

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

DAIMLERCHRYSLER CORPORATION  
2003 JEEP LIBERTY  
SUV

NHTSA NUMBER: R30403

GDAIS TEST NUMBER: 8757-V301-01

September 24, 2004

GENERAL DYNAMICS  
ADVANCED INFORMATION ENGINEERING SERVICES  
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FINAL REPORT

PREPARED FOR:

U.S. Department of Transportation  
Volpe National Transportation Systems Center  
Office of Safety and Security  
55 Broadway  
Cambridge, MA 02142

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15. Supplementary Notes			
16. Abstract <p>The purpose of this test is to evaluate the seat and occupant performance in moderate-to-high speed rear impacts. This test was performed following the OVSC Laboratory Test Procedure No. TP-301-03, dated February 28, and was modified as follows:</p> <ul style="list-style-type: none"> <li>- 2 fully instrumented Hybrid III ATDs were positioned in the left front seat (P1) and right rear seat (P3) in place of ballast ATDs.</li> <li>- 2 door mounted high speed cameras were installed.</li> <li>- 4 seatback frame and 1 front sill MHDs were installed.</li> <li>- 4 vehicle accelerometers were installed.</li> <li>- VRTC seatback translation device was installed.</li> </ul> <p>The ATDs were positioned following TP208-12 with the following exceptions:</p> <ul style="list-style-type: none"> <li>- Seatbacks for positions that contained a 50<sup>th</sup> percentile male were set to 25 degrees ± 1 degree as measured with the SAE J826 manikin.</li> <li>- Seats that contained a 5<sup>th</sup> percentile female were placed in a fore-aft position that allowed for the best high speed camera occupant view. If the 5<sup>th</sup> 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).</li> <li>- Moveable head restraints for seats that contained a 5<sup>th</sup> 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.</li> </ul>			
17. Key Words Seatback Rotation and Displacement Test FMVSS 301R Rear Impact Test		18. Distribution Statement Copies of this report are available from: NHTSA Technical Reference Division Room 5108 (NPO-230), 400 Seventh , S.W., Washington, D.C. 20590 Telephone No. (202) 366-4946	
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## SECTION 1

### PURPOSE OF TEST

This 30 mph rear impact dynamic seat test was performed on a 2003 Jeep Liberty SUV. 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 2034.5 kg 2003 Jeep Liberty SUV was impacted from the rear by an 1797 kg moving barrier at a velocity of 47.47 kph (29.5 mph). The test was performed by Advanced Information Engineering Services on September 24, 2004.

The vehicle was prepared and tested following the Office of Vehicle Safety Compliance Test Procedure for Federal Motor Vehicle Safety Standard (FMVSS) 301R (OVSC TP-301-03, dated February 28, 2003). For the purpose of acquiring information for Office of Vehicle Safety Research, the test was modified as follows:

- Instrumented 50<sup>th</sup> percentile male Part 572E Hybrid III ATDs were positioned in the left front driver seat (P1) and the right rear passenger seat (P3) in place of ballast ATDs.
- 2 high speed cameras were installed on the vehicle front doors.
- 4 front seatback frame MHDs and 1 front sill MHDs were installed 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 3-14 and 3-15 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 and seat data is summarized below.

	Seatback Rotation		HIC (36ms)	Nij				Head -to- Torso Rotation		Clip (g)	Chest Disp. (mm)	Femur	
	Left (deg)	Right (deg)		Ntf	Nte	Ncf	Nce	Flexion (deg)	Extension (deg)			Left (N)	Right (N)
<b>P1</b>	18.4	22.2	111.3	0.15	0.26	0.04	0.10	22.5	-47.4	16.4	-2.1	-274.4	-747.3
<b>P3</b>	10.5	9.2	207.1	0.15	0.23	0.06	0.01	22.3	-41.1	28.8	-4.7	-1206.5	-1274.5

The P1 seatback frame immediately above the adjustment mechanism deformed rearward and the left front seat track (fore/aft adjuster) slid rearward 78 mm during the impact. The adjustment mechanism remained operable following the test. The P1 seat back reclined statically 9.7 degrees from its pre-test position. The P3 seatback frame was deformed rearward statically 2.6 degrees from its pre-test position.

Electronic data anomalies are summarized below.

<b>Channel Number</b>	<b>Sensor Type</b>	<b>Sensor Location</b>	<b>Sensor Attachment (name)</b>	<b>Axis</b>	<b>Problem / Action</b>
31	AC	P3	HDCG (Head CG)	XL	Noise suspected in data from 89-121. Data acquisition unit channel was verified functional, accelerometer was replaced.
41	LC	P3	NEKL (Lower Neck)	XL	Connector pulled from of loadcell. Connector was cleaned and reattached. Connector locks were verified functional. (channels 41-43 used same connector)
42	LC	P3	NEKL (Lower Neck)	YL	Connector pulled from of loadcell. Connector was cleaned and reattached. Connector locks were verified functional. (channels 41-43 used same connector)
43	LC	P3	NEKL (Lower Neck)	ZL	Connector pulled from of loadcell. Connector was cleaned and reattached. Connector locks were verified functional. (channels 41-43 used same connector)

SECTION 3  
TEST DATA

DATA SHEET 1

TEST VEHICLE SPECIFICATIONS

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 2003 Jeep Liberty SUV  
 NHTSA No.: R30403 ; Color: Blue  
 Engine Data: 4 Cylinders; - CID; 2.4 Liters; - cc  
 Placement: X Longitudinal or In-Line; - Transverse or Lateral  
 Transmission Data: 5 Speeds; X Manual; - Automatic; - Overdrive  
 Final Drive: - Rear Wheel Drive; - Front Wheel Drive; X Four Wheel Drive  
 Major Options: X A/C; X Power Steering; X Power Brakes  
- Power Windows; - Power Door Locks; X Tilt Wheel  
 Date Received: 9/29/2004 ; Odometer Reading 51470 km  
 Selling Dealer: Ricart Chrysler, Plymouth, Jeep, Eagle  
 & Address: 465 S. Hamilton Rd., Columbus OH 43213

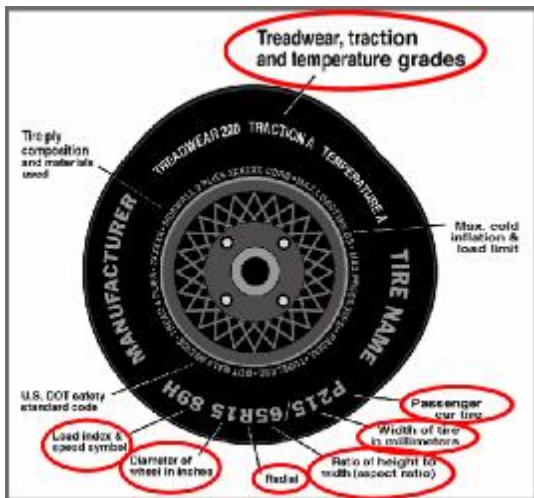
DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: DaimlerChrysler Corporation  
 Date of Manufacture: 8-03  
 VIN: 1J4GL481X3W506425  
 GVWR: 2359 kg; GAWR-FRONT: 1248 kg; GAWR-REAR: 1339 kg

DATA FROM VEHICLE'S TIRE LABEL:

Location of Placard on Vehicle: Driver Door  
 Recommended Tire Size: P215/75R16  
 \* Recommended Cold Tire Pressure: FRONT: 227 kPa; REAR: 227 kPa  
 Type of Spare Tire: P215/75R16 mounted on rear gate

DATA FROM TIRE SIDEWALL:



Size of Tires on Test Vehicle: P215/75R16  
 Manufacturer and Model: Goodyear Wrangler ST  
 Maximum Cold Tire Pressure: 300 kPa  
 Load Index and Speed Symbol: 101S  
 Treadwear Grade: 340  
 Traction Grade: A  
 Temperature Grade: B

\*Tire pressure used for test.



DATA SHEET 2 (continued)

VEHICLE DATA

TYPE OF TEST:

Type of Test: Rear Barrier Impact Angle: 0°  
Test Date: September 24, 2004 Time: 15:28 Temperature: 22.2 °C  
Vehicle NHTSA No.: R30403 VIN: 1J4GL481X3W506425  
Required Impact Velocity Range: 46.51 to 48.12 kph

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

Trap No. 1 = 47.47 kph; Trap No. 2 = 47.47 kph  
Average Impact Speed = 47.47 kph

VEHICLE STATIC CRUSH:

Vehicle Length:

Pre-Test Left = 4190 ; C/L = 4445 Right = 4190  
Post-Test Left = 4058 ; C/L = 4163 Right = 4062  
Crush Left = 132 ; C/L = 282 Right = 128  
AVERAGE = 181 millimeters

DATA SHEET 3

MOVING BARRIER DATA

WEIGHT OF MOVING BARRIER:

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

MOVING BARRIER DIMENSIONS:

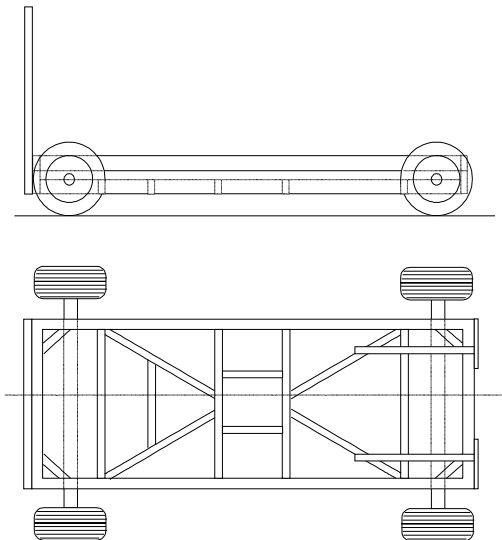
Barrier Face Height: 1524 mm  
Barrier Face Width: 1981 mm  
Barrier Face Ground Clearance: 127 mm  
Tread Width: 1511 mm  
Wheel Base: 3048 mm  
Location of C.G.: X: 1344 mm rearward of front wheel center.  
Y: 0 mm from longitudinal-vertical plane of symmetry.  
Z: 414 mm above ground.

MOVING BARRIER TIRES:

Manufacturer: Dunlop  
Model: AT Radial Rover  
Size: P205/75R15  
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>		
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>-</u>	<u>X</u>		
Power:	<u>-</u>	<u>X</u>		
Lever (with detents):	<u>X</u>	<u>-</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>X</u>	<u>-</u>		
Adjustable:	<u>-</u>	<u>X</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>18</u>	Travel: <u>215</u> mm
Manual-Infinite:	<u>-</u>	<u>X</u>	Travel: <u>-</u> mm	
SEAT CUSHION VERTICAL	YES	NO		DETAILS
Fixed:	<u>X</u>	<u>-</u>		
Power:	<u>-</u>	<u>X</u>		
Manual-Detents	<u>-</u>	<u>X</u>		
Manual-Infinite	<u>-</u>	<u>X</u>		
SEAT TEST POSITION				
Seat Cushion Fore-aft:	<u>Mid-position (detent 9) OR 107.5 mm forward of rearward-most position</u>			
Seat Cushion Vertical:	<u>Fixed</u>			
Seat Back:	<u>25 degree torso angle as set with the H-point machine.</u>			
Head Restraint:	<u>Fixed</u>			

DATA SHEET 4 (continued)

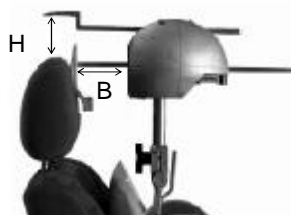
SEAT DATA

P3 DATA:

HEAD RESTRAINT	YES	NO	DETAILS
Fixed:	<u>-</u>	<u>X</u>	
Vertical Adjustment:	<u>X</u>	<u>-</u>	
Vertical Locks:	<u>X</u>	<u>-</u>	Prevents head restraint from sliding downward. Button must be pushed to move restraint downward.
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>-</u>	<u>X</u>	Forward folding seatback latches in a single upright position for occupant use. Latch is located at the upper outboard side of the seatback.
LUMBAR ADJUSTMENT	YES	NO	DETAILS
Fixed:	<u>X</u>	<u>-</u>	
Adjustable:	<u>-</u>	<u>X</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>X</u>	<u>-</u>	
Power:	<u>-</u>	<u>X</u>	Travel: <u>-</u> mm
Manual-Detents:	<u>-</u>	<u>X</u>	First Detent: <u>-</u> Last Detent: <u>-</u> Travel: <u>-</u> mm
Manual-Infinite:	<u>-</u>	<u>X</u>	Travel: <u>-</u> mm
SEAT CUSHION VERTICAL	YES	NO	DETAILS
Fixed:	<u>X</u>	<u>-</u>	
Power:	<u>-</u>	<u>X</u>	
Manual-Detents	<u>-</u>	<u>X</u>	
Manual-Infinite	<u>-</u>	<u>X</u>	
SEAT TEST POSITION			
Seat Cushion Fore-aft:	<u>Fixed</u>		
Seat Cushion Vertical:	<u>Fixed</u>		
Seat Back:	<u>Fixed</u>		
Head Restraint:	<u>Full up</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:	50	65	25.0	789
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:	50	65	25.0	789
Head restraint positioning details:	None			

P3 DATA:

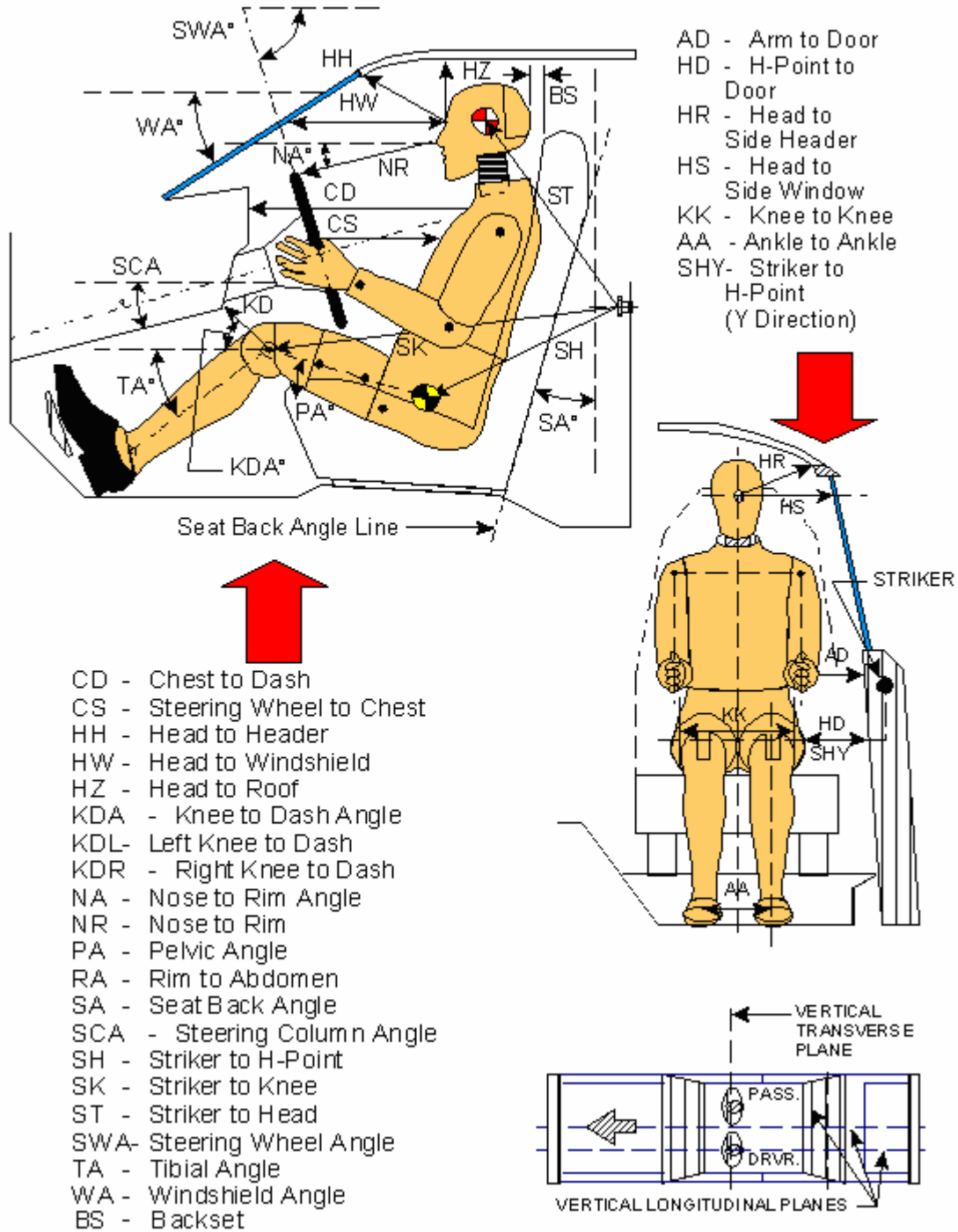
ICBC MEASUREMENTS

HEAD RESTRAINT POSITION (vertical/fore-aft)	B (mm, backset)	H (mm, height)	Torso Angle (deg)	Height Along Torso Line From Pivot (mm)
Full Up / Fixed:	80	45	24.8	833
Full Down / Fixed:	75	105	24.8	769
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)
Full Up / Fixed:	80	45	24.8	833
Head restraint positioning details:	Head restraint was positioned full up.			

DATA SHEET 6

DUMMY MEASUREMENTS

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS



DATA SHEET 6 (continued)

DUMMY MEASUREMENTS

	DRIVER (Serial #202)			PASS. (Serial #206)		
WA <sup>o</sup>	43.6 deg.			N/A		
SWA <sup>o</sup>	65.7 deg.			N/A		
SCA <sup>o</sup>	24.3 deg.			N/A		
SA <sup>o</sup>	25.0 deg. (H-point machine back pan)			24.8 deg. (H-point machine back pan)		
HZ	218			298		
HH	435			1290		
HW	560			1450		
HR	194			242		
NR	417	Angle	17 deg.	N/A		
CD	520			1426		
CS	294			N/A		
RA	190			N/A		
KDL	136	Angle (KDA)	7 deg.	1008		
KDR	134			1008	Angle (KDA)	3 deg.
PA <sup>o</sup>	24.6 deg.			24.5 deg.		
TA <sup>o</sup>	61.0 deg.			62.0 deg.		
KK	372			306		
AA	255			170		
ST	592	Angle	5 deg.	400	Angle	11 deg.
SK	592	Angle	85 deg.	612	Angle	102 deg.
SH	211	Angle	105 deg.	335	Angle	134 deg.
SHY	208			220		
HS	330			350		
HD	195			152		
AD	82			90		
BS*	64			106		

\*Note: Measured with ATD in final seating position  
Dimensions in millimeters

DATA SHEET 7

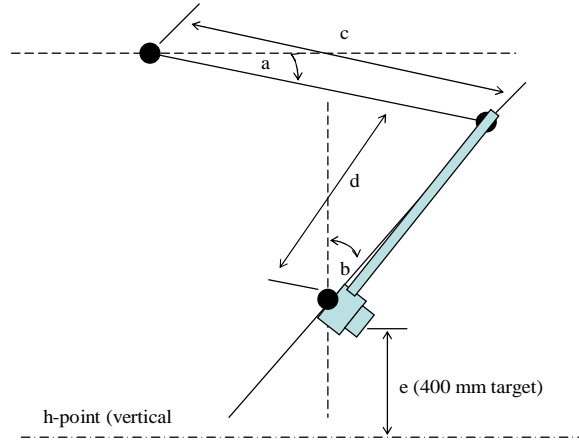
VEHICLE AND SEAT INSTRUMENTATION MEASUREMENTS

VEHICLE INSTRUMENTATION					
LOCATION	TRANSDUCER TYPE	DIRECTION OF MEASURE	PRE-TEST DIMENSIONS (mm) *		
			X	Y	Z
Left Rear Seat Cross Member	Accelerometer	X	1905	-680	-465
Left Rear Seat Cross Member Redundant	Accelerometer	X	1905	-680	-465
Right Rear Seat Cross Member Redundant	Accelerometer	X	1905	680	-465
Right Rear Seat Cross Member	Accelerometer	X	1905	680	-465
Left Front Sill	MHD ARS-06	About Y	2665	656	-465
Right Front Sill	MHD ARS-06	About Y	-	-	-

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

DATA SHEET 7 (continued)

VEHICLE AND SEAT INSTRUMENTATION MEASUREMENTS



DIMENSION	P1 LEFT	P1 RIGHT	P3 LEFT	P3 RIGHT
a (deg from horiz.)	35.6	36.6	31.2	30.9
b (deg from vertical)	22.2	22.2	24.1	22.2
c (mm)	306	312	374	360
d (mm)	380	380	365	365
e (mm, target=400)	330	330	400	400

SEATBACK ANGLE	P1		P3	
	PRE (deg)	POST (deg)	PRE (deg)	POST (deg)
Left MDH Bracket	20.9	29.1	22.8	24.3
Right MHD Bracket	20.9	30.8	20.9	23.4
Front Sill	-1.1	-1.4	-1.1	-1.4

**POST TEST DETAILS**

Seatback Deformation: The P1 seatback frame immediately above the adjustment mechanism deformed rearward. The P1 seat back reclined 9.7 degrees statically from its pre-test position. The P3 seatback frame deformed (reclined) rearward 2.6 degrees statically from its pre-test position.

Seat/Floor Attachment Point Deformation: No deformation of the seat/floor attachment points. The P1 left front seat track (fore/aft adjuster) slid rearward 78 mm during the impact.

Recliner Mechanism Deformation: None. The adjustment mechanism remained operable following the test.

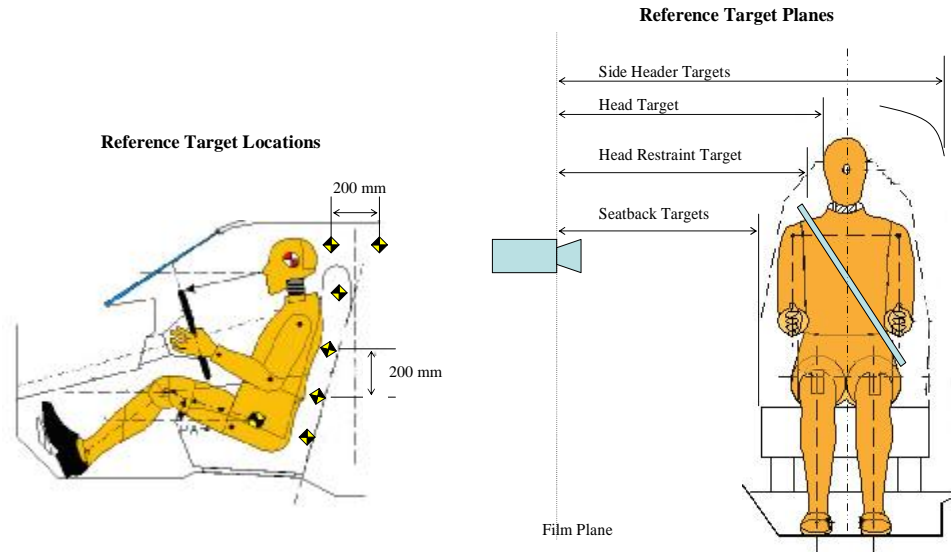
Comments: None

DATA SHEET 8

REFERENCE TARGET MEASUREMENTS

NHTSA No. : R30403

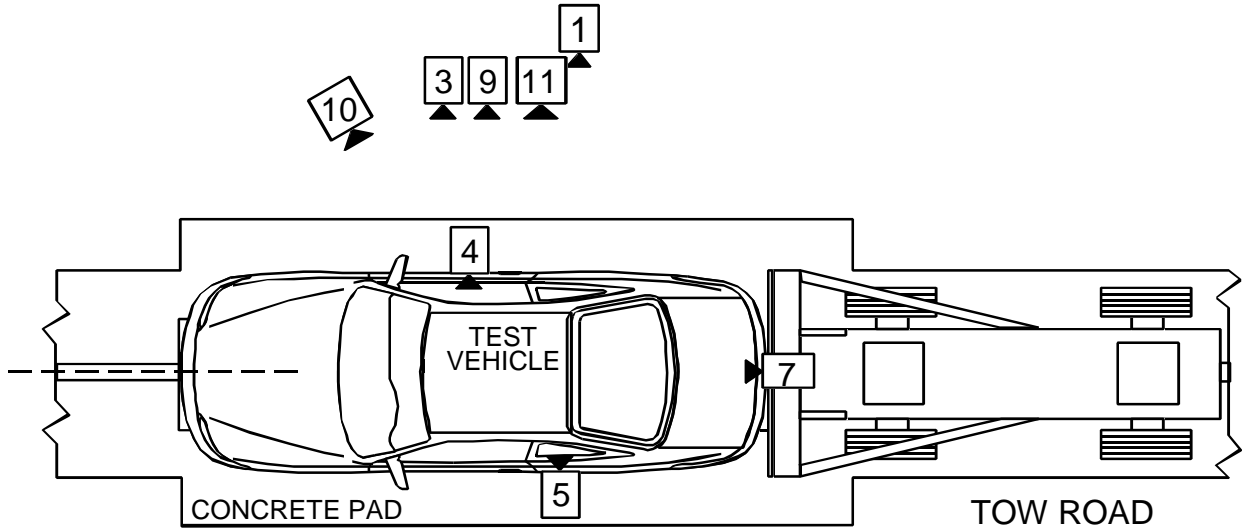
Vehicle : 2003 Jeep Liberty SUV



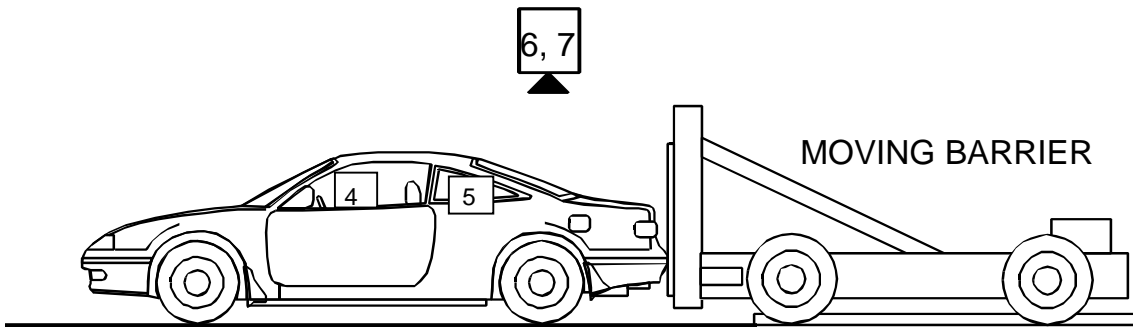
Film Plane to Reference Plane Distance		
Plane	Front Occupant View (mm)	Rear Occupant View (mm)
Seatback	1090	-
Head Restraint	1250	1217
Head Target	1280	1255
Side Header	1487	1439

DATA SHEET 9

HIGH SPEED CAMERA LOCATIONS



2 8  
TOP VIEW



LEFT SIDE VIEW

DATA SHEET 9 (continued)

HIGH SPEED CAMERA LOCATIONS

NHTSA No. : R30403

Vehicle : 2003 Jeep Liberty SUV

CAMERA NO.	VIEW	CAMERA POSITIONS (mm)*			ANGLE** (degrees)	LENS (mm)	SPEED (fps)
		X	Y	Z			
1	Real-Time Camera	-	-	-	-	-	24
2	Left Side View	9960	1785	1255	-1	25	1000
3	Right Side View	10445	2430	1230	-1	25	1005
4	Onboard Driver	915	2420	1225	-9	8	1000
5	Onboard Passenger	960	1605	1215	-12	8	1000
6	Overhead Overall View	0	620	4880	90	8	1000
7	Overhead Close View	0	360	4880	90	12.5	1000
8	Left Side Video	8675	2920	1365	-3	28	1000
9	Right Side Video	7640	2390	1395	-3	28	1000
10	Driver/Interior Video	2615	3200	1610	-7	50	1000
11	Driver and Passenger Right Side Close Video	4930	310	1360	0	28-70	1000

- \* 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

DATA SHEET 10

FUEL SYSTEM PERFORMANCE

TEST VEHICLE NHTSA NO.: R30403 TEST DATE: September 24, 2004  
 Vehicle Mfgr./Make/Model: 2003 Jeep Liberty SUV

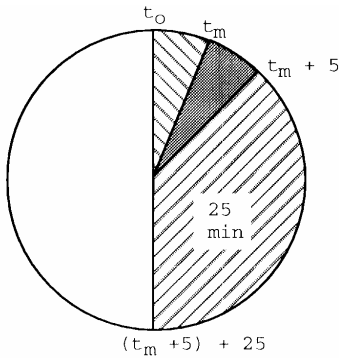
**FUEL SYSTEM DATA:**

Fuel System Capacity From Owner's Manual = 70.0 liters  
 Usable Capacity Figure Furnished by COTR = 70.0 liters  
 Test Volume Range (91 to 94% of Usable Capacity) = 63.7 to 65.8 liters  
 ACTUAL TEST VOLUME= 64.35 liters (with entire fuel system filled)  
 Test Fluid Type: Stoddard Solution Test Fluid Color: Orange  
 Test Fluid Specific Gravity: 0.764 Test Fluid Kinematic Viscosity: 0.96 centistokes  
 Type of Vehicle Fuel Pump: Electric  
 Electric Fuel Pump Operation with Ignition Switch ON and Engine OFF: When the ignition is switched on without starting the engine, the fuel pump operates briefly then shuts off.  
 Details of Fuel System: Fuel filler is located on the left rear quarter panel aft of the rear axle; Fuel tank is located on the vehicle underbody rear of the rear axle; Fuel lines are routed along the left side of the vehicle underbody.

\*\*\*\*\*

**TEST VEHICLE IMPACT TYPE:** Rear Moving Barrier (42.31 kph target velocity)

**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	28 g
0	28 g.
0	28 g/min.

**SOLVENT SPILLAGE DETAILS:**

None

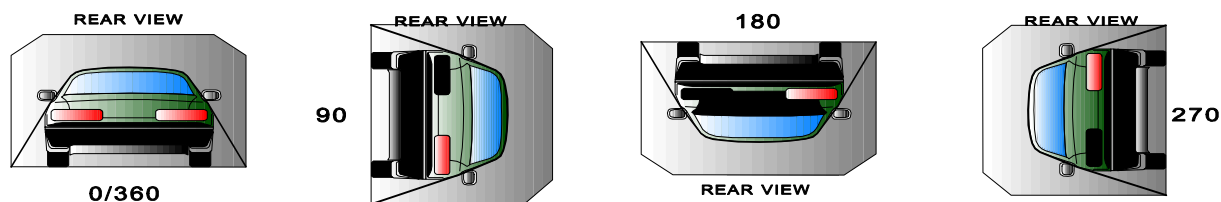
DATA SHEET 10 (continued)

FUEL SYSTEM PERFORMANCE

STATIC ROLLOVER DATA SHEET

Vehicle: 2003 Jeep Liberty SUV

NHTSA No.: R30403



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Stage	Rotation Time (spec. 1 -3 min)				FMVSS 301 Hold Time		Total Time				Next Whole Minute Interval	
	1	minutes	5	seconds	5	minutes	6	minutes	5	seconds	7	minutes
0° - 90°	1	minutes	5	seconds	5	minutes	6	minutes	5	seconds	7	minutes
90° - 180°	1	minutes	7	seconds	5	minutes	6	minutes	7	seconds	7	minutes
180°-270°	1	minutes	4	seconds	5	minutes	6	minutes	4	seconds	7	minutes
270°-360°	1	minutes	8	seconds	5	minutes	6	minutes	8	seconds	7	minutes

II. FMVSS 301 REQUIREMENTS: (Maximum allowable solvent spillage):

First 5 minutes from onset of rotation	6th min.	7th min.	8th min. (if required)
142 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

Rollover Stage	First 5 minutes from onset of rotation (g)	6th min. (g)	7th min. (g)	8th min. (if required) (g)
0° - 90°	0	0	Trace	-
90° - 180°	Trace	Trace	Trace	-
180°-270°	22.7	2.8	2.8	-
270°-360°	56.7	0	0	-

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

IV. SOLVENT SPILLAGE LOCATION(S):

Rollover Stage	Spillage Location
0° - 90°	Between top of fuel tank and vehicle underbody.
90° - 180°	Between top of fuel tank and vehicle underbody.
180°-270°	Between top of fuel tank and vehicle underbody.
270°-360°	Between top of fuel tank and vehicle underbody.

Appendix A  
PHOTOGRAPHS

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Figure A-1 DRIVER ICBC BACKSET VIEW



Figure A-2 PASSENGER ICBC BACKSET VIEW



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Figure A-3 PRE-TEST DRIVER BACKSET VIEW



Figure A-4 PRE-TEST PASSENGER BACKSET VIEW



Figure A-5 PRE-TEST DRIVER SEAT CLOSE-UP VIEW



Figure A-6 POST-TEST DRIVER SEAT CLOSE-UP VIEW



Figure A-7 PRE-TEST DRIVER SEAT PERPENDICULAR VIEW

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Figure A-8 POST-TEST DRIVER SEAT PERPENDICULAR VIEW

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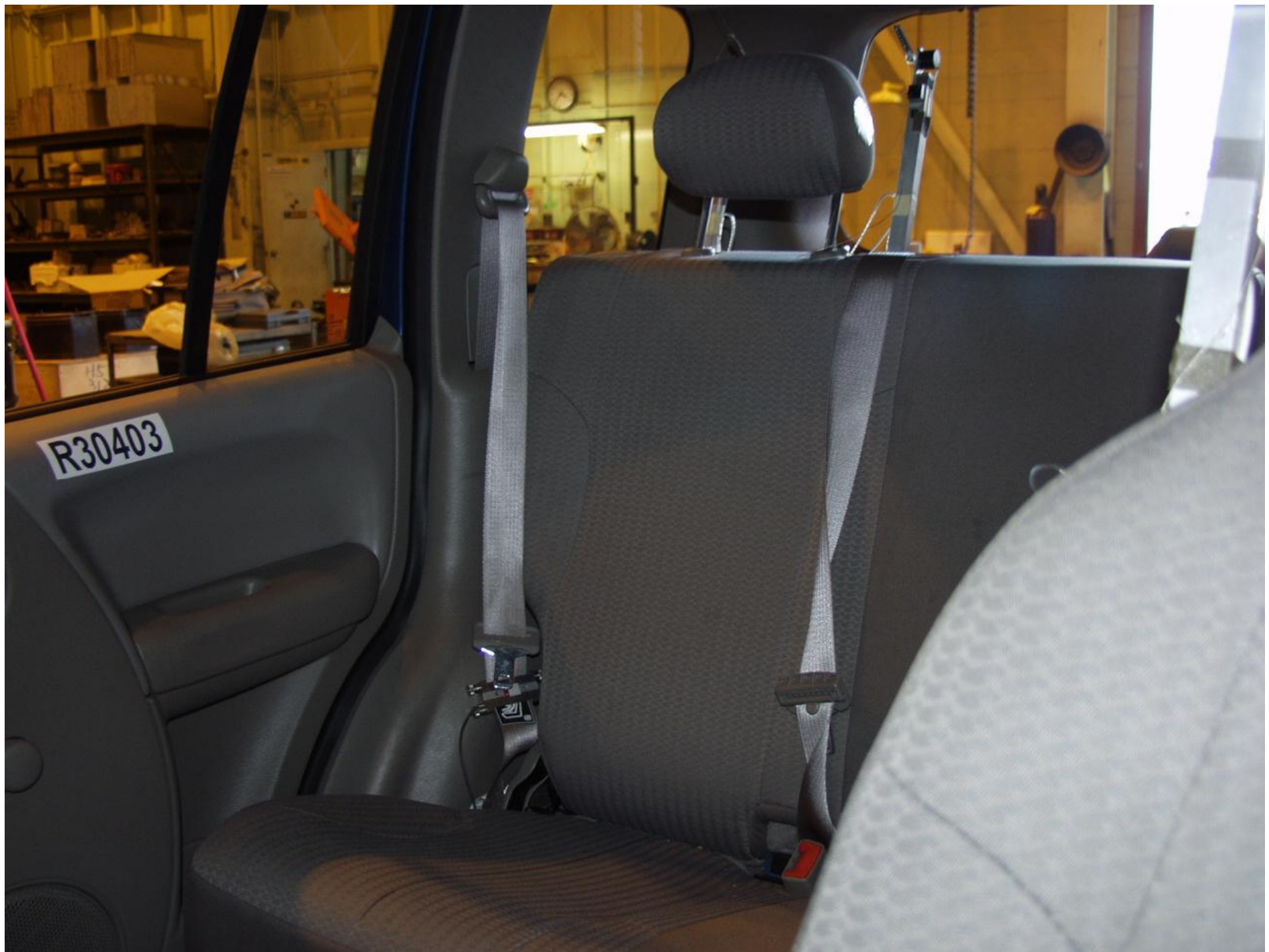


Figure A-9 PRE-TEST PASSENGER SEAT CLOSE-UP VIEW

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Figure A-10 POST-TEST PASSENGER SEAT CLOSE-UP VIEW



Figure A-11 PRE-TEST PASSENGER SEAT PERPENDICULAR VIEW



Figure A-12 POST-TEST PASSENGER SEAT PERPENDICULAR VIEW



Figure A-13 PRE-TEST DRIVER LEFT SIDE VIEW



Figure A-14 POST-TEST DRIVER LEFT SIDE VIEW



Figure A-15 PRE-TEST DRIVER RIGHT SIDE VIEW



Figure A-16 POST-TEST DRIVER RIGHT SIDE VIEW



Figure A-17 PRE-TEST DRIVER ISOMETRICAL VIEW



Figure A-18 POST-TEST DRIVER ISOMETRICAL VIEW



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Figure A-19 PRE-TEST PASSENGER LEFT SIDE VIEW



Figure A-20 POST-TEST PASSENGER LEFT SIDE VIEW



Figure A-21 PRE-TEST PASSENGER RIGHT SIDE VIEW



Figure A-22 POST-TEST PASSENGER RIGHT SIDE VIEW



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Figure A-23 PRE-TEST PASSENGER ISOMETRICAL VIEW



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Figure A-24 POST-TEST PASSENGER ISOMETRICAL VIEW



Figure A-25 PRE-TEST FRONT VIEW



Figure A-26 POST-TEST FRONT VIEW



Figure A-27 PRE-TEST LEFT SIDE VIEW



Figure A-28 POST-TEST LEFT SIDE VIEW



Figure A-29 PRE-TEST RIGHT SIDE VIEW



Figure A-30 POST-TEST RIGHT SIDE VIEW



Figure A-31 PRE-TEST REAR VIEW



Figure A-32 POST-TEST REAR VIEW



Figure A-33 PRE-TEST LEFT FRONT THREE-QUARTER VIEW



Figure A-34 POST-TEST LEFT FRONT THREE-QUARTER VIEW



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Figure A-35 PRE-TEST RIGHT REAR THREE-QUARTER VIEW



Figure A-36 POST-TEST RIGHT REAR THREE-QUARTER VIEW



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Figure A-37 PRE-TEST FRONT UNDERBODY VIEW



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Figure A-38 POST-TEST FRONT UNDERBODY VIEW



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Figure A-39 PRE-TEST REAR UNDERBODY VIEW



Figure A-40 POST-TEST REAR UNDERBODY VIEW

MFD BY DAIMLERCHRYSLER CORPORATION DATE OF MFR 8-02 GVWR 2359 KG(05200 LB)

GAWR FRONT 1248 KG(2750 LB) WITH TIRES P215/75R16 RIMS AT 16X7 COLD 227 KPA(33 PSI)  
GAWR REAR 1339 KG(2950 LB) WITH TIRES R215/75R16 RIMS AT 16X7 COLD 227 KPA(33 PSI)

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY AND THEFT PREVENTION STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

VIN: 1J4GL481X3W506425 TYPE: MPV SINGLE X DUAL



MDH: 080616 775AA PNT:PBJ VEHICLE MADE IN U.S.A. TRM:M5L5 4648503

Figure A-41 CERTIFICATION PLACARD

MFD BY DAIMLERCHRYSLER CORPORATION DATE OF MFR 8-02 GVWR 2359 KG(05200 LB)

GAWR FRONT	WITH TIRES	RIMS AT	COLD
1248 KG(2750 LB)	P215/75R16	16X7	227 KPA(33 PSI)
GAWR REAR	WITH TIRES	RIMS AT	COLD
1339 KG(2950 LB)	R215/75R16	16X7	227 KPA(33 PSI)

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY AND THEFT PREVENTION STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

VIN: 1J4GL481X3W506425 TYPE: MPV SINGLE X DUAL



MDH: 080616 775AA PNT:PBJ VEHICLE MADE IN U.S.A. TRM:M5L5 4648503

Figure A-42 TIRE PLACARD



Figure A-43 ROLLOVER 90°



Figure A-44 ROLLOVER 180°

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Figure A-45 ROLLOVER 270°



Figure A-46 ROLLOVER 360°



Figure A-47 STODDARD SPILLAGE AT 90°

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Figure A-48 STODDARD SPILLAGE AT 270°

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

TEST NO. R30403

MEASUREMENT	SAE FILTER CHANNEL CLASS
Head Accelerations	1000
Head Angular Velocity	1000
Neck Forces	1000
Neck Moments	600
Chest Accelerations	180
Chest Angular Velocity	600
Chest Rotations	1000
Pelvic Accelerations	1000
Belt Forces	60
Belt Spoolout	180
Vehicle Accelerations	60
Vehicle Angular Velocity	1000

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





**Maximum and Minimum Data**

NAME	Unit	Max	msec	Min	msec	Comment
V2P1 Head x	g	28.2	121.3	-5.9	359.1	
V2P1 Head y	g	3.0	150.8	-1.2	67.4	
V2P1 Head z	g	20.3	108.9	-1.2	59.6	
V2P1 Head Resultant	g	30.7	119.8	0.0	-14.1	
V2P1 Head AVy	deg/s	1506.5	102.8	-1056.3	206.9	
V2P1 Head Comp AVy	deg/s	1586.7	102.9	-1059.2	209.1	f2=0.283 Hz; f4=0.001 Hz
V2P1 Head Comp ADy	deg	62.4	119.1	-52.0	358.2	f2=0.283 Hz; f4=0.001 Hz
V2P1 Upper Neck Fx	N	367.4	122.7	-217.9	358.2	
V2P1 Upper Neck Fy	N	139.1	132.3	-27.6	274.4	
V2P1 Upper Neck Fz	N	1184.8	108.9	-30.0	78.1	
V2P1 Upper Neck F Resultant	N	1197.9	108.9	0.1	-43.0	
V2P1 Upper Neck Mx	N-m	9.8	118.8	-2.7	291.0	
V2P1 Upper Neck My	N-m	15.9	123.6	-16.1	141.2	
V2P1 Upper Neck Mz	N-m	4.1	155.1	-2.9	99.7	
V2P1 Upper Neck M Resultant	N-m	18.2	123.5	0.0	-22.9	
V2P1 Lower Neck Fx	N	963.0	119.5	-180.3	329.8	
V2P1 Lower Neck Fy	N	228.9	113.1	-68.0	350.4	
V2P1 Lower Neck Fz	N	912.9	109.8	-44.2	370.4	
V2P1 Lower Neck F Resultant	N	1299.0	109.7	0.0	-22.1	
V2P1 Lower Neck Mx	N-m	38.0	125.1	-8.1	242.5	
V2P1 Lower Neck My	N-m	58.7	358.7	-187.2	109.8	
V2P1 Lower Neck Mz	N-m	18.4	356.8	-91.5	109.6	
V2P1 Lower Neck M Resultant	N-m	210.5	109.8	0.0	-40.3	
V2P1 Lower Neck x	g	23.2	55.1	-5.1	298.8	
V2P1 Chest x	g	20.5	55.2	-4.3	300.8	
V2P1 Chest y	g	4.6	80.6	-1.9	70.3	
V2P1 Chest z	g	7.1	67.4	-2.0	76.9	
V2P1 Chest Resultant	g	21.6	55.1	0.0	-64.6	
V2P1 Chest Displacement	mm	0.2	174.7	-2.1	317.9	
V2P1 Chest AVy	deg/s	374.3	84.4	-314.7	268.8	
V2P1 Chest Comp AVy	deg/s	385.3	84.6	-347.1	269.1	f2=0.298 Hz; f4=0.001 Hz
V2P1 Chest Comp ADy	deg	16.3	131.9	-29.5	349.2	f2=0.298 Hz; f4=0.001 Hz
V2P1 Pelvic x	g	31.5	66.9	-2.5	141.4	
V2P1 Pelvic y	g	4.8	110.6	-3.5	66.4	
V2P1 Pelvic z	g	13.3	71.9	-1.4	141.7	
V2P1 Pelvic Resultant	g	33.6	67.2	0.0	-58.2	
V2P1 Left Femur	N	3038.8	71.7	-274.4	259.5	
V2P1 Right Femur	N	774.6	82.4	-747.3	71.3	
V2P1 Head to Chest	deg	22.5	358.4	-47.4	117.4	
V2P1 Lap Belt	N	282.3	302.1	-26.1	70.8	
V2P1 Belt Spoolout	mm	0.0	-79.2	-92.8	110.6	

**Maximum and Minimum Data (Continued)**

NAME	Unit	Max	msec	Min	msec	Comment
V2P3 Head x	g	106.2	90.7	-130.2	97.8	Questionable Data: 89 - 121 ms
V2P3 Head y	g	7.1	117.8	-4.6	68.2	
V2P3 Head z	g	17.0	87.8	-4.1	44.7	
V2P3 Head Resultant	g	130.6	97.8	0.0	-91.1	Questionable Data: 89 - 121 ms
V2P3 Head AVy	deg/s	1756.1	65.7	-1057.1	126.0	
V2P3 Head Comp AVy	deg/s	1801.5	66.2	-1003.9	126.7	f2=0.287 Hz; f4=0.001 Hz
V2P3 Head Comp ADy	deg	49.4	86.3	-31.0	242.1	f2=0.287 Hz; f4=0.001 Hz
V2P3 Upper Neck Fx	N	420.3	93.2	-229.1	205.3	
V2P3 Upper Neck Fy	N	99.4	103.3	-154.5	69.7	
V2P3 Upper Neck Fz	N	785.2	87.9	-163.5	45.4	
V2P3 Upper Neck F Resultant	N	836.8	87.9	0.1	-83.7	
V2P3 Upper Neck Mx	N-m	3.8	128.9	-17.9	93.9	
V2P3 Upper Neck My	N-m	27.0	93.6	-26.8	113.9	
V2P3 Upper Neck Mz	N-m	17.1	131.7	-9.5	195.9	
V2P3 Upper Neck M Resultant	N-m	32.4	93.7	0.0	-55.2	
V2P3 Lower Neck Fx	N	15415.9	50.8	-1836.1	50.2	Channel Opened: 49 ms
V2P3 Lower Neck Fy	N	6902.7	51.0	-2038.4	49.7	Channel Opened: 49-52, 87-142 ms
V2P3 Lower Neck Fz	N	16033.4	51.1	-16010.7	50.5	Channel Opened: 49 ms
V2P3 Lower Neck F Resultant	N	23004.2	51.1	0.1	-20.5	Channel Opened: 49 ms
V2P3 Lower Neck Mx	N-m	29.6	118.3	-37.9	66.8	
V2P3 Lower Neck My	N-m	55.5	230.7	-123.4	91.5	
V2P3 Lower Neck Mz	N-m	15.5	95.2	-18.0	54.4	
V2P3 Lower Neck M Resultant	N-m	124.3	91.5	0.0	-46.4	
V2P3 Lower Neck x	g	30.9	50.3	-2.4	187.7	
V2P3 Chest x	g	29.2	51.5	-2.4	188.7	
V2P3 Chest y	g	6.1	85.1	-5.0	50.9	
V2P3 Chest z	g	9.8	56.4	-2.4	270.8	
V2P3 Chest Resultant	g	30.2	51.6	0.0	-68.0	
V2P3 Chest Compression	mm	0.1	103.7	-4.7	198.5	
V2P3 Chest AVy	deg/s	322.4	74.3	-216.9	185.8	
V2P3 Chest Comp AVy	deg/s	330.2	74.5	-220.3	186.3	f2=0.308 Hz; f4=0.001 Hz
V2P3 Chest Comp ADy	deg	9.6	107.7	-10.9	275.8	f2=0.308 Hz; f4=0.001 Hz
V2P3 Pelvic x	g	35.1	56.3	-4.0	170.9	
V2P3 Pelvic y	g	3.3	66.0	-7.0	55.8	
V2P3 Pelvic z	g	14.8	56.5	-1.9	285.4	
V2P3 Pelvic Resultant	g	38.7	56.4	0.0	-29.2	
V2P3 Left Femur	N	287.5	169.4	-1206.5	57.8	
V2P3 Right Femur	N	303.0	171.7	-1274.5	58.8	
V2P3 Head to Chest	deg	22.3	228.6	-42.1	84.3	
V2P3 Lap Belt	N	1160.4	167.8	-13.2	34.5	

**Maximum and Minimum Data (Continued)**

NAME	Unit	Max	msec	Min	msec	Comment
V2 Left X Member x	g	35.2	24.0	-2.2	499.9	
V2 Left X Member RED x	g	36.0	23.9	-1.9	103.2	
V2 Right X Member x	g	38.1	24.1	-4.4	29.5	
V2 Right X Member RED x	g	39.9	24.1	-5.4	29.5	
V2 Left Front Sill AVy	deg/s	50.0	71.3	-107.8	64.9	
V2 Left Front Sill Comp AVy	deg/s	47.7	71.3	-109.4	64.9	f2=0.283 Hz; f4=0.001 Hz
V2 Left Front Sill Comp ADy	deg	0.2	441.6	-1.5	94.1	f2=0.283 Hz; f4=0.001 Hz
V2P1 Left Seat AVy	deg/s	683.5	60.1	-274.1	156.5	
V2P1 Left Seat Comp AVy	deg/s	702.0	60.1	-254.8	156.7	f2=0.374 Hz; f4=0.001 Hz
V2P1 Left Seat Comp ADy	deg	16.9	118.6	0.0	8.8	f2=0.374 Hz; f4=0.001 Hz
V2P1 Right Seat AVy	deg/s	569.7	64.5	-216.5	147.2	
V2P1 Right Seat Comp AVy	deg/s	593.4	64.5	-192.4	161.0	f2=0.337 Hz; f4=0.001 Hz
V2P1 Right Seat Comp ADy	deg	20.8	105.7	0.0	-19.3	f2=0.337 Hz; f4=0.001 Hz
V2P1 Left Link ADy	deg	33.0	113.4	-7.4	47.1	
V2P1 Right Link ADy	deg	19.9	108.7	-2.6	32.7	
V2P1 Left Span Bar D	mm	389.5	115.3	0.0	-98.4	
V2P1 Right Span Bar D	mm	341.7	106.2	0.0	-81.6	
V2P3 Left Seat AVy	deg/s	888.5	62.2	-804.1	45.8	
V2P3 Left Seat Comp AVy	deg/s	890.1	62.2	-801.8	45.9	f2=0.3 Hz; f4=0.001 Hz
V2P3 Left Seat Comp ADy	deg	9.1	98.4	-3.4	55.2	f2=0.3 Hz; f4=0.001 Hz
V2P3 Right Seat AVy	deg/s	554.0	59.1	-399.8	42.1	
V2P3 Right Seat Comp AVy	deg/s	556.9	59.1	-396.7	42.1	f2=0.396 Hz; f4=0.001 Hz
V2P3 Right Seat Comp ADy	deg	7.8	99.8	-1.0	51.7	f2=0.396 Hz; f4=0.001 Hz
V2P3 Left Link ADy	deg	18.7	116.5	-46.8	75.8	
V2P3 Right Link ADy	deg	8.4	108.4	-9.3	54.3	
V2P3 Left Span Bar D	mm	200.6	92.1	0.0	-100.0	
V2P3 Right Span Bar D	mm	136.6	99.0	0.0	-78.1	
P1 Left Change in Seat Back Angle	deg	18.4	118.4	0.0	9.4	
P1 Left Change in String Angle	deg	19.2	72.0	-14.0	83.2	
P1 Left Seat X Displacement	mm	298.5	113.4	-10.1	47.3	
P1 Right Change in Seat Back Angle	deg	22.2	105.9	0.0	8.0	
P1 Right Change in String Angle	deg	2.2	360.4	-6.5	44.8	
P1 Right Seat X Displacement	mm	133.5	111.7	-3.8	32.1	
P3 Left Change in Seat Back Angle	deg	10.5	98.3	-3.0	55.1	
P3 Left Change in String Angle	deg	12.6	117.7	-52.8	75.8	
P3 Left Seat X Displacement	mm	138.4	84.6	-302.6	75.7	
P3 Right Change in Seat Back Angle	deg	9.2	99.9	-0.7	51.4	
P3 Right Change in String Angle	deg	0.7	108.6	-9.8	70.5	
P3 Right Seat X Displacement	mm	65.4	76.6	-8.0	45.6	

### Table of Data Plots

PLOT	PLOT NAME[UNITS, CHANNEL FILTER CLASS]	PAGE
1	V2P1 Head x [g, CFC_1000]	B-11
2	V2P1 Head y [g, CFC_1000]	B-12
3	V2P1 Head z [g, CFC_1000]	B-13
4	V2P1 Head Resultant [g, CFC_1000]	B-14
5	V2P1 Head AVy	B-15
6	V2P1 Head Comp AVy	B-16
7	V2P1 Head Comp ADy	B-17
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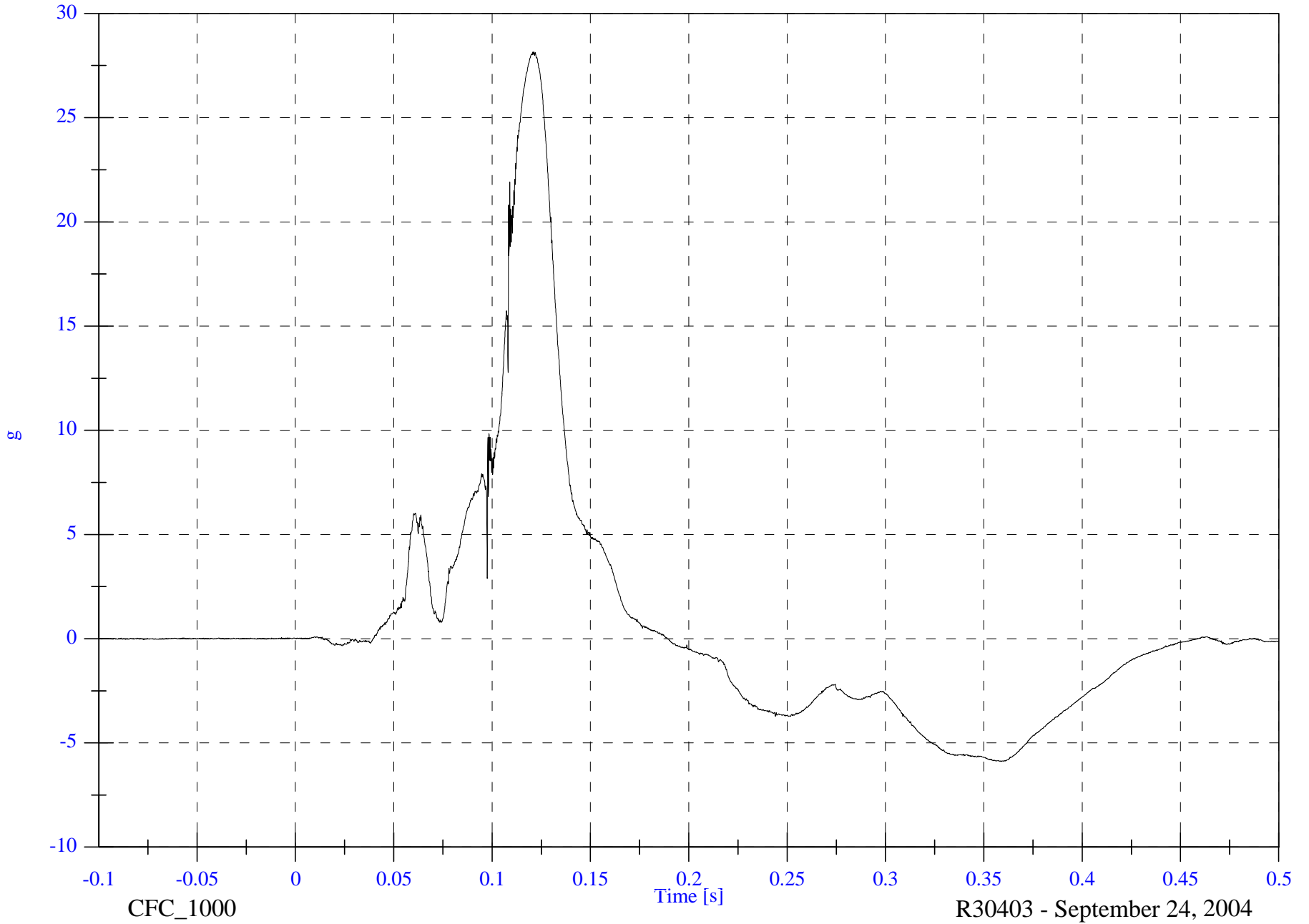
V2P1 Head x

Max: 28.2 [g] at 0.121 [s]

Min: -5.9 [g] at 0.359 [s]

B-11

8757-V301-01

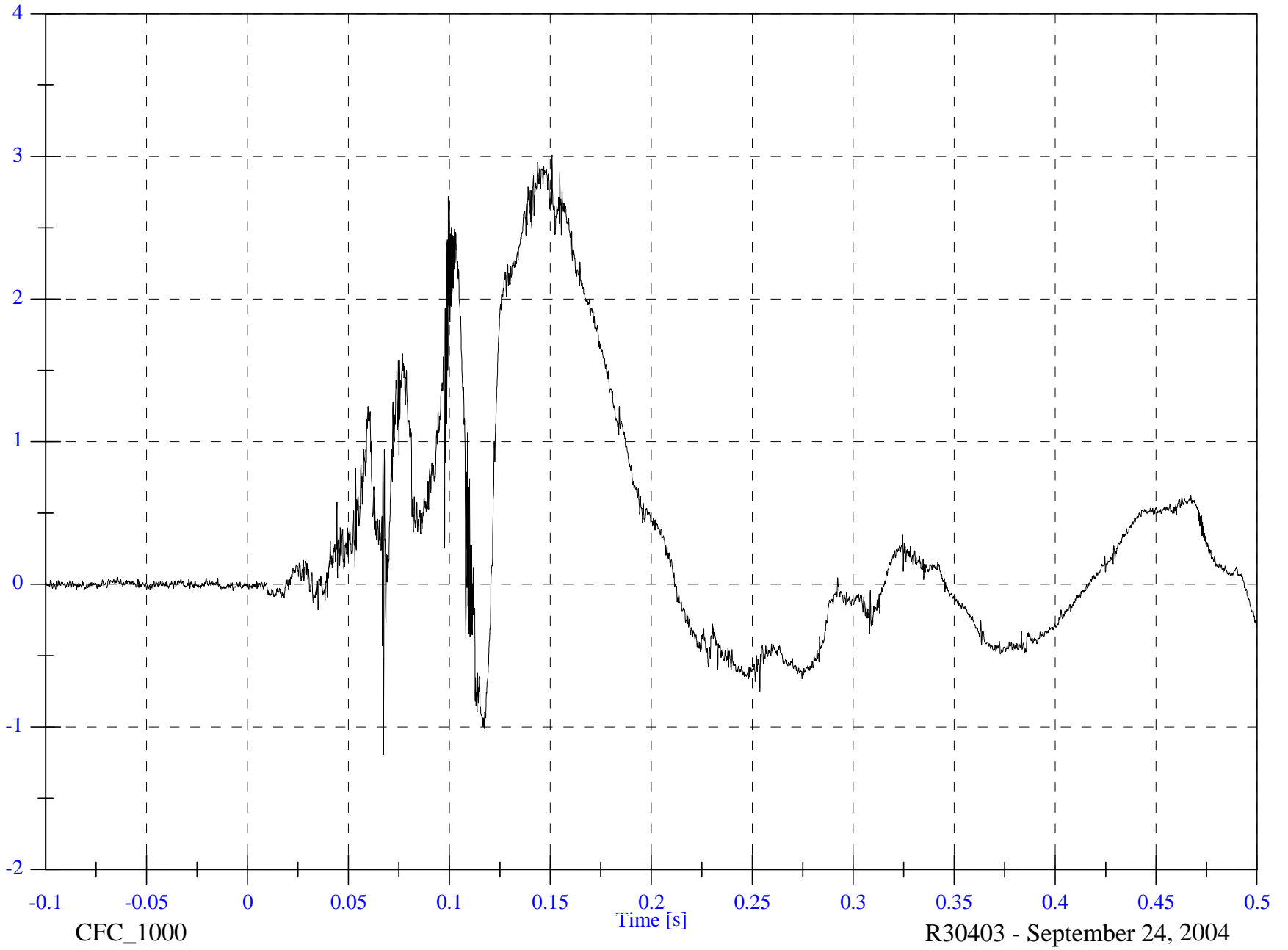


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V2P1 Head y

Max: 3.0 [g] at 0.151 [s]

Min: -1.2 [g] at 0.067 [s]



B-12

8757-V301-01

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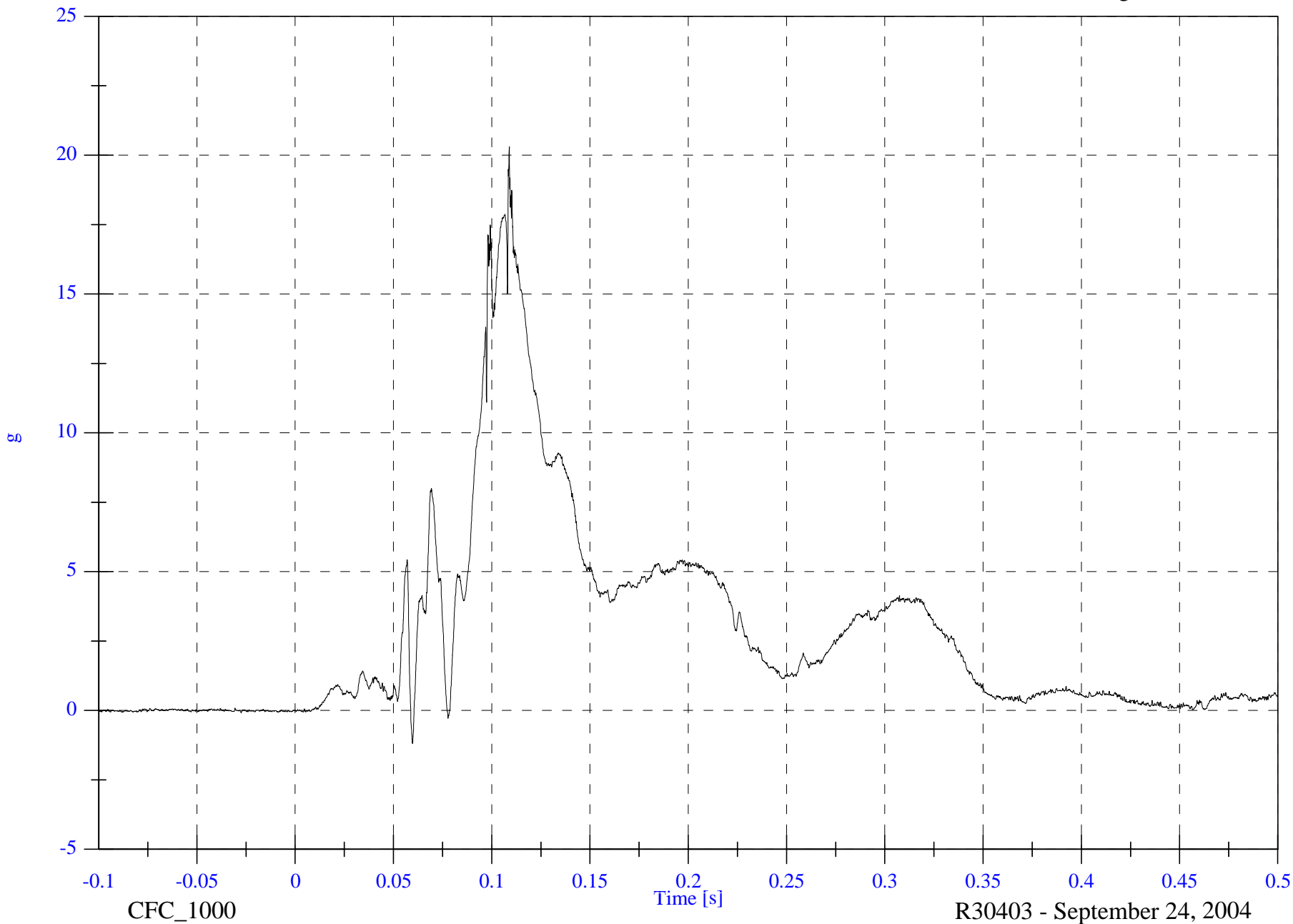
V2P1 Head z

Max: 20.3 [g] at 0.109 [s]

Min: -1.2 [g] at 0.060 [s]

B-13

8757-V301-01



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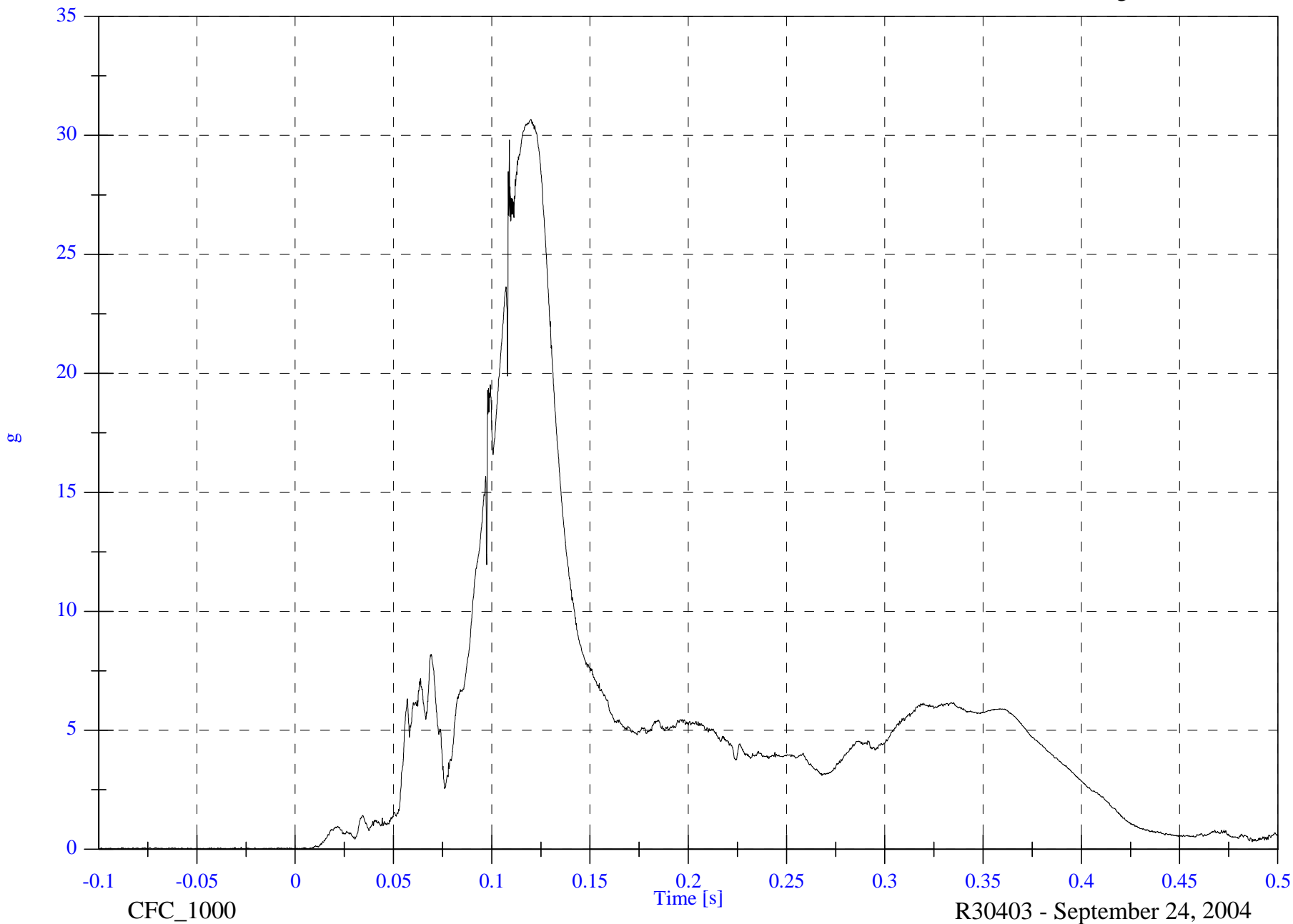
V2P1 Head Resultant

