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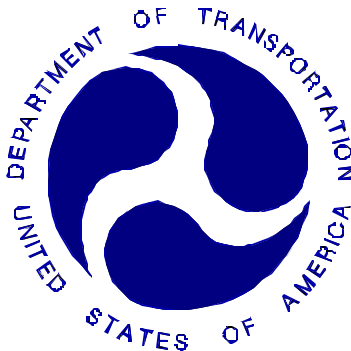
**NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST**

VOLVO GOTHENBURG SWEDEN
2004.5 VOLVO S40
4-DOOR SEDAN

NHTSA NUMBER: O45901

GENERAL DYNAMICS TEST NUMBER: C42216-1001-2146

GENERAL DYNAMICS
ADVANCED INFORMATION ENGINEERING SERVICES
TRANSPORTATION SCIENCES CENTER
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July 9, 2004

FINAL REPORT

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16. Abstract A frontal load cell barrier test of a 2004.5 Volvo S40 4-door sedan was performed at General Dynamics crash test facility in Buffalo, New York, on July 9, 2004. The impact velocity was 56.2 kph and the temperature at the barrier face was 21°C. The maximum post-test vehicle crush was 339 mm. The test vehicle was equipped with 3-point restraint systems with shoulder belt pretensioners and load limiters, knee bolsters, head restraints and airbags at both the driver and right outboard passenger seating positions. With respect to FMVSS 208 "Occupant Crash Protection - Injury Criteria" both the driver and passenger appeared to comply with head, chest, and femur requirements.					
ATD Position	HIC	Clip (g's)	Chest Disp (mm)	Left Femur (N)	Right Femur (N)
Driver (061)	392.5	47.2	-38.7	-2744.3	-2051.7
Passenger (064)	258.4	43.5	-31.0	-4163.7	-2330.5
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SECTION 1

PURPOSE AND SUMMARY OF TEST

1.1 PURPOSE

The purpose of this 56.2 kph frontal barrier impact test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 48.3 kph requirements.

The 56.2 kph frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Indicant Test procedure.

1.2 TEST PROCEDURE

This 56.2 kph frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards (OCS) New Car Assessment Program (NCAP) Laboratory Indicant Test Procedure, dated December 1999. Data was obtained indicant of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Retention"; FMVSS 219, "Windshield Zone Intrusion (Partial)"; and FMVSS 301 "Fuel System Integrity" performance. Procedures for receiving, inspection testing and reporting of test results are described in the test procedures and are not repeated in this report.

One real-time camera and 16 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

Two Part 572E, 50th percentile male anthropomorphic test devices (ATDs), were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

Both ATDs were fully instrumented with nine accelerometer array heads, chest and pelvis triaxial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 061) and the right-front passenger (position 2) ATD (Serial No.064) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The vehicle, occupant, camera and measurement data are presented in Section 2. Appendix A contains the still photograph prints. The 194 channels of data were recorded on an on-board data acquisition system. Appendix B contains the vehicle, load cell barrier and dummy response data traces. Appendix C contains the dummy calibration data and Appendix D contains the transducer calibration dates.

1.3 SUMMARY OF FRONTAL BARRIER IMPACT TEST

A load cell barrier consisting of 36 load cells was impacted by a 2004.5 Volvo S40 4-door Sedan at a velocity of 56.2 kph. The test was performed at General Dynamics on July 9, 2004. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The occupant data is summarized below.

	HIC	Clip (g)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)	Belt Spool (mm)	Belt Stretch (mm/50 mm)
Driver ATD	392.5	47.2	-38.7	-2744.3	-2051.7	§	†
Passenger ATD	258.4	43.5	-31.0	-4163.7	-2330.5	§	†

§ - Not installed due to d-ring configuration

† - Not used due to pretensioner payout and load cell location.

AUTOMATIC DOOR LOCK SUMMARY

ADL Equipped Test Vehicle:	Yes
ADL Activation Status:	Not Activated
Door Lock Condition:	Unlocked

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was no Stoddard solvent leakage after the event or during any phase of the static rollover.

The maximum vehicle static crush was 339 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: the face to the center of the airbag, the back of the head to the center of the head restraint, the chest to the airbag and the left and right knees to the knee bolster. The passenger's visible contact points were as follows: the face to the center of the airbag, the back of the head to the center of the head restraint, the chest to the airbag and the left and right knees to the knee bolster.

The 2004.5 Volvo S40 4-door Sedan did not exceed the requirements of FMVSS 208, FMVSS 212, FMVSS 219, and FMVSS 301. Data pertaining to these standards are presented in the data sheets.

SECTION 2

GENERAL TEST AND VEHICLE PARAMETER DATA

DATA SHEET NO. 1 CRASH TEST SUMMARY

Vehicle NHTSA No.:	O45901	Test Mode:	56.3 kph Frontal Barrier	
Test Date:	July 9, 2004	Time:	12:11	Temperature: 21 °C
Vehicle Make/Model/Body Style:	2004.5 Volvo S40 4-door Sedan			
Vehicle Test Weight:	1698.0	kg		
Vehicle/Barrier Impact Angle:	0	°		
Impact Velocity:	56.2	kph		
Maximum Static Crush:	339	mm		
Vehicle Rebound:	565	mm		
<u>DUMMIES:</u>		<u>DRIVER</u>	<u>PASSENGER</u>	
Type:		572E	572E	
Restraint System:		Three point safety belt with torso belt pretensioner and load limiter, Airbag, Knee Bolster and Head Restraint	Three point safety belt with torso belt pretensioner and load limiter, Airbag, Knee Bolster and Head Restraint	
Number of Data Channels:	194			
Number of Cameras:	1	Real Time		
	16	High Speed		
<u>DOOR OPENING DATA:</u>	Closed, latched and operable without tools - Left Front			
	Closed, latched and operable without tools - Right Front			
Front Seat(s) Data:		<u>DRIVER</u>	<u>PASSENGER</u>	
Seat Track Failure: (mm of shift)		30 mm forward	5 mm forward	
Seat Back Failure:		None	None	
<u>VISIBLE DUMMY CONTACT POINTS:</u>		<u>DRIVER</u>	<u>PASSENGER</u>	
Head:		The face to the center of the airbag, the back of the head to the center of the head restraint	The face to the center of the airbag, the back of the head to the head restraint	
Abdomen:		None	None	
Chest:		Airbag	Airbag	
Knees:		Knee Bolster	Knee Bolster	

DATA SHEET NO. 2 GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 2004.5 Volvo S40 4-door Sedan

NHTSA No. : O45901 ; VIN: YV1MS382742008653 ; Color: Red

Engine Data: 5 cylinders; - CID; 2.4 Liters; - cc

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

Transmission Data: 5 speeds; - Manual; X Automatic; X Overdrive

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

Safety Belt Features – Driver X Pretensioner (Shoulder); X Load Limiter; X Adj. Anchorage

Safety Belt Features - Passenger X Pretensioner (Shoulder); X Load Limiter; X Adj. Anchorage

Major Options: X ADLs; X A/C; X Pwr.Strg.; X Pwr. Brakes

X Pwr. Windows; X Pwr. Door Locks; X Tilt Wheel

Date Received: 7/2/2004 ; Odometer Reading 45 km

Selling Dealer: Jim Culligan Inc.

& Address: 8129 Main Street Williamsville, NY 14221

DATA FROM TIRE VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: Volvo Gothenburg Sweden

Date of Manufacture 01/04

GVWR: 1959 kg; GAWR: 1080 kg FRONT; 966 kg REAR

DATA FROM TIRE PLACARD:

Recommended Tire Size: P205/55R16

* Recommended Cold Tire Pressure: 250 kPa FRONT; 250 kPa REAR

DATA FROM TIRE SIDEWALL:

Size of Tires on Test Vehicle: P205/55R16 91V ; Manufacturer: Michelin

Tire Pressure with Maximum Capacity Vehicle Load: Front: 350 kPa; Rear: 350 kPa

Treadwear: - ; Traction: - ; Temperature: -

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) = 430.7 kg

No. of Occupants x 68.04 kg = 340.2 kg

Rated Cargo/Luggage Weight (RCLW) = 90.5 kg

*Tire pressure used for test

DATA SHEET NO. 2 GENERAL TEST AND VEHICLE PARAMETER DATA (cont.)

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

Right Front =	<u>435.0</u>	kg	Right Rear =	<u>286.5</u>	kg
Left Front =	<u>441.0</u>	kg	Left Rear =	<u>297.5</u>	kg
TOTAL FRONT =	<u>876.0</u>	kg	TOTAL REAR =	<u>584.0</u>	kg
TOTAL DELIVERED WEIGHT =	<u>1460.0</u>	kg			
% of Total Front of Vehicle Weight =	<u>60.0</u>		% of Total Rear Weight =	<u>40.0</u>	%

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight (UDW) =	<u>1460.0</u>	kg
Rated Cargo/Luggage Weight (RCLW) =	<u>90.5</u>	kg
Weight of 2 p.572 Dummies @ 76 each =	<u>152</u>	kg
TARGET TEST WEIGHT =	<u>1702.5</u>	kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND

86.0

KG OF CARGO WEIGHT:

Right Front =	<u>462.0</u>	kg	Right Rear =	<u>378.0</u>	kg
Left Front =	<u>480.0</u>	kg	Left Rear =	<u>378.0</u>	kg
TOTAL FRONT =	<u>942.0</u>	kg	TOTAL REAR =	<u>756.0</u>	kg
TOTAL TEST WEIGHT =	<u>1698.0</u>	kg			
% of Total Front Weight =	<u>55.5</u>	%	% of Total Rear Weight =	<u>44.5</u>	%
Weight of Ballast Secured in Vehicle Trunk Area =	<u>0</u>	kg			
Vehicle Components Removed for Weight Reduction:			Rear side door glass, side mirrors, 38 L of Stoddard		

VEHICLE ATTITUDE (all dimension in millimeters):

AS DELIVERED:	RF	<u>688</u>	LF	<u>683</u>	RR	<u>704</u>	LR	<u>702</u>
FULLY LOADED:	RF	<u>673</u>	LF	<u>671</u>	RR	<u>681</u>	LR	<u>673</u>
AS TESTED:	RF	<u>680</u>	LF	<u>679</u>	RR	<u>682</u>	LR	<u>677</u>
Vehicle's Wheel Base:		<u>2640</u>	mm					
Location of Vehicle's C.G.:		<u>1175</u>	mm rearward of front wheel center.					

FUEL SYSTEM DATA:

Fuel System Capacity From Owner's Manual =	<u>62</u>	liters
Usable Capacity Figure Furnished by COTR =	<u>62</u>	liters
Test Volume Range (92 to 94% of Usable Capacity) =	<u>57.04</u>	to <u>58.28</u> liters
ACTUAL TEST VOLUME=	<u>21.2**</u>	liters (with entire fuel system filled)
Test Fluid Type:	<u>Stoddard Solution</u>	; Spec. Grav. = <u>0.764</u>
Kinematic Viscosity =	<u>0.96</u>	centistokes; Color = <u>Orange</u>
Type of Fuel Pump: Electric-	<u> </u>	; Mechanical- <u> </u>
Does Electric Pump operate with ignition switch "ON" & engine "OFF"	Yes- <u> </u>	No- <u> </u>

Details of Fuel System: The fuel tank is centered ahead of the rear axle; The fuel lines are located along the outside of the right frame stiffener; The fuel filler is located on the right side of the vehicle behind the rear axle.

** The vehicle manufacturer requested that no major exterior components be removed from the vehicle. Following previous practice, the vehicle fuel system was filled to 33% capacity.

DATA SHEET NO. 3 POST IMPACT DATA

TYPE OF TEST:

Type of Test: Frontal Barrier Impact Angle: 0°
Test Date: July 9, 2004 Time: 12:11 Temperature: 21 °C
Vehicle NHTSA No.: O45901
Required Impact Velocity Range: 55.5 to 57.1 kph

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

Trap No. 1 = 56.2 kph; Trap No. 2 = 56.2 kph
Distance from vehicle to barrier: (1) entering trap = 813 mm
(2) exiting trap = 305 mm

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

Vehicle Length:

Pre-Test	Left = <u>4396</u>	; C/L = <u>4463</u>	; Right = <u>4396</u>
Post-Test	Left = <u>4096</u>	; C/L = <u>4130</u>	; Right = <u>4099</u>
Crush	Left = <u>300</u>	; C/L = <u>333</u>	; Right = <u>297</u>
AVERAGE	= <u>310</u>	mm	

VEHICLE REBOUND: (From rigid barrier only.)

Distance from front of test vehicle to impact point:

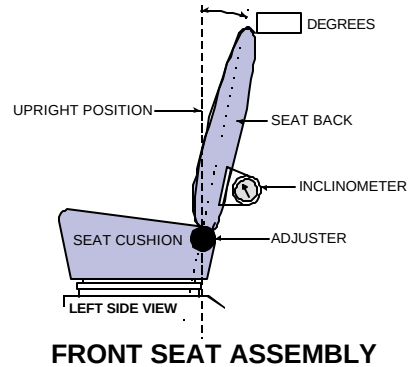
	Left = <u>579</u>	; C/L = <u>545</u>	; Right = <u>572</u>
AVERAGE	= <u>565</u>	mm	

DATA SHEET NO. 4 TEST VEHICLE INFORMATION

VEHICLE IDENTIFICATION:

Model Year : 2004.5 Vehicle Model: Volvo S40 Body Style : 4-door Sedan

1. NOMINAL DESIGN RIDING POSITION:
for adjustable driver and passenger seat backs.
Please describe how to position the inclinometer to
measure the seat back angle. Include description of
the location of the adjustment latch detent, if
applicable.



Seat back angle for driver's seat: 18

Measurement instructions: Measured along a straight edge placed at the rear centerline of the seat.

Seat back angle for passenger's seat: 18

Measurement instructions: The same as the driver's seat.

2. SEAT FORE AND AFT POSITIONING:

Positioning of the driver's seat: The seat tracks were placed at mid-track (125 mm) of total seat cushion travel (250 mm).

Positioning of the passenger's seat: The seat tracks were positioned at mid-track (110 mm) of 220 mm of total seat cushion travel.

3. FUEL TANK CAPACITY DATA:

3.1 A. "Usable Capacity" of the standard equipment fuel tank is 62 liters

B. "Usable Capacity" of the optional equipment fuel tank is - liters

C. "Usable Capacity" of the vehicle(s) used for certification
testing to requirements of FMVSS 301 = 62 liters

3.2 Amount of Stoddard solvent added to vehicle(s) used for certification test(s) = 58 liters

3.3 Is vehicle equipped with electric fuel pump? Yes- X ; No- -

If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.

When the ignition is turned to the 'ON' position and while the engine is running.

DATA SHEET NO. 4 TEST VEHICLE INFORMATION (cont.)

4. STEERING COLUMN ADJUSTMENTS:

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine the geometric center.

Operational Instructions: Adjust steering column to mid-travel (25mm) and mid-tilt (24°

5. SEAT BELT UPPER ANCHORAGE:

Nominal design riding position: Adjusted to mid-slot position.

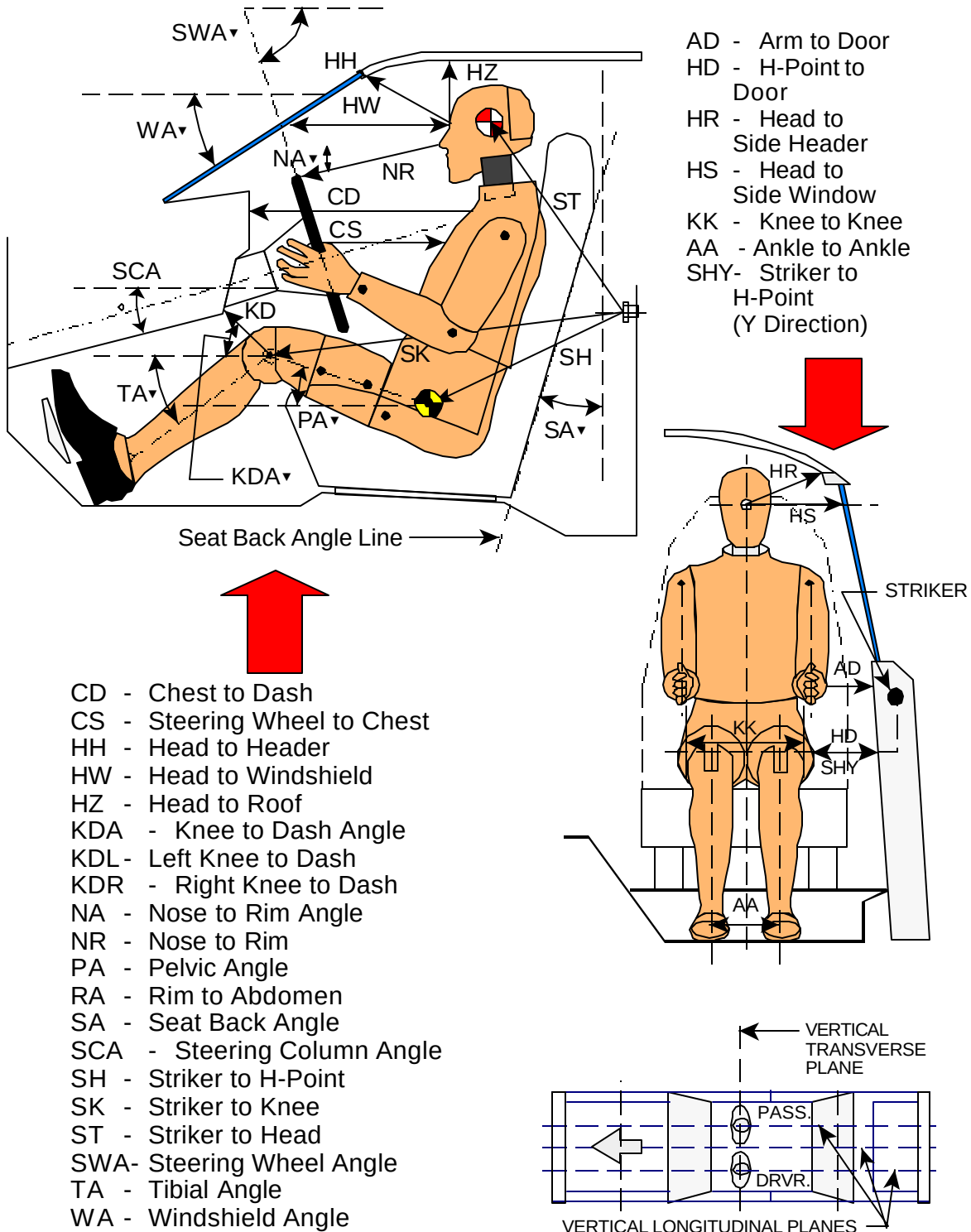
6. AUTOMATIC DOOR LOCKS: Is test vehicle equipped with ADLs? X Yes; - No;

Does vehicle owner's manual describe how to deactivate ADLs? X Yes; - No; - N/A

Comments: Page 60 of the vehicle owner's manual describes how to activate and deactivate the vehicle doors

Autolock function using the vehicle control panel menu.

DATA SHEET NO. 5 FRONT SEAT DUMMY POSITIONING MEASUREMENTS IN VEHICLE
DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS



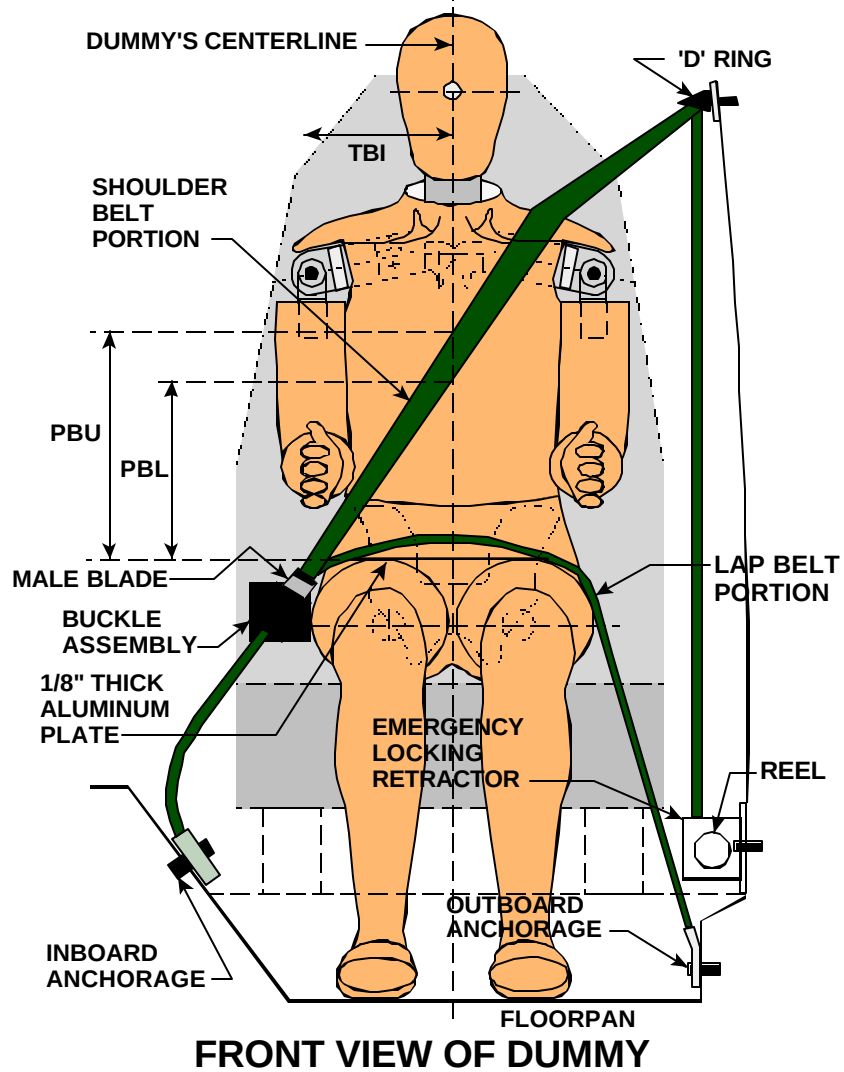
DATA SHEET NO. 5 FRONT SEAT DUMMY POSITIONING MEASUREMENTS IN VEHICLE (cont.)

	DRIVER (Serial #061)			PASS. (Serial #064)		
WA ⁰	25 deg.			N/A		
SWA ⁰	65.8 deg.			N/A		
SCA ⁰	24.2 deg.			N/A		
SA ⁰	18 deg.			18 deg.		
HZ	208			172		
HH	359			338		
HW	691			611		
HR	223			221		
NR	380	Angle	-6 deg.	N/A		
CD	533			488		
CS	302			N/A		
RA	187			N/A		
KDL	190	Angle (KDA)	35 deg.	156		
KDR	175			178	Angle (KDA)	31 deg.
PA ⁰	23.5 deg.			24.1 deg.		
TA ⁰	44.7 deg.			45.0 deg.		
KK	320			255		
AA	280			225		
ST	500	Angle	-2 deg.	520	Angle	5 deg.
SK	569	Angle	88 deg.	560	Angle	95 deg.
SH	238	Angle	128 deg.	240	Angle	123 deg.
SHY	240			240		
HS	318			319		
HD	159			159		
AD	115			106		

Dimensions in millimeters

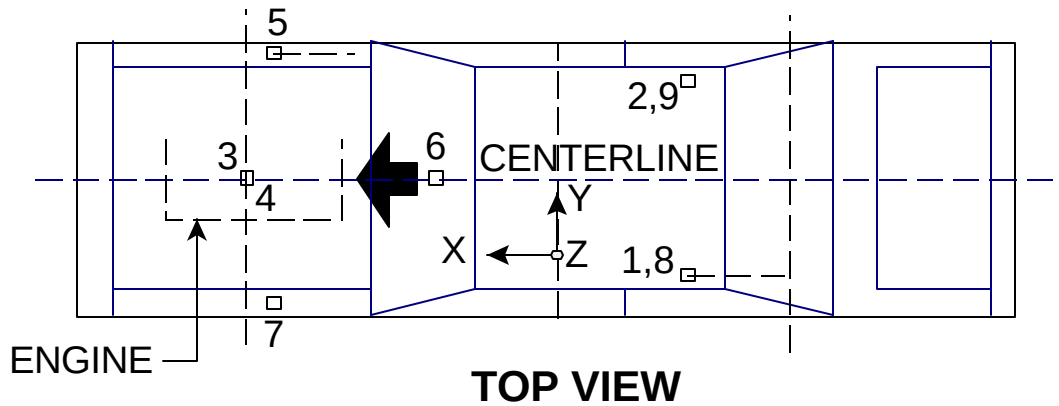
DATA SHEET NO. 6 SEAT BELT POSITIONING DATA

SEAT BELT POSITIONING DATA

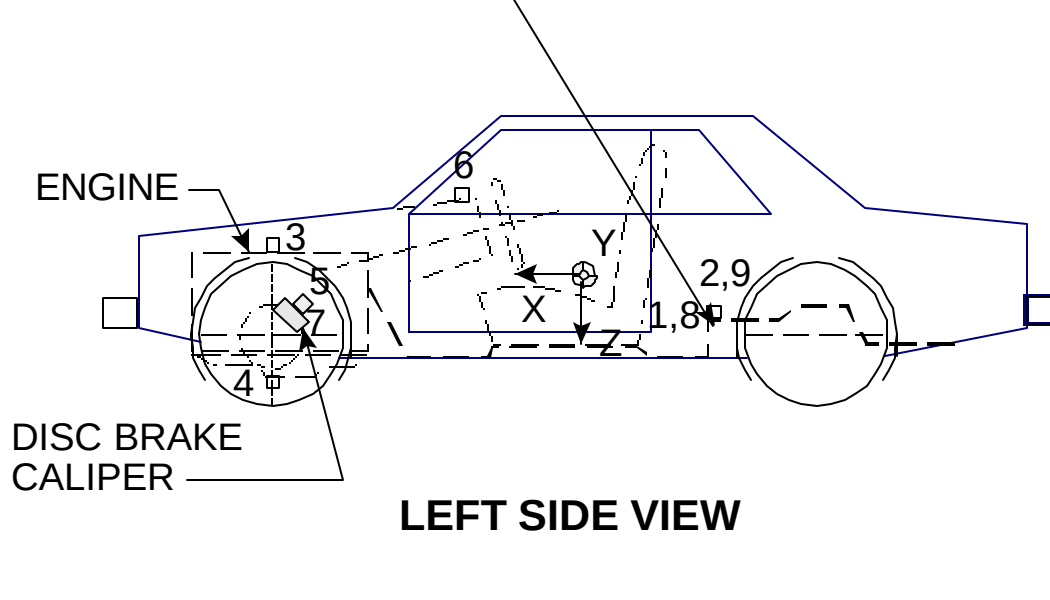


	DRIVER DUMMY (mm)	PASSENGER DUMMY (mm)
PBU -- Top surface of alum. plate to upper edge	326	370
PBL-- Top surface of alum. plate to belt lower edge	250	290
LAP BELT TENSION	10 N	10 N
SHOULDER BELT TENSION	Retractor	Retractor

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



REAR SEAT CUSHION
ASSY. FRONT ATTACHMENT
BRACKET SUPPORT



Note: Vehicle accelerometer location and data summary shown in DATA SHEET NO. 7

DATA SHEET NO. 7 VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY (cont.)

LOCATION		PRE-TEST LENGTH (mm)		
		X	Y	Z
1	Left Rear Seat Cross Member X	1829	-634	-337
2	Right Rear Seat Cross Member X	1824	635	-331
3	Top of Engine Block	3990	184	-741
4	Bottom of Engine	3127	11	-152
5	Disc Brake Caliper @ Right Side	3507	692	-394
6	Instrument Panel	2767	-57	-705
7	Disc Brake Caliper @Left Side	3620	-693	-449
8	Left Rear Seat Cross Member Z	1829	-634	-337
9	Right Rear Seat Cross Member Z	1824	635	-331

LOCATION NUMBER	DESCRIPTION	MAXIMUM VALUE (g's)			
		Pos.	msec.	Neg.	msec.
1	Left Rear Seat Cross Member X	1.8	88.1	-47.3	44.3
2	Right Rear Seat Cross Member X	2.7	89.3	-47.8	44.8
3	Top of Engine Block	60.8	39.6	-126.6	25.4
4	Bottom of Engine	56.2	34.4	-204.5	27.3
5	Disc Brake Caliper @ Right Side	§	§	§	§
6	Instrument Panel	10.1	78.7	-53.1	53.7
7	Disc Brake Caliper @Left Side	43.5	62.5	-74.3	55.0
8	Left Rear Seat Cross Member Z	9.6	73.8	-6.8	50.8
9	Right Rear Seat Cross Member Z	10.1	20.7	-6.7	130.2

§ - Channel Opened during the event

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES

Vehicle Year/Make/Model/Body Style: 2004.5 Volvo S40 4-door Sedan

NHTSA Test No.: O45901 Test Date: July 9, 2004

		MAXIMUM VALUE							
		Driver				Passenger			
DESCRIPTION	Unit	Pos	msec	Neg	msec	Pos	msec	Neg	msec
Head 9 Array X Arm Y	g	10.9	59.9	-9.7	48.8	3.6	53.2	-14.6	69.2
Head 9 Array X Arm Z	g	34.6	43.7	-28.6	61.0	23.3	49.4	-8.4	64.4
Head 9 Array Y Arm X	g	2.7	199.8	-50.2	52.1	1.9	199.7	-40.9	74.8
Head 9 Array Y Arm Z	g	20.9	50.3	-5.3	84.1	19.4	53.8	-1.7	142.9
Head 9 Array Z Arm X	g	4.3	43.6	-77.5	59.2	4.2	24.9	-59.1	65.9
Head 9 Array Z Arm Y	g	2.8	41.8	-4.7	96.6	4.5	52.5	-14.7	76.6
Head X	g	2.0	199.9	-50.4	53.3	1.2	199.8	-38.8	78.9
Head Y	g	6.0	59.1	-5.9	71.9	4.1	29.2	-12.7	83.0
Head Z	g	20.9	50.2	-3.5	83.9	18.6	53.7	-1.6	142.0
Head Resultant	g	53.4	53.3	0.1	-30.6	41.7	79.7	0.0	-20.7
Redundant Head X	g	2.3	198.8	-49.2	53.3	1.6	199.8	-39.9	78.9
Redundant Head Y	g	6.0	60.1	-6.0	71.2	4.2	29.2	-27.4	77.5
Redundant Head Z	g	21.0	50.2	-3.0	83.0	19.6	53.2	-1.6	142.6
Redundant Head Resultant	g	52.1	53.3	0.1	-34.0	48.2	77.5	0.0	-50.0
Upper Neck Fx	N	856.2	77.0	-264.4	129.5	683.0	69.6	-447.0	48.9
Upper Neck Fy	N	174.5	66.2	-28.5	30.5	108.2	37.4	-119.5	70.2
Upper Neck Fz	N	1278.8	50.2	-36.0	15.8	1070.8	53.6	-132.0	70.0
Upper Neck F Resultant	N	1287.0	50.2	2.5	-30.3	1121.5	53.6	0.5	-49.9
Upper Neck Mx	N-m	1.7	120.9	-16.5	59.1	22.6	85.7	-8.6	125.5
Upper Neck My	N-m	102.4	60.5	-9.7	181.3	71.1	65.8	-20.2	102.3
Upper Neck Mz	N-m	8.4	97.7	-6.5	142.6	13.1	94.0	-6.2	144.0
Upper Neck M Resultant	N-m	103.7	60.4	0.2	-27.4	72.2	65.8	0.0	-47.8
Chest X	g	2.3	130.5	-51.2	49.3	2.1	130.3	-44.8	55.6
Chest Y	g	8.5	60.3	-3.0	45.5	4.1	48.8	-7.9	62.9
Chest Z	g	10.5	68.3	-3.8	43.0	5.3	42.8	-4.8	66.0
Chest Resultant	g	51.5	49.4	0.0	-36.5	45.1	55.6	0.0	-46.2

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES (cont.)

