

REPORT NUMBER: 301-CAL-03-01

**NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
MODERATE-TO-HIGH SPEED REAR IMPACT TEST**

**PERFORMED IN CONJUNCTION WITH
SAFETY COMPLIANCE TESTING FOR FMVSS 301R
FUEL SYSTEM INTEGRITY**

VOLVO GOTHENBURG SWEDEN
2003 VOLVO V70
STATION WAGON

NHTSA NUMBER: C35900

VERIDIAN TEST NUMBER: 8655-F301-10R

July 22, 2003

VERIDIAN ENGINEERING
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FINAL REPORT

PREPARED FOR:

U. S. Department of Transportation
National Highway Traffic Safety Administration
Applied Research
Crashworthiness Research Division
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Washington, DC 20590

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16. Abstract <p>This test was performed in conjunction with Compliance Testing for FMVSS 301R, Fuel System Integrity. The purpose of this test is to evaluate the seat and occupant performance in moderate-to-high speed rear impacts. The base FMVSS 301R test was modified as follows:</p> <ul style="list-style-type: none"> - 2 fully instrumented Hybrid III ATDs were positioned in the front seats (P1 and P2) in place of ballast ATDs. - 2 door mounted high speed cameras were installed. - 4 seatback frame and 2 front sill MHDs were installed. - 4 vehicle accelerometers were installed. - VRTC seatback translation was installed. <p>The ATDs were positioned following TP208-12 with the following exceptions:</p> <ul style="list-style-type: none"> - Seatbacks for positions that contained a 50th percentile male were set to 25 degrees ± 1 degree as measured with the SAE J826 manikin. - Seats that contained a 5th percentile female were placed in a fore-aft position that allowed for the best high speed camera occupant view. If the 5th percentile female was located in the P1 occupant position, the arms were positioned following TP208-12 S16.3.3.3 (against the seat cushion instead of on the steering wheel). - Moveable head restraints for seats that contained a 5th percentile female were set full forward and closest to, but not less than, 750 mm as measured from the SAE J826 manikin hip pivot point to the top of the head restraint along the torso line. 			
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SECTION 1

PURPOSE OF TEST

This moderate-to-high speed rear impact test was performed in conjunction with a Federal Motor Vehicle Safety Standard (FMVSS) 301R 30 mph rear moving barrier impact test of a 2003 Volvo V70 Station Wagon. The purpose of this test is to evaluate the seat and occupant performance in moderate-to-high speed rear impacts.

SECTION 2

SUMMARY OF TEST

A 1818.9 kg 2003 Volvo V70 Station Wagon was impacted from the rear by an 1797 kg moving barrier at a velocity of 46.51 kph (28.9 mph). The test was performed by Veridian Engineering on July 22, 2003.

The test vehicle prepared for the Federal Motor Vehicle Safety Standard (FMVSS) 301R Compliance Test Program conducted for the National Highway Traffic Safety Administration (NHTSA) following the OVSC Laboratory Test Procedure No. TP-301-03, dated February 28, 2003. For the purpose of acquiring information for Applied Research, the test was modified as follows:

- An instrumented 5th percentile female Part 572O Hybrid III ATD was positioned in the driver seat (P1) in place of a ballast ATD.
- An instrumented 50th percentile male Part 572E Hybrid III ATD was positioned in the right front passenger seat (P2) in place of a ballast ATD.
- 2 high speed cameras were installed on the vehicle front doors.
- 4 front seatback frame MHDs and 2 front sill MHDs were to measure rotation about the Y-axis.
- 4 vehicle accelerometers were installed to measure acceleration along the X-axis.
- The VRTC seatback translation was installed.

The crash event was recorded by ten high-speed cameras and one real-time camera. Camera locations and other pertinent camera information are found on pages 3-13 and 3-14 of this report. Pre- and post-test photographs of the ATDs can be found in Appendix A. Electronic data plots are presented in Appendix B.

The occupant data is summarized below.

	HIC (36ms)	Nij				Head-to-Torso Rotation (deg)		Clip (g)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
		Ntf	Nte	Ncf	Nce	Flexion	Extension				
P1 ATD	63.7	0.06	0.16	0.04	0.20	14.1	-11.6	13.3	-0.8	-213.7	-338.4
P2 ATD	155.0	0.31	0.15	0.03	0.04	32.6	-11.8	†	-1.3	-678.9	-620.1

† P2 Chest Ay accelerometer failed, injury value could not be calculated.

The P1 seatback frame was deformed rearward and the adjustment mechanism remained operable. The seat back reclined statically 13.9 degrees from its pre-test position. The P2 seatback frame was deformed rearward and the adjustment mechanism remained operable. The seat back reclined statically 13.2 degrees from its pre-test position. Both seat backs were equipped with the Volvo Whiplash Injury Prevention System (WHIPS).

SECTION 3
TEST DATA

DATA SHEET 1

TEST VEHICLE SPECIFICATIONS

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 2003 Volvo V70 Station Wagon
NHTSA No.: C35900 ; Color: Black
Engine Data: 5 Cylinders; - CID; 2.4 Liters; - cc
Placement: - Longitudinal or In-Line; X Transverse or Lateral
Transmission Data: 5 Speeds; - Manual; X Automatic; X Overdrive
Final Drive: - Rear Wheel Drive; X Front Wheel Drive; - Four Wheel Drive
Major Options: X A/C; X Power Steering; X Power Brakes
X Power Windows; X Power Door Locks; X Tilt Wheel
Date Received: 4/9/03 ; Odometer Reading 254 km
Selling Dealer: Best Motors
& Address: 1500 University Ave. Rochester, NY 14610

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: Volvo Gothenburg Sweden
Date of Manufacture: 01/03
VIN: YV1SW61T932321959
GVWR: 2127 kg; GAWR-FRONT: 1057 kg; GAWR-REAR: 1120 kg

DATA FROM VEHICLE'S TIRE LABEL:

Location of Placard on Vehicle: Fuel filler door
Recommended Tire Size: 195/65R15

* Recommended Cold Tire Pressure: FRONT: 221 kPa; REAR: 207 kPa

DATA FROM TIRE SIDEWALL:

Size of Tires on Test Vehicle: P195/65R15 Manufacturer: Michelin
Tire Pressure with Maximum Capacity Vehicle Load: FRONT: 303 kPa; REAR: 303 kPa
Type of Spare Tire: Temporary T128/80R17

VEHICLE CAPACITY DATA:

Type of Front Seats: - Bench; X Bucket; - Split Bench
Number of Occupants: 2 Front; 3 Rear; 5 Total
Vehicle Capacity Weight (VCW) = 421.8 kg
No. of Occupants x 68.04 kg = 340.2 kg
Rated Cargo/Luggage Weight (RCLW) = 81.6 kg

*Tire pressure used for test

DATA SHEET 2

VEHICLE DATA

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with maximum fluids)= UDW:

Right Front	=	<u>439.5</u>	kg	Right Rear	=	<u>346.5</u>	kg
Left Front	=	<u>453.1</u>	kg.	Left Rear	=	<u>357.0</u>	kg
TOTAL FRONT	=	<u>892.6</u>	kg	TOTAL REAR	=	<u>703.5</u>	kg
TOTAL DELIVERED WEIGHT	=	<u>1596.1</u>	kg				
% of Total Front of Vehicle Weight	=	<u>55.9%</u>		of Total Rear Weight	=	<u>44.1%</u>	

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight	=	<u>1596.1</u>	kg
Rated Cargo/Luggage Weight (RCLW)	=	<u>81.6</u>	kg
Weight of 2 p.572 Dummies, 74.4 kg	=	<u>148.8</u>	kg
TARGET TEST WEIGHT	=	<u>1826.5</u>	kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 74 KG OF CARGO WEIGHT:

Right Front	=	<u>535.2</u>	kg	Right Rear	=	<u>378.3</u>	kg
Left Front	=	<u>527.1</u>	kg	Left Rear	=	<u>378.3</u>	kg
TOTAL FRONT	=	<u>1062.3</u>	kg	TOTAL REAR	=	<u>756.6</u>	kg
TOTAL TEST WEIGHT	=	<u>1818.9</u>	kg				
% of Total Front of Vehicle Weight	=	<u>58.4%</u>		of Total Rear Weight	=	<u>41.6%</u>	

* Weight of Ballast Secured in Vehicle Trunk Area = 20.4 kg

Type of Ballast: Canvas bags containing lead shot

Method of Securing Ballast: Wedged between back of engine and firewall

Vehicle Components Removed for Weight Reduction: None

VEHICLE ATTITUDE (all dimension in millimeters):

AS DELIVERED:	RF	<u>695</u>	LF	<u>687</u>	RR	<u>705</u>	LR	<u>705</u>
AS TESTED:	RF	<u>654</u>	LF	<u>648</u>	RR	<u>701</u>	LR	<u>700</u>
Vehicle's Wheel Base:		<u>2758</u>	mm					
Location of Vehicle's C.G.:		<u>1147</u>	millimeters rearward of front wheel center.					

DATA SHEET 2 (continued)

VEHICLE DATA

TYPE OF TEST:

Type of Test: Rear Barrier Impact Angle: 0°
Test Date: July 22, 2003 Time: 15:57 Temperature: 22.8 °C
Vehicle NHTSA No.: C35900 VIN: YV1SW61T932321959
Required Impact Velocity Range: 46.51 to 48.12 kph

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

Trap No. 1 = 46.51 kph; Trap No. 2 = 46.51 kph
Average Impact Speed = 46.51 kph

VEHICLE STATIC CRUSH:

Vehicle Length:

Pre-Test Left = 4585 ; C/L = 4711 Right = 4586
Post-Test Left = 4341 ; C/L = 4466 Right = 4362
Crush Left = 244 ; C/L = 245 Right = 224
AVERAGE = 238 millimeters

DATA SHEET 3

MOVING BARRIER DATA

WEIGHT OF MOVING BARRIER:

Right Front = 504.9 kg Right Rear = 393.7 kg.
Left Front = 499.9 kg Left Rear = 398.3 kg
TOTAL FRONT = 1004.8 kg TOTAL REAR = 792.0 kg
TOTAL BARRIER WEIGHT = 1796.8 kg

MOVING BARRIER DIMENSIONS:

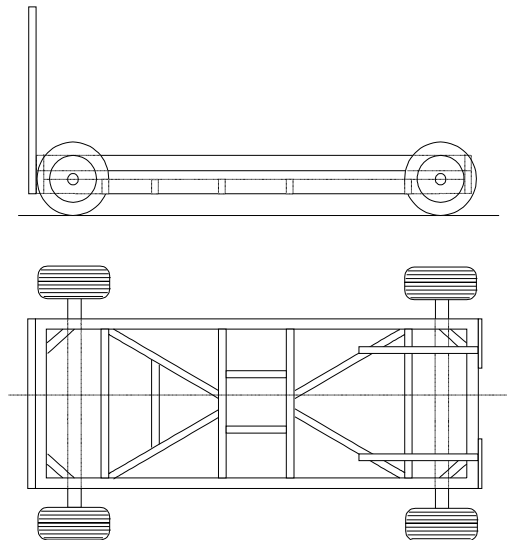
Barrier Face Height: 1524 mm
Barrier Face Width: 1981 mm
Barrier Face Ground Clearance: 127 mm
Tread Width: 1511 mm
Wheel Base: 3048 mm
Location of C.G.: X: 1344 mm rearward of front wheel center.
Y: 0 mm from longitudinal-vertical plane of symmetry.
Z: 414 mm above ground.

MOVING BARRIER TIRES:

Manufacturer: Classic
Model: Poly IV
Size: 215/75D15
Recommended Max Pressure: 240 kPa:

MOVING BARRIER ABORT SYSTEM:

Type: Trailing cable



DATA SHEET 4

SEAT DATA

PI DATA:

HEAD RESTRAINT	YES	NO	DETAILS
Fixed:	<u>X</u>	<u>-</u>	Volvo Whiplash Injury Prevention System (WHIPS)
Vertical Adjustment:	<u>-</u>	<u>X</u>	
Vertical Locks:	<u>-</u>	<u>X</u>	
Fore-Aft Adjustment:	<u>-</u>	<u>X</u>	
Fore-Aft Locks:	<u>-</u>	<u>X</u>	
SEATBACK RECLINE TYPE	YES	NO	DETAILS
Fixed:	<u>X</u>	<u>-</u>	
Power:	<u>-</u>	<u>X</u>	
Lever (with detents):	<u>-</u>	<u>X</u>	
Lever (infinite)	<u>-</u>	<u>X</u>	
Lever (ratchet)	<u>-</u>	<u>X</u>	
Rotary Knob:	<u>-</u>	<u>X</u>	
Pivot Locks on Both Sides:	<u>X</u>	<u>-</u>	
LUMBAR ADJUSTMENT	YES	NO	DETAILS
Fixed:	<u>-</u>	<u>X</u>	Placed in retracted position for ICBC measurements and test.
Adjustable:	<u>X</u>	<u>-</u>	
BOLSTER ADJUSTMENT	YES	NO	DETAILS
Fixed:	<u>X</u>	<u>-</u>	Placed in full open for ICBC measurements and test.
Adjustable:	<u>-</u>	<u>X</u>	
SEAT CUSHION TYPE	YES	NO	DETAILS
Cushion moves vertically independently of seat back:	<u>-</u>	<u>X</u>	
SEAT CUSHION FORE-AFT	YES	NO	DETAILS
Fixed:	<u>-</u>	<u>X</u>	Travel: <u>280</u> mm First Detent: <u>-</u> Last Detent: <u>-</u> Travel: <u>-</u> mm Manual-Detents: <u>-</u> Travel: <u>-</u> mm Manual-Infinite: <u>-</u>
Power:	<u>X</u>	<u>-</u>	
Manual-Detents:	<u>-</u>	<u>X</u>	
Manual-Infinite:	<u>-</u>	<u>X</u>	
SEAT CUSHION VERTICAL	YES	NO	DETAILS
Fixed:	<u>-</u>	<u>X</u>	
Power:	<u>X</u>	<u>-</u>	
Manual-Detents	<u>-</u>	<u>X</u>	
Manual-Infinite	<u>-</u>	<u>X</u>	
SEAT TEST POSITION			
Seat Cushion Fore-aft:	<u>58 mm rearward of mid-position</u>		
Seat Cushion Vertical:	<u>Mid-height while maintaining mid-angle</u>		
Seat Back:	<u>20 degree torso angle as set with the Part 5720 ATD and measured with the H-point machine</u>		
Head Restraint:	<u>Fixed</u>		

DATA SHEET 4 (continued)

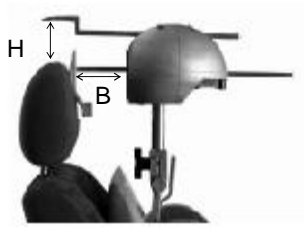
SEAT DATA

P2 DATA:

HEAD RESTRAINT	YES	NO	DETAILS	
Fixed:	<u>X</u>	<u>-</u>	Volvo Whiplash Injury Prevention System (WHIPS)	
Vertical Adjustment:	<u>-</u>	<u>X</u>		
Vertical Locks:	<u>-</u>	<u>X</u>		
Fore-Aft Adjustment:	<u>-</u>	<u>X</u>		
Fore-Aft Locks:	<u>-</u>	<u>X</u>		
SEATBACK RECLINE TYPE	YES	NO	DETAILS	
Fixed:	<u>X</u>	<u>-</u>		
Power:	<u>-</u>	<u>X</u>		
Lever (with detents):	<u>-</u>	<u>X</u>		
Lever (infinite)	<u>-</u>	<u>X</u>		
Lever (ratchet)	<u>-</u>	<u>X</u>		
Rotary Knob:	<u>-</u>	<u>X</u>		
Pivot locks on Both Sides:	<u>X</u>	<u>-</u>		
LUMBAR ADJUSTMENT	YES	NO	DETAILS	
Fixed:	<u>-</u>	<u>X</u>		
Adjustable:	<u>X</u>	<u>-</u>	Placed in retracted position for ICBC measurements and test.	
BOLSTER ADJUSTMENT	YES	NO	DETAILS	
Fixed:	<u>X</u>	<u>-</u>		
Adjustable:	<u>-</u>	<u>X</u>	Placed in full open for ICBC measurements and test.	
SEAT CUSHION TYPE	YES	NO	DETAILS	
Cushion moves vertically independently of seat back:	<u>-</u>	<u>X</u>		
SEAT CUSHION FORE-AFT	YES	NO	DETAILS	
Fixed:	<u>-</u>	<u>X</u>		
Power:	<u>-</u>	<u>X</u>	Travel: <u>-</u> mm	
Manual-Detents:	<u>X</u>	<u>-</u>	First Detent: <u>0</u>	Last Detent: <u>16</u> Travel: <u>220</u> mm
Manual-Infinite:	<u>-</u>	<u>X</u>	Travel: <u>-</u> mm	
SEAT CUSHION VERTICAL	YES	NO	DETAILS	
Fixed:	<u>-</u>	<u>X</u>		
Power:	<u>-</u>	<u>X</u>		
Manual-Detents	<u>X</u>	<u>-</u>		
Manual-Infinite	<u>-</u>	<u>X</u>		
SEAT TEST POSITION				
Seat Cushion Fore-aft:	<u>Mid-position (detent 8)</u>			
Seat Cushion Vertical:	<u>Full down while maintaining mid-angle</u>			
Seat Back:	<u>25 degree torso angle as set with the H-point machine</u>			
Head Restraint:	<u>Fixed</u>			

DATA SHEET 5

ICBC MEASUREMENTS



P1 DATA:

ICBC MEASUREMENTS

HEAD RESTRAINT POSITION (vertical/fore-aft)	B (mm, backset)	H (mm, height)	Torso Angle (deg)	Height Along Torso Line From Pivot (mm)
Fixed / Fixed:	45	33	25.0	816

HEAD RESTRAINT POSITION – CONFIGURED FOR TEST (vertical/fore-aft)	B (mm, backset)	H (mm, height)	Torso Angle (deg)	Height Along Torso Line From Pivot (mm)
Fixed / Fixed:	NA	NA	20	NA

Head restraint positioning details: _____ None _____

P2 DATA:

ICBC MEASUREMENTS

HEAD RESTRAINT POSITION (vertical/fore-aft)	B (mm, backset)	H (mm, height)	Torso Angle (deg)	Height Along Torso Line From Pivot (mm)
Fixed / Fixed:	45	32	25.0	817

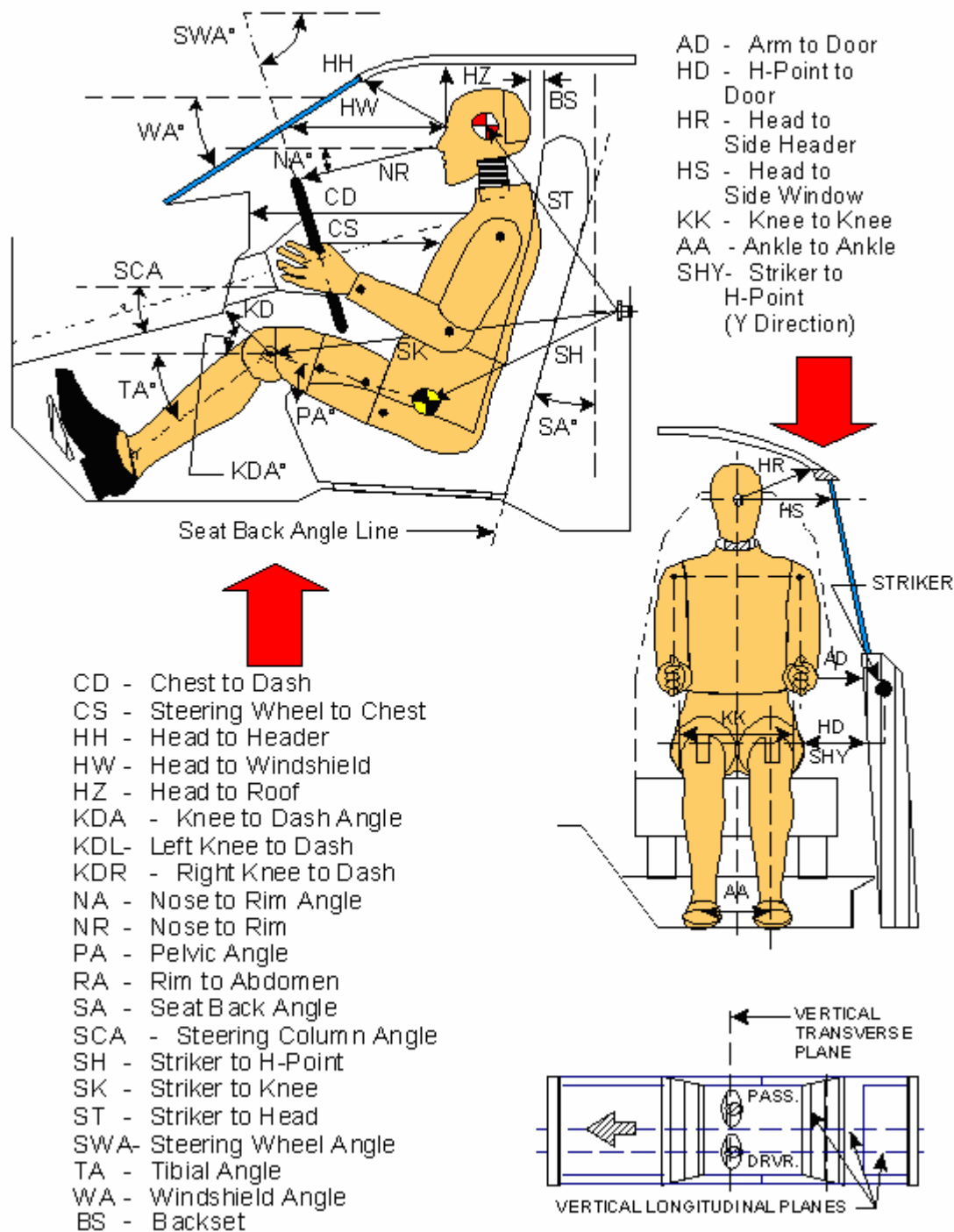
HEAD RESTRAINT POSITION – CONFIGURED FOR TEST (vertical/fore-aft)	B (mm, backset)	H (mm, height)	Torso Angle (deg)	Height Along Torso Line From Pivot (mm)
Fixed / Fixed:	45	32	25.0	817

Head restraint positioning details: _____ None _____

DATA SHEET 6

DUMMY MEASUREMENTS

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS



DATA SHEET 6 (continued)

DUMMY MEASUREMENTS

	DRIVER (Serial #505)			PASS. (Serial #206)		
WA ^o	32 deg.			N/A		
SWA ^o	N/A deg.			N/A		
SCA ^o	N/A deg.			N/A		
SA ^o	20 deg. (H-point machine torso angle)			25 deg. (H-point machine torso angle)		
HZ	312			191		
HH	447			325		
HW	842			648		
HR	290			226		
NR	N/A			N/A		
CD	598			578		
CS	N/A			N/A		
RA	N/A			N/A		
KDL	246	Angle (KDA)	25 deg.	159		
KDR	241			170	Angle (KDA)	25 deg.
PA ^o	18.5 deg.			22.3 deg.		
TA ^o	50.0 deg.			39.0 deg.		
KK	165			195		
AA	175			225		
ST	365	Angle	11 deg.	445	Angle	15 deg.
SK	532	Angle	104 deg.	615	Angle	100 deg.
SH	262	Angle	133 deg.	300	Angle	130 deg.
SHY	259			231		
HS	379			355		
HD	178			142		
AD	143			108		
BS	45			68		

Dimensions in millimeters

DATA SHEET 7

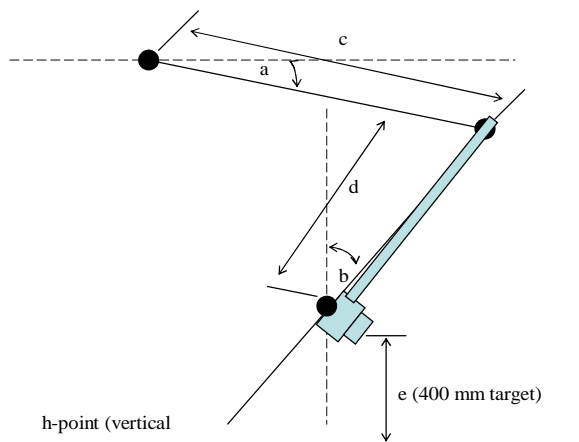
VEHICLE AND SEAT INSTRUMENTATION MEASUREMENTS

VEHICLE INSTRUMENTATION					
LOCATION	TRANSDUCER TYPE	DIRECTION OF MEASURE	PRE-TEST DIMENSIONS (mm) *		
			X	Y	Z
Left Rear Seat Cross Member	Accelerometer	X	1958	-602	202
Left Rear Seat Cross Member Redundant	Accelerometer	X	1958	-602	202
Right Rear Seat Cross Member Redundant	Accelerometer	X	1958	602	202
Right Rear Seat Cross Member	Accelerometer	X	1958	602	202
Left Front Sill	MHD ARS-06	About Y	2568	-690	305
Right Front Sill	MHD ARS-01	About Y	-	-	-

* X: From rear bumper, positive forward; Y: From long. centerline, positive right; Z: From ground, positive down.

DATA SHEET 7

VEHICLE AND SEAT INSTRUMENTATION MEASUREMENTS



DIMENSION	P1 LEFT	P1 RIGHT	P2 LEFT	P2 RIGHT
a (deg from horiz.)	4.0	4.0	8.0	7.9
b (deg from vertical)	23.4	21.9	26.8	28.8
c (mm)	647	646	653	670
d (mm)	365	365	365	365
e (mm, target=400)	335	332	332	336

SEATBACK ANGLE	P1		P2	
	PRE (deg)	POST (deg)	PRE (deg)	POST (deg)
Left MDH Bracket †	19.9	33.6	23.1	36.3
Right MHD Bracket †	18.5	32.0	25.7	39.1
Front Sill ‡	-0.8	-1.1	-1.0	-0.9

POST TEST DETAILS

Seatback Deformation: Both seat backs deformed rearward (reclined). The recline mechanisms for both seats remained operable.

Seat/Floor Attachment Point Deformation: None

Recliner Mechanism Deformation: None

Comments:

P1 Contacts: Back of head to head restraint and back to seat back

P2 Contacts: Back of head to head restraint and back to seat back

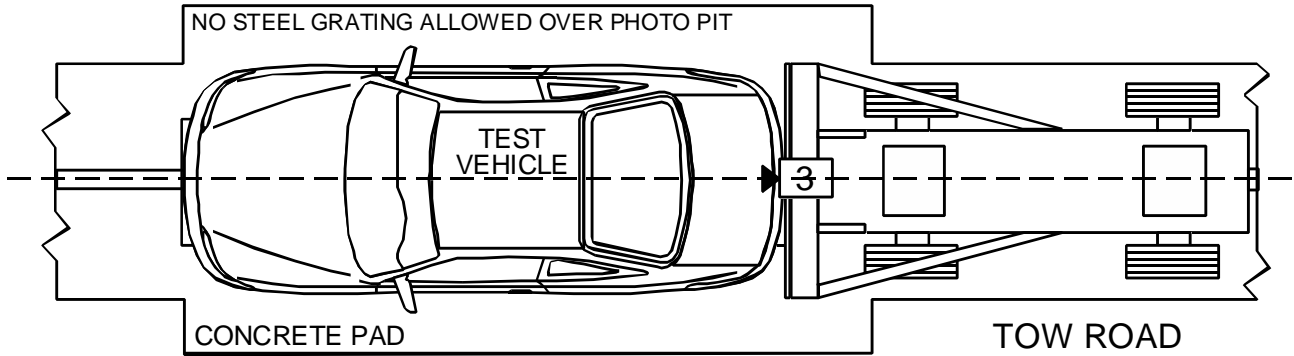
† Reference: From vertical, positive rearward (reclined).

‡ Reference: From horizontal, positive front of sill higher than rear.

CAMERA POSITIONS FOR REAR IMPACTS

REAL TIME CAMERA →

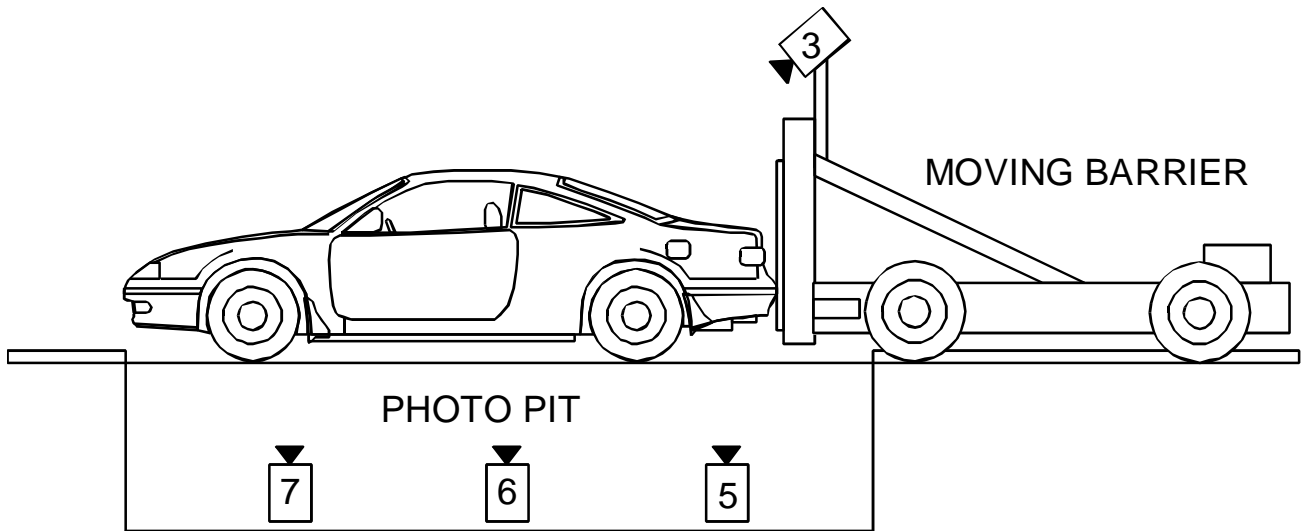
2	4
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1

TOP VIEW



LEFT SIDE VIEW

DATA SHEET 8

CAMERA POSITIONS FOR REAR IMPACTS

NHTSA No. : C35900

Vehicle : 2003 Volvo V70 Station Wagon

CAMERA NO.	VIEW	CAMERA POSITIONS (mm)*			ANGLE** (degrees)	LENS (mm)	SPEED (fps)
		X	Y	Z			
1	Real-Time Camera	-	-	-	-	-	24
2	Right Side View	15900	1700	1080	-1	35	740
3	Left Side View	16550	2500	1140	0	35	500
4	Vehicle Front Underbody View	0	3430	-1956	90	13	1000
5	Vehicle Mid-Section Underbody View	0	2000	-1956	90	13	1020
6	Vehicle Rear Underbody View	0	900	-1956	90	13	1000
7	Moving Barrier View	0	0	2515	-105	13	1000
8	Overhead Overall View	-508	0	9804	-90	13	1005
9†	Onboard Driver View	960	2781	1050	-12	8	500
10†	Onboard Passenger View	822	2815	1050	-4	8	500

- * 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

† Research cameras.

Appendix A
PHOTOGRAPHS

LIST OF PHOTOGRAPHS

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PHOTOGRAPH IS NOT AVAILABLE

Figure A-1 DRIVER SEAT ICBC VIEW

PHOTOGRAPH IS NOT AVAILABLE

Figure A-2 PASSENGER SEAT ICBC VIEW

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8655-F301-10R



Figure A-3 PRE-TEST DRIVER BACKSET VIEW



Figure A-4 PRE-TEST PASSENGER BACKSET VIEW



Figure A-5 PRE-TEST DRIVER SEAT VIEW



Figure A-6 POST-TEST DRIVER SEAT VIEW



Figure A-7 PRE-TEST PASSENGER SEAT VIEW

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8655-F301-10R



Figure A-8 POST-TEST PASSENGER SEAT VIEW



Figure A-9 PRE-TEST DRIVER SIDE VIEW



Figure A-10 POST-TEST DRIVER SIDE VIEW

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8655-F301-10R



Figure A-11 PRE-TEST PASSENGER SIDE VIEW

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Figure A-12 POST-TEST PASSENGER SIDE VIEW



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Figure A-13 PRE-TEST DRIVER ISOMETRICAL VIEW



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Figure A-14 POST-TEST DRIVER ISOMETRICAL VIEW



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Figure A-15 PRE-TEST PASSENGER ISOMETRICAL VIEW



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Figure A-16 POST-TEST PASSENGER ISOMETRICAL VIEW

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

DATA CHANNEL FILTER CLASS SUMMARY

DATA TYPE	SAE FILTER CLASS (Hz)
Dummy Head Accelerations	1000
Dummy Head Angular Accelerations	1000
Dummy Neck Forces	1000
Dummy Neck Moments	600
Dummy Neck Accelerations	1000
Dummy Chest Accelerations	180
Dummy Chest Displacements	60
Dummy Chest Angular Accelerations	1000
Dummy Femur Forces	600
Dummy Belt Displacements	180
Dummy Belt Loads	60
Seat Angular Accelerations	1000
Vehicle Angular Accelerations	1000
Vehicle Accelerations	60
Vehicle Velocity Integrations	180
Vehicle Displacement Integrations	180
VRTC Seat Device Components	1000

All reported data is in the SAE coordinate system.

FACILITY: VERF DATE: July 22, 2003
TEST#: 42057-1001-2076
TITLE: 2003 FMVSS 301 Test 1 2003 Volvo V70 C35900
Version 5.00

=====
P1 HIC(36 ms): 63.7

t1: 94.8 msec

t2: 130.8 msec

Duration: 36.0 msec

Average Acceleration: 19.9 g

Input channels: V2P1 Head Ax (2) CFC_1000

V2P1 Head Ay (3) CFC_1000

V2P1 Head Az (4) CFC_1000

P1 UP NECK Fx: Max: 67.0 N 50.0 msec

Min: -165.9 N 130.2 msec

Input channel: V2P1 Upper Neck Fx (5) CFC_1000

P1 UP NECK Fz: Max: 288.9 N 92.8 msec

Min: -238.4 N 136.5 msec

Input channel: V2P1 Upper Neck Fz (7) CFC_1000

P1 UP NECK Mocy (5th Female)

Max: 7.2 N-m 270.8 msec

Min: -10.3 N-m 129.1 msec

Input channels: V2P1 Upper Neck Fx (5) CFC_600

V2P1 Upper Neck My (9) CFC_600

Docy: 0.01778

P1 UP NECK Nij (5th Female)

Ntf: 0.06 Nij 272.5 msec CVt: 4287; CVf: 155

Nte: 0.16 Nij 103.1 msec CVt: 4287; CVe: 67

Ncf: 0.04 Nij 45.7 msec CVc: 3880; CVf: 155

Nce: 0.20 Nij 130.6 msec CVc: 3880; CVe: 67

Input channels: V2P1 Upper Neck Fz (7) CFC_600

V2P1 Upper Neck Mocy [N-m, CFC_600] (78)

P1 CLIP(3 ms): 13.3 g

t1: 72.7 msec

t2: 75.7 msec

Duration: 3.0 msec

P1 CSI: 28.2

Input channels: V2P1 Chest Ax (17) CFC_180

V2P1 Chest Ay (18) CFC_180

V2P1 Chest Az (19) CFC_180

P1 CHEST DISP: Max: 0.7 mm 66.2 msec

Min: -0.8 mm 272.6 msec

Input channel: V2P1 Chest Displacement (25) CFC_600

P1 LEFT FEMUR: Max: 395.7 N 61.2 msec

Min: -213.7 N 161.6 msec

Input channel: V2P1 Left Femur (23) CFC_600

P1 RIGHT FEMUR: Max: 387.5 N 61.6 msec

Min: -338.4 N 220.2 msec

Input channel: V2P1 Right Femur (24) CFC_600

```

=====
P2 HIC(36 ms): 155.0
  t1: 107.0 msec
  t2: 138.7 msec
  Duration: 31.7 msec
  Average Acceleration: 29.9 g
  Input channels: V2P2 Head x (29) CFC_1000
                  V2P2 Head y (30) CFC_1000
                  V2P2 Head z (31) CFC_1000

P2 UP NECK Fx: Max:  421.9 N 124.6 msec
               Min: -160.8 N 263.1 msec
  Input channel: V2P2 Upper Neck Fx (32) CFC_1000

P2 UP NECK Fz: Max: 1819.6 N 113.9 msec
               Min: -194.1 N  55.4 msec
  Input channel: V2P2 Upper Neck Fz (34) CFC_1000

P2 UP NECK Mocy (50th Male)
  Max:  34.7 N-m 125.9 msec
  Min: -14.8 N-m 147.9 msec
  Input channels: V2P2 Upper Neck Fx (32) CFC_600
                  V2P2 Upper Neck My (36) CFC_600
  Docy: 0.01778

P2 UP NECK Nij (50th Male)
  Ntf: 0.31 Nij 123.5 msec  CVt: 6806; CVf: 310
  Nte: 0.15 Nij 148.6 msec  CVt: 6806; CVe: 135
  Ncf: 0.03 Nij 392.4 msec  CVc: 6160; CVf: 310
  Nce: 0.04 Nij  59.1 msec  CVc: 6160; CVe: 135
  Input channels: V2P2 Upper Neck Fz (34) CFC_600
                  V2P2 Upper Neck Mocy [N-m, CFC_600] (84)

P2 CLIP(3 ms): 118.8 g
  t1: 77.9 msec
  t2: 80.9 msec
  Duration: 3.0 msec
P2 CSI: 5679.6
  Input channels: V2P2 Chest x (47) CFC_180
                  V2P2 Chest y (48) CFC_180
                  V2P2 Chest z (49) CFC_180

P2 CHEST DISP: Max:  2.5 mm 74.4 msec
               Min: -1.3 mm 218.9 msec
  Input channel: V2P2 Chest Displacement (46) CFC_600

P2 LEFT FEMUR: Max:  156.8 N 111.8 msec
               Min: -678.9 N  65.7 msec
  Input channel: V2P2 Left Femur (44) CFC_600

P2 RIGHT FEMUR: Max:  170.6 N 106.3 msec
                Min: -620.1 N  65.7 msec
  Input channel: V2P2 Right Femur (45) CFC_600
=====

```

NAME	Unit	Max	msec	Min	msec	Comment
V2P1 Head Ax	g	21.2	111.9	-4.1	268.3	
V2P1 Head Ay	g	1.0	499.4	-2.0	104.9	
V2P1 Head Az	g	10.5	99.2	-1.6	42.7	
V2P1 Head A Resultant	g	22.6	110.6	0.0	-11.8	
V2P1 Head Comp AVy	deg/s	938.7	96.6	-600.7	221.4	f2=0.292 Hz; f4=0.001 Hz
V2P1 Head Comp ADy	deg	42.1	116.4	-25.5	371.3	f2=0.292 Hz; f4=0.001 Hz
V2P1 Upper Neck Fx	N	67.0	50.0	-165.9	130.2	
V2P1 Upper Neck Fy	N	57.1	133.8	-20.4	372.0	
V2P1 Upper Neck Fz	N	288.9	92.8	-238.4	136.5	
V2P1 Upper Neck F Resultant	N	289.1	92.8	0.1	-94.4	
V2P1 Upper Neck Mx	N-m	1.6	499.8	-3.1	134.6	
V2P1 Upper Neck My	N-m	5.8	47.3	-13.3	128.6	
V2P1 Upper Neck Mz	N-m	0.9	329.5	-0.8	59.7	
V2P1 Upper Neck M Resultant	N-m	13.4	129.7	0.0	-30.8	
V2P1 Lower Neck Fx	N	44.5	47.5	-323.8	132.9	
V2P1 Lower Neck Fy	N	41.9	498.1	-52.0	79.6	
V2P1 Lower Neck Fz	N	405.8	75.6	-131.7	135.5	
V2P1 Lower Neck F Resultant	N	407.6	75.6	0.1	-78.7	
V2P1 Lower Neck Mx	N-m	7.9	499.9	-4.0	371.0	
V2P1 Lower Neck My	N-m	20.4	266.9	-38.8	93.8	
V2P1 Lower Neck Mz	N-m	2.3	320.6	-4.4	59.4	
V2P1 Lower Neck M Resultant	N-m	39.1	93.8	0.0	-11.9	
V2P1 Lower Neck Ax	g	13.0	85.1	-2.4	320.1	
V2P1 Chest Ax	g	12.1	70.3	-1.7	317.8	
V2P1 Chest Ay	g	0.6	439.4	-1.3	69.7	
V2P1 Chest Az	g	7.2	75.5	-1.6	457.2	
V2P1 Chest A Resultant	g	13.4	73.5	0.0	-34.1	
V2P1 Chest Dx	mm	0.7	66.2	-0.8	272.6	
V2P1 Chest Comp AVy	deg/s	624.4	82.8	-431.7	163.2	f2=0.298 Hz; f4=0.001 Hz
V2P1 Chest Comp ADy	deg	33.3	128.6	-15.1	343.9	f2=0.298 Hz; f4=0.001 Hz
V2P1 Pelvic Ax	g	20.6	71.8	-2.4	161.8	
V2P1 Pelvic Ay	g	1.2	161.9	-3.0	69.7	
V2P1 Pelvic Az	g	0.0	-100.0	0.0	100.0	Transducer failed
V2P1 Pelvic A Resultant	g	20.6	71.8	0.0	-29.5	
V2P1 Left Femur Fz	N	395.7	61.2	-213.7	161.6	
V2P1 Right Femur Fz	N	387.5	61.6	-338.4	220.2	
V2P1 Head to Chest Comp ADy	deg	14.1	279.3	-11.6	109.7	f2=0.292 Hz; f4=0.001 Hz
V2 Driver Lap Belt F	N	269.0	165.6	-14.3	101.1	
V2P2 Head Ax	g	36.5	122.3	-4.0	266.9	
V2P2 Head Ay	g	4.1	118.8	-1.2	140.0	
V2P2 Head Az	g	19.1	113.1	-4.2	58.8	
V2P2 Head A Resultant	g	38.0	122.2	0.0	-40.8	
V2P2 Head Comp AVy	deg/s	1880.4	109.6	-920.8	233.0	f2=0.287 Hz; f4=0.001 Hz
V2P2 Head Comp ADy	deg	55.6	124.4	-28.0	406.8	f2=0.287 Hz; f4=0.001 Hz
V2P2 Upper Neck Fx	N	421.9	124.6	-160.8	263.1	
V2P2 Upper Neck Fy	N	18.4	321.3	-46.6	118.9	
V2P2 Upper Neck Fz	N	1819.6	113.9	-194.1	55.4	

NAME	Unit	Max	msec	Min	msec	Comment
V2P2 Upper Neck F Resultant	N	1826.7	113.9	0.3	-51.7	
V2P2 Upper Neck Mx	N-m	2.1	101.6	-4.1	126.5	
V2P2 Upper Neck My	N-m	42.1	125.7	-17.1	147.9	
V2P2 Upper Neck Mz	N-m	2.0	97.4	-1.7	146.8	
V2P2 Upper Neck M Resultant	N-m	42.3	125.7	0.0	-59.5	
V2P2 Lower Neck Fx	N	1027.2	123.8	-151.7	269.6	
V2P2 Lower Neck Fy	N	89.3	112.1	-30.4	76.2	
V2P2 Lower Neck Fz	N	1539.4	113.4	-269.9	58.7	
V2P2 Lower Neck F Resultant	N	1736.6	113.7	0.3	-23.8	
V2P2 Lower Neck Mx	N-m	9.6	109.8	-5.8	72.7	
V2P2 Lower Neck My	N-m	41.0	268.8	-163.1	118.5	
V2P2 Lower Neck Mz	N-m	7.0	108.6	-2.6	75.2	
V2P2 Lower Neck M Resultant	N-m	163.2	118.5	0.0	-53.8	
V2P2 Lower Neck x	g	23.6	104.9	-2.4	332.4	
V2P2 Chest Ax	g	15.7	105.2	-2.2	327.7	
V2P2 Chest Ay	g	57.0	191.9	-124.0	79.4	Transducer cable failed
V2P2 Chest Az	g	8.2	75.0	-3.8	57.4	
V2P2 Chest A Resultant	g	124.7	79.4	0.0	-62.4	
V2P2 Chest Dx	mm	2.5	74.4	-1.3	218.9	
V2P2 Chest Comp AVy	deg/s	772.9	91.1	-414.2	178.1	f2=0.296 Hz; f4=0.001 Hz
V2P2 Chest Comp ADy	deg	38.1	140.6	-14.0	439.8	f2=0.296 Hz; f4=0.001 Hz
V2P2 Pelvic Ax	g	27.7	66.9	-4.7	151.9	
V2P2 Pelvic Ay	g	2.4	64.7	-4.1	73.4	
V2P2 Pelvic Az	g	9.0	73.2	-3.5	112.9	
V2P2 Pelvic A Resultant	g	28.7	66.9	0.0	-38.9	
V2P2 Left Femur Fz	N	156.8	111.8	-678.9	65.7	
V2P2 Right Femur Fz	N	170.6	106.3	-620.1	65.7	
V2P2 Head to Chest Comp ADy	deg	16.4	272.4	-20.4	120.9	f2=0.287 Hz; f4=0.001 Hz
V2 RFP Lap Belt F	N	1018.4	153.6	-12.2	23.3	
V2 Left X Member Ax	g	23.4	7.4	-1.2	159.9	
V2 Left X Member Red Ax	g	23.5	7.3	-1.4	182.5	
V2 Right X Member Ax	g	23.0	7.4	-2.5	109.2	
V2 Right X Member Red Ax	g	23.1	7.3	-2.0	123.4	
V2 Left Front Sill Comp AVy	deg/s	73.5	39.6	-177.2	40.8	f2=0.308 Hz; f4=0.001 Hz
V2 Left Front Sill Comp ADy	deg	0.4	364.8	-1.9	64.4	f2=0.308 Hz; f4=0.001 Hz
V2P1 Left Seat Comp AVy	deg/s	828.2	72.1	-238.4	65.2	f2=0.283 Hz; f4=0.001 Hz
V2P1 Left Seat Comp ADy	deg	26.4	122.4	-0.2	22.1	f2=0.283 Hz; f4=0.001 Hz
V2P1 Right Seat Comp AVy	deg/s	587.5	68.0	-226.0	159.1	f2=0.294 Hz; f4=0.001 Hz
V2P1 Right Seat Comp ADy	deg	26.4	116.5	-0.6	24.2	f2=0.294 Hz; f4=0.001 Hz
V2P2 Left Seat Comp AVy	deg/s	607.8	70.9	-196.1	158.9	f2=0.3 Hz; f4=0.001 Hz
V2P2 Left Seat Comp ADy	deg	25.3	118.9	-0.3	18.1	f2=0.3 Hz; f4=0.001 Hz
V2P2 Right Seat Comp AVy	deg/s	863.4	71.5	-229.3	161.6	f2=0.283 Hz; f4=0.001 Hz
V2P2 Right Seat Comp ADy	deg	26.4	121.1	-0.2	20.9	f2=0.283 Hz; f4=0.001 Hz
V2P1 Left Link ADy	deg	29.0	95.9	-5.5	104.0	
V2P1 Right Link ADy	deg	14.8	113.2	-2.8	37.6	
V2P1 Left Span Bar D	mm	0.1	127.3	-0.3	74.4	Transducer cable failed
V2P1 Right Span Bar D	mm	432.1	124.0	0.0	-69.7	
V2P2 Left Link ADy	deg	26.6	384.8	-16.6	59.0	

NAME	Unit	Max	msec	Min	msec	Comment
V2P2 Right Link ADy	deg	0.0	-100.0	0.0	100.0	Transducer failed
V2P2 Left Span Bar D	mm	389.6	119.7	-0.5	17.4	
V2P2 Right Span Bar D	mm	399.8	121.3	0.0	-26.5	
P1 Lt Change in Seat Back Angle WRT Sill	deg	27.8	122.3	-0.4	20.1	
P1 Lt Change in String Angle	deg	5.0	95.7	-31.7	104.1	
P1 Lt Seat X Displacement	mm	1.0	23.0	-256.9	104.1	String potentiometer failed
P1 Rt Change in Seat Back Angle WRT Sill	deg	27.8	117.0	-0.6	23.0	
P1 Rt Change in String Angle	deg	0.1	26.1	-17.6	122.5	
P1 Rt Seat X Displacement	mm	241.9	137.8	-0.2	9.6	
P2 Lt Change in Seat Back Angle WRT Sill	deg	26.7	119.2	-0.5	18.1	
P2 Lt Change in String Angle	deg	14.4	300.4	-26.0	59.1	
P2 Lt Seat X Displacement	mm	235.9	129.9	-15.8	59.0	
P2 Rt Change in Seat Back Angle WRT Sill	deg	27.8	121.4	-0.4	20.2	
P2 Rt Change in String Angle	deg	0.4	20.2	-27.8	121.4	Rotary potentiometer failed
P2 Rt Seat X Displacement	mm	112.5	199.6	-0.2	9.8	Rotary potentiometer failed

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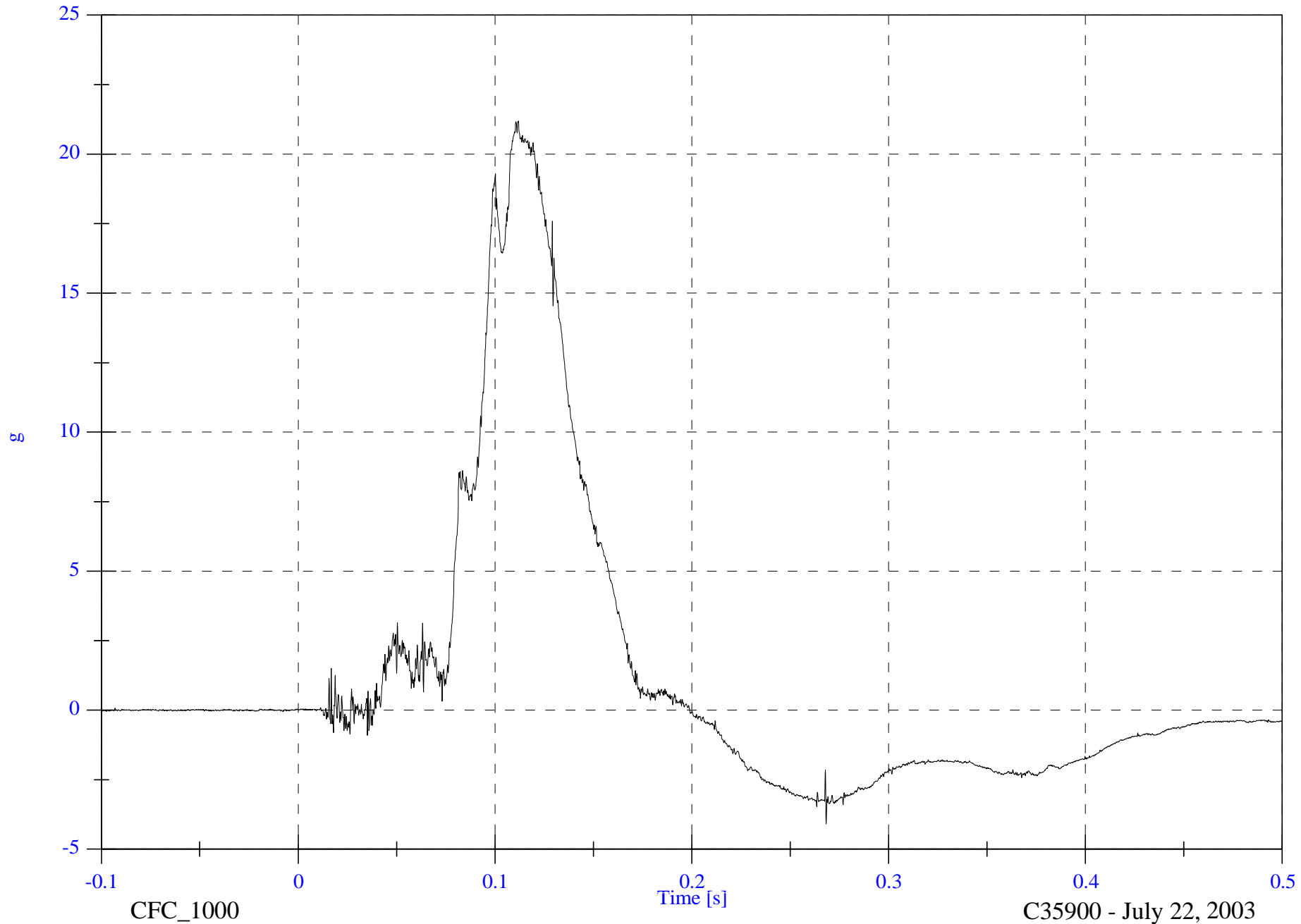
FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Head Ax

Max: 21.2 [g] at 0.112 [s]
Min: -4.1 [g] at 0.268 [s]

B-11

8655-F301-10R



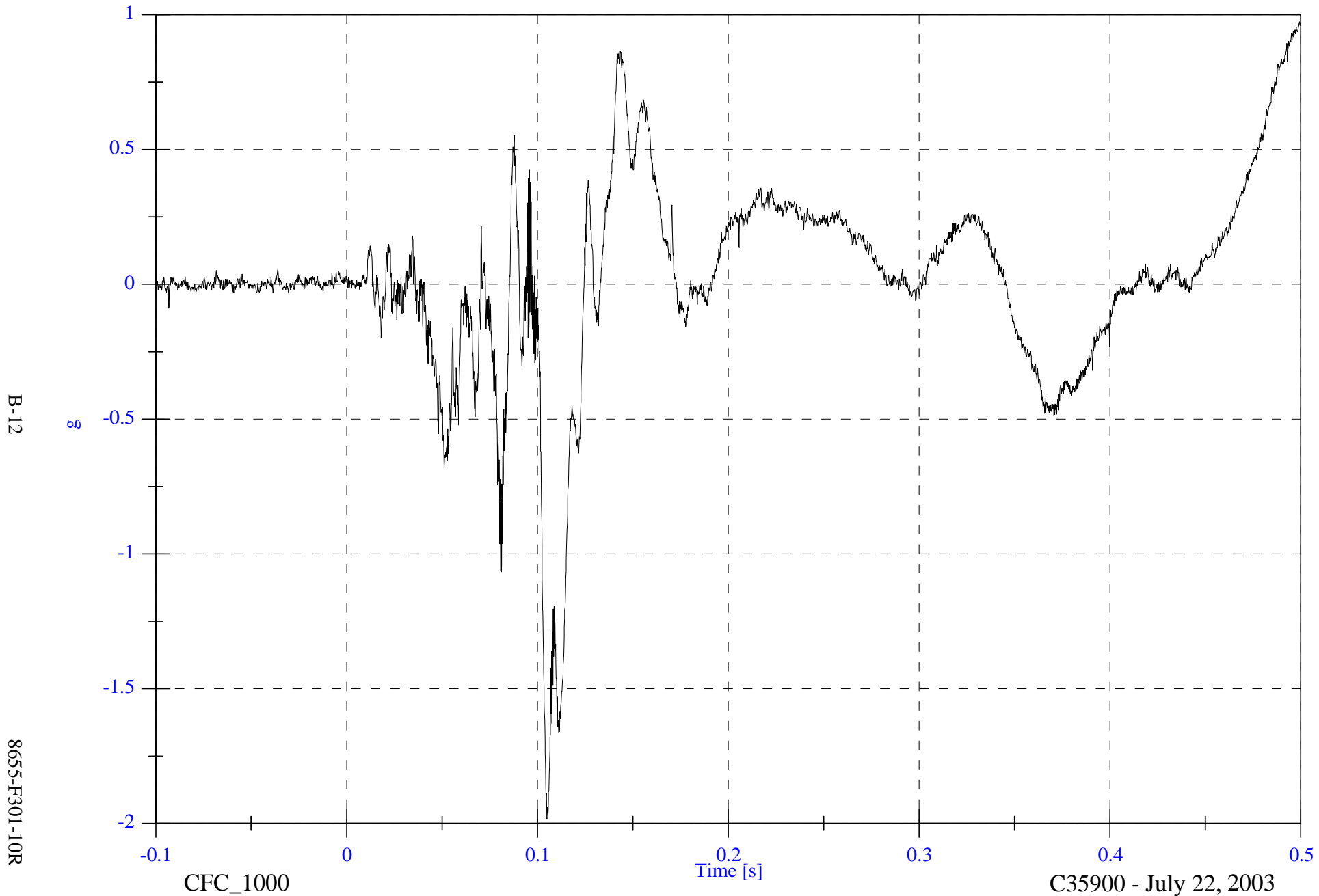
CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Head Ay

Max: 1.0 [g] at 0.499 [s]
Min: -2.0 [g] at 0.105 [s]



B-12

8655-F301-10R

CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

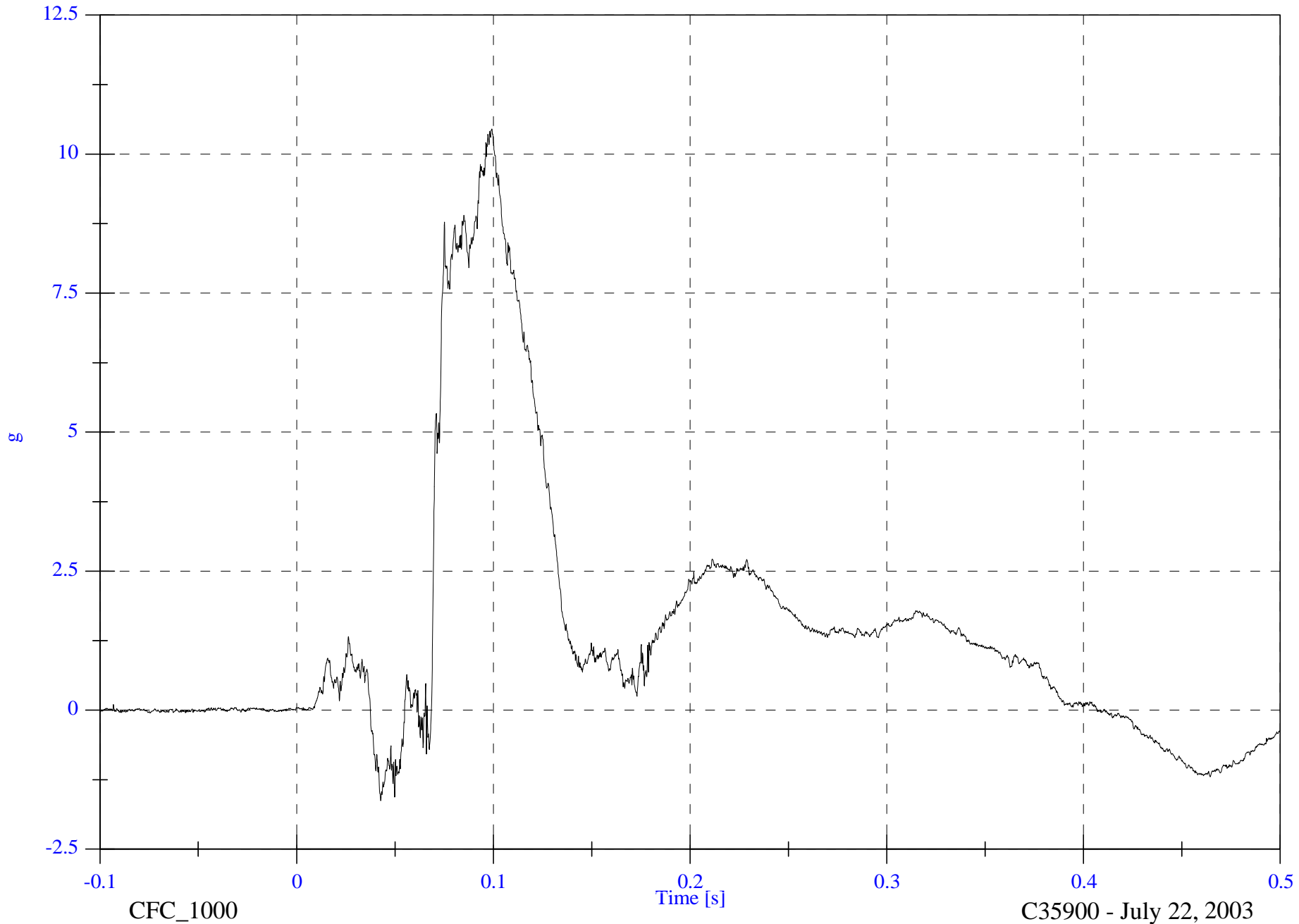
V2P1 Head Az

Max: 10.5 [g] at 0.099 [s]

Min: -1.6 [g] at 0.043 [s]

B-13

8655-F301-10R



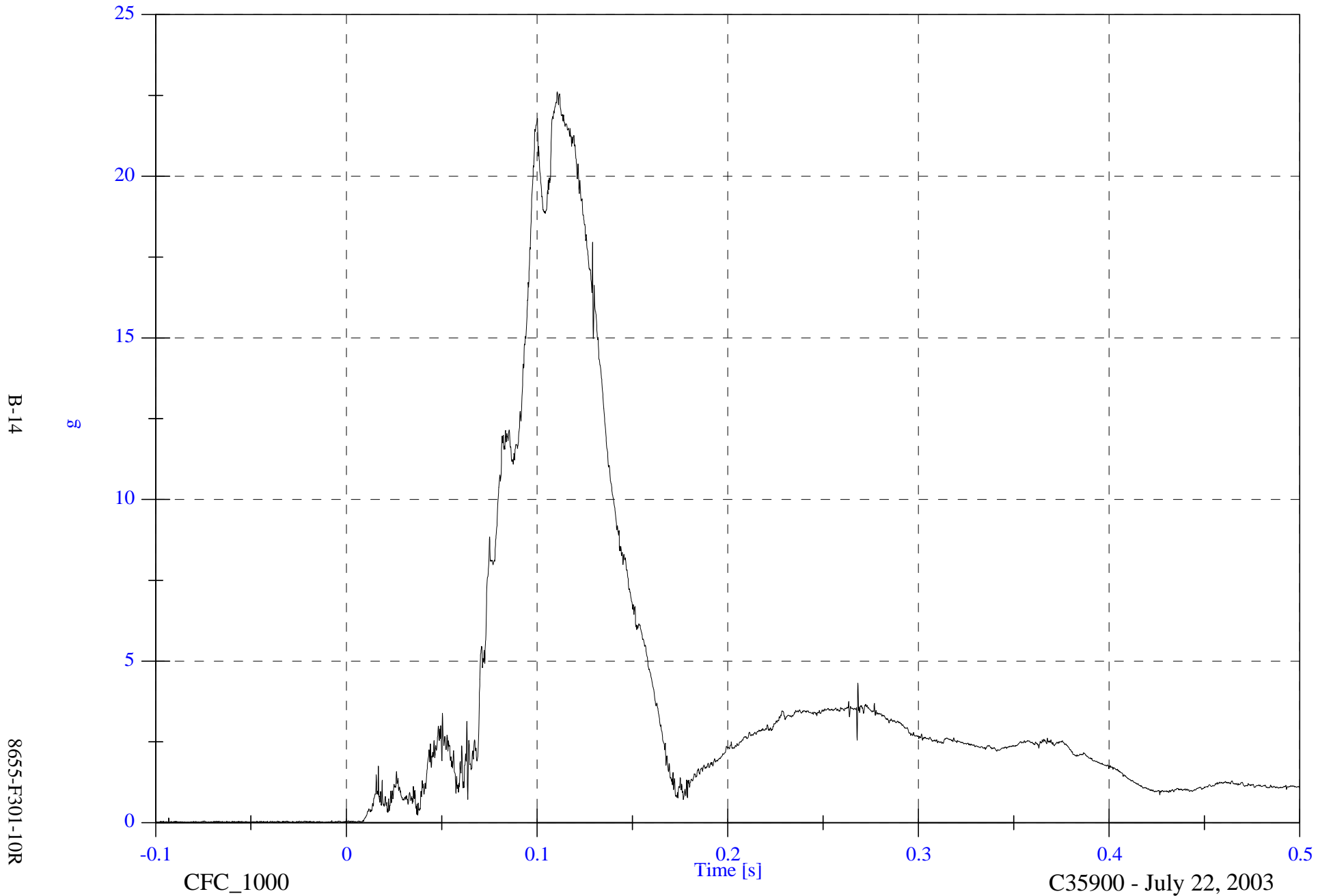
CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Head A Resultant

Max: 22.6 [g] at 0.111 [s]
Min: 0.0 [g] at -0.012 [s]

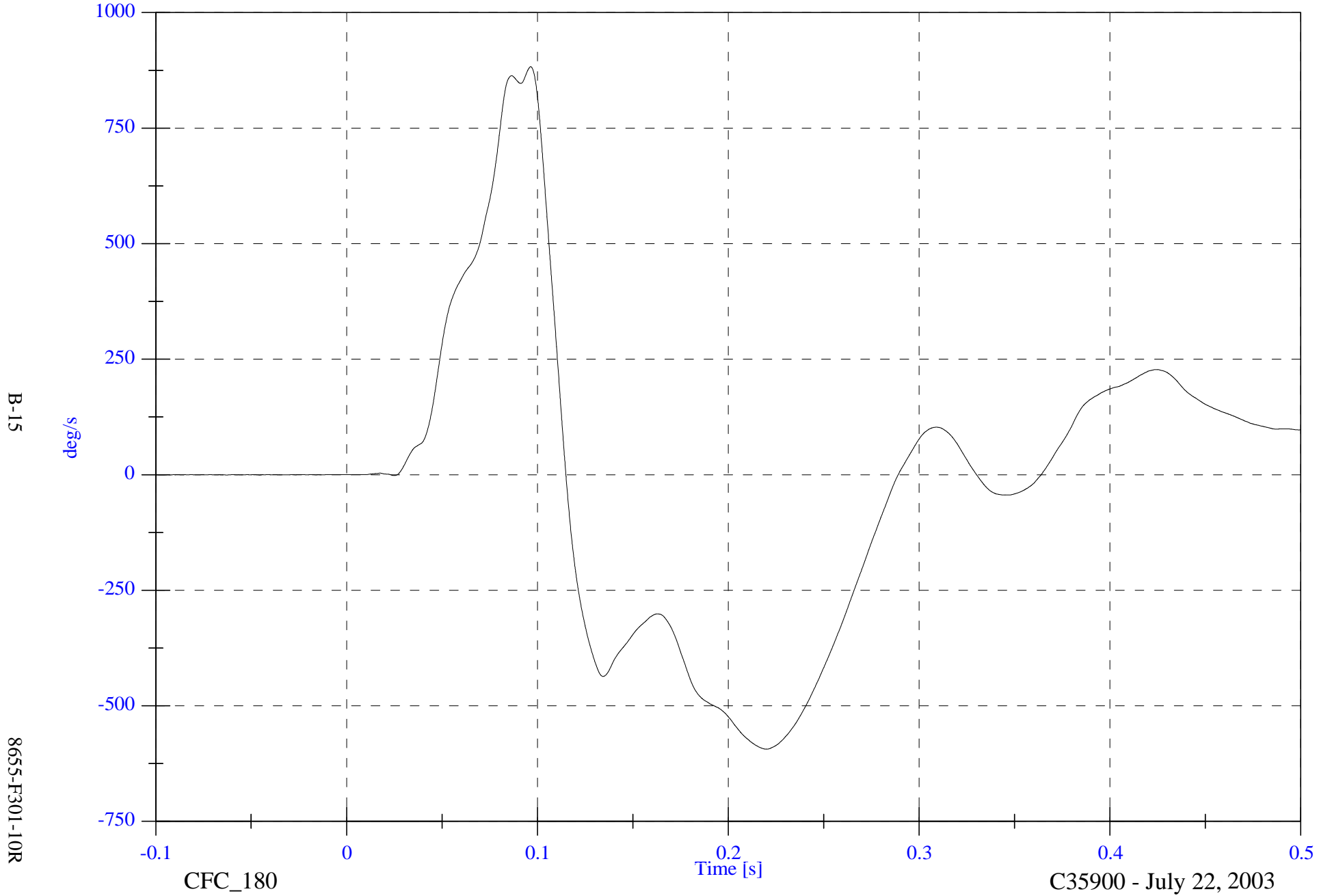


FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Head AVy

Max: 882.9 [deg/s] at 0.096 [s]