Max: 30.7 [g] at 0.120 [s]

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

B-14

8757-V301-01



R30403 - September 24, 2004

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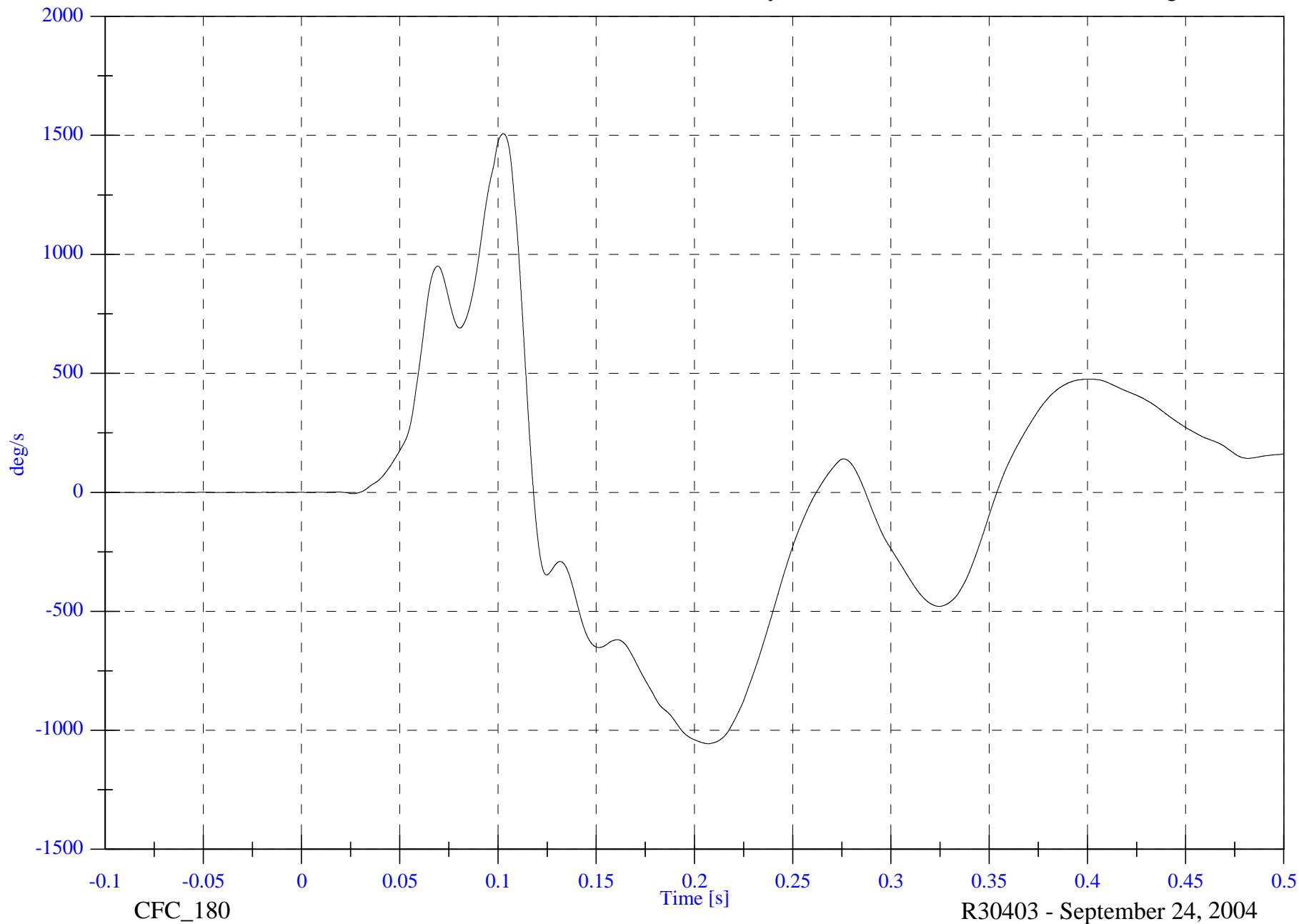
V2P1 Head AVy

Max: 1506.5 [deg/s] at 0.103 [s]

Min: -1056.3 [deg/s] at 0.207 [s]

B-15

8757-V301-01



CFC\_180

Time [s]

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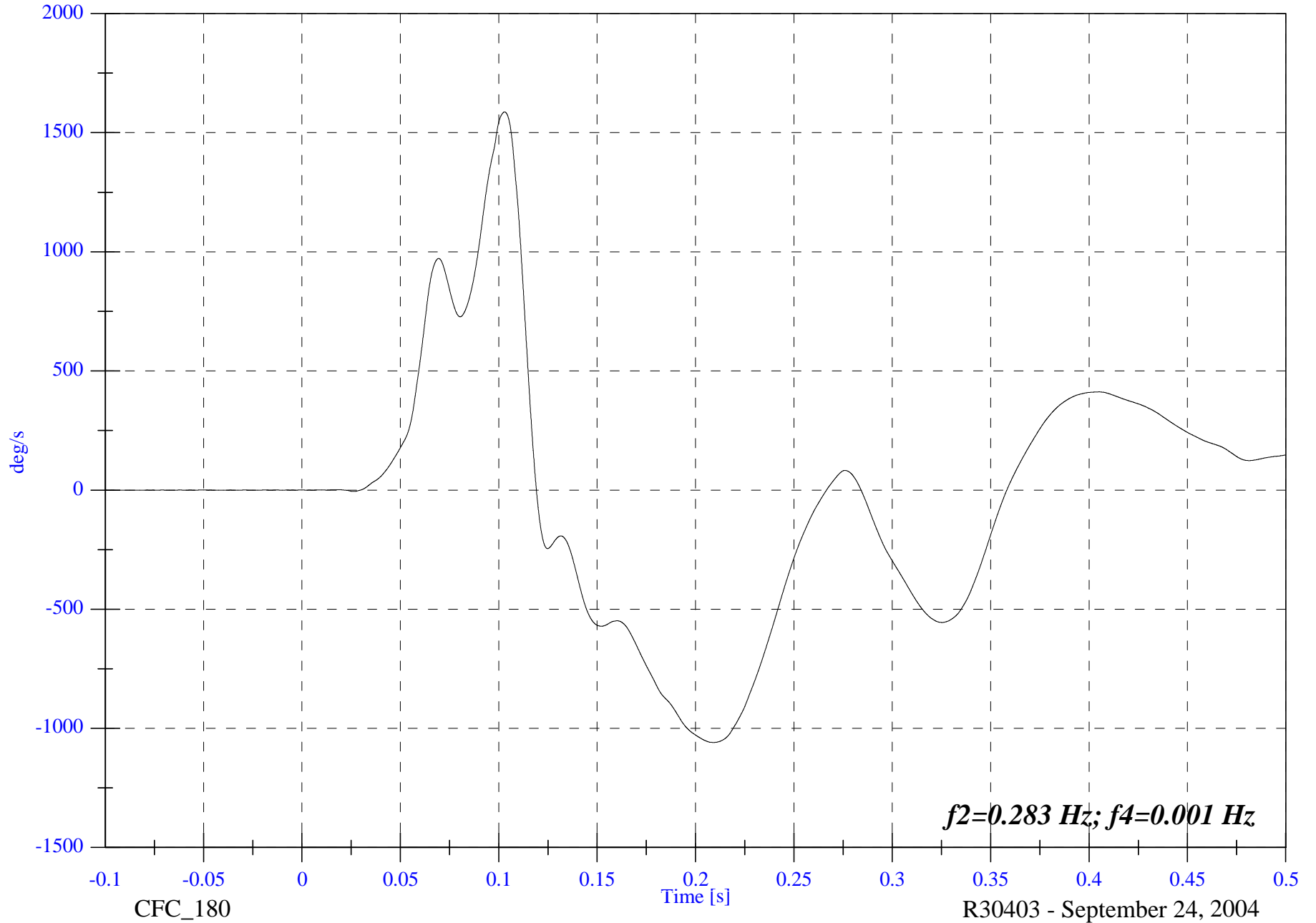
V2P1 Head Comp AVy

Max: 1586.7 [deg/s] at 0.103 [s]

Min: -1059.2 [deg/s] at 0.209 [s]

B-16

8757-V301-01



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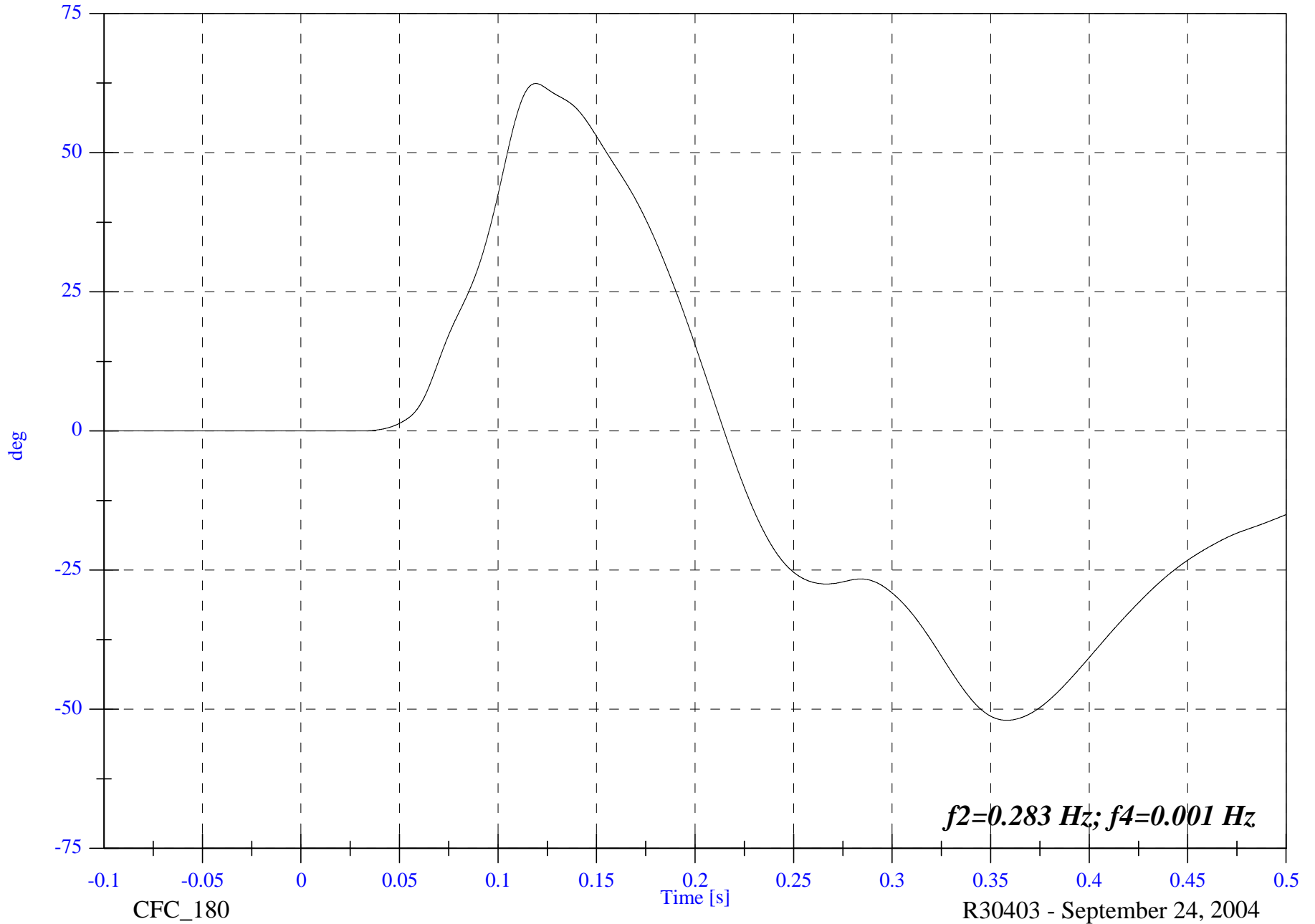
V2P1 Head Comp ADy

Max: 62.4 [deg] at 0.119 [s]

Min: -52.0 [deg] at 0.358 [s]

B-17

8757-V301-01



$f_2=0.283$  Hz;  $f_4=0.001$  Hz

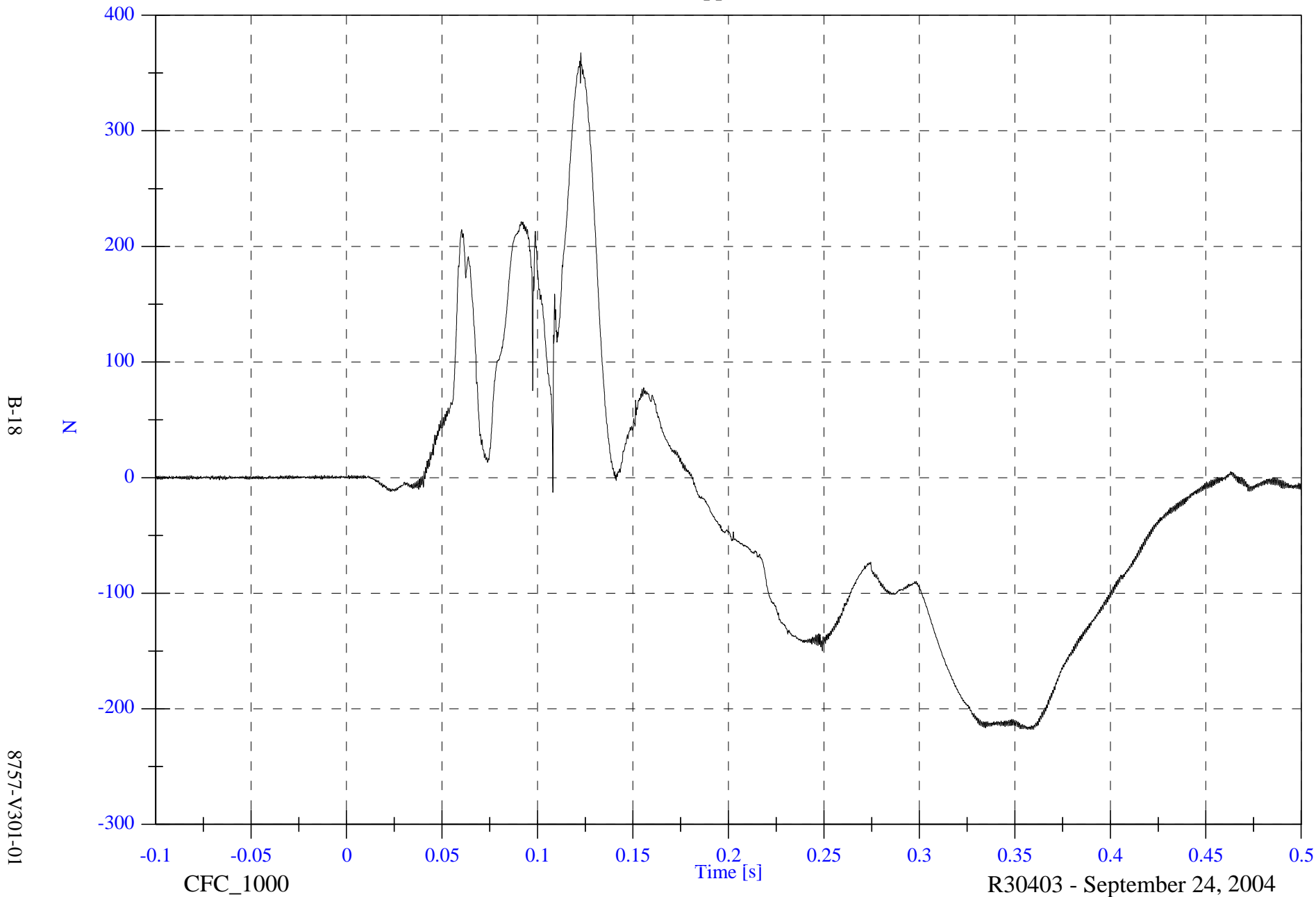
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Max: 367.4 [N] at 0.123 [s]

V2P1 Upper Neck Fx

Min: -217.9 [N] at 0.358 [s]



B-18

8757-V301-01

CFC\_1000

Time [s]

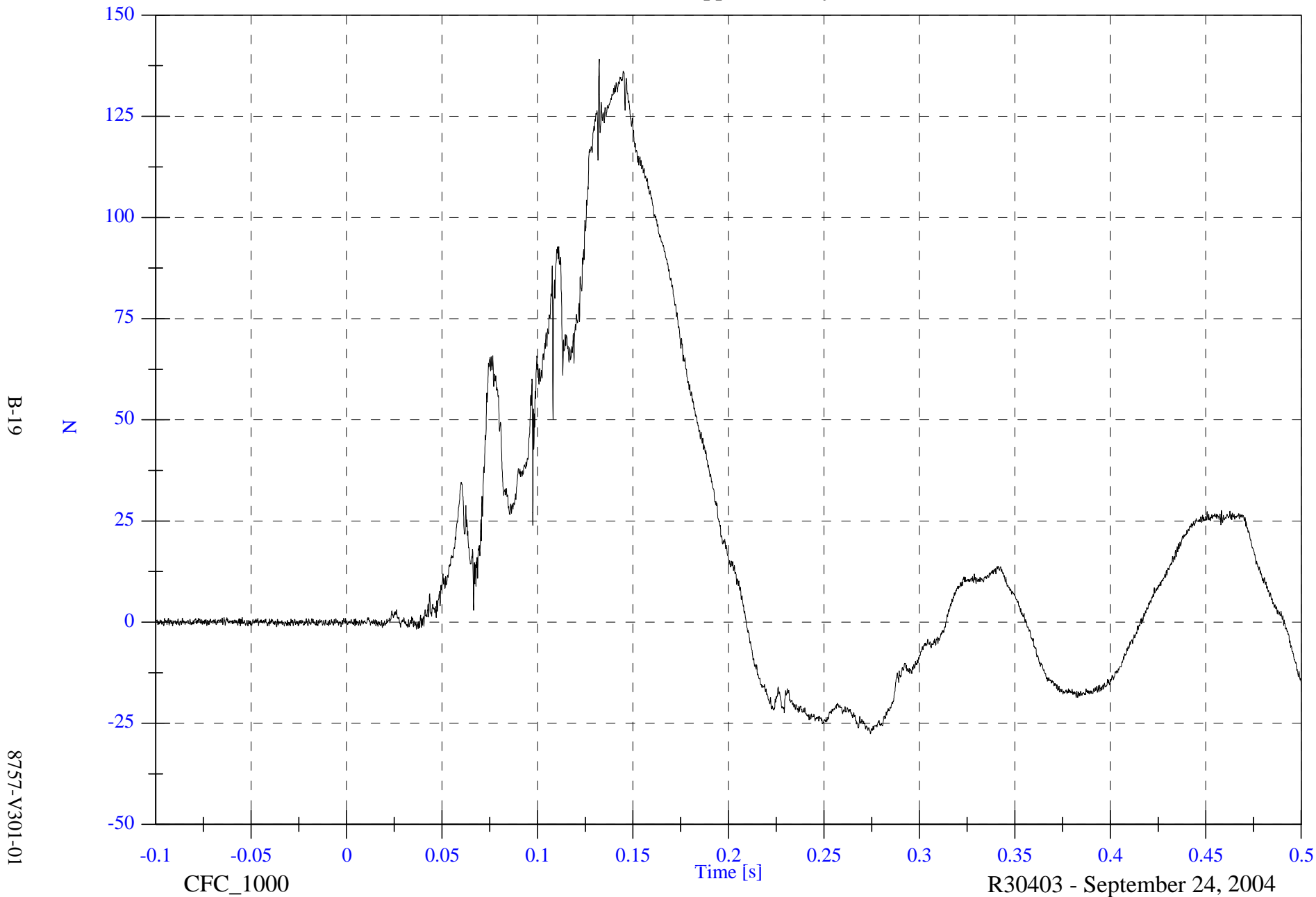
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Max: 139.1 [N] at 0.132 [s]

V2P1 Upper Neck Fy

Min: -27.6 [N] at 0.274 [s]



B-19

N

8757-V301-01

CFC\_1000

Time [s]

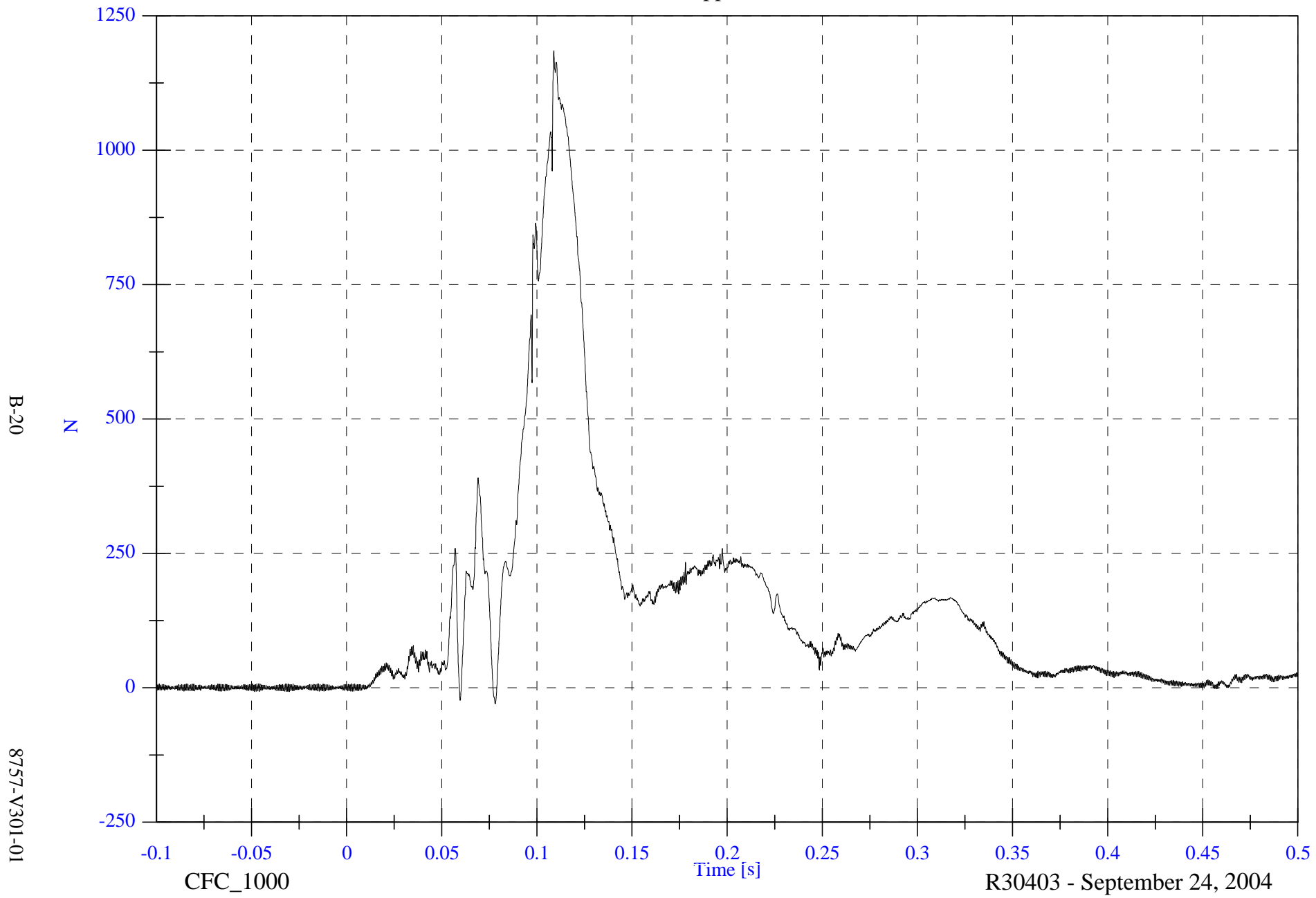
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V2P1 Upper Neck Fz

Max: 1184.8 [N] at 0.109 [s]

Min: -30.0 [N] at 0.078 [s]



B-20

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CFC\_1000

Time [s]

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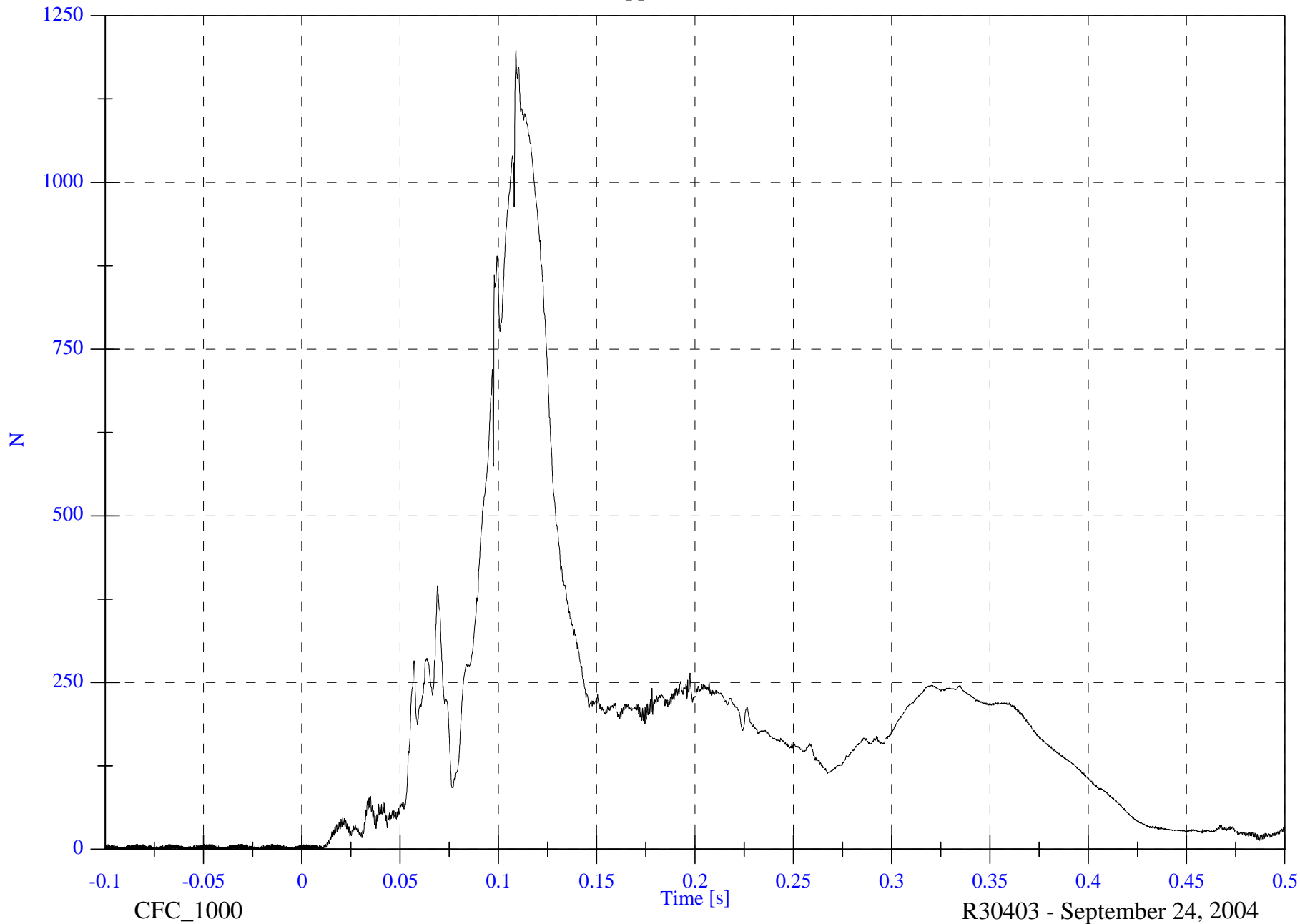
V2P1 Upper Neck F Resultant

Max: 1197.9 [N] at 0.109 [s]

Min: 0.1 [N] at -0.043 [s]

B-21

8757-V301-01

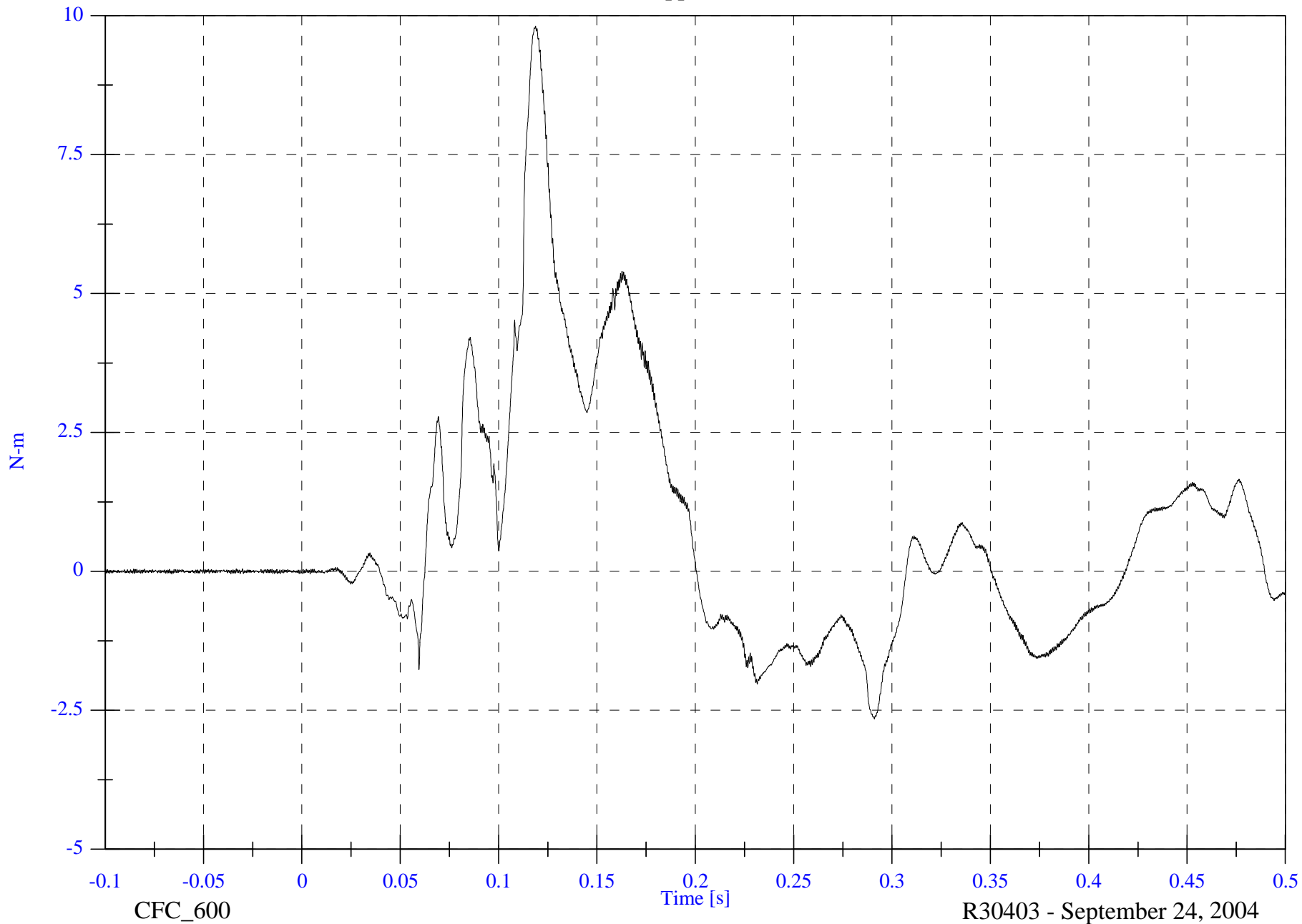


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V2P1 Upper Neck Mx

Max: 9.8 [N-m] at 0.119 [s]

Min: -2.7 [N-m] at 0.291 [s]



B-22

8757-V301-01

CFC\_600

Time [s]

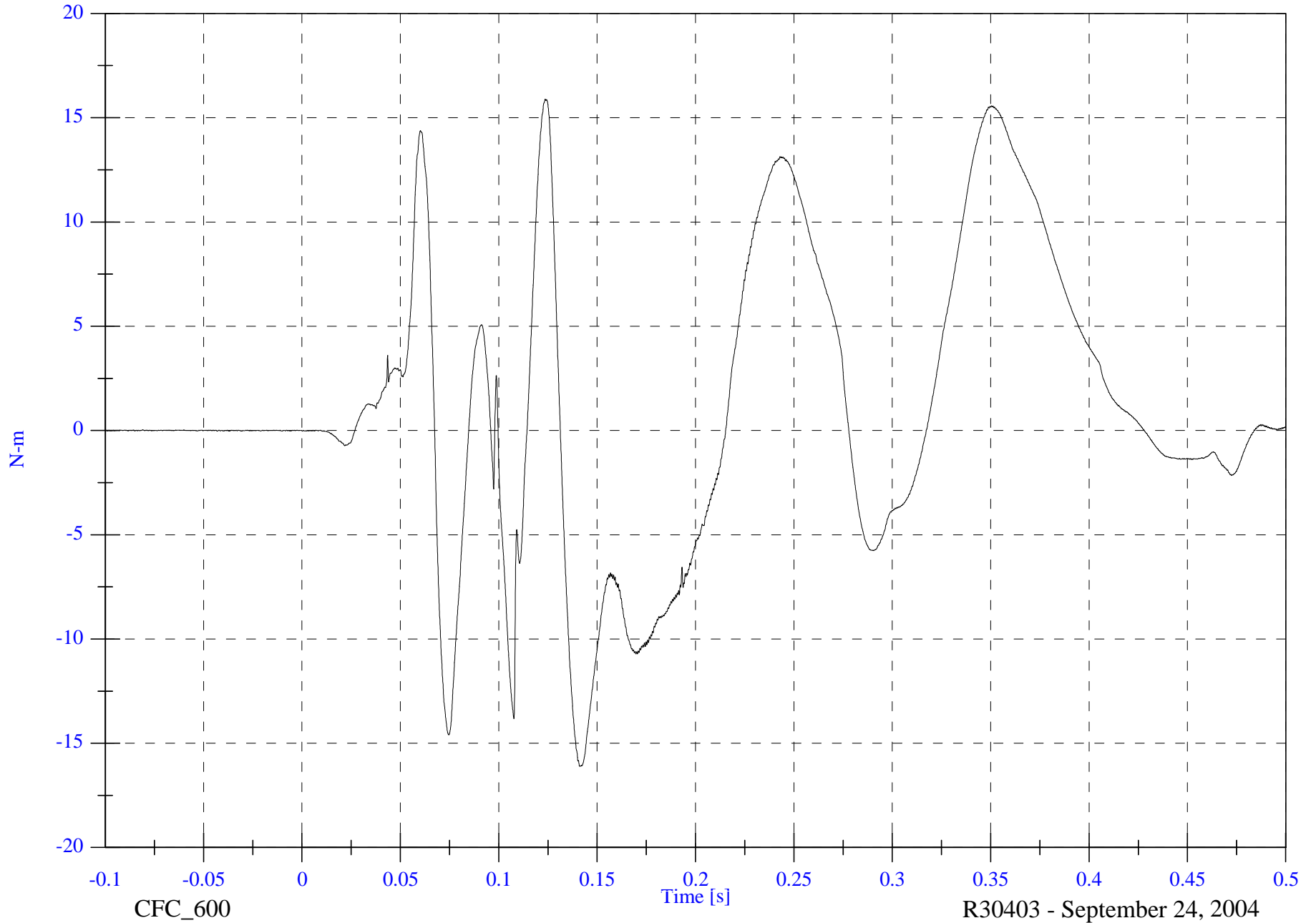
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V2P1 Upper Neck My

Max: 15.9 [N-m] at 0.124 [s]

Min: -16.1 [N-m] at 0.141 [s]



B-23

8757-V301-01

CFC\_600

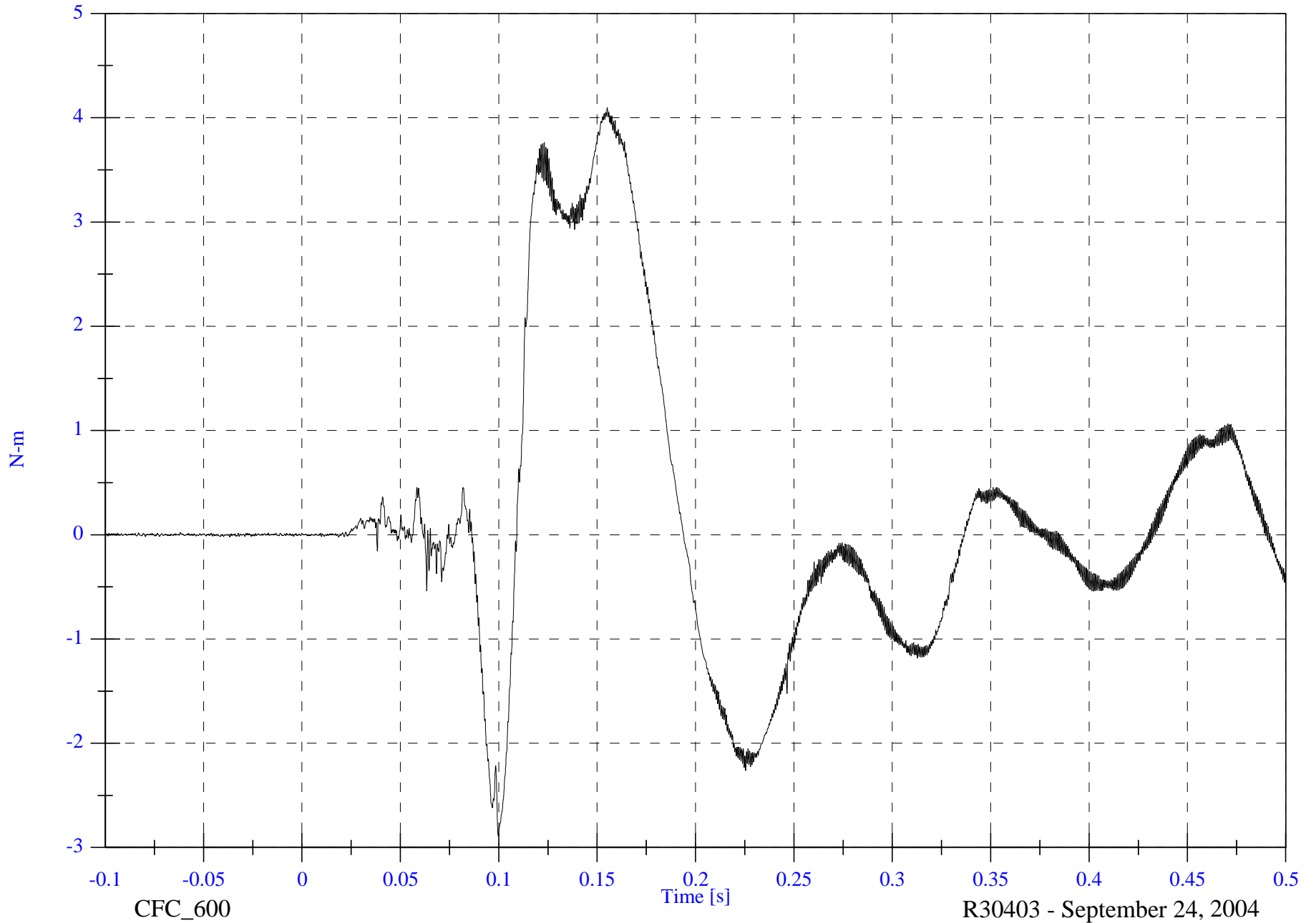
Time [s]

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Max: 4.1 [N-m] at 0.155 [s]  
Min: -2.9 [N-m] at 0.100 [s]

V2P1 Upper Neck Mz



B-24

8757-V301-01

CFC\_600

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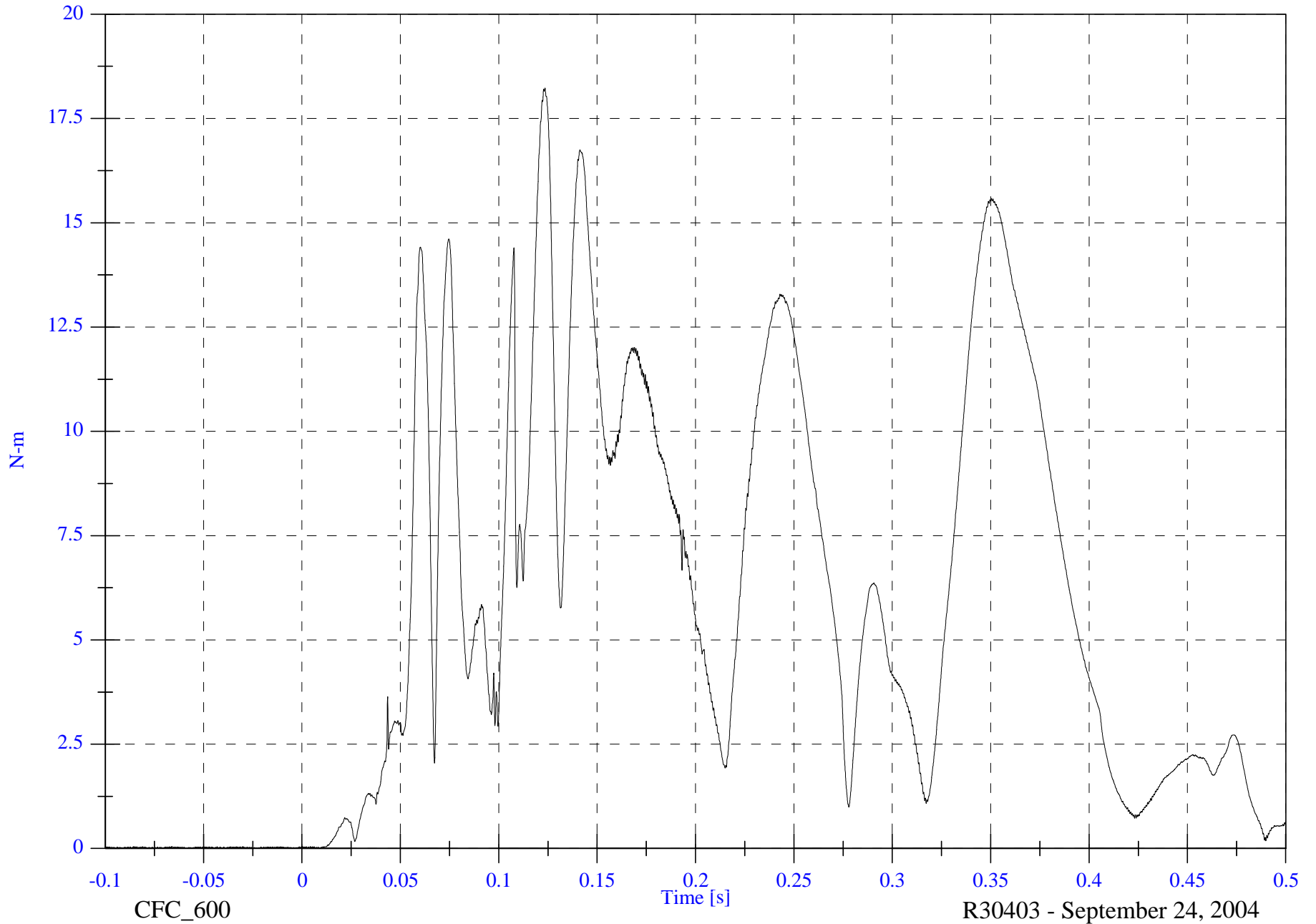
V2P1 Upper Neck M Resultant

Max: 18.2 [N-m] at 0.123 [s]

Min: 0.0 [N-m] at -0.023 [s]

B-25

8757-V301-01



CFC\_600

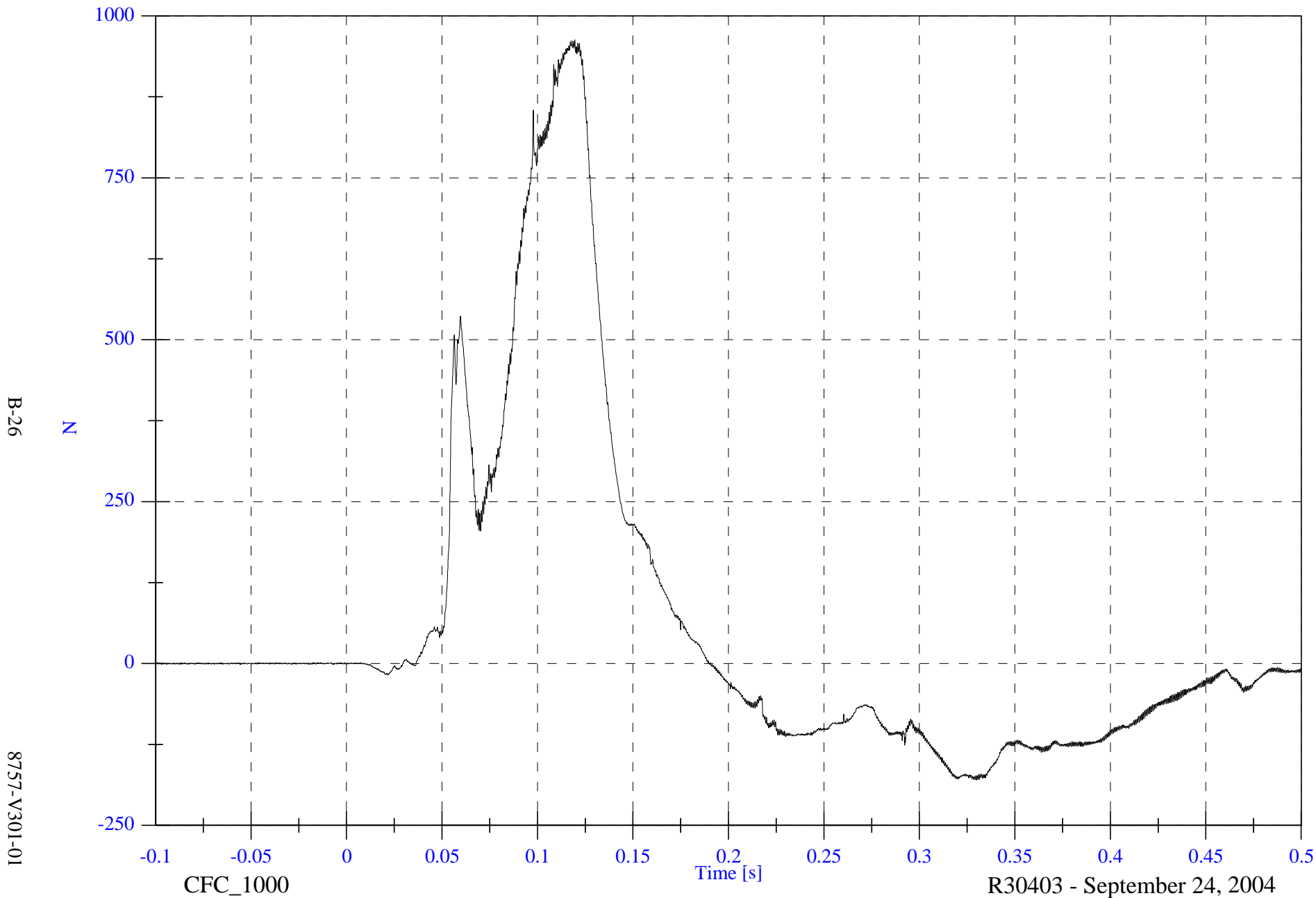
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V2P1 Lower Neck Fx

Max: 963.0 [N] at 0.120 [s]

Min: -180.3 [N] at 0.330 [s]



B-26

8757-V301-01

CFC\_1000

Time [s]

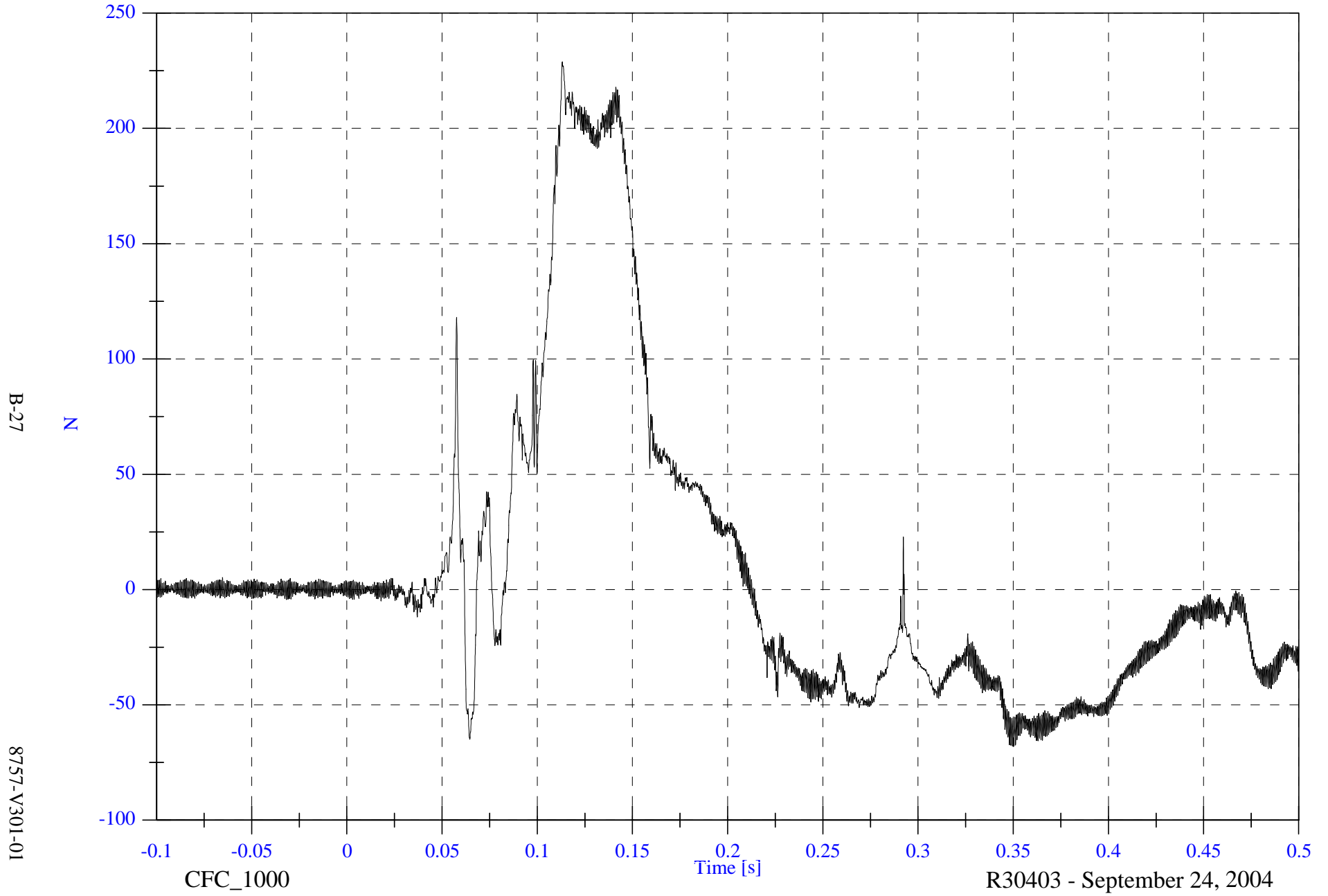
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Max: 228.9 [N] at 0.113 [s]

V2P1 Lower Neck Fy

Min: -68.0 [N] at 0.350 [s]



B-27

8757-V301-01

CFC\_1000

Time [s]

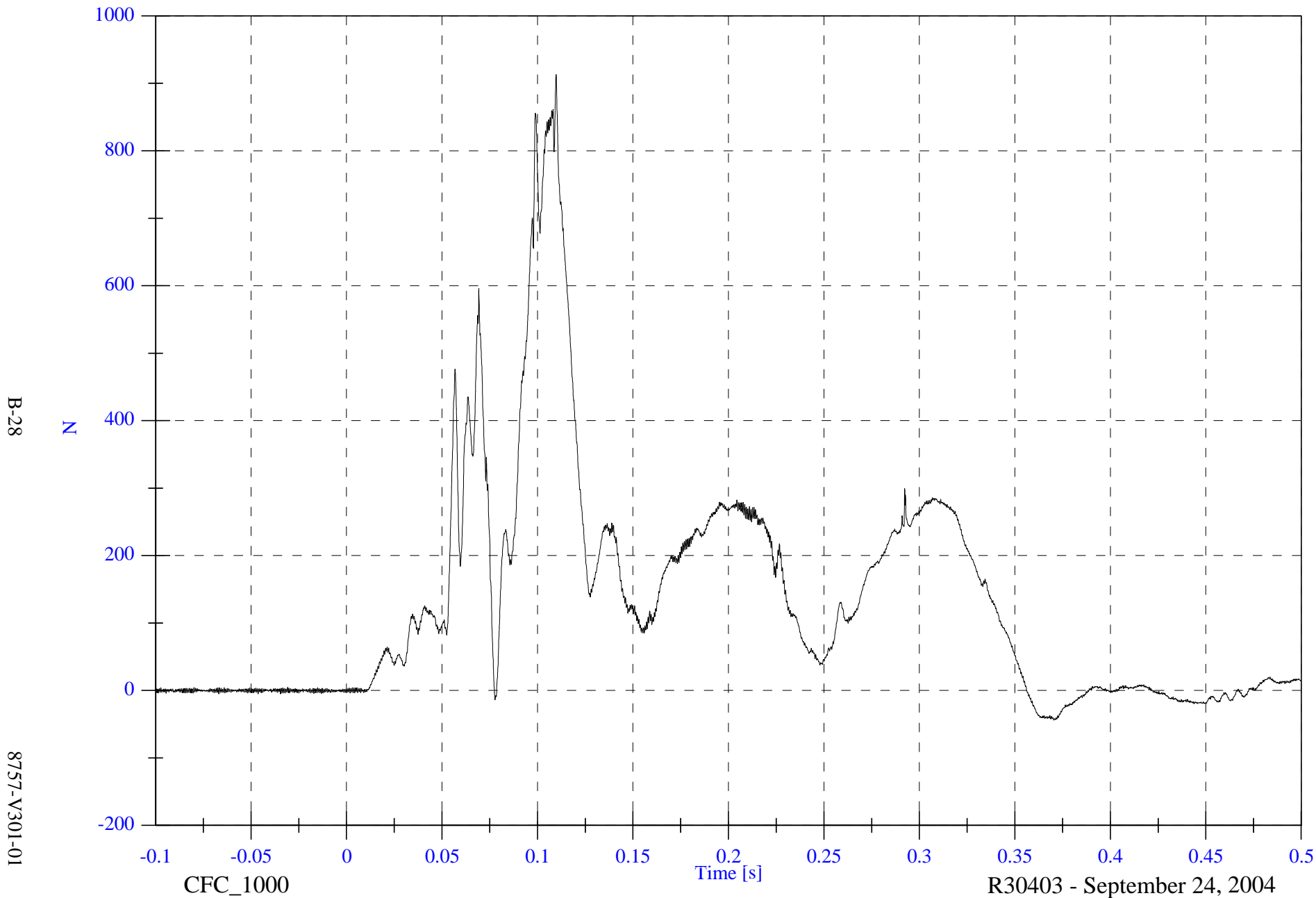
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Max: 912.9 [N] at 0.110 [s]

V2P1 Lower Neck Fz

Min: -44.2 [N] at 0.370 [s]



VOLPE 301 Test 1 - 2003 Jeep Liberty

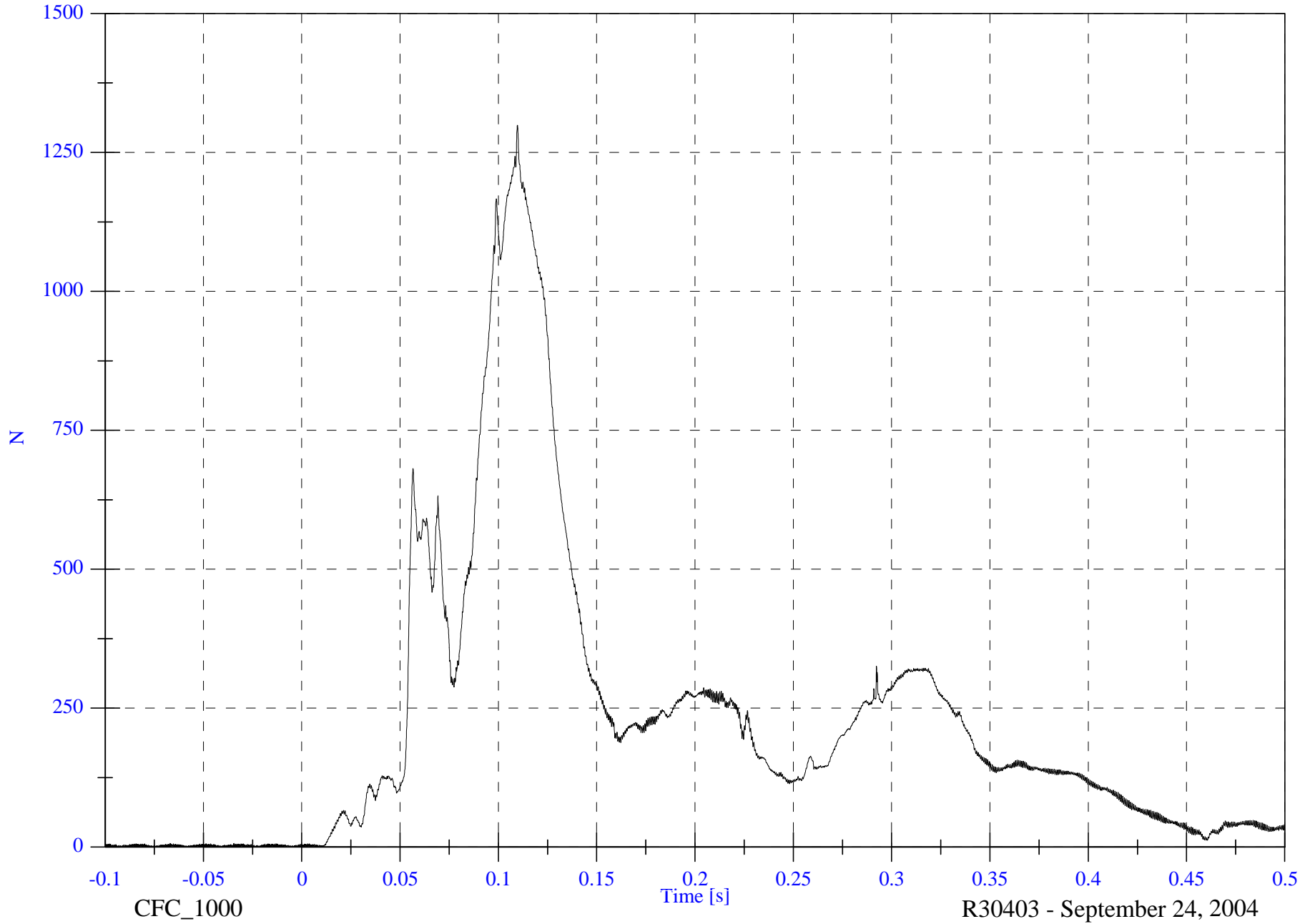
V2P1 Lower Neck F Resultant

Max: 1299.0 [N] at 0.110 [s]

Min: 0.0 [N] at -0.022 [s]

B-29

8757-V301-01



CFC\_1000

Time [s]

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VOLPE 301 Test 1 - 2003 Jeep Liberty

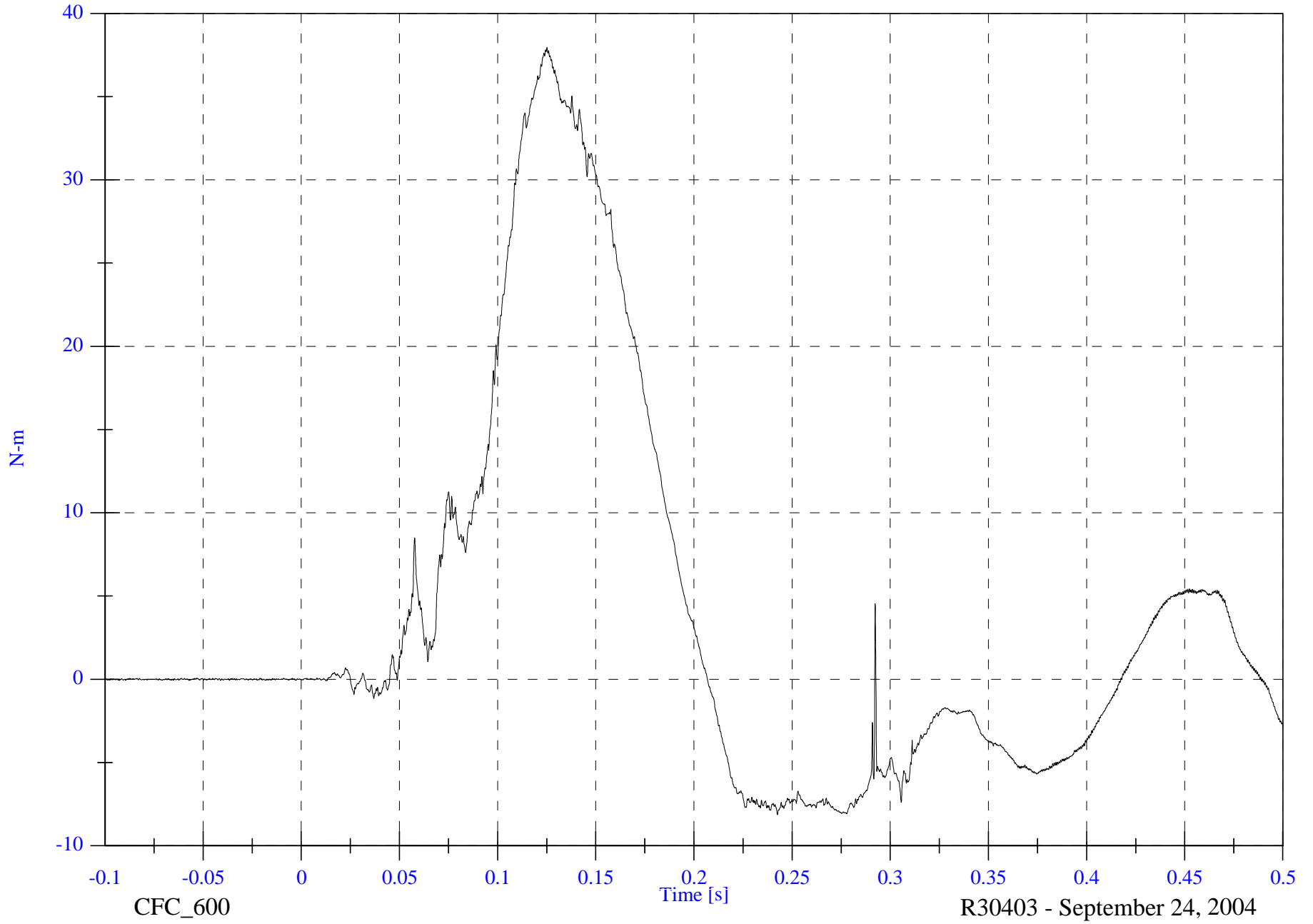
Max: 38.0 [N-m] at 0.125 [s]

V2P1 Lower Neck Mx

Min: -8.1 [N-m] at 0.242 [s]

B-30

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

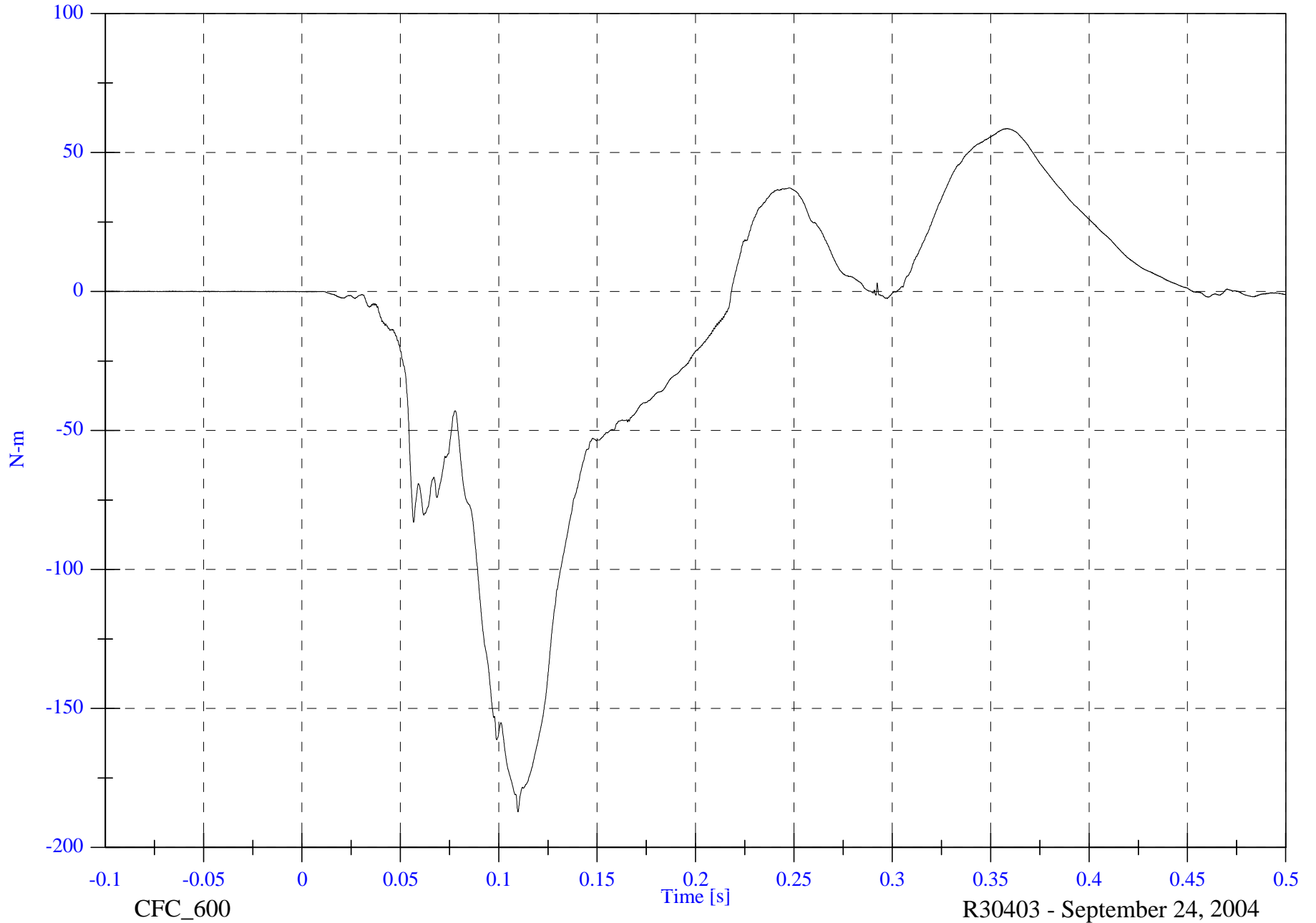
V2P1 Lower Neck My

Max: 58.7 [N-m] at 0.359 [s]

Min: -187.2 [N-m] at 0.110 [s]

B-31

8757-V301-01



CFC\_600

Time [s]

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VOLPE 301 Test 1 - 2003 Jeep Liberty

