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REPORT NUMBER: 214-CAL-99-04

**SAFETY COMPLIANCE TESTING FOR FMVSS 214
SIDE IMPACT PROTECTION**

TOYOTA MOTOR MANUFACTURING KENTUCKY INC.
1999 TOYOTA SIENNA CE MINIVAN

NHTSA NUMBER: CX5103

CALSPAN CORPORATION
TRANSPORTATION SCIENCES CENTER
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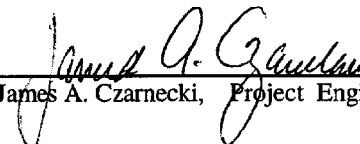
December 3, 1998

FINAL REPORT

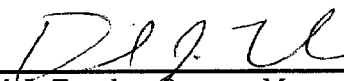
U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Compliance
400 Seventh Street, SW
Room 6115 (NSA-30)
Washington, DC 20590

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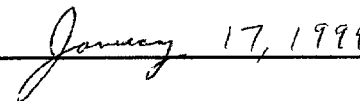
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Approved By:

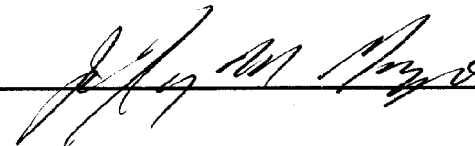

David J. Travale, Program Manager
Transportation Sciences Center

Approval Date:

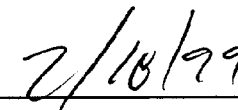

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16. Abstract A 48/24 kph 90° Impact (Moving Deformable Barrier) Compliance Test was conducted on the subject 1999 Toyota Sienna CE Minivan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-214D-04 to determine FMVSS 214 Side Impact Protection compliance. This test was conducted at the Calspan Corporation Crash Test Facility in Buffalo, New York, on December 3, 1998. The impact velocity of the Moving Deformable Barrier (MDB) was 52.6 kph, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 20°C. The target vehicle post-test maximum crush was 249 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>42</u></td> <td align="center">g's</td> <td align="center"><u>29</u></td> <td align="center">g's</td> </tr> <tr> <td>Left Lower Rib Acceleration:</td> <td align="center"><u>46</u></td> <td align="center">g's</td> <td align="center"><u>36</u></td> <td align="center">g's</td> </tr> <tr> <td>Lower Spine Acceleration:</td> <td align="center"><u>52</u></td> <td align="center">g's</td> <td align="center"><u>43</u></td> <td align="center">g's</td> </tr> <tr> <td>Thoracic Trauma Index (TTI):</td> <td align="center"><u>49</u></td> <td align="center">g's</td> <td align="center"><u>39</u></td> <td align="center">g's</td> </tr> <tr> <td>Pelvis Acceleration (PEV):</td> <td align="center"><u>65</u></td> <td align="center">g's</td> <td align="center"><u>58</u></td> <td align="center">g's</td> </tr> </tbody> </table> The one door 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>42</u>	g's	<u>29</u>	g's	Left Lower Rib Acceleration:	<u>46</u>	g's	<u>36</u>	g's	Lower Spine Acceleration:	<u>52</u>	g's	<u>43</u>	g's	Thoracic Trauma Index (TTI):	<u>49</u>	g's	<u>39</u>	g's	Pelvis Acceleration (PEV):	<u>65</u>	g's	<u>58</u>	g's
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TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	PURPOSE AND TEST PROCEDURE	1-1
2	SUMMARY OF SIDE IMPACT TEST	2-1
3	VEHICLE TEST DATA	3-1
	Data Sheet 1 - General Vehicle Test Parameter Data	3-2
	Data Sheet 2 - Test Vehicle Summary of Results	3-5
	Data Sheet 3 - Moving Deformable Barrier (MDB) Summary	3-6
	Data Sheet 4 - Post Test Observations	3-7
4	OCCUPANT AND VEHICLE INFORMATION	4-1
	Data Sheet 5 - SID Instrumentation Data	4-2
	Data Sheet 6 - Vehicle Pre- And Post Test Measurements	4-3
	Data Sheet 7 - SID Longitudinal Clearance Dimensions	4-4
	Data Sheet 8 - SID Lateral Clearance Dimensions	4-5
	Data Sheet 9 - Vehicle Side Measurements	4-6
	Data Sheet 10 - Vehicle Exterior Crush Profiles - All Levels	4-7
	Data Sheet 11 - Vehicle Damage Profile Distances	4-13
	Data Sheet 12 - Exterior Static Crush For Impactor Face	4-14
	Data Sheet 13 - Test Vehicle Accelerometer Locations And Data Summary	4-16
	Data Sheet 14 - MDB Accelerometer Locations and Data Summary	4-19
	Data Sheet 15 - High Speed Camera Locations and Data	4-20
5	VEHICLE FUEL SYSTEM INTEGRITY	5-1
	Data Sheet 16 - FMVSS 301 Fuel System Integrity Data	5-2
	Data Sheet 17 - FMVSS 301 Rollover Data	5-3
APPENDIX A	PHOTOGRAPHS	A-1
APPENDIX B	VEHICLE, MDB AND SID RESPONSE DATA	B-1
APPENDIX C	SID CONFIGURATION AND PERFORMANCE VERIFICATION DATA	C-1
APPENDIX D	TEST EQUIPMENT LIST AND CALIBRATION INFORMATION	D-1

SECTION 1

PURPOSE AND TEST PROCEDURE

This side impact test is part of the FMVSS 214 Side Impact Protection Compliance Test Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-97-C-01033. The purpose of this test was to evaluate side impact protection in a 1999 Toyota Sienna CE Minivan. The test was conducted in accordance with the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-214D-04, dated September 1, 1995).

SECTION 2

SUMMARY OF SIDE IMPACT TEST

A 1999 Toyota Sienna CE Minivan 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 52.6 kph (32.7 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 Calspan Corporation Transportation Sciences Center in Buffalo, New York on December 3, 1998. 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 OVSC Side Impact Laboratory Test Procedure (TP-214D-04, dated September 1, 1995). Both SIDs were certified prior to this test. 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 41 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)	49	39
PEV (g)	65	58

FMVSS 214D requires that the TTI not exceed 85 for 4 door vehicles and not exceed 90 for 2 door vehicles. Peak lateral pelvis acceleration shall not exceed 130 g's.

SECTION 3

SUMMARY OF TEST RESULTS

DATA SHEET 1

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1999 Toyota Sienna CE Minivan

Vehicle Body Color: Silver Spruce VIN: 4T3GF19C5XU104733

Vehicle NHTSA No.: CX5103 Month & Year of Manufacture: 10/98

Engine Data: 6 Cylinders; - CID; 3.0 Liters; - cc

Engine Placement: - Longitudinal; or x Lateral

Transmission: 4 Speed; - Manual; x Automatic; x Overdrive

Final Drive: - Rear Wheel Drive; x Front Wheel Drive; - Four Wheel

Odometer Reading 12.87 km

Options: x A/C; x Power Steering; x Pwr.Brakes; x Pwr. Windows

DATA FROM TIRE PLACARD

Tire Pressure* (at capacity); 240 kPa FRONT
240 kPa REAR

Recommended Tire Size: P205/70R15

Tires on Test Vehicle: P205/70R15 ; Manufacturer: Firestone

Vehicle Capacity Data:

Number of Occupants: 2 Front; 2 Rear; 3 3rd Seat; 7 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 = 526.0 kg (A)

No. of Occupants x 68.04 kg. = 476.3 kg (B)

Vehicle Cargo Capacity = 49.7 kg (A-B)

TEST VEHICLE DELIVERED WEIGHT WITH MAXIMUM FLUIDS:

Left Front	=	<u>515.0</u> kg	Left Rear	=	<u>372.0</u> kg
Right Front	=	<u>511.0</u> kg	Right Rear	=	<u>355.5</u> kg
TOTAL FRONT	=	<u>1,026.0</u> kg	TOTAL REAR	=	<u>727.5</u> kg
% of Total Weight	=	<u>58.5</u> %	% of Total Weight	=	<u>41.5</u> %
TOTAL WEIGHT	=	<u>1,753.5</u> kg			

* Tire pressure used in test.

DATA SHEET 1 (continued)

GENERAL TEST VEHICLE PARAMETER DATA

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Max. Fluids	=	<u>1753.5</u>	kg (A)
Maximum Cargo Carrying Capacity of Test Vehicle	=	<u>49.7</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>1,965.6</u>	kg (A+B+C)

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

Left Front	=	<u>563.5</u>	kg	Left Rear	=	<u>476.5</u>	kg
Right Front	=	<u>509.0</u>	kg	Right Rear	=	<u>417.0</u>	kg
TOTAL FRONT	=	<u>1,072.5</u>	kg	TOTAL REAR	=	<u>893.5</u>	kg
% of Total Weight	=	<u>54.6</u>	%	% of Total Weight	=	<u>45.4</u>	%
TOTAL TEST WEIGHT	=	<u>1,966.0</u>	kg				

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

Left Front	=	<u>569.5</u>	kg	Left Rear	=	<u>461.5</u>	kg
Right Front	=	<u>514</u>	kg	Right Rear	=	<u>412</u>	kg
TOTAL FRONT	=	<u>1,083.5</u>	kg	TOTAL REAR	=	<u>873.5</u>	kg
% of Total Weight	=	<u>55.4</u>	%	% of Total Weight	=	<u>44.6</u>	%
TOTAL TEST WEIGHT	=	<u>1,957.0</u>	kg				

TEST VEHICLE ATTITUDE (all dimensions in millimeters):

AS DELIVERED:

Left Front	<u>774</u>	Right Front	<u>781</u>	Left Rear	<u>763</u>	Right Rear	<u>777</u>
------------	------------	-------------	------------	-----------	------------	------------	------------

FULLY LOADED:

Left Front	<u>727</u>	Right Front	<u>752</u>	Left Rear	<u>713</u>	Right Rear	<u>743</u>
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READY FOR TEST:

Left Front	<u>735</u>	Right Front	<u>752</u>	Left Rear	<u>735</u>	Right Rear	<u>747</u>
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Test Vehicle Wheelbase: 2898 millimeters

C.G. = 1,294 millimeters rearward of front wheel centerline

TOTAL VEHICLE LENGTH:

Right Side	=	<u>4810</u>	millimeters
Left Side	=	<u>4810</u>	millimeters
Centerline	=	<u>4932</u>	millimeters

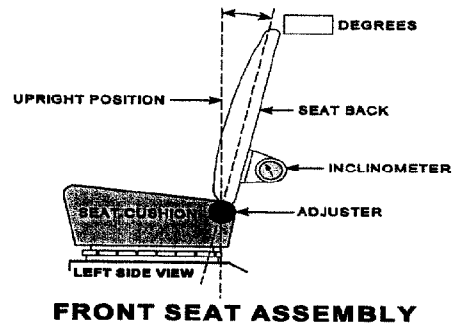
DATA SHEET 1 (continued)

GENERAL TEST VEHICLE PARAMETER DATA

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103

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:

Mechanical Mid-point

Total Length of Adjustment Travel: 230 millimeters

Total Number of Adjustment Positions or Detents: 31 detents - placed in 16th

FRONT SEAT BACK ADJUSTMENT POSITION:

Manual adjustment to 20 degrees

Seat Back Torso Angle: 20 degrees

SECOND POSITION SEAT:

Total Length of Fore/Aft Adjustment Travel: 0 millimeters

Seat Back Adjustment Position: 4 detents

ADJUSTABLE STEERING COLUMN POSITION:

5 detents - placed in 3rd

WINDOW POSITIONS:

Left Front: Closed

Left Rear: Closed

Right Front: Open/
Removed

Right Rear: Open/
Removed

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:

80.3 liters (Fuel Tank Usable Capacity)

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

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

Wheelbase = 2898 millimeters

Impact Point is 509 millimeters rearward of front axle centerline

(which is 940 millimeters forward of the wheelbase midpoint)

Actual Impact Point is 527 millimeters rearward of front axle centerline

DATA SHEET 2

TEST VEHICLE SUMMARY OF RESULTS

VEHICLE IDENTIFICATION:

Vehicle Year/Make/Model: 1999 Toyota Sienna CE

Body Style: Minivan

VIN: 4T3GF19C5XU104733

NHTSA No.: CX5103

Test Date: December 3, 1998

Overall Length = 4932 millimeters; Overall Width = 1864 millimeters

VEHICLE TEST WEIGHT (Pre-Test):

Left Front = 569.5 kg Left Rear = 461.5 kg

Right Front = 514 kg Right Rear = 412 kg

TOTAL FRONT = 1,083.5 kg TOTAL REAR = 873.5 kg

TOTAL VEHICLE WEIGHT 1,957.0 kg

Wheelbase = 2898 millimeters

Longitudinal C.G. from Center of Front Axle = 1,294 millimeters

Impact Angle with Respect to Impactor = 90 degrees

ACTUAL IMPACT POINT

Actual Impact Point is 18 mm rearward of nominal impact ref. line (Lateral)

Actual Impact Point is 7 mm below nominal impact point (Vertical)

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (312 mm above ground) = 85 millimeters

2. LEVEL 2 (675 mm above ground) = 249 millimeters

3. LEVEL 3 (644 mm above ground) = 246 millimeters

4. LEVEL 4 (1011 mm above ground) = 175 millimeters

5. LEVEL 5 (1563 mm above ground) = 26 millimeters

Maximum Post-Test Intrusion = 249 millimeters

OCCUPANTS:

Front Passenger:

Rear Passenger:

Dummy Identification 015

016

Restraints Used 3-point belt system

3-point belt system

INSTRUMENTATION:

Number of Vehicle Data Channels: = 19

Number of Cameras: Onboard = 3

Offboard = 6

TOTAL = 9

DATA SHEET 3

MOVING DEFORMABLE BARRIER (MDB) SUMMARY

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103

MDB FACE MANUFACTURER AND SERIAL NUMBER:

Plascore 128A1098-3 083C1098 2324-01

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>1,362.5</u>	kg				
Impact Angle (MDB C/L to Target Vehicle C/L)	=	<u>90</u>	degrees				
Impact Speed	=	<u>52.6</u>	kph				

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

1. Row A at Center of Bumper Level	=	<u>131</u>	millimeters
2. Row B at Top of Bumper Level	=	<u>49</u>	millimeters
3. Row C at Mid Level	=	<u>38</u>	millimeters
4. Row D at Top of Stack Level	=	<u>66</u>	millimeters

INSTRUMENTATION:

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

POST-TEST OBSERVATIONS

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103

VISIBLE DUMMY CONTACT POINTS:

LEFT FRONT SID

Head: Back of head to head restraint

Upper Torso: Left shoulder to rear portion of door trim panel above armrest

Lower Torso: Pelvis to lower rear portion of door trim panel below armrest

Left Knee: Left knee to front portion of door trim panel

Right Knee: Left knee

LEFT REAR SID

Back of head to head restraint

Left shoulder to rear portion of door trim panel above armrest

Pelvis to lower rear portion of door trim panel below armrest

Left knee to front portion of door trim panel

Left knee

DOOR OPENING:

LEFT DOOR

Front: Closed/Inoperable

Rear: -

RIGHT DOOR

Closed/Operable

Open/Operable

MDB DISTANCE FROM TARGET IMPACT POINT:

Vertical: 7 mm down

Horizontal: 18 mm rearward

ARM REST LOCATIONS:

Front: 180 mm below window opening

Rear: 190 mm below window opening

SEAT MOVEMENT:

Front: Driver seat was pushed inboard

Rear: Rear bench seat was pushed inboard

GLAZING DAMAGE:

Windshield: None

Window: Rear passenger window blown out

PILLAR PERFORMANCE:

No visible tears or separations

SILL SEPARATION:

None

OTHER NOTABLE IMPACT EFFECTS:

Frontal airbags for driver and passenger side did not deploy during test impact.

SECTION 4

OCCUPANT AND VEHICLE INFORMATION

DATA SHEET 5

SID INSTRUMENTATION DATA

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103

	Front Dummy ID# 015				Rear Dummy ID# 016			
	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	42.4	45.0	-6.6	95.0	28.9	51.2	-6.5	196.2
Upper Rib Lateral . . Y(R)	41.0	45.6	-5.5	95.0	28.1	43.1	-5.8	196.2
Lower Rib Lateral . Y	46.4	45.0	-5.1	171.9	35.9	50.7	-7.4	196.2
Lower Rib Lateral . Y(R)	44.4	45.0	-4.8	171.9	36.6	44.4	-6.7	196.2
SPINE ACCELERATIONS:								
Lower Lateral Y	51.6	45.7	-6.4	95.6	42.6	48.7	-9.3	73.7
Lower Lateral Y(R)	51.6	46.2	-6.0	95.6	43.7	48.7	-9.4	73.7
PELVIC ACCELERATIONS:								
Lateral Y	64.9	41.2	-9.3	64.4	57.7	40.0	-7.8	63.7
Lateral Y(R)	63.2	41.2	-8.8	64.4	58.1	40.0	-8.3	63.7

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

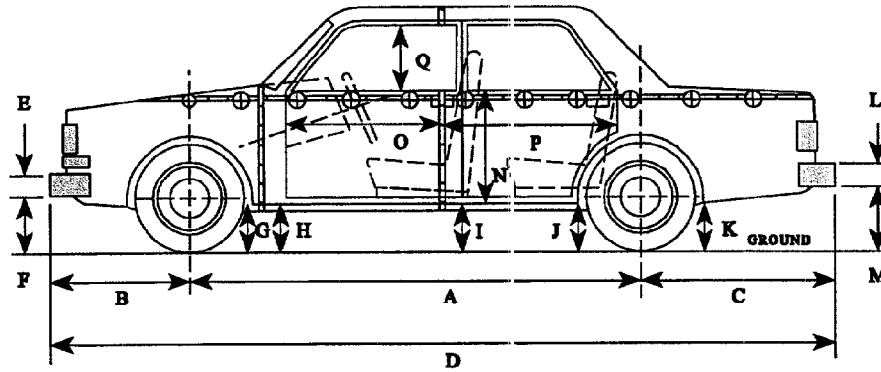
Note: Above data has been FIR filtered, Y(R) denotes redundant Y direction accelerometer.

DATA SHEET 6

VEHICLE SIDE MEASUREMENTS

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103



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	2898	-	2881	-17
B	951	-	953	2
C	1093	-	1083	-10
D	4932	-	4917	-15
E	175	-	175	0
F	425	403	429	26
G	257	230	250	20
H	259	234	249	15
I	278	247	269	22
J1	229	203	215	12
J2	269	239	247	8
K	347	318	309	-9
L	195	-	195	0
M	382	350	346	-4
N	809	-	780	-29
O	1170	-	1146	-24
P	n/a	-	n/a	0
Q	475	-	472	-3
R	4810	-	4815	5
S	4810	-	4805	-5
T	1864	-	1726	-138

D = Length at Centerline
T = Width at B-Pillar

E&L = Bumper Thickness
J1 = To Pinch Weld

R = Right Side Length
J2 = To Sill

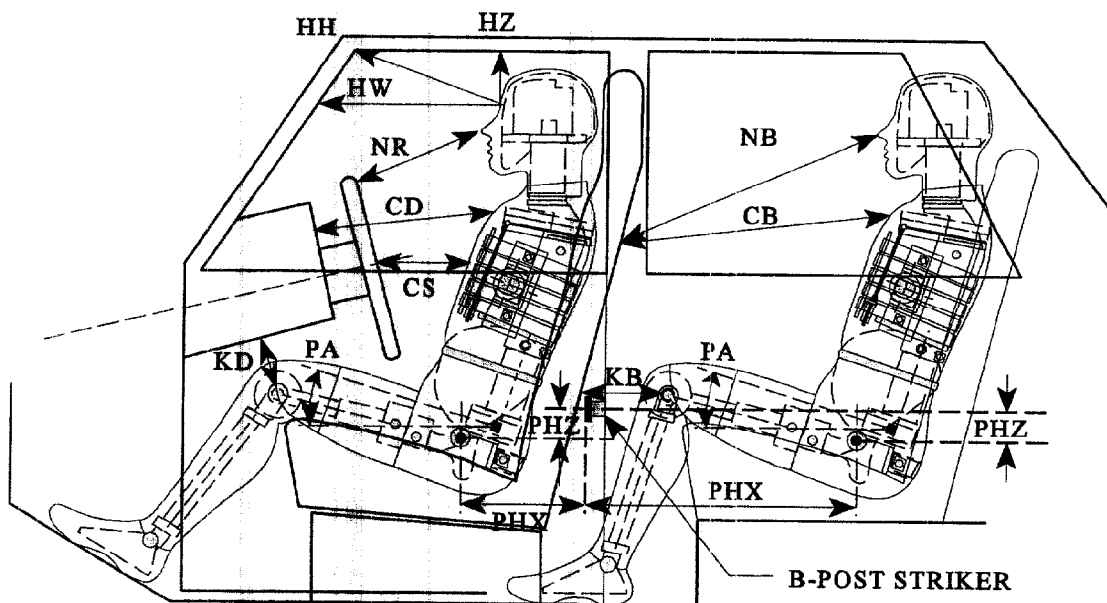
S = Left Side Length

DATA SHEET 7

SID LONGITUDINAL CLEARANCE DIMENSIONS

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103



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# 015	LEFT REAR PASS. ID# 016
HH	415	N/A
HW	771	N/A
HZ	239	231
NR/NB	464	698
CD/CB	565	609
CS	364	N/A
KDL(KDA°)/KBL(KDA°)	167 / (24 °)	239 / (19 °)
KDR(KBA°)/KBR(KBA°)	171 / (26 °)	248 / (15 °)
PA°	24.5 °	24.7 °
PHX	326.0	604.0
PHZ	175.4	99.4

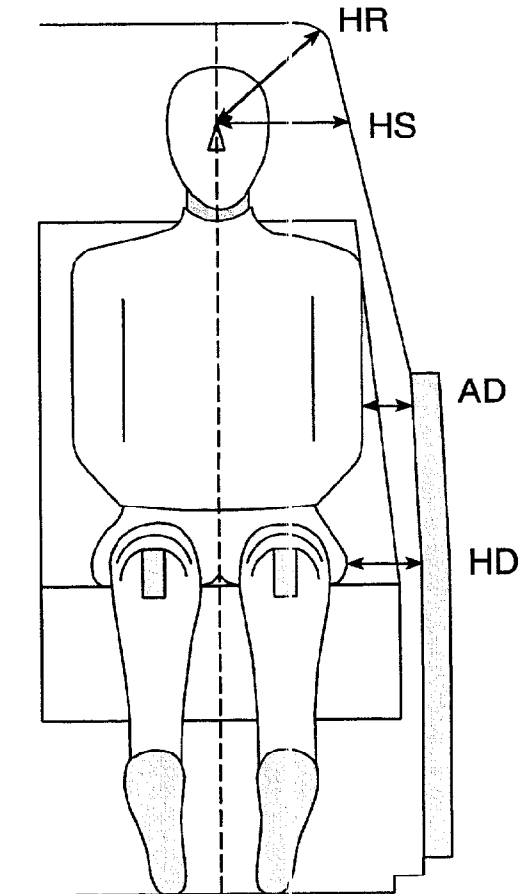
Note: 2-door vehicle shown. Rear dummy PHX & PHZ measurements for 4-door vehicle would use the C-post striker as a reference point.

DATA SHEET 8

SID LATERAL CLEARANCE DIMENSIONS

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103



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

	DRIVER ID # <u>015</u>		LEFT REAR PASS. ID # <u>016</u>	
HR	247		248	
HS	329		378	
AD*	LOWER: 127	UPPER: 119	LOWER: 185	UPPER: 175
HD	176		122	

* 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.

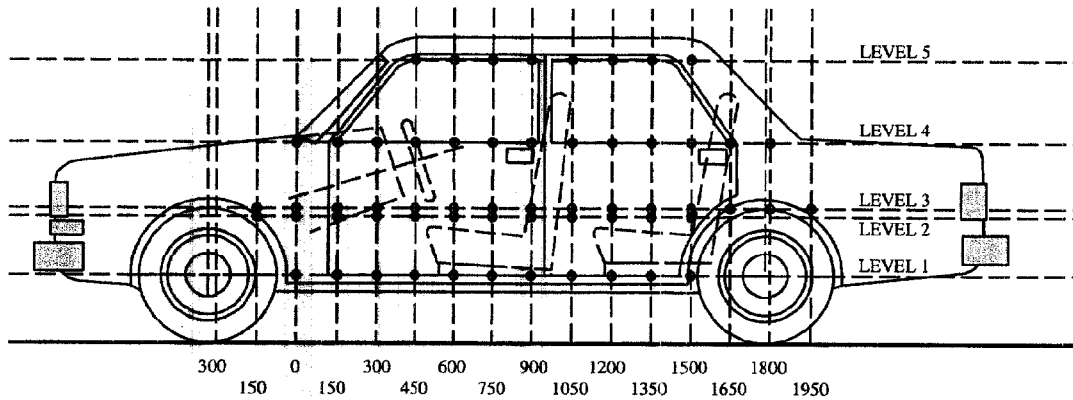
Upper measurement is taken laterally at the center of the upper rib accelerometer height from the SID arm segment to the closest part of the vehicle side.

DATA SHEET 9

VEHICLE SIDE MEASUREMENTS

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103



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>1563</u>	millimeters
Level 4 @ Window Sill	=	<u>1011</u>	millimeters
Level 3 @ Mid Door	=	<u>644</u>	millimeters
Level 2 @ Occupant H-Point	=	<u>675</u>	millimeters
Level 1 @ Axle Centerline Height (or Sill Top Height)	=	<u>312</u>	millimeters

DATA SHEET 10

VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS

NHTSA No. CX5103

Vehicle: 1999 Toyota Sienna CE

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

		DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT																											
LEVEL	HEIGHT T (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	312	PRE	202	--	--	--	--	164	157	161	161	162	164	163	163	160	158	153	152	150	145	--	--	--	--	--	--	--	
		POST	175	--	--	--	--	130	181	214	225	227	223	226	243	241	240	238	233	198	151	--	--	--	--	--	--	--	
		CRUSH	-26	N/A	N/A	N/A	N/A	N/A	-34	24	53	64	65	59	63	80	81	83	85	82	49	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LEVEL 2 H POINT	672	PRE	170	125	--	--	100	104	99	94	92	90	86	87	84	89	85	86	86	86	83	82	--	--	--	107	131	154	
		POST	167	172	--	--	103	95	163	233	269	282	279	293	300	301	318	319	327	335	327	254	192	--	--	151	171	188	
		CRUSH	-2	47	N/A	N/A	3	-9	61	134	176	189	189	207	213	217	229	234	241	243	241	171	110	N/A	N/A	N/A	44	40	34
LEVEL 3 MID DOOR	644	PRE	155	117	--	--	--	102	100	99	94	95	92	93	91	90	91	91	93	92	93	95	87	--	--	100	128	146	
		POST	170	178	--	--	--	95	166	249	281	291	283	295	302	299	313	318	326	338	327	253	185	--	--	138	172	176	
		CRUSH	15	62	N/A	N/A	N/A	-8	65	150	186	196	192	202	202	210	209	223	226	232	243	159	98	N/A	N/A	N/A	37	44	31
LEVEL 4 WINDOW SILL	1011	PRE	--	248	208	180	164	156	147	145	138	131	127	124	124	123	120	111	112	110	110	111	113	116	120	129	143	159	
		POST	--	233	196	165	155	149	143	172	186	206	217	232	243	276	287	285	285	285	213	205	185	169	162	158	160	160	176
		CRUSH	N/A	-15	-12	-14	-9	-6	0	27	48	75	90	108	118	157	164	155	175	173	103	95	73	56	46	38	30	17	17
LEVEL 5 WINDOW TOP	1563	PRE	--	--	--	--	--	--	--	--	357	342	337	333	324	325	325	324	324	321	322	323	326	332	336	344	362	--	
		POST	--	--	--	--	--	--	--	--	308	313	328	347	349	336	335	332	333	328	325	331	334	333	340	357	370	--	
		CRUSH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-49	-30	-9	14	26	12	10	9	9	8	3	7	8	2	4	13	7	N/A

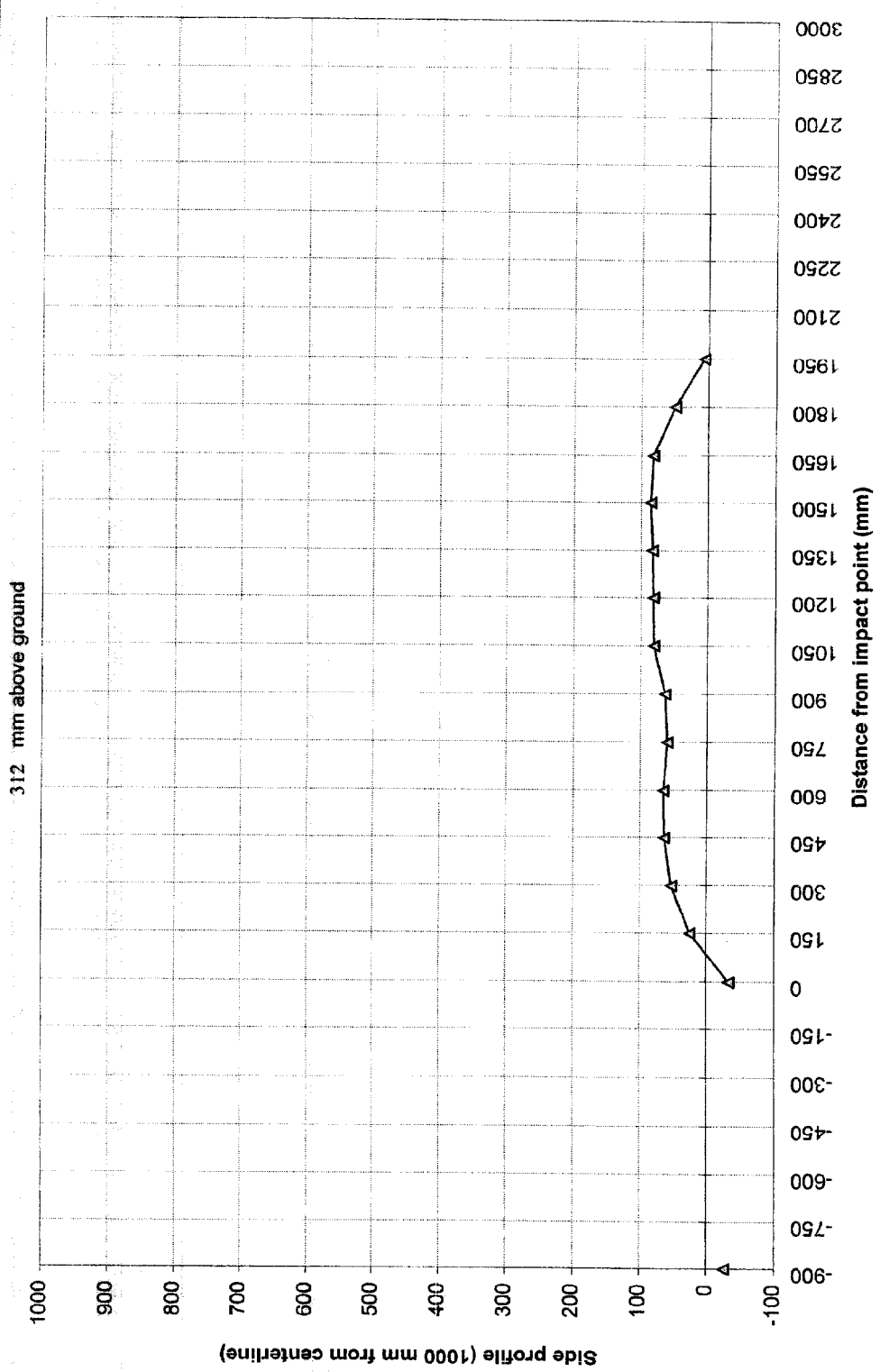
DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103

SIDE PROFILE LEVEL 1



DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES

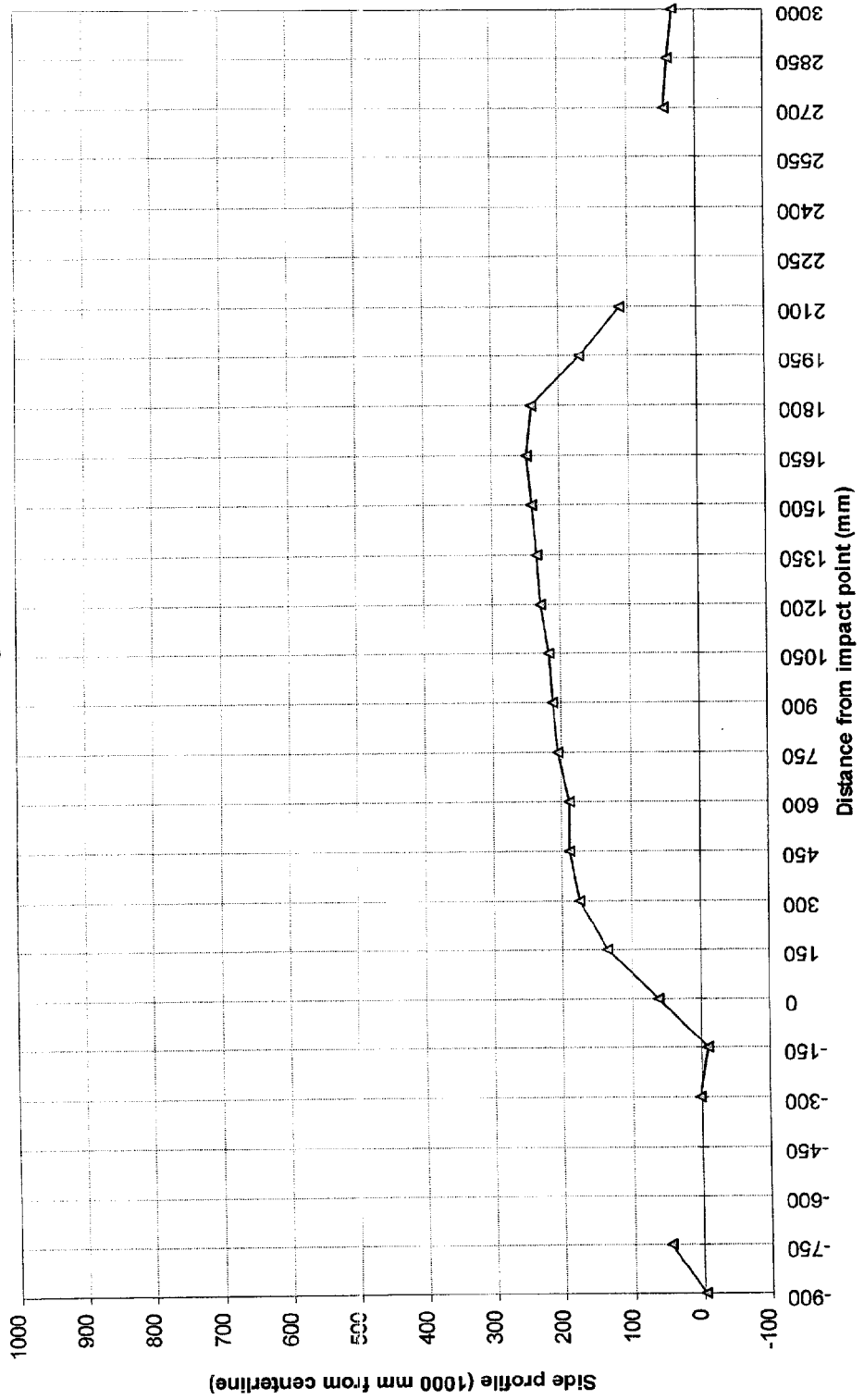
NHTSA No. CX5103

Vehicle: 1999 Toyota Sienna CE

—△— CRUSH

SIDE PROFILE LEVEL 2

672 mm above ground



DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES

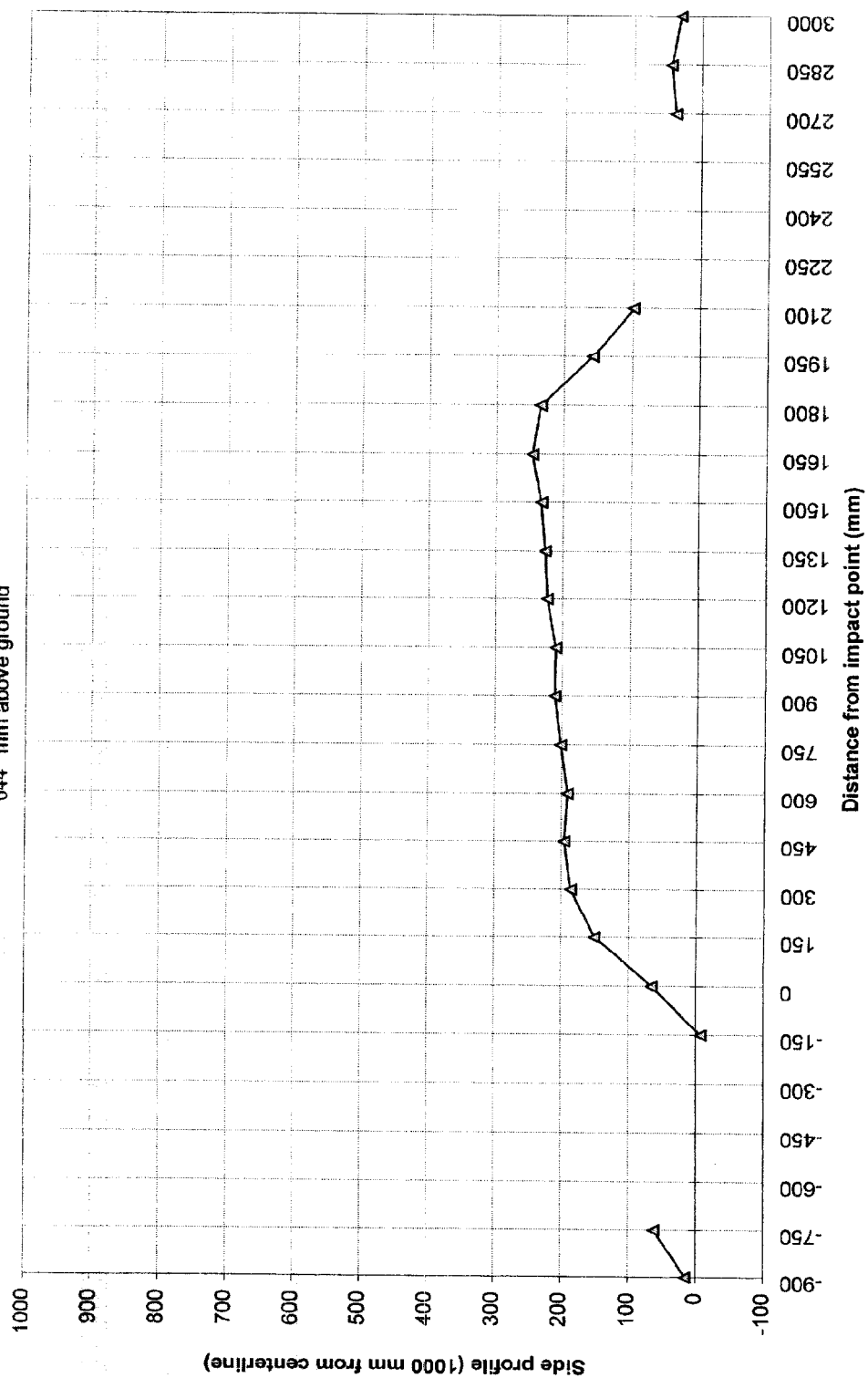
Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103

SIDE PROFILE LEVEL 3

644 mm above ground

—▲— CRUSH



DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES

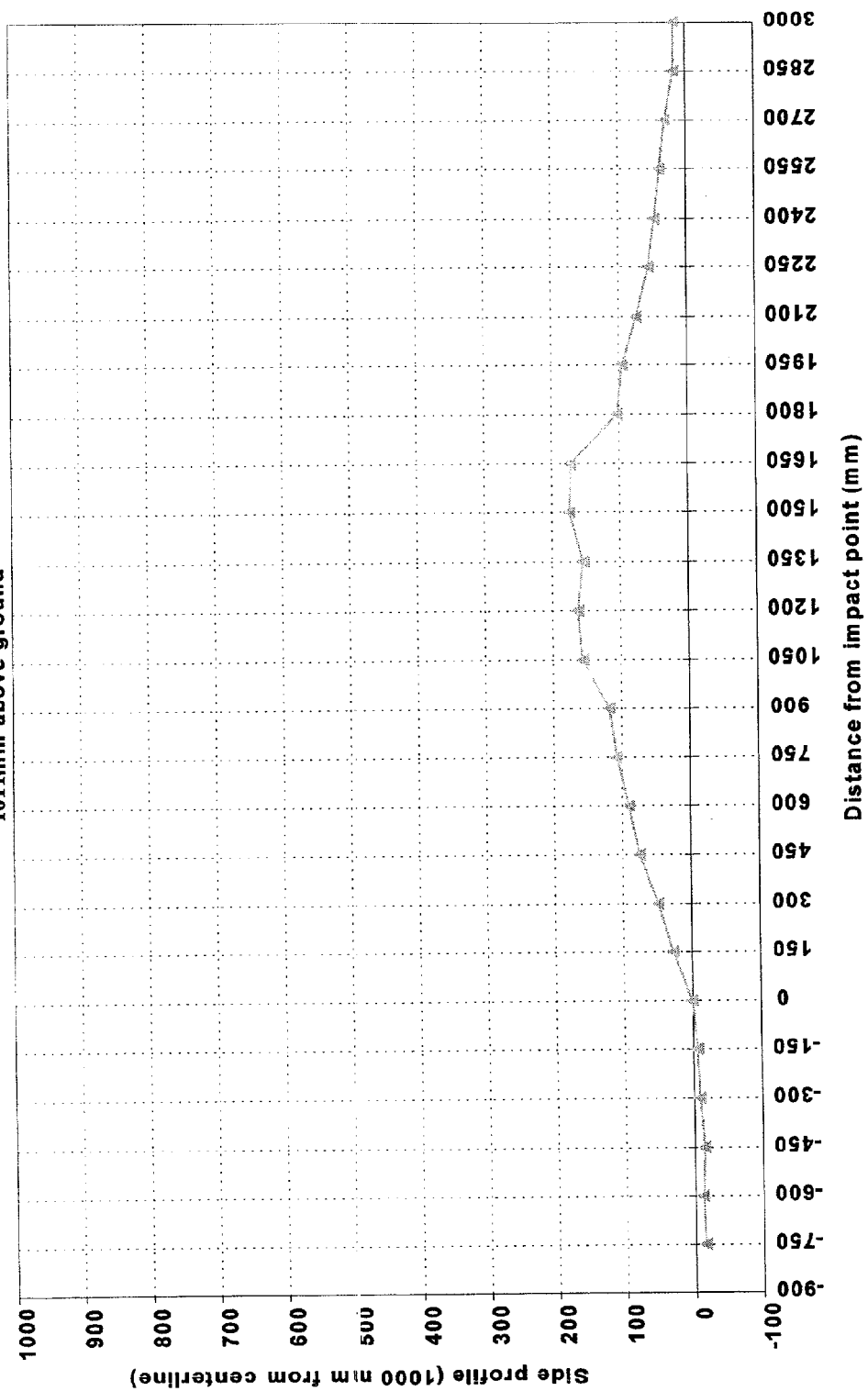
NHTSA No. CX5103

Vehicle: 1999 Toyota Sienna CE

CRUSH

SIDE PROFILE LEVEL 4

1011mm above ground



DATA SHEET 10 (continued)

VEHICLE EXTERIOR CRUSH PROFILES

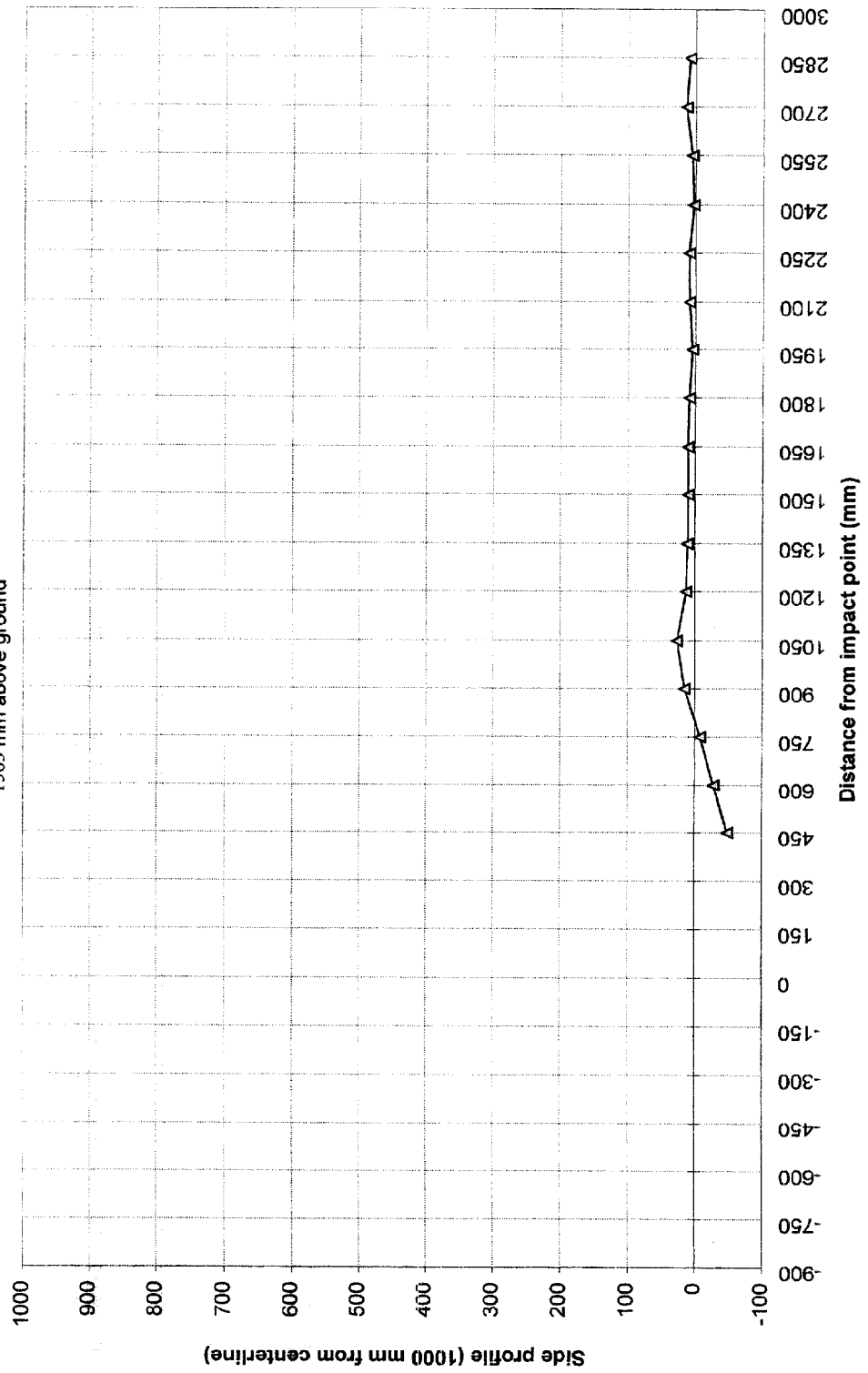
Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103

SIDE PROFILE LEVEL 5

1563 mm above ground

—▲— CRUSH

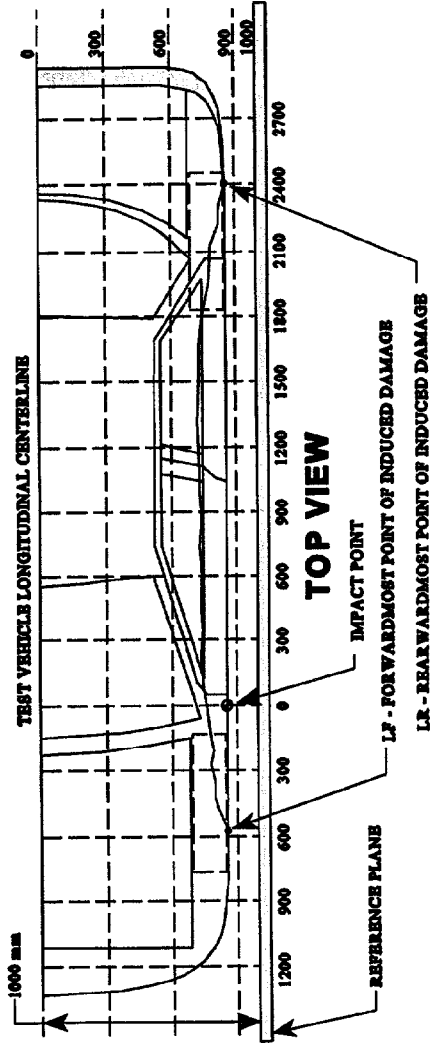


DATA SHEET 11

VEHICLE DAMAGE PROFILE DISTANCES

NHTSA No. CX5103

Vehicle: 1999 Toyota Sienna CE



MEASUREMENT CONVENTIONS:
 Distances of the impact point (forward/rearward of vehicle) is considered negative (-).
 Distances of the impact point (forward/rearward 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 = -120 mm)	109	102	7
2	504	288	94	194
3	1128	307	90	217
4	1752	331	93	238
5	2376	-	-	0
6	(LR = 3000 mm)	176	146	30

DATA SHEET 12

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

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103

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

LEVEL		HEIGHT AT CL (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		PRE	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619
TOP	813	POST	647	624	611	604	604	608	616	635	622	617	618	625	635	647	666	686	686
STACK		CRUSH	29	6	-7	-14	-14	-10	17	17		-1	0	6	7	16	29	47	66
LEVEL 3		PRE	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619
MID	636	POST	632	609	605	610	616	615	617	633	627	621	617	616	617	625	639	656	656
LEVEL		CRUSH	13	-10	-14	-9	-3	-4	15	15	9	3	-1	-2	-1	0	7	20	38
LEVEL 2		PRE	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619	619
TOP	559	POST	667	656	649	646	646	643	645	640	639	634	634	637	633	636	638	643	643
BUMPER		CRUSH	49	37	30	27	27	25	22	22	21	16	15	18	15	14	18	19	24
LEVEL 1		PRE	535	519	518	518	518	518	518	518	518	518	518	518	518	518	519	535	535
MID	432	POST	665	643	634	629	631	631	632	636	635	627	627	627	624	623	623	628	637
BUMPER		CRUSH	131	124	116	111	113	112	118	118	117	109	109	109	106	105	105	108	102

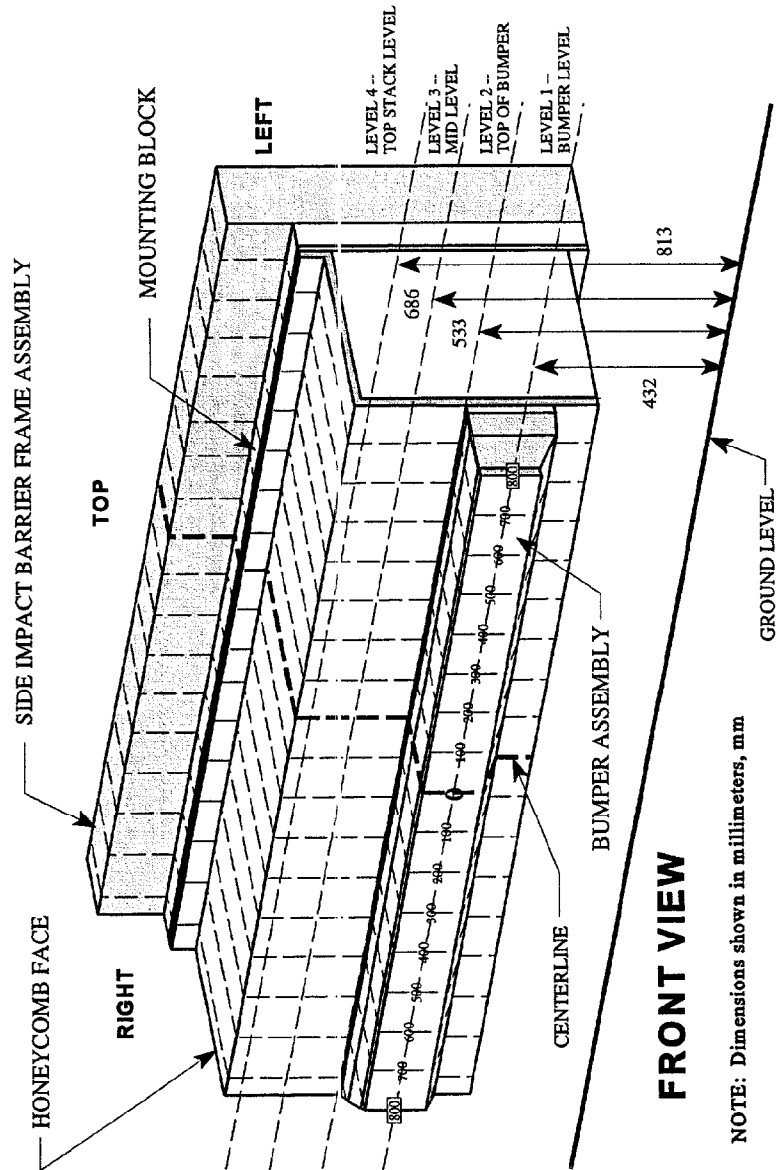
* Heights measured above ground level.

DATA SHEET 12 (continued)

EXTERIOR STATIC CRUSH FOR IMPACTOR FACE

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103

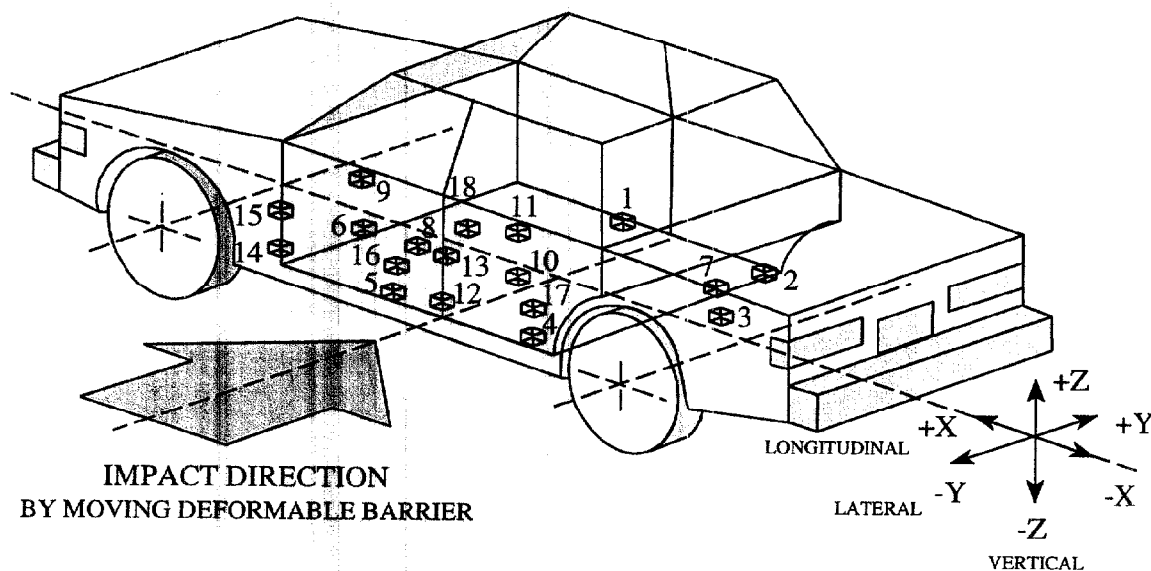


DATA SHEET 13

TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103



- 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

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103

Accel. No.	Location	Coordinates (mm) ± 3			Long. (x)		Lat. (y)		Vert. (z)		Resultant	
		X*	Y*	Z*	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
1	Right Side Sill at Front Seat	3095	747	262	pos. 3.3 neg. -4.1	61.8 10.1	30.3 -2.9	10.2 161.3	4.2 -7.0	109.7 10.7	31.3 -	10.2 -
2	Right Side Sill at Rear Seat	2283	776	252	pos. 2.7 neg. -3.5	92.9 14.0	31.2 -3.7	10.3 129.8	4.9 -7.3	130.6 19.9	31.6 -	10.3 -
3	Rear Floorpan Above Axle	739	-5	522	pos. 2.8 neg. -5.4	62.7 30.6	0.9 -0.9	46.9 142.4	10.3 -9.2	35.5 68.5	10.8 -	35.5 -
4	Left Side Sill at Rear Seat	2283	-625	452	pos. - neg. -	- -	184.0 -382.7	160.1 166.0	- -	- -	- -	- -
5	Left Side Sill at Front Seat	3095	-707	331	pos. - neg. -	- -	25.8 -2.1	10.0 161.9	- -	- -	- -	- -
6**	Left Front Door on Centerline	-	-	-	pos. - neg. -	- -	- -	- -	- -	- -	- -	- -
7	Right Rear Occupant Compartment	2195	363	452	pos. - neg. -	- -	25.4 -2.0	10.1 161.7	- -	- -	- -	- -
8**	Midrear of Left Front Door	-	-	-	pos. - neg. -	- -	- -	- -	- -	- -	- -	- -
9**	Left Front Door Upper Centerline	-	-	-	pos. - neg. -	- -	- -	- -	- -	- -	- -	- -
10**	Midrear of Left Rear Door	-	-	-	pos. - neg. -	- -	- -	- -	- -	- -	- -	- -
11**	Left Rear Door Upper Centerline	-	-	-	pos. - neg. -	- -	- -	- -	- -	- -	- -	- -

*Reference: X - Rear Bumper (+ Forward)
 **Accelerometer was not requested by COTR.

Y - Vehicle Centerline (+ To Right) Z - Ground Level (+ Up)

DATA SHEET 13 (continued)

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103

Accel. No.	Location	Coordinates (mm) ± 3			Long. (x)		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	2486	-751	626	pos. neg.	-	126.8 -33.2	8.2 14.4	-	-	-	-
13	Left Middle B-Pillar	2499	-731	941	pos. neg.	-	82.8 -47.1	8.0 29.0	-	-	-	-
14	Left Lower A-Pillar	4567	-736	484	pos. neg.	-	31.3 -2.8	8.3 22.6	-	-	-	-
15	Left Middle A-Pillar	4152	-707	1000	pos. neg.	-	-	-	-	-	-	-
16	Front Seat Track	2623	-591	455	pos. neg.	-	31.0 -7.8	29.4 40.0	-	-	-	-
17	Rear Seat Track	3047	-591	465	pos. neg.	-	22.8 -6.4	22.7 40.3	-	-	-	-
18	Vehicle CG	2674	0	452	pos. neg.	8.9 -6.8	26.3 -2.2	10.2 161.9	2.3 -4.4	61.7 31.1	27.1 -	10.0 -

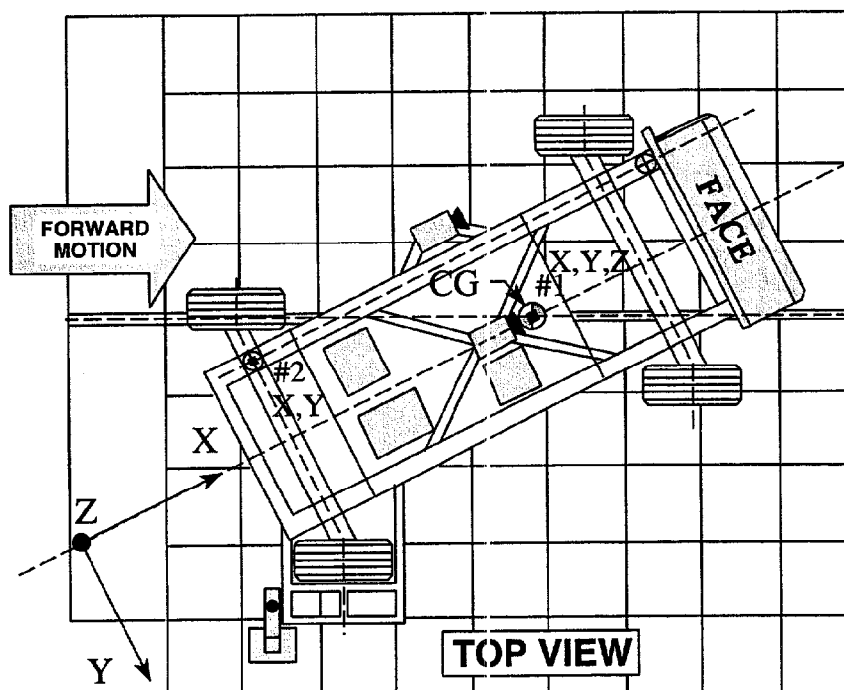
*Reference: X - Rear Bumper (+ Forward) Y - Vehicle Centerline (+ To Right) Z - Ground Level (+ Up)

DATA SHEET 14

MDB ACCELEROMETER LOCATIONS AND DATA SUMMARY

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103



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	17.6	499.9	-20.0	32.8
	Lateral..... Y				2.8	66.8	-13.1	499.9
	Vertical..... Z				18.5	65.3	-19.5	23.9
	Resultant..... R				27.0	23.9	-	-
2	Rear Frame Member							
	Longitudinal... X	386	-660	660	2.9	499.9	-23.2	32.6
	Lateral..... Y				2.8	48.3	-3.0	499.9

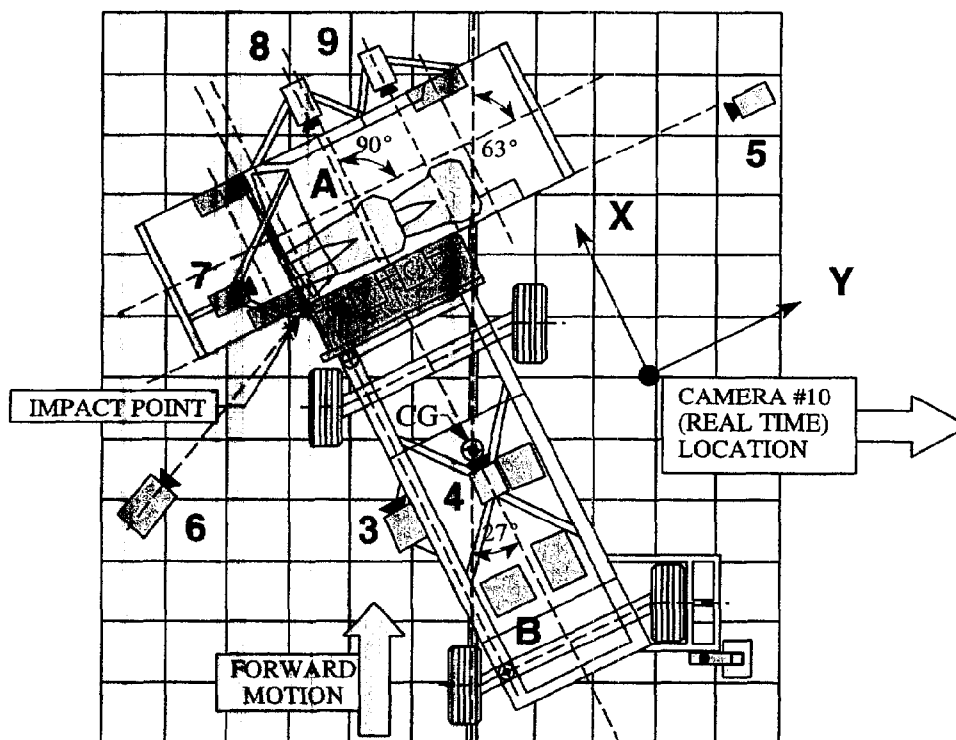
*Reference: X = Rear Bumper (+ Forward)
Y = Vehicle Centerline (+ To Right)
Z = Ground Level (+ Up)
All measurements accurate to within ± 3 mm.

DATA SHEET 15

HIGH SPEED CAMERA LOCATIONS AND DATA SUMMARY

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103



Camera No.	View	Coordinates (millimeters)			Angle (deg.)	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Overhead view of test vehicle	178	826	4880	-87	8	1000
2	Overhead closeup view of impact plane	-12	737	4880	-90	12.5	1010
3	MDB onboard closeup view of impact point	1470	0	847	0	13	1020
4	MDB onboard view of driver dummy	1140	838	1586	-17	7.5	1020
5	Right side ground level overall view	-333	9232	1085	-3	25	1010
6	Left side ground level overall view	-2026	-2019	1049	-6	13	1010
7	Test vehicle onboard driver front view	504	693	1382	-6	13	1020
8	Test vehicle onboard driver side view	1742	630	1159	-8	8	1010
9	Test vehicle onboard passenger side view	1773	1652	1225	-8	8	1010
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.: CX5103

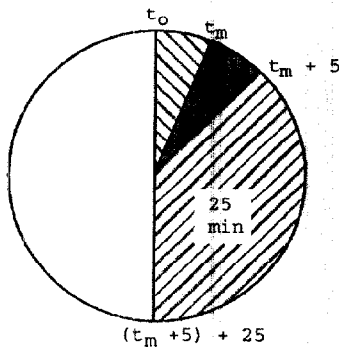
TEST DATE: December 3, 1998

Vehicle Mfgr./Make/Model : 1999 Toyota Sienna CE Minivan

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 (53.91 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

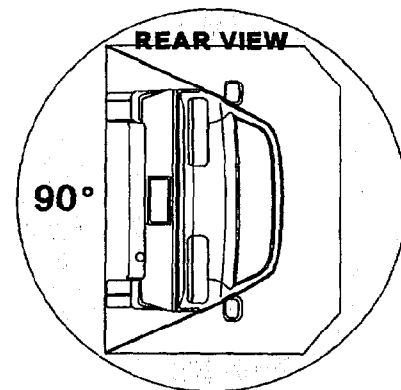
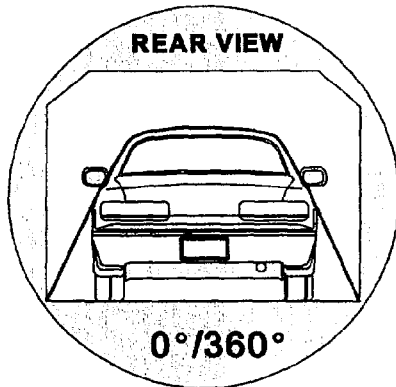
DATA SHEET 17

ROLLOVER DATA

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103

0 - 90 Degrees



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD :

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

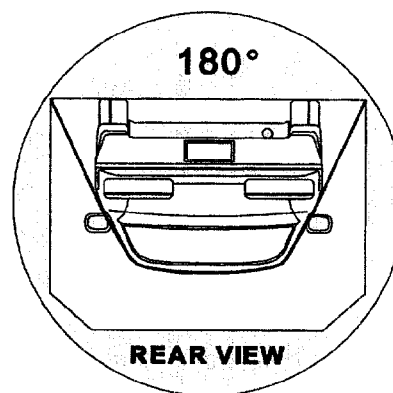
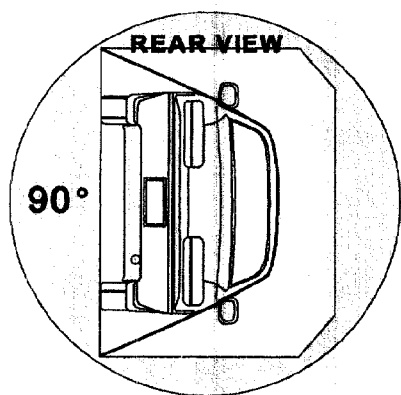
DATA SHEET 17 (continued)

ROLLOVER DATA

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103

90 - 180 Degrees



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD :

Rollover Fixture 90° Rotation Time	<u>1</u> minutes <u>13</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>13</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

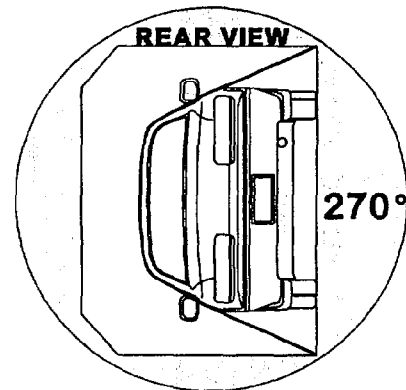
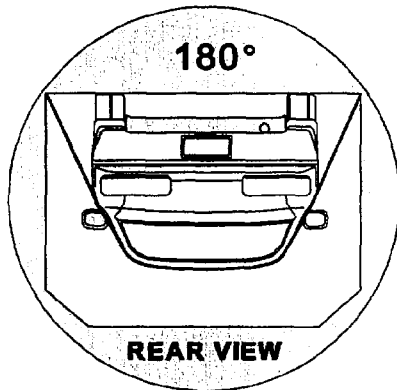
DATA SHEET 17 (continued)

ROLLOVER DATA

Vehicle: 1999 Toyota Sienna CE

NHTSA No. CX5103

180 - 270 Degrees



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD :

Rollover Fixture 90° Rotation Time

1 minutes 3 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time +

5 minutes 0 seconds

TOTAL

6 minutes 3 seconds

Next whole minute interval

7 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

TABLE OF PHOTOGRAPHS

<u>Figure</u>	<u>Photograph Title</u>	<u>Page</u>
Figure A- 1	PRE-TEST FRONTAL VIEW OF TEST VEHICLE	A- 3
Figure A- 2	POST-TEST FRONTAL VIEW OF TEST VEHICLE	A- 4
Figure A- 3	PRE-TEST REAR VIEW OF TEST VEHICLE	A- 5
Figure A- 4	POST-TEST REAR VIEW OF TEST VEHICLE	A- 6
Figure A- 5	PRE-TEST IMPACTED SIDE VIEW OF TEST VEHICLE	A- 7
Figure A- 6	POST-TEST IMPACTED SIDE VIEW OF TEST VEHICLE	A- 8
Figure A- 7	PRE-TEST FRONTAL VIEW OF IMPACTOR FACE	A- 9
Figure A- 8	POST-TEST FRONTAL VIEW OF IMPACTOR FACE	A- 10
Figure A- 9	PRE-TEST LEFT SIDE VIEW OF IMPACTOR FACE	A- 11
Figure A- 10	POST-TEST LEFT SIDE VIEW OF IMPACTOR FACE	A- 12
Figure A- 11	PRE-TEST RIGHT SIDE VIEW OF IMPACTOR FACE	A- 13
Figure A- 12	POST-TEST RIGHT SIDE VIEW OF IMPACTOR FACE	A- 14
Figure A- 13	PRE-TEST TOP VIEW OF IMPACTOR FACE	A- 15
Figure A- 14	POST-TEST TOP VIEW OF IMPACTOR FACE	A- 16
Figure A- 15	PRE-TEST OVERHEAD VIEW OF ALIGNED MDB AND VEHICLE	A- 17
Figure A- 16	POST-TEST OVERHEAD VIEW OF MDB AND VEHICLE	A- 18
Figure A- 17	PRE-TEST RIGHT OCCUPANT COMPARTMENT VIEW OF FRONT SID	A- 19
Figure A- 18	POST-TEST RIGHT OCCUPANT COMPARTMENT VIEW OF FRONT SID	A- 20
Figure A- 19	PRE-TEST RIGHT OCCUPANT COMPARTMENT VIEW OF REAR SID	A- 21
Figure A- 20	POST-TEST RIGHT OCCUPANT COMPARTMENT VIEW OF REAR SID	A- 22
Figure A- 21	PRE-TEST LEFT OCCUPANT COMPARTMENT VIEW OF FRONT SID	A- 23
Figure A- 22	POST-TEST LEFT OCCUPANT COMPARTMENT VIEW OF FRONT SID	A- 24
Figure A- 23	PRE-TEST LEFT OCCUPANT COMPARTMENT VIEW OF REAR SID	A- 25
Figure A- 24	POST-TEST LEFT OCCUPANT COMPARTMENT VIEW OF REAR SID	A- 26
Figure A- 25	PRE-TEST INTERIOR OF FRONT DOOR	A- 27
Figure A- 26	POST-TEST INTERIOR OF FRONT DOOR SHOWING SID IMPACT LOCATIONS	A- 28
Figure A- 27	PRE-TEST INTERIOR OF OCCUPANT COMFARTMENT	A- 29
Figure A- 28	POST-TEST INTERIOR OF OCCUPANT COMFARTMENT SHOWING SID IMPACT LOCATIONS	A- 30
Figure A- 29	PRE-TEST LEFT SIDE VIEW OF MDB WITH IMPACTOR FACE IN POSITION	A- 31
Figure A- 30	PRE-TEST RIGHT SIDE VIEW OF MDB WITH IMPACTOR FACE IN POSITION	A- 32
Figure A- 31	POST-TEST CLOSE-UP VIEW OF IMPACT POINT TARGET	A- 33
Figure A- 32	CLOSE-UP VIEW OF VEHICLE'S CERTIFICATION LABEL	A- 34
Figure A- 33	CLOSE-UP VIEW OF VEHICLE'S TIRE PLACARD LABEL	A- 35
Figure A- 34	IMPACT PHOTO	A- 36
Figure A- 35	ROLLOVER 90 DEGREES	A- 37
Figure A- 36	ROLLOVER 180 DEGREES	A- 38
Figure A- 37	ROLLOVER 270 DEGREES	A- 39
Figure A- 38	ROLLOVER 360 DEGREES	A- 40