Min: -593.5 [deg/s] at 0.220 [s]



FMVSS 301 Test 1 - 2003 Volvo V70

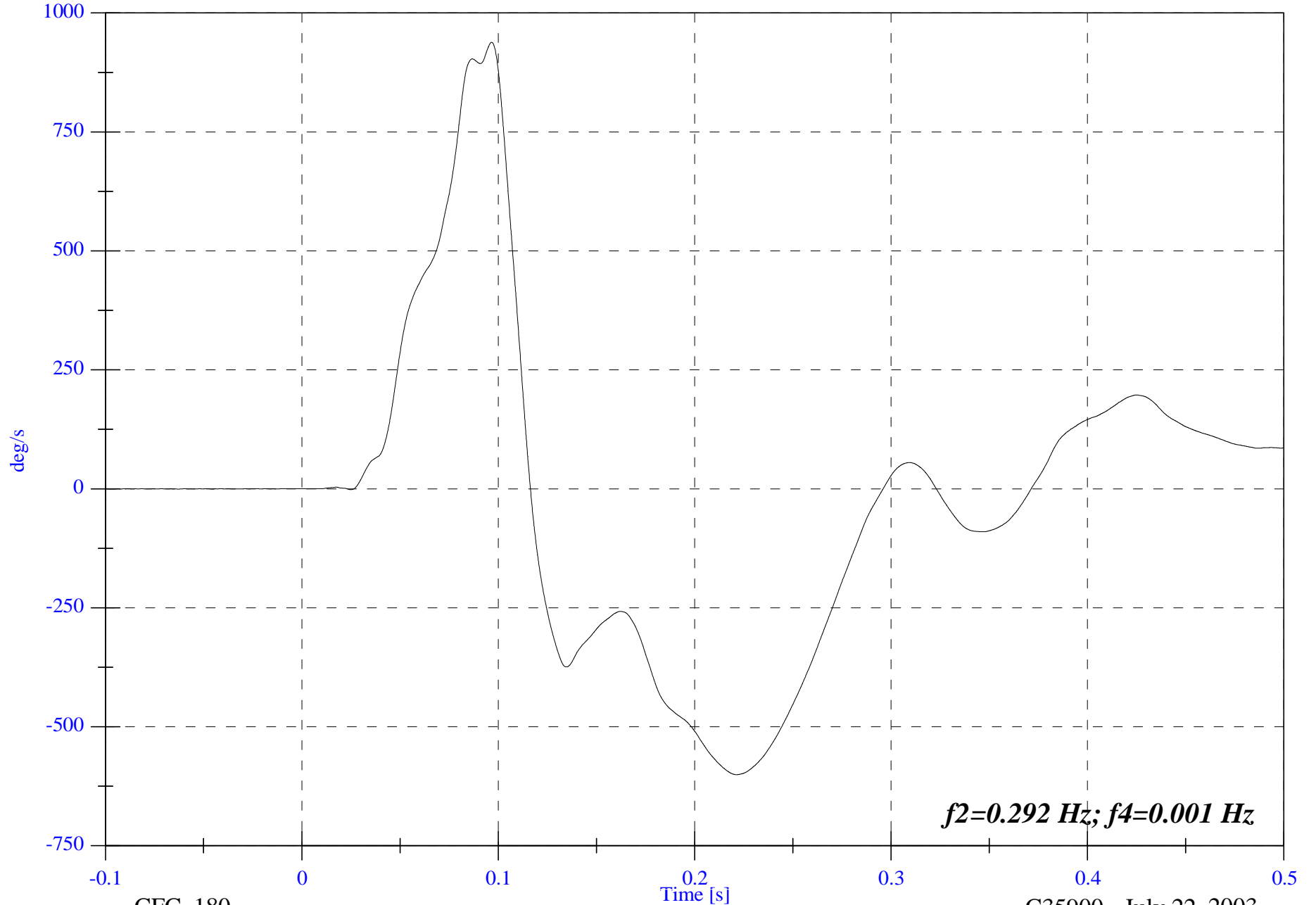
V2P1 Head Comp AVy

Max: 938.7 [deg/s] at 0.097 [s]

Min: -600.7 [deg/s] at 0.221 [s]

B-16

8655-F301-10R



f2=0.292 Hz; f4=0.001 Hz

CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

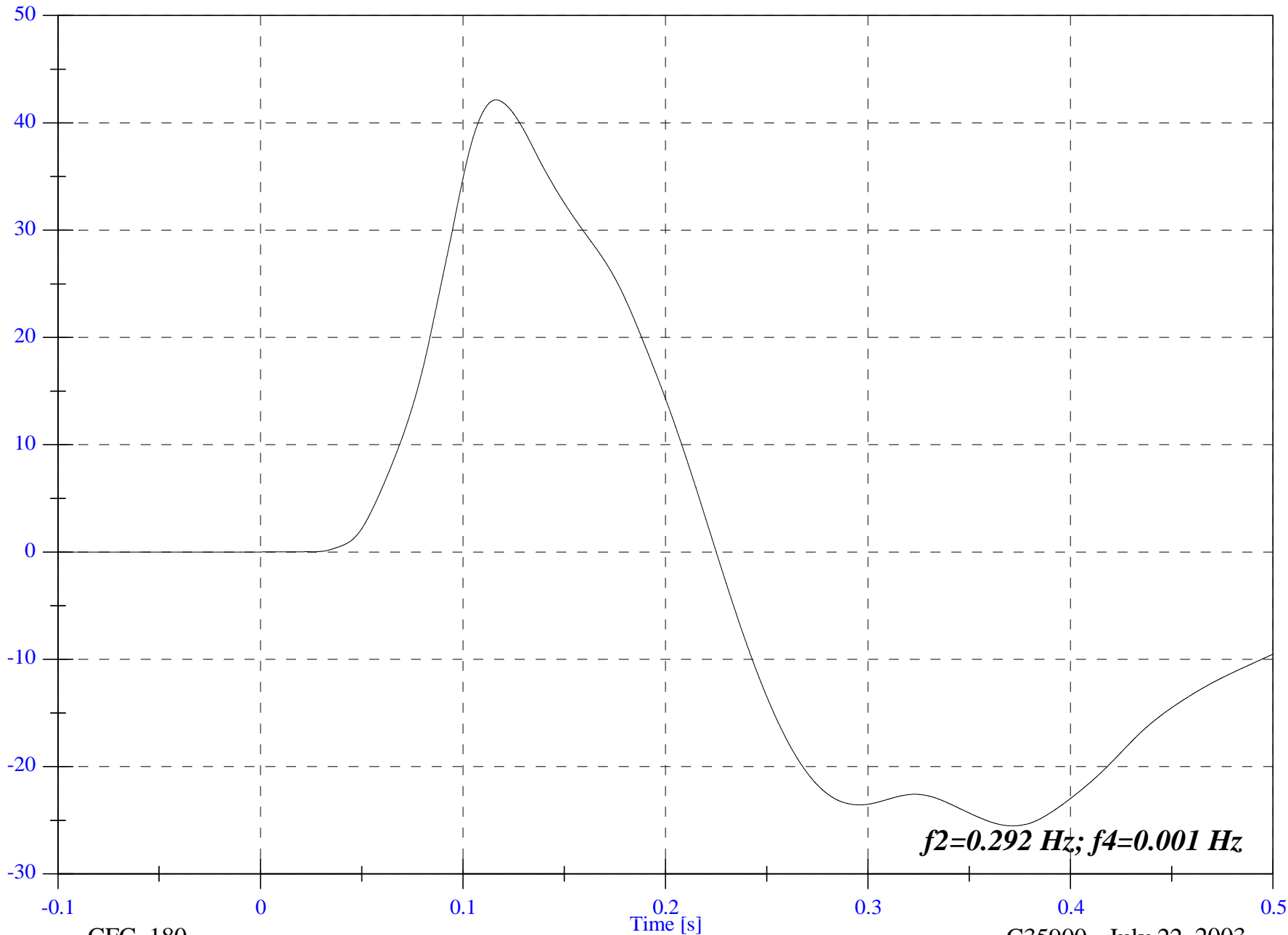
V2P1 Head Comp ADy

Max: 42.1 [deg] at 0.116 [s]

Min: -25.5 [deg] at 0.371 [s]

B-17

gap



8655-F301-10R

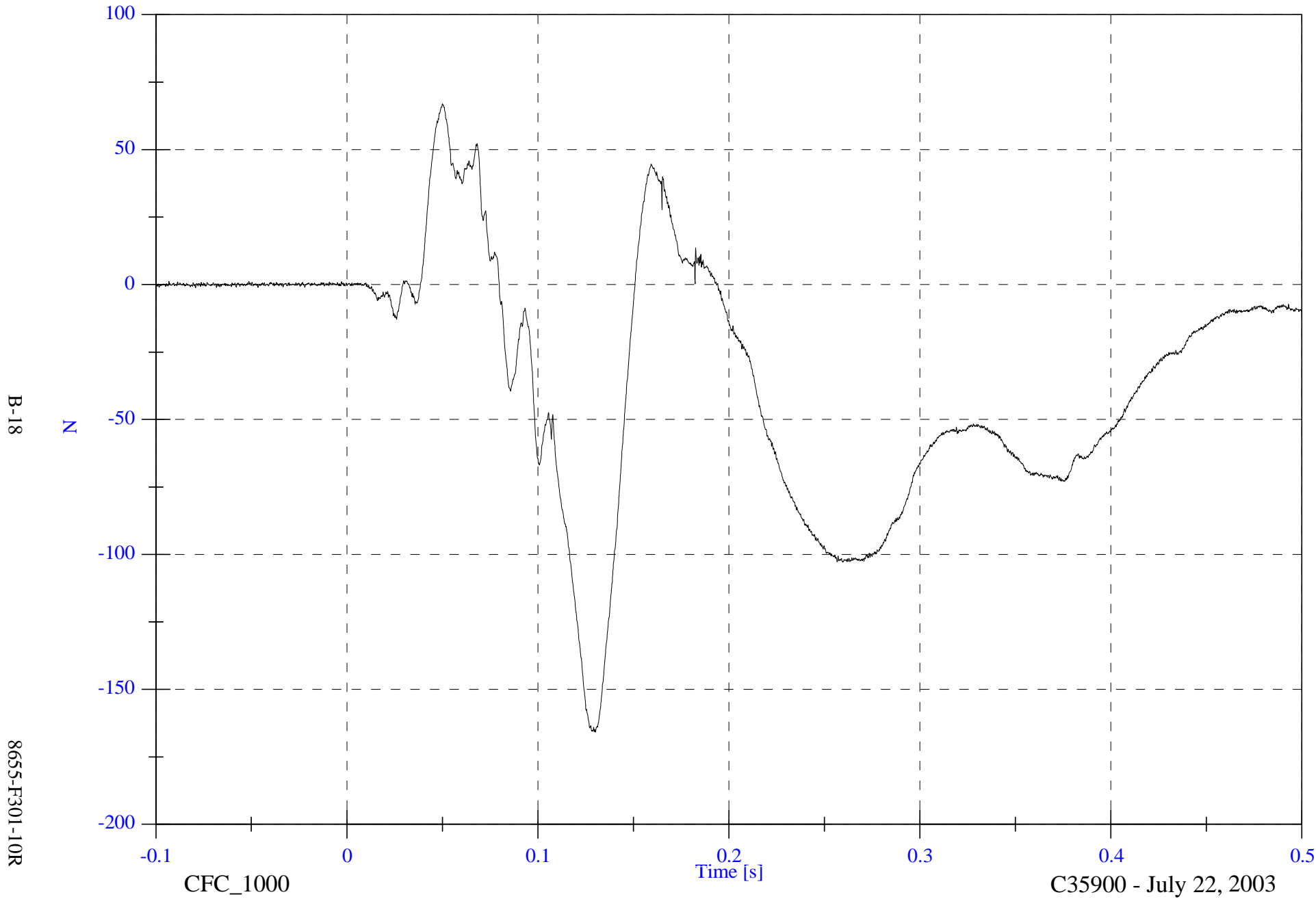
CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Upper Neck Fx

Max: 67.0 [N] at 0.050 [s]
Min: -165.9 [N] at 0.130 [s]



B-18

8655-F301-10R

CFC_1000

Time [s]

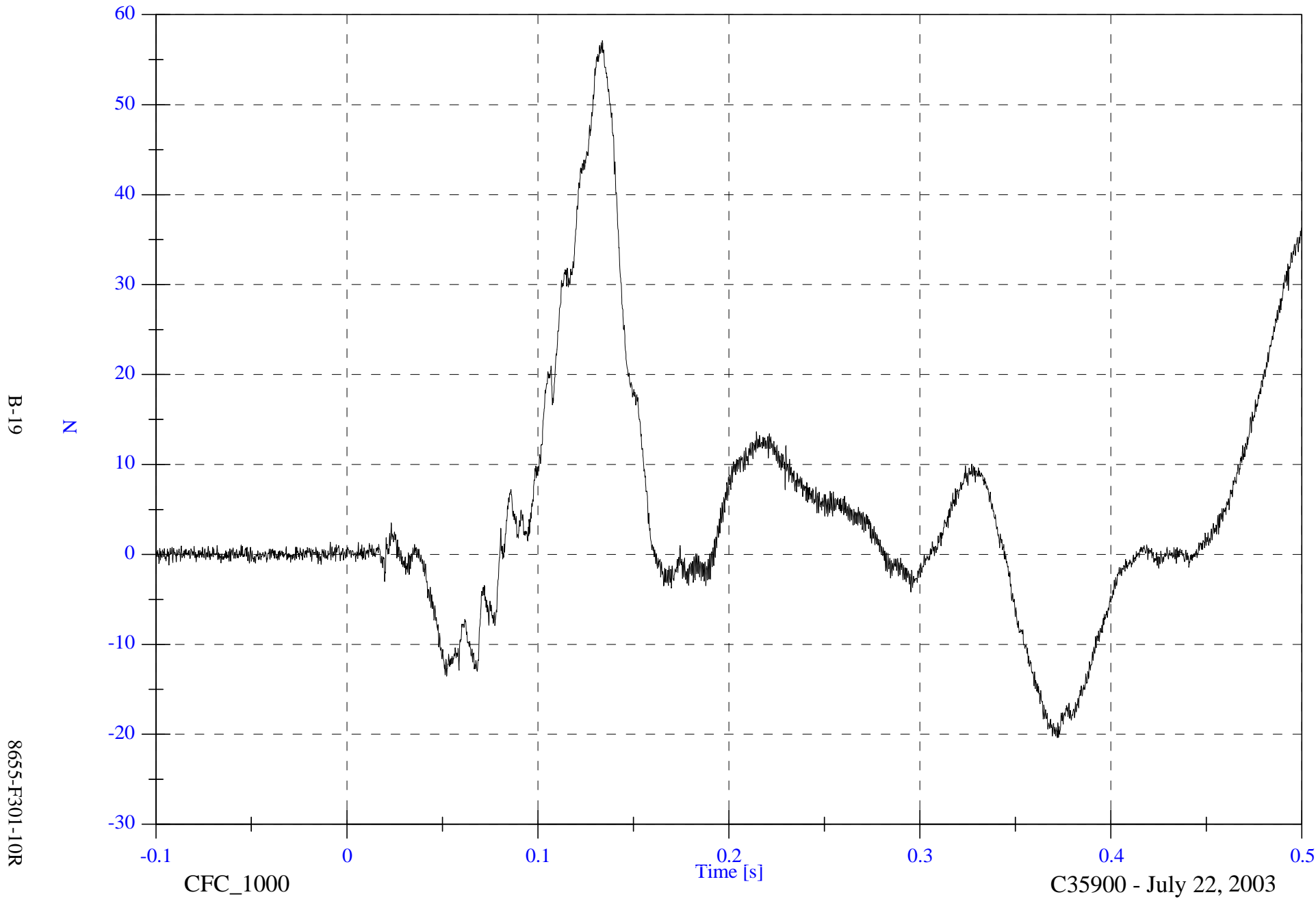
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Upper Neck Fy

Max: 57.1 [N] at 0.134 [s]

Min: -20.4 [N] at 0.372 [s]



B-19

N

8655-F301-10R

CFC_1000

Time [s]

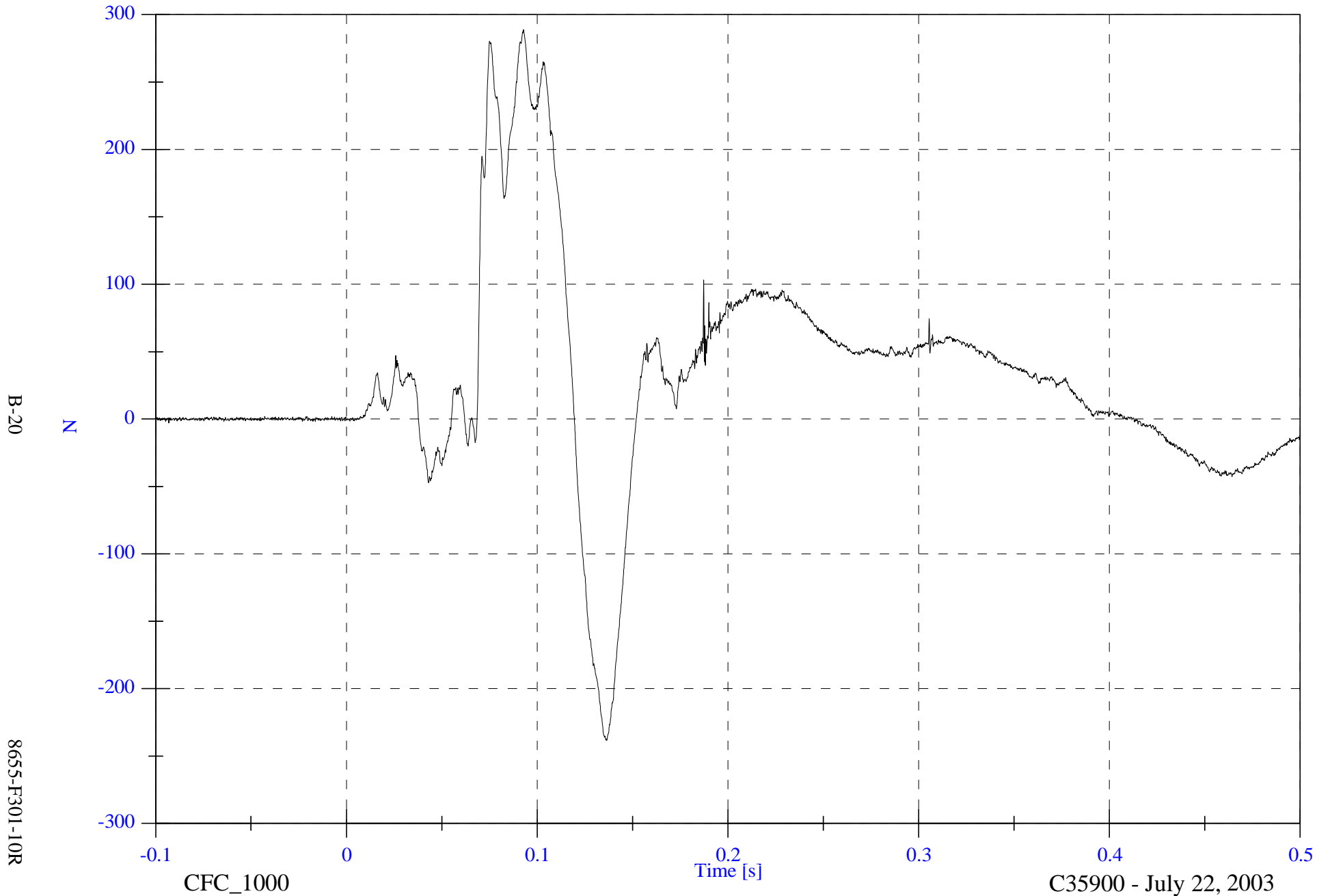
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Upper Neck Fz

Max: 288.9 [N] at 0.093 [s]

Min: -238.4 [N] at 0.137 [s]



B-20

8655-F301-10R

CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

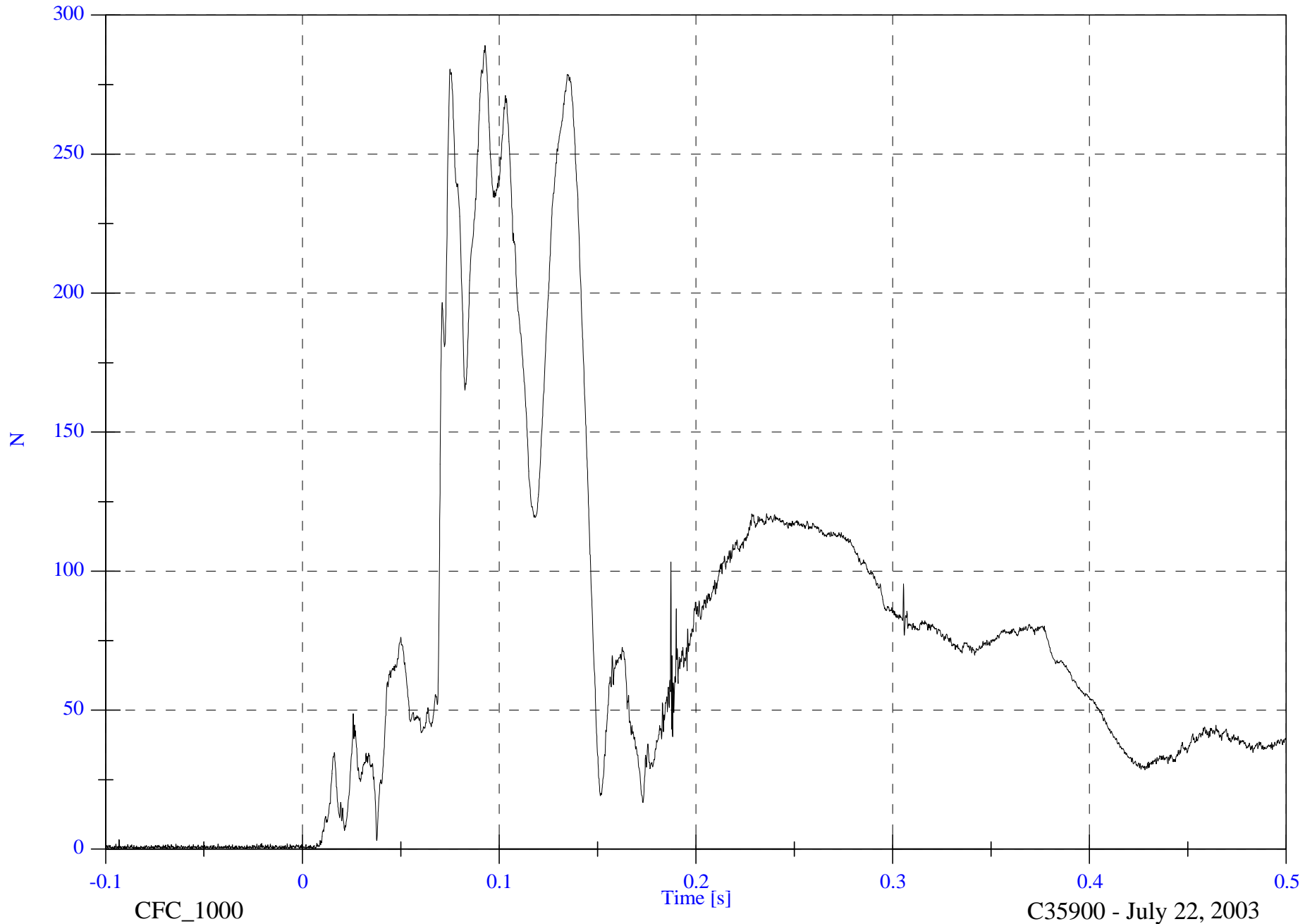
V2P1 Upper Neck F Resultant

Max: 289.1 [N] at 0.093 [s]

Min: 0.1 [N] at -0.094 [s]

B-21

8655-F301-10R



CFC_1000

Time [s]

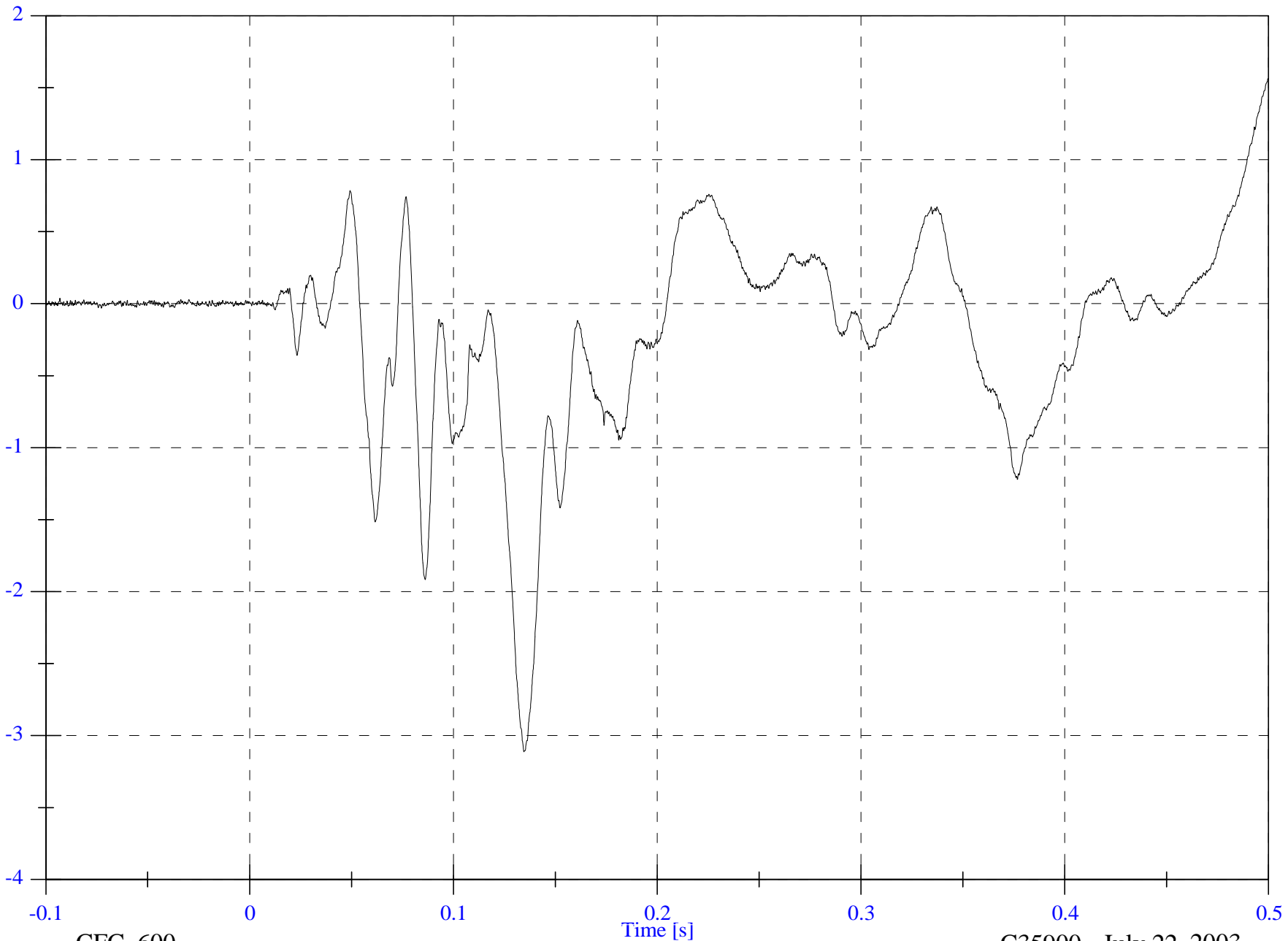
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Upper Neck Mx

Max: 1.6 [N-m] at 0.500 [s]

Min: -3.1 [N-m] at 0.135 [s]



B-22

N-m

8655-F301-10R

CFC_600

Time [s]

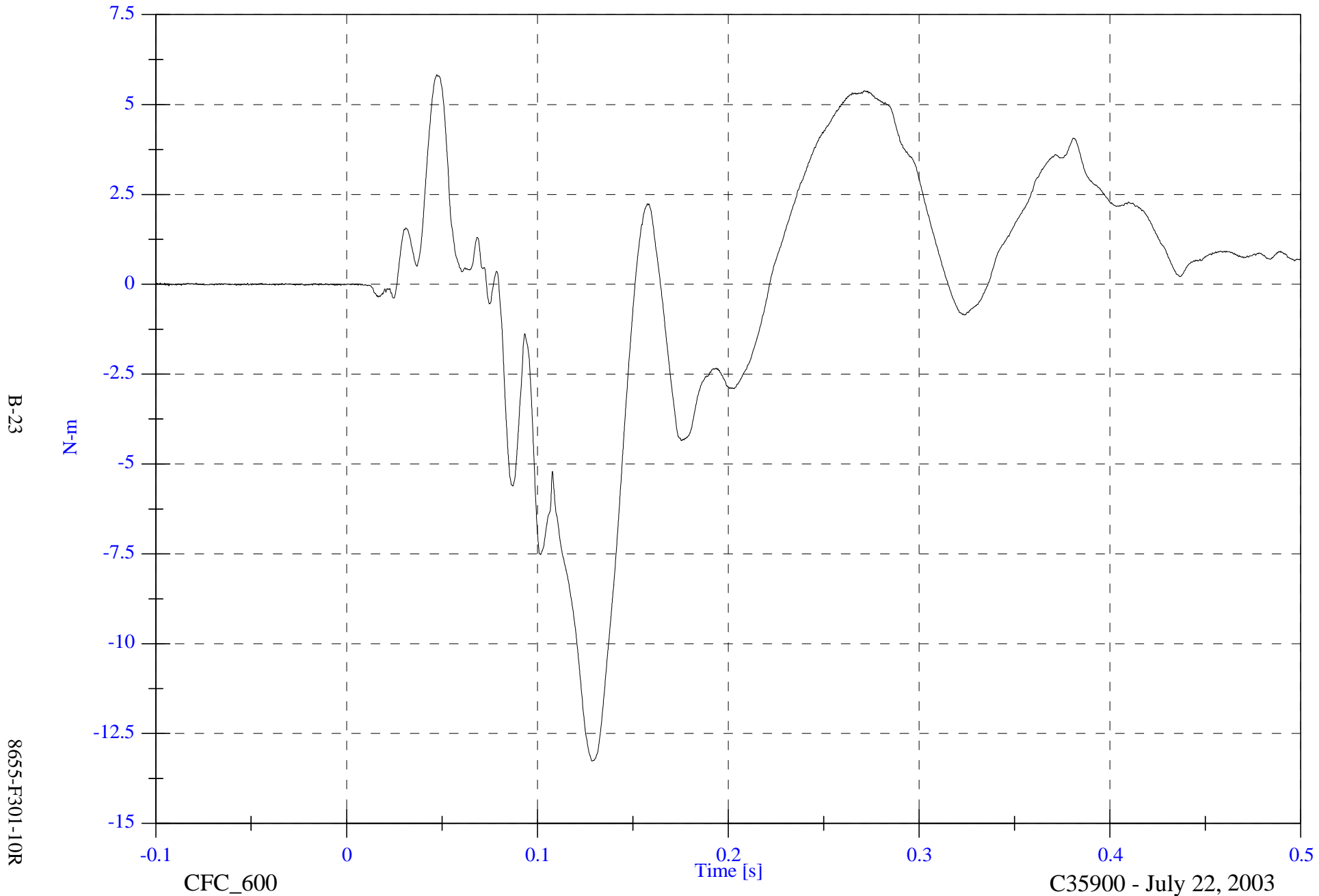
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Upper Neck My

Max: 5.8 [N-m] at 0.047 [s]

Min: -13.3 [N-m] at 0.129 [s]



B-23

8655-F301-10R

CFC_600

Time [s]

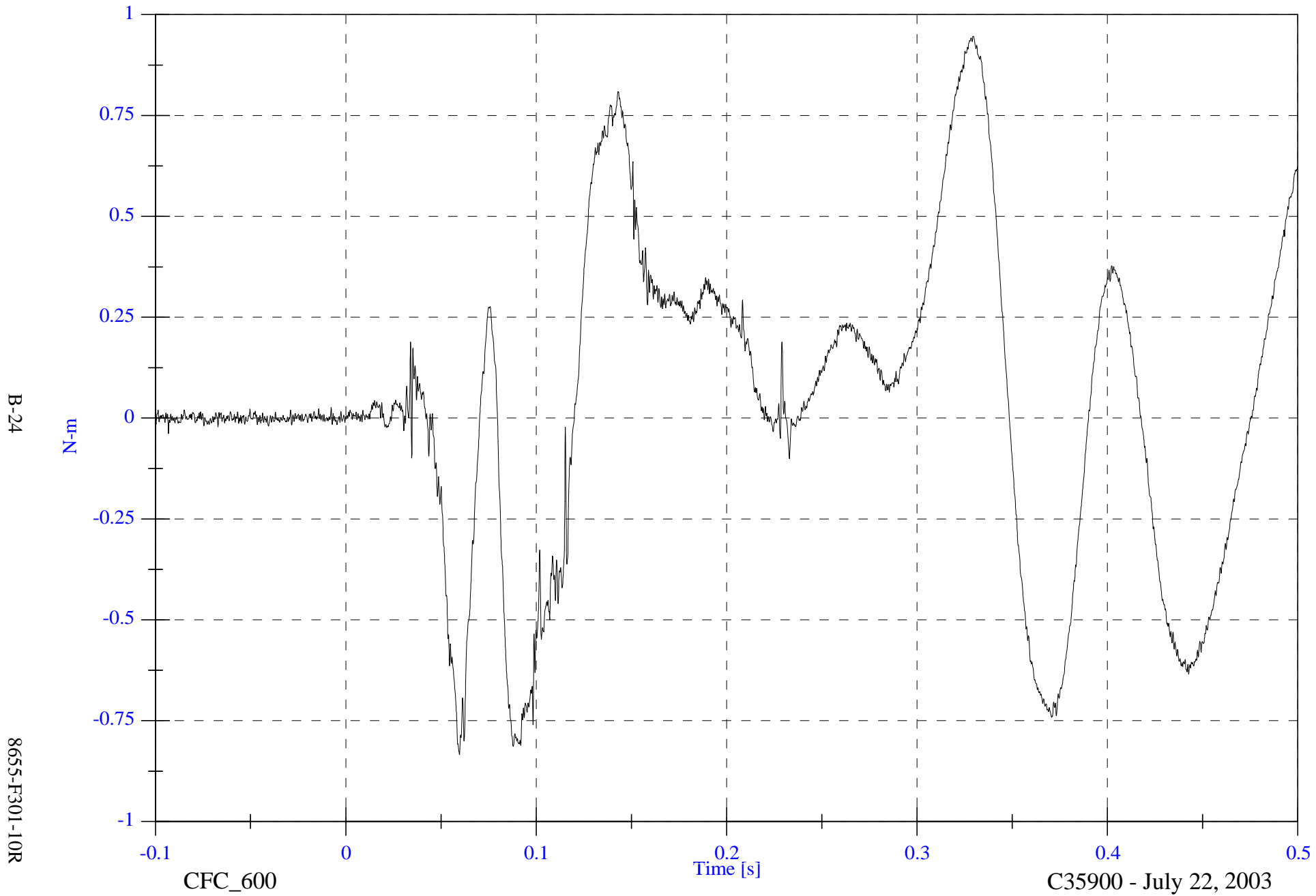
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Upper Neck Mz

Max: 0.9 [N-m] at 0.330 [s]

Min: -0.8 [N-m] at 0.060 [s]



B-24

8655-F301-10R

CFC_600

Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

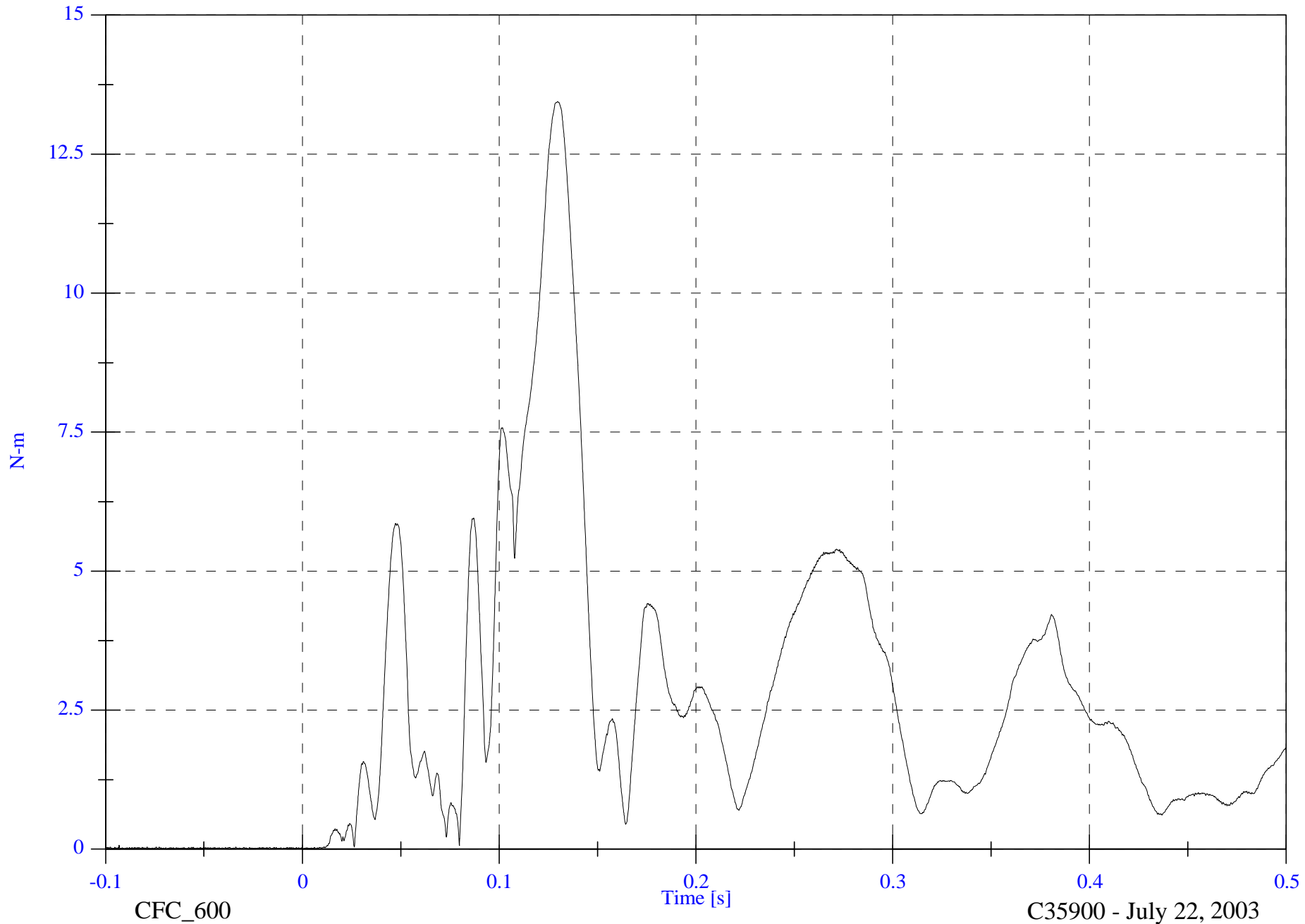
V2P1 Upper Neck M Resultant

Max: 13.4 [N-m] at 0.130 [s]

Min: 0.0 [N-m] at -0.031 [s]

B-25

8655-F301-10R



CFC_600

Time [s]

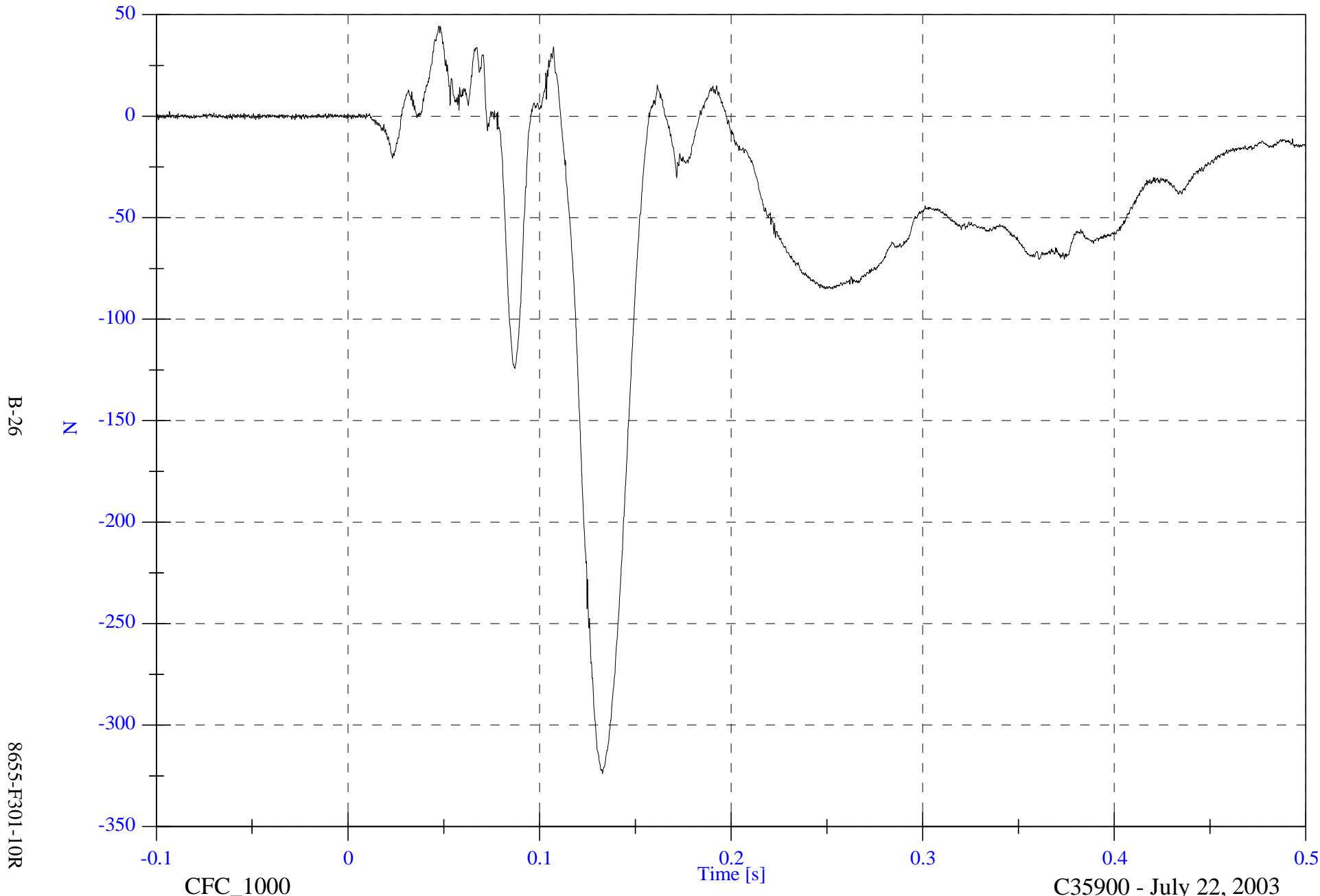
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Lower Neck Fx

Max: 44.5 [N] at 0.048 [s]

Min: -323.8 [N] at 0.133 [s]



B-26

8655-F301-10R

CFC_1000

C35900 - July 22, 2003

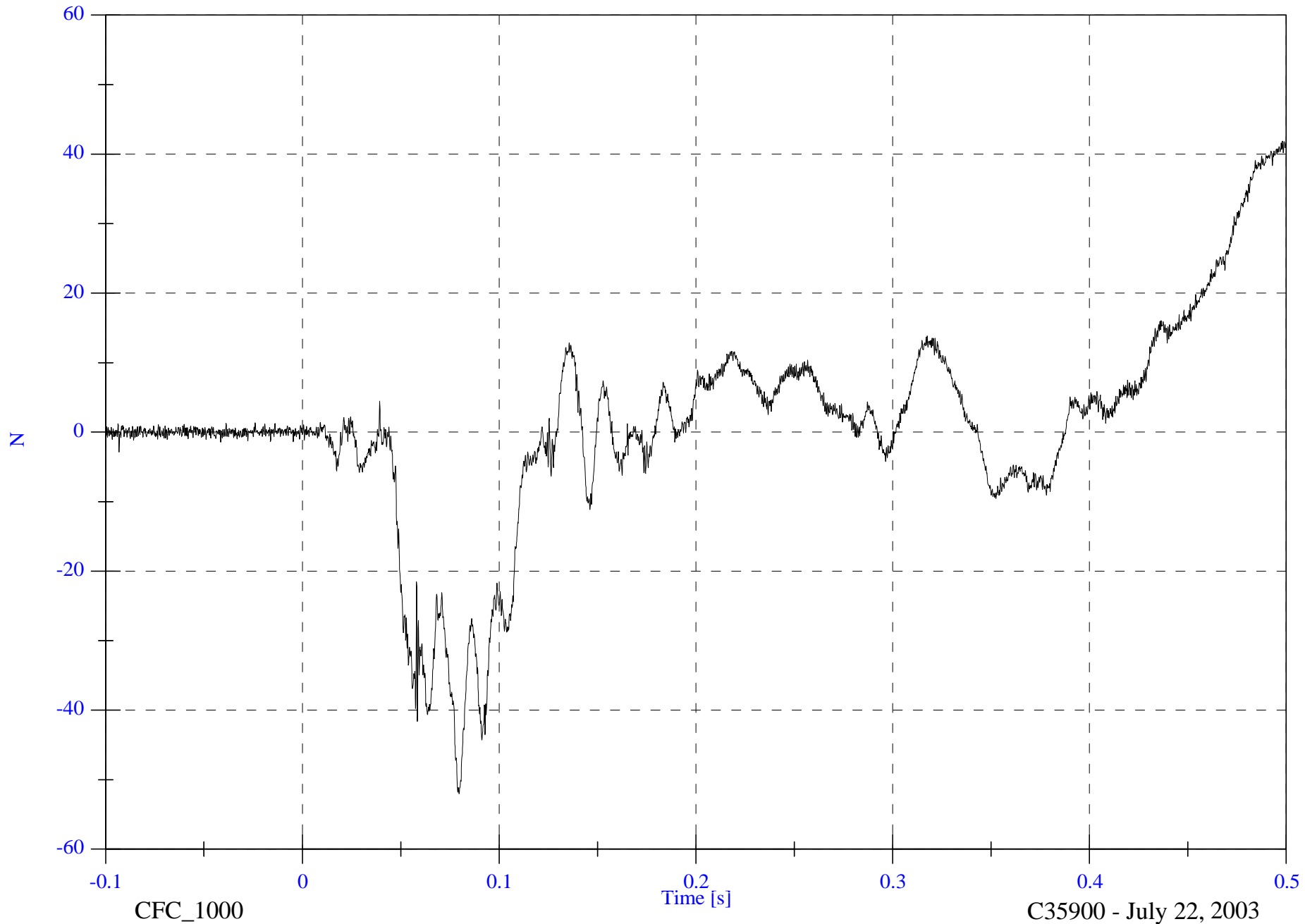
FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Lower Neck Fy

Max: 41.9 [N] at 0.498 [s]
Min: -52.0 [N] at 0.080 [s]

B-27

8655-F301-10R



CFC_1000

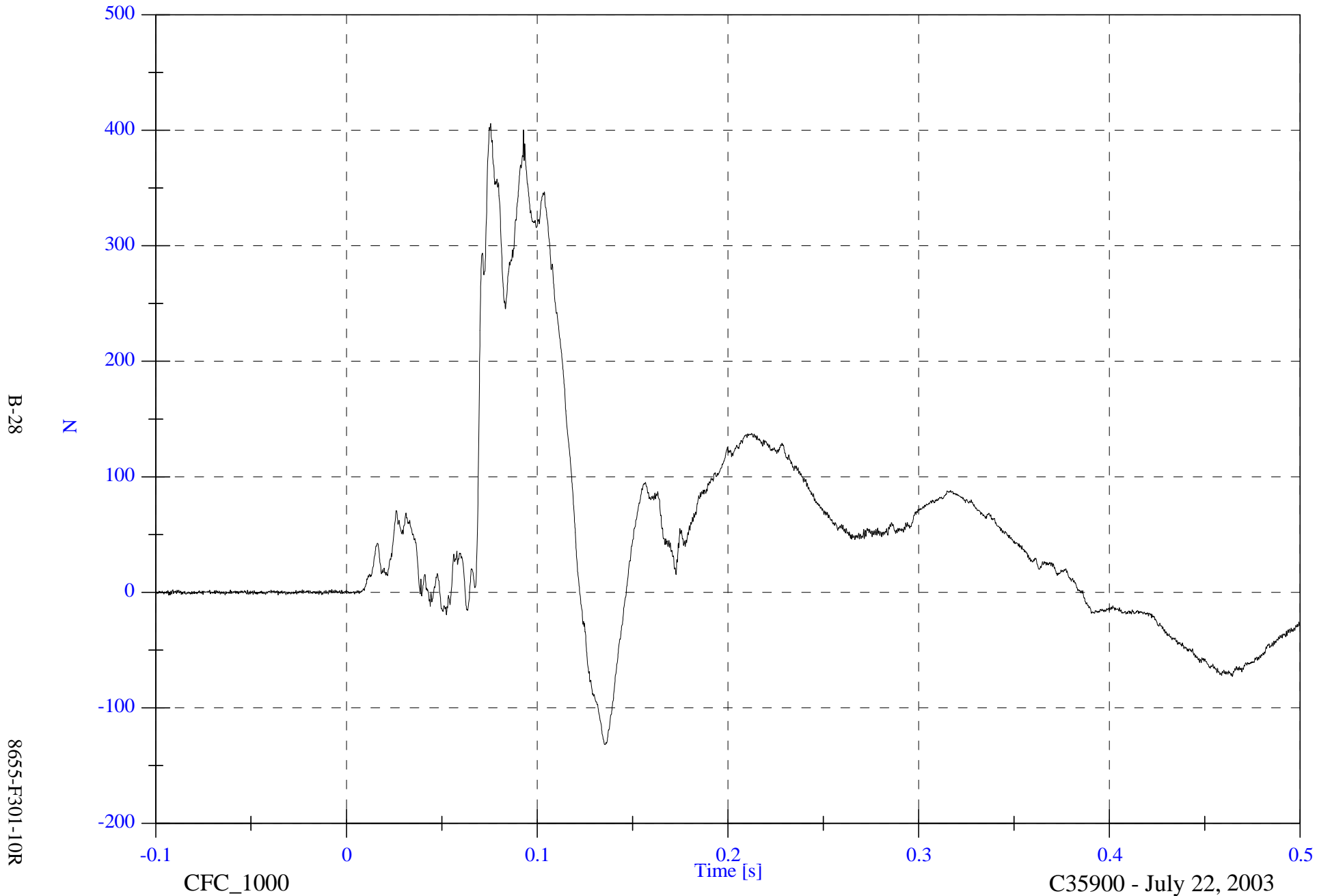
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Lower Neck Fz

Max: 405.8 [N] at 0.076 [s]

Min: -131.7 [N] at 0.135 [s]



B-28

8655-F301-10R

CFC_1000

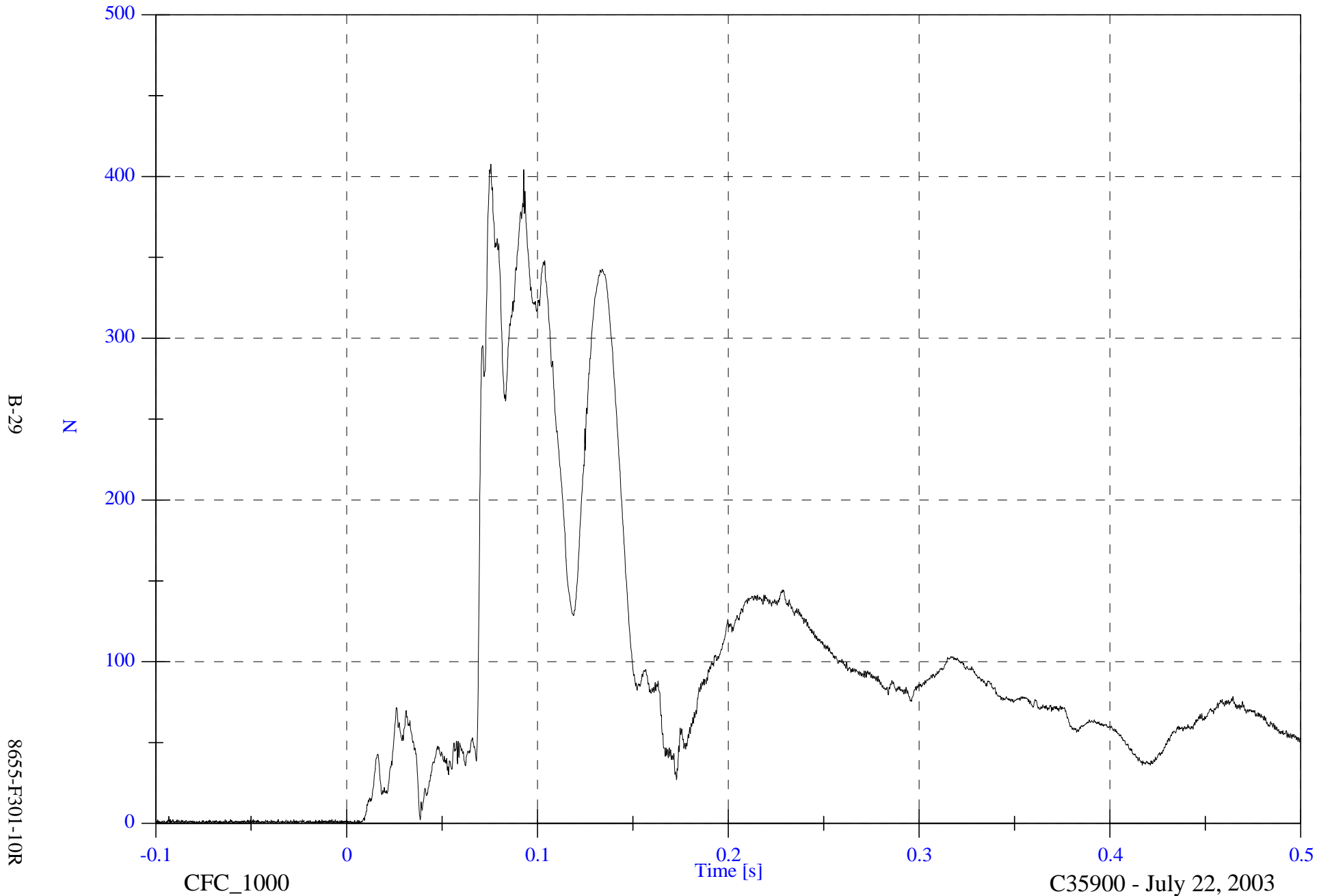
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Lower Neck F Resultant

Max: 407.6 [N] at 0.076 [s]

Min: 0.1 [N] at -0.079 [s]



B-29

8655-F301-10R

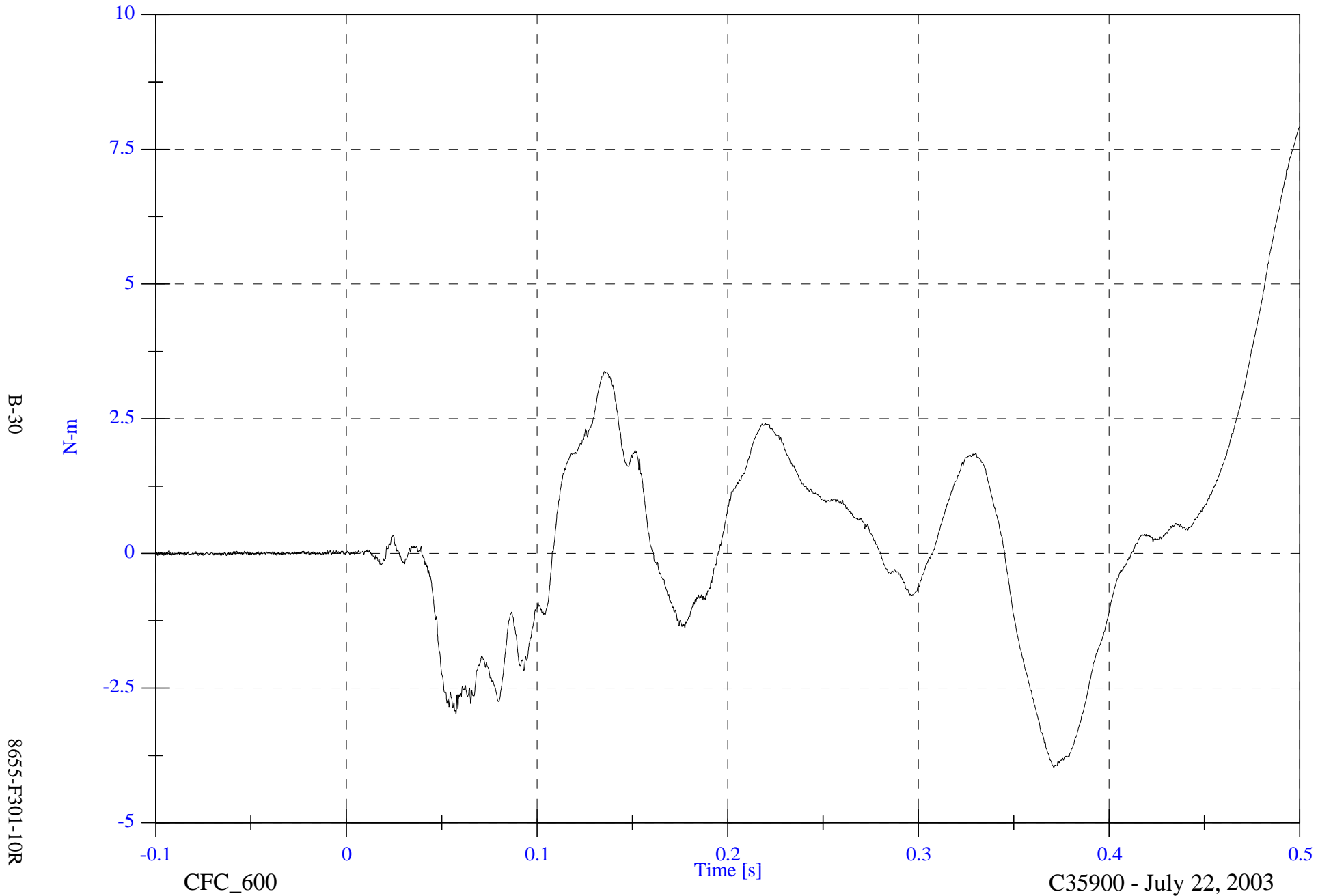
CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Lower Neck Mx

Max: 7.9 [N-m] at 0.500 [s]
Min: -4.0 [N-m] at 0.371 [s]



B-30

8655-F301-10R

CFC_600

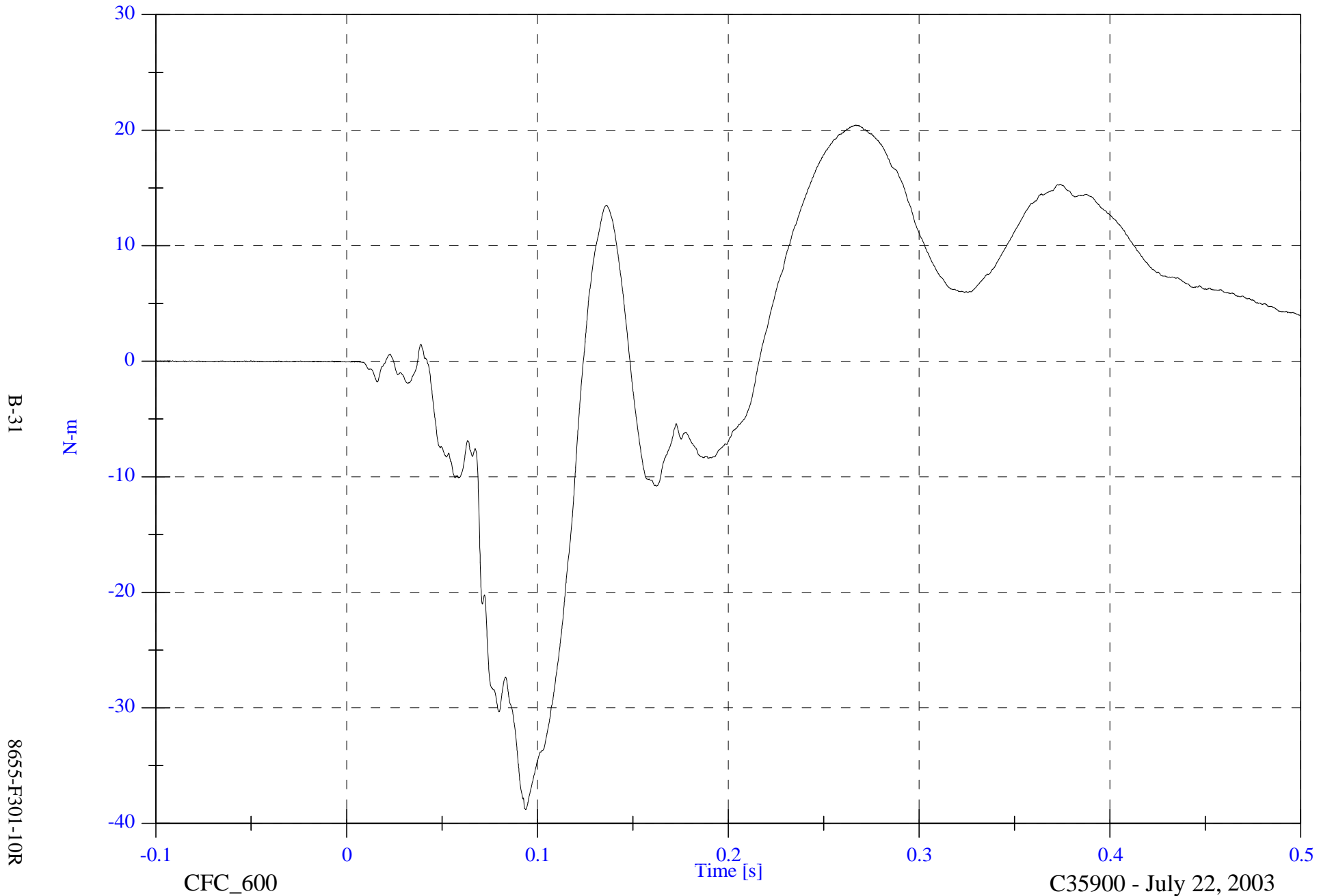
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Lower Neck My

Max: 20.4 [N-m] at 0.267 [s]

Min: -38.8 [N-m] at 0.094 [s]



B-31

8655-F301-10R

CFC_600

Time [s]

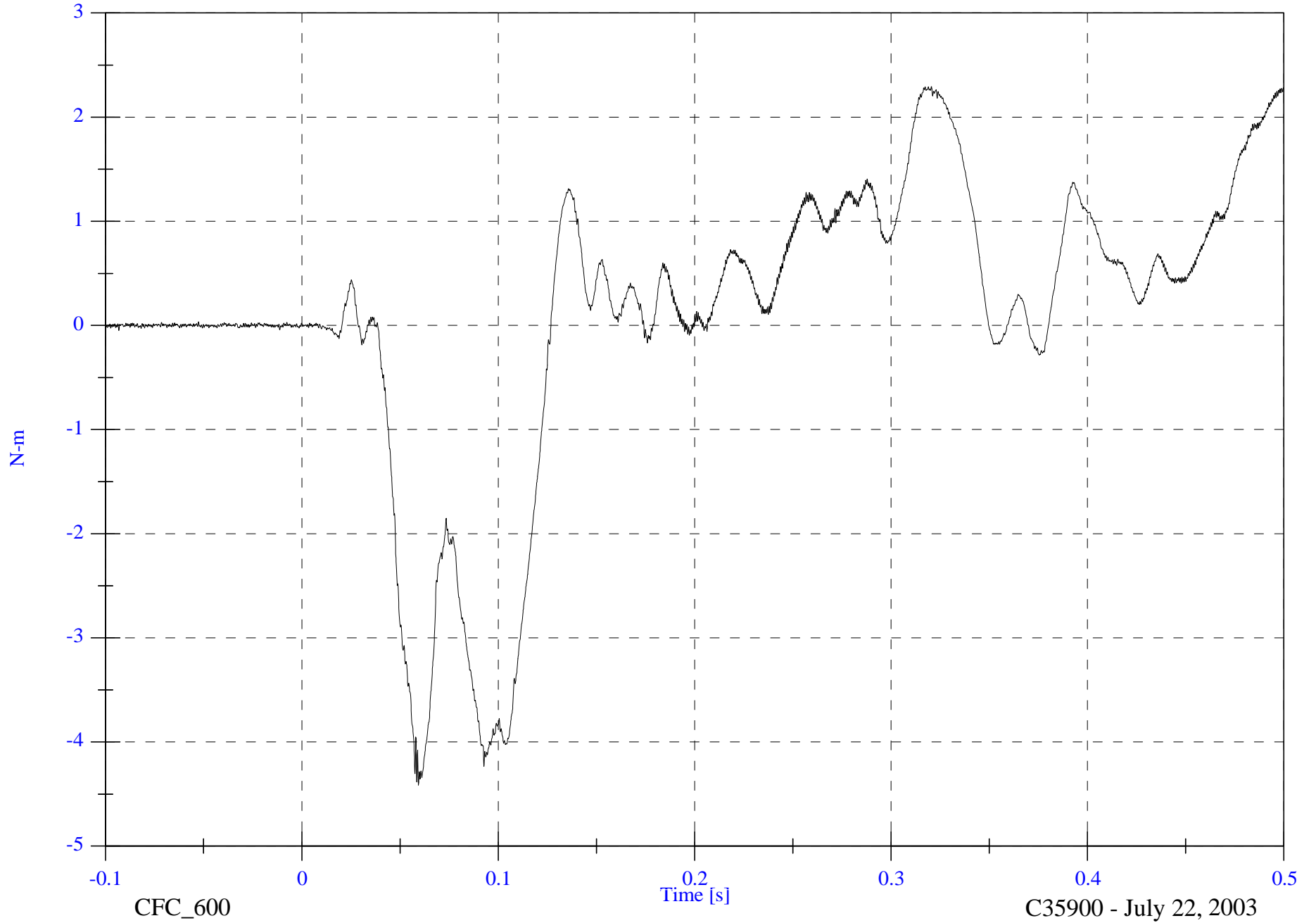
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Lower Neck Mz

