

REPORT NUMBER: 301-CAL-00-09

V3420

**SAFETY COMPLIANCE TESTING FOR FMVSS 301
FUEL SYSTEM INTEGRITY**

**VOLVO CAR CORPORATION
2000 VOLVO S80
4-DOOR SEDAN**

NHTSA NUMBER: CY5900

VERIDIAN TEST NUMBER: 8480-19

**VERIDIAN ENGINEERING
P.O. BOX 400
BUFFALO, NEW YORK 14225**



July 18, 2000

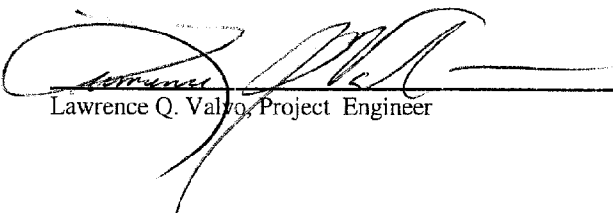
FINAL REPORT

PREPARED FOR:

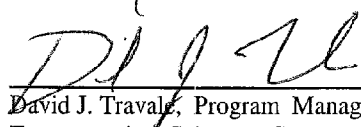
**U. S. Department of Transportation
National Highway Traffic Safety Administration
ENFORCEMENT
Office of Vehicle Safety Compliance
400 Seventh Street, S. W.
Room No. 6115 (NEF-30)
Washington, DC 20590**

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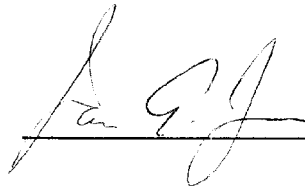

David J. Travale, Program Manager
Transportation Sciences Center

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16. Abstract Compliance tests were conducted on the subject 2000 Volvo S80 4-Door Sedan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-301-01 for the determination of FMVSS 301 compliance. Test failures identified were as follows: The test vehicle appeared to comply with all requirements of FMVSS 301 "Fuel System Integrity."					
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Section 1

PURPOSE OF COMPLIANCE TEST

This 30 mph rear moving barrier impact test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 301 Compliance Test Program conducted for the National Highway Traffic Safety Administration (NHTSA) by Veridian Engineering under Contract No. DTNH22-95-D-11000. The purpose of this test was to determine if the subject vehicle, a 2000 Volvo S80 4-Door Sedan, meets the performance requirements of FMVSS No. 301, "Fuel System Integrity." This compliance test was conducted using the requirements found in the OVSC Laboratory Test Procedure No. TP-301-01, dated March 28, 1994.

Section 2

COMPLIANCE TEST RESULTS SUMMARY

A 4053 pound 2000 Volvo S80 4-Door Sedan was impacted from the rear by a 3961 pound moving barrier at a velocity of 28.9 mph. The test was performed by Veridian Engineering on July 18, 2000.

One instrumented Part 572 E and one non-instrumented Part 572 B, 50th percentile male Anthropomorphic Test Device (ATD) were placed in the driver and right-front passenger seating positions respectively. Additional ballast (25 pounds) was secured in the vehicle rear passenger seating area.

The crash event was recorded by one real-time and eight high-speed cameras. Camera locations and other pertinent camera information are found on pages 3-9 and 3-10 of this report. Pre- and post-test photographs of the vehicle can be found in Appendix A. Vehicle and ATD electronic data plots are presented in Appendix B.

The 21 gallon fuel tank was filled to 92 percent capacity with orange Stoddard fluid prior to the impact. After the impact, there was no fluid leakage for the first 30 minutes nor during any phase of the rollover test. Average vehicle longitudinal crush was 11.4 inches. The vehicle appeared to comply with all the requirements of FMVSS No. 301 "Fuel System Integrity." Section 3 presents the results of these tests.

Table 1

CRASH TEST SUMMARY

Vehicle NHTSA No.: CY5900 Test Mode: 30 mph Rear Barrier
 Test Date: July 18, 2000 Time: 12:19 Temperature : 71 °F
 Vehicle Make/Model/Body Style: 2000 Volvo S80 4-Door Sedan
 Vehicle Test Weight: 4053 lbs Impact Velocity: 28.9 mph
 Static Crush: Left Side = 11.0 inches
 Right Side = 11.4 inches
 Centerline = 11.9 inches
 Average Crush: 11.4 inches

TYPE OF FRONT OCCUPANT RESTRAINT SYSTEM INSTALLED IN TEST VEHICLE:

Driver's DSP: 3-Point Seatbelt, Airbag, Knee Bolster
 Right Passenger's DSP: 3-Point Seatbelt, Airbag, Knee Bolster

VISIBLE DUMMY CONTACT POINTS:

Driver: Back of head to head restraint, back to center of seat back.

 Passenger: Back of head to head restraint, back to center of seat back.

DOOR OPENING DATA:

Closed / Operable - Left Front
Closed / Operable - Right Front

Stoddard Solvent Spillage from Vehicle's Fuel System: None

Remarks: The rear window shattered during impact. The driver and passenger seat backs reclined approximately
28 degrees during the impact.

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATATEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 2000 Volvo S80 4-Door Sedan

NHTSA No.: CY5900 ; VIN: YV1TS94D0Y1112581 ; Color: Tan

Engine Data: 6 cylinders; - CID; 2.9 Liters; - cc

Placement: - Longitudinal or In-Line; X Transverse or Lateral

Transmission Data: 4 speeds; - Manual; X Automatic; X Overdrive

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

Major Options: X A/C; X Pwr.Strg.; X Pwr. Brakes
X Pwr. Windows; X Pwr. Door Locks; X Tilt Wheel

Date Received: 6/26/00 ; Odometer Reading 40 miles

Selling Dealer: Not Available

& Address: -

DATA FROM TIRE VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: Volvo Car Corporation

Date of Manufacture: 11/99

GVWR: 4608 lbs.; GAWR: 2491 lbs. FRONT; 2293 lbs. REAR

DATA FROM TIRE PLACARD:

Location of Placard on Vehicle: Driver side B-pillar

Tire Pressure with Maximum Capacity Vehicle Load: 51 psi FRONT 51 psi REAR

Recommended Tire Size: P215/55 R16

* Recommended Cold Tire Pressure: 39 psi FRONT; 39 psi REAR

Size of Tires on Test Vehicle: P215/55 R16

Type of Spare Tire: Temporary

Vehicle Capacity Data: Information placard located on fuel lid door

Type of Front Seats: - Bench; X Bucket; - Split Bench

Number of Occupants: 2 Front; 3 Rear; 5 Total

Vehicle Capacity Weight (VCW) = 890 lbs.

No. of Occupants x 150 lbs. = 750 lbs.

Rated Cargo/Luggage Weight (RCLW) = 140 lbs.

*Tire pressure used for test

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont.)WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with maximum fluids)= UDW:

Right Front	=	<u>1039</u>	lbs.	Right Rear	=	<u>744</u>	lbs.
Left Front	=	<u>1074</u>	lbs.	Left Rear	=	<u>740</u>	lbs.
TOTAL FRONT	=	<u>2,113</u>	lbs.	TOTAL REAR	=	<u>1,484</u>	lbs.
TOTAL DELIVERED WEIGHT = <u>3,597</u> lbs.							
% of Total Front of Vehicle Weight = <u>59</u>				% of Total Rear Weight = <u>41</u> %			

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight	=	<u>3,597</u>	lbs.
Rated Cargo/Luggage Weight (RCLW)	=	<u>140</u>	lbs.
Weight of 2 p.572 Dummies, 167 & 164 lbs	=	<u>331</u>	lbs.
TARGET TEST WEIGHT	=	<u>4,068</u>	lbs.

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 125 POUNDS OF CARGO WEIGHT:

Right Front	=	<u>1165</u>	lbs.	Right Rear	=	<u>817</u>	lbs.
Left Front	=	<u>1232</u>	lbs.	Left Rear	=	<u>839</u>	lbs.
TOTAL FRONT	=	<u>2,397</u>	lbs.	TOTAL REAR	=	<u>1,656</u>	lbs.
TOTAL TEST WEIGHT = <u>4,053.0</u> lbs.							
% of Total Front Weight = <u>59.1</u> %				% of Total Rear Weight = <u>40.9</u> %			

* Weight of Ballast Secured in Vehicle Trunk Area = 25 lbs.

Type of Ballast: Lead shot

Method of Securing Ballast: Rear seat belt anchorages

Vehicle Components Removed for Weight Reduction: None

VEHICLE ATTITUDE (all dimension in inches):

AS DELIVERED:	RF	<u>27.9</u>	LF	<u>27.8</u>	RR	<u>28.3</u>	LR	<u>27.9</u>
AS TESTED:	RF	<u>27.0</u>	LF	<u>26.6</u>	RR	<u>27.6</u>	LR	<u>27.2</u>
Vehicle's Wheel Base: <u>109.8</u> in.								
Location of Vehicle's C.G.: <u>44.9</u> inches rearward of front wheel center.								

FUEL SYSTEM DATA:

Fuel System Capacity From Owner's Manual	=	<u>21.0</u>	gallons
Usable Capacity Figure Furnished by COTR	=	<u>21.0</u>	gallons
Test Volume Range (91 to 94% of Usable Capacity)	=	<u>19.1</u>	to <u>19.7</u> gallons
ACTUAL TEST VOLUME=	<u>19.3</u>	gallons (with entire fuel system filled)	

* Ballast weight includes the RCLW, the weight of drained vehicle fluids and the weight of any removed vehicle components less the weight of onboard instrumentation, cameras, and hardware.

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont.)FUEL SYSTEM DATA (continued):

Test Fluid Type:	Stoddard Solution
Test Fluid Specific Gravity:	0.764
Test Fluid Kinematic Viscosity:	0.96 centistokes
Test Fluid Color:	Orange ("red" is preferred)
Type of Vehicle Fuel Pump:	Electric
Electric Fuel Pump Operation with Ignition Switch ON and Engine OFF - Fuel pump operated.	
Details of Fuel System:	Fuel filler is located on the right rear quarter panel aft of the rear axle; Fuel tank is located on the vehicle underbody beneath the rear seat and forward of the rear axle line; Fuel lines are routed beneath the vehicle right of the tunnel.

Table 3

MOVING BARRIER PARAMETER DATA

WEIGHT OF MOVING BARRIER:

Right Front	=	<u>1113</u>	lbs.	Right Rear	=	<u>868</u>	lbs.
Left Front	=	<u>1102</u>	lbs.	Left Rear	=	<u>878</u>	lbs.
TOTAL FRONT	=	<u>2,215</u>	lbs.	TOTAL REAR	=	<u>1,746</u>	lbs.
TOTAL BARRIER WEIGHT	=	<u>3,961</u>	lbs.				

MOVING BARRIER DIMENSIONS:

Barrier Face Height:	<u>60.0</u>	in.
Barrier Face Width:	<u>78.0</u>	in.
Barrier Face		
Ground Clearance:	<u>5.0</u>	in.
Tread Width:	<u>59.5</u>	in.
Wheel Base:	<u>120.0</u>	in.
Location of C.G.:	X: <u>52.9</u> inches rearward of front wheel center.	
	Y: <u>0.0</u> inches from longitudinal-vertical plane of symmetry.	
	Z: <u>16.3</u> inches above ground.	

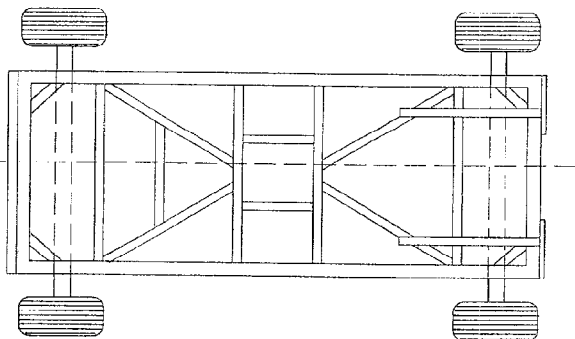
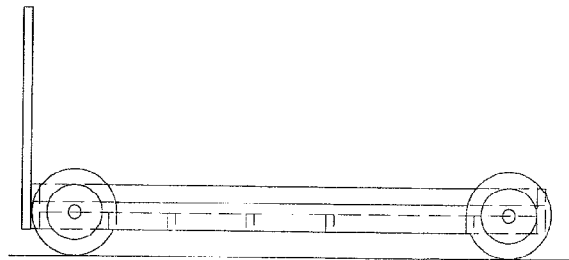


Table 4

POST IMPACT DATATYPE OF TEST:

Type of Test: Rear Barrier Impact Angle: 0°
 Test Date: July 18, 2000 Time: 12:19 Temperature: 71 °F
 Vehicle NHTSA No.: CY5900
 Required Impact Velocity Range: 28.9 to 29.9 mph

BARRIER IMPACT VELOCITY: (Speed traps within 5 feet of impact plane.)

Trap No. 1 = 28.9 mph; Trap No. 2 = 28.9 mph
 Average Impact Speed = 28.9 mph

VEHICLE STATIC CRUSH: (For frontal and rear impacts only.)

Vehicle Length:

Pre-Test	Right =	<u>186.4</u>	; C/L =	<u>190.0</u>	; Left =	<u>186.6</u>
Post-Test	Right =	<u>175.0</u>	; C/L =	<u>178.1</u>	; Left =	<u>175.6</u>
Crush	Right =	<u>11.4</u>	; C/L =	<u>11.9</u>	; Left =	<u>11.0</u>
AVERAGE	=	<u>11.4</u>	inches			

Section 3

COMPLIANCE TEST DATA

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION
(FOR REAR IMPACTS ONLY)

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS

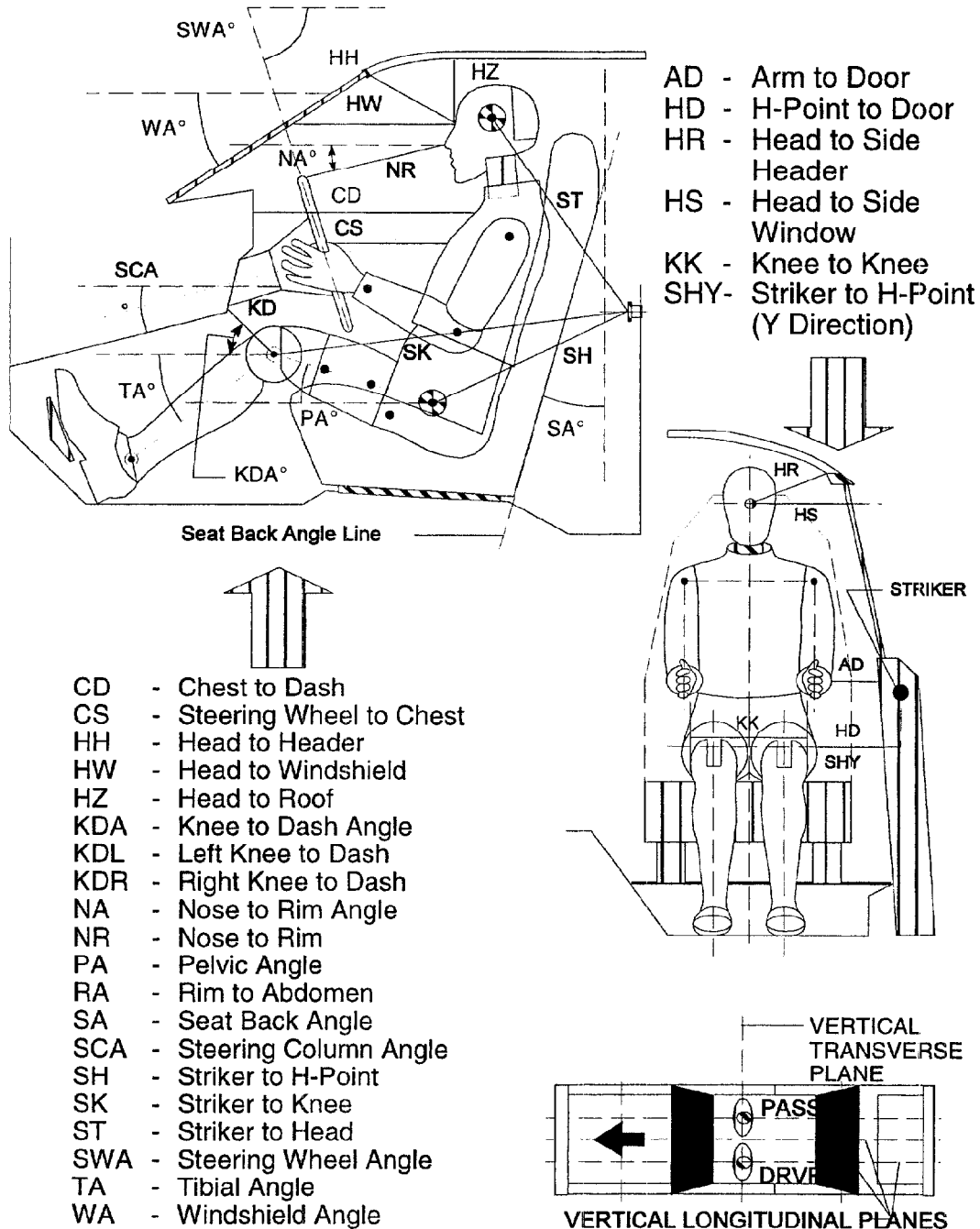


Table 5

FRONT SEAT OCCUPANT MEASUREMENTS
(FOR REAR IMPACT ONLY)

	DRIVER (Serial #152)		
WA°	27 deg.		
SWA°	64 deg.		
SCA°	26 deg.		
SA°	19 deg.		
HZ	8.1		
HH	14.2		
HW	27.1		
HR	9.4		
NR	15.6	Angle	12 deg.
CD	21.1		
CS	11.3		
RA	7.4		
KDL	7.2	Angle (KDA)	27 deg.
KDR	6.6		
PA°	25 deg.		
TA°	40 deg.		
KK	13.6		
ST	16.6	Angle	8 deg.
SK	24.2	Angle	101 deg.
SH	12.5	Angle	138 deg.
SHY	10.5		
HS	14.2		
HD	6.1		
AD	4.7		

(Measurements in inches)

Table 6
FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

FMVSS NO. 301

TEST VEHICLE NHTSA NO.: CY5900 TEST DATE: July 18, 2000

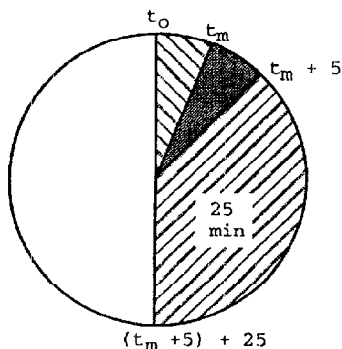
Vehicle Mfgr./Make/Model: 2000 Volvo S80 4-Door Sedan

Test vehicle fuel tank filled to 91% to 94% of manufacturer's "usable" capacity and with electric fuel pump operating (if it will operate without engine operation). Part 572 test dummies located at each front designated seating position.

TEST VEHICLE IMPACT TYPE:

- Frontal (30 mph)
 - Oblique (30 mph) with - "barrier face first
 contacting -
 (driver/passenger) side
X Rear Moving Barrier (30 mph)
- Lateral Moving Barrier (20 mph)

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	1 oz.
0	5 oz.
0	1 oz./1 min.

SOLVENT SPILLAGE DETAILS:

None

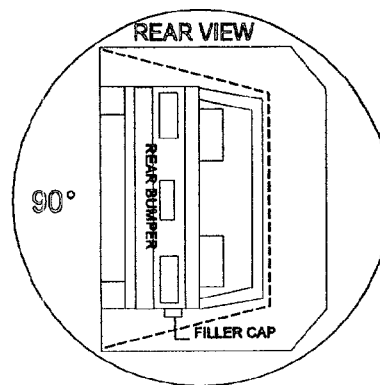
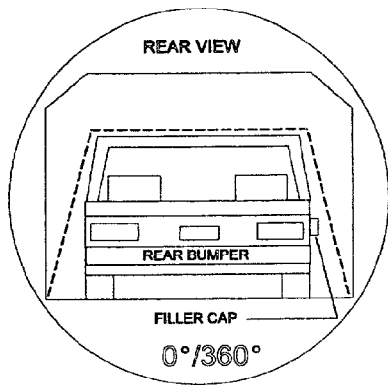
Table 7

FMVSS NO. 301 STATIC ROLLOVER DATA SHEETTEST PHASE :

0-90 Deg.

Vehicle NHTSA ID No. :

CY5900

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time
(Spec. Range = 1 to 3 minutes)

1 minutes 12 seconds

FMVSS 301 Position Hold Time +

5 minutes 00 seconds

TOTAL

6 minutes 12 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 reqd.
--	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

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

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

IV. SOLVENT SPILLAGE LOCATION(S):

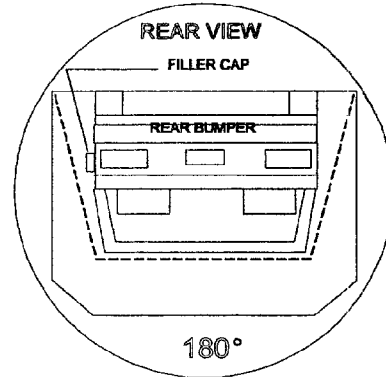
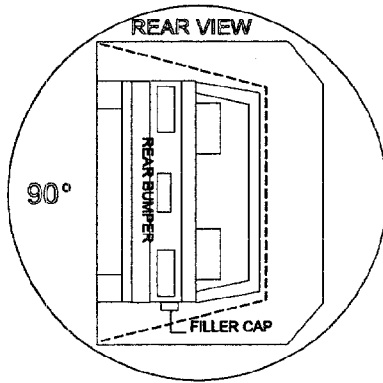
None

Table 7

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE :
90-180 Deg.

Vehicle NHTSA ID No.:
CY5900

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 1 minutes 11 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 00 seconds

TOTAL 6 minutes 11 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 reqd.
--	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

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

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

IV. SOLVENT SPILLAGE LOCATION(S):

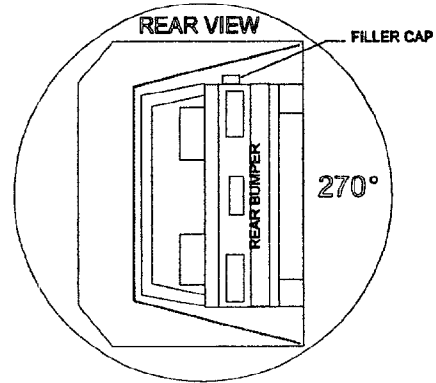
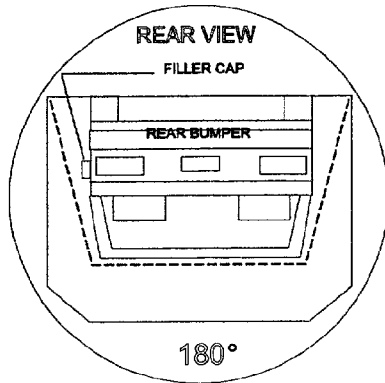
None

Table 7

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE :
180-270 Deg.

Vehicle NHTSA ID No. :
CY5900



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 1 minutes 8 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 00 seconds

TOTAL 6 minutes 8 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 reqd.
--	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

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

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

IV. SOLVENT SPILLAGE LOCATION(S):

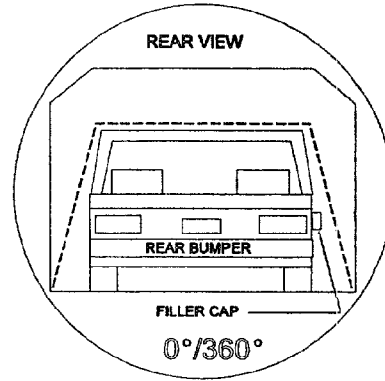
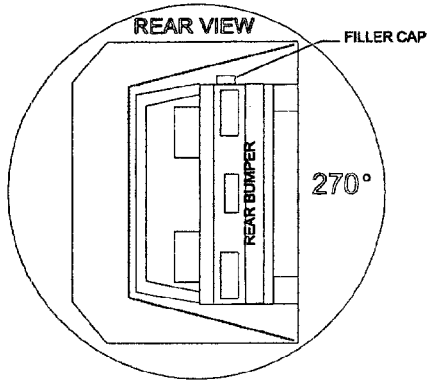
None

Table 7

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE :
270-360 Deg.