Vehicle Year/Make/Model/Body Style: 2004.5 Volvo S40 4-door Sedan

NHTSA Test No.: O45901 Test Date: July 9, 2004

		MAXIMUM VALUE							
		Driver				Passenger			
DESCRIPTION	Unit	Pos	msec	Neg	msec	Pos	msec	Neg	msec
Redundant Chest X	g	2.2	130.4	-51.3	49.2	2.2	130.4	-45.2	54.7
Redundant Chest Y	g	8.6	63.0	-4.1	45.5	4.5	48.6	-7.5	62.9
Redundant Chest Z	g	10.0	67.5	-4.4	42.8	5.2	41.3	-4.5	66.0
Redundant Chest Resultant	g	51.7	49.3	0.0	-37.5	45.4	54.8	0.0	-46.9
Chest Displacement	mm	0.0	-36.4	-38.7	55.4	0.0	8.7	-31.0	58.0
Pelvic X	g	2.4	198.3	-67.4	52.3	3.5	199.9	-68.4	53.5
Pelvic Y	g	12.7	72.5	-6.5	38.6	7.7	55.6	-10.1	66.5
Pelvic Z	g	2.4	198.5	-41.5	69.3	3.2	94.9	-36.8	70.3
Pelvic Resultant	g	73.0	52.2	0.0	-34.3	73.4	53.5	0.0	-24.5
Left Femur	N	562.5	44.6	-2744.3	54.9	497.5	42.8	-4163.7	62.2
Right Femur	N	875.9	46.1	-2051.7	58.9	403.5	43.8	-2330.5	53.3
Left Upper Tibia Mx	N-m	18.6	50.4	-14.9	62.0	52.4	78.0	-11.2	142.0
Left Upper Tibia My	N-m	14.4	199.9	-87.2	47.5	28.1	45.7	-95.3	40.2
Left Lower Tibia Fz	N	98.2	131.6	-2006.0	33.0	72.0	161.9	-3576.4	35.1
Left Lower Tibia Mx	N-m	44.9	57.9	-3.9	32.7	12.4	74.8	-5.9	98.1
Left Lower Tibia My	N-m	34.6	78.9	-32.9	49.3	33.3	85.9	-35.0	55.1
Right Upper Tibia Mx	N-m	36.6	43.2	-17.2	66.5	2.8	22.4	-35.3	55.4
Right Upper Tibia My	N-m	15.1	150.8	-139.6	43.4	20.1	199.6	-85.6	41.9
Right Lower Tibia Fz	N	79.6	199.9	-3481.7	42.7	26.0	158.5	-2644.1	41.0
Right Lower Tibia Mx	N-m	27.0	42.6	-84.4	47.3	6.4	172.2	-8.0	39.7
Right Lower Tibia My	N-m	19.4	78.4	-53.2	40.5	30.2	73.0	-23.3	54.2
Left Foot Aft Ax	g	9.3	86.9	-53.5	50.5	16.4	80.5	-65.5	40.1
Left Foot Aft Az	g	4.2	101.8	-43.1	32.3	6.1	45.9	-48.7	34.8
Left Foot Fore Az	g	21.2	16.9	-64.8	54.4	13.6	70.8	-69.0	38.8
Right Foot Aft Ax	g	13.2	65.1	-119.1	44.6	14.1	66.7	-52.1	38.9
Right Foot Aft Az	g	12.1	64.3	-89.4	41.9	1.9	101.7	-59.0	40.1
Right Foot Fore Az	g	38.2	67.6	-178.9	41.8	18.0	69.7	-74.3	39.6
Lap Belt Load	N	6238.5	59.6	-4.6	-18.9	6616.5	62.5	-12.1	157.8
Torso Belt	N	7221.9	50.4	-44.9	121.5	6846.7	53.7	-36.1	131.6

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES (cont.)

Vehicle Year/Make/Model/Body Style: 2004.5 Volvo S40 4-door Sedan

NHTSA Test No.: 045901 Test Date: July 9, 2004

HEAD INJURY CRITERIA (HIC)				
	HIC**	t ₁ (msec)	t ₂ (msec)	Average Acceleration t ₁ to t ₂
Position #1 - Driver	392.5	46.6	82.6	41.2 g
Position #2 - Passenger	258.4	51.9	87.8	34.9 g

** HIC is as defined in FMVSS 208. The maximum time interval from t₁ to t₂ is 36 milliseconds.

CLIP SUMMARY*				
	CLIP (g's)	t ₁ (msec)	t ₂ (msec)	CSI
Position #1 - Driver	47.2	47.7	50.7	497.0
Position #2 - Passenger	43.5	53.7	56.7	401.3

* The maximum chest resultant acceleration is defined as the maximum acceleration which exceeds 0.003 seconds in duration.

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES (cont.)
REDUNDANT DATA

Vehicle Year/Make/Model/Body Style: 2004.5 Volvo S40 4-door Sedan

NHTSA Test No.: 045901 Test Date: July 9, 2004

HEAD INJURY CRITERIA (HIC) REDUNDANT				
	HIC**	t ₁ (msec)	t ₂ (msec)	Average Acceleration t ₁ to t ₂
Position #1 - Driver	372.2	46.9	82.8	40.3 g
Position #2 - Passenger	257.0	52.3	88.3	34.8 g

** HIC is as defined in FMVSS 208. The maximum time interval from t₁ to t₂ is 36 milliseconds.

CLIP SUMMARY* REDUNDANT				
	CLIP (g's)	t ₁ (msec)	t ₂ (msec)	CSI
Position #1 - Driver	46.7	47.6	50.6	497.4
Position #2 - Passenger	44.1	53.5	56.5	410.6

* The maximum chest resultant acceleration is defined as the maximum acceleration which exceeds 0.003 seconds in duration.

DATA SHEET NO. 9 SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

BELT LENGTH DATA:

Belt length from trim panel exit
to bolt hole anchor point for
continuous webbing systems.

Driver

Passenger

1520

1560

Shoulder belt length as measured
on Part 572 Dummy.

900

900

Lap belt length as measured
on Part 572 Dummy.

620

660

Dimensions in millimeters

DATA SHEET NO.10 SUMMARY OF FMVSS 212 DATA

FMVSS NO. 212 - "WINDSHIELD MOUNTING" DATA

DETAILS OF WINDSHIELD MOUNTING SUCH AS RETENTION METHOD, TRIM TYPE, ETC.:

Windshield is bonded in place and covered with a 5 mm molding.

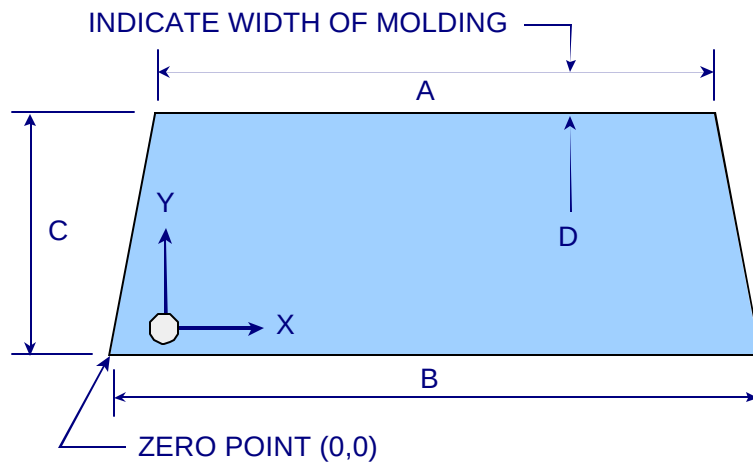
FMVSS 212 REQUIREMENTS:

The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of the windshield for vehicles equipped with automatic restraint systems for front occupants,

FMVSS 212 TEST DATA

	WINDSHIELD PERIPHERY		% OF RETENTION
	PRE-TEST (mm)	POST-TEST (mm)	
RIGHT SIDE	2177.5	2177.5	100.0%
LEFT SIDE	2177.5	2177.5	100.0%
TOTAL	4355	4355	100.0%

AREA OF RETENTION FAILURE: None



DIMENSIONS (mm)	
A	1185
B	1540
C	815
D	5

FRONT VIEW OF WINDSHIELD

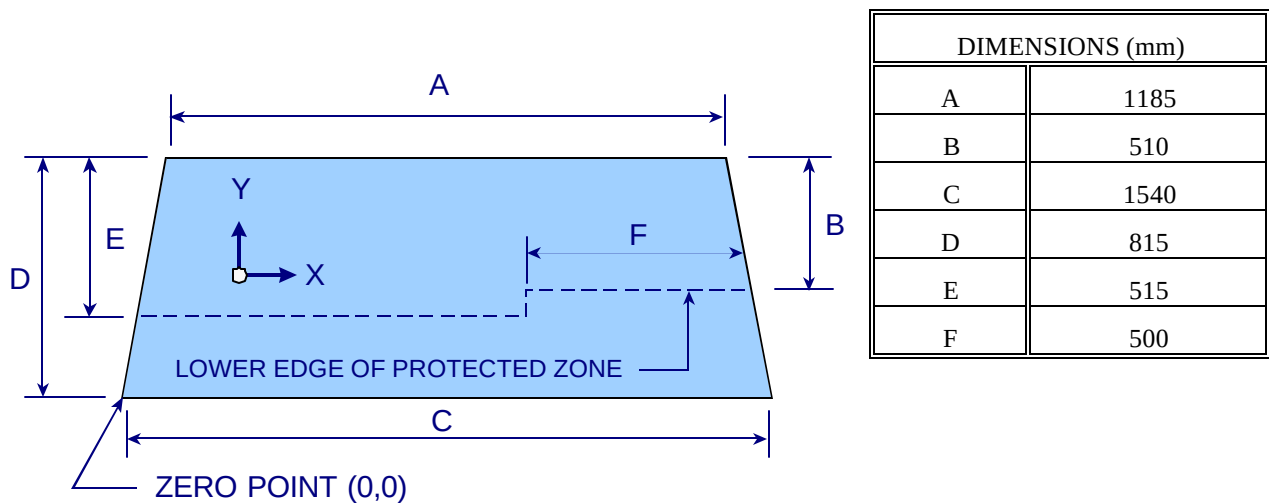
FAILURE DETAILS: None

DATA SHEET NO. 11 FMVSS NO. 219 (PARTIAL) - "WINDSHIELD ZONE INTRUSION" DATA

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 165 mm diameter rigid sphere weighing 6.8 kg in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. The locus of points is drawn on the inner surface of the windshield contacted by the sphere across the width of the instrument panel. From the outermost contactable points extend the locus line horizontally to the edges of the windshield, then draw a line on the inner surface of the windshield below and 13 mm distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection of this line onto the outer surface of the windshield.

FMVSS 219 TEST DATA:



FRONT VIEW OF WINDSHIELD

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 6 mm: None

(Show location of penetration on the above sketch)

COORDINATES		
	X	Y
1.	-	-
2.	-	-
3.	-	-
4.	-	-

DATA SHEET NO. 12 FMVSS NO. 301-75 "FUEL SYSTEM INTEGRITY" POST IMPACT TEST DATA

NHTSA TEST No.: O45901 TEST DATE: July 9, 2004

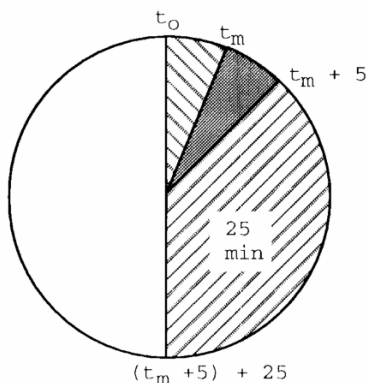
VEHICLE MAKE/MODEL: 2004.5 Volvo S40 4-door Sedan

The test vehicle was filled from 92% to 94% of the manufacture's "usable" capacity. The electric fuel pump was operating if it will operate without engine operation. Two Part 572 anthropomorphic test devices were located at each of the front designated seating positions.

=====

TEST VEHICLE IMPACT TYPE: X Frontal (56 kph)
 - Oblique (48 kph) with _____ deg. barrier face first contacting _____
 - (driver/passenger) side
 - Rear Moving Barrier (48 kph)
 - Lateral Moving Barrier (32 kph)

FUEL SPILLAGE MEASUREMENT:



1. From impact until vehicle motion ceases
2. For 5 minute period after vehicle motion ceases
3. For next 25 minutes

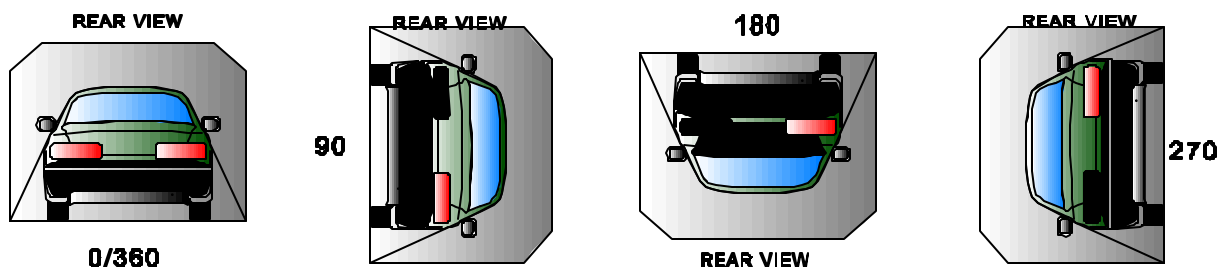
ACTUAL	MAX ALLOWED
0	28 g
0	141 g
0	28 g/min.

SOLVENT SPILLAGE DETAILS: None

DATA SHEET NO. 13 - ROLLOVER DATA

Vehicle: 2004.5 Volvo S40 4-door Sedan

NHTSA No.: O45901



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	
0° - 90°	1	minutes	14	seconds	5	minutes	6	minutes	14	seconds	7	minutes
90° - 180°	1	minutes	02	seconds	5	minutes	6	minutes	2	seconds	7	minutes
180°-270°	1	minutes	02	seconds	5	minutes	6	minutes	2	seconds	7	minutes
270°-360°	1	minutes	10	seconds	5	minutes	6	minutes	10	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:

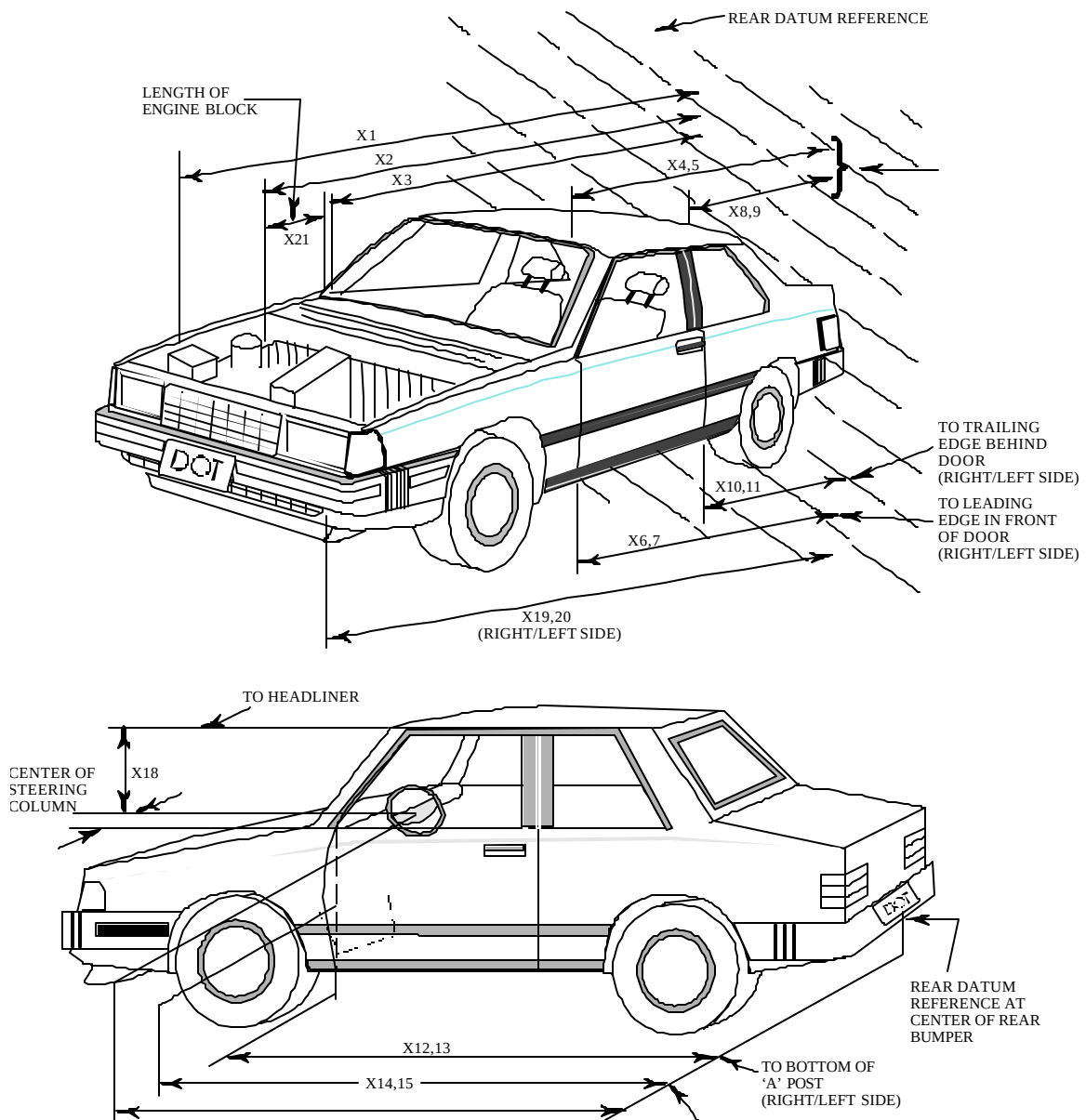
Rollover Stage	First 5 minutes from onset of rotation (g)	6th min. (g)	7th min. (g)	8th min. (if required) (g)
0° - 90°	0	0	0	N/A
90° - 180°	0	0	0	N/A
180°-270°	0	0	0	N/A
270°-360°	0	0	0	N/A

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

IV. SOLVENT SPILLAGE LOCATION(S):

Rollover Stage	Spillage Location
0° - 90°	None
90° - 180°	None
180°-270°	None
270°-360°	None

DATA SHEET NO. 14 TEST VEHICLE MEASUREMENTS

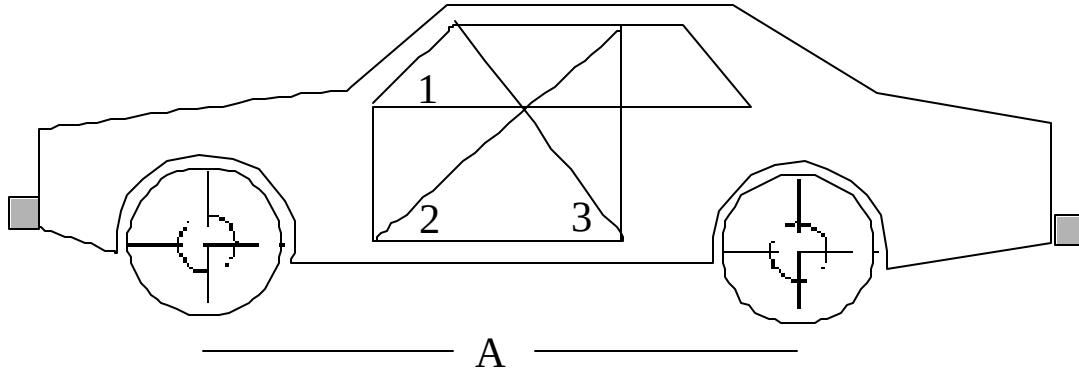


DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)

No.		Pre-Test	Post-Test	Difference
X1	Total Length of Vehicle at Centerline	4463	4130	333
X2	Rear Surface of Vehicle to Front of Engine	3985	3759	226
X3	Rear Surface of Vehicle to Firewall	3582	3547	35
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	3126	3125	1
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	3125	3128	-3
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	3144	3141	3
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	3144	3150	-6
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	2041	2043	-2
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	2041	2042	-1
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	2093	2092	1
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	2095	2099	-4
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	3231	3229	2
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	3223	3222	1
X14	Rear Surface of Vehicle to Firewall, Right Side	3702	3655	47
X15	Rear Surface of Vehicle to Firewall, Left Side	3704	3653	51
X16	Rear Surface of Vehicle to Steering Column	2640	2693	-53
X17	Center of Steering Column to "A" Post	299	265	34
X18	Center of Steering Column to Headliner	410	433	-23
X19	Rear Surface of Vehicle to Right Side of Front Bumper	4396	4099	297
X20	Rear Surface of Vehicle to Left Side of Front Bumper	4396	4096	300
X21	Length of Engine Block	305	305	0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	2850	2848	2
CD	Rear Surface of Vehicle to Center of Dash Panel	2874	2868	6
LD	Rear Surface of Vehicle to Left Side of Dash Panel	2853	2847	6

All Dimensions in mm

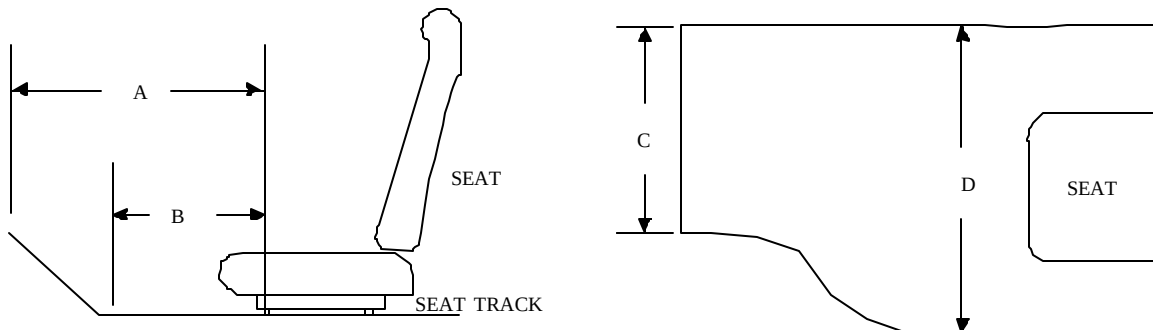
DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)
 VEHICLE INTRUSION MEASUREMENTS
 DOOR OPENING WIDTH



UNITS (mm)	LEFT			RIGHT		
MEASUREMENT	1	2	3	1	2	3
BEFORE TEST	940	1475	930	946	1470	948
AFTER TEST	939	1482	929	930	1480	940
DIFFERENCE	1	-7	1	16	-10	8

UNITS (mm)	A = WHEELBASE LEFT	A = WHEELBASE RIGHT
BEFORE TEST	2640	2640
AFTER TEST	2579	2515
DIFFERENCE	61	125

DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)
 VEHICLE INTRUSION MEASUREMENTS
 STATIC FOOTWELL DEFORMATION



DRIVER

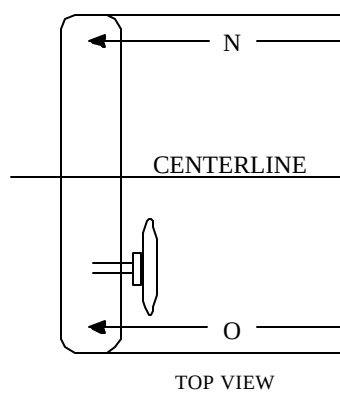
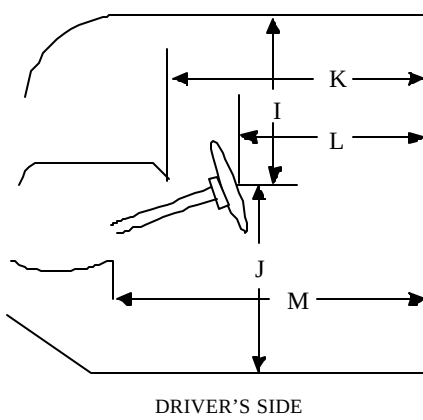
Measurement	Pre-Test	Post-Test	Difference
A	770	671	99
B	565	596	-31
C	396	417	-21
D	411	426	-15

PASSENGER

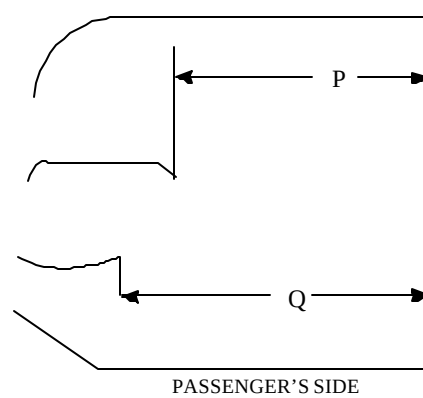
Measurement	Pre-Test	Post-Test	Difference
A	670	645	25
B	508	510	-2
C	391	390	1
D	417	394	23

Units = mm

DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)
 VEHICLE INTRUSION MEASUREMENTS
 STATIC PASSENGER COMPARTMENT INTRUSION



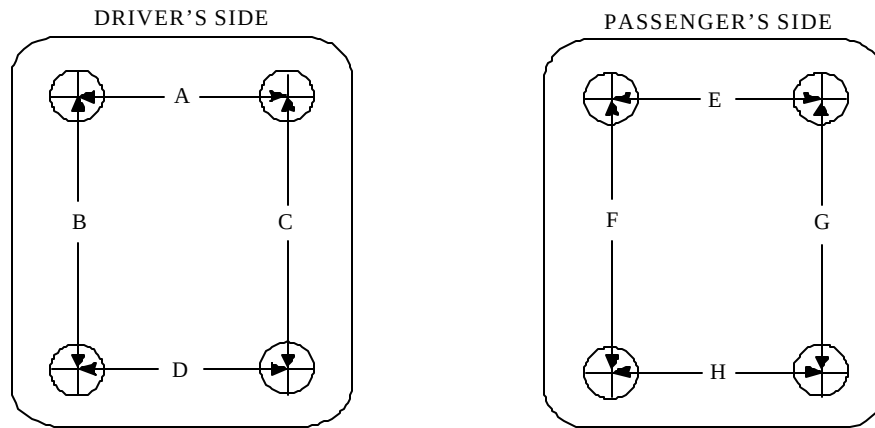
MEASUREMENTS
FROM C-PILLAR
BELT ANCHORAGE



Measurement	Pre-Test	Post-Test	Difference
I	410	433	-23
J	638	626	12
K	1637	1629	8
L	1410	1462	-52
M	1764	1756	8
N	1620	1613	7
O	1623	1616	7
P = K (PASS.)	1651	1672	-21
Q = M (PASS.)	1715	1712	3

Units = mm

DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)
FLOORBOARD DEFORMATION

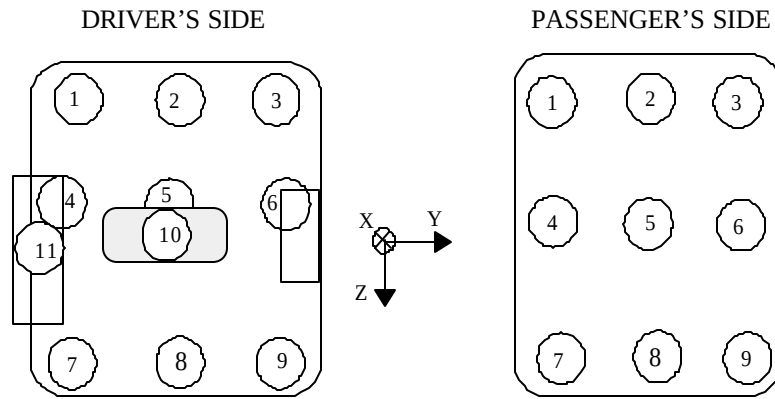


TOP VIEW THROUGH FLOOR PAN

Measurement	Pre-Test	Post-Test	Difference
A	396	417	-21
B	365	336	29
C	379	298	80
D	411	426	-15
E	391	390	1
F	367	367	-1
G	372	386	-14
H	417	394	23