Max: 2.3 [N-m] at 0.321 [s]

Min: -4.4 [N-m] at 0.059 [s]



B-32

8655-F301-10R

CFC_600

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

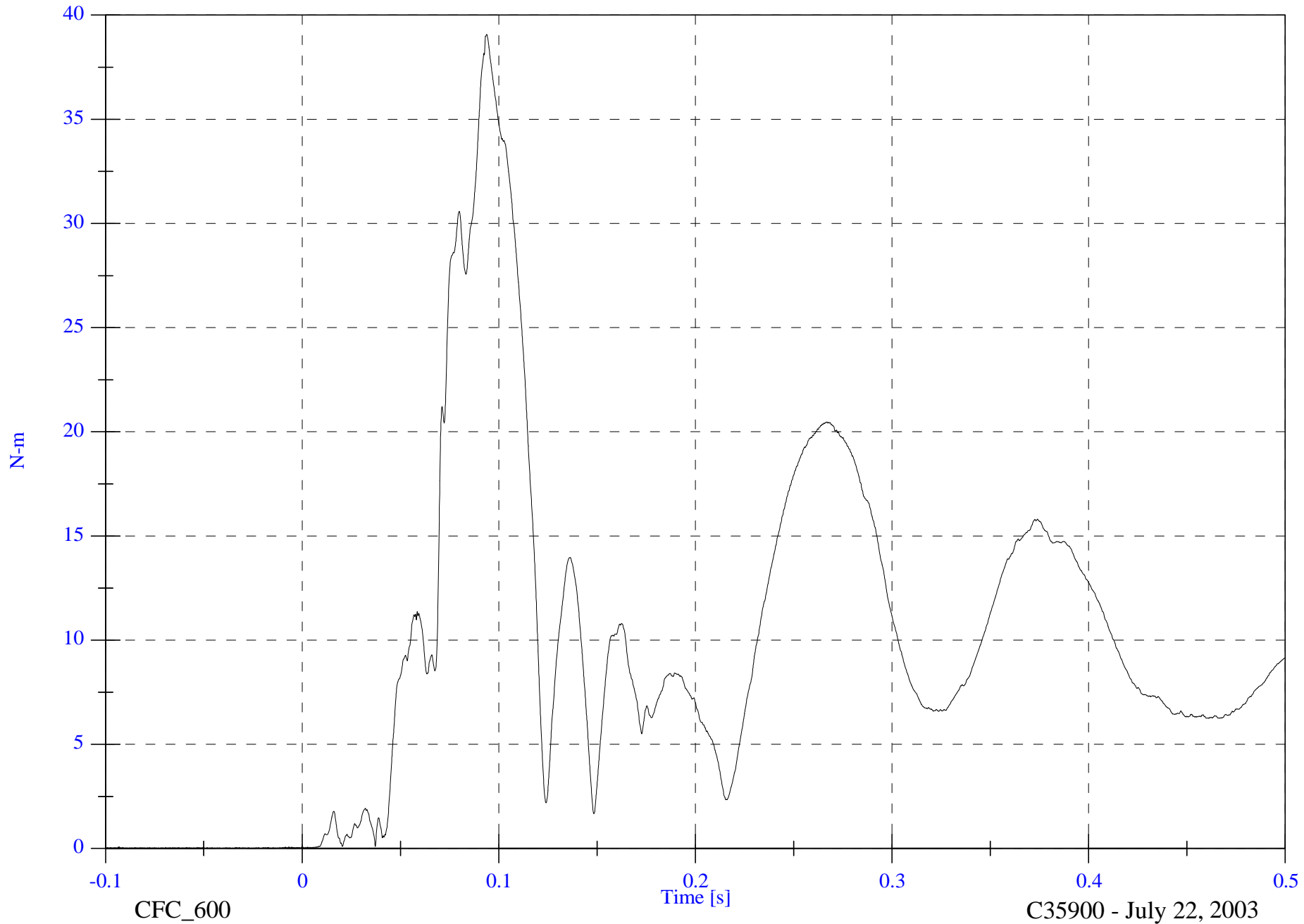
V2P1 Lower Neck M Resultant

Max: 39.1 [N-m] at 0.094 [s]

Min: 0.0 [N-m] at -0.012 [s]

B-33

8655-F301-10R



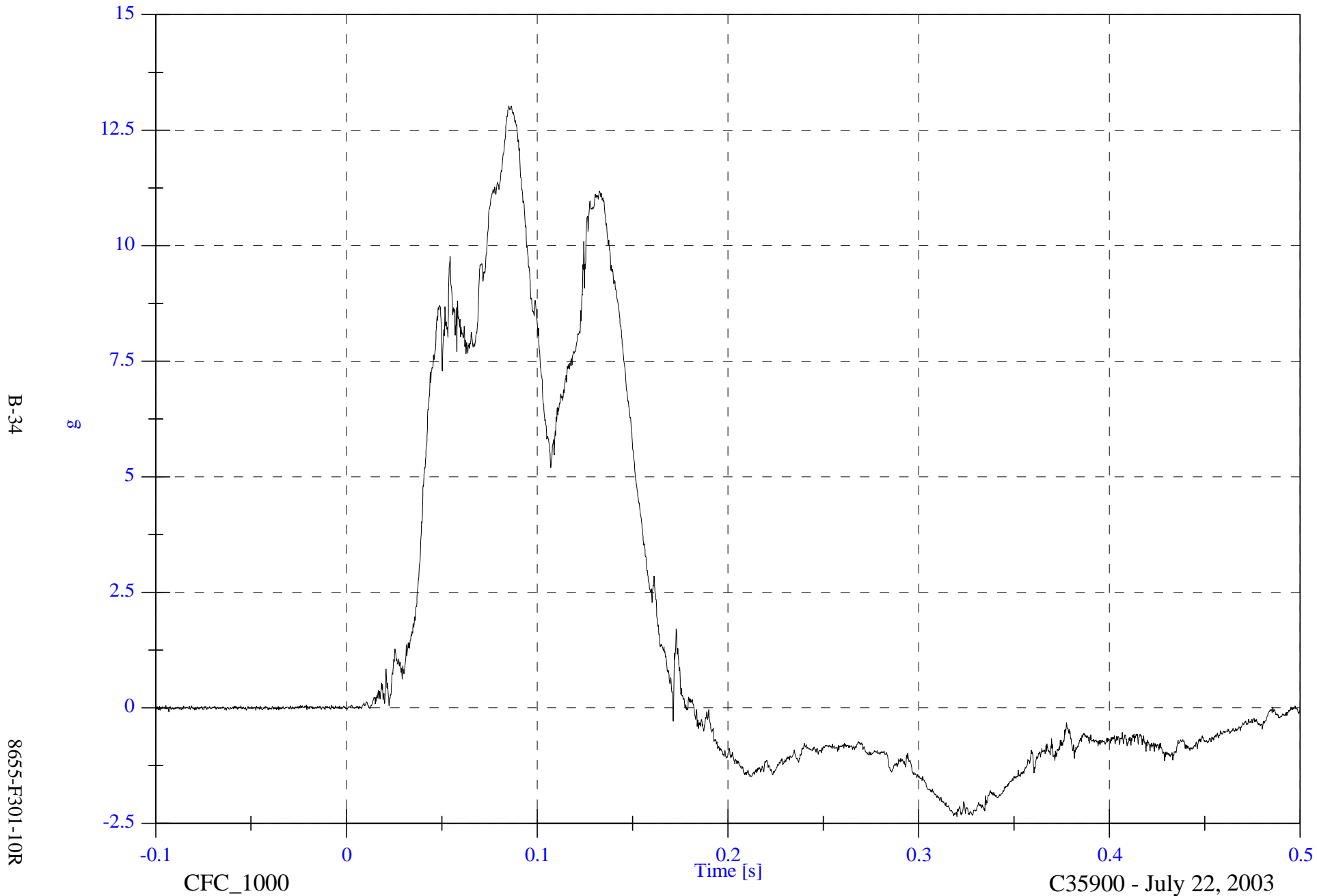
CFC_600

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Lower Neck x

Max: 13.0 [g] at 0.085 [s]
Min: -2.4 [g] at 0.320 [s]



B-34

8655-F301-10R

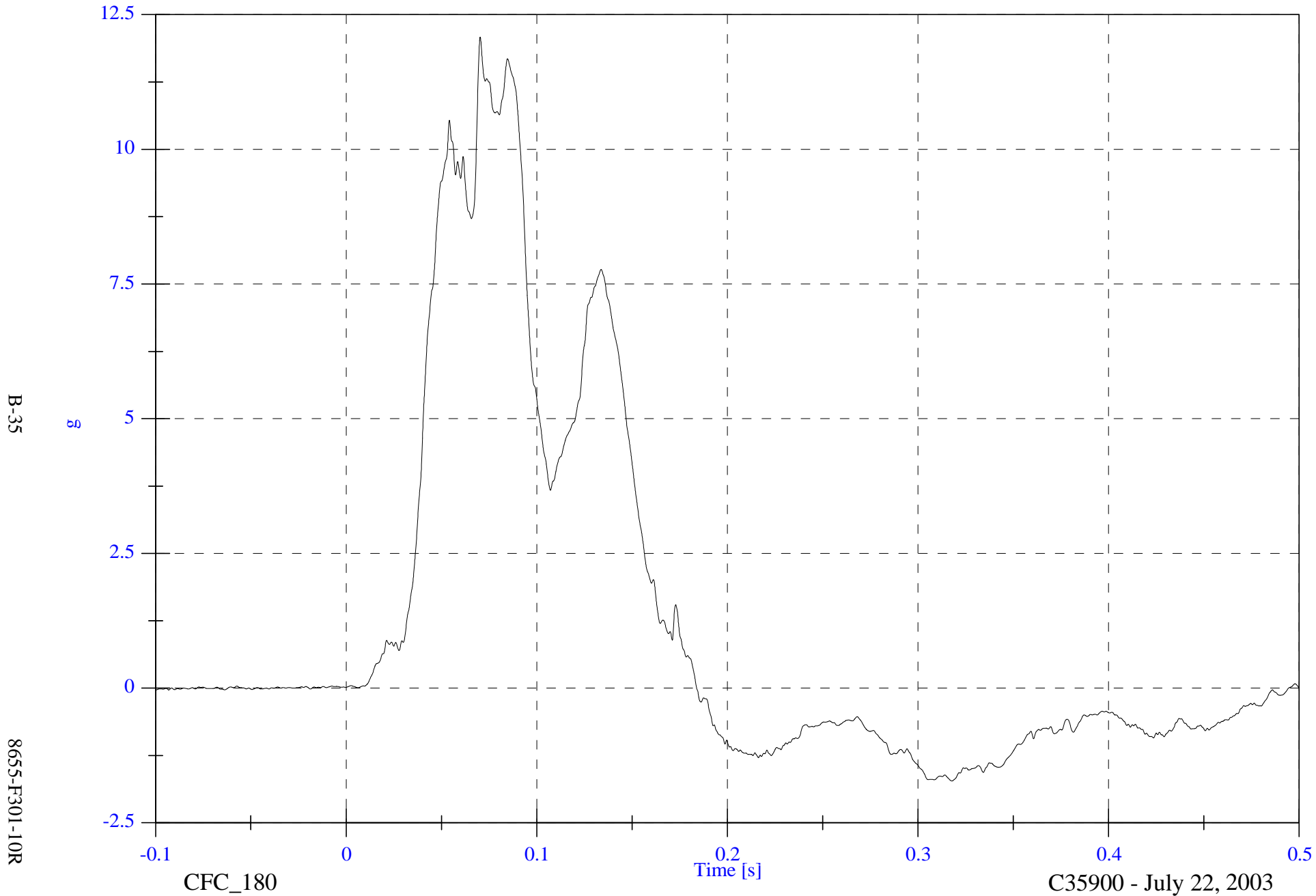
CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Chest Ax

Max: 12.1 [g] at 0.070 [s]
Min: -1.7 [g] at 0.318 [s]



B-35

8655-F301-10R

CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Chest Ay

Max: 0.6 [g] at 0.439 [s]
Min: -1.3 [g] at 0.070 [s]



B-36

8655-F301-10R

CFC_180

Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

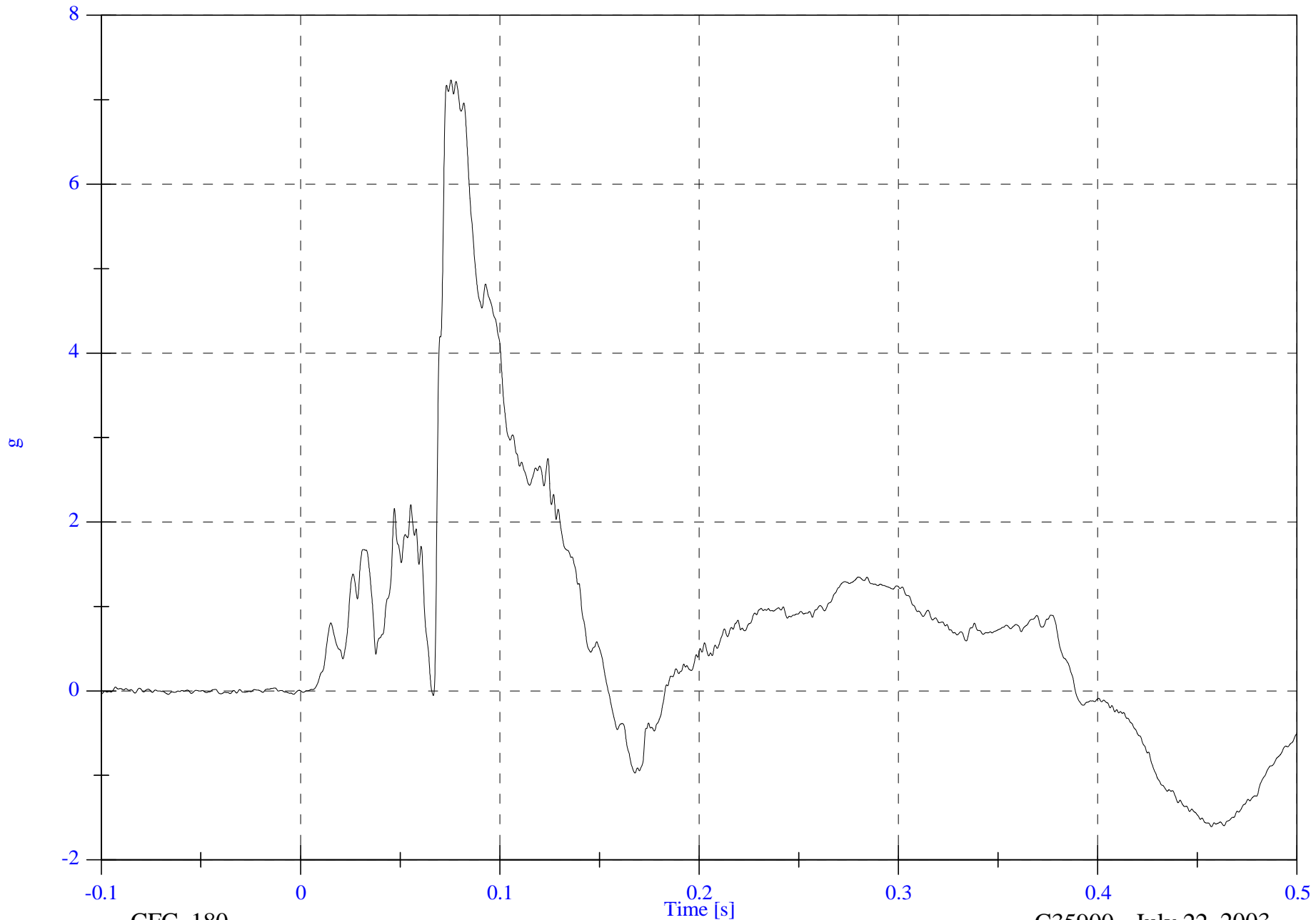
V2P1 Chest Az

Max: 7.2 [g] at 0.076 [s]

Min: -1.6 [g] at 0.457 [s]

B-37

8655-F301-10R



CFC_180

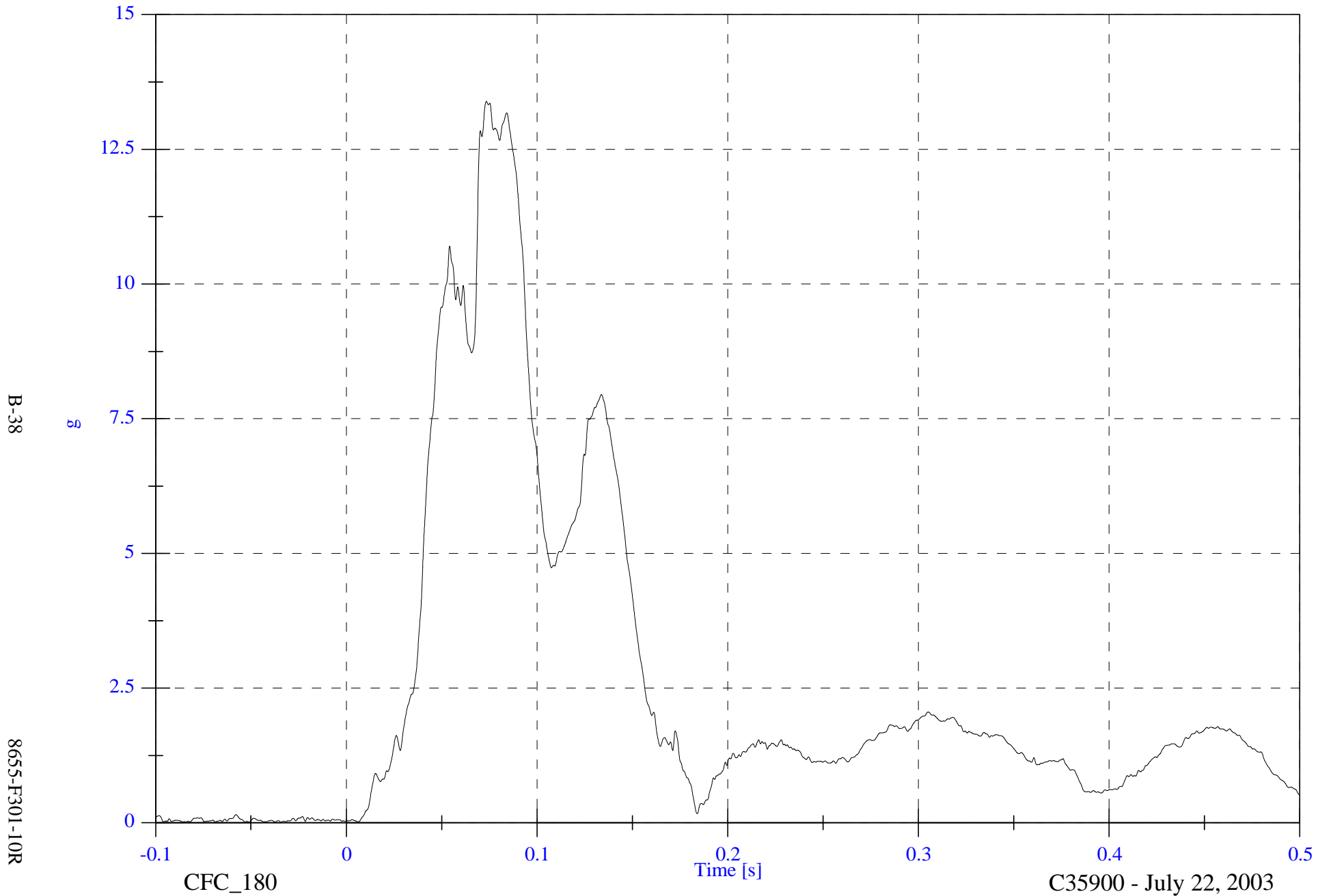
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Chest A Resultant

Max: 13.4 [g] at 0.073 [s]

Min: 0.0 [g] at -0.034 [s]

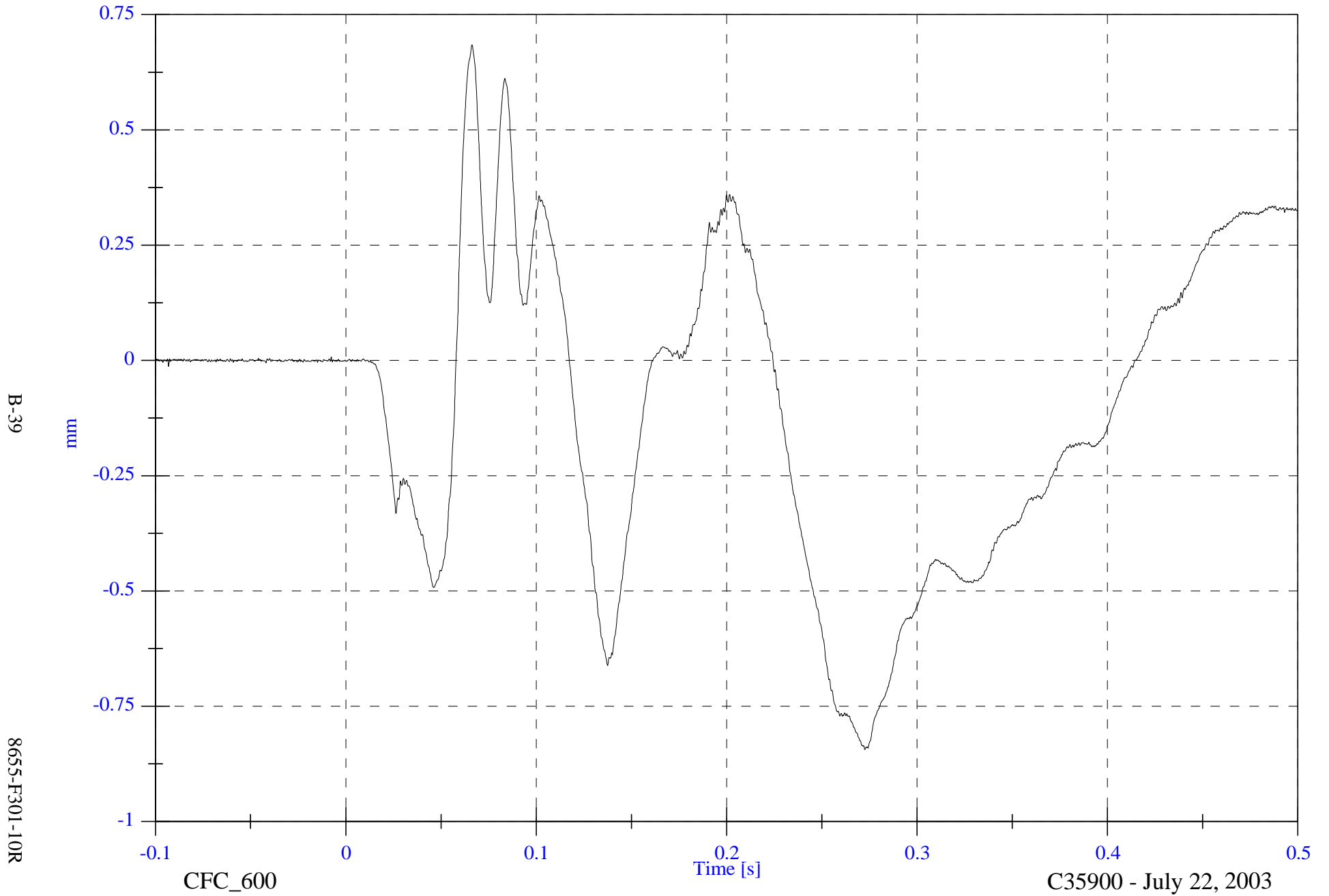


FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Chest Dx

Max: 0.7 [mm] at 0.066 [s]

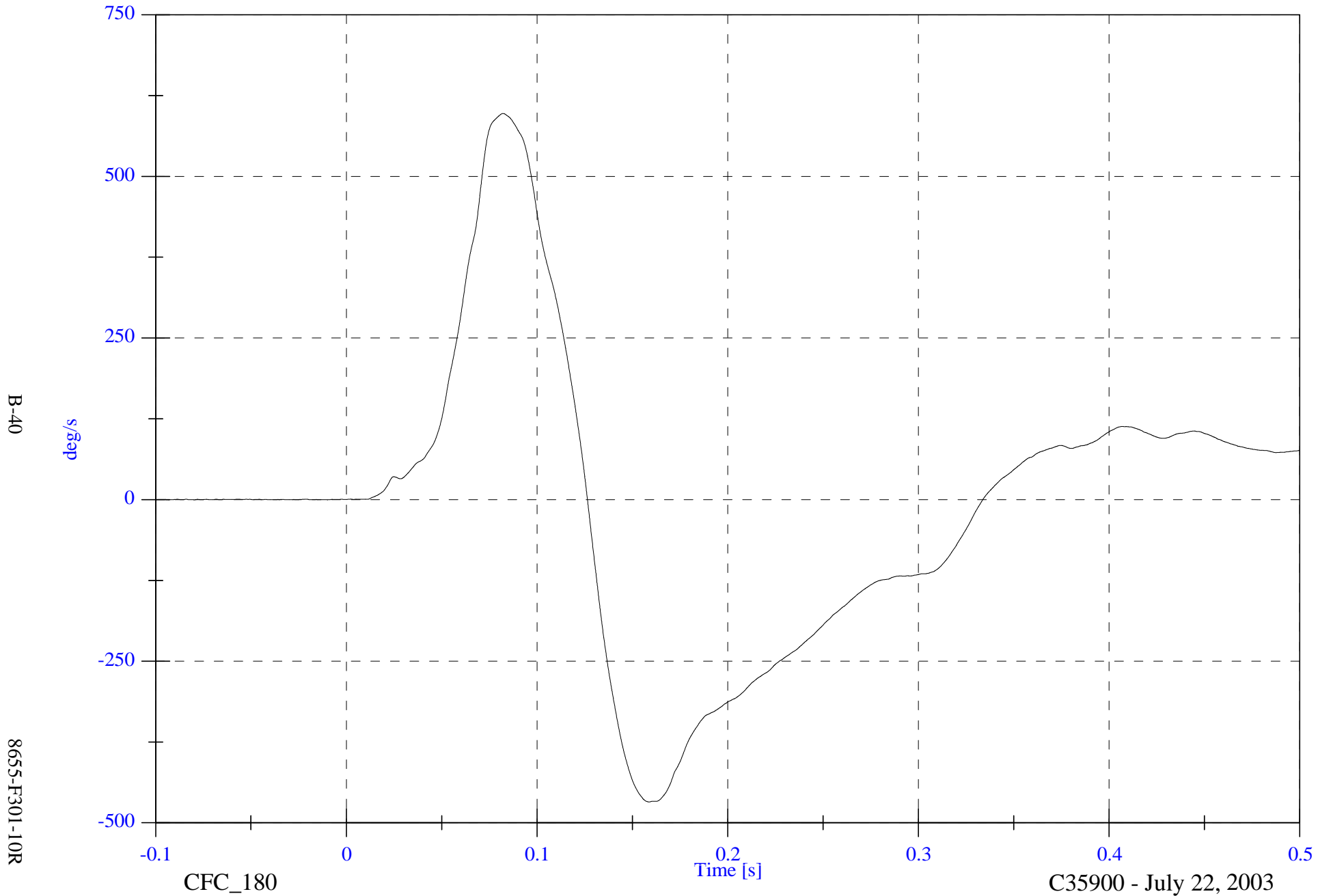
Min: -0.8 [mm] at 0.273 [s]



FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Chest AVy

Max: 597.2 [deg/s] at 0.082 [s]
Min: -467.7 [deg/s] at 0.159 [s]



B-40

8655-F301-10R

CFC_180

Time [s]

C35900 - July 22, 2003

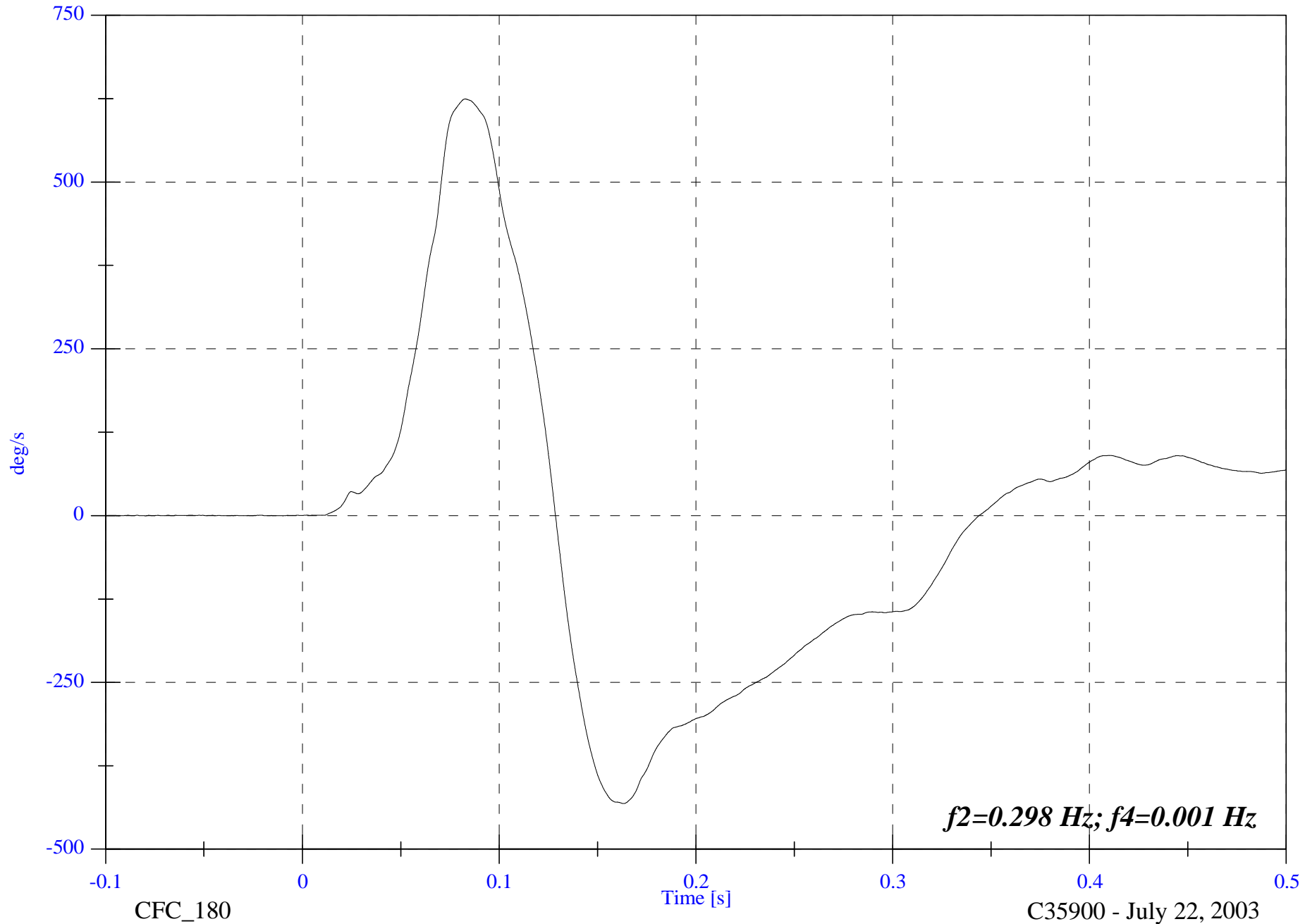
FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Chest Comp AVy

Max: 624.4 [deg/s] at 0.083 [s]
Min: -431.7 [deg/s] at 0.163 [s]

B-41

8655-F301-10R



$f_2=0.298\text{ Hz}; f_4=0.001\text{ Hz}$

CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

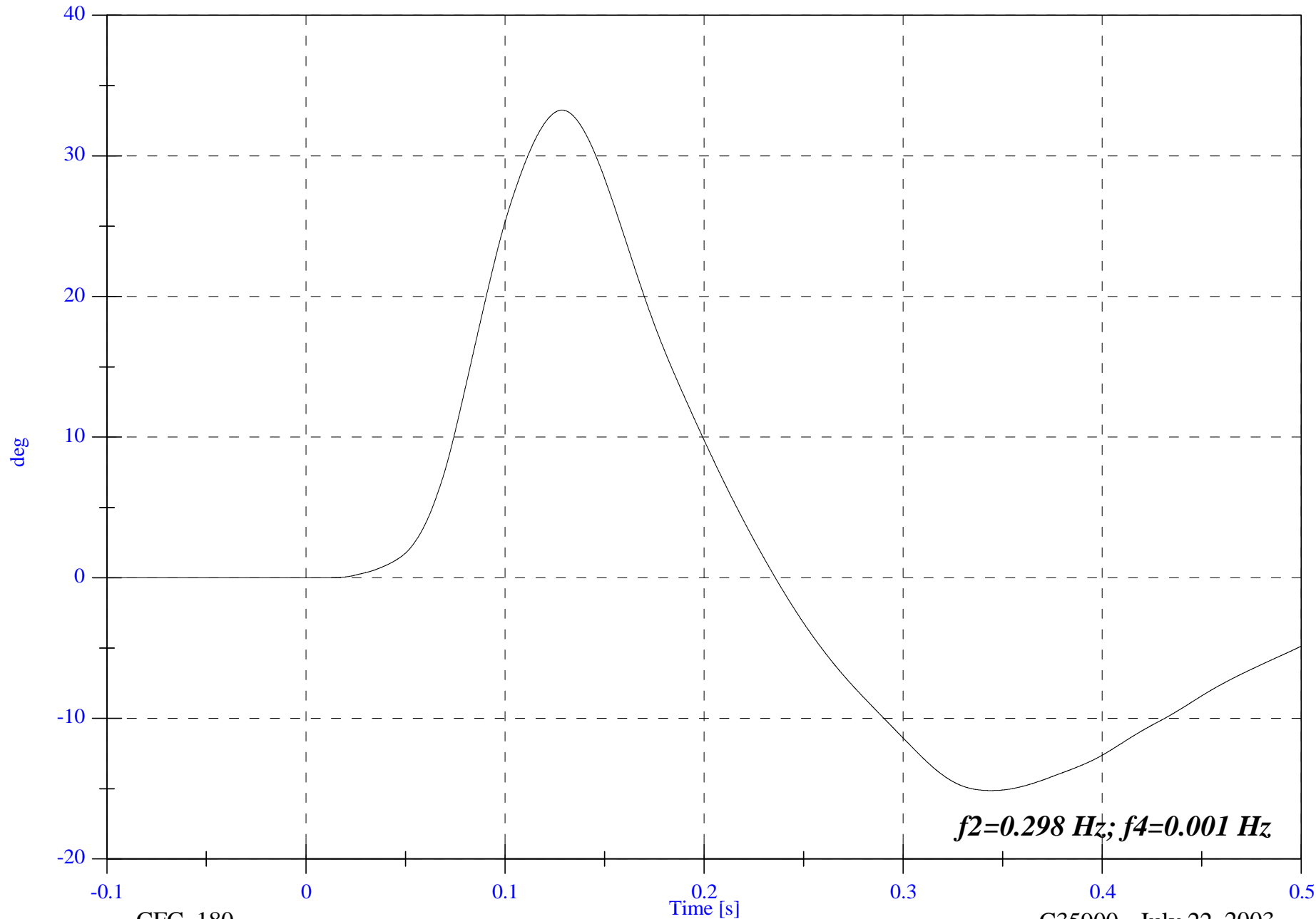
V2P1 Chest Comp ADy

Max: 33.3 [deg] at 0.129 [s]

Min: -15.1 [deg] at 0.344 [s]

B-42

8655-F301-10R



CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

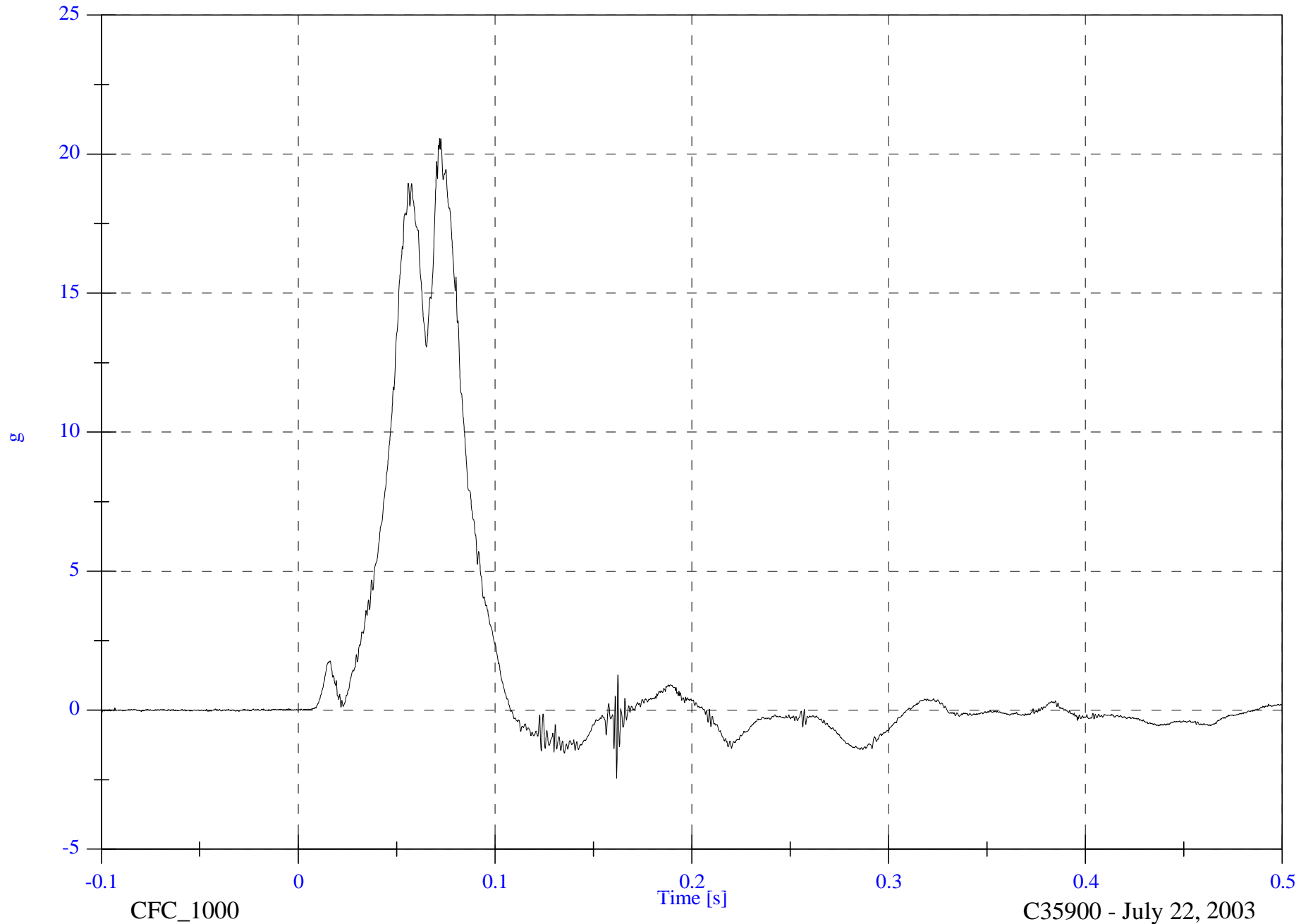
V2P1 Pelvic Ax

Max: 20.6 [g] at 0.072 [s]

Min: -2.4 [g] at 0.162 [s]

B-43

8655-F301-10R



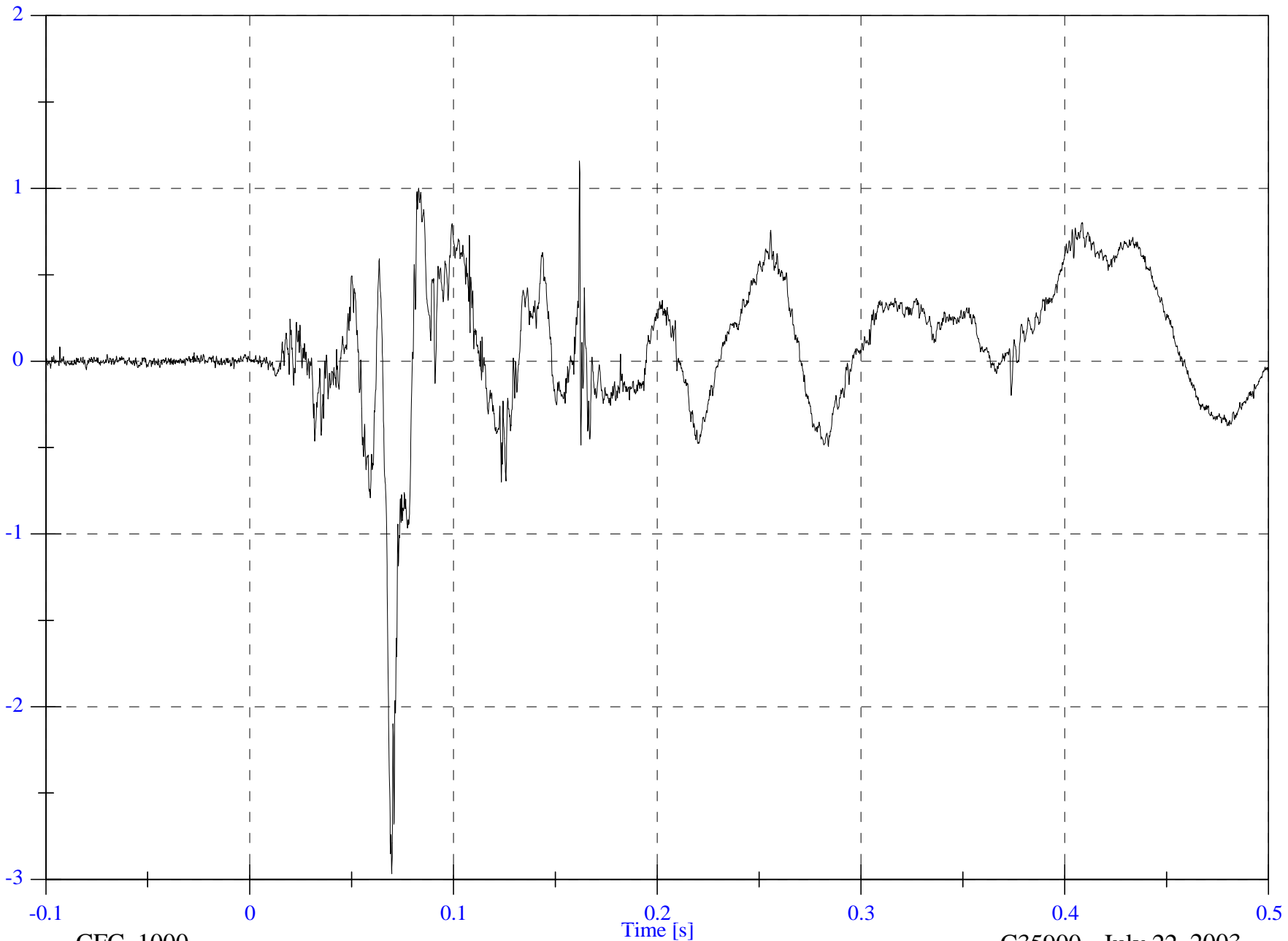
CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Pelvic Ay

Max: 1.2 [g] at 0.162 [s]
Min: -3.0 [g] at 0.070 [s]



B-44

8655-F301-10R

CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Pelvic Az

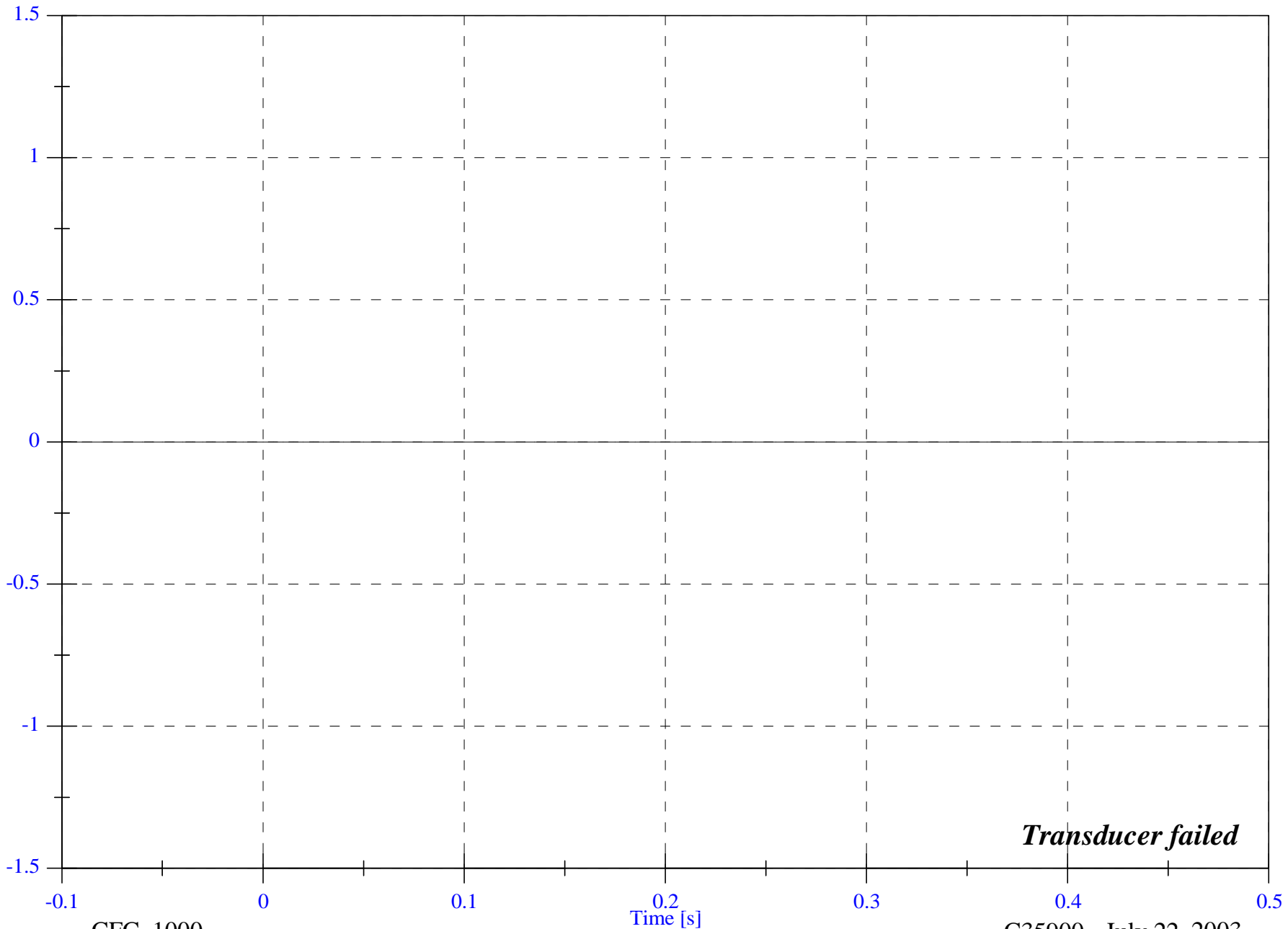
Max: 0.0 [g] at -0.100 [s]

Min: 0.0 [g] at -0.100 [s]

B-45

g

8655-F301-10R



CFC_1000

C35900 - July 22, 2003

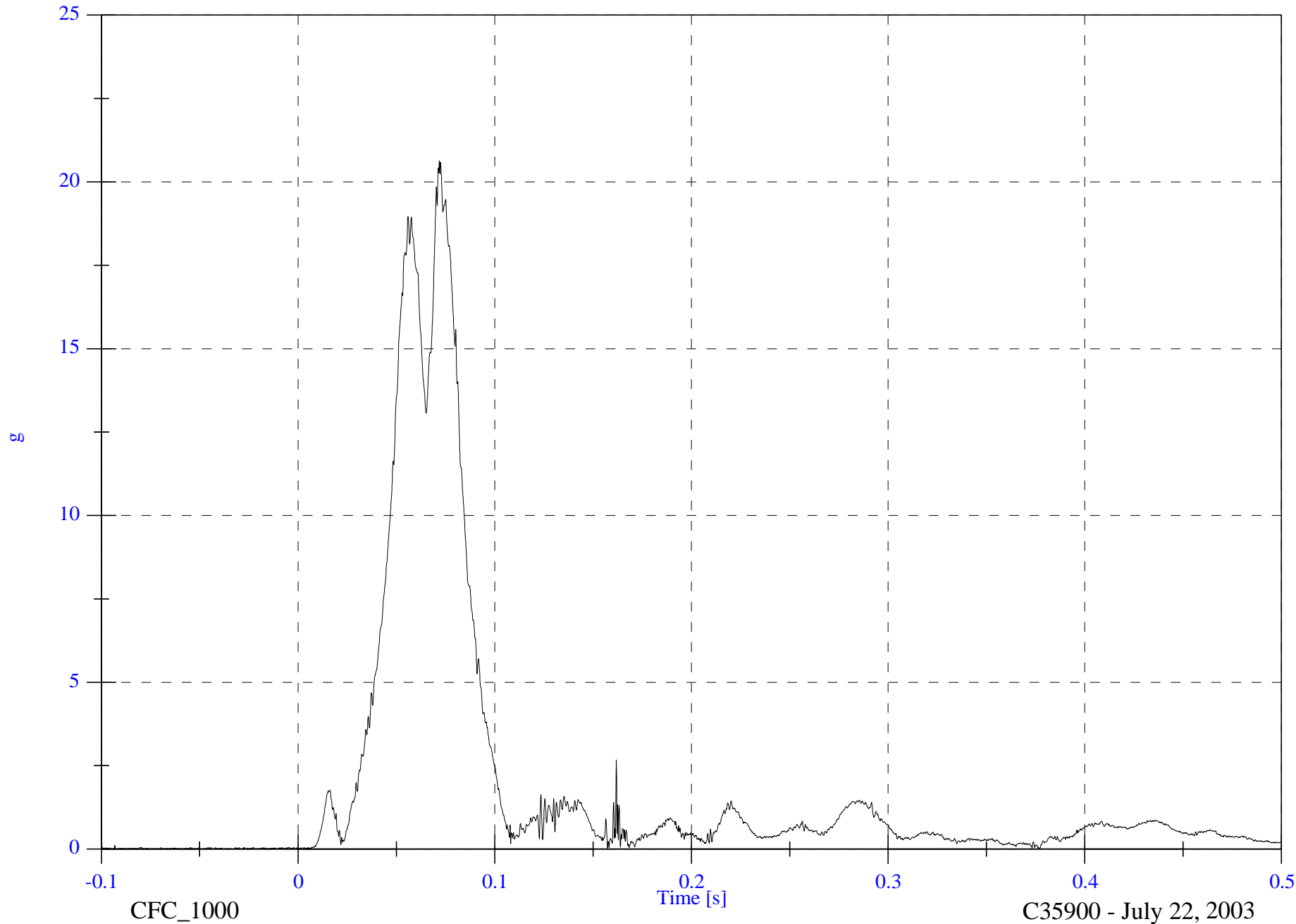
FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Pelvic A Resultant

Max: 20.6 [g] at 0.072 [s]
Min: 0.0 [g] at -0.030 [s]

B-46

8655-F301-10R



CFC_1000

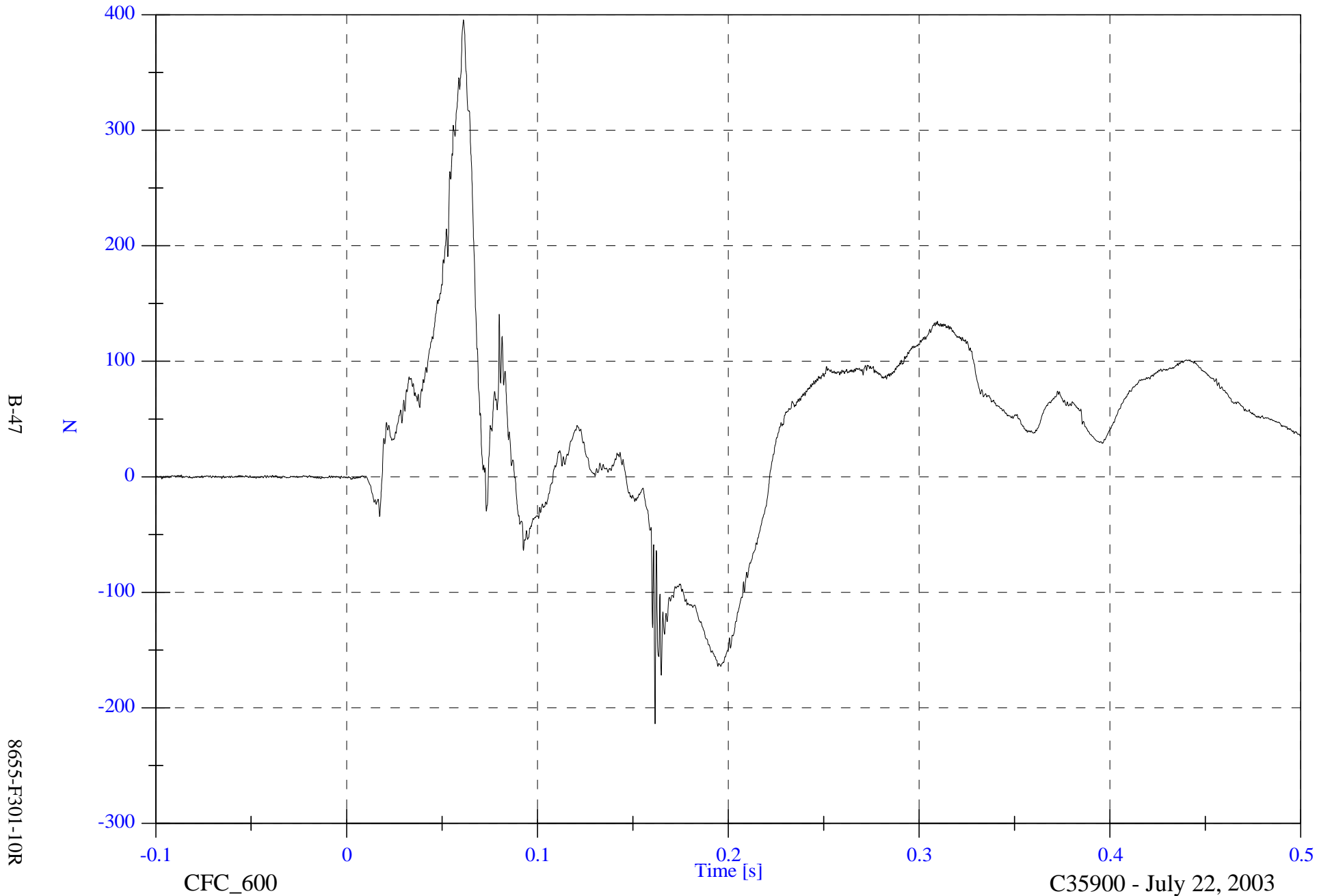
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Left Femur Fz

Max: 395.7 [N] at 0.061 [s]

Min: -213.7 [N] at 0.162 [s]



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8655-F301-10R

CFC_600

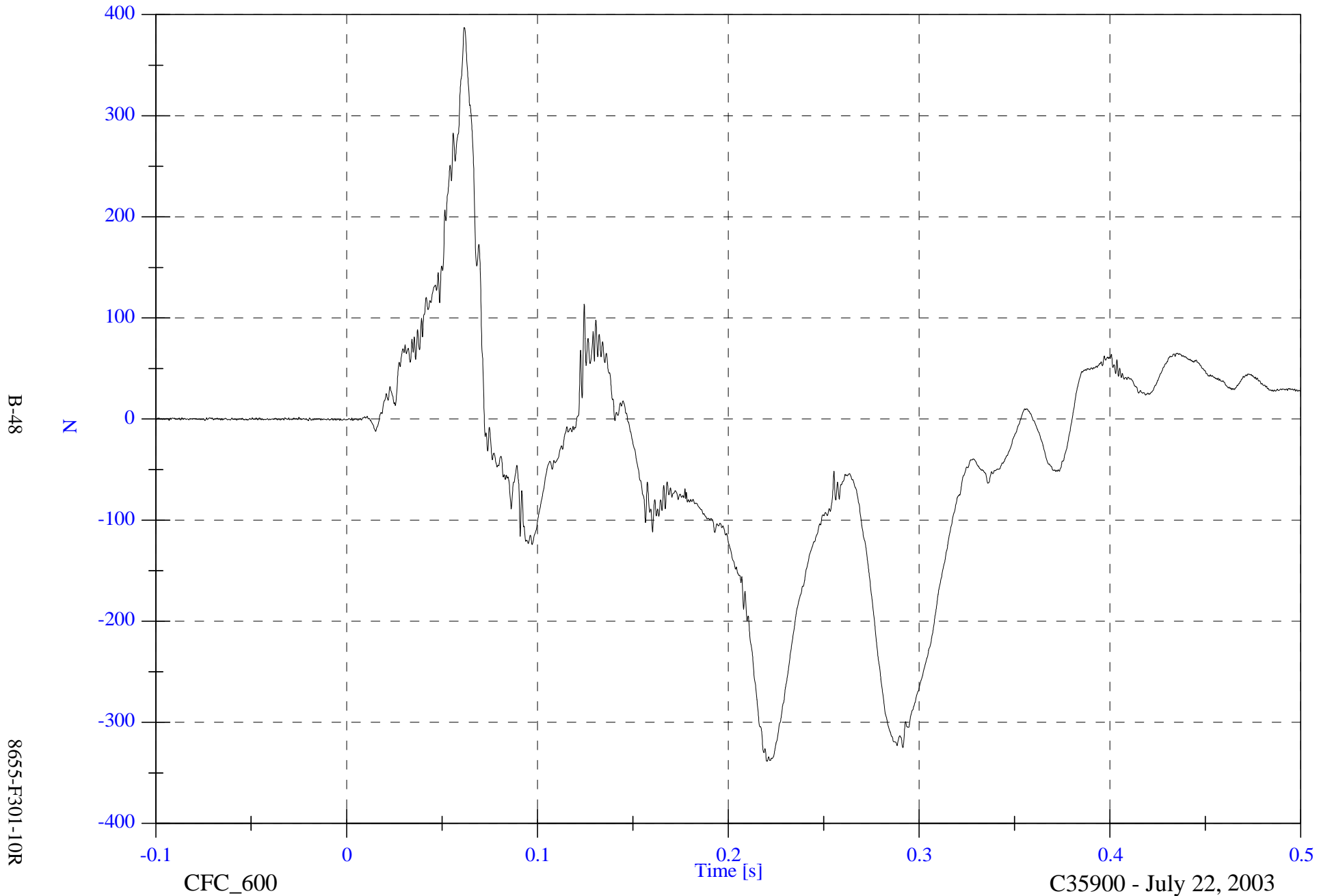
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Right Femur Fz

Max: 387.5 [N] at 0.062 [s]

Min: -338.4 [N] at 0.220 [s]



B-48

8655-F301-10R

CFC_600

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

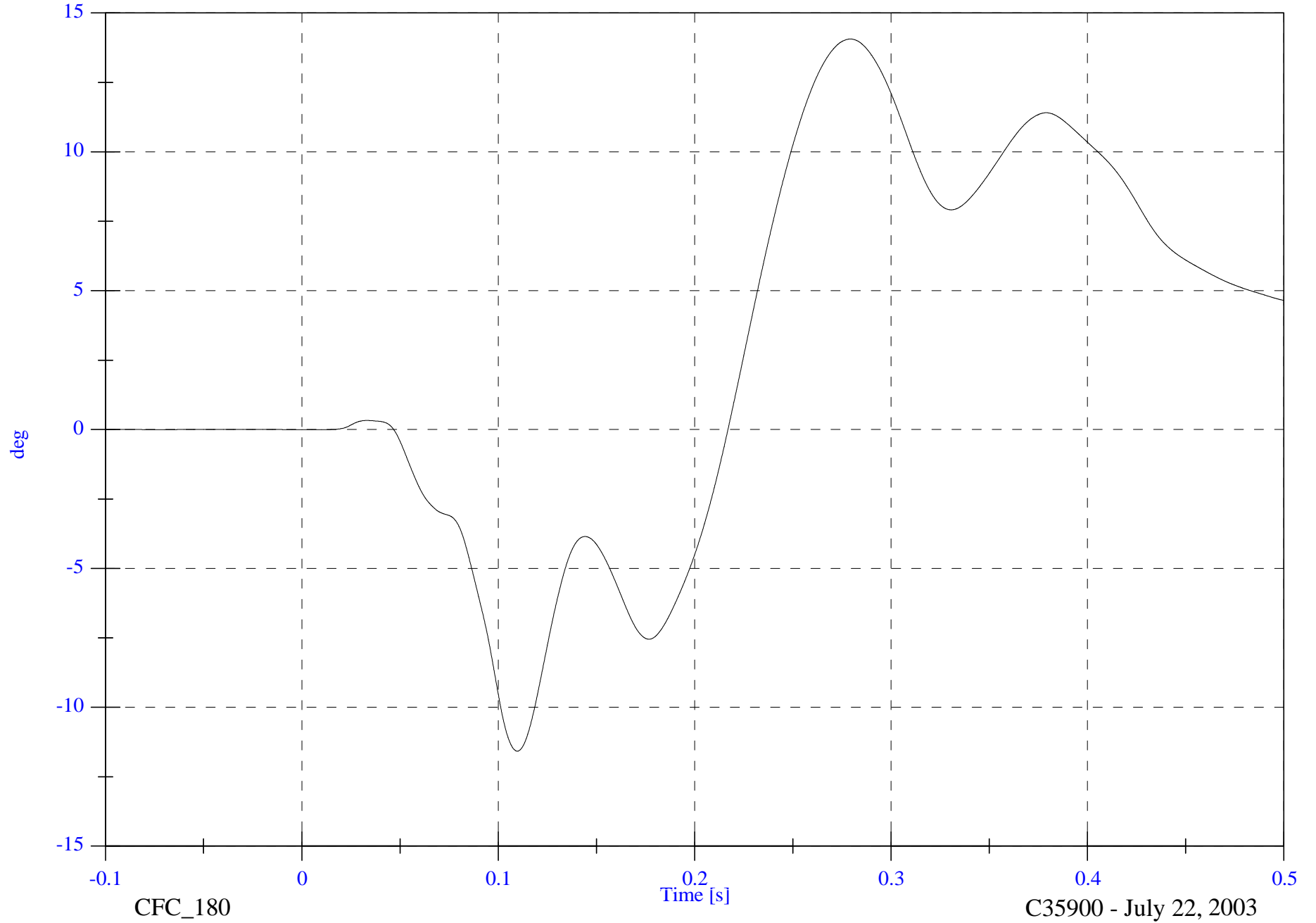
V2P1 Head to Chest Comp ADy

Max: 14.1 [deg] at 0.279 [s]

Min: -11.6 [deg] at 0.110 [s]

B-49

8655-F301-10R



CFC_180

Time [s]

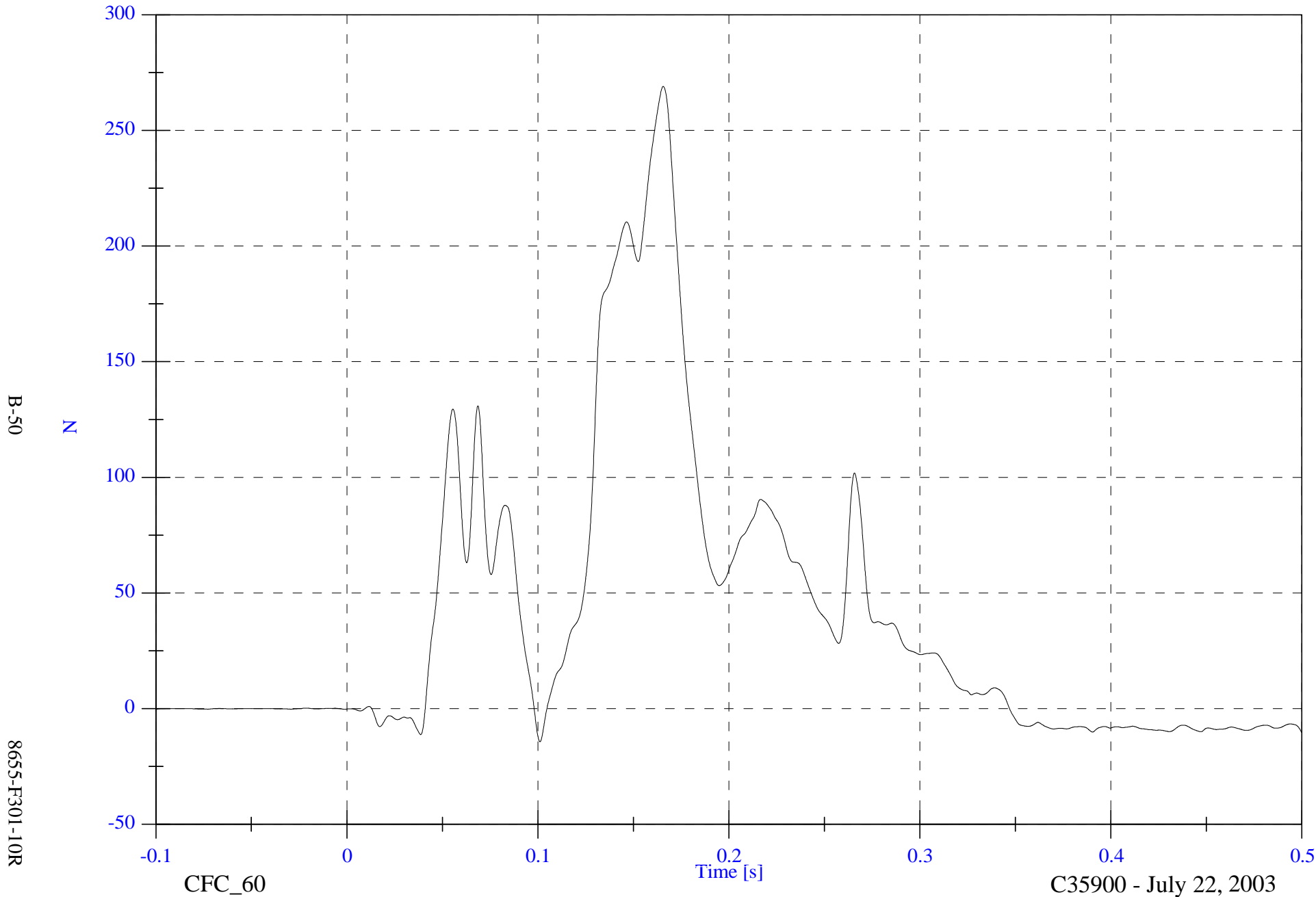
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2 Driver Lap Belt F