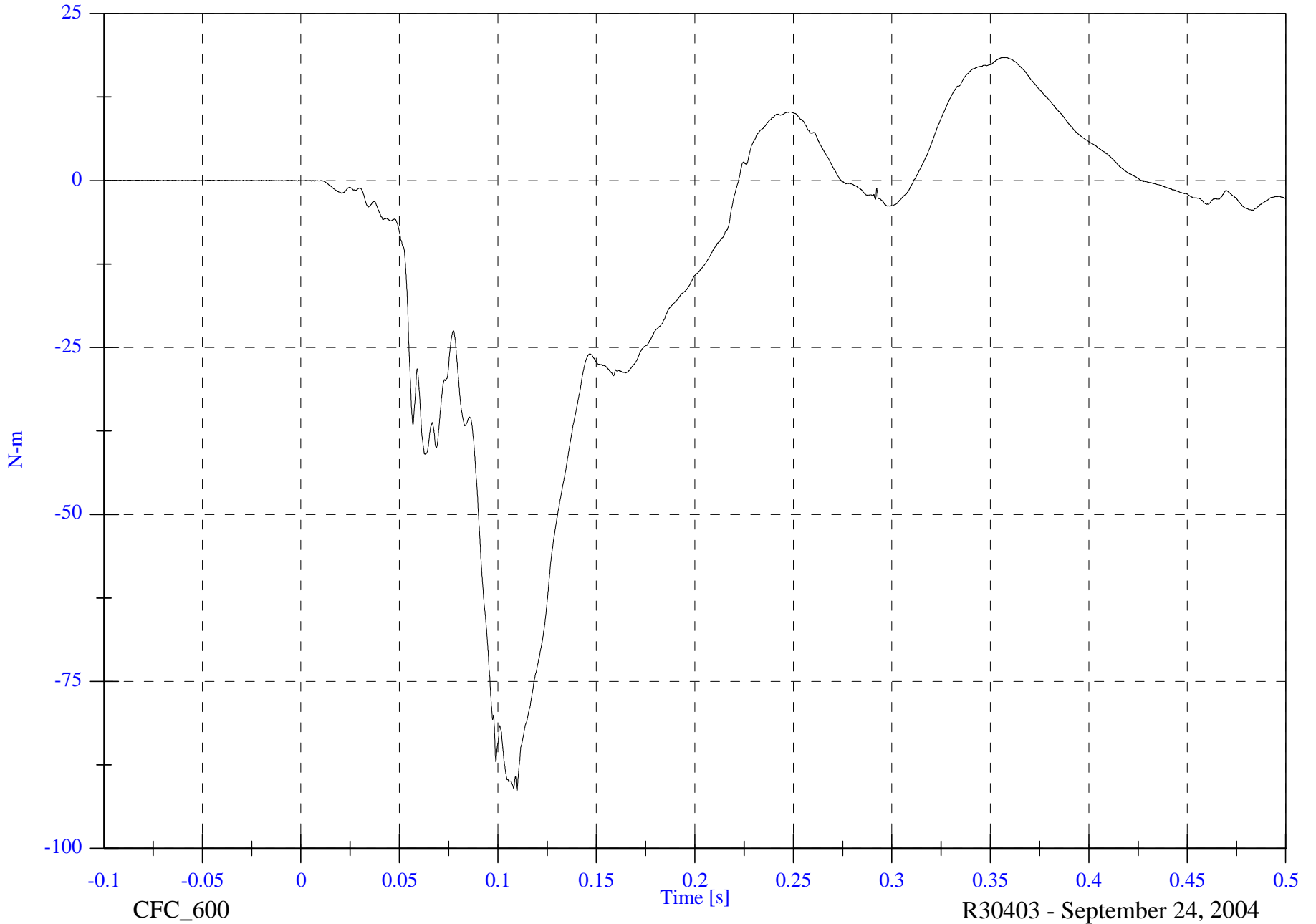
V2P1 Lower Neck Mz

Max: 18.4 [N-m] at 0.357 [s]

Min: -91.5 [N-m] at 0.110 [s]

B-32

8757-V301-01



CFC\_600

Time [s]

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VOLPE 301 Test 1 - 2003 Jeep Liberty

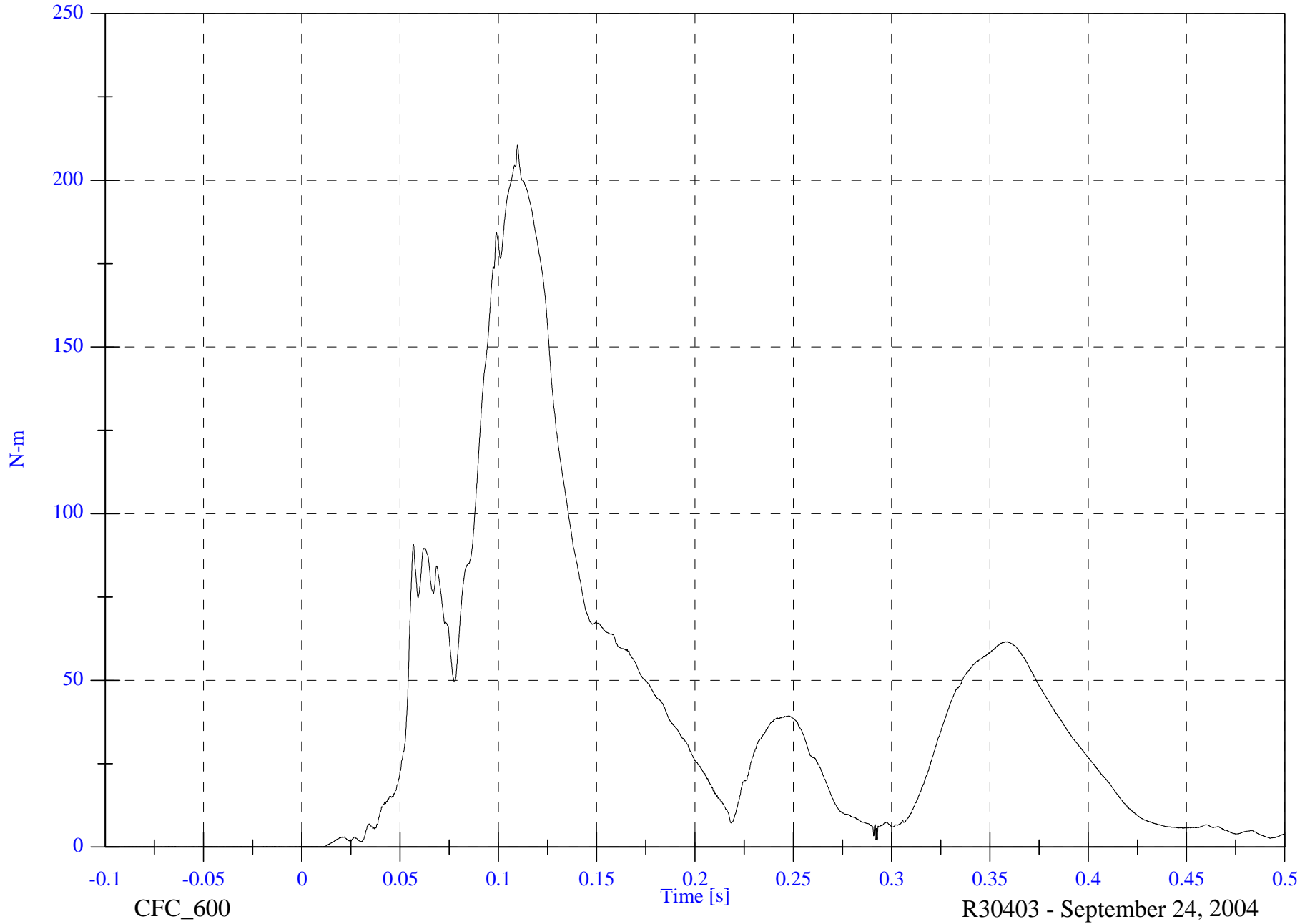
V2P1 Lower Neck M Resultant

Max: 210.5 [N-m] at 0.110 [s]

Min: 0.0 [N-m] at -0.040 [s]

B-33

8757-V301-01



CFC\_600

Time [s]

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VOLPE 301 Test 1 - 2003 Jeep Liberty

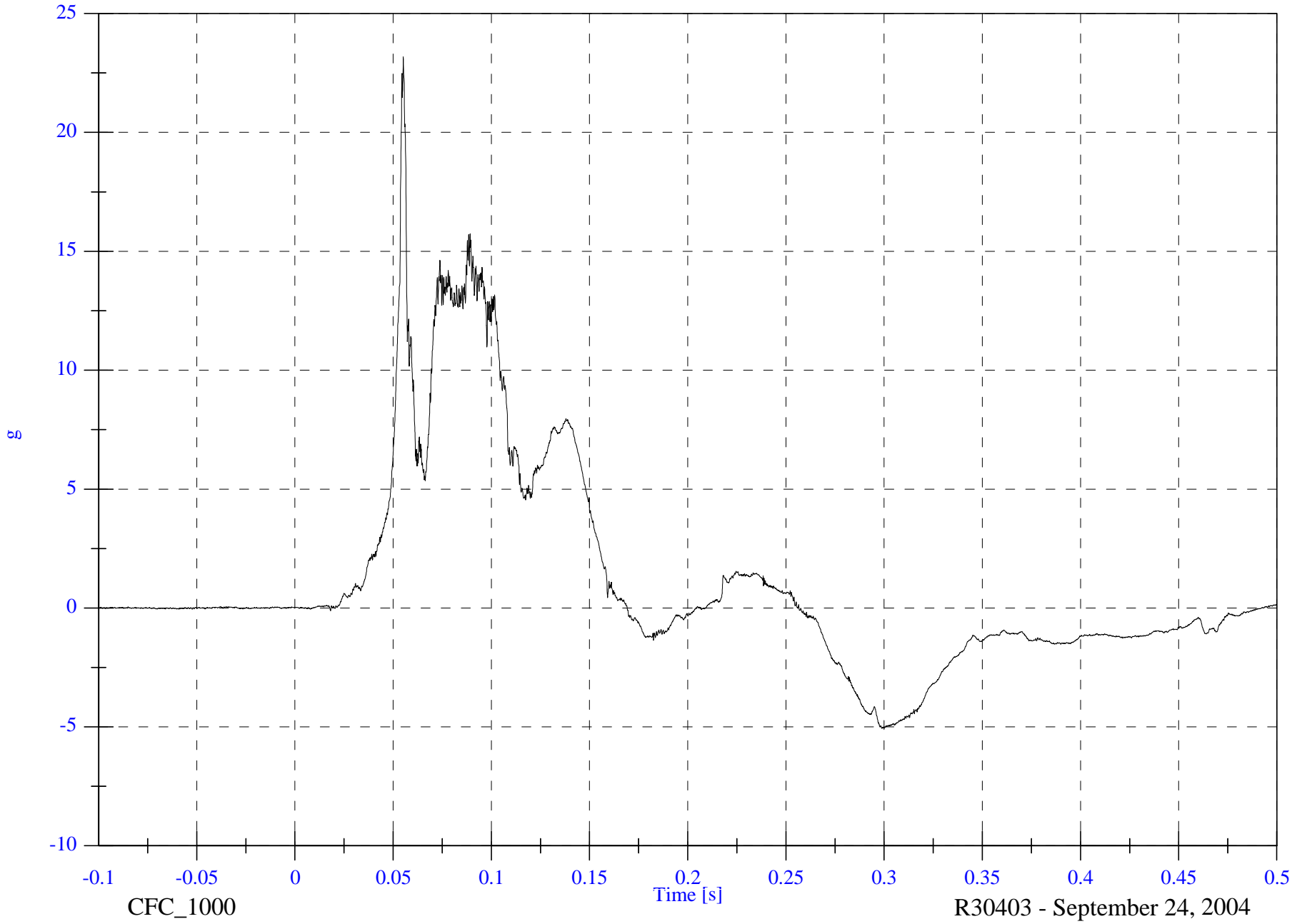
V2P1 Lower Neck x

Max: 23.2 [g] at 0.055 [s]

Min: -5.1 [g] at 0.299 [s]

B-34

8757-V301-01



CFC\_1000

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VOLPE 301 Test 1 - 2003 Jeep Liberty

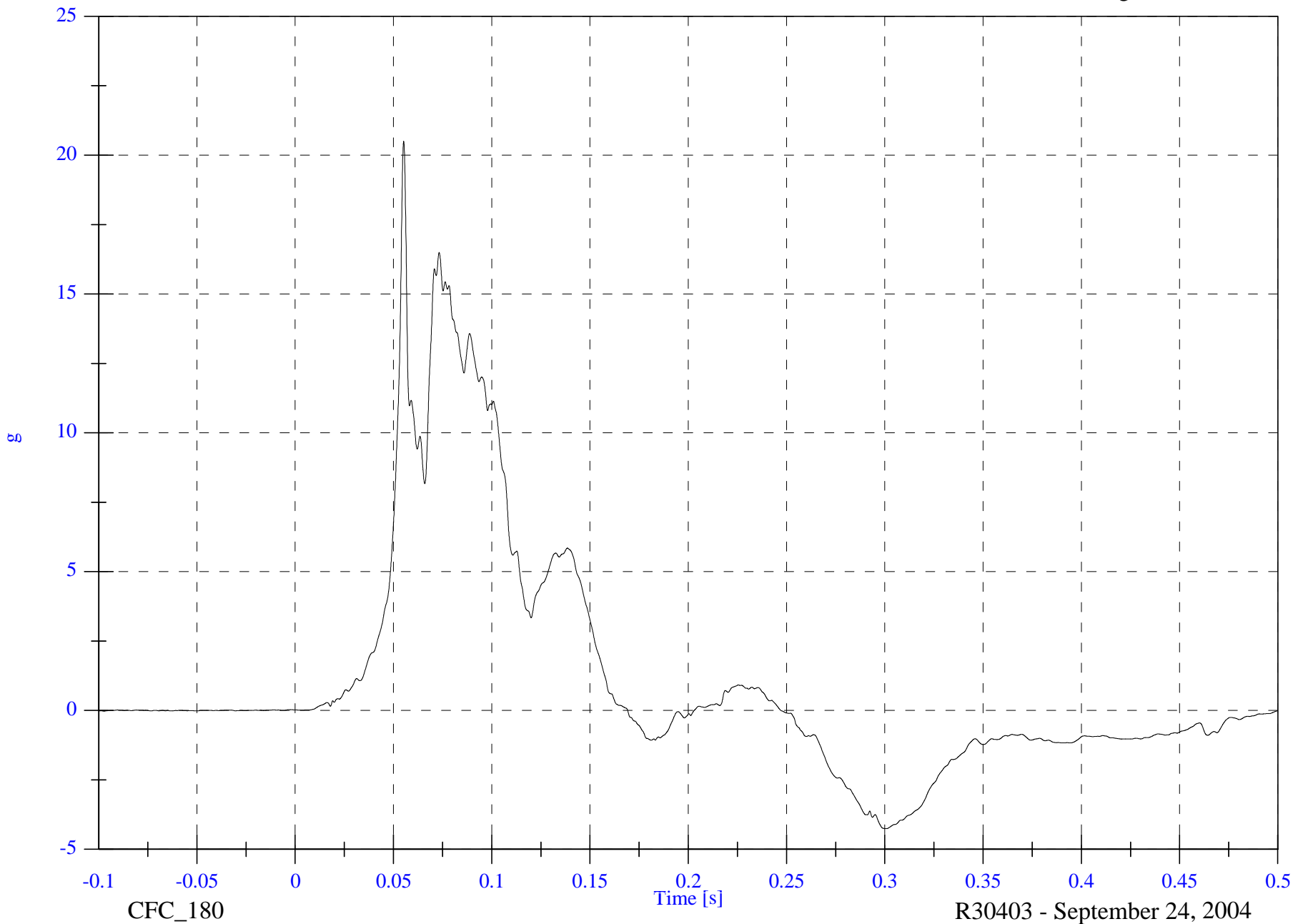
V2P1 Chest x

Max: 20.5 [g] at 0.055 [s]

Min: -4.3 [g] at 0.301 [s]

B-35

8757-V301-01

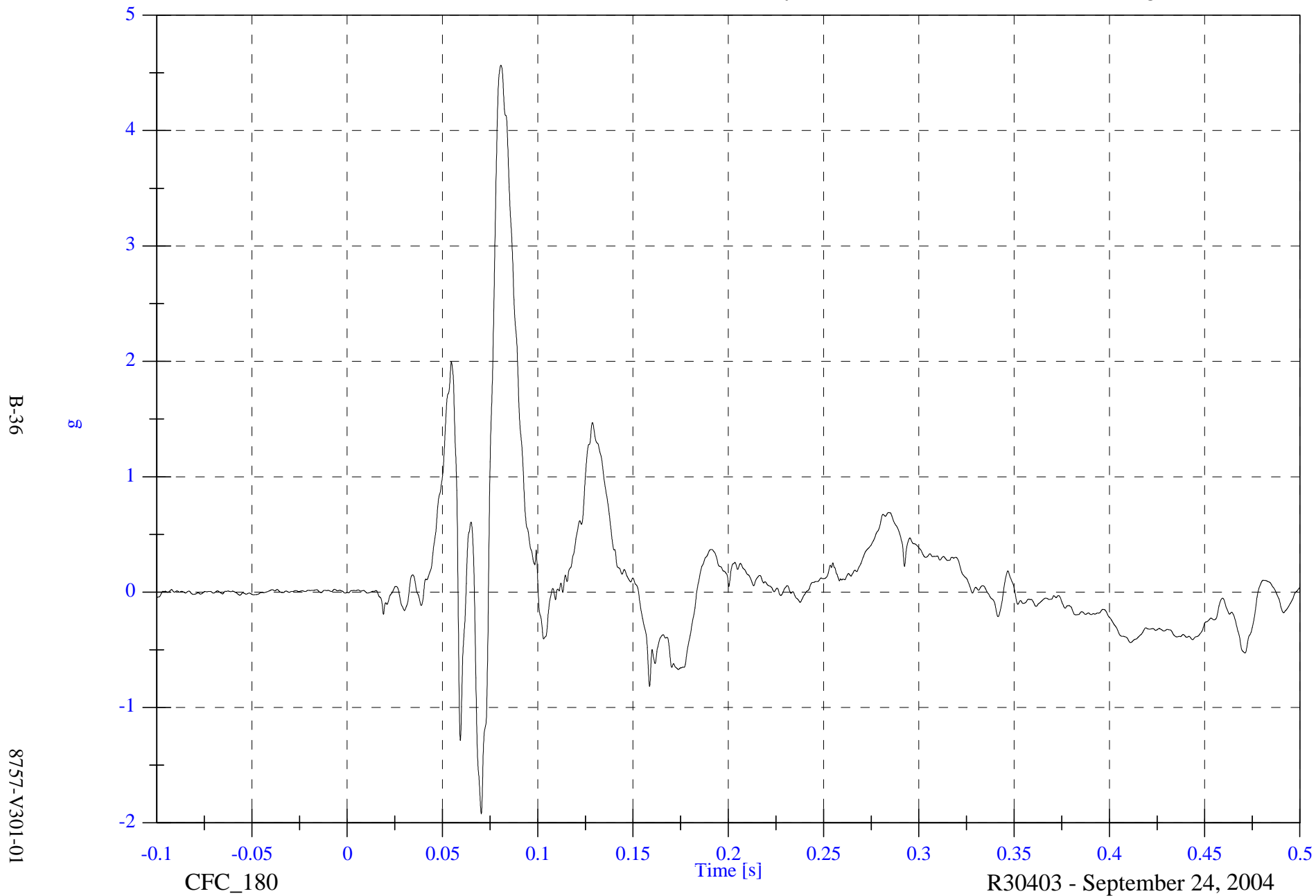


VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P1 Chest y

Max: 4.6 [g] at 0.081 [s]

Min: -1.9 [g] at 0.070 [s]



B-36

8757-V301-01

CFC\_180

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

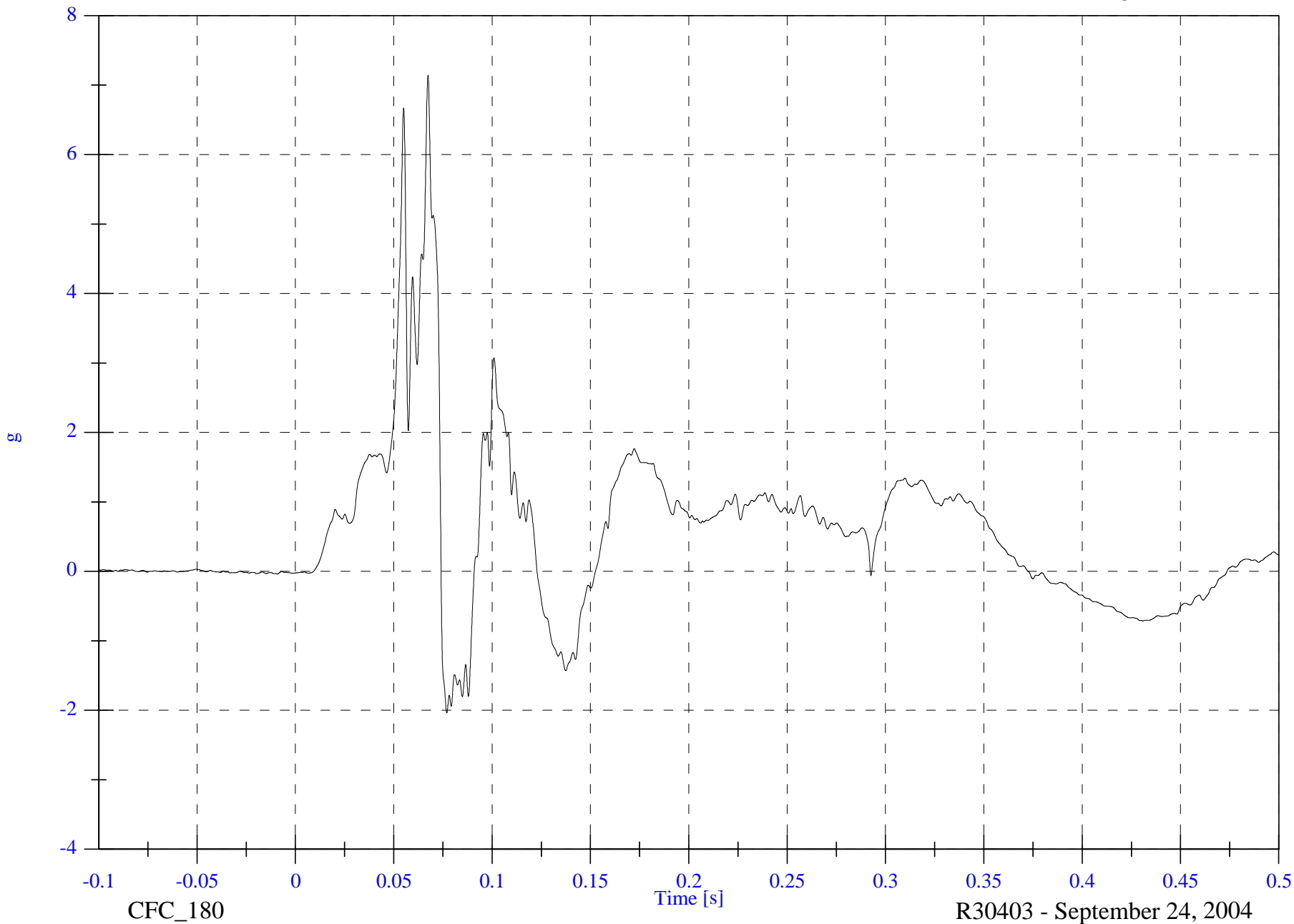
V2P1 Chest z

Max: 7.1 [g] at 0.067 [s]

Min: -2.0 [g] at 0.077 [s]

B-37

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

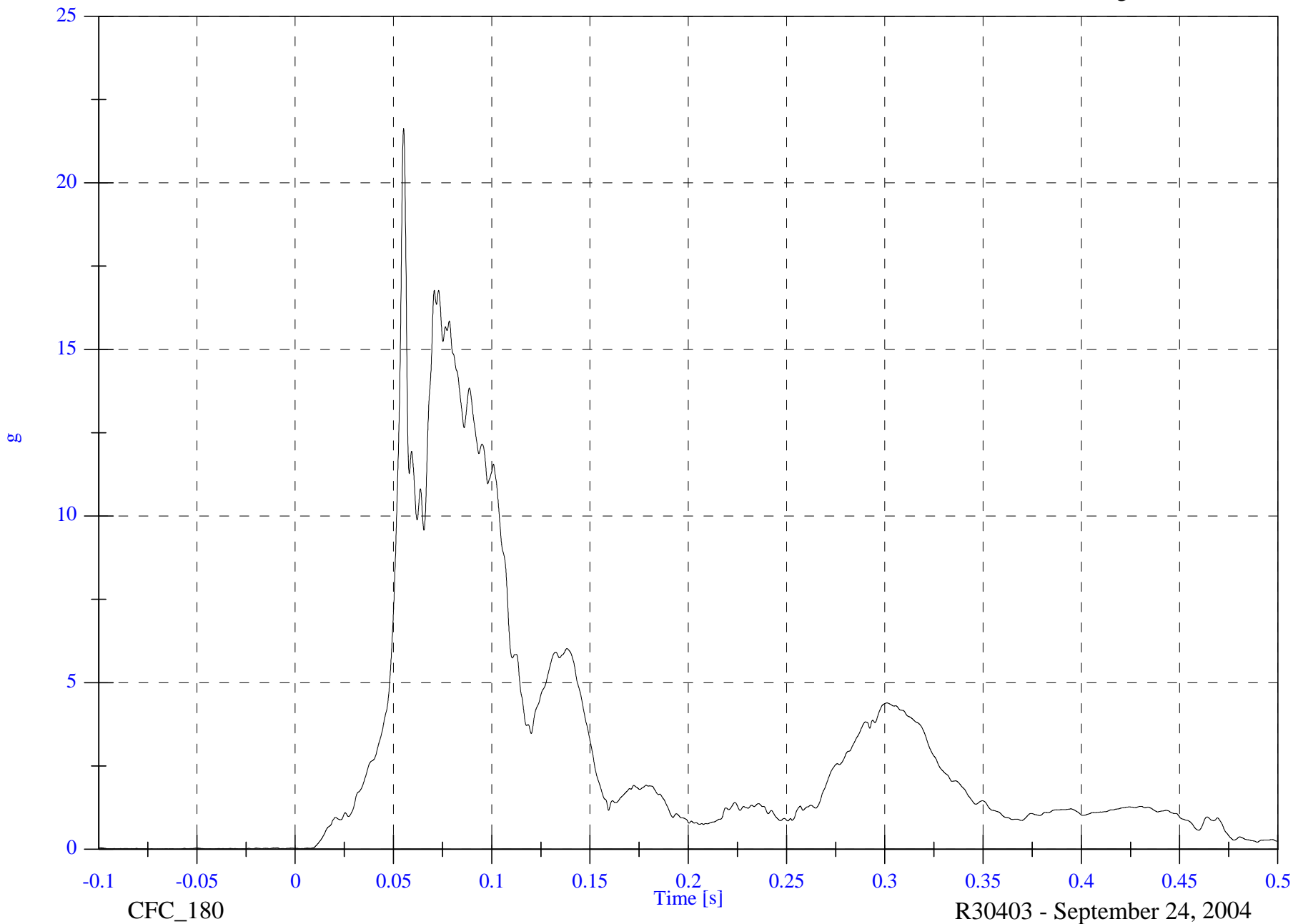
V2P1 Chest Resultant

Max: 21.6 [g] at 0.055 [s]

Min: 0.0 [g] at -0.065 [s]

B-38

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

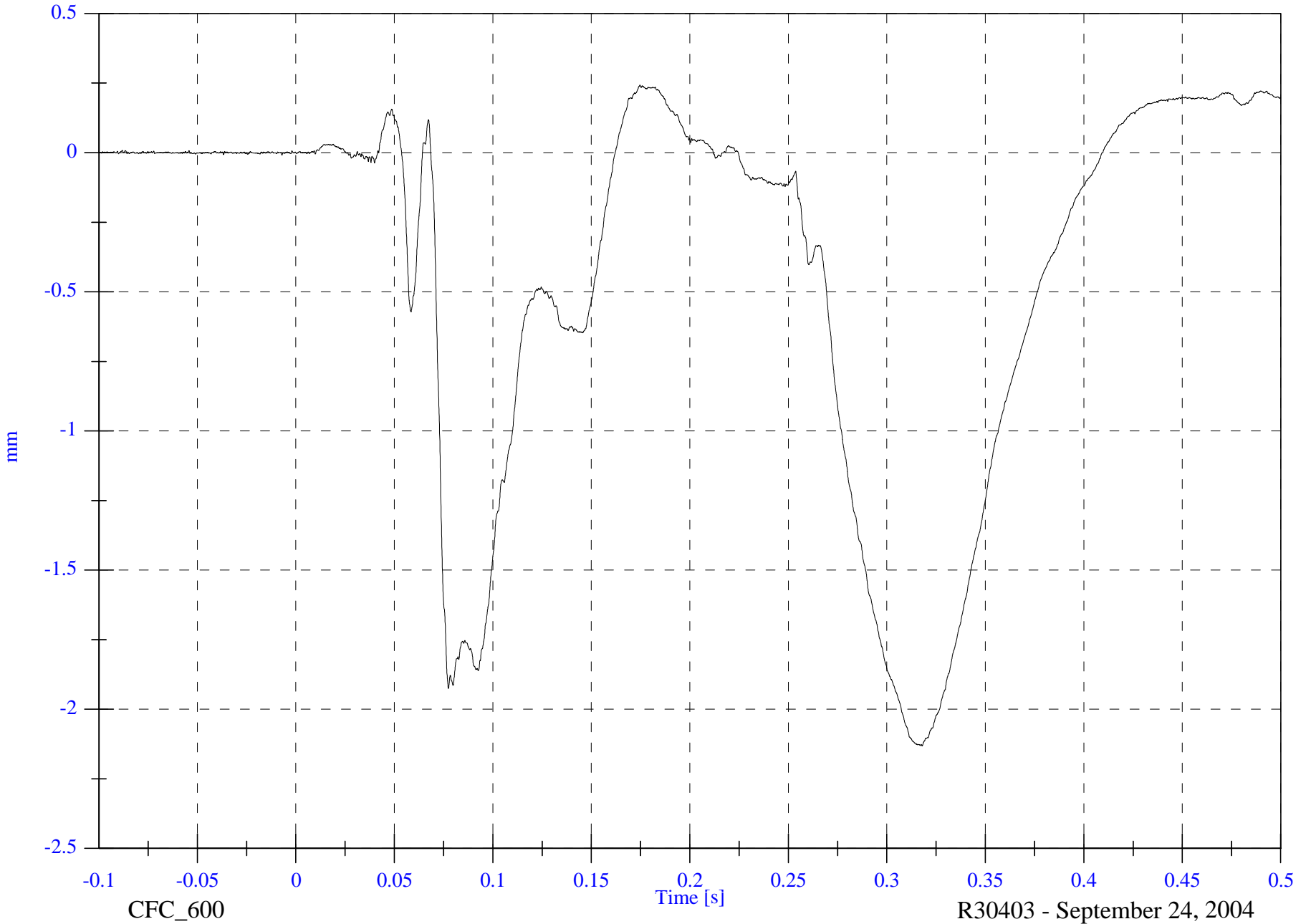
V2P1 Chest Displacement

Max: 0.2 [mm] at 0.175 [s]

Min: -2.1 [mm] at 0.318 [s]

B-39

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

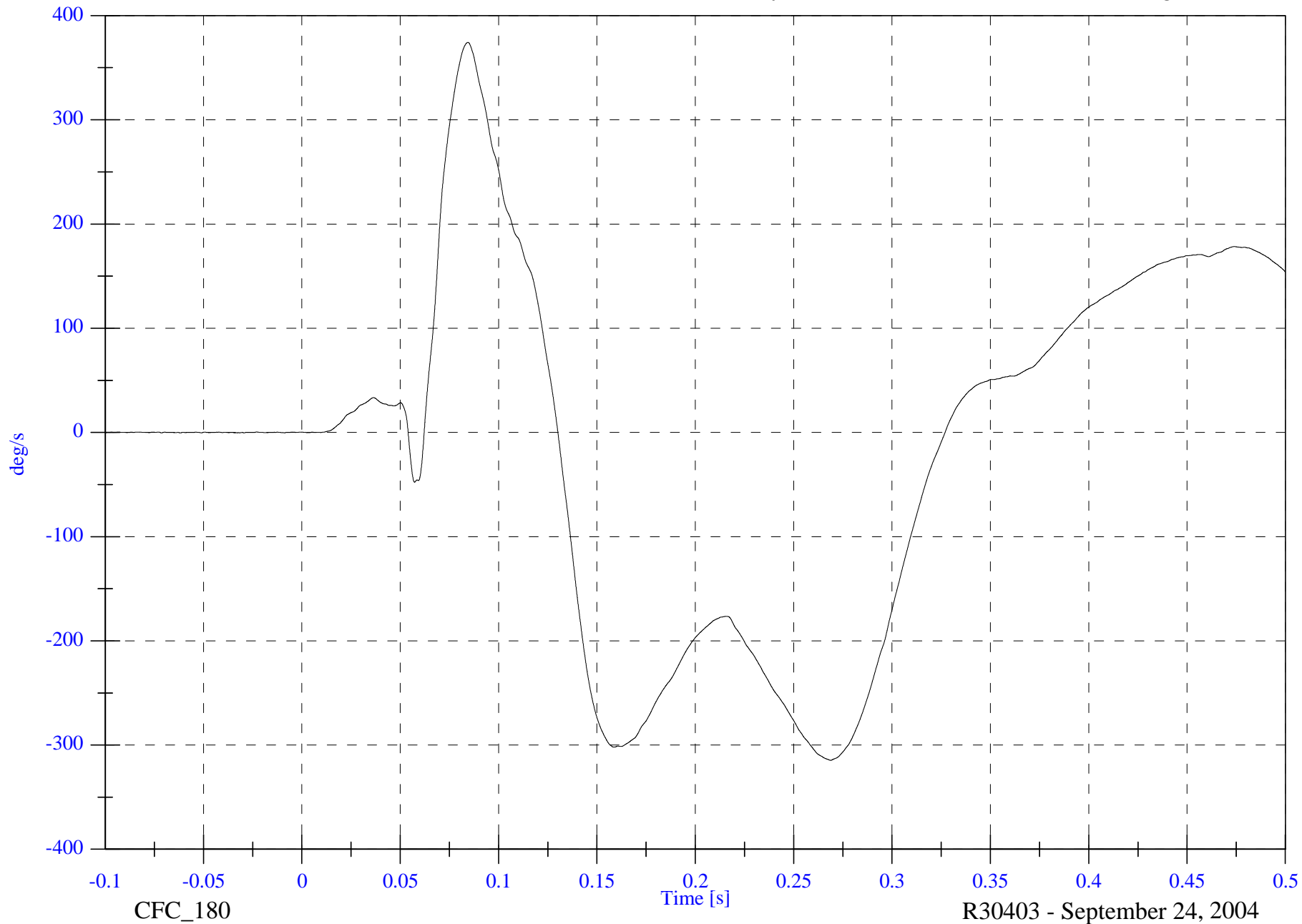
V2P1 Chest AVy

Max: 374.3 [deg/s] at 0.084 [s]

Min: -314.7 [deg/s] at 0.269 [s]

B-40

8757-V301-01



CFC\_180

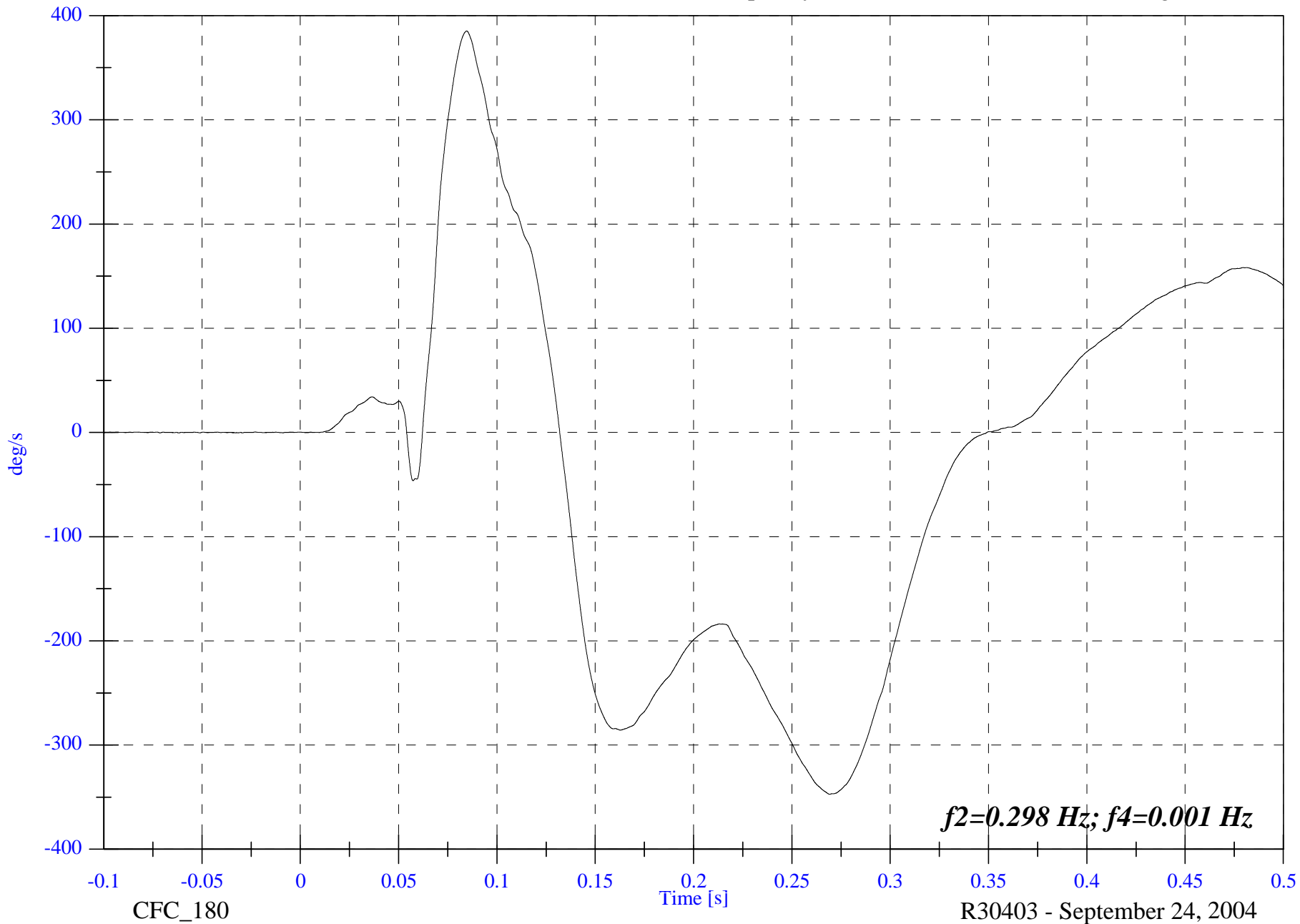
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V2P1 Chest Comp AVy

Max: 385.3 [deg/s] at 0.085 [s]

Min: -347.1 [deg/s] at 0.269 [s]



B-41

8757-V301-01

CFC\_180

Time [s]

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VOLPE 301 Test 1 - 2003 Jeep Liberty

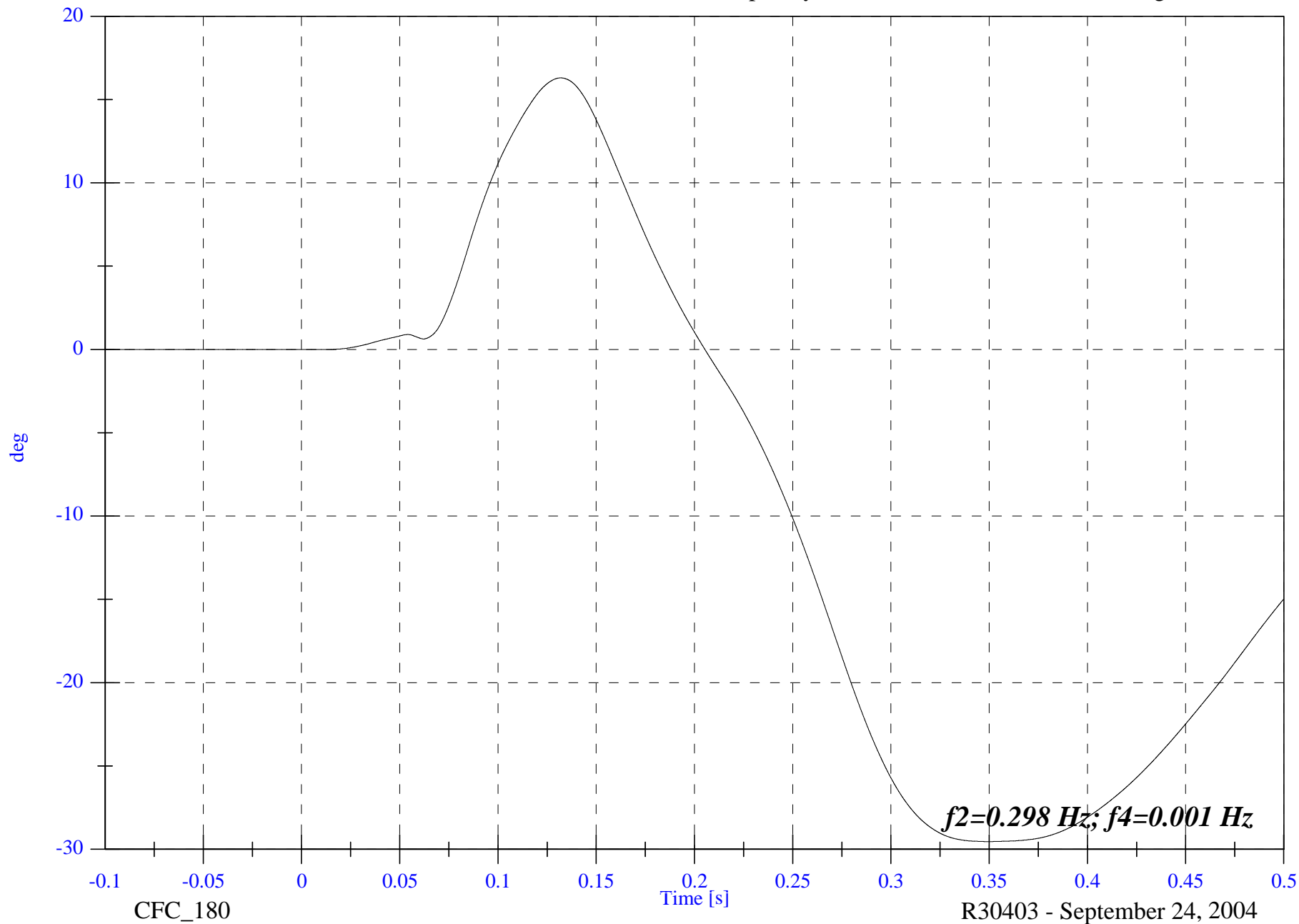
V2P1 Chest Comp ADy

Max: 16.3 [deg] at 0.132 [s]

Min: -29.5 [deg] at 0.349 [s]

B-42

8757-V301-01

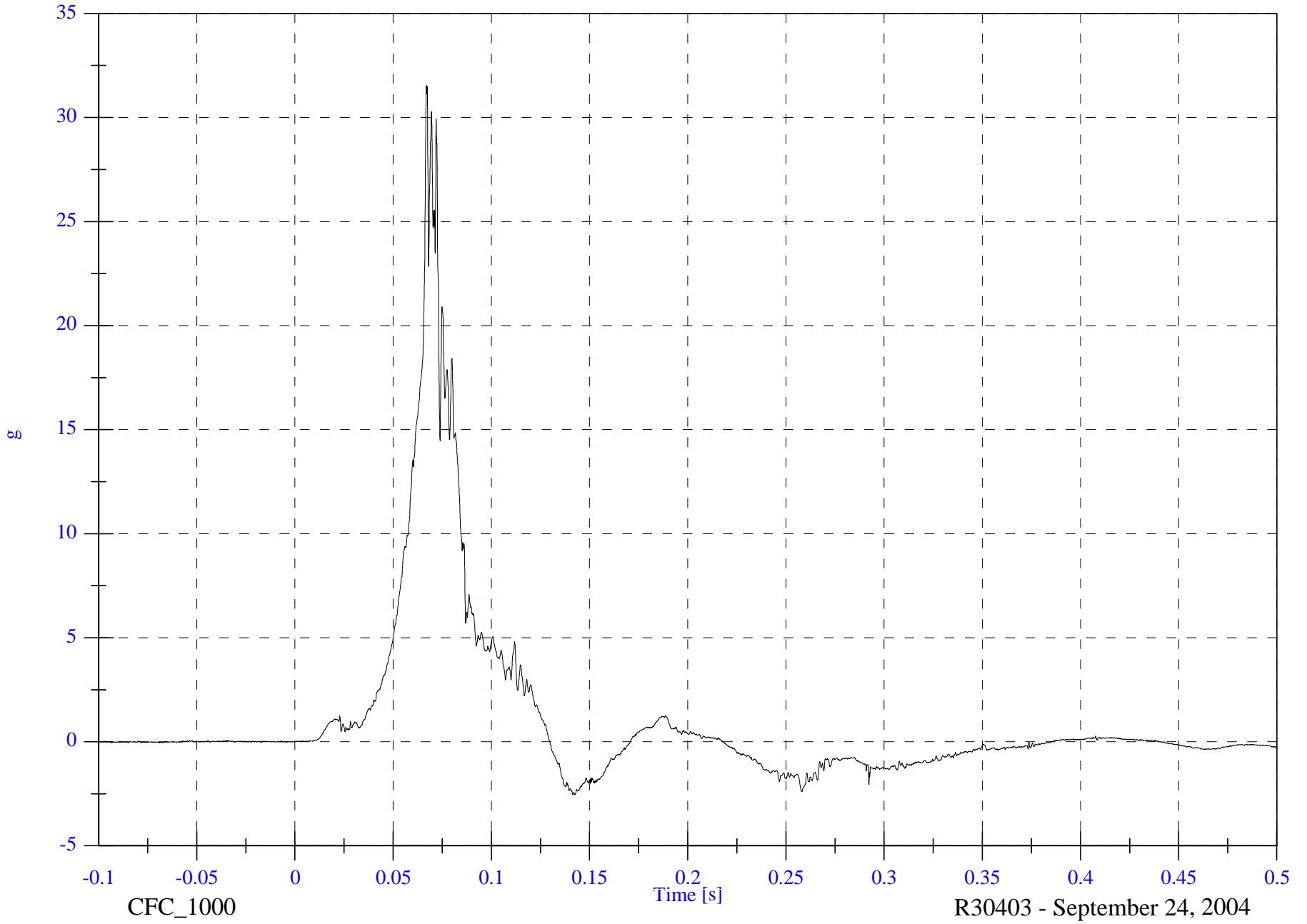


VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P1 Pelvic x

Max: 31.5 [g] at 0.067 [s]

Min: -2.5 [g] at 0.141 [s]



B-43

8757-V301-01

CFC\_1000

Time [s]

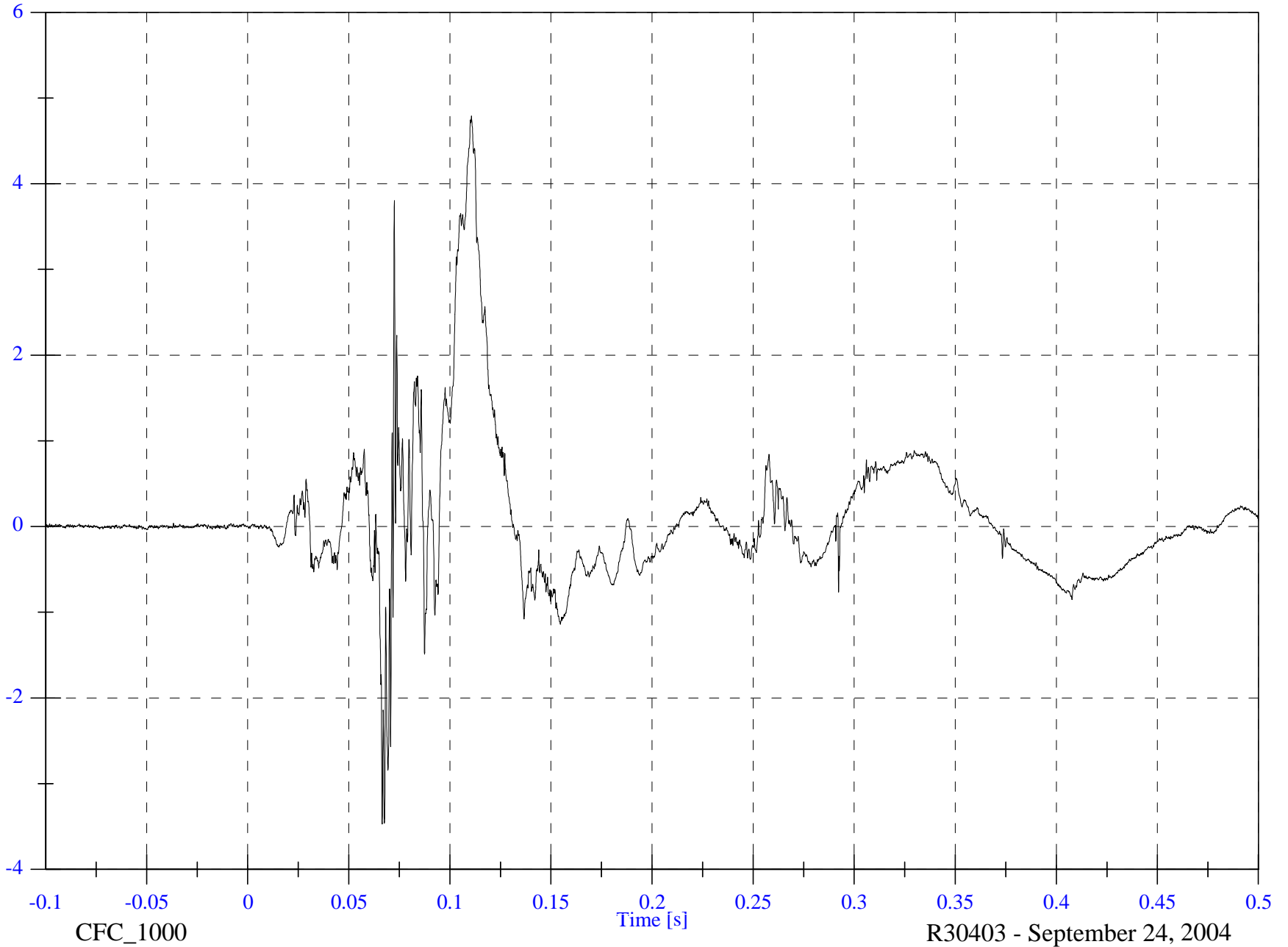
R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P1 Pelvic y

Max: 4.8 [g] at 0.111 [s]

Min: -3.5 [g] at 0.066 [s]



B-44

8757-V301-01

CFC\_1000

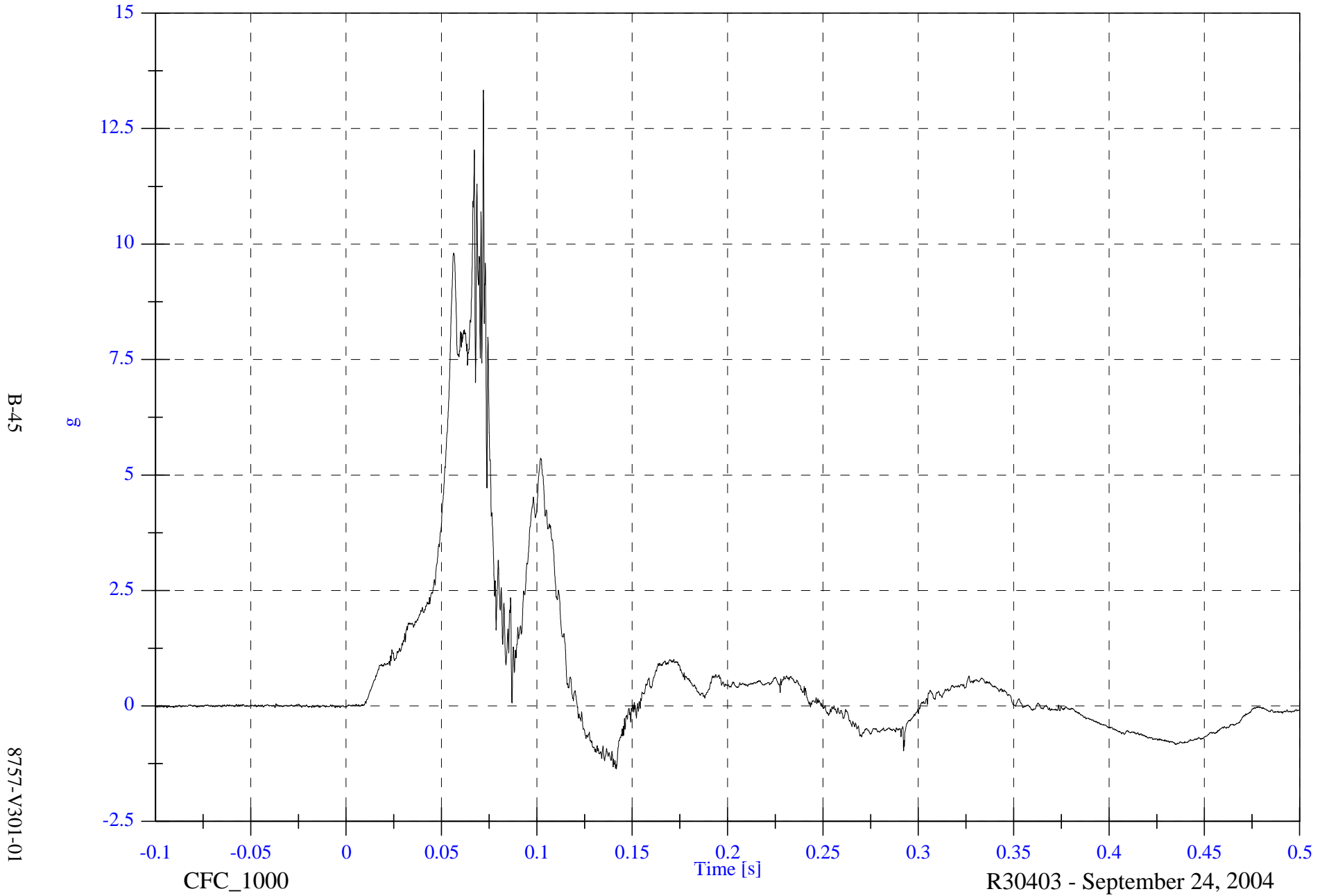
R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P1 Pelvic z

Max: 13.3 [g] at 0.072 [s]

Min: -1.4 [g] at 0.142 [s]



VOLPE 301 Test 1 - 2003 Jeep Liberty

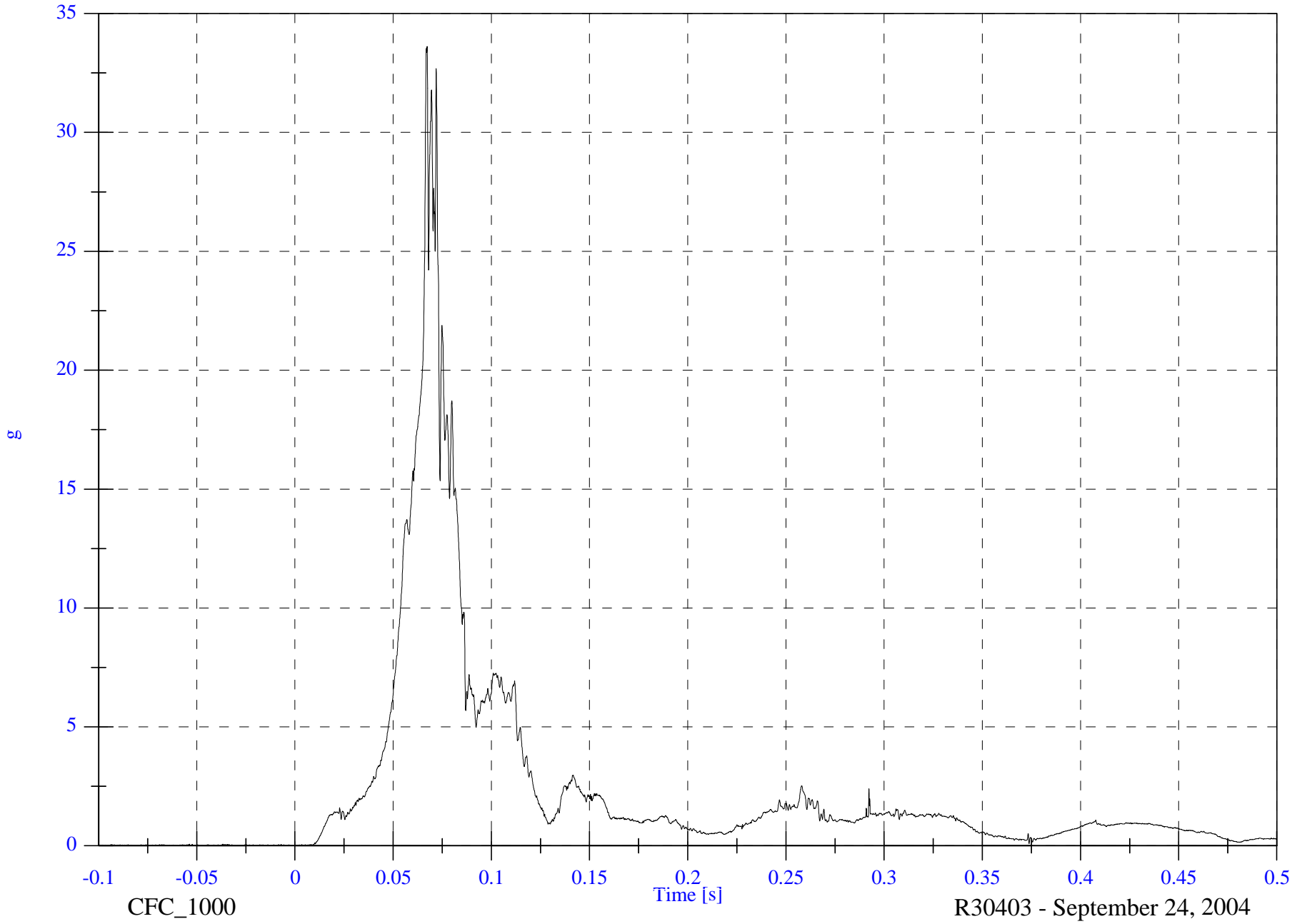
V2P1 Pelvic Resultant

Max: 33.6 [g] at 0.067 [s]

Min: 0.0 [g] at -0.058 [s]

B-46

8757-V301-01

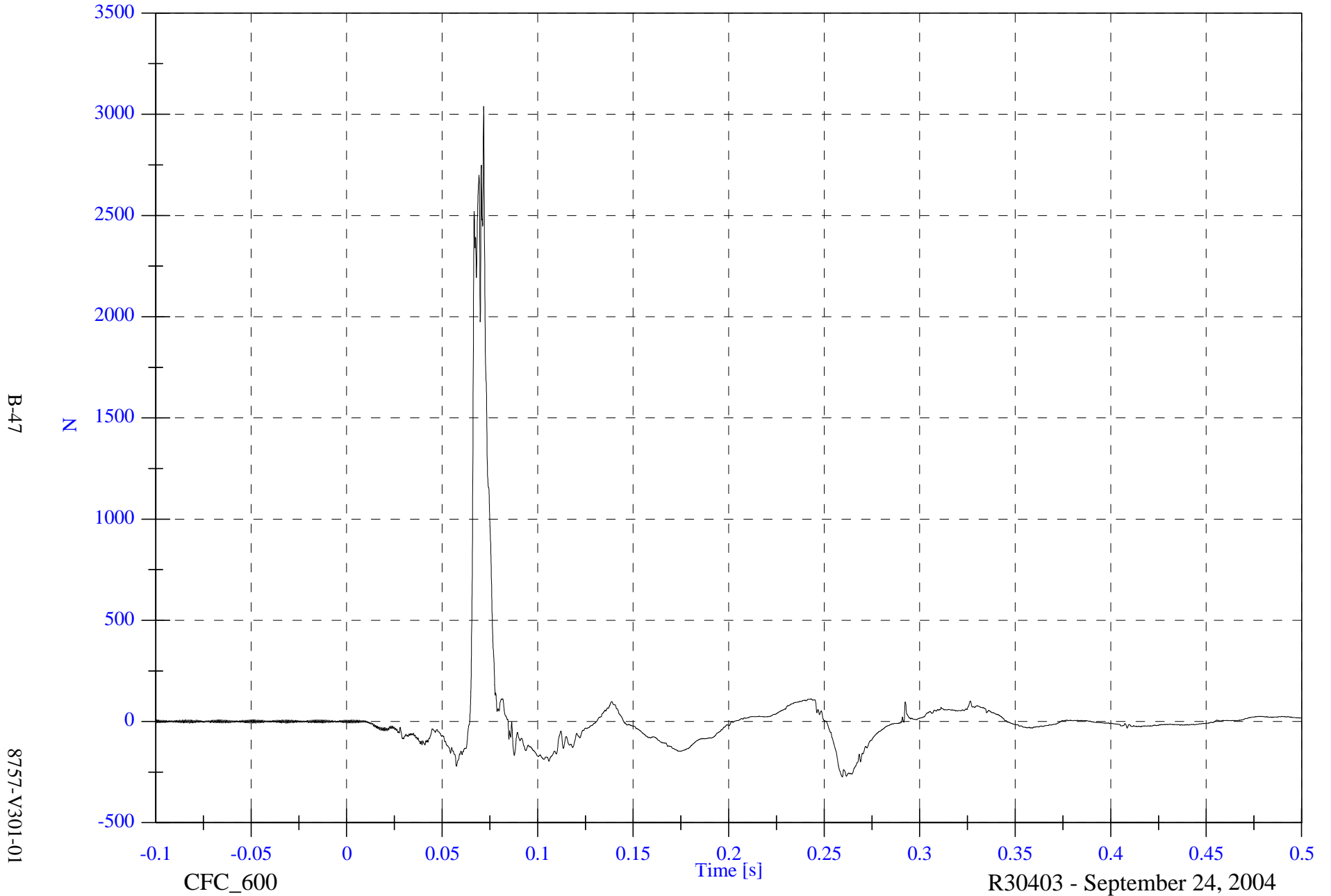


VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P1 Left Femur

Max: 3038.8 [N] at 0.072 [s]

Min: -274.4 [N] at 0.259 [s]



B-47

8757-V301-01

CFC\_600

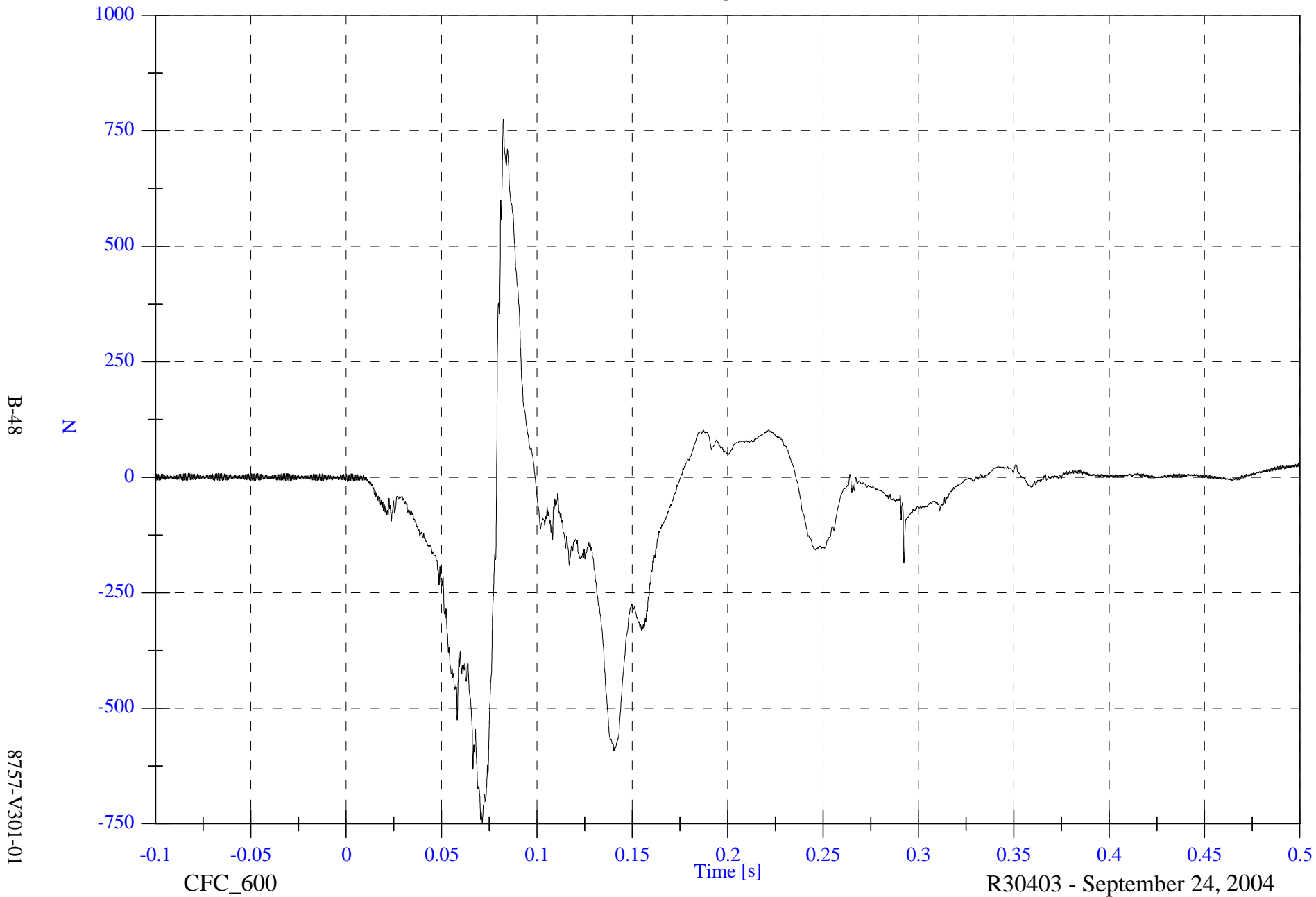
R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P1 Right Femur

Max: 774.6 [N] at 0.082 [s]

Min: -747.3 [N] at 0.071 [s]



B-48

N

8757-V301-01

CFC\_600

Time [s]

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VOLPE 301 Test 1 - 2003 Jeep Liberty

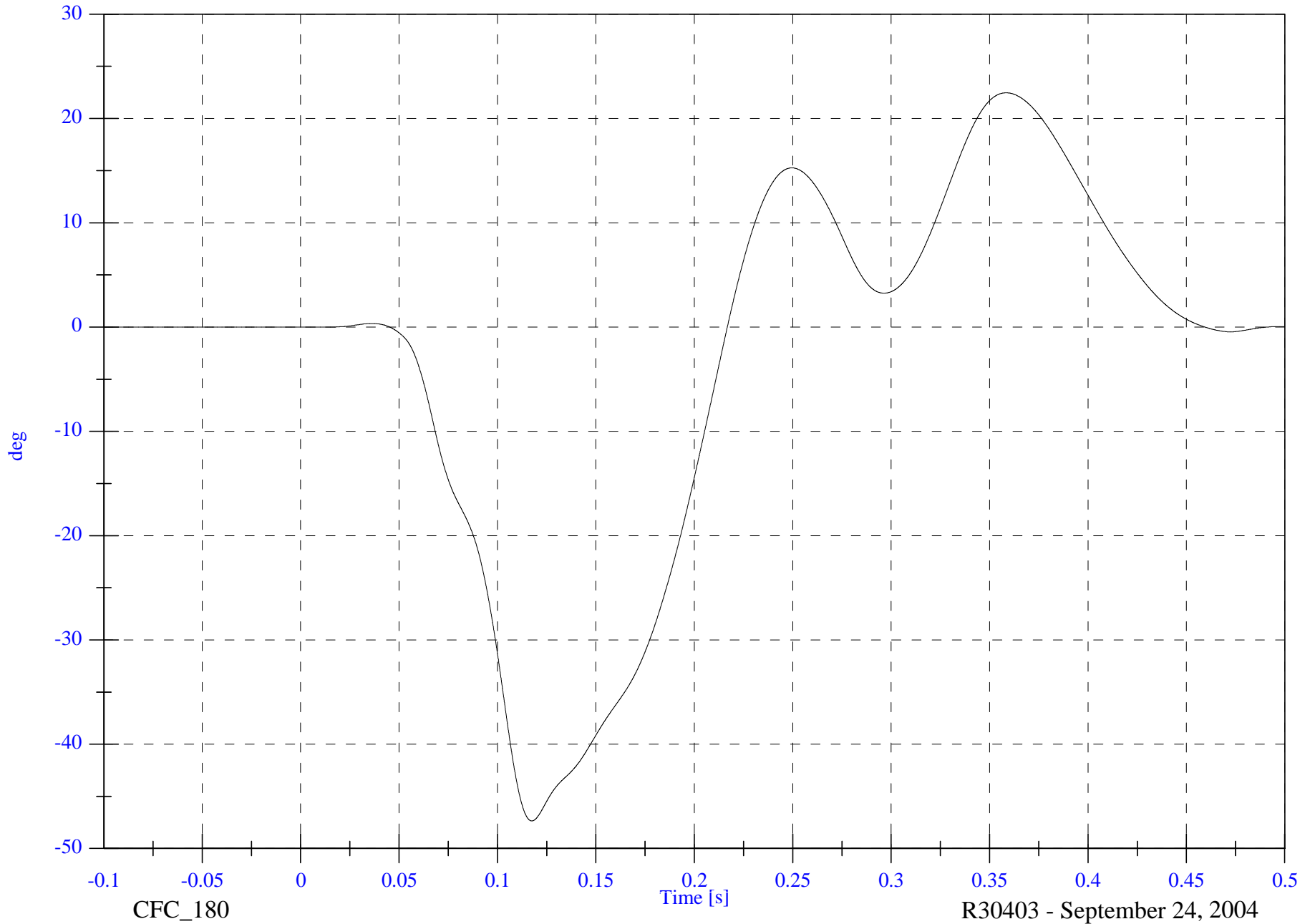
V2P1 Head to Chest

Max: 22.5 [deg] at 0.358 [s]