Vehicle NHTSA ID No. :
CY5900

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time
 (Spec. Range = 1 to 3 minutes)

1 minutes 5 seconds

FMVSS 301 Position Hold Time +

5 minutes 00 seconds

TOTAL

6 minutes 5 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 reqd.
--	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

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

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

IV. SOLVENT SPILLAGE LOCATION(S):

None

Figure 2

CAMERA POSITIONS FOR REAR IMPACTS

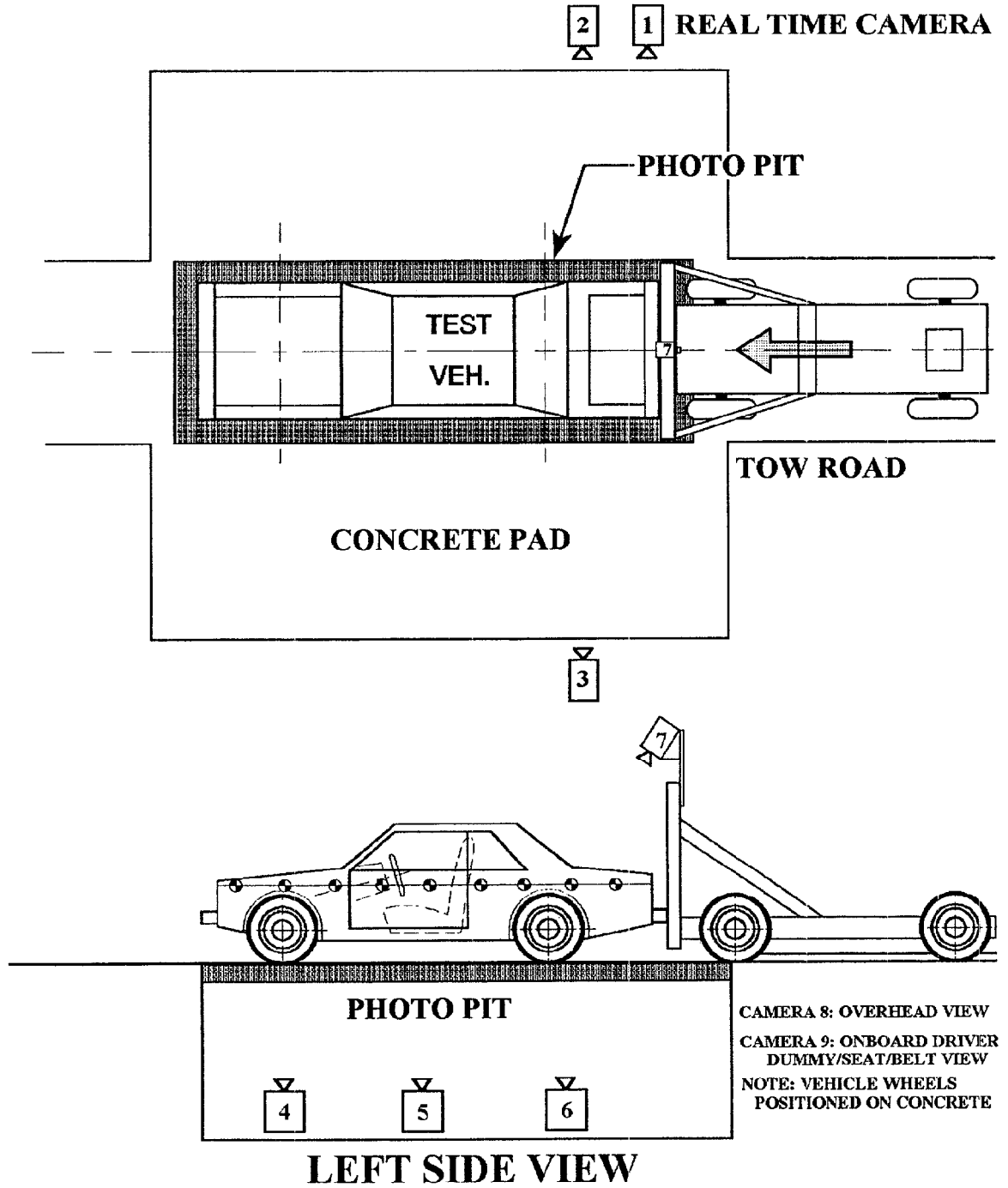


Table 8

HIGH-SPEED CAMERA LOCATIONSNHTSA No. : CY5900 Vehicle : 2000 Volvo S80 4-Door Sedan

CAMERA NO.	VIEW	CAMERA POSITIONS (inches)*			ANGLE** (degrees)	LENS (mm)	SPEED (fps)
		X	Y	Z			
1	Real-Time Camera	-	-	-	-	-	24
2	Right Side View	-536.0	52.4	42.5	0	25	1000
3	Left Side View	533.0	79.5	48.0	0	25	1000
4	Vehicle Front Underbody View	0	145.3	-77.0	90	13	1000
5	Vehicle Mid-Section Underbody View	0	88.0	-77.0	90	13	1025
6	Vehicle Rear Underbody View	0	29.5	-77.0	90	13	990
7	Moving Barrier View	0	0	99.0	-105	13	1000
8	Overhead Overall View	-20.0	0	386.0	-90	13	1000
9	Onboard Driver Dummy/Seat/Belt View	-	-	-	-	8	650

* X = film plant to monorail centerline (+ to left of rail)

Y = film plane to impact location (+ ahead of impact location)

Z = film plane to ground (+ above ground)

** = referenced to horizontal plane

Appendix A
PHOTOGRAPHS

LIST OF PHOTOGRAPHS

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A-5	PRE-TEST RIGHT SIDE VIEW	A-7
A-6	POST-TEST RIGHT SIDE VIEW	A-8
A-7	PRE-TEST REAR VIEW	A-9
A-8	POST-TEST REAR VIEW	A-10
A-9	PRE-TEST LEFT FRONT THREE-QUARTER VIEW	A-11
A-10	POST-TEST LEFT FRONT THREE-QUARTER VIEW	A-12
A-11	PRE-TEST RIGHT REAR THREE-QUARTER VIEW	A-13
A-12	POST-TEST RIGHT REAR THREE-QUARTER VIEW	A-14
A-13	PRE-TEST FRONT UNDERBODY VIEW	A-15
A-14	POST-TEST FRONT UNDERBODY VIEW	A-16
A-15	PRE-TEST REAR UNDERBODY VIEW	A-17
A-16	POST-TEST REAR UNDERBODY VIEW	A-18
A-17	CERTIFICATION PLACARD	A-19
A-18	TIRE PLACARD	A-20
A-19	ROLLOVER 90°	A-21
A-20	ROLLOVER 180°	A-22
A-21	ROLLOVER 270°	A-23
A-22	ROLLOVER 360°	A-24