Max: 269.0 [N] at 0.166 [s]

Min: -14.3 [N] at 0.101 [s]



B-50

N

8655-F301-10R

CFC_60

Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

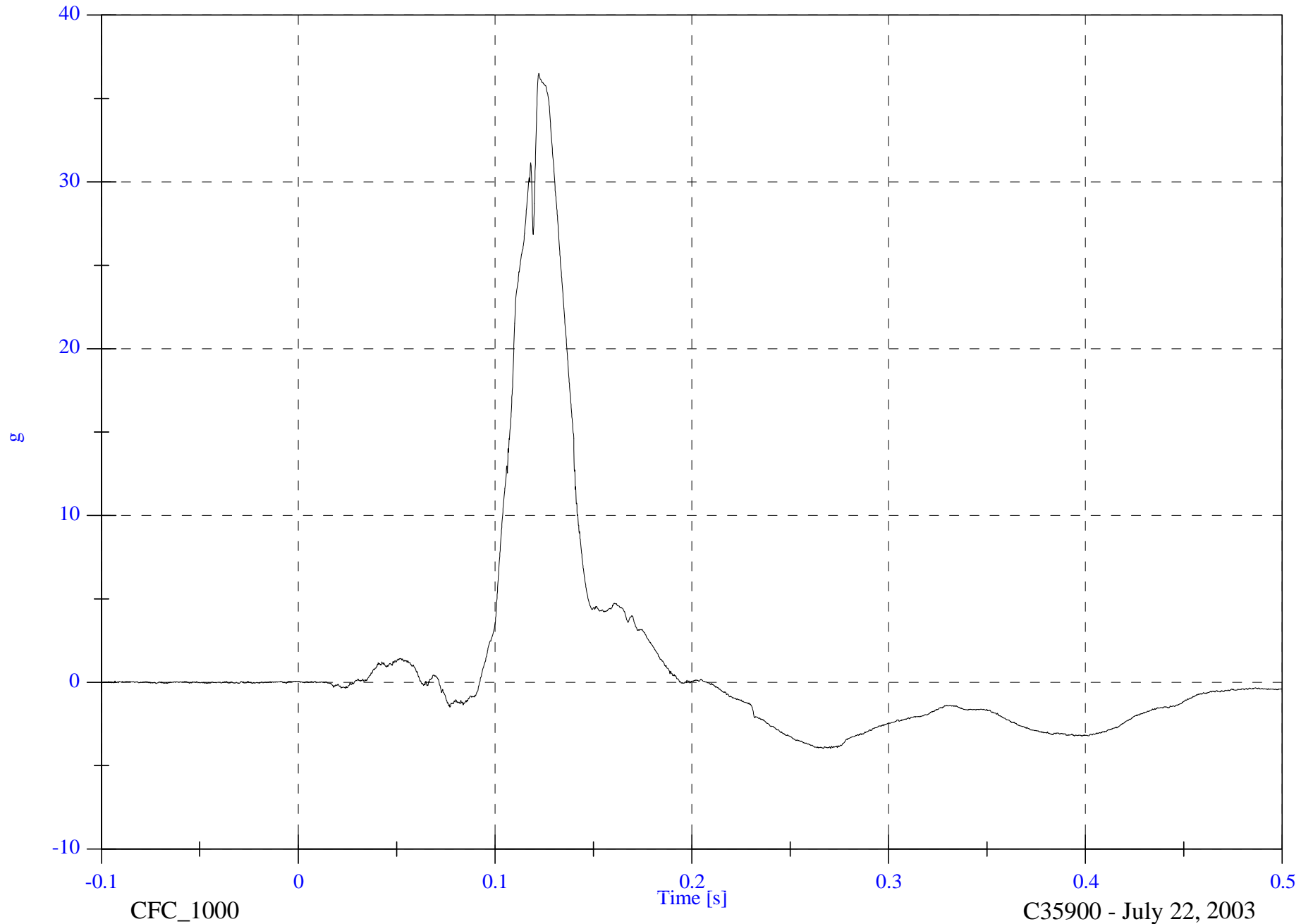
V2P2 Head Ax

Max: 36.5 [g] at 0.122 [s]

Min: -4.0 [g] at 0.267 [s]

B-51

8655-F301-10R



CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

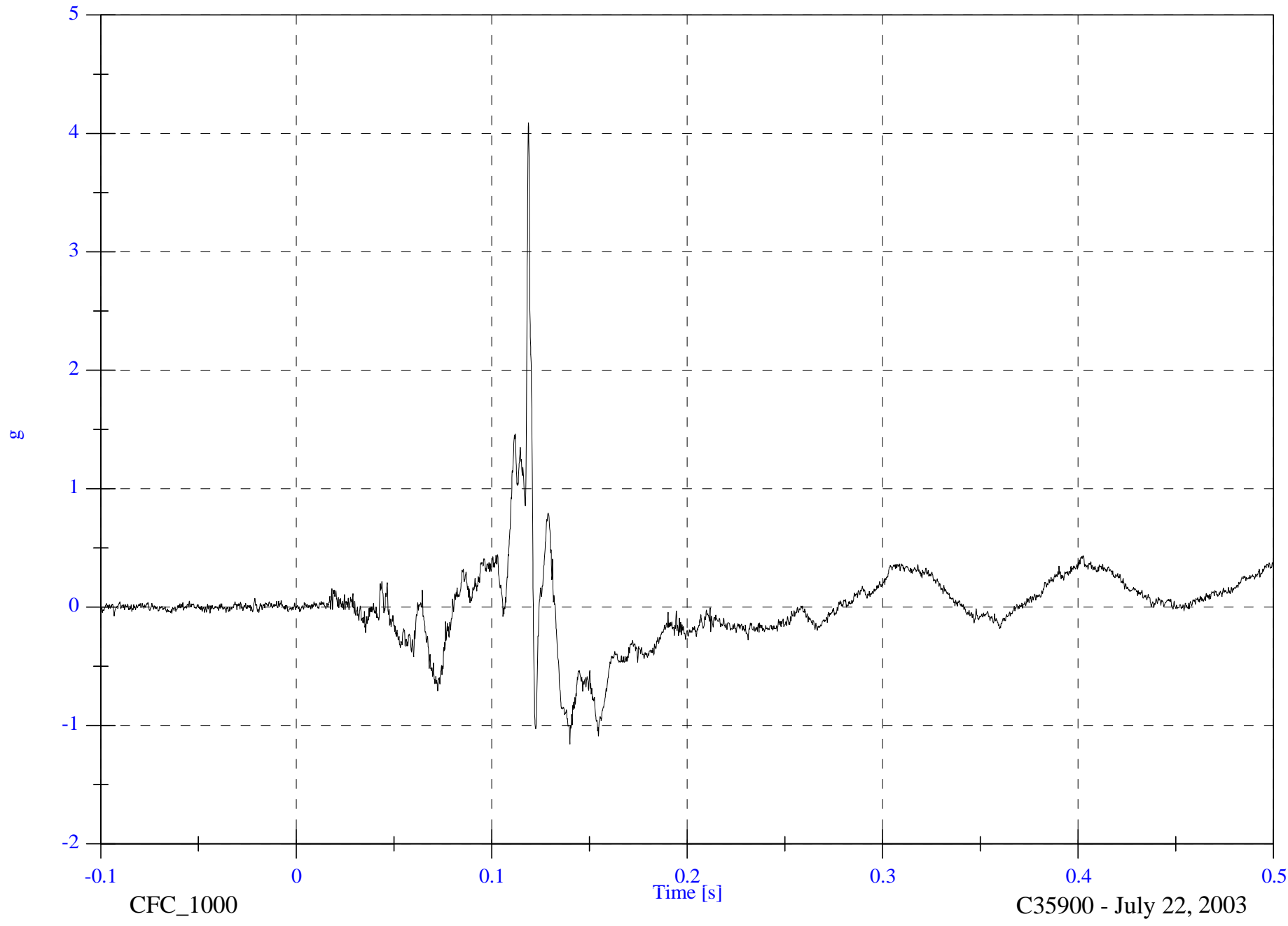
V2P2 Head Ay

Max: 4.1 [g] at 0.119 [s]

Min: -1.2 [g] at 0.140 [s]

B-52

8655-F301-10R



CFC_1000

C35900 - July 22, 2003

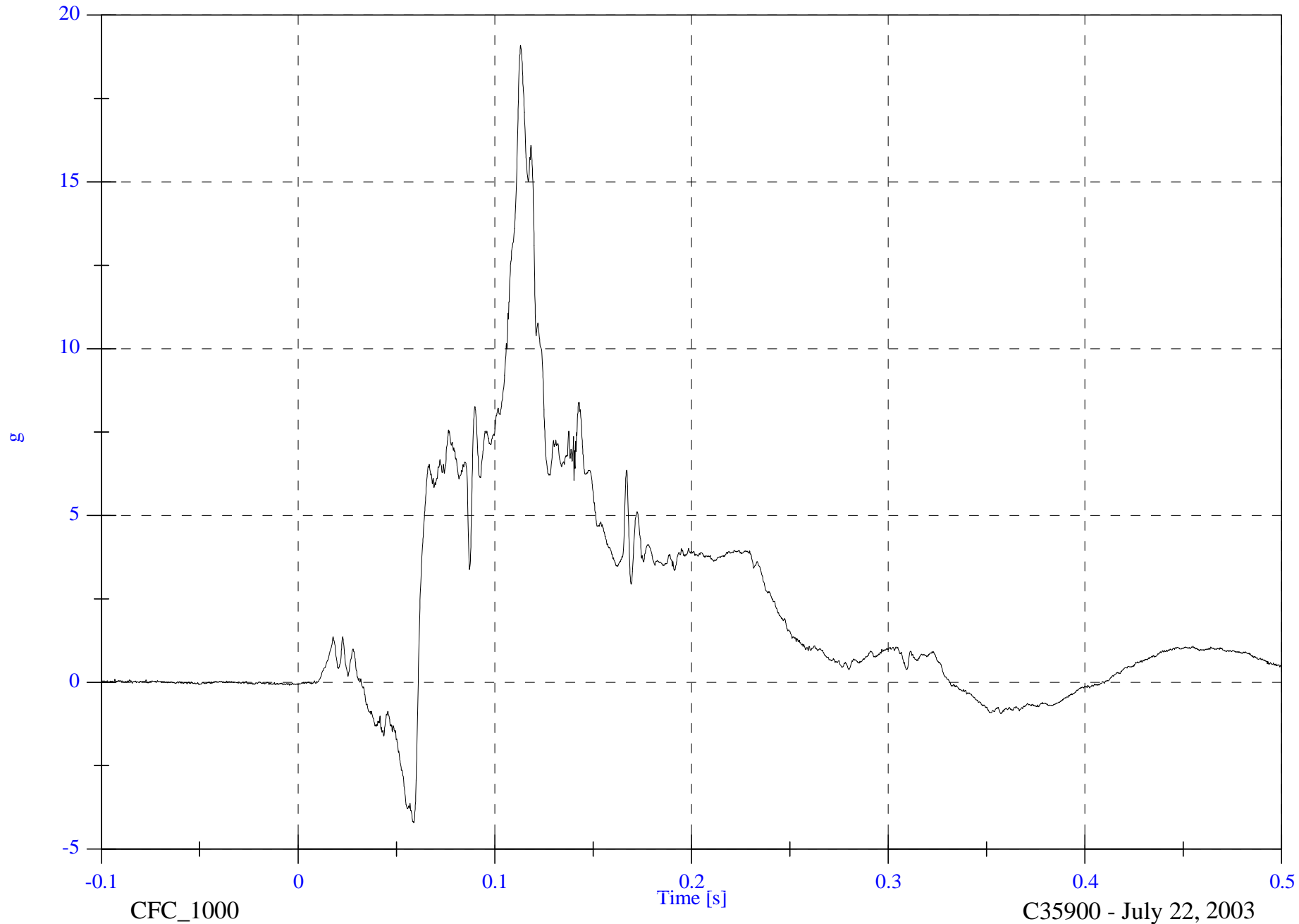
FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Head Az

Max: 19.1 [g] at 0.113 [s]
Min: -4.2 [g] at 0.059 [s]

B-53

8655-F301-10R



CFC_1000

C35900 - July 22, 2003

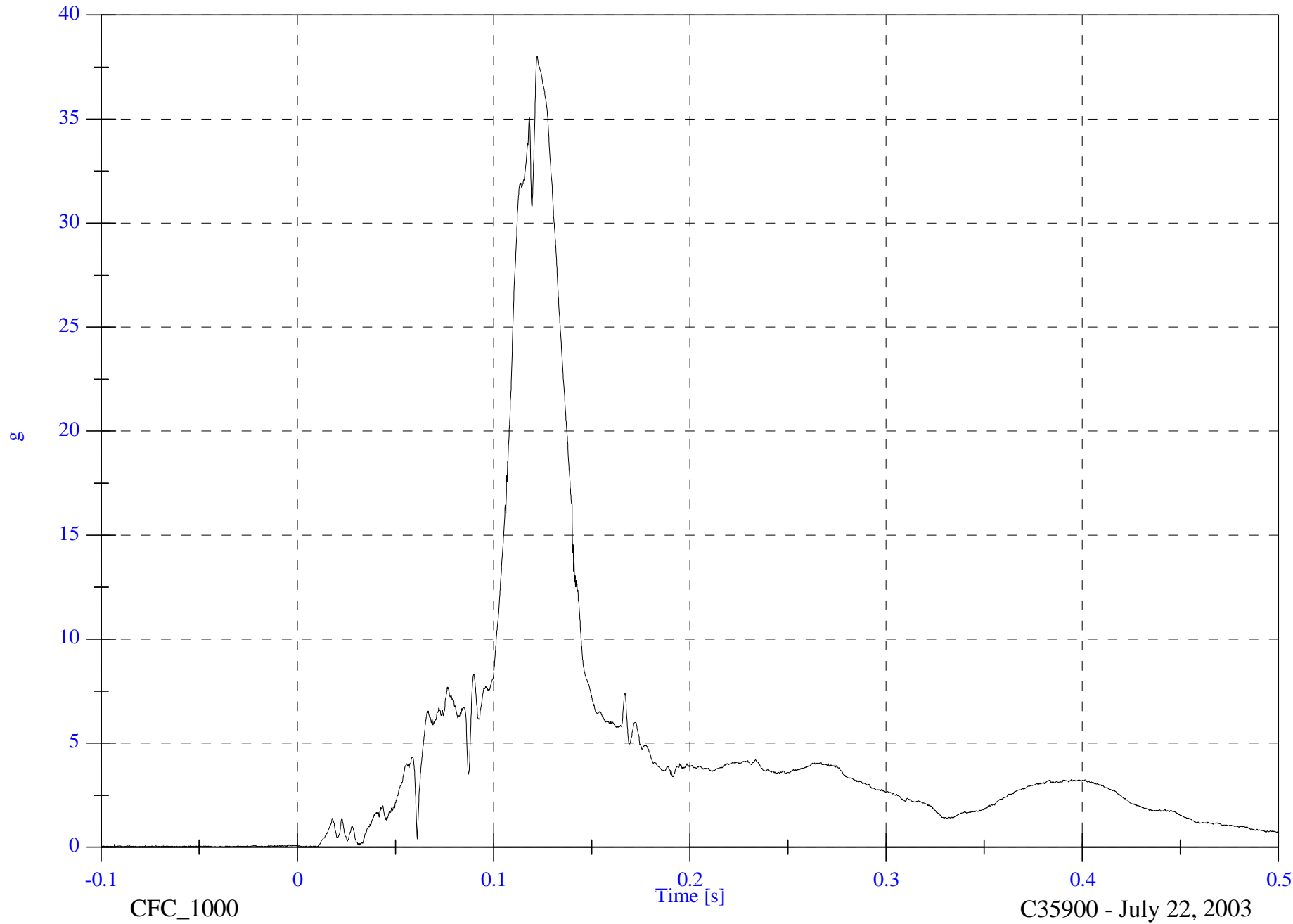
FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Head A Resultant

Max: 38.0 [g] at 0.122 [s]
Min: 0.0 [g] at -0.041 [s]

B-54

8655-F301-10R



CFC_1000

Time [s]

C35900 - July 22, 2003

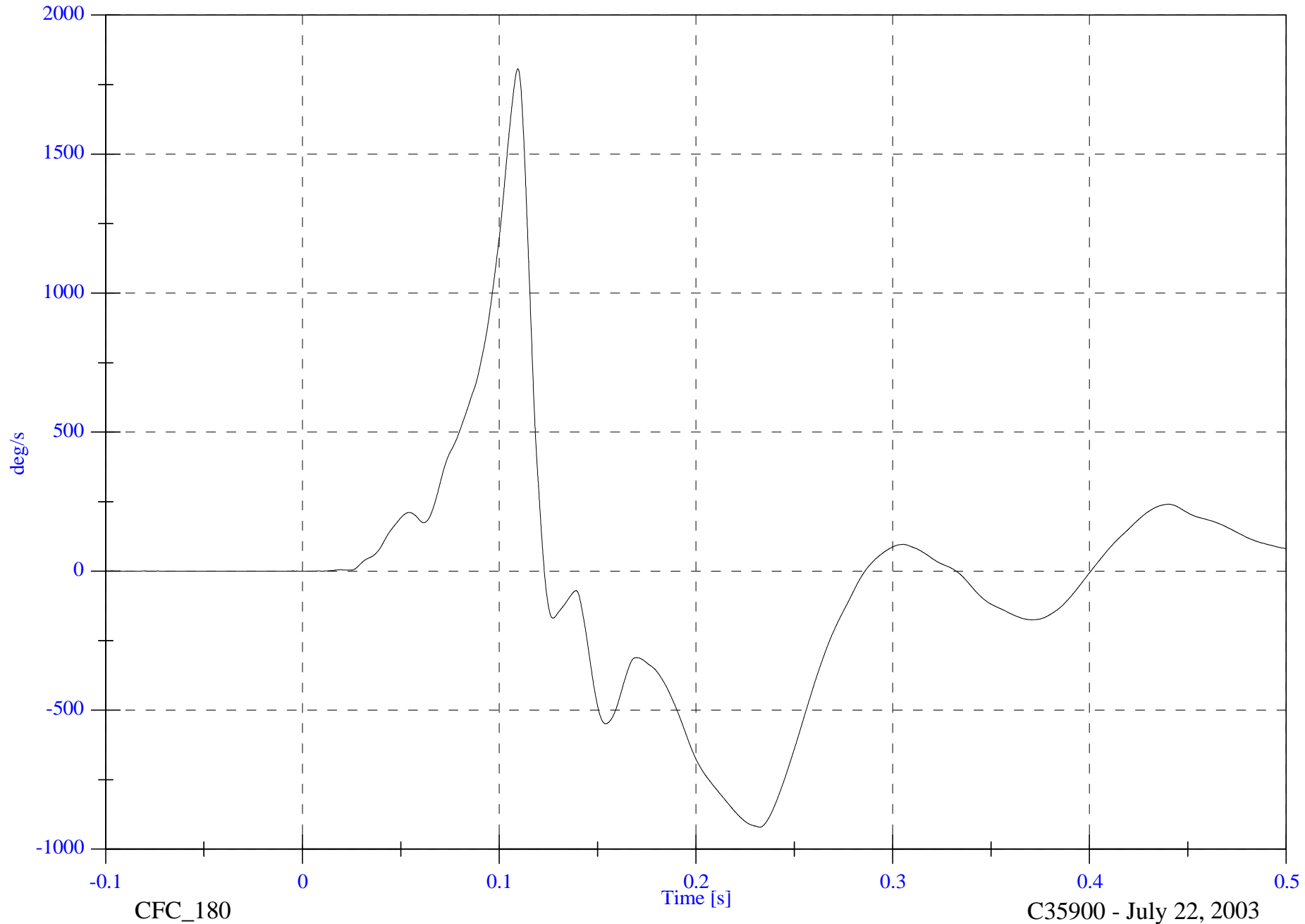
FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Head AVy

Max: 1807.3 [deg/s] at 0.109 [s]
Min: -920.8 [deg/s] at 0.232 [s]

B-55

8655-F301-10R



CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

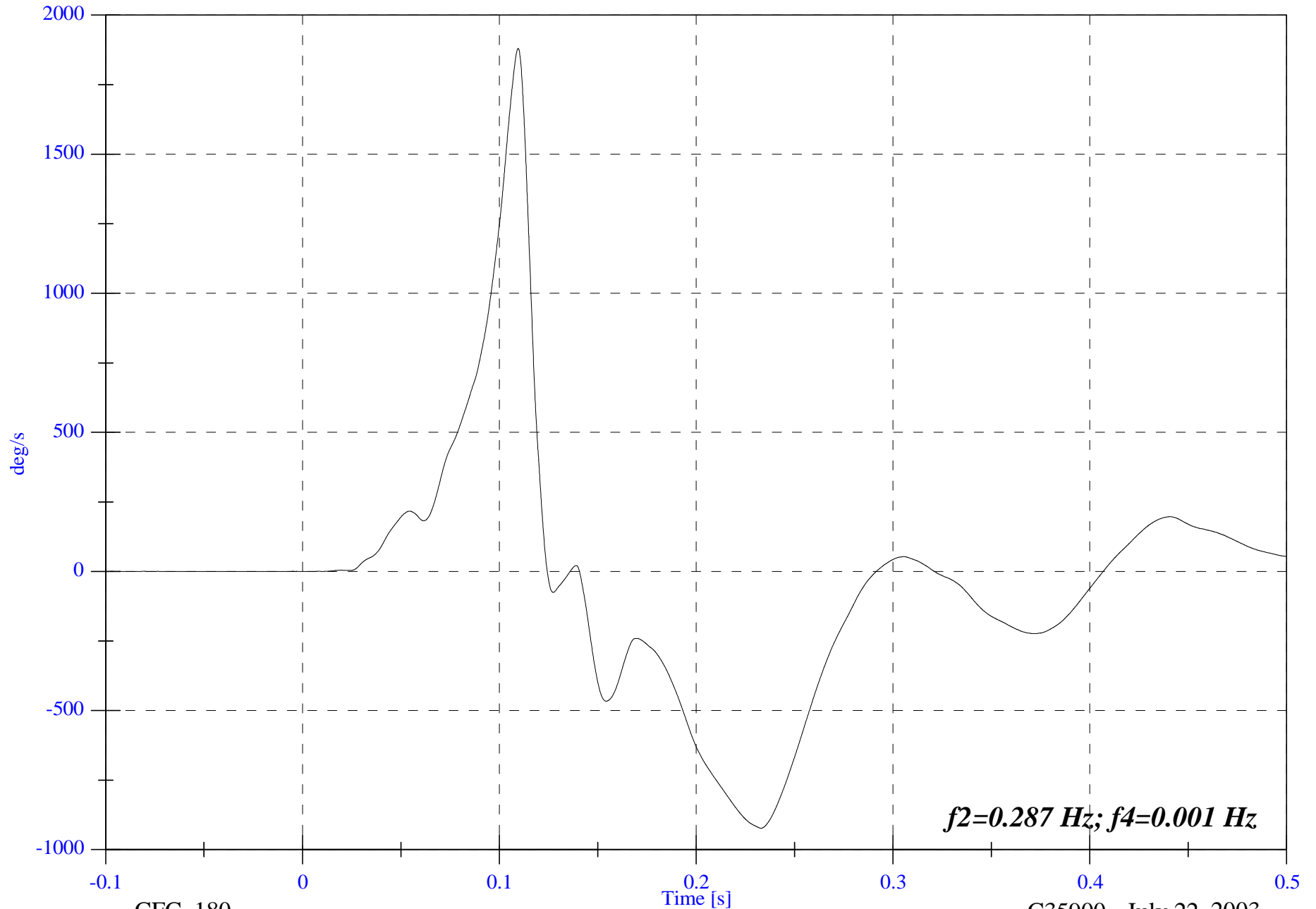
V2P2 Head Comp AVy

Max: 1880.4 [deg/s] at 0.110 [s]

Min: -923.2 [deg/s] at 0.233 [s]

B-56

8655-F301-10R



f2=0.287 Hz; f4=0.001 Hz

CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Head Comp ADy

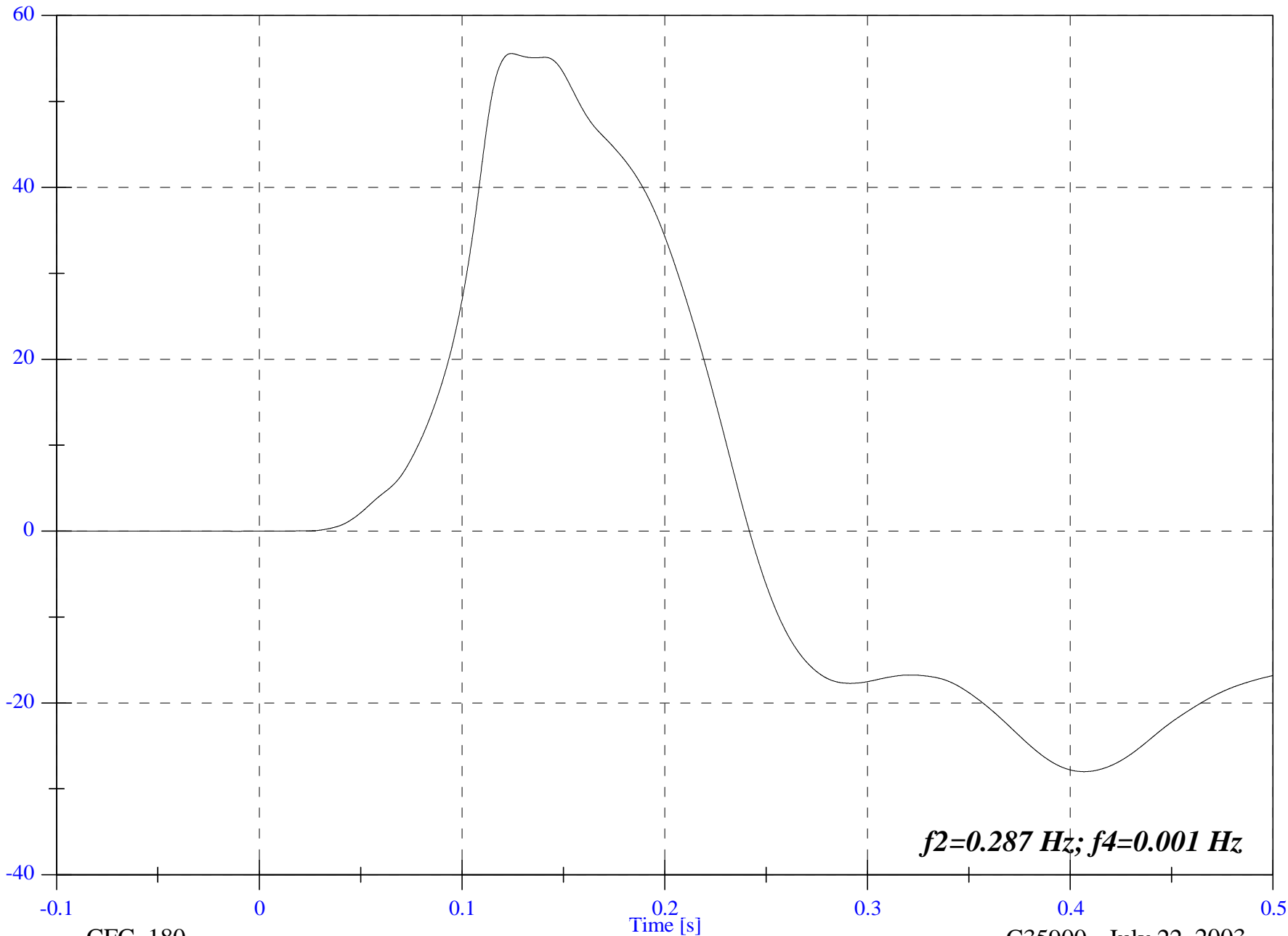
Max: 55.6 [deg] at 0.124 [s]

Min: -28.0 [deg] at 0.407 [s]

B-57

gap

8655-F301-10R



CFC_180

Time [s]

C35900 - July 22, 2003

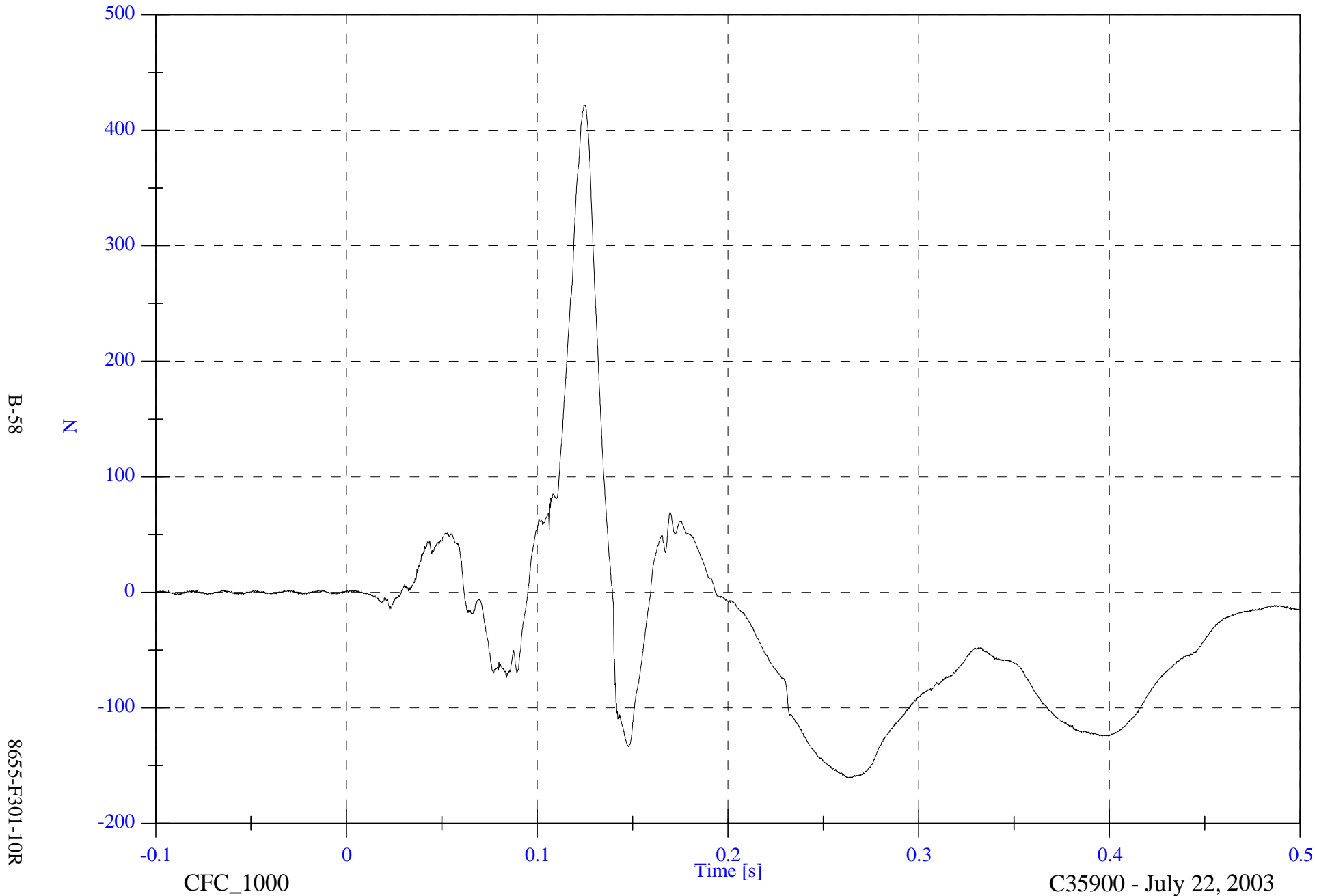
$f_2=0.287$ Hz; $f_4=0.001$ Hz

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Upper Neck Fx

Max: 421.9 [N] at 0.125 [s]

Min: -160.8 [N] at 0.263 [s]



B-58

8655-F301-10R

CFC_1000

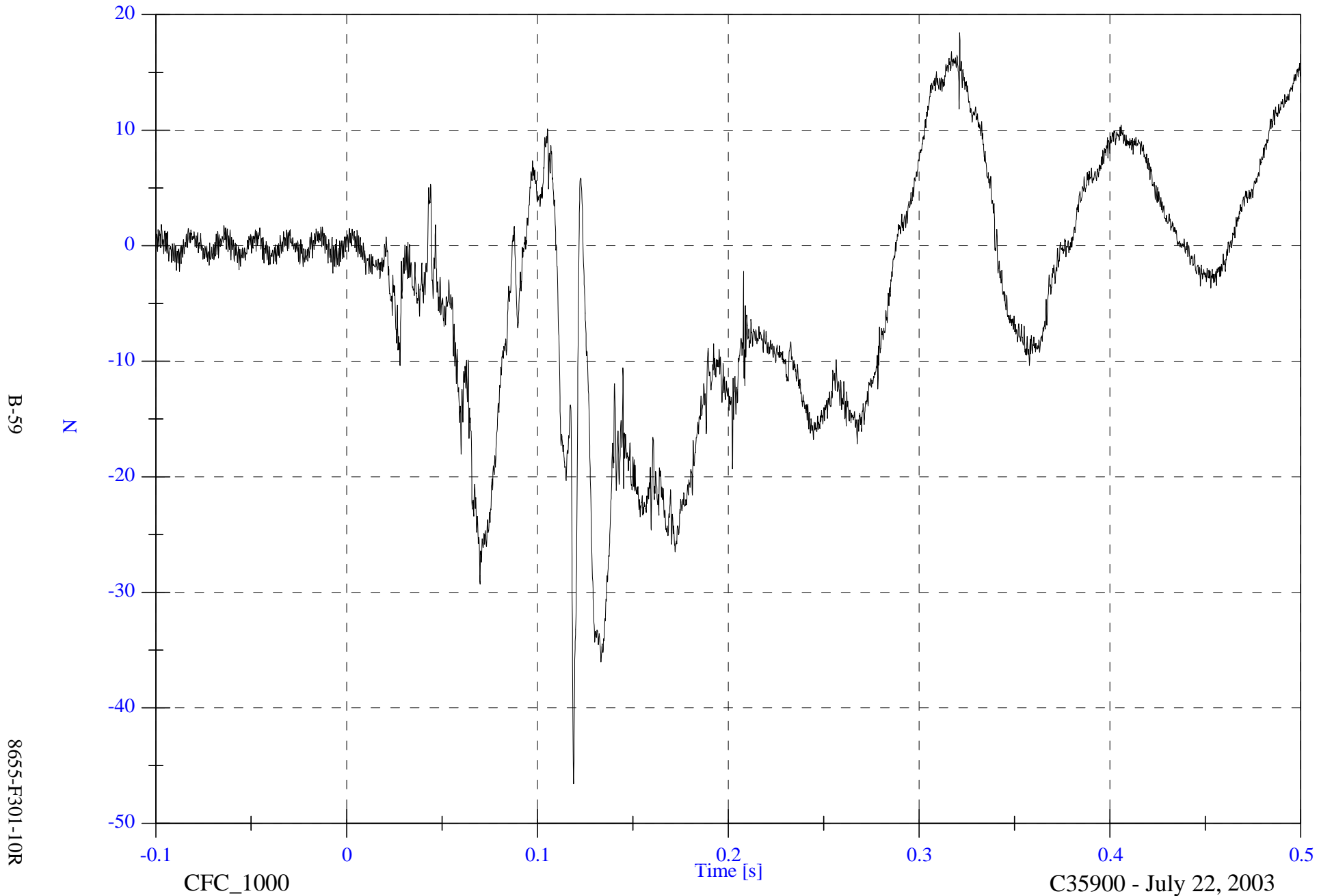
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Upper Neck Fy

Max: 18.4 [N] at 0.321 [s]

Min: -46.6 [N] at 0.119 [s]



B-59

N

8655-F301-10R

CFC_1000

Time [s]

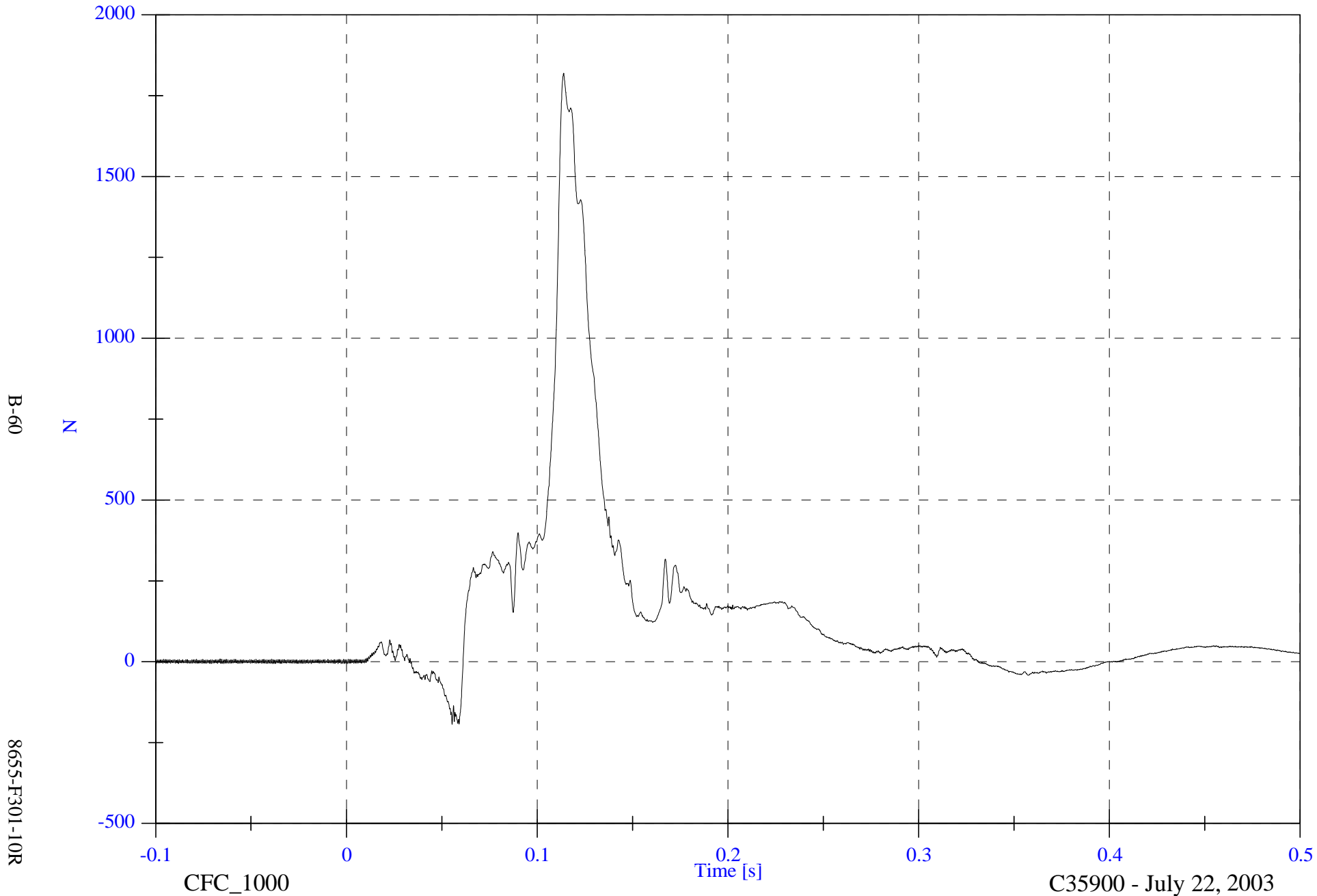
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Upper Neck Fz

Max: 1819.6 [N] at 0.114 [s]

Min: -194.1 [N] at 0.055 [s]



B-60

N

8655-F301-10R

CFC_1000

Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

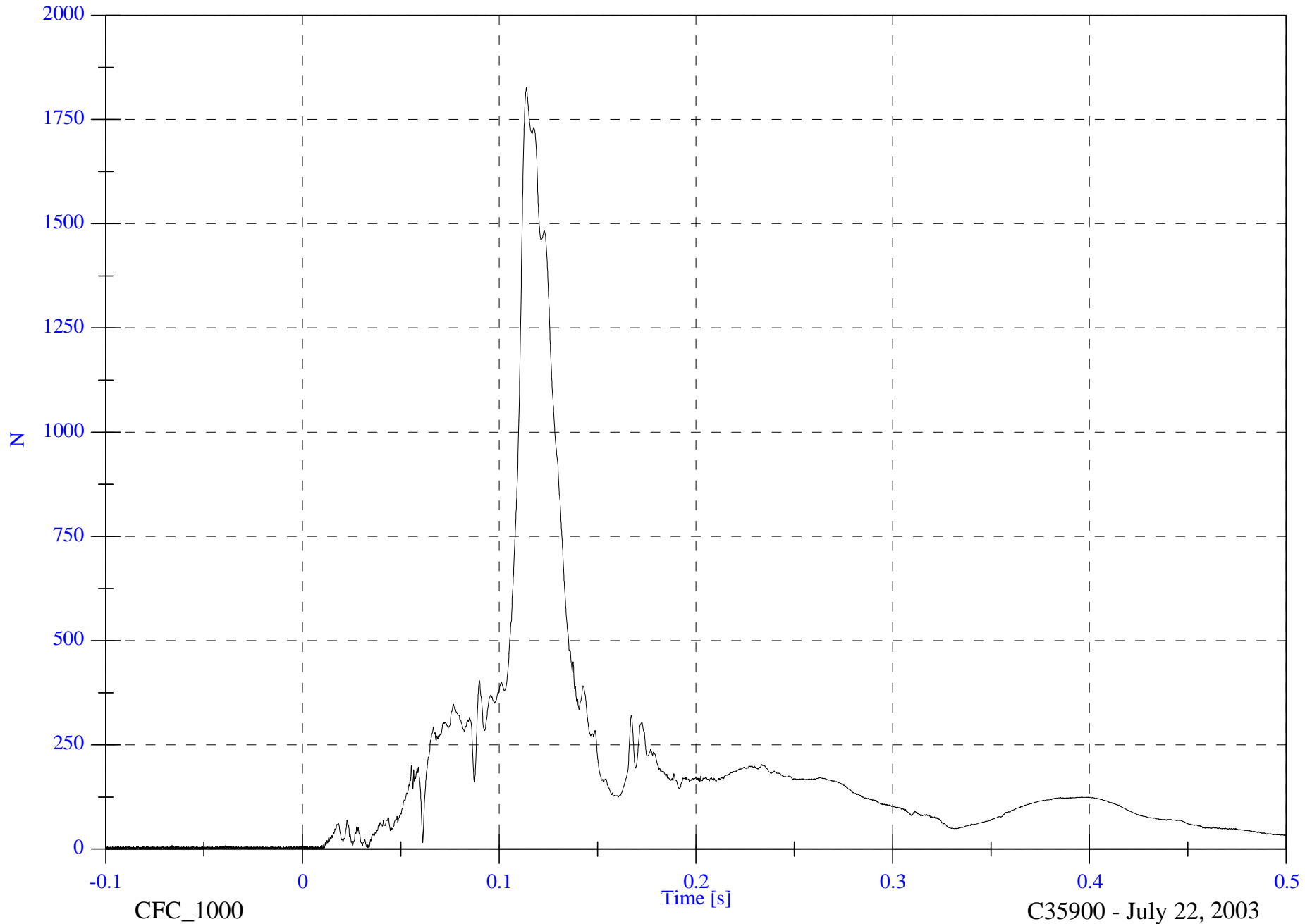
V2P2 Upper Neck F Resultant

Max: 1826.7 [N] at 0.114 [s]

Min: 0.3 [N] at -0.052 [s]

B-61

8655-F301-10R



CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

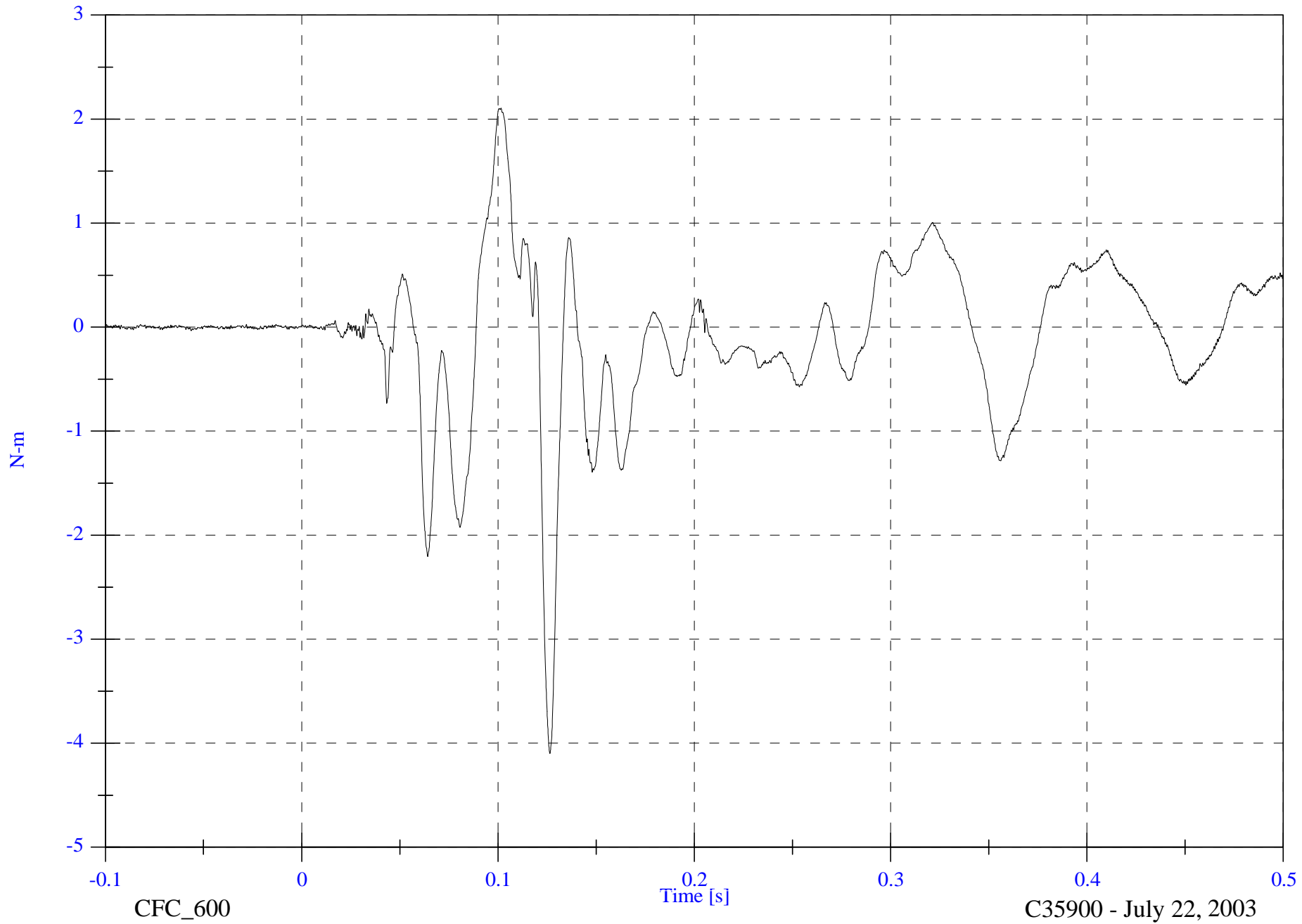
V2P2 Upper Neck Mx

Max: 2.1 [N-m] at 0.102 [s]

Min: -4.1 [N-m] at 0.126 [s]

B-62

8655-F301-10R



CFC_600

Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

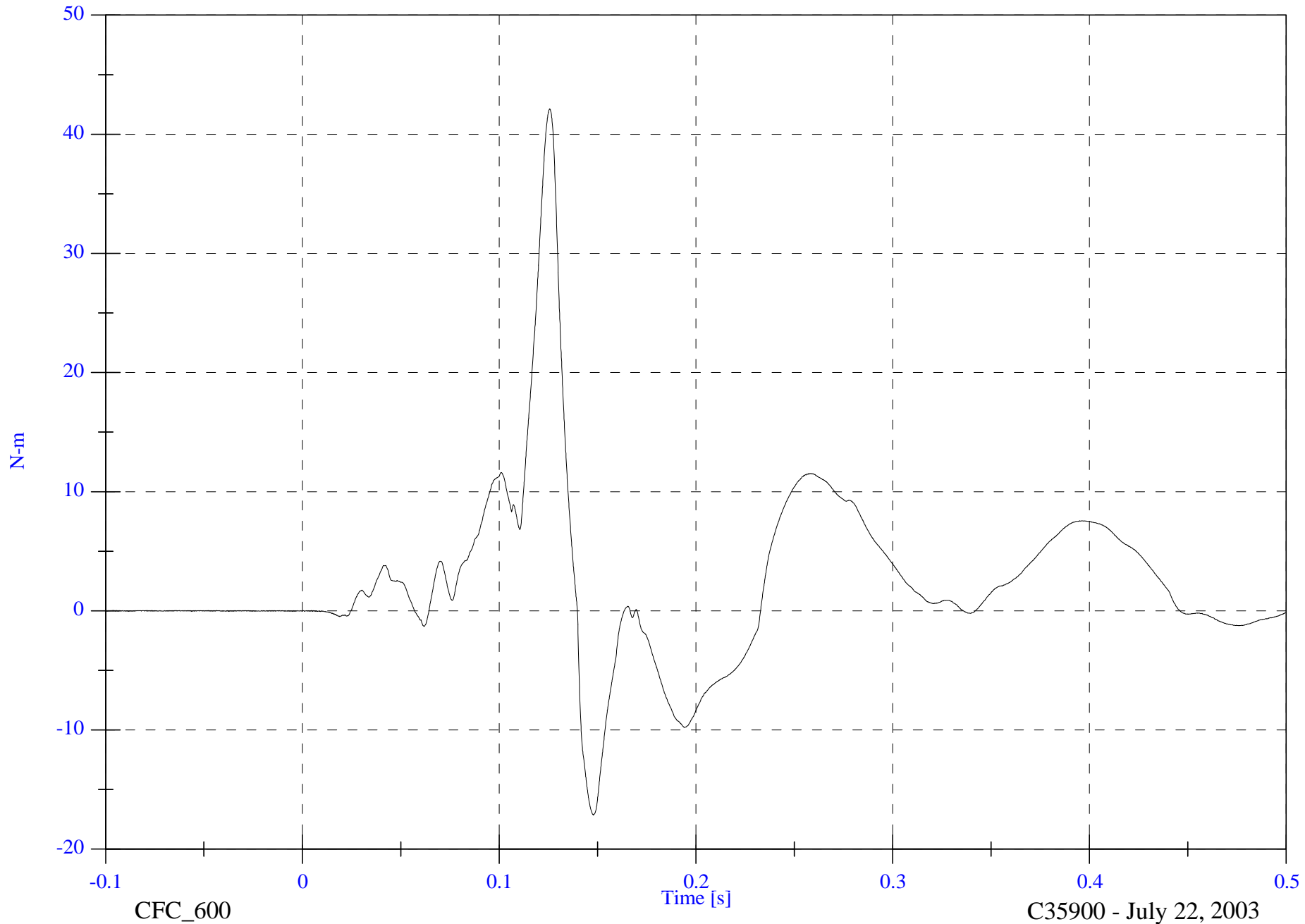
V2P2 Upper Neck My

Max: 42.1 [N-m] at 0.126 [s]

Min: -17.1 [N-m] at 0.148 [s]

B-63

8655-F301-10R



CFC_600

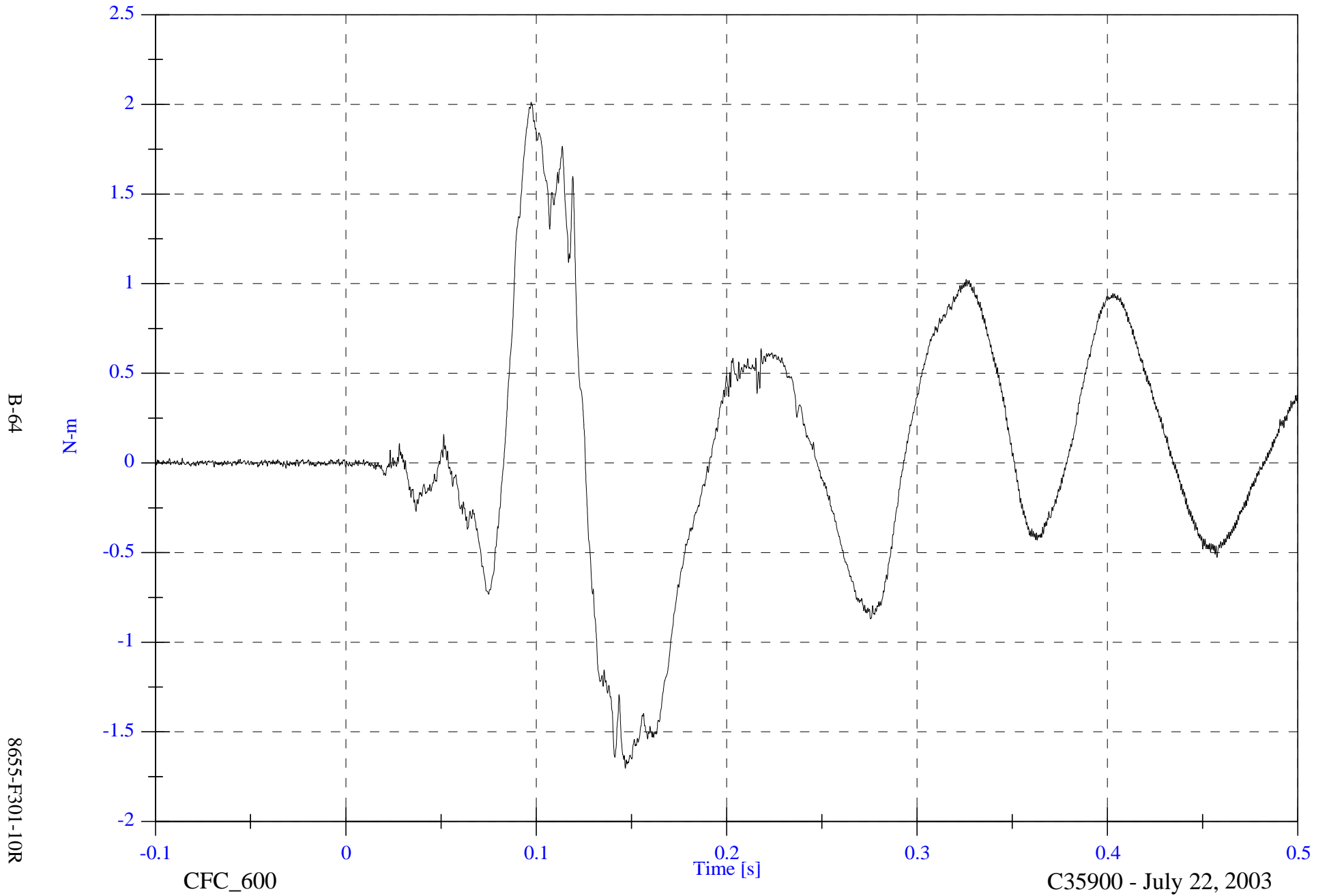
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Upper Neck Mz

Max: 2.0 [N-m] at 0.097 [s]

Min: -1.7 [N-m] at 0.147 [s]



B-64

8655-F301-10R

CFC_600

Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

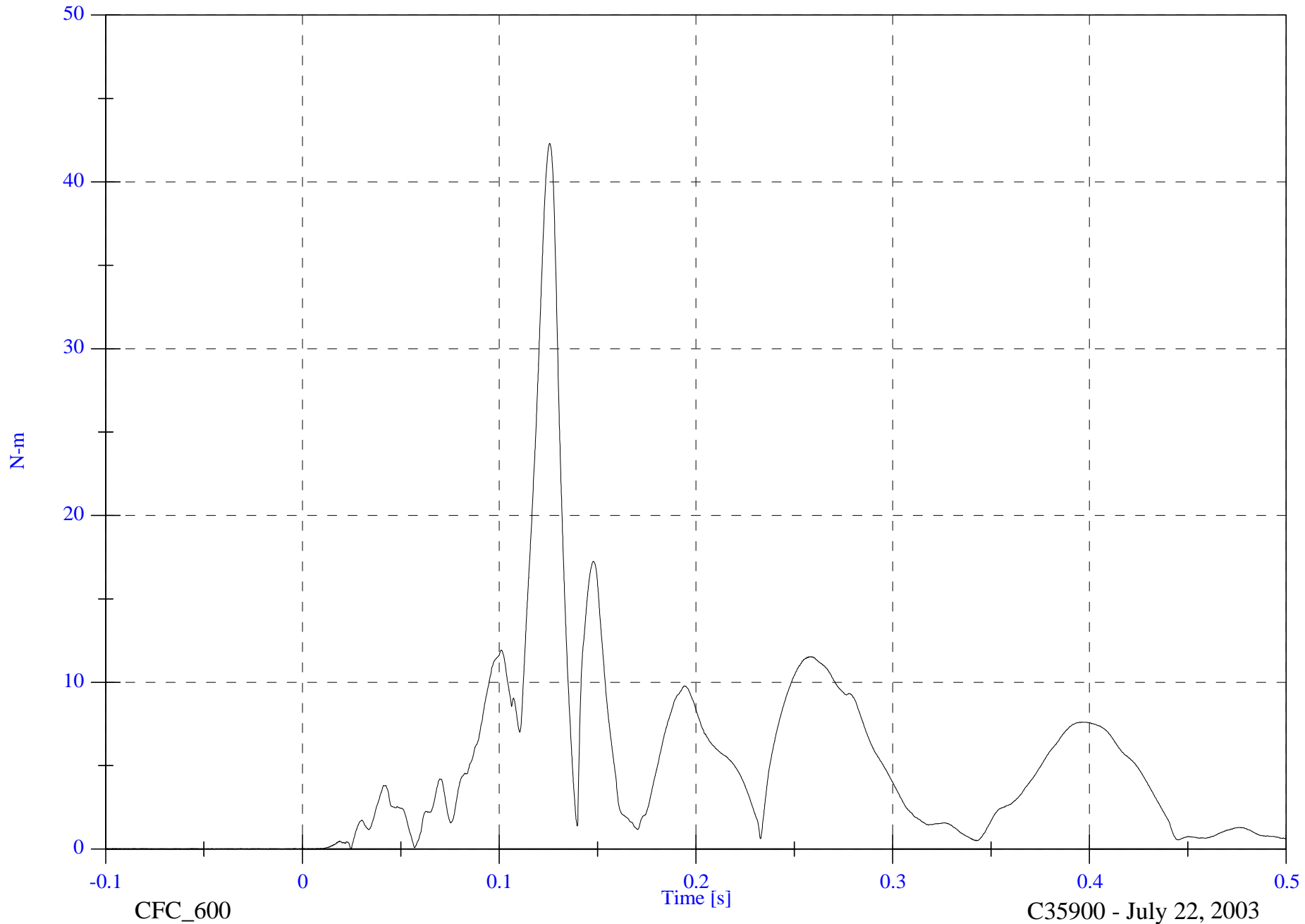
V2P2 Upper Neck M Resultant

Max: 42.3 [N-m] at 0.126 [s]

Min: 0.0 [N-m] at -0.060 [s]

B-65

8655-F301-10R



CFC_600

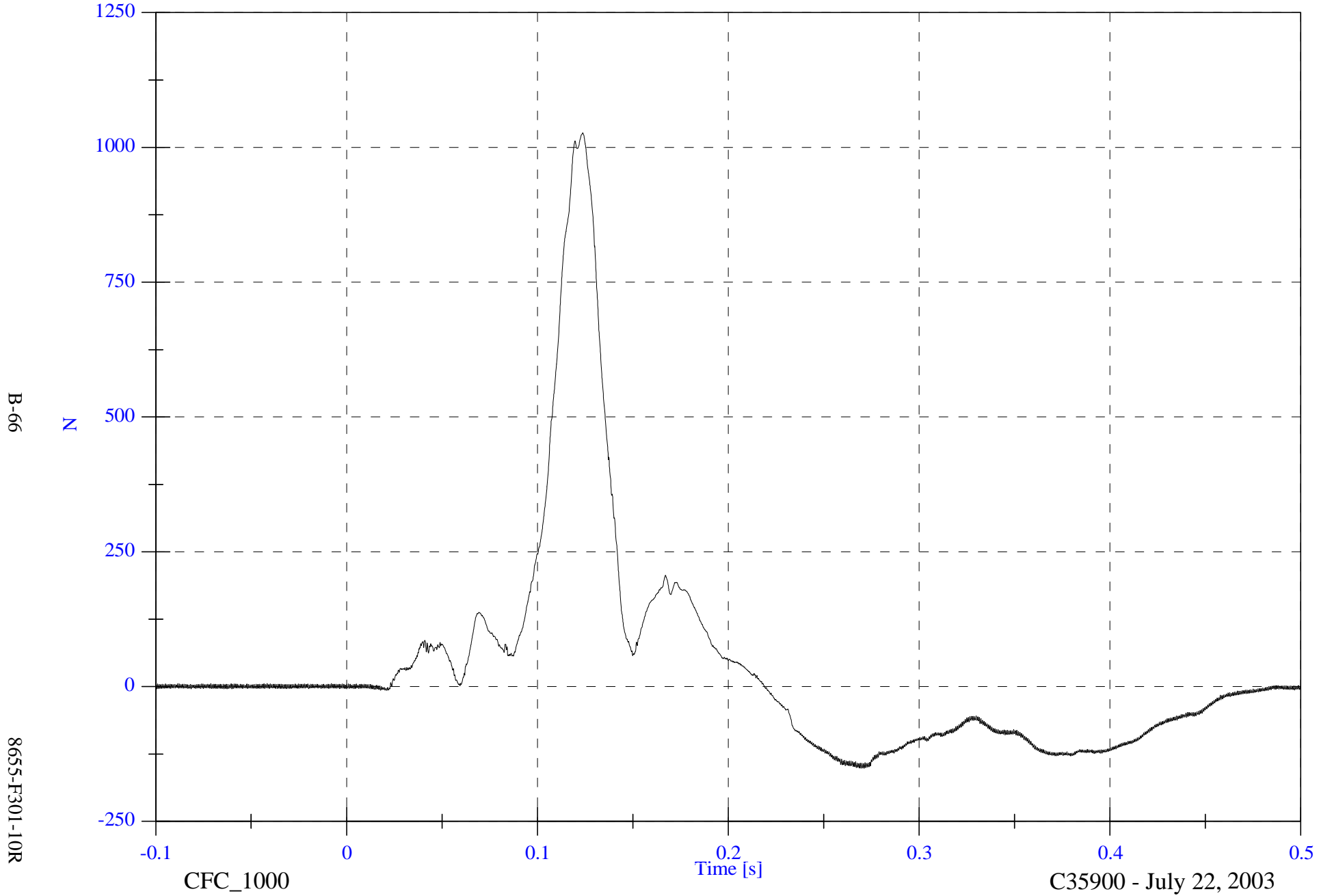
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Lower Neck Fx

Max: 1027.2 [N] at 0.124 [s]

Min: -151.7 [N] at 0.270 [s]



