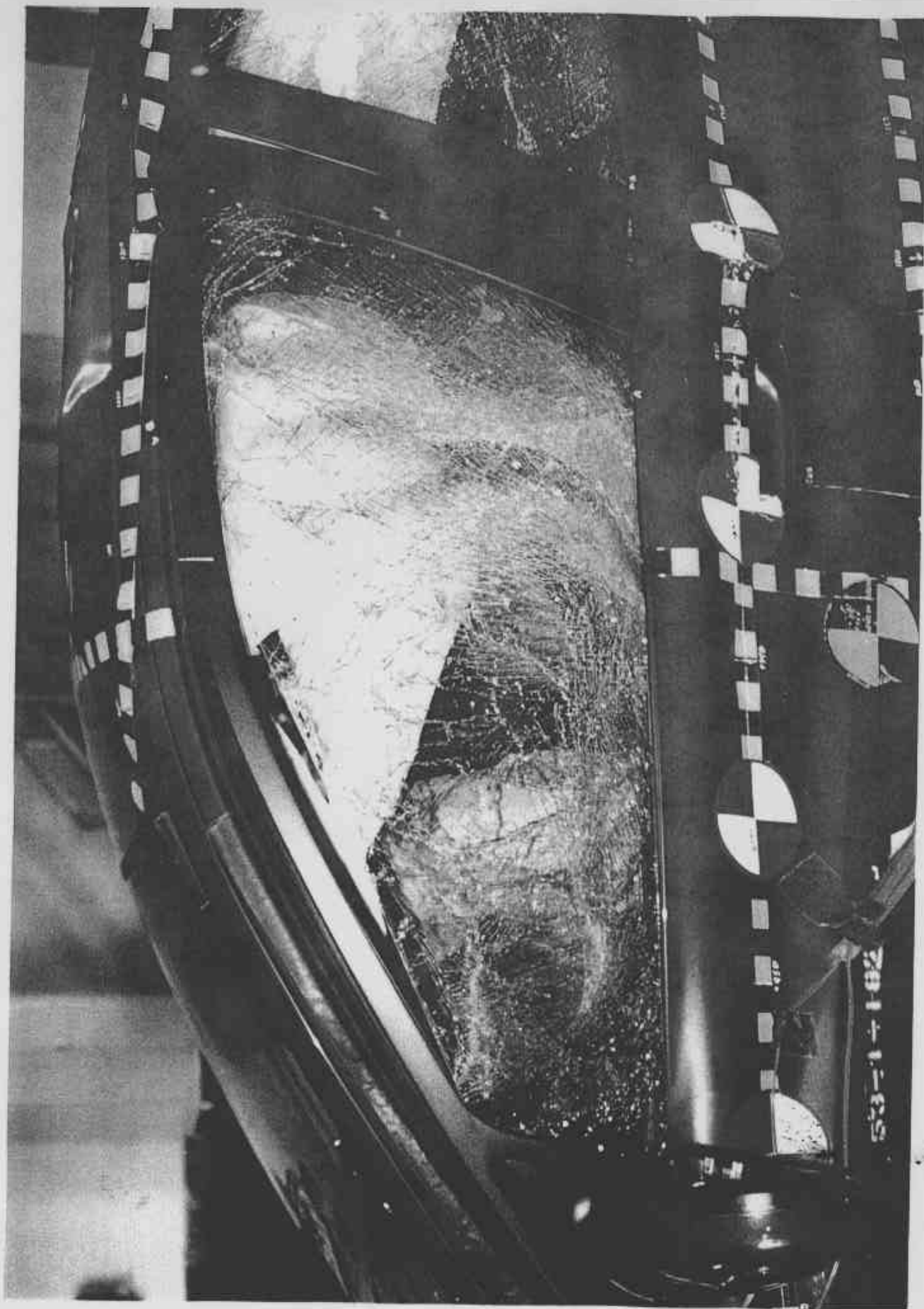


Figure A-22 POST-TEST LEFT OCCUPANT COMPARTMENT VIEW OF FRONT SID

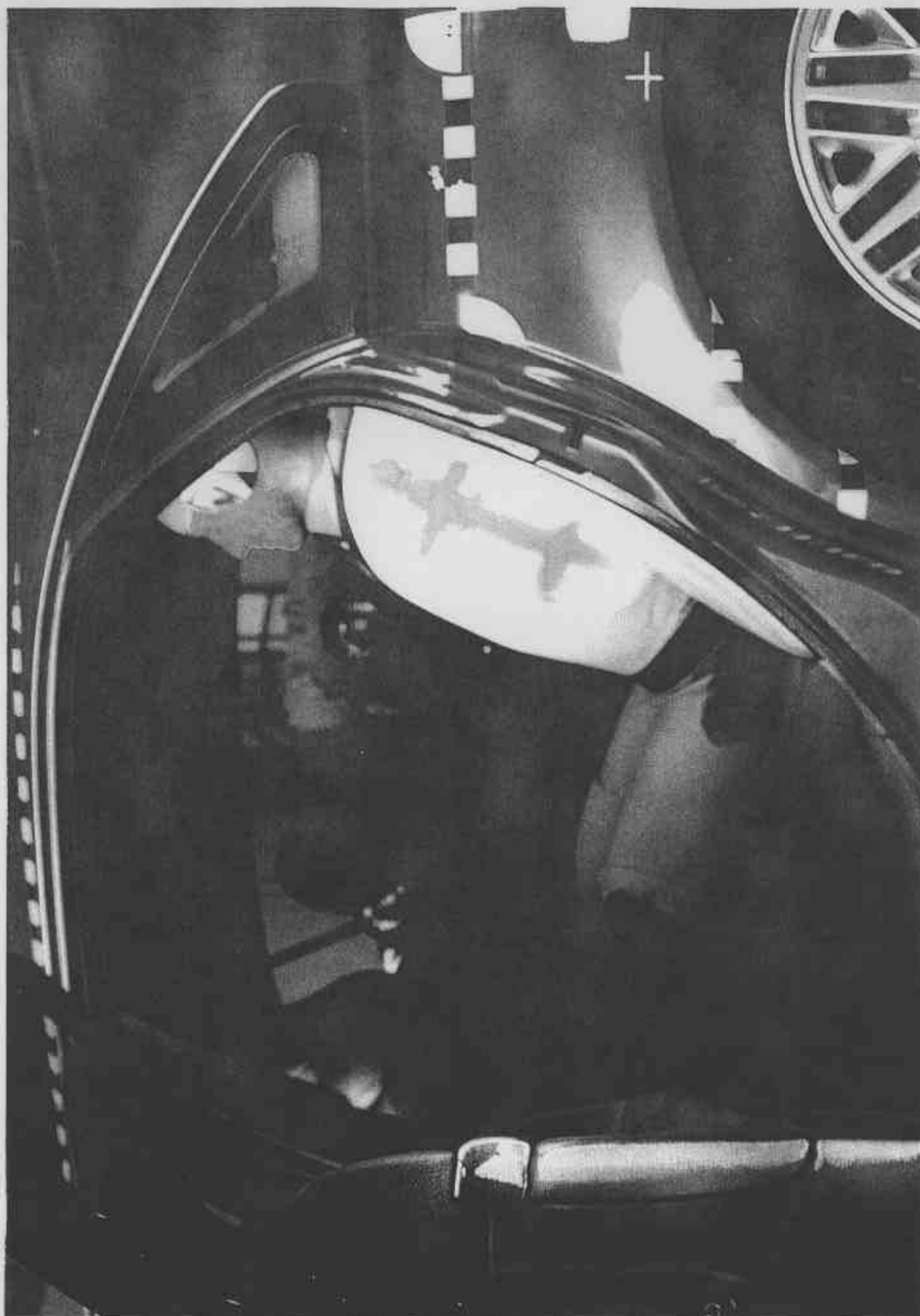


Figure A-23 PRE-TEST LEFT OCCUPANT COMPARTMENT VIEW OF REAR SID

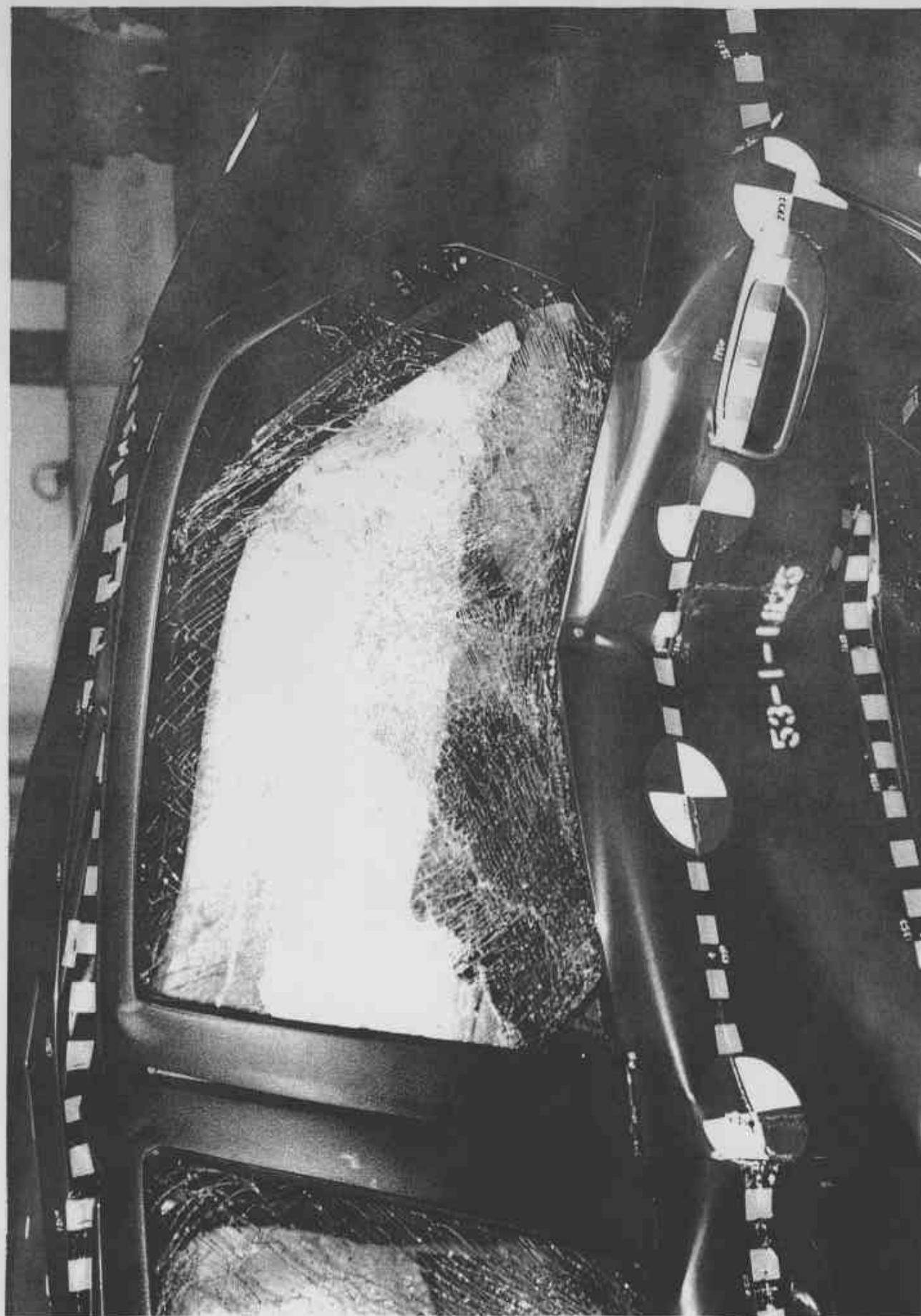


Figure A-24 POST-TEST LEFT OCCUPANT COMPARTMENT VIEW OF REAR SID

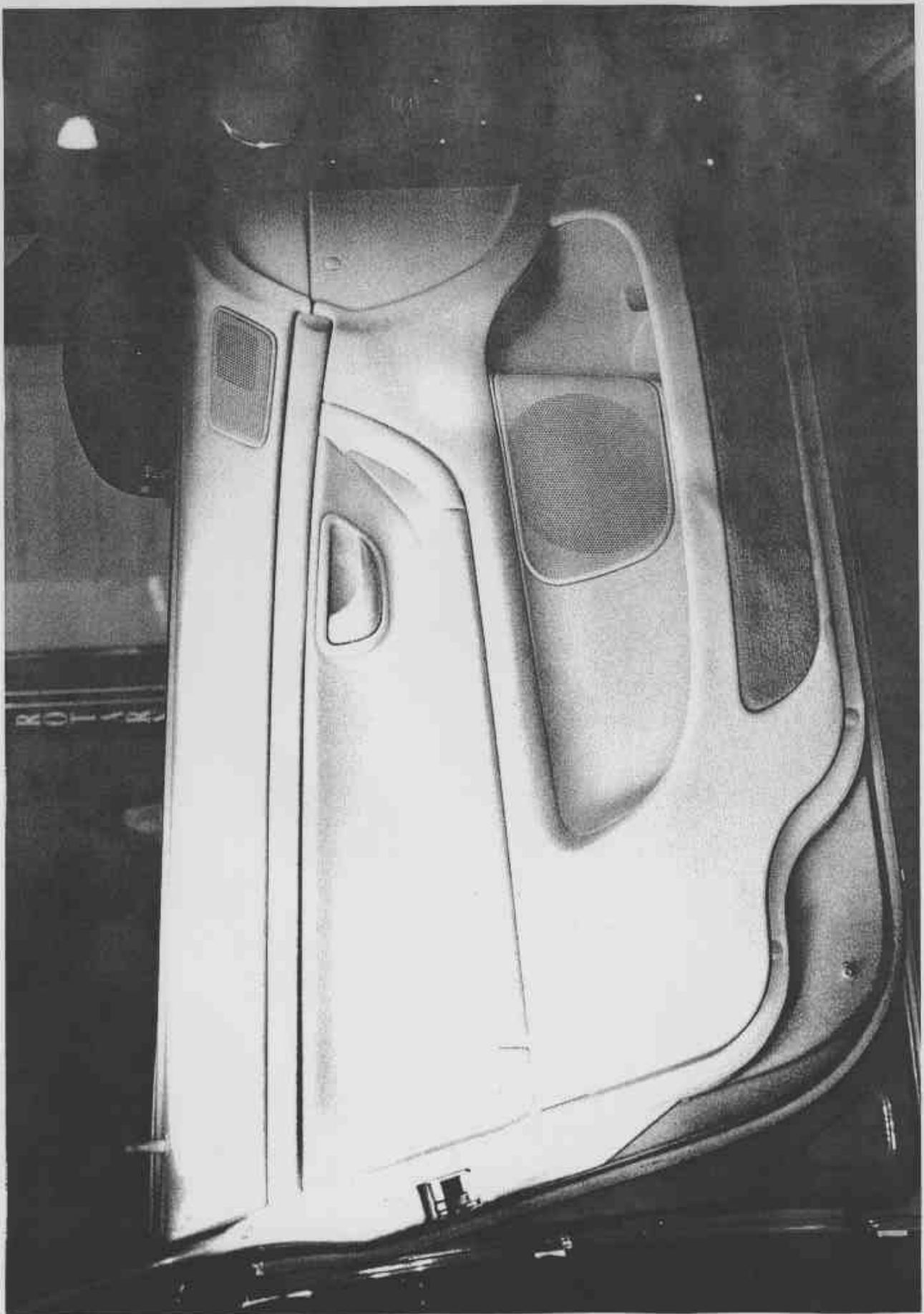


Figure A-25 PRE-TEST INTERIOR OF FRONT DOOR



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

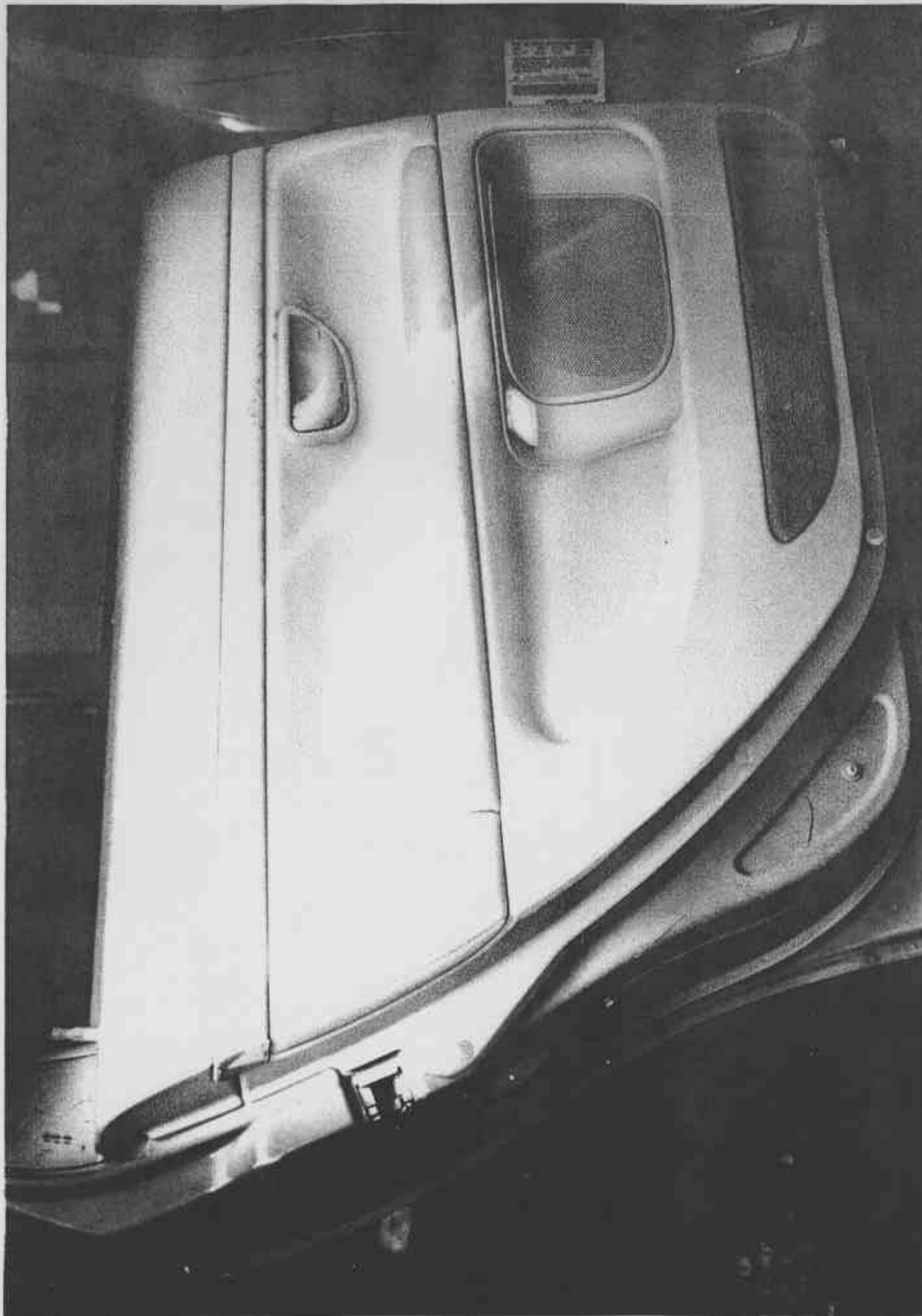


Figure A-27 PRE-TEST INTERIOR OF REAR DOOR



Figure A-28 POST-TEST INTERIOR OF REAR DOOR SHOWING SID IMPACT LOCATIONS

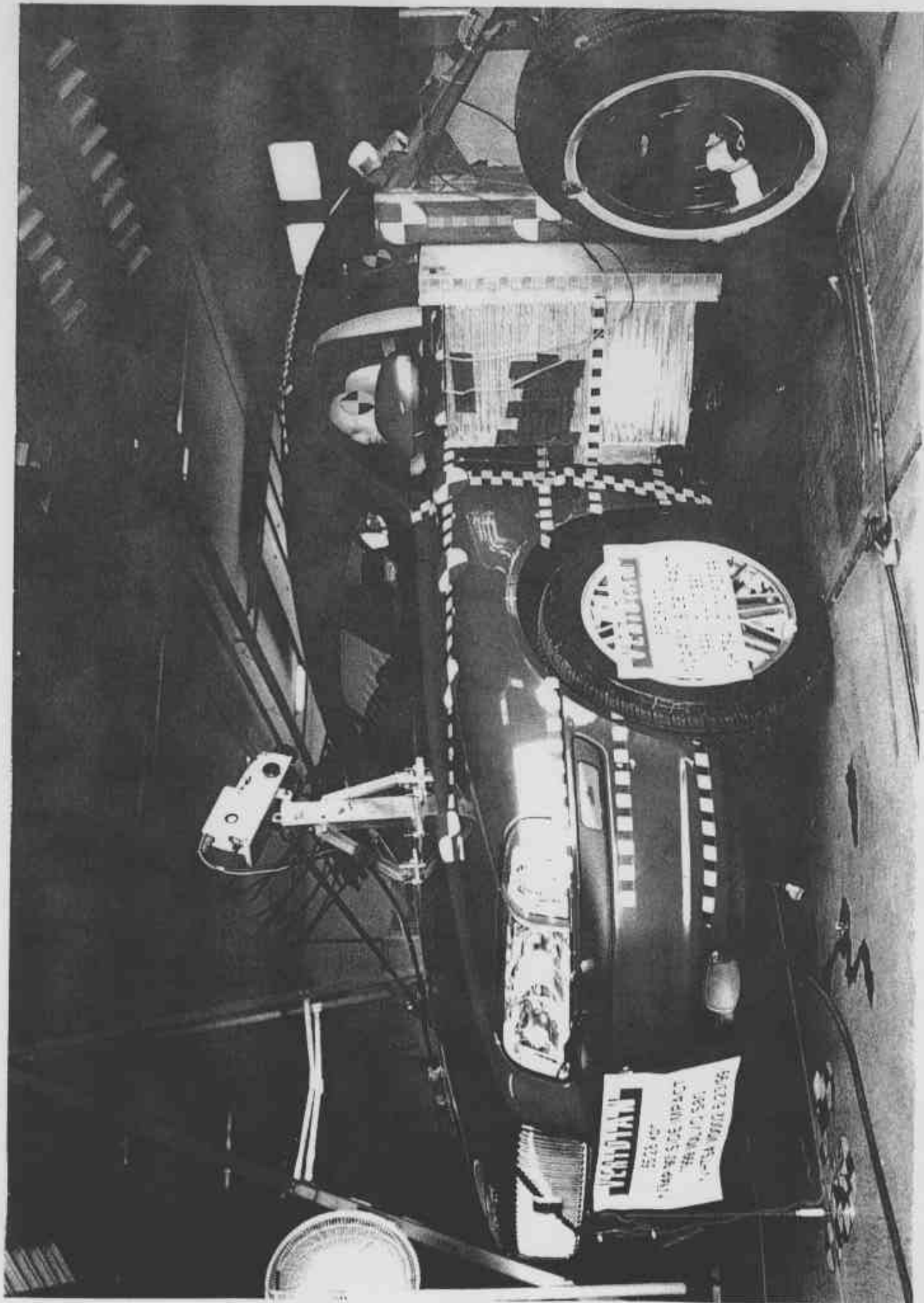


Figure A-29 PRE-TEST LEFT SIDE VIEW OF MDB WITH IMPACTOR FACE IN POSITION

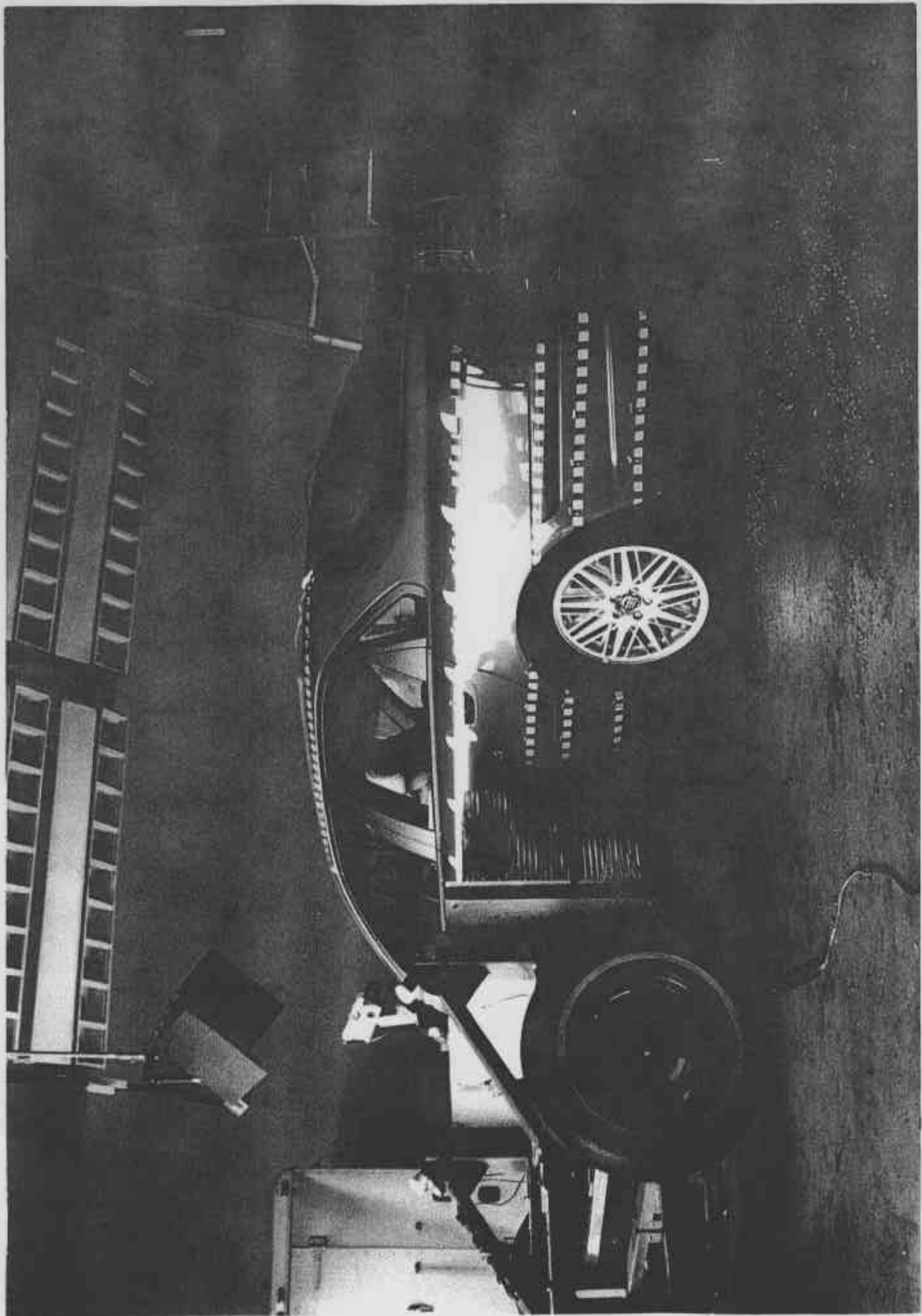


Figure A-30 PRE-TEST RIGHT SIDE VIEW OF MDB WITH IMPACTOR FACE IN POSITION

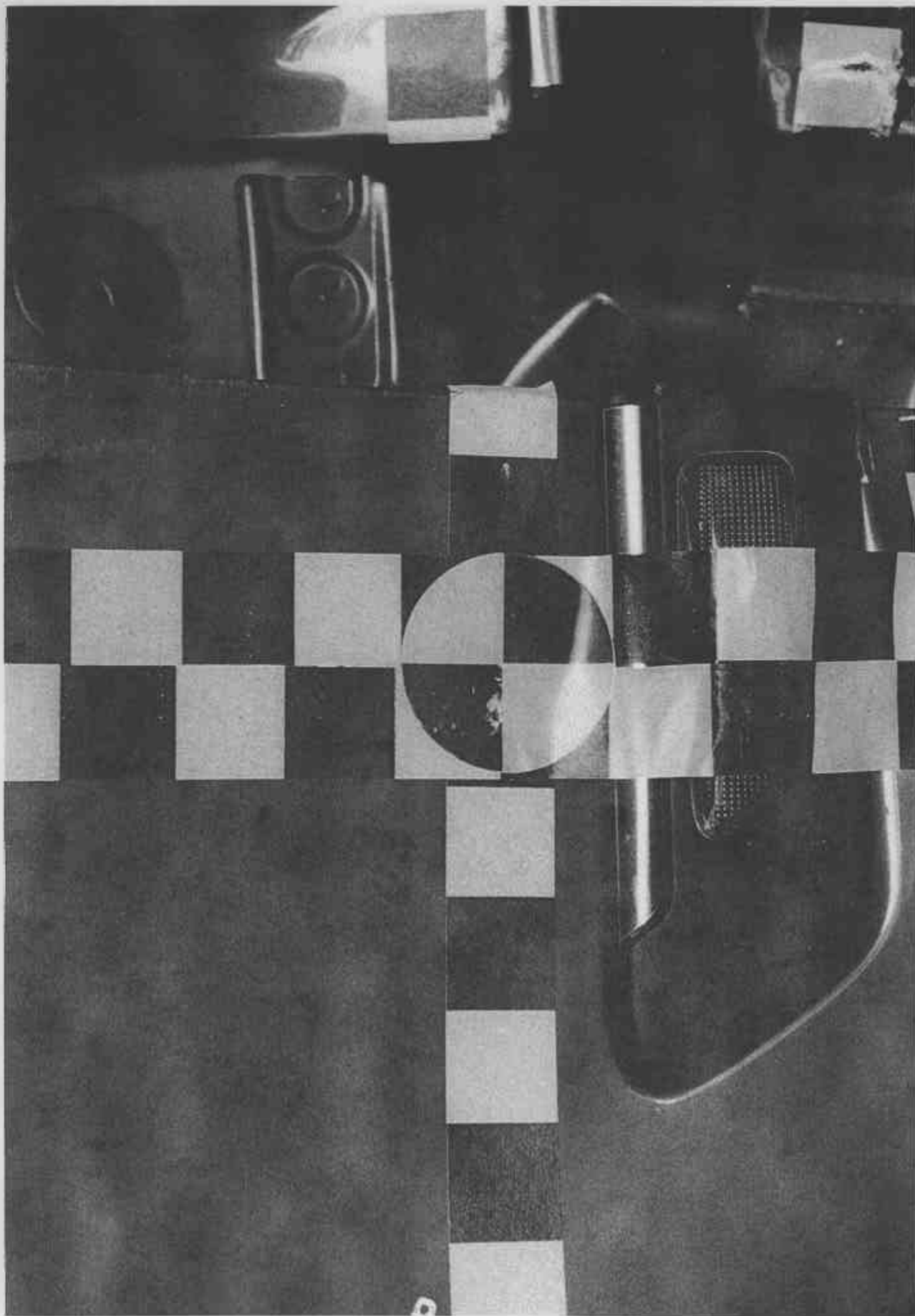


Figure A-31 POST-TEST CLOSE-UP VIEW OF IMPACT POINT TARGET

MFD. BY VOLVO GOTHENBURG SWEDEN
DATE: GVWR GVWR FRONT GVWR REAR
03/99 4630 2491 2293 LB

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL
MOTOR VEHICLE SAFETY BUMPER AND THEFT PROTEC-
TION STANDARDS IN EFFECT ON THE DATE OF MANUFAC-
TURE SHOWN ABOVE

VIN YV1TS9008X1051484 PASS CAR



VOLVO

3514535

Figure A-32 CLOSE-UP VIEW OF VEHICLE'S CERTIFICATION LABEL

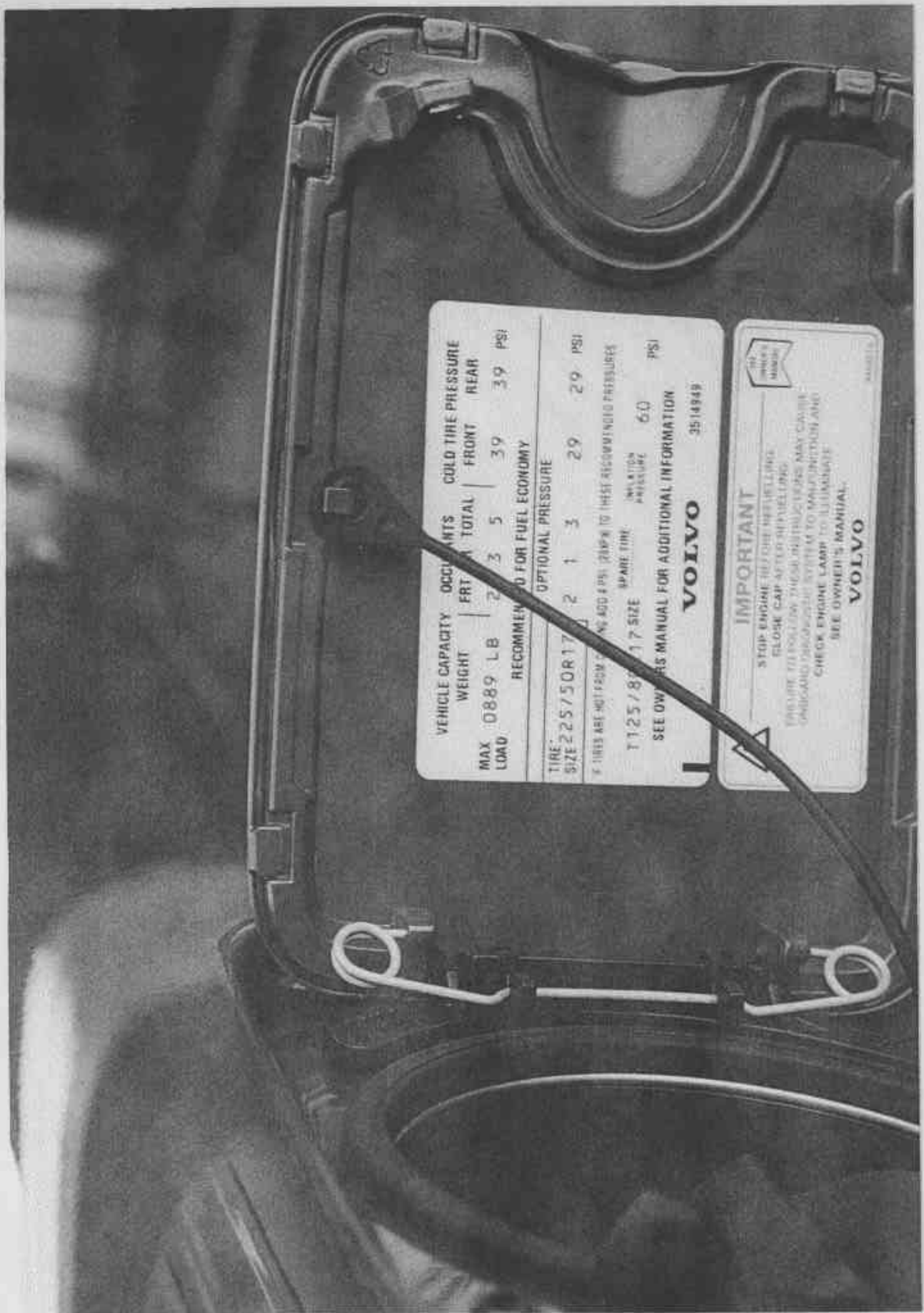


Figure A-33 CLOSE-UP VIEW OF VEHICLE'S TIRE PLACARD LABEL



Figure A-34 IMPACT PHOTO

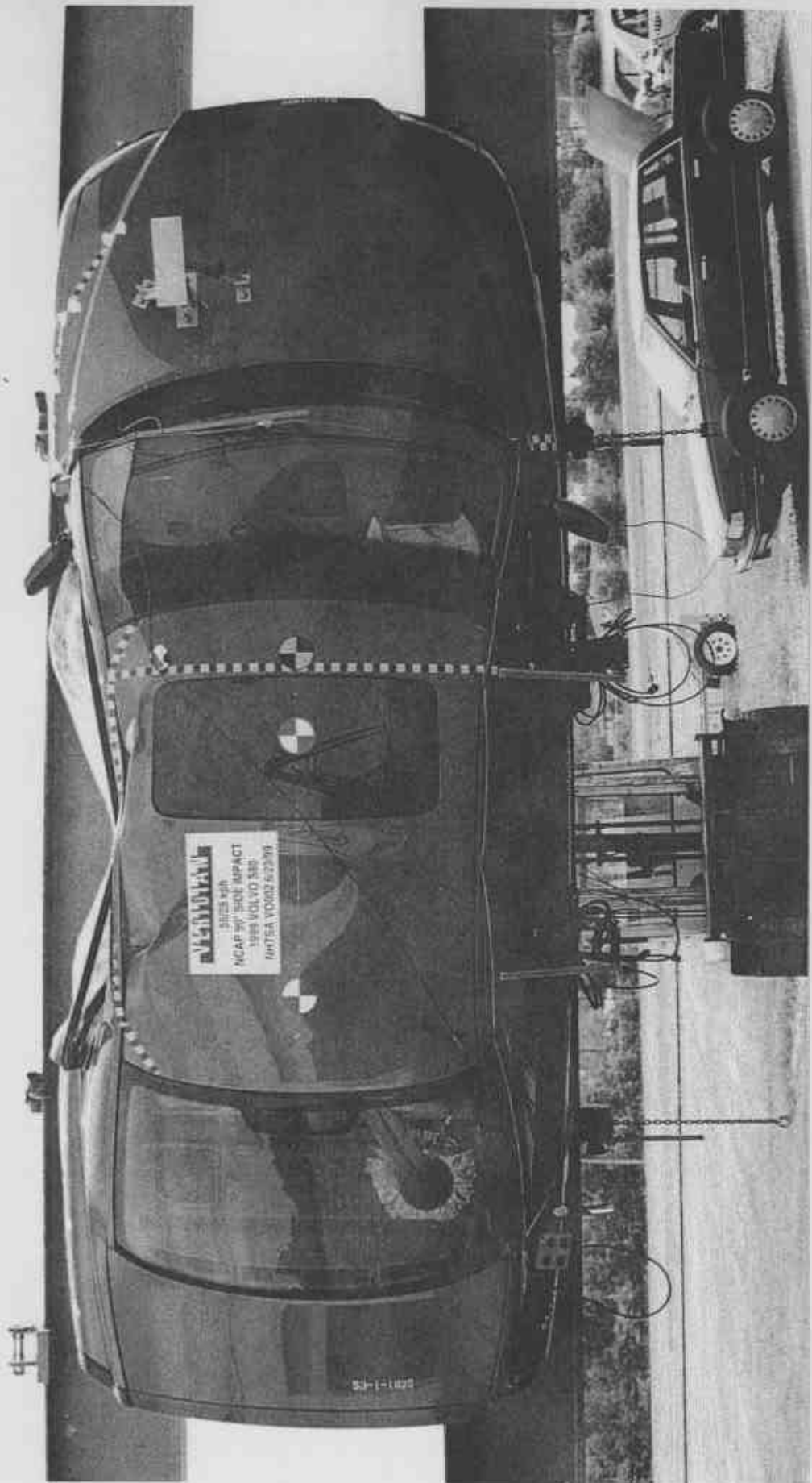


Figure A-35 ROLLOVER 90 DEGREES

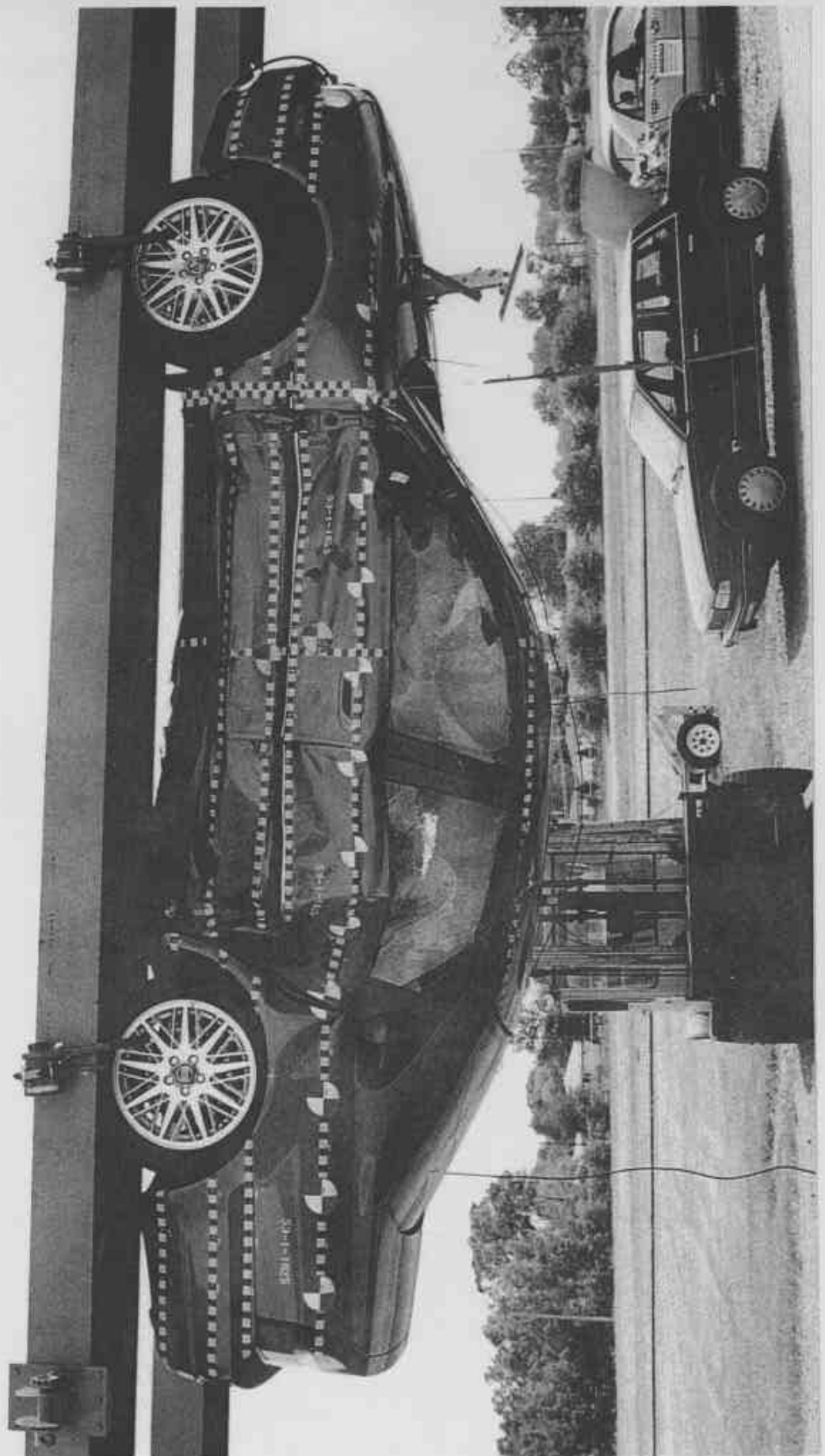
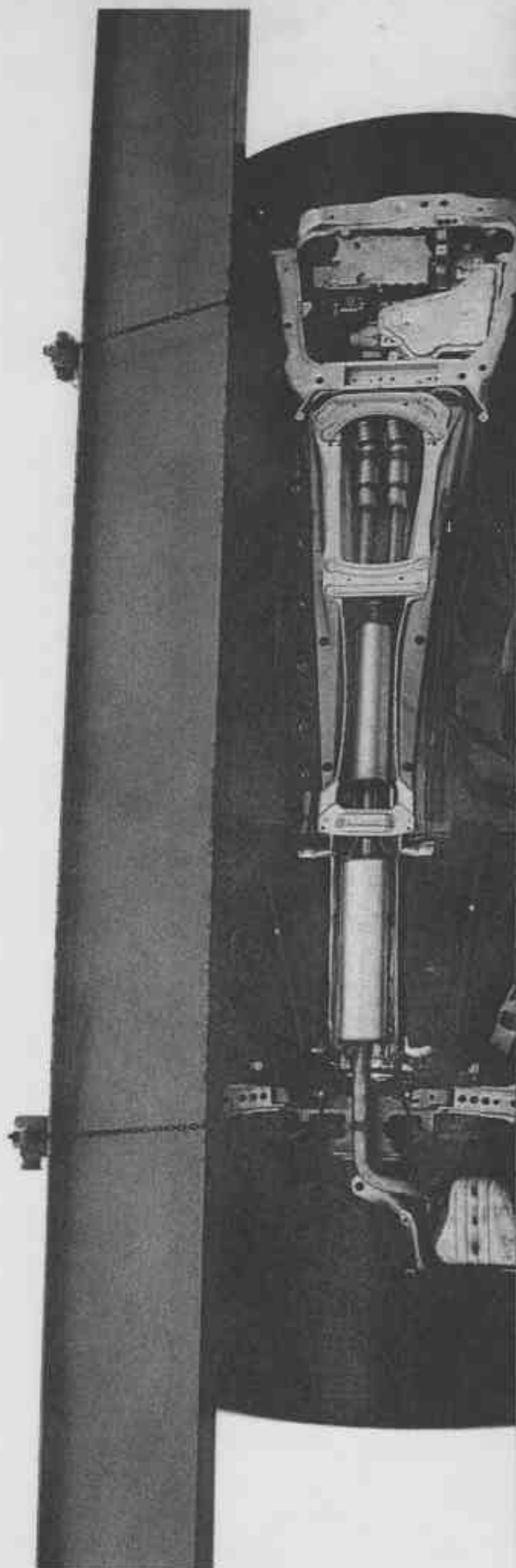


Figure A-36 ROLLOVER 180 DEGREES



A-39



Figure A-37 ROLLOVER 270 DEGREES

8526-1



Figure A-38 ROLLOVER 360 DEGREES

TABLE OF DATA PLOTS

DRIVER AND PASSENGER DUMMY INSTRUMENTATION PLOTS 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>
1	DRIVER UPPER RIB (Y) ACCELERATION VS TIME	B- 6
2	DRIVER UPPER RIB (Y) VELOCITY VS TIME	B- 7
3	DRIVER LOWER RIB (Y) ACCELERATION VS TIME	B- 8
4	DRIVER LOWER RIB (Y) VELOCITY VS TIME	B- 9
5	DRIVER LOWER SPINE (Y) ACCELERATION VS TIME	B- 10
6	DRIVER LOWER SPINE (Y) VELOCITY VS TIME	B- 11
7	DRIVER PELVIC (Y) ACCELERATION VS TIME	B- 12
8	DRIVER PELVIC (Y) VELOCITY VS TIME	B- 13
9	PASSENGER UPPER RIB (Y) ACCELERATION VS TIME	B- 14
10	PASSENGER UPPER RIB (Y) VELOCITY VS TIME	B- 15
11	PASSENGER LOWER RIB (Y) ACCELERATION VS TIME	B- 16
12	PASSENGER LOWER RIB (Y) VELOCITY VS TIME	B- 17
13	PASSENGER LOWER SPINE (Y) ACCELERATION VS TIME	B- 18
14	PASSENGER LOWER SPINE (Y) VELOCITY VS TIME	B- 19
15	PASSENGER PELVIC (Y) ACCELERATION VS TIME	B- 20
16	PASSENGER PELVIC (Y) VELOCITY VS TIME	B- 21

DRIVER & PASSENGER DUMMY INSTRUMENTATION PLOTS ACCELERATION DATA - FIR FILTERED

<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
17	DRIVER UPPER RIB (Y) ACCELERATION VS TIME	B- 23
18	DRIVER LOWER RIB (Y) ACCELERATION VS TIME	B- 24
19	DRIVER LOWER SPINE (Y) ACCELERATION VS TIME	B- 25
20	DRIVER PELVIC (Y) ACCELERATION VS TIME	B- 26
21	PASSENGER UPPER RIB (Y) ACCELERATION VS TIME	B- 27
22	PASSENGER LOWER RIB (Y) ACCELERATION VS TIME	B- 28
23	PASSENGER LOWER SPINE (Y) ACCELERATION VS TIME	B- 29
24	PASSENGER PELVIC (Y) ACCELERATION VS TIME	B- 30

TEST VEHICLE INSTRUMENTATION PLOTS
ACCELERATION DATA - FILTER CLASS 60
INTEGRATION DATA - FILTER CLASS 180

<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
25	RIGHT SIDE SILL AT FRONT SEAT (X) ACCELERATION VS TIME	B- 30
26	RIGHT SIDE SILL AT FRONT SEAT (X) VELOCITY VS TIME	B- 31
27	RIGHT SIDE SILL AT FRONT SEAT (Y) ACCELERATION VS TIME	B- 32
28	RIGHT SIDE SILL AT FRONT SEAT (Y) VELOCITY VS TIME	B- 33
29	RIGHT SIDE SILL AT FRONT SEAT (Z) ACCELERATION VS TIME	B- 34
30	RIGHT SIDE SILL AT FRONT SEAT (Z) VELOCITY VS TIME	B- 35
31	RIGHT SIDE SILL AT FRONT SEAT RESULTANT ACCELERATION VS TIME	B- 36
32	RIGHT SIDE SILL AT REAR SEAT (X) ACCELERATION VS TIME	B- 37
33	RIGHT SIDE SILL AT REAR SEAT (X) VELOCITY VS TIME	B- 38
34	RIGHT SIDE SILL AT REAR SEAT (Y) ACCELERATION VS TIME	B- 39
35	RIGHT SIDE SILL AT REAR SEAT (Y) VELOCITY VS TIME	B- 40
36	RIGHT SIDE SILL AT REAR SEAT (Z) ACCELERATION VS TIME	B- 41
37	RIGHT SIDE SILL AT REAR SEAT (Z) VELOCITY VS TIME	B- 42
38	RIGHT SIDE SILL AT REAR SEAT RESULTANT ACCELERATION VS TIME	B- 43
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40	REAR FLOORPAN ABOVE AXLE (X) VELOCITY VS TIME	B- 45
41	REAR FLOORPAN ABOVE AXLE (Y) ACCELERATION VS TIME	B- 46
42	REAR FLOORPAN ABOVE AXLE (Y) VELOCITY VS TIME	B- 47
43	REAR FLOORPAN ABOVE AXLE (Z) ACCELERATION VS TIME	B- 48
44	REAR FLOORPAN ABOVE AXLE (Z) VELOCITY VS TIME	B- 49
45	REAR FLOORPAN ABOVE AXLE RESULTANT ACCELERATION VS TIME	B- 50
46	LEFT SIDE SILL AT REAR SEAT (Y) ACCELERATION VS TIME	B- 51
47	LEFT SIDE SILL AT REAR SEAT (Y) VELOCITY VS TIME	B- 52
48	LEFT SIDE SILL AT FRONT SEAT (Y) ACCELERATION VS TIME	B- 53
49	LEFT SIDE SILL AT FRONT SEAT (Y) VELOCITY VS TIME	B- 54
50	RIGHT REAR OCCUPANT COMPARTMENT (Y) ACCELERATION VS TIME	B- 55
51	RIGHT REAR OCCUPANT COMPARTMENT (Y) VELOCITY VS TIME	B- 56
52	MID REAR OF LEFT REAR DOOR (Y) ACCELERATION VS TIME	B- 57
53	MID REAR OF LEFT REAR DOOR (Y) VELOCITY VS TIME	B- 58
54	LEFT REAR DOOR UPPER CENTERLINE (Y) ACCELERATION VS TIME	B- 59
55	LEFT REAR DOOR UPPER CENTERLINE (Y) VELOCITY VS TIME	B- 60
56	LOWER B-POST (Y) ACCELERATION VS TIME	B- 61
57	LOWER B-POST (Y) VELOCITY VS TIME	B- 62
58	UPPER B-POST (Y) ACCELERATION VS TIME	B- 63
59	UPPER B-POST (Y) VELOCITY VS TIME	B- 64
60	LOWER A-POST (Y) ACCELERATION VS TIME	B- 65
61	LOWER A-POST (Y) VELOCITY VS TIME	B- 66
62	UPPER A-POST (Y) ACCELERATION VS TIME	B- 67
63	UPPER A-POST (Y) VELOCITY VS TIME	B- 68
64	FRONT SEAT TRACK (Y) ACCELERATION VS TIME	B- 69
65	FRONT SEAT TRACK (Y) VELOCITY VS TIME	B- 70
66	REAR SEAT TRACK (Y) ACCELERATION VS TIME	B- 71
67	REAR SEAT TRACK (Y) VELOCITY VS TIME	B- 72
68	VEHICLE CENTER OF GRAVITY (X) ACCELERATION VS TIME	B- 73
69	VEHICLE CENTER OF GRAVITY (X) VELOCITY VS TIME	B- 74
70	VEHICLE CENTER OF GRAVITY (Y) ACCELERATION VS TIME	B- 75
71	VEHICLE CENTER OF GRAVITY (Y) VELOCITY ACCELERATION VS TIME	B- 76

TEST VEHICLE INSTRUMENTATION PLOTS
ACCELERATION DATA - FILTER CLASS 60
INTEGRATION DATA - FILTER CLASS 180

<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
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73	VEHICLE CENTER OF GRAVITY (Z) VELOCITY VS TIME	B- 78
74	VEHICLE CENTER OF GRAVITY RESULTANT ACCELERATION VS TIME	B- 79

MDB INSTRUMENTATION PLOTS
ACCELERATION DATA - FILTER CLASS 60
INTEGRATION DATA - FILTER CLASS 180

<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
75	MDB CENTER OF GRAVITY (X) ACCELERATION VS TIME	B- 80
76	MDB CENTER OF GRAVITY (X) VELOCITY VS TIME	B- 81
77	MDB CENTER OF GRAVITY (Y) ACCELERATION VS TIME	B- 82
78	MDB CENTER OF GRAVITY (Y) VELOCITY VS TIME	B- 83
79	MDB CENTER OF GRAVITY (Z) ACCELERATION VS TIME	B- 84
80	MDB CENTER OF GRAVITY (Z) VELOCITY VS TIME	B- 85
81	MDB CENTER OF GRAVITY RESULTANT ACCELERATION VS TIME	B- 86
82	MDB REAR (X) ACCELERATION VS TIME	B- 87
83	MDB REAR (X) VELOCITY VS TIME	B- 88
84	MDB REAR (Y) ACCELERATION VS TIME	B- 89
85	MDB REAR (Y) VELOCITY VS TIME	B- 90

DRIVER & 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>
86	DRIVER UPPER RIB (Y) ACCELERATION VS TIME	B- 91
87	DRIVER UPPER RIB (Y) VELOCITY VS TIME	B- 92
88	DRIVER LOWER RIB (Y) ACCELERATION VS TIME	B- 93
89	DRIVER LOWER RIB (Y) VELOCITY VS TIME	B- 94
90	DRIVER LOWER SPINE (Y) ACCELERATION VS TIME	B- 95
91	DRIVER LOWER SPINE (Y) VELOCITY VS TIME	B- 96
92	DRIVER PELVIC (Y) ACCELERATION VS TIME	B- 97
93	DRIVER PELVIC (Y) VELOCITY VS TIME	B- 98
94	PASSENGER UPPER RIB (Y) ACCELERATION VS TIME	B- 99
95	PASSENGER UPPER RIB (Y) VELOCITY VS TIME	B- 100
96	PASSENGER LOWER RIB (Y) ACCELERATION VS TIME	B- 101
97	PASSENGER LOWER RIB (Y) VELOCITY VS TIME	B- 102
98	PASSENGER LOWER SPINE (Y) ACCELERATION VS TIME	B- 103
99	PASSENGER LOWER SPINE (Y) VELOCITY VS TIME	B- 104
100	PASSENGER PELVIC (Y) ACCELERATION VS TIME	B- 105
101	PASSENGER PELVIC (Y) VELOCITY VS TIME	B- 106

DRIVER & PASSENGER DUMMY INSTRUMENTATION PLOTS (REDUNDANT)
ACCELERATION DATA - FIR FILTERED

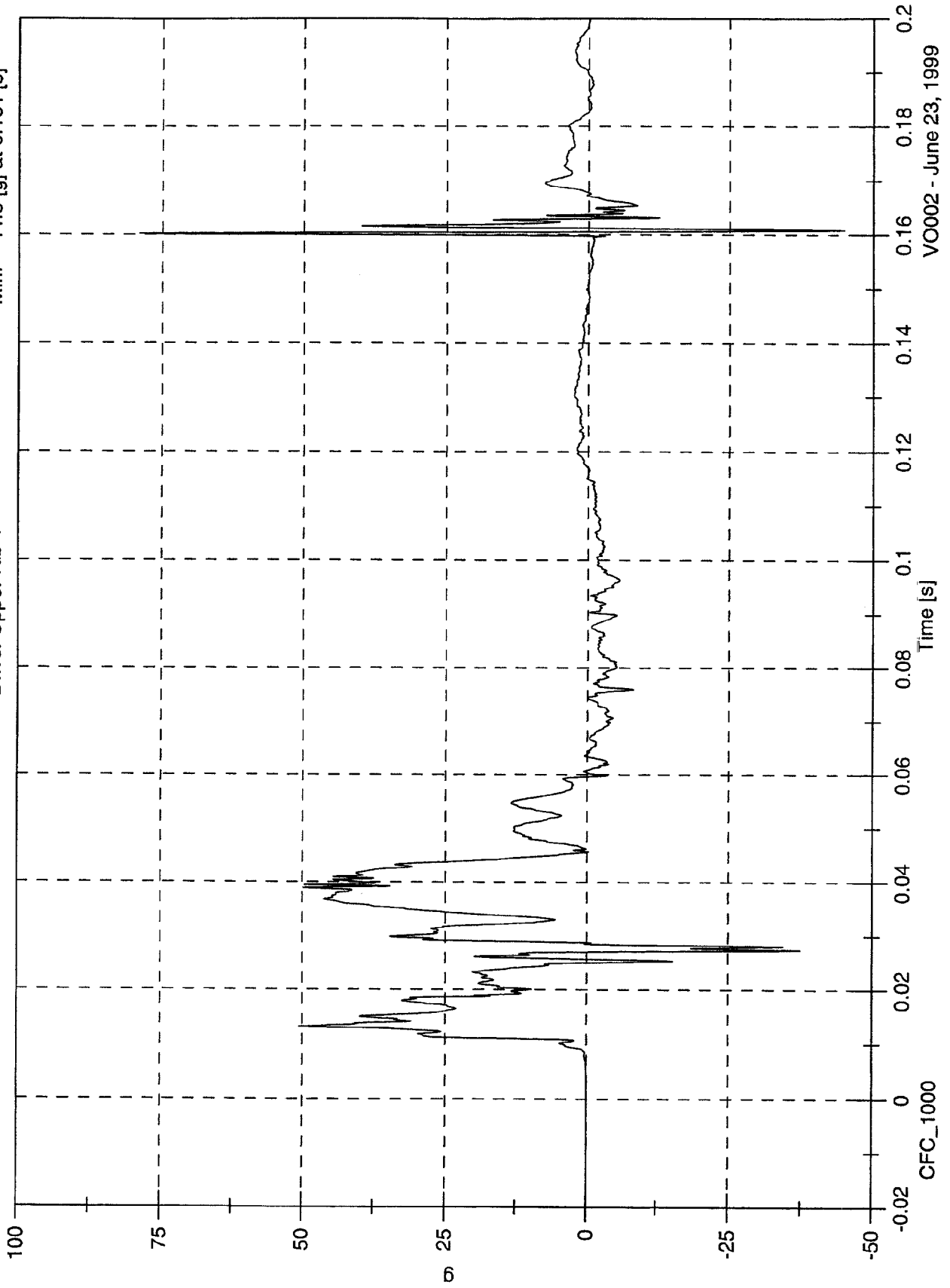
<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
102	DRIVER UPPER RIB (Y) ACCELERATION VS TIME	B- 107
103	DRIVER LOWER RIB (Y) ACCELERATION VS TIME	B- 108
104	DRIVER LOWER SPINE (Y) ACCELERATION VS TIME	B- 109
105	DRIVER PELVIC (Y) ACCELERATION VS TIME	B- 110
106	PASSENGER UPPER RIB (Y) ACCELERATION VS TIME	B- 111
107	PASSENGER LOWER RIB (Y) ACCELERATION VS TIME	B- 112
108	PASSENGER LOWER SPINE (Y) ACCELERATION VS TIME	B- 113
109	PASSENGER PELVIC (Y) ACCELERATION VS TIME	B- 114

SNCAP Test#1 Volvo S80T6

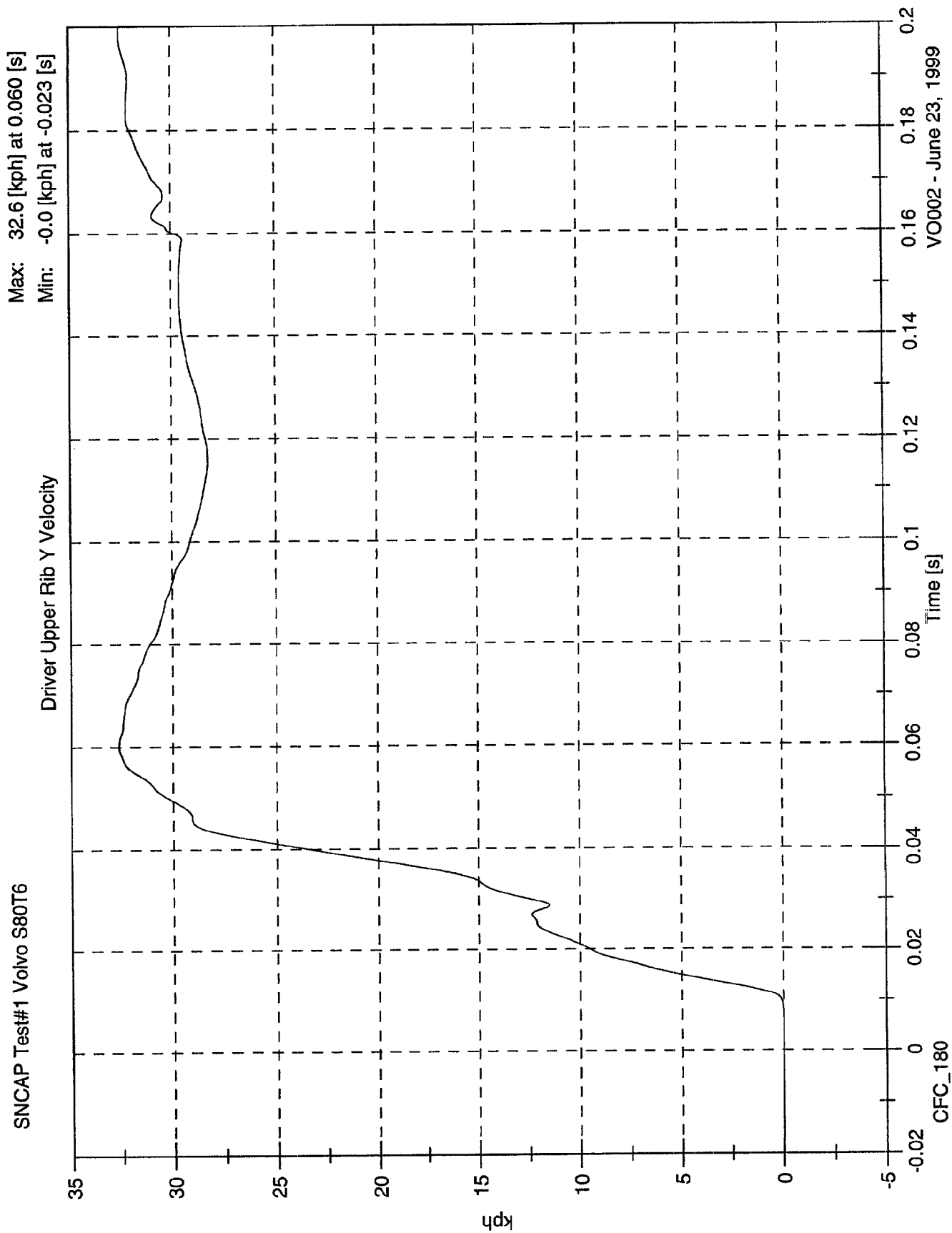
Driver Upper Rib Y

Max: 79.1 [g] at 0.160 [s]

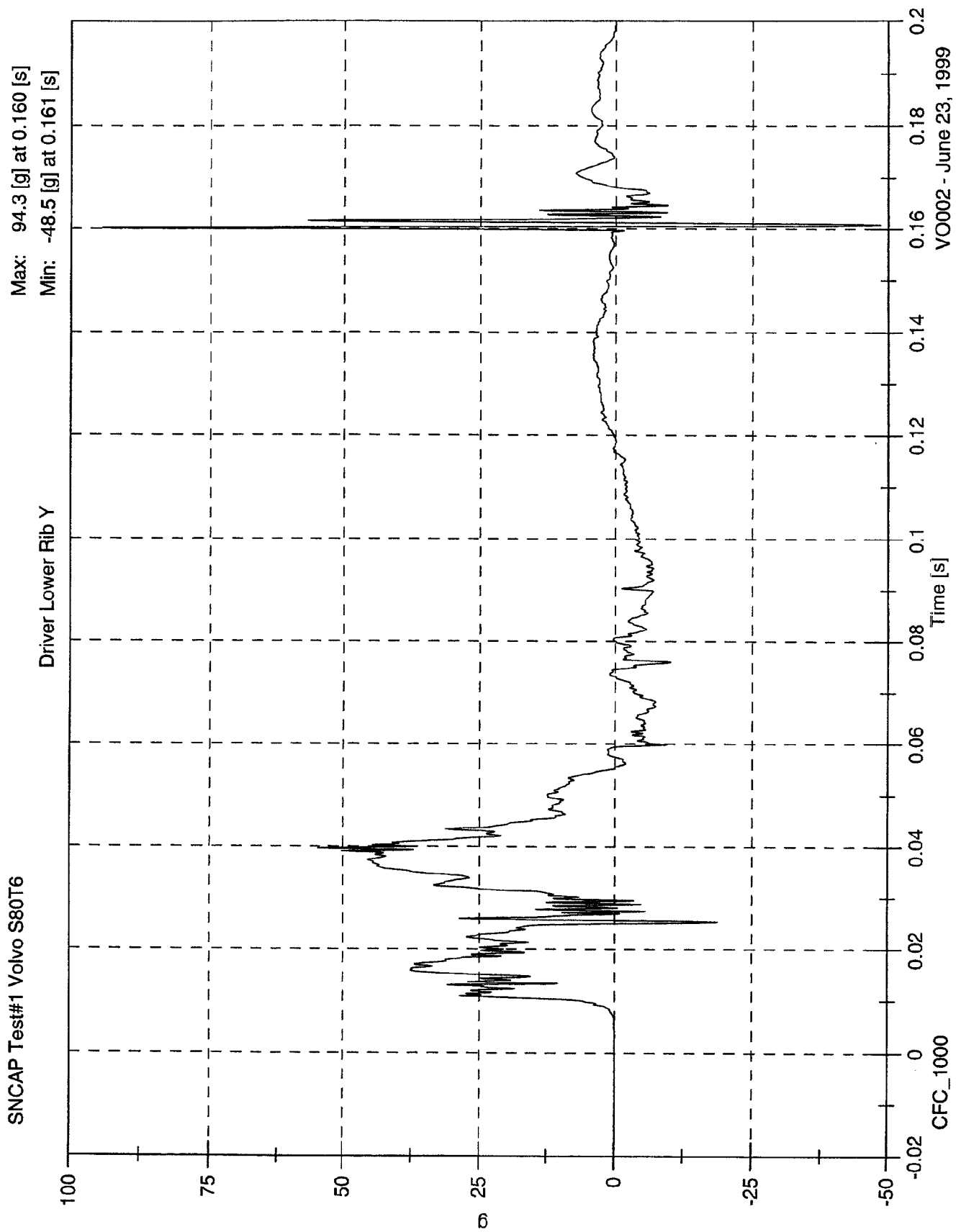
Min: -44.8 [g] at 0.161 [s]

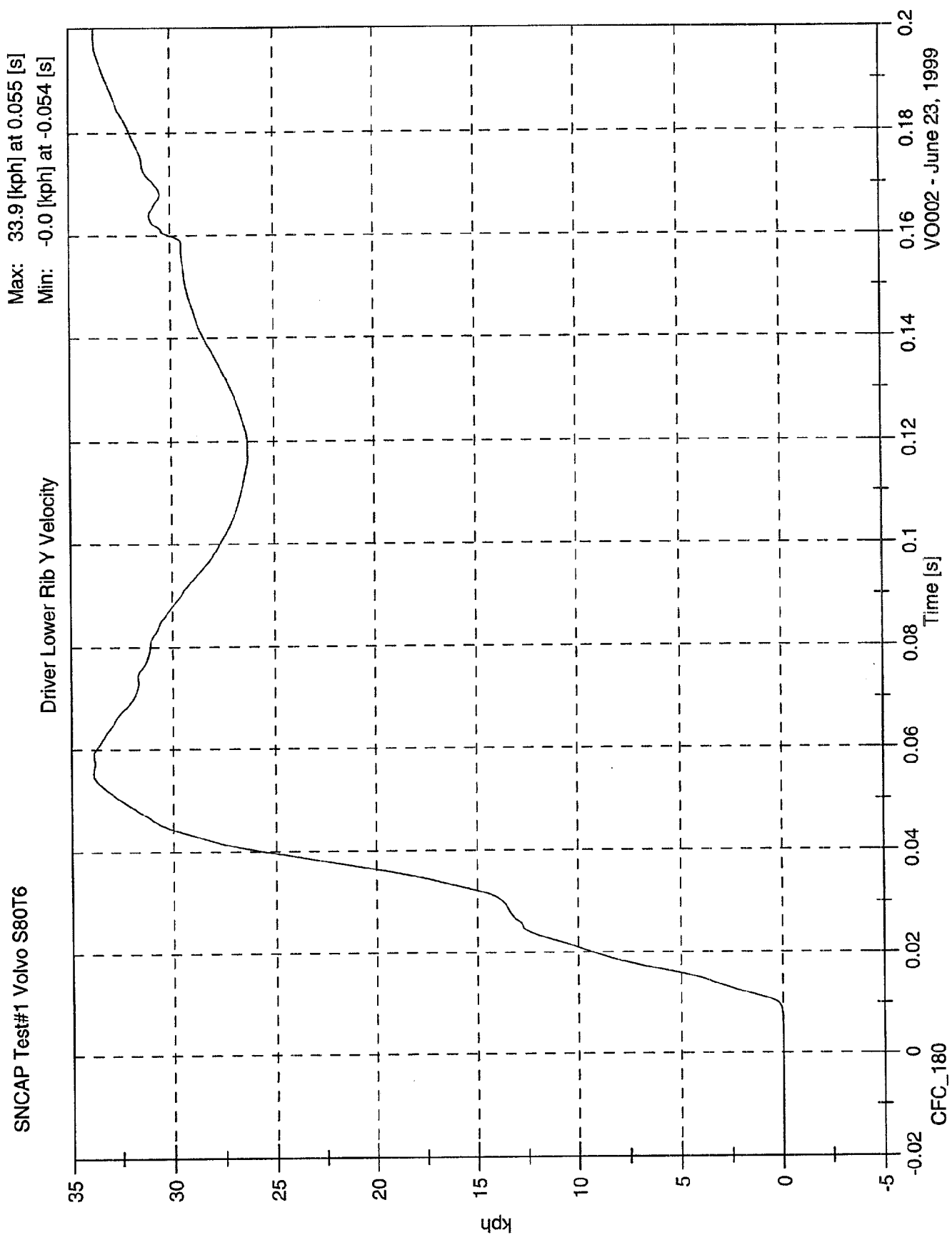


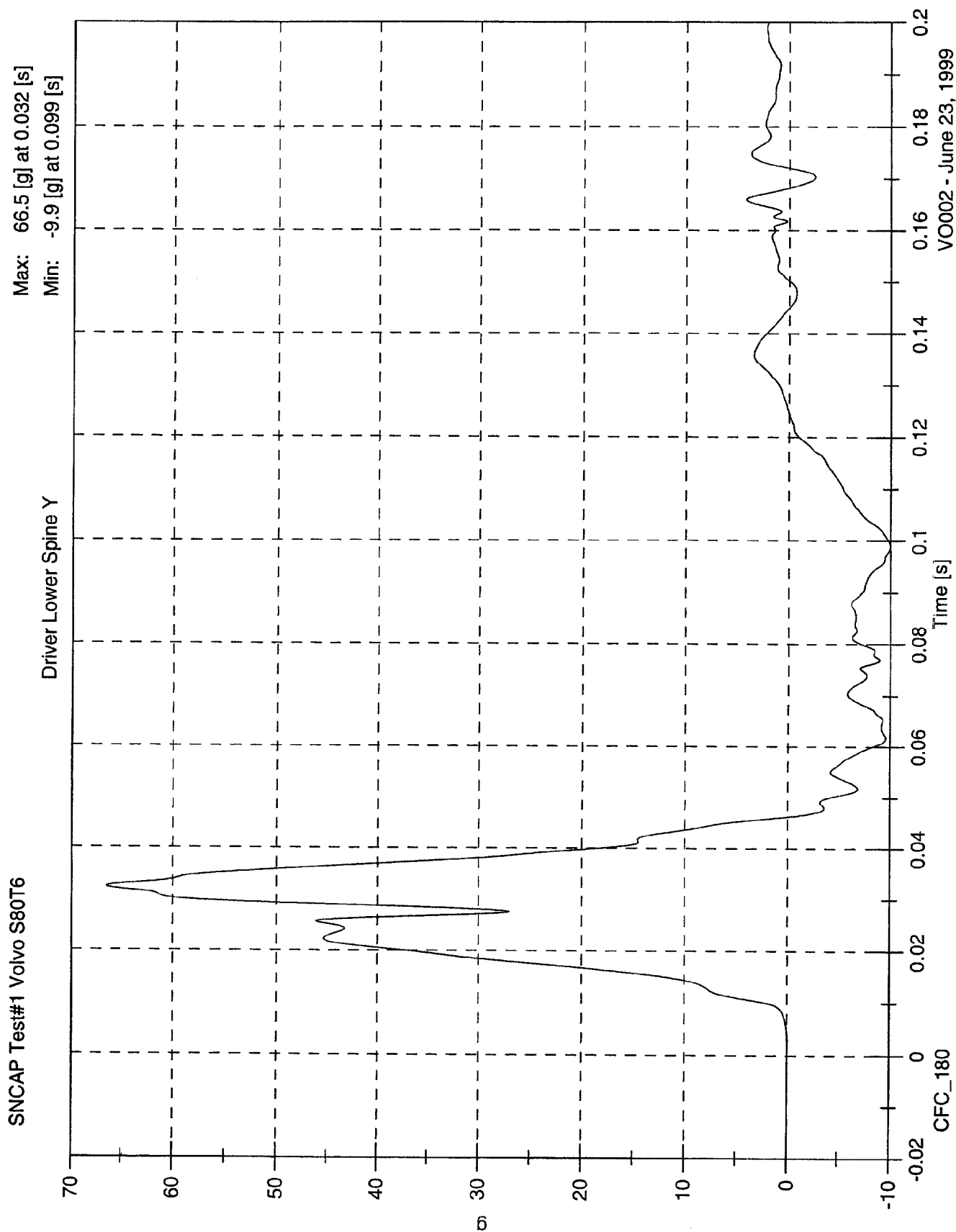
VC002 - June 23, 1999



VO002 - June 23, 1999



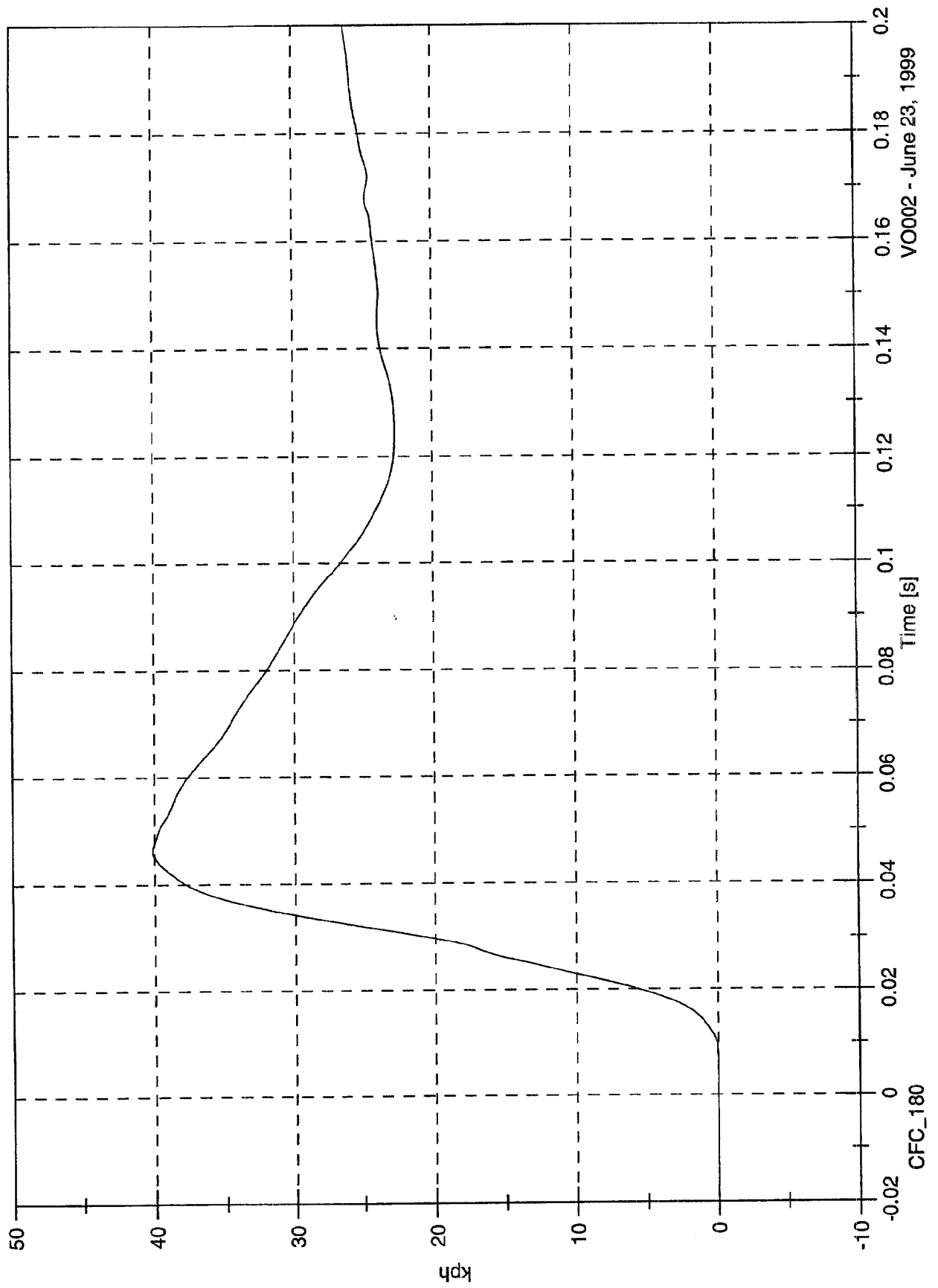




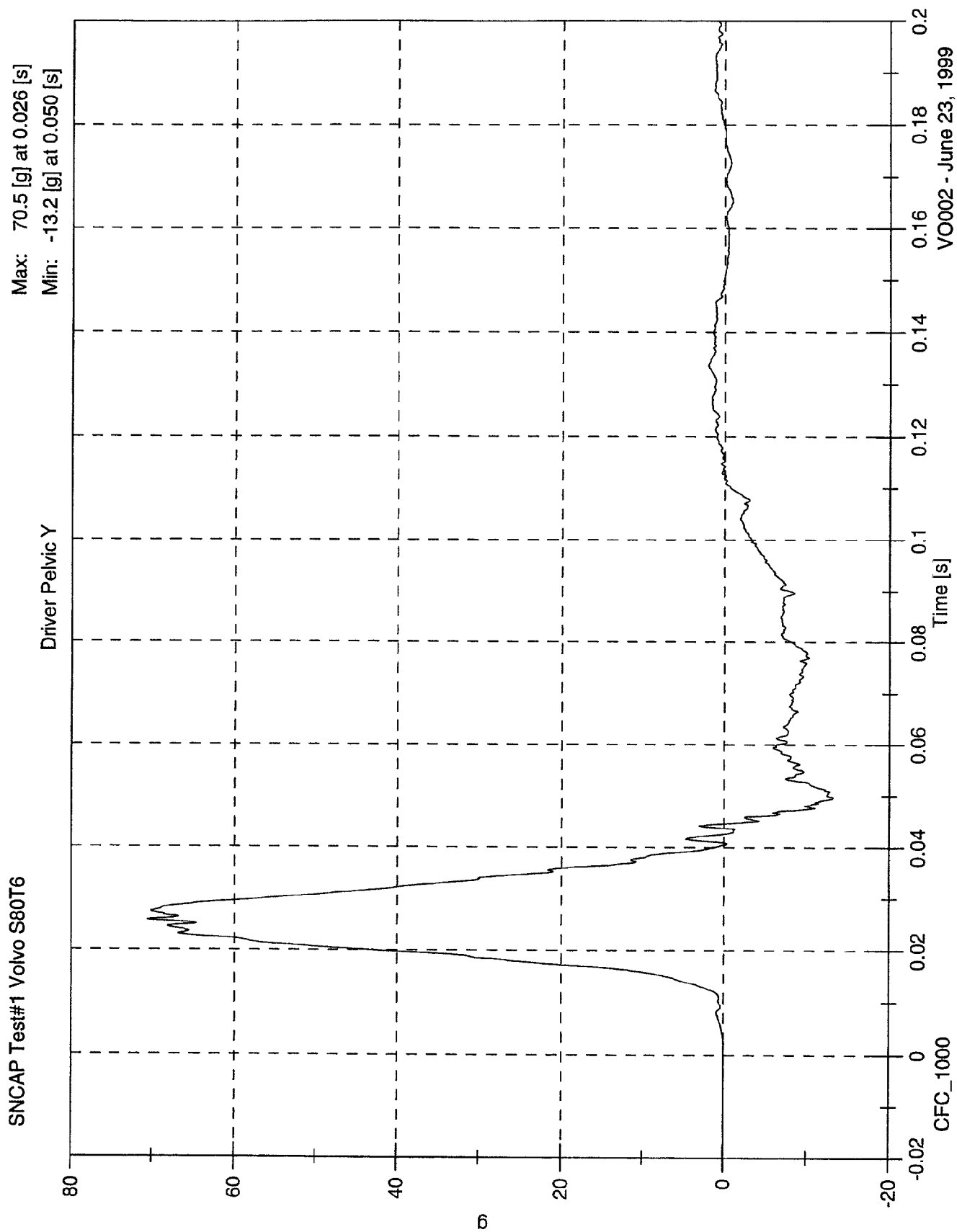
SNCAP Test#1 Volvo S80T6

Max: 40.1 [kph] at 0.046 [s]
Min: -0.0 [kph] at -0.049 [s]

Driver Lower Spine Y Velocity



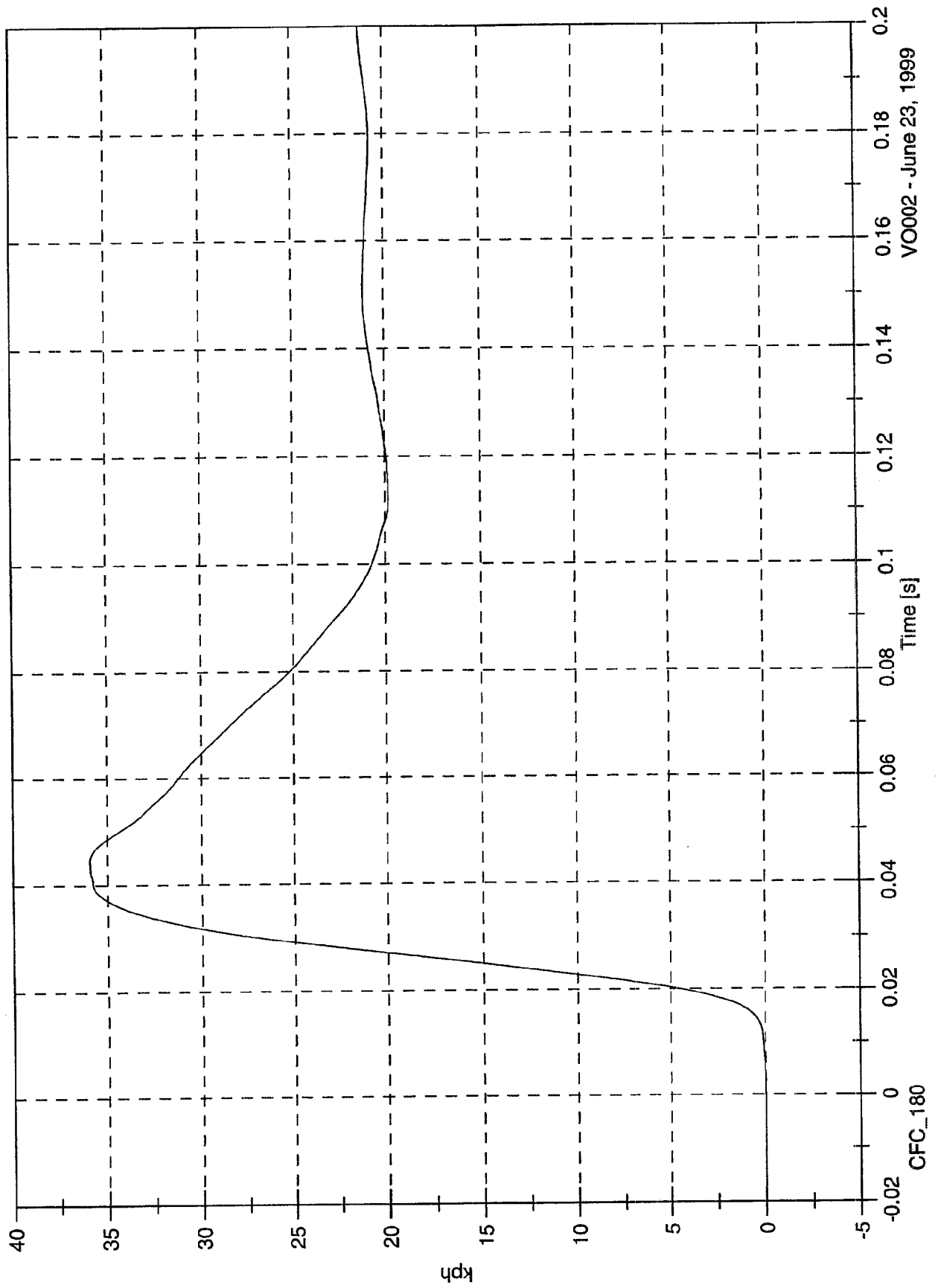
VO002 - June 23, 1999



SNCAP Test#1 Volvo S80T6

Max: 35.9 [kph] at 0.044 [s]
Min: -0.0 [kph] at -0.069 [s]