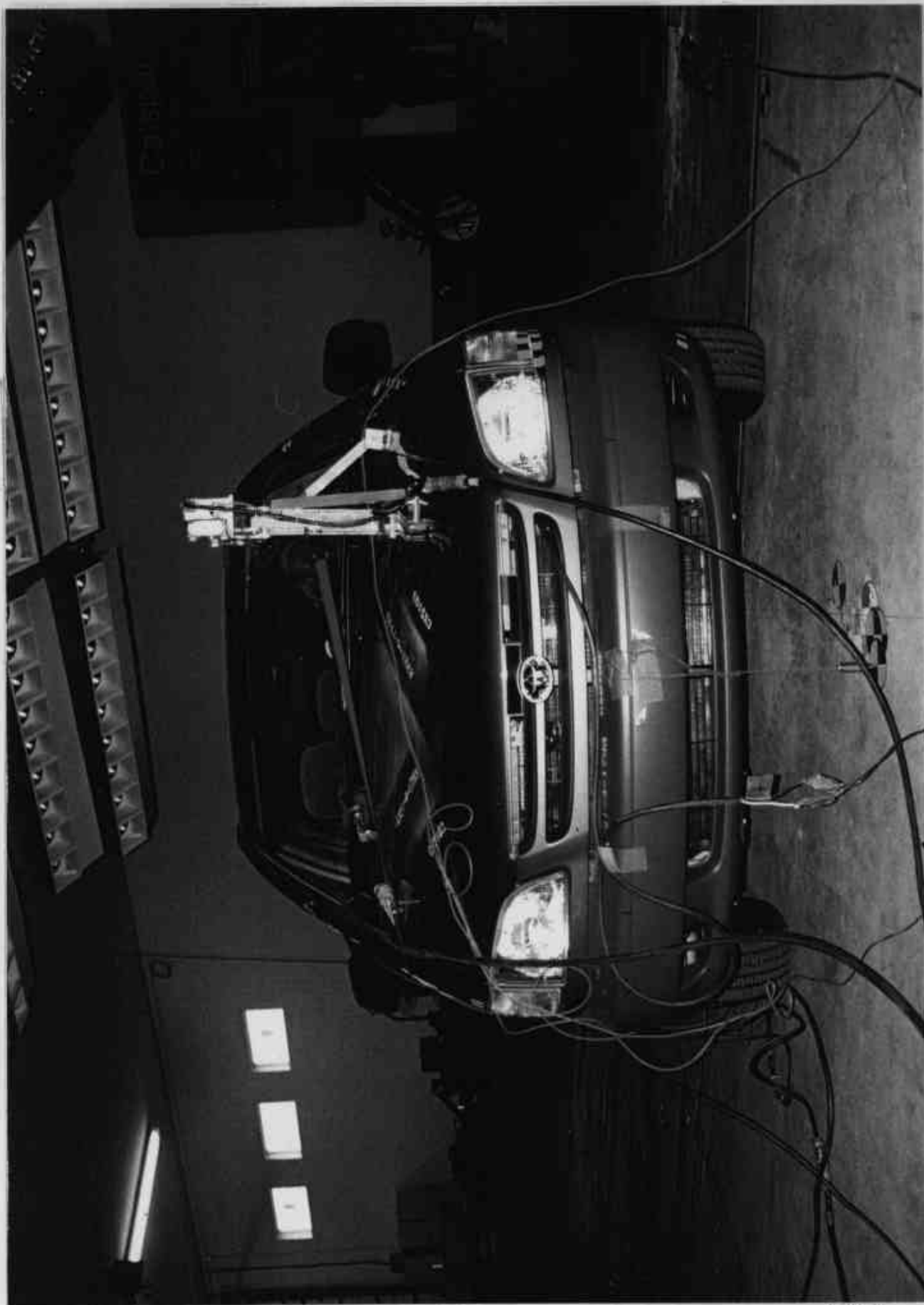


Figure A-1 PRE-TEST FRONTAL VIEW OF TEST VEHICLE

PHOTOGRAPH NOT AVAILABLE

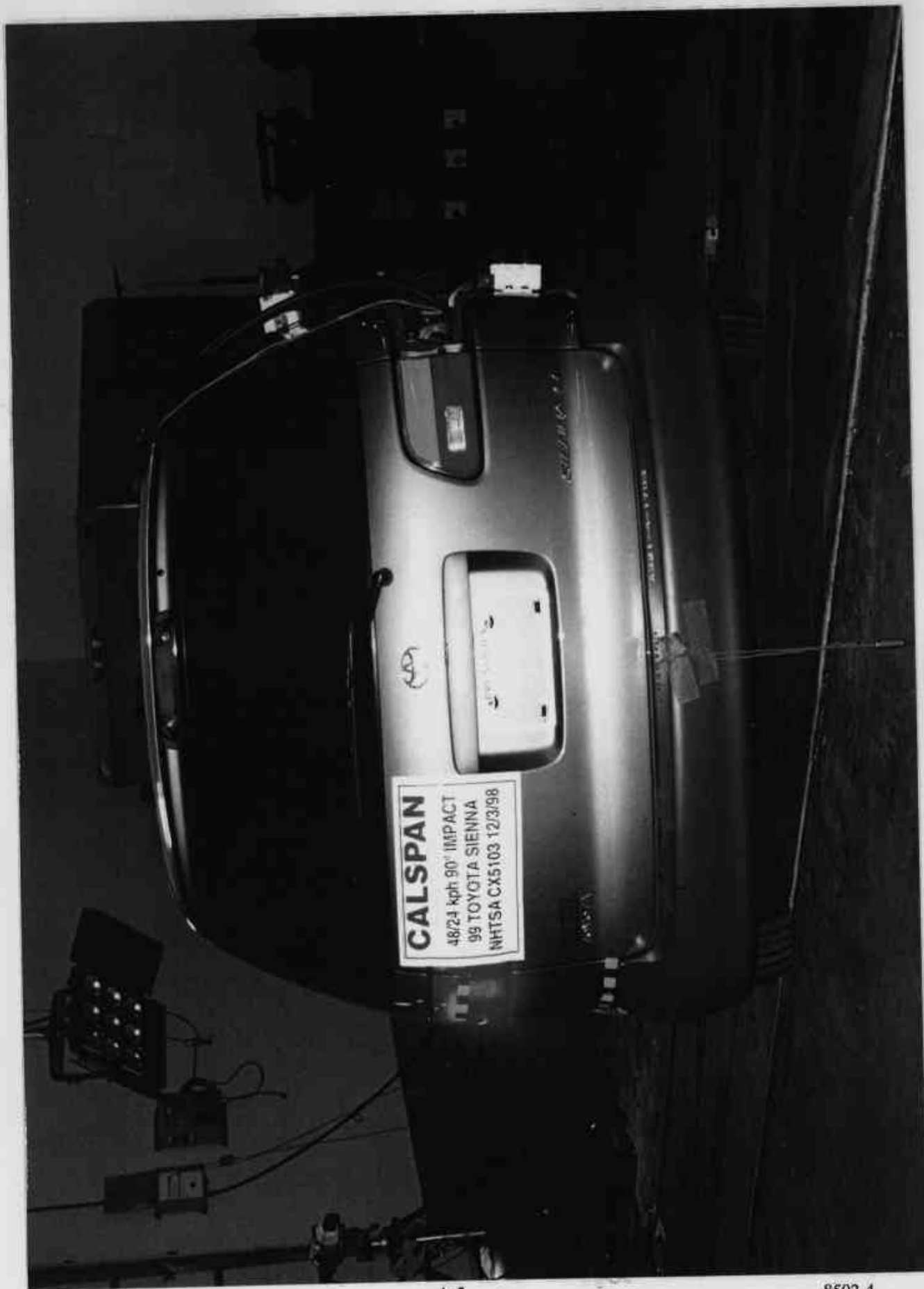


Figure A-3 PRE-TEST REAR VIEW OF TEST VEHICLE



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

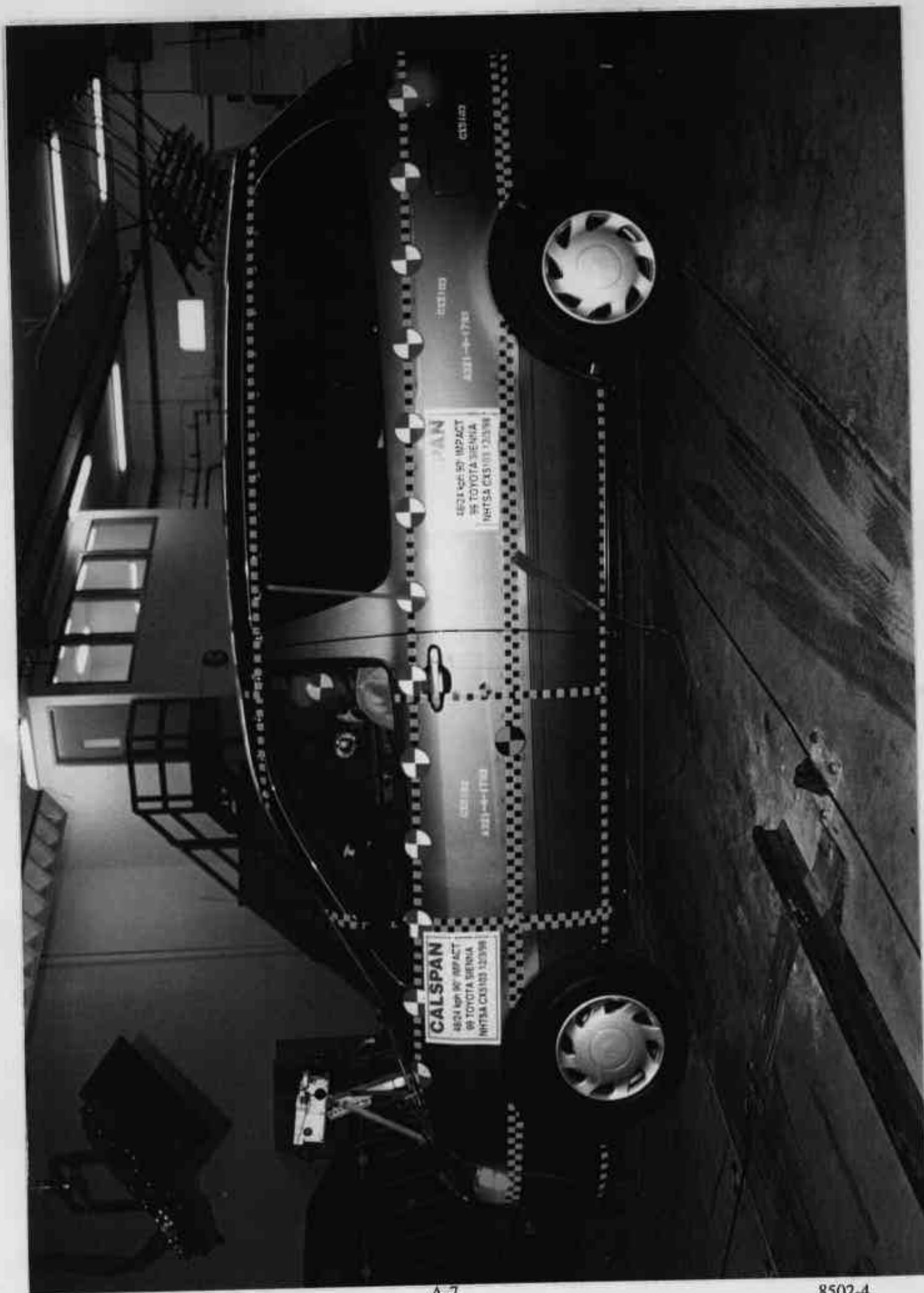


Figure A-5 PRE-TEST IMPACTED SIDE VIEW OF TEST VEHICLE

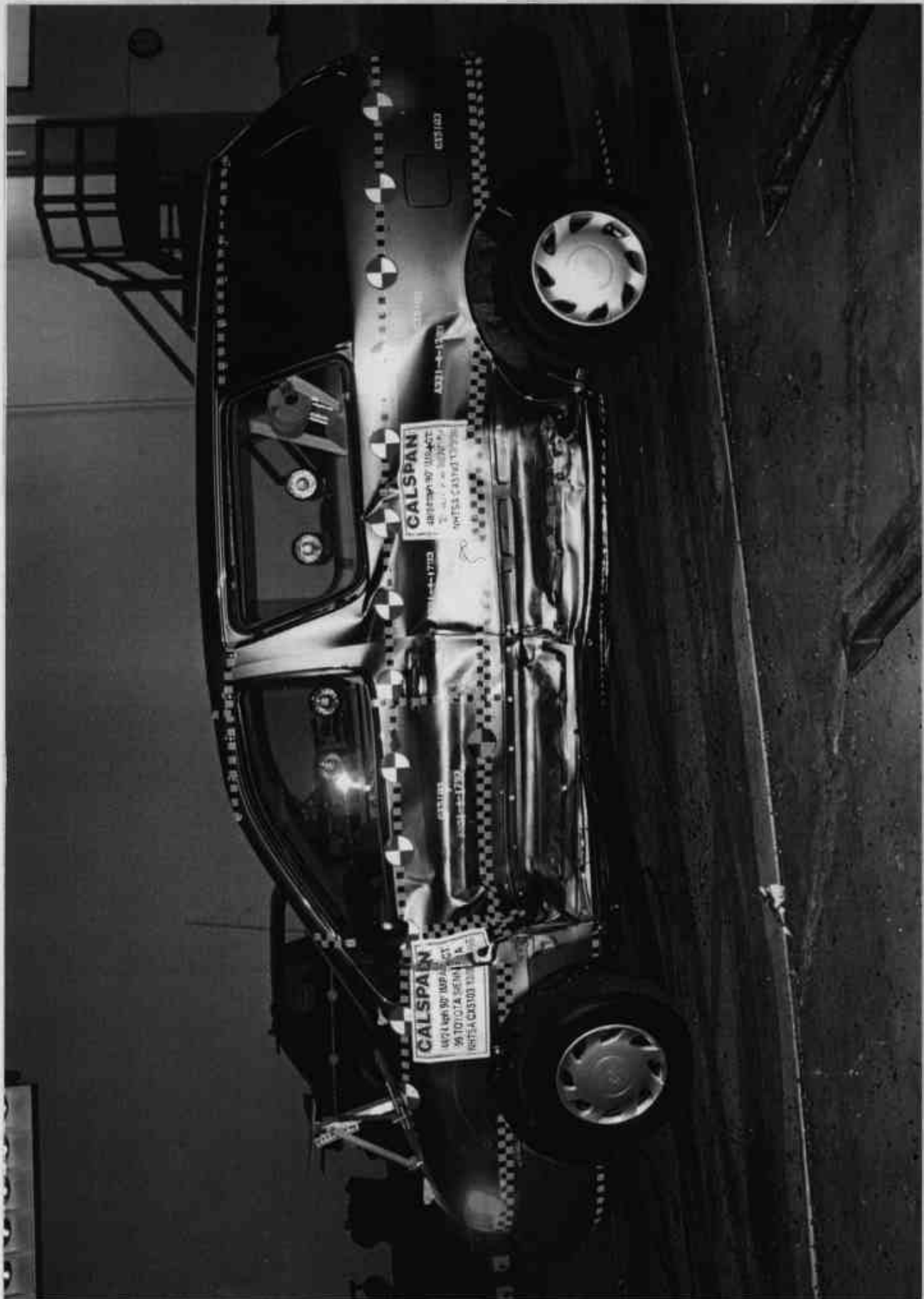


Figure A-6 POST-TEST IMPACTED SIDE VIEW OF TEST VEHICLE



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

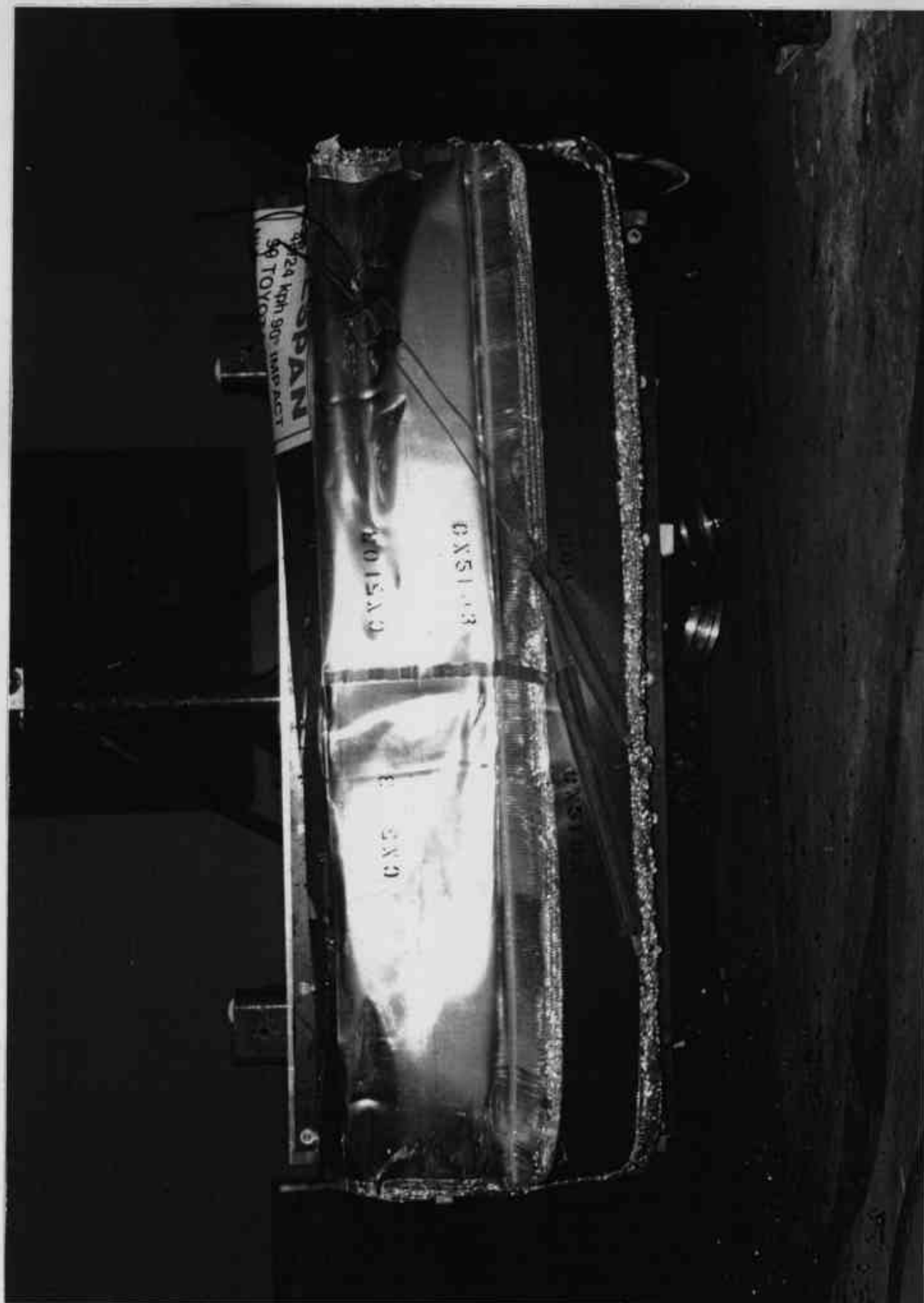


Figure A-8 POST-TEST FRONTAL VIEW OF IMPACTOR FACE

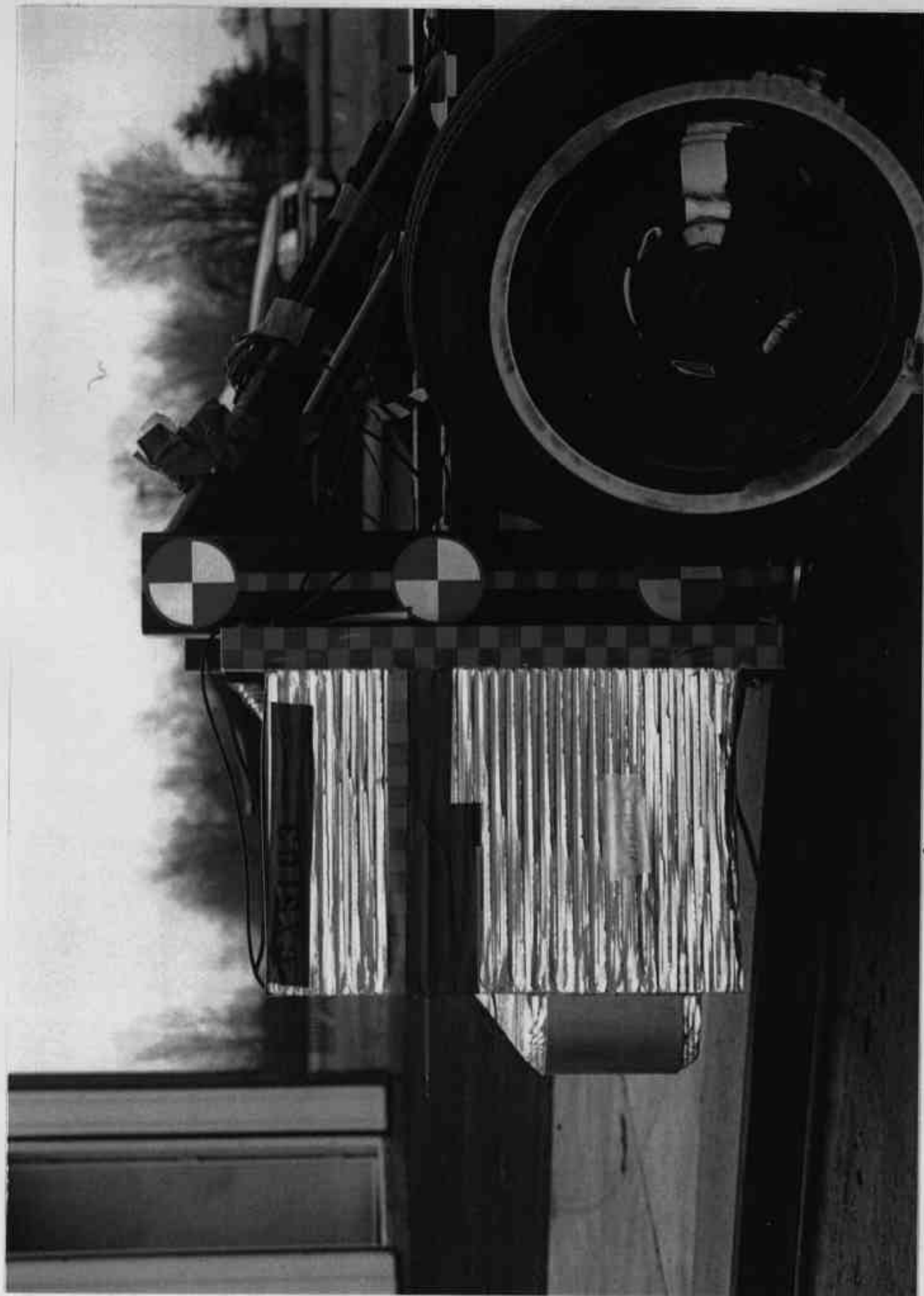


Figure A-9 PRE-TEST LEFT SIDE VIEW OF IMPACTOR FACE



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

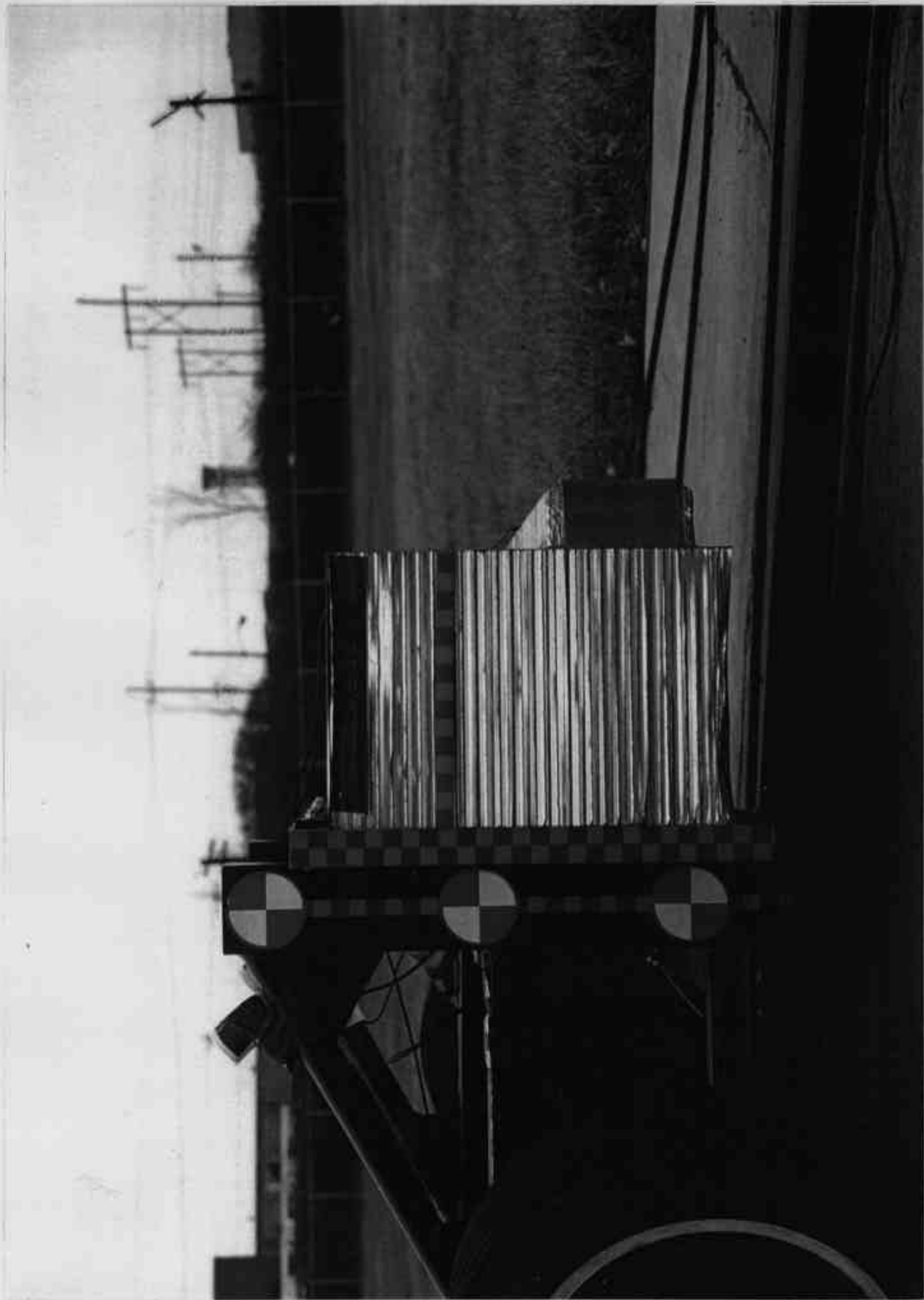


Figure A-11 PRE-TEST RIGHT SIDE VIEW OF IMPACTOR FACE

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

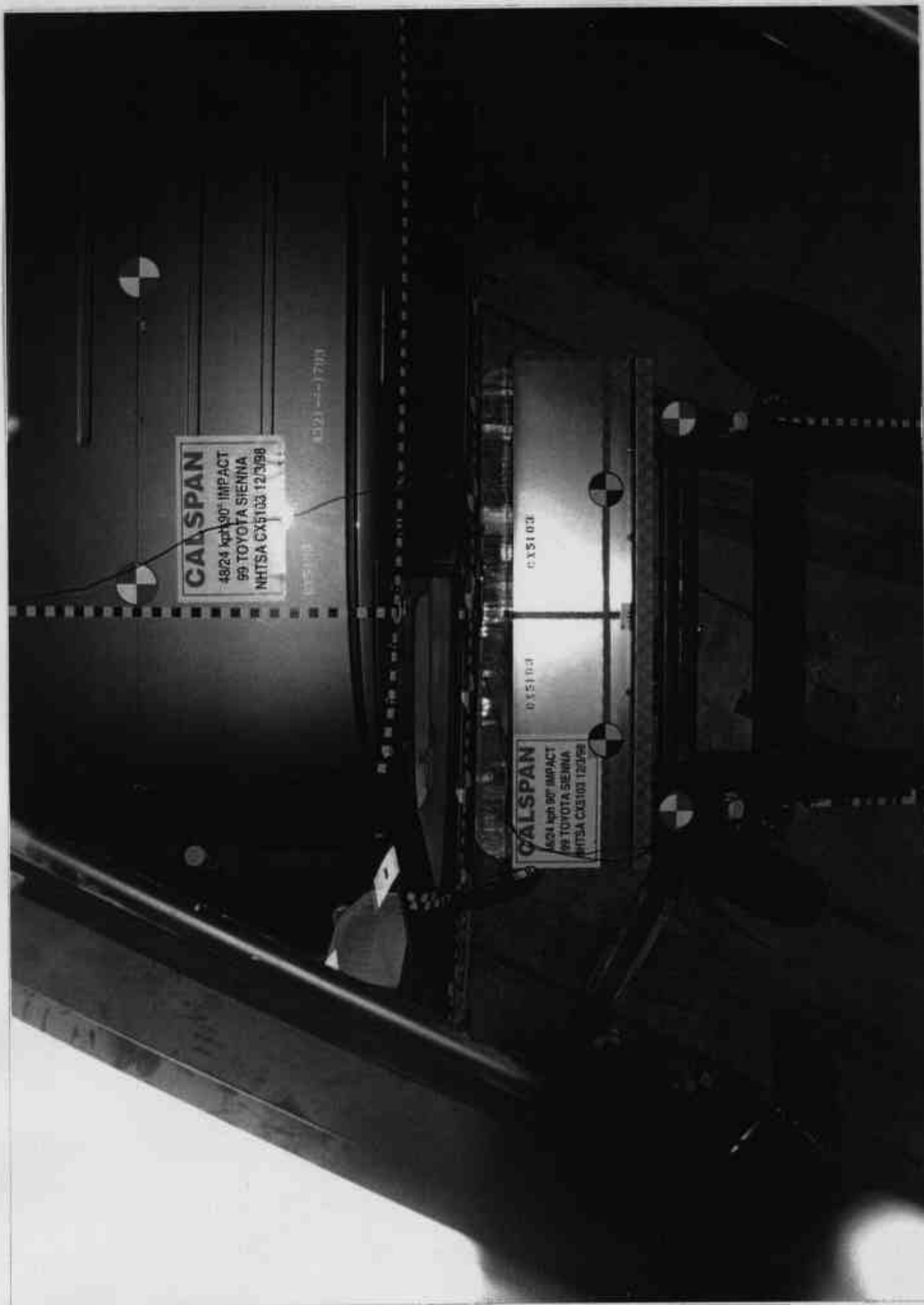


Figure A-15 PRE-TEST OVERHEAD VIEW OF ALIGNED MDB AND VEHICLE

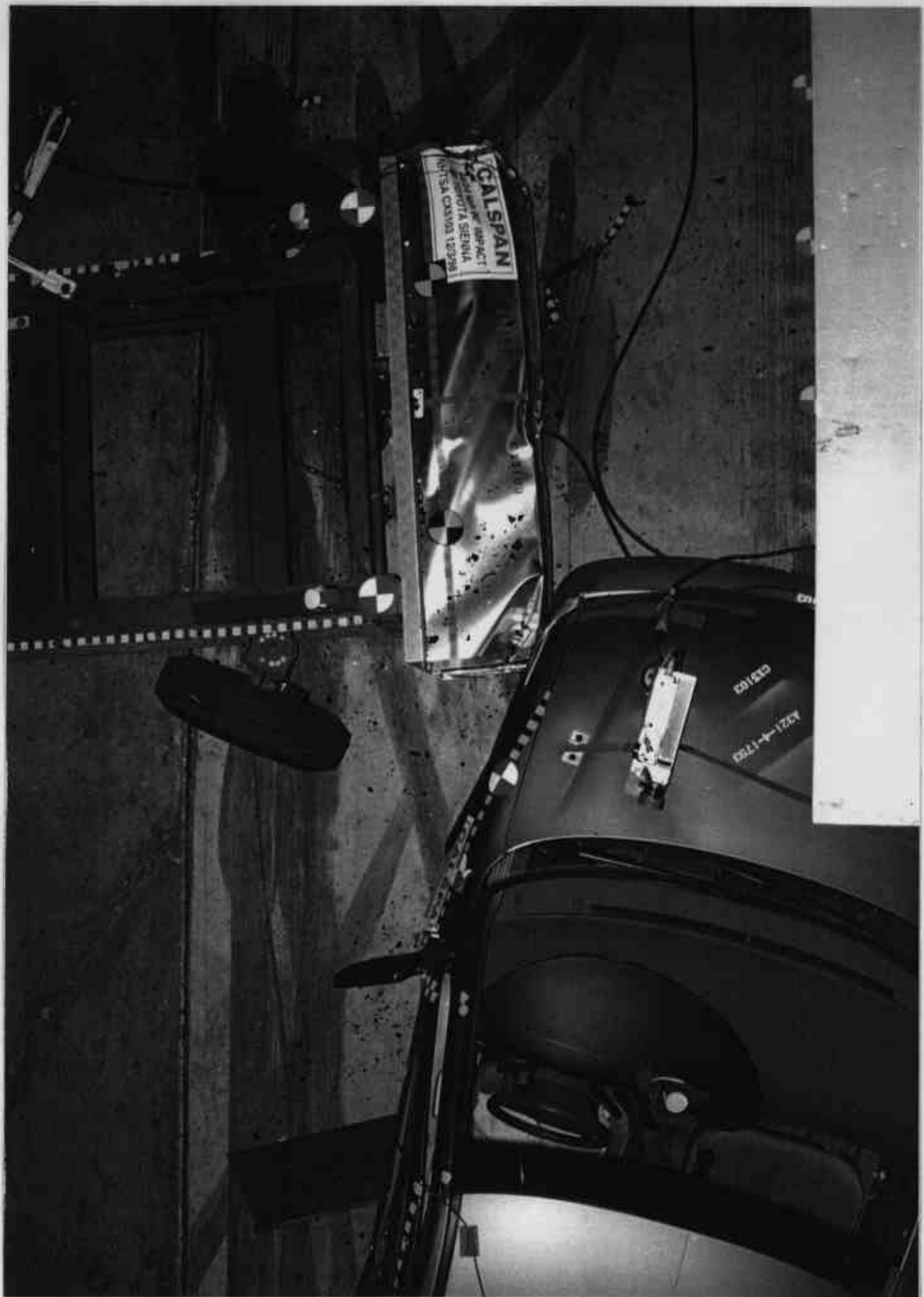


Figure A-16 POST-TEST OVERHEAD VIEW OF MDB AND VEHICLE



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

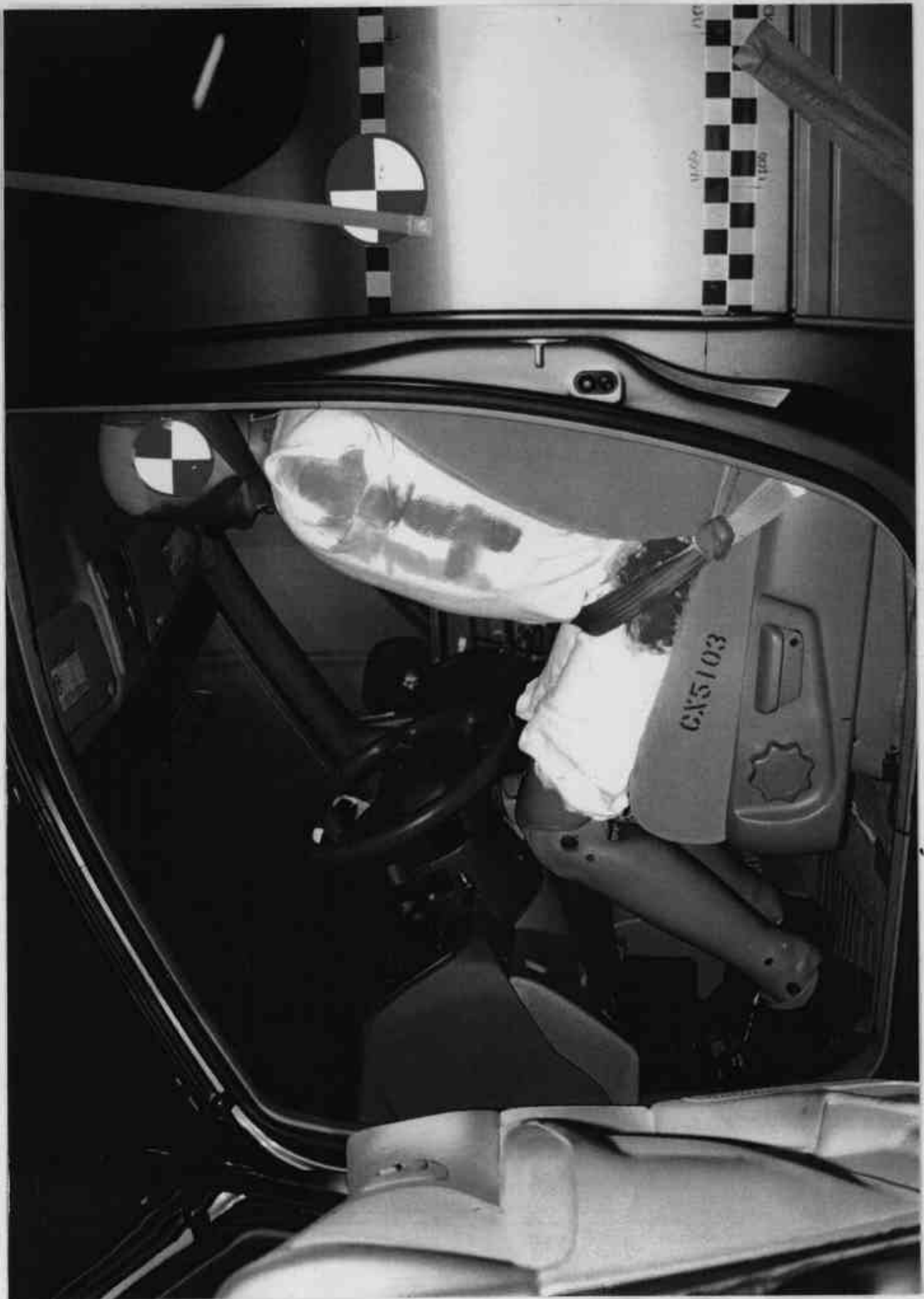


Figure A-21 PRE-TEST LEFT OCCUPANT COMPARTMENT VIEW OF FRONT SID



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



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

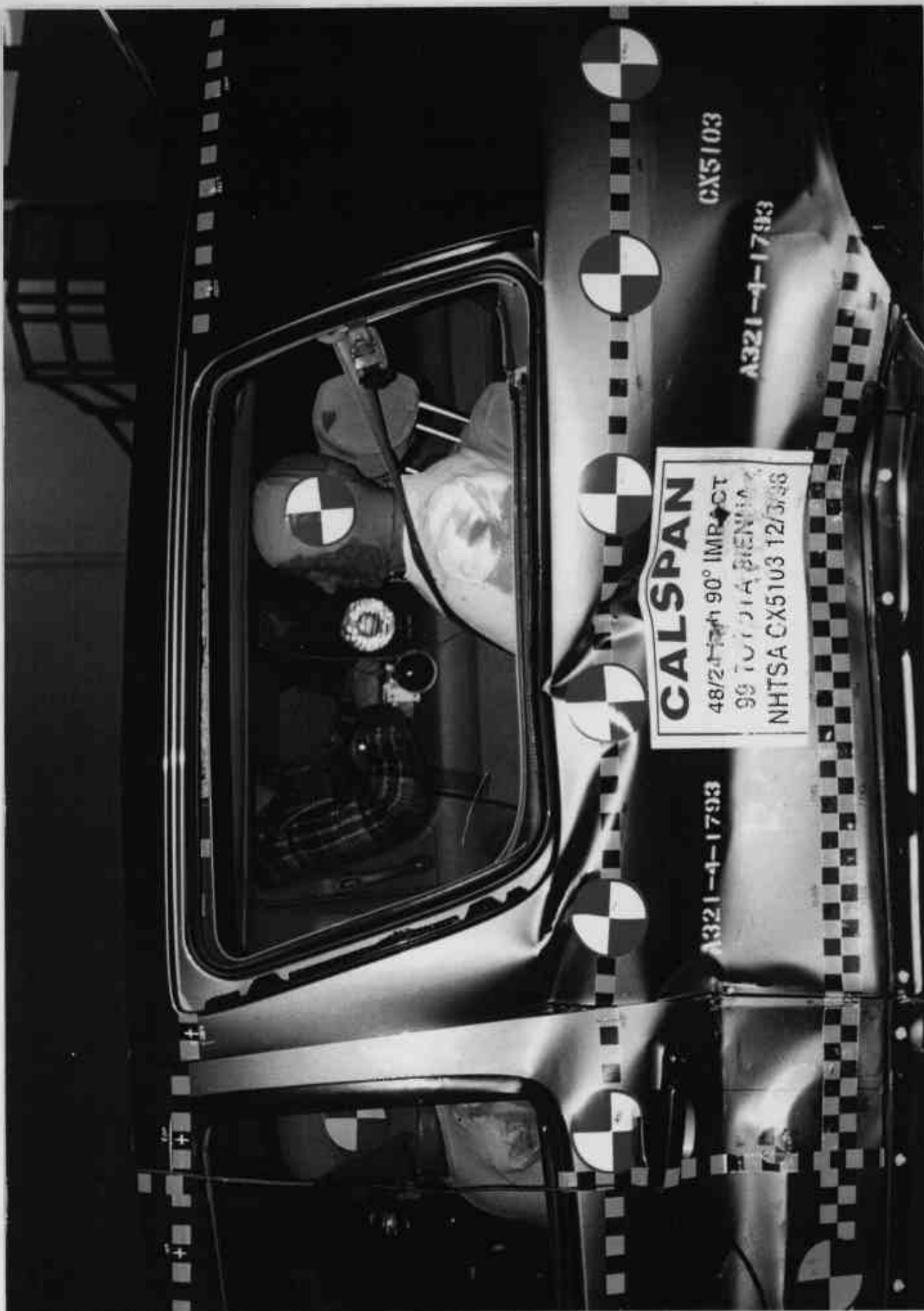


Figure A-24 POST-TEST LEFT OCCUPANT COMPARTMENT VIEW OF REAR SID



Figure A-25 PRE-TEST INTERIOR OF FRONT DOOR



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

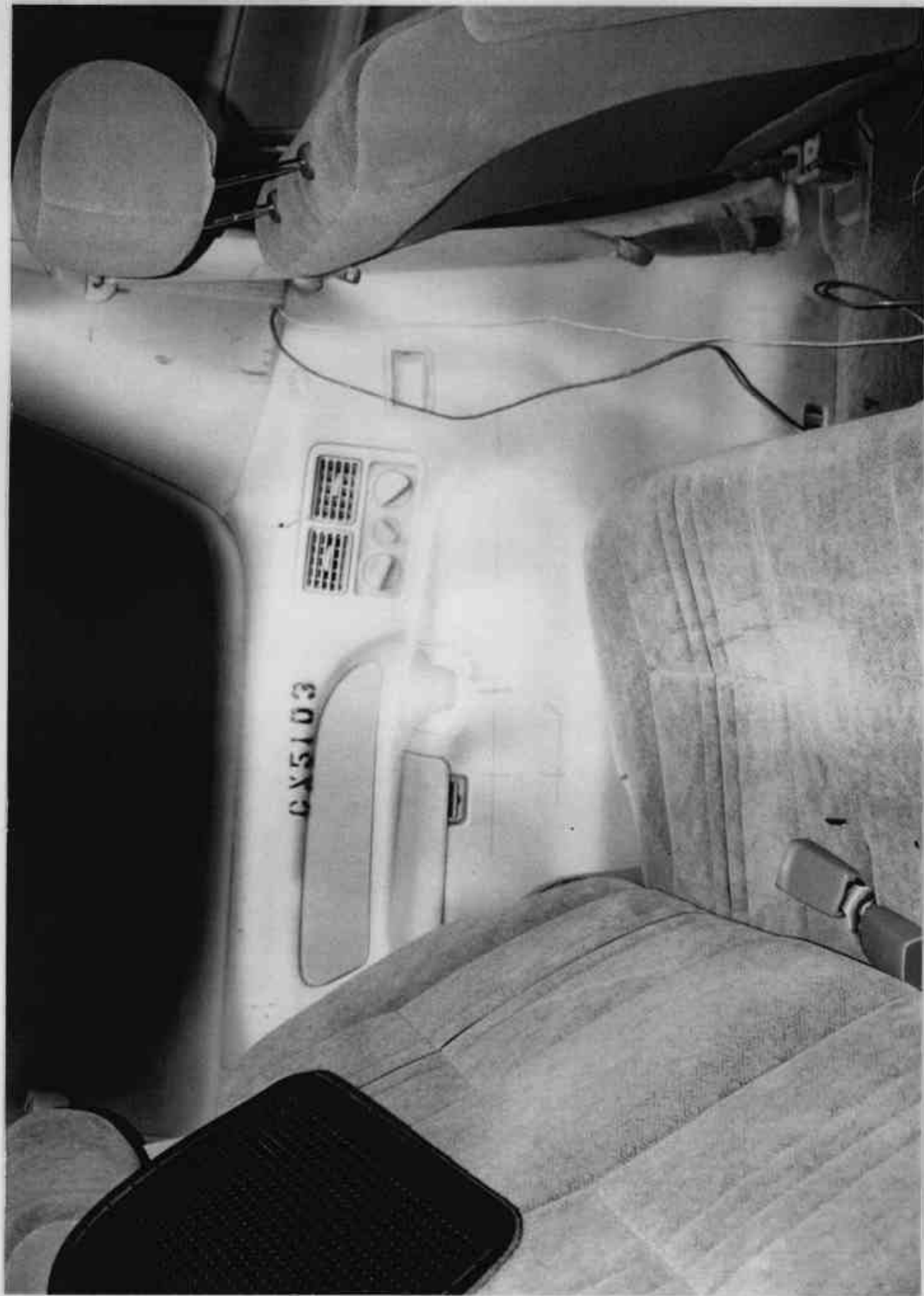


Figure A-27 PRE-TEST INTERIOR OF OCCUPANT COMPARTMENT

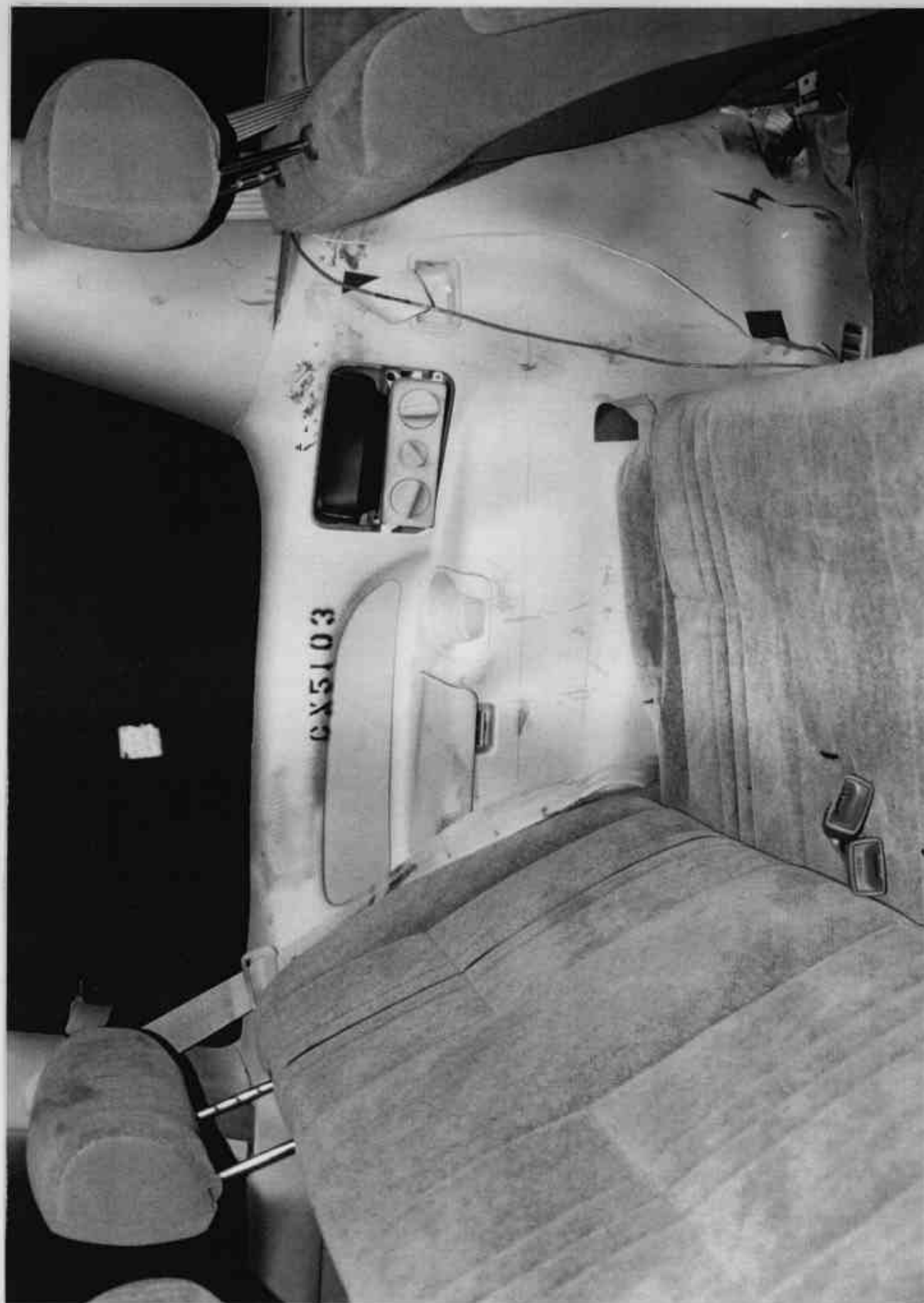


Figure A-28 POST-TEST INTERIOR OF OCCUPANT COMPARTMENT SHOWING SID IMPACT LOCATIONS



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

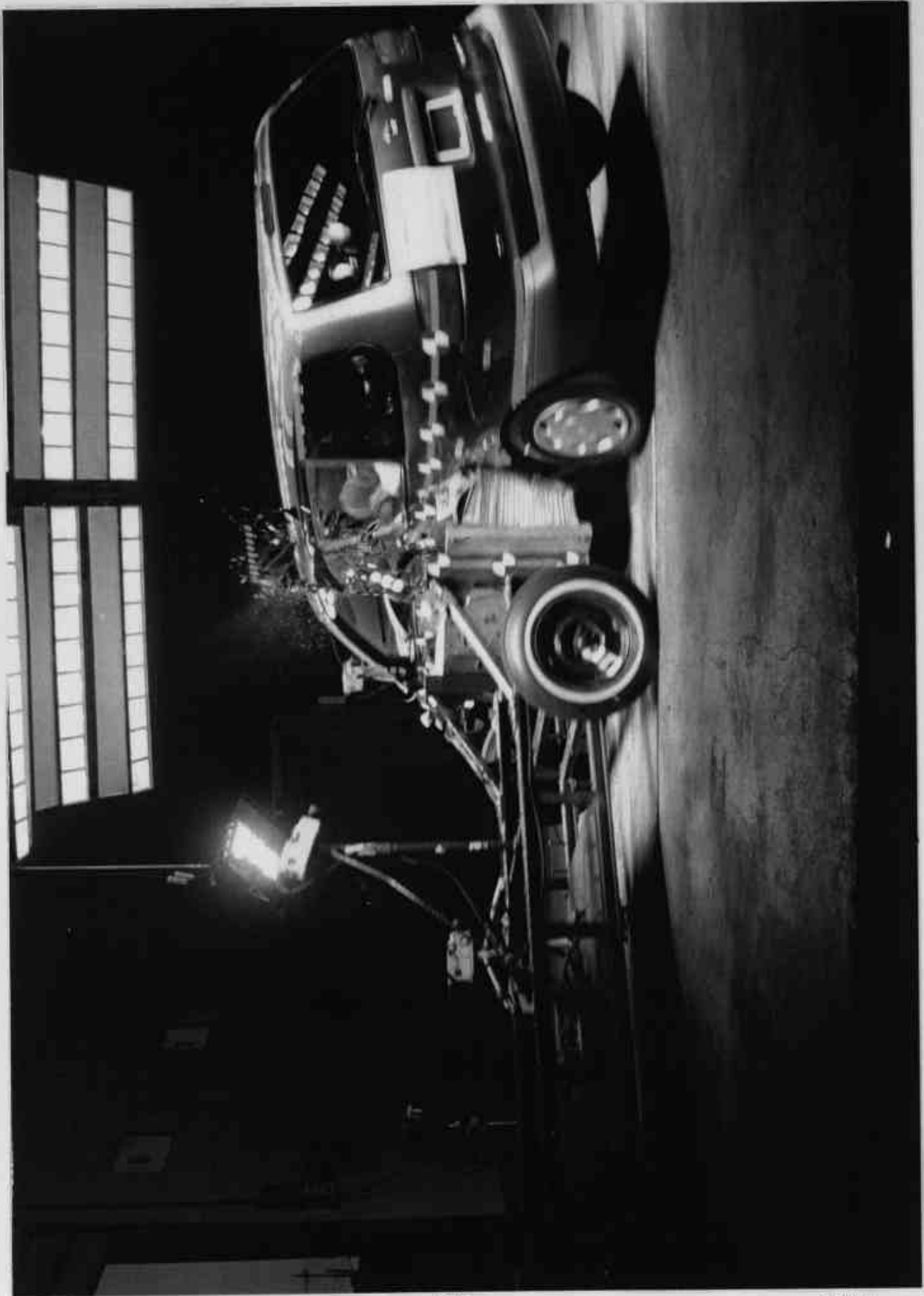


Figure A-32 CLOSE-UP VIEW OF VEHICLE'S CERTIFICATION LABEL

VEHICLE CAPACITY WEIGHT (CHARGE MAXIMALE DU VEHICULE): 526kg (1160 lb)		ARRIERE [3]	
OCCUPANT PERSONNES: TOTAL 7 (FRONT [AVANT] 2, CENTER [CENTRE] 2, REAR [ARRIERE] 3)			
RECOMMENDED TIRE SIZE & COLD INFLATION PRESSURE: F11 & R1			
INFLATION ET PRESSION DE GONFLAGE A FROID DES PNEUS RECOMMANDEES: AVANT [AVANT] 115 PSI (7.9 BAR) 300, VEHICULE CAPACITY WEIGHT (CHARGE MAXIMALE DU VEHICULE) AVEC 6 PERSONNES A BOARDED [AVANT] 115 PSI (7.9 BAR) 300, VEHICULE CAPACITY WEIGHT (CHARGE MAXIMALE DU VEHICULE) AVEC 6 PERSONNES A BOARDED [ARRIERE] 115 PSI (7.9 BAR) 300			
COLD INFLATION PRESSURE (PRESSION DE GONFLAGE A FROID DES PNEUS): 4.2 (2.9) (psi)			
FOR ADDITIONAL INFORMATION, SEE THE OWNER'S MANUAL (POUR PLUS DE DETAILS, VOIR LE MANUEL DU PROPRIETAIRE)			

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

Figure A-34. IMPACT PHOTO



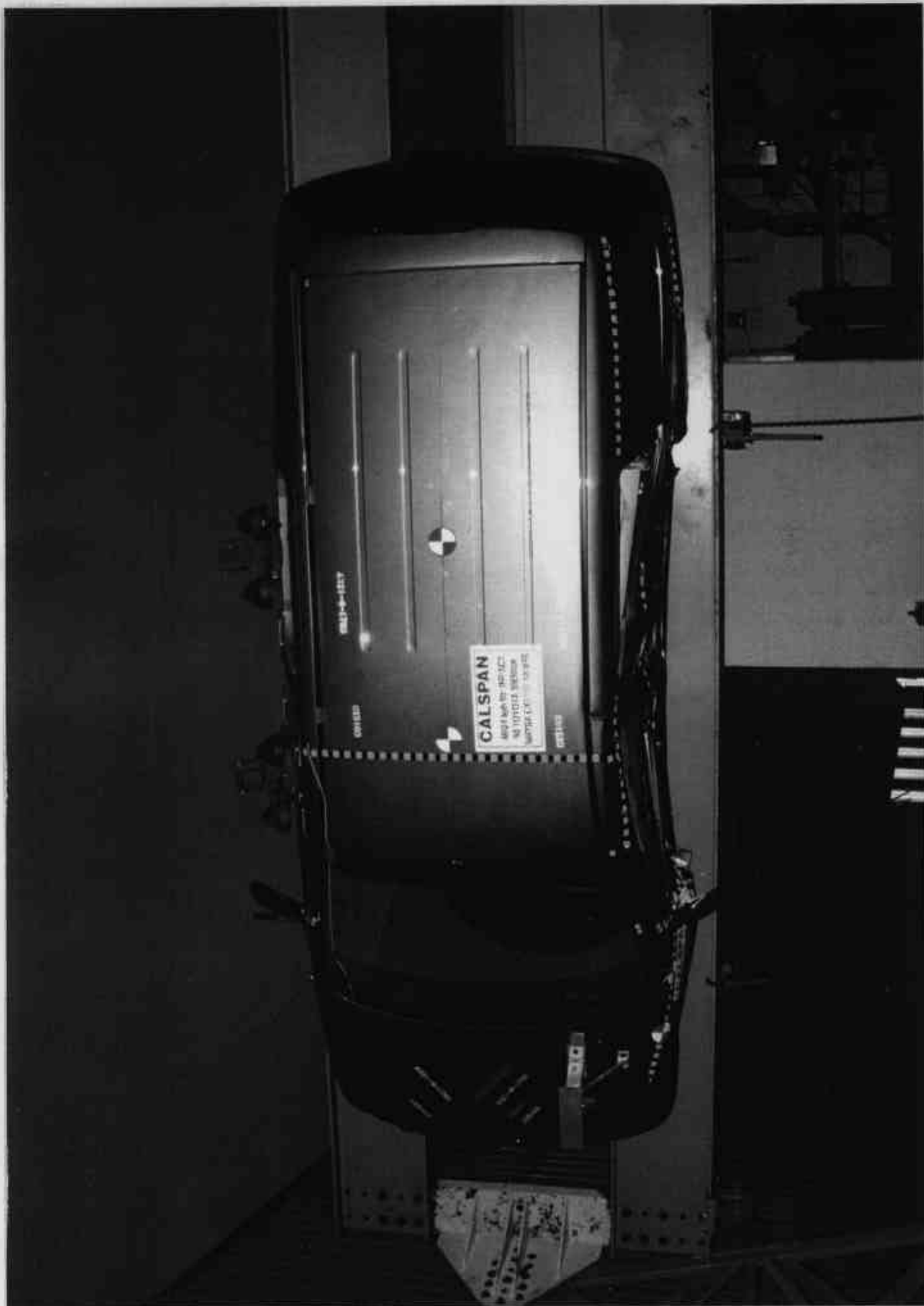


Figure A-35 ROLLOVER 90 DEGREES

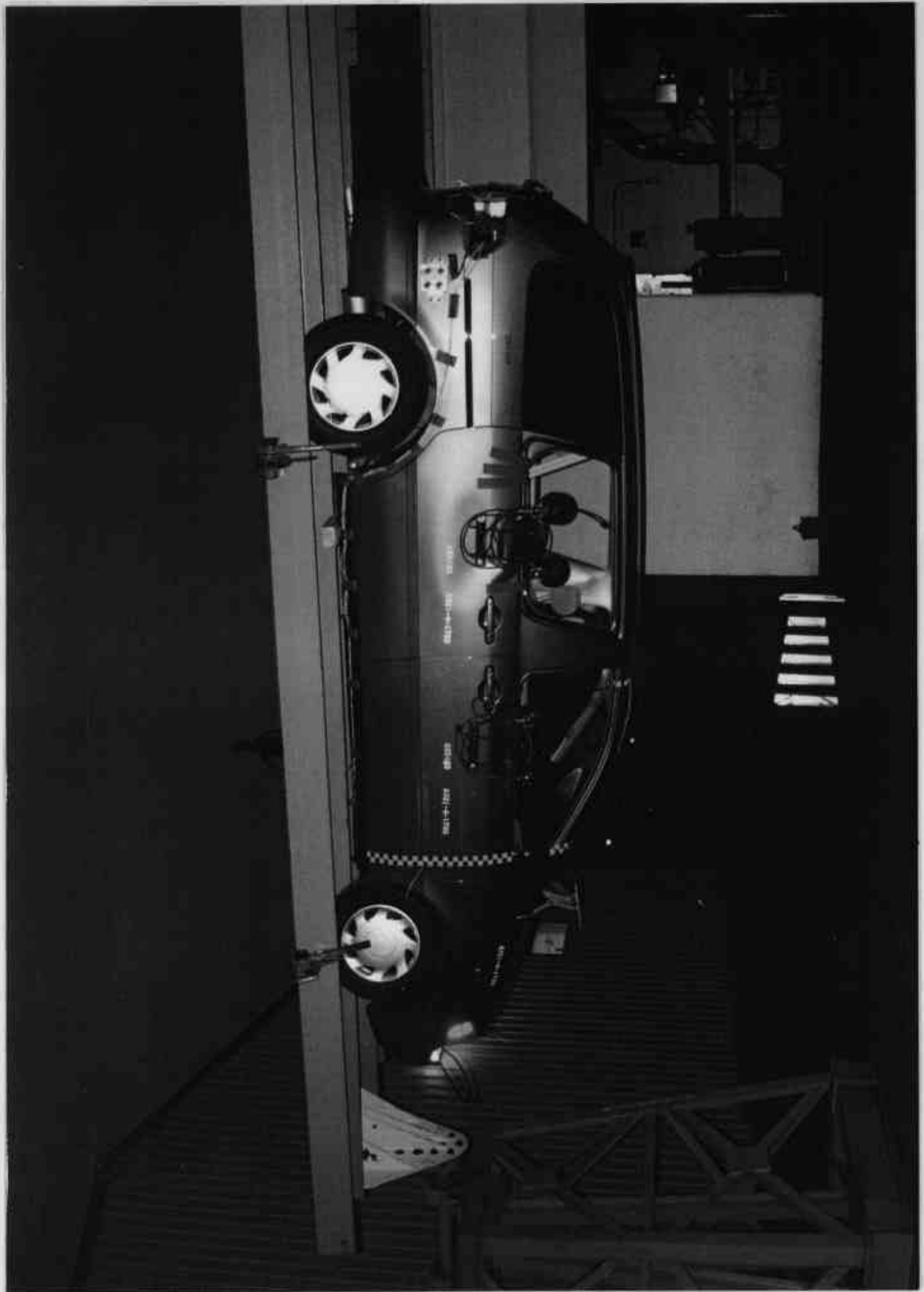


Figure A-36 ROLLOVER 180 DEGREES

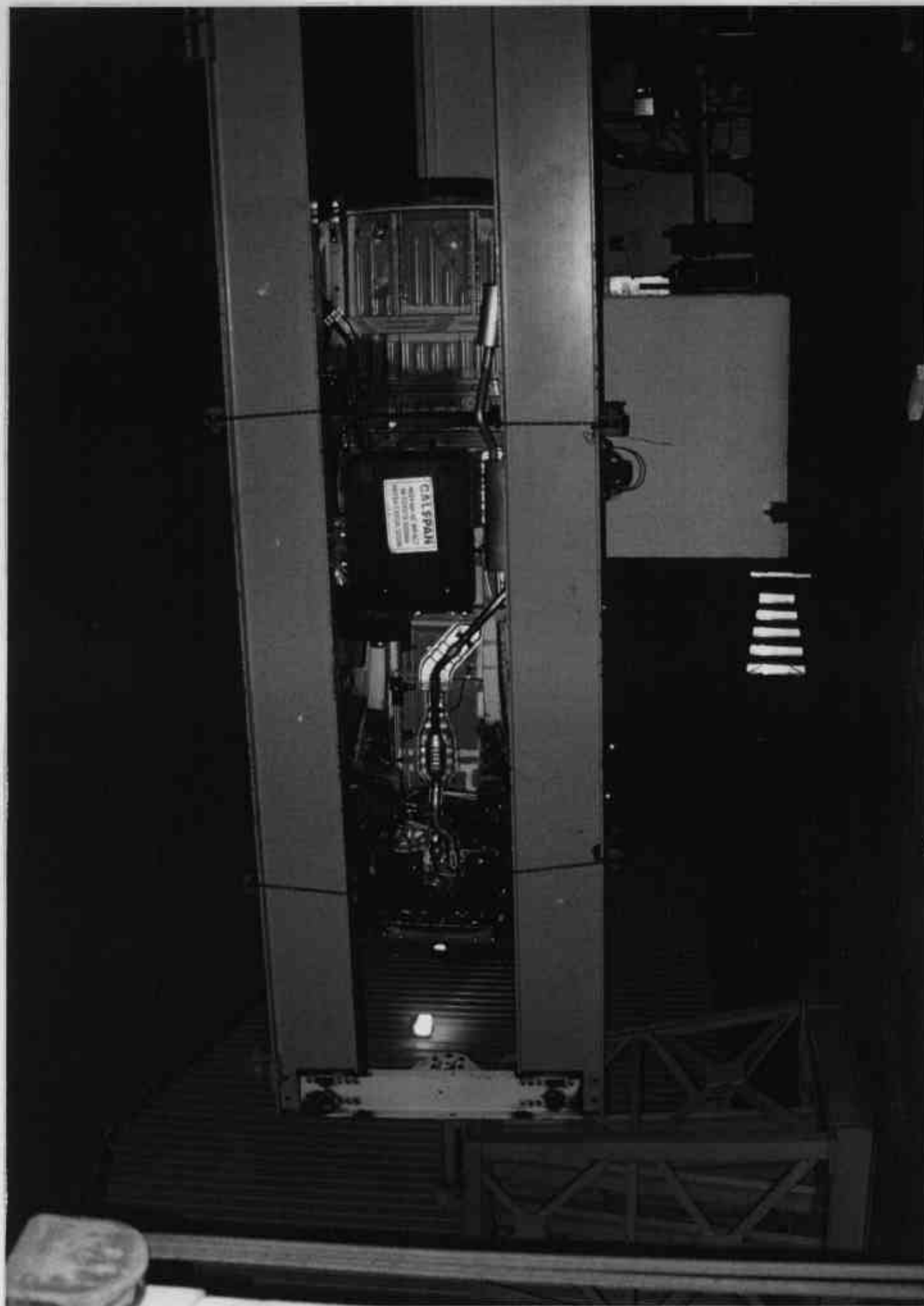


Figure A-37 ROLLOVER 270 DEGREES

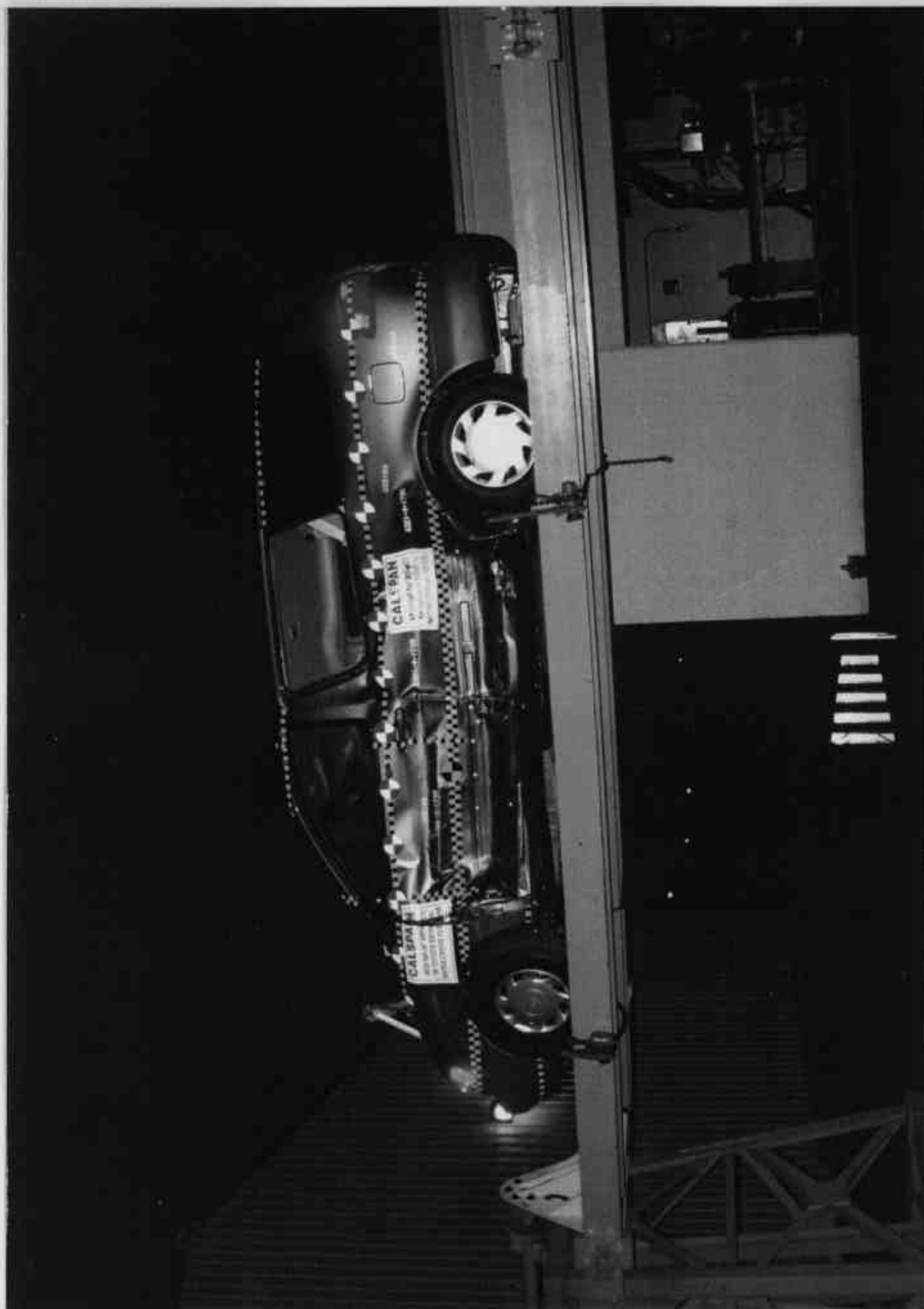


Figure A-38 ROLLOVER 360 DEGREES

APPENDIX B

VEHICLE, MDB AND SID RESPONSE DATA

TABLE OF DATA PLOTS

DRIVER AND PASSENGER DUMMY INSTRUMENTATION PLOTS

ACCELERATION DATA - FILTER CLASS 1000

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- 32
26	RIGHT SIDE SILL AT FRONT SEAT (X) VELOCITY VS TIME	B- 33
27	RIGHT SIDE SILL AT FRONT SEAT (Y) ACCELERATION VS TIME	B- 34
28	RIGHT SIDE SILL AT FRONT SEAT (Y) VELOCITY VS TIME	B- 35
29	RIGHT SIDE SILL AT FRONT SEAT (Z) ACCELERATION VS TIME	B- 36
30	RIGHT SIDE SILL AT FRONT SEAT (Z) VELOCITY VS TIME	B- 37
31	RIGHT SIDE SILL AT FRONT SEAT RESULTANT ACCELERATION VS TIME	B- 38
32	RIGHT SIDE SILL AT REAR SEAT (X) ACCELERATION VS TIME	B- 39
33	RIGHT SIDE SILL AT REAR SEAT (X) VELOCITY VS TIME	B- 40
34	RIGHT SIDE SILL AT REAR SEAT (Y) ACCELERATION VS TIME	B- 41
35	RIGHT SIDE SILL AT REAR SEAT (Y) VELOCITY VS TIME	B- 42
36	RIGHT SIDE SILL AT REAR SEAT (Z) ACCELERATION VS TIME	B- 43
37	RIGHT SIDE SILL AT REAR SEAT (Z) VELOCITY VS TIME	B- 44
38	RIGHT SIDE SILL AT REAR SEAT RESULTANT ACCELERATION VS TIME	B- 45

39	REAR FLOORPAN ABOVE AXLE (X) ACCELERATION VS TIME	B- 46
40	REAR FLOORPAN ABOVE AXLE (X) VELOCITY VS TIME	B- 47
41	REAR FLOORPAN ABOVE AXLE (Y) ACCELERATION VS TIME	B- 48
42	REAR FLOORPAN ABOVE AXLE (Y) VELOCITY VS TIME	B- 49
43	REAR FLOORPAN ABOVE AXLE (Z) ACCELERATION VS TIME	B- 50
44	REAR FLOORPAN ABOVE AXLE (Z) VELOCITY VS TIME	B- 51
45	REAR FLOORPAN ABOVE AXLE RESULTANT ACCELERATION VS TIME	B- 52
46	LEFT SIDE SILL AT REAR SEAT (Y) ACCELERATION VS TIME	B- 53
47	LEFT SIDE SILL AT REAR SEAT (Y) VELOCITY VS TIME	B- 54
48	LEFT SIDE SILL AT FRONT SEAT (Y) ACCELERATION VS TIME	B- 55
49	LEFT SIDE SILL AT FRONT SEAT (Y) VELOCITY VS TIME	B- 56
50	RIGHT REAR OCCUPANT COMPARTMENT (Y) ACCELERATION VS TIME	B- 57
51	RIGHT REAR OCCUPANT COMPARTMENT (Y) VELOCITY VS TIME	B- 58
52	LOWER B-POST (Y) ACCELERATION VS TIME	B- 59
53	LOWER B-POST (Y) VELOCITY VS TIME	B- 60
54	UPPER B-POST (Y) ACCELERATION VS TIME	B- 61
55	UPPER B-POST (Y) VELOCITY VS TIME	B- 62
56	LOWER A-POST (Y) ACCELERATION VS TIME	B- 63
57	LOWER A-POST (Y) VELOCITY VS TIME	B- 64
58	UPPER A-POST (Y) ACCELERATION VS TIME	B- 65
59	UPPER A-POST (Y) VELOCITY VS TIME	B- 66
60	FRONT SEAT TRACK (Y) ACCELERATION VS TIME	B- 67
61	FRONT SEAT TRACK (Y) VELOCITY VS TIME	B- 68
62	REAR SEAT TRACK (Y) ACCELERATION VS TIME	B- 69
63	REAR SEAT TRACK (Y) VELOCITY VS TIME	B- 70
64	VEHICLE CENTER OF GRAVITY (X) ACCELERATION VS TIME	B- 71
65	VEHICLE CENTER OF GRAVITY (X) VELOCITY VS TIME	B- 72
66	VEHICLE CENTER OF GRAVITY (Y) ACCELERATION VS TIME	B- 73
67	VEHICLE CENTER OF GRAVITY (Y) VELOCITY ACCELERATION VS TIME	B- 74
68	VEHICLE CENTER OF GRAVITY (Z) ACCELERATION VS TIME	B- 75
69	VEHICLE CENTER OF GRAVITY (Z) VELOCITY VS TIME	B- 76
70	VEHICLE CENTER OF GRAVITY RESULTANT ACCELERATION VS TIME	B- 77

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>
71	MDB CENTER OF GRAVITY (X) ACCELERATION VS TIME	B- 79
72	MDB CENTER OF GRAVITY (X) VELOCITY VS TIME	B- 80
73	MDB CENTER OF GRAVITY (Y) ACCELERATION VS TIME	B- 81
74	MDB CENTER OF GRAVITY (Y) VELOCITY VS TIME	B- 82
75	MDB CENTER OF GRAVITY (Z) ACCELERATION VS TIME	B- 83
76	MDB CENTER OF GRAVITY (Z) VELOCITY VS TIME	B- 84
77	MDB CENTER OF GRAVITY RESULTANT ACCELERATION VS TIME	B- 85
78	MDB REAR (X) ACCELERATION VS TIME	B- 86
79	MDB REAR (X) VELOCITY VS TIME	B- 87
80	MDB REAR (Y) ACCELERATION VS TIME	B- 88
81	MDB REAR (Y) VELOCITY VS TIME	B- 89

DRIVER & PASSENGER DUMMY INSTRUMENTATION PLOTS (REDUNDANT)
ACCELERATION DATA - FILTER CLASS 1000
INTEGRATION DATA - FILTER CLASS 180

<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
82	DRIVER UPPER RIB (Y) ACCELERATION VS TIME	B- 91
83	DRIVER UPPER RIB (Y) VELOCITY VS TIME	B- 92
84	DRIVER LOWER RIB (Y) ACCELERATION VS TIME	B- 93
85	DRIVER LOWER RIB (Y) VELOCITY VS TIME	B- 94
86	DRIVER LOWER SPINE (Y) ACCELERATION VS TIME	B- 95
87	DRIVER LOWER SPINE (Y) VELOCITY VS TIME	B- 96
88	DRIVER PELVIC (Y) ACCELERATION VS TIME	B- 97
89	DRIVER PELVIC (Y) VELOCITY VS TIME	B- 98
90	PASSENGER UPPER RIB (Y) ACCELERATION VS TIME	B- 99
91	PASSENGER UPPER RIB (Y) VELOCITY VS TIME	B- 100
92	PASSENGER LOWER RIB (Y) ACCELERATION VS TIME	B- 101
93	PASSENGER LOWER RIB (Y) VELOCITY VS TIME	B- 102
94	PASSENGER LOWER SPINE (Y) ACCELERATION VS TIME	B- 103
95	PASSENGER LOWER SPINE (Y) VELOCITY VS TIME	B- 104
96	PASSENGER PELVIC (Y) ACCELERATION VS TIME	B- 105
97	PASSENGER PELVIC (Y) VELOCITY VS TIME	B- 106

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

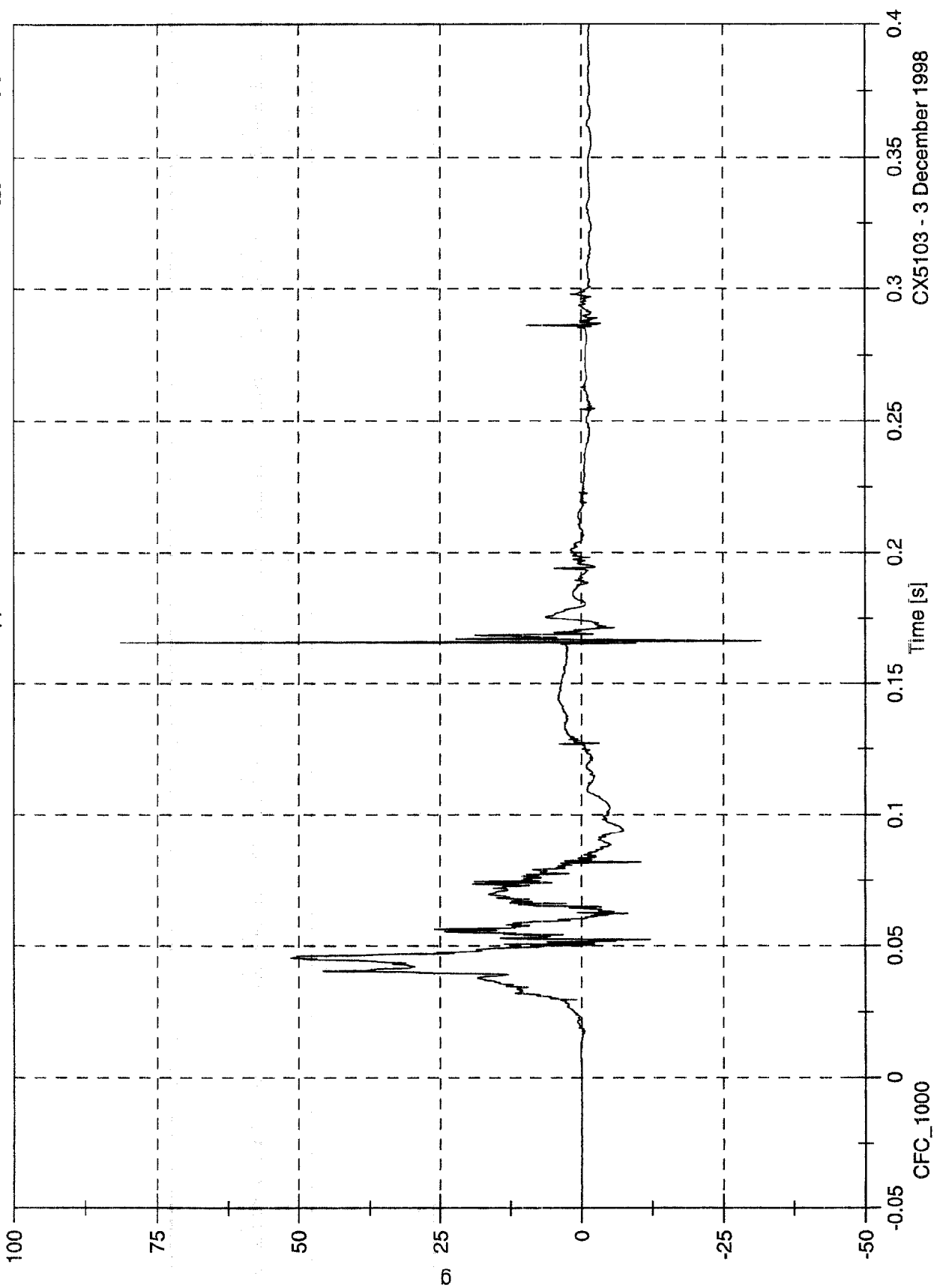
<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
98	DRIVER UPPER RIB (Y) ACCELERATION VS TIME	B- 108
99	DRIVER LOWER RIB (Y) ACCELERATION VS TIME	B- 109
100	DRIVER LOWER SPINE (Y) ACCELERATION VS TIME	B- 110
101	DRIVER PELVIC (Y) ACCELERATION VS TIME	B- 111
102	PASSENGER UPPER RIB (Y) ACCELERATION VS TIME	B- 112
103	PASSENGER LOWER RIB (Y) ACCELERATION VS TIME	B- 113
104	PASSENGER LOWER SPINE (Y) ACCELERATION VS TIME	B- 114
105	PASSENGER PELVIC (Y) ACCELERATION VS TIME	B- 115

DRIVER AND PASSENGER DUMMY INSTRUMENTATION PLOTS
ACCELERATION DATA - FILTER CLASS 1000
INTEGRATION DATA - FILTER CLASS 180

NHTSA Side Impact - 1999 Toyota Sienna

Max: 81.5 [g] at 0.166 [s]
Min: -31.6 [g] at 0.167 [s]

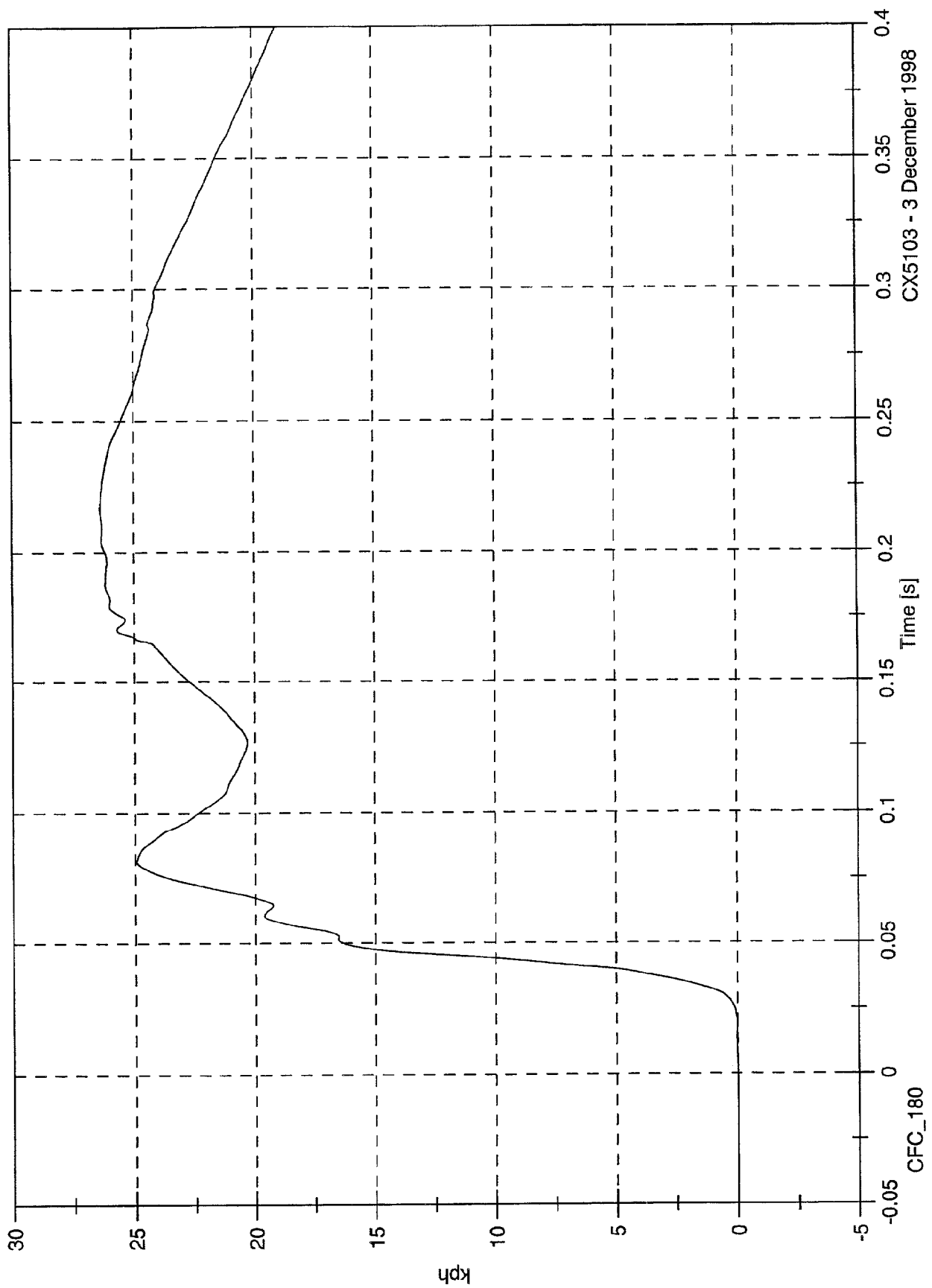
Driver Upper Rib Y



NHTSA Side Impact - 1999 Toyota Sienna

Max: 26.4 [kph] at 0.217 [s]
Min: -0.0 [kph] at -0.062 [s]

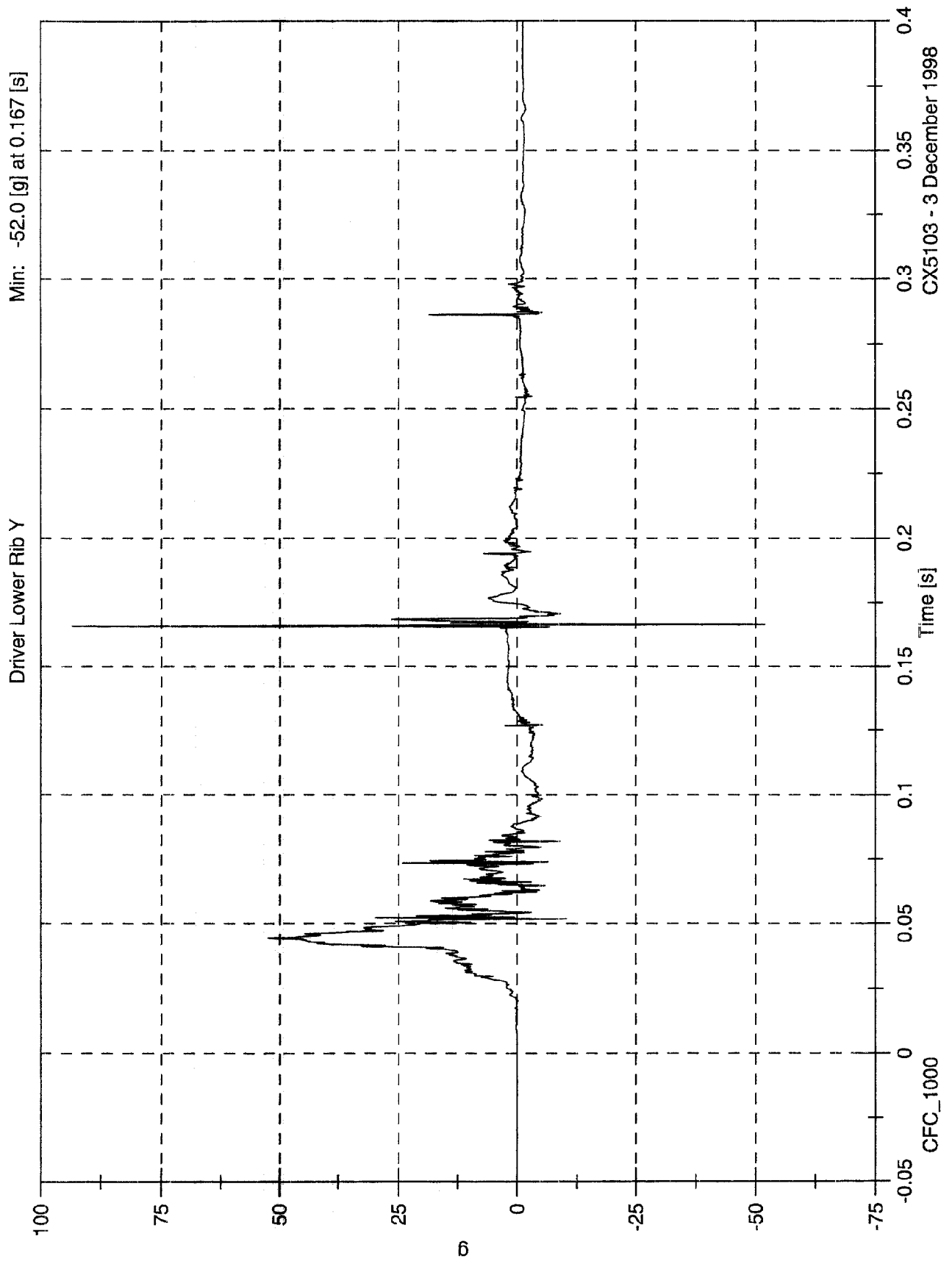
Driver Upper Rib Y



CX5103 - 3 December 1998

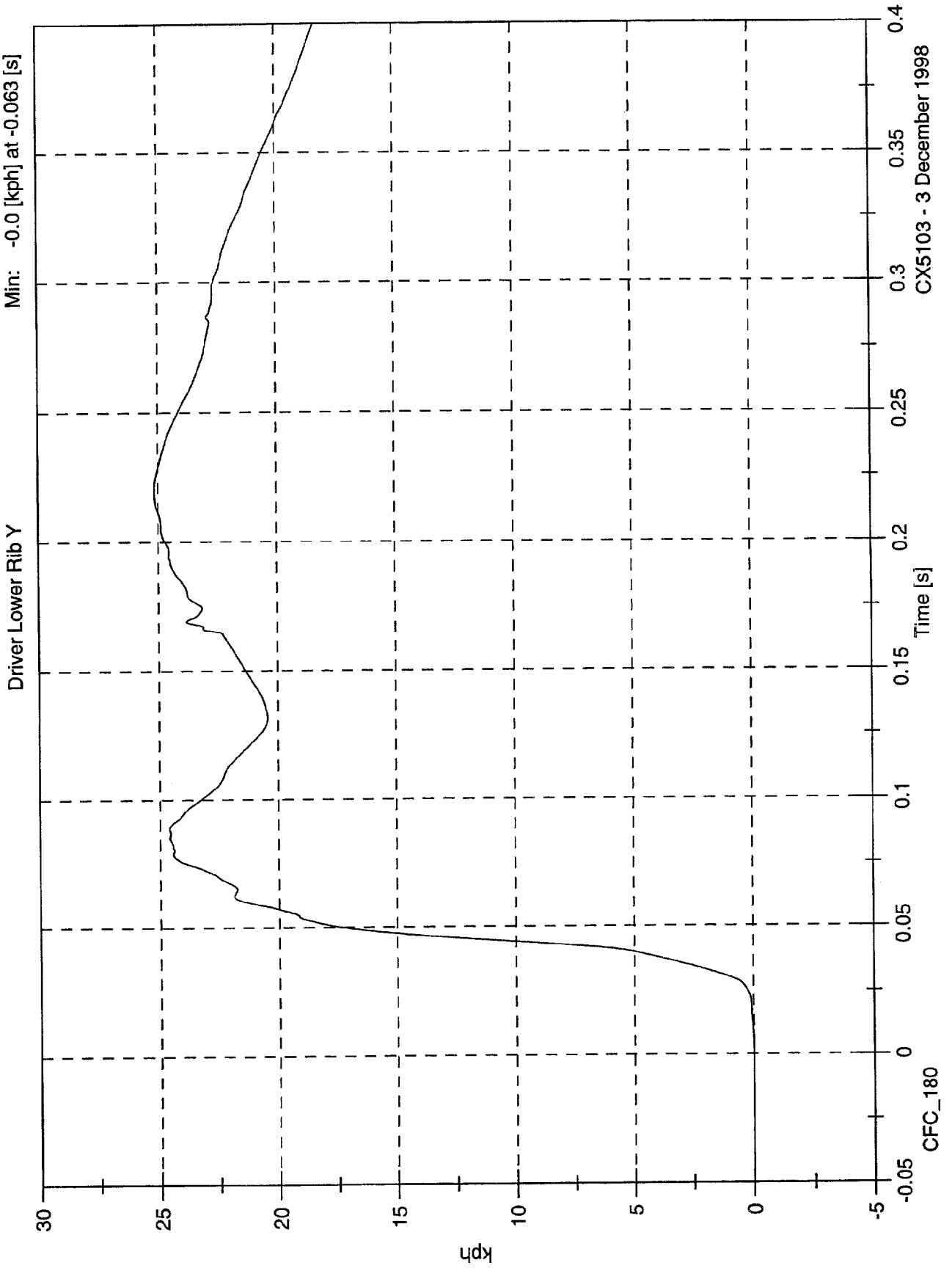
NHTSA Side Impact - 1999 Toyota Sienna

Max: 93.5 [g] at 0.166 [s]
Min: -52.0 [g] at 0.167 [s]



CX5103 - 3 December 1998

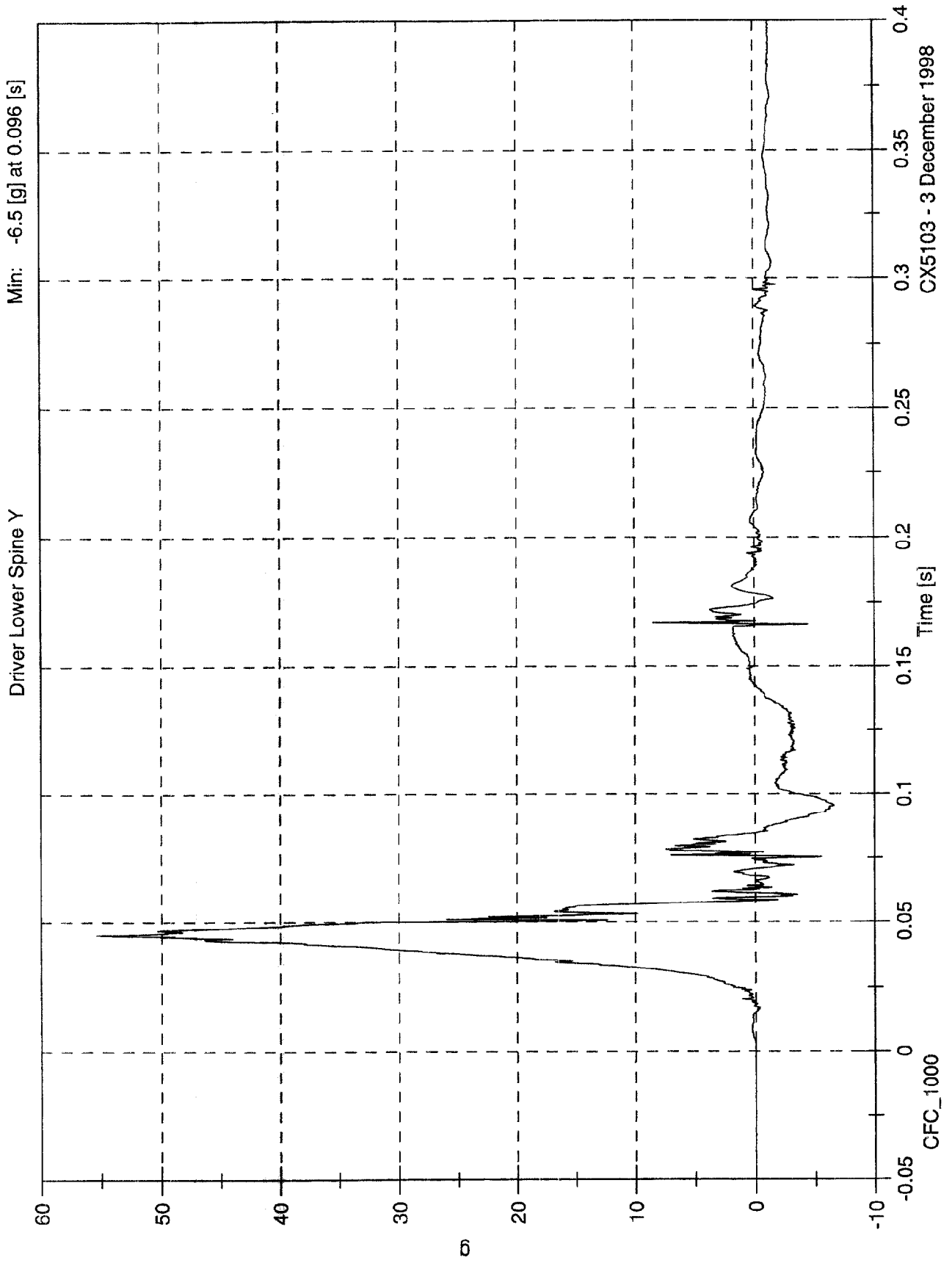
NHTSA Side Impact - 1999 Toyota Sienna



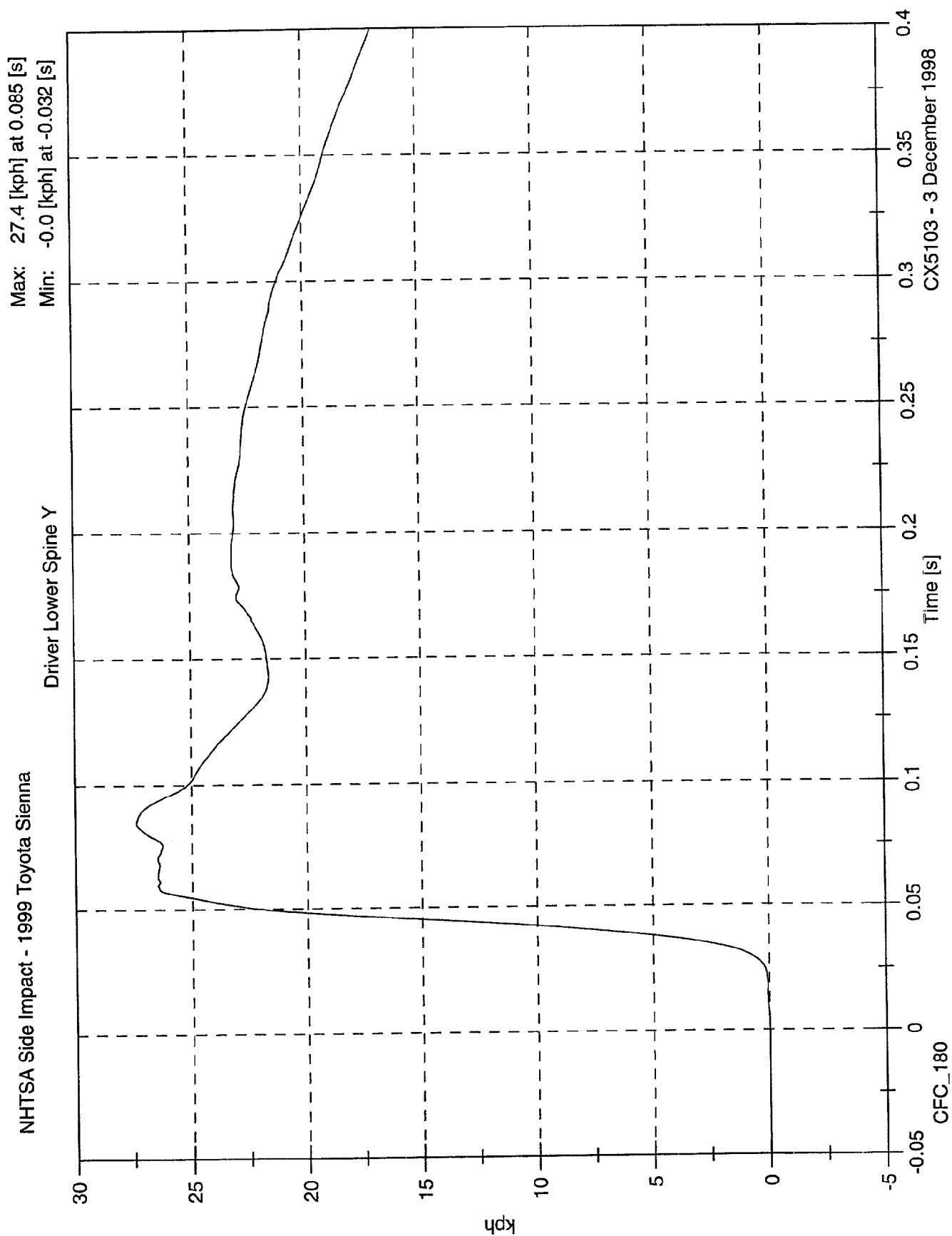
CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 55.3 [g] at 0.045 [s]
 Min: -6.5 [g] at 0.096 [s]



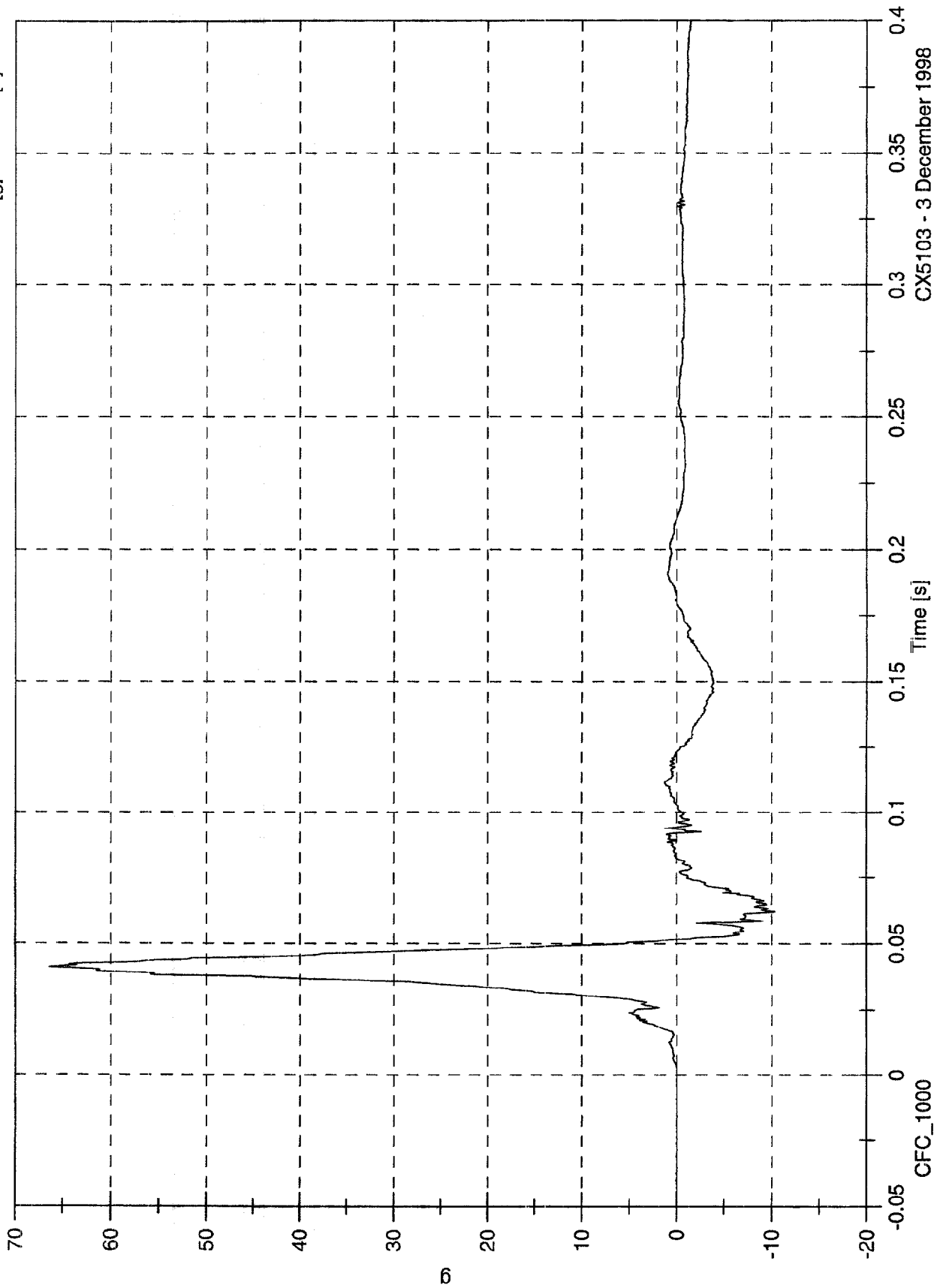
CX5103 - 3 December 1998



NHTSA Side Impact - 1999 Toyota Sienna

Max: 66.4 [g] at 0.041 [s]
Min: -10.4 [g] at 0.062 [s]

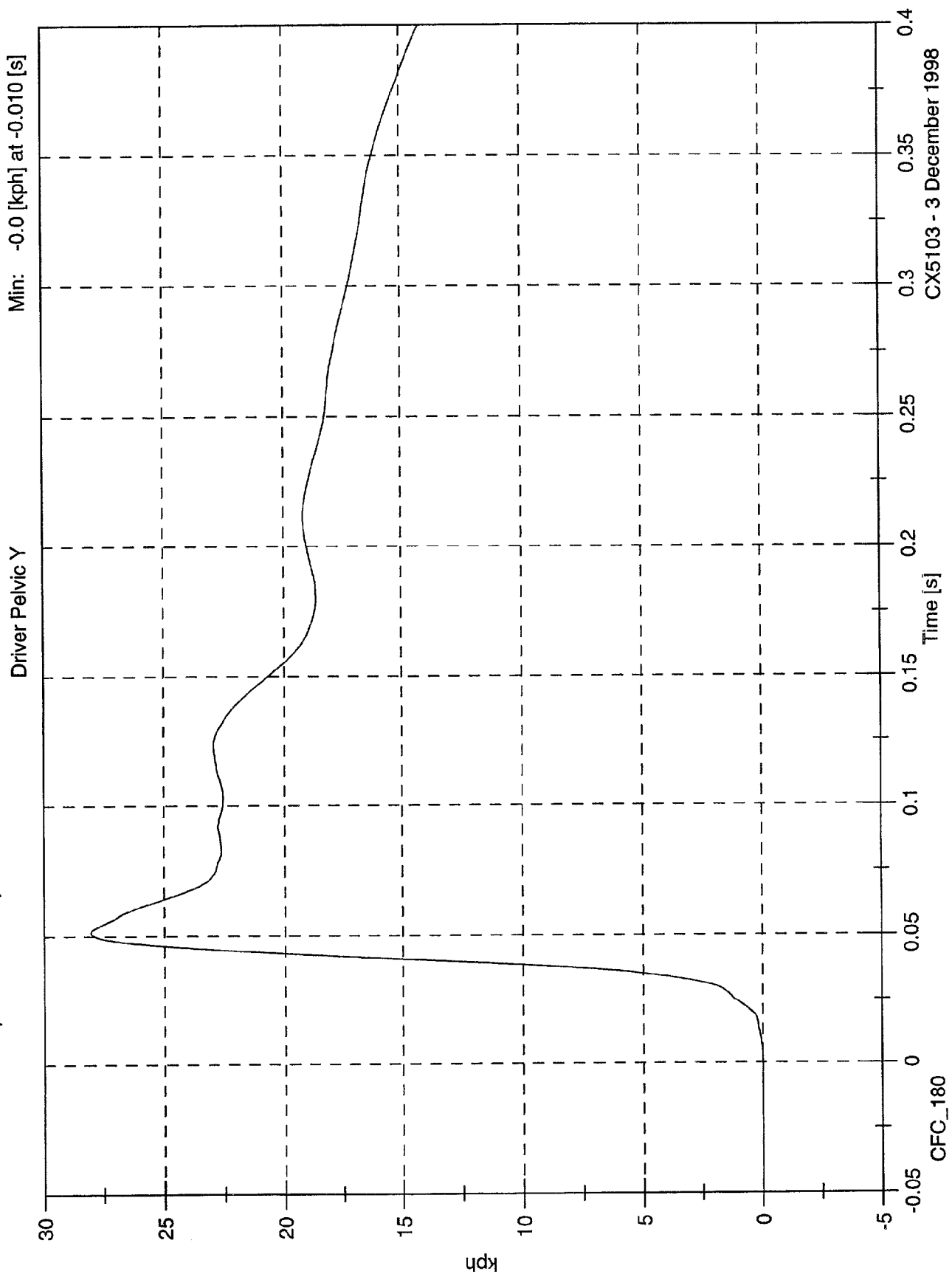
Driver Pelvic Y



CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

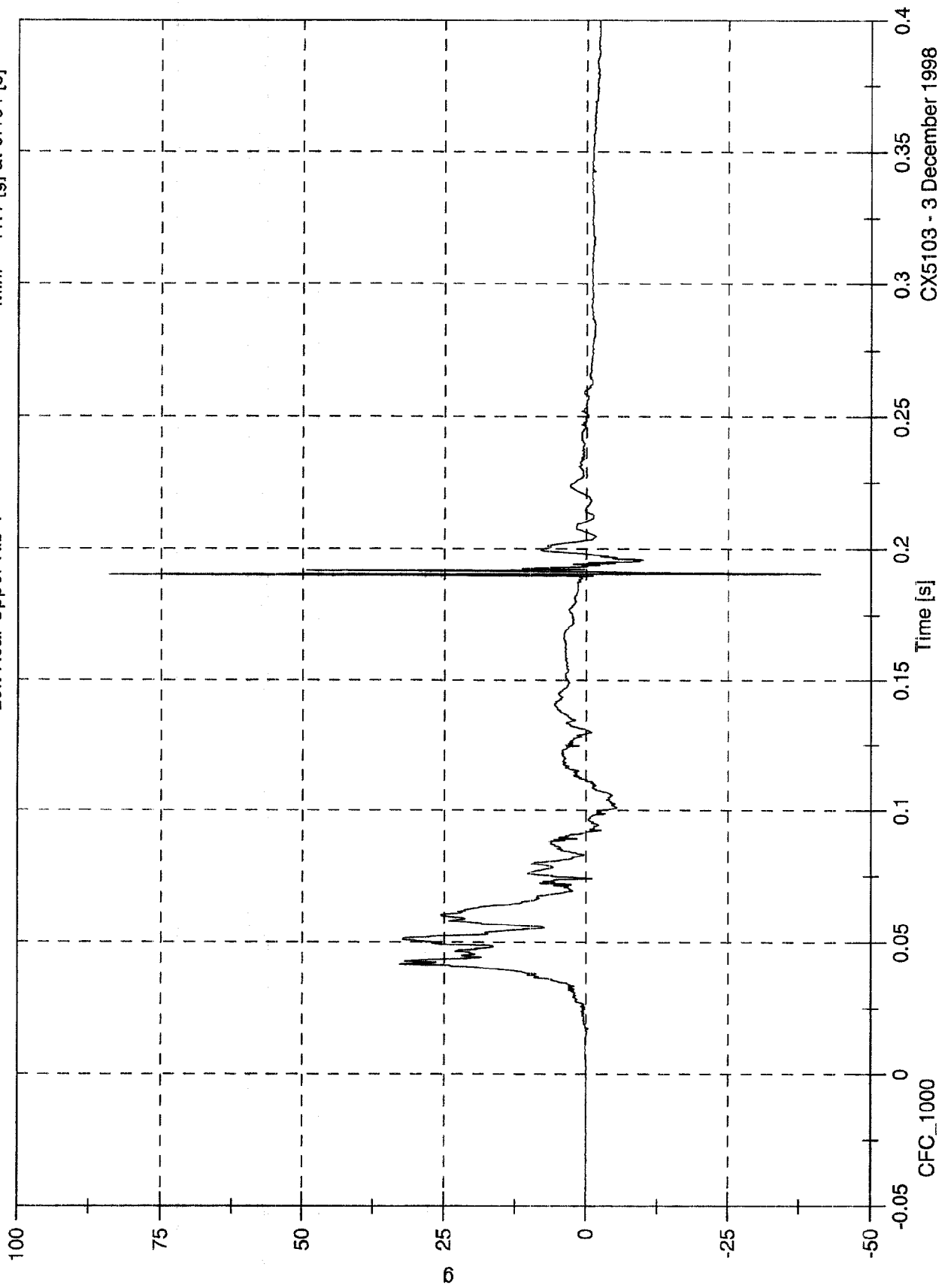
Max: 28.0 [kph] at 0.051 [s]
Min: -0.0 [kph] at -0.010 [s]



NHTSA Side Impact - 1999 Toyota Sienna

Max: 84.0 [g] at 0.190 [s]
Min: -41.1 [g] at 0.191 [s]

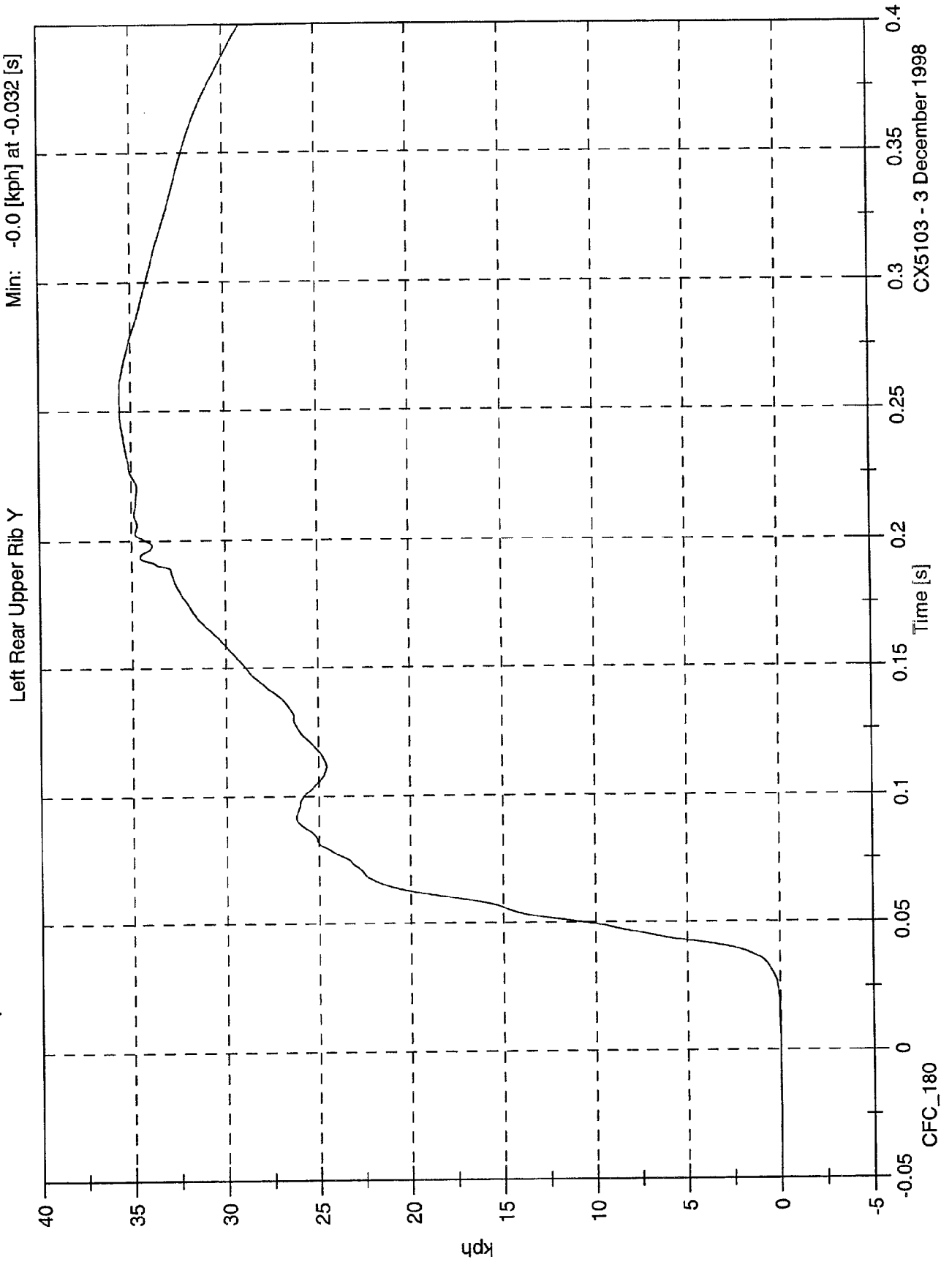
Left Rear Upper Rib Y



CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

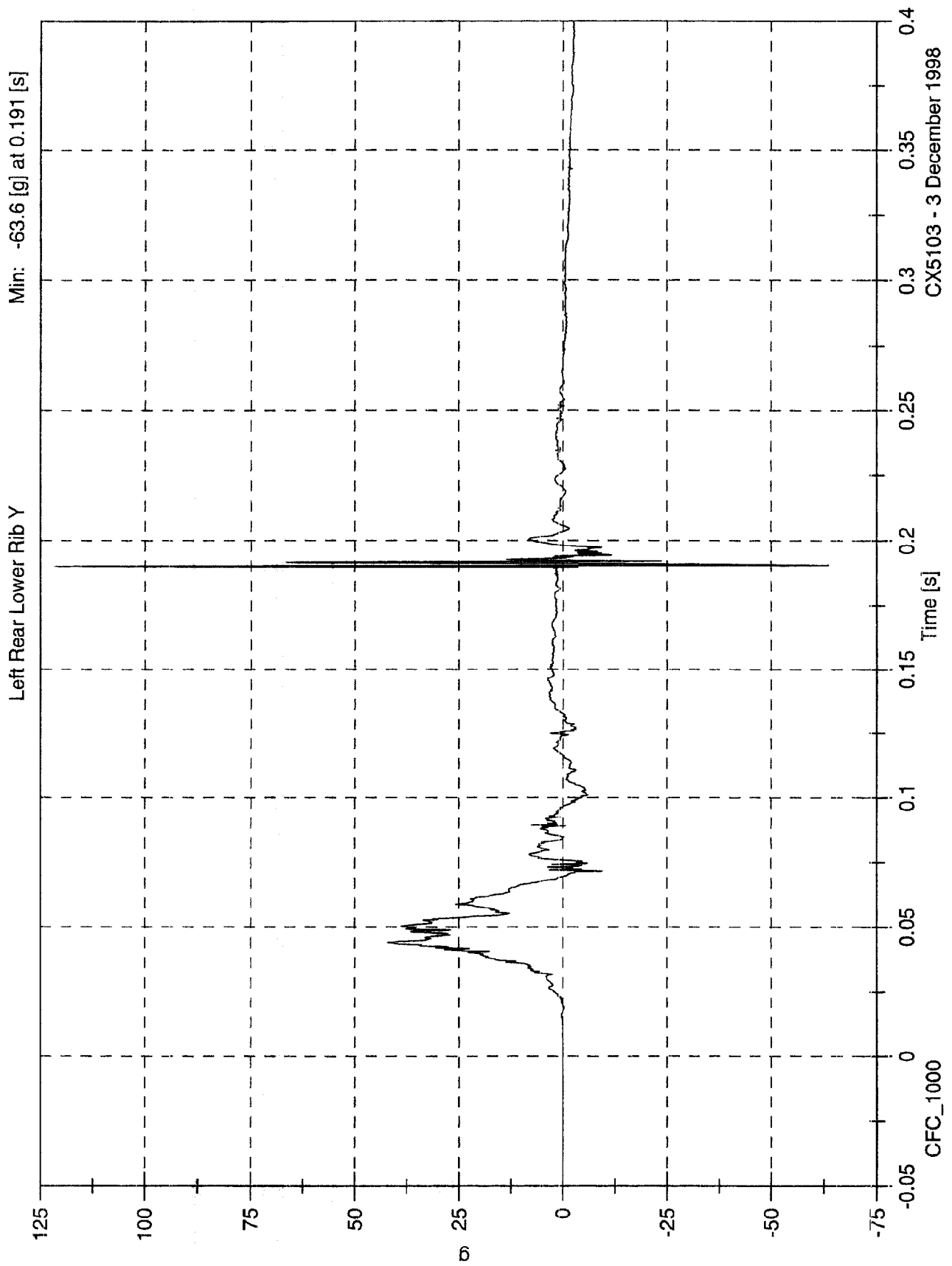
Max: 35.6 [kph] at 0.255 [s]
Min: -0.0 [kph] at -0.032 [s]



CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

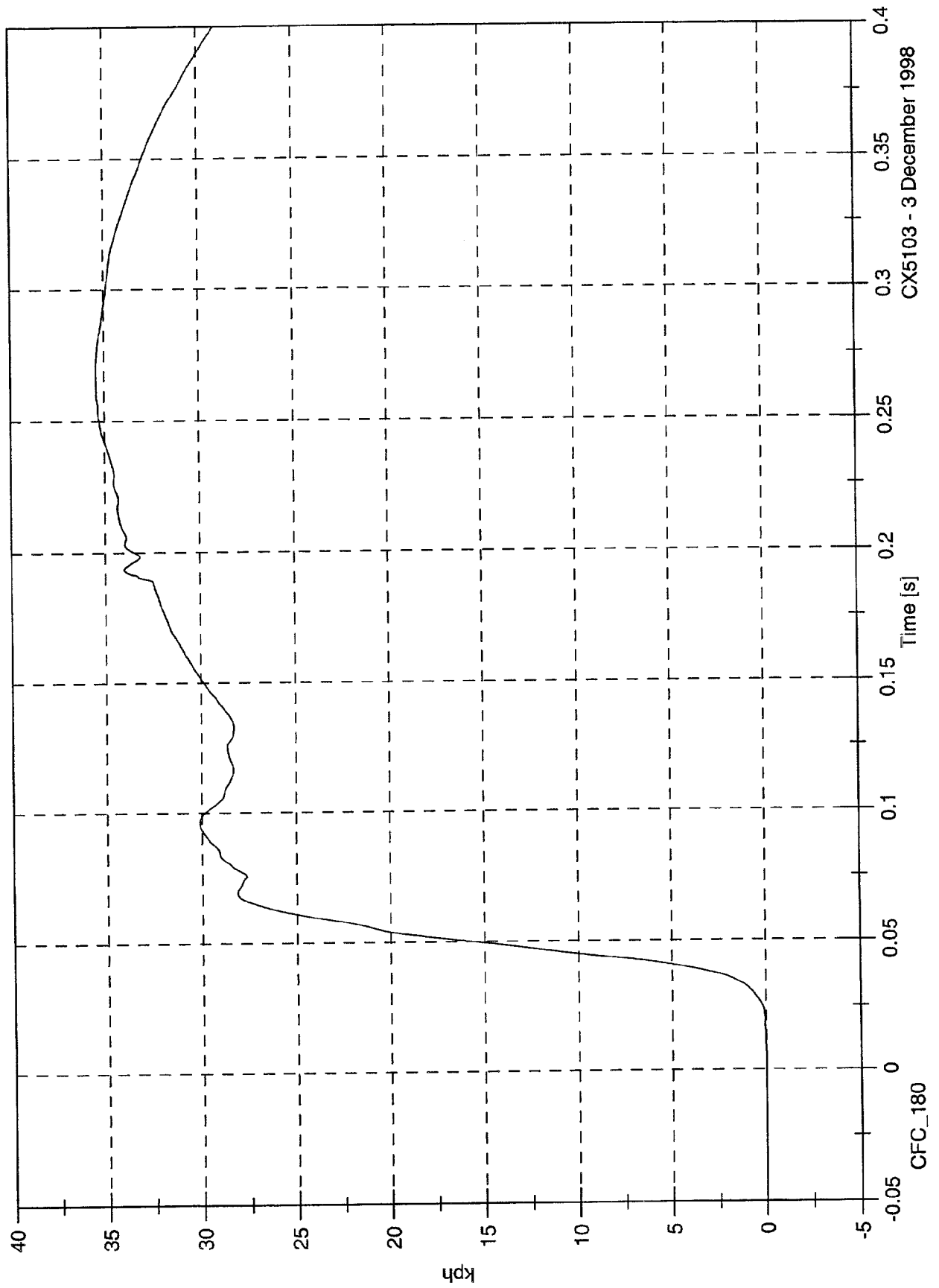
Max: 121.7 [g] at 0.190 [s]
Min: -63.6 [g] at 0.191 [s]



NHTSA Side Impact - 1999 Toyota Sienna

Left Rear Lower Rib Y

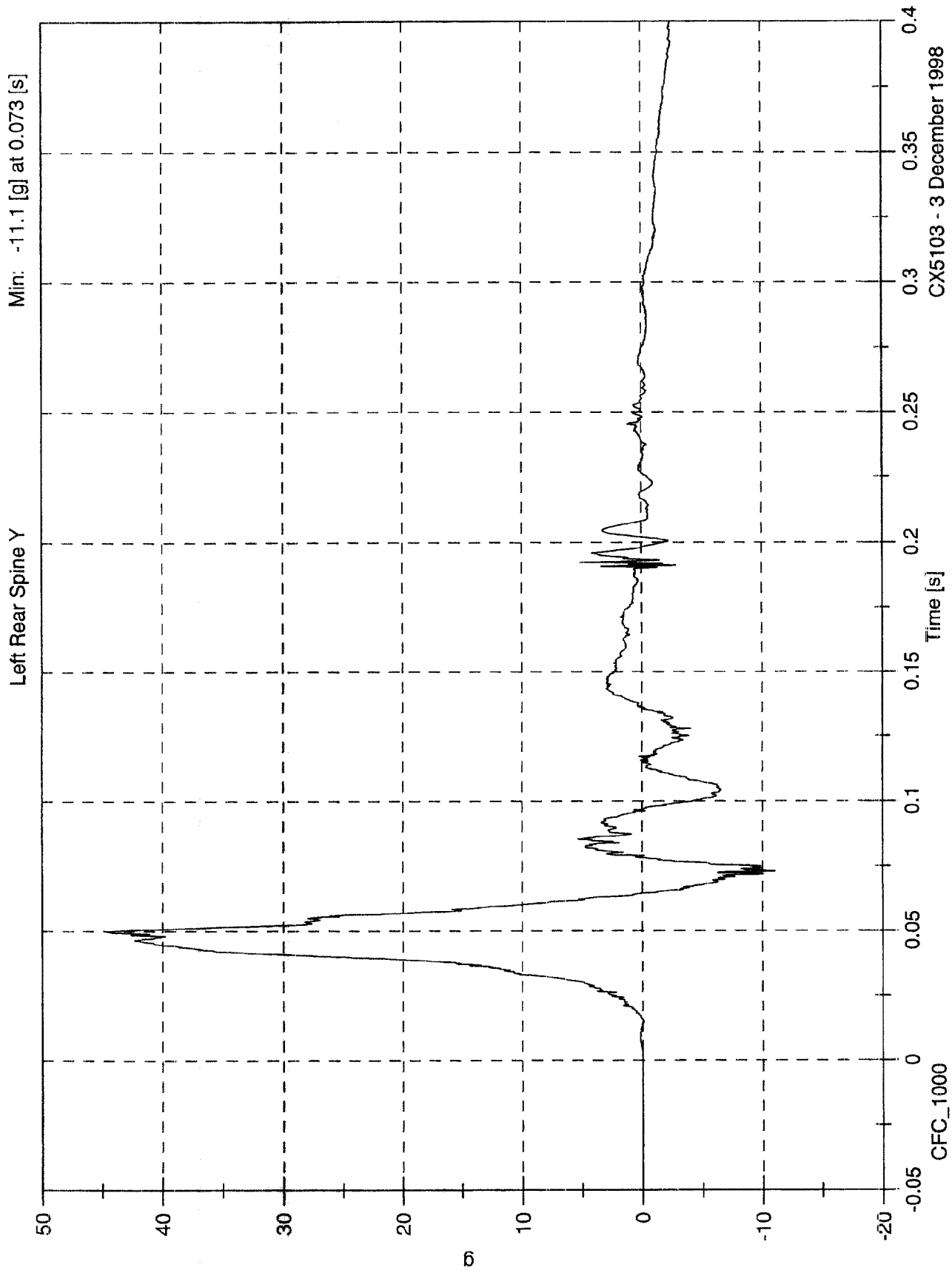
Max: 35.4 [kph] at 0.267 [s]
Min: -0.0 [kph] at -0.030 [s]



CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 44.6 [g] at 0.050 [s]
Min: -11.1 [g] at 0.073 [s]

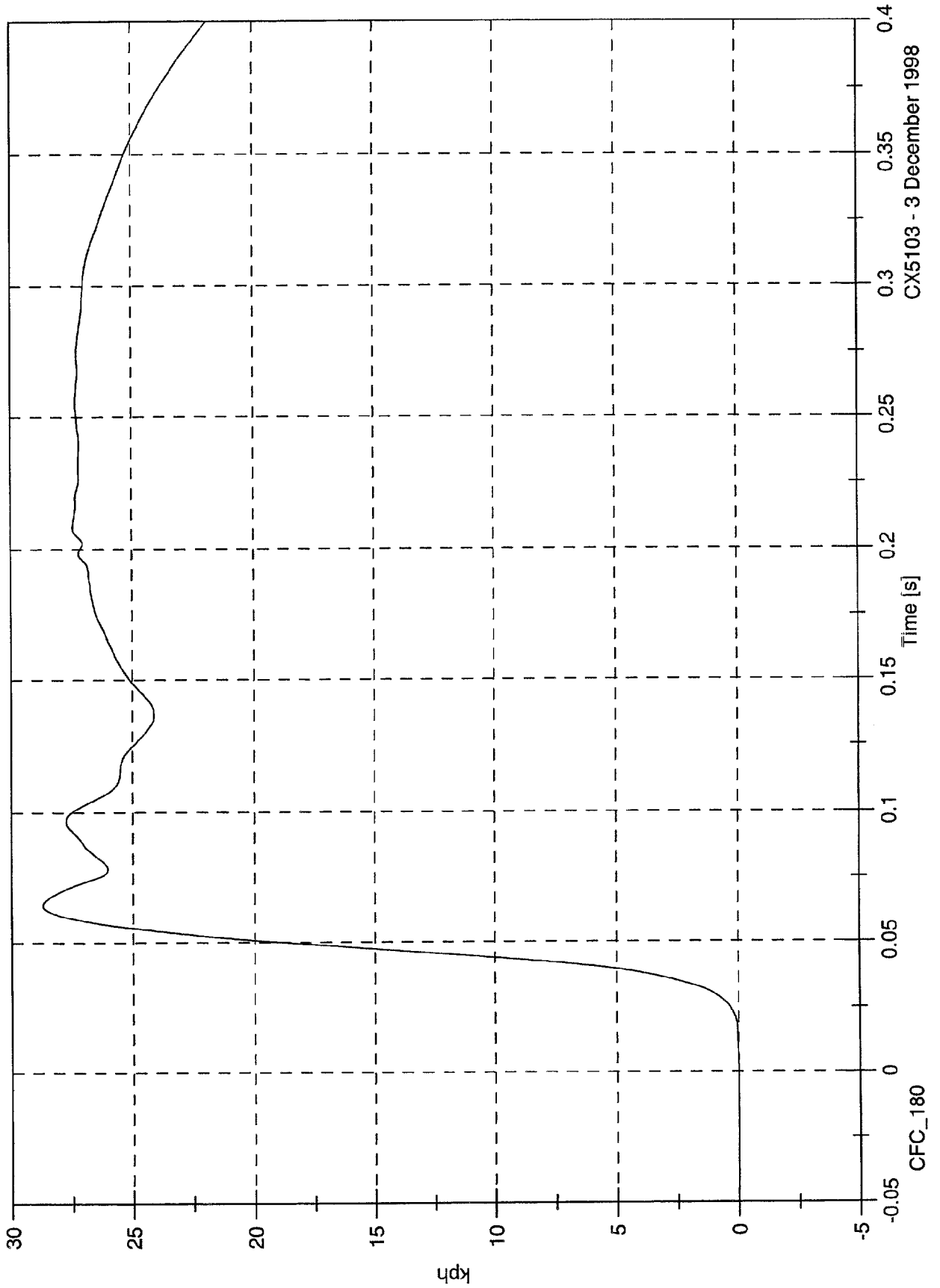


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 28.7 [kph] at 0.064 [s]
Min: -0.0 [kph] at -0.029 [s]

Left Rear Spine Y

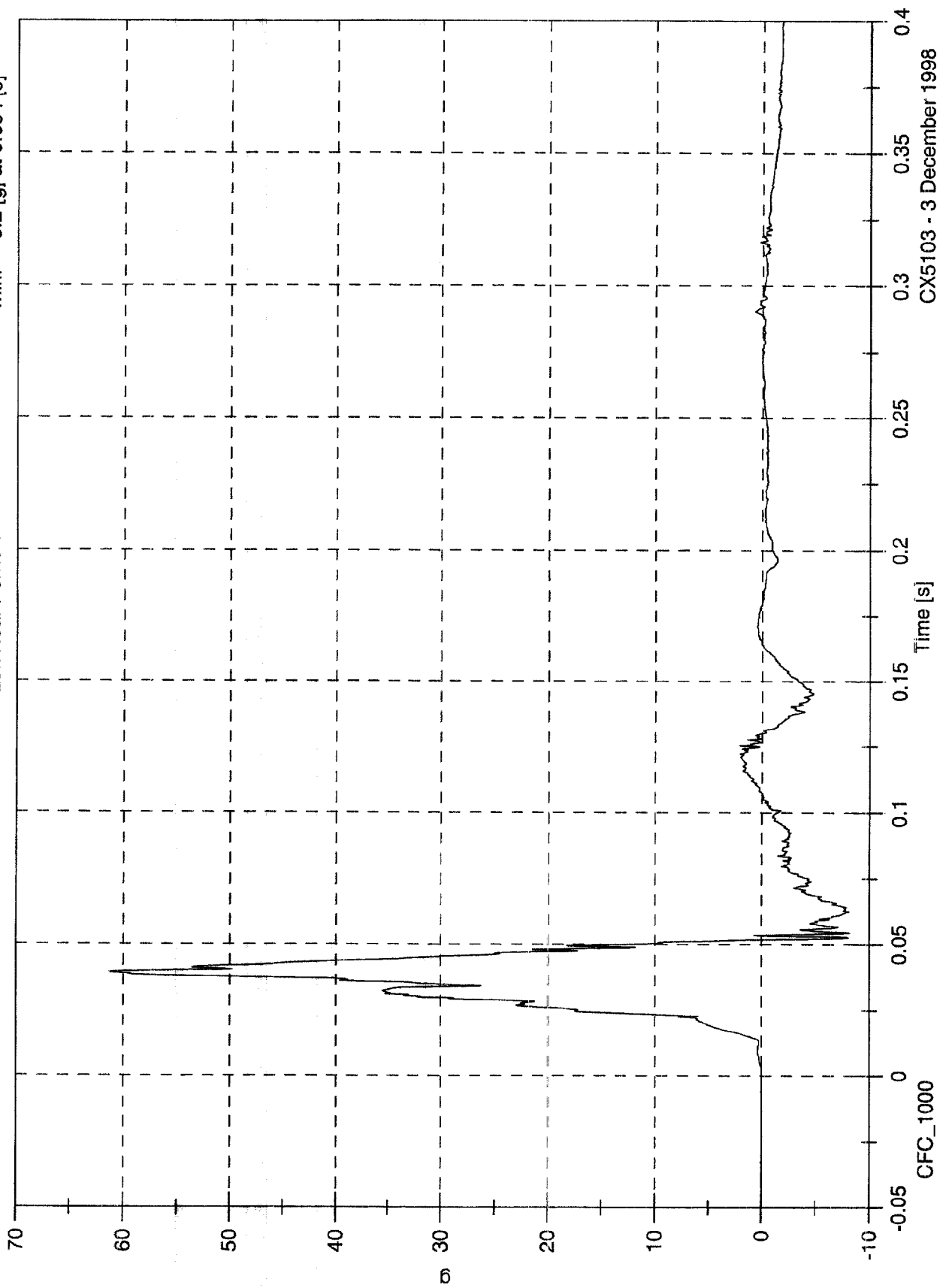


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 61.3 [g] at 0.039 [s]
 Min: -8.2 [g] at 0.054 [s]

Left Rear Pelvic Y

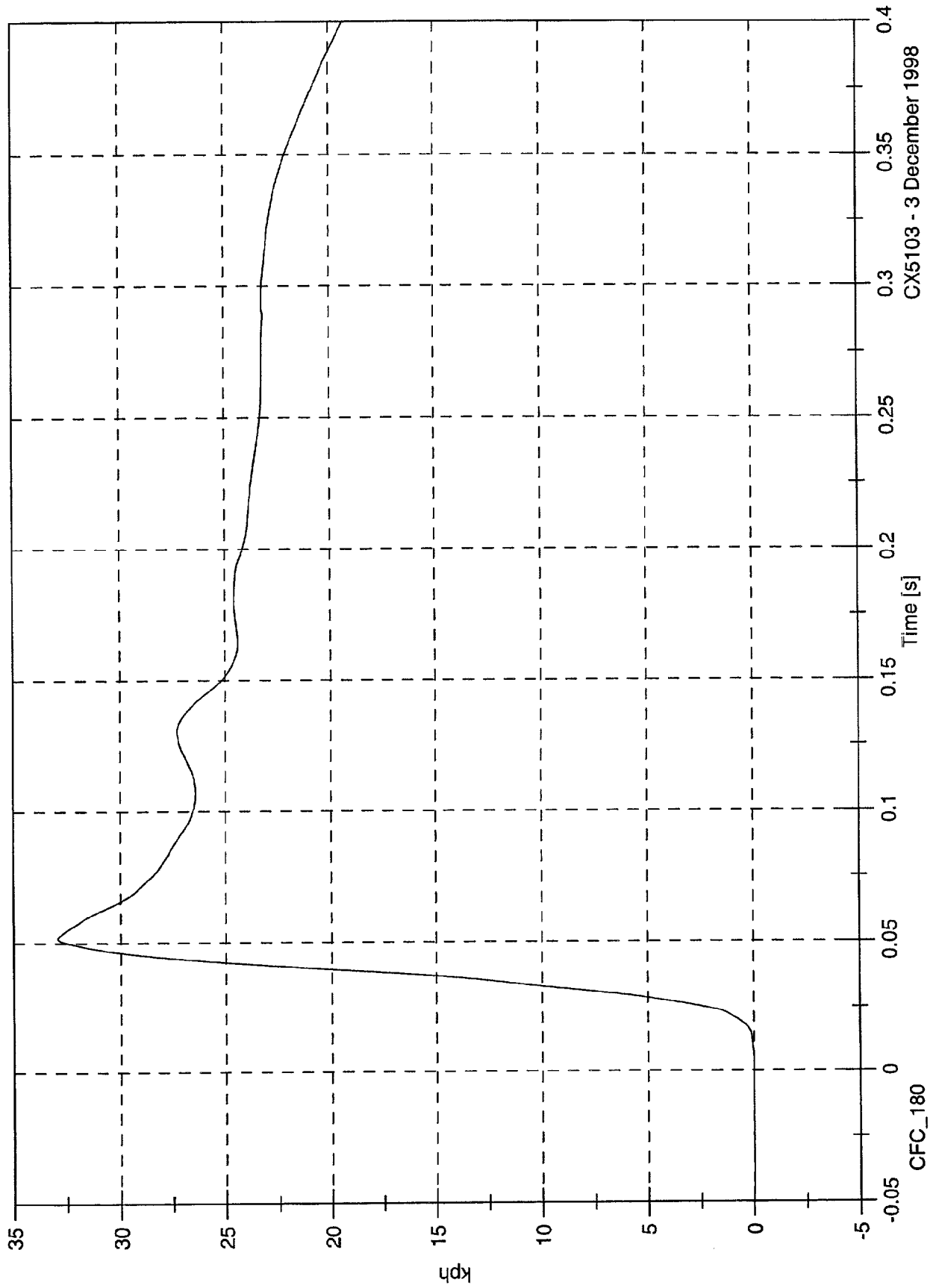


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 33.0 [kph] at 0.052 [s]
Min: -0.0 [kph] at -0.019 [s]

Left Rear Pelvic Y



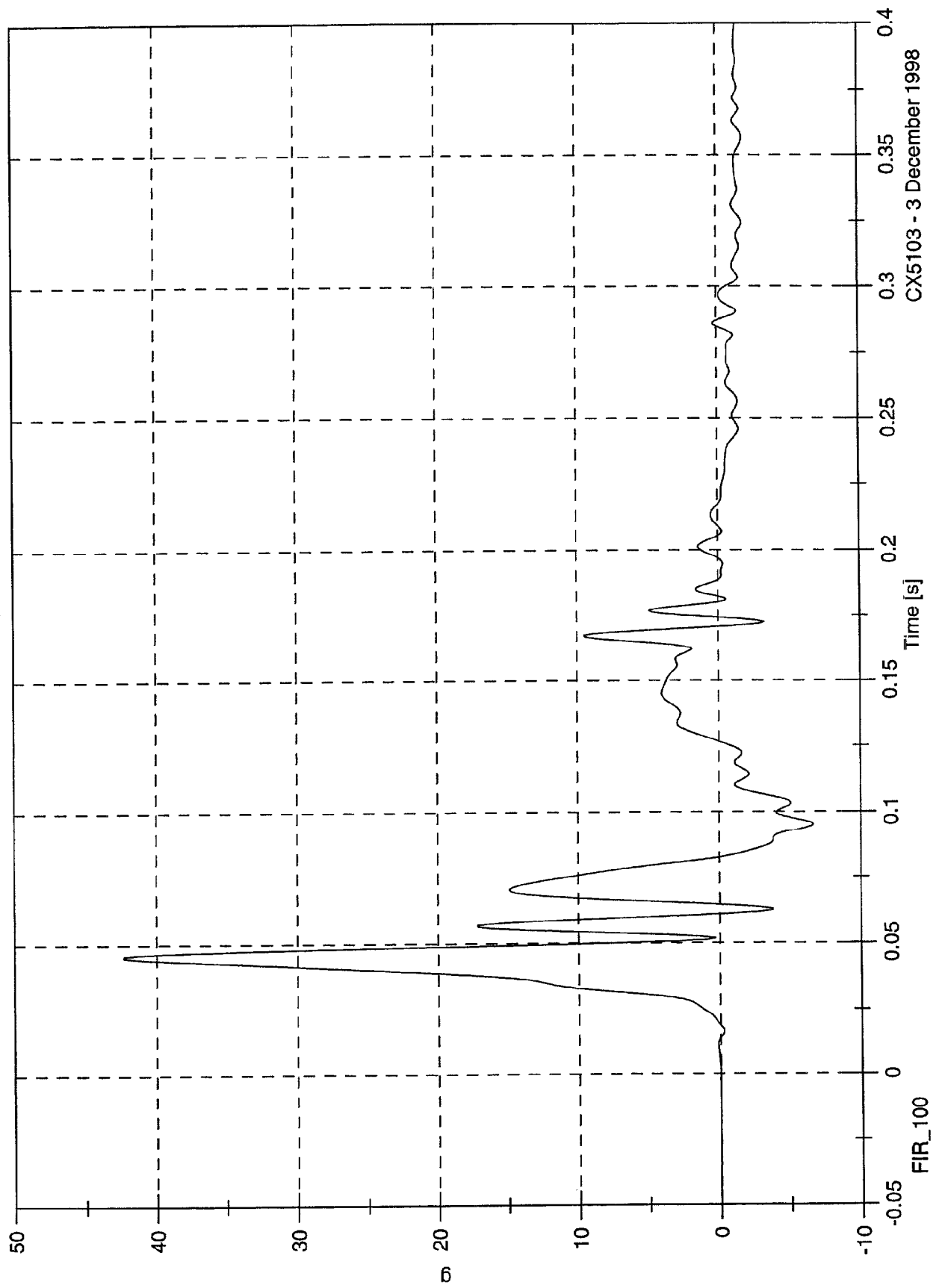
CX5103 - 3 December 1998

DRIVER & PASSENGER DUMMY INSTRUMENTATION PLOTS
ACCELERATION DATA - FIR FILTERED

NHTSA Side Impact - 1999 Toyota Sienna

Max: 42.4 [g] at 0.045 [s]
Min: -6.6 [g] at 0.095 [s]

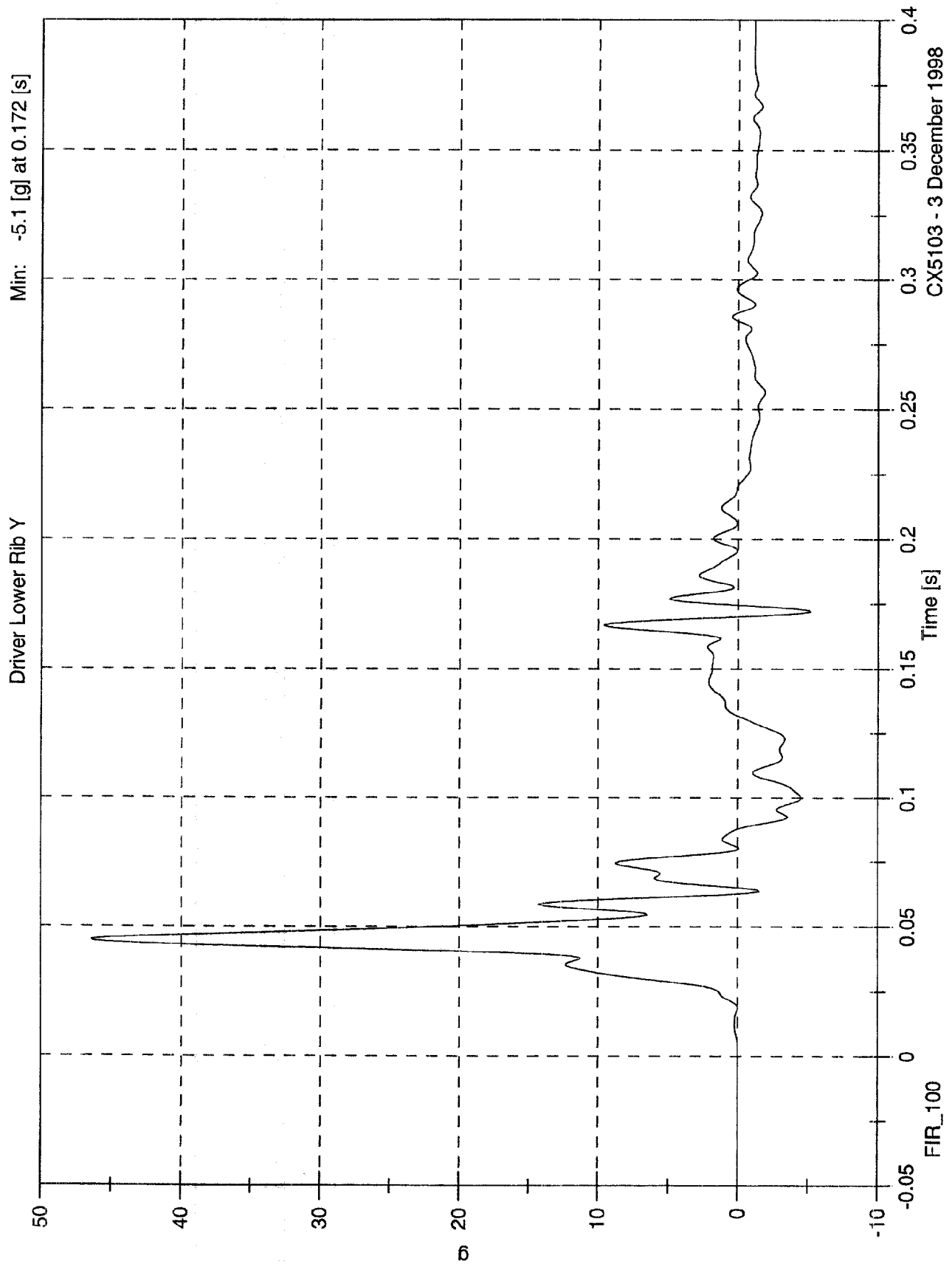
Driver Upper Rib Y



CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 46.4 [g] at 0.045 [s]
Min: -5.1 [g] at 0.172 [s]

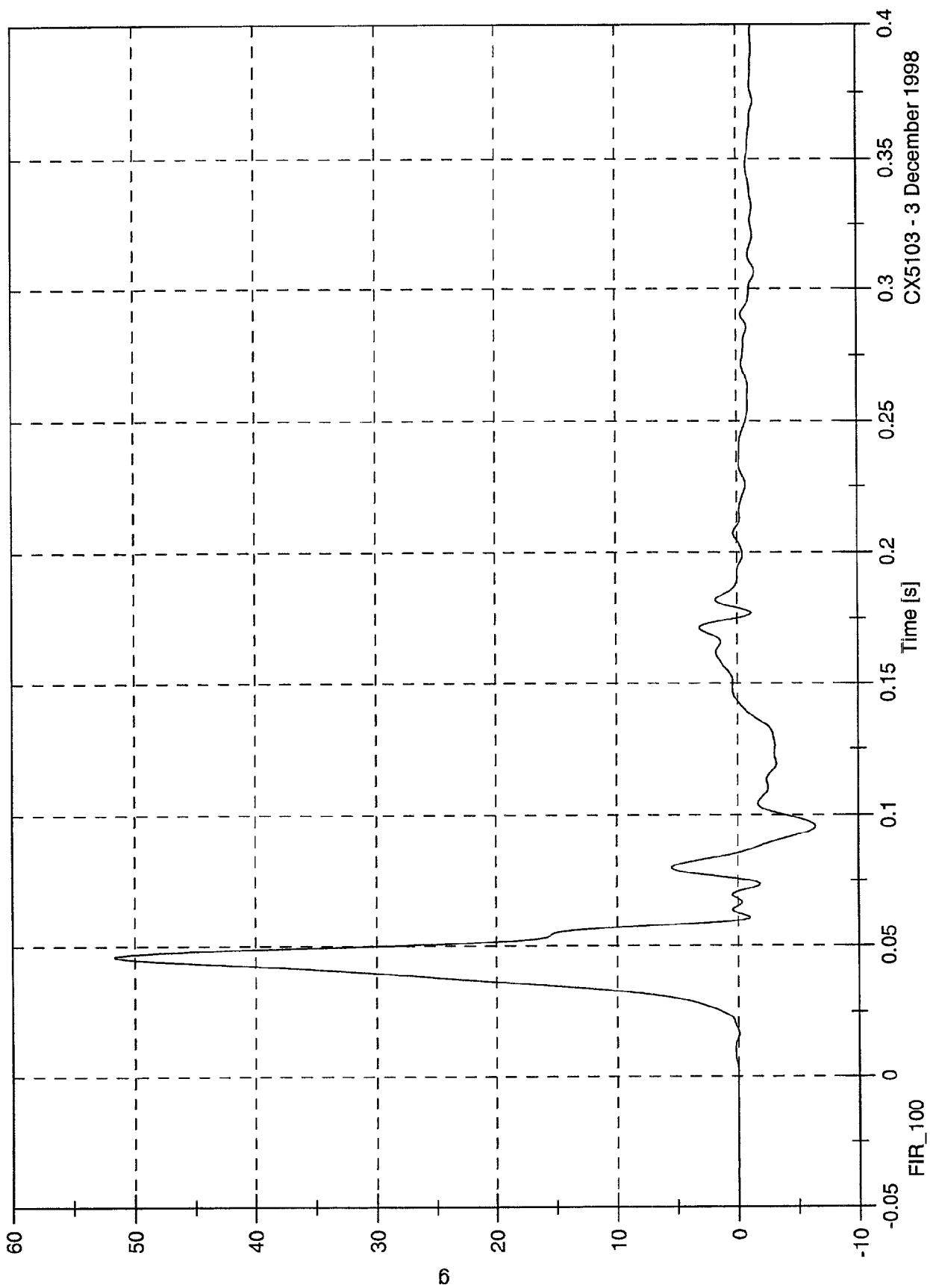


NHTSA Side Impact - 1999 Toyota Sienna

Max: 51.6 [g] at 0.046 [s]

Min: -6.4 [g] at 0.096 [s]

Driver Lower Spine Y

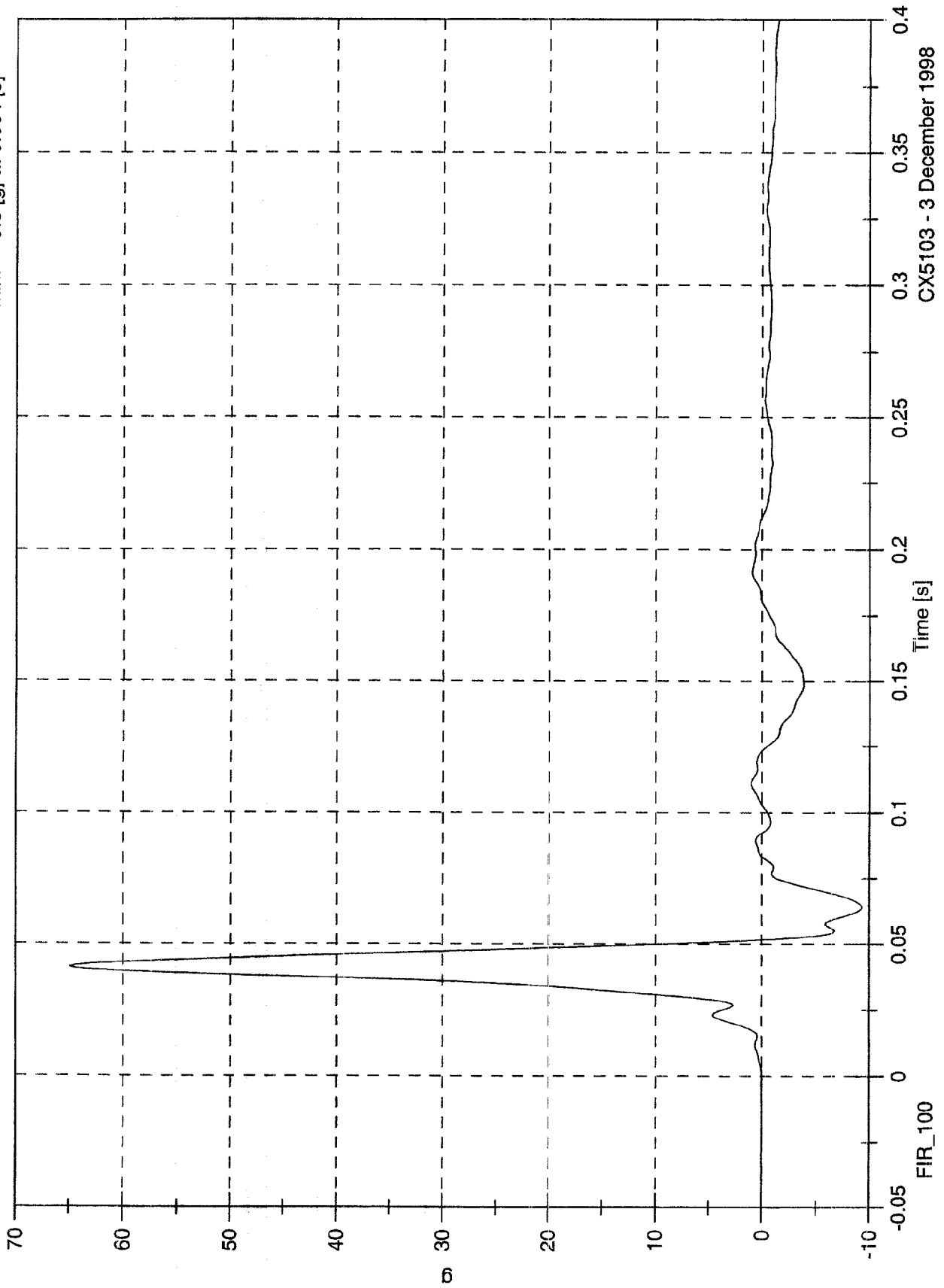


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 64.9 [g] at 0.041 [s]
Min: -9.3 [g] at 0.064 [s]

Driver Pelvic Y



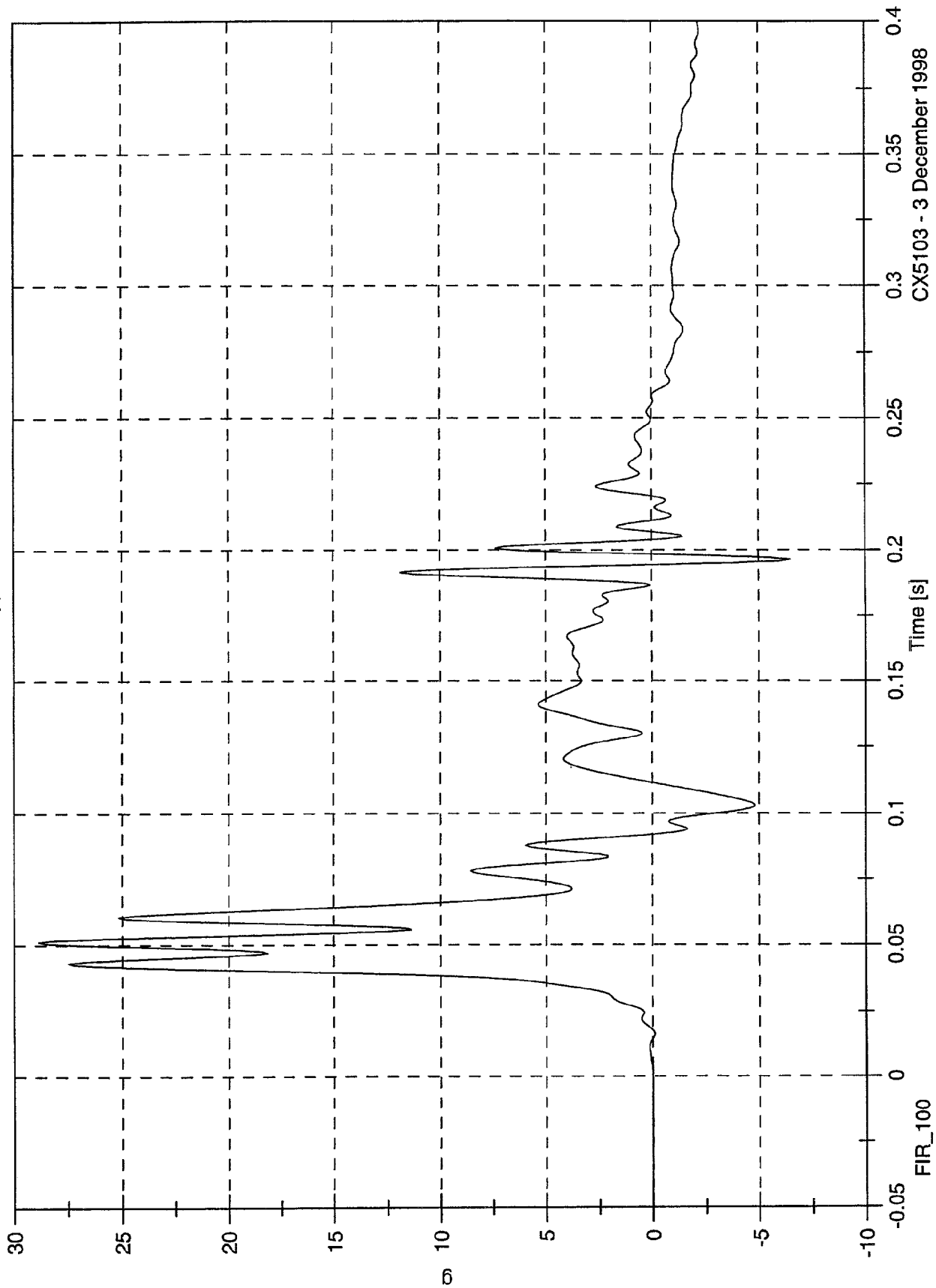
CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Left Rear Upper Rib Y

Max: 28.9 [g] at 0.051 [s]

Min: -6.5 [g] at 0.196 [s]

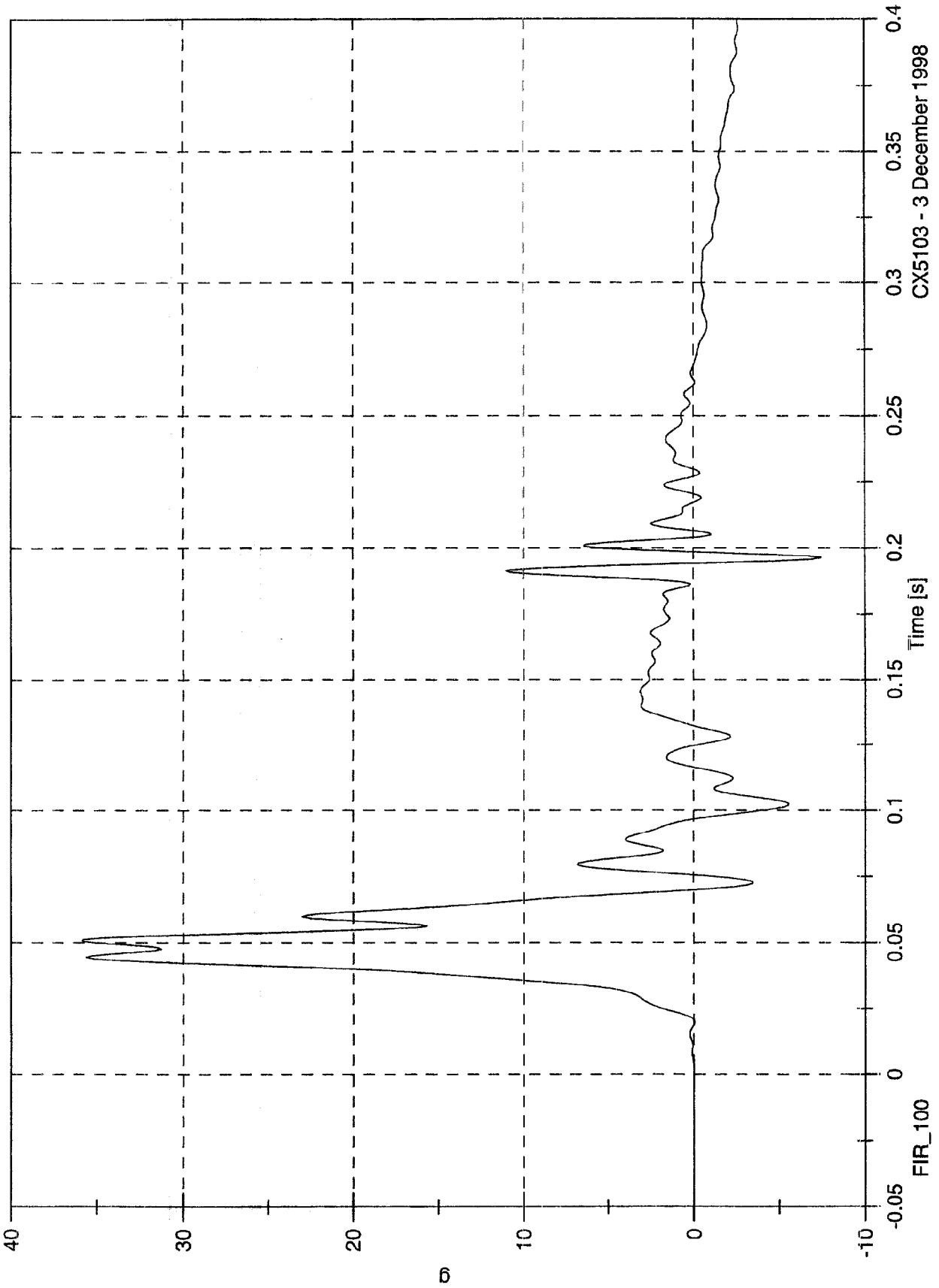


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

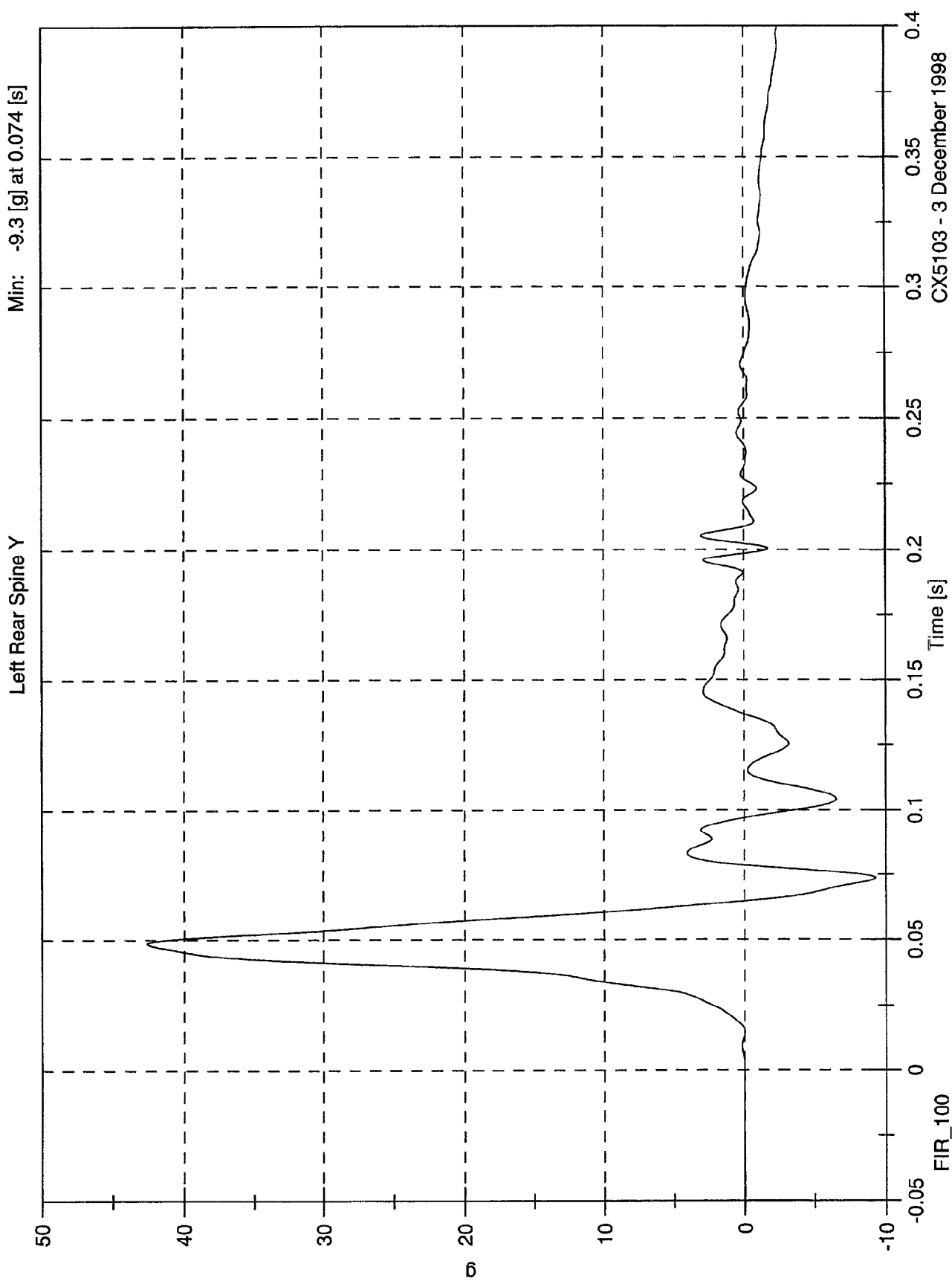
Left Rear Lower Rib Y

Max: 35.9 [g] at 0.051 [s]
Min: -7.4 [g] at 0.196 [s]



NHTSA Side Impact - 1999 Toyota Sienna

Max: 42.6 [g] at 0.049 [s]
Min: -9.3 [g] at 0.074 [s]

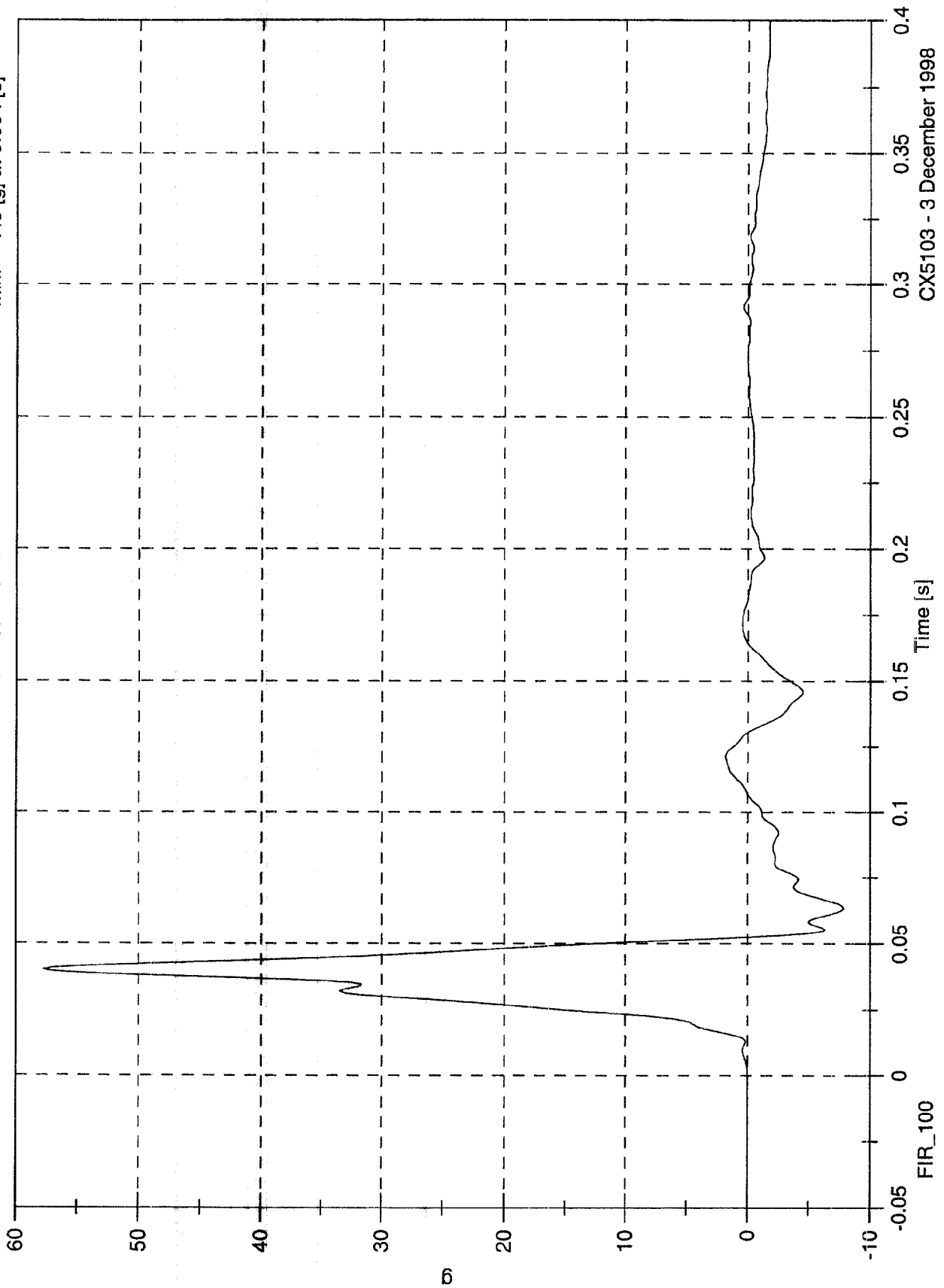


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 57.7 [g] at 0.040 [s]
 Min: -7.8 [g] at 0.064 [s]

Left Rear Pelvic Y



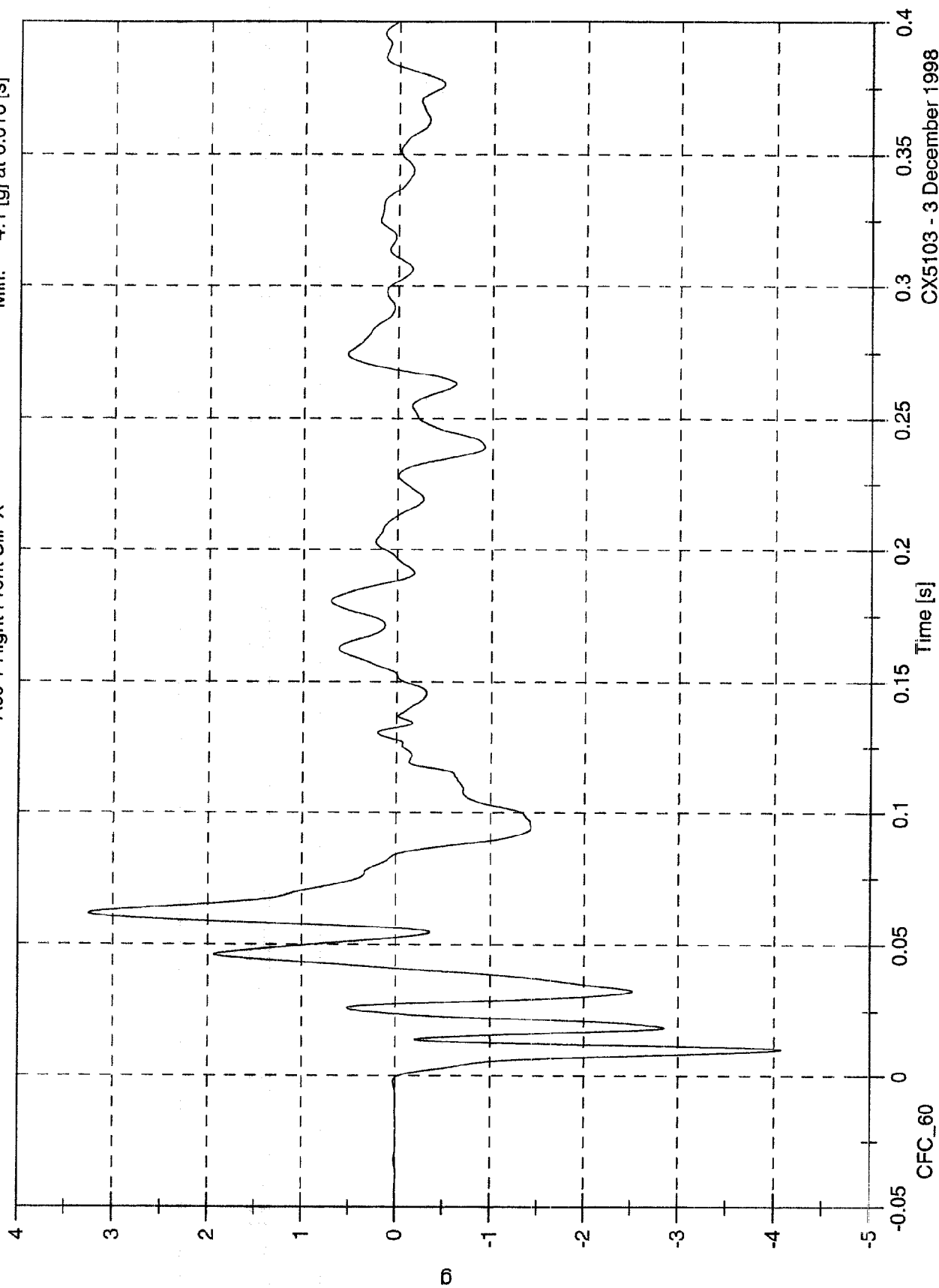
CX5103 - 3 December 1998

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

NHTSA Side Impact - 1999 Toyota Sienna

Max: 3.3 [g] at 0.062 [s]
 Min: -4.1 [g] at 0.010 [s]

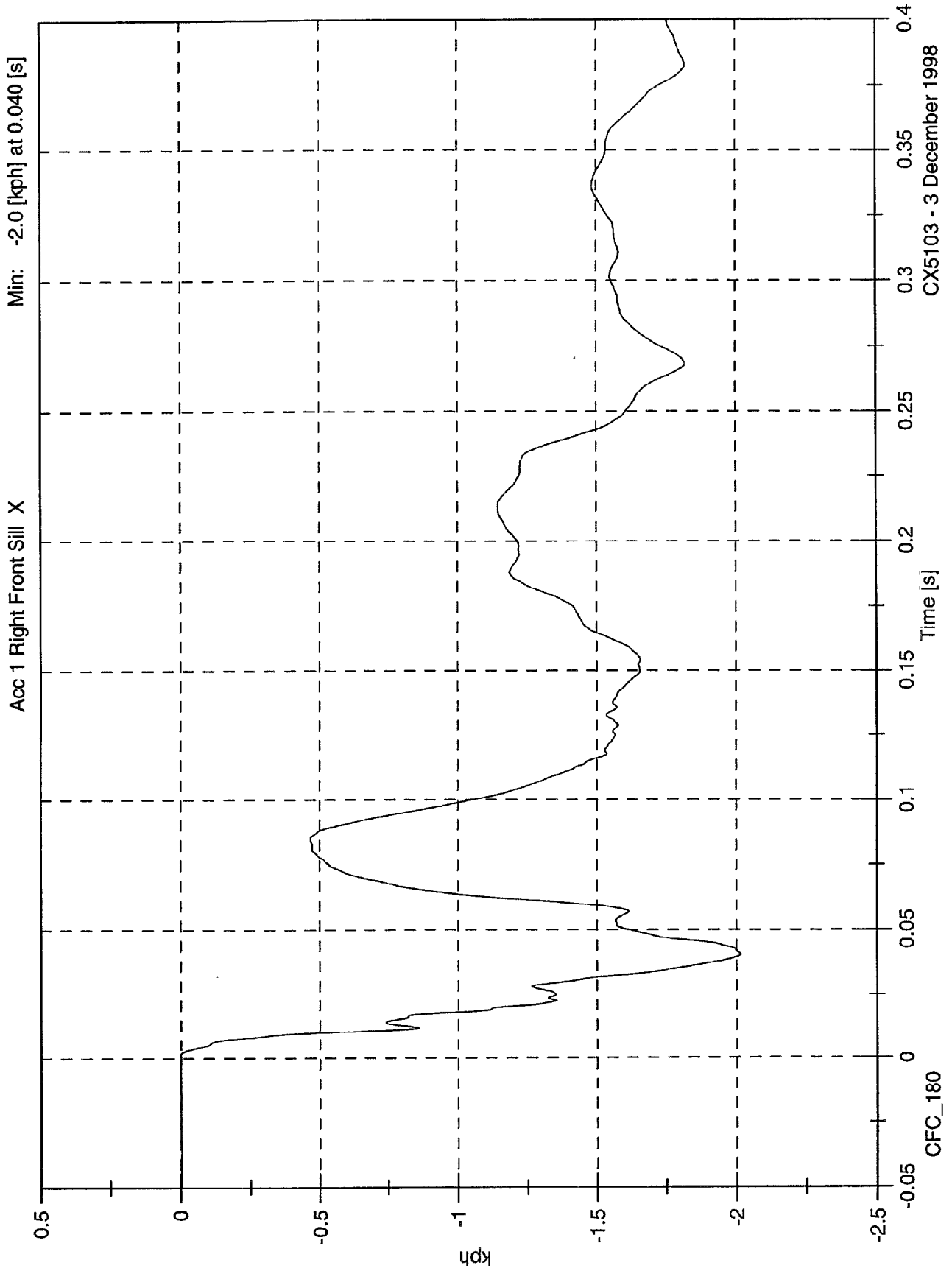
Acc 1 Right Front Sill X



CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 0.0 [kph] at -0.078 [s]
Min: -2.0 [kph] at 0.040 [s]

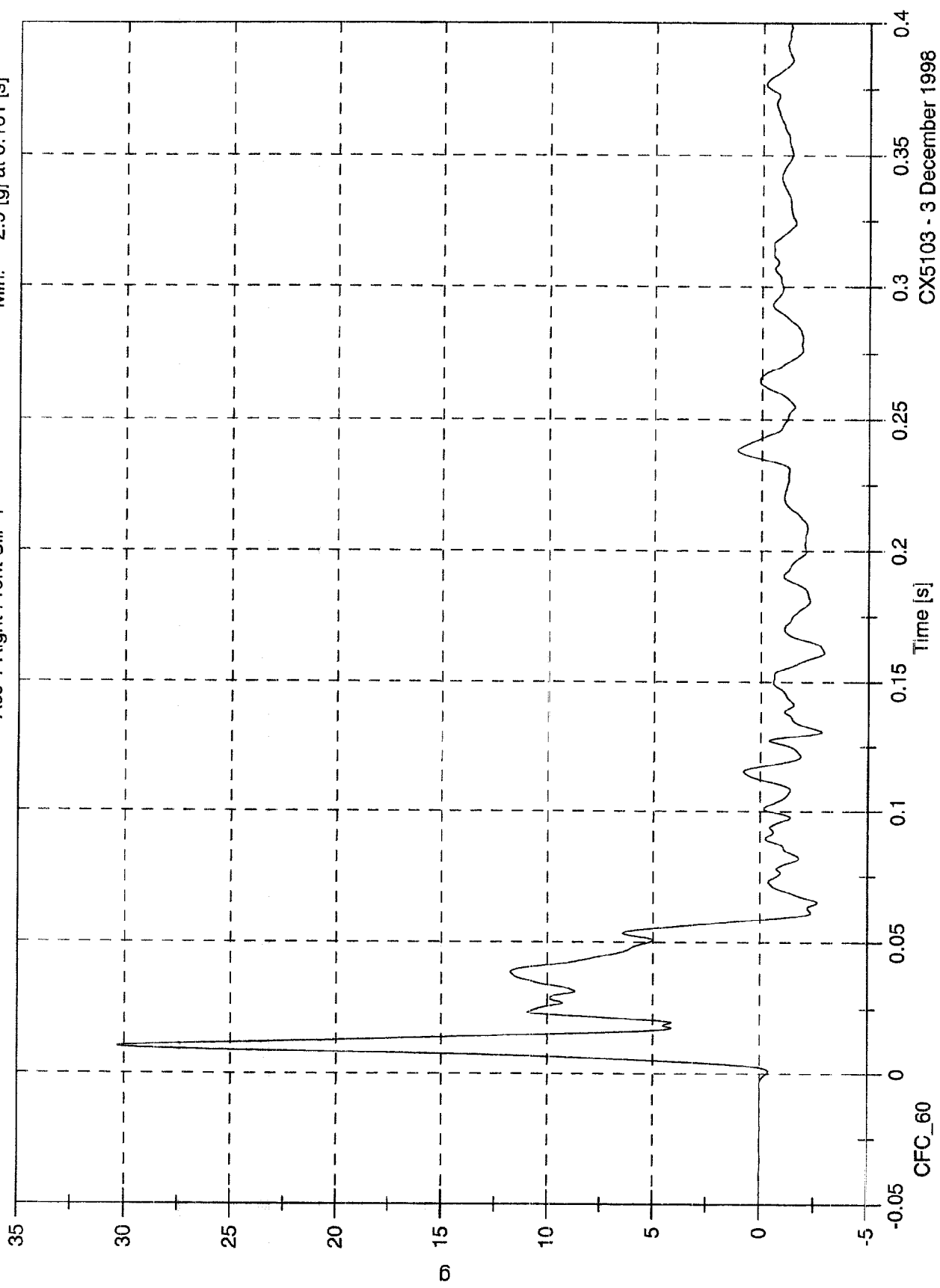


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 30.3 [g] at 0.010 [s]
Min: -2.9 [g] at 0.161 [s]

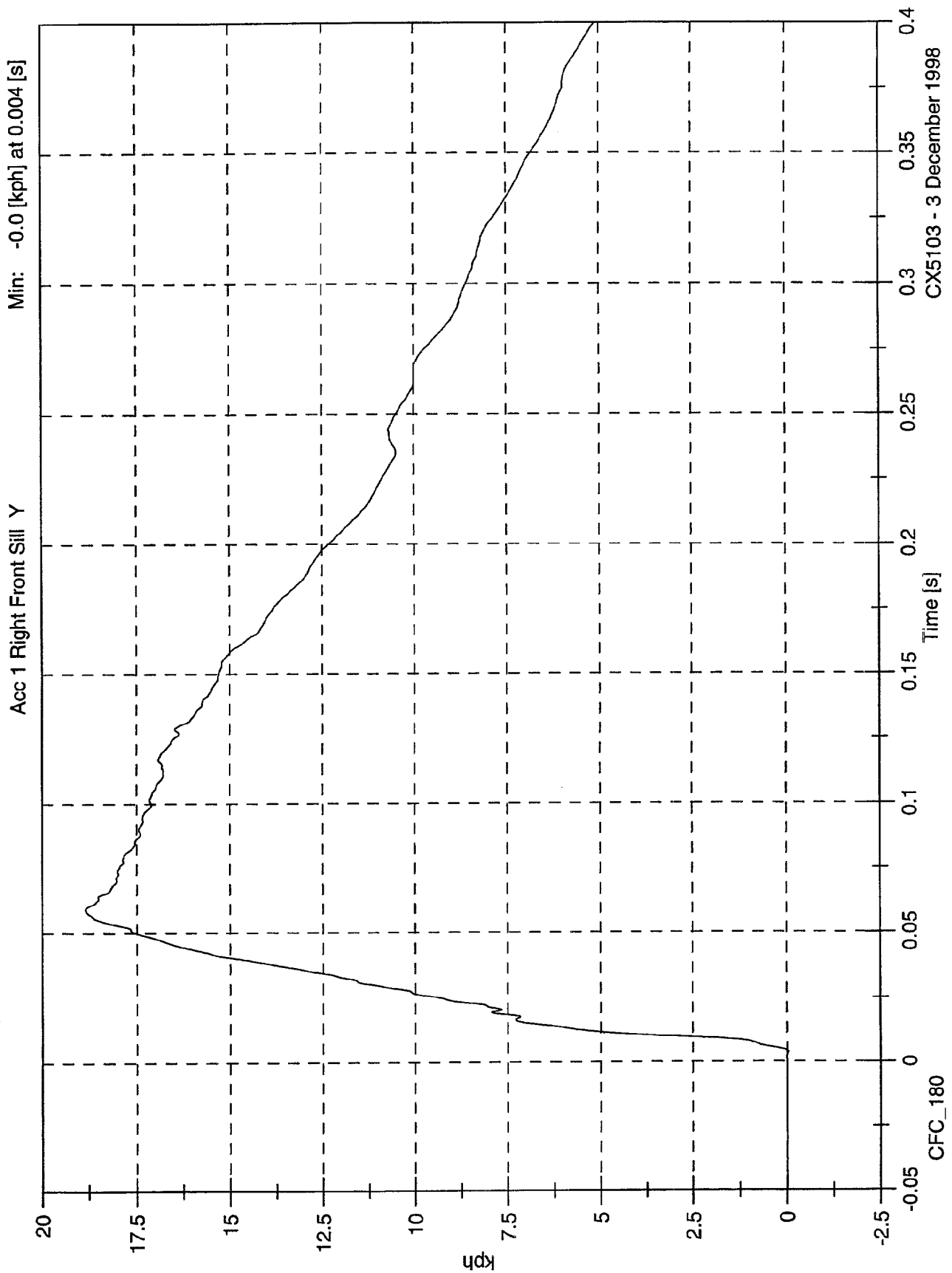
Acc 1 Right Front Sill Y



CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 18.8 [kph] at 0.059 [s]
 Min: -0.0 [kph] at 0.004 [s]

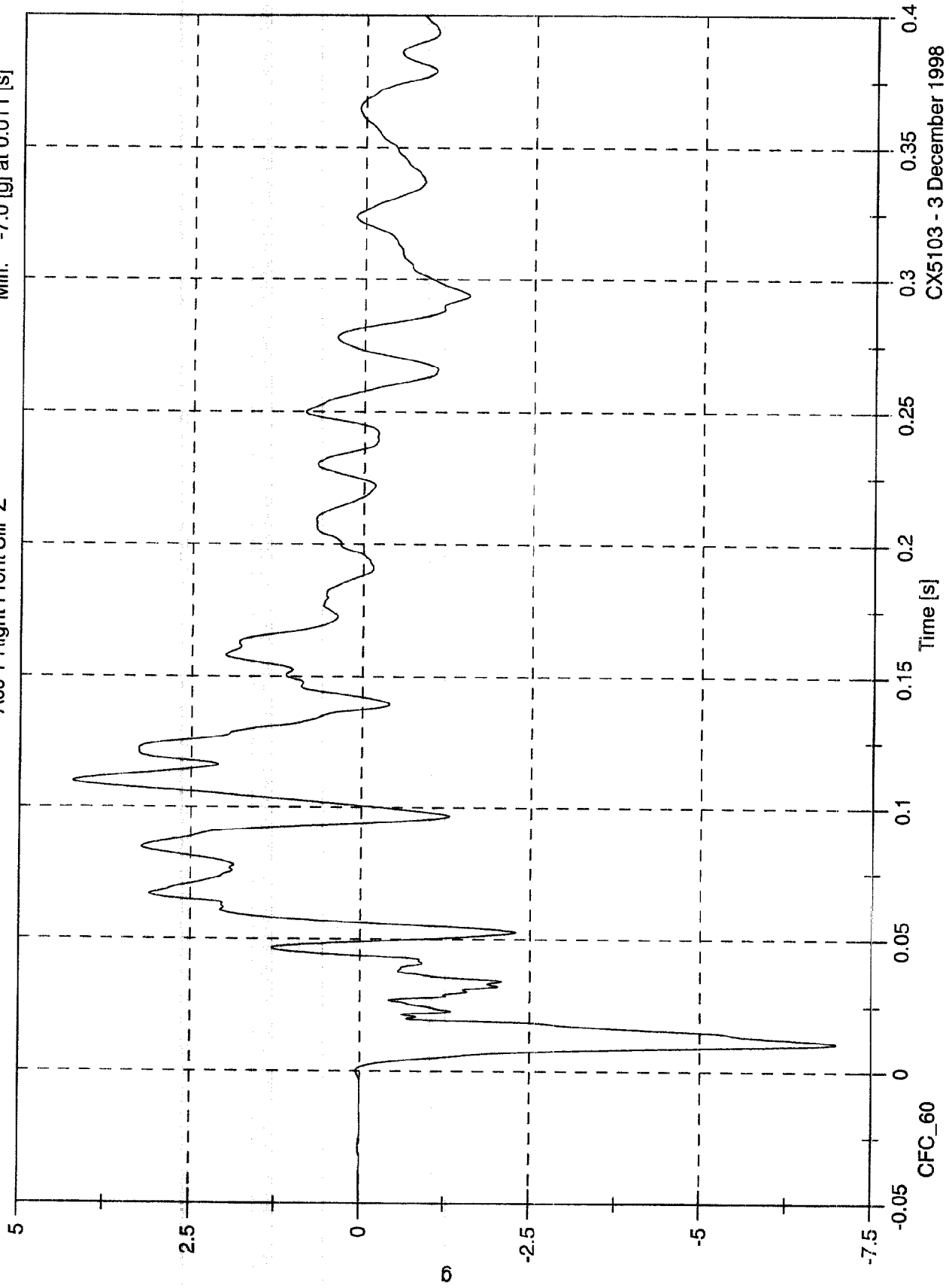


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 4.2 [g] at 0.110 [s]
Min: -7.0 [g] at 0.011 [s]

Acc 1 Right Front Sill Z

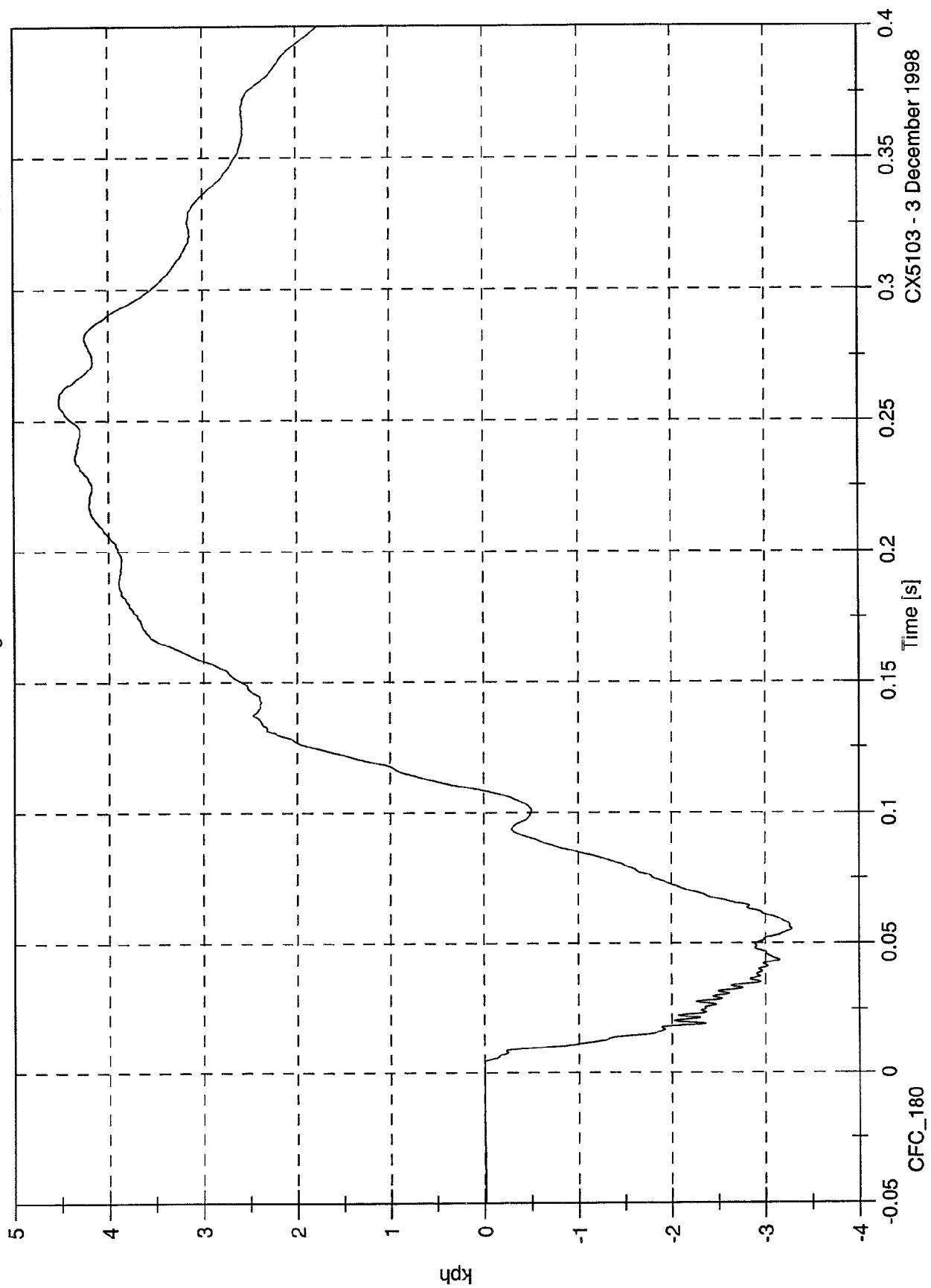


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 4.5 [kph] at 0.258 [s]
Min: -3.3 [kph] at 0.055 [s]

Acc 1 Right Front Sill Z

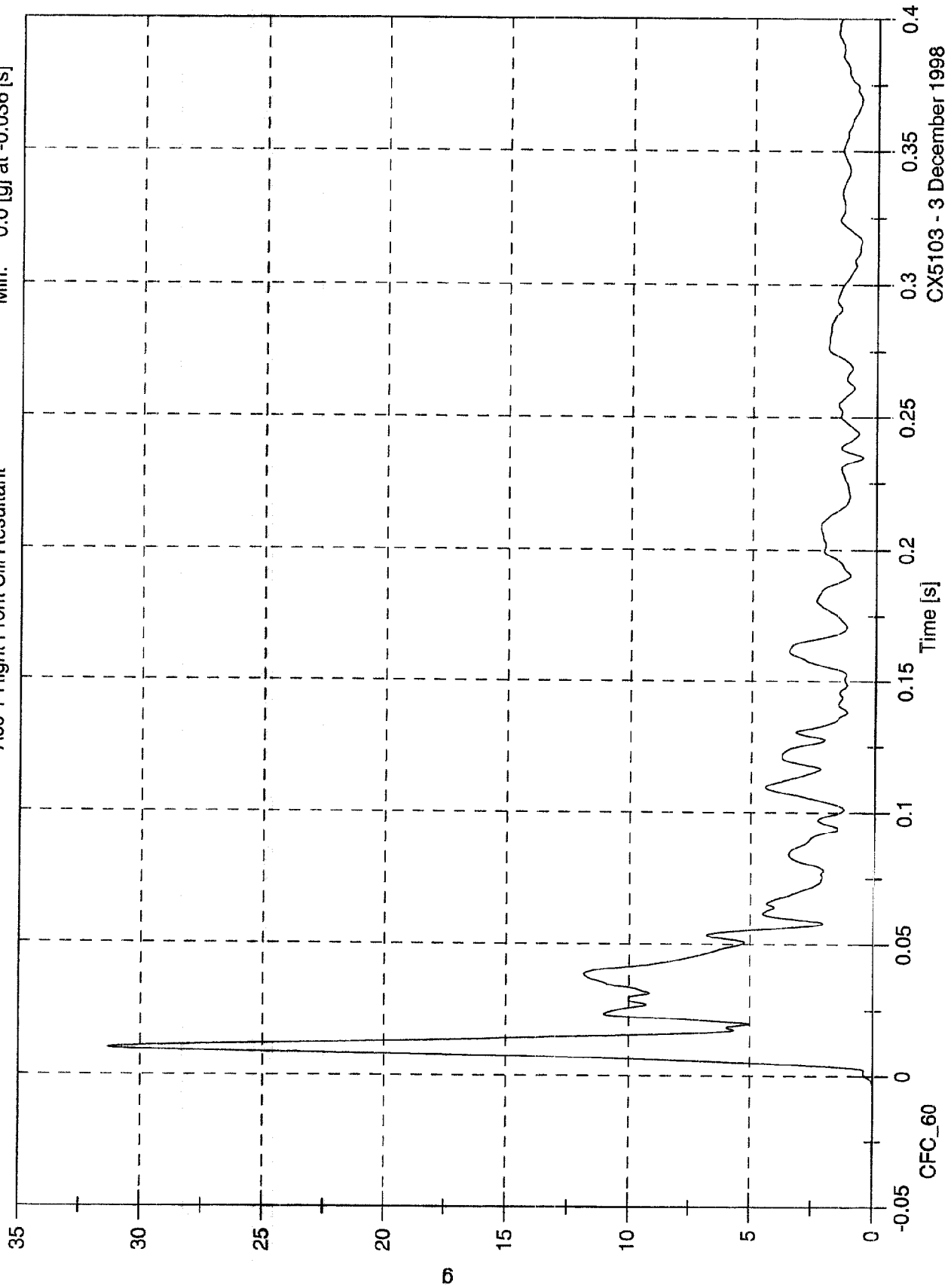


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 31.3 [g] at 0.010 [s]
Min: 0.0 [g] at -0.036 [s]

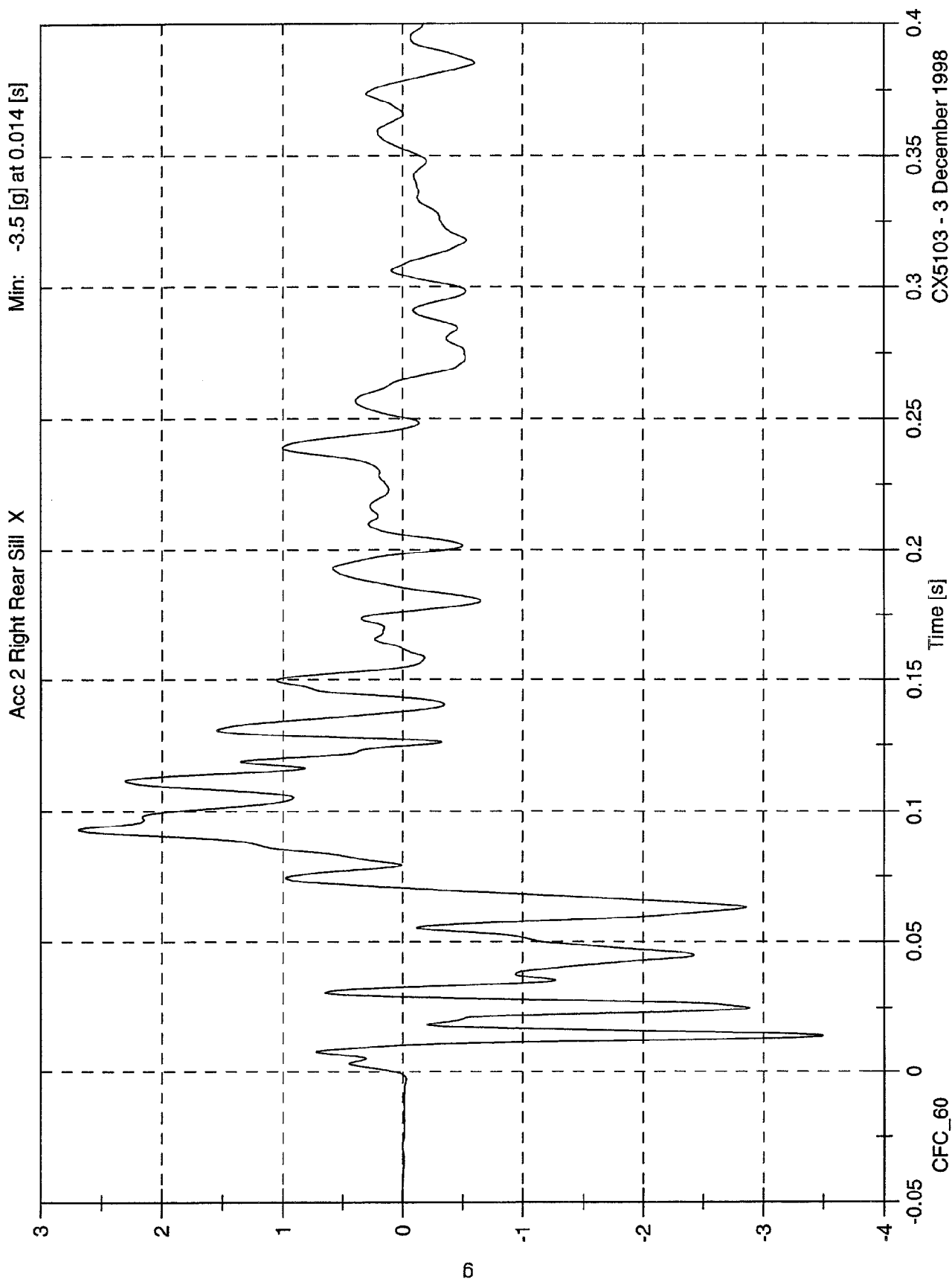
Acc 1 Right Front Sill Resultant



CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 2.7 [g] at 0.093 [s]
Min: -3.5 [g] at 0.014 [s]

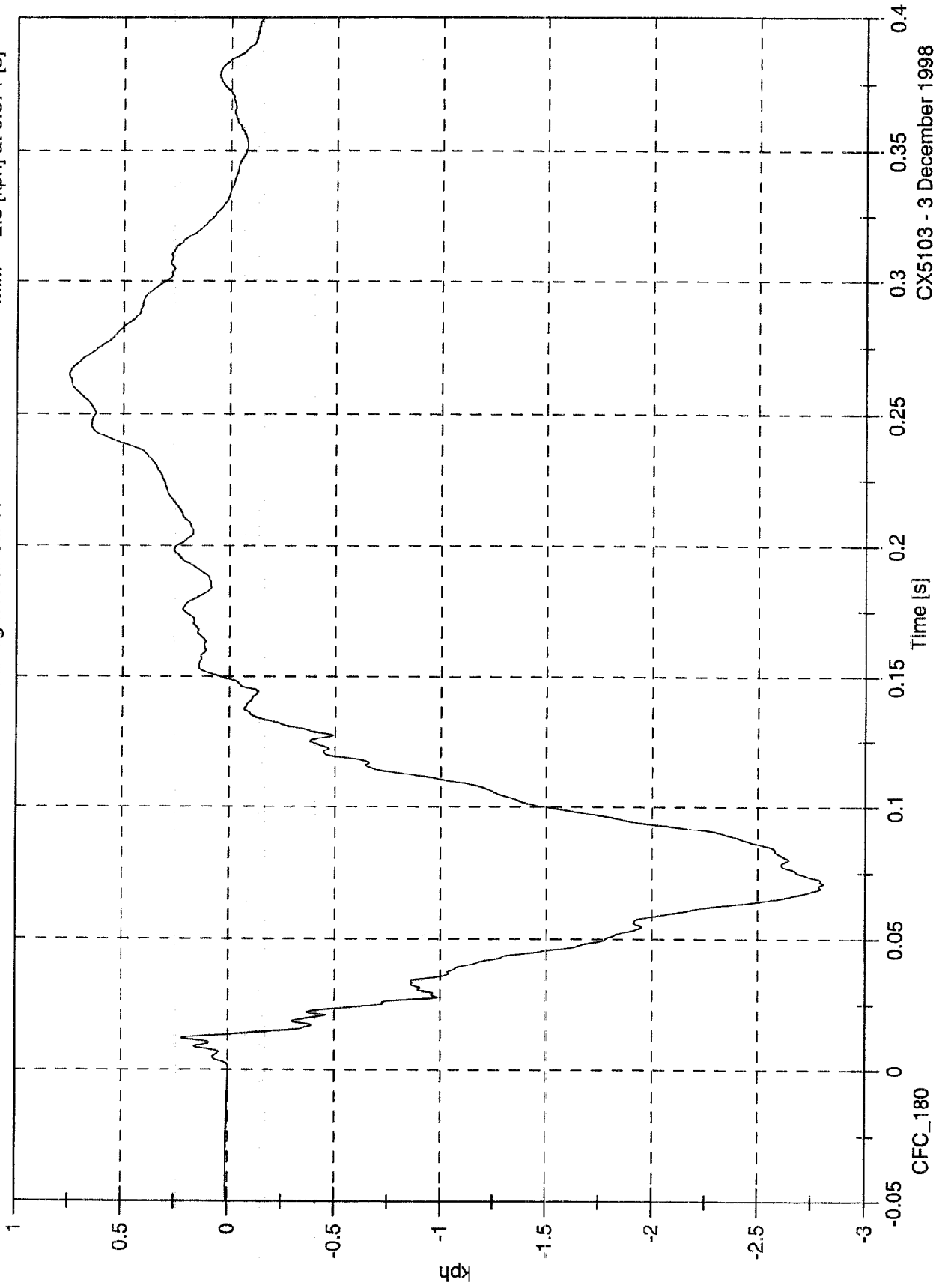


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 0.8 [kph] at 0.265 [s]
Min: -2.8 [kph] at 0.071 [s]

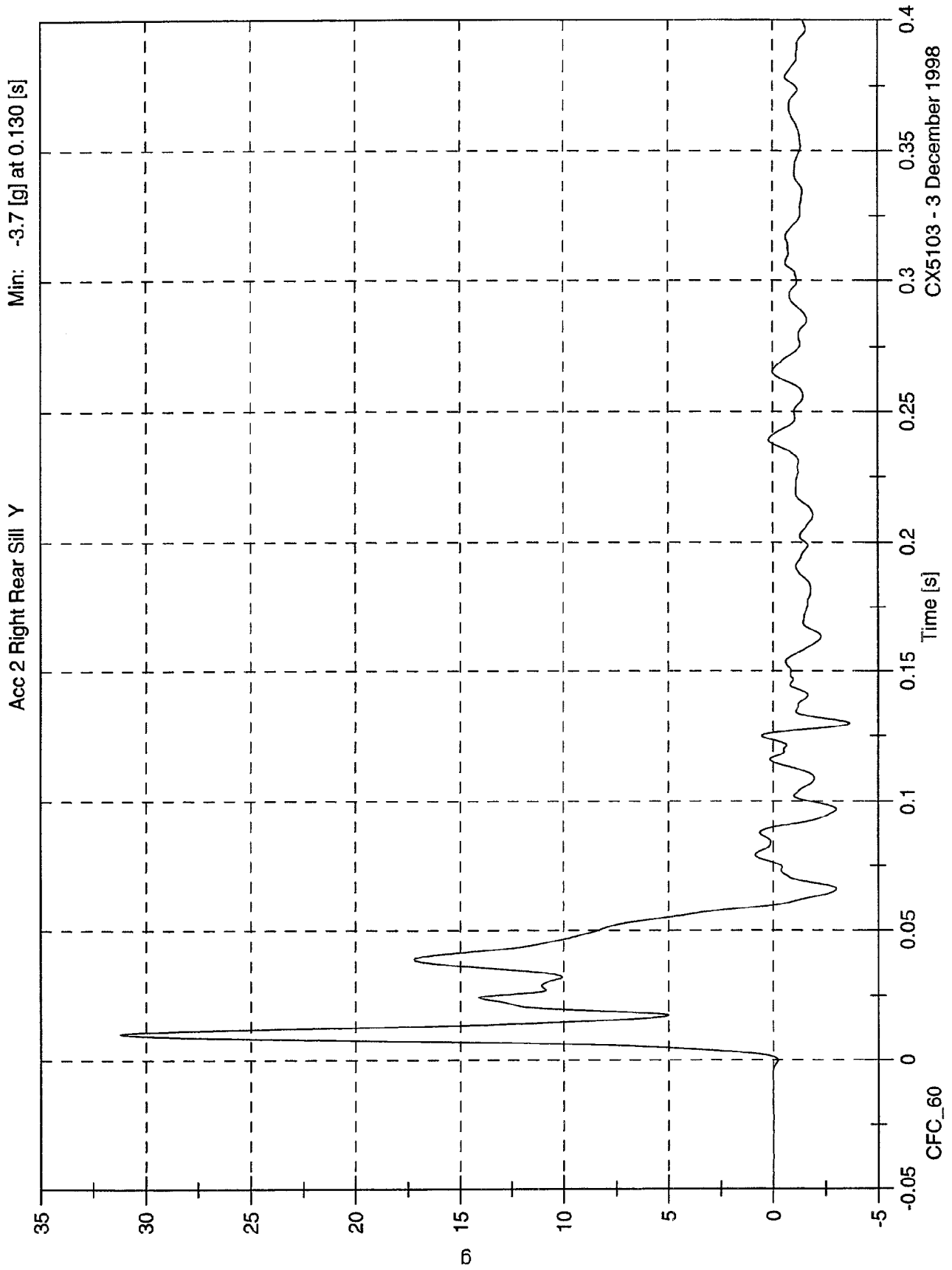
Acc 2 Right Rear Sill X



CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 31.2 [g] at 0.010 [s]
Min: -3.7 [g] at 0.130 [s]

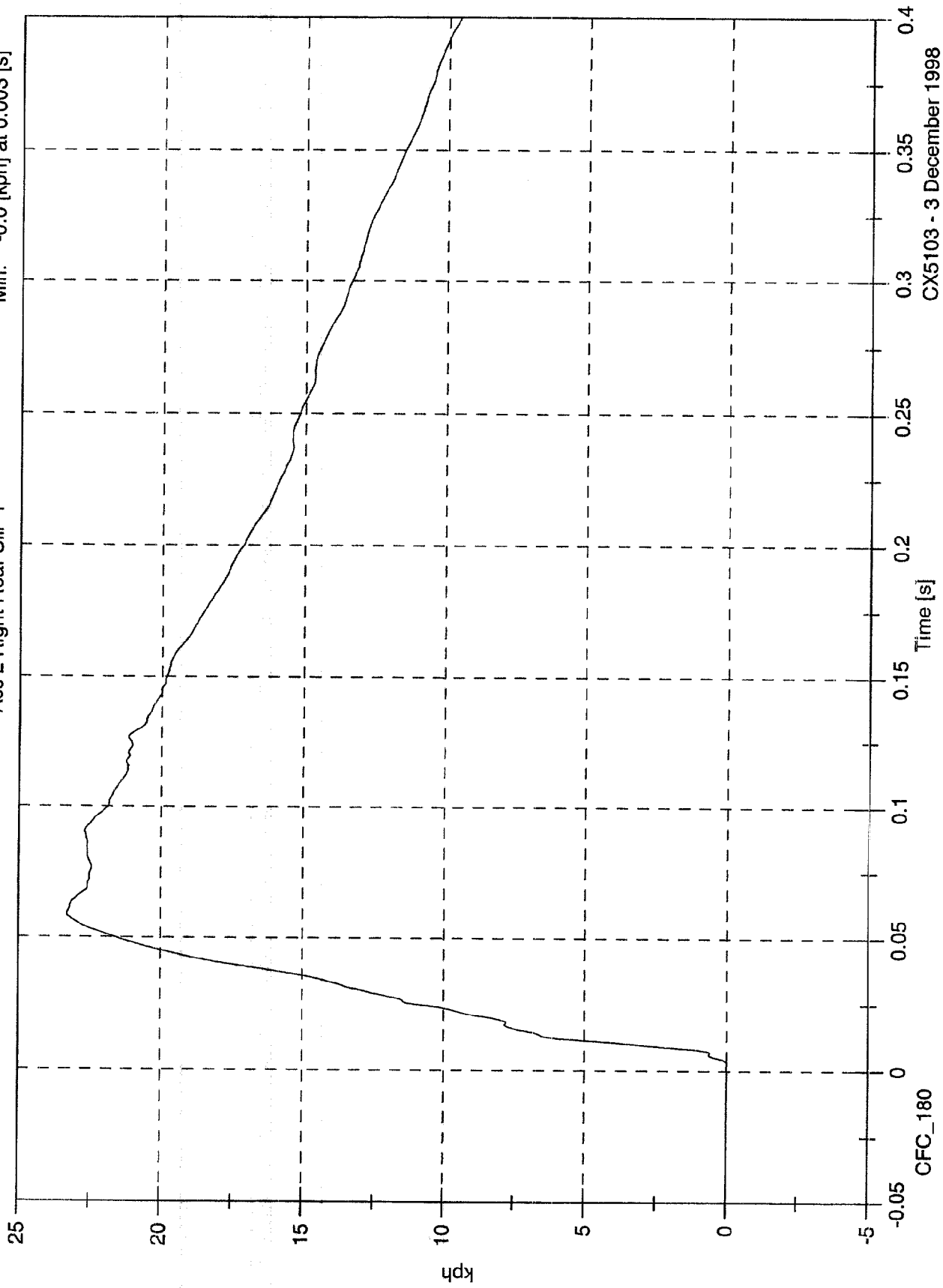


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 23.3 [kph] at 0.059 [s]
Min: -0.0 [kph] at 0.003 [s]

Acc 2 Right Rear Sill Y

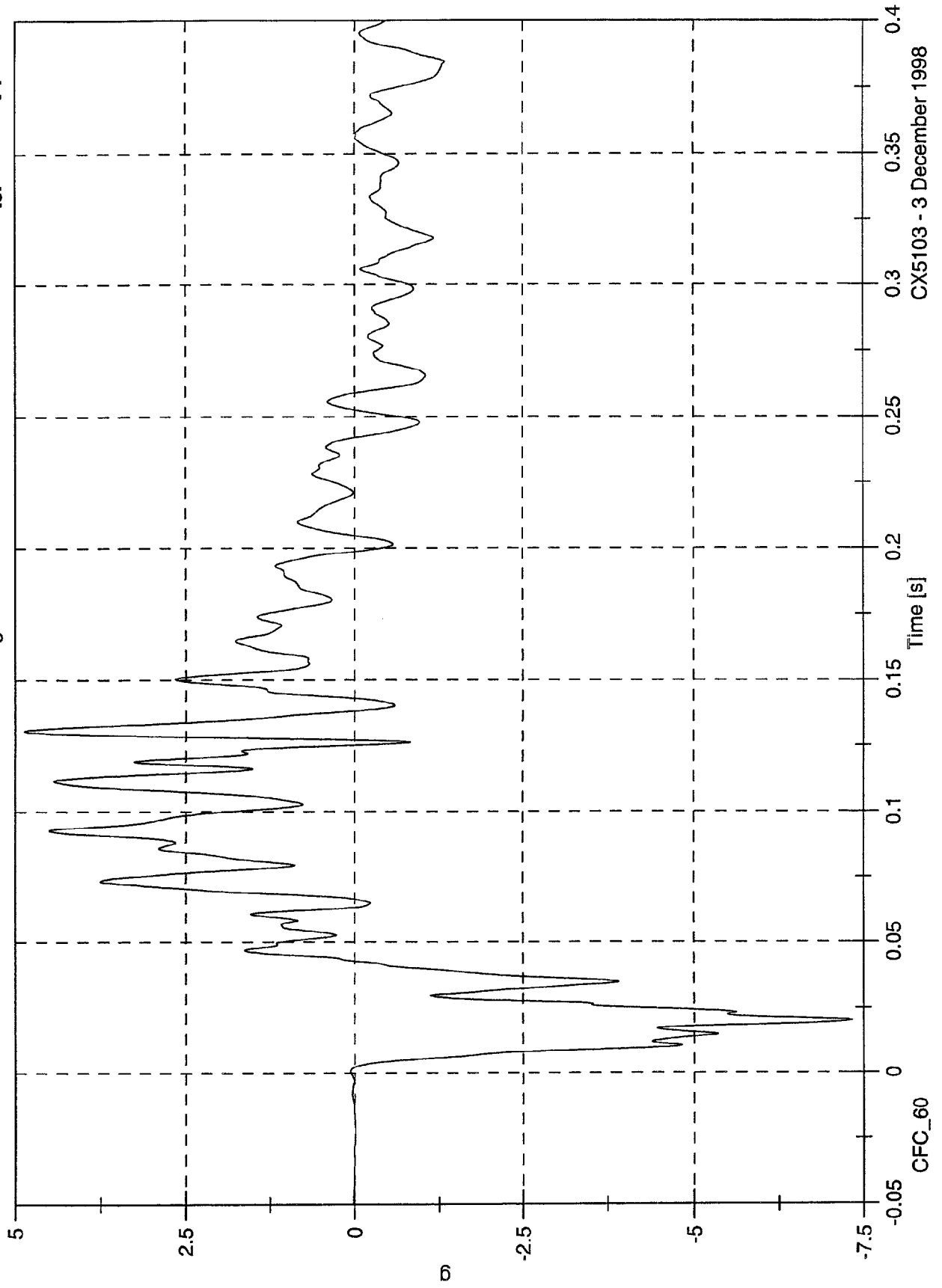


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 4.9 [g] at 0.131 [s]
Min: -7.3 [g] at 0.020 [s]