Min: -47.4 [deg] at 0.117 [s]

B-49

8757-V301-01



CFC\_180

Time [s]

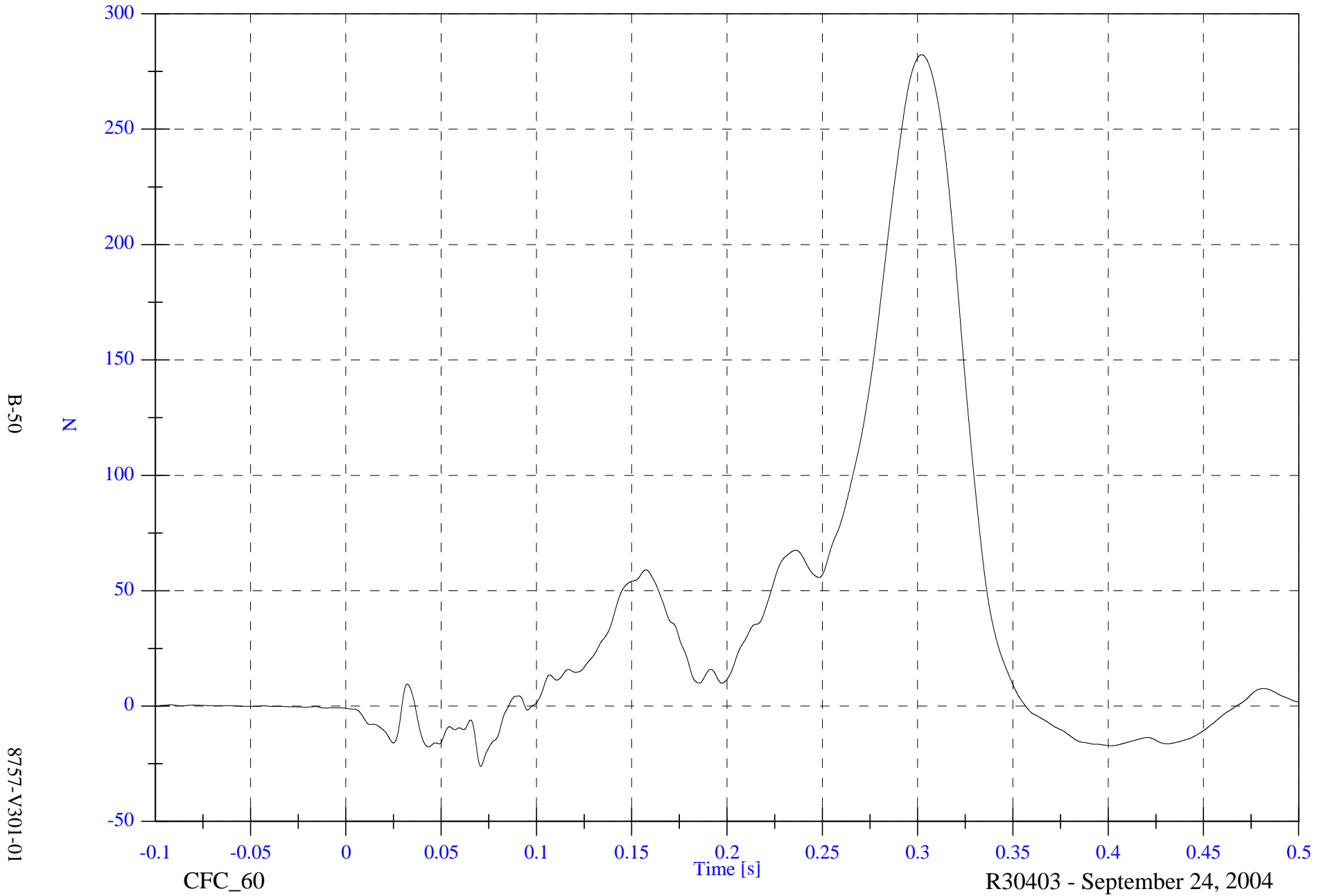
R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P1 Lap Belt

Max: 282.3 [N] at 0.302 [s]

Min: -26.1 [N] at 0.071 [s]



B-50

N

8757-V301-01

CFC\_60

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

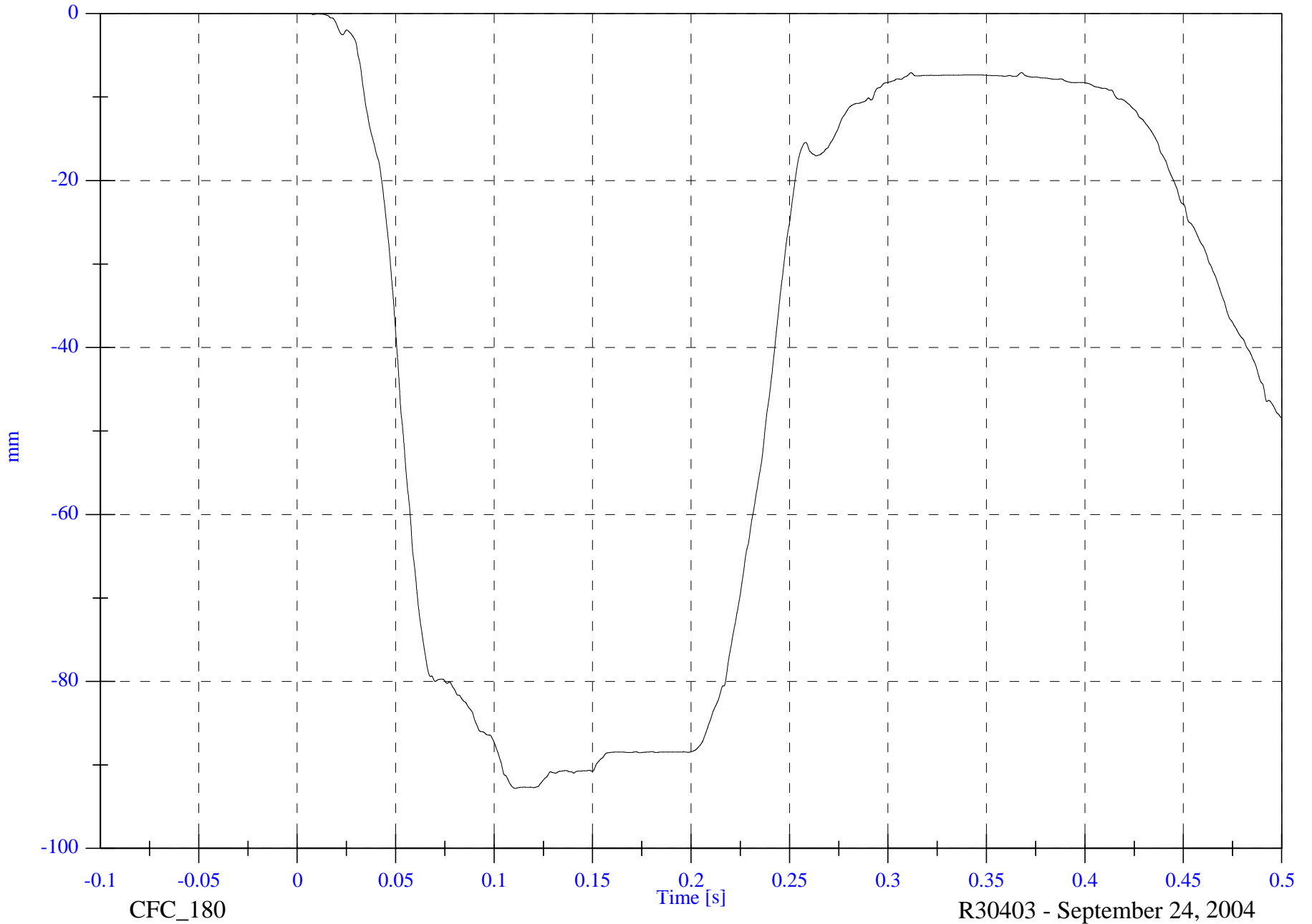
V2P1 Belt Spoolout

Max: 0.0 [mm] at -0.079 [s]

Min: -92.8 [mm] at 0.111 [s]

B-51

8757-V301-01



CFC\_180

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

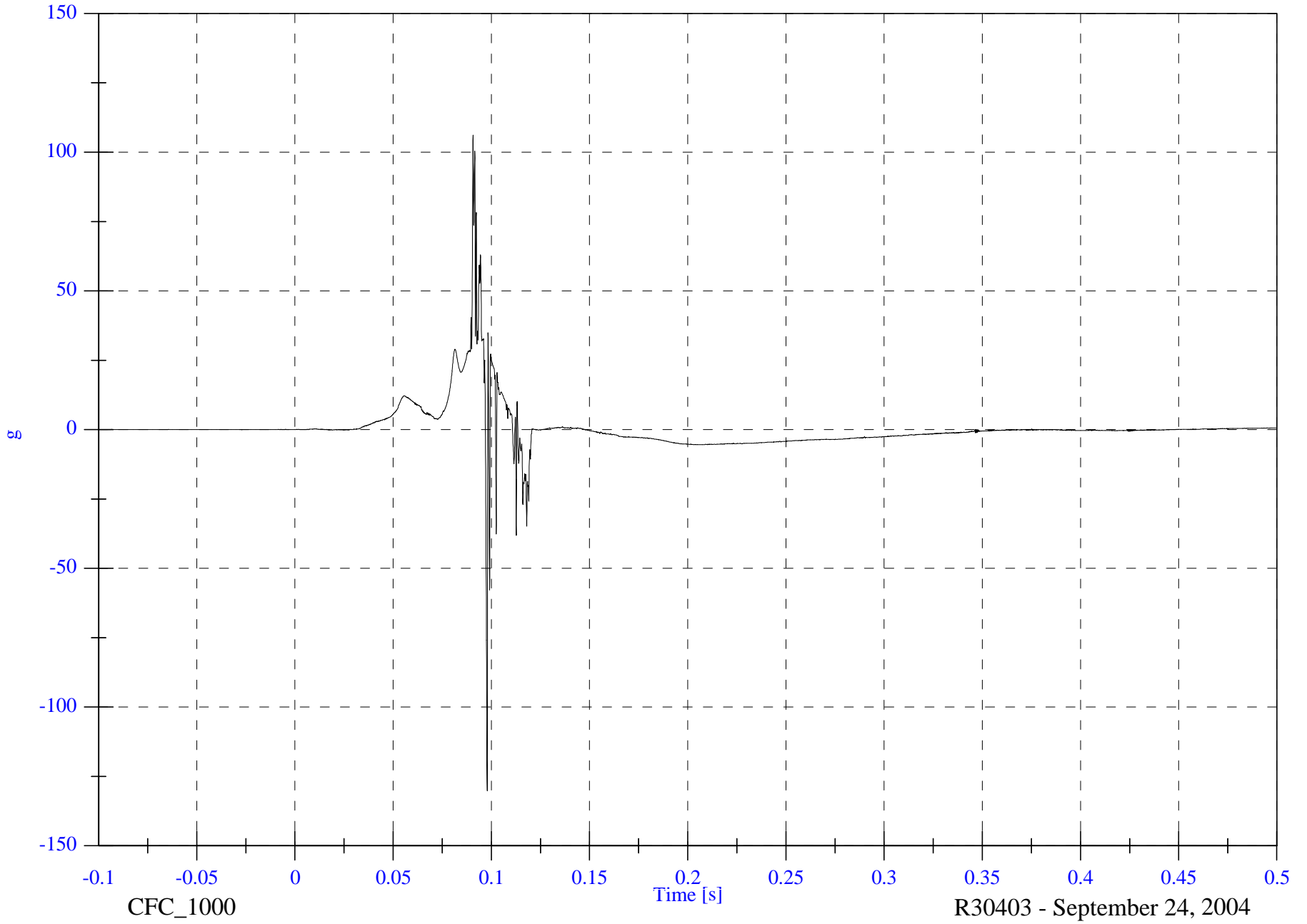
V2P3 Head x

Max: 106.2 [g] at 0.091 [s]

Min: -130.2 [g] at 0.098 [s]

B-52

8757-V301-01

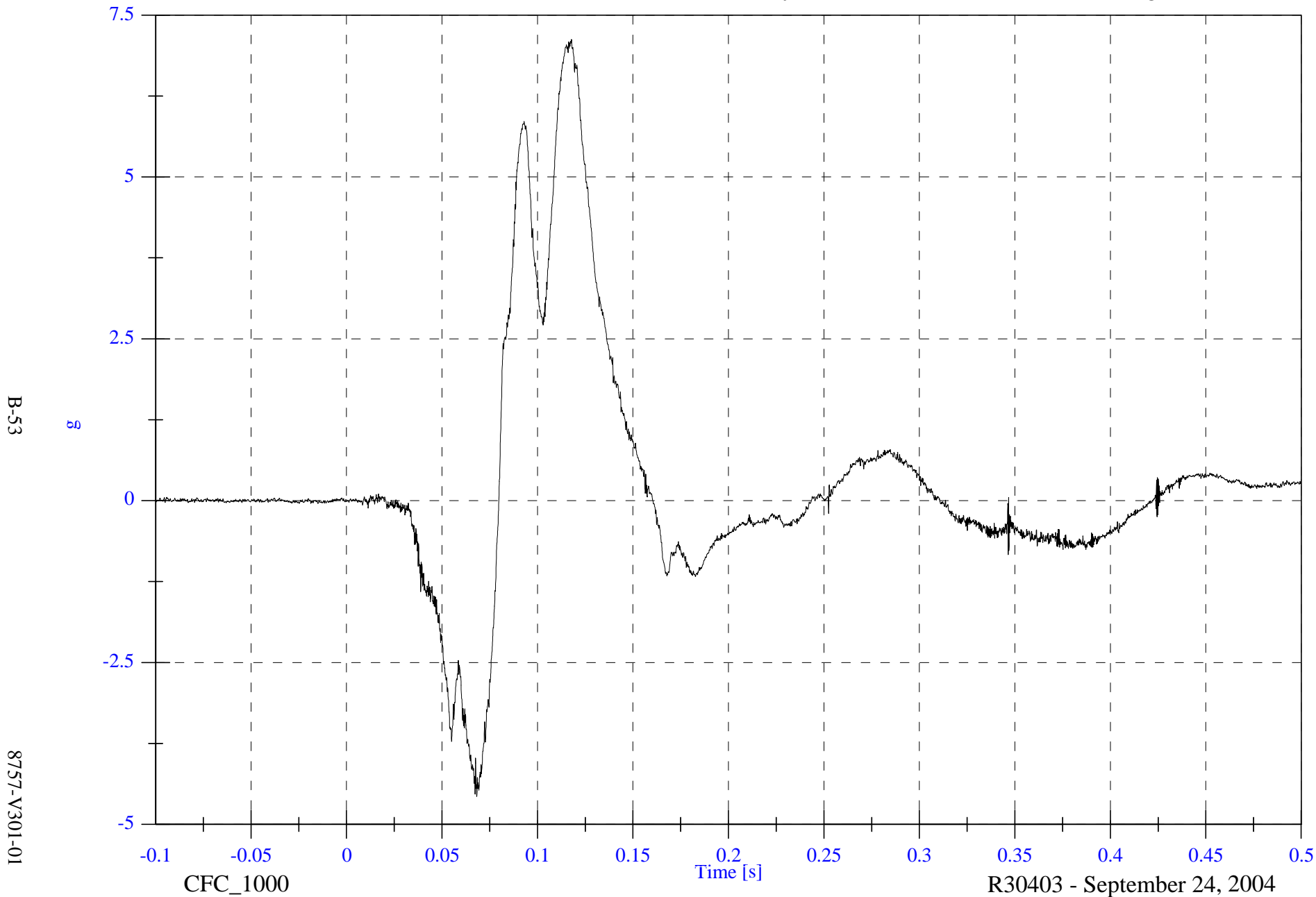


VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P3 Head y

Max: 7.1 [g] at 0.118 [s]

Min: -4.6 [g] at 0.068 [s]



B-53

8757-V301-01

CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

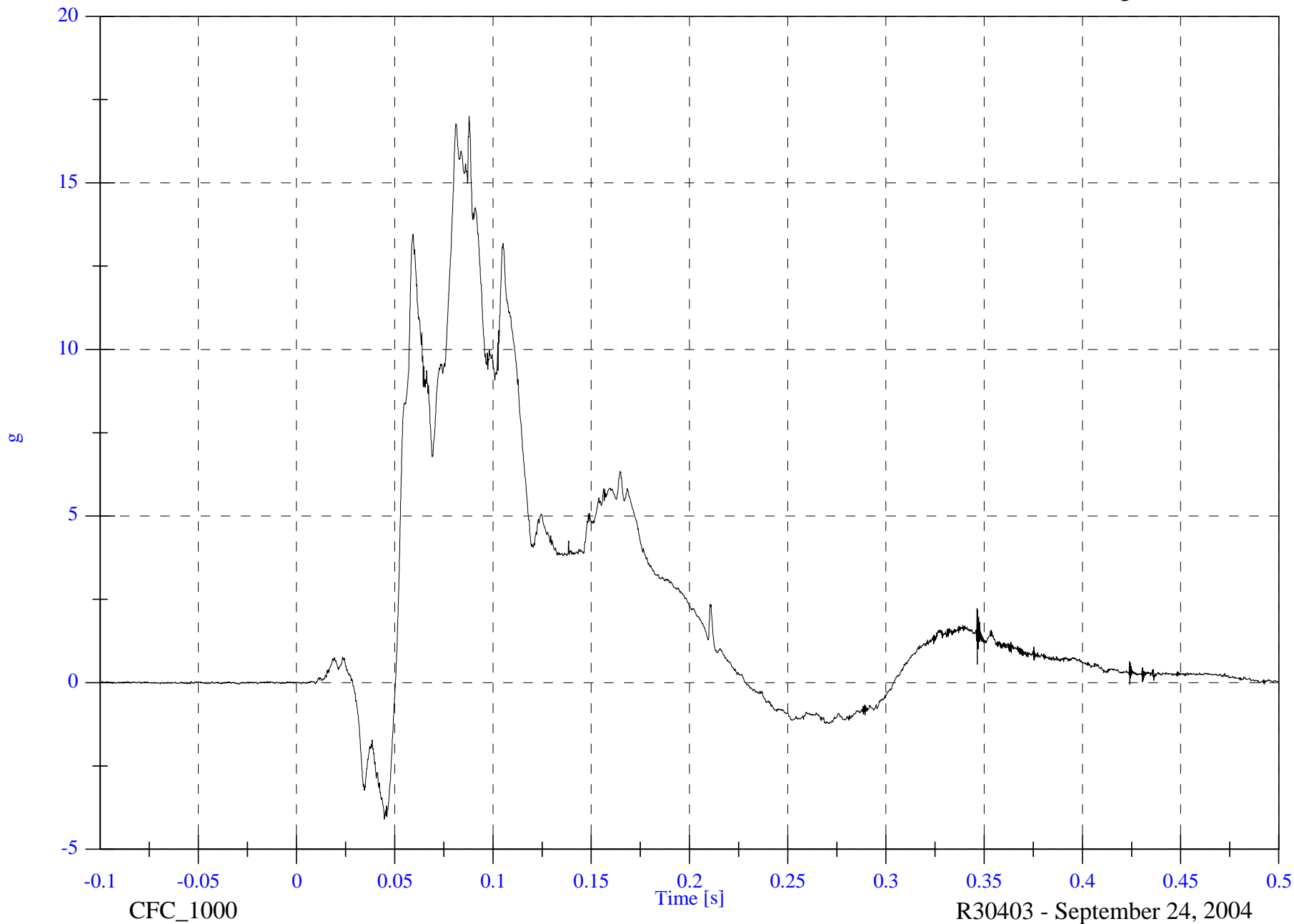
V2P3 Head z

Max: 17.0 [g] at 0.088 [s]

Min: -4.1 [g] at 0.045 [s]

B-54

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

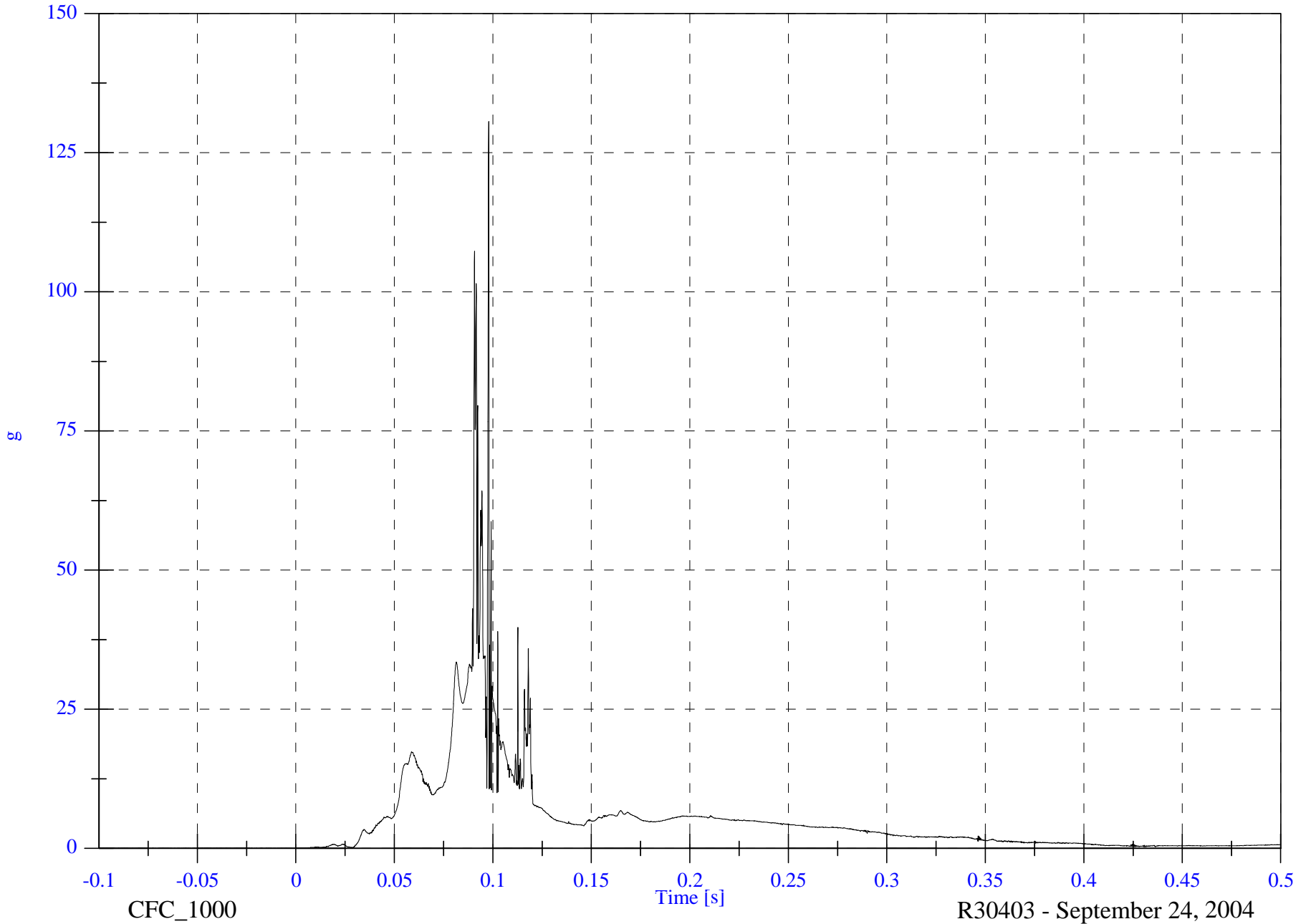
V2P3 Head Resultant

Max: 130.6 [g] at 0.098 [s]

Min: 0.0 [g] at -0.091 [s]

B-55

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

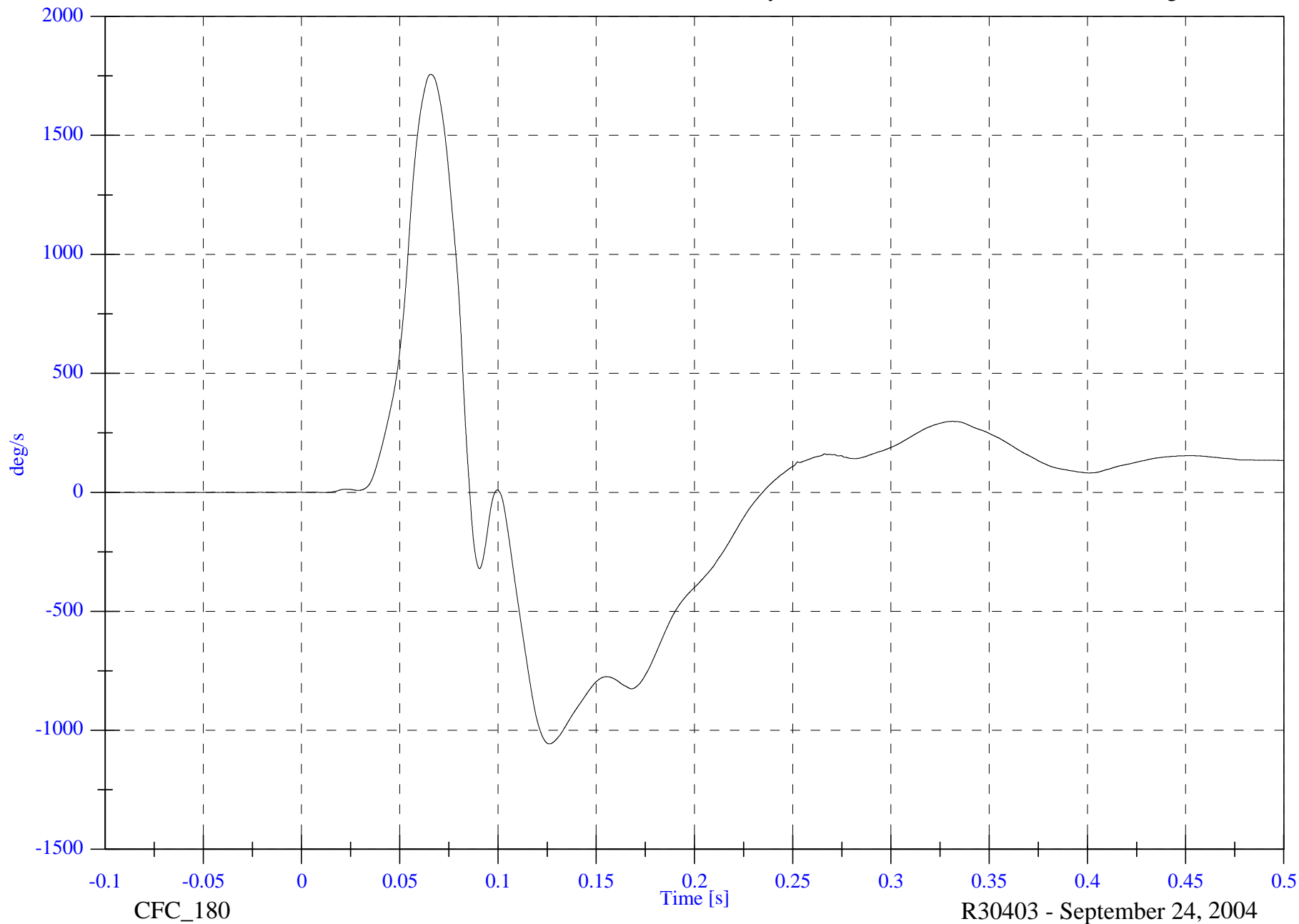
V2P3 Head AVy

Max: 1756.1 [deg/s] at 0.066 [s]

Min: -1057.1 [deg/s] at 0.126 [s]

B-56

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

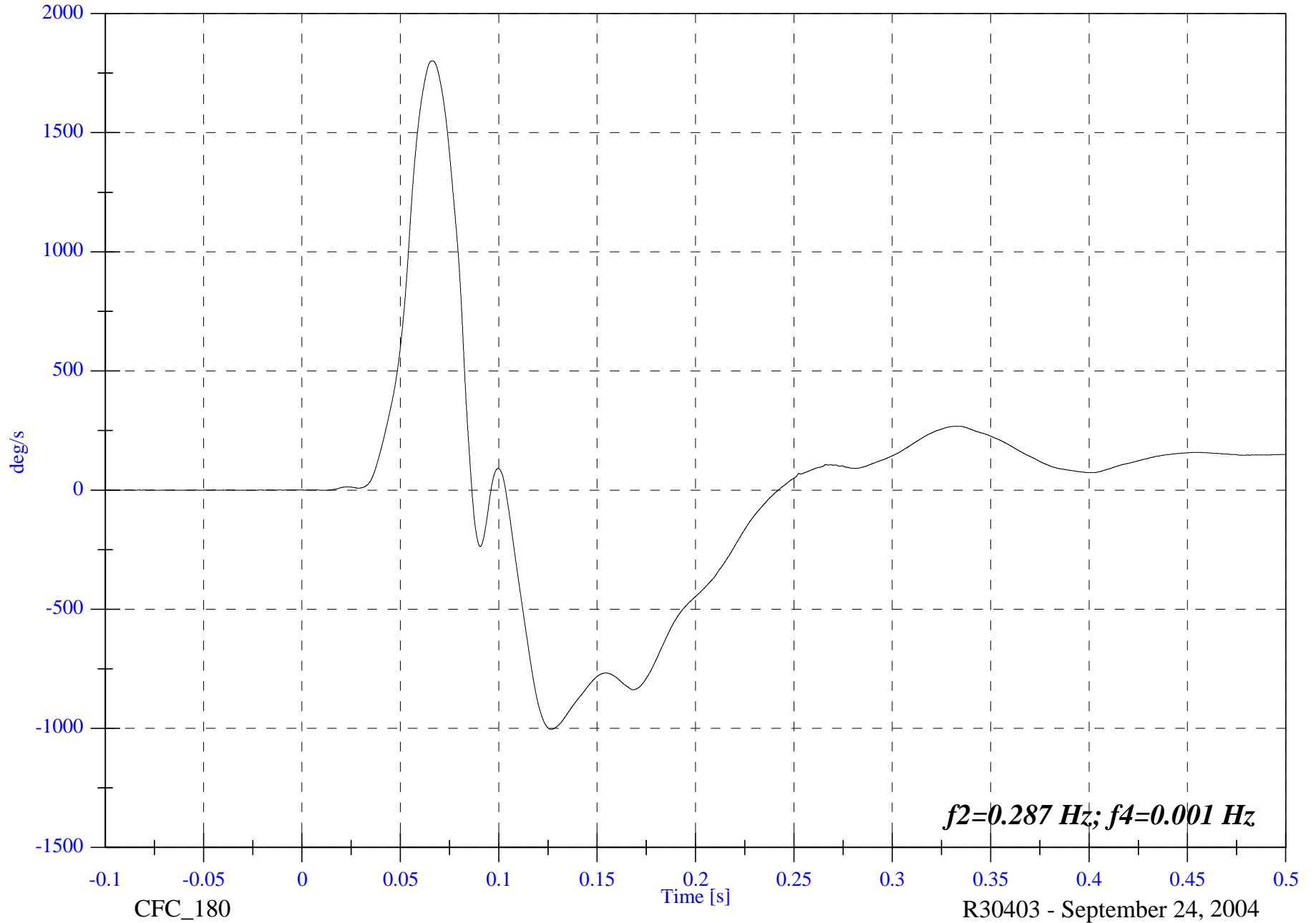
V2P3 Head Comp AVy

Max: 1801.5 [deg/s] at 0.066 [s]

Min: -1003.9 [deg/s] at 0.127 [s]

B-57

8757-V301-01



$f_2=0.287 \text{ Hz}; f_4=0.001 \text{ Hz}$

CFC\_180

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

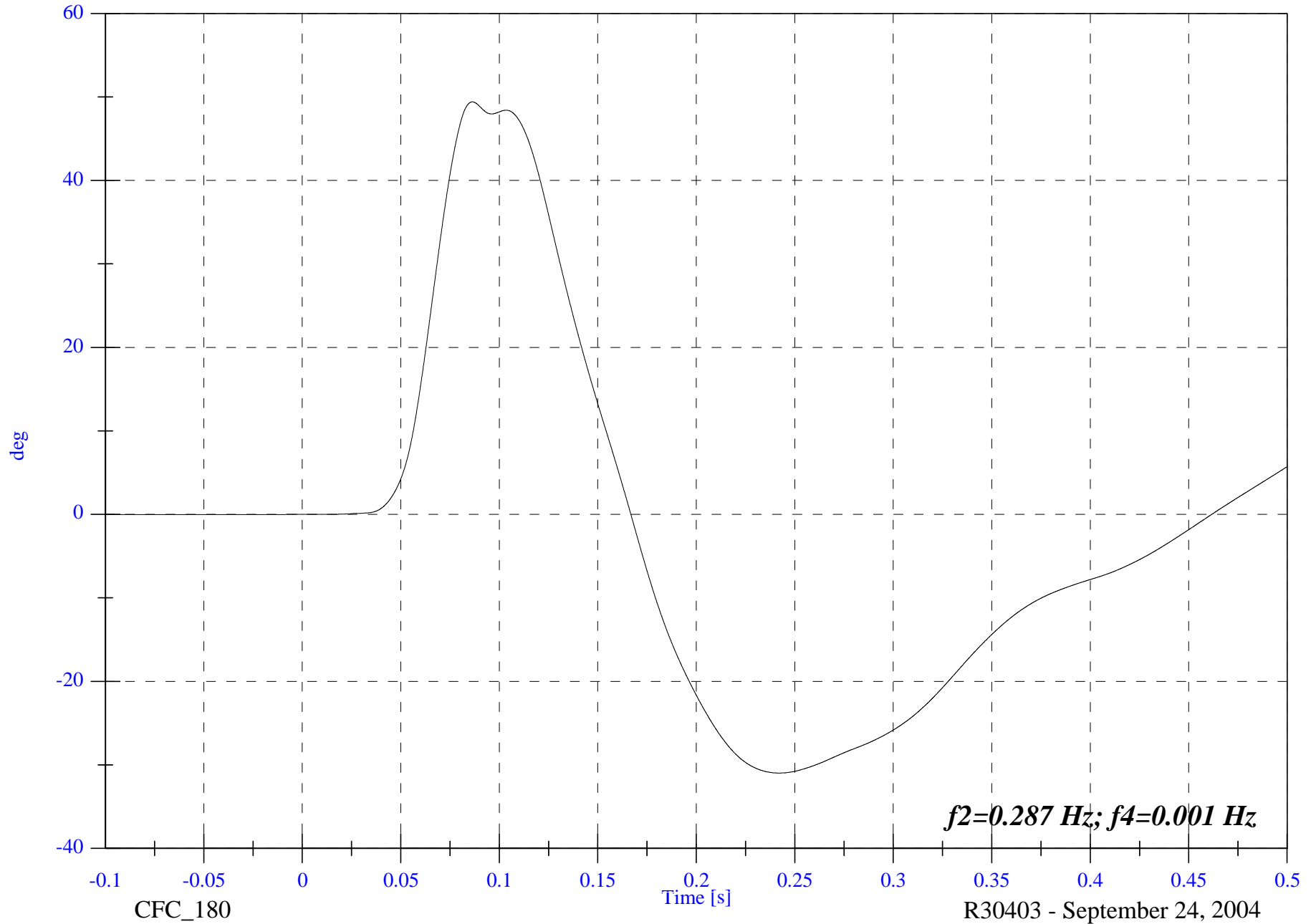
V2P3 Head Comp ADy

Max: 49.4 [deg] at 0.086 [s]

Min: -31.0 [deg] at 0.242 [s]

B-58

8757-V301-01



CFC\_180

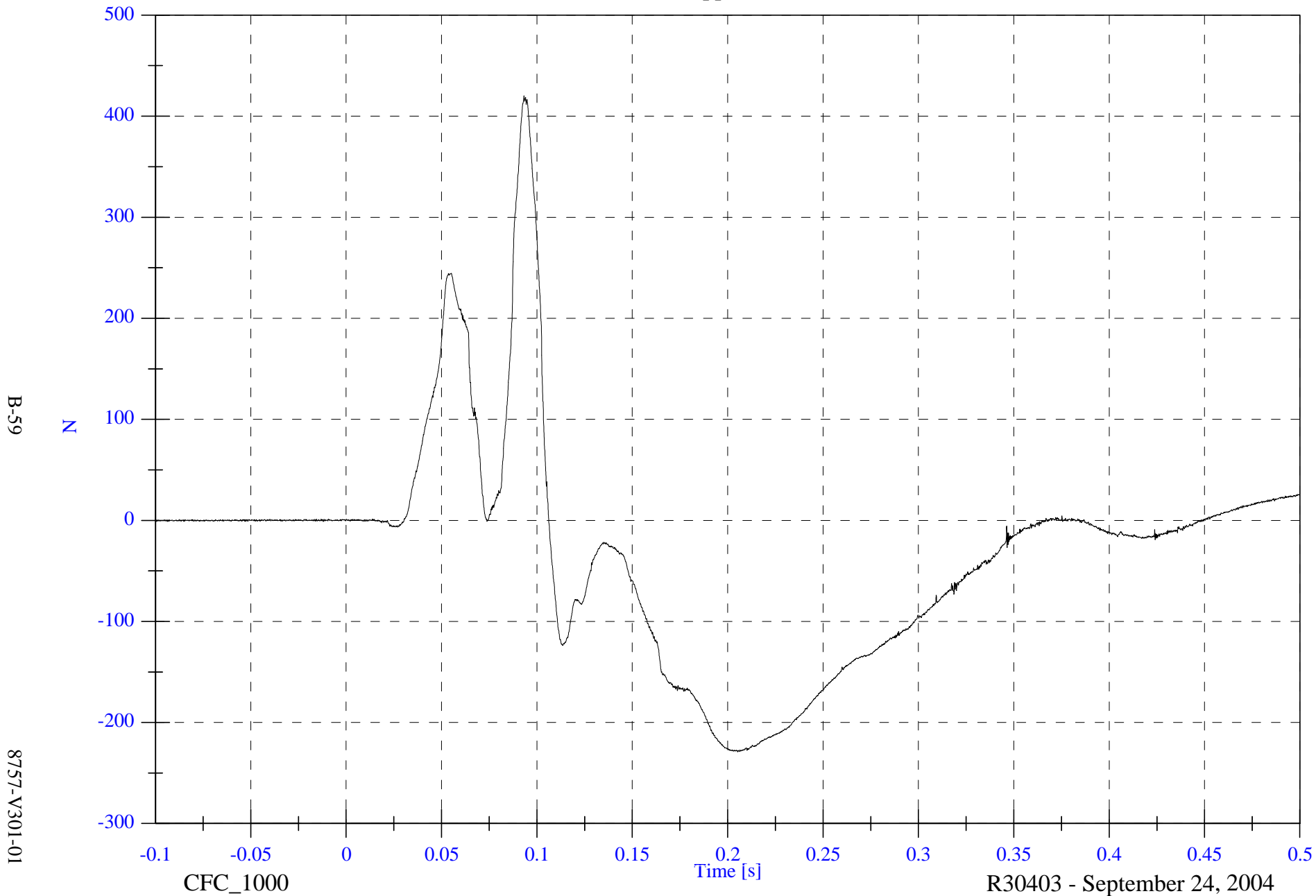
R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P3 Upper Neck Fx

Max: 420.3 [N] at 0.093 [s]

Min: -229.1 [N] at 0.205 [s]



B-59

8757-V301-01

CFC\_1000

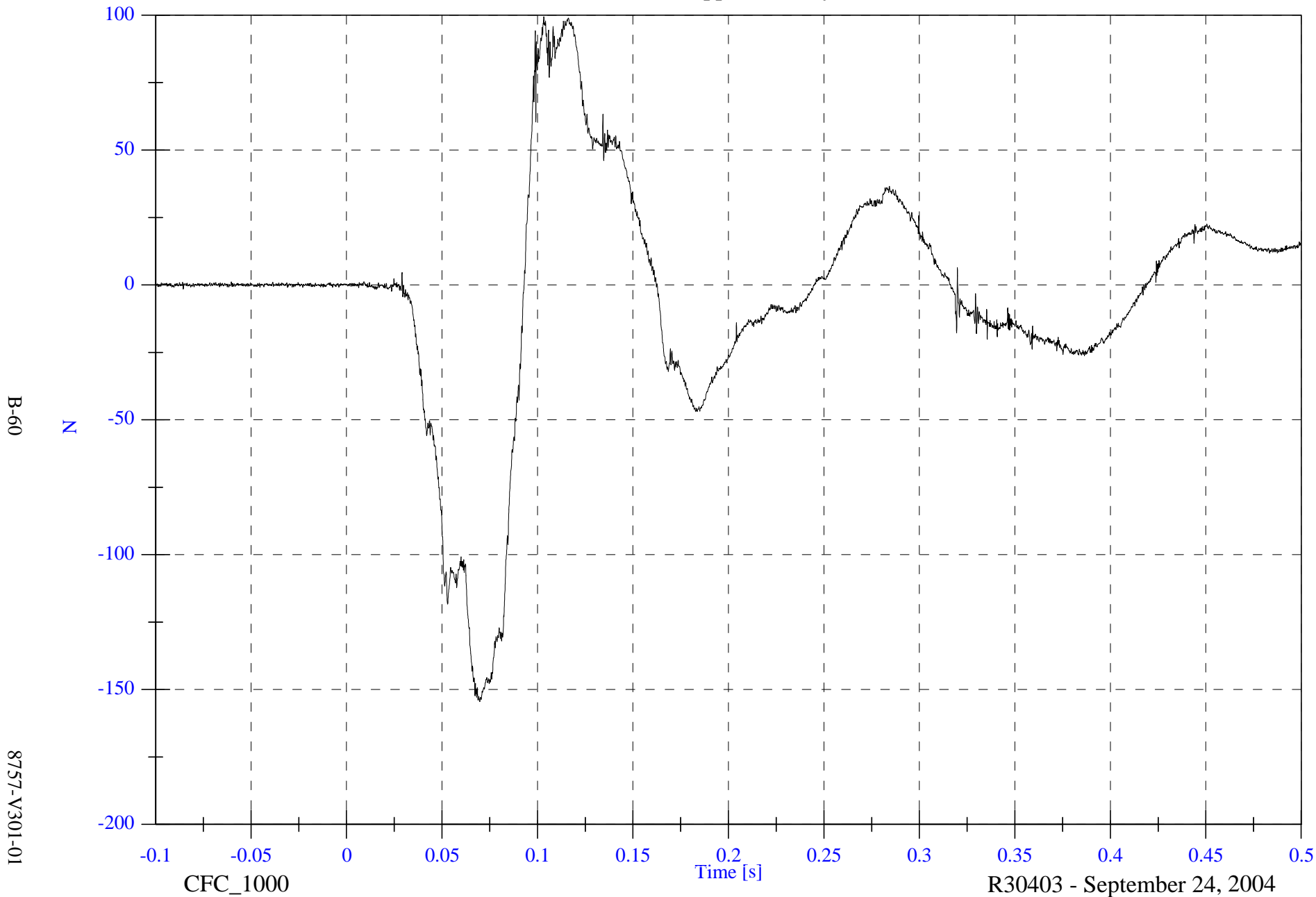
R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P3 Upper Neck Fy

Max: 99.4 [N] at 0.103 [s]

Min: -154.5 [N] at 0.070 [s]



B-60

N

8757-V301-01

CFC\_1000

Time [s]

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Max: 785.2 [N] at 0.088 [s]

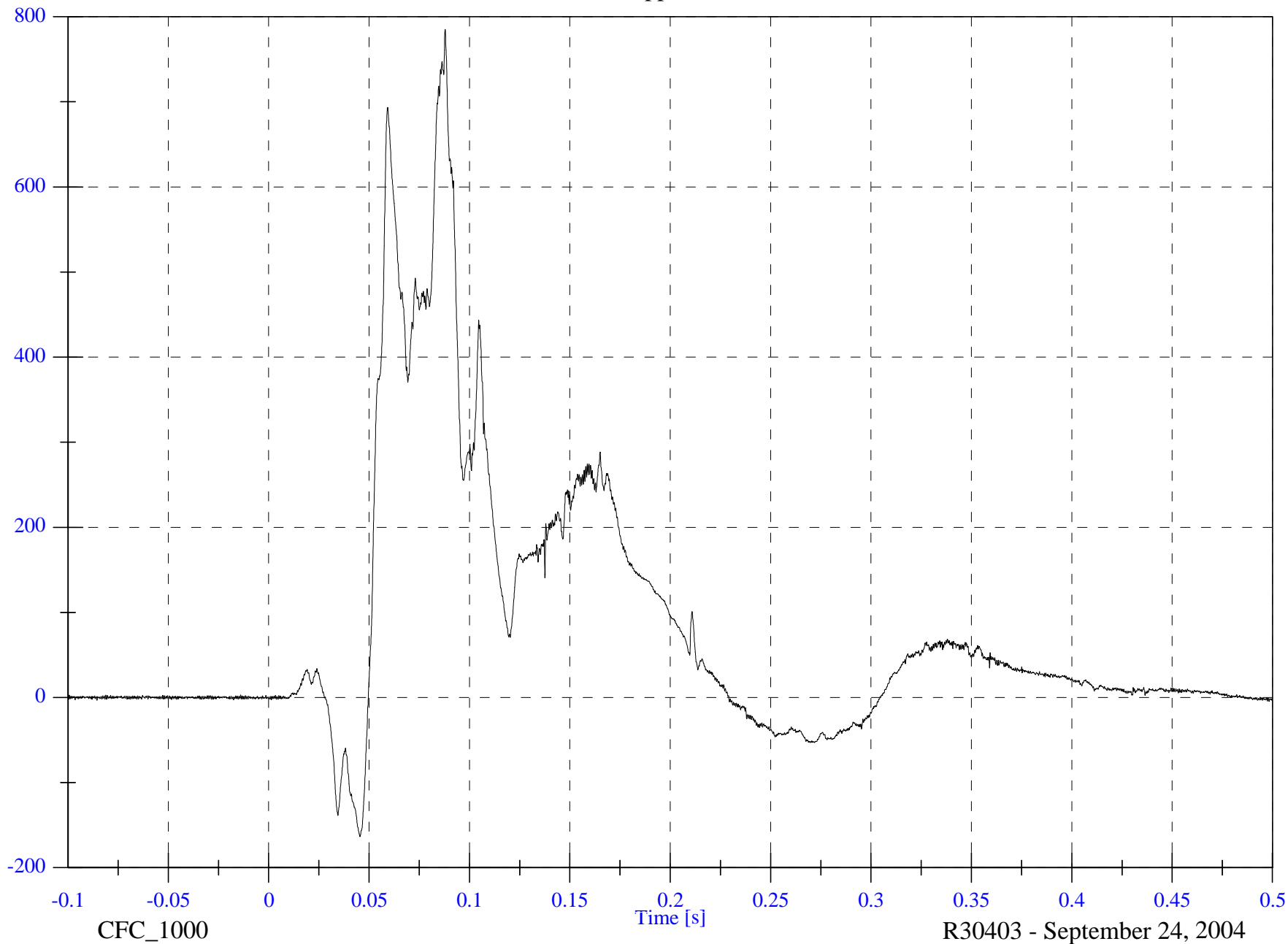
V2P3 Upper Neck Fz

Min: -163.5 [N] at 0.045 [s]

B-61

N

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

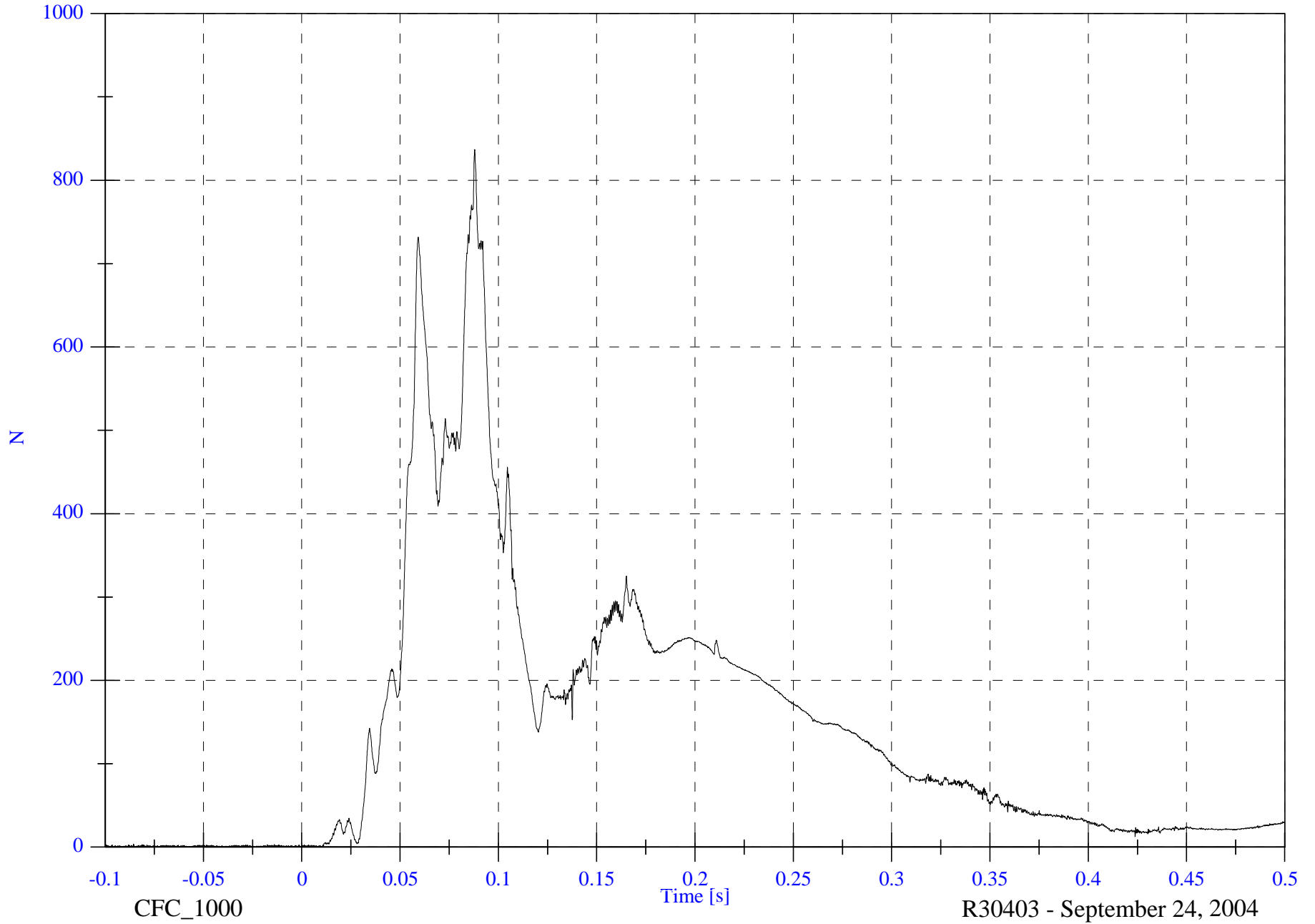
V2P3 Upper Neck F Resultant

Max: 836.8 [N] at 0.088 [s]

Min: 0.1 [N] at -0.084 [s]

B-62

8757-V301-01



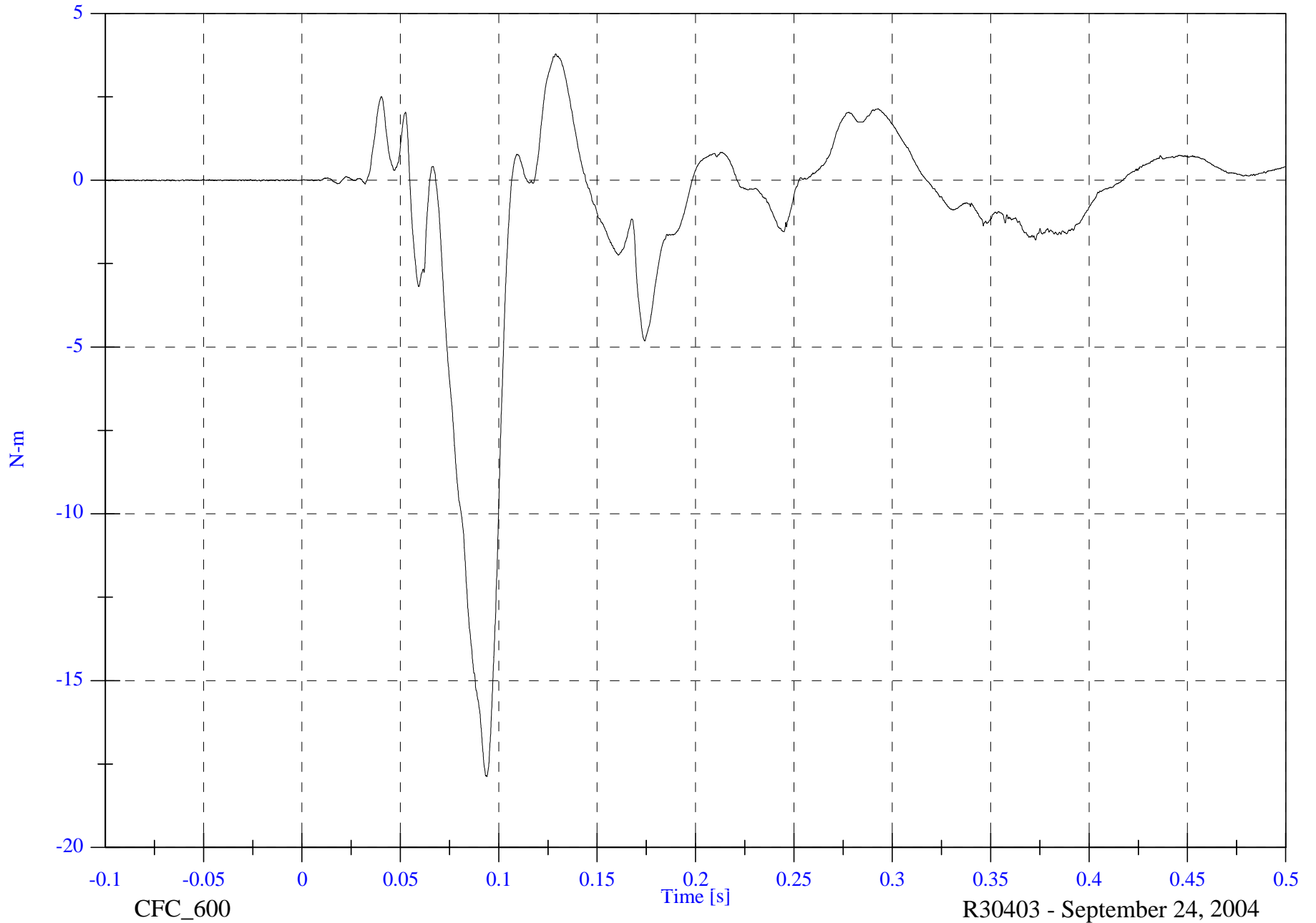
R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P3 Upper Neck Mx

Max: 3.8 [N-m] at 0.129 [s]

Min: -17.9 [N-m] at 0.094 [s]



B-63

8757-V301-01

CFC\_600

Time [s]

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VOLPE 301 Test 1 - 2003 Jeep Liberty

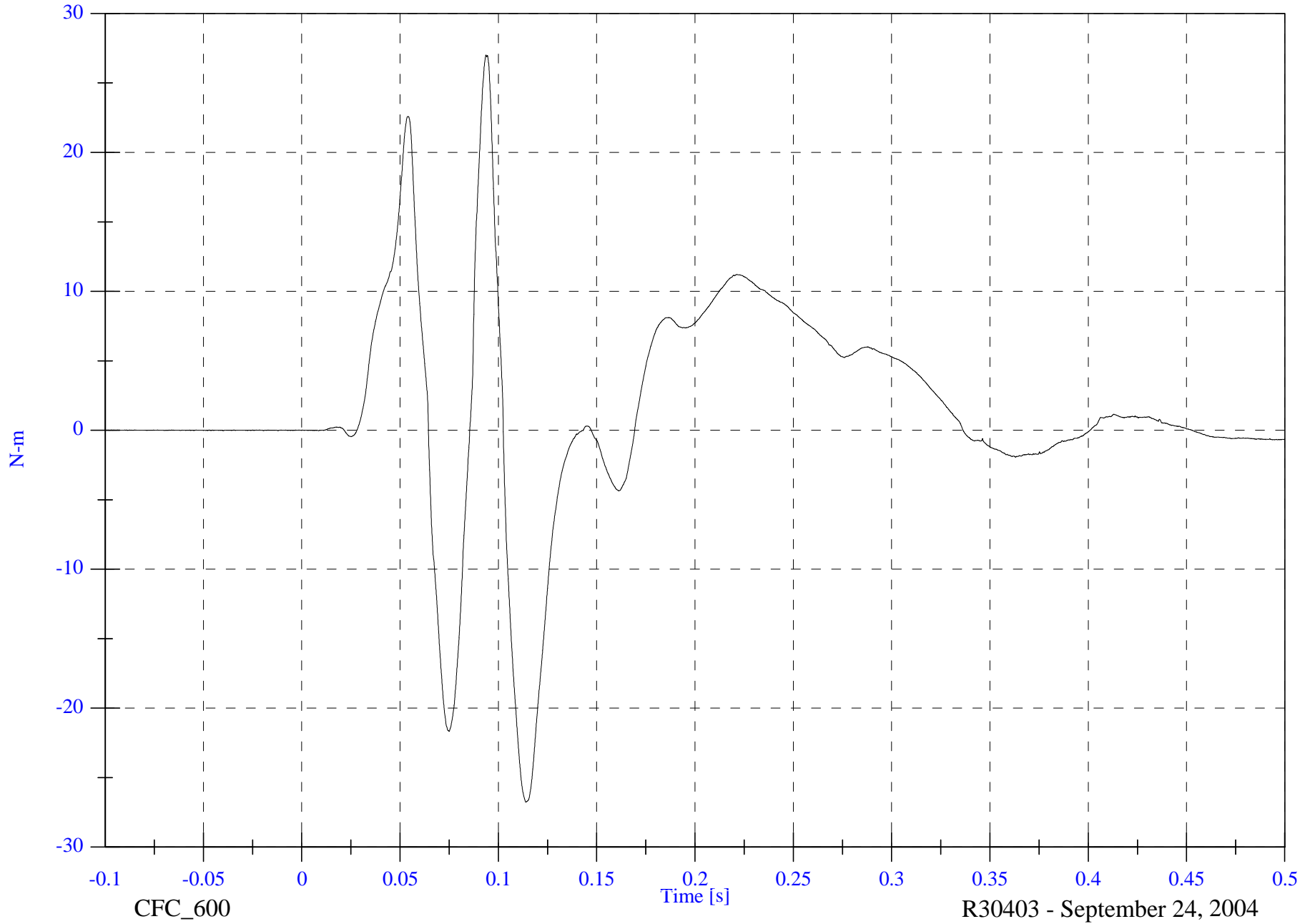
V2P3 Upper Neck My

Max: 27.0 [N-m] at 0.094 [s]

Min: -26.8 [N-m] at 0.114 [s]

B-64

8757-V301-01



R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

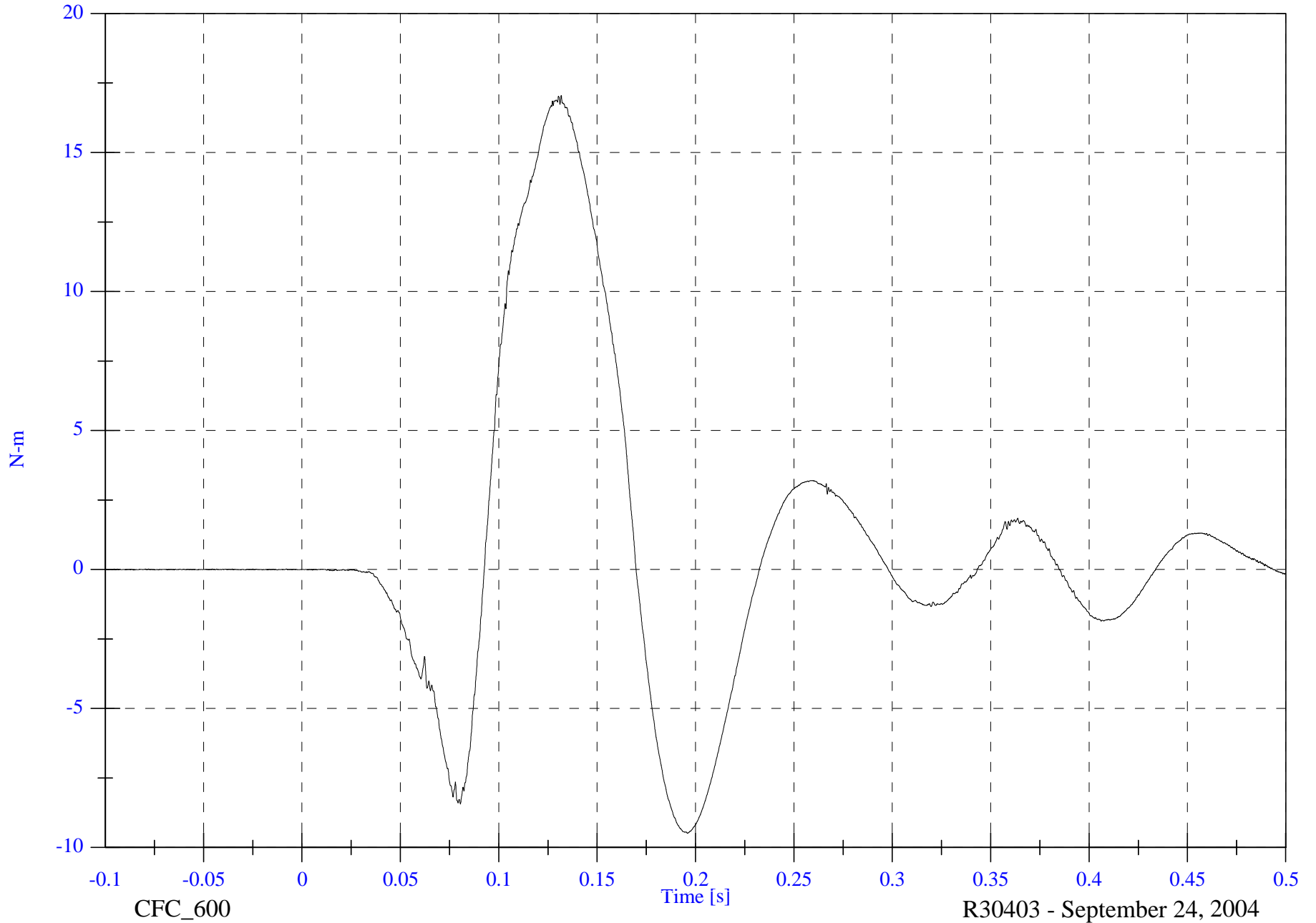
Max: 17.1 [N-m] at 0.132 [s]

V2P3 Upper Neck Mz

Min: -9.5 [N-m] at 0.196 [s]

B-65

8757-V301-01



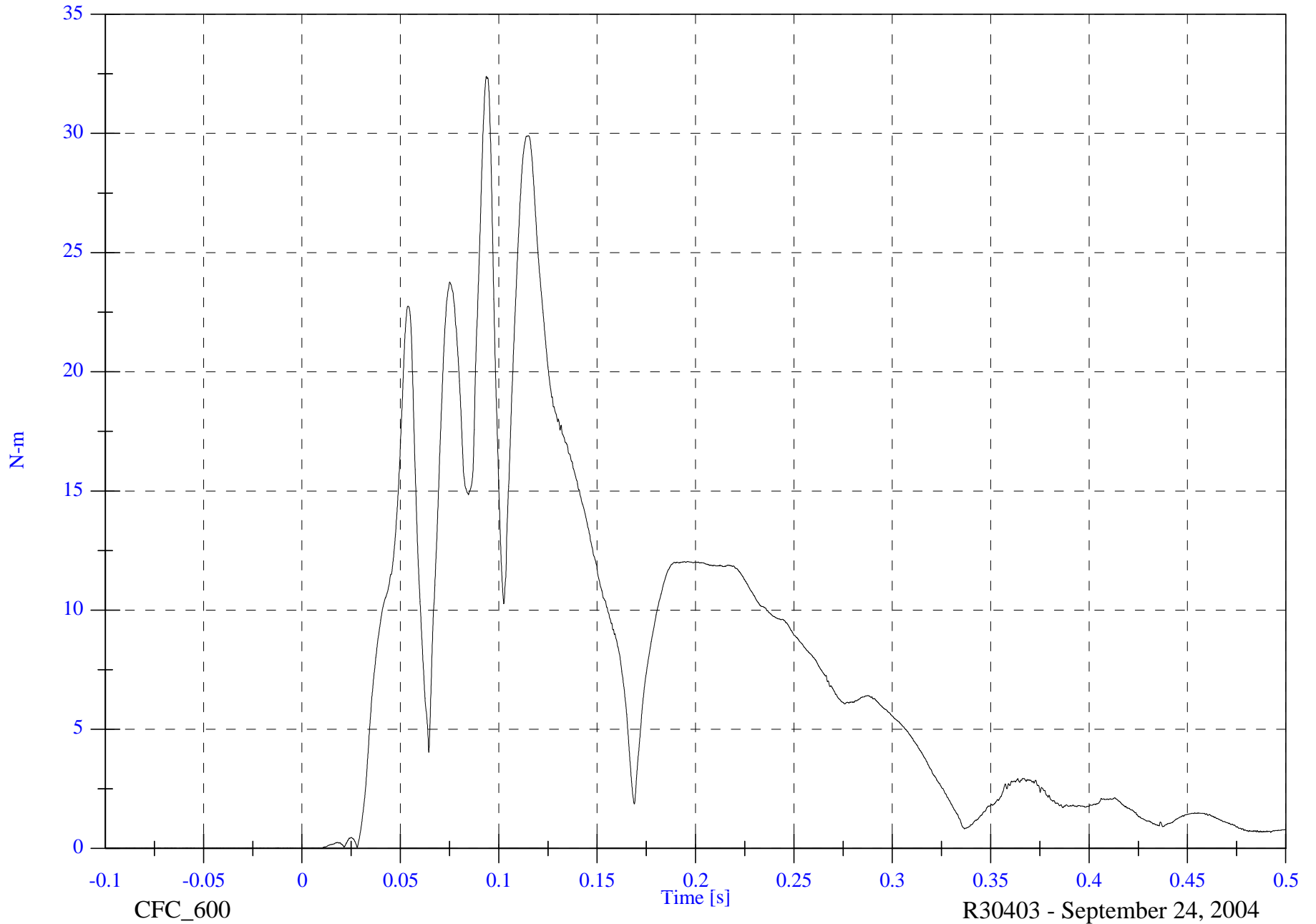
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V2P3 Upper Neck M Resultant

Max: 32.4 [N-m] at 0.094 [s]

Min: 0.0 [N-m] at -0.055 [s]