Driver Pelvic Y Velocity



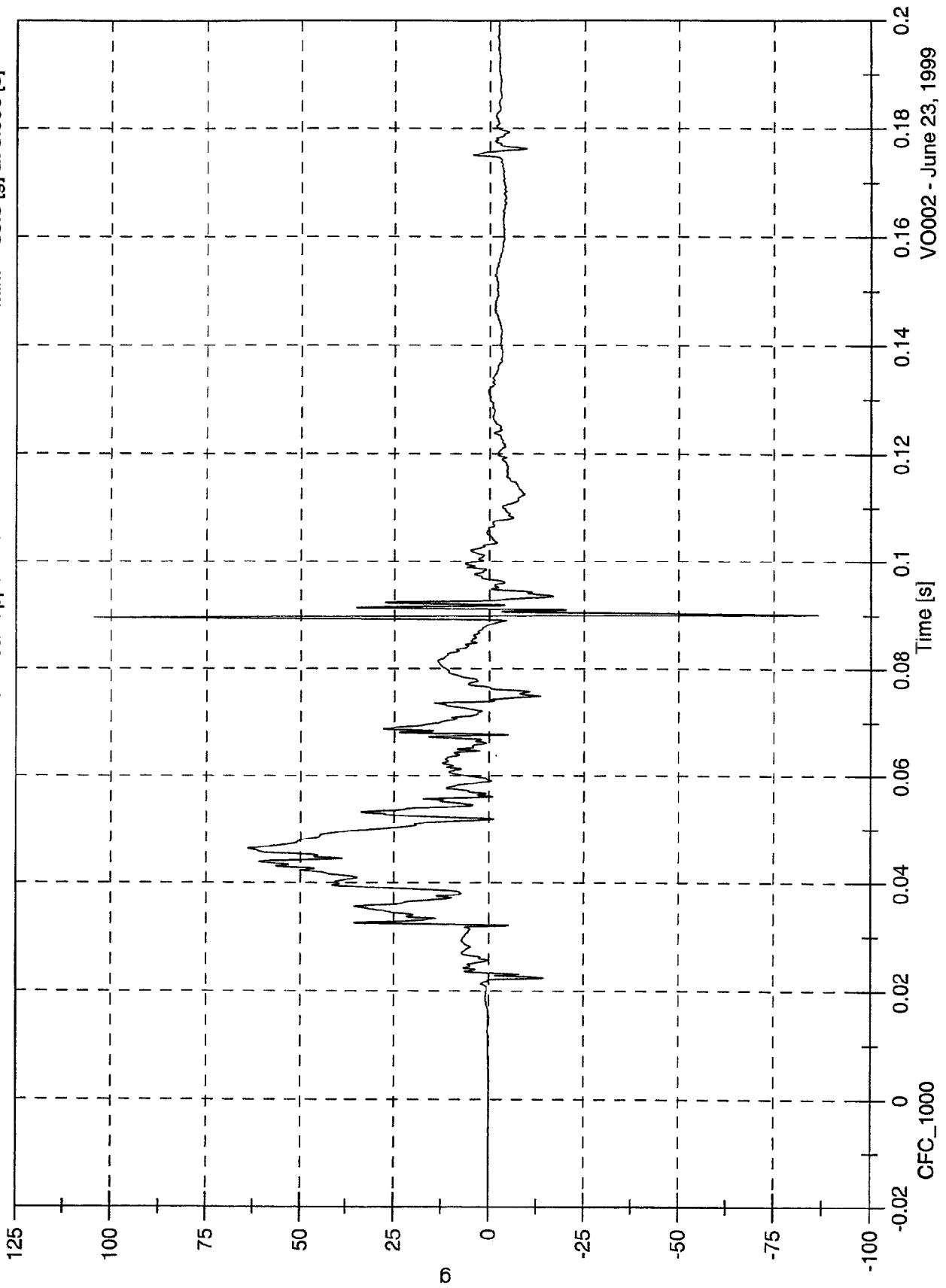
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Left Rear Upper Rib Y

Max: 104.6 [g] at 0.090 [s]

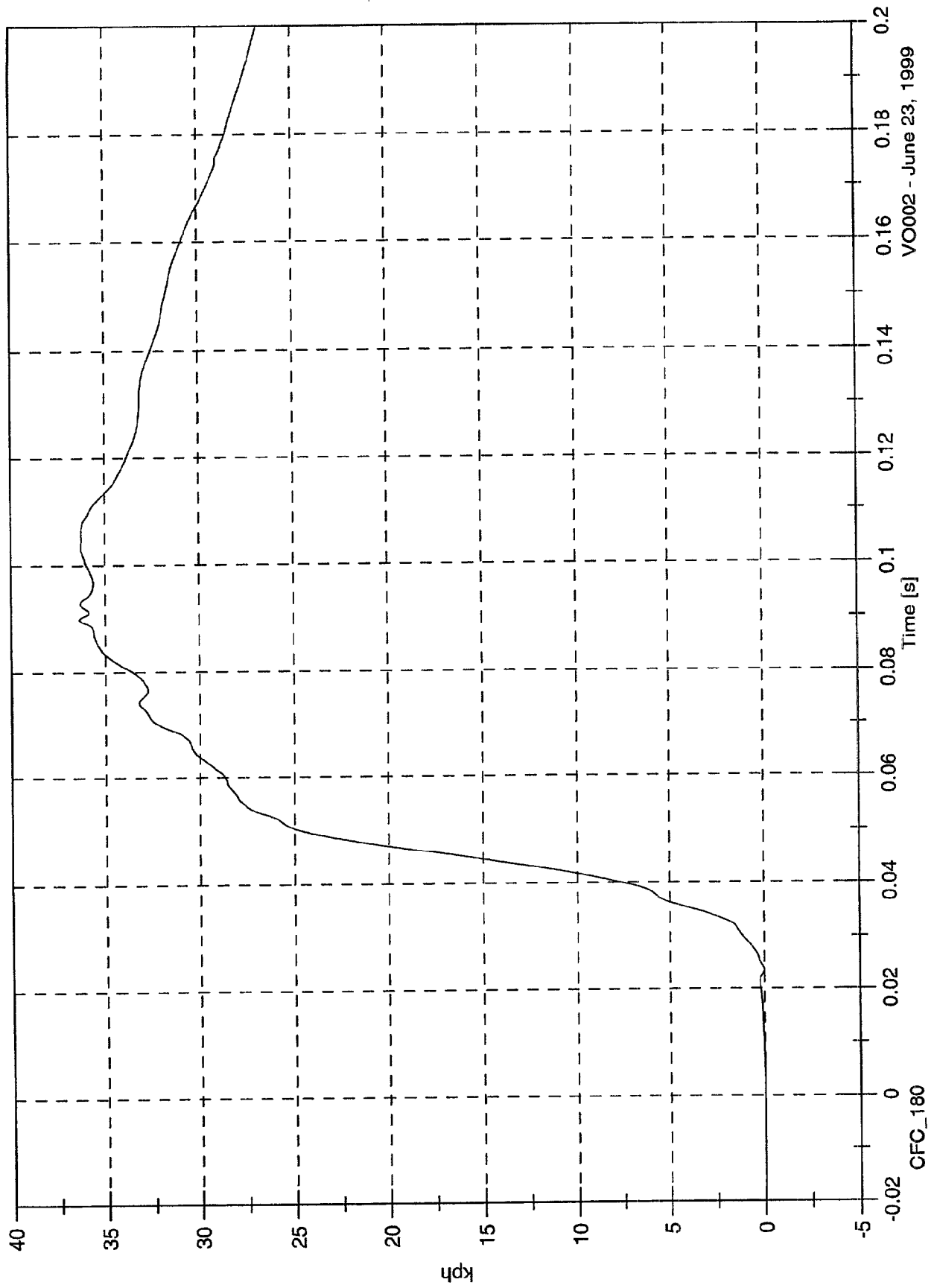
Min: -86.3 [g] at 0.090 [s]



SNCAP Test#1 Volvo S80T6

Max: 36.4 [kph] at 0.090 [s]
Min: -0.0 [kph] at 0.023 [s]

Left Rear Upper Rib Y Velocity



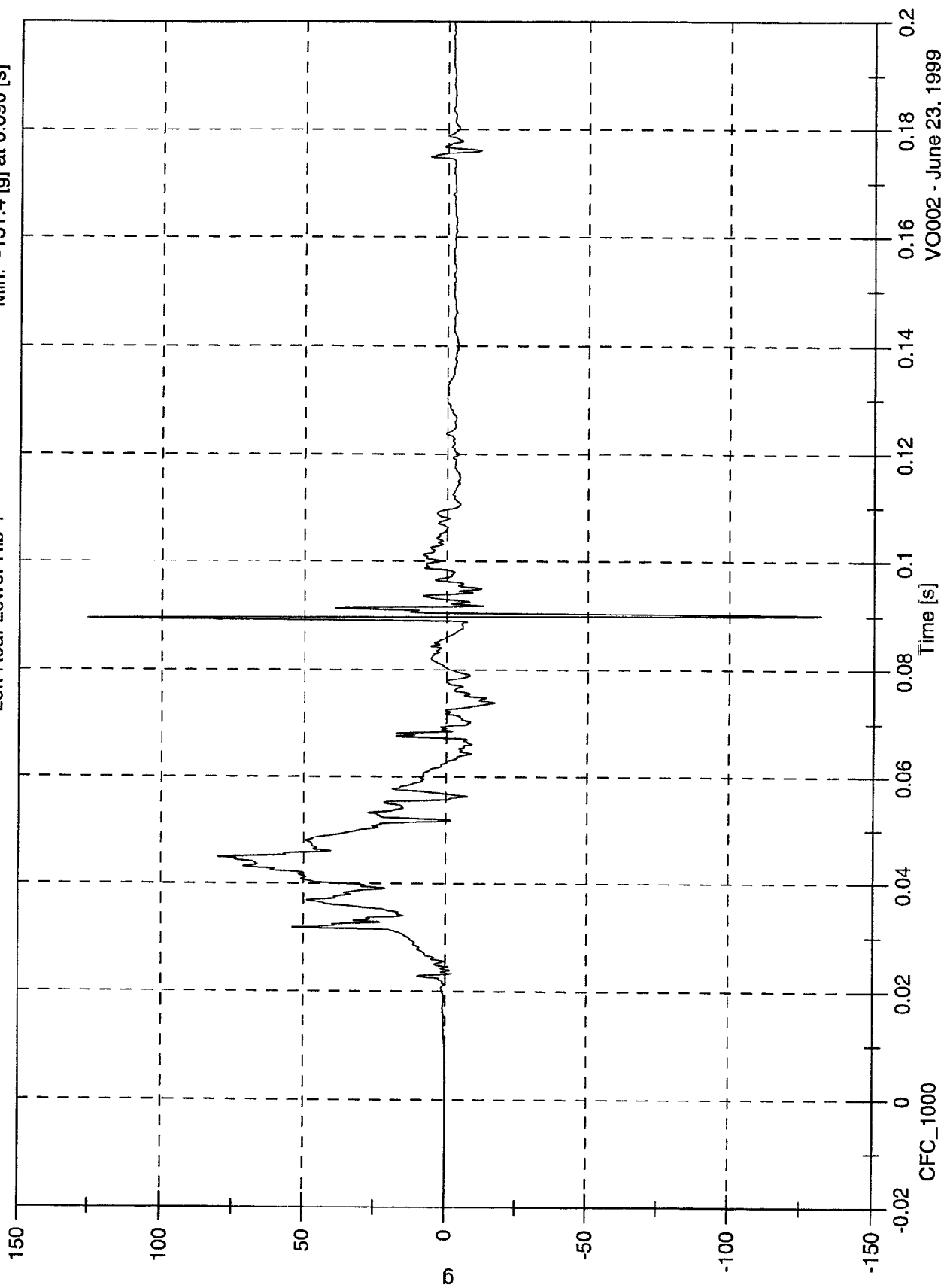
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Left Rear Lower Rib Y

Max: 126.2 [g] at 0.090 [s]

Min: -131.4 [g] at 0.090 [s]

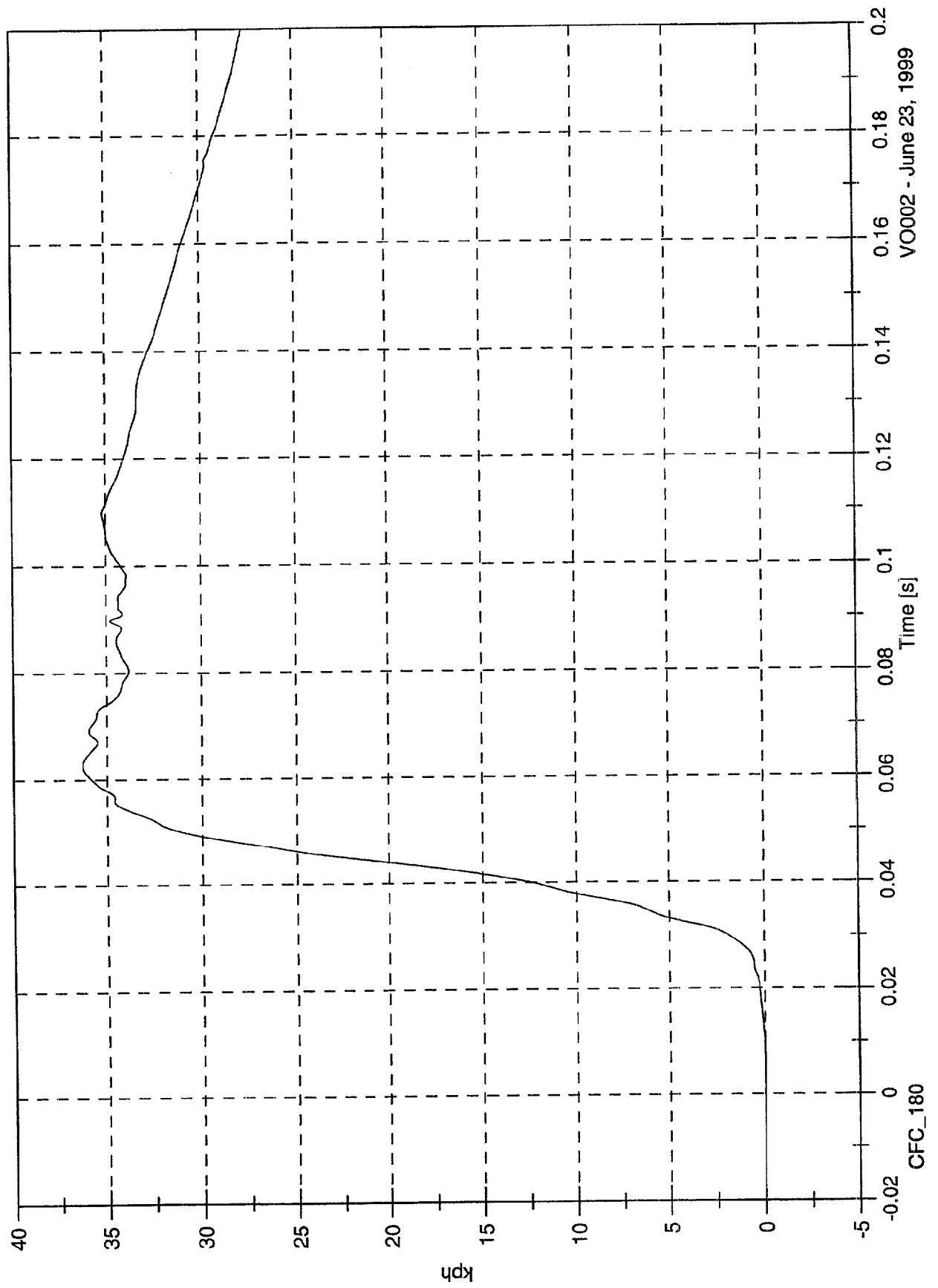


VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 36.3 [kph] at 0.063 [s]
Min: -0.0 [kph] at -0.065 [s]

Left Rear Lower Rib Y Velocity



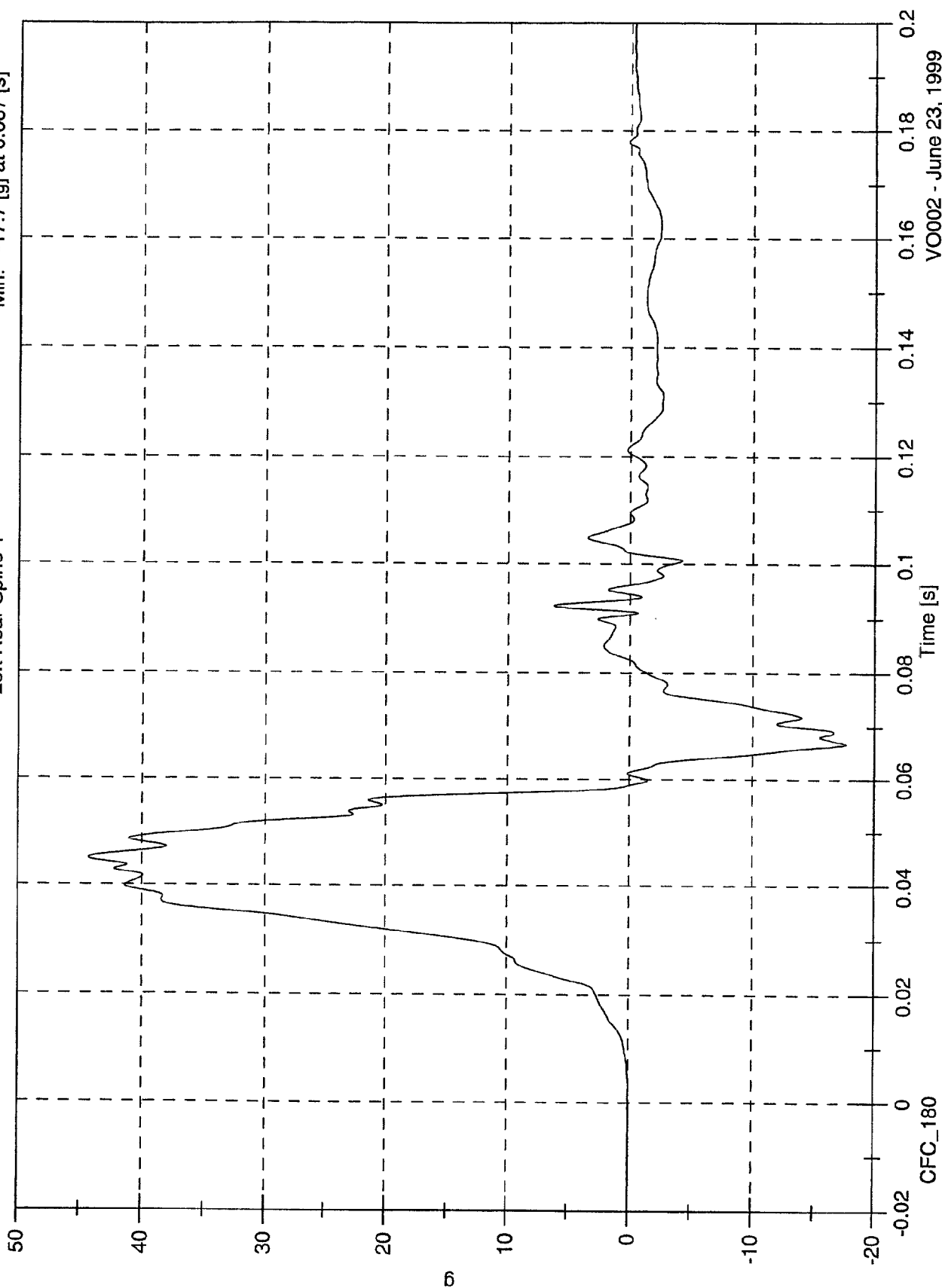
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 44.3 [g] at 0.045 [s]

Min: -17.7 [g] at 0.067 [s]

Left Rear Spine Y

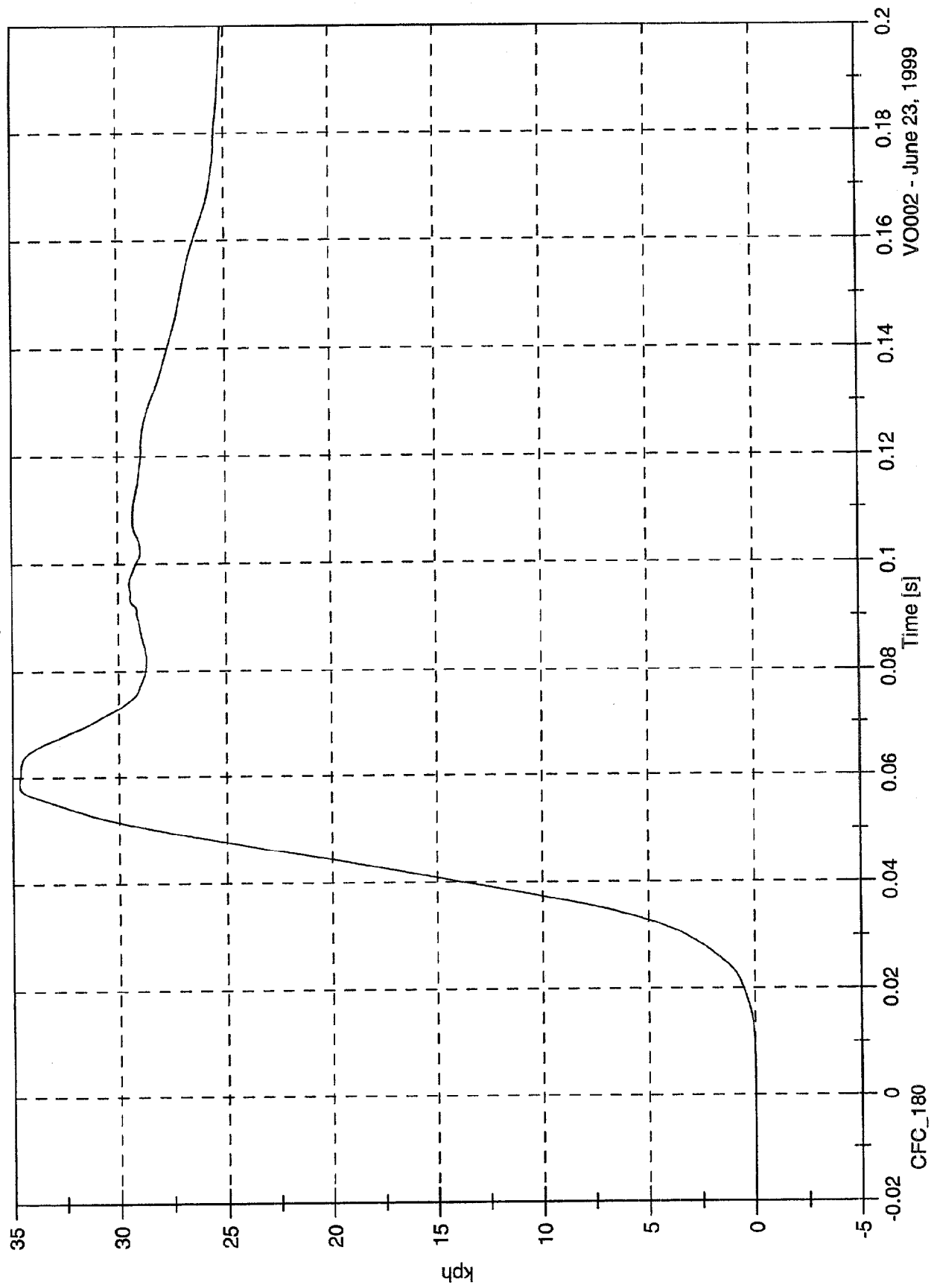


VO002 - June 23, 1999

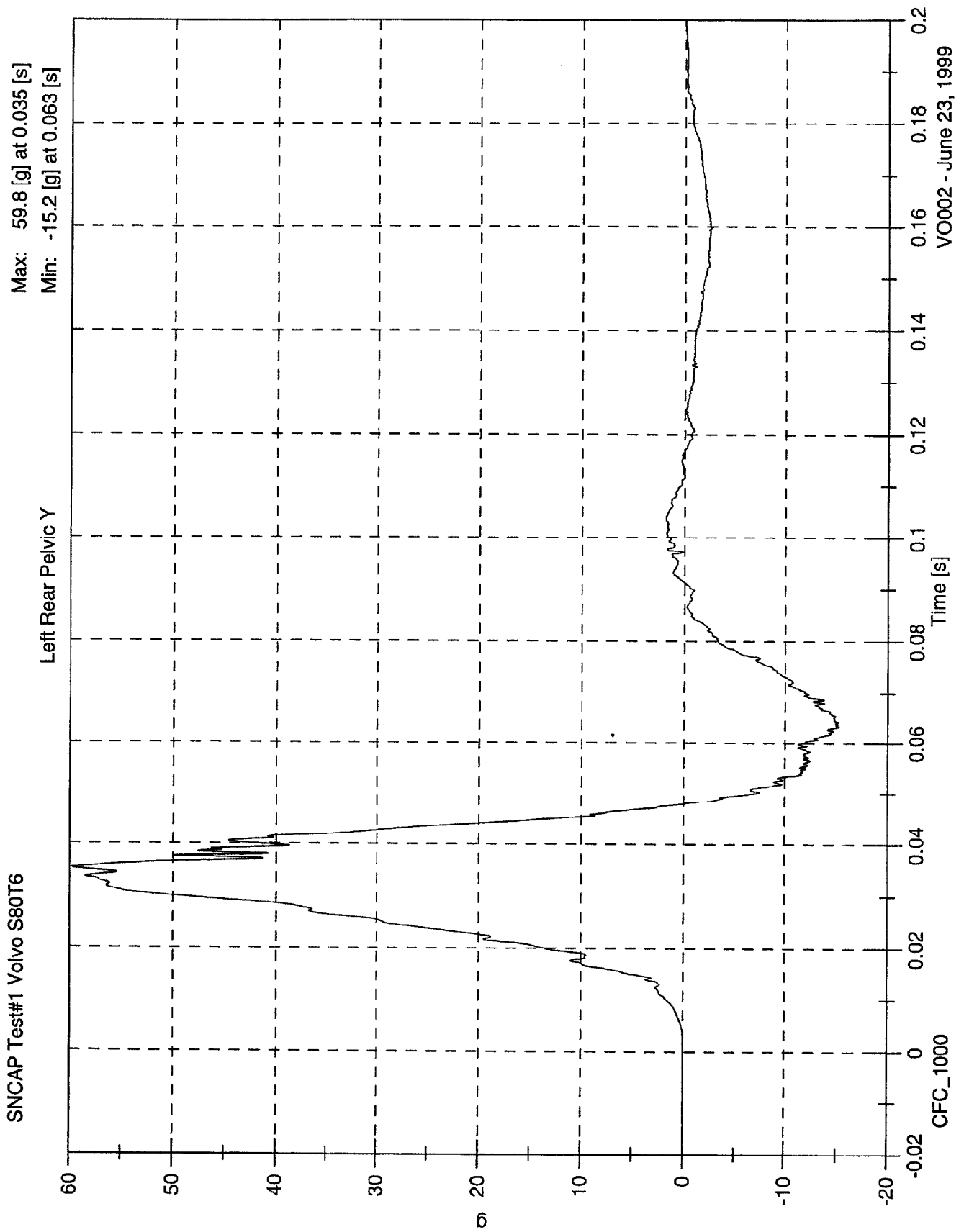
SNCAP Test#1 Volvo S80T6

Max: 34.7 [kph] at 0.059 [s]
Min: -0.0 [kph] at -0.051 [s]

Left Rear Spine Y Velocity



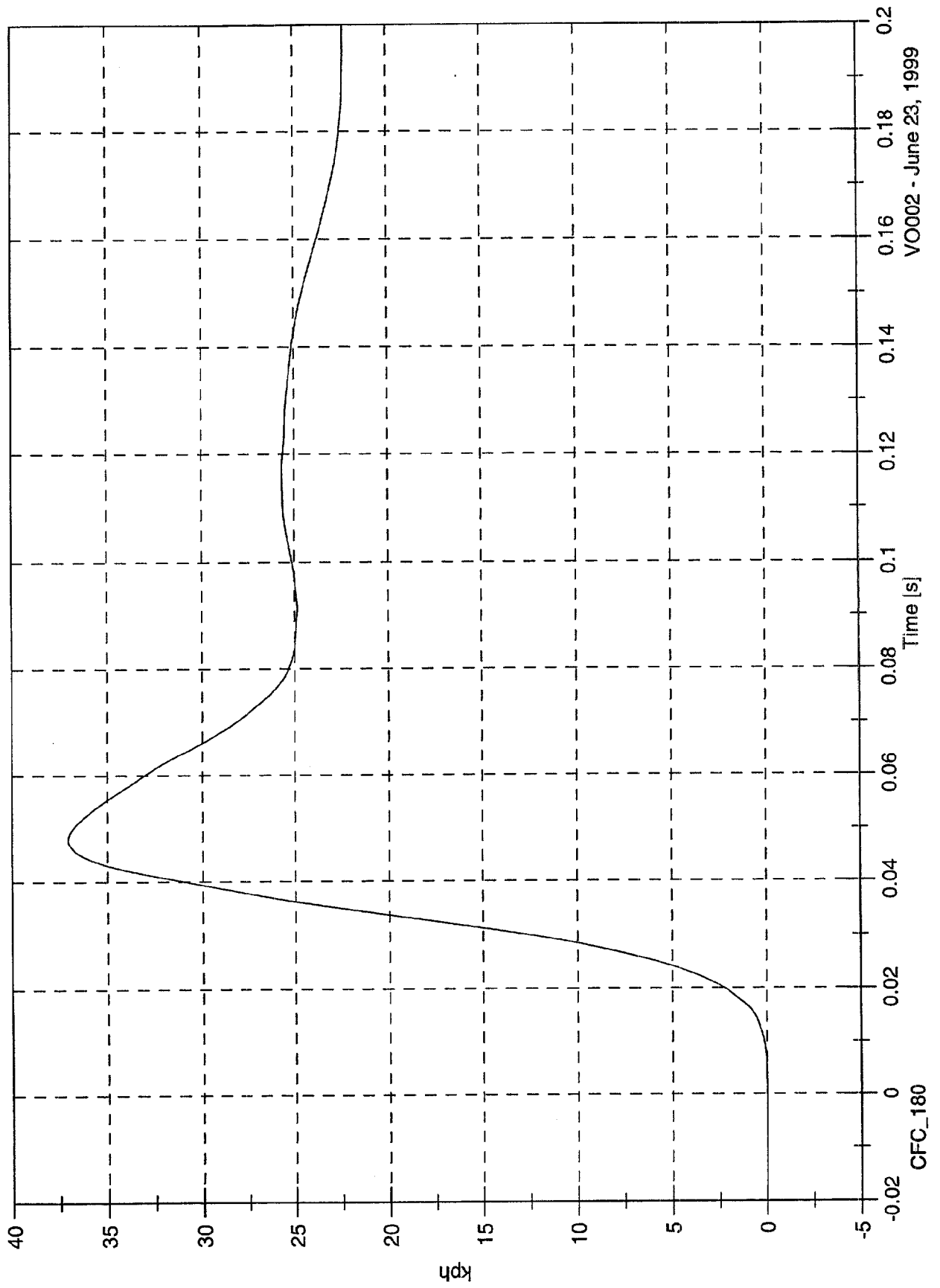
VO002 - June 23, 1999



SNCAP Test#1 Volvo S80T6

Max: 37.1 [kph] at 0.048 [s]
Min: -0.0 [kph] at -0.069 [s]

Left Rear Pelvic Y Velocity



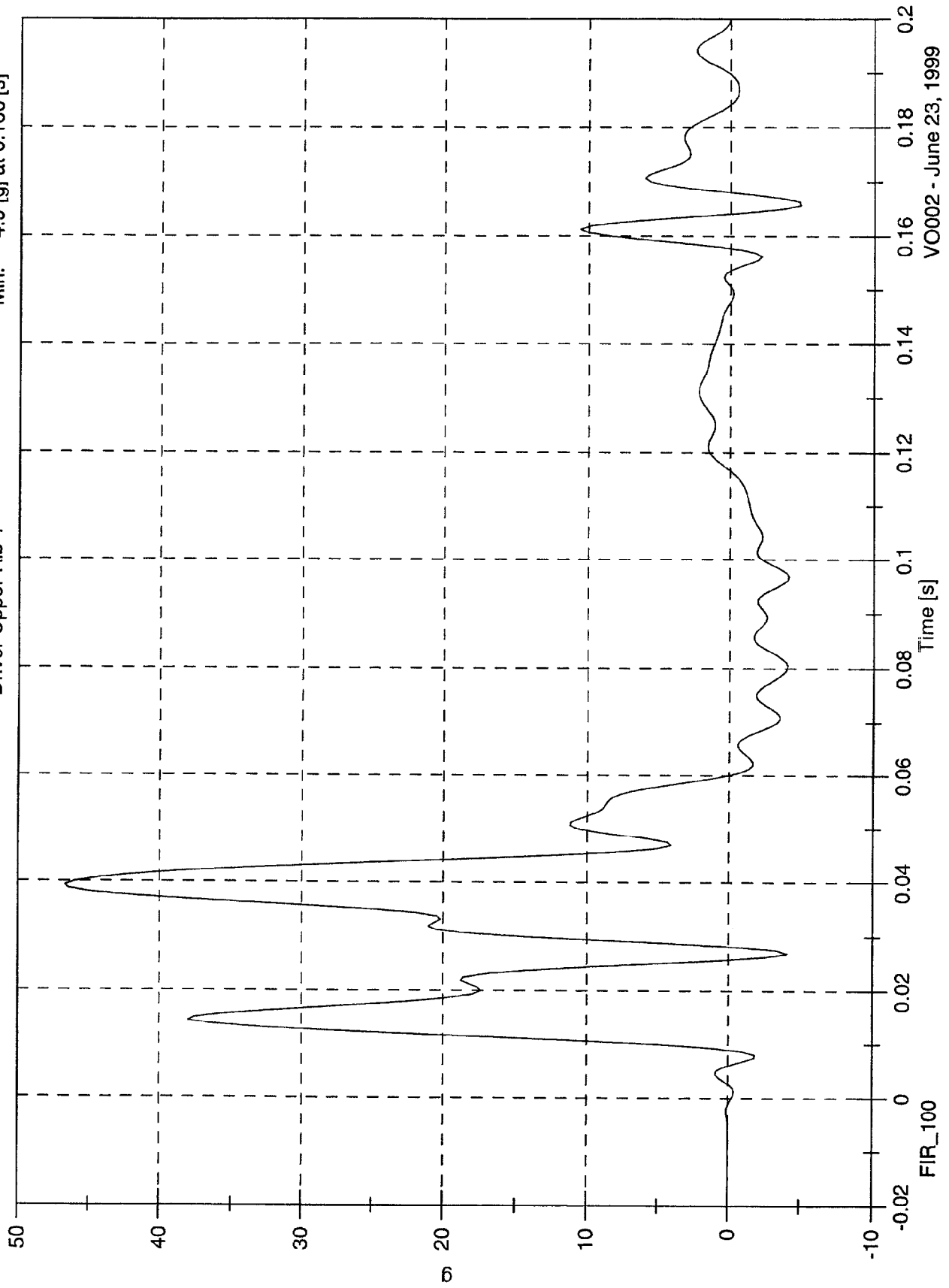
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

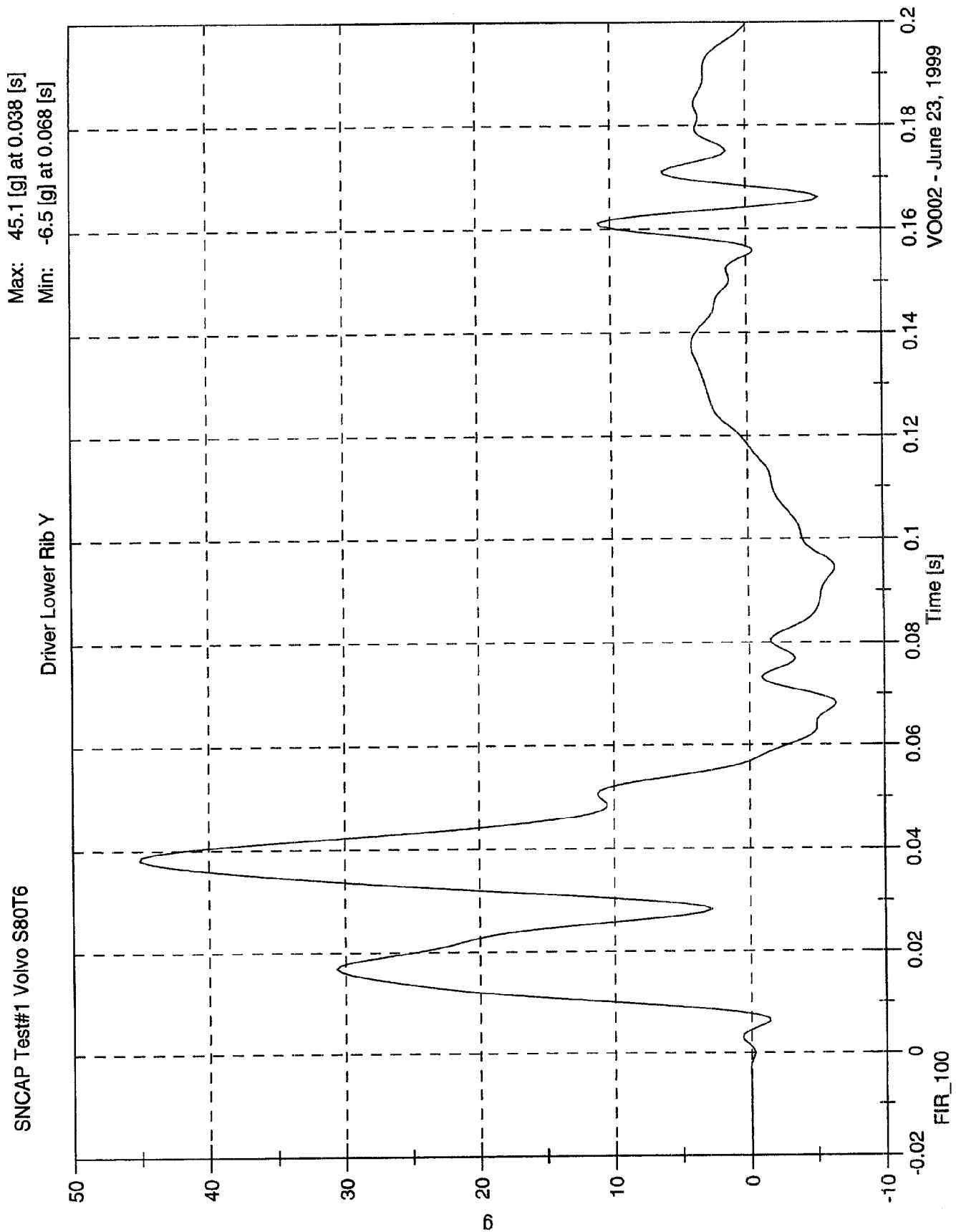
Driver Upper Rib Y

Max: 46.7 [g] at 0.039 [s]

Min: -4.9 [g] at 0.166 [s]



VO002 - June 23, 1999

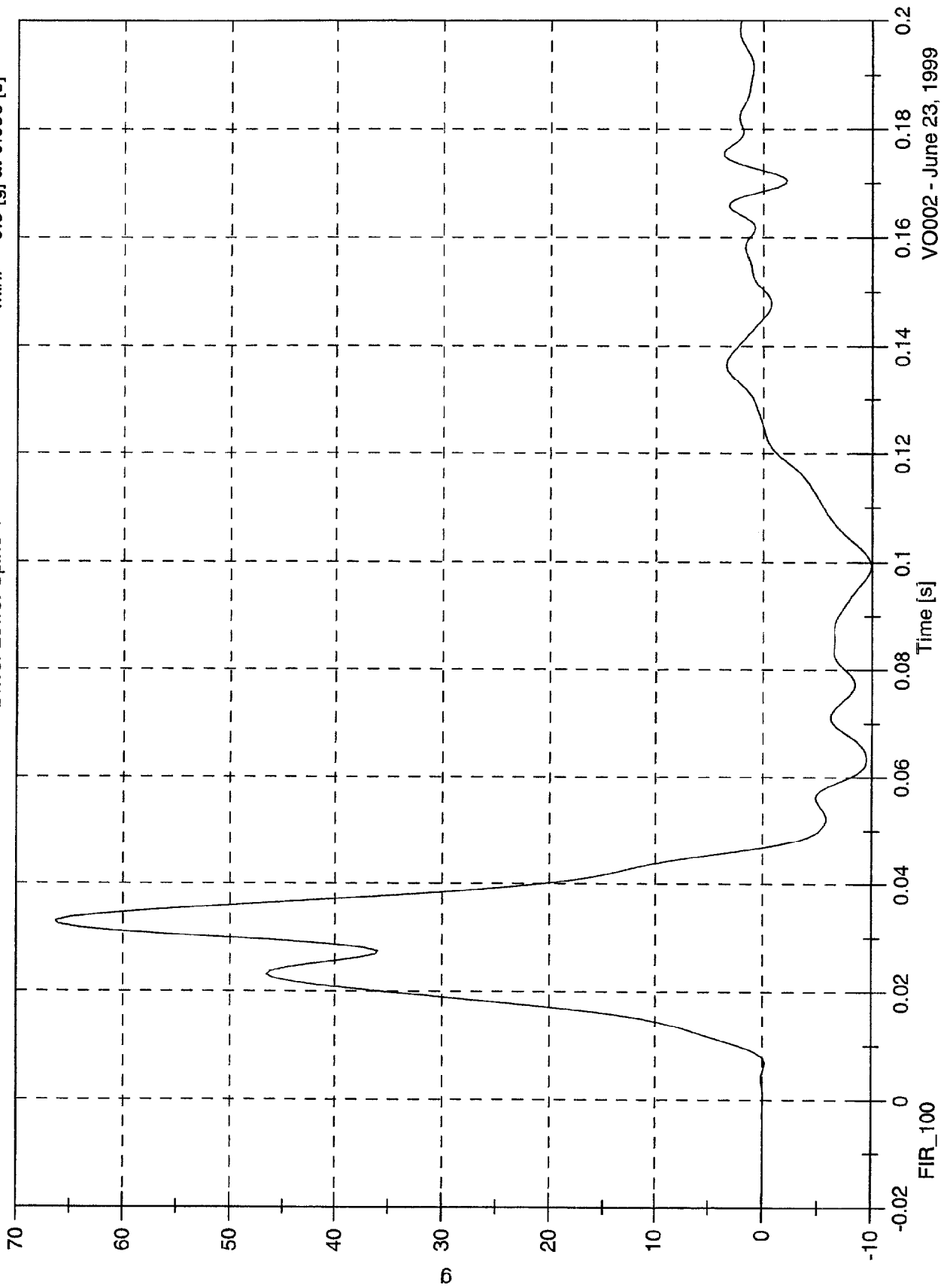


SNCAP Test#1 Volvo S80T6

Driver Lower Spine Y

Max: 66.3 [g] at 0.033 [s]

Min: -9.9 [g] at 0.099 [s]



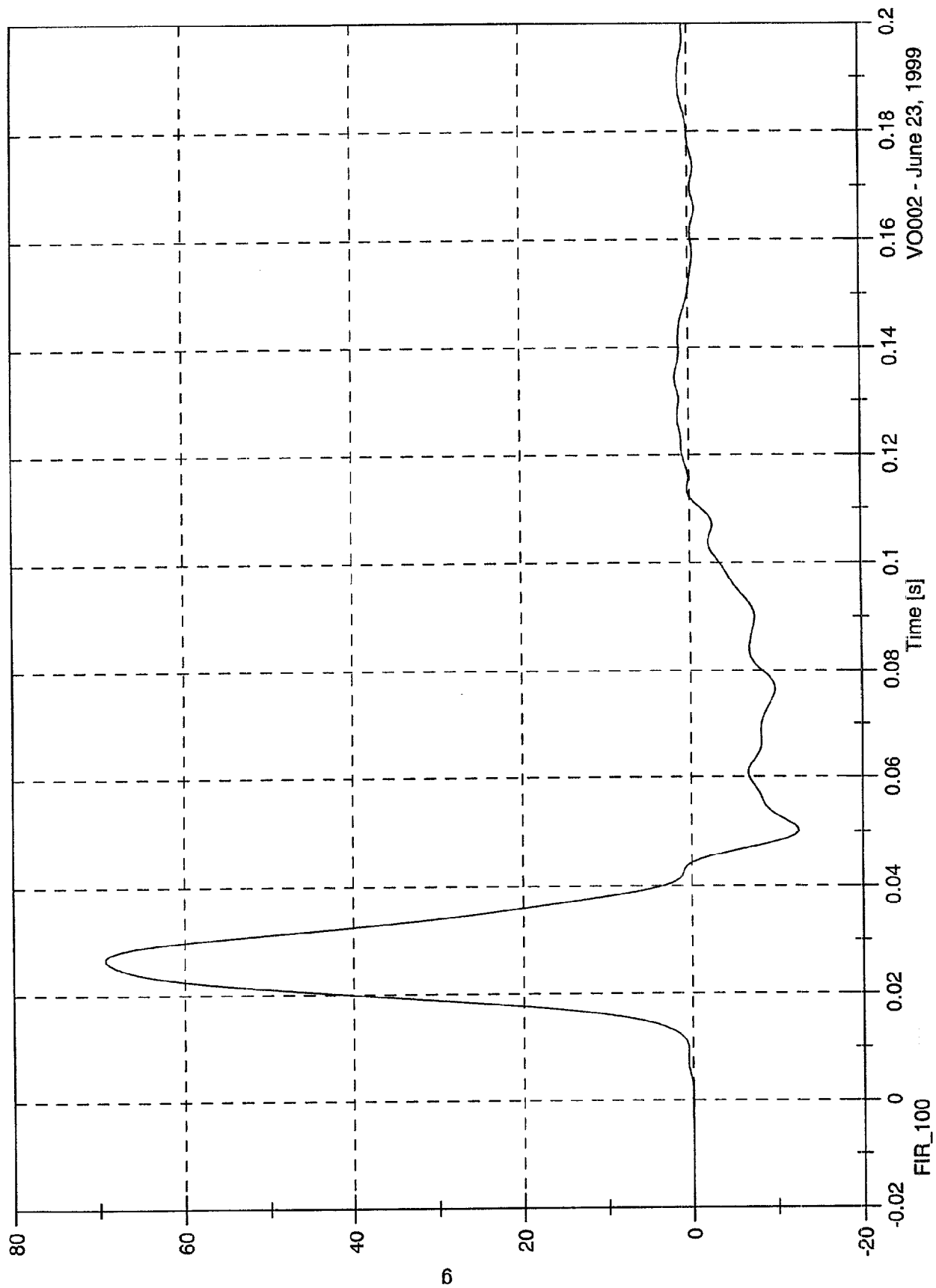
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 69.3 [g] at 0.027 [s]

Min: -12.5 [g] at 0.050 [s]

Driver Pelvic Y



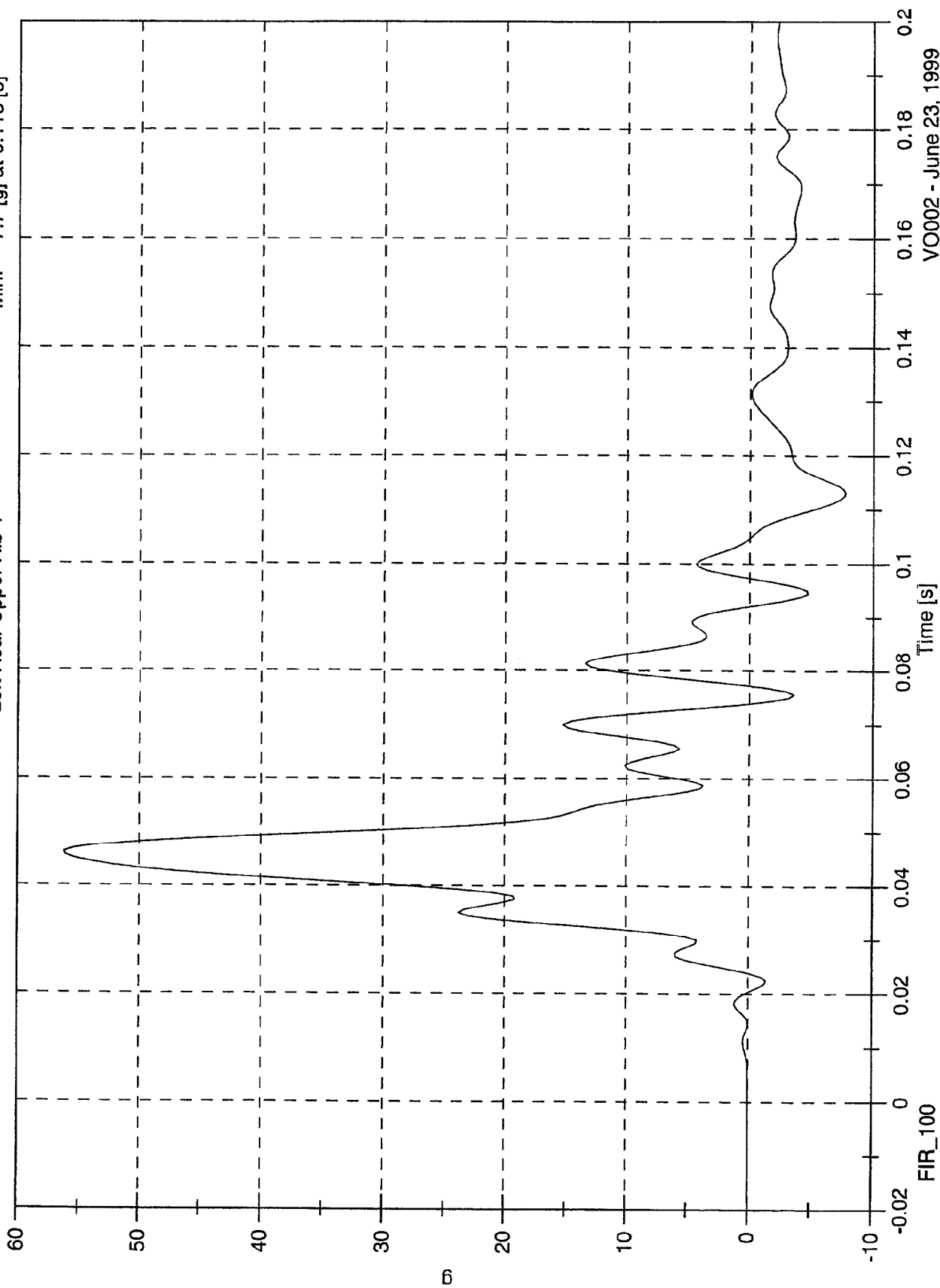
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Left Rear Upper Rib Y

Max: 56.2 [g] at 0.046 [s]

Min: -7.7 [g] at 0.113 [s]

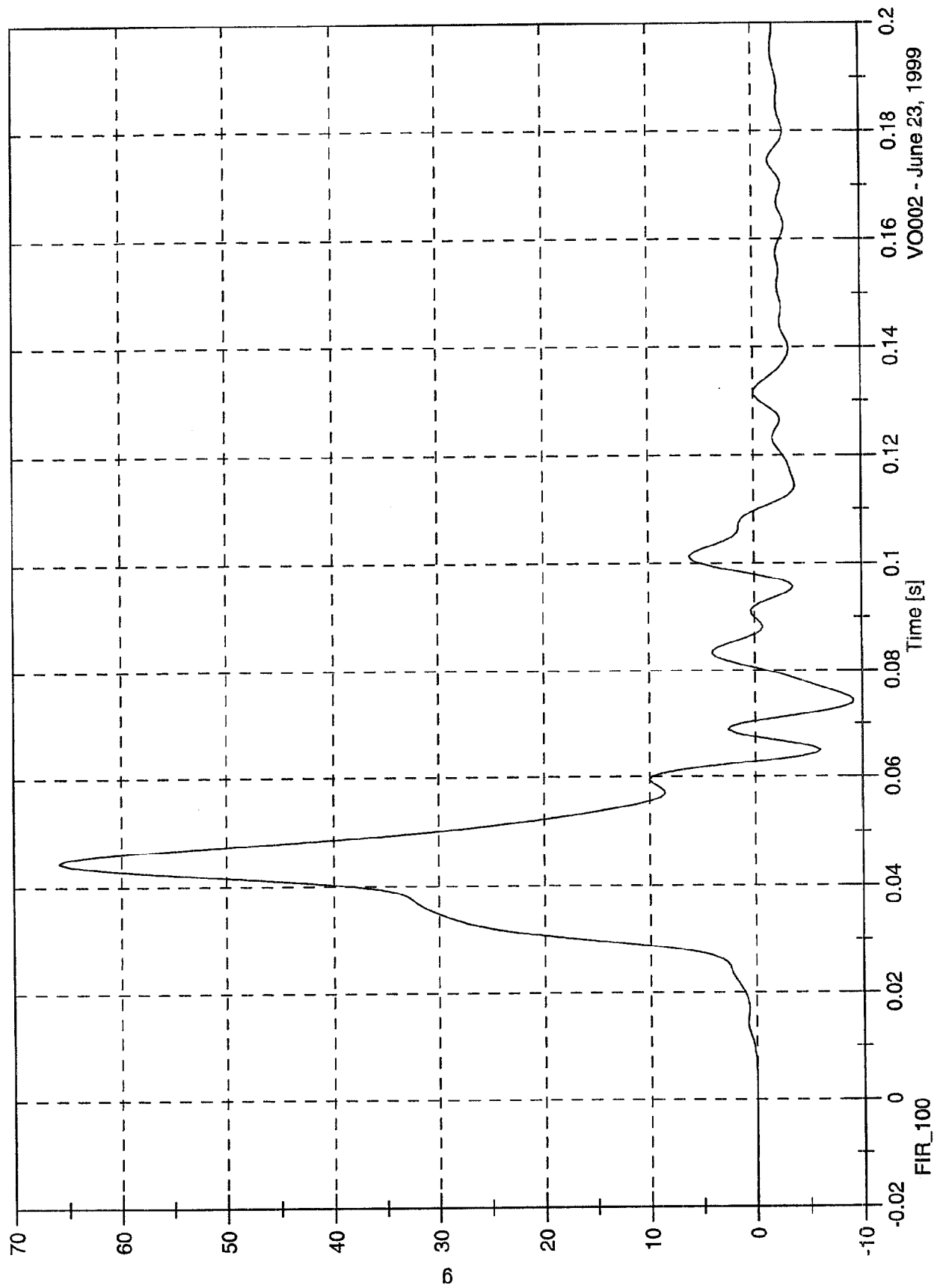


SNCAP Test#1 Volvo S80T6

Max: 65.8 [g] at 0.044 [s]

Min: -9.1 [g] at 0.074 [s]

Left Rear Lower Rib Y

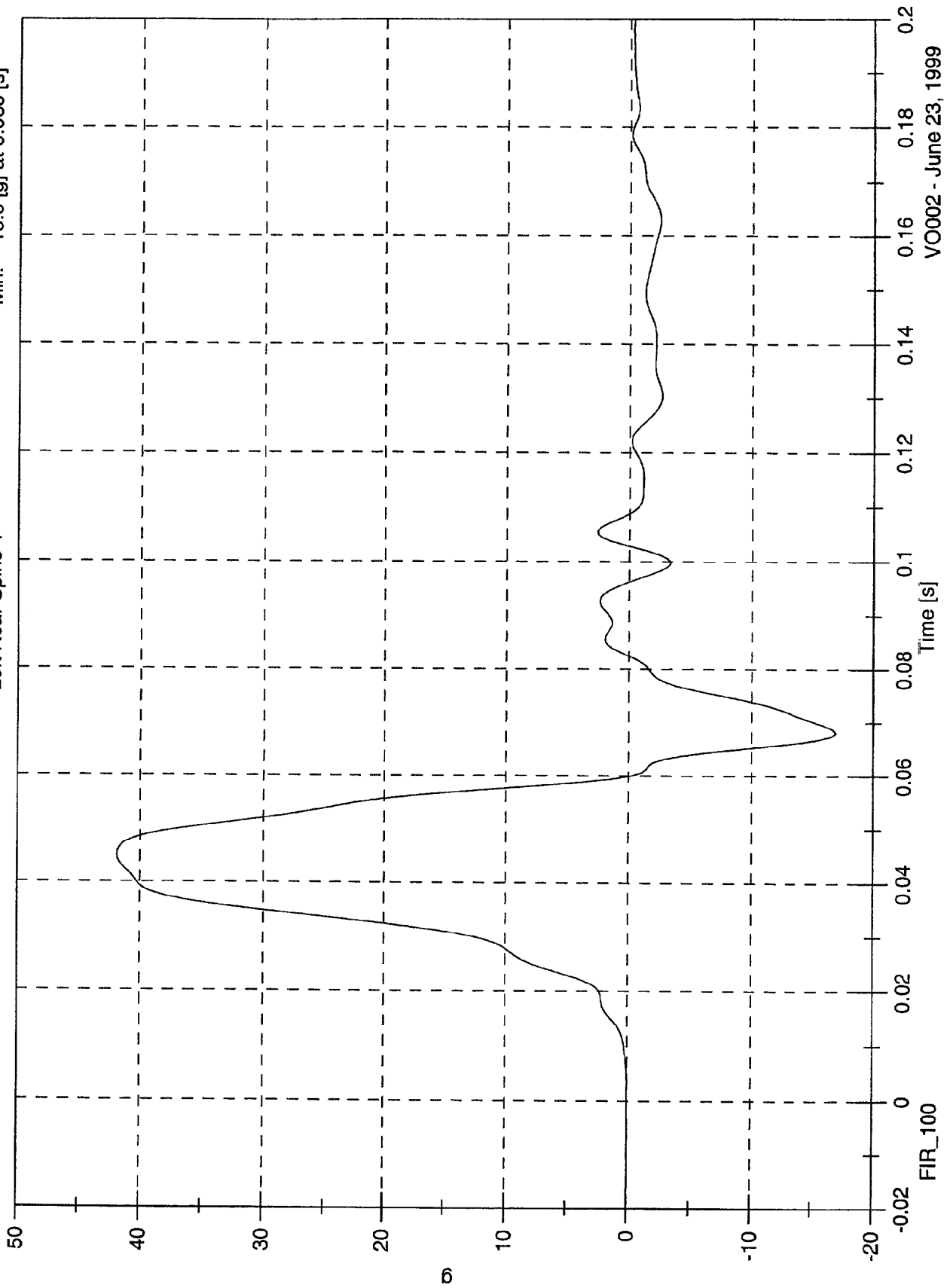


VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 41.9 [g] at 0.045 [s]
Min: -16.9 [g] at 0.068 [s]

Left Rear Spine Y

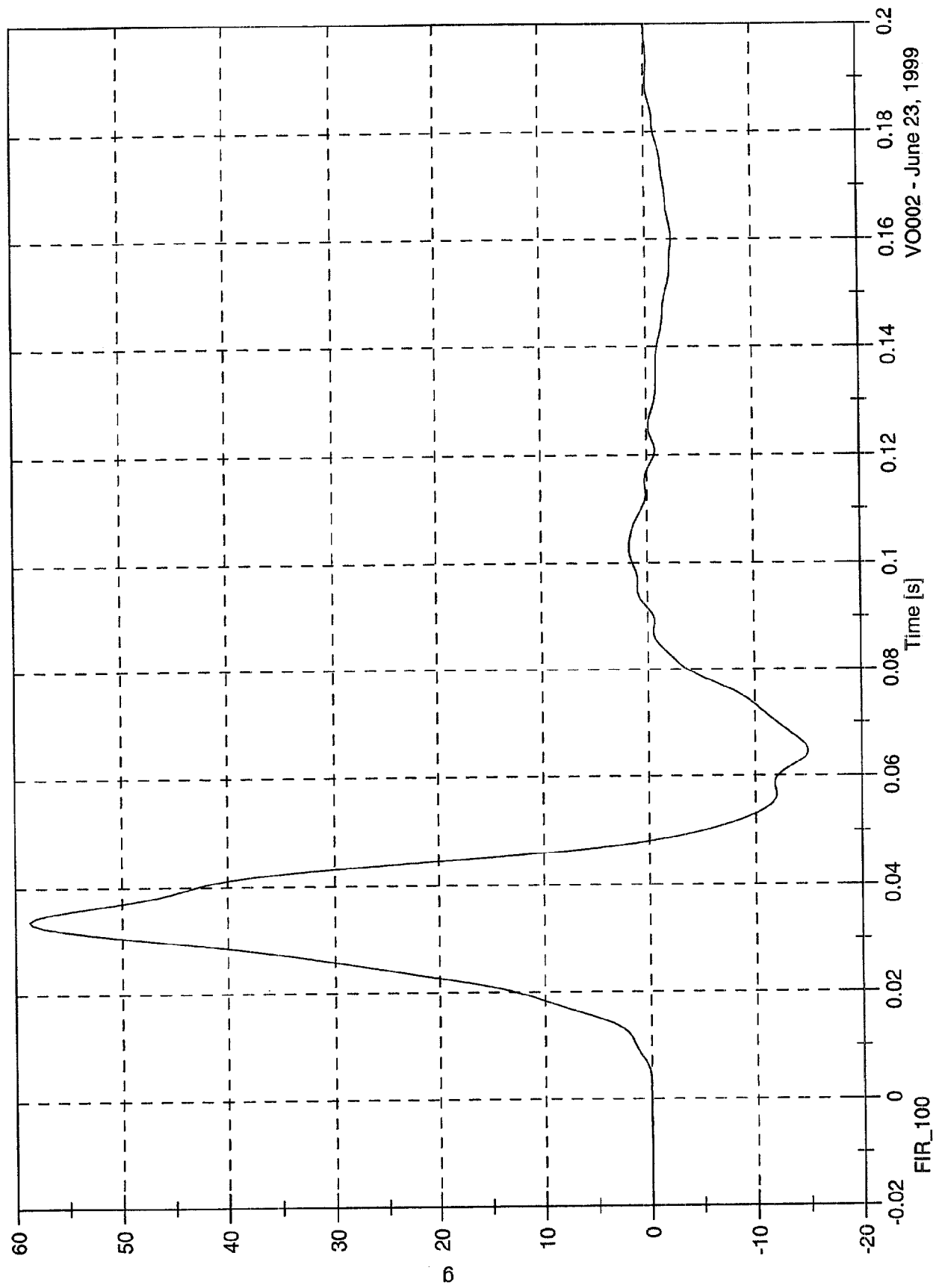


VO002 - June 23, 1999

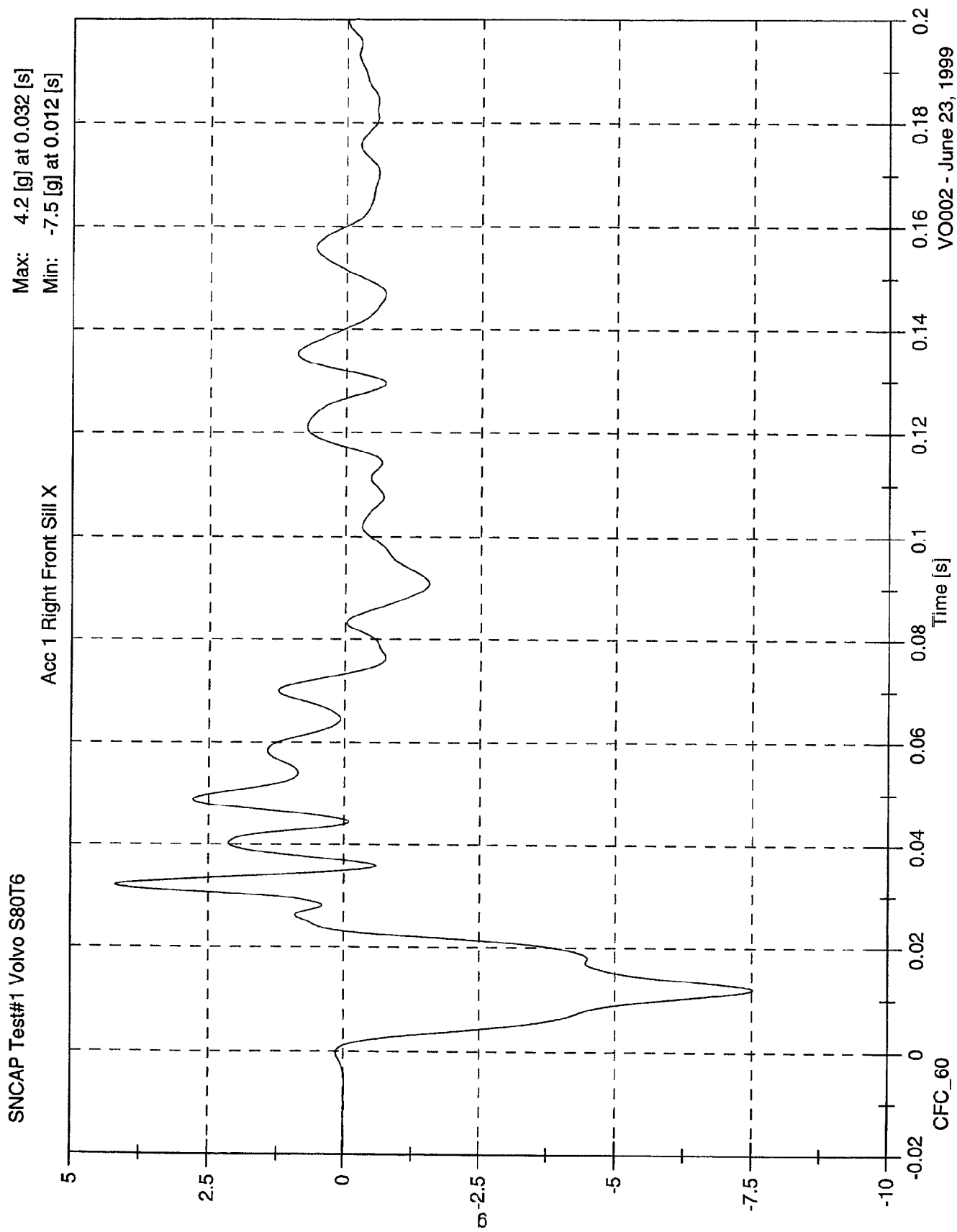
SNCAP Test#1 Volvo S80T6

Max: 58.7 [g] at 0.034 [s]
Min: -14.9 [g] at 0.064 [s]

Left Rear Pelvic Y



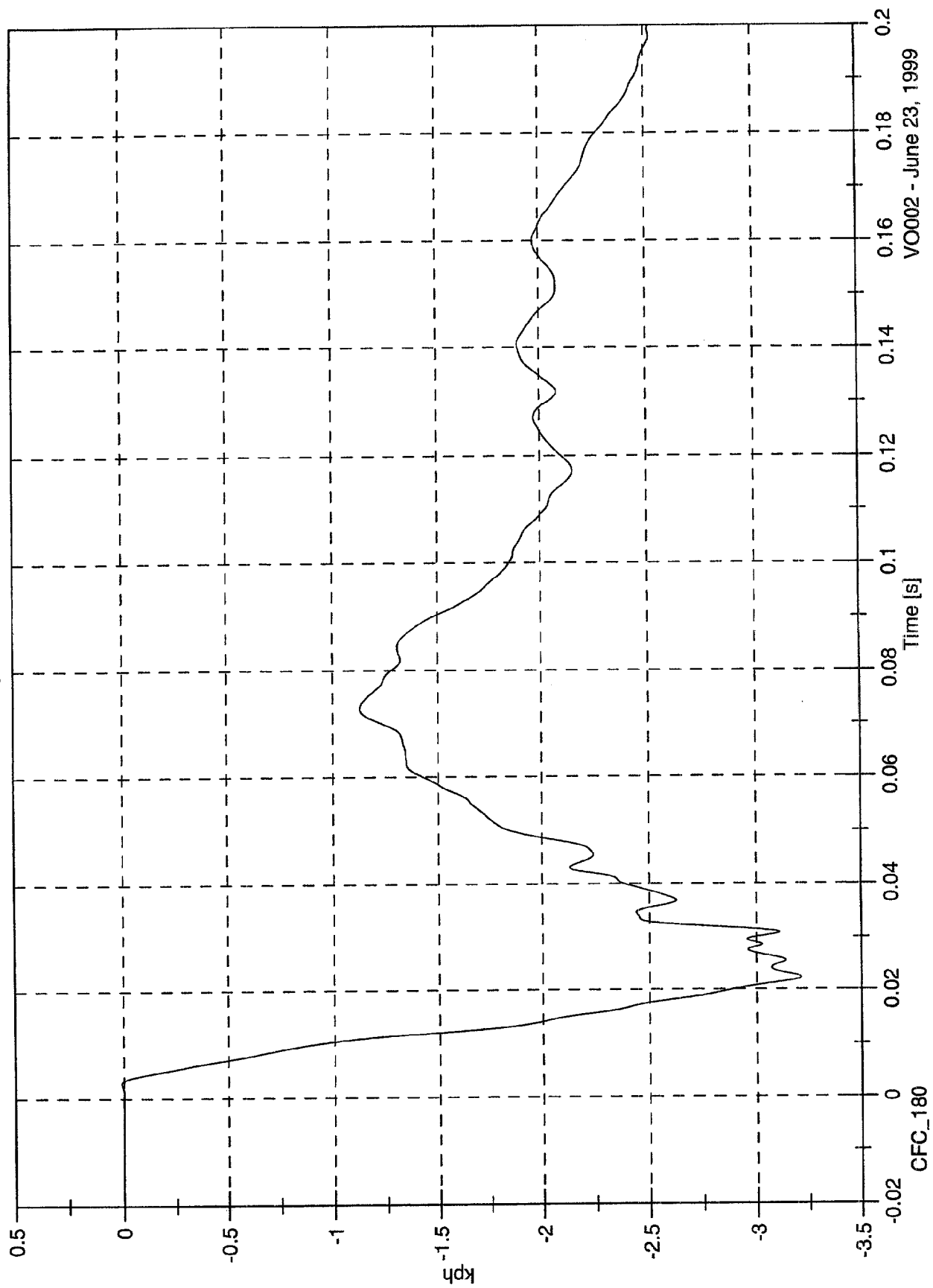
VO002 - June 23, 1999



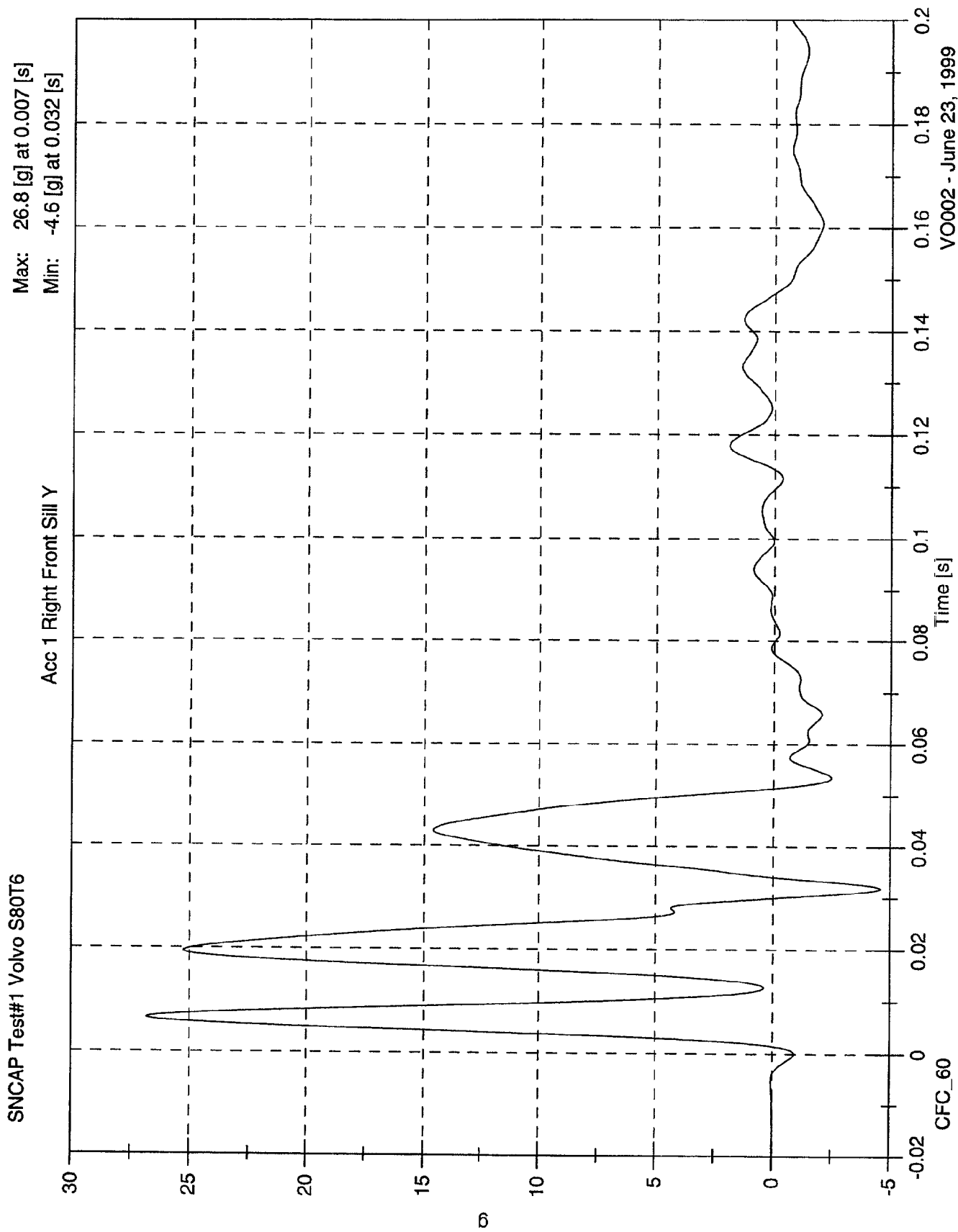
SNCAP Test#1 Volvo S80T6

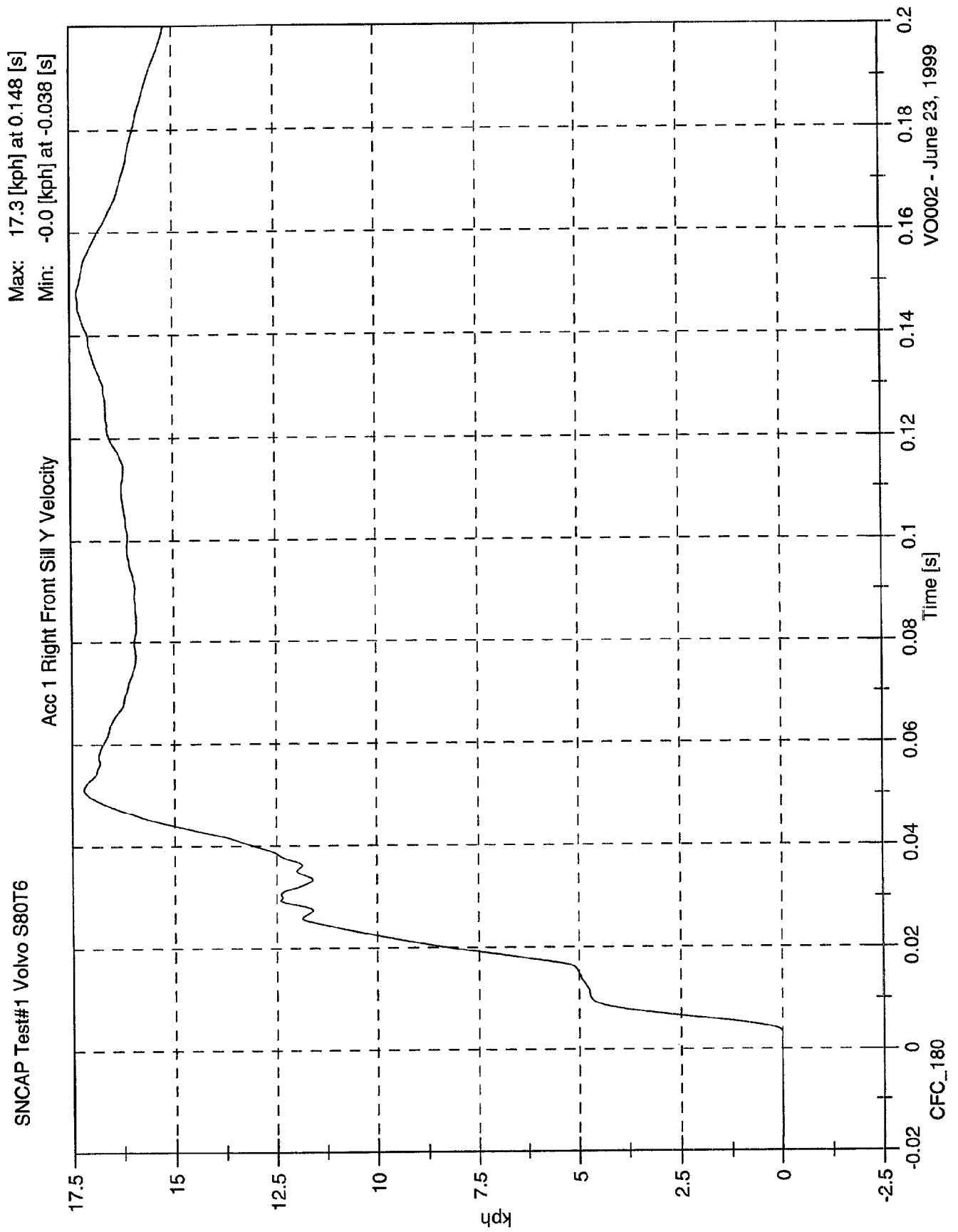
Max: 0.0 [kph] at 0.003 [s]
Min: -3.2 [kph] at 0.022 [s]

Acc 1 Right Front Sill X Velocity



VO002 - June 23, 1999



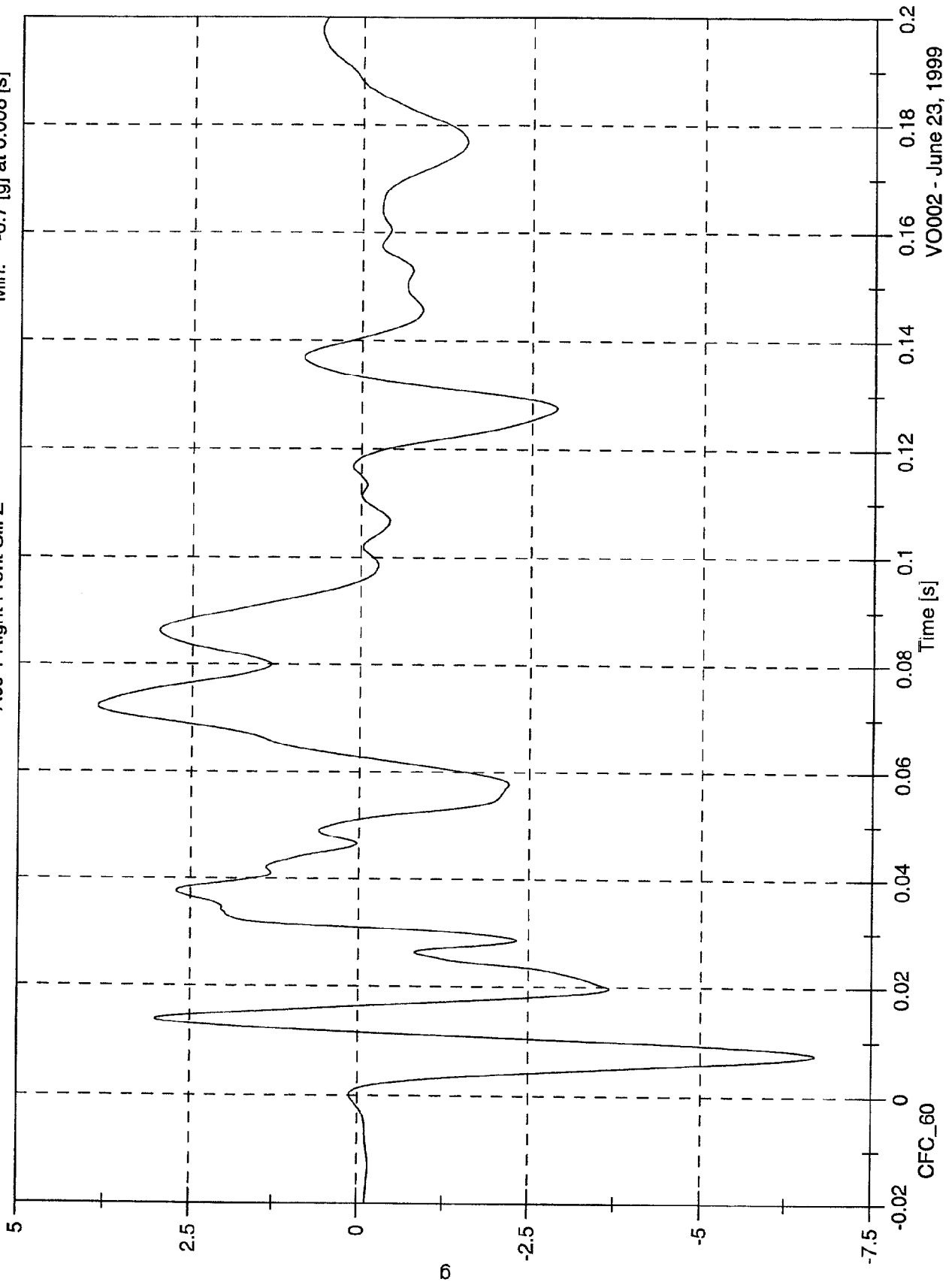


SNCAP Test#1 Volvo S80T6

Acc 1 Right Front Sill Z

Max: 3.9 [g] at 0.072 [s]

Min: -6.7 [g] at 0.008 [s]

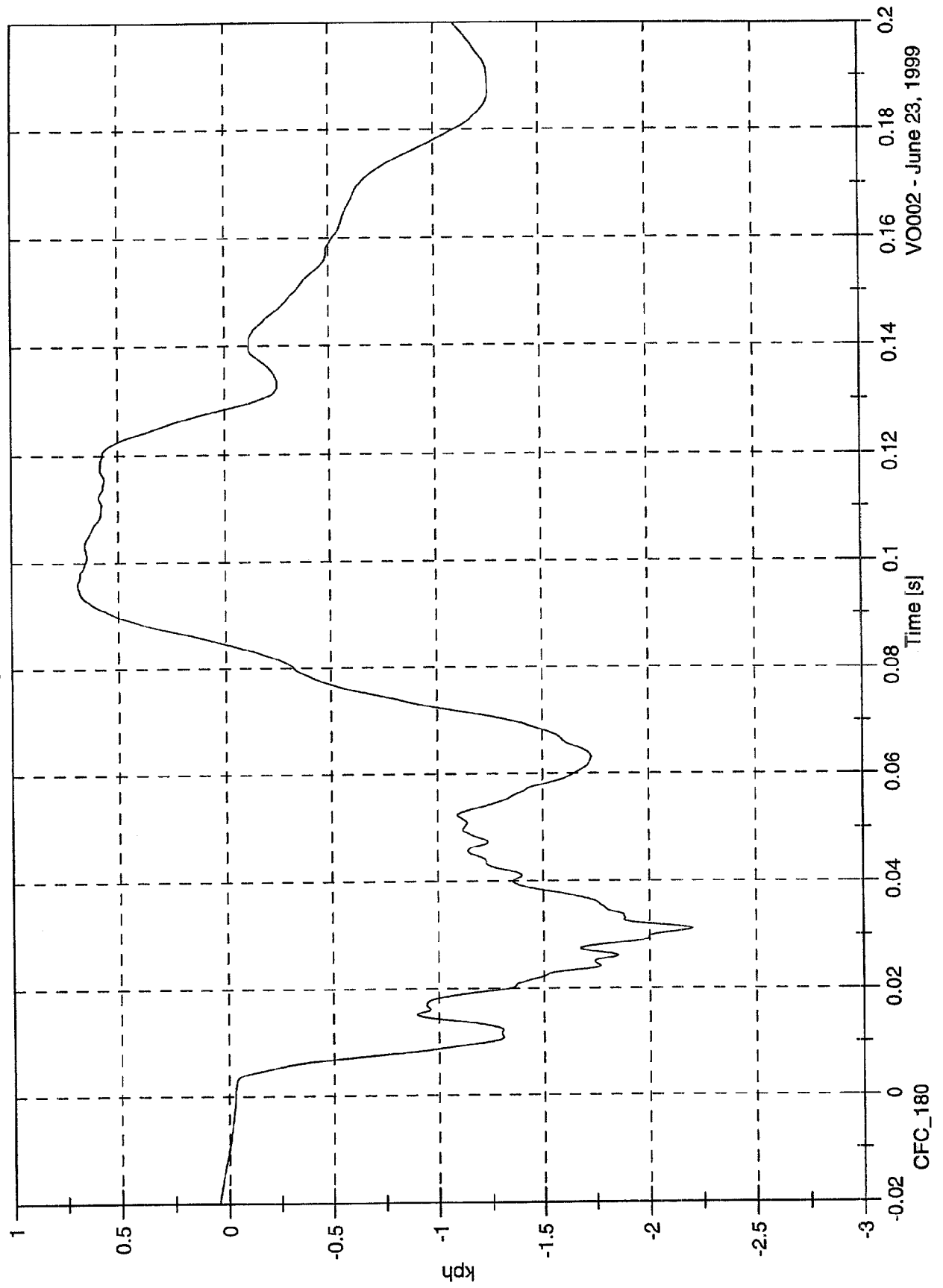


VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 0.7 [kph] at 0.096 [s]
Min: -2.9 [kph] at 0.342 [s]