Acc 2 Right Rear Sill Z

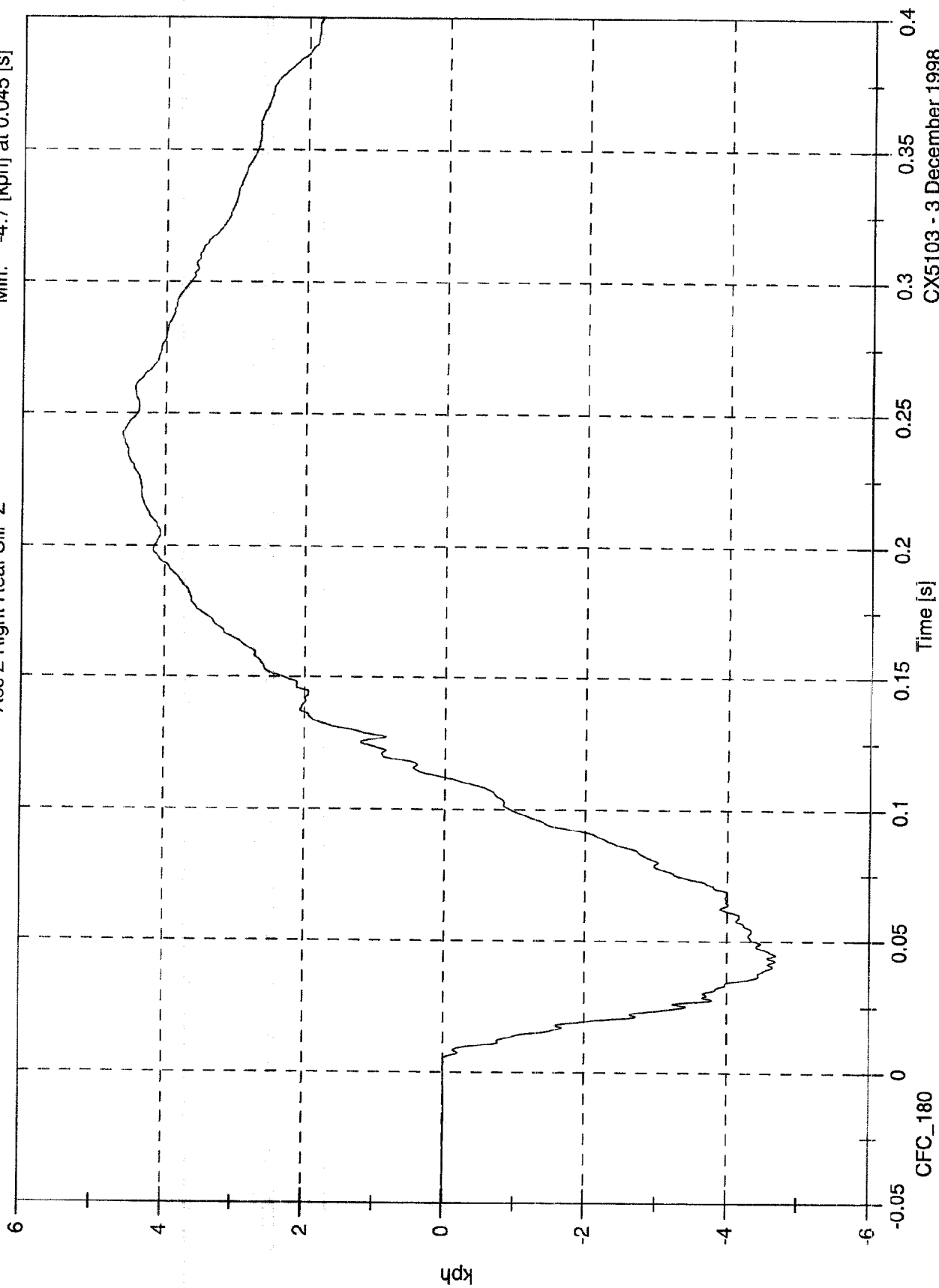


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 4.6 [kph] at 0.243 [s]
 Min: -4.7 [kph] at 0.045 [s]

Acc 2 Right Rear Sill Z

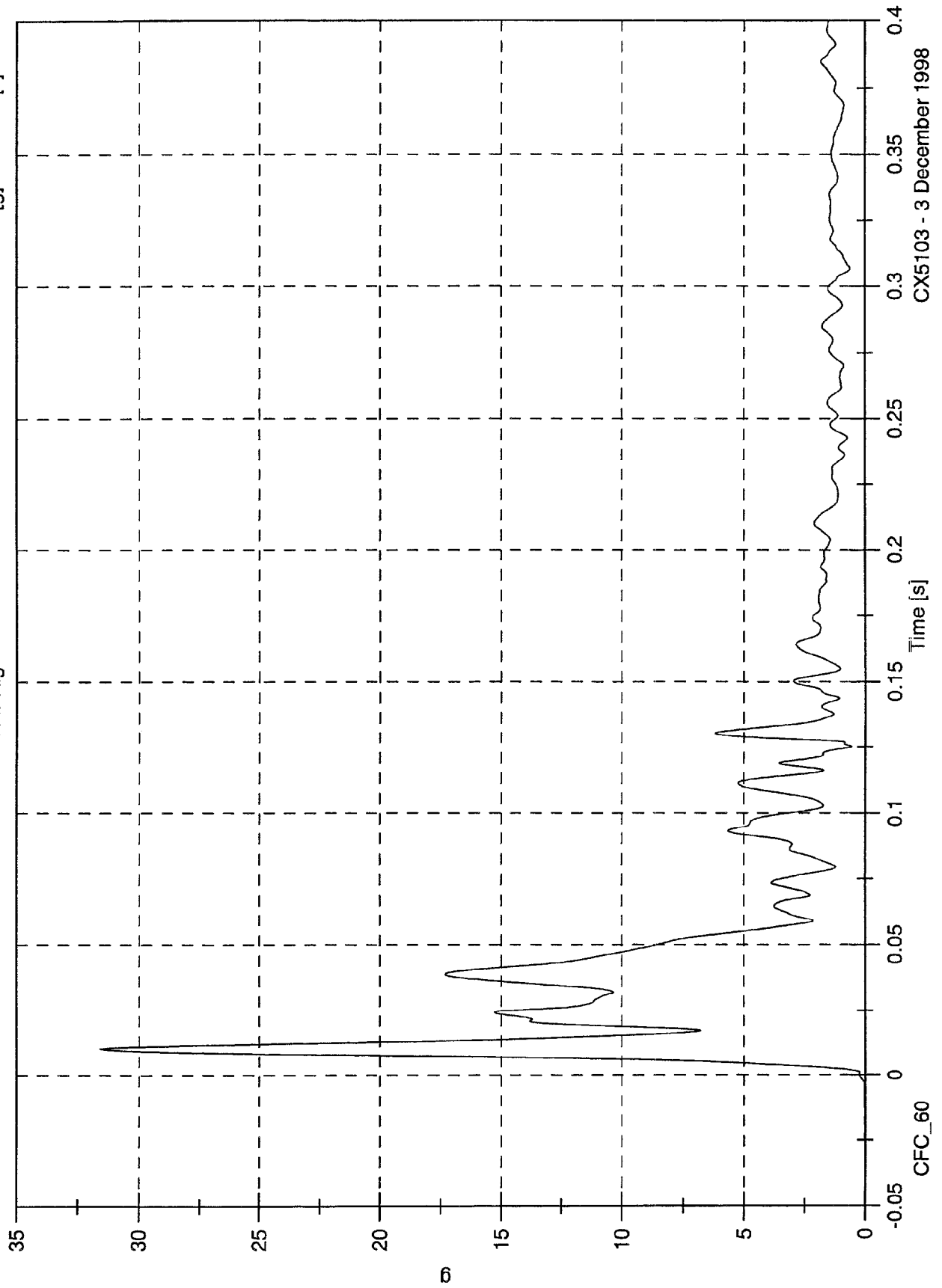


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 31.6 [g] at 0.010 [s]
Min: 0.0 [g] at -0.028 [s]

Acc 2 Right Rear Sill Resultant

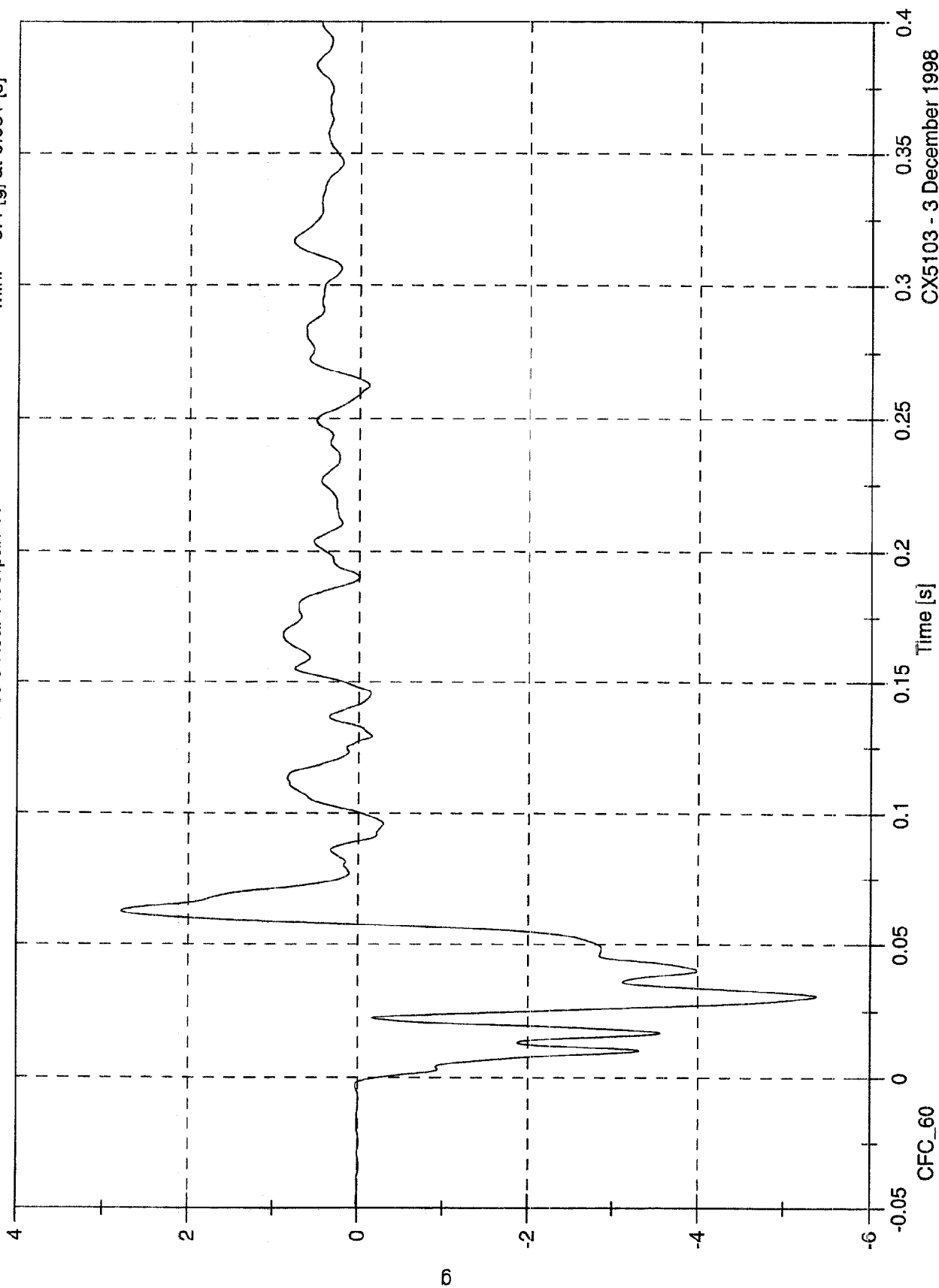


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

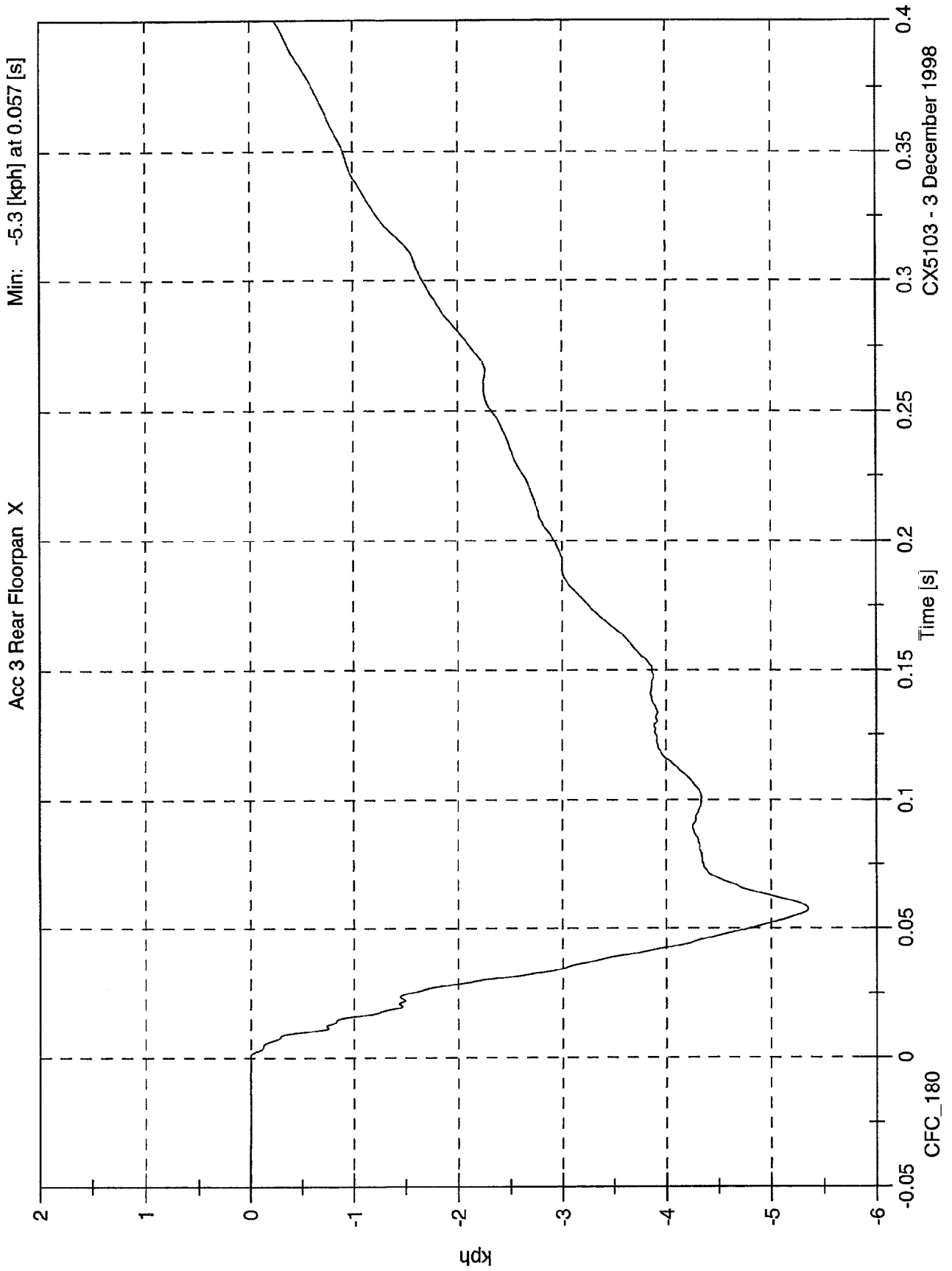
Max: 2.8 [g] at 0.063 [s]
Min: -5.4 [g] at 0.031 [s]

Acc 3 Rear Floorpan X



NHTSA Side Impact - 1999 Toyota Sienna

Max: 1.4 [kph] at 0.500 [s]
Min: -5.3 [kph] at 0.057 [s]

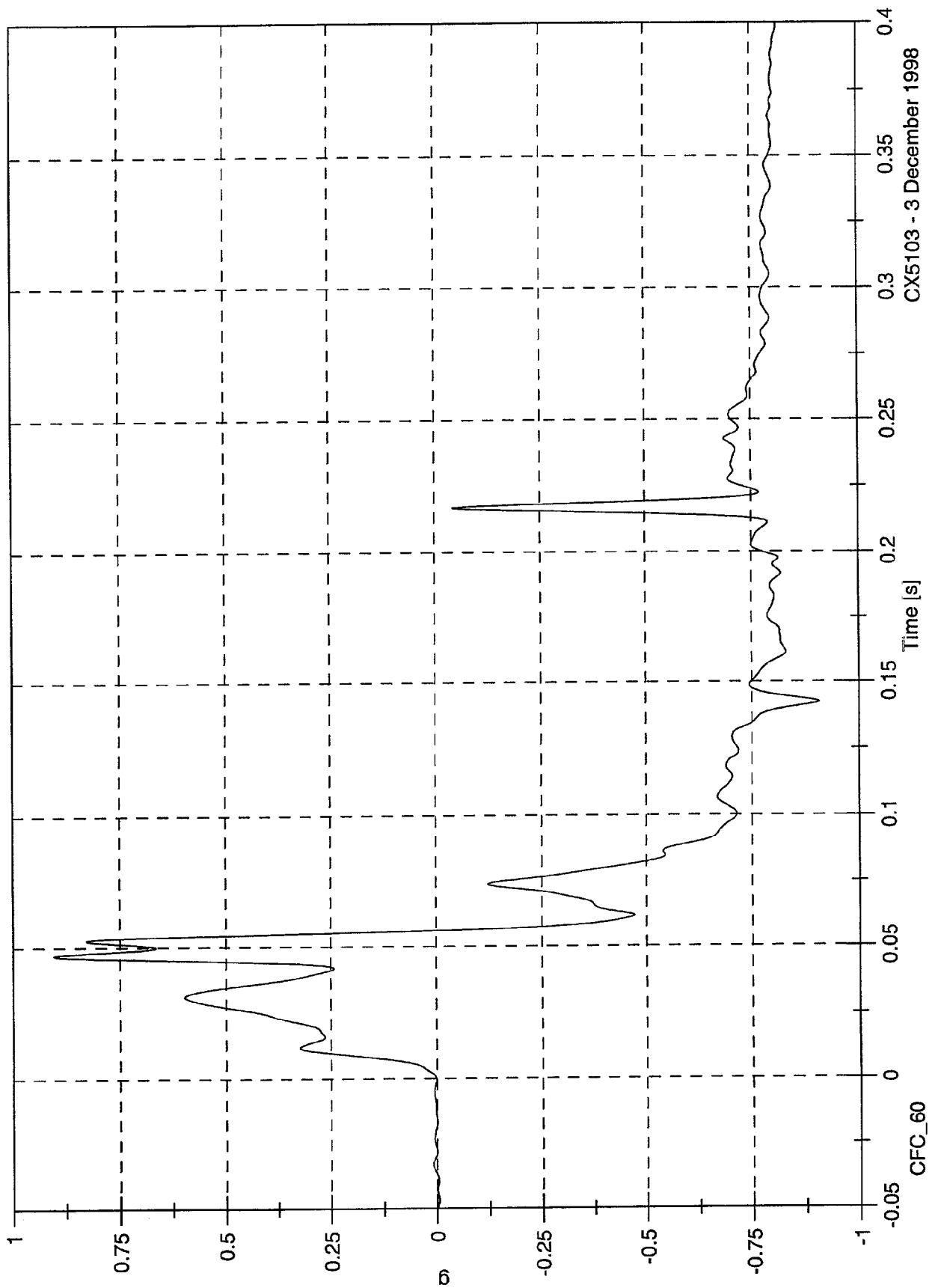


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 0.9 [g] at 0.047 [s]
Min: -0.9 [g] at 0.142 [s]

Acc 3 Rear Floorpan Y

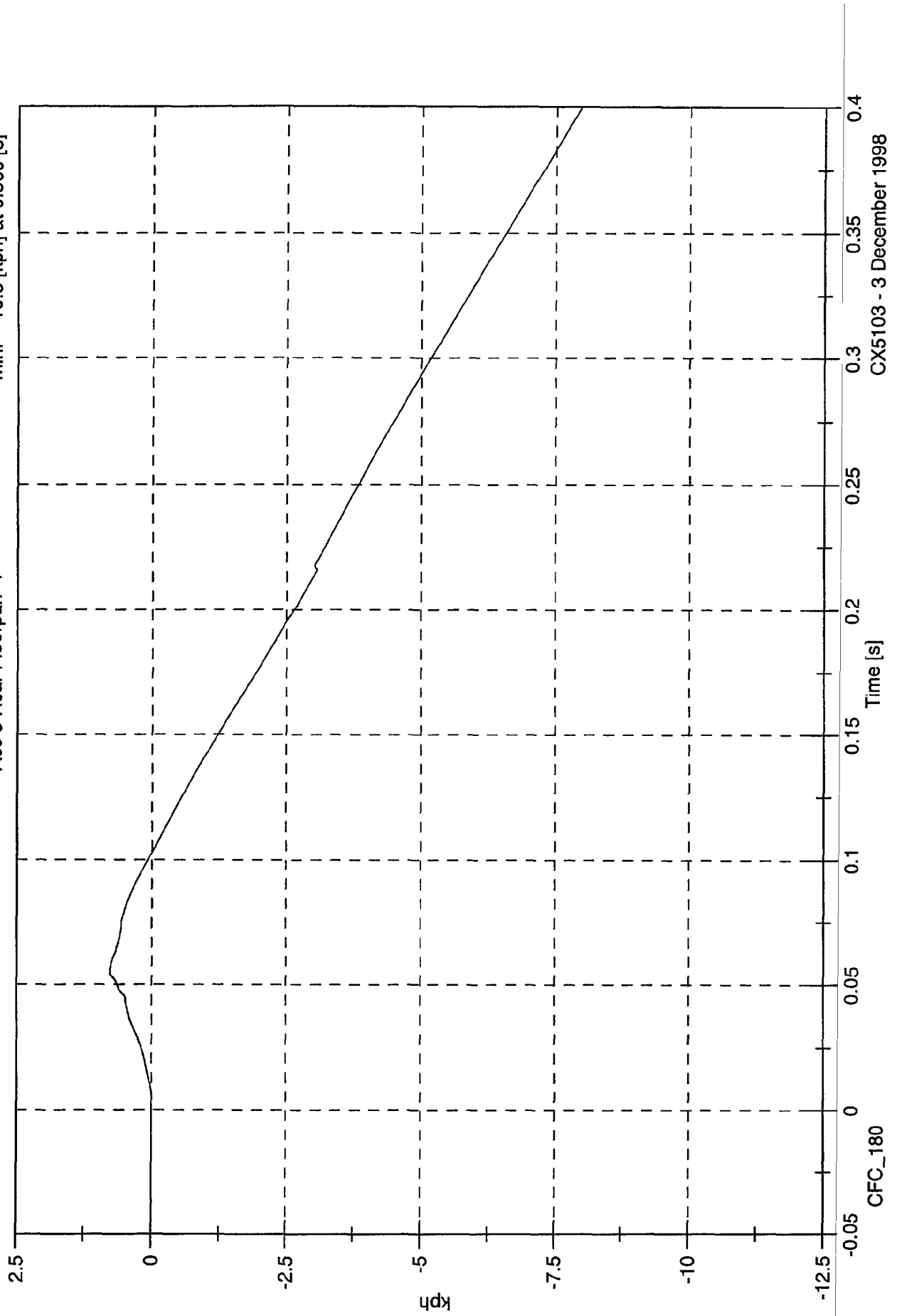


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 0.8 [kph] at 0.055 [s]
Min: -10.8 [kph] at 0.500 [s]

Acc 3 Rear Floorpan Y

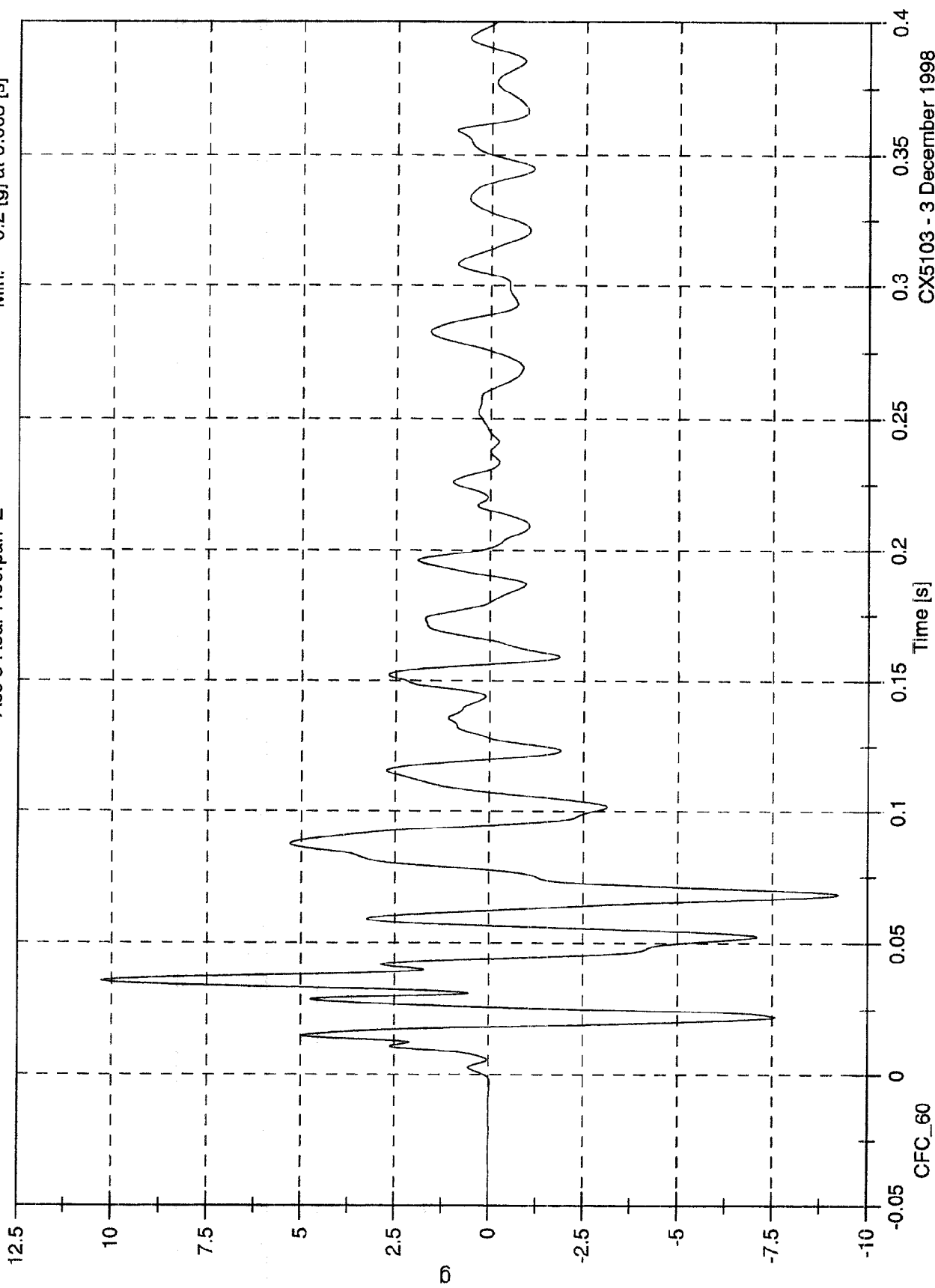


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 10.3 [g] at 0.036 [s]
Min: -9.2 [g] at 0.068 [s]

Acc 3 Rear Floorpan Z



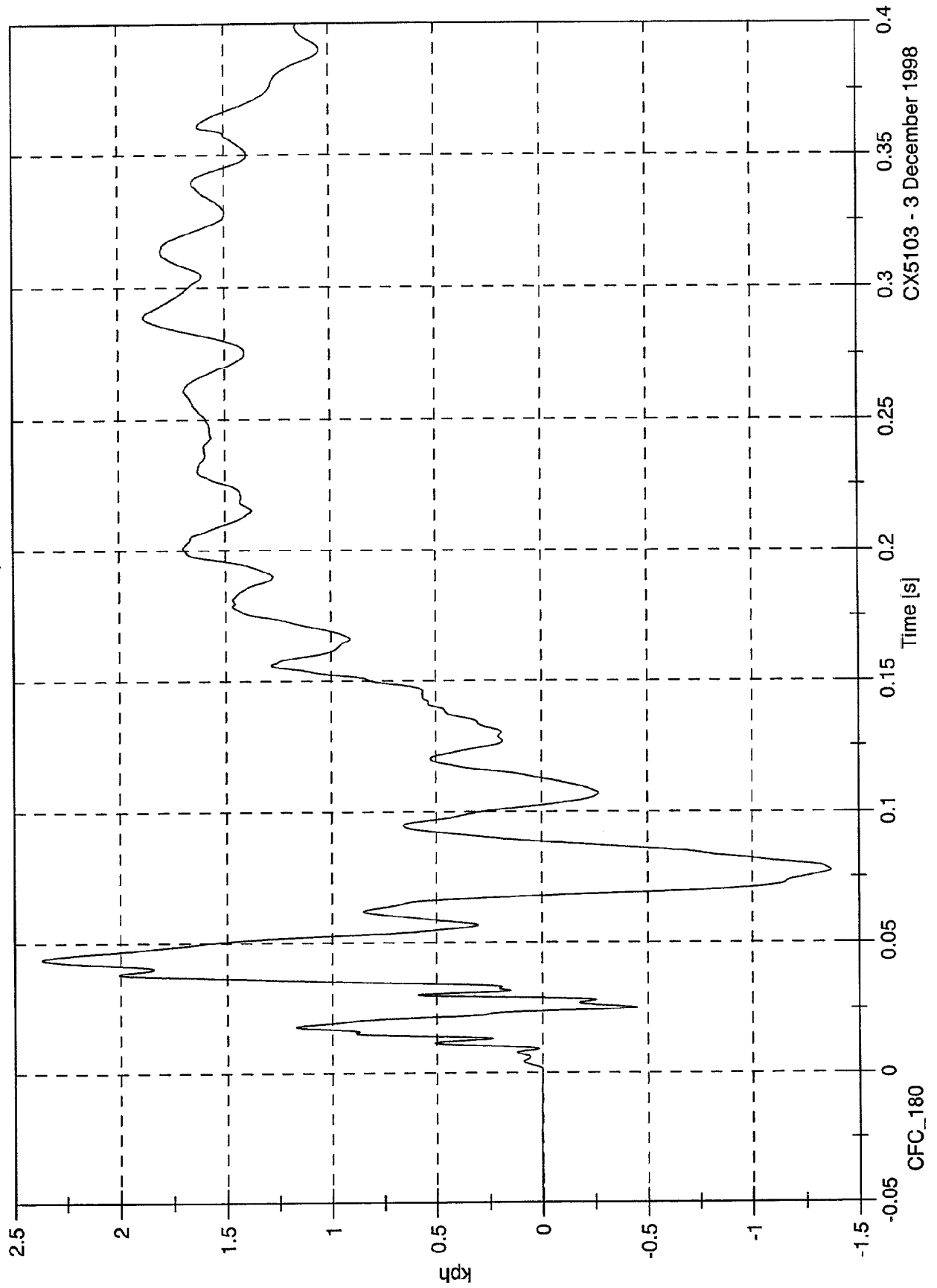
CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 2.4 [kph] at 0.044 [s]

Min: -1.4 [kph] at 0.077 [s]

Acc 3 Rear Floorpan Z

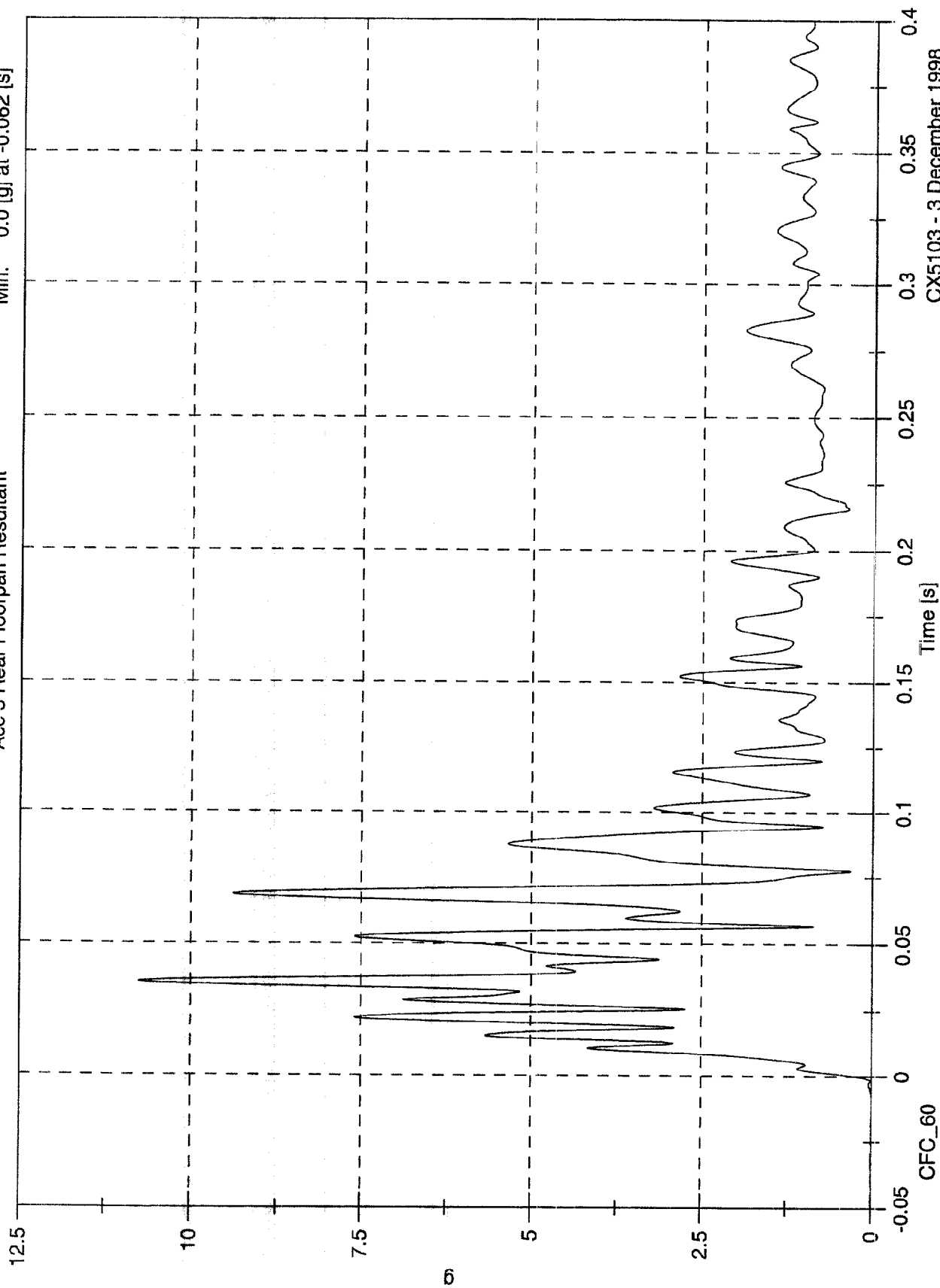


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Acc 3 Rear Floorpan Resultant

Max: 10.8 [g] at 0.036 [s]
Min: 0.0 [g] at -0.062 [s]

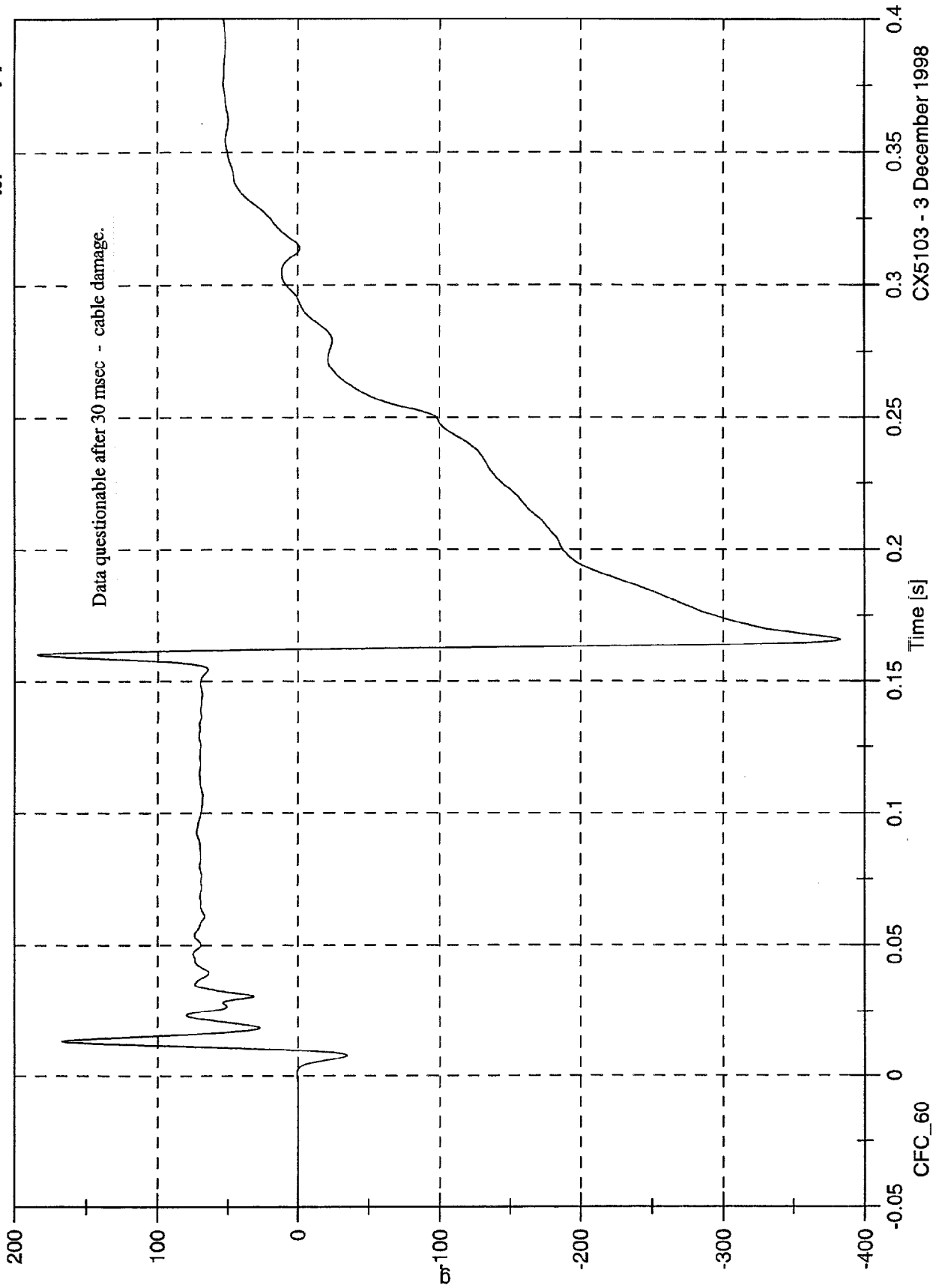


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 184.0 [g] at 0.160 [s]
Min: -382.7 [g] at 0.166 [s]

Acc 4 Left Rear Sill Y

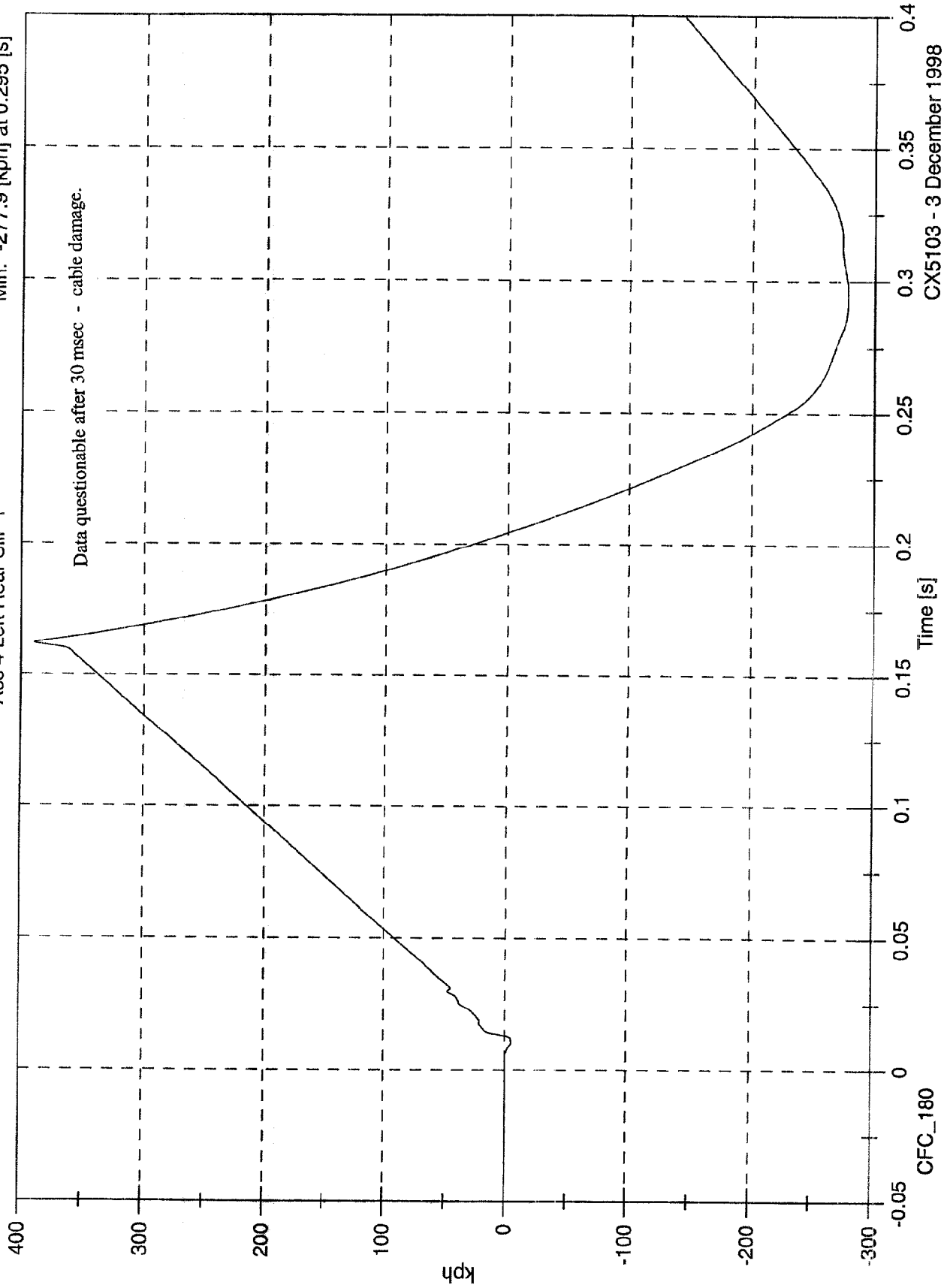


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 389.2 [kph] at 0.162 [s]
Min: -277.9 [kph] at 0.295 [s]

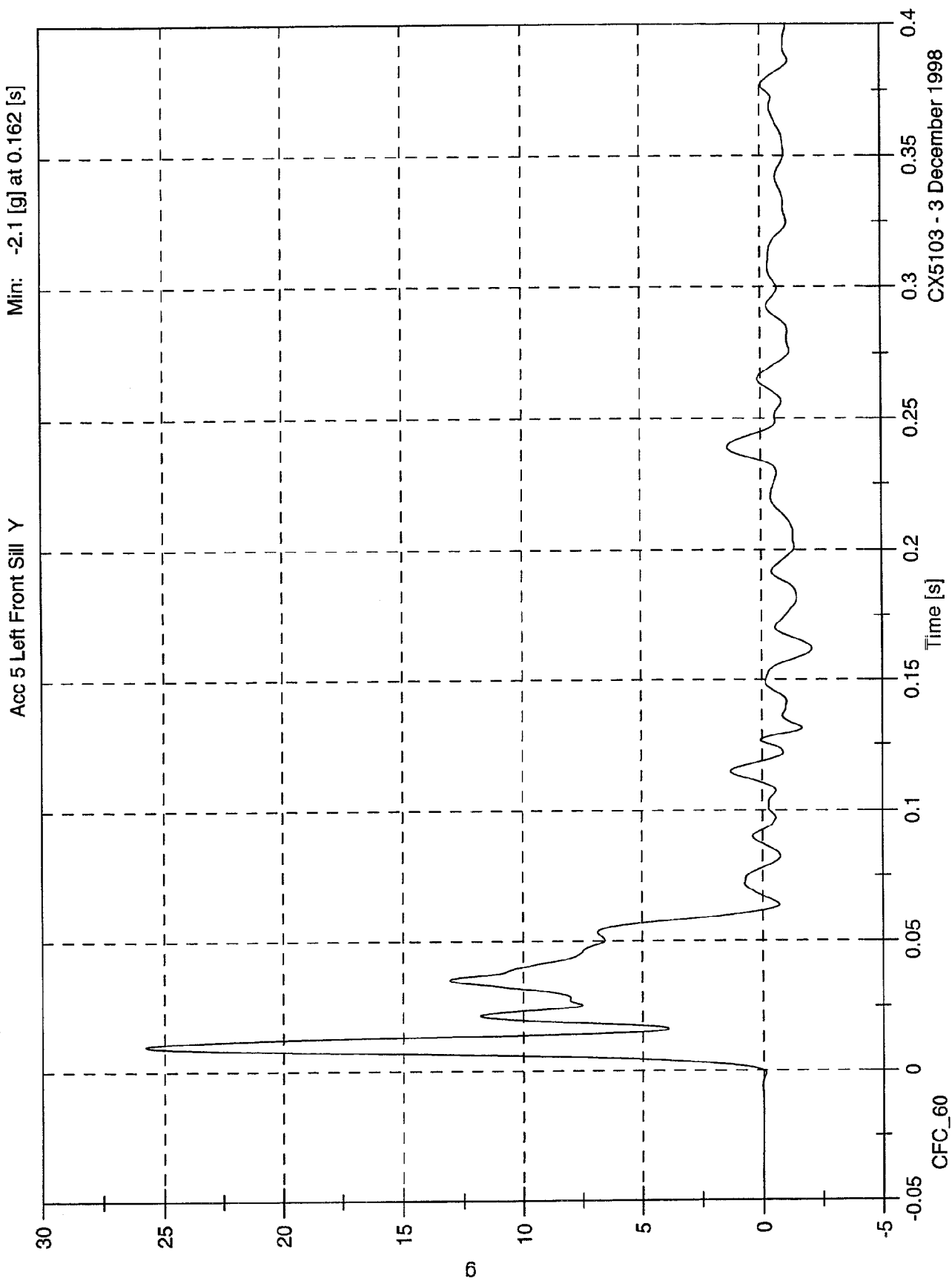
Acc 4 Left Rear Sill Y



CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 25.8 [g] at 0.010 [s]
Min: -2.1 [g] at 0.162 [s]



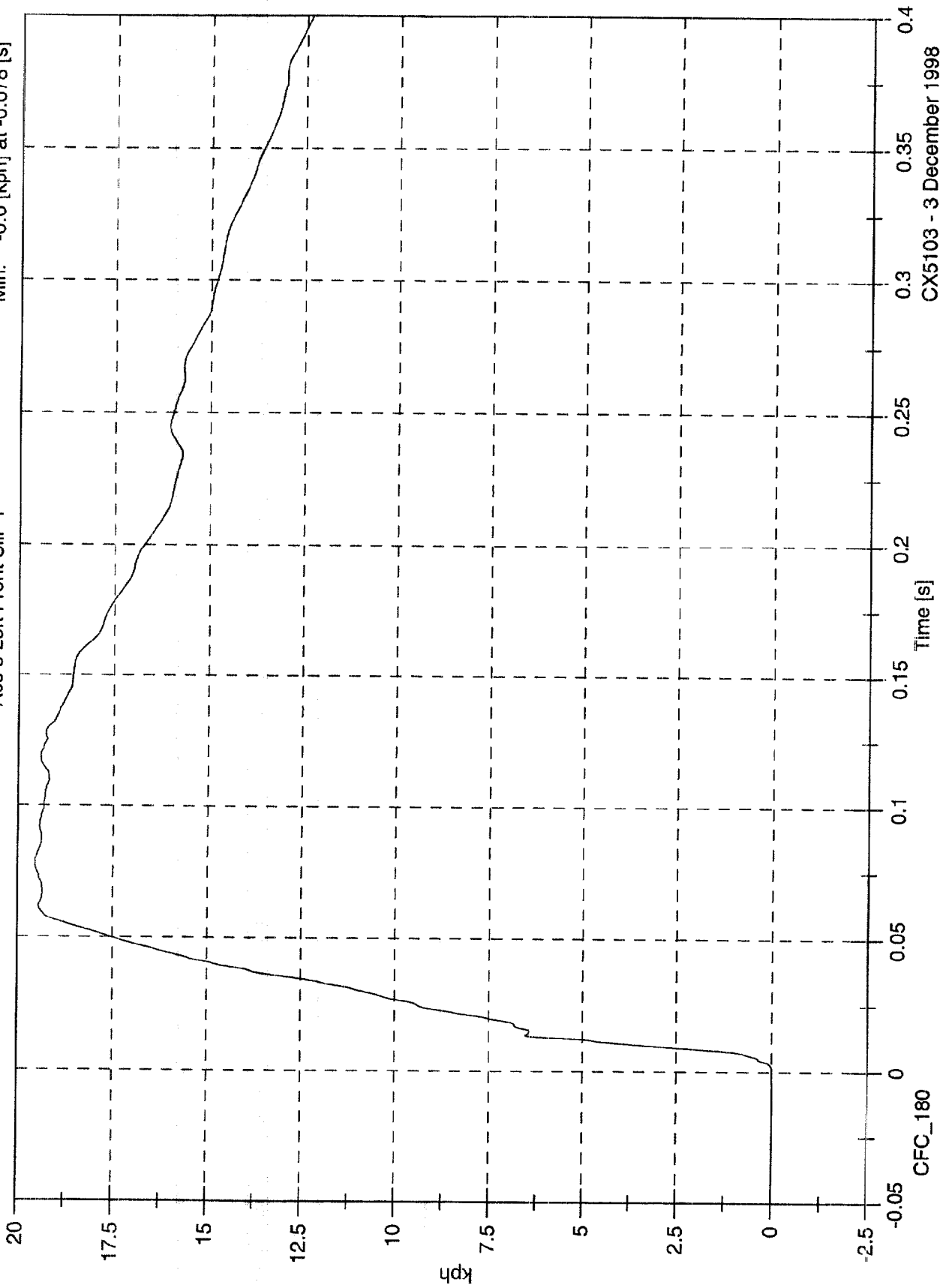
CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 19.5 [kph] at 0.079 [s]

Min: -0.0 [kph] at -0.078 [s]

Acc 5 Left Front Sill Y

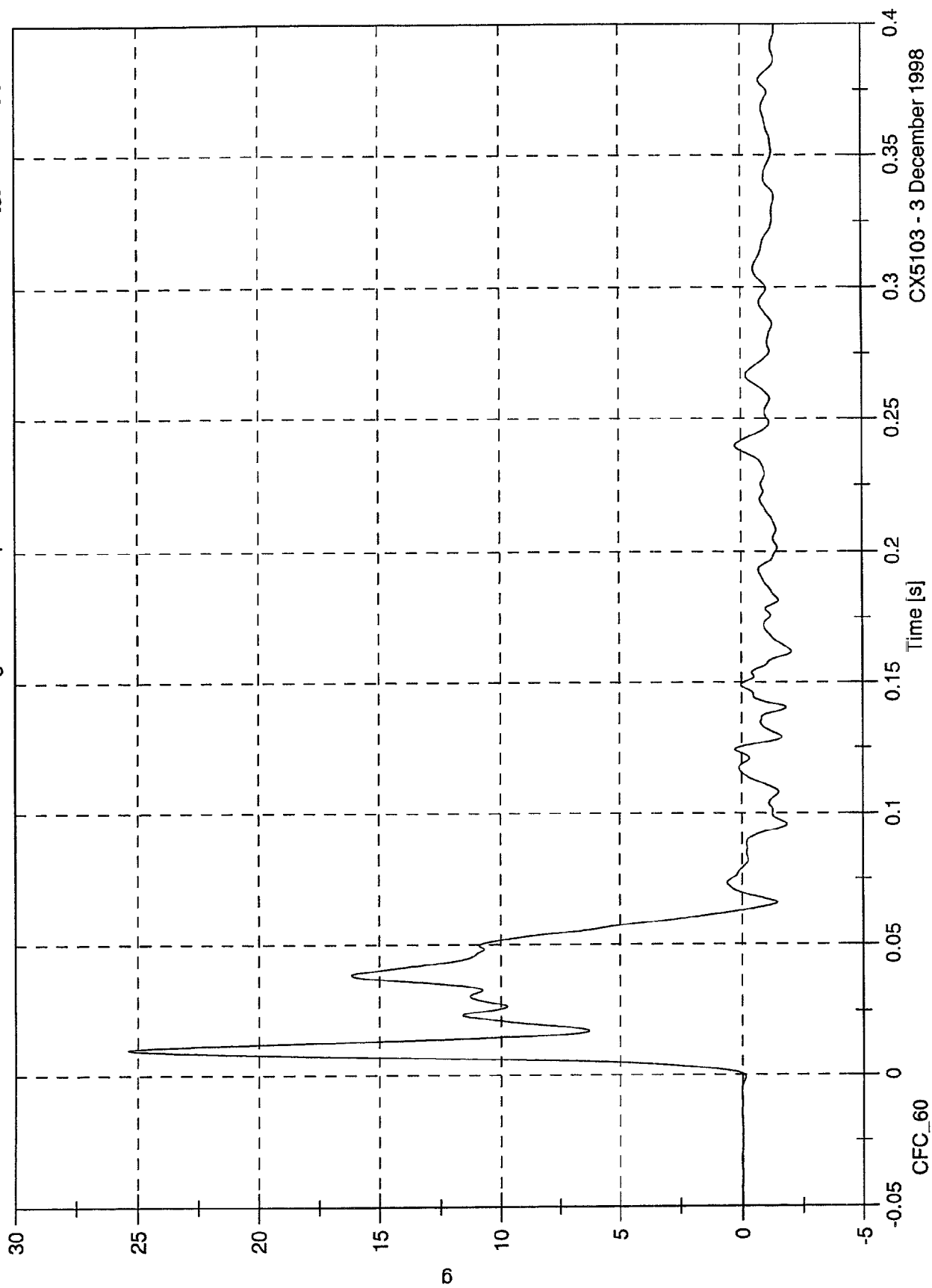


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

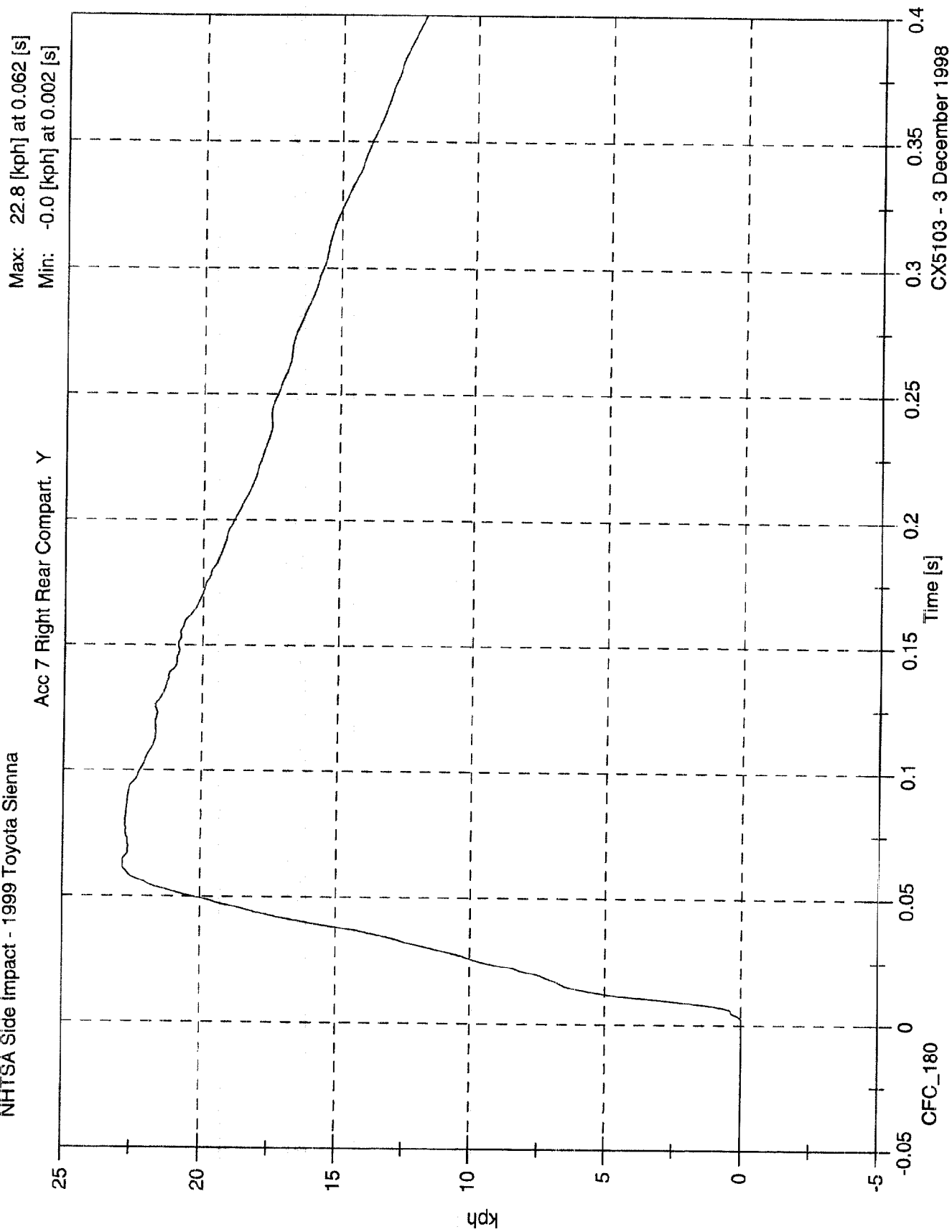
Max: 25.4 [g] at 0.010 [s]
Min: -2.0 [g] at 0.162 [s]

Acc 7 Right Rear Compart. Y



CX5103 - 3 December 1998

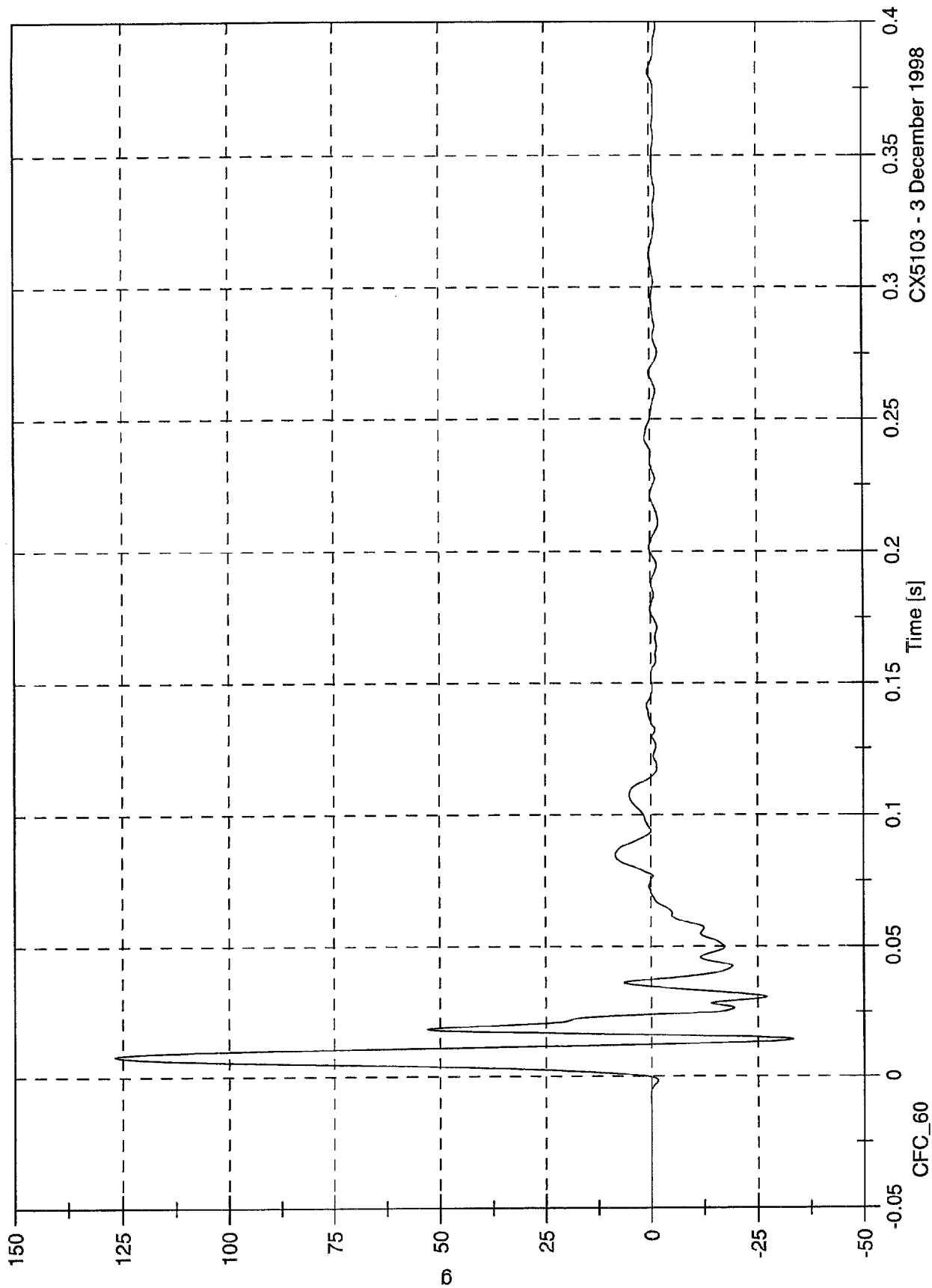
NHTSA Side Impact - 1999 Toyota Sienna



NHTSA Side Impact - 1999 Toyota Sienna

Max: 126.8 [g] at 0.008 [s]
Min: -33.2 [g] at 0.014 [s]

Acc 12 Left Lower B Pillar Y

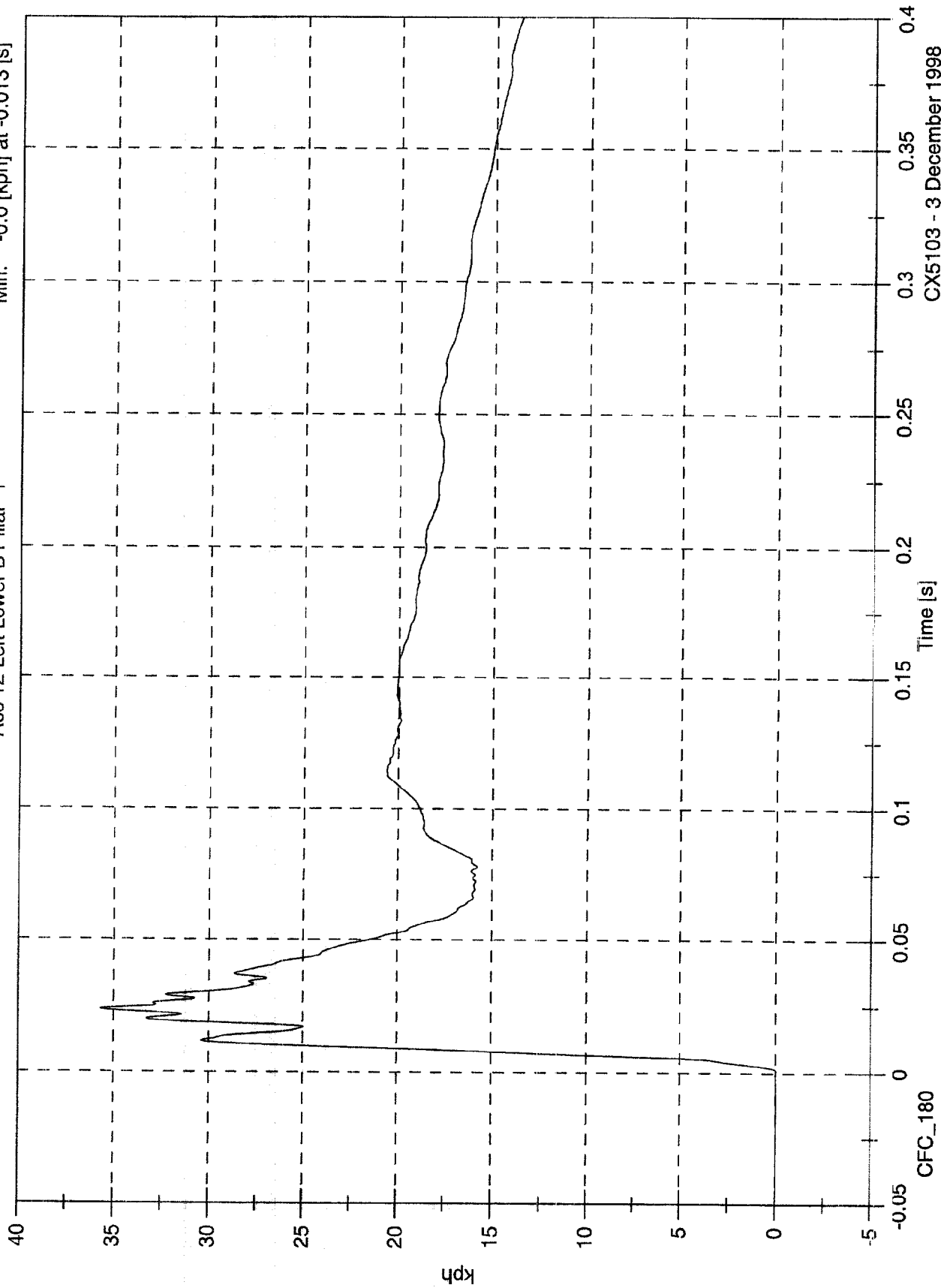


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Acc 12 Left Lower B Pillar Y

Max: 35.7 [kph] at 0.024 [s]
Min: -0.0 [kph] at -0.013 [s]

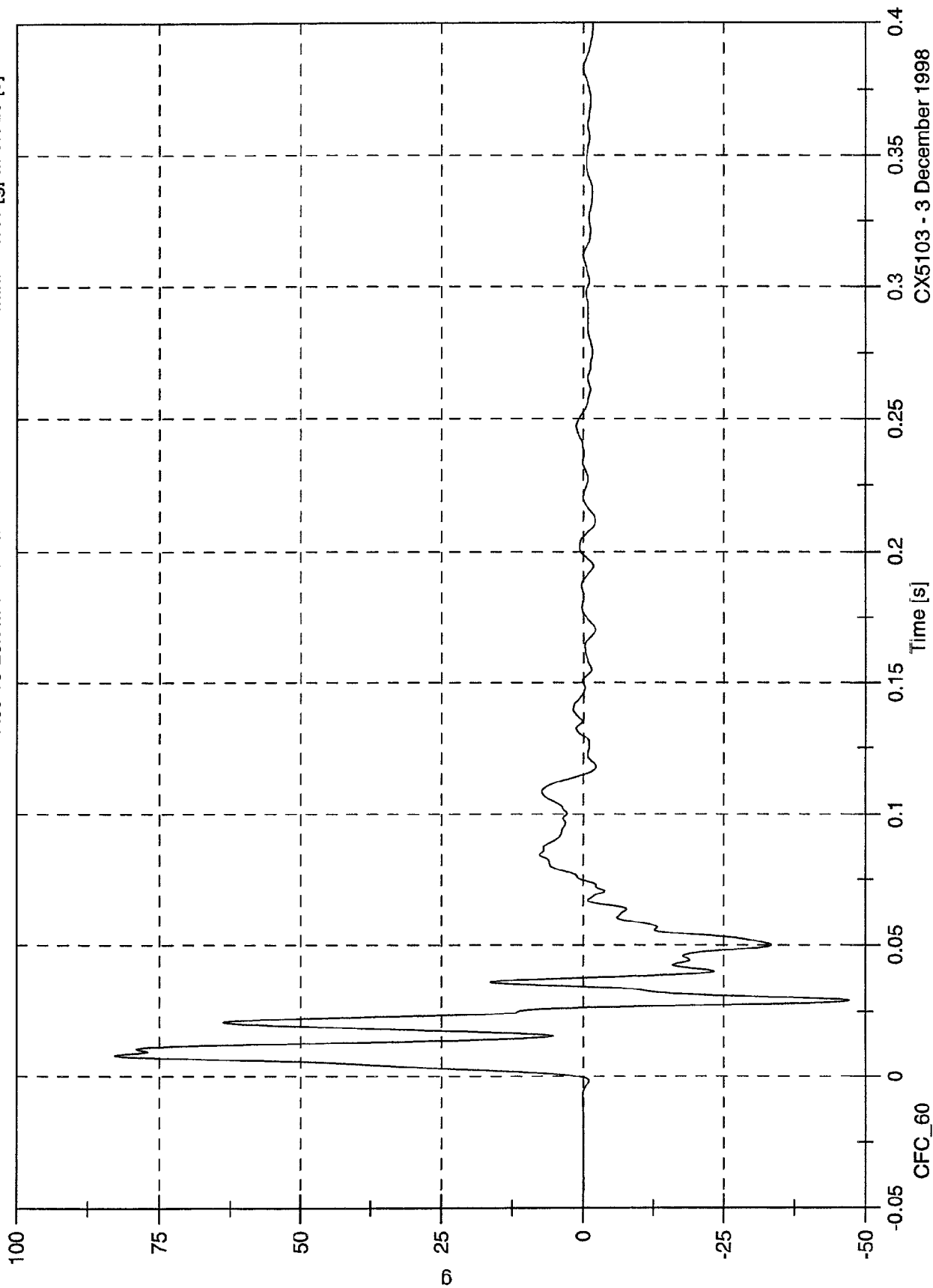


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 82.8 [g] at 0.008 [s]
Min: -47.1 [g] at 0.029 [s]

Acc 13 Left Mid B Pillar Y

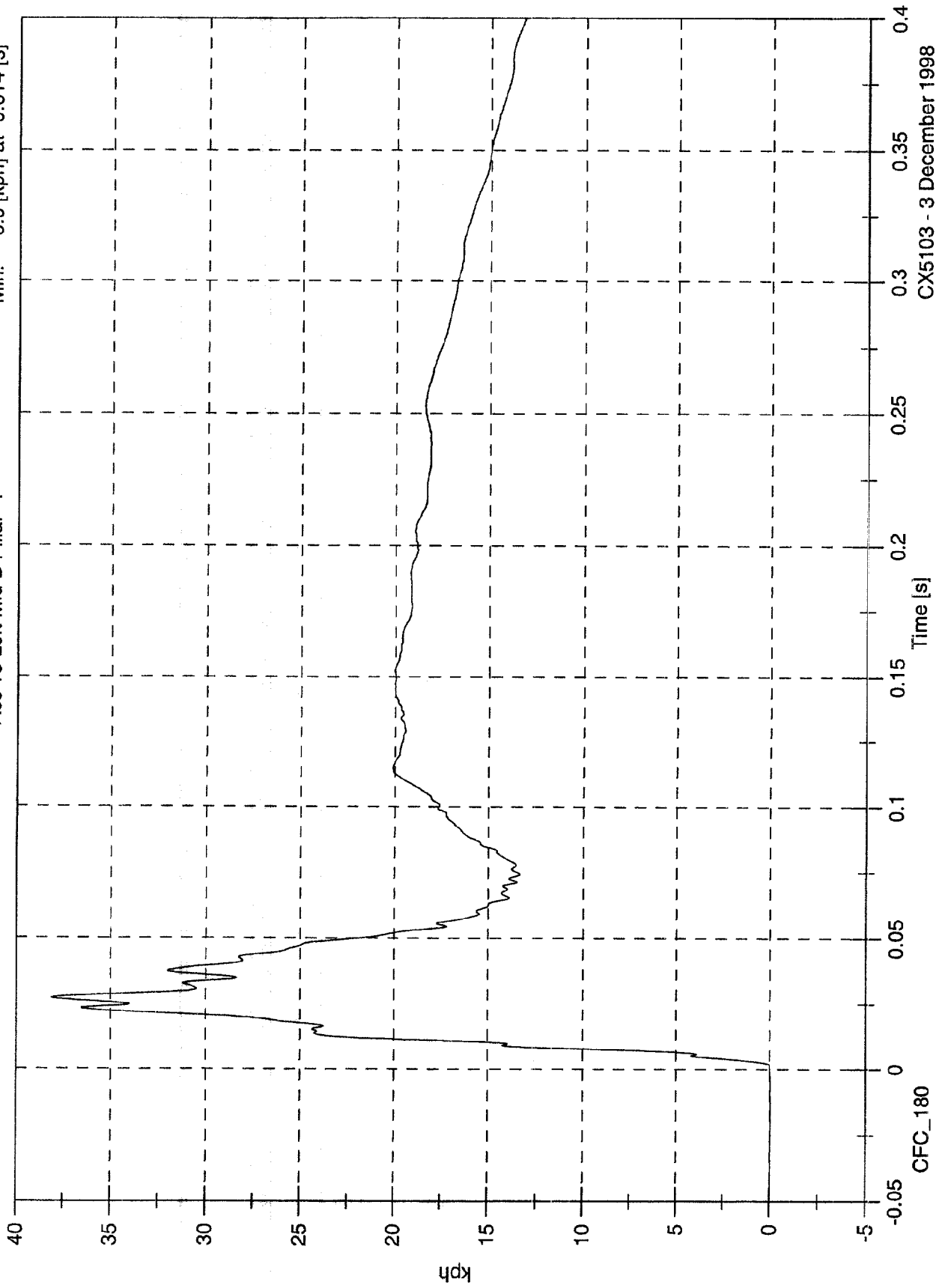


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Acc 13 Left Mid B Pillar Y

Max: 38.1 [kph] at 0.027 [s]
Min: -0.0 [kph] at -0.014 [s]

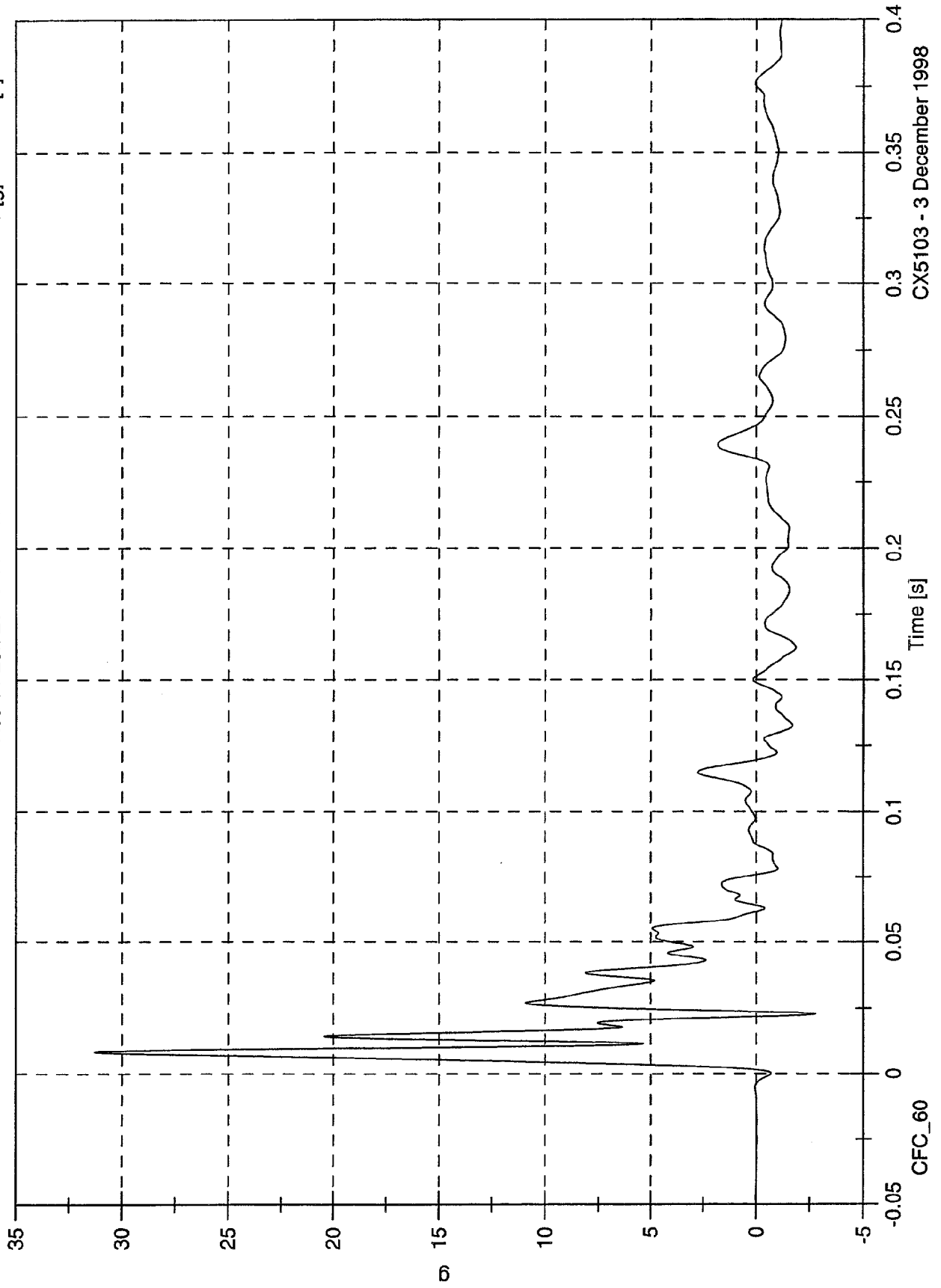


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 31.3 [g] at 0.008 [s]
Min: -2.8 [g] at 0.023 [s]

Acc 14 Left Lower A Pillar Y

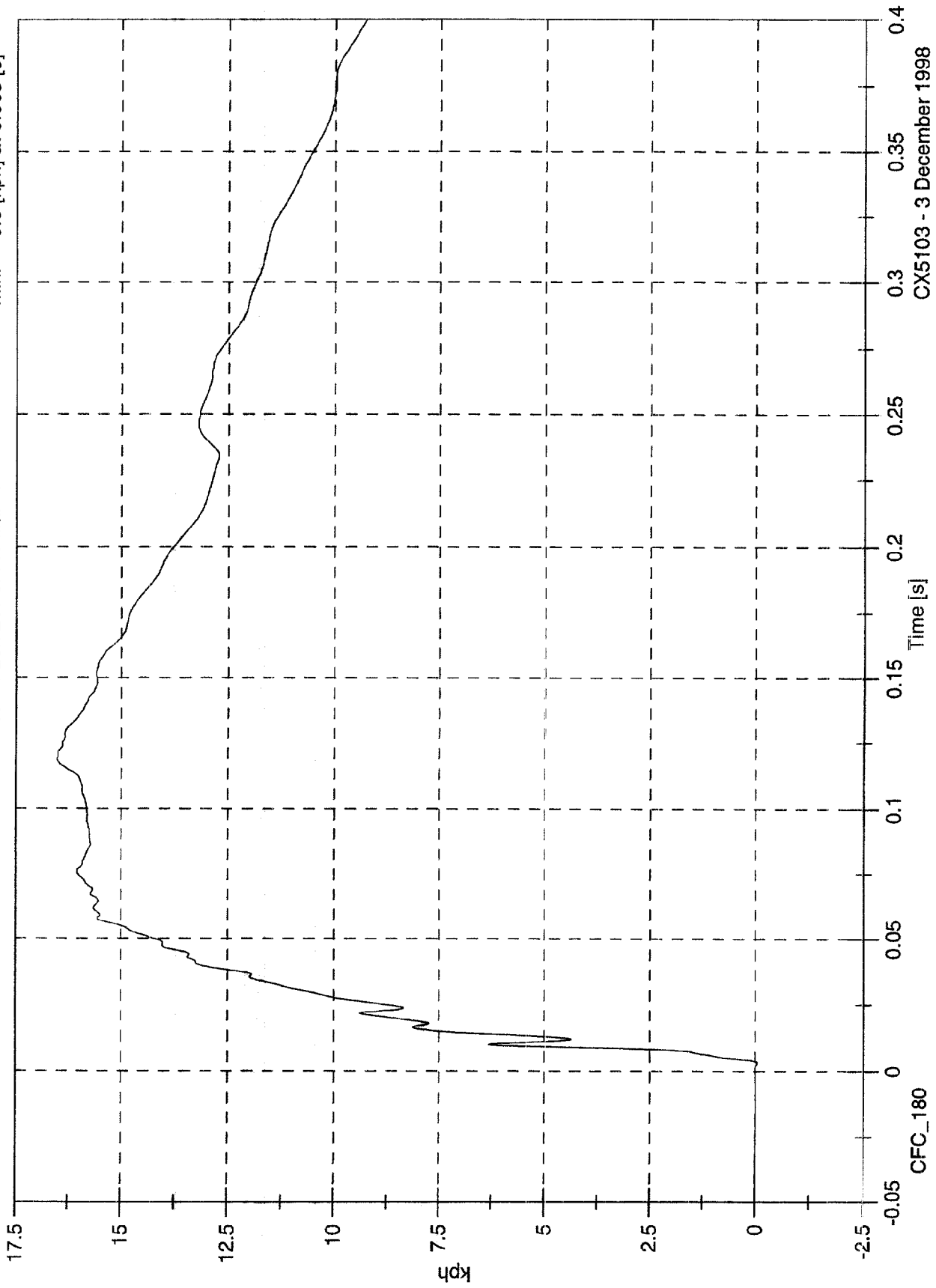


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Acc 14 Left Lower A Pillar Y

Max: 16.5 [kph] at 0.119 [s]
Min: -0.0 [kph] at 0.003 [s]



CX5103 - 3 December 1998

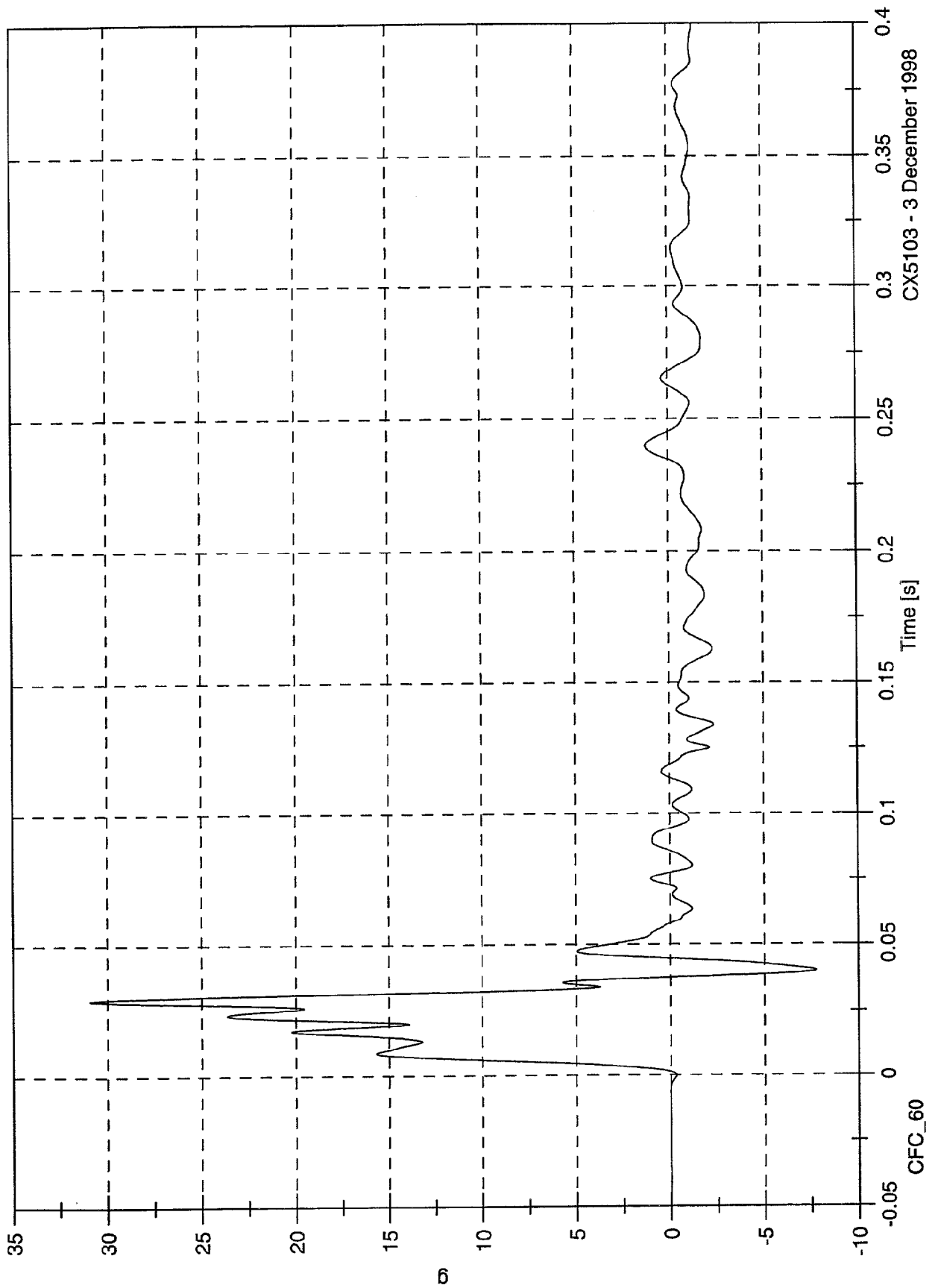
Acc 15 Left Upper A Pillar Y
Mounting location not accessible

Acc 15 Left Upper A Pillar Y
Mounting location not accessible

NHTSA Side Impact - 1999 Toyota Sienna

Max: 31.0 [g] at 0.029 [s]
Min: -7.8 [g] at 0.040 [s]

Acc 16 Front Seat Track Y

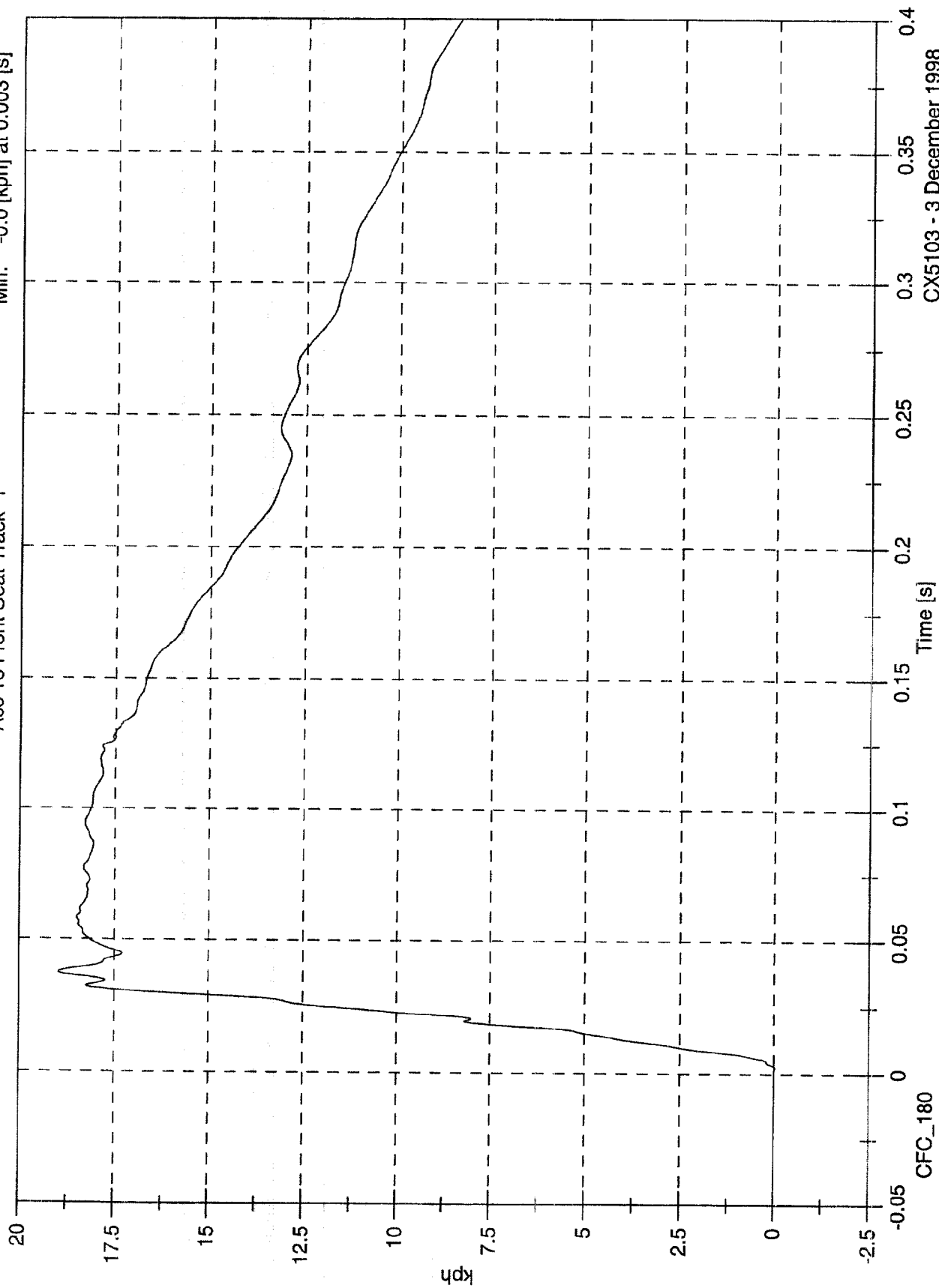


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 19.0 [kph] at 0.037 [s]
 Min: -0.0 [kph] at 0.003 [s]

Acc 16 Front Seat Track Y

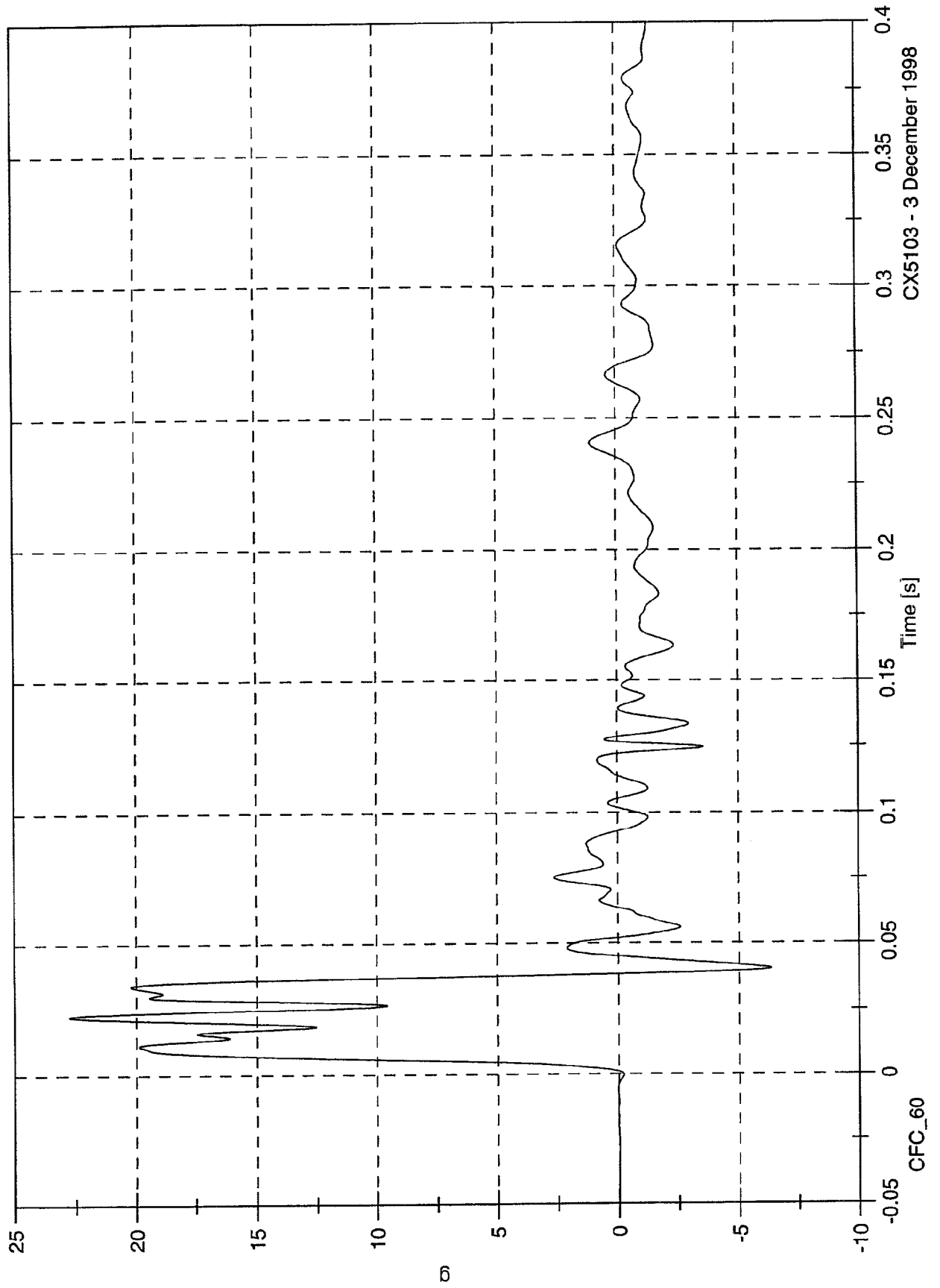


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Acc 17 Rear Seat Track Y Y

Max: 22.8 [g] at 0.023 [s]
Min: -6.4 [g] at 0.040 [s]

