REPORT NUMBER: 301-CAL-04-01

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

GENERAL MOTORS OF CANADA LTD.
2004 PONTIAC GRAND PRIX
FOUR-DOOR SEDAN

NHTSA NUMBER: C40101

GDAIS TEST NUMBER: 8655-F301-18R

June 14, 2004

GENERAL DYNAMICS
ADVANCED INFORMATION ENGINEERING SERVICES
P.O. BOX 400
BUFFALO, NEW YORK 14225

FINAL REPORT

PREPARED FOR:

U. S. Department of Transportation
National Highway Traffic Safety Administration
Office of Vehicle Safety Research
Crashworthiness Research Division
400 Seventh Street, S. W.
Room No. 6226
Washington, DC 20590

Prepared By: _____
Patrick G. MacDiarmid, Jr., Project Engineer

Approved By: _____
David J. Travale, Program Manager
Transportation Sciences Center

Approval Date: _____

FINAL REPORT ACCEPTANCE BY OCS:

Accepted By: _____

Acceptance Date: _____

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
301-CAL-04-01		

4. Title and Subtitle	5. Report Date
Final Report, 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, of a 2004 Pontiac Grand Prix Four-Door Sedan, NHTSA No. C40101	June 14, 2004
	6. Performing Organization Code: CAL
7. Author(s): Patrick G. MacDiarmid, Jr., Project Engineer; David J. Travale, Program Manager	8. Performing Organization Report No.: 8655-F301-18R
9. Performing Organization Name and Address: Advanced Information Engineering Services, 4455 Genesee Street, Buffalo, New York 14225	10. Work Unit No.
	11. Contract or Grant No.: DTNH22-01-C-01025
12. Sponsoring Agency Name and Address: U.S. Department of Transportation, National Highway Traffic Safety Administration, Office of Vehicle Safety Research, Crashworthiness Research Division, Mail Code: NVS-321, 400 Seventh St, S.W., Rm. 6226, Washington, D.C. 20590	13. Type of Report and Period Covered: Final Test Report, June 2004
	14. Sponsoring Agency Code: NVS-321

15. Supplementary Notes

16. Abstract

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:

- 2 fully instrumented Hybrid III ATDs were positioned in the vehicle seats (P1 and P3) in place of ballast ATDs.
- 2 door mounted high speed cameras were installed.
- 2 seatback frame and 1 front sill MHDs were installed.
- 4 vehicle accelerometers were installed.
- VRTC seatback translation was installed.

The ATDs were positioned following TP208-12 with the following exceptions:

- Seatbacks for positions that contained a 50th percentile male were set to 25 degrees ± 1 degree as measured with the SAE J826 manikin.

17. Key Words	18. Distribution Statement
Seatback Rotation and Displacement Test FMVSS 301R Rear Impact Test	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

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	169	

TABLE OF CONTENTS

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 2004 Pontiac Grand Prix Four-Door Sedan. 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 1795.0 kg 2004 Pontiac Grand Prix Four-Door Sedan was impacted from the rear by a 1797 kg moving barrier at a velocity of 46.51 kph (28.9 mph). The test was performed by Advanced Information Engineering Services on June 14, 2004.

The test vehicle prepared for the Federal Motor Vehicle Safety Standard (FMVSS) 301R Compliance Test Program was 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 Office of Vehicle Safety Research, the test was modified as follows:

- An instrumented 50th percentile male Part 572E 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 rear passenger seat (P3) in place of a ballast ATD.
- The right front passenger seat was removed.
- One high speed camera was installed on the vehicle right front door.
- One high speed camera was installed on the vehicle left rear door.
- 2 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 eleven 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.

	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)
P1	25.5	27.2	115.2	0.12	0.25	0.09	0.00	15.6	-50.6	12.4	-1.0	§	-740.6
P3	-	-	101.0	0.19	0.26	0.09	0.03	16.1	-33.8	25.5‡	-4.7	-1049.9	-1118.5

§ - Data is Questionable
‡ - Chest Y data was not accurate – calculated using Chest X and Z only.

The P1 seatback frame was deformed rearward and the adjustment mechanism remained operable. The seat back reclined statically 10 degrees from its pre-test position on the left side portion of the seat back frame and 13 degrees from its pre-test position on the right side portion of the frame. The P3 seatback frame was not adjustable and did not appear to deform during the event.

SECTION 3

TEST DATA

DATA SHEET 1

TEST VEHICLE SPECIFICATIONS

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 2004 Pontiac Grand Prix Four-Door Sedan

NHTSA No.: C40101 ; Color: White

Engine Data: 6 Cylinders; - CID; 3.8 Liters; - cc

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

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

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

Major Options: X A/C; X Power Steering; X Power Brakes

X Power Windows; X Power Door Locks; X Tilt Wheel

Date Received: 10/23/2004 ; Odometer Reading 60 km

Selling Dealer: #1 Cochran of Monroeville

& Address: 4200 William Penn Highway Monroeville, PA 15146

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: General Motors of Canada Ltd.

Date of Manufacture: 08/03

VIN: 2G2WS542X41171754

GVWR: 2014 kg; GAWR-FRONT: 1103 kg; GAWR-REAR: 911 kg

DATA FROM VEHICLE'S TIRE LABEL:

Location of Placard on Vehicle: Trunk Lid

Recommended Tire Size: P2225/60R16

* Recommended Cold Tire Pressure: FRONT: 210 kPa; REAR: 210 kPa

DATA FROM TIRE SIDEWALL:

Size of Tires on Test Vehicle: P2225/60R16 97S Manufacturer: Goodyear

Tire Pressure with Maximum Capacity Vehicle Load: FRONT: 300 kPa; REAR: 300 kPa

Type of Spare Tire: Temporary

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) = 416 kg

No. of Occupants x 68.04 kg = 340.2 kg

Rated Cargo/Luggage Weight (RCLW) = 75.8 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 =	498.5	kg	Right Rear =	299.0	kg
Left Front =	496.0	kg.	Left Rear =	284.5	kg
TOTAL FRONT =	994.5	kg	TOTAL REAR =	583.5	kg

TOTAL DELIVERED WEIGHT = 1578 kg

% of Total Front of Vehicle Weight = 63.0% of Total Rear Weight = 37.0%

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight	=	1578 kg
Rated Cargo/Luggage Weight (RCLW)	=	75.8 kg
Weight of 2 p.572 Dummies, 74.4 kg	=	148.8 kg
TARGET TEST WEIGHT	=	1802.6 kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 68.2 KG OF CARGO WEIGHT:

Right Front =	547.0	kg	Right Rear =	341.0	kg
Left Front =	562.0	kg	Left Rear =	345.0	kg
TOTAL FRONT =	1109	kg	TOTAL REAR =	686	kg

TOTAL TEST WEIGHT = 1795 kg

% of Total Front of Vehicle Weight = 61.8% of Total Rear Weight = 38.2%

* Weight of Ballast Secured in Vehicle Cargo Area = 12.0 kg

Type of Ballast: Lead Shot

Method of Securing Ballast: Secured to Floor

Vehicle Components Removed for Weight Reduction: Right Front Passenger Seat

VEHICLE ATTITUDE (all dimension in millimeters):

AS DELIVERED:	RF	733	LF	736	RR	750	LR 751
AS TESTED:	RF	718	LF	712	RR	730	LR 725

Vehicle's Wheel Base: 2814 mm

Location of Vehicle's C.G.: 1075 millimeters rearward of front wheel center.

DATA SHEET 2 (continued)

VEHICLE DATA

TYPE OF TEST:

Type of Test: Rear Barrier Impact Angle: 0º

Test Date: June 14, 2004 Time: 13:46 Temperature: 21 ºC

Vehicle NHTSA No.: C40101 VIN: 2G2WS542X41171754

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 =	4890	; C/L =	5045	Right =	4890
Post-Test	Left =	4620	; C/L =	4762	Right =	4630
Crush	Left =	270	; C/L =	283	Right =	260

AVERAGE = 271 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 BA RRIER TIRES:

Manufacturer: Dunlop

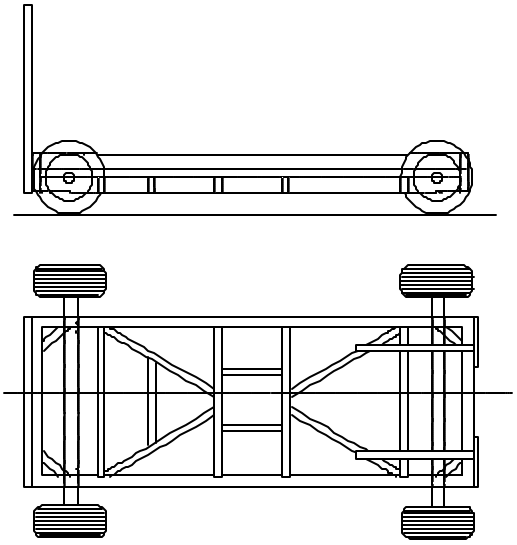
Model: AT Radial Rover

Size: P205/75R15

Recommended Max Pressure: 240 kPa:

MOVING BARRIER ABORT SYSTEM:

Type: Trailing cable



DATA SHEET 4

SEAT DATA

P1 DATA:

HEAD RESTRAINT	YES	NO	DETAILS
Fixed:	-	X	
Vertical Adjustment:	X	-	There was 50 mm of travel
Vertical Locks:	X	-	There are four locking positions
Fore-Aft Adjustment:	-	X	
Fore-Aft Locks:	-	X	

SEATBACK RECLINE TYPE	YES	NO	DETAILS
Fixed:	-	X	
Power:	-	X	
Lever (with detents):	X	-	There were defined detents in the recline mechanism
Lever (infinite)	-	X	
Lever (ratchet)	-	X	
Rotary Knob:	-	X	
Pivot locks on Both Sides:	X	-	

LUMBAR ADJUSTMENT	YES	NO	DETAILS
Fixed:	X	-	
Adjustable:	-	X	Placed in retracted position for ICBC measurements and test.

BOLSTER ADJUSTMENT	YES	NO	DETAILS
Fixed:	X	-	
Adjustable:	-	X	Placed in full open for ICBC measurements and test.

SEAT CUSHION TYPE	YES	NO	DETAILS
Cushion moves vertically independently of seat back:	-	X	

SEAT CUSHION FORE-AFT	YES	NO	DETAILS
Fixed:	-	X	
Power:	X	-	Travel: 190 mm
Manual-Detents:	-	X	First Detent: - Last Detent: - Travel: - mm
Manual-Infinite:	-	X	Travel: - mm

SEAT CUSHION VERTICAL	YES	NO	DETAILS
Fixed:	-	X	
Power:	X	-	40 mm of total travel
Manual-Detents	-	X	
Manual-Infinite	-	X	

SEAT TEST POSITION

Seat Cushion Fore-aft:	Mid-position (95 mm)
Seat Cushion Vertical:	Mid-height (20 mm) while maintaining mid-angle (19.05º)
Seat Back:	25 degree torso angle as set with the H-point machine
Head Restraint:	Full up / fixed

DATA SHEET 4 (continued)

SEAT DATA

P3 DATA:

HEAD RESTRAINT	YES	NO	DETAILS
Fixed:	X	-	
Vertical Adjustment:	-	X	
Vertical Locks:	-	X	
Fore-Aft Adjustment:	-	X	
Fore-Aft Locks:	-	X	

SEATBACK RECLINE TYPE	YES	NO	DETAILS
Fixed:	X	-	
Power:	-	X	
Lever (with detents):	-	X	
Lever (infinite)	-	X	
Lever (ratchet)	-	X	
Rotary Knob:	-	X	
Pivot locks on Both Sides:	-	X	

LUMBAR ADJUSTMENT	YES	NO	DETAILS
Fixed:	X	-	
Adjustable:	-	X	Placed in retracted position for ICBC measurements and test.

BOLSTER ADJUSTMENT	YES	NO	DETAILS
Fixed:	X	-	
Adjustable:	-	X	Placed in full open for ICBC measurements and test.

SEAT CUSHION TYPE	YES	NO	DETAILS
Cushion moves vertically independently of seat back:	-	X	

SEAT CUSHION FORE-AFT	YES	NO	DETAILS
Fixed:	X	-	
Power:	-	X	Travel: - mm
Manual-Detents:	-	X	First Detent: - Last Detent: - Travel: - mm
Manual-Infinite:	-	X	Travel: - mm

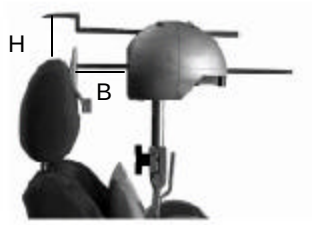
SEAT CUSHION VERTICAL	YES	NO	DETAILS
Fixed:	X	-	
Power:	-	X	
Manual-Detents	-	X	
Manual-Infinite	-	X	

SEAT TEST POSITION

Seat Cushion Fore-aft:	Not Adjustable
Seat Cushion Vertical:	Not Adjustable
Seat Back:	Not Adjustable
Head Restraint:	Not Adjustable

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)
Full Up / Fixed:	107	47	25	830
Full Down / Fixed:	102	97	25	775

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:	107	47	25	830

Head restraint positioning details: Full-Up

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)
Fixed / Fixed:	90	110	27.7	752

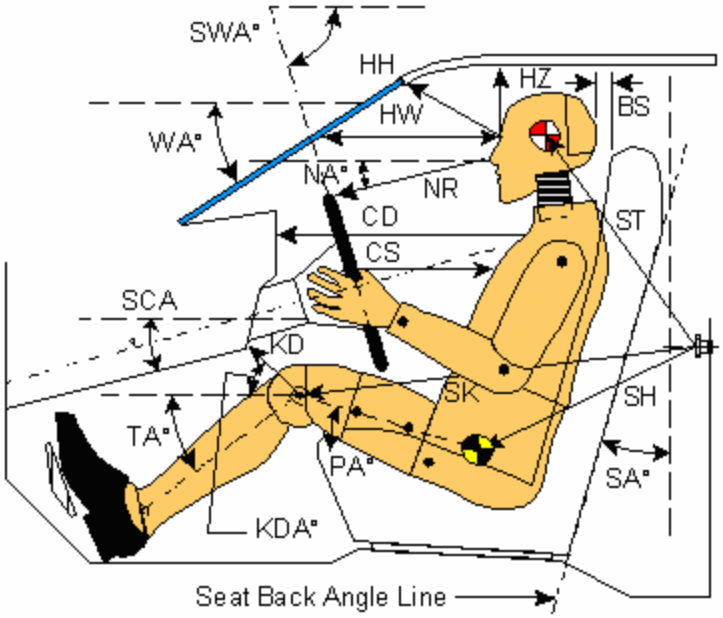
HEAD RESTRAINT POSITION – CONFIGURED FOR TEST *(vertical/fore-aft)*	B (mm, backset)	H (mm, height)	Torso Angle (deg)	Height Along Torso Line From Pivot (mm)
Fixed / Fixed:	90	110	27.7	752

Head restraint positioning details: Fixed

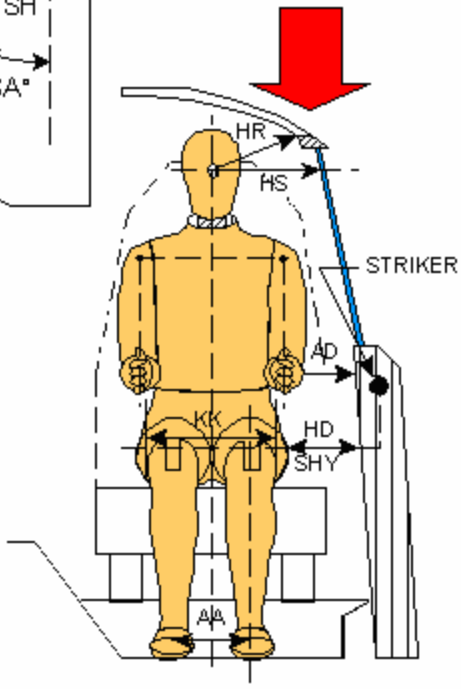
DATA SHEET 6

DUMMY MEASUREMENTS

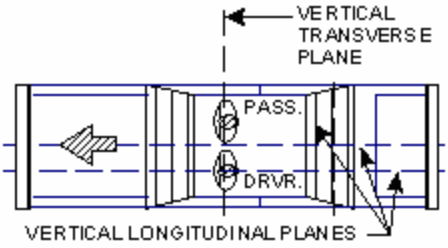
DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS



AD - Arm to Door
HD - H-Point to Door
HR - Head to Side Header
HS - Head to Side Window
KK - Knee to Knee
AA - Ankle to Ankle
SHY- Striker to H-Point (Y Direction)



CD - Chest to Dash
CS - Steering Wheel to Chest
HH - Head to Header
HW - Head to Windshield
HZ - Head to Roof
KDA - Knee to Dash Angle
KDL- Left Knee to Dash
KDR - Right Knee to Dash
NA - Nose to Rim Angle
NR - Nose to Rim
PA - Pelvic Angle
RA - Rim to Abdomen
SA - Seat Back Angle
SCA - Steering Column Angle
SH - Striker to H-Point
SK - Striker to Knee
ST - Striker to Head
SWA- Steering Wheel Angle
TA - Tibial Angle
WA - Windshield Angle
BS - Backset



DATA SHEET 6 (continued)

DUMMY MEASUREMENTS

	DRIVER (Serial #202)			PASS. (Serial #206)		
WA^O	25 deg.			N/A		
SWA^O	67.4 deg.			N/A		
SCA^O	22.6 deg.			N/A		
SA^O	25 deg.			N/A deg.		
HZ	175			144		
HH	337			-		
HW	610			-		
HR	181			178		
NR	405	Angle	-10 deg.	N/A		
CD	533			1403		
CS	305			N/A		
RA	184			N/A		
KDL	164	Angle (KDA)	29 deg.	-		
KDR	157			-	Angle (KDA)	- deg.
PA^O	21.1 deg.			24.4 deg.		
TA^O	40.0 deg.			39.0 deg.		
KK	320			275		
AA	340			220		
ST	525	Angle	3 deg.	335	Angle	27 deg.
SK	574	Angle	95 deg.	750	Angle	104 deg.
SH	238	Angle	135 deg.	465	Angle	127 deg.
SHY	270			249		
HS	314			329		
HD	141			147		
AD	114			104		
BS	107			114		

Dimensions in millimeters

DATA SHEET 7

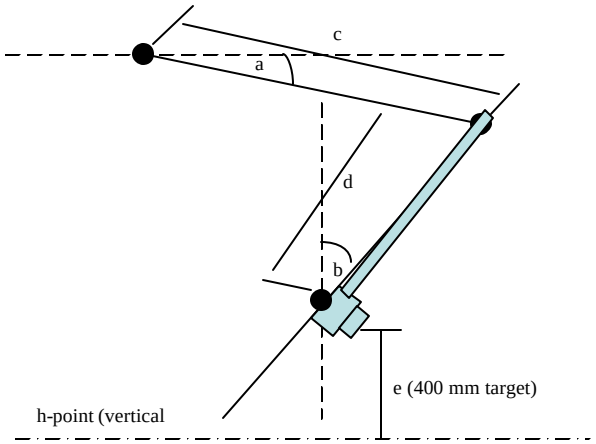
VEHICLE AND SEAT INSTRUMENTATION MEASUREMENTS

VEHICLE INSTRUMENTATION					
LOCATION	TRANSDUCER TYPE	DIRECTION OF MEASURE	PRE-TEST DIMENSIONS (mm) *		
			X	Y	Z
Left Rear Seat Cross Member	Accelerometer	X	1829	-600	334
Left Rear Seat Cross Member Redundant	Accelerometer	X	1829	-600	334
Right Rear Seat Cross Member Redundant	Accelerometer	X	1829	600	334
Right Rear Seat Cross Member	Accelerometer	X	1829	600	334
Left Front Sill	MHD ARS-06	About Y	2504	-690	530
Right Front Sill[1]	MHD ARS-06	About Y	-	-	-

* X: From rear bumper, positive forward; Y: From long. centerline, positive right; Z: From ground, positive down.
[1]Not Used

DATA SHEET 7

VEHICLE AND SEAT INSTRUMENTATION MEASUREMENTS



DIMENSION	P1 LEFT	P1 RIGHT	P3 LEFT	P3 RIGHT
a (deg from horiz.)	14	15	-	-
b (deg from vertical)	35	33	-	-
c (mm)	420	419	-	-
d (mm)	375	370	-	-
e (mm, target=400)	400	400	-	-

SEATBACK ANGLE	P1		P3	
	PRE (deg)	POST (deg)	PRE (deg)	POST (deg)
Left MDH Bracket	35	45	-	-
Right MHD Bracket	33	46	-	-
Front Sill	-0.4	-0.4	-	-

POST TEST DETAILS

Seatback Deformation: The P1 seatback reclined statically 10 degrees on the left post and 13 degrees on the right post. The recliner mechanism was operational after the event. The P3 seatback was fixed and did not appear to deform.

Seat/Floor Attachment Point Deformation: There was no apparent deformation at the seat attachment points

Recliner Mechanism Deformation: The P1 recliner mechanism remained operational with no visible deformation after the event. The P3 seatback was not adjustable.

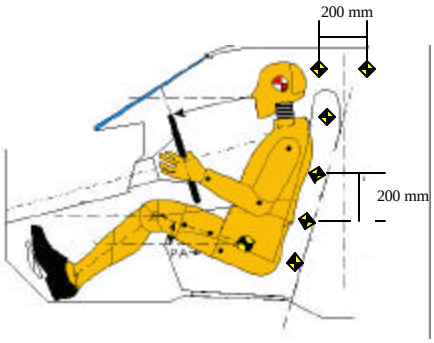
Comments: None

DATA SHEET 8

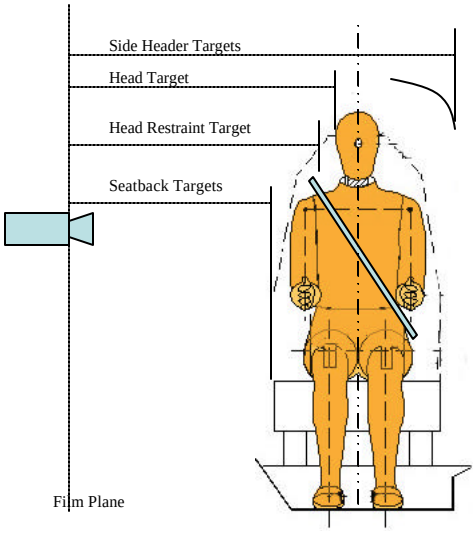
REFERENCE TARGET MEASUREMENTS

NHTSA No. : C40101 Vehicle : 2004 Pontiac Grand Prix Four-Door Sedan

Reference Target Locations



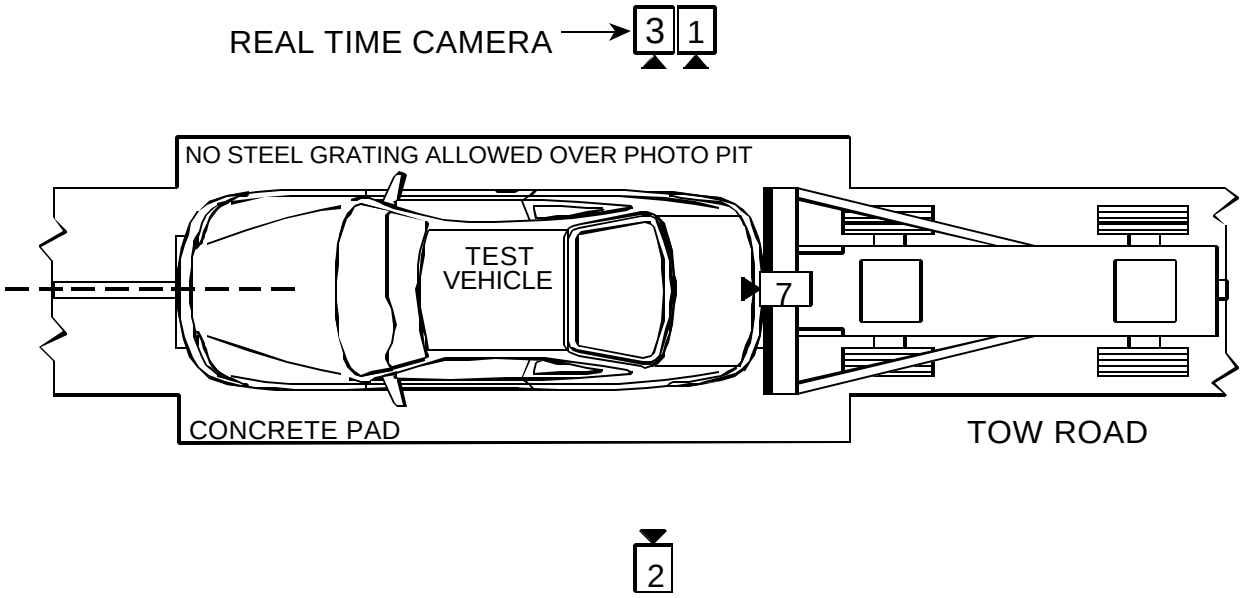
Reference Target Planes



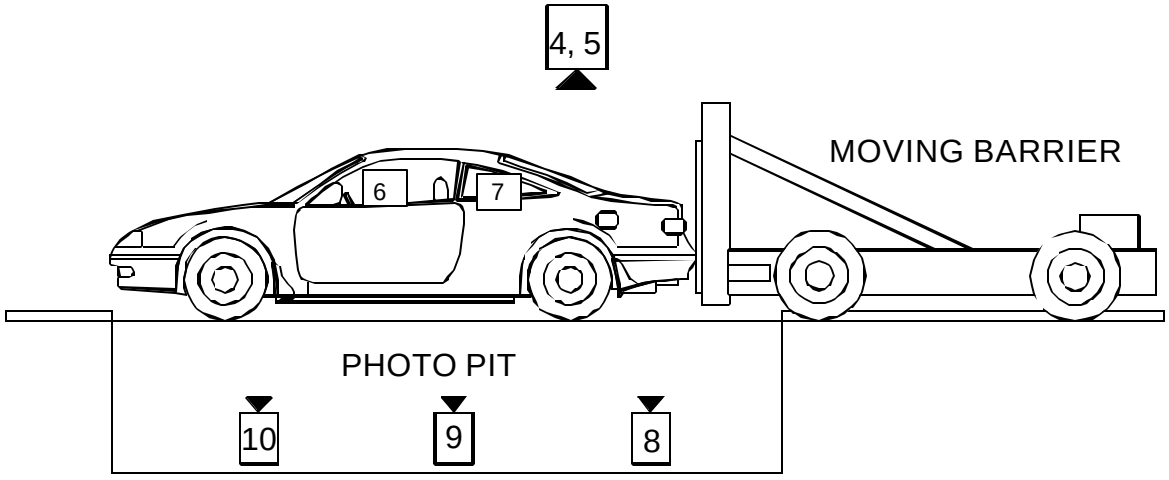
Film Plane to Reference Plane Distance		
Plane	**Front Occupant View (mm)**	**Rear Occupant View (mm)**
Seatback	1086	-
Head Restraint	1098	1088
Head Target	1139	1119
Side Header	1405	1418

DATA SHEET 9

HIGH SPEED CAMERA LOCATIONS



TOP VIEW



LEFT SIDE VIEW

DATA SHEET 9 (continued)

HIGH SPEED CAMERA LOCATIONS

NHTSA No. : C40101 Vehicle : 2004 Pontiac Grand Prix Four-Door Sedan

CAMERA NO.	VIEW	CAMERA POSITIONS (mm)*			ANGLE** (degrees)	LENS (mm)	SPEED (fps)
		X	Y	Z			
1	Real-Time Camera	-	-	-	-	-	24
2	Left Side View	17221	2134	1100	0	13	1000
3	Right Side View	17348	2438	1096	0	35	1005
4	Overhead Overall View	-508	0	9804	-90	13	1000
5	Overhead Close View	-508	0	9804	-105	13	1000
6†	Onboard Driver View	905	2485	1010	-9	8	1005
7†	Onboard Passenger View	918	1818	1110	-11	8	1000
8	Vehicle Rear Underbody View	0	1307	-1956	90	13	1030
9	Vehicle Mid-Section Underbody View	0	2411	-1956	90	13	1005
10	Vehicle Front Underbody View	0	3066	-1956	90	13	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

† Research cameras – X distance is measured to the reference target plane.

Appendix A

PHOTOGRAPHS

LIST OF PHOTOGRAPHS

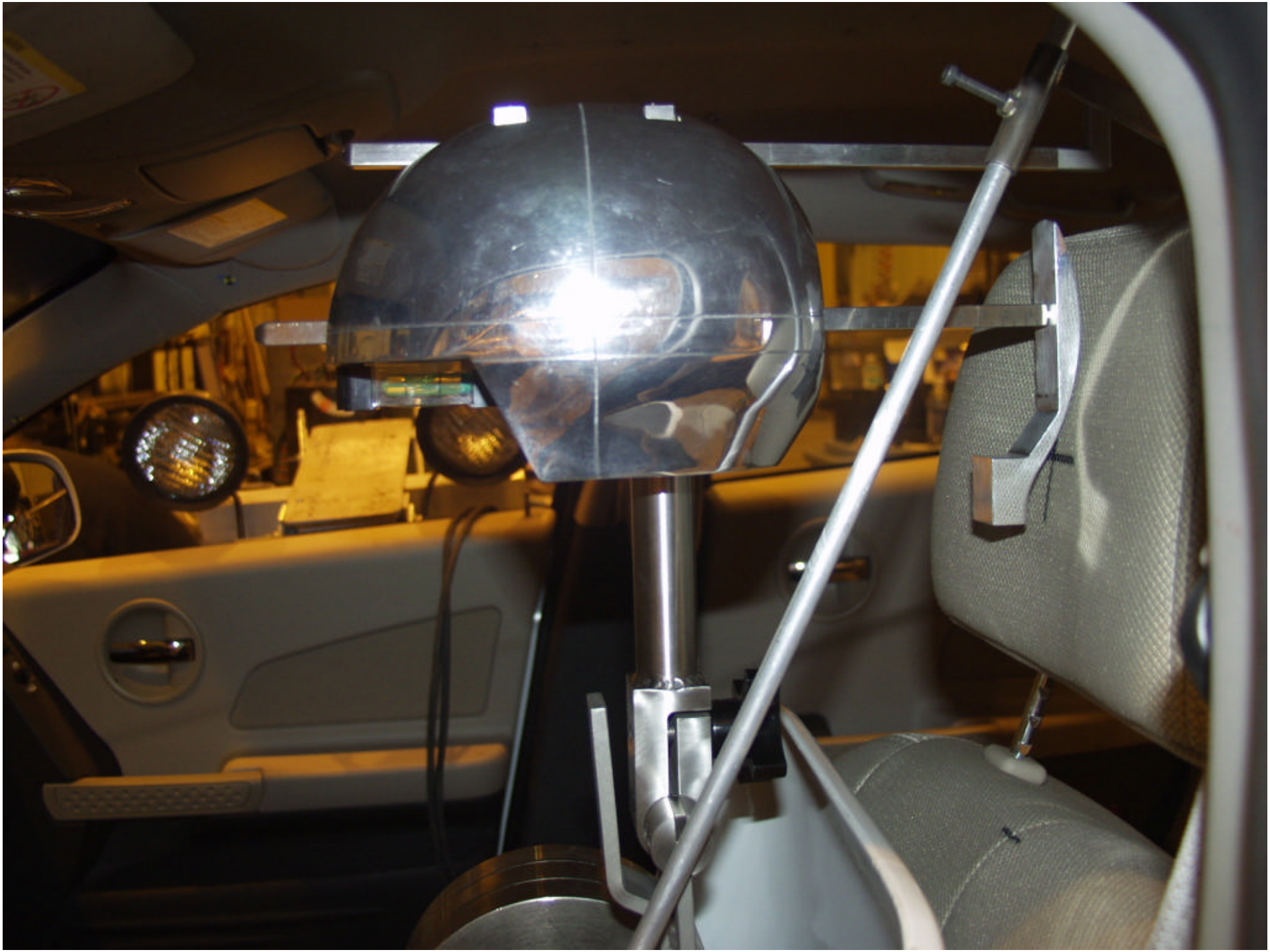


Figure A-1 DRIVER ICBC BACKSET VIEW

Figure A-2 PASSENGER ICBC BACKSET VIEW

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

Figure A-7 POST-TEST DRIVER SEAT PERPENDICULAR VIEW

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

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

Figure A-19 PRE-TEST PASSENGER LEFT SIDE VIEW

PHOTOGRAPH IS NOT AVAILABLE

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

Figure A-23 PRE-TEST PASSENGER ISOMETRICAL VIEW

Figure A-24 POST-TEST PASSENGER ISOMETRICAL VIEW

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

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

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

FACILITY: VERF DATE: June 14, 2004
TEST#: 42057-2001-2140
TITLE: 2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix C40101
Version 5.00

P1 Head

P1 HIC(15 ms): 75.2
t1: 136.8 msec
t2: 151.8 msec
Duration: 15.0 msec
Average Acceleration: 30.2 g

P1 HIC(36 ms): 115.2
t1: 123.9 msec
t2: 159.9 msec
Duration: 36.0 msec
Average Acceleration: 25.2 g

P1 Upper Neck

P1 UP NECK Fx: Max: 391.0 N 145.4 msec
Min: -165.0 N 271.6 msec

P1 UP NECK Fz: Max: 973.9 N 132.7 msec
Min: -349.6 N 268.7 msec

P1 UP NECK Mocy (50th Male)
Max: 13.0 N-m 286.2 msec
Min: -15.1 N-m 131.3 msec
Docy: 0.01778

P1 UP NECK Nij (50th Male)

Ntf: 0.12 Nij 140.8 msec CVt: 6806; CVf: 310
Fz: 804.6 N
Fx: 340.1 N
Mocy: 0.8 N-m

Nte: 0.25 Nij 131.8 msec CVt: 6806; CVe: 135
Fz: 955.7 N
Fx: 63.3 N
Mocy: -14.9 N-m

Ncf: 0.09 Nij 268.7 msec CVc: 6160; CVf: 310
Fz: -349.5 N
Fx: -67.6 N
Mocy: 9.4 N-m

Nce: 0.00 Nij -37.8 msec CVc: 6160; CVe: 135
Fz: -3.6 N
Fx: 0.8 N
Mocy: -0.0 N-m

P1 Chest

P1 CLIP(3 ms): 12.4 g
t1: 95.2 msec
t2: 98.2 msec
Duration: 3.0 msec
P1 CSI: 27.8

P1 CHEST DISP: Max: 0.6 mm 68.2 msec
Min: -1.0 mm 170.1 msec

P1 Femur

P1 LEFT FEMUR: Max: 4375.9 N 35.1 msec
Min: -8069.3 N 498.6 msec

P1 RIGHT FEMUR: Max: 1650.1 N 90.2 msec
Min: -740.6 N 178.9 msec

FACILITY: VERF DATE: June 14, 2004
TEST#: 42057-2001-2140
TITLE: 2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix C40101
Version 5.00

P3 Head

P3 HIC(15 ms): 94.8
t1: 67.6 msec
t2: 82.6 msec
Duration: 15.0 msec
Average Acceleration: 33.1 g

P3 HIC(36 ms): 101.0
t1: 61.9 msec
t2: 84.8 msec
Duration: 23.0 msec
Average Acceleration: 28.7 g

P3 Upper Neck

P3 UP NECK Fx: Max: 214.6 N 59.9 msec
Min: -177.5 N 156.5 msec

P3 UP NECK Fz: Max: 1461.5 N 75.4 msec
Min: -363.5 N 51.1 msec

P3 UP NECK Mocy (50th Male)
Max: 14.3 N-m 176.7 msec
Min: -16.8 N-m 103.6 msec
Docy: 0.01778

P3 UP NECK Nij (50th Male)

Ntf: 0.19 Nij 77.7 msec CVt: 6806; CVf: 310
Fz: 1312.0 N
Fx: 54.5 N
Mocy: 0.1 N-m

Nte: 0.26 Nij 74.8 msec CVt: 6806; CVe: 135
Fz: 1450.8 N
Fx: -1.6 N
Mocy: -6.0 N-m

Ncf: 0.09 Nij 52.1 msec CVc: 6160; CVf: 310
Fz: -358.6 N
Fx: 193.9 N
Mocy: 10.6 N-m

Nce: 0.03 Nij 385.9 msec CVc: 6160; CVe: 135
Fz: -19.7 N
Fx: 14.3 N
Mocy: -3.1 N-m

P3 Chest

P3 CLIP(3 ms): 25.5 g
t1: 56.4 msec
t2: 59.4 msec
Duration: 3.0 msec
P3 CSI: 64.3

P3 CHEST DISP: Max: 0.6 mm 87.6 msec
Min: -4.7 mm 145.2 msec

P3 Femur

P3 LEFT FEMUR: Max: 269.1 N 132.7 msec
Min: -1049.9 N 61.2 msec

P3 RIGHT FEMUR: Max: 351.4 N 141.9 msec
Min: -1118.5 N 62.7 msec

Maximum and Minimum Data

NAME	Unit	Max	msec	Min	msec	Comment
V2P1 Head x	g	32.7	146.7	-7.1	297.3	
V2P1 Head y	g	1.4	209.6	-2.6	140.4	
V2P1 Head z	g	18.4	130.5	-8.4	268.6	
V2P1 Head Resultant	g	34.3	146.3	0.0	-49.2	
V2P1 Head AVy	deg/s	1720.3	126.2	-989.4	169.9	
V2P1 Head Comp AVy	deg/s	1815.4	126.3	-898.5	170.3	f2=0.283 Hz; f4=0.001 Hz
V2P1 Head Comp ADy	deg	74.2	144.2	-31.1	429.1	f2=0.283 Hz; f4=0.001 Hz
V2P1 Upper Neck Fx	N	391.0	145.4	-165.0	271.6	
V2P1 Upper Neck Fy	N	57.5	205.2	-55.7	147.4	
V2P1 Upper Neck Fz	N	973.9	132.7	-349.6	268.7	
V2P1 Upper Neck F Resultant	N	978.1	132.8	0.1	-83.6	
V2P1 Upper Neck Mx	N-m	3.3	91.1	-3.8	308.4	
V2P1 Upper Neck My	N-m	14.2	147.2	-14.4	166.5	
V2P1 Upper Neck Mz	N-m	4.8	194.5	-2.1	360.0	
V2P1 Upper Neck M Resultant	N-m	14.6	131.1	0.0	-44.2	
V2P1 Lower Neck Fx	N	826.8	143.5	-174.8	272.0	
V2P1 Lower Neck Fy	N	87.2	267.6	-112.7	125.5	
V2P1 Lower Neck Fz	N	737.6	116.4	-331.6	269.0	
V2P1 Lower Neck F Resultant	N	1019.6	131.0	0.1	-50.3	
V2P1 Lower Neck Mx	N-m	10.6	205.7	-17.1	135.0	
V2P1 Lower Neck My	N-m	48.1	269.1	-160.7	133.5	
V2P1 Lower Neck Mz	N-m	20.5	269.3	-72.3	132.7	
V2P1 Lower Neck M Resultant	N-m	176.9	133.0	0.0	-59.7	
V2P1 Lower Neck x	g	13.7	108.6	-3.5	265.6	
V2P1 Chest x	g	11.8	97.4	-2.5	404.9	
V2P1 Chest y	g	0.8	188.3	-2.1	76.4	
V2P1 Chest z	g	5.4	91.0	-1.9	167.6	
V2P1 Chest Resultant	g	12.6	103.8	0.0	-19.7	
V2P1 Chest Displacement	mm	0.6	68.2	-1.0	170.1	
V2P1 Chest AVy	deg/s	483.9	100.1	-372.6	201.1	
V2P1 Chest Comp AVy	deg/s	506.7	100.8	-348.5	203.0	f2=0.298 Hz; f4=0.001 Hz
V2P1 Chest Comp ADy	deg	25.6	164.6	-18.8	458.1	f2=0.298 Hz; f4=0.001 Hz
V2P1 Pelvic x	g	18.5	81.7	-3.8	191.5	
V2P1 Pelvic y	g	2.3	198.9	-1.9	75.2	
V2P1 Pelvic z	g	6.7	93.8	-1.9	407.0	
V2P1 Pelvic Resultant	g	19.6	81.7	0.0	-88.6	
V2P1 Left Femur	N	4375.9	35.1	-8069.3	498.6	Data is Questionable
V2P1 Right Femur	N	1650.1	90.2	-740.6	178.9	
V2P1 Head to Chest	deg	15.6	290.0	-50.6	142.8	
V2P1 Lap Belt Load	N	2281.0	139.5	-18.9	37.2	
V2P1 Belt Spoolout	mm	0.1	8.8	-95.3	140.3	
V2P3 Head x	g	35.6	75.7	-3.7	156.0	
V2P3 Head y	g	2.8	183.0	-4.7	78.9	
V2P3 Head z	g	15.9	74.7	-9.0	51.4	
V2P3 Head Resultant	g	39.1	75.7	0.0	-34.0	
V2P3 Head AVy	deg/s	1485.5	67.2	-814.2	119.6	
V2P3 Head Comp AVy	deg/s	1530.1	67.3	-783.5	120.0	f2=0.287 Hz; f4=0.001 Hz
V2P3 Head Comp ADy	deg	36.3	78.5	-17.3	197.4	f2=0.287 Hz; f4=0.001 Hz
V2P3 Upper Neck Fx	N	214.6	59.9	-177.5	156.5	

Maximum and Minimum Data (Continued)

NAME	Unit	Max	msec	Min	msec	Comment
V2P3 Upper Neck Fy	N	121.1	183.7	-184.4	76.9	
V2P3 Upper Neck Fz	N	1461.5	75.4	-363.5	51.1	
V2P3 Upper Neck F Resultant	N	1472.1	75.5	0.0	-78.1	
V2P3 Upper Neck Mx	N-m	7.5	189.7	-4.1	92.1	
V2P3 Upper Neck My	N-m	16.7	59.9	-17.6	103.7	
V2P3 Upper Neck Mz	N-m	6.7	119.0	-5.5	69.8	
V2P3 Upper Neck M Resultant	N-m	18.1	104.3	0.0	-86.4	
V2P3 Lower Neck Fx	N	886.9	76.8	-141.7	152.9	
V2P3 Lower Neck Fy	N	72.0	198.6	-193.1	63.2	
V2P3 Lower Neck Fz	N	941.2	75.4	-558.5	52.1	
V2P3 Lower Neck F Resultant	N	1285.3	75.6	0.1	4.1	
V2P3 Lower Neck Mx	N-m	31.3	182.7	-23.0	64.3	
V2P3 Lower Neck My	N-m	39.1	189.3	-147.0	75.7	
V2P3 Lower Neck Mz	N-m	10.0	85.0	-11.8	62.2	
V2P3 Lower Neck M Resultant	N-m	148.8	75.7	0.0	-28.1	
V2P3 Lower Neck x	g	3.6	18.6	-39.0	172.6	Data is Meaningless
V2P3 Chest x	g	25.5	58.4	-3.9	130.1	
V2P3 Chest y	g	51.6	112.4	-50.0	170.2	Data is questionable
V2P3 Chest z	g	6.1	132.4	-5.7	50.7	
V2P3 Chest Resultant	g	51.7	112.4	0.0	-32.6	Data is Questionable
V2P3 Chest Compression	mm	0.6	87.6	-4.7	145.2	
V2P3 Chest AVy	deg/s	96.4	80.5	-104.1	150.9	
V2P3 Chest Comp AVy	deg/s	101.3	80.6	-100.6	166.0	f2=0.308 Hz; f4=0.001 Hz
V2P3 Chest Comp ADy	deg	4.5	126.0	-2.5	231.7	f2=0.308 Hz; f4=0.001 Hz
V2P3 Pelvic x	g	23.0	57.7	-6.8	137.9	
V2P3 Pelvic y	g	3.5	127.9	-5.6	52.9	
V2P3 Pelvic z	g	4.6	68.9	-1.9	364.8	
V2P3 Pelvic Resultant	g	23.5	57.7	0.0	-61.7	
V2P3 Left Femur	N	269.1	132.7	-1049.9	61.2	
V2P3 Right Femur	N	351.4	141.9	-1118.5	62.7	
V2P3 Head to Chest	deg	16.1	189.8	-33.8	77.9	
V2P3 Lap Belt	N	99.0	377.4	-12.1	38.5	
V2 Left Front Sill AVy	deg/s	33.1	24.8	-37.0	52.9	
V2 Left Front Sill Comp AVy	deg/s	33.6	24.8	-37.1	52.9	f2=0.283 Hz; f4=0.001 Hz
V2 Left Front Sill Comp ADy	deg	0.4	27.5	-0.9	90.4	f2=0.283 Hz; f4=0.001 Hz
V2P1 Left Seat AVy	deg/s	412.4	88.4	-237.6	209.2	
V2P1 Left Seat Comp AVy	deg/s	447.8	88.4	-216.6	209.2	f2=0.374 Hz; f4=0.001 Hz
V2P1 Left Seat Comp ADy	deg	24.8	143.9	0.0	8.1	f2=0.374 Hz; f4=0.001 Hz
V2P1 Right Seat AVy	deg/s	511.2	96.0	-266.6	181.5	
V2P1 Right Seat Comp AVy	deg/s	559.2	96.1	-237.1	198.8	f2=0.396 Hz; f4=0.001 Hz
V2P1 Right Seat Comp ADy	deg	26.4	125.6	0.0	13.4	f2=0.396 Hz; f4=0.001 Hz
V2 Left X Member x	g	16.5	5.2	-1.2	229.2	
V2 Left X Member RED x	g	15.8	5.1	-1.9	33.4	
V2 Right X Member x	g	16.0	5.1	-1.2	33.3	
V2 Right X Member RED x	g	16.2	5.1	-1.1	238.1	
V2P1 Left Link ADy	deg	14.7	191.9	-3.9	213.9	
V2P1 Right Link ADy	deg	15.1	128.6	-2.4	18.1	
V2P1 Left Span Bar Displacement	mm	430.3	128.5	-0.2	10.5	
V2P1 Right Span Bar Displacement	mm	462.2	120.2	-83.1	191.2	Questionable - Channel Opened

Maximum and Minimum Data (Continued)

NAME	Unit	Max	msec	Min	msec	Comment
P1 Left Change in Seat Back Angle	deg	25.5	141.8	0.0	9.4	
P1 Left Change in String Angle	deg	0.0	5.7	-21.3	127.1	
P1 Left Seat X Displacement	mm	235.9	152.4	-0.9	12.4	
P1 Right Change in Seat Back Angle	deg	27.2	125.8	-0.1	13.3	
P1 Right Change in String Angle	deg	0.0	6.2	-16.9	120.1	
P1 Right Seat X Displacement	mm	236.3	107.9	-224.1	157.2	

Table of Data Plots

Table of Data Plots (continued)

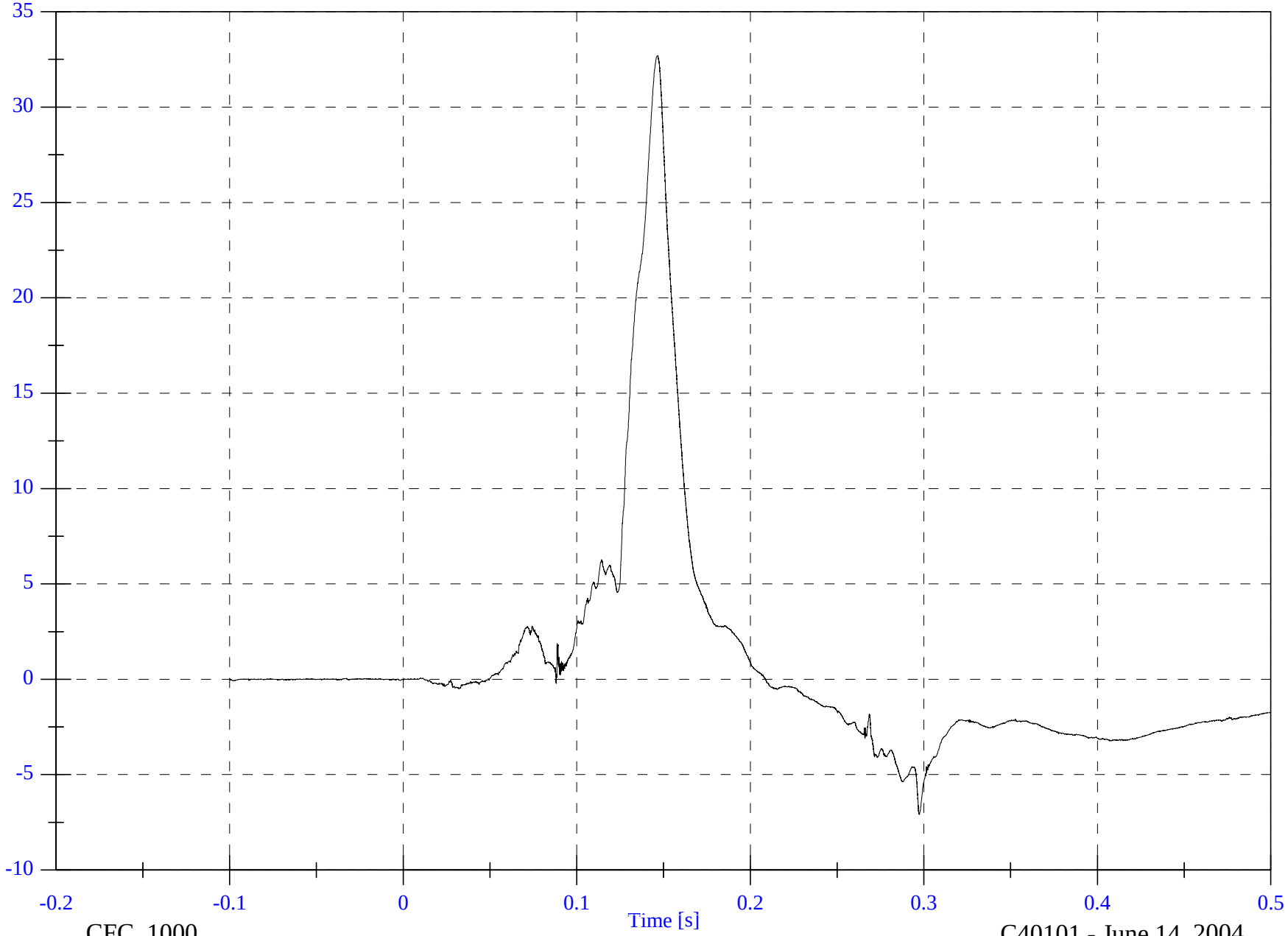
Table of Data Plots (continued)

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Head x

Max: 32.7 [g] at 0.147 [s]

Min: -7.1 [g] at 0.297 [s]

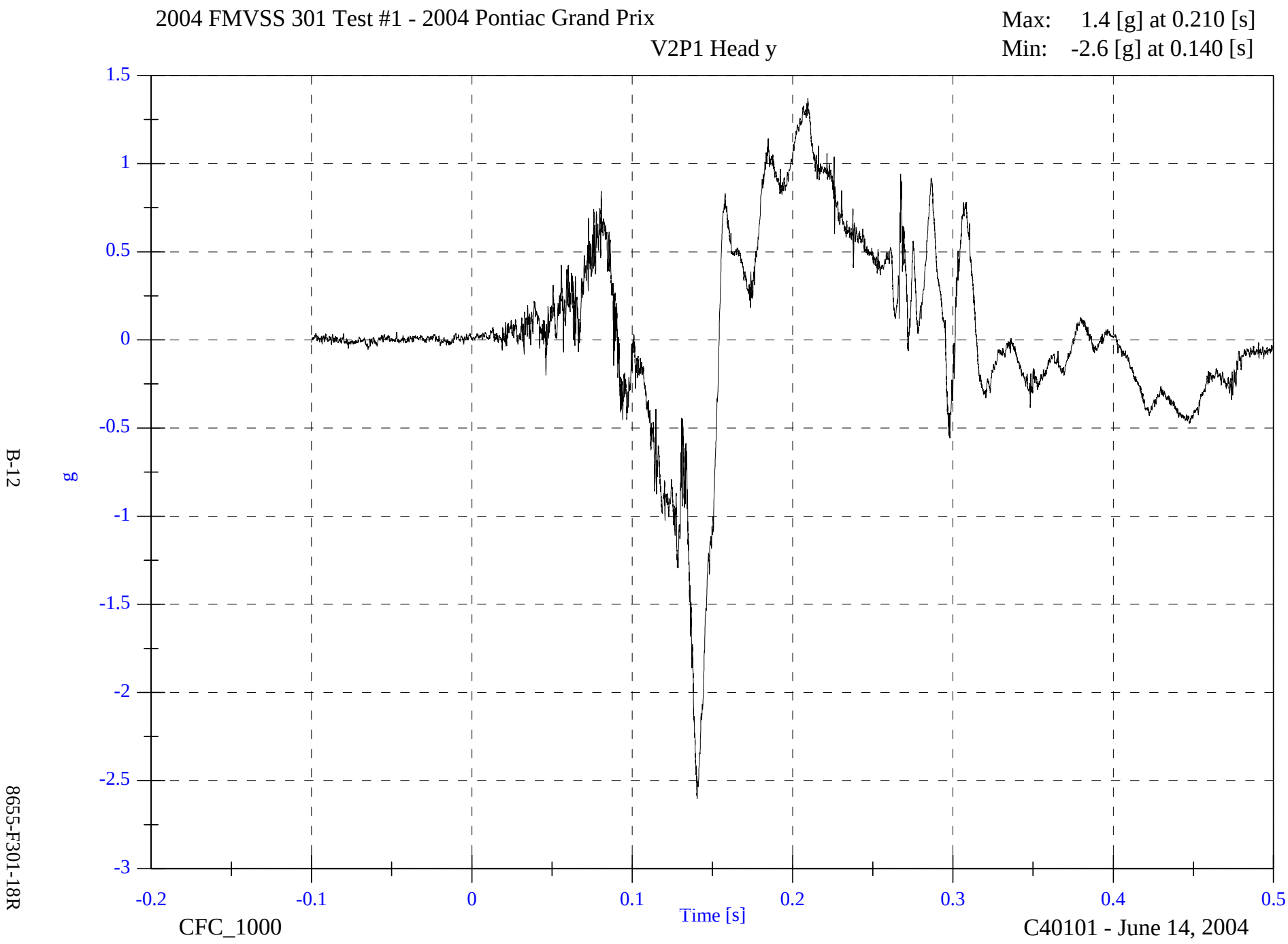


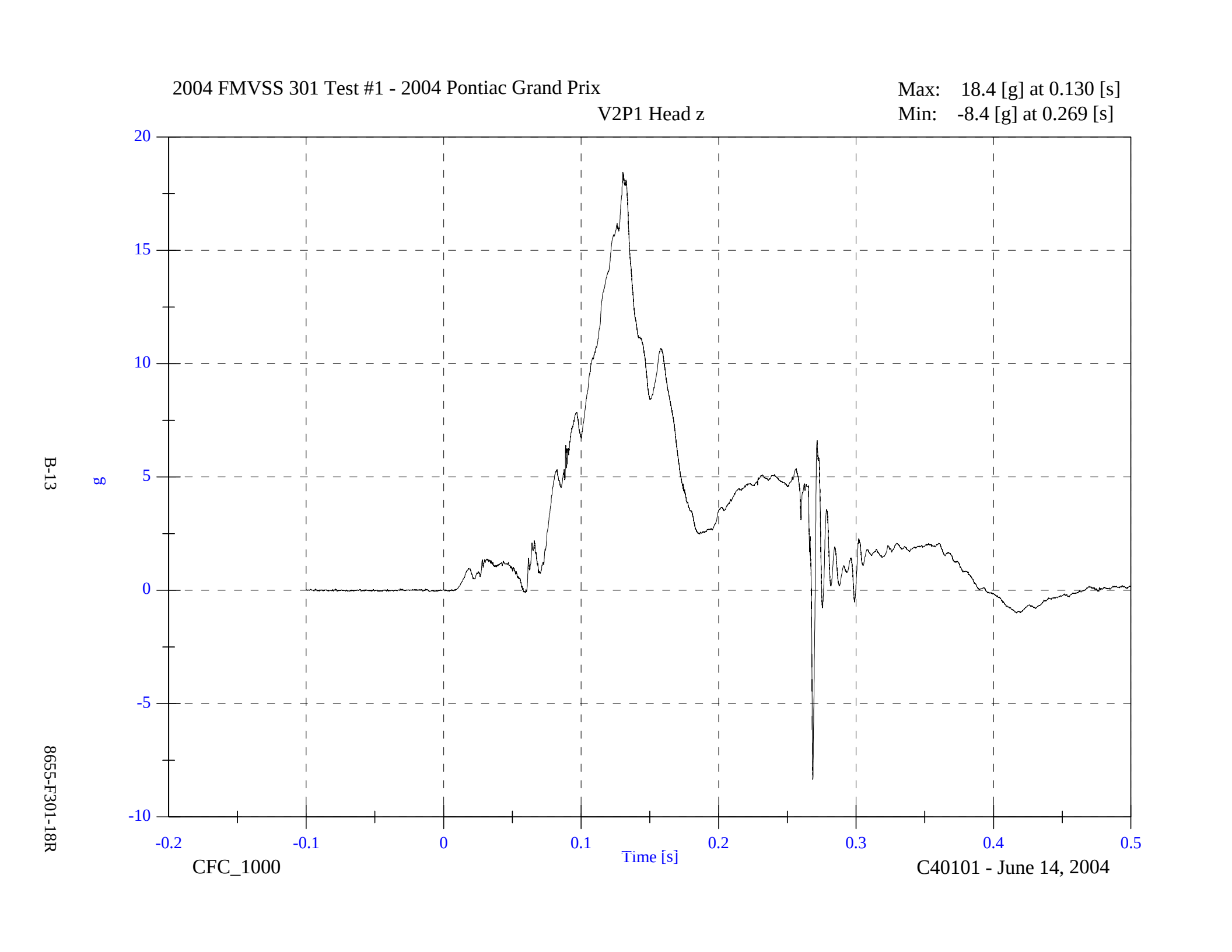
B-11

8655-F301-18R

CFC_1000

C40101 - June 14, 2004


2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P1 Head y
Max: 1.4 [g] at 0.210 [s]
Min: -2.6 [g] at 0.140 [s]
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
g
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
CFC_1000
C40101 - June 14, 2004