Acc 1 Right Front Sill Z Velocity

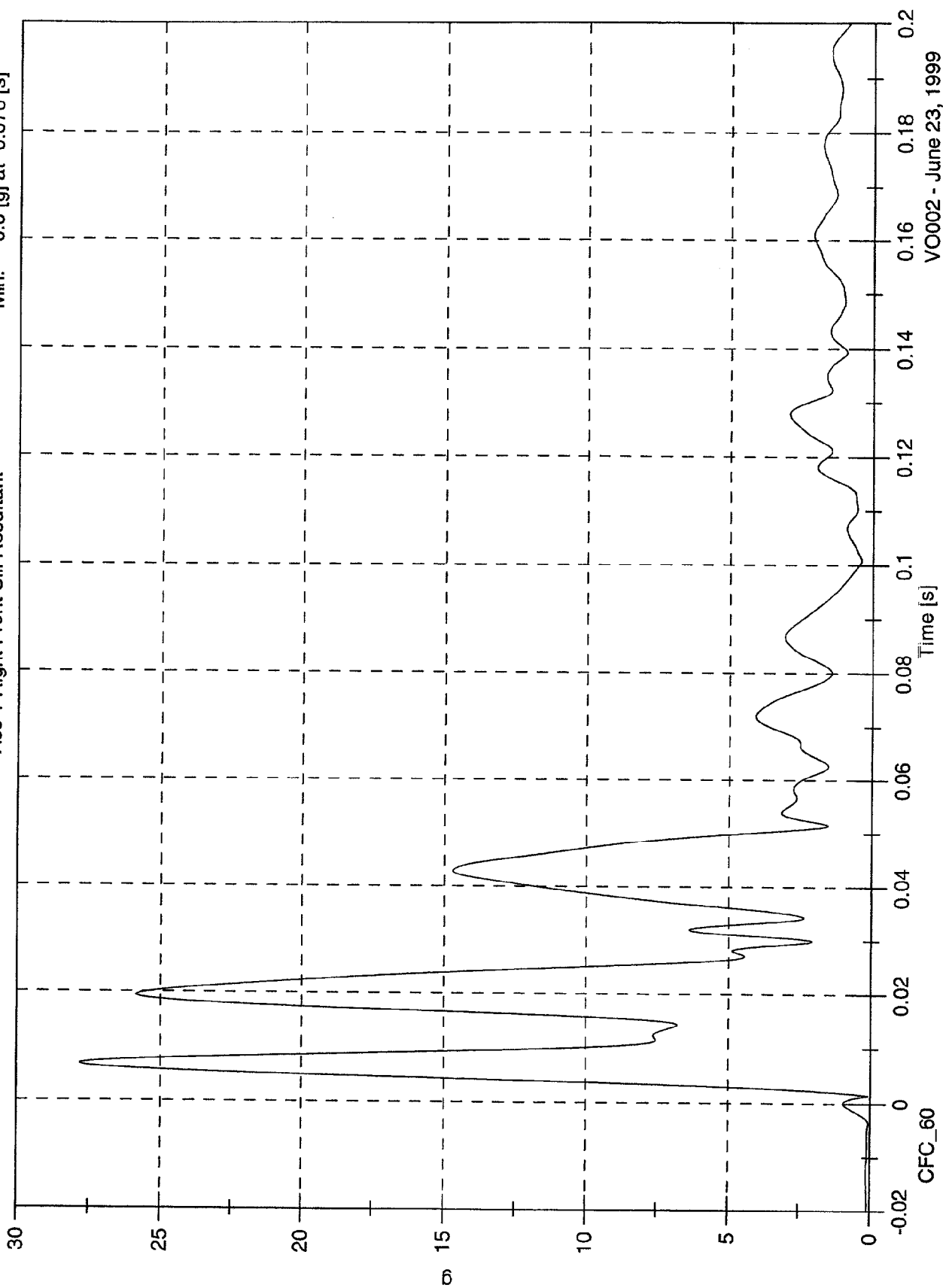


VO002 - June 23, 1999

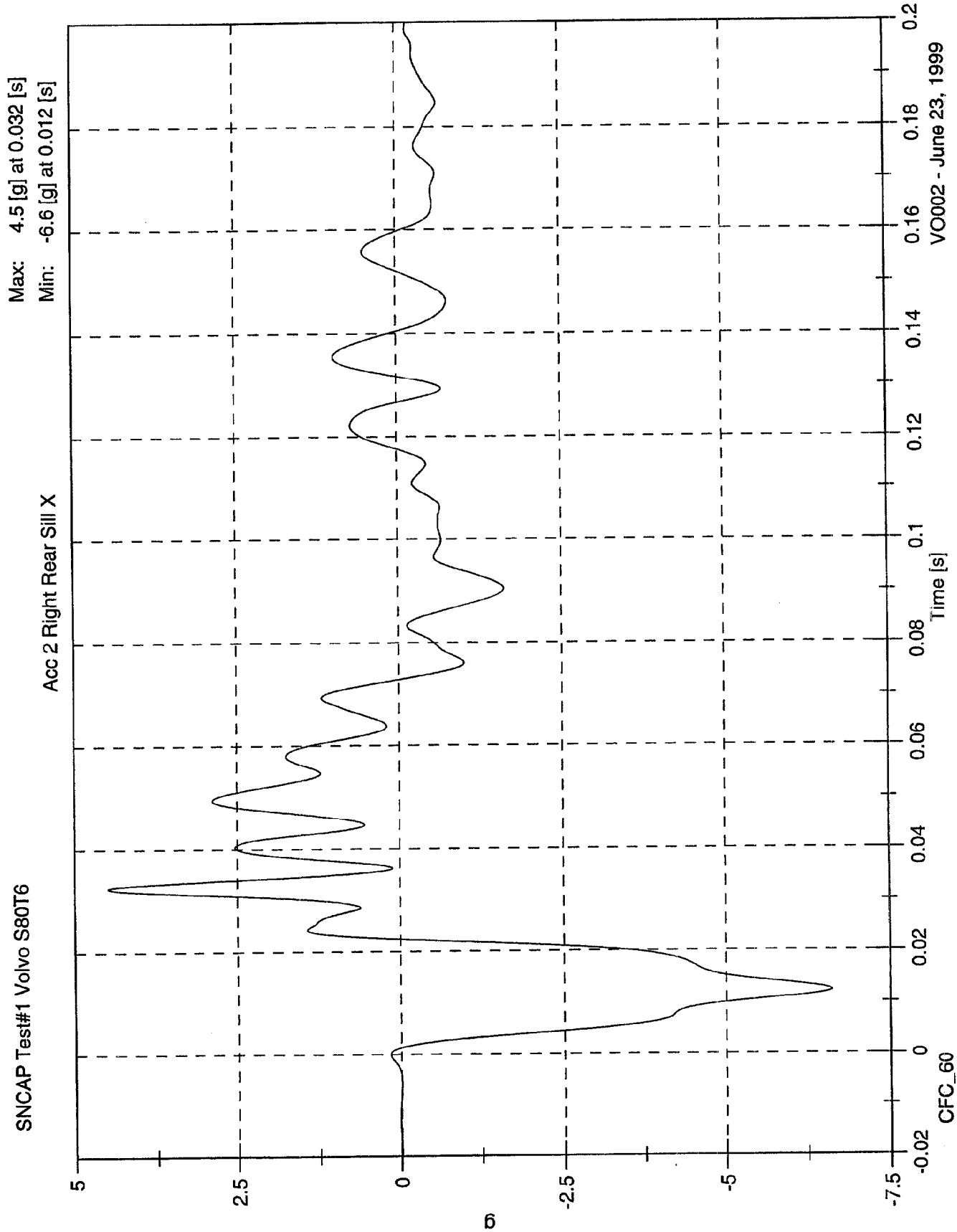
SNCAP Test#1 Volvo S80T6

Acc 1 Right Front Sill Resultant

Max: 27.8 [g] at 0.007 [s]
Min: 0.0 [g] at -0.078 [s]



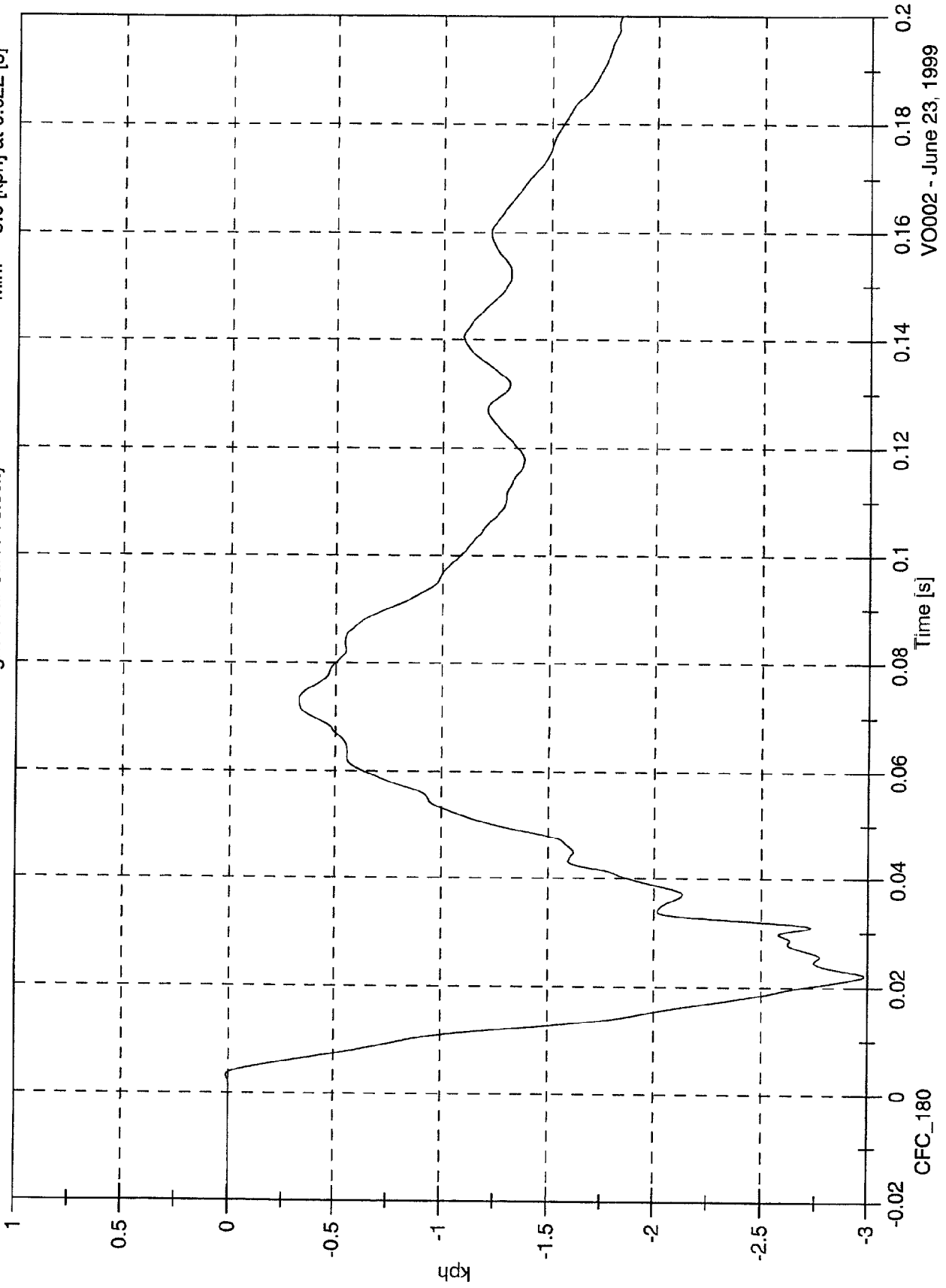
VO002 - June 23, 1999



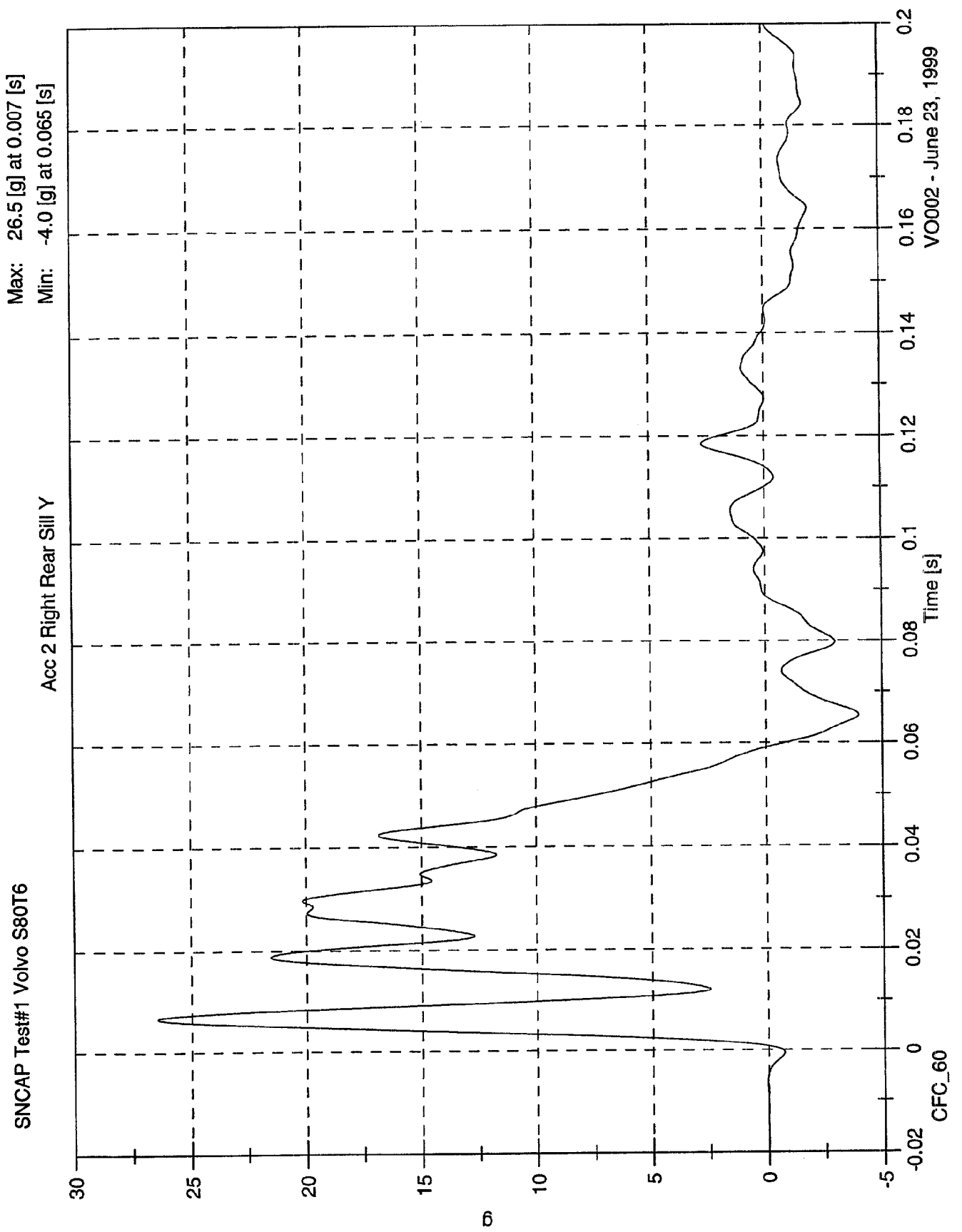
SNCAP Test#1 Volvo S80T6

Max: 0.5 [kph] at 0.500 [s]
Min: -3.0 [kph] at 0.022 [s]

Acc 2 Right Rear Sill X Velocity



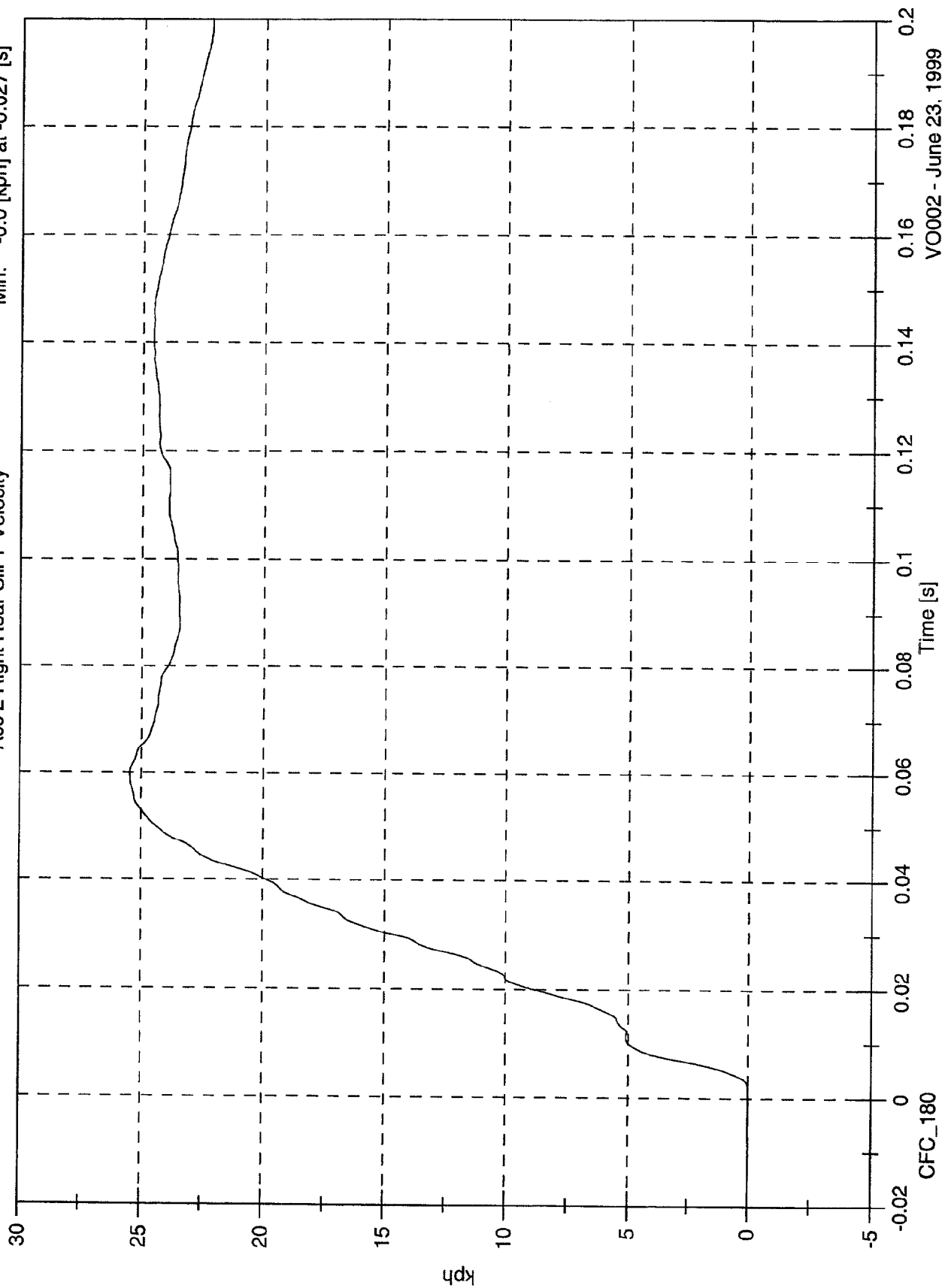
VO002 - June 23, 1999



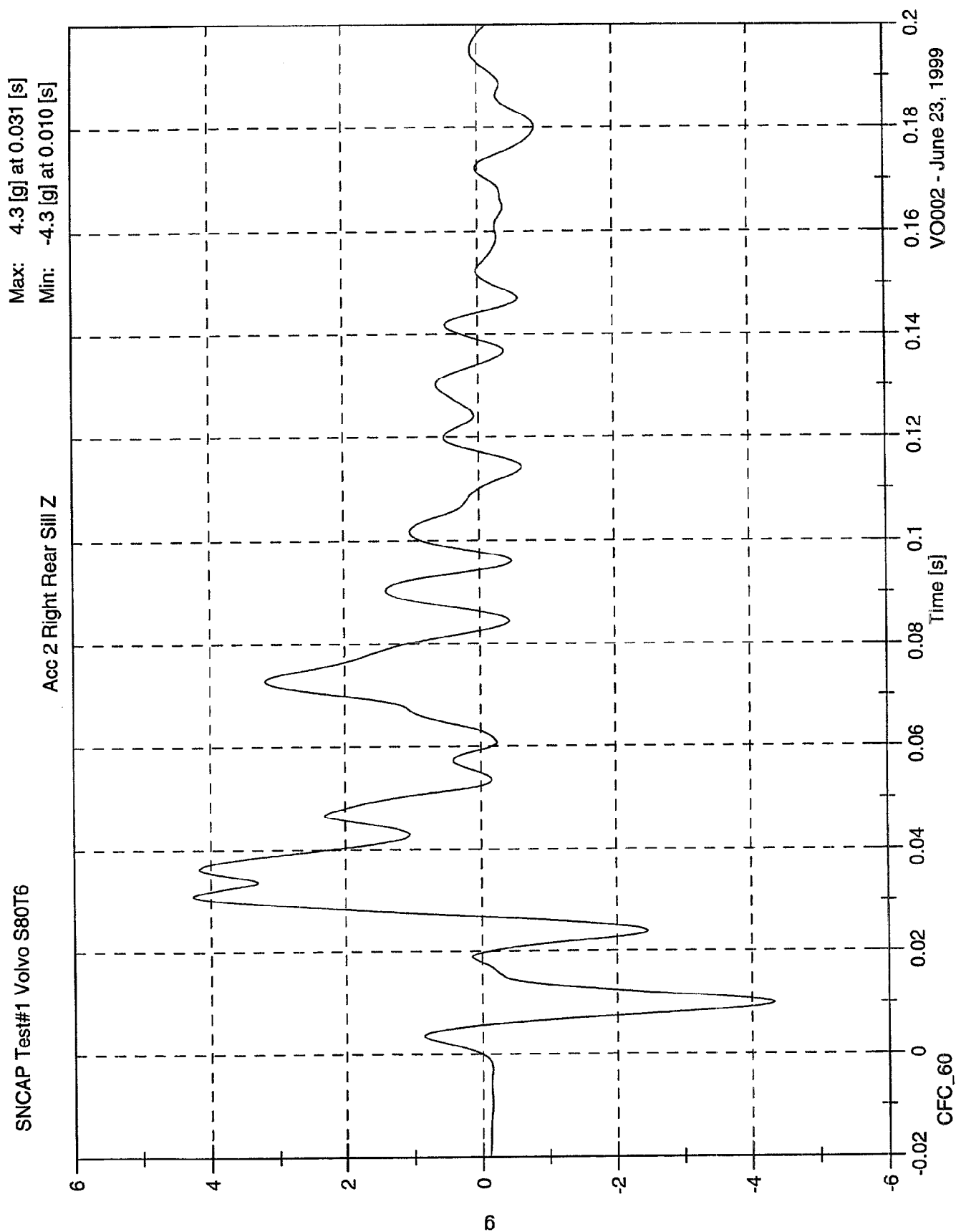
SNCAP Test#1 Volvo S80T6

Max: 25.5 [kph] at 0.060 [s]
Min: -0.0 [kph] at -0.027 [s]

Acc 2 Right Rear Sill Y Velocity



VO002 - June 23, 1999

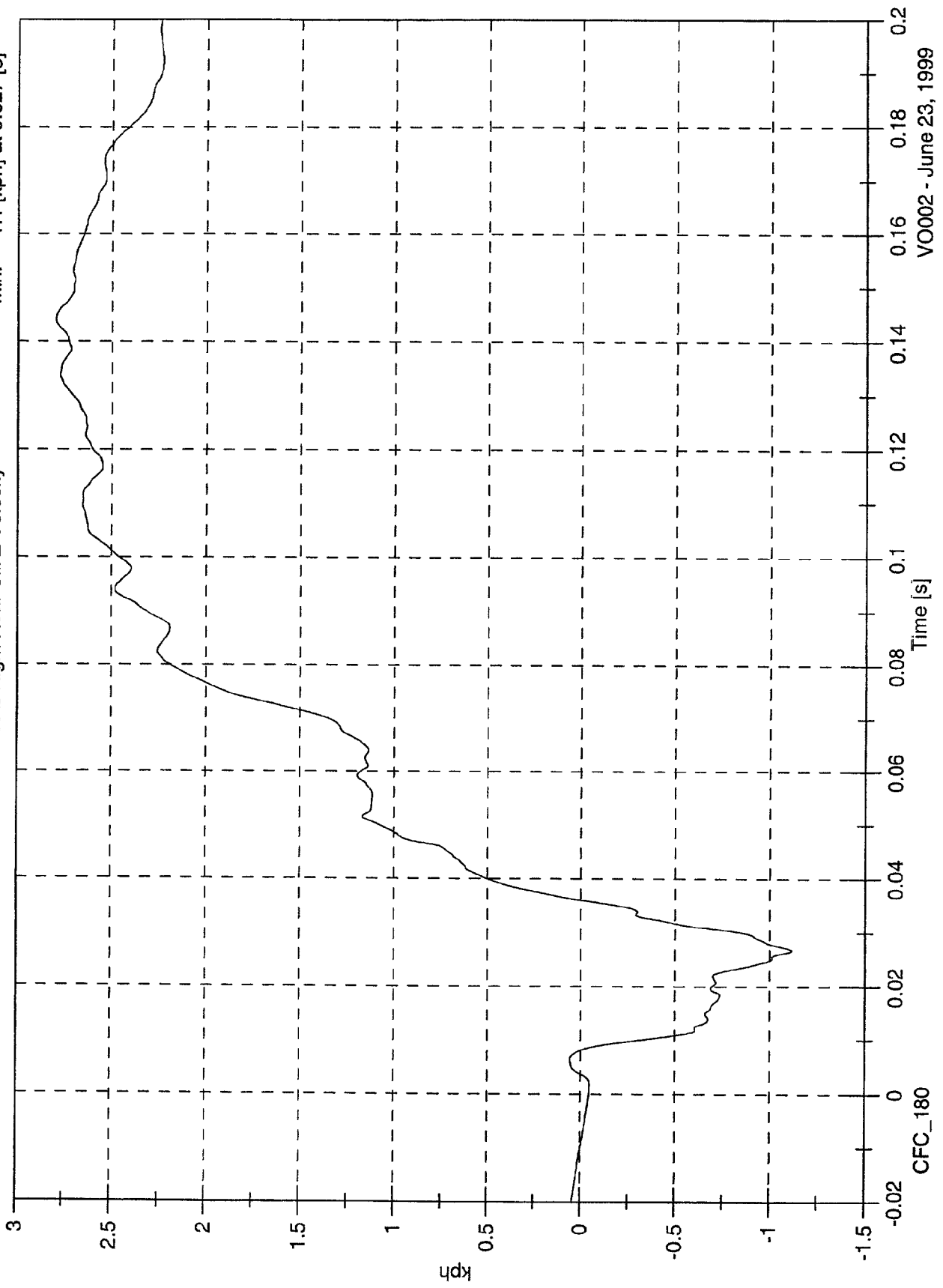


SNCAP Test#1 Volvo S80T6

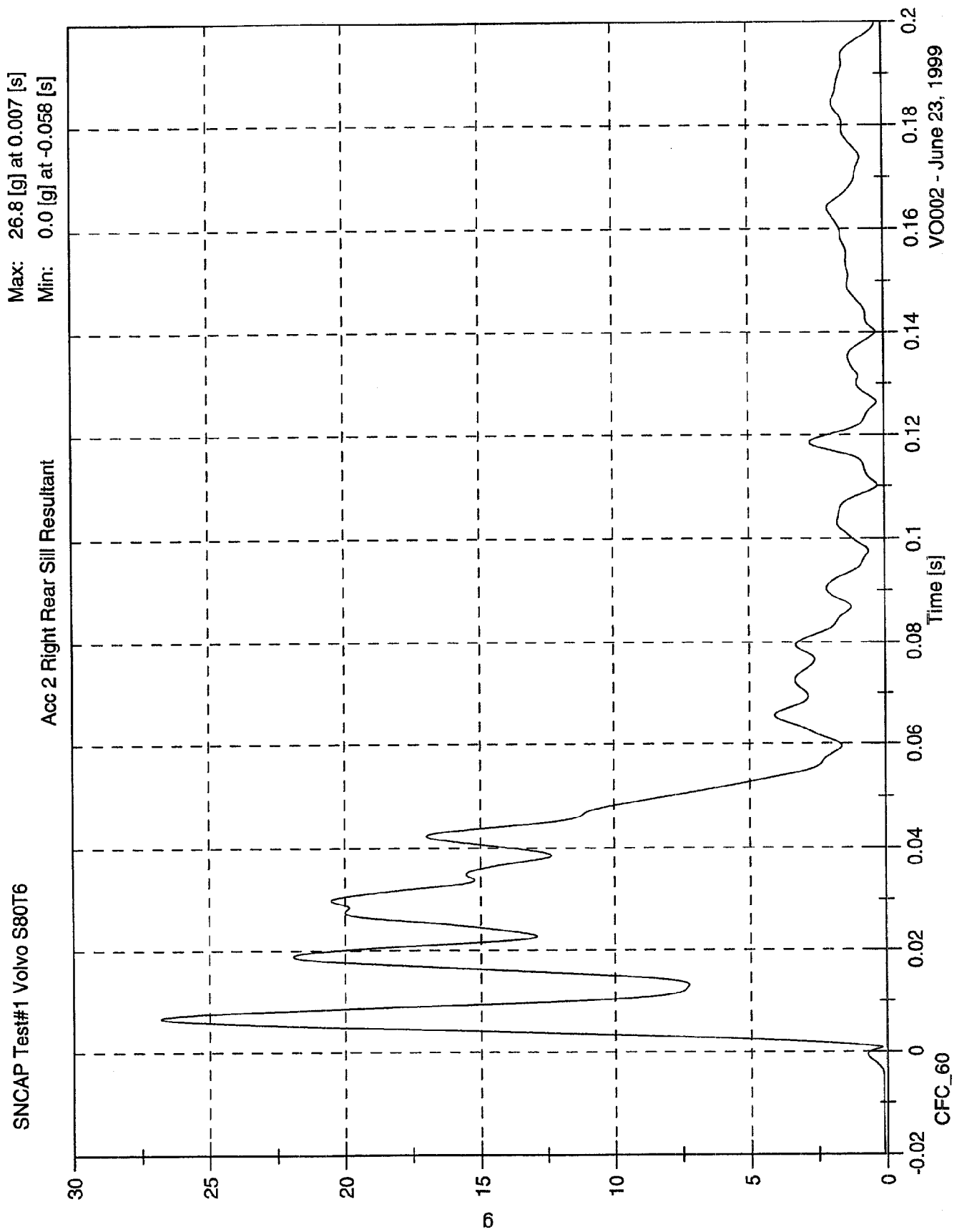
Max: 2.8 [kph] at 0.144 [s]

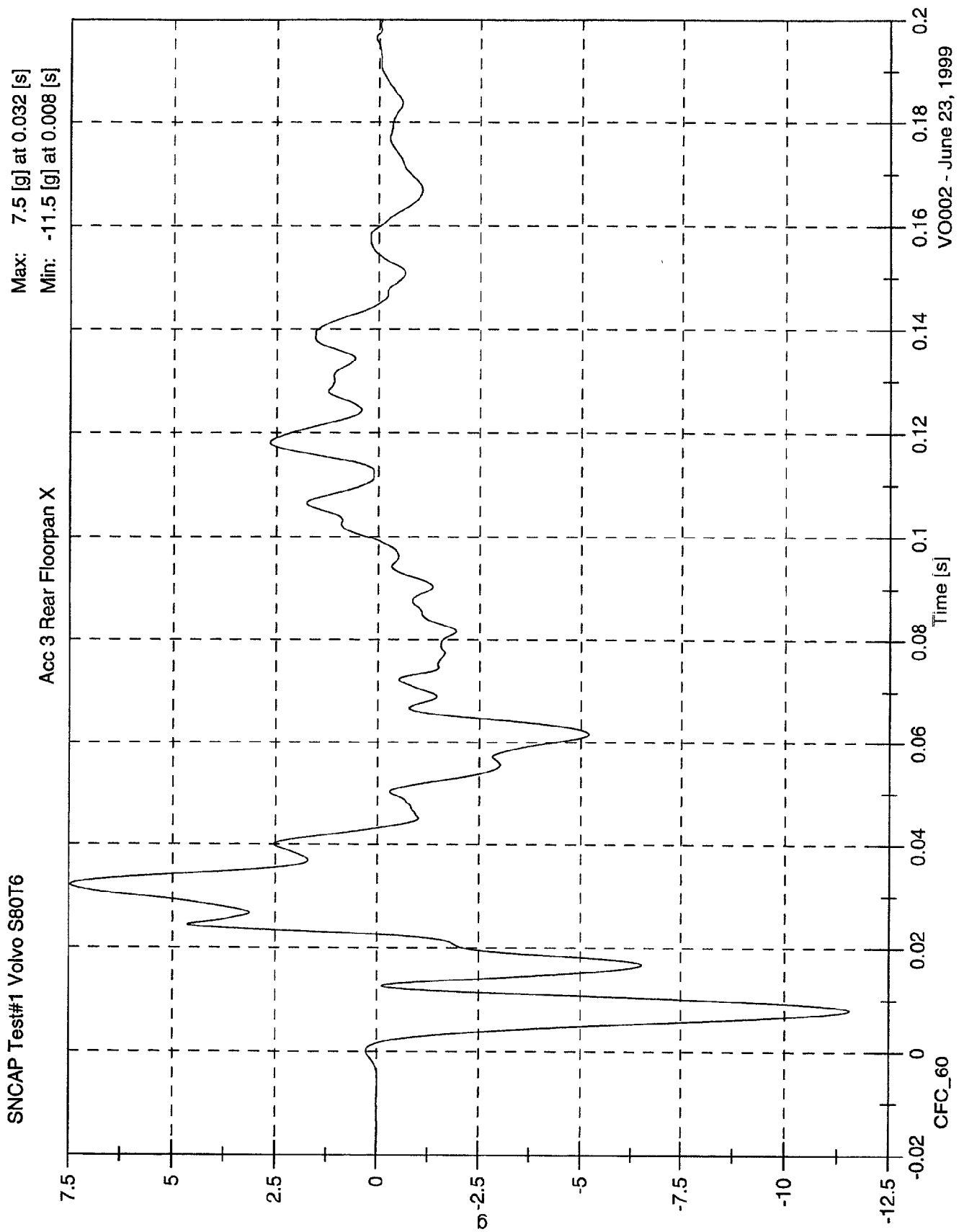
Min: -1.1 [kph] at 0.027 [s]

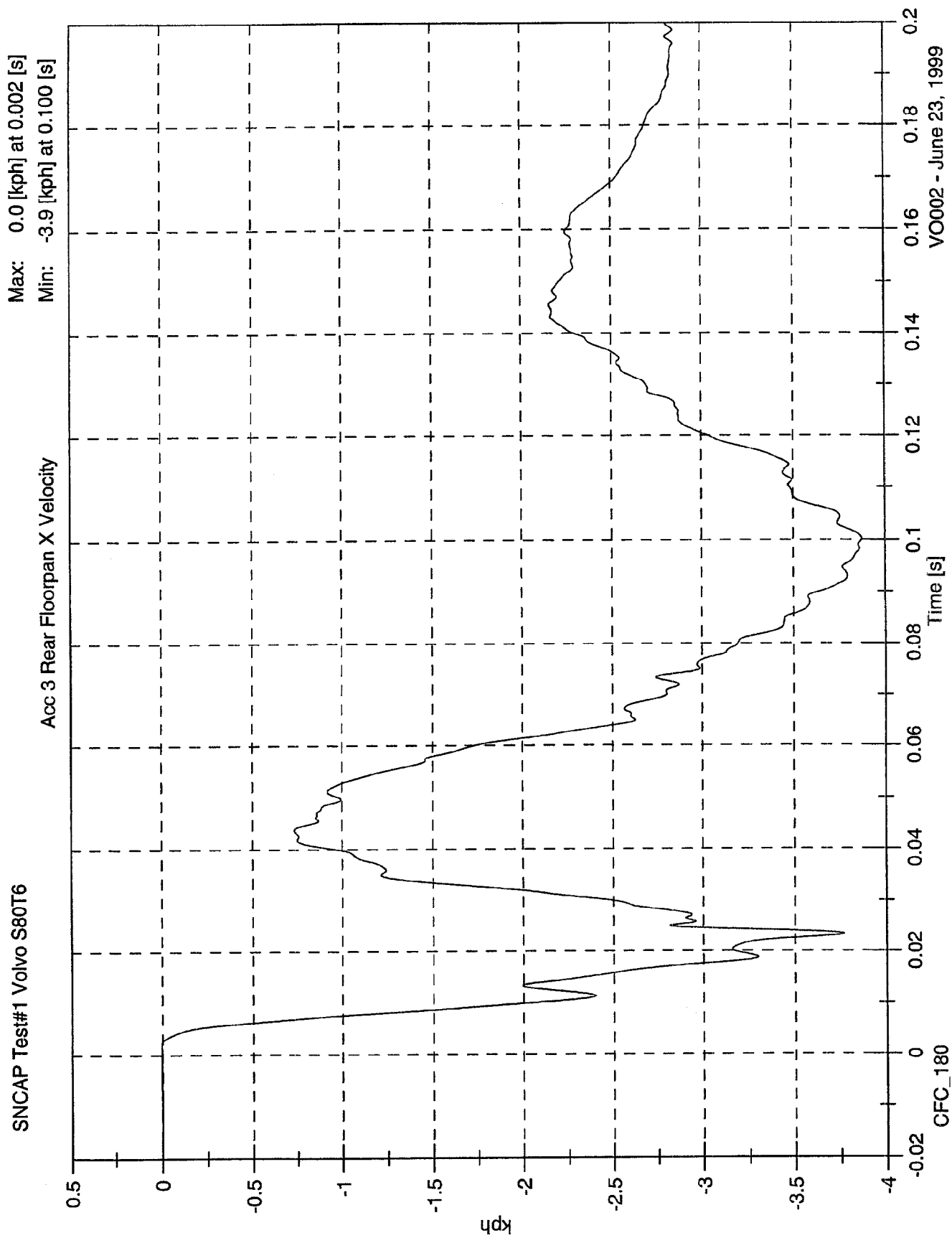
Acc 2 Right Rear Sill Z Velocity

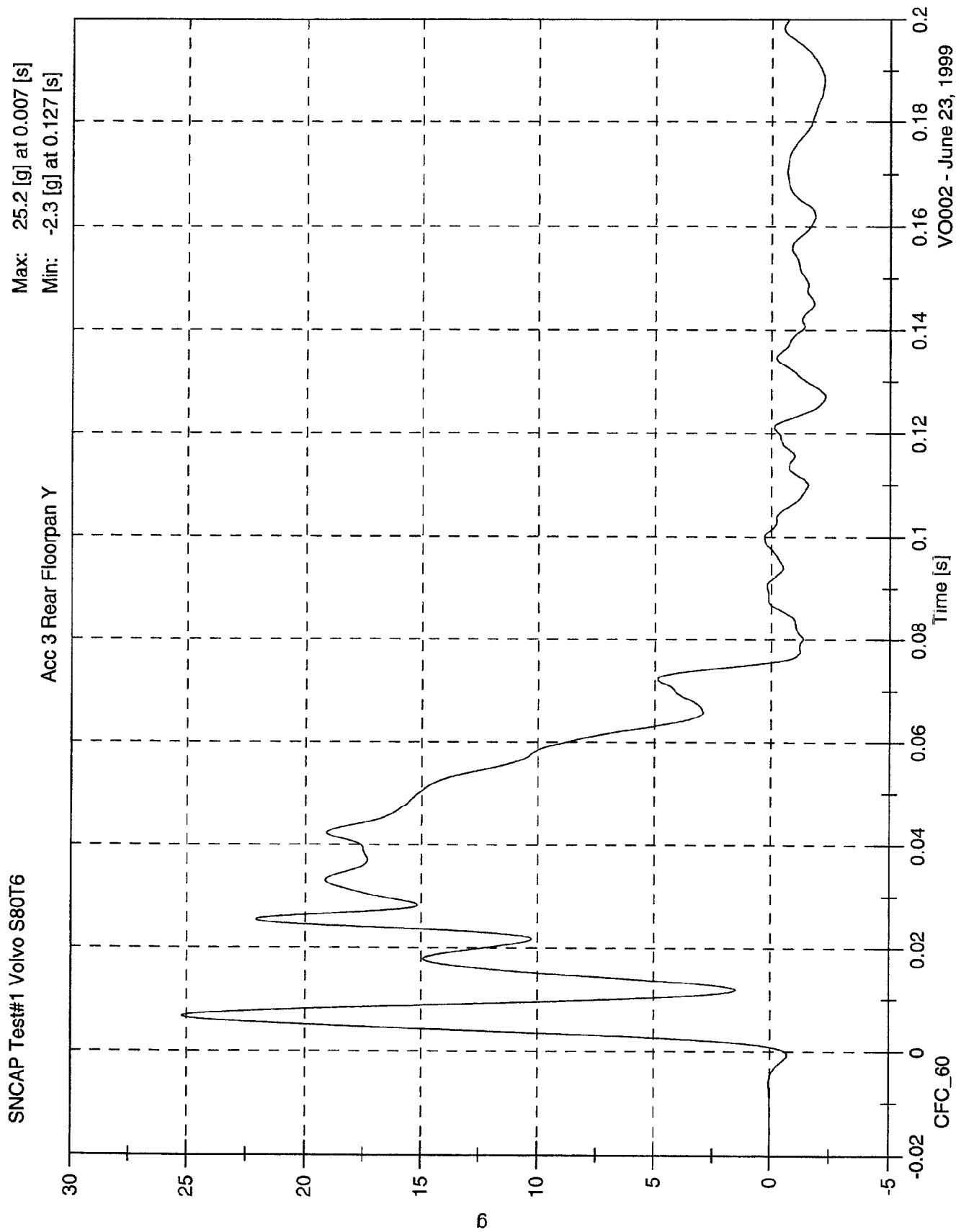


VO002 - June 23, 1999





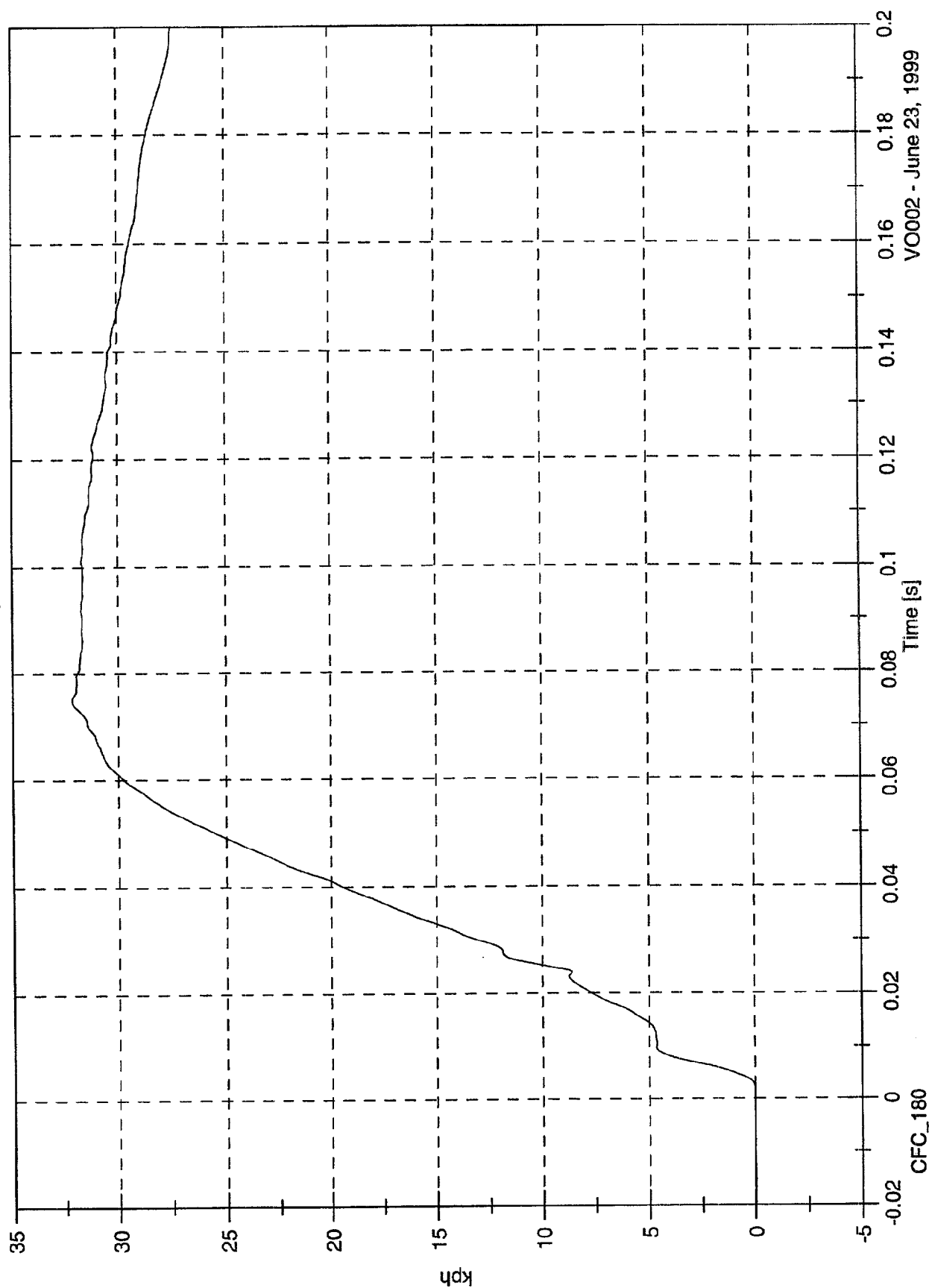




SNCAP Test#1 Volvo S80T6

Max: 32.2 [kph] at 0.075 [s]
Min: -0.0 [kph] at -0.068 [s]

Acc 3 Rear Floorpan Y Velocity



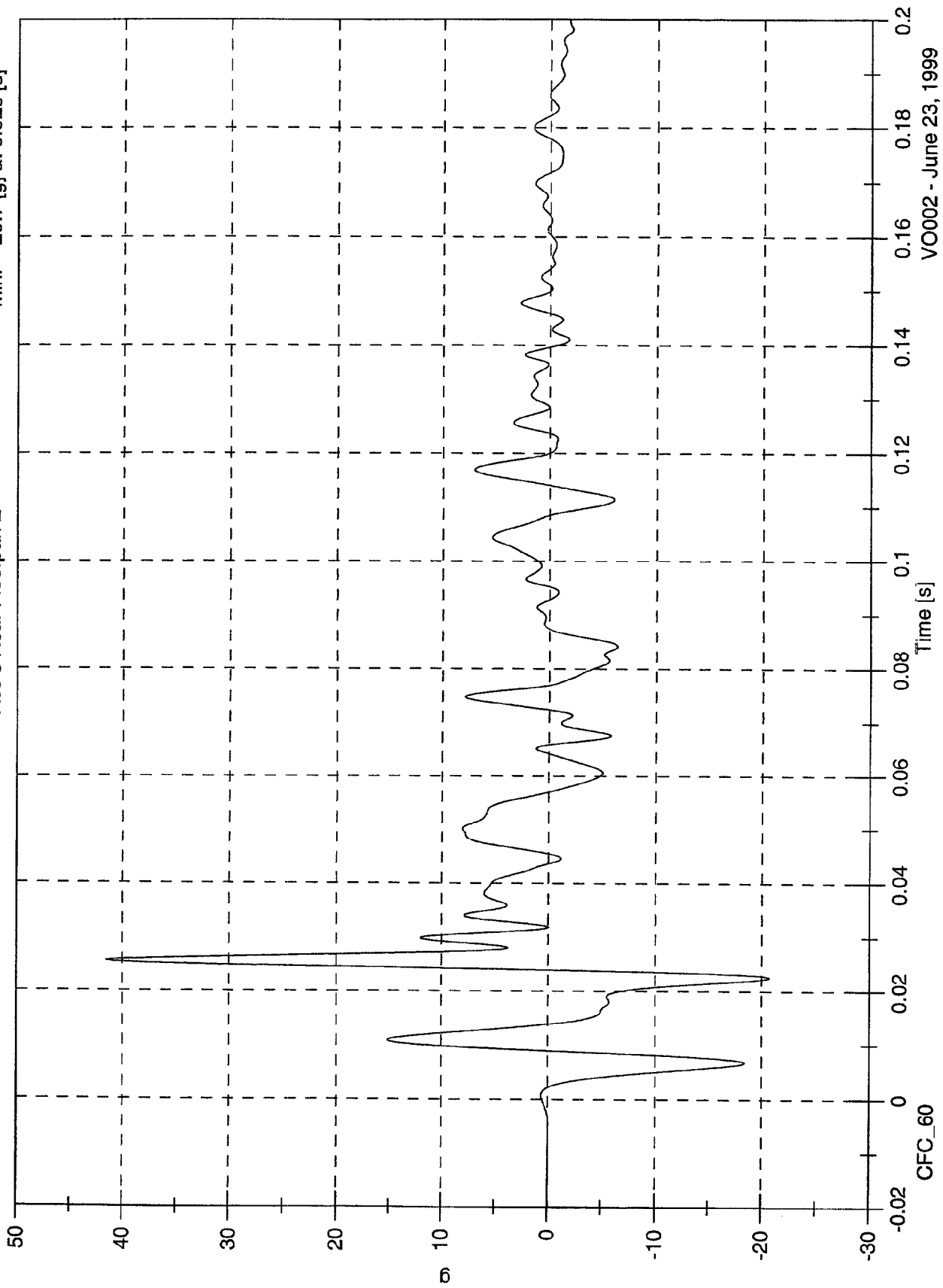
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

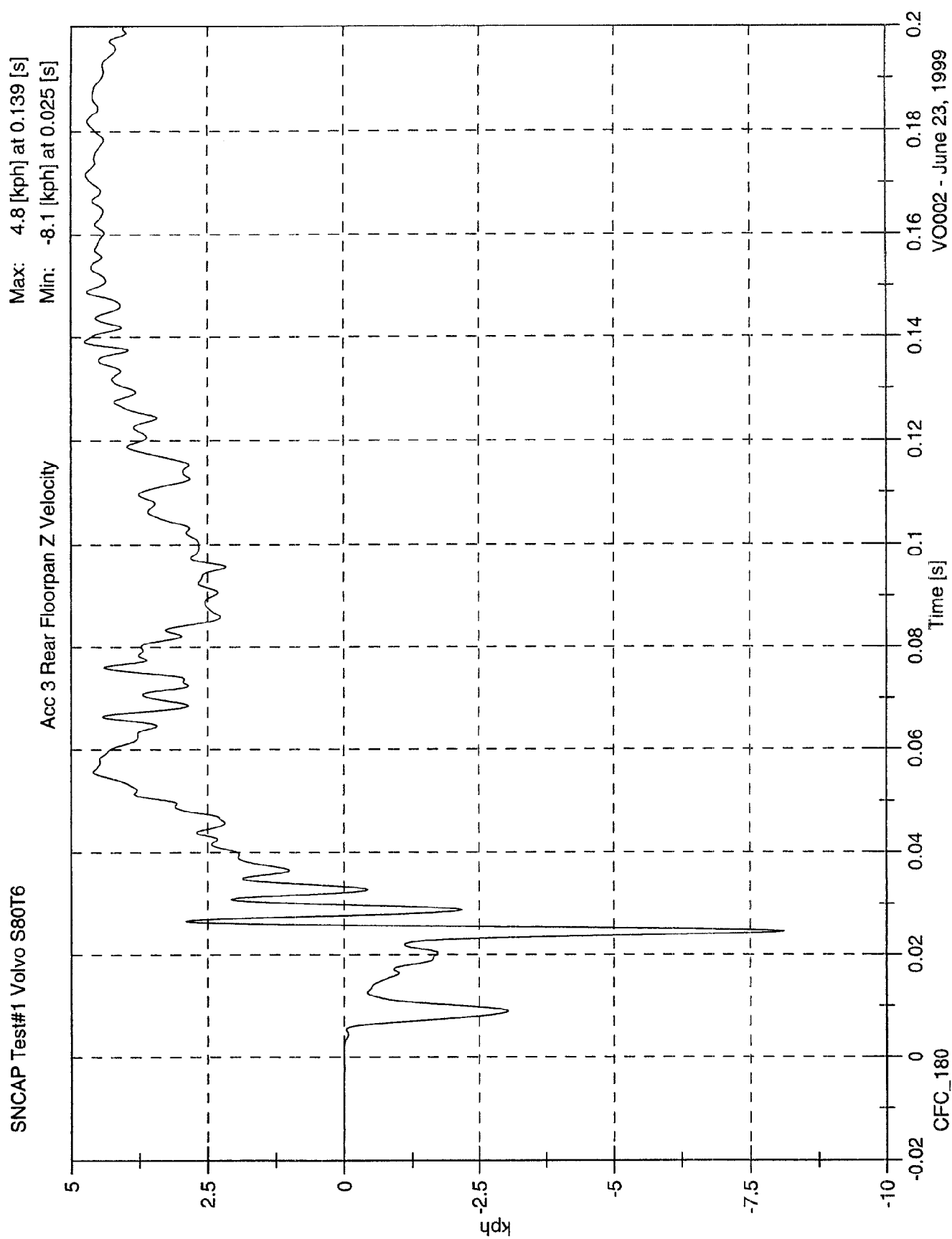
Acc 3 Rear Floorpan Z

Max: 41.5 [g] at 0.026 [s]

Min: -20.7 [g] at 0.023 [s]



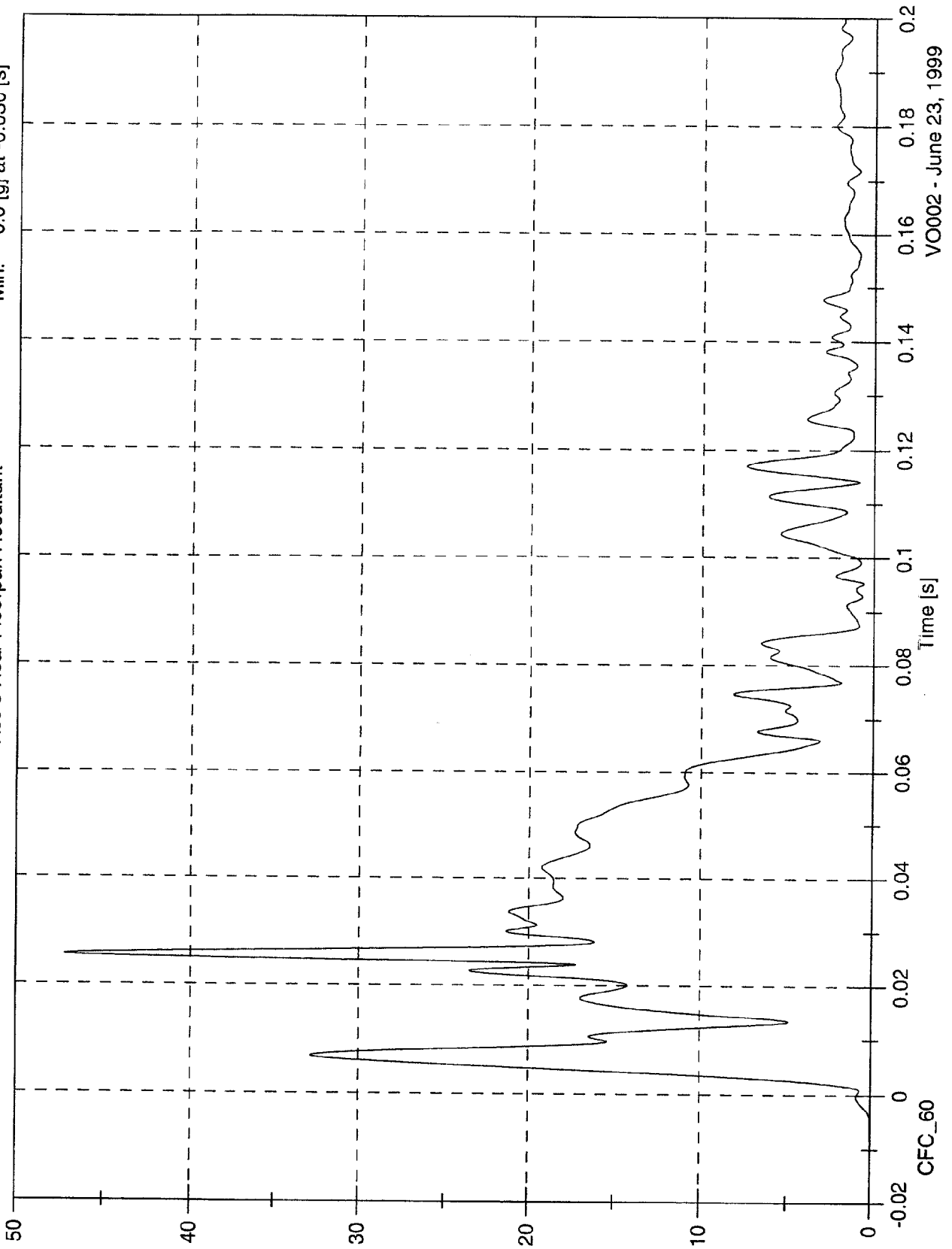
VO002 - June 23, 1999



SNCAP Test#1 Volvo S80T6

Acc 3 Rear Floorpan Resultant

Max: 47.2 [g] at 0.026 [s]
Min: 0.0 [g] at -0.030 [s]



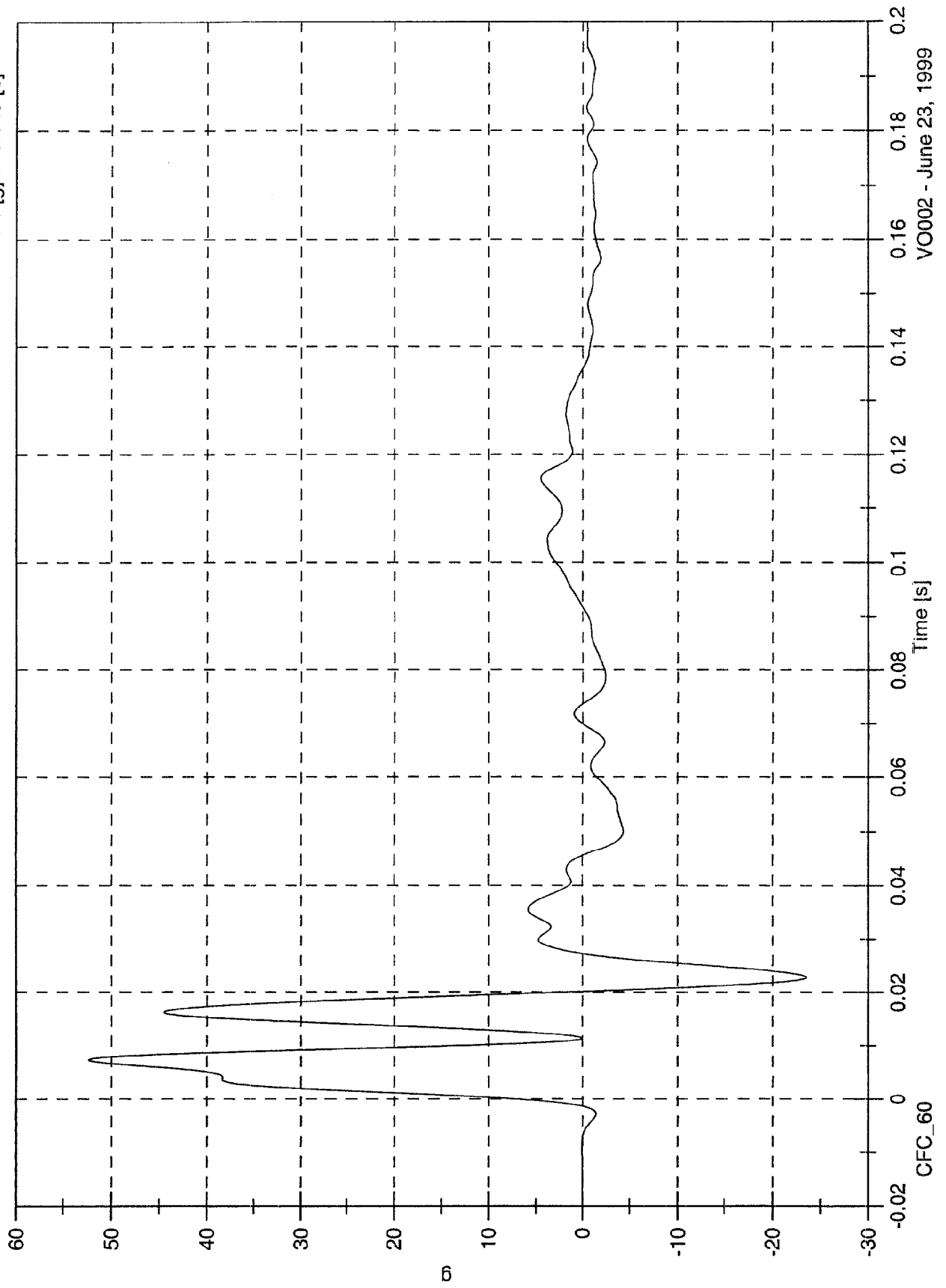
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Acc 4 Left Rear Sill Y

Max: 52.3 [g] at 0.007 [s]

Min: -23.6 [g] at 0.023 [s]

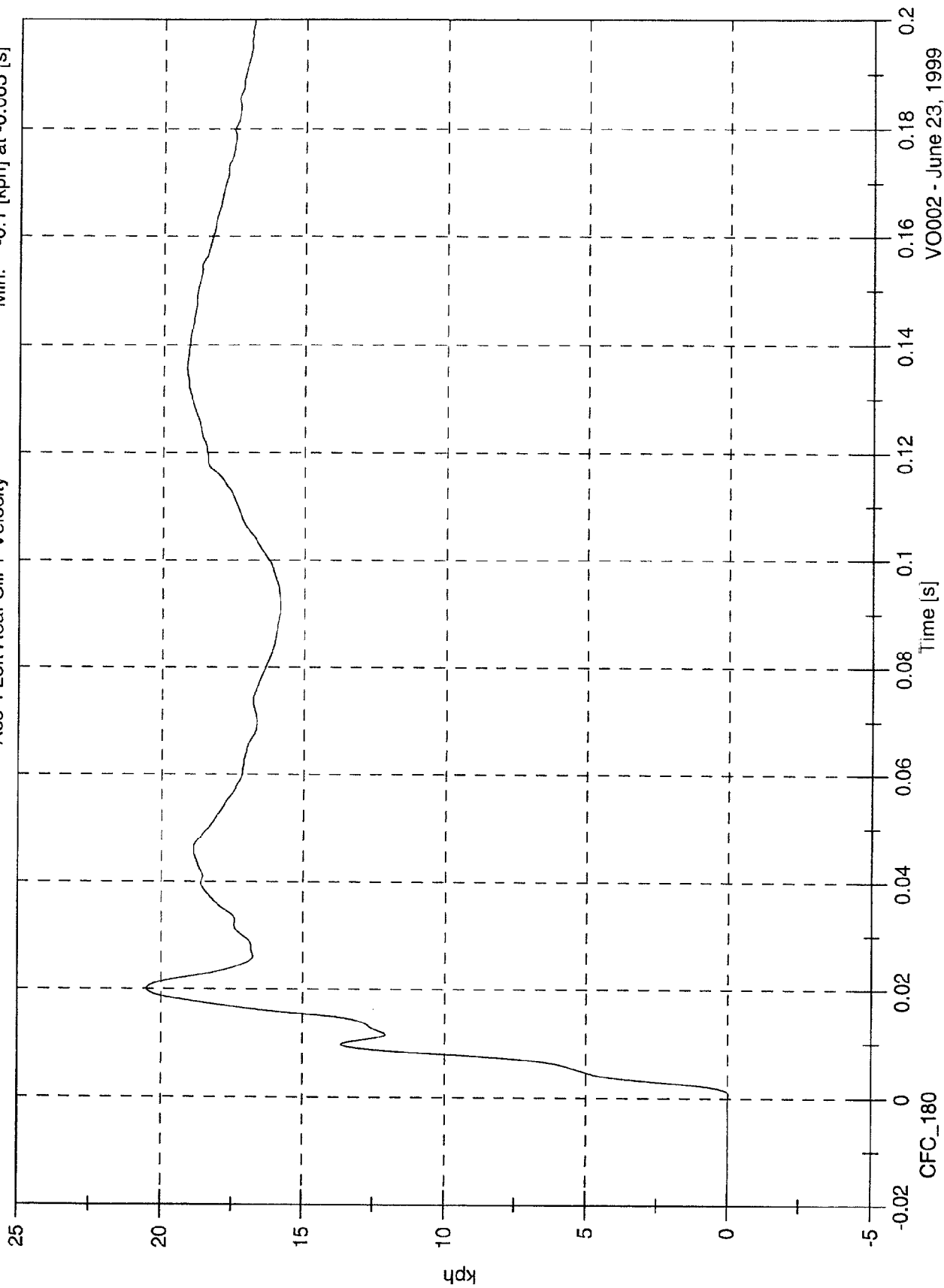


VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 20.5 [kph] at 0.020 [s]
Min: -0.1 [kph] at -0.065 [s]

Acc 4 Left Rear Sill Y Velocity



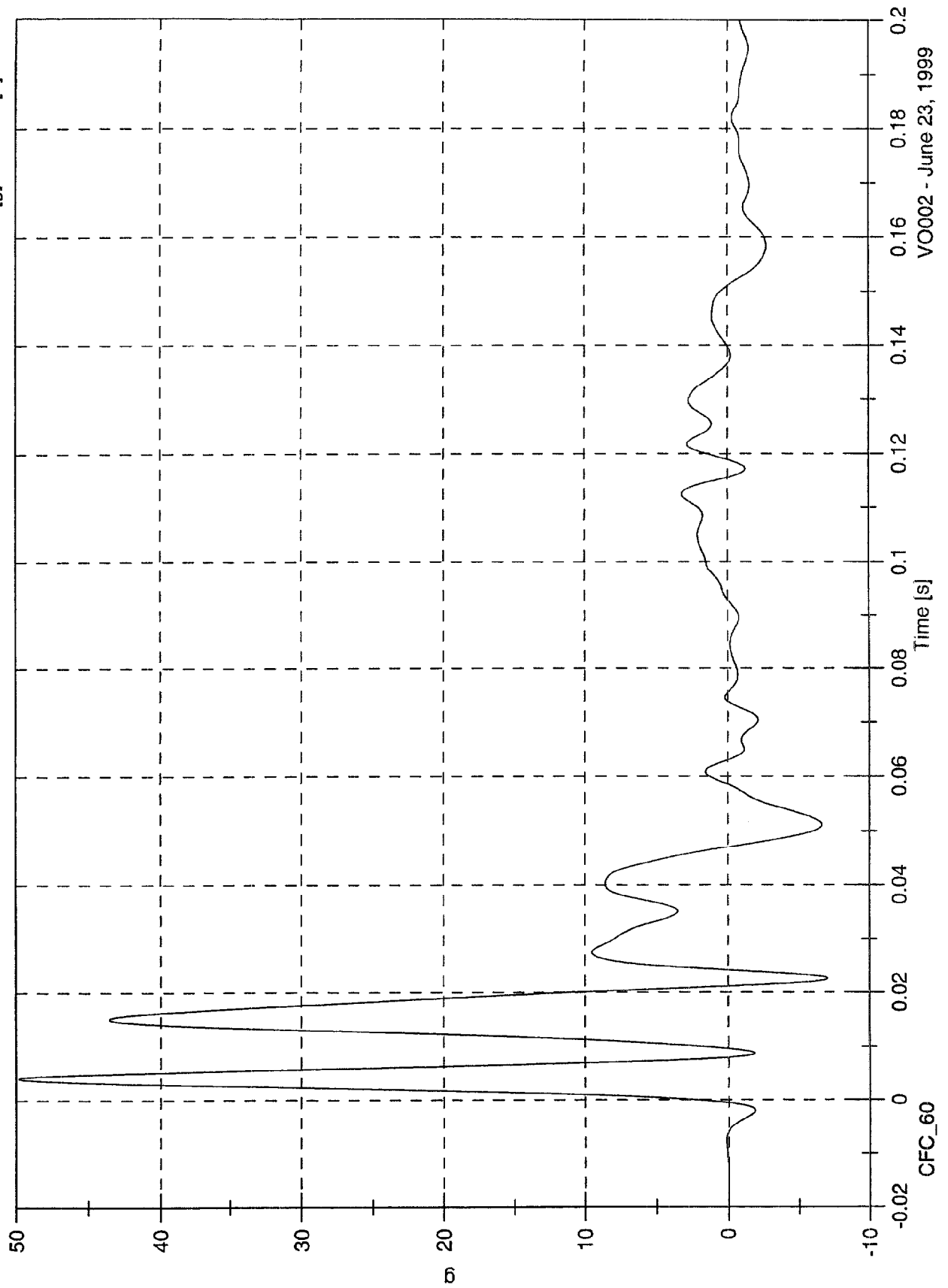
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Acc 5 Left Front Sill Y

Max: 49.8 [g] at 0.004 [s]

Min: -7.0 [g] at 0.023 [s]



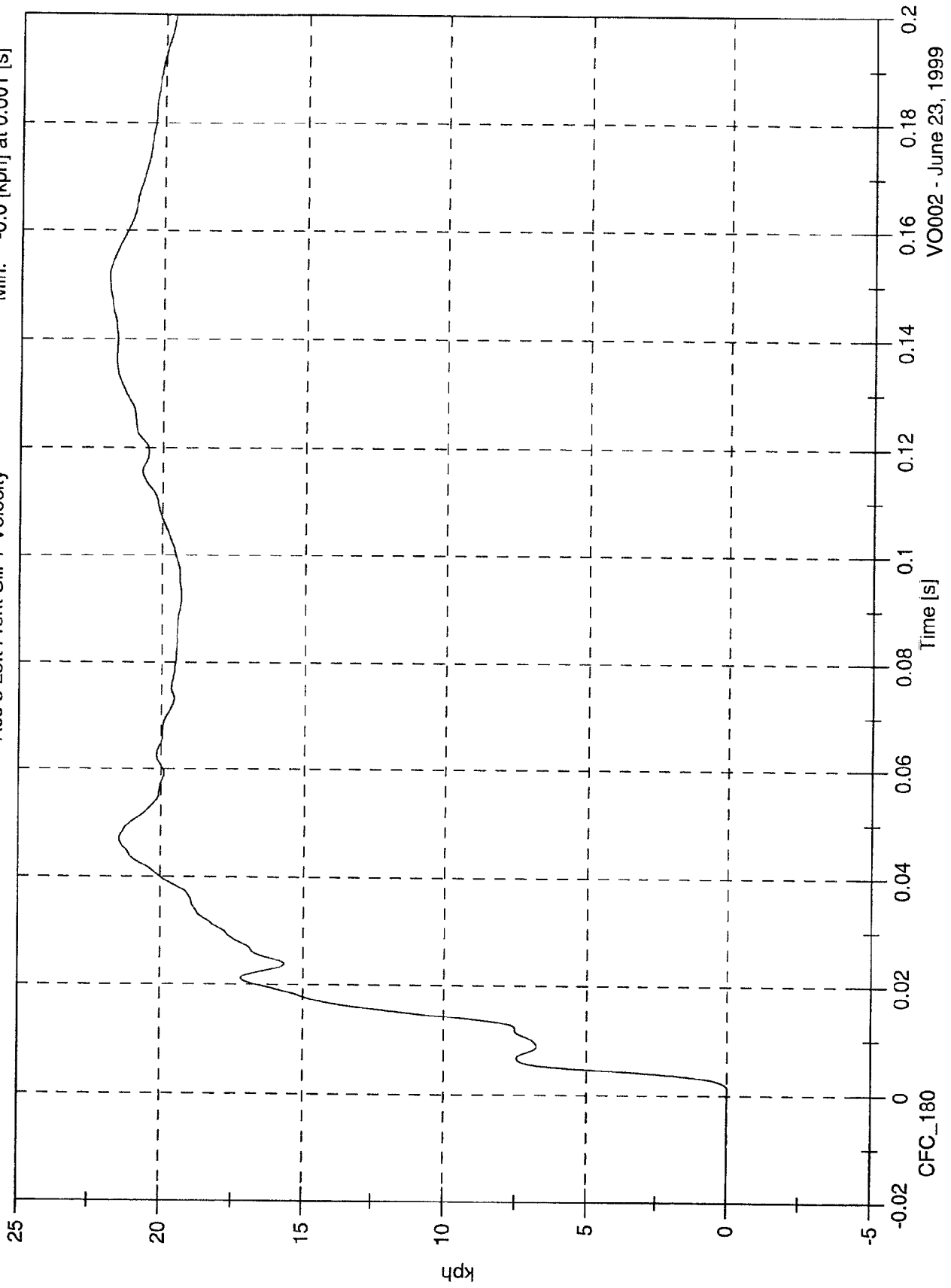
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

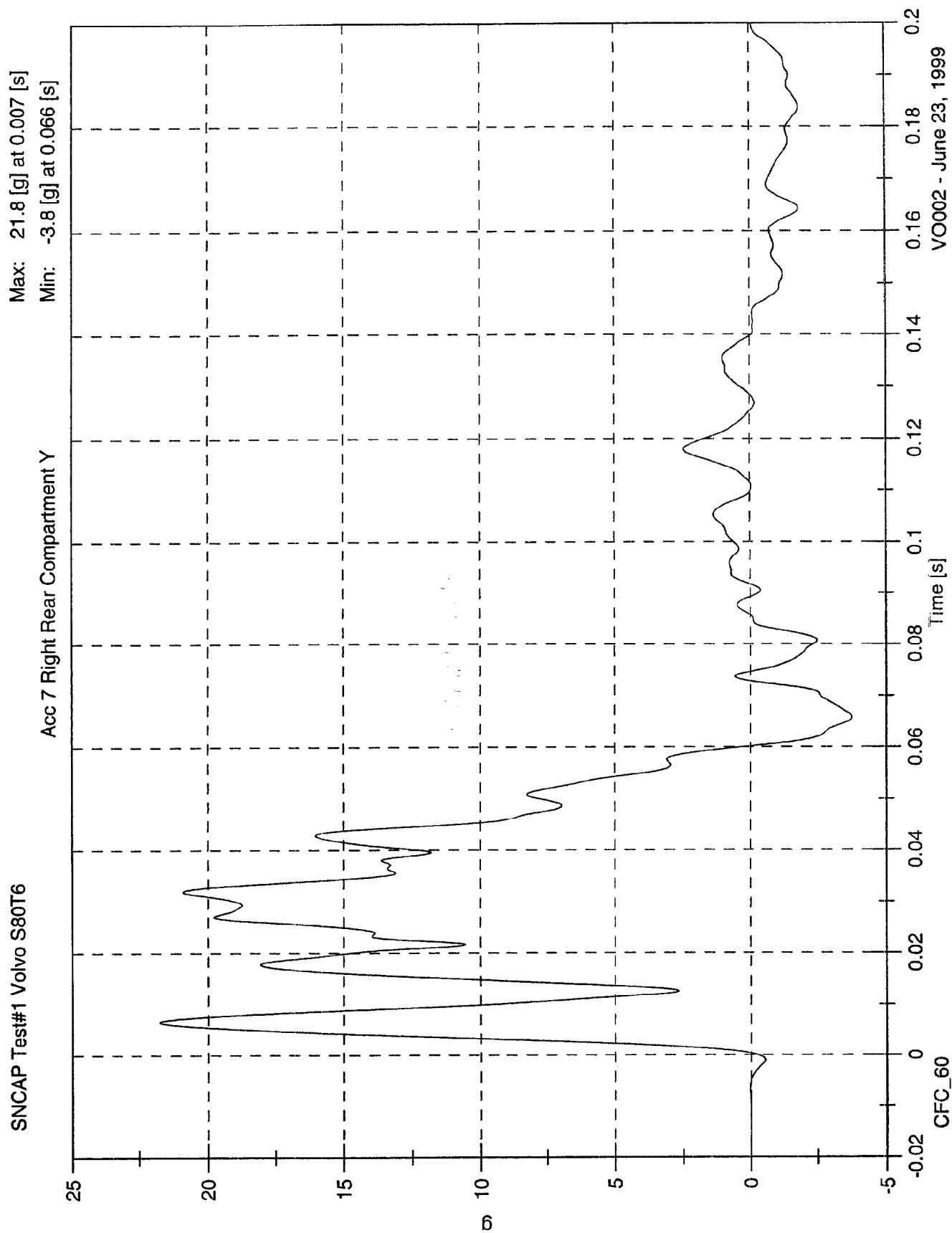
Max: 21.9 [kph] at 0.152 [s]

Min: -0.0 [kph] at 0.001 [s]

Acc 5 Left Front Sill Y Velocity



VO002 - June 23, 1999

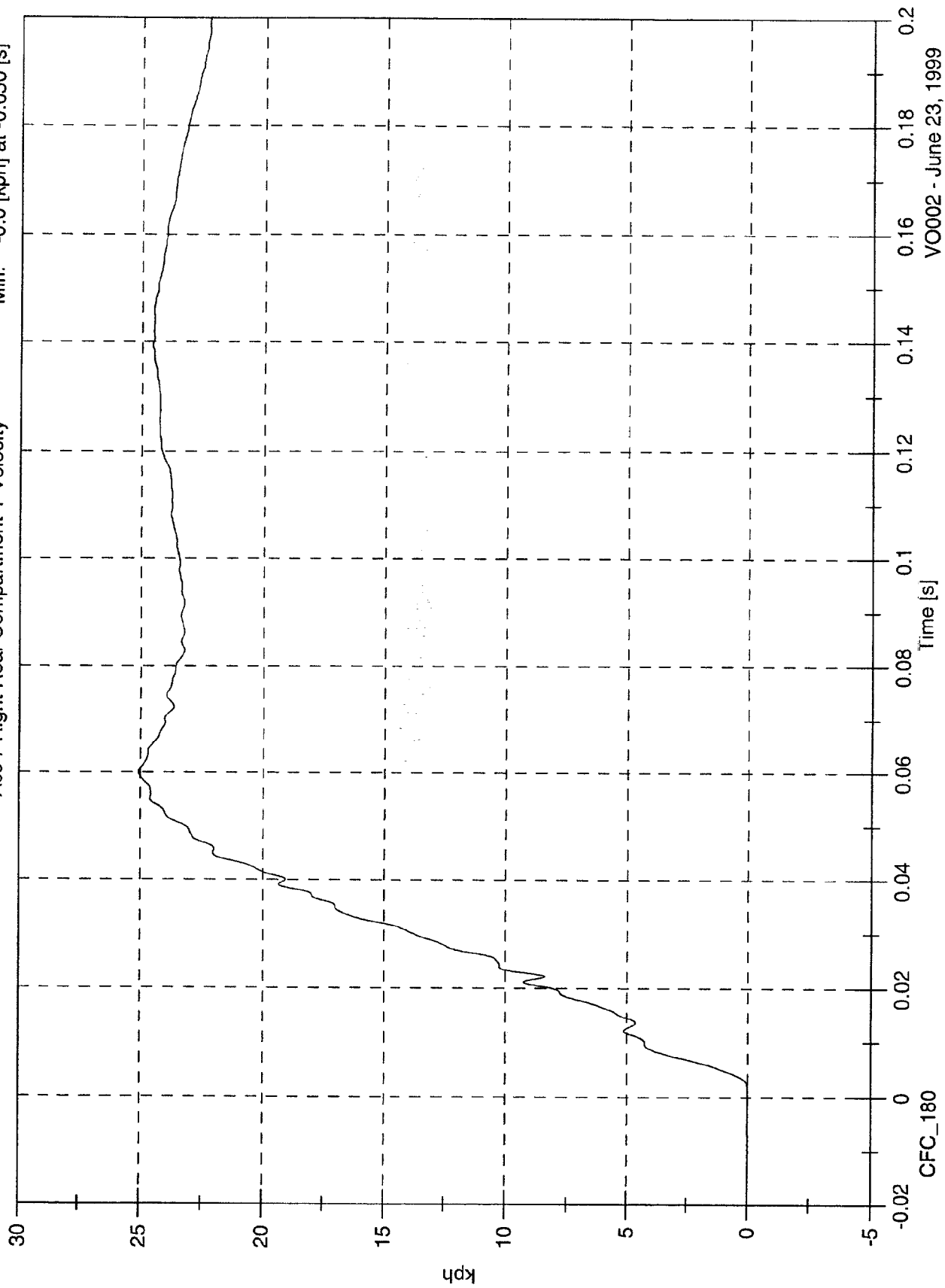


SNCAP Test#1 Volvo S80T6

Max: 25.1 [kph] at 0.060 [s]

Min: -0.0 [kph] at -0.050 [s]

Acc 7 Right Rear Compartment Y Velocity

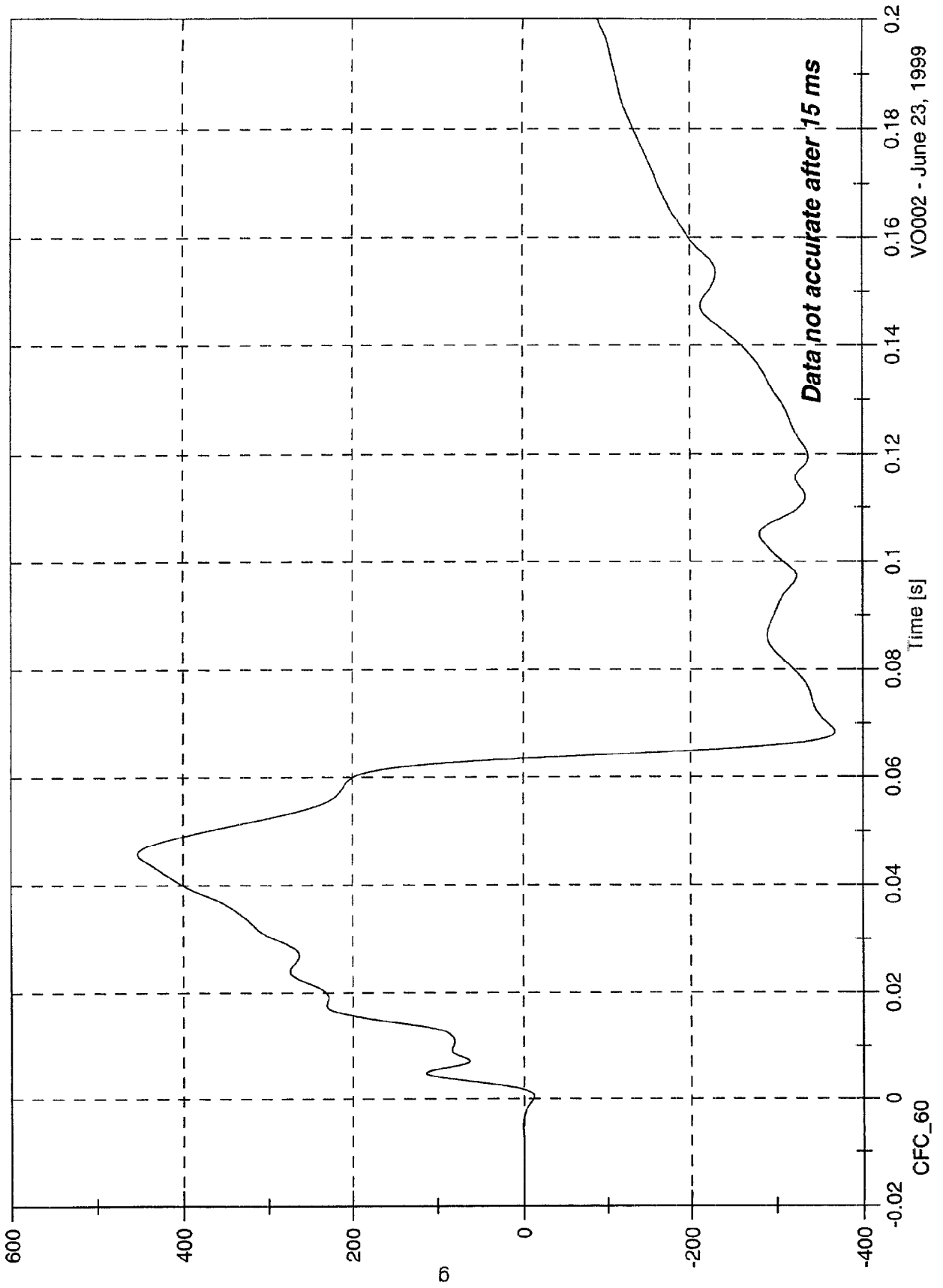


VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 452.3 [g] at 0.046 [s]
Min: -366.9 [g] at 0.068 [s]

Acc 10 Left Rear Door Midrear Y

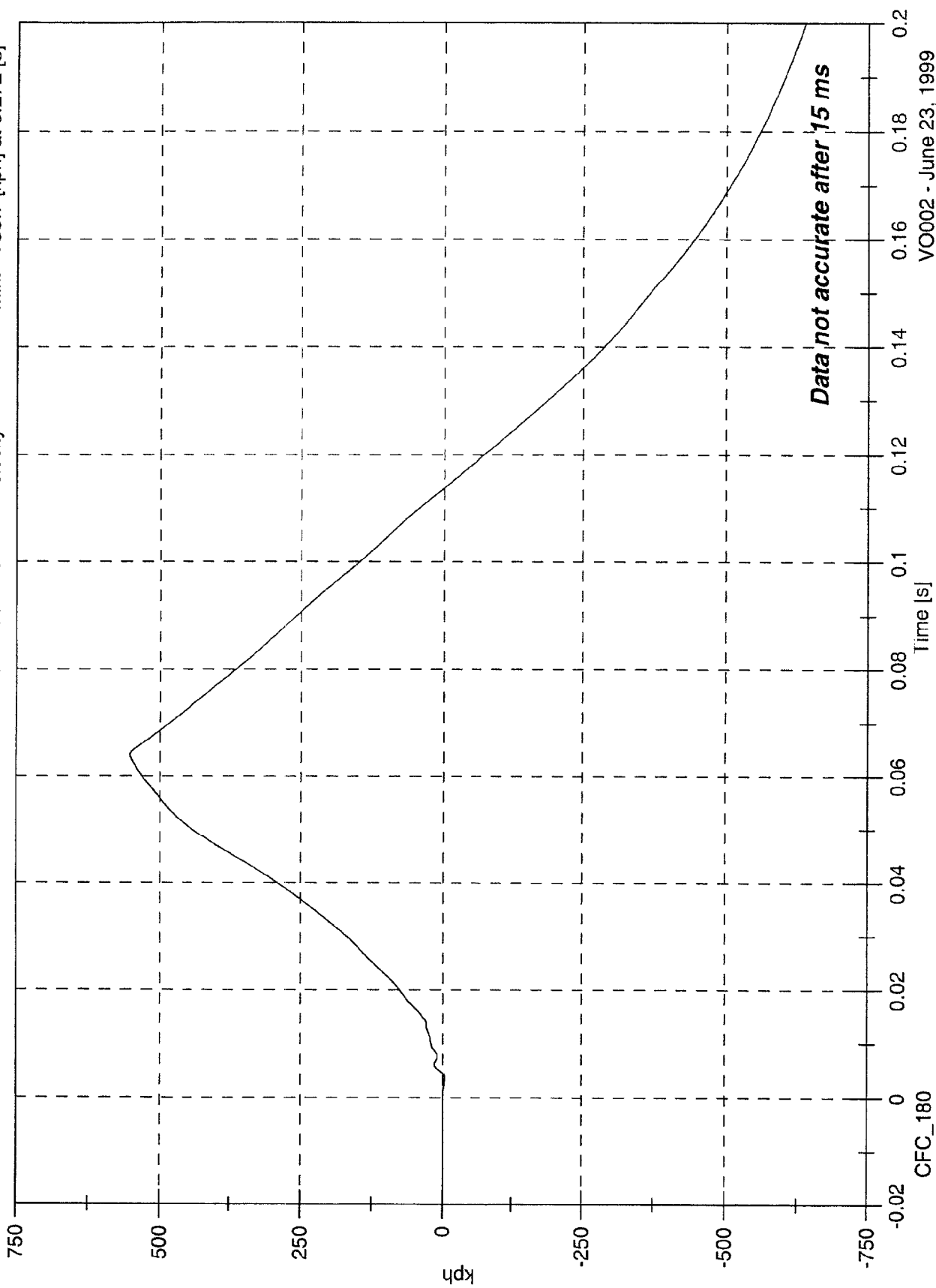


VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 552.7 [kph] at 0.064 [s]
Min: -736.7 [kph] at 0.272 [s]