B-66

8655-F301-10R

CFC_1000

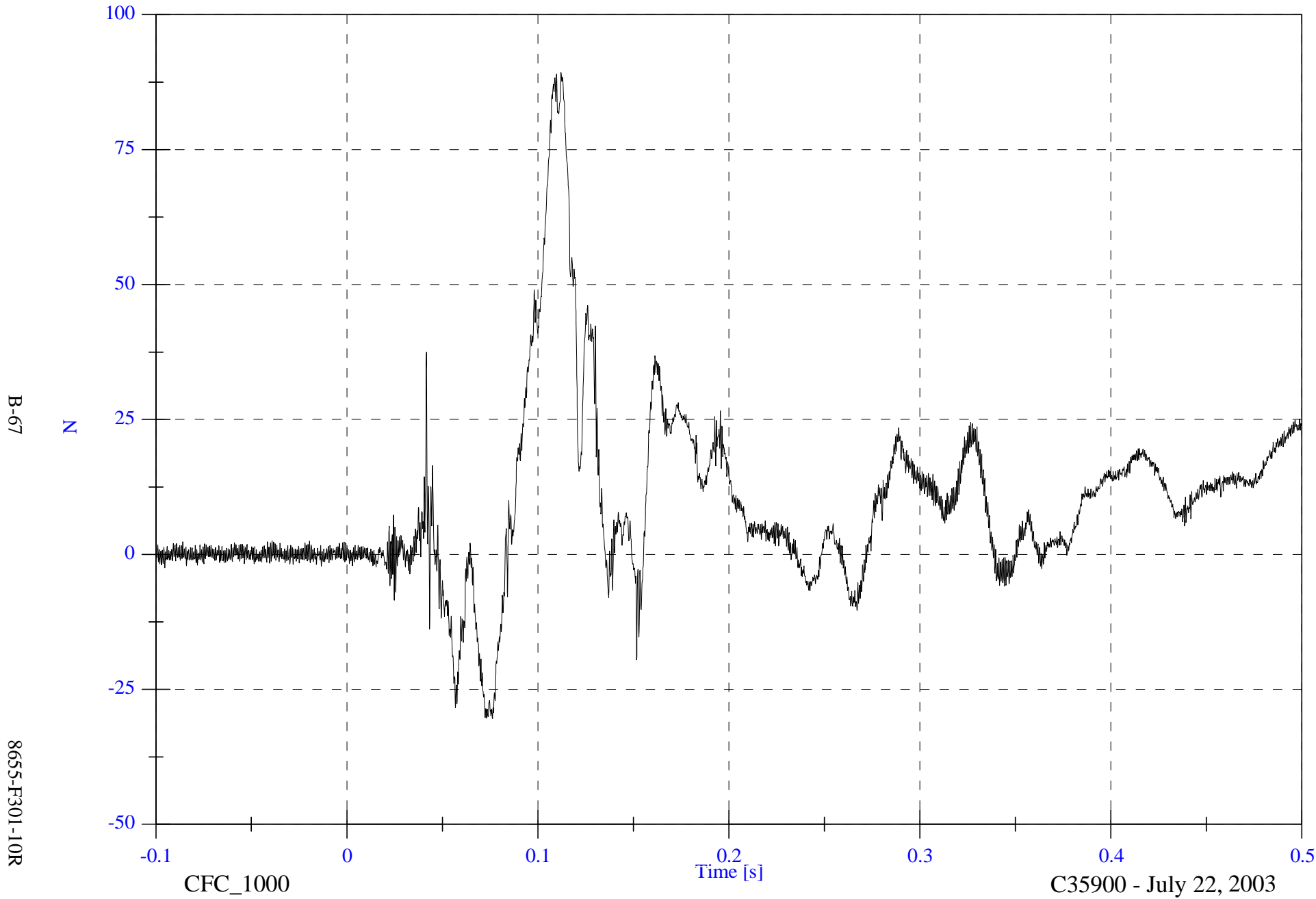
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Lower Neck Fy

Max: 89.3 [N] at 0.112 [s]

Min: -30.4 [N] at 0.076 [s]



B-67

N

8655-F301-10R

CFC_1000

Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Lower Neck Fz

Max: 1539.4 [N] at 0.113 [s]

Min: -269.9 [N] at 0.059 [s]



B-68

8655-F301-10R

CFC_1000

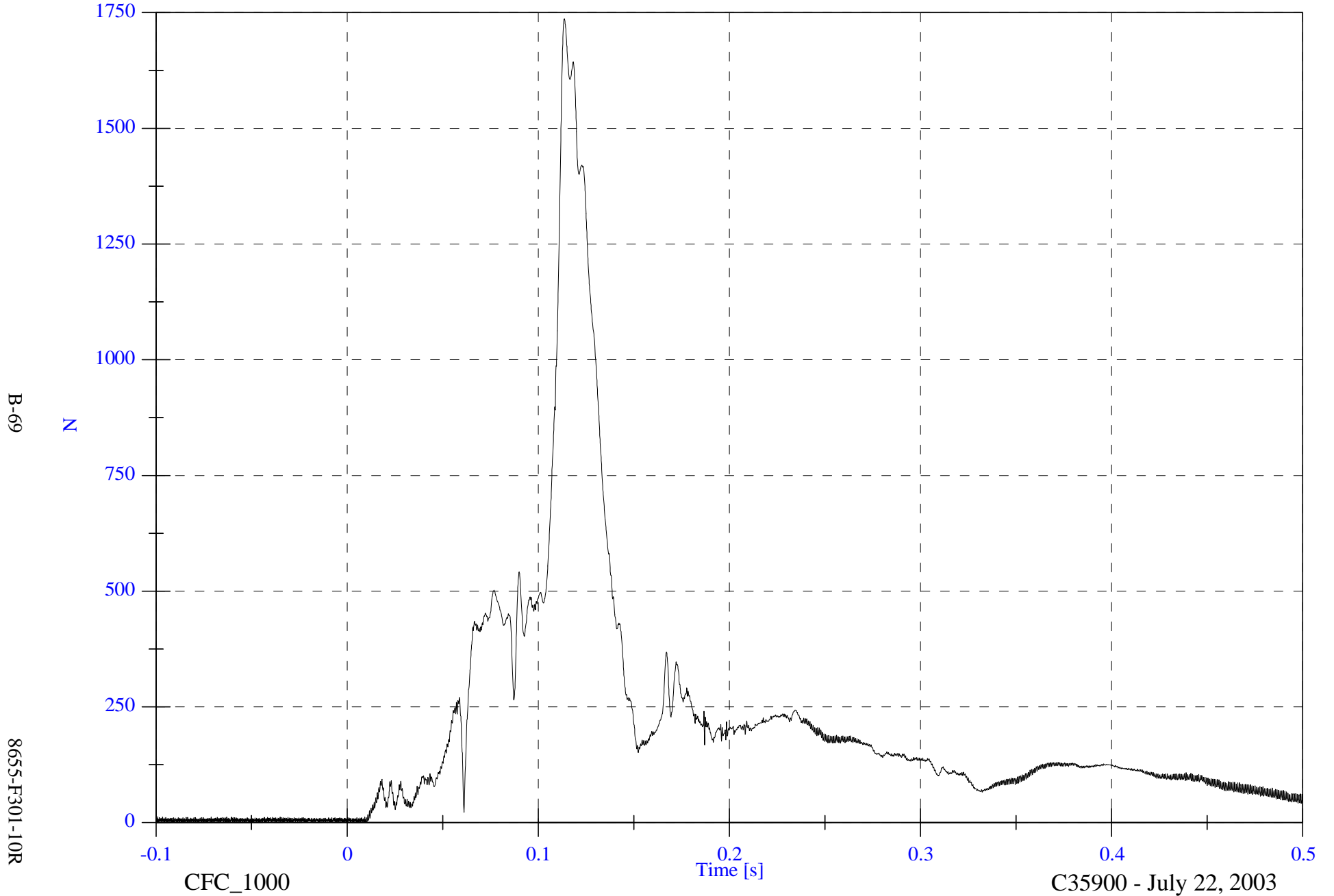
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Lower Neck F Resultant

Max: 1736.6 [N] at 0.114 [s]

Min: 0.3 [N] at -0.024 [s]



B-69

8655-F301-10R

CFC_1000

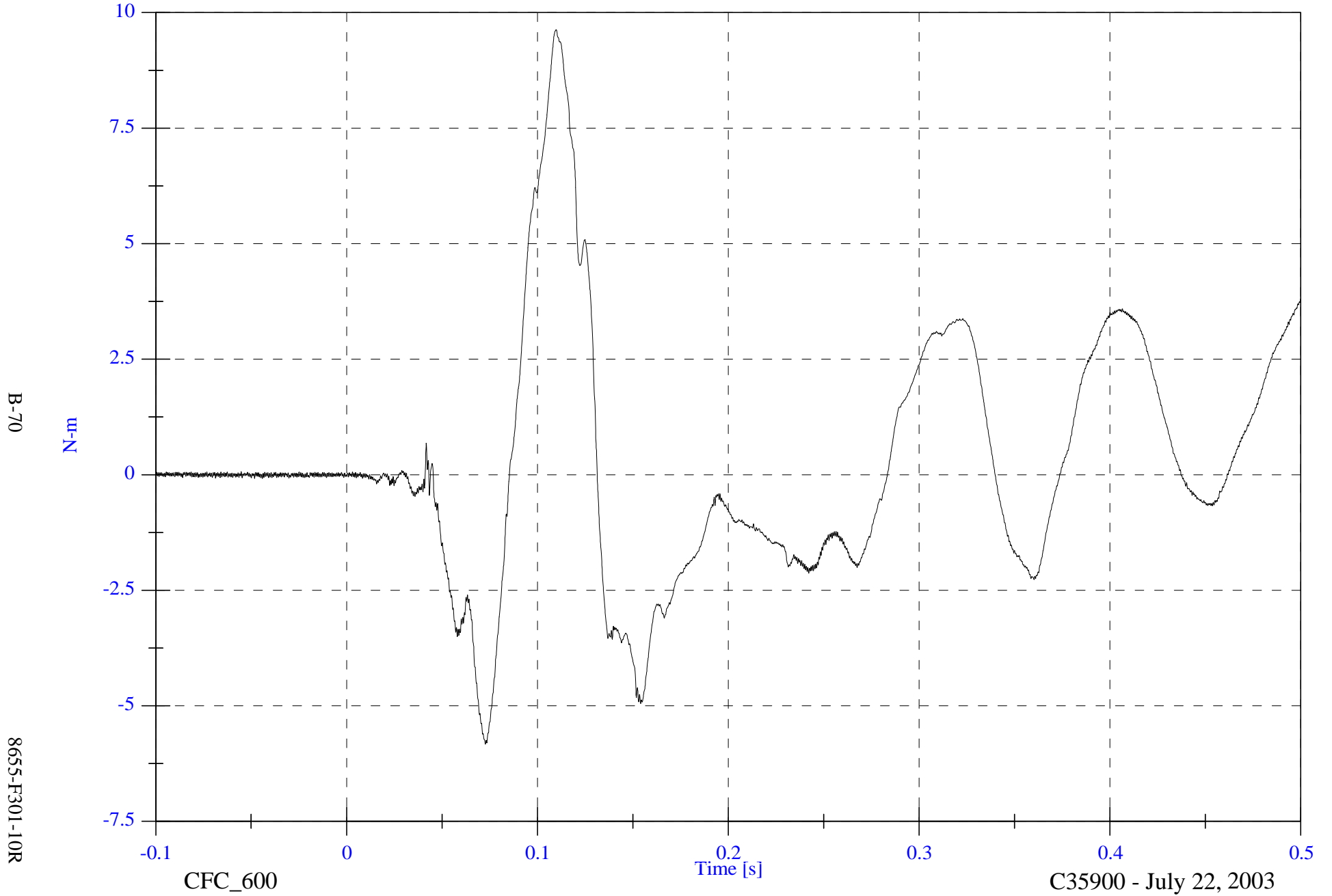
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Lower Neck Mx

Max: 9.6 [N-m] at 0.110 [s]

Min: -5.8 [N-m] at 0.073 [s]



B-70

8655-F301-10R

CFC_600

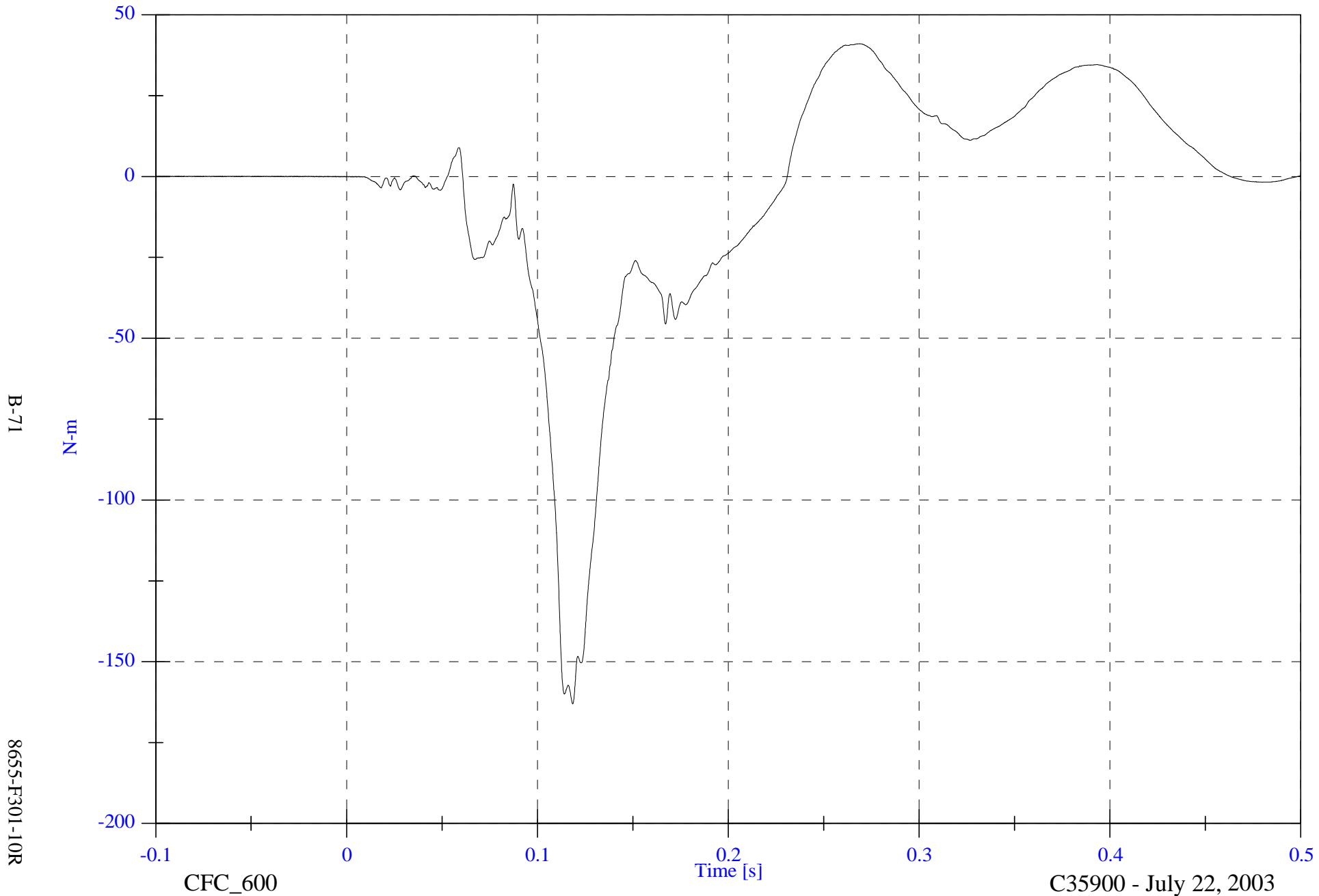
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Lower Neck My

Max: 41.0 [N-m] at 0.269 [s]

Min: -163.1 [N-m] at 0.118 [s]



B-71

8655-F301-10R

CFC_600

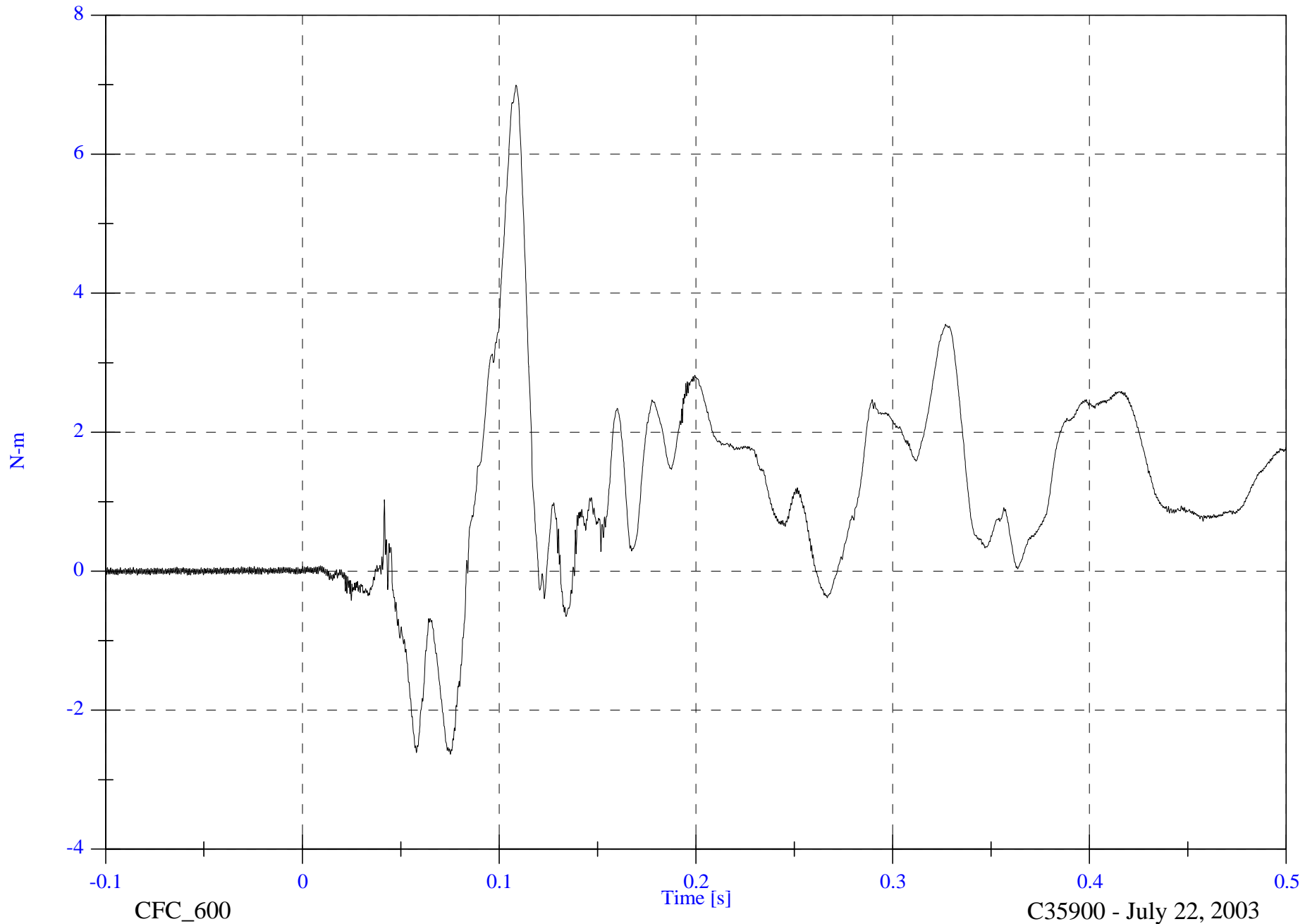
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Lower Neck Mz

Max: 7.0 [N-m] at 0.109 [s]

Min: -2.6 [N-m] at 0.075 [s]



B-72

8655-F301-10R

CFC_600

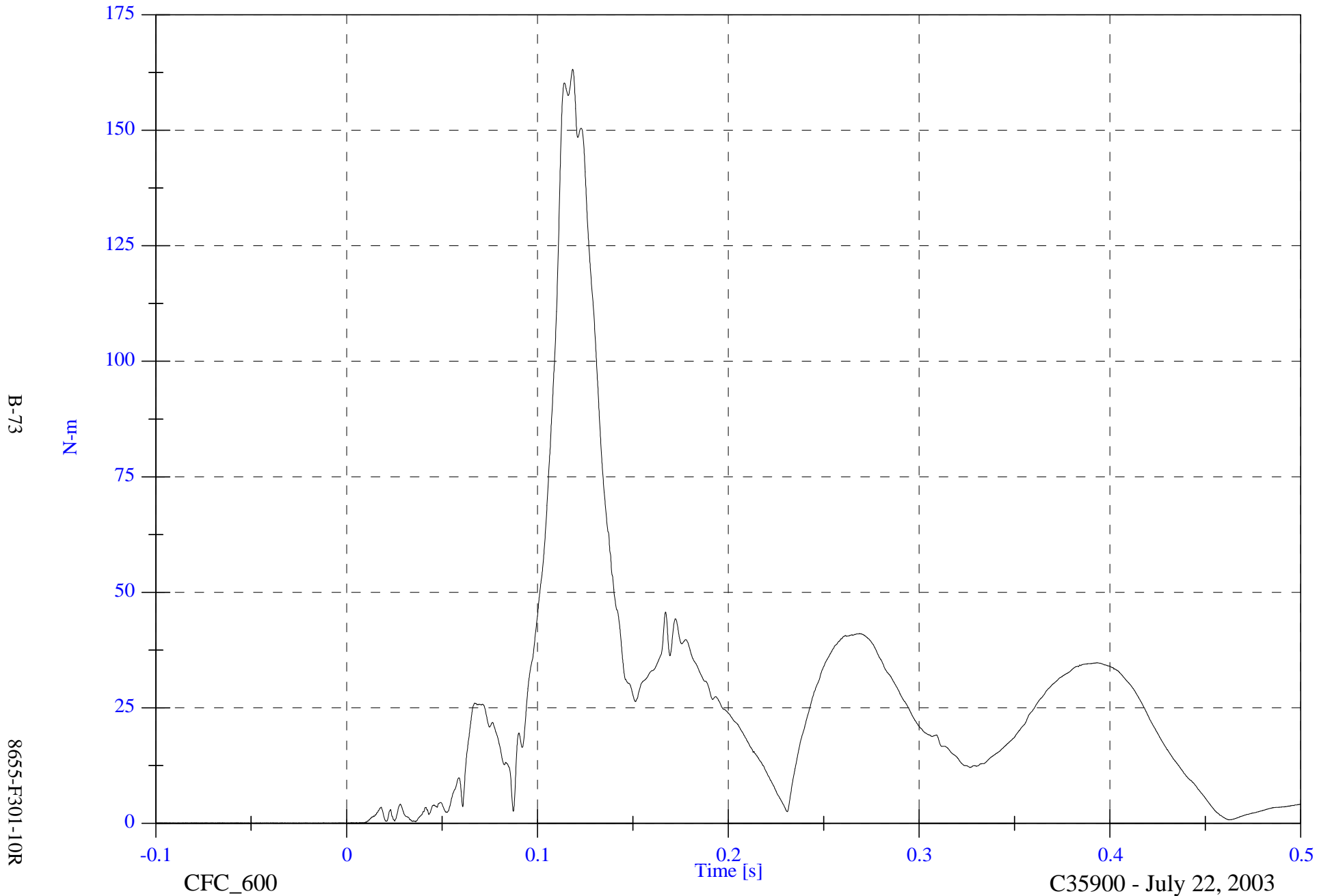
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Lower Neck M Resultant

Max: 163.2 [N-m] at 0.118 [s]

Min: 0.0 [N-m] at -0.054 [s]



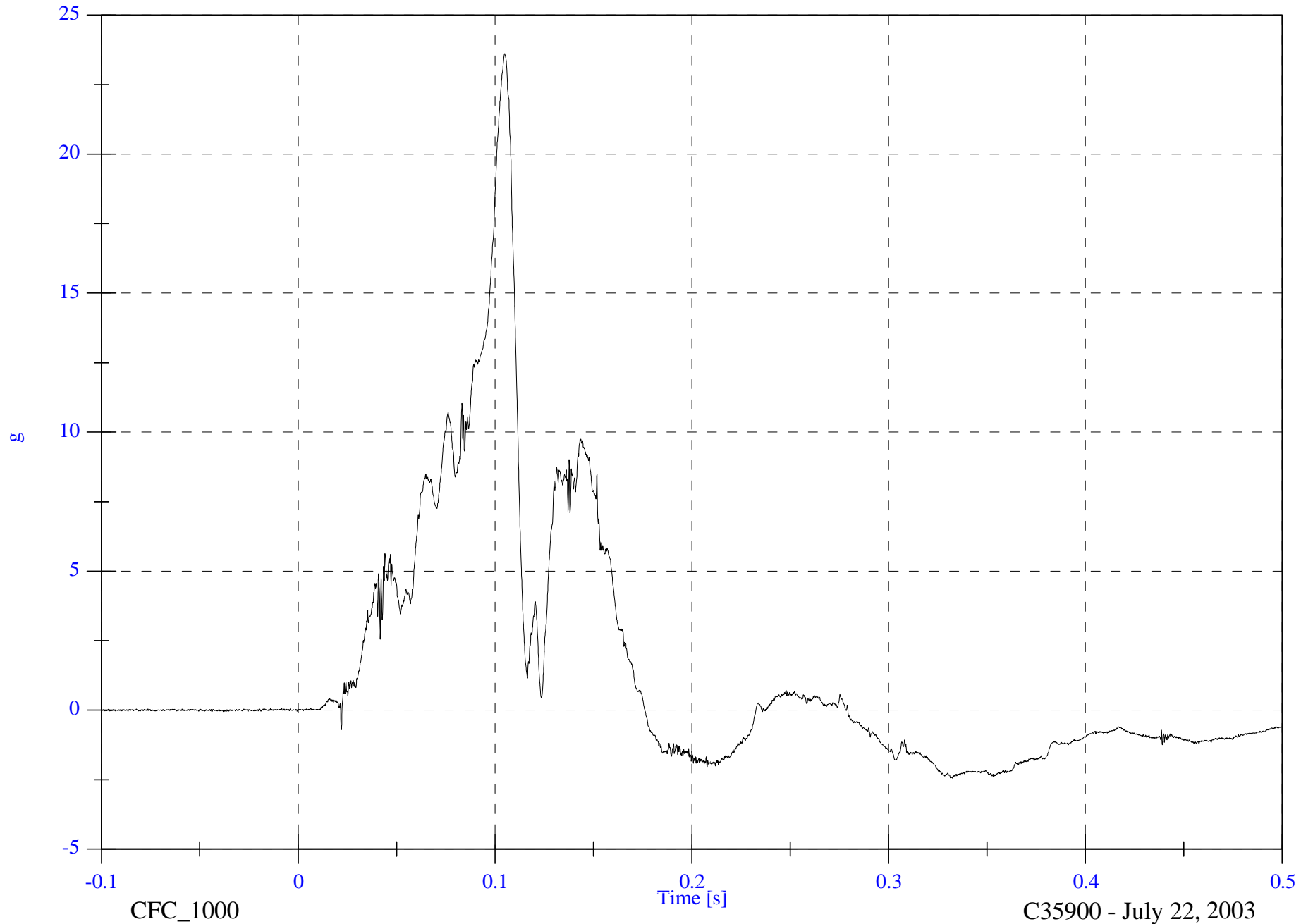
FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Lower Neck x

Max: 23.6 [g] at 0.105 [s]
Min: -2.4 [g] at 0.332 [s]

B-74

8655-F301-10R



CFC_1000

Time [s]

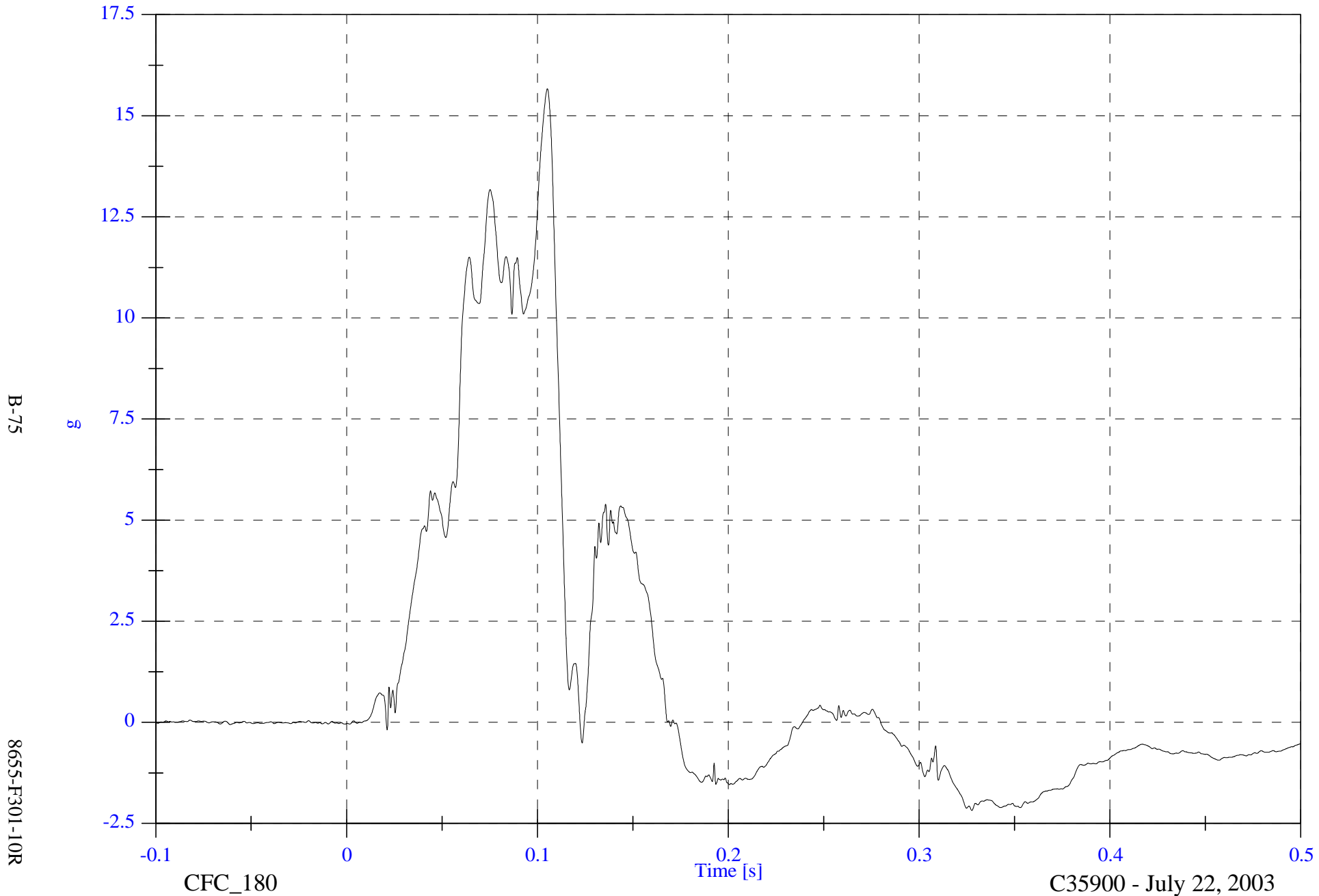
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Chest Ax

Max: 15.7 [g] at 0.105 [s]

Min: -2.2 [g] at 0.328 [s]



B-75

8655-F301-10R

CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Chest Ay

Max: 57.0 [g] at 0.192 [s]

Min: -124.0 [g] at 0.079 [s]



B-76

8655-F301-10R

CFC_180

Time [s]

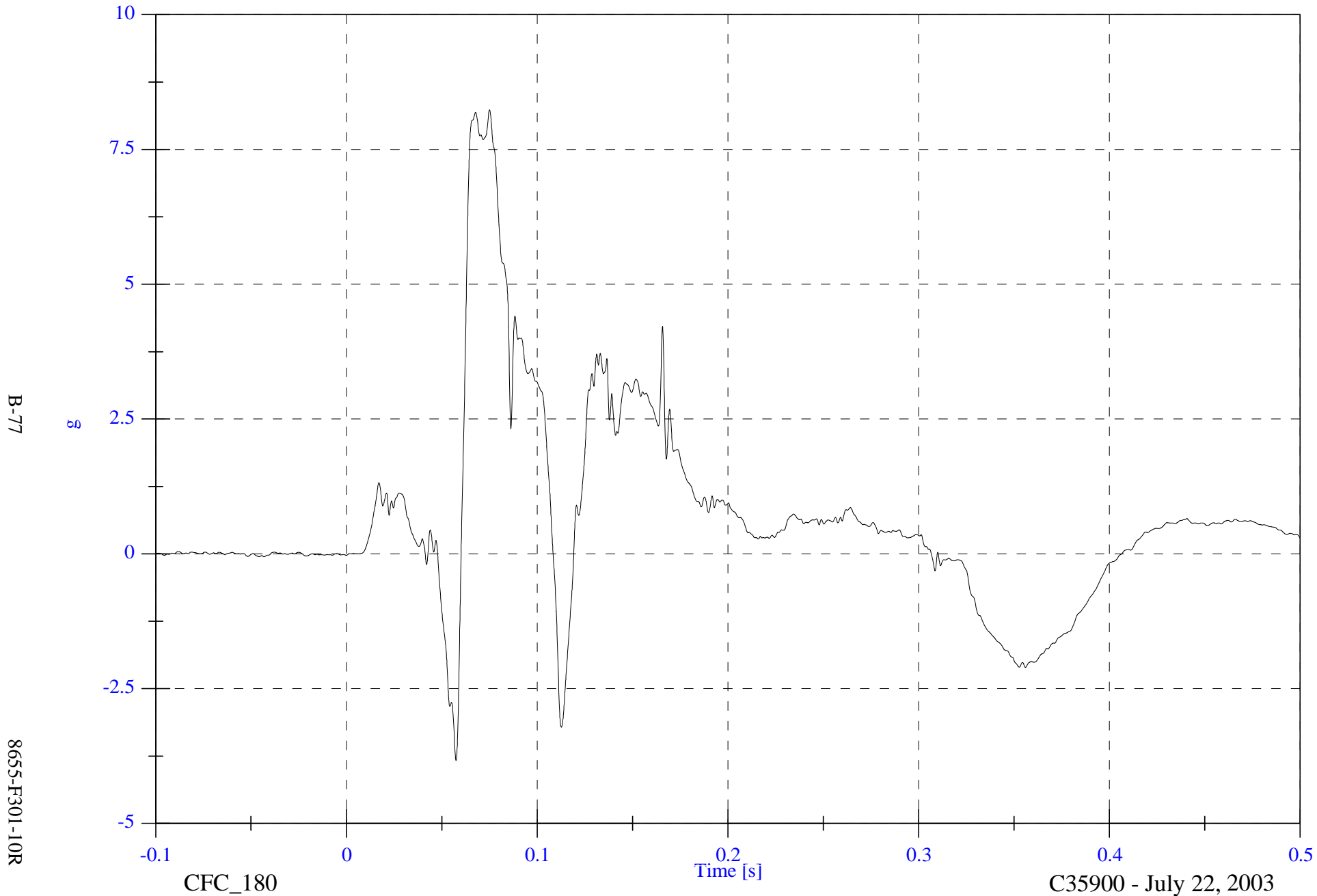
C35900 - July 22, 2003

Transducer cable failed

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Chest Az

Max: 8.2 [g] at 0.075 [s]
Min: -3.8 [g] at 0.057 [s]

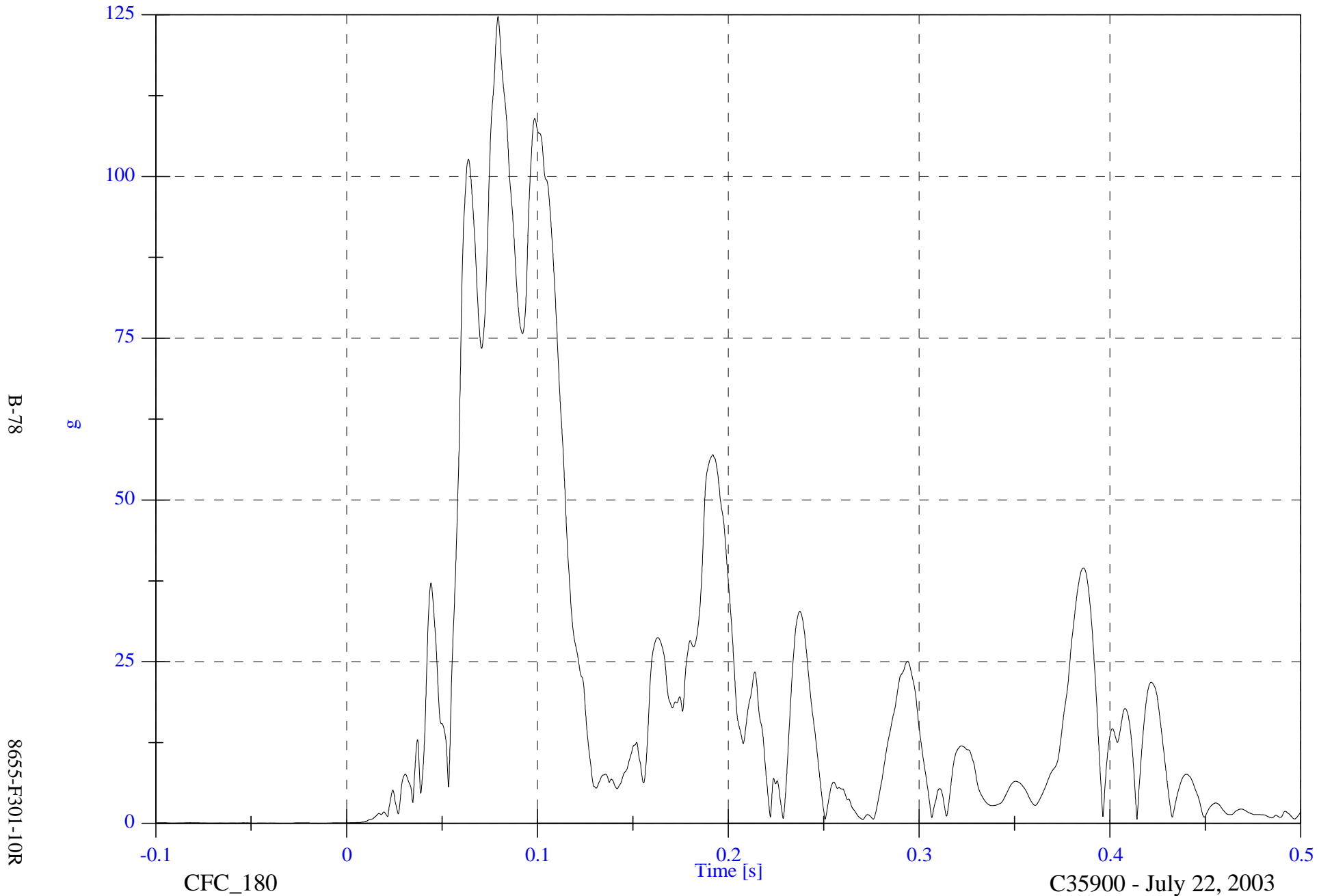


FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Chest A Resultant

Max: 124.7 [g] at 0.079 [s]

Min: 0.0 [g] at -0.062 [s]

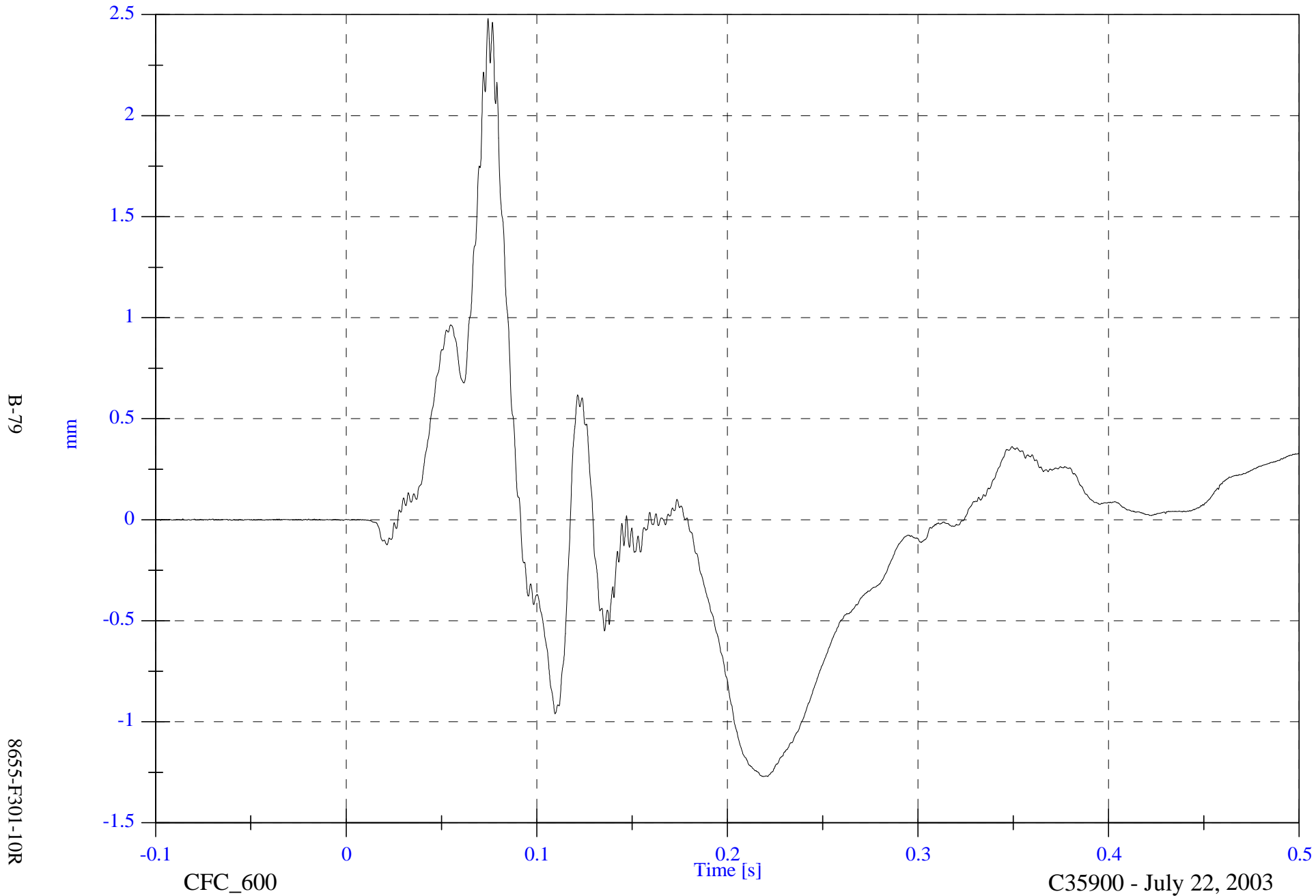


FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Chest Dx

Max: 2.5 [mm] at 0.074 [s]

Min: -1.3 [mm] at 0.219 [s]



B-79

8655-F301-10R

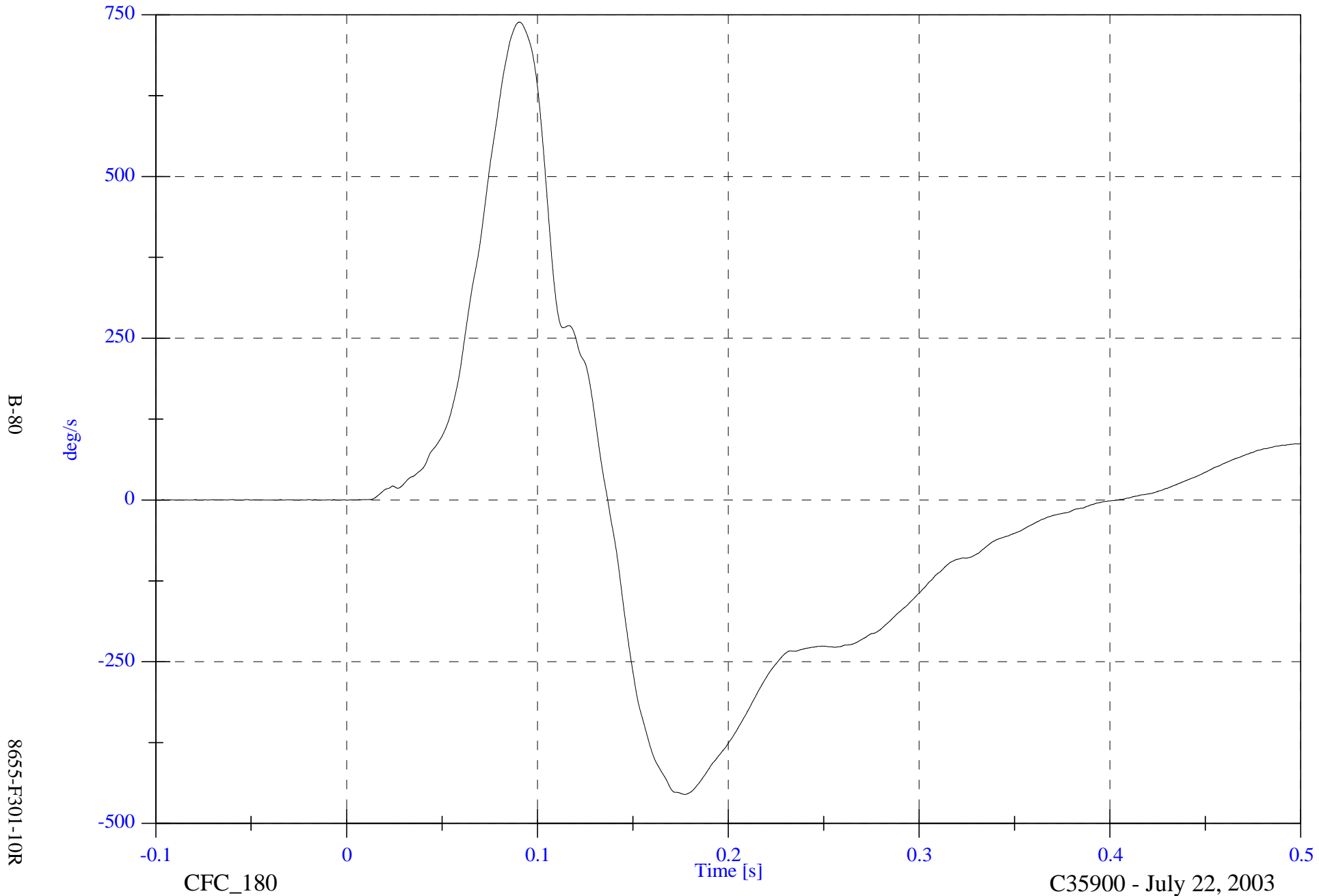
CFC_600

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Chest AVy

Max: 738.5 [deg/s] at 0.090 [s]
Min: -455.1 [deg/s] at 0.177 [s]



B-80

8655-F301-10R

CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

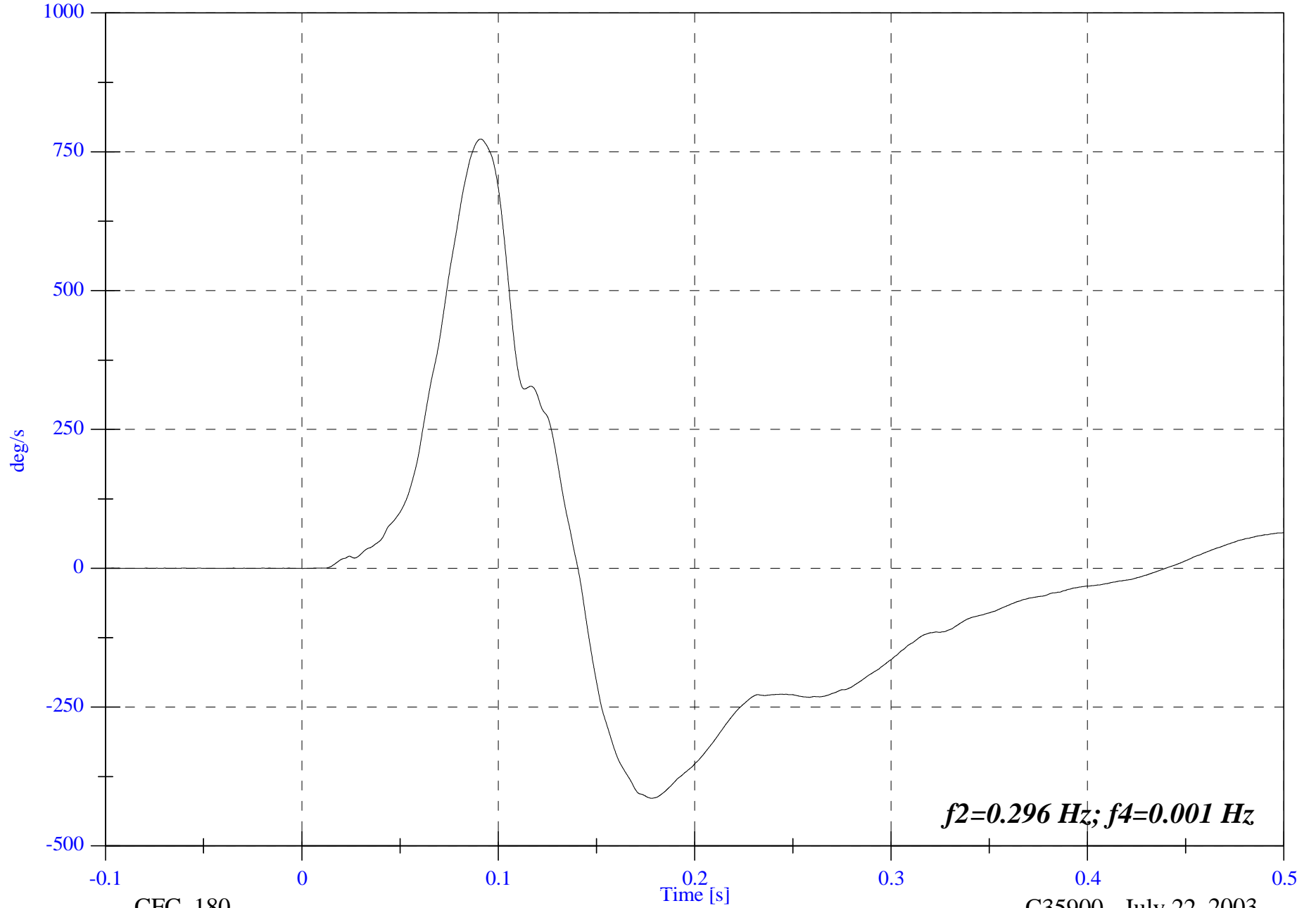
V2P2 Chest Comp AVy

Max: 772.9 [deg/s] at 0.091 [s]

Min: -414.2 [deg/s] at 0.178 [s]

B-81

8655-F301-10R



CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

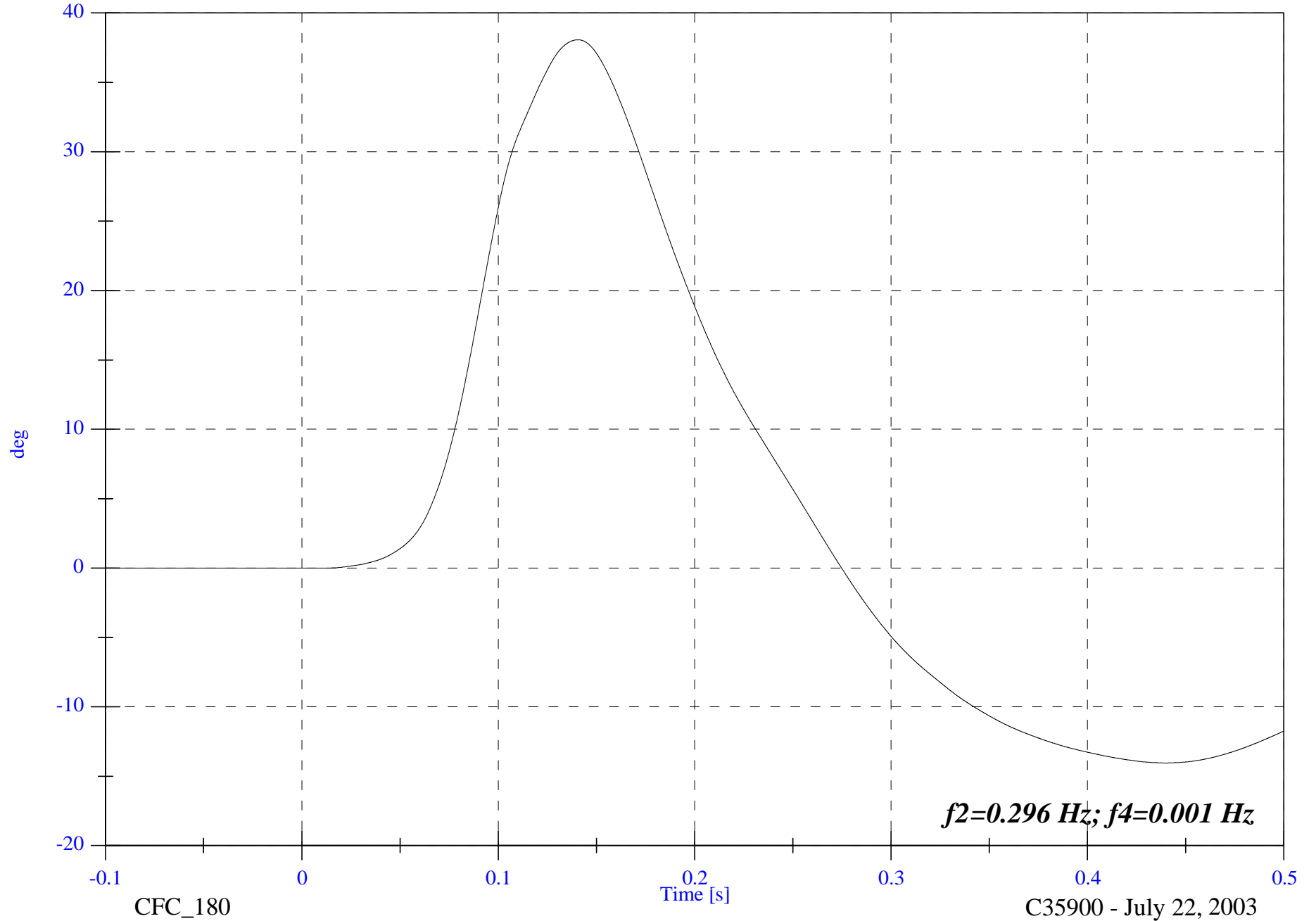
V2P2 Chest Comp ADy

Max: 38.1 [deg] at 0.141 [s]

Min: -14.0 [deg] at 0.440 [s]

B-82

8655-F301-10R



CFC_180

C35900 - July 22, 2003

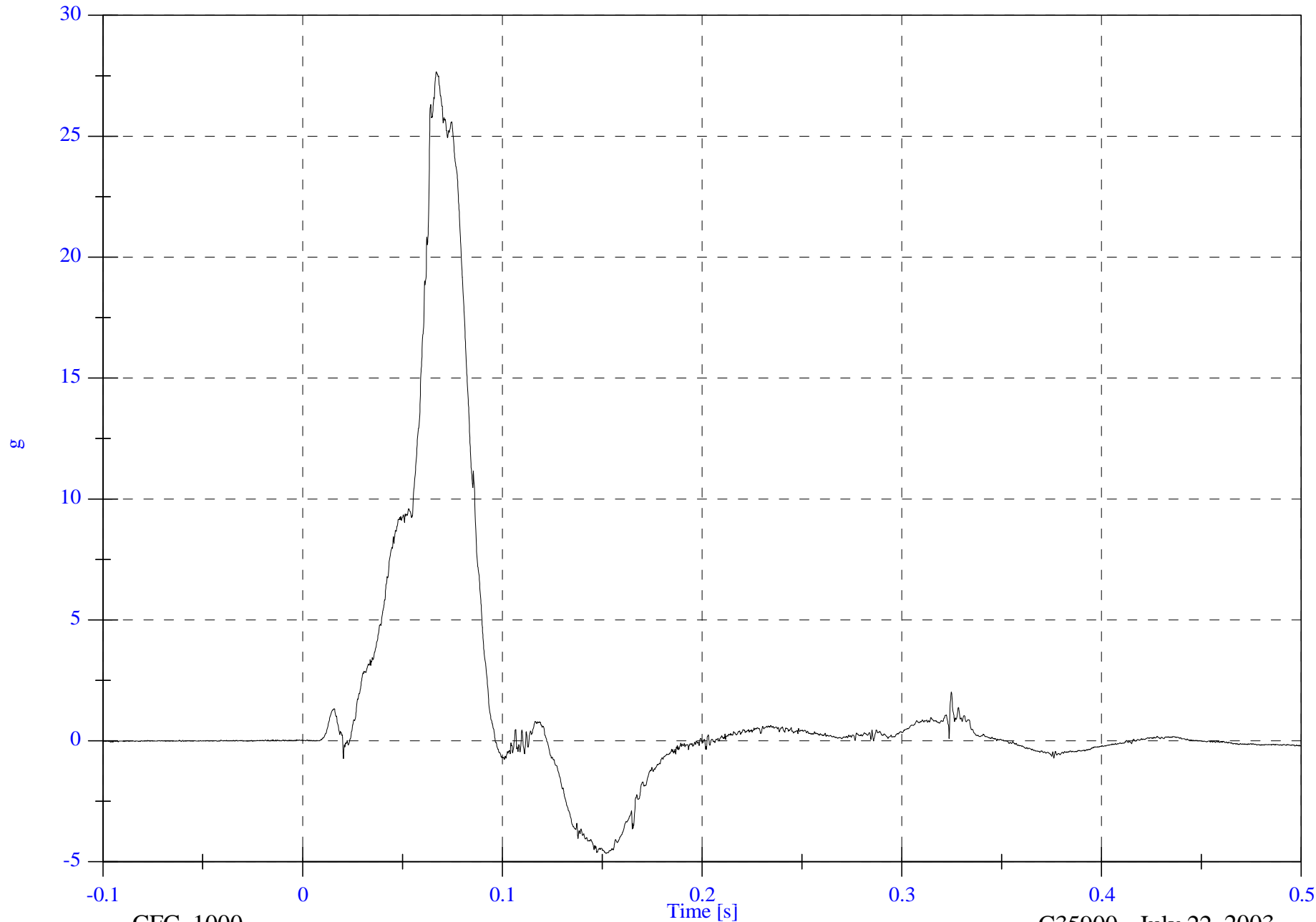
FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Pelvic Ax

Max: 27.7 [g] at 0.067 [s]
Min: -4.7 [g] at 0.152 [s]

B-83

8655-F301-10R



CFC_1000

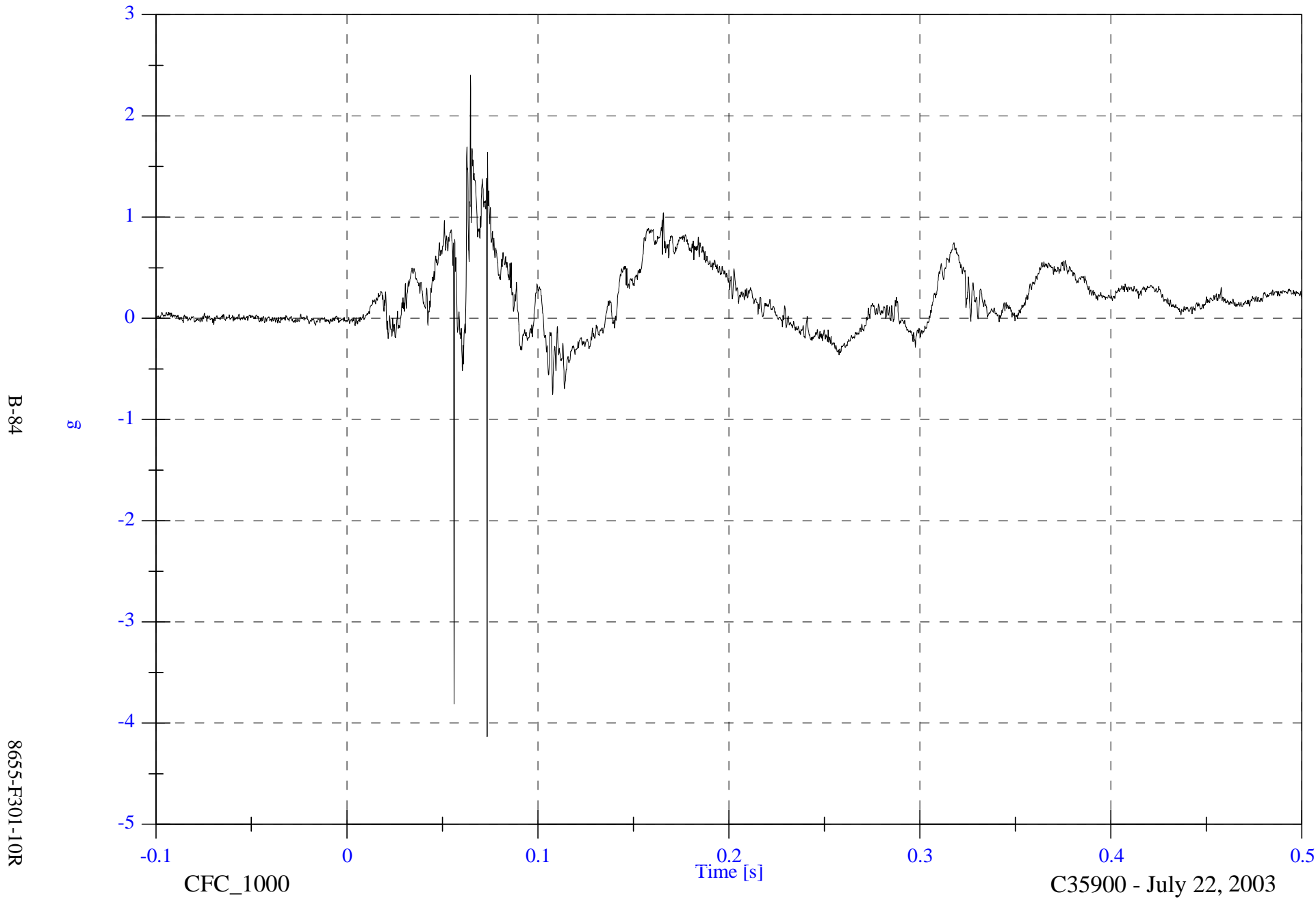
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Pelvic Ay

Max: 2.4 [g] at 0.065 [s]

Min: -4.1 [g] at 0.073 [s]



B-84

8655-F301-10R

CFC_1000

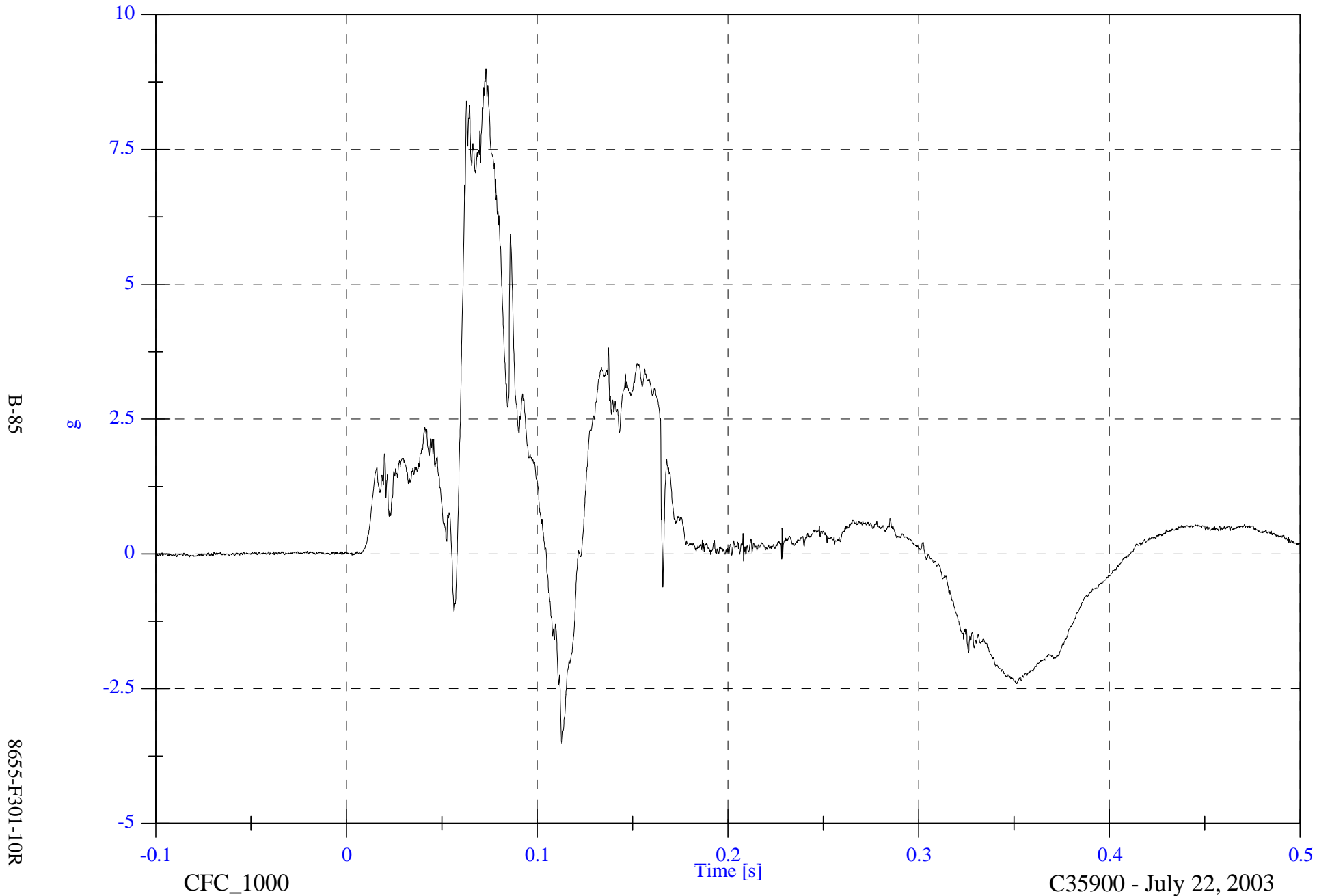
Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Pelvic Az

Max: 9.0 [g] at 0.073 [s]
Min: -3.5 [g] at 0.113 [s]