Figure A-1: PRE-TEST FRONT VIEW



Figure A-2: POST-TEST FRONT VIEW

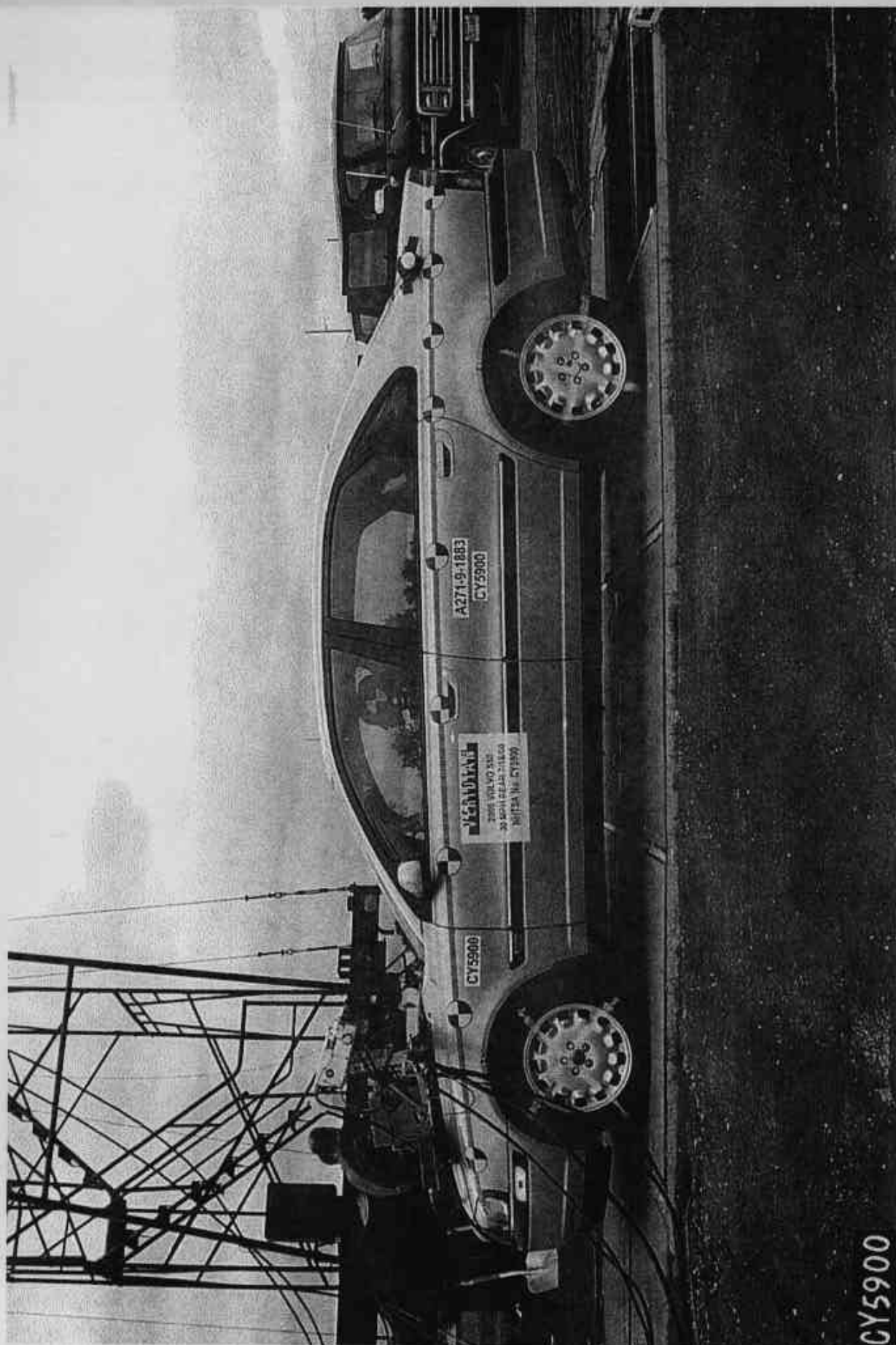


Figure A-3: PRE-TEST LEFT SIDE VIEW



Figure A-4: POST-TEST LEFT SIDE VIEW



Figure A-5. PRE-TEST RIGHT SIDE VIEW

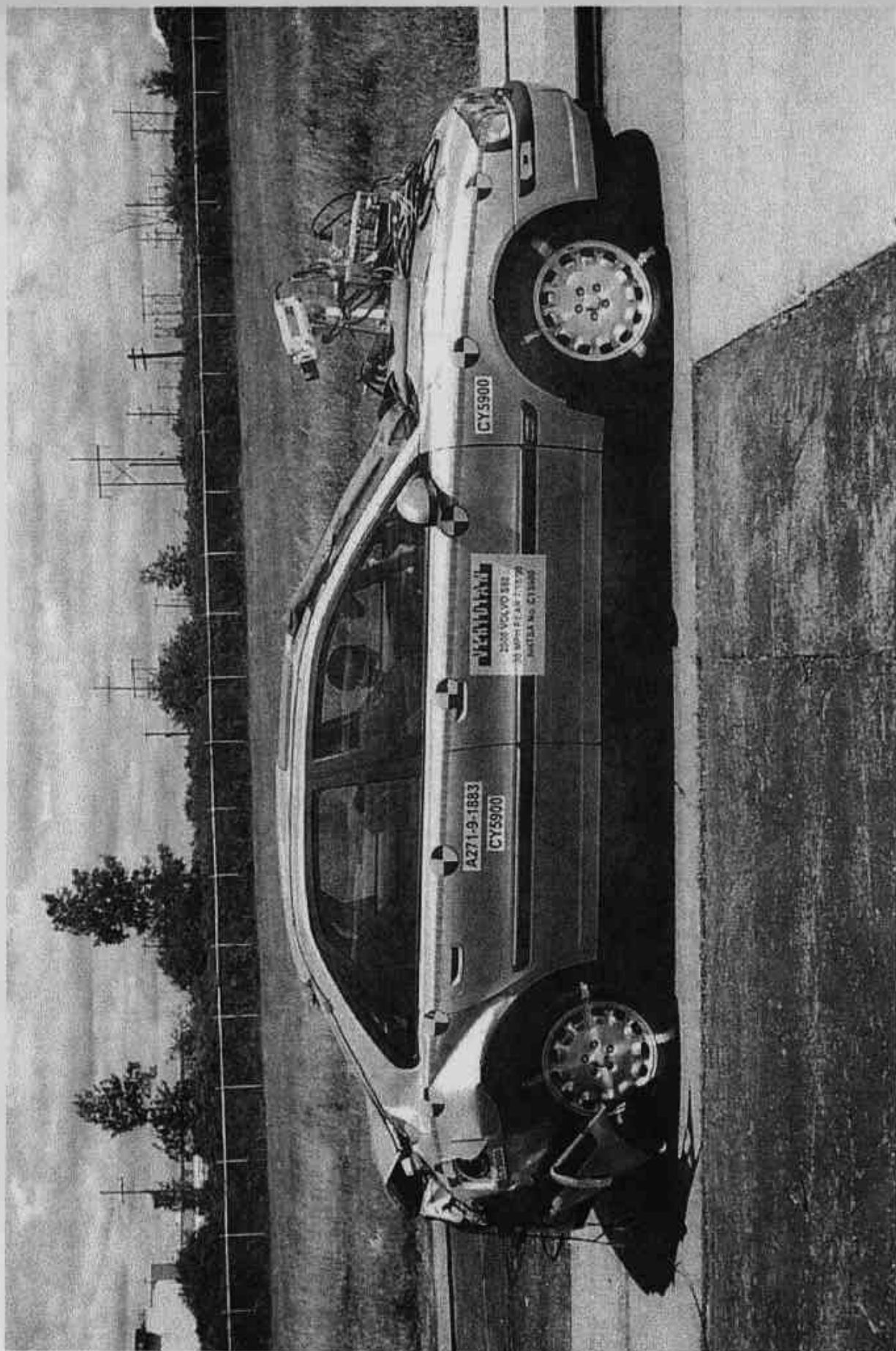


Figure A-6: POST-TEST RIGHT SIDE VIEW



Figure A-7: PRE-TEST REAR VIEW

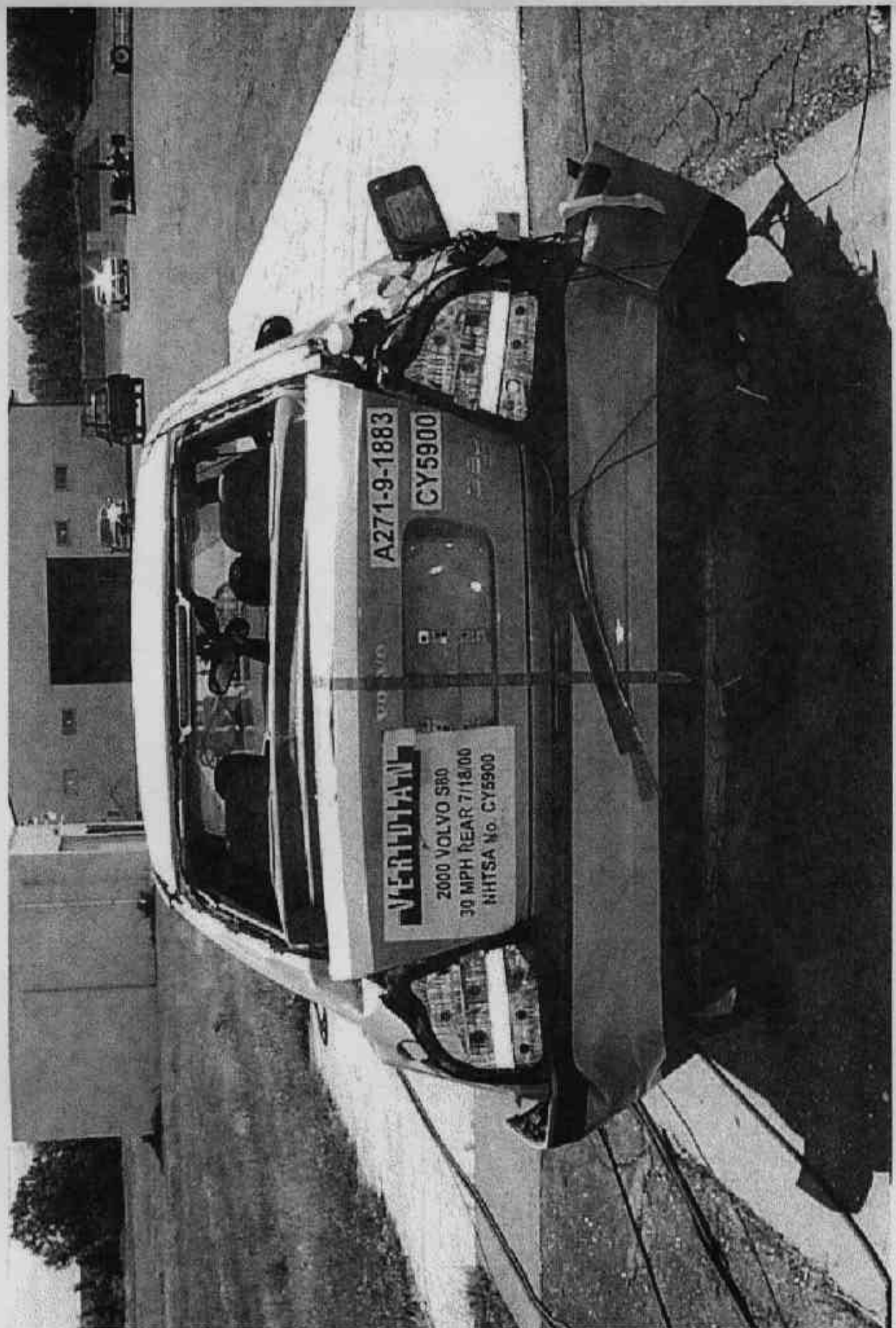


Figure A-8: POST-TEST REAR VIEW



Figure A-9: PRE-TEST LEFT FRONT THREE-QUARTER VIEW



Figure A-10: POST-TEST LEFT FRONT THREE-QUARTER VIEW



Figure A-11: PRE-TEST RIGHT REAR THREE-QUARTER VIEW



Figure A-12: POST-TEST RIGHT REAR THREE-QUARTER VIEW

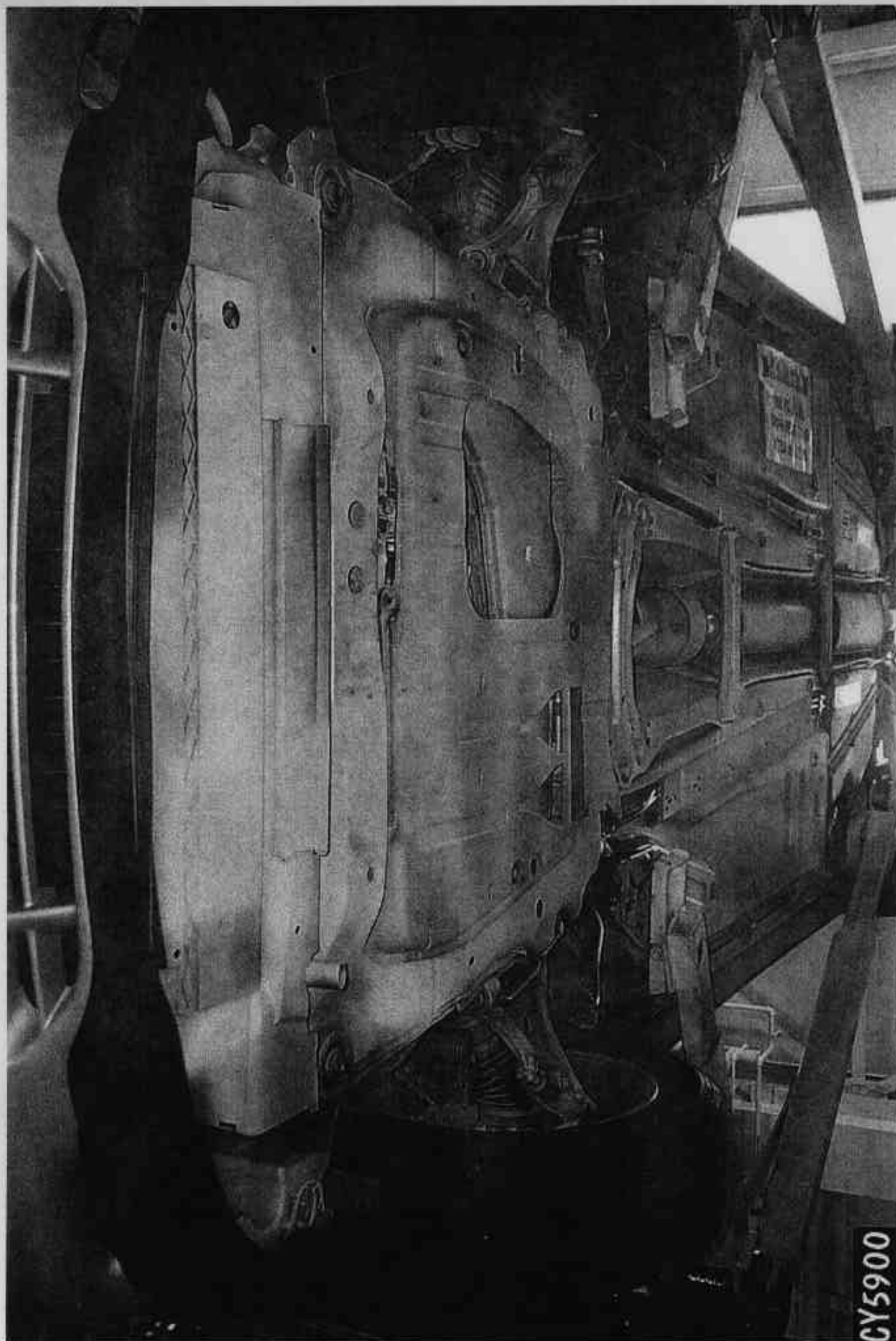


Figure A-13: PRE-TEST FRONT UNDERBODY VIEW

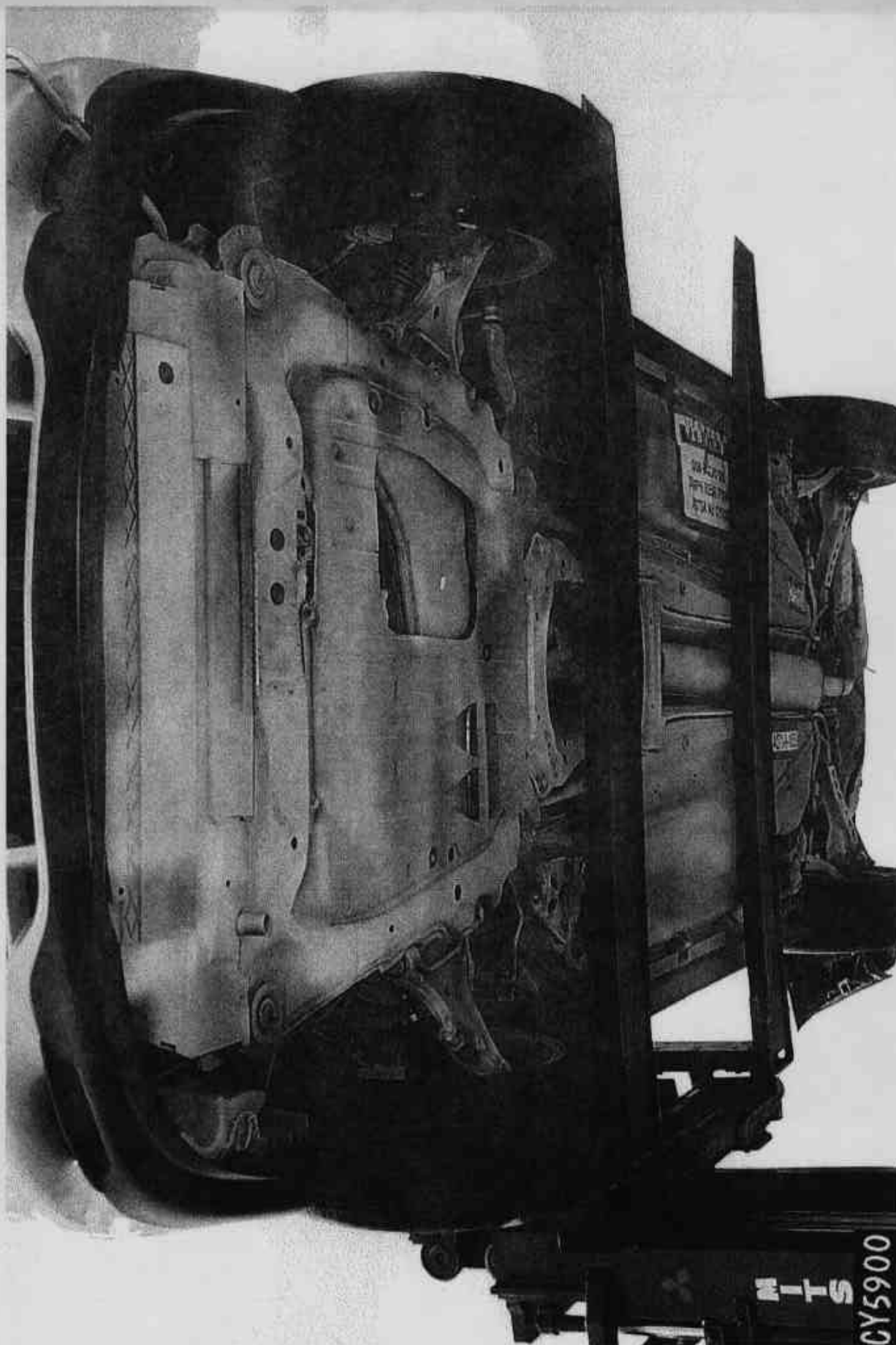


Figure A-14: POST-TEST FRONT UNDERBODY VIEW

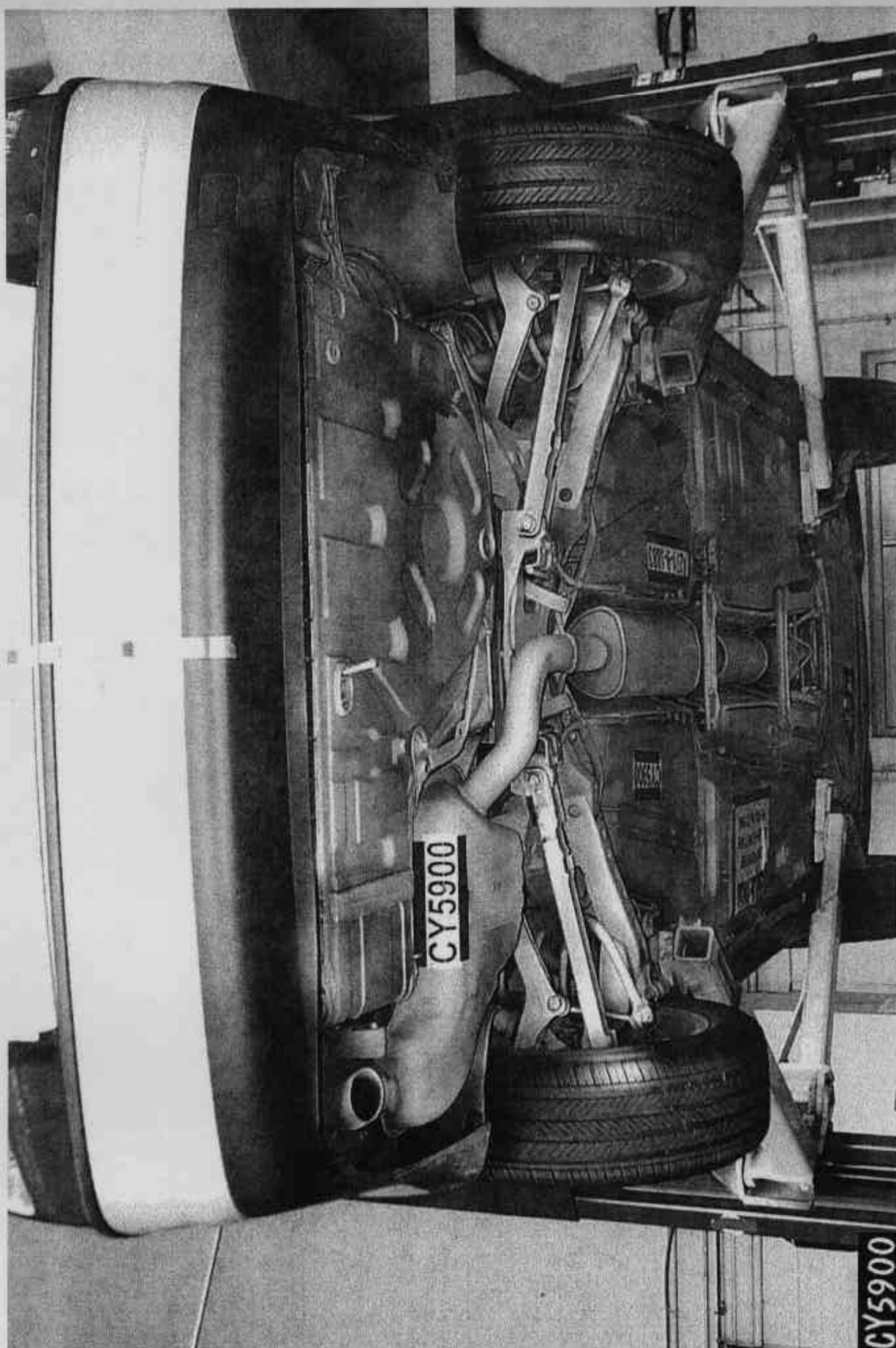


Figure A-15: PRE-TEST REAR UNDERBODY VIEW



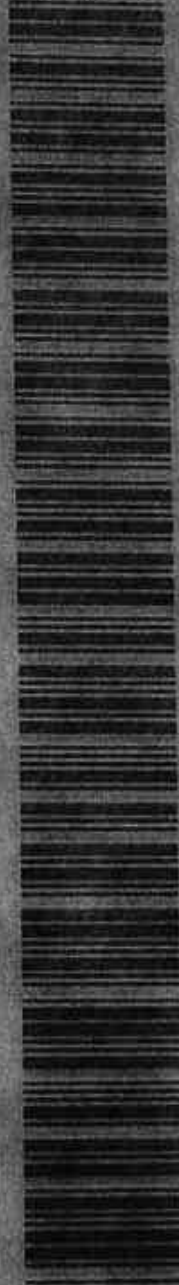
Figure A-16: POST-TEST REAR UNDERBODY VIEW

MFD. BY VOLVO GOTHENBURG SWEDEN

DATE: GV.W.R GA.W.R.FRONT GA.W.R.REAR
11/99 4608 2491 2293 LB

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

VIN YV1TS94DOY1112581 PASS.CAR



VOLVO

3514635

CY5900

Figure A-17: CERTIFICATION PLACARD

VEHICLE CAPACITY		OCCUPANTS		COLD TIRE PRESSURE		
WEIGHT		FRT	RR	TOTAL	FRONT	REAR
MAX	0890 LB	2	3	5	39	39 PSI
LOAD						

RECOMMENDED FOR FUEL ECONOMY

OPTIONAL PRESSURE

TIRE SIZE	2	1	3	29	29	PSI
215/55R16						

IF TIRES ARE HOT FROM DRIVING ADD 4 PSI. (28kPa) TO THESE RECOMMENDED PRESSURES

T125/80R17 SIZE SPARE TIRE INFLATION PRESSURE 60 PSI

SEE OWNERS MANUAL FOR ADDITIONAL INFORMATION.

VOLVO 3514949



IMPORTANT

STOP ENGINE BEFORE REFUELLING.
CLOSE CAP AFTER REFUELLING.

FAILURE TO FOLLOW THESE INSTRUCTIONS MAY CAUSE
ONBOARD DIAGNOSTIC SYSTEM TO MALFUNCTION AND
CHECK ENGINE LAMP TO ILLUMINATE.

SEE OWNER'S MANUAL.

VOLVO

9454010

CY5900

Figure A-18: TIRE PLACARD

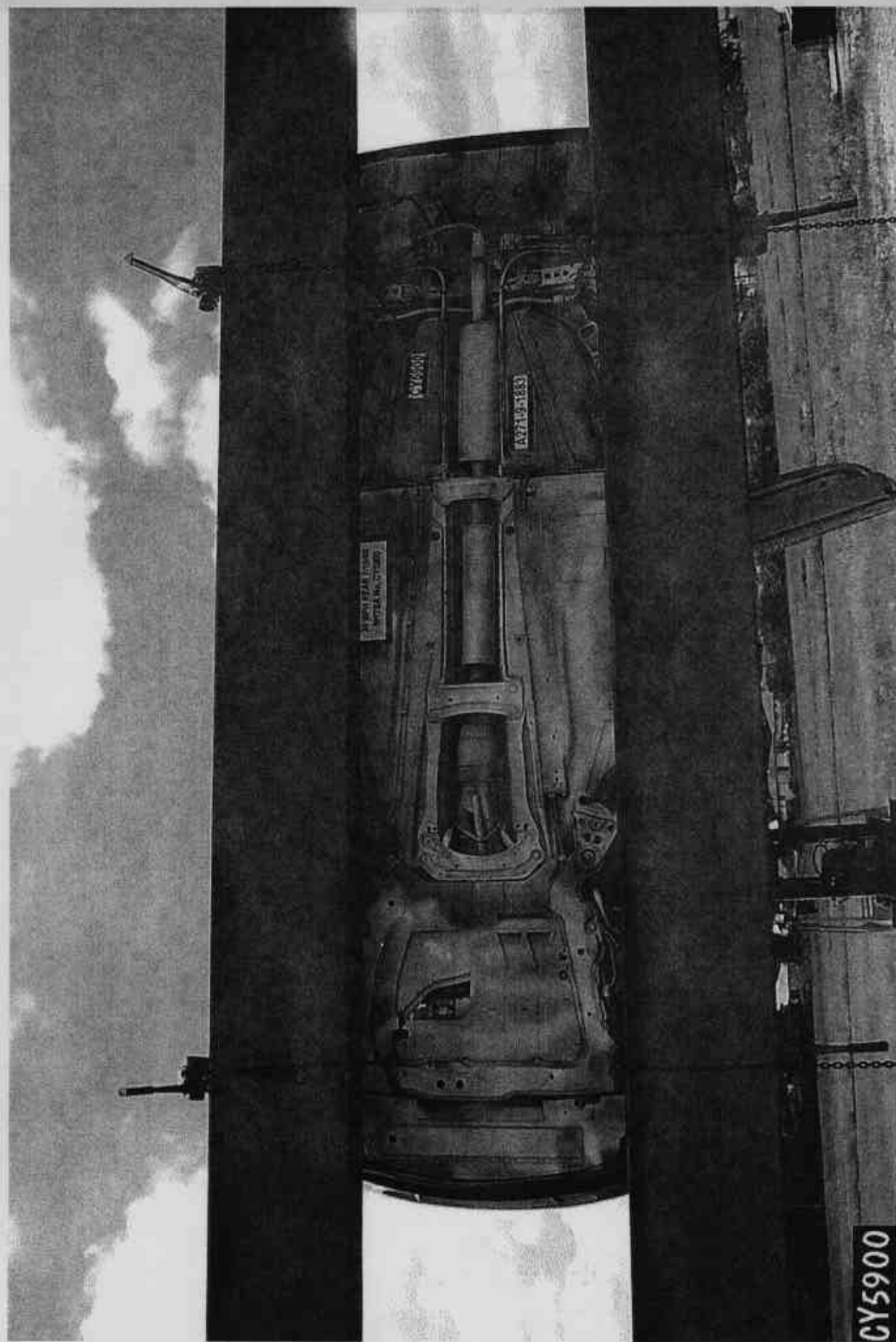


Figure A-19: ROLLOVER 90°



Figure A-20: ROLLOVER 180°



Figure A-21: ROLLOVER 270°



Figure A-22: ROLLOVER 360°

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

(REAR IMPACT ONLY)

FACILITY: VERP
TEST#: A271-9-1883

DATE: July 18, 2000

TITLE: NHTSA FMVSS 301 Test #9 - 2000 Volvo S80 CY5900

CHN NAME	Unit	Max	msec	Min	msec	Filt	Comment
25 Acc #1 Left Rear Xmember X	g	22.1	39.3	-1.5	91.0	CFC_60	
28 Acc #2 Right Rear Xmember X	g	19.7	39.5	-1.4	159.8	CFC_60	
31 Acc #3 Upper Seatback X	g	73.6	64.5	-16.8	53.2	CFC_60	
32 Acc #4 Lower Seatback X	g	69.4	63.9	-12.9	52.4	CFC_60	
36 P1 Head x	g	34.5	134.2	-4.1	345.8	CFC_1000	
37 P1 Head y	g	0.9	187.4	-1.4	143.8	CFC_1000	
38 P1 Head z	g	17.7	117.3	-2.2	67.2	CFC_1000	
39 P1 Head Resultant	g	34.8	133.5	0.0	4.4	CFC_1000	
40 P1 Upper Neck Fx	lbf	37.7	347.6	-90.3	135.1	CFC_1000	
41 P1 Upper Neck Fy	lbf	15.6	136.9	-7.1	202.6	CFC_1000	
42 P1 Upper Neck Fz	lbf	21.4	67.2	-290.7	129.1	CFC_1000	
43 P1 Upper Neck F Resultant	lbf	299.9	129.2	0.0	-36.7	CFC_1000	
44 P1 Upper Neck Mx	in-lb	38.2	87.9	-38.5	72.5	CFC_600	
45 P1 Upper Neck My	in-lb	96.3	200.5	-367.1	136.6	CFC_600	
46 P1 Upper Neck Mz	in-lb	21.4	255.4	-25.4	189.2	CFC_600	
47 P1 Upper Neck M Resultant	in-lb	368.6	136.6	0.0	-15.1	CFC_600	
48 P1 Chest x	g	12.6	115.1	-2.2	322.9	CFC_180	
49 P1 Chest y	g	1.8	82.3	-1.7	98.3	CFC_180	
50 P1 Chest z	g	7.5	79.2	-1.9	121.2	CFC_180	
51 P1 Chest Resultant	g	12.8	88.3	0.0	-43.1	CFC_180	
52 P1 Chest Compression	in	0.0	198.7	-0.0	118.5	CFC_600	
53 P1 Pelvic x	g	21.9	79.1	-4.2	153.1	CFC_1000	
54 P1 Pelvic y	g	6.1	78.6	-4.6	71.5	CFC_1000	
55 P1 Pelvic z	g	13.7	79.4	-7.7	78.9	CFC_1000	
56 P1 Pelvic Resultant	g	24.2	79.3	0.0	-29.3	CFC_1000	
57 P1 Lap Belt	lbf	25.0	92.3	-3.9	224.5	CFC_60	

=====

P1 HIC(36 ms): 141.6

t1: 113.2 msec

t2: 149.2 msec

Duration: 36.0 msec

Average Acceleration: 27.4 g

Input channels: P1 Head x (2) CFC_1000

P1 Head y (3) CFC_1000

P1 Head z (4) CFC_1000

P1 CLIP(3 ms): 12.6 g

t1: 86.9 msec

t2: 89.9 msec

Duration: 3.0 msec

P1 CSI: 28.6

Input channels: P1 Chest x (11) CFC_180

P1 Chest y (12) CFC_180

P1 Chest z (13) CFC_180

P1 CHEST DISP: Max: 0.0 in 198.8 msec

Min: -0.0 in 118.5 msec

Input channel: P1 Chest Compression (14) CFC_600

TEST NO. CY5900

VEHICLE

SAE FILTER CHANNEL CLASS

60

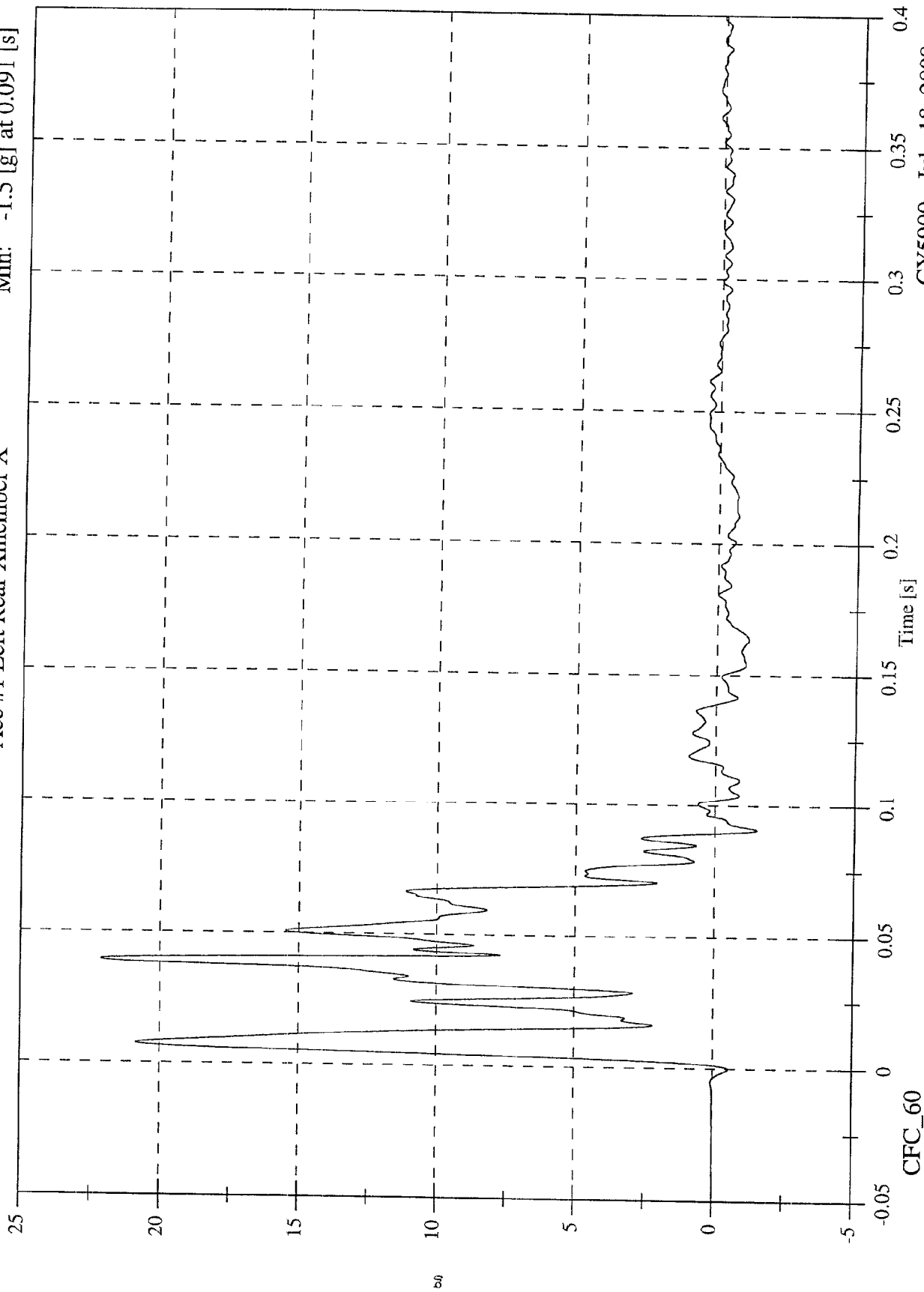
Note: Angular seatback position is measured in degrees of rotation from the initial (design) position.

NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Acc #1 Left Rear Xmember X

Max: 22.1 [g] at 0.039 [s]

Min: -1.5 [g] at 0.091 [s]

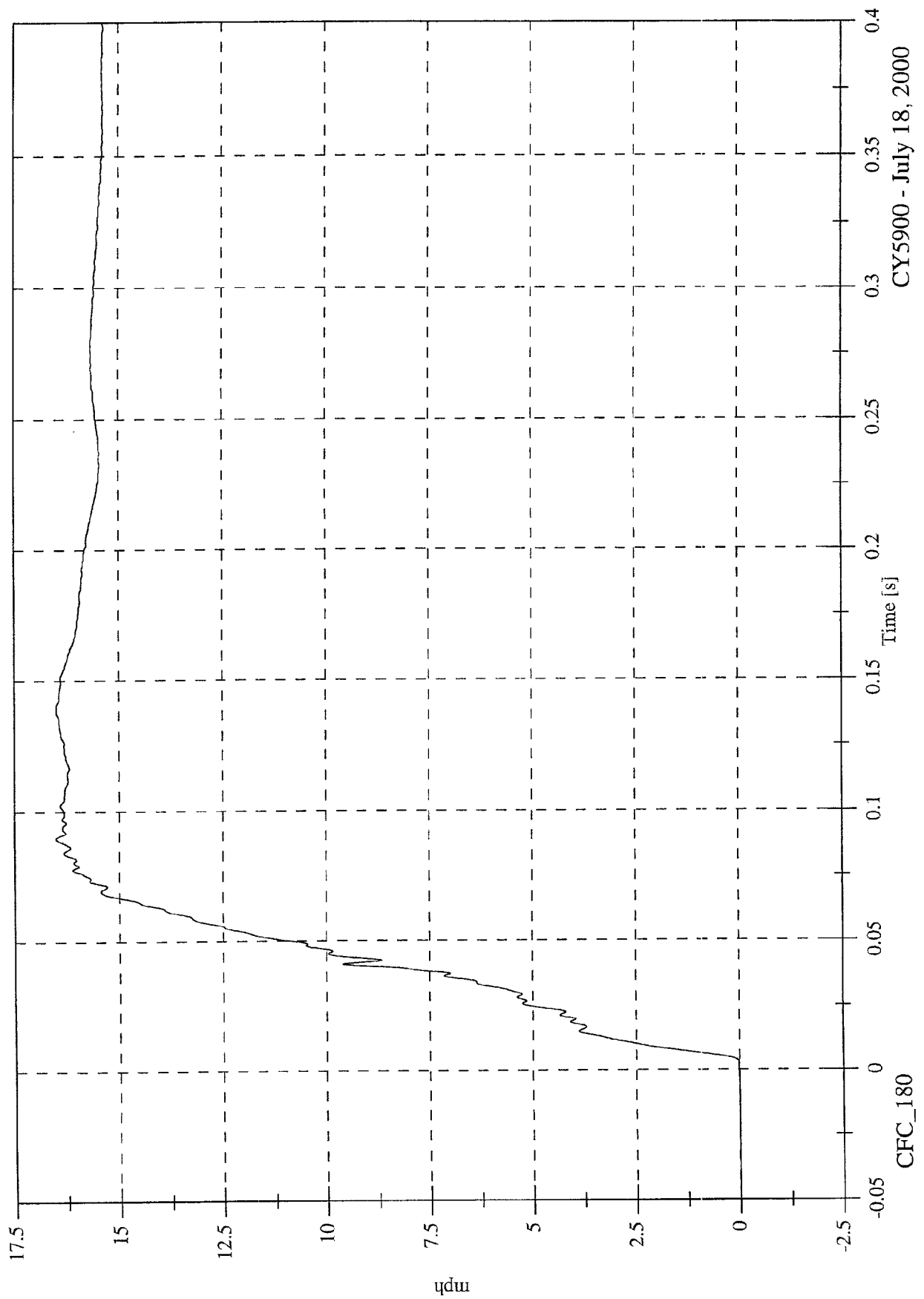


CY5900 - July 18, 2000

NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 16.5 [mph] at 0.089 [s]
Min: -0.0 [mph] at -0.043 [s]