Acc 10 Left Rear Door Midrear Y Velocity



Data not accurate after 15 ms

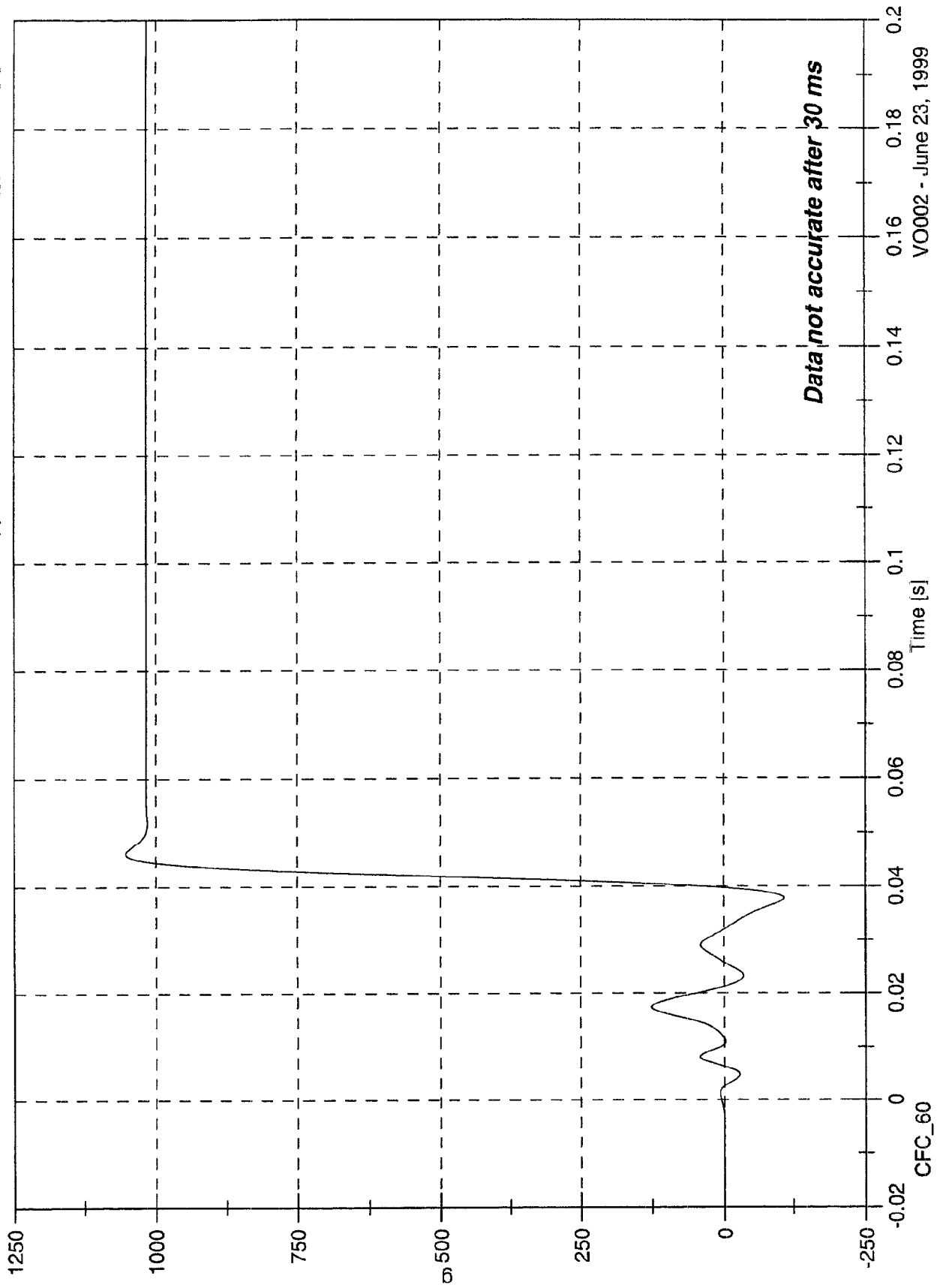
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Acc 11 Left Rear Door Upper Y

Max: 1052.0 [g] at 0.046 [s]

Min: -107.9 [g] at 0.038 [s]



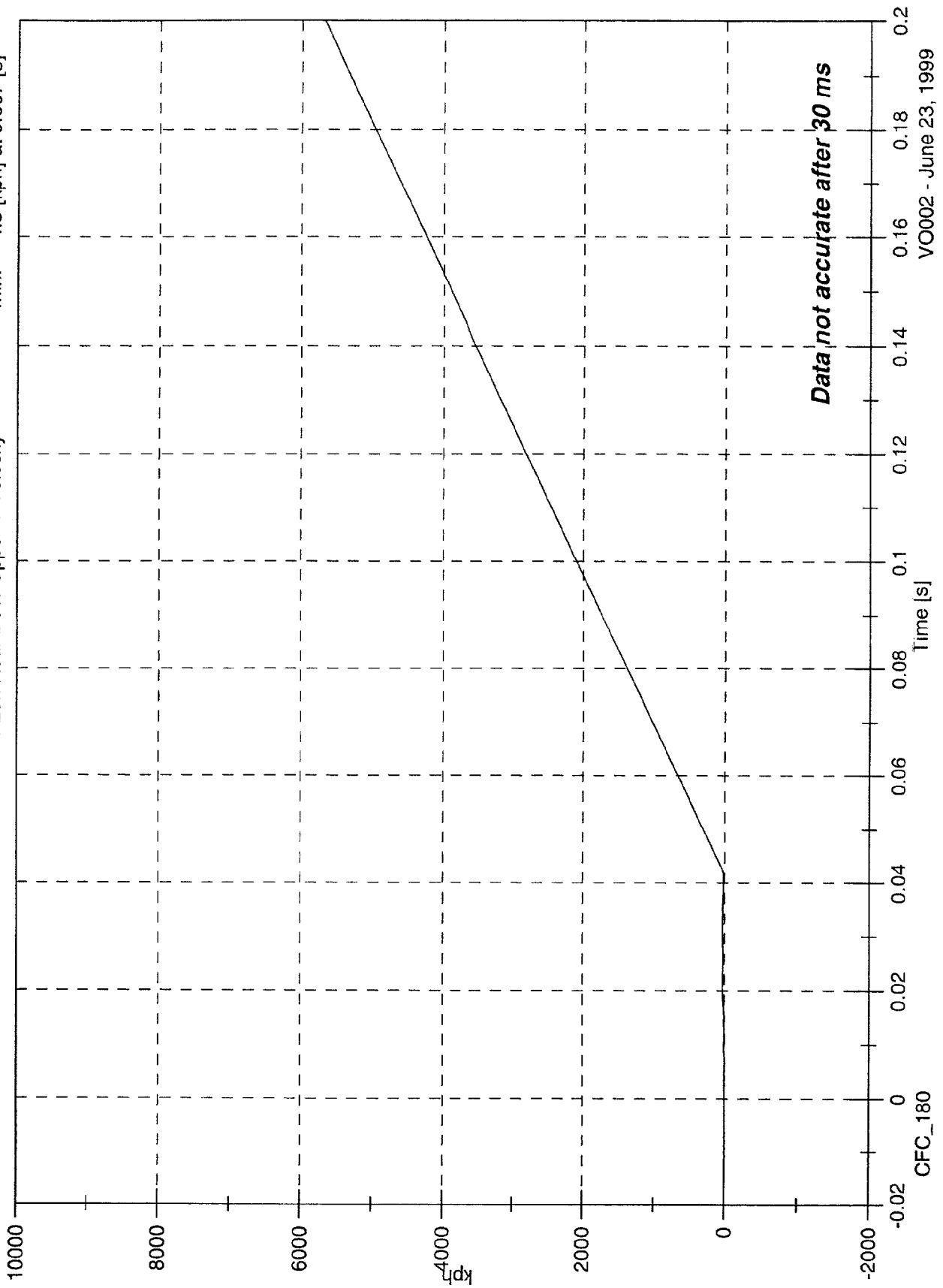
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Acc 11 Left Rear Door Upper Y Velocity

Max: 8810.5 [kph] at 0.493 [s]

Min: -4.5 [kph] at 0.007 [s]



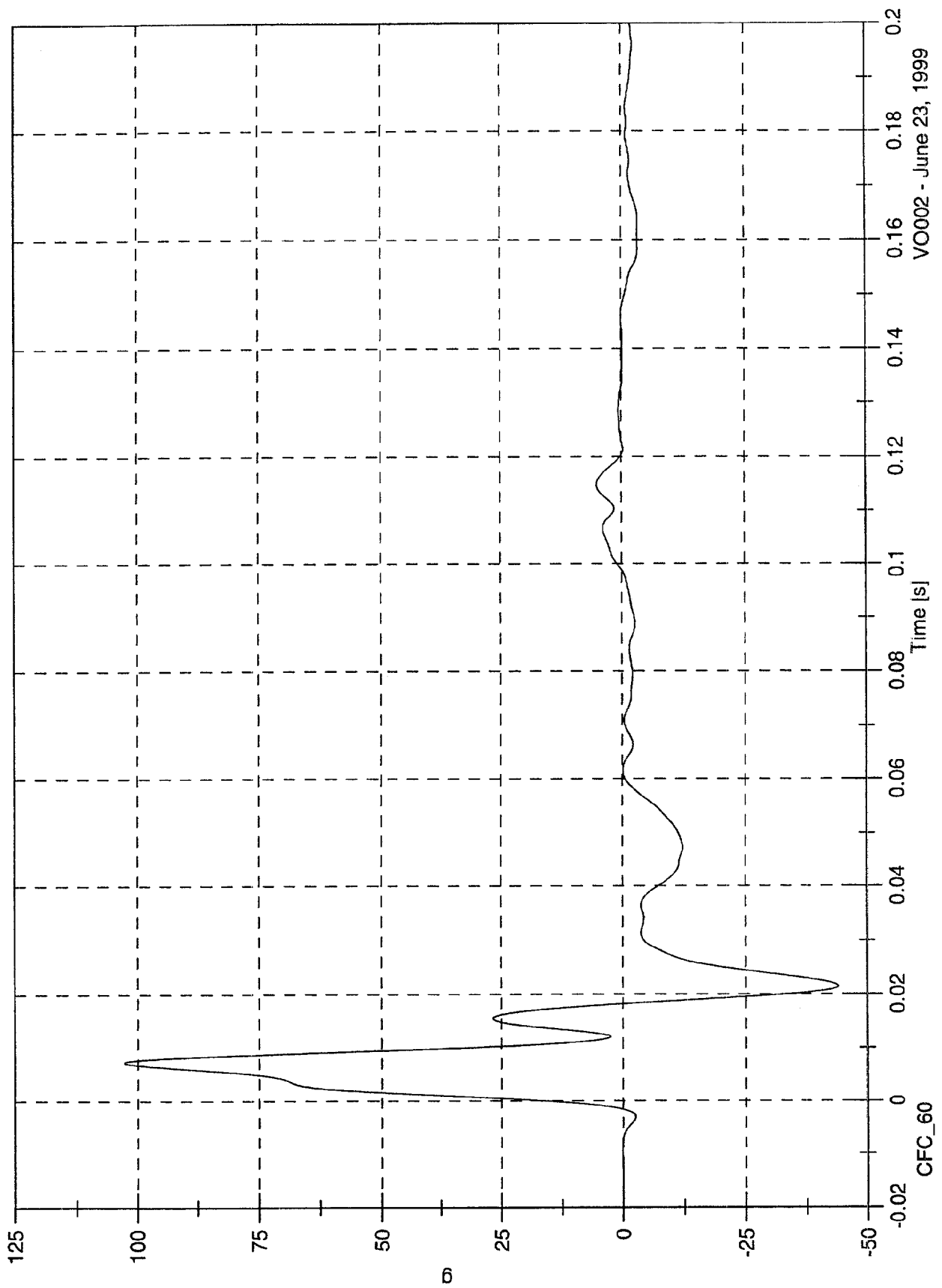
Data not accurate after 30 ms

VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Acc 12 Left Lower B Post Y

Max: 102.6 [g] at 0.007 [s]
Min: -44.1 [g] at 0.021 [s]



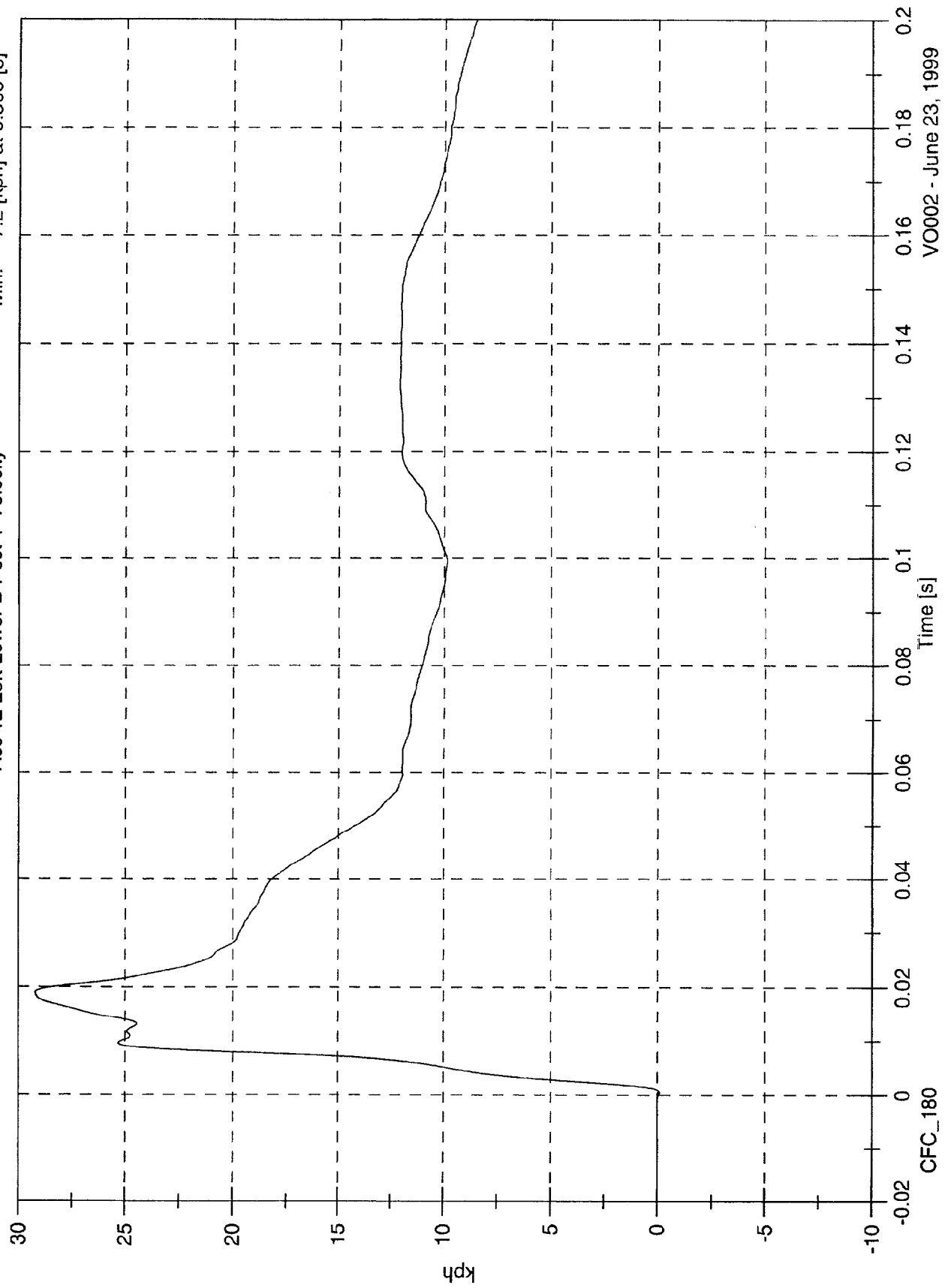
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 29.2 [kph] at 0.019 [s]

Min: -7.2 [kph] at 0.500 [s]

Acc 12 Left Lower B Post Y Velocity



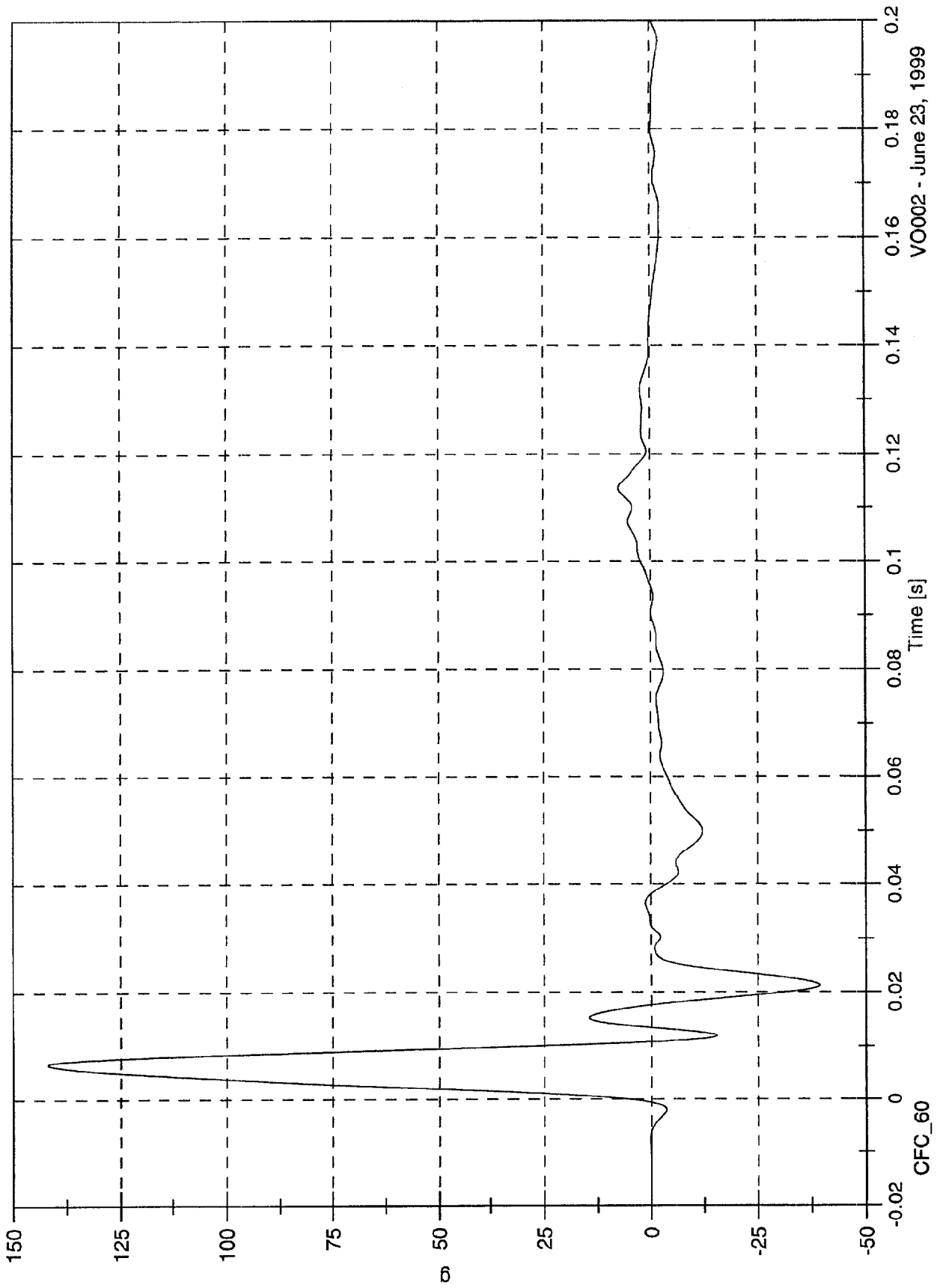
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 141.9 [g] at 0.007 [s]

Min: -39.3 [g] at 0.021 [s]

Acc 13 Left Mid B Post Y



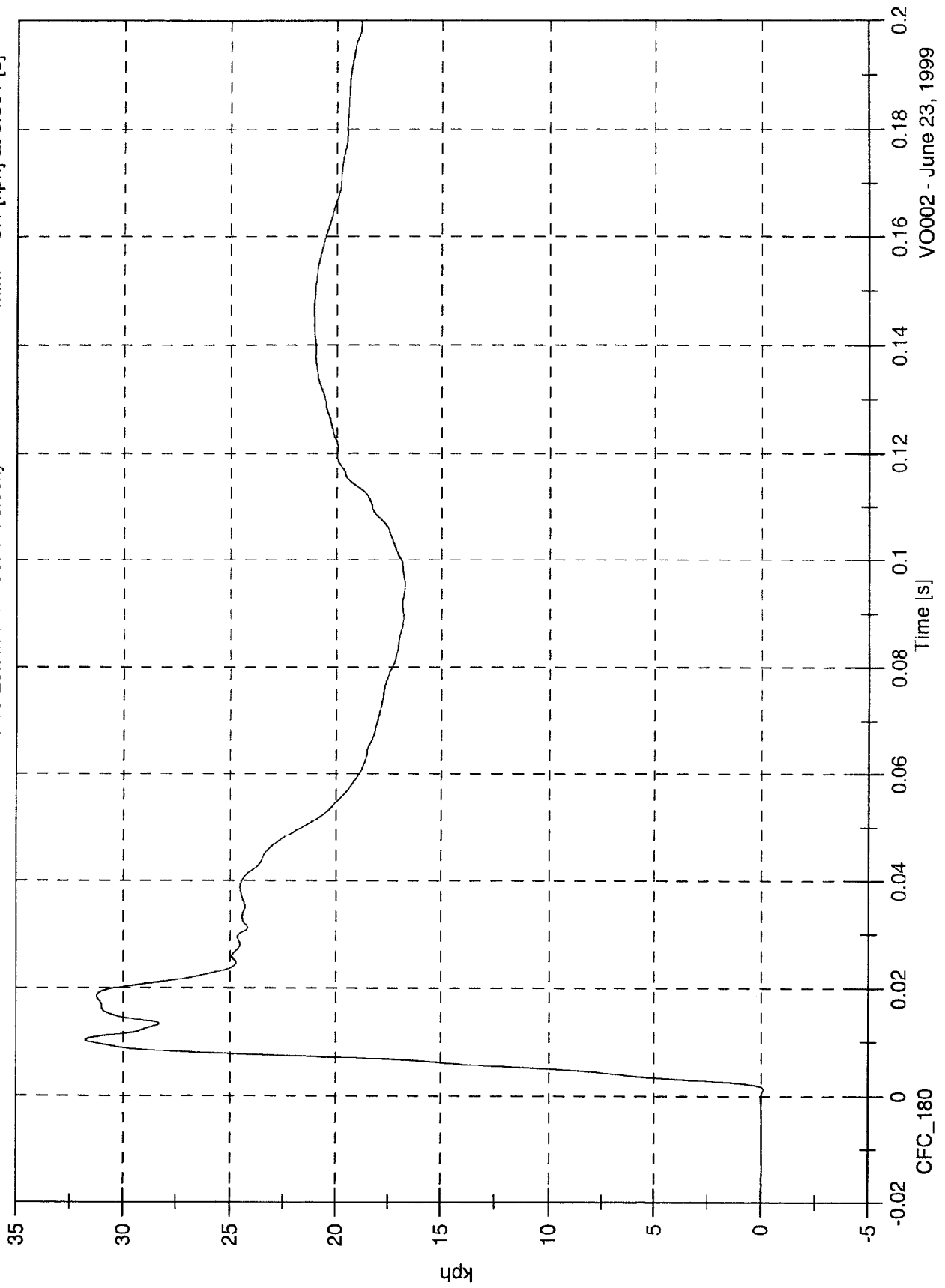
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Acc 13 Left Mid B Post Y Velocity

Max: 31.8 [kph] at 0.010 [s]

Min: -0.1 [kph] at 0.001 [s]

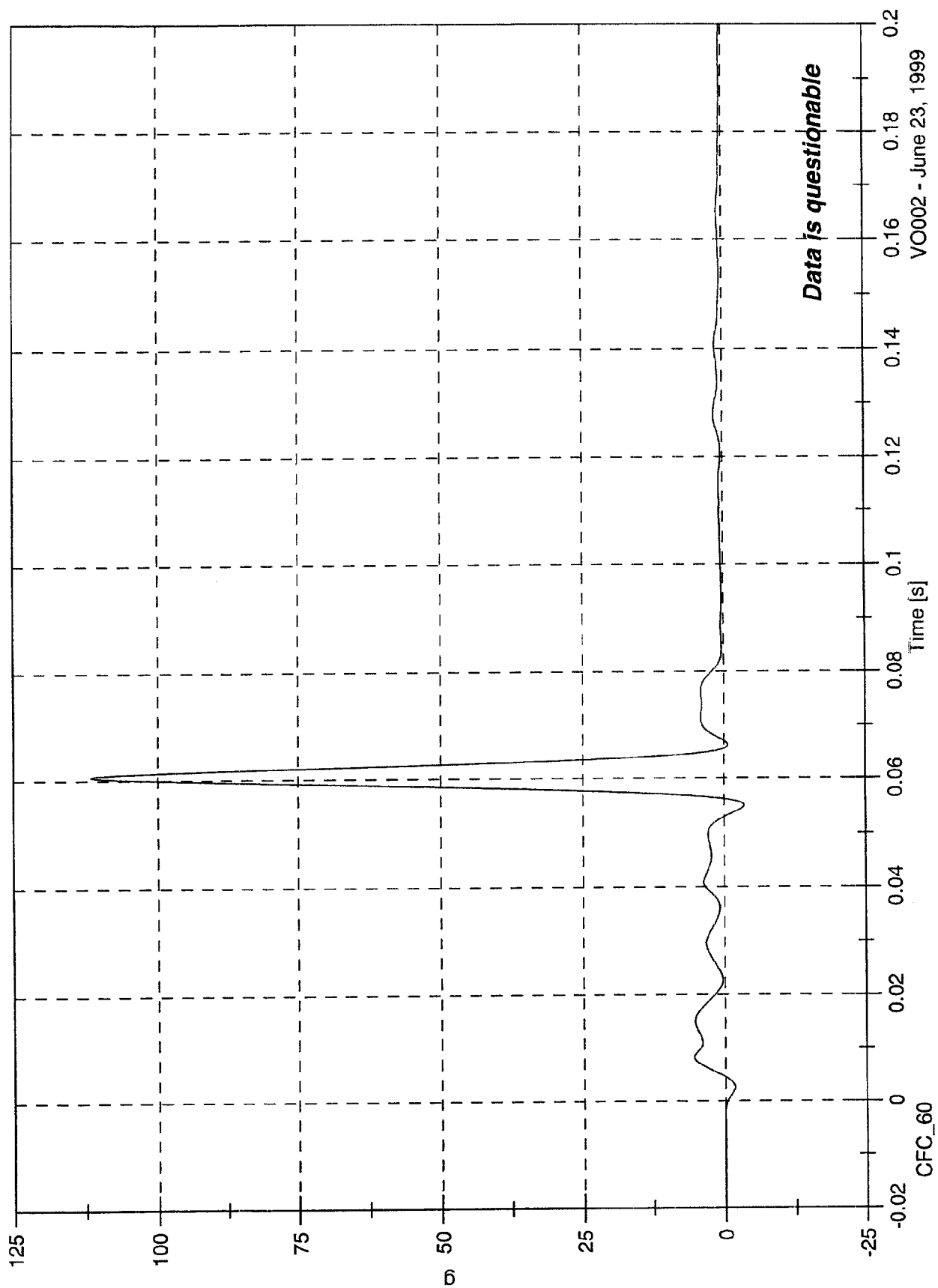


VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 111.6 [g] at 0.061 [s]
Min: -3.6 [g] at 0.055 [s]

Acc 14 Left Lower A Post Y

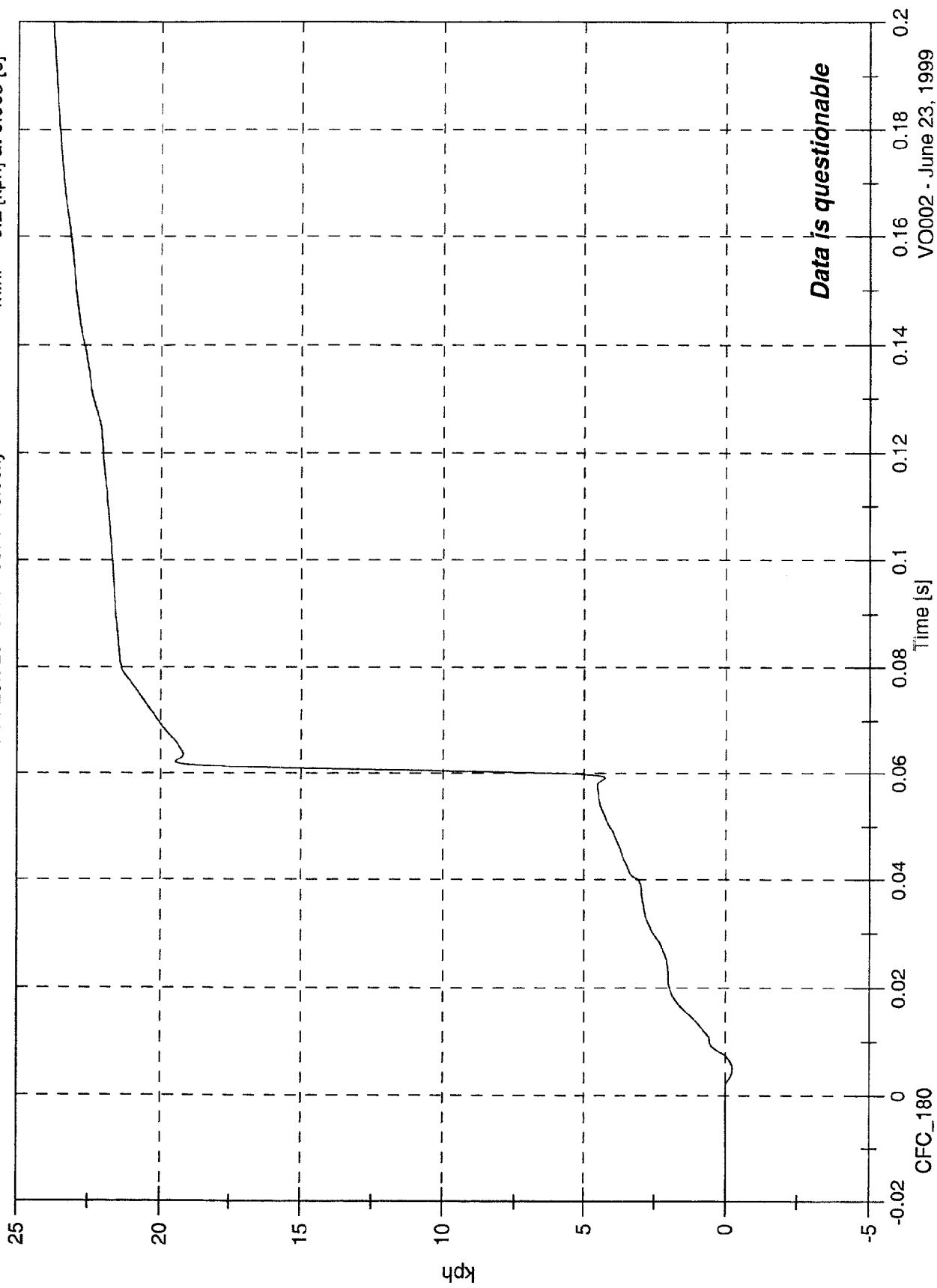


SNCAP Test#1 Volvo S80T6

Max: 24.9 [kph] at 0.500 [s]

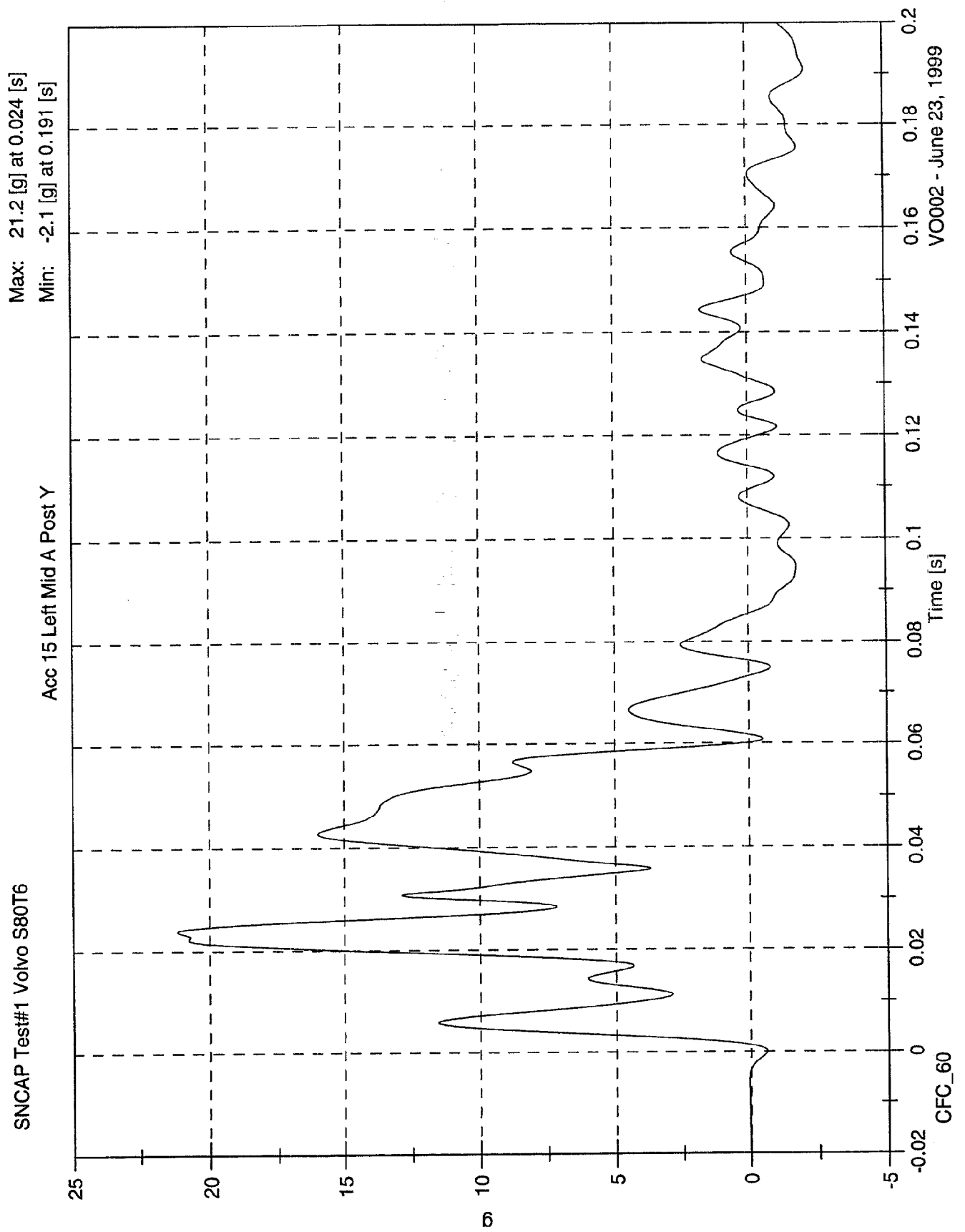
Min: -0.2 [kph] at 0.005 [s]

Acc 14 Left Lower A Post Y Velocity



Data is questionable

VO002 - June 23, 1999

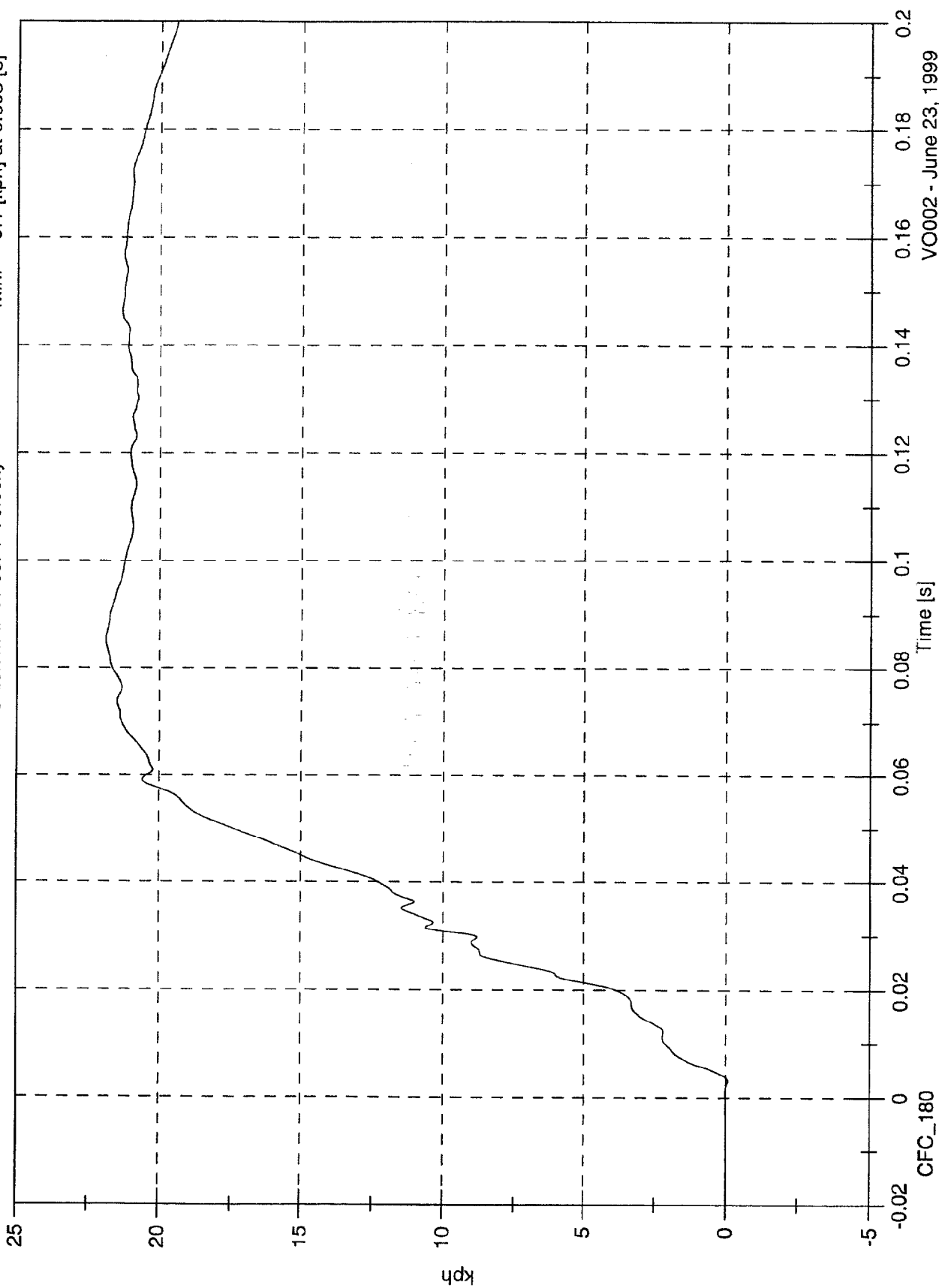


SNCAP Test#1 Volvo S80T6

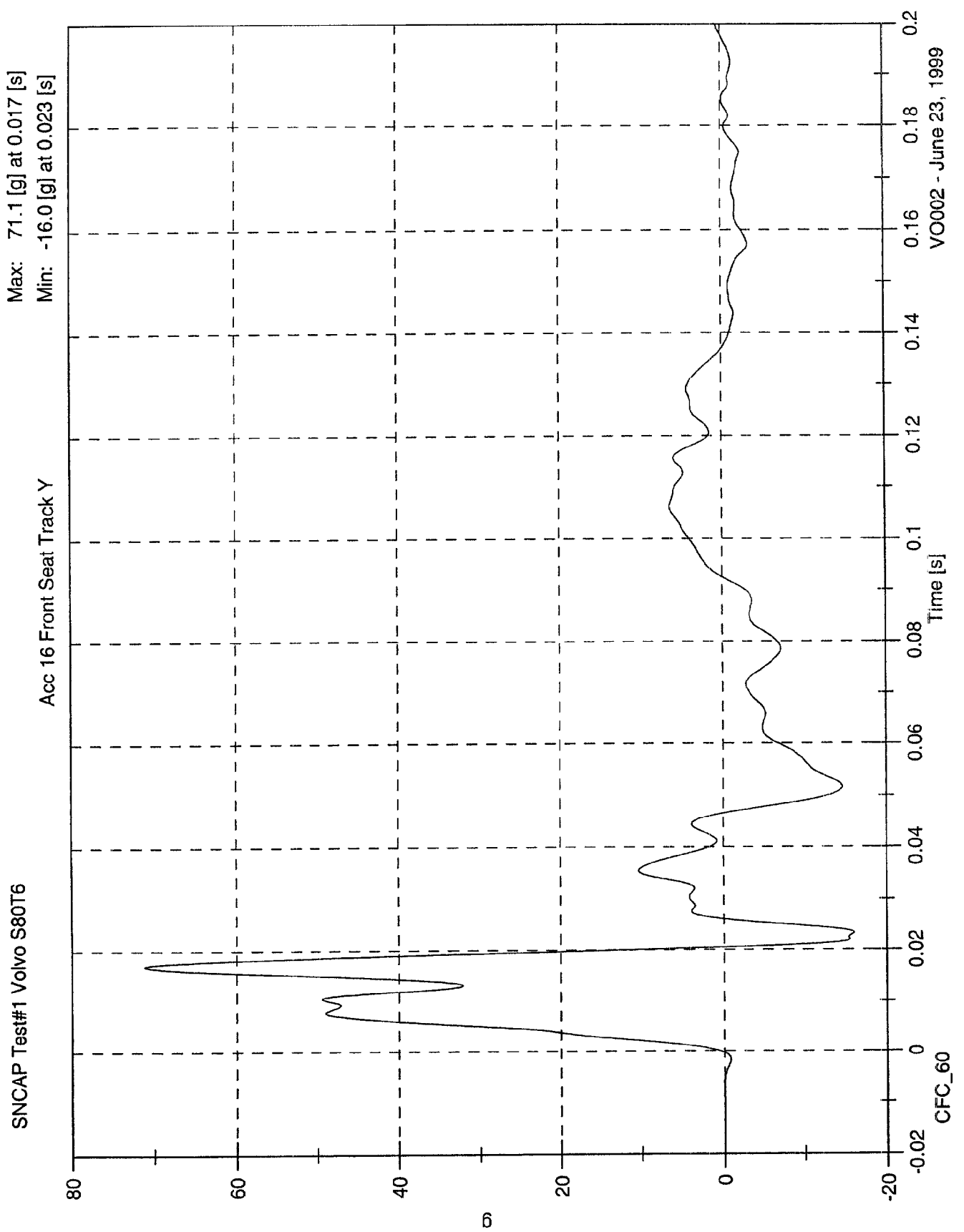
Acc 15 Left Mid A Post Y Velocity

Max: 21.9 [kph] at 0.085 [s]

Min: -0.1 [kph] at 0.003 [s]



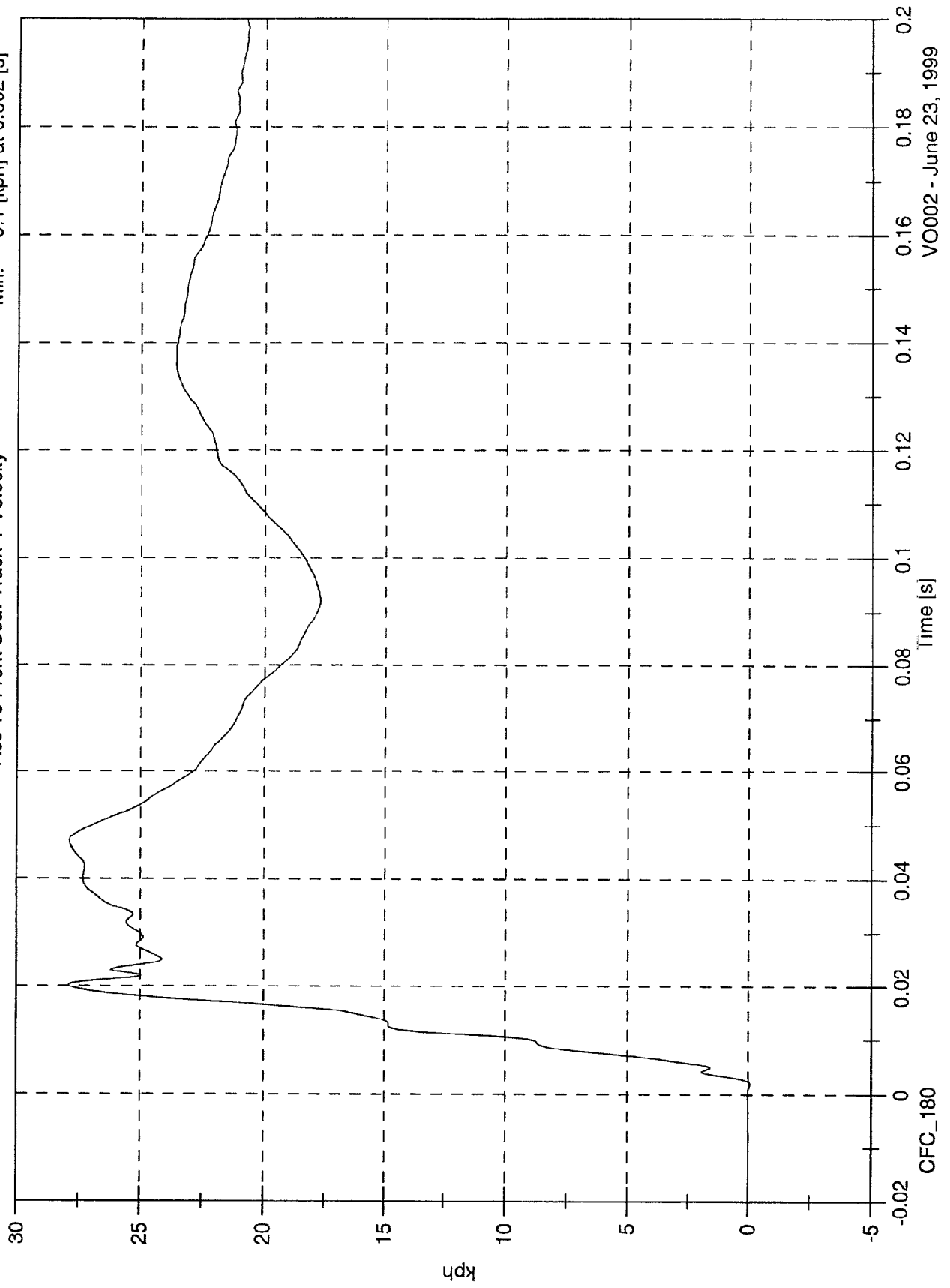
VO002 - June 23, 1999



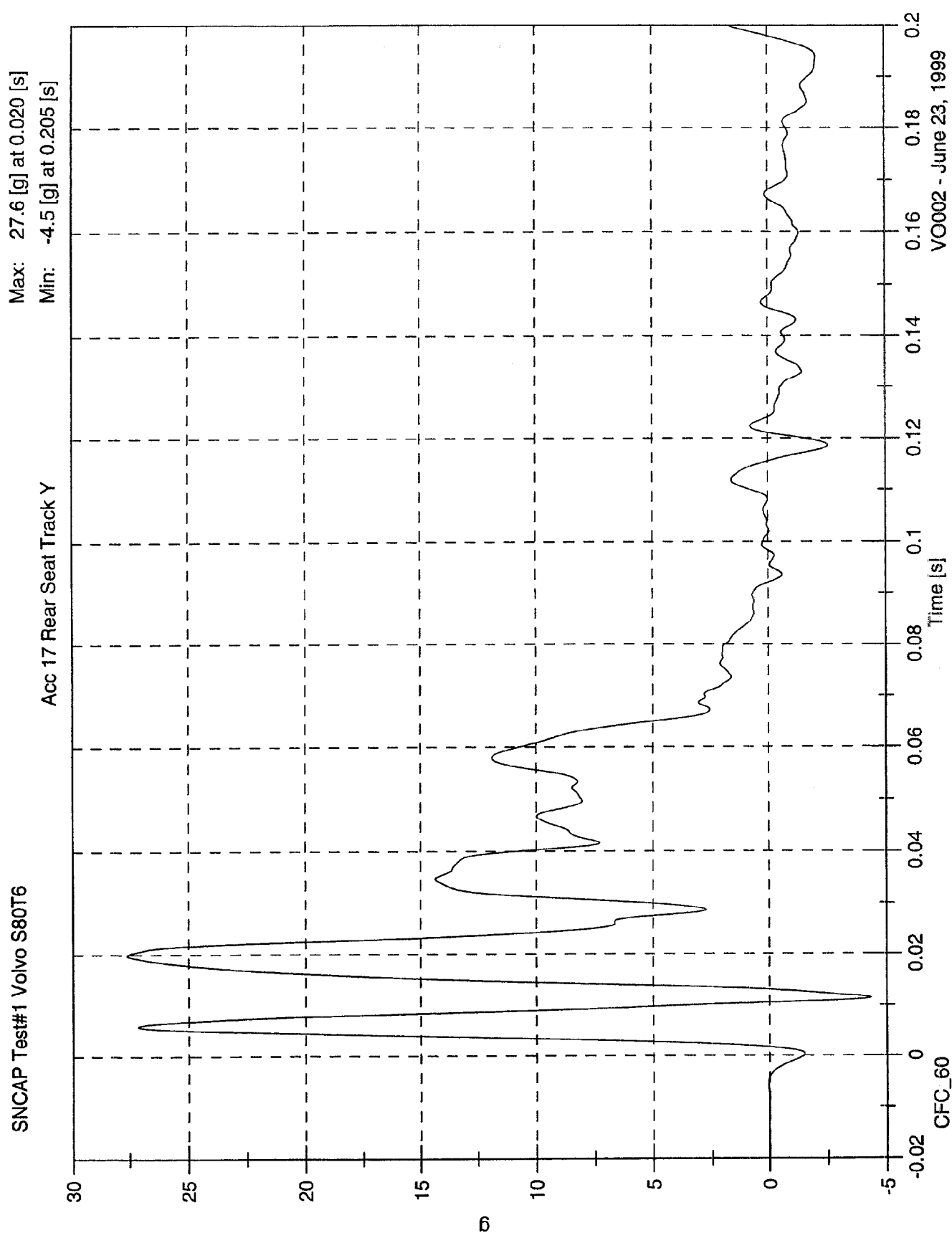
SNCAP Test#1 Volvo S80T6

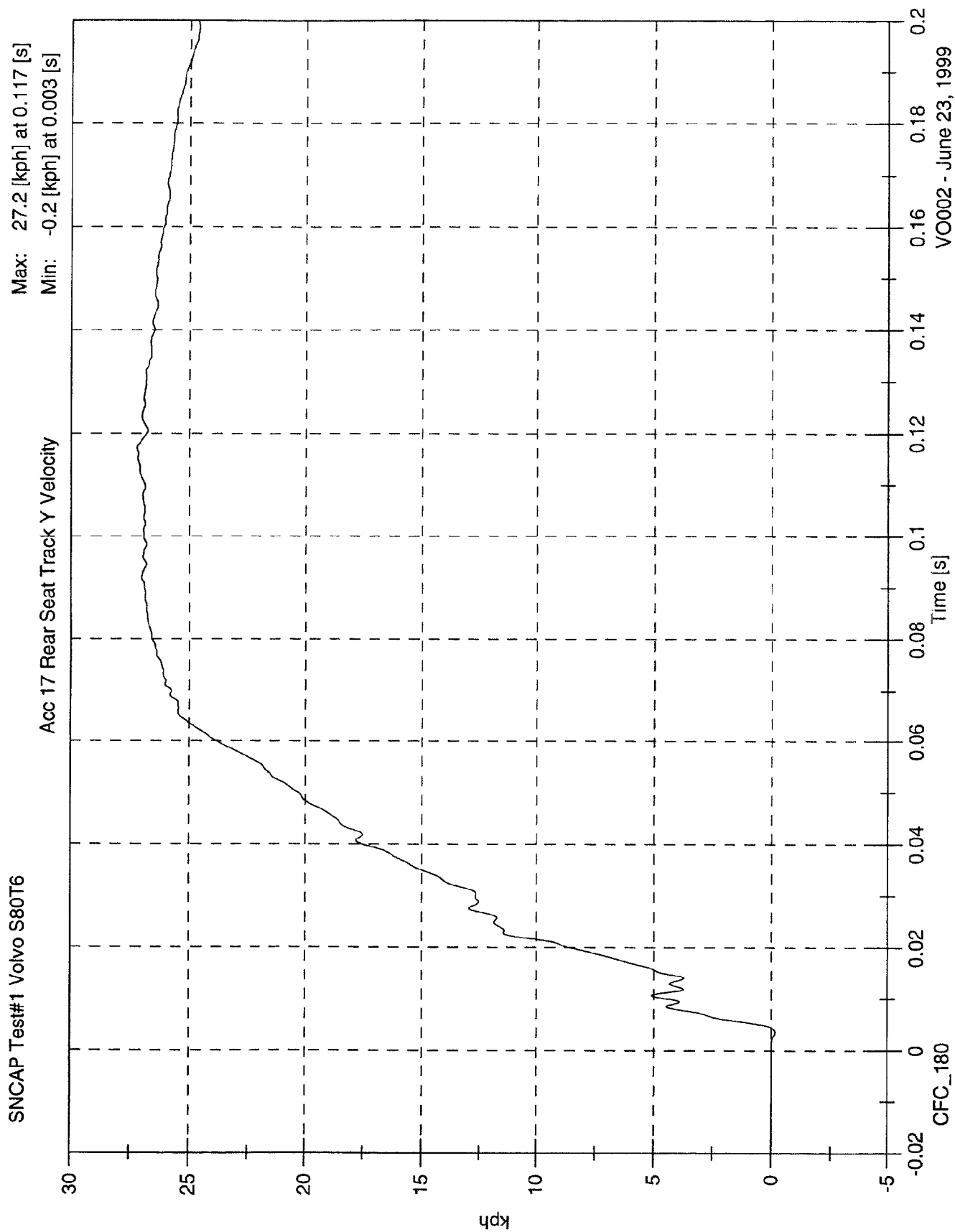
Max: 27.9 [kph] at 0.020 [s]
Min: -0.1 [kph] at 0.002 [s]

Acc 16 Front Seat Track Y Velocity



VO002 - June 23, 1999

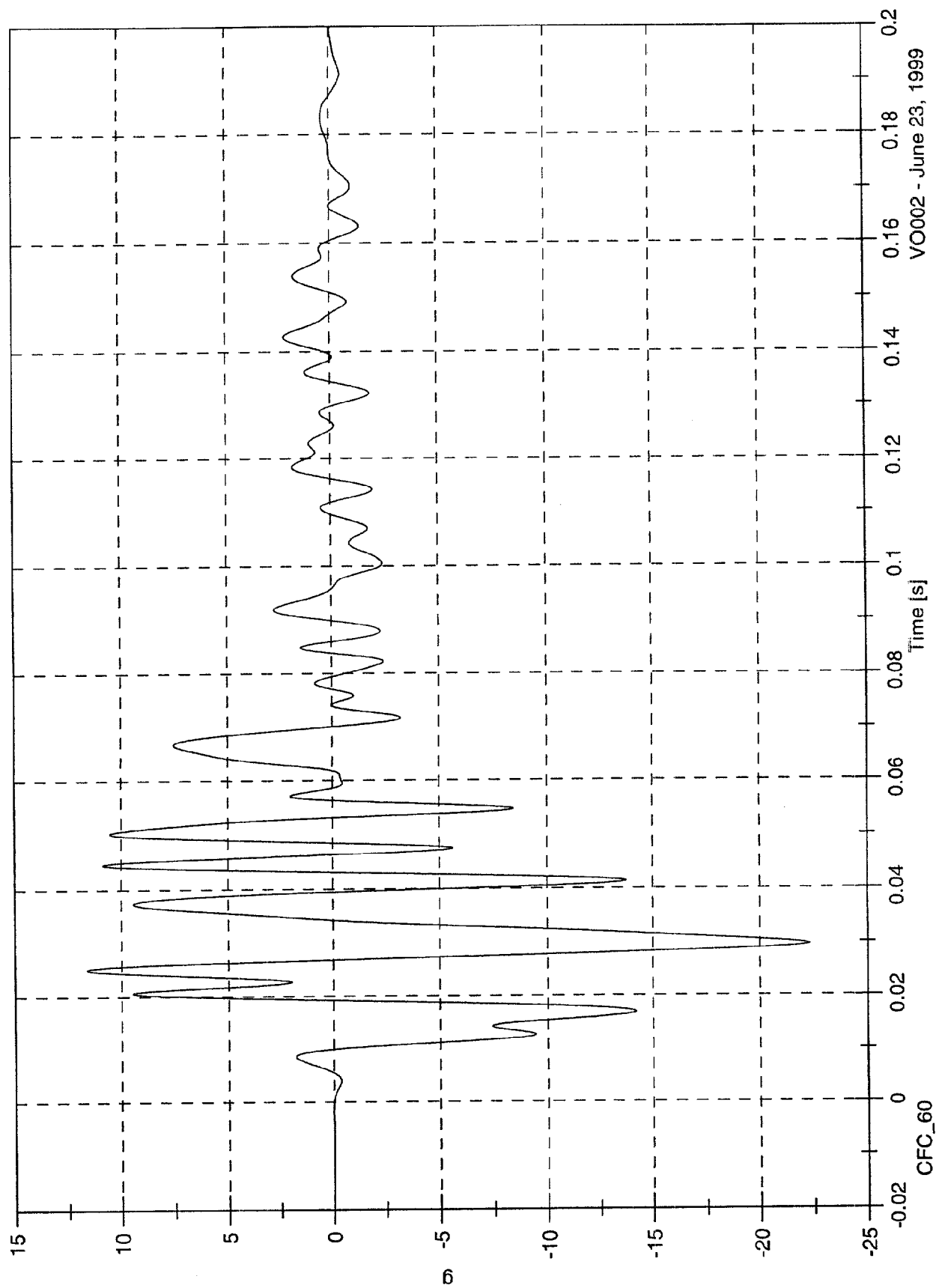




SNCAP Test#1 Volvo S80T6

Acc 18 Target CG X

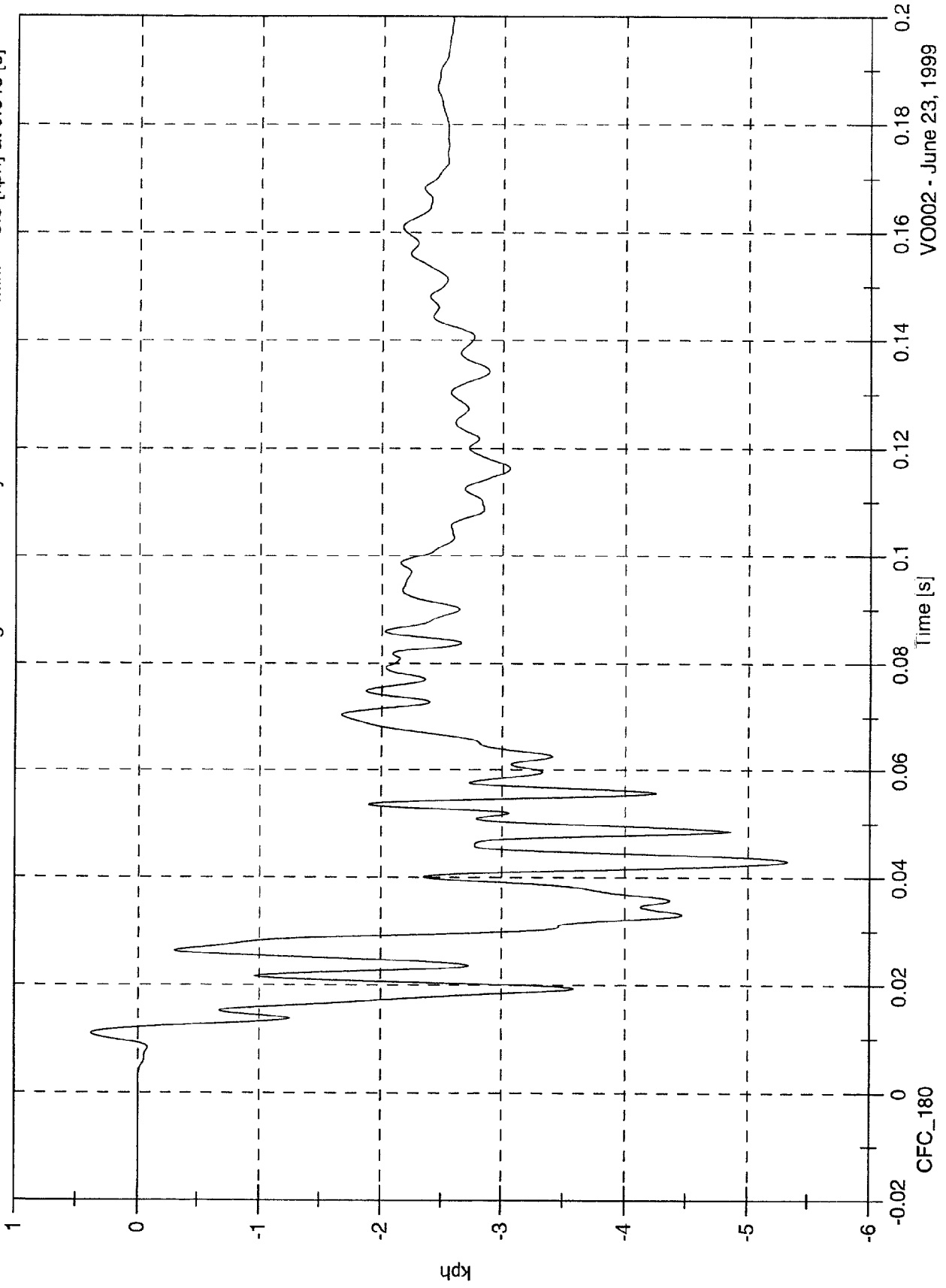
Max: 11.6 [g] at 0.025 [s]
Min: -22.3 [g] at 0.030 [s]



SNCAP Test#1 Volvo S80T6

Max: 0.5 [kph] at 0.500 [s]
Min: -5.3 [kph] at 0.043 [s]

Acc 18 Target CG X Velocity



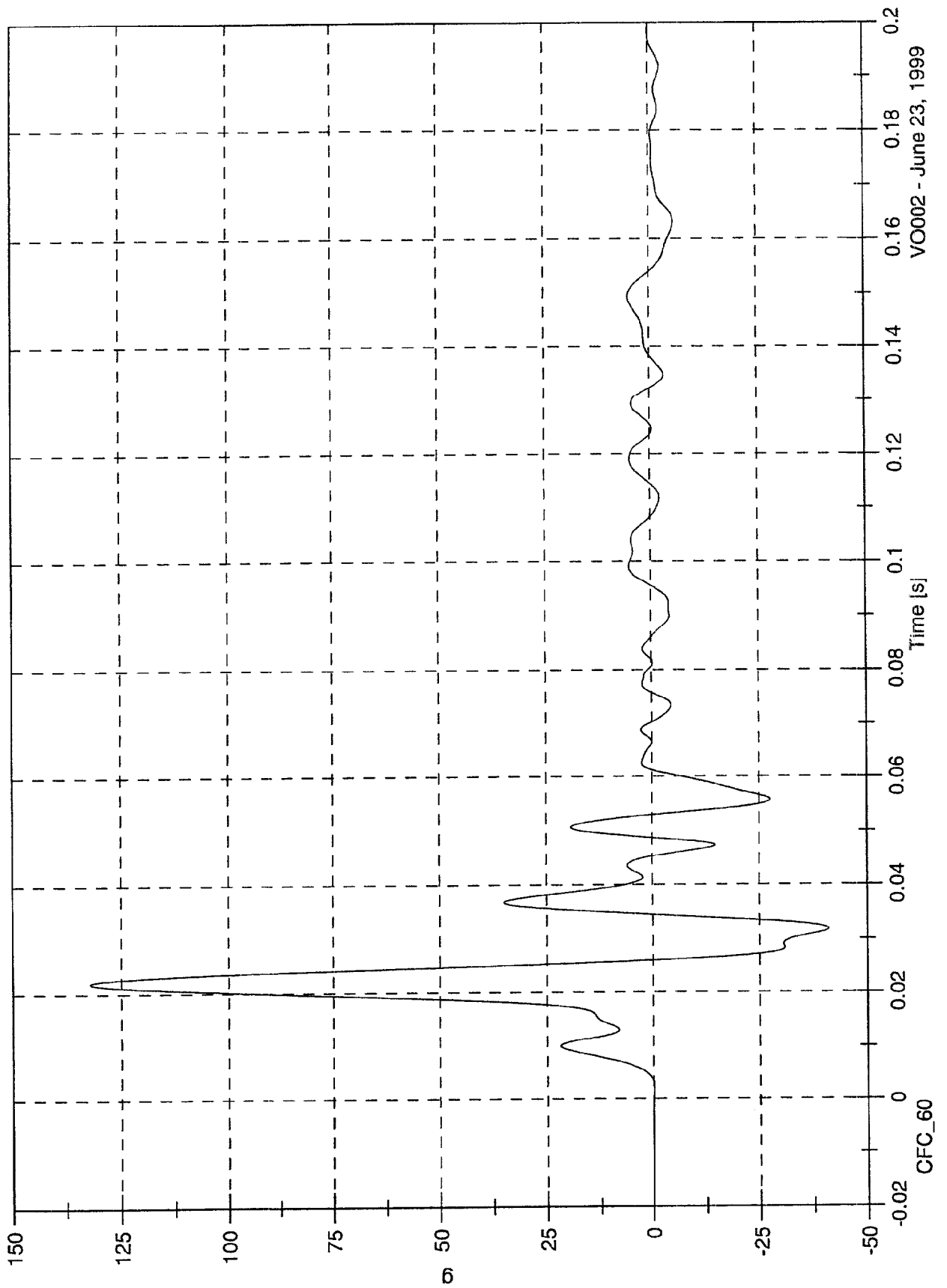
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 132.2 [g] at 0.022 [s]

Min: -40.9 [g] at 0.032 [s]

Acc 18 Target CG Y

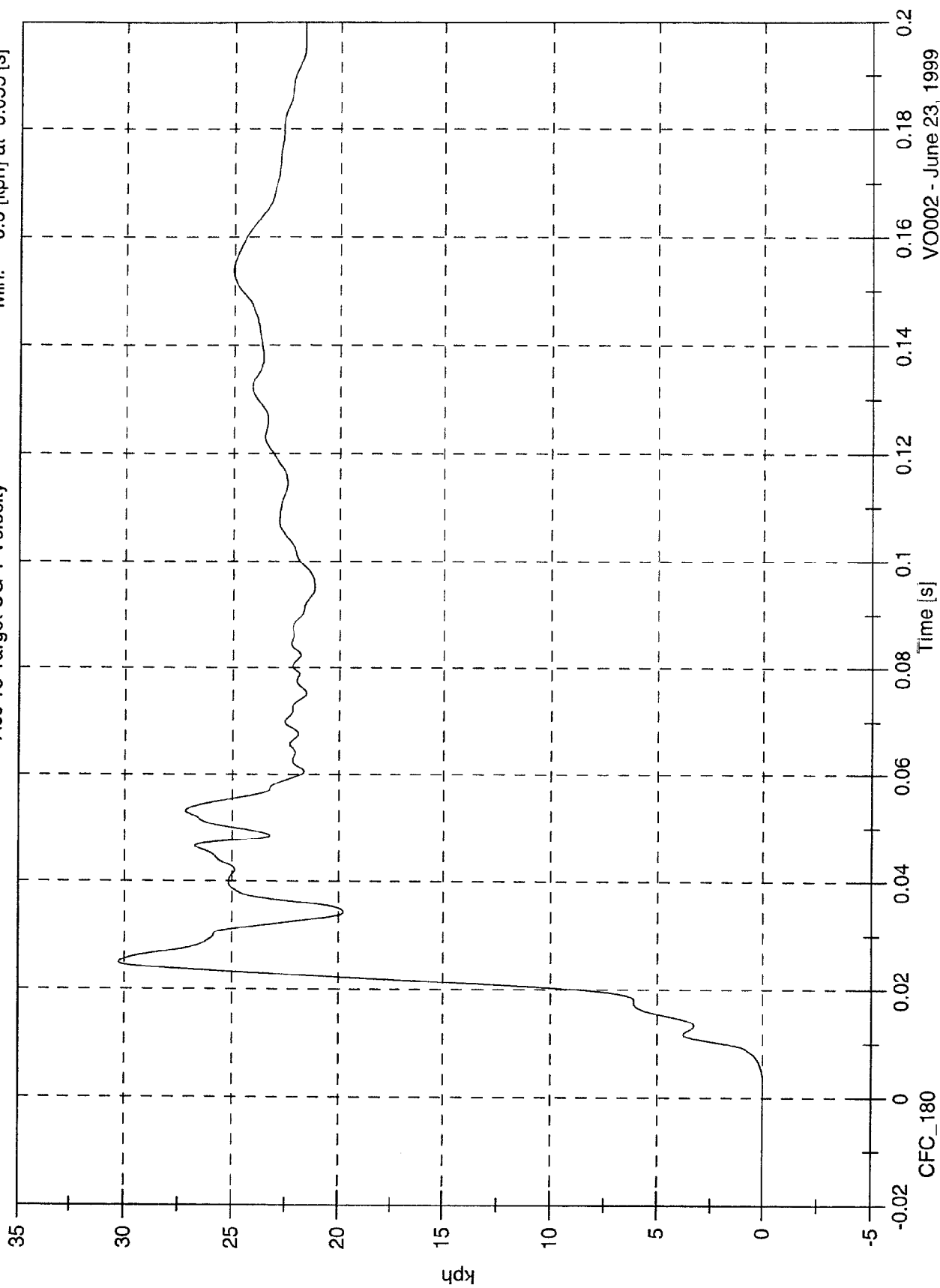


VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 30.3 [kph] at 0.025 [s]
Min: -0.0 [kph] at -0.055 [s]

Acc 18 Target CG Y Velocity



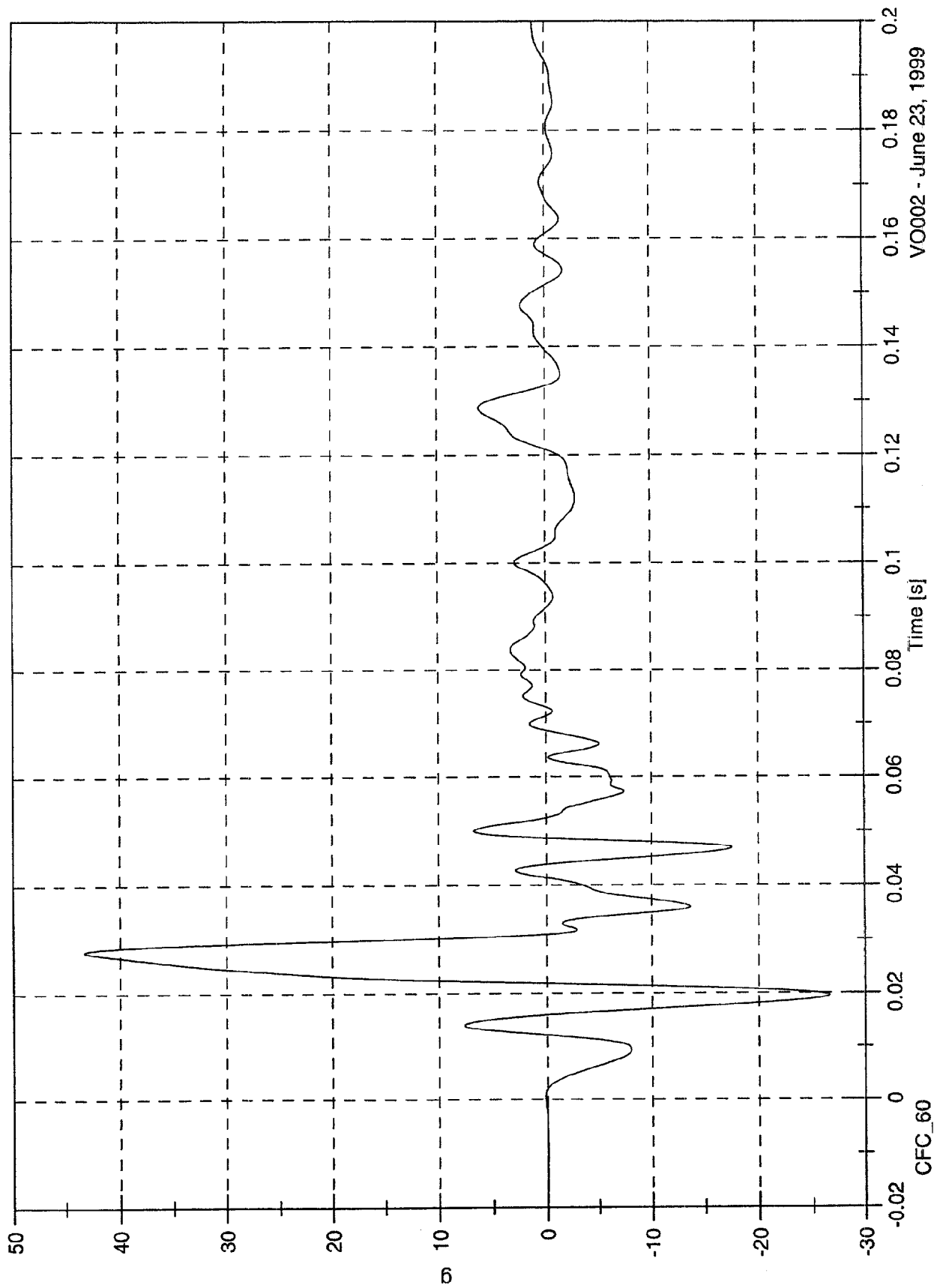
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 43.3 [g] at 0.028 [s]

Min: -26.6 [g] at 0.020 [s]

Acc 18 Target CG Z



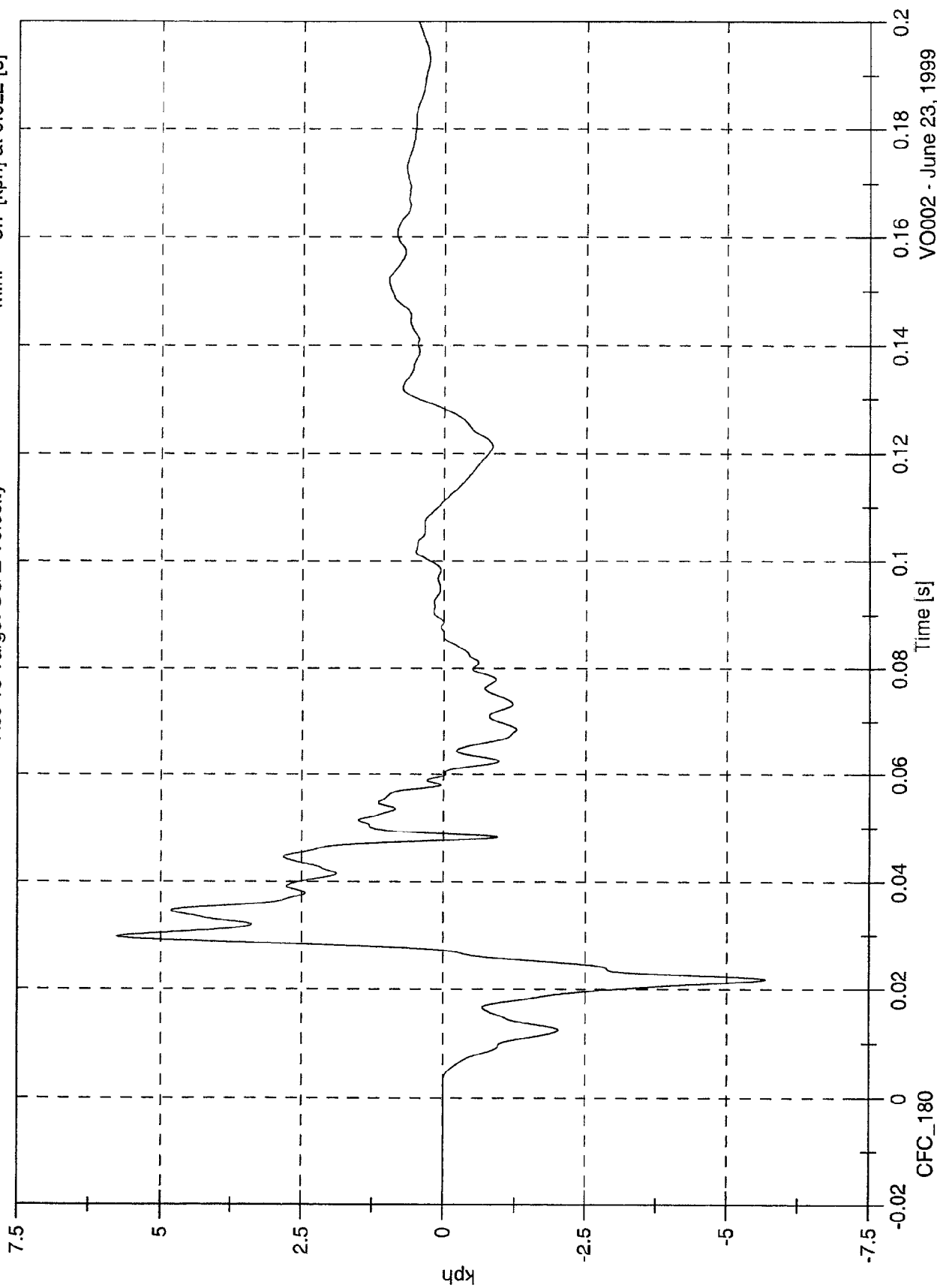
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 5.8 [kph] at 0.030 [s]

Min: -5.7 [kph] at 0.022 [s]

Acc 18 Target CG Z Velocity



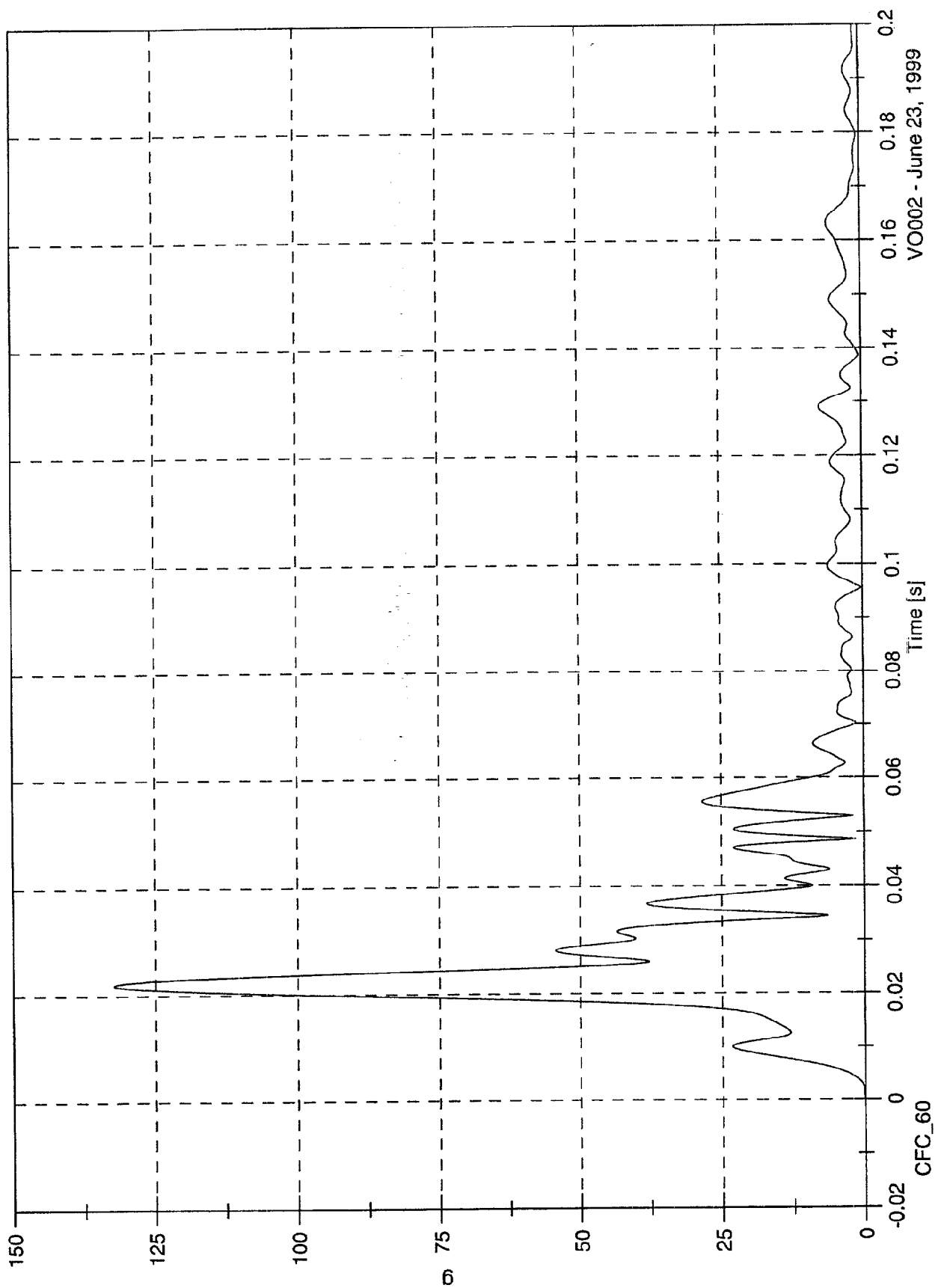
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

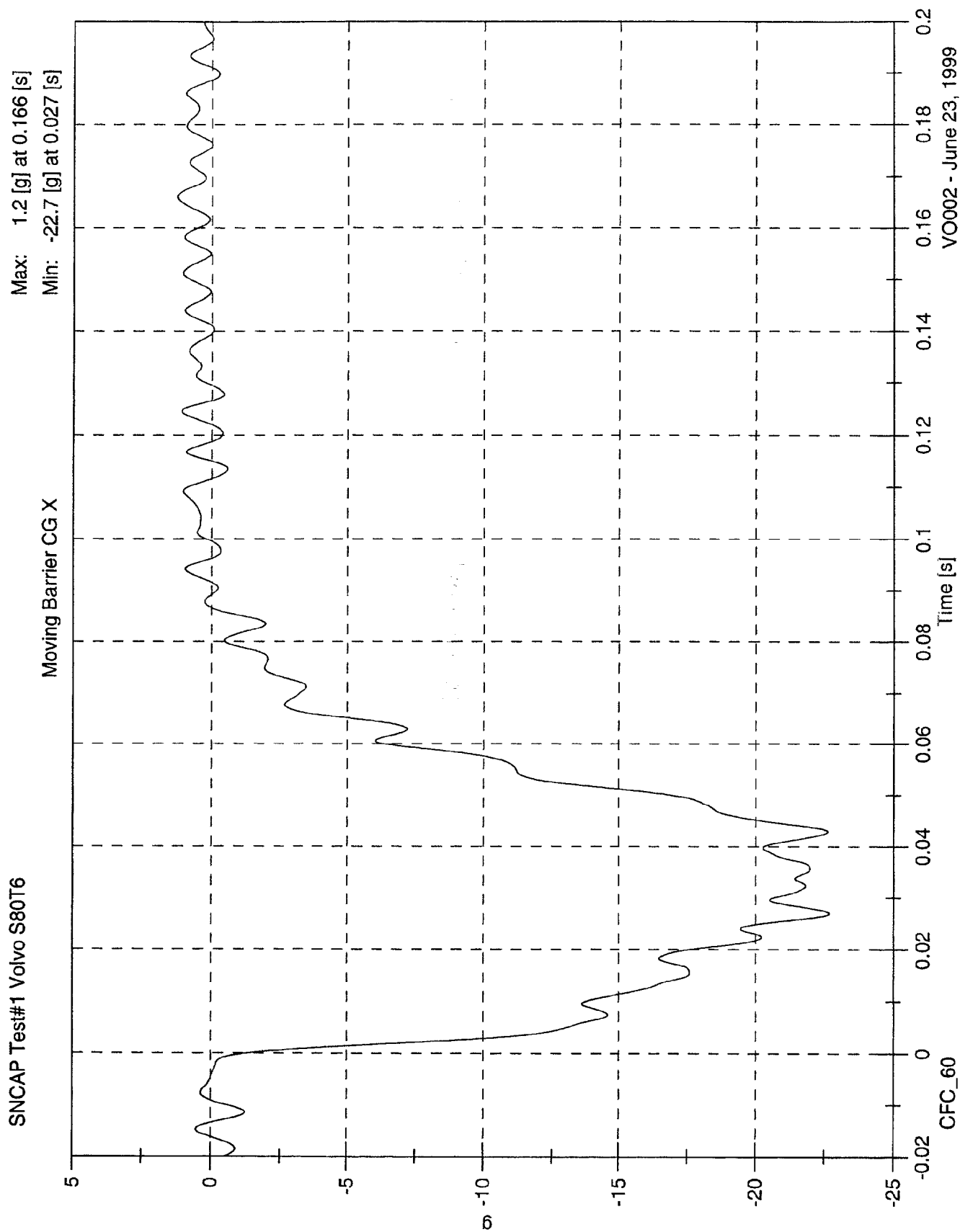
Max: 132.2 [g] at 0.022 [s]

Min: 0.0 [g] at -0.014 [s]

Acc 18 Target CG Resultant



VO002 - June 23, 1999

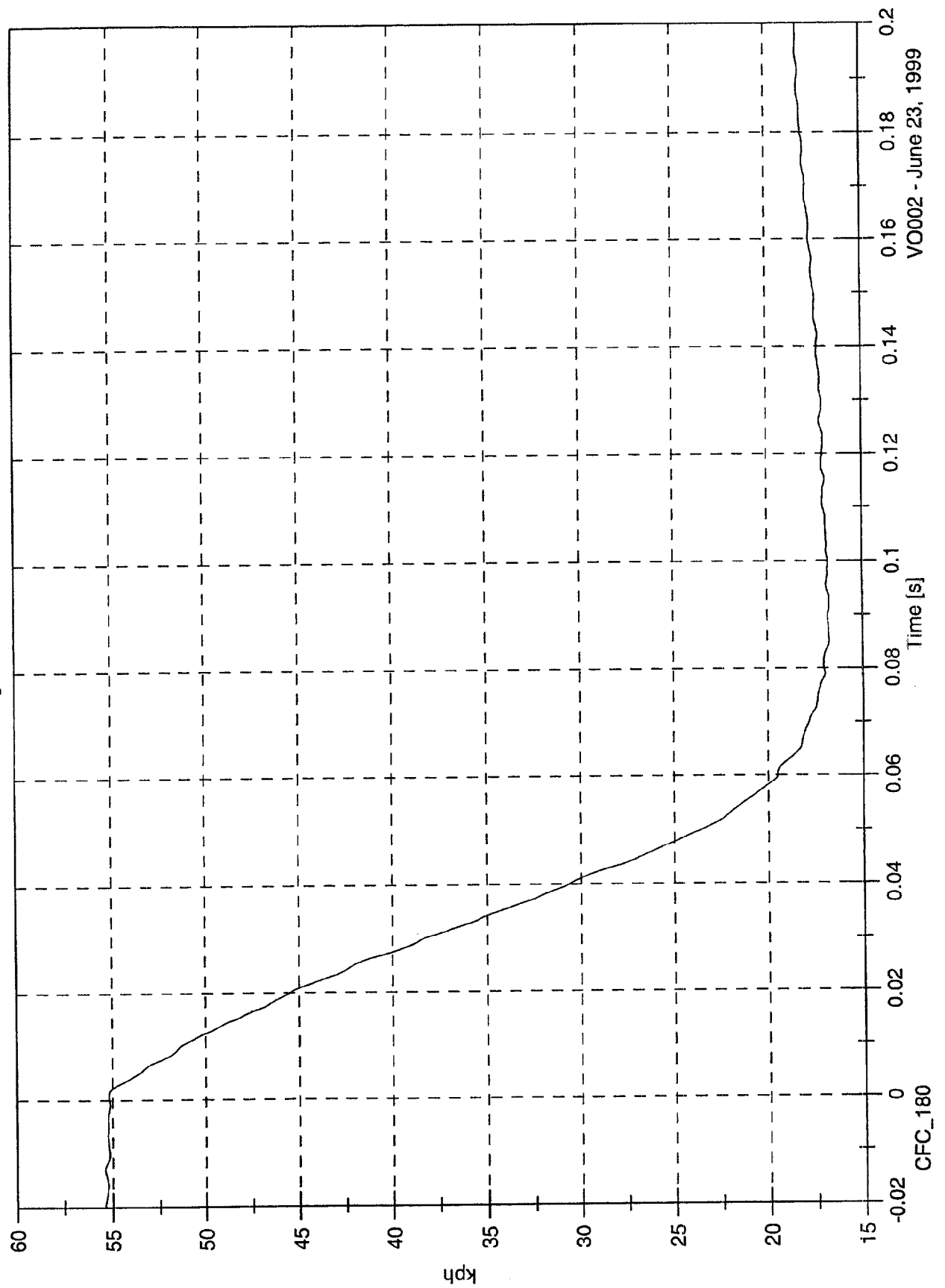


VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 55.5 [kph] at -0.040 [s]
Min: 16.8 [kph] at 0.085 [s]