B-66

8757-V301-01

CFC\_600

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

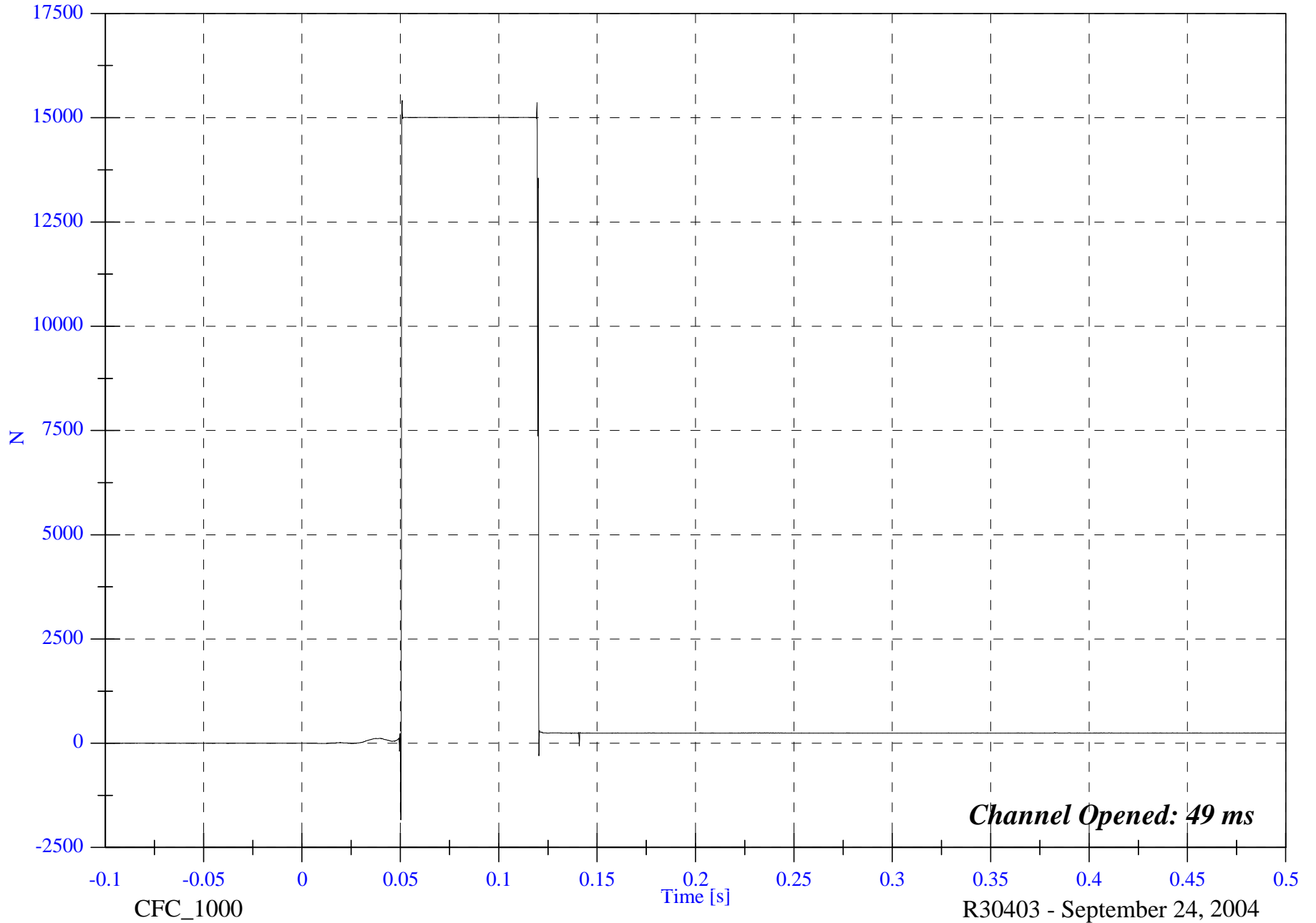
Max: 15415.9 [N] at 0.051 [s]

V2P3 Lower Neck Fx

Min: -1836.1 [N] at 0.050 [s]

B-67

8757-V301-01



*Channel Opened: 49 ms*

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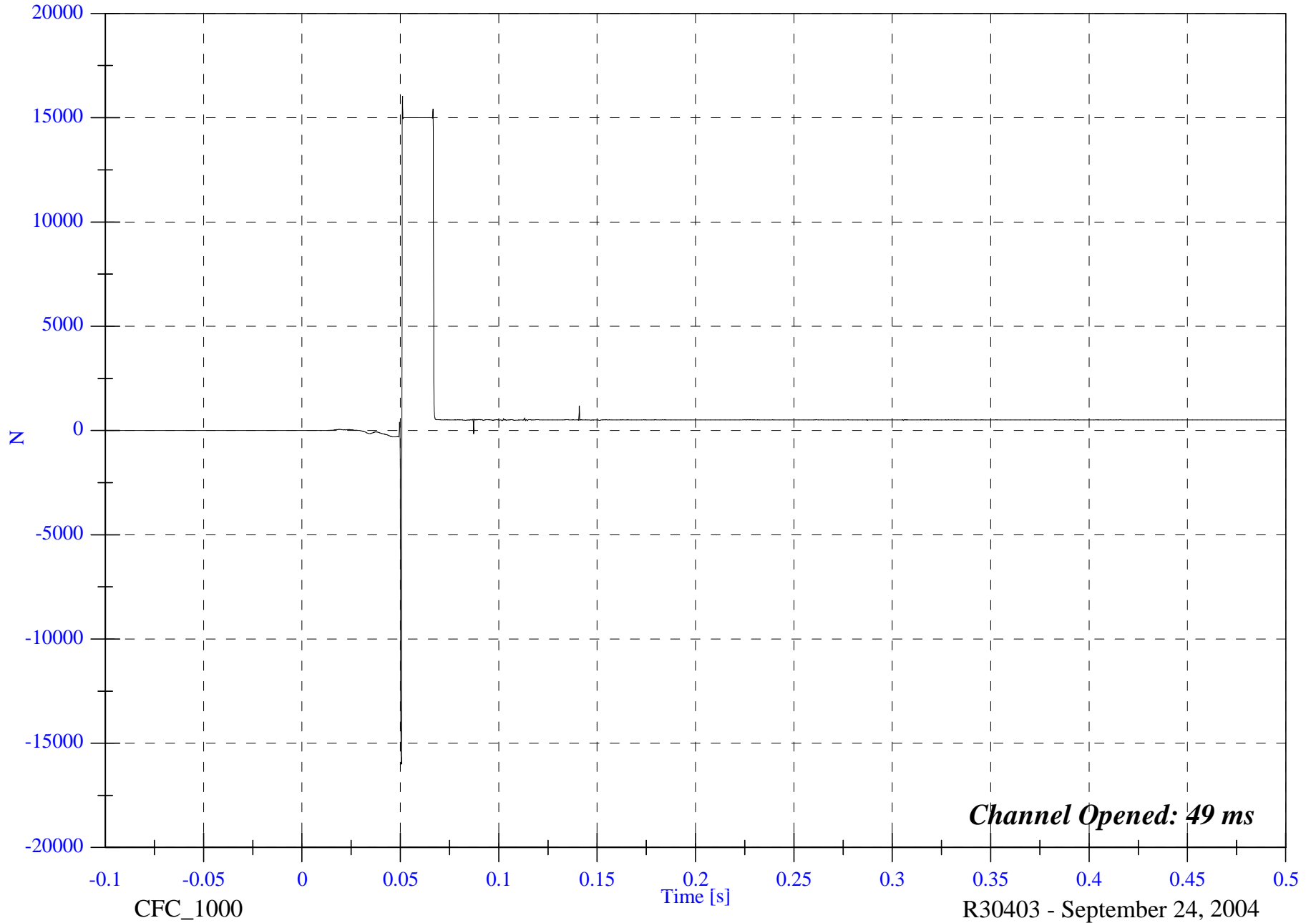
V2P3 Lower Neck Fz

Max: 16033.4 [N] at 0.051 [s]

Min: -16010.7 [N] at 0.051 [s]

B-69

8757-V301-01



*Channel Opened: 49 ms*

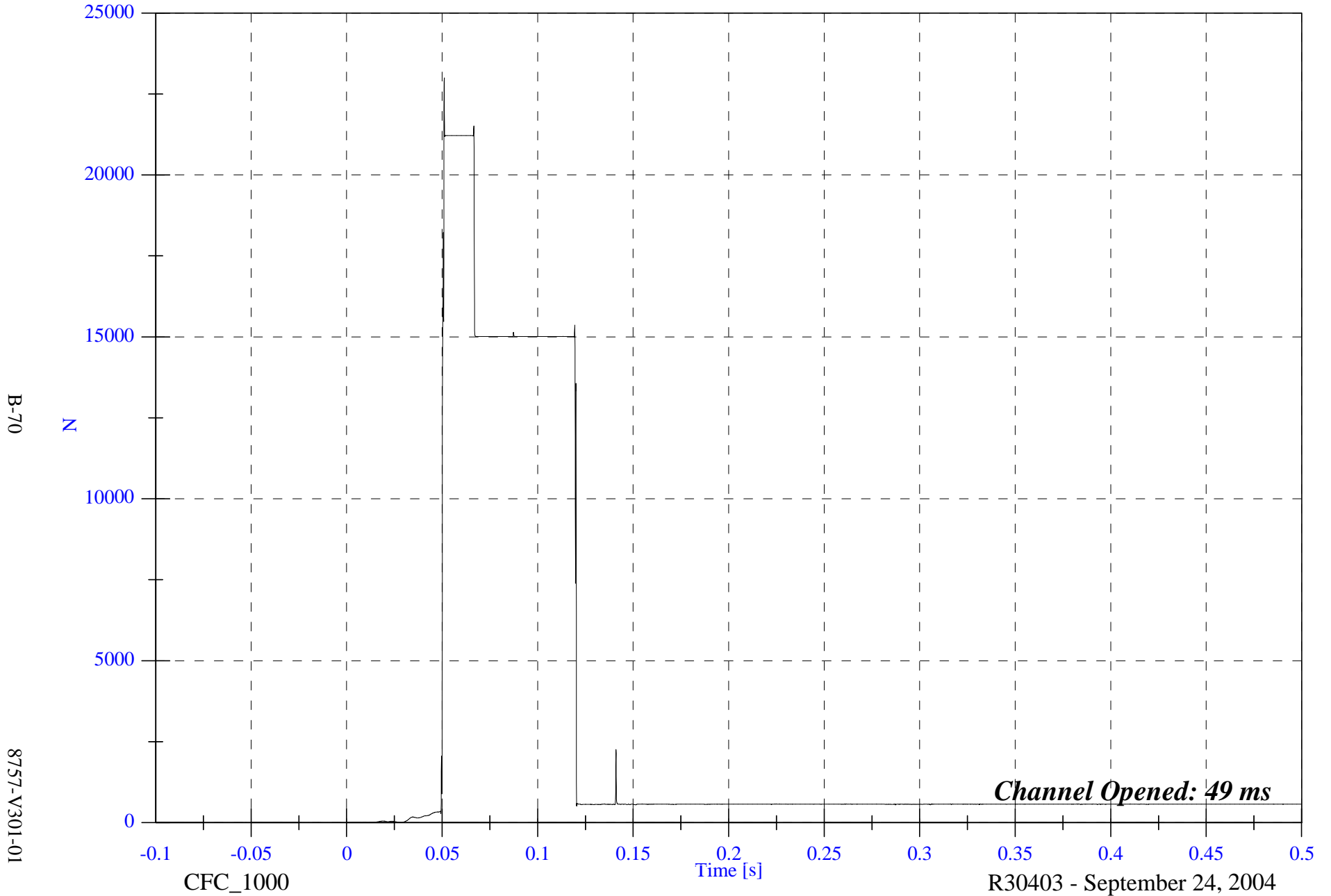
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V2P3 Lower Neck F Resultant

Max: 23004.2 [N] at 0.051 [s]

Min: 0.1 [N] at -0.021 [s]



B-70

8757-V301-01

CFC\_1000

Time [s]

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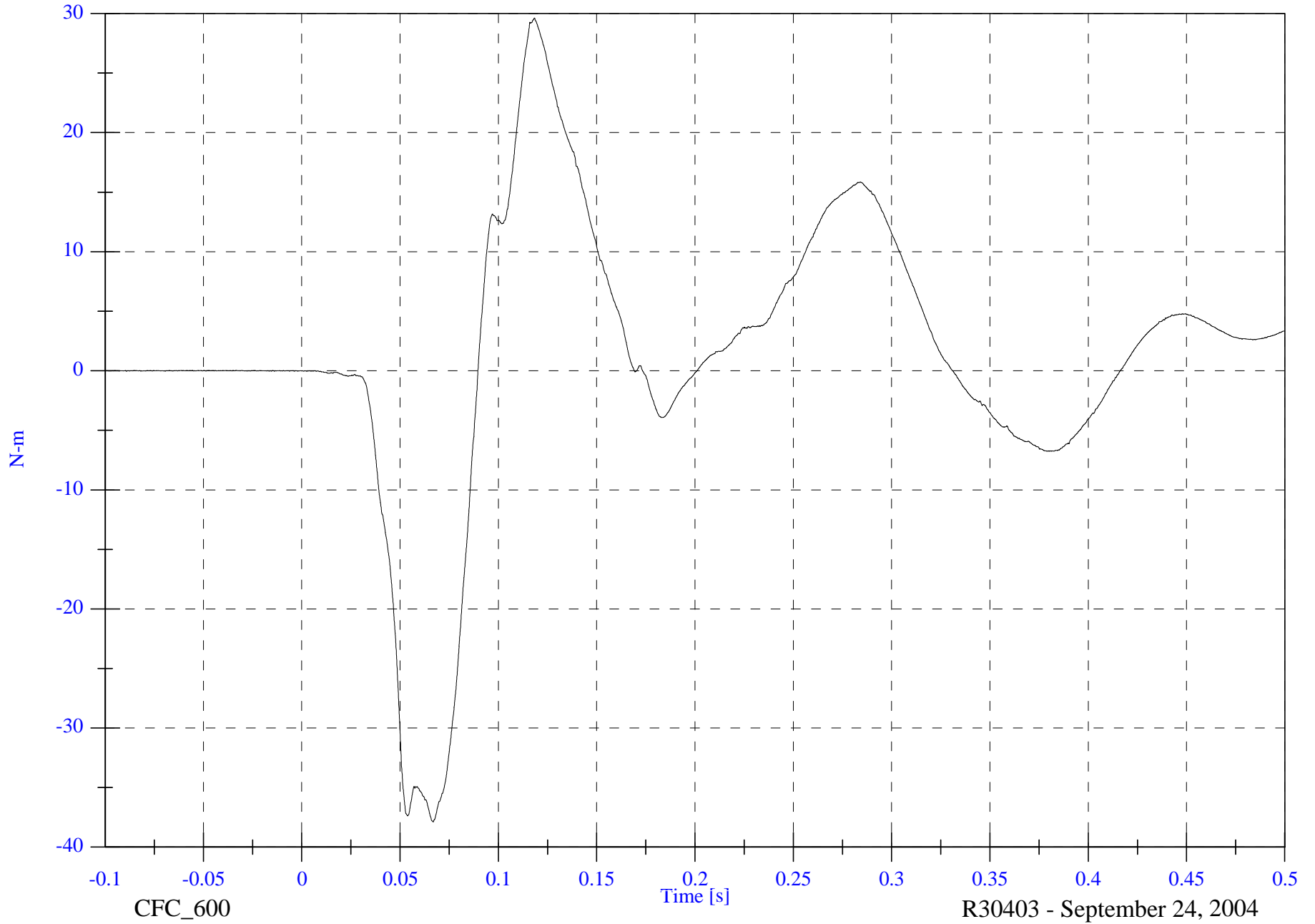
V2P3 Lower Neck Mx

Max: 29.6 [N-m] at 0.118 [s]

Min: -37.9 [N-m] at 0.067 [s]

B-71

8757-V301-01



CFC\_600

Time [s]

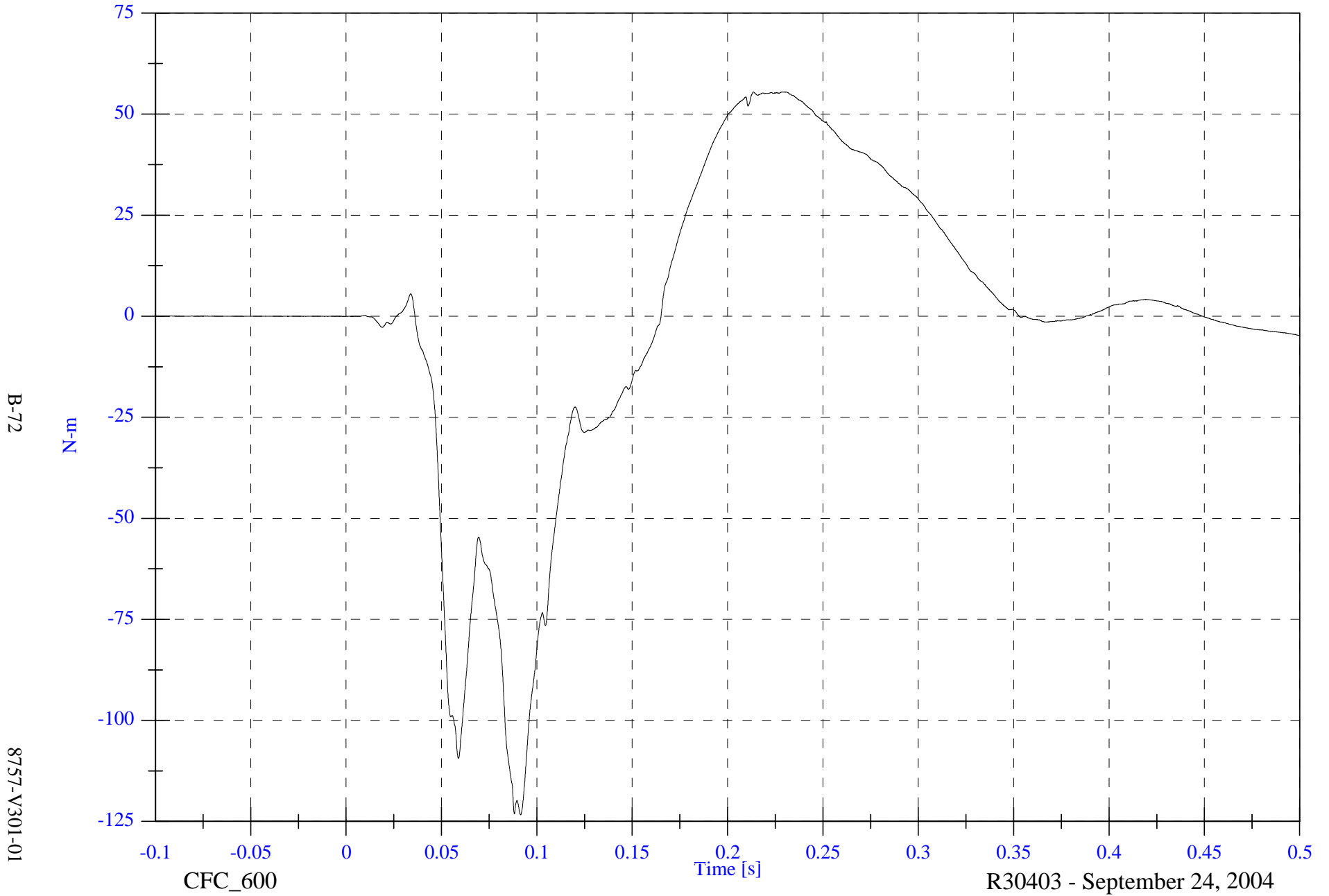
R30403 - September 24, 2004

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V2P3 Lower Neck My

Max: 55.5 [N-m] at 0.231 [s]

Min: -123.4 [N-m] at 0.092 [s]



B-72

8757-V301-01

CFC\_600

Time [s]

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VOLPE 301 Test 1 - 2003 Jeep Liberty

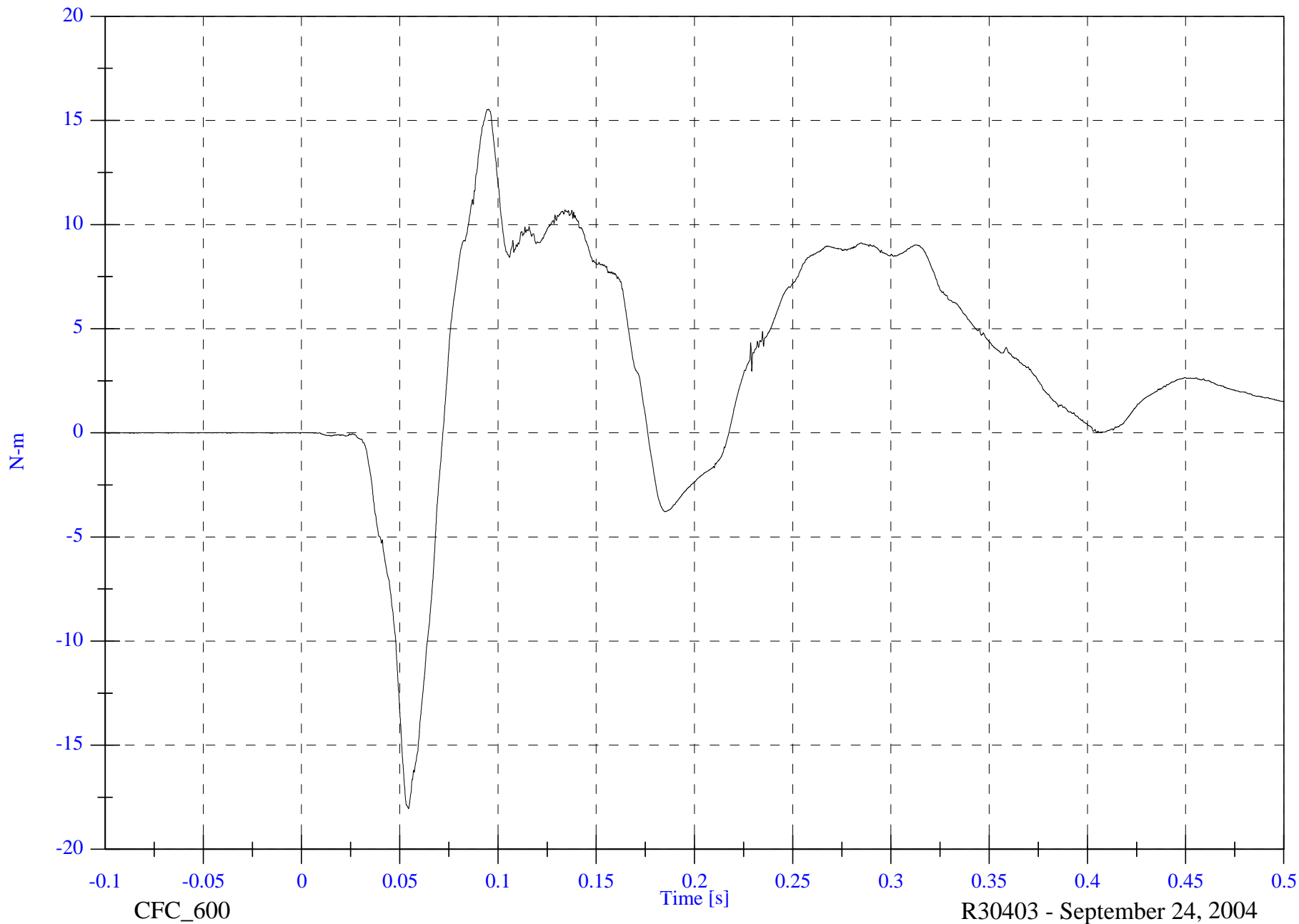
V2P3 Lower Neck Mz

Max: 15.5 [N-m] at 0.095 [s]

Min: -18.0 [N-m] at 0.054 [s]

B-73

8757-V301-01



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VOLPE 301 Test 1 - 2003 Jeep Liberty

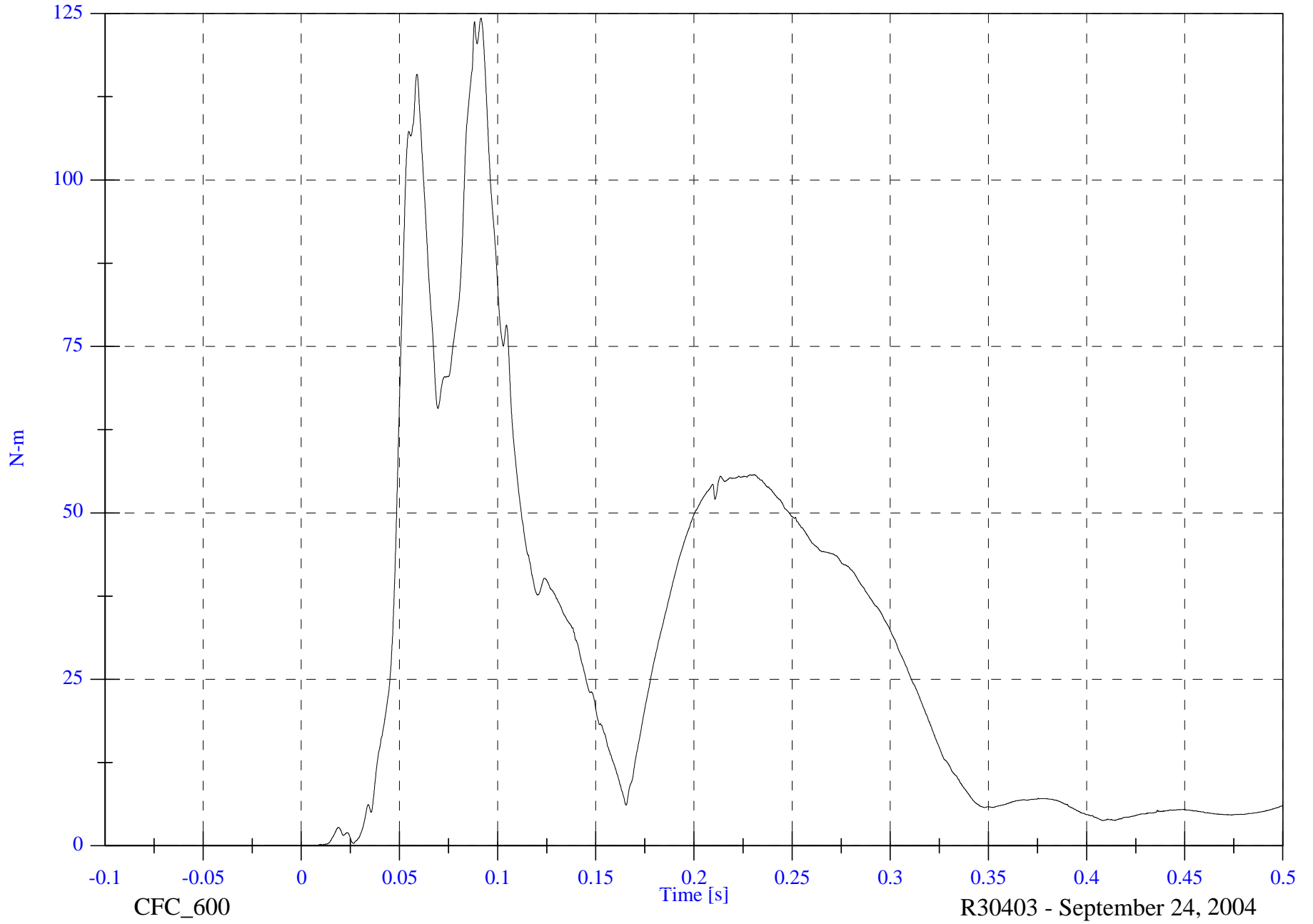
V2P3 Lower Neck M Resultant

Max: 124.3 [N-m] at 0.092 [s]

Min: 0.0 [N-m] at -0.046 [s]

B-74

8757-V301-01



CFC\_600

Time [s]

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VOLPE 301 Test 1 - 2003 Jeep Liberty

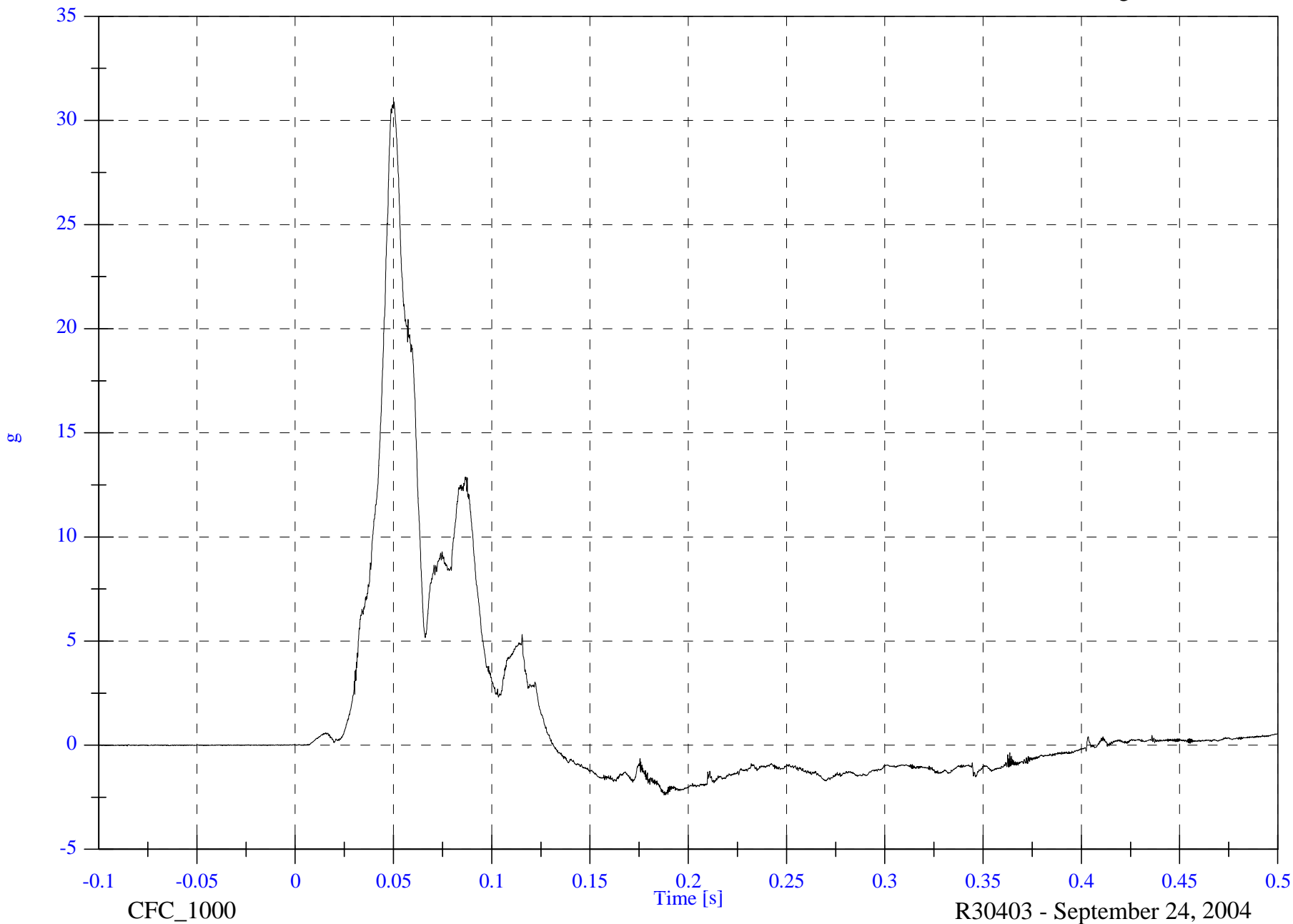
V2P3 Lower Neck x

Max: 30.9 [g] at 0.050 [s]

Min: -2.4 [g] at 0.188 [s]

B-75

8757-V301-01



CFC\_1000

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VOLPE 301 Test 1 - 2003 Jeep Liberty

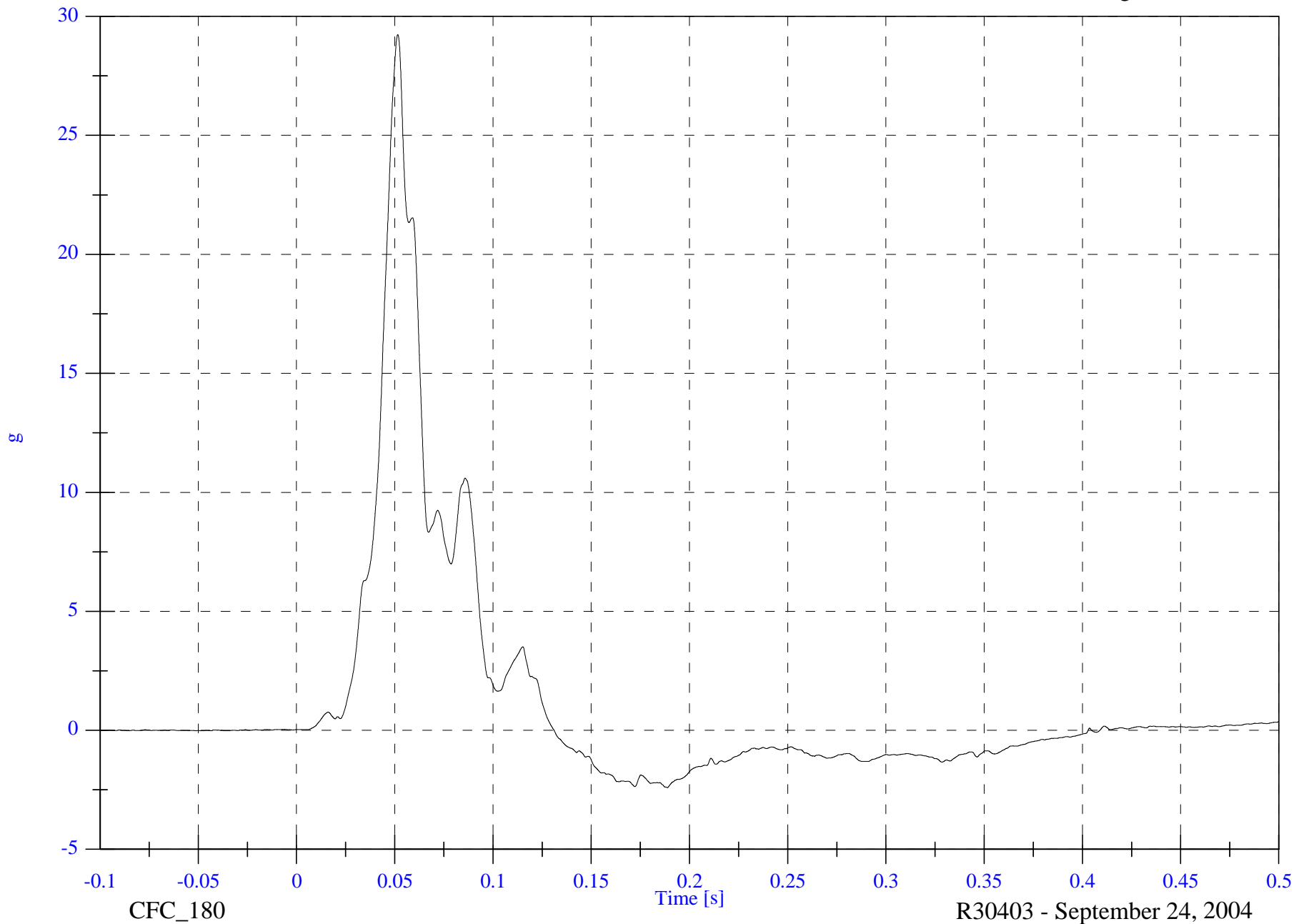
V2P3 Chest x

Max: 29.2 [g] at 0.051 [s]

Min: -2.4 [g] at 0.189 [s]

B-76

8757-V301-01

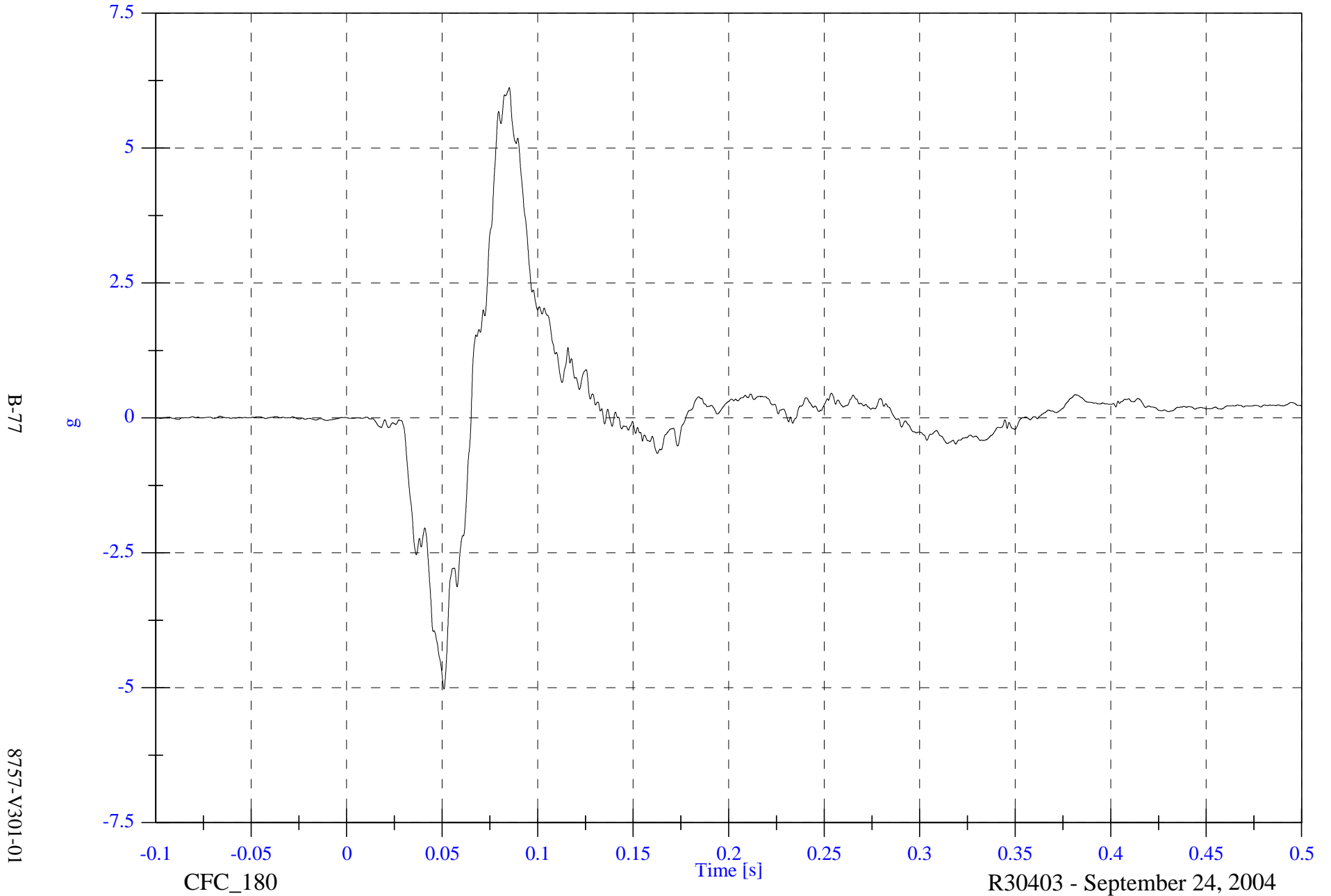


VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P3 Chest y

Max: 6.1 [g] at 0.085 [s]

Min: -5.0 [g] at 0.051 [s]



VOLPE 301 Test 1 - 2003 Jeep Liberty

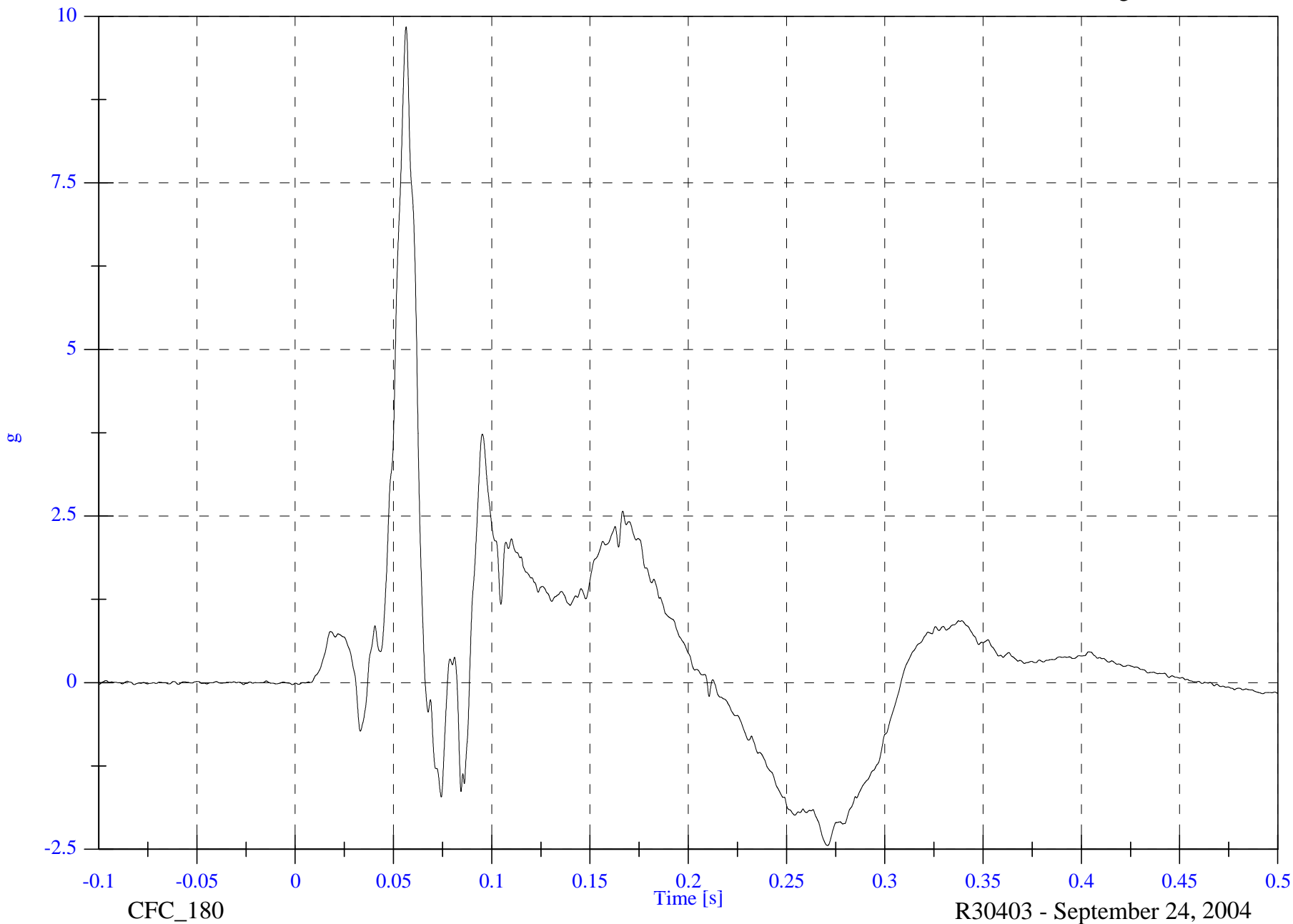
V2P3 Chest z

Max: 9.8 [g] at 0.056 [s]

Min: -2.4 [g] at 0.271 [s]

B-78

8757-V301-01



CFC\_180

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

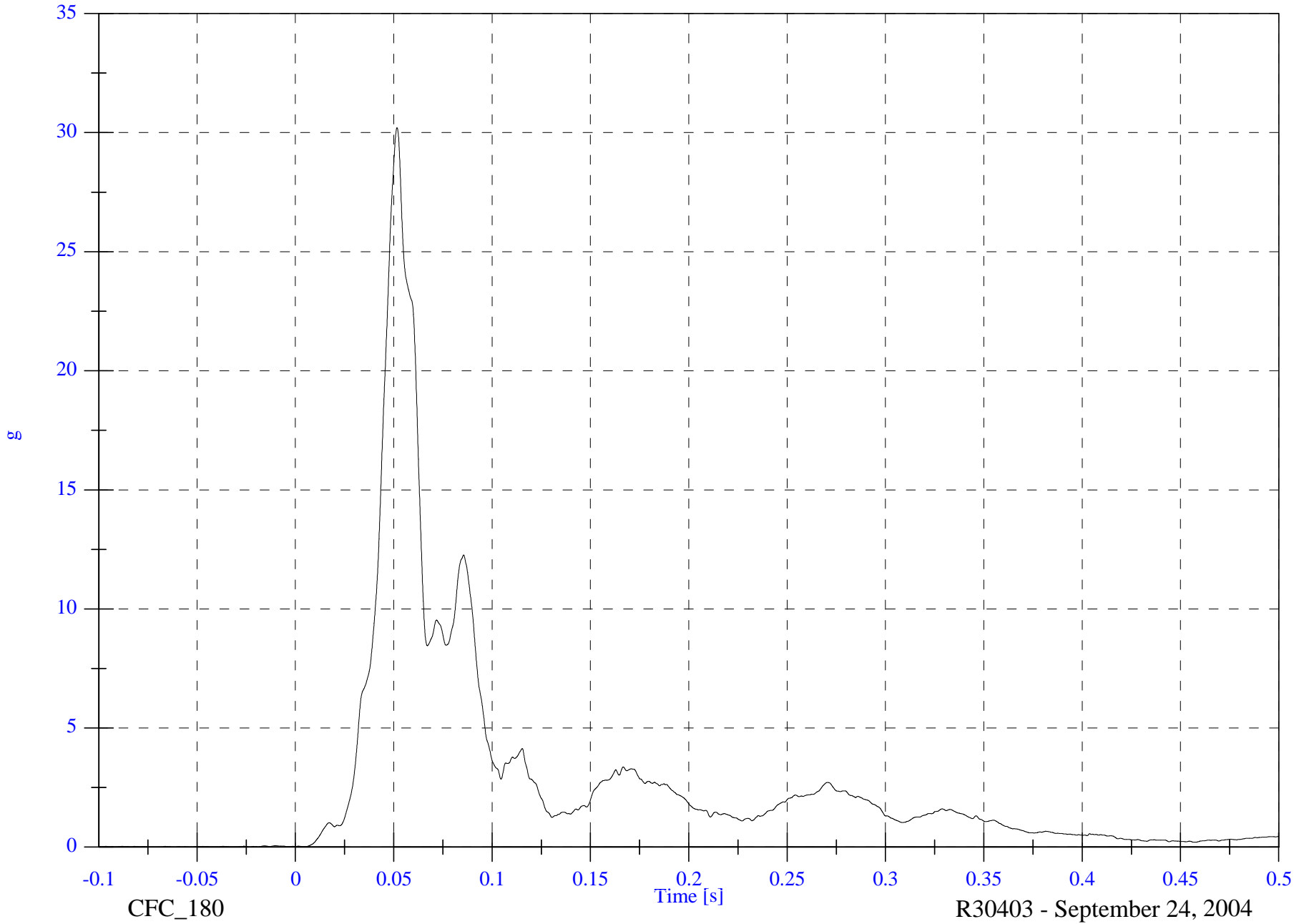
V2P3 Chest Resultant

Max: 30.2 [g] at 0.052 [s]

Min: 0.0 [g] at -0.068 [s]

B-79

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

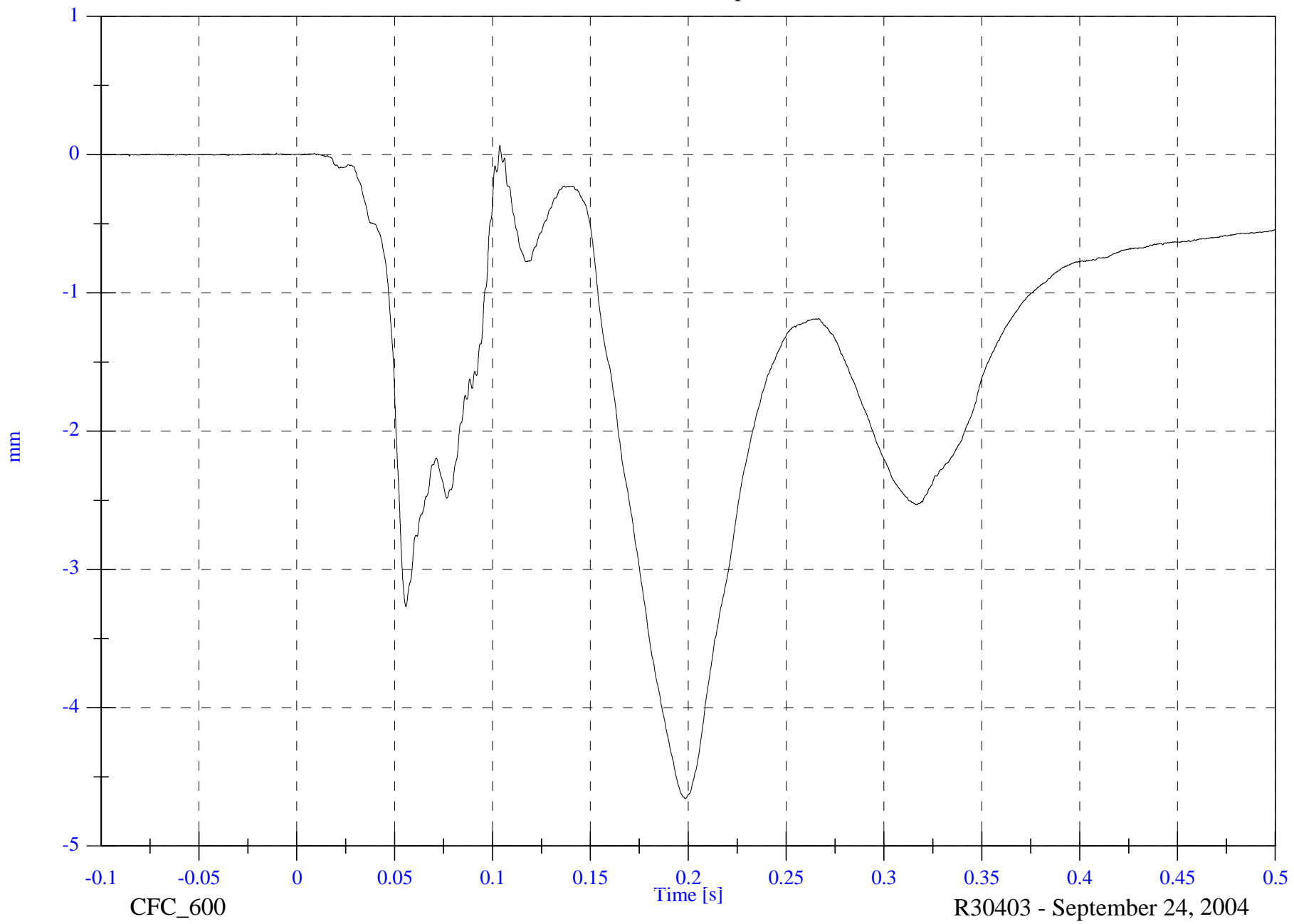
V2P3 Chest Compression

Max: 0.1 [mm] at 0.104 [s]

Min: -4.7 [mm] at 0.198 [s]

B-80

8757-V301-01



CFC\_600

Time [s]

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VOLPE 301 Test 1 - 2003 Jeep Liberty

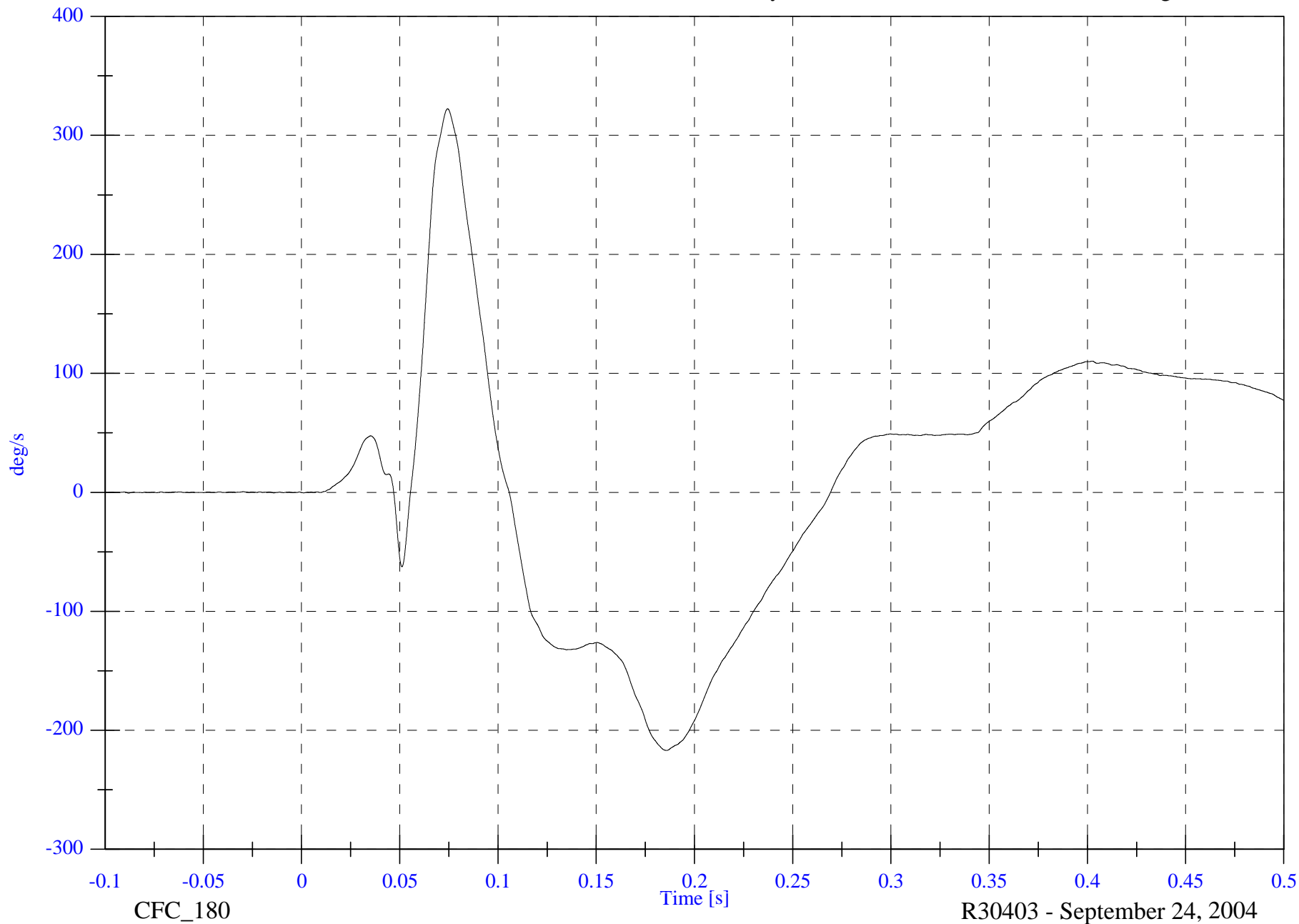
V2P3 Chest AVy

Max: 322.4 [deg/s] at 0.074 [s]

Min: -216.9 [deg/s] at 0.186 [s]

B-81

8757-V301-01



CFC\_180

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

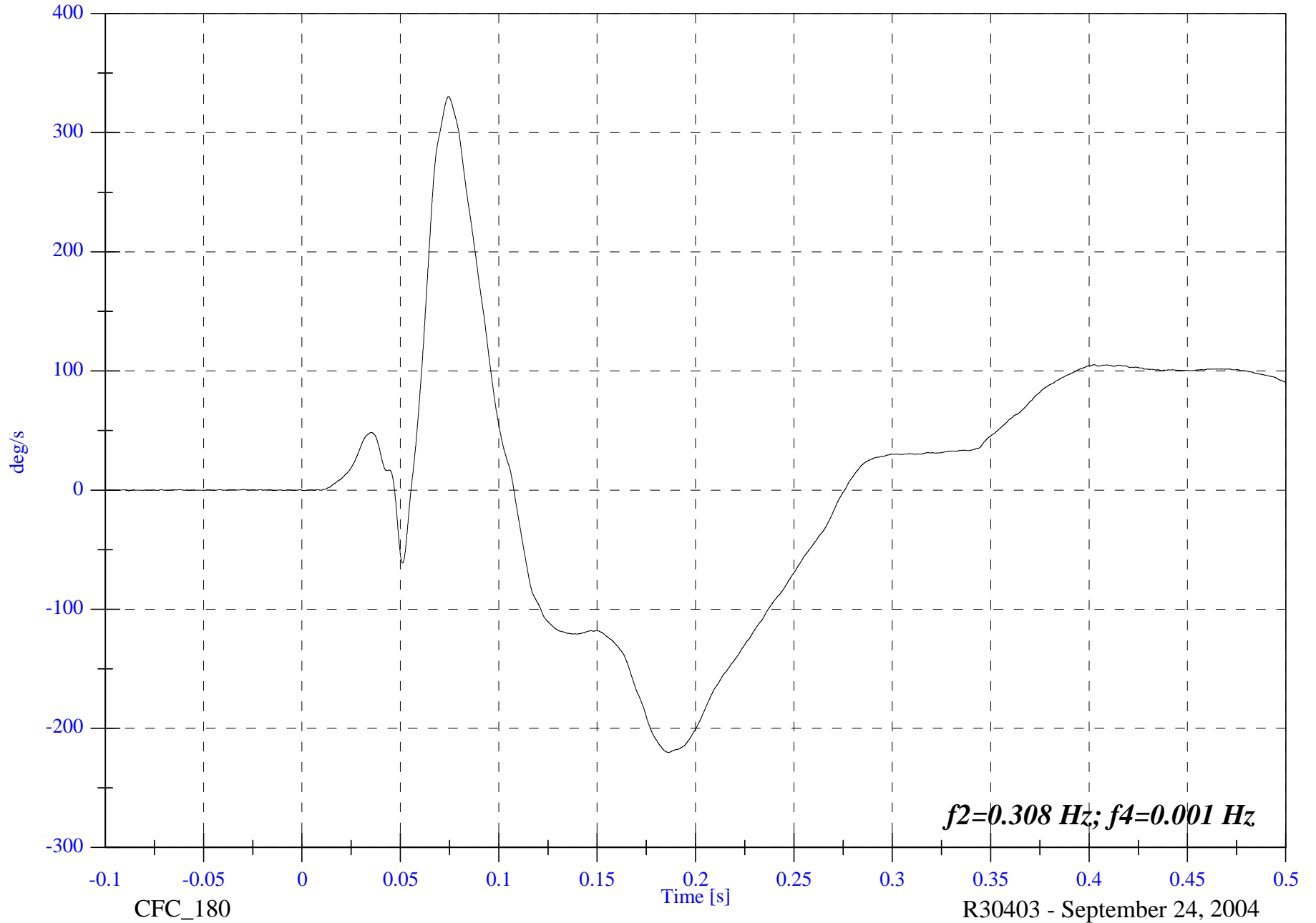
V2P3 Chest Comp AVy

Max: 330.2 [deg/s] at 0.075 [s]

Min: -220.3 [deg/s] at 0.186 [s]

B-82

8757-V301-01



$f_2=0.308 \text{ Hz}; f_4=0.001 \text{ Hz}$

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VOLPE 301 Test 1 - 2003 Jeep Liberty

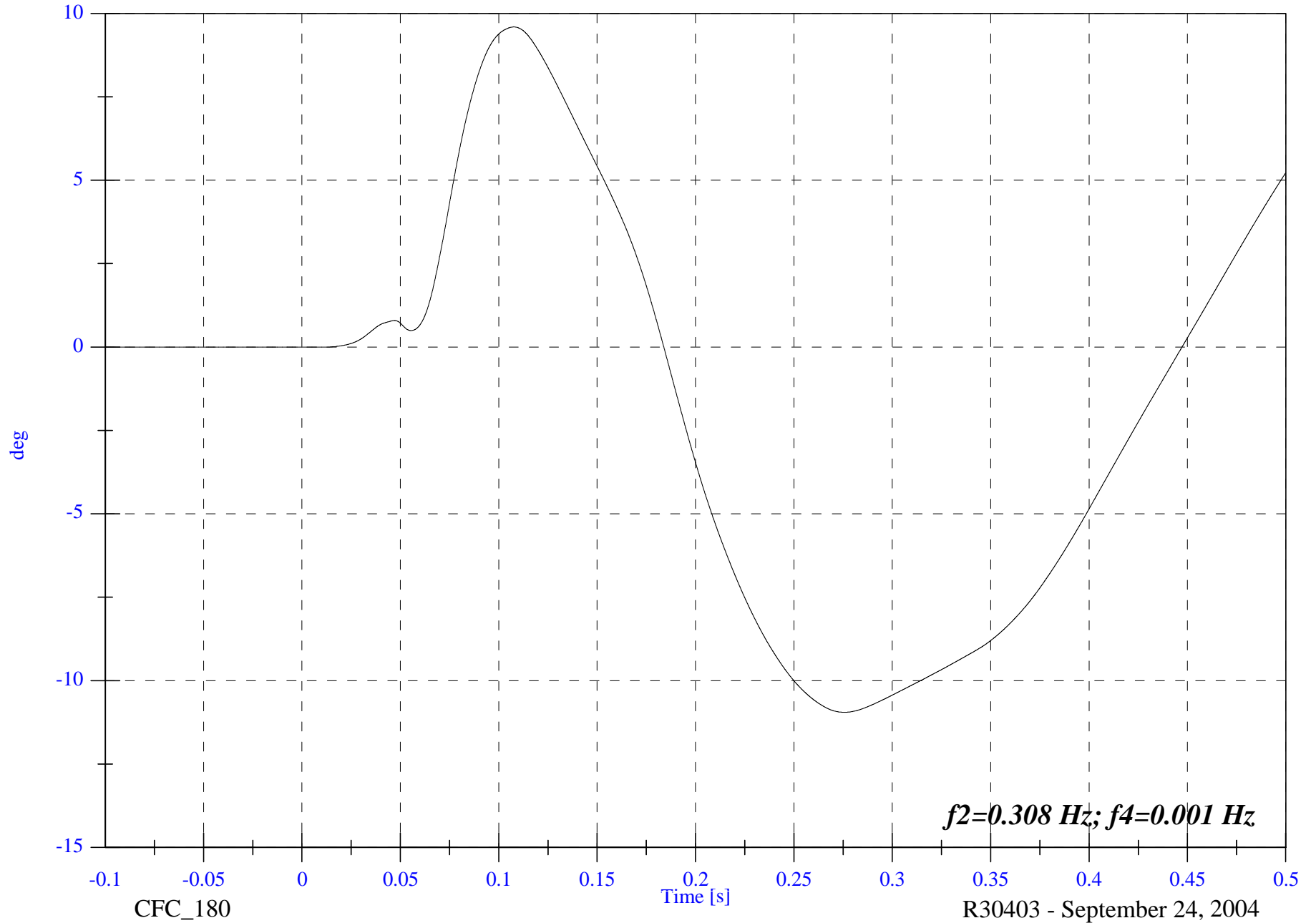
V2P3 Chest Comp ADy

Max: 9.6 [deg] at 0.108 [s]

Min: -10.9 [deg] at 0.276 [s]

B-83

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

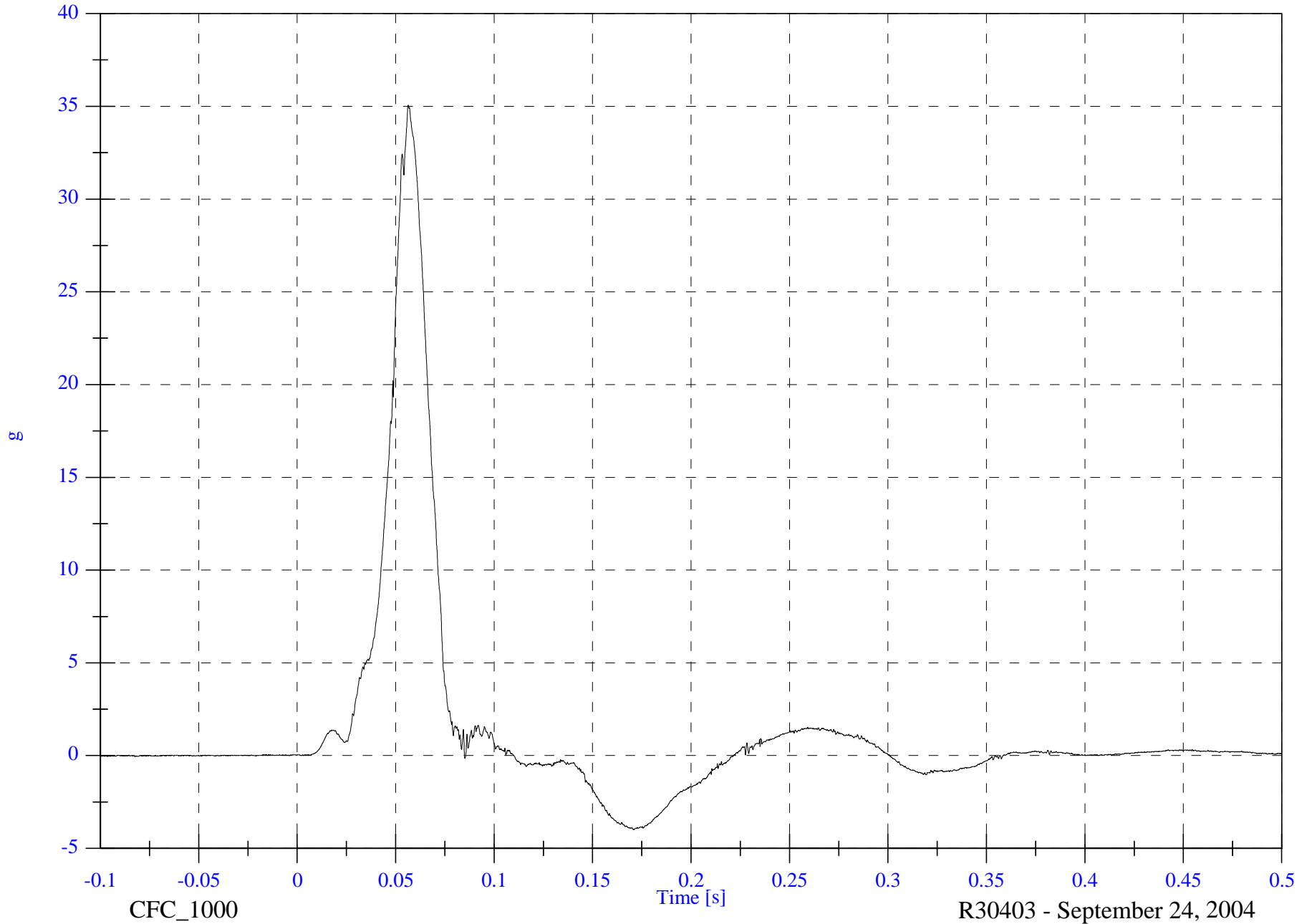
V2P3 Pelvic x

Max: 35.1 [g] at 0.056 [s]

Min: -4.0 [g] at 0.171 [s]

B-84

8757-V301-01



CFC\_1000

Time [s]

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VOLPE 301 Test 1 - 2003 Jeep Liberty

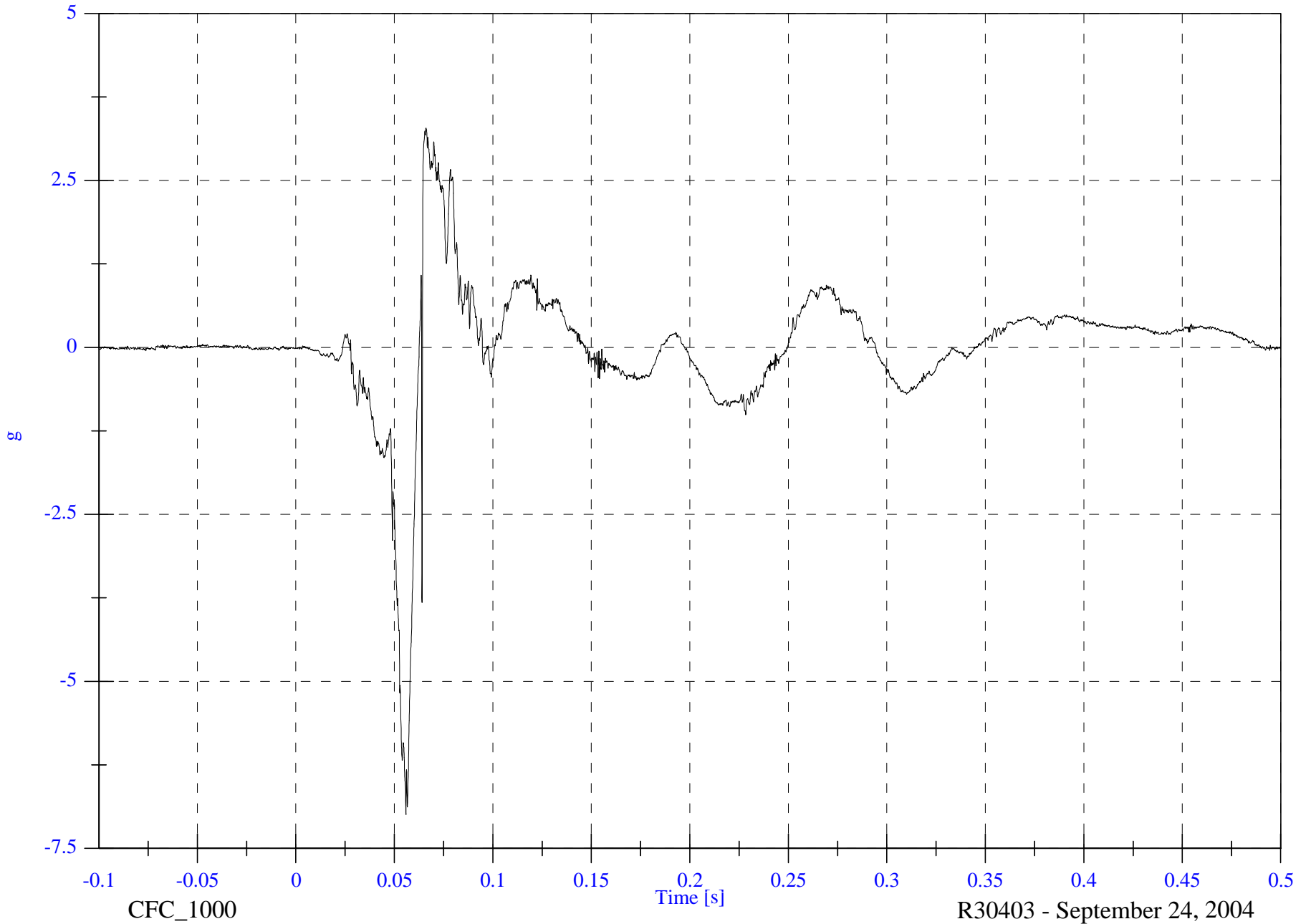
V2P3 Pelvic y

Max: 3.3 [g] at 0.066 [s]