B-85

8655-F301-10R

CFC_1000

C35900 - July 22, 2003

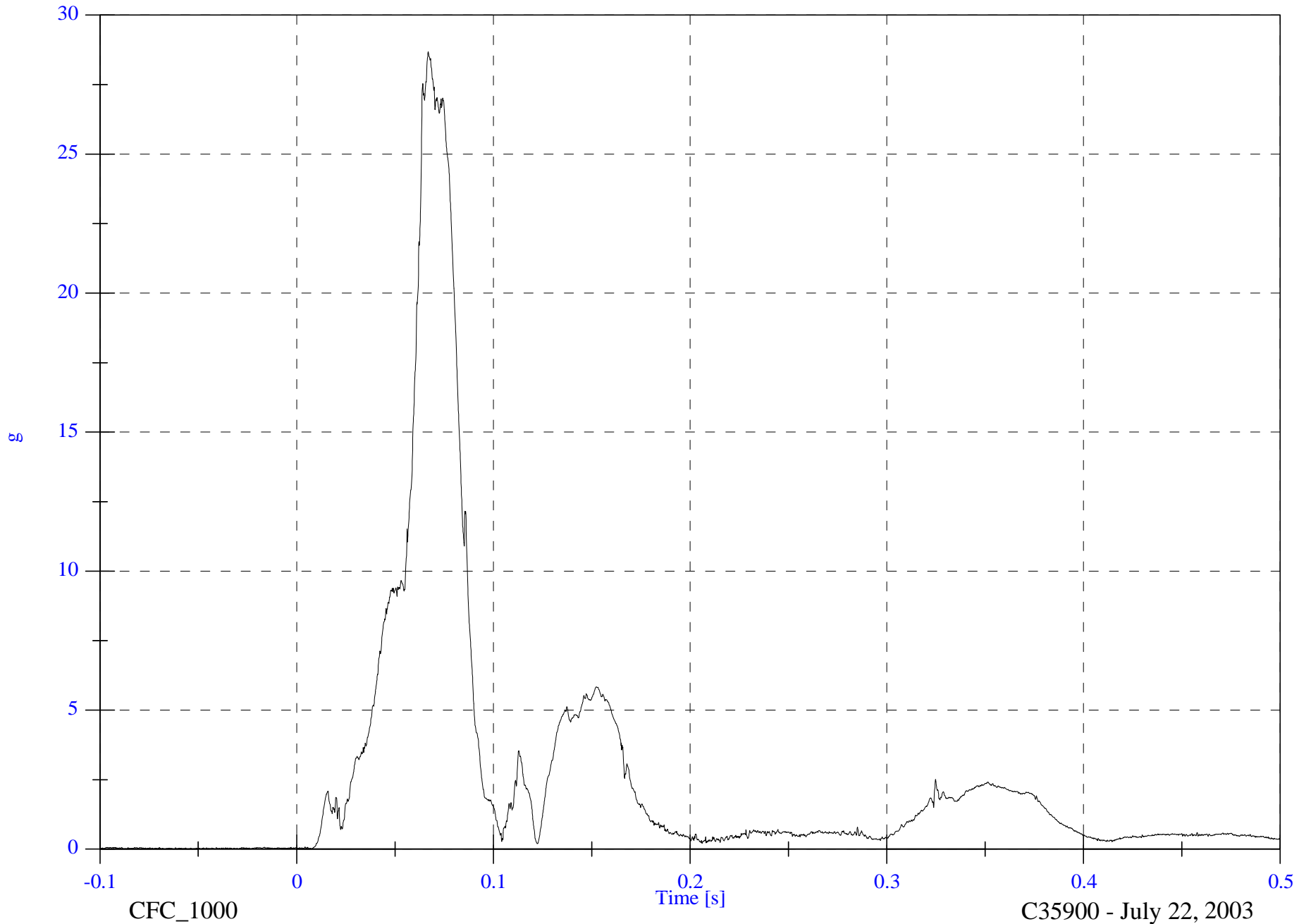
FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Pelvic A Resultant

Max: 28.7 [g] at 0.067 [s]
Min: 0.0 [g] at -0.039 [s]

B-86

8655-F301-10R



CFC_1000

Time [s]

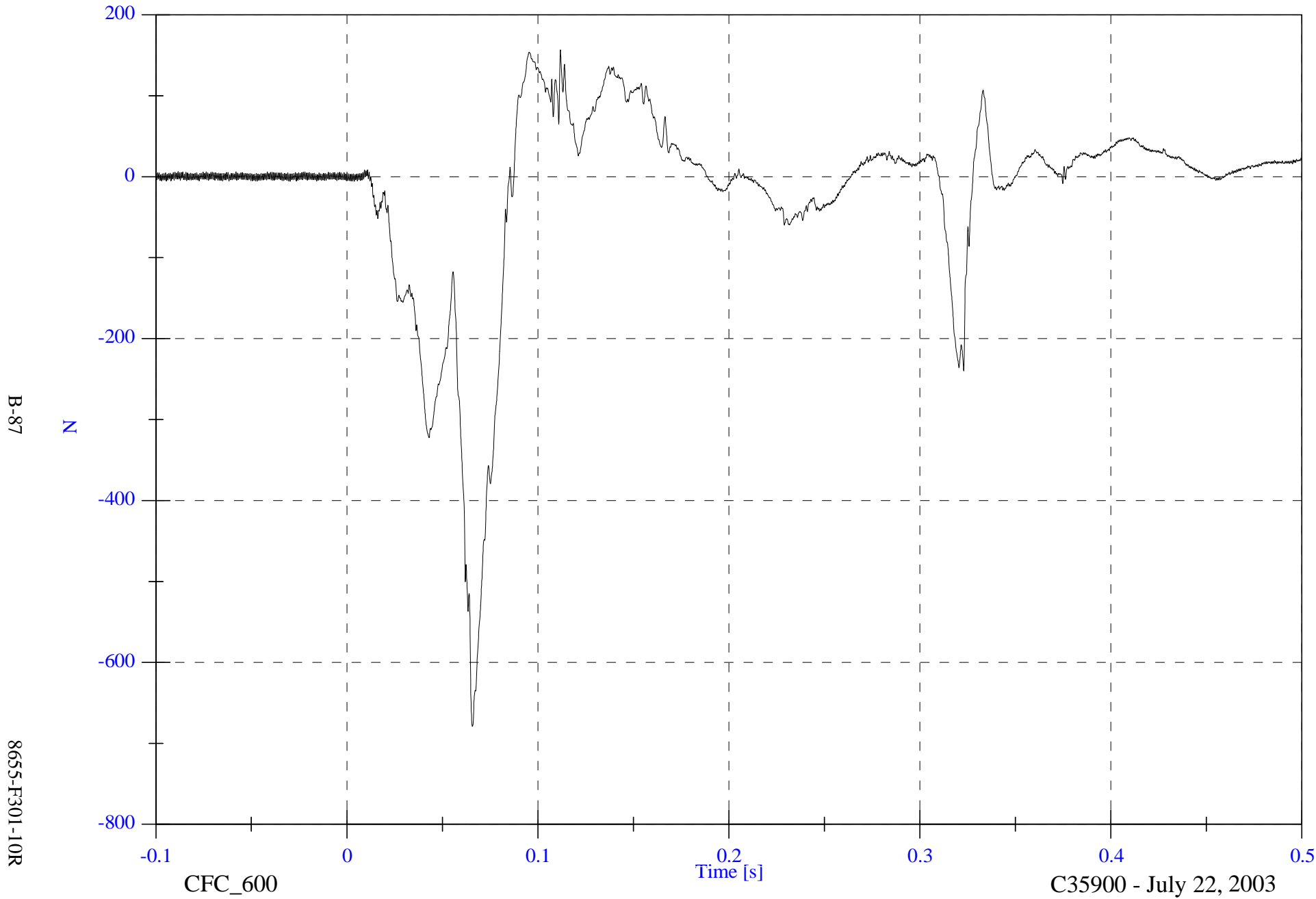
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Left Femur Fz

Max: 156.8 [N] at 0.112 [s]

Min: -678.9 [N] at 0.066 [s]



B-87

8655-F301-10R

CFC_600

Time [s]

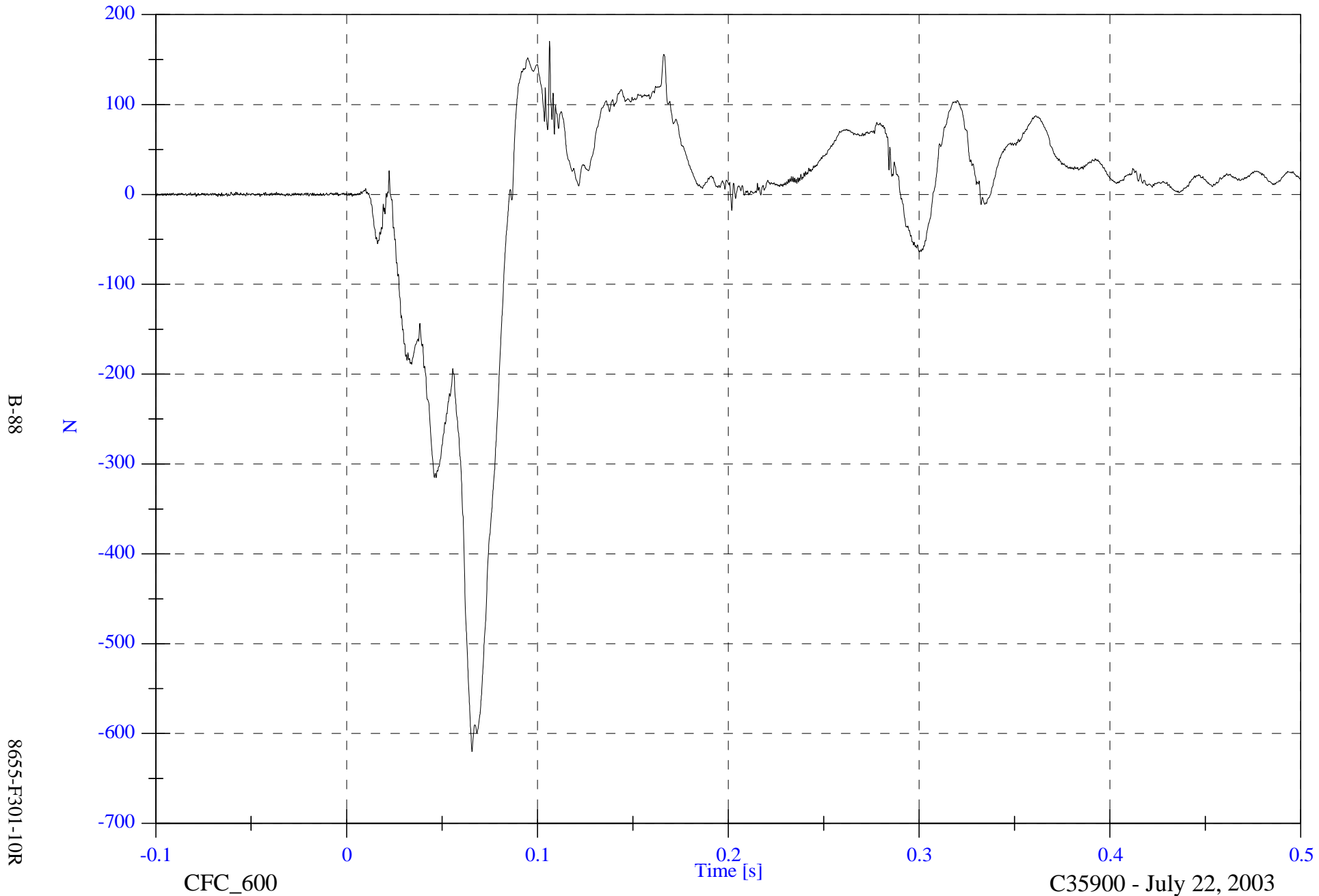
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Right Femur Fz

Max: 170.6 [N] at 0.106 [s]

Min: -620.1 [N] at 0.066 [s]



B-88

8655-F301-10R

CFC_600

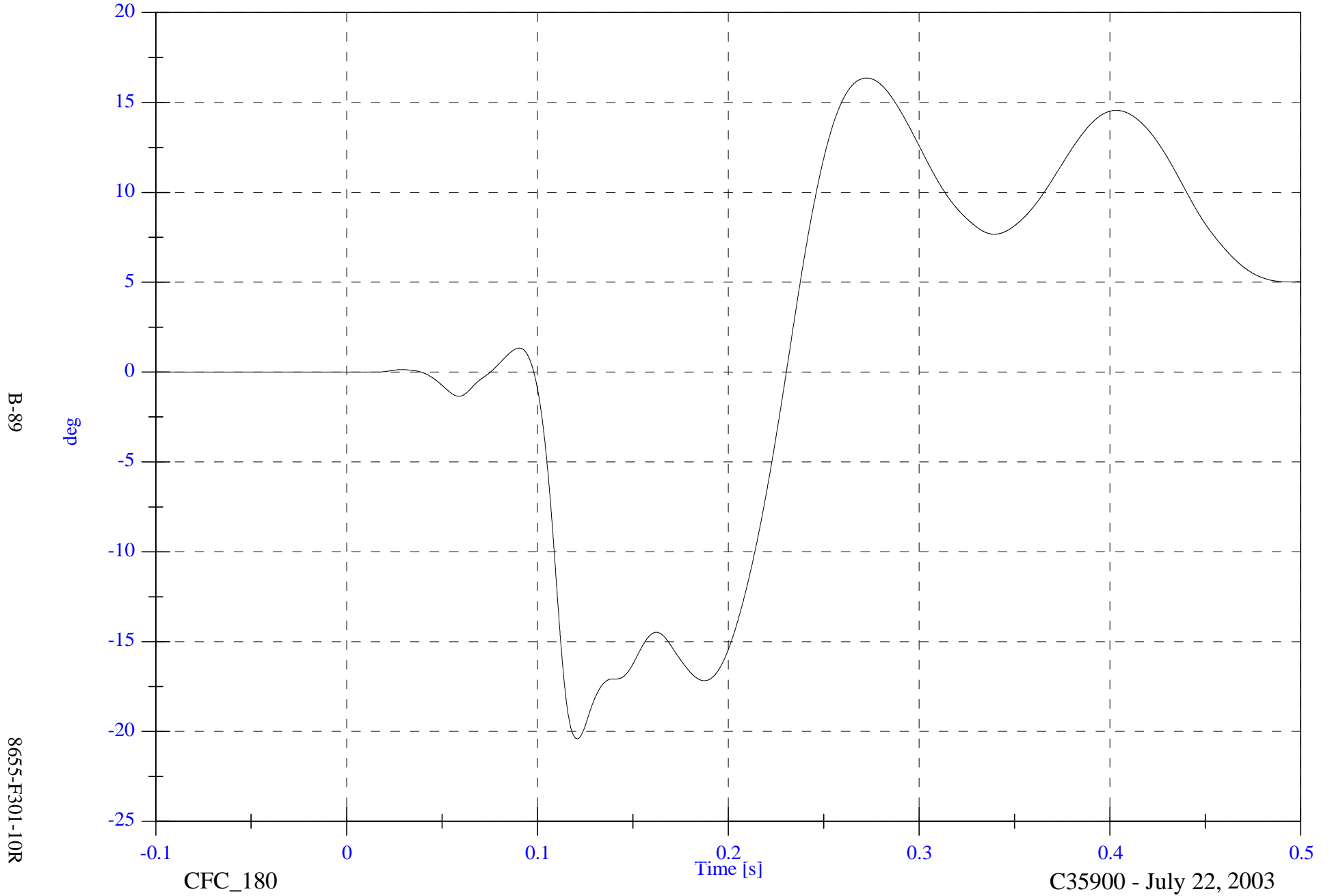
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Head to Chest Comp ADy

Max: 16.4 [deg] at 0.272 [s]

Min: -20.4 [deg] at 0.121 [s]



B-89

8655-F301-10R

CFC_180

Time [s]

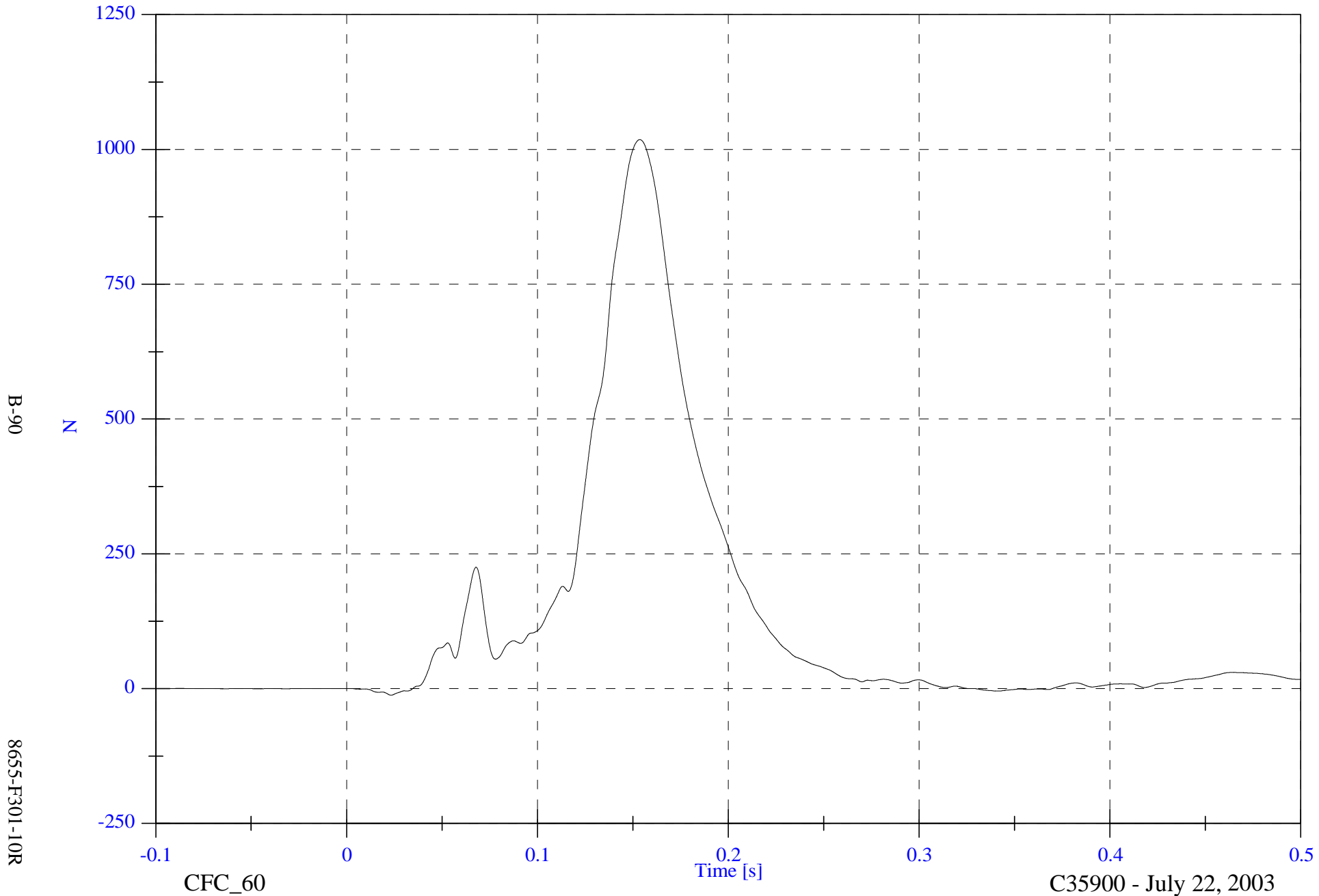
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2 RFP Lap Belt F

Max: 1018.4 [N] at 0.154 [s]

Min: -12.2 [N] at 0.023 [s]

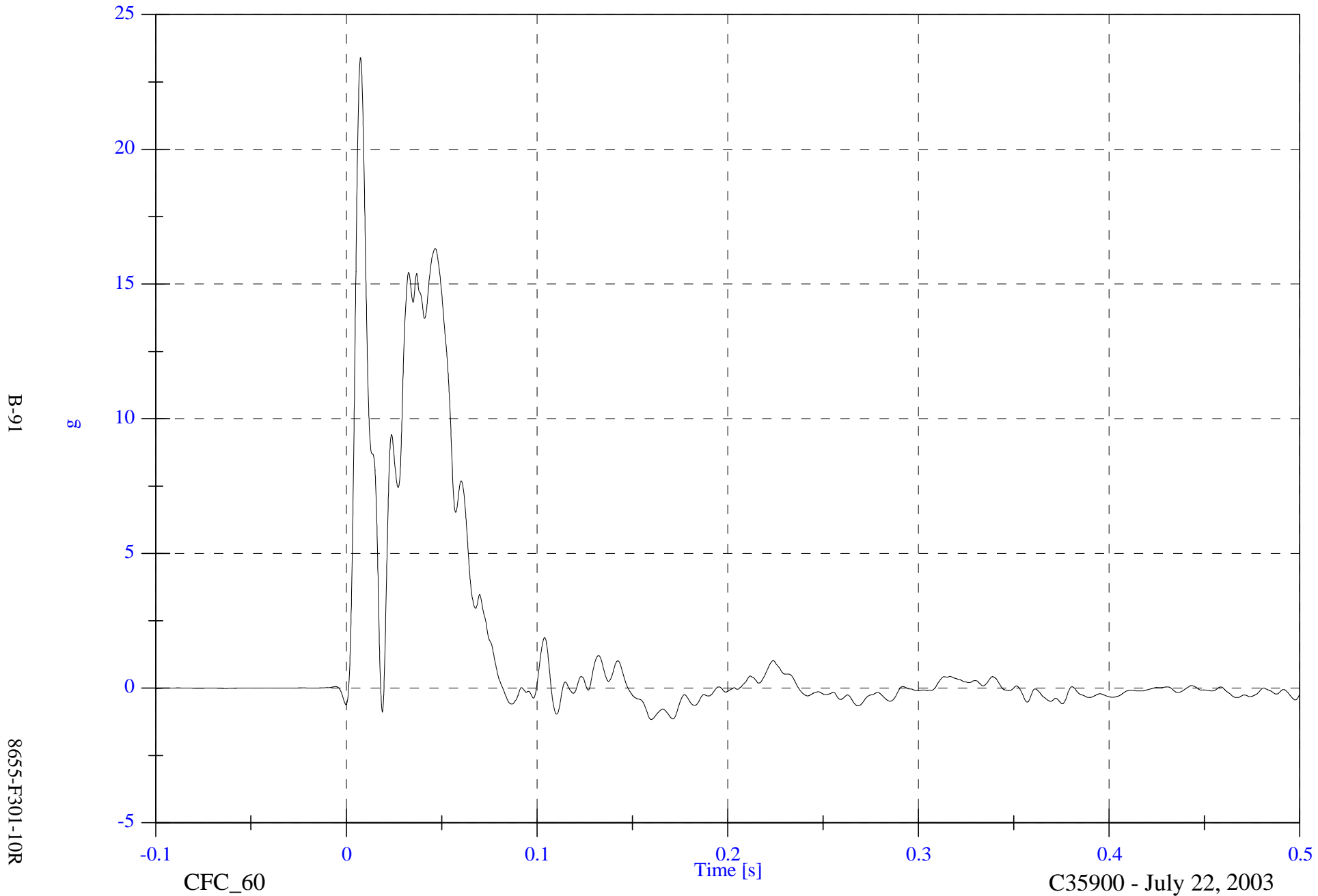


FMVSS 301 Test 1 - 2003 Volvo V70

V2 Left X Member Ax

Max: 23.4 [g] at 0.007 [s]

Min: -1.2 [g] at 0.160 [s]



B-91

8655-F301-10R

CFC_60

Time [s]

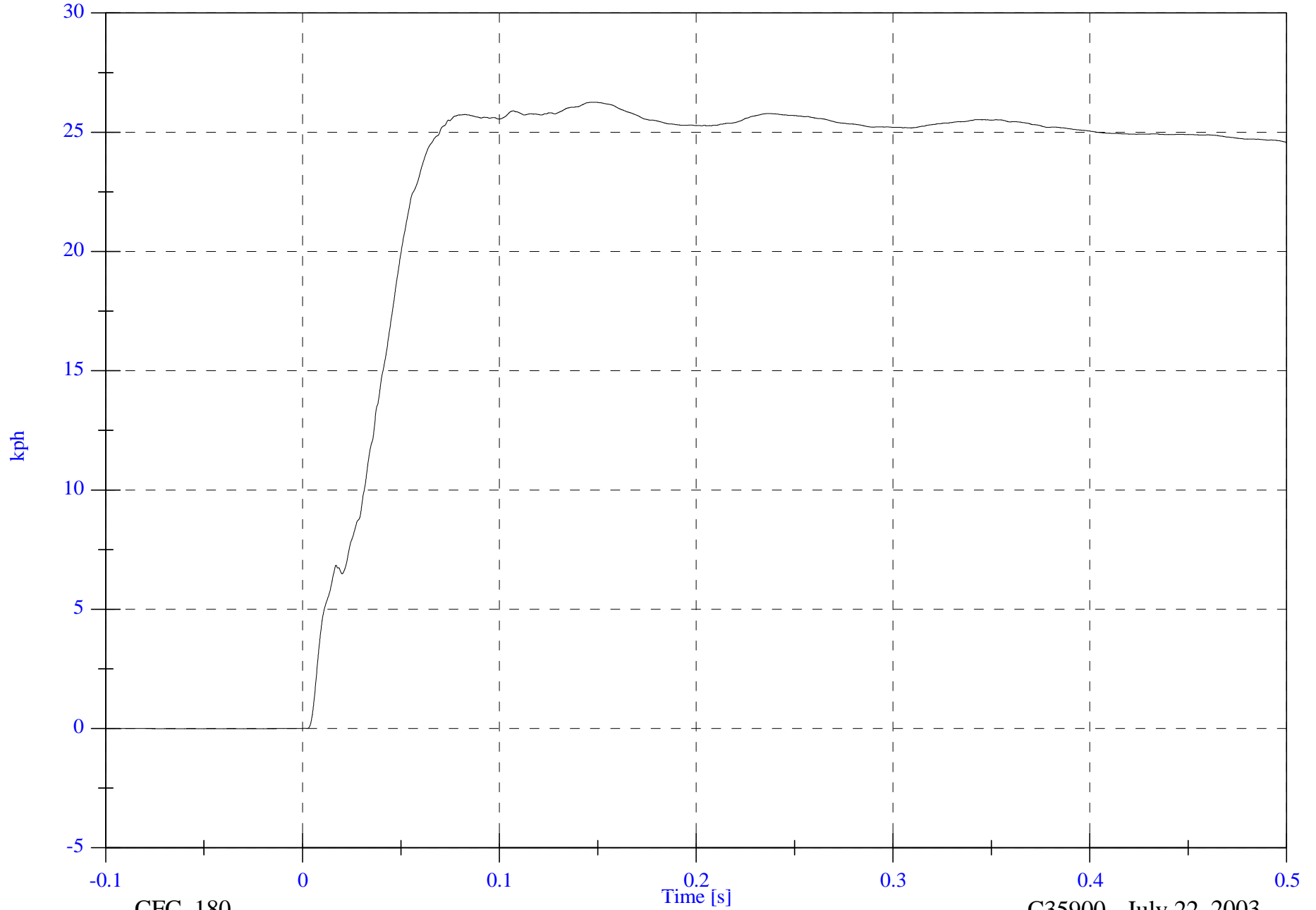
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2 Left X Member Ax Velocity

Max: 26.3 [kph] at 0.147 [s]

Min: -0.0 [kph] at -0.048 [s]



B-92

8655-F301-10R

CFC_180

Time [s]

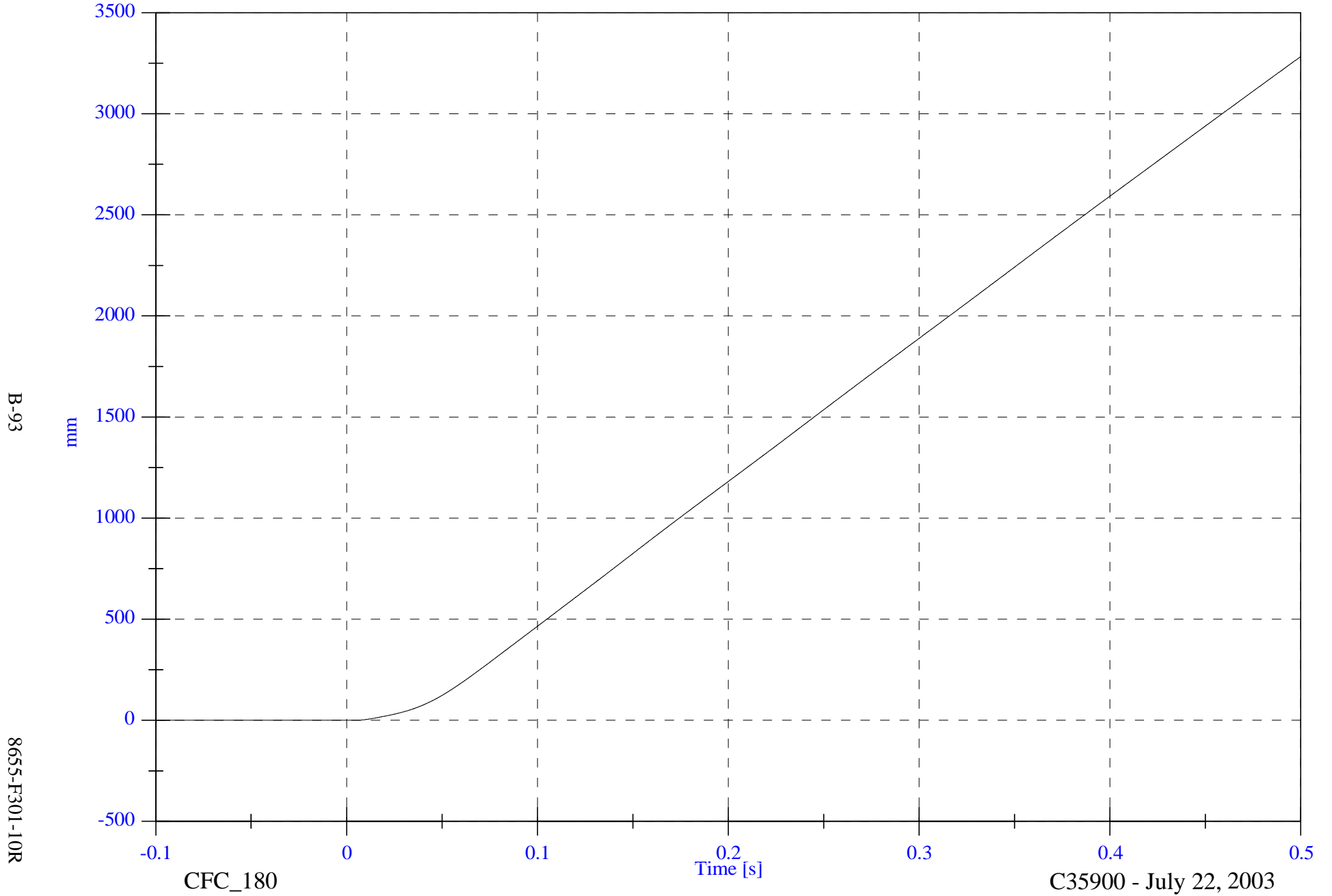
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2 Left X Member Ax Displacement

Max: 3282.1 [mm] at 0.500 [s]

Min: -0.0 [mm] at -0.010 [s]



B-93

8655-F301-10R

CFC_180

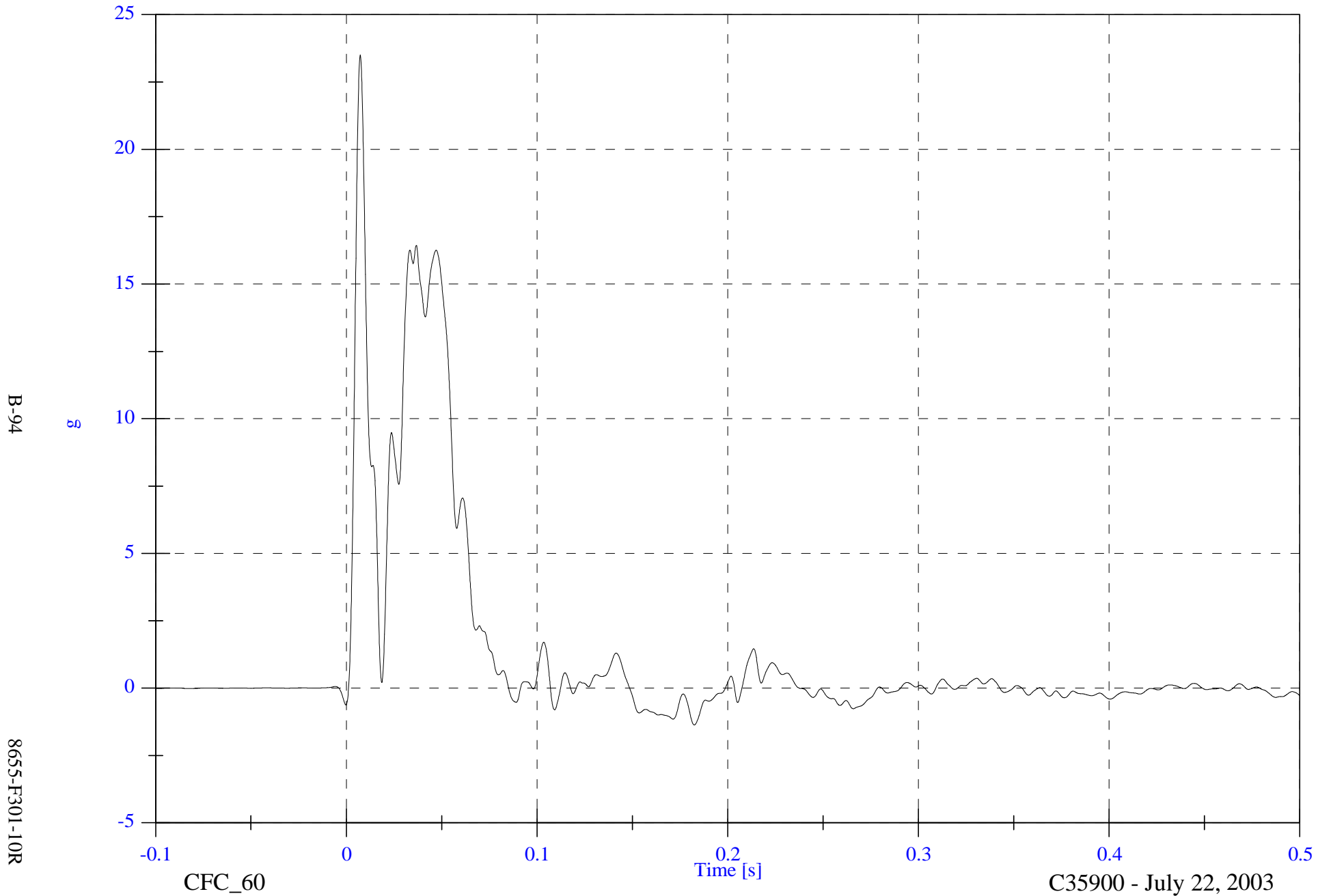
Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2 Left X Member Red Ax

Max: 23.5 [g] at 0.007 [s]
Min: -1.4 [g] at 0.182 [s]



B-94

8655-F301-10R

CFC_60

Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

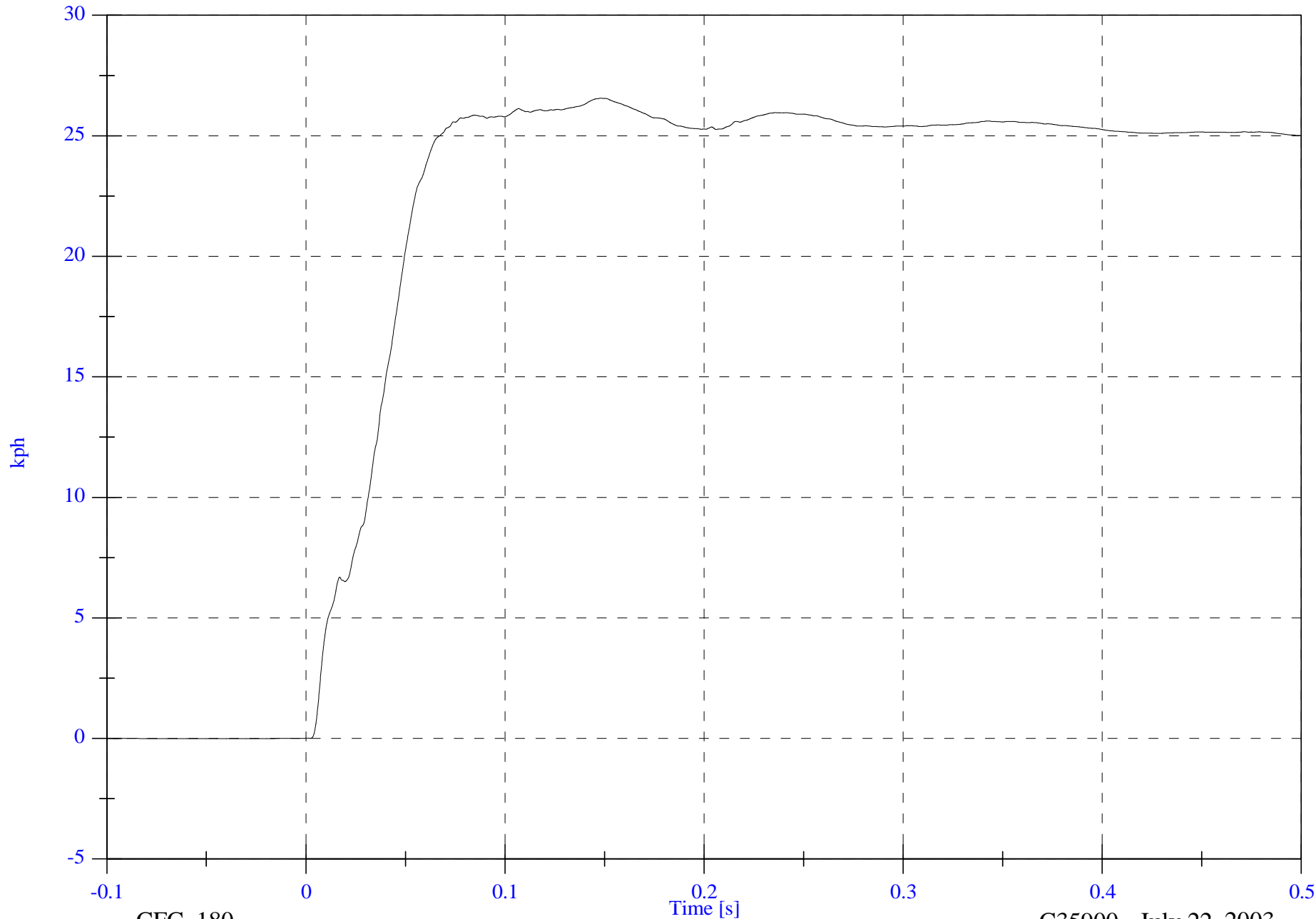
V2 Left X Member Red Ax Velocity

Max: 26.6 [kph] at 0.148 [s]

Min: -0.0 [kph] at -0.048 [s]

B-95

8655-F301-10R



CFC_180

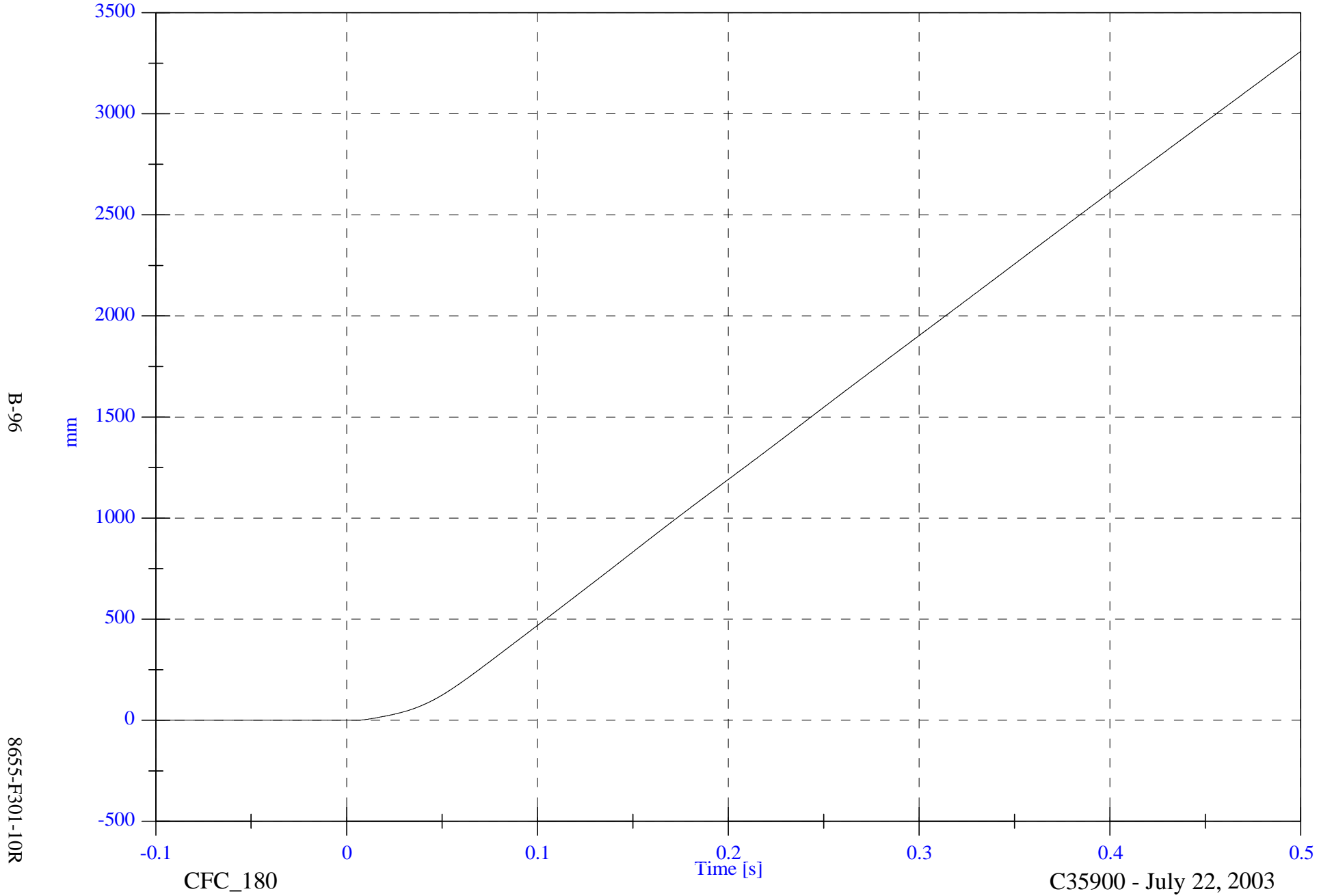
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2 Left X Member Red Ax Displacement

Max: 3307.9 [mm] at 0.500 [s]

Min: -0.0 [mm] at -0.010 [s]



B-96

8655-F301-10R

CFC_180

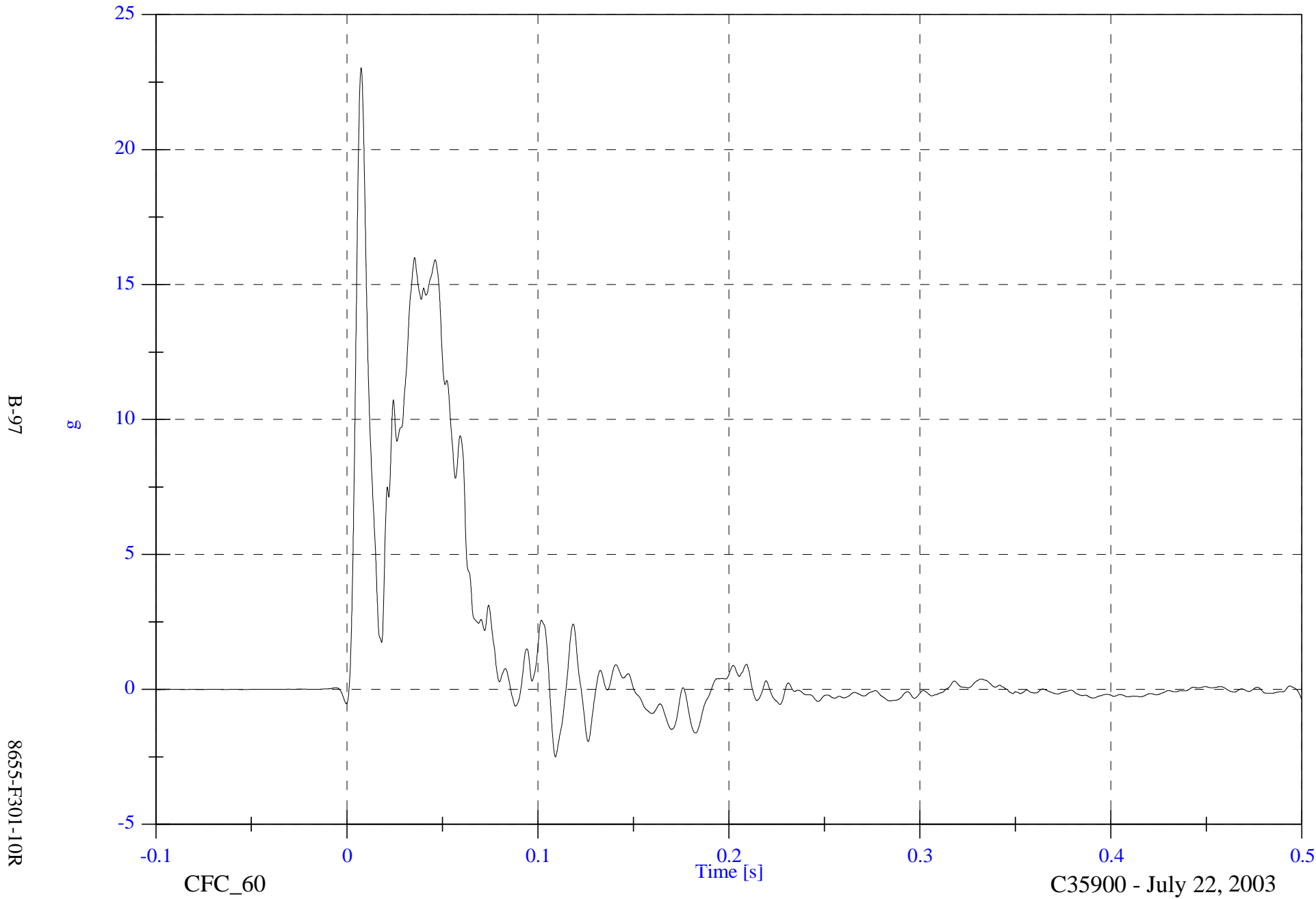
Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2 Right X Member Ax

Max: 23.0 [g] at 0.007 [s]
Min: -2.5 [g] at 0.109 [s]



B-97

8655-F301-10R

CFC_60

Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

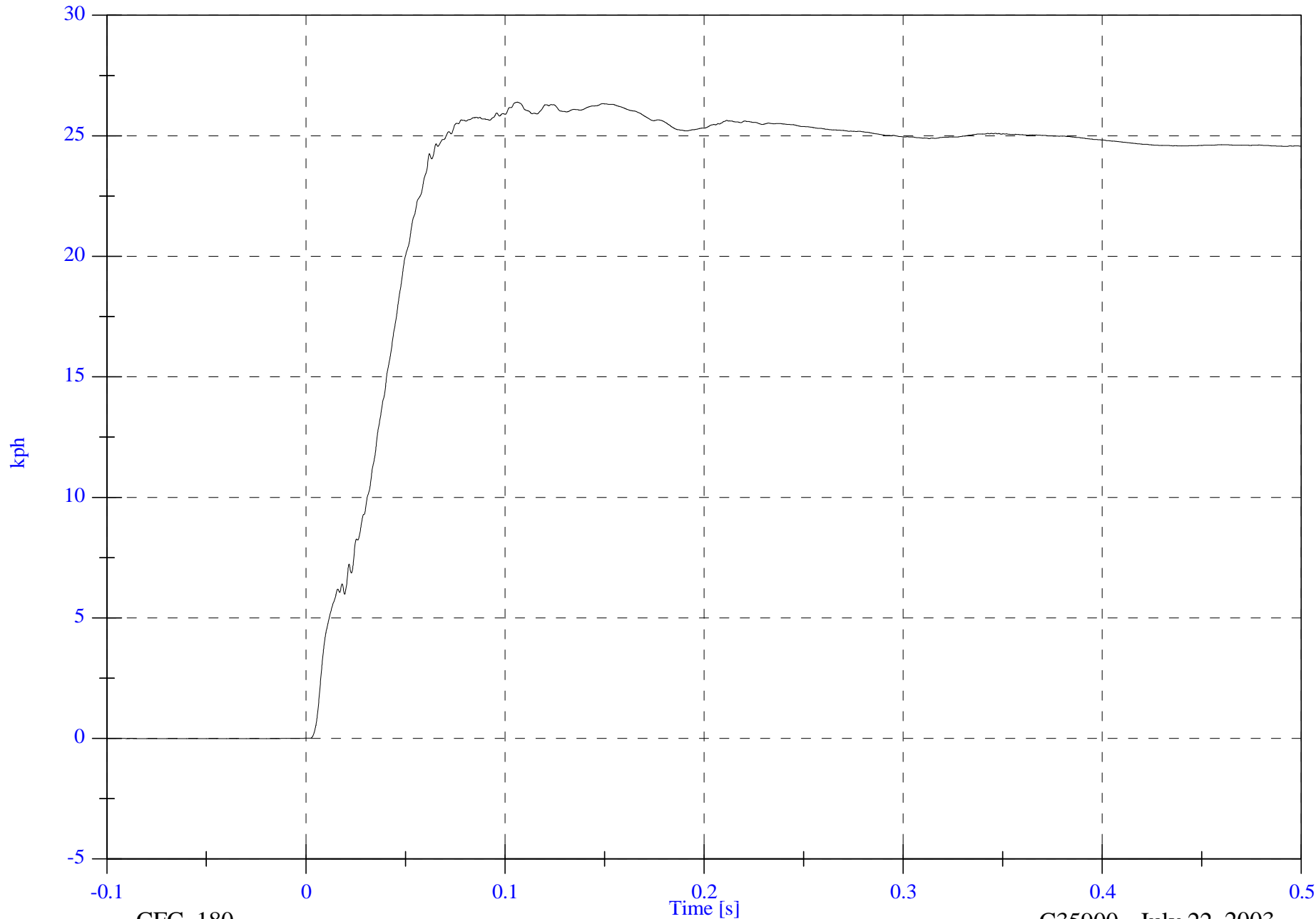
V2 Right X Member Ax Velocity

Max: 26.4 [kph] at 0.106 [s]

Min: -0.0 [kph] at -0.049 [s]

B-98

8655-F301-10R



CFC_180

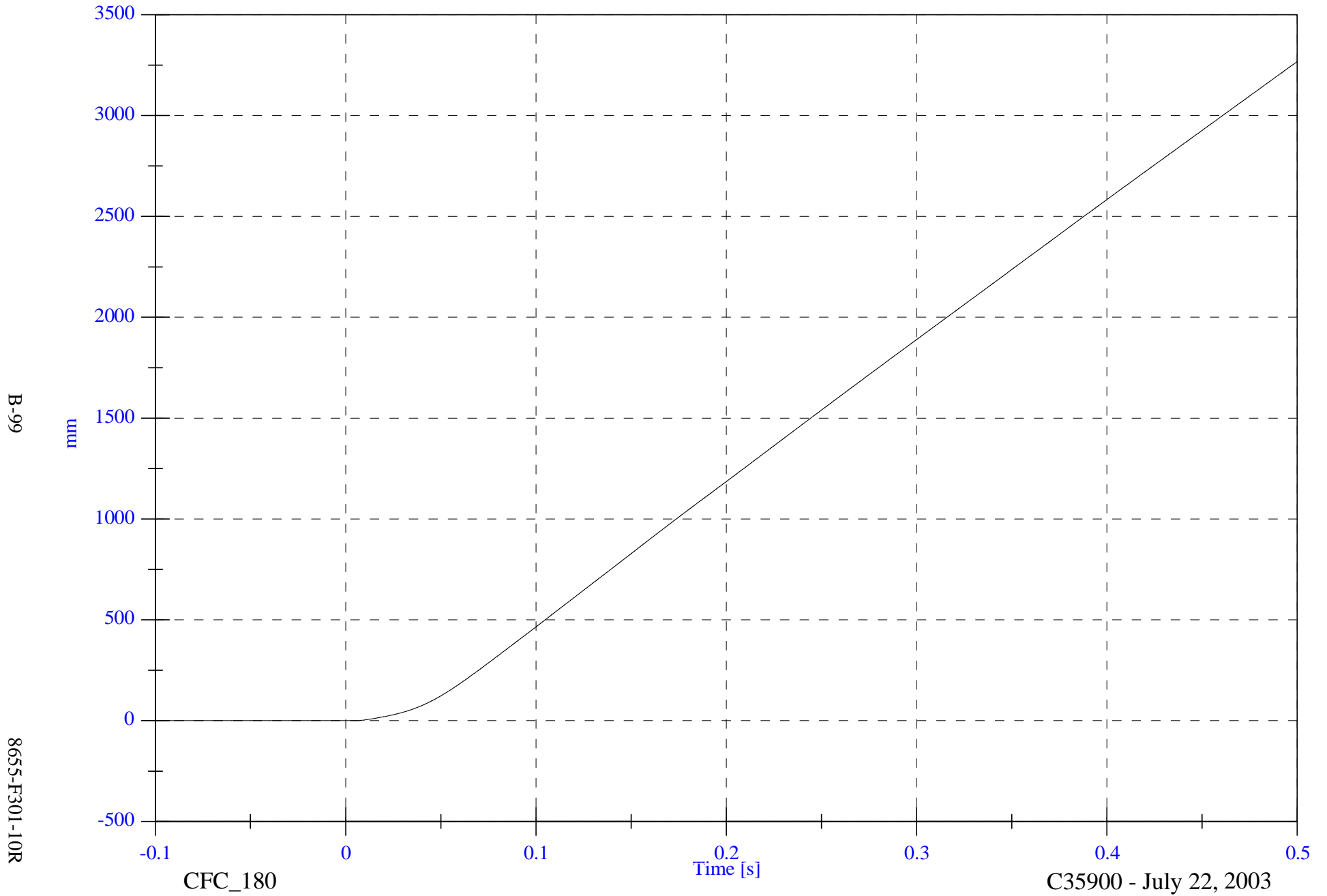
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2 Right X Member Ax Displacement

Max: 3266.8 [mm] at 0.500 [s]

Min: -0.0 [mm] at -0.010 [s]



B-99

8655-F301-10R

CFC_180

Time [s]

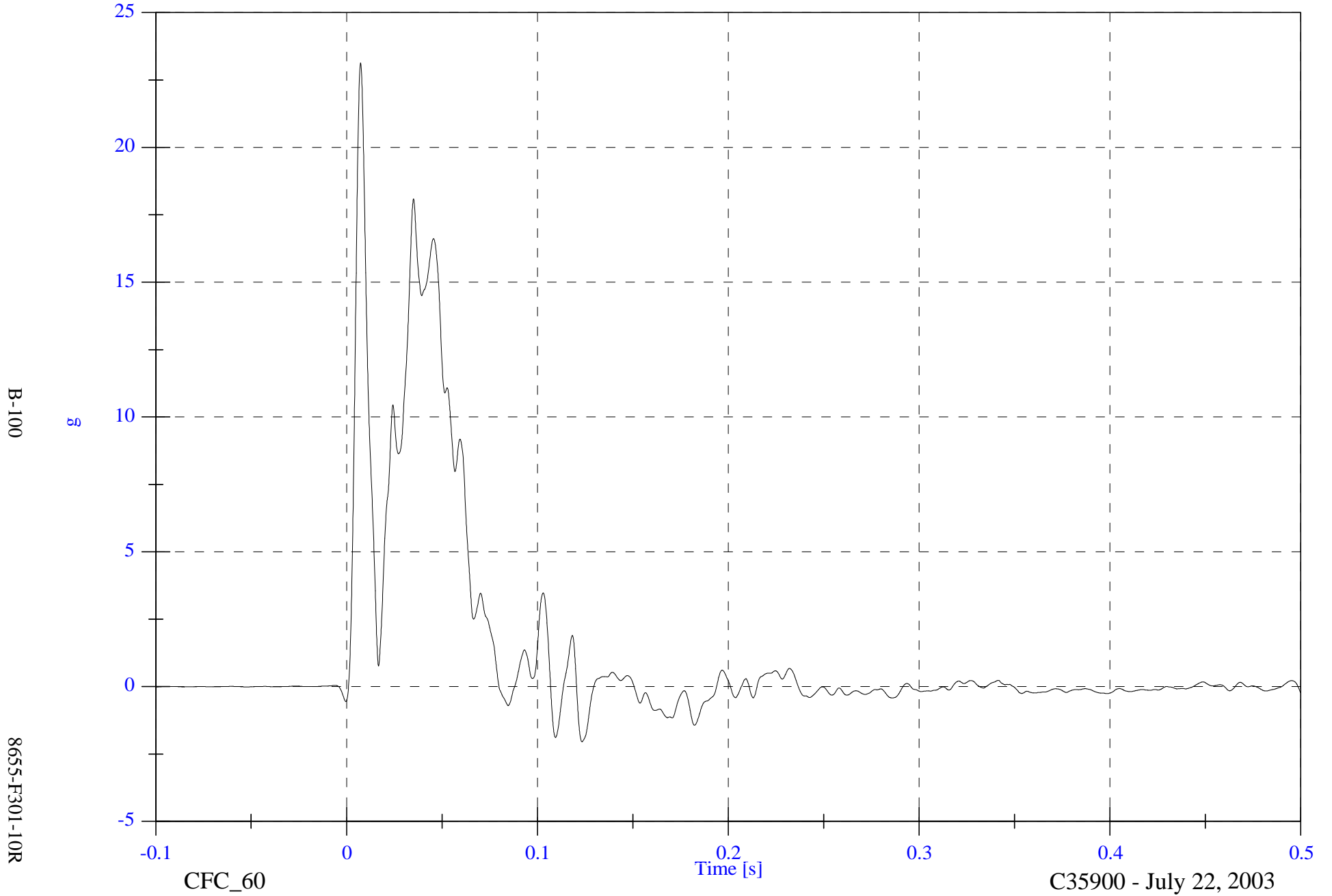
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2 Right X Member Red Ax

Max: 23.1 [g] at 0.007 [s]

Min: -2.0 [g] at 0.123 [s]



FMVSS 301 Test 1 - 2003 Volvo V70

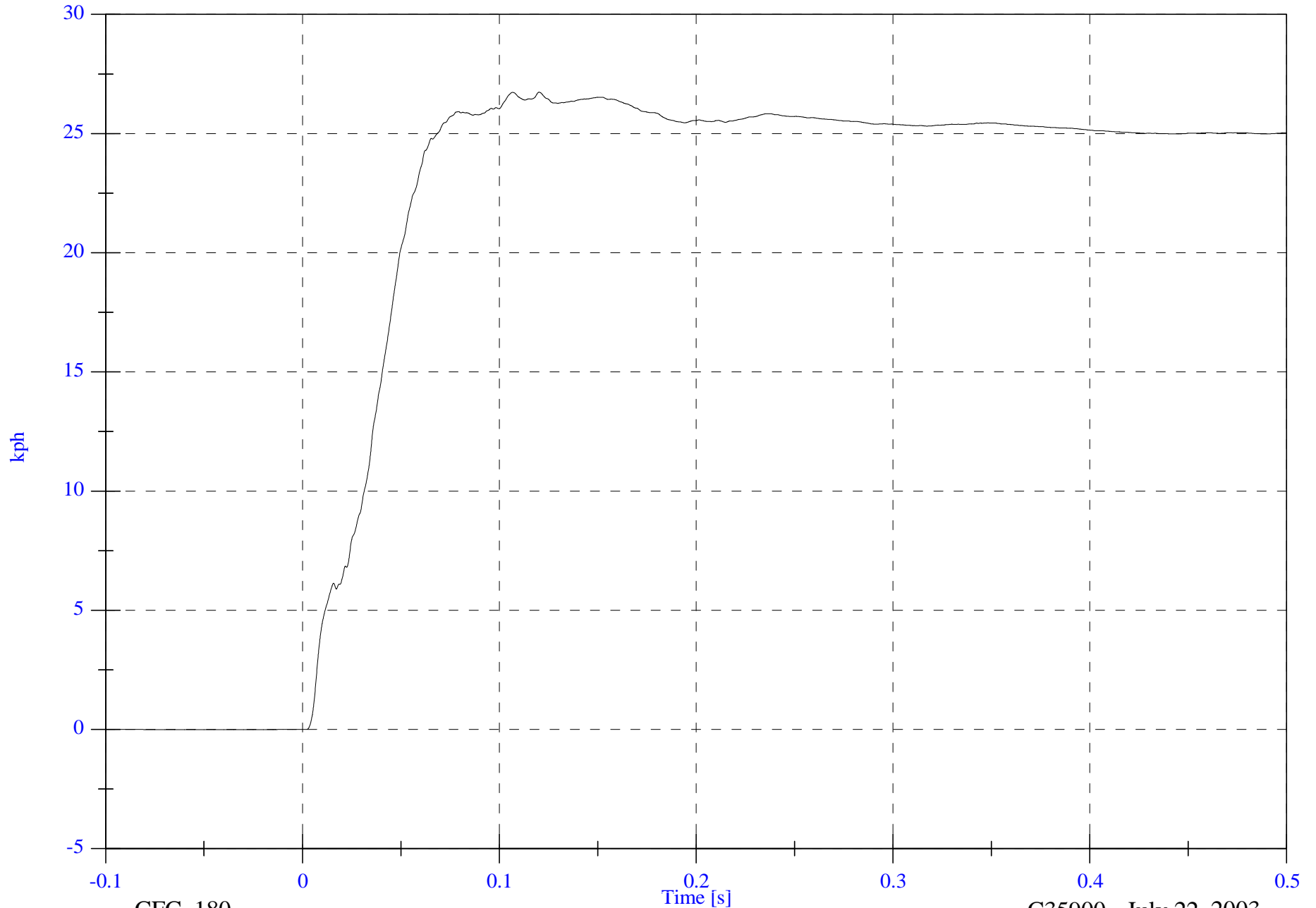
V2 Right X Member Red Ax Velocity

Max: 26.7 [kph] at 0.120 [s]

Min: -0.0 [kph] at -0.033 [s]

B-101

8655-F301-10R



CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

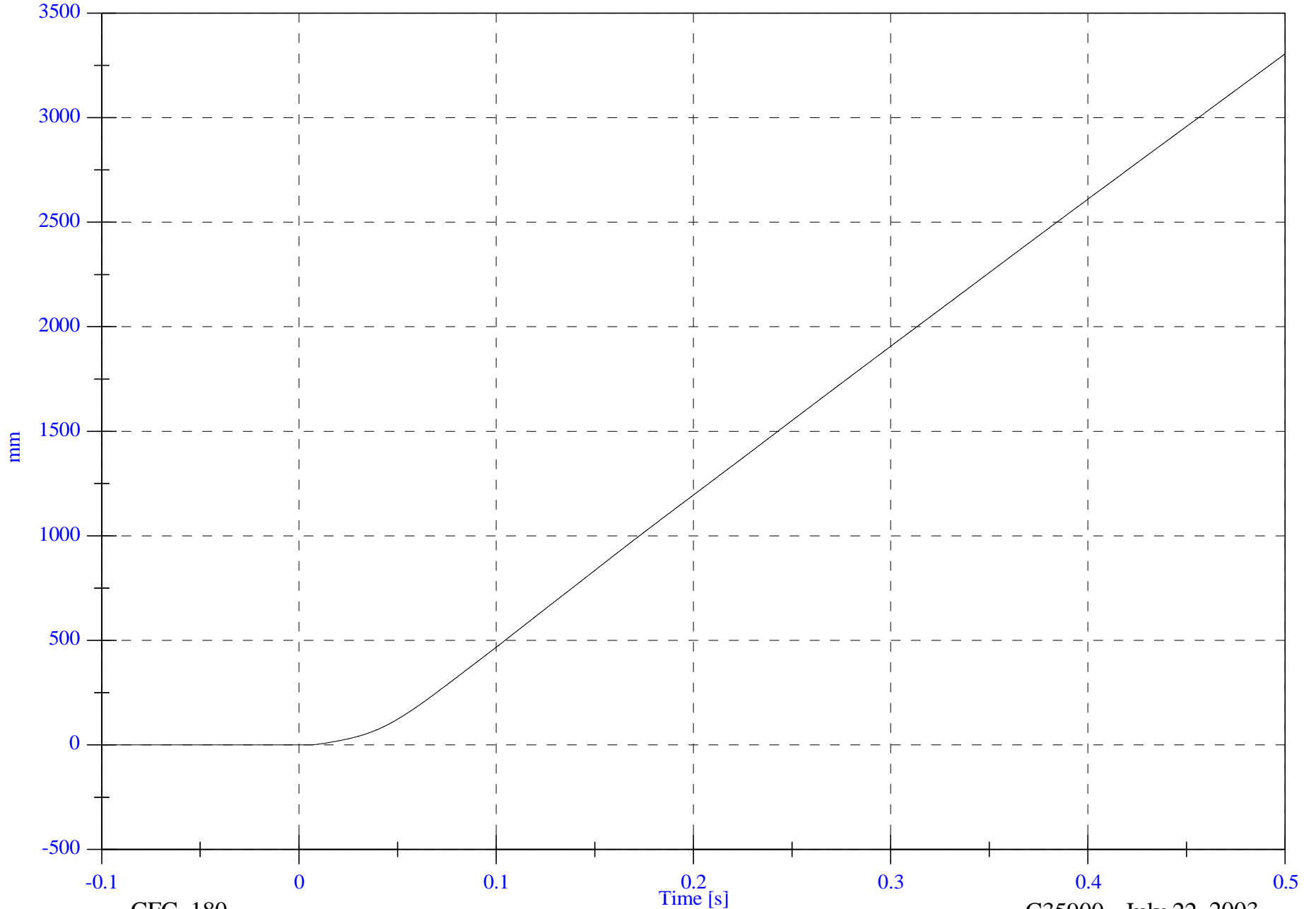
V2 Right X Member Red Ax Displacement

Max: 3304.5 [mm] at 0.500 [s]

Min: -0.0 [mm] at -0.010 [s]