Moving Barrier CG X Velocity



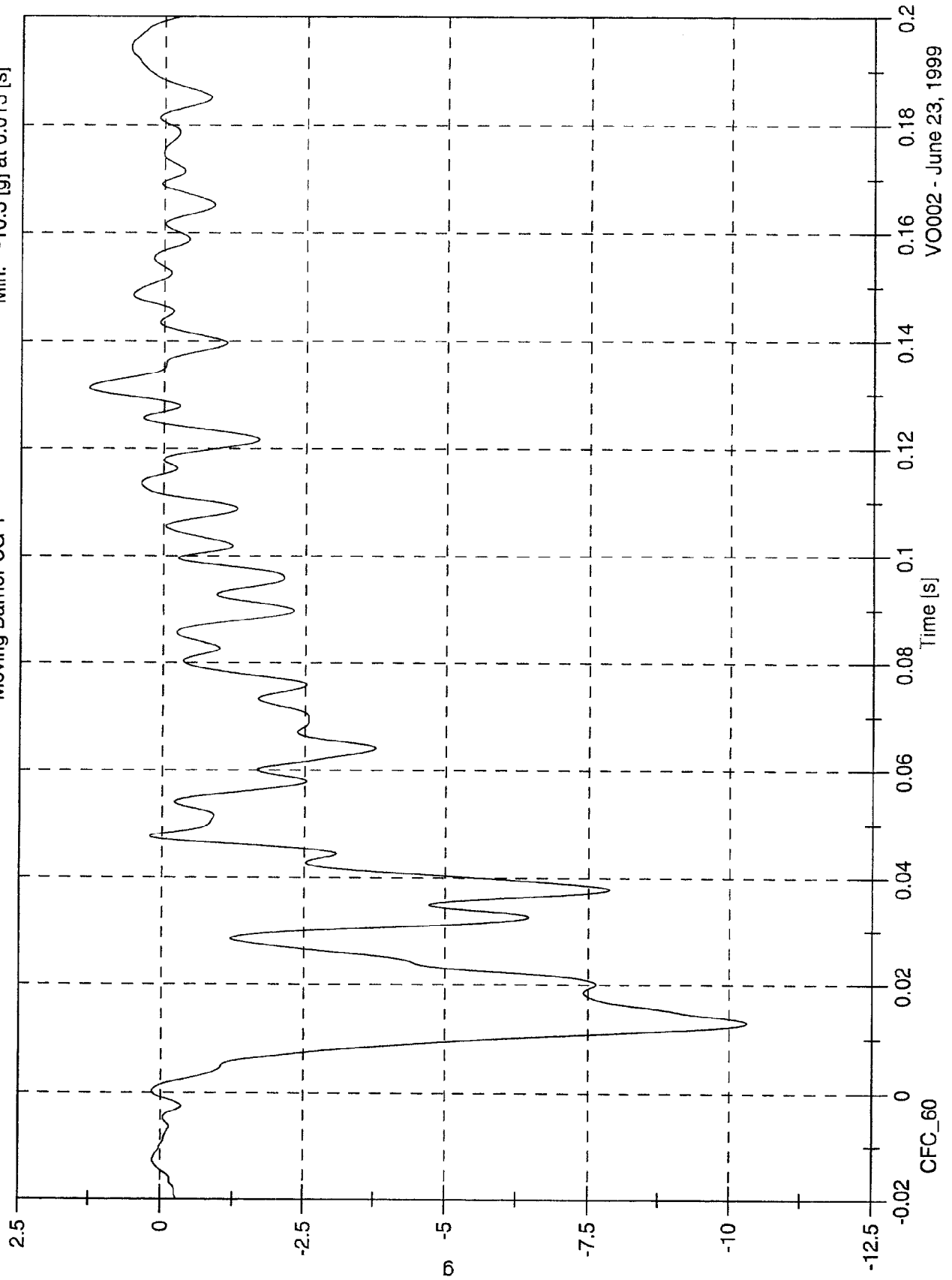
VO002 - June 23, 1999

SNCAP Test#1 Valvo S80T6

Max: 1.3 [g] at 0.131 [s]

Min: -10.3 [g] at 0.013 [s]

Moving Barrier CG Y

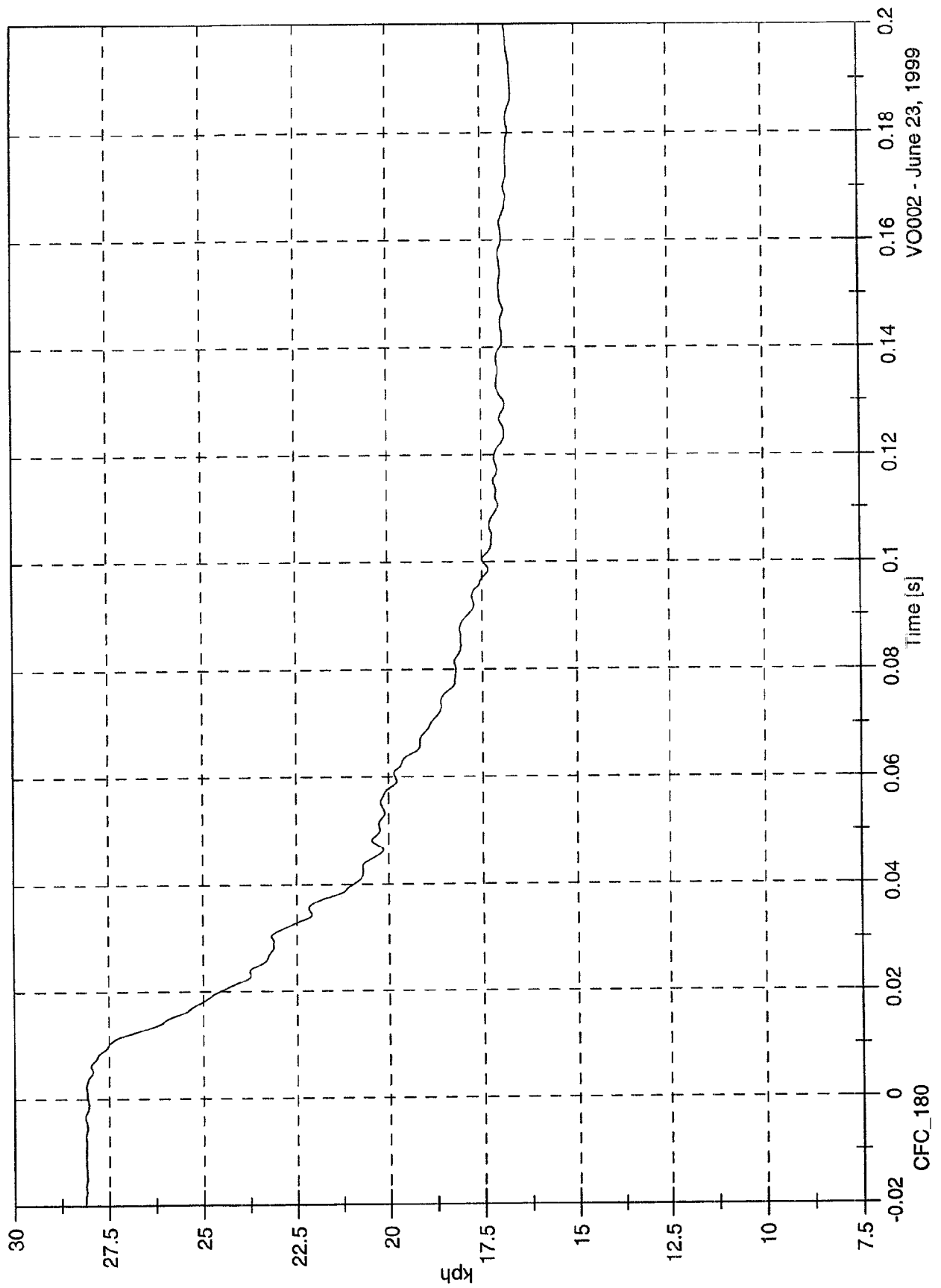


VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 28.2 [kph] at -0.045 [s]
Min: 9.5 [kph] at 0.500 [s]

Moving Barrier CG Y Velocity



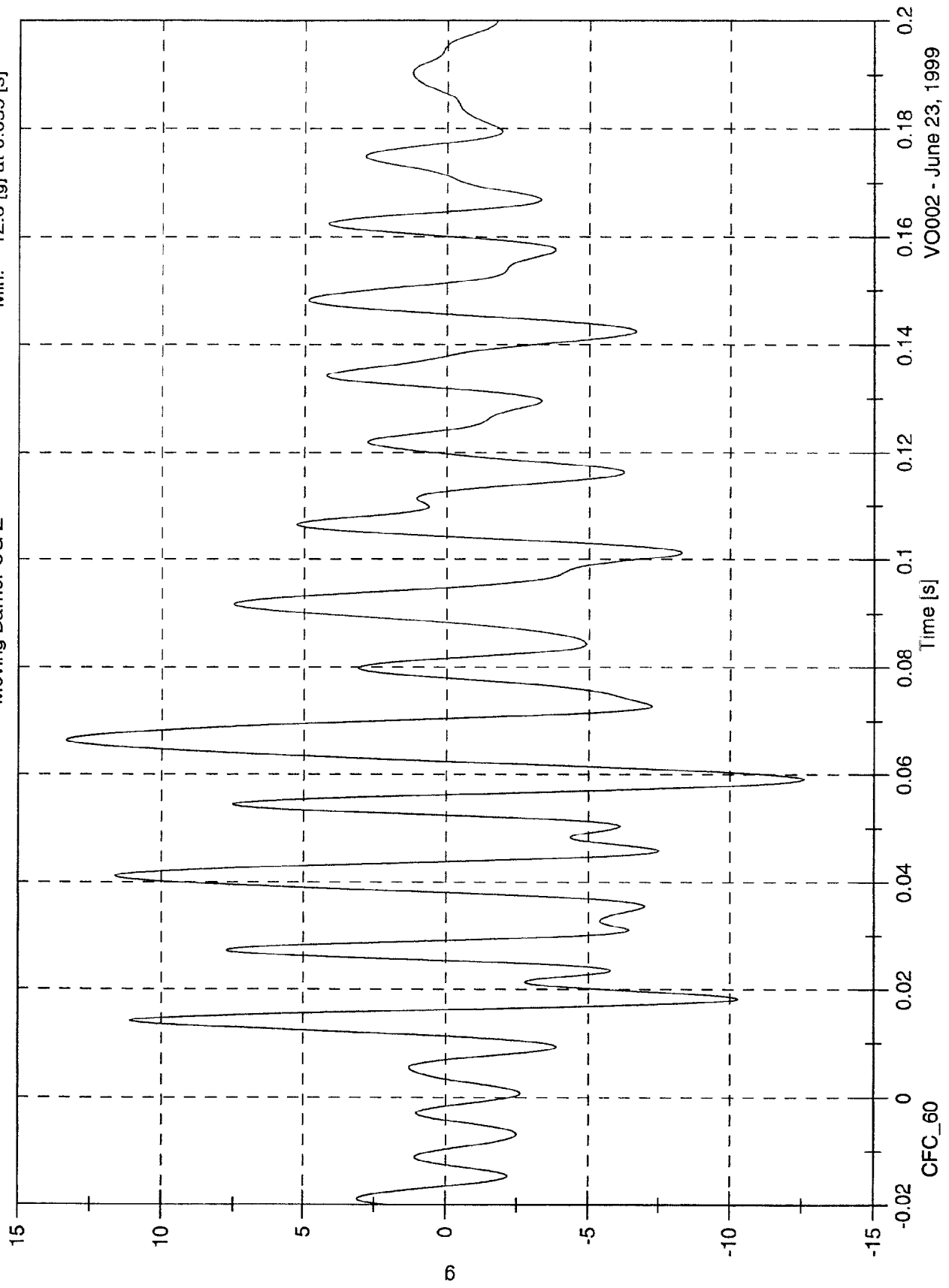
VO002 - June 23, 1999

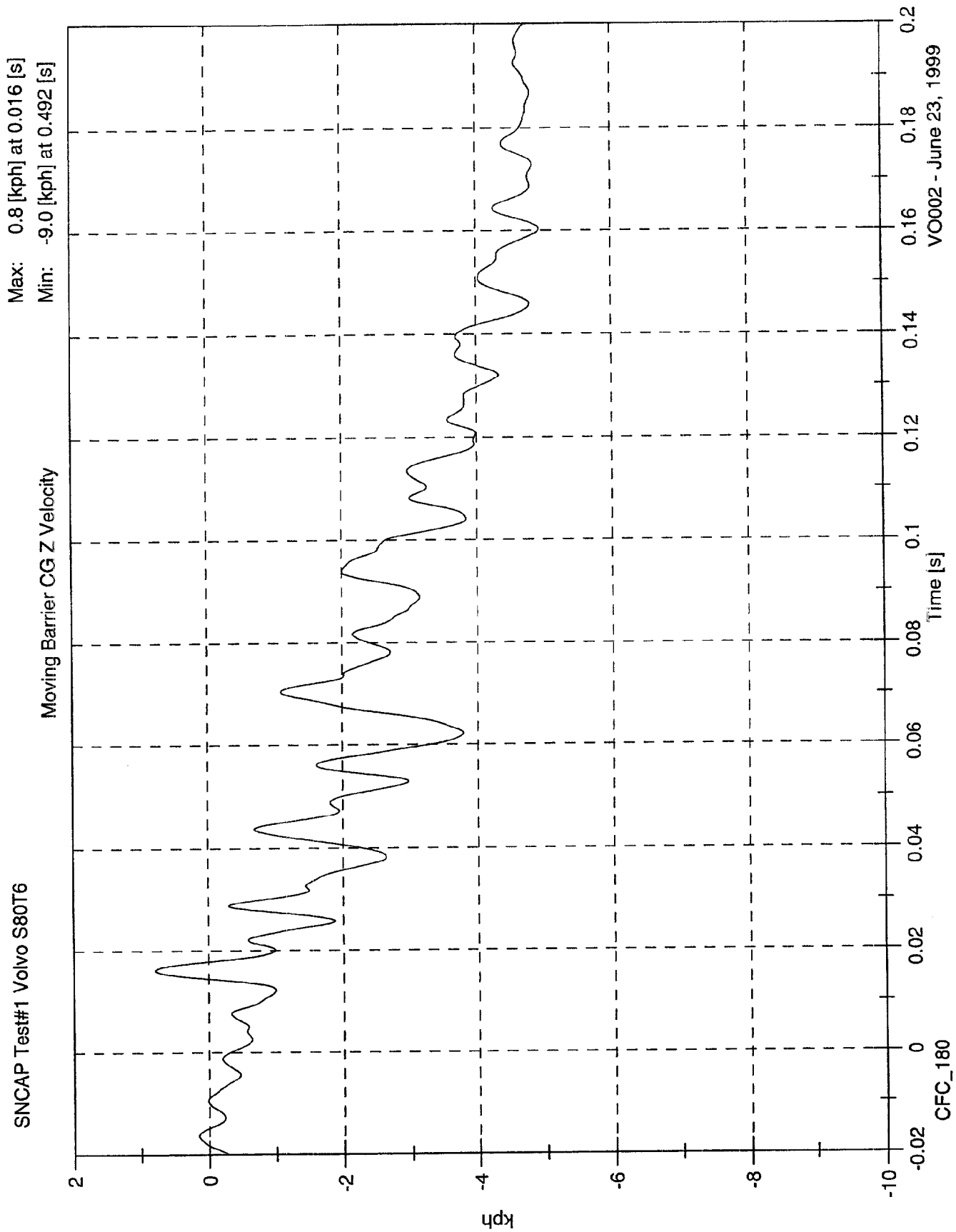
SNCAP Test#1 Volvo S80T6

Max: 13.3 [g] at 0.066 [s]

Min: -12.6 [g] at 0.059 [s]

Moving Barrier CG Z



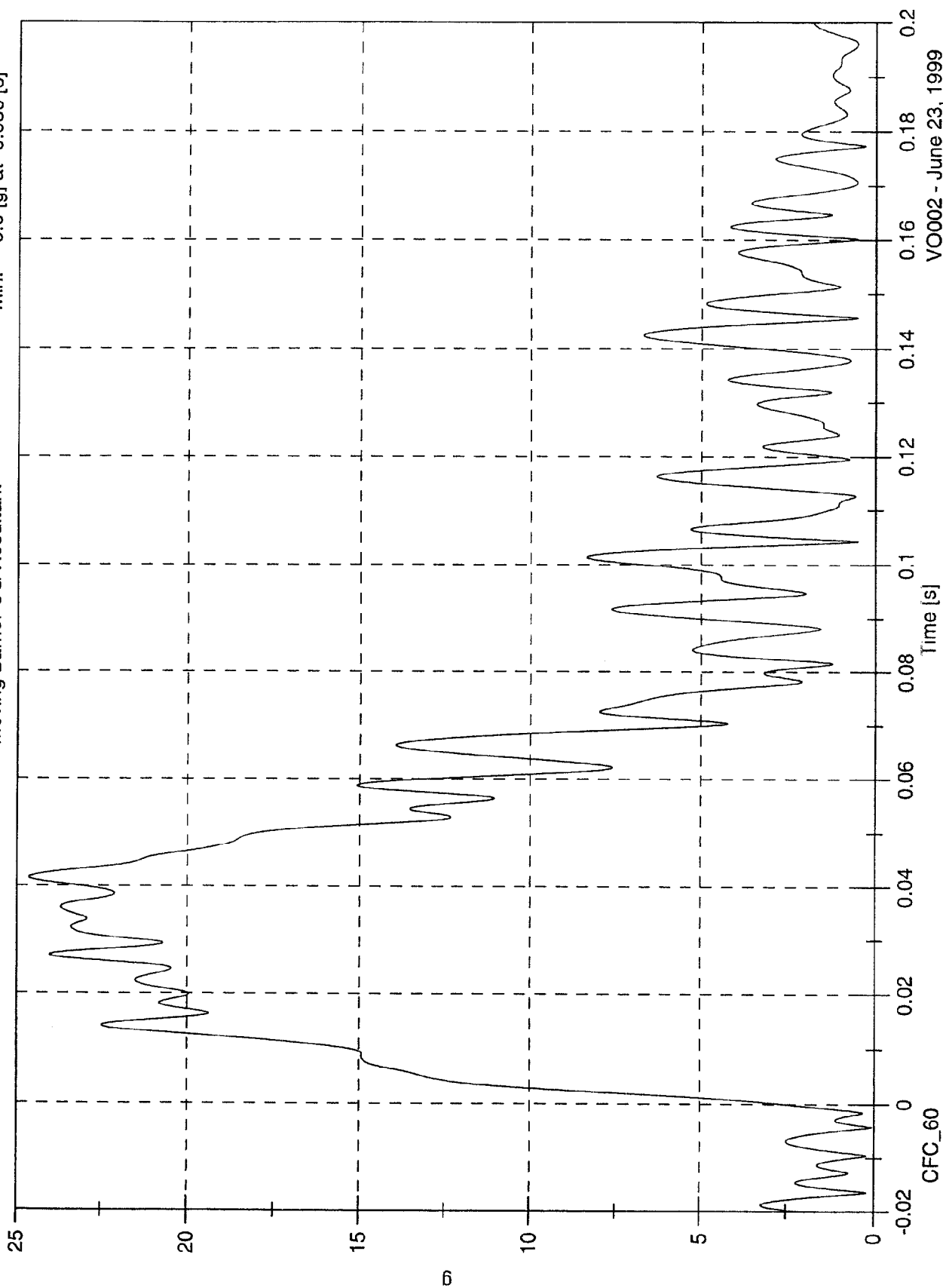


SNCAP Test#1 Volvo S80T6

Max: 24.6 [g] at 0.042 [s]

Min: 0.0 [g] at -0.036 [s]

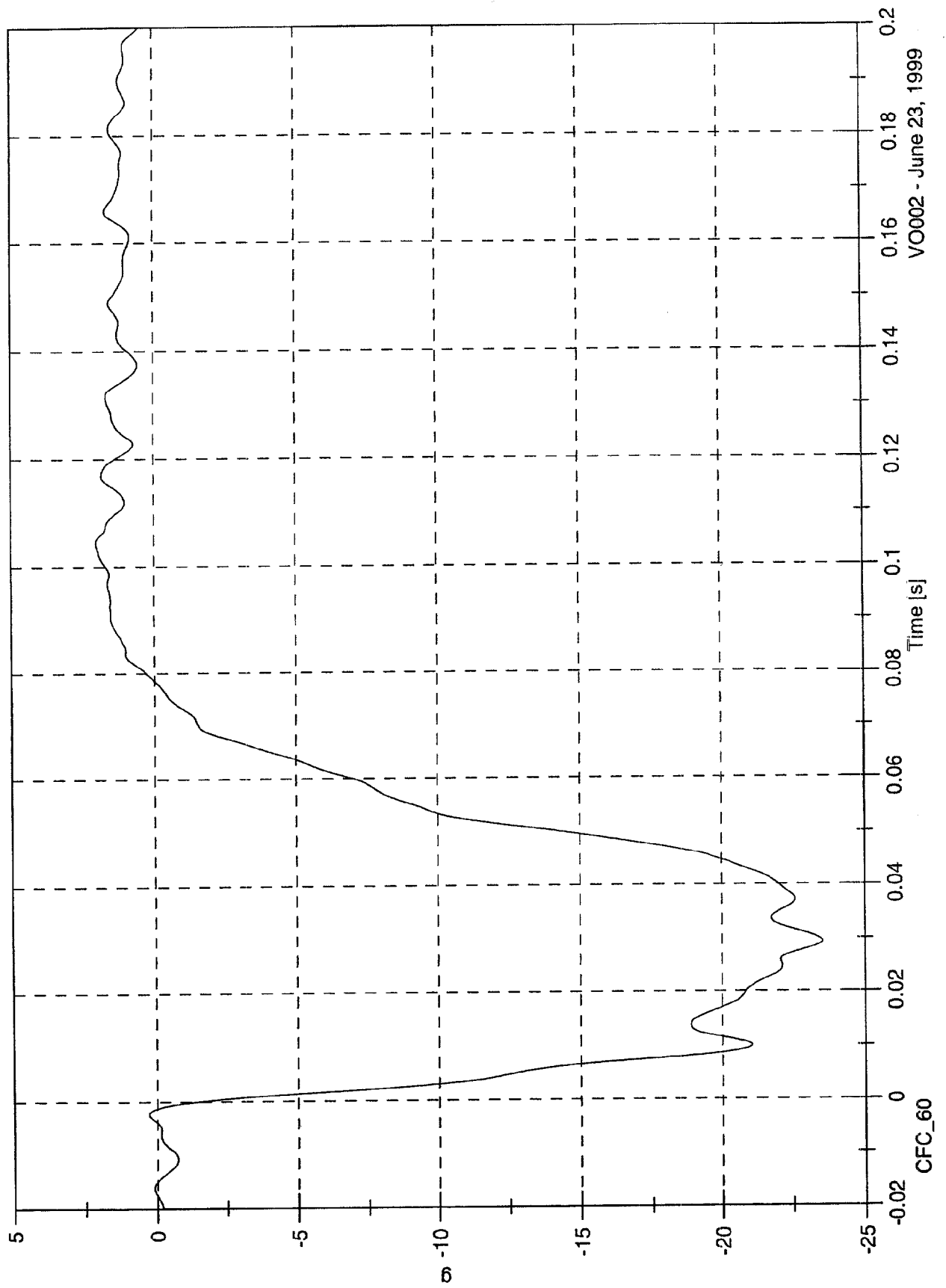
Moving Barrier CG Resultant



SNCAP Test#1 Volvo S80T6

Max: 2.0 [g] at 0.104 [s]
Min: -23.5 [g] at 0.029 [s]

Moving Barrier Left Rail X



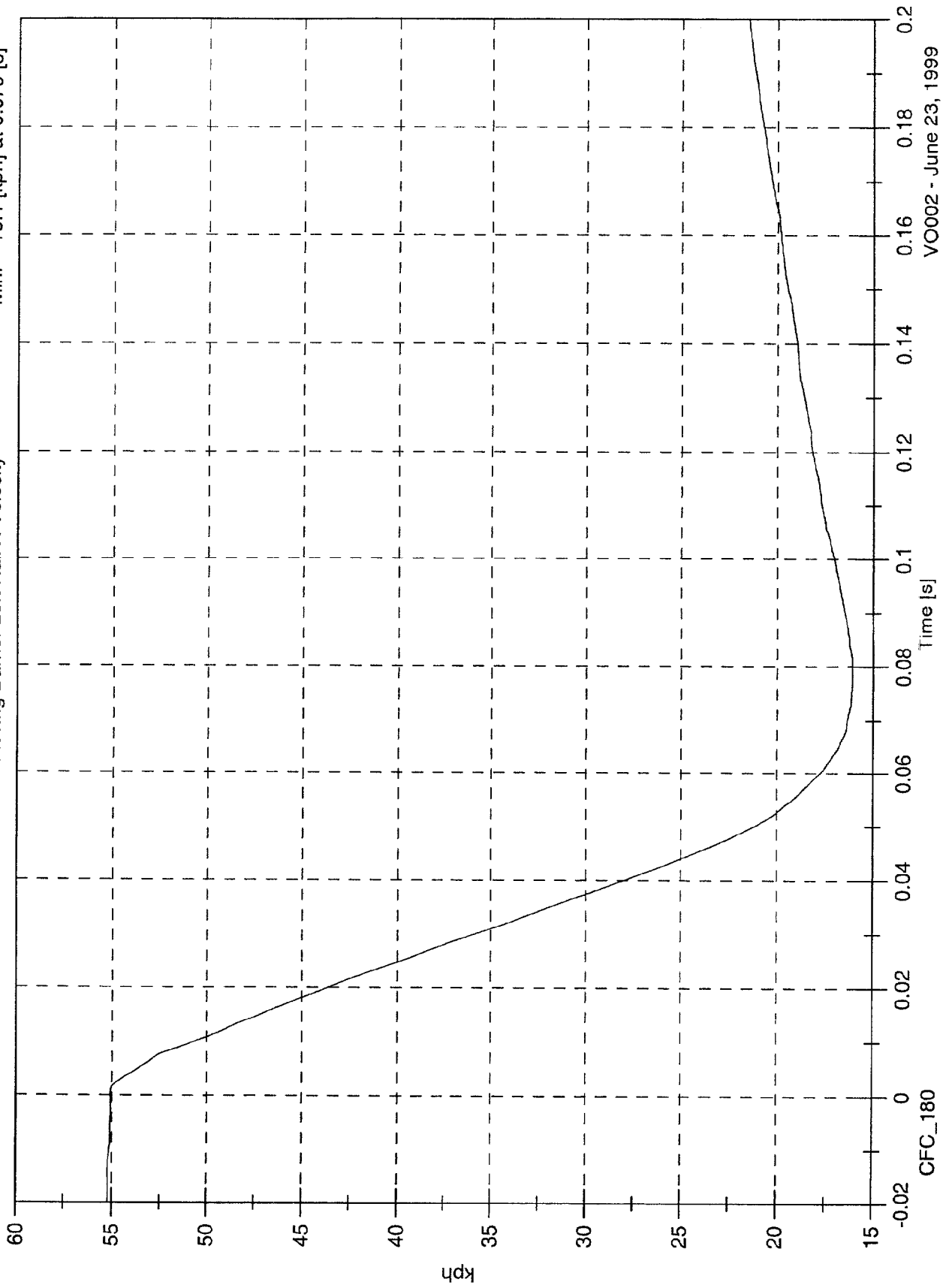
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 55.4 [kph] at -0.037 [s]

Min: 16.1 [kph] at 0.079 [s]

Moving Barrier Left Rail X Velocity



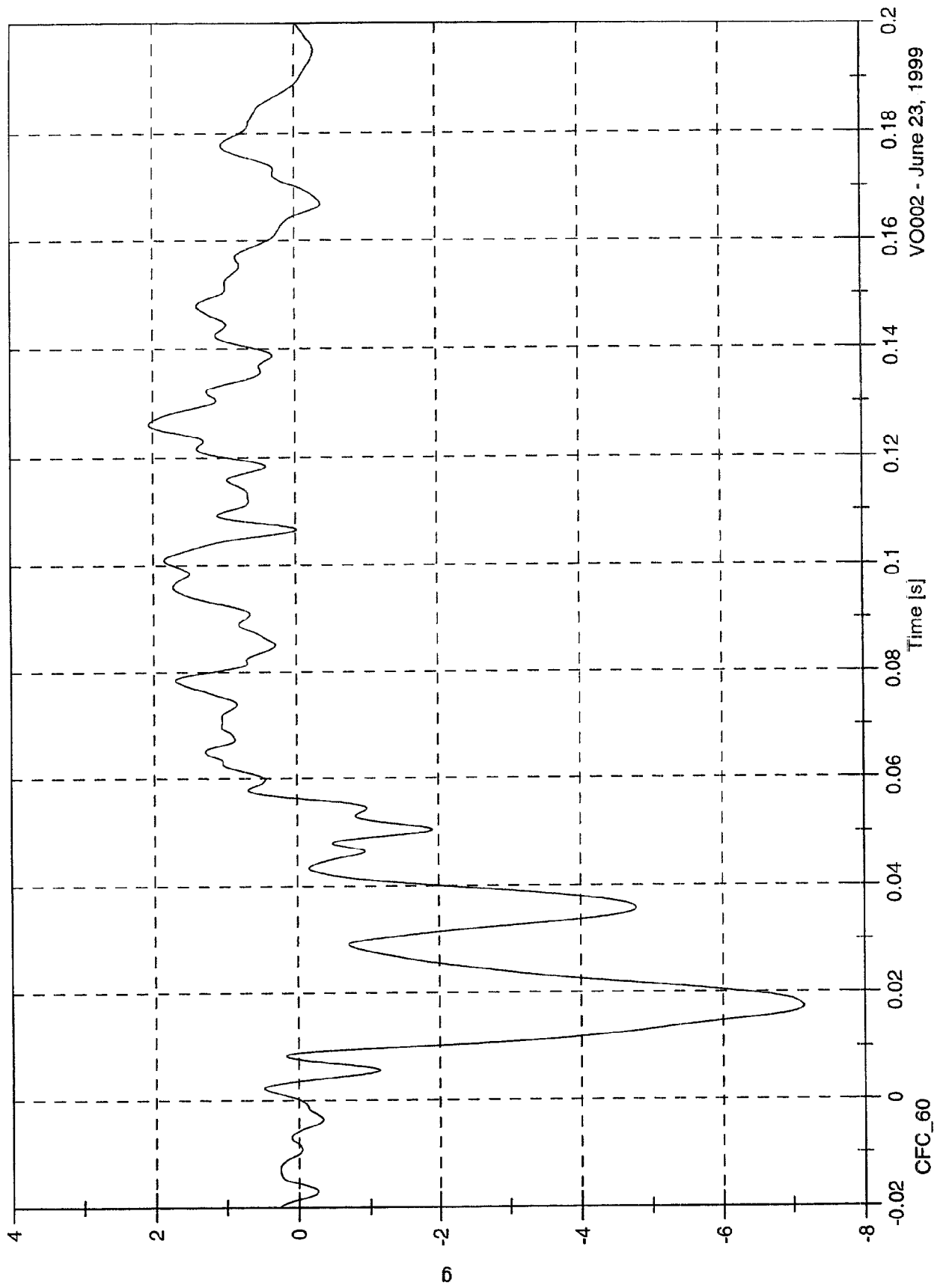
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 2.1 [g] at 0.126 [s]

Min: -7.2 [g] at 0.017 [s]

Moving Barrier Left Rail Y



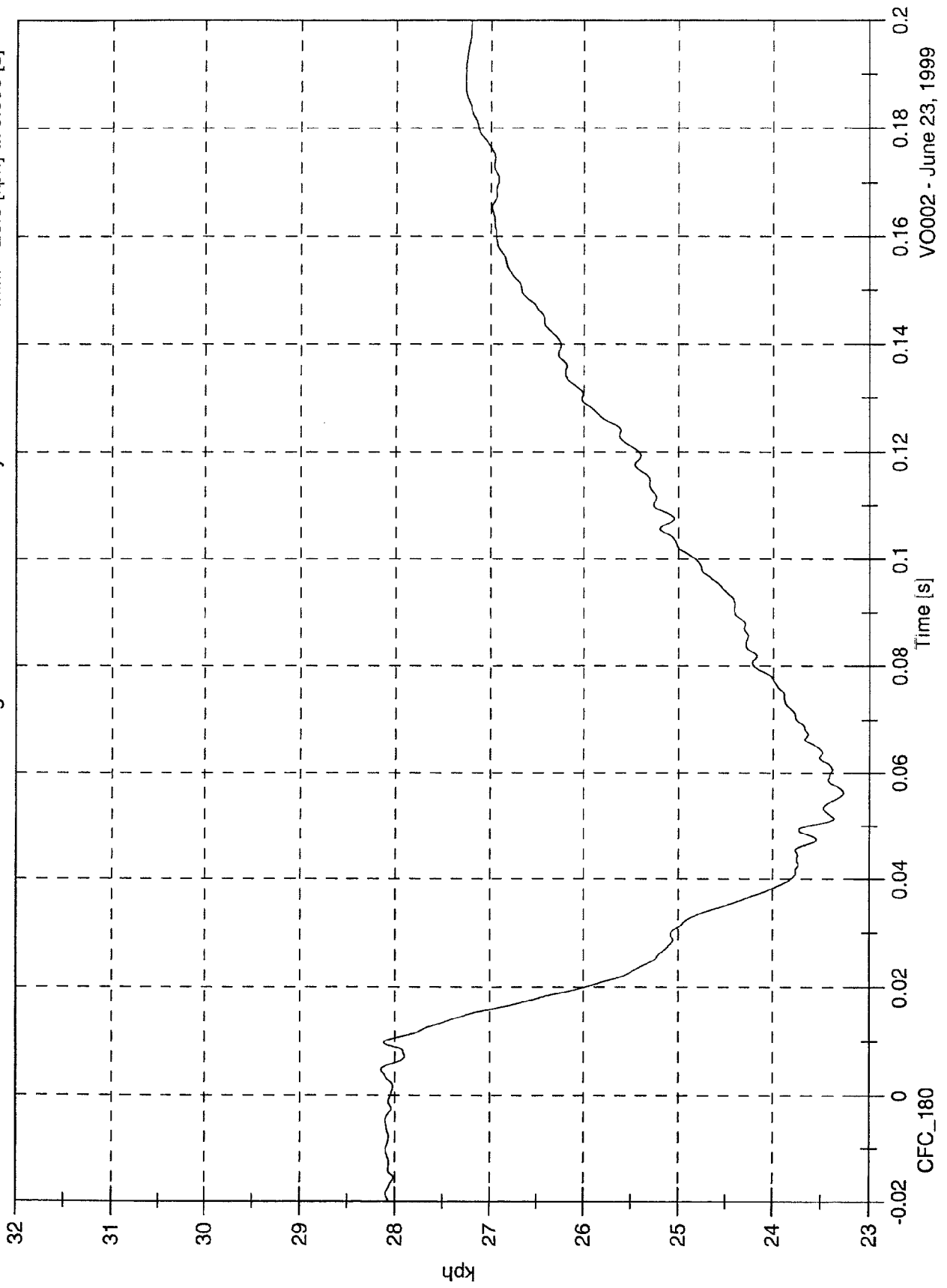
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 31.1 [kph] at 0.500 [s]

Min: 23.3 [kph] at 0.056 [s]

Moving Barrier Left Rail Y Velocity



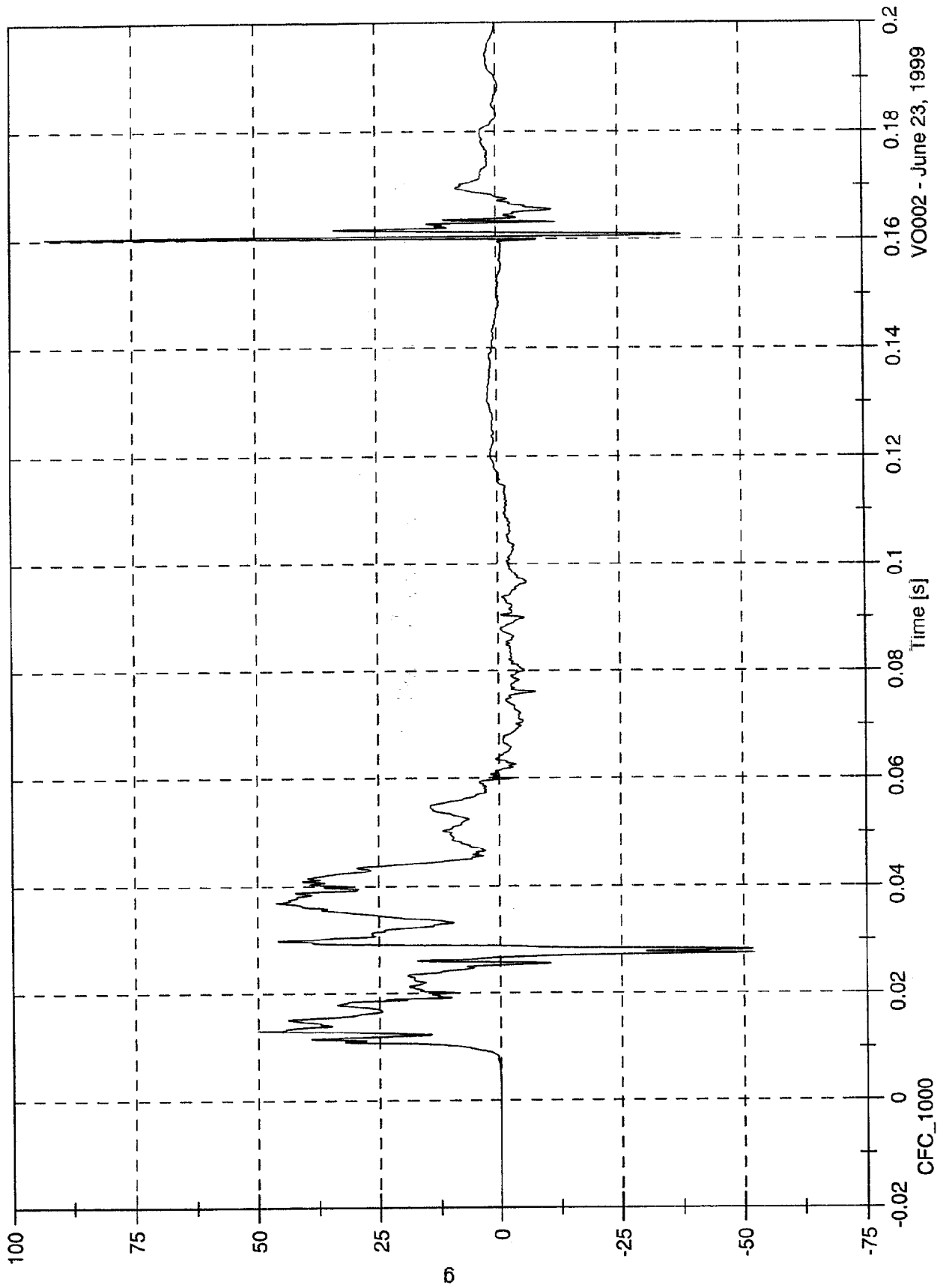
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 92.4 [g] at 0.160 [s]

Min: -52.2 [g] at 0.027 [s]

Driver Upper Rib RY

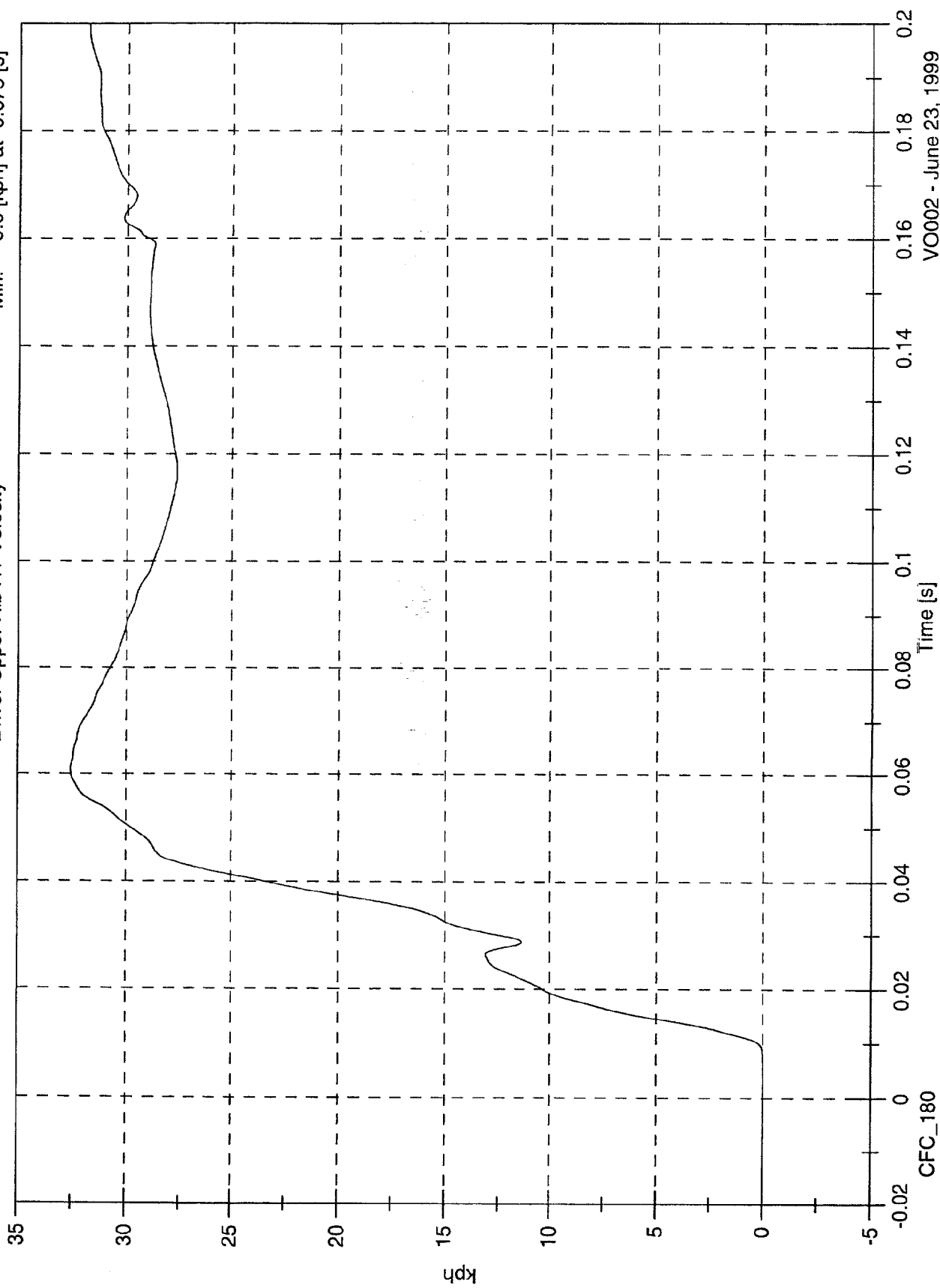


SNCAP Test#1 Volvo S80T6

Max: 32.6 [kph] at 0.061 [s]

Min: -0.0 [kph] at -0.075 [s]

Driver Upper Rib RY Velocity



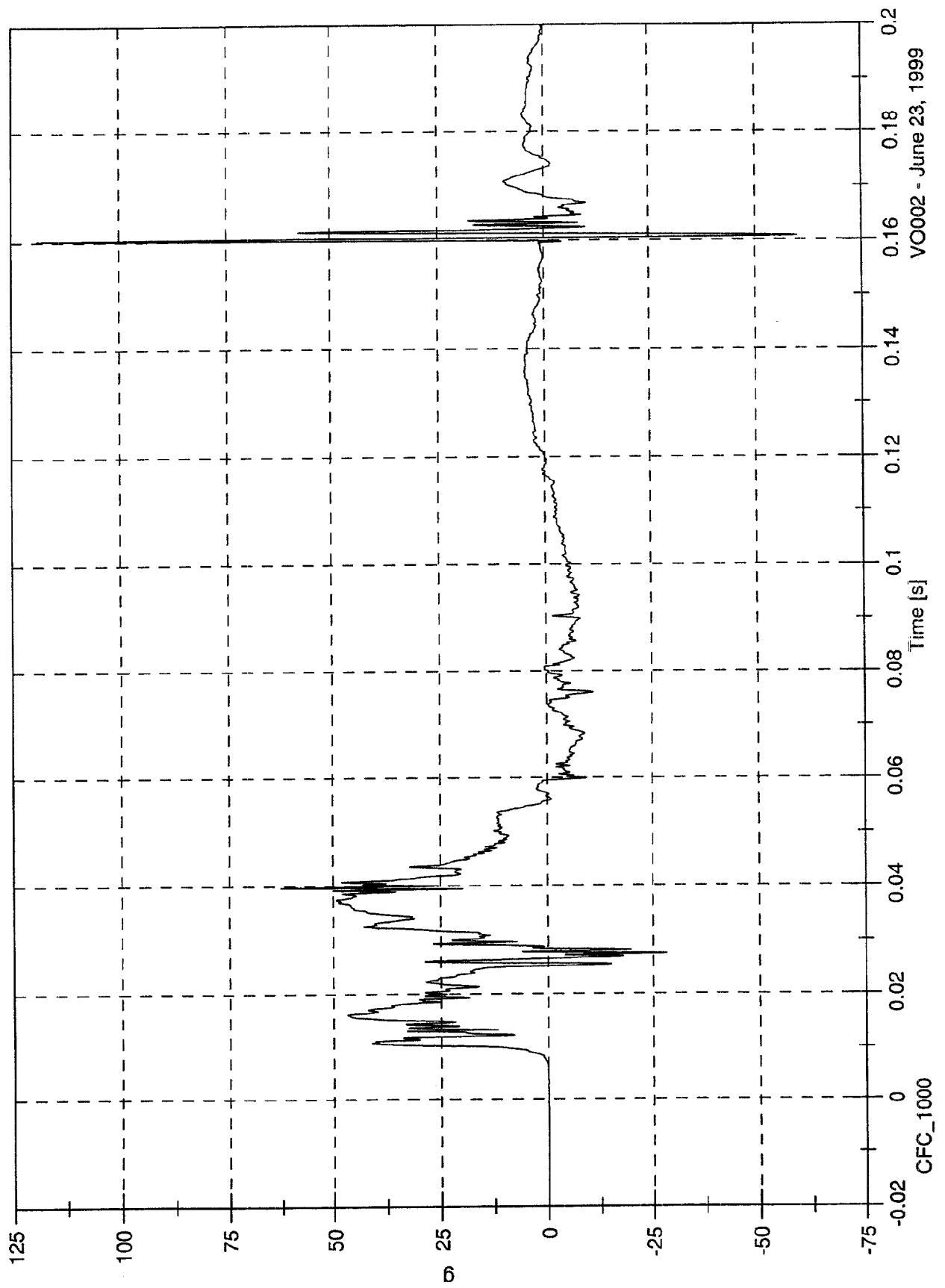
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 119.0 [g] at 0.160 [s]

Min: -59.7 [g] at 0.161 [s]

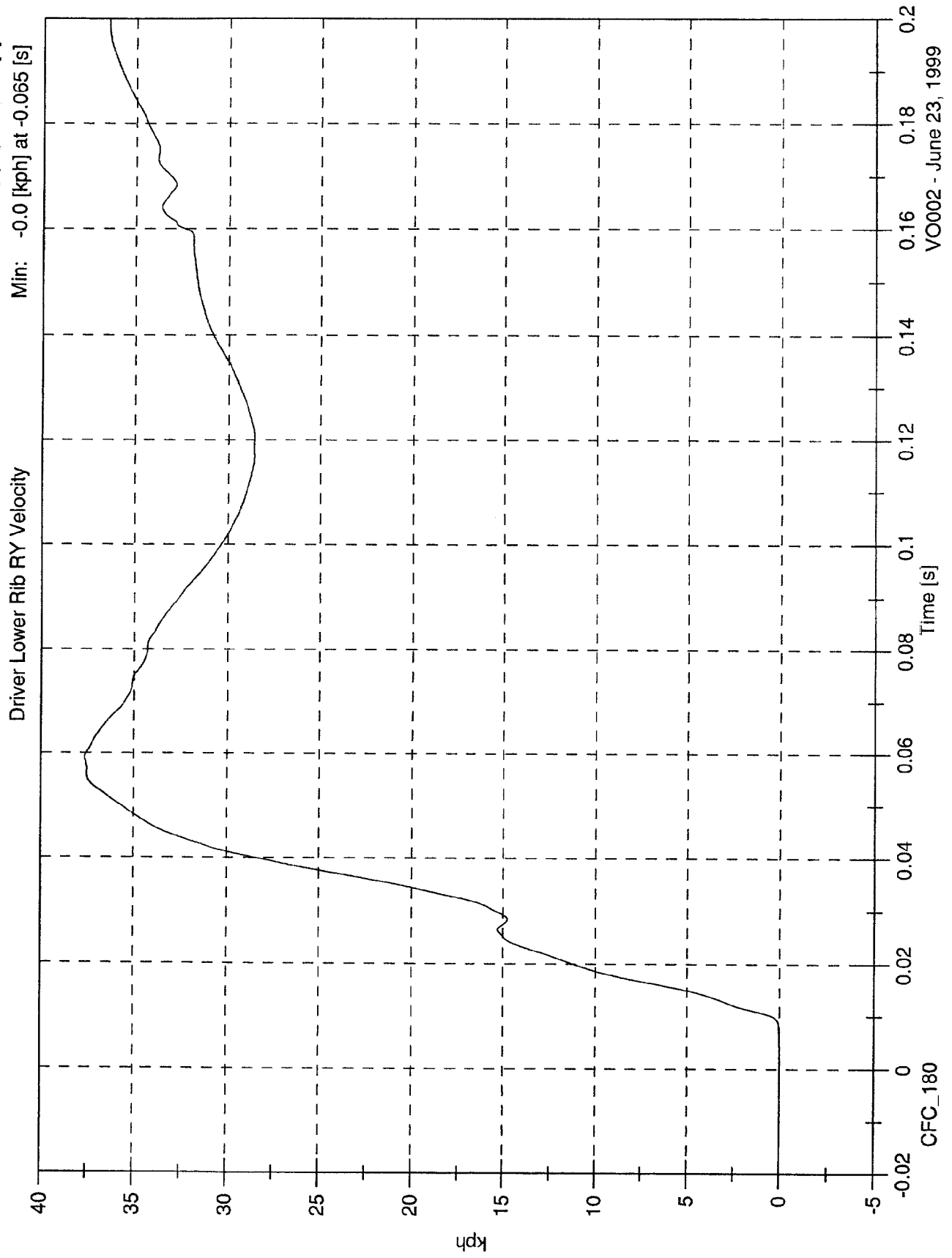
Driver Lower Rib RY



VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 37.6 [kph] at 0.059 [s]
Min: -0.0 [kph] at -0.065 [s]



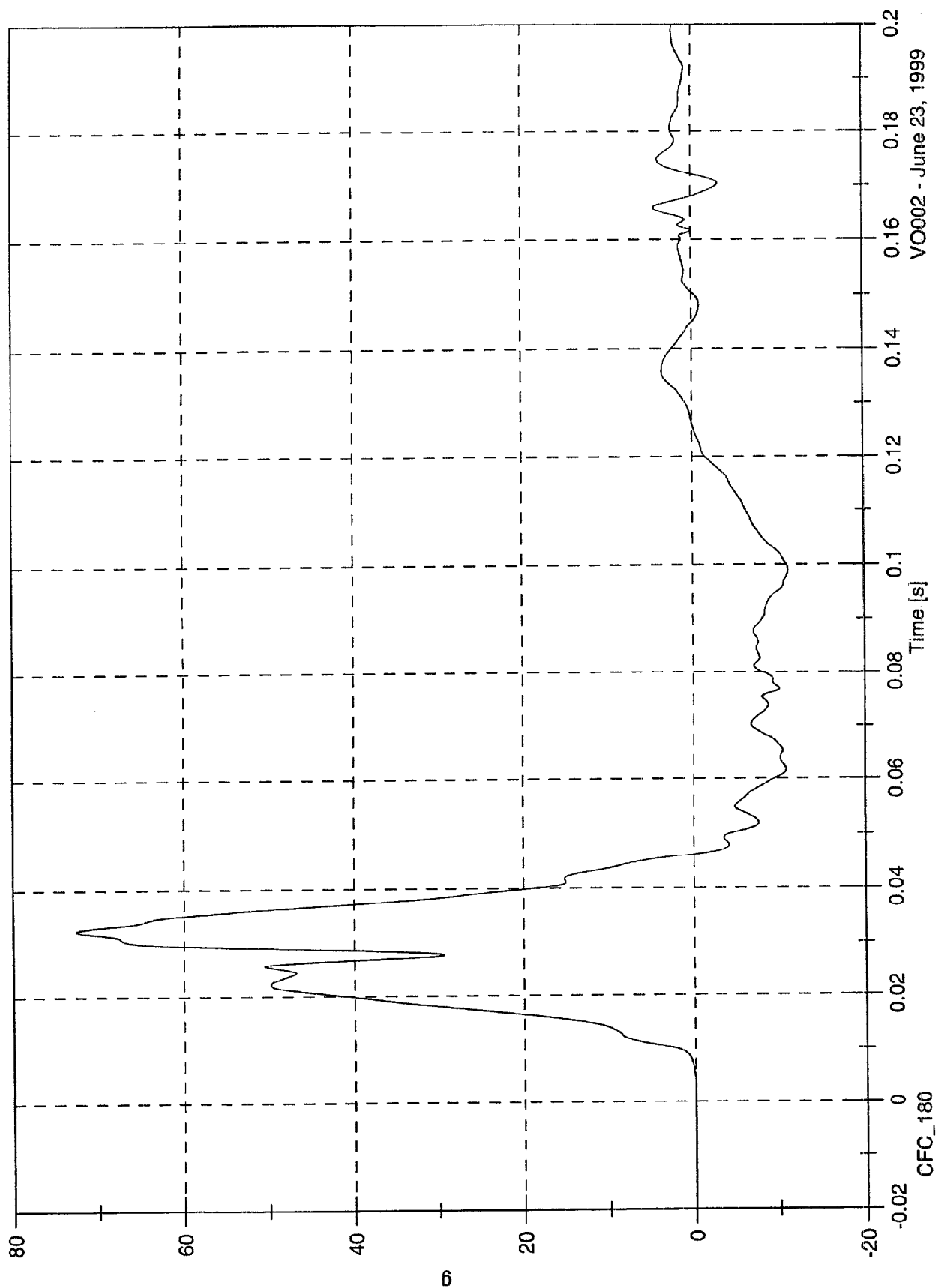
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Driver Lower Spine RY

Max: 72.6 [g] at 0.032 [s]

Min: -11.2 [g] at 0.099 [s]



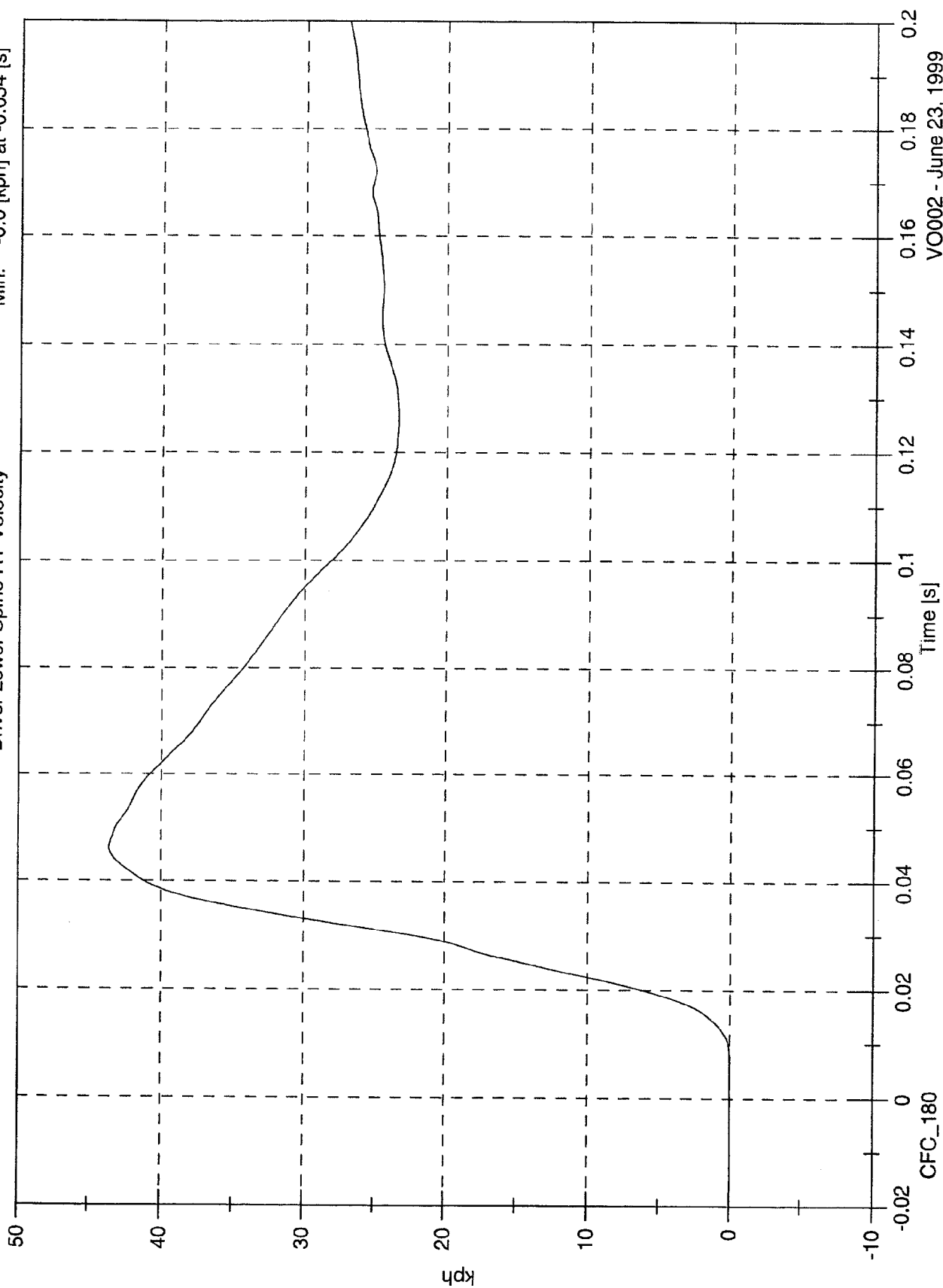
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 43.6 [kph] at 0.046 [s]

Min: -0.0 [kph] at -0.054 [s]

Driver Lower Spine RY Velocity



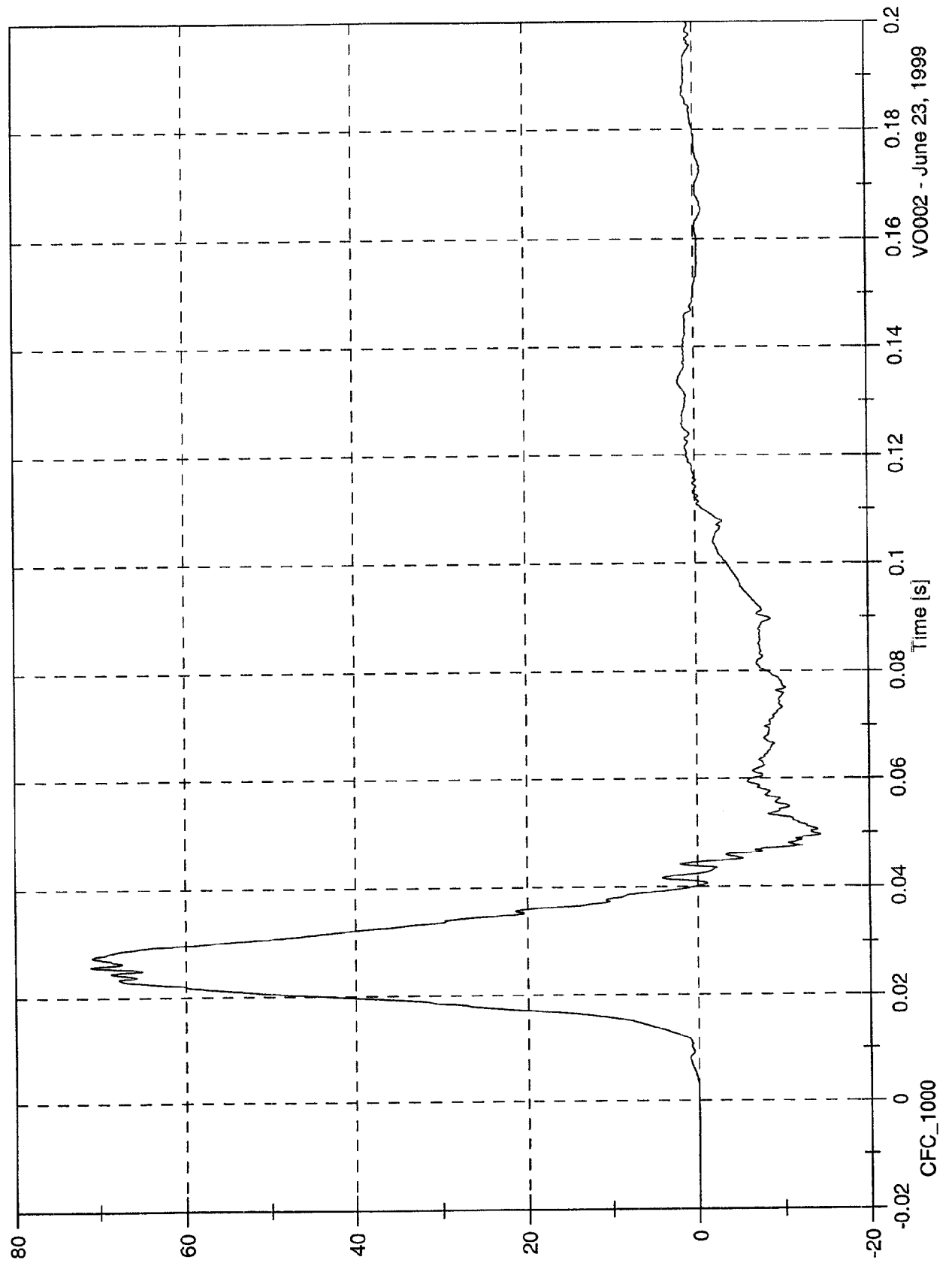
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 71.1 [g] at 0.026 [s]

Min: -14.3 [g] at 0.050 [s]

Driver Pelvic RY



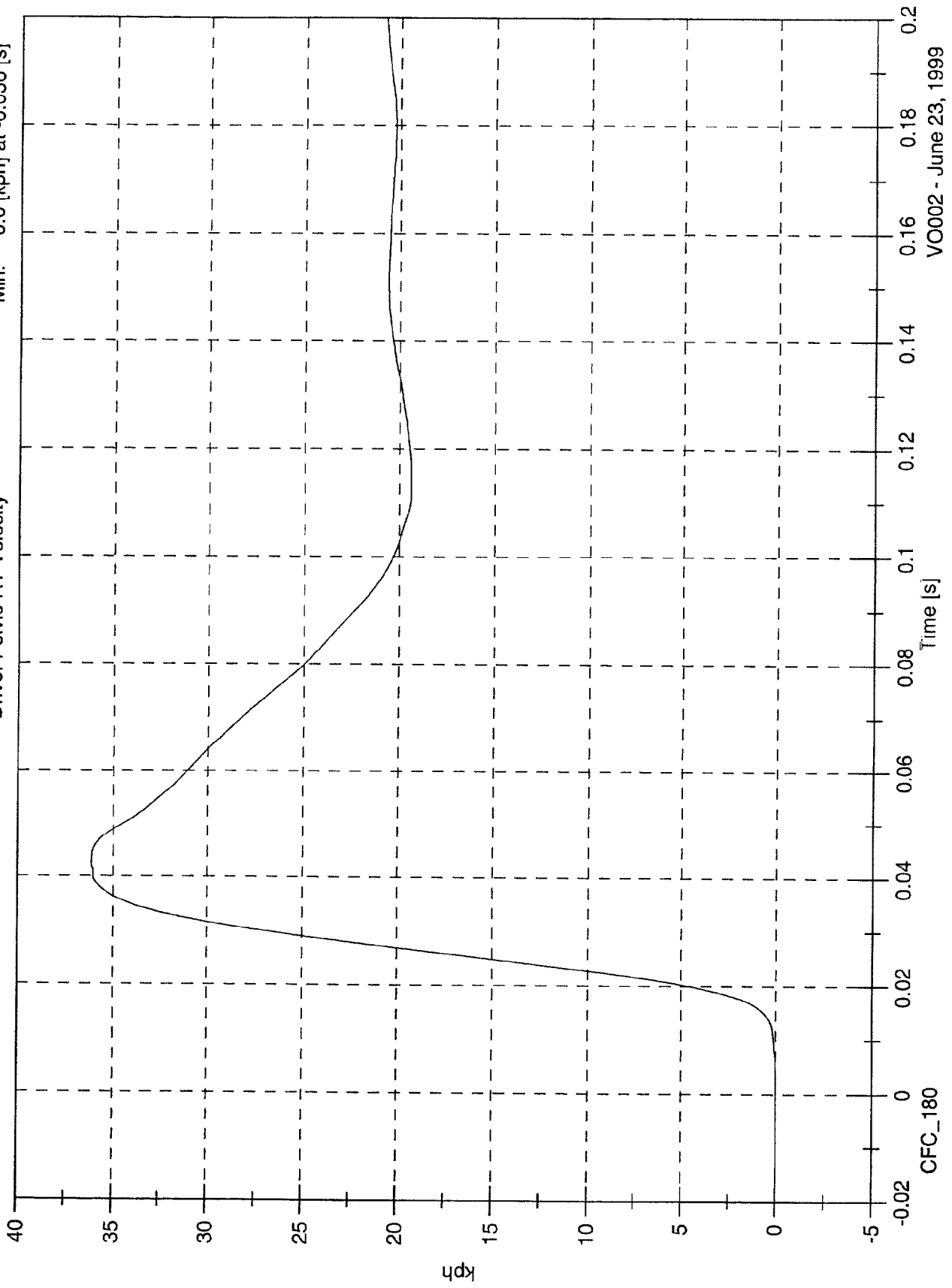
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

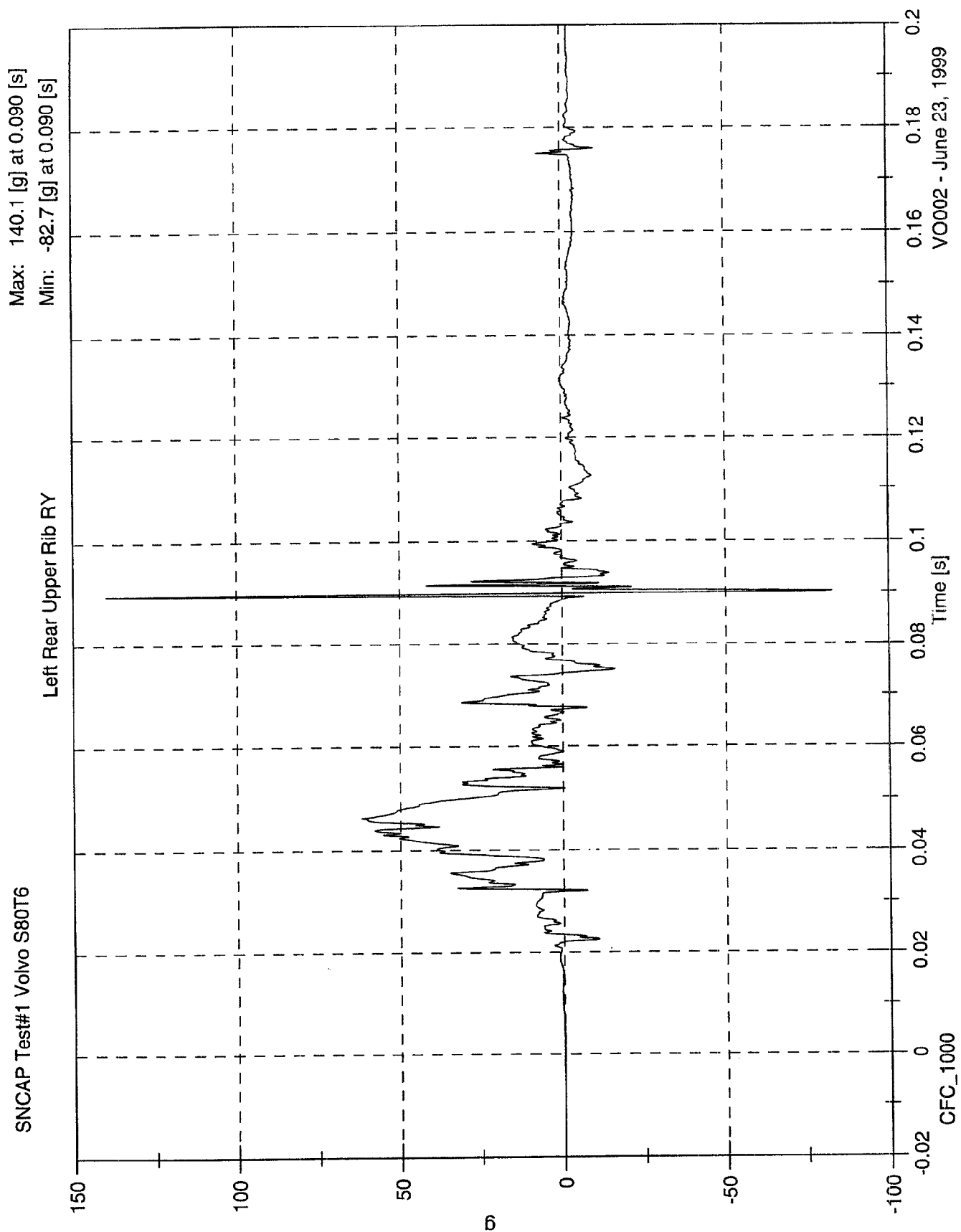
Max: 36.1 [kph] at 0.043 [s]

Min: -0.0 [kph] at -0.036 [s]

Driver Pelvic RY Velocity



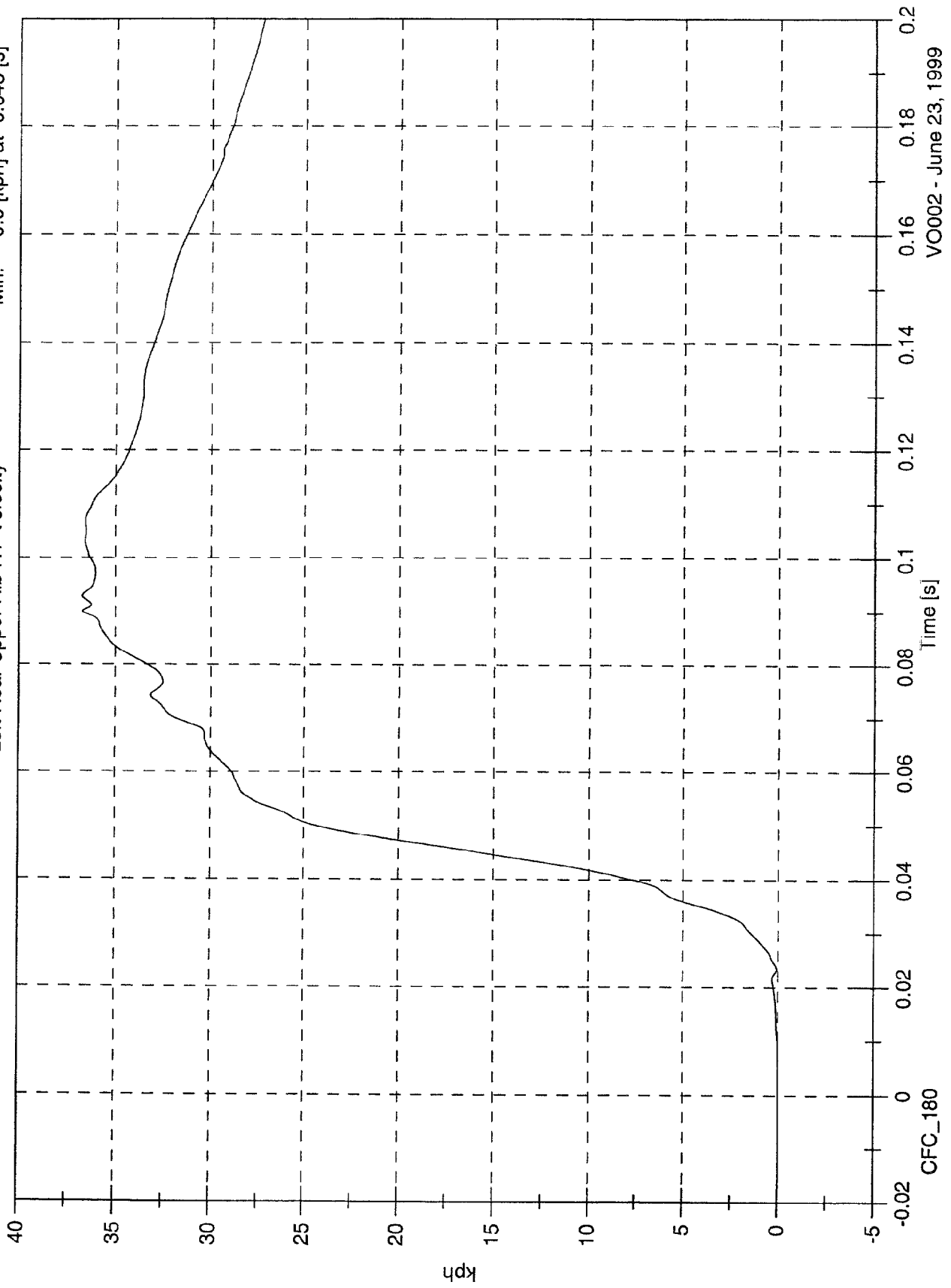
VO002 - June 23, 1999



SNCAP Test#1 Volvo S80T6

Max: 36.7 [kph] at 0.093 [s]
Min: -0.0 [kph] at -0.048 [s]

Left Rear Upper Rib RY Velocity

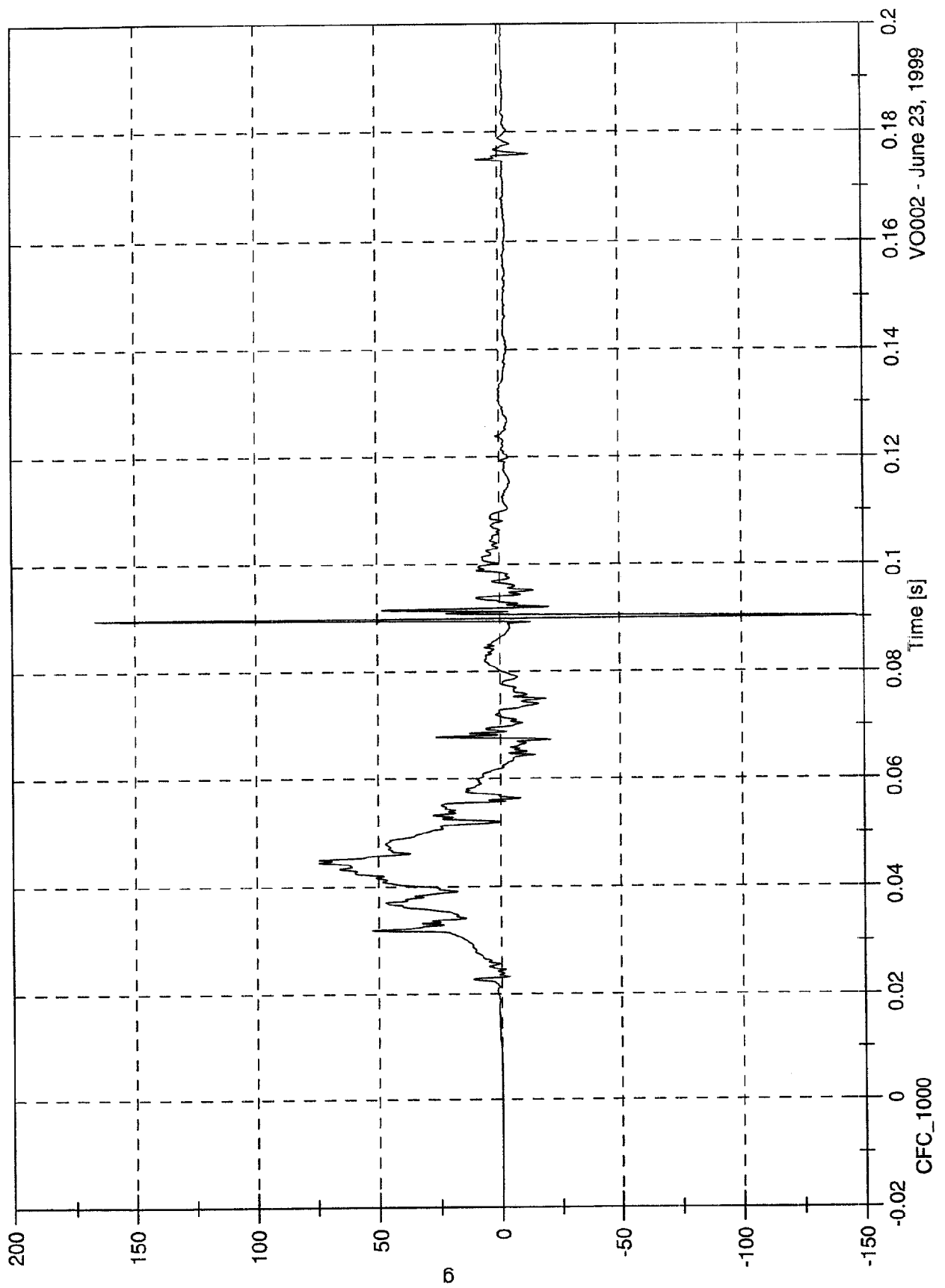


SNCAP Test#1 Volvo S80T6

Max: 166.8 [g] at 0.090 [s]

Min: -146.8 [g] at 0.090 [s]

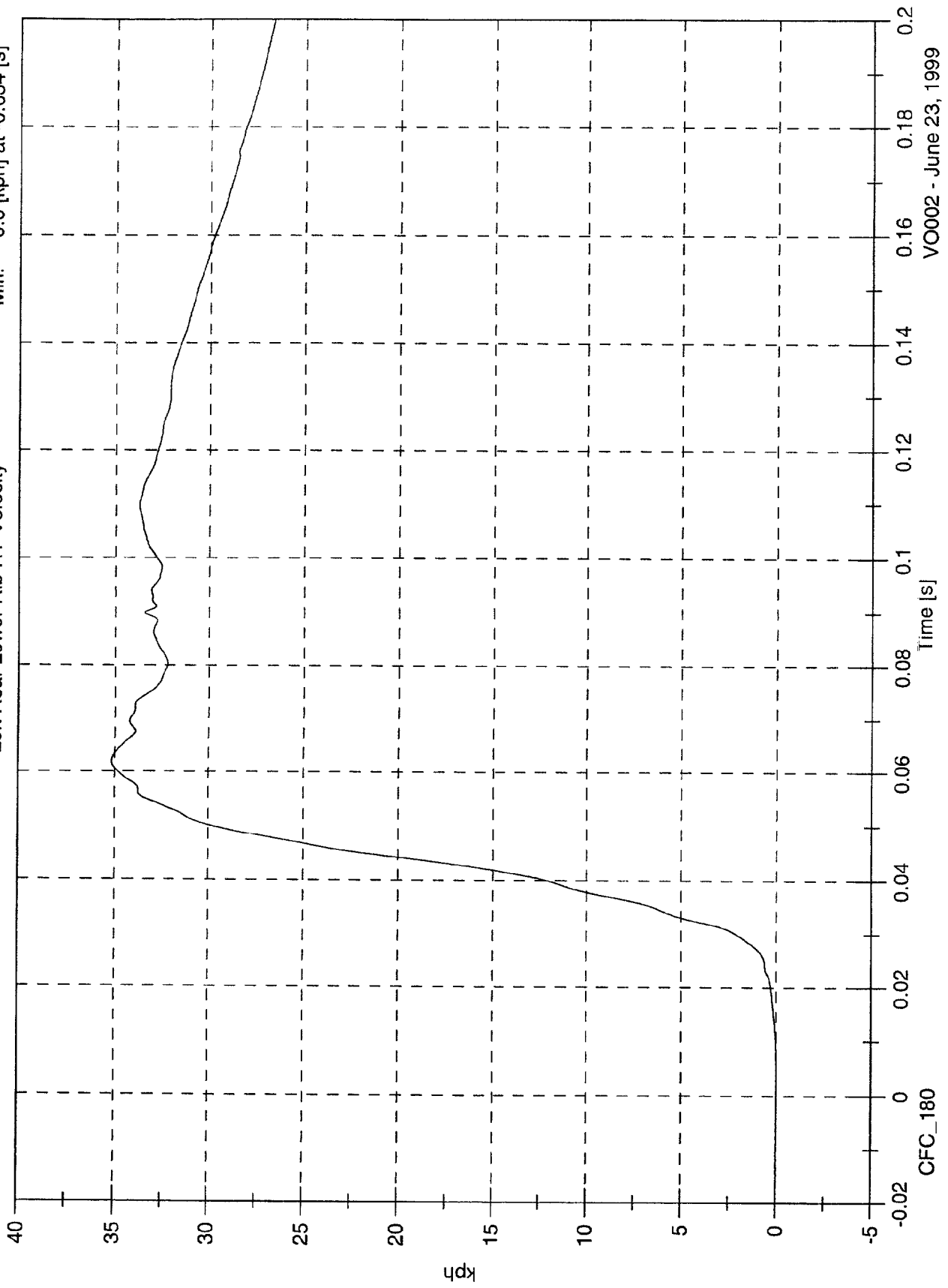
Left Rear Lower Rib RY



SNCAP Test#1 Volvo S80T6

Max: 35.2 [kph] at 0.062 [s]
Min: -0.0 [kph] at -0.034 [s]

Left Rear Lower Rib RY Velocity



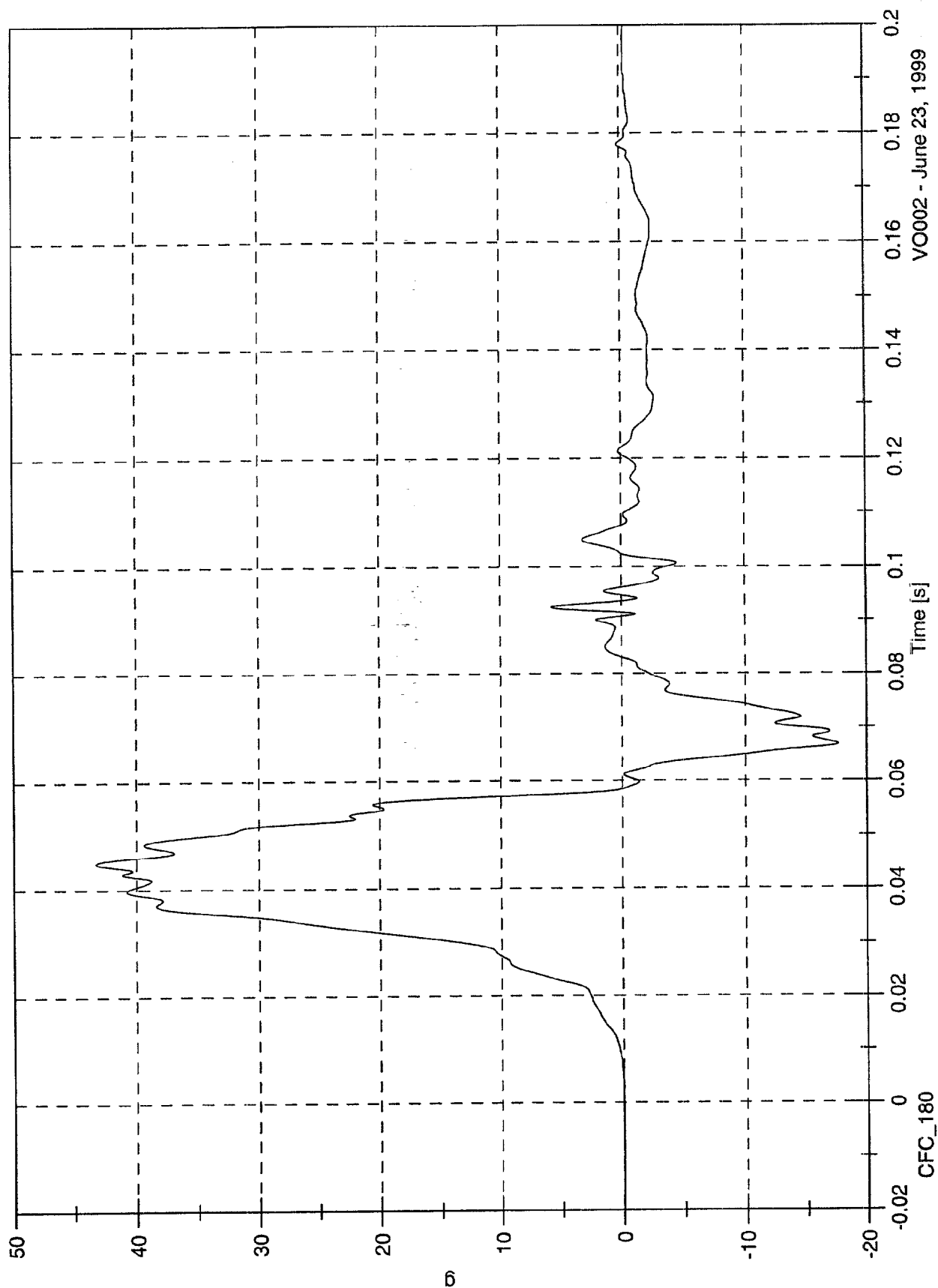
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 43.3 [g] at 0.045 [s]

Min: -17.6 [g] at 0.067 [s]