Min: -7.0 [g] at 0.056 [s]

B-85

8757-V301-01



R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

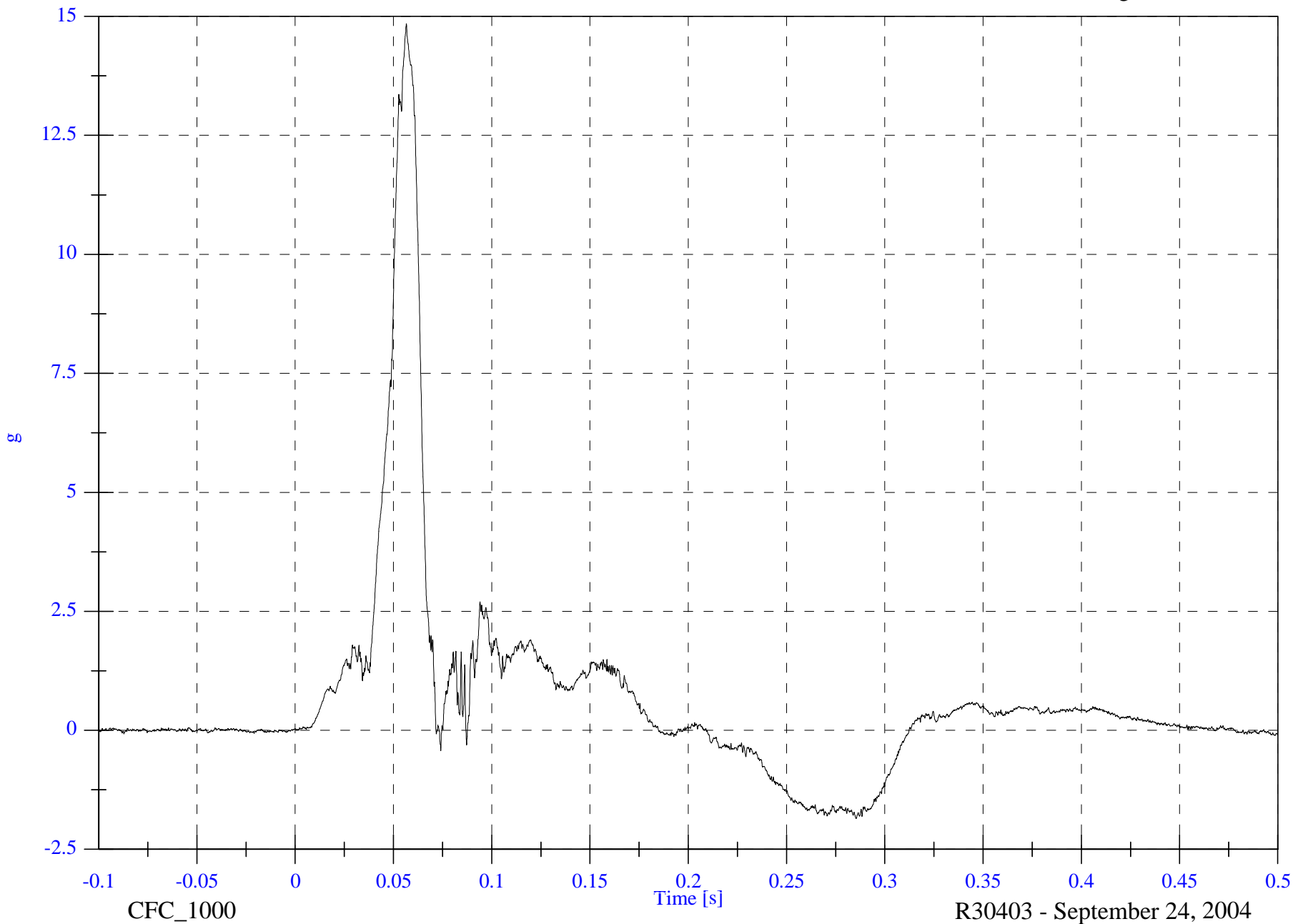
V2P3 Pelvic z

Max: 14.8 [g] at 0.057 [s]

Min: -1.9 [g] at 0.285 [s]

B-86

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

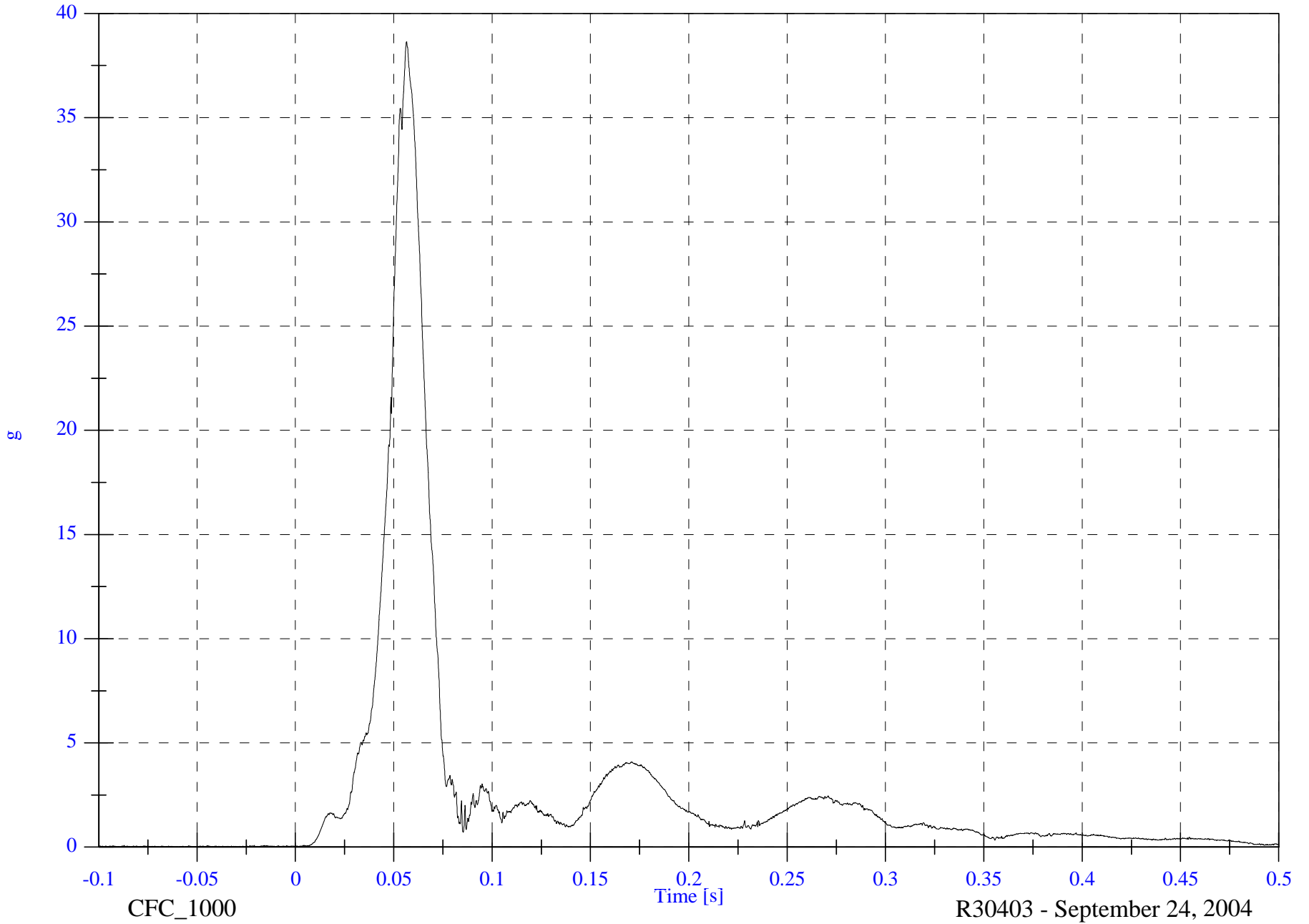
V2P3 Pelvic Resultant

Max: 38.7 [g] at 0.056 [s]

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

B-87

8757-V301-01



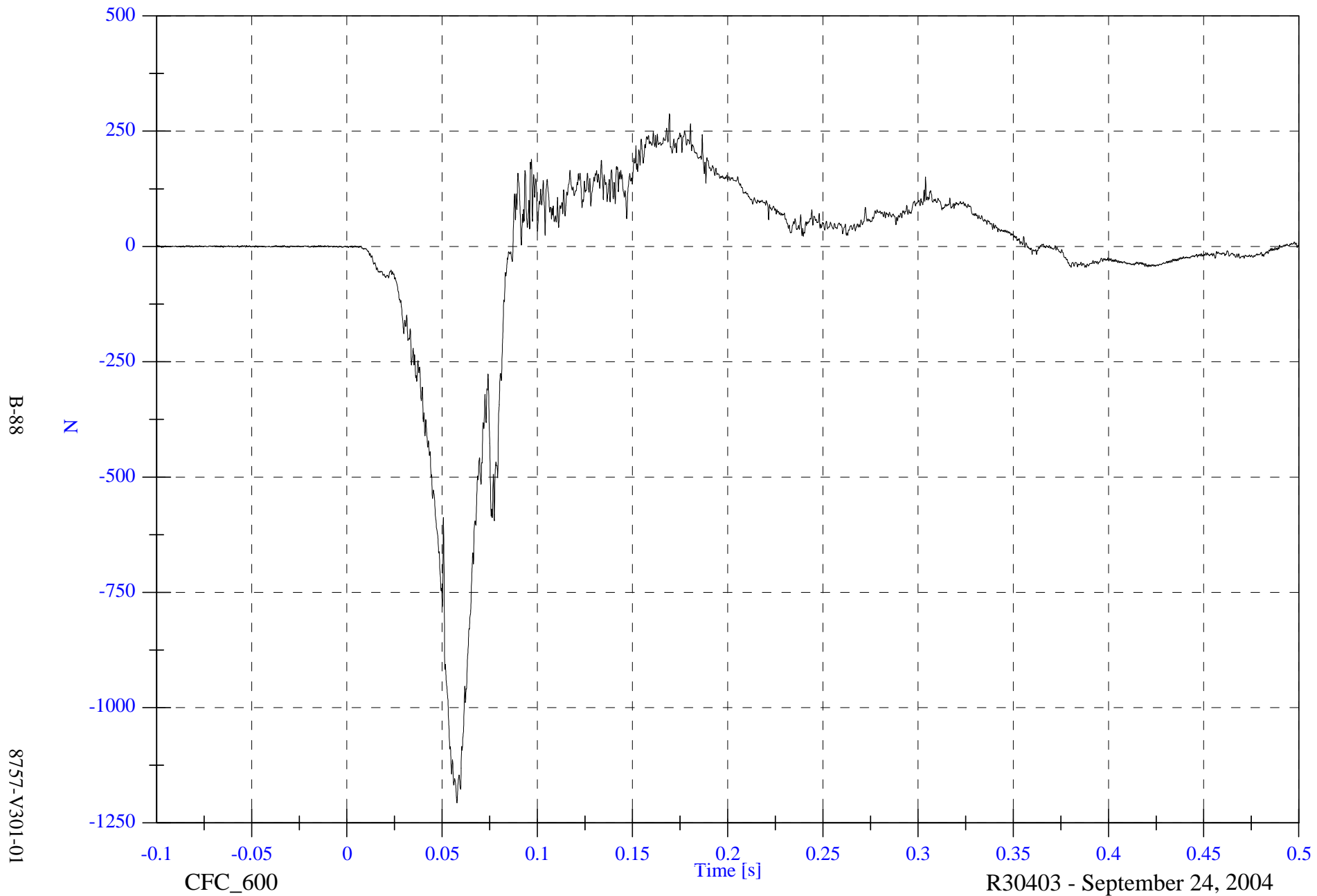
R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P3 Left Femur

Max: 287.5 [N] at 0.169 [s]

Min: -1206.5 [N] at 0.058 [s]



B-88

N

8757-V301-01

CFC\_600

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

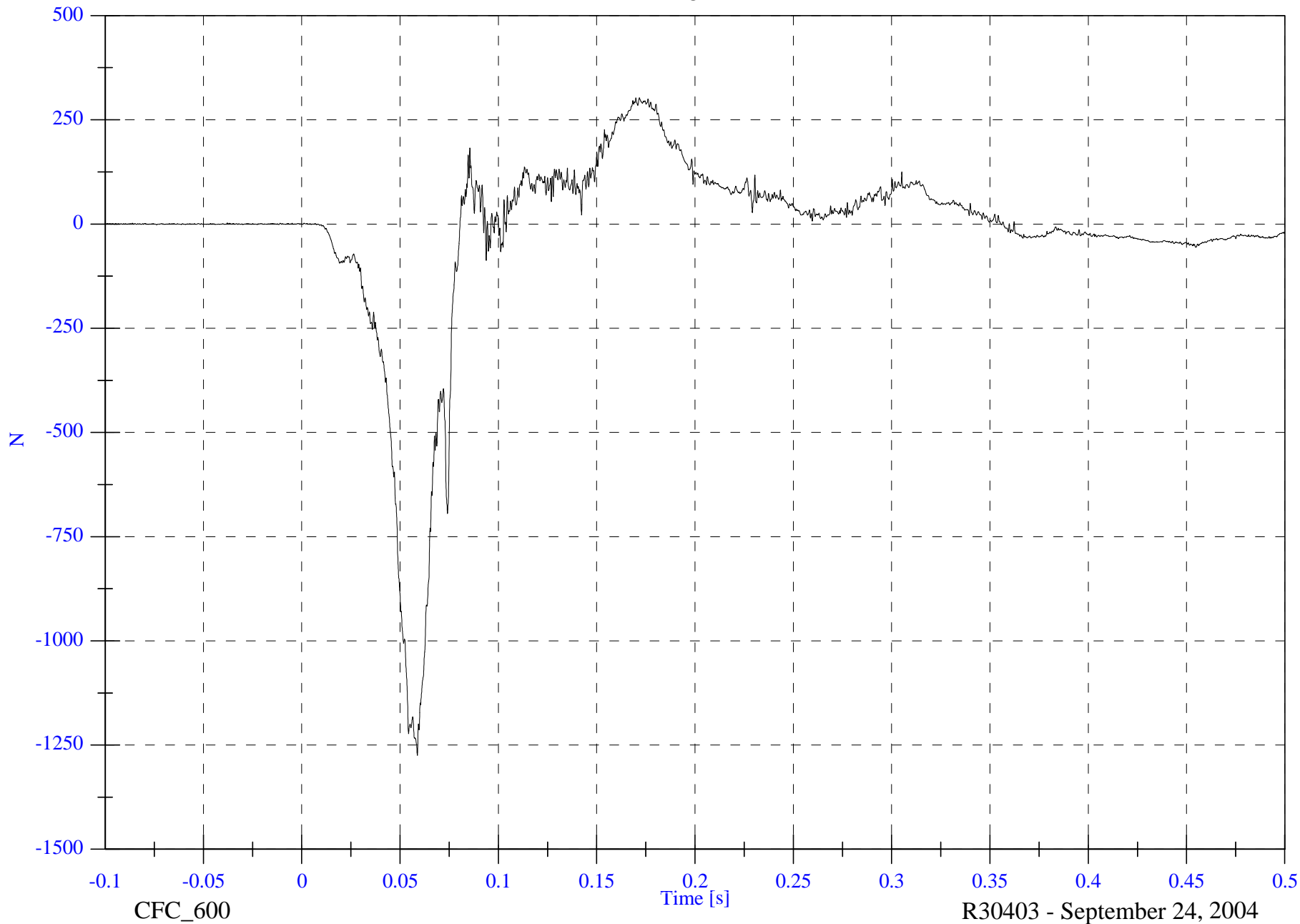
V2P3 Right Femur

Max: 303.0 [N] at 0.172 [s]

Min: -1274.5 [N] at 0.059 [s]

B-89

8757-V301-01



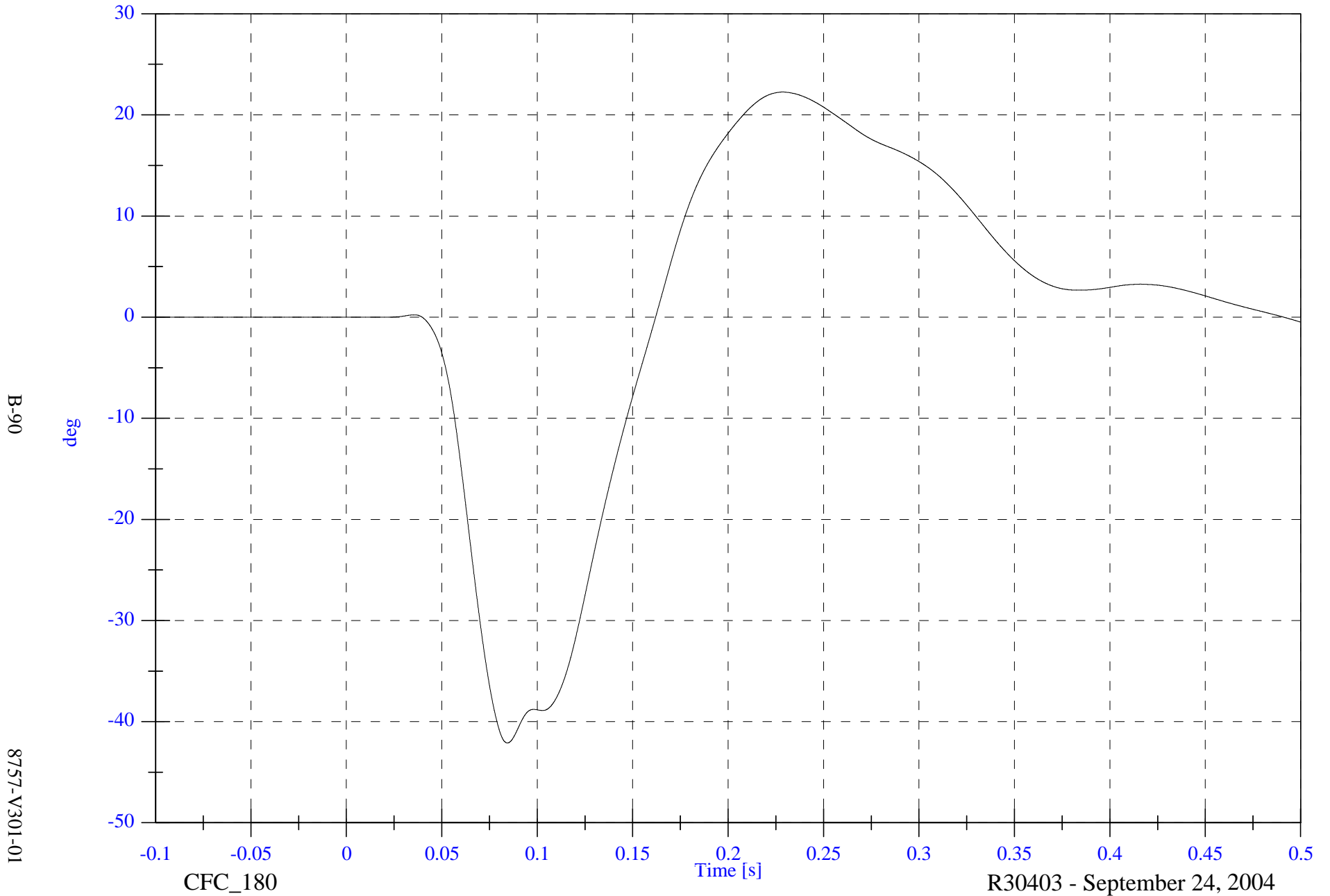
R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P3 Head to Chest

Max: 22.3 [deg] at 0.229 [s]

Min: -42.1 [deg] at 0.084 [s]



B-90

8757-V301-01

CFC\_180

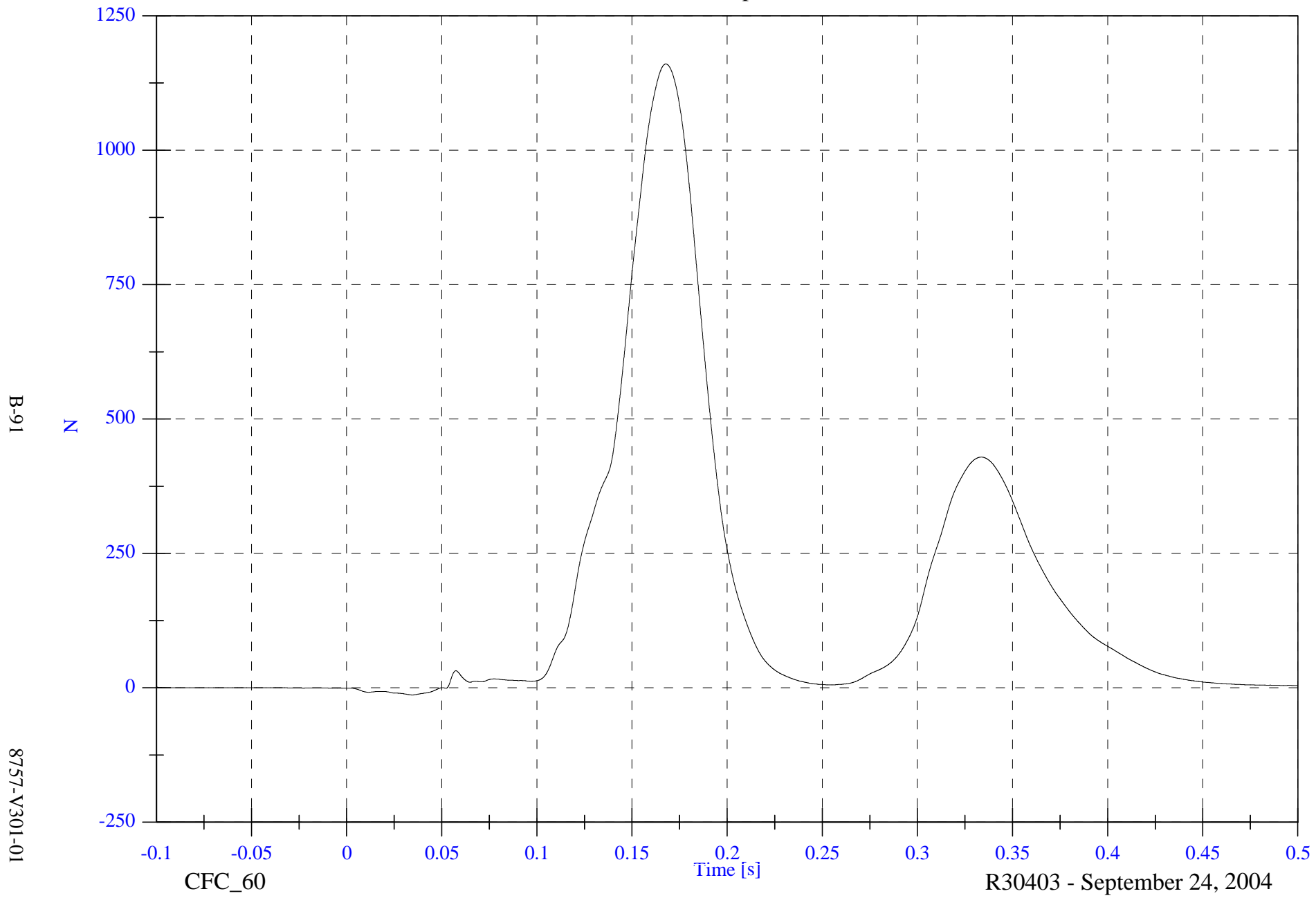
R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P3 Lap Belt

Max: 1160.4 [N] at 0.168 [s]

Min: -13.2 [N] at 0.034 [s]

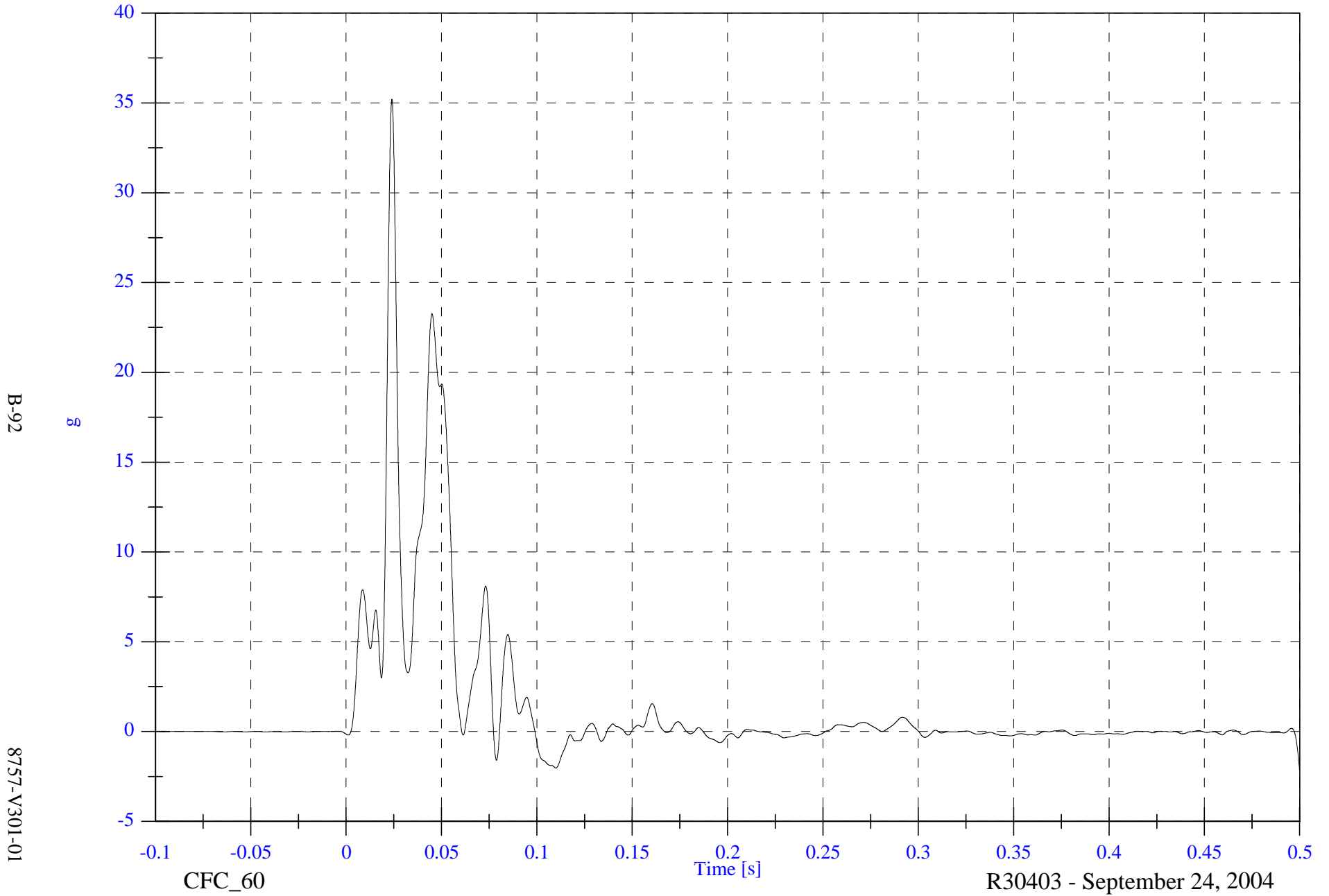


VOLPE 301 Test 1 - 2003 Jeep Liberty

V2 Left X Member x

Max: 35.2 [g] at 0.024 [s]

Min: -2.2 [g] at 0.500 [s]



B-92

8757-V301-01

CFC\_60

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

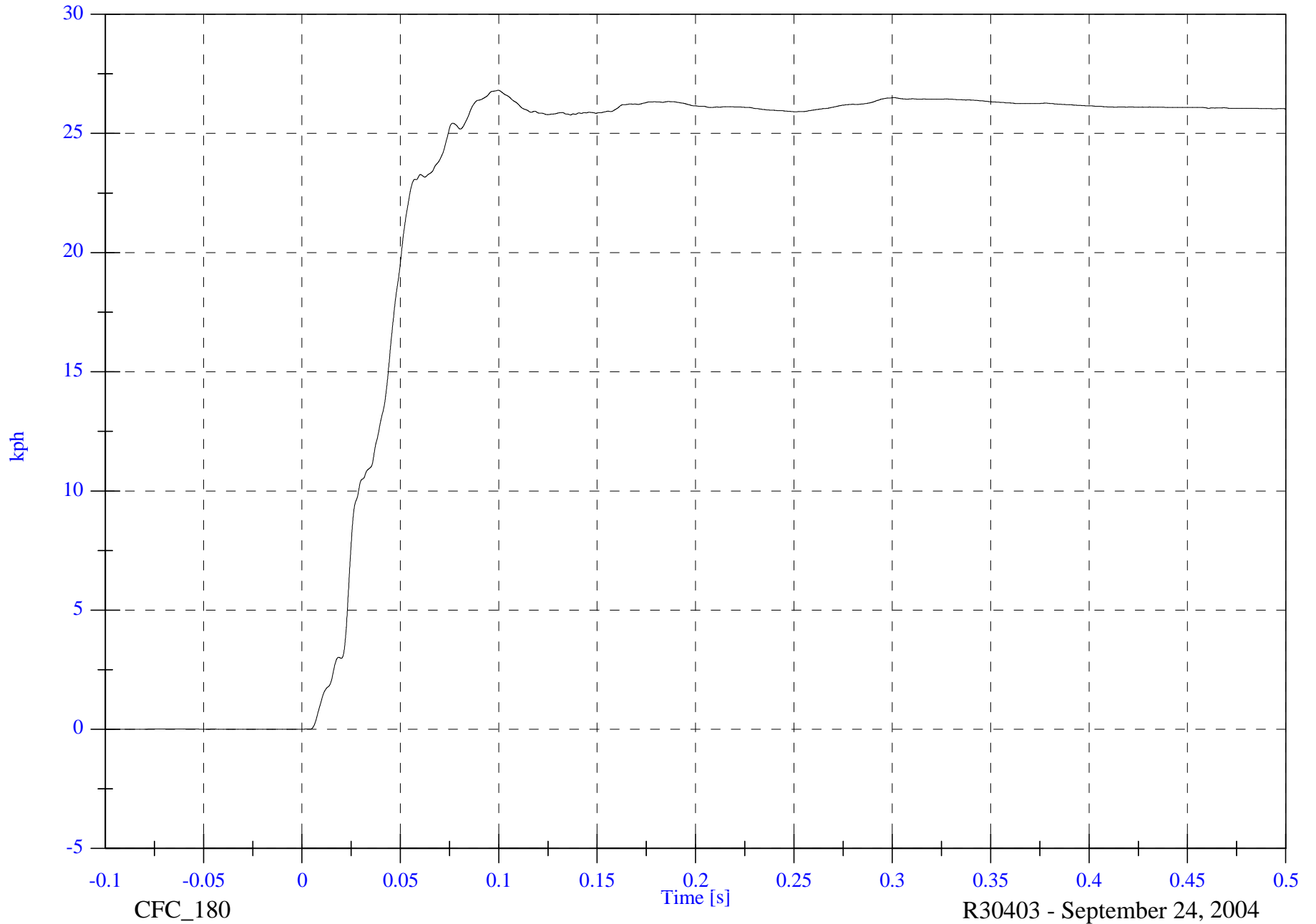
V2 Left X Member x Velocity

Max: 26.8 [kph] at 0.100 [s]

Min: -0.0 [kph] at -0.016 [s]

B-93

8757-V301-01



CFC\_180

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

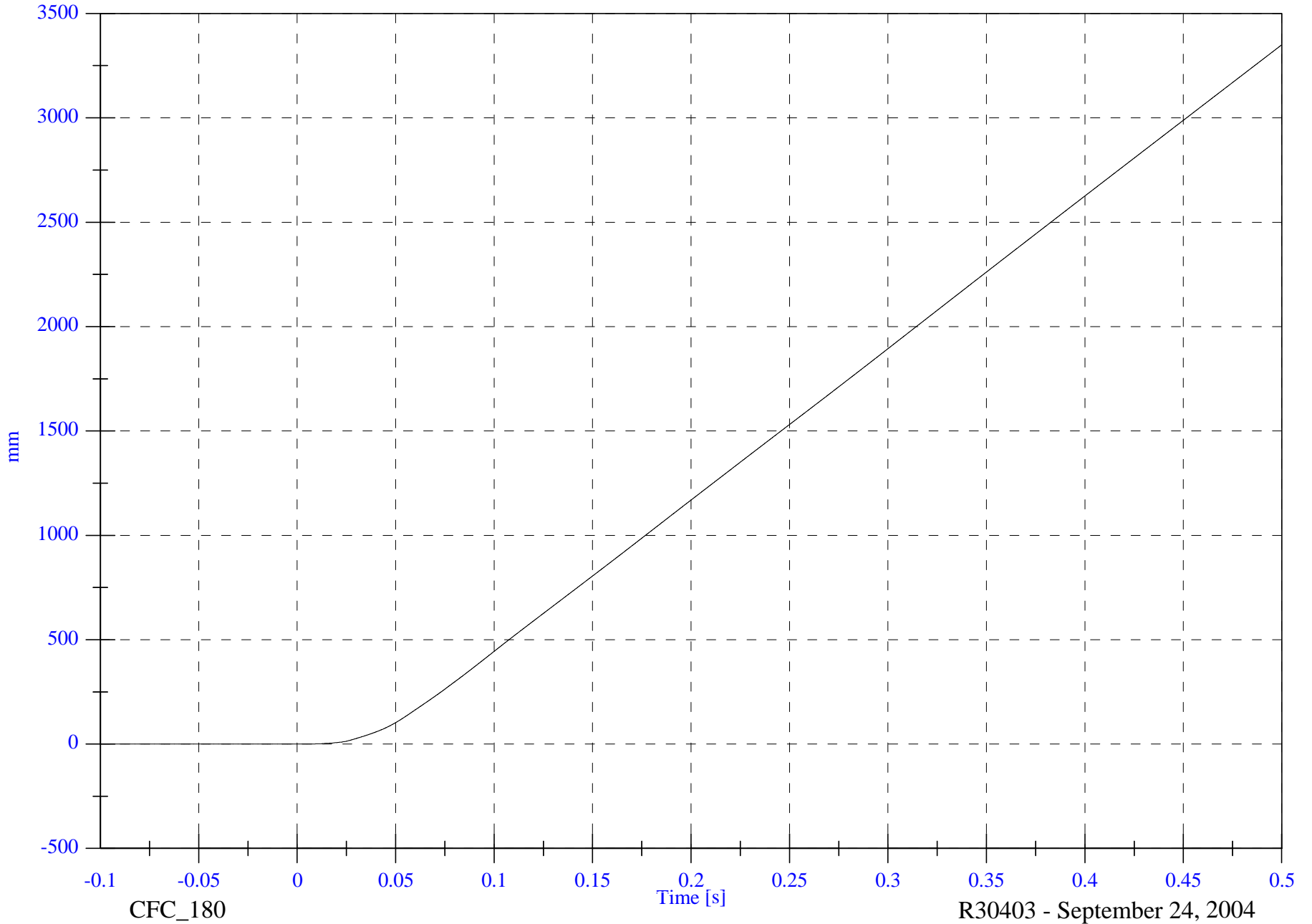
V2 Left X Member x Displacement

Max: 3349.8 [mm] at 0.500 [s]

Min: -0.1 [mm] at -0.100 [s]

B-94

8757-V301-01



CFC\_180

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

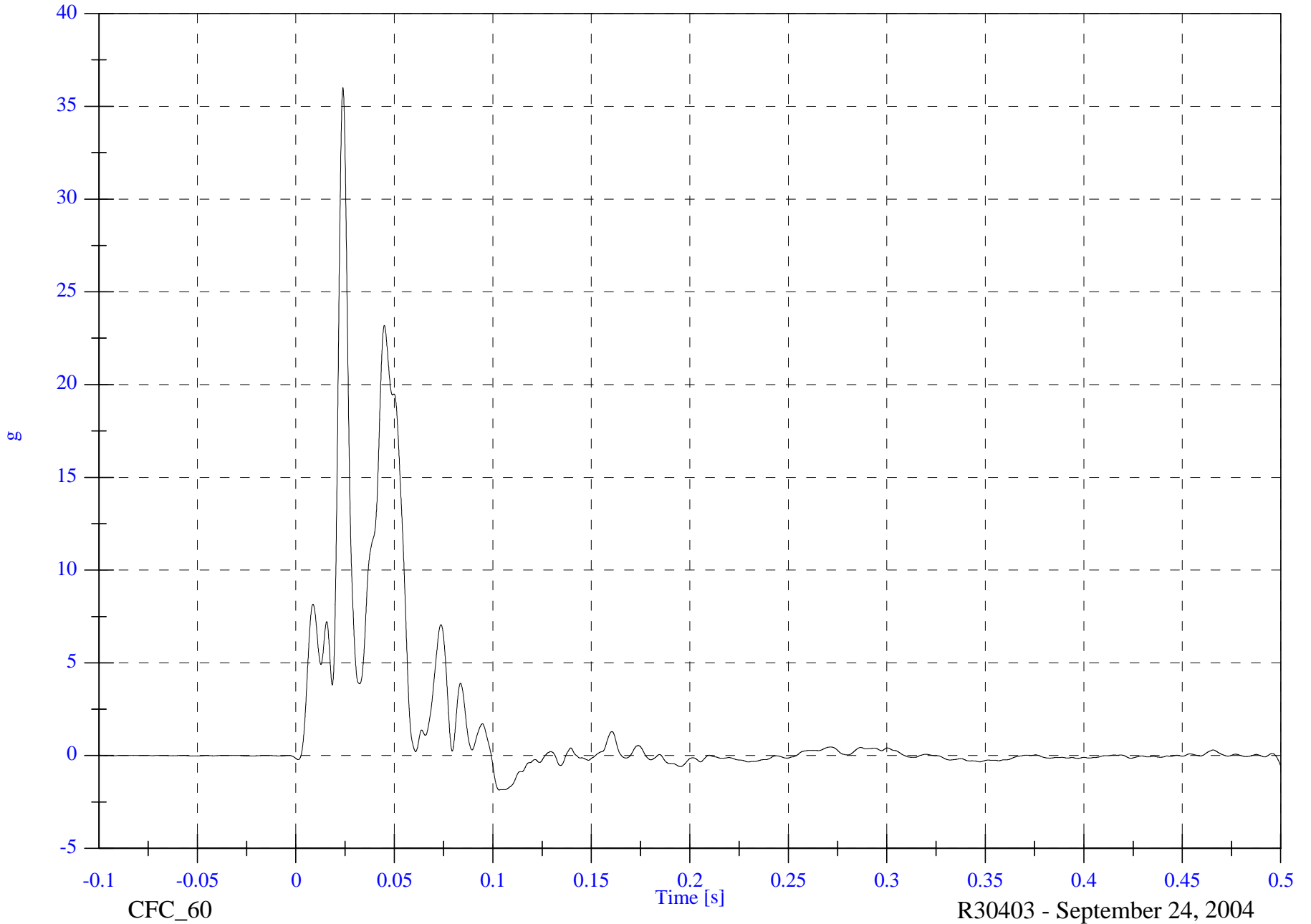
V2 Left X Member RED x

Max: 36.0 [g] at 0.024 [s]

Min: -1.9 [g] at 0.103 [s]

B-95

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

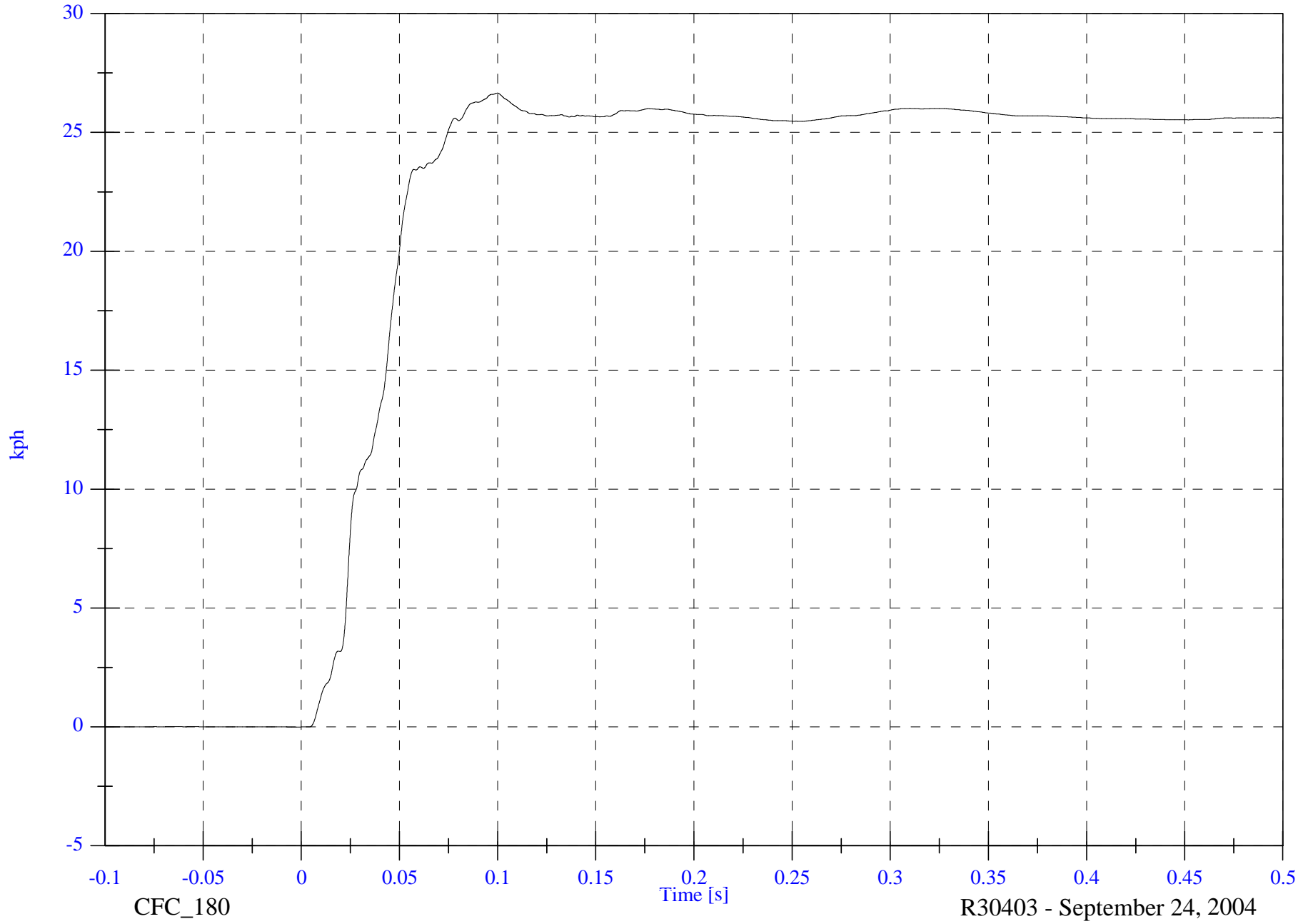
V2 Left X Member RED x Velocity

Max: 26.7 [kph] at 0.100 [s]

Min: -0.0 [kph] at -0.004 [s]

B-96

8757-V301-01



CFC\_180

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

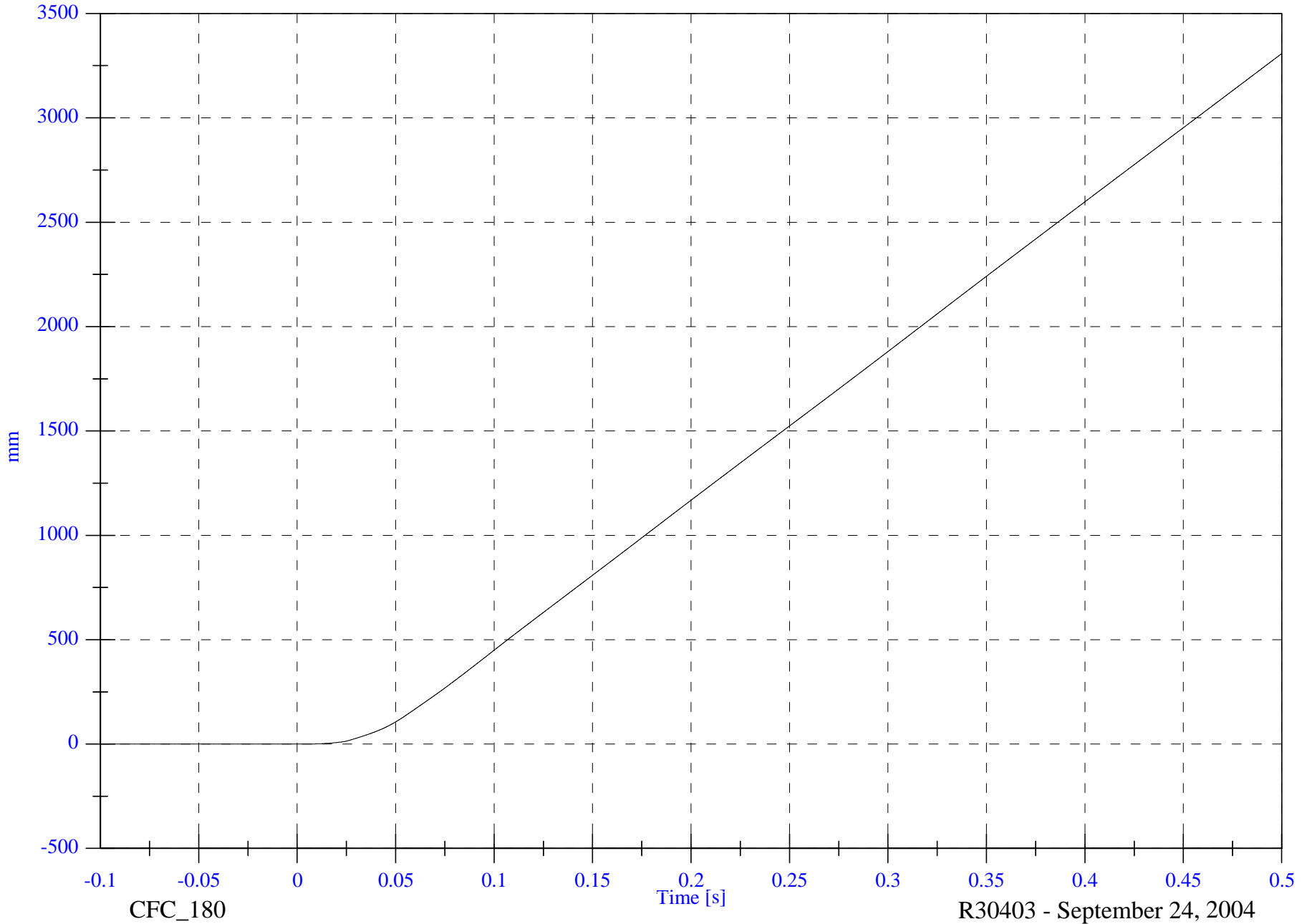
V2 Left X Member RED x Displacement

Max: 3307.8 [mm] at 0.500 [s]

Min: -0.1 [mm] at -0.100 [s]

B-97

8757-V301-01



CFC\_180

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

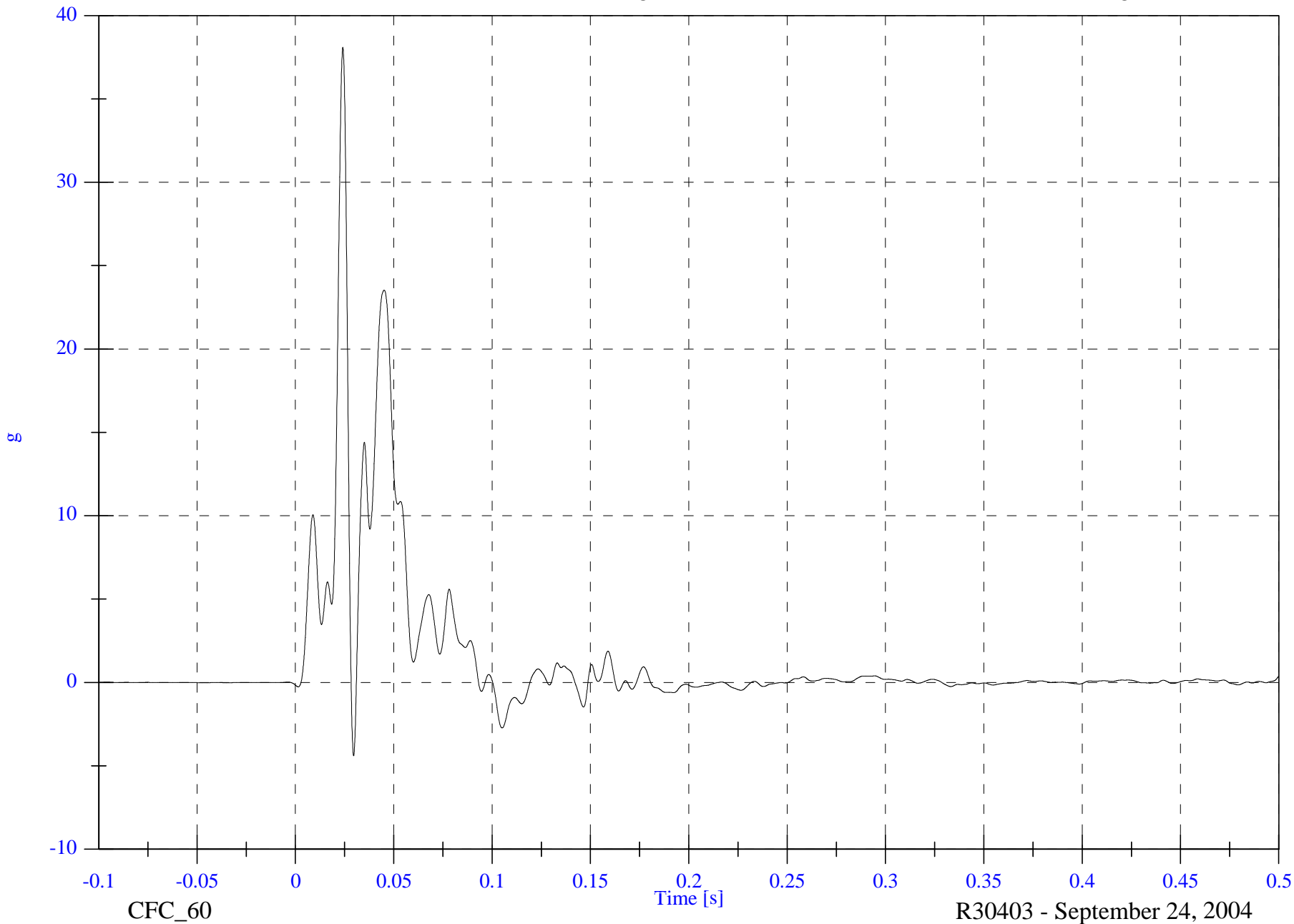
V2 Right X Member x

Max: 38.1 [g] at 0.024 [s]

Min: -4.4 [g] at 0.030 [s]

B-98

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

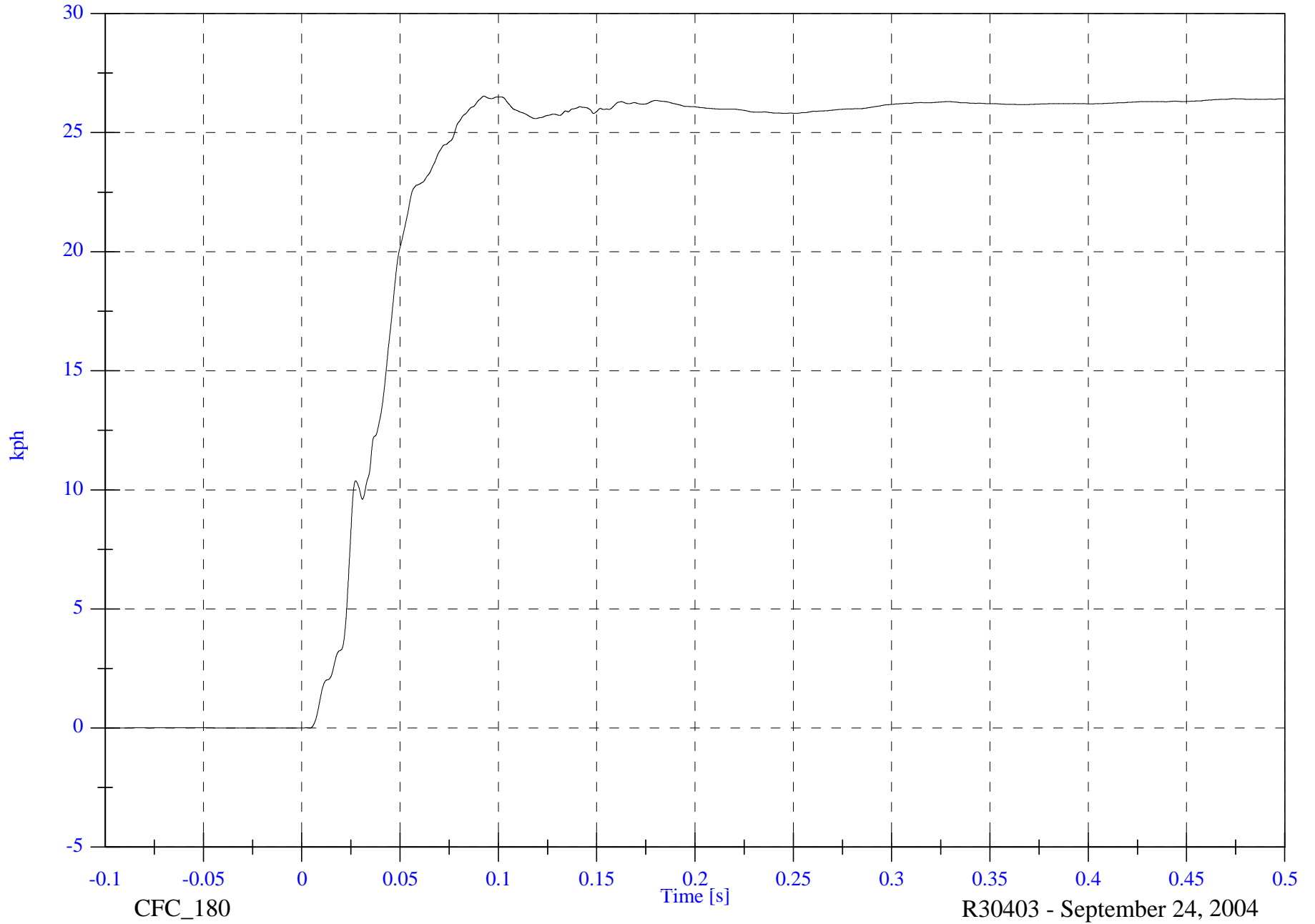
V2 Right X Member x Velocity

Max: 26.5 [kph] at 0.093 [s]

Min: -0.0 [kph] at -0.012 [s]

B-99

8757-V301-01



CFC\_180

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

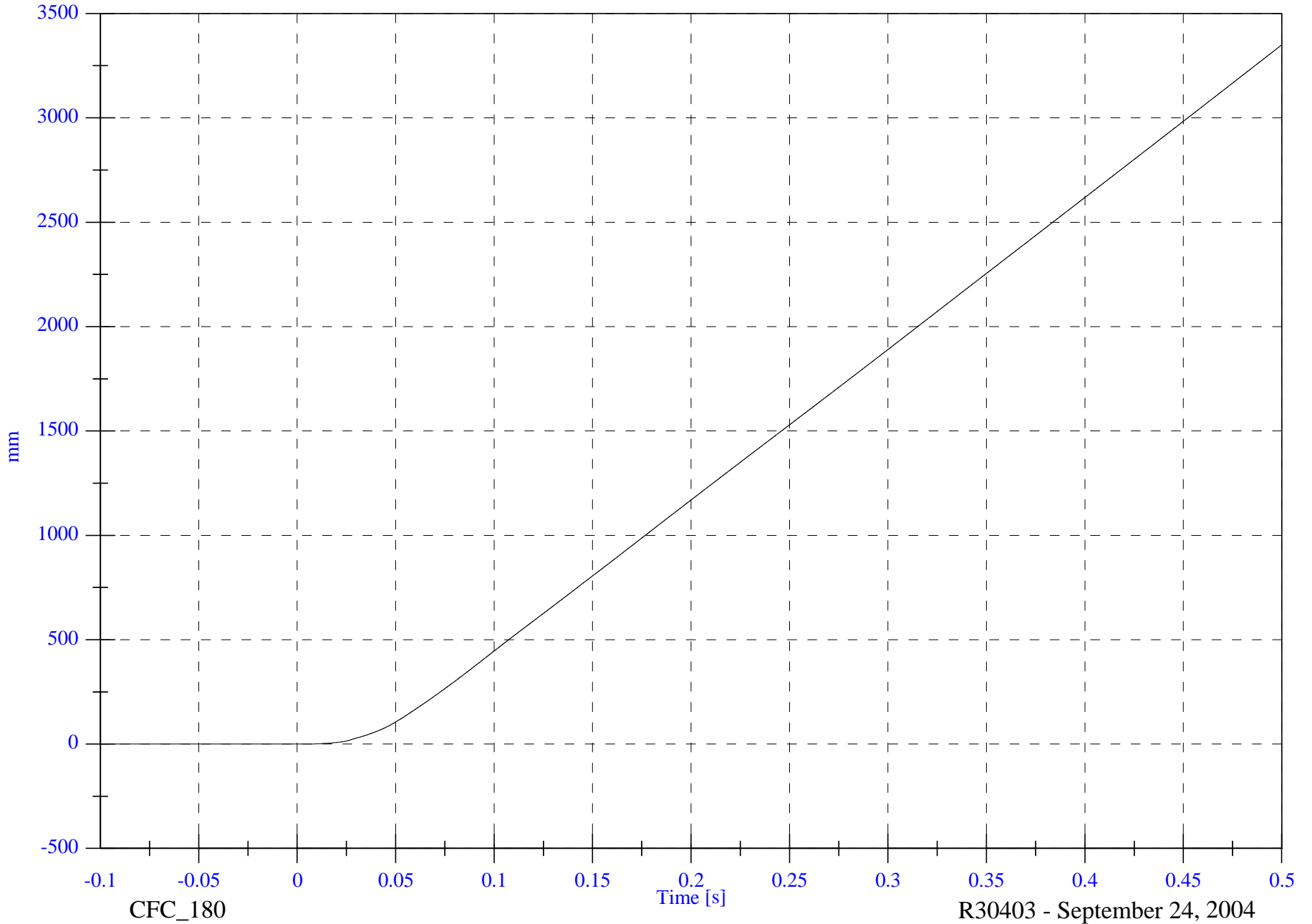
V2 Right X Member x Displacement

Max: 3349.5 [mm] at 0.500 [s]

Min: -0.1 [mm] at -0.100 [s]

B-100

8757-V301-01



CFC\_180

Time [s]

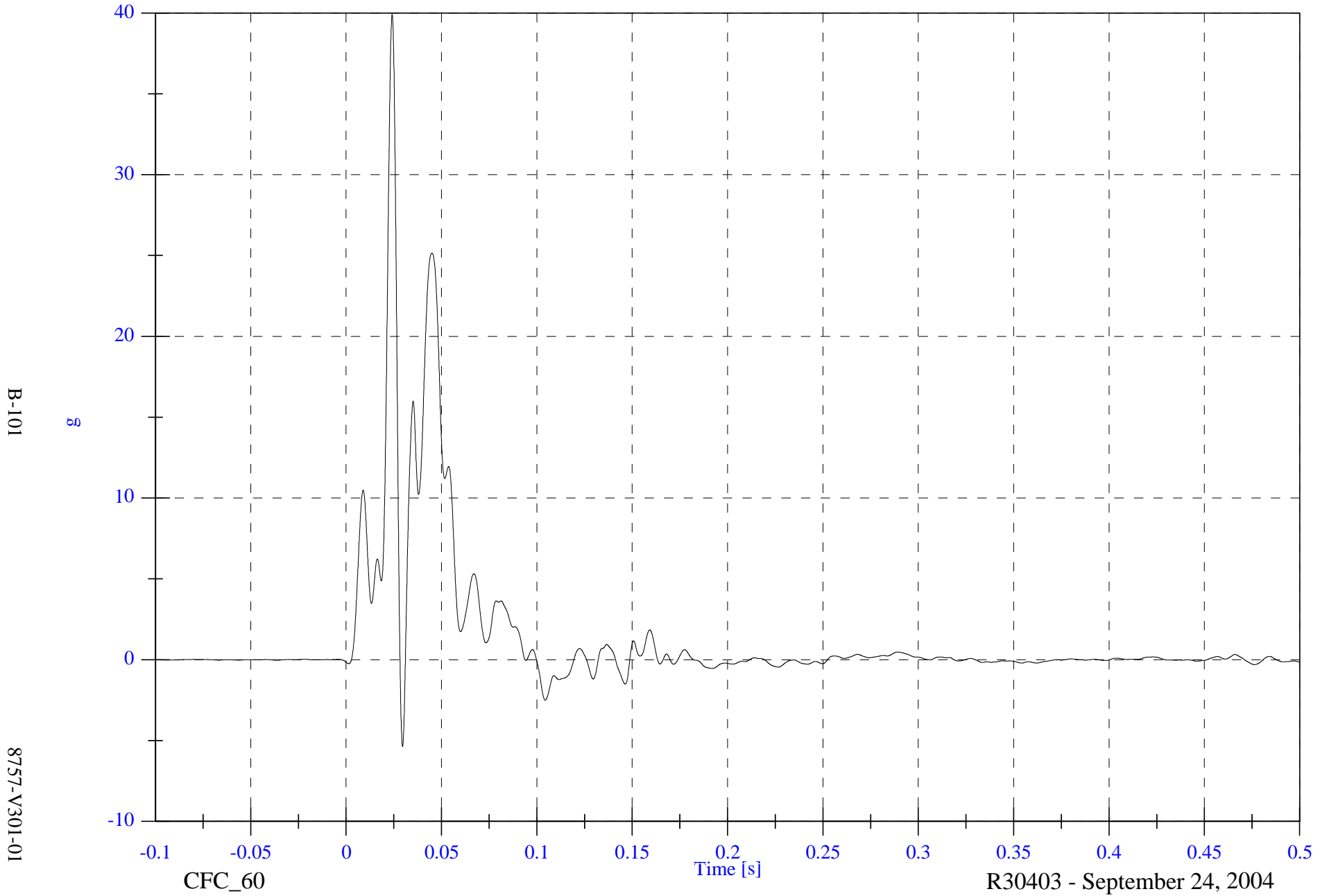
R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

V2 Right X Member RED x

Max: 39.9 [g] at 0.024 [s]

Min: -5.4 [g] at 0.030 [s]



B-101

8757-V301-01

CFC\_60

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

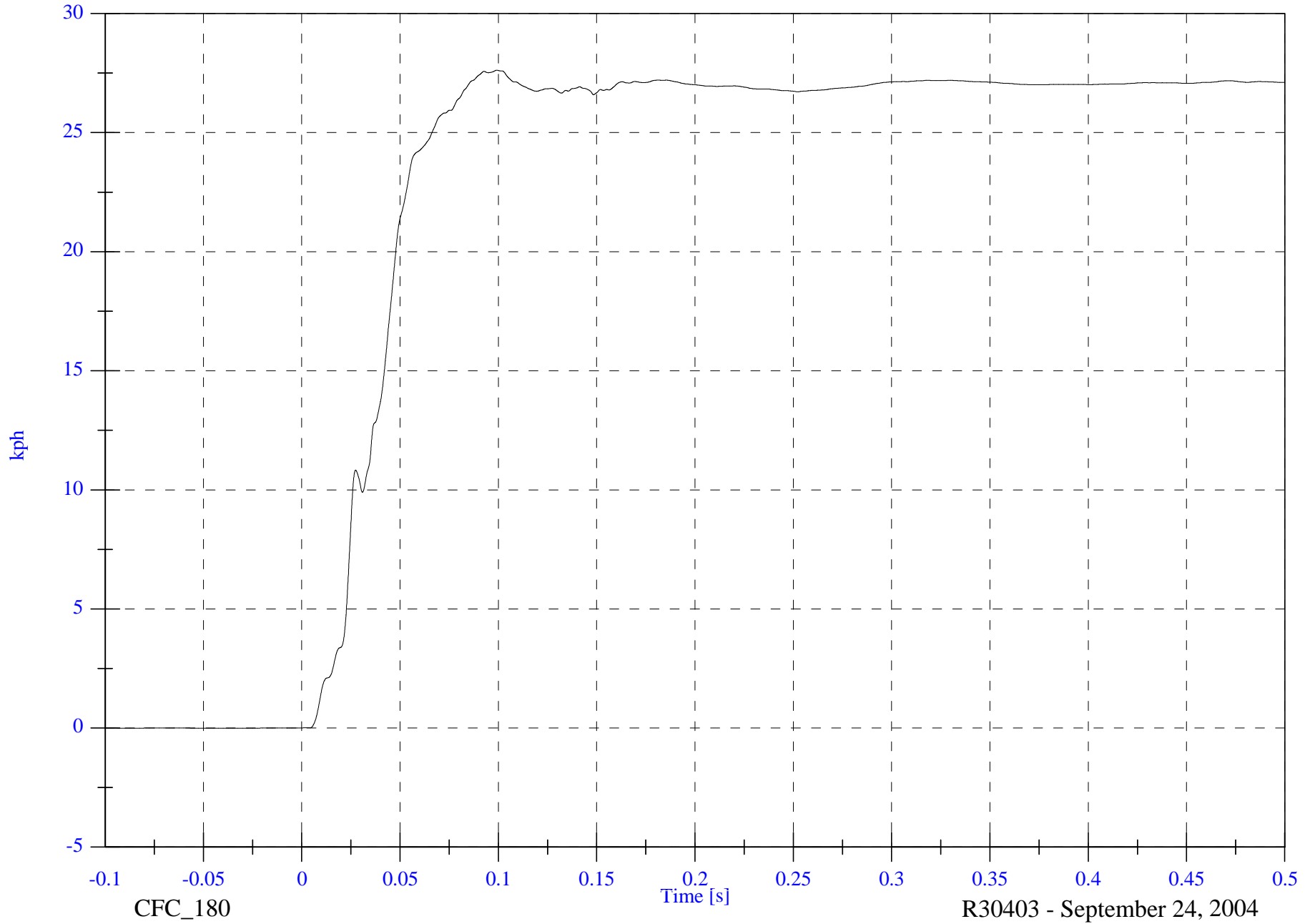
V2 Right X Member RED x Velocity

Max: 27.6 [kph] at 0.099 [s]