Units = mm

DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)
TOE-PAN INTRUSION



Driver Side Toe-pan Measurements

Toe-pan Location	X Deformation (mm)			Z Deformation (mm)		
	Pre-Test	Post-Test	Difference	Pre-Test	Post-Test	Difference
1	3343	3293	50	-454	-416	-38
2	3369	3270	99	-406	-398	-8
3	3342	3301	41	-391	-484	93
4	3247	3250	-3	-373	-324	-49
5	3258	3255	3	-349	-341	-8
6	3247	3269	-22	-341	-369	28
7	3172	3177	-5	-300	-262	-38
8	3164	3195	-31	-299	-276	-23
9	3168	3196	-28	-300	-284	-16
10	3138	3167	-29	-425	-410	-15
11	3187	3200	-13	-408	-413	5

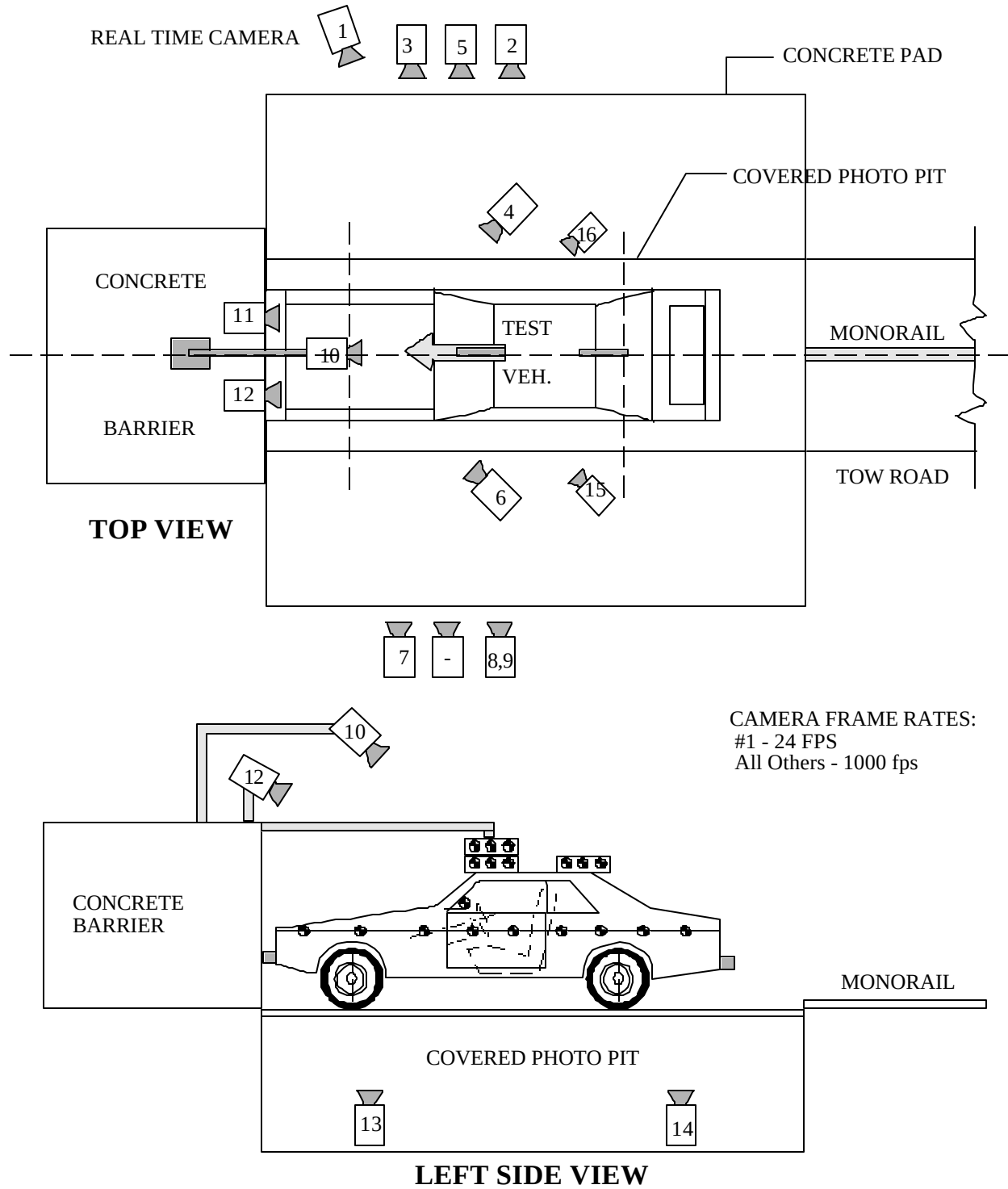
Passenger Side Toe-pan Measurements

Toe-pan Location	X Deformation (mm)			Z Deformation (mm)		
	Pre-Test	Post-Test	Difference	Pre-Test	Post-Test	Difference
1	3275	3262	13	-450	-441	-9
2	3281	3259	22	-461	-462	1
3	3245	3237	8	-495	-484	-11
4	3209	3168	41	-352	-328	-24
5	3206	3191	15	-354	-345	-9
6	3211	3198	13	-359	-347	-12
7	3107	3115	-8	-263	-234	-29
8	3119	3124	-5	-259	-243	-16
9	3119	3125	-6	-262	-253	-9

Reference: SAE: X = Rear Bumper (Positive: forward); Z = Ground (Positive: down)

DATA SHEET NO.15 HIGH-SPEED CAMERA LOCATIONS

NOTE: Camera information shown in DATA SHEET NO. 15.



DATA SHEET NO.15 HIGH-SPEED CAMERA LOCATIONS (cont.)

NHTSA Test No.: O45901 Vehicle: 2004.5 Volvo S40 4-door Sedan

CAMERA NO.	VIEW	CAMERA POSITIONS (mm)*			ANGLE (deg)**	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Camera	-	-	-	-	-	-	24
2	Right Passenger View	7749	1600	1196	-2	8033	35	1010
3	Overall Right Side	7189	2179	1117	0	7473	12.5	1000
4	Passenger and Interior View	3155	3835	1987	-8	-	25	1005
5	Right Side View	9457	1094	1113	-1	9741	25	1045
6	Driver and Interior View	7362	3320	2048	-11	-	25	1010
7	Left Side View	7435	890	1070	-1	7169	25	1000
8	Steering Column (Top)	7363	1833	1777	-9	7097	25	1000
9	Steering Column (Bottom)	7363	1873	1177	-4	7097	25	1005
10	Windshield View	0	-530	3374	-48	-	13	1000
11	Passenger Front View	620	-92	1987	-40	-	13	1005
12	Driver Front View	620	-92	1987	-37	-	13	1005
13	Pit View of Engine	0	615	-3048	90	-	13	1000
14	Pit View of Fuel Tank	0	2733	-3048	90	-	13	1000
-	Overall Left Side	8086	1545	1095	-2	7820	12.5	§
15	Left Side Lateral CRS View	3178	2616	2277	-18	-	28	1000
16	Right Side Lateral CRS View	7208	2731	2200	-18	-	28	1000

*X = film plane to monorail centerline ** = referenced to horizontal plane

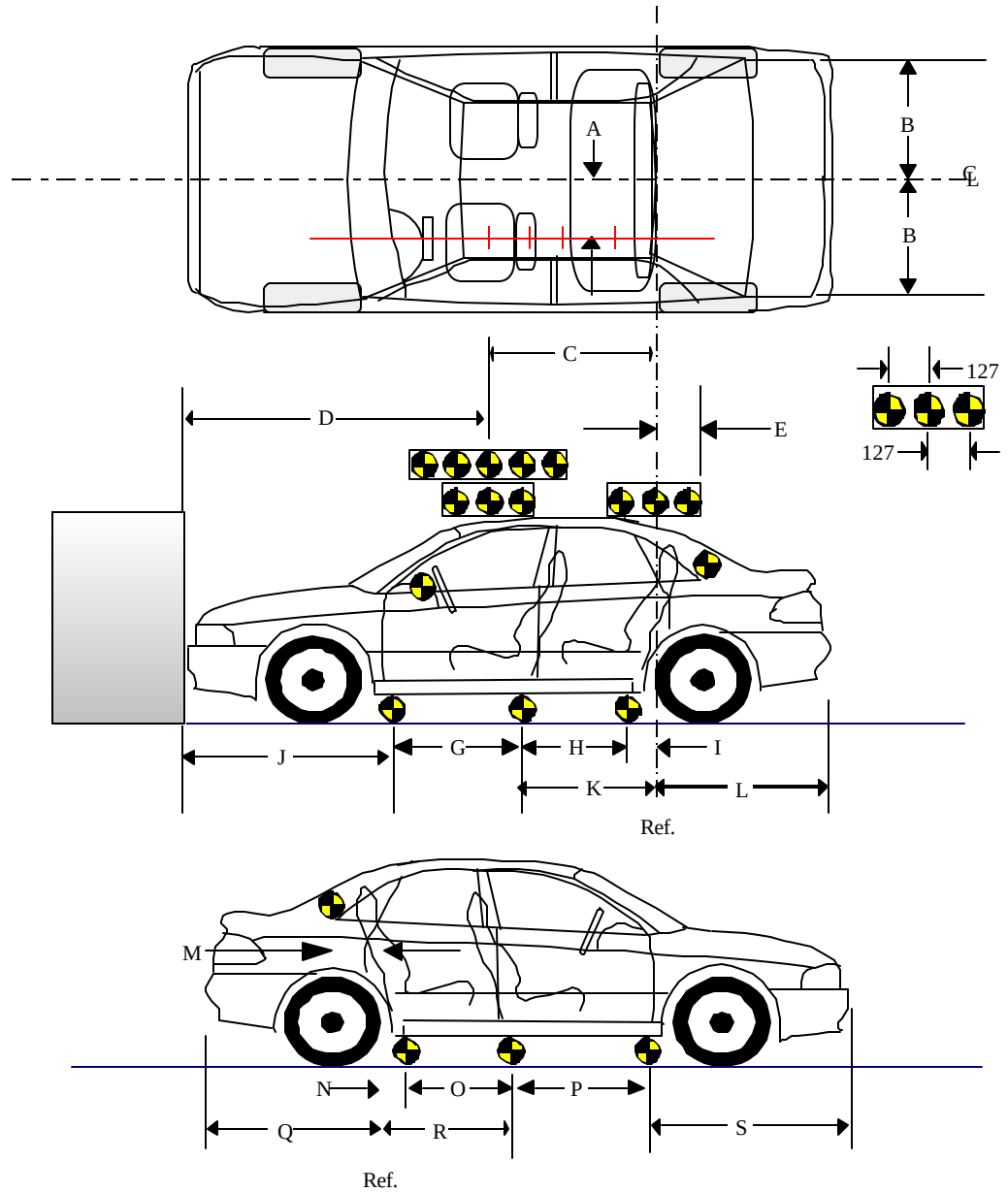
Y = film plane to impact location N.T. indicates No Timing

Z = film plane to ground § - Film Broke – Image not available

DATA SHEET NO. 16 VEHICLE REFERENCE PHOTO TARGET LOCATIONS

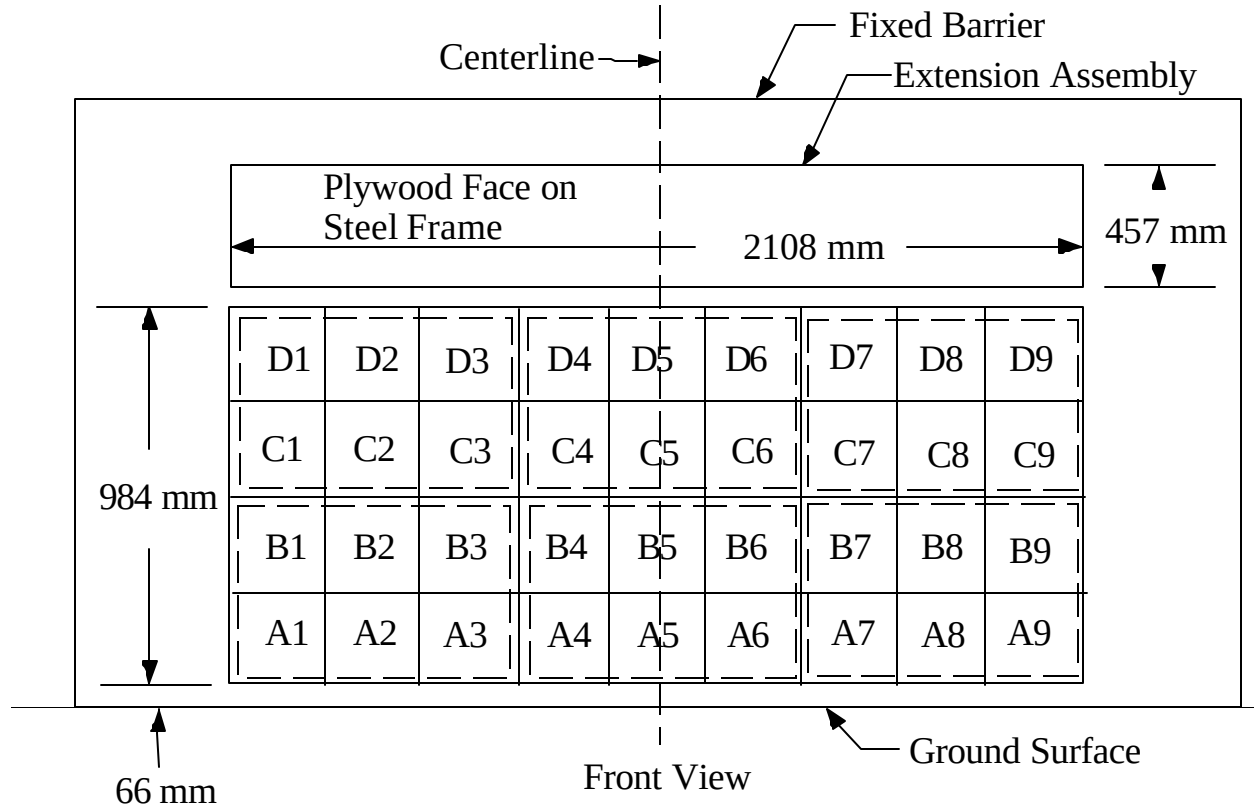
(Dimensions in millimeters)

A	360
B	550
C	1223
D	1953
E	311
F	1543
G	898
H	895
I	78
J	1261
K	973
L	1330
M	302
N	71
O	904
P	902
Q	1331
R	975
S	1254



DATA SHEET NO. 17 LOAD CELL LOCATIONS ON FIXED BARRIER

36 Load Cells
 4 Rows
 9 Columns
 6 Groupings (6 cells/group)



6 GROUPS OF 6 LOAD CELLS EACH

Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

The following data is presented in Appendix B:

- (1)Data from 36 individual load cells
- (2)Total or Sum of 36 individual load cells
- (3)Data from 6 Groupings shown above (6 cells/group)

DATA SHEET NO. 18 POST TEST AIR BAG DATA

NHTSA No.: O45901; Test Date: July 9, 2004; Technician: Patrick G. MacDiarmid Jr.

Vehicle Model Year/Make/Model: 2004.5 Volvo S40 4-door Sedan

A. No. of vent holes: 1 -Driver 2 -Passenger

B. Size of vent holes: (mm²) 1256 -Driver 3848 -Passenger

C. Total vent area: (mm²) 1256 -Driver 7696 -Passenger

D. Deflated air bag length and width dimensions or, if round, diameter. (mm)

Driver: 525 -Height; 550 -Width; 400 -Depth

Passenger: 680 -Height; 450 -Width; 700 -Depth

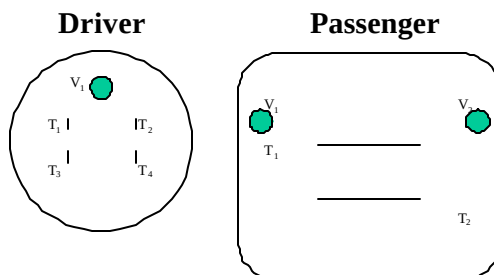
E. Is the air bag tethered?

Driver: X -Yes; - -No; If yes, record length of tether- 250

Passenger: X -Yes; - -No; If yes, record length of tether- 200 (lateral)

Sketch the air bag showing the location of the vent holes, how the bag is tethered, and where the bag is tethered. Also describe how the tethers are attached to the bag and the steering wheel.

(Note: Not to scale; V_n = Vent hole_n, T_n = Tether_n).



F. Record part numbers and manufacturer name of the air bag and gas generator.

Driver: Air bag: 4106 A03 AVVA 141603380291

Generator: -

Passenger: Air bag: 21985033360347 1985 AVVA 1985 A00

Generator: 37585 50 03 LR45 8508

DATA SHEET NO. 19 ACCIDENT INVESTIGATION DIVISION DATA

FOR FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: Volvo S40 4-door Sedan

NHTSA Test No.: O45901 VIN: YV1MS382742008653

Model Year: 2004.5 Build Date: 01/04 Test Date: July 9, 2004

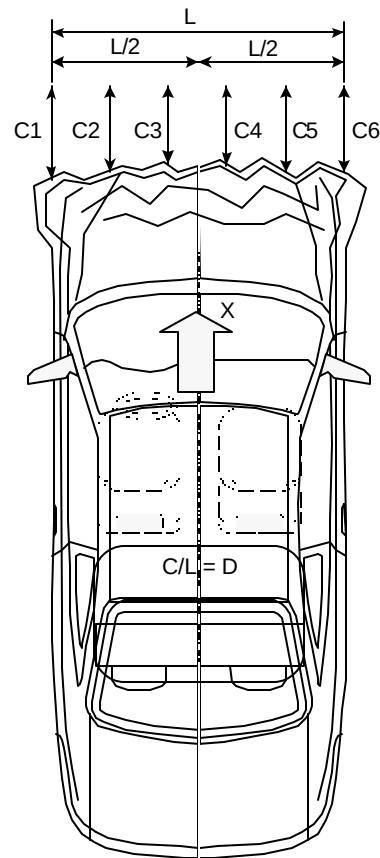
Vehicle Size Category: Compact Test Weight: 1698.0 kg

Vehicle Wheelbase: 2640 mm; Front Overhang: 841 mm; Overall Width: 1770 mm

Collision Deformation Classification (CDC) Code: 12FDEW 2

Crush Depth Dimensions

	PRE (mm)	POST (mm)	DIFF (mm)
C1 =	4260	4018	242
C2 =	4429	4105	324
C3 =	4462	4123	339
C4 =	4463	4126	337
C5 =	4430	4113	317
C6 =	4261	4022	239



Midpoint of Damage: D = Vehicle Centerline (Longitudinal)

Length of Damaged Region: L1= 1350 mm

L2= 675.0 mm

L5= 270 mm

APPENDIX A
PHOTOGRAPHS

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Figure A-1 LOAD CELL LOCATIONS



Figure A-2 VEHICLE CERTIFICATION PLACARD



Figure A-3 VEHICLE TIRE PLACARD



Figure A-4 RIGHT FRONT, AS RECEIVED



Figure A-5 LEFT REAR, AS RECEIVED



Figure A-6 PRE-TEST FRONT VIEW



Figure A-7 POST-TEST FRONT VIEW



Figure A-8 PRE-TEST LEFT SIDE VIEW



Figure A-9 POST-TEST LEFT SIDE VIEW



Figure A-10 PRE-TEST RIGHT SIDE VIEW



Figure A-11 POST-TEST RIGHT SIDE VIEW



Figure A-12 PRE-TEST RIGHT FRONT THREE-QUARTER VIEW



Figure A-13 POST-TEST RIGHT FRONT THREE-QUARTER VIEW



Figure A-14 PRE-TEST LEFT REAR THREE-QUARTER VIEW



Figure A-15 POST-TEST LEFT REAR THREE-QUARTER VIEW



Figure A-16 LEFT REAR THREE-QUARTER VIEW OF DOORS AFTER IMPACT



Figure A-17 RIGHT REAR THREE-QUARTER VIEW OF DOORS AFTER IMPACT



Figure A-18 PRE-TEST WINDSHIELD VIEW



Figure A-19 POST-TEST WINDSHIELDVIEW



Figure A-20 PRE-TEST ENGINE COMPARTMENT VIEW



Figure A-21 POST-TEST ENGINE COMPARTMENT VIEW



Figure A-22 PRE-TEST FUEL CAP VIEW



Figure A-23 POST-TEST FUEL CAP VIEW



Figure A-24 PRE-TEST FRONT UNDERBODY VIEW



Figure A-25 POST-TEST FRONT UNDERBODY VIEW



Figure A-26 PRE-TEST MID UNDERBODY VIEW



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Figure A-27 POST-TEST MID UNDERBODY VIEW



Figure A-28 PRE-TEST REAR UNDERBODY VIEW



Figure A-29 POST-TEST REAR UNDERBODY VIEW



Figure A-30 PRE-TEST DRIVER HEAD LOCATION



Figure A-31 POST-TEST DRIVER HEAD LOCATION



Figure A-32 PRE-TEST DRIVER POSITION VIEW



Figure A-33 POST-TEST DRIVER POSITION VIEW



Figure A-34 PRE-TEST DRIVER AND INTERIOR VIEW



Figure A-35 POST-TEST DRIVER AND INTERIOR VIEW



Figure A-36 PRE-TEST DRIVER FEET VIEW



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Figure A-37 POST-TEST DRIVER FEET VIEW



Figure A-38 PRE-TEST DRIVER KNEE BOLSTER VIEW



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Figure A-39 POST-TEST DRIVER KNEE BOLSTER VIEW



Figure A-40 PRE-TEST DRIVER FLOOR PAN VIEW



Figure A-41 POST-TEST DRIVER FLOOR PAN VIEW



Figure A-42 POST-TEST DRIVER HEAD VIEW



Figure A-43 POST-TEST DRIVER CONTACT TO AIRBAG



Figure A-44 PRE-TEST PASSENGER HEAD LOCATION



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Figure A-45 POST-TEST PASSENGER HEAD LOCATION



Figure A-46 PRE-TEST PASSENGER POSITION VIEW



Figure A-47 POST-TEST PASSENGER POSITION VIEW



Figure A-48 PRE-TEST PASSENGER AND INTERIOR VIEW



Figure A-49 POST-TEST PASSENGER AND INTERIOR VIEW



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Figure A-50 PRE- TEST PASSENGER FEET VIEW



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Figure A-51 POST-TEST PASSENGER FEET VIEW



Figure A-52 PRE-TEST PASSENGER KNEE BOLSTER VIEW



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Figure A-53 POST-TEST PASSENGER KNEE BOLSTER VIEW



Figure A-54 PRE-TEST PASSENGER FLOOR PAN VIEW



Figure A-55 POST-TEST PASSENGER FLOOR PAN VIEW



Figure A-56 POST-TEST PASSENGER HEAD VIEW



Figure A-57 POST-TEST PASSENGER CONTACT TO AIRBAG



Figure A-58 ROLLOVER VIEW



Figure A-59 IMPACT VIEW

APPENDIX B

DUMMY, VEHICLE AND LOAD CELL BARRIER RESPONSE DATA

**Hybrid III Dummy Sign Conventions
Load Cells and Special Transducers**

Transducer	SAE Sign Convention (positive unless noted)
Upper Neck Load Cell	Fx Head rearward Fy Head left Fz Neck in tension Mx Left ear to left shoulder My Chin to chest (flexion) Mz Chin to left shoulder (look left)
Chest Displacement Potentiometer	Compression is negative
Pelvic Load Cell (Lower Lumbar)	Fx Chest rearward Fy Chest left Fz Spine in tension
Femur Load Cell	Compression is negative
Upper Tibia Load Cell (right and left leg)	Mx Support tibia at ends, load left side center My Support tibia at ends, load front (shin) center
Lower Tibia Load Cell (right and left leg)	Fz Tibia in tension Mx Support tibia at ends, load left side center My Support tibia at ends, load front (shin) center

DATA CHANNEL FILTER CLASS SUMMARY

NHTSA TEST NO. O45901

DATA TYPE	SAE FILTER CLASS (Hz)
Dummy Head Accelerations	1000
Dummy Chest Accelerations	180
Dummy Chest Displacements	600
Dummy Femur Forces	600
Dummy Belt Loads	60
Dummy Belt Displacements	180
Dummy Neck Forces	1000
Dummy Neck Moments	600
Vehicle Accelerations	60
Vehicle Velocity Integrations	180
Vehicle Displacement Integrations	180
Load Cell Barrier Forces	60