Left Rear Spine RY



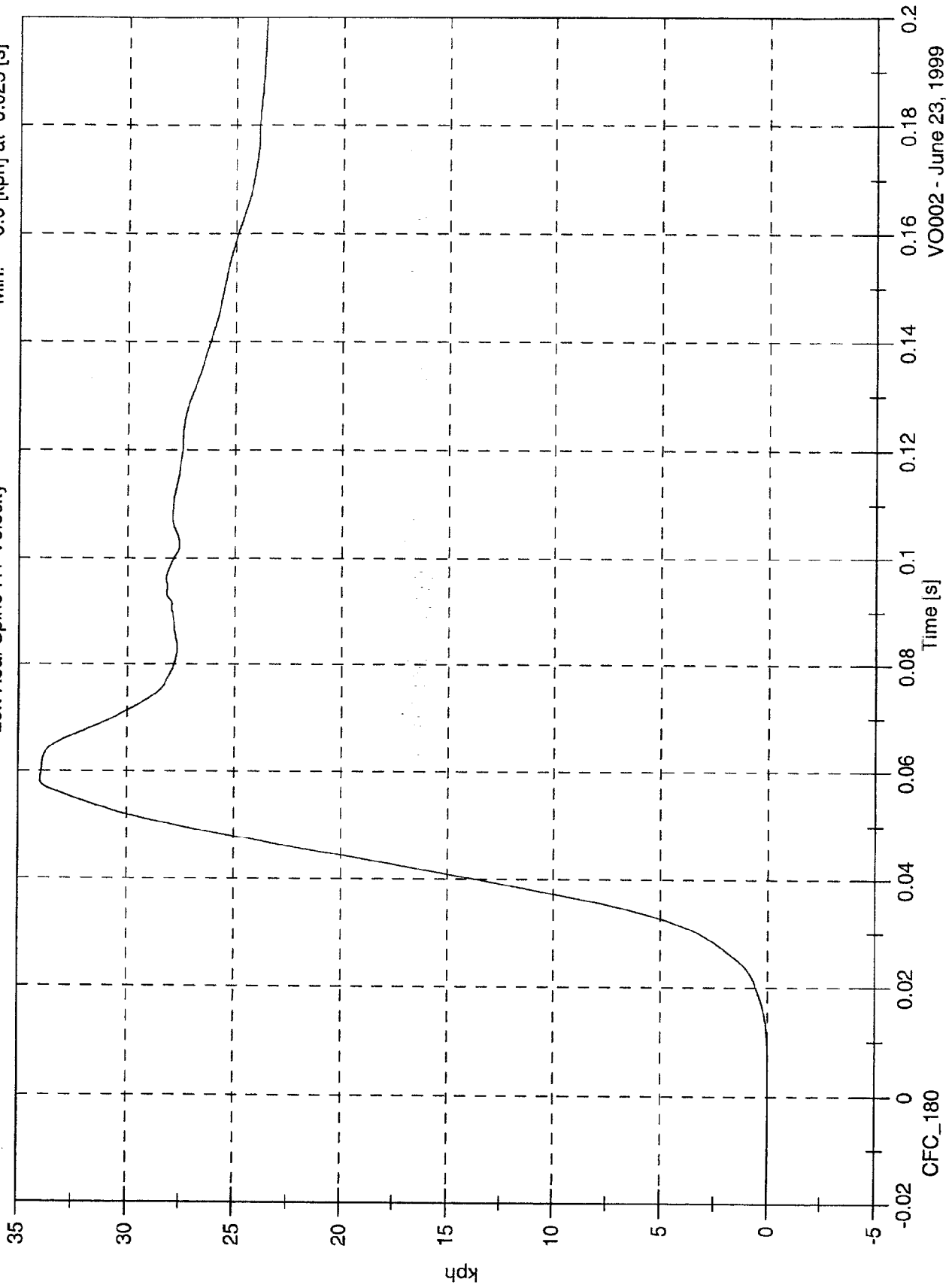
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 34.0 [kph] at 0.059 [s]

Min: -0.0 [kph] at -0.025 [s]

Left Rear Spine RY Velocity

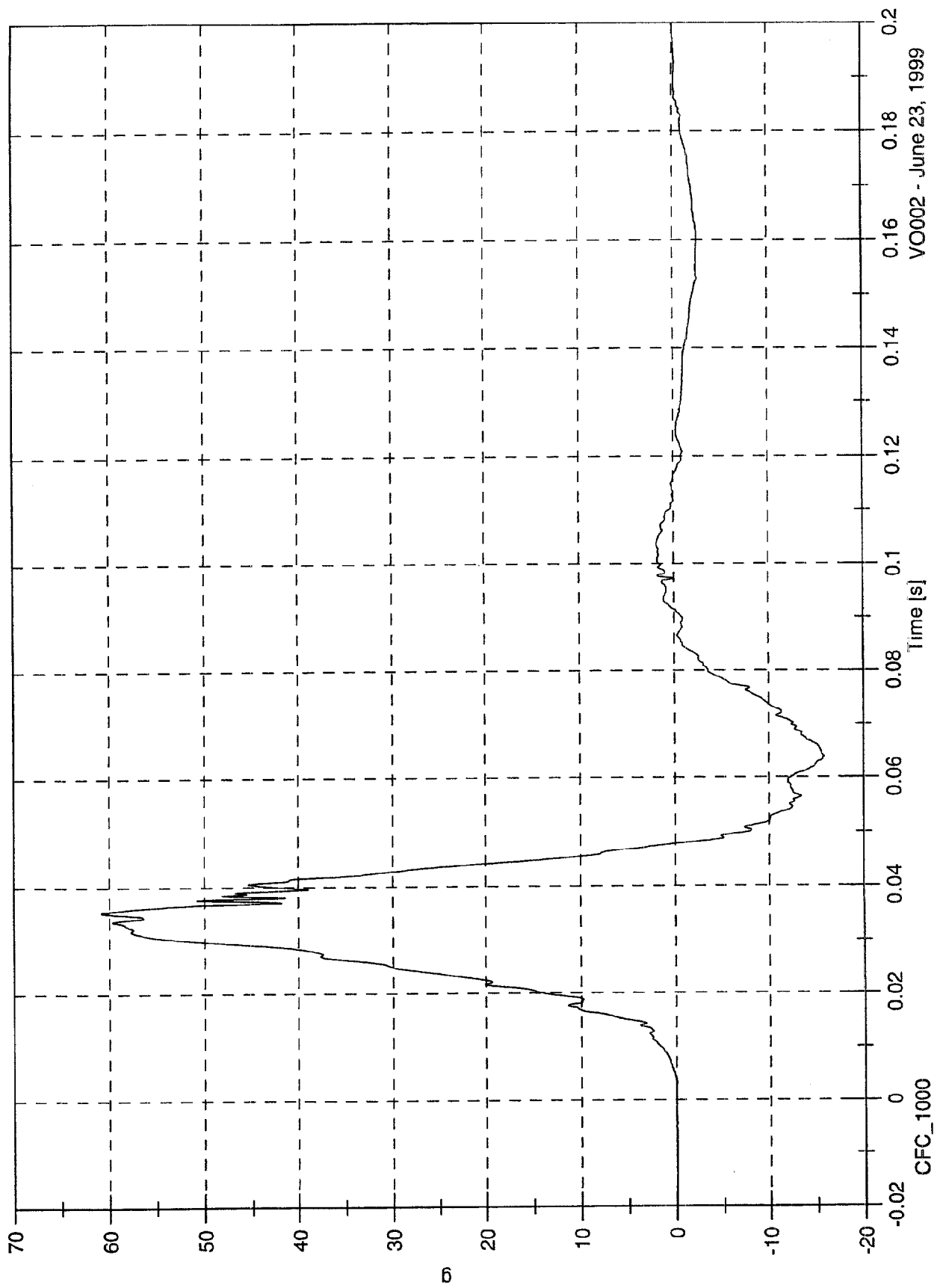


VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

Max: 60.9 [g] at 0.035 [s]
Min: -15.8 [g] at 0.064 [s]

Left Rear Pelvic RY



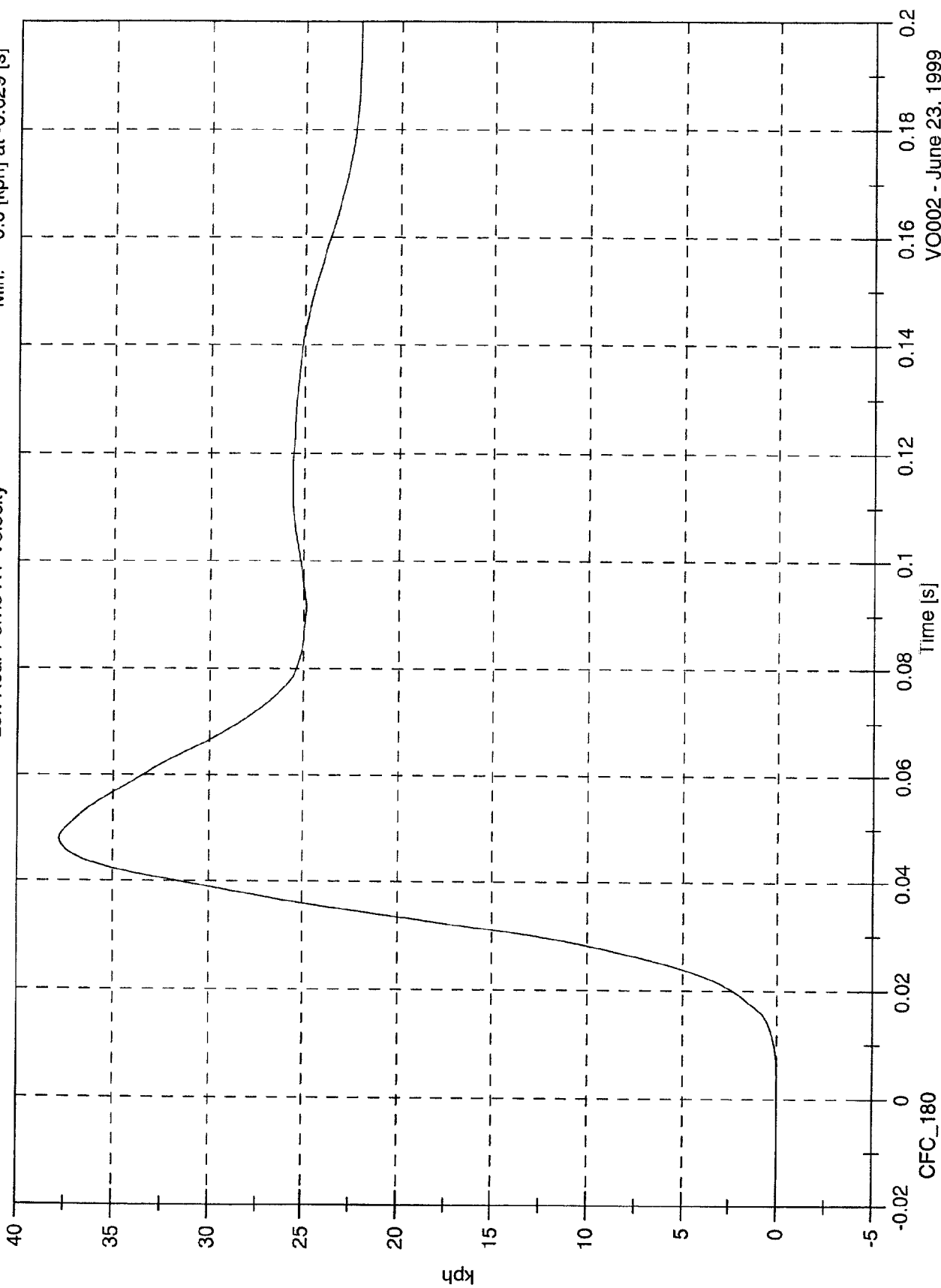
VO002 - June 23, 1999

SNCAP Test#1 Volvo S80T6

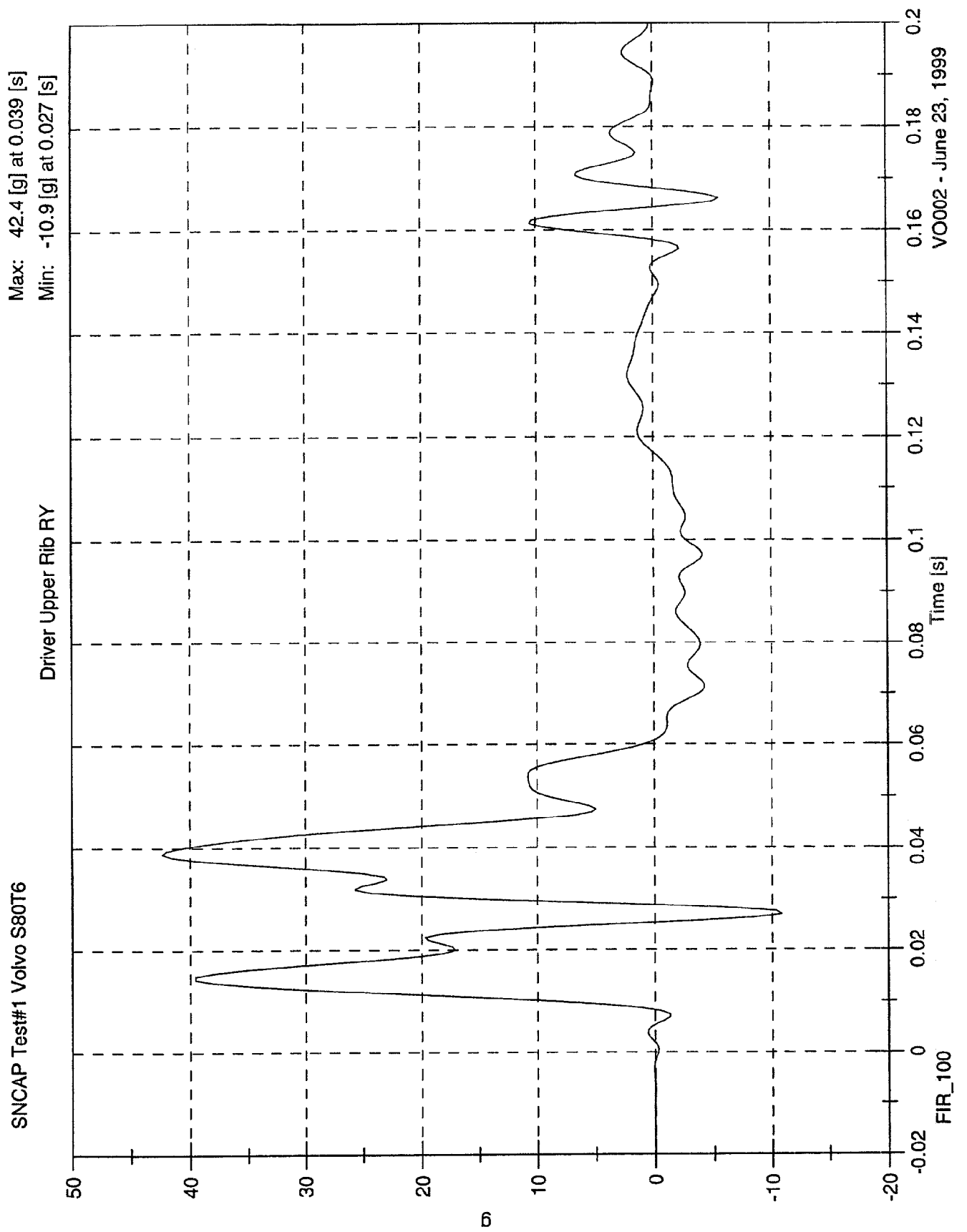
Max: 37.8 [kph] at 0.048 [s]

Min: -0.0 [kph] at -0.029 [s]

Left Rear Pelvic RY Velocity



VO002 - June 23, 1999

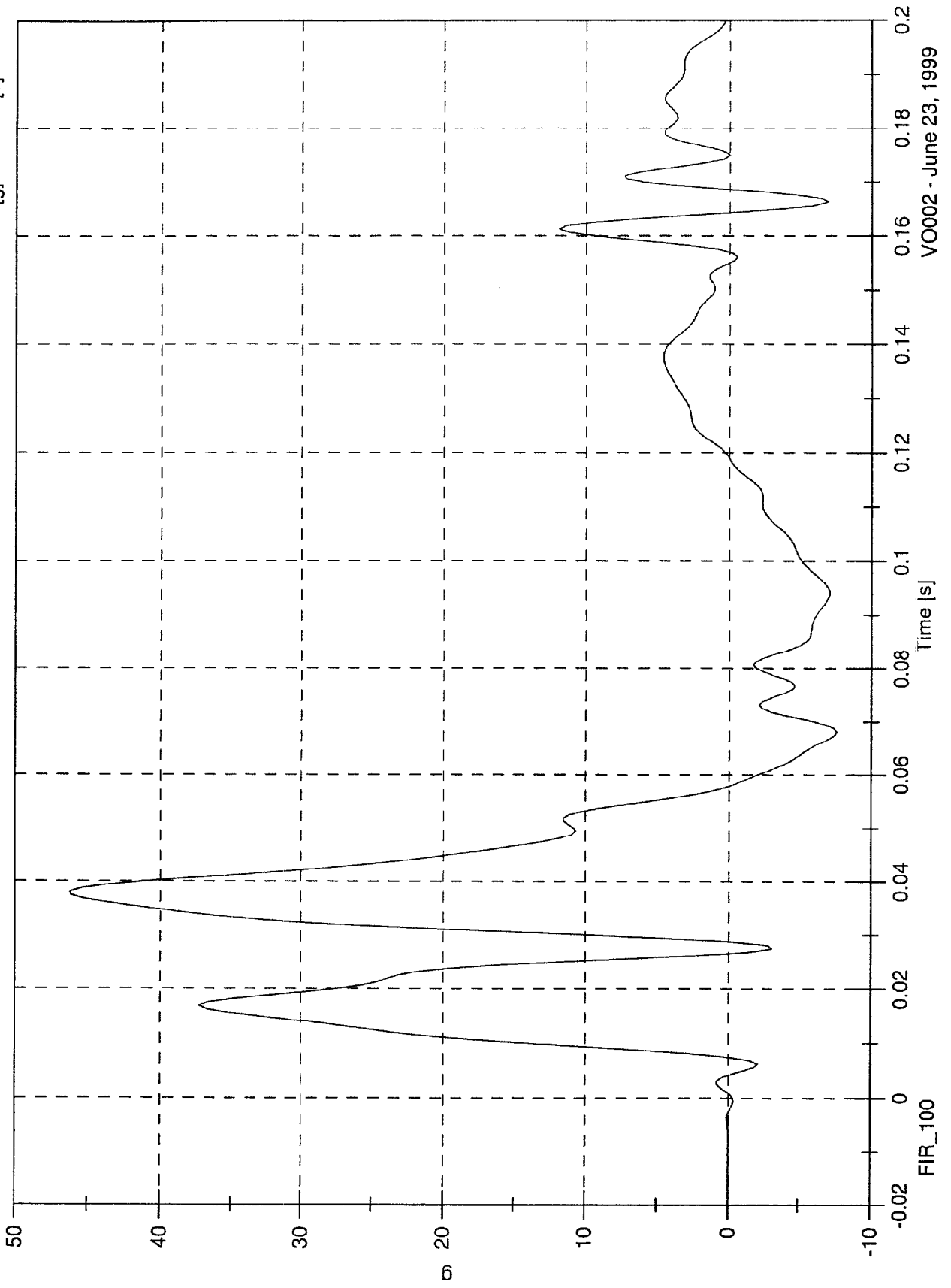


SNCAP Test#1 Volvo S80T6

Driver Lower Rib RY

Max: 46.2 [g] at 0.038 [s]

Min: -7.6 [g] at 0.068 [s]

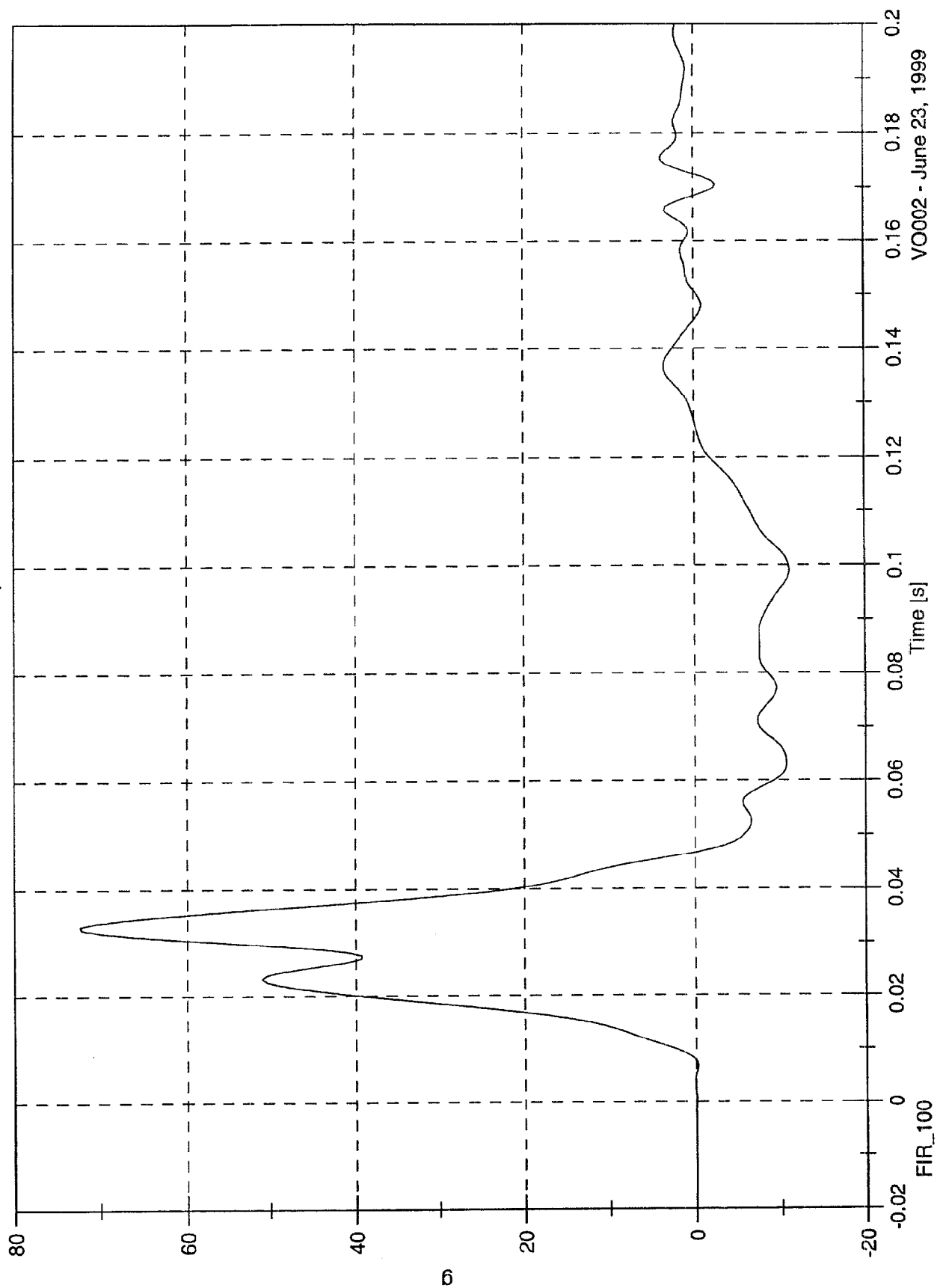


VO002 - June 23, 1999

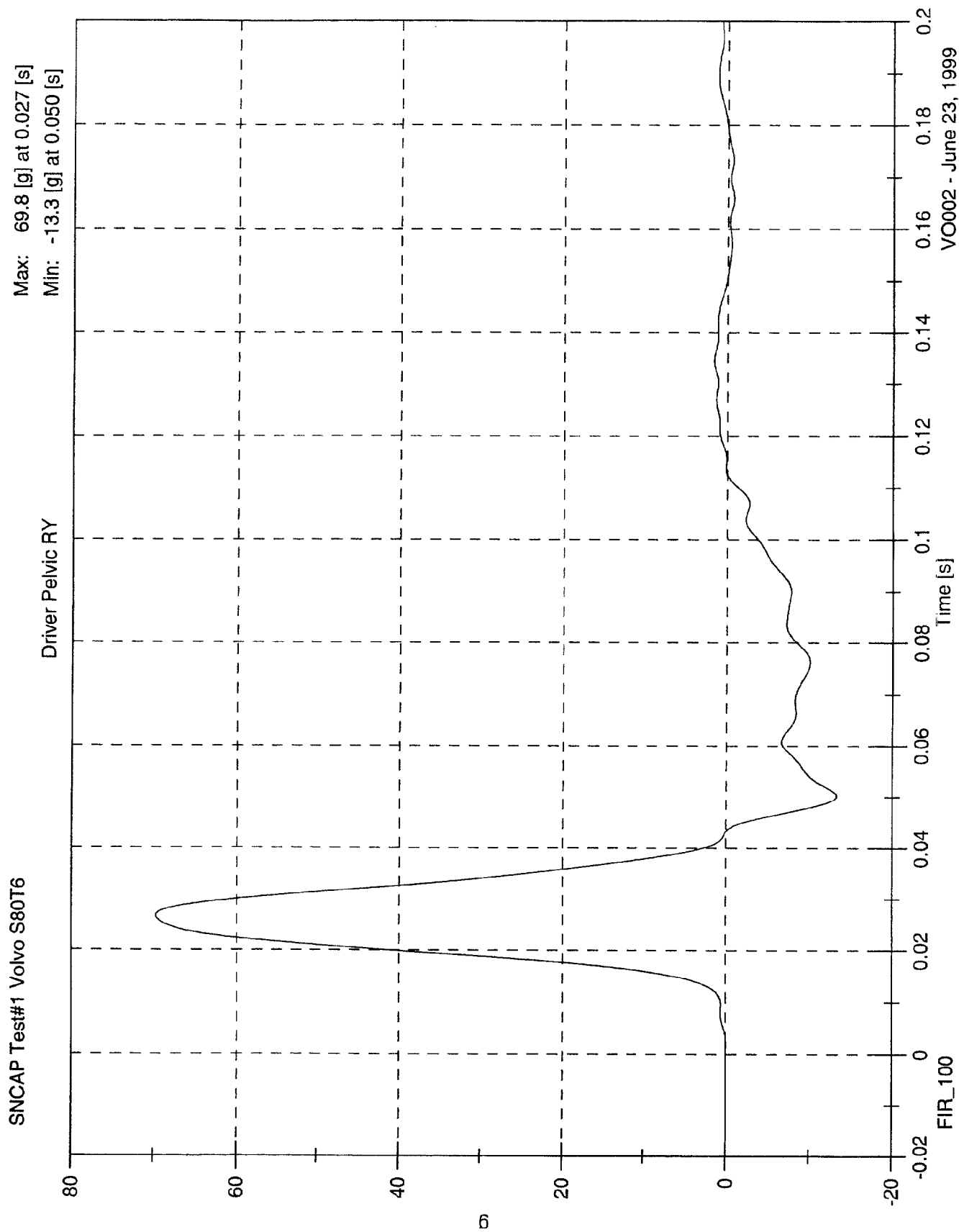
SNCAP Test#1 Volvo S80T6

Driver Lower Spine RY

Max: 72.3 [g] at 0.033 [s]
Min: -11.2 [g] at 0.099 [s]



VO002 - June 23, 1999

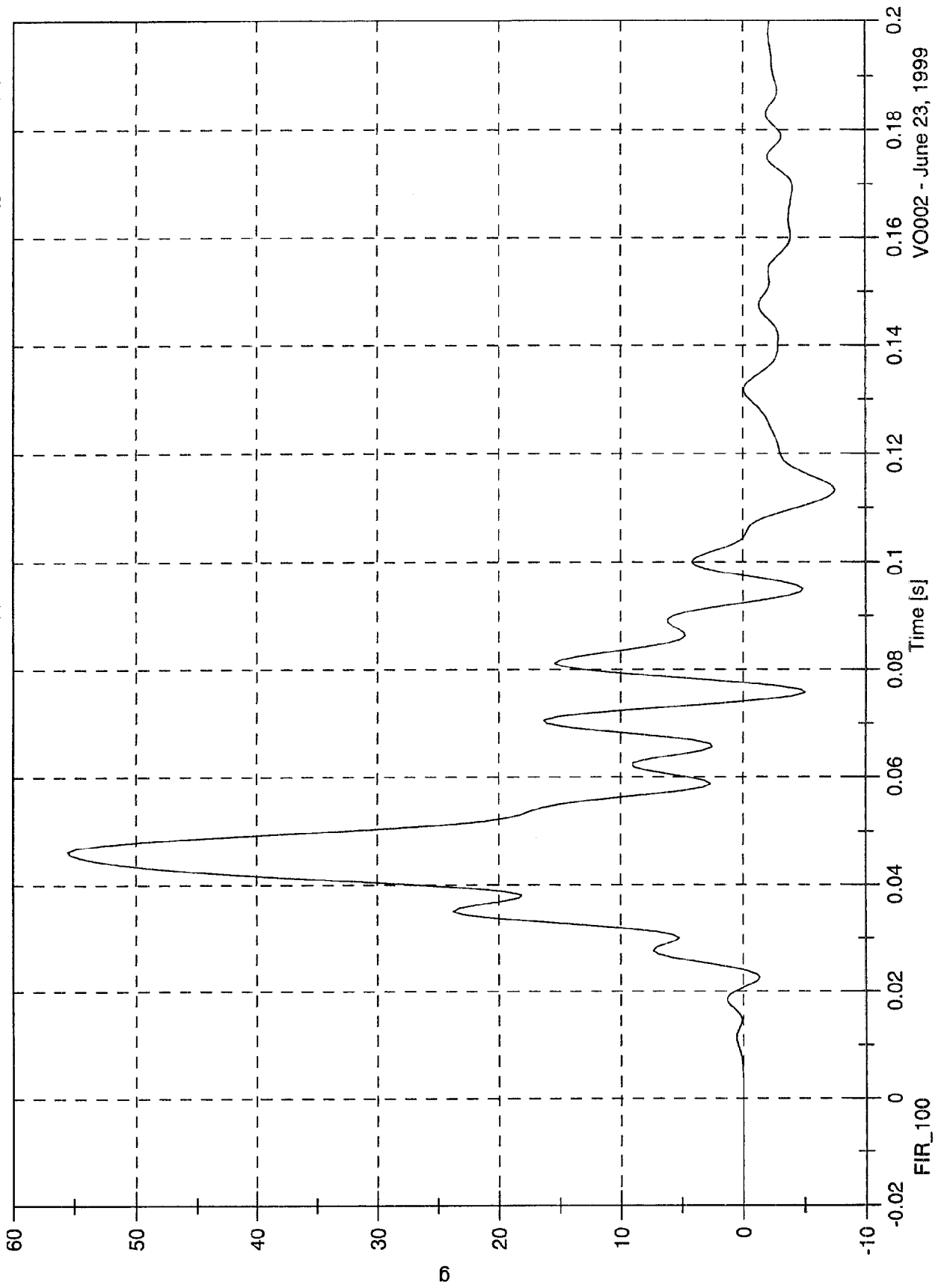


SNCAP Test#1 Volvo S80T6

Max: 55.5 [g] at 0.046 [s]

Min: -7.4 [g] at 0.113 [s]

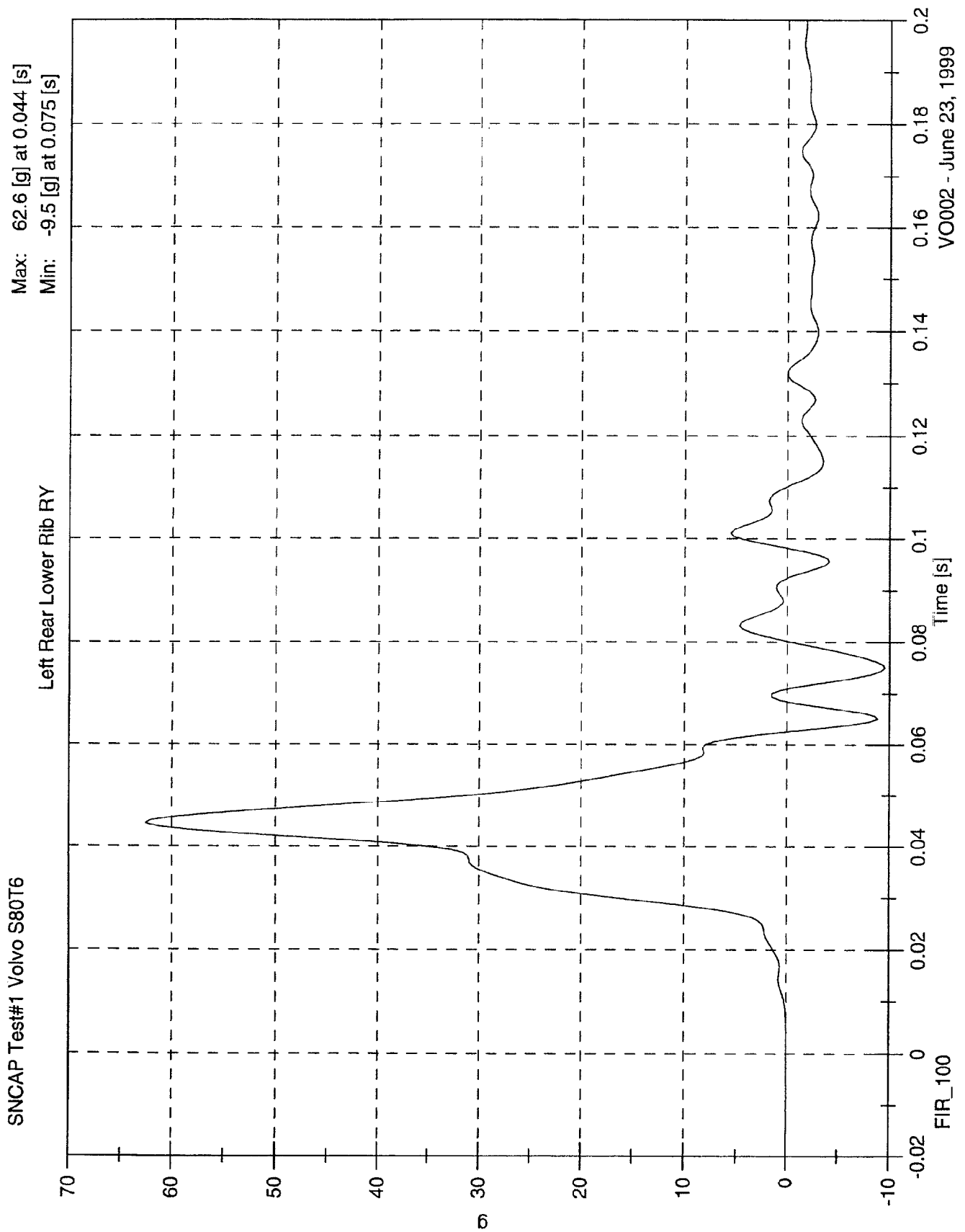
Left Rear Upper Rib RY



FIR_100

Time [s]

VO002 - June 23, 1999

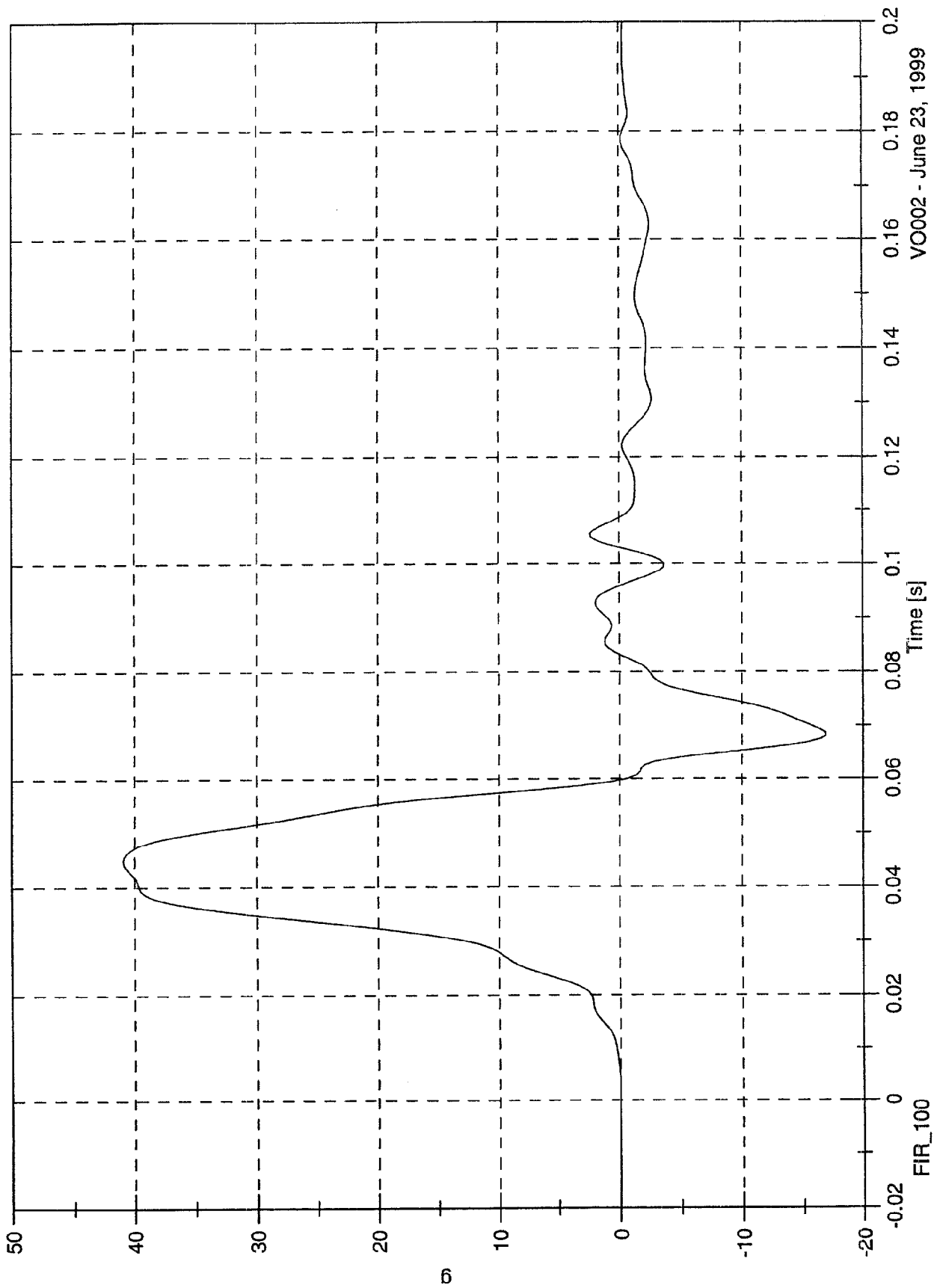


SNCAP Test#1 Volvo S80T6

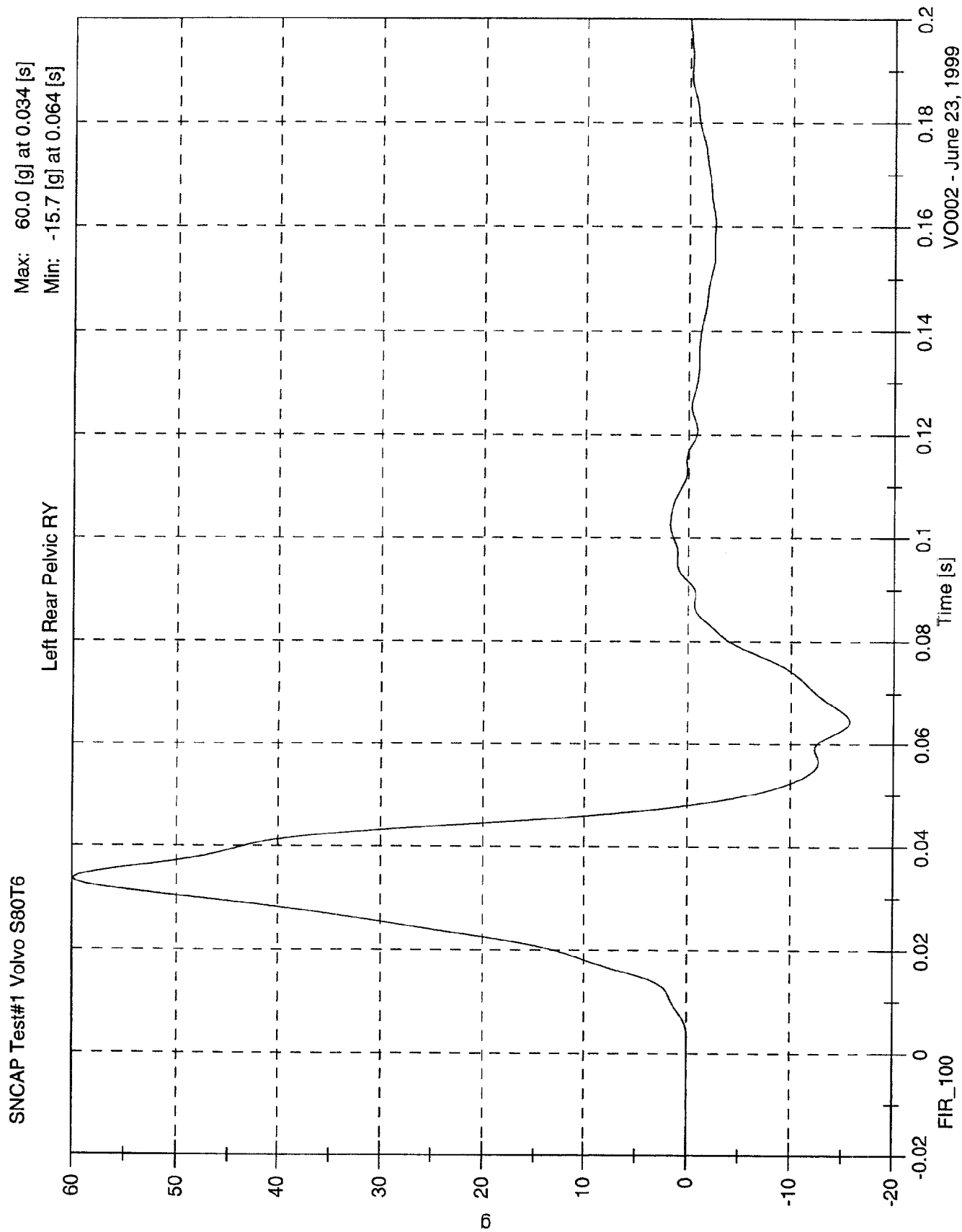
Max: 40.9 [g] at 0.045 [s]

Min: -16.9 [g] at 0.068 [s]

Left Rear Spine RY



VO002 - June 23, 1999



APPENDIX C

SID CONFIGURATION AND PERFORMANCE VERIFICATION DATA

SUMMARY
SID PRE & POST TEST CALIBRATION

CONFIGURED FOR LEFT SIDE IMPACT

Date: April 30, 1999; June 30, 1999

Sequential Test Number:

1

Laboratory Technician:

B. Swiecicki

TEST PARAMETER	SPECIFICATION	SID NO.: 016		SID NO.: 027	
		PRE TEST	POST TEST	PRE TEST	POST TEST
SH- Seated Height (mm)	889 - 909	902	902	909	909
RH- Rib Height (mm)	501 - 521	516	514	516	514
HP- Hip Pivot Height (mm)	99 ref.	99	99	99	99
RD- Rib from Back Line (mm)	229 - 241	240	239	236	236
KV- Knee Pivot from Back Line (mm)	511 - 526	523	526	516	516
SW- Knee Pivot to Floor (mm)	490 - 505	494	494	493	493
HW- Hip Width (mm)	356 - 391	362	361	368	367
THORAX IMPACTS					
TEMPERATURE (°C)	18.9 - 25.5	21.1	21.1	21.1	21.1
RELATIVE HUMIDITY (%)	10 -70	30	32	30	32
PROBE SPEED (m/s)	4.27 - 4.33	4.29	4.27	4.32	4.29
UPPER RIB (g's)	37 - 46	42.3	39.5	40.9	40.4
LOWER RIB (g's)	37 - 46	41.6	39.1	39.1	37.9
LOWER SPINE (g's)	15 -22	21.5	21.1	20.2	21.1
PELVIS IMPACT					
TEMPERATURE (°C)	18.9 - 25.5	21.1	21.1	21.1	21.1
RELATIVE HUMIDITY (%)	10 - 70	30	32	30	32
PROBE SPEED (m/s)	4.27 - 4.33	4.28	4.30	4.30	4.28
PELVIS (g's)	40 -60	43.2	40.6	48.2	56.5

REMARKS: None

CALIBRATION TEST RESULTS
PRE-TEST

SID NO.: 016

CONFIGURED FOR LEFT SIDE IMPACT

**CALIBRATION TEST RESULTS SUMMARY
PRE-TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Sequential Test Number: 1
Date: April 30, 1999 Laboratory Technician: B. Swiecicki

TEST	COMMENTS
EXTERNAL DIMENSIONS	Passed all requirements.
THORACIC SHOCK ABSORBER TEST	Passed all requirements.
LATERAL THORAX IMPACT TEST	Passed all requirements.
LATERAL PELVIS IMPACT TEST	Passed all requirements.
ABDOMINAL COMPRESSION TEST*	Passed all requirements.
LUMBAR FLEXION TEST*	Passed all requirements.

* Test not required for SID certification.

REMARKS: None

**EXTERNAL DIMENSIONS
PRE-TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016
Date: April 30, 1999

Sequential Test Number: 1
Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	902
RH- Rib Height (mm)	502 - 520	516
HP- Hip Pivot Height (mm)	99 ref.	99
RD- Rib from Back Line (mm)	229 - 241	240
KH- Knee Pivot from Back Line (mm)	511 - 526	523
KV- Knee Pivot to Floor (mm)	490 - 505	494
HW- Hip Width (mm)	356 - 391	362

REMARKS: None

**THORACIC SHOCK ABSORBER TESTS
PRE-TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Sequential Test Number: 1
Date: February 15, 1999 Laboratory Technician: B. Swiecicki

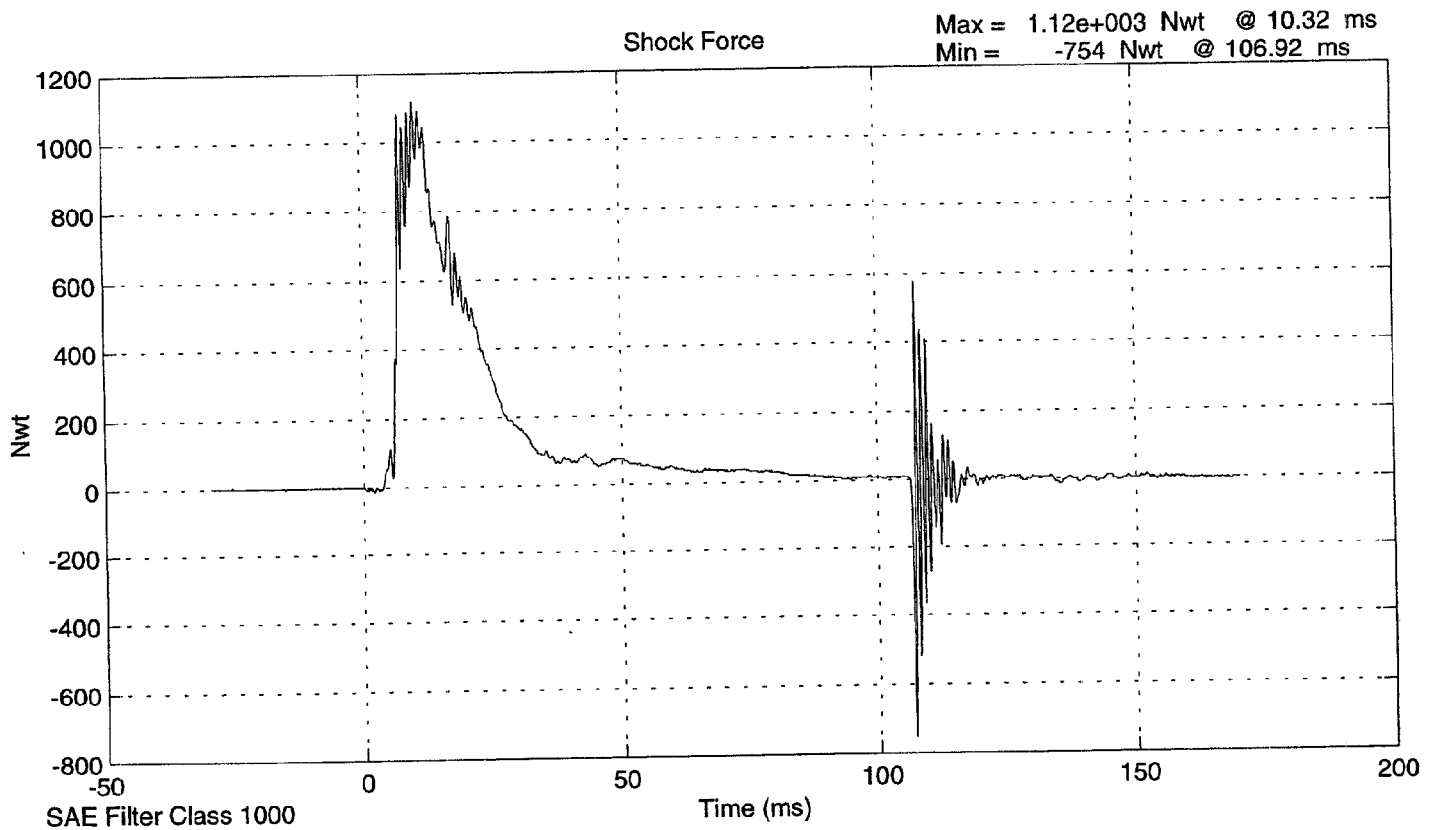
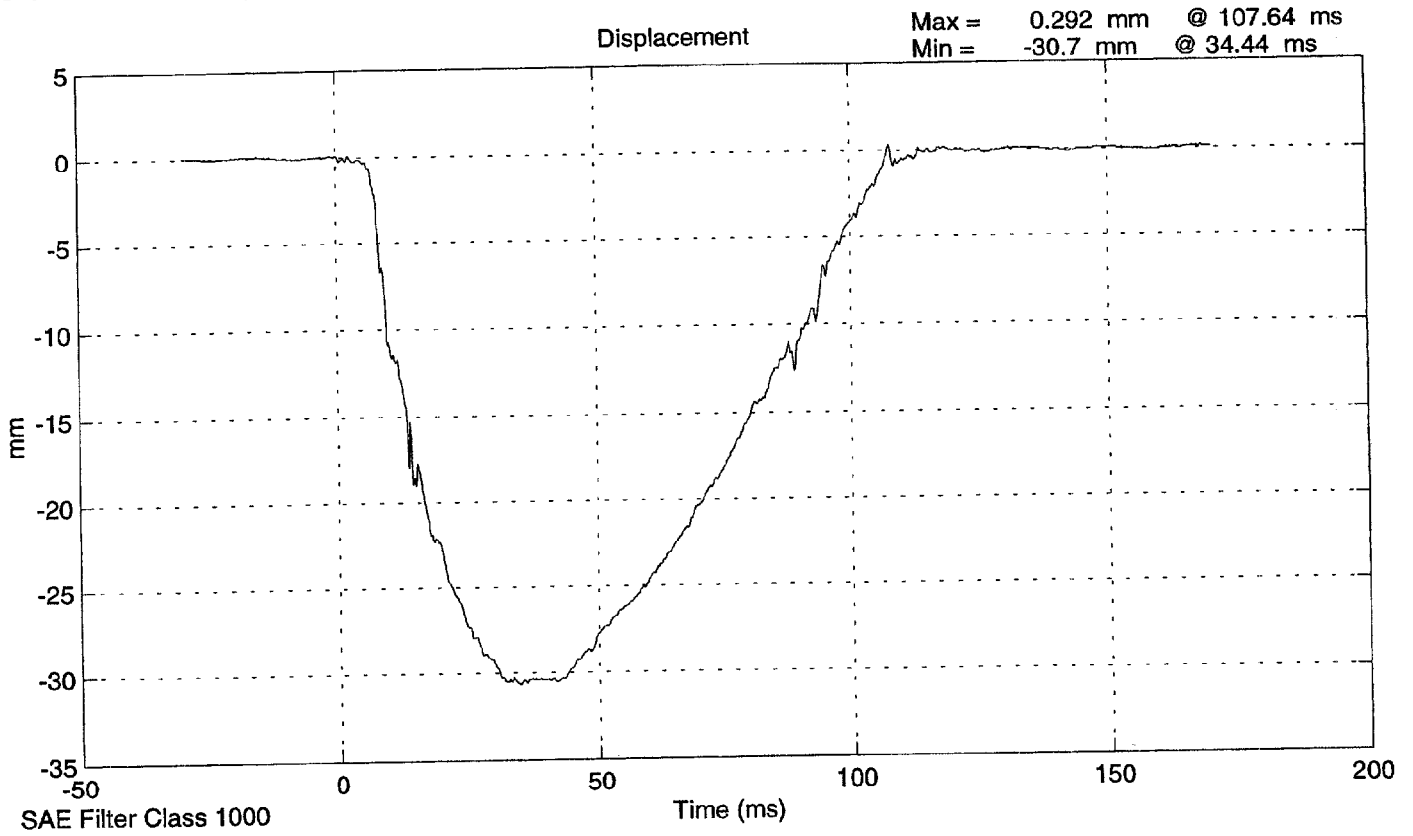
DAMPER IDENTIFICATION: 016

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)		18.9 - 25.5	21.7
RELATIVE HUMIDITY (%)		10 - 70	15
VELOCITY 3.05 m/s	FORCE (N)	836 - 1125	1116.6
	DISPLACEMENT (mm)	30 - 35	30.7
VELOCITY 4.27 m/s	FORCE (N)	1730 - 2099	2065.0
	DISPLACEMENT (mm)	32 - 37	33.2
VELOCITY 6.10 m/s	FORCE (N)	3741 - 4448	3980.3
	DISPLACEMENT (mm)	33 - 40	35.0

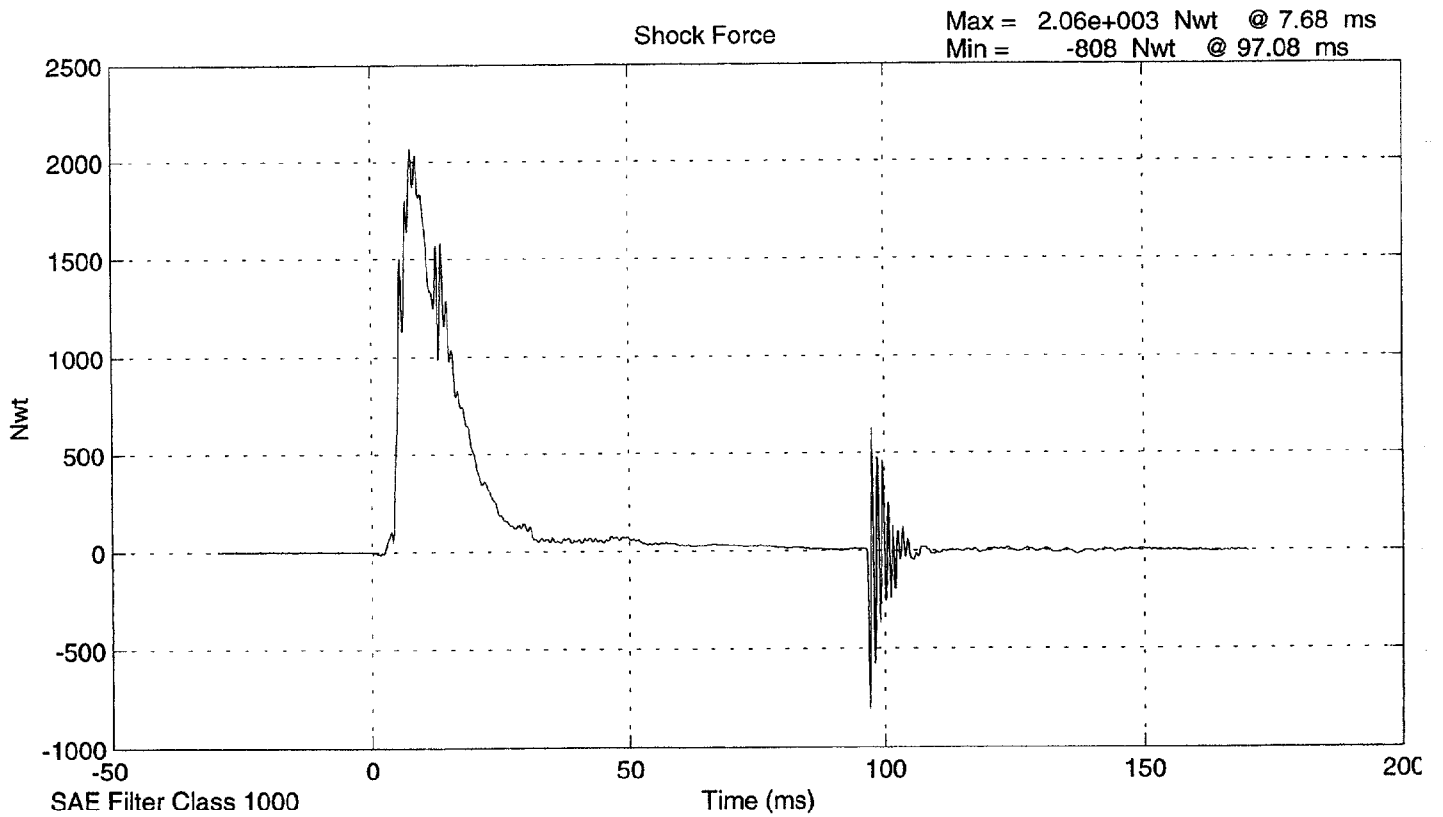
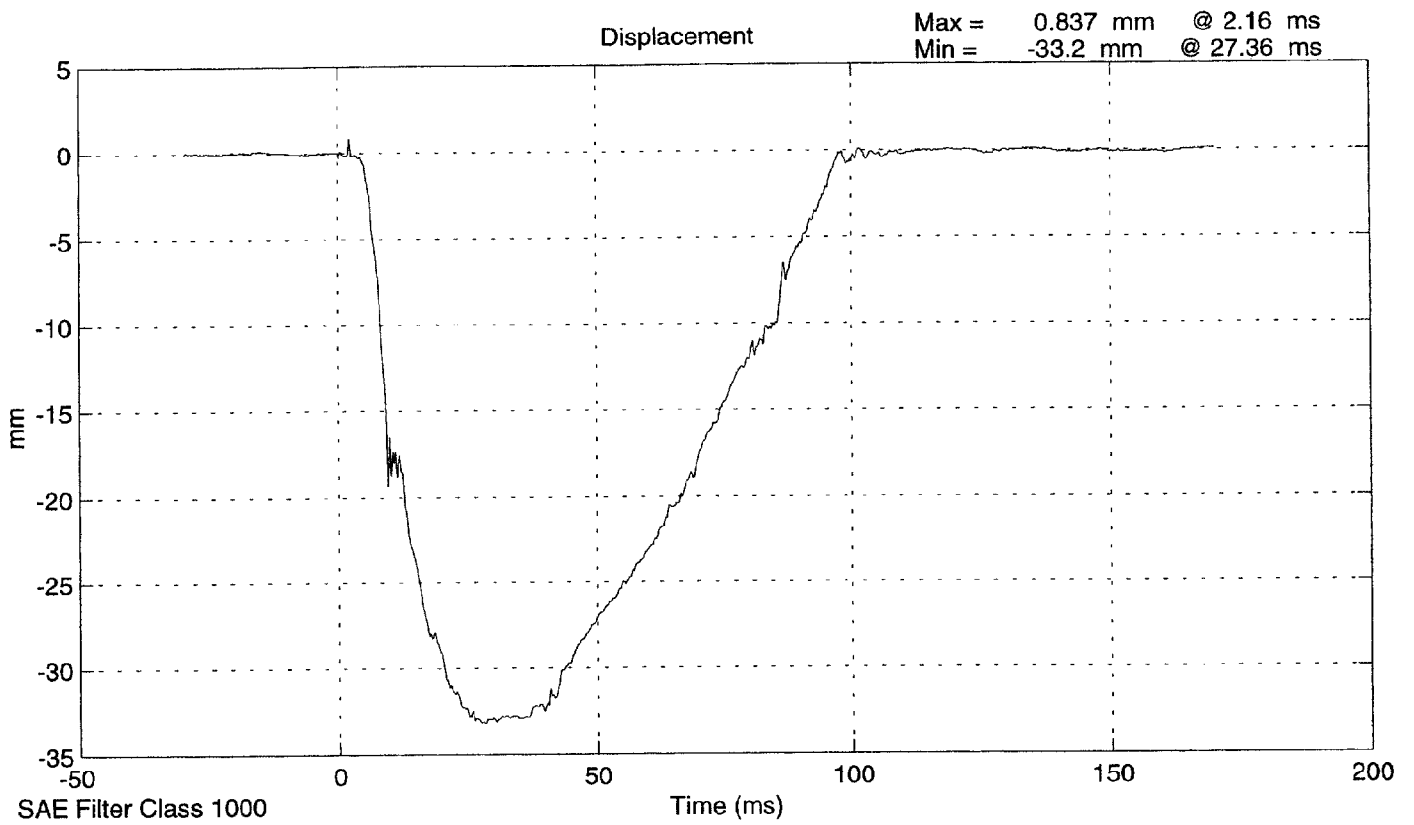
DAMPER SETTING: 5

REMARKS: None

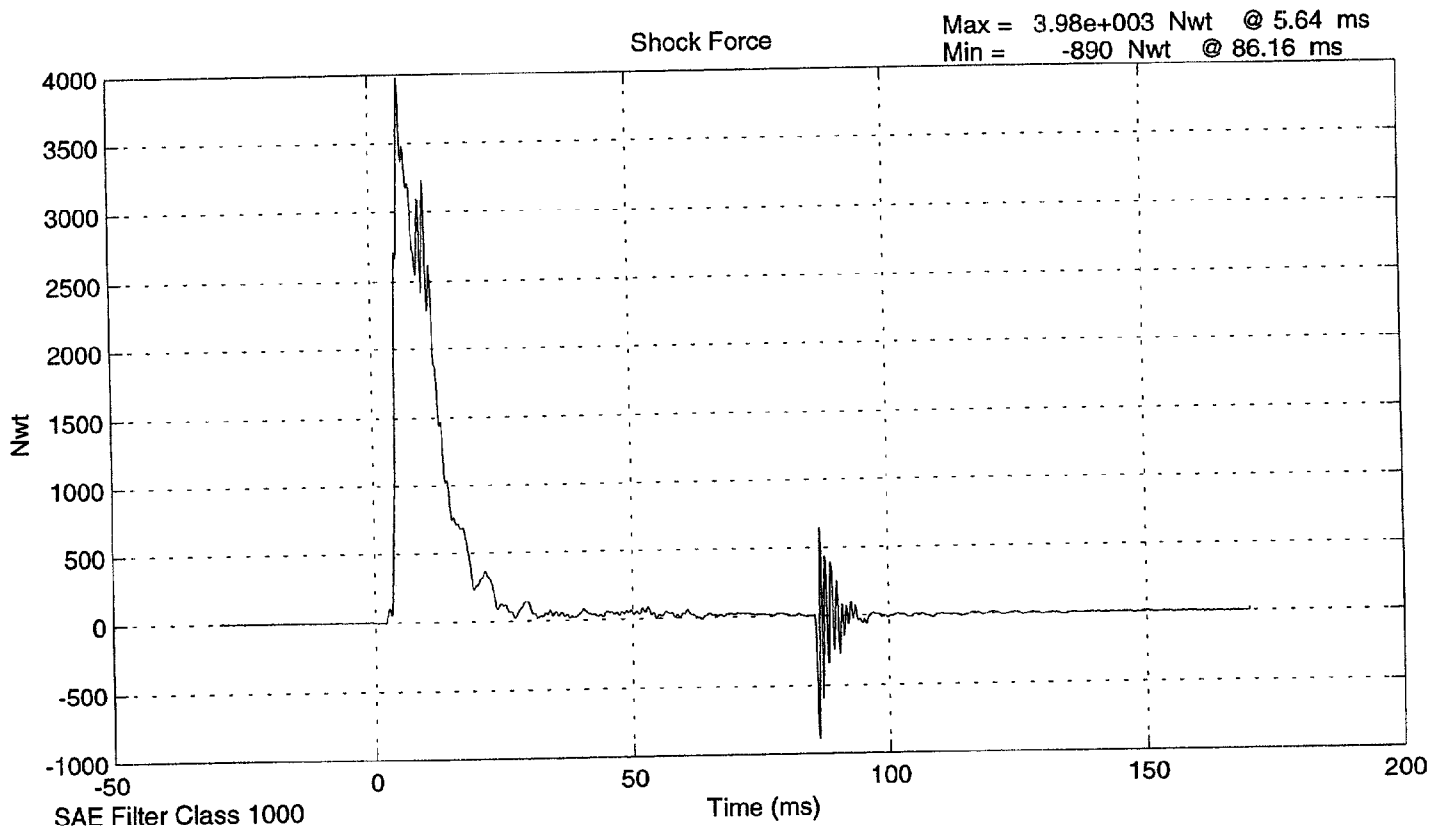
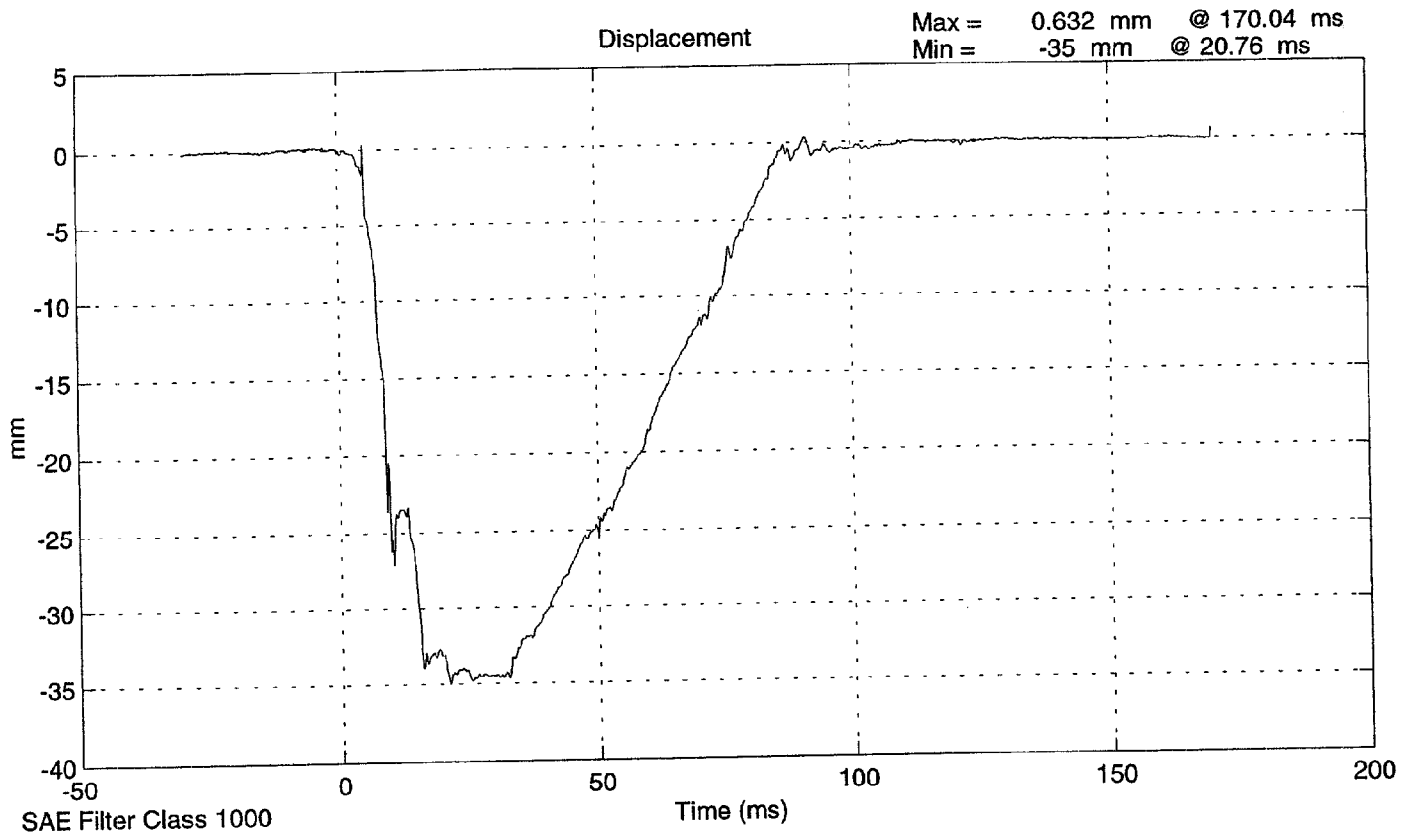
SID Shock Absorber Impact Test 016 @ 3.0358 m/s



SID Shock Absorber Impact Test 016 @ 4.2855 m/s



SID Shock Absorber Impact Test 016 @ 6.1021 m/s



**LATERAL THORAX IMPACT TEST
PRE-TEST**

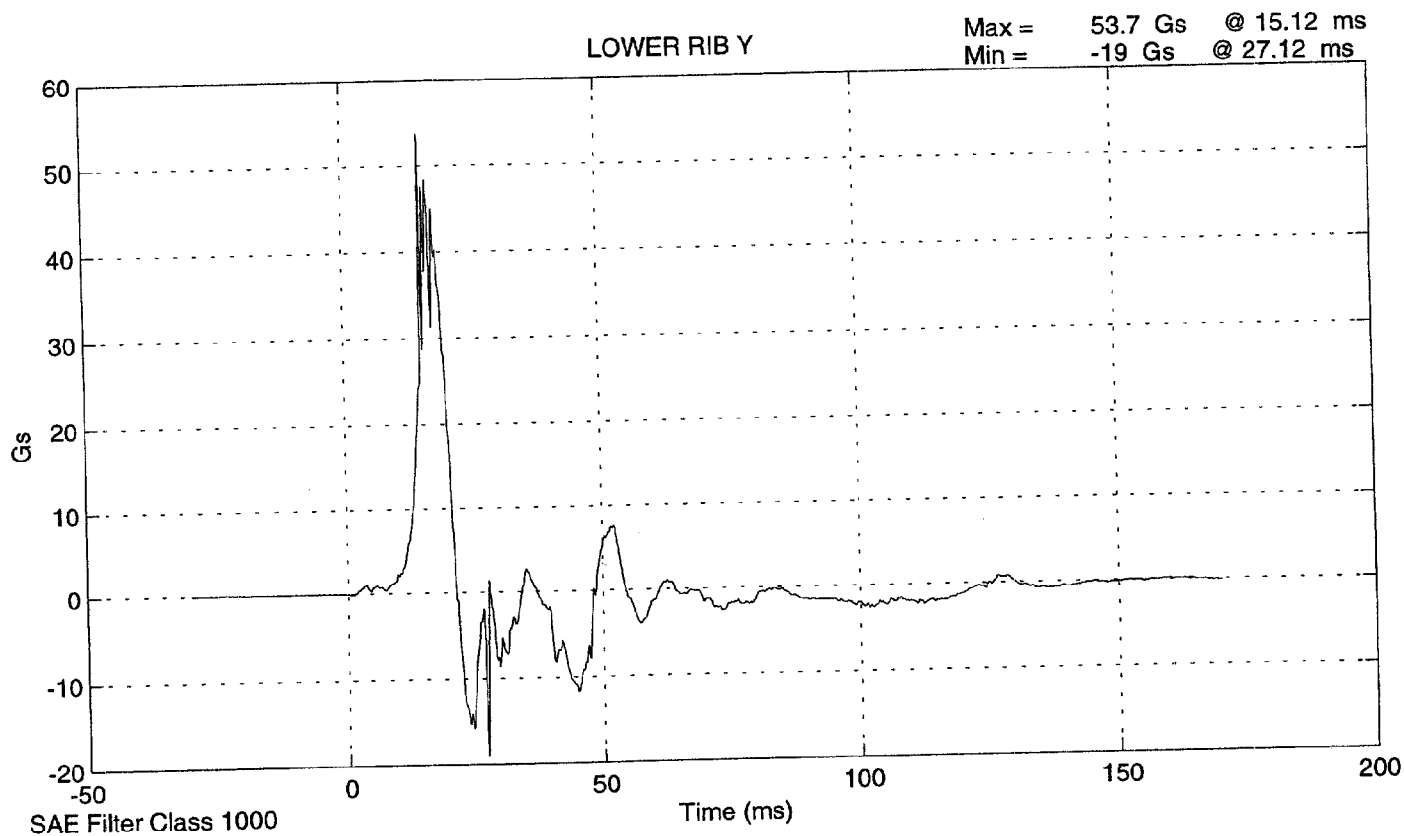
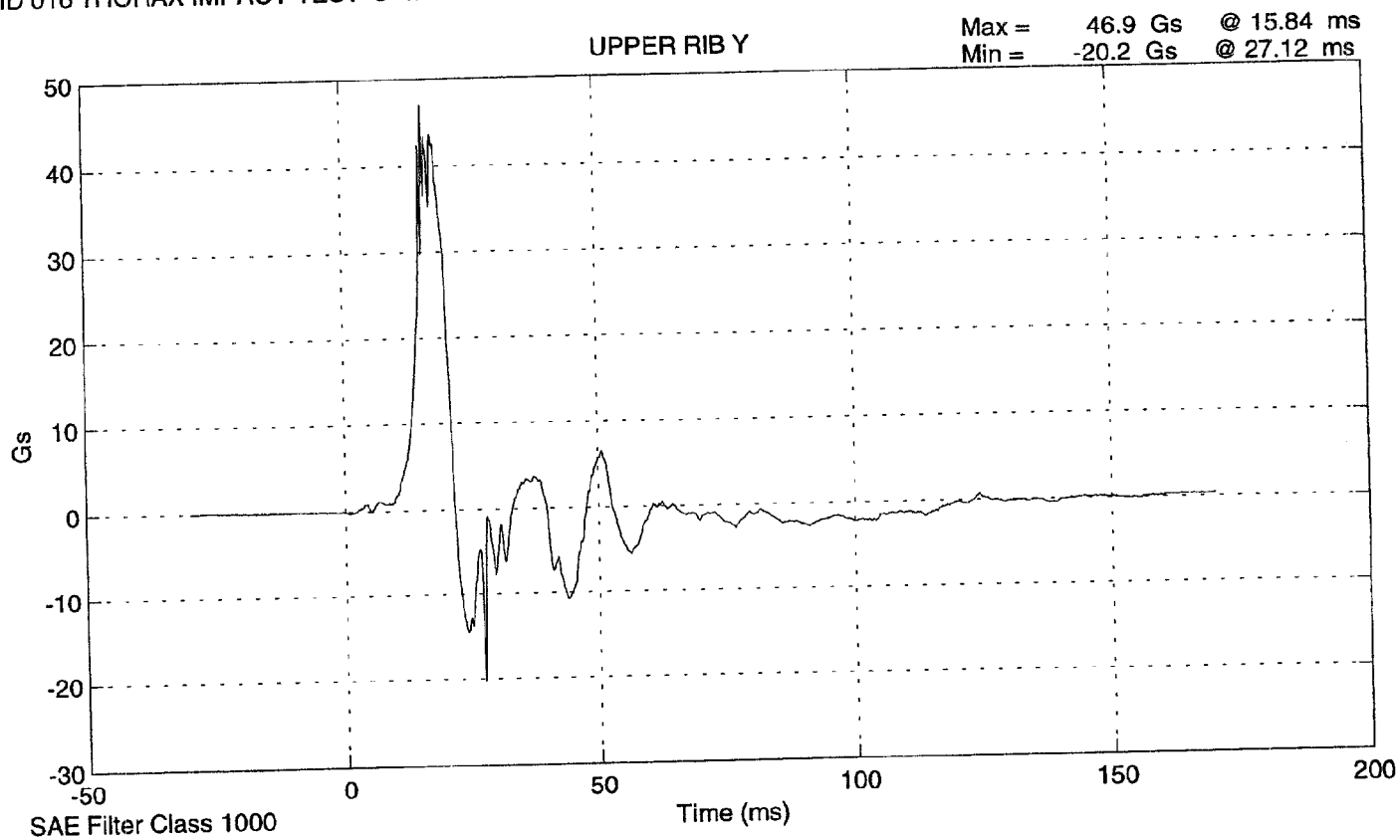
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Sequential Test Number: 1
Date: April 29, 1999 Laboratory Technician: B. Swiecicki

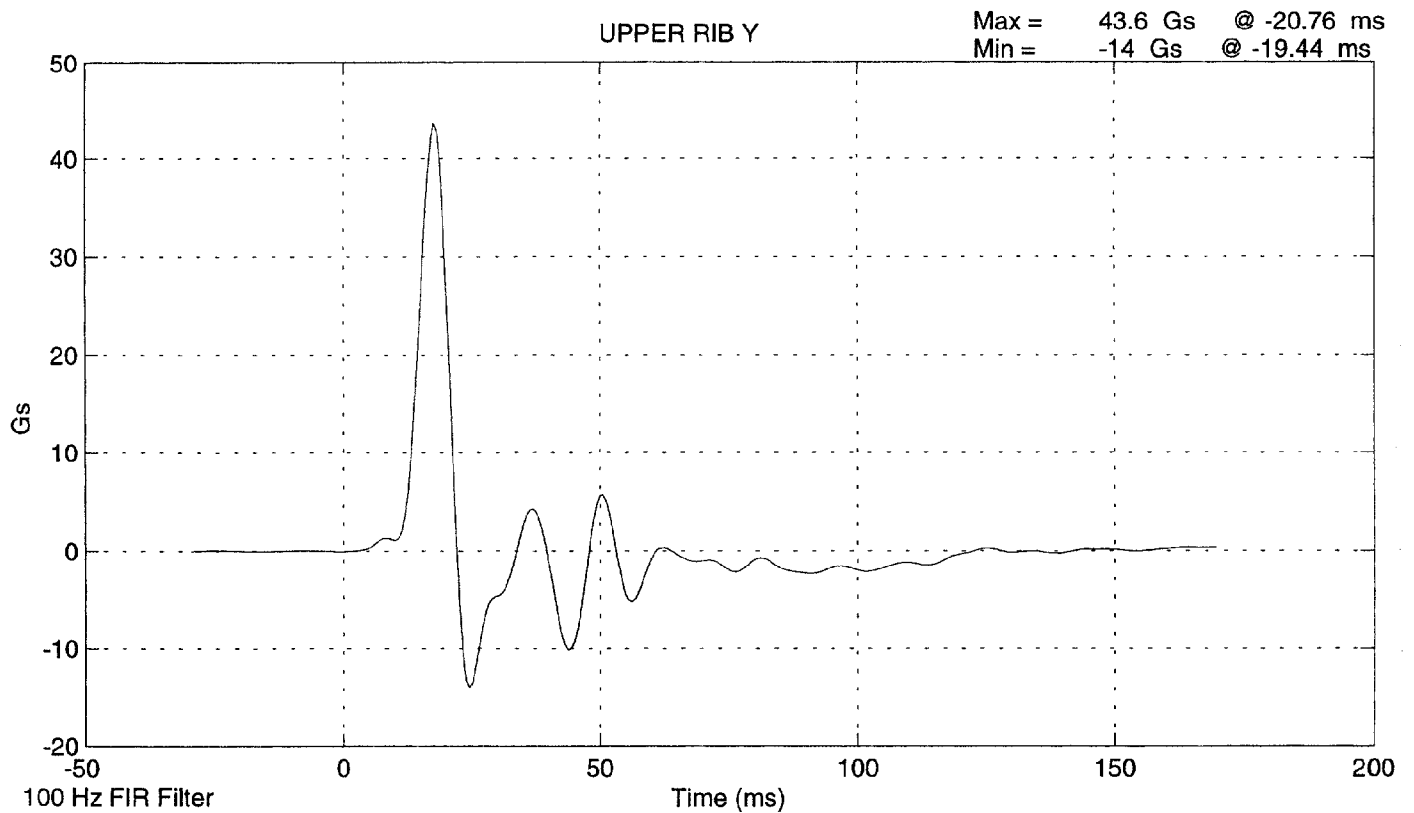
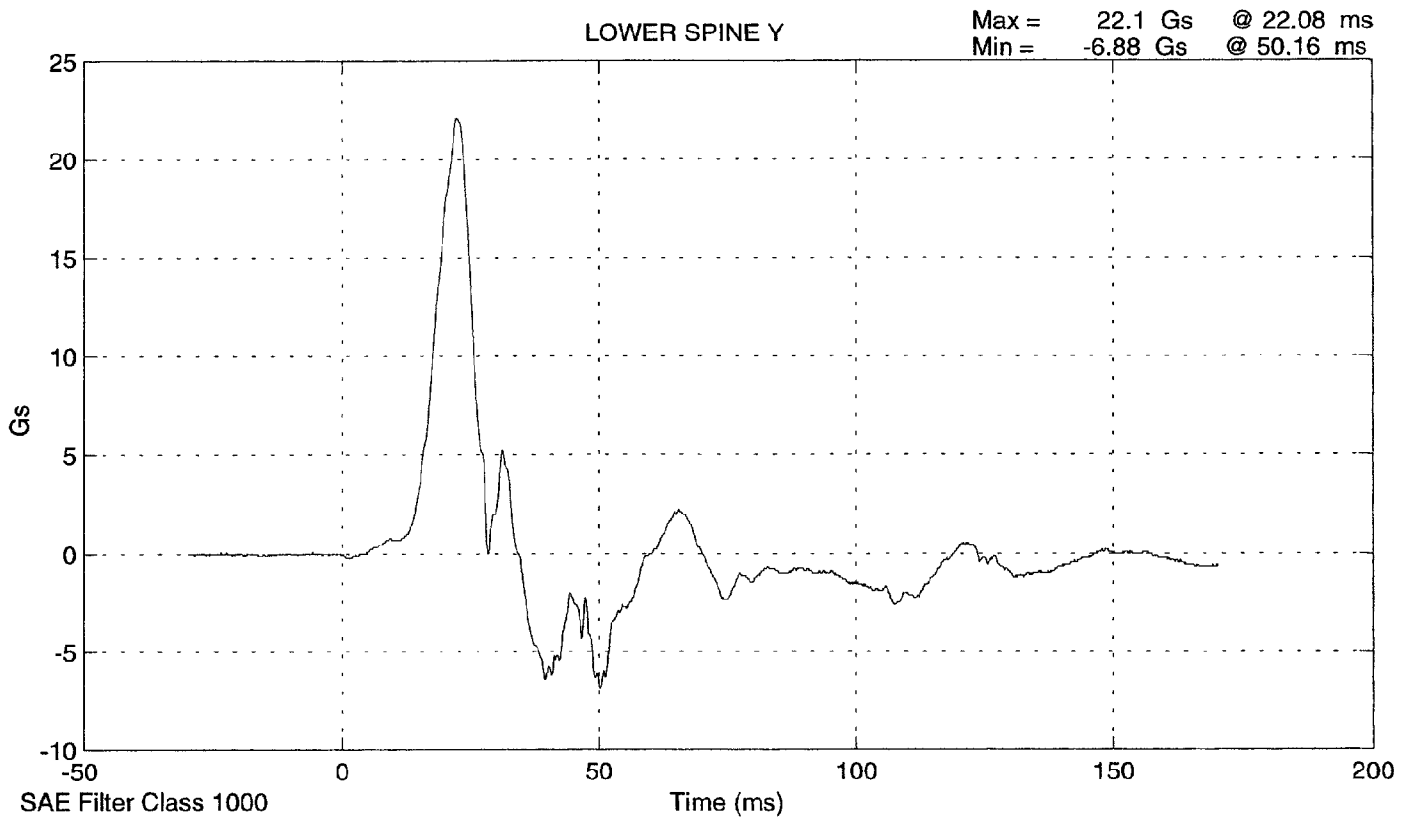
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	30
PROBE SPEED (m/s)	4.27 - 4.33	4.29
UPPER RIB (g's)	37 - 46	42.3
LOWER RIB (g's)	37 - 46	41.6
LOWER SPINE (g's)	15 - 22	21.5

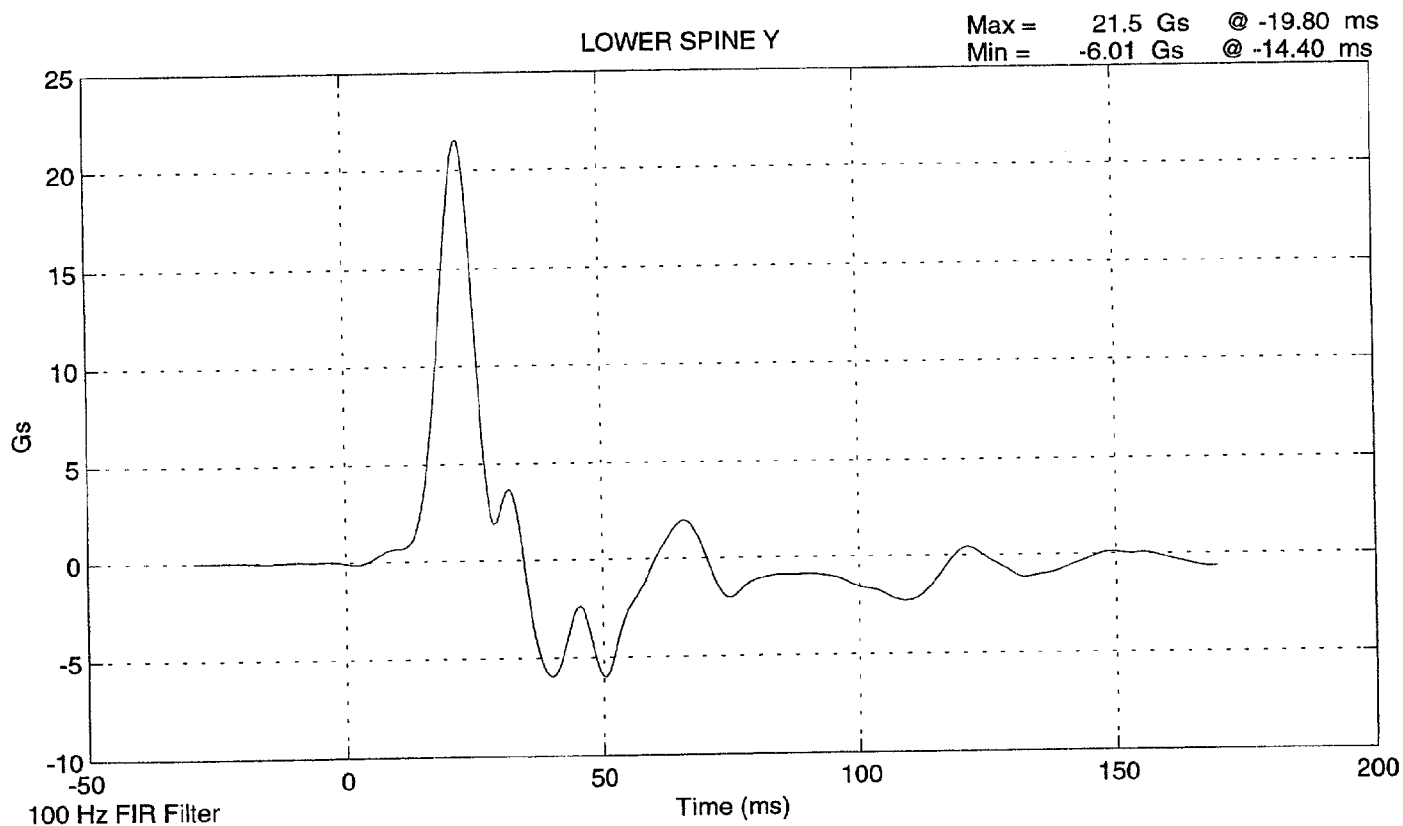
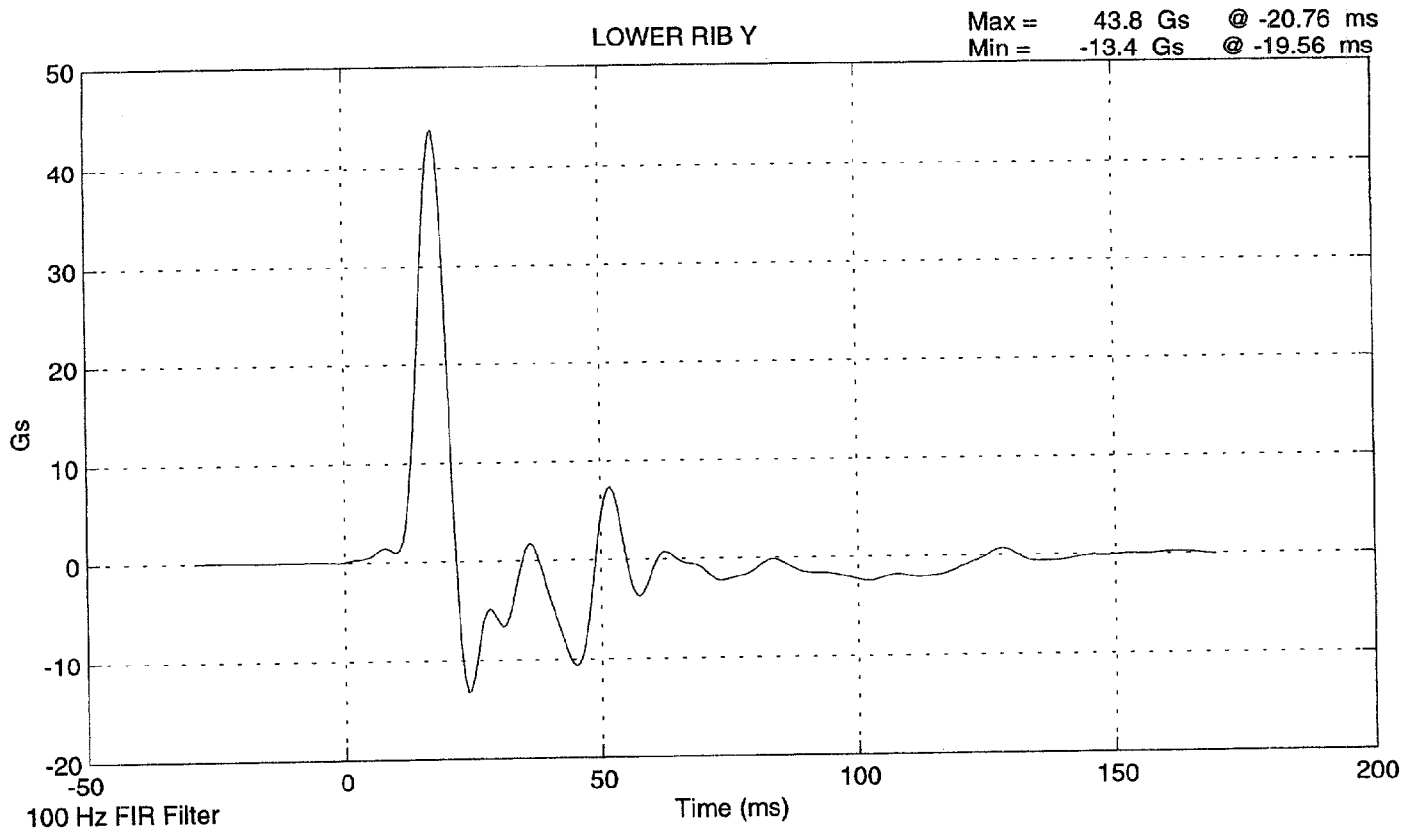
REMARKS: None