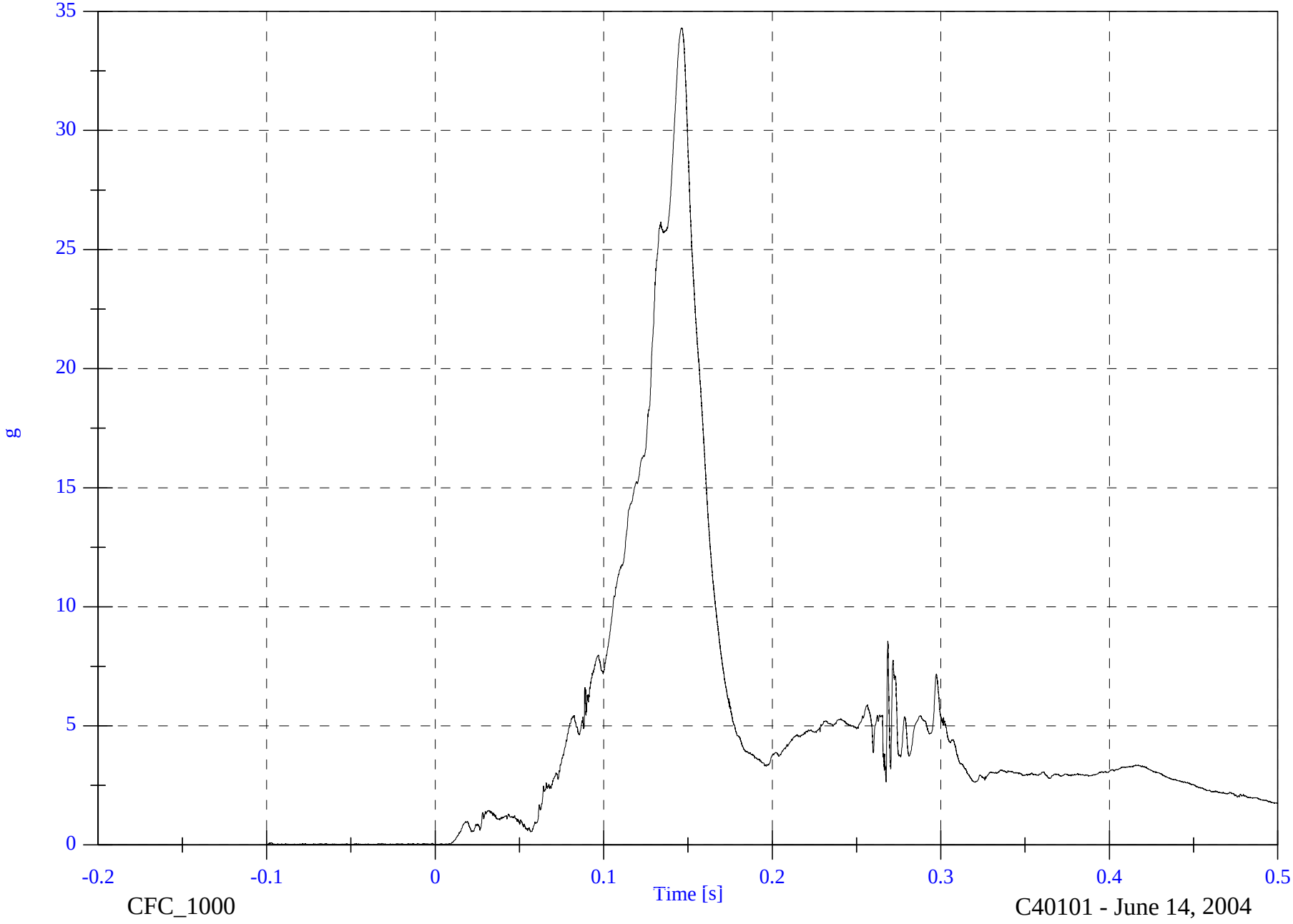

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P1 Head z
Max: 18.4 [g] at 0.130 [s]
Min: -8.4 [g] at 0.269 [s]
20
15
10
5
0
-5
-10
g
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
B-13
8655-F301-18R
CFC_1000
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Head Resultant

Max: 34.3 [g] at 0.146 [s]

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



B-14

8655-F301-18R

CFC_1000

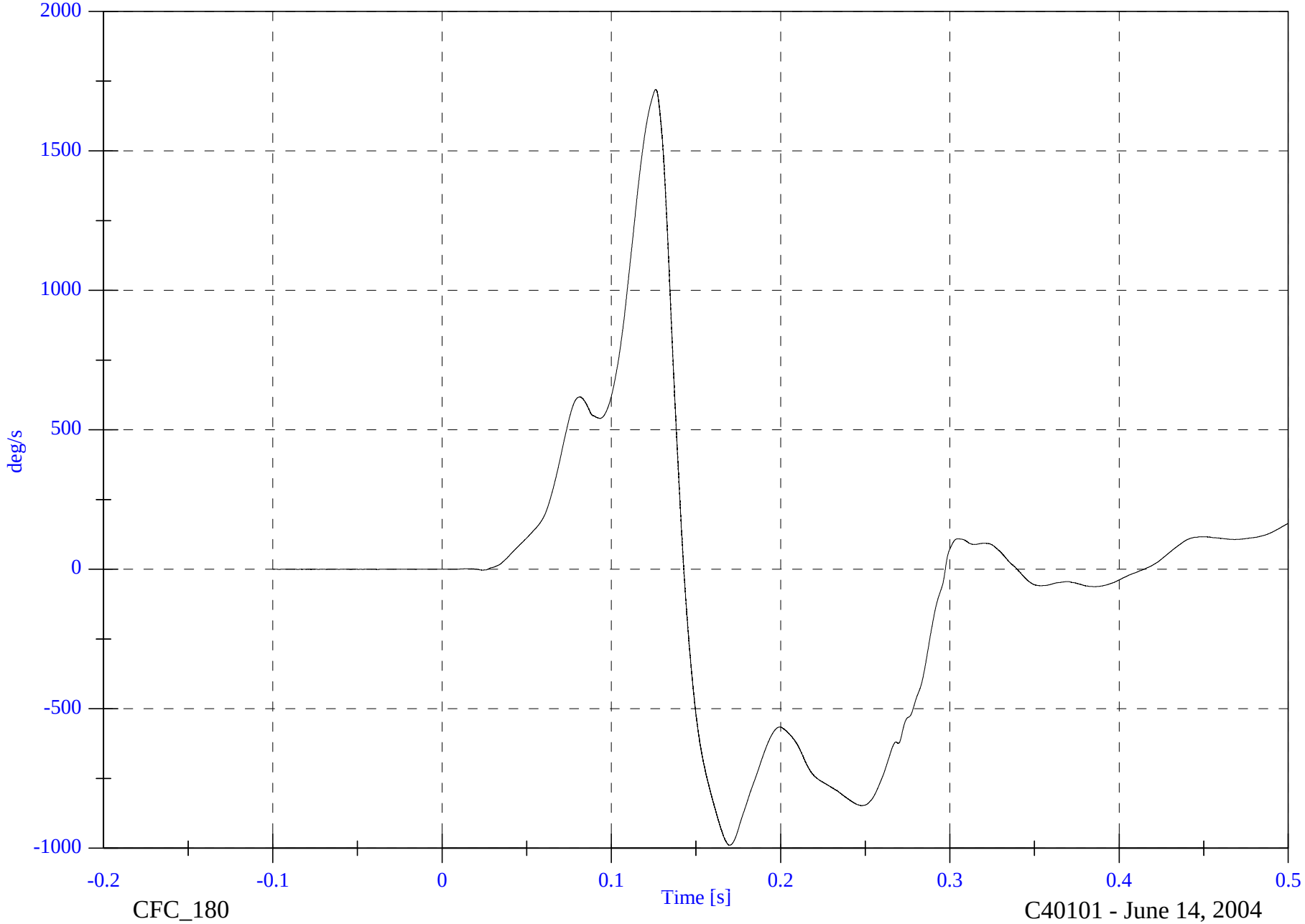
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Head AVy

Max: 1720.3 [deg/s] at 0.126 [s]

Min: -989.4 [deg/s] at 0.170 [s]

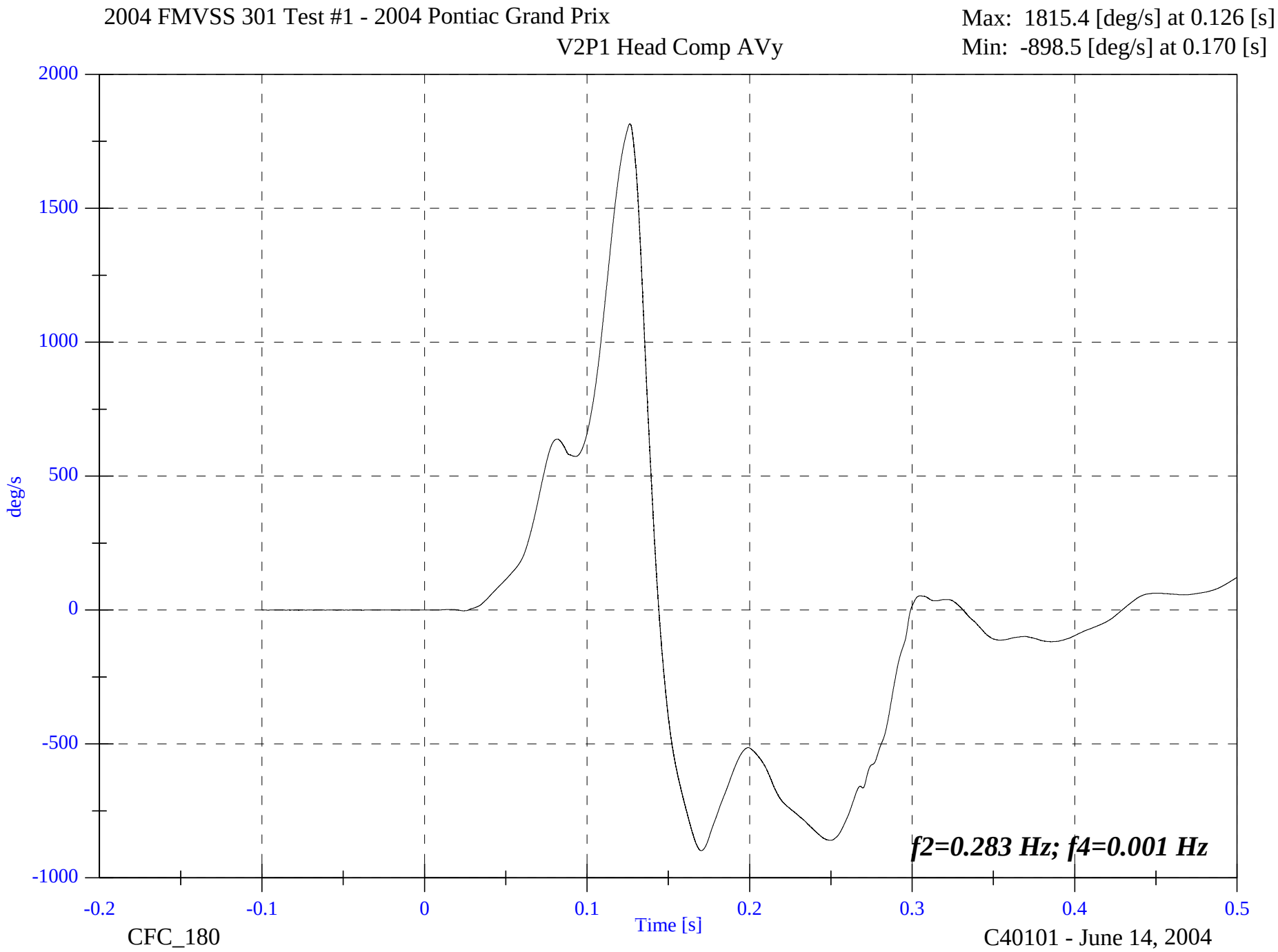


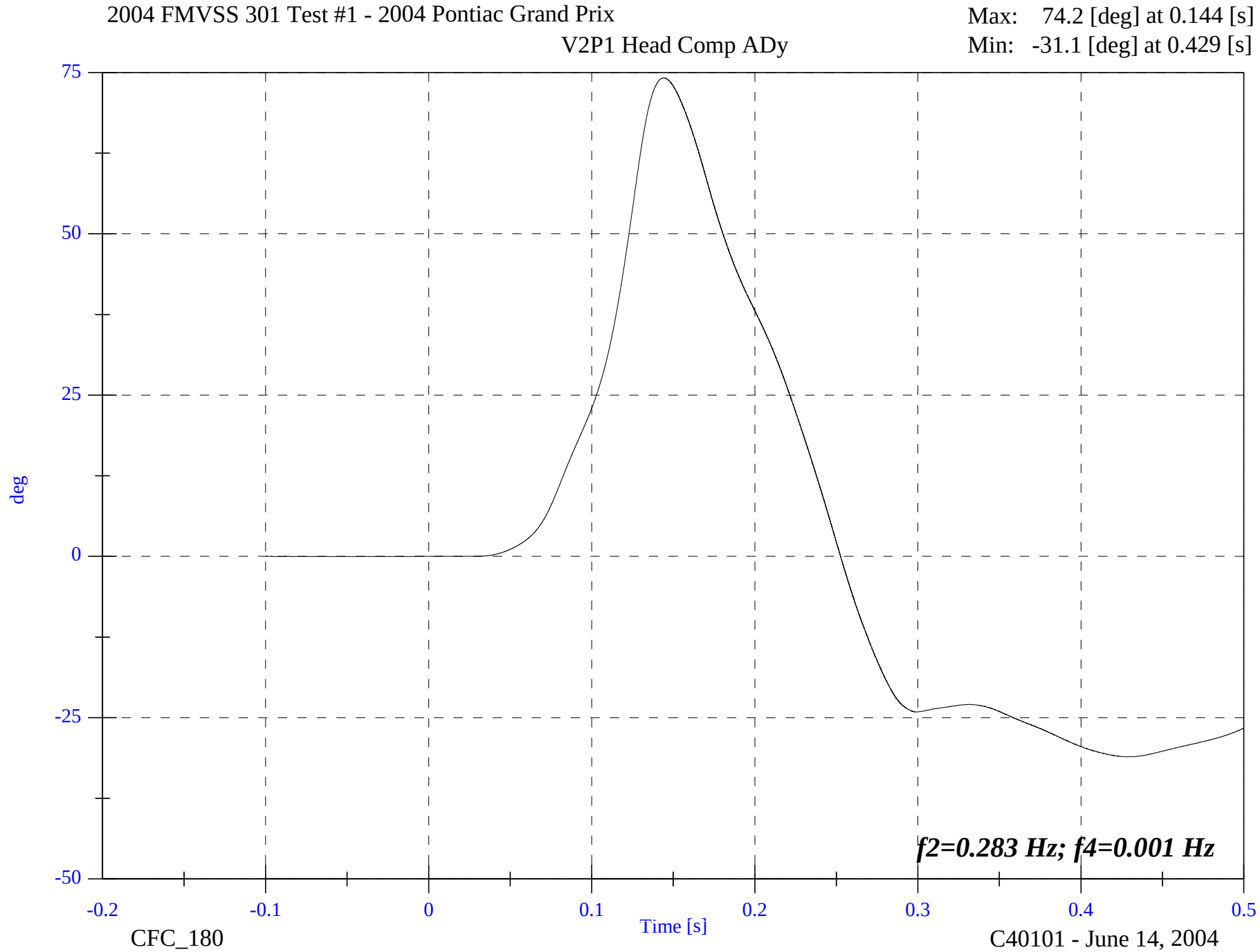
B-15

8655-F301-18R

CFC_180

C40101 - June 14, 2004


2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P1 Head Comp AVy
Max: 1815.4 [deg/s] at 0.126 [s]
Min: -898.5 [deg/s] at 0.170 [s]
2000
1500
1000
500
0
-500
-1000
deg/s
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
f2=0.283 Hz; f4=0.001 Hz
CFC_180
C40101 - June 14, 2004



B-17

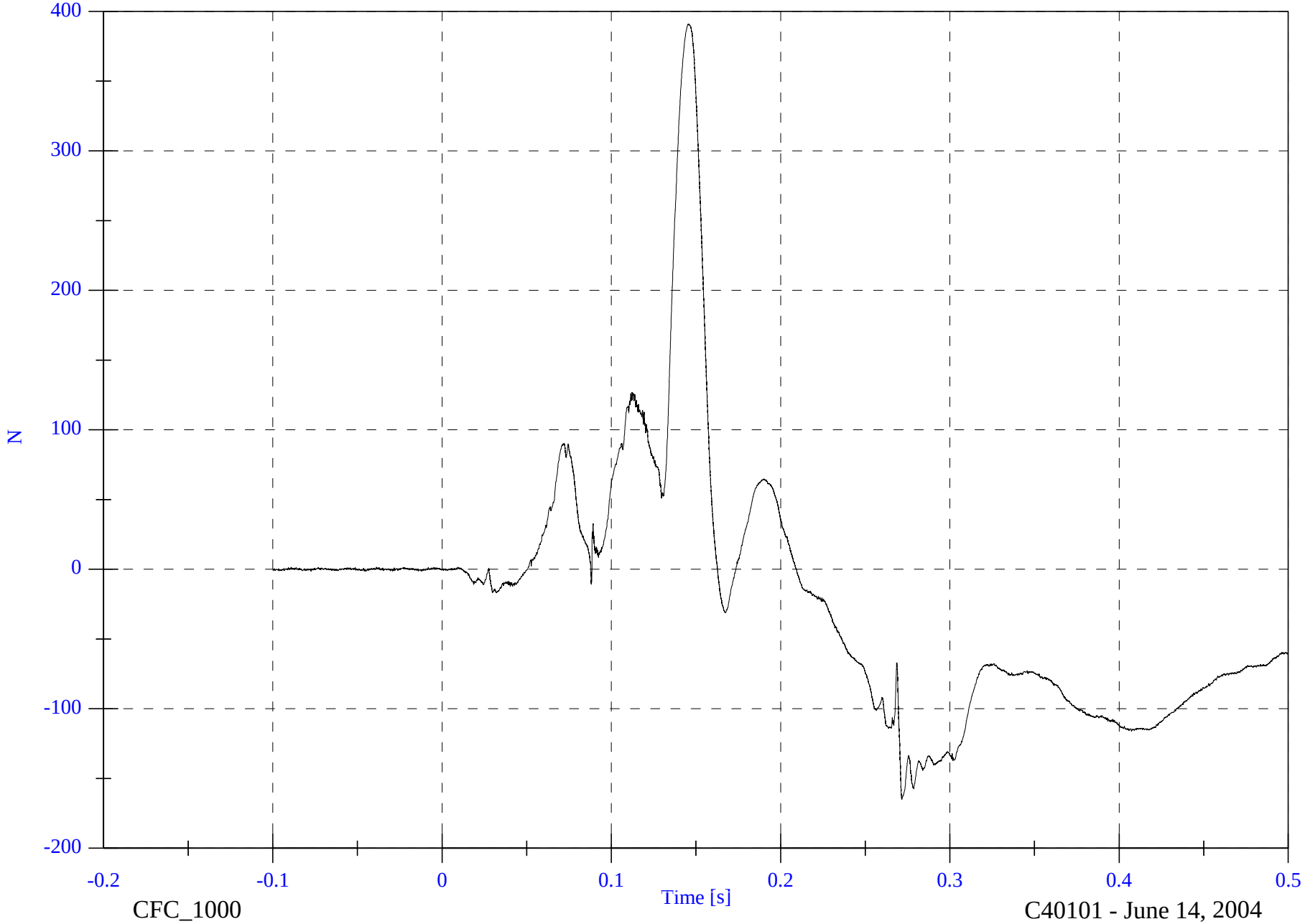
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Upper Neck Fx

Max: 391.0 [N] at 0.145 [s]

Min: -165.0 [N] at 0.272 [s]



B-18

8655-F301-18R

CFC_1000

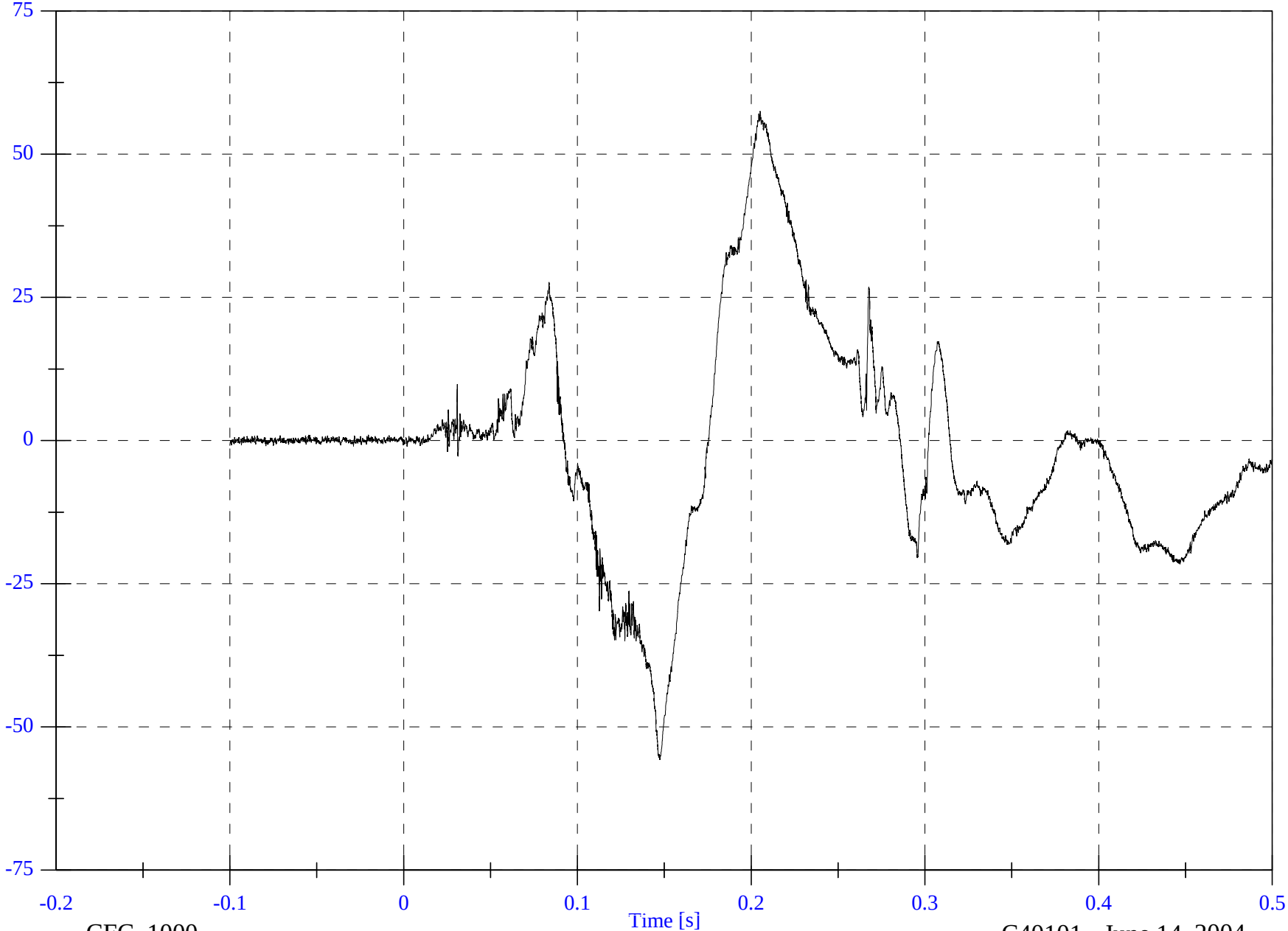
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Upper Neck Fy

Max: 57.5 [N] at 0.205 [s]

Min: -55.7 [N] at 0.147 [s]

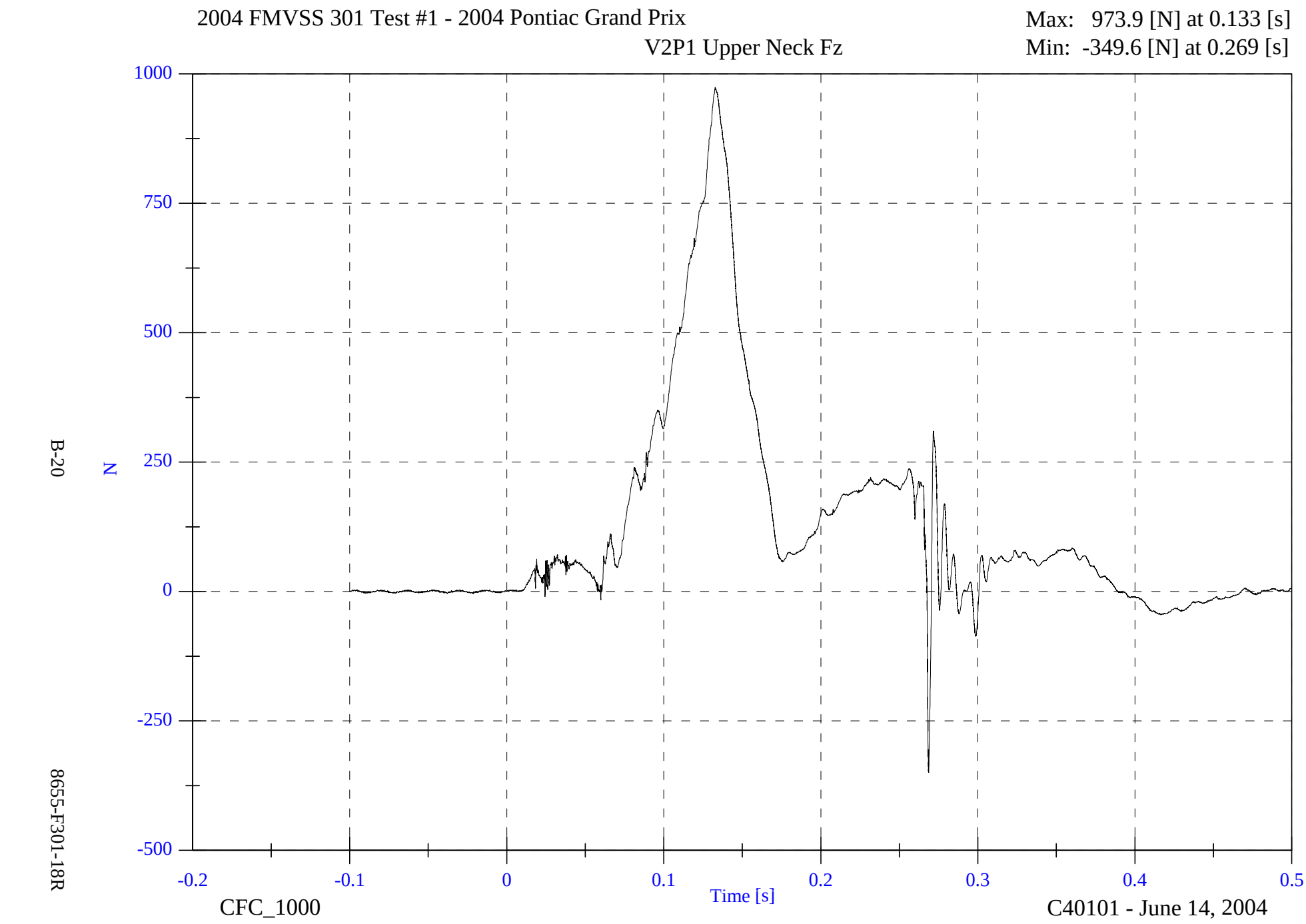


CFC_1000

C40101 - June 14, 2004

B-19

8655-F301-18R

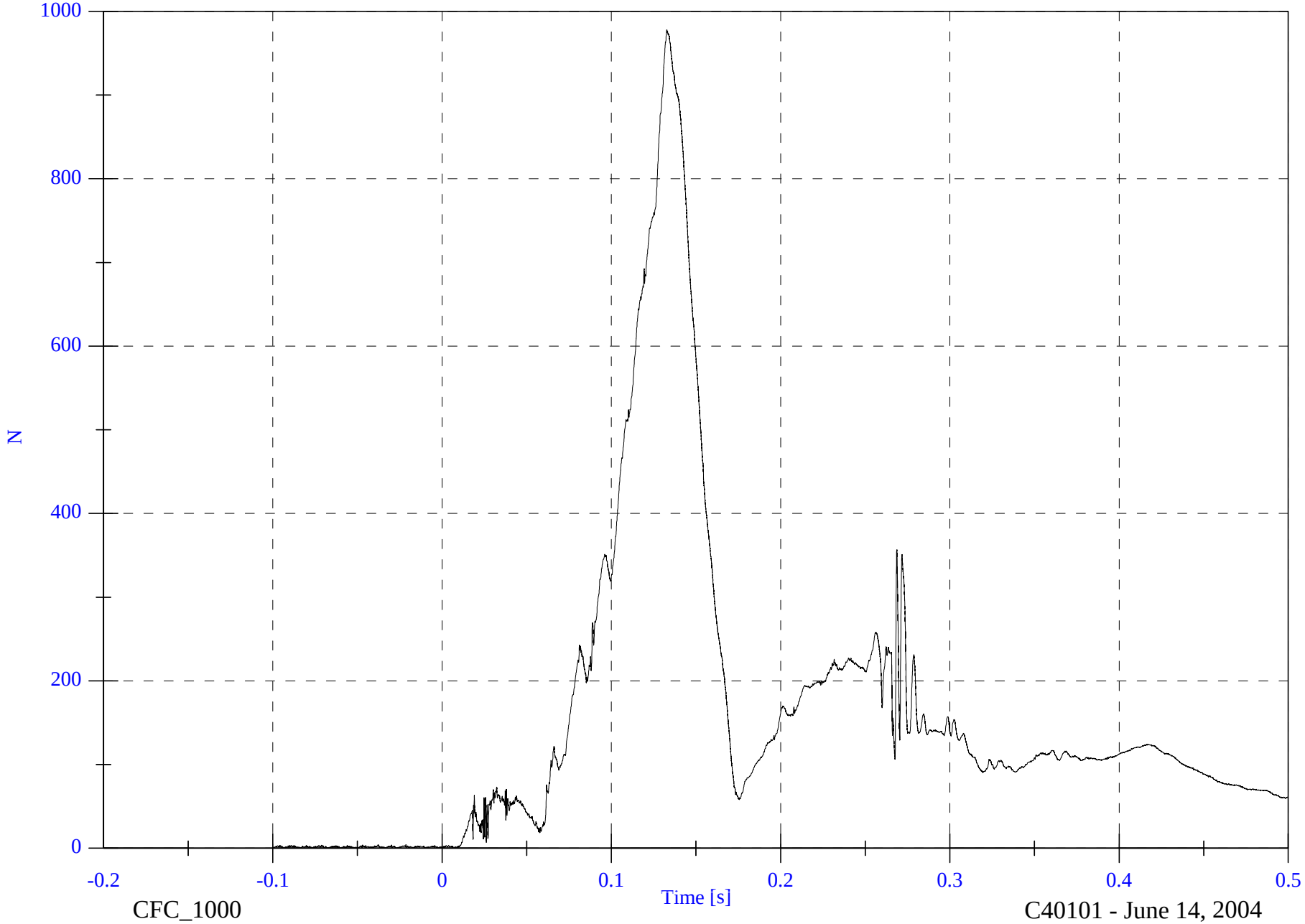

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P1 Upper Neck Fz
Max: 973.9 [N] at 0.133 [s]
Min: -349.6 [N] at 0.269 [s]
1000
750
500
250
0
-250
-500
N
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
CFC_1000
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Upper Neck F Resultant

Max: 978.1 [N] at 0.133 [s]

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



B-21

8655-F301-18R

CFC_1000

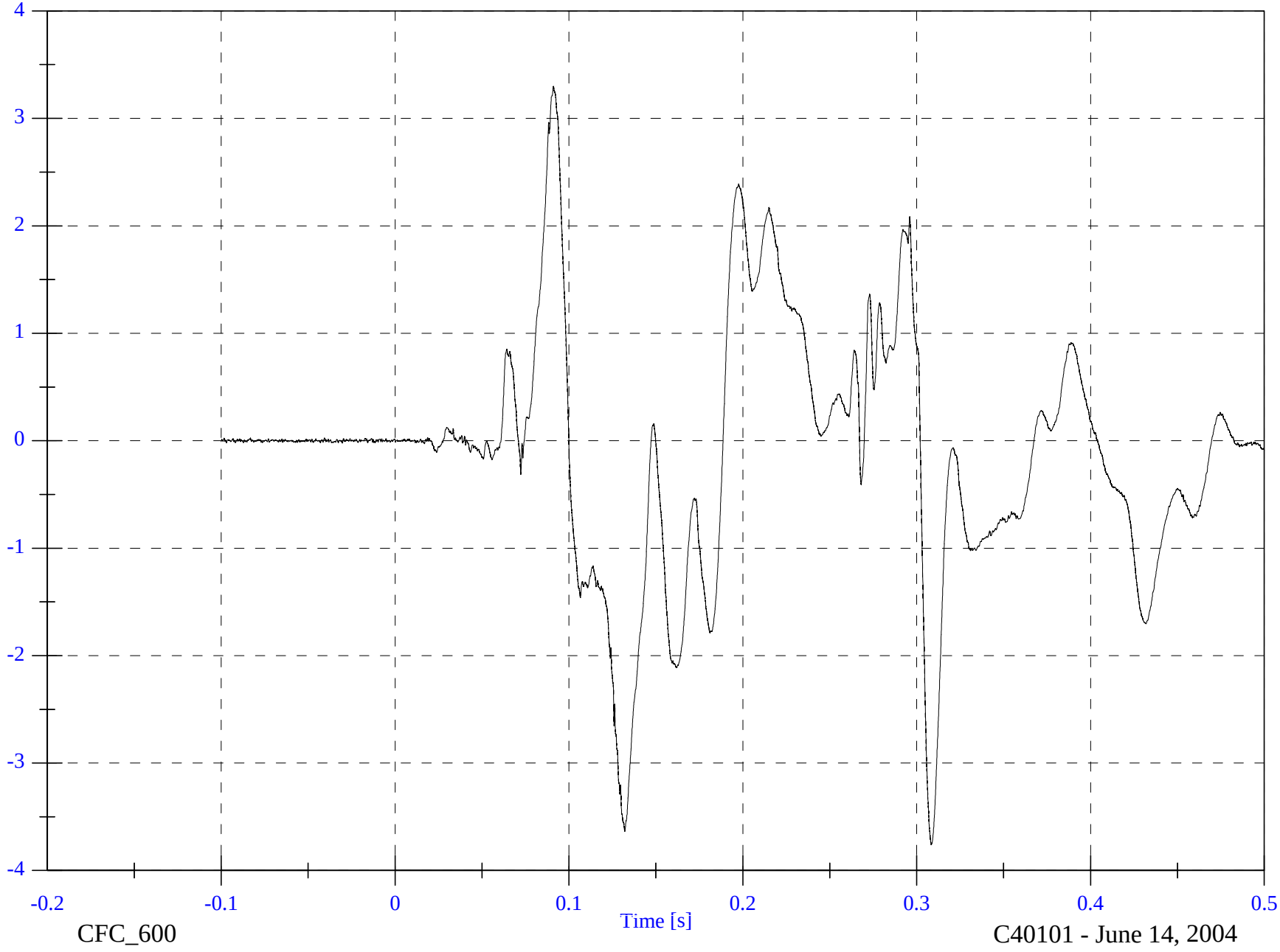
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Upper Neck Mx

Max: 3.3 [N-m] at 0.091 [s]

Min: -3.8 [N-m] at 0.308 [s]



CFC_600

C40101 - June 14, 2004

B-22

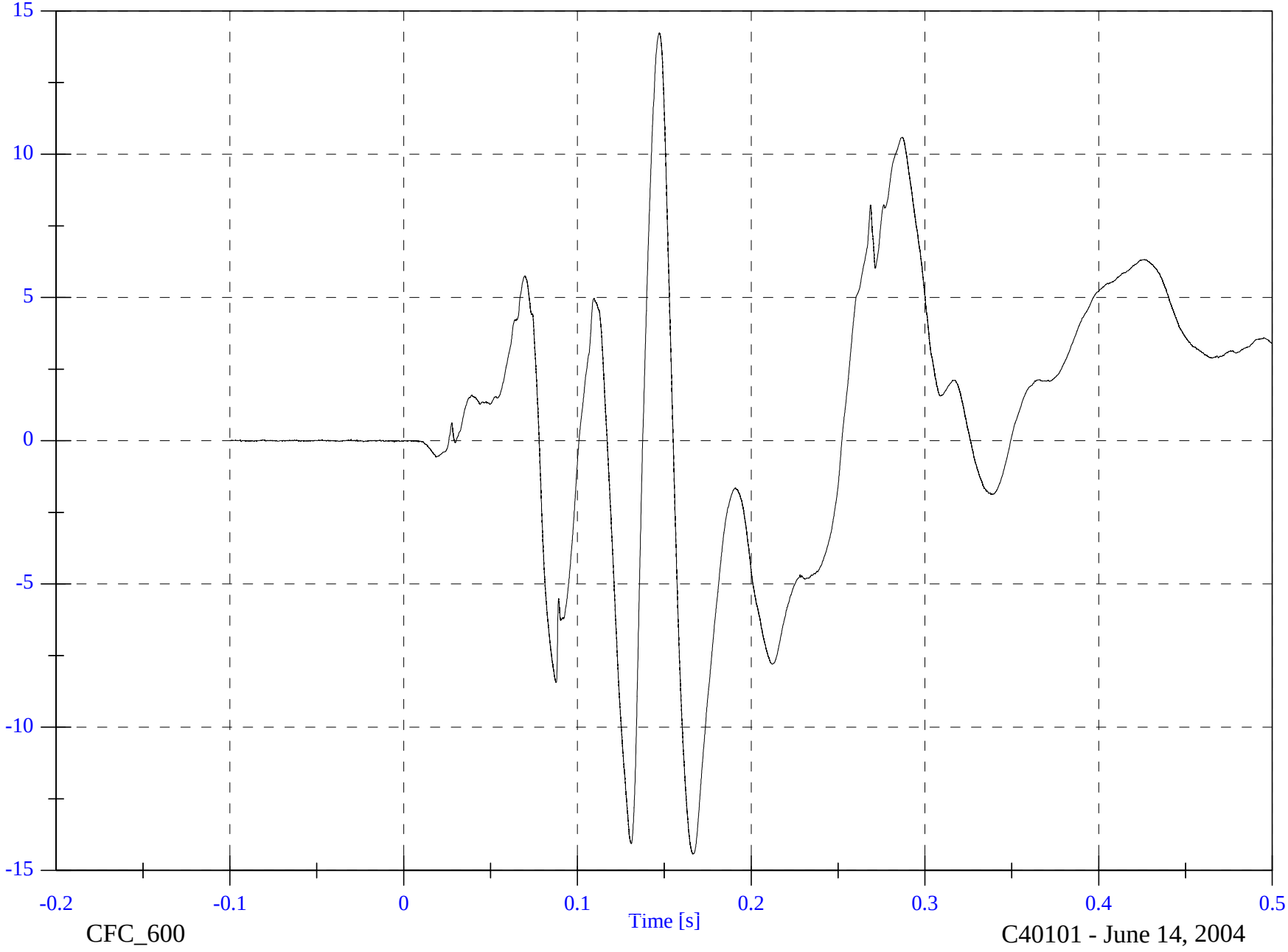
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Upper Neck My

Max: 14.2 [N-m] at 0.147 [s]

Min: -14.4 [N-m] at 0.167 [s]



B-23

8655-F301-18R

CFC_600

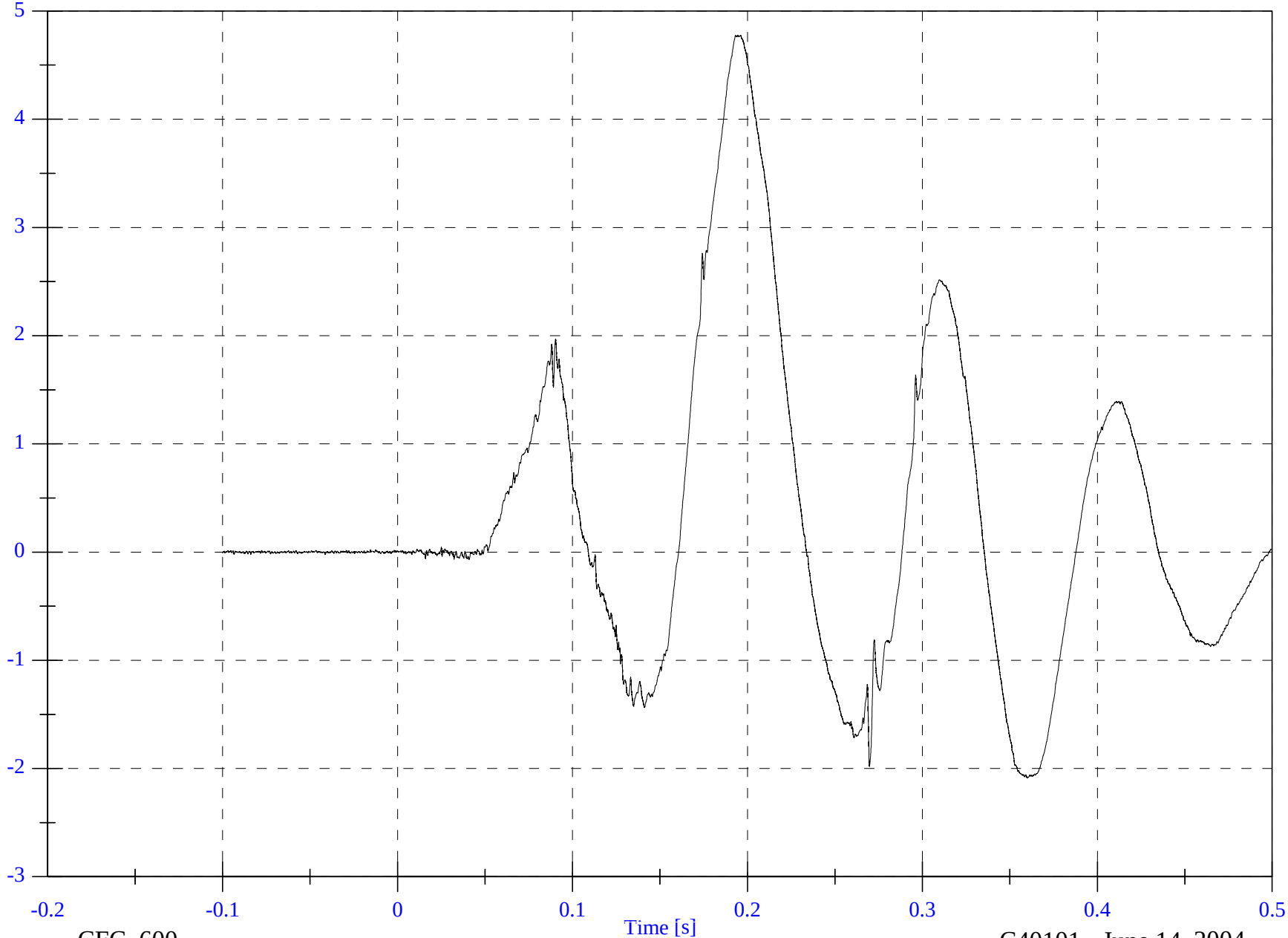
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Upper Neck Mz

Max: 4.8 [N-m] at 0.194 [s]

Min: -2.1 [N-m] at 0.360 [s]



CFC_600

C40101 - June 14, 2004

B-24

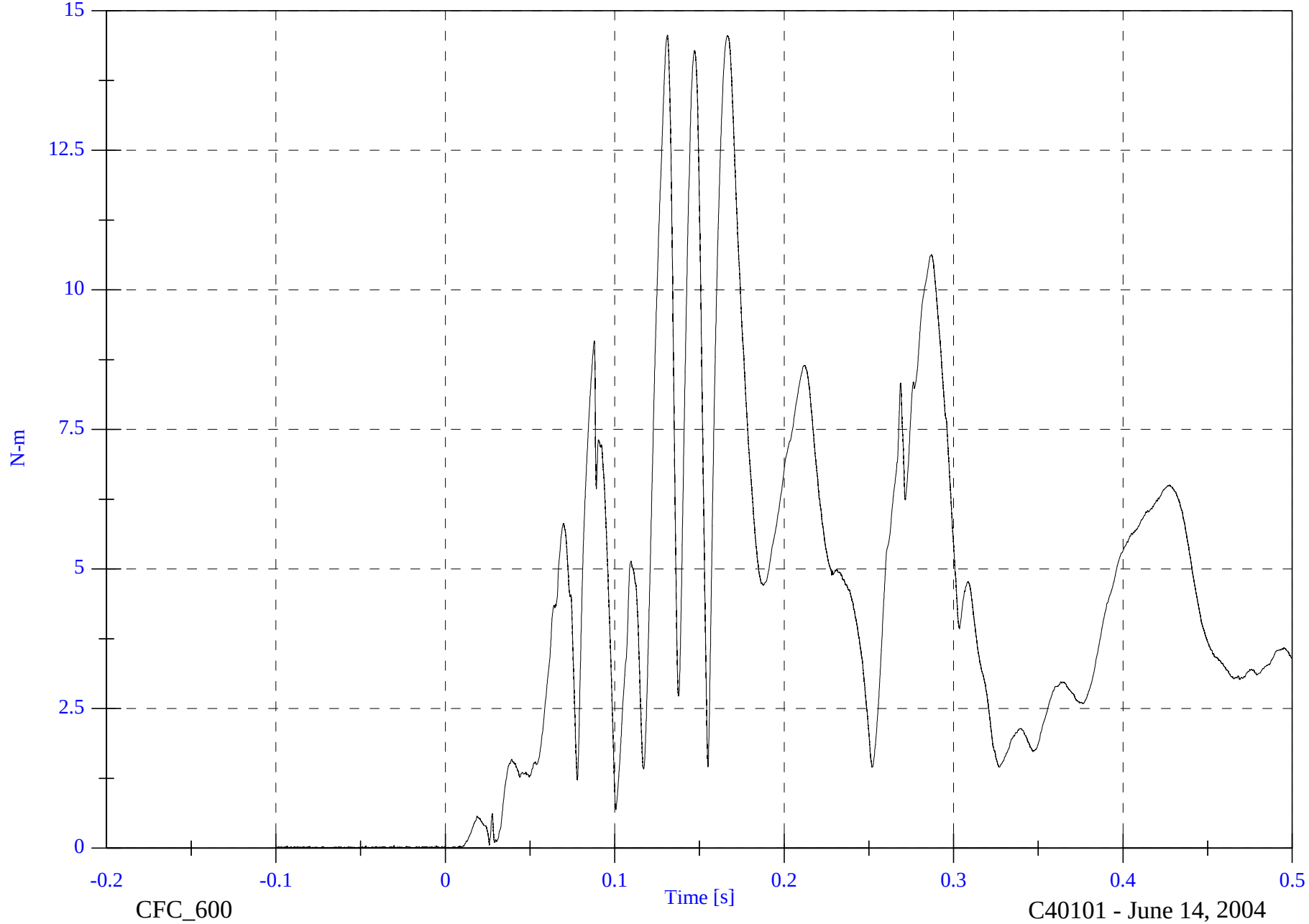
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Upper Neck M Resultant

Max: 14.6 [N-m] at 0.131 [s]

Min: 0.0 [N-m] at -0.044 [s]



CFC_600

C40101 - June 14, 2004

B-25

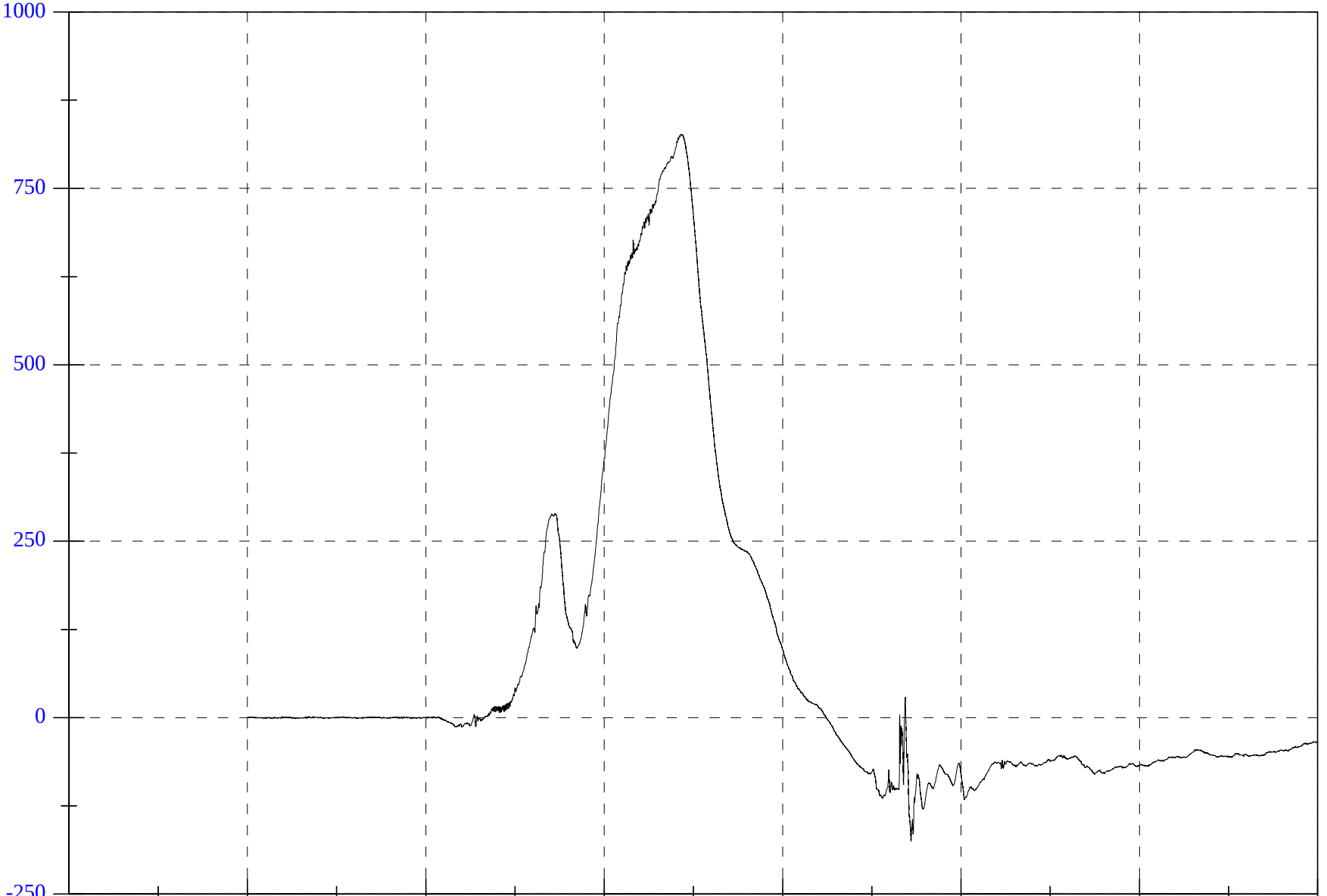
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Lower Neck Fx

Max: 826.8 [N] at 0.143 [s]

Min: -174.8 [N] at 0.272 [s]



B-26

8655-F301-18R

CFC_1000

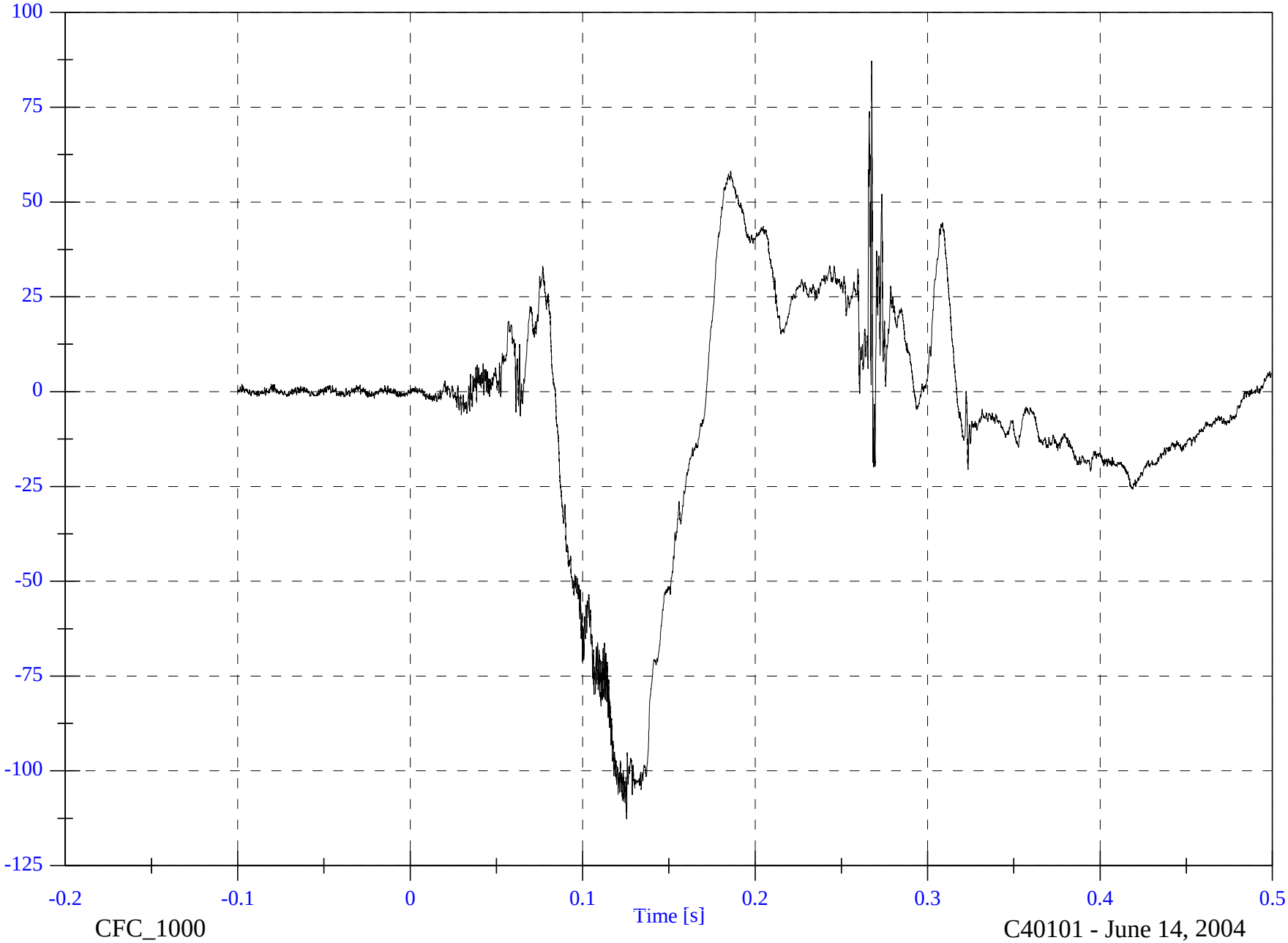
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Lower Neck Fy

Max: 87.2 [N] at 0.268 [s]

Min: -112.7 [N] at 0.126 [s]

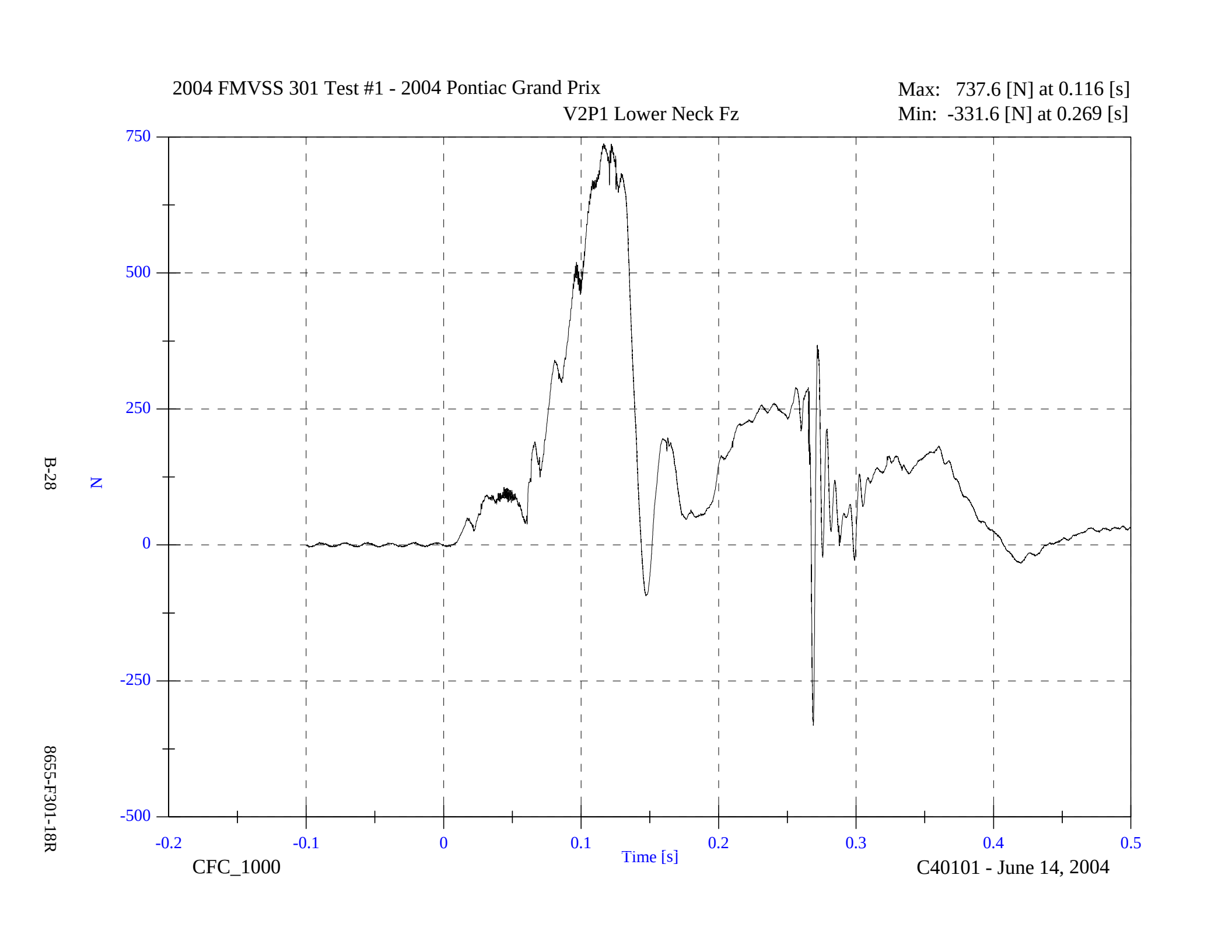


CFC_1000

C40101 - June 14, 2004

B-27

8655-F301-18R

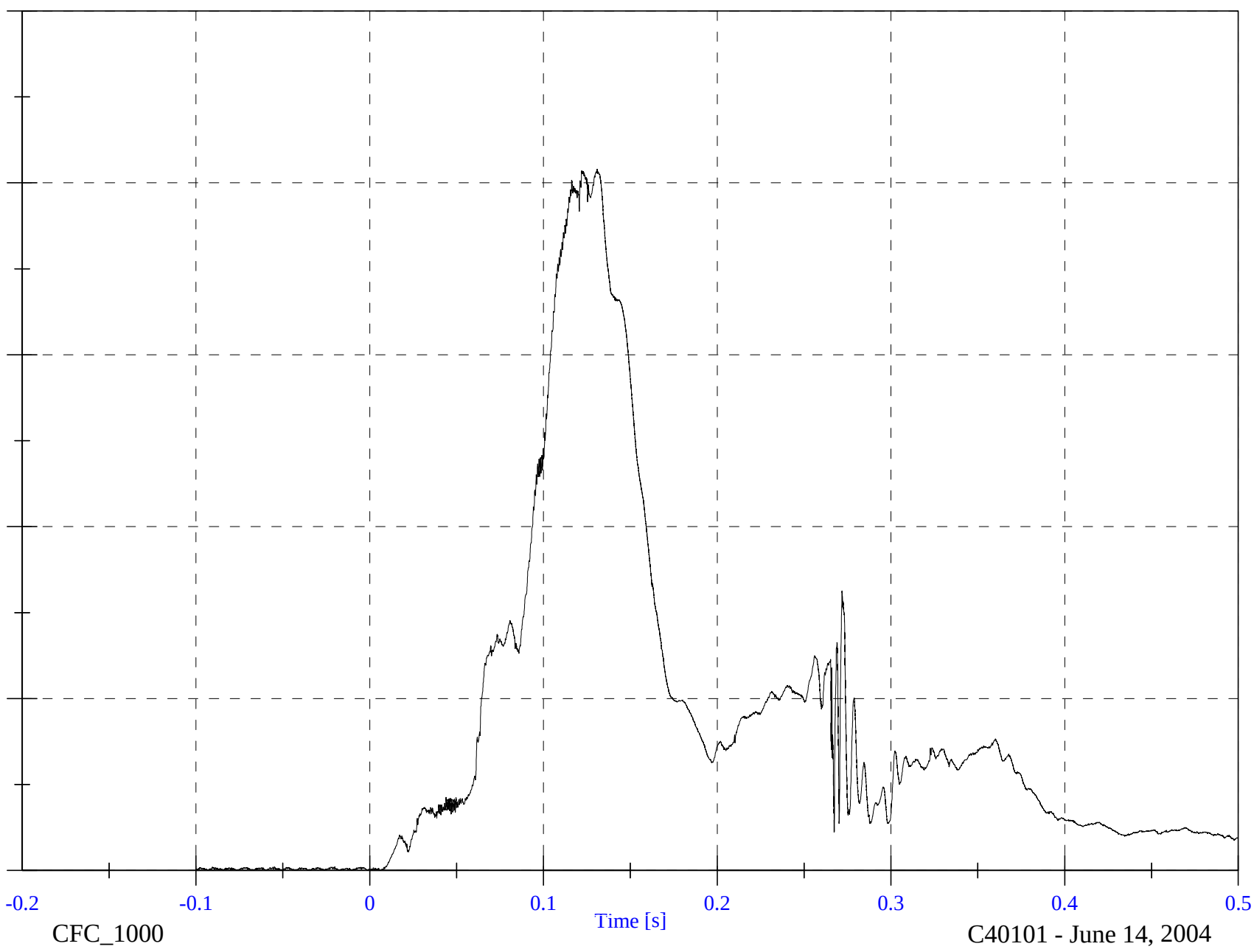

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P1 Lower Neck Fz
Max: 737.6 [N] at 0.116 [s]
Min: -331.6 [N] at 0.269 [s]
750
500
250
0
-250
-500
N
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
B-28
8655-F301-18R
CFC_1000
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Lower Neck F Resultant