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

B-102

8757-V301-01



CFC\_180

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

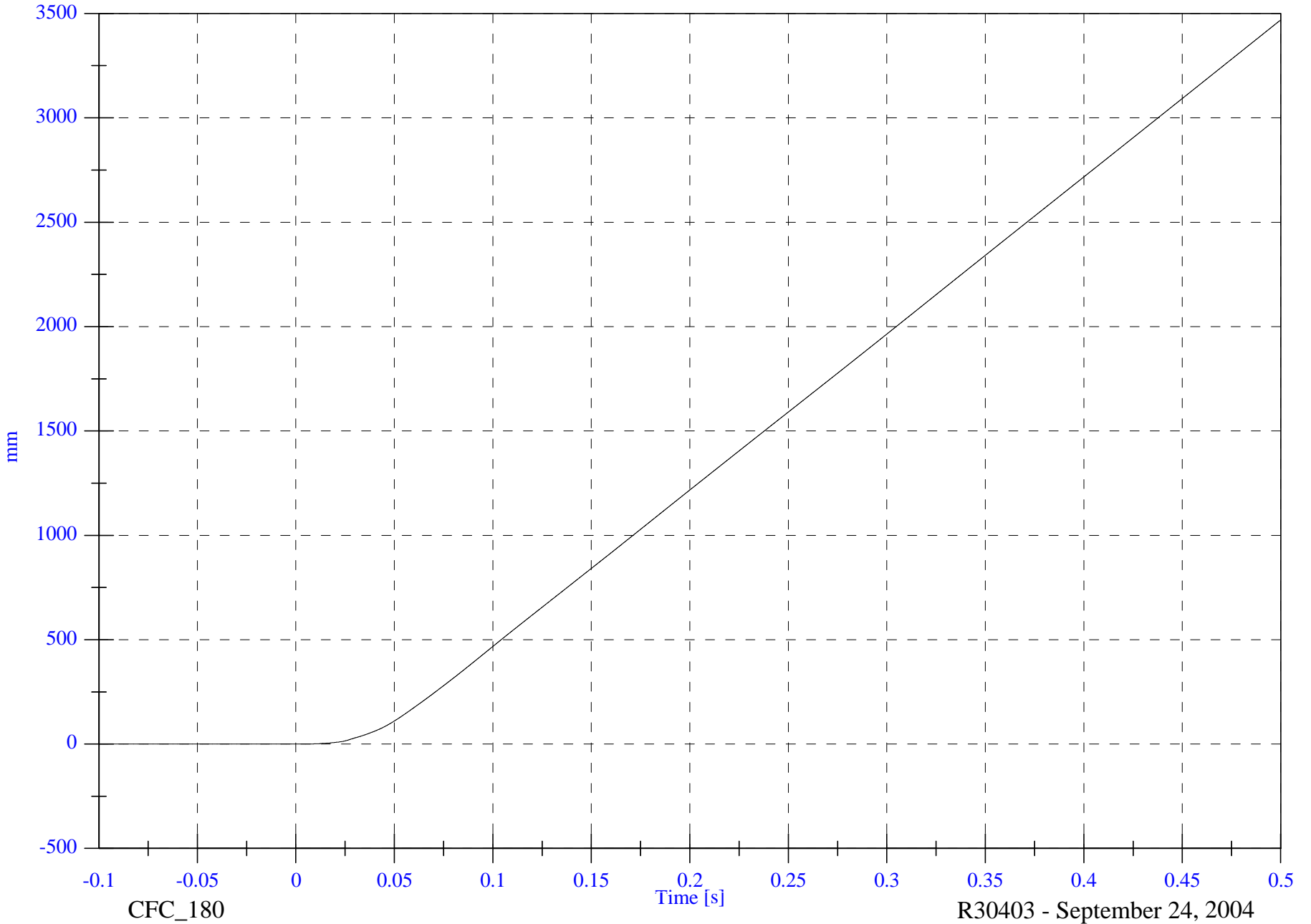
V2 Right X Member RED x Displacement

Max: 3469.1 [mm] at 0.500 [s]

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

B-103

8757-V301-01



CFC\_180

Time [s]

R30403 - September 24, 2004



VOLPE 301 Test 1 - 2003 Jeep Liberty

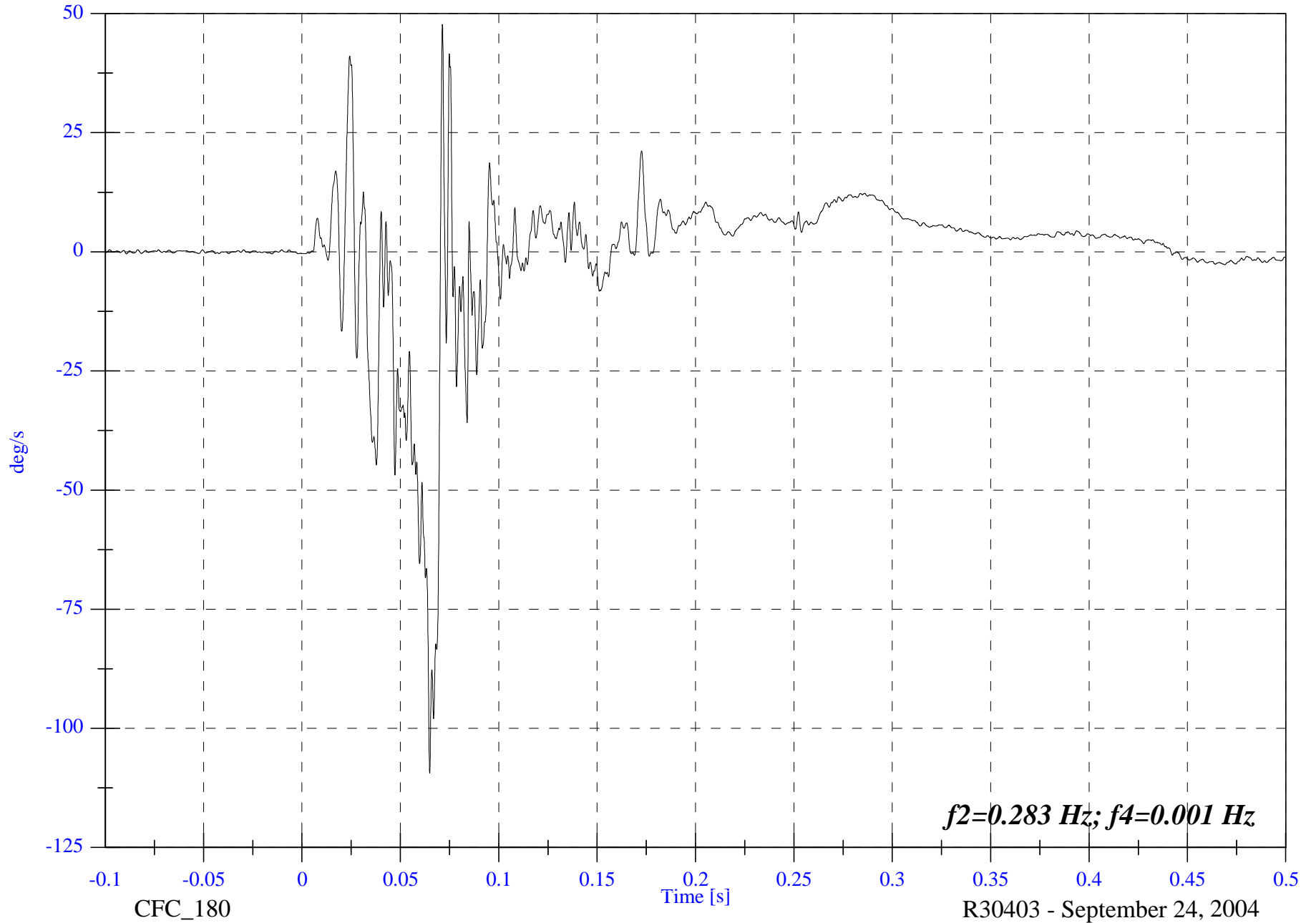
V2 Left Front Sill Comp AVy

Max: 47.7 [deg/s] at 0.071 [s]

Min: -109.4 [deg/s] at 0.065 [s]

B-105

8757-V301-01

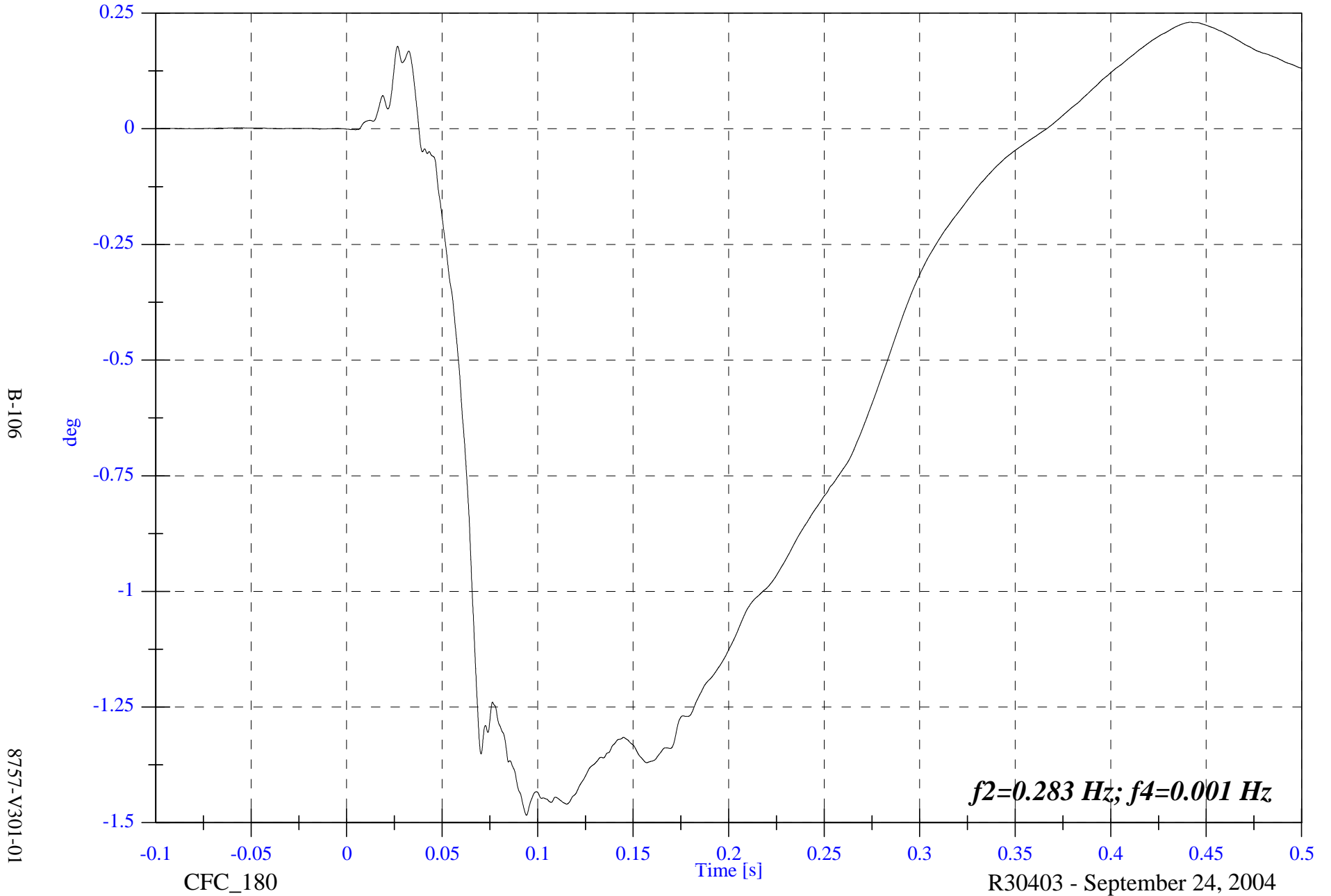


VOLPE 301 Test 1 - 2003 Jeep Liberty

V2 Left Front Sill Comp ADy

Max: 0.2 [deg] at 0.442 [s]

Min: -1.5 [deg] at 0.094 [s]



VOLPE 301 Test 1 - 2003 Jeep Liberty

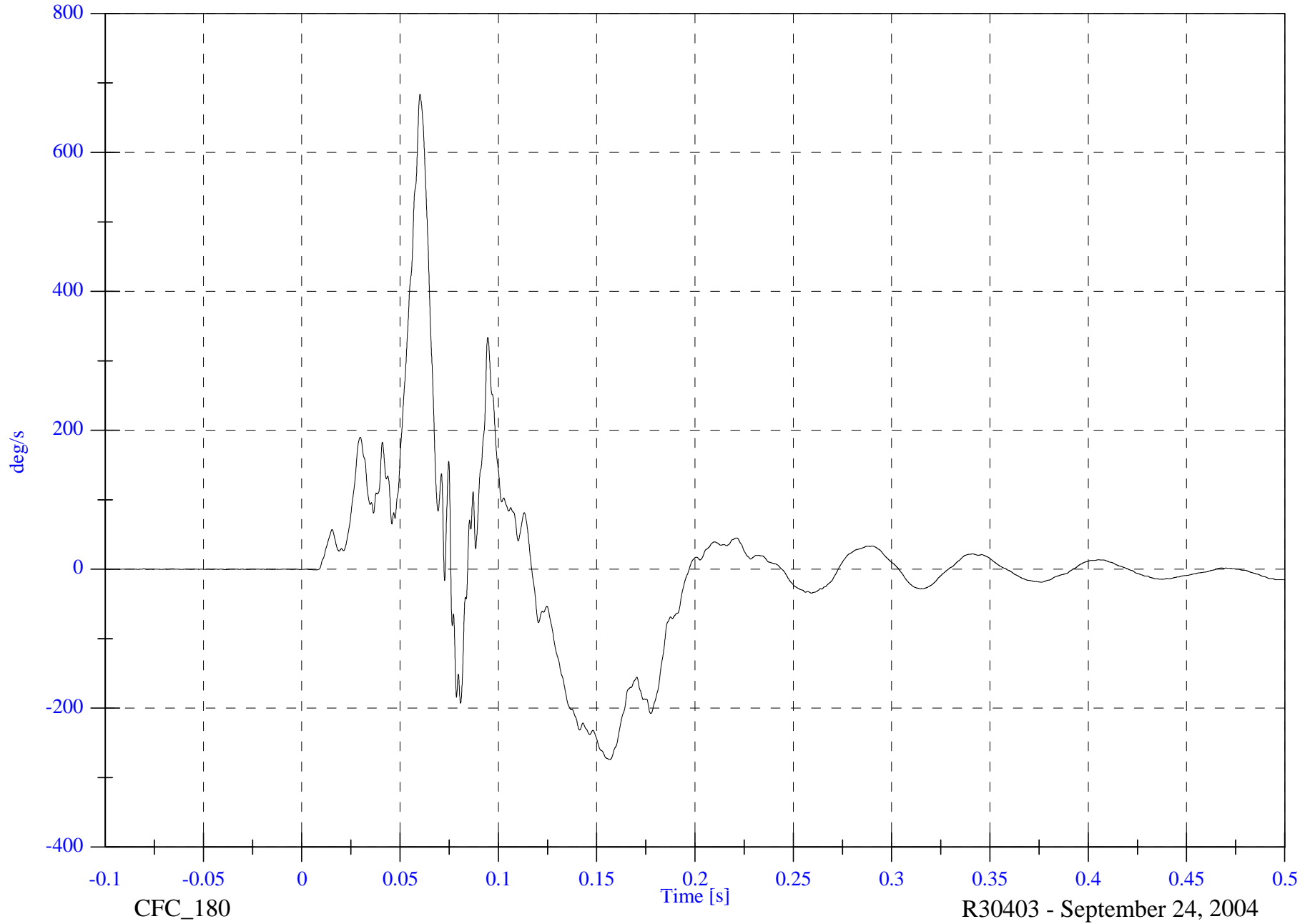
V2P1 Left Seat AVy

Max: 683.5 [deg/s] at 0.060 [s]

Min: -274.1 [deg/s] at 0.157 [s]

B-107

8757-V301-01



CFC\_180

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

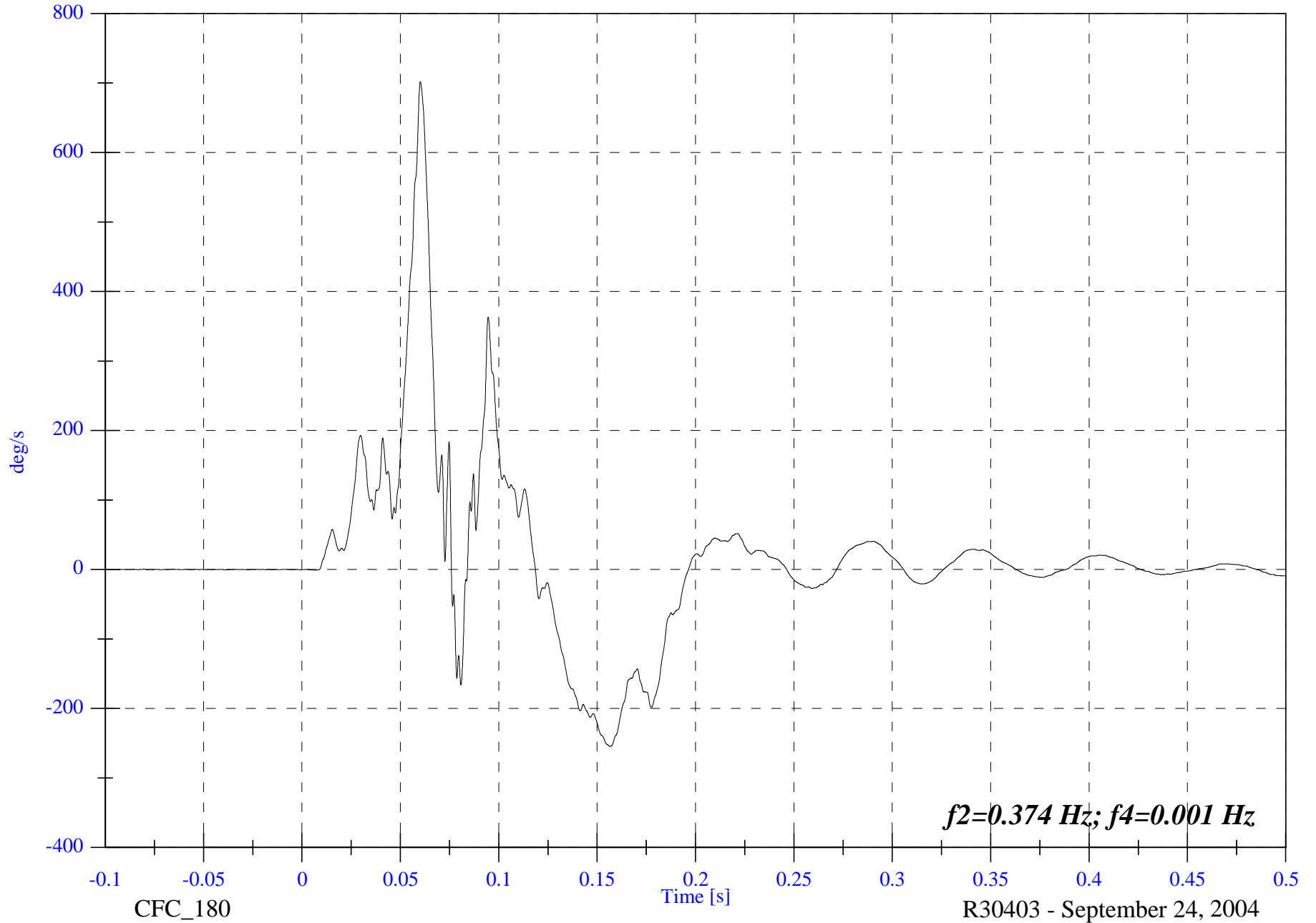
V2P1 Left Seat Comp AVy

Max: 702.0 [deg/s] at 0.060 [s]

Min: -254.8 [deg/s] at 0.157 [s]

B-108

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

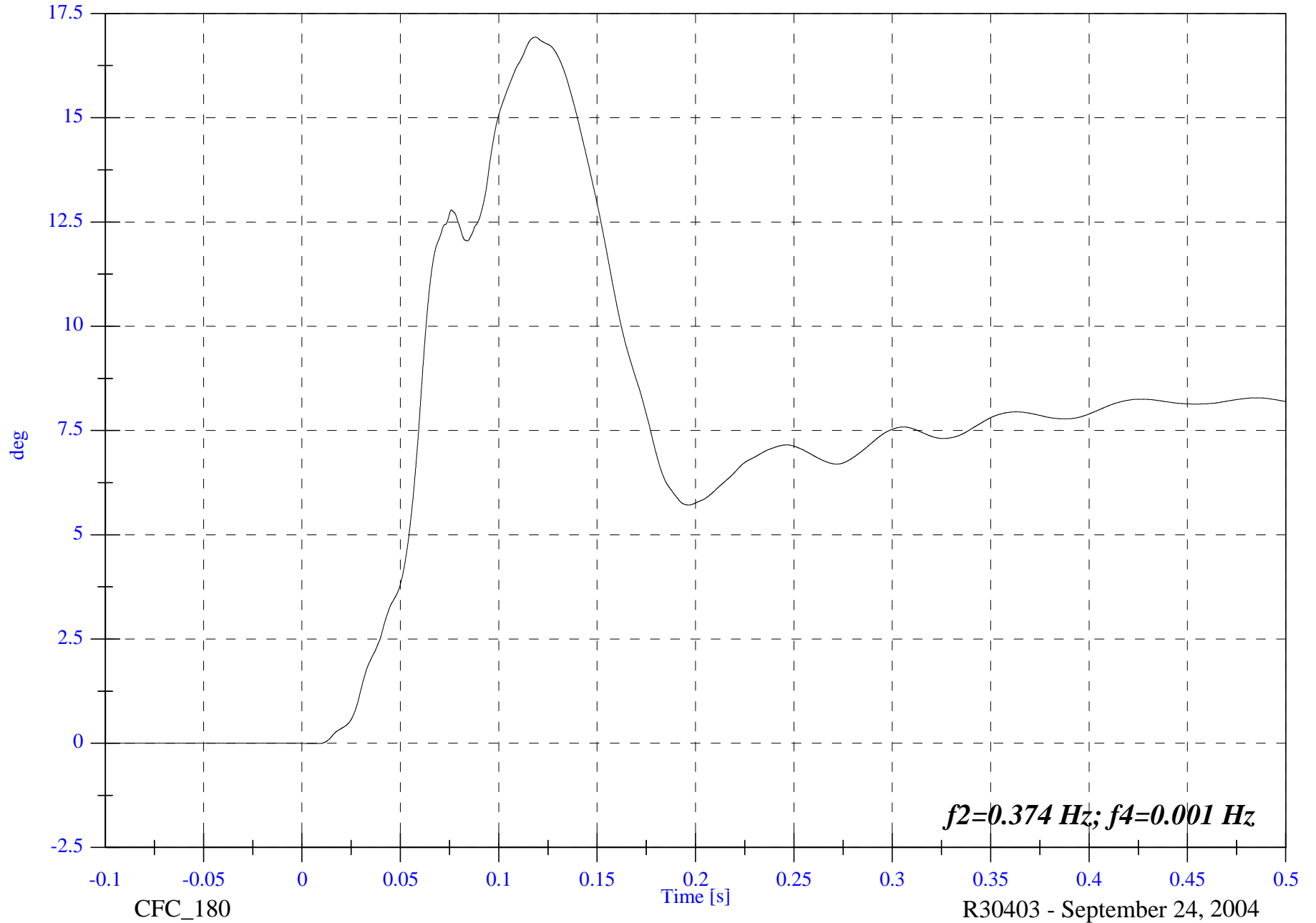
V2P1 Left Seat Comp ADy

Max: 16.9 [deg] at 0.119 [s]

Min: -0.0 [deg] at 0.009 [s]

B-109

8757-V301-01



$f_2=0.374$  Hz;  $f_4=0.001$  Hz

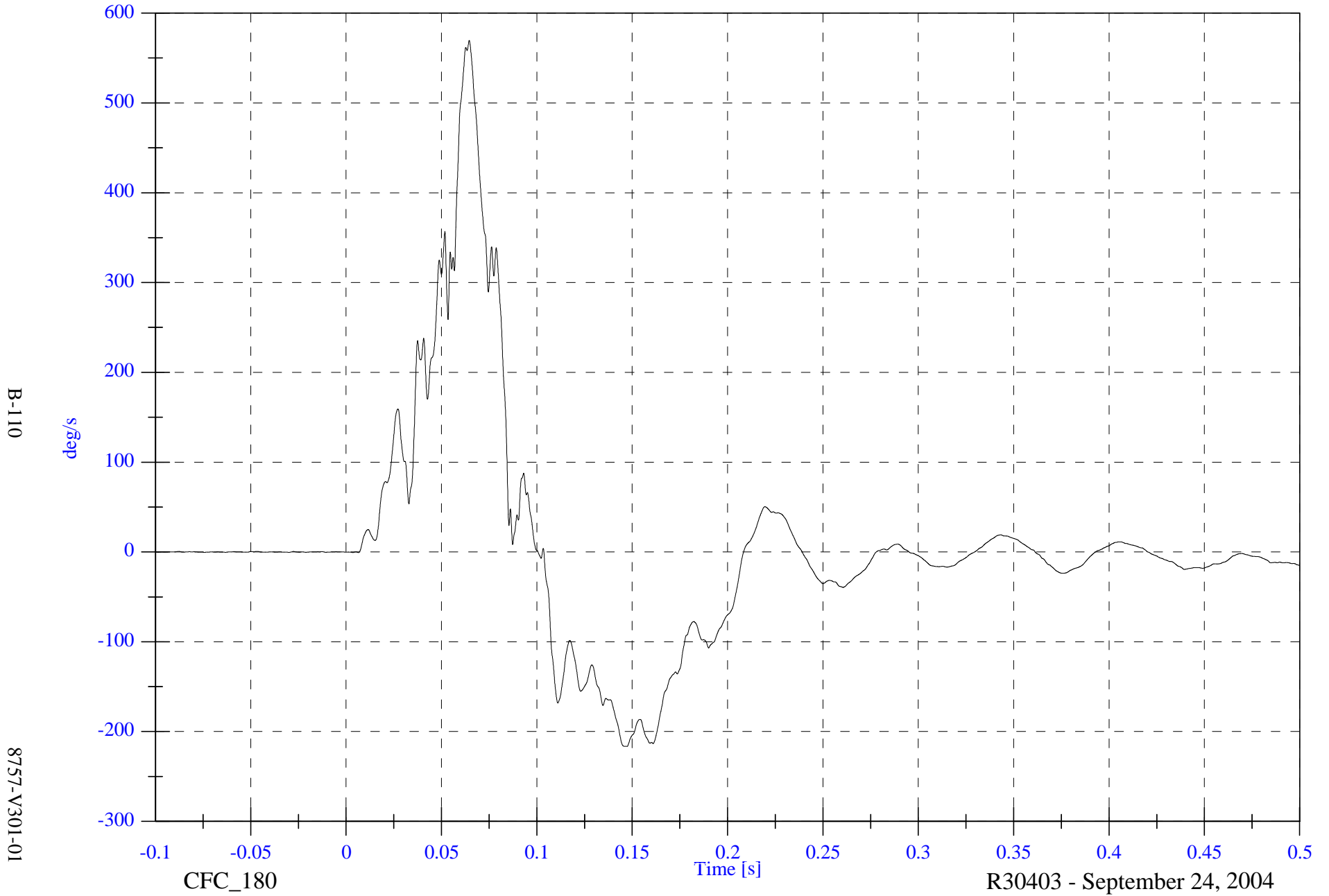
R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P1 Right Seat AVy

Max: 569.7 [deg/s] at 0.065 [s]

Min: -216.5 [deg/s] at 0.147 [s]



VOLPE 301 Test 1 - 2003 Jeep Liberty

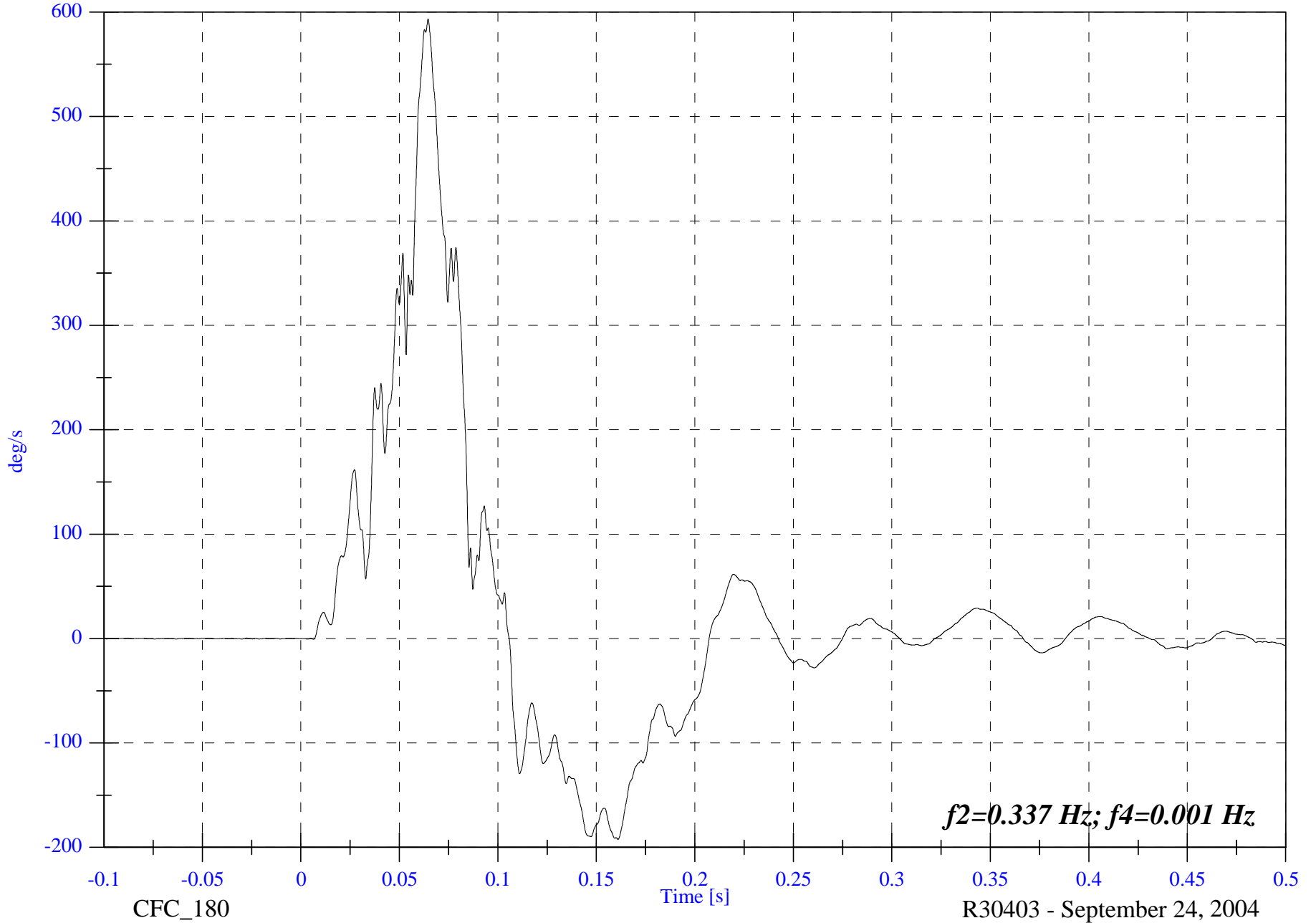
V2P1 Right Seat Comp AVy

Max: 593.4 [deg/s] at 0.065 [s]

Min: -192.4 [deg/s] at 0.161 [s]

B-111

8757-V301-01



*f2=0.337 Hz; f4=0.001 Hz*

CFC\_180

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

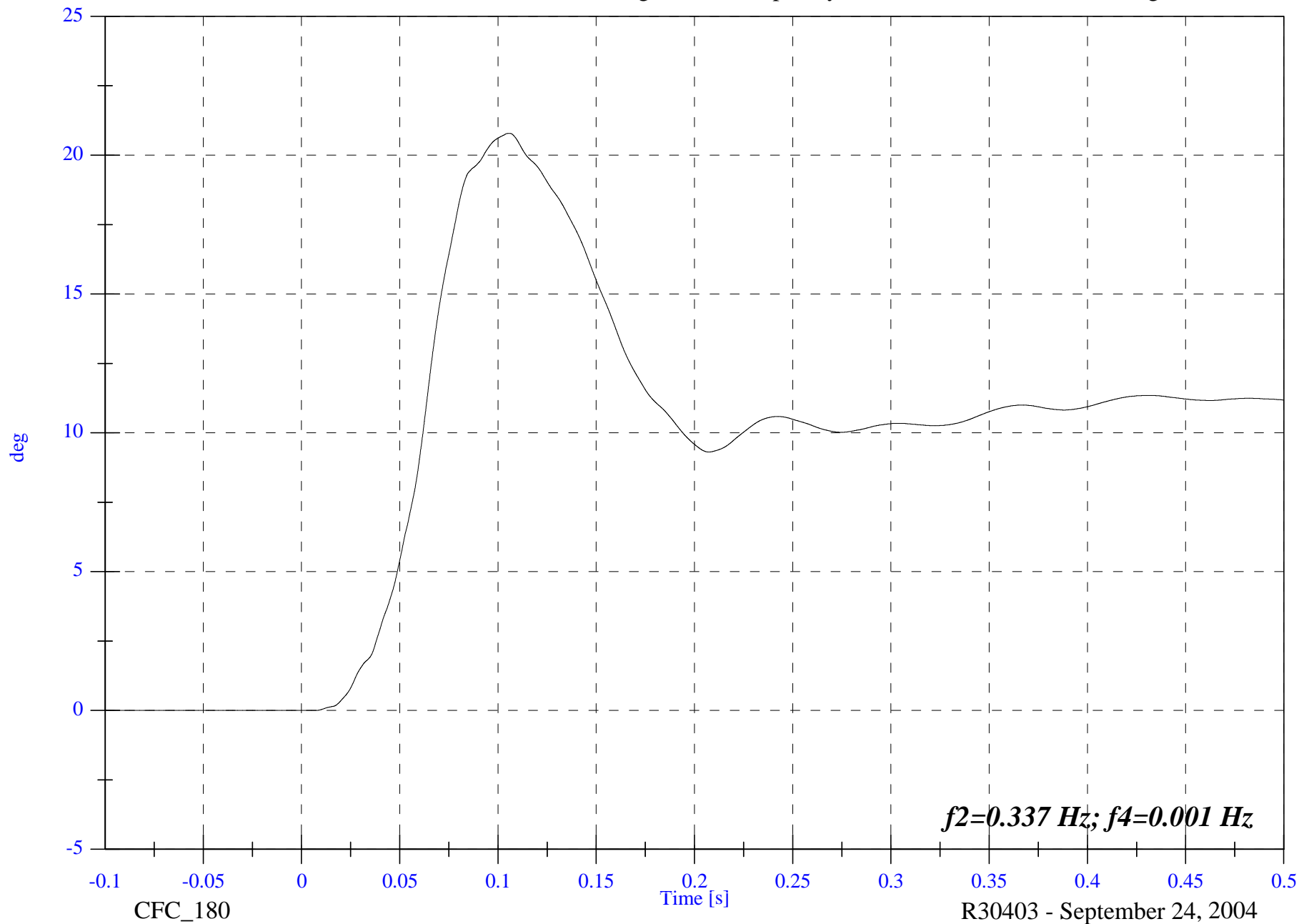
V2P1 Right Seat Comp ADy

Max: 20.8 [deg] at 0.106 [s]

Min: -0.0 [deg] at -0.019 [s]

B-112

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

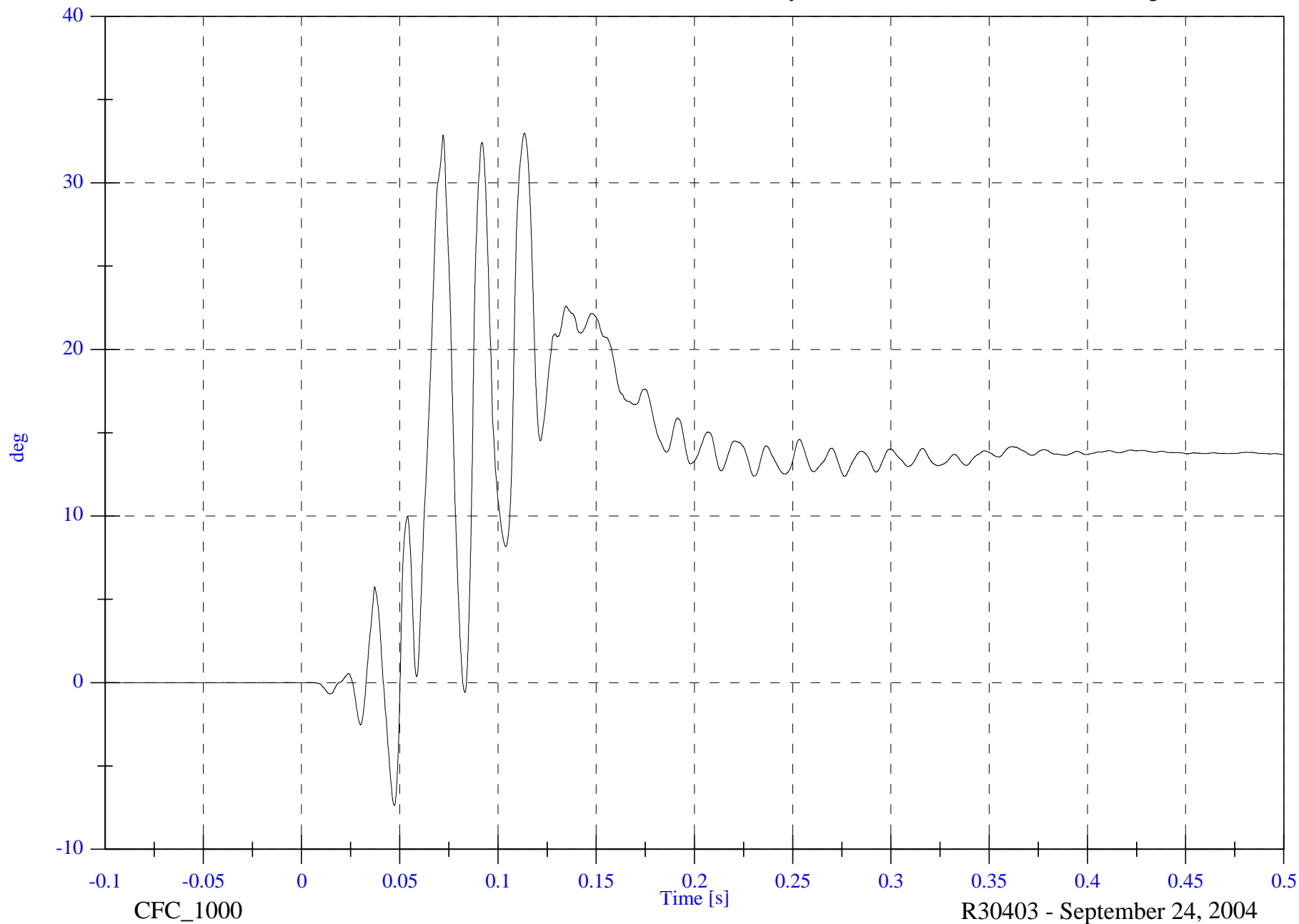
V2P1 Left Link ADy

Max: 33.0 [deg] at 0.113 [s]

Min: -7.4 [deg] at 0.047 [s]

B-113

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

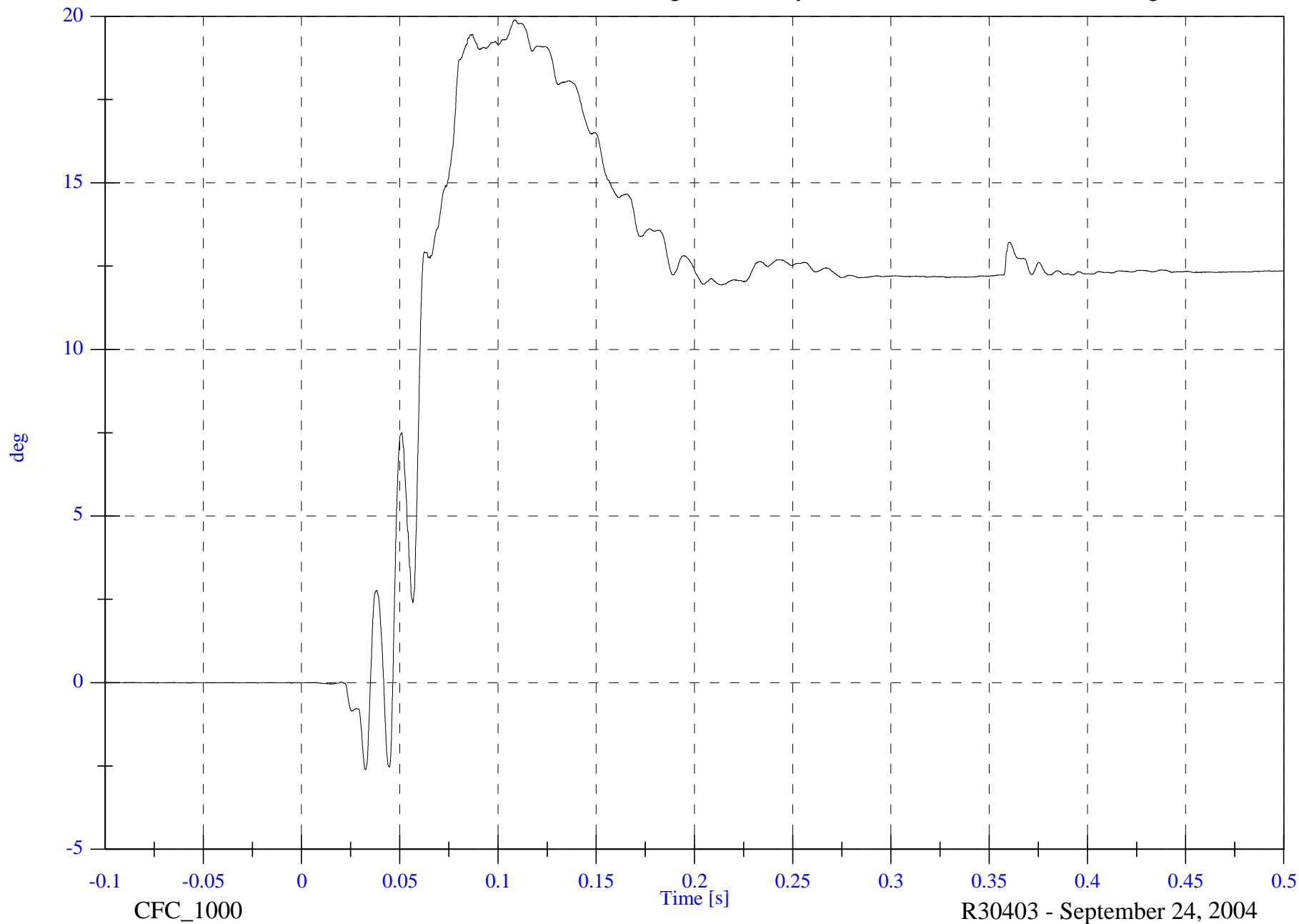
V2P1 Right Link ADy

Max: 19.9 [deg] at 0.109 [s]

Min: -2.6 [deg] at 0.033 [s]

B-114

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

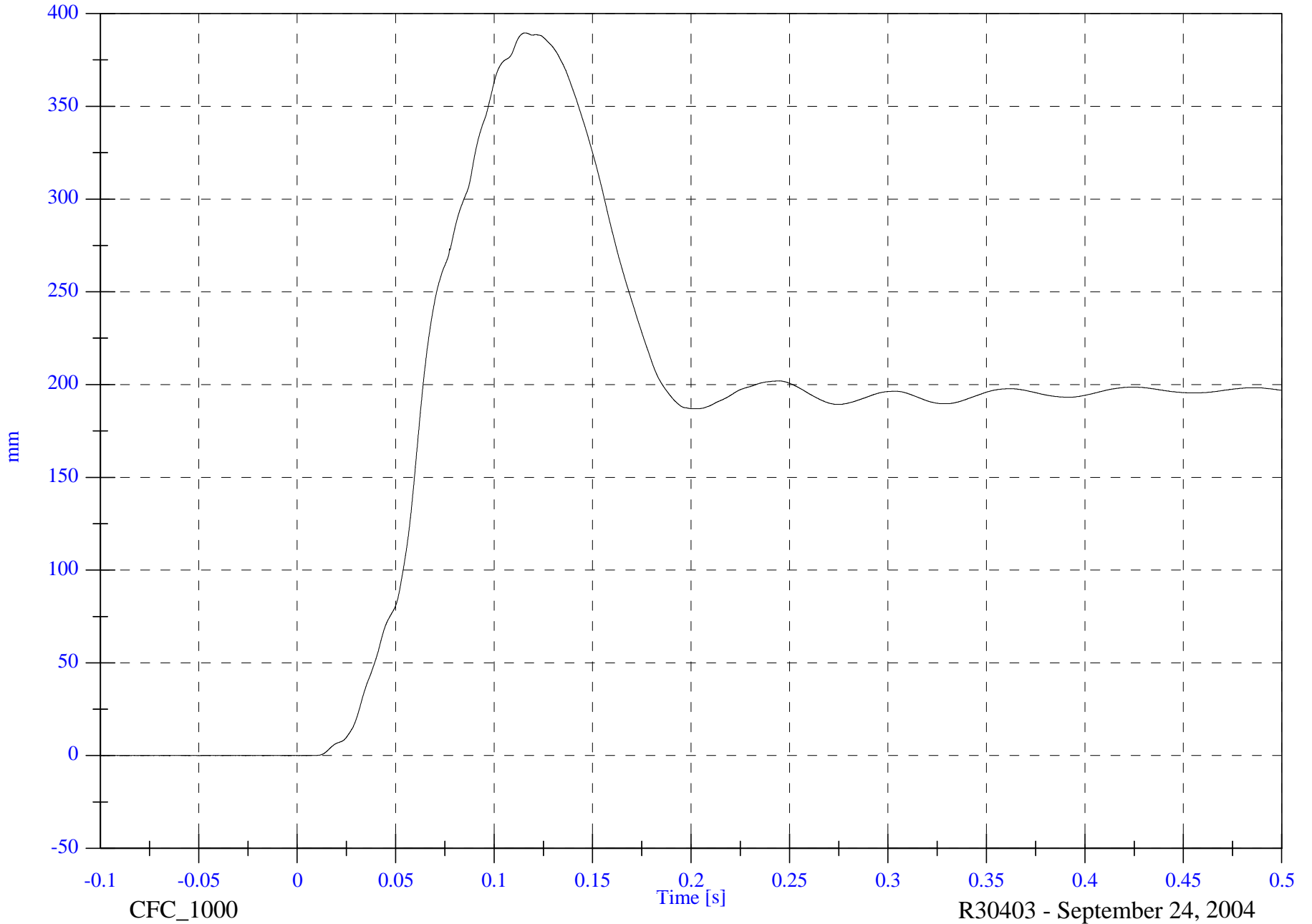
V2P1 Left Span Bar D

Max: 389.5 [mm] at 0.115 [s]

Min: -0.0 [mm] at -0.098 [s]

B-115

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

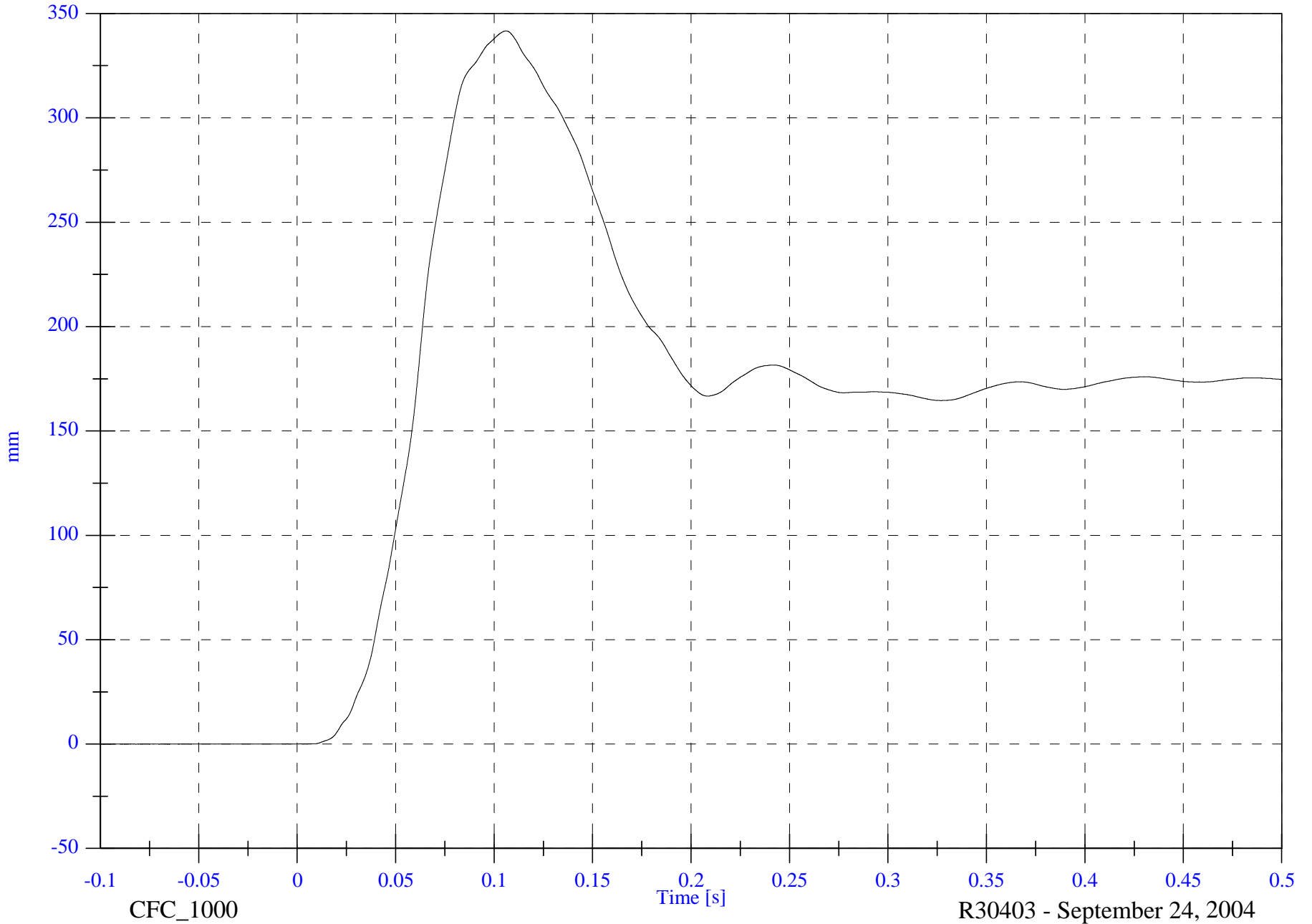
V2P1 Right Span Bar D

Max: 341.7 [mm] at 0.106 [s]

Min: -0.0 [mm] at -0.082 [s]

B-116

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

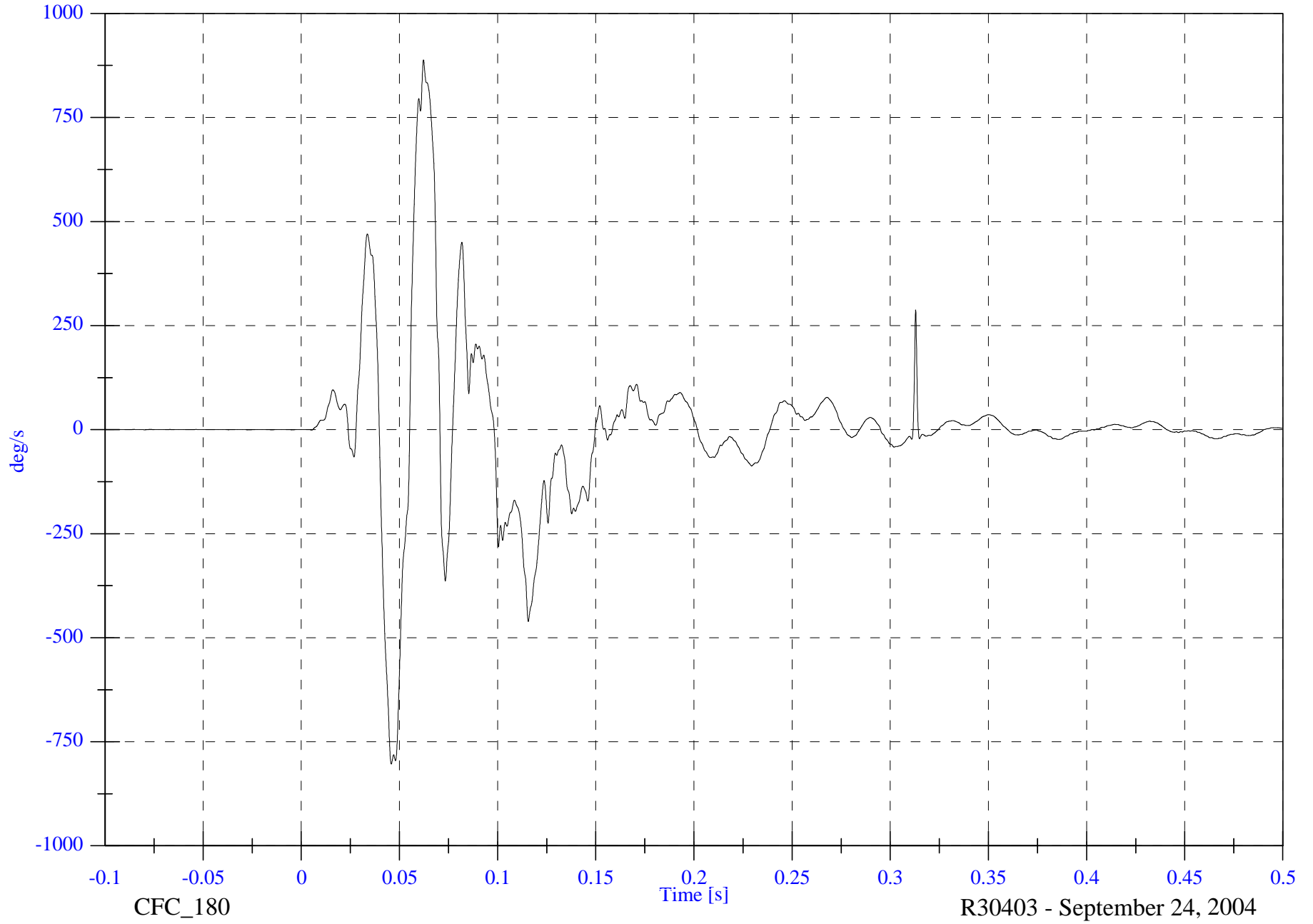
V2P3 Left Seat AVy

Max: 888.5 [deg/s] at 0.062 [s]

Min: -804.1 [deg/s] at 0.046 [s]

B-117

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

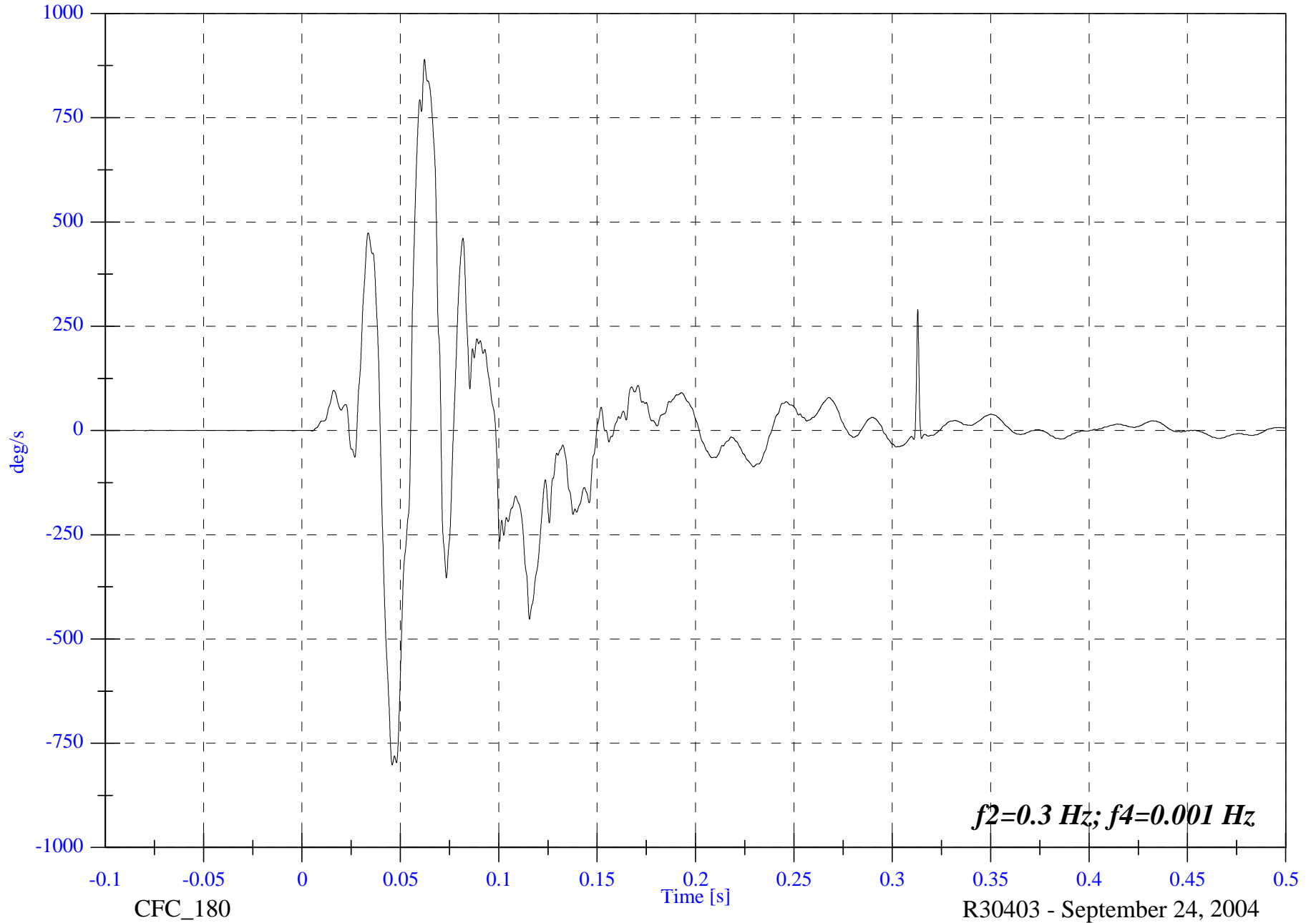
V2P3 Left Seat Comp AVy

Max: 890.1 [deg/s] at 0.062 [s]

Min: -801.8 [deg/s] at 0.046 [s]

B-118

8757-V301-01



VOLPE 301 Test 1 - 2003 Jeep Liberty

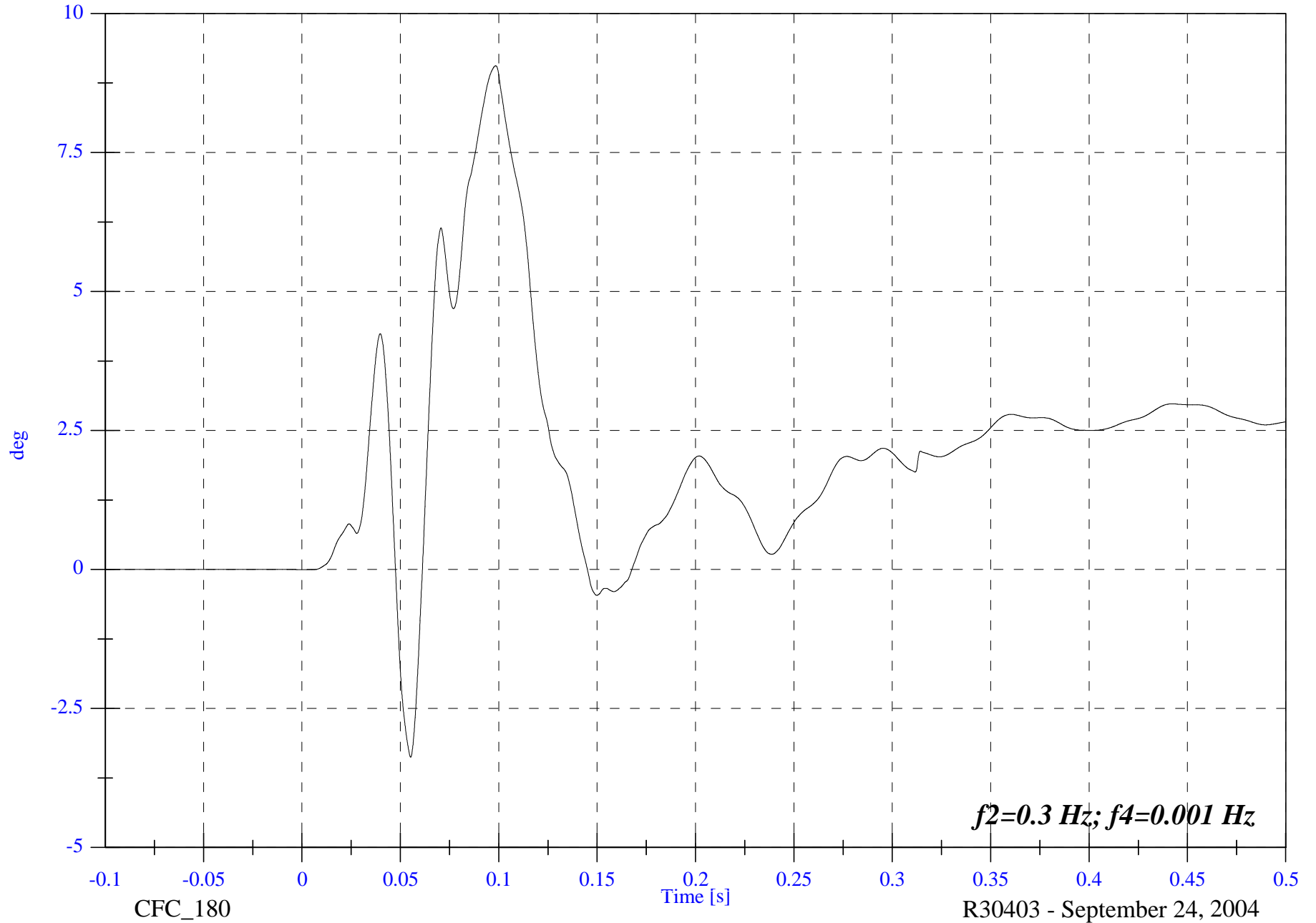
V2P3 Left Seat Comp ADy

Max: 9.1 [deg] at 0.098 [s]

Min: -3.4 [deg] at 0.055 [s]

B-119

8757-V301-01



$f_2=0.3$  Hz;  $f_4=0.001$  Hz

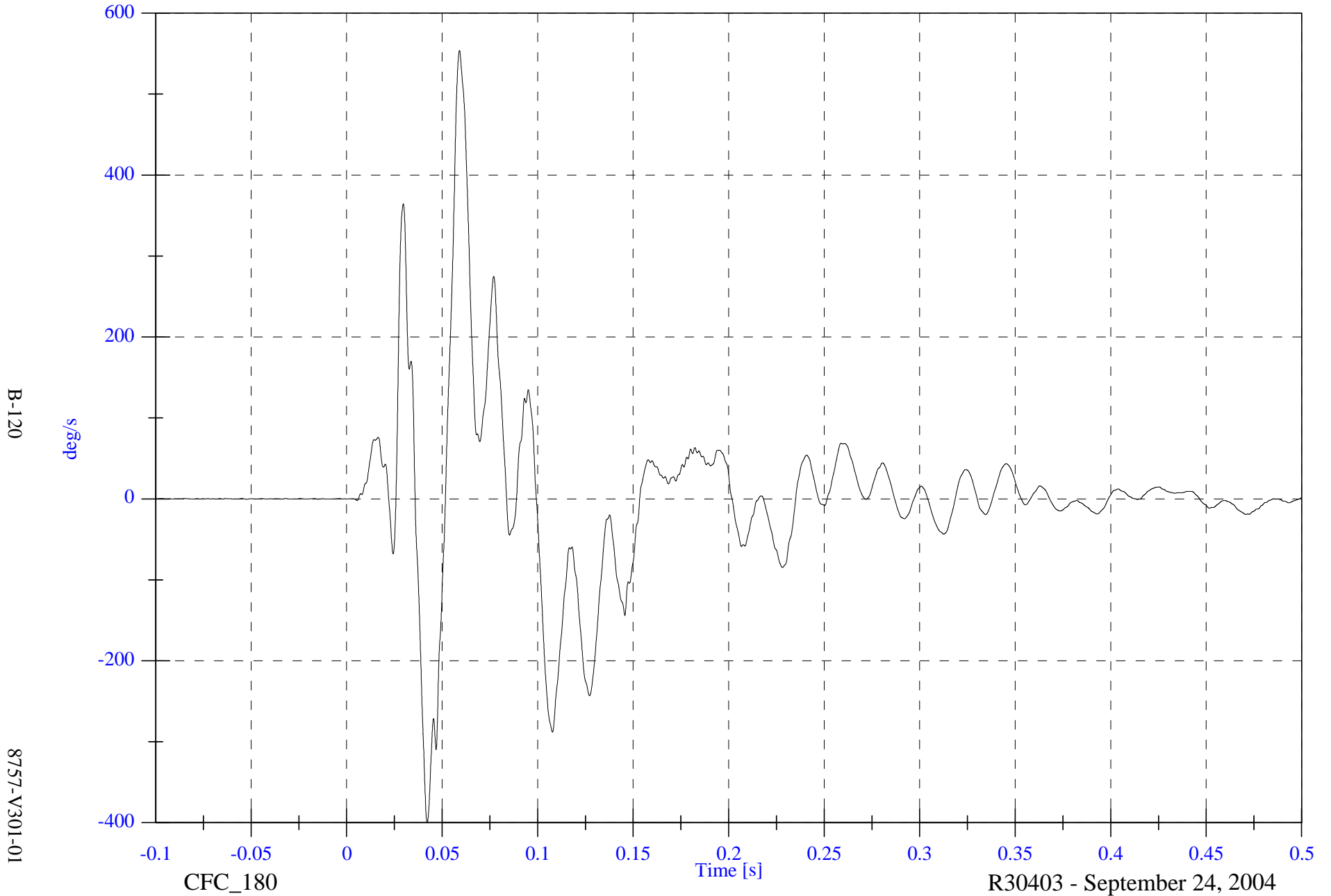
R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P3 Right Seat AVy

Max: 554.0 [deg/s] at 0.059 [s]

Min: -399.8 [deg/s] at 0.042 [s]



VOLPE 301 Test 1 - 2003 Jeep Liberty

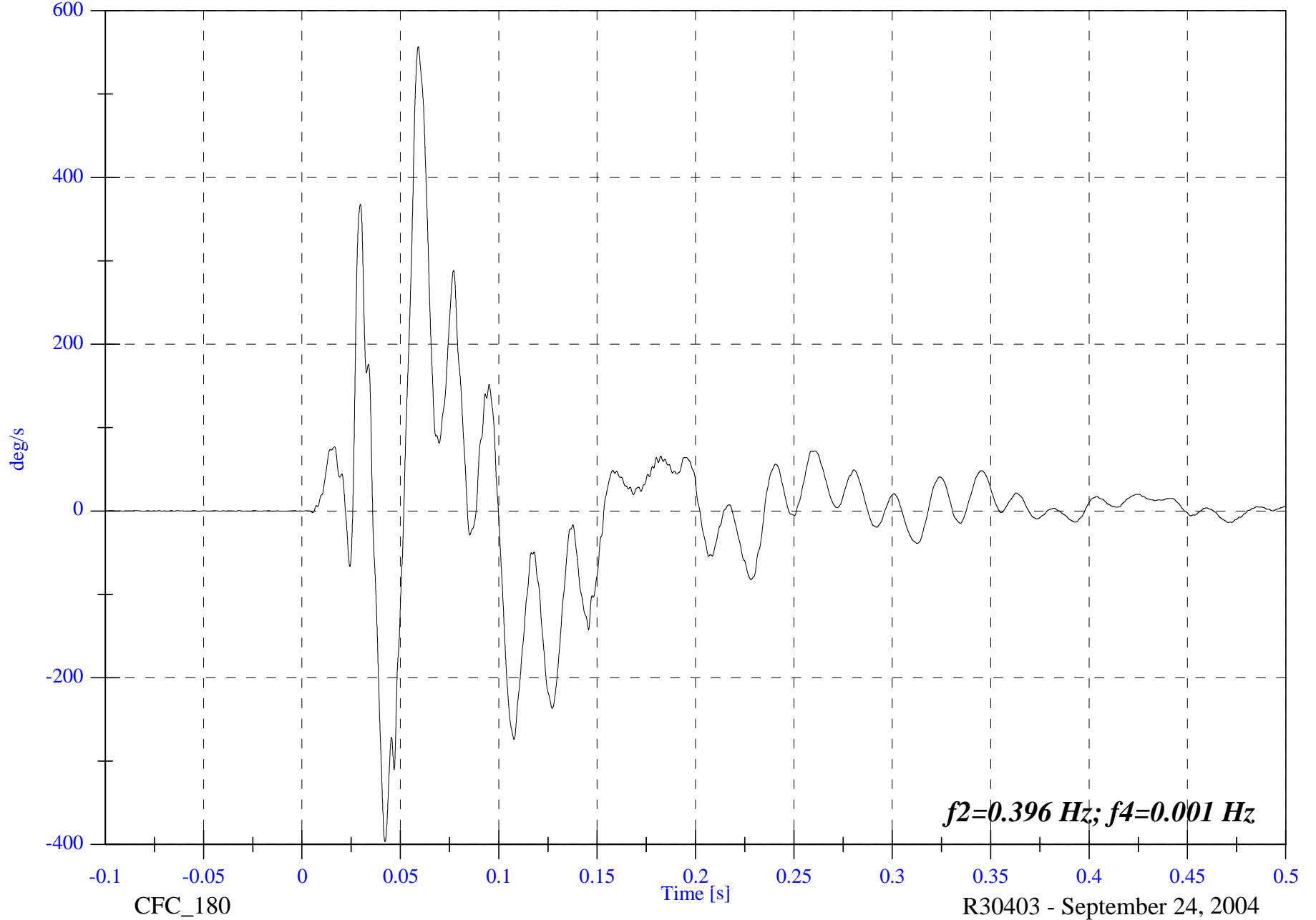
V2P3 Right Seat Comp AVy

Max: 556.9 [deg/s] at 0.059 [s]