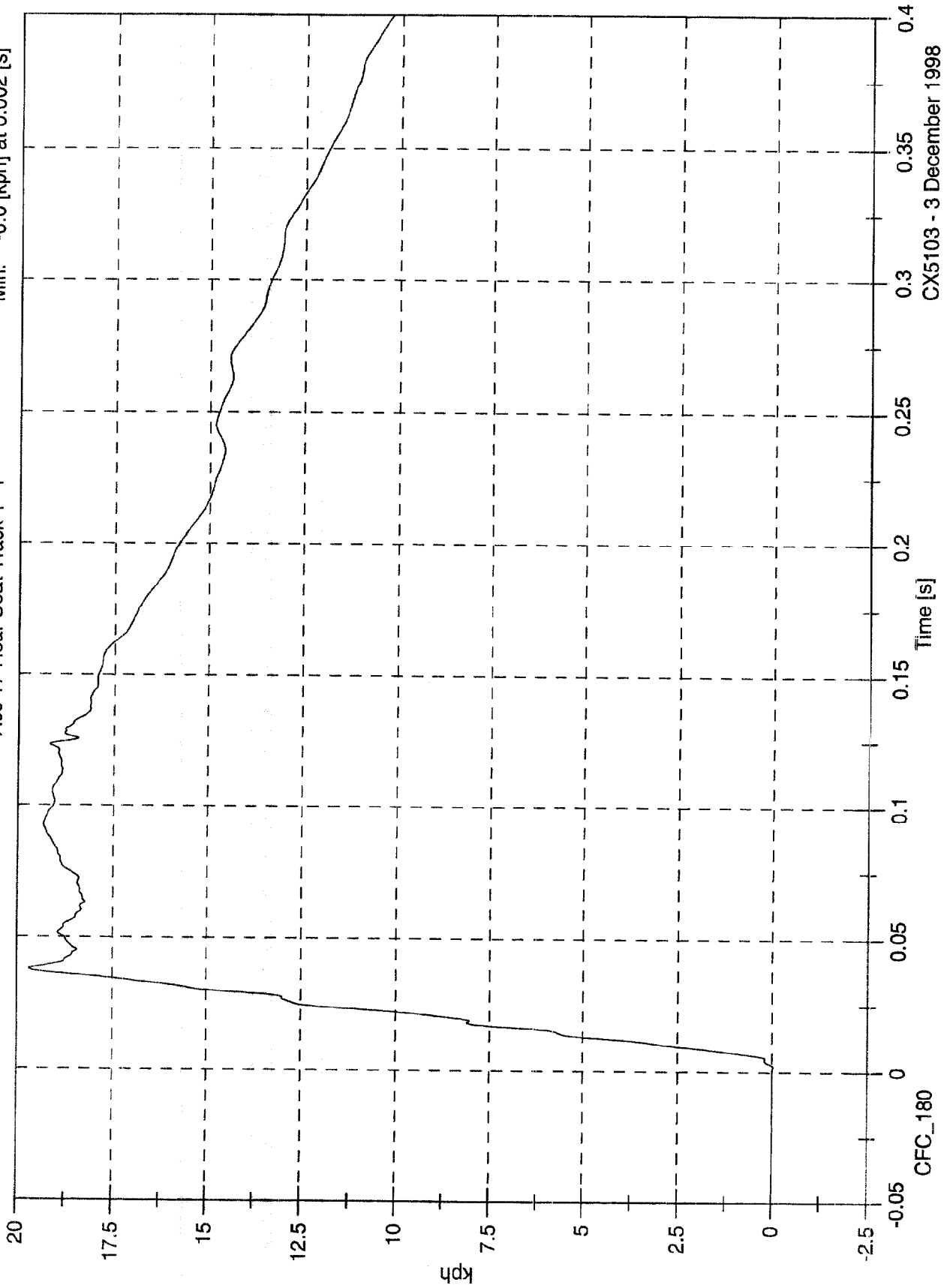


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 19.7 [kph] at 0.038 [s]
Min: -0.0 [kph] at 0.002 [s]

Acc 17 Rear Seat Track Y Y

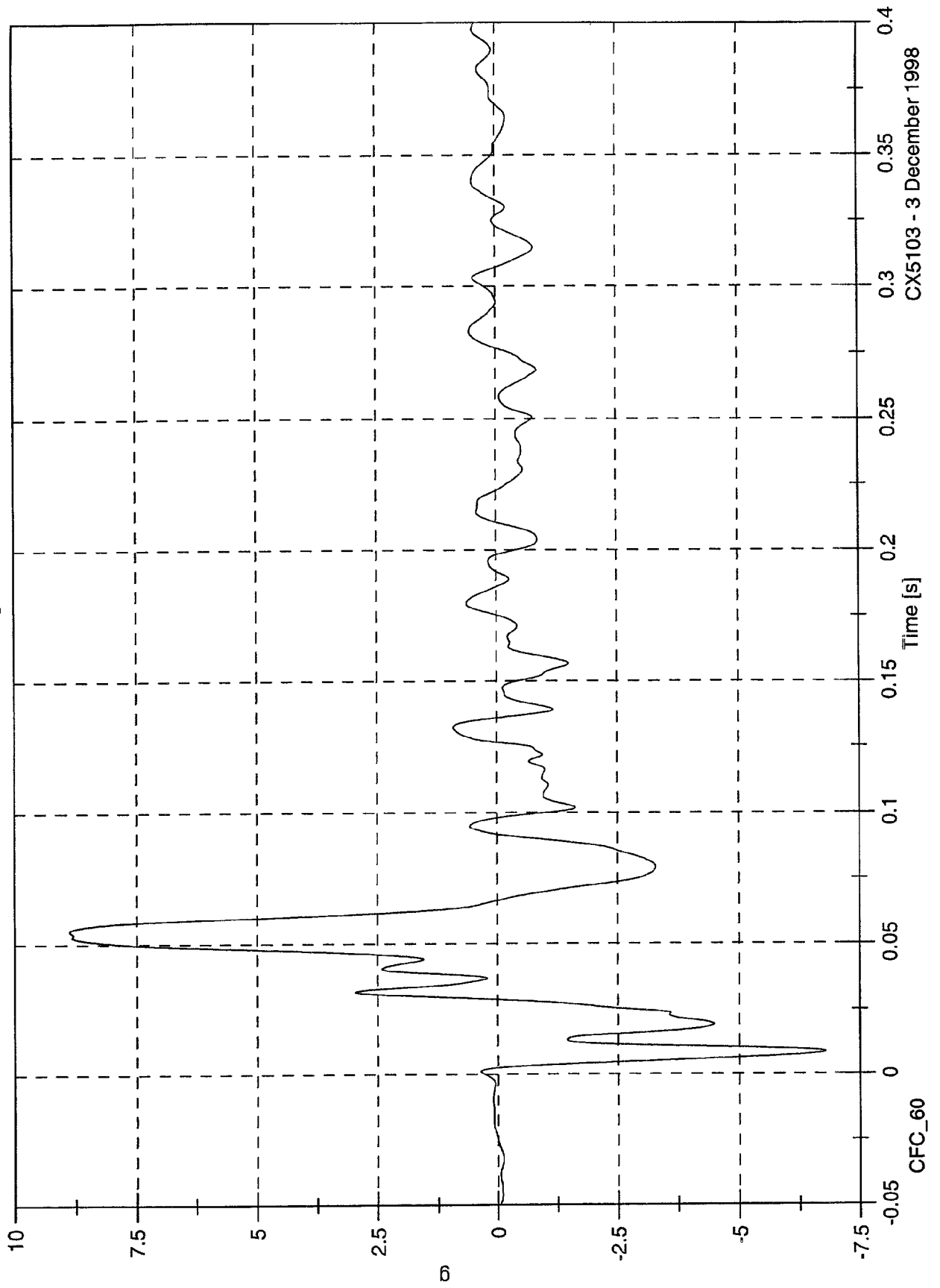


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 8.9 [g] at 0.055 [s]
Min: -6.8 [g] at 0.009 [s]

Acc 18 Target C/G X

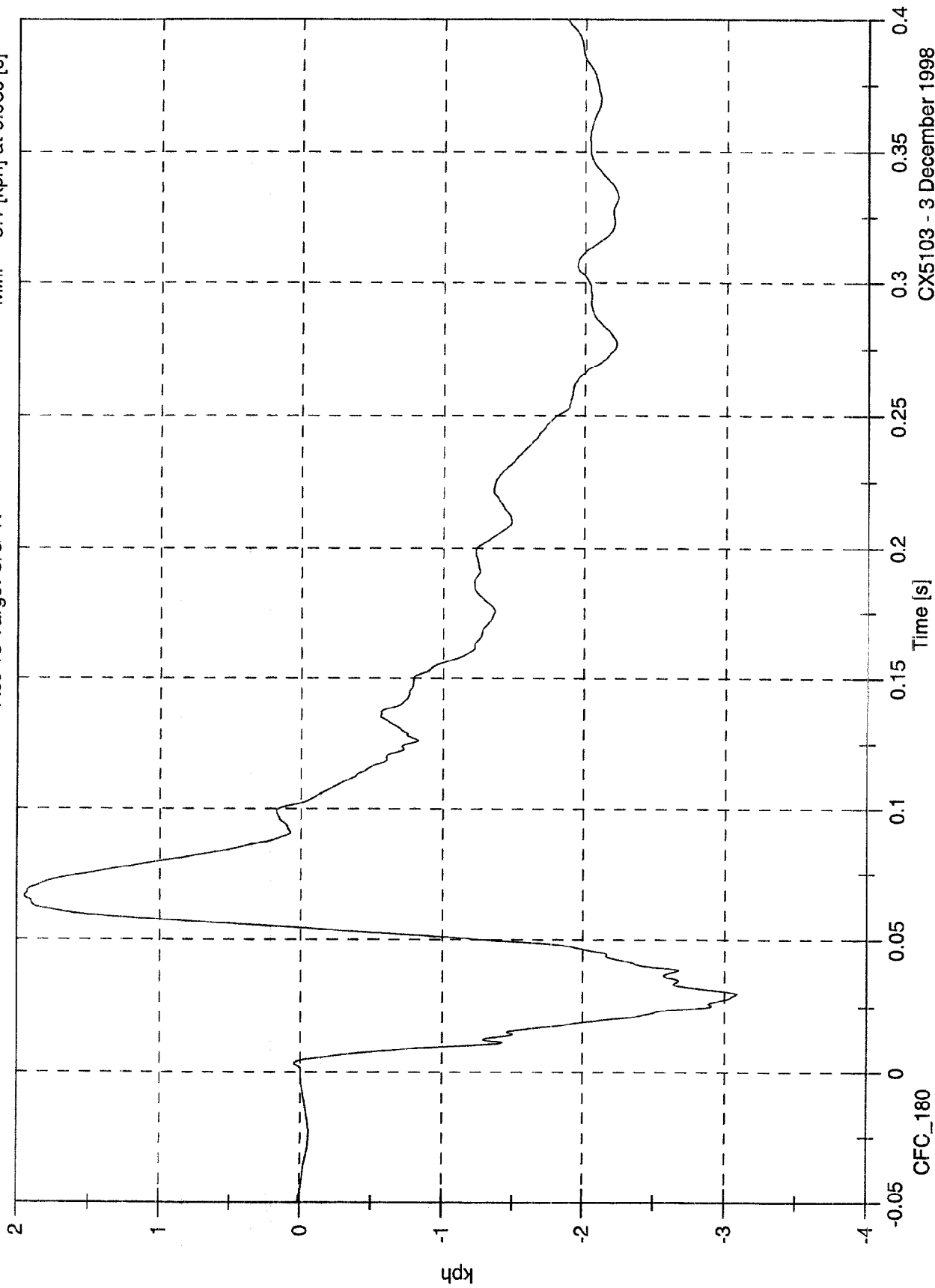


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 1.9 [kph] at 0.066 [s]
Min: -3.1 [kph] at 0.030 [s]

Acc 18 Target C/G X

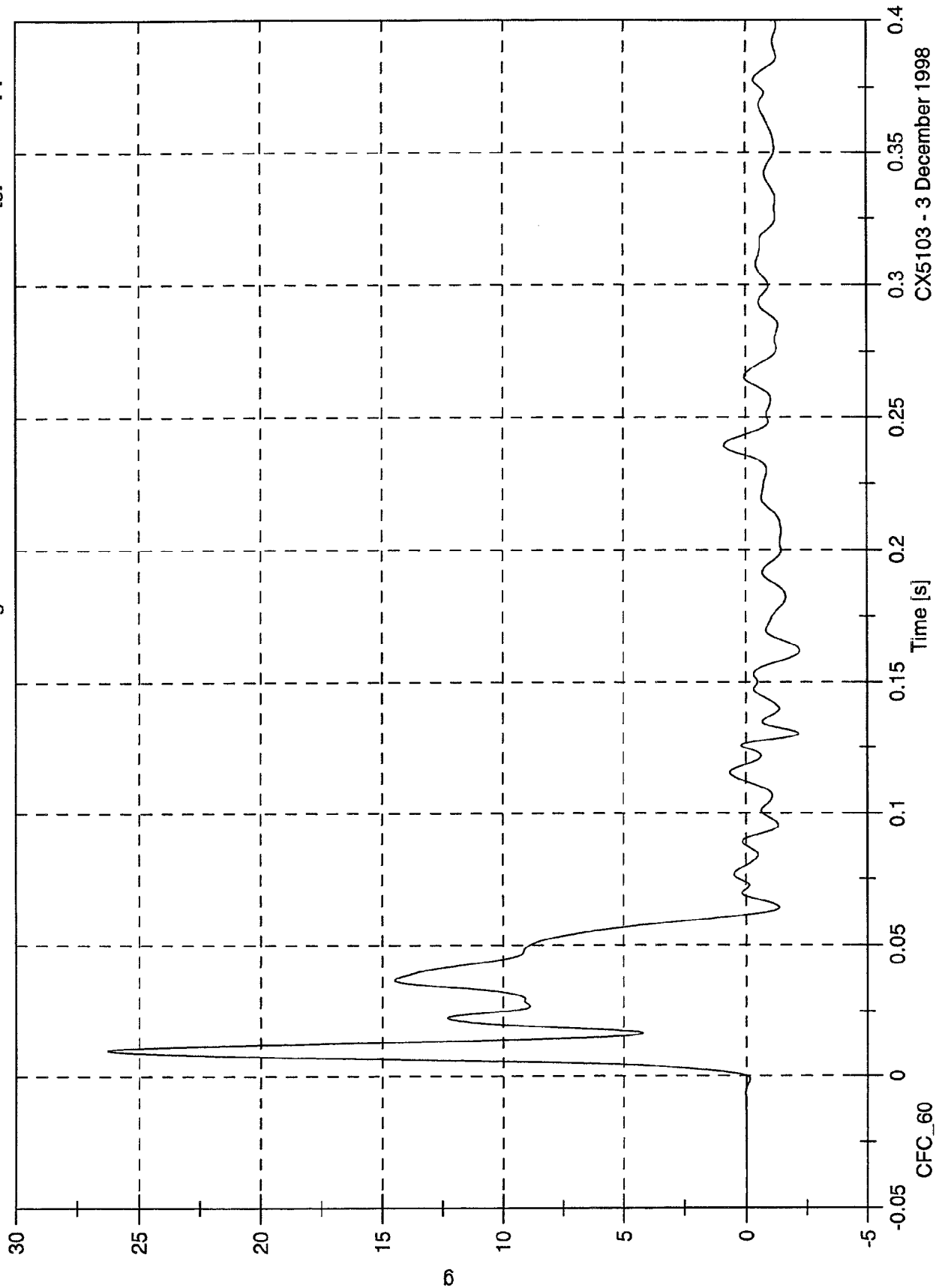


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 26.3 [g] at 0.010 [s]
Min: -2.2 [g] at 0.162 [s]

Acc 18 Target C/G Y

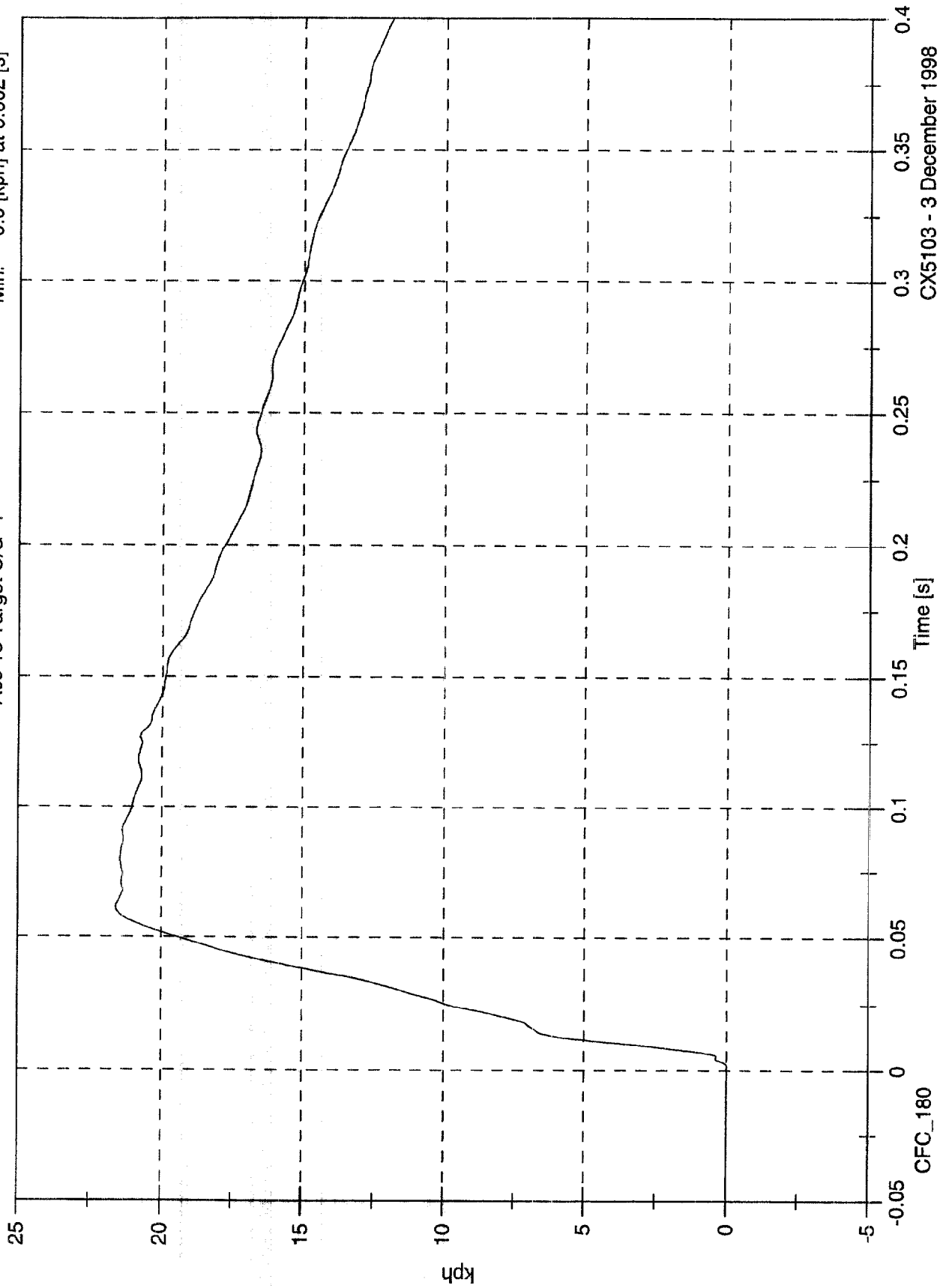


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 21.6 [kph] at 0.062 [s]
Min: -0.0 [kph] at 0.002 [s]

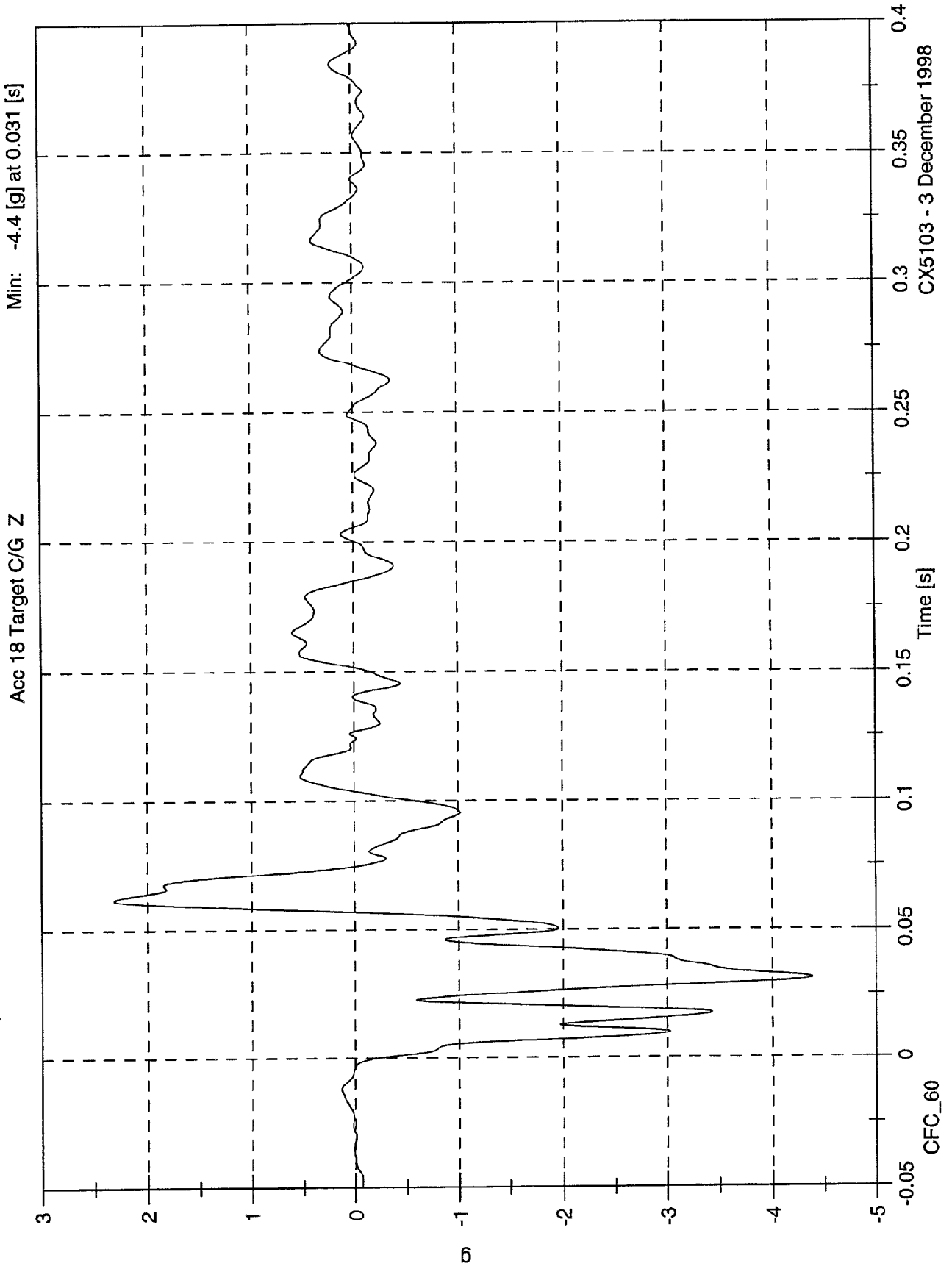
Acc 18 Target C/G Y



CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

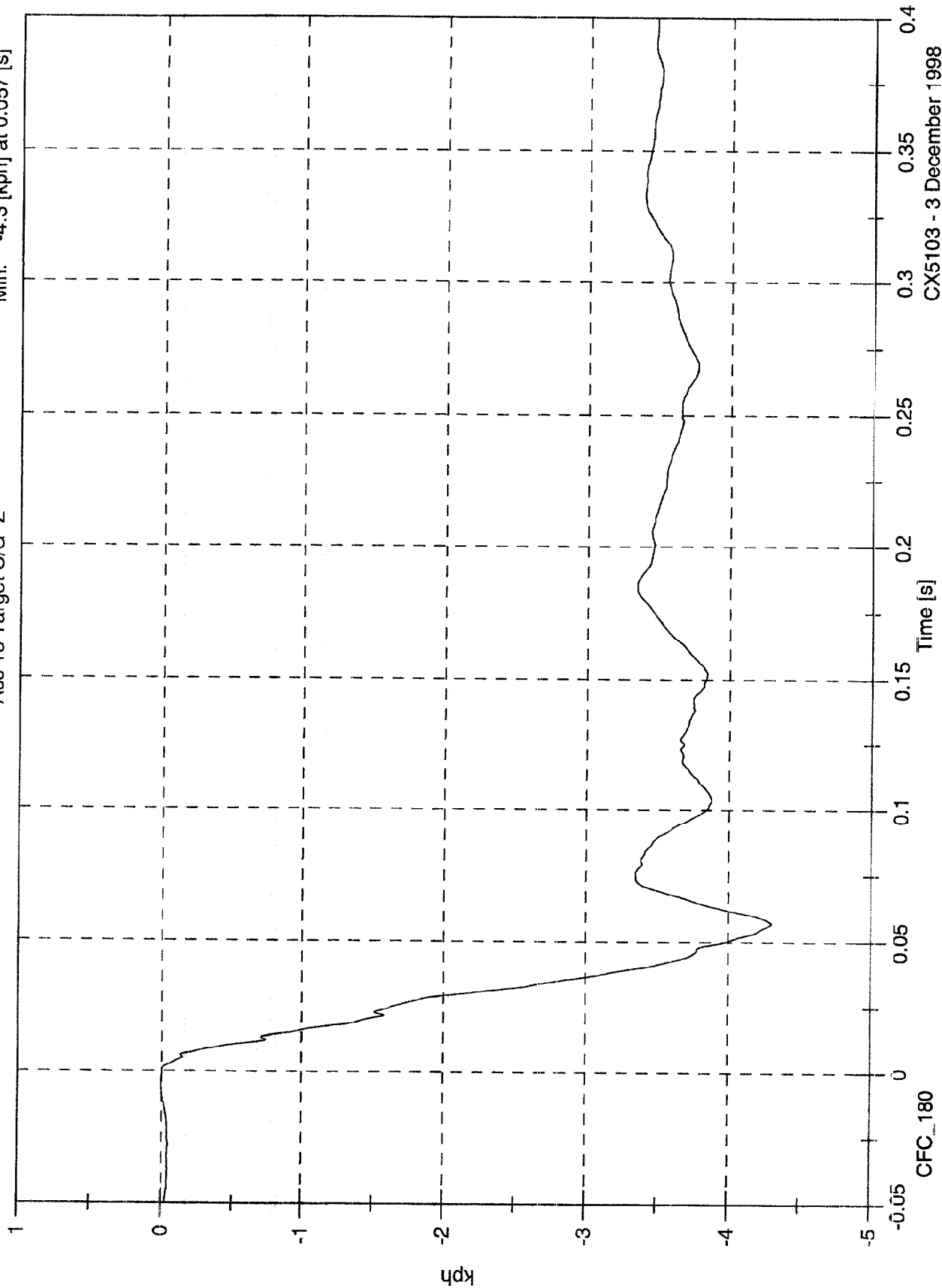
Max: 2.3 [g] at 0.062 [s]
Min: -4.4 [g] at 0.031 [s]



NHTSA Side Impact - 1999 Toyota Sienna

Max: 0.0 [kph] at -0.004 [s]
 Min: -4.3 [kph] at 0.057 [s]

Acc 18 Target C/G Z

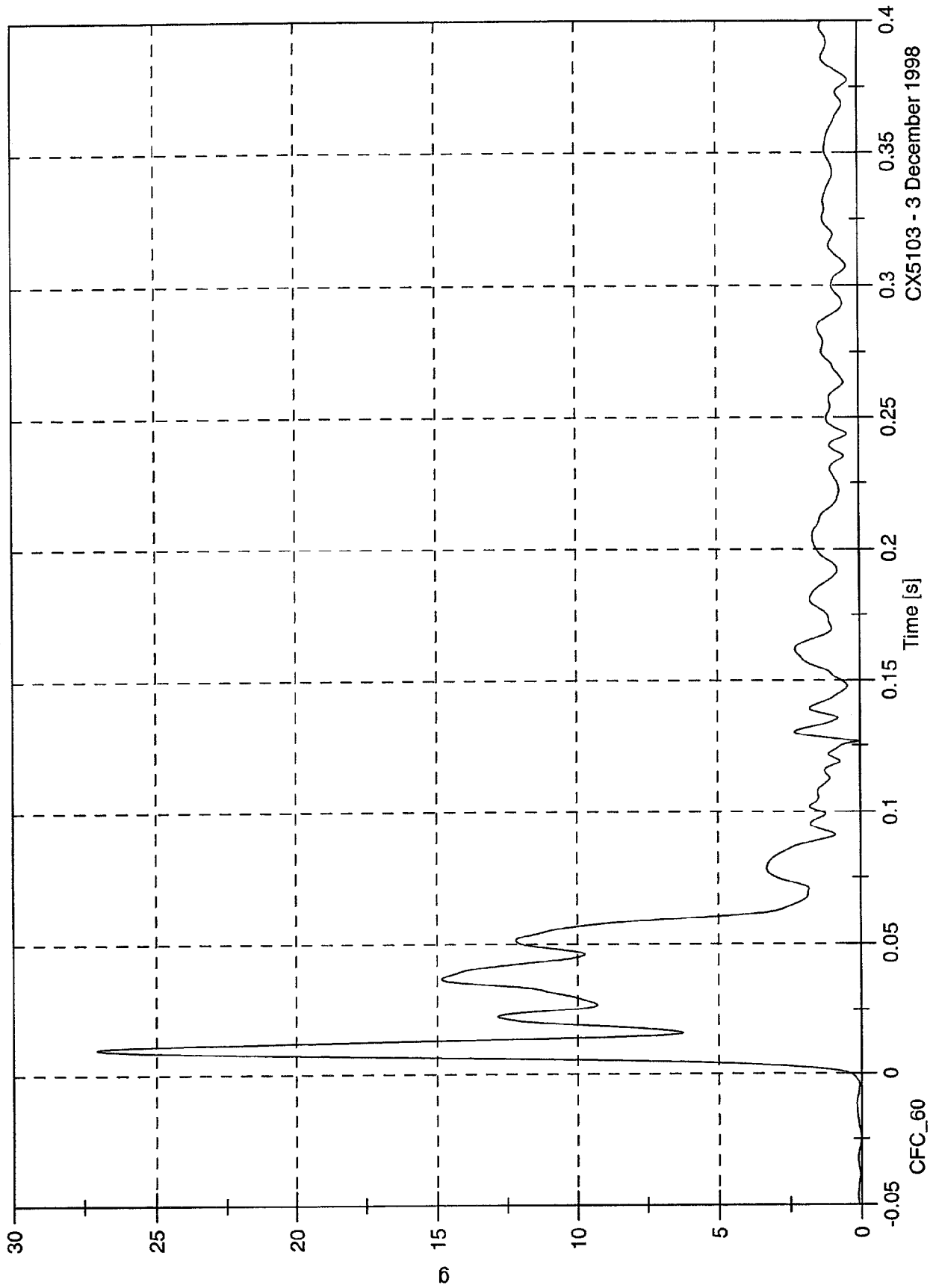


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 27.1 [g] at 0.010 [s]
Min: 0.0 [g] at -0.055 [s]

Acc 18 Target C/G Resultant



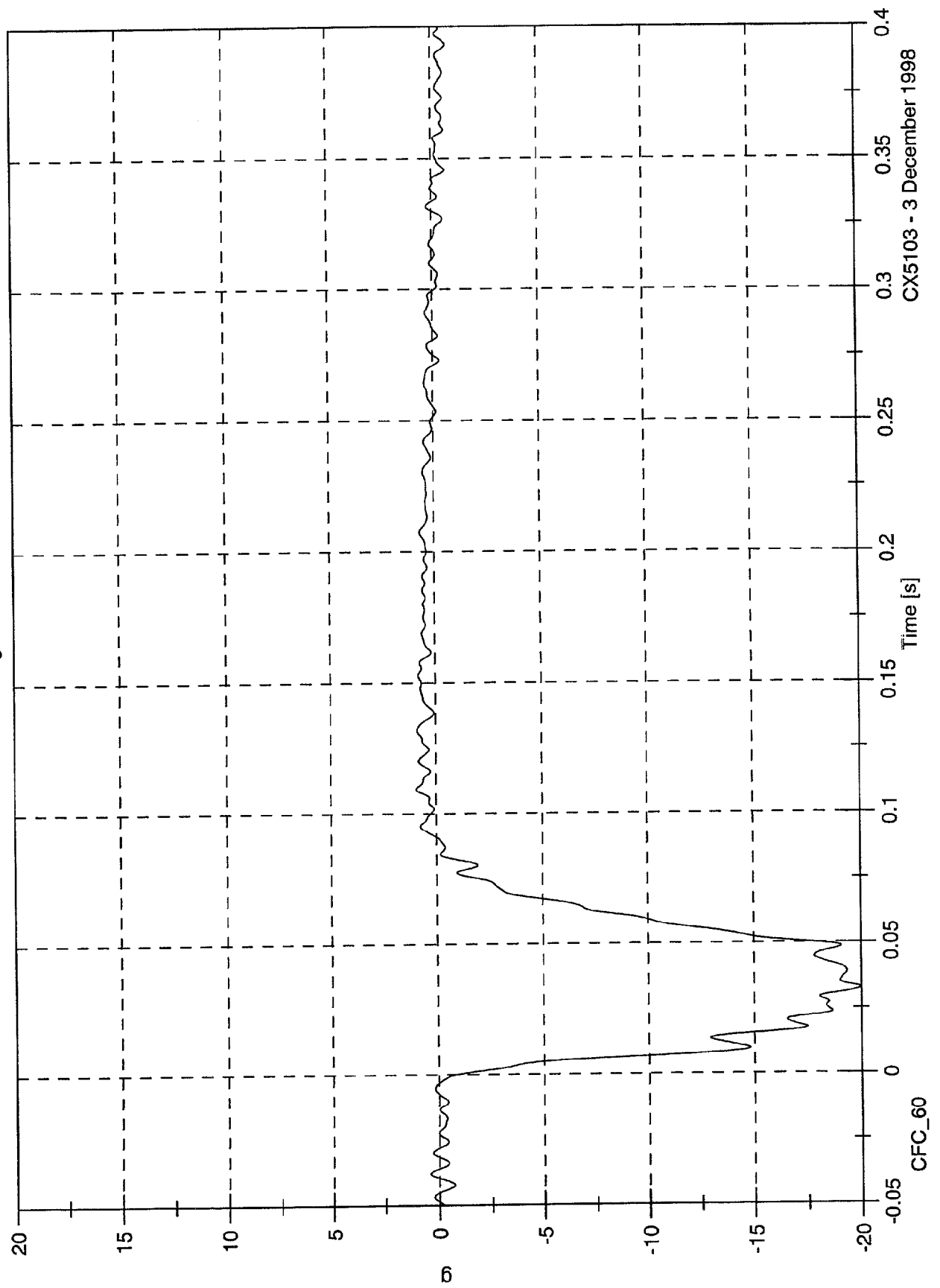
CX5103 - 3 December 1998

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

NHTSA Side Impact - 1999 Toyota Sienna

Max: 17.6 [g] at 0.500 [s]
Min: -20.0 [g] at 0.033 [s]

Moving Barrier CG X

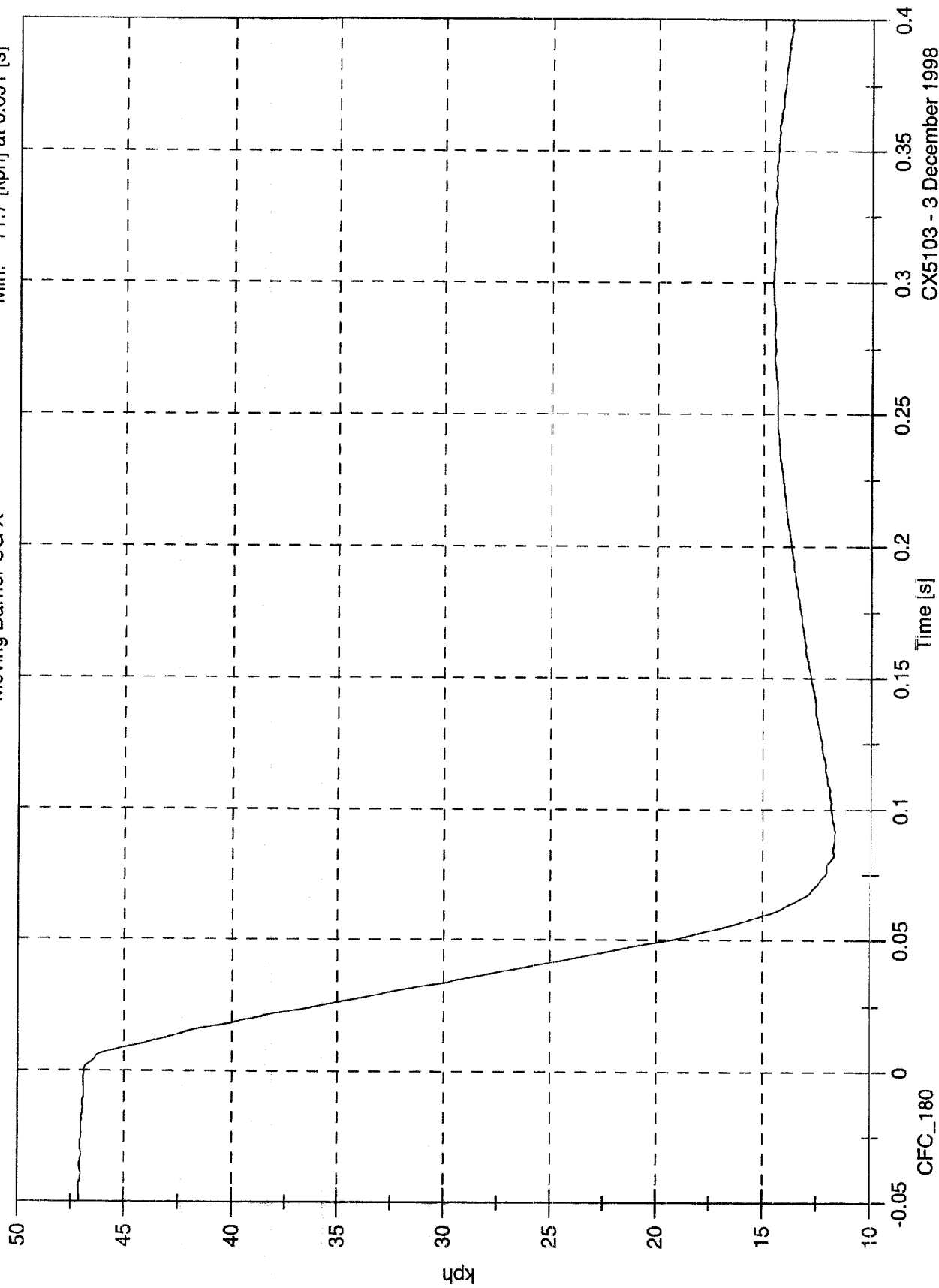


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 47.2 [kph] at -0.054 [s]
Min: 11.7 [kph] at 0.091 [s]

Moving Barrier CG X

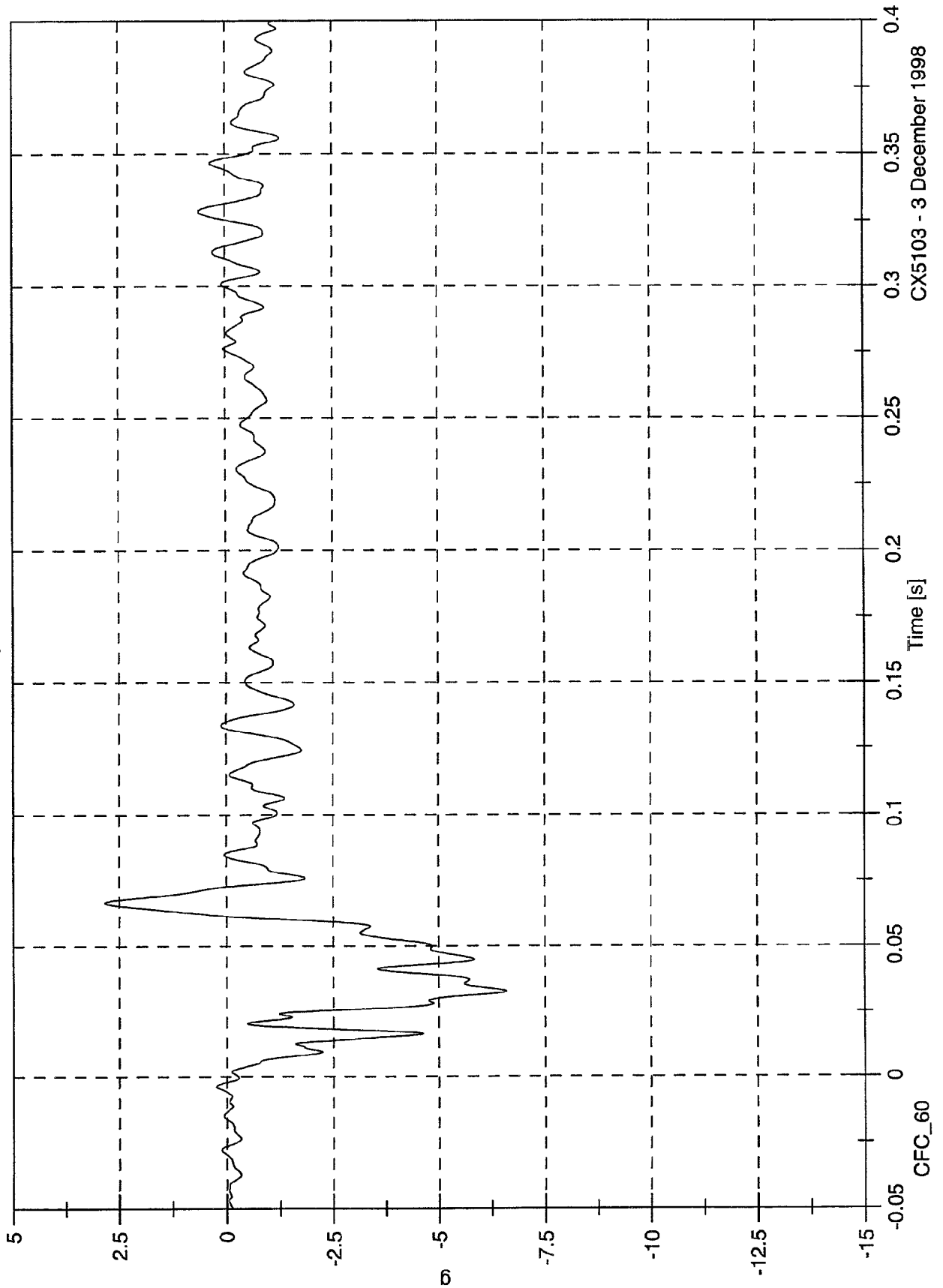


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 2.8 [g] at 0.067 [s]
Min: -13.1 [g] at 0.500 [s]

Moving Barrier CG Y

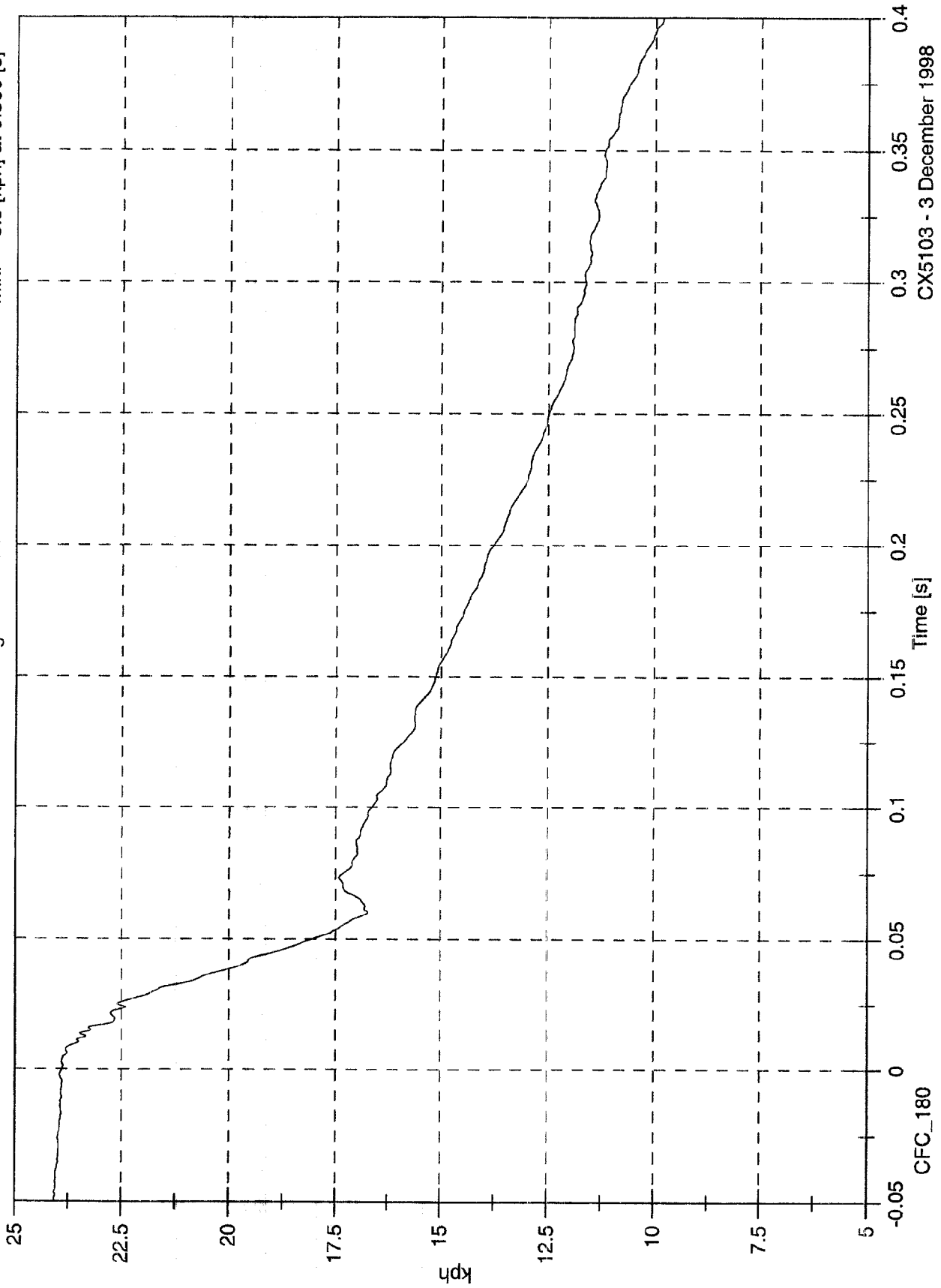


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 24.1 [kph] at -0.053 [s]
Min: 5.5 [kph] at 0.500 [s]

Moving Barrier CG Y

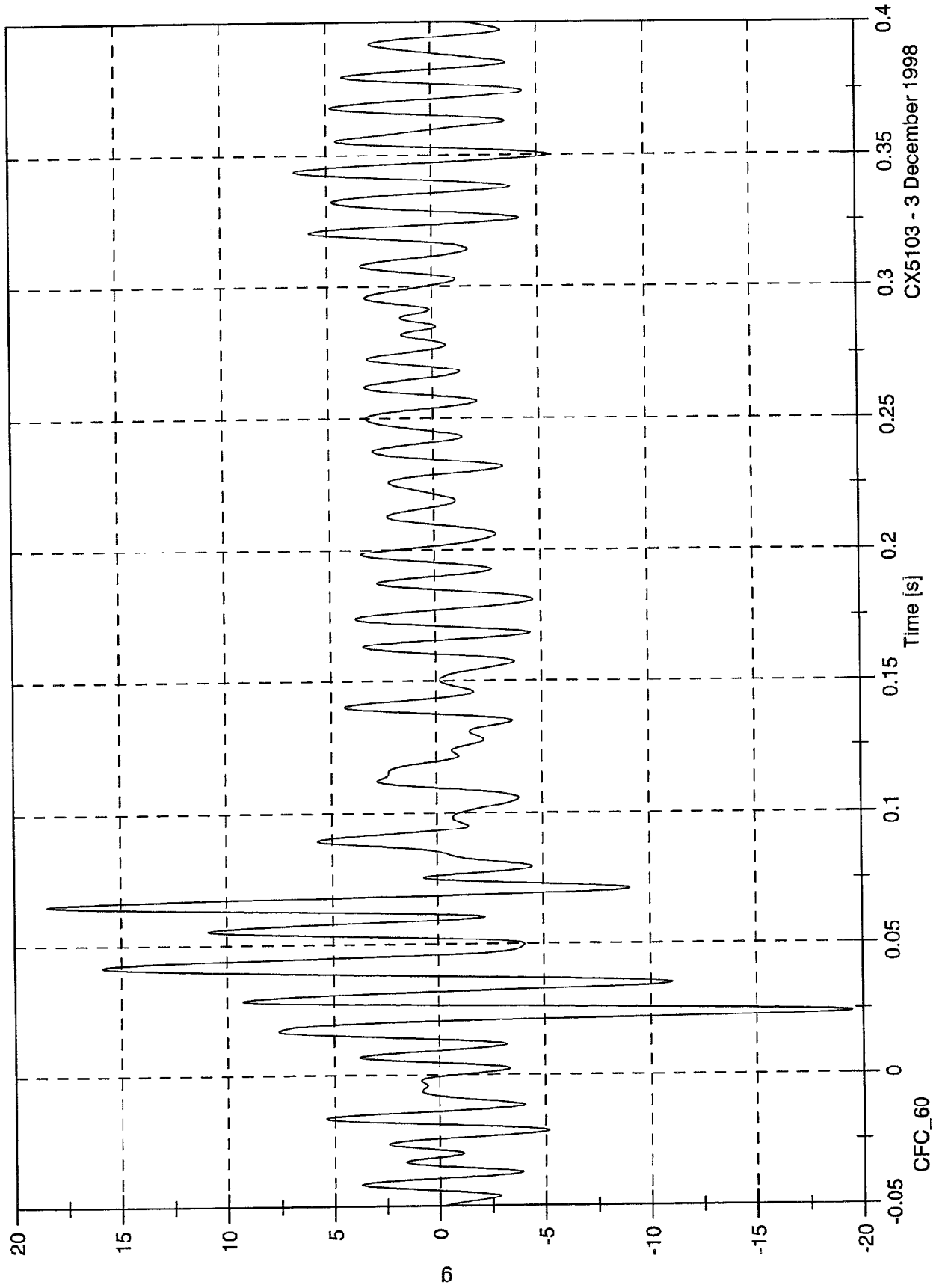


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Moving Barrier CG Z

Max: 18.5 [g] at 0.065 [s]
Min: -19.5 [g] at 0.024 [s]

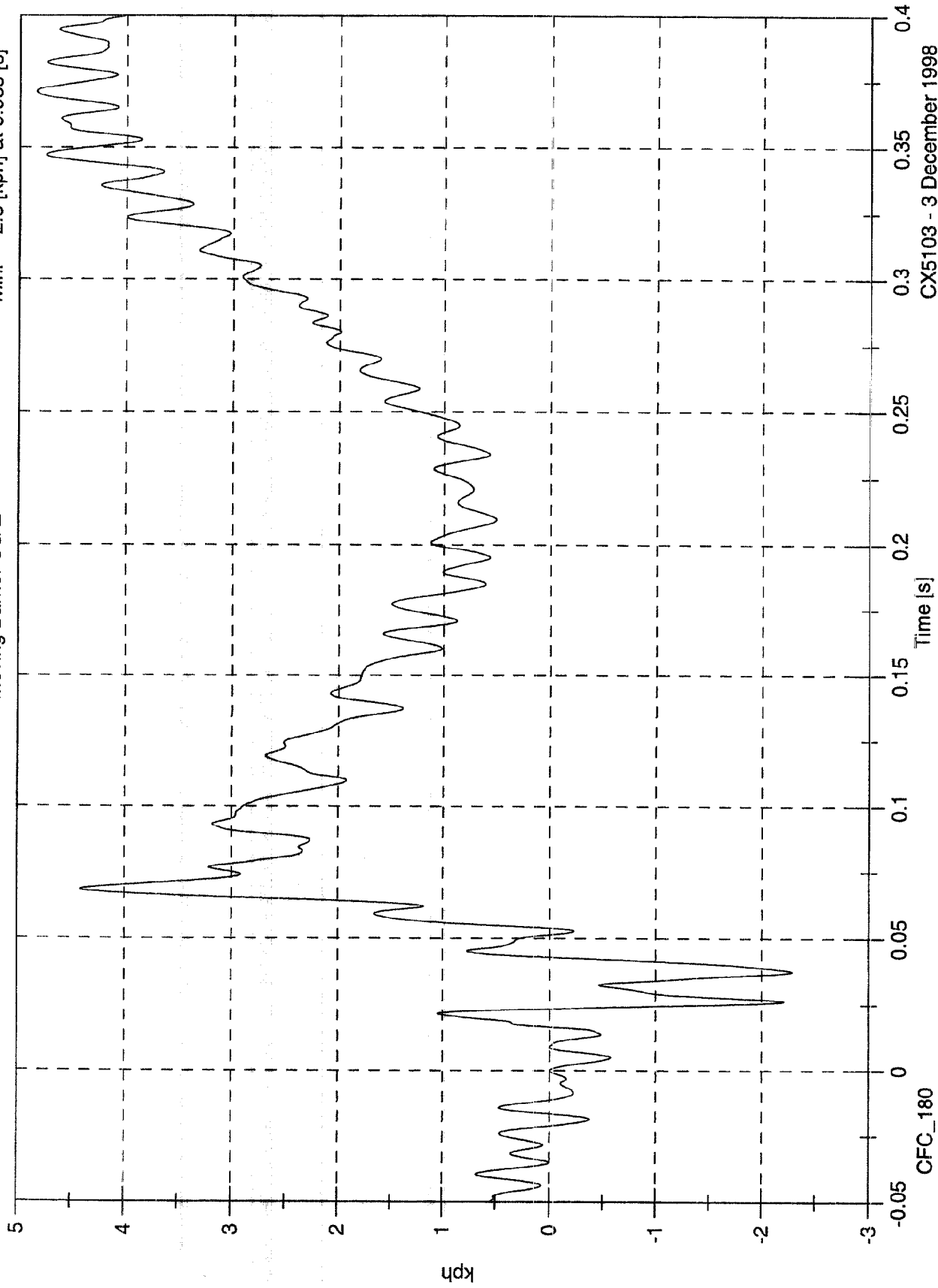


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 4.8 [kph] at 0.371 [s]
 Min: -2.3 [kph] at 0.038 [s]

Moving Barrier CG Z



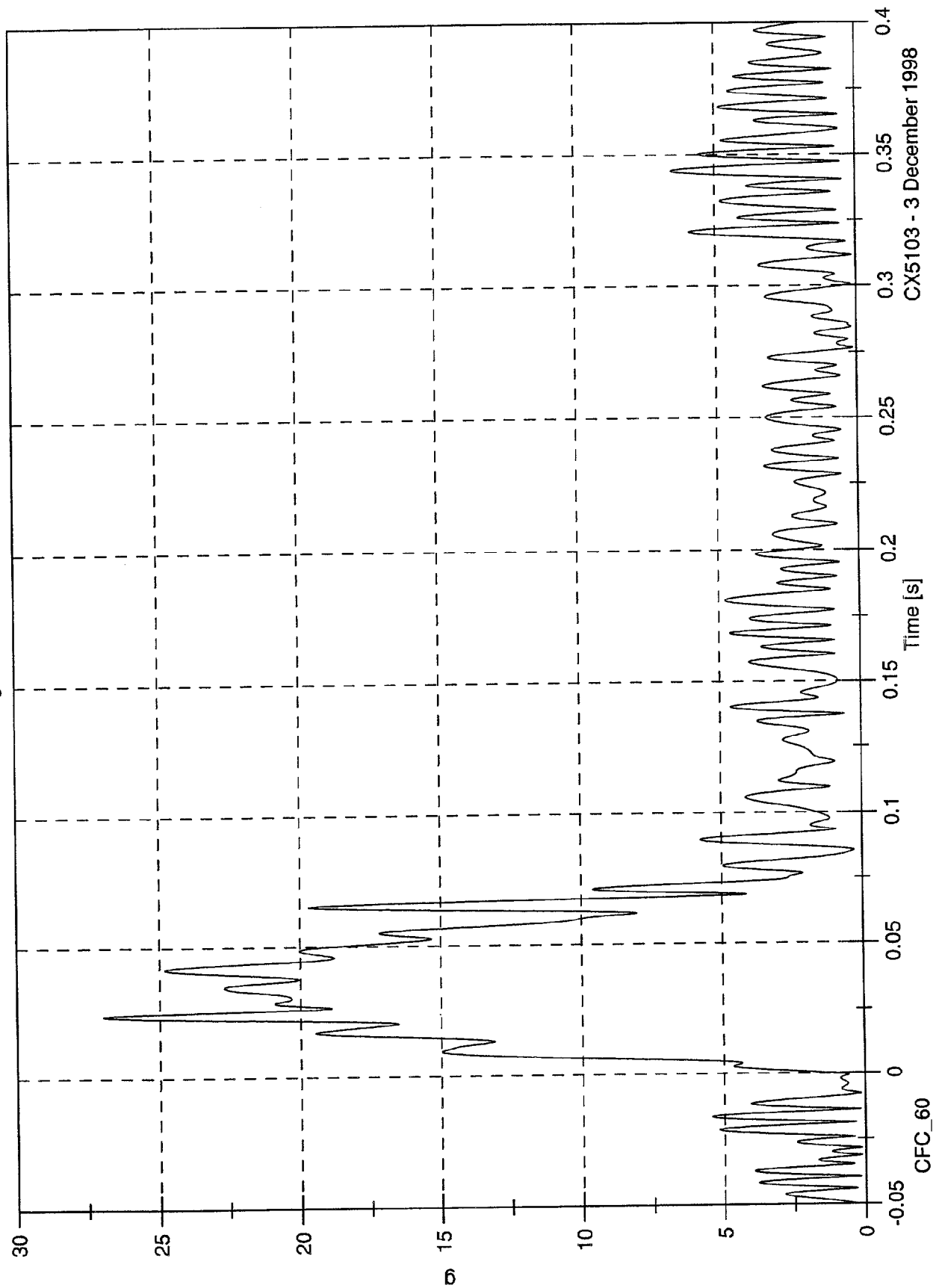
CFC_180

CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 27.0 [g] at 0.024 [s]
Min: 0.1 [g] at -0.086 [s]

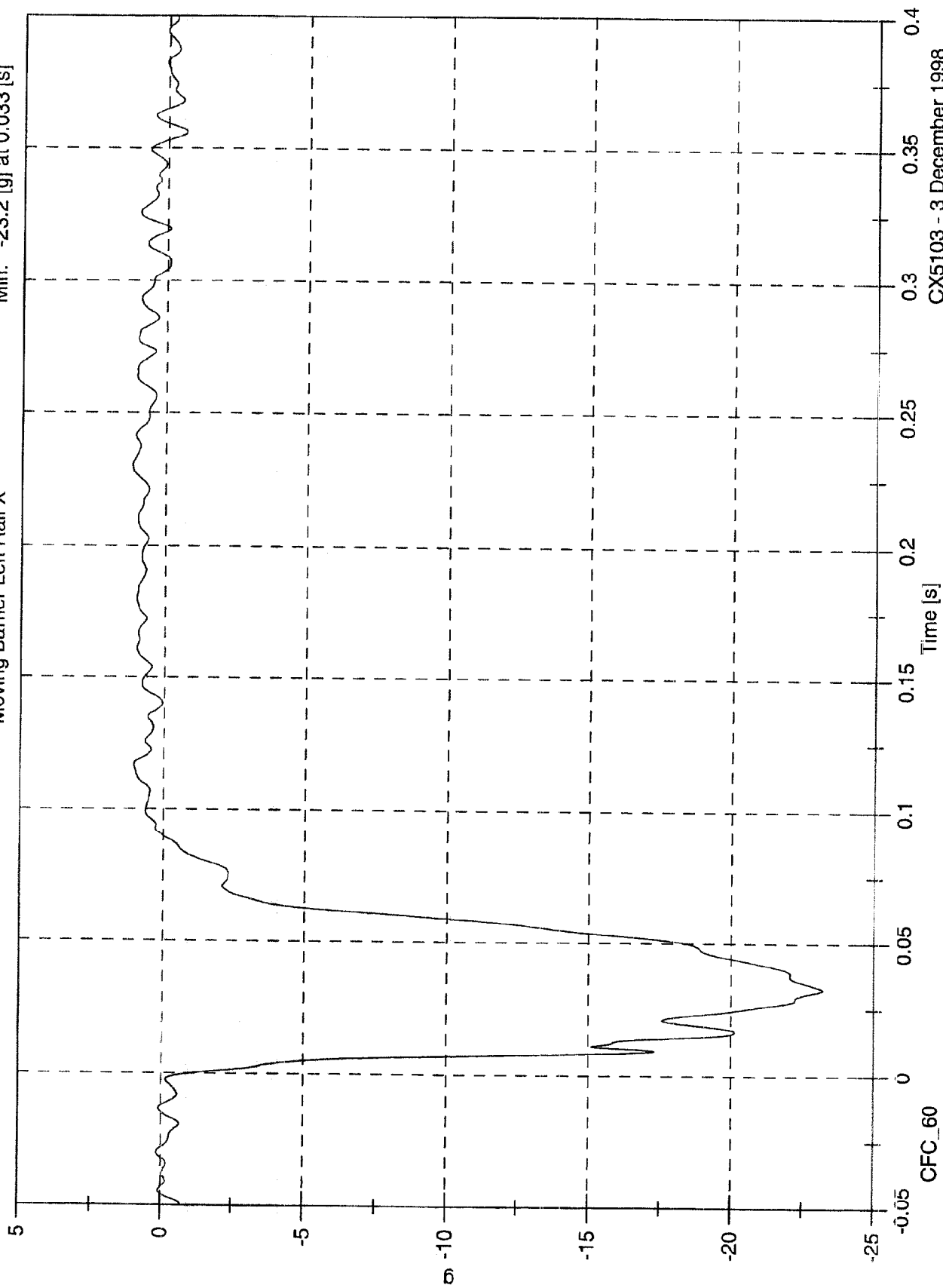
Moving Barrier CG Resultant



NHTSA Side Impact - 1999 Toyota Sienna

Max: 2.9 [g] at 0.500 [s]
Min: -23.2 [g] at 0.033 [s]

Moving Barrier Left Rail X

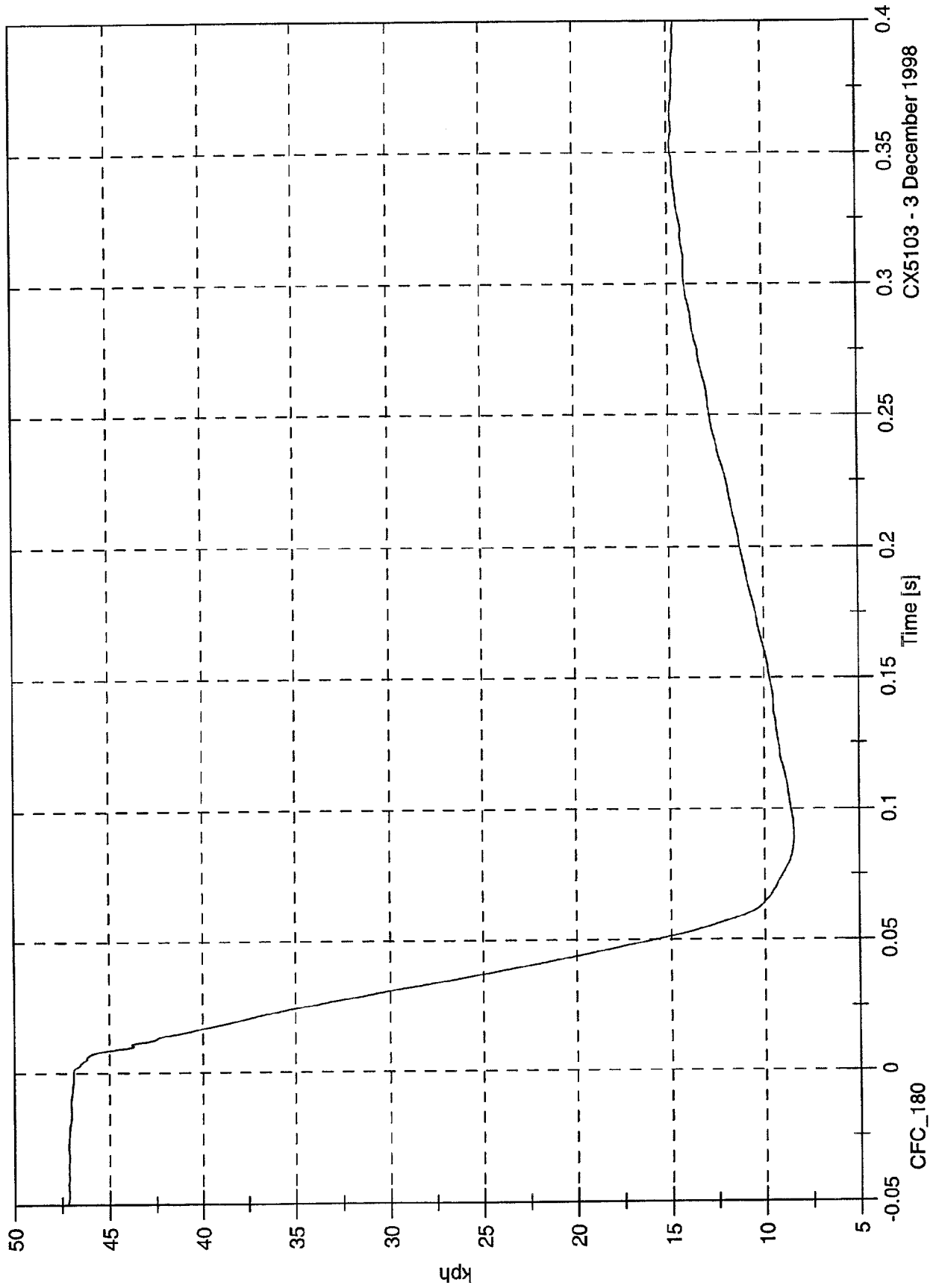


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Moving Barrier Left Rail X

Max: 47.2 [kph] at -0.052 [s]
Min: 8.5 [kph] at 0.089 [s]

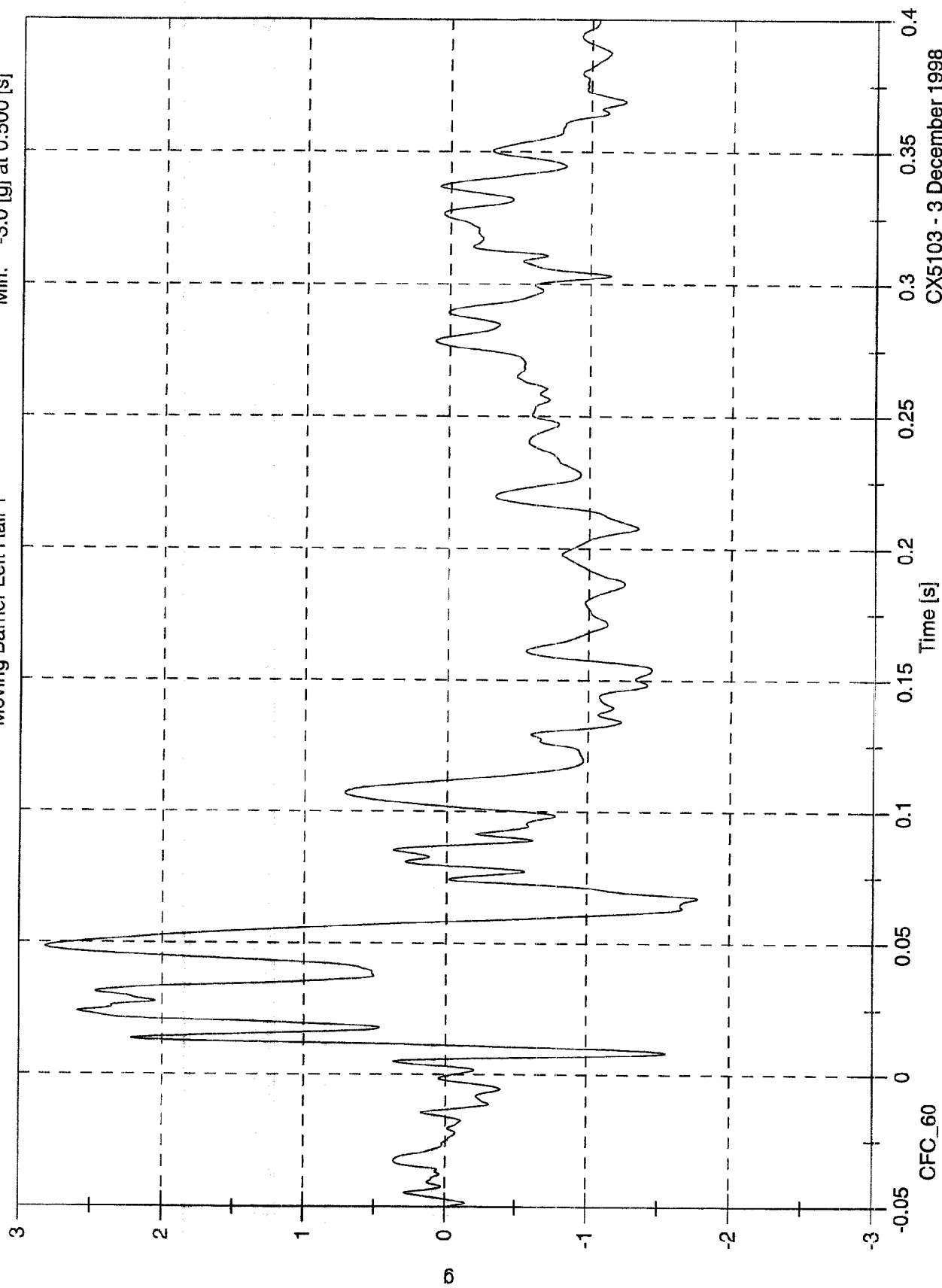


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 2.8 [g] at 0.048 [s]
Min: -3.0 [g] at 0.500 [s]

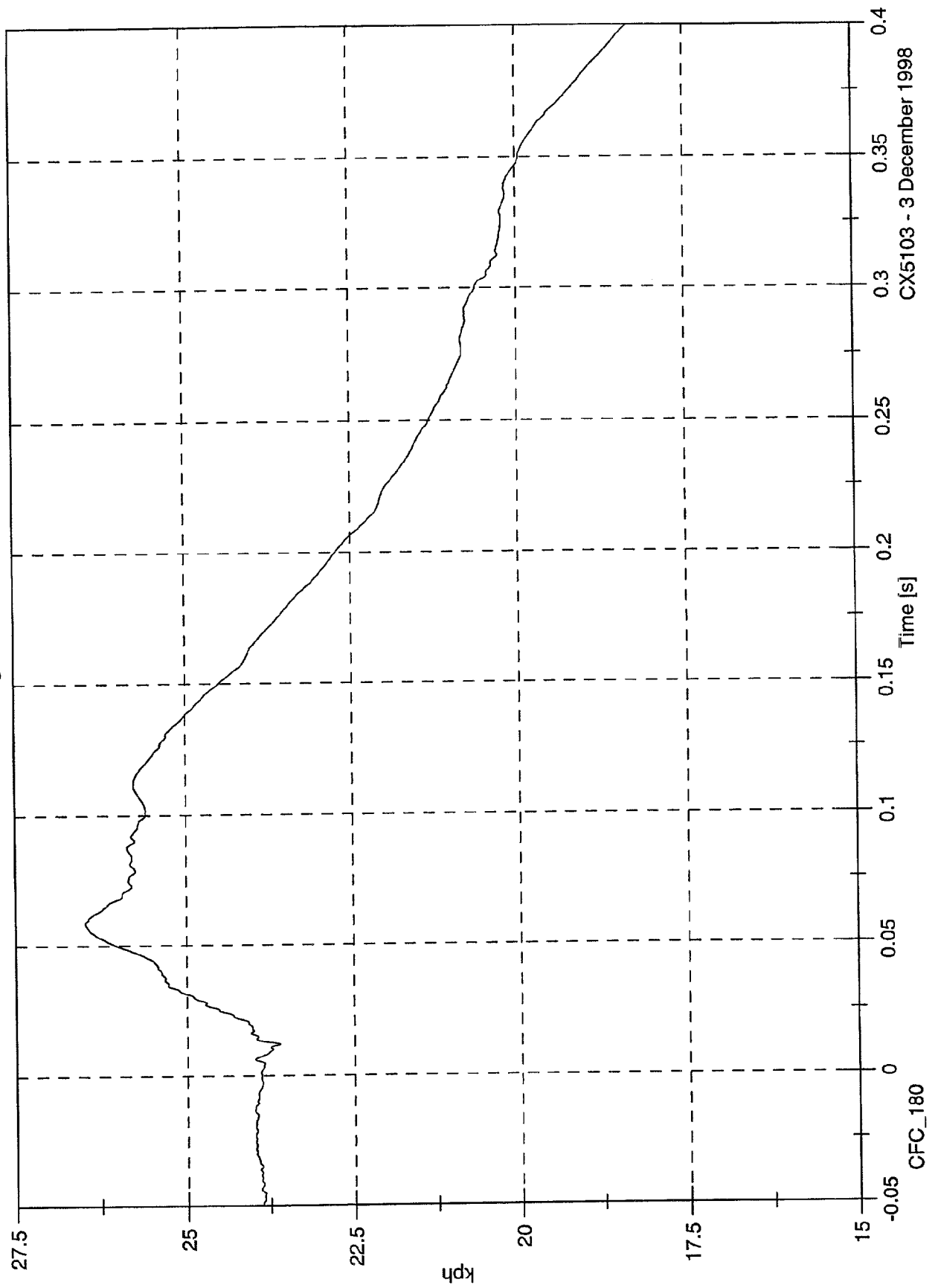
Moving Barrier Left Rail Y



NHTSA Side Impact - 1999 Toyota Sienna

Max: 26.5 [kph] at 0.059 [s]
Min: 15.2 [kph] at 0.500 [s]

Moving Barrier Left Rail Y



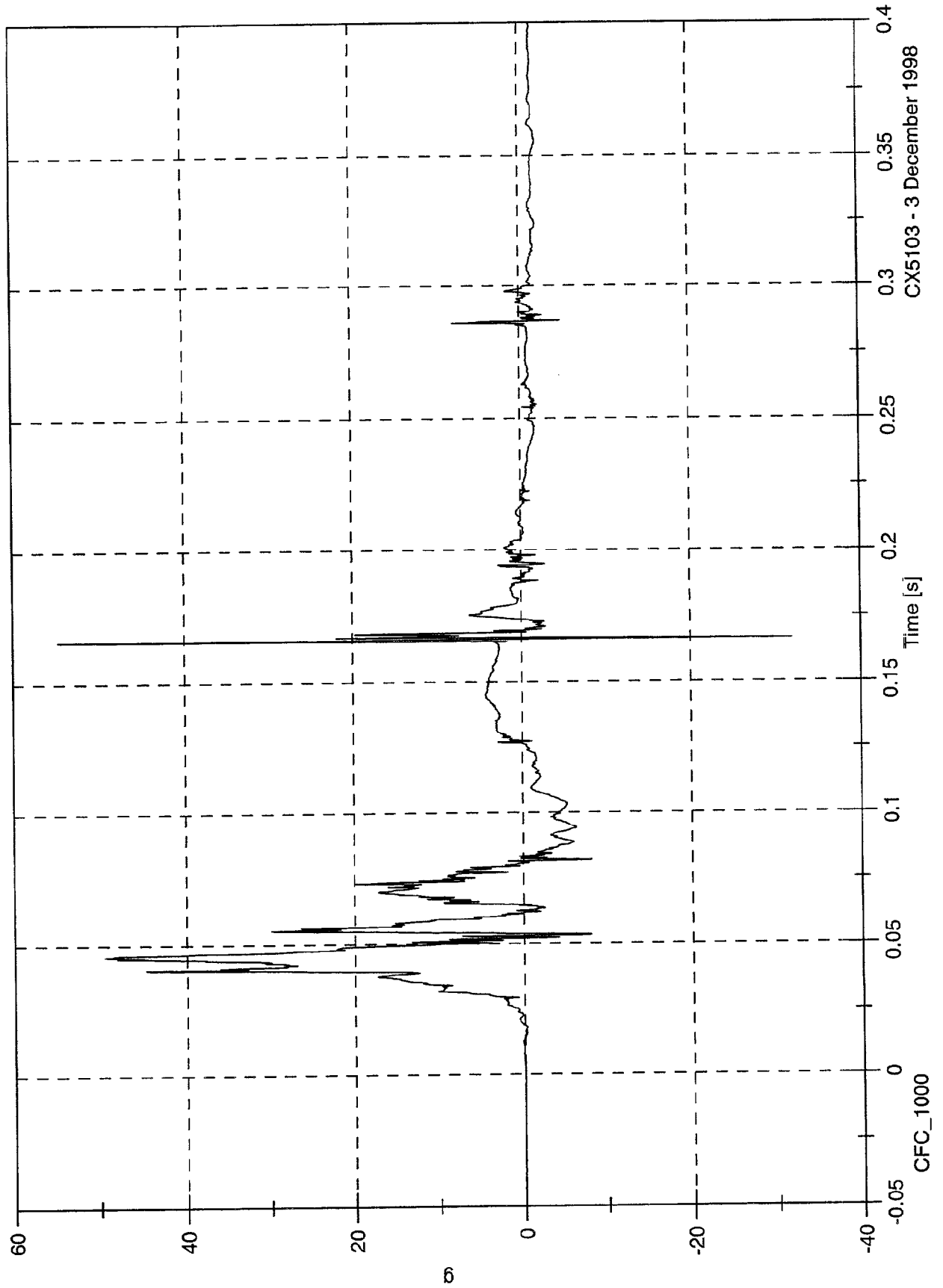
CX5103 - 3 December 1998

DRIVER & PASSENGER DUMMY INSTRUMENTATION PLOTS (REDUNDANT)
ACCELERATION DATA - FILTER CLASS 1000
INTEGRATION DATA - FILTER CLASS 180

NHTSA Side Impact - 1999 Toyota Sienna

Max: 54.7 [g] at 0.166 [s]
Min: -31.9 [g] at 0.167 [s]

Driver Upper Rib RY

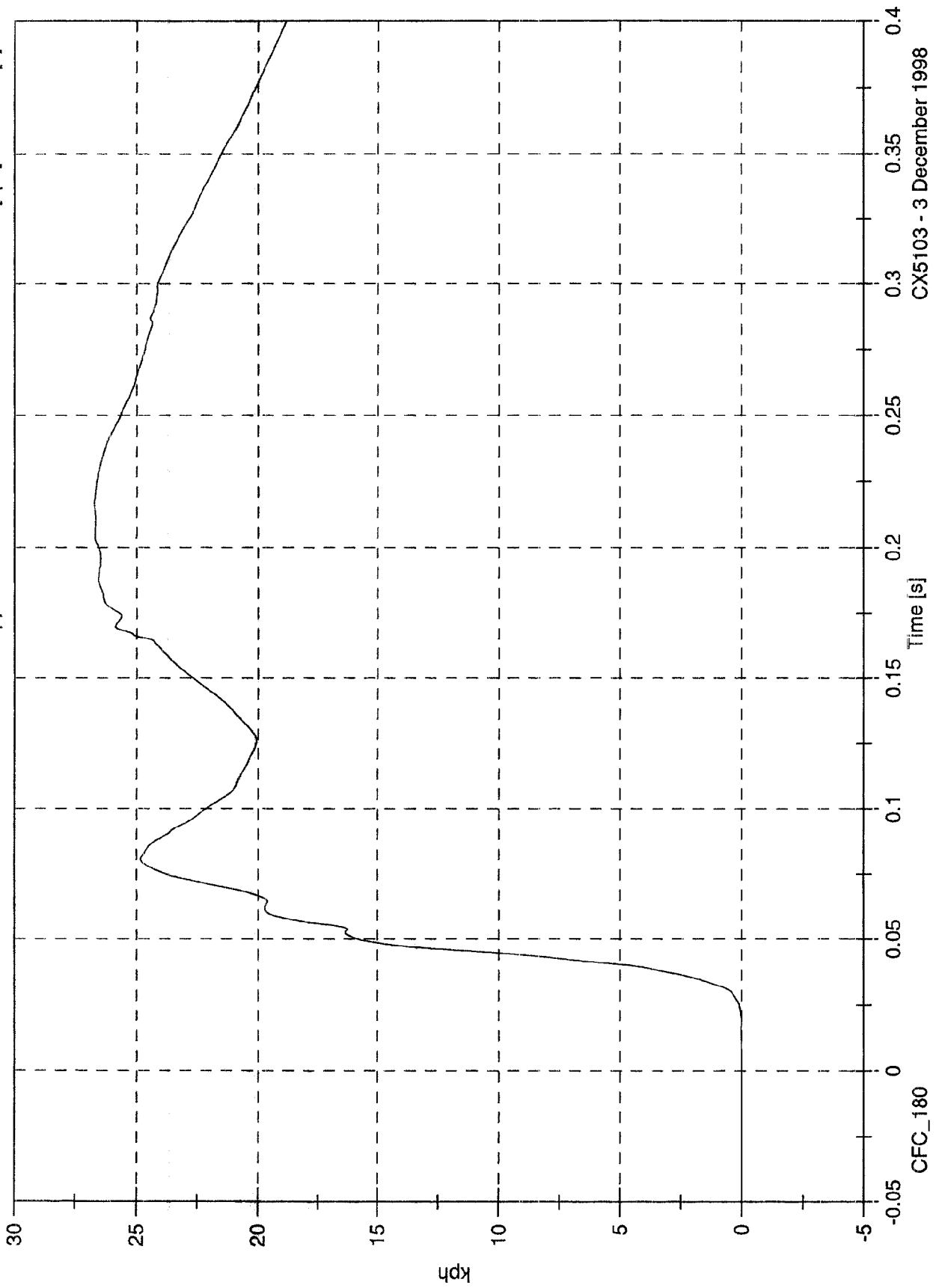


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Driver Upper Rib RY

Max: 26.7 [kph] at 0.217 [s]
Min: -0.0 [kph] at -0.088 [s]

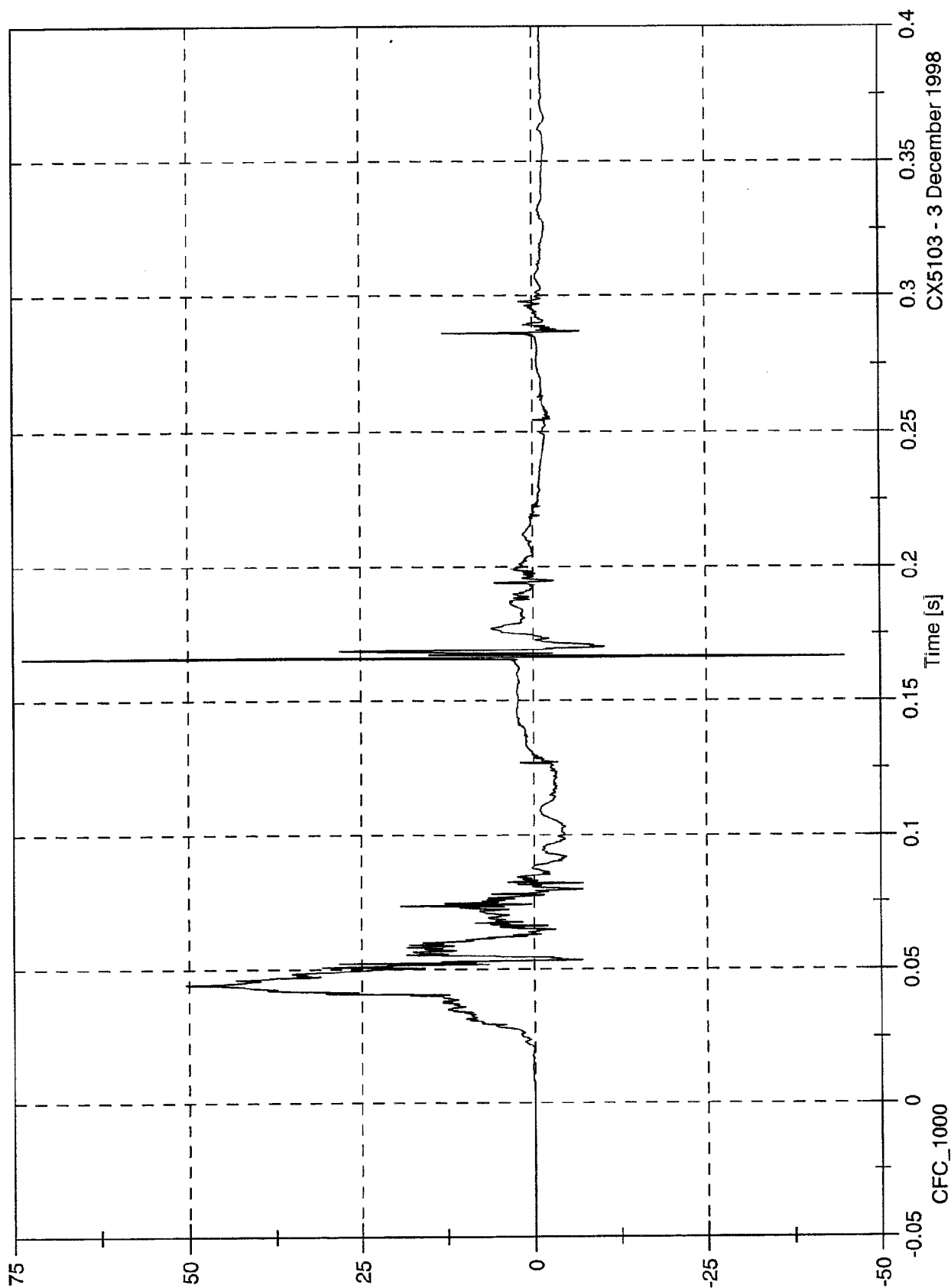


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 73.6 [g] at 0.166 [s]
Min: -44.8 [g] at 0.167 [s]

Driver Lower Rib RY

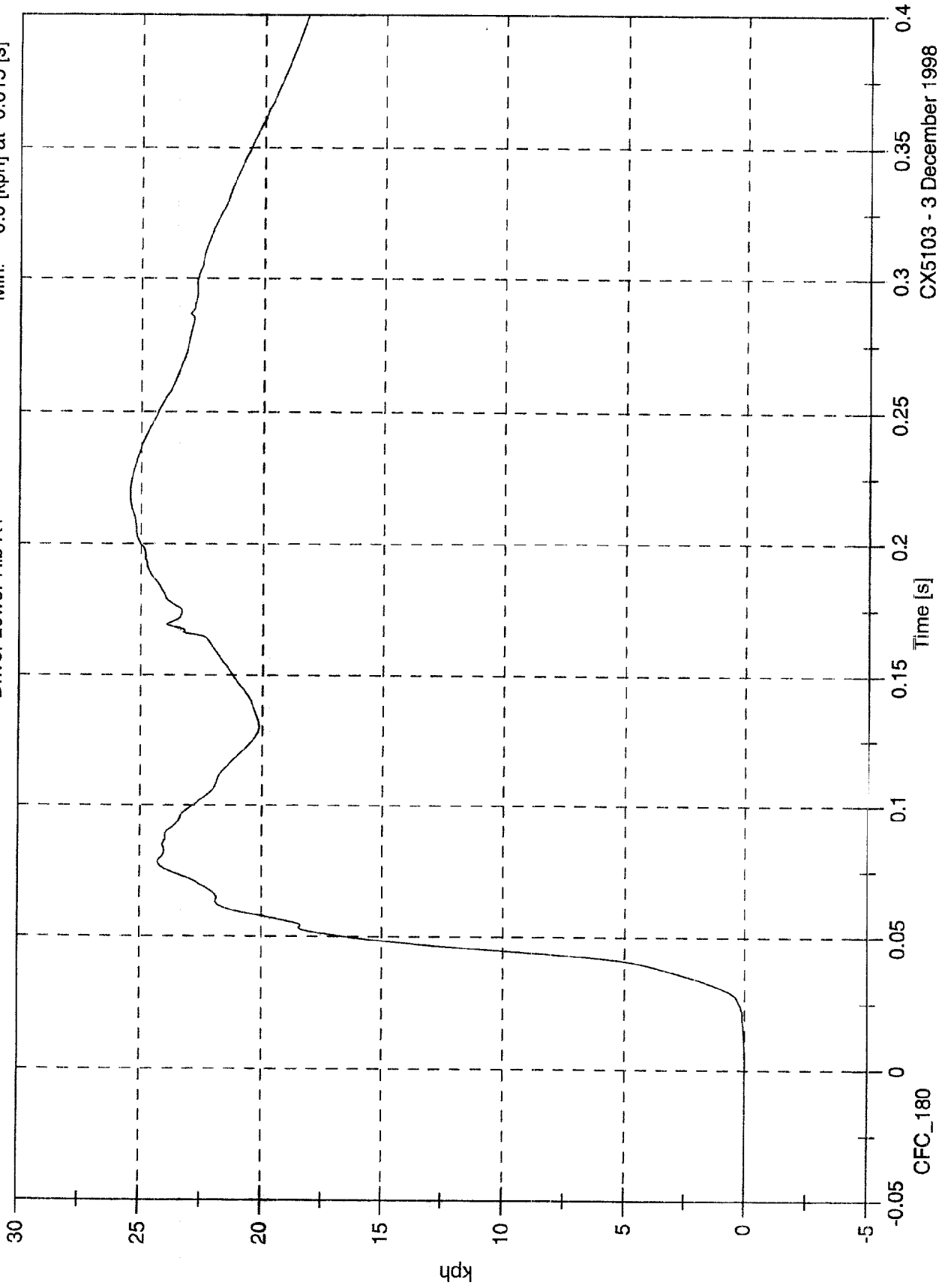


CX5103 - 3 December 1998

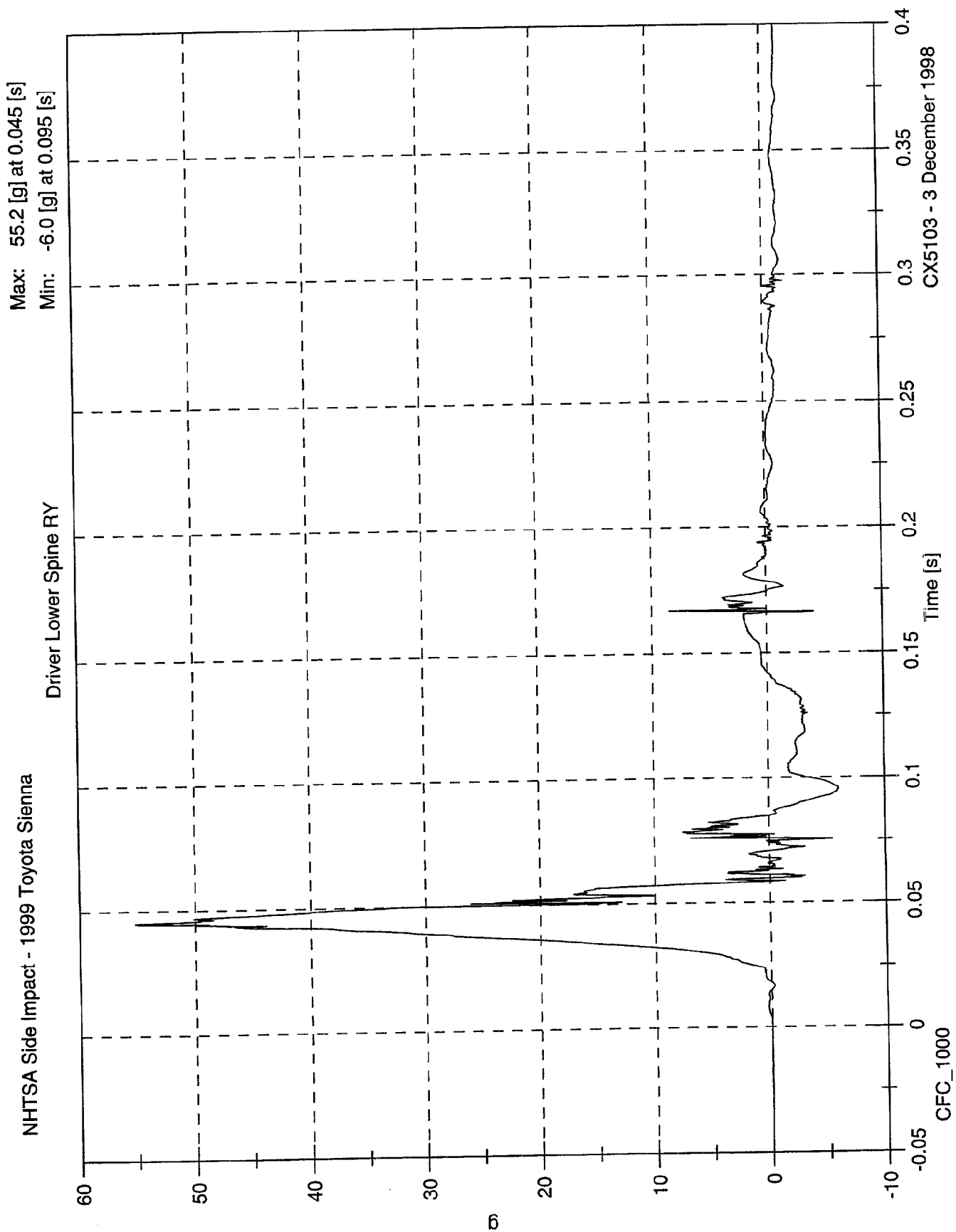
NHTSA Side Impact - 1999 Toyota Sienna

Driver Lower Rib RY

Max: 25.5 [kph] at 0.219 [s]
Min: -0.0 [kph] at -0.015 [s]



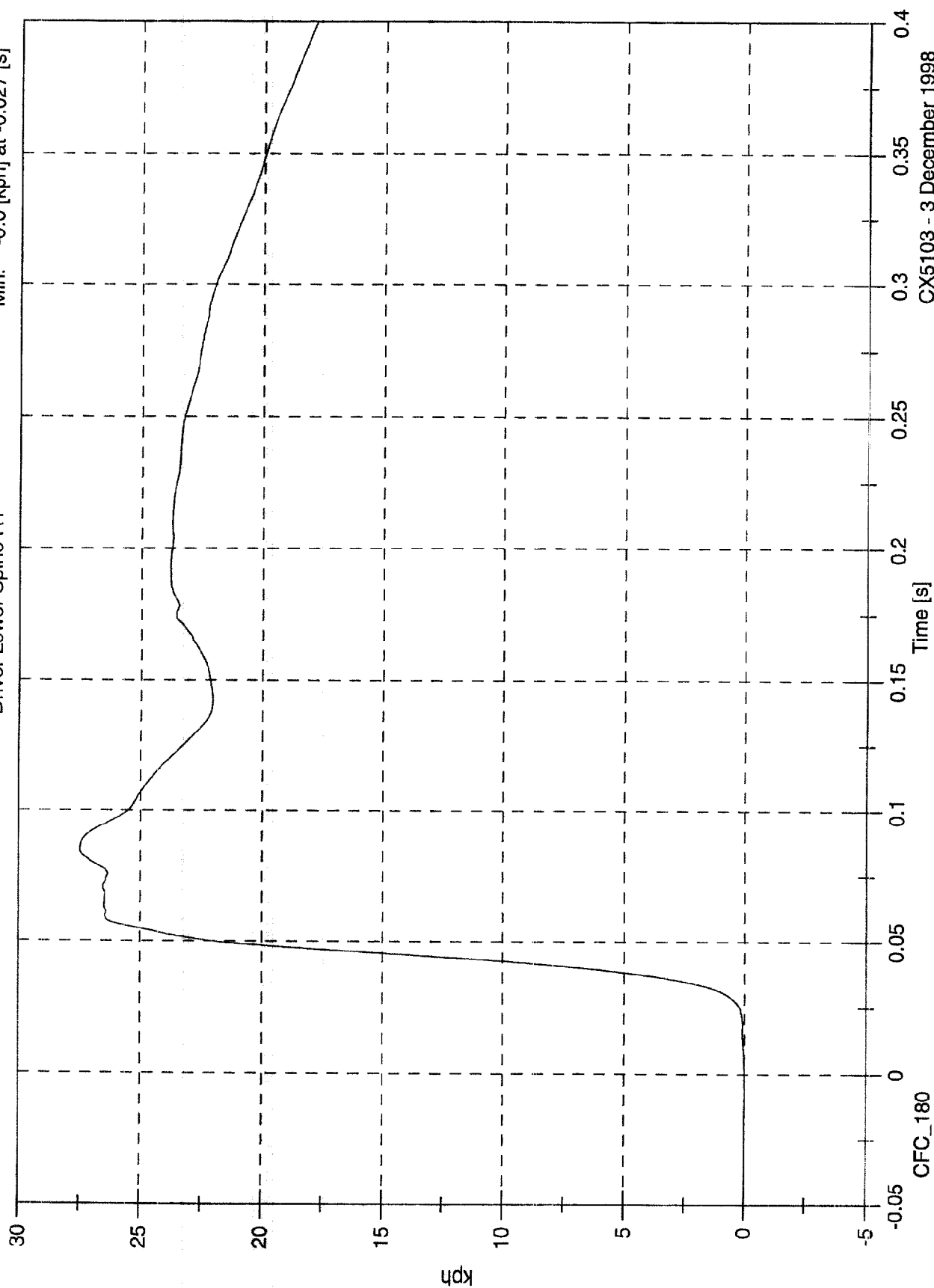
CX5103 - 3 December 1998



NHTSA Side Impact - 1999 Toyota Sienna

Driver Lower Spine RY

Max: 27.5 [kph] at 0.085 [s]
Min: -0.0 [kph] at -0.027 [s]