Max: 1019.6 [N] at 0.131 [s]

Min: 0.1 [N] at -0.050 [s]



B-29

8655-F301-18R

CFC_1000

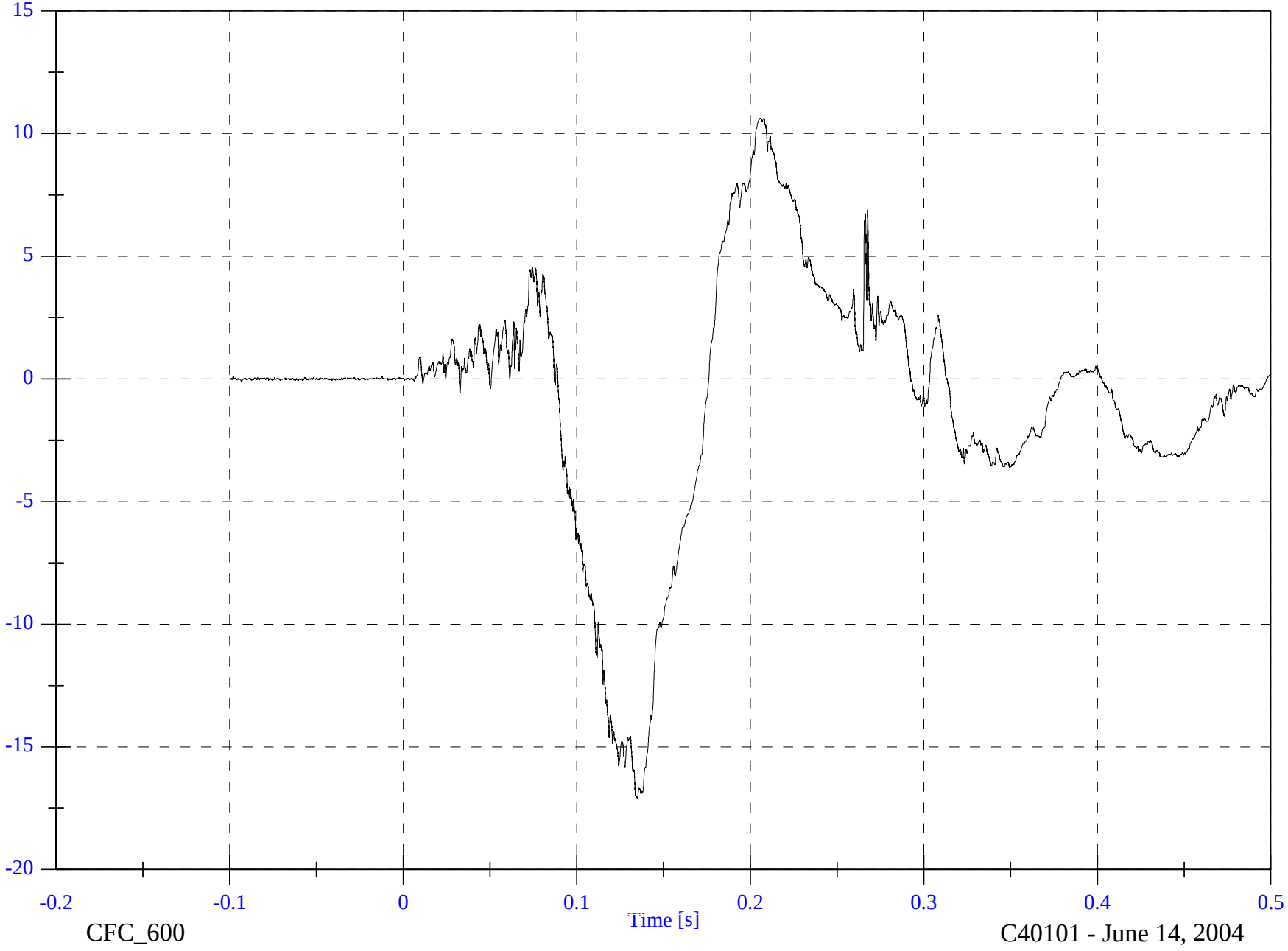
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Lower Neck Mx

Max: 10.6 [N-m] at 0.206 [s]

Min: -17.1 [N-m] at 0.135 [s]



CFC_600

C40101 - June 14, 2004

B-30

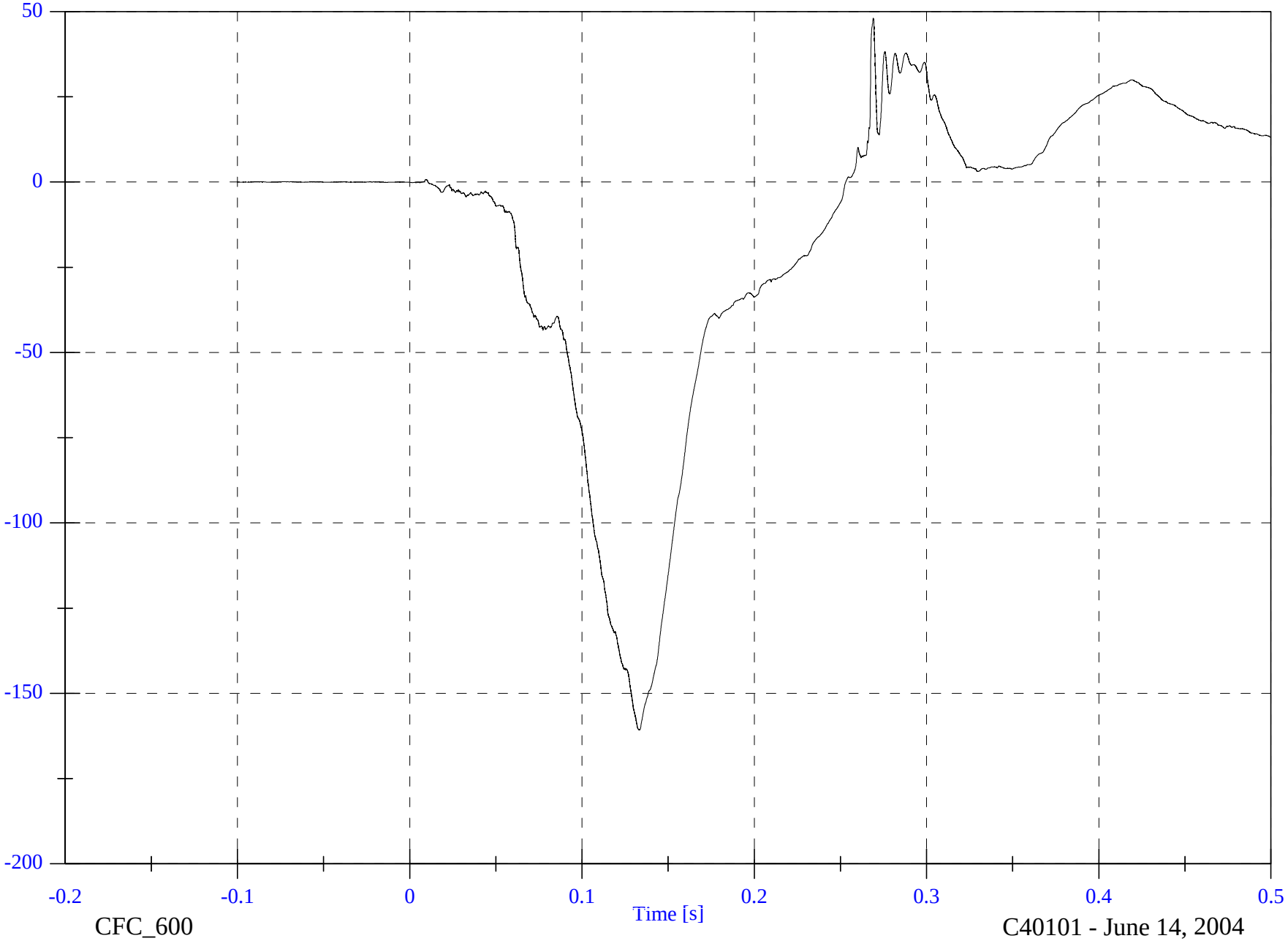
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Lower Neck My

Max: 48.1 [N-m] at 0.269 [s]

Min: -160.7 [N-m] at 0.134 [s]



B-31

8655-F301-18R

CFC_600

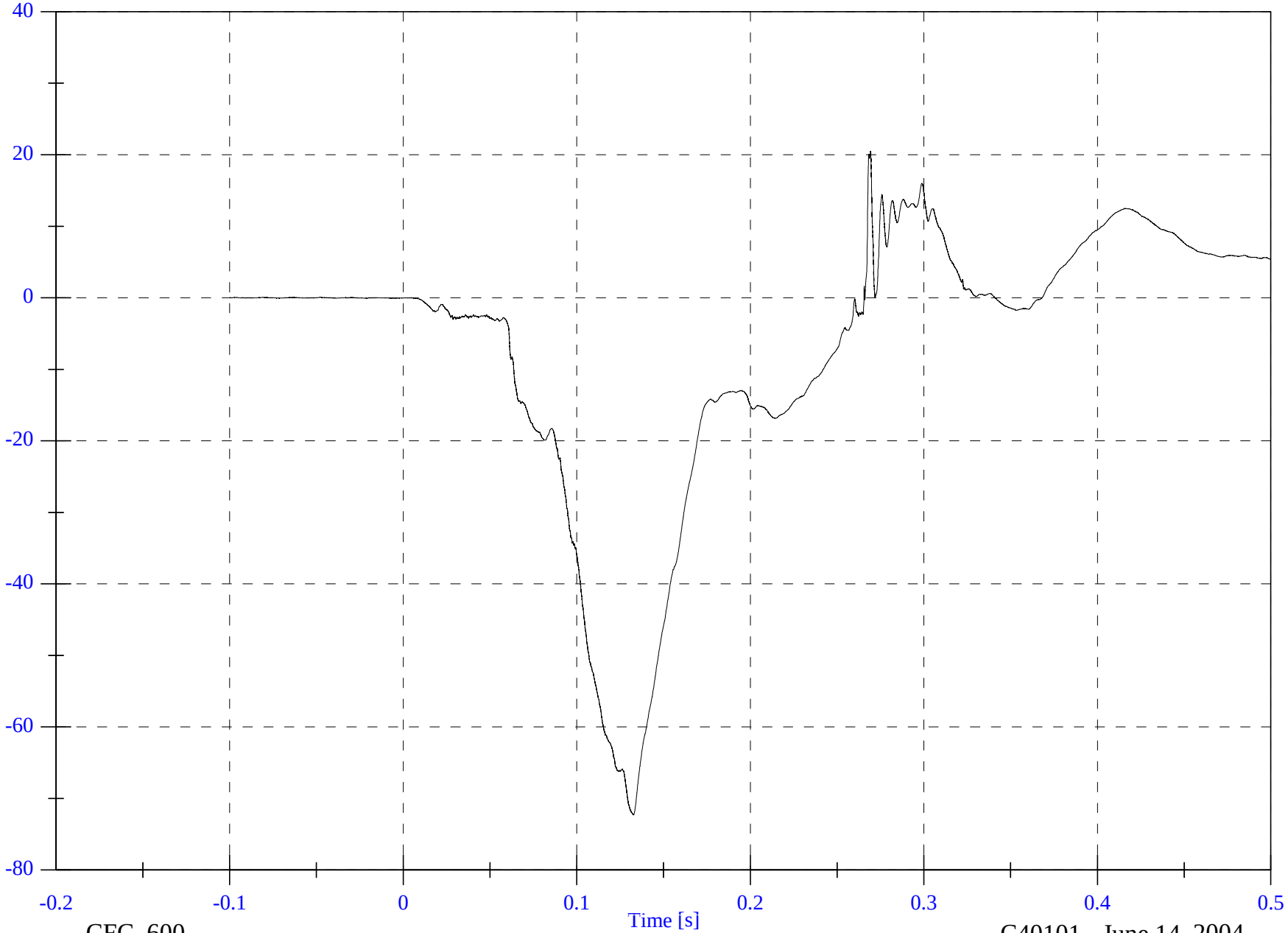
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Lower Neck Mz

Max: 20.5 [N-m] at 0.269 [s]

Min: -72.3 [N-m] at 0.133 [s]



CFC_600

C40101 - June 14, 2004

B-32

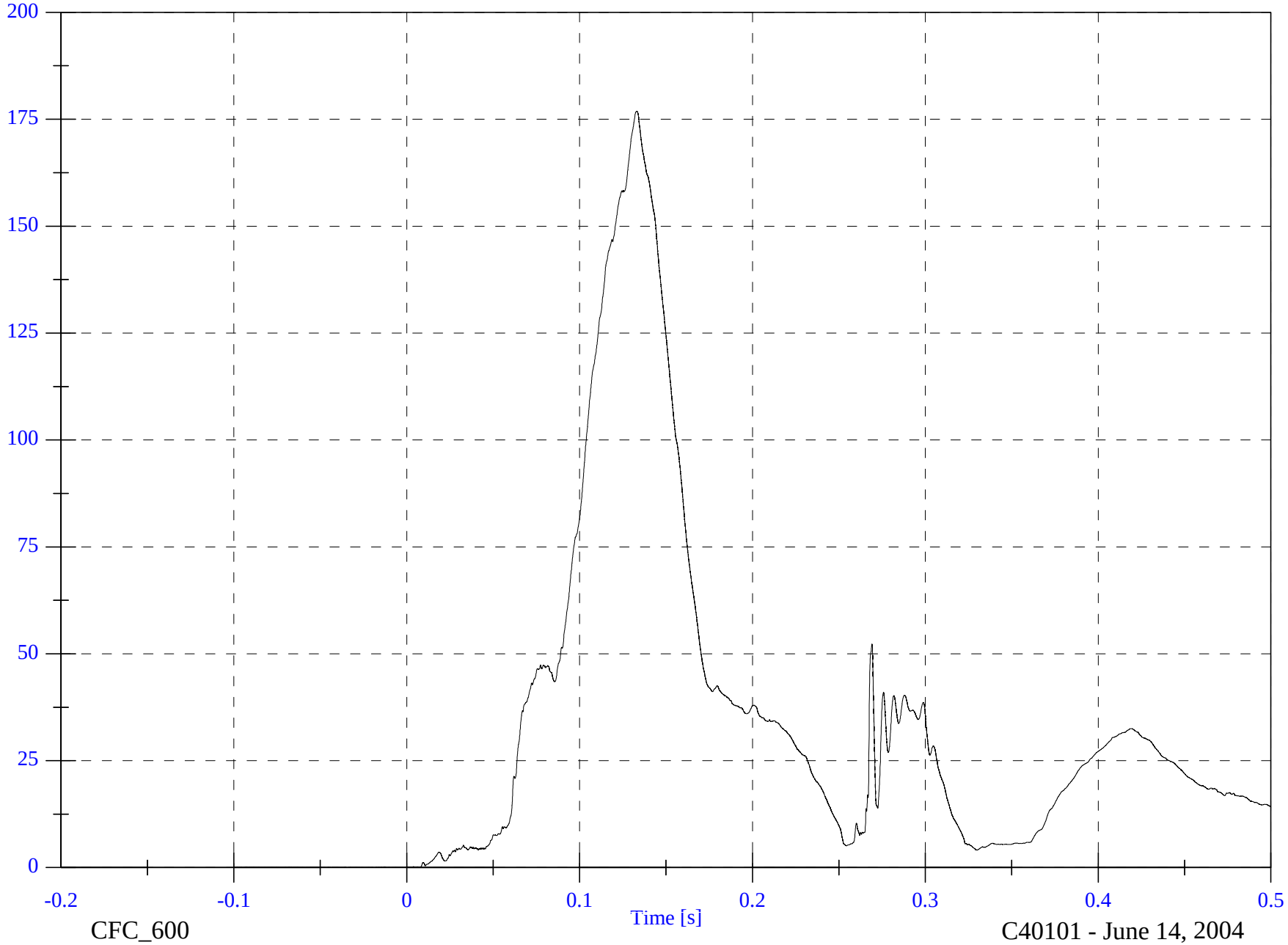
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Lower Neck M Resultant

Max: 176.9 [N-m] at 0.133 [s]

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



CFC_600

C40101 - June 14, 2004

B-33

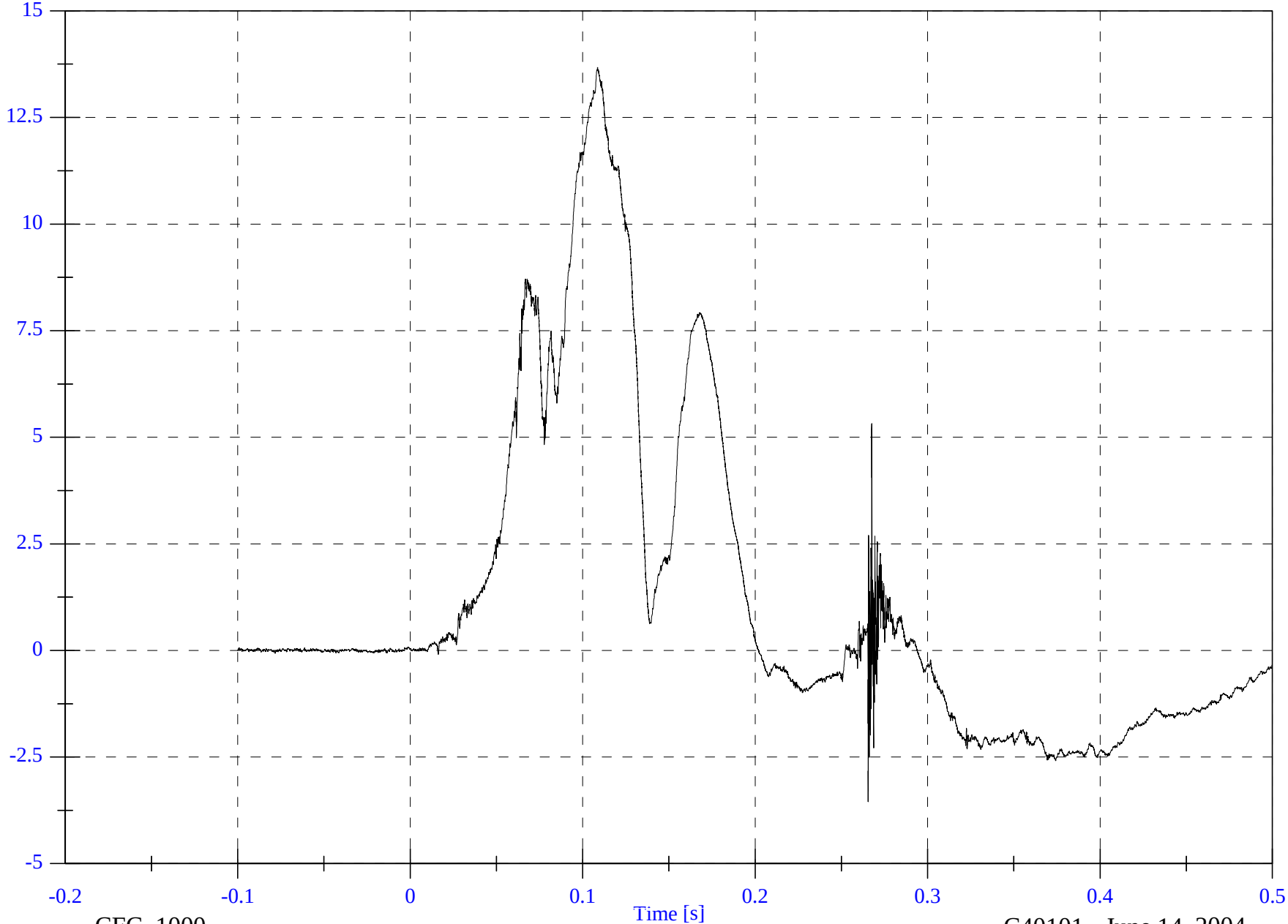
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Lower Neck x

Max: 13.7 [g] at 0.109 [s]

Min: -3.5 [g] at 0.266 [s]

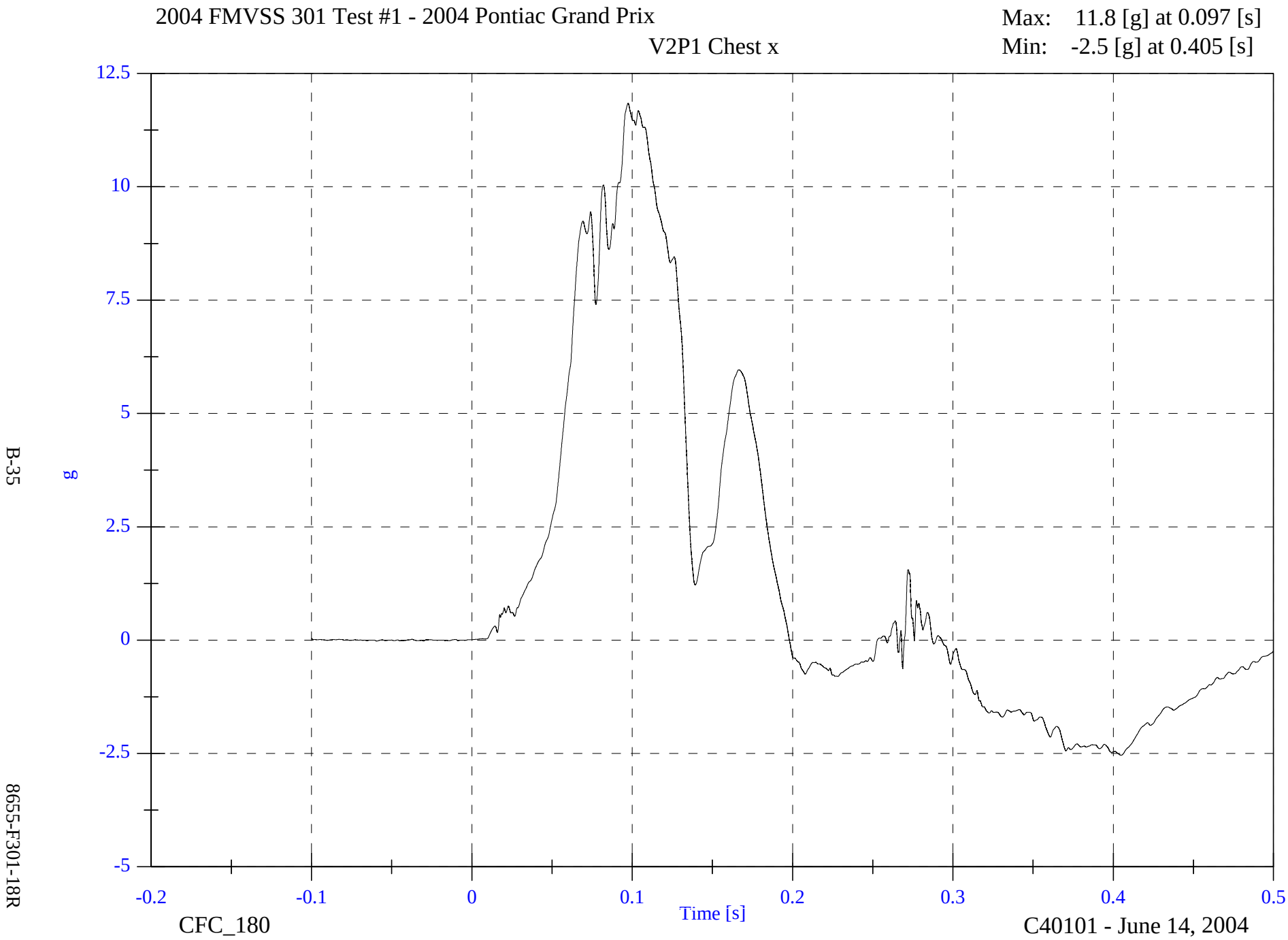


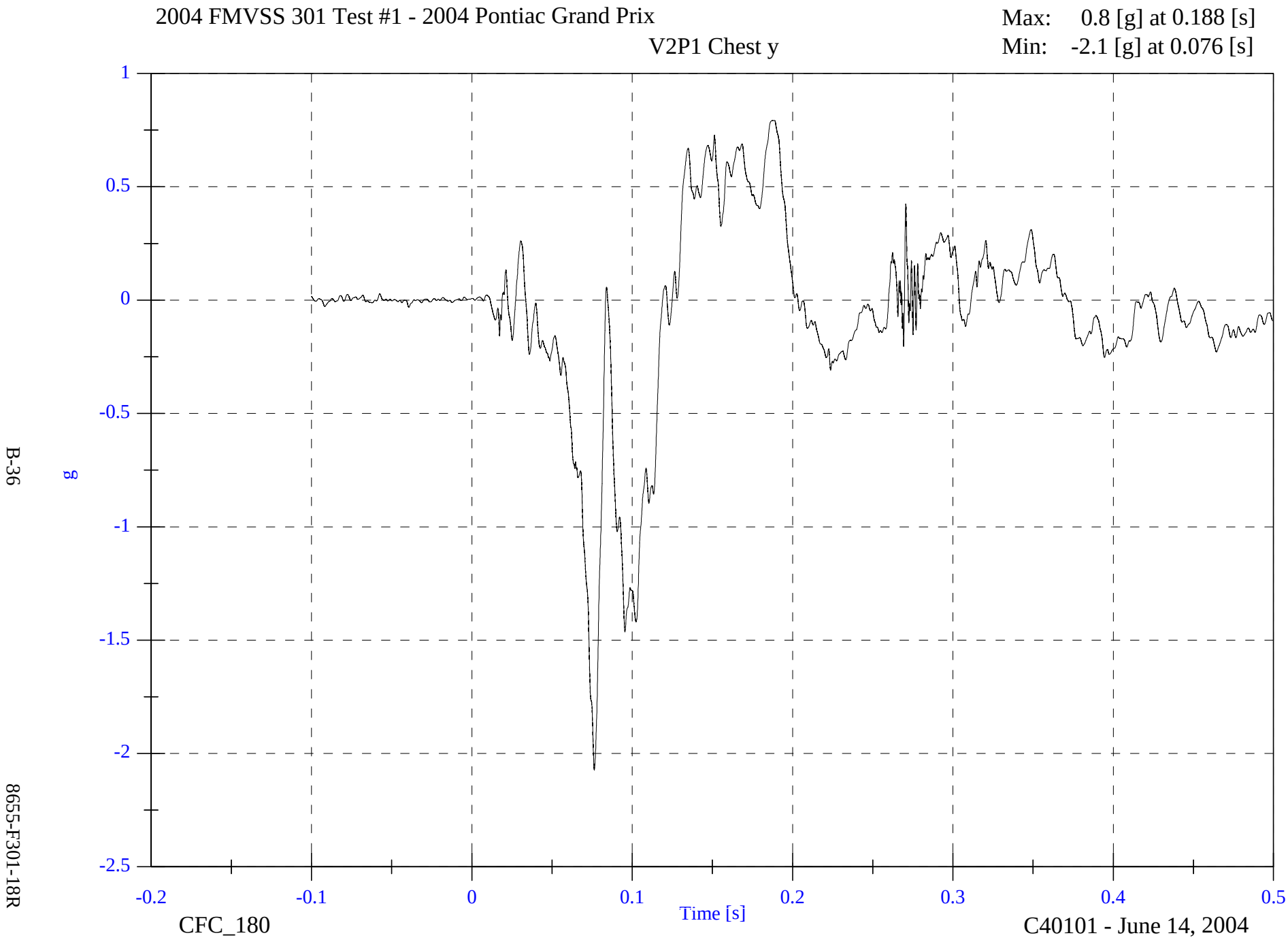
CFC_1000

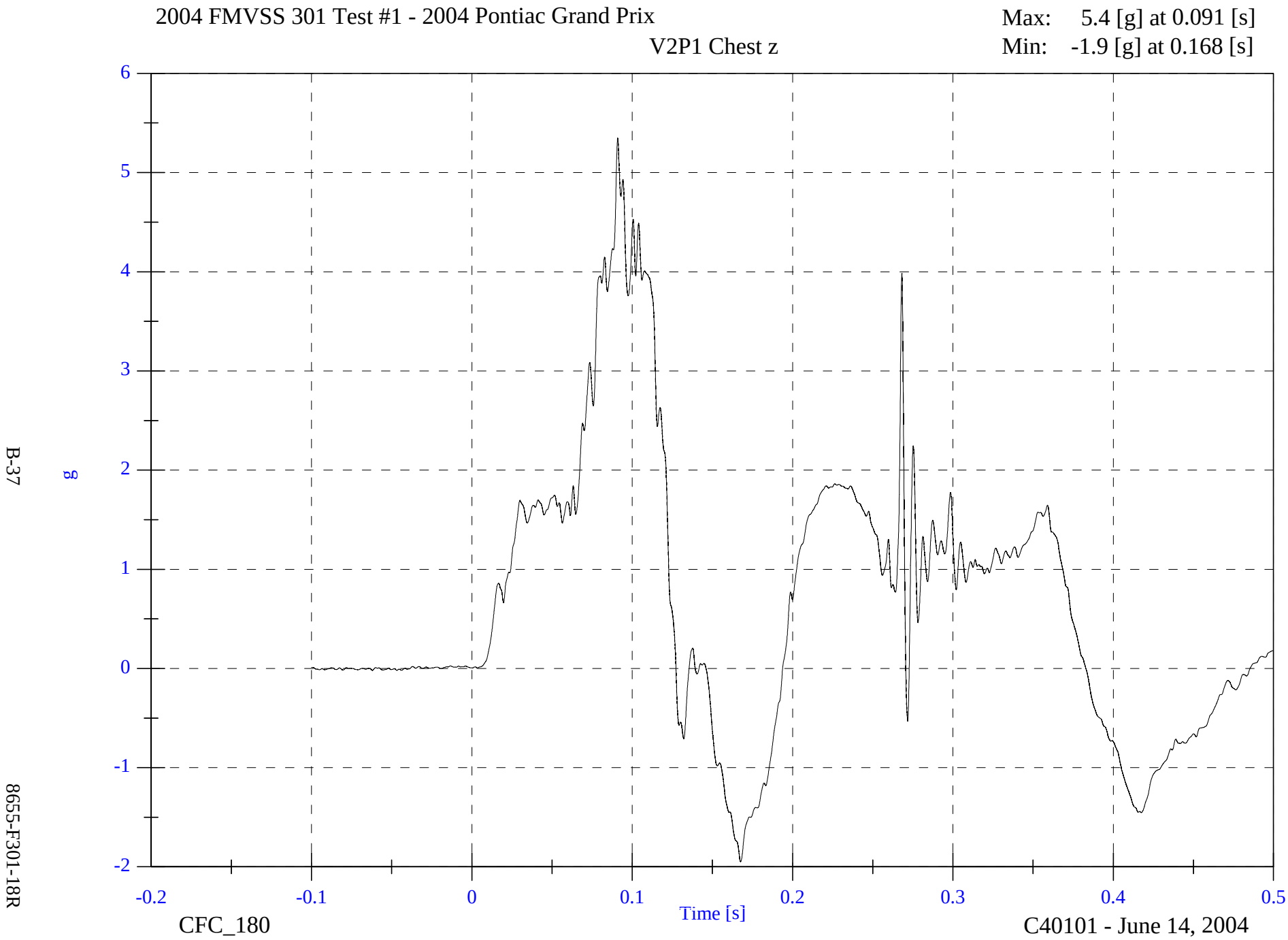
C40101 - June 14, 2004

B-34

8655-F301-18R


2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P1 Chest x
Max: 11.8 [g] at 0.097 [s]
Min: -2.5 [g] at 0.405 [s]
12.5
10
7.5
5
2.5
0
-2.5
-5
g
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
B-35
8655-F301-18R
CFC_180
C40101 - June 14, 2004


2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P1 Chest y
Max: 0.8 [g] at 0.188 [s]
Min: -2.1 [g] at 0.076 [s]
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
g
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
CFC_180
C40101 - June 14, 2004

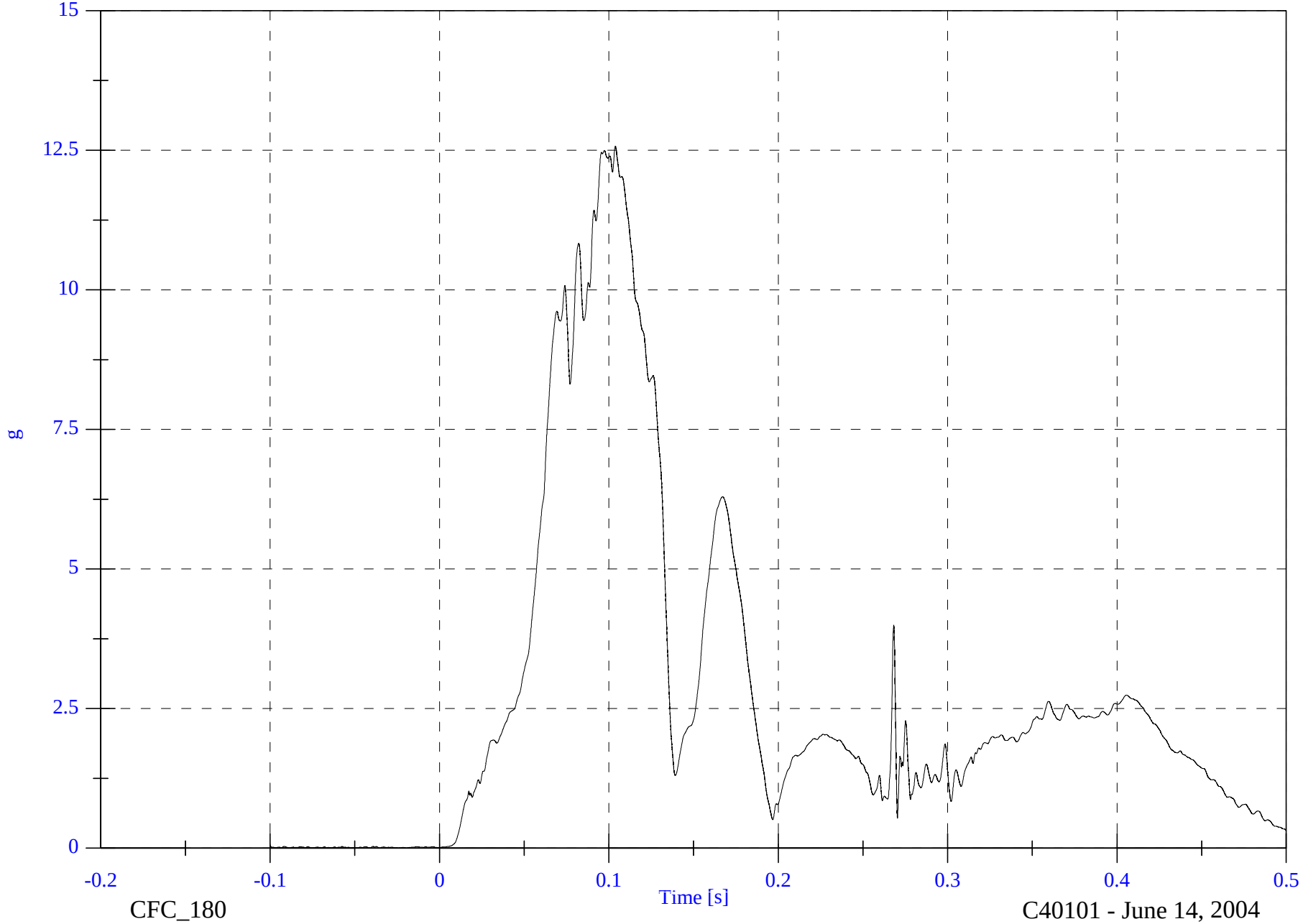

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P1 Chest z
Max: 5.4 [g] at 0.091 [s]
Min: -1.9 [g] at 0.168 [s]
6
5
4
3
2
1
0
-1
-2
g
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
CFC_180
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Chest Resultant

Max: 12.6 [g] at 0.104 [s]

Min: 0.0 [g] at -0.020 [s]



B-38

8655-F301-18R

CFC_180

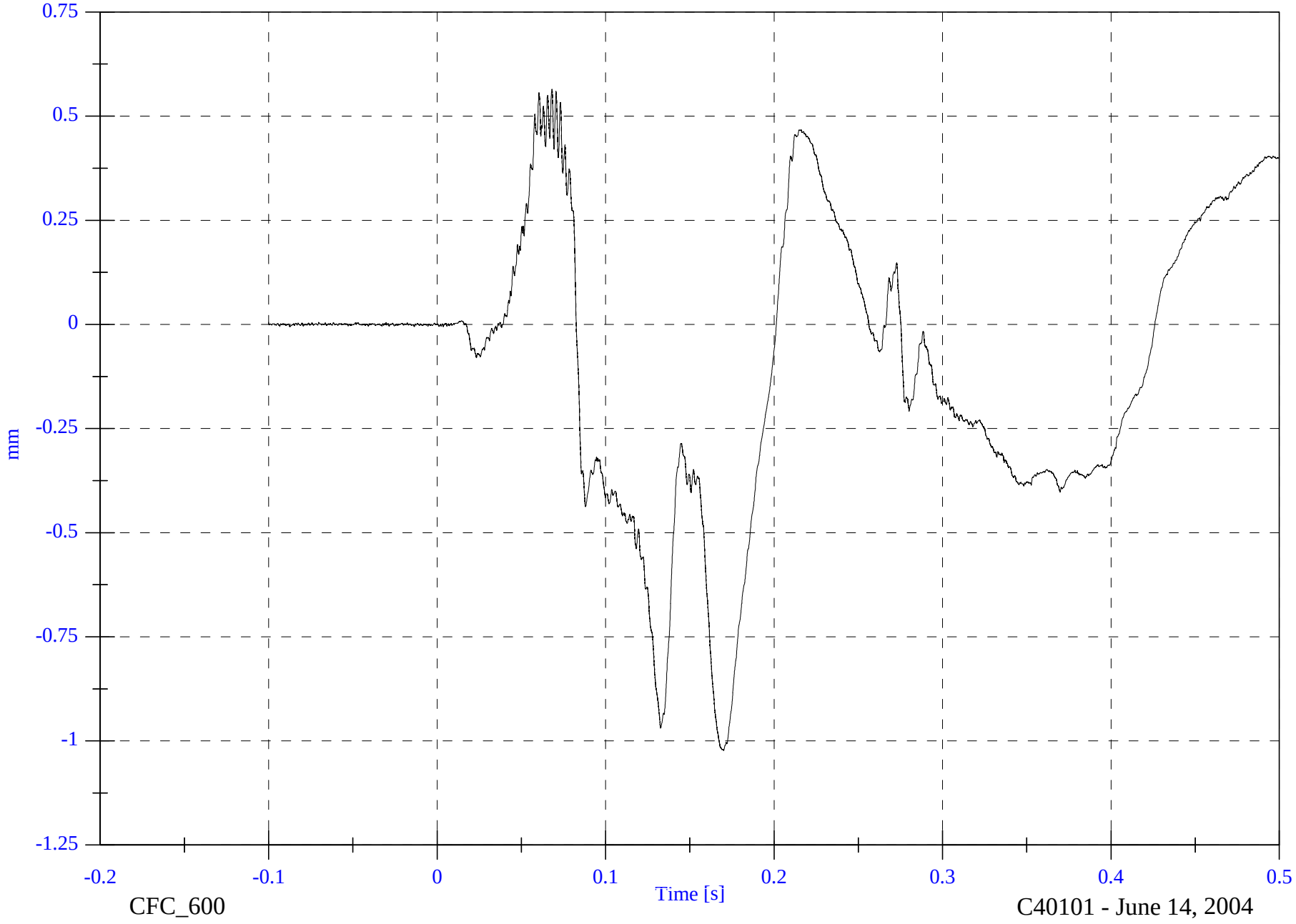
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Chest Displacement

Max: 0.6 [mm] at 0.068 [s]

Min: -1.0 [mm] at 0.170 [s]

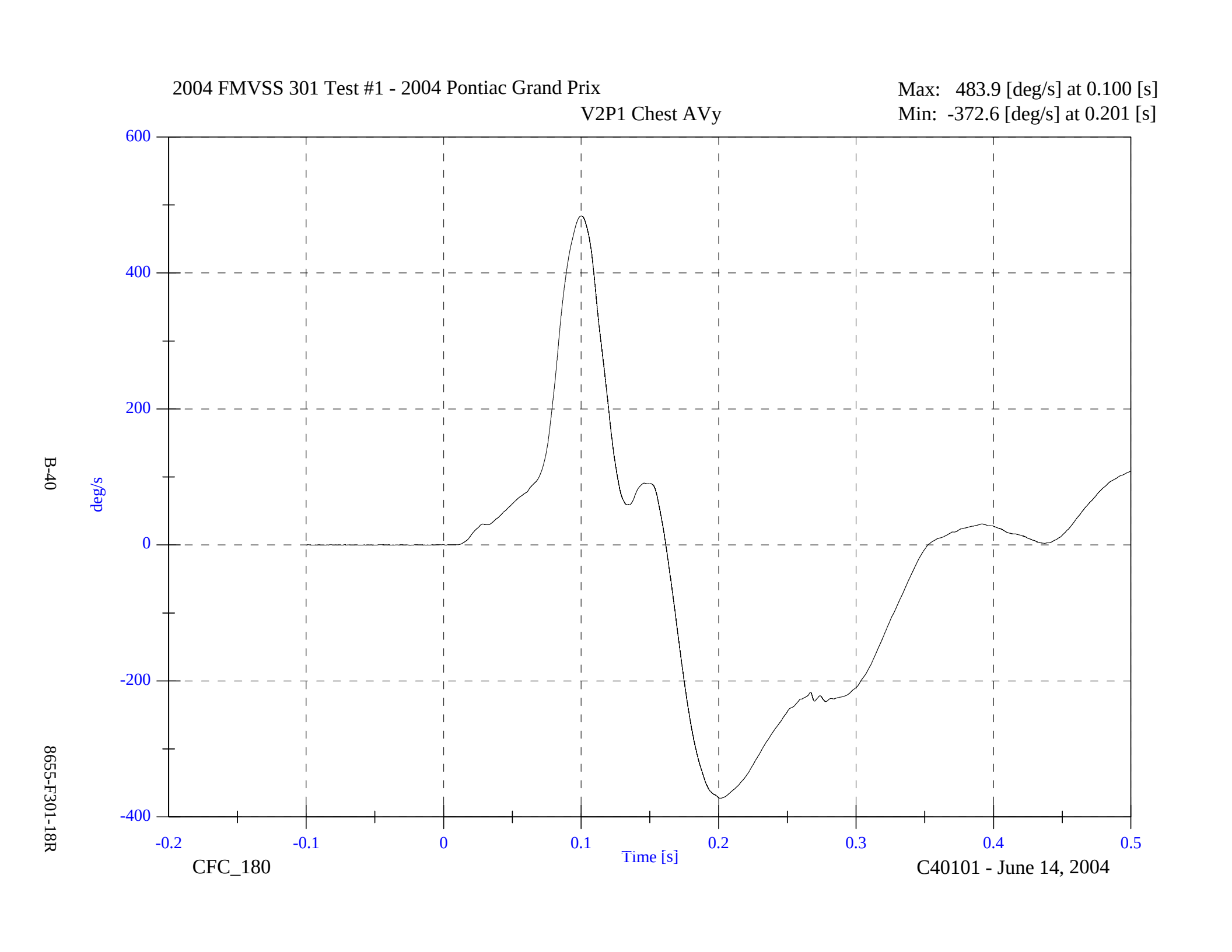


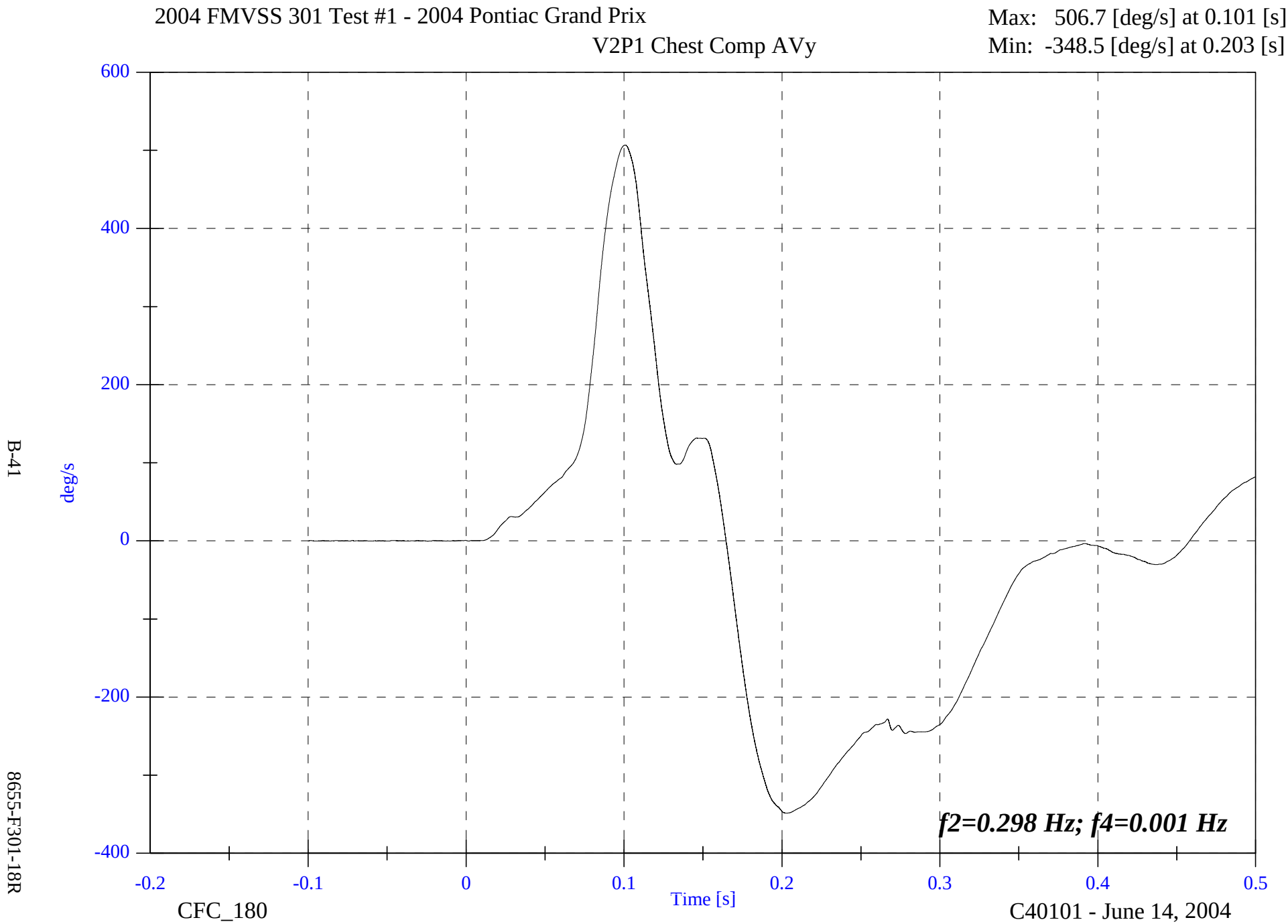
CFC_600

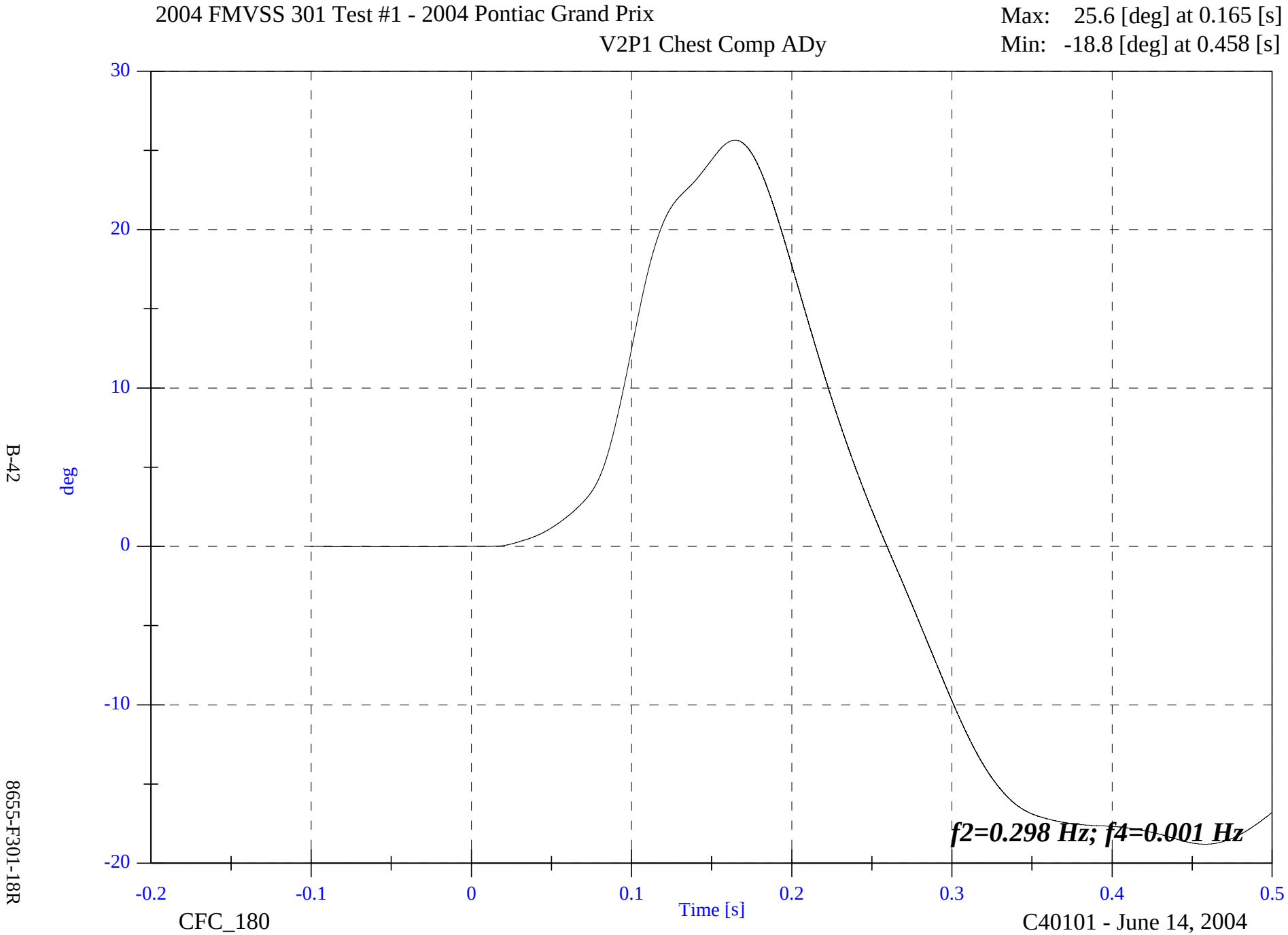
C40101 - June 14, 2004

B-39

8655-F301-18R


2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P1 Chest AVy
Max: 483.9 [deg/s] at 0.100 [s]
Min: -372.6 [deg/s] at 0.201 [s]
600
400
200
0
-200
-400
deg/s
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
B-40
8655-F301-18R
CFC_180
C40101 - June 14, 2004


2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P1 Chest Comp AVy
Max: 506.7 [deg/s] at 0.101 [s]
Min: -348.5 [deg/s] at 0.203 [s]
600
400
200
0
-200
-400
deg/s
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
f2=0.298 Hz; f4=0.001 Hz
CFC_180
C40101 - June 14, 2004

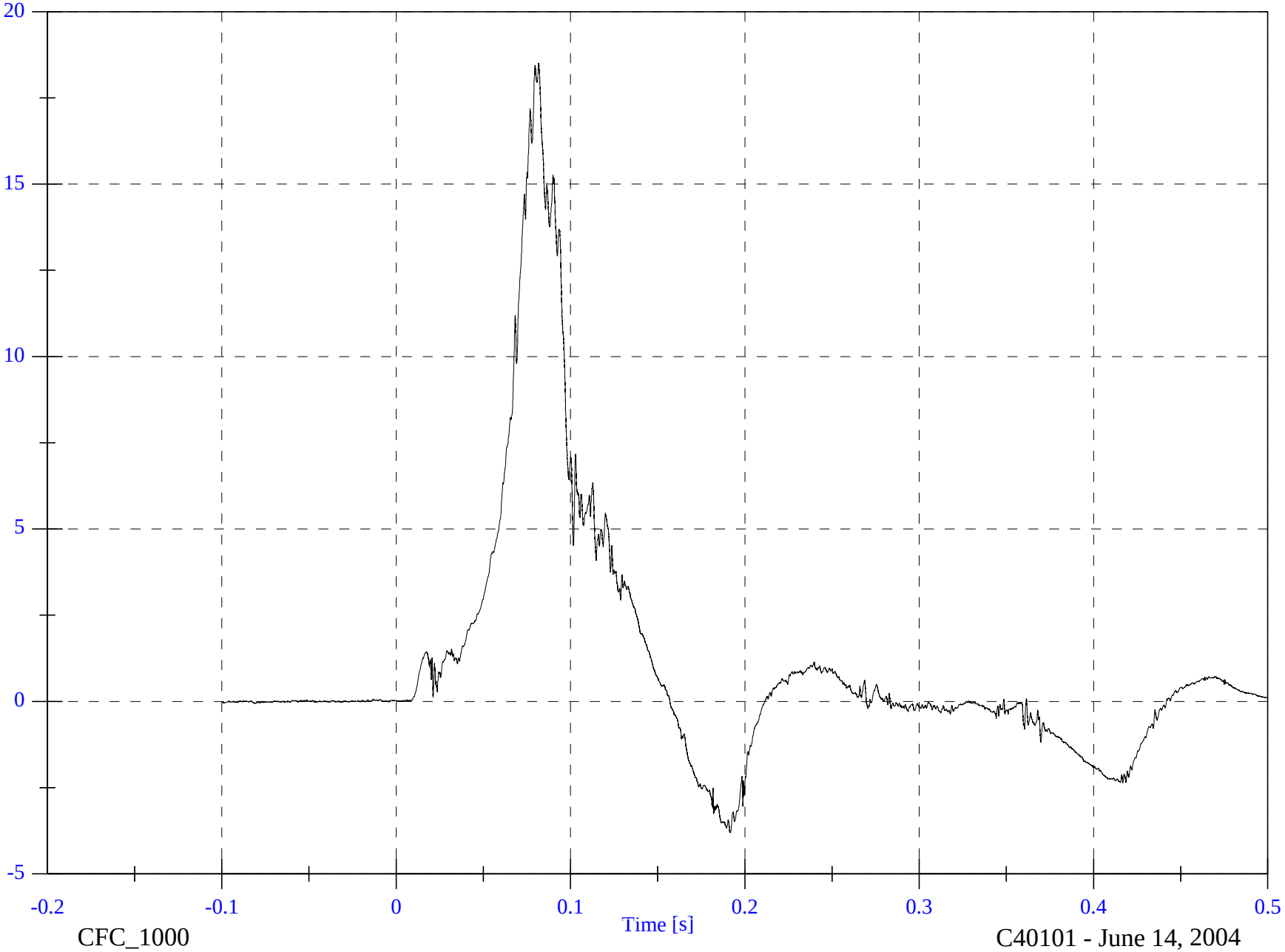

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P1 Chest Comp ADy
Max: 25.6 [deg] at 0.165 [s]
Min: -18.8 [deg] at 0.458 [s]
30
20
10
0
-10
-20
deg
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
f2=0.298 Hz; f4=0.001 Hz
CFC_180
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Pelvic x

Max: 18.5 [g] at 0.082 [s]

Min: -3.8 [g] at 0.192 [s]