Table of Data Plots

PLOT	PLOT NAME[UNITS, CHANNEL FILTER CLASS]	PAGE
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2	V1P1 Head 9 Array X Arm Az [g, CFC_1000]	B-9
3	V1P1 Head 9 Array Y Arm Ax [g, CFC_1000]	B-10
4	V1P1 Head 9 Array Y Arm Az [g, CFC_1000]	B-11
5	V1P1 Head 9 Array Z Arm Ax [g, CFC_1000]	B-12
6	V1P1 Head 9 Array Z Arm Ay [g, CFC_1000]	B-13
7	V1P1 Head CG x [g, CFC_1000]	B-14
8	V1P1 Head CG y [g, CFC_1000]	B-15
9	V1P1 Head CG z [g, CFC_1000]	B-16
10	V1P1 Head CG Resultant [g, CFC_1000]	B-17
11	V1P1 Head CG Red x [g, CFC_1000]	B-18
12	V1P1 Head CG Red y [g, CFC_1000]	B-19
13	V1P1 Head CG Red z [g, CFC_1000]	B-20
14	V1P1 Head CG Red Resultant [g, CFC_1000]	B-21
15	V1P1 Upper Neck Fx [N, CFC_1000]	B-22
16	V1P1 Upper Neck Fy [N, CFC_1000]	B-23
17	V1P1 Upper Neck Fz [N, CFC_1000]	B-24
18	V1P1 Upper Neck F Resultant [N, CFC_1000]	B-25
19	V1P1 Upper Neck Mx [N-m, CFC_600]	B-26
20	V1P1 Upper Neck My [N-m, CFC_600]	B-27
21	V1P1 Upper Neck Mz [N-m, CFC_600]	B-28
22	V1P1 Upper Neck M Resultant [N-m, CFC_600]	B-29
23	V1P1 Chest x [g, CFC_180]	B-30
24	V1P1 Chest y [g, CFC_180]	B-31
25	V1P1 Chest z [g, CFC_180]	B-32
26	V1P1 Chest Resultant [g, CFC_180]	B-33
27	V1P1 Chest Red x [g, CFC_180]	B-34
28	V1P1 Chest Red y [g, CFC_180]	B-35
29	V1P1 Chest Red z [g, CFC_180]	B-36
30	V1P1 Chest Red Resultant [g, CFC_180]	B-37
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32	V1P1 Pelvic x [g, CFC_1000]	B-39
33	V1P1 Pelvic y [g, CFC_1000]	B-40
34	V1P1 Pelvic z [g, CFC_1000]	B-41
35	V1P1 Pelvic Resultant [g, CFC_1000]	B-42
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37	V1P1 Right Femur z [N, CFC_600]	B-44
38	V1P1 Left Upper Tibia Mx [N-m, CFC_600]	B-45
39	V1P1 Left Upper Tibia My [N-m, CFC_600]	B-46
40	V1P1 Left Lower Tibia Fz [N, CFC_600]	B-47
41	V1P1 Left Lower Tibia Mx [N-m, CFC_600]	B-48
42	V1P1 Left Lower Tibia My [N-m, CFC_600]	B-49
43	V1P1 Right Upper Tibia Mx [N-m, CFC_600]	B-50
44	V1P1 Right Upper Tibia My [N-m, CFC_600]	B-51
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49	V1P1 Left Foot Aft z [g, CFC_600]	B-56
50	V1P1 Left Foot Fore z [g, CFC_600]	B-57
51	V1P1 Right Foot Aft x [g, CFC_600]	B-58
52	V1P1 Right Foot Aft z [g, CFC_600]	B-59
53	V1P1 Right Foot Fore z [g, CFC_600]	B-60
54	V1P1 Lap Belt [N, CFC_60]	B-61
55	V1P1 Torso Belt [N, CFC_60]	B-62
56	V1P2 Head 9 Array X Arm Ay [g, CFC_1000]	B-63
57	V1P2 Head 9 Array X Arm Az [g, CFC_1000]	B-64
58	V1P2 Head 9 Array Y Arm Ax [g, CFC_1000]	B-65
59	V1P2 Head 9 Array Y Arm Az [g, CFC_1000]	B-66
60	V1P2 Head 9 Array Z Arm Ax [g, CFC_1000]	B-67
61	V1P2 Head 9 Array Z Arm Ay [g, CFC_1000]	B-68
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63	V1P2 Head CG y [g, CFC_1000]	B-70
64	V1P2 Head CG z [g, CFC_1000]	B-71
65	V1P2 Head CG Resultant [g, CFC_1000]	B-72
66	V1P2 Head CG Red x [g, CFC_1000]	B-73
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68	V1P2 Head CG Red z [g, CFC_1000]	B-75
69	V1P2 Head CG Red Resultant [g, CFC_1000]	B-76
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79	V1P2 Chest y [g, CFC_180]	B-86
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81	V1P2 Chest Resultant [g, CFC_180]	B-88
82	V1P2 Chest Red x [g, CFC_180]	B-89
83	V1P2 Chest Red y [g, CFC_180]	B-90
84	V1P2 Chest Red z [g, CFC_180]	B-91
85	V1P2 Chest Red Resultant [g, CFC_180]	B-92
86	V1P2 Chest Compression x [mm, CFC_600]	B-93
87	V1P2 Pelvic x [g, CFC_1000]	B-94
88	V1P2 Pelvic y [g, CFC_1000]	B-95
89	V1P2 Pelvic z [g, CFC_1000]	B-96
90	V1P2 Pelvic Resultant [g, CFC_1000]	B-97
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96	V1P2 Left Lower Tibia Mx [N-m, CFC_600]	B-103
97	V1P2 Left Lower Tibia My [N-m, CFC_600]	B-104
98	V1P2 Right Upper Tibia Mx [N-m, CFC_600]	B-105
99	V1P2 Right Upper Tibia My [N-m, CFC_600]	B-106
100	V1P2 Right Lower Tibia Fz [N, CFC_600]	B-107
101	V1P2 Right Lower Tibia Mx [N-m, CFC_600]	B-108
102	V1P2 Right Lower Tibia My [N-m, CFC_600]	B-109
103	V1P2 Left Foot Aft x [g, CFC_600]	B-110
104	V1P2 Left Foot Aft z [g, CFC_600]	B-111
105	V1P2 Left Foot Fore z [g, CFC_600]	B-112
106	V1P2 Right Foot Aft x [g, CFC_600]	B-113
107	V1P2 Right Foot Aft z [g, CFC_600]	B-114
108	V1P2 Right Foot Fore z [g, CFC_600]	B-115
109	V1P2 Lap Belt [N, CFC_60]	B-116
110	V1P2 Torso Belt [N, CFC_60]	B-117
111	V1 Left Rear #1x [g, CFC_60]	B-118
112	V1 Left Rear #1x Velocity [kph, CFC_180]	B-119
113	V1 Left Rear #1x Displacement [mm, CFC_180]	B-120
114	V1 Right Rear #2x [g, CFC_60]	B-121
115	V1 Right Rear #2x Velocity [kph, CFC_180]	B-122
116	V1 Right Rear #2x Displacement [mm, CFC_180]	B-123
117	V1 Engine Top #3x [g, CFC_60]	B-124
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119	V1 Engine Top #3x Displacement [mm, CFC_180]	B-126
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134	V1 Left Rear #8z Displacement [mm, CFC_180]	B-141
135	V1 Right Rear #9z [g, CFC_60]	B-142
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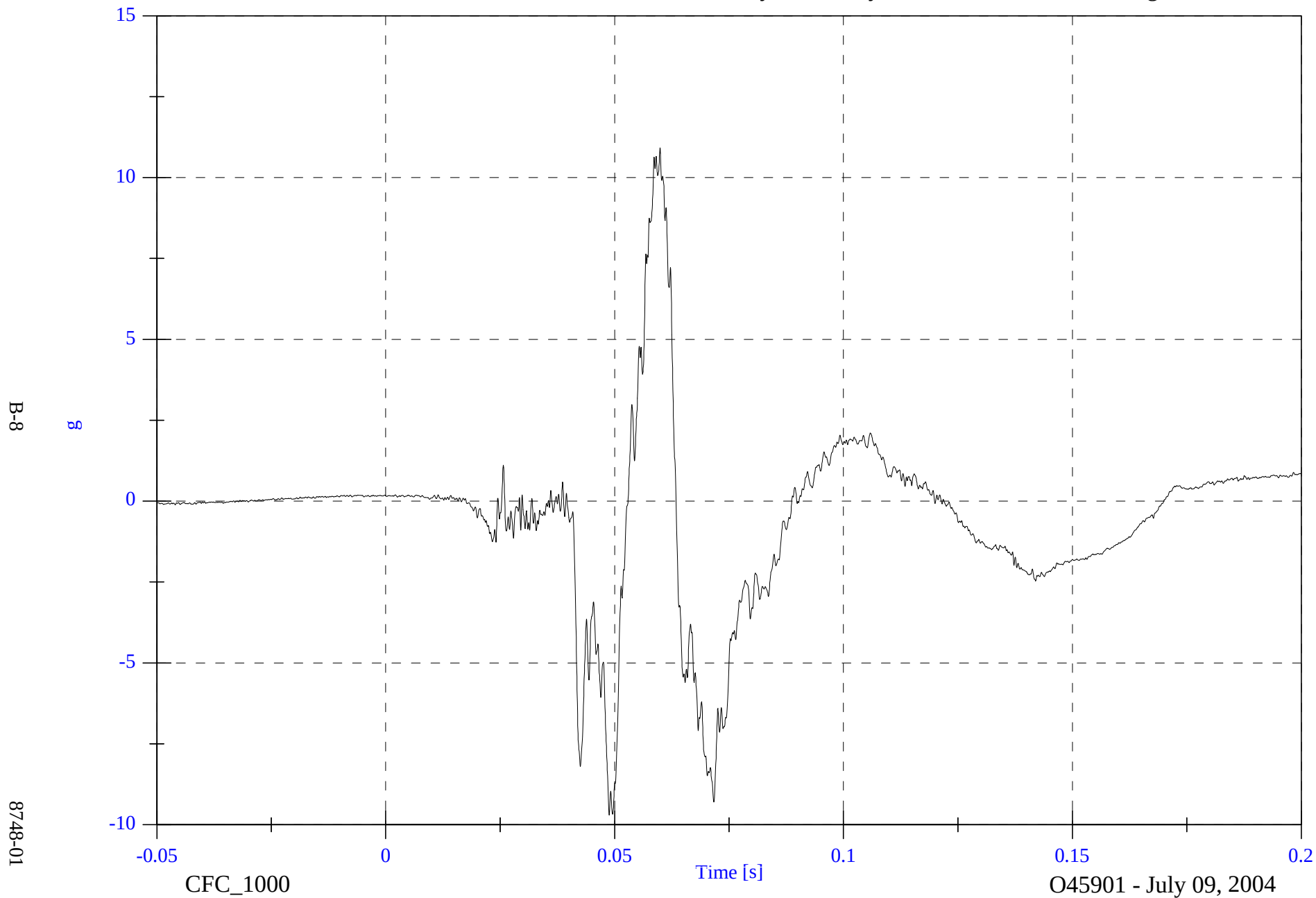
PLOT	PLOT NAME[UNITS, CHANNEL FILTER CLASS]	PAGE
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140	Barrier Load Cell A3 Fx [N, CFC_60]	B-147
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143	Barrier Load Cell A6 Fx [N, CFC_60]	B-150
144	Barrier Load Cell A7 Fx [N, CFC_60]	B-151
145	Barrier Load Cell A8 Fx [N, CFC_60]	B-152
146	Barrier Load Cell A9 Fx [N, CFC_60]	B-153
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148	Barrier Load Cell B2 Fx [N, CFC_60]	B-155
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152	Barrier Load Cell B6 Fx [N, CFC_60]	B-159
153	Barrier Load Cell B7 Fx [N, CFC_60]	B-160
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165	Barrier Load Cell D1 Fx [N, CFC_60]	B-172
166	Barrier Load Cell D2 Fx [N, CFC_60]	B-173
167	Barrier Load Cell D3 Fx [N, CFC_60]	B-174
168	Barrier Load Cell D4 Fx [N, CFC_60]	B-175
169	Barrier Load Cell D5 Fx [N, CFC_60]	B-176
170	Barrier Load Cell D6 Fx [N, CFC_60]	B-177
171	Barrier Load Cell D7 Fx [N, CFC_60]	B-178
172	Barrier Load Cell D8 Fx [N, CFC_60]	B-179
173	Barrier Load Cell D9 Fx [N, CFC_60]	B-180
174	Group 1 Load Cell Sum (A1,A2,A3,B1,B2,B3)	B-181
175	Group 2 Load Cell Sum (A4,A5,A6,B4,B5,B6)	B-182
176	Group 3 Load Cell Sum (A7,A8,A9,B7,B8,B9)	B-183
177	Group 4 Load Cell Sum (C1,C2,C3,D1,D2,D3)	B-184
178	Group 5 Load Cell Sum (C4,C5,C6,D4,D5,D6)	B-185
179	Group 6 Load Cell Sum (C7,C8,C9,D7,D8,D9)	B-186
180	Total Load Cell Sum (All 6 Groups)	B-187

NCAP Optional Test - 2004.5 Volvo S40

V1P1 Head 9 Array X Arm Ay

Max: 10.9 [g] at 0.060 [s]

Min: -9.7 [g] at 0.049 [s]

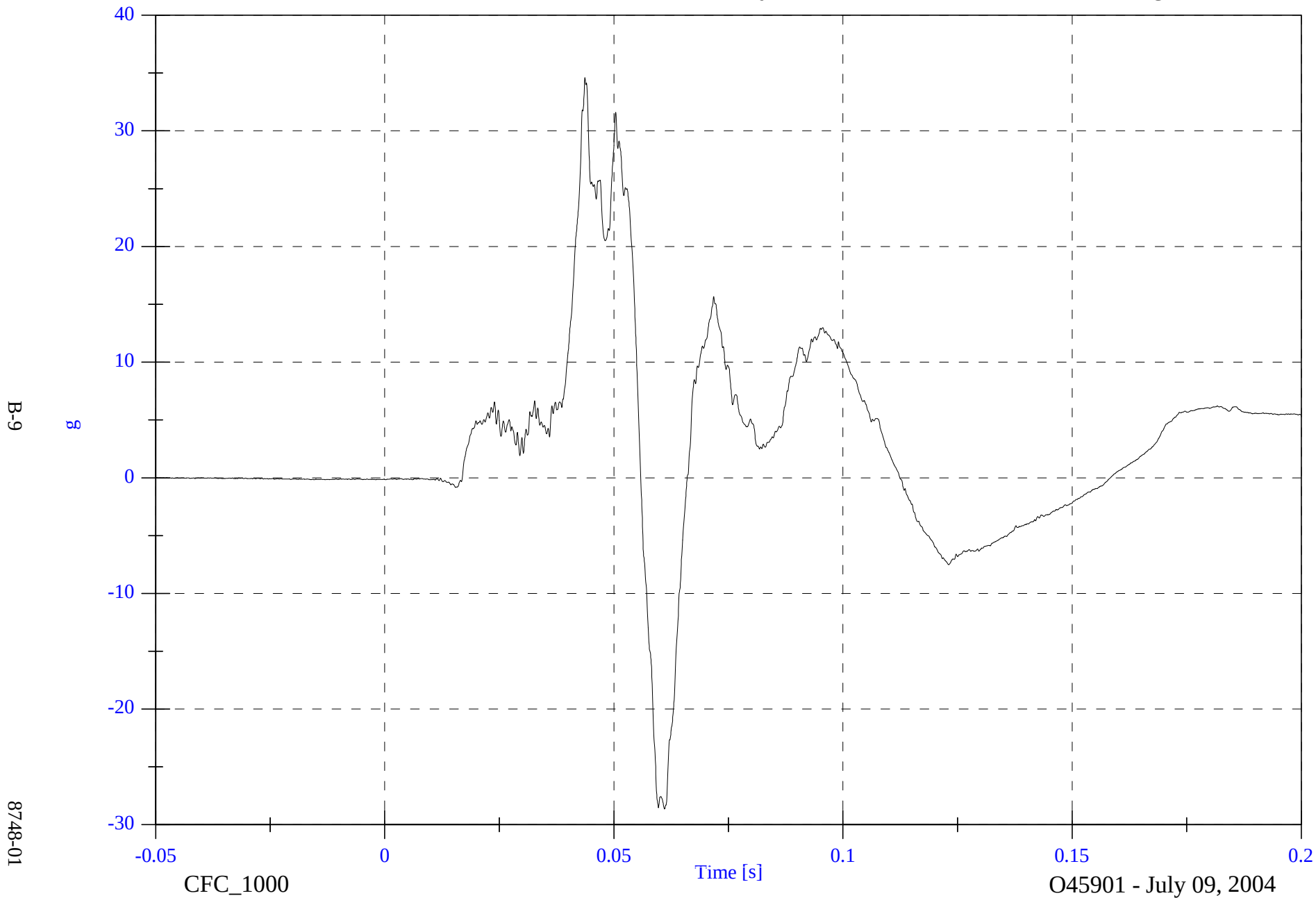


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Head 9 Array X Arm Az

Max: 34.6 [g] at 0.044 [s]

Min: -28.6 [g] at 0.061 [s]

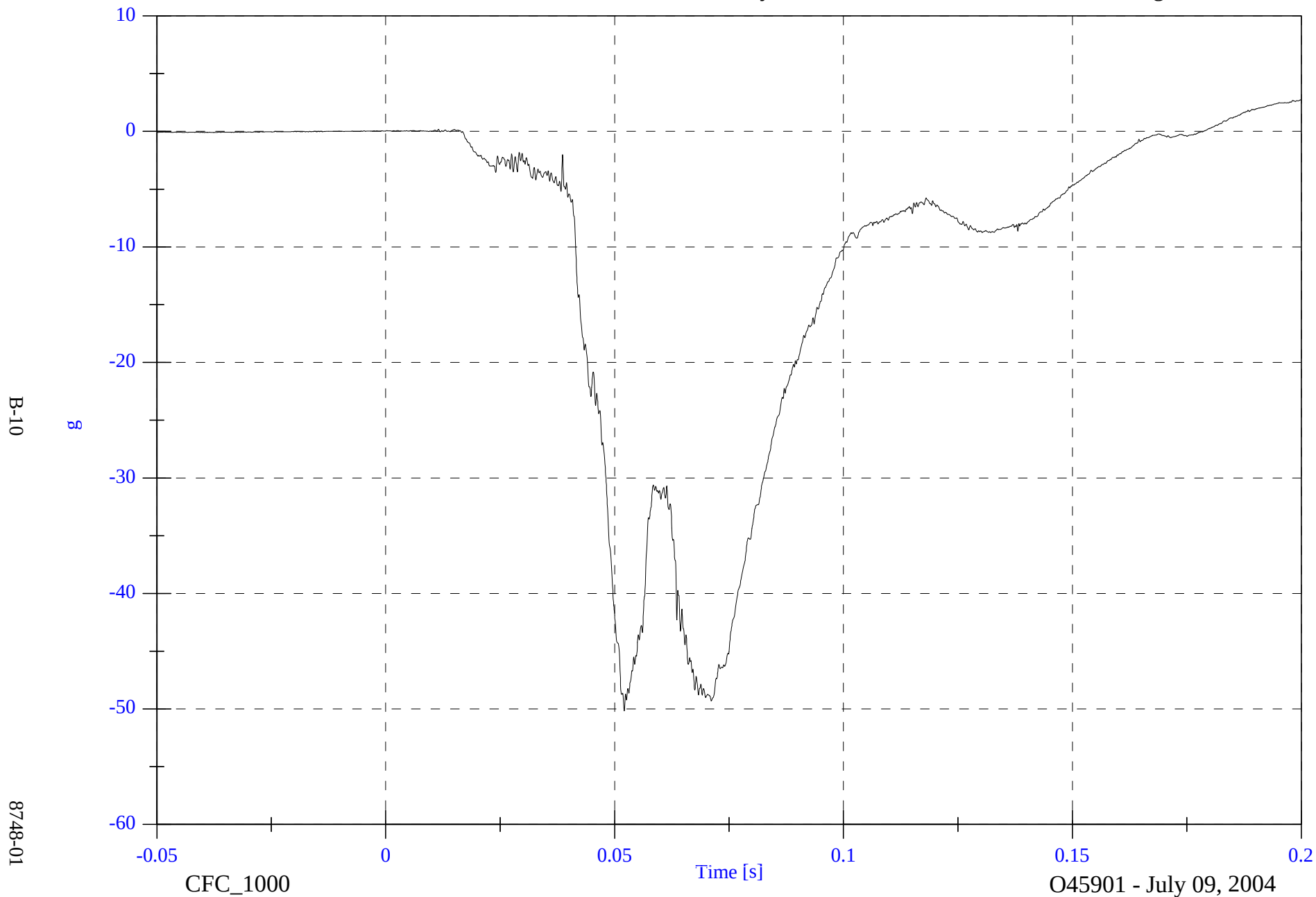


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Head 9 Array Y Arm Ax

Max: 2.7 [g] at 0.200 [s]

Min: -50.2 [g] at 0.052 [s]



NCAP Optional Test - 2004.5 Volvo S40

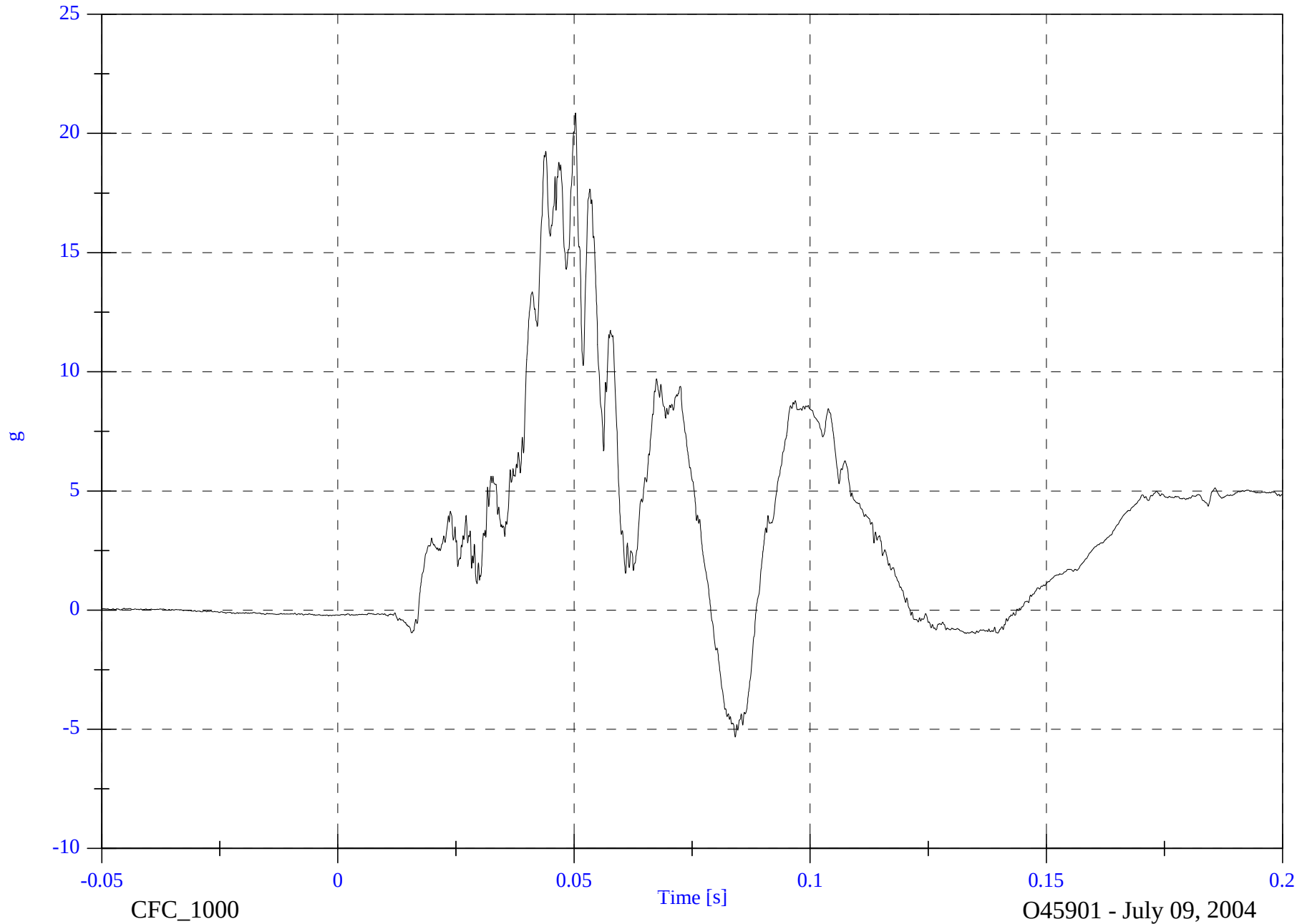
V1P1 Head 9 Array Y Arm Az

Max: 20.9 [g] at 0.050 [s]

Min: -5.3 [g] at 0.084 [s]

B-11

8748-01

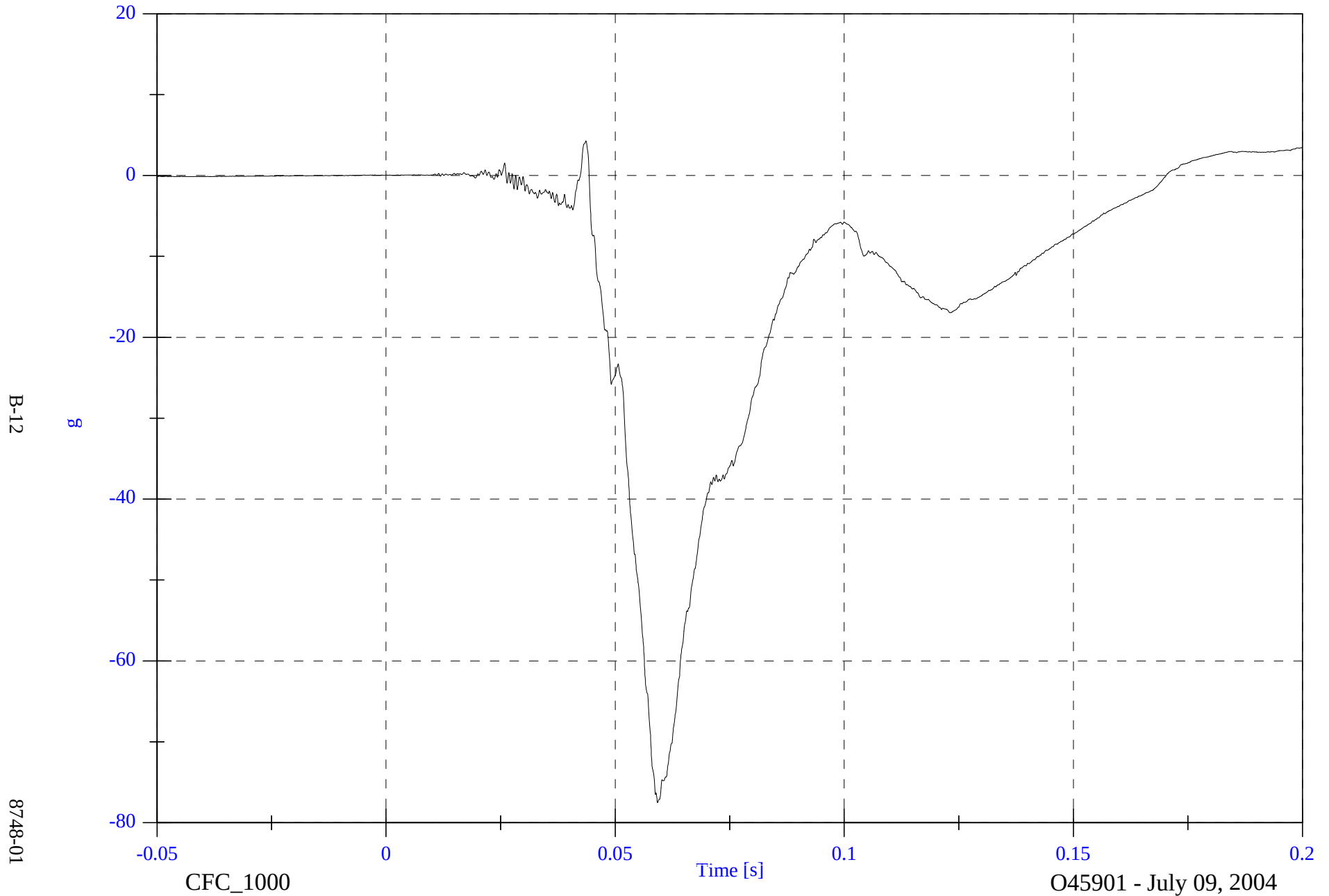


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Head 9 Array Z Arm Ax

Max: 4.3 [g] at 0.044 [s]

Min: -77.5 [g] at 0.059 [s]



NCAP Optional Test - 2004.5 Volvo S40

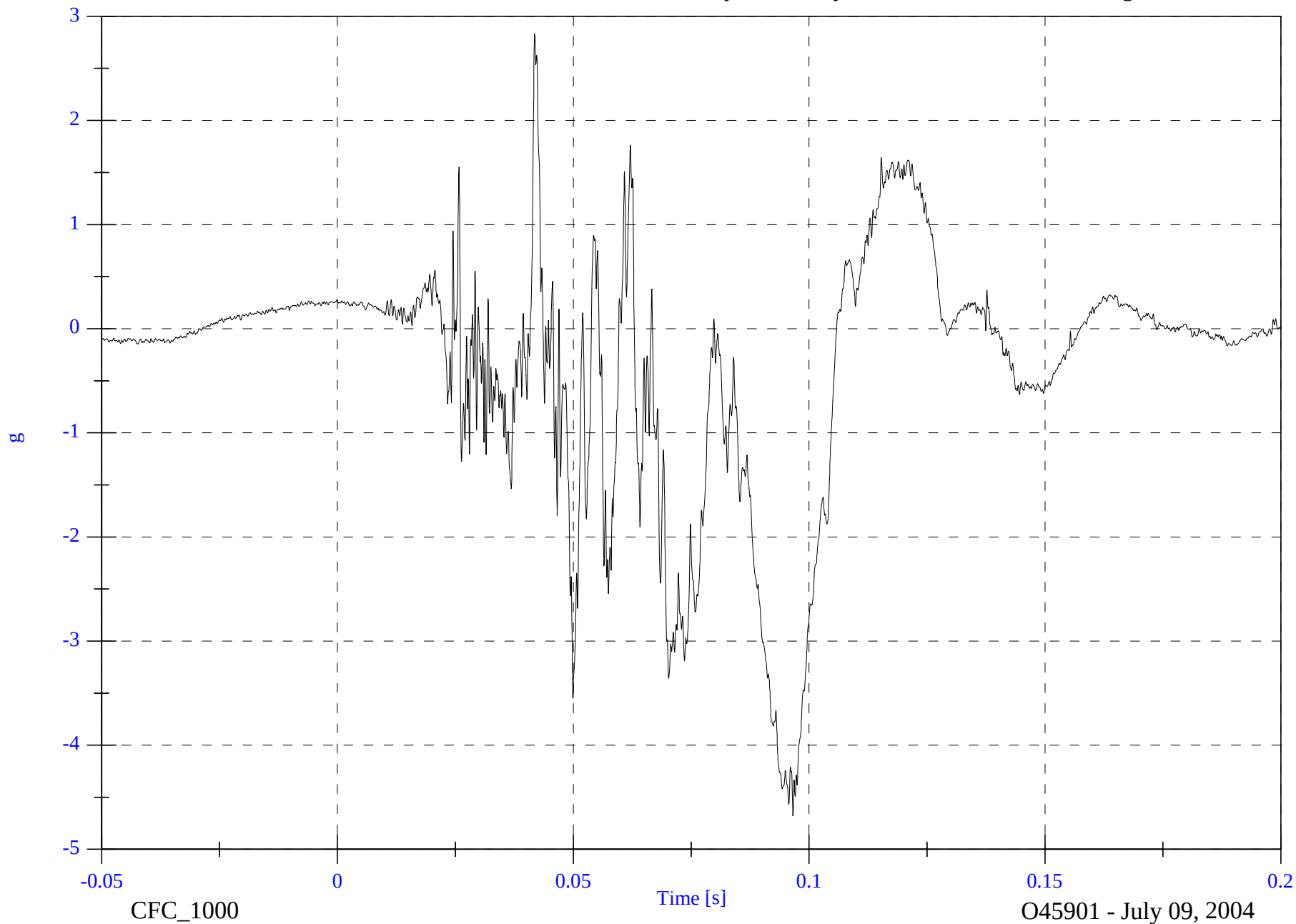
V1P1 Head 9 Array Z Arm Ay

Max: 2.8 [g] at 0.042 [s]

Min: -4.7 [g] at 0.097 [s]

B-13

8748-01

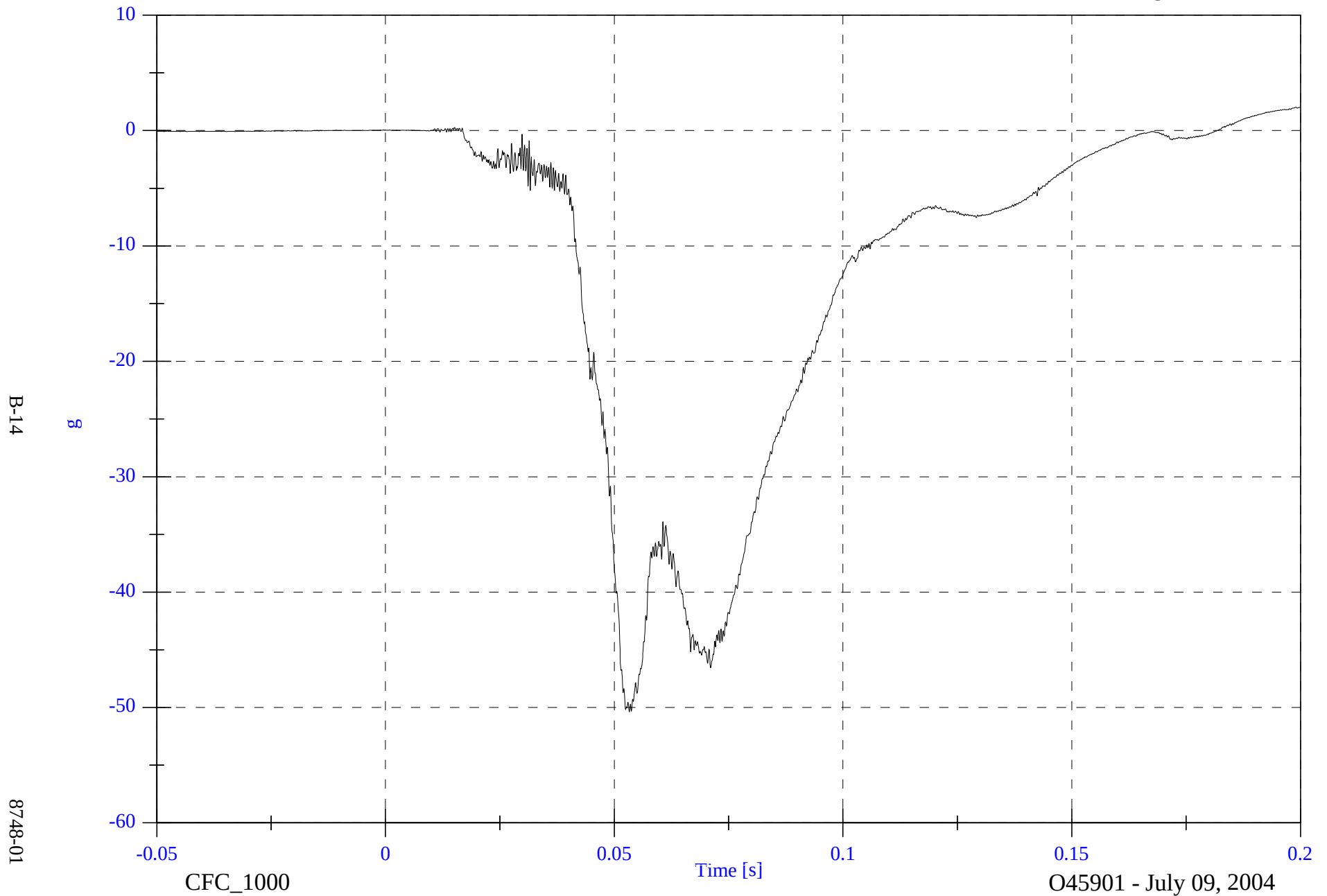


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Head CG x

Max: 2.0 [g] at 0.200 [s]