SID 016 THORAX IMPACT TEST @ 4.2977 m/s



SID 016 THORAX IMPACT TEST @ 4.2977 m/s





**LATERAL PELVIS IMPACT TEST
PRE-TEST**

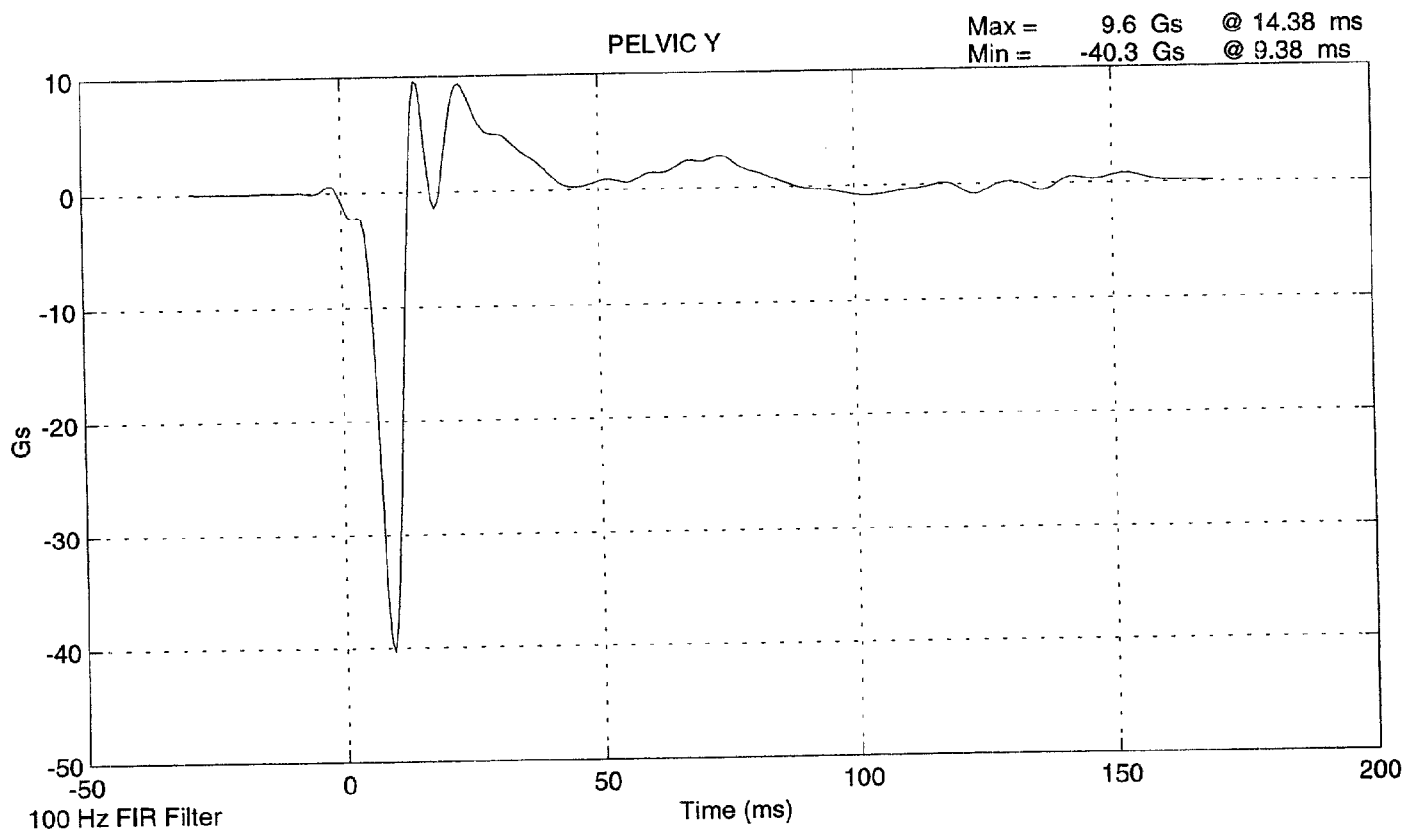
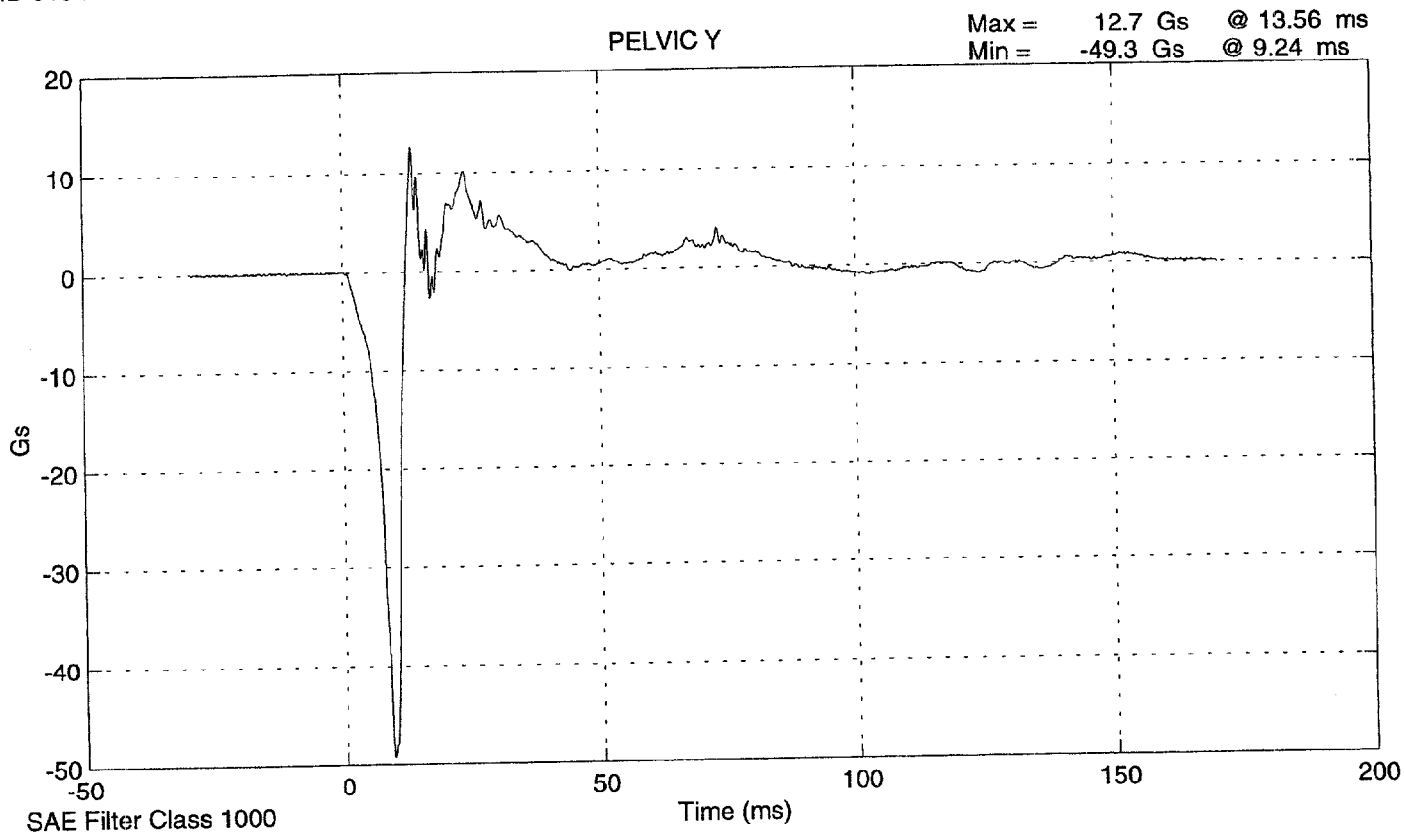
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Sequential Test Number: 1
Date: April 29, 1999 Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	30
PROBE SPEED (m/s)	4.27 - 4.33	4.28
PELVIS ACCELERATION (g's)	40 - 60	43.2

REMARKS: None

SID 016 PELVIC IMPACT TEST @ 4.3038 m/s



**ABDOMINAL COMPRESSION TEST
PRE-TEST**

(Test not required for SID certification)

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Sequential Test Number: 1
Date: April 30, 1999 Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	31
FORCE @ 13 mm (N)	104 - 162	112
FORCE @ 19 mm (N)	163 - 221	174
FORCE @ 25 mm (N)	222 - 280	258
FORCE @ 33 mm (N)	325 - 391	391

REMARKS: None

Dummy S/N 016

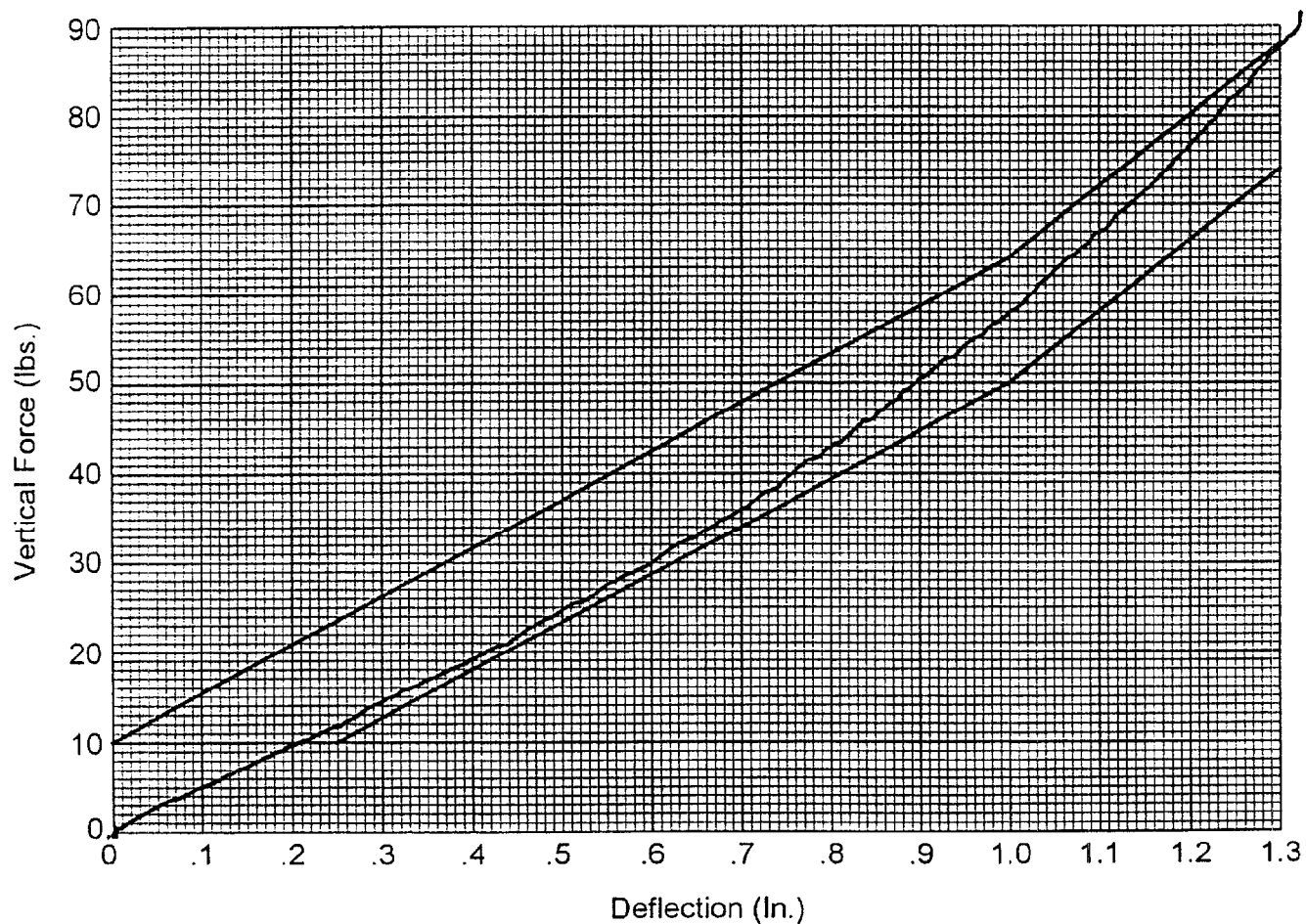
W/A _____

Date 4-30-99

Performed By BS

Temp. 70

Humidity 31



**Hybrid II
Abdomen Static Press**

LUMBAR FLEXION TEST
PRE-TEST
(Test not required for SID certification)

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Sequential Test Number: 1
Date: April 30, 1999 Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	31
FORCE @ 0° (N)	0 - 26.7	0
FORCE @ 20° (N)	97.8 - 151.2	142.3
FORCE @ 30° (N)	151.2 - 204.6	189.0
FORCE @ 40° (N)	204.6 - 258	237.5
RETURN ANGLE	12° max.	7.5

REMARKS: None

Dummy S/N 016

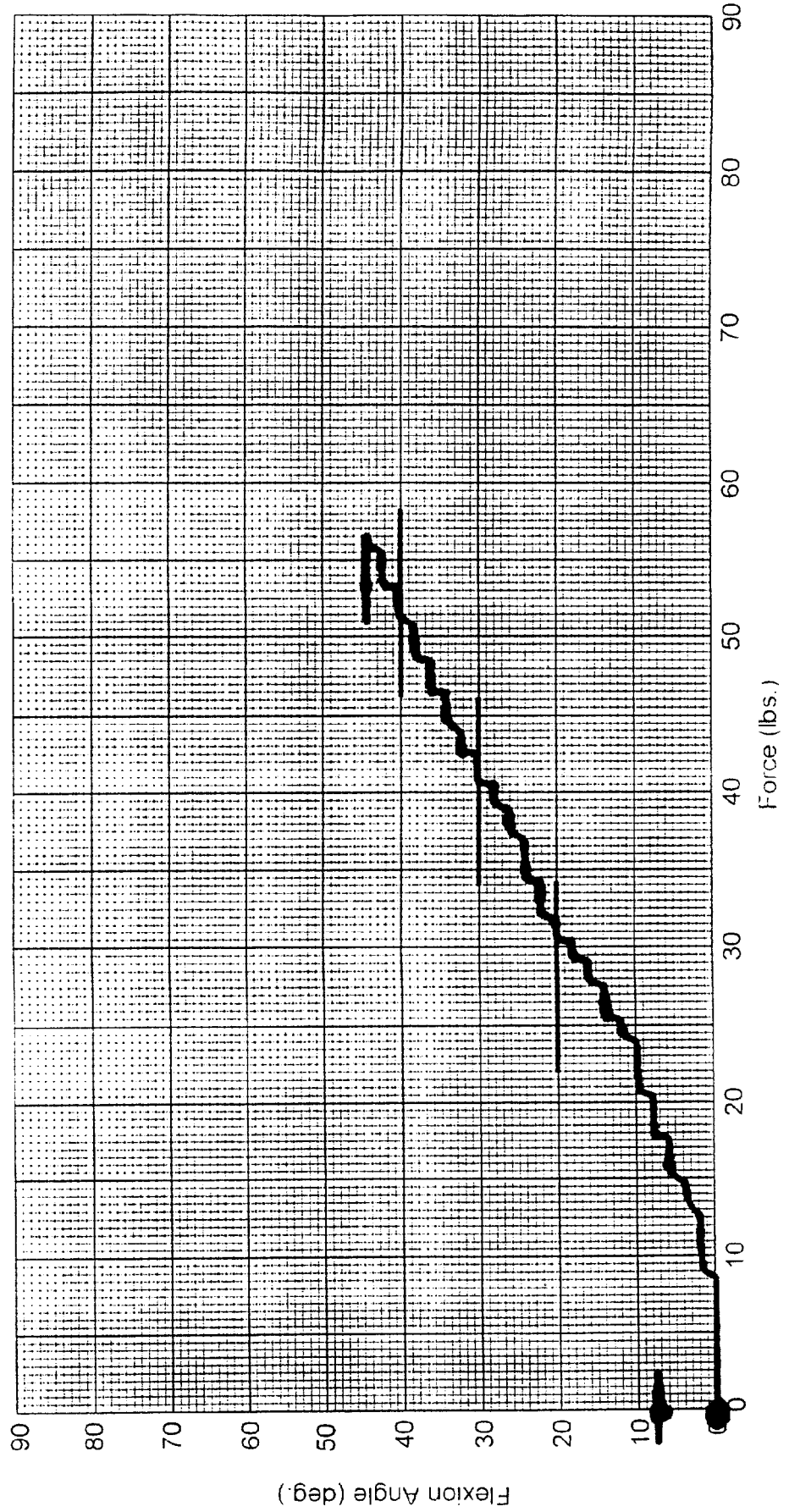
W/A

Date 4-30-99

Performed By [Signature]

Temp. 70

Humidity 31



Hybrid II Lumbar Spine Flexion Test

PRE-TEST DUMMY INSPECTION LIST

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Sequential Test Number: 1
Date: April 30, 1999 Laboratory Technician: B. Swiecicki

PART	ITEMS CHECKED	COMMENTS
SKIN	VISUAL INSPECTION	OK
HEAD	VISUAL, BALLAST, ACCELEROMETER MOUNT	OK
NECK	VISUAL, CABLE TORQUE	OK
SPINE BOX	VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT	OK
RIB CAGE	VISUAL, MEASURE, STIFFENERS	OK
STERNUM	VISUAL	OK
LUMBAR SPINE	VISUAL	OK
ABDOMEN	VISUAL	OK
PELVIS	VISUAL, PALPATE, ACCELEROMETER MOUNT	OK
UPPER LEGS	VISUAL	OK
KNEES	VISUAL, STOPS, INSERTS	OK
LOWER LEGS	VISUAL, RANGE OF MOTION	OK
ANKLES	VISUAL, RANGE OF MOTION	OK
FEET	VISUAL, RANGE OF MOTION	OK
JOINTS	1 TO 2 g RANGE	OK
OTHER	NONE	-

REMARKS: None

CALIBRATION TEST RESULTS
PRE-TEST

SID NO.: 027

CONFIGURED FOR LEFT SIDE IMPACT

**CALIBRATION TEST RESULTS SUMMARY
PRE-TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Sequential Test Number: 1
Date: April 30, 1999 Laboratory Technician: B. Swiecicki

TEST	COMMENTS
EXTERNAL DIMENSIONS	Passed all requirements.
THORACIC SHOCK ABSORBER TEST	Passed all requirements.
LATERAL THORAX IMPACT TEST	Passed all requirements.
LATERAL PELVIS IMPACT TEST	Passed all requirements.
ABDOMINAL COMPRESSION TEST*	Passed all requirements.
LUMBAR FLEXION TEST*	Passed all requirements.

* Test not required for SID certification.

REMARKS: None

**EXTERNAL DIMENSIONS
PRE-TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027
Date: April 30, 1999

Sequential Test Number: 1
Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	909
RH- Rib Height (mm)	502 - 520	516
HP- Hip Pivot Height (mm)	99 ref.	99
RD- Rib from Back Line (mm)	229 - 241	236
KH- Knee Pivot from Back Line (mm)	511 - 526	516
KV- Knee Pivot to Floor (mm)	490 - 505	493
HW- Hip Width (mm)	356 - 391	368

REMARKS: None

**THORACIC SHOCK ABSORBER TESTS
PRE-TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Sequential Test Number: 1
Date: February 15, 1999 Laboratory Technician: B. Swiecicki

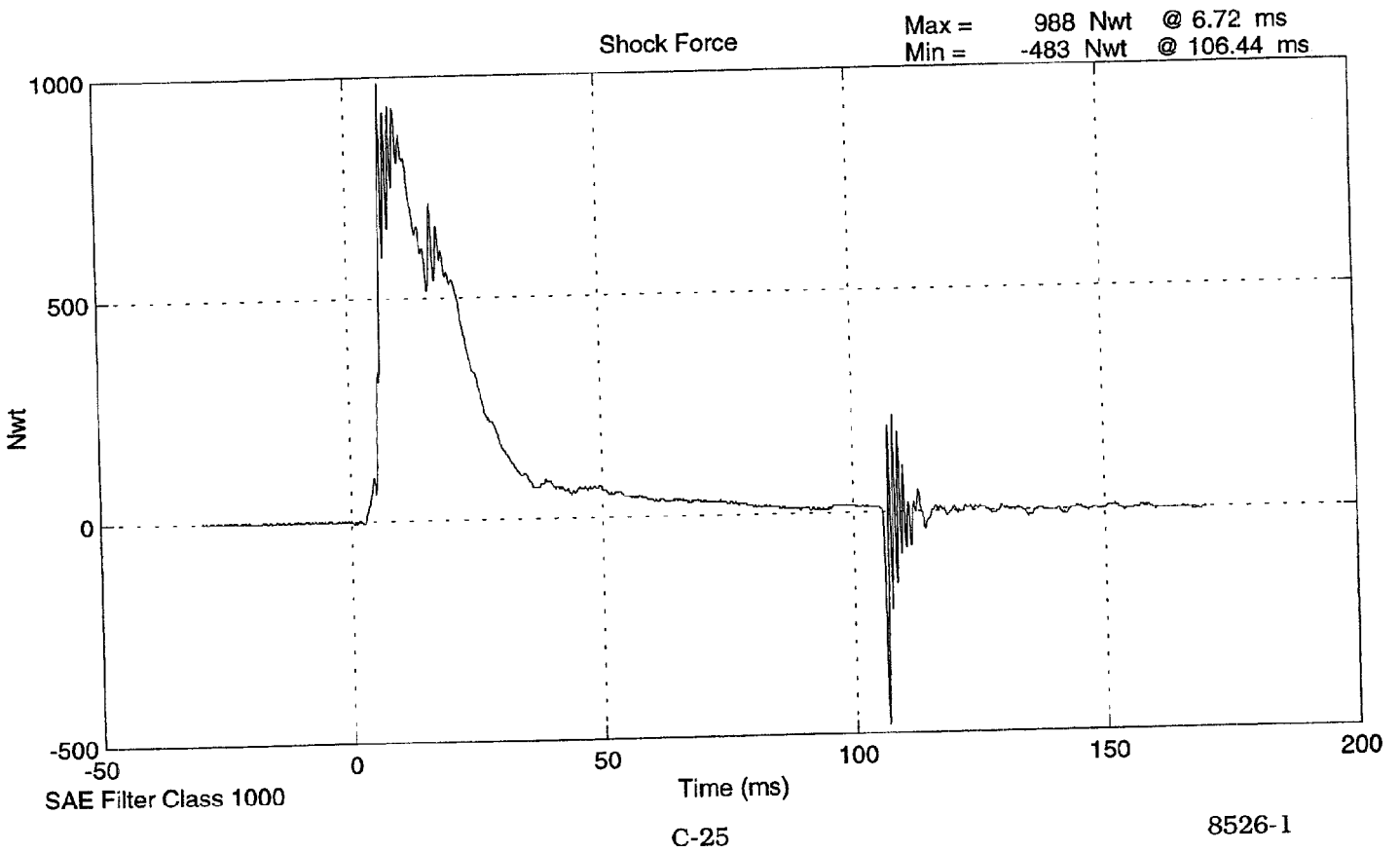
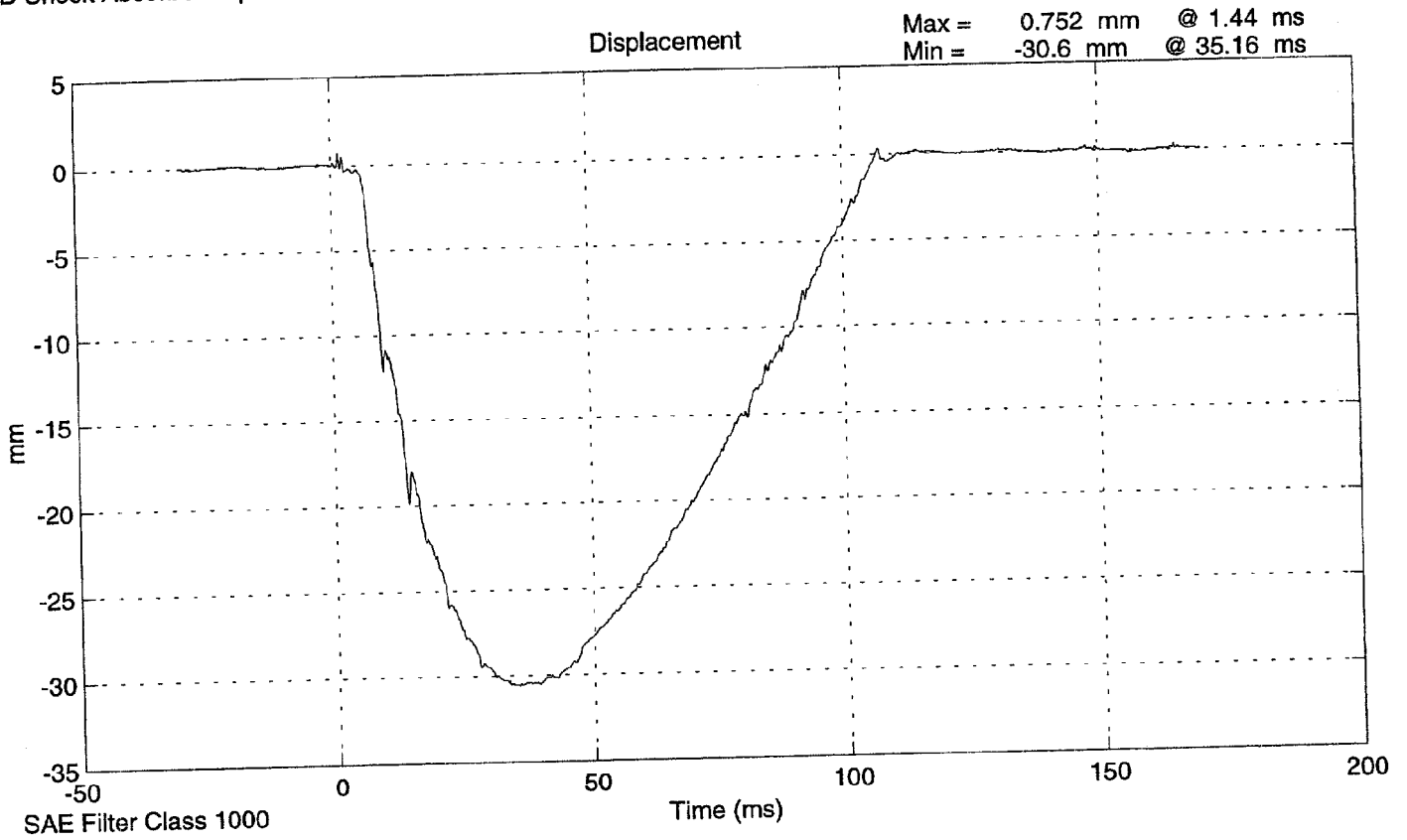
DAMPER IDENTIFICATION: 027

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)		18.9 - 25.5	21.7
RELATIVE HUMIDITY (%)		10 - 70	15
VELOCITY 3.05 m/s	FORCE (N)	836 - 1125	988.0
	DISPLACEMENT (mm)	30 - 35	30.6
VELOCITY 4.27 m/s	FORCE (N)	1730 - 2099	1736.9
	DISPLACEMENT (mm)	32 - 37	34.6
VELOCITY 6.10 m/s	FORCE (N)	3741 - 4448	3771.1
	DISPLACEMENT (mm)	33 - 40	36.4

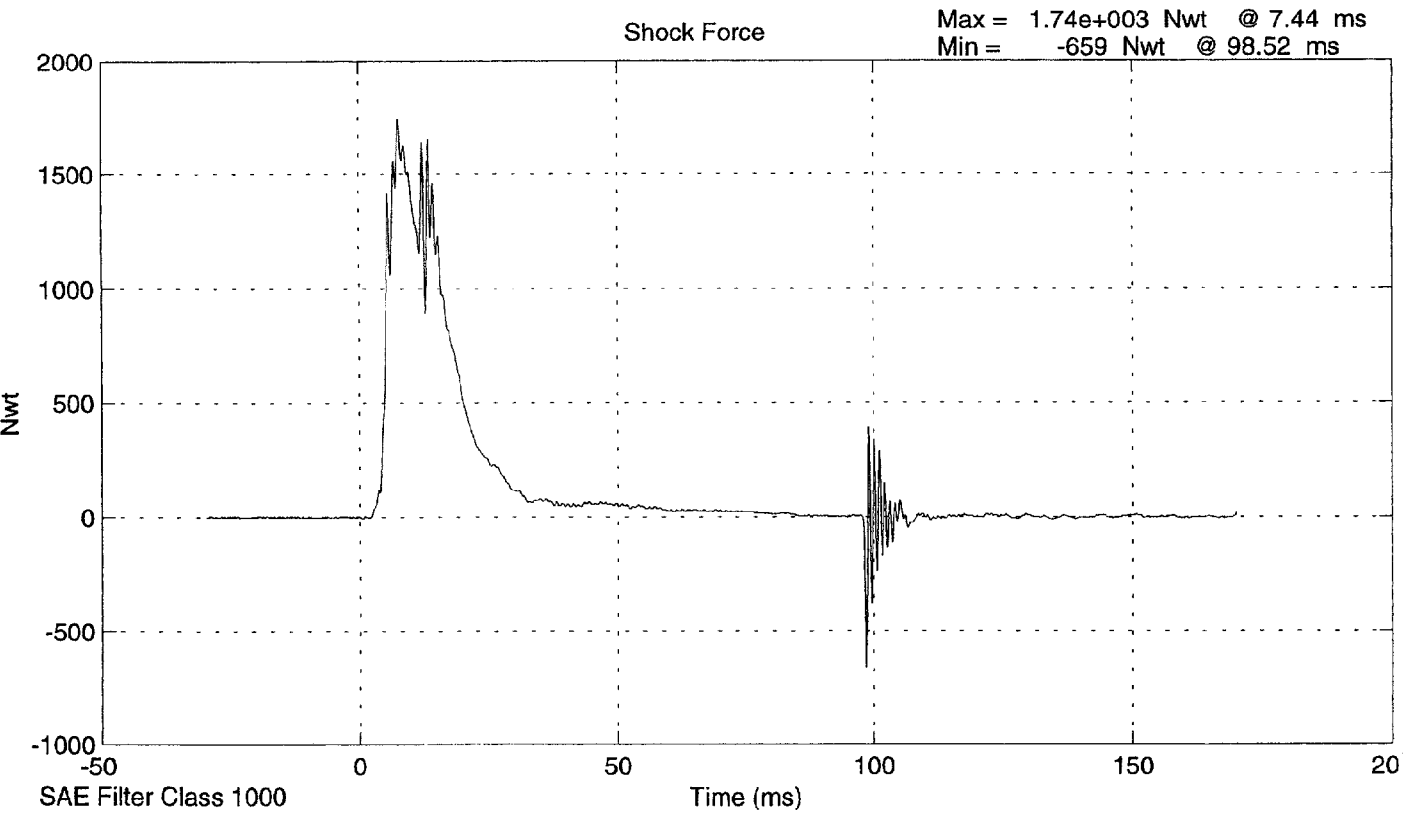
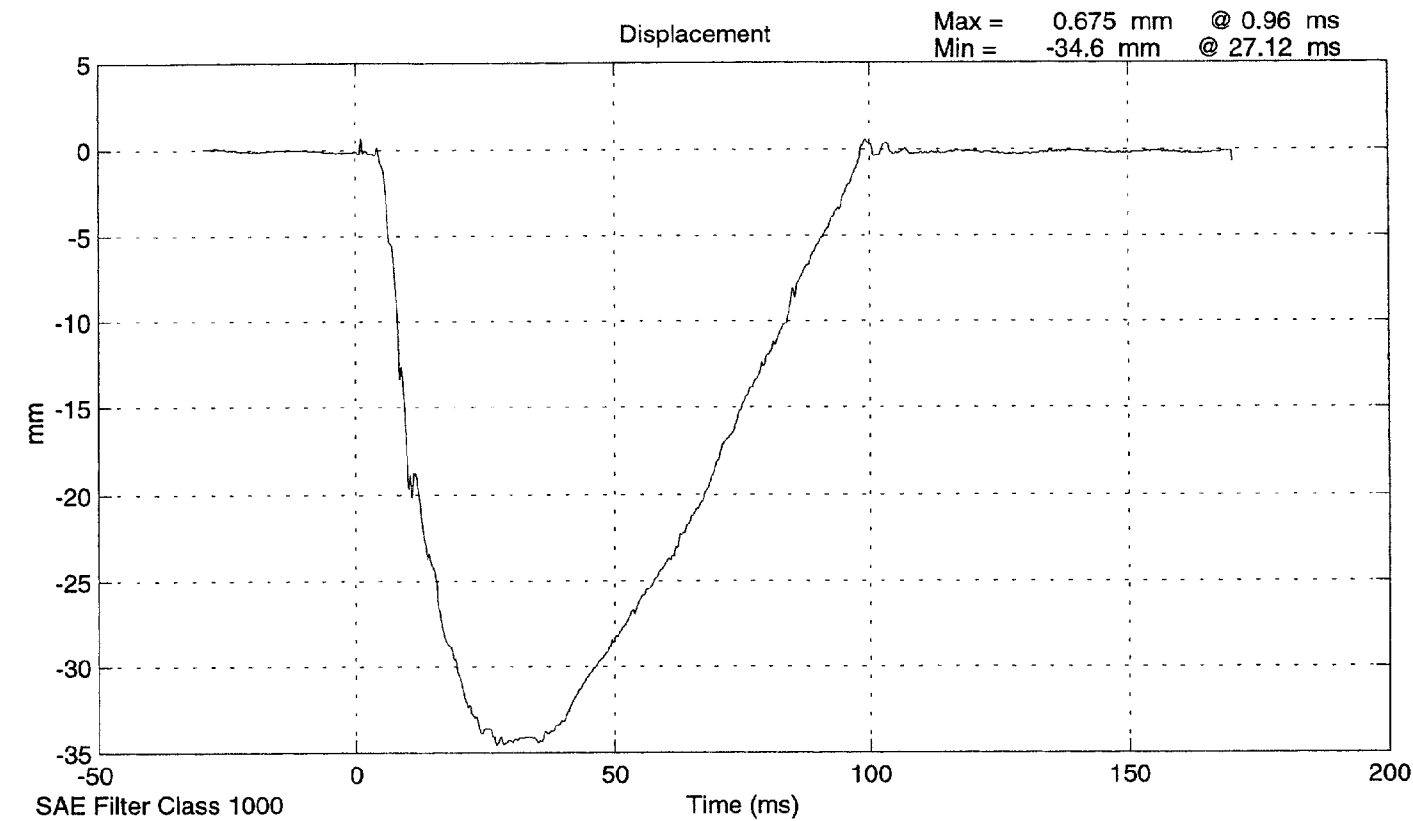
DAMPER SETTING: 5

REMARKS: None

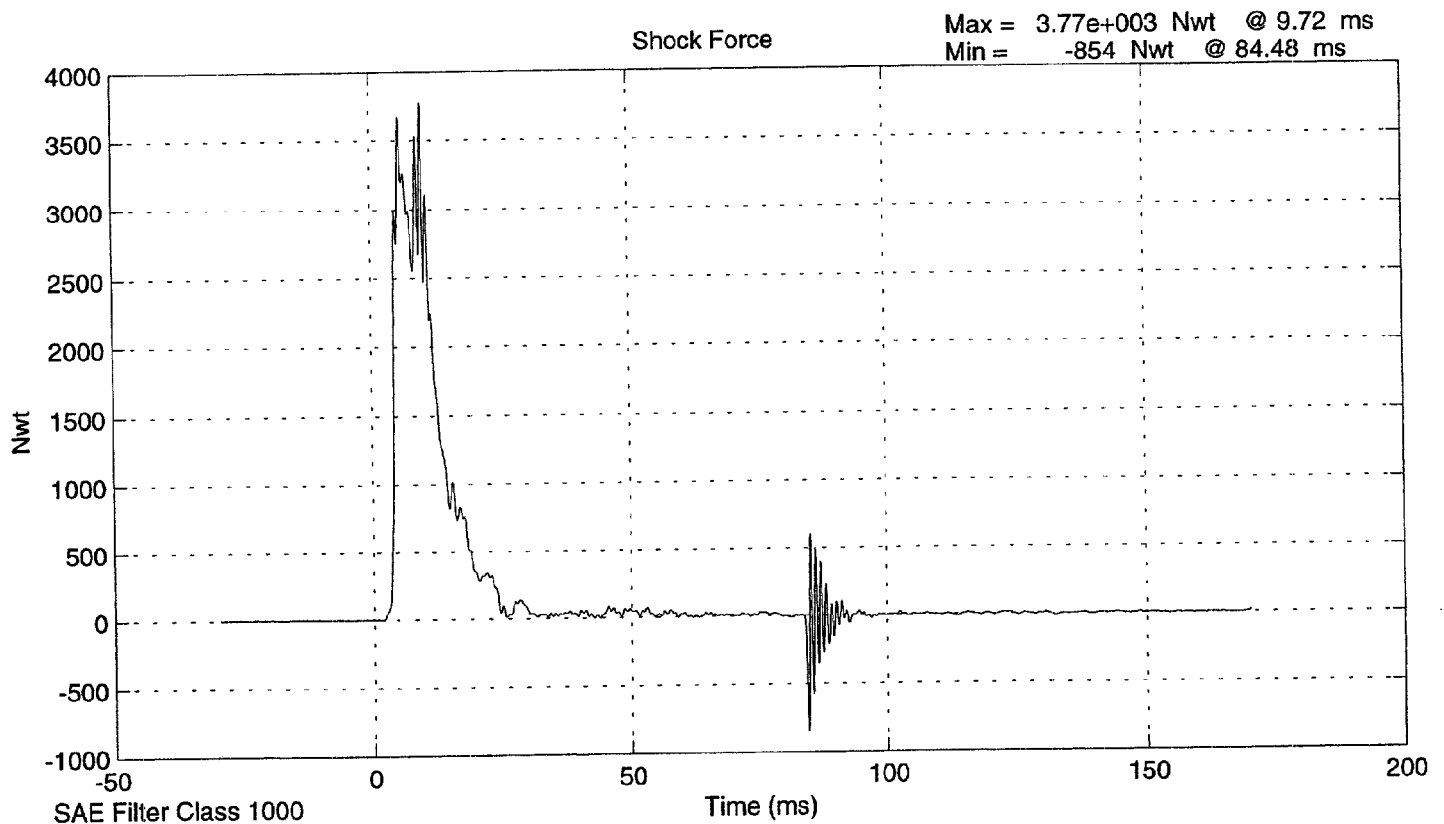
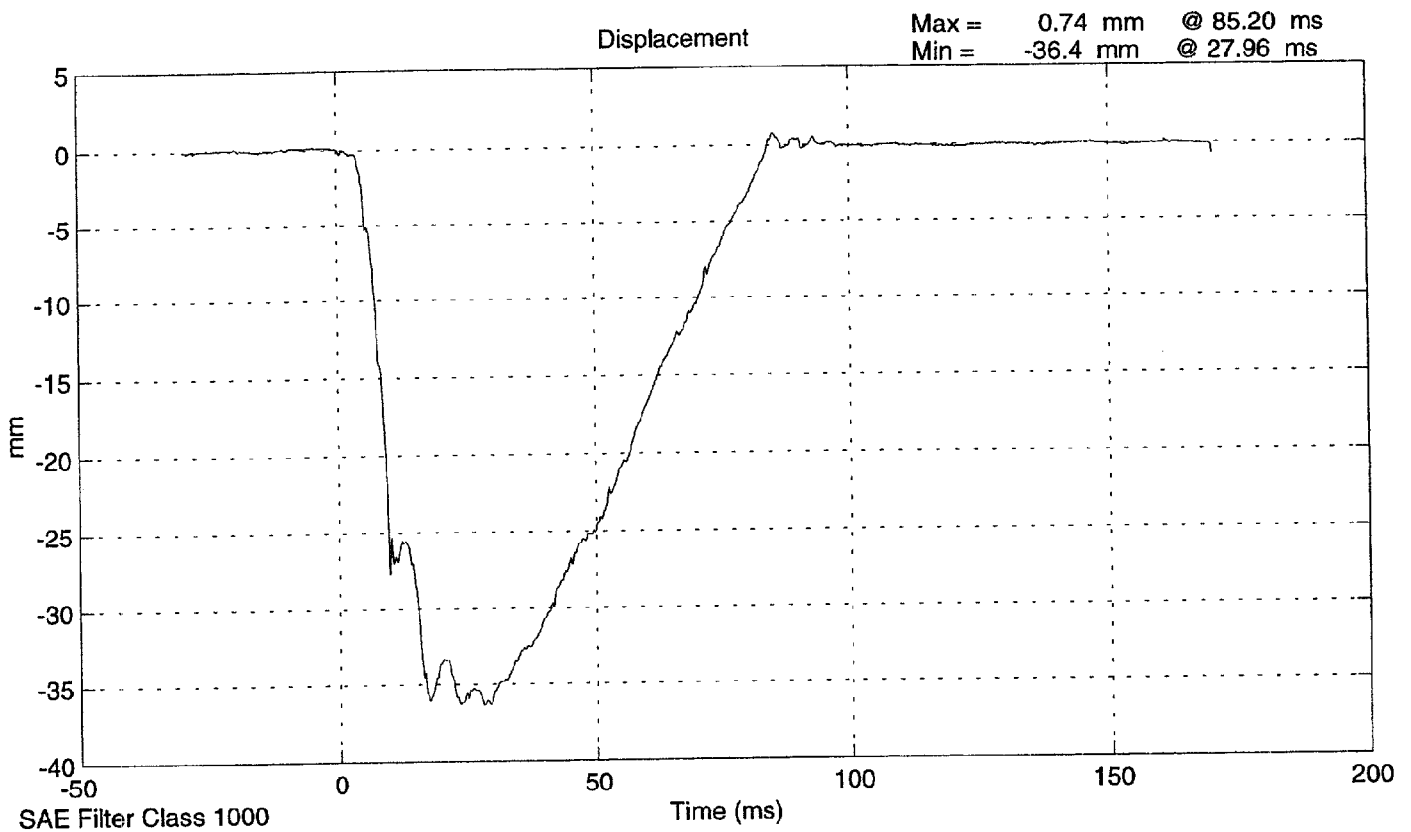
SID Shock Absorber Impact Test 027 @ 3.048 m/s



SID Shock Absorber Impact Test 027 @ 4.2824 m/s



SID Shock Absorber Impact Test 027 @ 6.1204 m/s



**LATERAL THORAX IMPACT TEST
PRE-TEST**

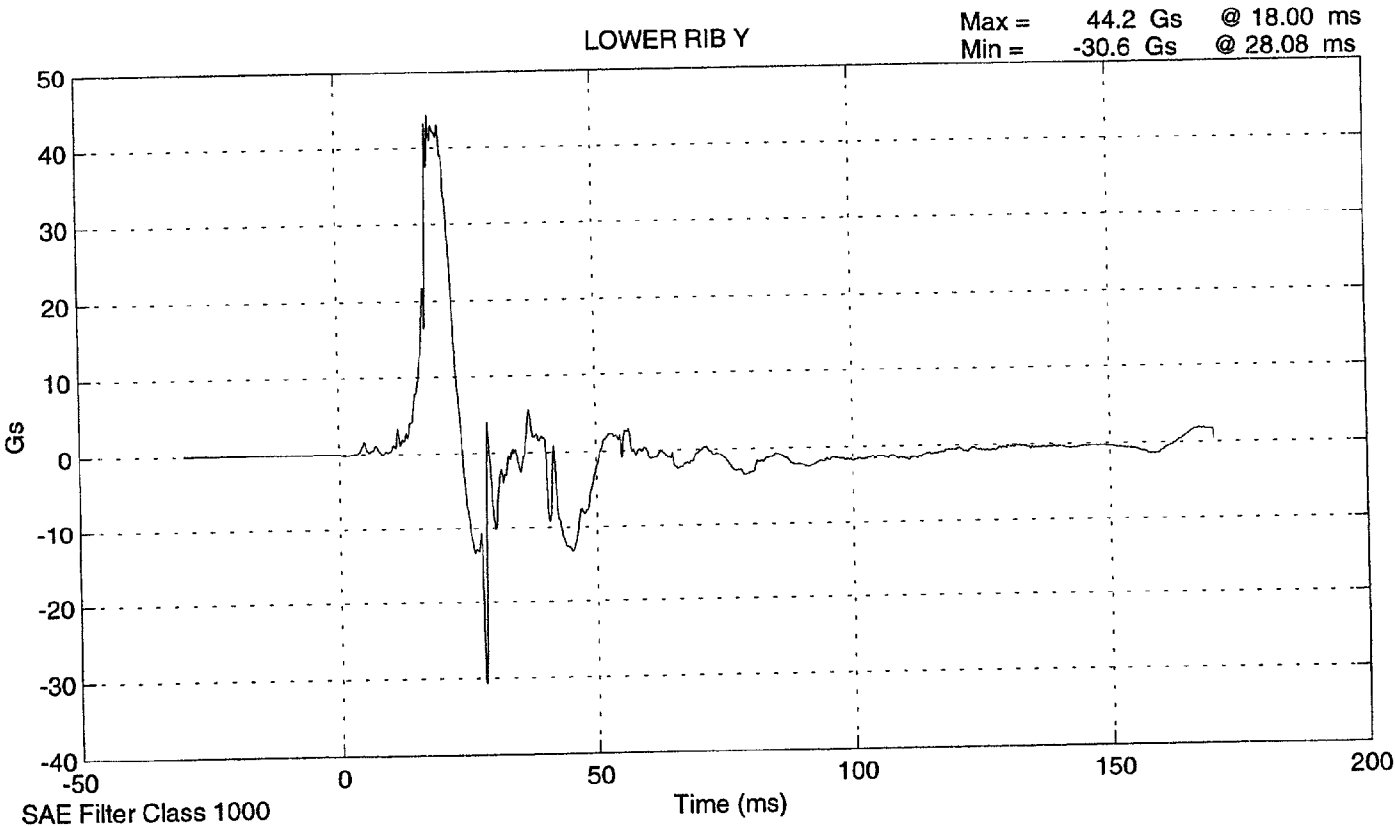
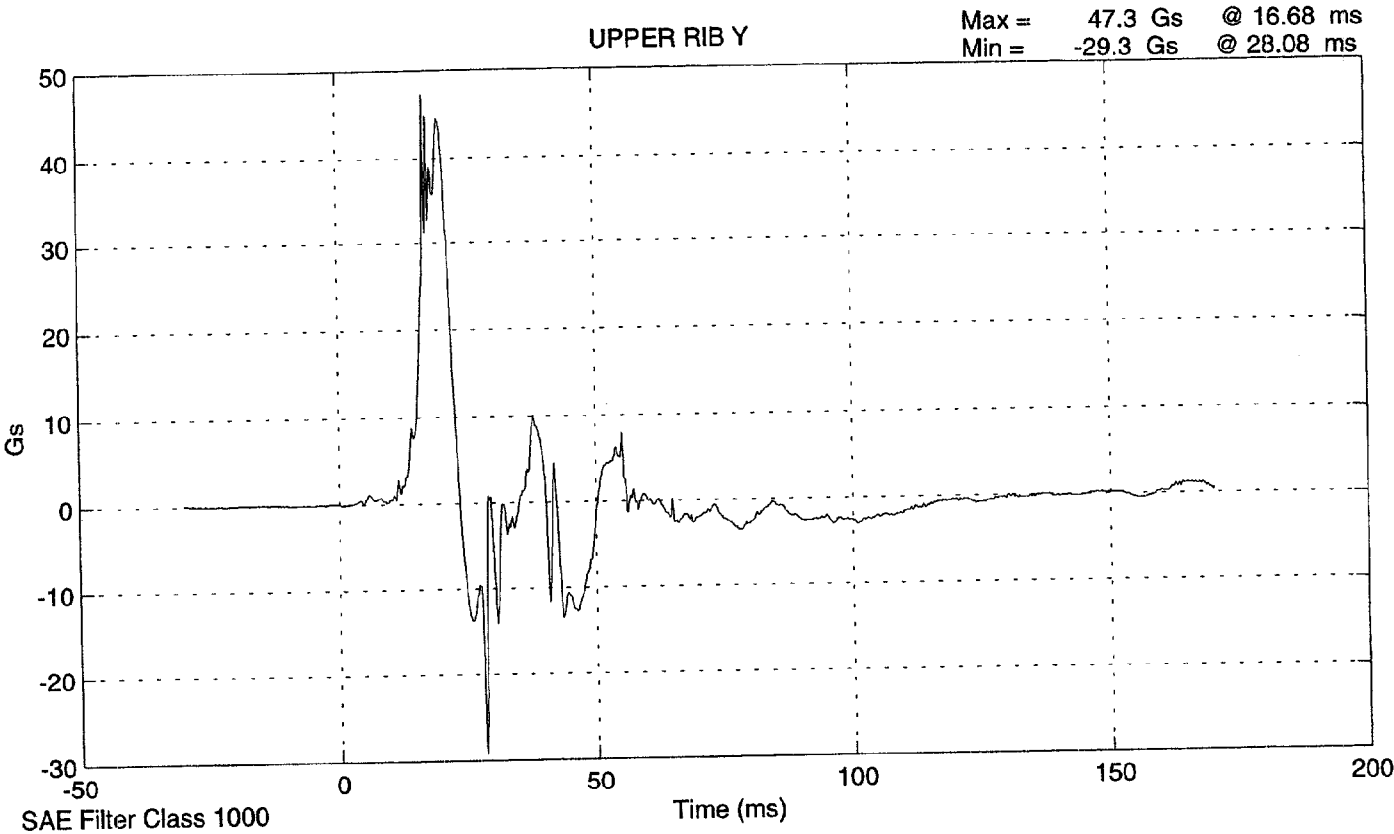
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027
Date: April 29, 1999

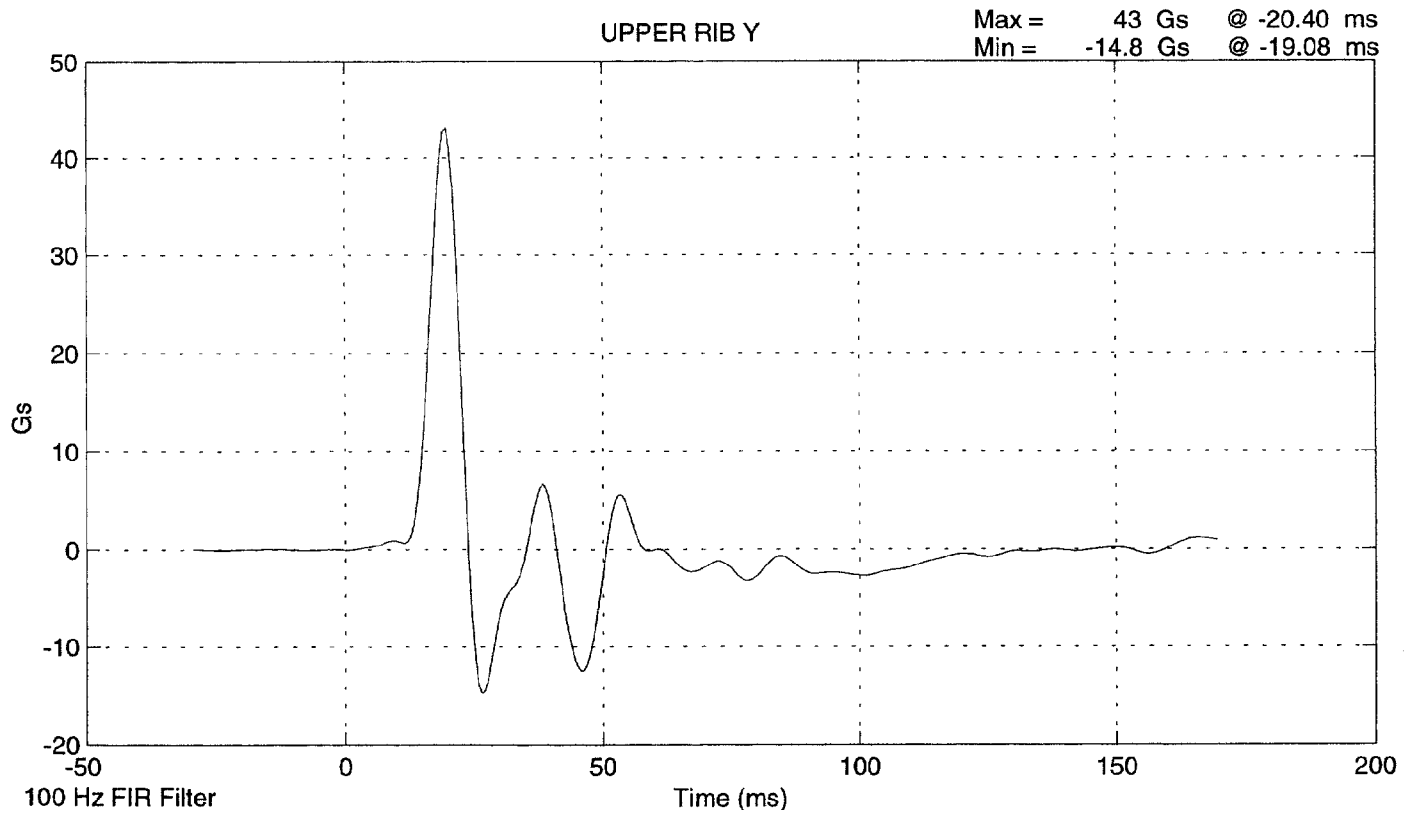
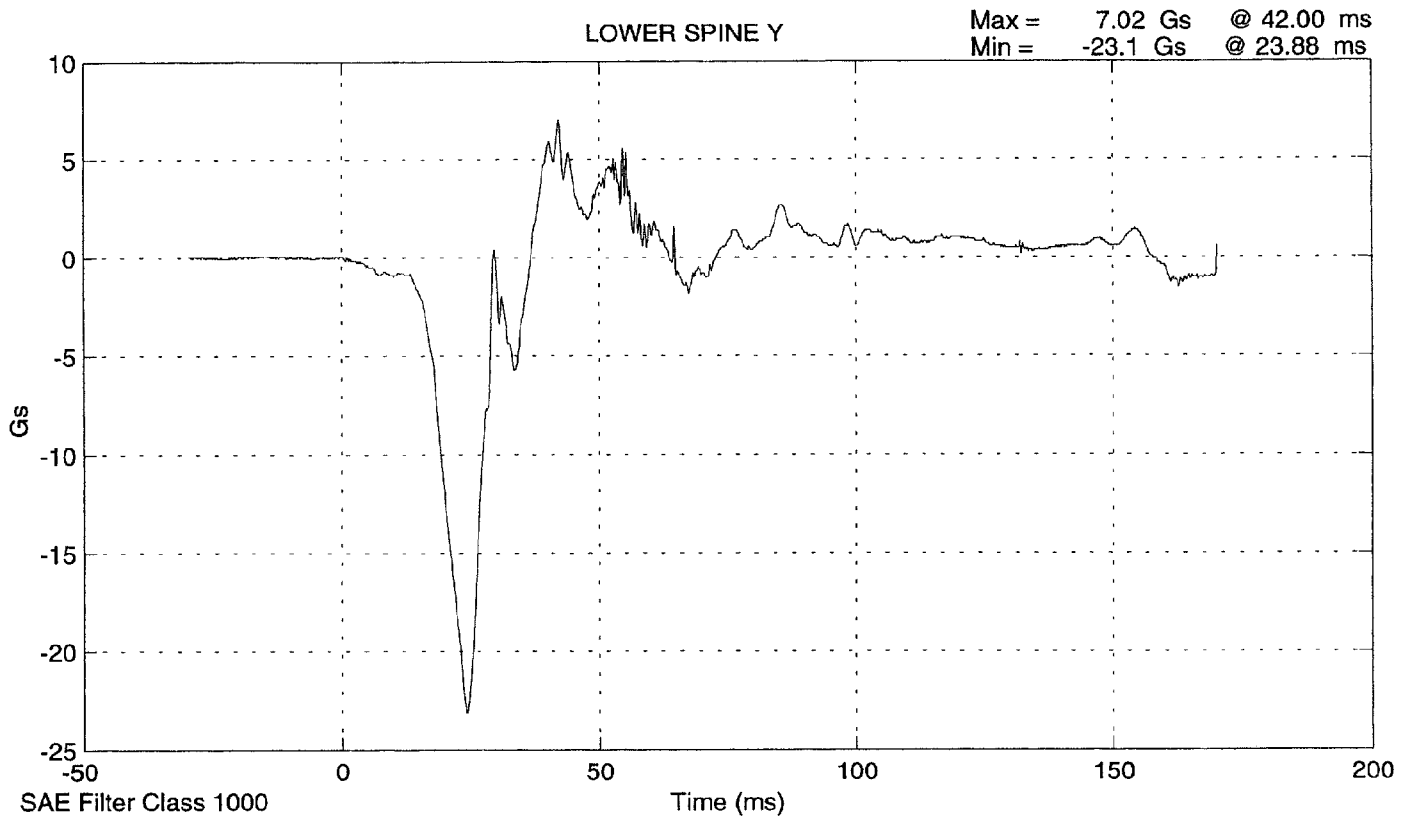
Sequential Test Number: 1
Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	30
PROBE SPEED (m/s)	4.27 - 4.33	4.32
UPPER RIB (g's)	37 - 46	40.9
LOWER RIB (g's)	37 - 46	39.1
LOWER SPINE (g's)	15 - 22	20.2

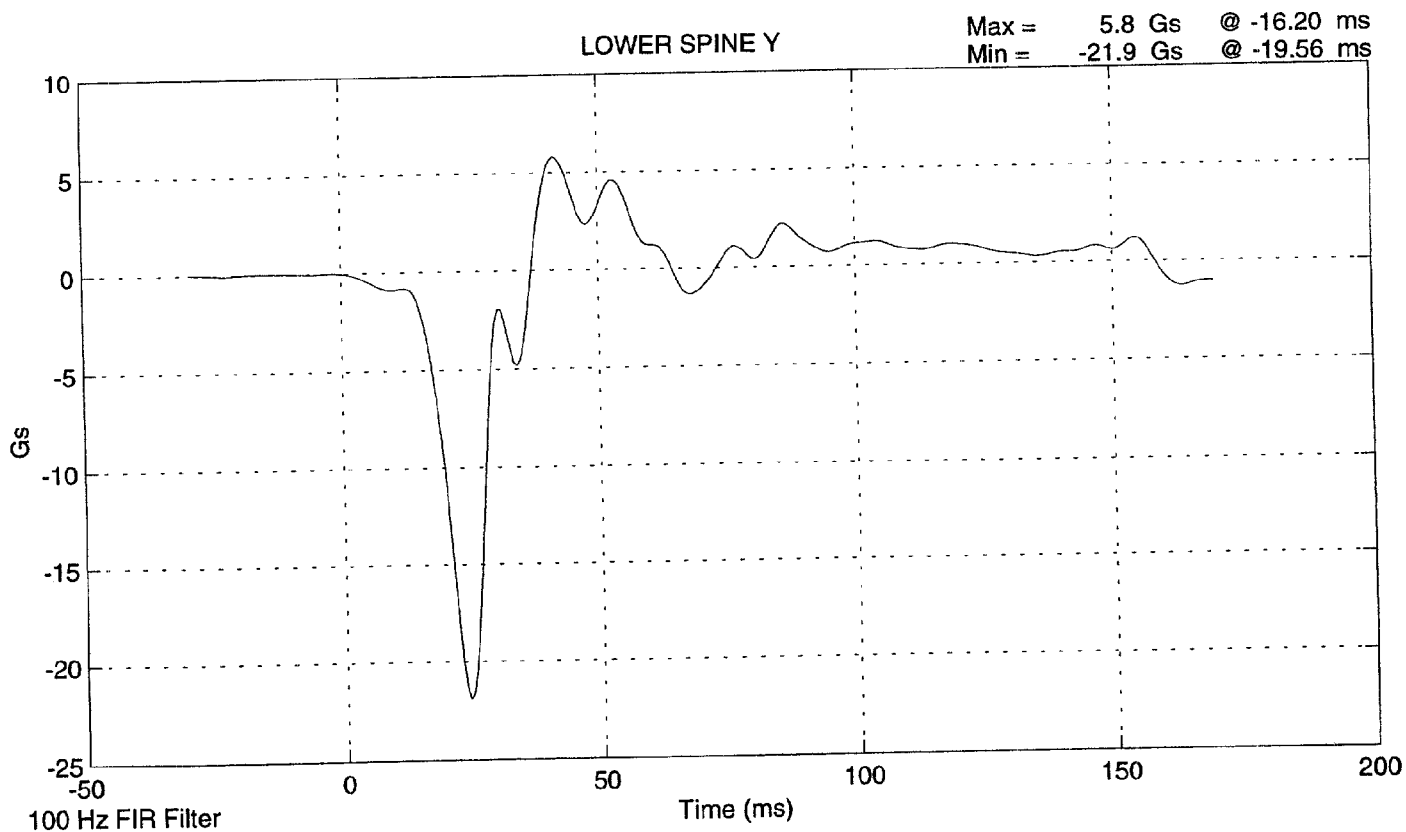
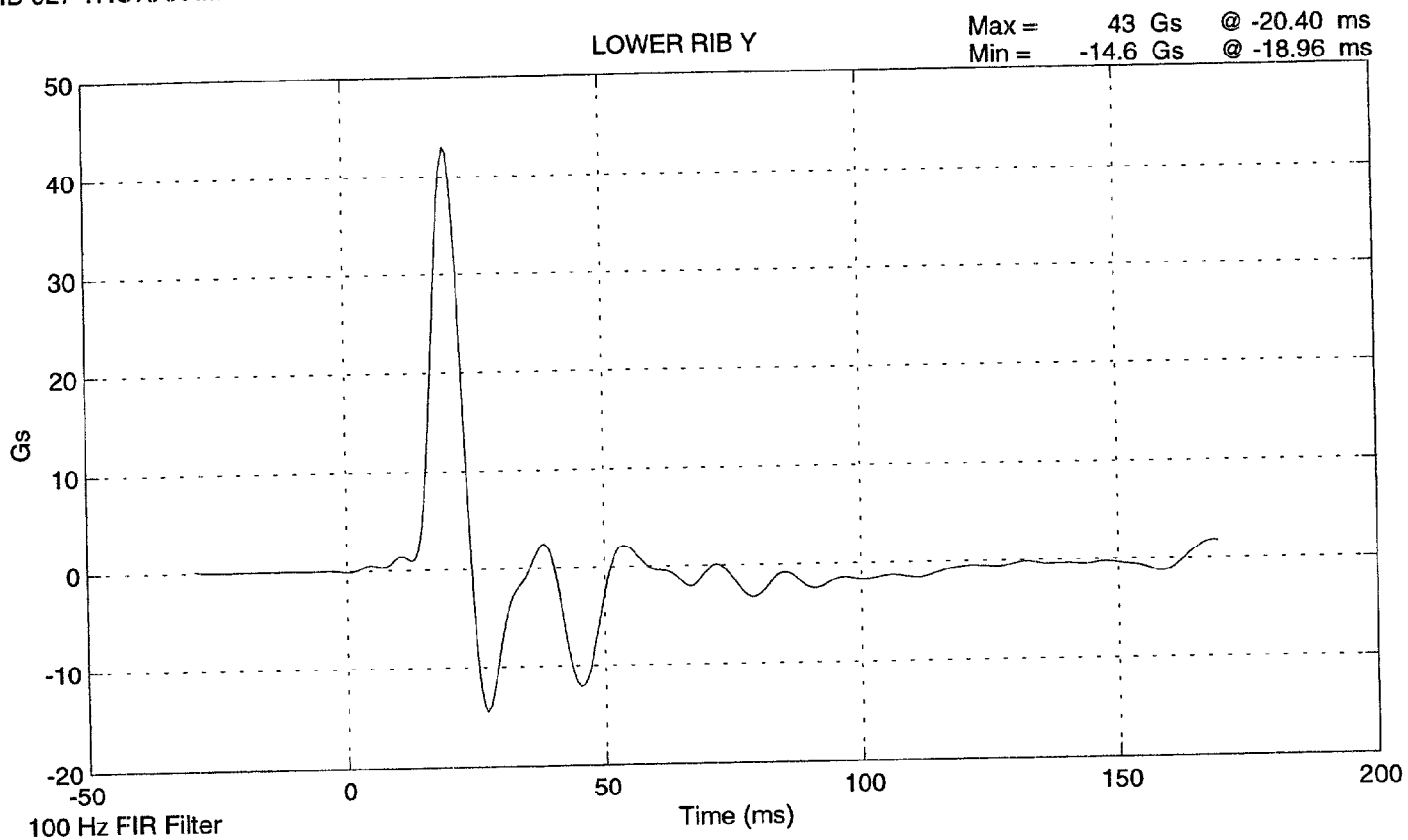
REMARKS: None



SID 027 THORAX IMPACT TEST @ 4.2885 m/s



SID 027 THORAX IMPACT TEST @ 4.2885 m/s



**LATERAL PELVIS IMPACT TEST
PRE-TEST**

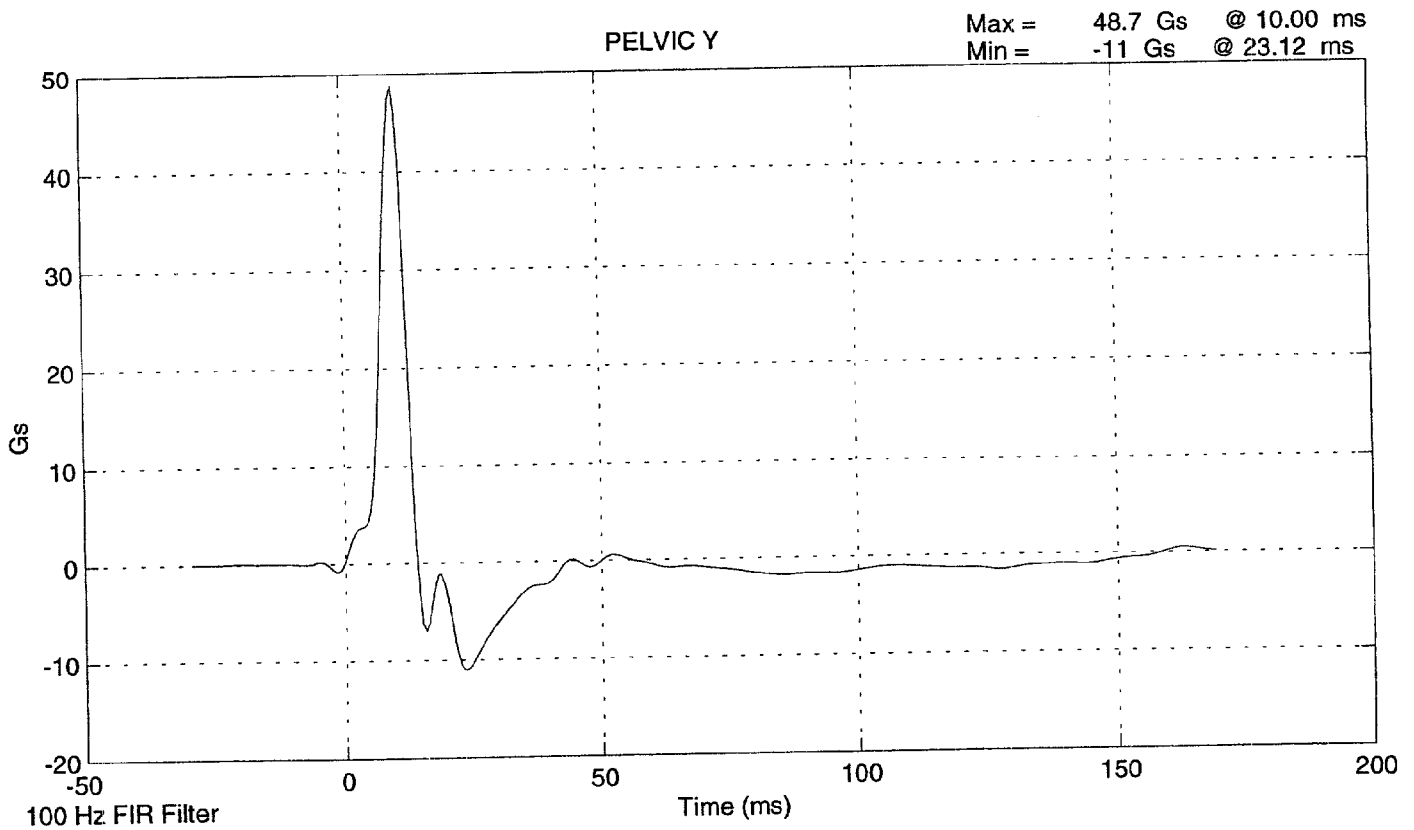
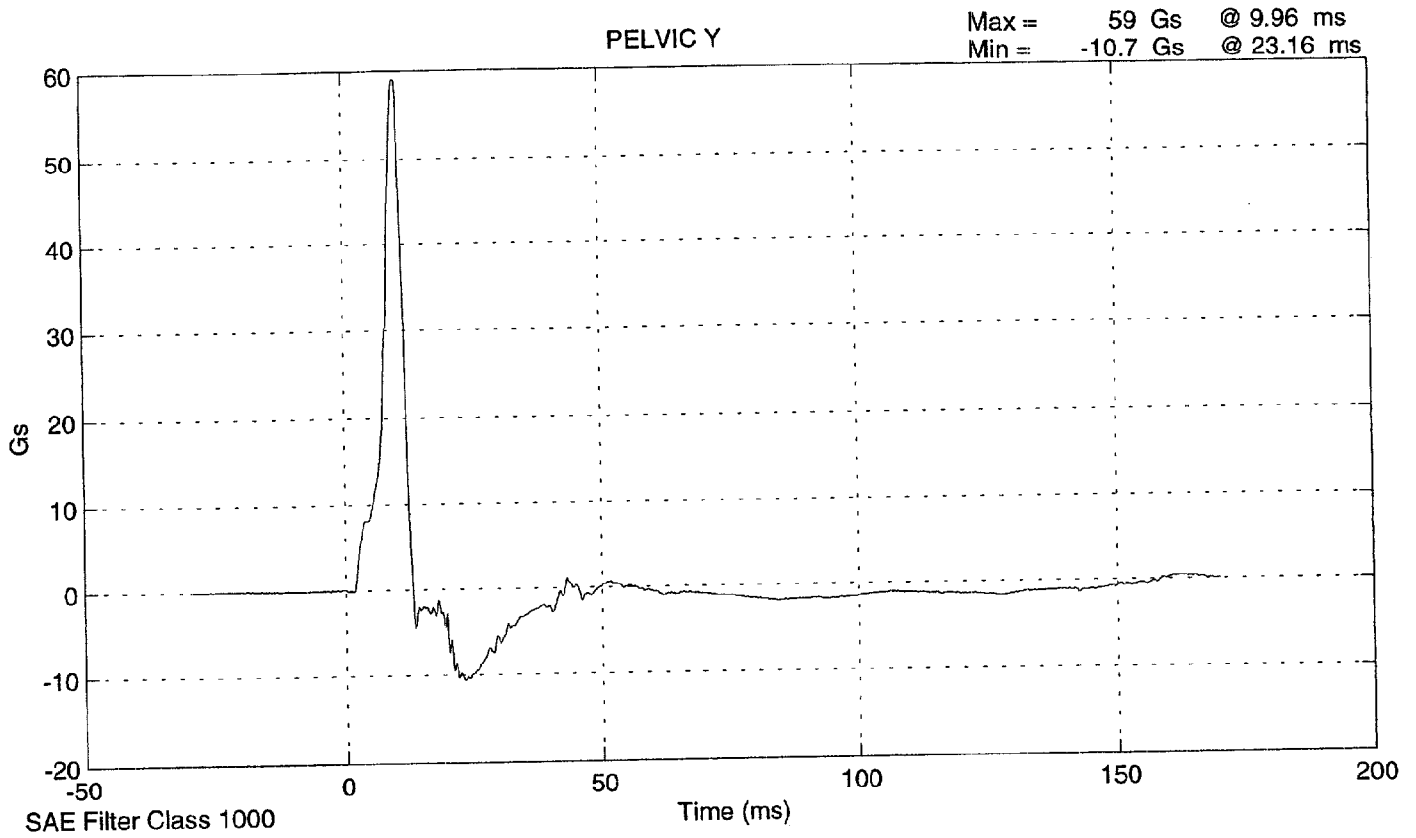
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Sequential Test Number: 1
Date: April 29, 1999 Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	30
PROBE SPEED (m/s)	4.27 - 4.33	4.30
PELVIS ACCELERATION (g's)	40 - 60	48.2

REMARKS: None

SID 027 PELVIC IMPACT TEST @ 4.2977 m/s



ABDOMINAL COMPRESSION TEST**PRE-TEST**

(Test not required for SID certification)

CONFIGURED FOR LEFT SIDE IMPACTSID Serial No.: 027

Sequential Test Number:

1Date: April 30, 1999

Laboratory Technician:

B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	31
FORCE @ 13 mm (N)	104 - 162	111
FORCE @ 19 mm (N)	163 - 221	178
FORCE @ 25 mm (N)	222 - 280	258
FORCE @ 33 mm (N)	325 - 391	389

REMARKS: None

Dummy S/N 027

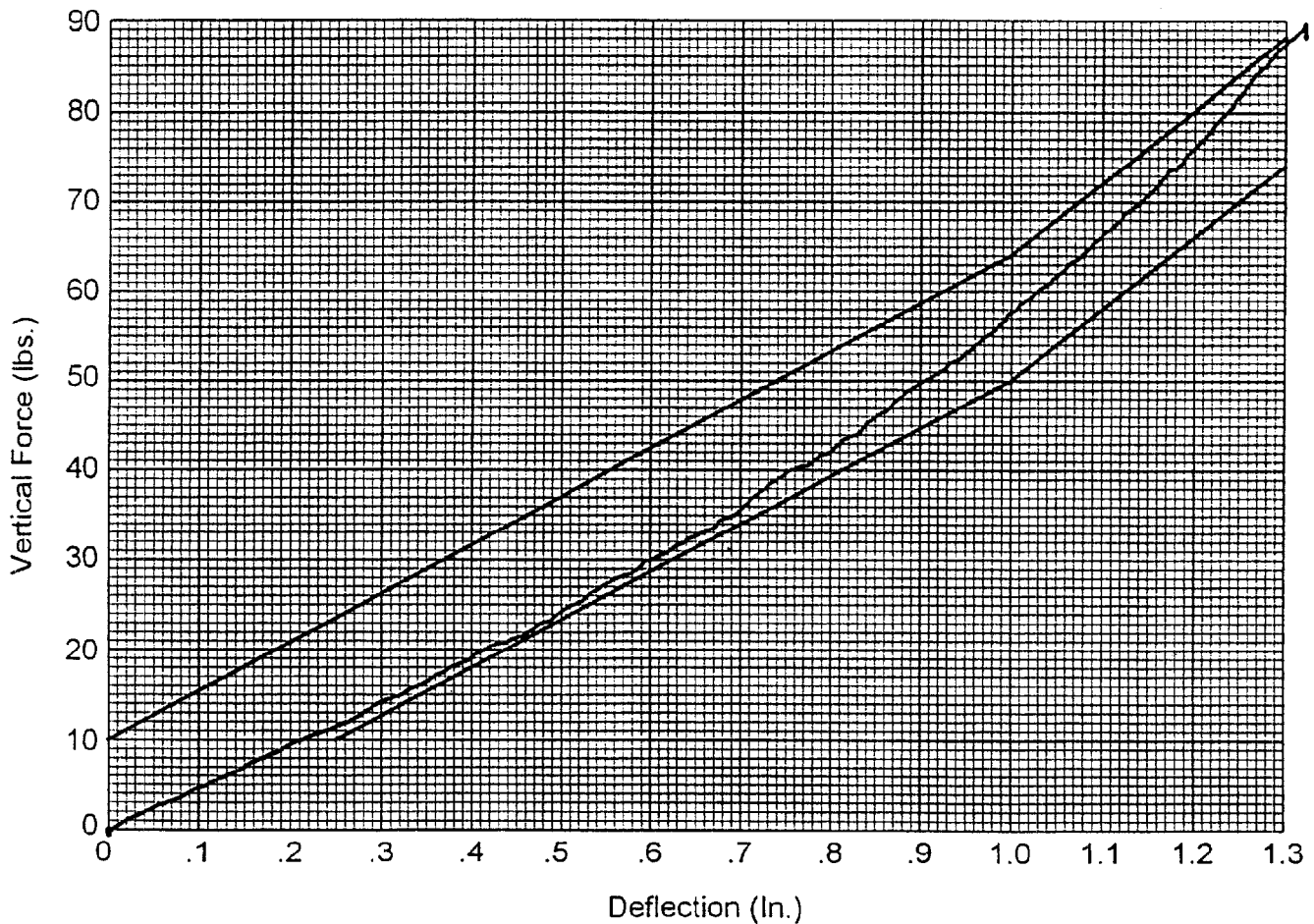
W/A _____

Date 4-30-99

Performed By BD

Temp. 70

Humidity 31



Hybrid II
Abdomen Static Press

LUMBAR FLEXION TEST
PRE-TEST
(Test not required for SID certification)

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Sequential Test Number: 1
Date: April 30, 1999 Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	31
FORCE @ 0° (N)	0 - 26.7	20.0
FORCE @ 20° (N)	97.8 - 151.2	149.0
FORCE @ 30° (N)	151.2 - 204.6	189.0
FORCE @ 40° (N)	204.6 - 258	242.4
RETURN ANGLE	12° max.	8.0

REMARKS: None

0.27

Dummy S/N

W/A

4-30-99

Date

[Signature]

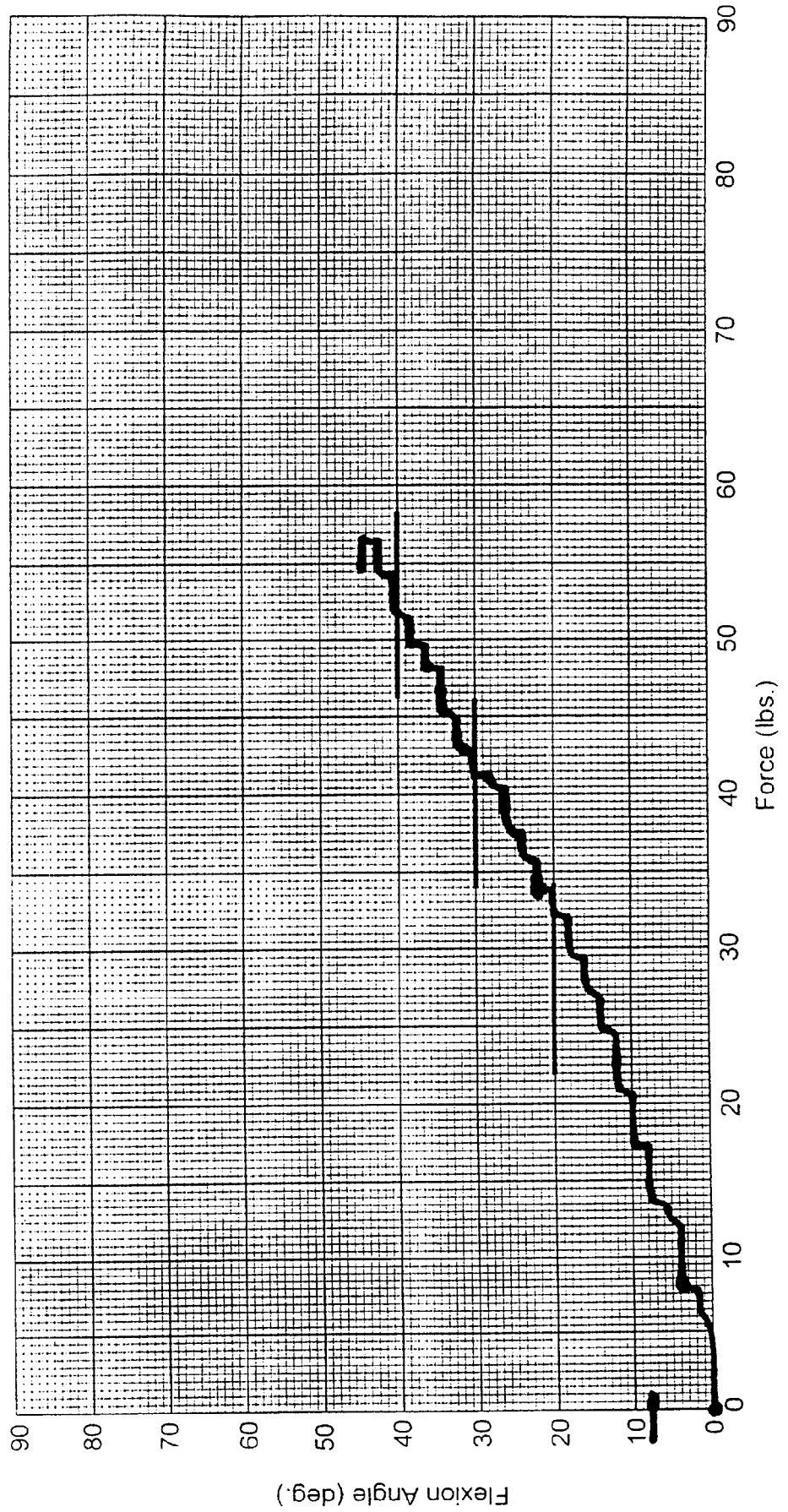
Performed By

70

Temp.

31

Humidity



Hybrid II Lumbar Spine Flexion Test

PRE-TEST DUMMY INSPECTION LIST

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Sequential Test Number: 1
 Date: April 30, 1999 Laboratory Technician: B. Swiecicki

PART	ITEMS CHECKED	COMMENTS
SKIN	VISUAL INSPECTION	OK
HEAD	VISUAL, BALLAST, ACCELEROMETER MOUNT	OK
NECK	VISUAL, CABLE TORQUE	OK
SPINE BOX	VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT	OK
RIB CAGE	VISUAL, MEASURE, STIFFENERS	OK
STERNUM	VISUAL	OK
LUMBAR SPINE	VISUAL	OK
ABDOMEN	VISUAL	OK
PELVIS	VISUAL, PALPATE, ACCELEROMETER MOUNT	OK
UPPER LEGS	VISUAL	OK
KNEES	VISUAL, STOPS, INSERTS	OK
LOWER LEGS	VISUAL, RANGE OF MOTION	OK
ANKLES	VISUAL, RANGE OF MOTION	OK
FEET	VISUAL, RANGE OF MOTION	OK
JOINTS	1 TO 2 g RANGE	OK
OTHER	NONE	-

REMARKS: None

**CALIBRATION TEST RESULTS
POST TEST**

SID NO.: 016

CONFIGURED FOR LEFT SIDE IMPACT

**CALIBRATION TEST RESULTS SUMMARY
POST TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Sequential Test Number: 1
Date: June 30, 1999 Laboratory Technician: B. Swiecicki

TEST	COMMENTS
EXTERNAL DIMENSIONS	Passed all requirements.
LATERAL THORAX IMPACT TEST	Passed all requirements.
LATERAL PELVIS IMPACT TEST	Passed all requirements.
ABDOMINAL COMPRESSION TEST*	Passed all requirements.
LUMBAR FLEXION TEST*	Passed all requirements.

* Test not required for SID certification.