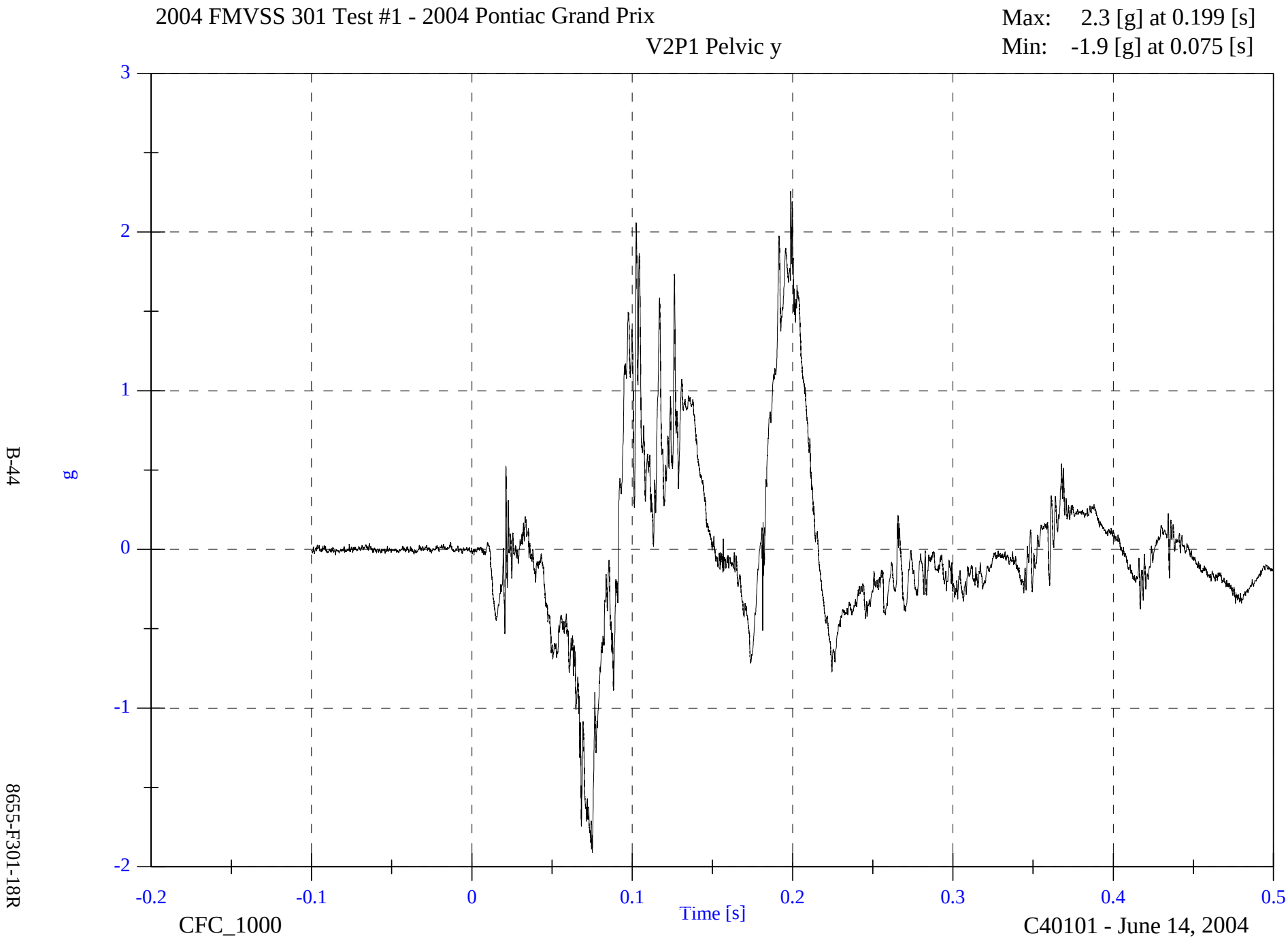


B-43

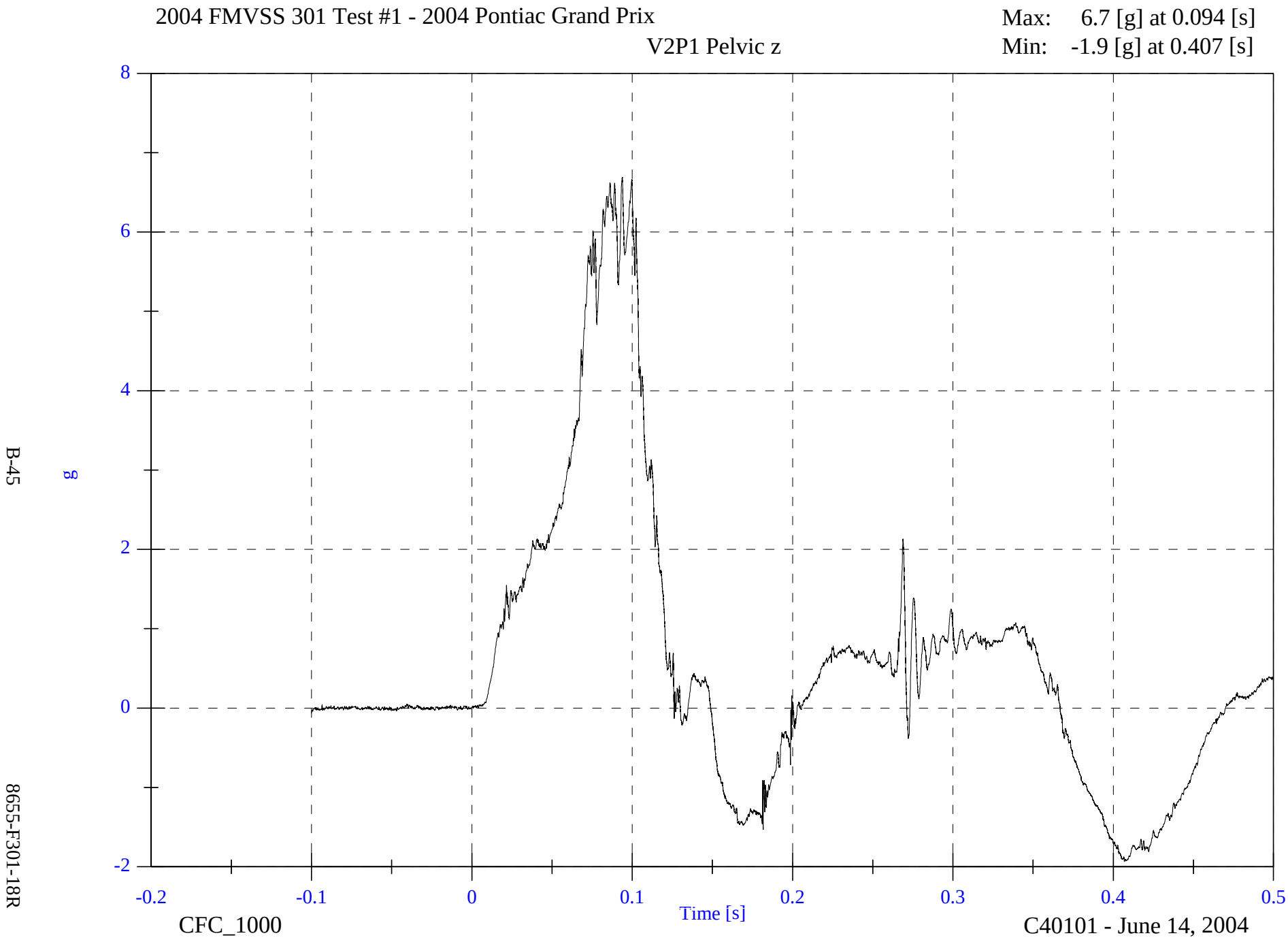
8655-F301-18R

CFC_1000

C40101 - June 14, 2004



8655-F301-18R

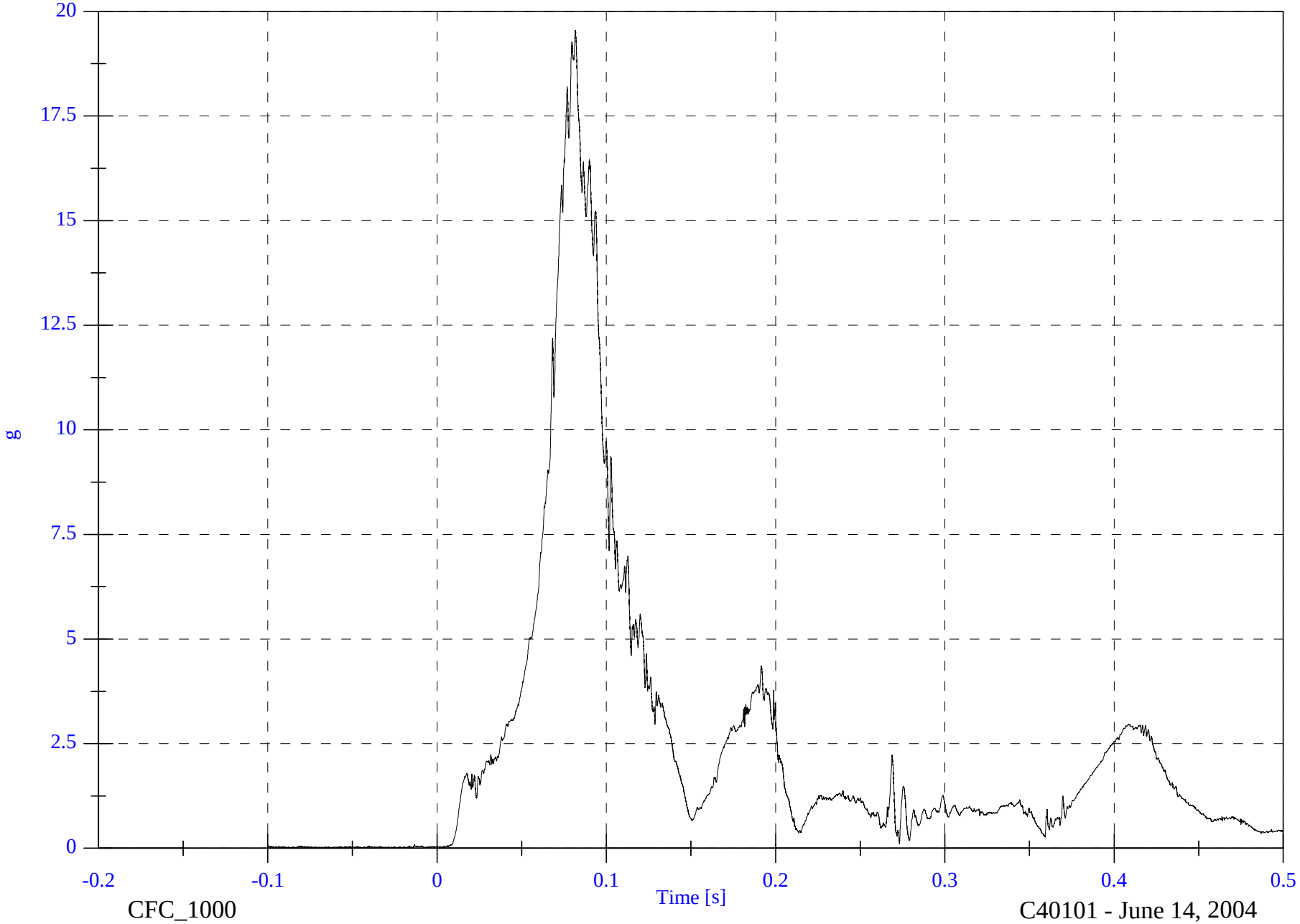

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P1 Pelvic z
Max: 6.7 [g] at 0.094 [s]
Min: -1.9 [g] at 0.407 [s]
8
6
4
2
0
-2
g
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
B-45
8655-F301-18R
CFC_1000
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Pelvic Resultant

Max: 19.6 [g] at 0.082 [s]

Min: 0.0 [g] at -0.089 [s]



B-46

8655-F301-18R

CFC_1000

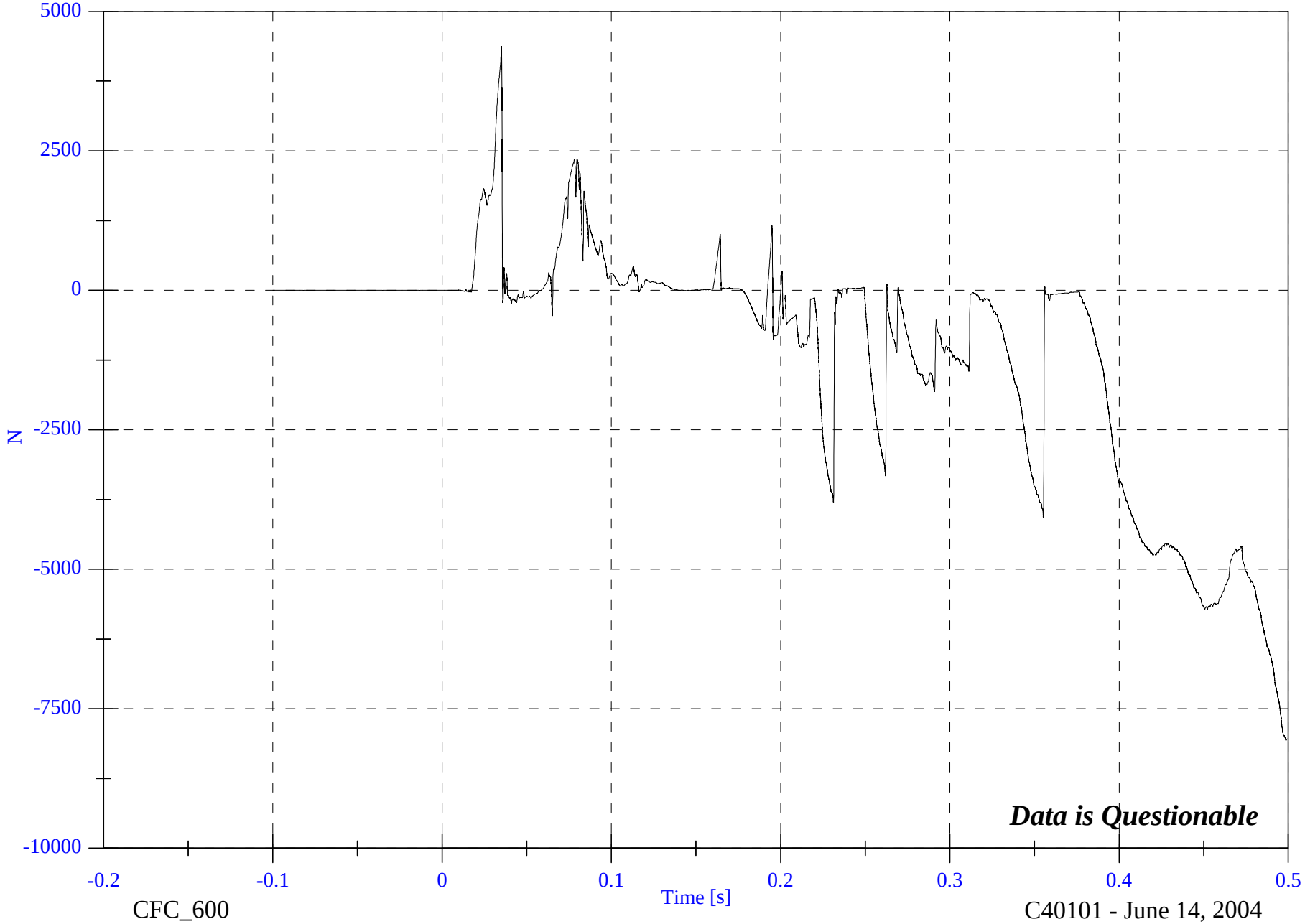
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Left Femur

Max: 4375.9 [N] at 0.035 [s]

Min: -8069.3 [N] at 0.499 [s]



B-47

8655-F301-18R

CFC_600

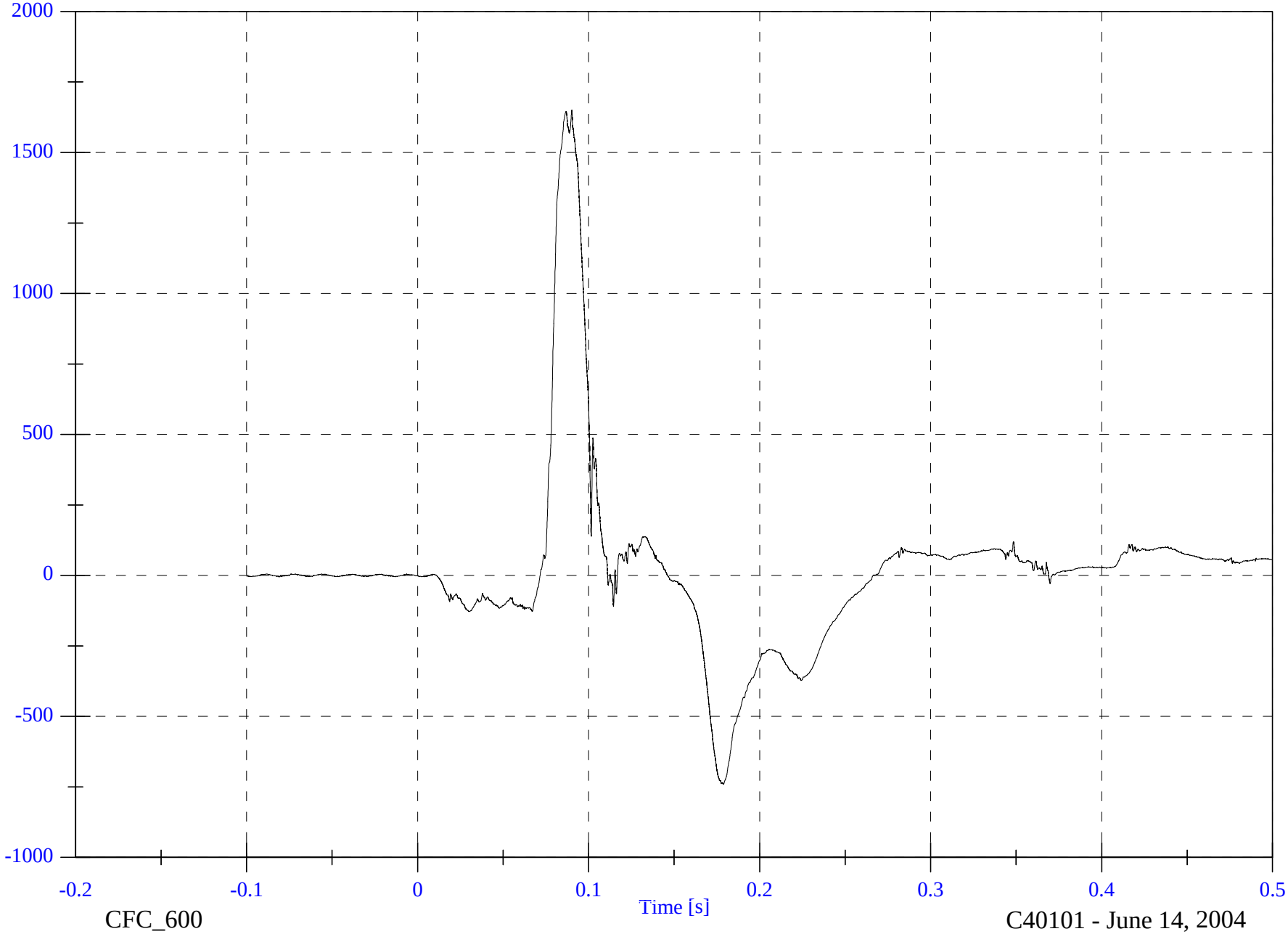
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Right Femur

Max: 1650.1 [N] at 0.090 [s]

Min: -740.6 [N] at 0.179 [s]



B-48

8655-F301-18R

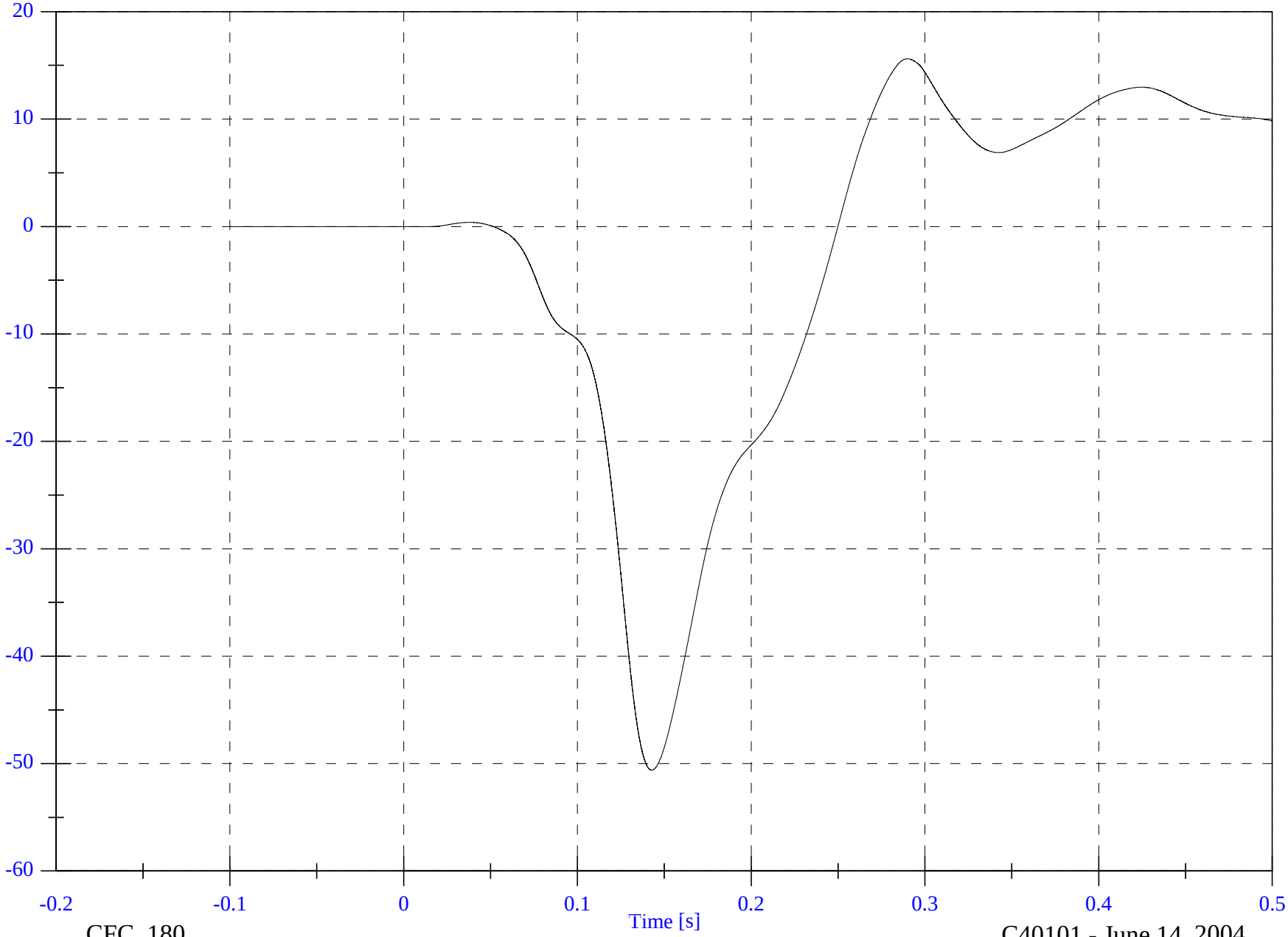
CFC_600

C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Head to Chest

Max: 15.6 [deg] at 0.290 [s]
Min: -50.6 [deg] at 0.143 [s]



B-49

8655-F301-18R

CFC_180

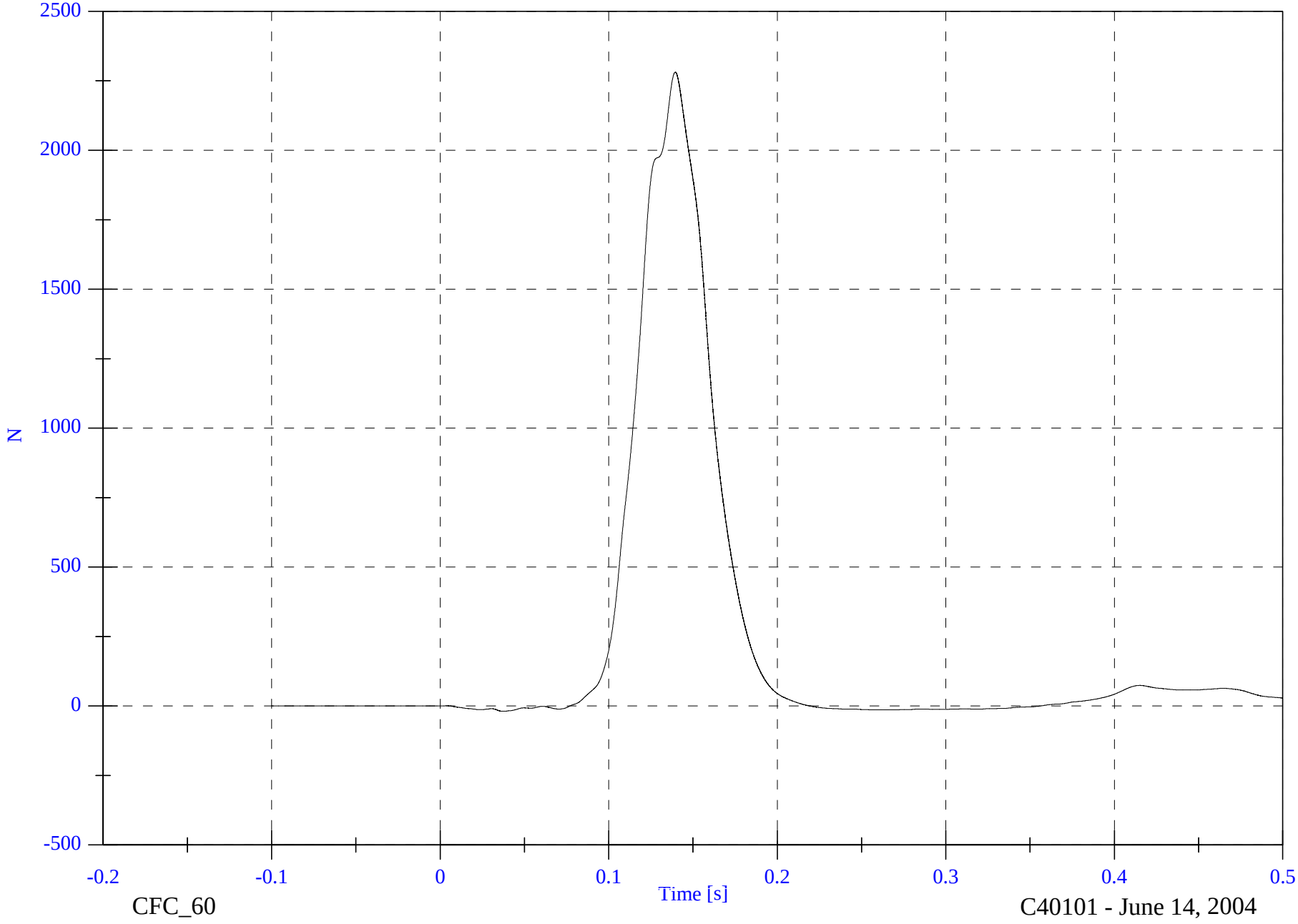
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Lap Belt Load

Max: 2281.0 [N] at 0.139 [s]

Min: -18.9 [N] at 0.037 [s]



B-50

8655-F301-18R

CFC_60

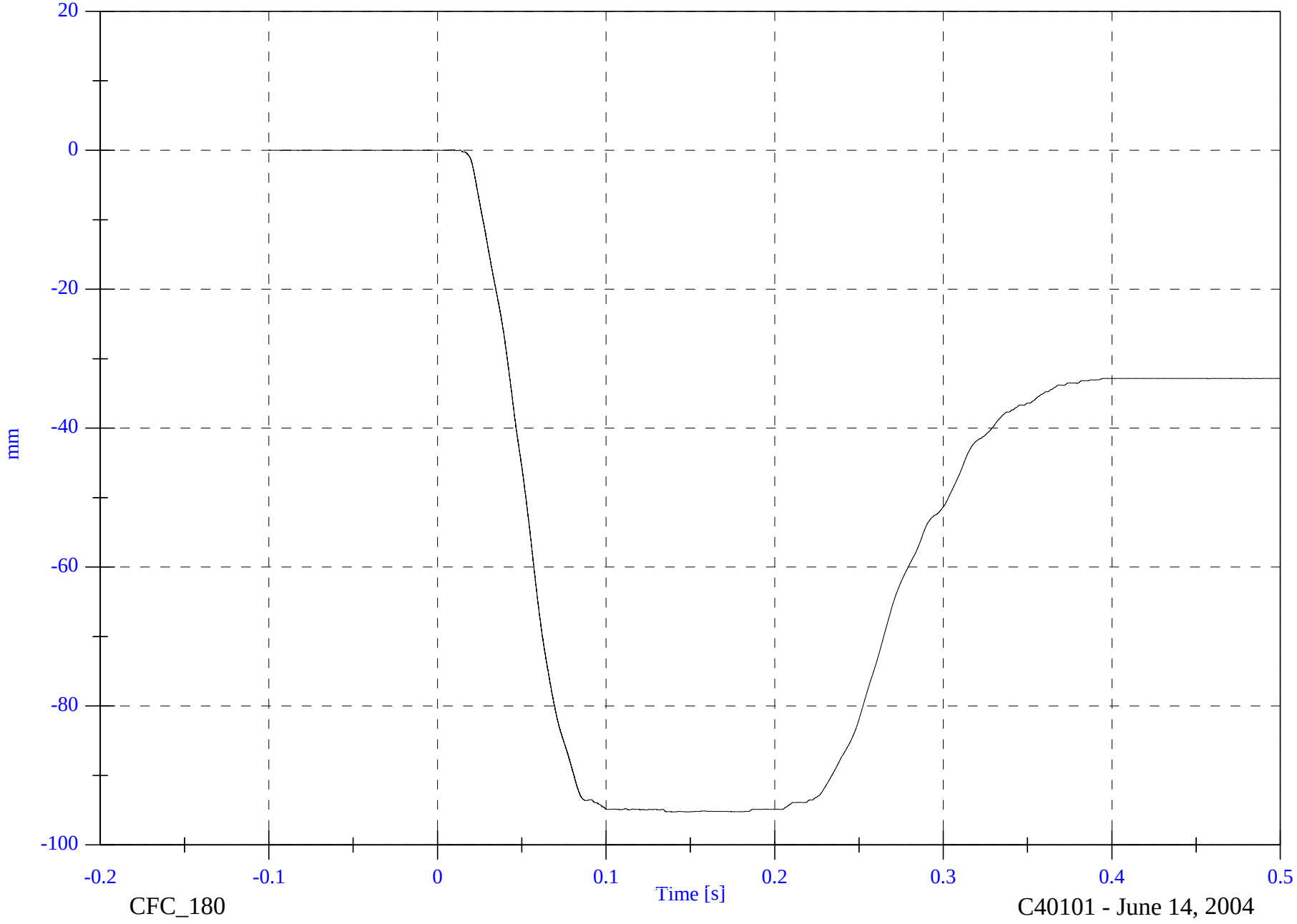
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Belt Spoolout

Max: 0.1 [mm] at 0.009 [s]

Min: -95.3 [mm] at 0.140 [s]



B-51

8655-F301-18R

CFC_180

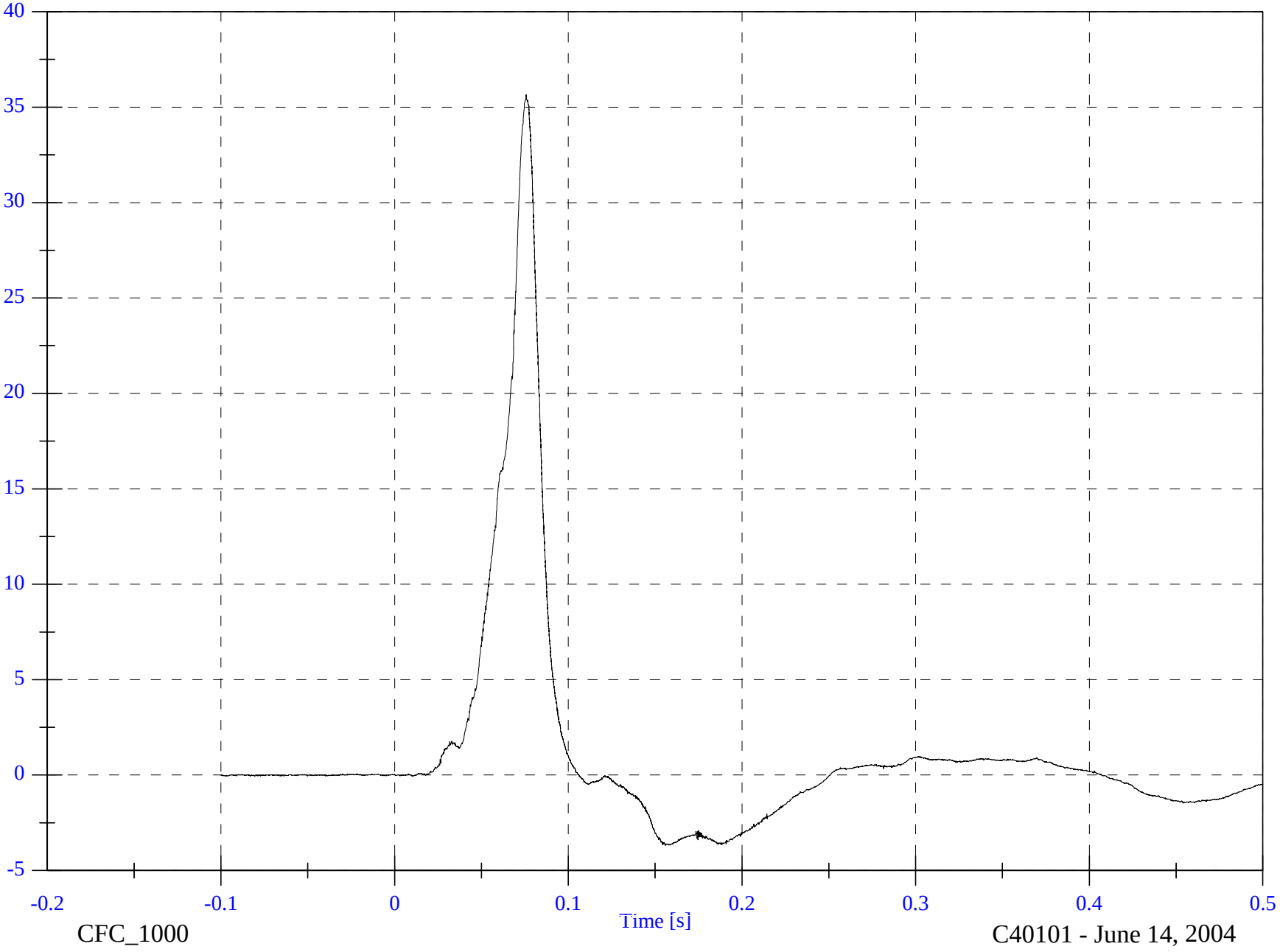
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Head x

Max: 35.6 [g] at 0.076 [s]

Min: -3.7 [g] at 0.156 [s]



B-52

8655-F301-18R

CFC_1000

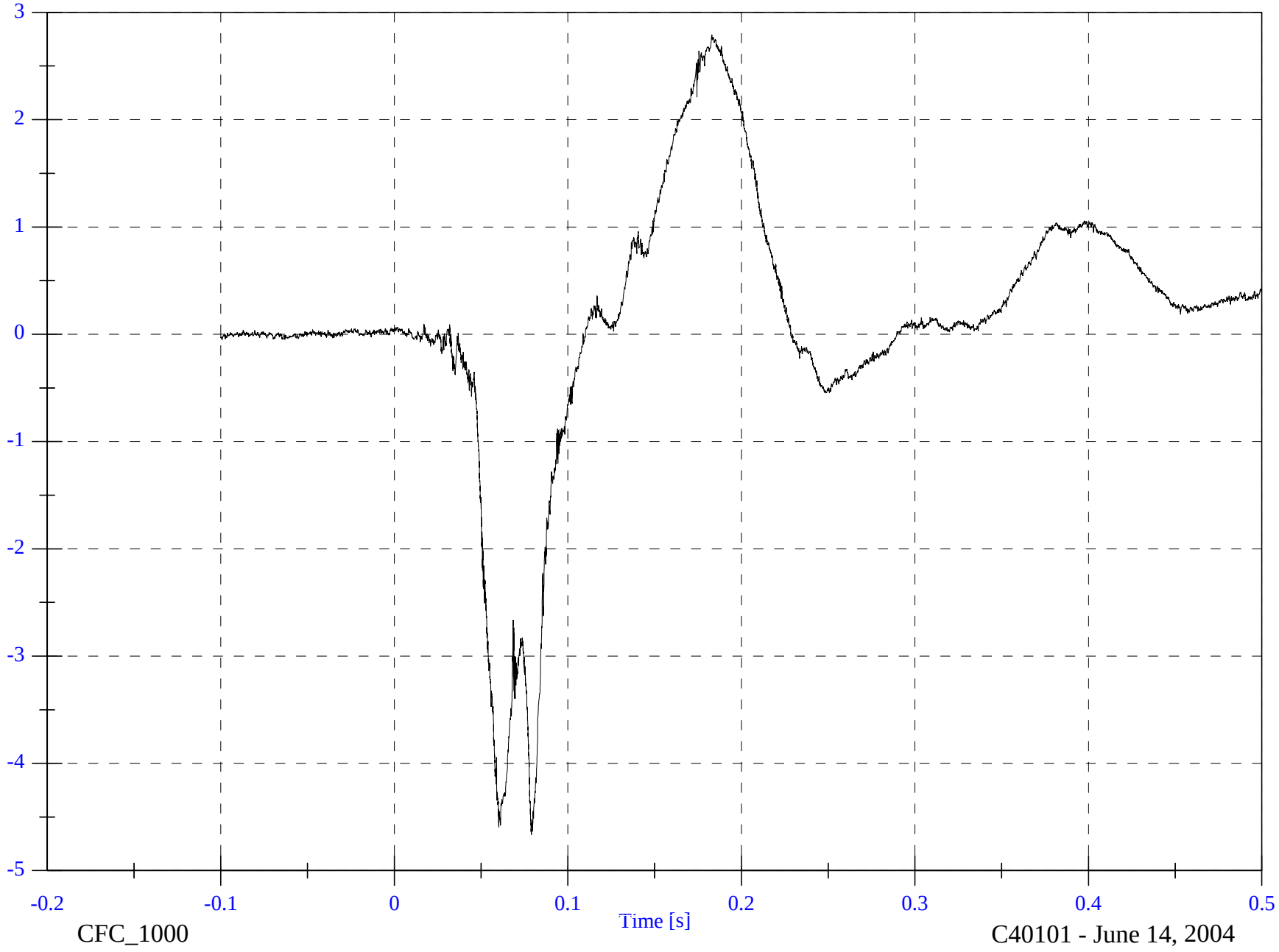
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Head y

Max: 2.8 [g] at 0.183 [s]

Min: -4.7 [g] at 0.079 [s]



B-53

8655-F301-18R

CFC_1000

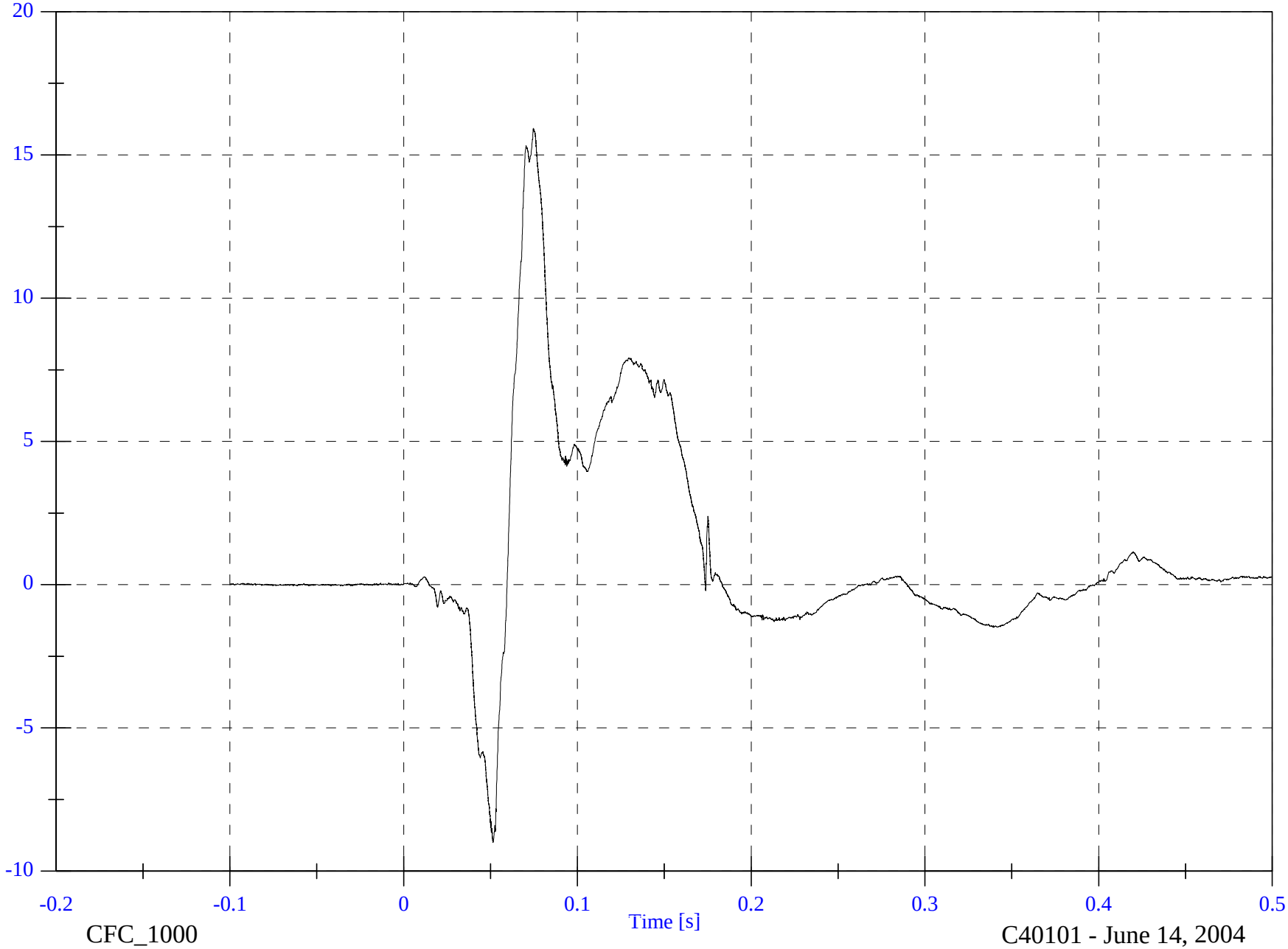
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Head z

Max: 15.9 [g] at 0.075 [s]

Min: -9.0 [g] at 0.051 [s]



B-54

8655-F301-18R

CFC_1000

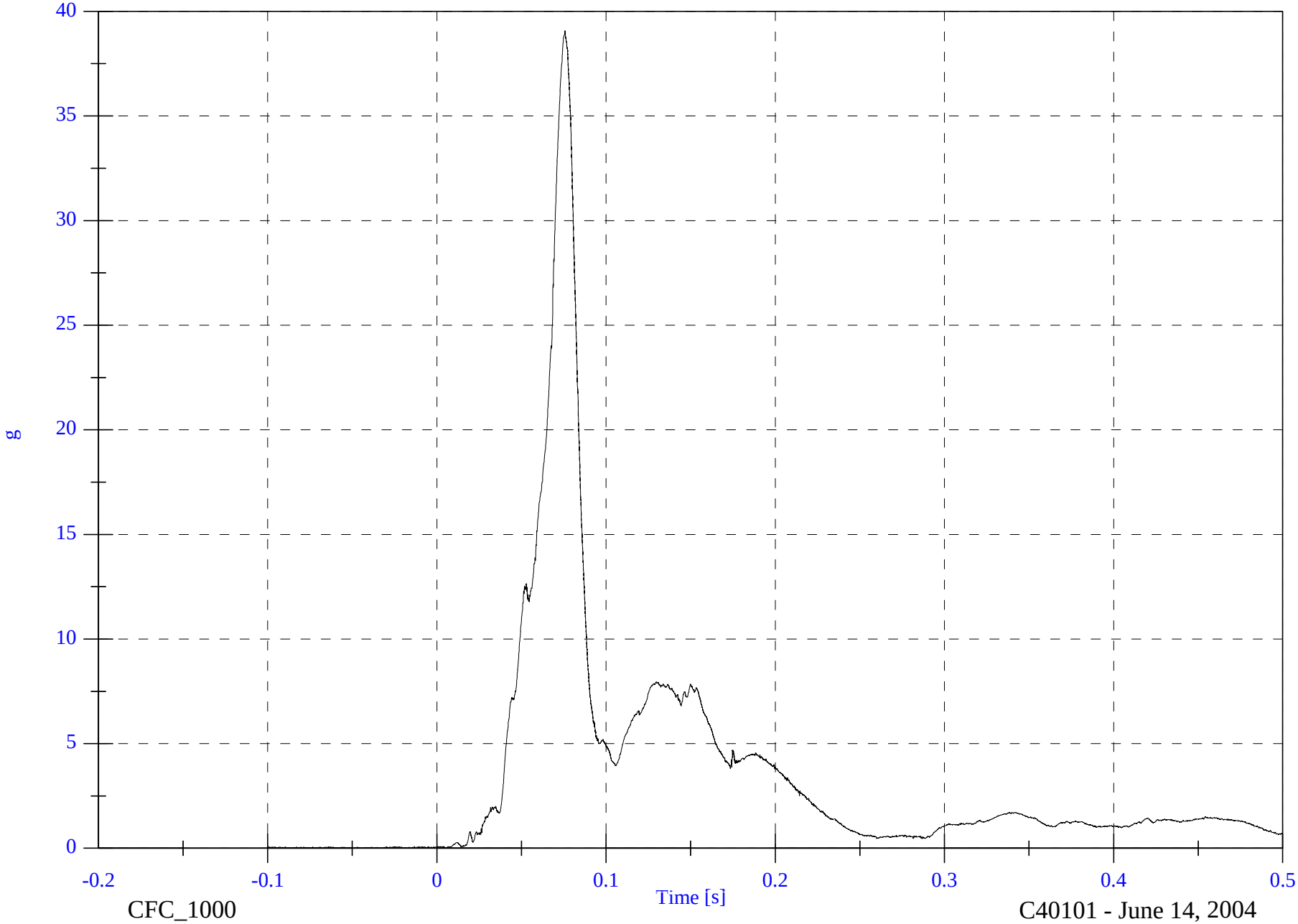
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Head Resultant

Max: 39.1 [g] at 0.076 [s]

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



B-55

8655-F301-18R

CFC_1000

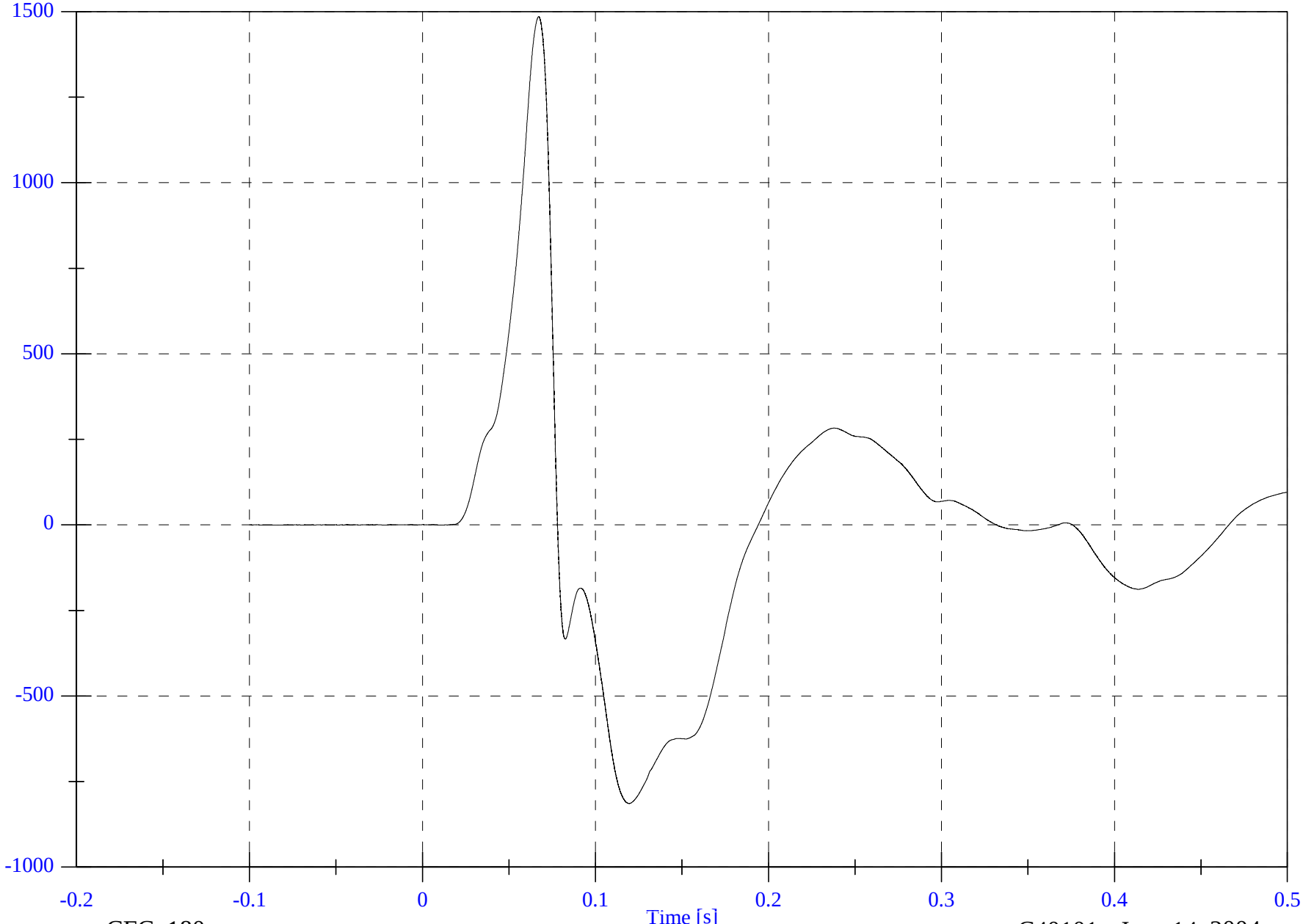
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Head AVy

Max: 1485.5 [deg/s] at 0.067 [s]

Min: -814.2 [deg/s] at 0.120 [s]



B-56

8655-F301-18R

CFC_180

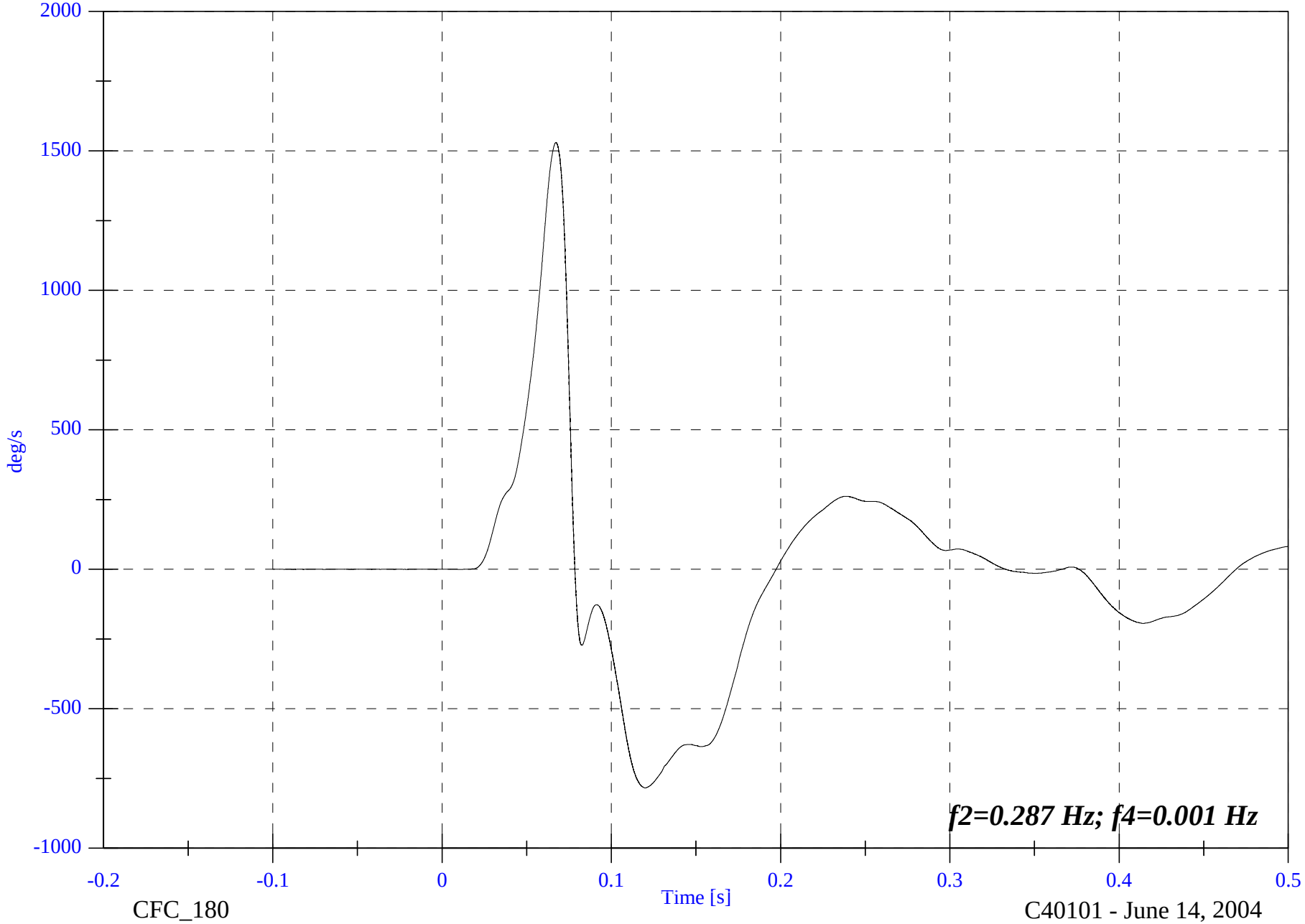
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Head Comp AVy

Max: 1530.1 [deg/s] at 0.067 [s]

Min: -783.5 [deg/s] at 0.120 [s]

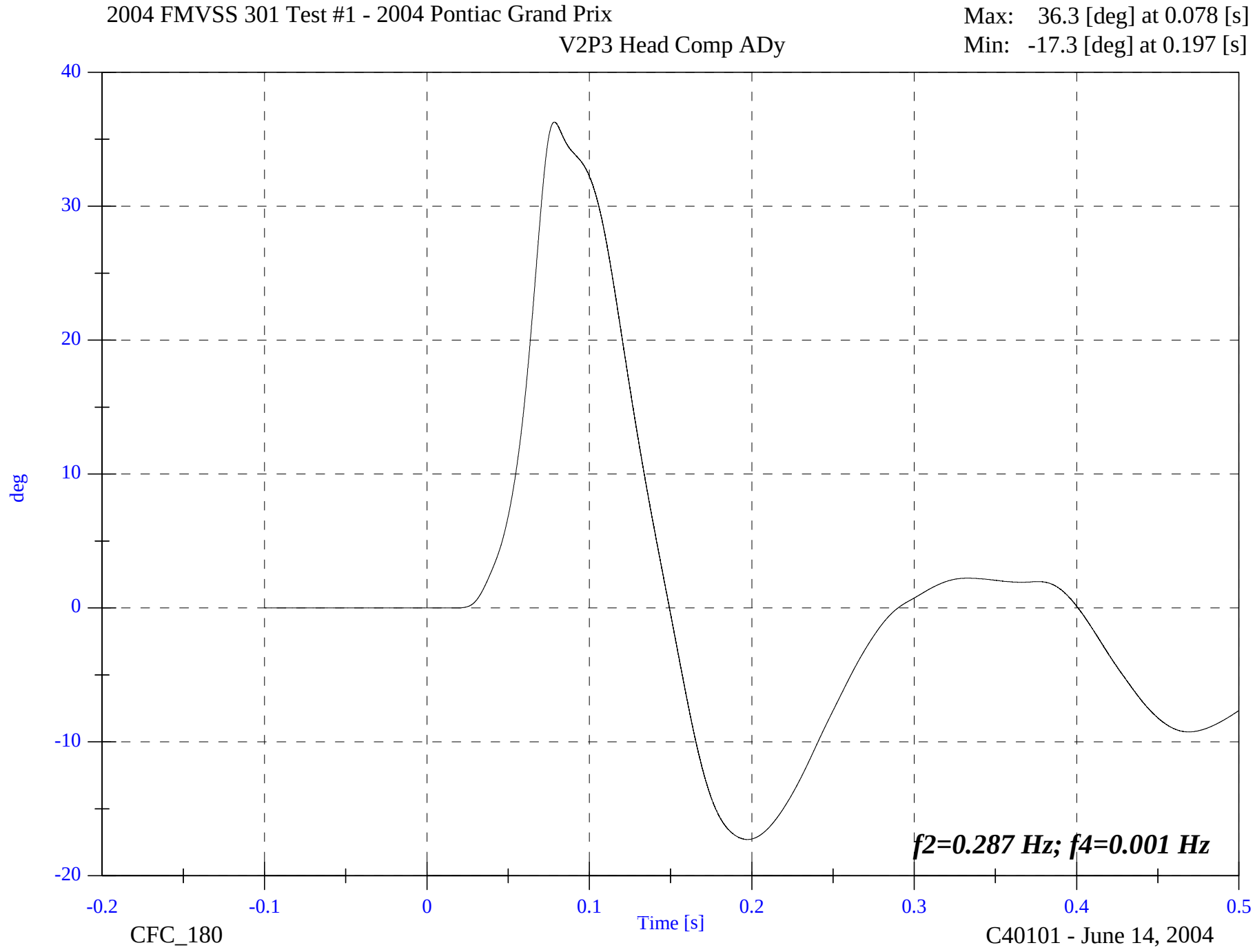


B-57

8655-F301-18R

CFC_180

C40101 - June 14, 2004



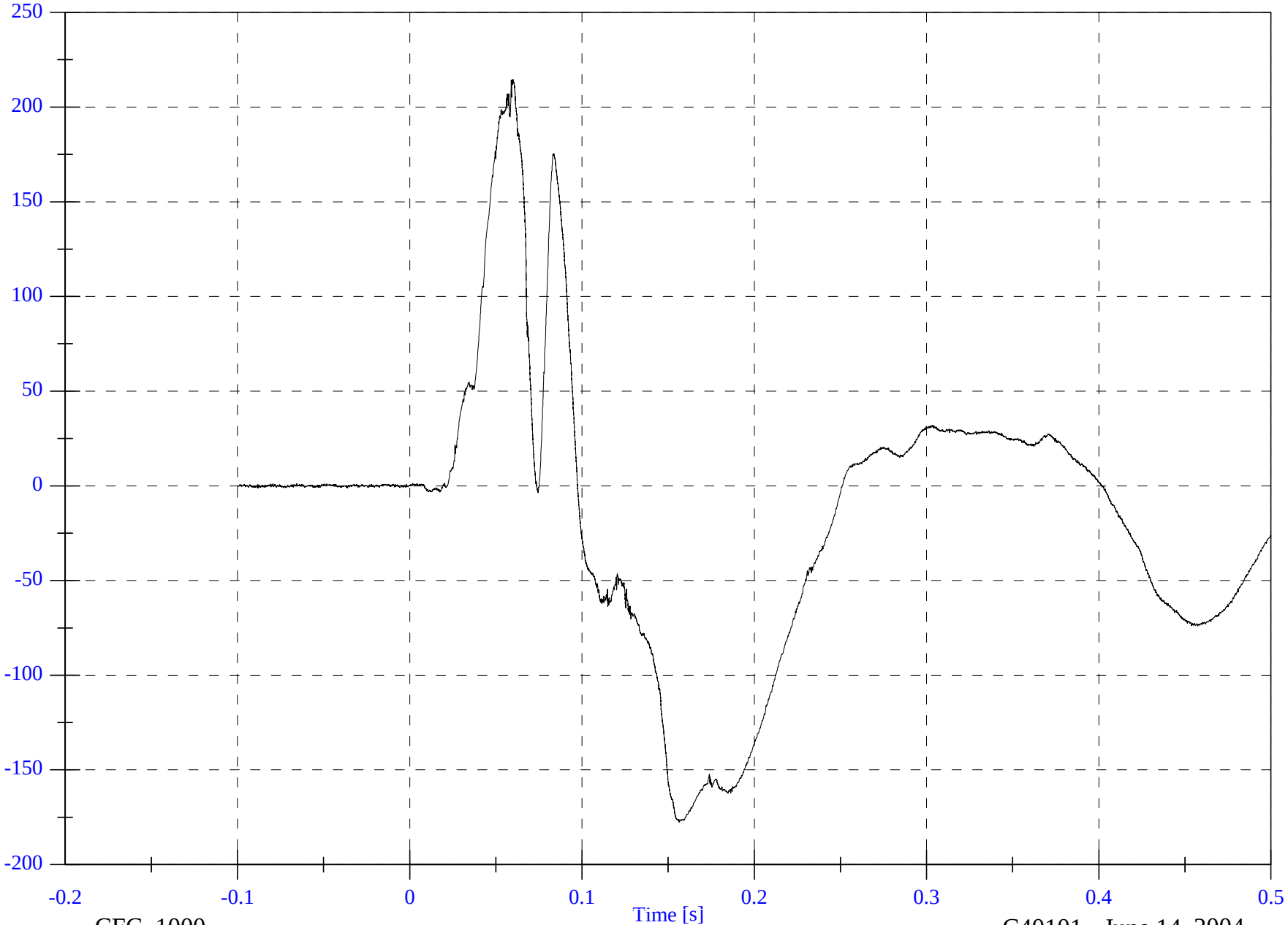
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Upper Neck Fx