Min: -50.4 [g] at 0.053 [s]



NCAP Optional Test - 2004.5 Volvo S40

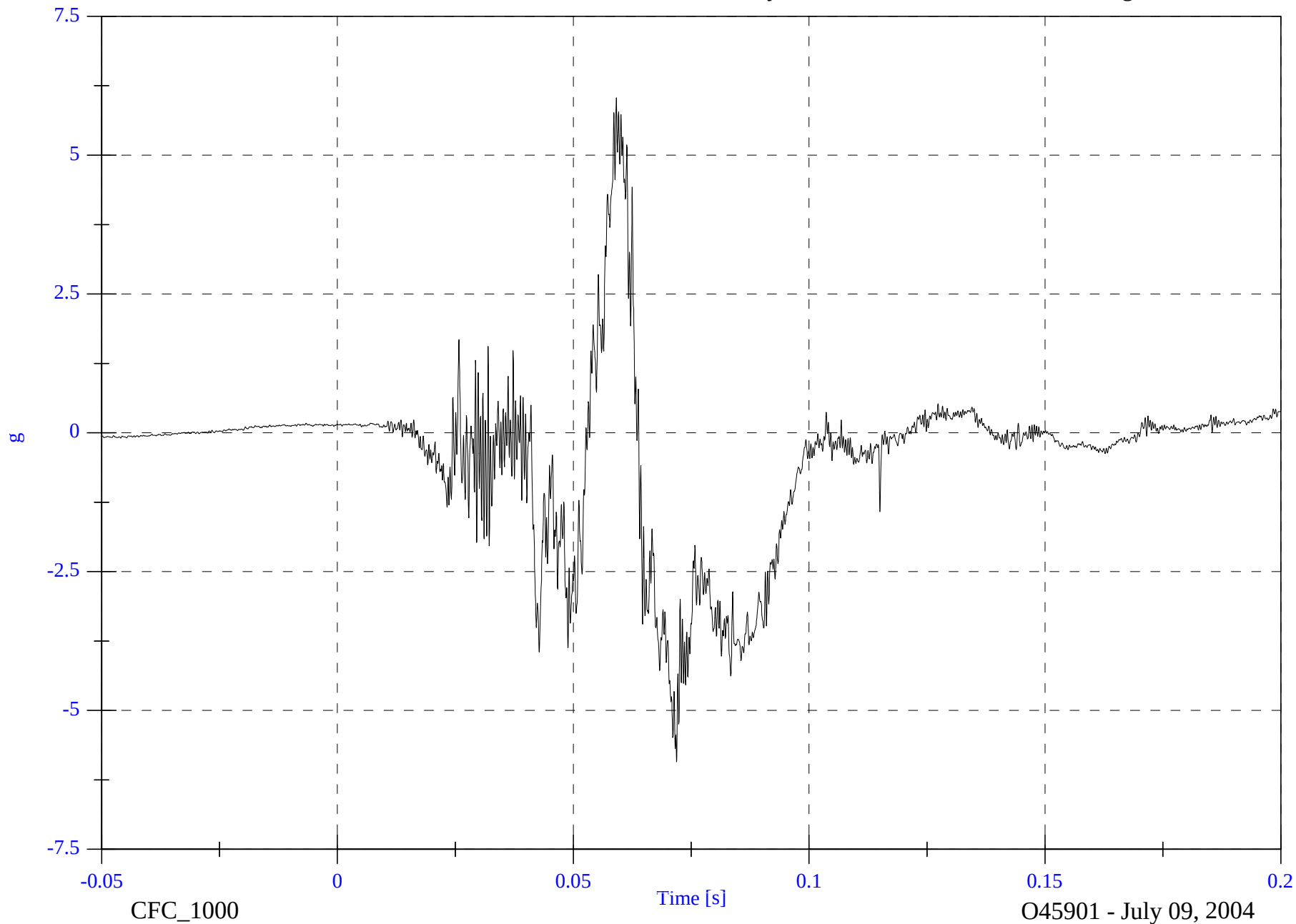
V1P1 Head CG y

Max: 6.0 [g] at 0.059 [s]

Min: -5.9 [g] at 0.072 [s]

B-15

8748-01



NCAP Optional Test - 2004.5 Volvo S40

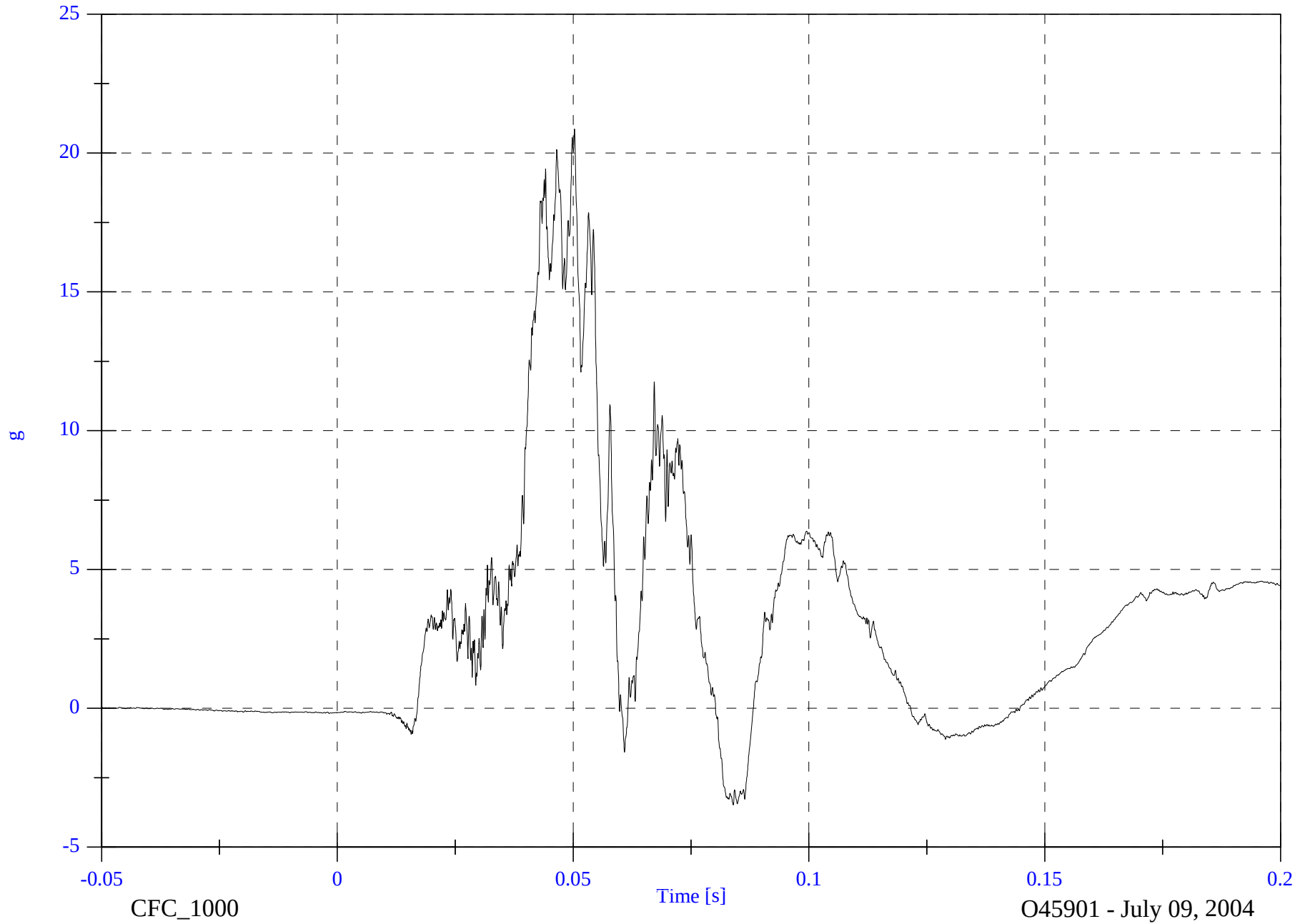
V1P1 Head CG z

Max: 20.9 [g] at 0.050 [s]

Min: -3.5 [g] at 0.084 [s]

B-16

8748-01



NCAP Optional Test - 2004.5 Volvo S40

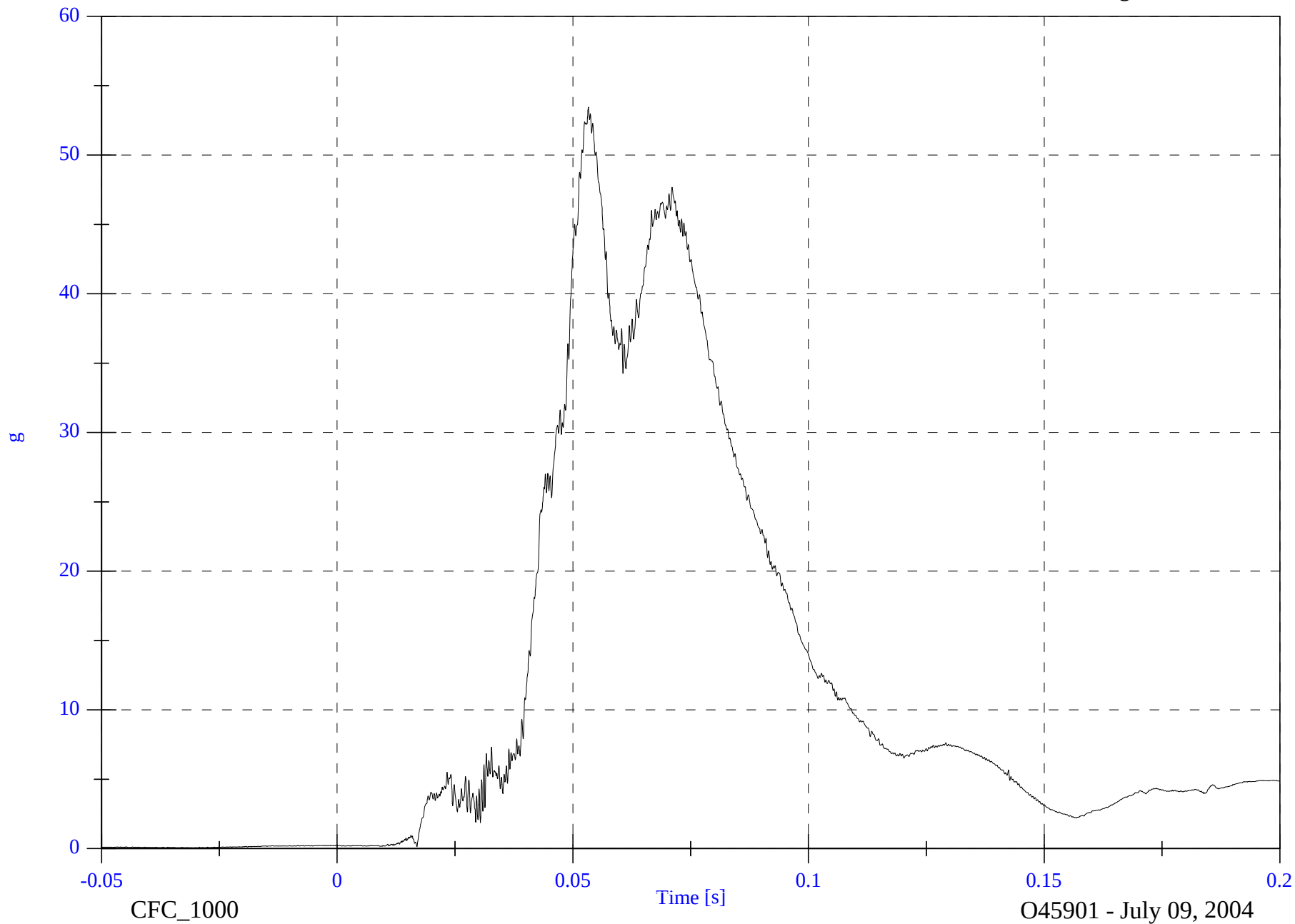
V1P1 Head CG Resultant

Max: 53.4 [g] at 0.053 [s]

Min: 0.1 [g] at -0.031 [s]

B-17

8748-01

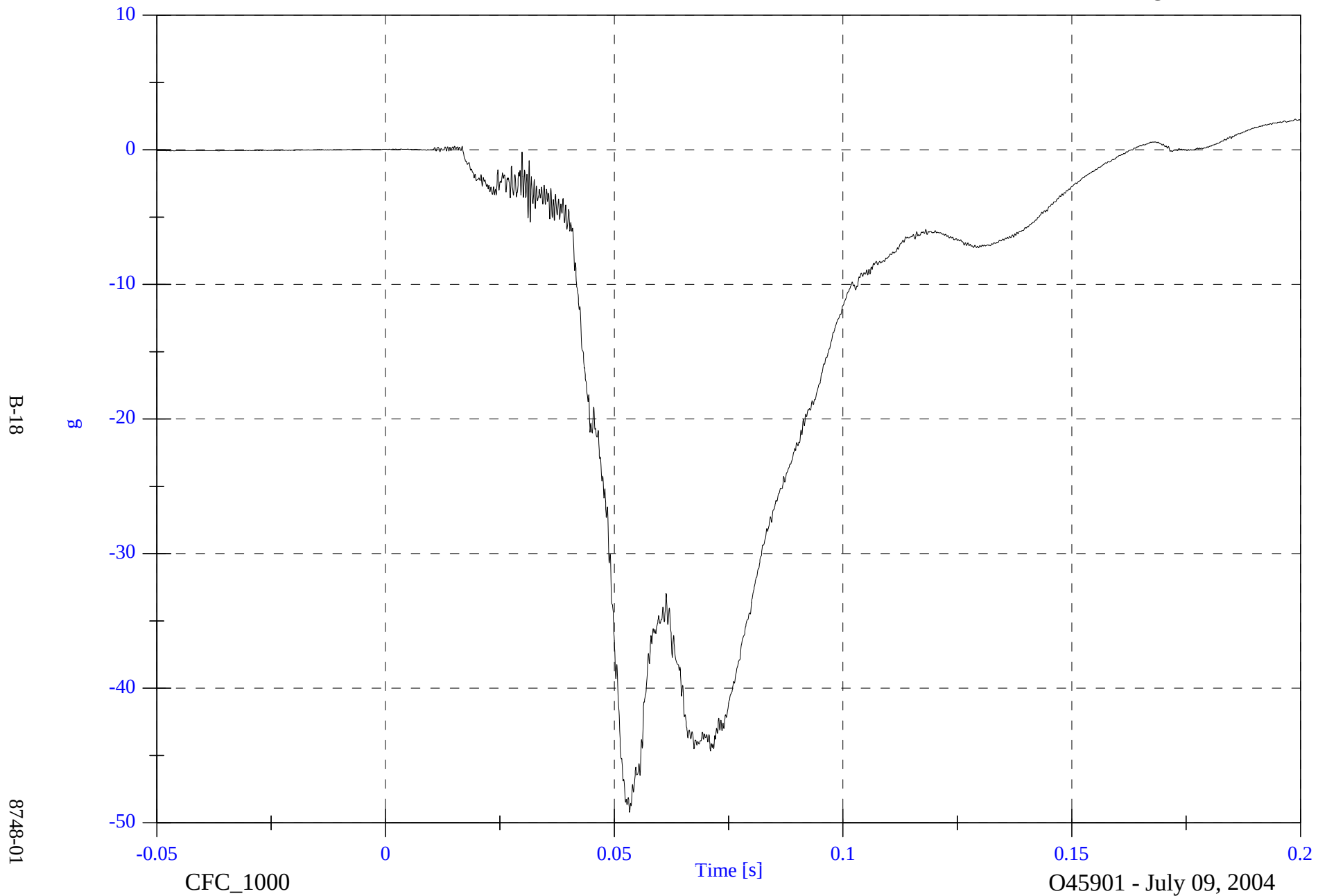


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Head CG Red x

Max: 2.3 [g] at 0.199 [s]

Min: -49.2 [g] at 0.053 [s]



NCAP Optional Test - 2004.5 Volvo S40

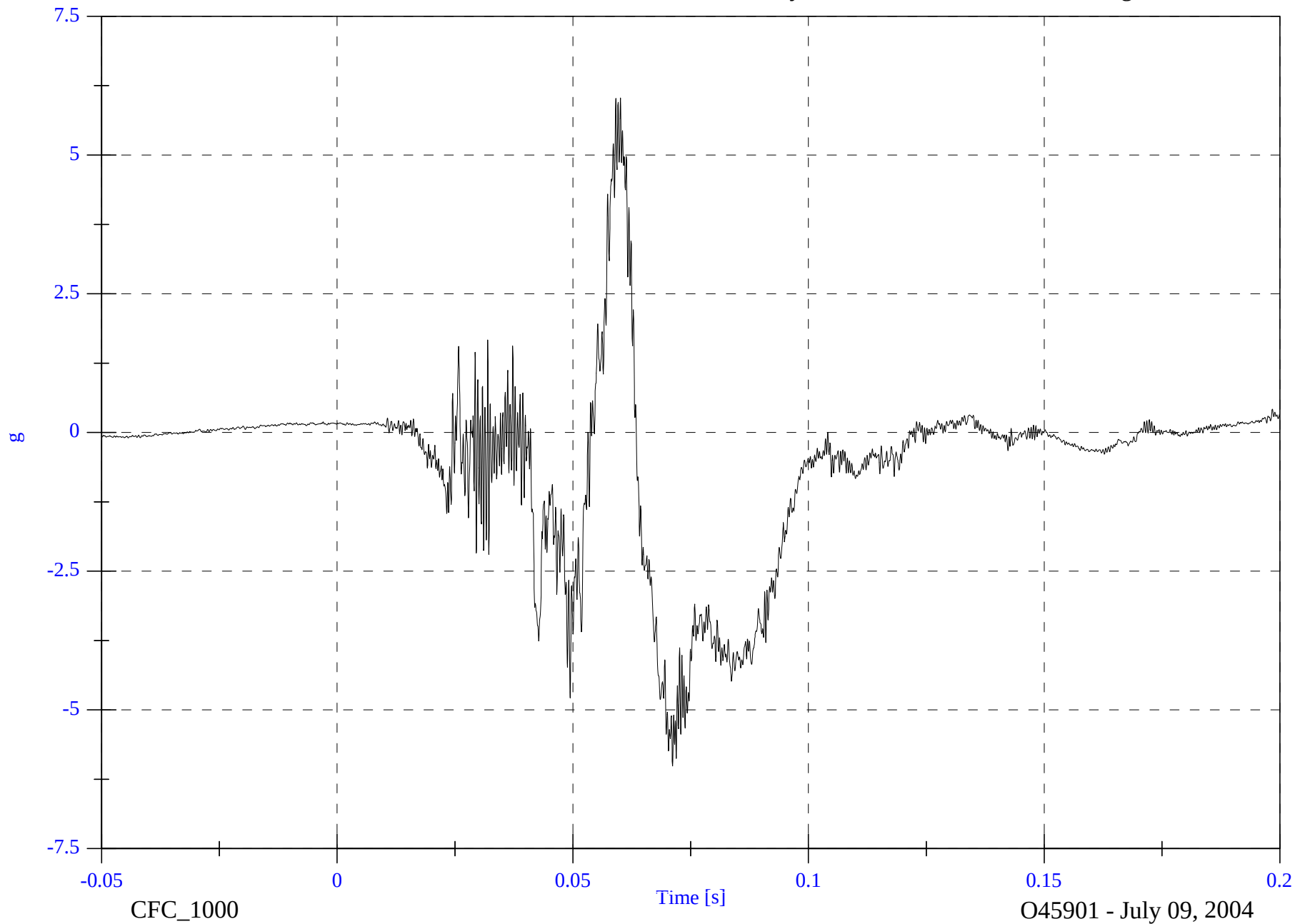
V1P1 Head CG Red y

Max: 6.0 [g] at 0.060 [s]

Min: -6.0 [g] at 0.071 [s]

B-19

8748-01

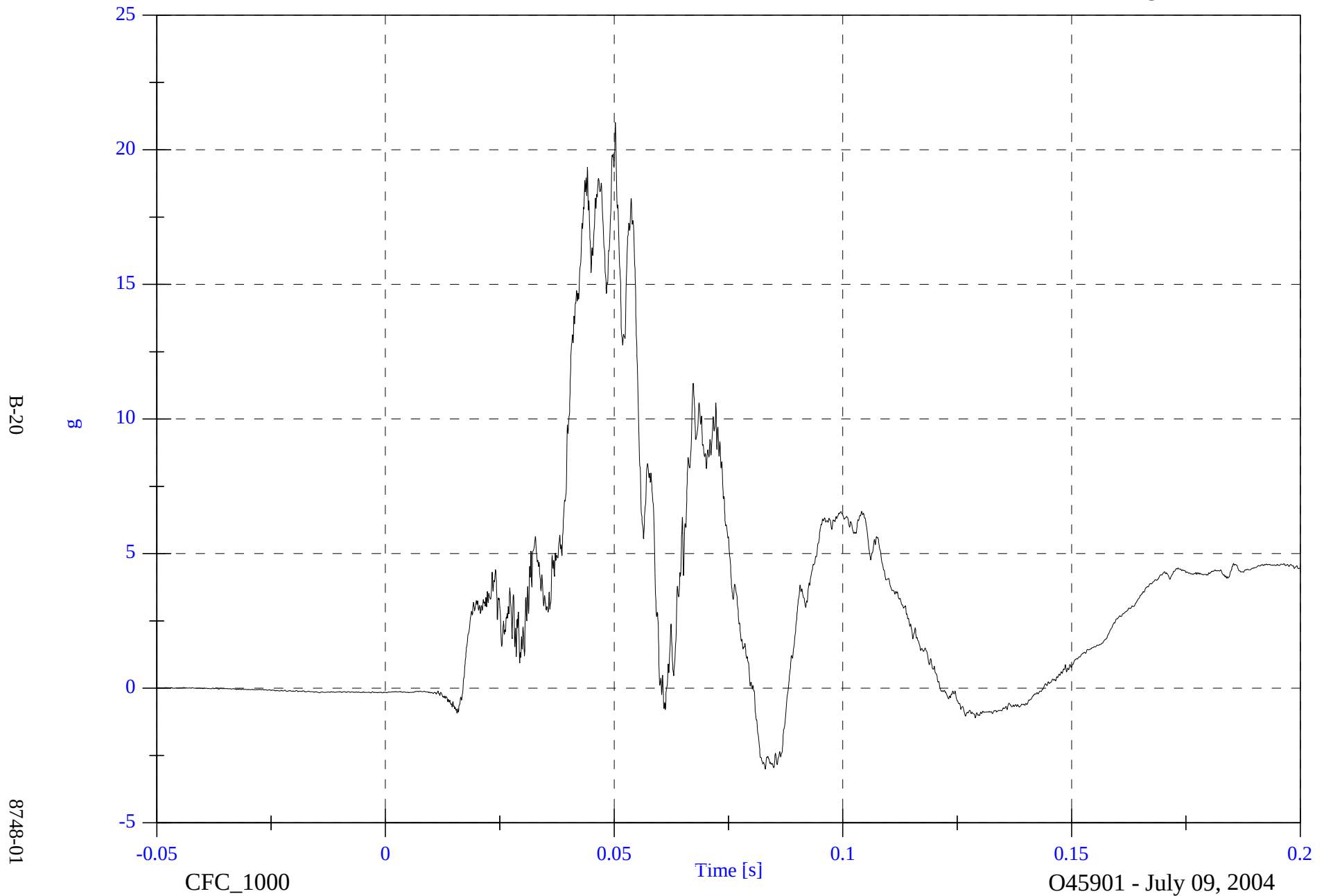


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Head CG Red z

Max: 21.0 [g] at 0.050 [s]

Min: -3.0 [g] at 0.083 [s]

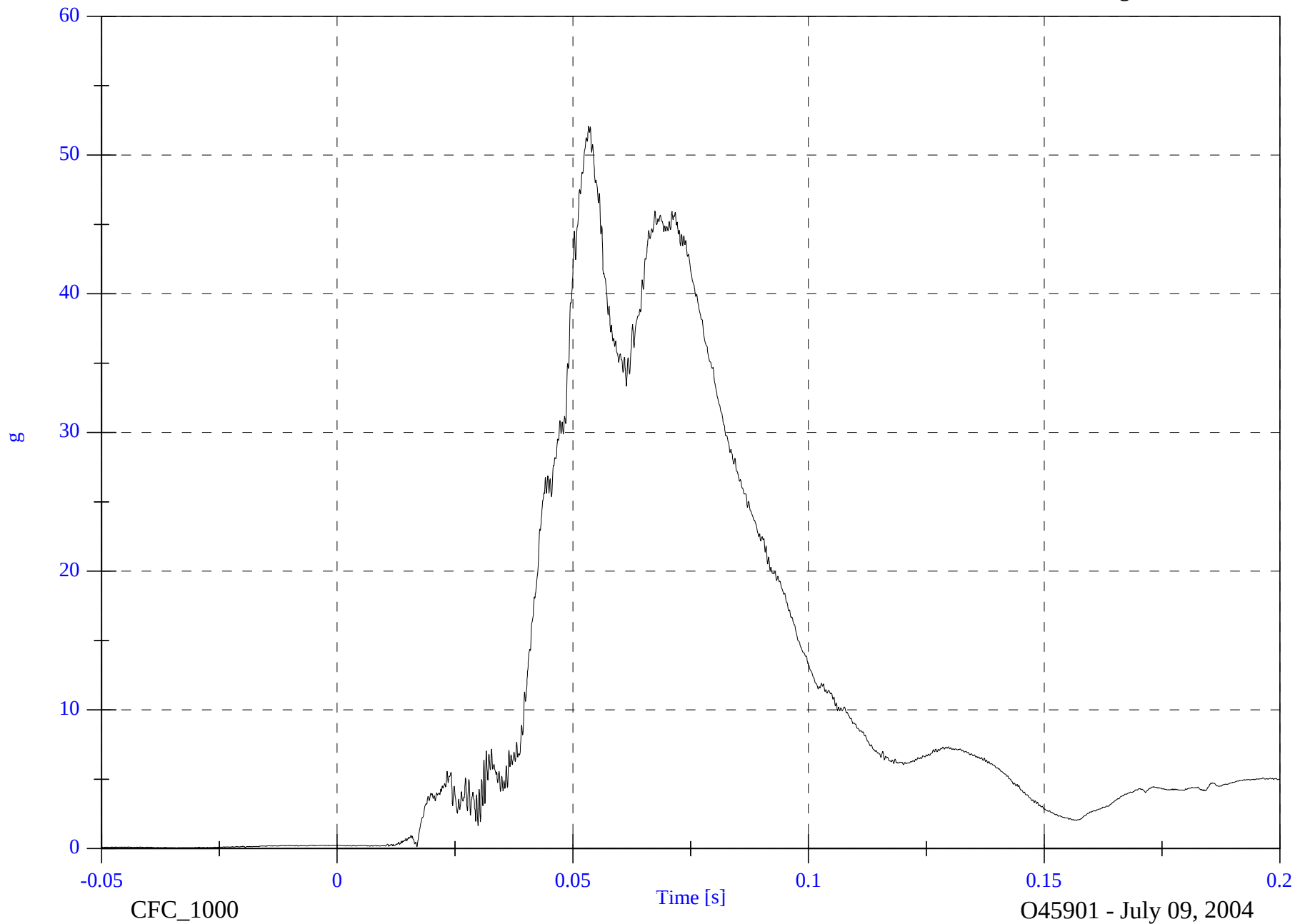


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Head CG Red Resultant

Max: 52.1 [g] at 0.053 [s]

Min: 0.1 [g] at -0.034 [s]