Acc #1 Left Rear Xmember X Velocity

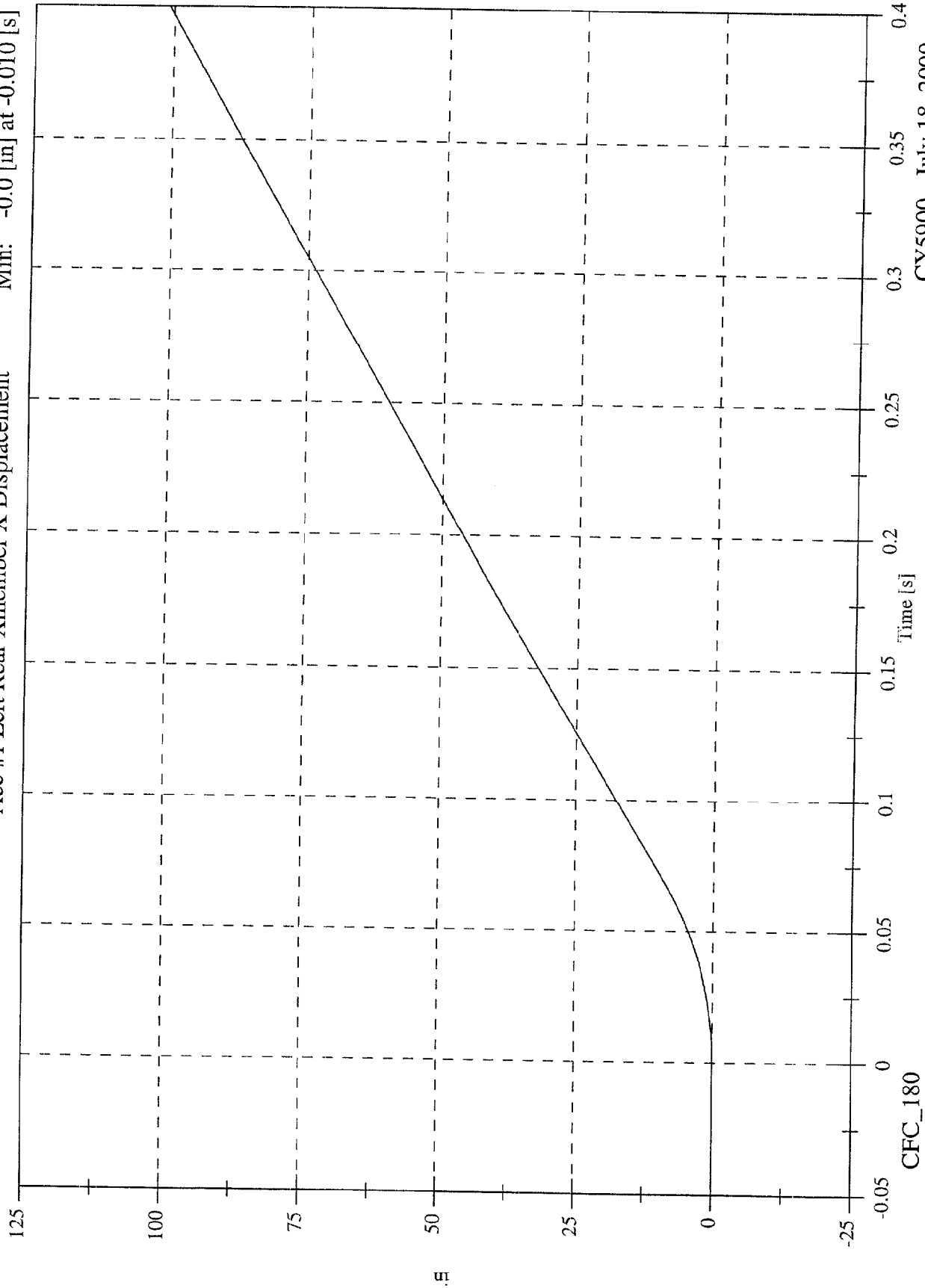


CFC_180

NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 100.8 [in] at 0.400 [s]
 Min: -0.0 [in] at -0.010 [s]

Acc #1 Left Rear Xmember X Displacement

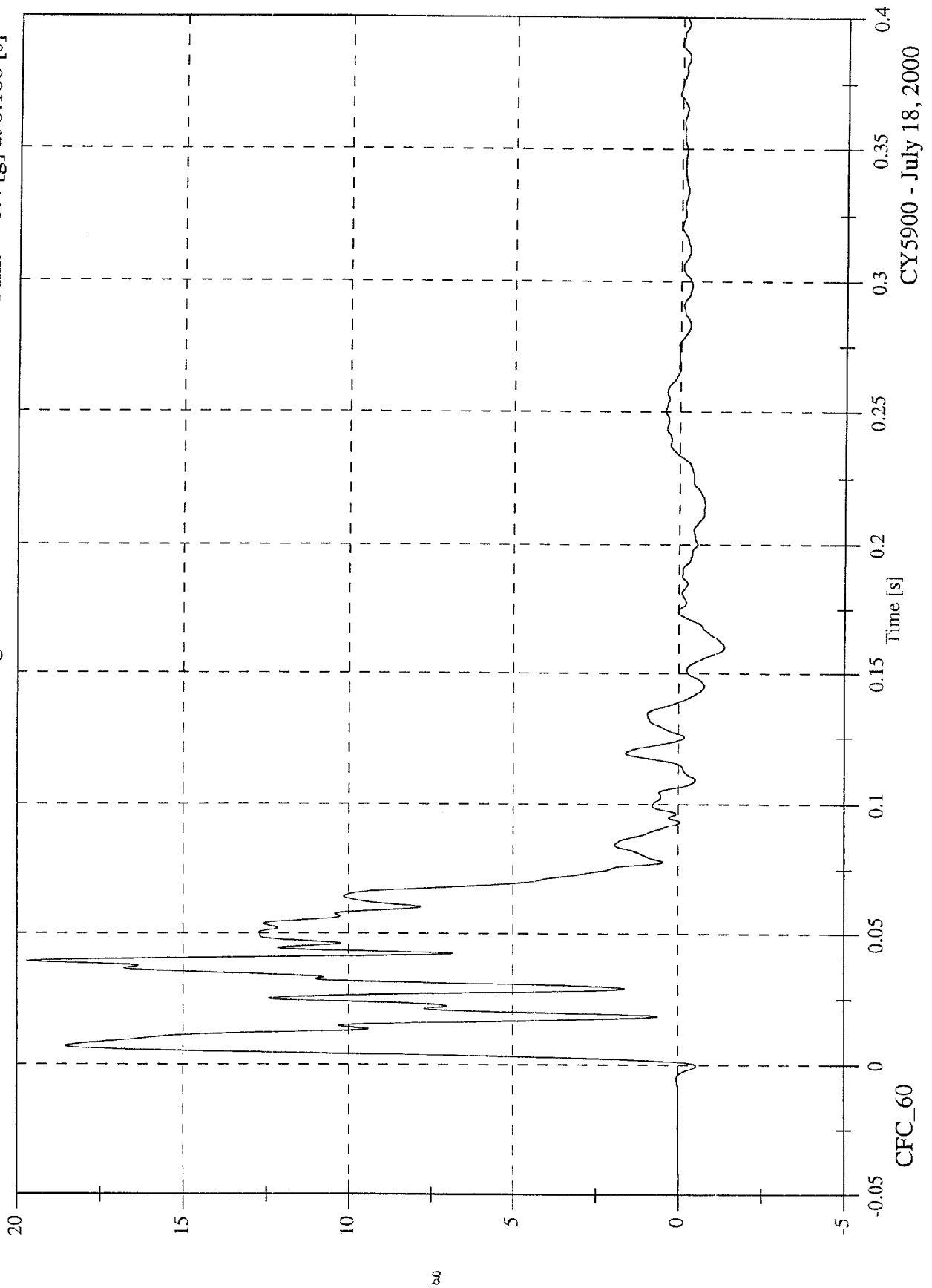


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NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Acc #2 Right Rear Xmember X

Max: 19.7 [g] at 0.039 [s]
Min: -1.4 [g] at 0.160 [s]

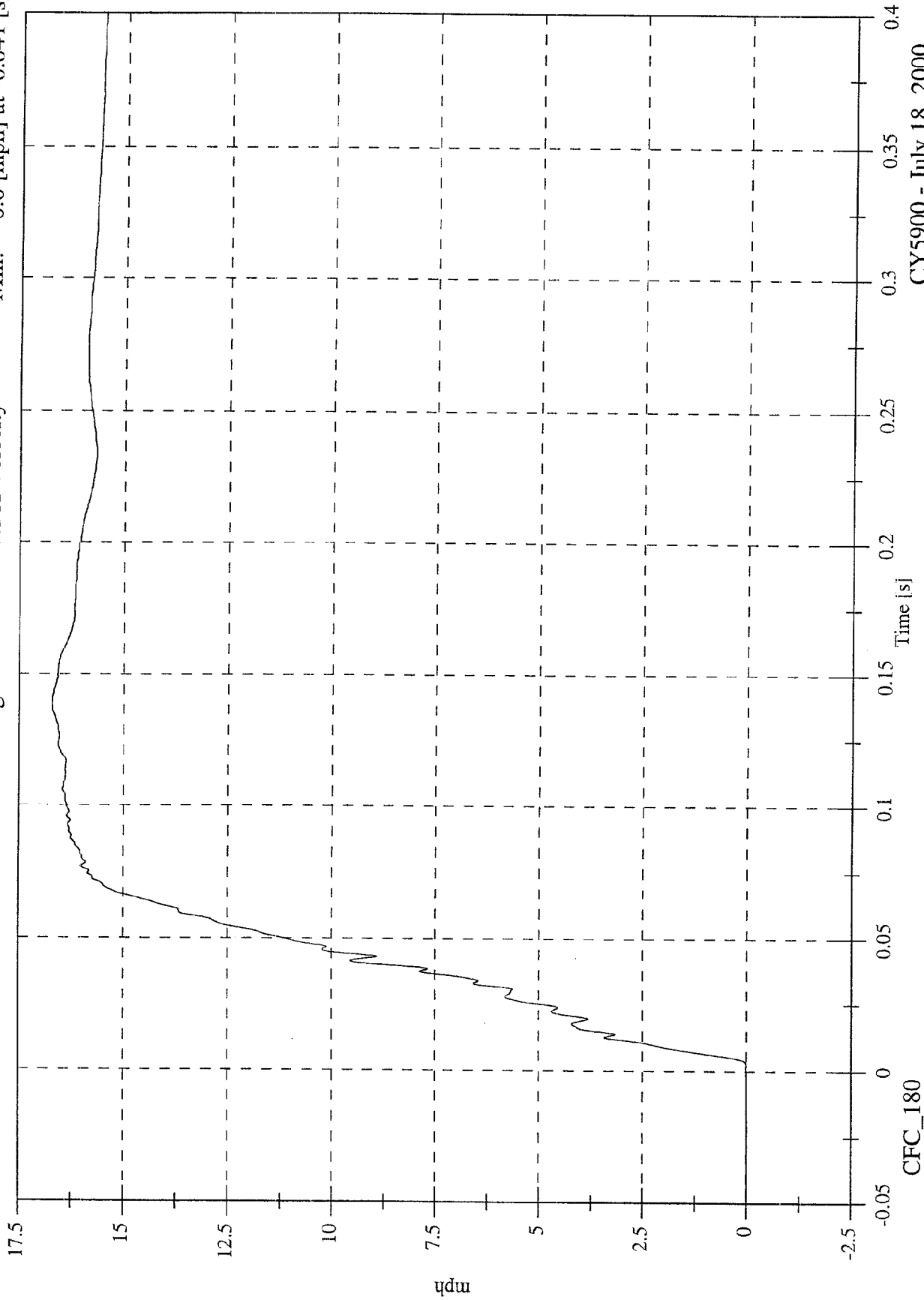


NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Acc #2 Right Rear Xmember X Velocity

Max: 16.7 [mph] at 0.139 [s]

Min: -0.0 [mph] at -0.041 [s]

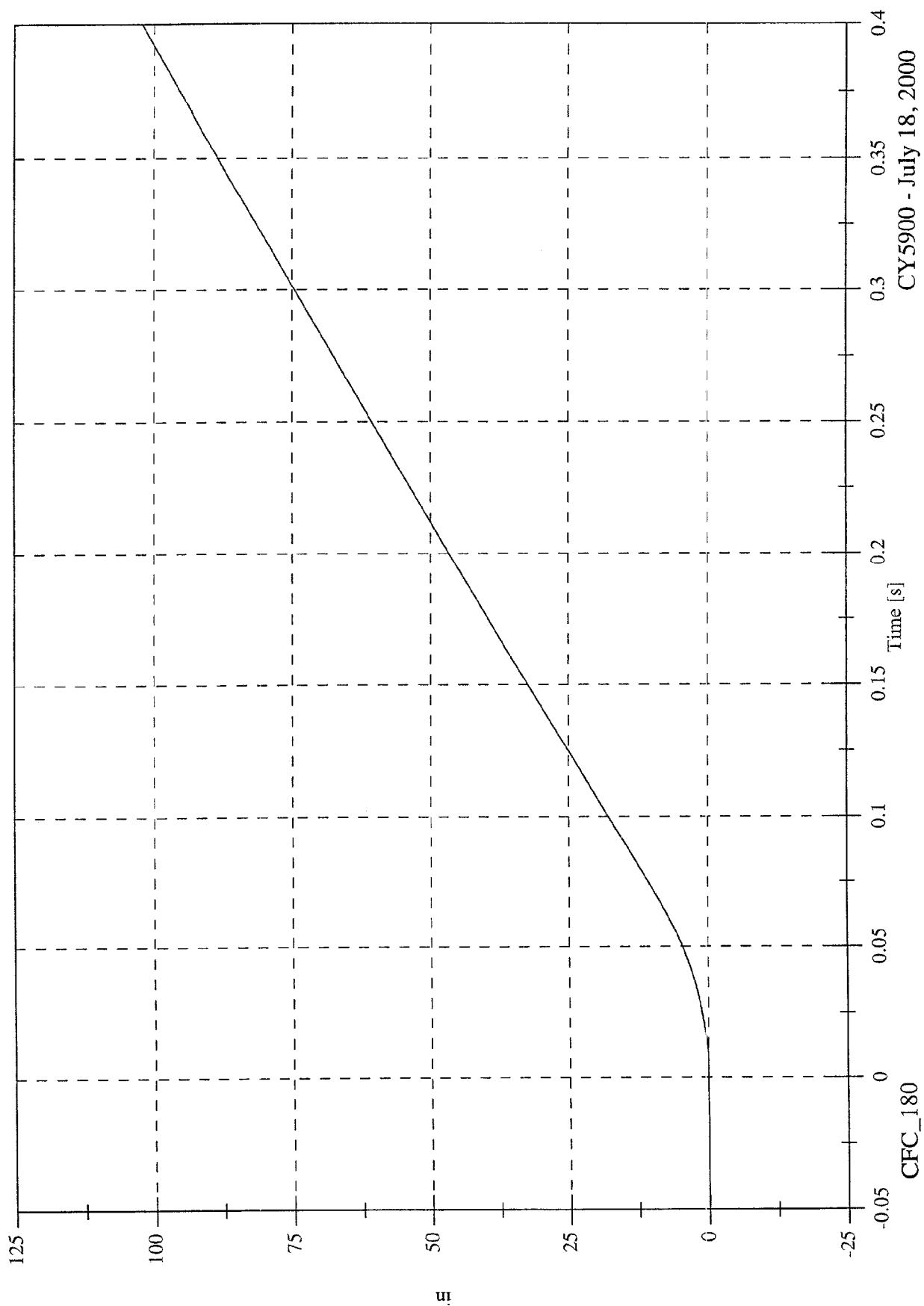


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NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 102.1 [in] at 0.400 [s]
Min: -0.0 [in] at -0.010 [s]

Acc #2 Right Rear Xmember X Displacement



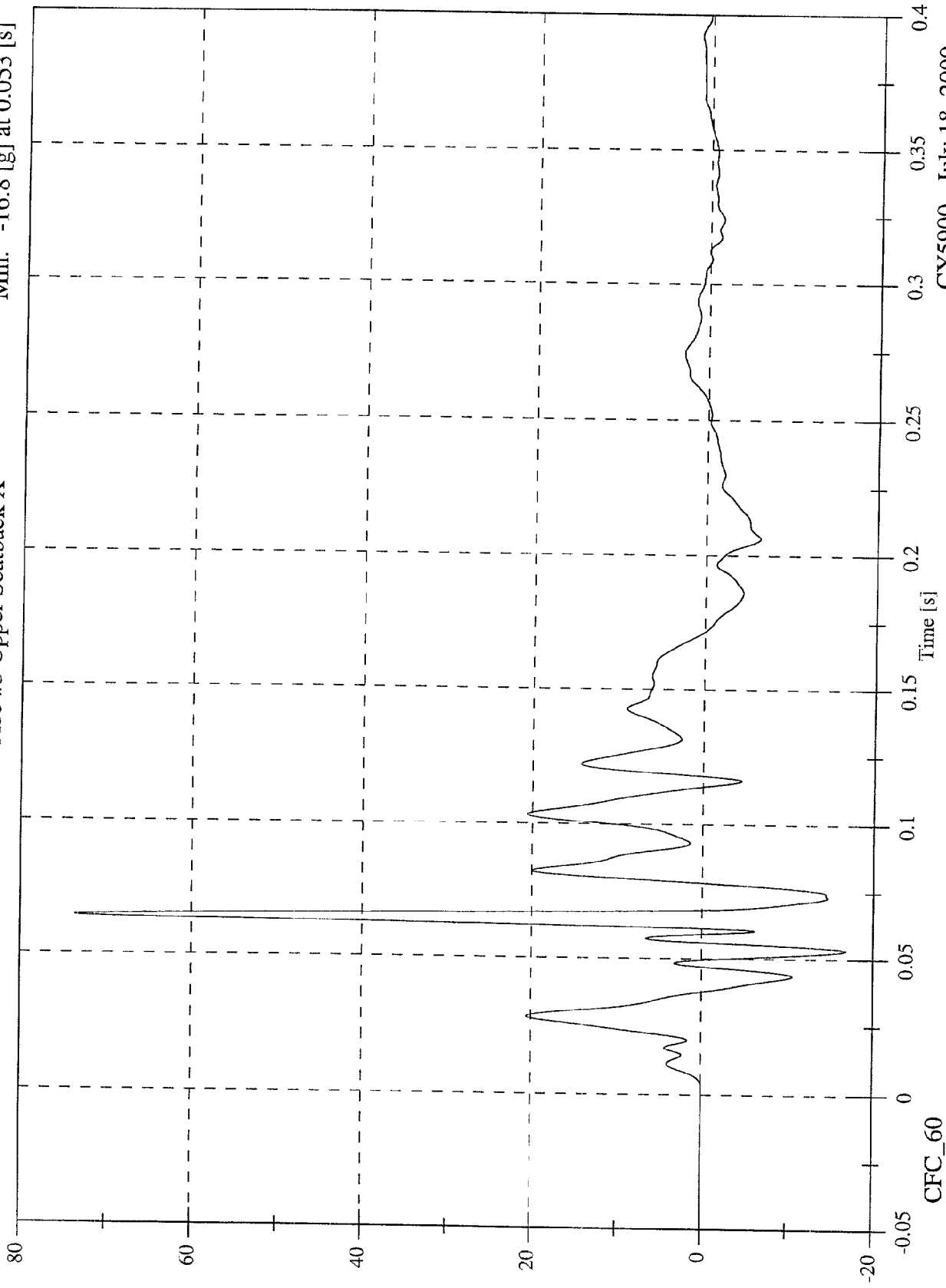
CFC_180

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NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Acc #3 Upper Seatback X

Max: 73.6 [g] at 0.064 [s]
Min: -16.8 [g] at 0.053 [s]

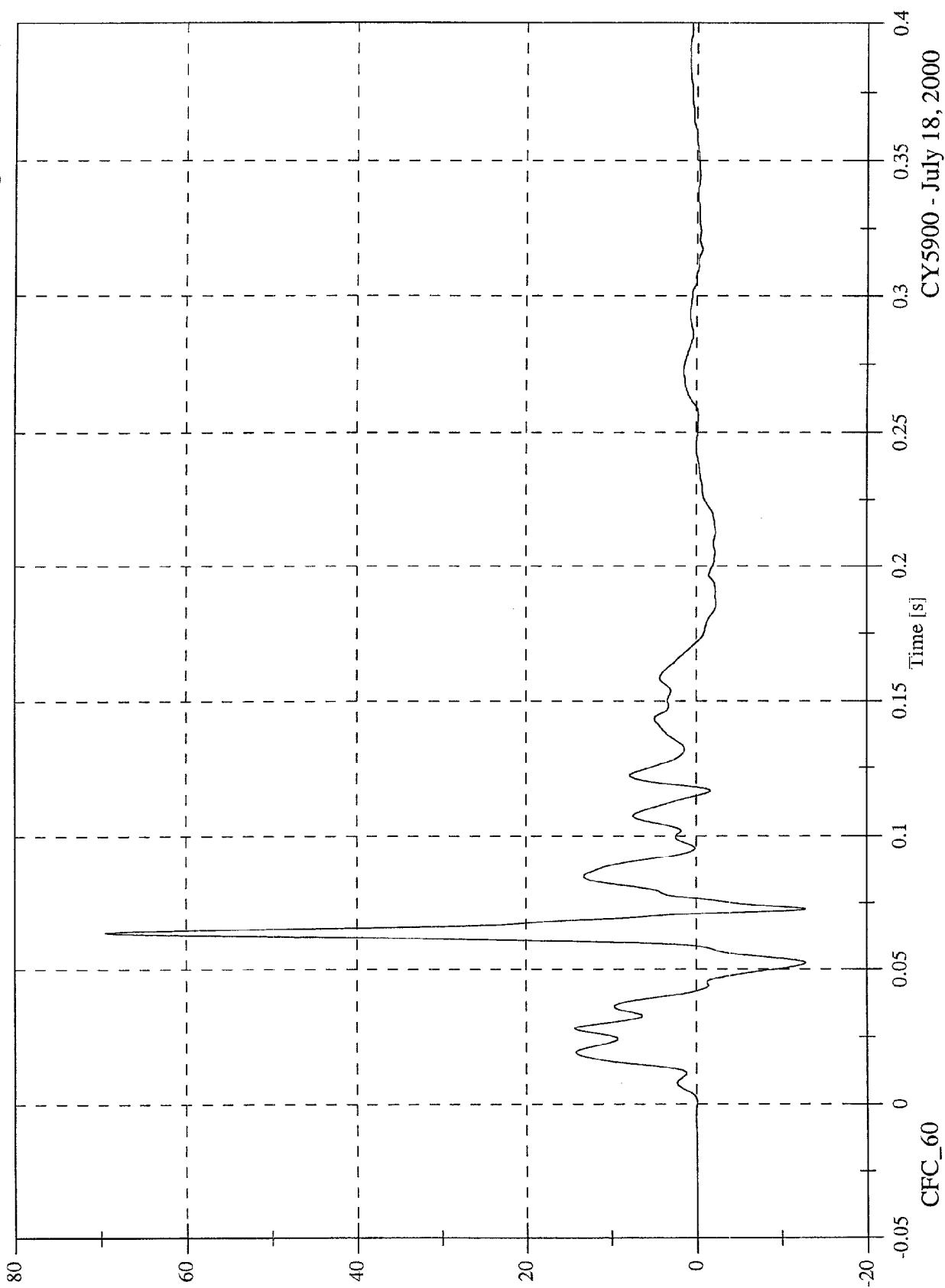


CY5900 - July 18, 2000

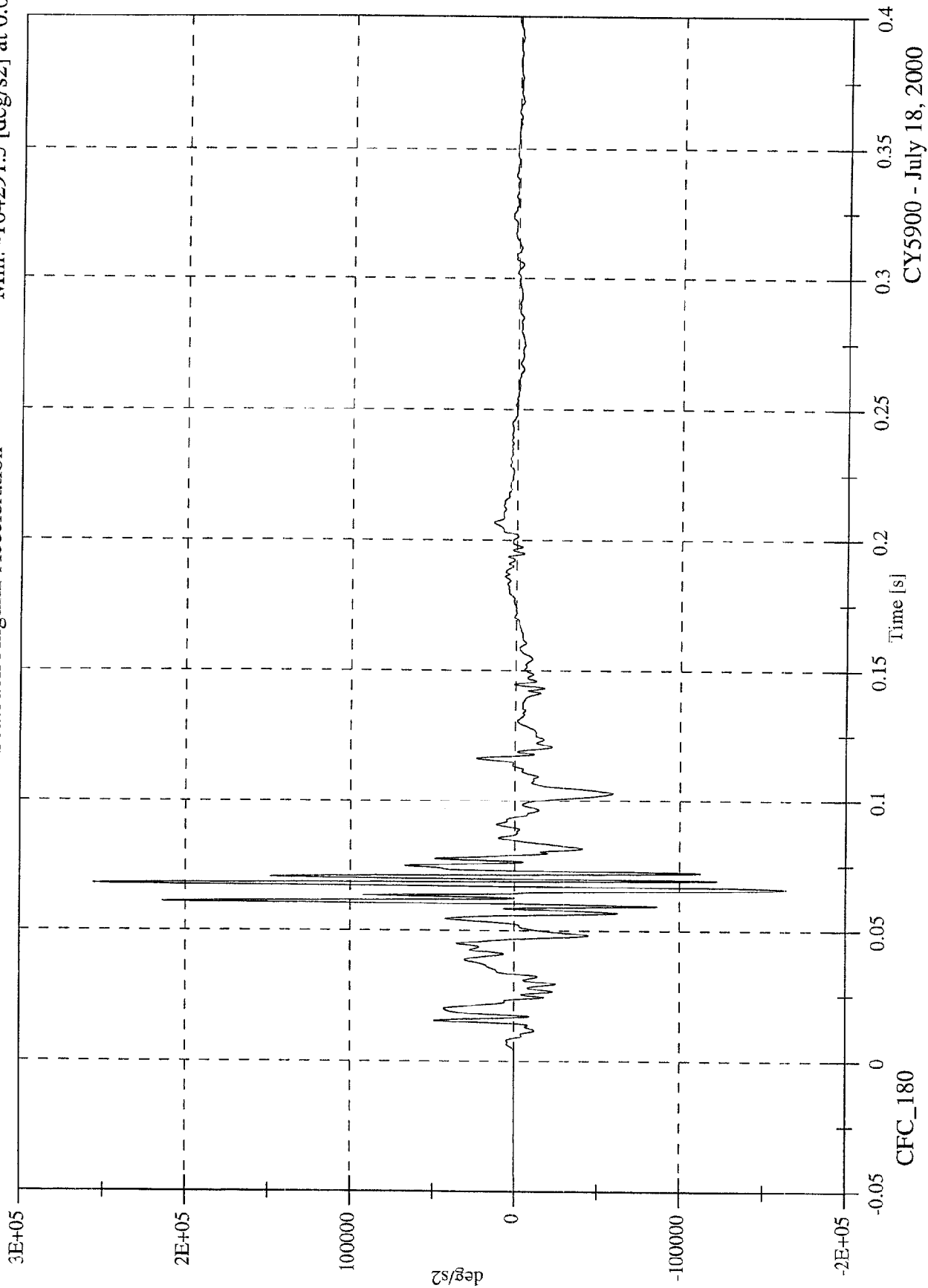
NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Acc #4 Lower Seatback X