Max: 214.6 [N] at 0.060 [s]

Min: -177.5 [N] at 0.156 [s]



B-59

8655-F301-18R

CFC_1000

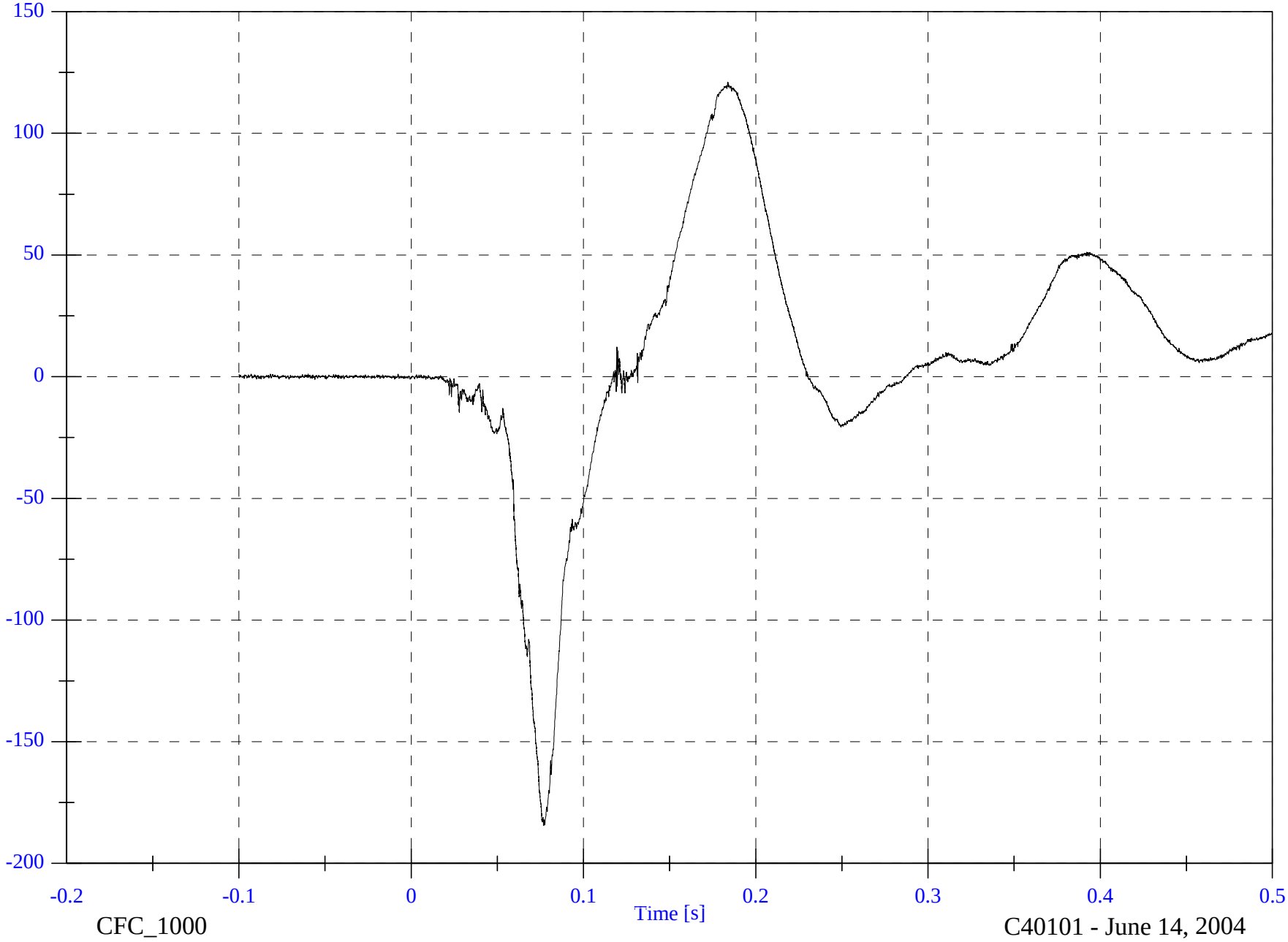
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Upper Neck Fy

Max: 121.1 [N] at 0.184 [s]

Min: -184.4 [N] at 0.077 [s]



B-60

8655-F301-18R

CFC_1000

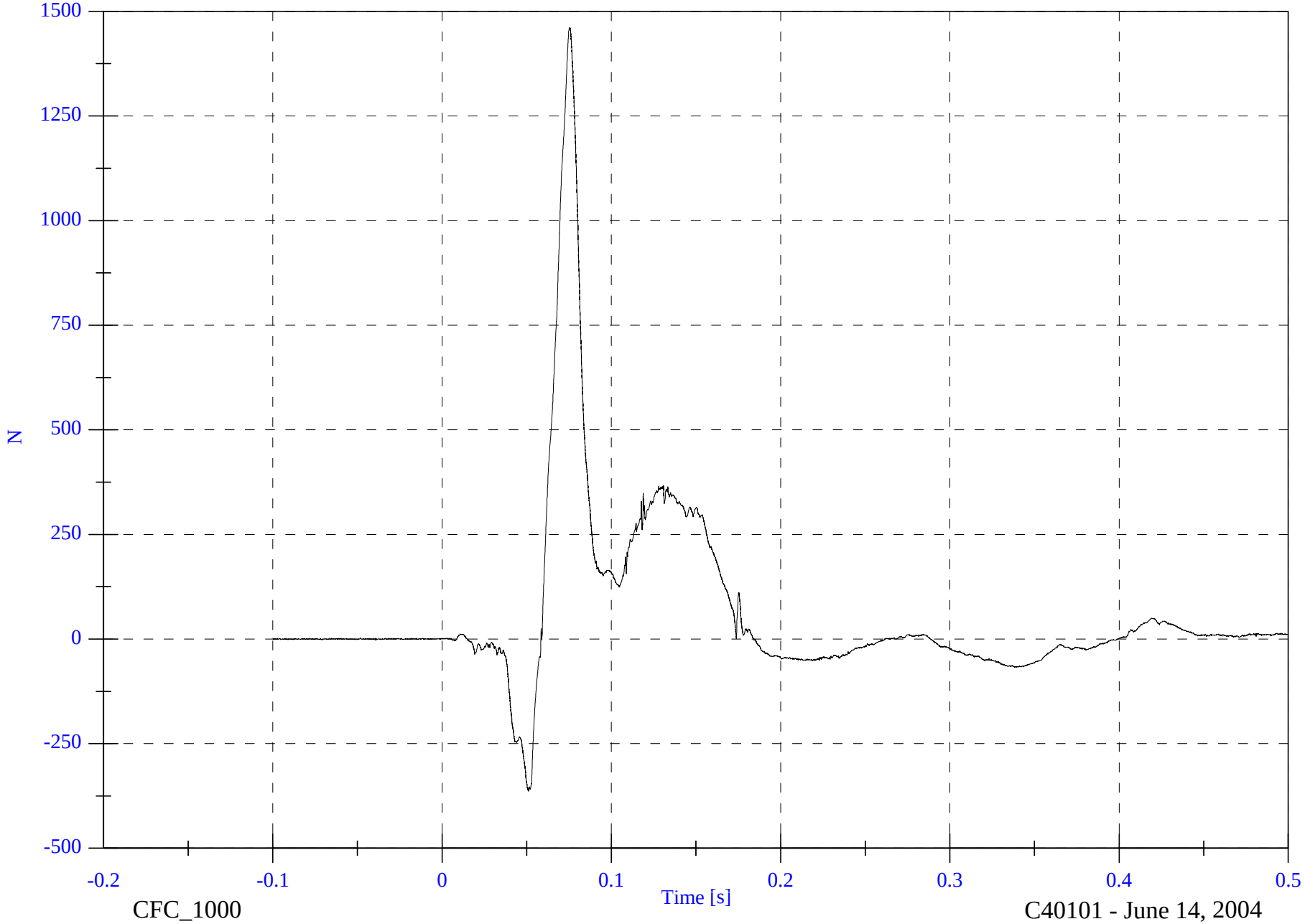
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Upper Neck Fz

Max: 1461.5 [N] at 0.075 [s]

Min: -363.5 [N] at 0.051 [s]



B-61

8655-F301-18R

CFC_1000

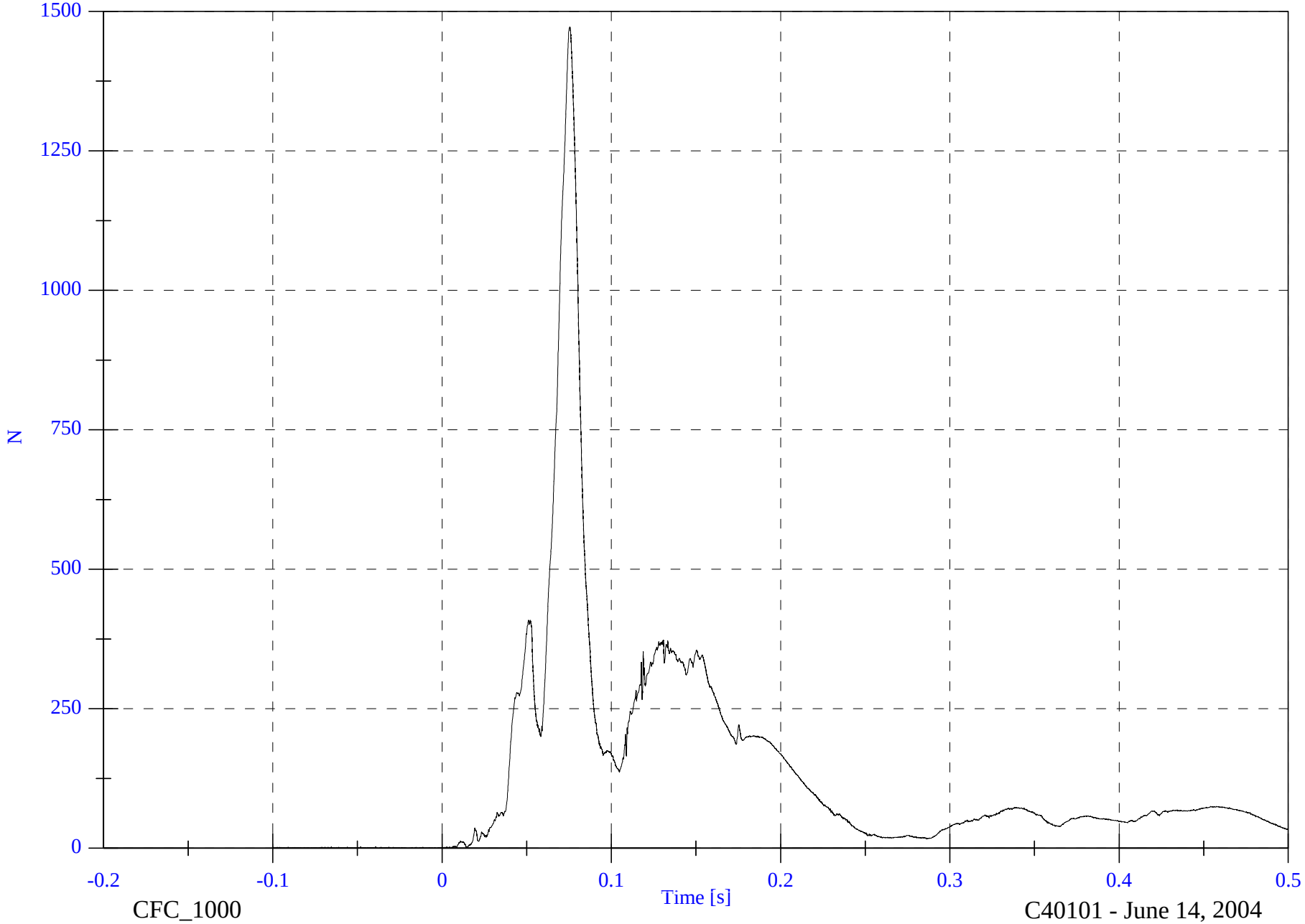
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Upper Neck F Resultant

Max: 1472.1 [N] at 0.076 [s]

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



CFC_1000

C40101 - June 14, 2004

B-62

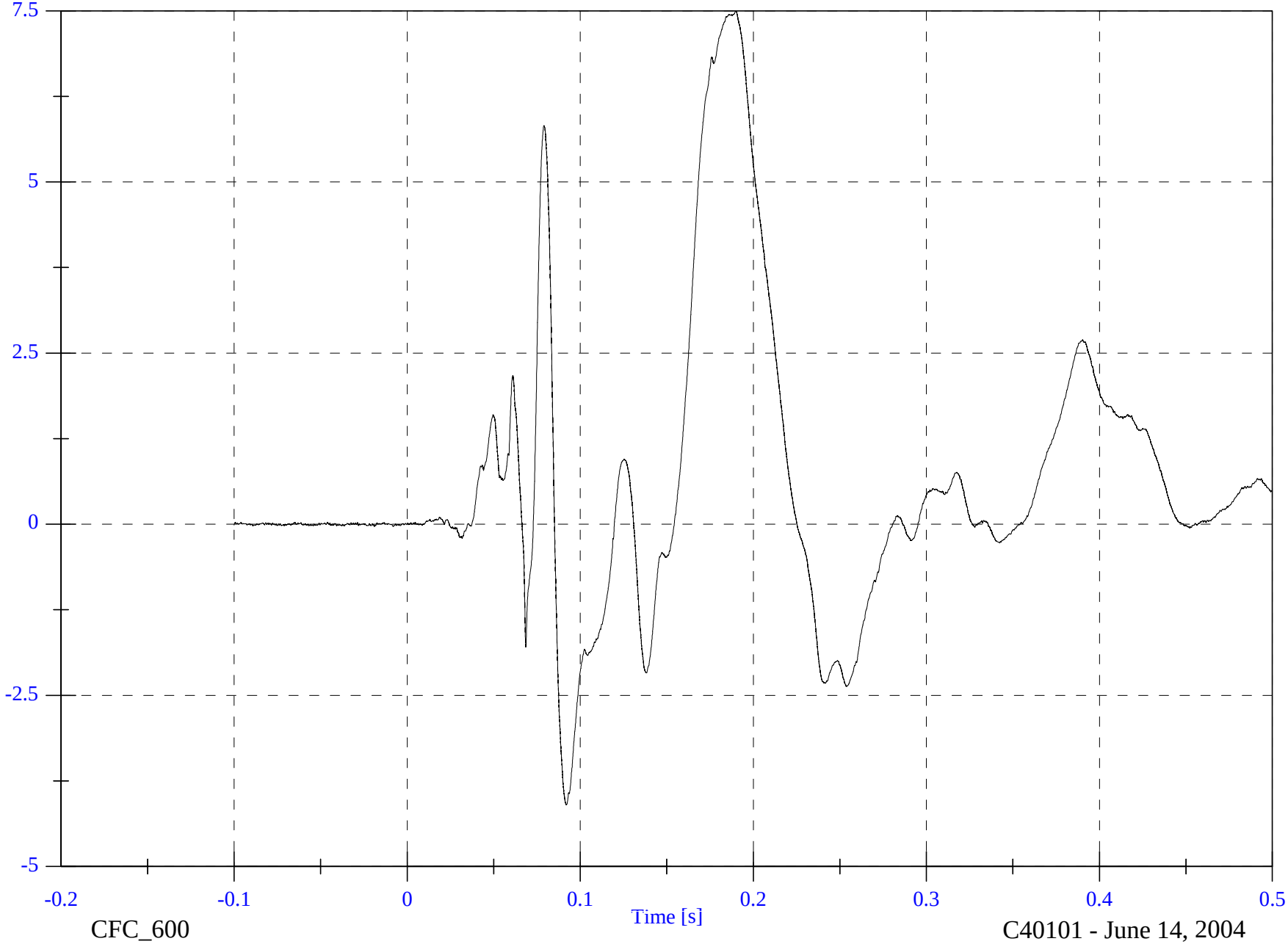
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Upper Neck Mx

Max: 7.5 [N-m] at 0.190 [s]

Min: -4.1 [N-m] at 0.092 [s]



CFC_600

C40101 - June 14, 2004

B-63

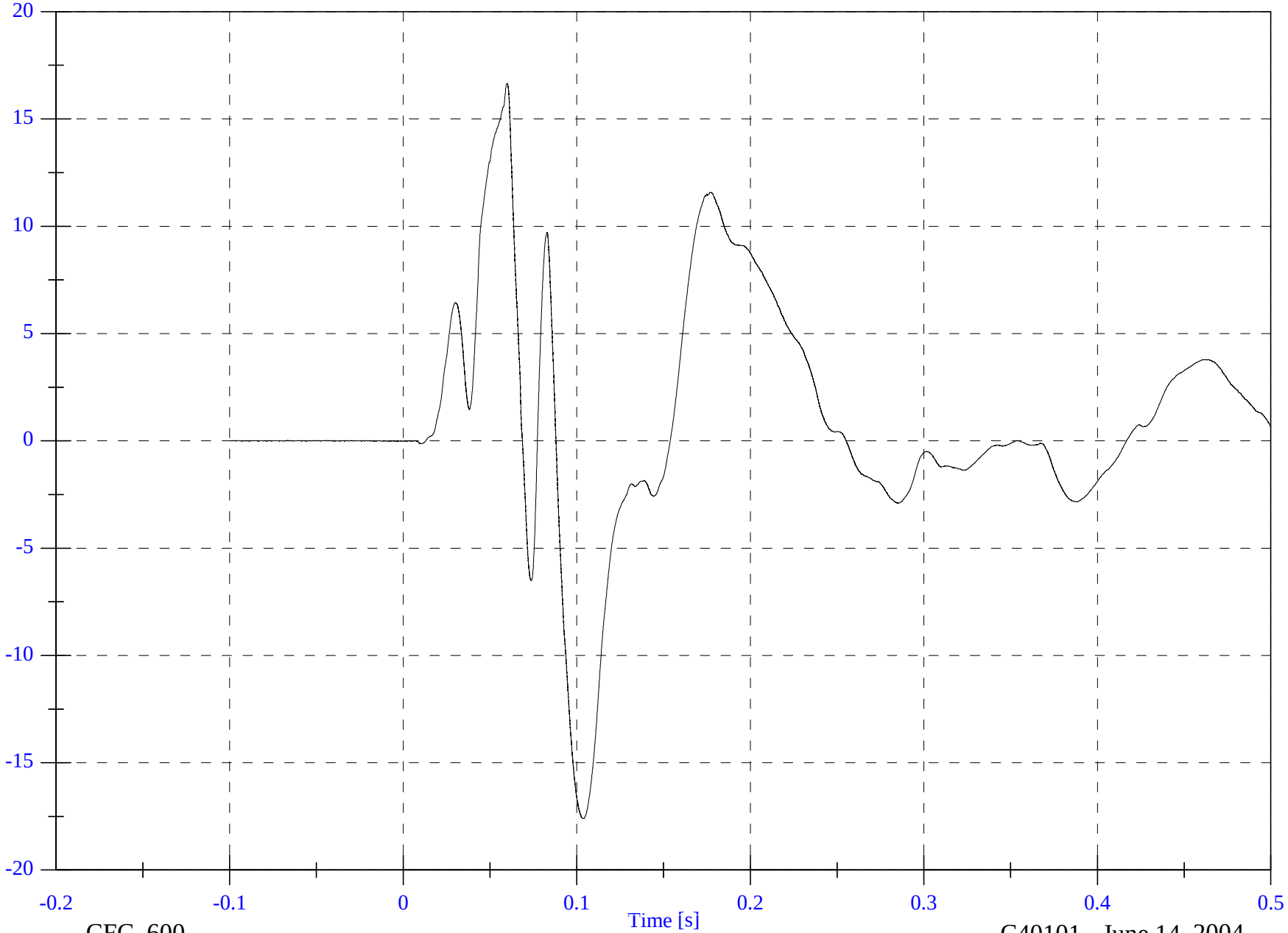
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Upper Neck My

Max: 16.7 [N-m] at 0.060 [s]

Min: -17.6 [N-m] at 0.104 [s]



CFC_600

C40101 - June 14, 2004

B-64

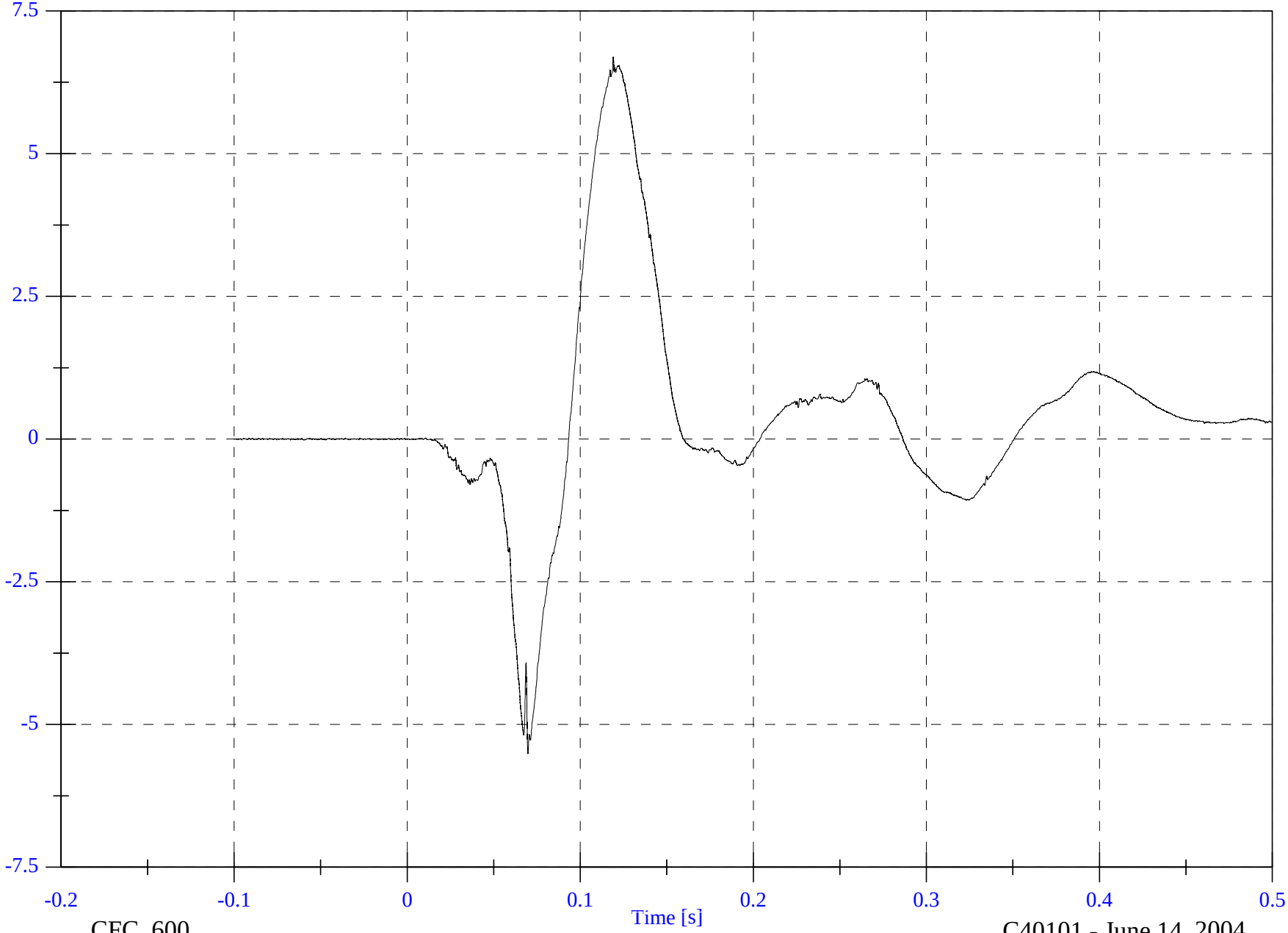
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Upper Neck Mz

Max: 6.7 [N-m] at 0.119 [s]

Min: -5.5 [N-m] at 0.070 [s]



B-65

8655-F301-18R

CFC_600

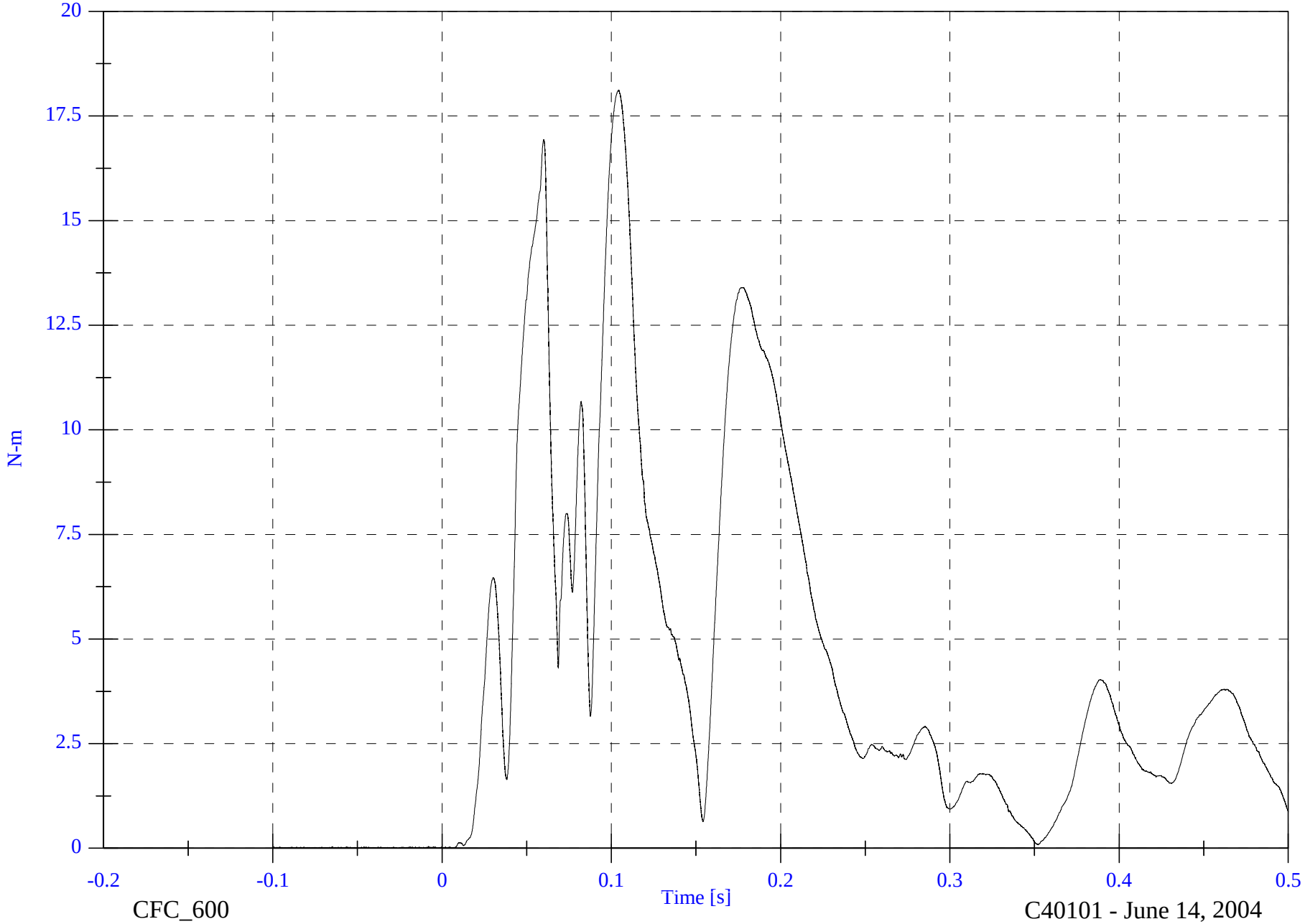
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Upper Neck M Resultant

Max: 18.1 [N-m] at 0.104 [s]

Min: 0.0 [N-m] at -0.086 [s]



CFC_600

C40101 - June 14, 2004

B-66

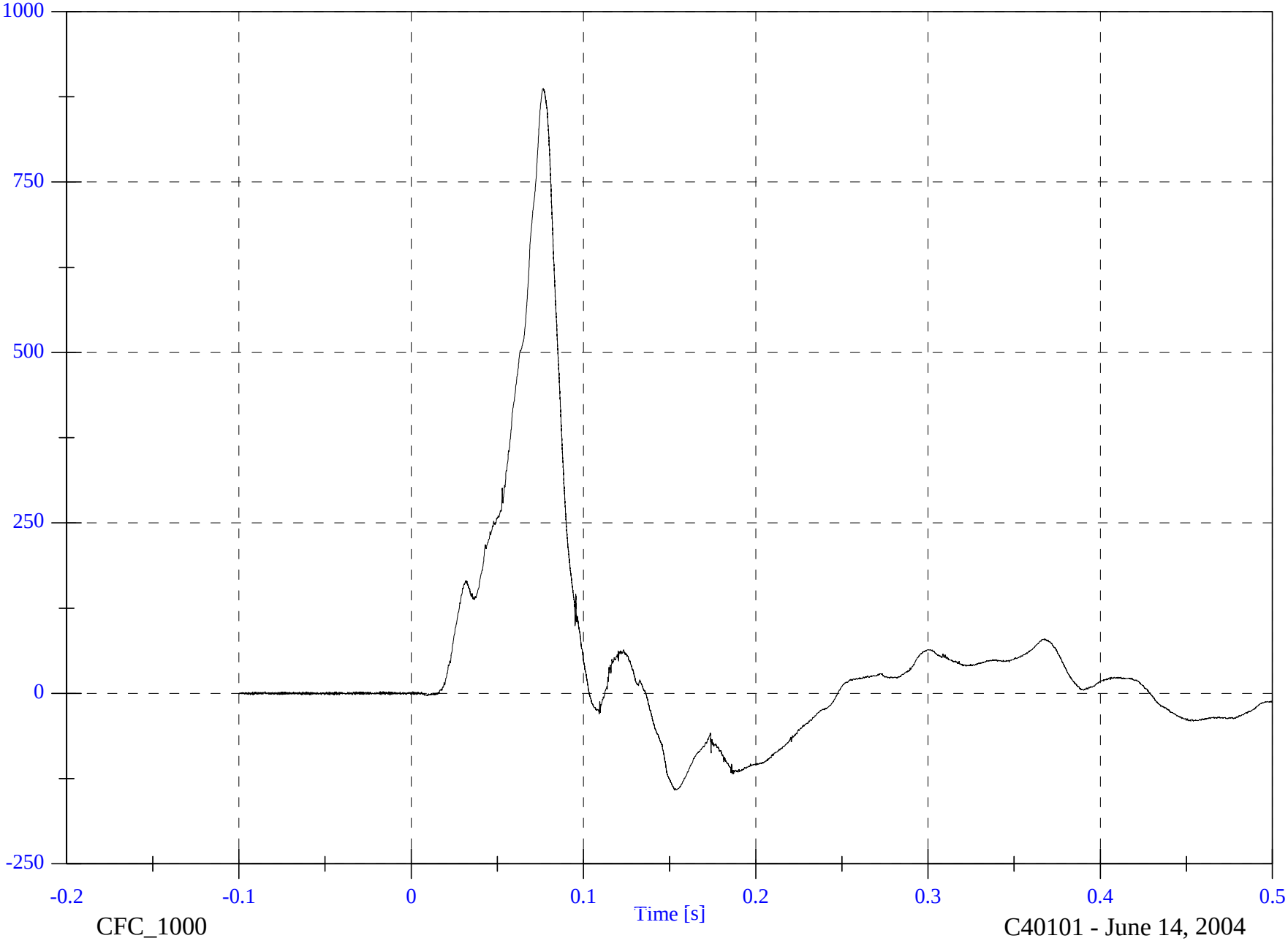
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Lower Neck Fx

Max: 886.9 [N] at 0.077 [s]

Min: -141.7 [N] at 0.153 [s]

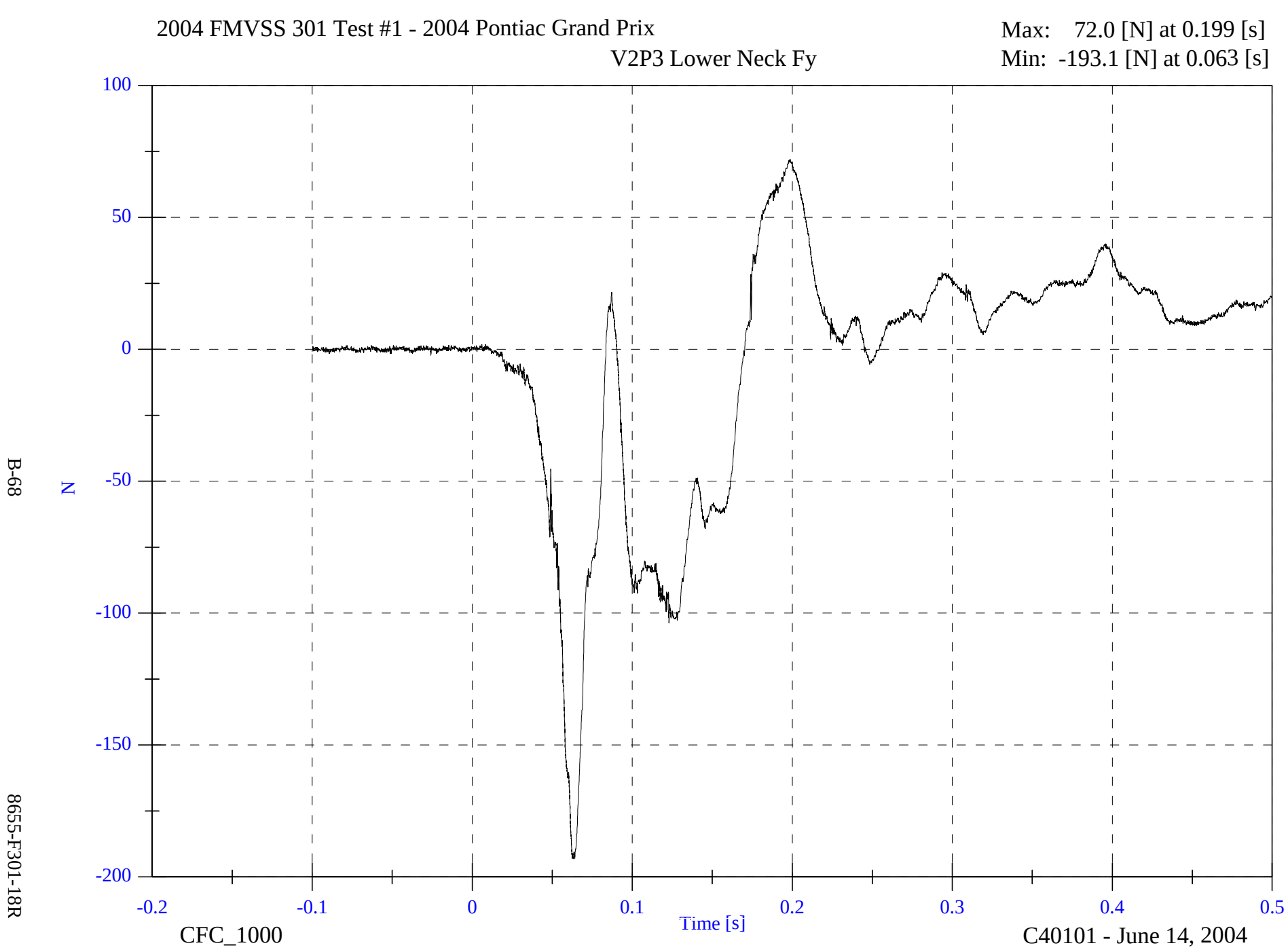


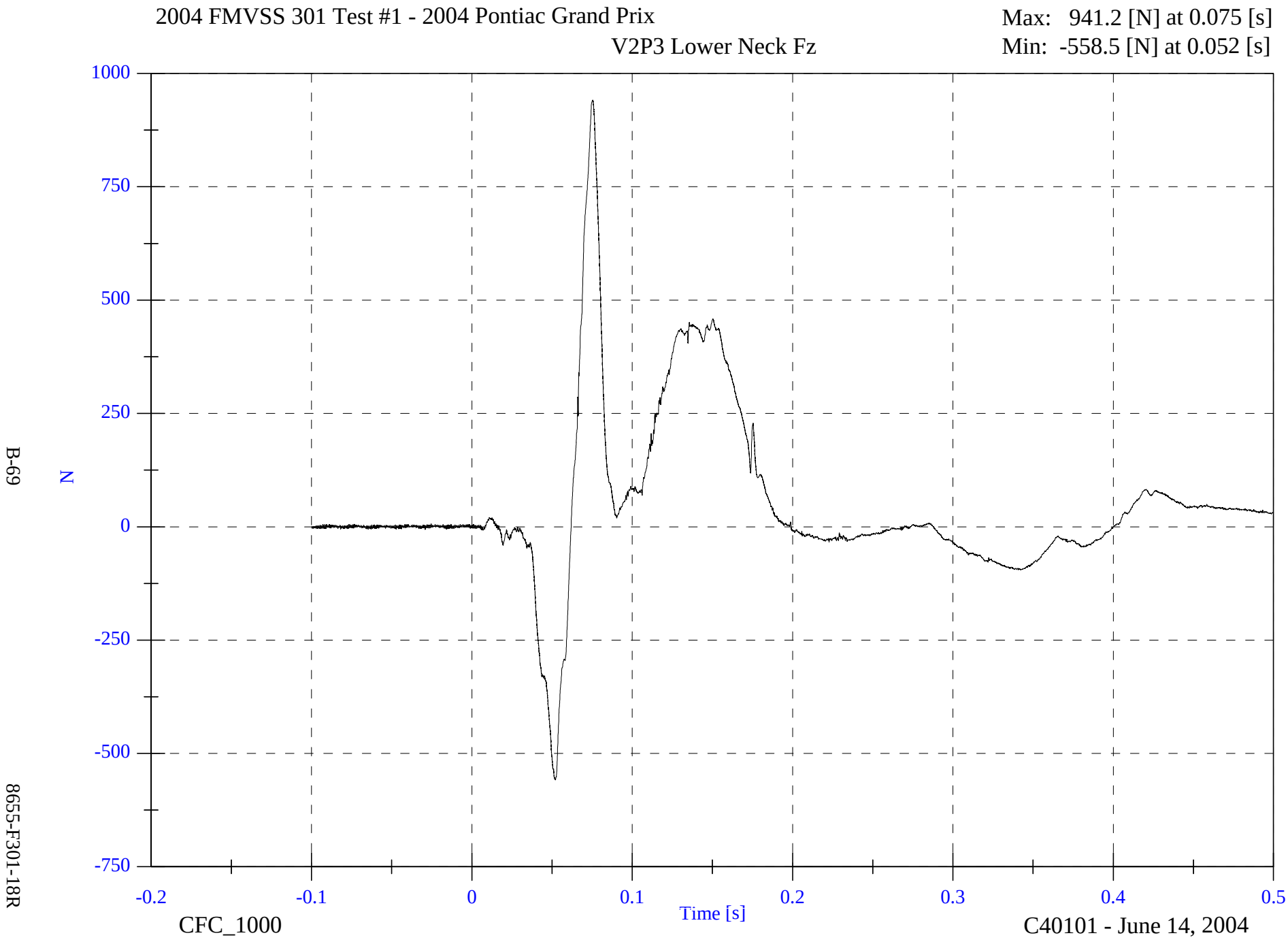
B-67

8655-F301-18R

CFC_1000

C40101 - June 14, 2004


2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P3 Lower Neck Fy
Max: 72.0 [N] at 0.199 [s]
Min: -193.1 [N] at 0.063 [s]
100
50
0
-50
-100
-150
-200
N
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
CFC_1000
C40101 - June 14, 2004
B-68
8655-F301-18R



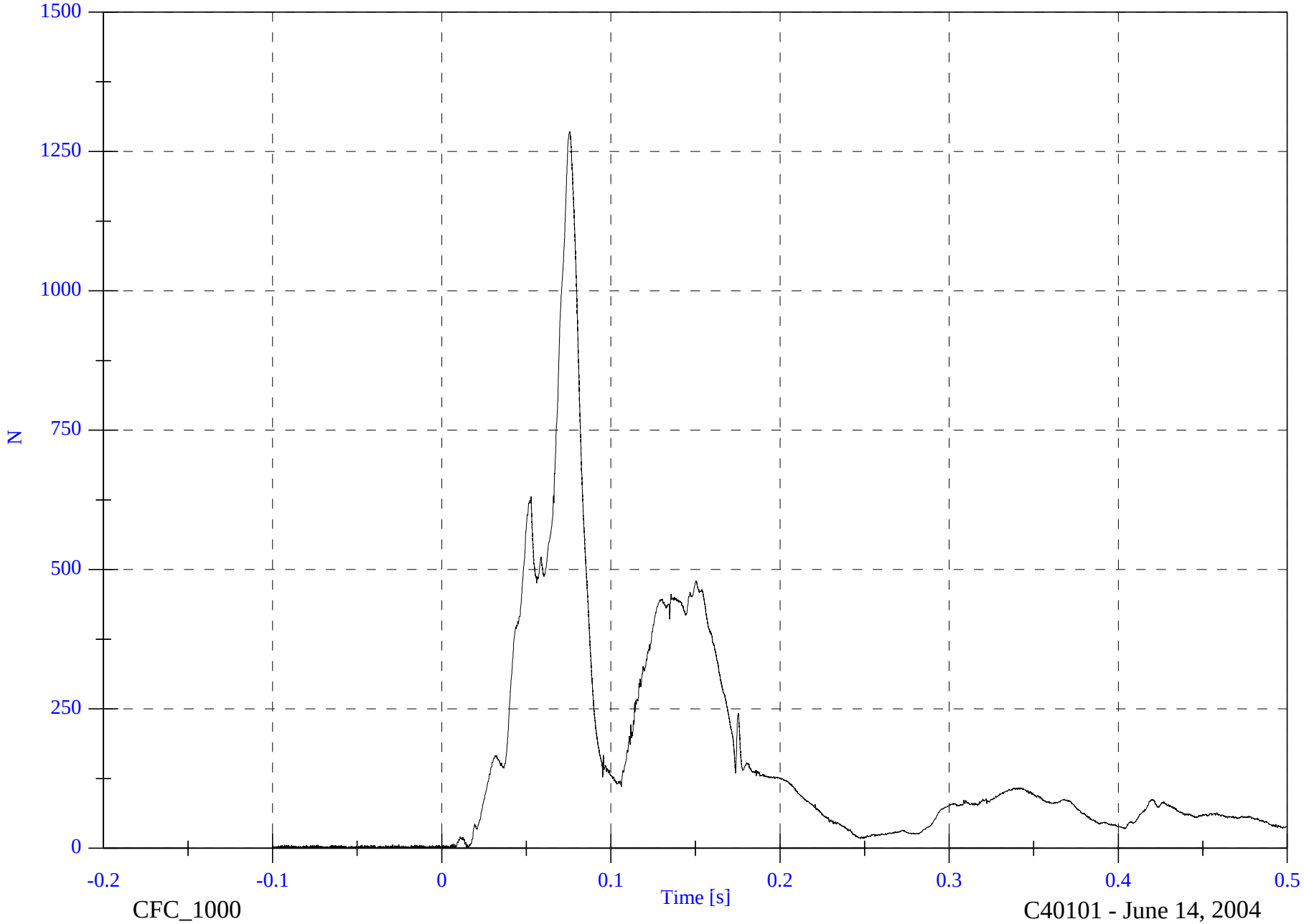
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Lower Neck F Resultant

Max: 1285.3 [N] at 0.076 [s]

Min: 0.1 [N] at 0.004 [s]



B-70

8655-F301-18R

CFC_1000

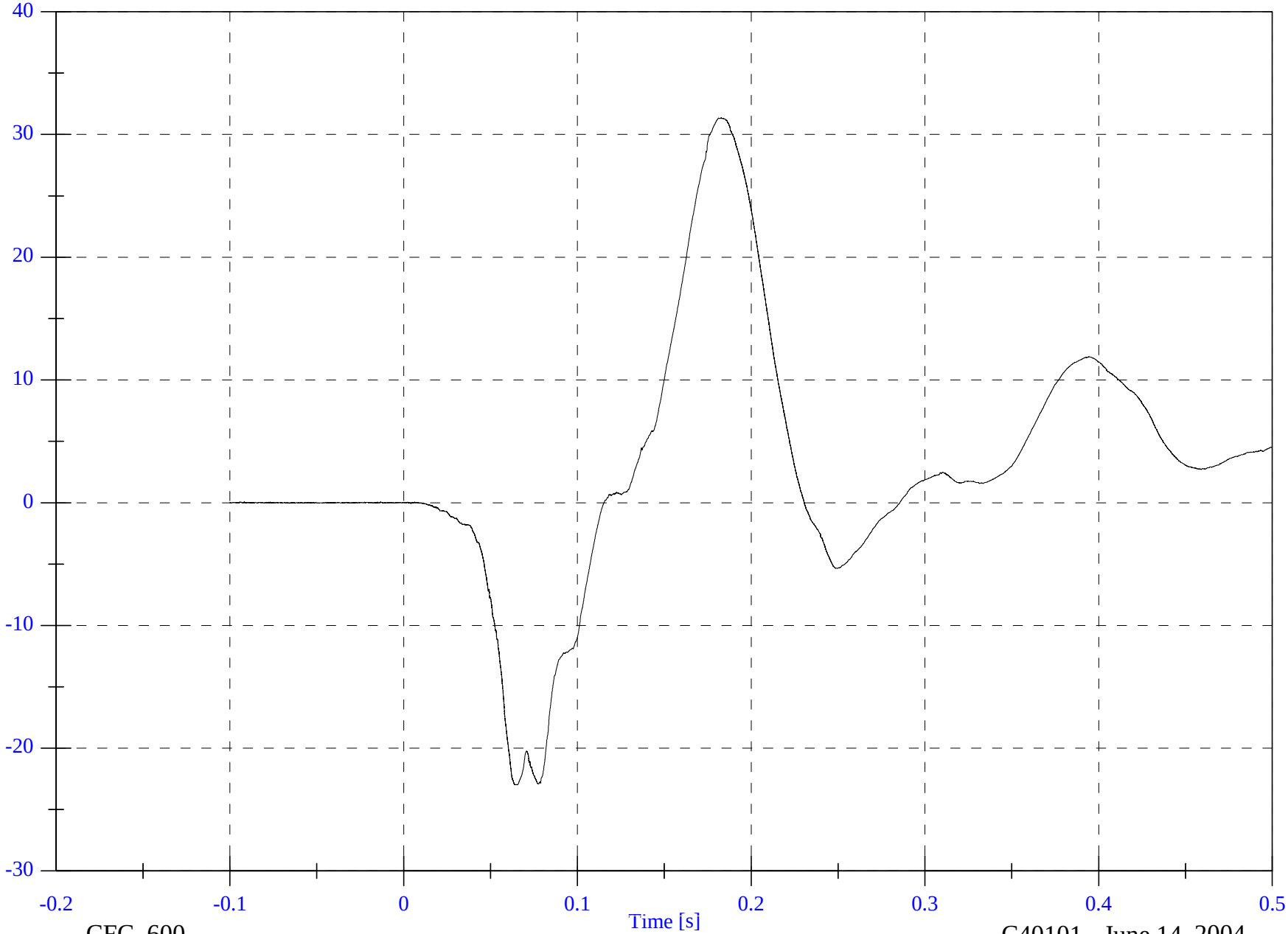
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Lower Neck Mx

Max: 31.3 [N-m] at 0.183 [s]

Min: -23.0 [N-m] at 0.064 [s]



CFC_600

C40101 - June 14, 2004

B-71

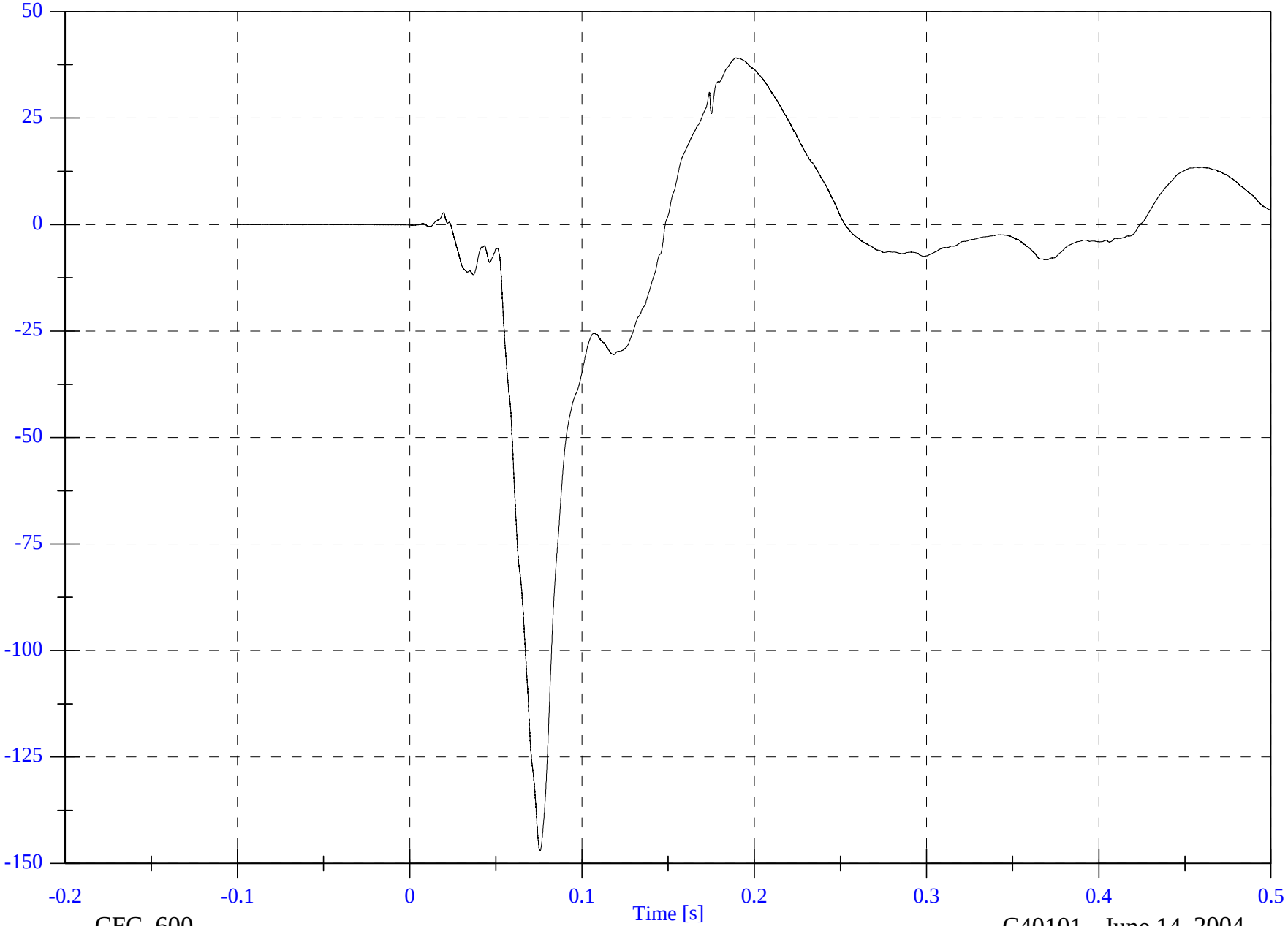
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Lower Neck My

Max: 39.1 [N-m] at 0.189 [s]

Min: -147.0 [N-m] at 0.076 [s]



CFC_600

C40101 - June 14, 2004

B-72

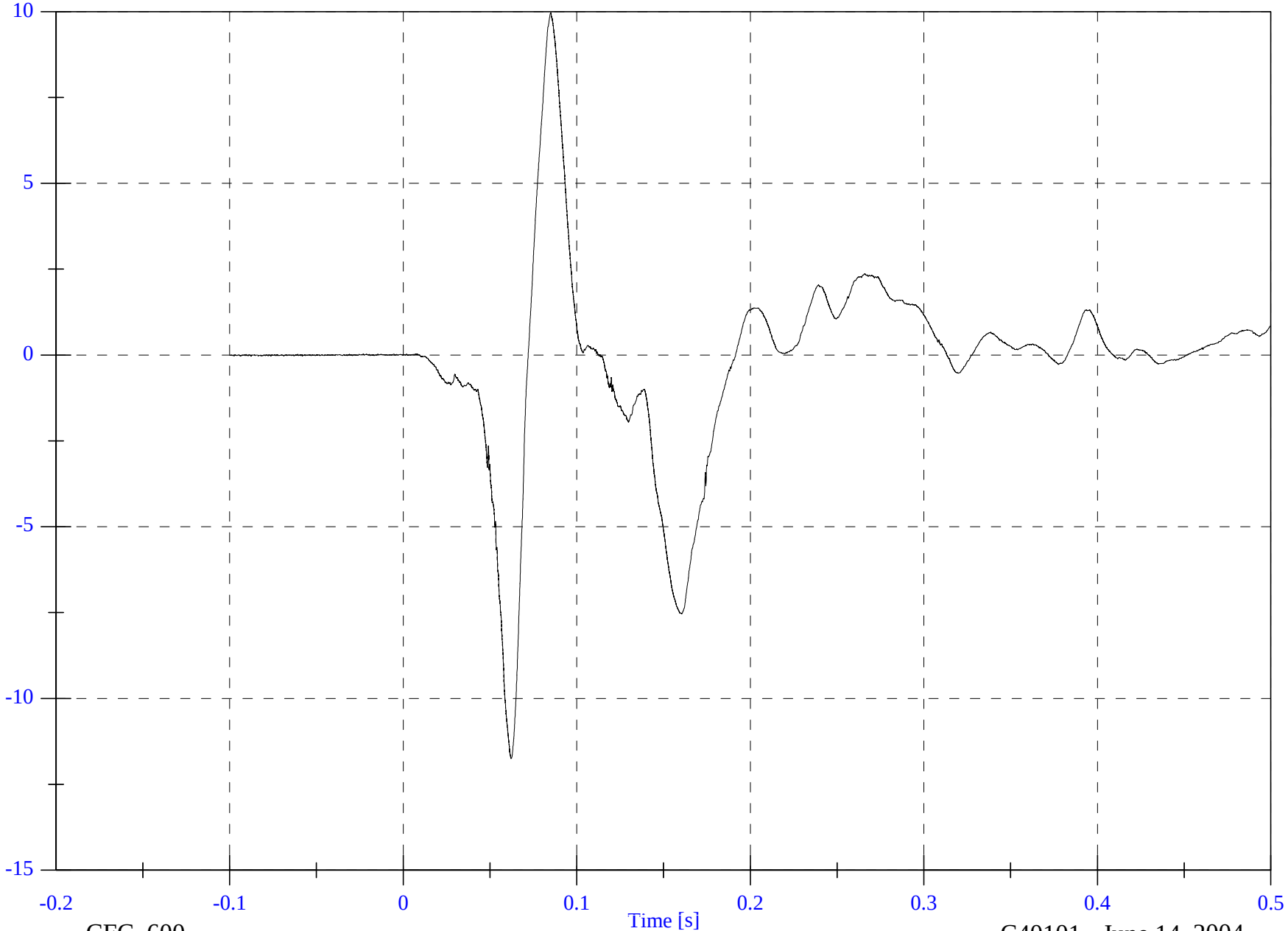
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Lower Neck Mz

Max: 10.0 [N-m] at 0.085 [s]

Min: -11.8 [N-m] at 0.062 [s]



CFC_600

C40101 - June 14, 2004

B-73

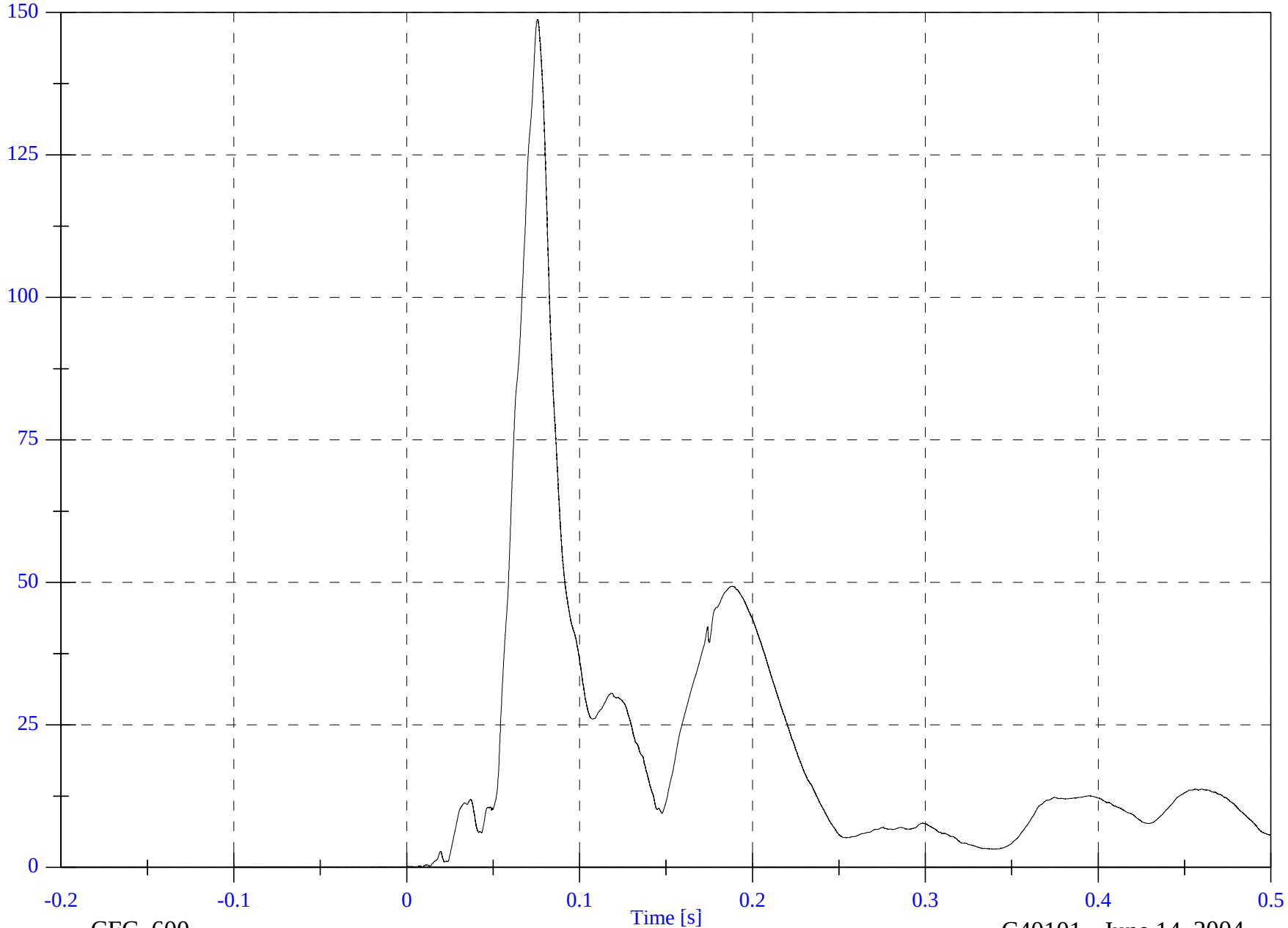
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Lower Neck M Resultant