B-21

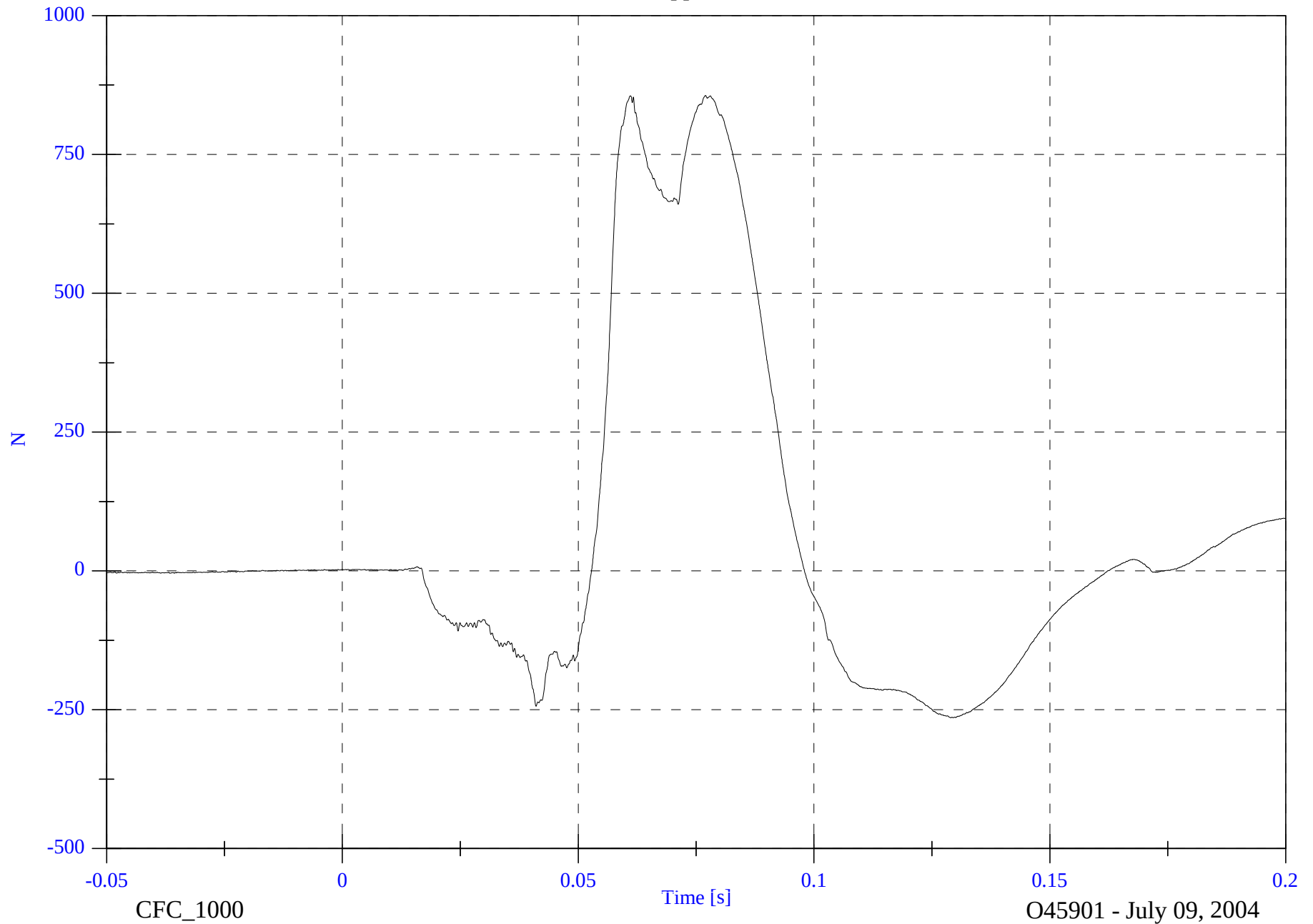
8748-01

NCAP Optional Test - 2004.5 Volvo S40

Max: 856.2 [N] at 0.077 [s]

Min: -264.4 [N] at 0.129 [s]

V1P1 Upper Neck Fx



B-22

8748-01

CFC_1000

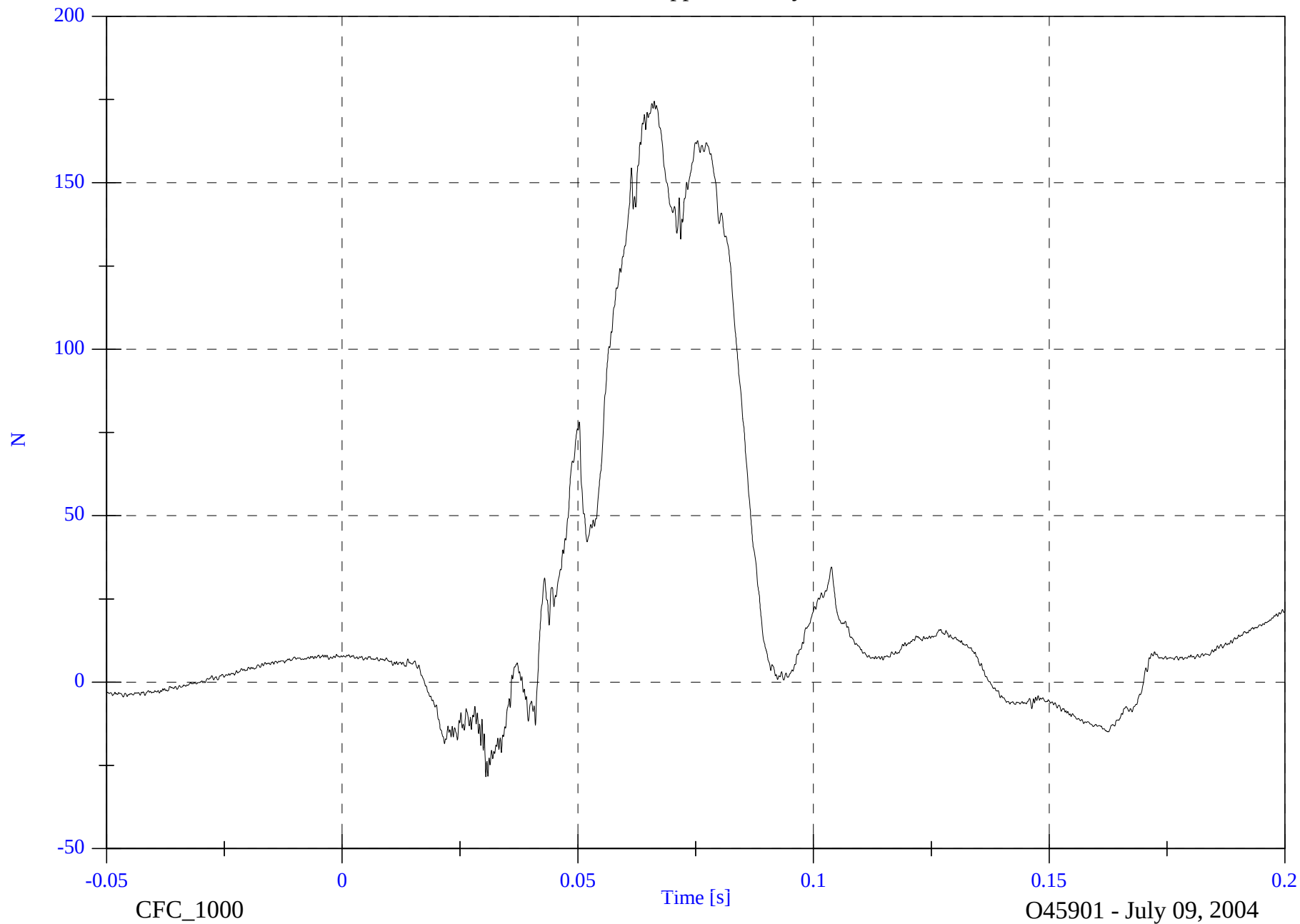
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

Max: 174.5 [N] at 0.066 [s]

Min: -28.5 [N] at 0.030 [s]

V1P1 Upper Neck Fy



B-23

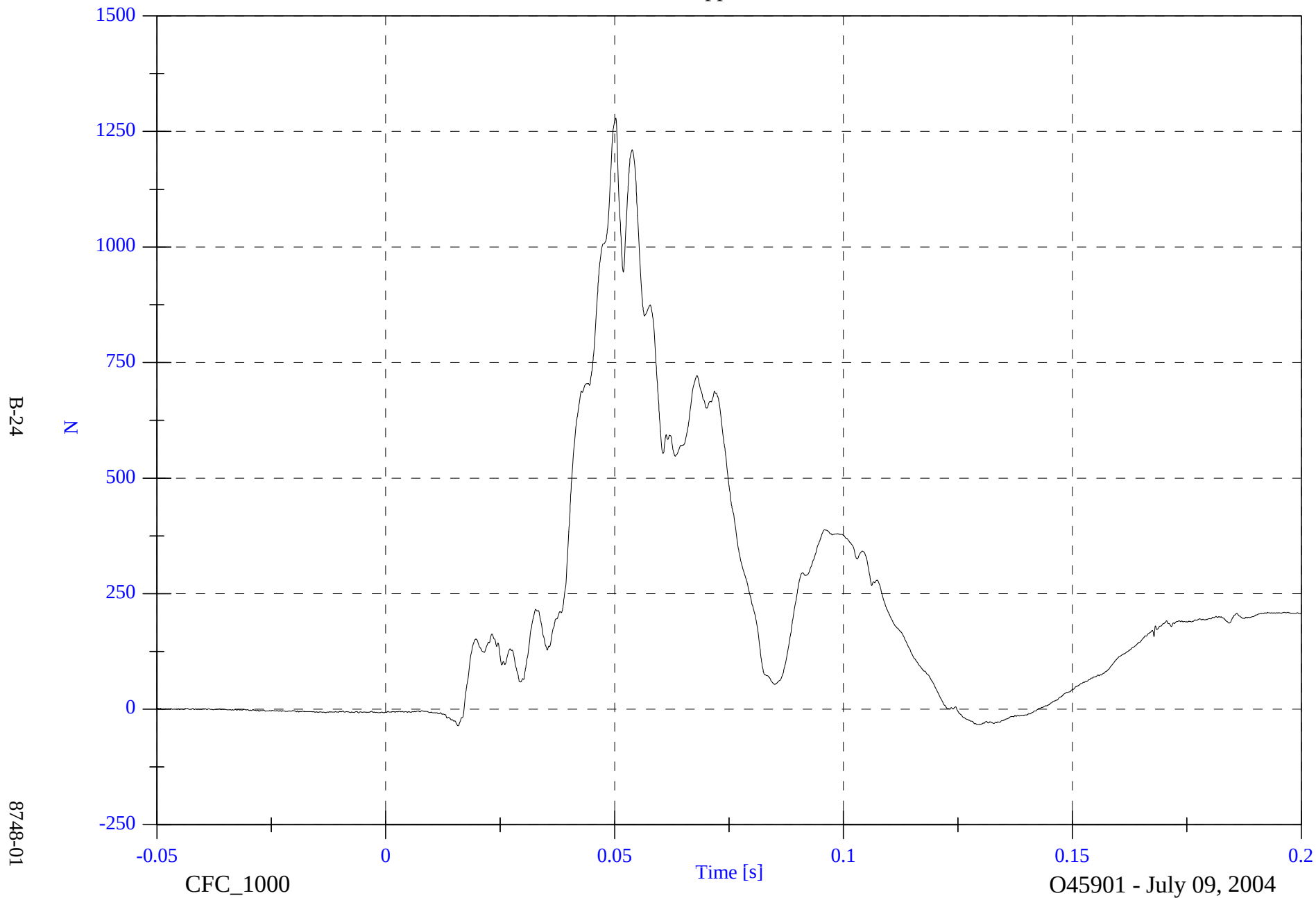
8748-01

NCAP Optional Test - 2004.5 Volvo S40

Max: 1278.8 [N] at 0.050 [s]

Min: -36.0 [N] at 0.016 [s]

V1P1 Upper Neck Fz

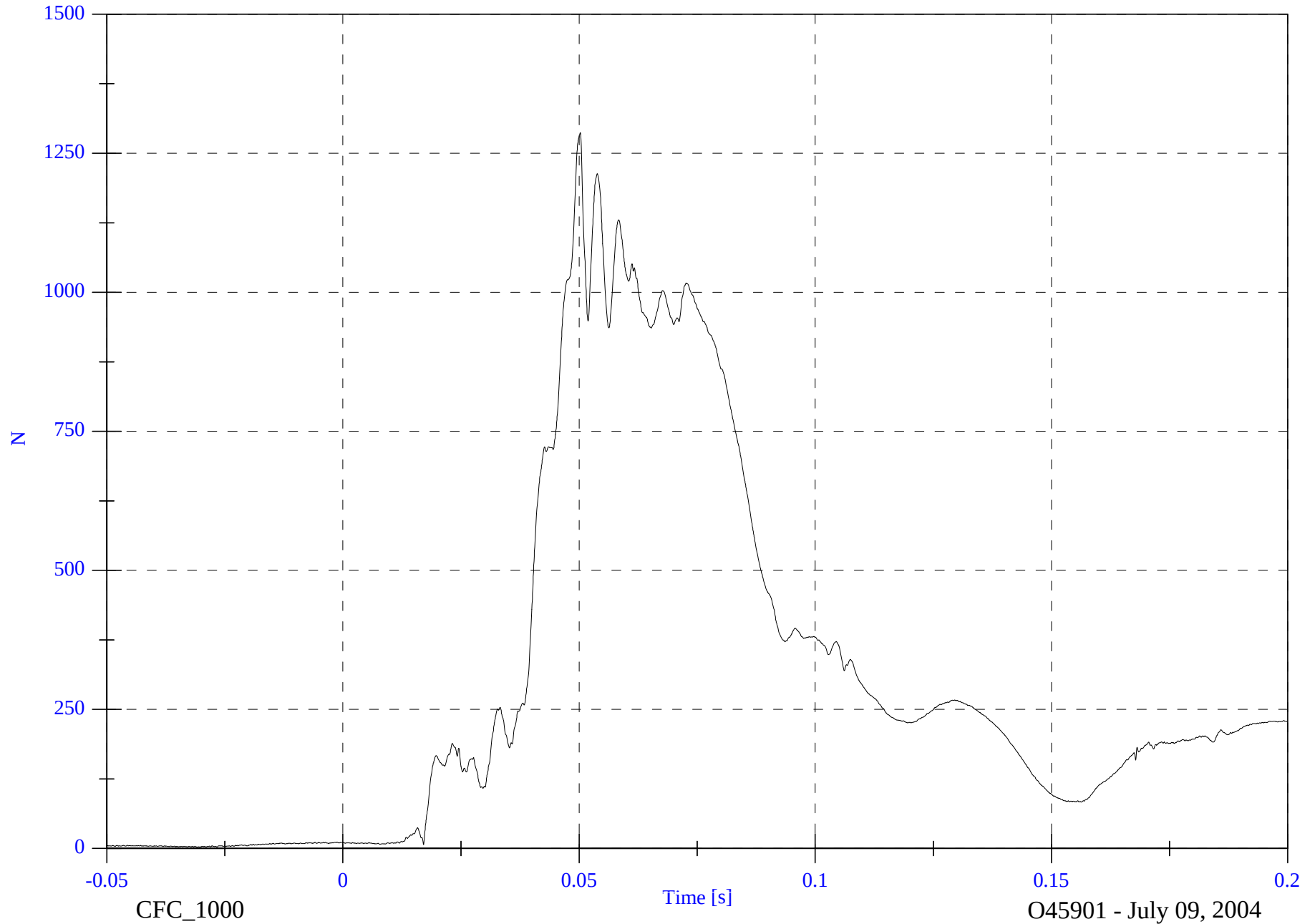


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Upper Neck F Resultant

Max: 1287.0 [N] at 0.050 [s]

Min: 2.5 [N] at -0.030 [s]



B-25

8748-01

CFC_1000

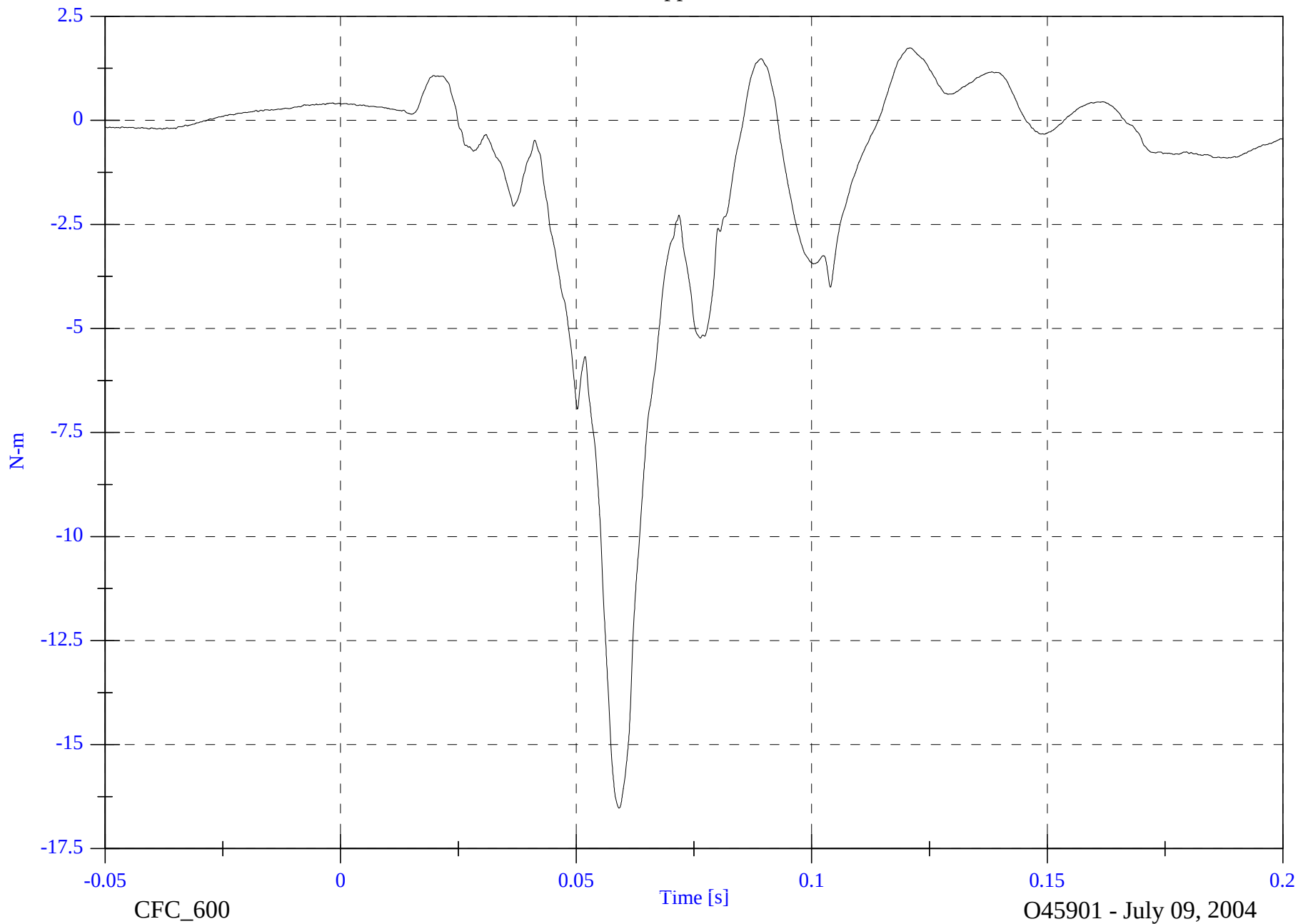
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P1 Upper Neck Mx

Max: 1.7 [N-m] at 0.121 [s]

Min: -16.5 [N-m] at 0.059 [s]



B-26

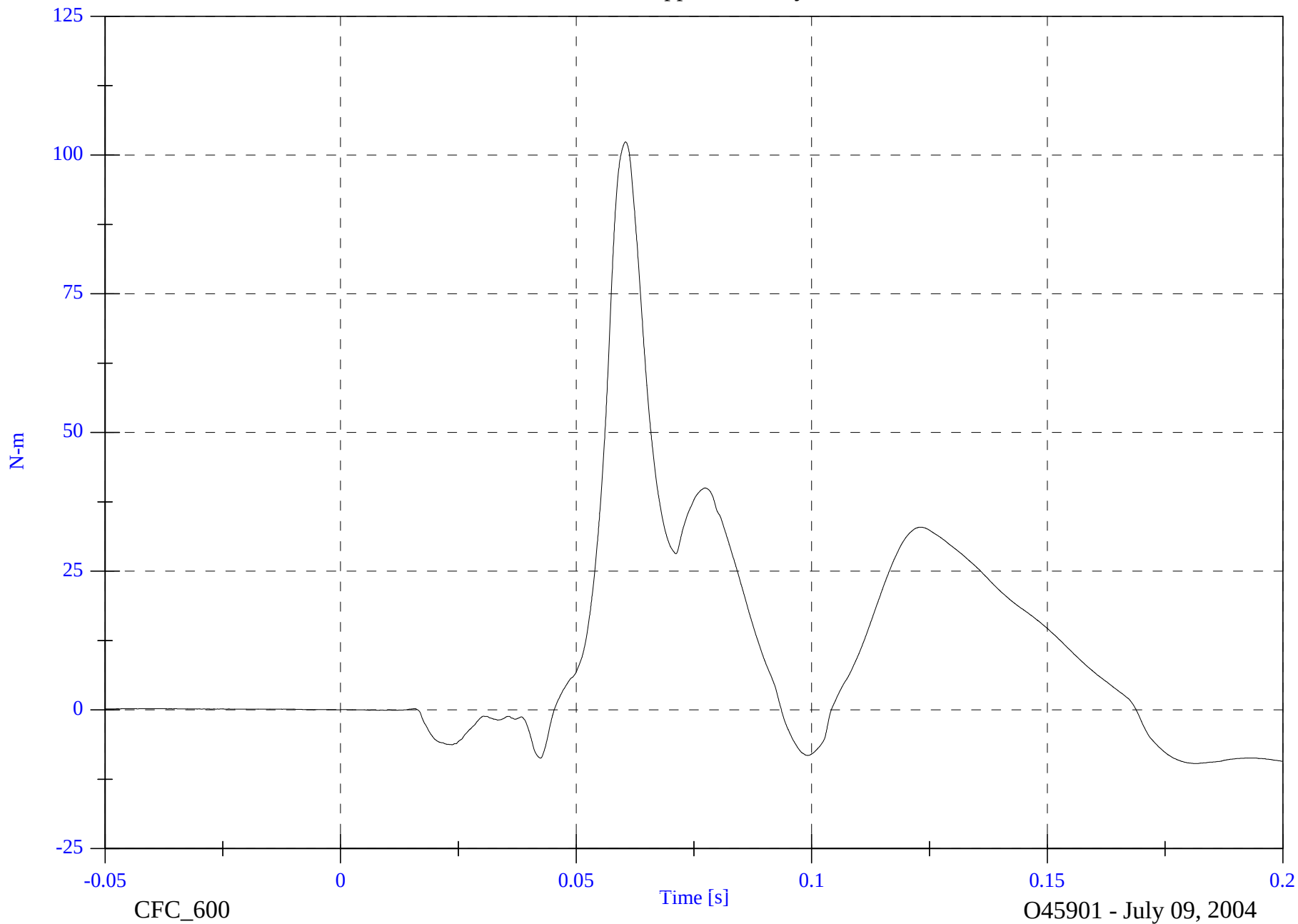
8748-01

NCAP Optional Test - 2004.5 Volvo S40

V1P1 Upper Neck My

Max: 102.4 [N-m] at 0.060 [s]

Min: -9.7 [N-m] at 0.181 [s]



B-27

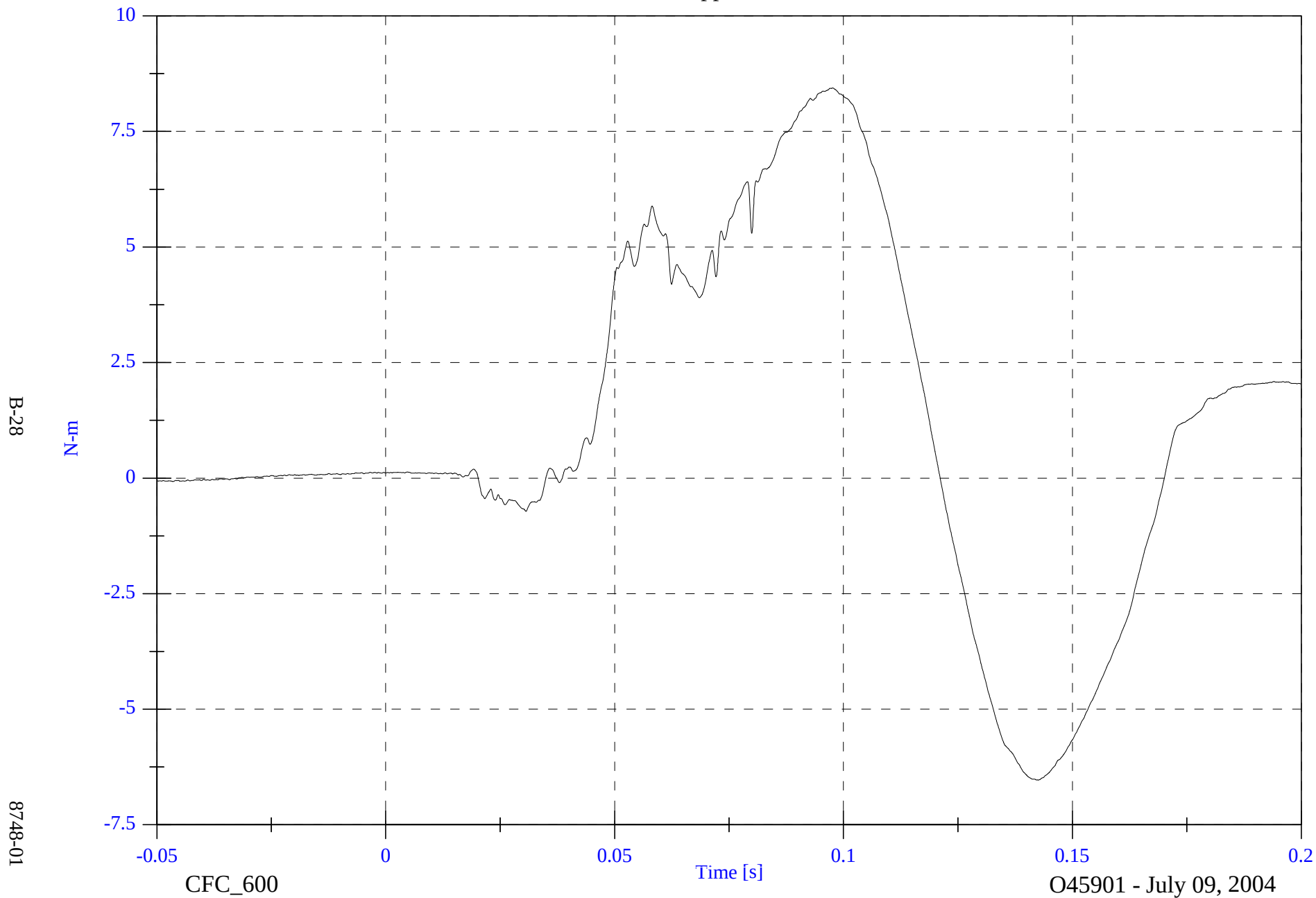
8748-01

NCAP Optional Test - 2004.5 Volvo S40

V1P1 Upper Neck Mz

Max: 8.4 [N-m] at 0.098 [s]

Min: -6.5 [N-m] at 0.143 [s]

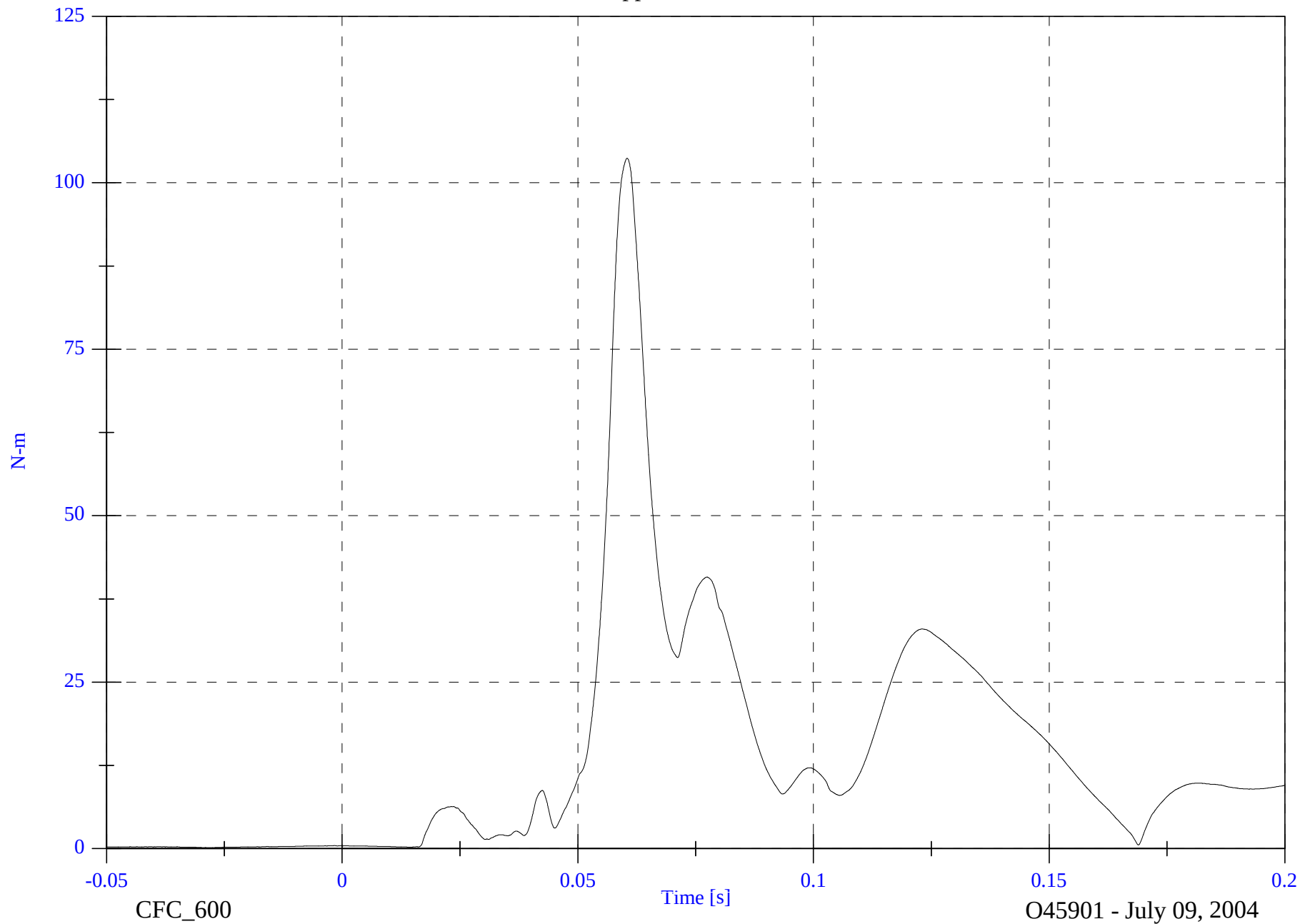


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Upper Neck M Resultant

Max: 103.7 [N-m] at 0.060 [s]