CFC_180

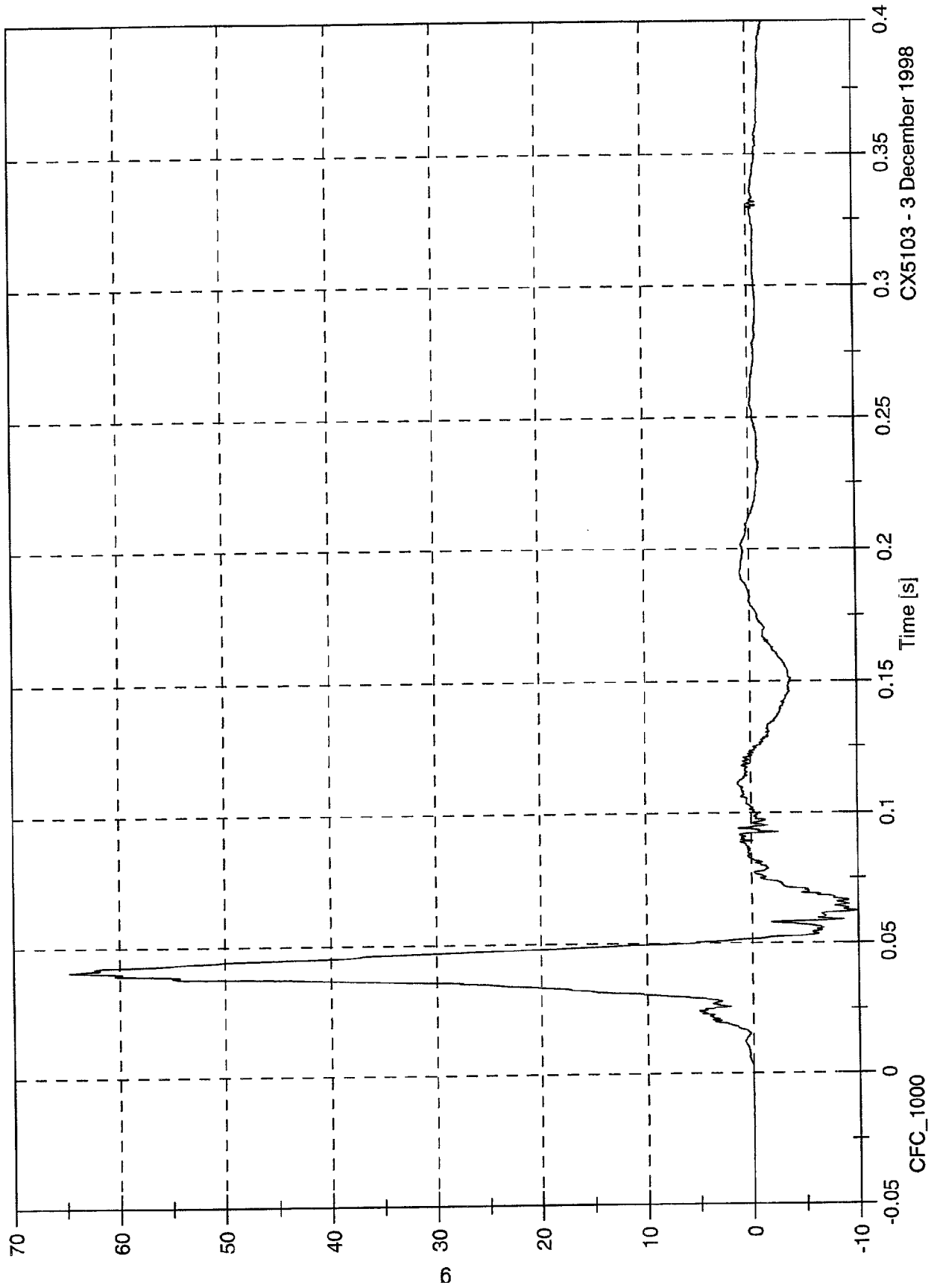
Time [s]

CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

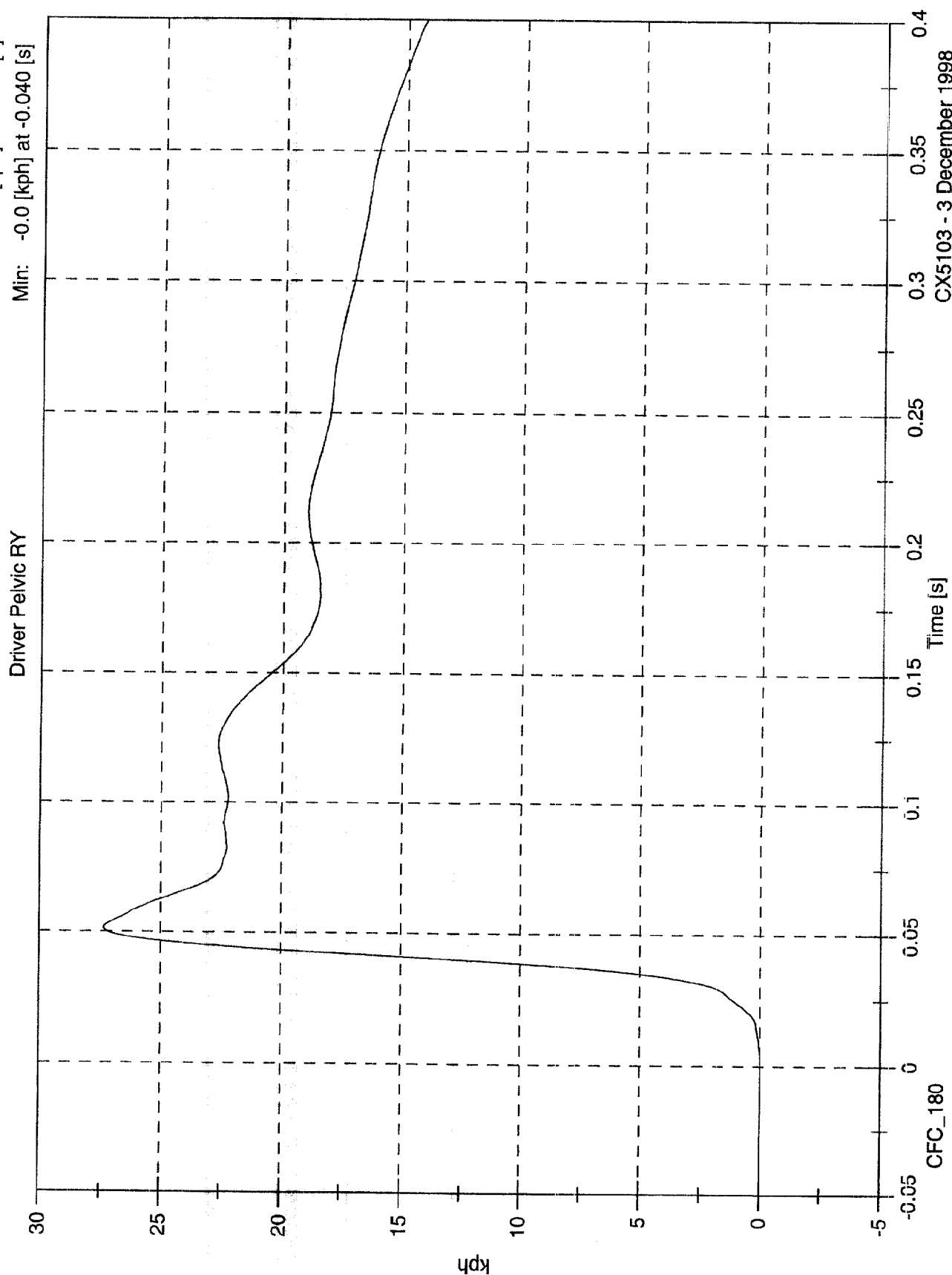
Max: 64.7 [g] at 0.041 [s]
Min: -10.0 [g] at 0.062 [s]

Driver Pelvic RY



CX5103 - 3 December 1998

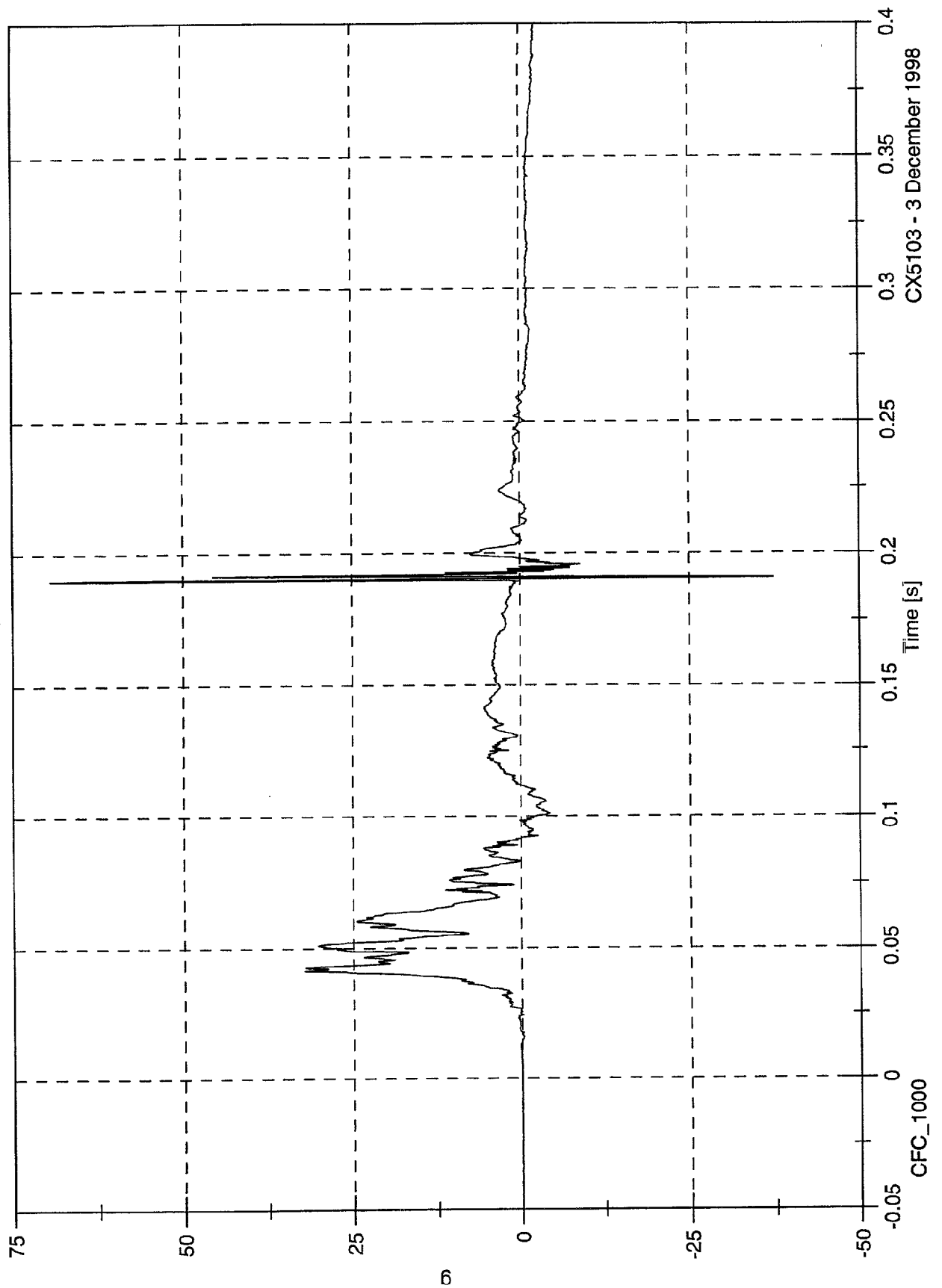
NHTSA Side Impact - 1999 Toyota Sienna



NHTSA Side Impact - 1999 Toyota Sienna

Max: 69.4 [g] at 0.190 [s]
Min: -37.3 [g] at 0.191 [s]

Left Rear Upper Rib RY

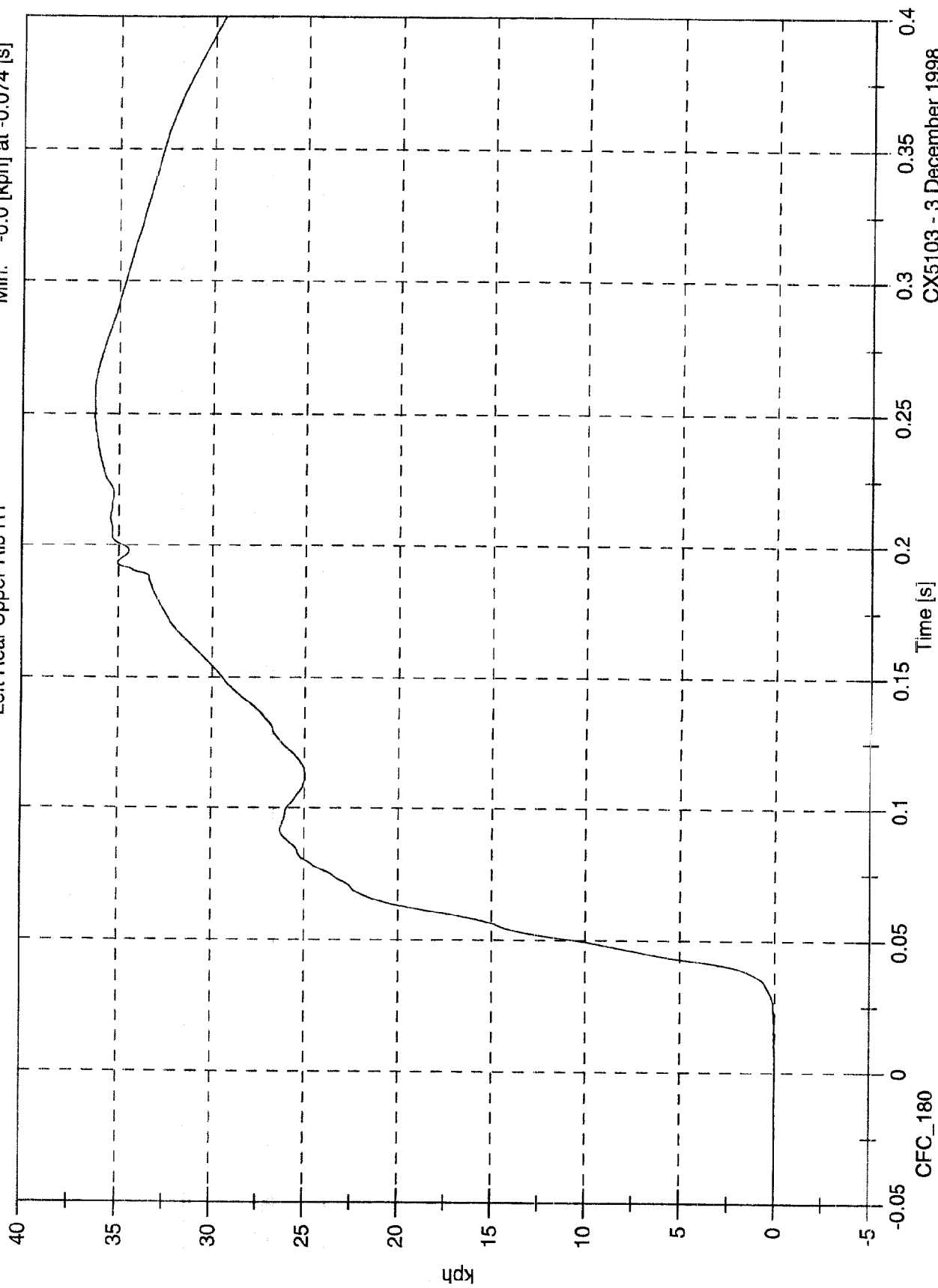


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 36.3 [kph] at 0.249 [s]
Min: -0.0 [kph] at -0.074 [s]

Left Rear Upper Rib RY

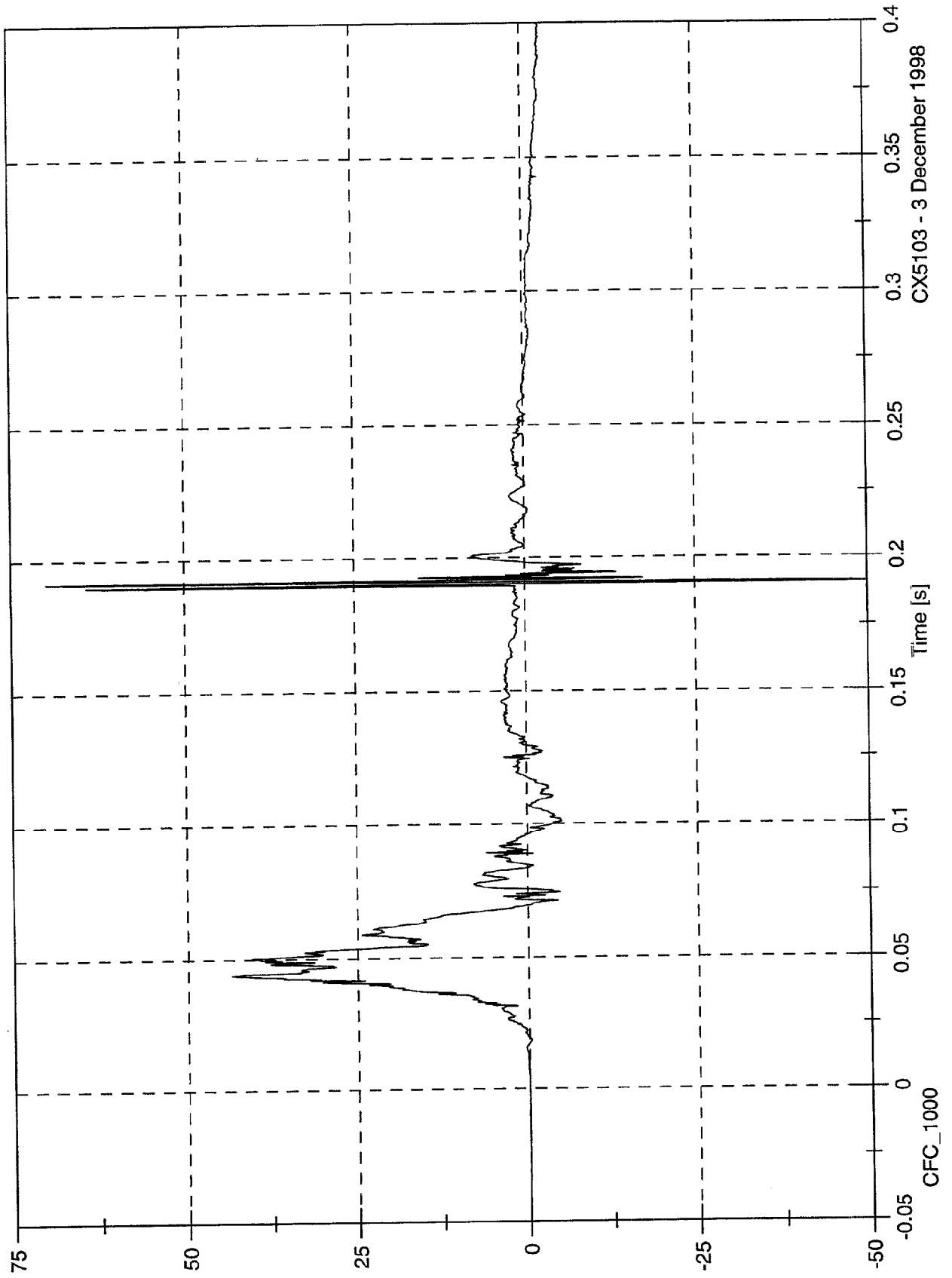


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

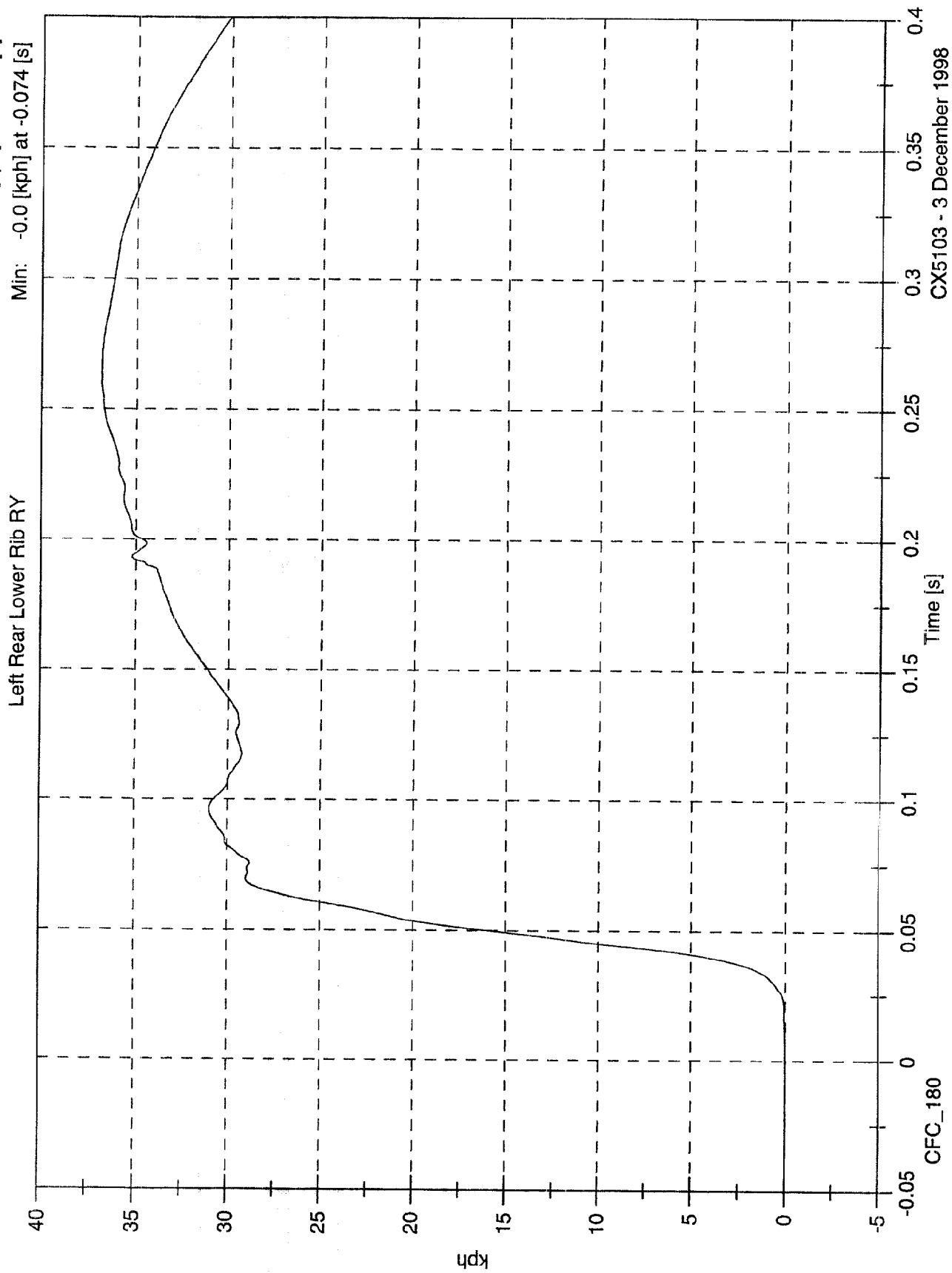
Max: 70.0 [g] at 0.191 [s]
Min: -49.8 [g] at 0.191 [s]

Left Rear Lower Rib RY



CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

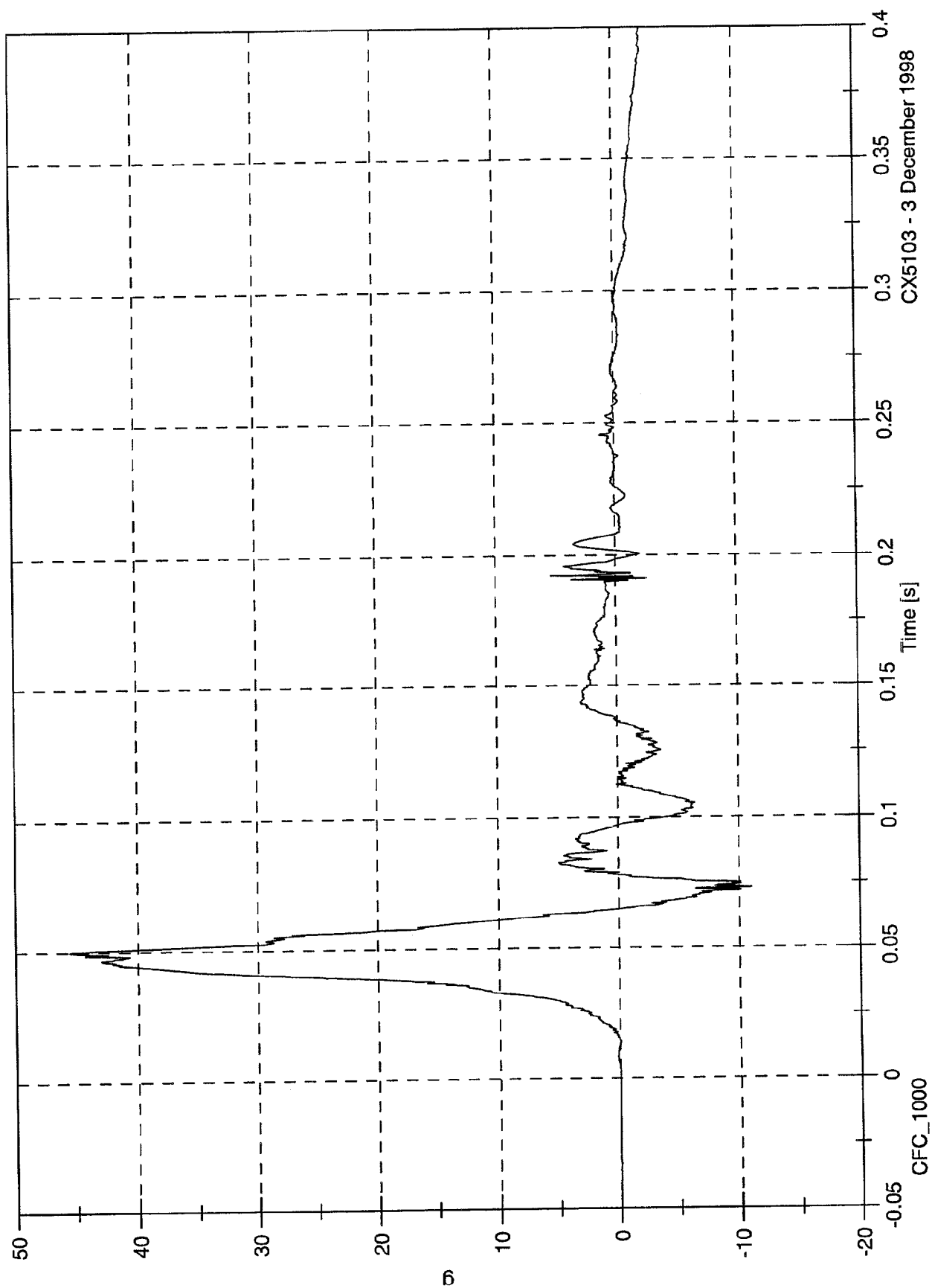


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

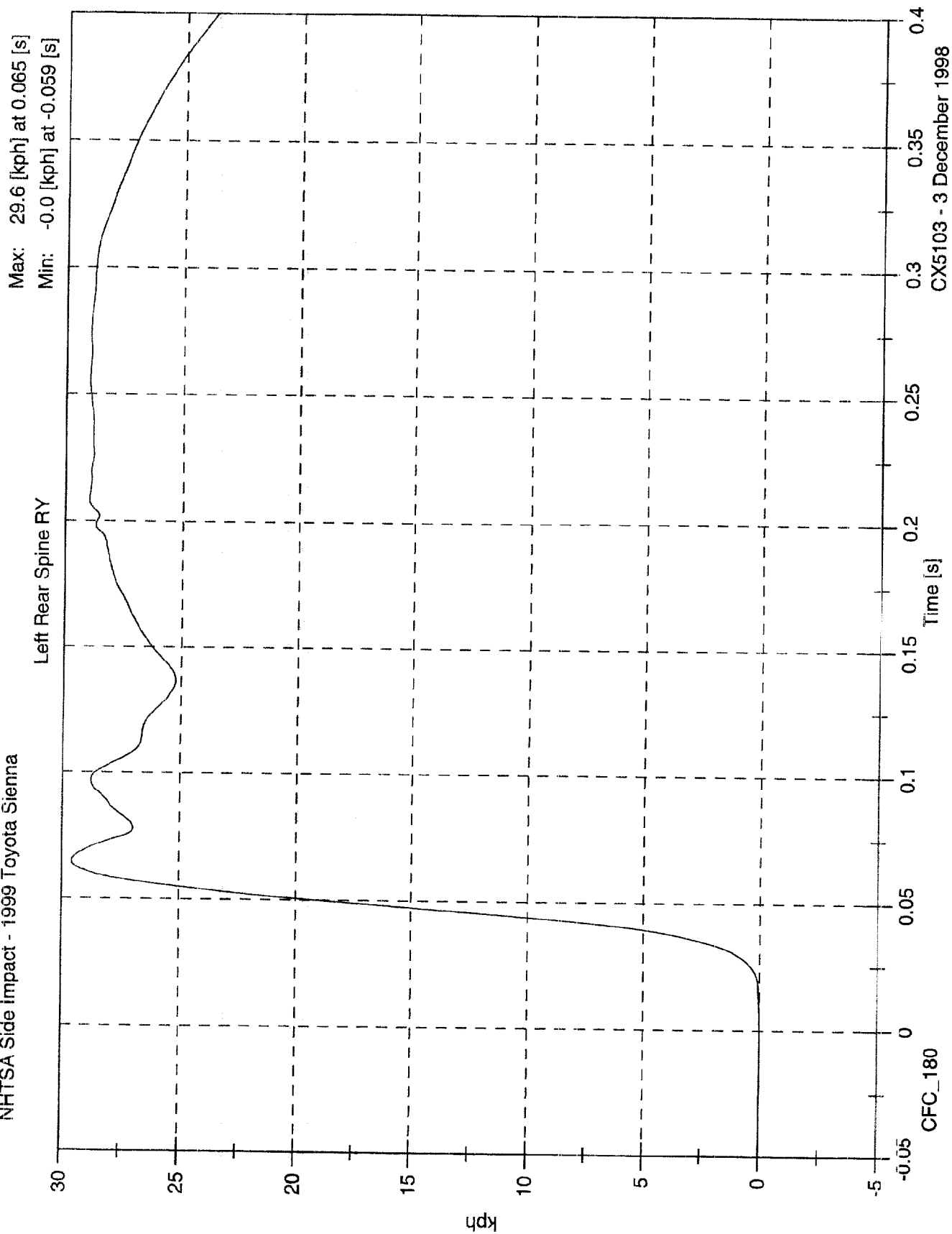
Max: 45.5 [g] at 0.050 [s]
Min: -11.0 [g] at 0.073 [s]

Left Rear Spine RY



CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

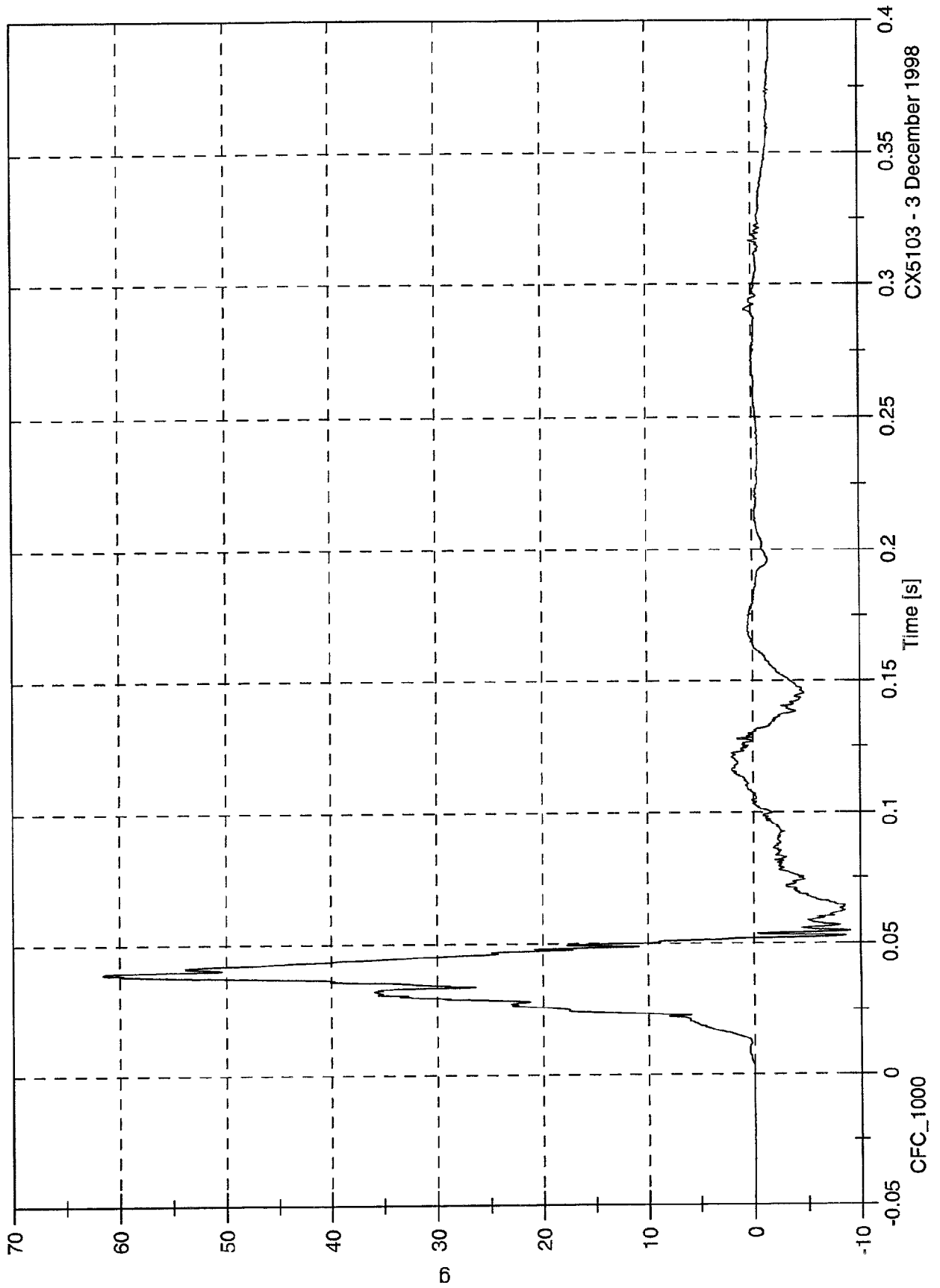


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 61.5 [g] at 0.039 [s]
Min: -9.0 [g] at 0.054 [s]

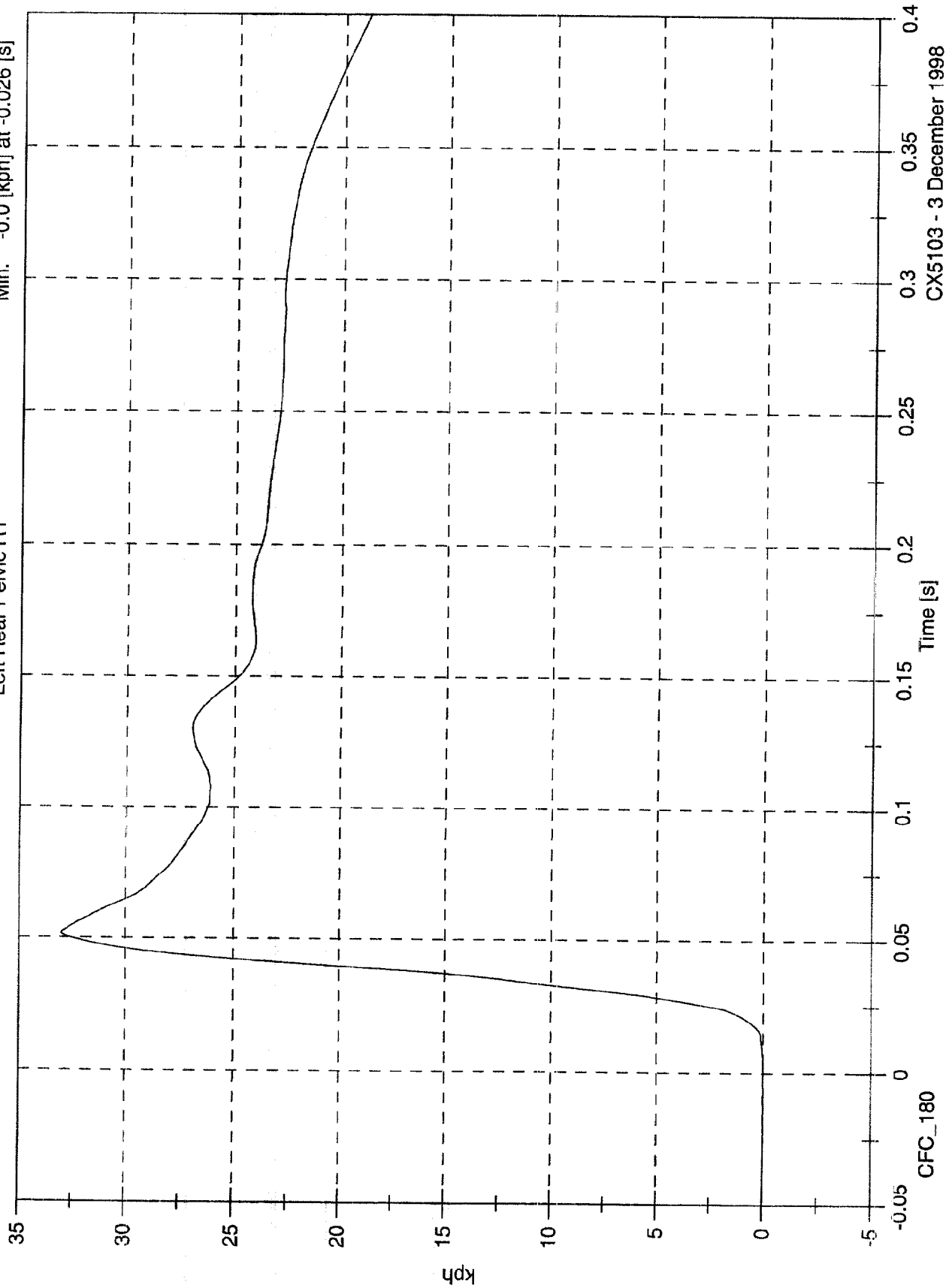
Left Rear Pelvic RY



NHTSA Side Impact - 1999 Toyota Sienna

Max: 33.0 [kph] at 0.052 [s]
Min: -0.0 [kph] at -0.026 [s]

Left Rear Pelvic RY



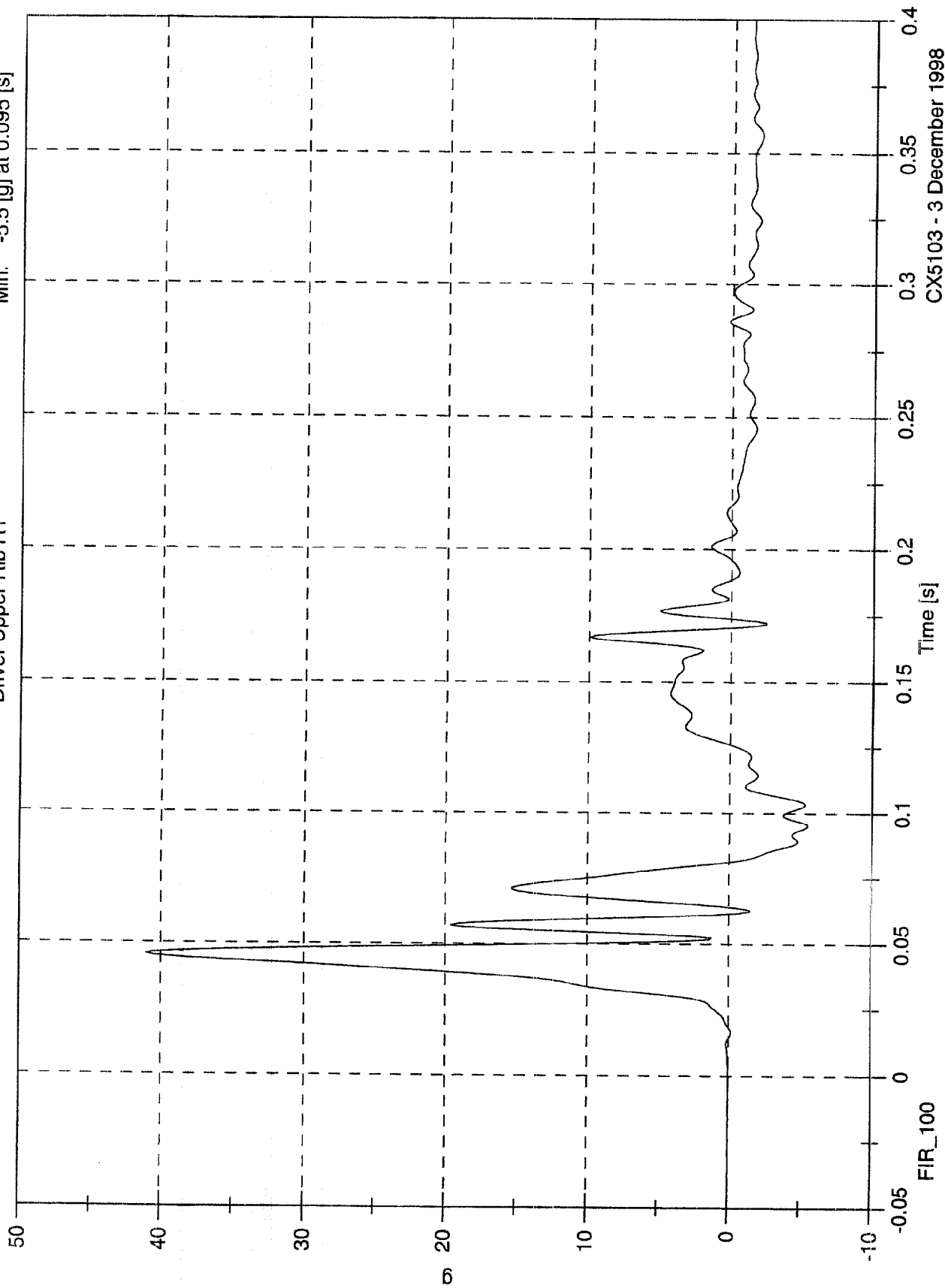
CX5103 - 3 December 1998

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

NHTSA Side Impact - 1999 Toyota Sienna

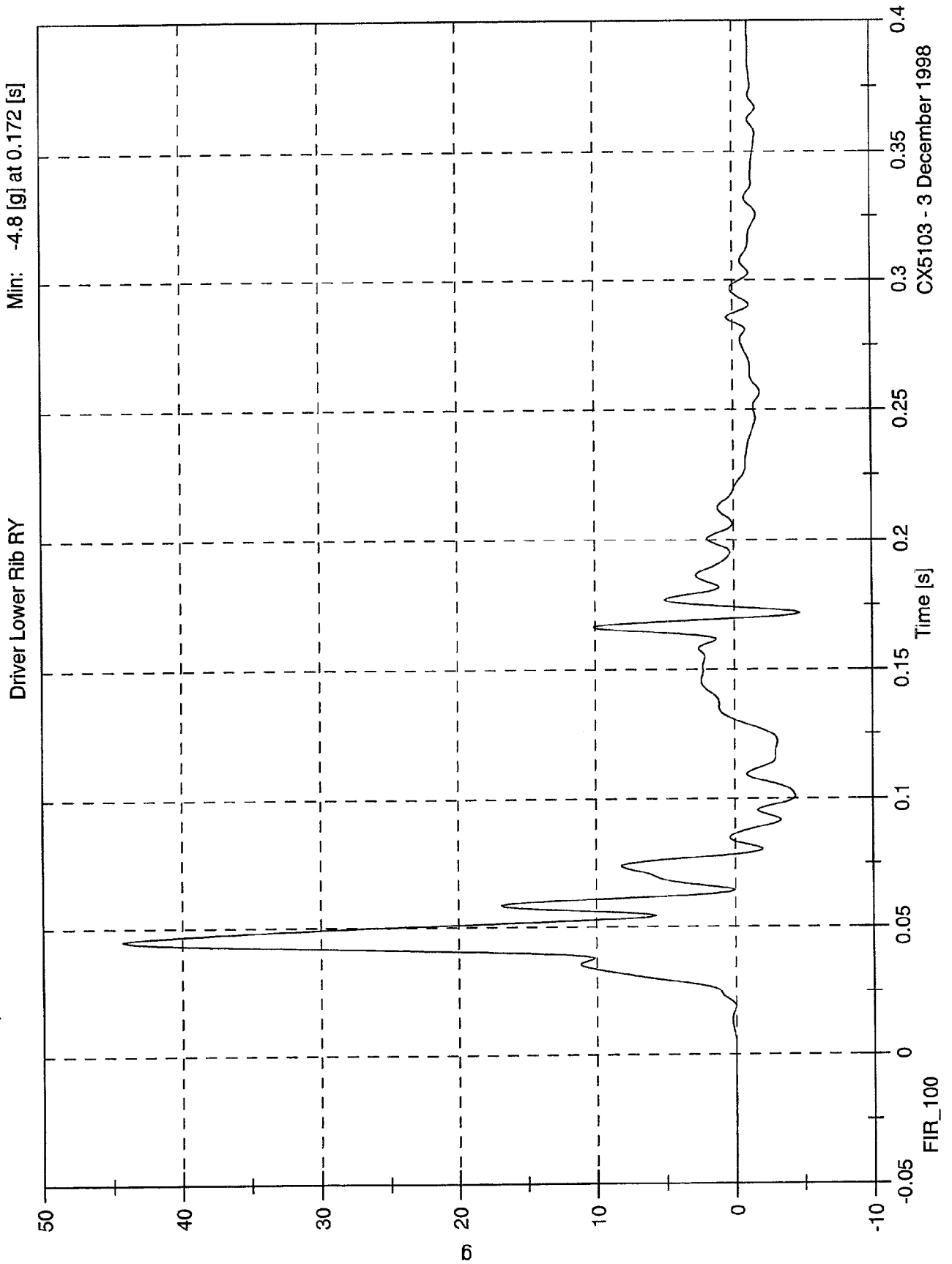
Max: 41.0 [g] at 0.046 [s]
Min: -5.5 [g] at 0.095 [s]

Driver Upper Rib RY

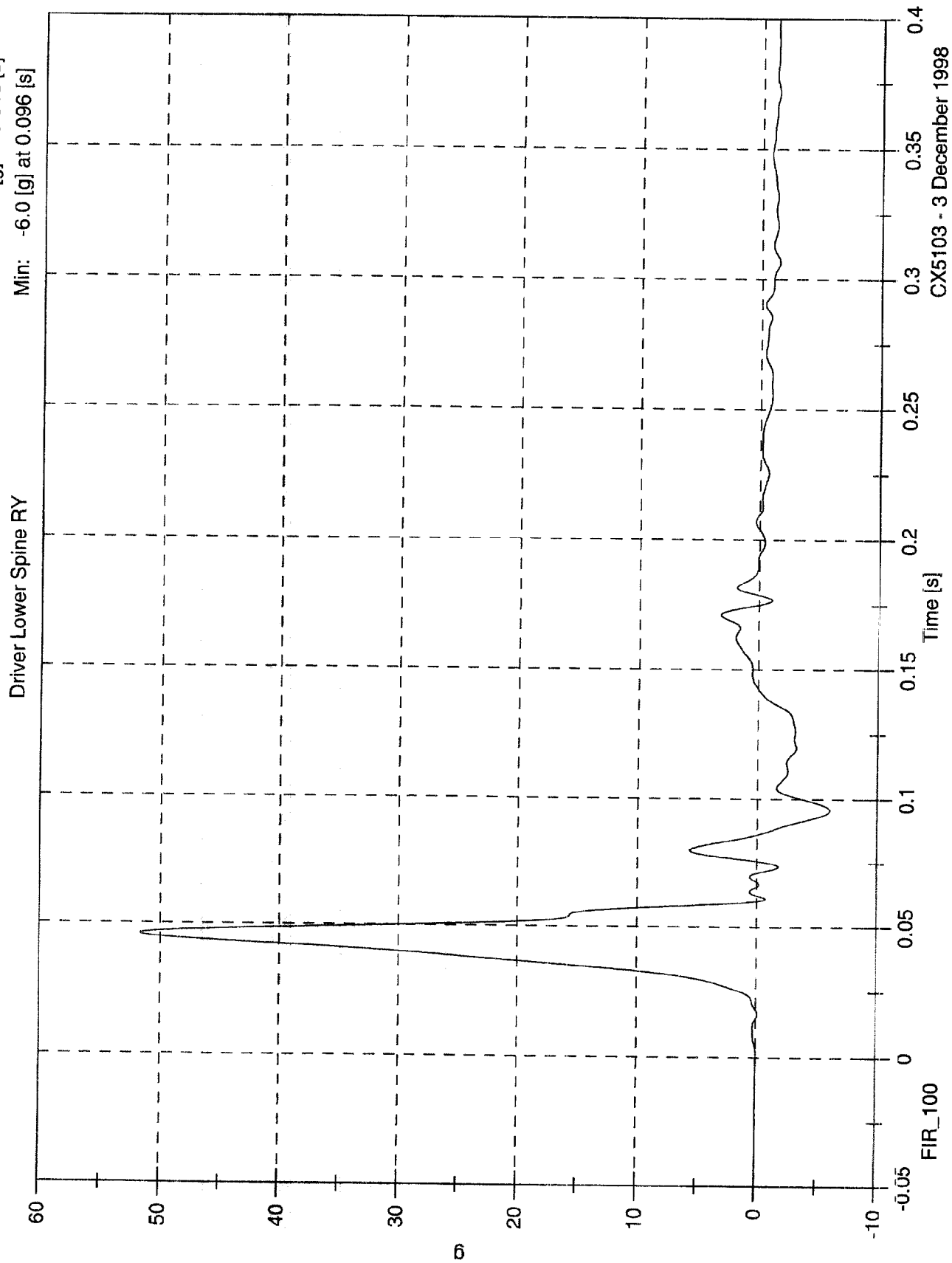


NHTSA Side Impact - 1999 Toyota Sienna

Max: 44.4 [g] at 0.045 [s]
Min: -4.8 [g] at 0.172 [s]

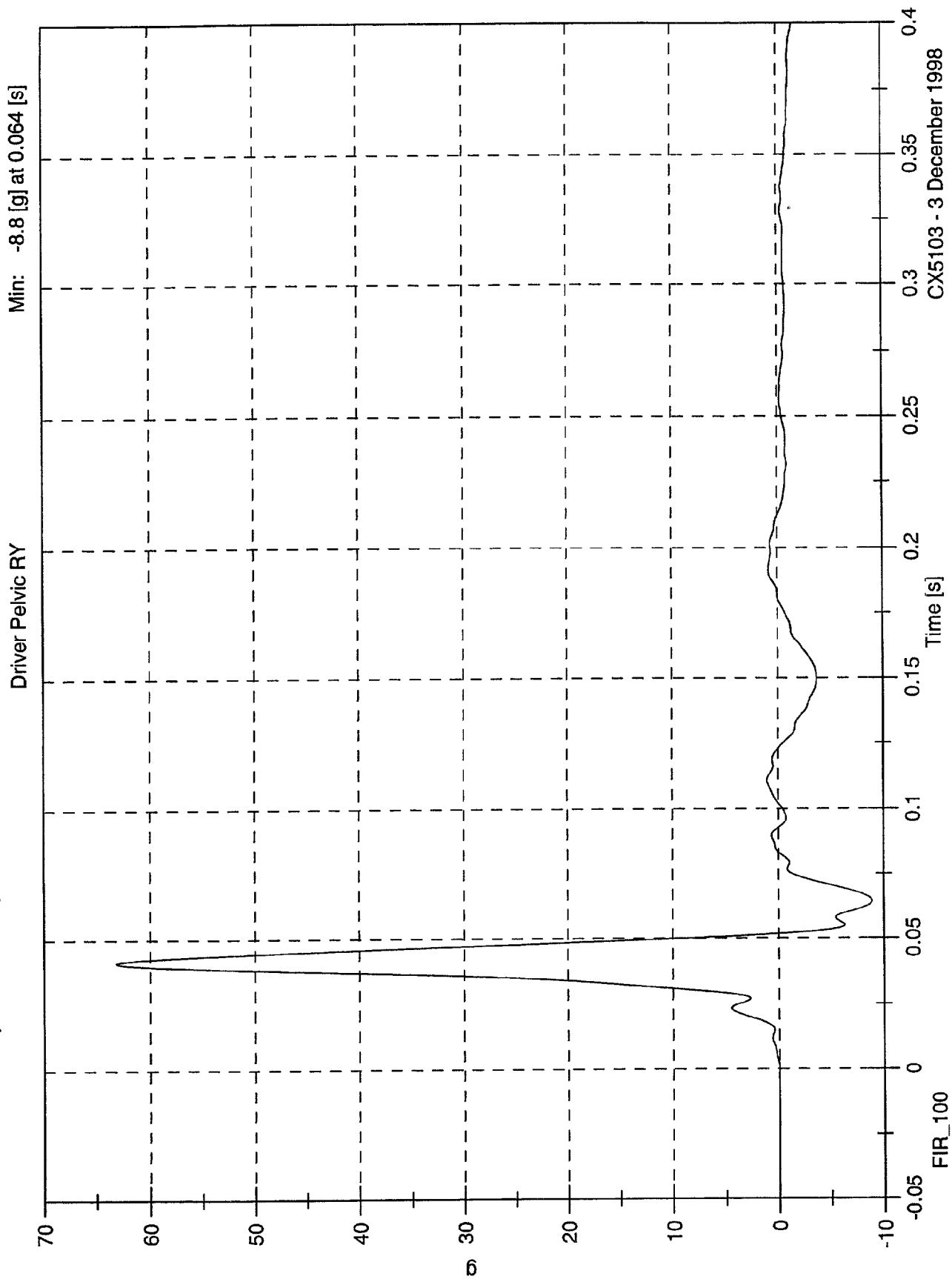


NHTSA Side Impact - 1999 Toyota Sienna



NHTSA Side Impact - 1999 Toyota Sienna

Max: 63.2 [g] at 0.041 [s]
Min: -8.8 [g] at 0.064 [s]

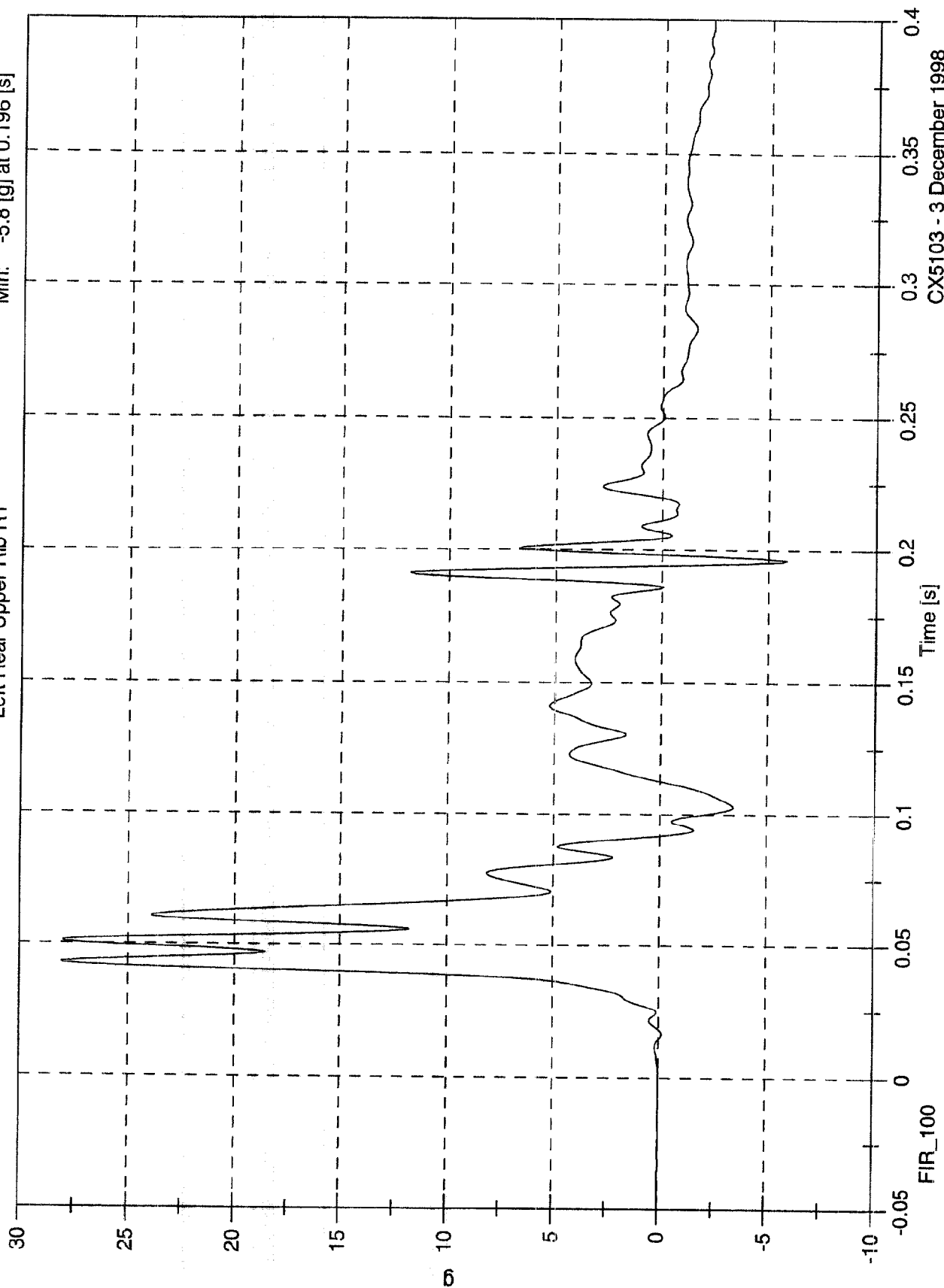


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Left Rear Upper Rib RY

Max: 28.1 [g] at 0.043 [s]
Min: -5.8 [g] at 0.196 [s]

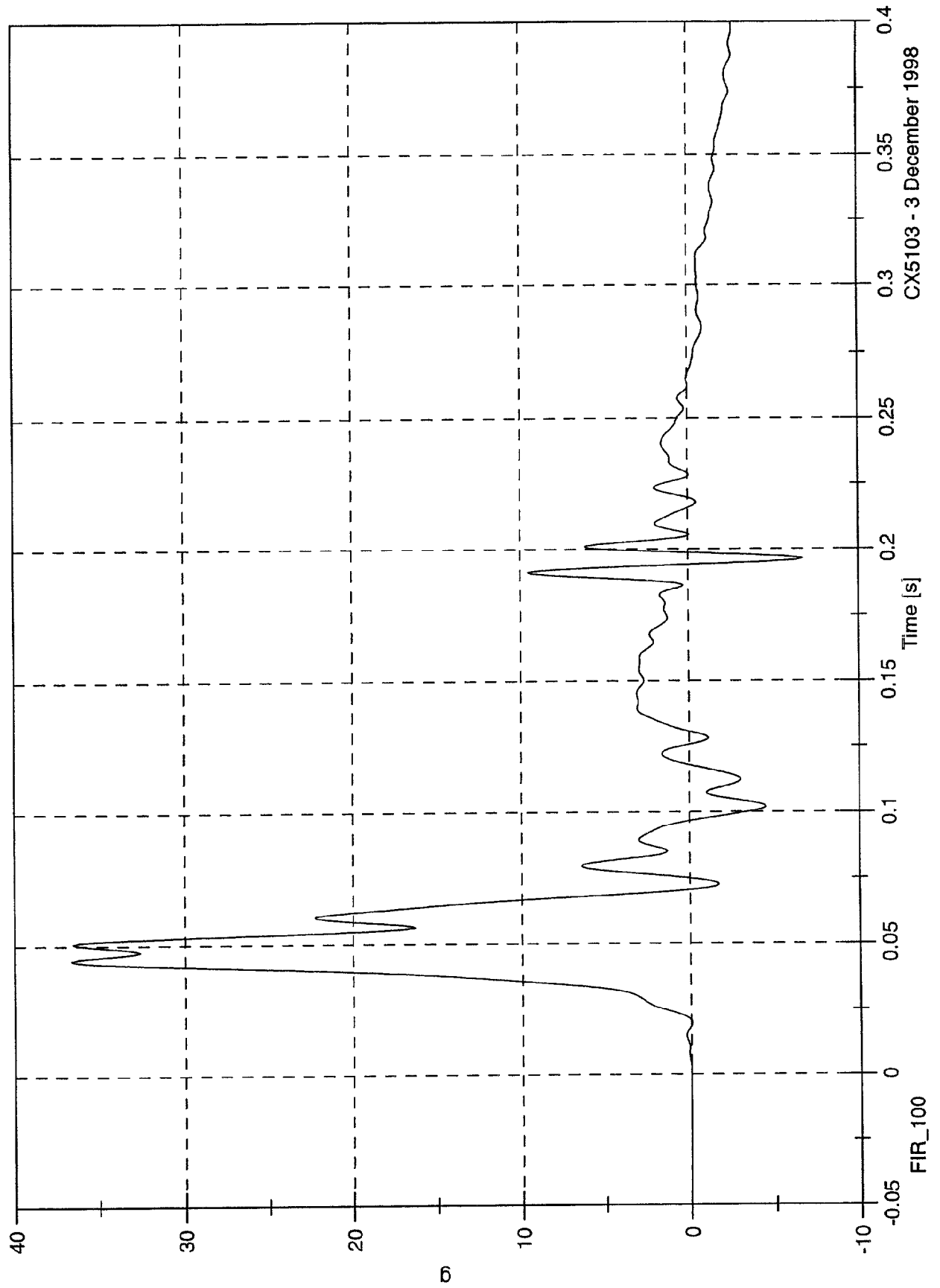


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 36.6 [g] at 0.044 [s]
Min: -6.7 [g] at 0.196 [s]

Left Rear Lower Rib RY

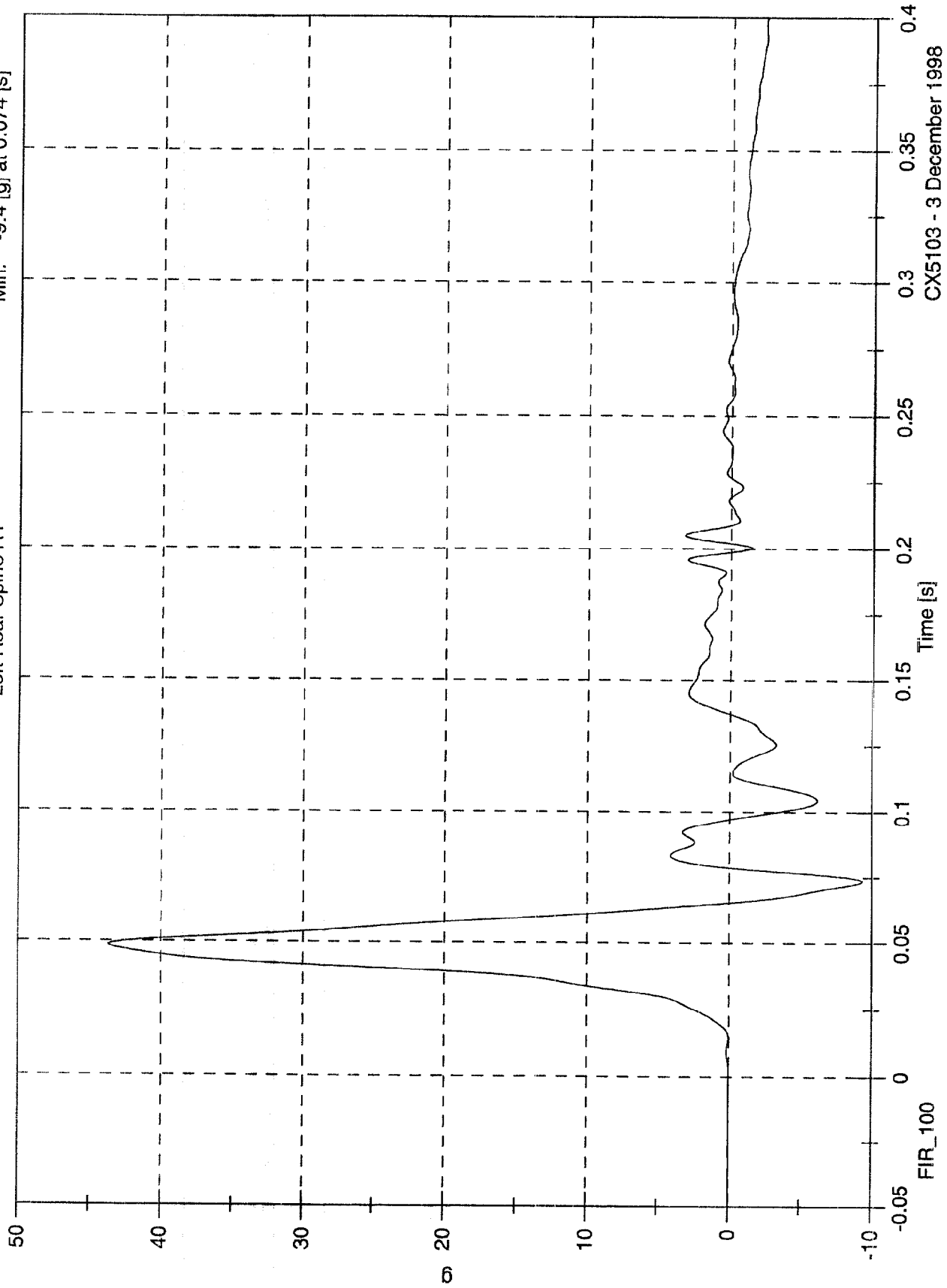


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 43.7 [g] at 0.049 [s]
Min: -9.4 [g] at 0.074 [s]

Left Rear Spine RY

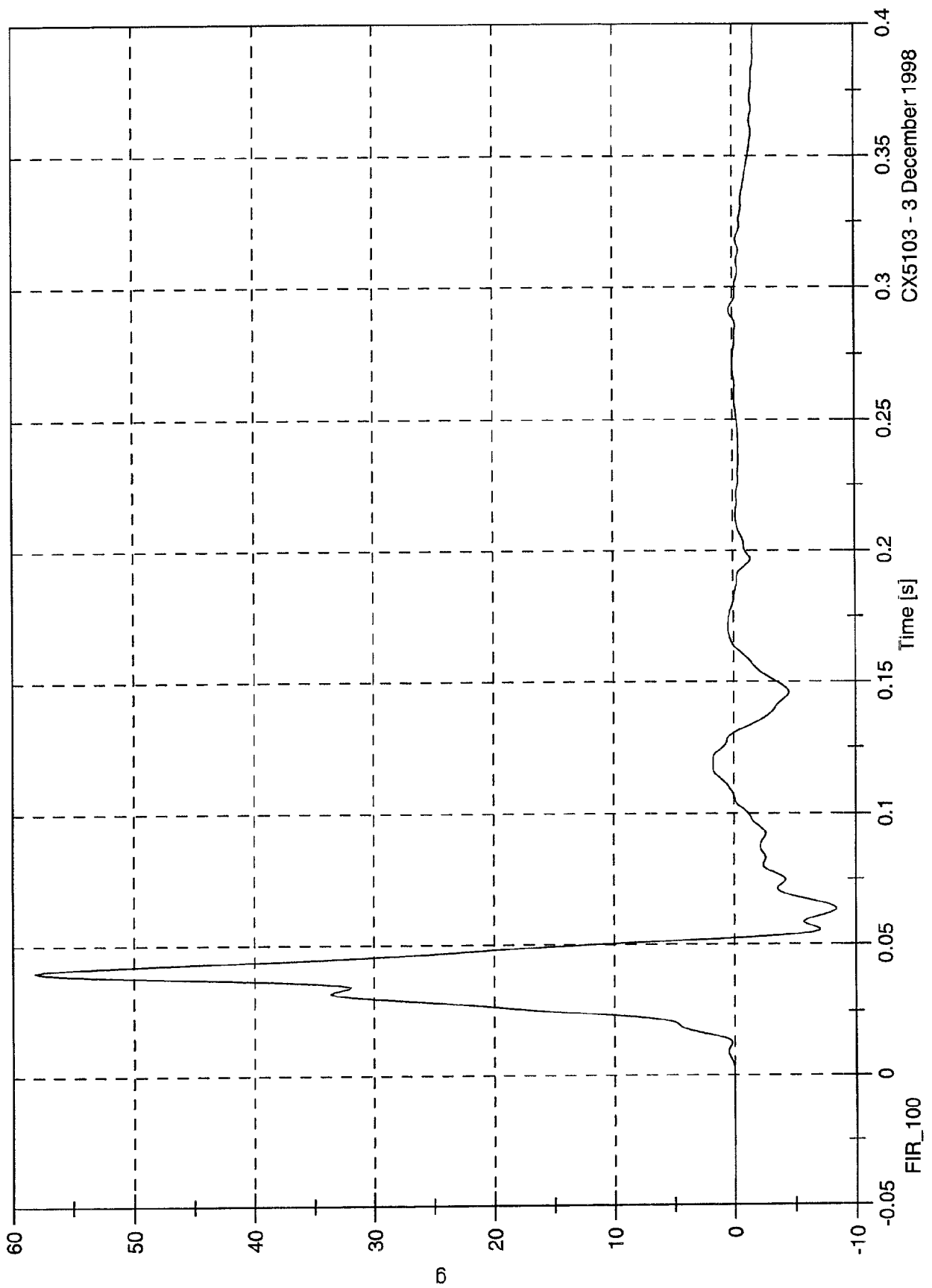


CX5103 - 3 December 1998

NHTSA Side Impact - 1999 Toyota Sienna

Max: 58.1 [g] at 0.040 [s]
Min: -8.3 [g] at 0.064 [s]

Left Rear Pelvic RY



APPENDIX C

SID CONFIGURATION AND PERFORMANCE VERIFICATION DATA

SUMMARY
SID PRE & POST TEST CALIBRATION

CONFIGURED FOR LEFT SIDE IMPACT

Date: 12/4/98 Calspan Sequential Test Number: 3,4
Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	SID NO.: 015		SID NO.: 016	
		PRE TEST	POST TEST	PRE TEST	POST TEST
SH- Seated Height (mm)	889 - 909	904	904	902	902
RH- Rib Height (mm)	501 - 521	508	511	513	513
HP- Hip Pivot Height (mm)	99 ref.	99	99	99	99
RD- Rib from Back Line (mm)	229 - 241	236	236	240	241
KV- Knee Pivot from Back Line (mm)	511 - 526	521	521	525	526
SW- Knee Pivot to Floor (mm)	490 - 505	494	493	494	494
HW- Hip Width (mm)	356 - 391	368	172	362	361
THORAX IMPACTS					
TEMPERATURE (°C)	18.9 - 25.5	21.1	21.1	21.1	21.1
RELATIVE HUMIDITY (%)	10 - 70	45	42	40	42
PROBE SPEED (m/s)	4.27 - 4.33	4.31	4.29	4.27	4.30
UPPER RIB (g's)	37 - 46	42.8	43.0	42.5	45.8
LOWER RIB (g's)	37 - 46	42.5	44.2	41.7	45.7
LOWER SPINE (g's)	15 - 22	21.8	21.1	18.5	15.8
PELVIS IMPACT					
TEMPERATURE (°C)	18.9 - 25.5	21.1	21.1	21.1	21.1
RELATIVE HUMIDITY (%)	10 - 70	45	42	40	42
PROBE SPEED (m/s)	4.27 - 4.33	4.32	4.27	4.27	4.30
PELVIS (g's)	40 - 60	46.4	44.9	41.0	53.1

REMARKS: None

**CALIBRATION TEST RESULTS
PRE-TEST**

SID NO.: 015

CONFIGURED FOR LEFT SIDE IMPACT

**CALIBRATION TEST RESULTS SUMMARY
PRE-TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 015 Calspan Sequential Test Number: 3
Date: 10/1/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

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.: 015

Calspan Sequential Test Number: 3

Date: 9/30/98

Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	904
RH- Rib Height (mm)	502 - 520	508
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	521
KV- Knee Pivot to Floor (mm)	490 - 505	494
HW- Hip Width (mm)	356 - 391	368

REMARKS: None

**THORACIC SHOCK ABSORBER TESTS
PRE-TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 015 Calspan Sequential Test Number: 1,2
Date: 9/14/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

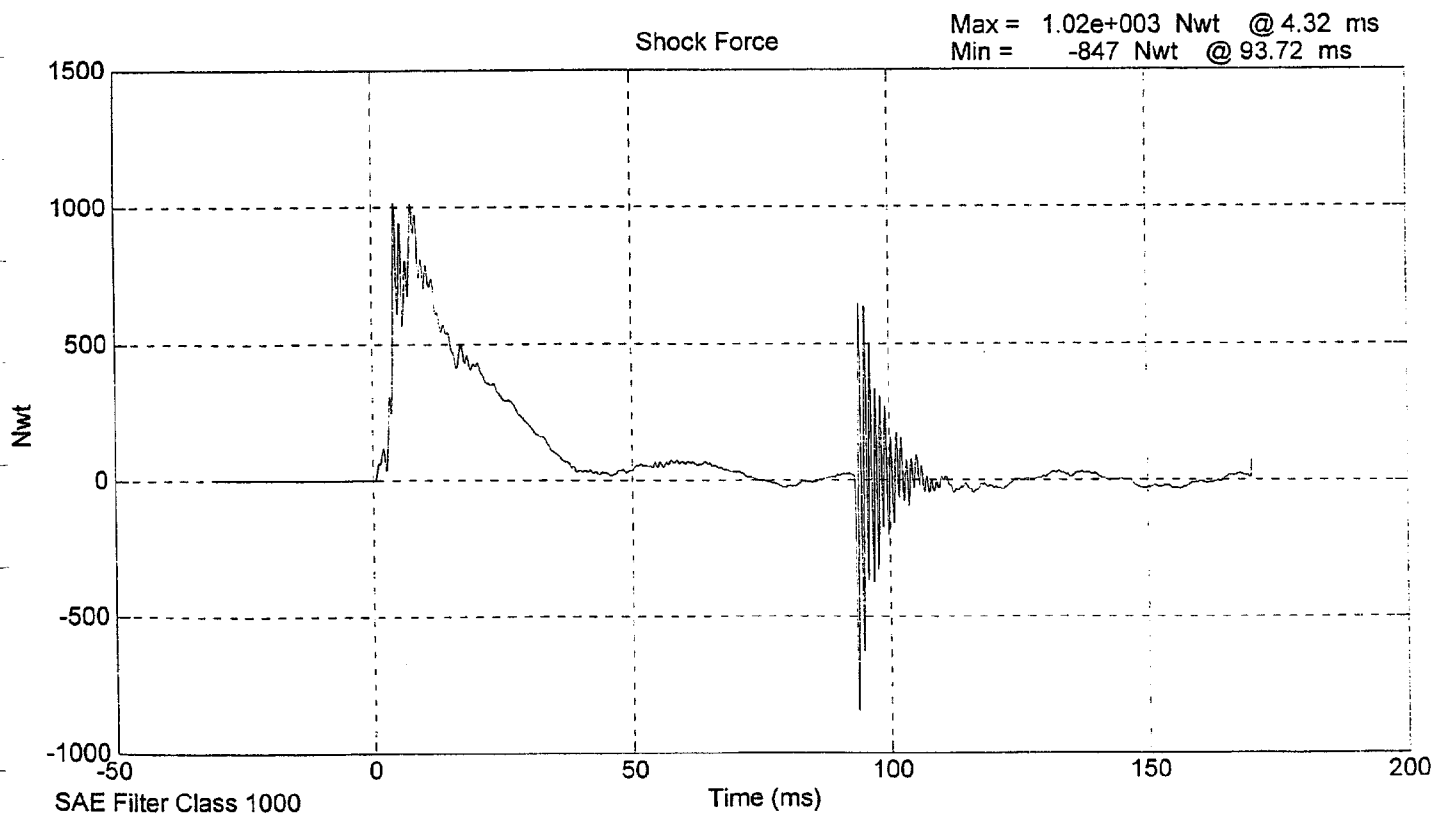
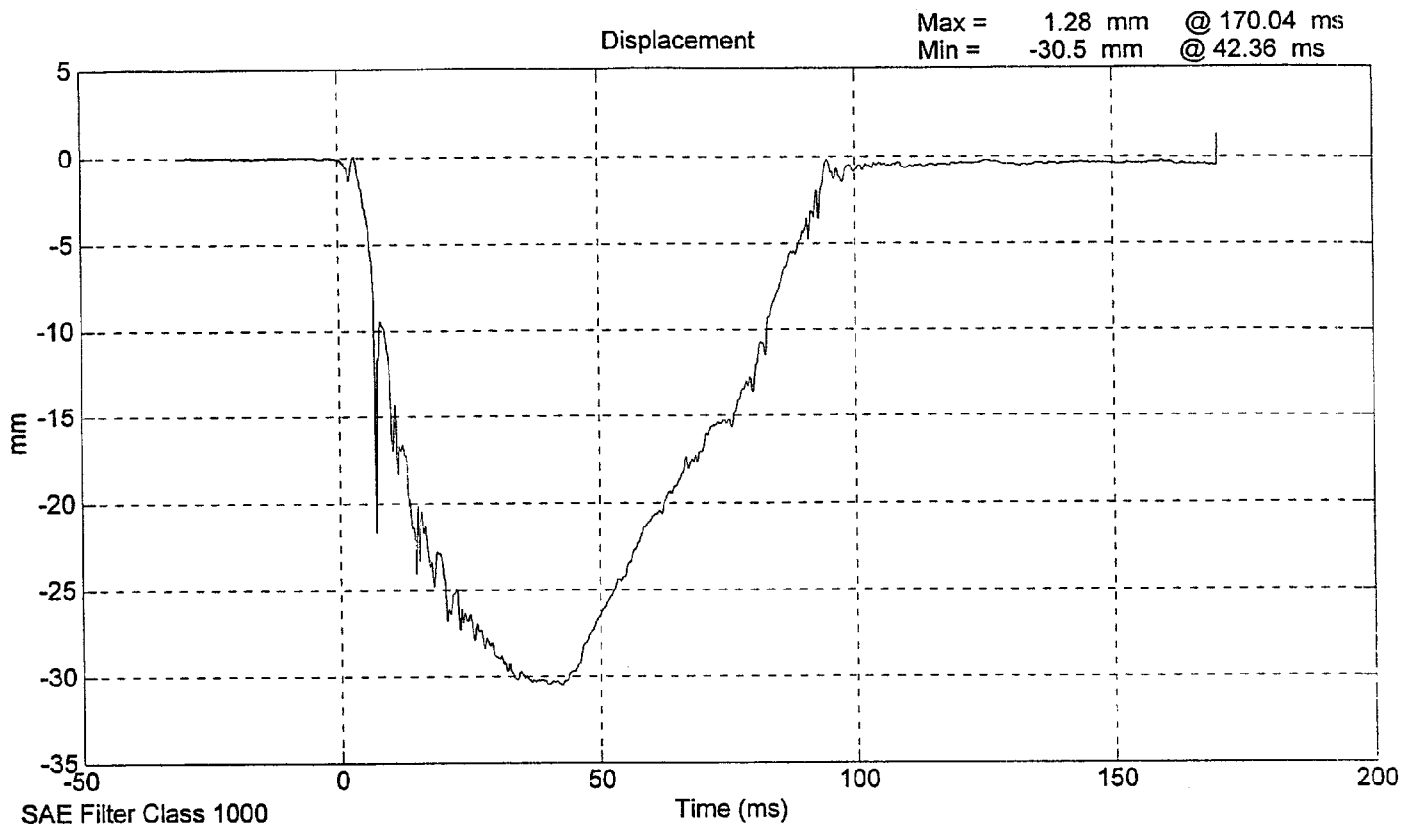
DAMPER IDENTIFICATION: 015

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)		18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)		10 - 70	45
VELOCITY 3.05 m/s	FORCE (N)	836 - 1125	1016
	DISPLACEMENT (mm)	30 - 35	30
VELOCITY 4.27 m/s	FORCE (N)	1730 - 2099	1932
	DISPLACEMENT (mm)	32 - 37	34
VELOCITY 6.10 m/s	FORCE (N)	3741 - 4448	3861
	DISPLACEMENT (mm)	33 - 40	38

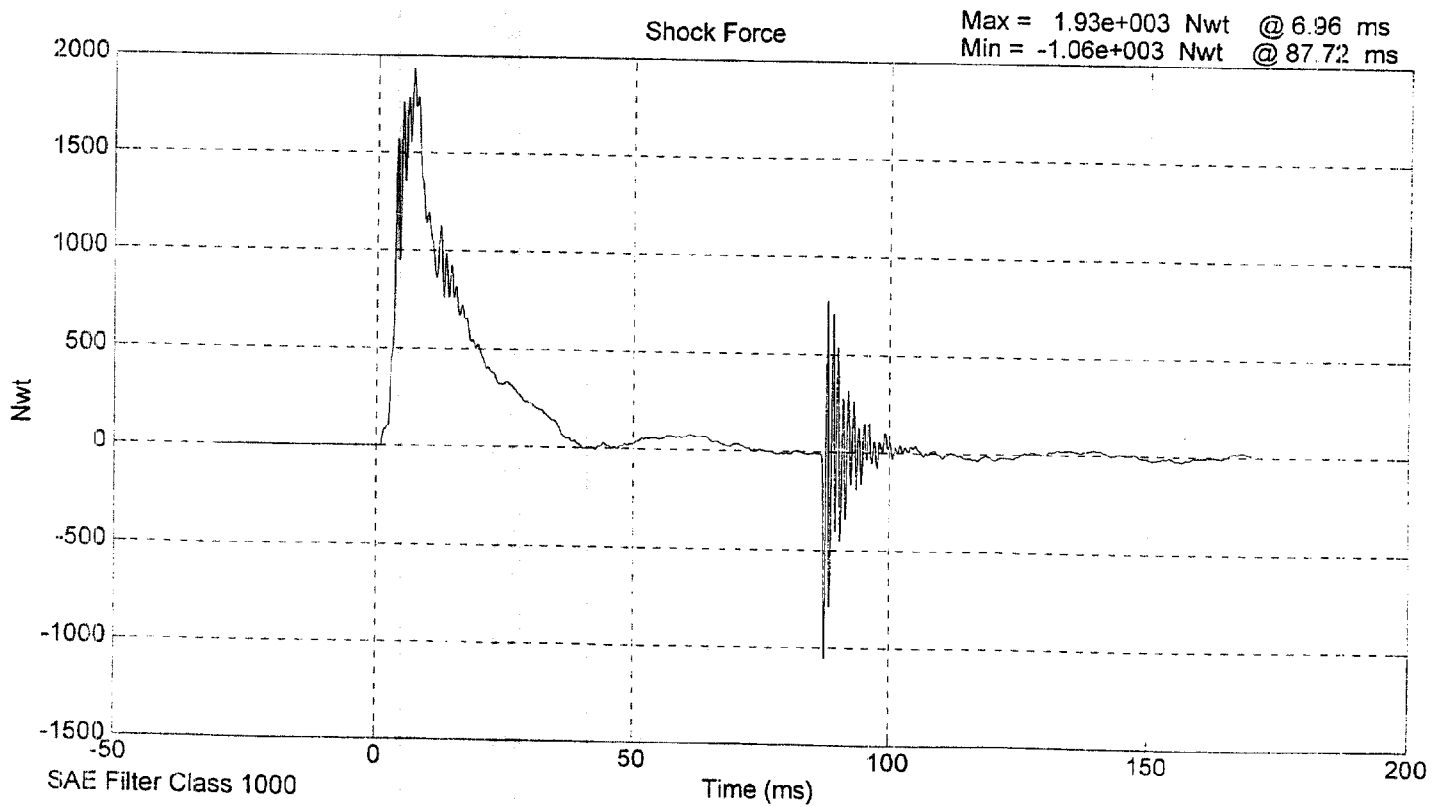
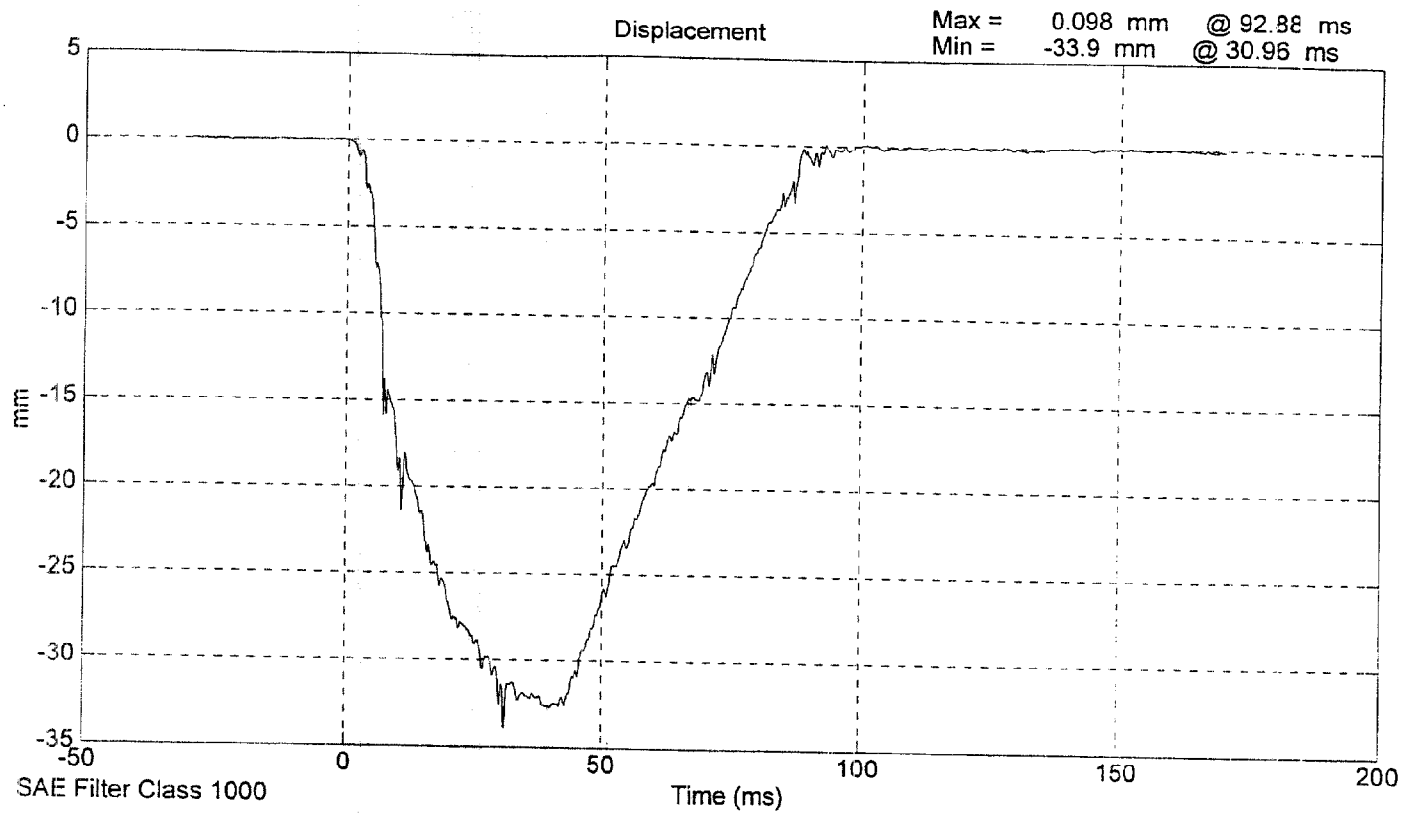
DAMPER SETTING: 5.75

REMARKS: None

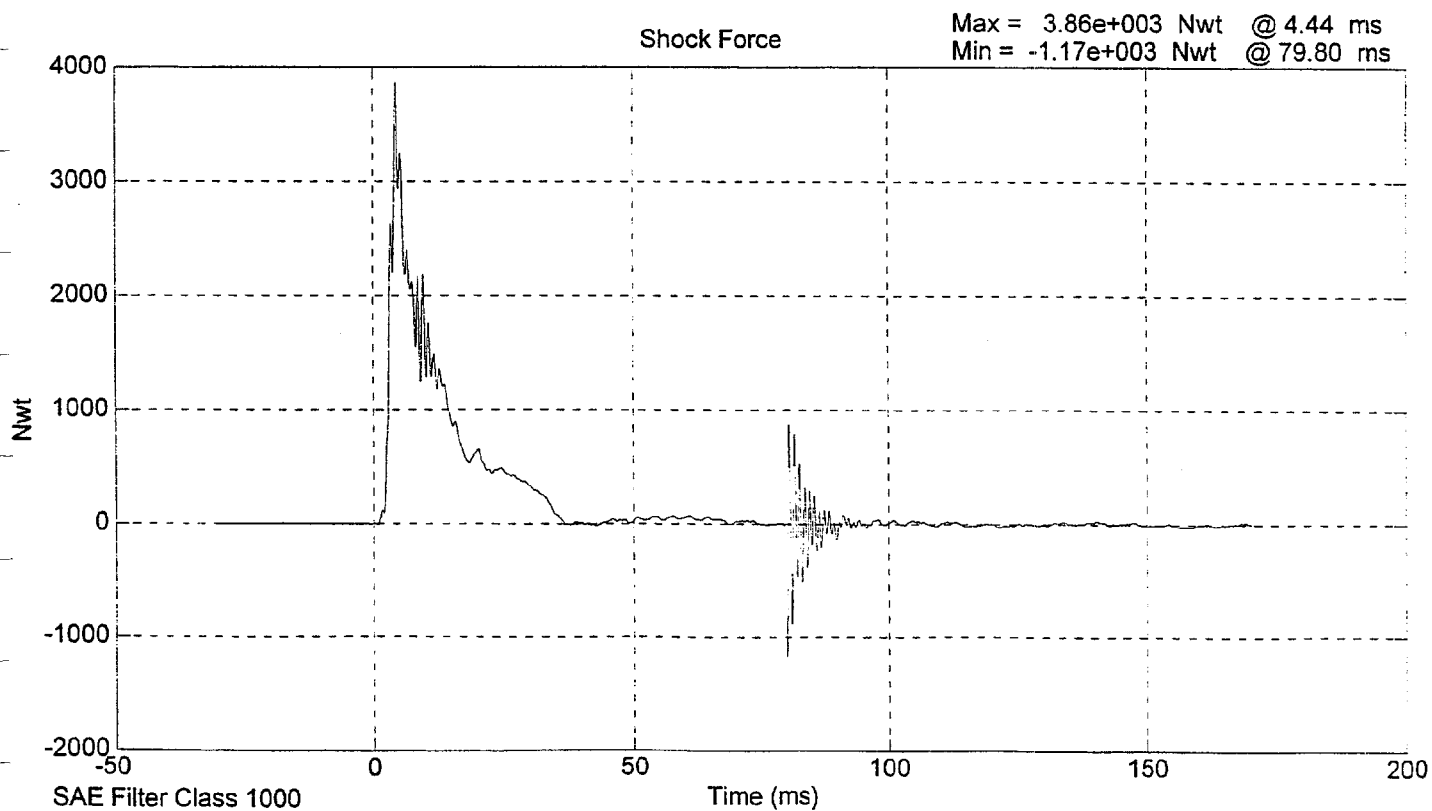
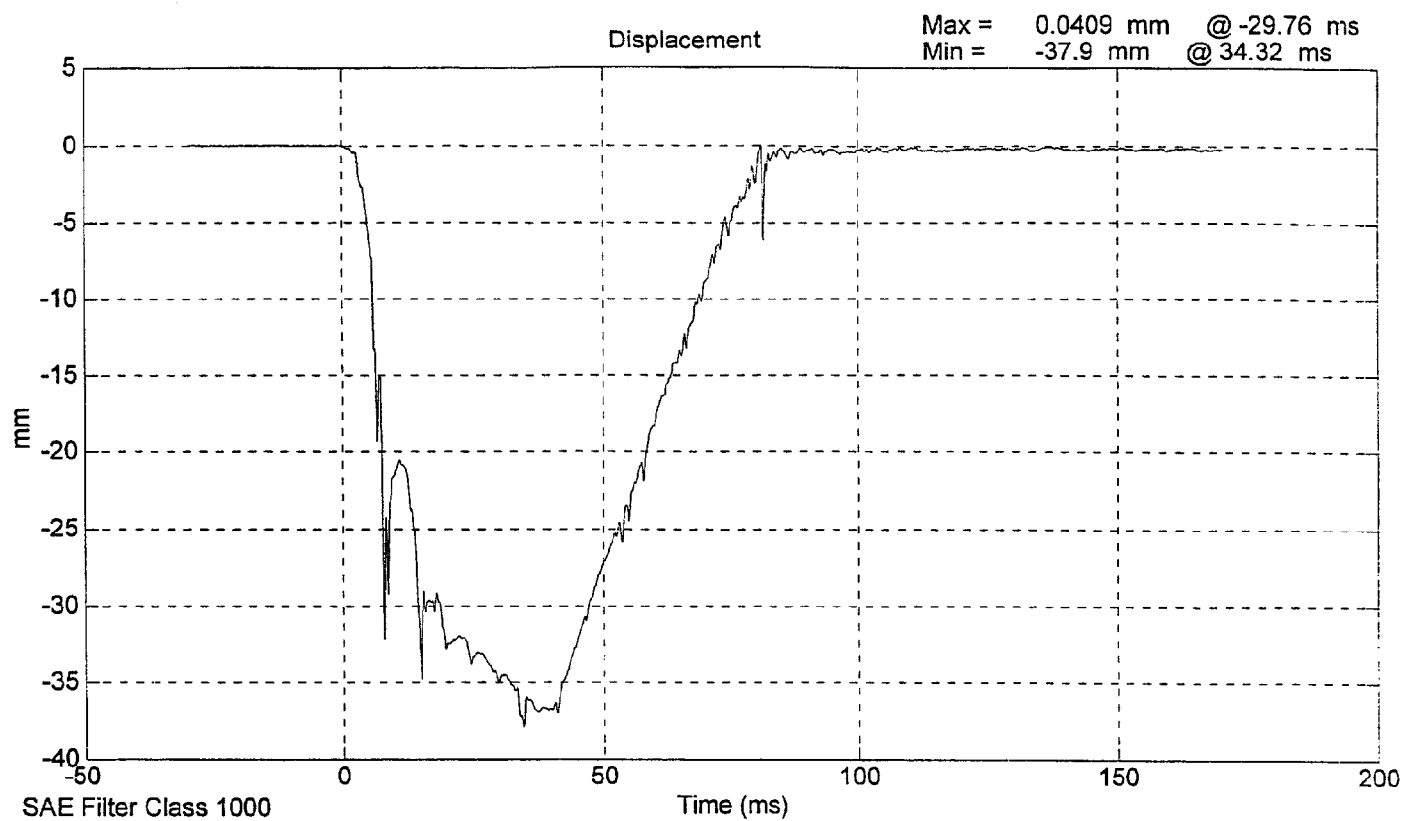
SID Shock Absorber Impact Test 015 @ 3.0419 m/s