Max: 148.8 [N-m] at 0.076 [s]

Min: 0.0 [N-m] at -0.028 [s]

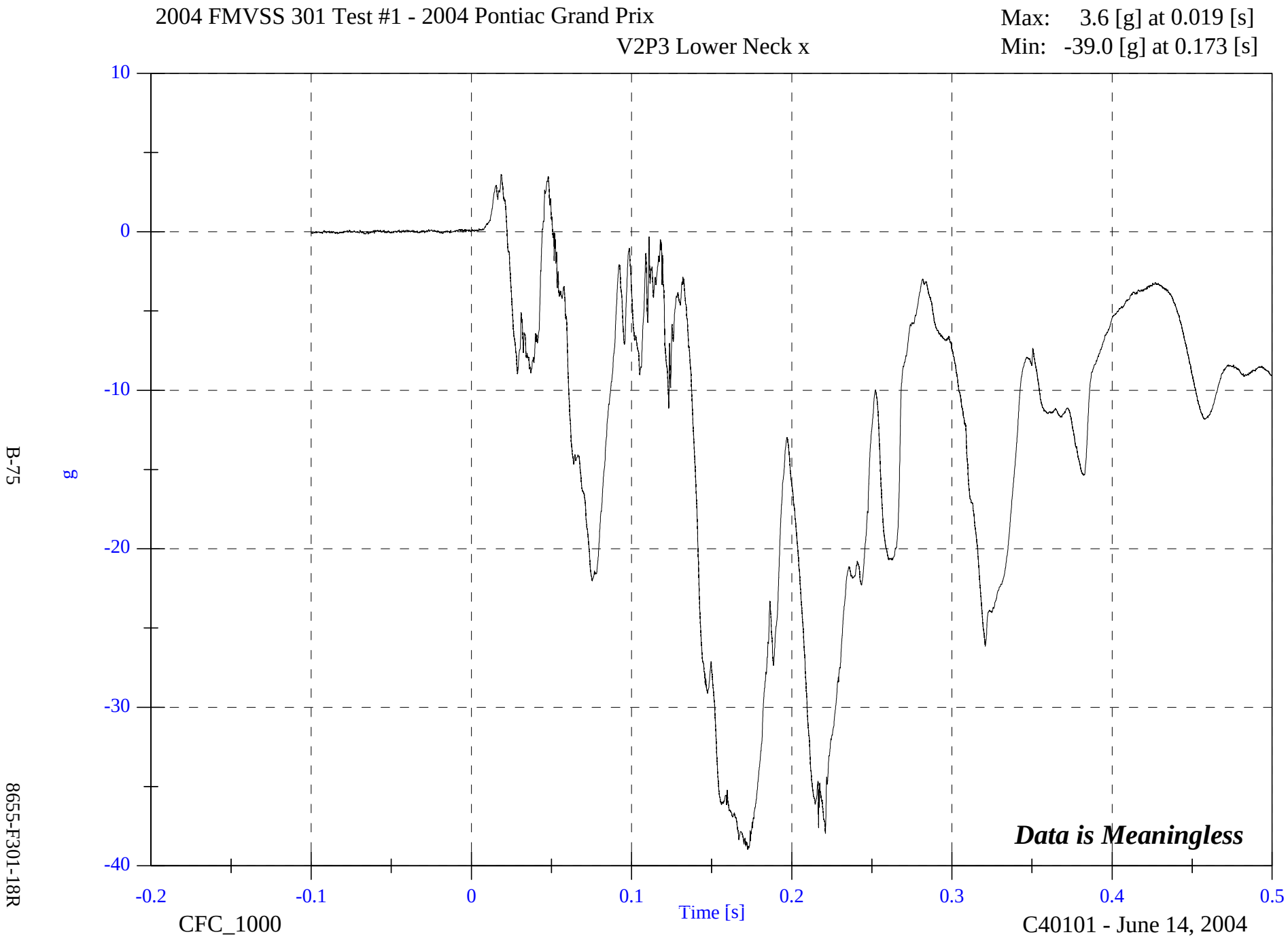


CFC_600

C40101 - June 14, 2004

B-74

8655-F301-18R

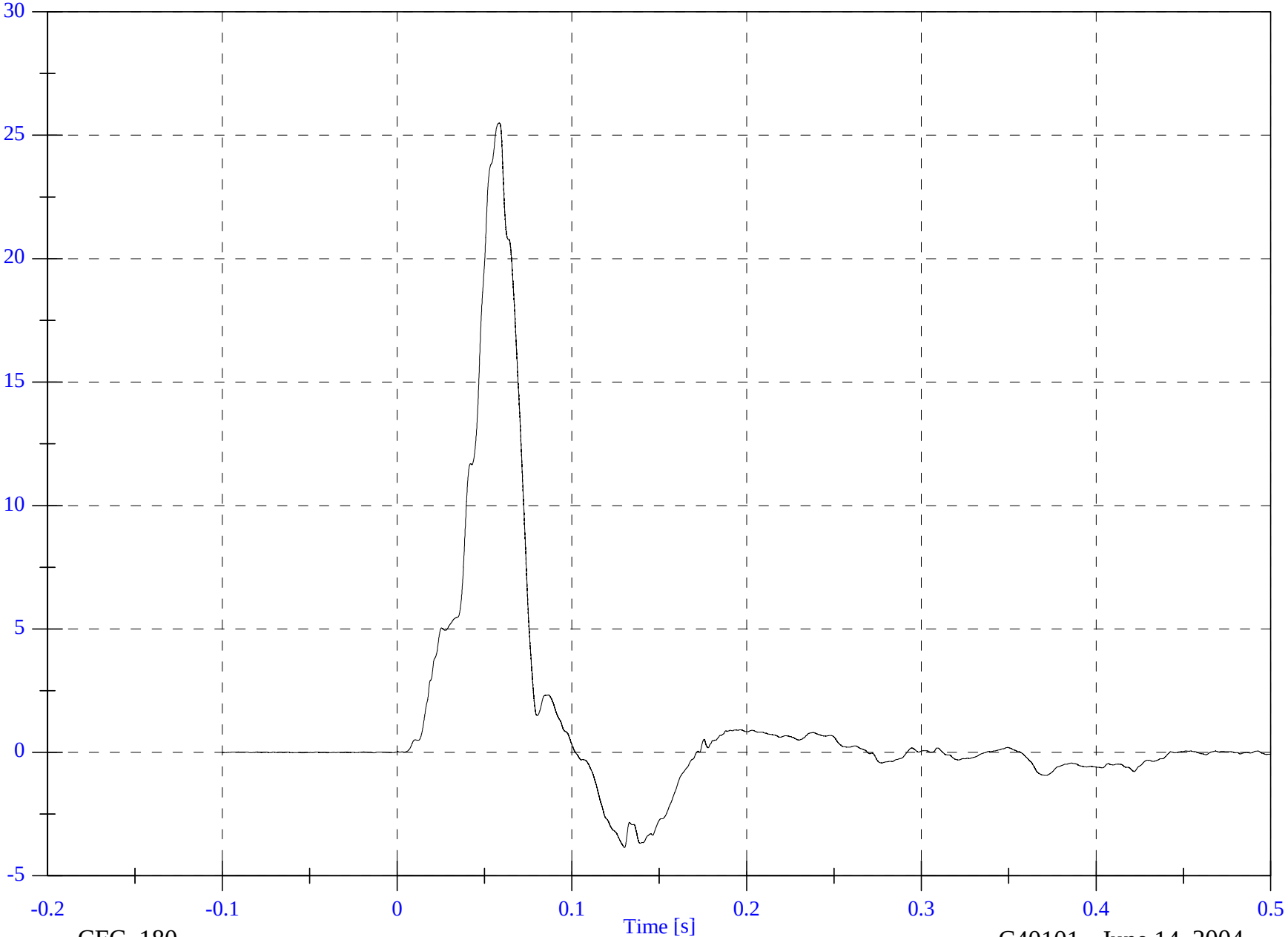

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P3 Lower Neck x
Max: 3.6 [g] at 0.019 [s]
Min: -39.0 [g] at 0.173 [s]
10
0
-10
-20
-30
-40
g
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
Data is Meaningless
B-75
8655-F301-18R
CFC_1000
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Chest x

Max: 25.5 [g] at 0.058 [s]

Min: -3.9 [g] at 0.130 [s]



B-76

8655-F301-18R

CFC_180

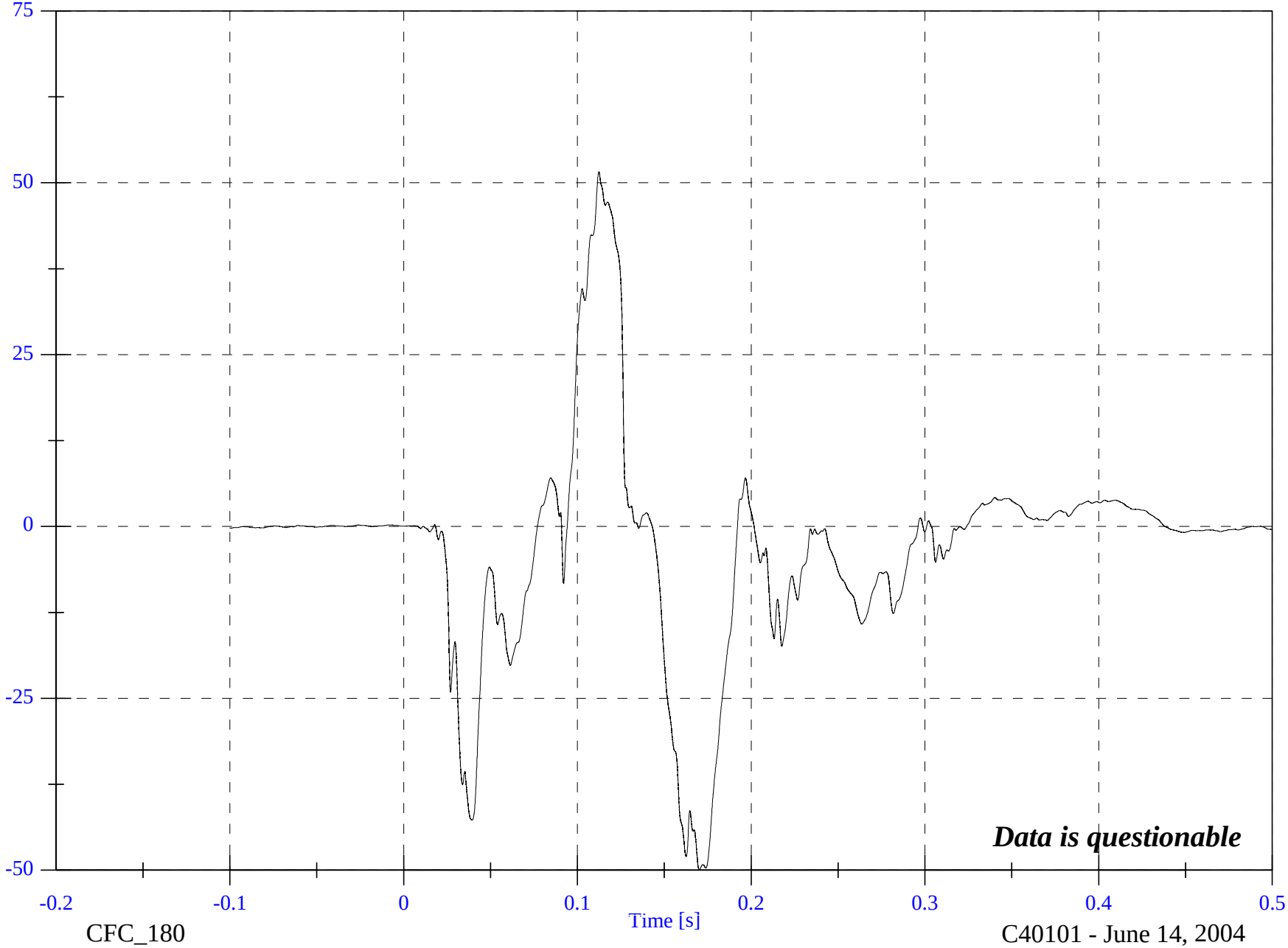
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Chest y

Max: 51.6 [g] at 0.112 [s]

Min: -50.0 [g] at 0.170 [s]

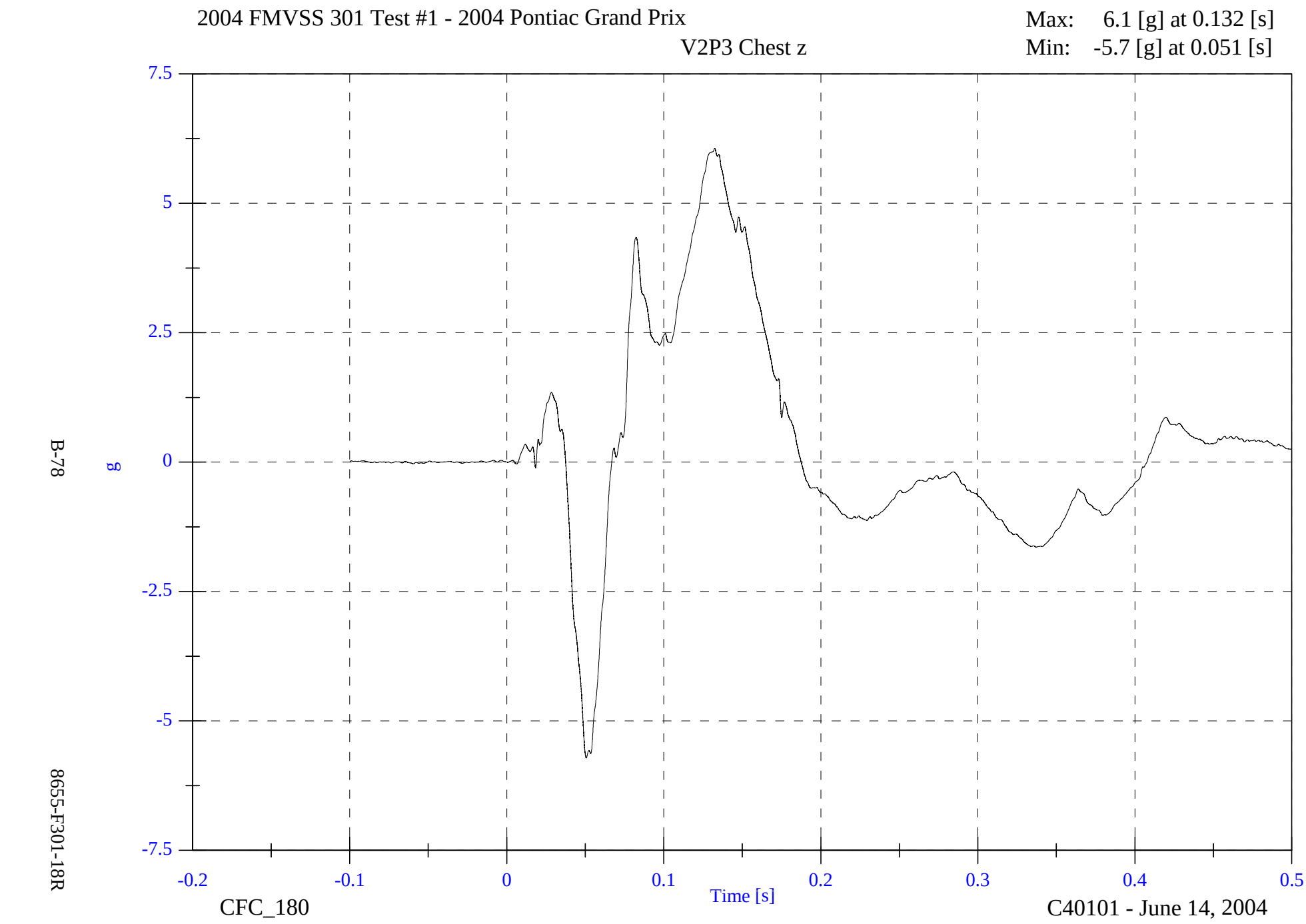


B-77

8655-F301-18R

CFC_180

C40101 - June 14, 2004

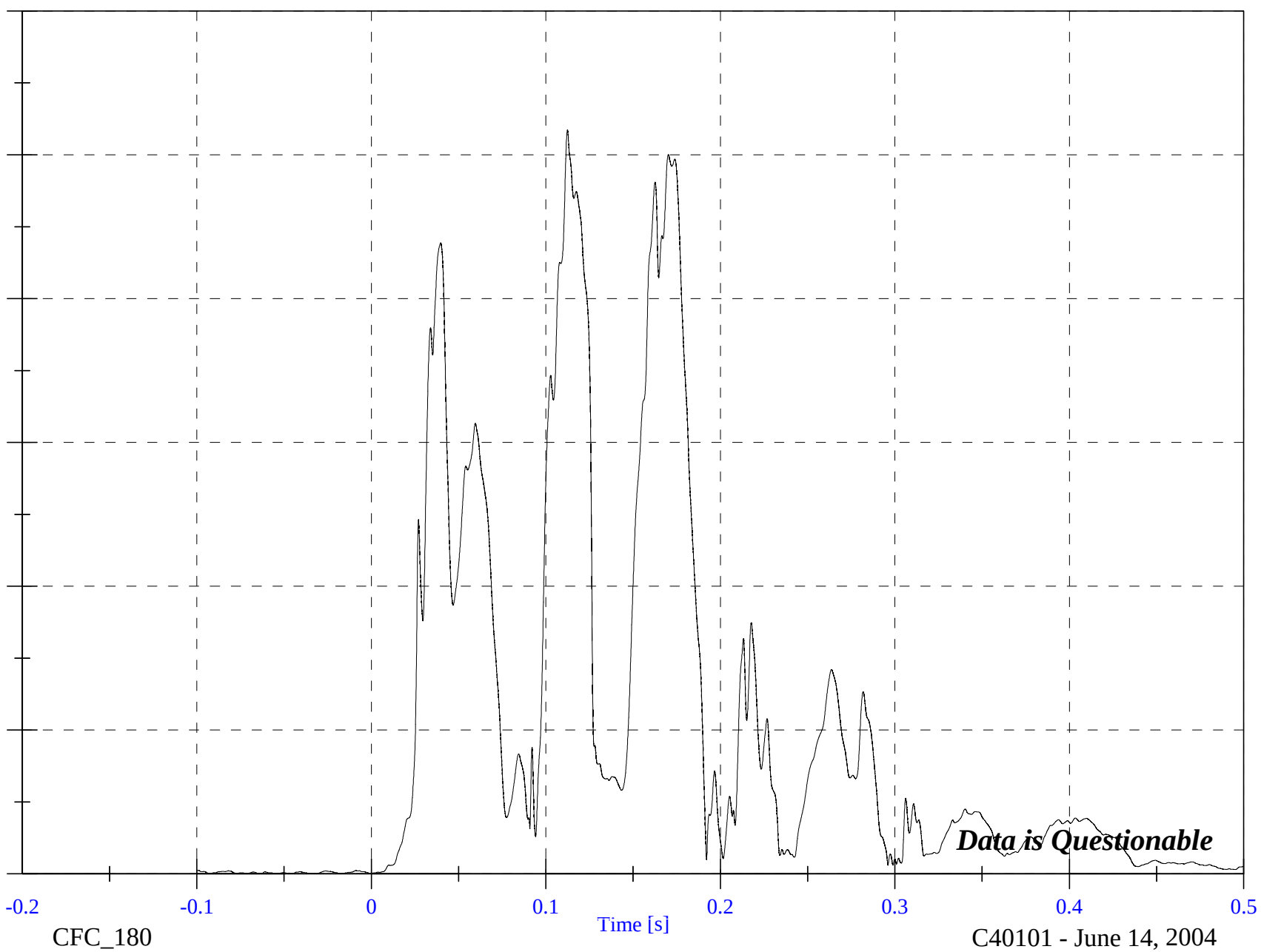

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P3 Chest z
Max: 6.1 [g] at 0.132 [s]
Min: -5.7 [g] at 0.051 [s]
7.5
5
2.5
0
-2.5
-5
-7.5
g
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
CFC_180
C40101 - June 14, 2004
B-78
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Chest Resultant

Max: 51.7 [g] at 0.112 [s]

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



B-79

8655-F301-18R

CFC_180

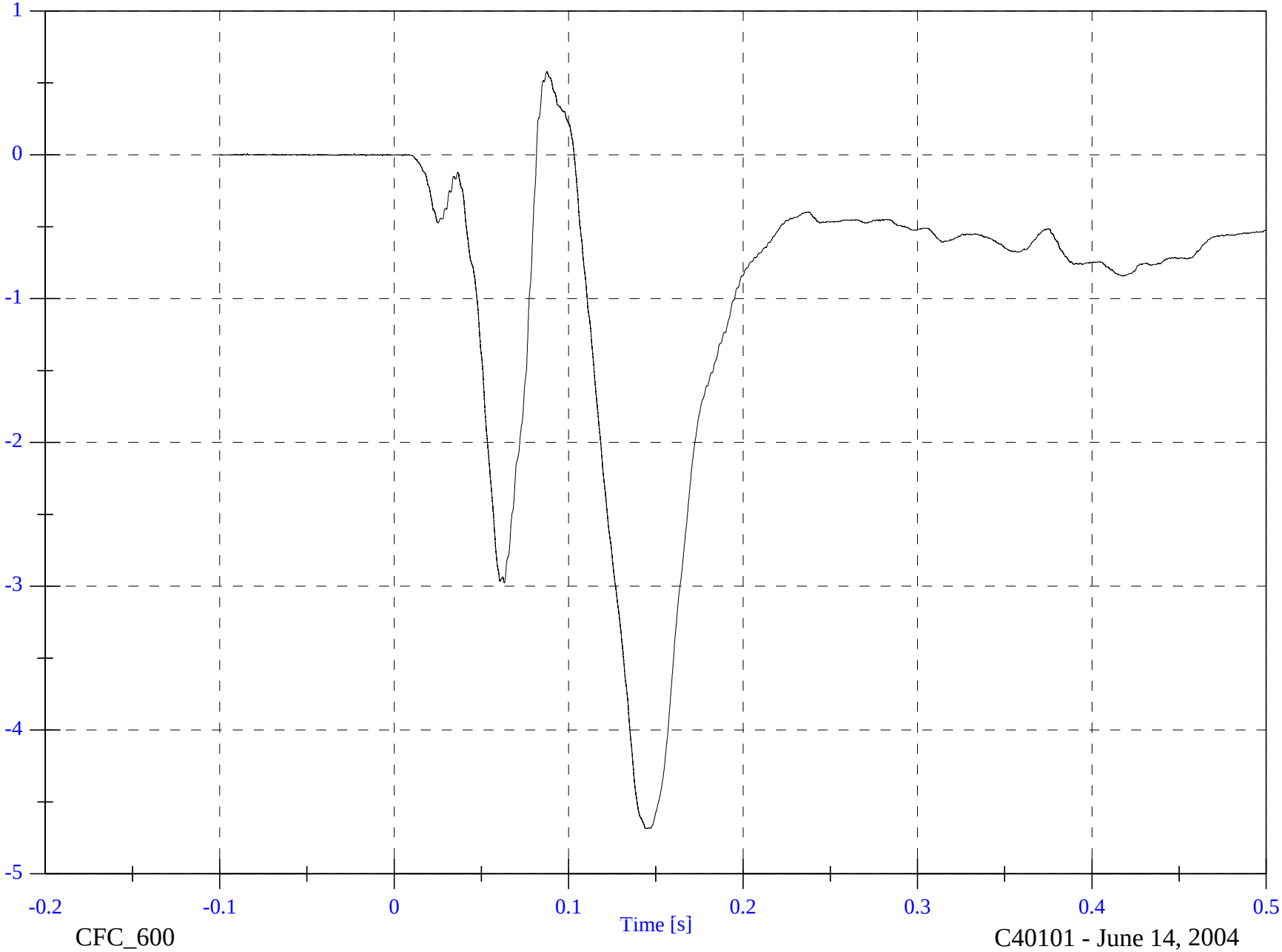
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Chest Compression

Max: 0.6 [mm] at 0.088 [s]

Min: -4.7 [mm] at 0.145 [s]



B-80

8655-F301-18R

CFC_600

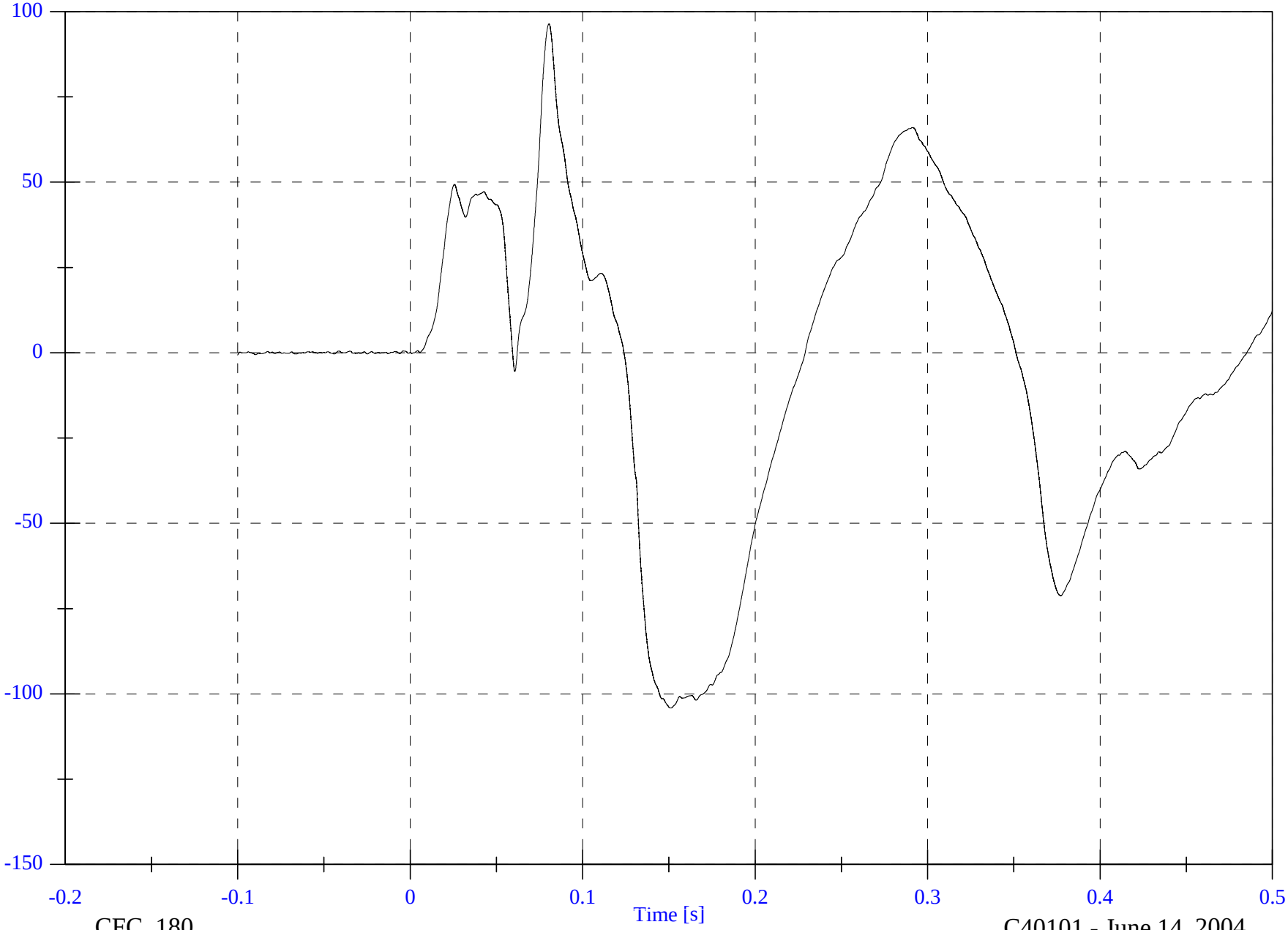
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Chest AVy

Max: 96.4 [deg/s] at 0.080 [s]

Min: -104.1 [deg/s] at 0.151 [s]



B-81

8655-F301-18R

CFC_180

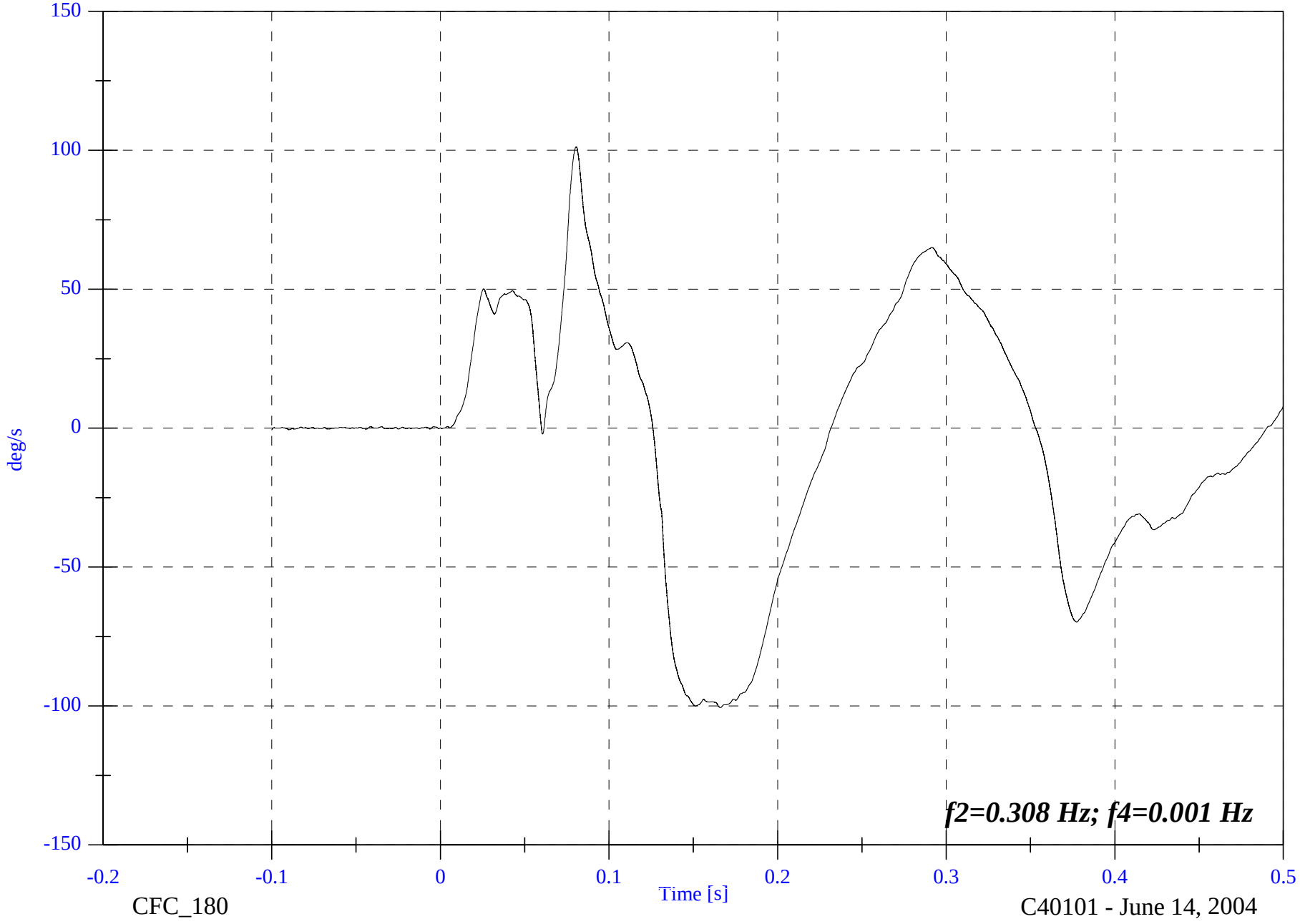
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Chest Comp AVy

Max: 101.3 [deg/s] at 0.081 [s]

Min: -100.6 [deg/s] at 0.166 [s]

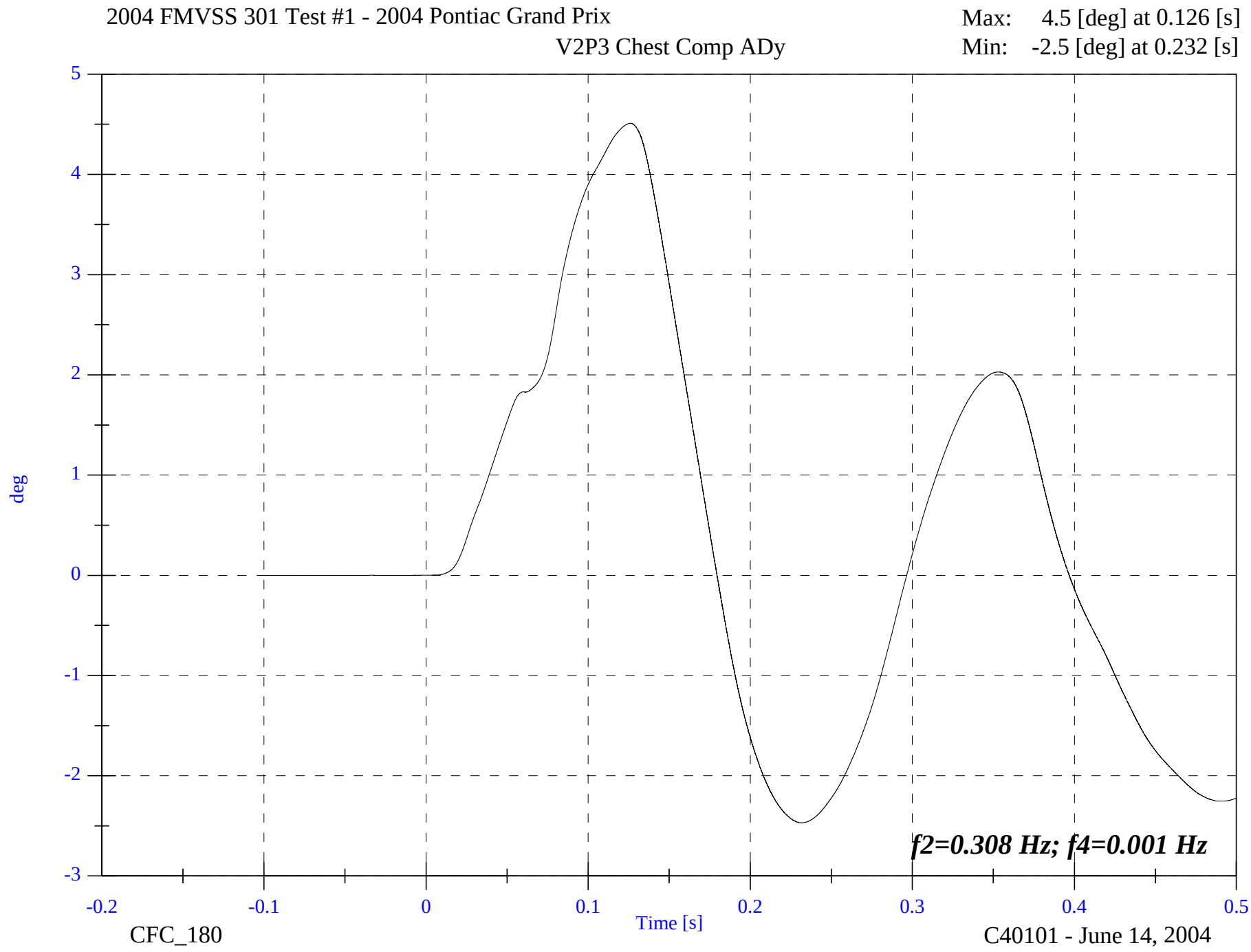


B-82

8655-F301-18R

CFC_180

C40101 - June 14, 2004



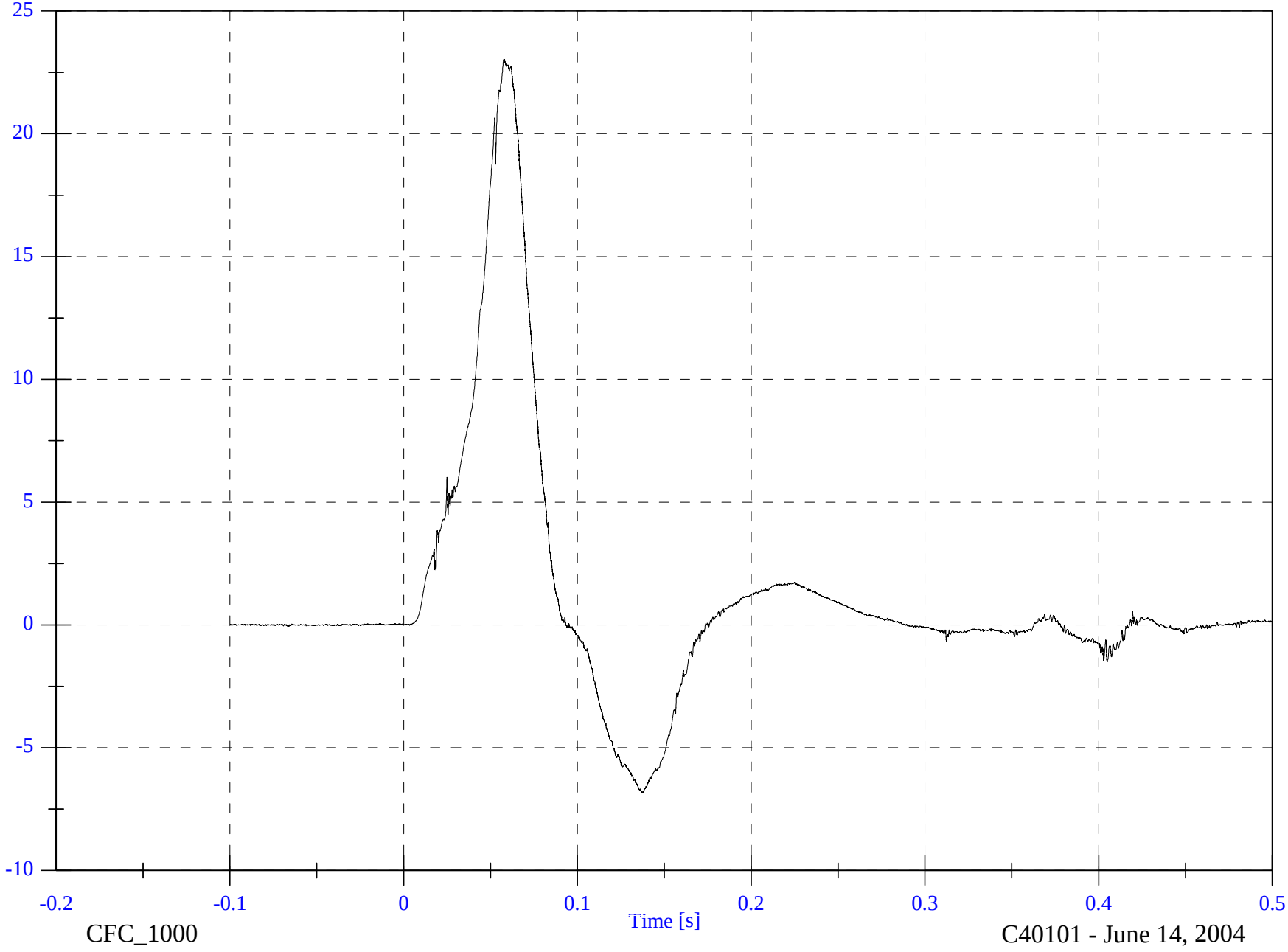
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Pelvic x

Max: 23.0 [g] at 0.058 [s]

Min: -6.8 [g] at 0.138 [s]



B-84

8655-F301-18R

CFC_1000

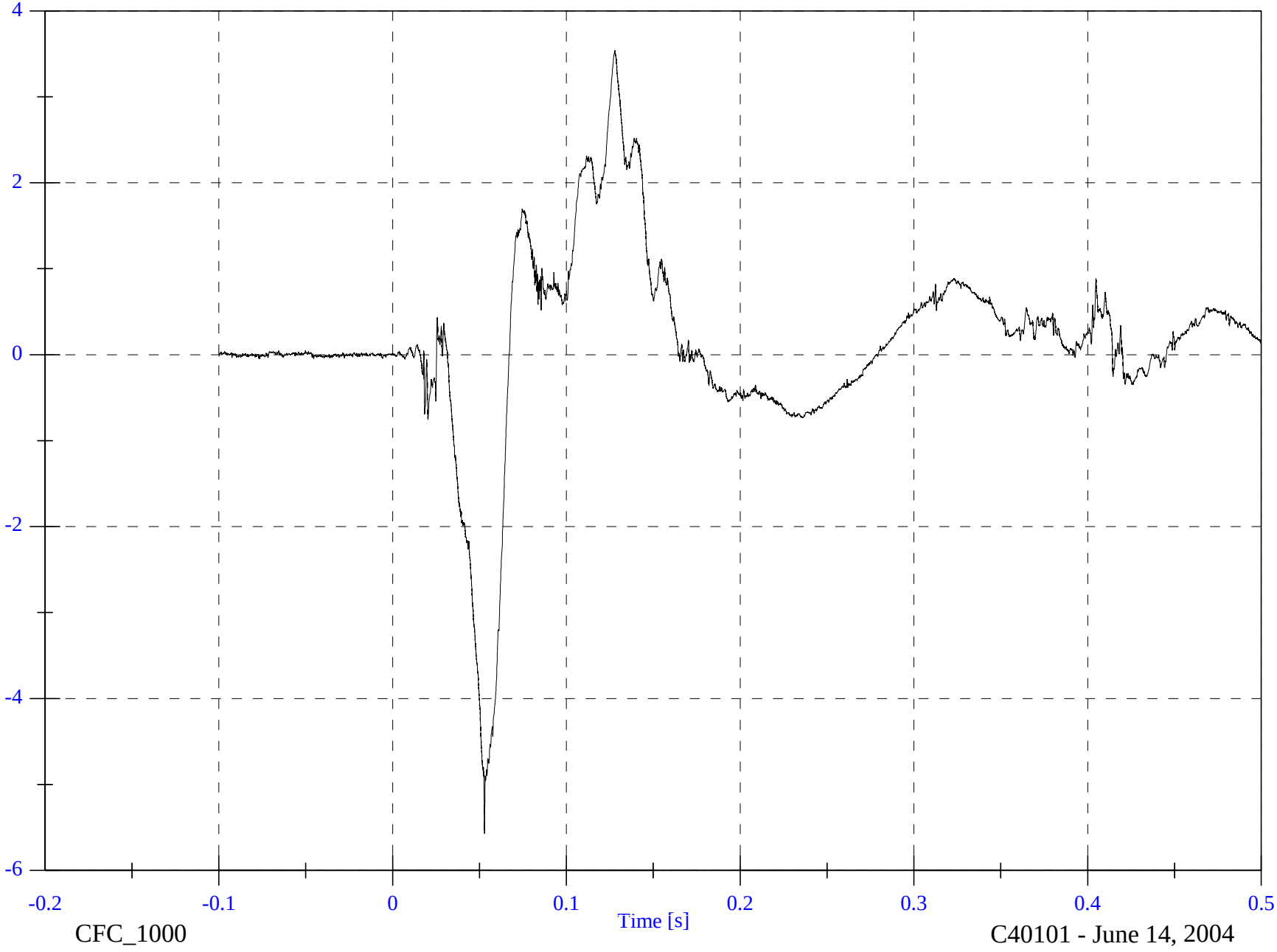
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Pelvic y

Max: 3.5 [g] at 0.128 [s]

Min: -5.6 [g] at 0.053 [s]

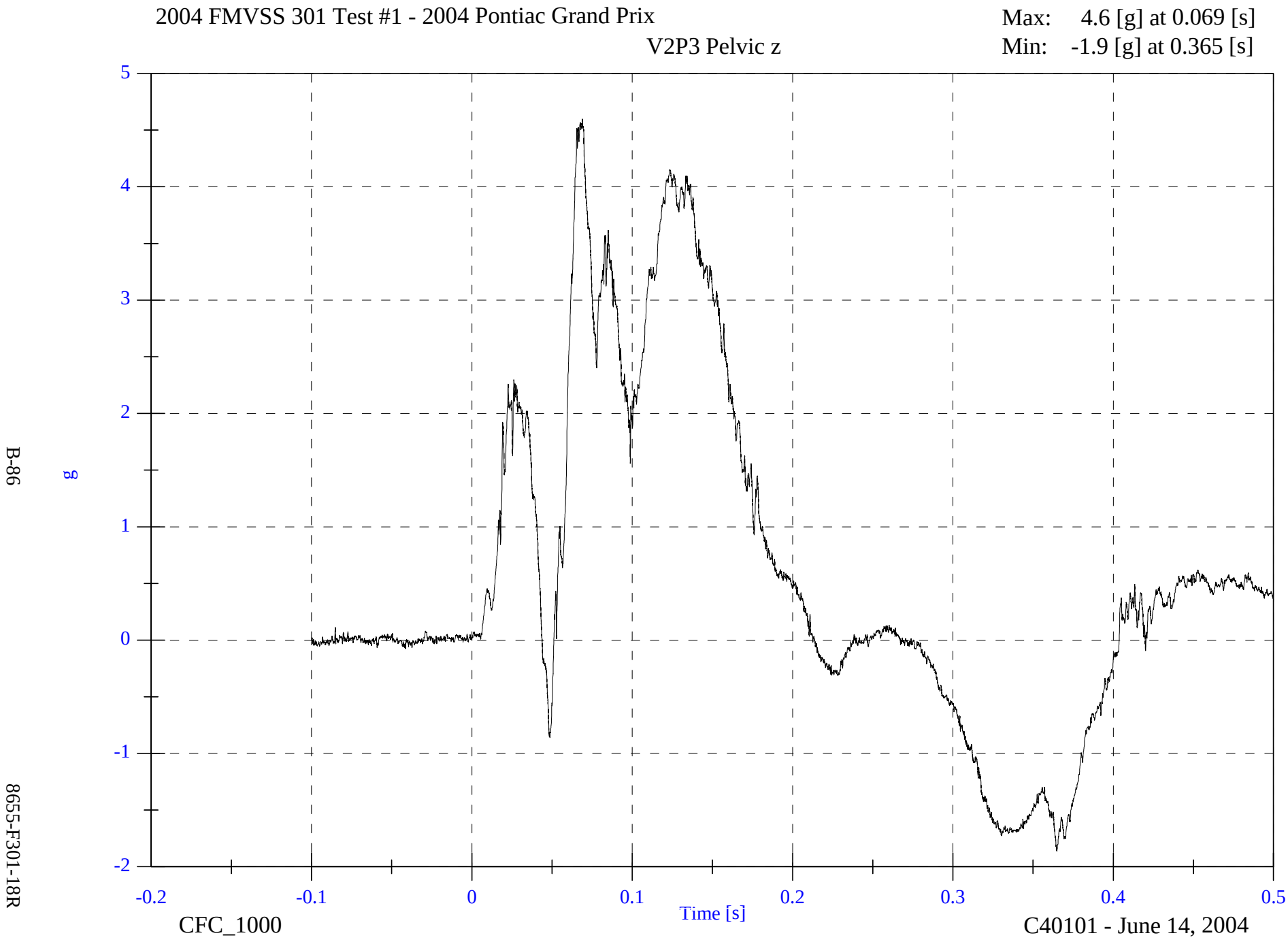


B-85

8655-F301-18R

CFC_1000

C40101 - June 14, 2004

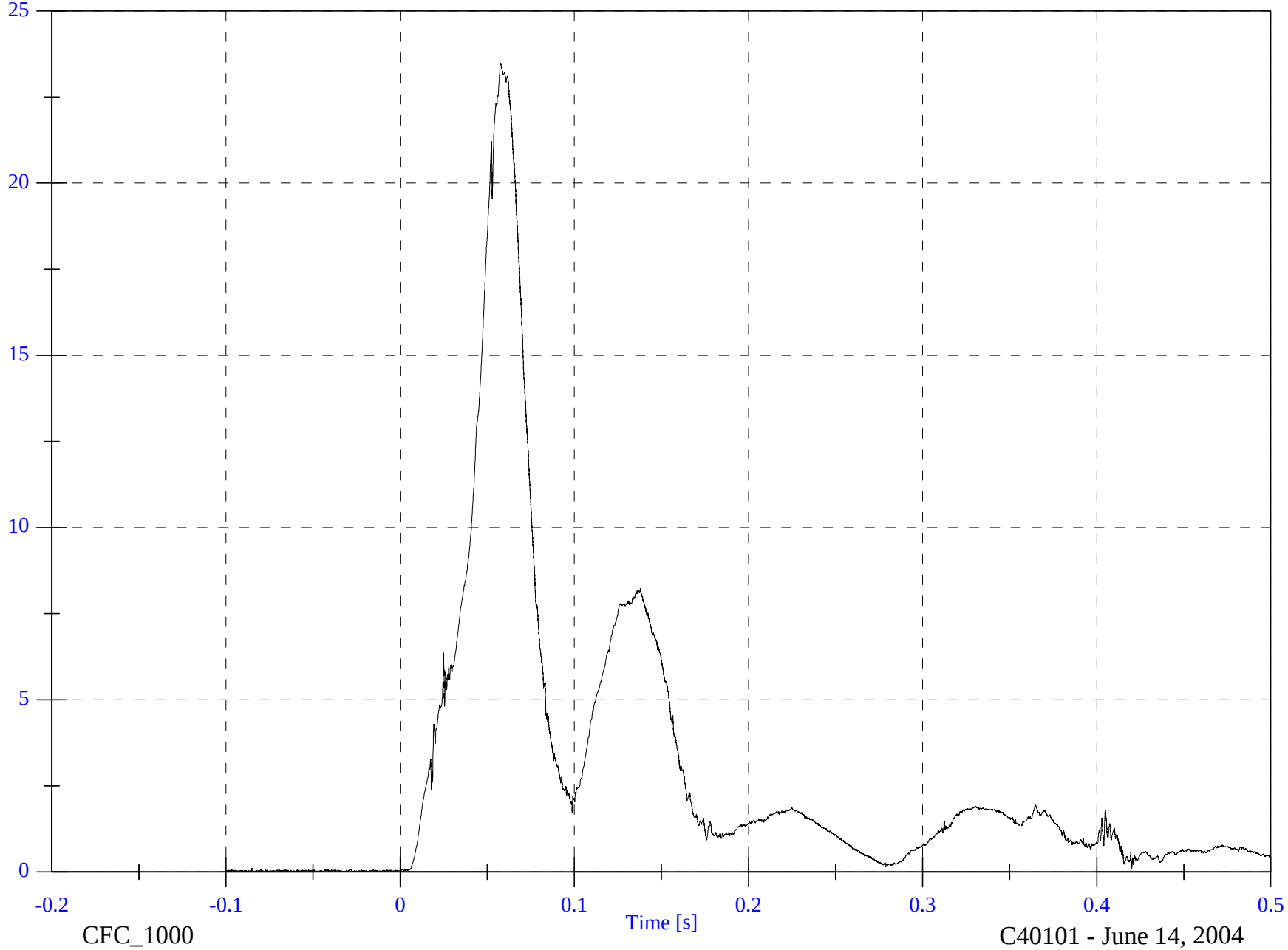

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix
V2P3 Pelvic z
Max: 4.6 [g] at 0.069 [s]
Min: -1.9 [g] at 0.365 [s]
5
4
3
2
1
0
-1
-2
g
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
Time [s]
CFC_1000
C40101 - June 14, 2004
B-86
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Pelvic Resultant

Max: 23.5 [g] at 0.058 [s]

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



B-87

8655-F301-18R

CFC_1000

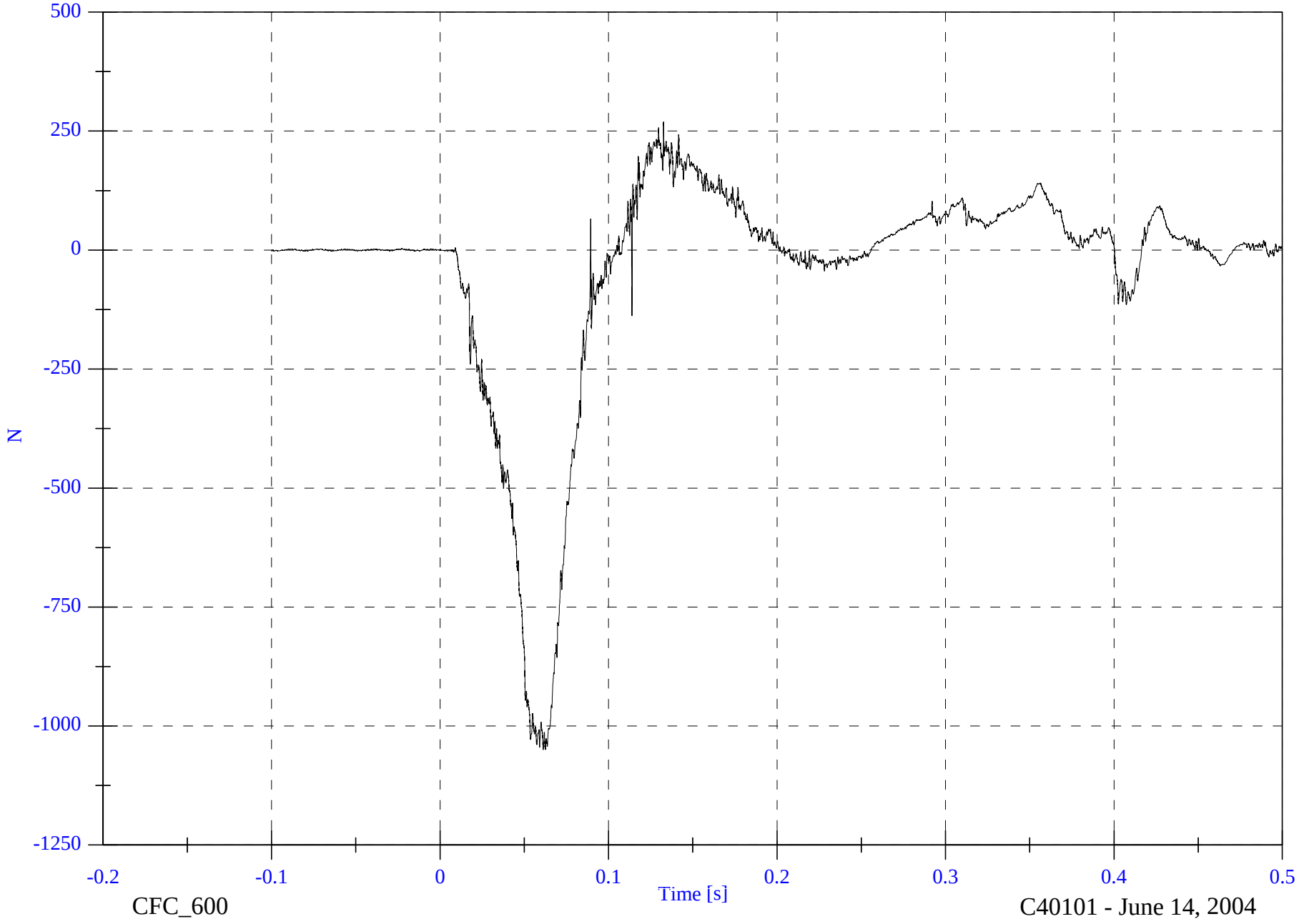
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Left Femur

Max: 269.1 [N] at 0.133 [s]

Min: -1049.9 [N] at 0.061 [s]



B-88

8655-F301-18R

CFC_600

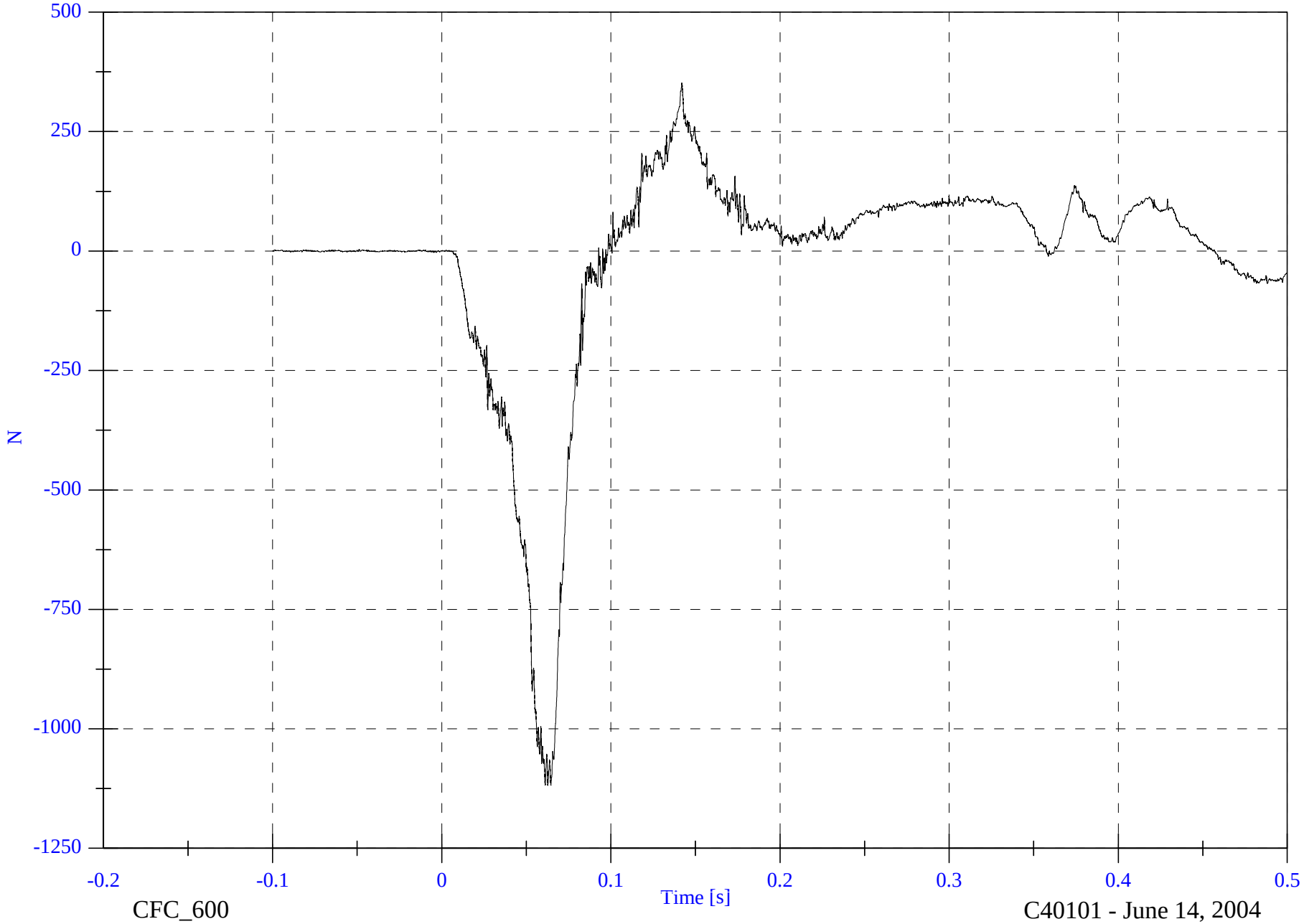
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Right Femur