Min: 0.2 [N-m] at -0.027 [s]



B-29

8748-01

CFC_600

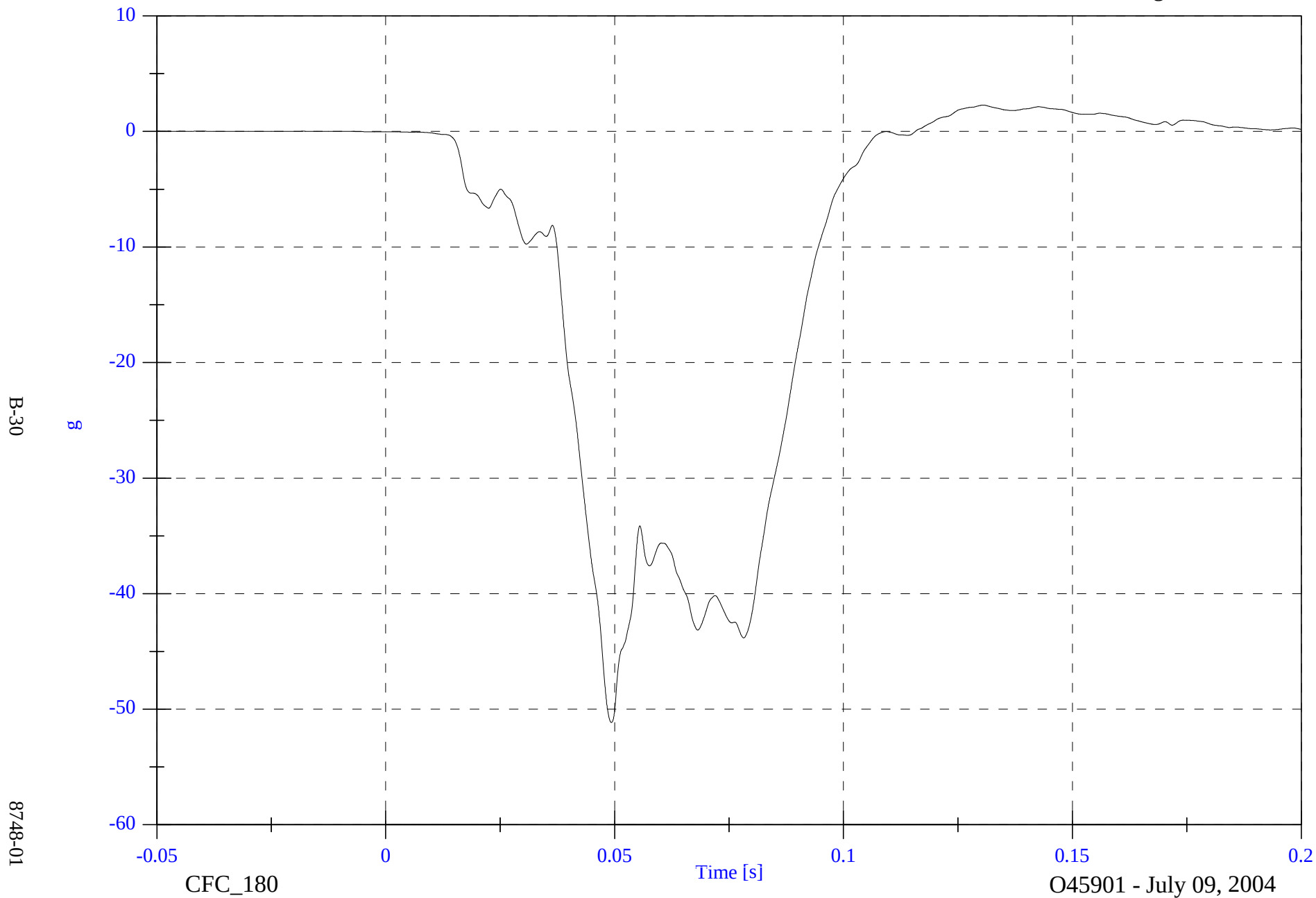
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P1 Chest x

Max: 2.3 [g] at 0.130 [s]

Min: -51.2 [g] at 0.049 [s]



NCAP Optional Test - 2004.5 Volvo S40

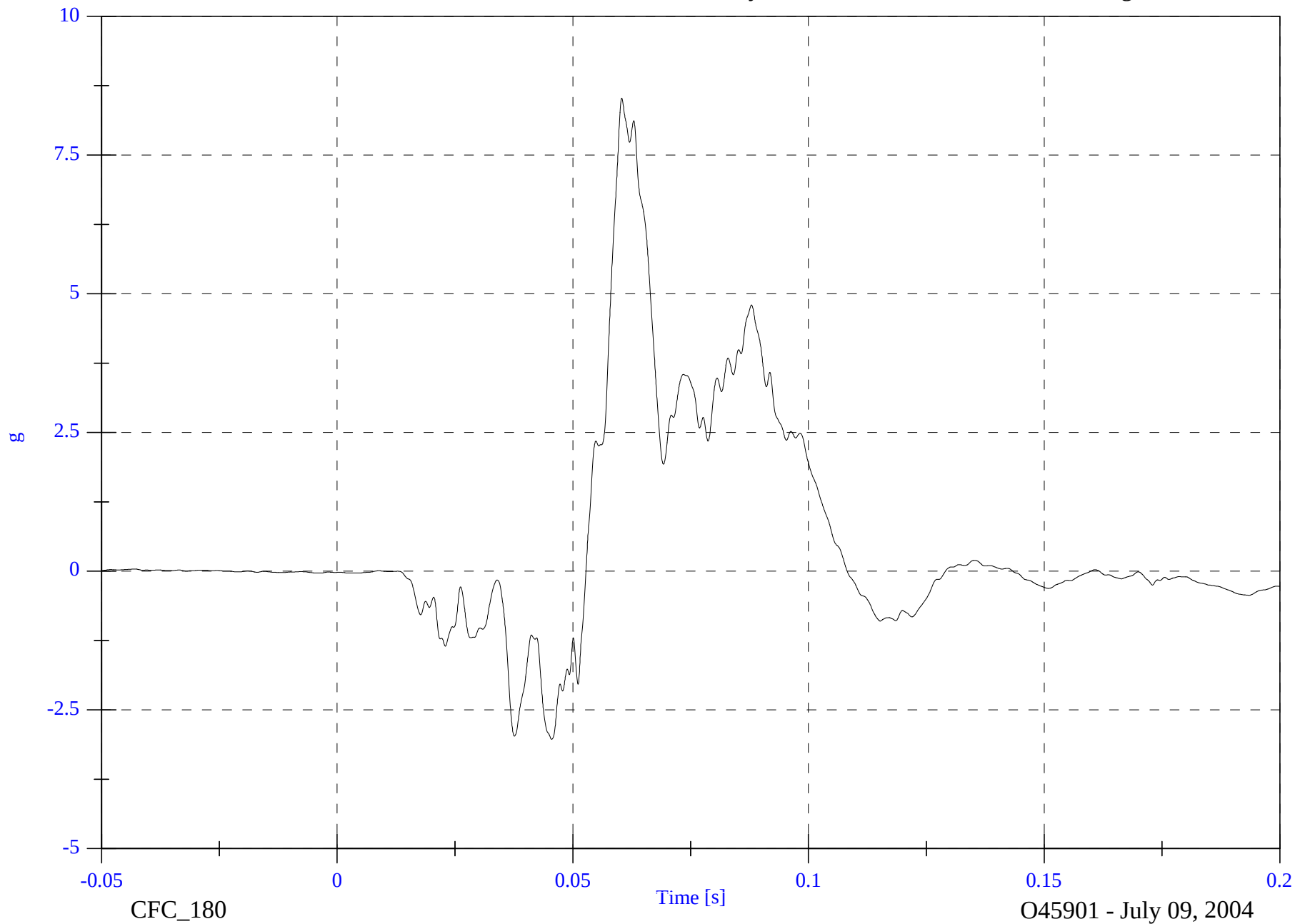
V1P1 Chest y

Max: 8.5 [g] at 0.060 [s]

Min: -3.0 [g] at 0.045 [s]

B-31

8748-01

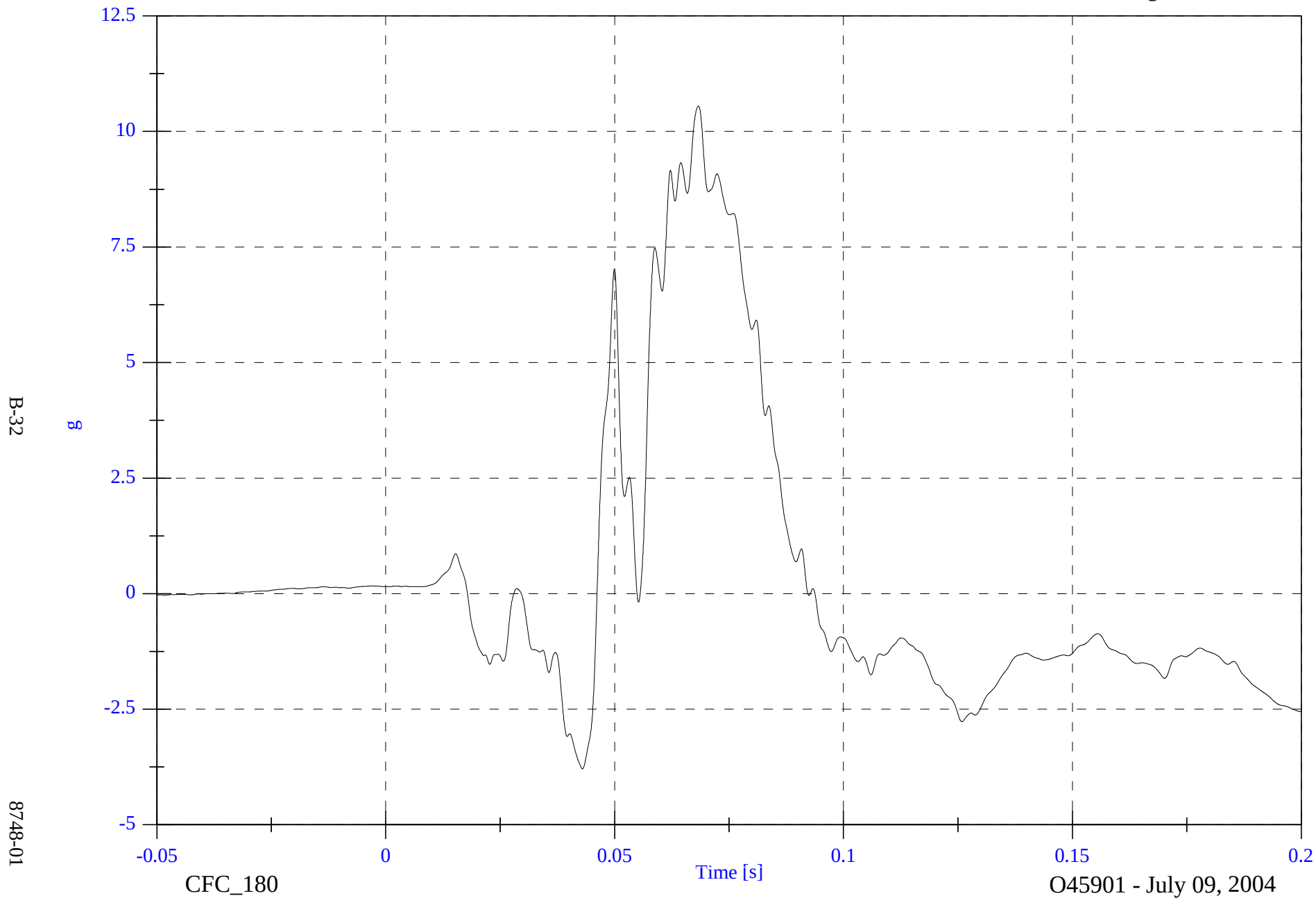


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Chest z

Max: 10.5 [g] at 0.068 [s]

Min: -3.8 [g] at 0.043 [s]



NCAP Optional Test - 2004.5 Volvo S40

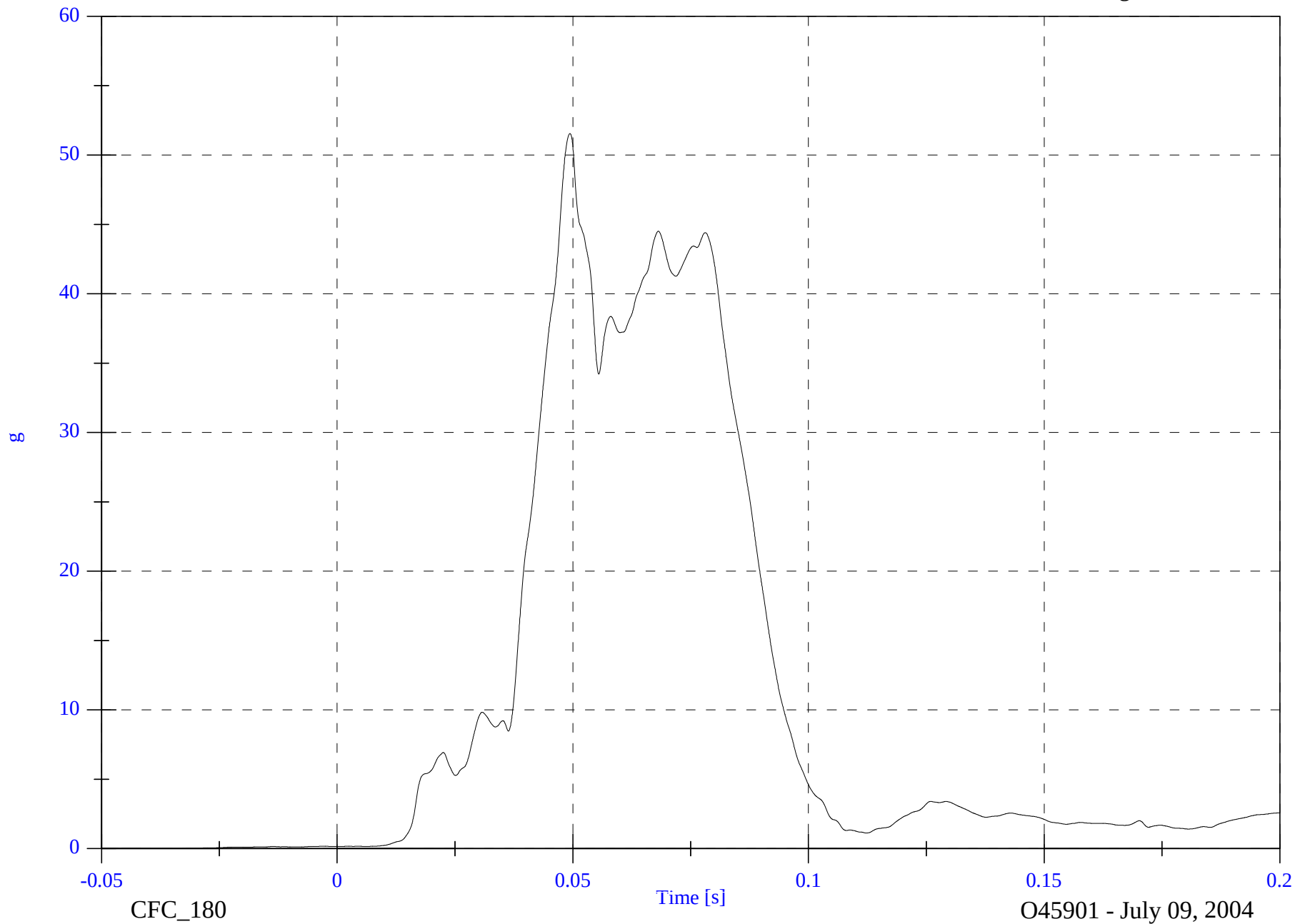
V1P1 Chest Resultant

Max: 51.5 [g] at 0.049 [s]

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

B-33

8748-01



NCAP Optional Test - 2004.5 Volvo S40

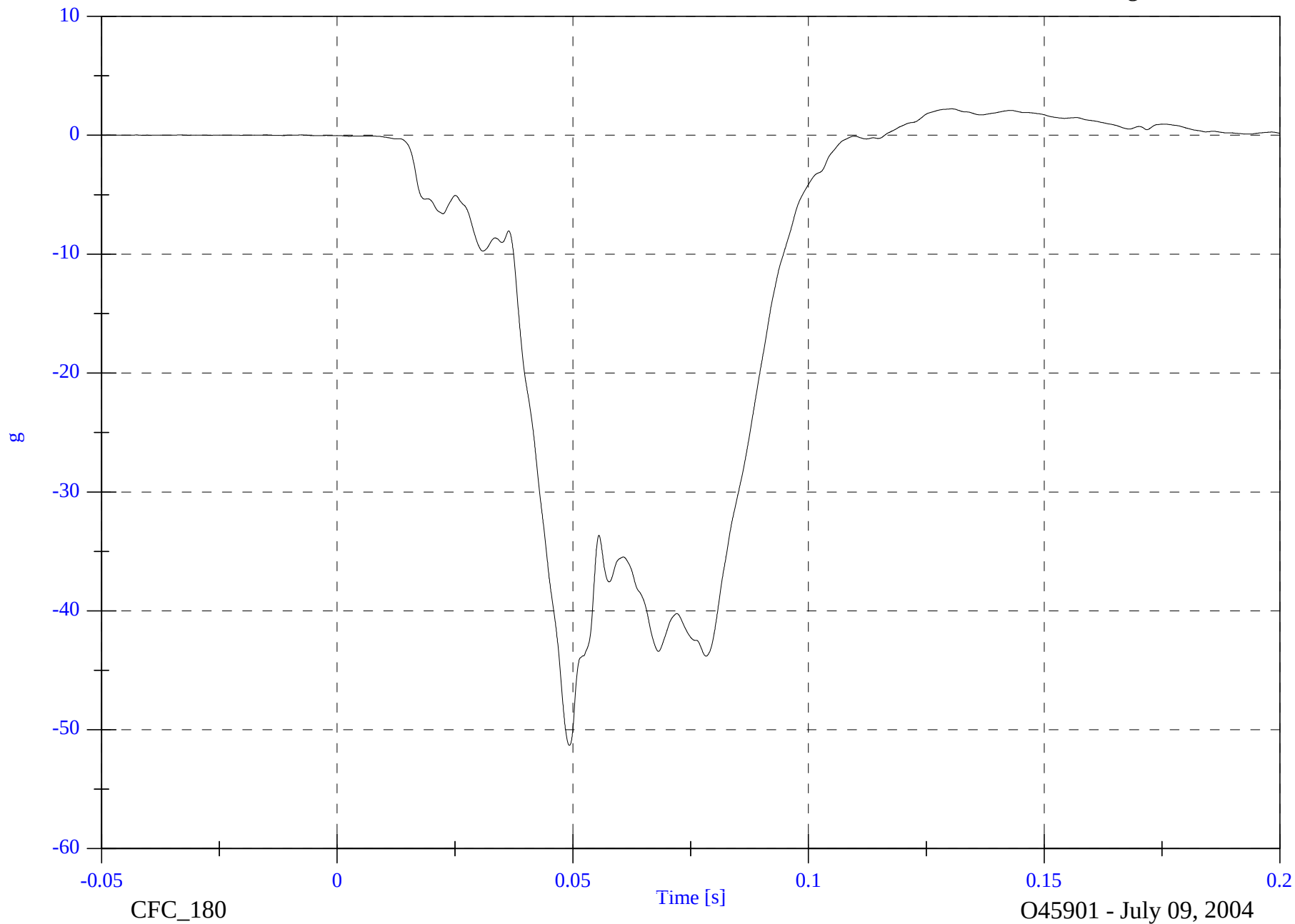
V1P1 Chest Red x

Max: 2.2 [g] at 0.130 [s]

Min: -51.3 [g] at 0.049 [s]

B-34

8748-01

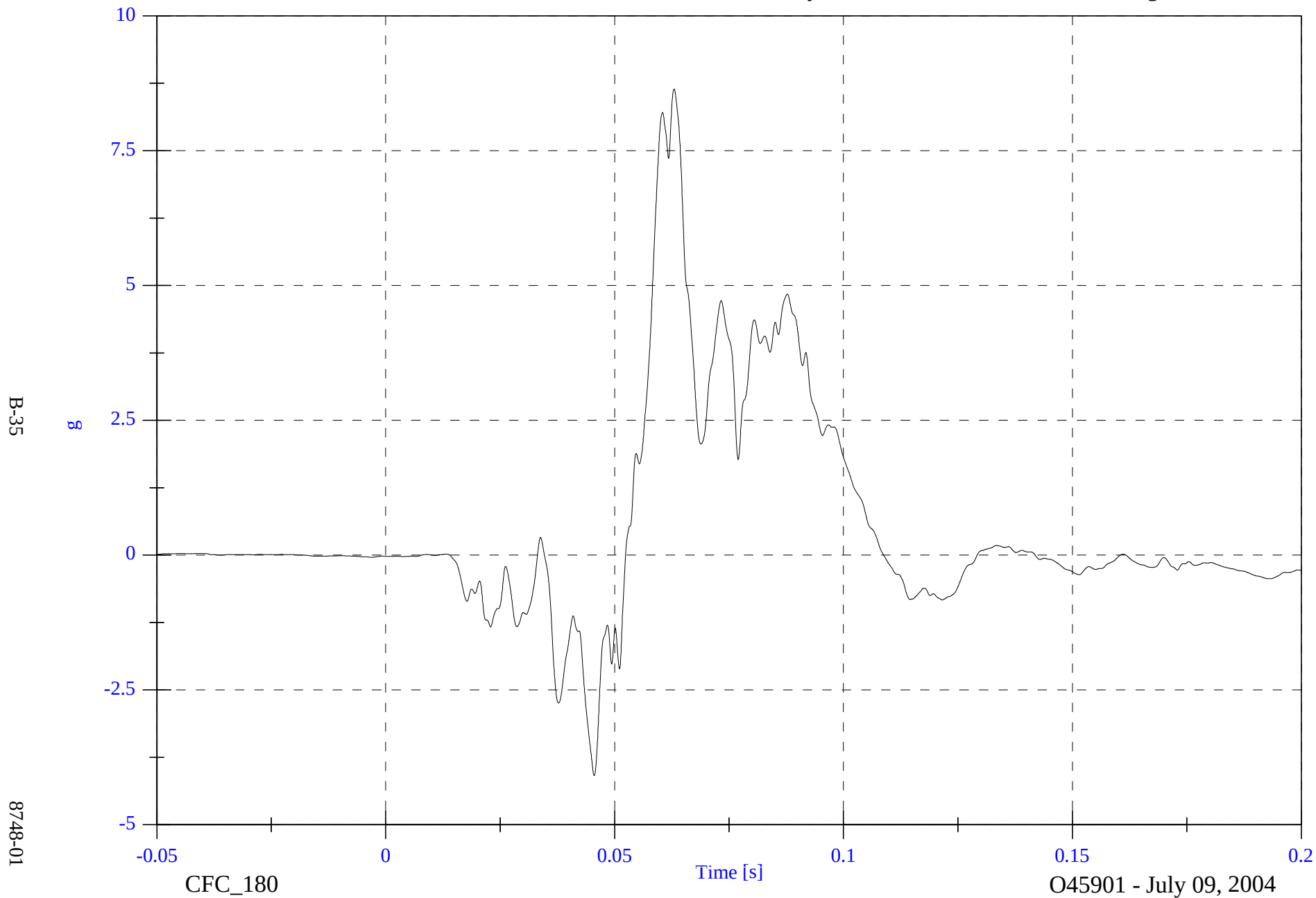


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Chest Red y

Max: 8.6 [g] at 0.063 [s]

Min: -4.1 [g] at 0.046 [s]

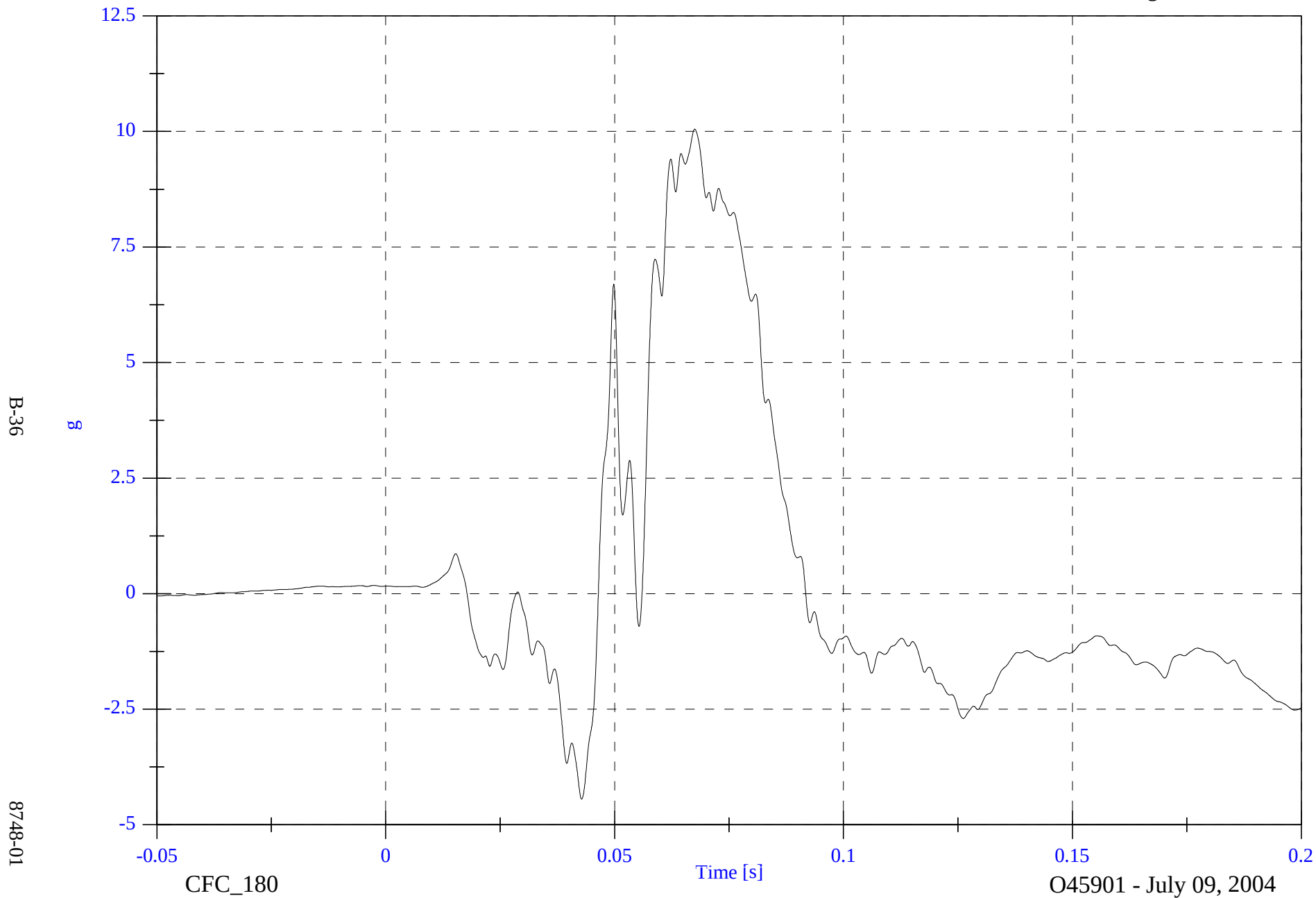


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Chest Red z

Max: 10.0 [g] at 0.068 [s]

Min: -4.4 [g] at 0.043 [s]