Max: 69.4 [g] at 0.064 [s]
Min: -12.9 [g] at 0.052 [s]



NHTSA FMVSS 301 Test #9 - 2000 Volvo S80
 Seatback Angular Acceleration
 Max: 255659.6 [deg/s²] at 0.068 [s]
 Min: -164291.5 [deg/s²] at 0.066 [s]

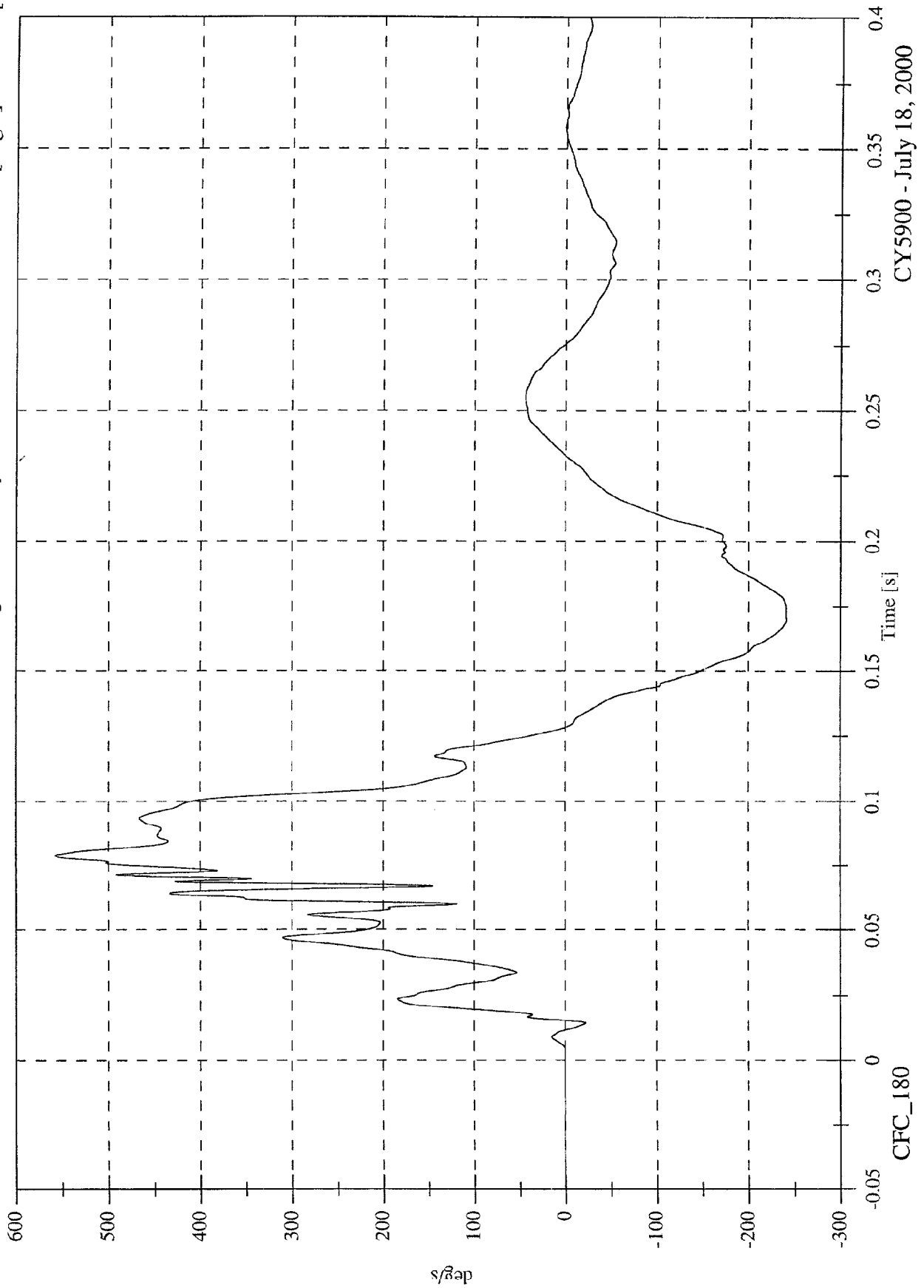


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NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 557.4 [deg/s] at 0.079 [s]
 Min: -241.6 [deg/s] at 0.170 [s]

Seatback Angular Velocity

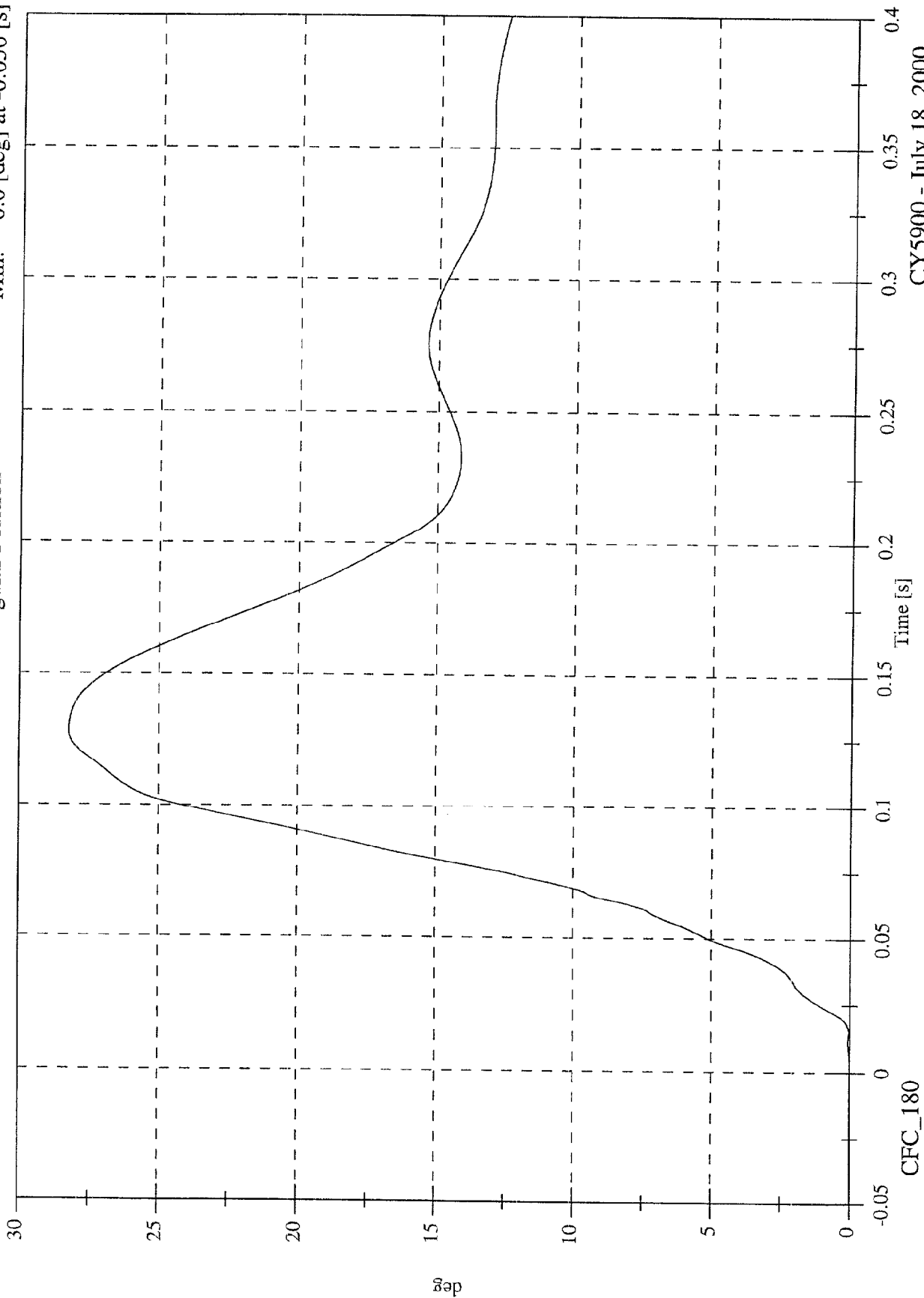


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NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 28.2 [deg] at 0.128 [s]
 Min: 0.0 [deg] at -0.050 [s]

Seatback Angular Position



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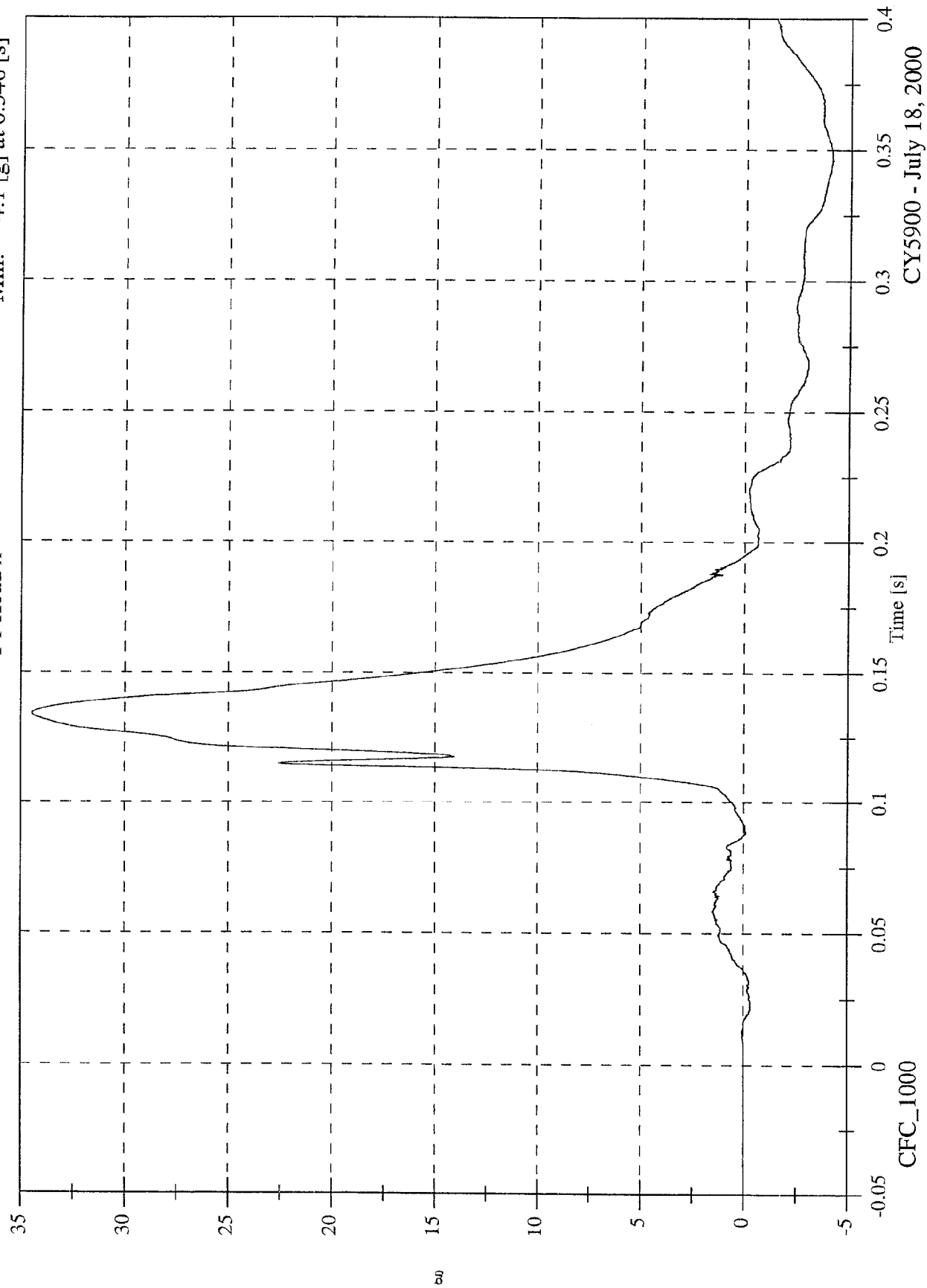
TEST NO. CY5900

DRIVER DUMMY (Pos. 1)	SAE FILTER CHANNEL CLASS
Head Accelerations	1000
Chest Accelerations	180
Pelvic Accelerations	1000
Upper Neck Forces	1000
Upper Neck Moments	600
Belt Forces	60
Belt Spoolout	60

NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 34.5 [g] at 0.134 [s]
 Min: -4.1 [g] at 0.346 [s]

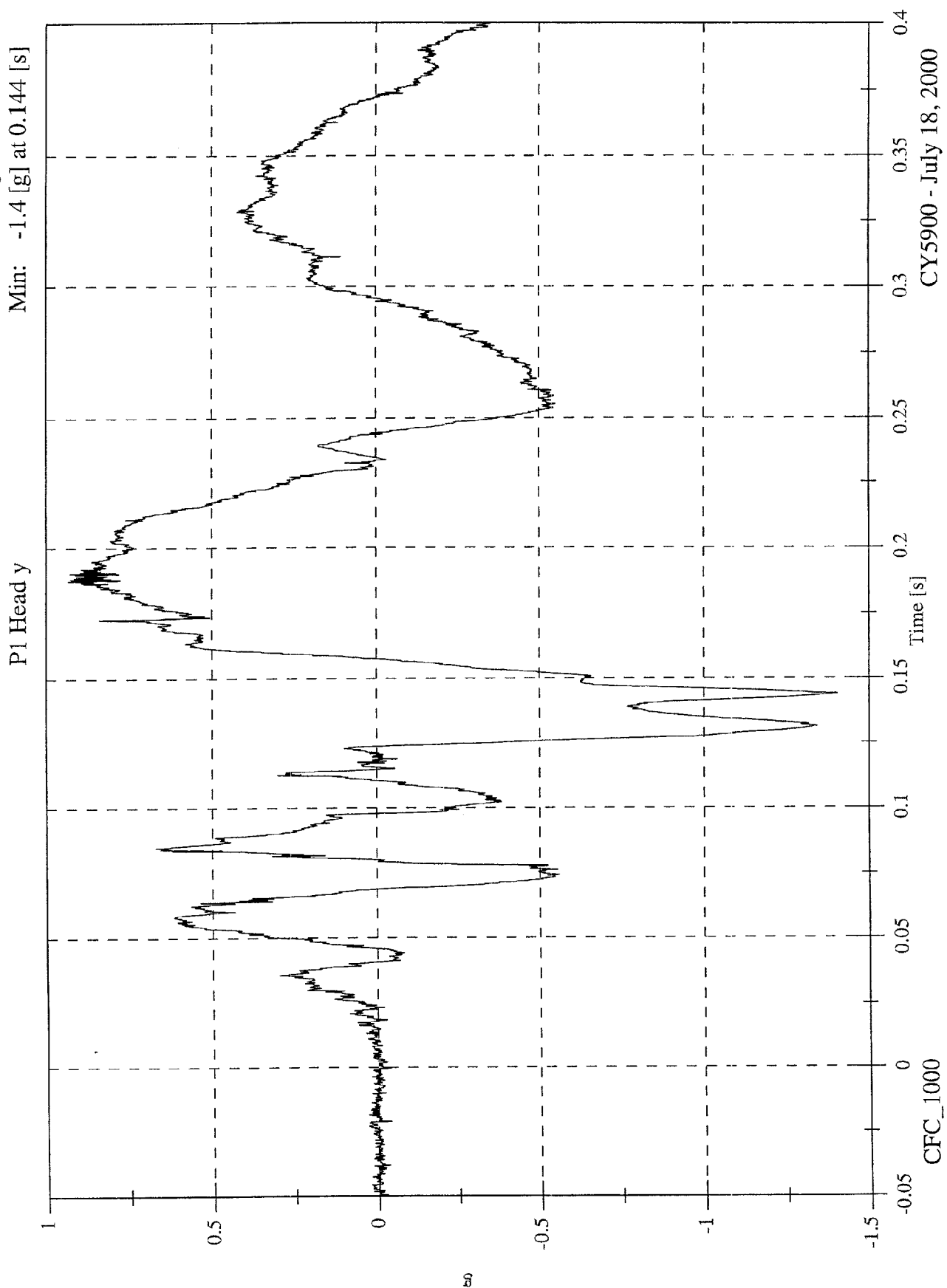
P1 Head x



CY5900 - July 18, 2000

NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

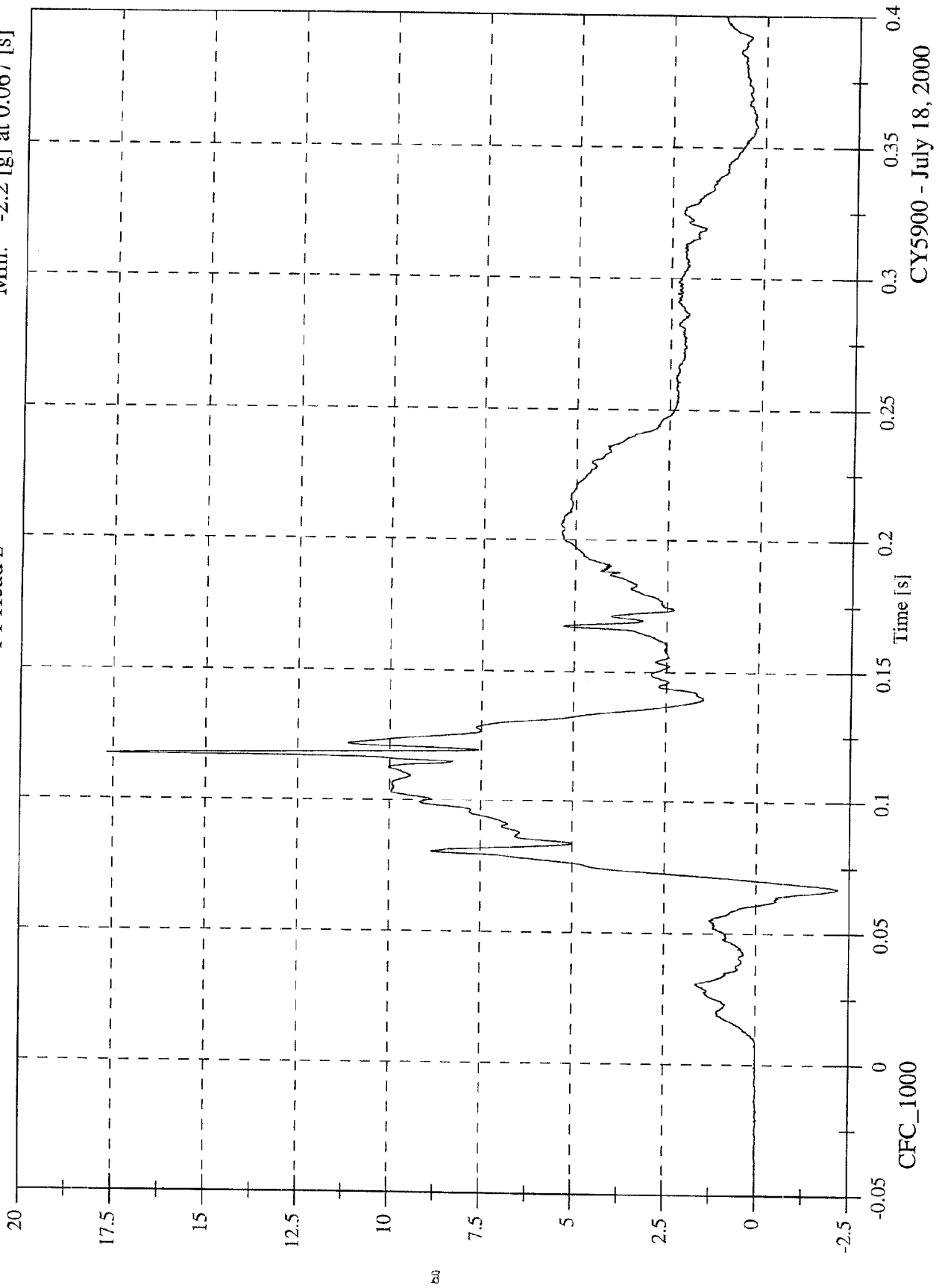
Max: 0.9 [g] at 0.187 [s]
 Min: -1.4 [g] at 0.144 [s]



NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 17.7 [g] at 0.117 [s]
 Min: -2.2 [g] at 0.067 [s]