Max: 351.4 [N] at 0.142 [s]

Min: -1118.5 [N] at 0.063 [s]



B-89

8655-F301-18R

CFC_600

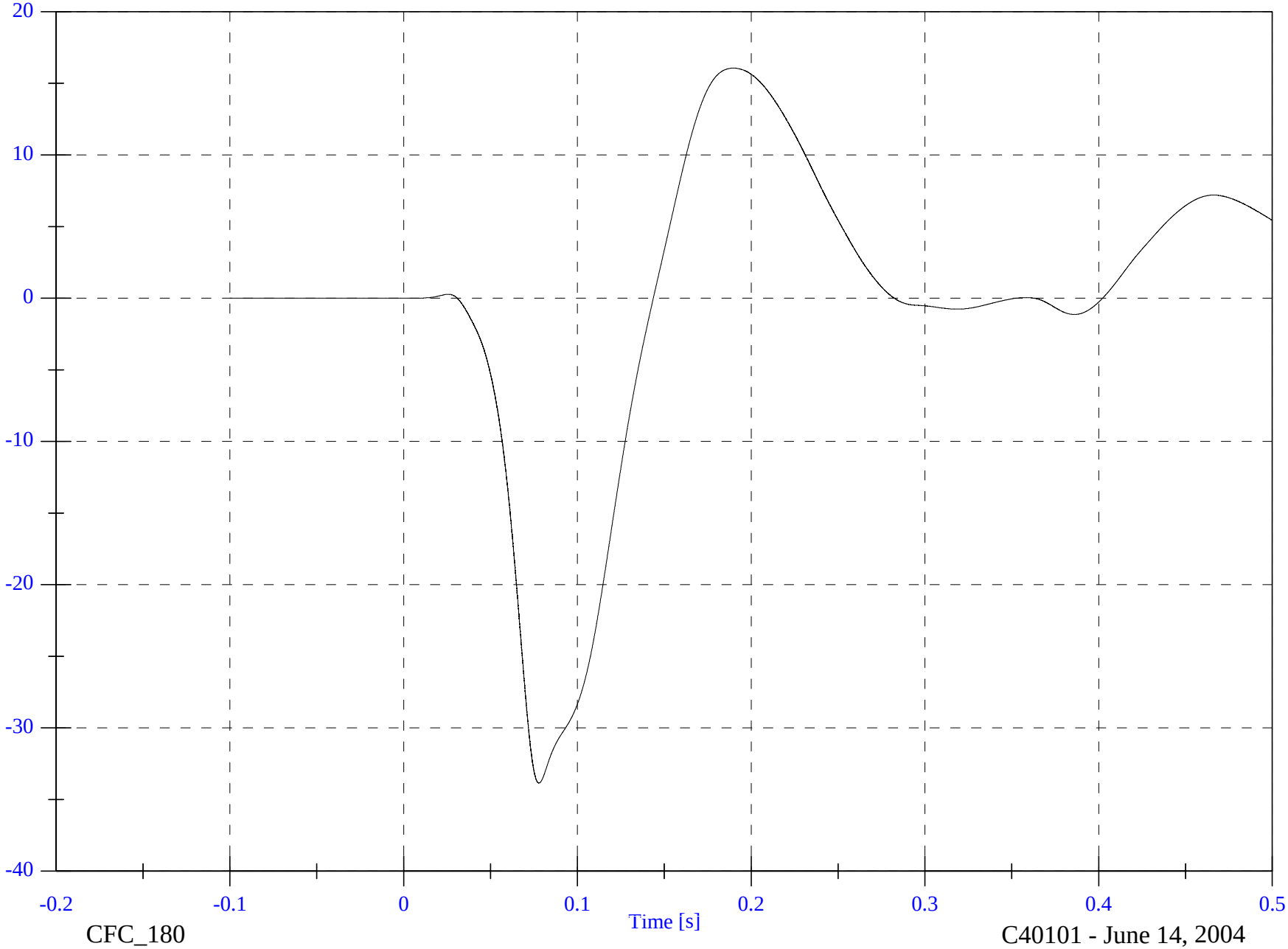
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Head to Chest

Max: 16.1 [deg] at 0.190 [s]

Min: -33.8 [deg] at 0.078 [s]



B-90

8655-F301-18R

CFC_180

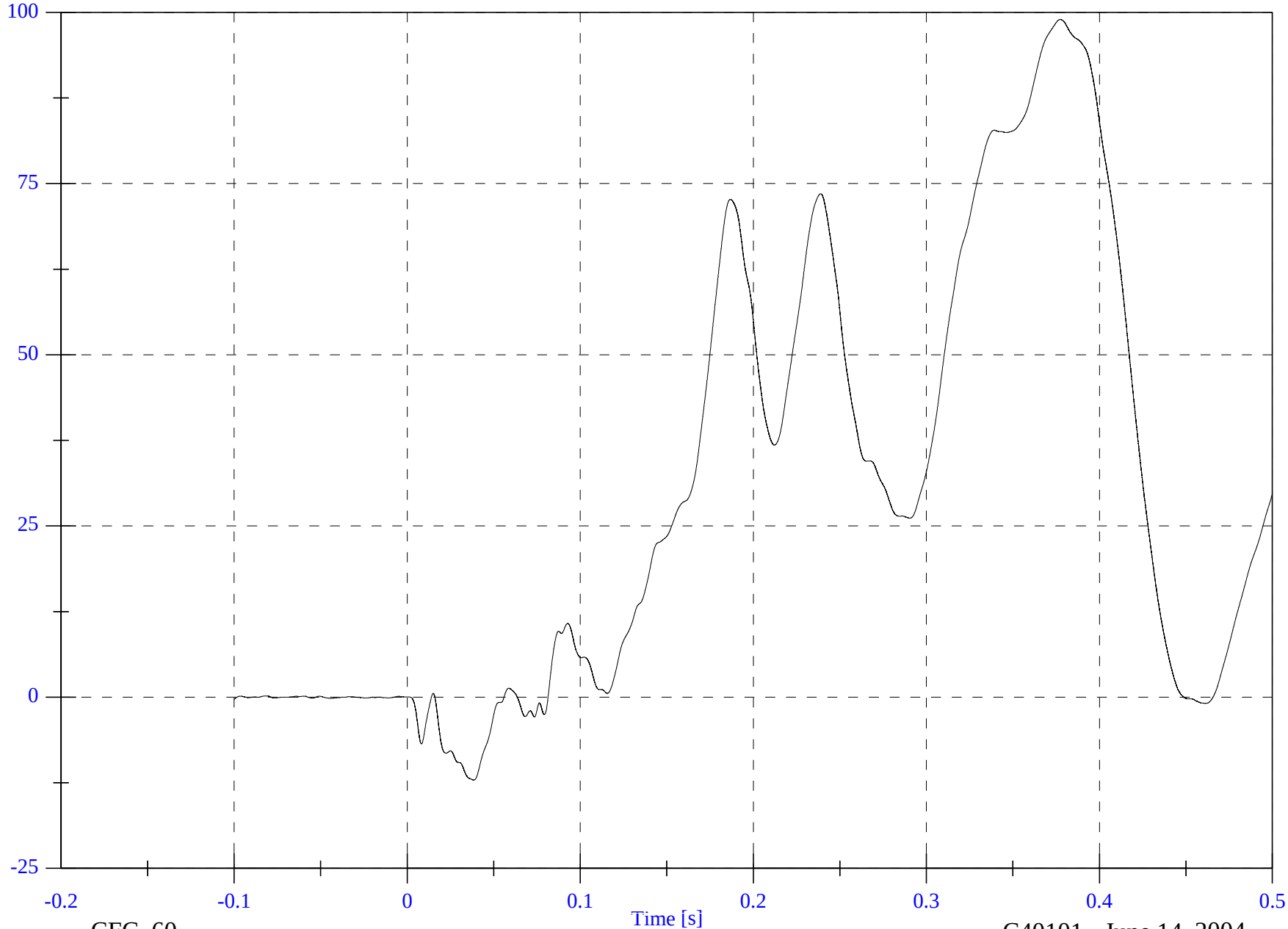
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P3 Lap Belt

Max: 99.0 [N] at 0.377 [s]

Min: -12.1 [N] at 0.038 [s]



B-91

8655-F301-18R

CFC_60

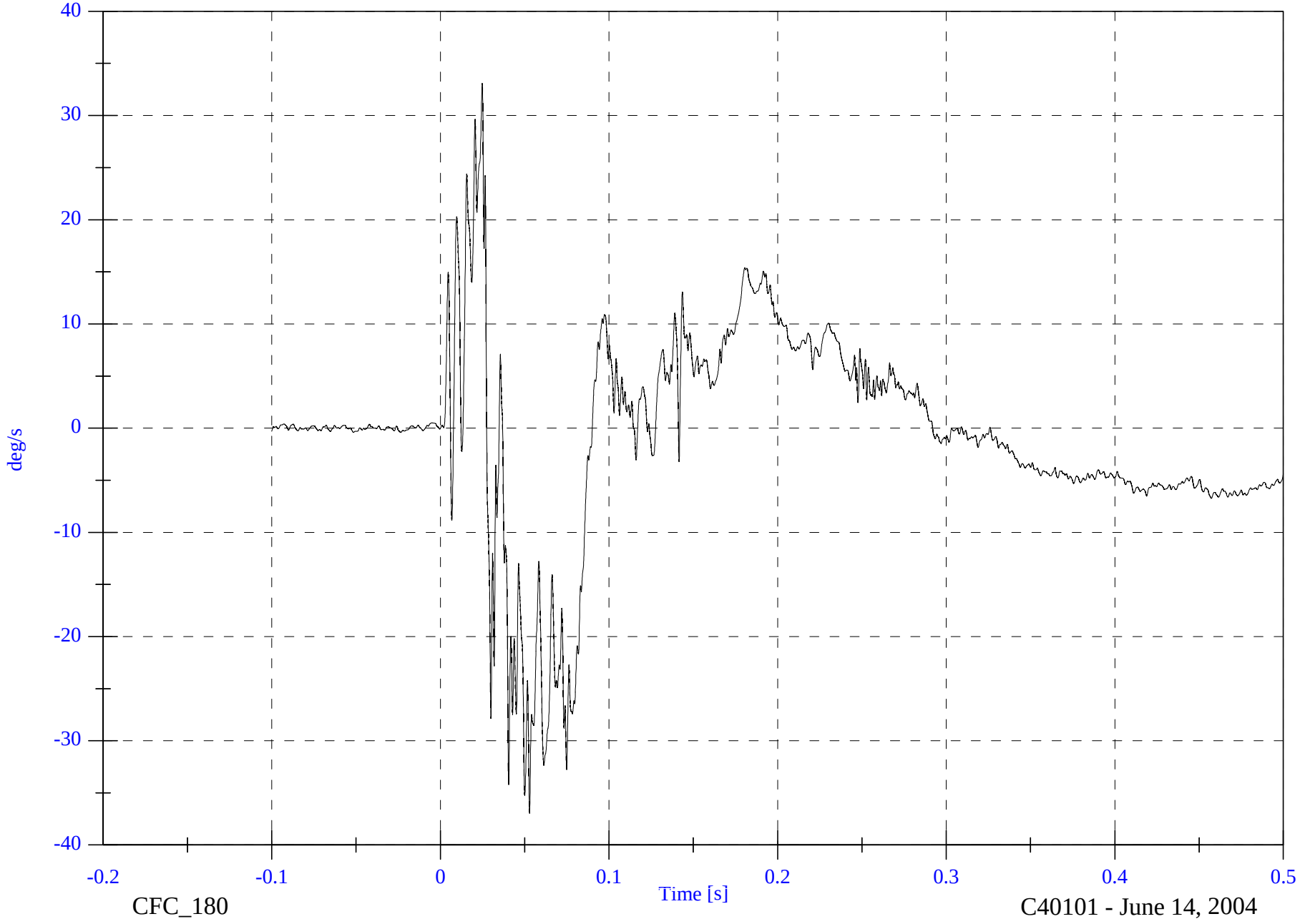
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2 Left Front Sill AVy

Max: 33.1 [deg/s] at 0.025 [s]

Min: -37.0 [deg/s] at 0.053 [s]



CFC_180

C40101 - June 14, 2004

B-92

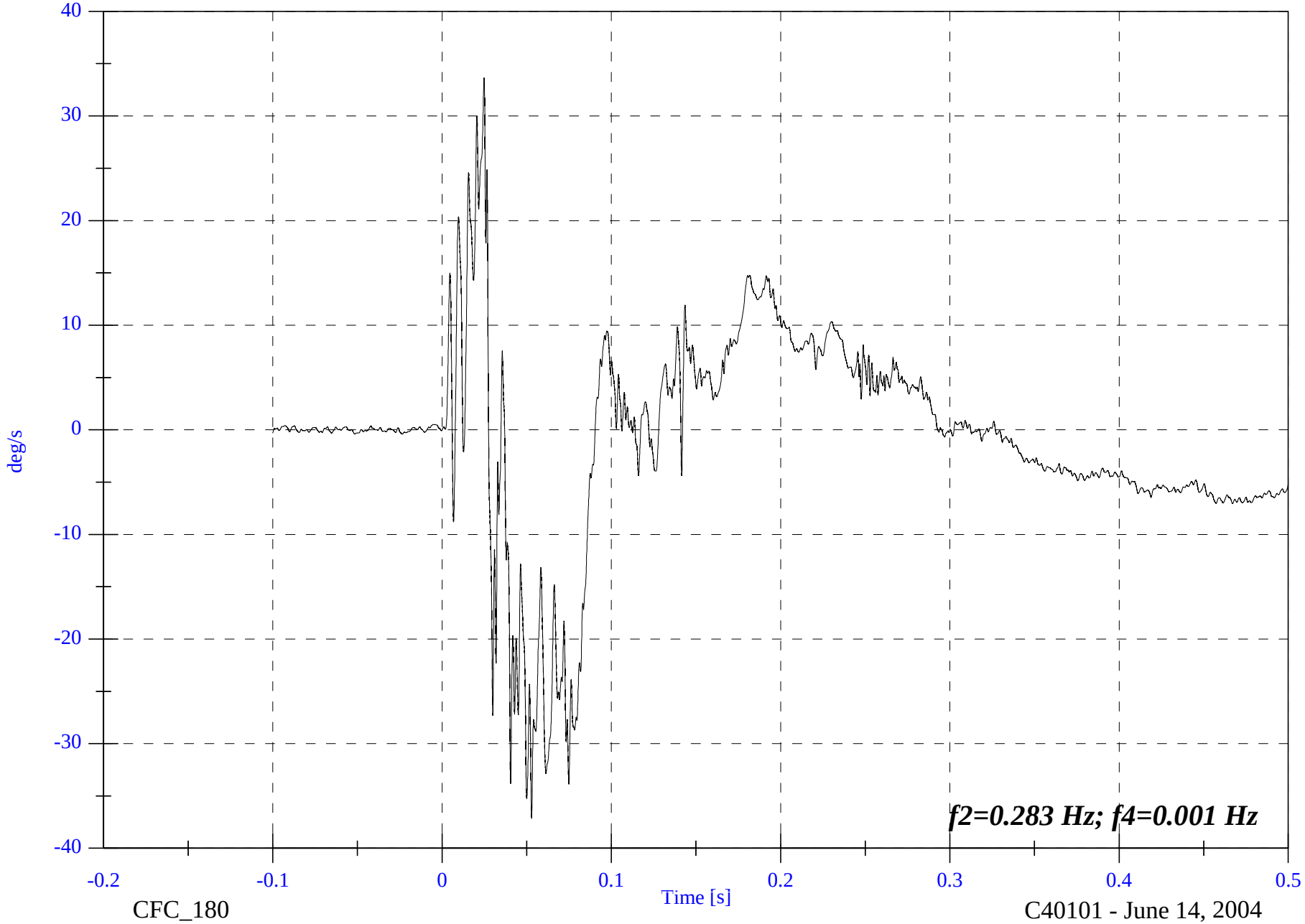
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2 Left Front Sill Comp AVy

Max: 33.6 [deg/s] at 0.025 [s]

Min: -37.1 [deg/s] at 0.053 [s]



B-93

8655-F301-18R

CFC_180

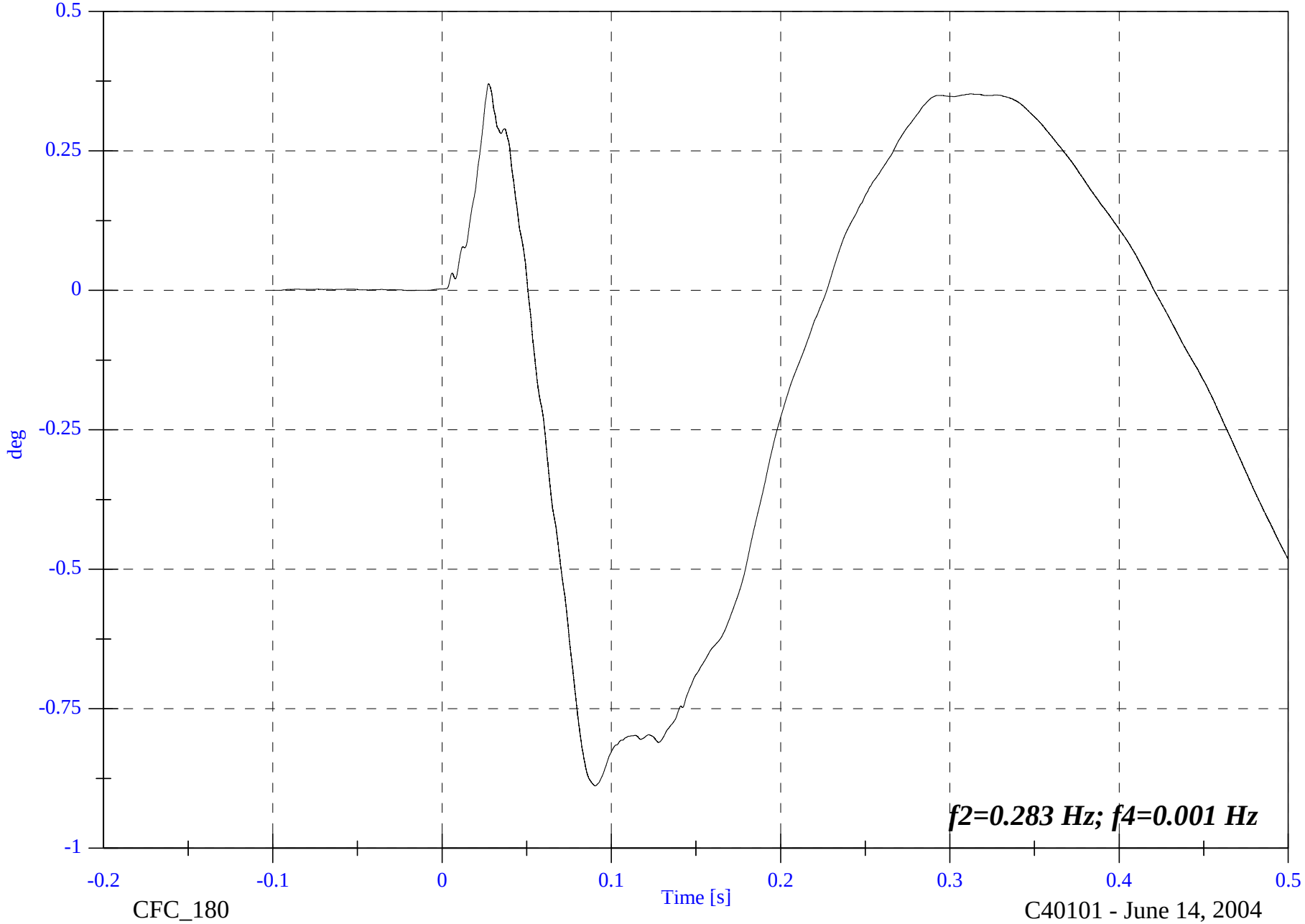
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2 Left Front Sill Comp ADy

Max: 0.4 [deg] at 0.027 [s]

Min: -0.9 [deg] at 0.090 [s]



B-94

8655-F301-18R

CFC_180

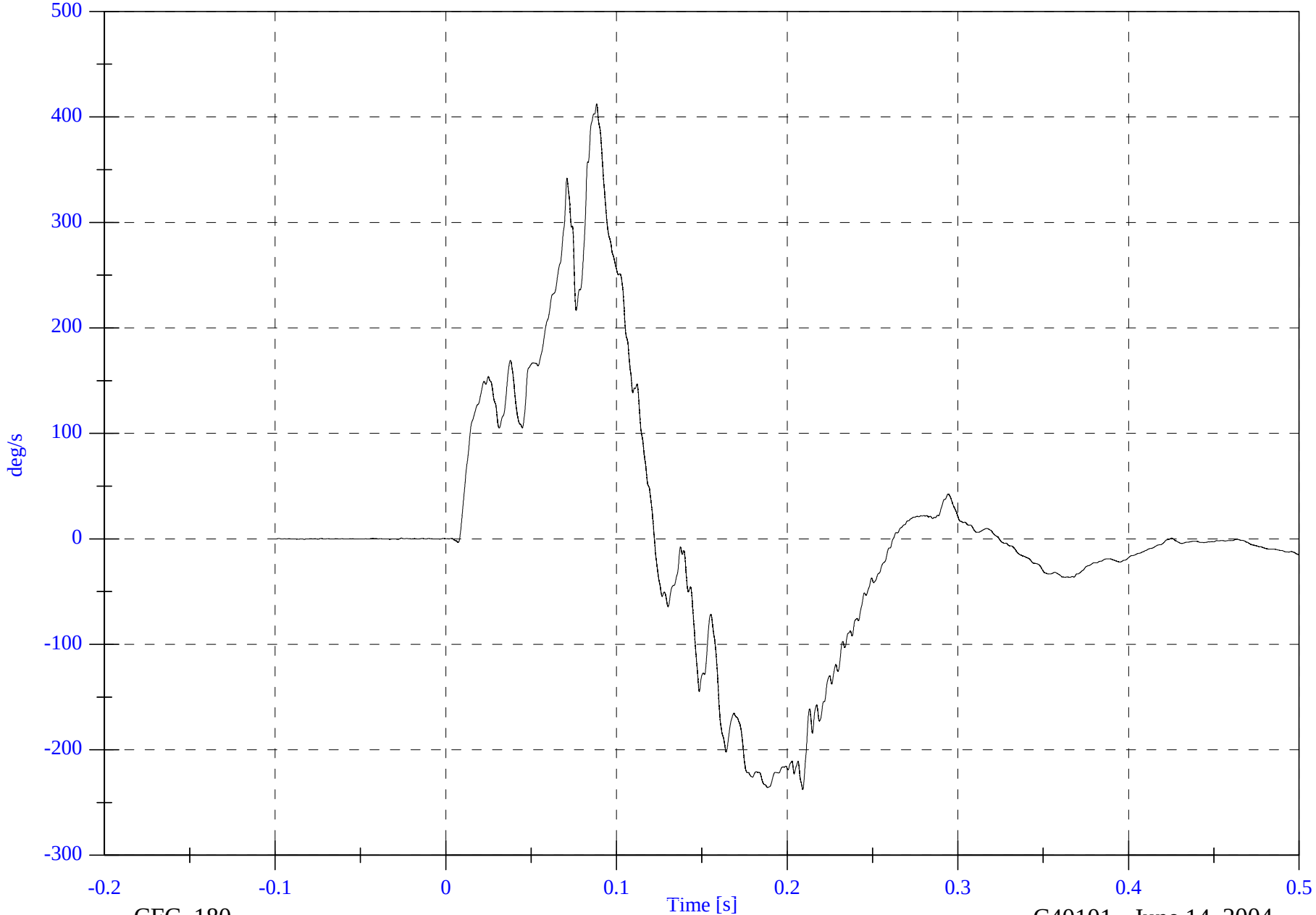
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Left Seat AVy

Max: 412.4 [deg/s] at 0.088 [s]

Min: -237.6 [deg/s] at 0.209 [s]



B-95

8655-F301-18R

CFC_180

C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Left Seat Comp AVy

Max: 447.8 [deg/s] at 0.088 [s]

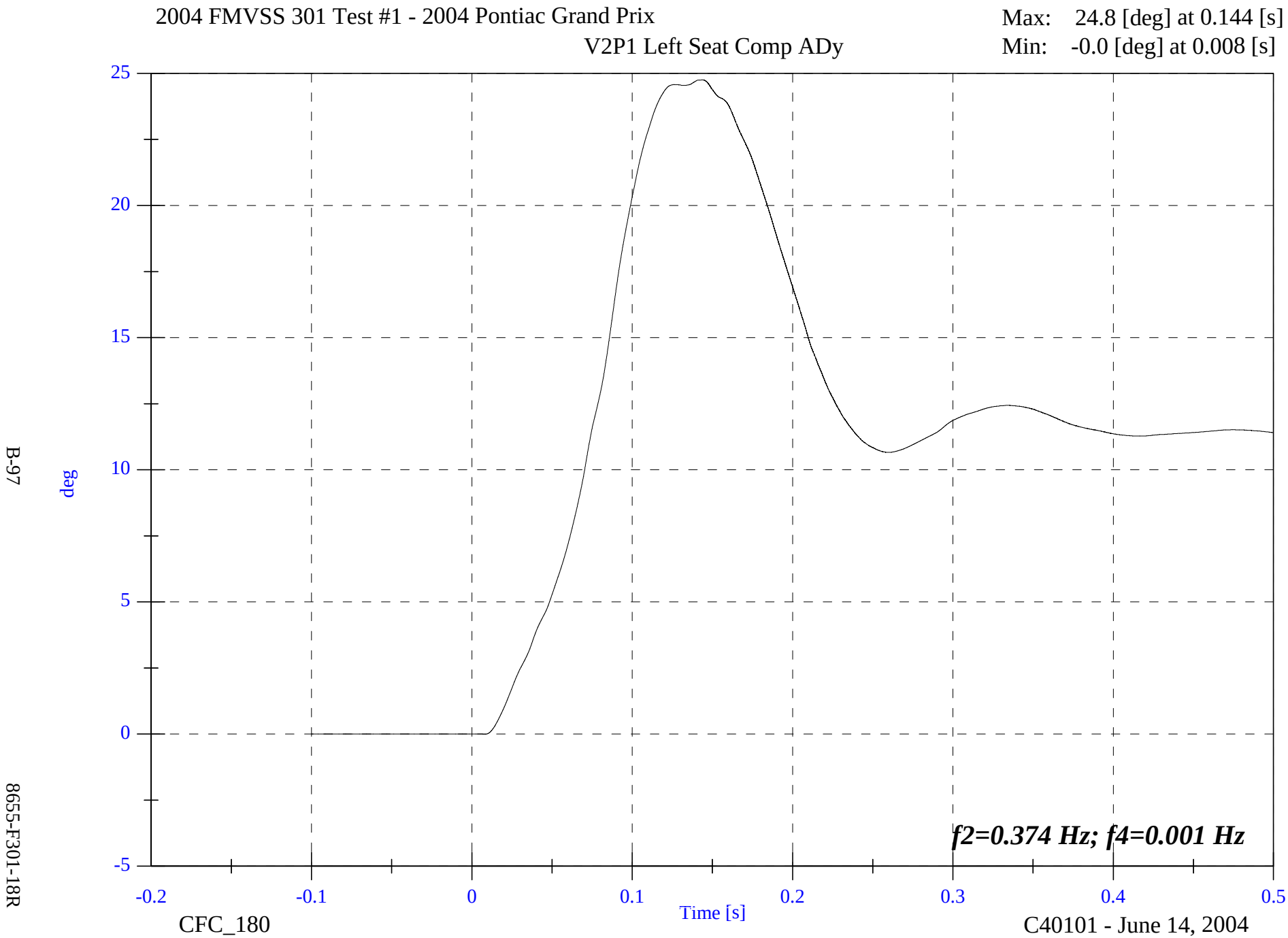
Min: -216.6 [deg/s] at 0.209 [s]

B-96

8655-F301-18R

CFC_180

C40101 - June 14, 2004



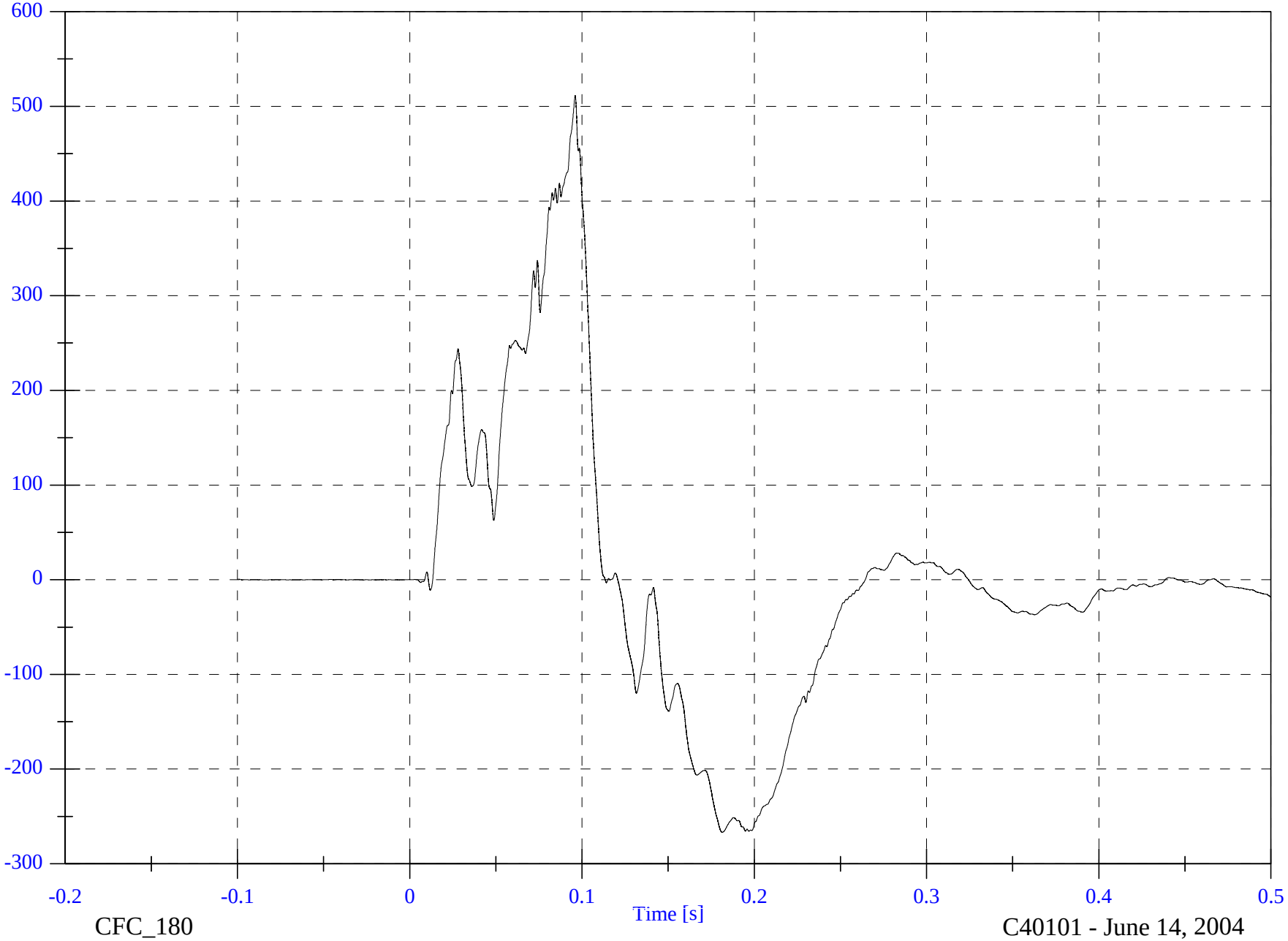
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Right Seat AVy

Max: 511.2 [deg/s] at 0.096 [s]

Min: -266.6 [deg/s] at 0.182 [s]



B-98

8655-F301-18R

CFC_180

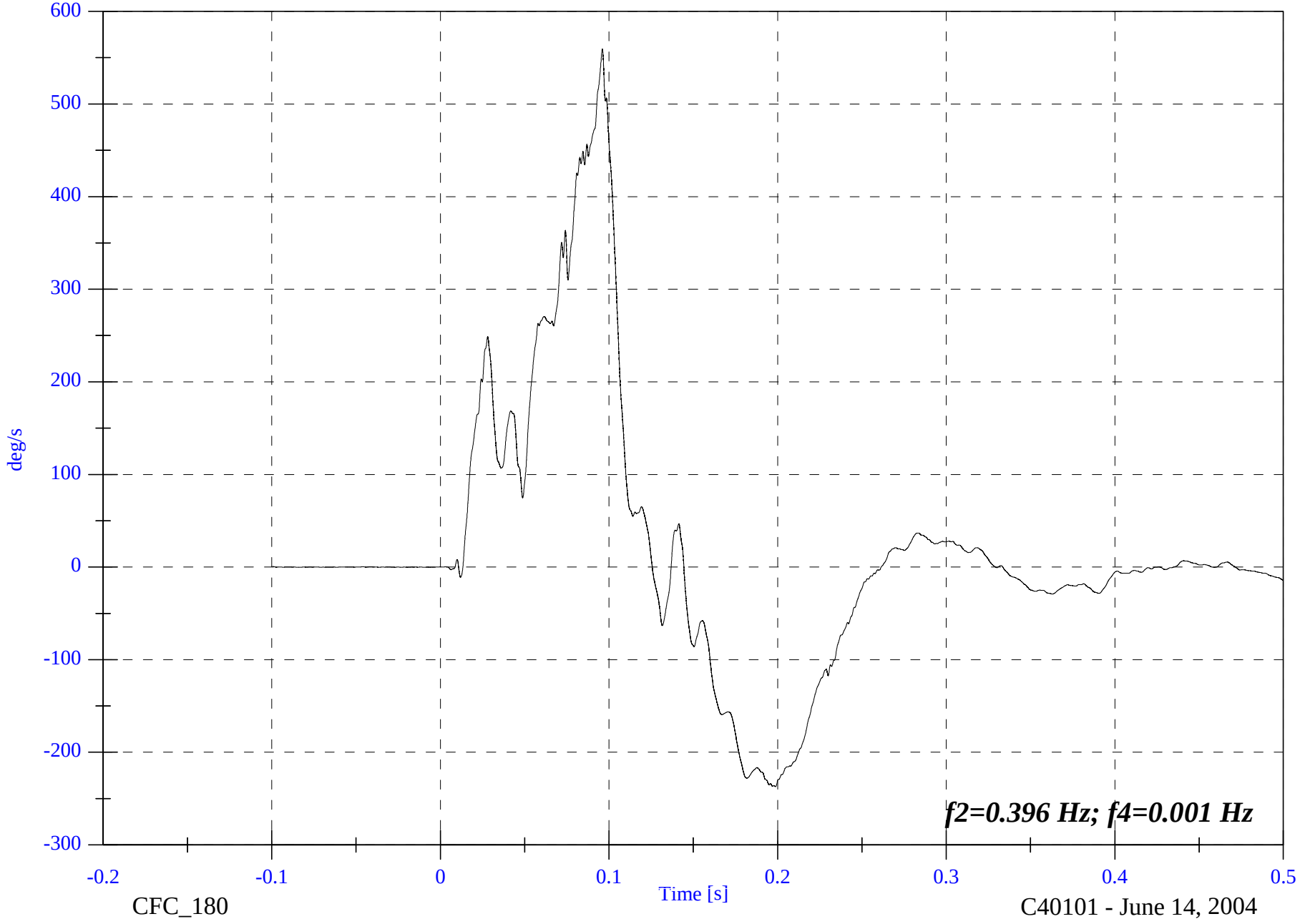
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Right Seat Comp AVy

Max: 559.2 [deg/s] at 0.096 [s]

Min: -237.1 [deg/s] at 0.199 [s]



B-99

8655-F301-18R

CFC_180

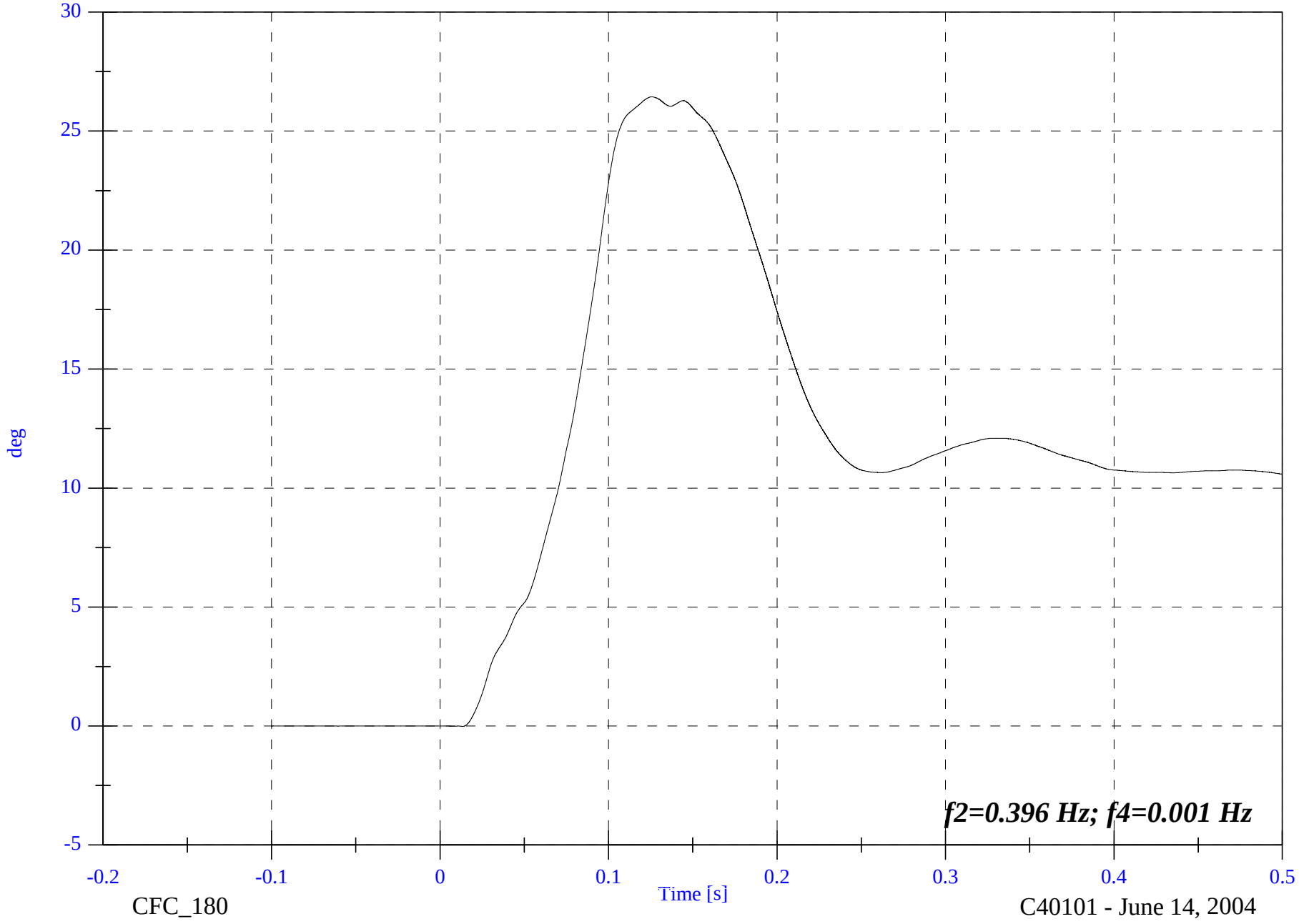
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Right Seat Comp ADy

Max: 26.4 [deg] at 0.126 [s]

Min: -0.0 [deg] at 0.013 [s]



B-100

8655-F301-18R

CFC_180

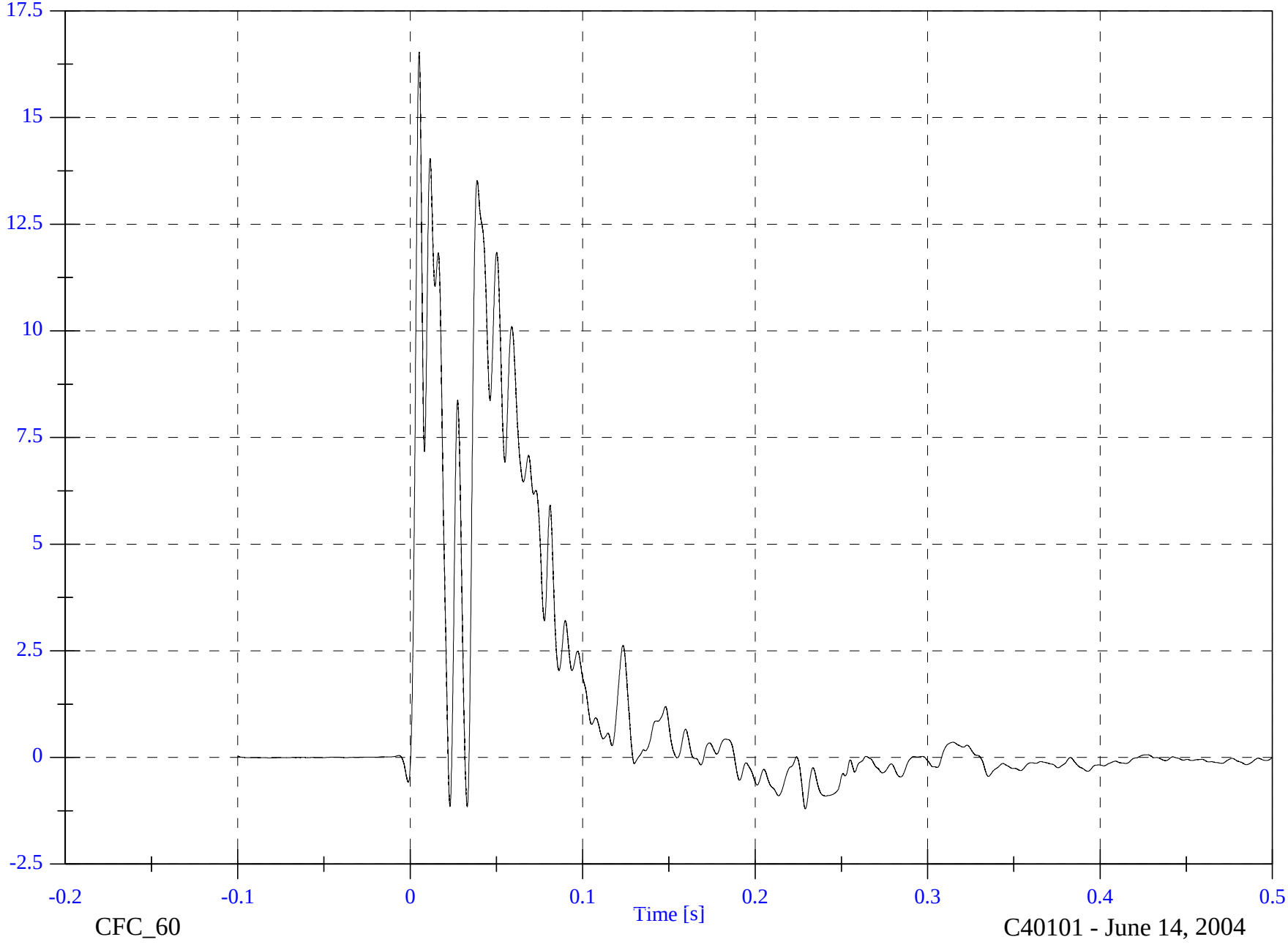
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2 Left X Member x

Max: 16.5 [g] at 0.005 [s]

Min: -1.2 [g] at 0.229 [s]



B-101

8655-F301-18R

CFC_60

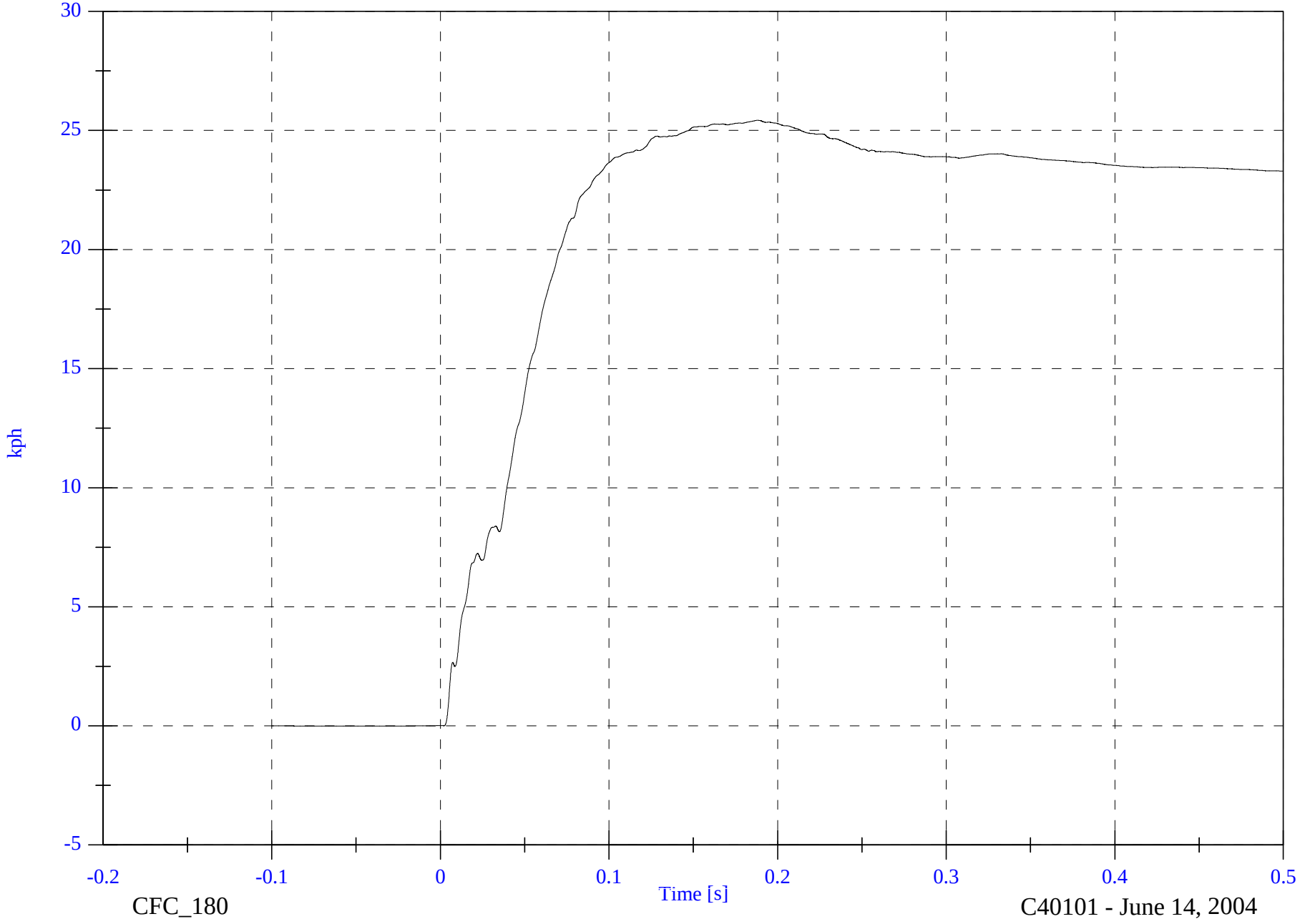
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2 Left X Member x Velocity

Max: 25.4 [kph] at 0.188 [s]

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



B-102

8655-F301-18R

CFC_180

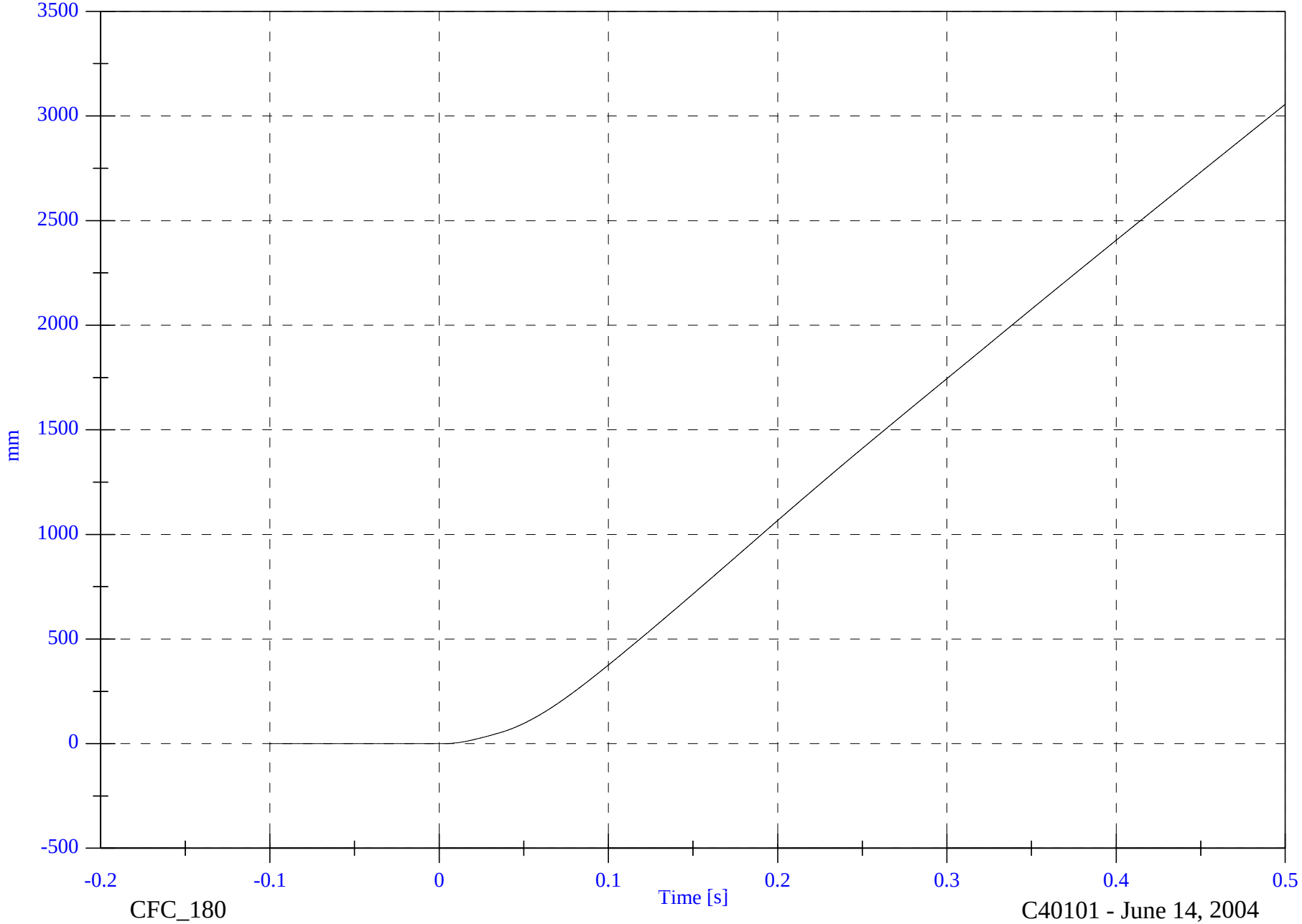
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2 Left X Member x Displacement

Max: 3055.8 [mm] at 0.500 [s]

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



B-103

8655-F301-18R

CFC_180

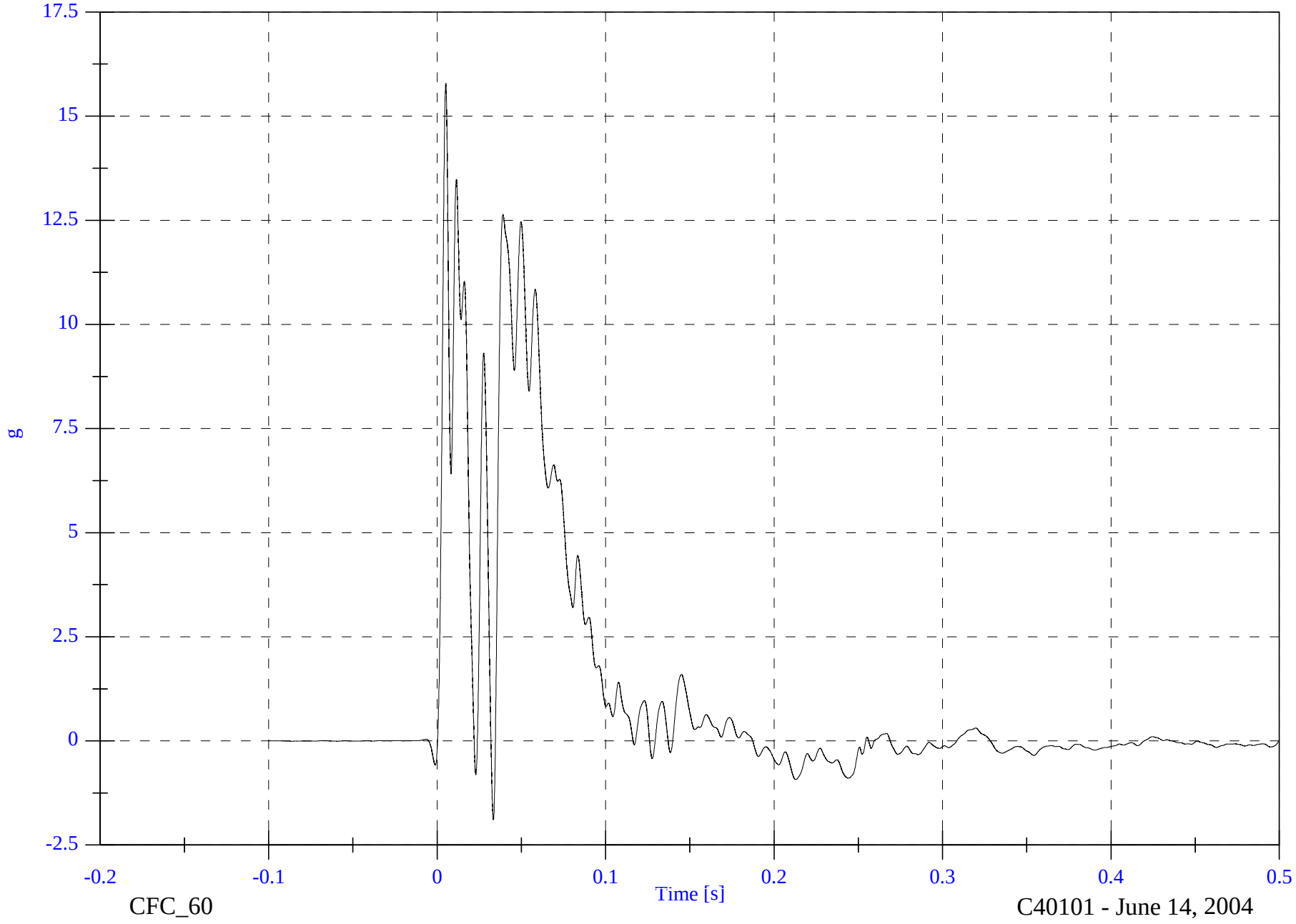
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2 Left X Member RED x

Max: 15.8 [g] at 0.005 [s]

Min: -1.9 [g] at 0.033 [s]



B-104

8655-F301-18R

CFC_60

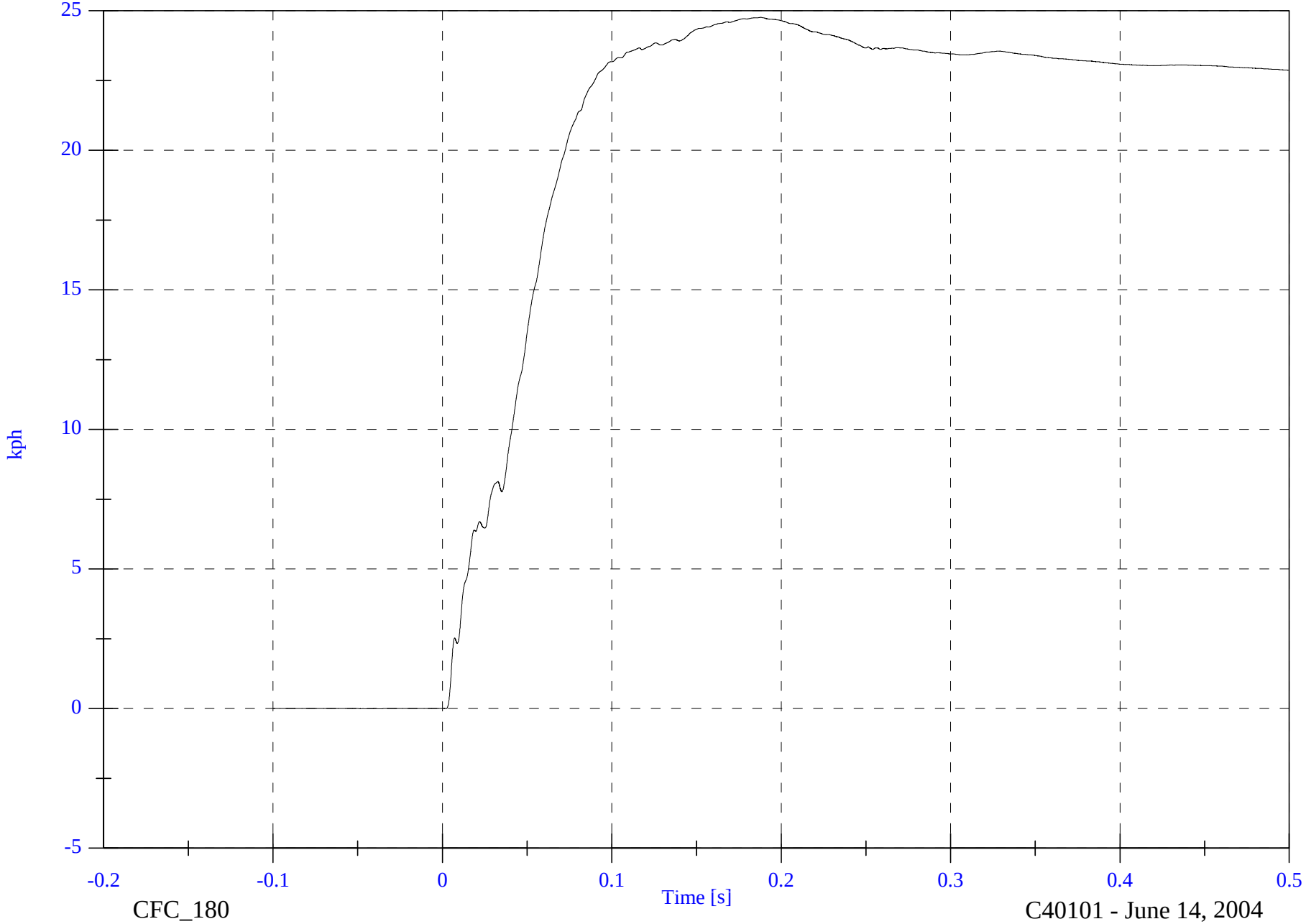
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2 Left X Member RED x Velocity

Max: 24.8 [kph] at 0.188 [s]

Min: -0.0 [kph] at -0.045 [s]