SID Shock Absorber Impact Test 015 @ 4.2702 m/s



SID Shock Absorber Impact Test 015 @ 6.1234 m/s



**LATERAL THORAX IMPACT TEST
PRE-TEST**

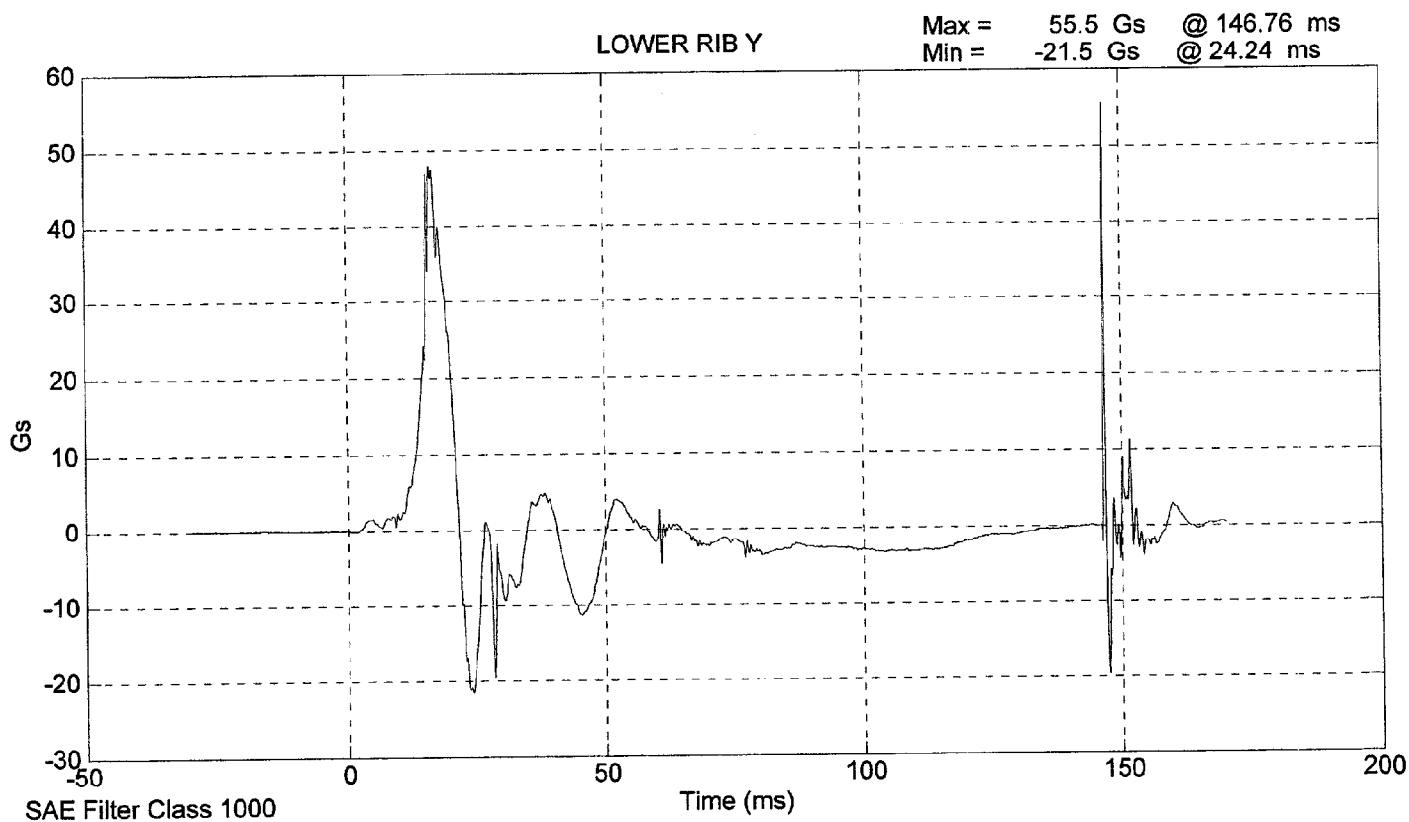
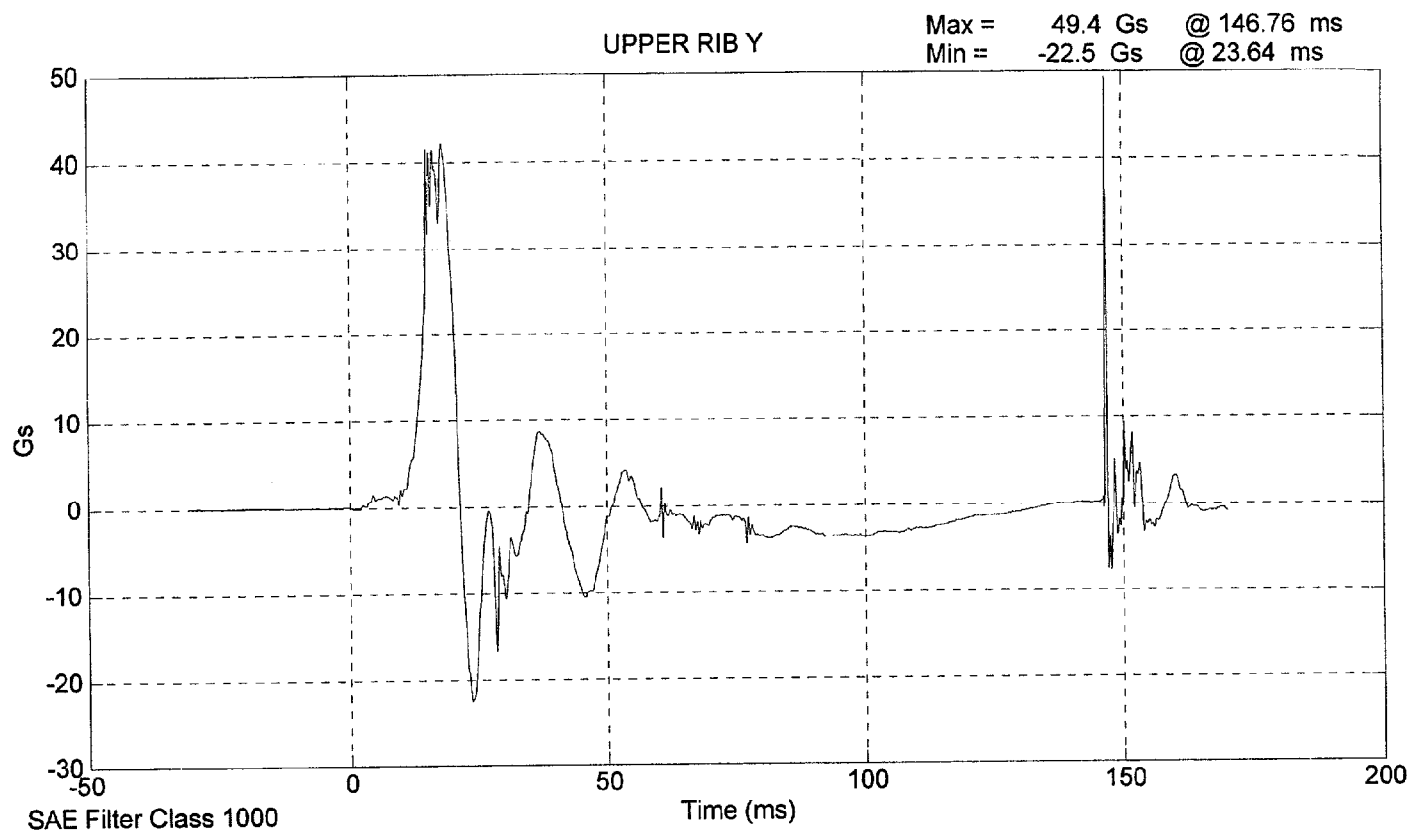
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 015 Calspan Sequential Test Number: 3
Date: 9/30/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

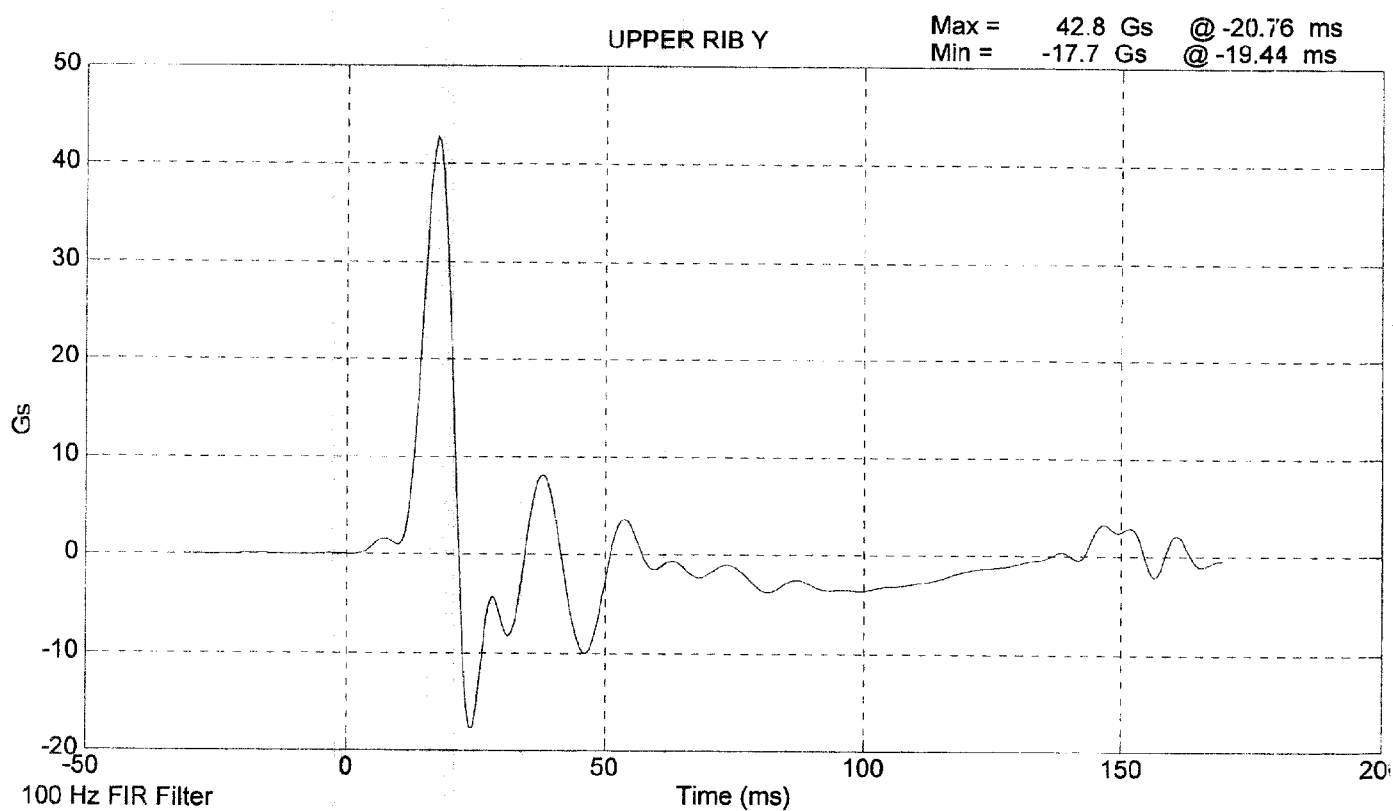
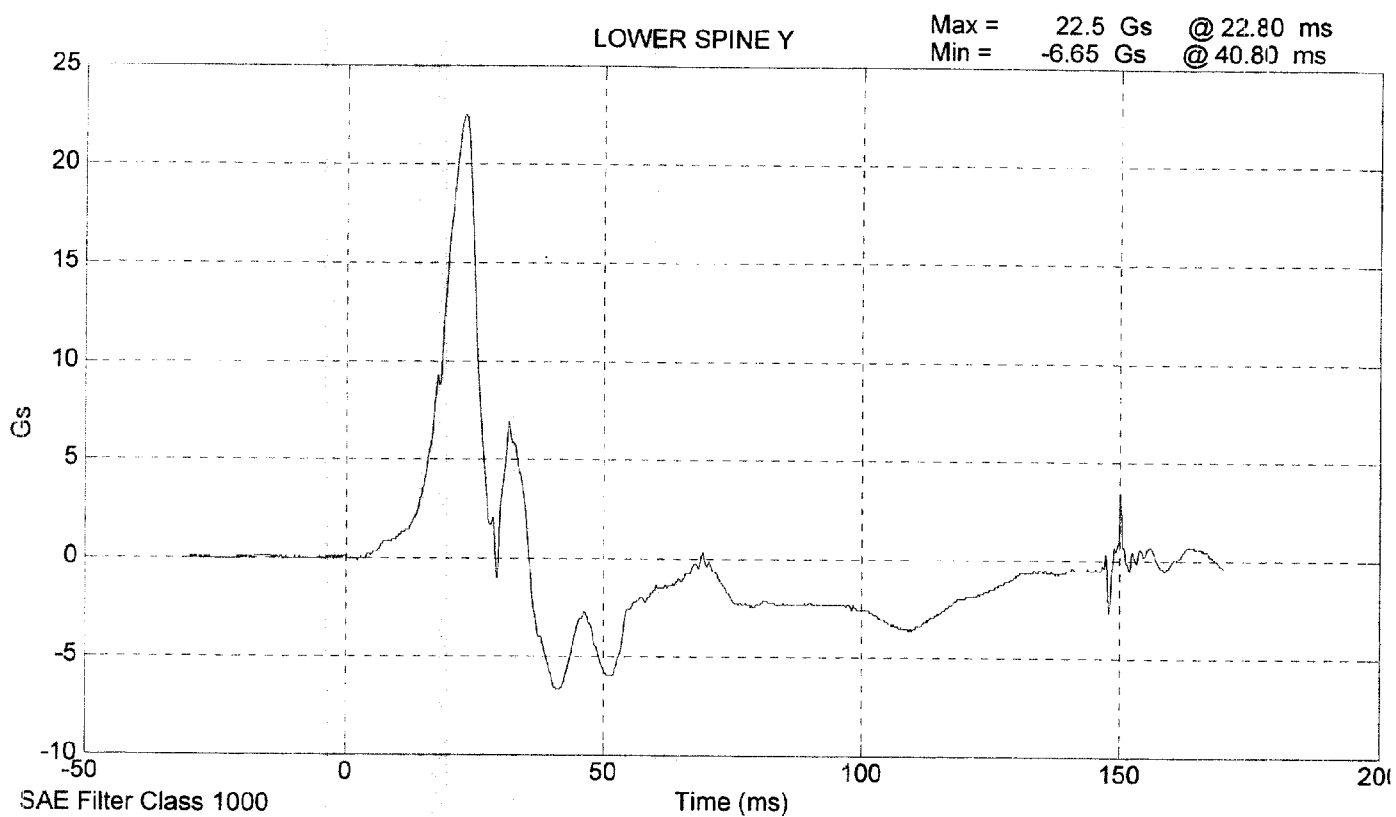
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	45
PROBE SPEED (m/s)	4.27 - 4.33	4.31
UPPER RIB (g's)	37 - 46	42.8
LOWER RIB (g's)	37 - 46	42.5
LOWER SPINE (g's)	15 - 22	21.8

REMARKS: None

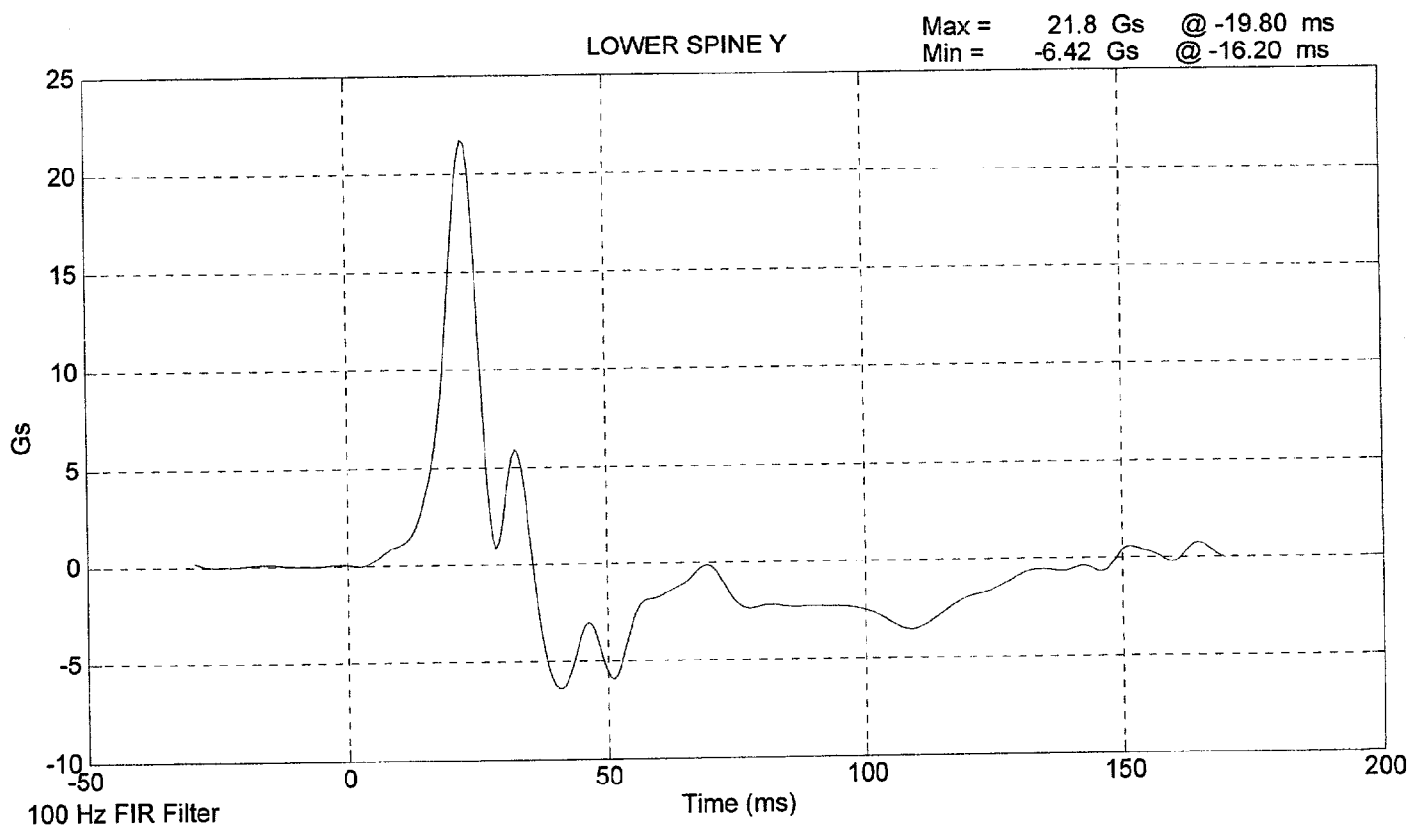
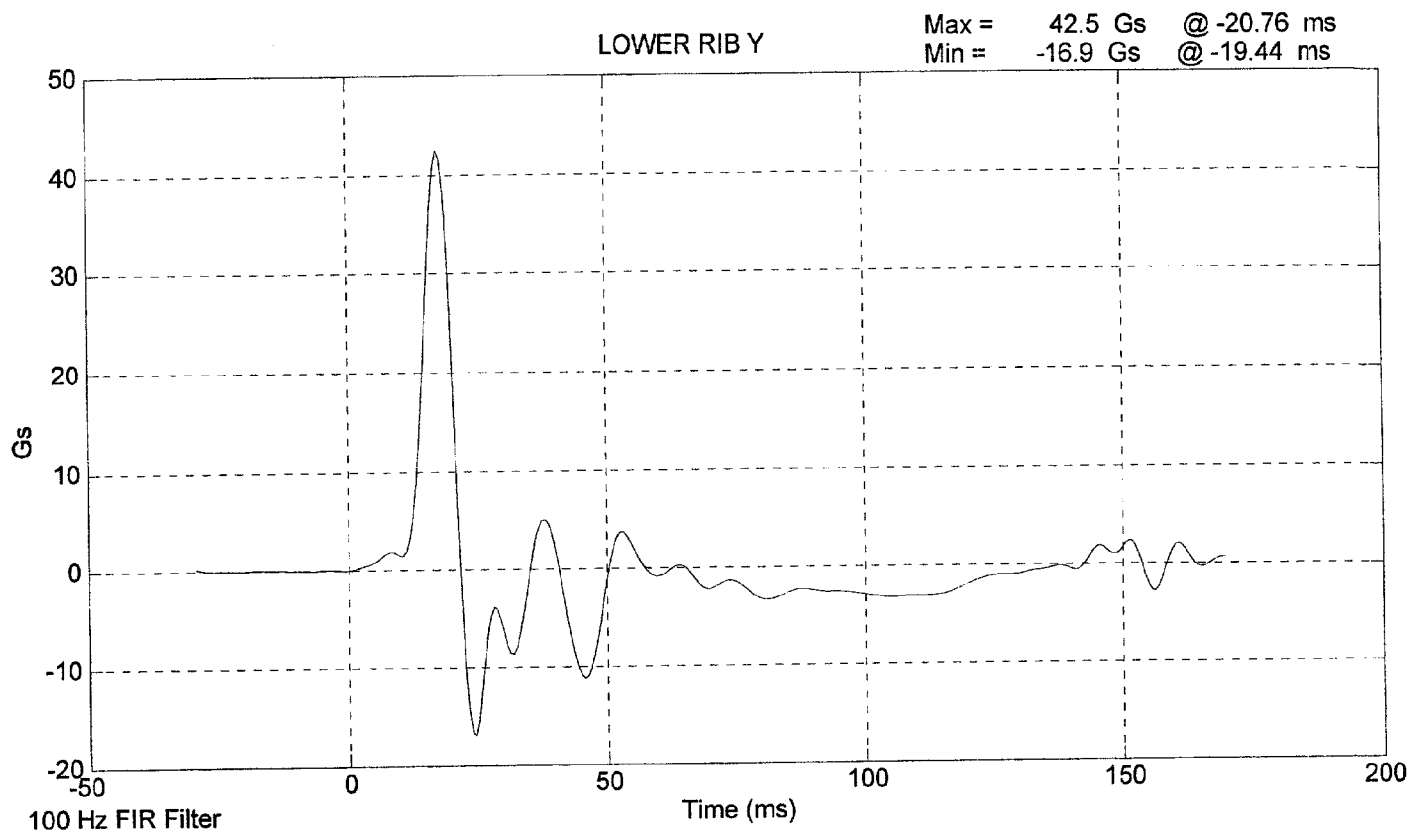
SID 015 Thorax Impact Test @ 4.31 m/s



SID 015 Thorax Impact Test @ 4.31 m/s



SID 015 Thorax Impact Test @ 4.31 m/s



**LATERAL PELVIS IMPACT TEST
PRE-TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 015

Calspan Sequential Test Number: 3

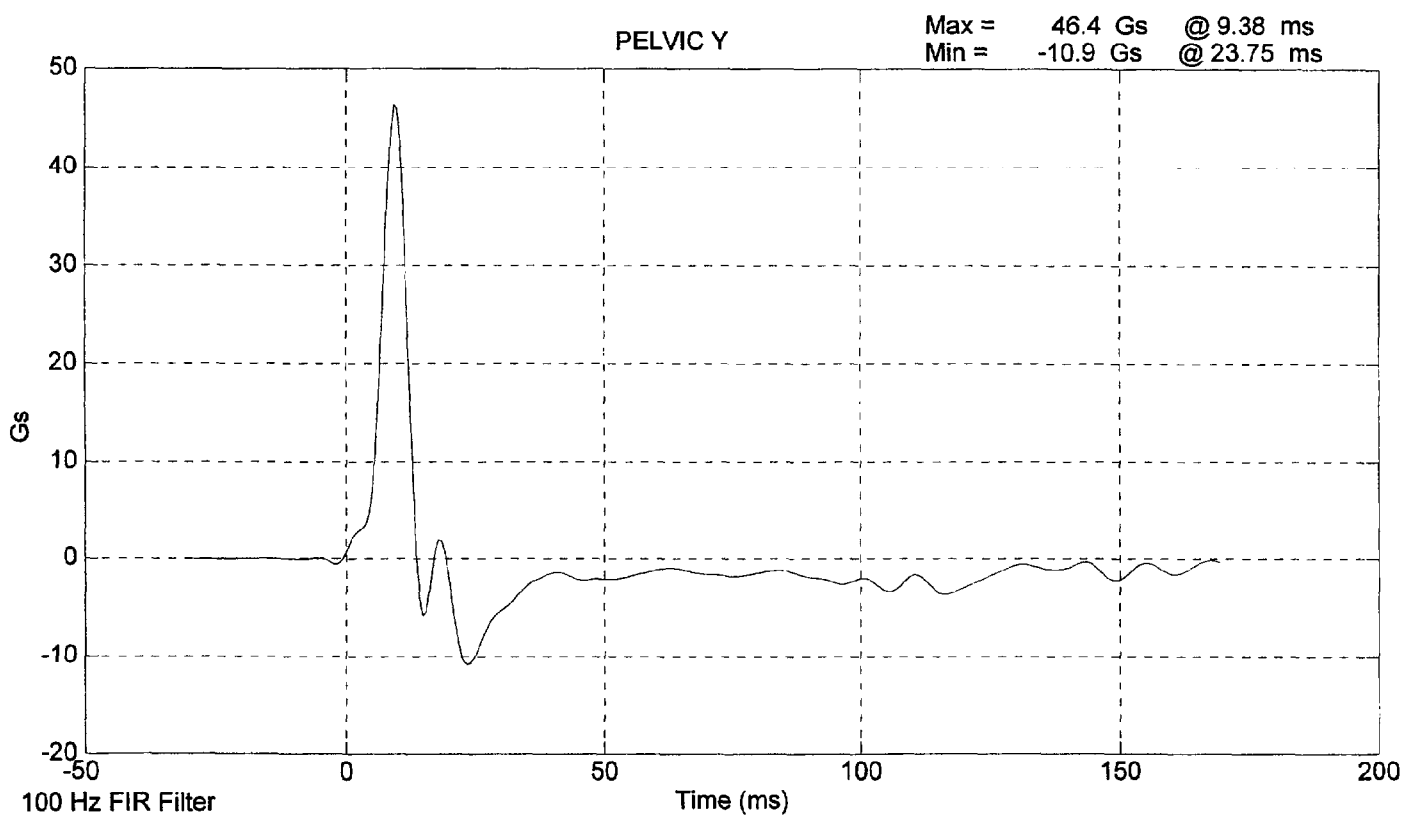
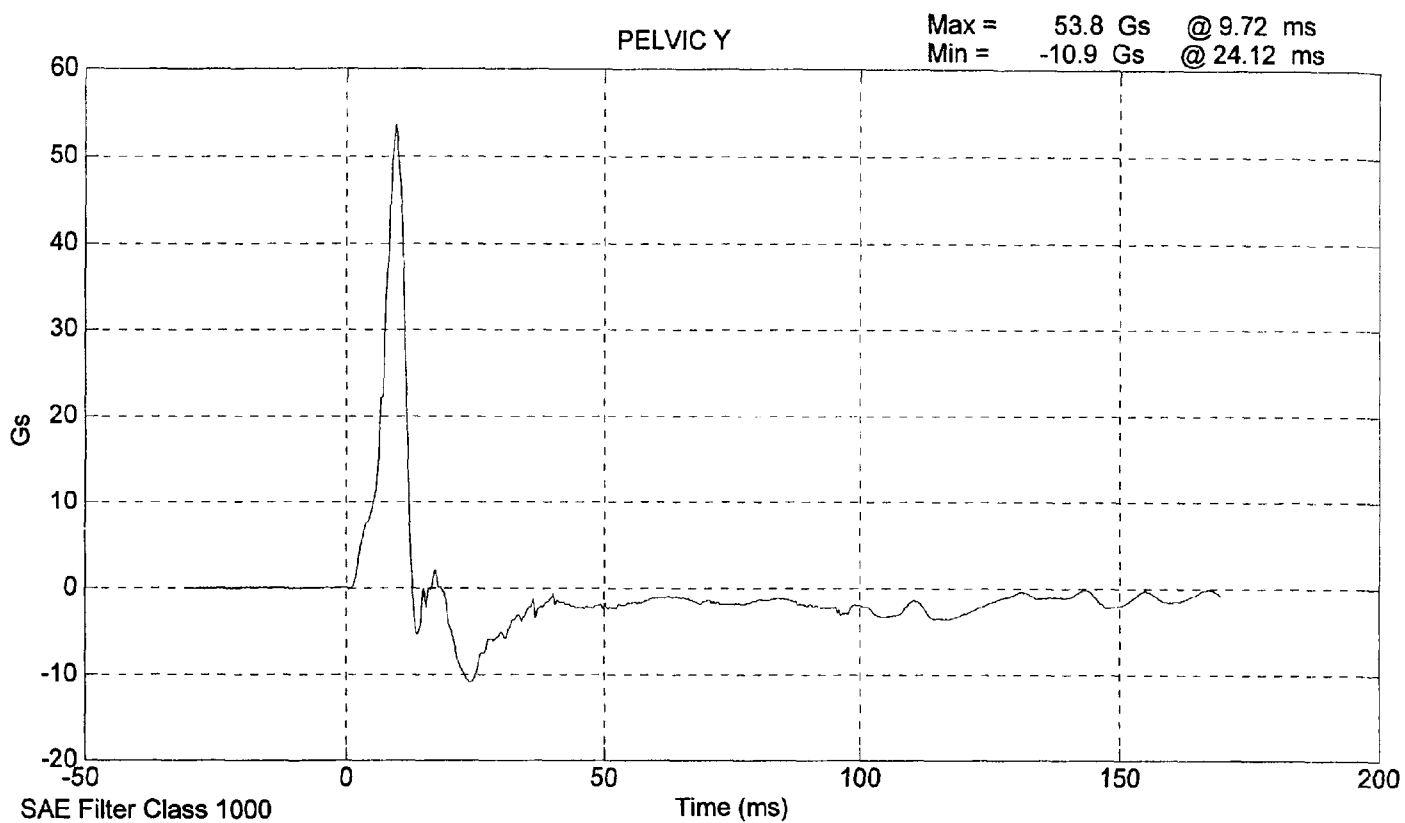
Date: 9/29/98

Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	45
PROBE SPEED (m/s)	4.27 - 4.33	4.32
PELVIS ACCELERATION (g's)	40 - 60	46.4

REMARKS: None

SID 015 Pelvic Impact Test @ 4.32 m/s



**ABDOMINAL COMPRESSION TEST
PRE-TEST**

(Test not required for SID certification)

CONFIGURED FOR LEFT SIDE IMPACT

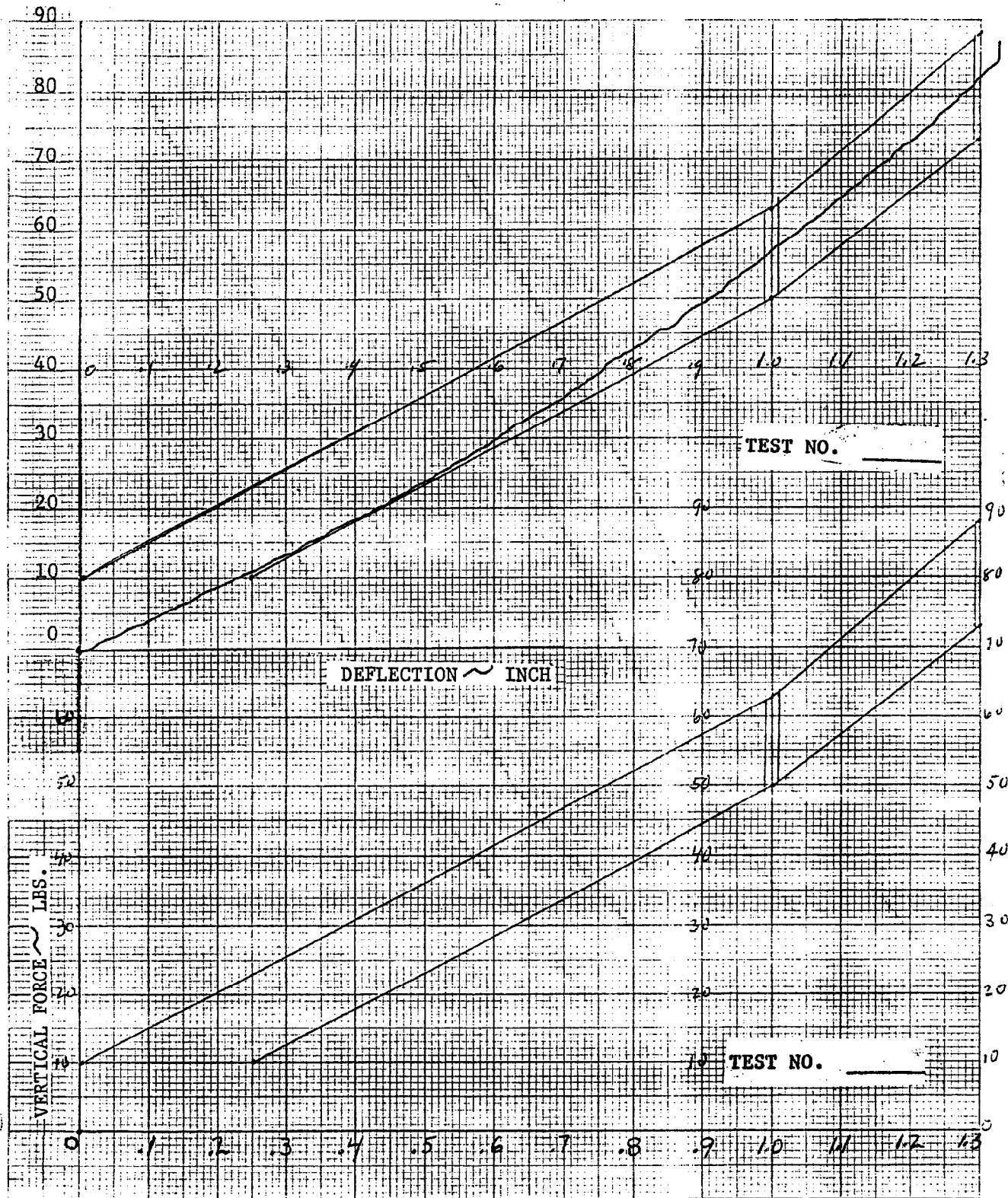
SID Serial No.: 015 Calspan Sequential Test Number: 3
Date: 9/30/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	45
FORCE @ 13 mm (N)	104 - 162	106
FORCE @ 19 mm (N)	163 - 221	174
FORCE @ 25 mm (N)	222 - 280	253
FORCE @ 33 mm (N)	325 - 391	364

REMARKS: None

GRAPHIC PAPER
GRAPHIC CONTROLS CORPORATION
Bellingham, New York Printing in U.S.A.

SQUARE
1 1/2 TO 10 THE 1/2 INCH
15-0913-01



DUMMY S/N 015
DATE 9/30/77
CONTRACT AUTHORIZATION _____
TEMP. 70° HUMIDITY 45%
PERFORMED BY (signature)

PART 572
ABDOMEN STATIC PRESS
DOT - 13 DEC. '77
C-17

DUMMY S/N 015

TEST NO. 3

CONTRACT AUTHORIZATION

DATE 9/30/99

PERFORMED BY

TEMP. 70

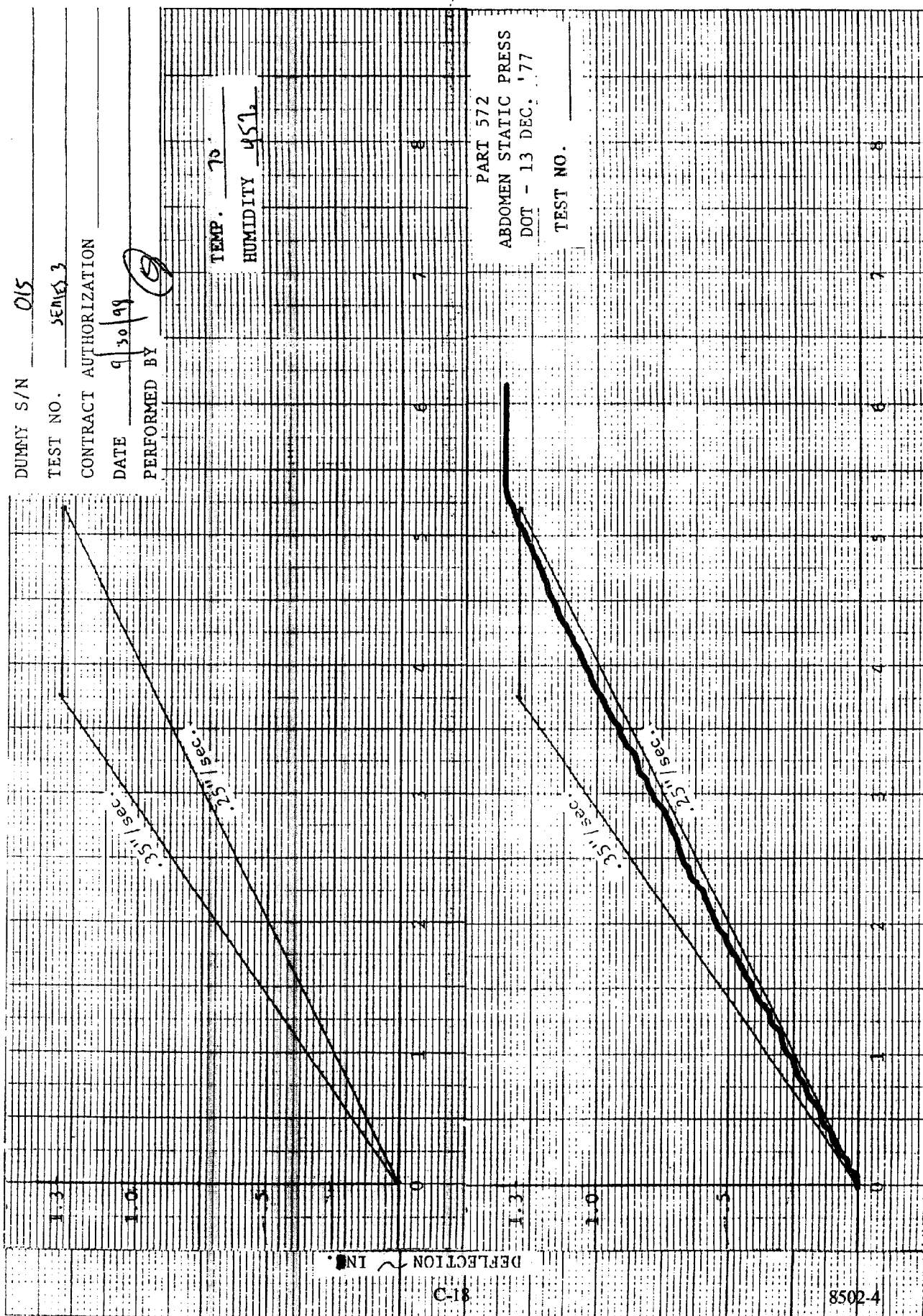
HUMIDITY 45%

PART 572

ABDOMEN STATIC PRESS

DOT - 13 DEC. '77

TEST NO.



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

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 015 Calspan Sequential Test Number: 3
Date: 10/1/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	40
FORCE @ 0° (N)	0 - 26.7	0
FORCE @ 20° (N)	97.8 - 151.2	119.7
FORCE @ 30° (N)	151.2 - 204.6	165.8
FORCE @ 40° (N)	204.6 - 258	216.4
RETURN ANGLE	12° max.	8.5

REMARKS: None

DUMMY S/N 015 TEST NO. 3

W/A

DATE

10/1/95

PERFORMED BY

(65)

TEMP.

70

HUMIDITY

40%

LUMBAR SPINE FLEXION TEST

FLEXION ANGLE ~ DEG.

FORCE ~ LBS.

80

70

60

50

40

30

20

10

0

80

60

40

20

0

DUMMY S/N 015

W/A

DATE 10/1/58

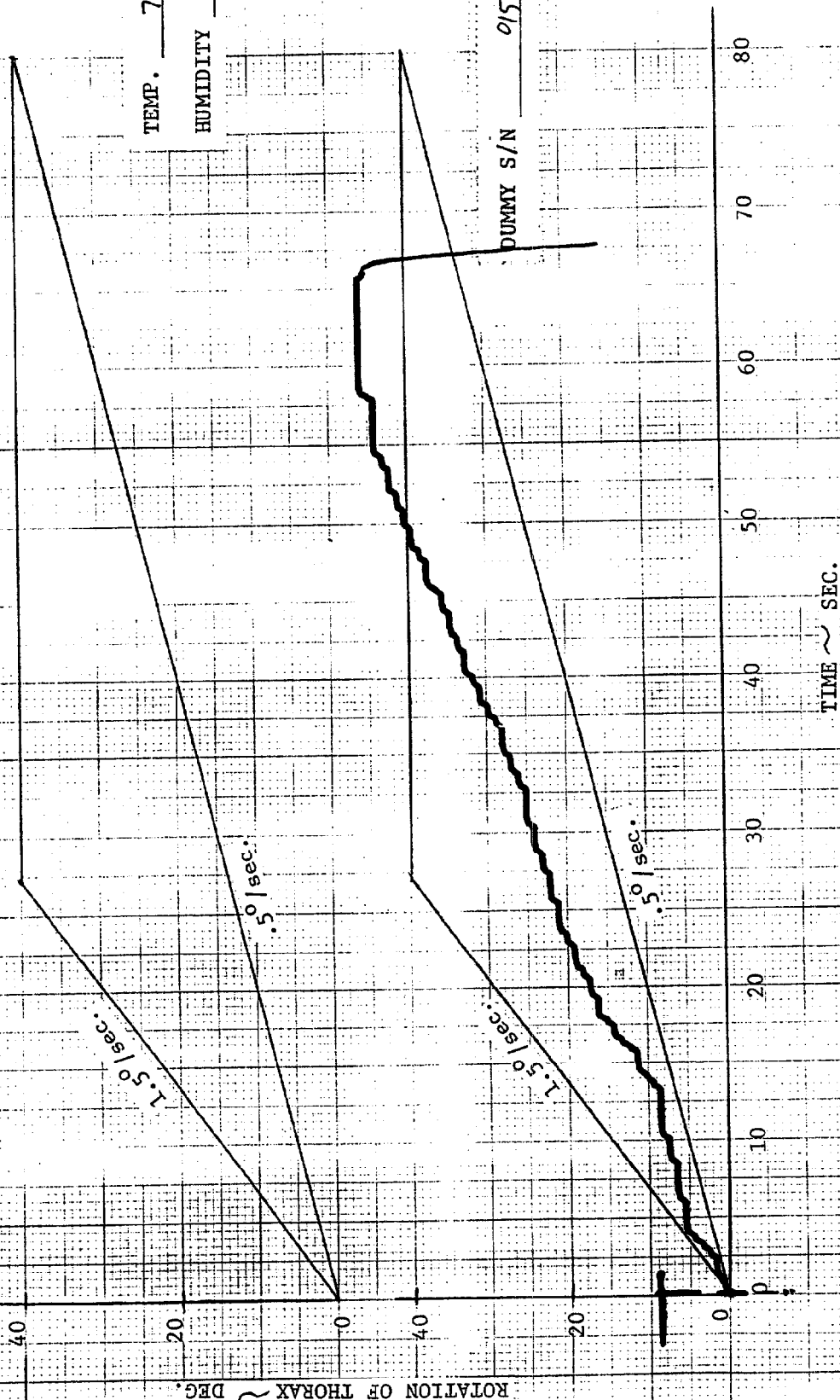
PERFORMED BY *GP*

TEMP. 70°

HUMIDITY 40%

DUMMY S/N 015

LUMBAR SPINE FLEXION TEST



PRE-TEST DUMMY INSPECTION LIST**CONFIGURED FOR LEFT SIDE IMPACT**

SID Serial No.: 015 Calspan Sequential Test Number: 3
Date: 10/1/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

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.: 016

CONFIGURED FOR LEFT SIDE IMPACT

CALIBRATION TEST RESULTS SUMMARY
PRE-TEST

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Calspan Sequential Test Number: 3
Date: 10/1/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

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 Calspan Sequential Test Number: 3
Date: 10/1/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	902
RH- Rib Height (mm)	502 - 520	513
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	525
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 Calspan Sequential Test Number: 1,2
Date: 9/14/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

DAMPER IDENTIFICATION: 016

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)		18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)		10 - 70	45
VELOCITY 3.05 m/s	FORCE (N)	836 - 1125	994
	DISPLACEMENT (mm)	30 - 35	31
VELOCITY 4.27 m/s	FORCE (N)	1730 - 2099	2049
	DISPLACEMENT (mm)	32 - 37	35
VELOCITY 6.10 m/s	FORCE (N)	3741 - 4448	3998
	DISPLACEMENT (mm)	33 - 40	37

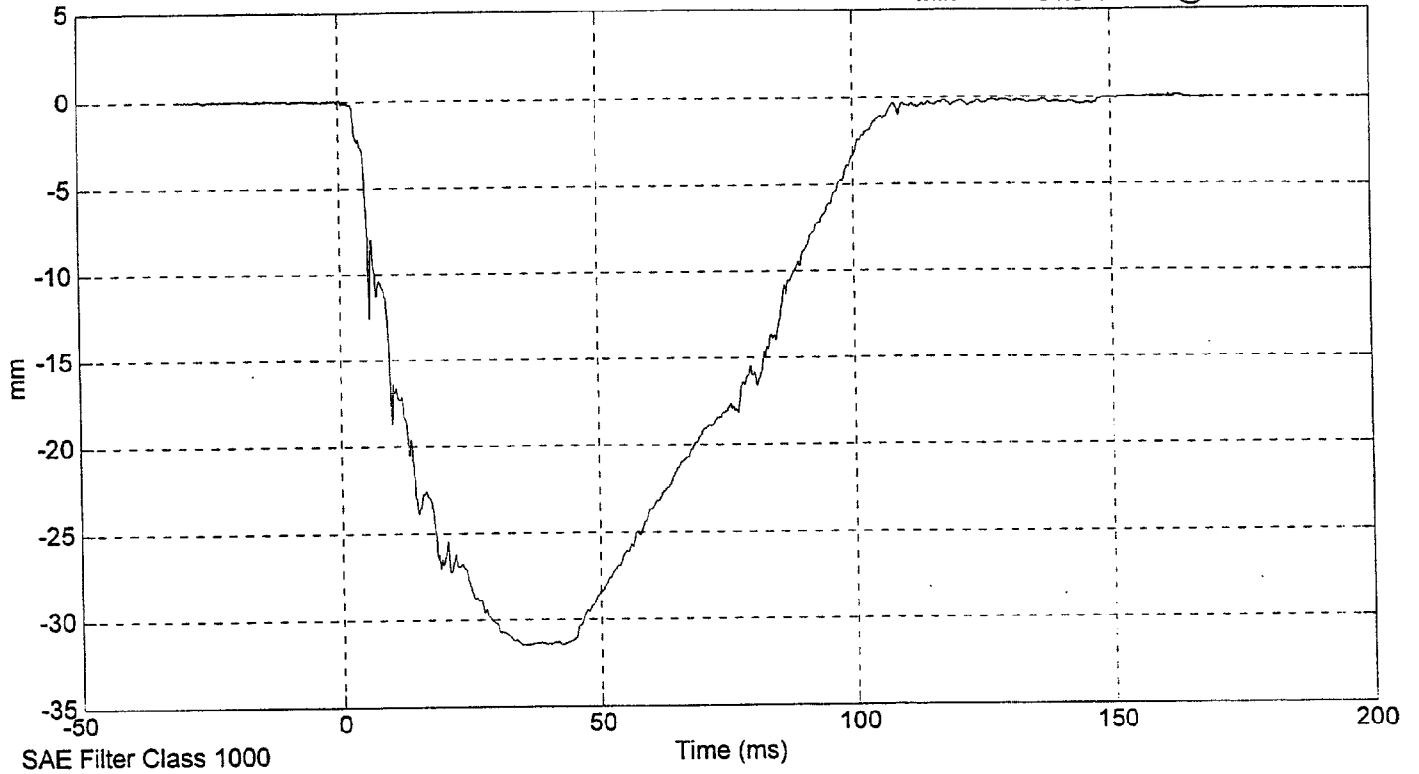
DAMPER SETTING: 5

REMARKS: None

SID Shock Absorber Impact Test 016 @ 3.051 m/s

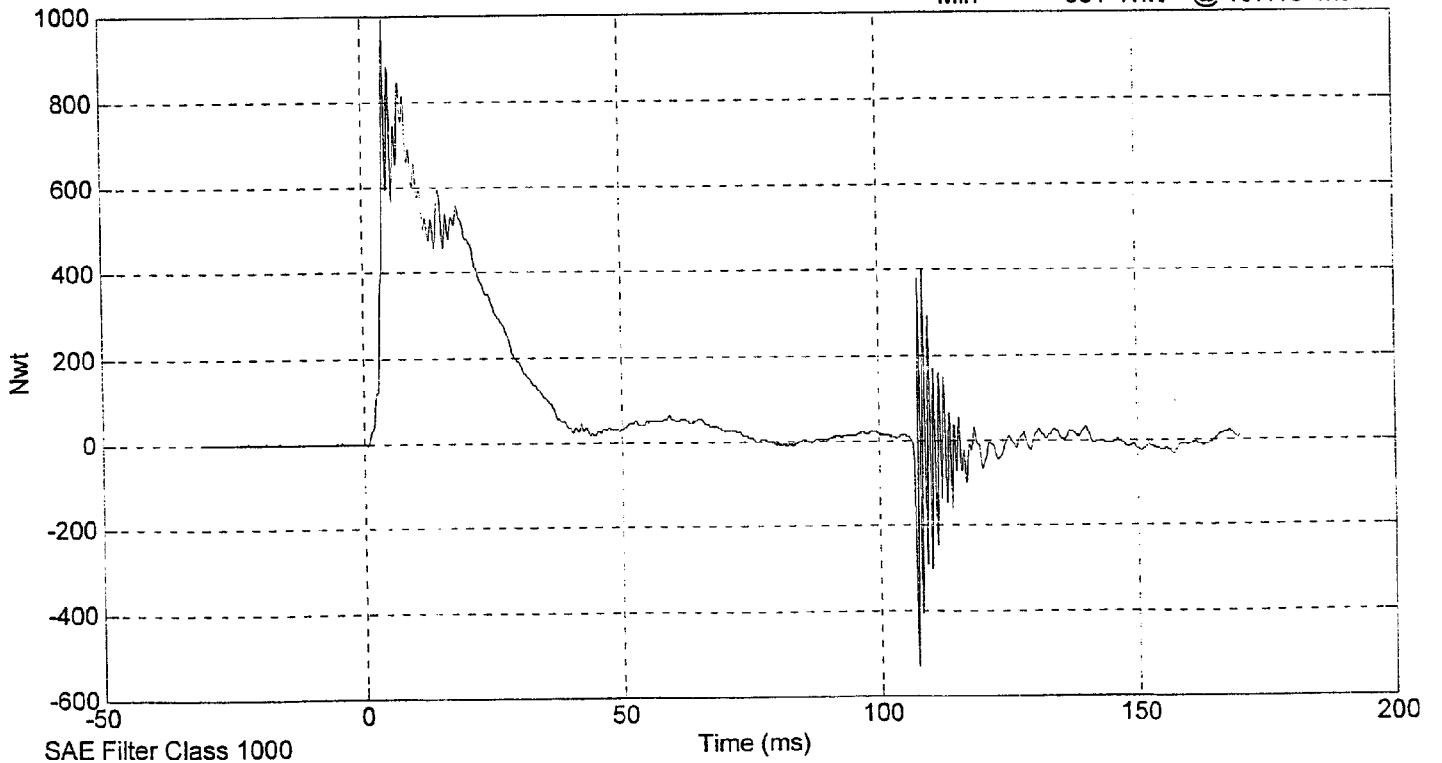
Displacement

Max = 0.174 mm @ 161.40 ms
Min = -31.5 mm @ 35.40 ms

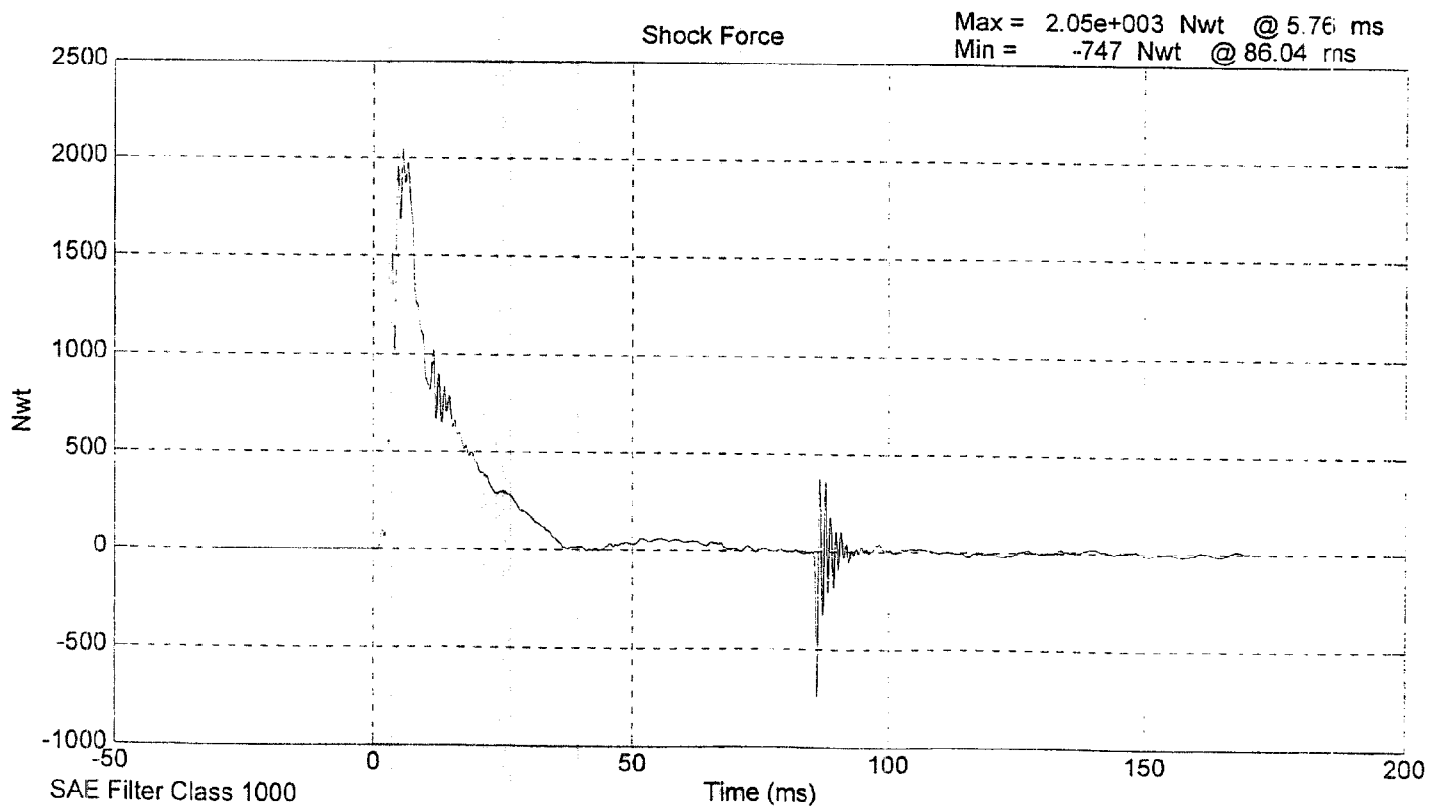
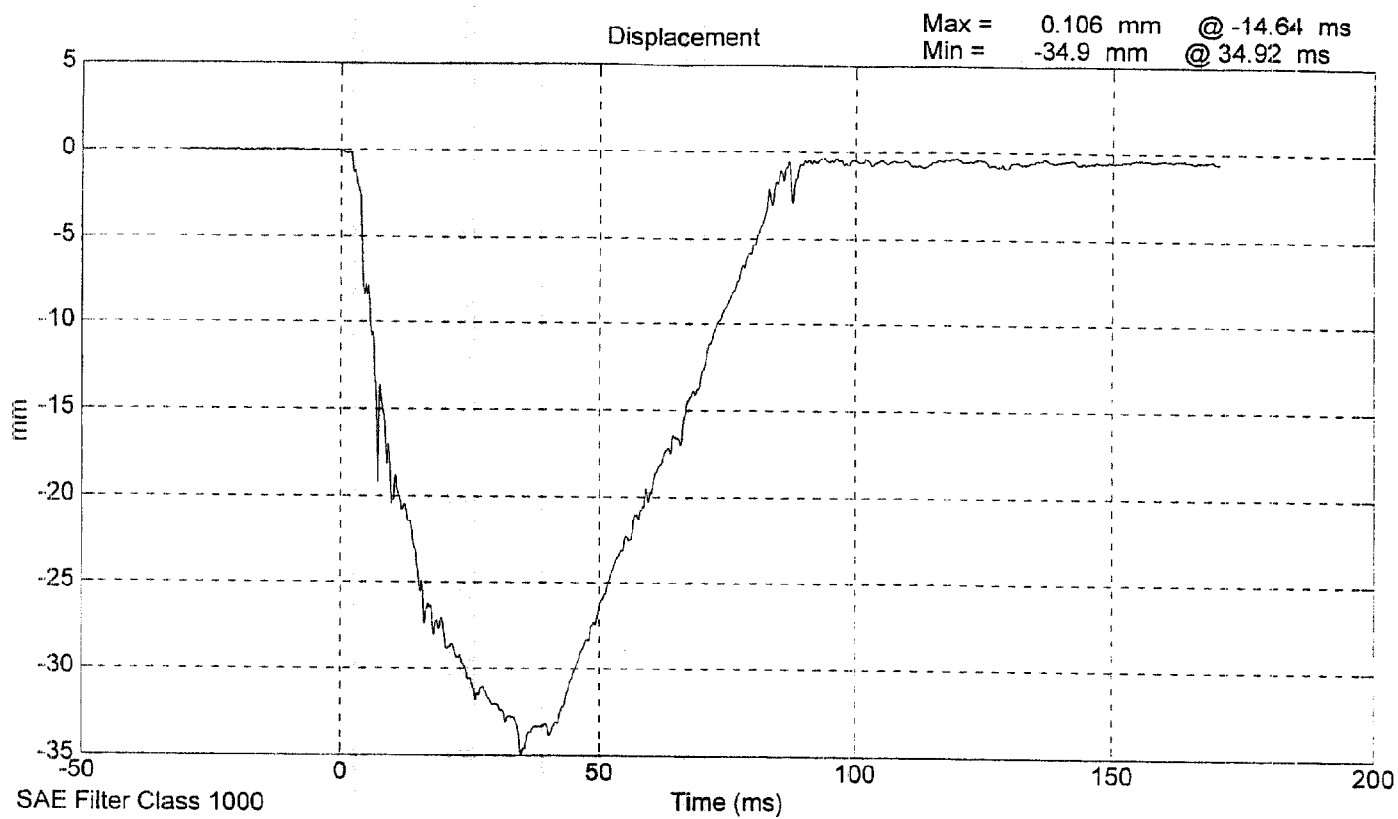


Shock Force

Max = 993 Nwt @ 4.20 ms
Min = -531 Nwt @ 107.16 ms



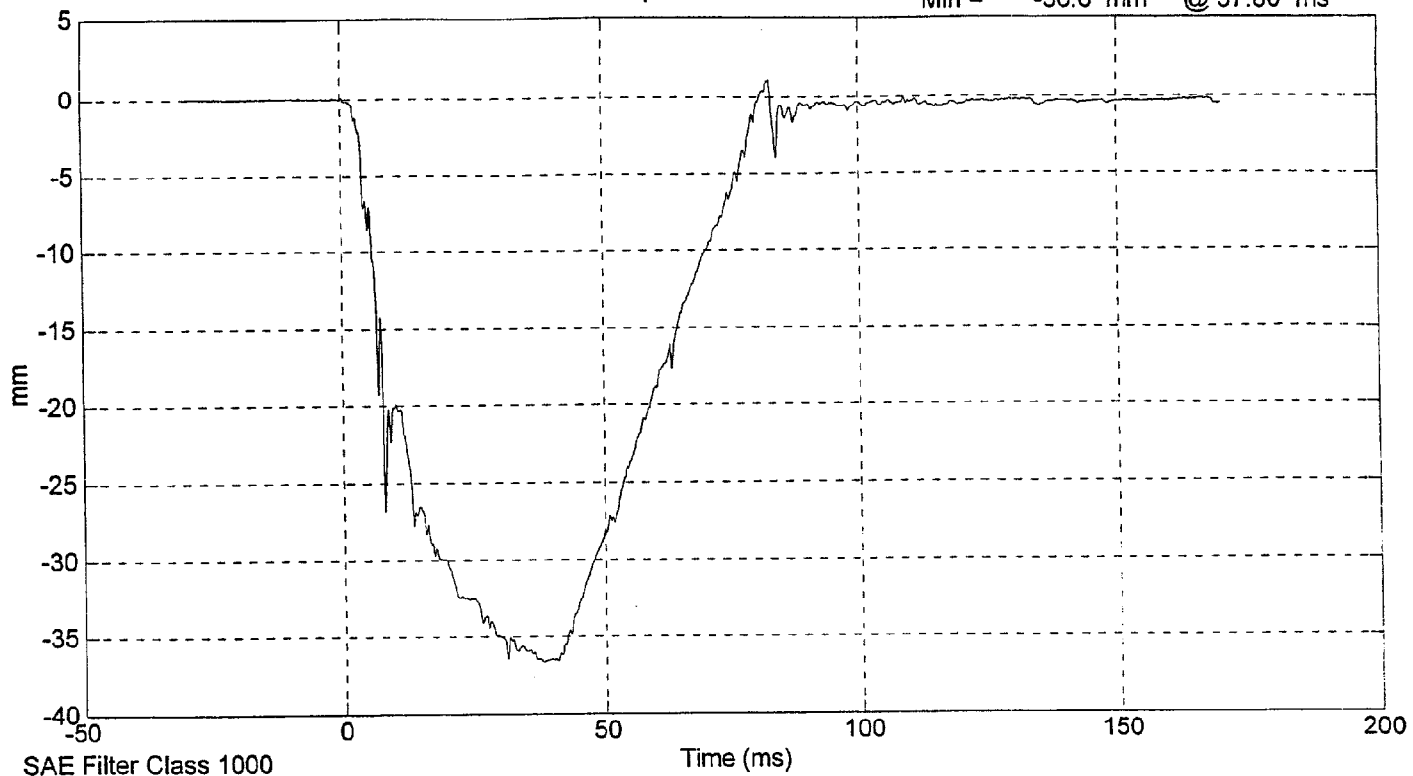
SID Shock Absorber Impact Test 016 @ 4.252 m/s



SID Shock Absorber Impact Test 016 @ 6.1356 m/s

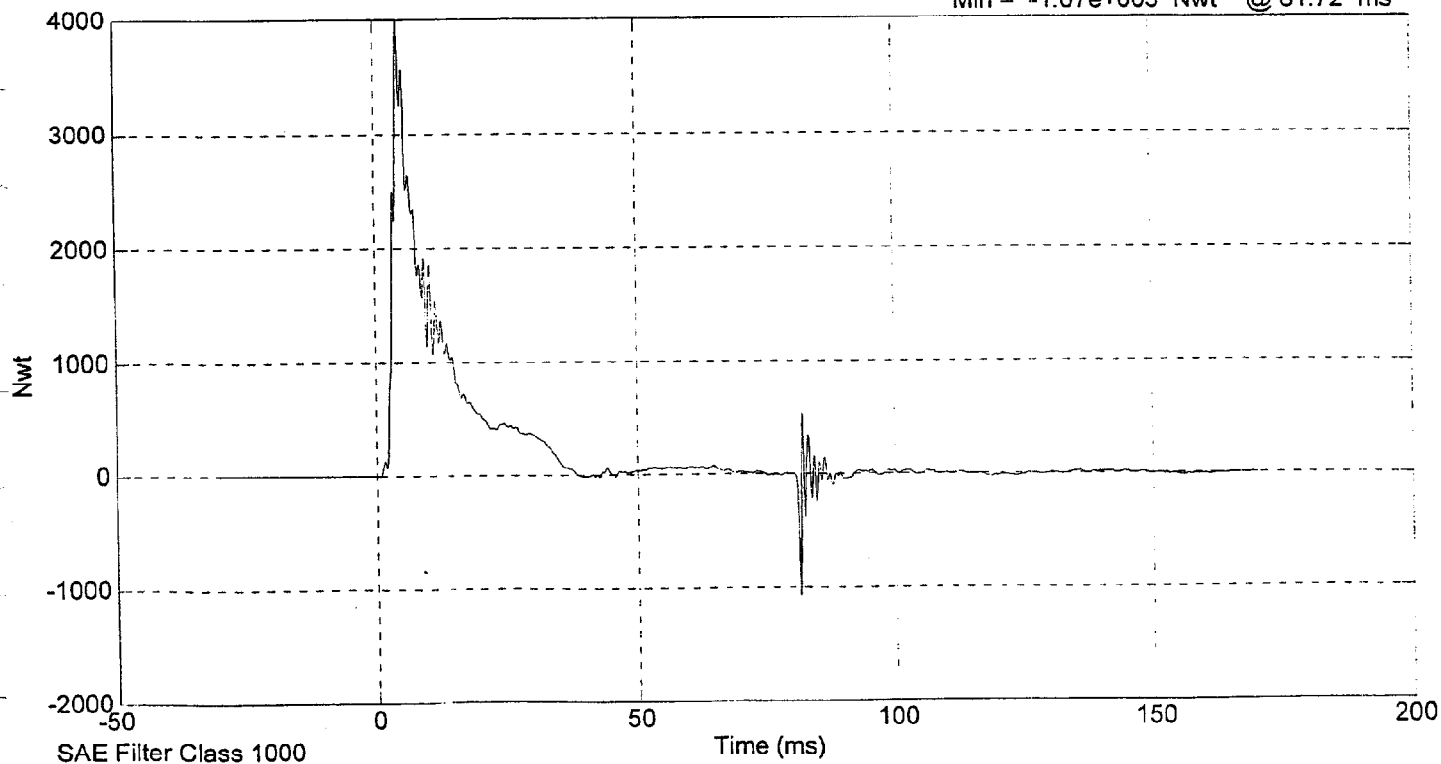
Max = 1.11 mm @ 83.04 ms
Min = -36.6 mm @ 37.80 ms

Displacement



Max = 4e+003 Nwt @ 4.44 ms
Min = -1.07e+003 Nwt @ 81.72 ms

Shock Force



**LATERAL THORAX IMPACT TEST
PRE-TEST**

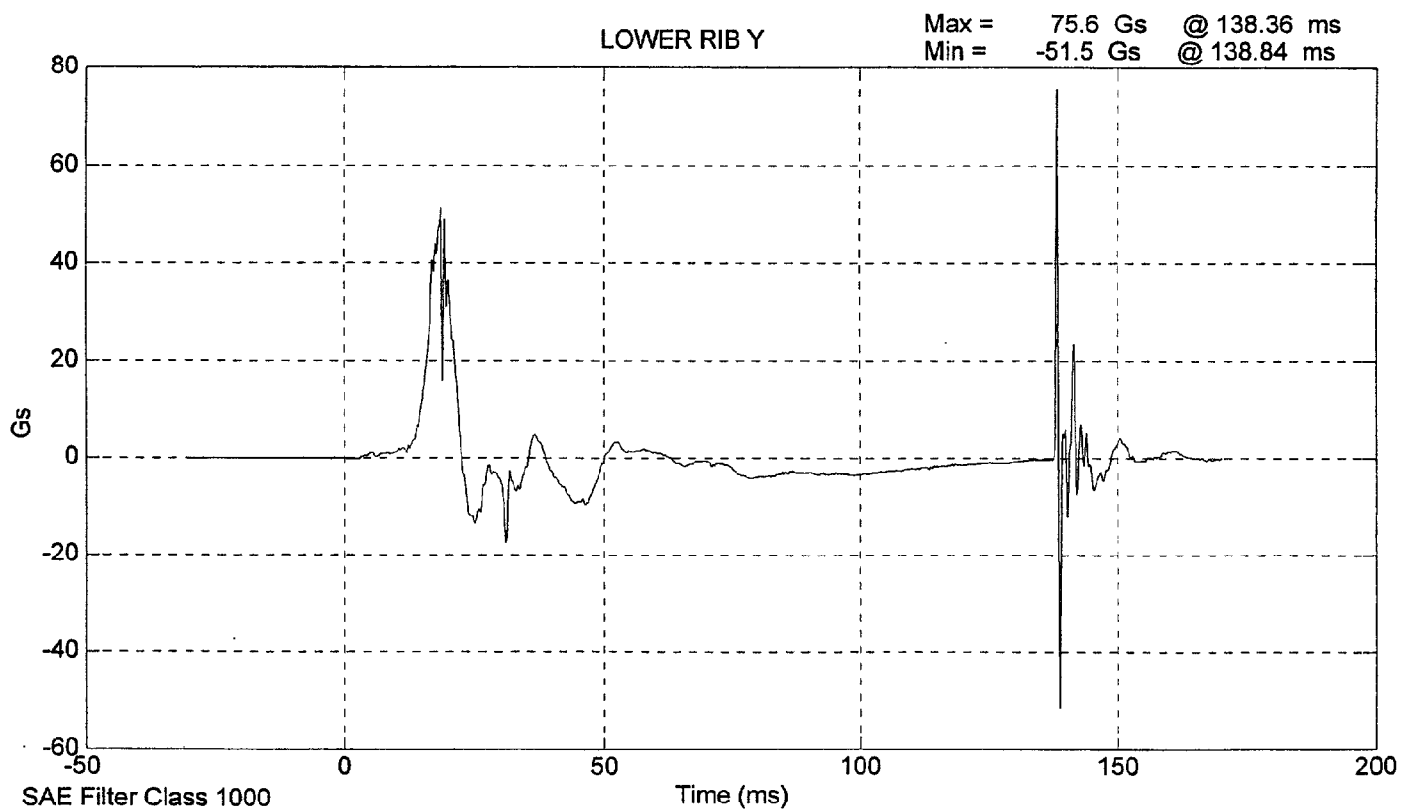
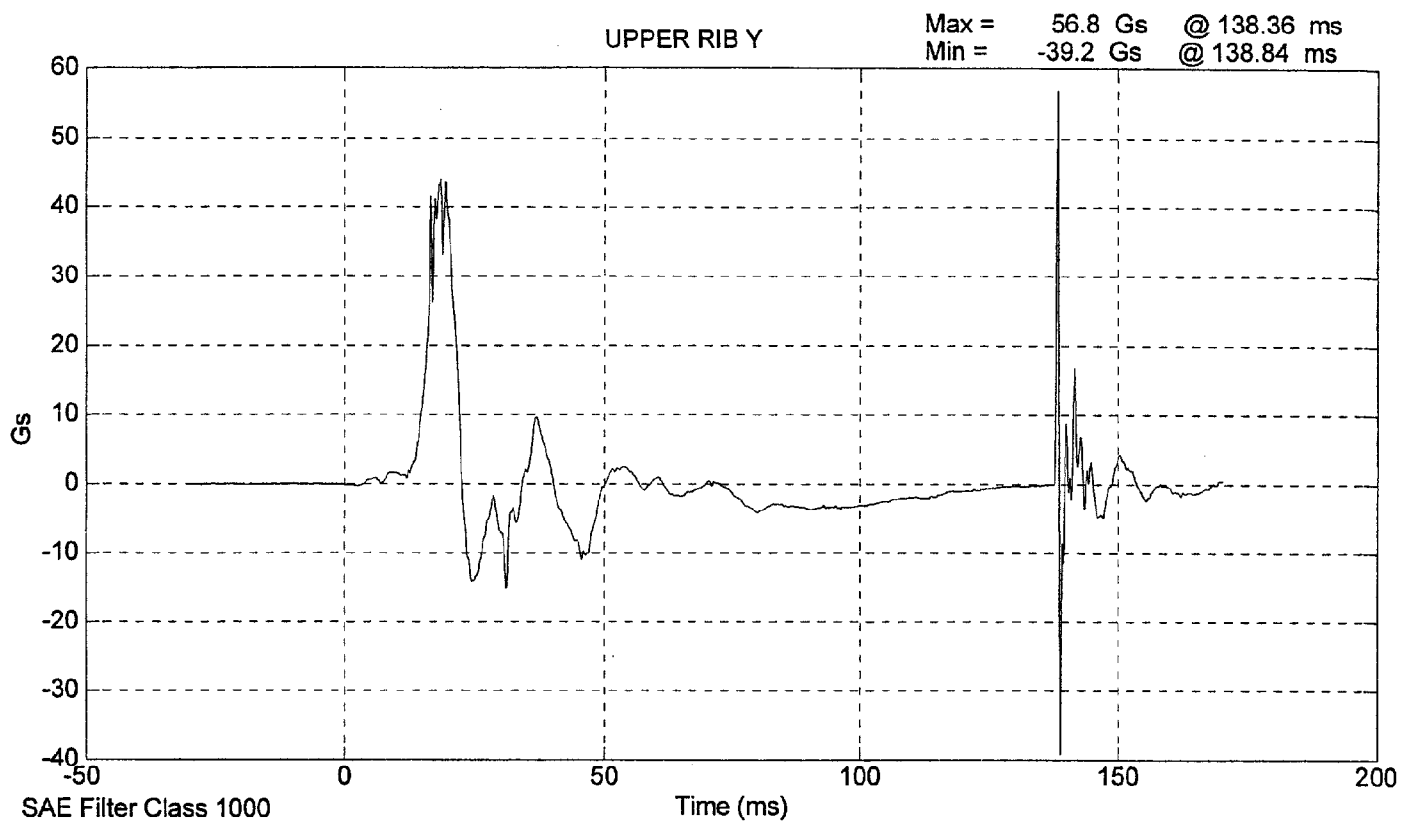
CONFIGURED FOR LEFT SIDE IMPACT

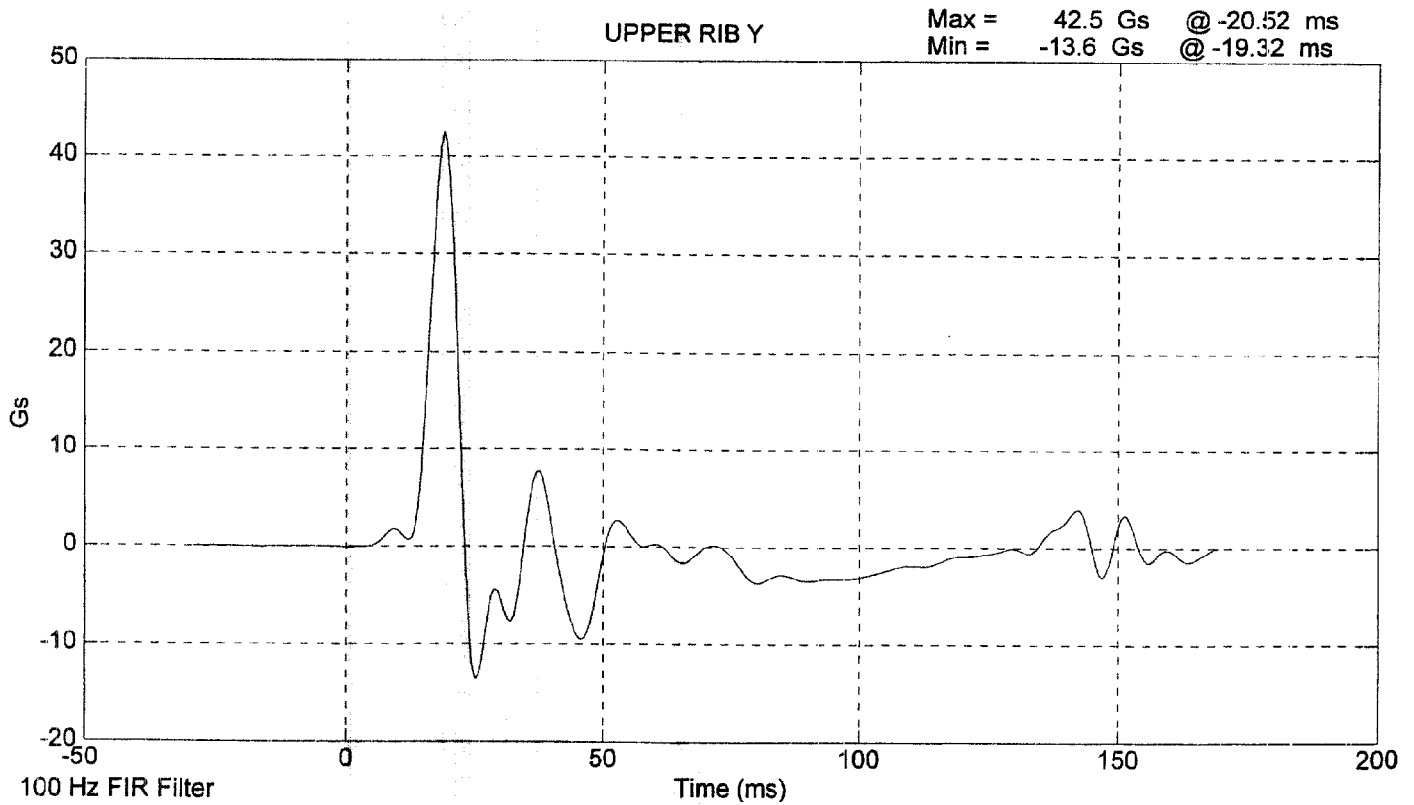
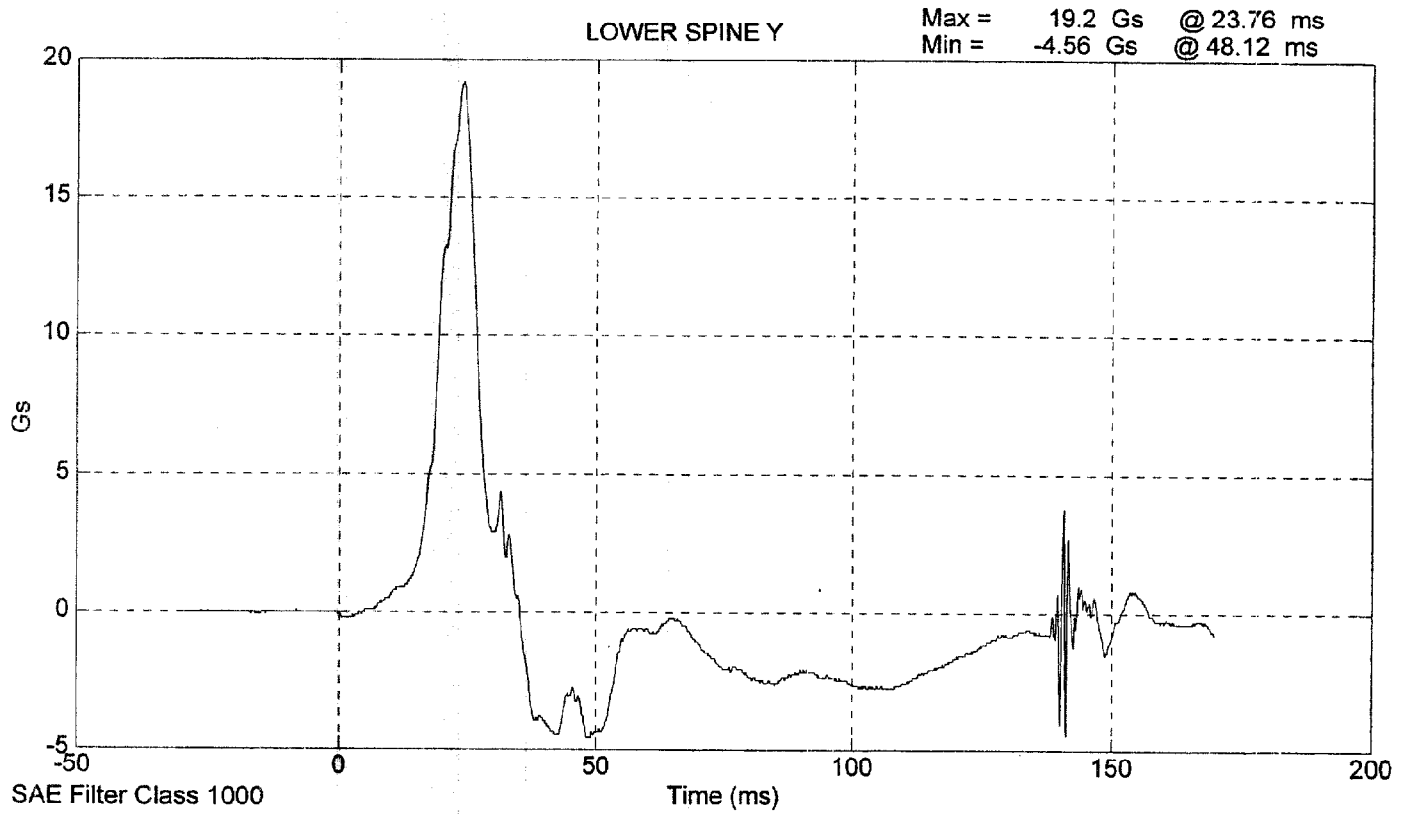
SID Serial No.: 016 Calspan Sequential Test Number: 3
Date: 10/1/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	40
PROBE SPEED (m/s)	4.27 - 4.33	4.27
UPPER RIB (g's)	37 - 46	42.5
LOWER RIB (g's)	37 - 46	41.7
LOWER SPINE (g's)	15 - 22	18.5

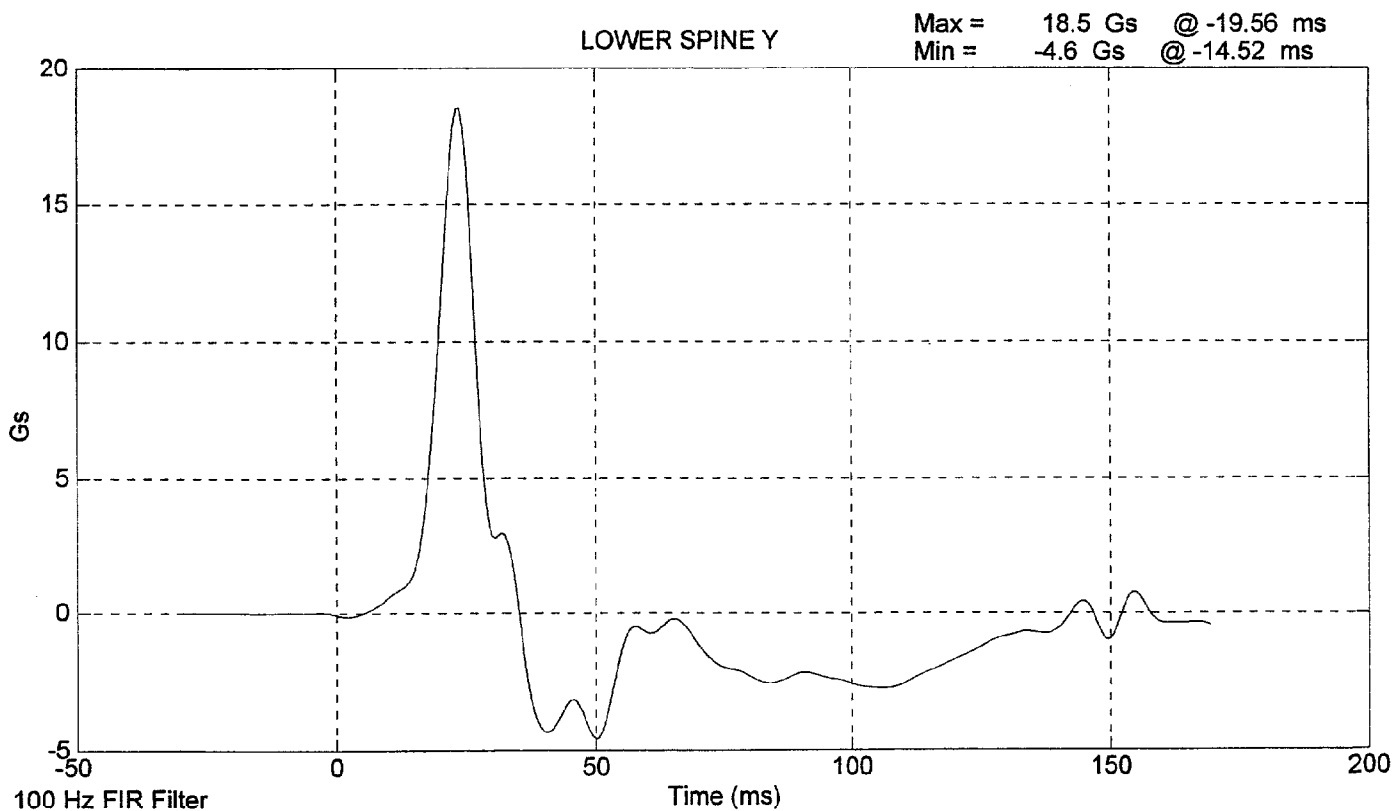
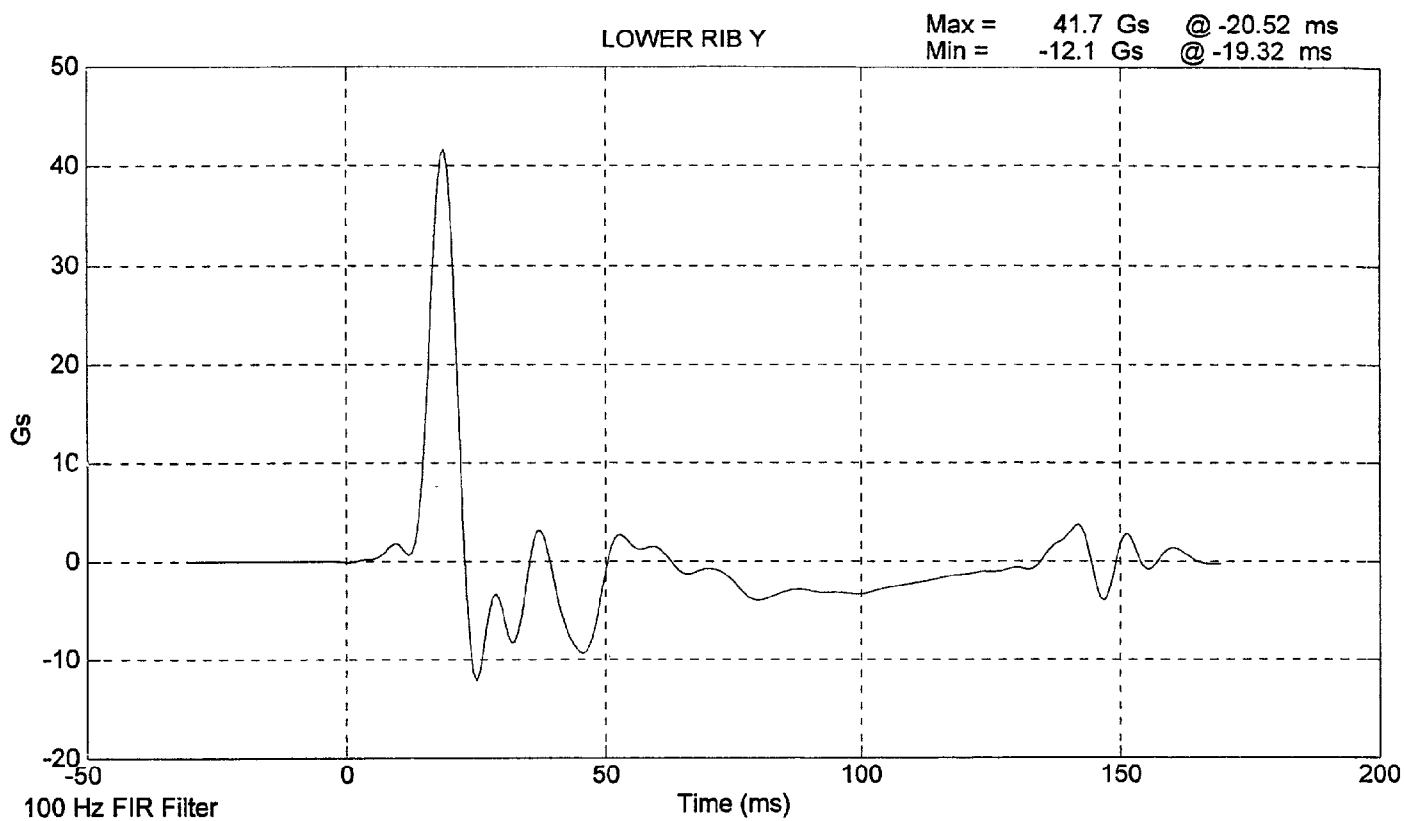
REMARKS: None

SID 016 Thorax Impact Test @ 4.27 m/s





SID 016 Thorax Impact Test @ 4.27 m/s



**LATERAL PELVIS IMPACT TEST
PRE-TEST**

CONFIGURED FOR LEFT SIDE IMPACT

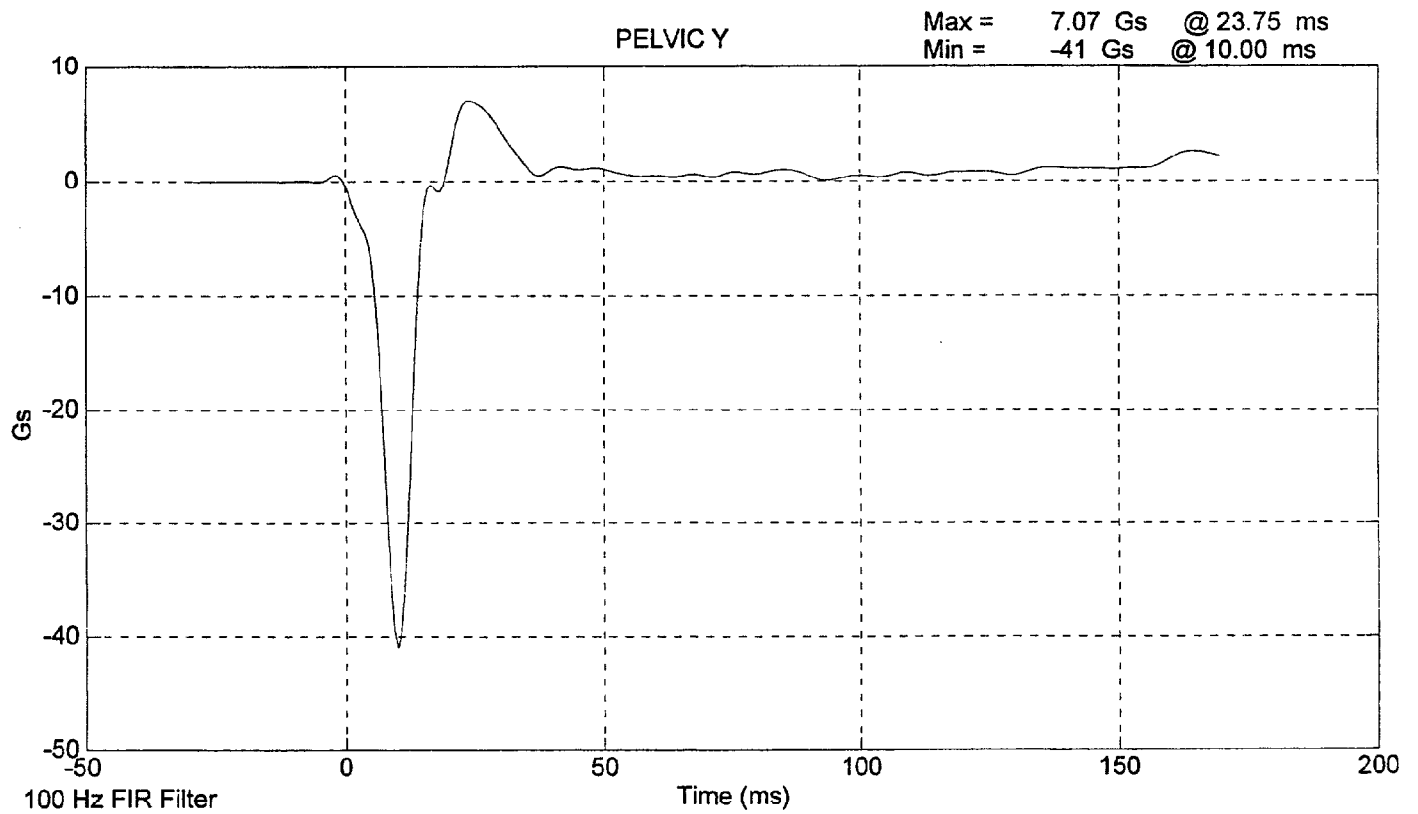
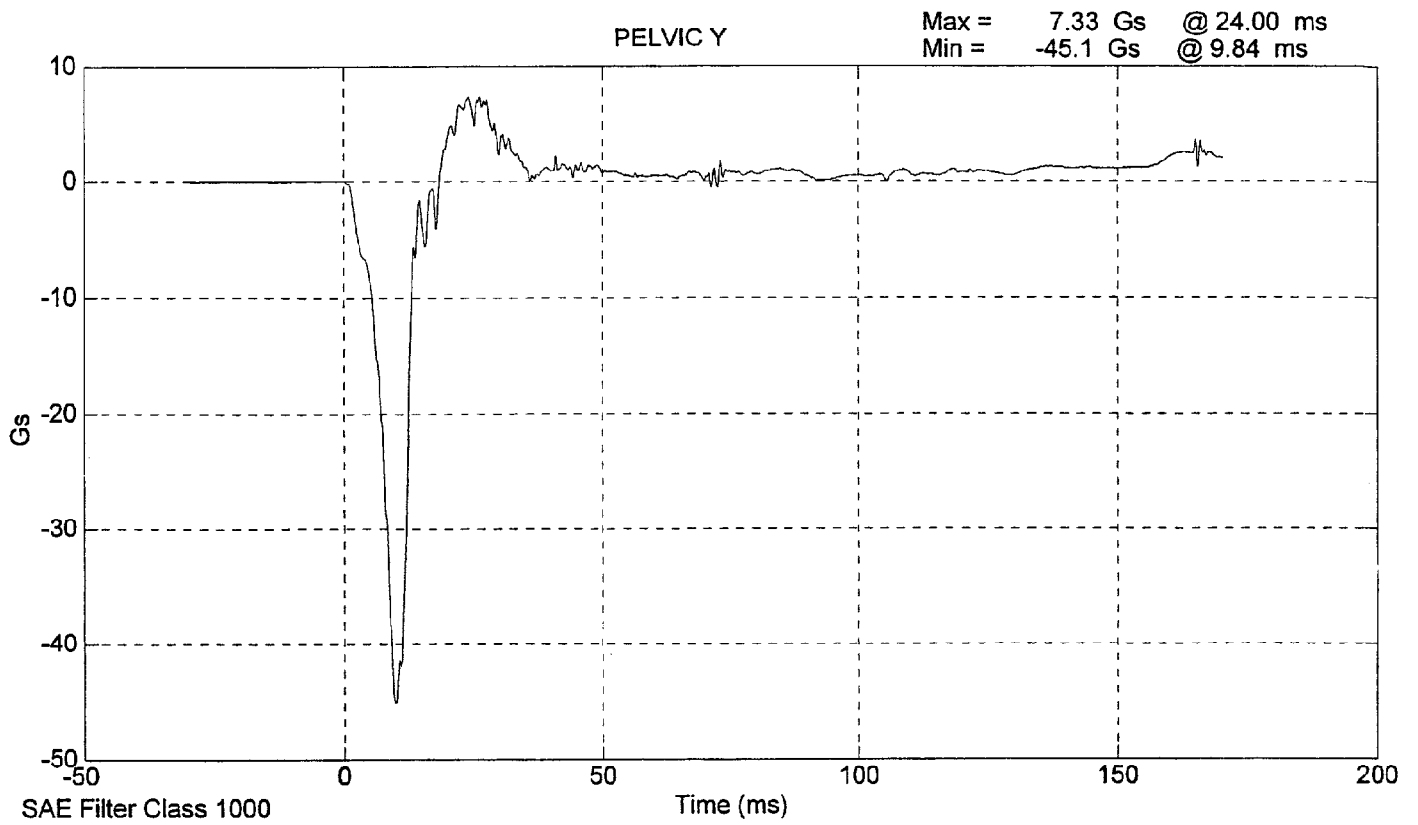
SID Serial No.: 016
Date: 9/29/98

Calspan Sequential Test Number: 3
Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	40
PROBE SPEED (m/s)	4.27 - 4.33	4.27
PELVIS ACCELERATION (g's)	40 - 60	41.0

REMARKS: None

SID 016 Pelvic Impact Test @ 4.27 m/s



DUMMY S/N 016

TEST NO.

CONTRACT AUTHORIZATION

DATE 9/30/91

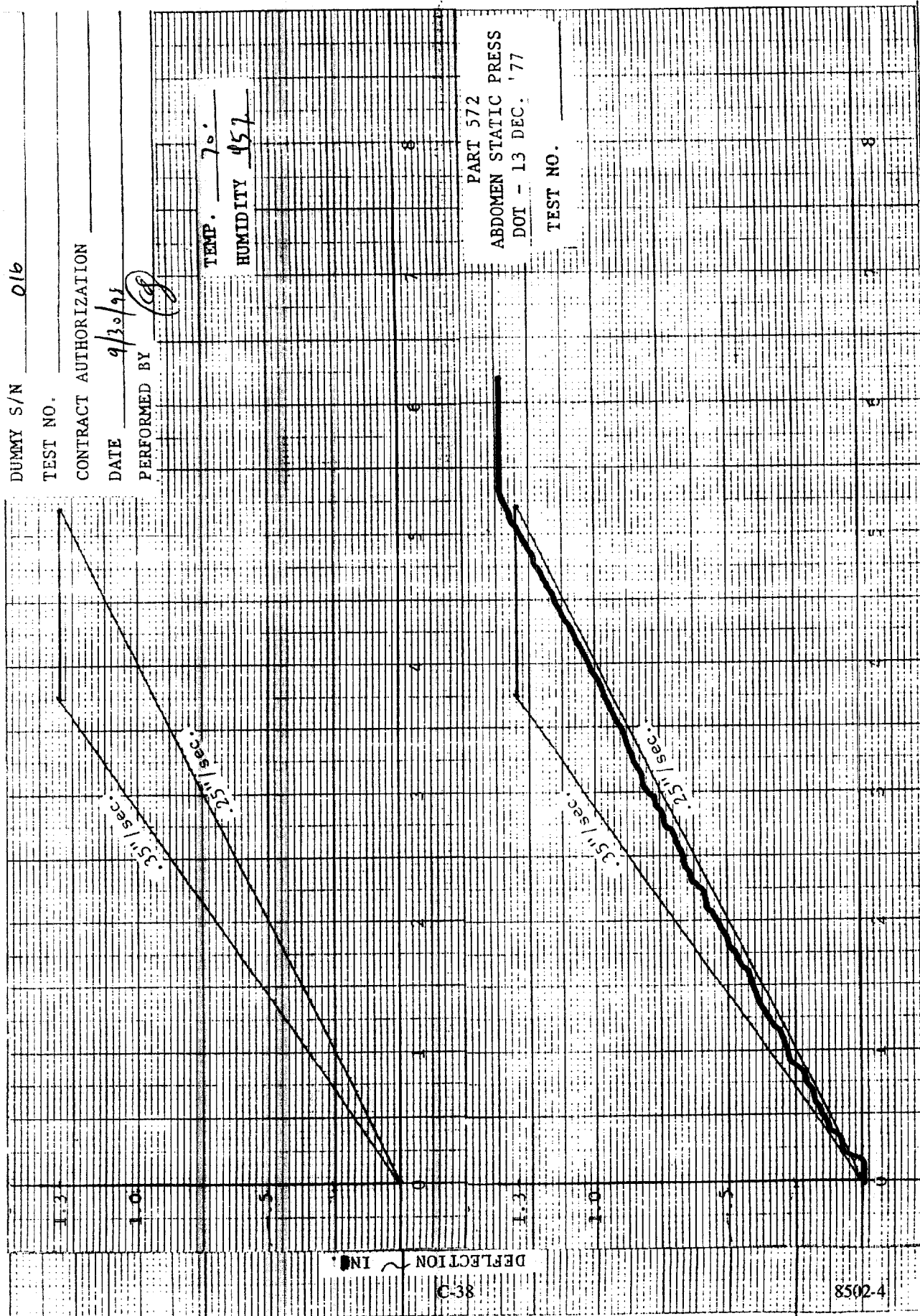
PERFORMED BY

TEMP. 70°

HUMIDITY 95%

PART 572
ABDOMEN STATIC PRESS
DOT - 13 DEC. '77

TEST NO.