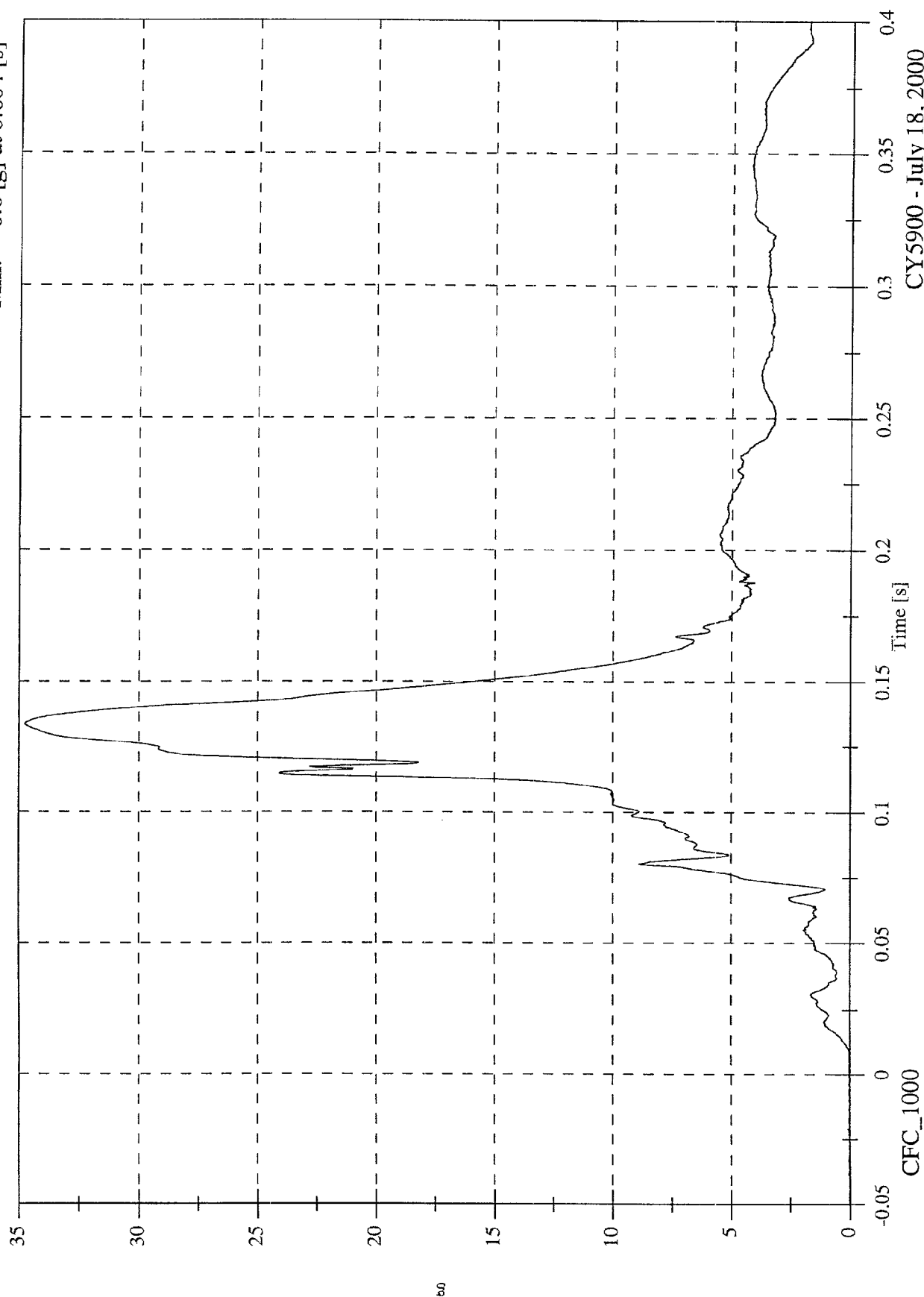
P1 Head z



NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 34.8 [g] at 0.134 [s]
Min: 0.0 [g] at 0.004 [s]

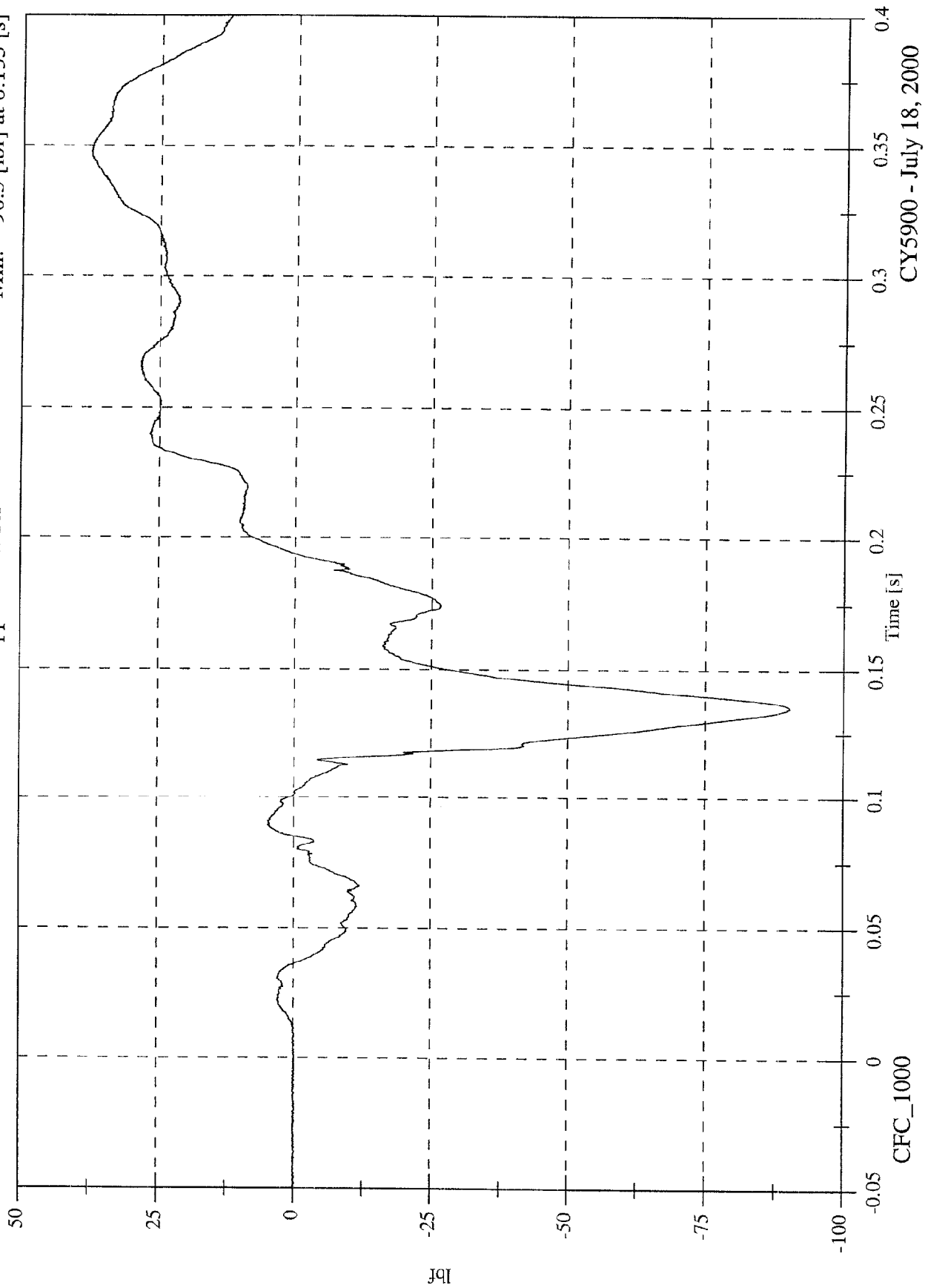
P1 Head Resultant



NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

P1 Upper Neck Fx

Max: 37.7 [lbf] at 0.348 [s]
Min: -90.3 [lbf] at 0.135 [s]

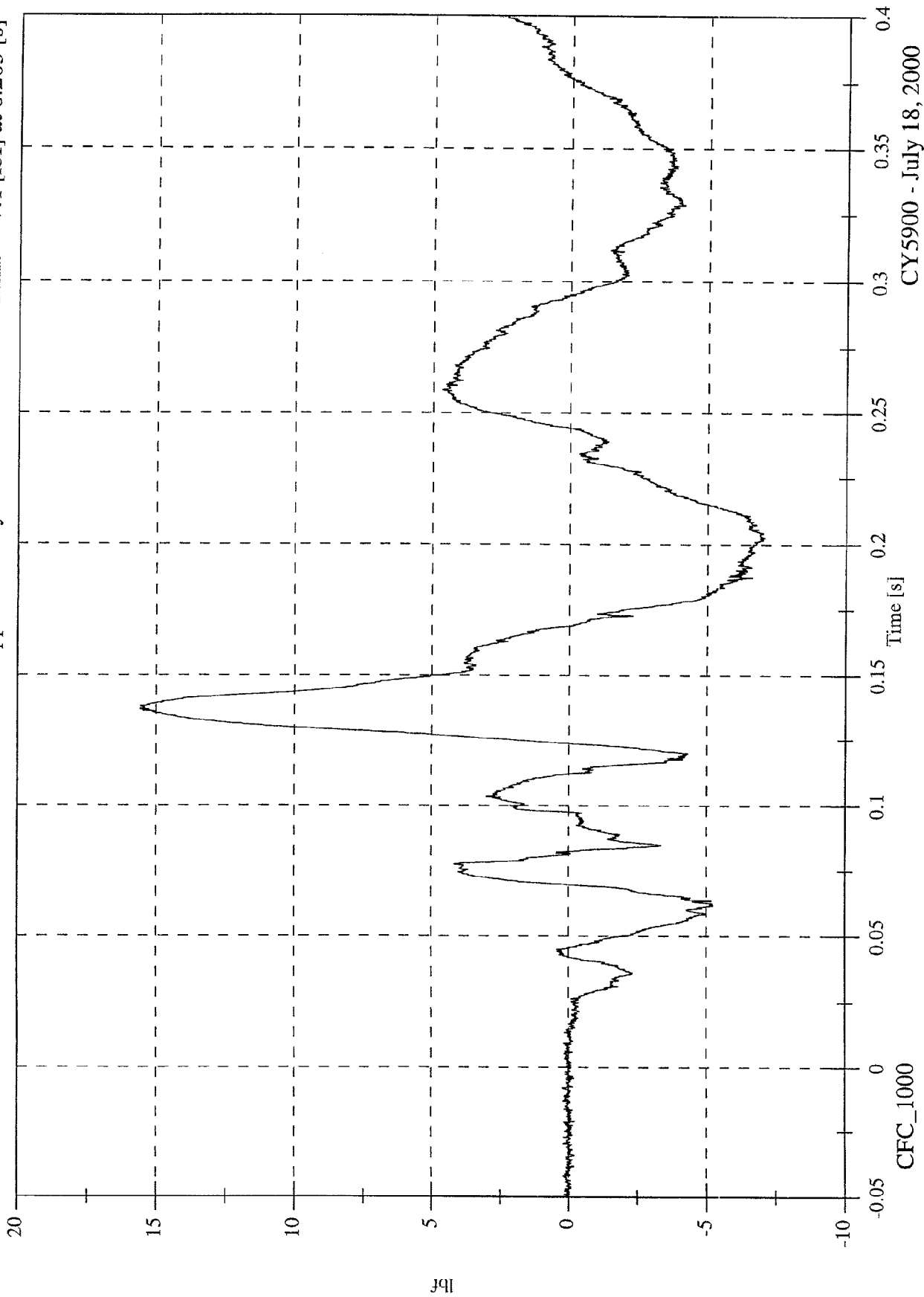


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NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 15.6 [lbf] at 0.137 [s]
 Min: -7.1 [lbf] at 0.203 [s]

P1 Upper Neck Fy

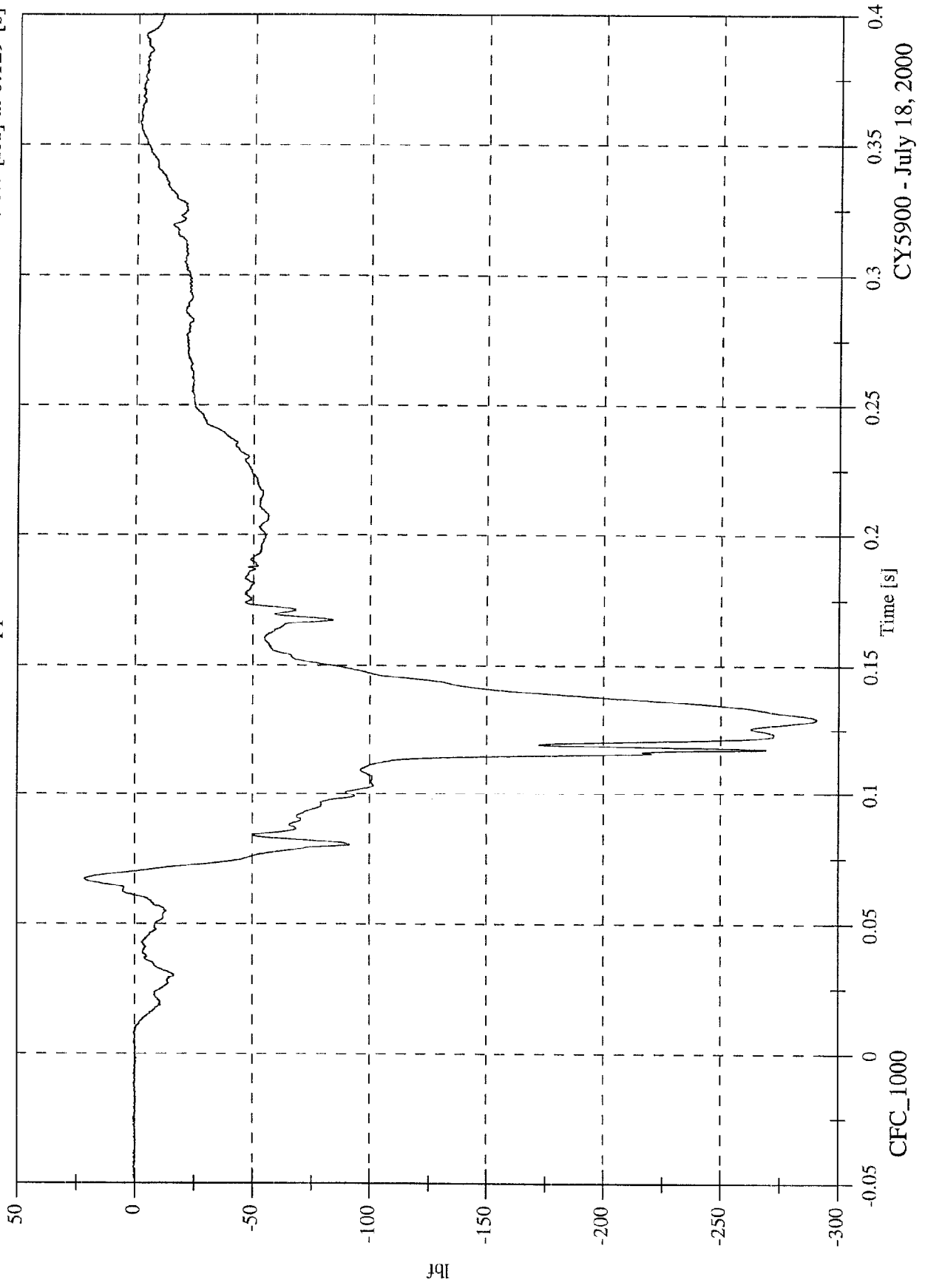


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NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 21.4 [lbf] at 0.067 [s]
Min: -290.7 [lbf] at 0.129 [s]

P1 Upper Neck Fz



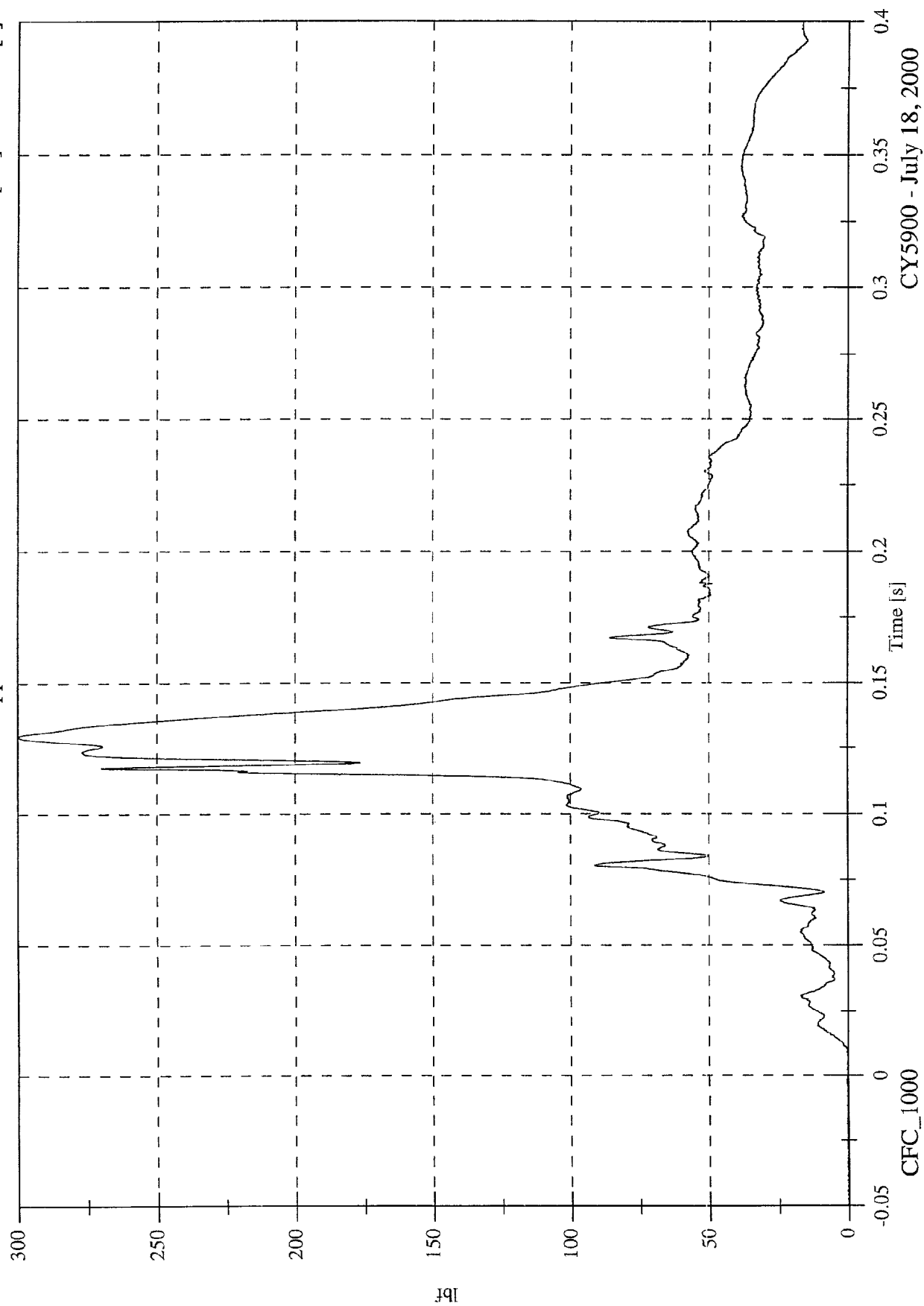
CY5900 - July 18, 2000

NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

P1 Upper Neck F Resultant

Max: 299.9 [lbf] at 0.129 [s]

Min: 0.0 [lbf] at -0.037 [s]

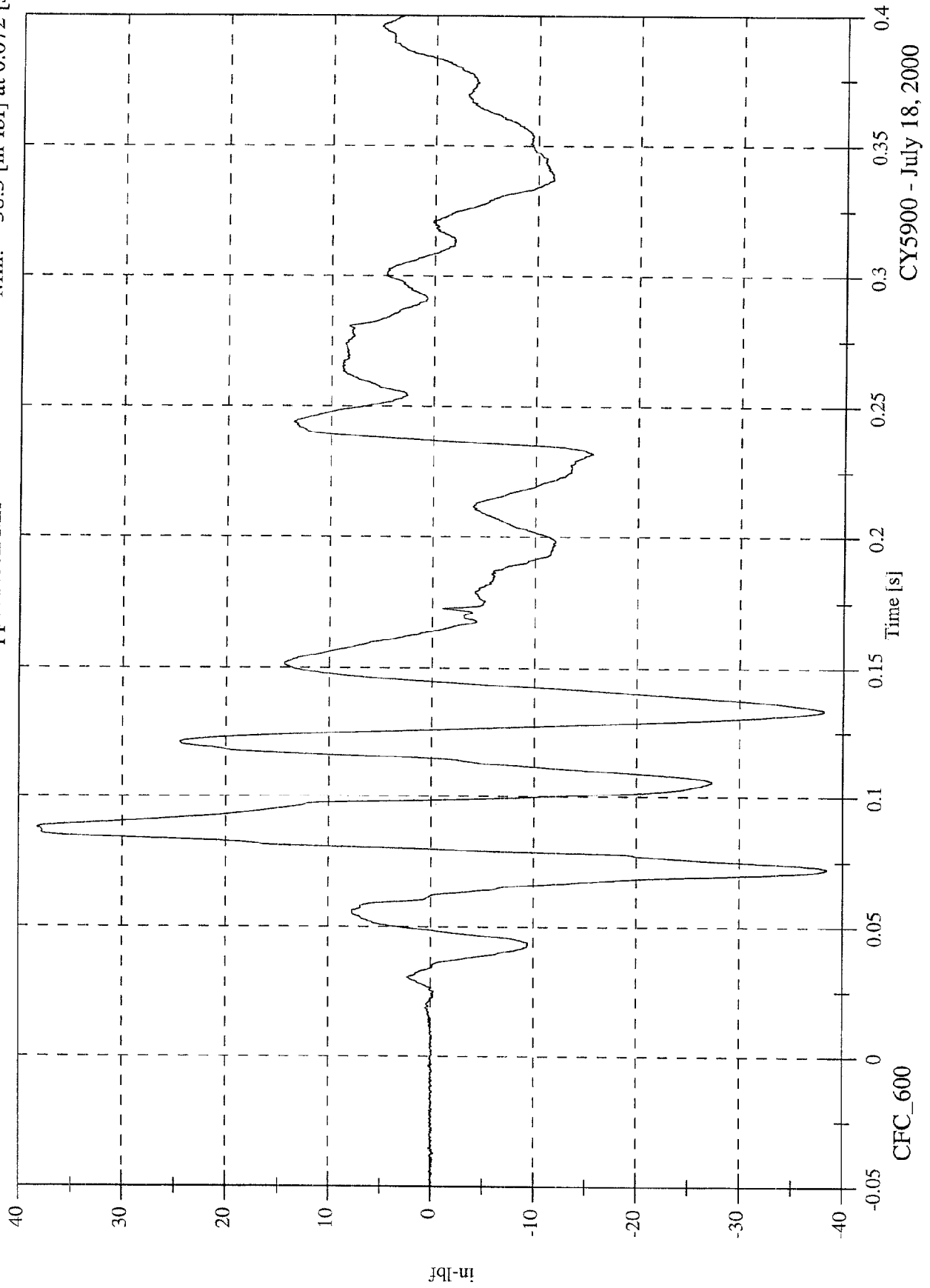


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NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

P1 Upper Neck Mx

Max: 38.2 [in-lbf] at 0.088 [s]
Min: -38.5 [in-lbf] at 0.072 [s]

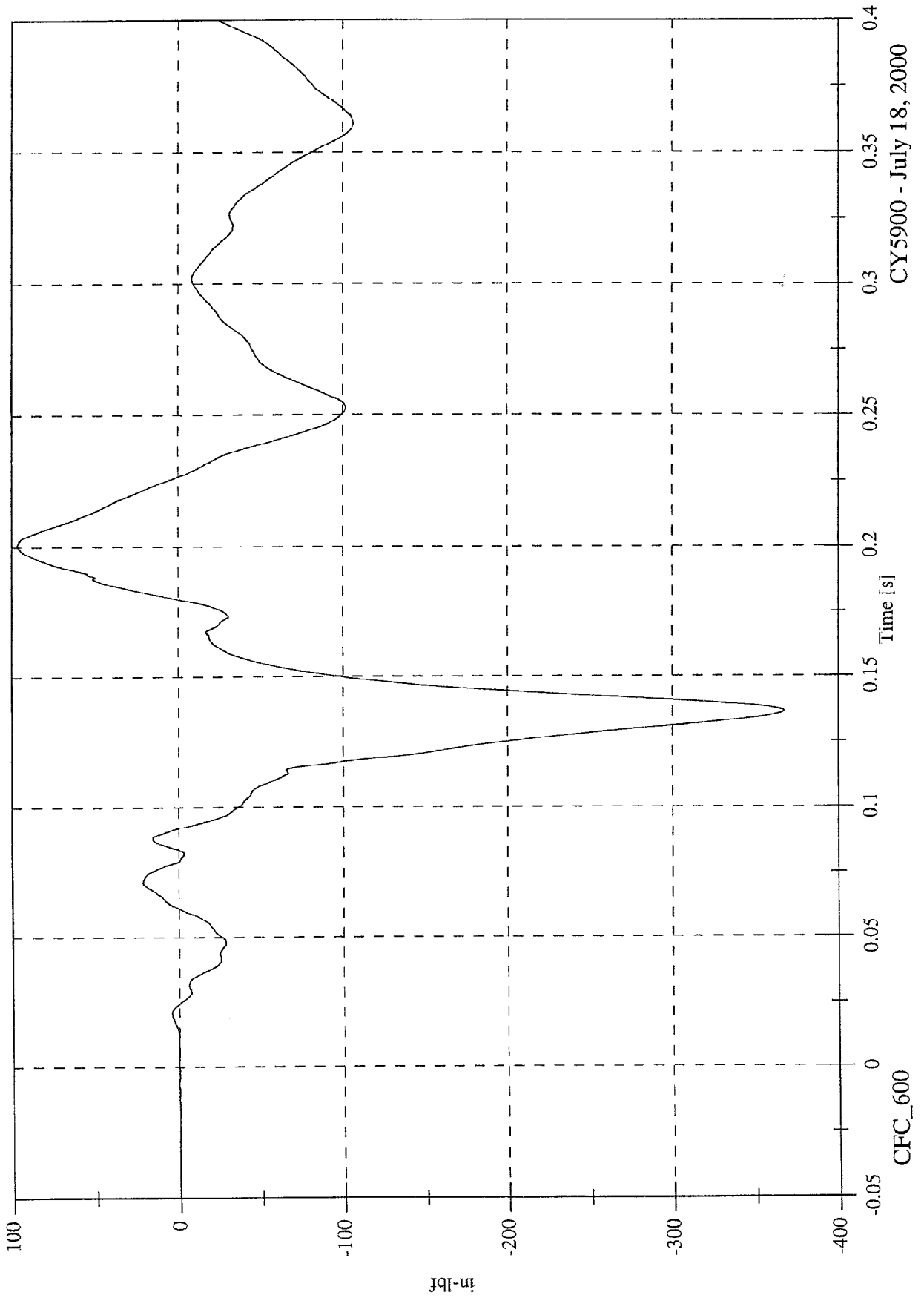


CY5900 - July 18, 2000

NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 96.3 [in-lbf] at 0.201 [s]
Min: -367.1 [in-lbf] at 0.137 [s]