Min: -396.7 [deg/s] at 0.042 [s]

B-121

8757-V301-01



$f_2=0.396$  Hz;  $f_4=0.001$  Hz

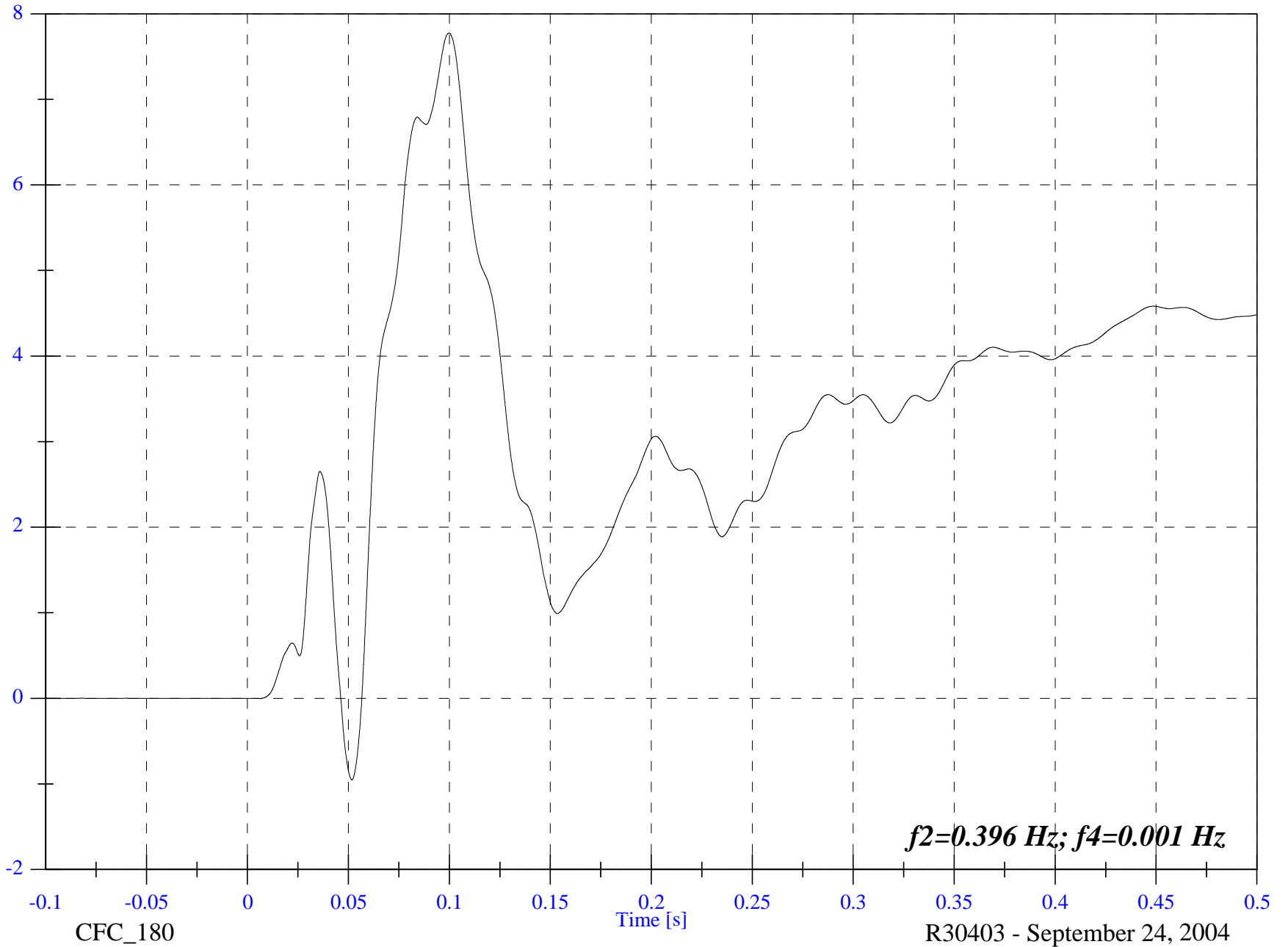
R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

V2P3 Right Seat Comp ADy

Max: 7.8 [deg] at 0.100 [s]

Min: -1.0 [deg] at 0.052 [s]



B-122

8757-V301-01

*f2=0.396 Hz; f4=0.001 Hz*

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

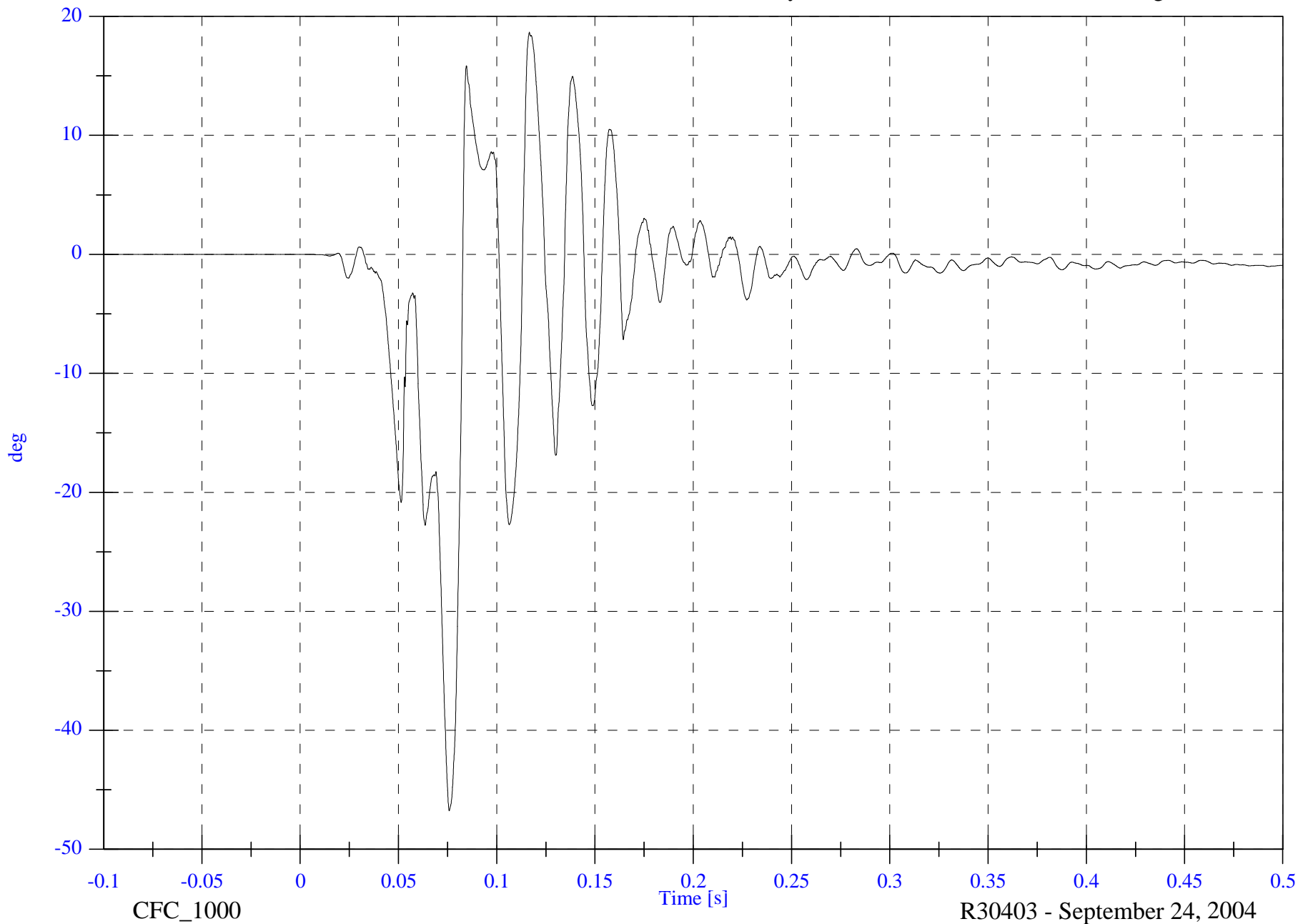
V2P3 Left Link ADy

Max: 18.7 [deg] at 0.117 [s]

Min: -46.8 [deg] at 0.076 [s]

B-123

8757-V301-01



CFC\_1000

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

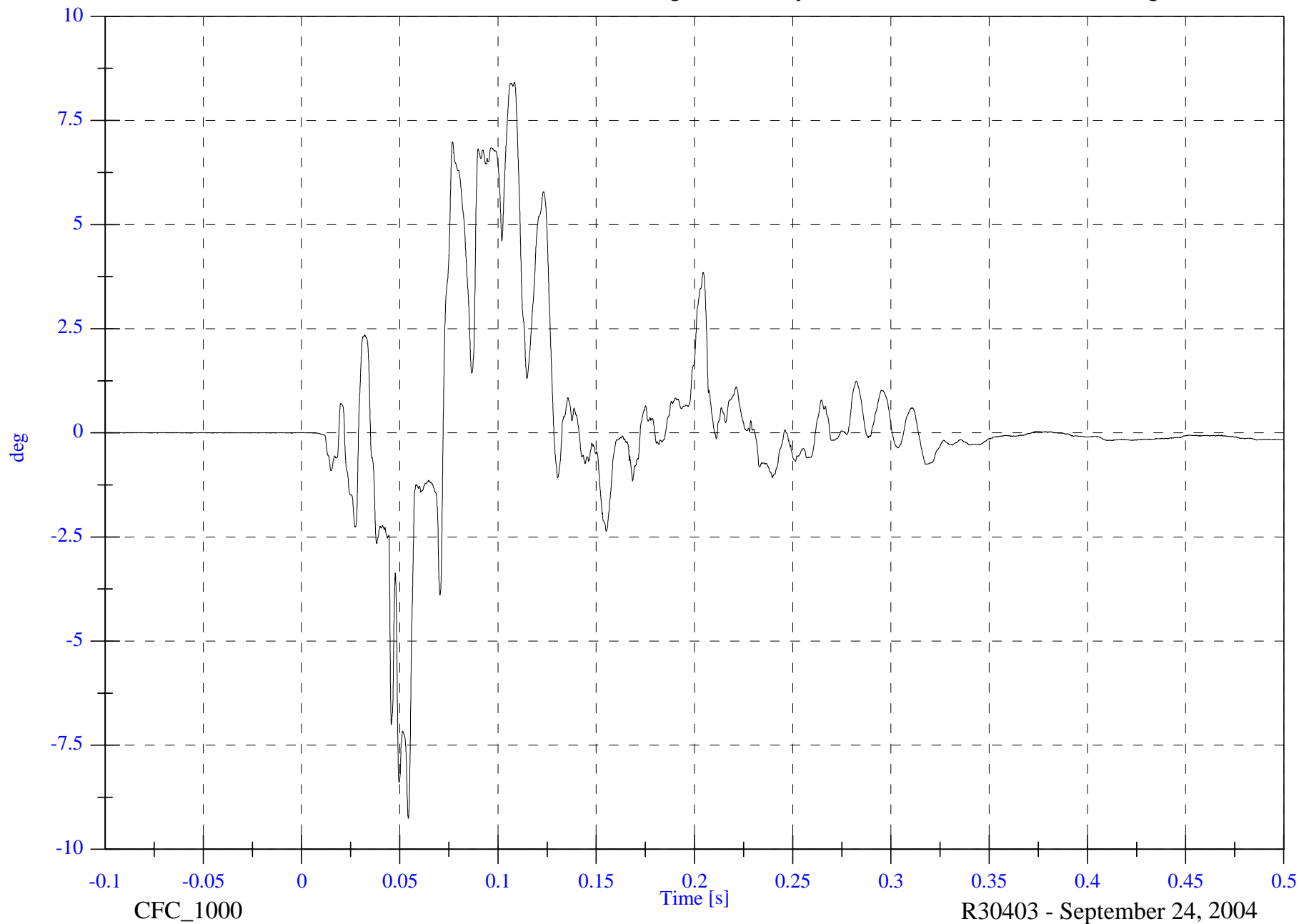
V2P3 Right Link ADy

Max: 8.4 [deg] at 0.108 [s]

Min: -9.3 [deg] at 0.054 [s]

B-124

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

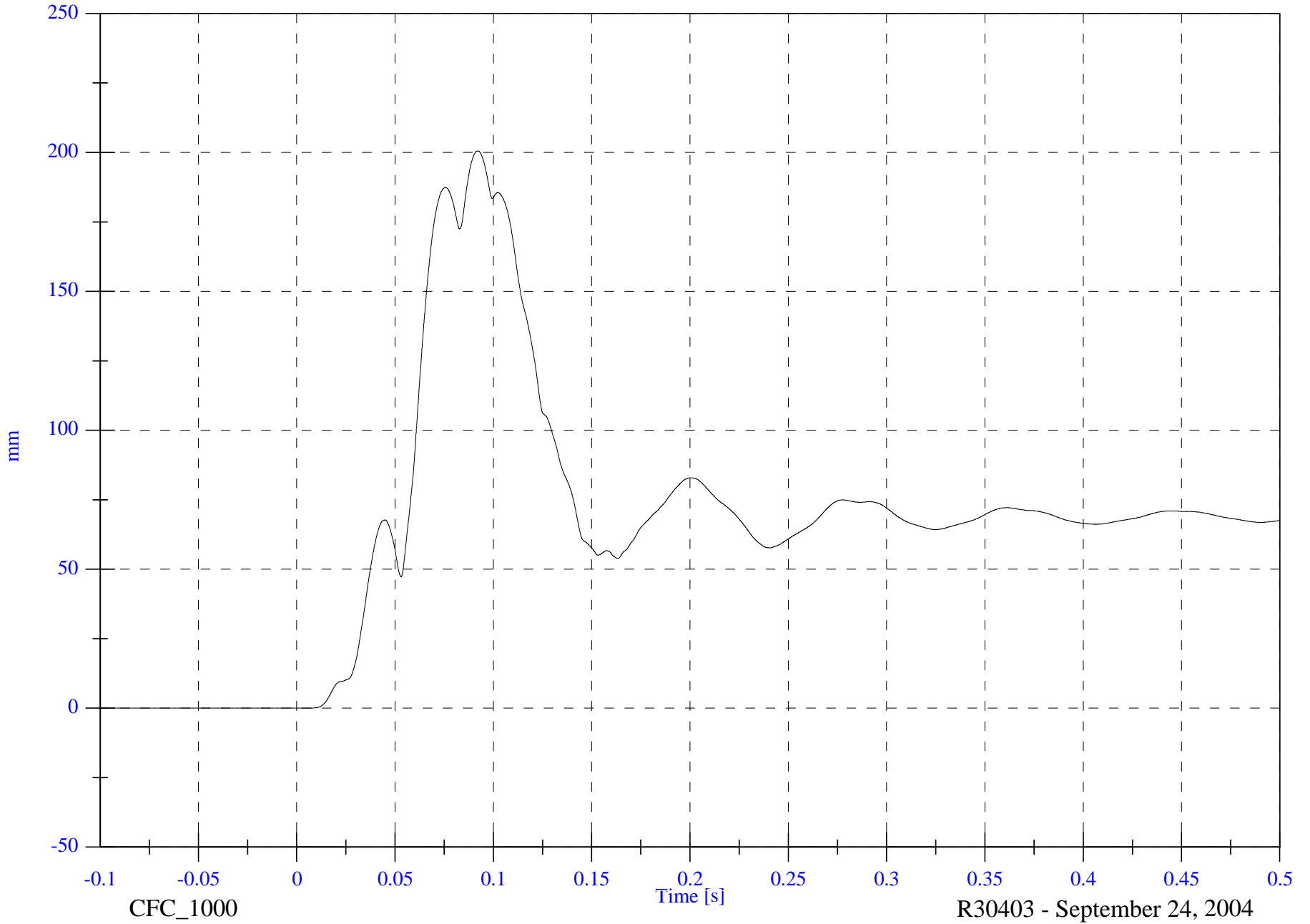
V2P3 Left Span Bar D

Max: 200.6 [mm] at 0.092 [s]

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

B-125

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

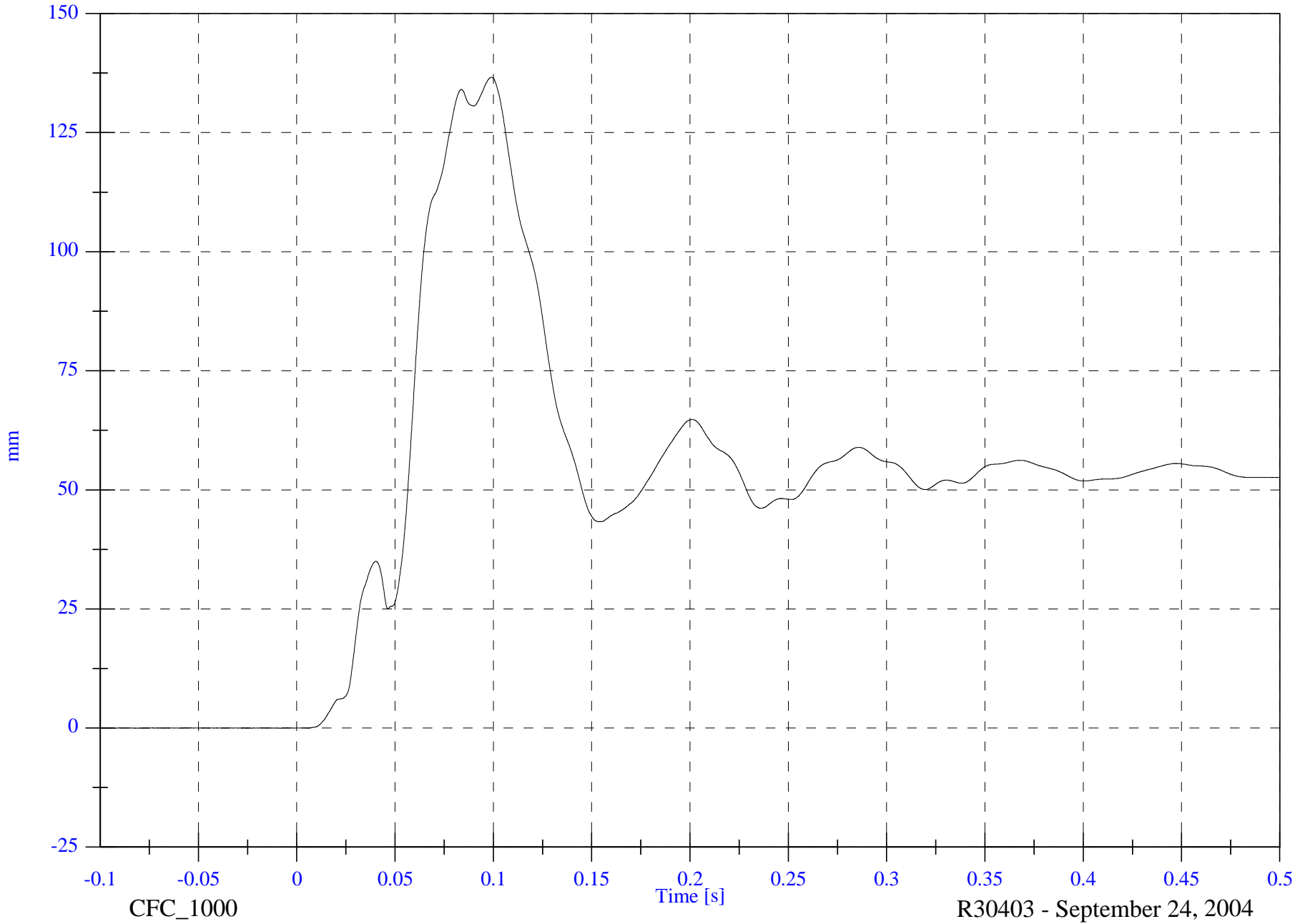
V2P3 Right Span Bar D

Max: 136.6 [mm] at 0.099 [s]

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

B-126

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

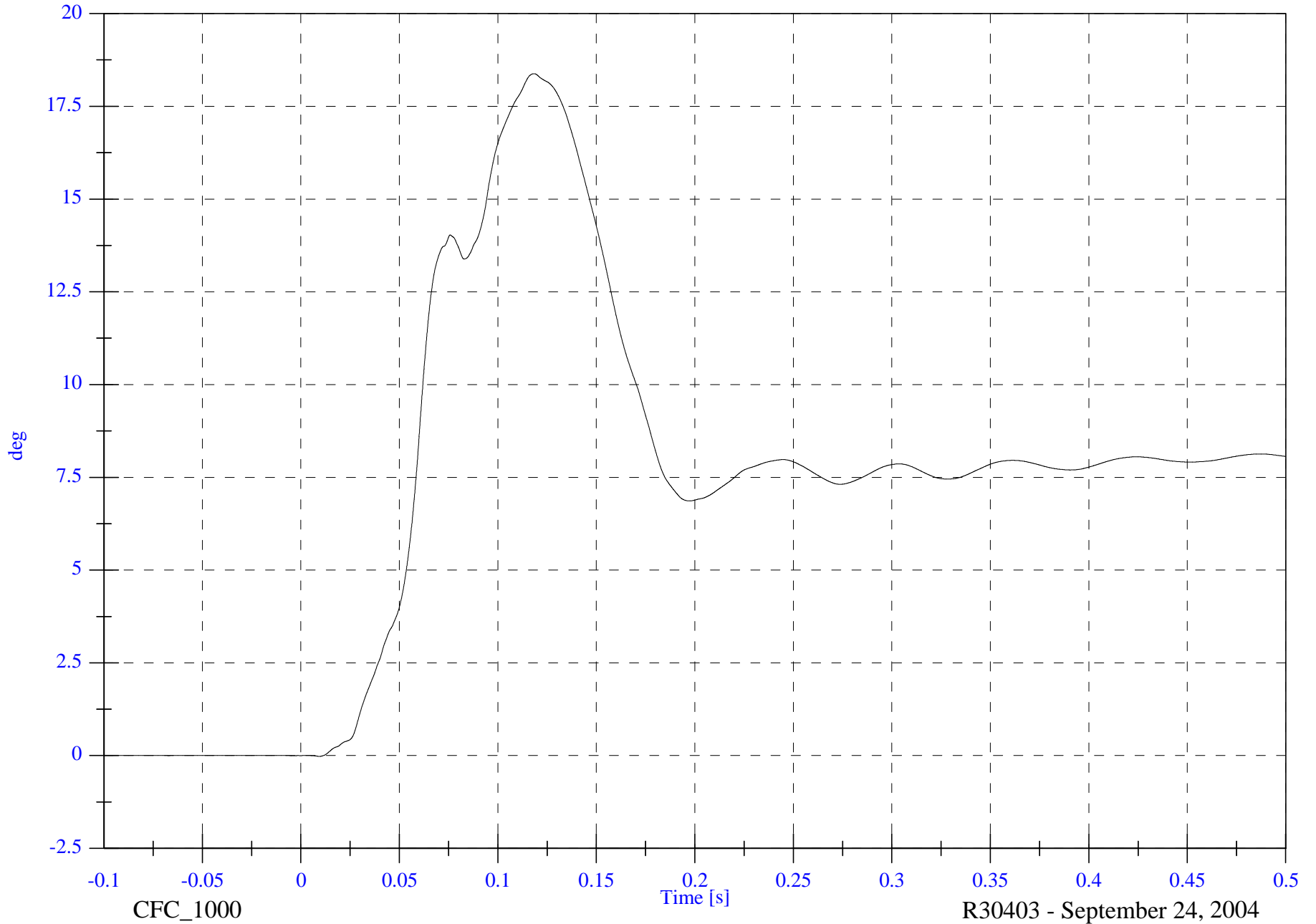
P1 Left Change in Seat Back Angle WRT Sill

Max: 18.4 [deg] at 0.118 [s]

Min: -0.0 [deg] at 0.009 [s]

B-127

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

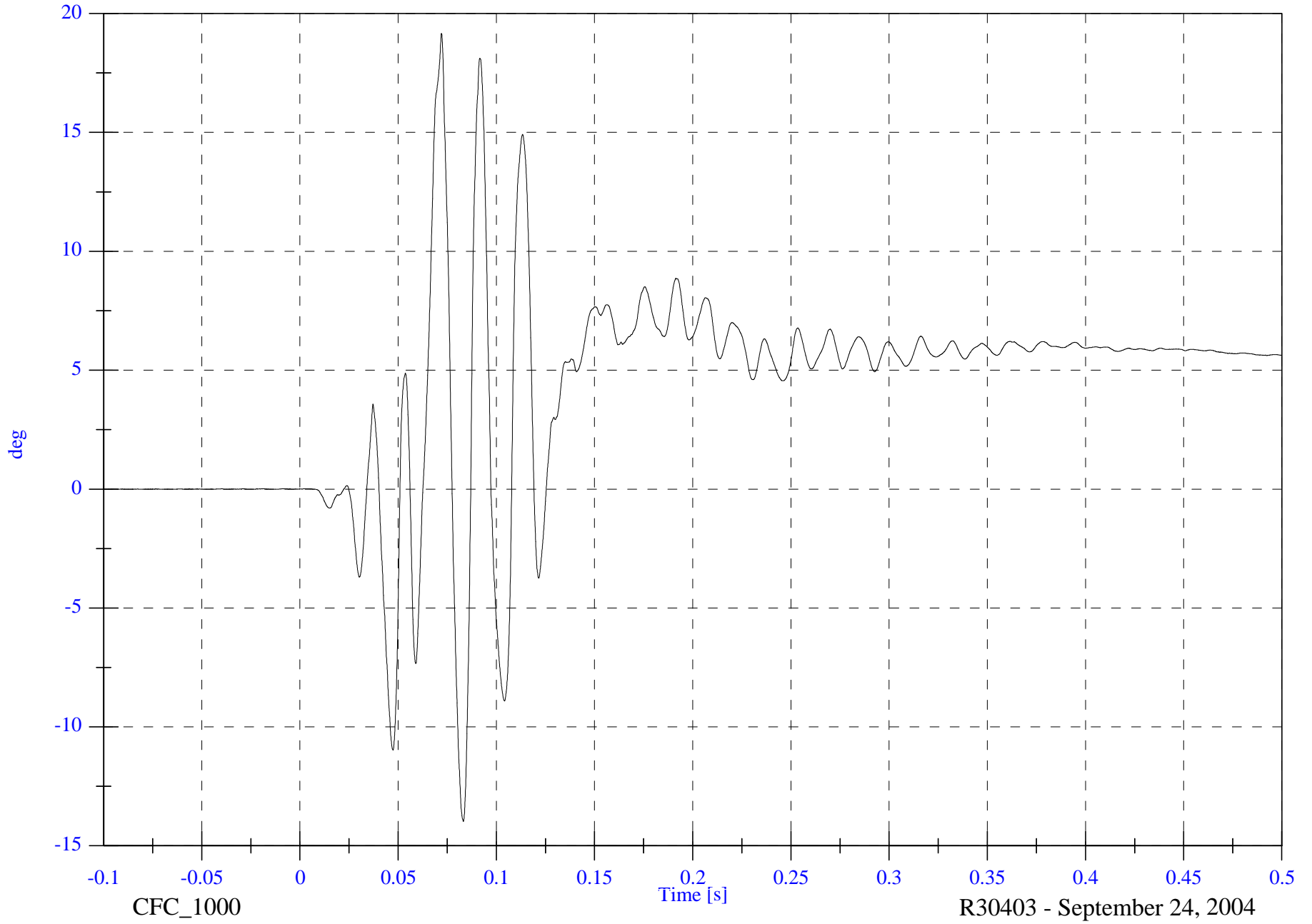
P1 Left Change in String Angle

Max: 19.2 [deg] at 0.072 [s]

Min: -14.0 [deg] at 0.083 [s]

B-128

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

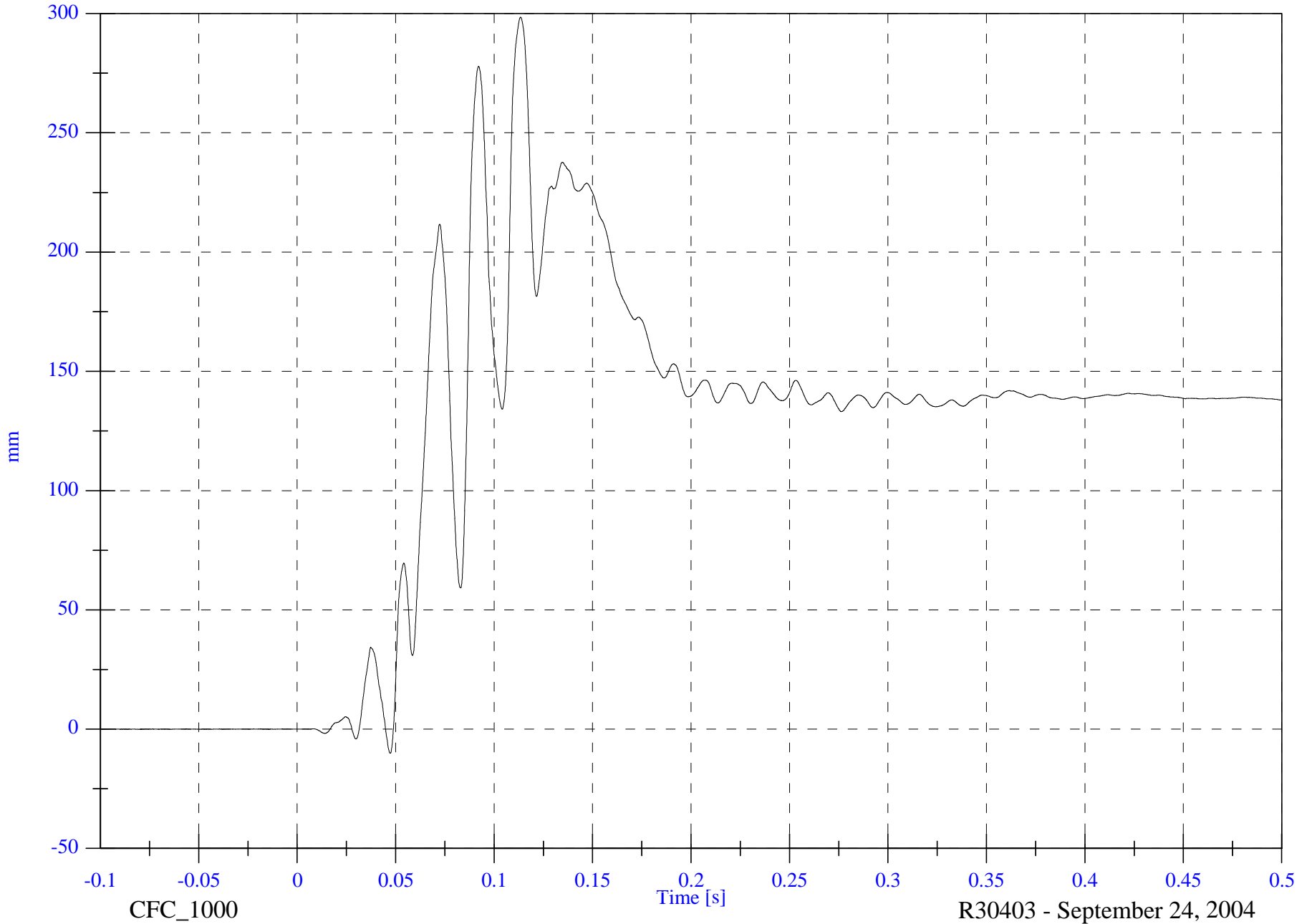
Max: 298.5 [mm] at 0.113 [s]

P1 Left Seat X Displacement

Min: -10.1 [mm] at 0.047 [s]

B-129

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

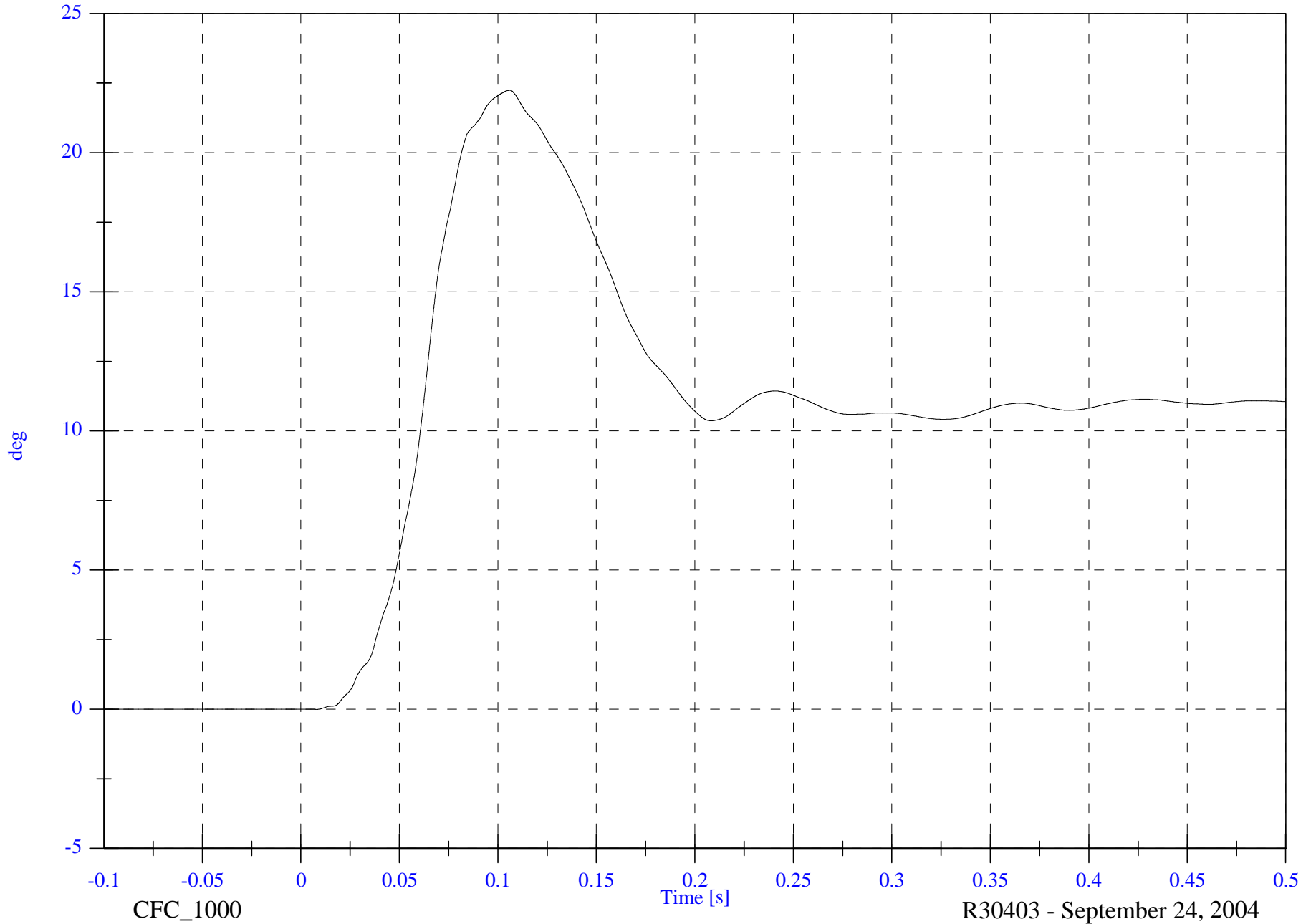
P1 Right Change in Seat Back Angle WRT Sill

Max: 22.2 [deg] at 0.106 [s]

Min: -0.0 [deg] at 0.008 [s]

B-130

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

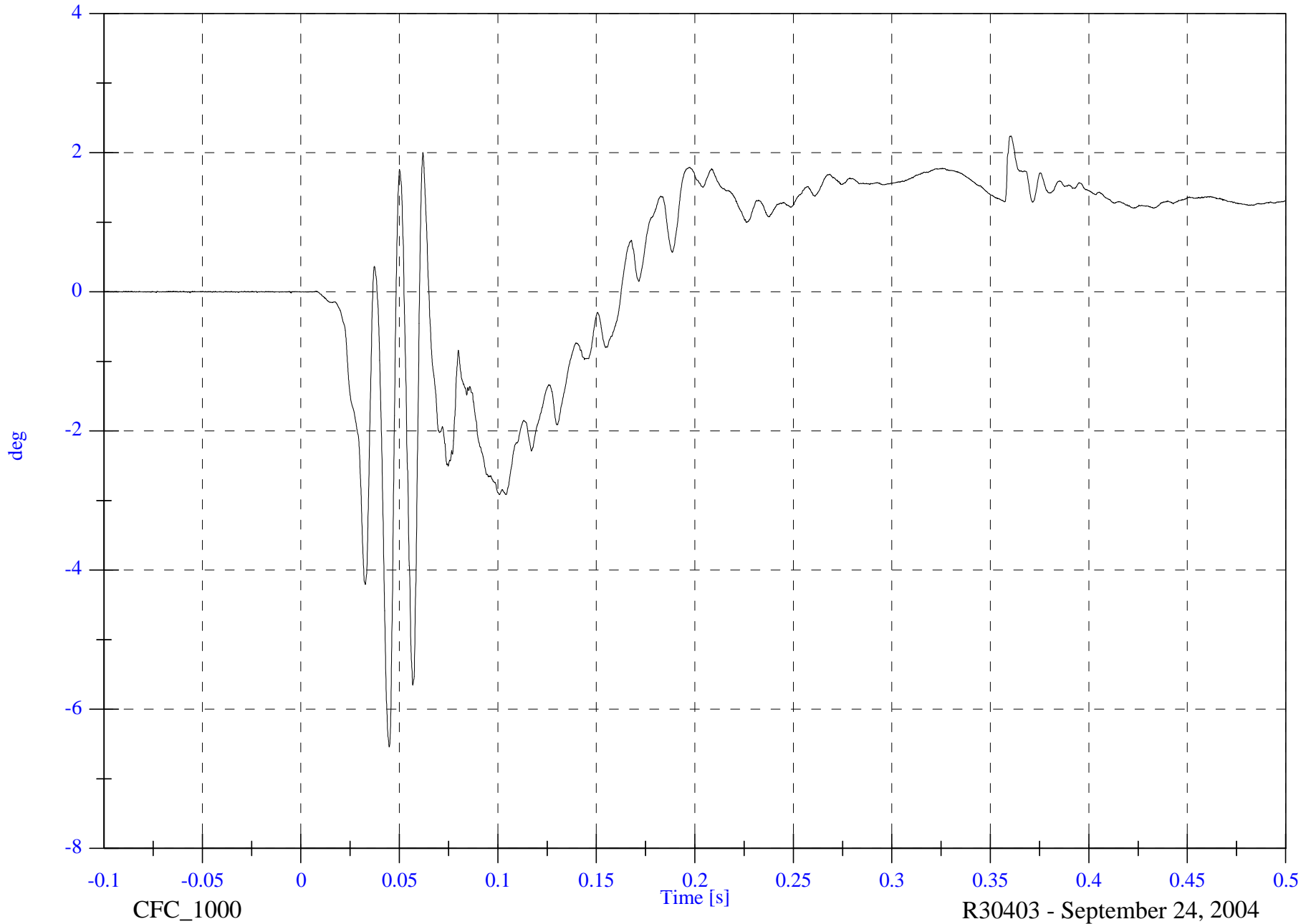
P1 Right Change in String Angle

Max: 2.2 [deg] at 0.360 [s]

Min: -6.5 [deg] at 0.045 [s]

B-131

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

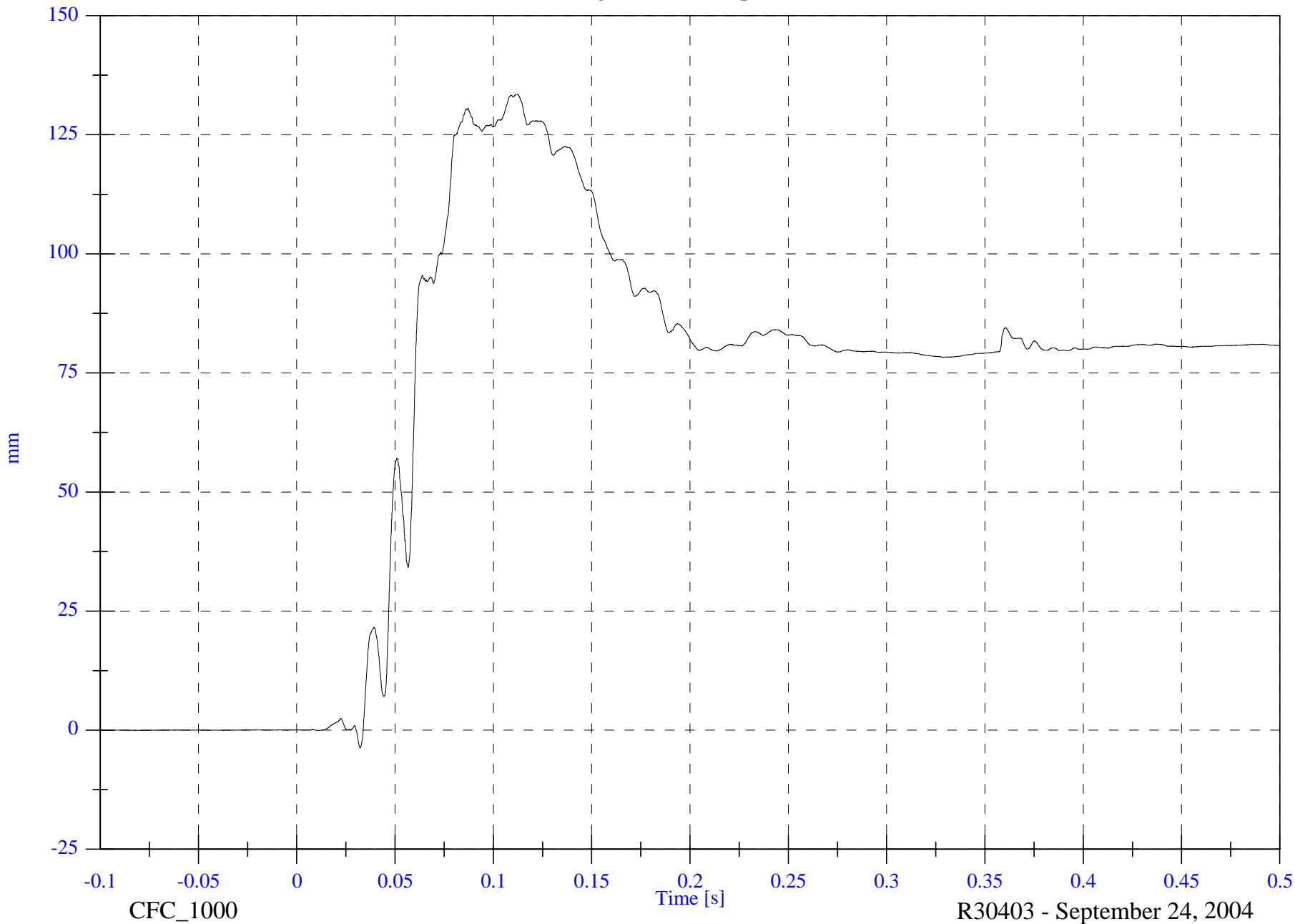
P1 Right Seat X Displacement

Max: 133.5 [mm] at 0.112 [s]

Min: -3.8 [mm] at 0.032 [s]

B-132

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

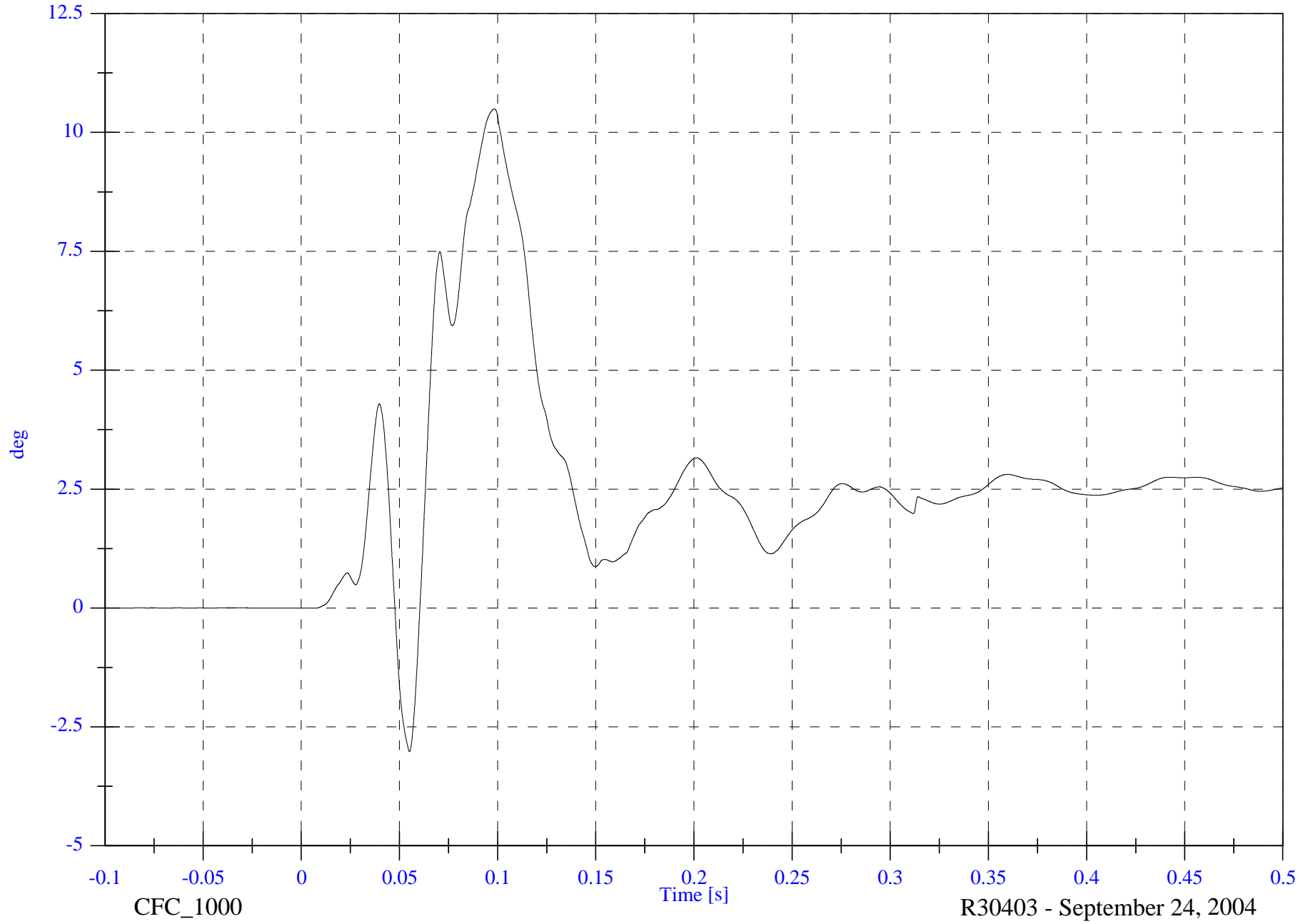
P3 Left Change in Seat Back Angle WRT Sill

Max: 10.5 [deg] at 0.098 [s]

Min: -3.0 [deg] at 0.055 [s]

B-133

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

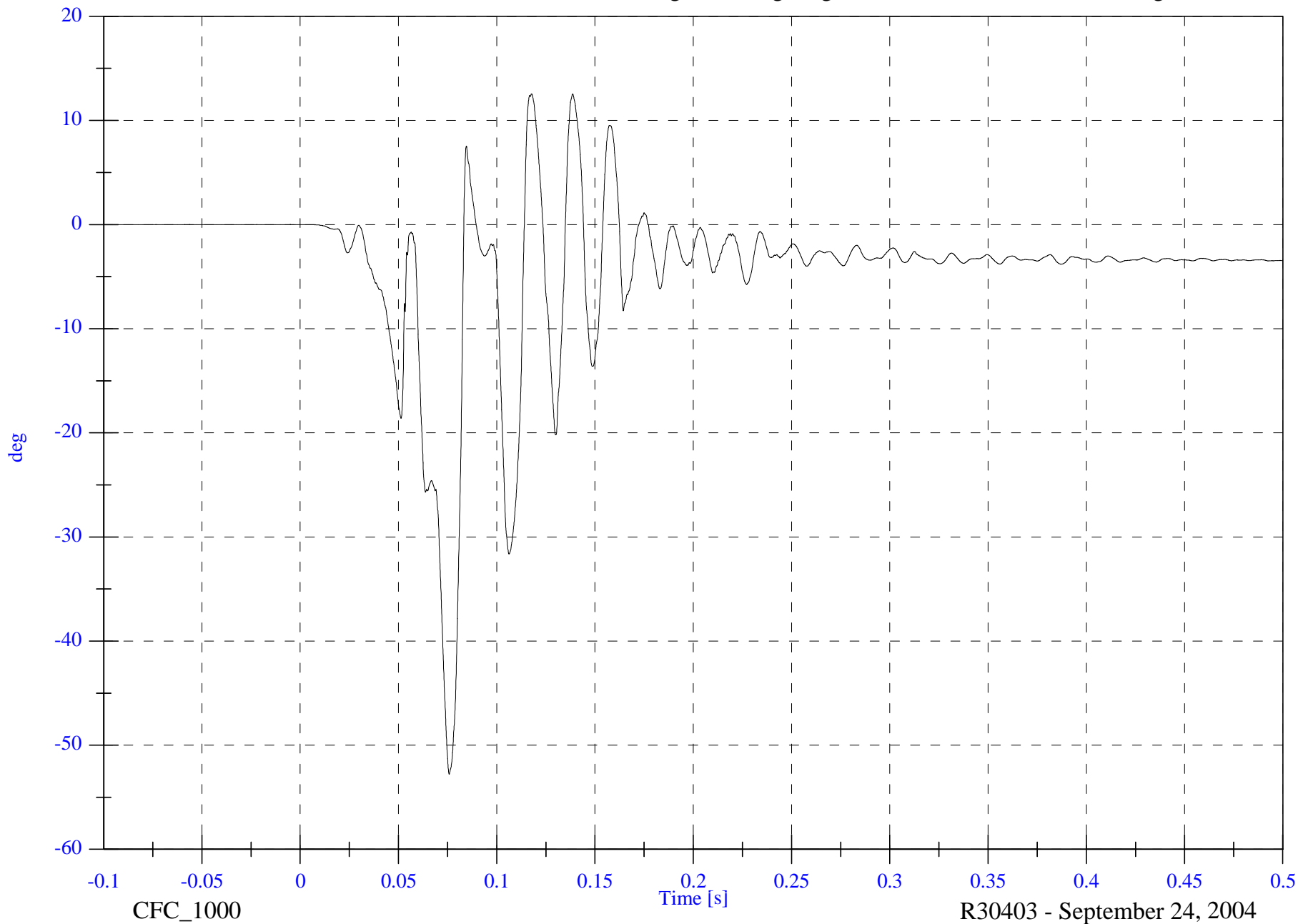
P3 Left Change in String Angle

Max: 12.6 [deg] at 0.118 [s]

Min: -52.8 [deg] at 0.076 [s]

B-134

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

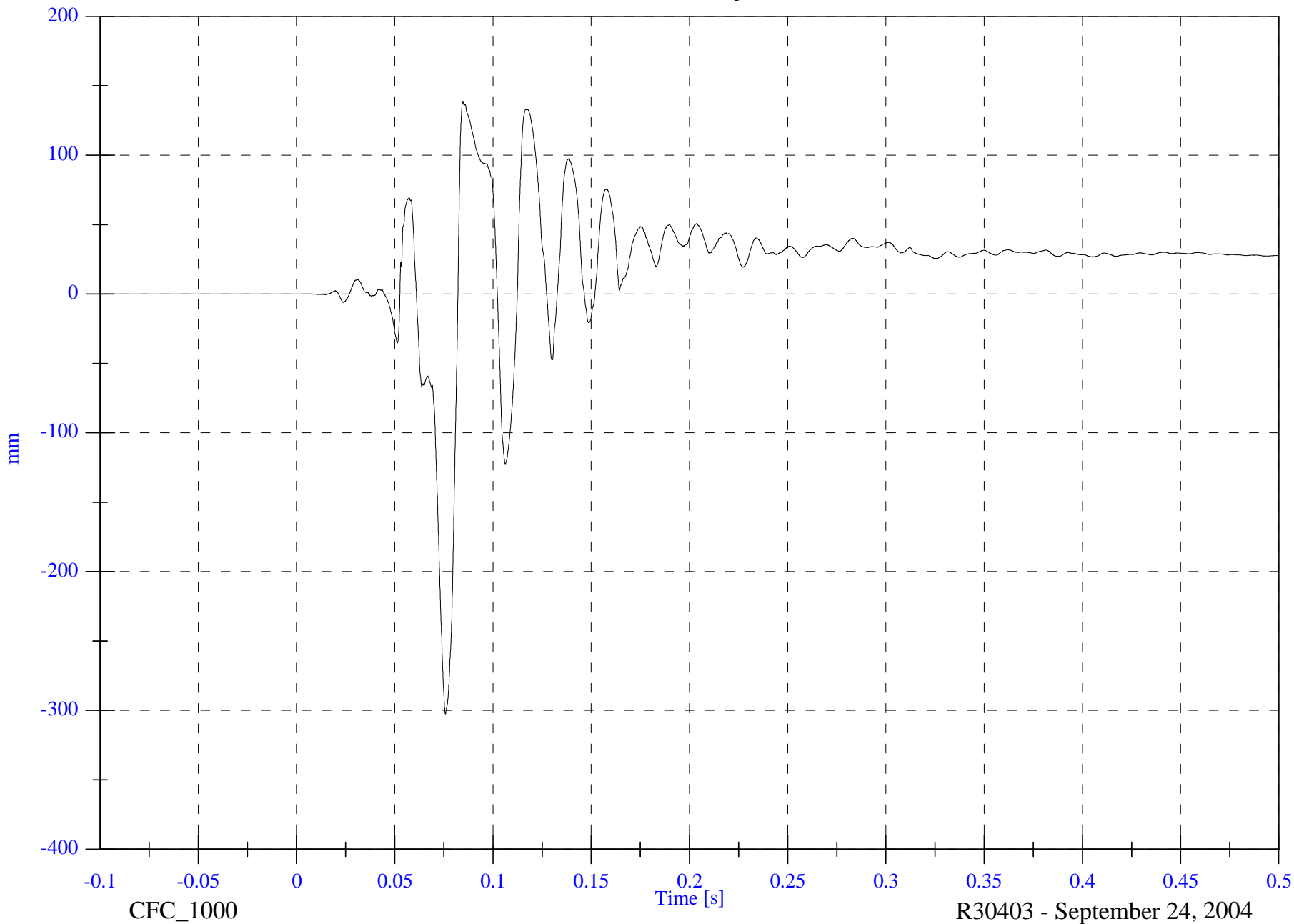
Max: 138.4 [mm] at 0.085 [s]

P3 Left Seat X Displacement

Min: -302.6 [mm] at 0.076 [s]

B-135

8757-V301-01



R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

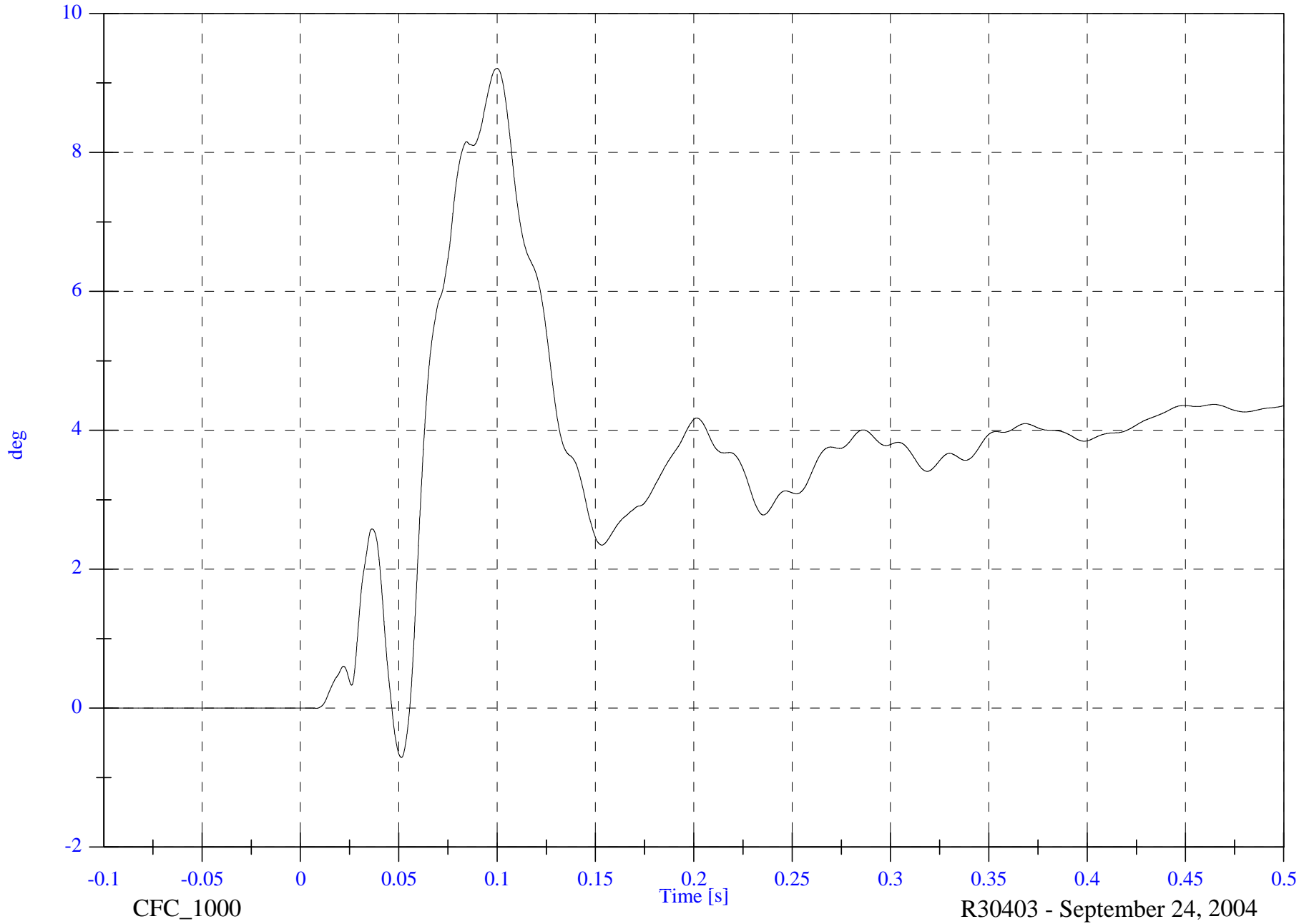
P3 Right Change in Seat Back Angle WRT Sill

Max: 9.2 [deg] at 0.100 [s]

Min: -0.7 [deg] at 0.051 [s]

B-136

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

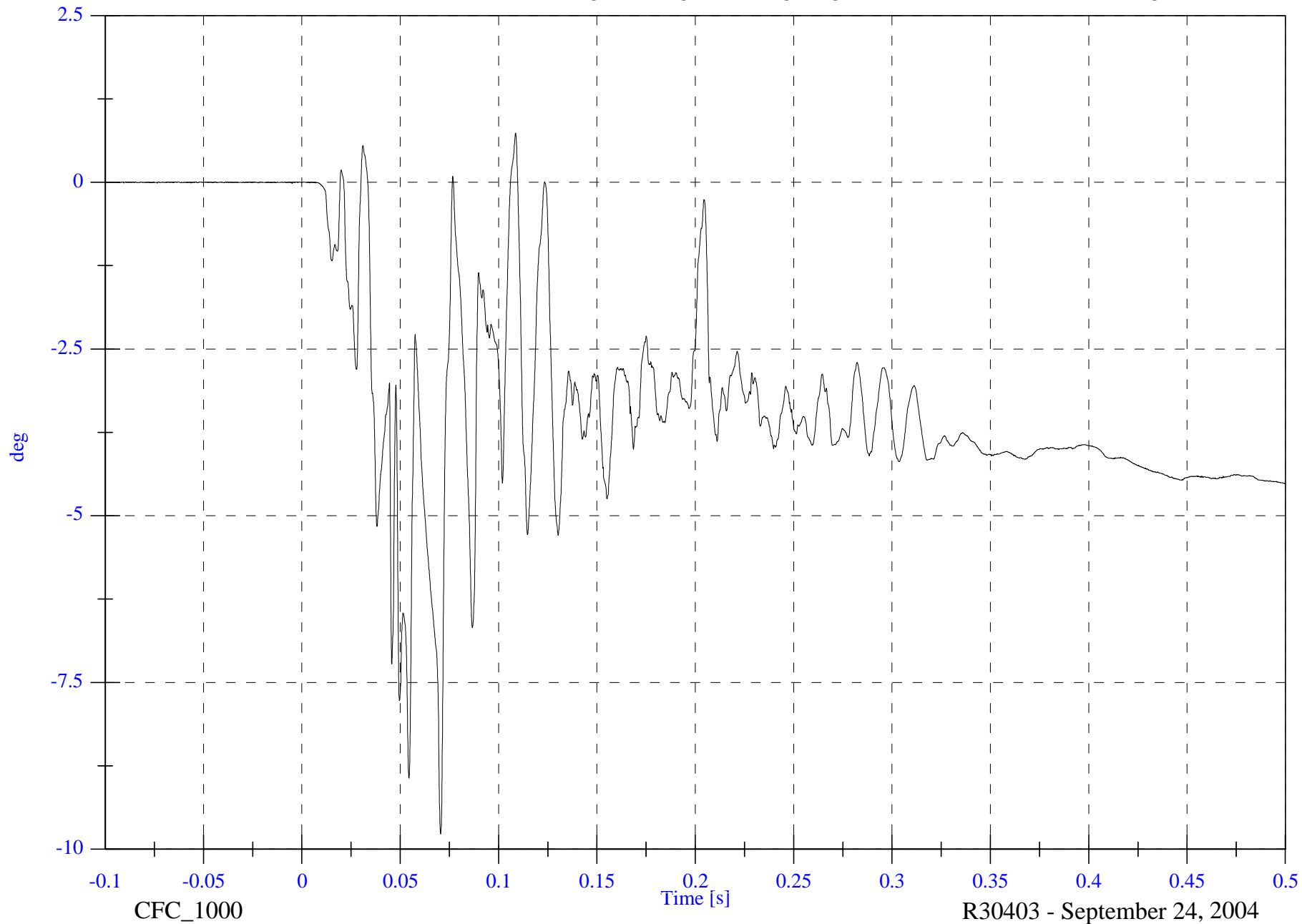
P3 Right Change in String Angle

Max: 0.7 [deg] at 0.109 [s]

Min: -9.8 [deg] at 0.070 [s]

B-137

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004

VOLPE 301 Test 1 - 2003 Jeep Liberty

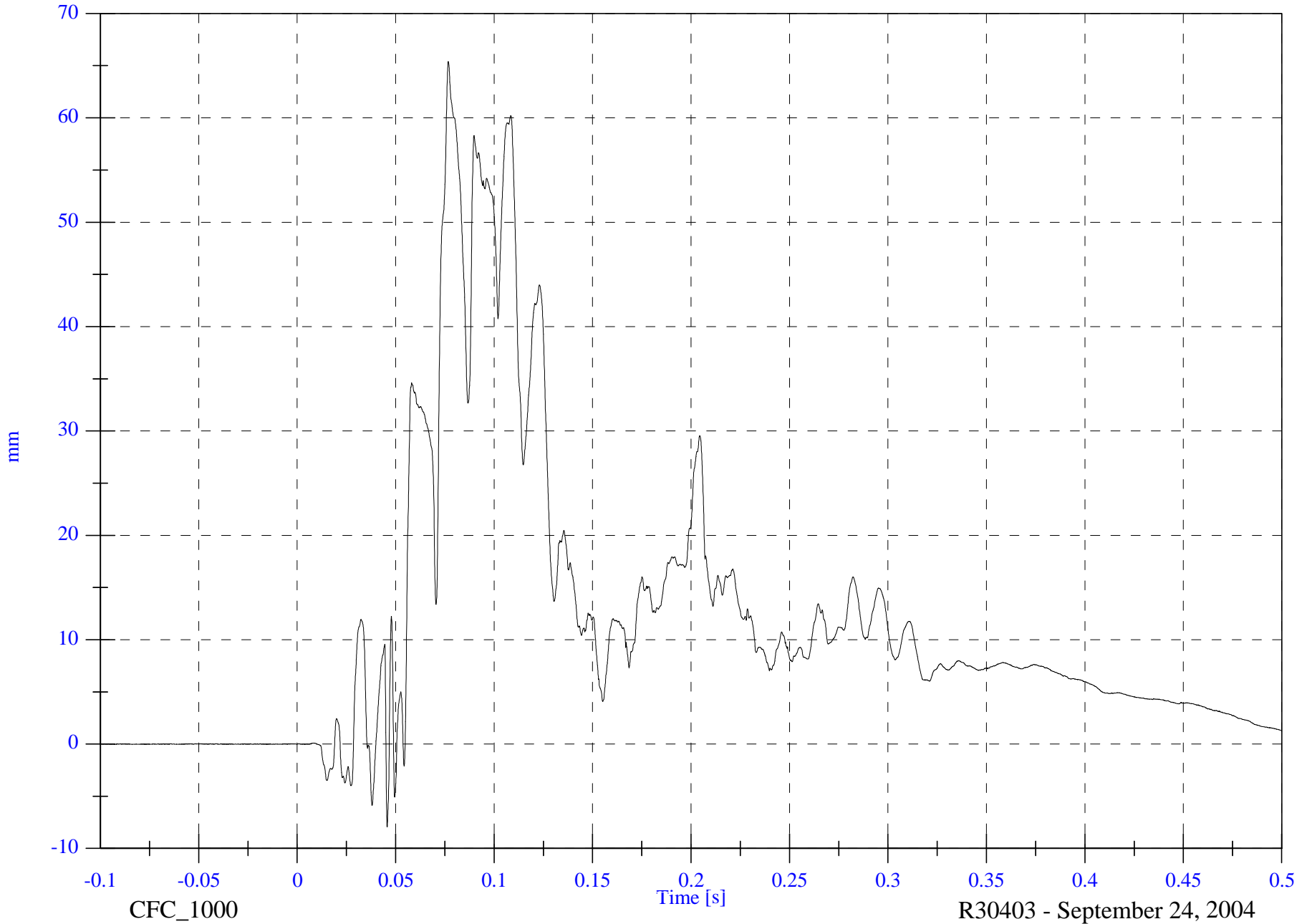
P3 Right Seat X Displacement

Max: 65.4 [mm] at 0.077 [s]

Min: -8.0 [mm] at 0.046 [s]

B-138

8757-V301-01



CFC\_1000

Time [s]

R30403 - September 24, 2004