REMARKS: None

EXTERNAL DIMENSIONS**POST TEST****CONFIGURED FOR LEFT SIDE IMPACT**

SID Serial No.: 016
Date: June 30, 1999

Sequential Test Number: 1
Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	902
RH- Rib Height (mm)	502 - 520	514
HP- Hip Pivot Height (mm)	99 ref.	99
RD- Rib from Back Line (mm)	229 - 241	239
KH- Knee Pivot from Back Line (mm)	511 - 526	526
KV- Knee Pivot to Floor (mm)	490 - 505	494
HW- Hip Width (mm)	356 - 391	361

REMARKS: None

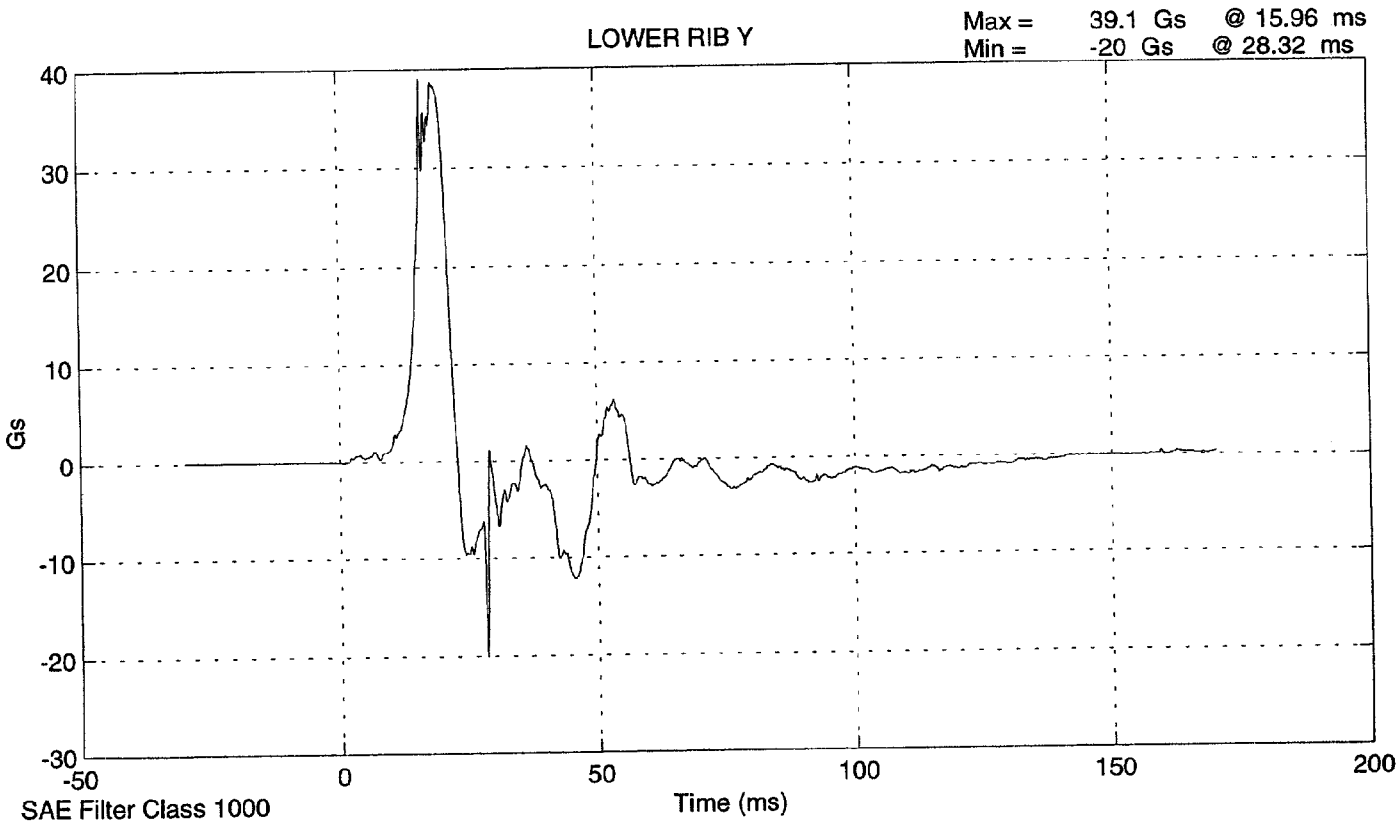
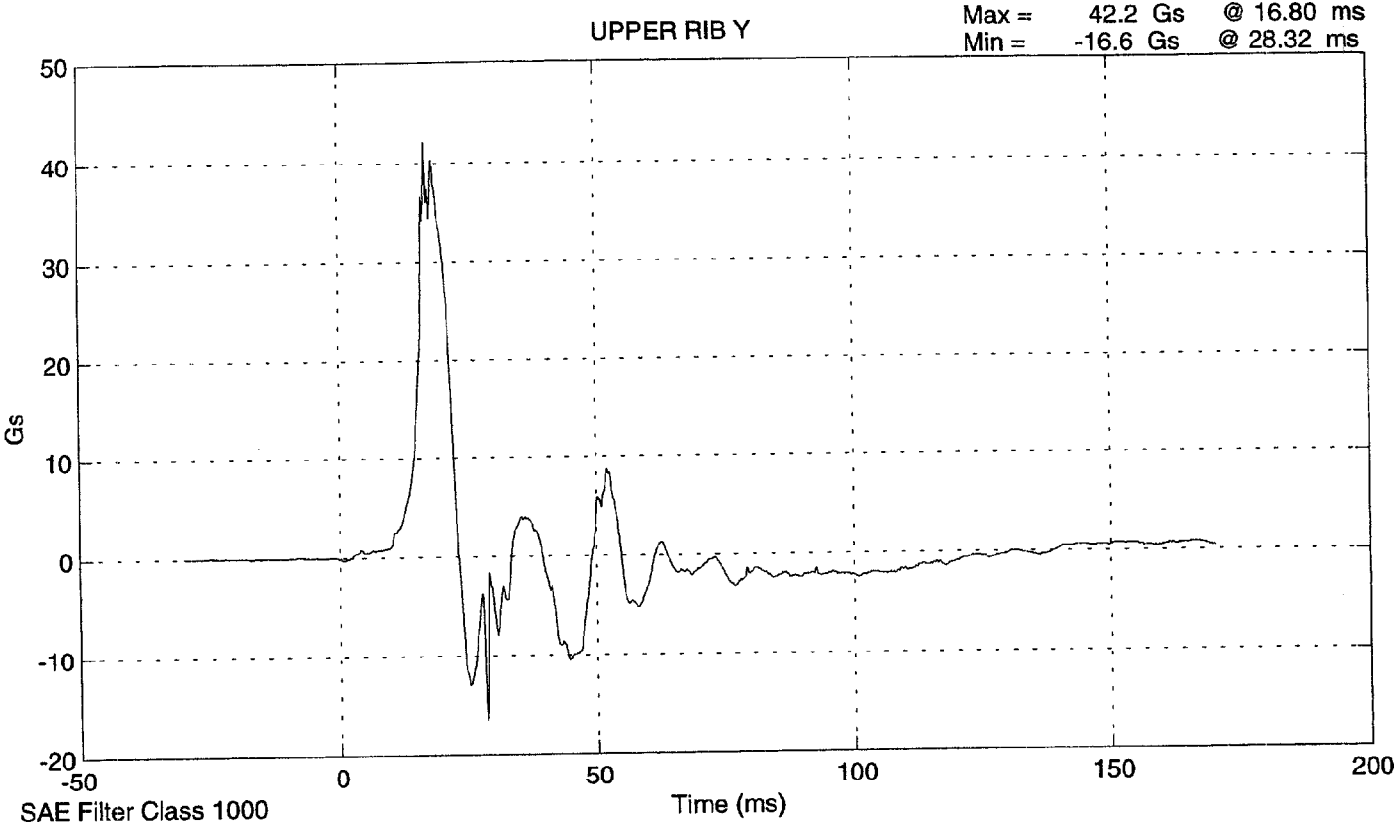
**LATERAL THORAX IMPACT TEST
POST TEST**

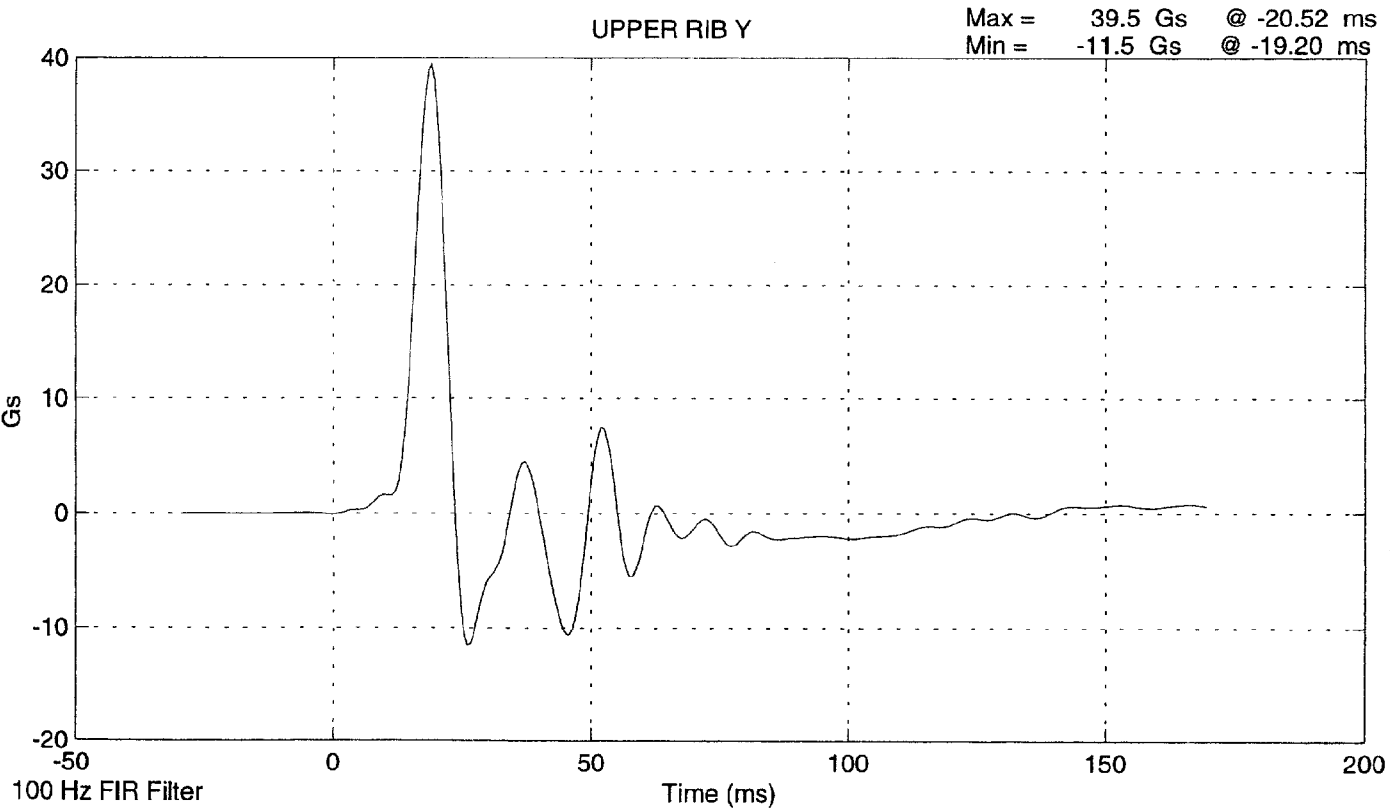
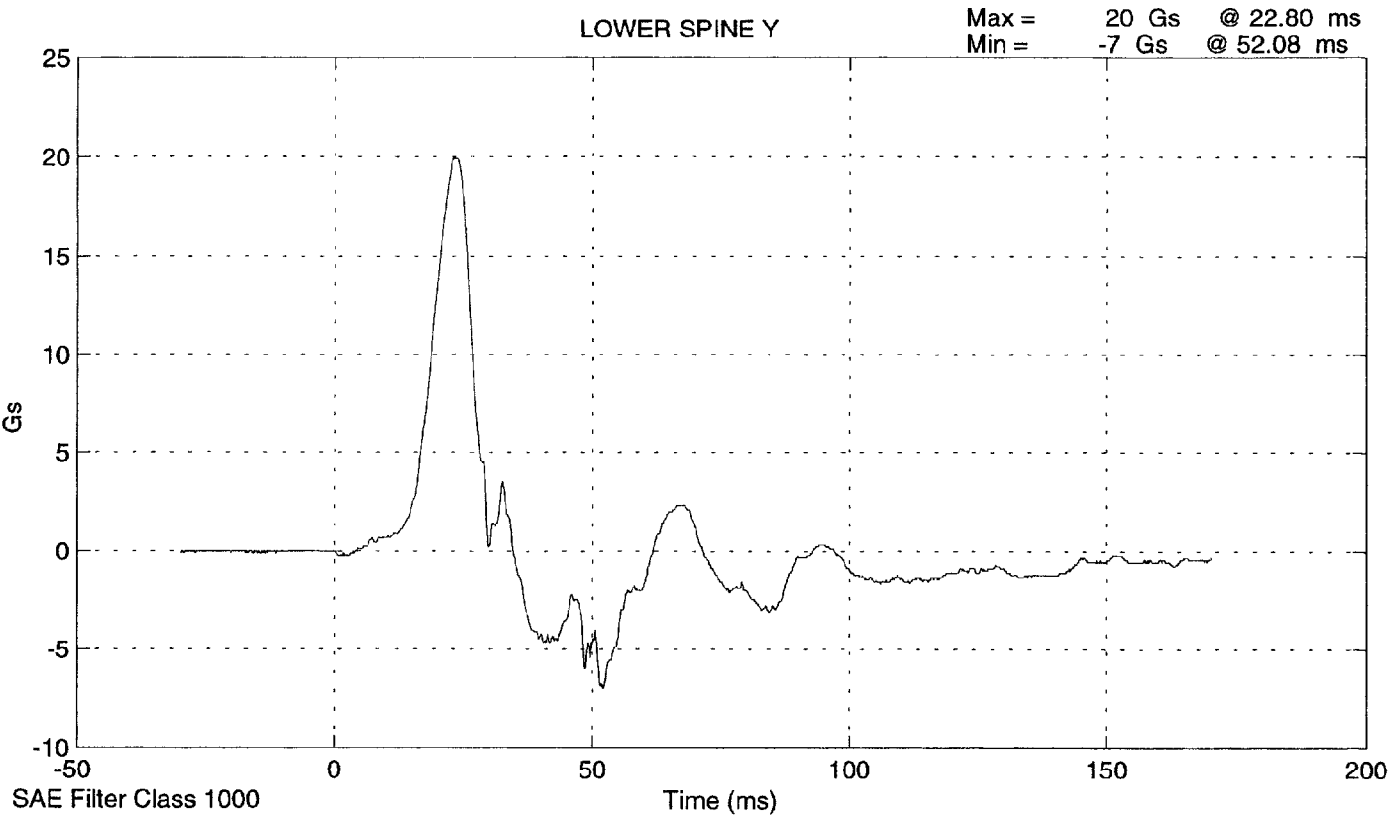
CONFIGURED FOR LEFT SIDE IMPACT

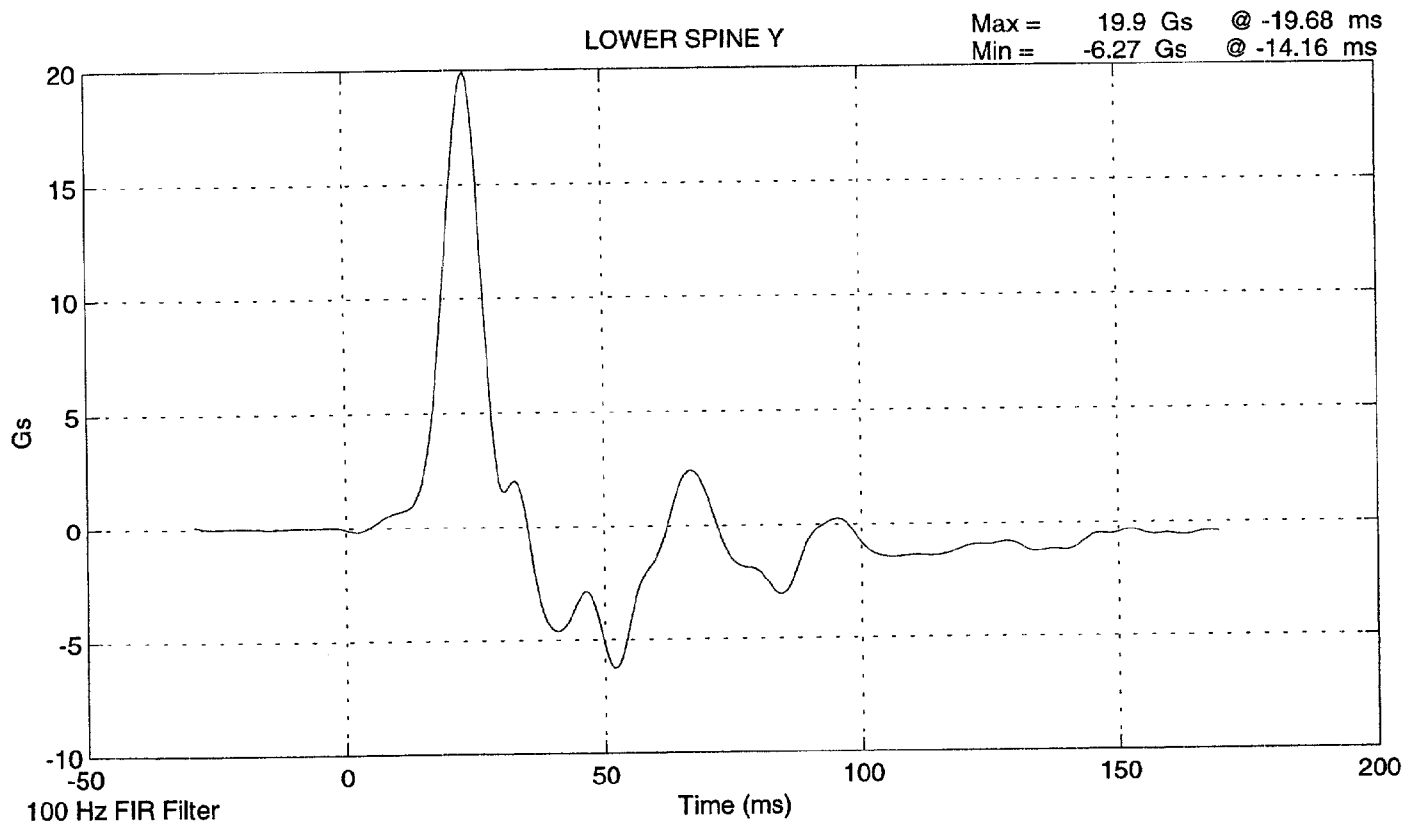
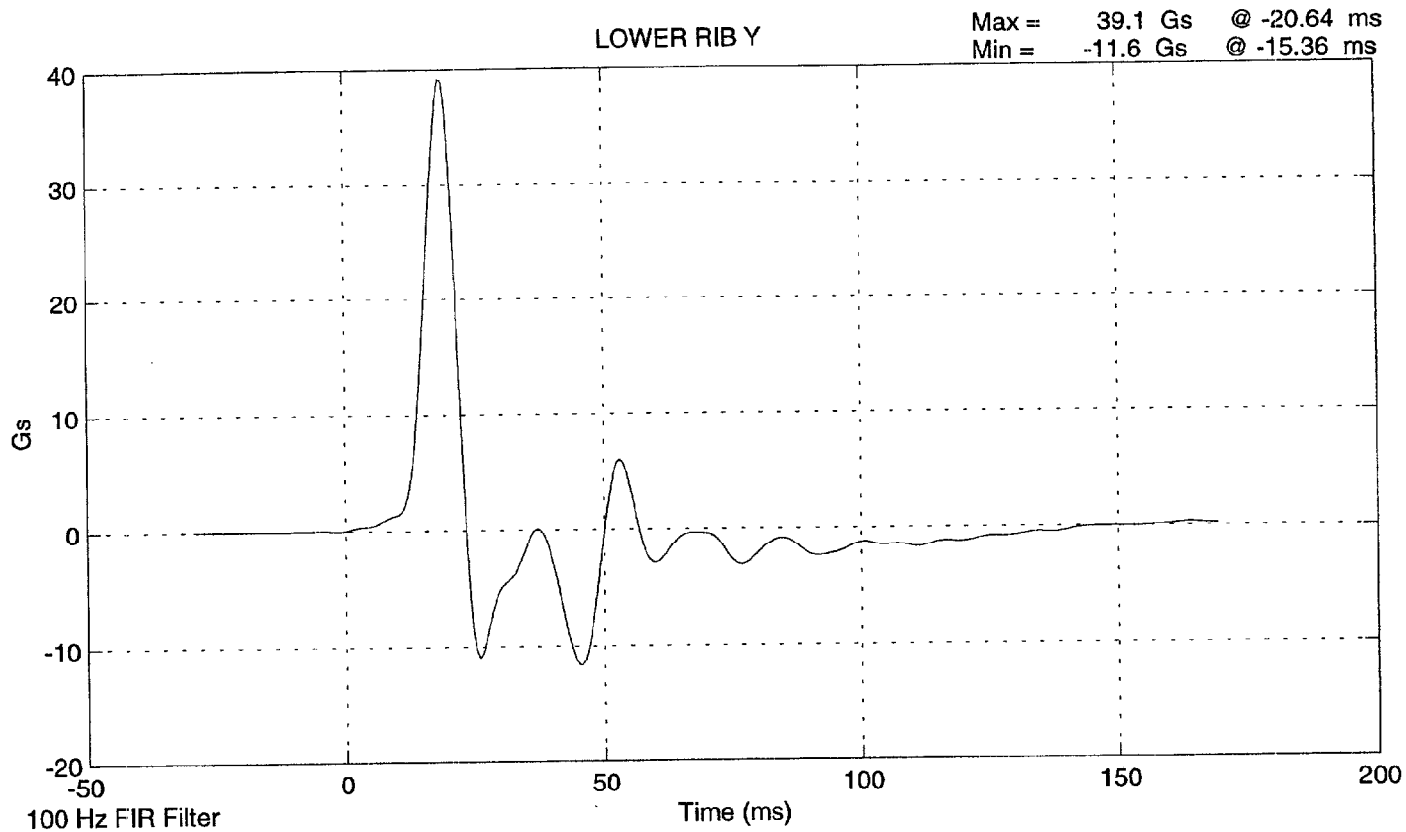
SID Serial No.: 016 Sequential Test Number: 1
Date: June 28, 1999 Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	32
PROBE SPEED (m/s)	4.27 - 4.33	4.27
UPPER RIB (g's)	37 - 46	39.5
LOWER RIB (g's)	37 - 46	39.1
LOWER SPINE (g's)	15 - 22	19.9

REMARKS: None







**LATERAL PELVIS IMPACT TEST
POST TEST**

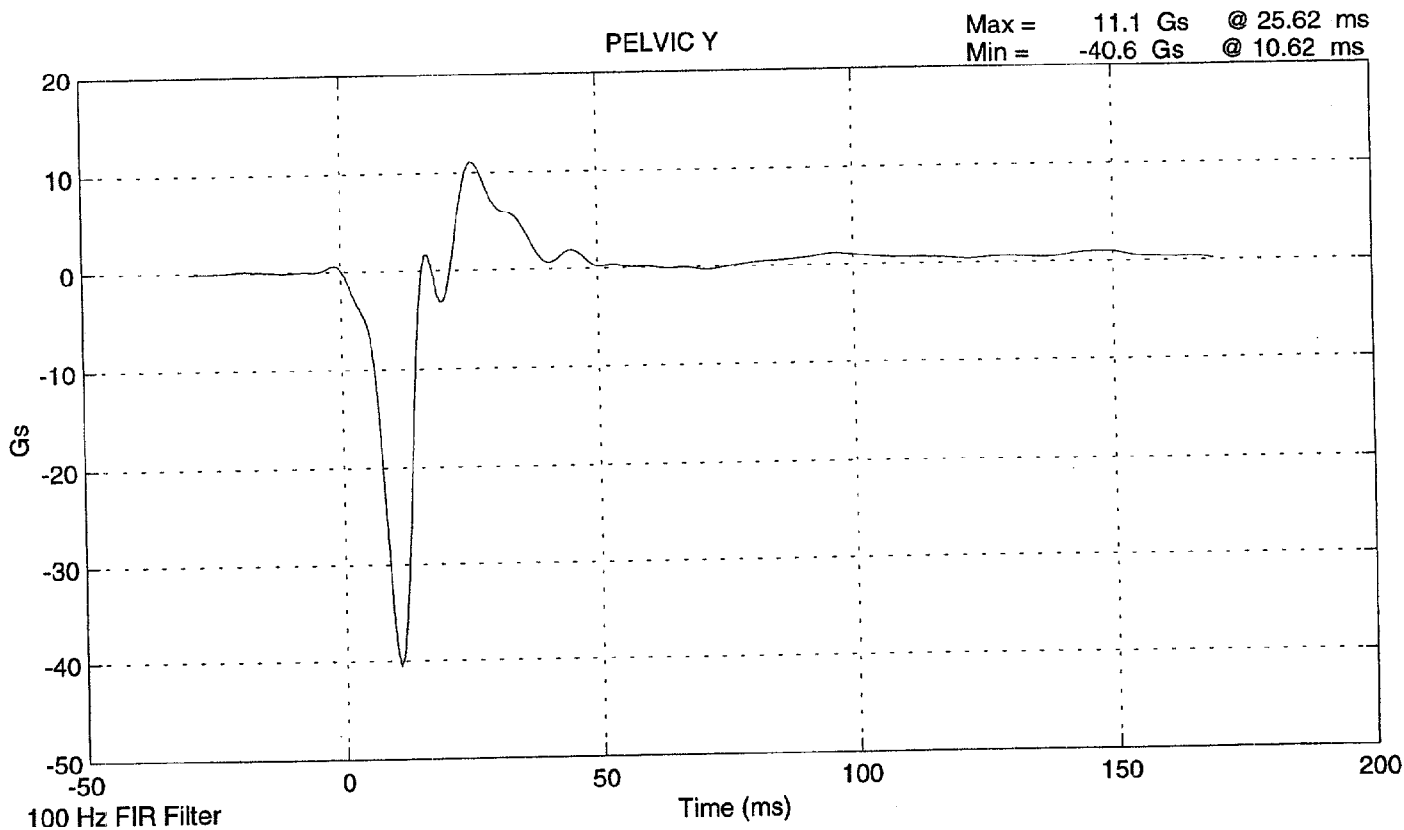
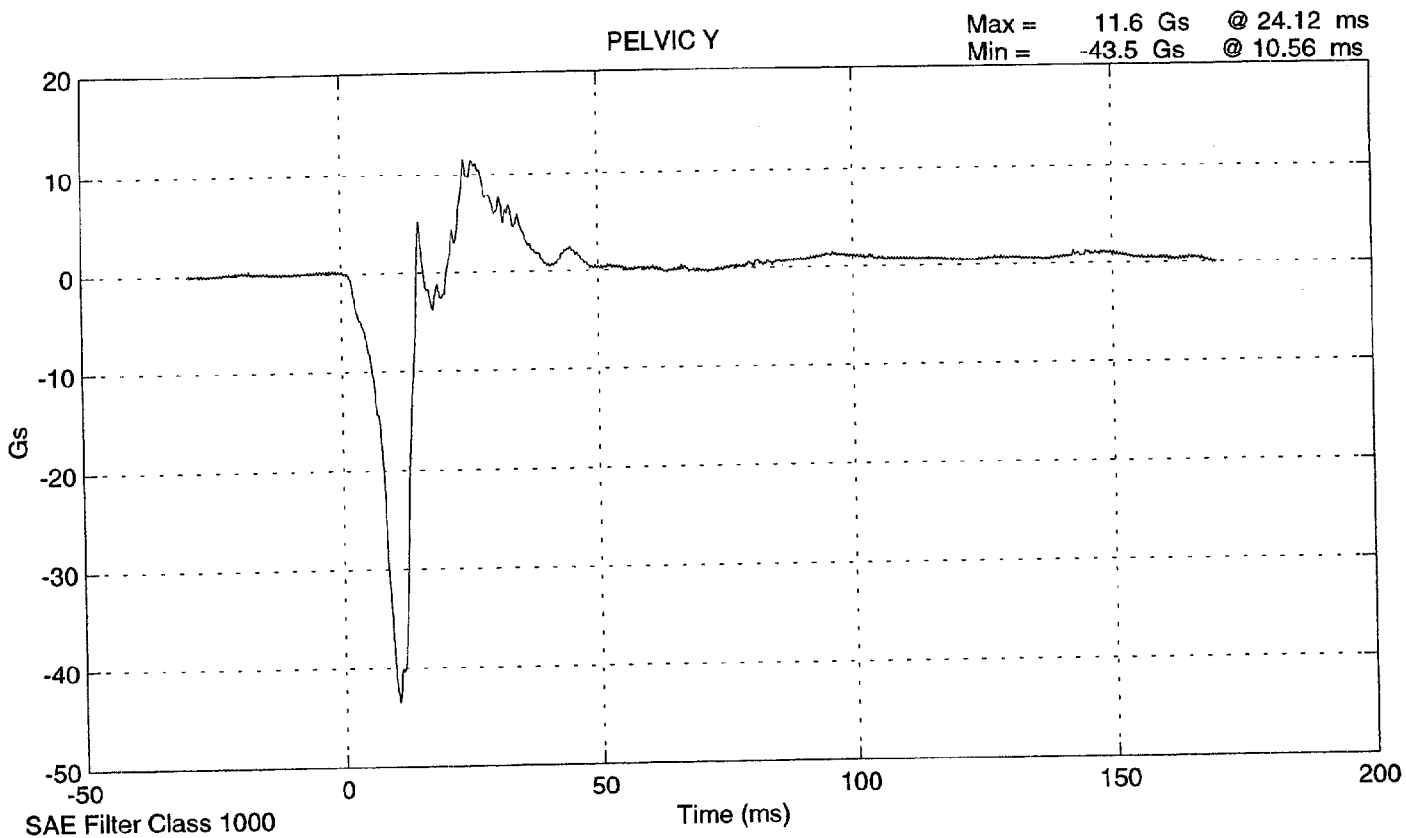
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Sequential Test Number: 1
Date: June 28, 1999 Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	32
PROBE SPEED (m/s)	4.27 - 4.33	4.30
PELVIS ACCELERATION (g's)	40 - 60	40.6

REMARKS: None

SID 016 PELVIC IMPACT TEST @ 4.3007 m/s



**ABDOMINAL COMPRESSION TEST
POST TEST**

(Test not required for SID certification)

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Sequential Test Number: 1
Date: June 30, 1999 Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	32
FORCE @ 13 mm (N)	104 - 162	111
FORCE @ 19 mm (N)	163 - 221	177
FORCE @ 25 mm (N)	222 - 280	256
FORCE @ 33 mm (N)	325 - 391	380

REMARKS: None

COPY

Dummy S/N 016

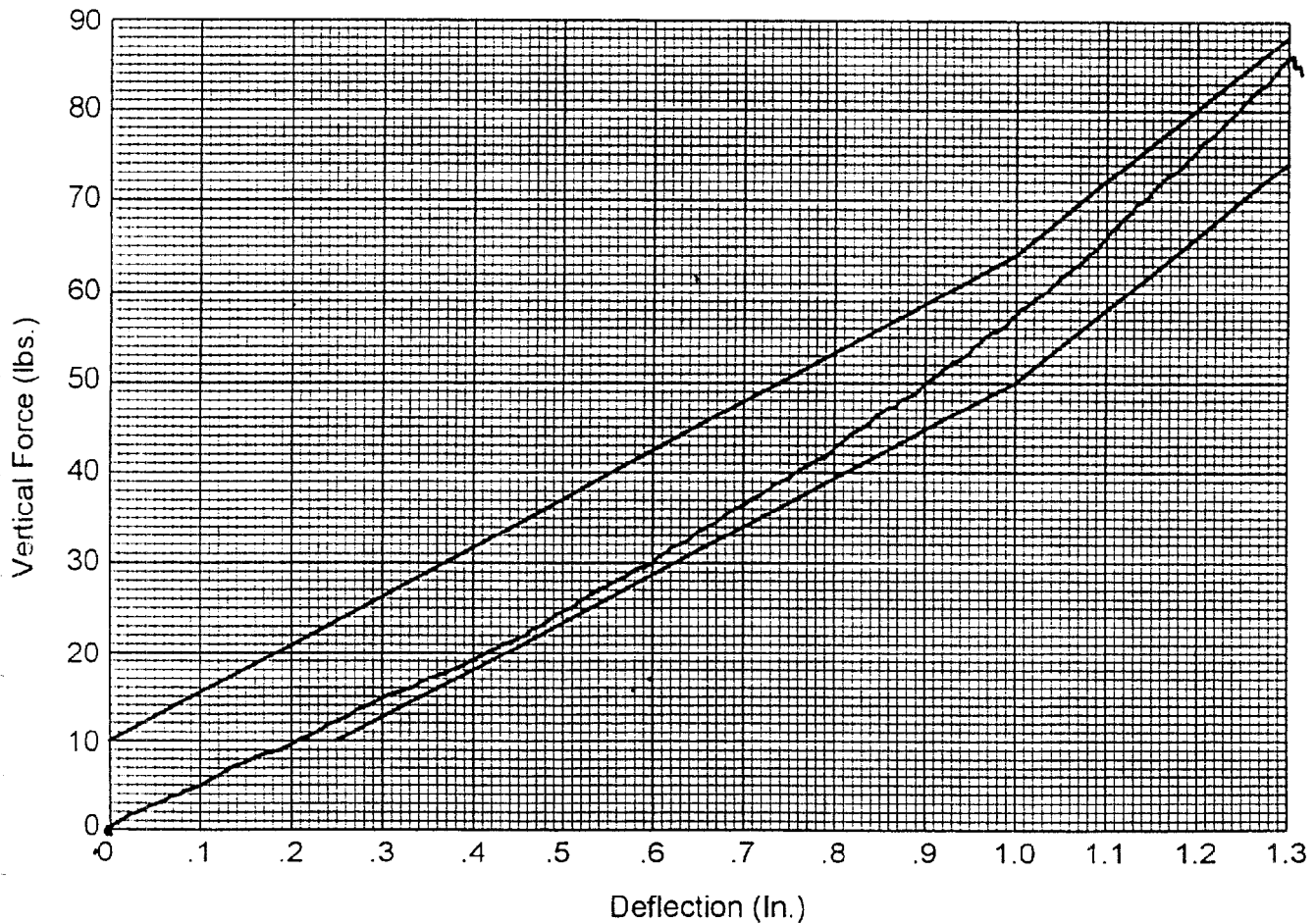
W/A _____

Date 6-30-99

Performed By BZ

Temp. 70

Humidity 32



Hybrid II
Abdomen Static Press

LUMBAR FLEXION TEST
POST TEST
(Test not required for SID certification)

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Sequential Test Number: 1
Date: June 30, 1999 Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	32
FORCE @ 0° (N)	0 - 26.7	26.7
FORCE @ 20° (N)	97.8 - 151.2	126.8
FORCE @ 30° (N)	151.2 - 204.6	180.2
FORCE @ 40° (N)	204.6 - 258	226.9
RETURN ANGLE	12° max.	8

REMARKS: None

COPY

Dummy S/N

016

W/A

Date

6-30-99

Performed By

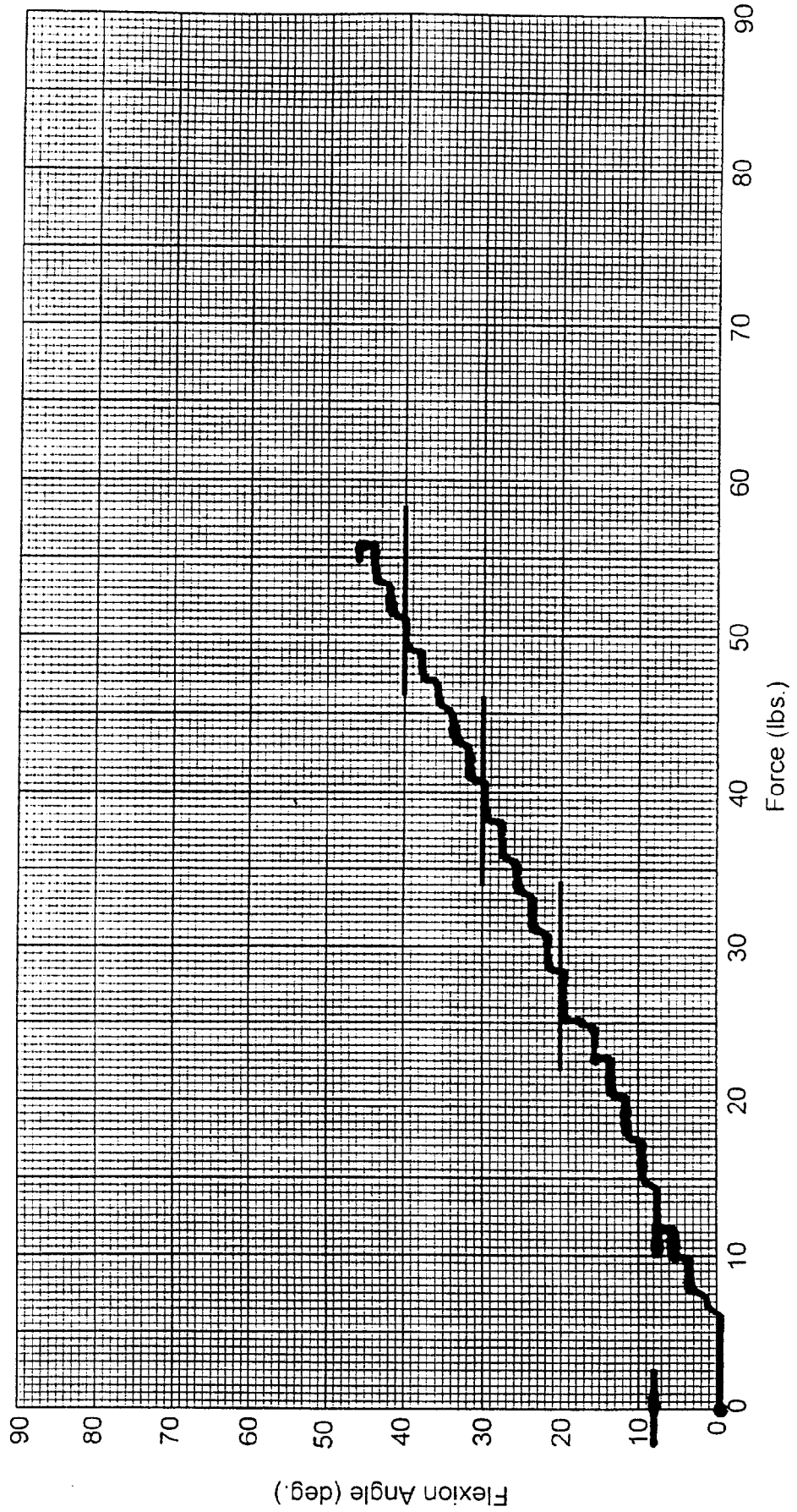
[Signature]

Temp.

70

Humidity

32



Hybrid II Lumbar Spine Flexion Test

POST TEST DUMMY INSPECTION LIST

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Sequential Test Number: 1
 Date: June 30, 1999 Laboratory Technician: B. Swiecicki

PART	ITEMS CHECKED	COMMENTS
SKIN	VISUAL INSPECTION	OK
HEAD	VISUAL, BALLAST, ACCELEROMETER MOUNT	OK
NECK	VISUAL, CABLE TORQUE	OK
SPINE BOX	VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT	OK
RIB CAGE	VISUAL, MEASURE, STIFFENERS	OK
STERNUM	VISUAL	OK
LUMBAR SPINE	VISUAL	OK
ABDOMEN	VISUAL	OK
PELVIS	VISUAL, PALPATE, ACCELEROMETER MOUNT	OK
UPPER LEGS	VISUAL	OK
KNEES	VISUAL, STOPS, INSERTS	OK
LOWER LEGS	VISUAL, RANGE OF MOTION	OK
ANKLES	VISUAL, RANGE OF MOTION	OK
FEET	VISUAL, RANGE OF MOTION	OK
JOINTS	1 TO 2 g RANGE	OK
OTHER	NONE	-

REMARKS: None

**CALIBRATION TEST RESULTS
POST TEST**

SID NO.: 027

CONFIGURED FOR LEFT SIDE IMPACT

**CALIBRATION TEST RESULTS SUMMARY
POST TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Sequential Test Number: 1
Date: June 30, 1990 Laboratory Technician: B. Swiecicki

TEST	COMMENTS
EXTERNAL DIMENSIONS	Passed all requirements.
LATERAL THORAX IMPACT TEST	Passed all requirements.
LATERAL PELVIS IMPACT TEST	Passed all requirements.
ABDOMINAL COMPRESSION TEST*	Passed all requirements.
LUMBAR FLEXION TEST*	Passed all requirements.

* Test not required for SID certification.

REMARKS: None

**EXTERNAL DIMENSIONS
POST TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027
Date: June 30, 1999

Sequential Test Number: 1
Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	909
RH- Rib Height (mm)	502 - 520	514
HP- Hip Pivot Height (mm)	99 ref.	99
RD- Rib from Back Line (mm)	229 - 241	236
KH- Knee Pivot from Back Line (mm)	511 - 526	516
KV- Knee Pivot to Floor (mm)	490 - 505	493
HW- Hip Width (mm)	356 - 391	367

REMARKS: None

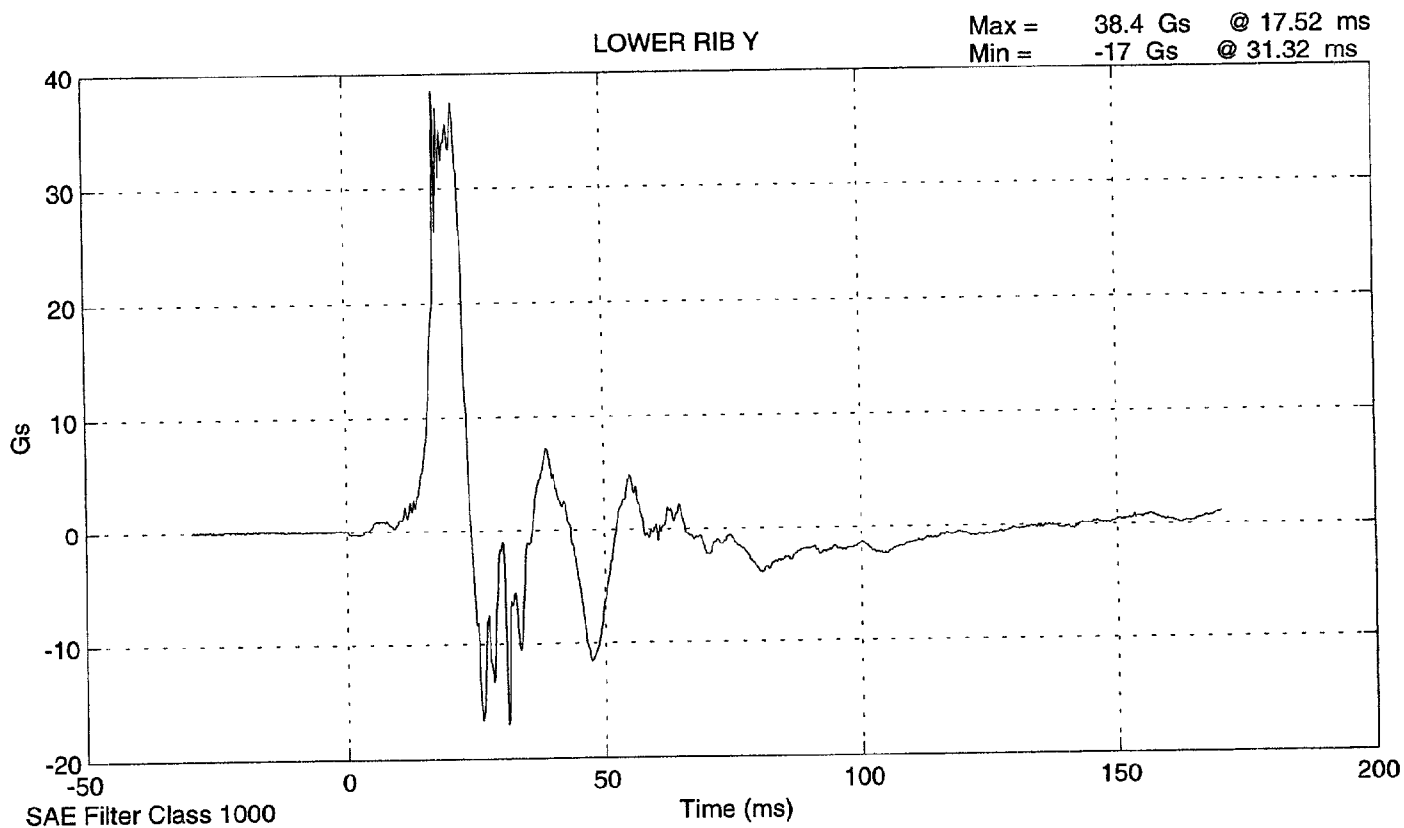
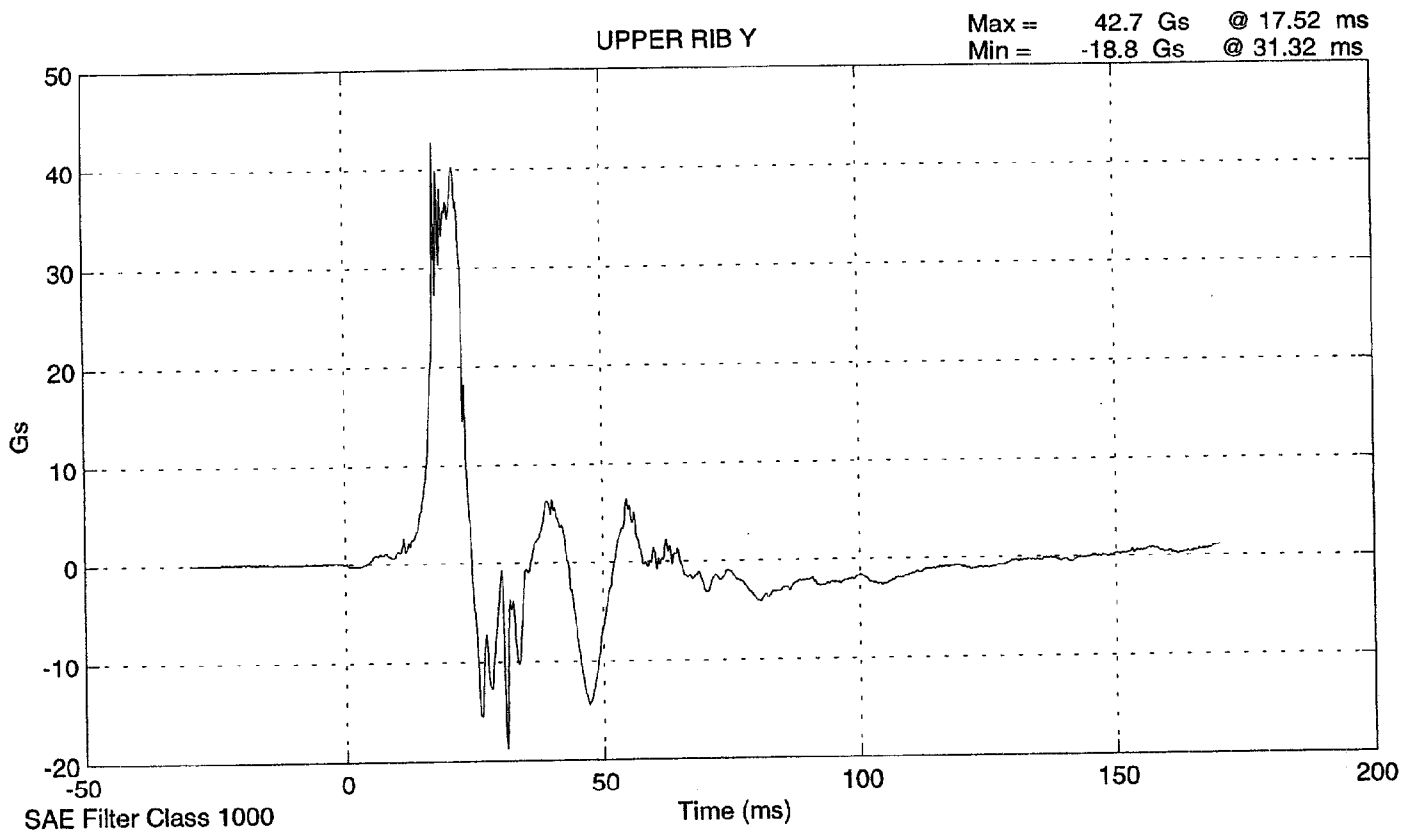
**LATERAL THORAX IMPACT TEST
POST TEST**

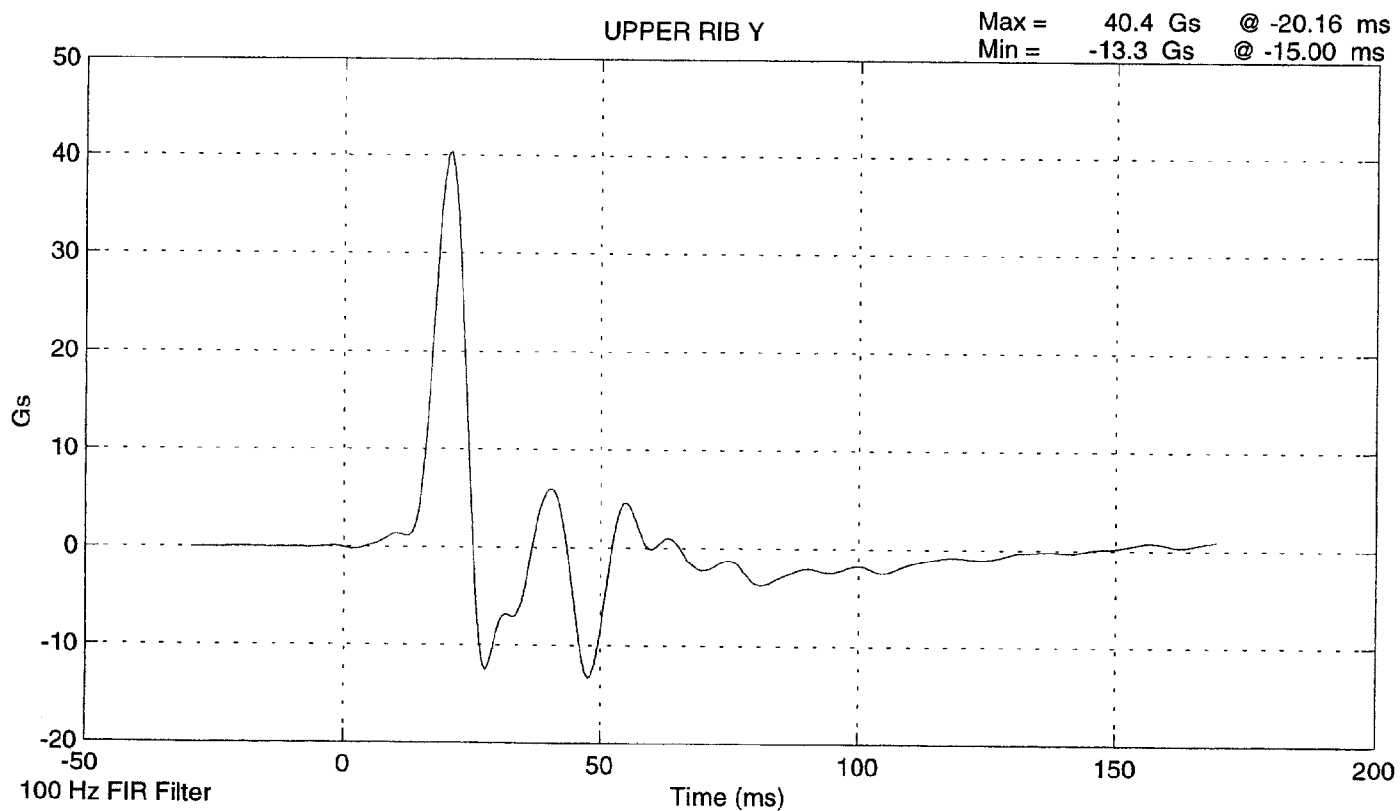
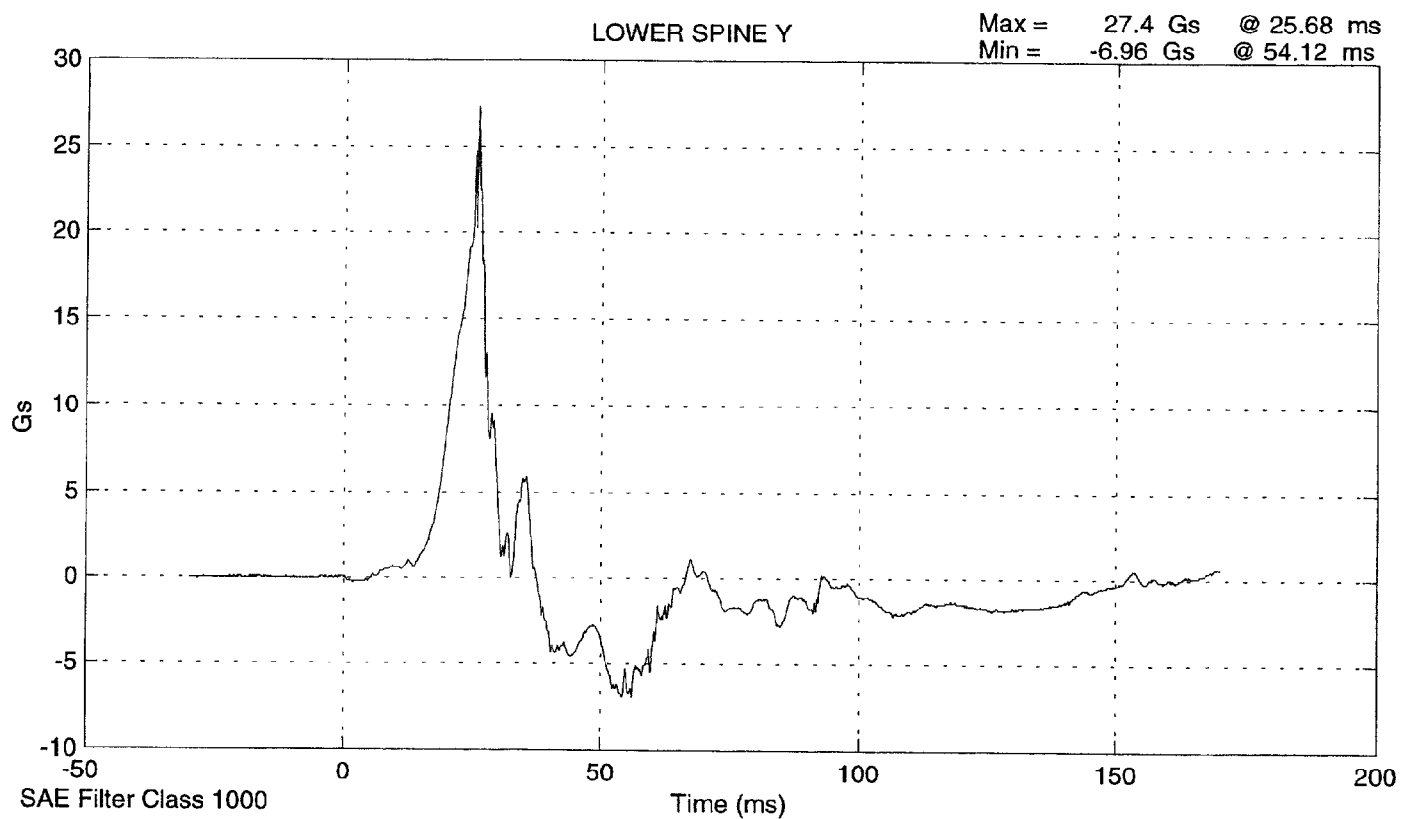
CONFIGURED FOR LEFT SIDE IMPACT

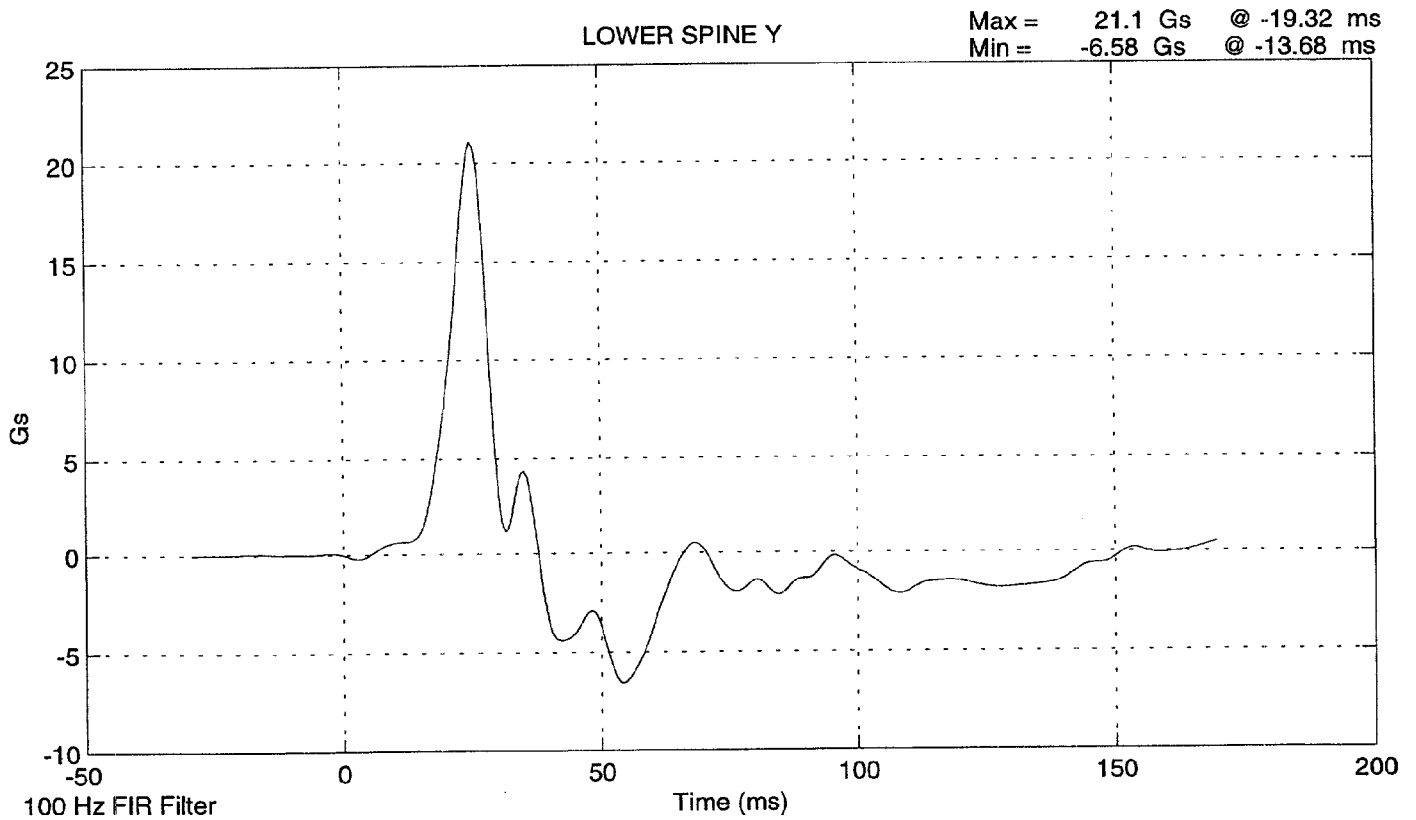
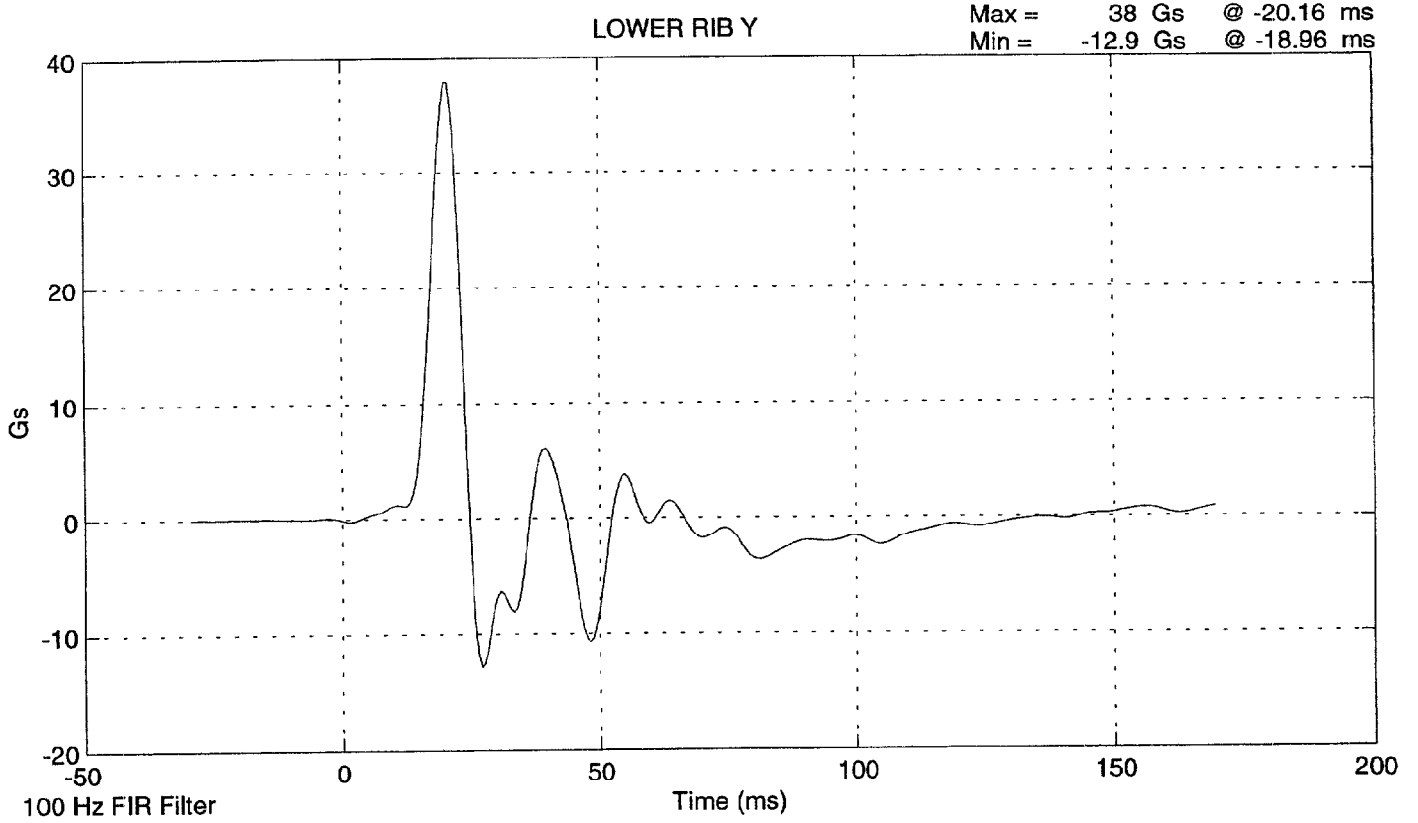
SID Serial No.: 027 Sequential Test Number: 1
Date: June 28, 1999 Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	32
PROBE SPEED (m/s)	4.27 - 4.33	4.29
UPPER RIB (g's)	37 - 46	40.4
LOWER RIB (g's)	37 - 46	37.9
LOWER SPINE (g's)	15 - 22	21.1

REMARKS: None







**LATERAL PELVIS IMPACT TEST
POST TEST**

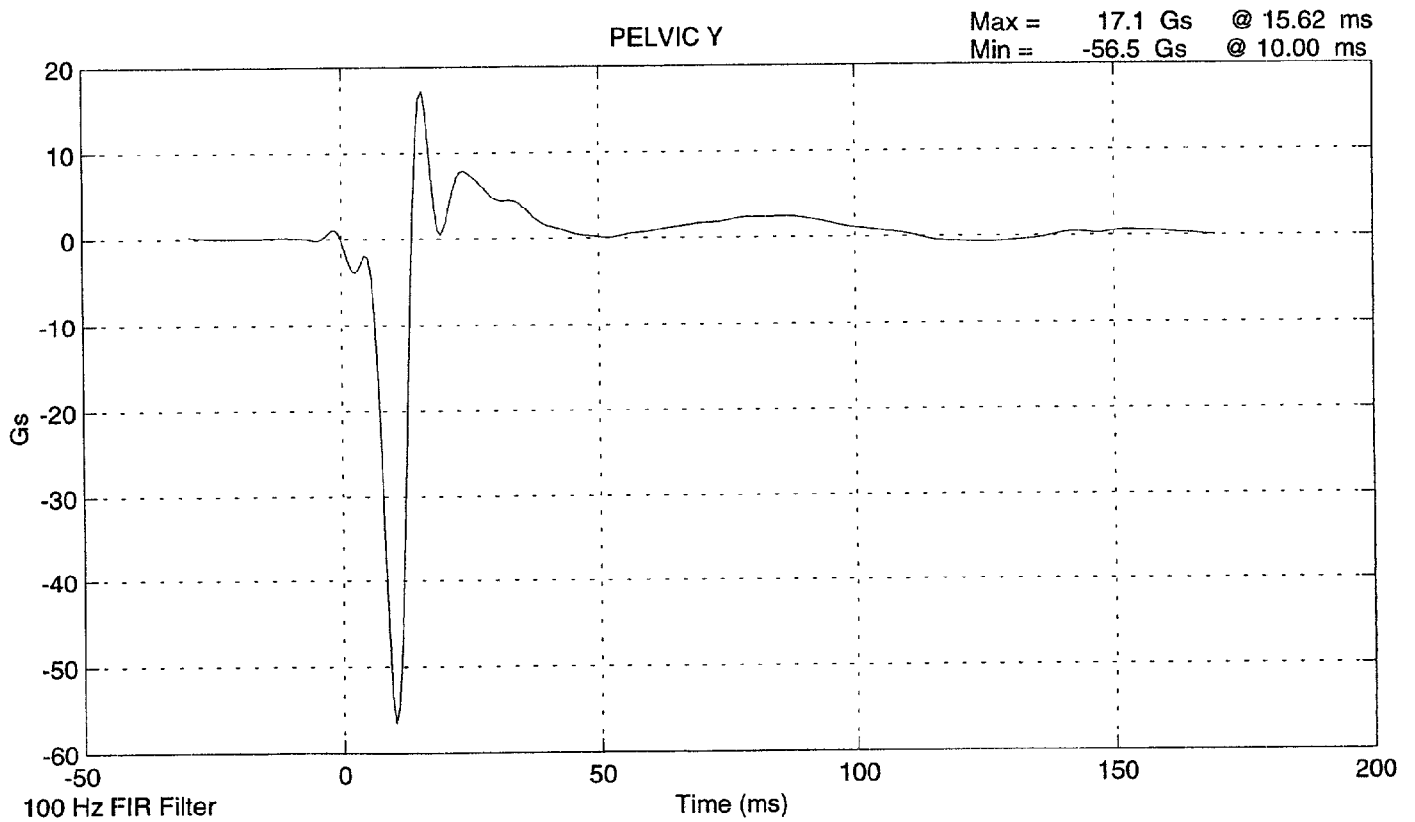
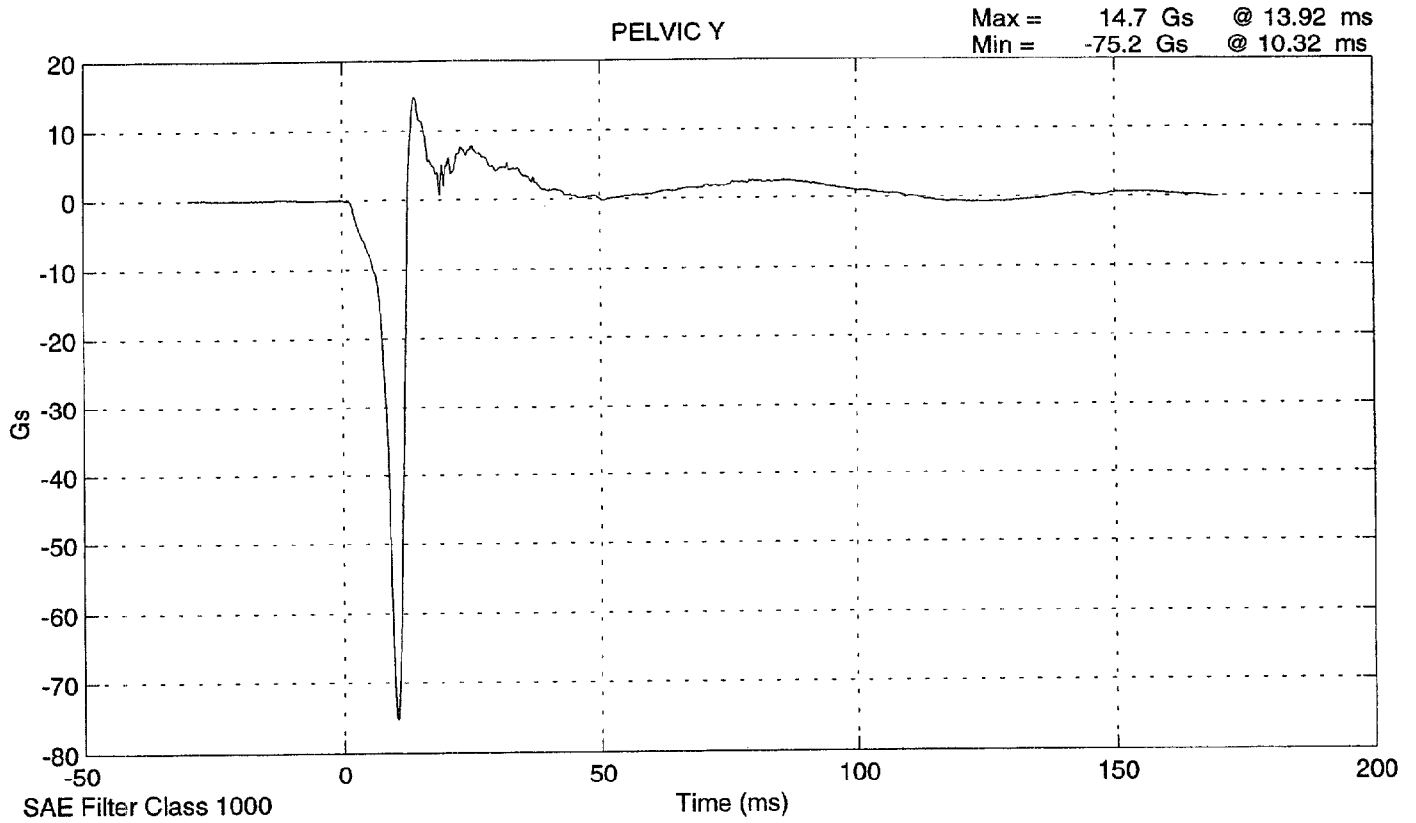
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027 Sequential Test Number: 1
Date: June 28, 1999 Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	32
PROBE SPEED (m/s)	4.27 - 4.33	4.28
PELVIS ACCELERATION (g's)	40 - 60	56.5

REMARKS: None

SID 027 PELVIC IMPACT TEST @ 4.2763 m/s



**ABDOMINAL COMPRESSION TEST
POST TEST**

(Test not required for SID certification)

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027
Date: June 30, 1999

Sequential Test Number: 1
Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	32
FORCE @ 13 mm (N)	104 - 162	116
FORCE @ 19 mm (N)	163 - 221	178
FORCE @ 25 mm (N)	222 - 280	258
FORCE @ 33 mm (N)	325 - 391	376

REMARKS: None

COPY

Dummy S/N 027

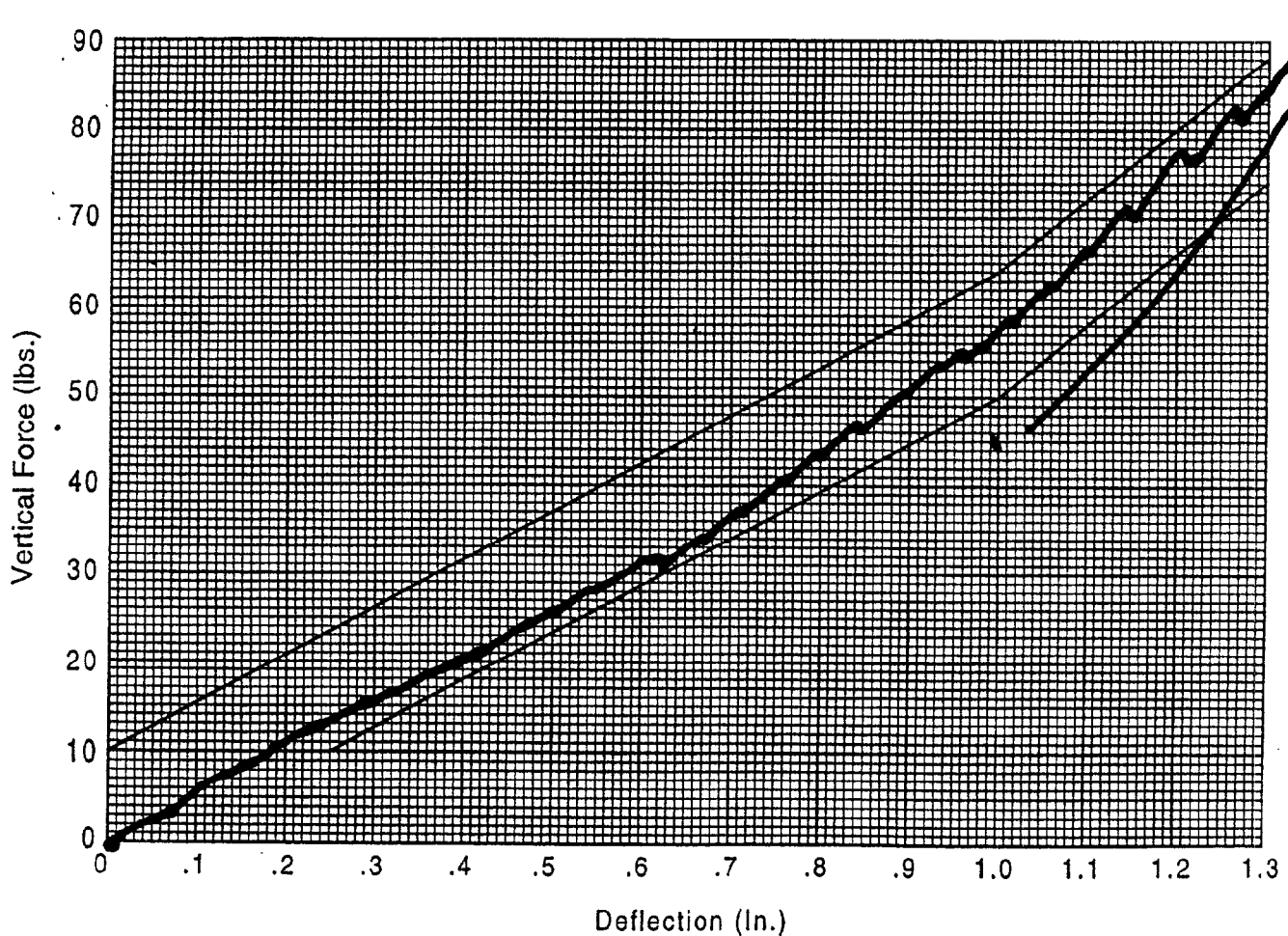
W/A _____

Date 6-30-99

Performed By BS

Temp. 70

Humidity 32



Hybrid II
Abdomen Static Press

LUMBAR FLEXION TEST
POST TEST
(Test not required for SID certification)

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027
Date: June 30, 1999

Sequential Test Number: 1
Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	32
FORCE @ 0° (N)	0 - 26.7	0
FORCE @ 20° (N)	97.8 - 151.2	139.0
FORCE @ 30° (N)	151.2 - 204.6	195.7
FORCE @ 40° (N)	204.6 - 258	255.8
RETURN ANGLE	12° max.	6

REMARKS: None

COPY

6-17

Summary J/N

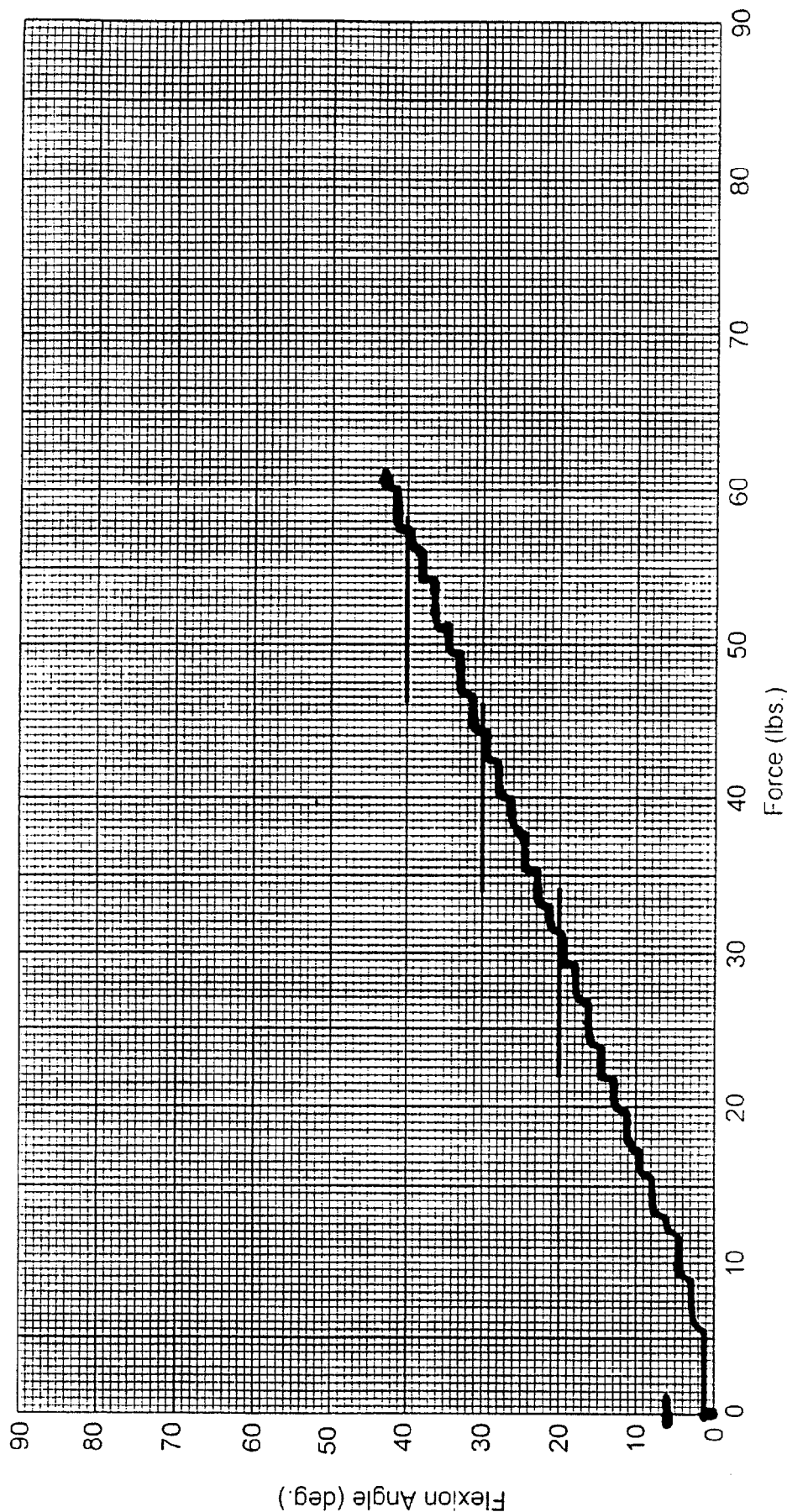
W/A

Date 6-30-99

Performed By BB

Temp. 70

Humidity 32



Hybrid II Lumbar Spine Flexion Test

POST TEST DUMMY INSPECTION LIST

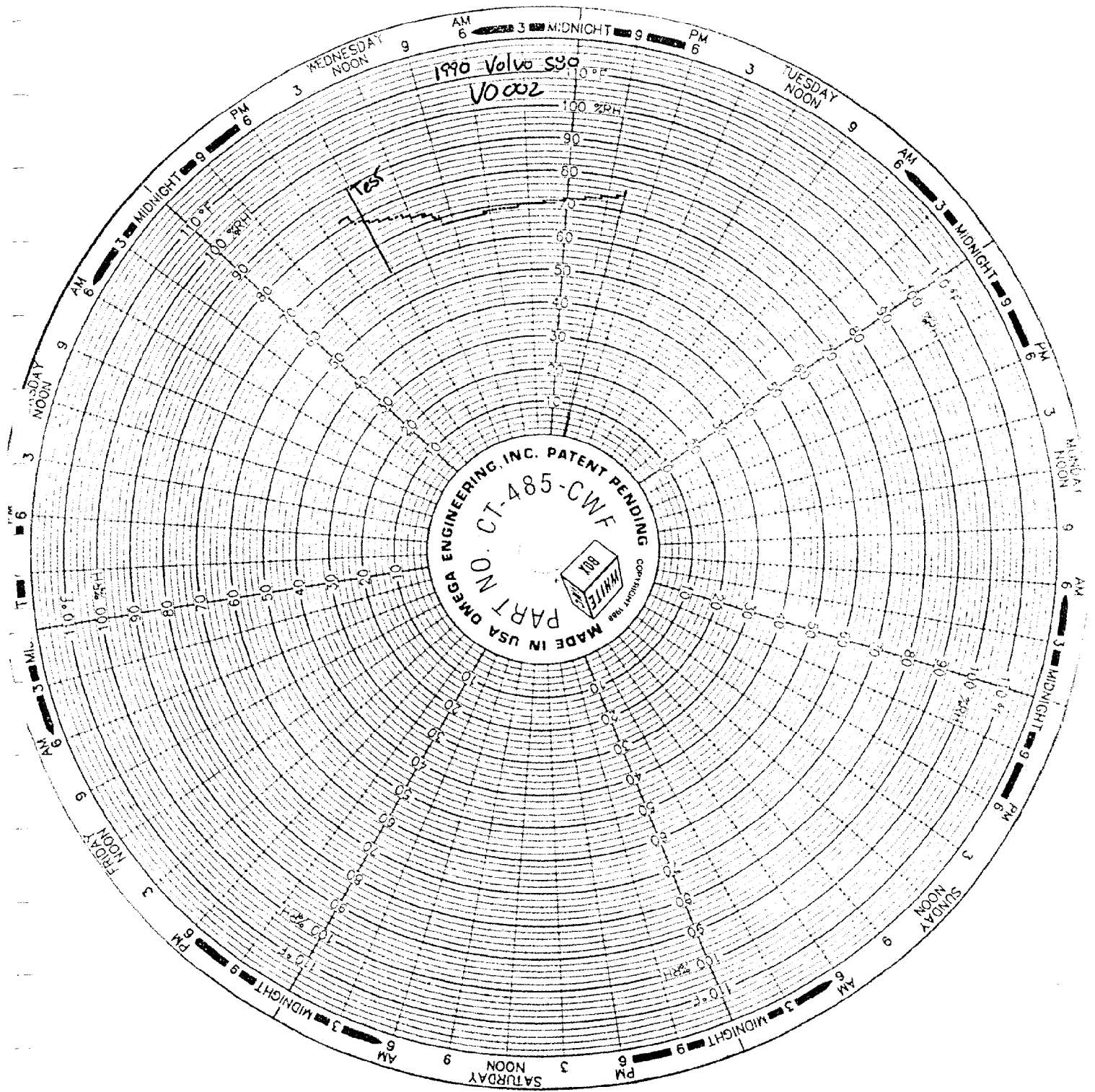
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 027
Date: June 30, 1999

Sequential Test Number: 1
Laboratory Technician: B. Swiecicki

PART	ITEMS CHECKED	COMMENTS
SKIN	VISUAL INSPECTION	OK
HEAD	VISUAL, BALLAST, ACCELEROMETER MOUNT	OK
NECK	VISUAL, CABLE TORQUE	OK
SPINE BOX	VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT	OK
RIB CAGE	VISUAL, MEASURE, STIFFENERS	OK
STERNUM	VISUAL	OK
LUMBAR SPINE	VISUAL	OK
ABDOMEN	VISUAL	OK
PELVIS	VISUAL, PALPATE, ACCELEROMETER MOUNT	OK
UPPER LEGS	VISUAL	OK
KNEES	VISUAL, STOPS, INSERTS	OK
LOWER LEGS	VISUAL, RANGE OF MOTION	OK
ANKLES	VISUAL, RANGE OF MOTION	OK
FEET	VISUAL, RANGE OF MOTION	OK
JOINTS	1 TO 2 g RANGE	OK
OTHER	NONE	-

REMARKS: None



APPENDIX D

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

SID INSTRUMENTATION

FRONT SID NO.: 016			
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
UPPER RIB	A14312	Endevco	6/16/99
LOWER RIB	A11544	Endevco	6/16/99
LOWER SPINE	A14372	Endevco	6/16/99
PELVIS	A13492	Endevco	6/16/99
UPPER RIB REDUNDANT	A13513	Endevco	6/16/99
LOWER RIB REDUNDANT	A14058	Endevco	6/16/99
LOWER SPINE REDUNDANT	A13506	Endevco	6/16/99
PELVIS REDUNDANT	A13498	Endevco	6/16/99

REAR SID NO.: 027			
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
UPPER RIB	A14342	Endevco	6/16/99
LOWER RIB	A14261	Endevco	6/16/99
LOWER SPINE	A14172	Endevco	6/16/99
PELVIS	A13565	Endevco	6/16/99
UPPER RIB REDUNDANT	A14246	Endevco	6/18/99
LOWER RIB REDUNDANT	A14358	Endevco	6/18/99
LOWER SPINE REDUNDANT	A13926	Endevco	6/18/99
PELVIS REDUNDANT	A12776	Endevco	6/18/99

REMARKS: None

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

VEHICLE AND MDB INSTRUMENTATION

	VEHICLE AND MDB INSTRUMENTS		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
RIGHT FRONT SILL (X)	J18622	Endevco	4/8/99
RIGHT FRONT SILL (Y)	APBB6	Endevco	4/1/99
RIGHT FRONT SILL (Z)	J18649	Endevco	4/1/99
RIGHT REAR SILL (X)	AP064	Endevco	4/15/99
RIGHT REAR SILL (Y)	B10955	Endevco	4/14/99
RIGHT REAR SILL (Z)	BB14	Endevco	1/27/99
REAR FLOORPAN ABOVE AXLE (X)	A14150	Endevco	3/25/99
REAR FLOORPAN ABOVE AXLE (Y)	A14126	Endevco	3/25/99
REAR FLOORPAN ABOVE AXLE (Z)	B10954	Endevco	3/25/99
LEFT REAR SILL (Y)	BA80	Endevco	5/19/99
LEFT FRONT SILL (Y)	APBD7	Endevco	4/9/99
RIGHT REAR SEAT OCCUPANT COMP. (Y)	Y17	ICS	5/25/99
MID REAR OF LEFT REAR DOOR (Y)	BB51	Endevco	5/3/99
LEFT REAR DOOR UPPER C/L (Y)	AP1A2	Endevco	5/3/99
LOWER LEFT B- PILLAR (Y)	B11073	Endevco	4/14/99
MIDDLE LEFT B-PILLAR (Y)	AY03	Endevco	5/19/99
LOWER LEFT A-PILLAR (Y)	APBF4	Endevco	4/1/99
UPPER LEFT A-PILLAR (Y)	APBD9	Endevco	3/23/99
FRONT SEAT TRACK (Y)	AP1B7	Endevco	3/24/99
REAR SEAT TRACK (Y)	BA65	Endevco	2/1/99
VEHICLE CG (X)	B11351	Endevco	3/24/99
VEHICLE CG (Y)	B11118	Endevco	6/17/99
VEHICLE CG (Z)	B10481	Endevco	3/24/99
MDB CG (X)	CL60	Endevco	6/21/99
MDB CG (Y)	CJ54	Endevco	6/21/99
MDB CG (Z)	GK12	Endevco	6/21/99
MDB REAR FRAME MEMBER (X)	CX05	Endevco	1/19/99
MDB REAR FRAME MEMBER (Y)	A27F	Endevco	2/1/99

REMARKS: None