P1 Upper Neck My

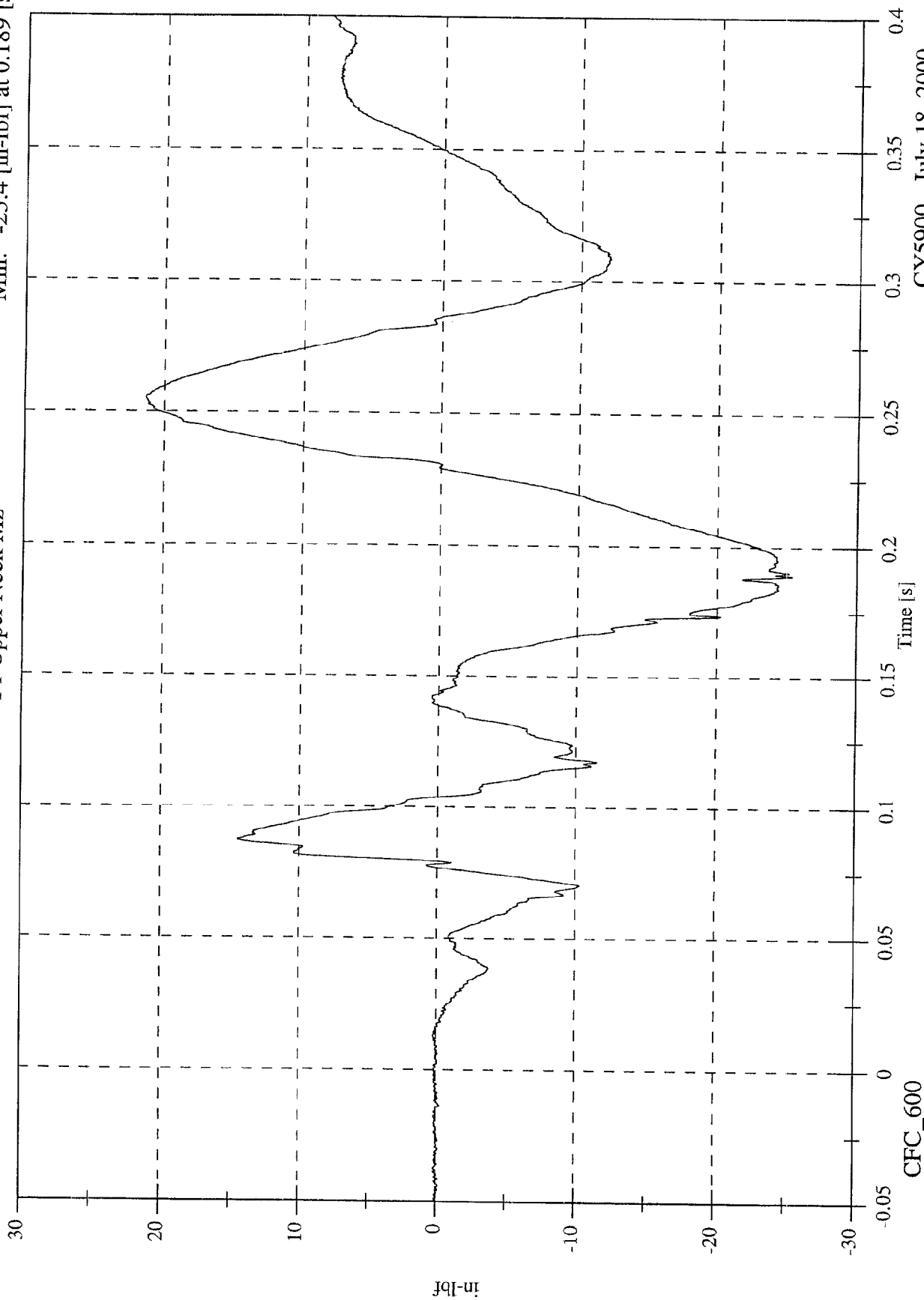


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NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

P1 Upper Neck Mz

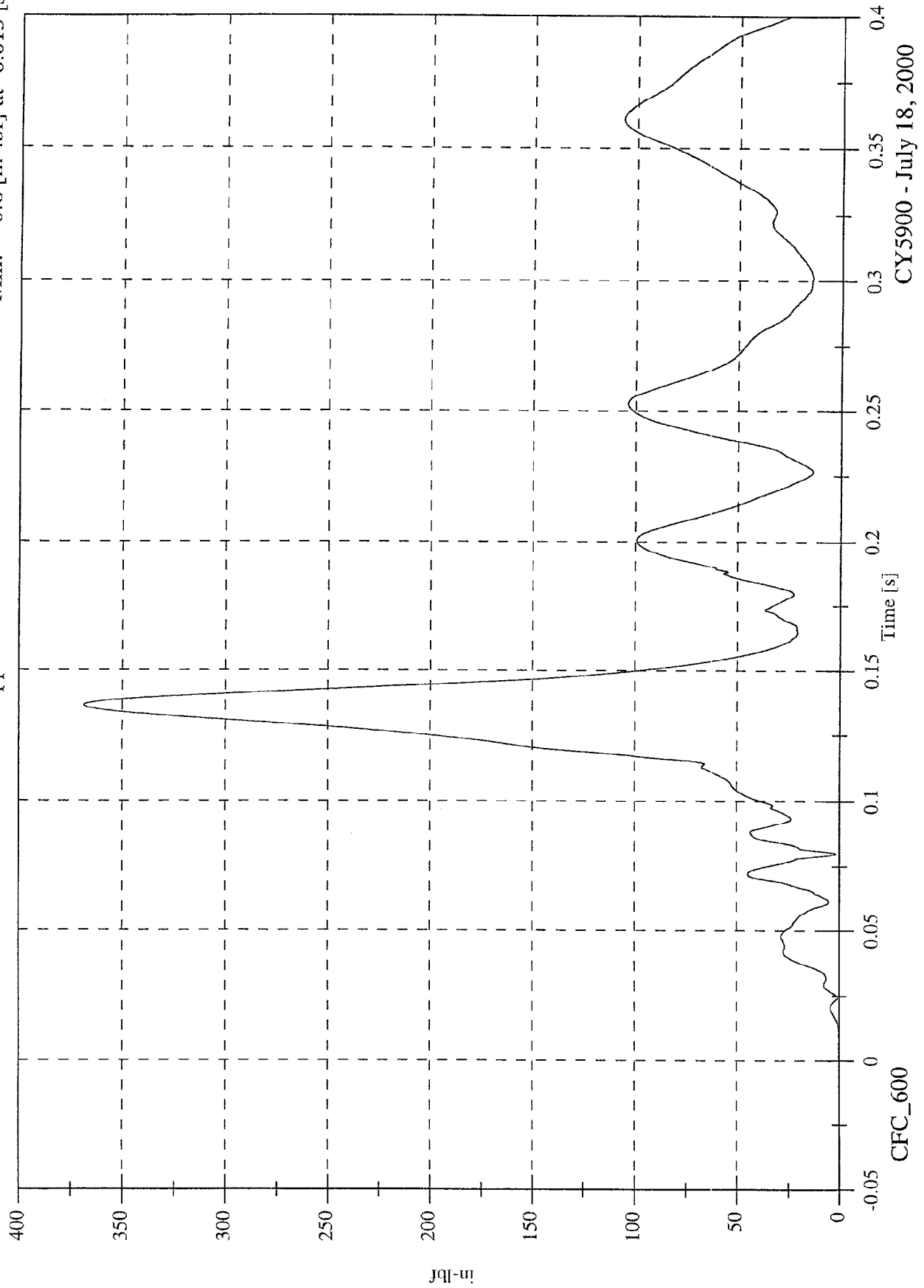
Max: 21.4 [in-lbf] at 0.255 [s]
Min: -25.4 [in-lbf] at 0.189 [s]



NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

P1 Upper Neck M Resultant

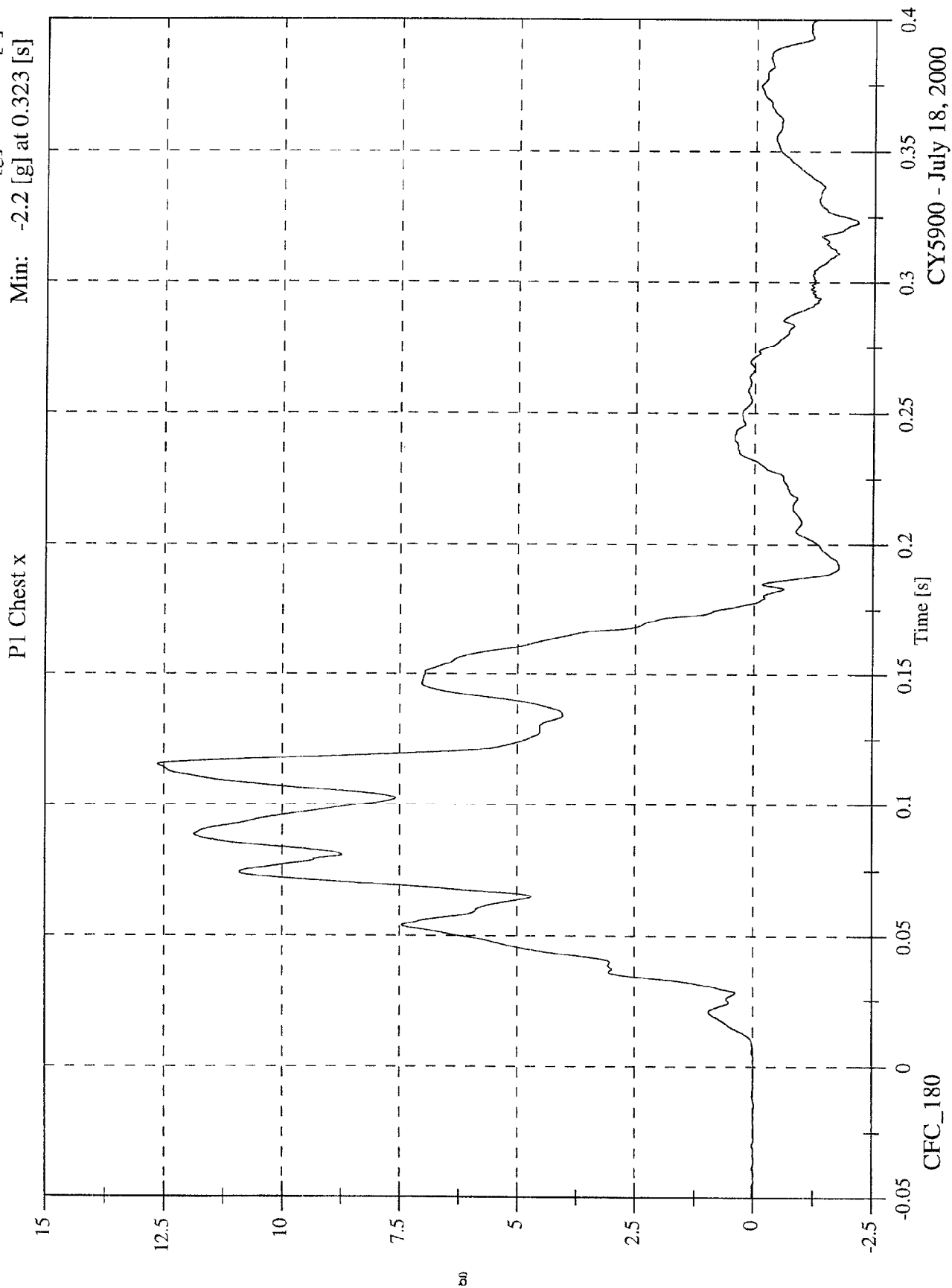
Max: 368.6 [in-lbf] at 0.137 [s]
Min: 0.0 [in-lbf] at -0.015 [s]



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NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 12.6 [g] at 0.115 [s]
Min: -2.2 [g] at 0.323 [s]

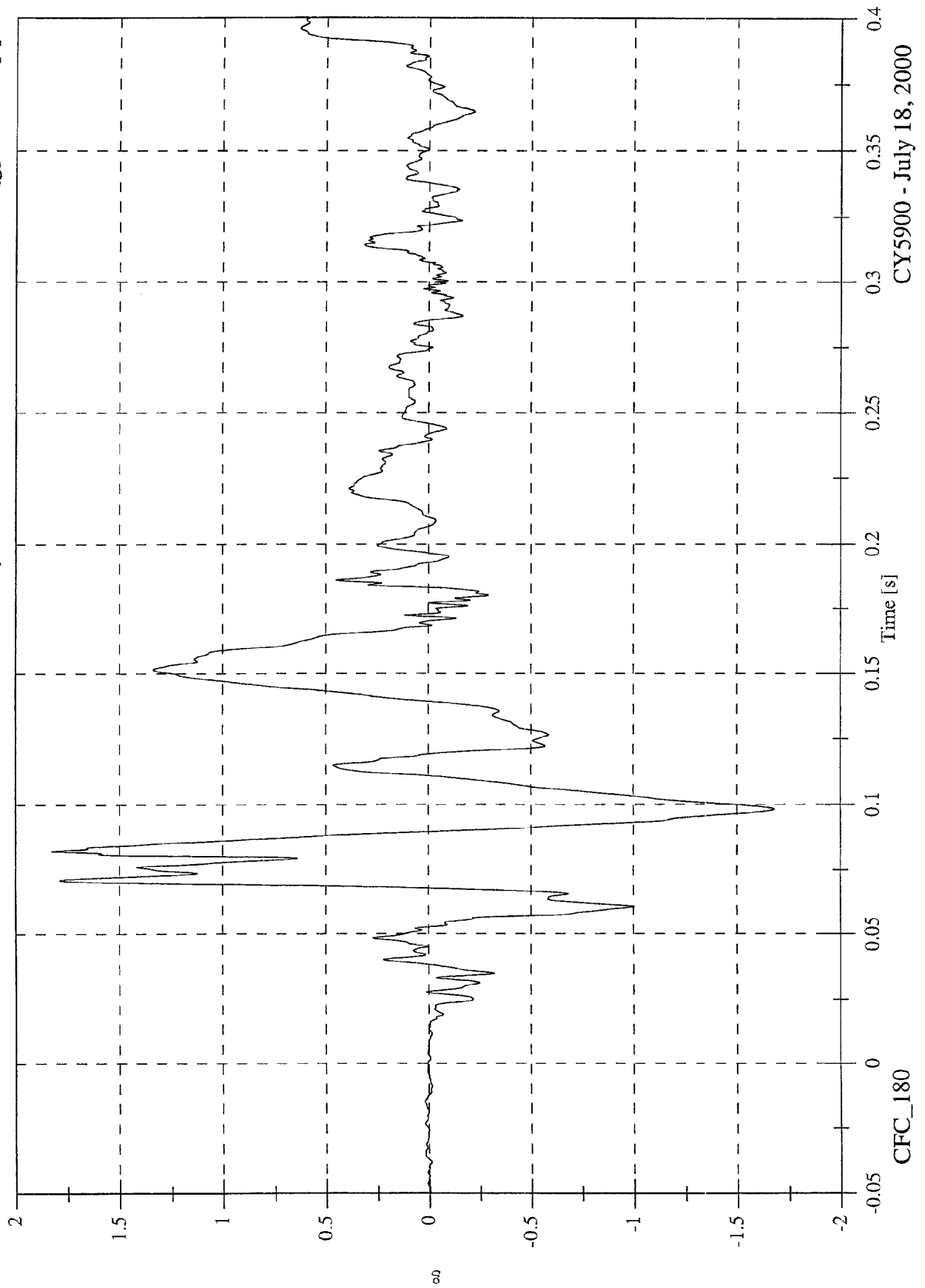


CY5900 - July 18, 2000

NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 1.8 [g] at 0.082 [s]
Min: -1.7 [g] at 0.098 [s]

P1 Chest y

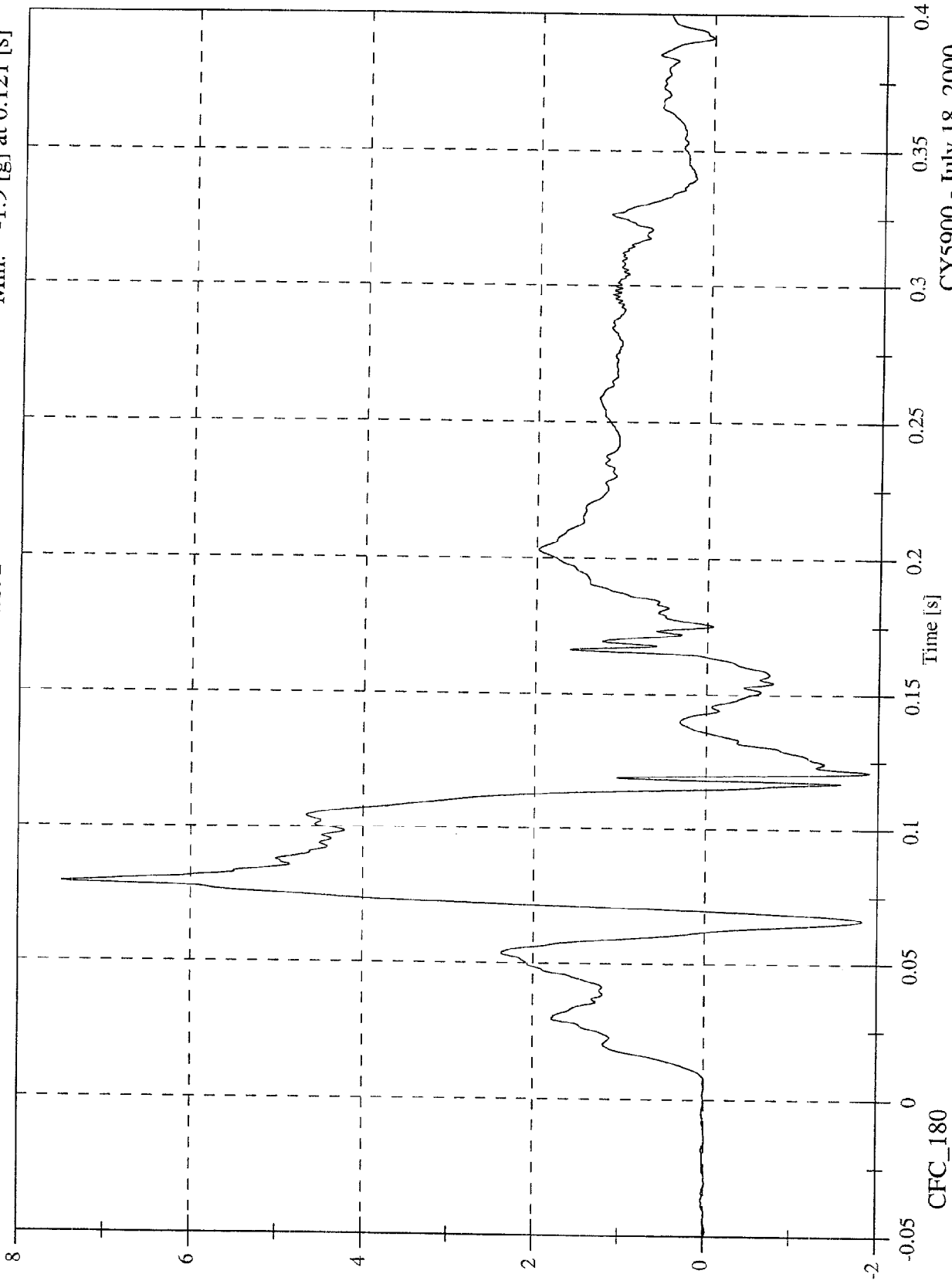


CY5900 - July 18, 2000

NIHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 7.5 [g] at 0.079 [s]
Min: -1.9 [g] at 0.121 [s]

P1 Chest z

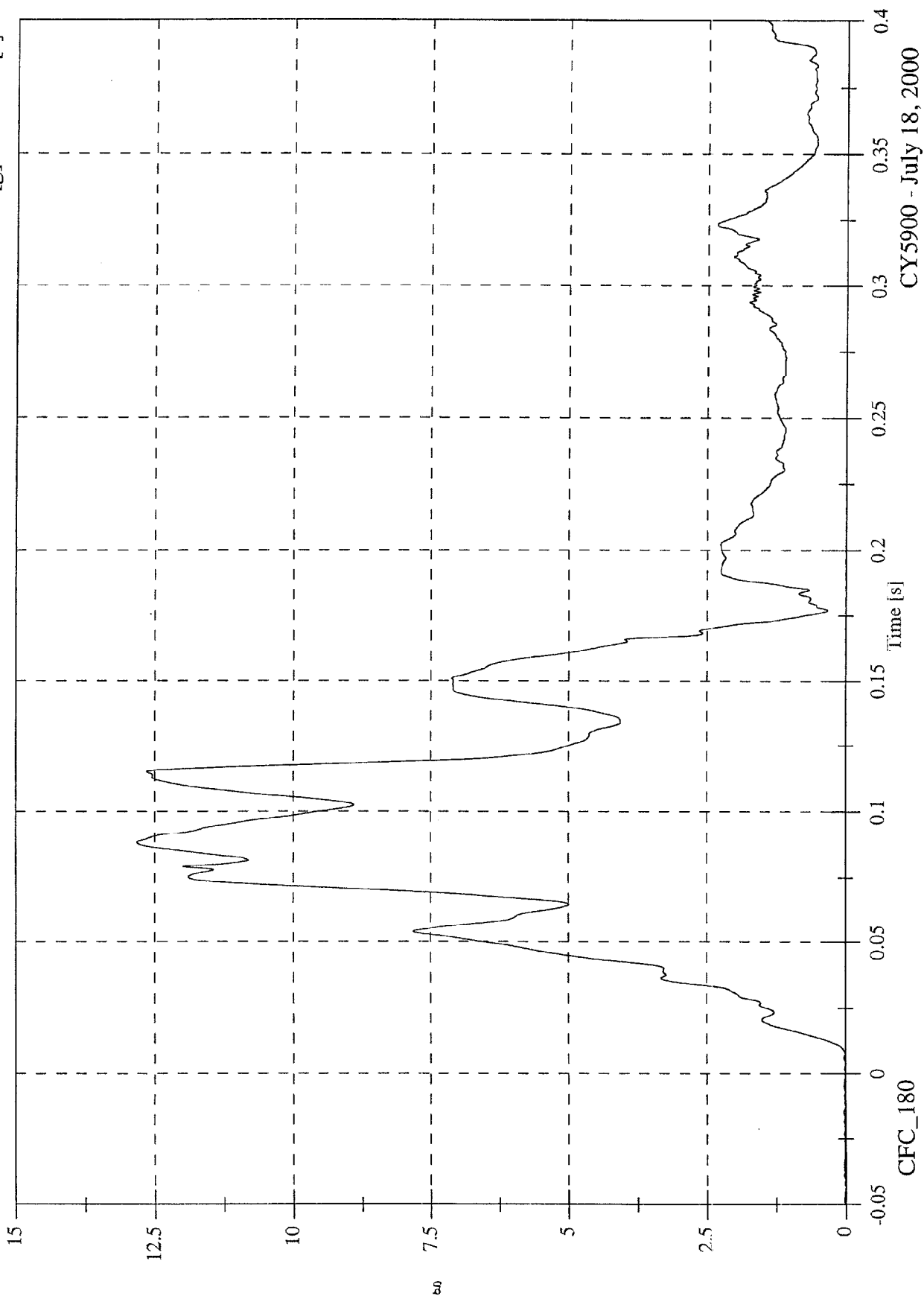


CY5900 - July 18, 2000

NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 12.8 [g] at 0.088 [s]
Min: 0.0 [g] at -0.043 [s]