B-102

8655-F301-10R



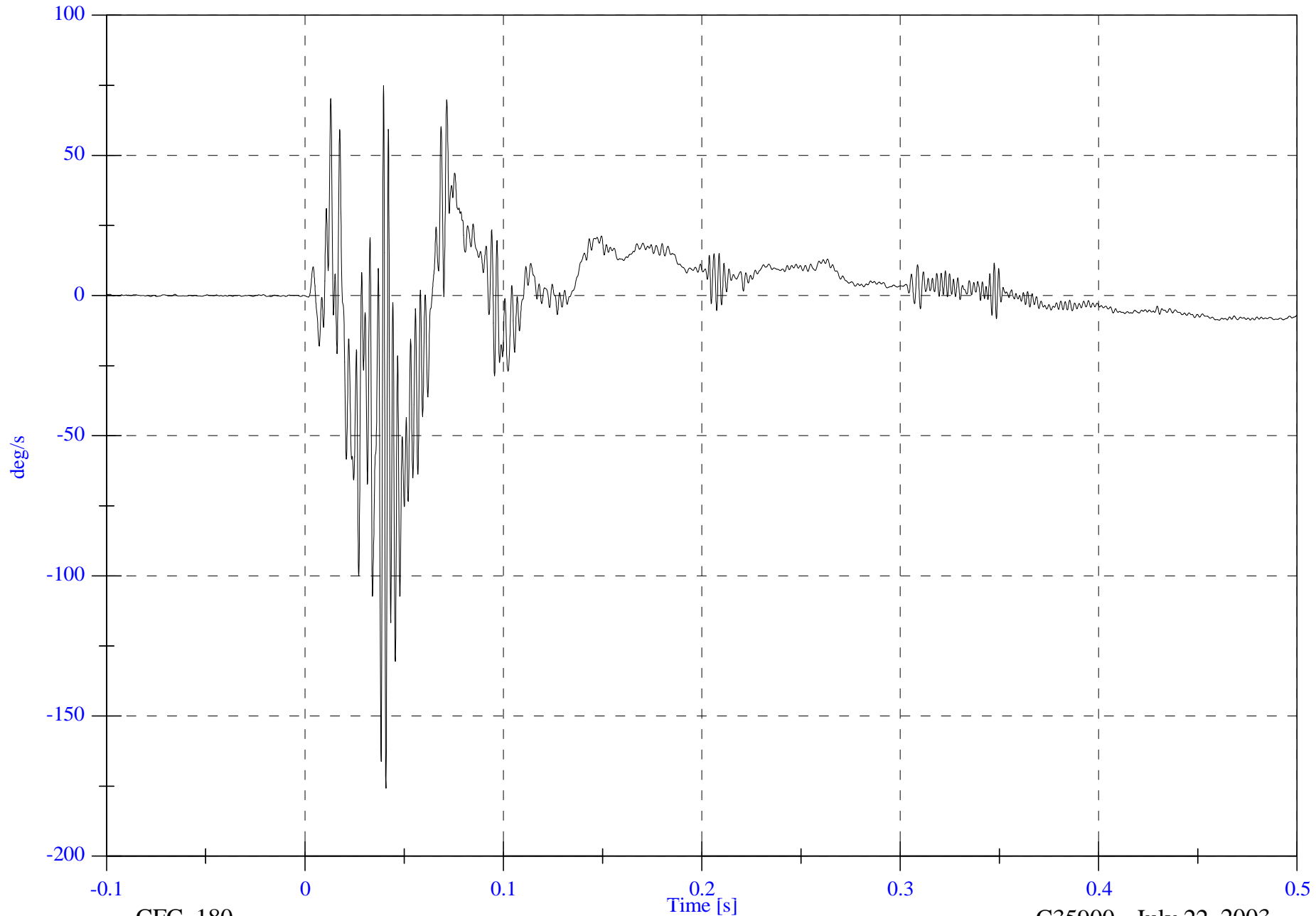
CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2 Left Front AVy

Max: 74.9 [deg/s] at 0.040 [s]
Min: -175.7 [deg/s] at 0.041 [s]



B-103

8655-F301-10R

CFC_180

Time [s]

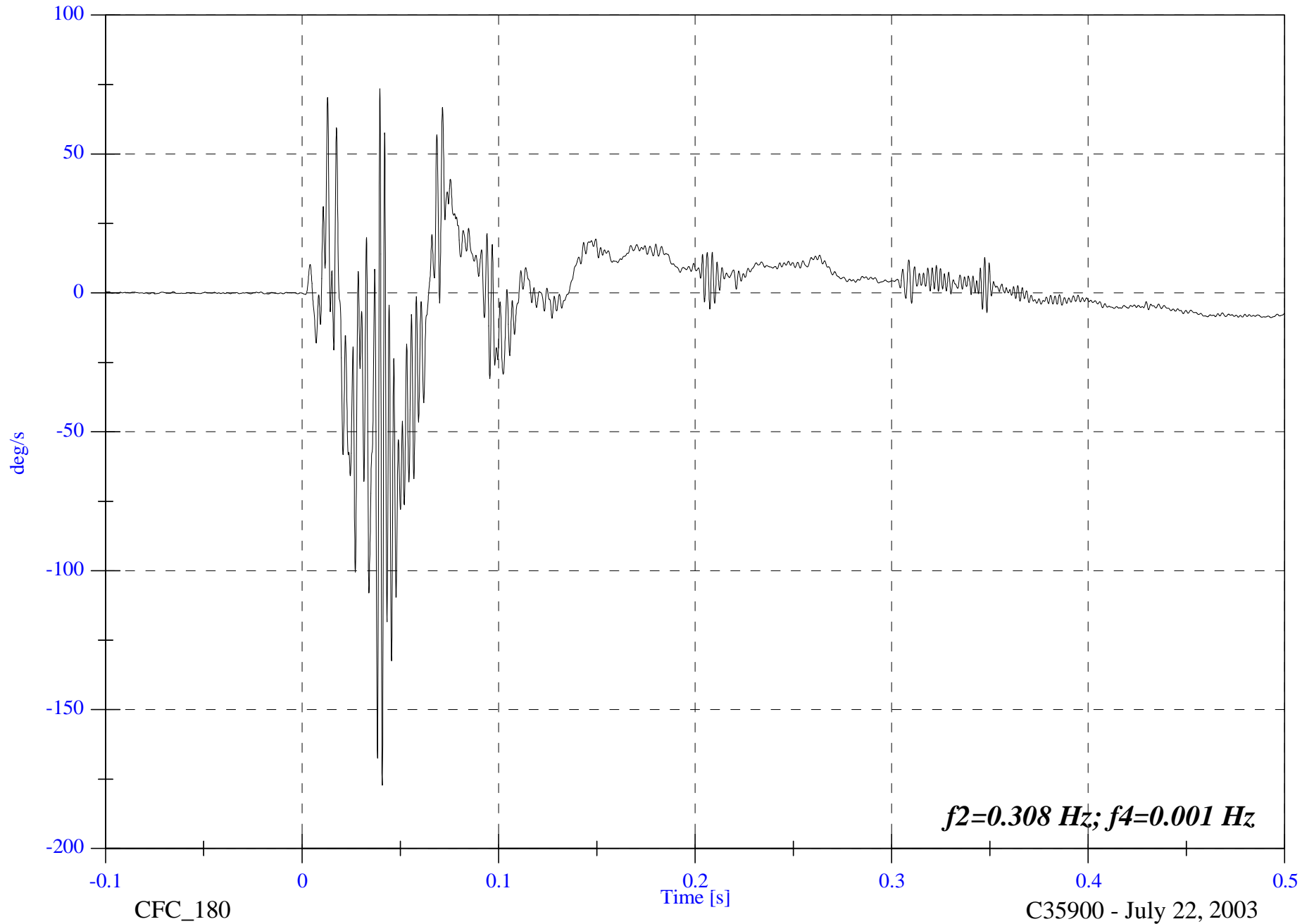
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2 Left Front Sill Comp AVy

Max: 73.5 [deg/s] at 0.040 [s]

Min: -177.2 [deg/s] at 0.041 [s]



B-104

8655-F301-10R

CFC_180

Time [s]

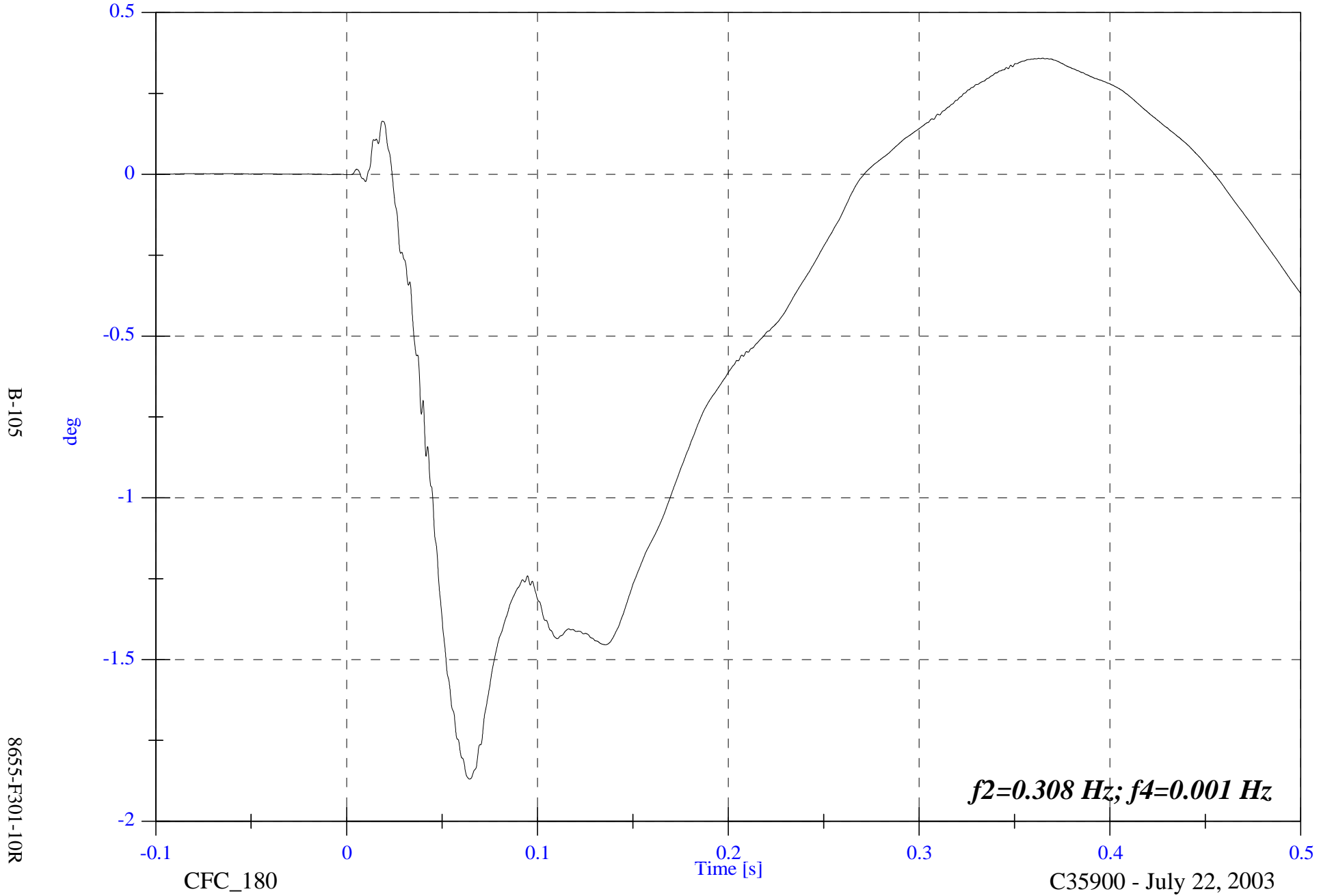
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2 Left Front Sill Comp ADy

Max: 0.4 [deg] at 0.365 [s]

Min: -1.9 [deg] at 0.064 [s]



CFC_180

C35900 - July 22, 2003

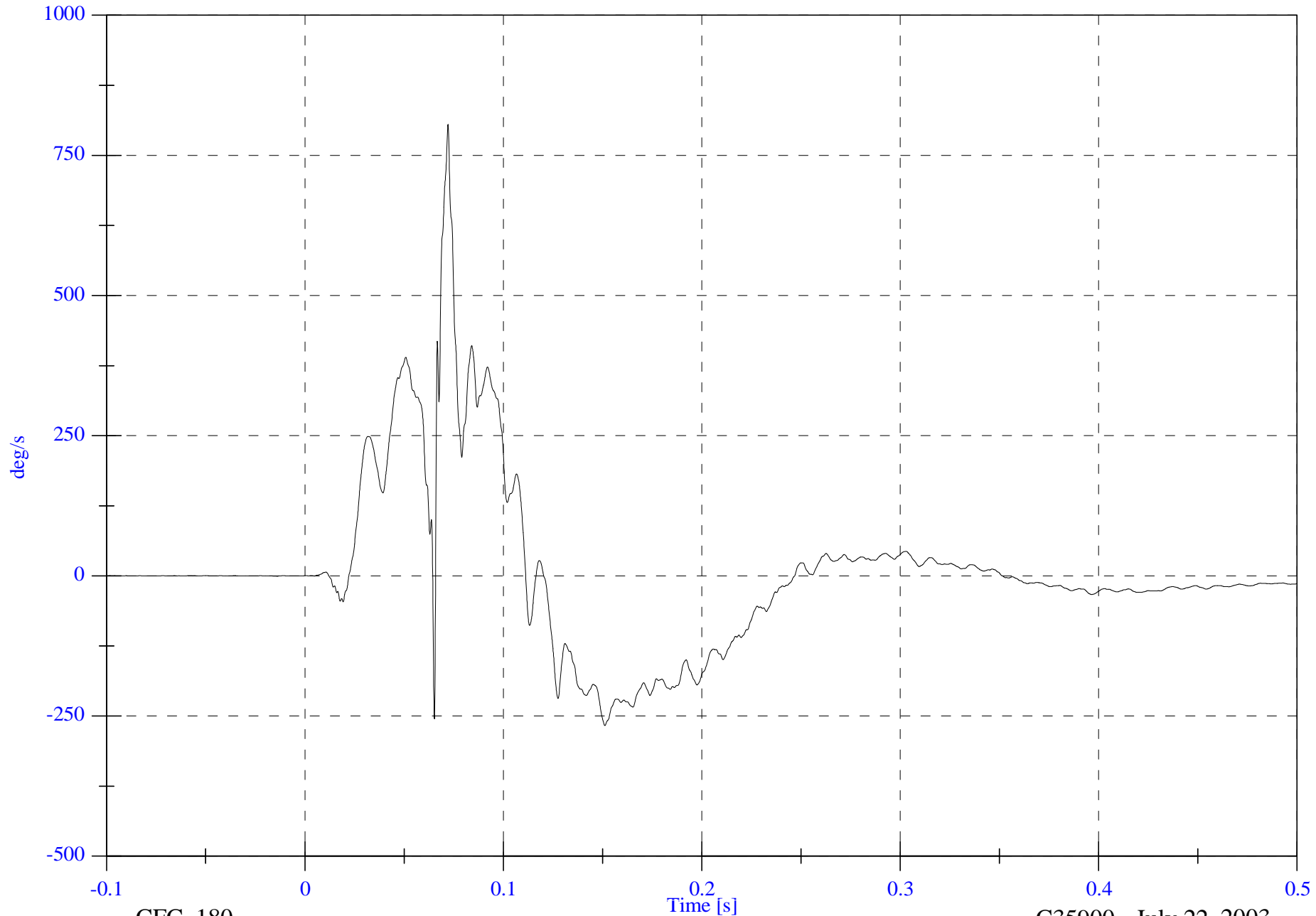
FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Left Seat AVy

Max: 805.7 [deg/s] at 0.072 [s]
Min: -267.0 [deg/s] at 0.151 [s]

B-106

8655-F301-10R



CFC_180

C35900 - July 22, 2003

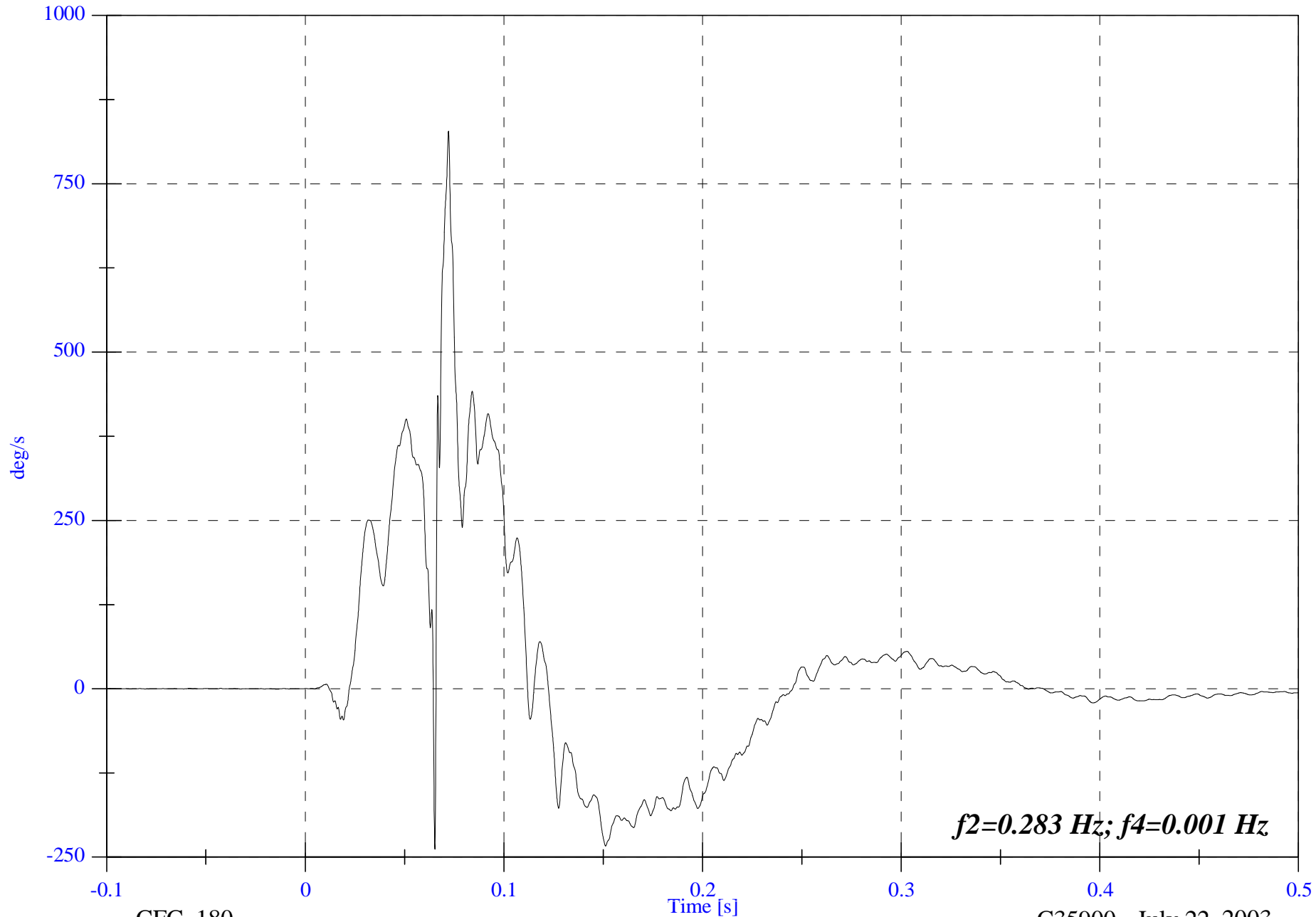
FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Left Seat Comp AVy

Max: 828.2 [deg/s] at 0.072 [s]
Min: -238.4 [deg/s] at 0.065 [s]

B-107

8655-F301-10R



CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

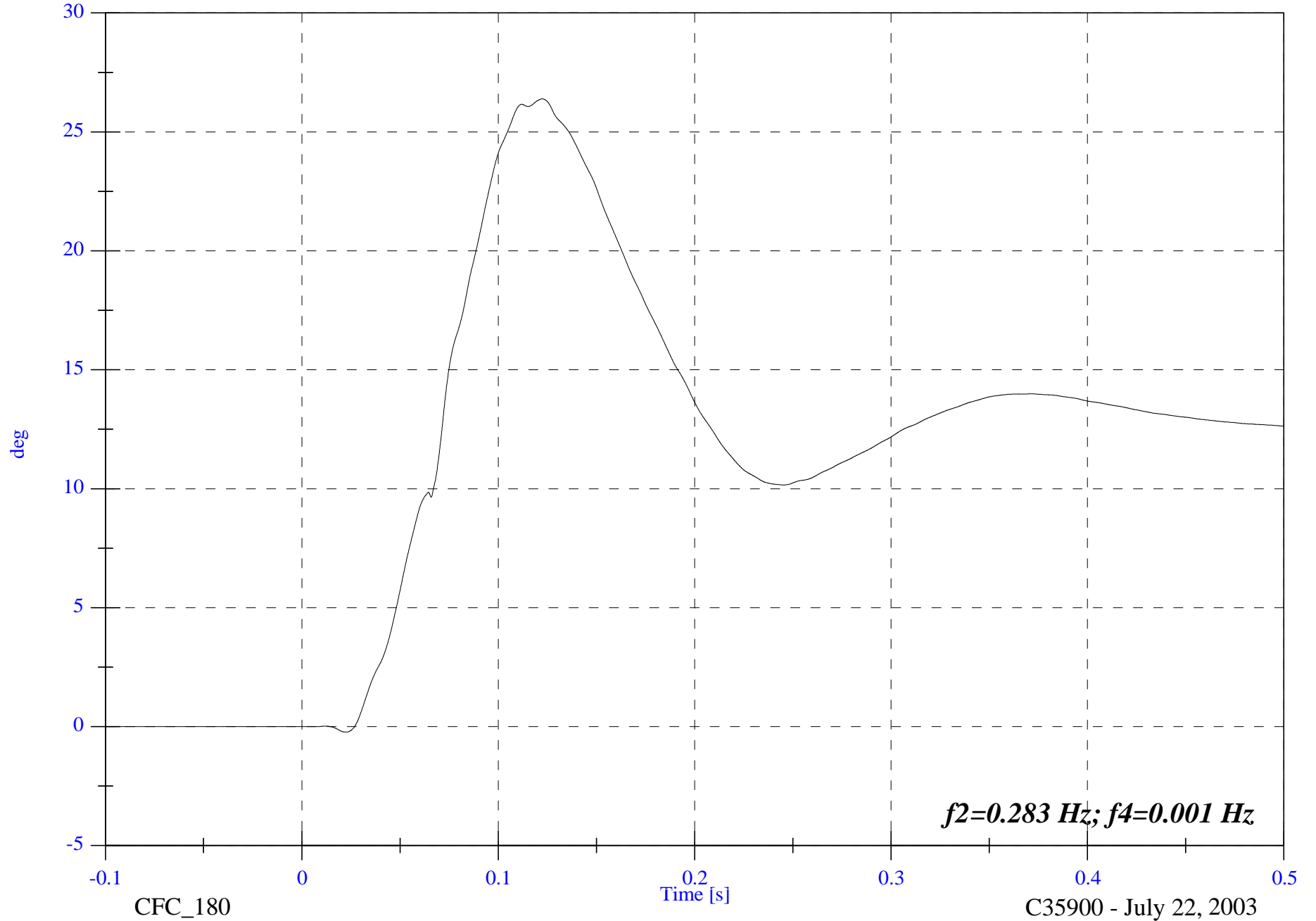
V2P1 Left Seat Comp ADy

Max: 26.4 [deg] at 0.122 [s]

Min: -0.2 [deg] at 0.022 [s]

B-108

8655-F301-10R



$f2=0.283$ Hz; $f4=0.001$ Hz

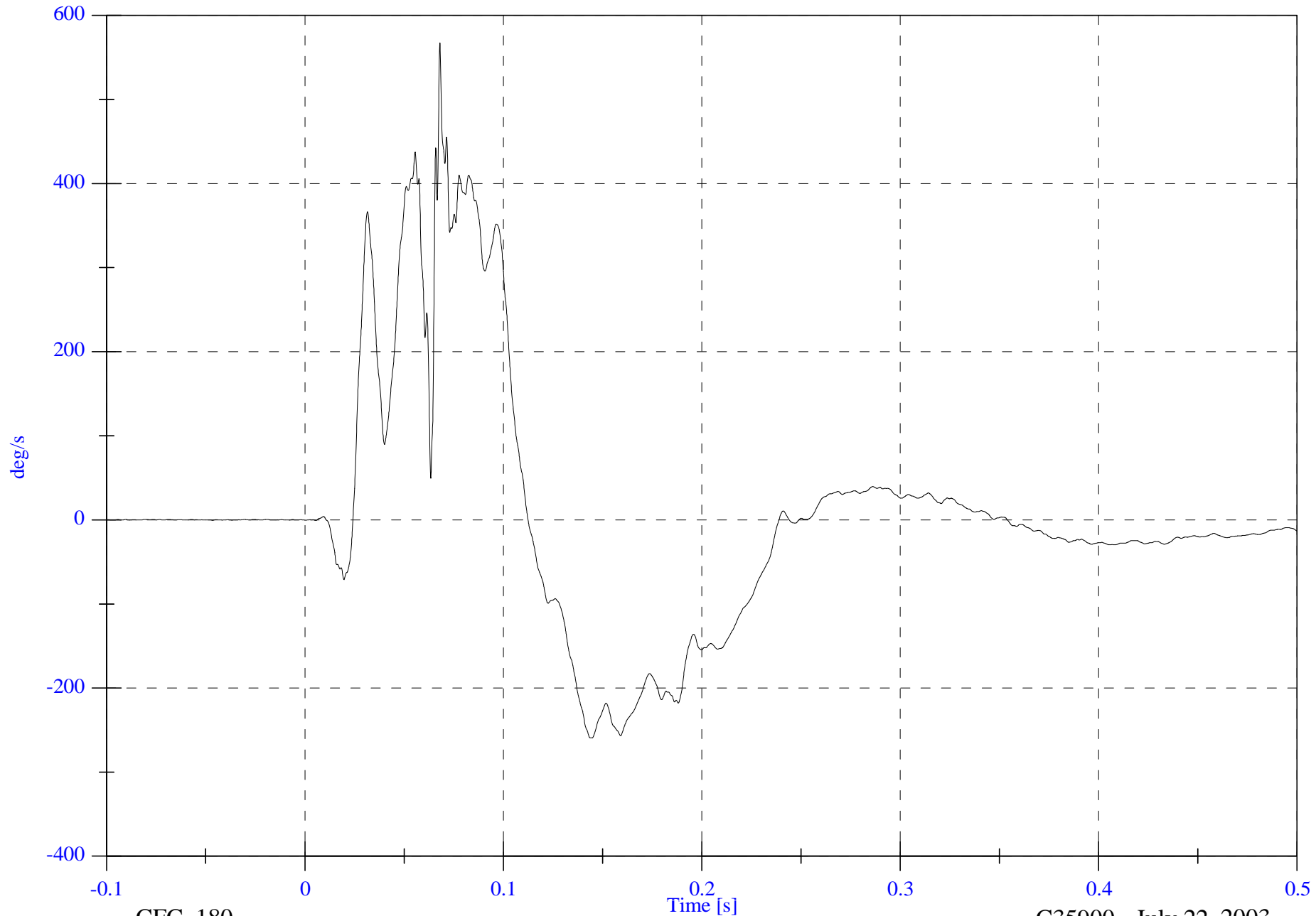
FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Right Seat AVy

Max: 567.3 [deg/s] at 0.068 [s]
Min: -259.4 [deg/s] at 0.145 [s]

B-109

8655-F301-10R



CFC_180

C35900 - July 22, 2003

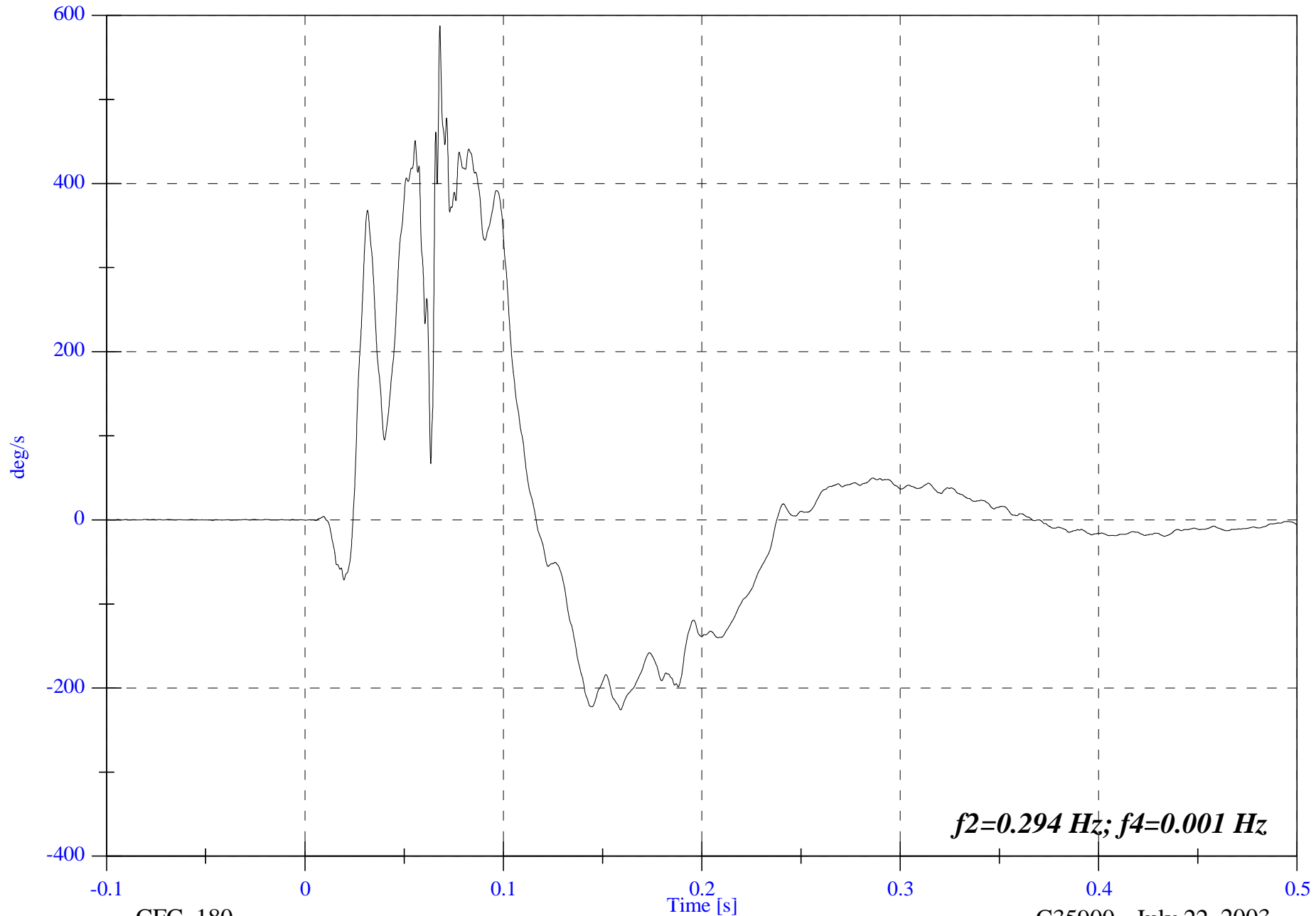
FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Right Seat Comp AVy

Max: 587.5 [deg/s] at 0.068 [s]
Min: -226.0 [deg/s] at 0.159 [s]

B-110

8655-F301-10R



f2=0.294 Hz; f4=0.001 Hz

CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

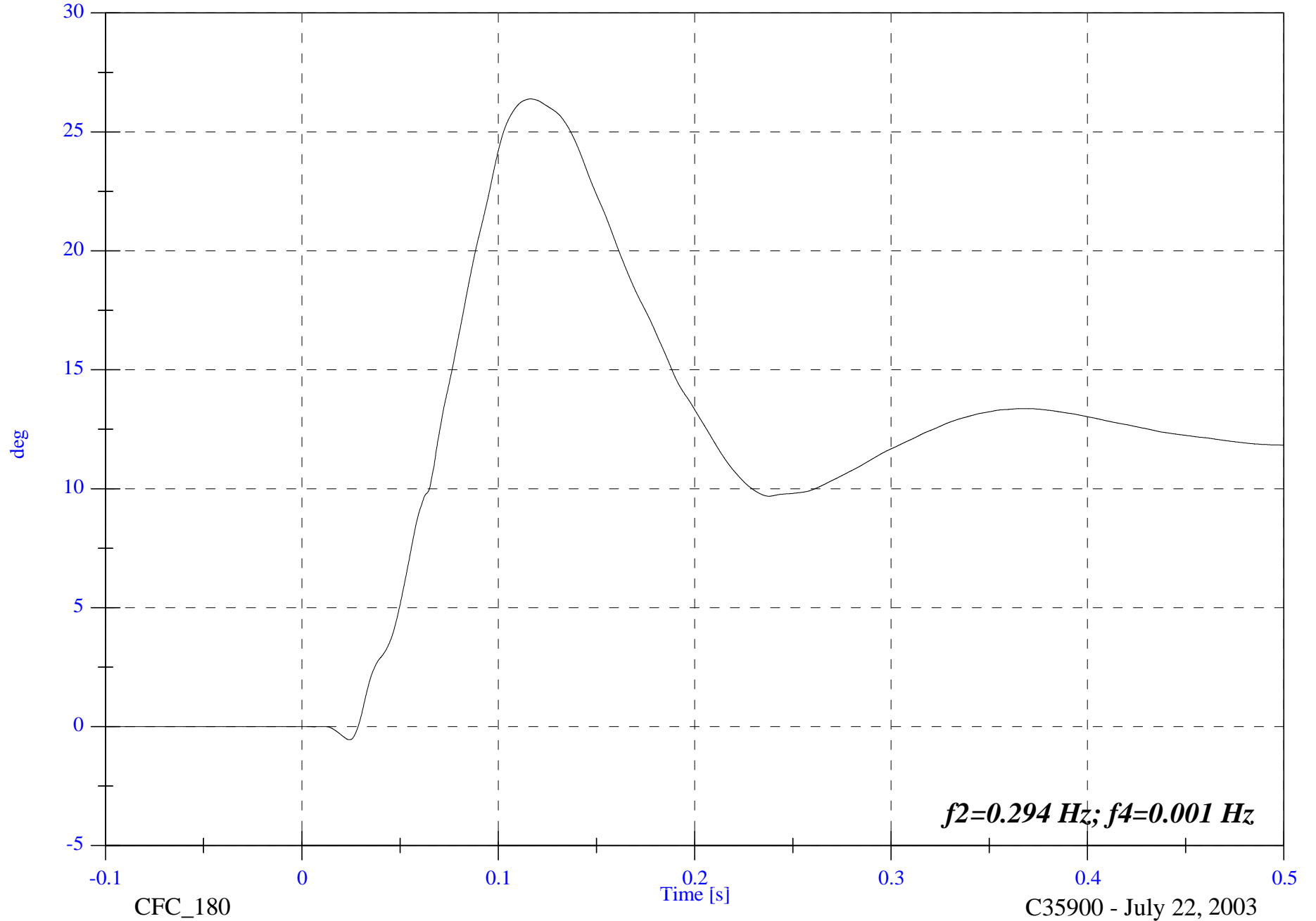
V2P1 Right Seat Comp ADy

Max: 26.4 [deg] at 0.116 [s]

Min: -0.6 [deg] at 0.024 [s]

B-111

8655-F301-10R



CFC_180

C35900 - July 22, 2003

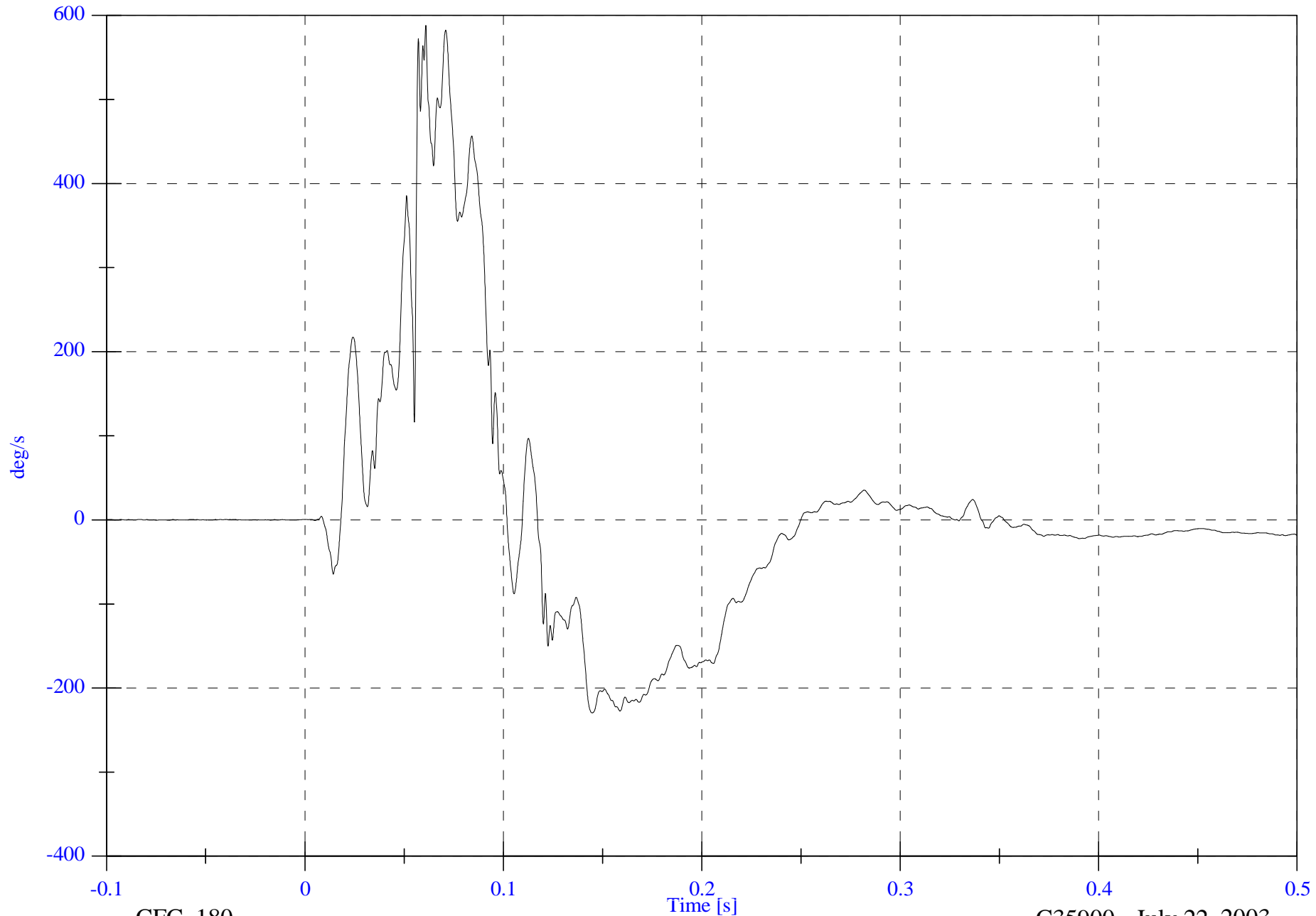
FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Left Seat AVy

Max: 588.2 [deg/s] at 0.061 [s]
Min: -229.6 [deg/s] at 0.145 [s]

B-112

8655-F301-10R



CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

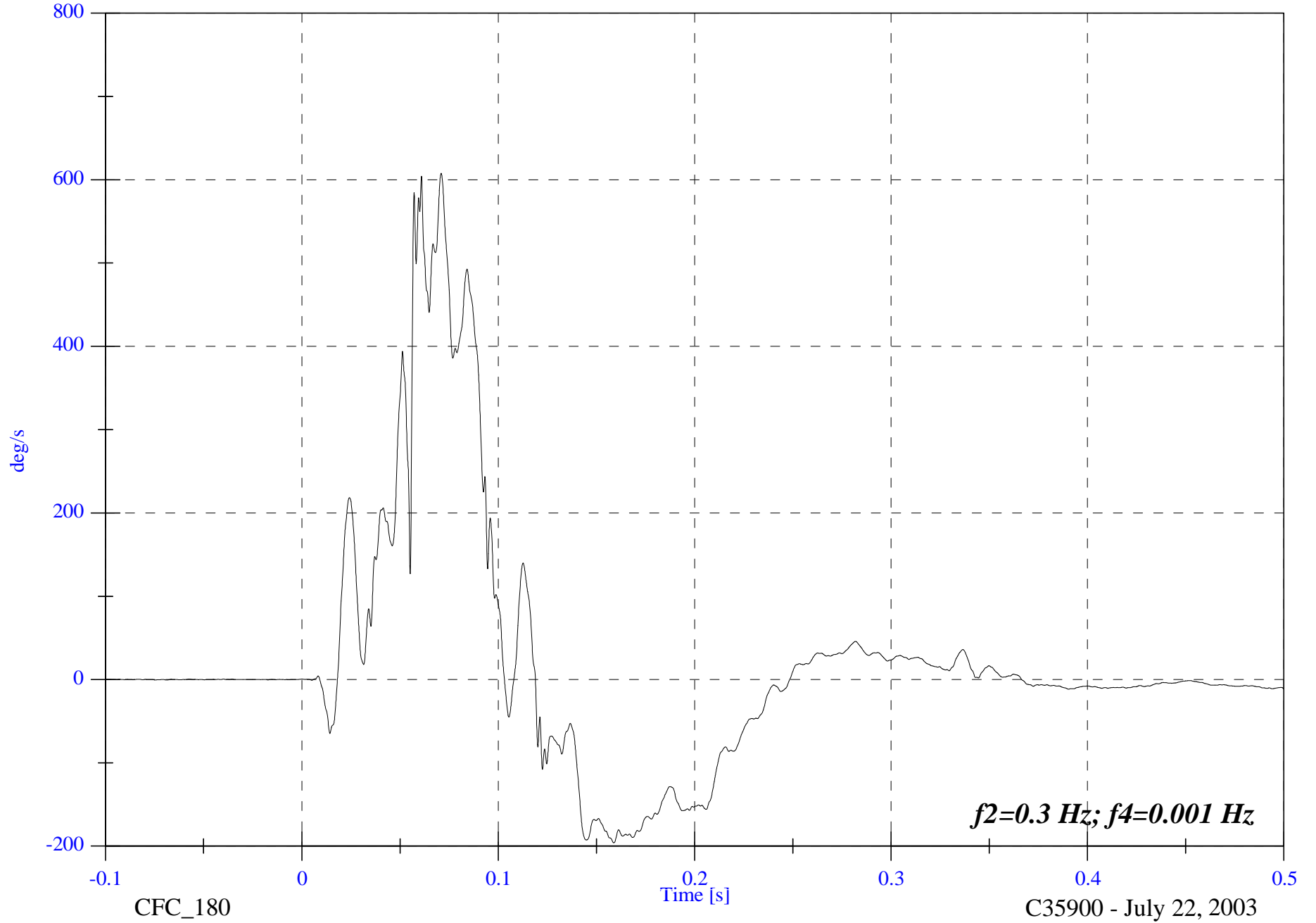
V2P2 Left Seat Comp AVy

Max: 607.8 [deg/s] at 0.071 [s]

Min: -196.1 [deg/s] at 0.159 [s]

B-113

8655-F301-10R



CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

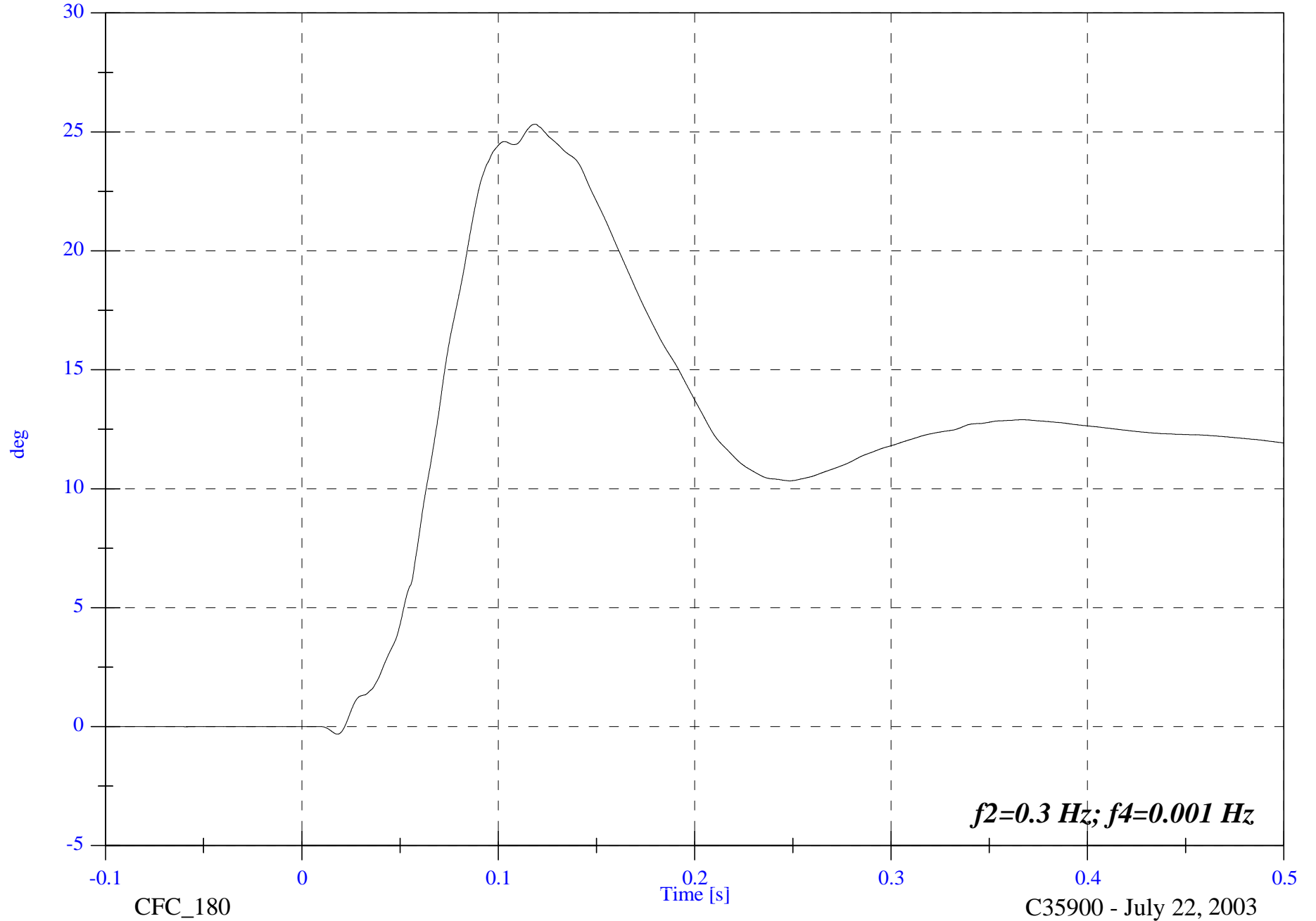
V2P2 Left Seat Comp ADy

Max: 25.3 [deg] at 0.119 [s]

Min: -0.3 [deg] at 0.018 [s]

B-114

8655-F301-10R



f2=0.3 Hz; f4=0.001 Hz

CFC_180

C35900 - July 22, 2003

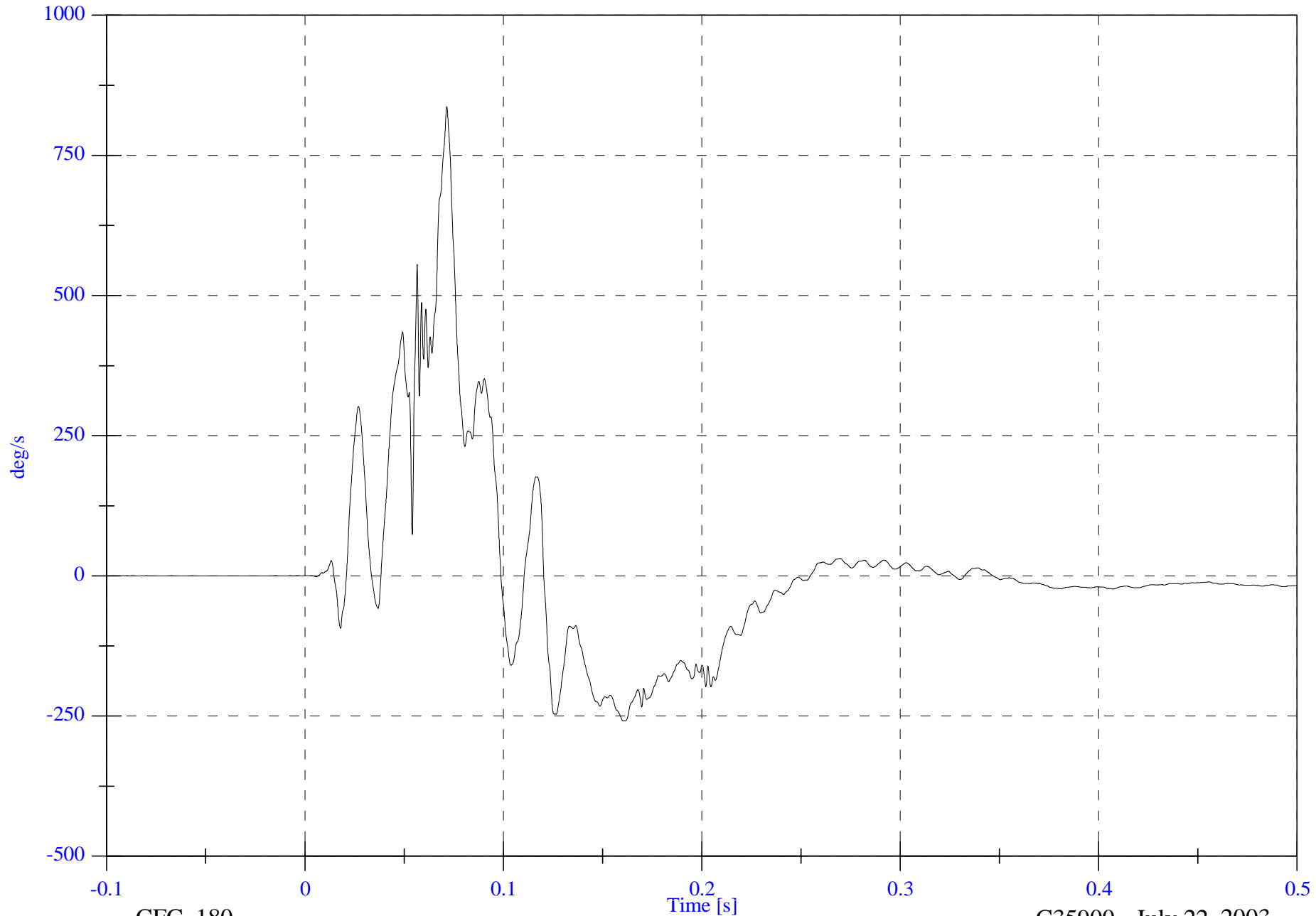
FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Right Seat AVy

Max: 837.1 [deg/s] at 0.072 [s]
Min: -258.7 [deg/s] at 0.160 [s]

B-115

8655-F301-10R



CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

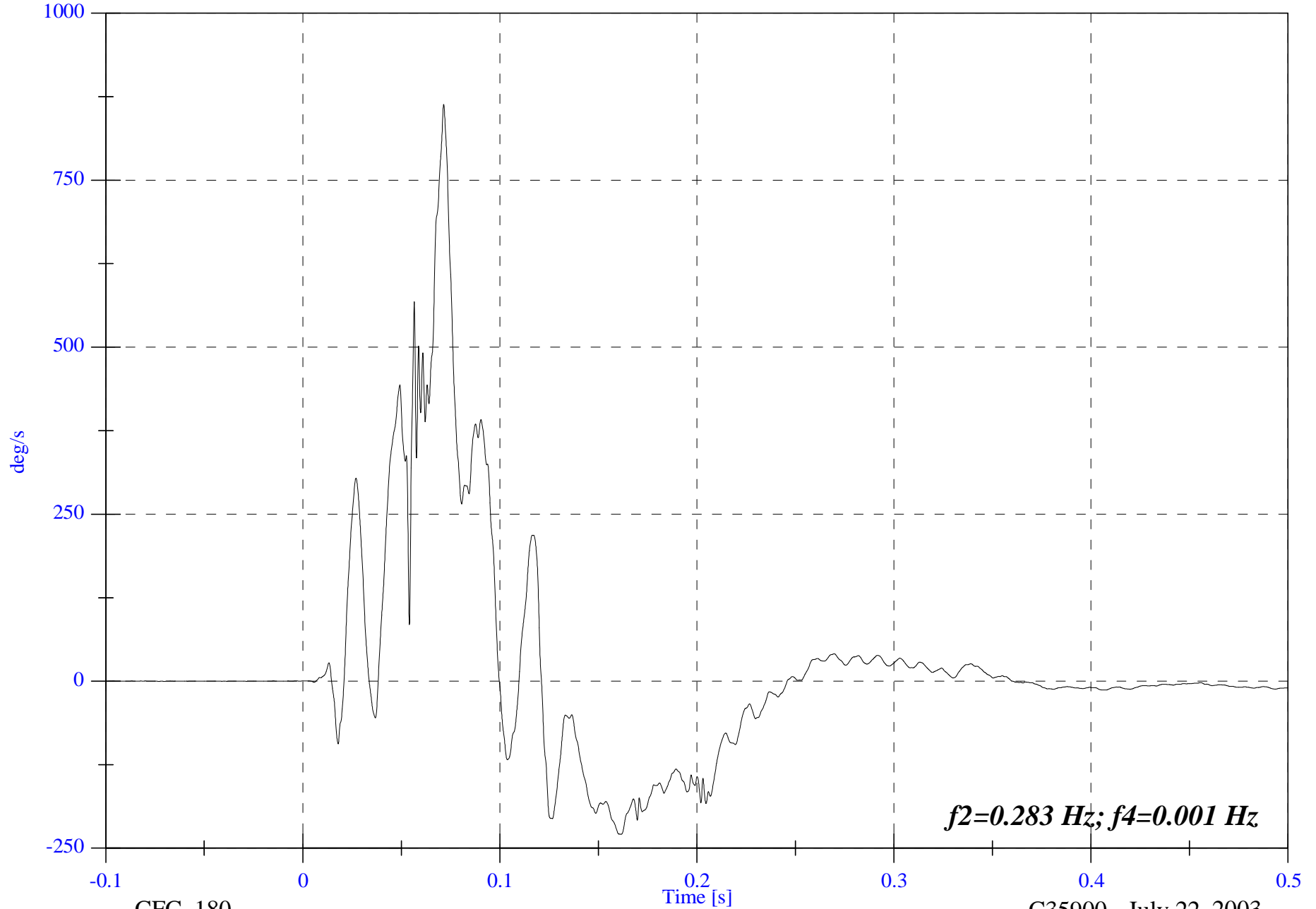
V2P2 Right Seat Comp AVy

Max: 863.4 [deg/s] at 0.072 [s]

Min: -229.3 [deg/s] at 0.162 [s]

B-116

8655-F301-10R



f2=0.283 Hz; f4=0.001 Hz

CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Right Seat Comp ADy

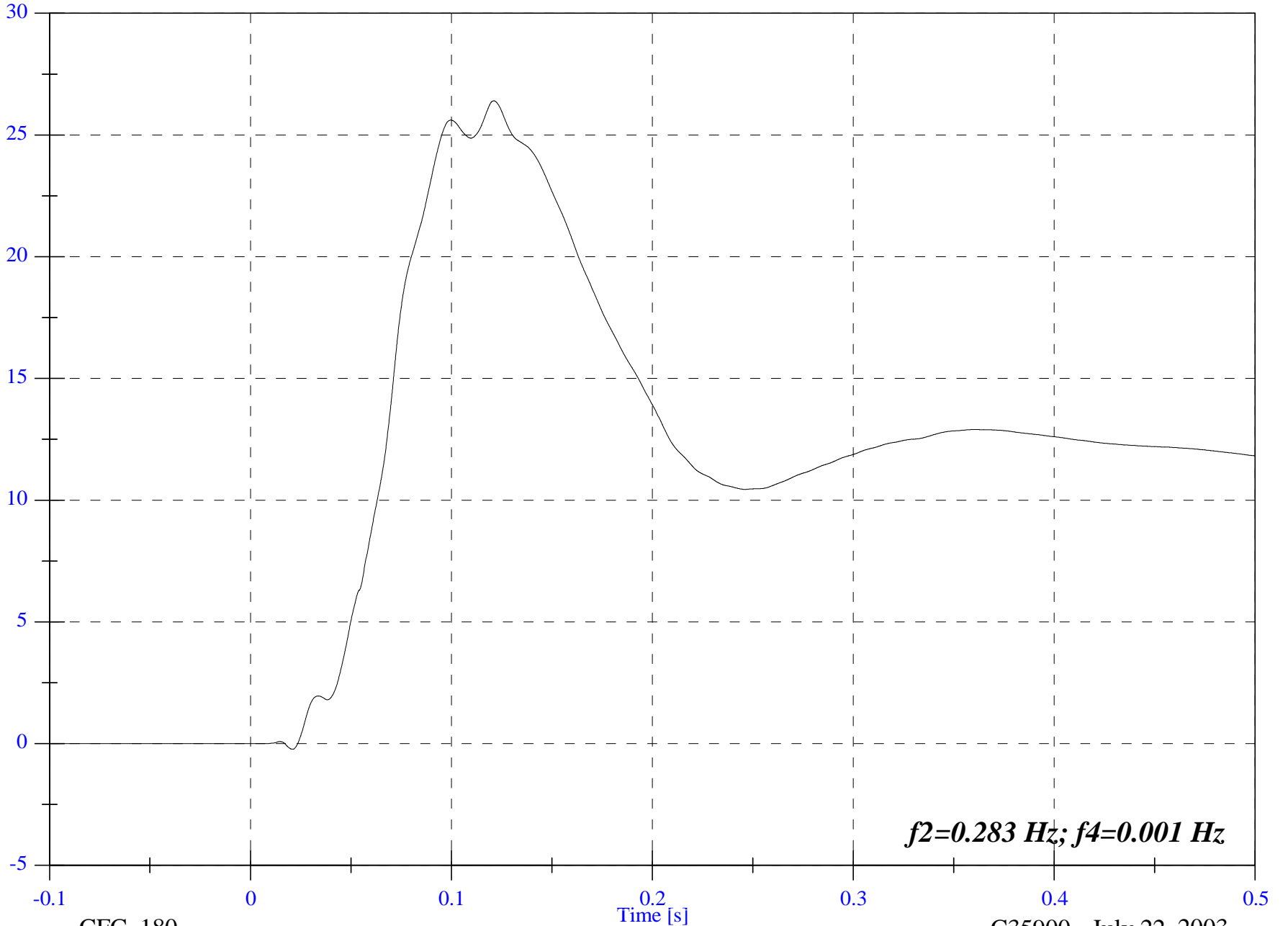
Max: 26.4 [deg] at 0.121 [s]

Min: -0.2 [deg] at 0.021 [s]

B-117

gap

8655-F301-10R



CFC_180

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

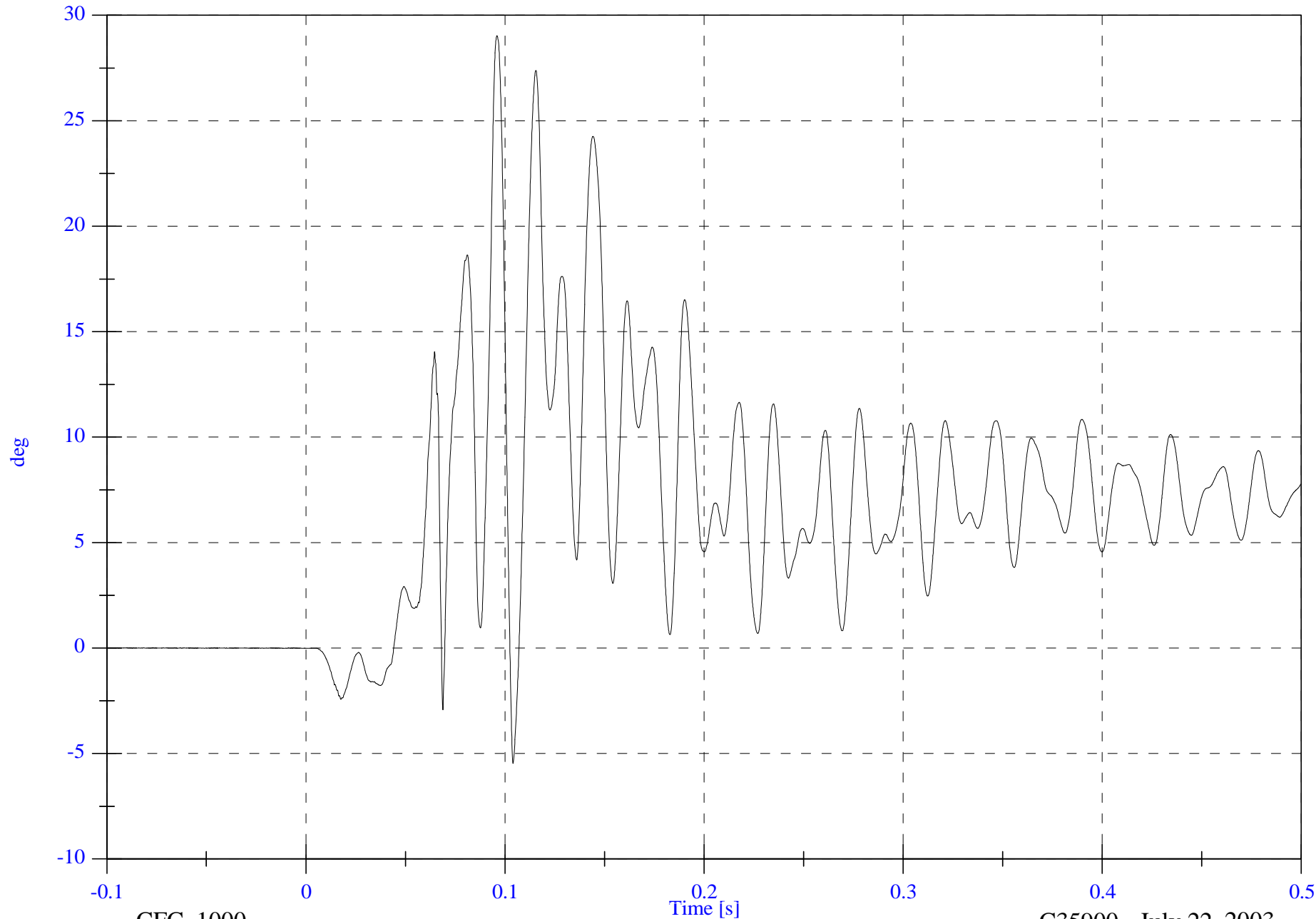
V2P1 Left Link ADy

Max: 29.0 [deg] at 0.096 [s]

Min: -5.5 [deg] at 0.104 [s]

B-118

8655-F301-10R



CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

V2P1 Right Link ADy

Max: 14.8 [deg] at 0.113 [s]

Min: -2.8 [deg] at 0.038 [s]

B-119

8655-F301-10R



CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

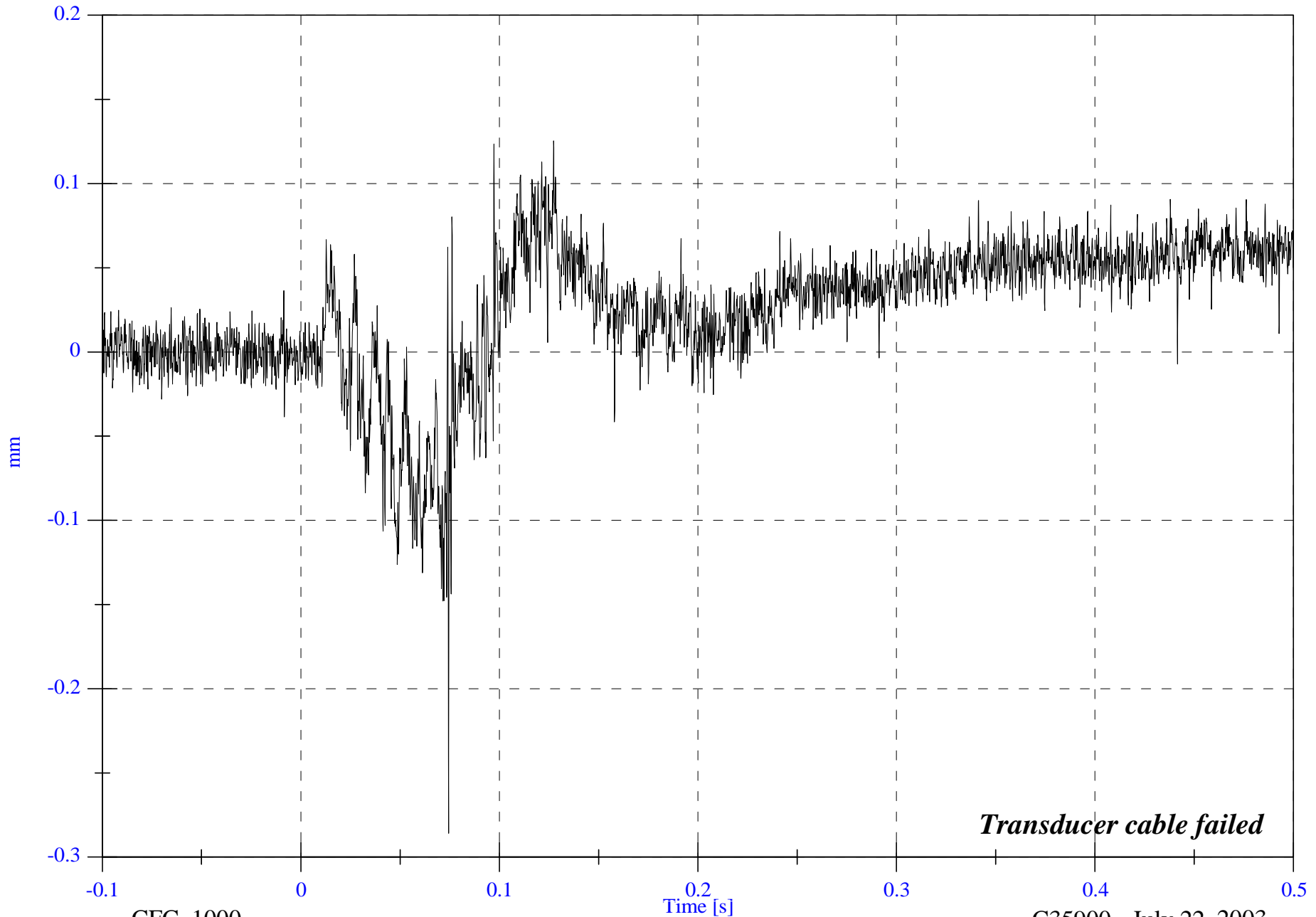
V2P1 Left Span Bar D

Max: 0.1 [mm] at 0.127 [s]

Min: -0.3 [mm] at 0.074 [s]