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

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Calspan Sequential Test Number: 3
Date: 10/1/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	40
FORCE @ 0° (N)	0 - 26.7	0
FORCE @ 20° (N)	97.8 - 151.2	130.7
FORCE @ 30° (N)	151.2 - 204.6	174.7
FORCE @ 40° (N)	204.6 - 258	230.9
RETURN ANGLE	12° max.	1.1

REMARKS: None

DUMMY S/N 616 TEST NO. }

W/A

DATE

PERFORMED BY

12/1/91
(9)

TEMP.

70°

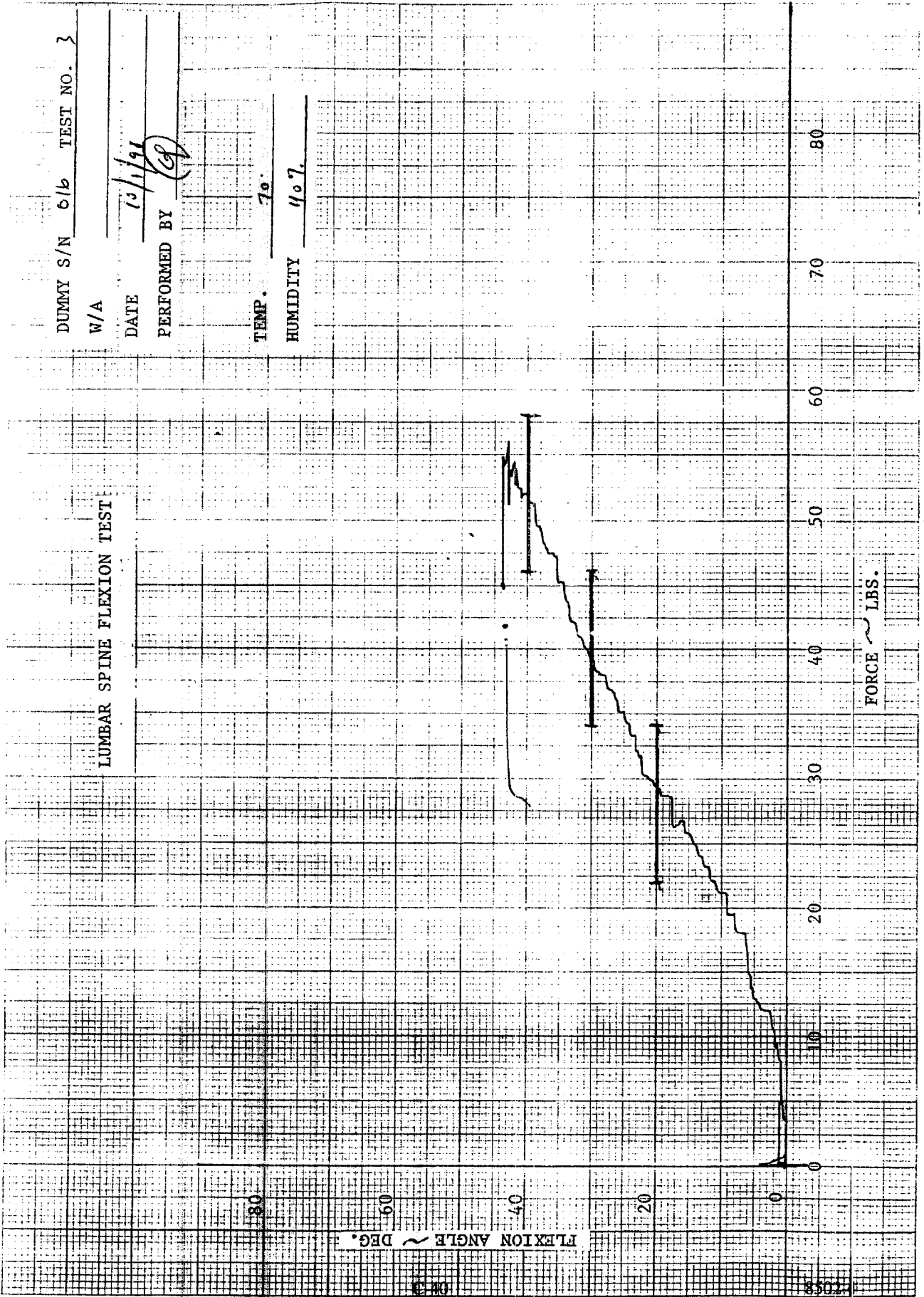
HUMIDITY

40%

LUMBAR SPINE FLEXION TEST

FLEXION ANGLE DEG.

FORCE LBS.



LUMBAR SPINE FLEXION TEST

DUMMY S/N 0/L

W/A

DATE 10/1/76

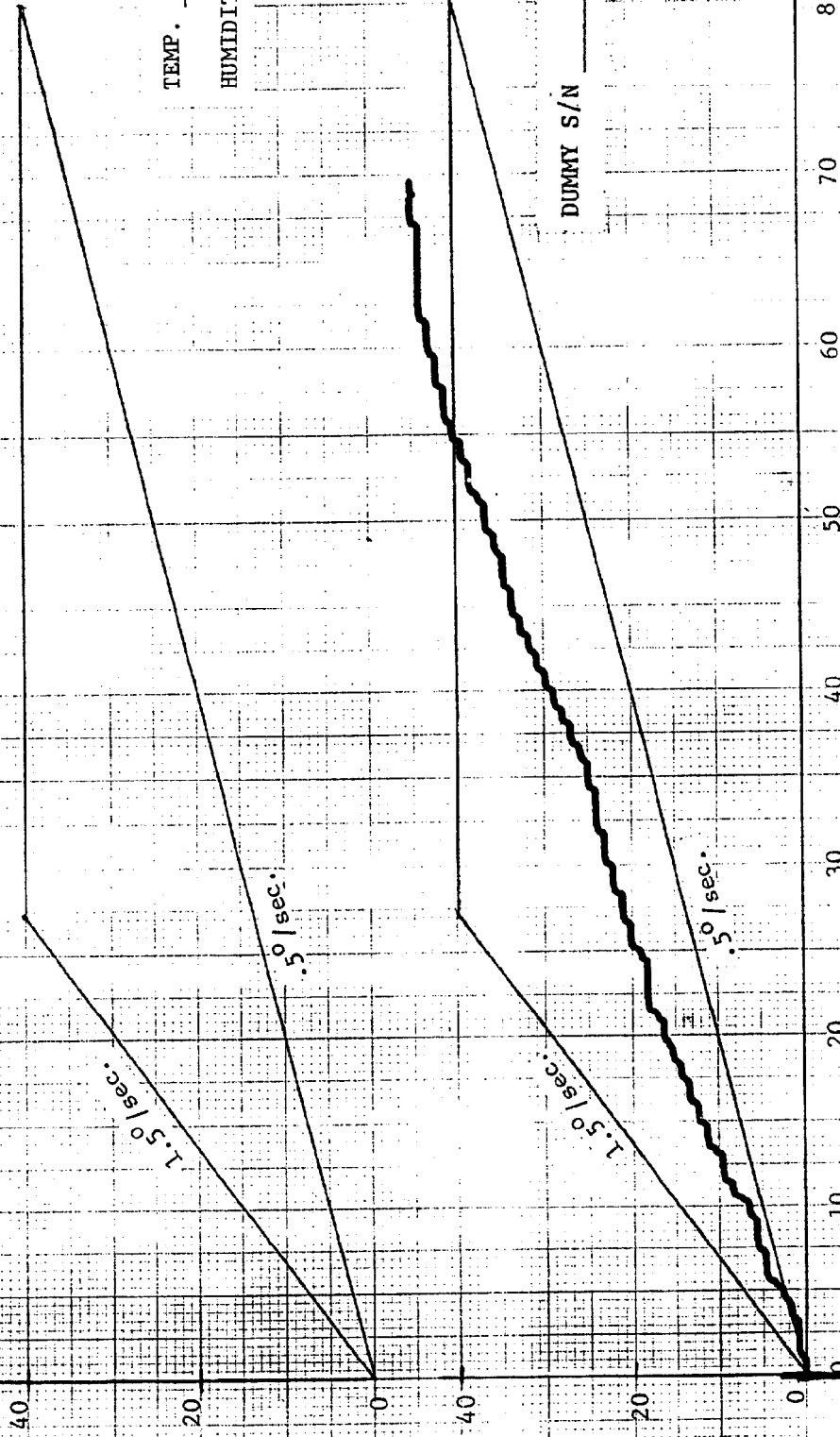
PERFORMED BY CG

TEMP. 70°

HUMIDITY 40%

DUMMY S/N 0/L

ROTATION OF THORAX ~ DEG.



TIME ~ SEC.

PRE-TEST DUMMY INSPECTION LIST**CONFIGURED FOR LEFT SIDE IMPACT**

SID Serial No.: 016 Calspan Sequential Test Number: 3
Date: 10/1/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

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.: 015

CONFIGURED FOR LEFT SIDE IMPACT

**CALIBRATION TEST RESULTS SUMMARY
POST TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 015 Calspan Sequential Test Number: 4
Date: 12/4/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

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.: 015 Calspan Sequential Test Number: 4
Date: 12/4/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	904
RH- Rib Height (mm)	502 - 520	511
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	521
KV- Knee Pivot to Floor (mm)	490 - 505	493
HW- Hip Width (mm)	356 - 391	172

REMARKS: None

**LATERAL THORAX IMPACT TEST
POST TEST**

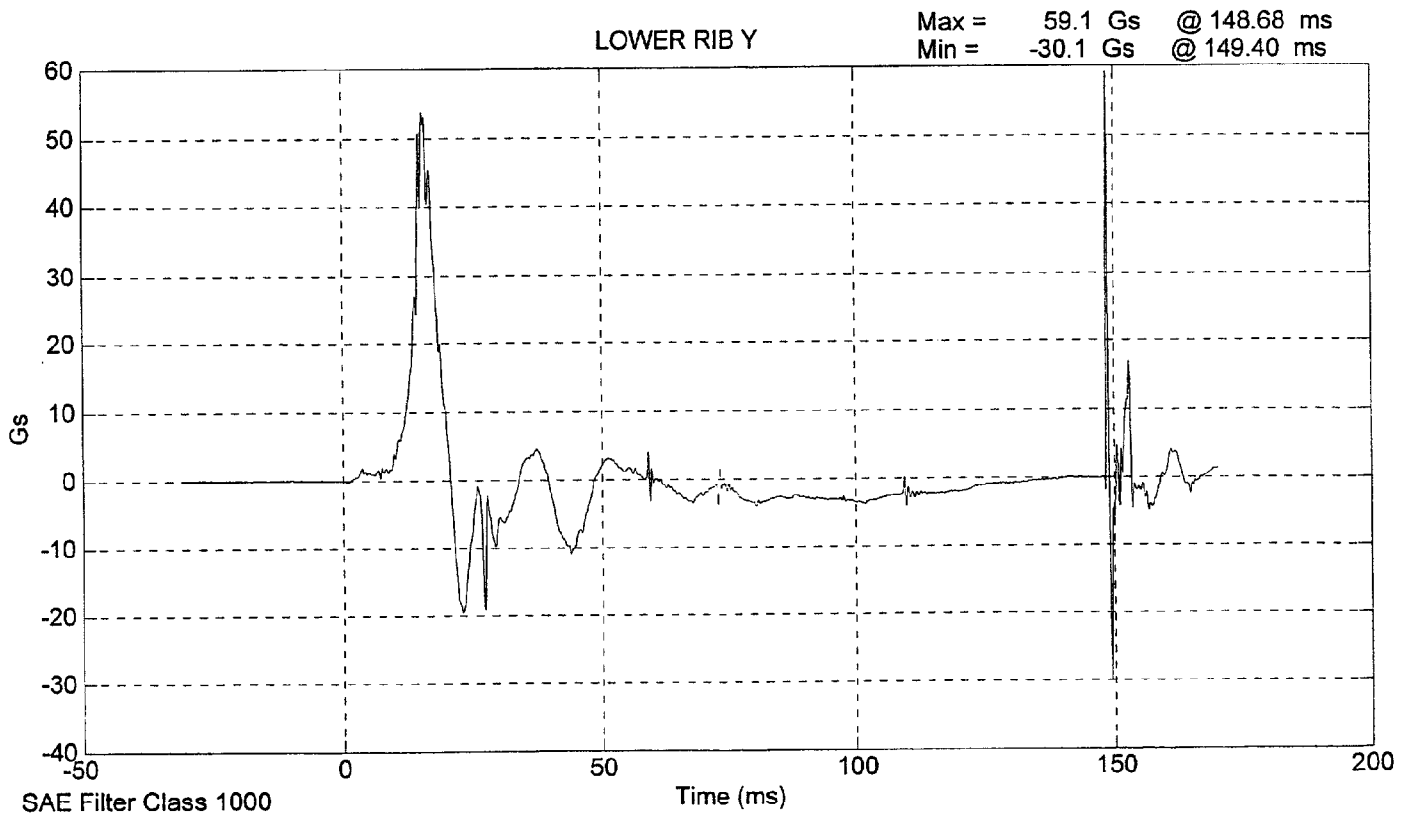
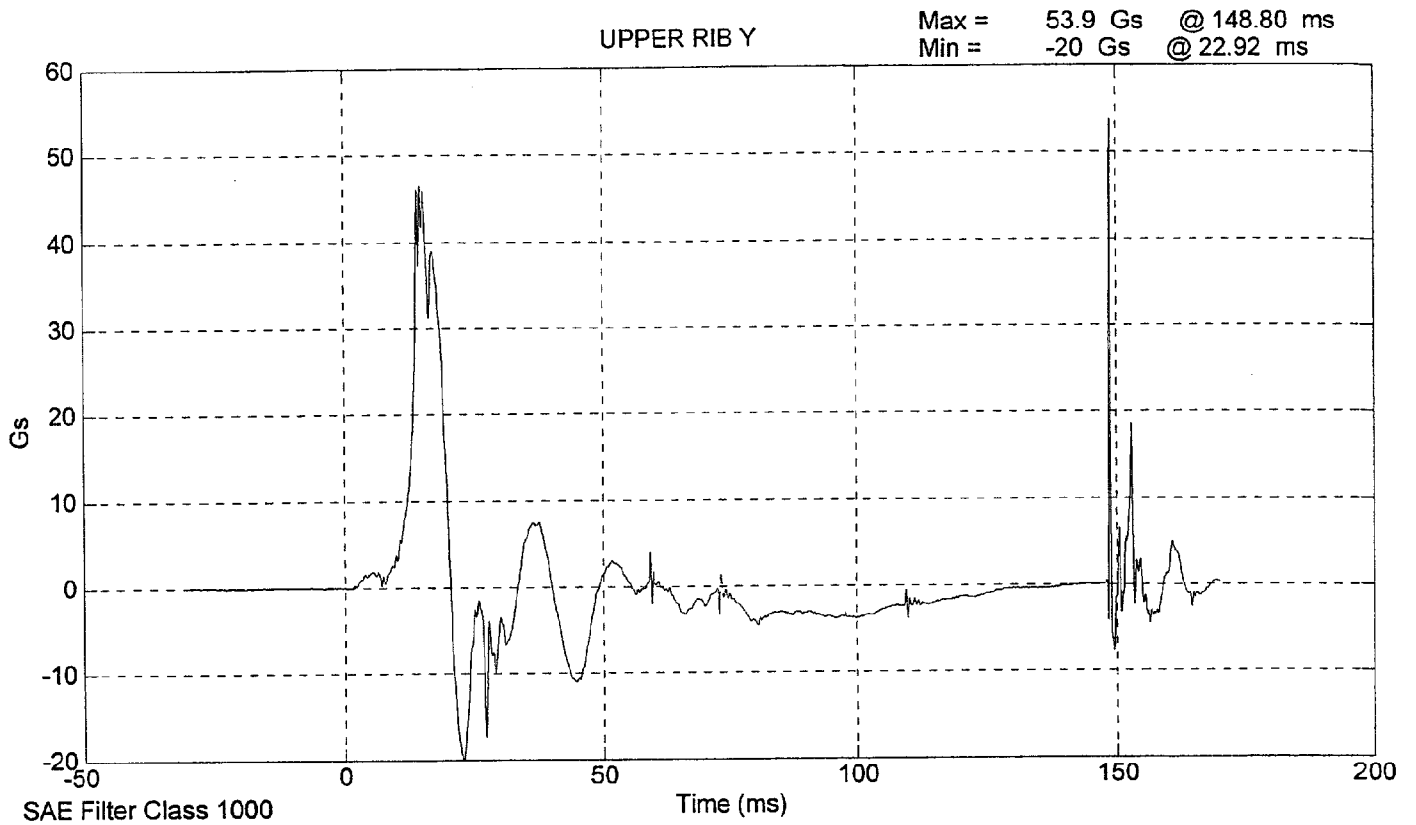
CONFIGURED FOR LEFT SIDE IMPACT

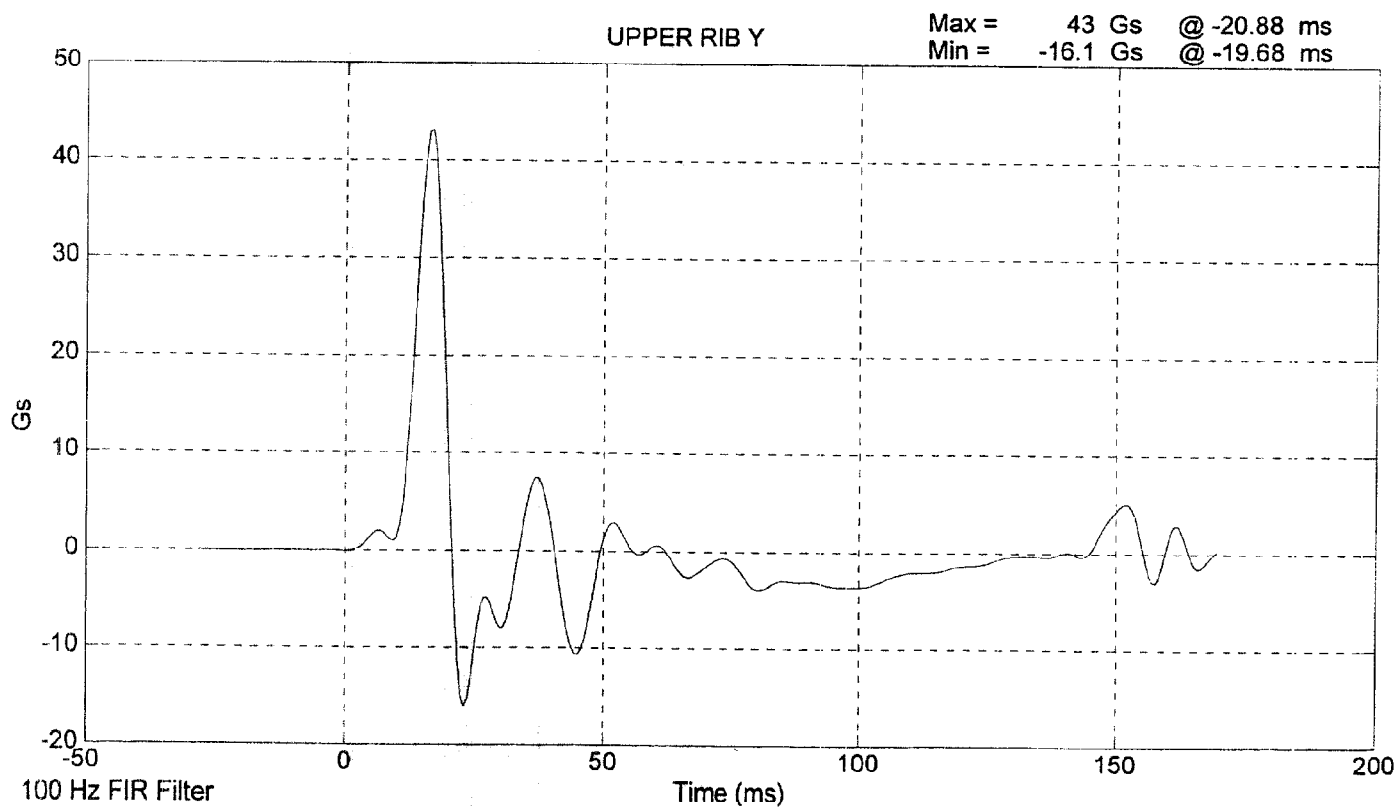
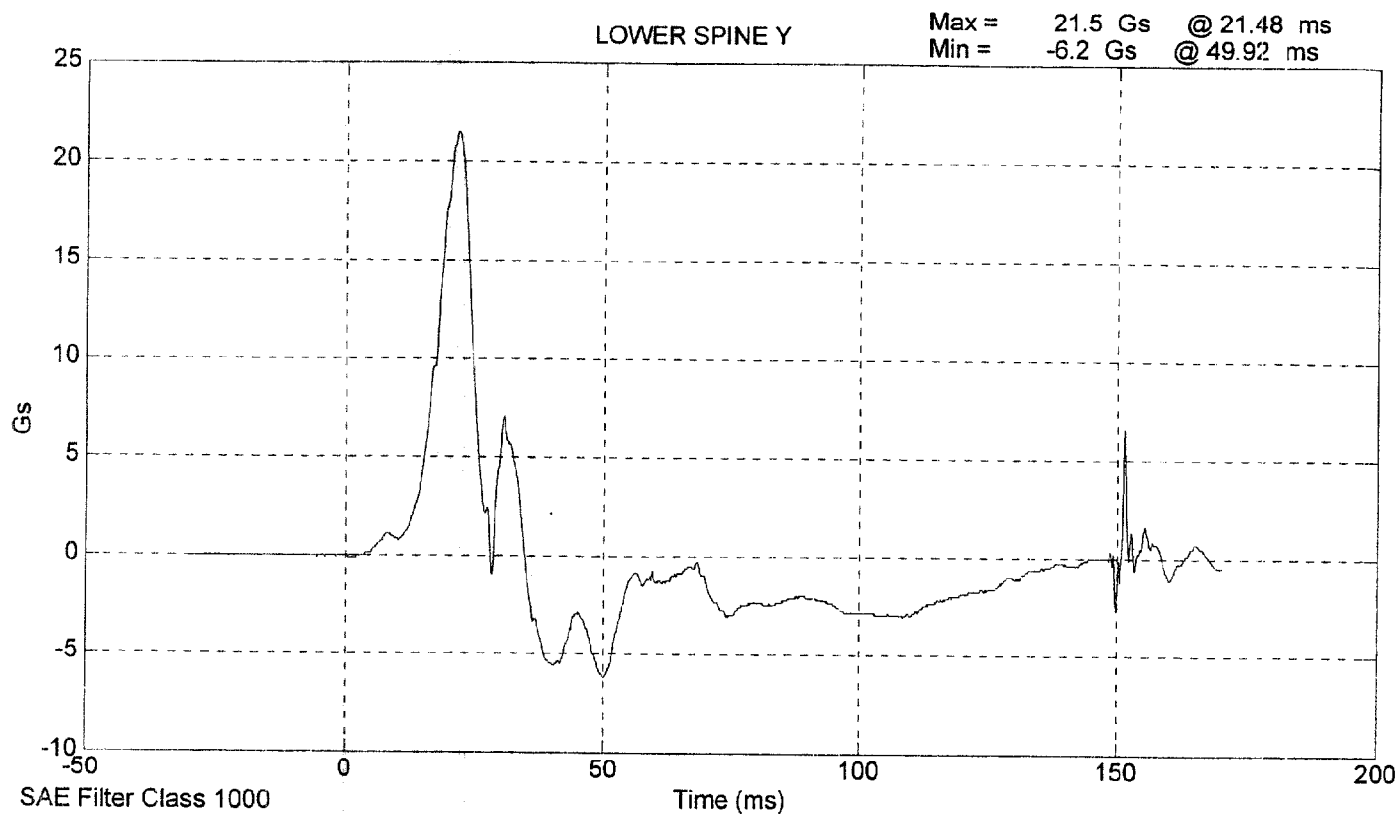
SID Serial No.: 015 Calspan Sequential Test Number: 4
Date: 12/4/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	42
PROBE SPEED (m/s)	4.27 - 4.33	4.29
UPPER RIB (g's)	37 - 46	43.0
LOWER RIB (g's)	37 - 46	44.2
LOWER SPINE (g's)	15 - 22	21.0

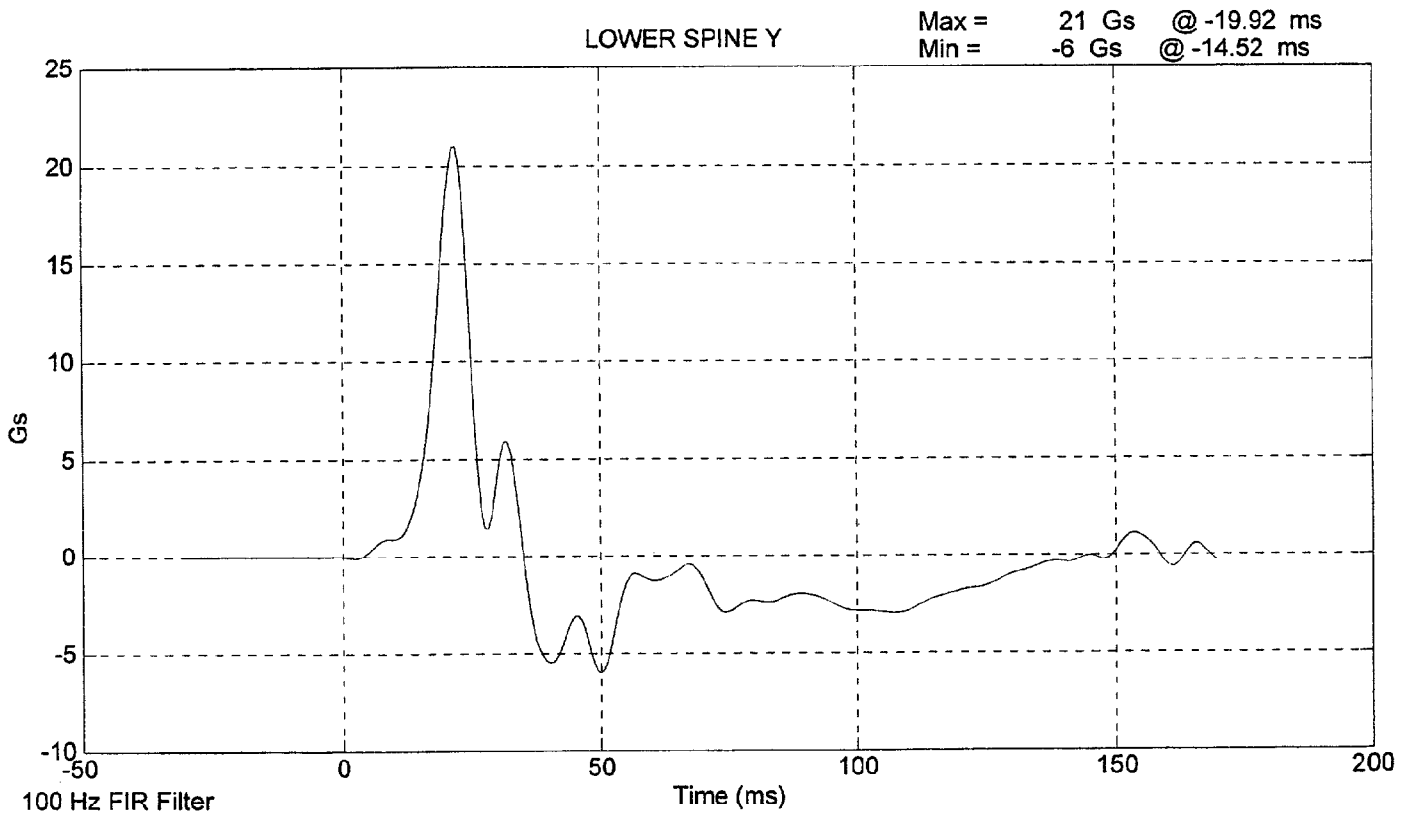
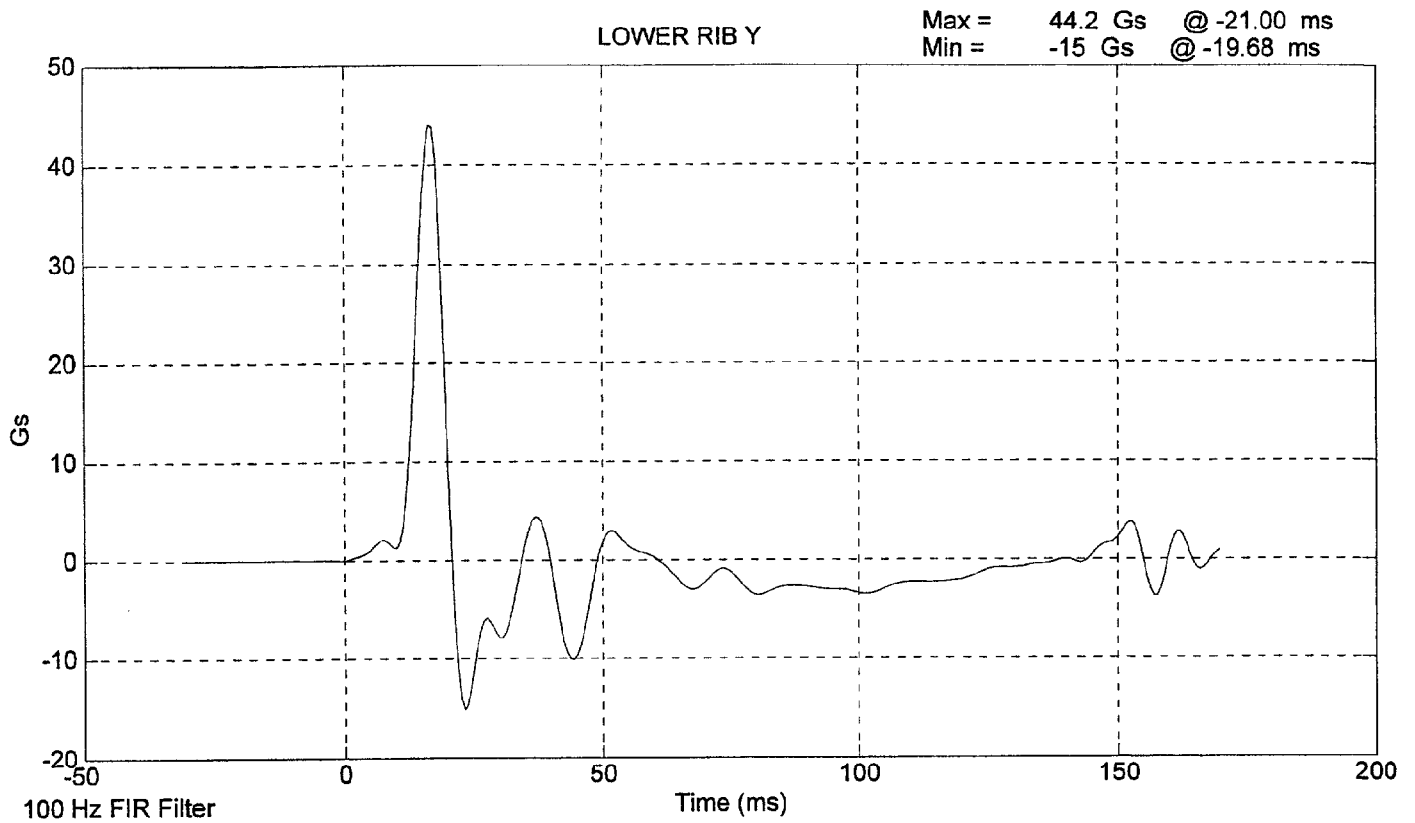
REMARKS: None

SID 015 Thorax Impact Test @ 4.2916 m/s





SID 015 Thorax Impact Test @ 4.2916 m/s



**LATERAL PELVIS IMPACT TEST
POST TEST**

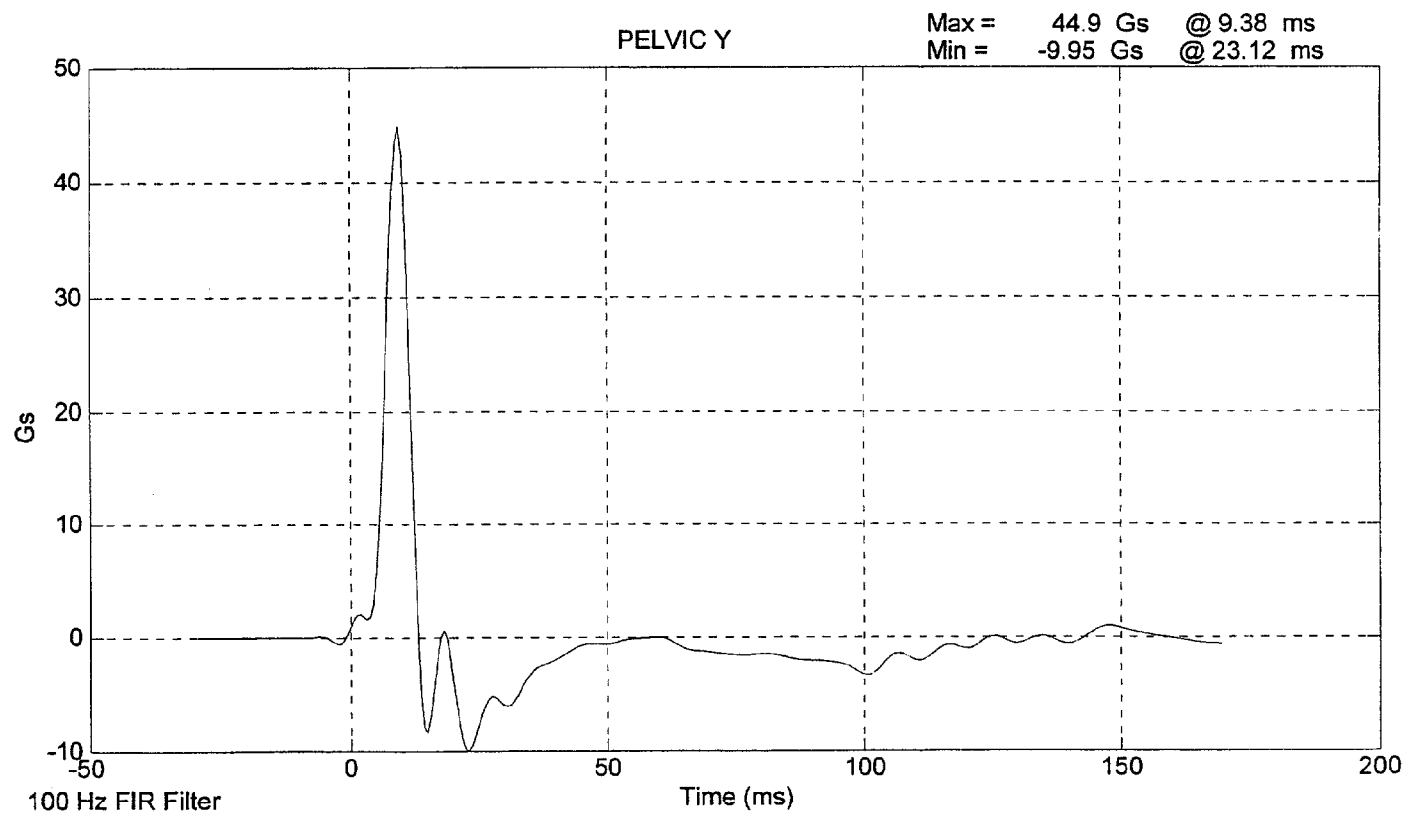
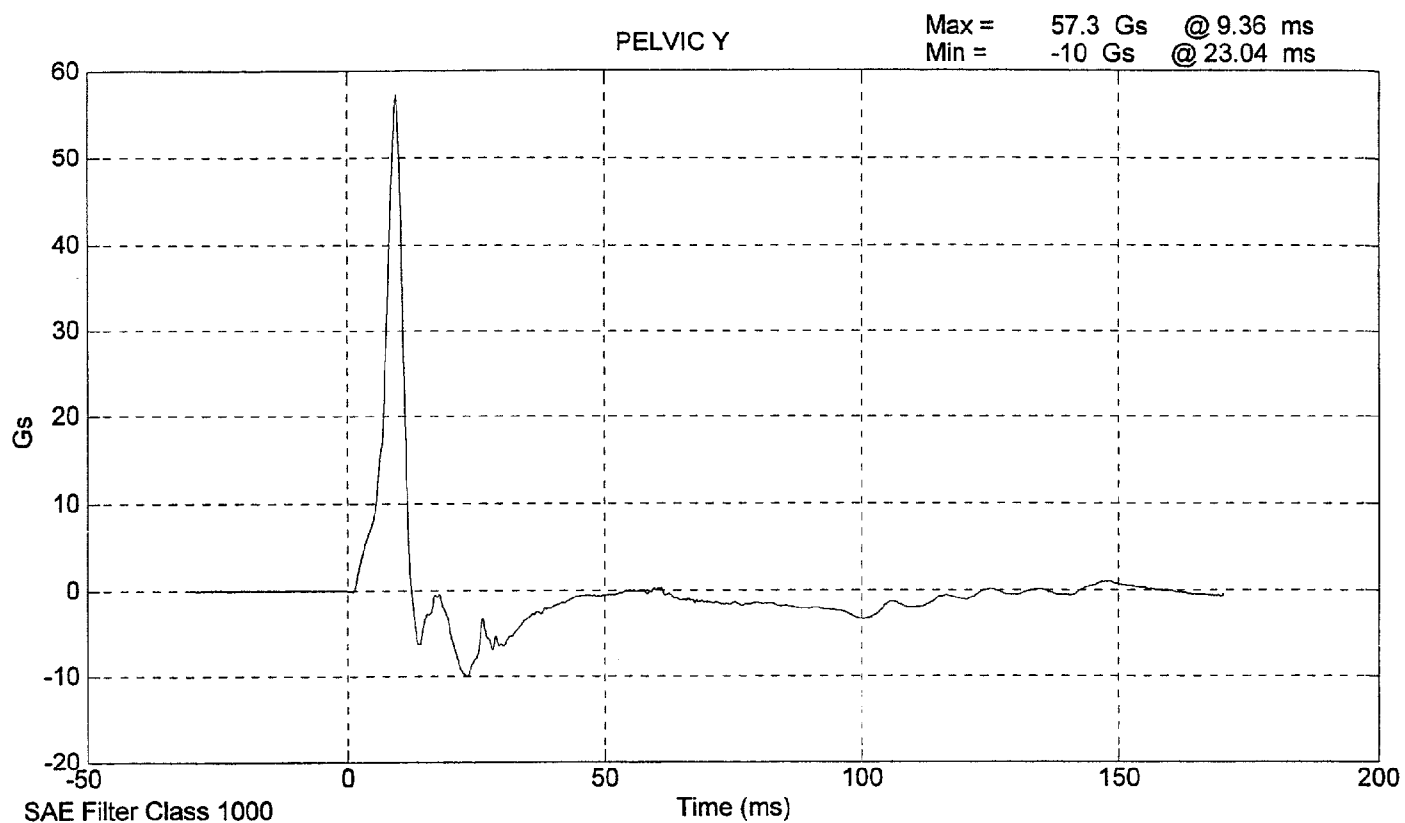
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 015 Calspan Sequential Test Number: 4
Date: 12/4/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	42
PROBE SPEED (m/s)	4.27 - 4.33	4.27
PELVIS ACCELERATION (g's)	40 - 60	44.9

REMARKS: None

SID 015 Pelvic Impact Test @ 4.2702 m/s



**ABDOMINAL COMPRESSION TEST
POST TEST**

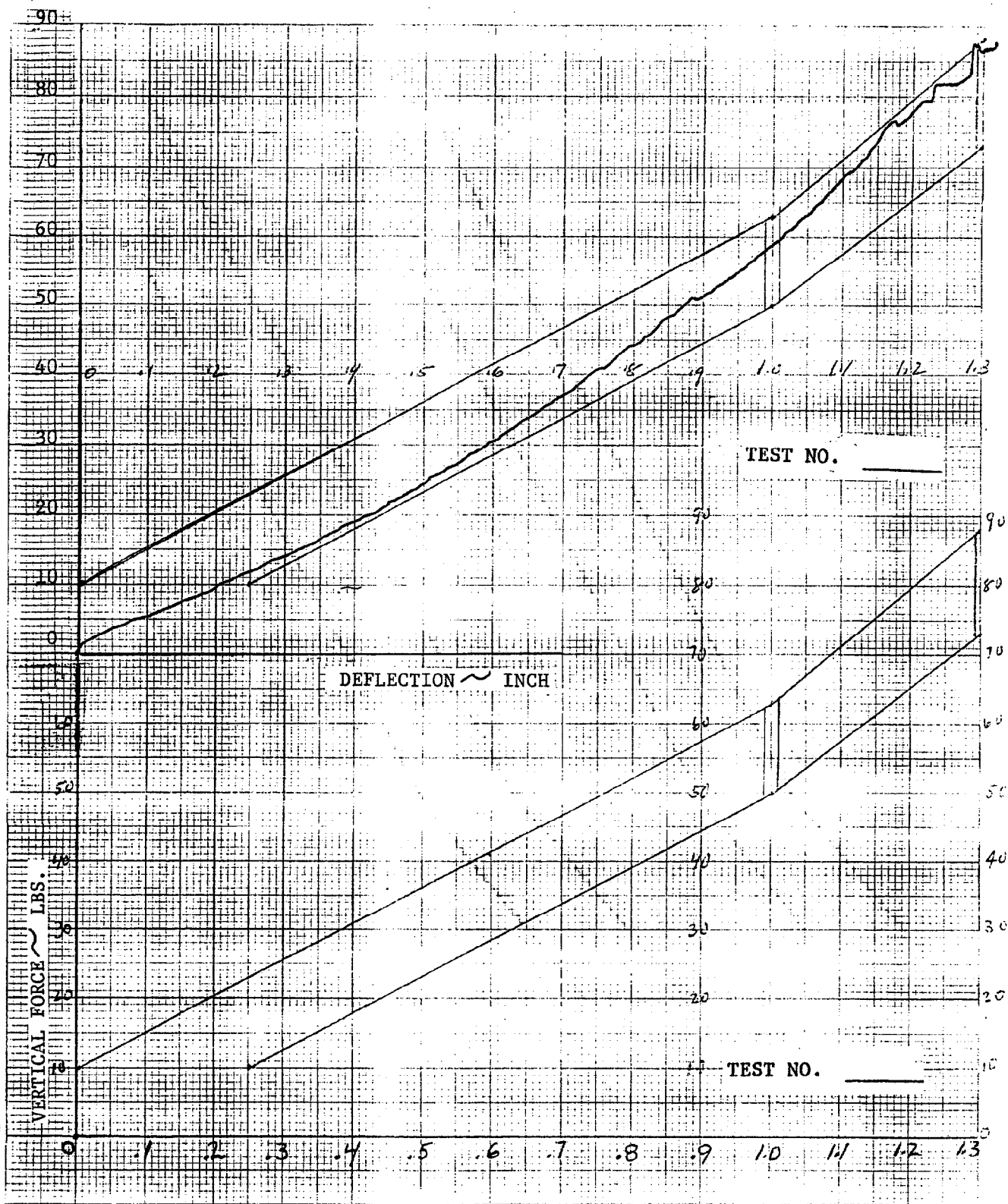
(Test not required for SID certification)

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 015 Calspan Sequential Test Number: 4
Date: 12/4/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	42
FORCE @ 13 mm (N)	104 - 162	111.2
FORCE @ 19 mm (N)	163 - 221	182.4
FORCE @ 25 mm (N)	222 - 280	254.3
FORCE @ 33 mm (N)	325 - 391	387.0

REMARKS: None



DUMMY S/N - 015

DATE 4 DEC

CONTRACT AUTHORIZATION _____

TEMP. 70 HUMIDITY 31

PERFORMED BY Ba

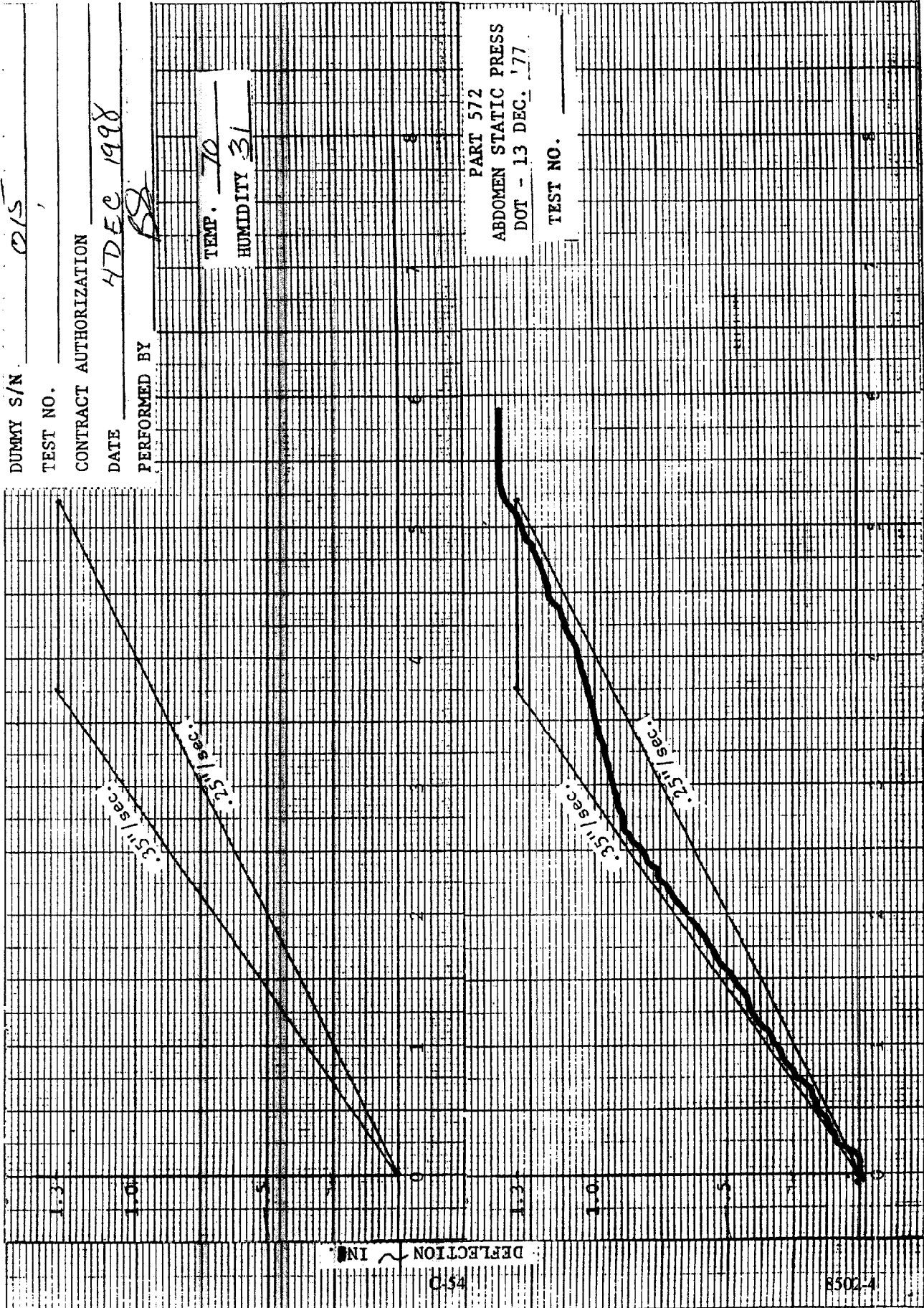
PART 572
ABDOMEN STATIC PRESS
DOT - 13 DEC. '77

DUMMY S/N 015
TEST NO. _____
CONTRACT AUTHORIZATION _____
DATE 4 DEC 1998
PERFORMED BY BS

TEMP. 70
HUMIDITY 31

PART 572
ABDOMEN STATIC PRESS
DOT - 13 DEC. '77

TEST NO. _____



LUMBAR FLEXION TEST
POST TEST
(Test not required for SID certification)
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 015 Calspan Sequential Test Number: 4
Date: 12/4/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

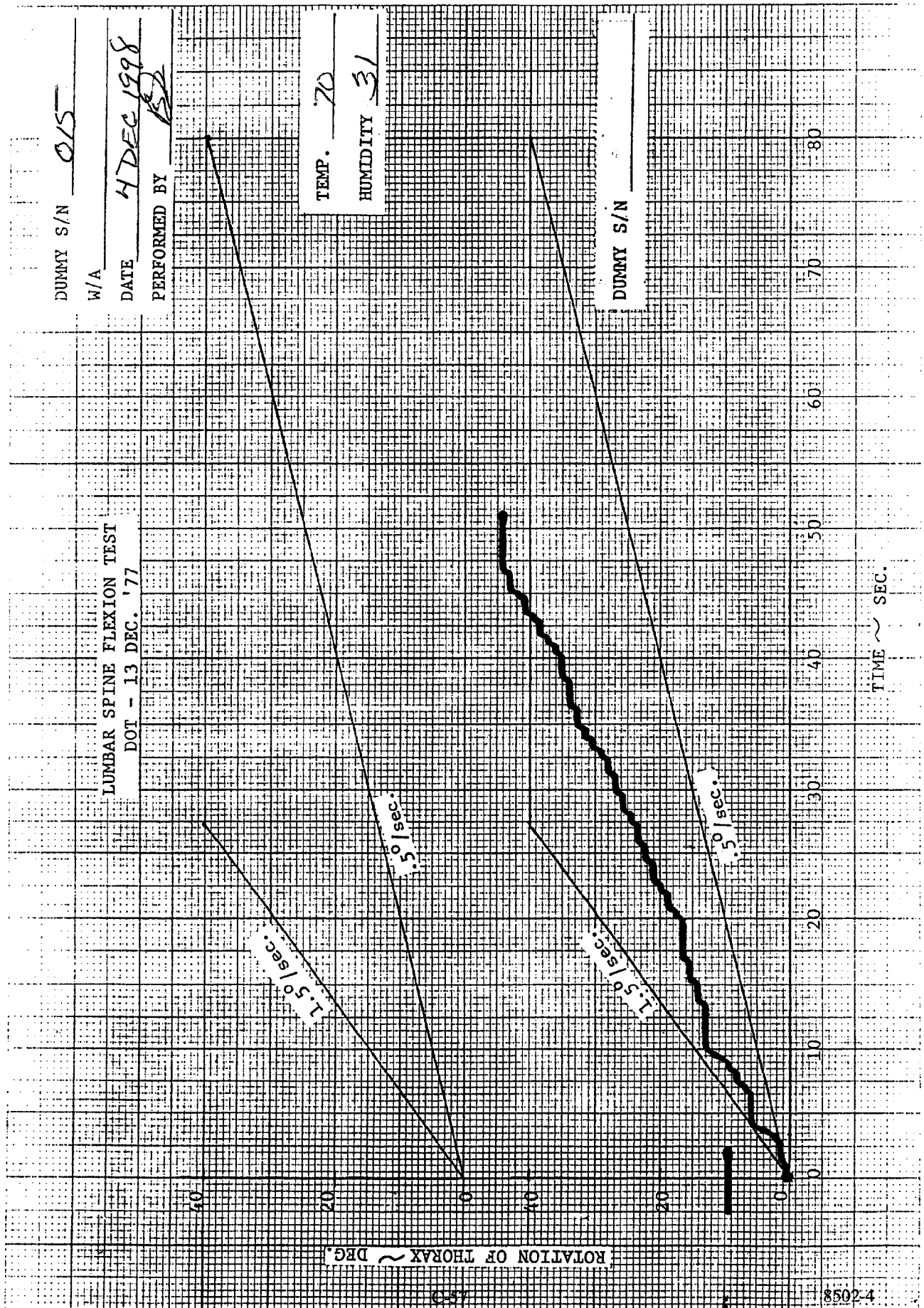
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	42
FORCE @ 0° (N)	0 - 26.7	0.0
FORCE @ 20° (N)	97.8 - 151.2	137.9
FORCE @ 30° (N)	151.2 - 204.6	191.3
FORCE @ 40° (N)	204.6 - 258	251.3
RETURN ANGLE	12° max.	9.5

REMARKS: None

HUMIDITY

FLEXION ANGLE ~ DEG.

FORCE ~ LBS.



POST TEST DUMMY INSPECTION LIST**CONFIGURED FOR LEFT SIDE IMPACT**

SID Serial No.: 015 Calspan Sequential Test Number: 4
Date: 12/4/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

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 Calspan Sequential Test Number: 4
Date: 12/4/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

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

Calspan Sequential Test Number: 4

Date: 12/4/98

Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	902
RH- Rib Height (mm)	502 - 520	513
HP- Hip Pivot Height (mm)	99 ref.	99
RD- Rib from Back Line (mm)	229 - 241	241
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**

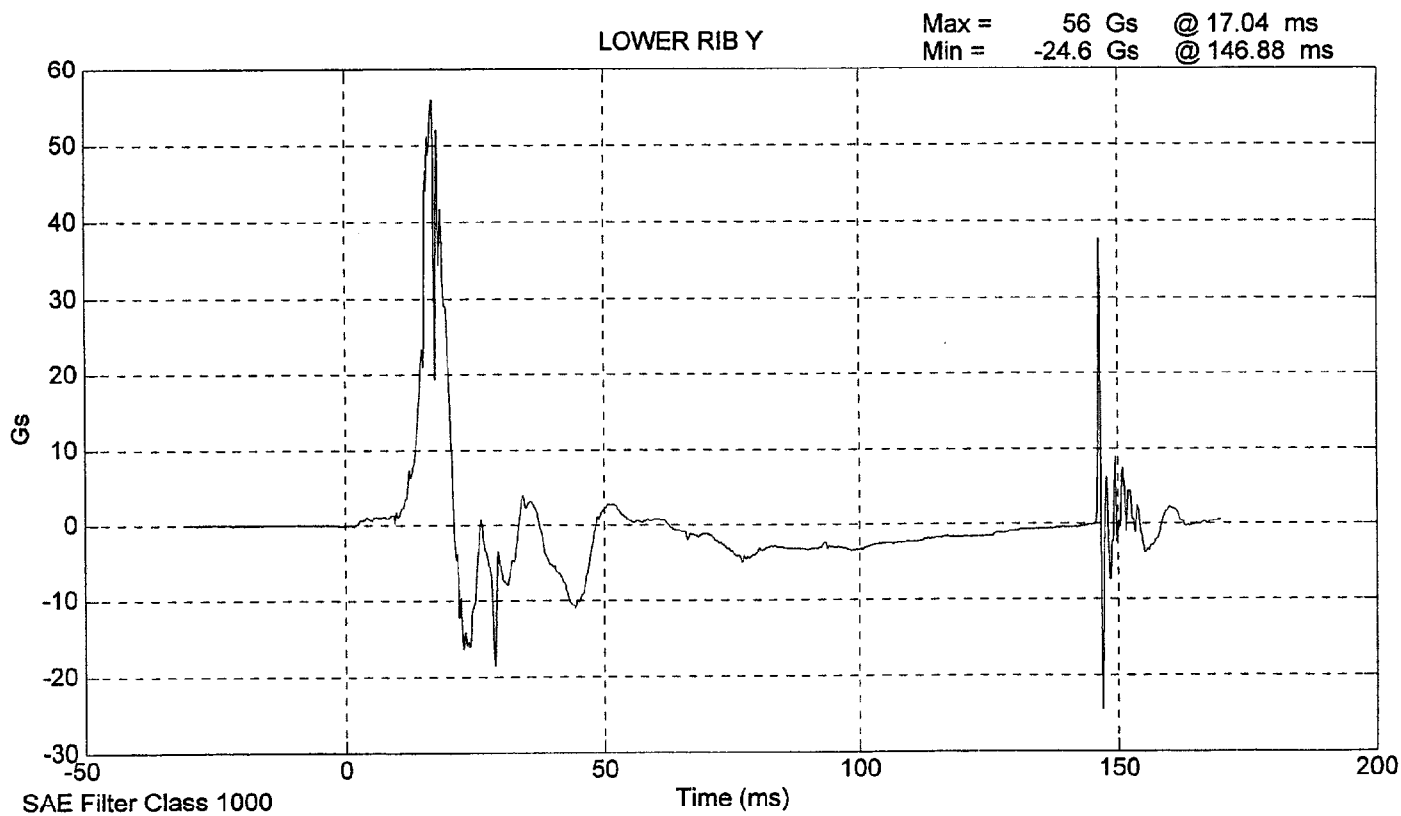
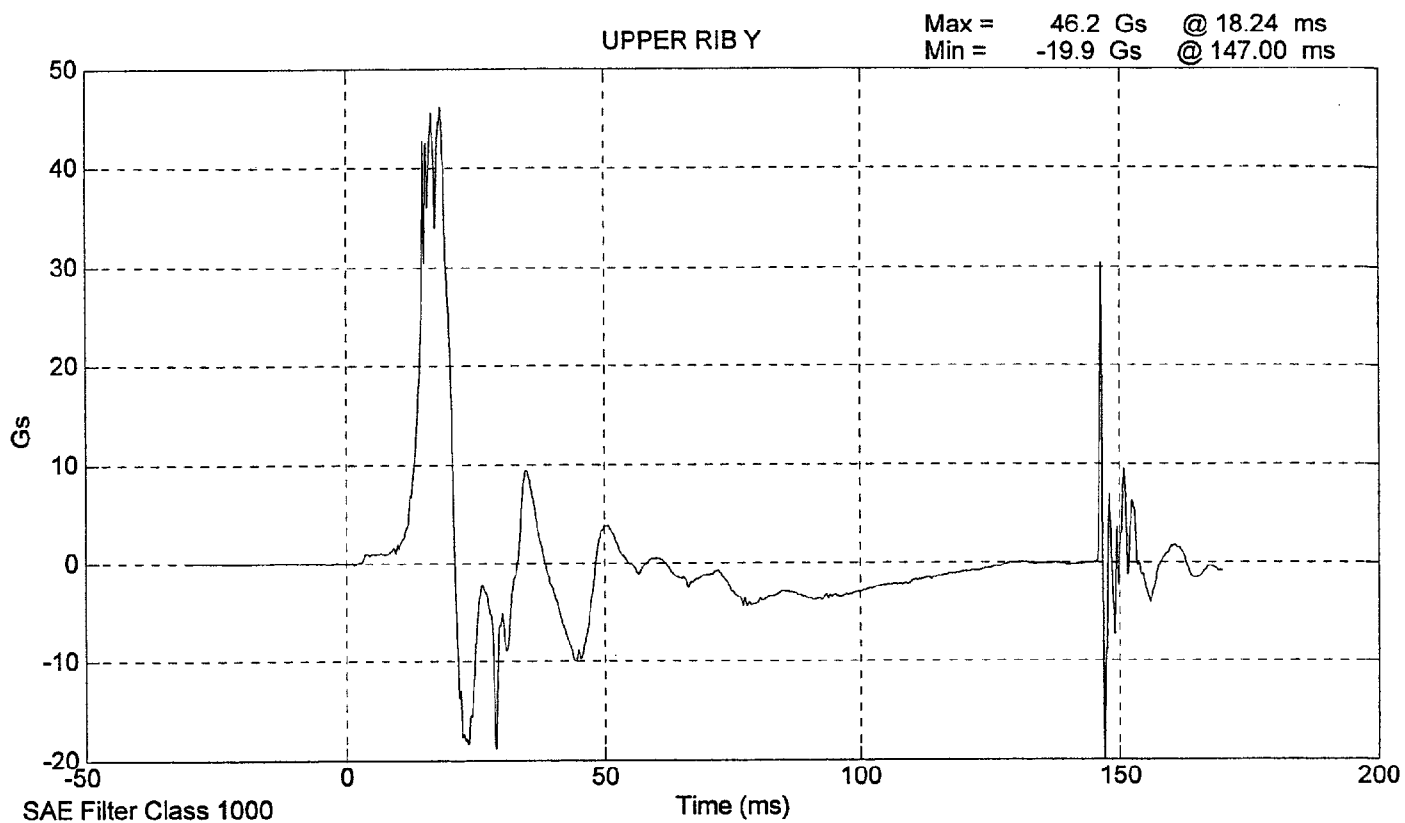
CONFIGURED FOR LEFT SIDE IMPACT

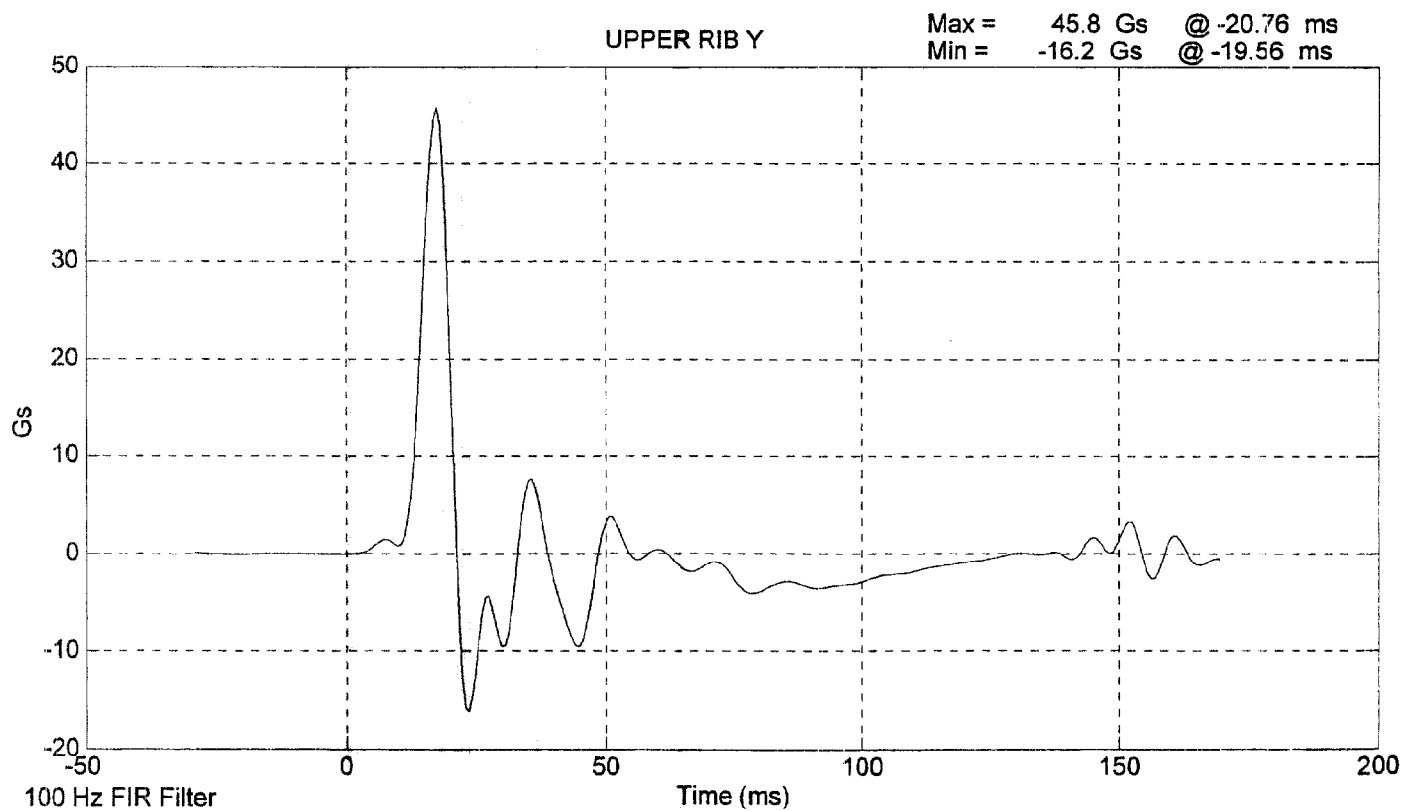
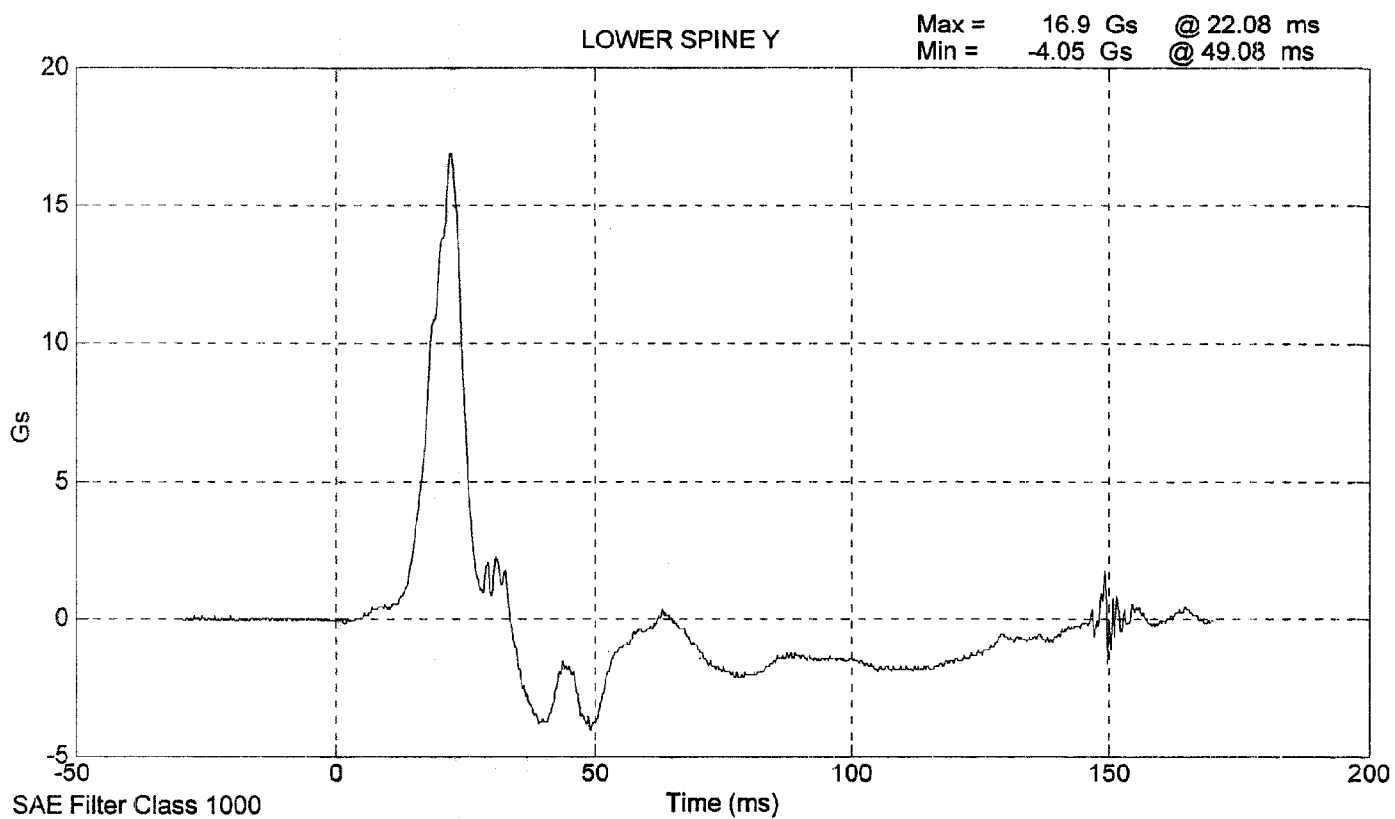
SID Serial No.: 016 Calspan Sequential Test Number: 4
Date: 12/4/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	42
PROBE SPEED (m/s)	4.27 - 4.33	4.30
UPPER RIB (g's)	37 - 46	45.8
LOWER RIB (g's)	37 - 46	45.7
LOWER SPINE (g's)	15 - 22	15.8

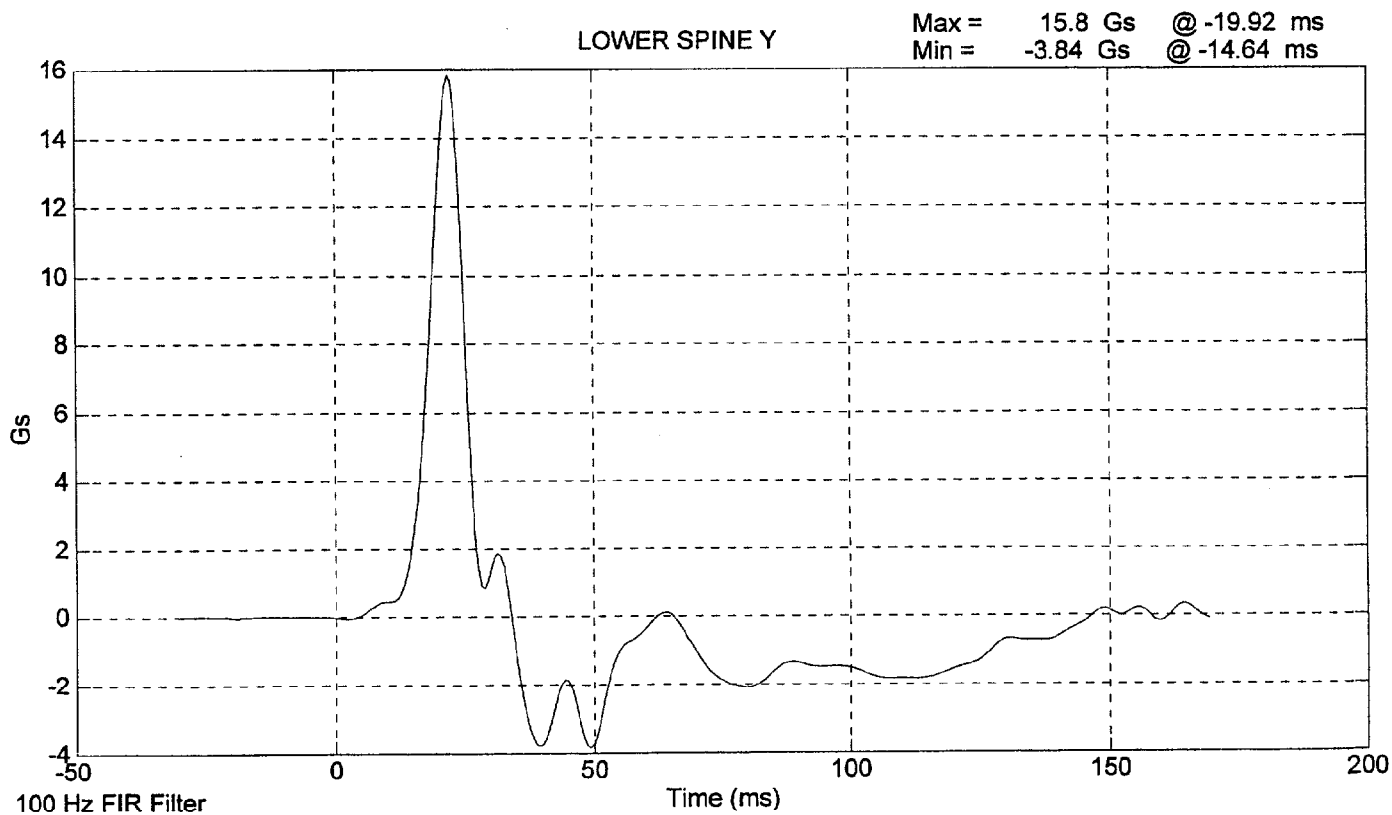
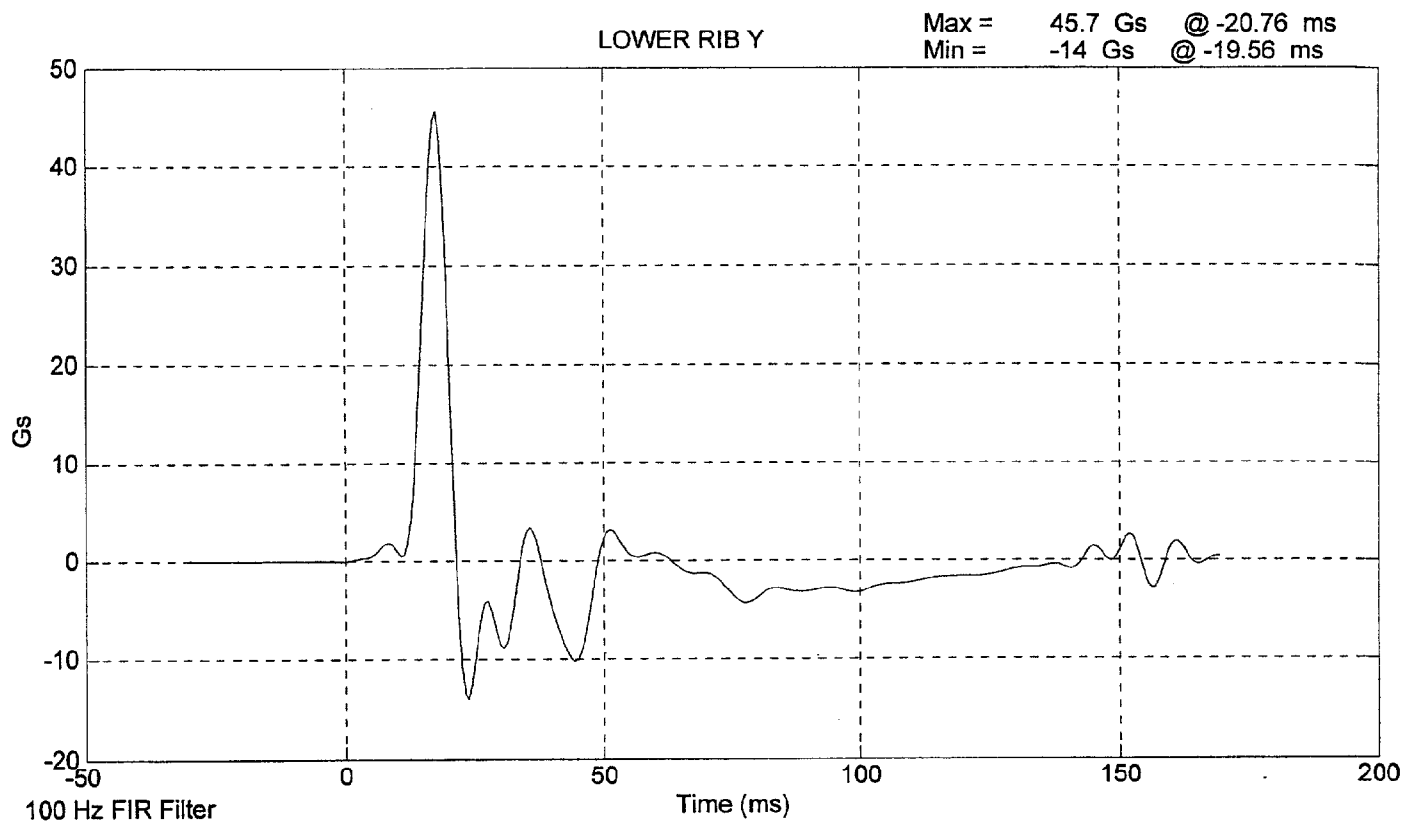
REMARKS: None

SID 016 Thorax Impact Test @ 4.3007 m/s





SID 016 Thorax Impact Test @ 4.3007 m/s



**LATERAL PELVIS IMPACT TEST
POST TEST**

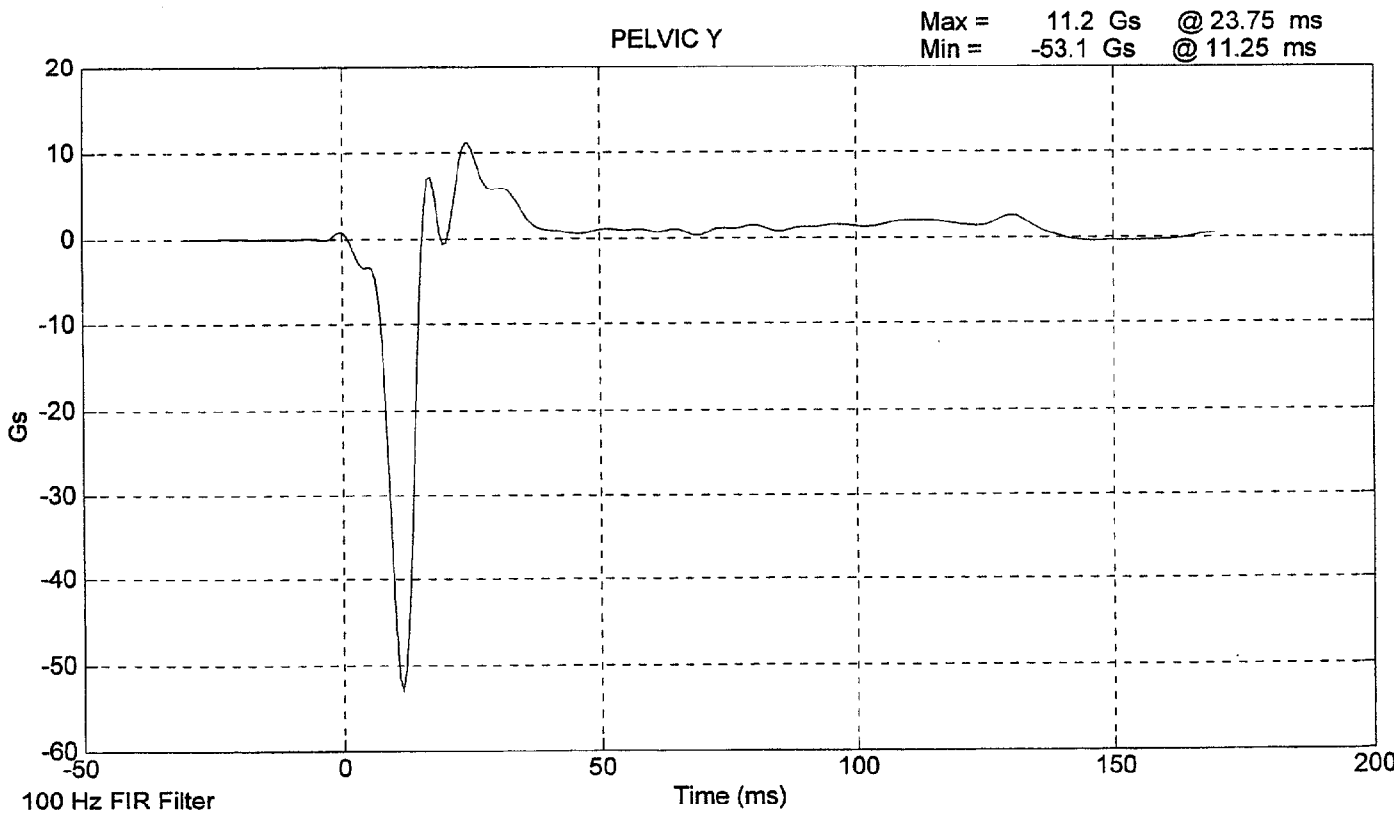
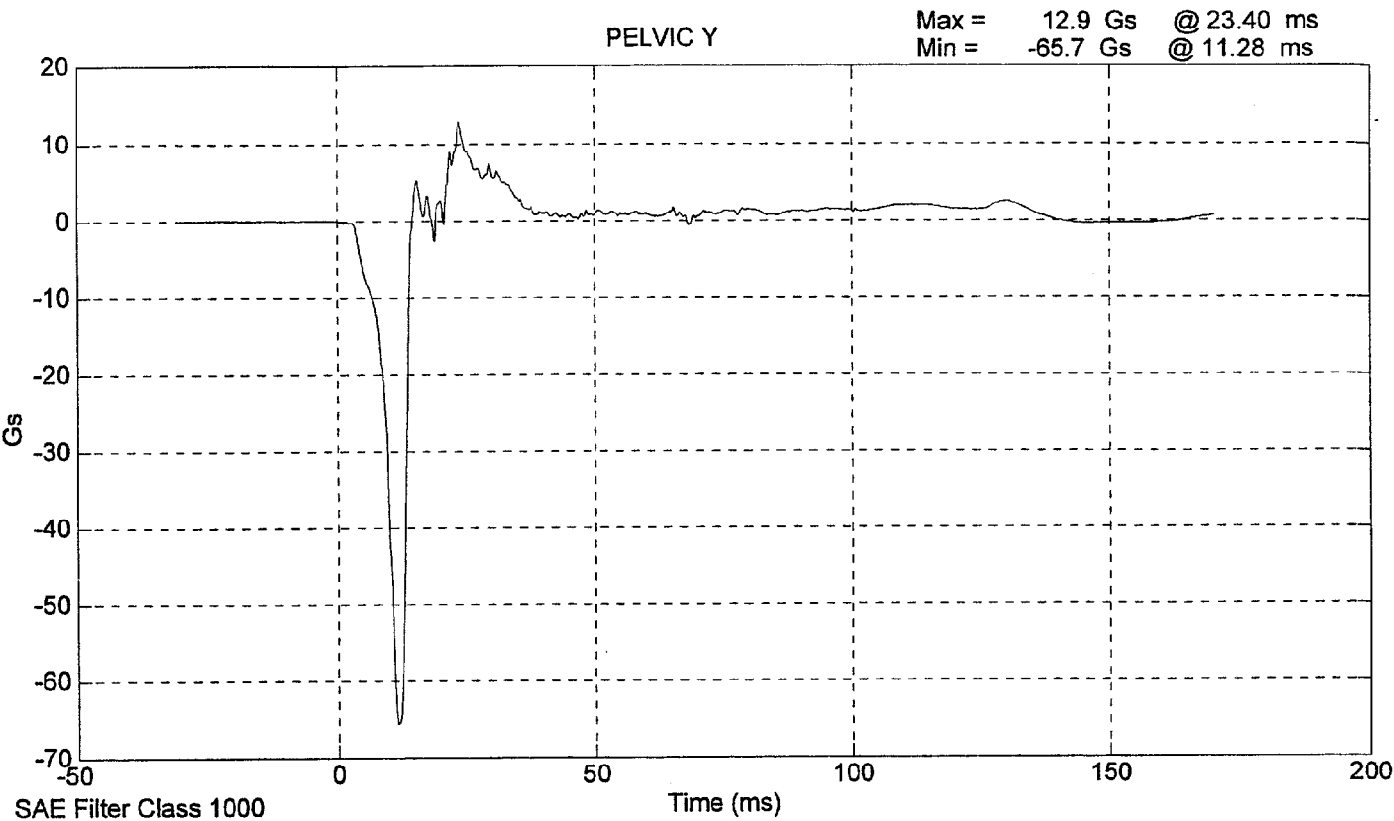
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Calspan Sequential Test Number: 4
Date: 12/4/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	42
PROBE SPEED (m/s)	4.27 - 4.33	4.30
PELVIS ACCELERATION (g's)	40 - 60	53.1

REMARKS: None

SID 016 Pelvic Impact Test @ 4.3038 m/s



**ABDOMINAL COMPRESSION TEST
POST TEST**

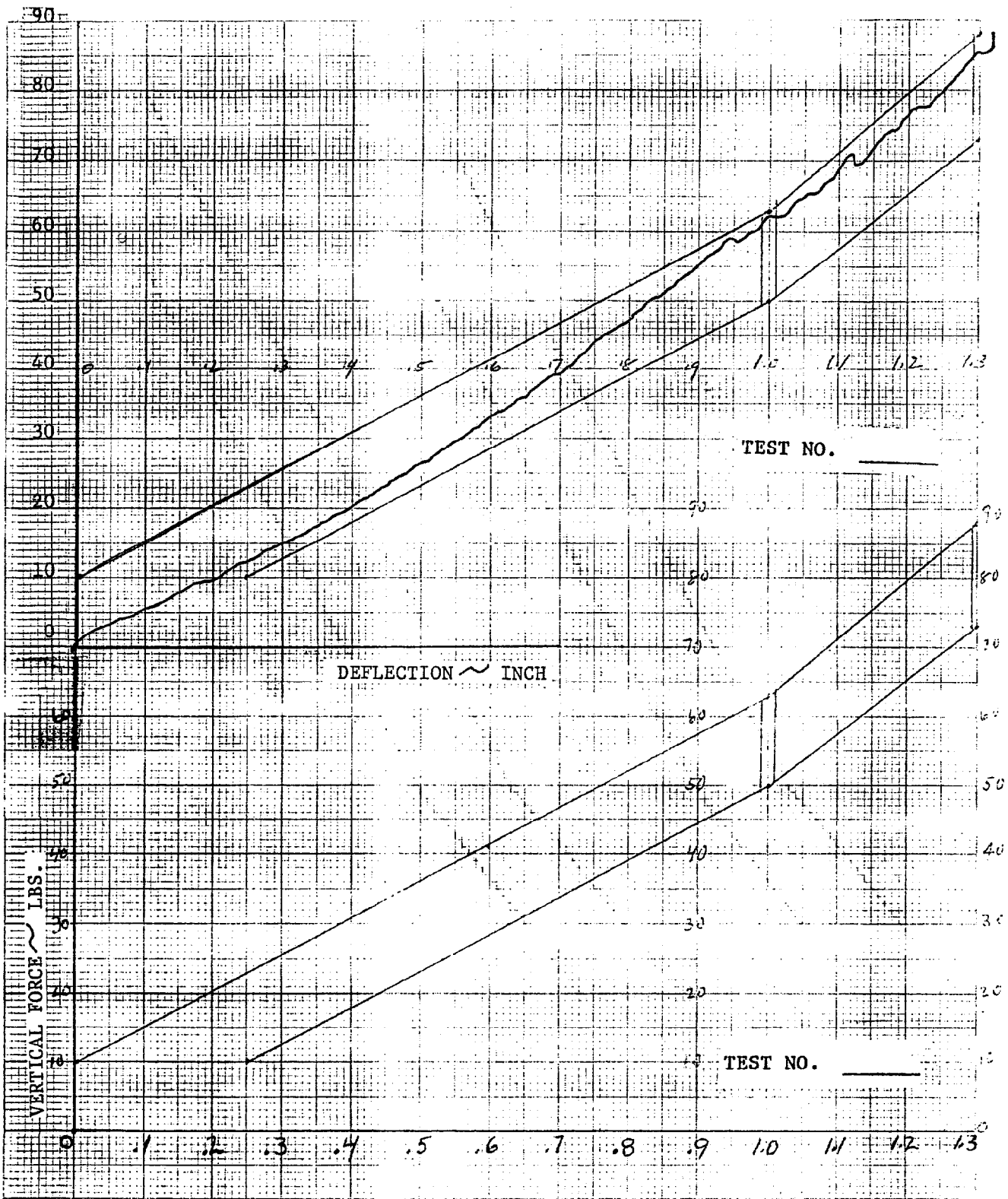
(Test not required for SID certification)

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Calspan Sequential Test Number: 4
Date: 12/4/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	42
FORCE @ 13 mm (N)	104 - 162	115.7
FORCE @ 19 mm (N)	163 - 221	195.7
FORCE @ 25 mm (N)	222 - 280	266.9
FORCE @ 33 mm (N)	325 - 391	378.1

REMARKS: None



DUMMY S/N - 016

DATE 4 DEC 1998

CONTRACT AUTHORIZATION _____

TEMP. 70 HUMIDITY 31

PERFORMED BY BOB

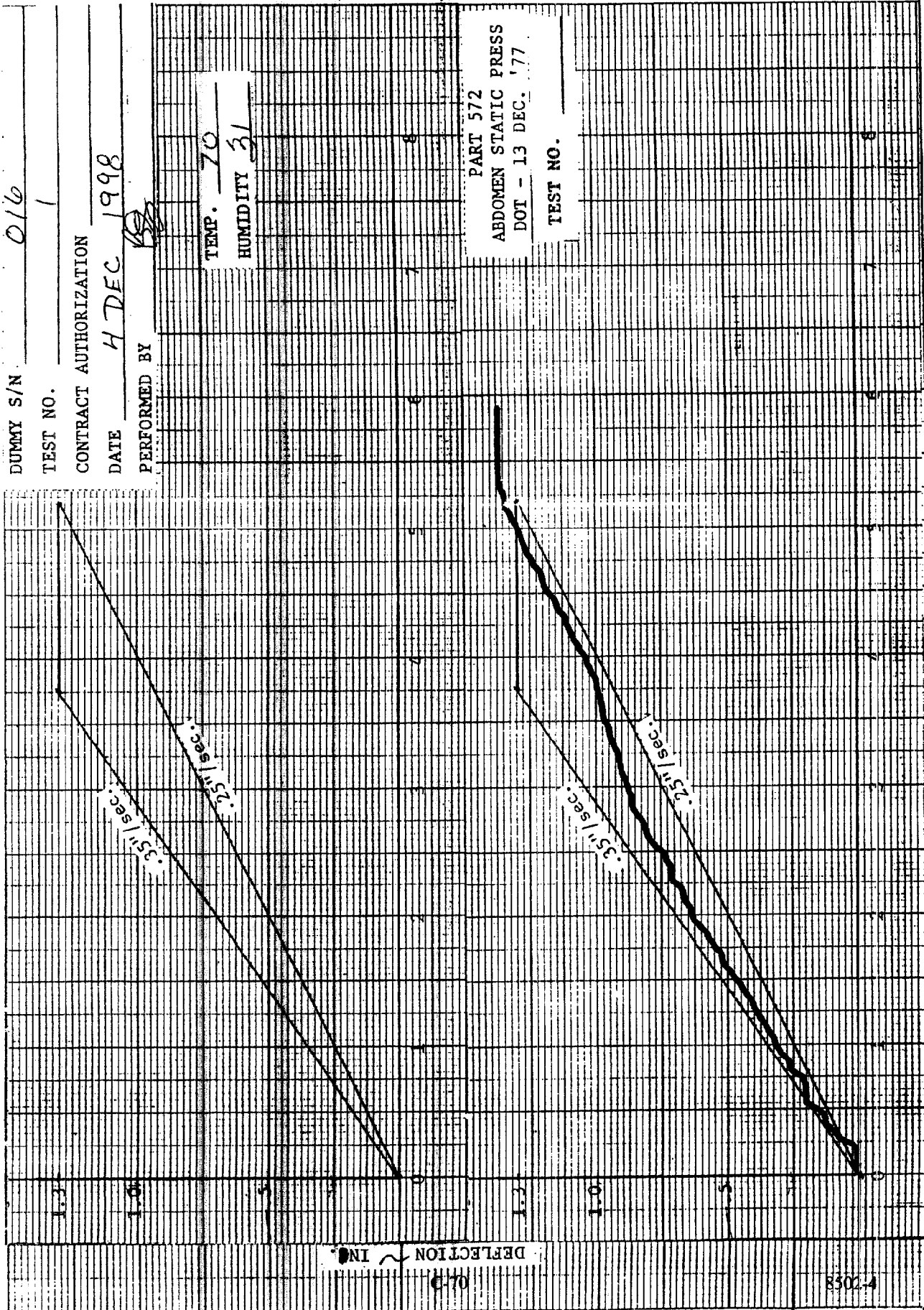
PART 572
ABDOMEN STATIC PRESS
DOT - 13 DEC. '77

DUMMY S/N 016
TEST NO. 1
CONTRACT AUTHORIZATION
DATE 4 DEC 1998
PERFORMED BY [Signature]

TEMP. 70
HUMIDITY 31

PART 572
ABDOMEN STATIC PRESS
DOT - 13 DEC. '77

TEST NO.



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

CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Calspan Sequential Test Number: 4
Date: 12/4/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE (°C)	18.9 - 25.5	21.1
RELATIVE HUMIDITY (%)	10 - 70	40
FORCE @ 0° (N)	0 - 26.7	0.0
FORCE @ 20° (N)	97.8 - 151.2	124.5
FORCE @ 30° (N)	151.2 - 204.6	186.8
FORCE @ 40° (N)	204.6 - 258	233.5
RETURN ANGLE	12° max.	10

REMARKS: None

DUMMY S/N OK TEST NO. /

W/A

DATE _____

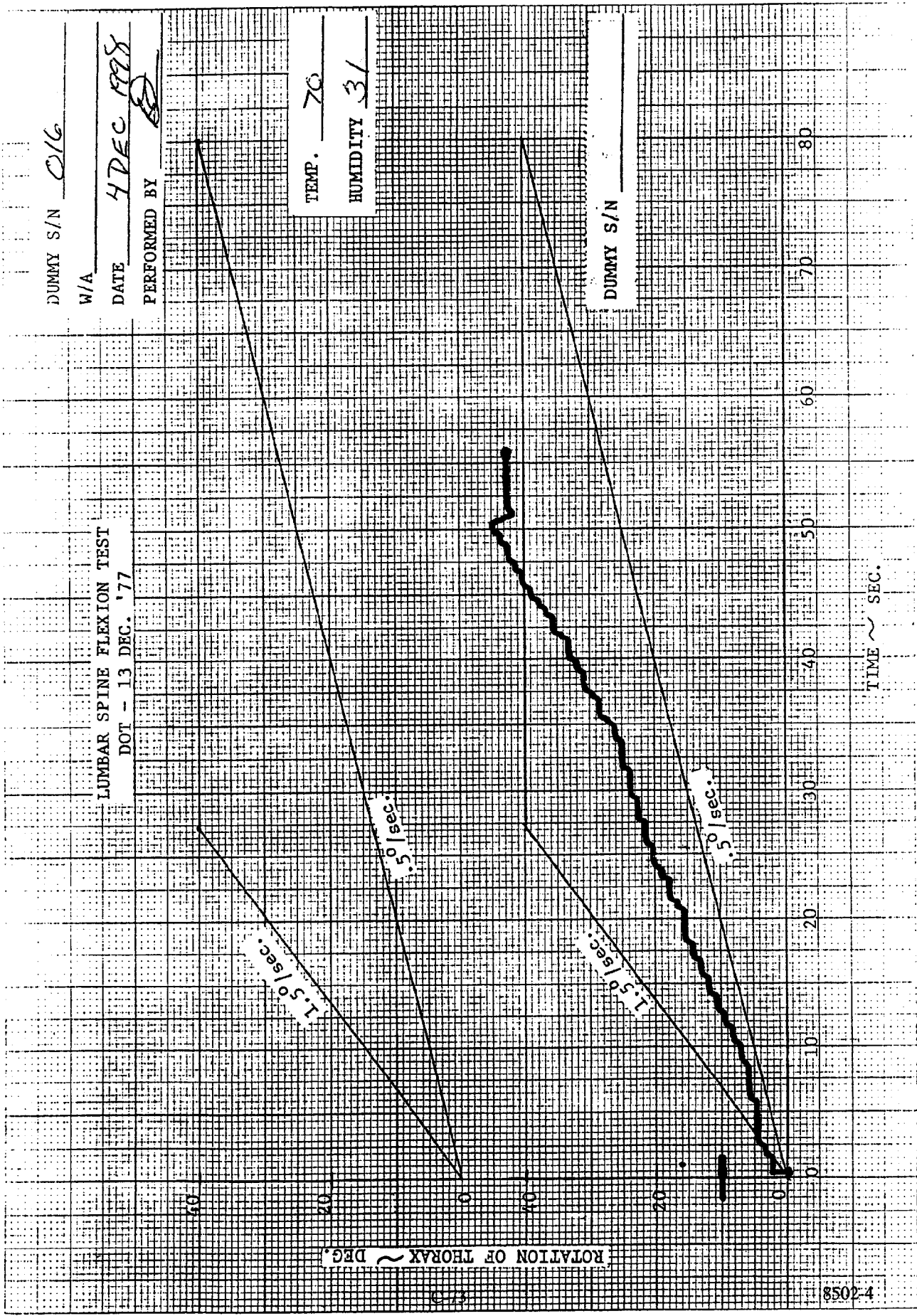
PERFORMED BY

TEMP:

HUMIDITY

FLEXION ANGLE ~ DEG.

FORCE - LBS.



POST TEST DUMMY INSPECTION LIST
CONFIGURED FOR LEFT SIDE IMPACT

SID Serial No.: 016 Calspan Sequential Test Number: 4
 Date: 12/4/98 Laboratory Technician: B. Swiecicki, G. Serbinowski

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