P1 Chest Resultant



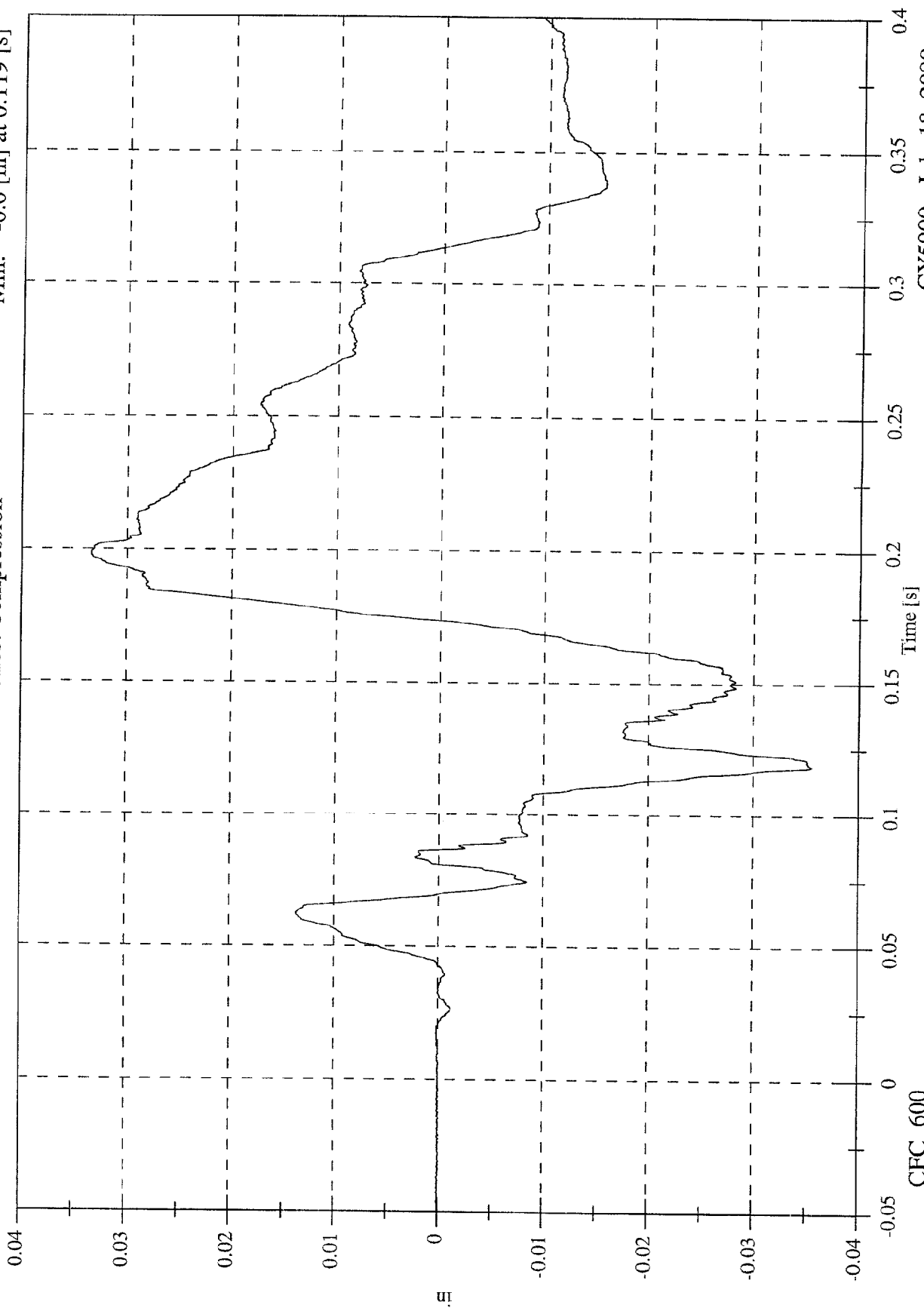
CFC_180

CY5900 - July 18, 2000

NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 0.0 [in] at 0.199 [s]
Min: -0.0 [in] at 0.119 [s]

P1 Chest Compression

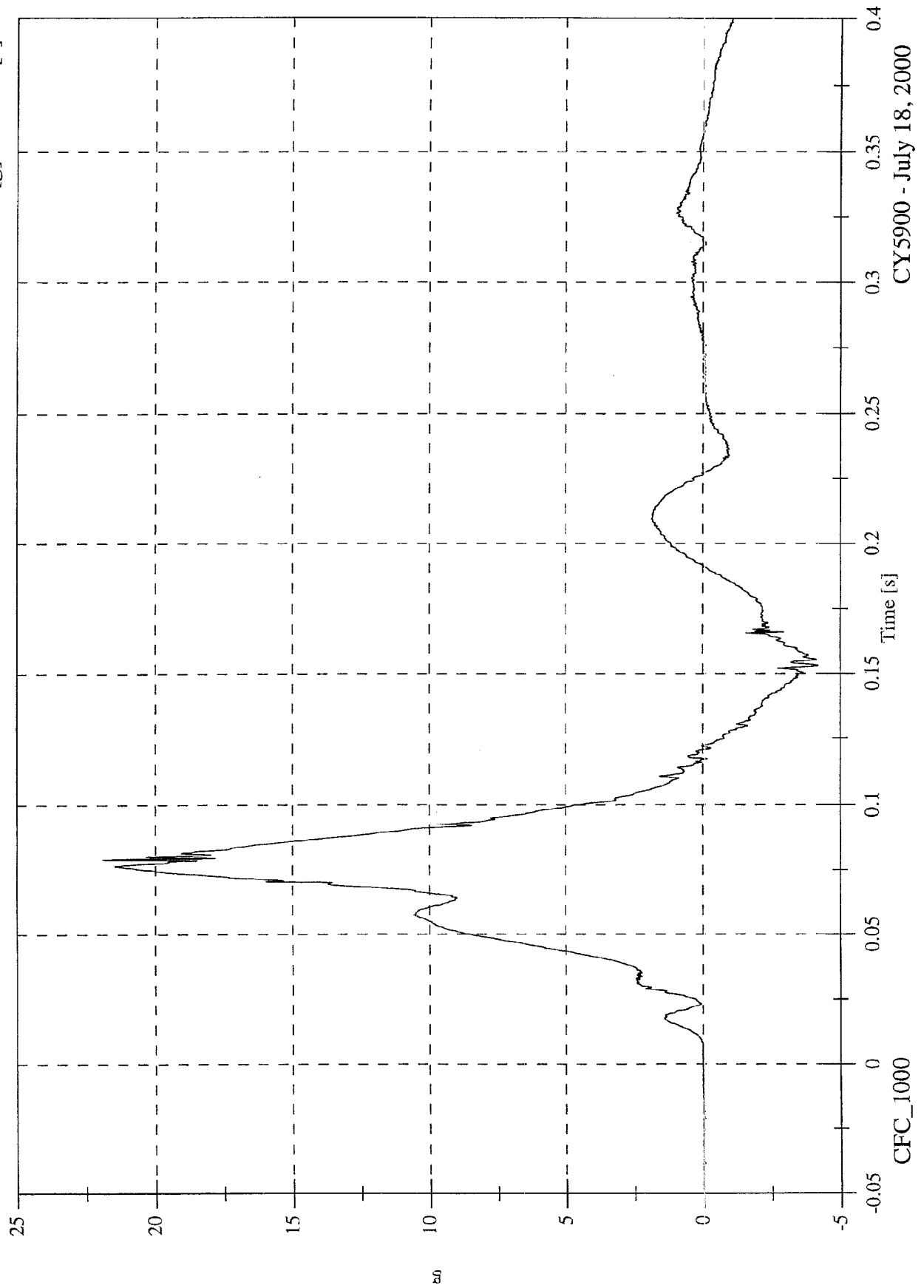


CY5900 - July 18, 2000

NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 21.9 [g] at 0.079 [s]
Min: -4.2 [g] at 0.153 [s]

P1 Pelvic x

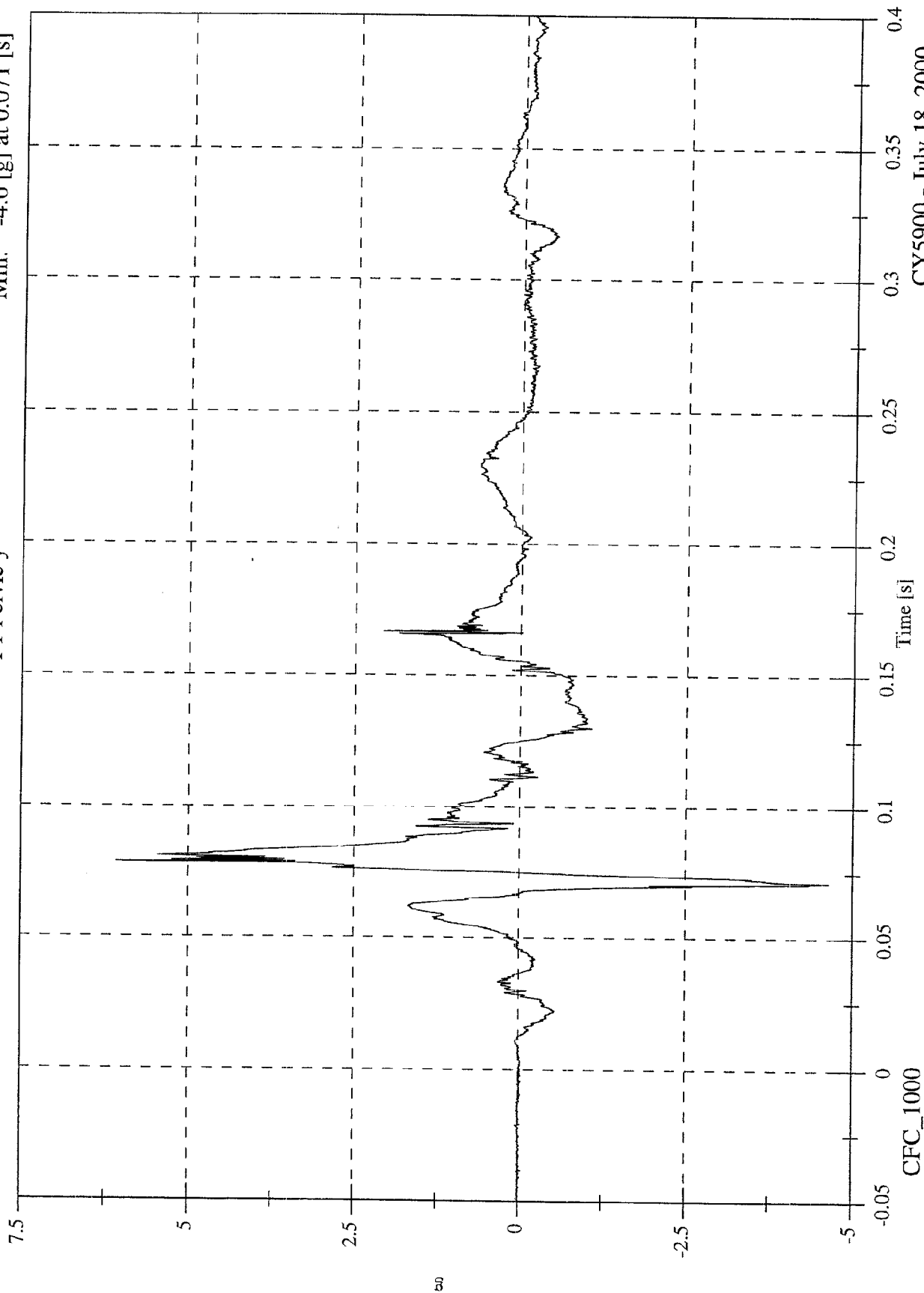


CY5900 - July 18, 2000

NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 6.1 [g] at 0.079 [s]
Min: -4.6 [g] at 0.071 [s]

P1 Pelvic y

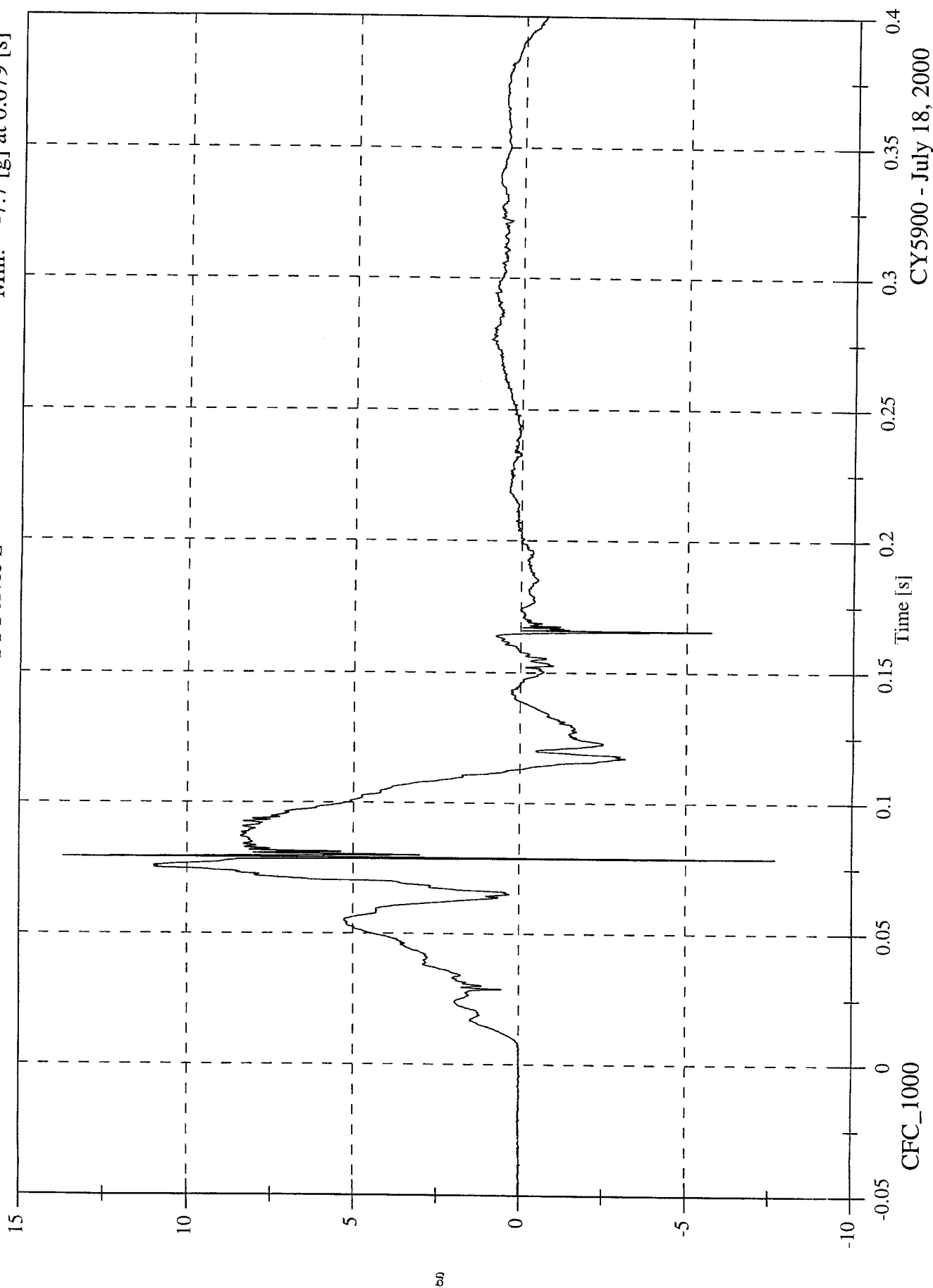


CY5900 - July 18, 2000

NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 13.7 [g] at 0.079 [s]
 Min: -7.7 [g] at 0.079 [s]

P1 Pelvic z

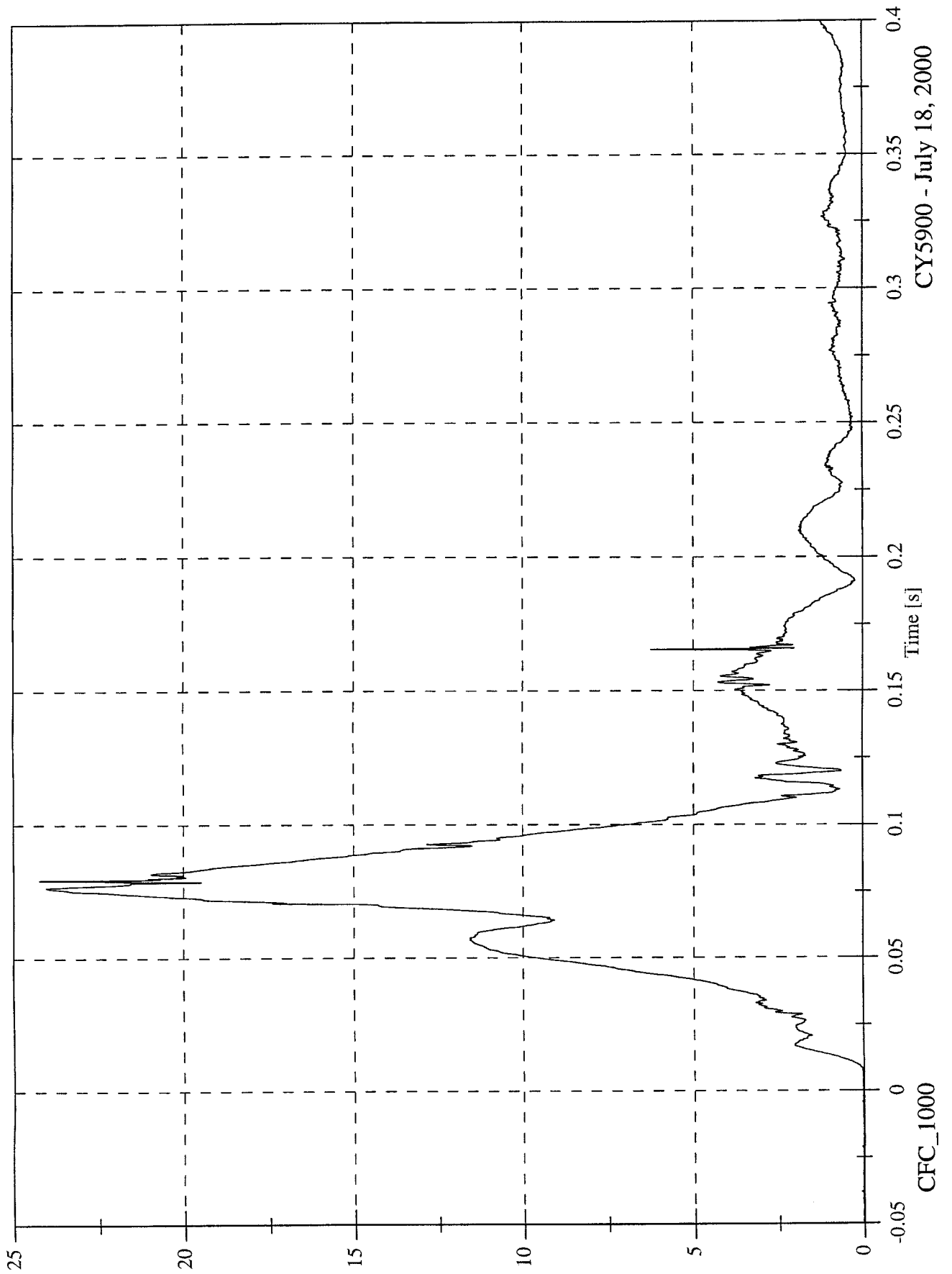


CY5900 - July 18, 2000

NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

Max: 24.2 [g] at 0.079 [s]
Min: 0.0 [g] at -0.029 [s]

P1 Pelvic Resultant

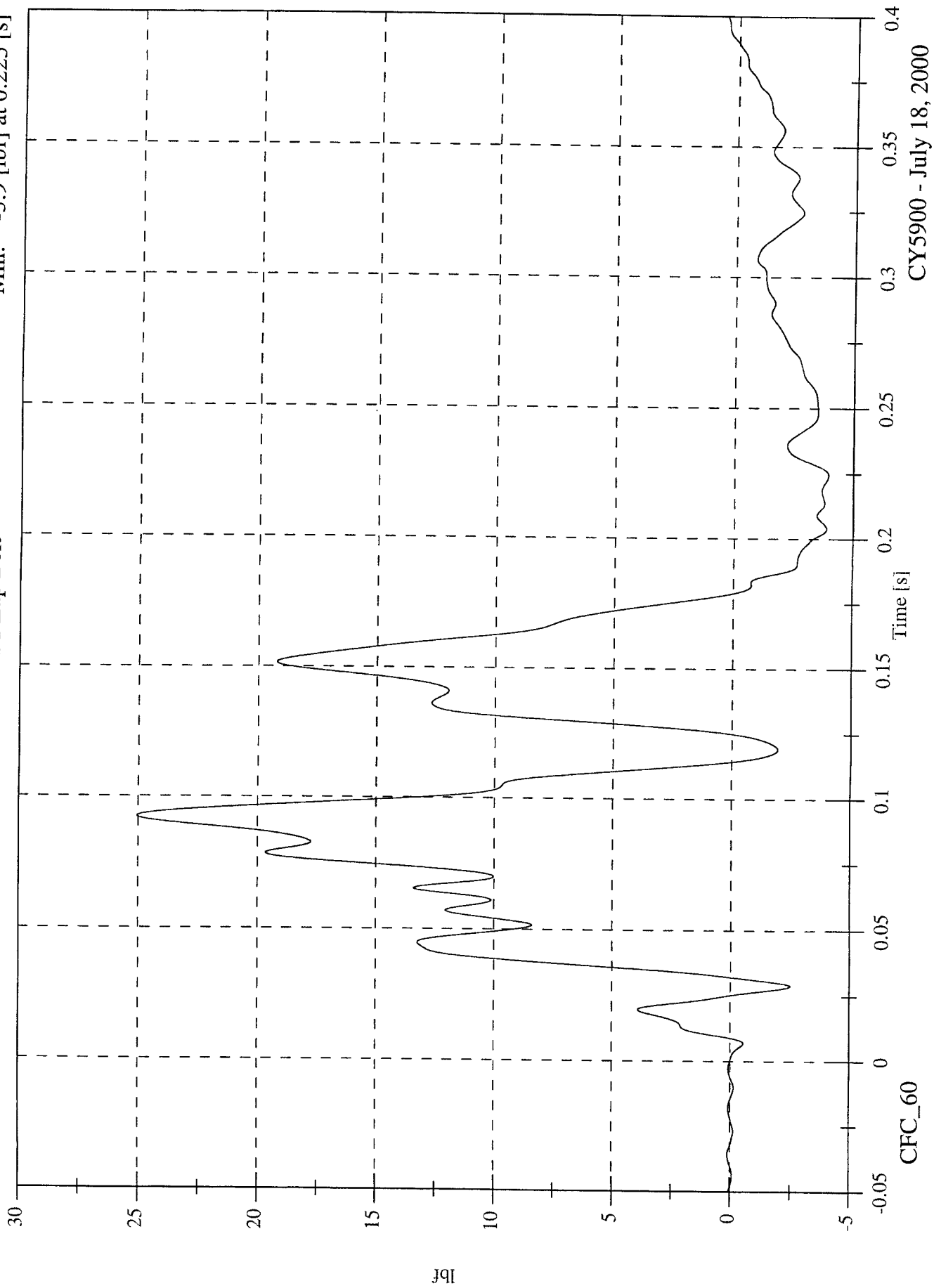


CY5900 - July 18, 2000

NHTSA FMVSS 301 Test #9 - 2000 Volvo S80

P1 Lap Belt

Max: 25.0 [lbf] at 0.092 [s]
Min: -3.9 [lbf] at 0.225 [s]



CY5900 - July 18, 2000