B-120

8655-F301-10R



Transducer cable failed

CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

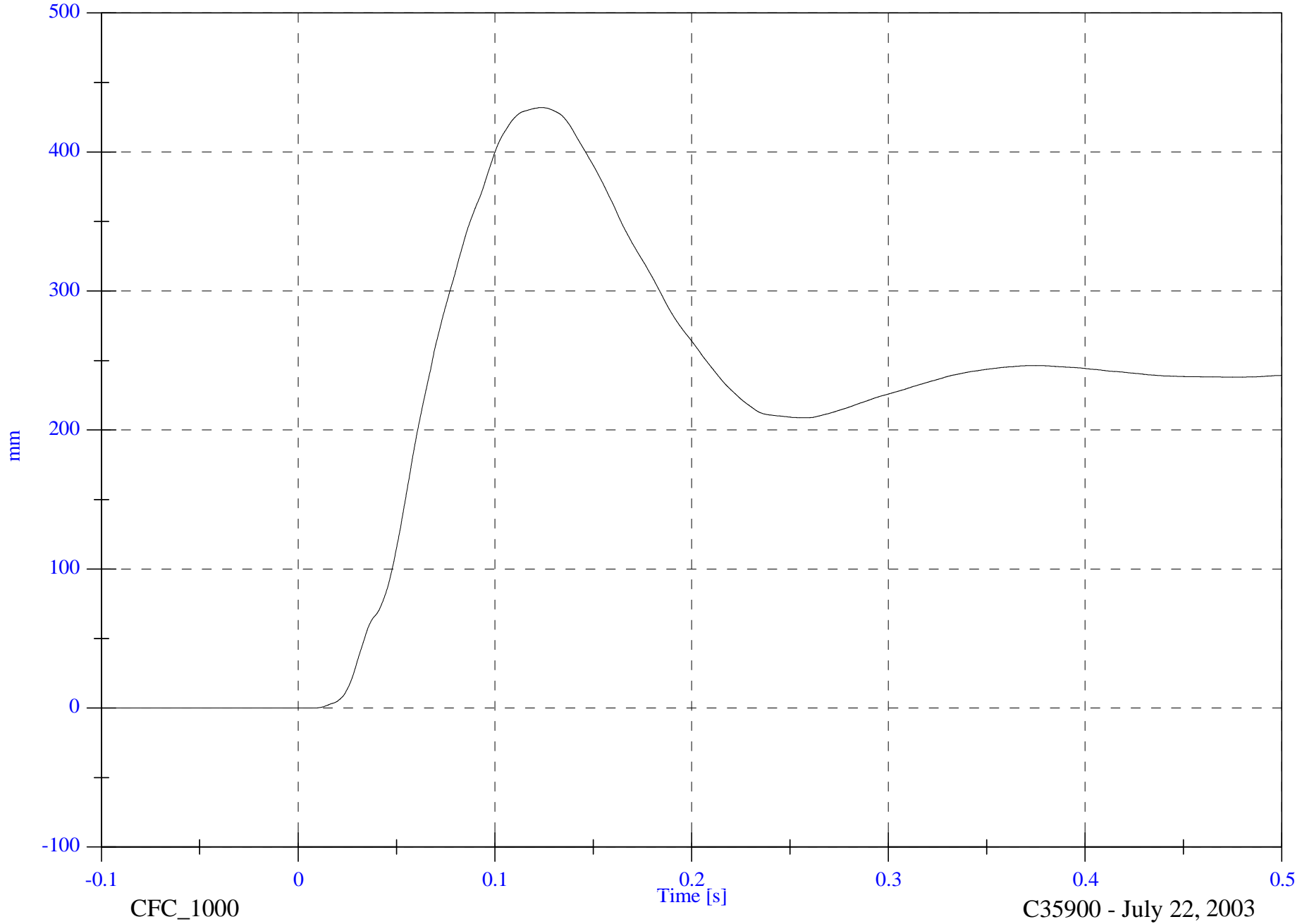
V2P1 Right Span Bar D

Max: 432.1 [mm] at 0.124 [s]

Min: -0.0 [mm] at -0.070 [s]

B-121

8655-F301-10R



FMVSS 301 Test 1 - 2003 Volvo V70

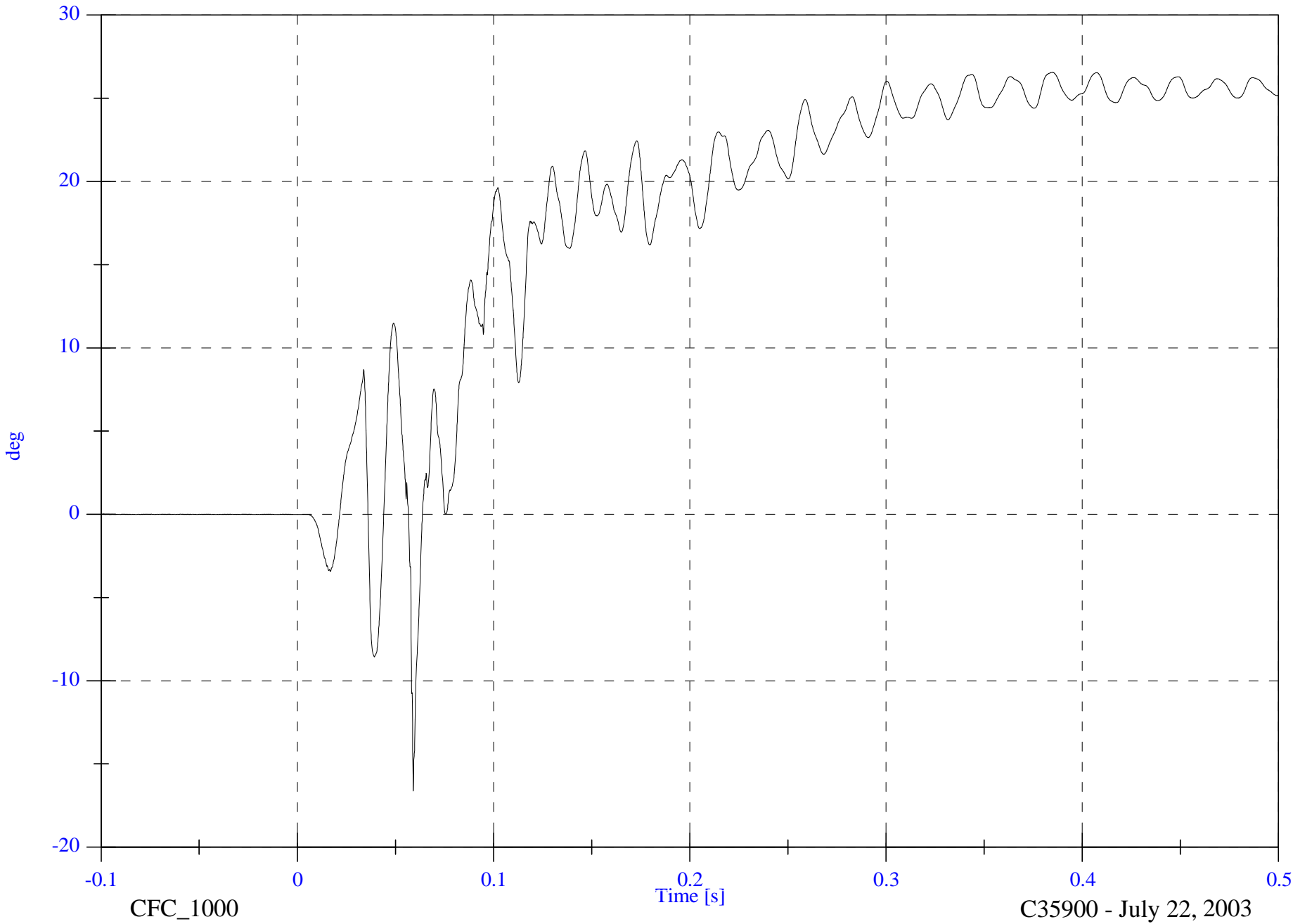
V2P2 Left Link ADy

Max: 26.6 [deg] at 0.385 [s]

Min: -16.6 [deg] at 0.059 [s]

B-122

8655-F301-10R



CFC_1000

Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

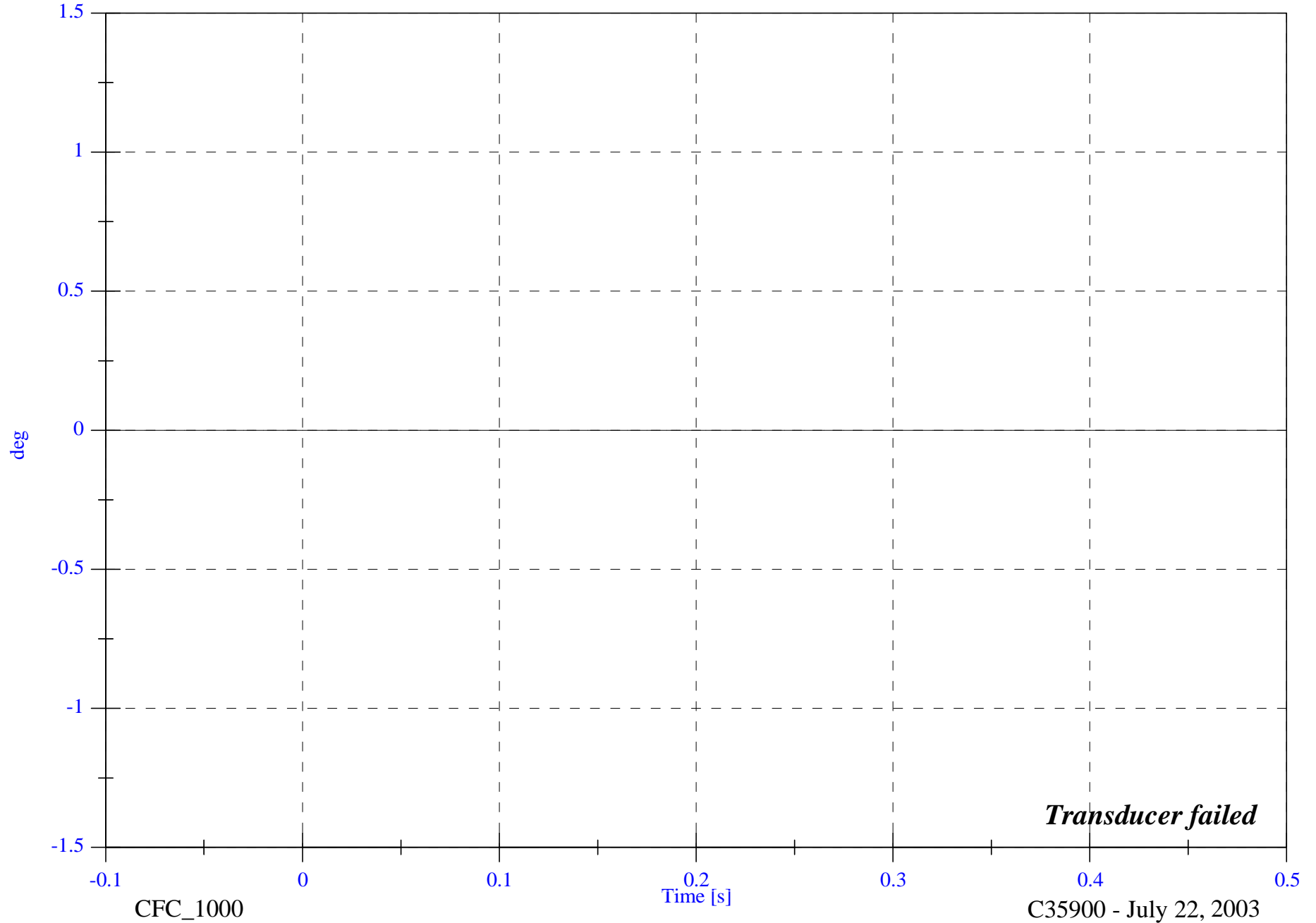
V2P2 Right Link ADy

Max: 0.0 [deg] at -0.100 [s]

Min: 0.0 [deg] at -0.100 [s]

B-123

8655-F301-10R



CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

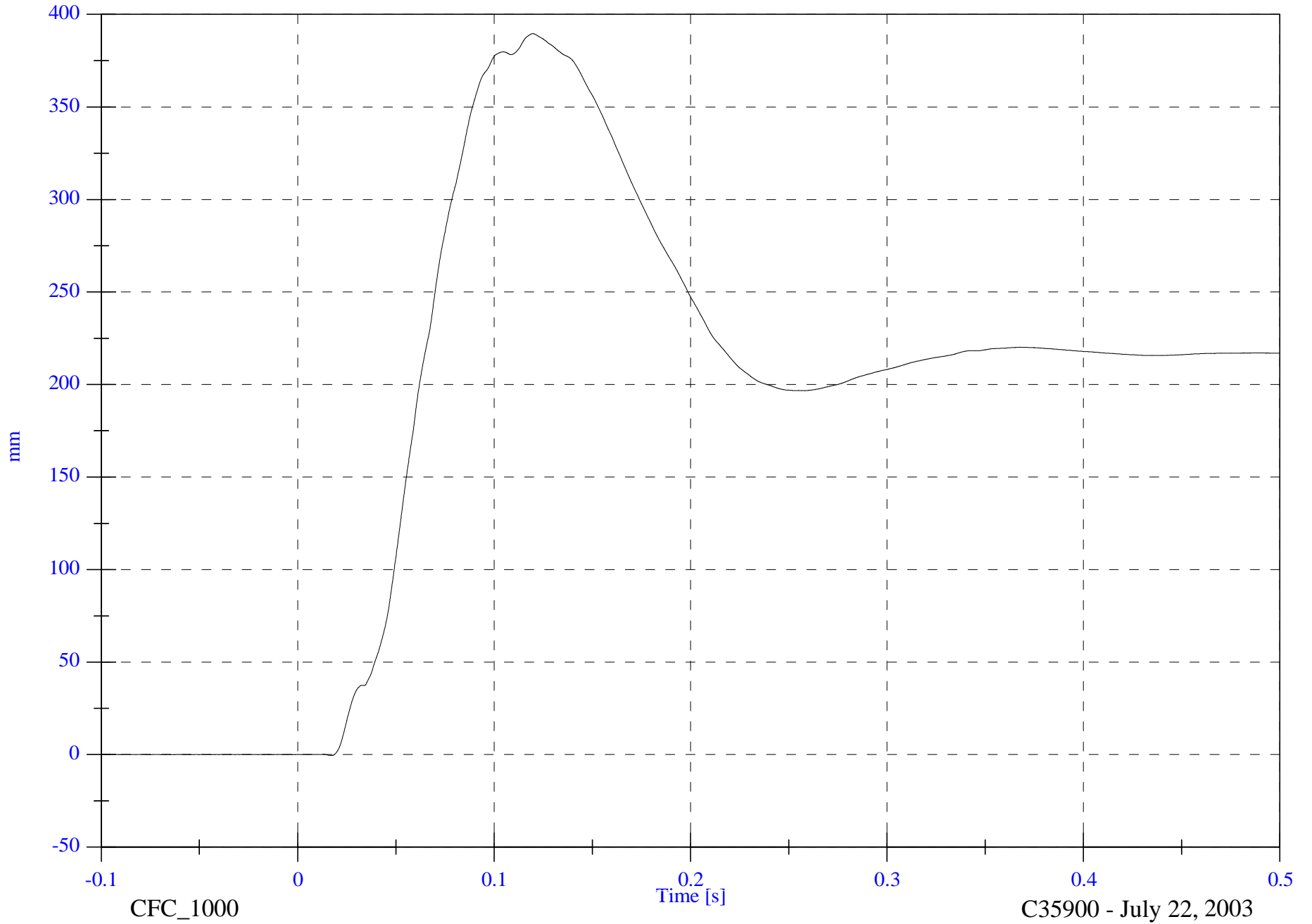
V2P2 Left Span Bar D

Max: 389.6 [mm] at 0.120 [s]

Min: -0.5 [mm] at 0.017 [s]

B-124

8655-F301-10R

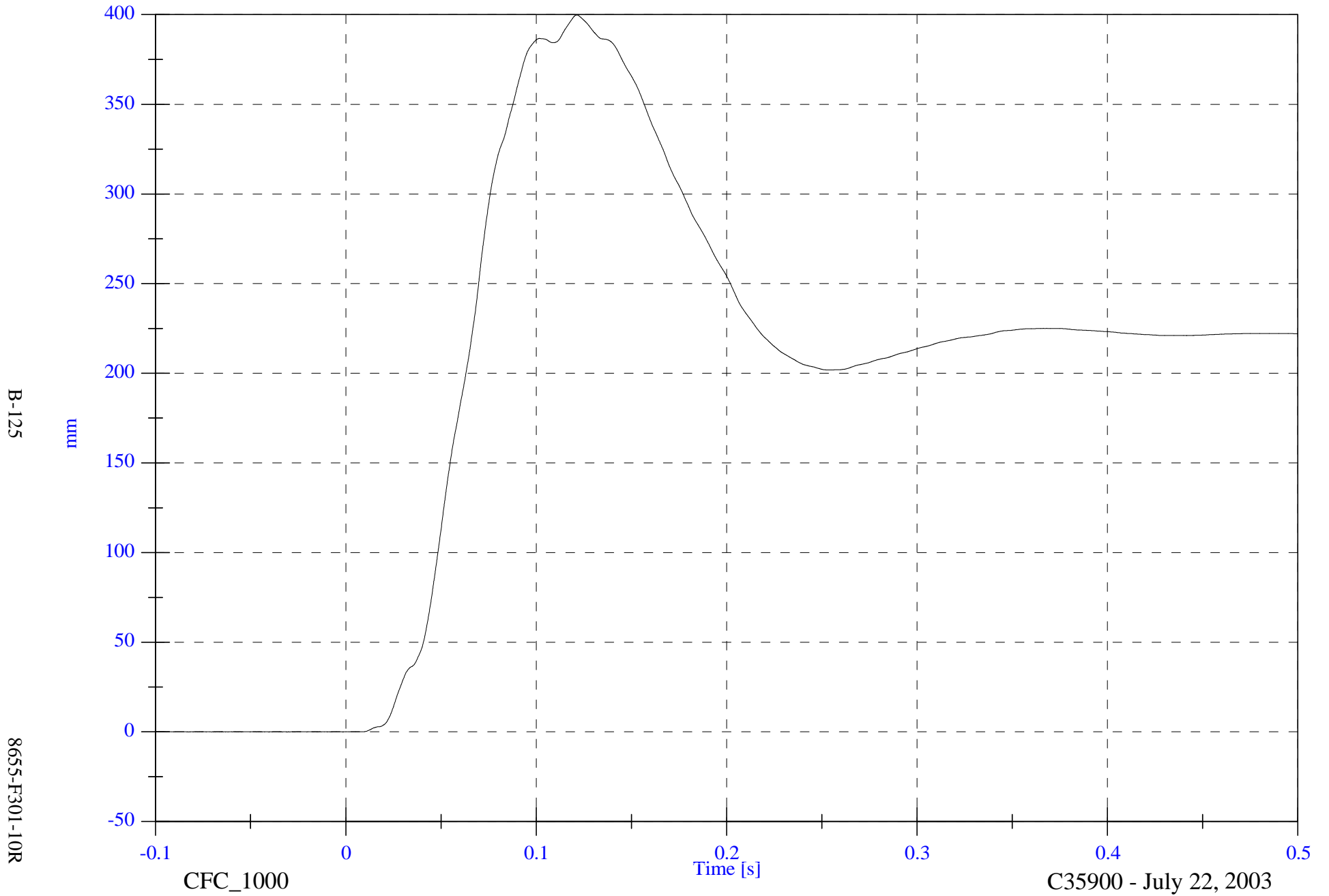


FMVSS 301 Test 1 - 2003 Volvo V70

V2P2 Right Span Bar D

Max: 399.8 [mm] at 0.121 [s]

Min: -0.0 [mm] at -0.027 [s]



B-125

8655-F301-10R

CFC_1000

Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

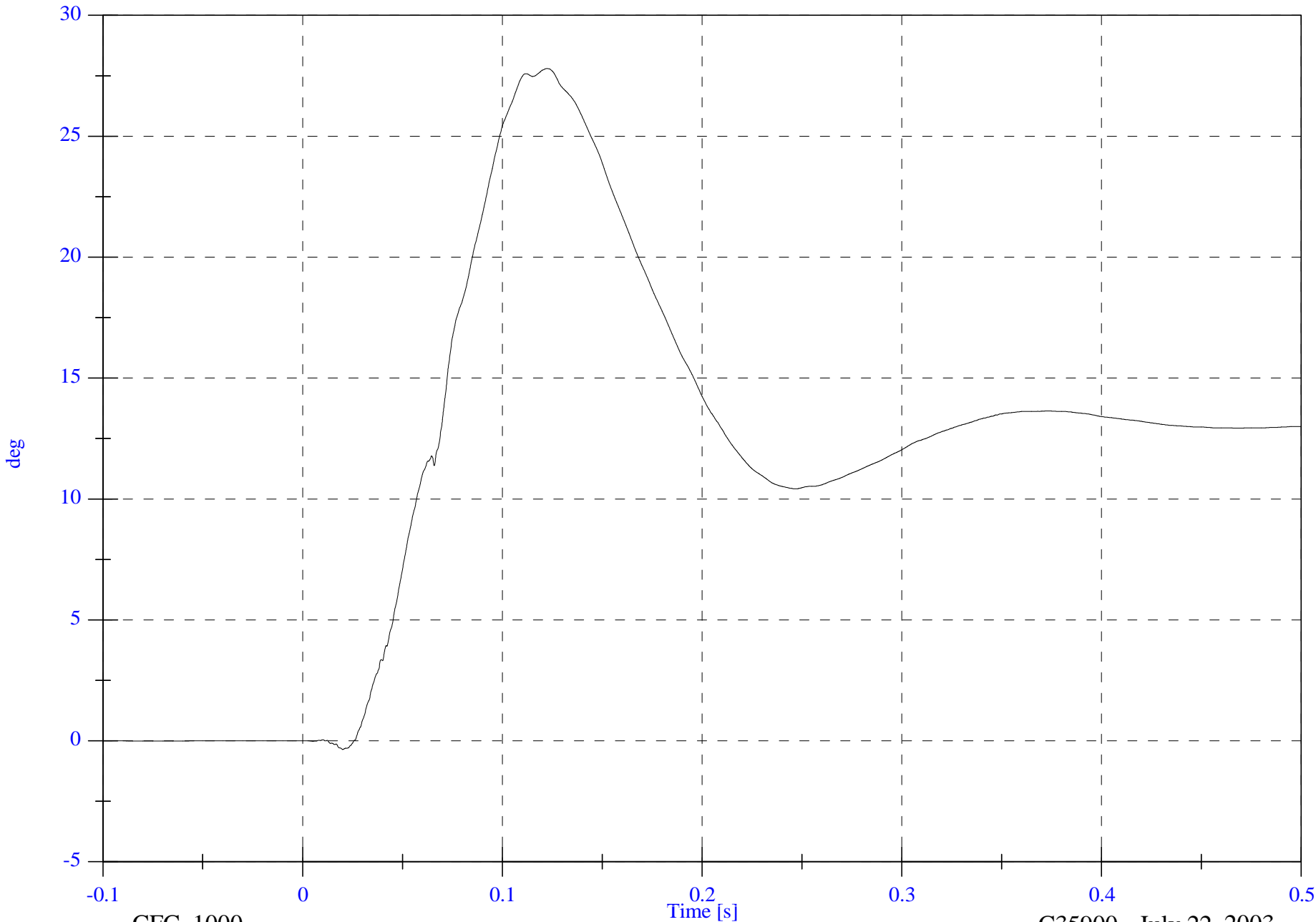
P1 Left Change in Seat Back Angle WRT Sill

Max: 27.8 [deg] at 0.122 [s]

Min: -0.4 [deg] at 0.020 [s]

B-126

8655-F301-10R



CFC_1000

Time [s]

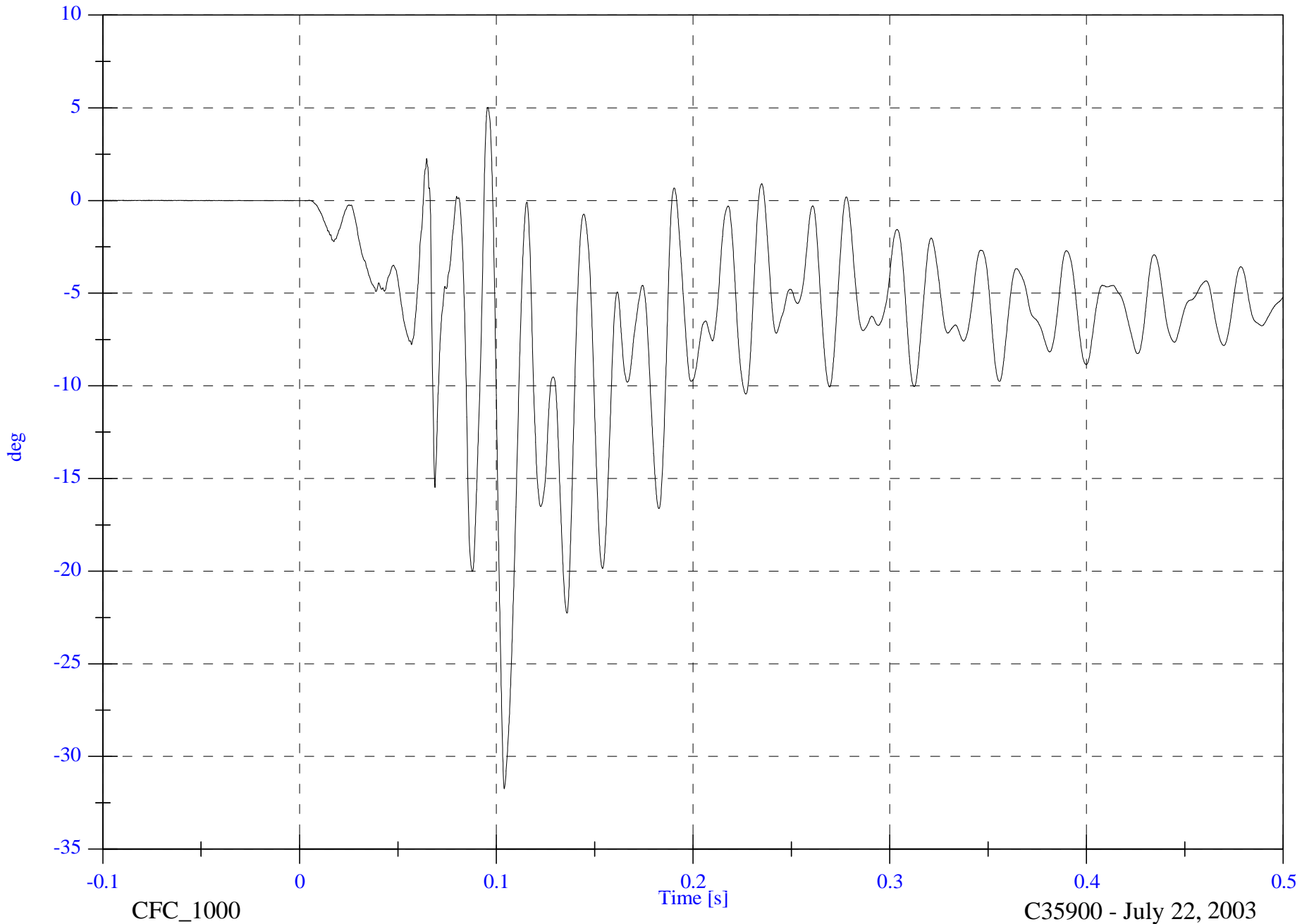
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

P1 Left Change in String Angle

Max: 5.0 [deg] at 0.096 [s]

Min: -31.7 [deg] at 0.104 [s]



B-127

8655-F301-10R

CFC_1000

C35900 - July 22, 2003

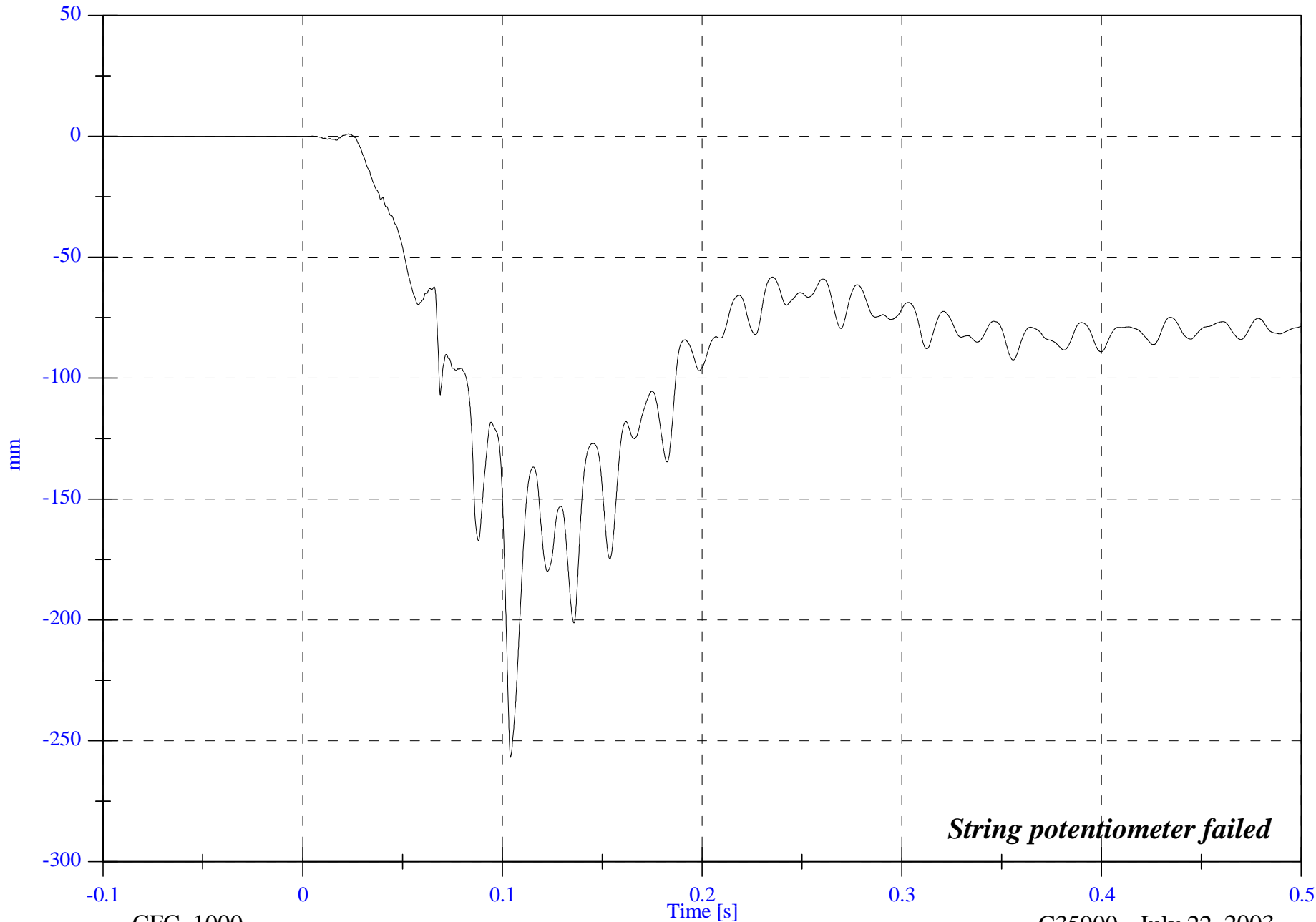
FMVSS 301 Test 1 - 2003 Volvo V70

P1 Left Seat X Displacement

Max: 1.0 [mm] at 0.023 [s]
Min: -256.9 [mm] at 0.104 [s]

B-128

8655-F301-10R



String potentiometer failed

CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

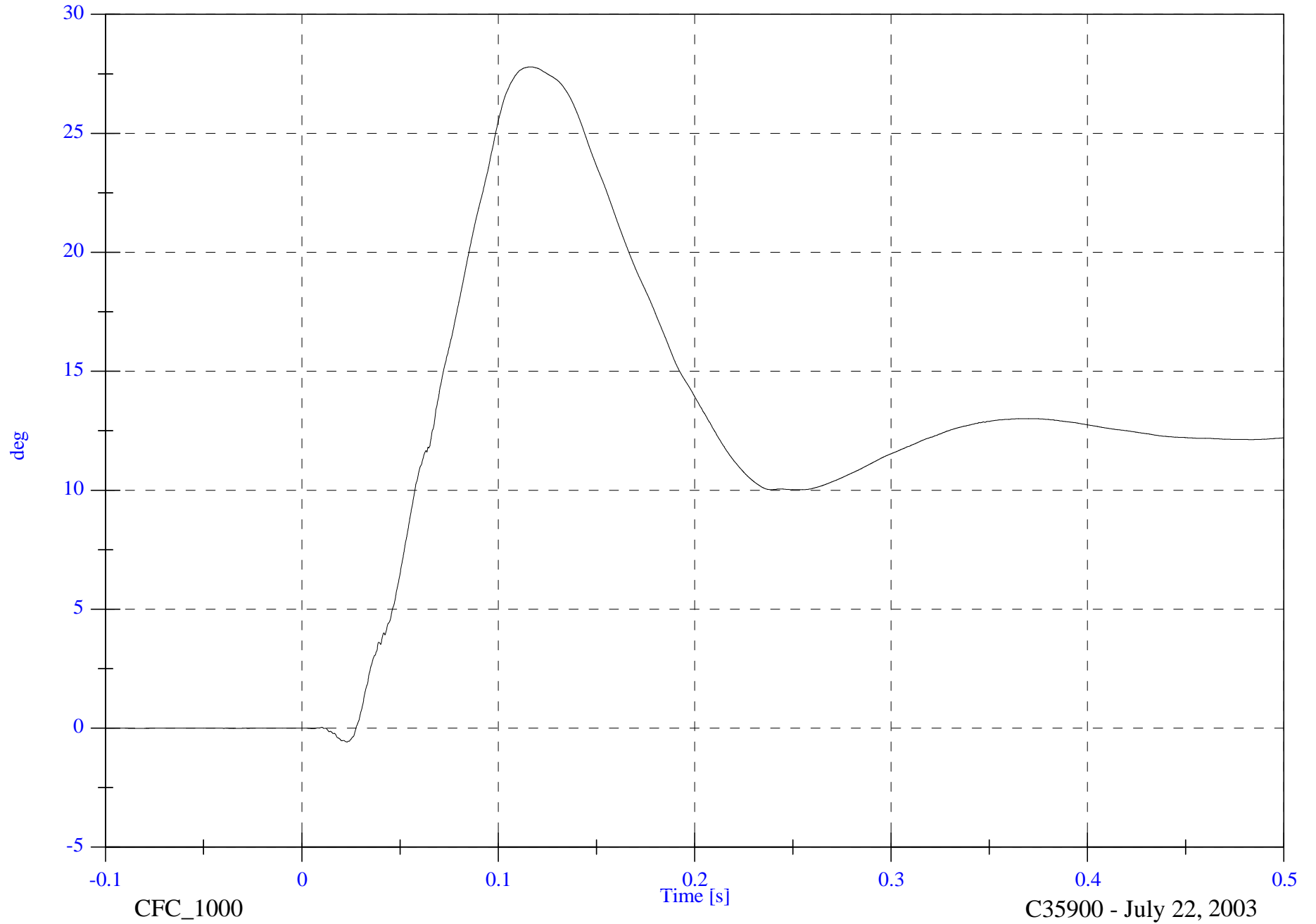
P1 Right Change in Seat Back Angle WRT Sill

Max: 27.8 [deg] at 0.117 [s]

Min: -0.6 [deg] at 0.023 [s]

B-129

8655-F301-10R



CFC_1000

Time [s]

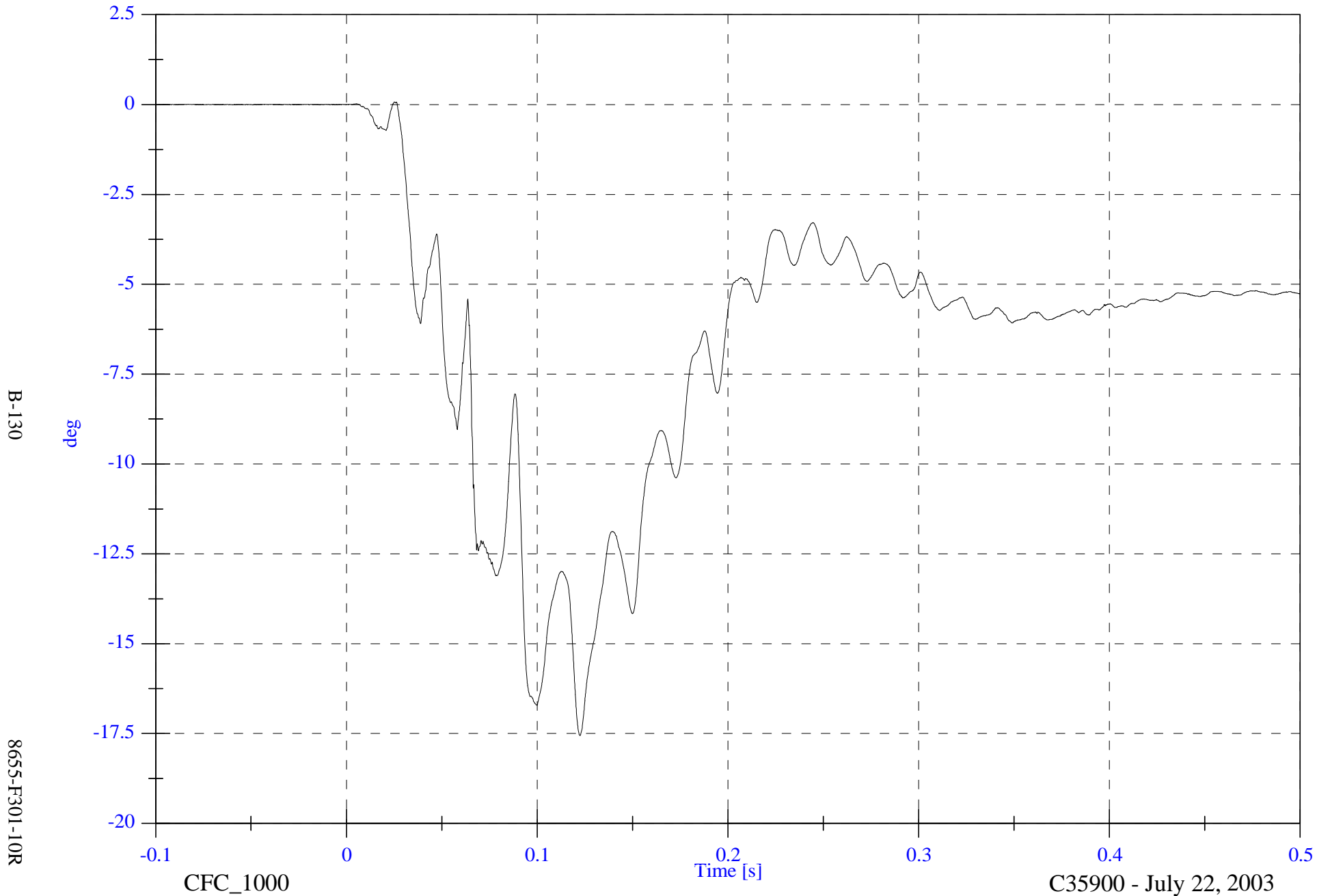
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

P1 Right Change in String Angle

Max: 0.1 [deg] at 0.026 [s]

Min: -17.6 [deg] at 0.123 [s]



B-130

8655-F301-10R

CFC_1000

Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

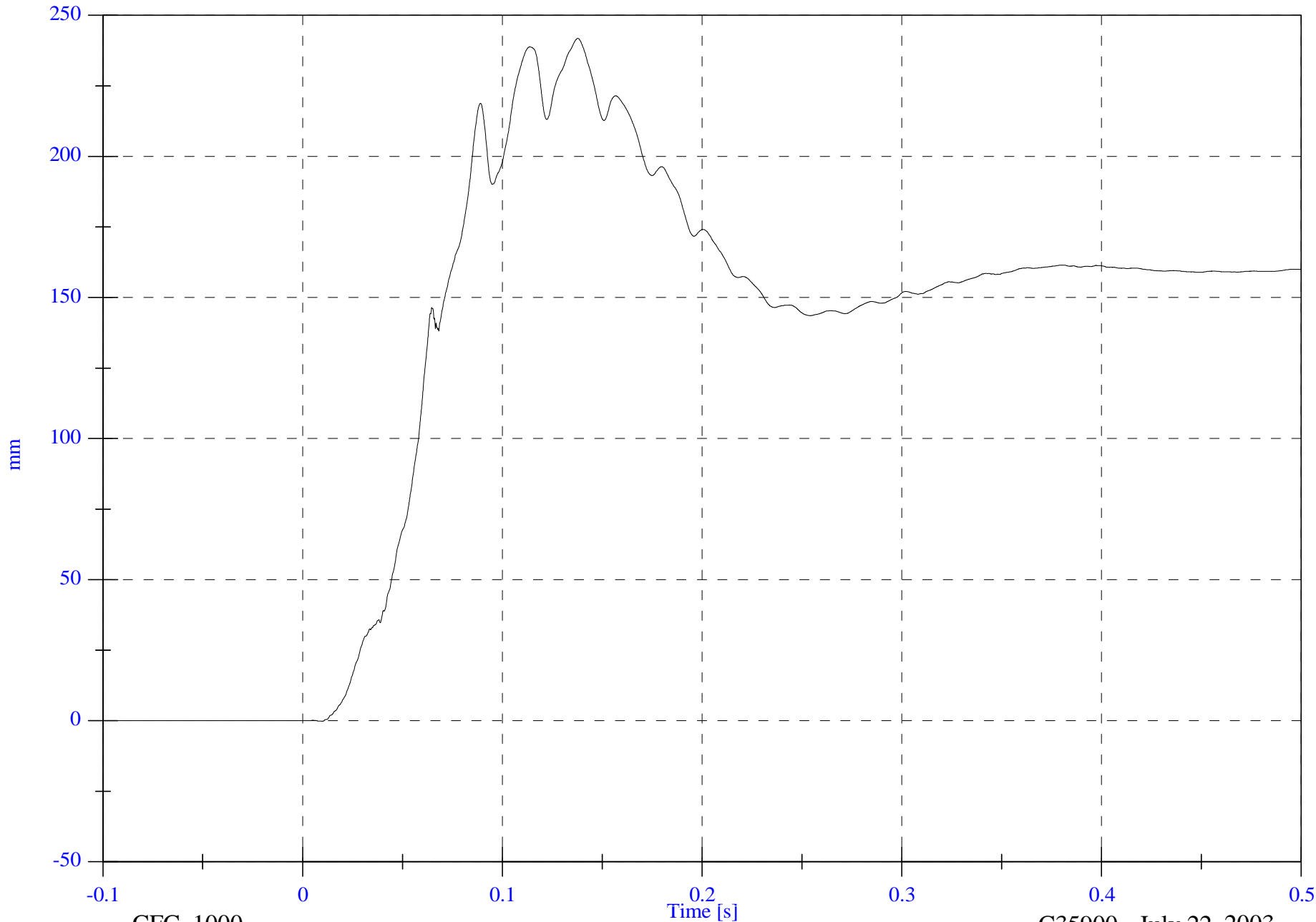
Max: 241.9 [mm] at 0.138 [s]

P1 Right Seat X Displacement

Min: -0.2 [mm] at 0.010 [s]

B-131

8655-F301-10R



CFC_1000

Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

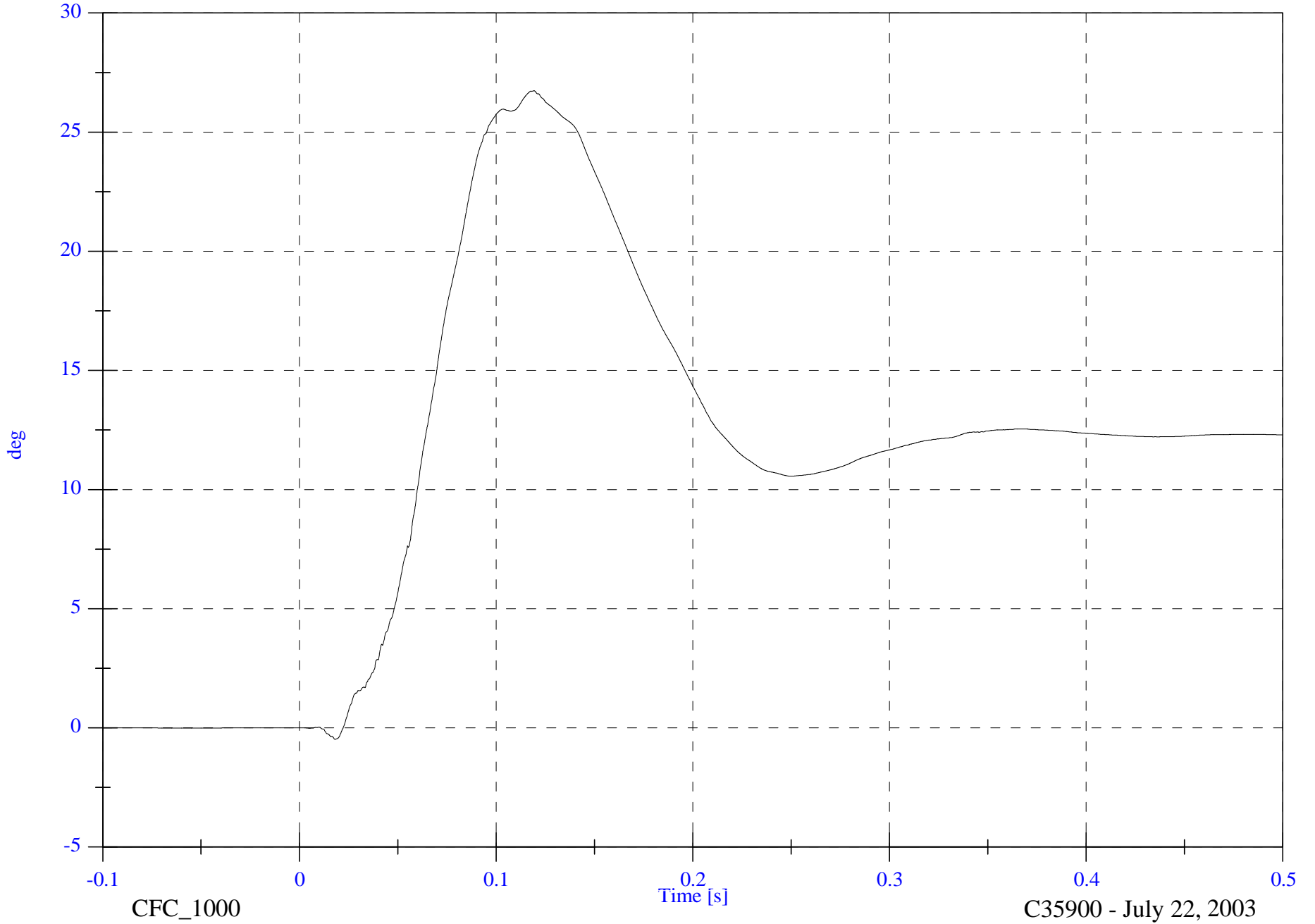
P2 Left Change in Seat Back Angle WRT Sill

Max: 26.7 [deg] at 0.119 [s]

Min: -0.5 [deg] at 0.018 [s]

B-132

8655-F301-10R



CFC_1000

Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

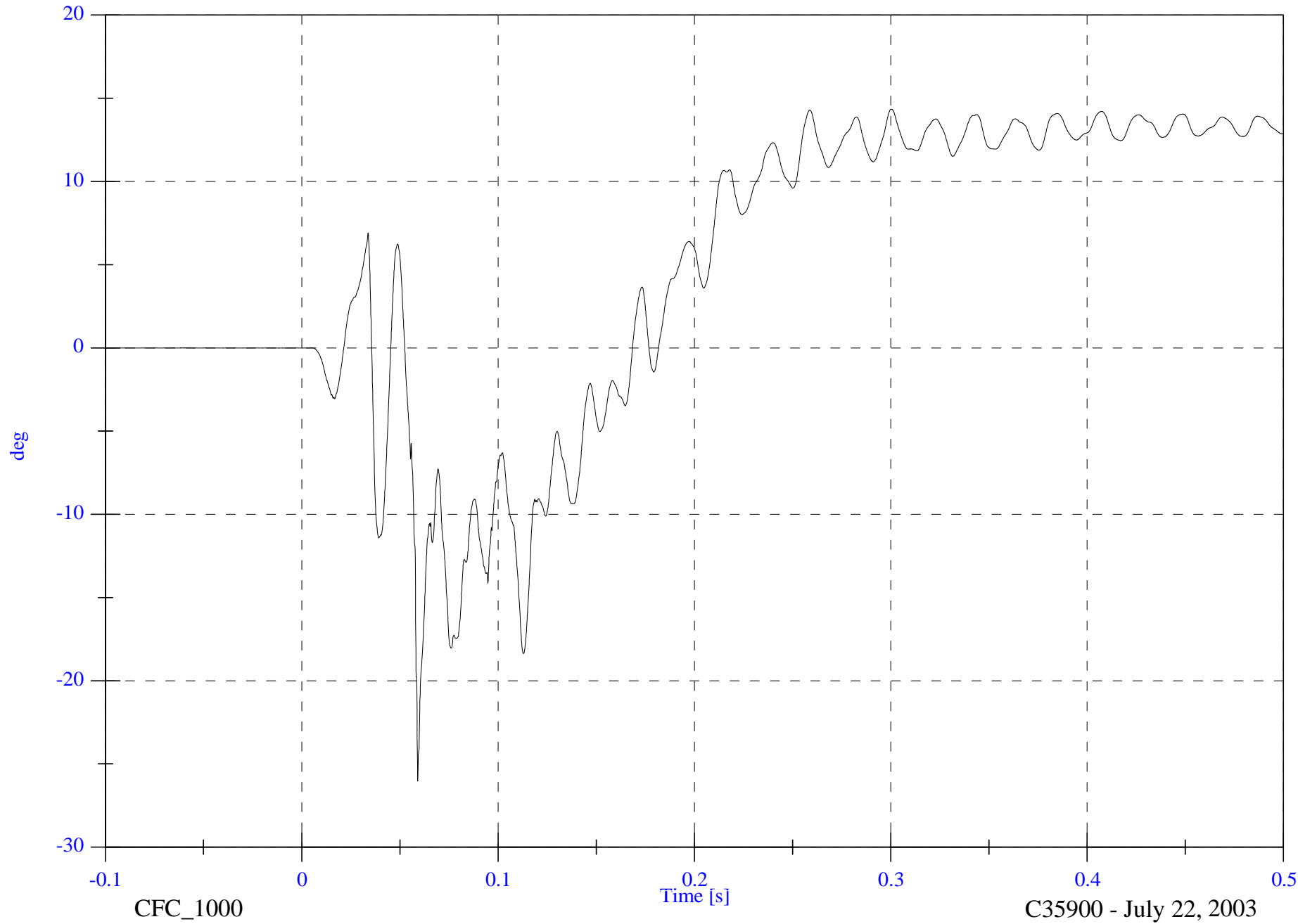
P2 Left Change in String Angle

Max: 14.4 [deg] at 0.300 [s]

Min: -26.0 [deg] at 0.059 [s]

B-133

8655-F301-10R



CFC_1000

Time [s]

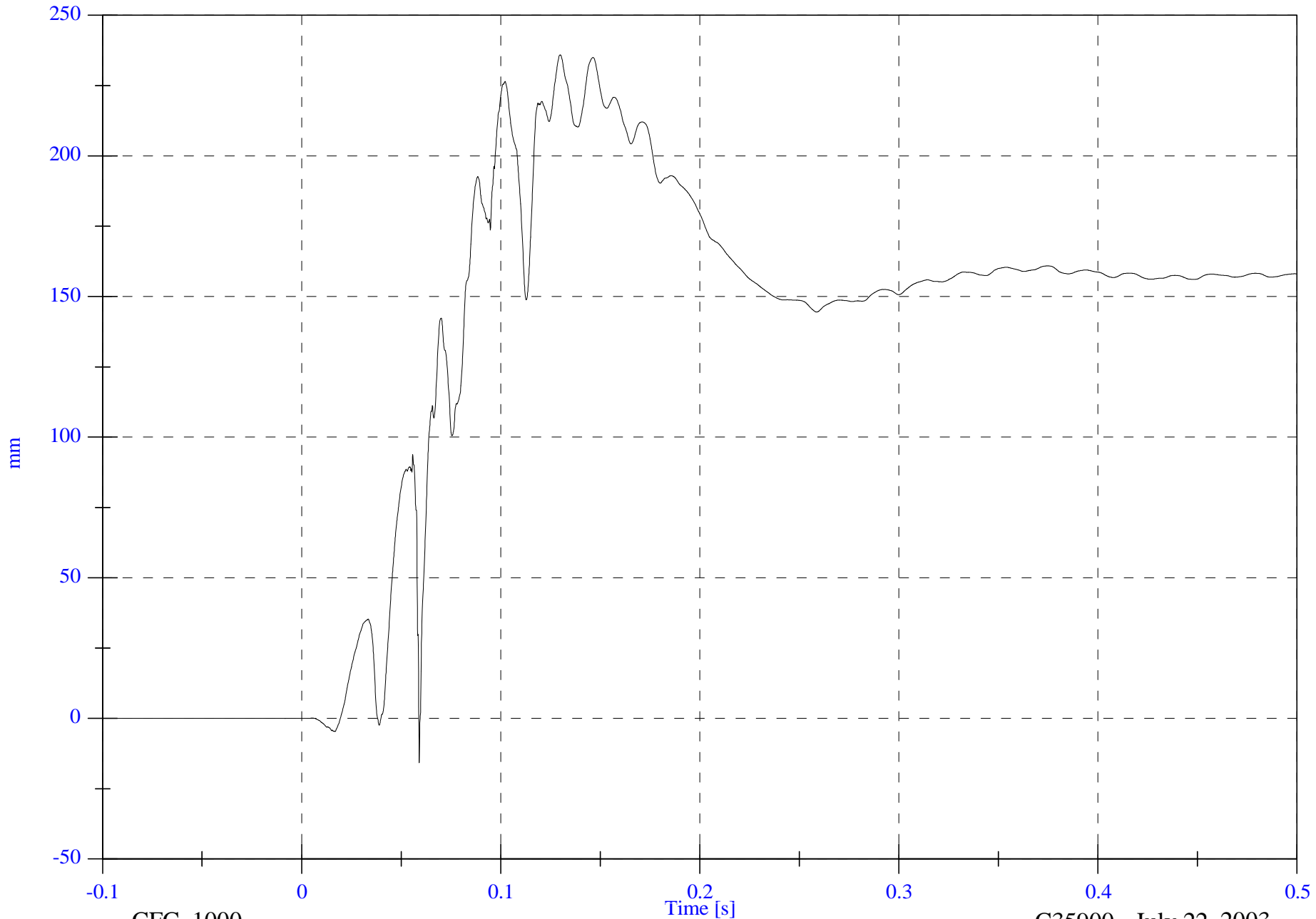
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

P2 Left Seat X Displacement

Max: 235.9 [mm] at 0.130 [s]

Min: -15.8 [mm] at 0.059 [s]



B-134

8655-F301-10R

CFC_1000

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

Max: 27.8 [deg] at 0.121 [s]

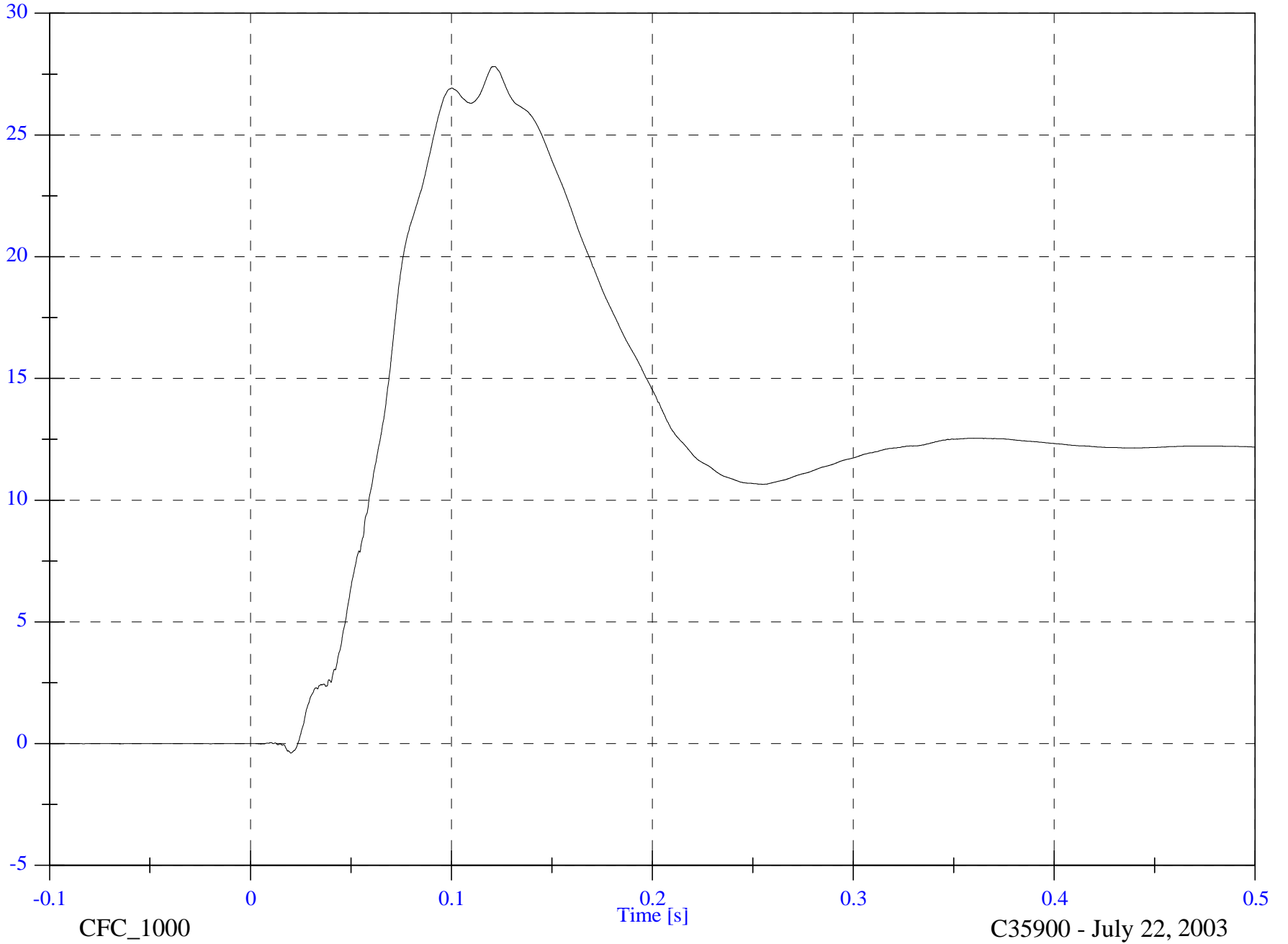
P2 Right Change in Seat Back Angle WRT Sill

Min: -0.4 [deg] at 0.020 [s]

B-135

deg

8655-F301-10R



CFC_1000

Time [s]

C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

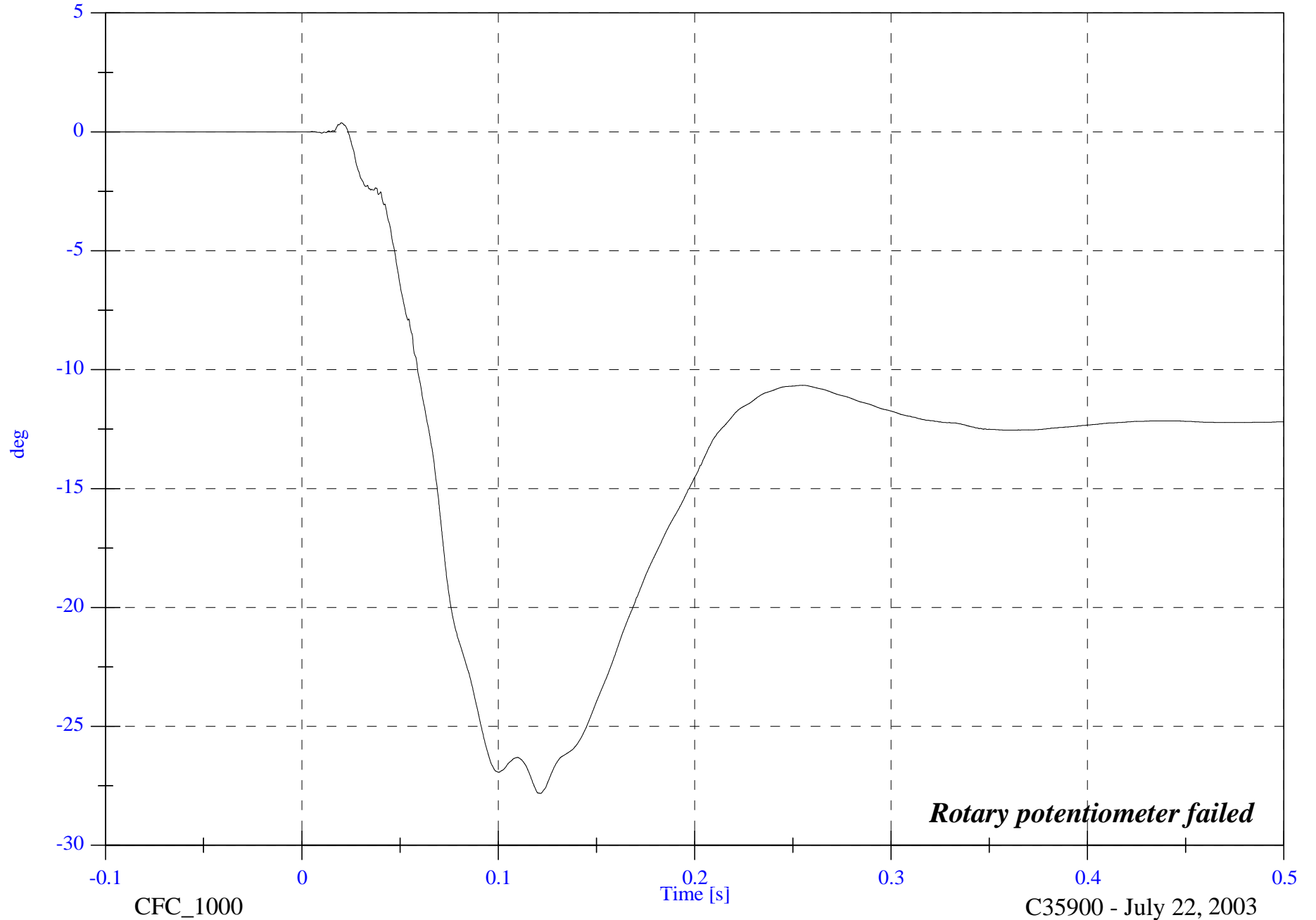
P2 Right Change in String Angle

Max: 0.4 [deg] at 0.020 [s]

Min: -27.8 [deg] at 0.121 [s]

B-136

8655-F301-10R



CFC_1000

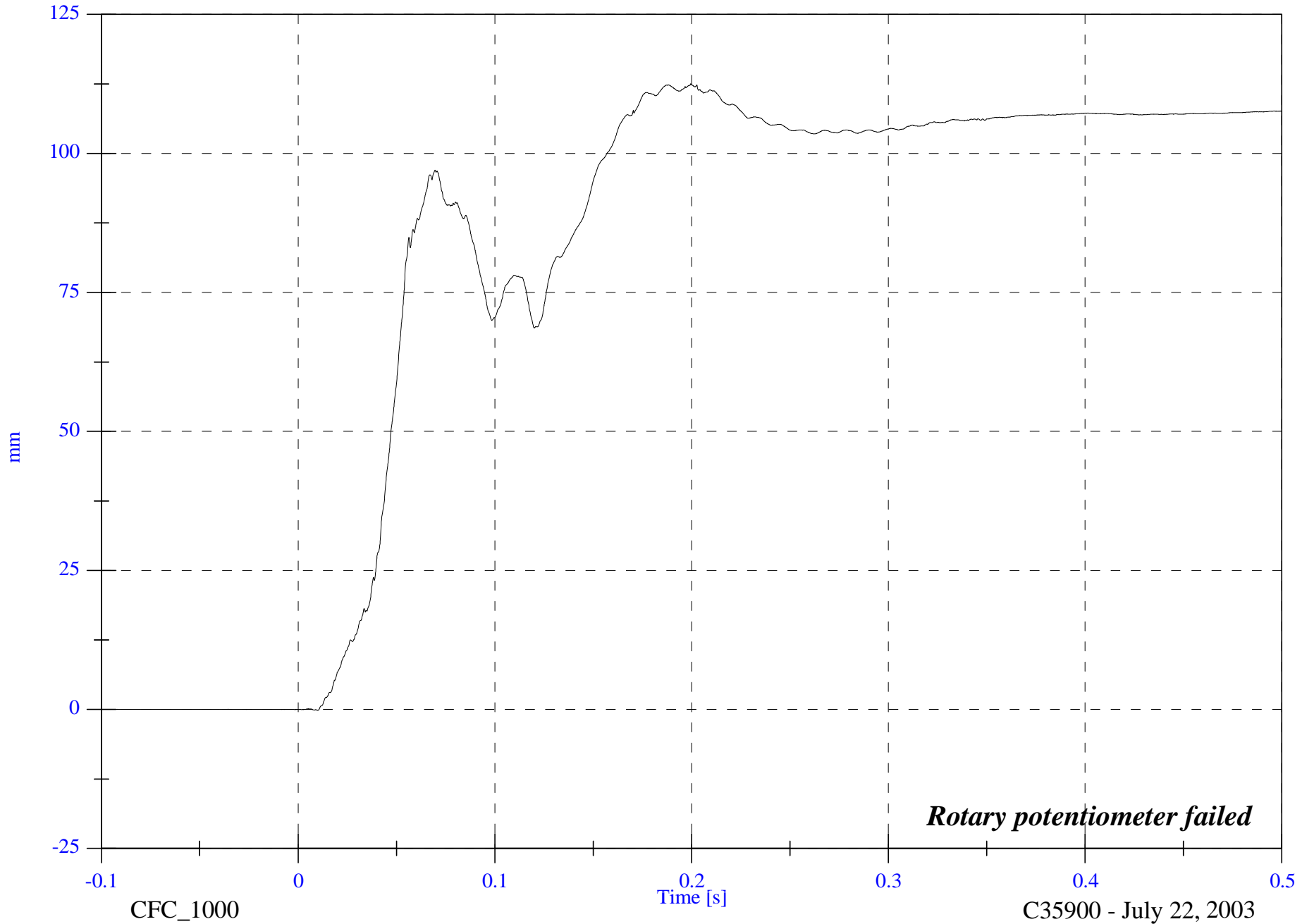
C35900 - July 22, 2003

FMVSS 301 Test 1 - 2003 Volvo V70

P2 Right Seat X Displacement

Max: 112.5 [mm] at 0.200 [s]

Min: -0.2 [mm] at 0.010 [s]



Rotary potentiometer failed

B-137

8655-F301-10R

CFC_1000

Time [s]

C35900 - July 22, 2003