B-105

8655-F301-18R

CFC_180

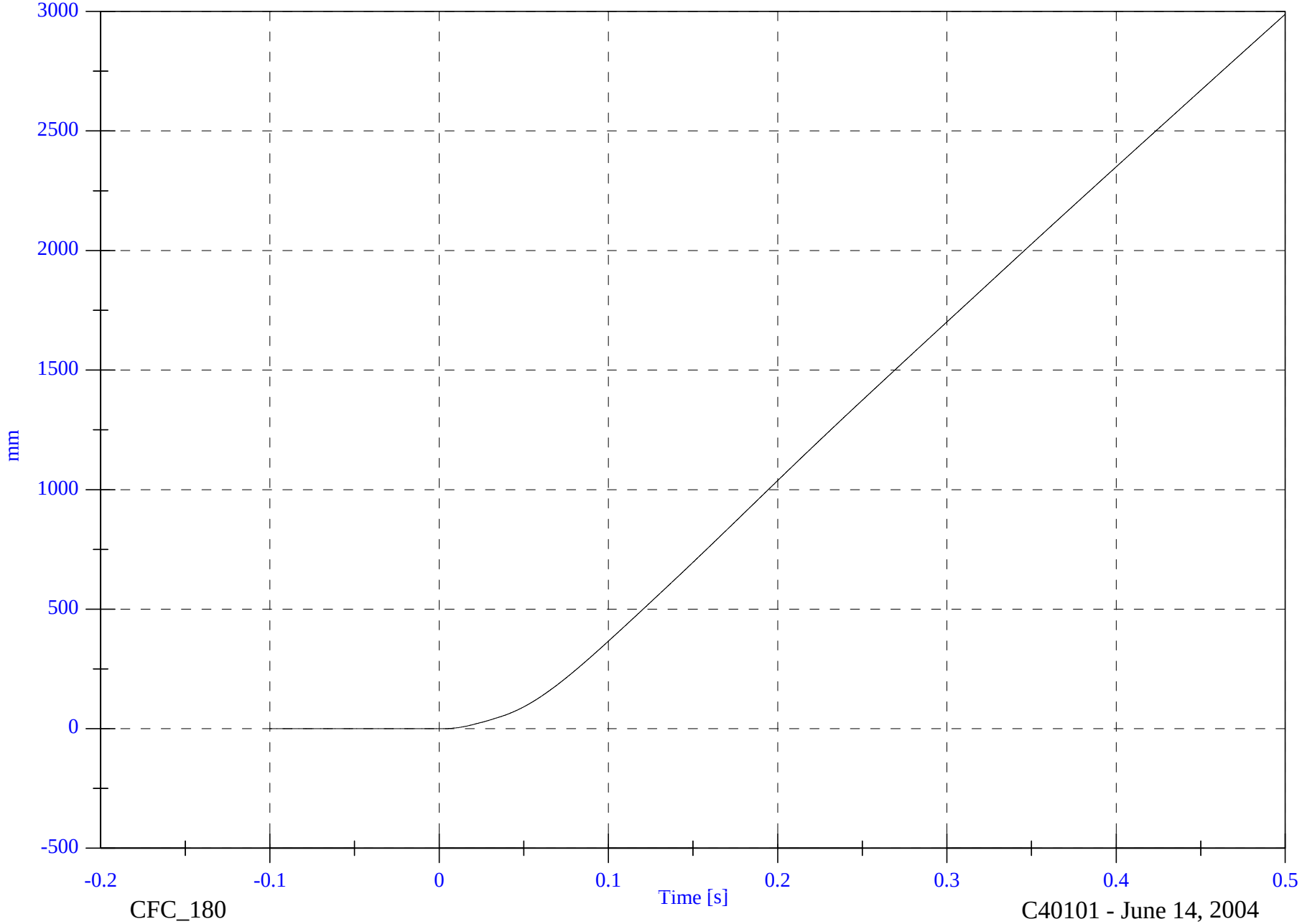
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2 Left X Member RED x Displacement

Max: 2988.1 [mm] at 0.500 [s]

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



B-106

8655-F301-18R

CFC_180

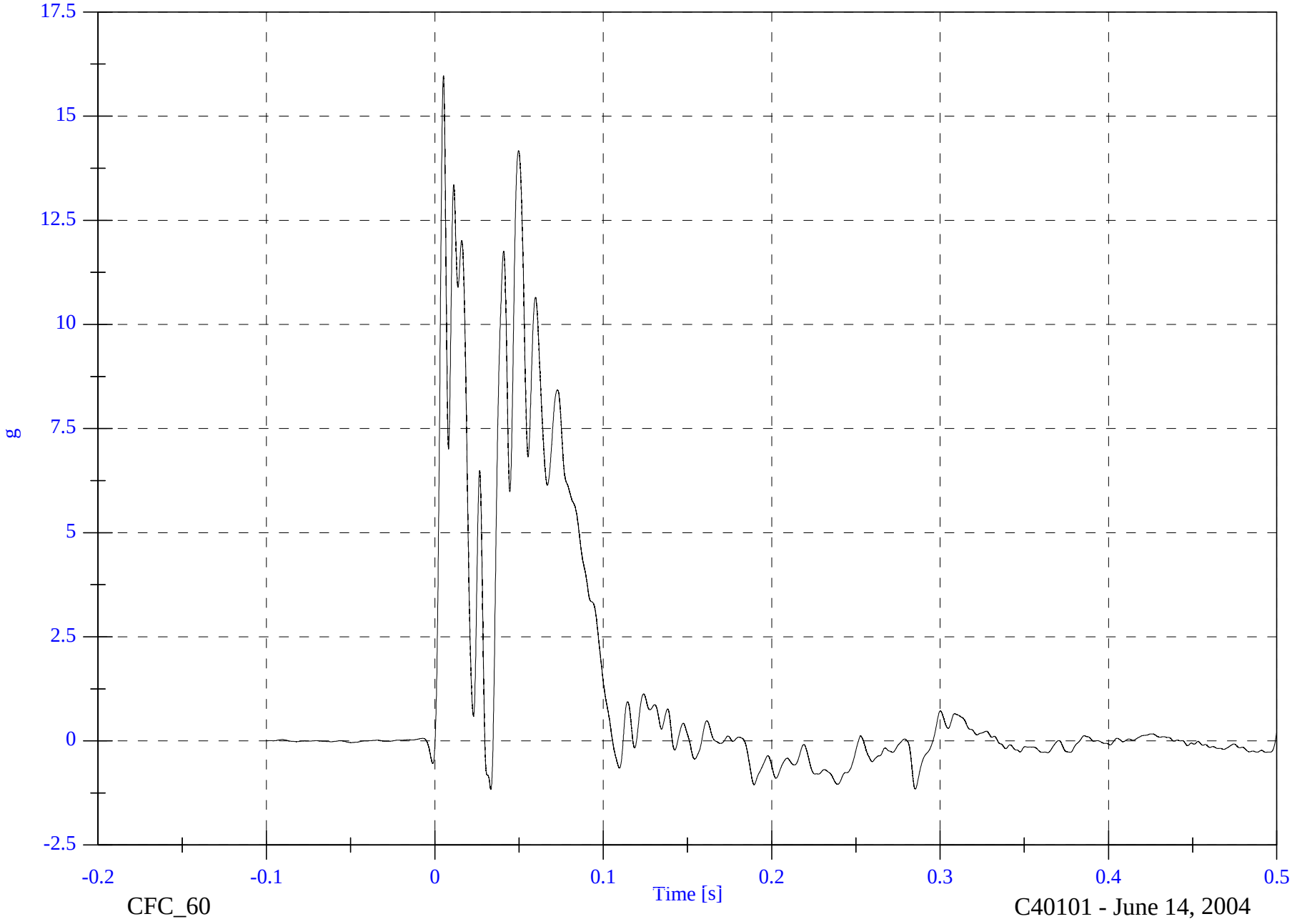
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2 Right X Member x

Max: 16.0 [g] at 0.005 [s]

Min: -1.2 [g] at 0.033 [s]



B-107

8655-F301-18R

CFC_60

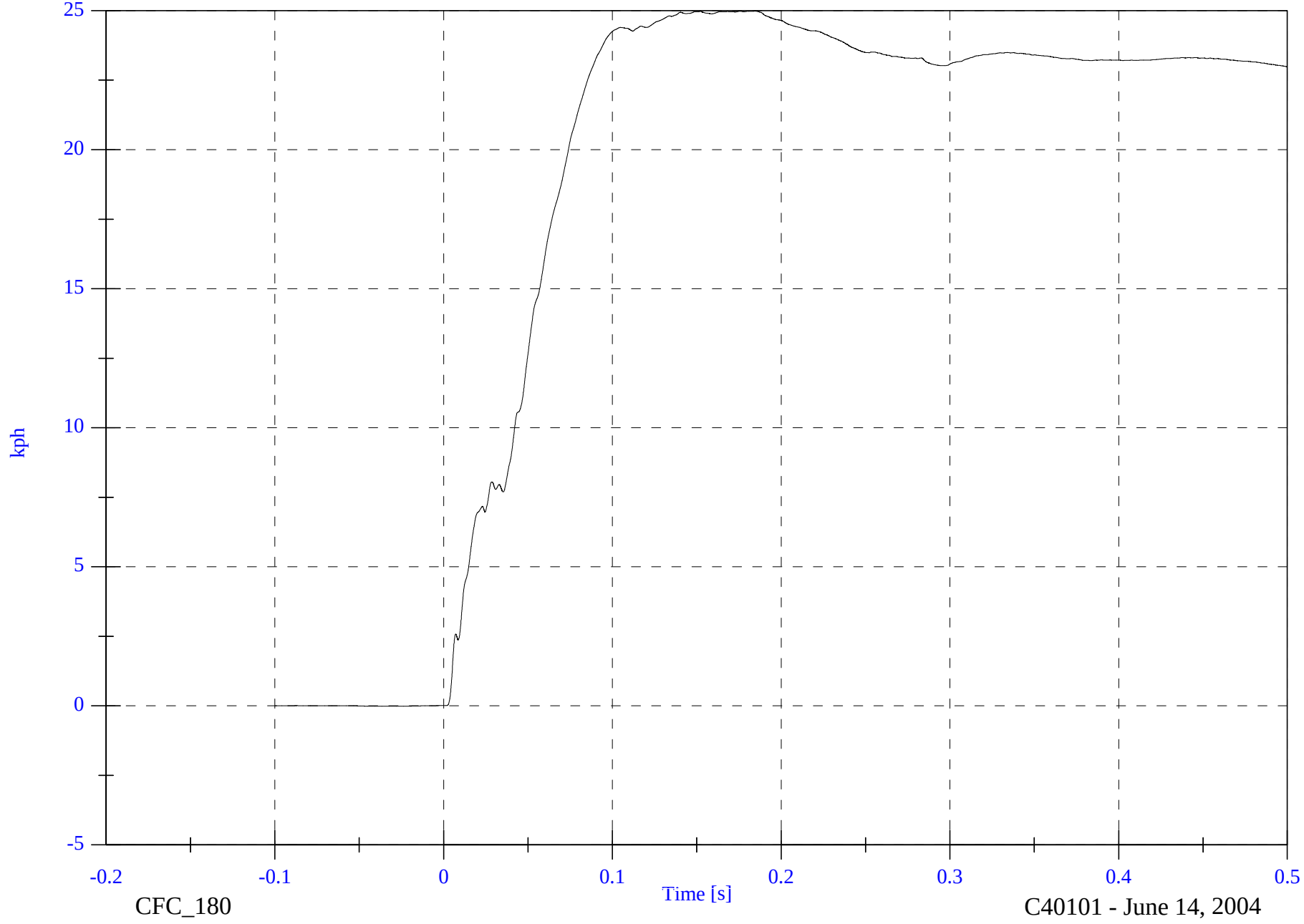
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2 Right X Member x Velocity

Max: 25.0 [kph] at 0.185 [s]

Min: -0.0 [kph] at -0.043 [s]



B-108

8655-F301-18R

CFC_180

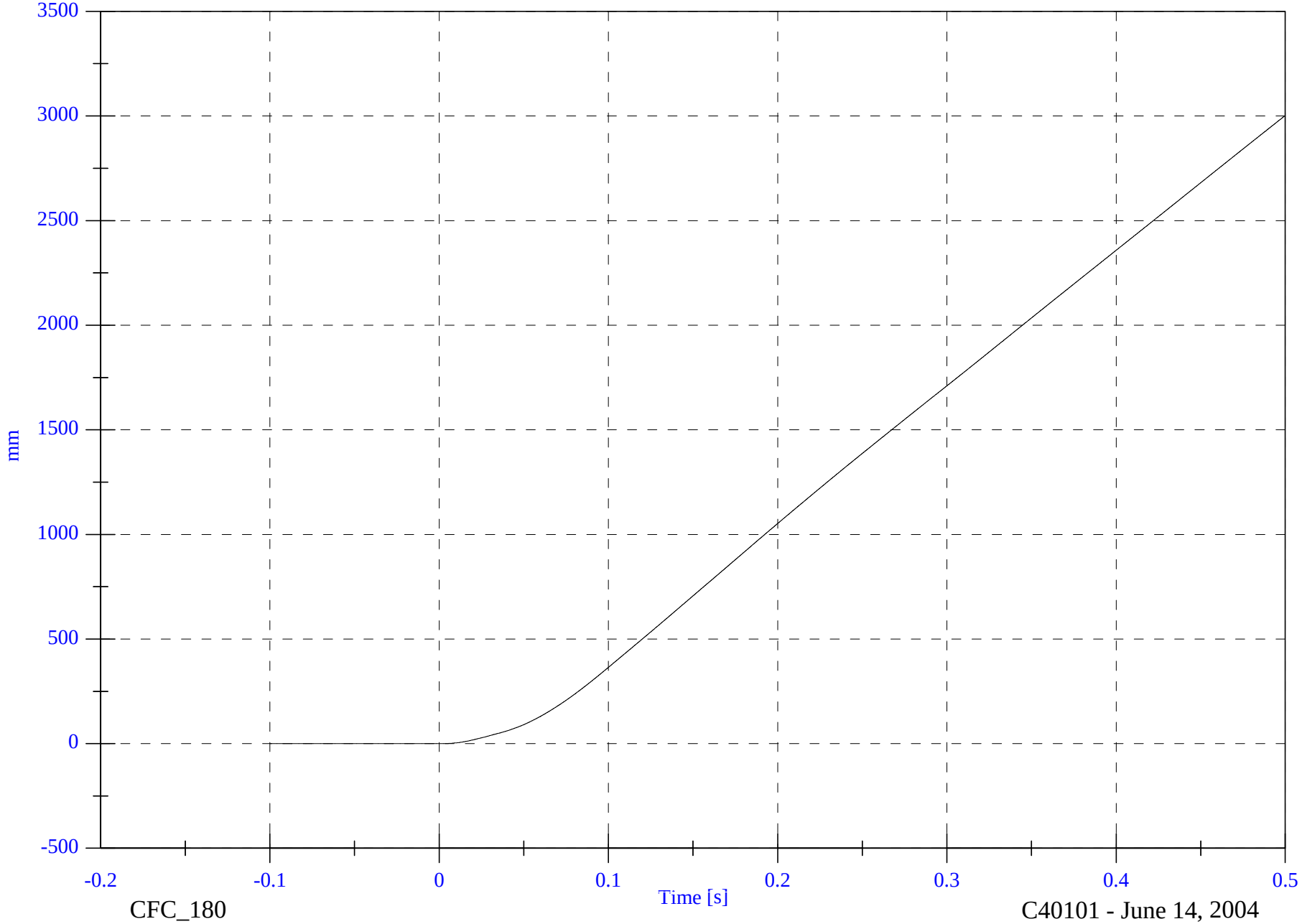
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2 Right X Member x Displacement

Max: 3002.4 [mm] at 0.500 [s]

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



B-109

8655-F301-18R

CFC_180

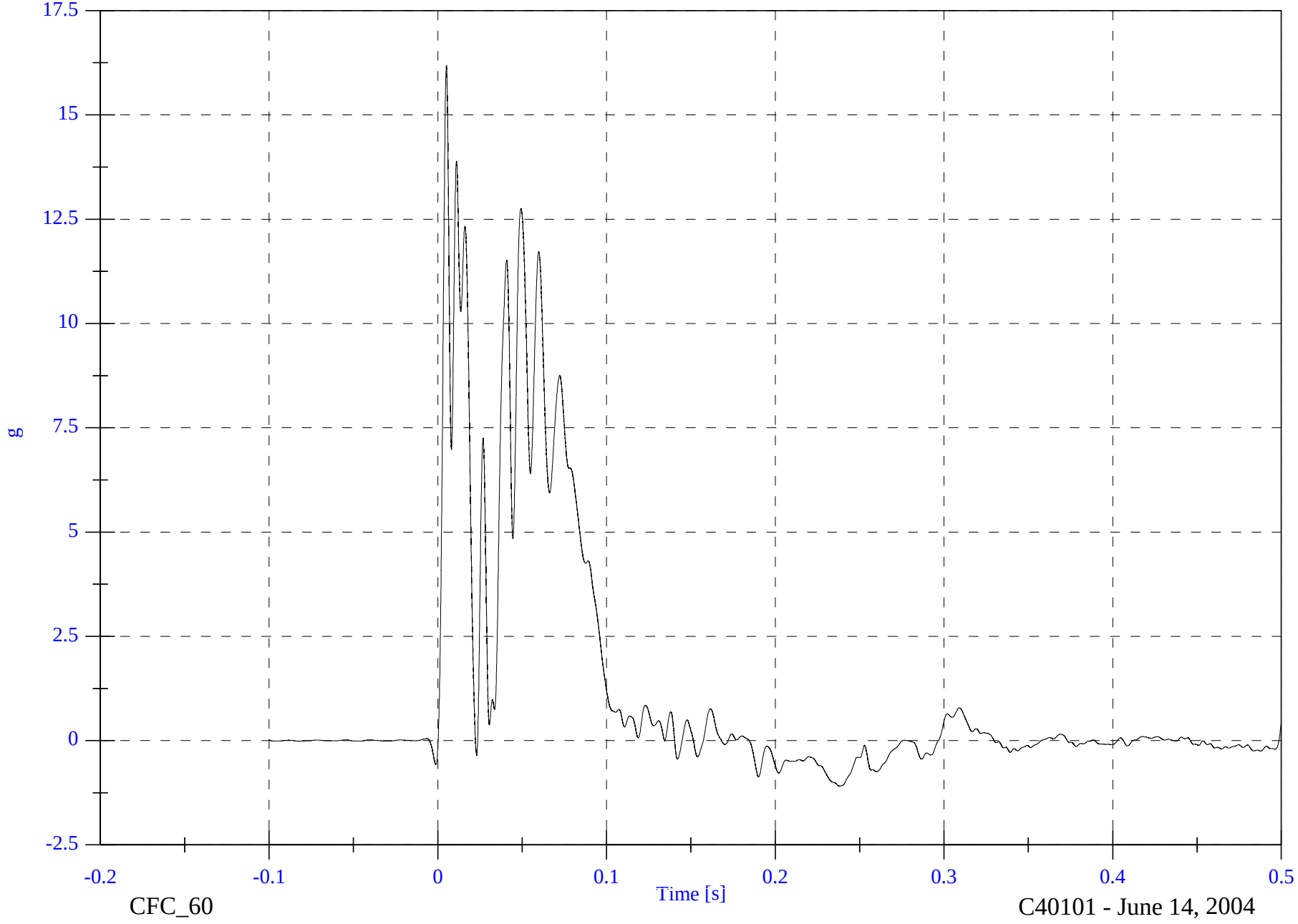
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2 Right X Member RED x

Max: 16.2 [g] at 0.005 [s]

Min: -1.1 [g] at 0.238 [s]



B-110

8655-F301-18R

CFC_60

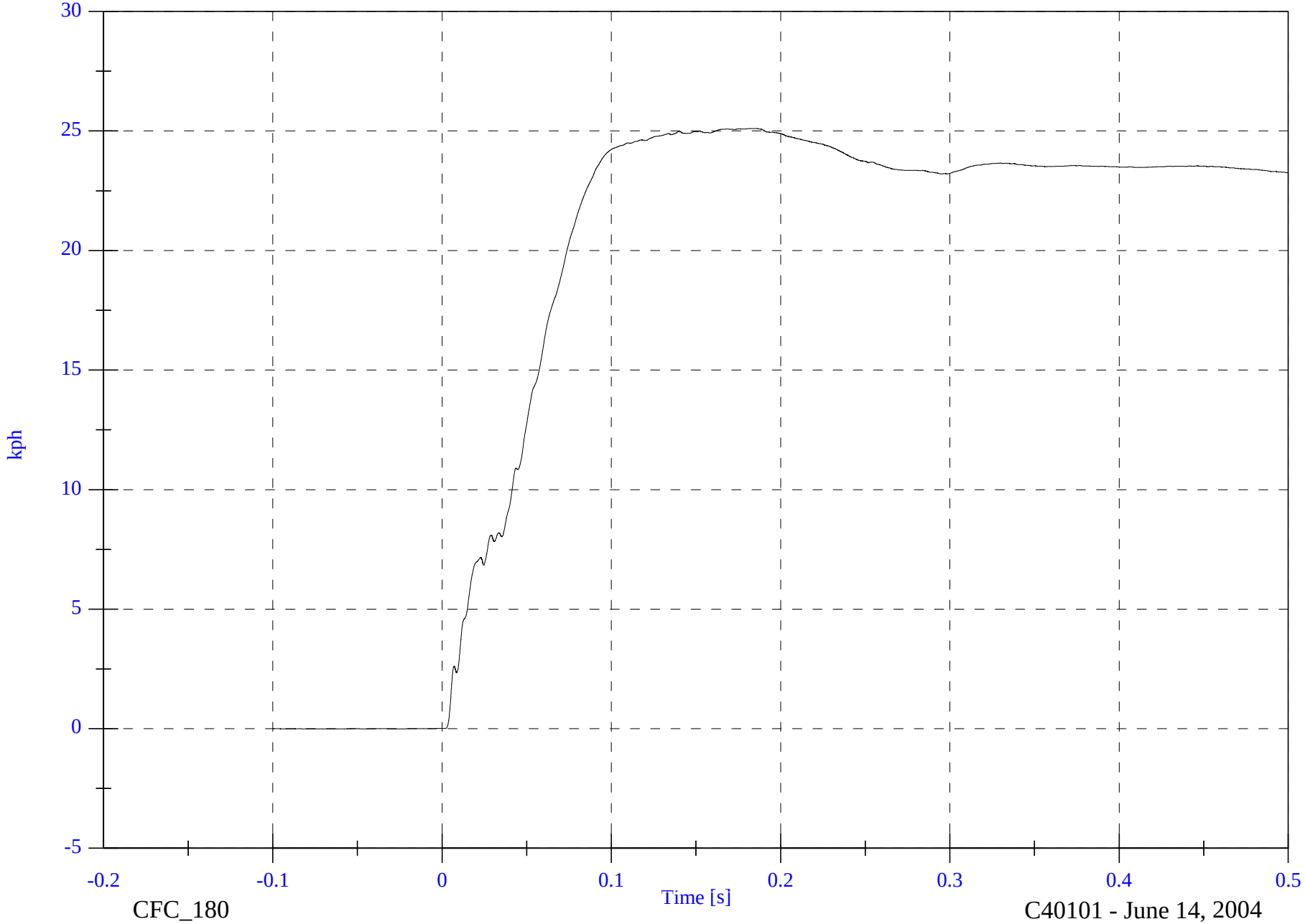
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2 Right X Member RED x Velocity

Max: 25.1 [kph] at 0.186 [s]

Min: -0.0 [kph] at -0.074 [s]



B-111

8655-F301-18R

CFC_180

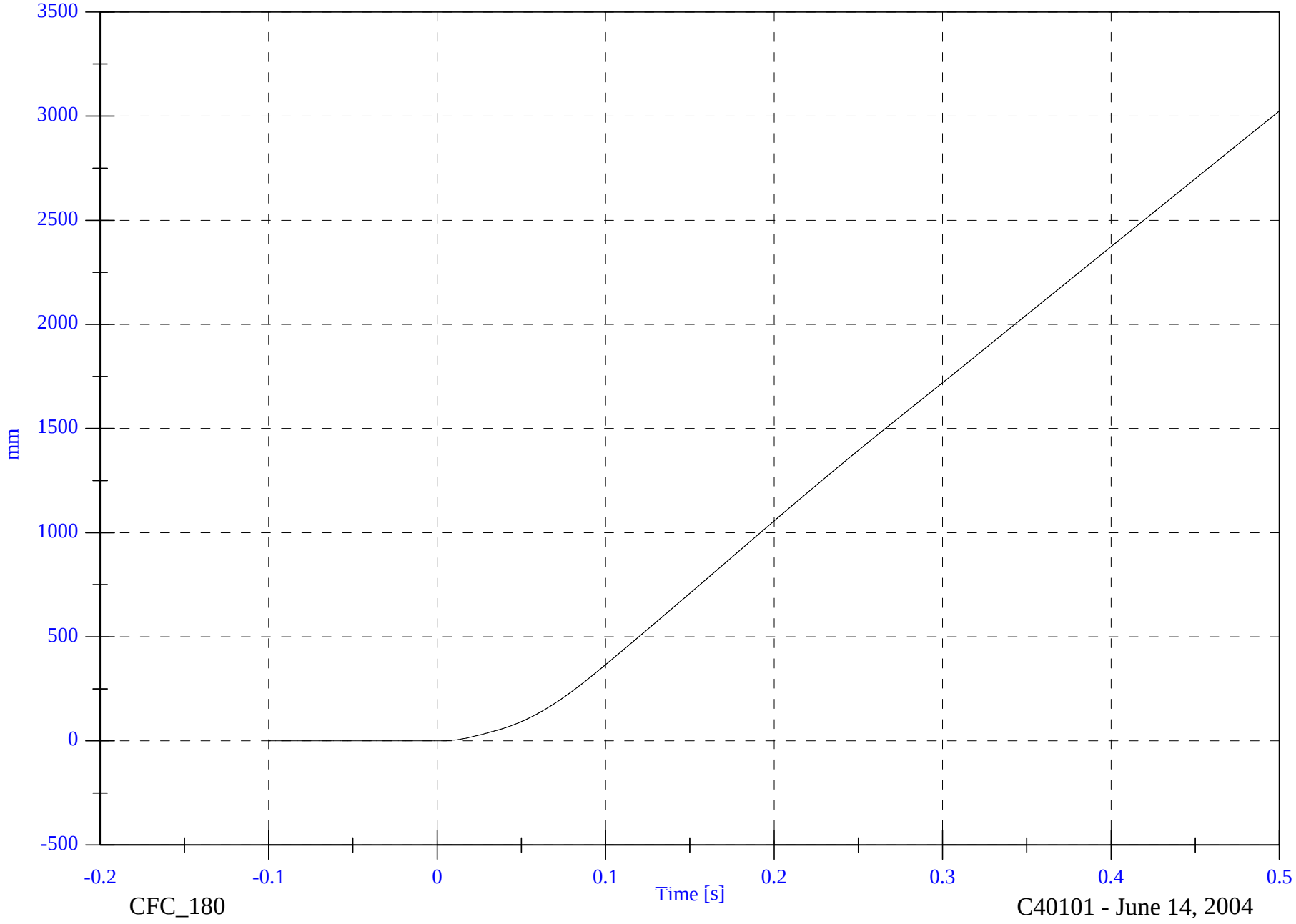
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2 Right X Member RED x Displacement

Max: 3024.2 [mm] at 0.500 [s]

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



B-112

8655-F301-18R

CFC_180

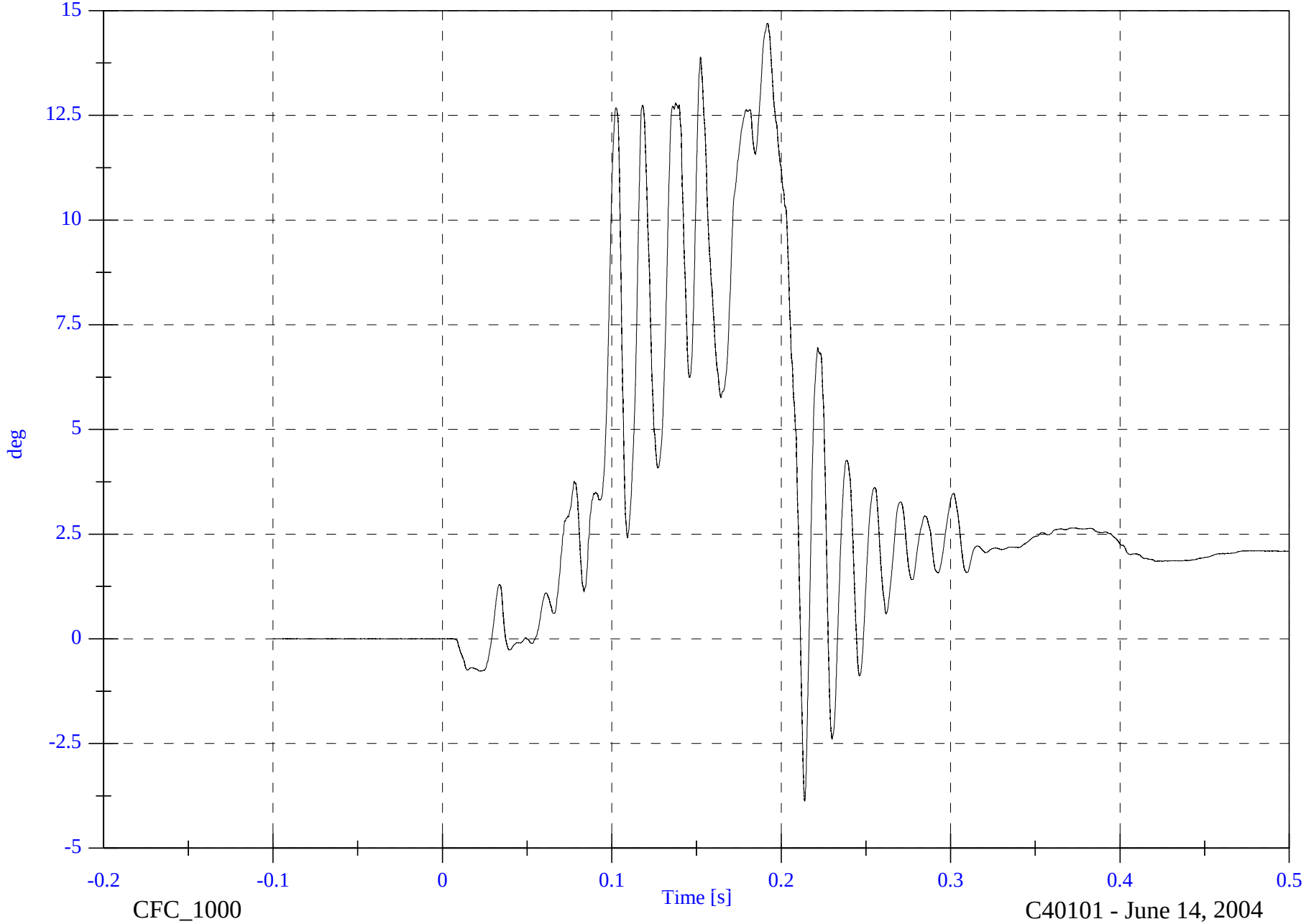
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Left Link ADy

Max: 14.7 [deg] at 0.192 [s]

Min: -3.9 [deg] at 0.214 [s]



B-113

8655-F301-18R

CFC_1000

C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Right Link ADy

Max: 15.1 [deg] at 0.129 [s]

Min: -2.4 [deg] at 0.018 [s]

CFC_1000

C40101 - June 14, 2004

B-114

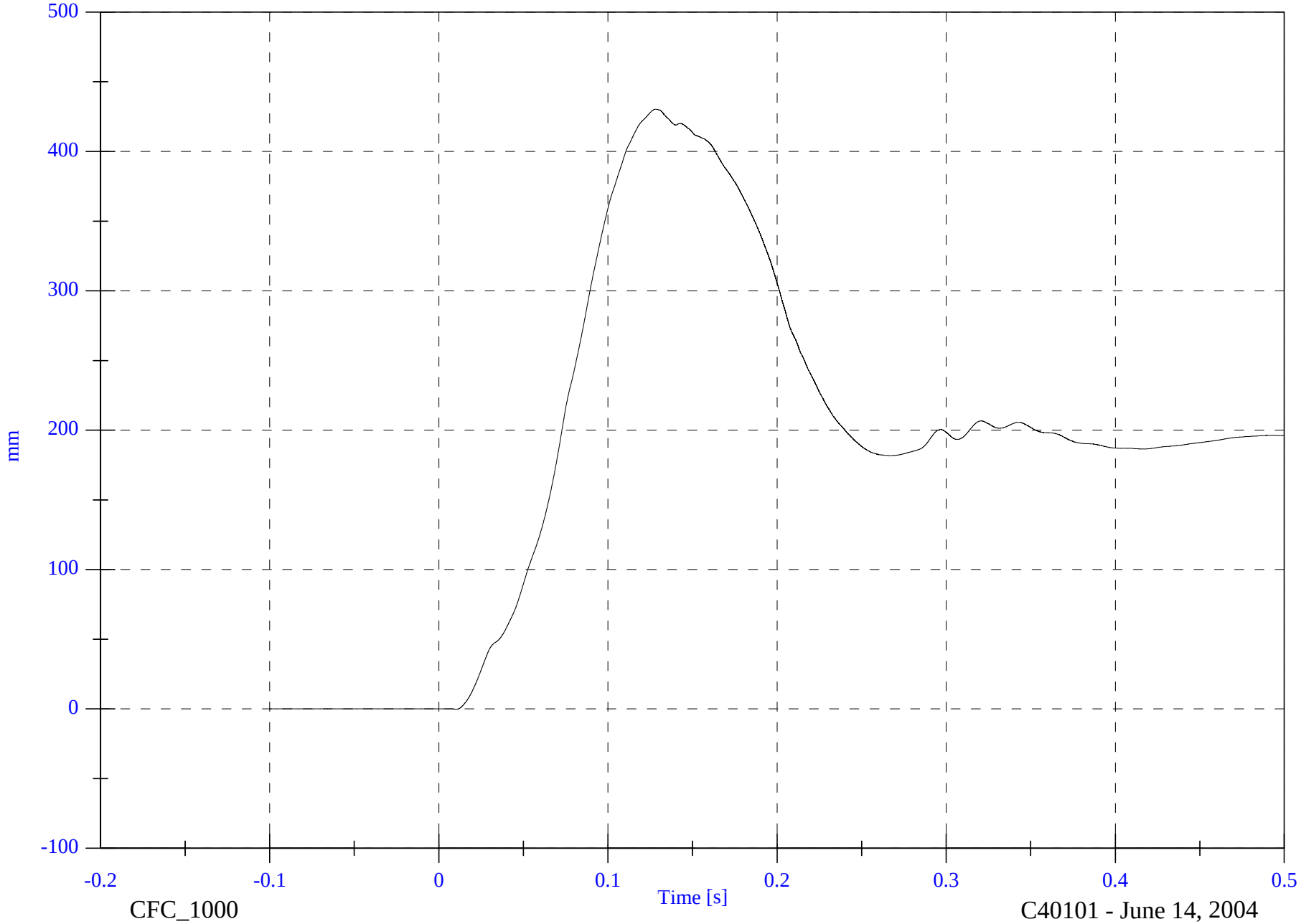
8655-F301-18R

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Left Span Bar Displacement

Max: 430.3 [mm] at 0.128 [s]

Min: -0.2 [mm] at 0.011 [s]



B-115

8655-F301-18R

CFC_1000

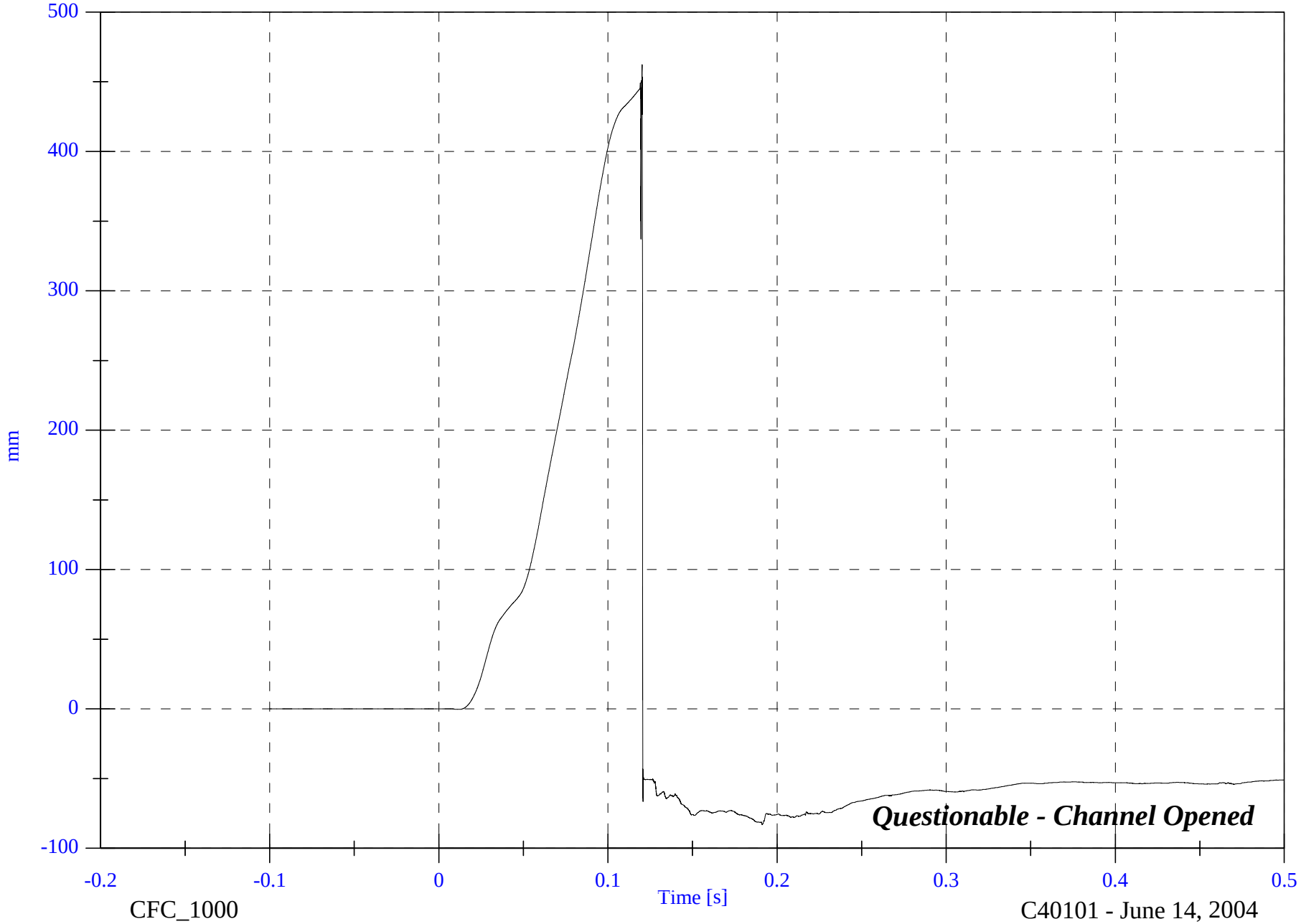
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

V2P1 Right Span Bar Displacement

Max: 462.2 [mm] at 0.120 [s]

Min: -83.1 [mm] at 0.191 [s]



B-116

8655-F301-18R

CFC_1000

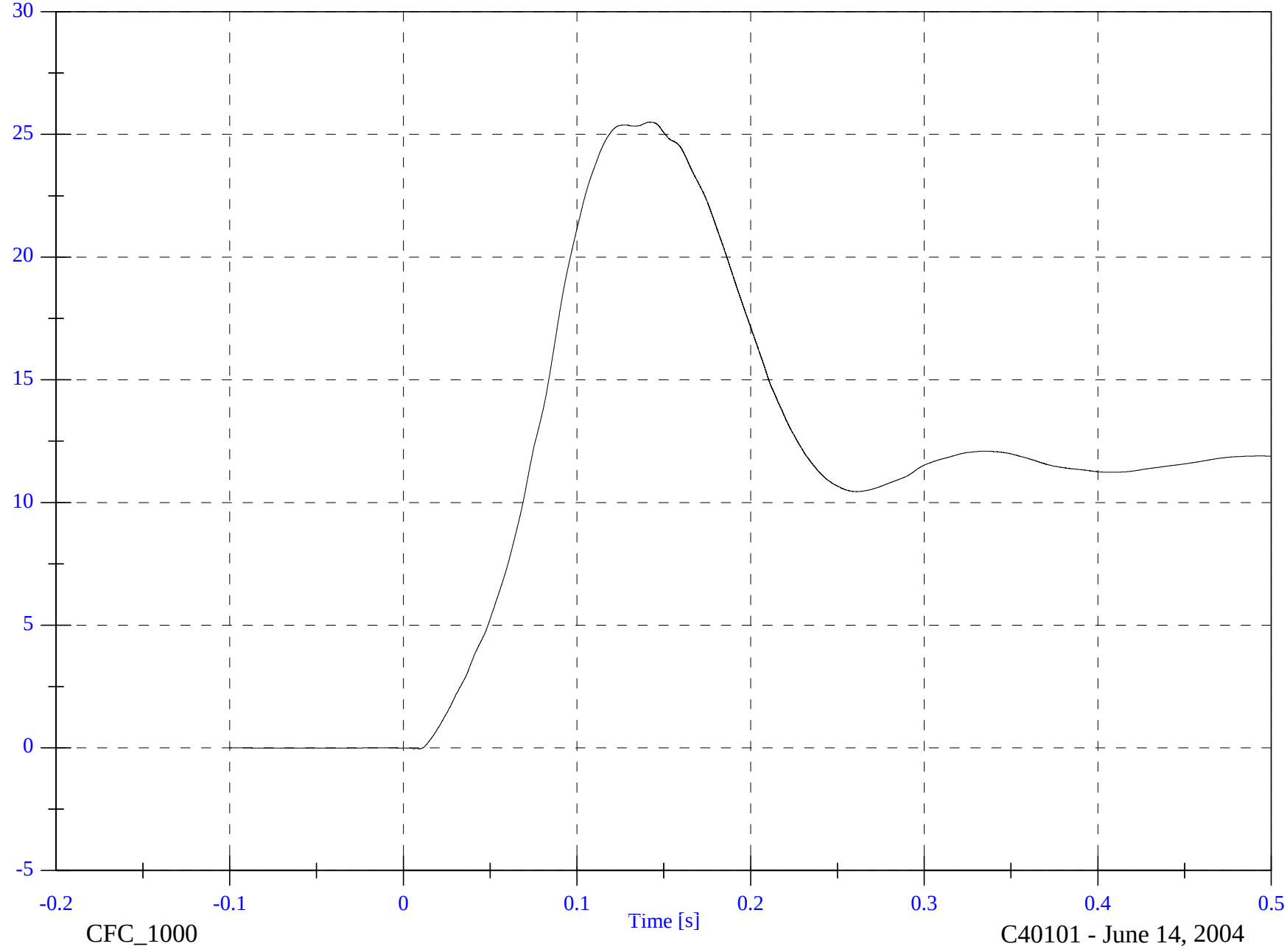
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

P1 Left Change in Seat Back Angle WRT Sill

Max: 25.5 [deg] at 0.142 [s]

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



B-117

8655-F301-18R

CFC_1000

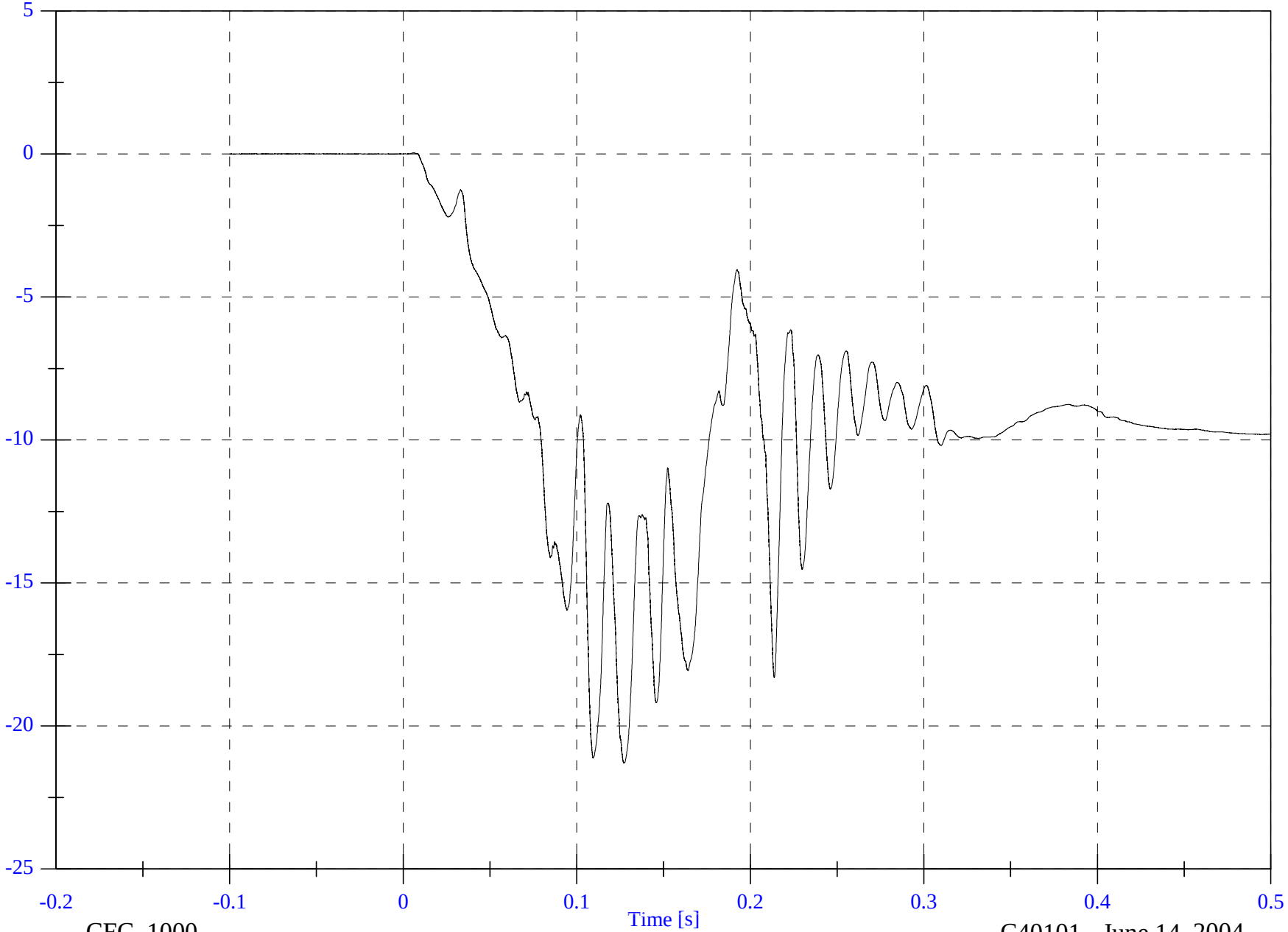
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

P1 Left Change in String Angle

Max: 0.0 [deg] at 0.006 [s]

Min: -21.3 [deg] at 0.127 [s]



B-118

8655-F301-18R

CFC_1000

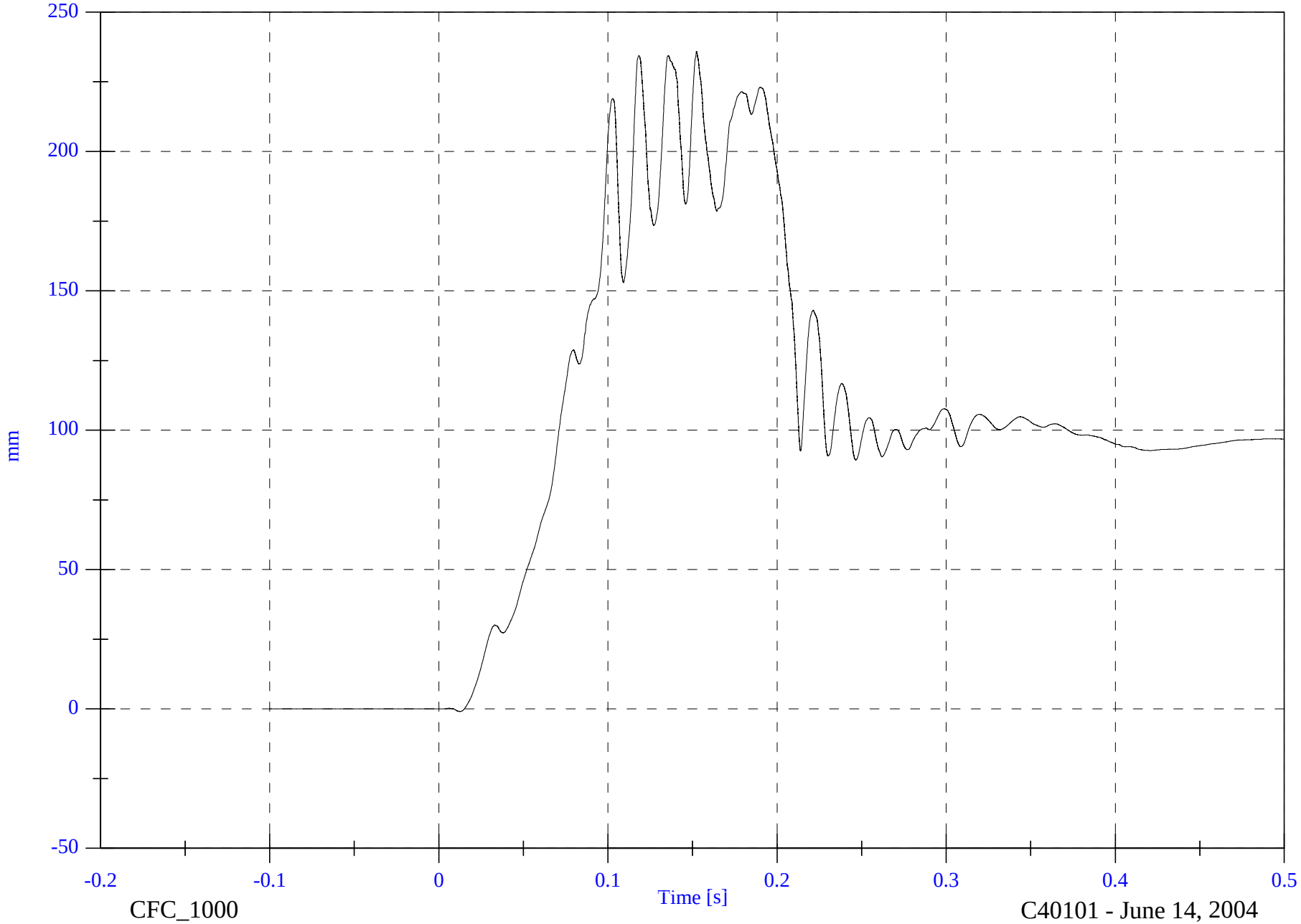
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

P1 Left Seat X Displacement

Max: 235.9 [mm] at 0.152 [s]

Min: -0.9 [mm] at 0.012 [s]



B-119

8655-F301-18R

CFC_1000

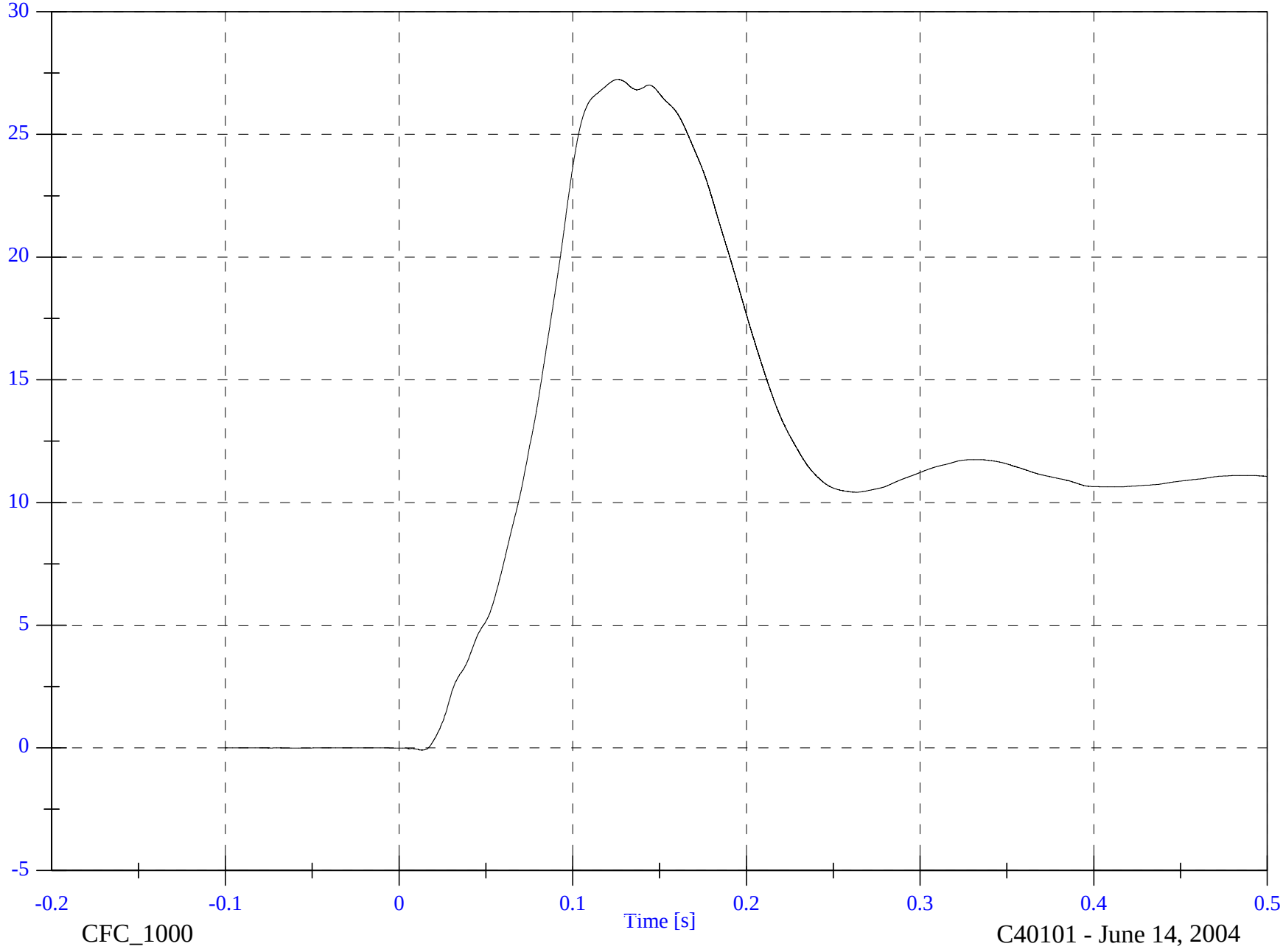
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

P1 Right Change in Seat Back Angle WRT Sill

Max: 27.2 [deg] at 0.126 [s]

Min: -0.1 [deg] at 0.013 [s]



B-120

8655-F301-18R

CFC_1000

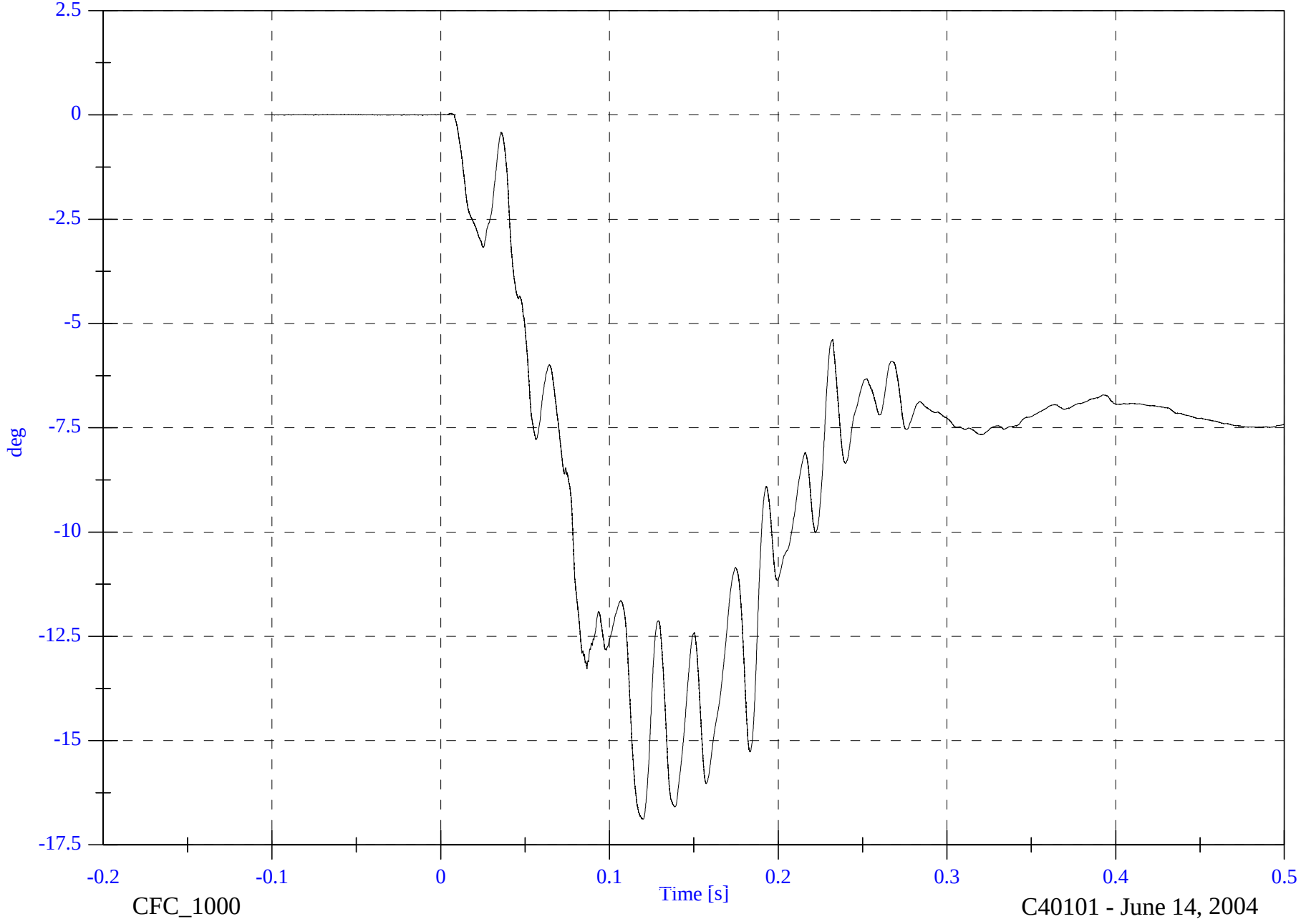
C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

P1 Right Change in String Angle

Max: 0.0 [deg] at 0.006 [s]

Min: -16.9 [deg] at 0.120 [s]



B-121

8655-F301-18R

CFC_1000

C40101 - June 14, 2004

2004 FMVSS 301 Test #1 - 2004 Pontiac Grand Prix

P1 Right Seat X Displacement

Max: 236.3 [mm] at 0.108 [s]

Min: -224.1 [mm] at 0.157 [s]

B-122

8655-F301-18R

CFC_1000

C40101 - June 14, 2004