NCAP Optional Test - 2004.5 Volvo S40

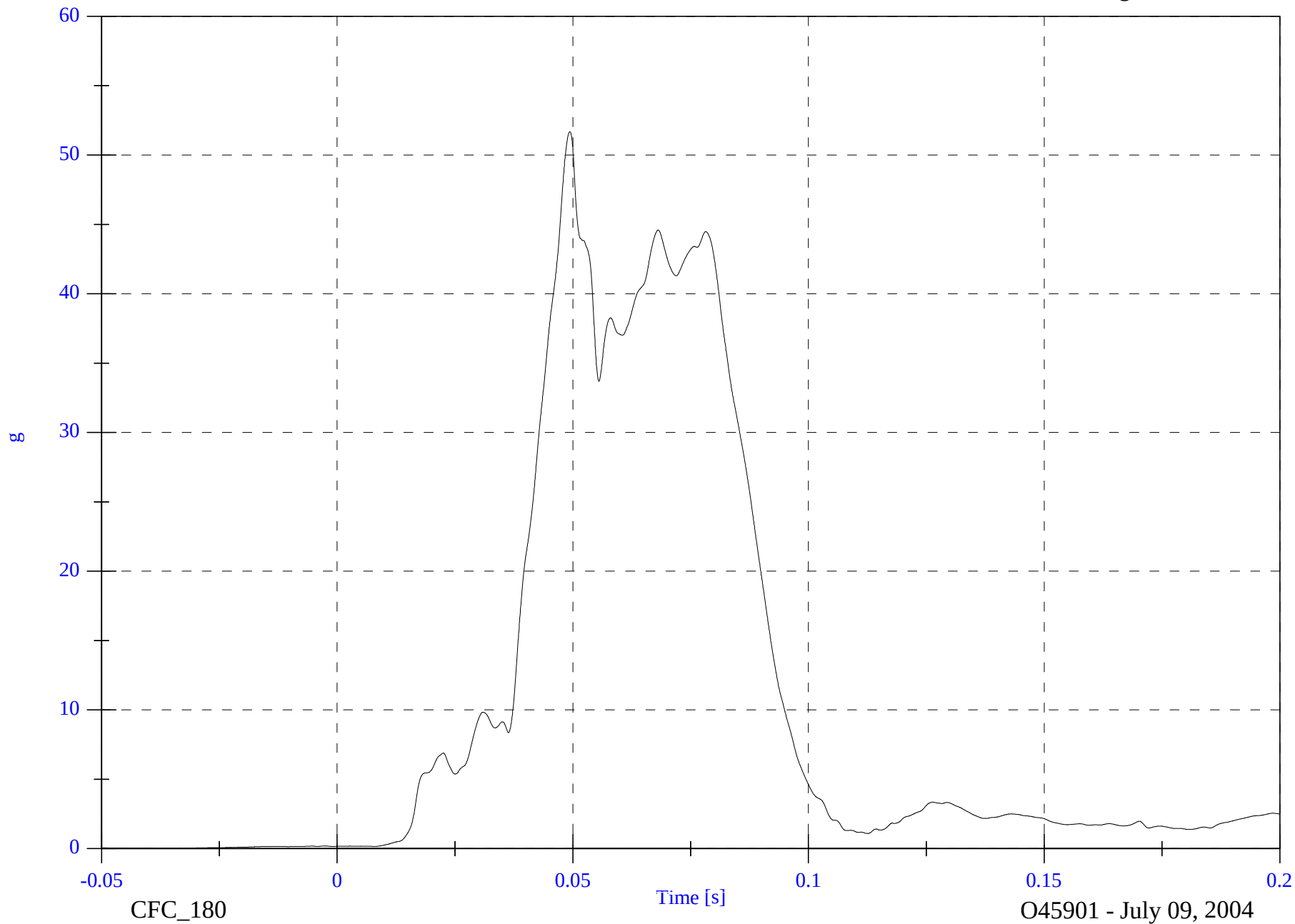
V1P1 Chest Red Resultant

Max: 51.7 [g] at 0.049 [s]

Min: 0.0 [g] at -0.038 [s]

B-37

8748-01



NCAP Optional Test - 2004.5 Volvo S40

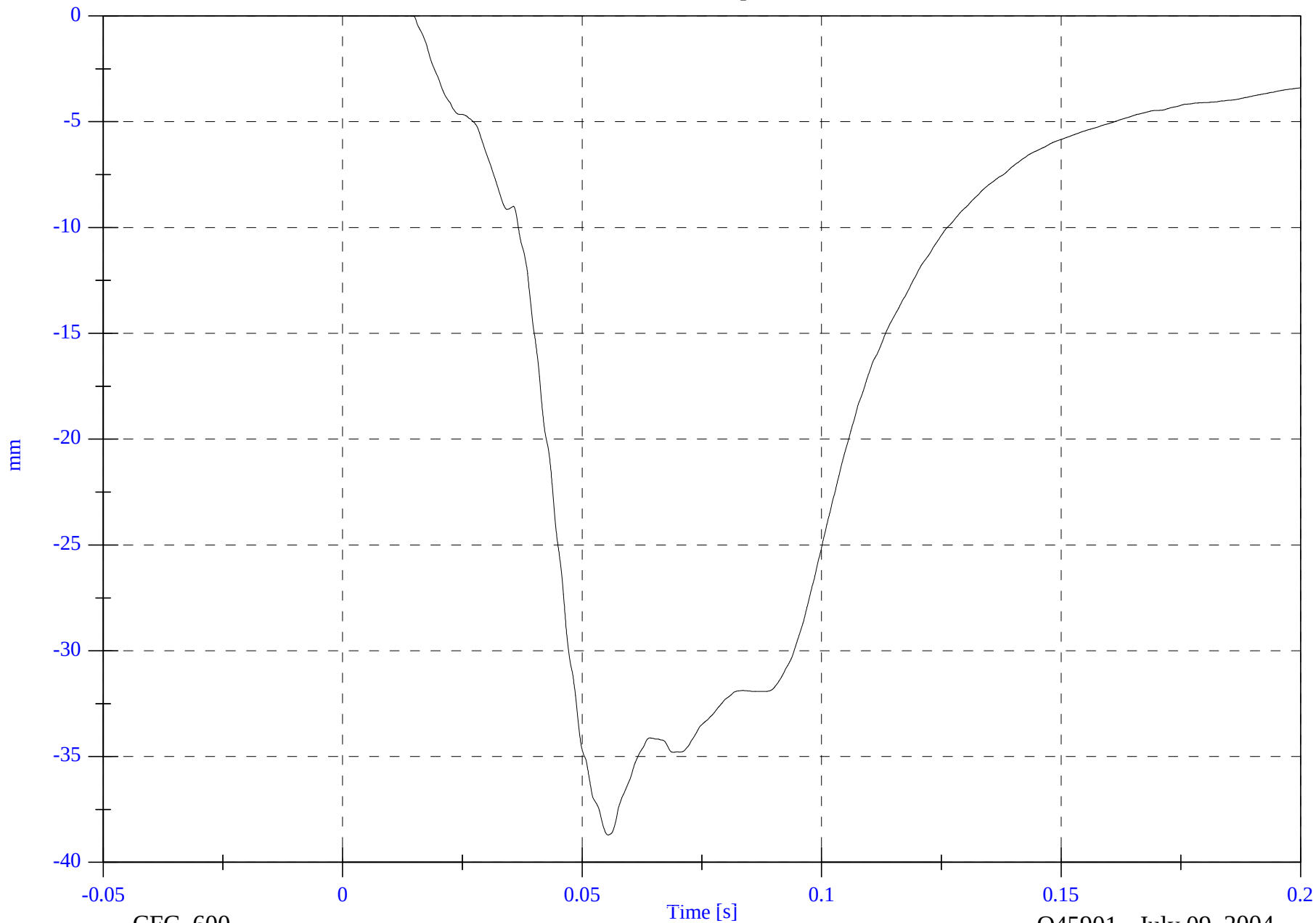
V1P1 Chest Compression x

Max: 0.0 [mm] at -0.036 [s]

Min: -38.7 [mm] at 0.055 [s]

B-38

8748-01



CFC_600

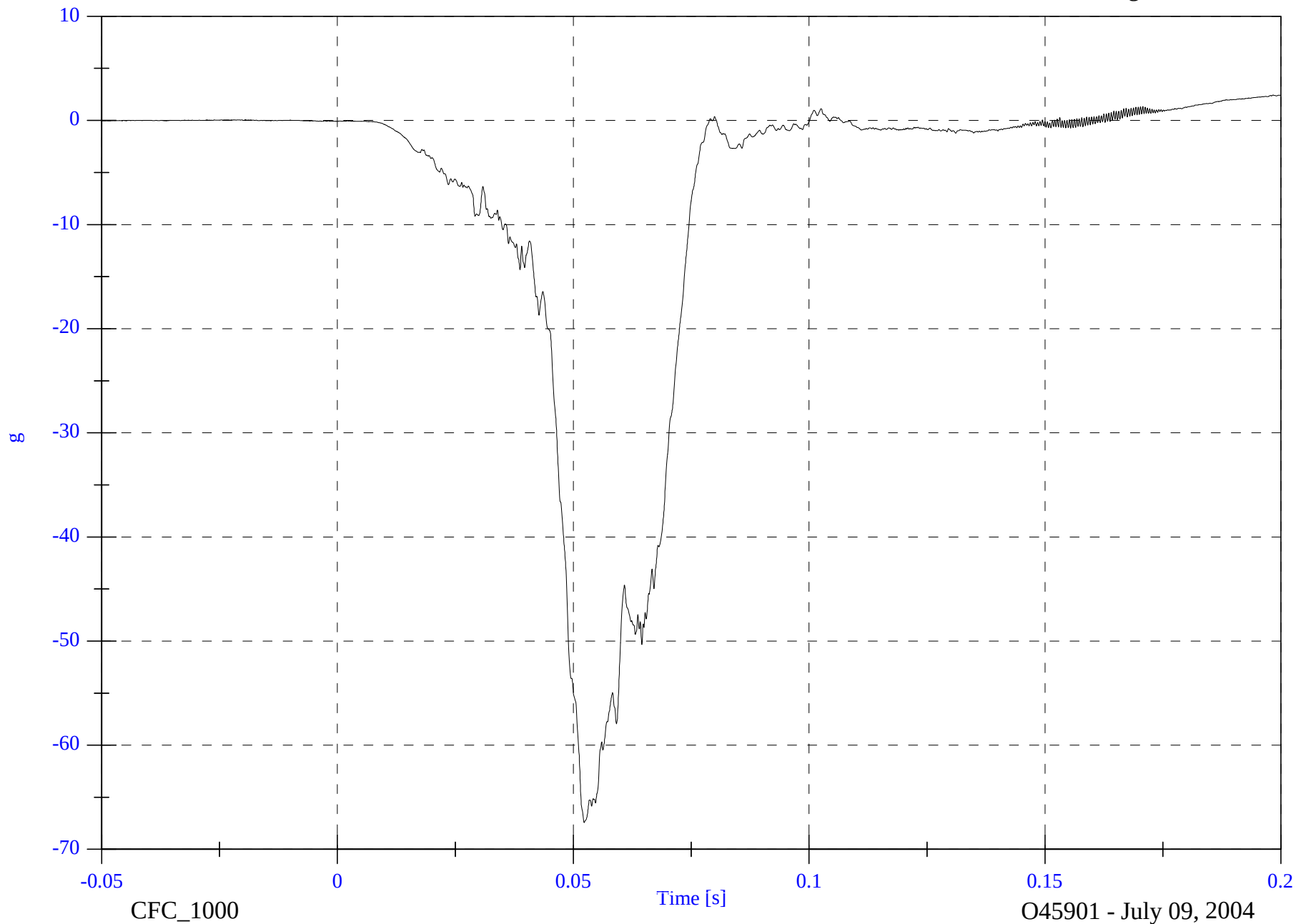
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P1 Pelvic x

Max: 2.4 [g] at 0.198 [s]

Min: -67.4 [g] at 0.052 [s]



B-39

8748-01

NCAP Optional Test - 2004.5 Volvo S40

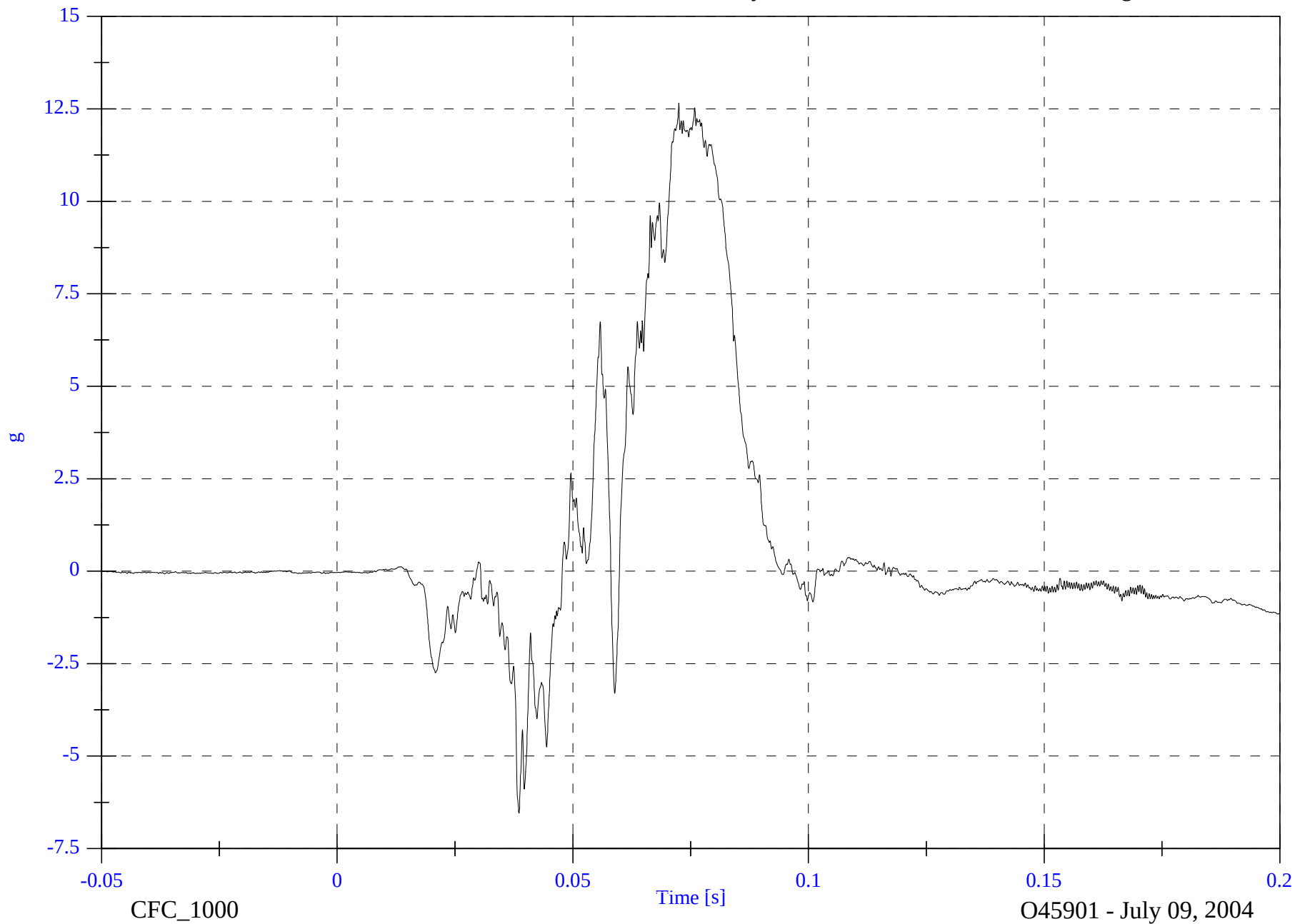
V1P1 Pelvic y

Max: 12.7 [g] at 0.072 [s]

Min: -6.5 [g] at 0.039 [s]

B-40

8748-01

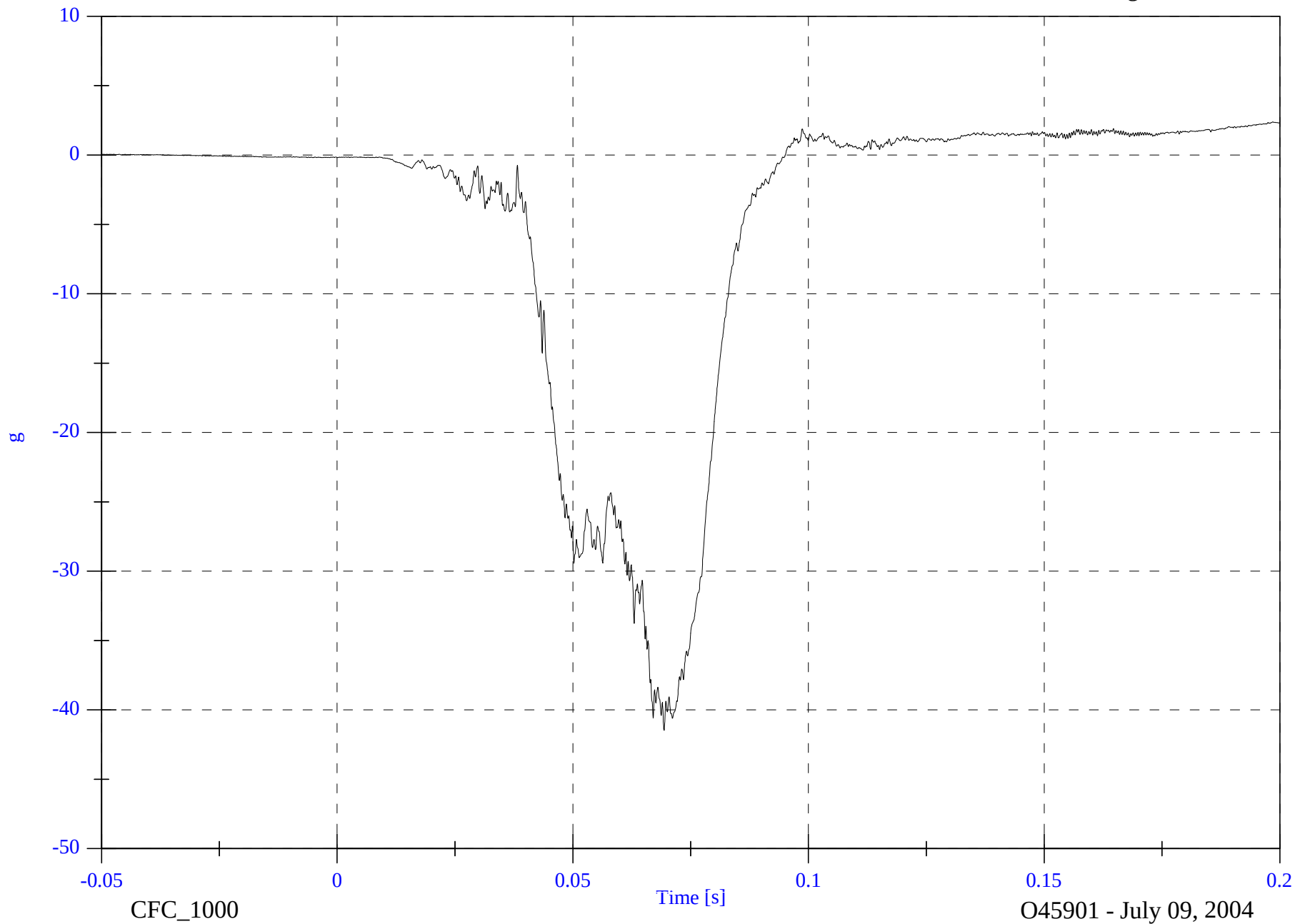


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Pelvic z

Max: 2.4 [g] at 0.198 [s]

Min: -41.5 [g] at 0.069 [s]



B-41

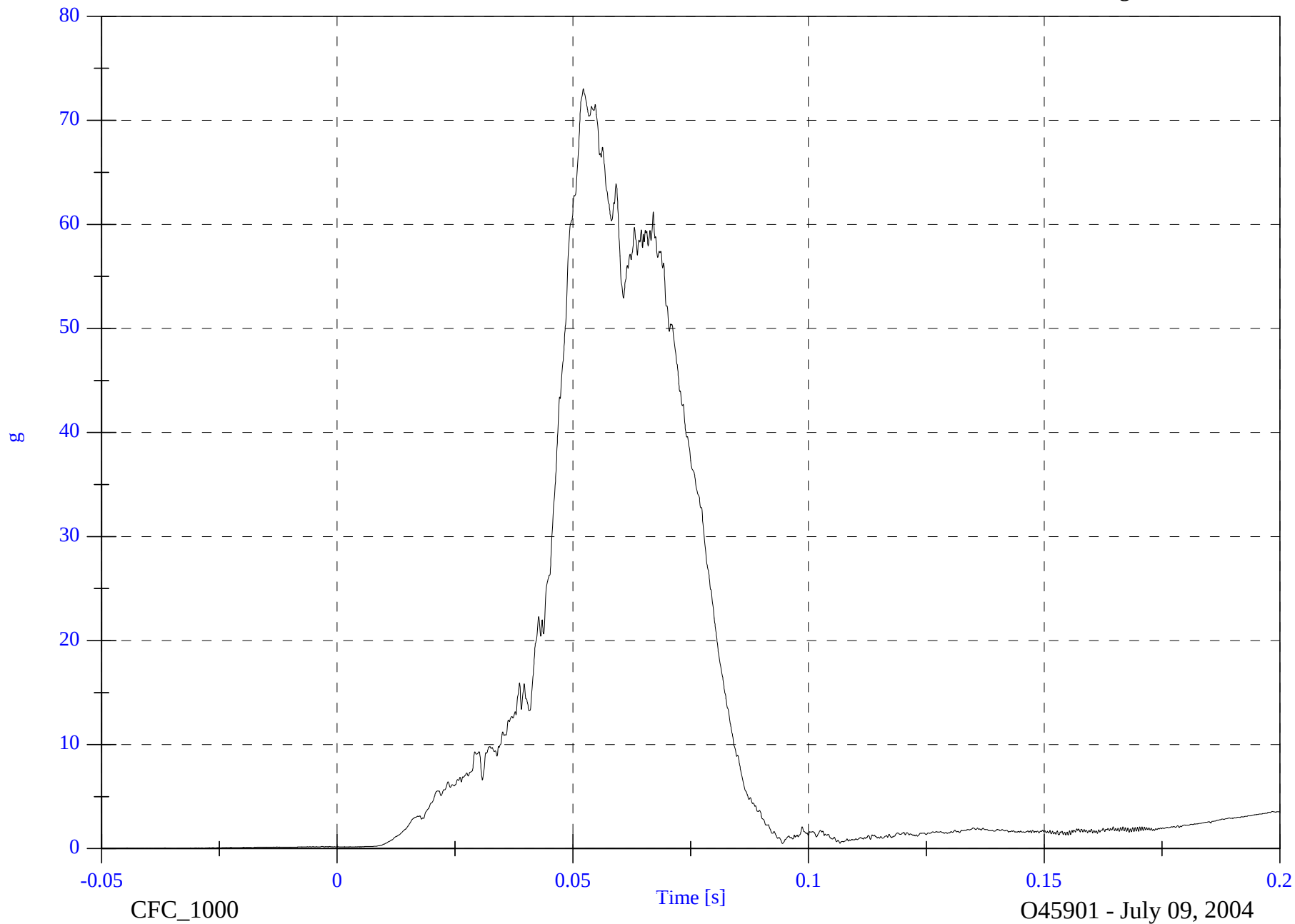
8748-01

NCAP Optional Test - 2004.5 Volvo S40

V1P1 Pelvic Resultant

Max: 73.0 [g] at 0.052 [s]

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



B-42

8748-01

CFC_1000

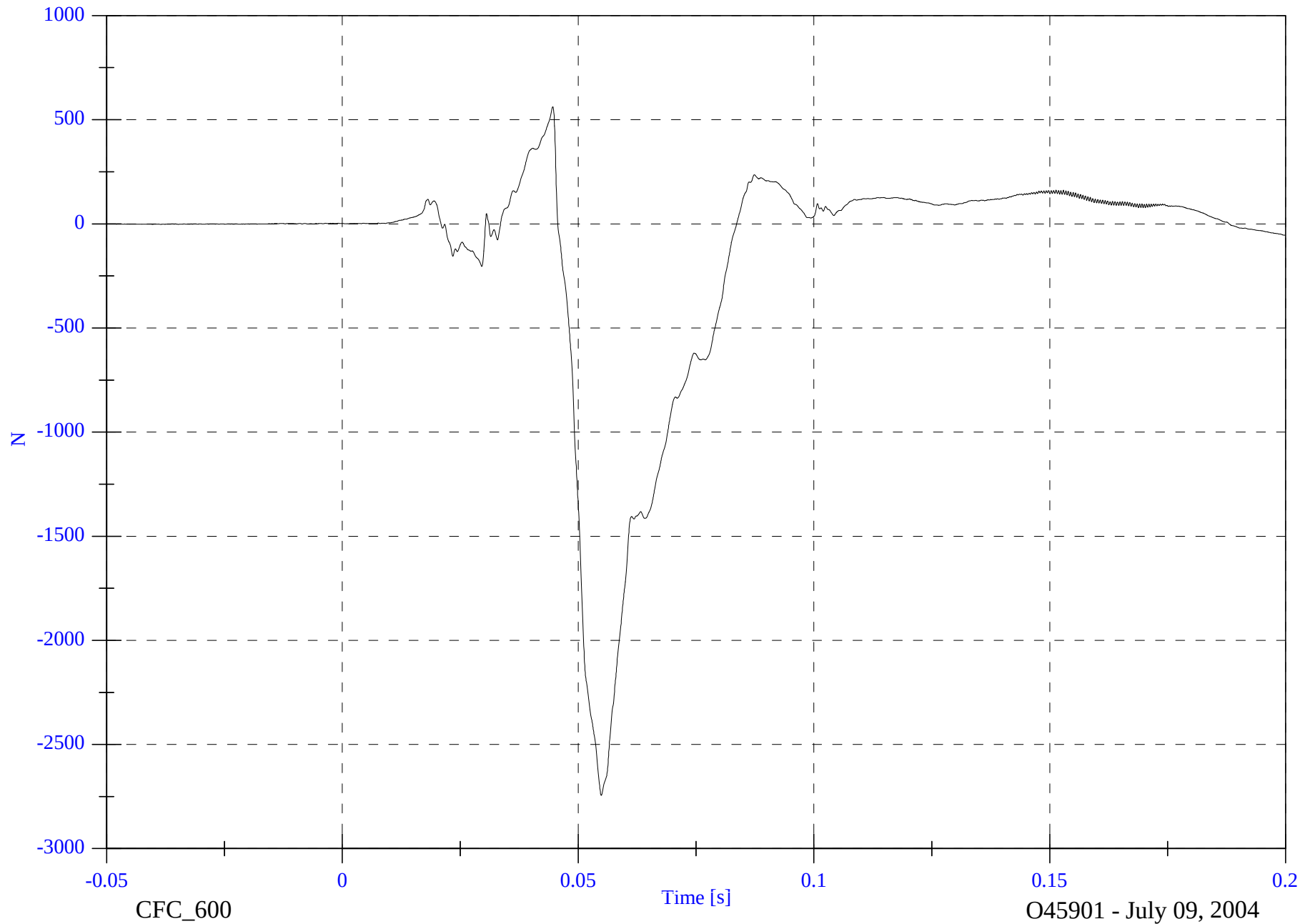
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P1 Left Femur z

Max: 562.5 [N] at 0.045 [s]

Min: -2744.3 [N] at 0.055 [s]



B-43

8748-01

CFC_600

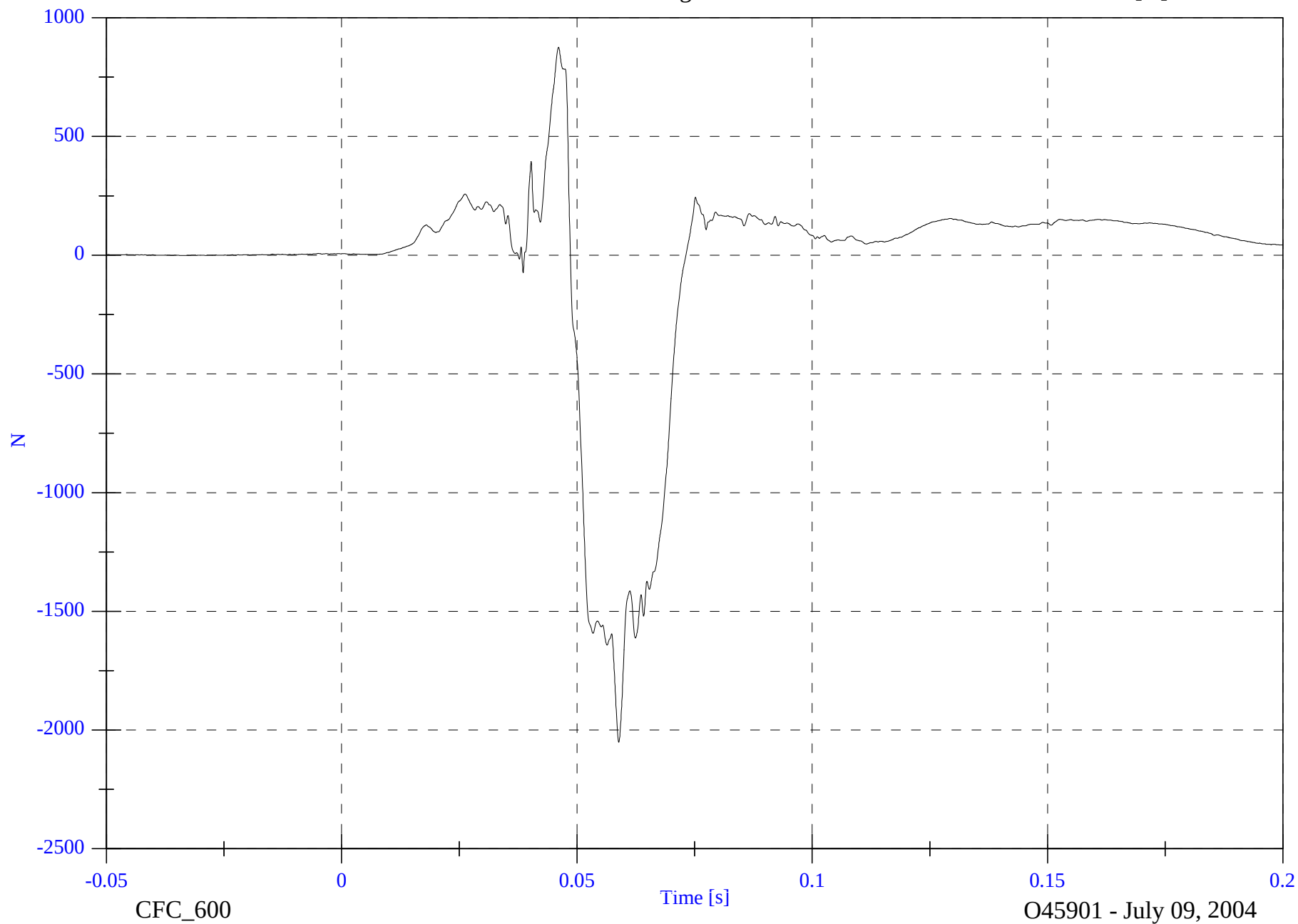
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

Max: 875.9 [N] at 0.046 [s]

Min: -2051.7 [N] at 0.059 [s]

V1P1 Right Femur z



B-44

8748-01

NCAP Optional Test - 2004.5 Volvo S40

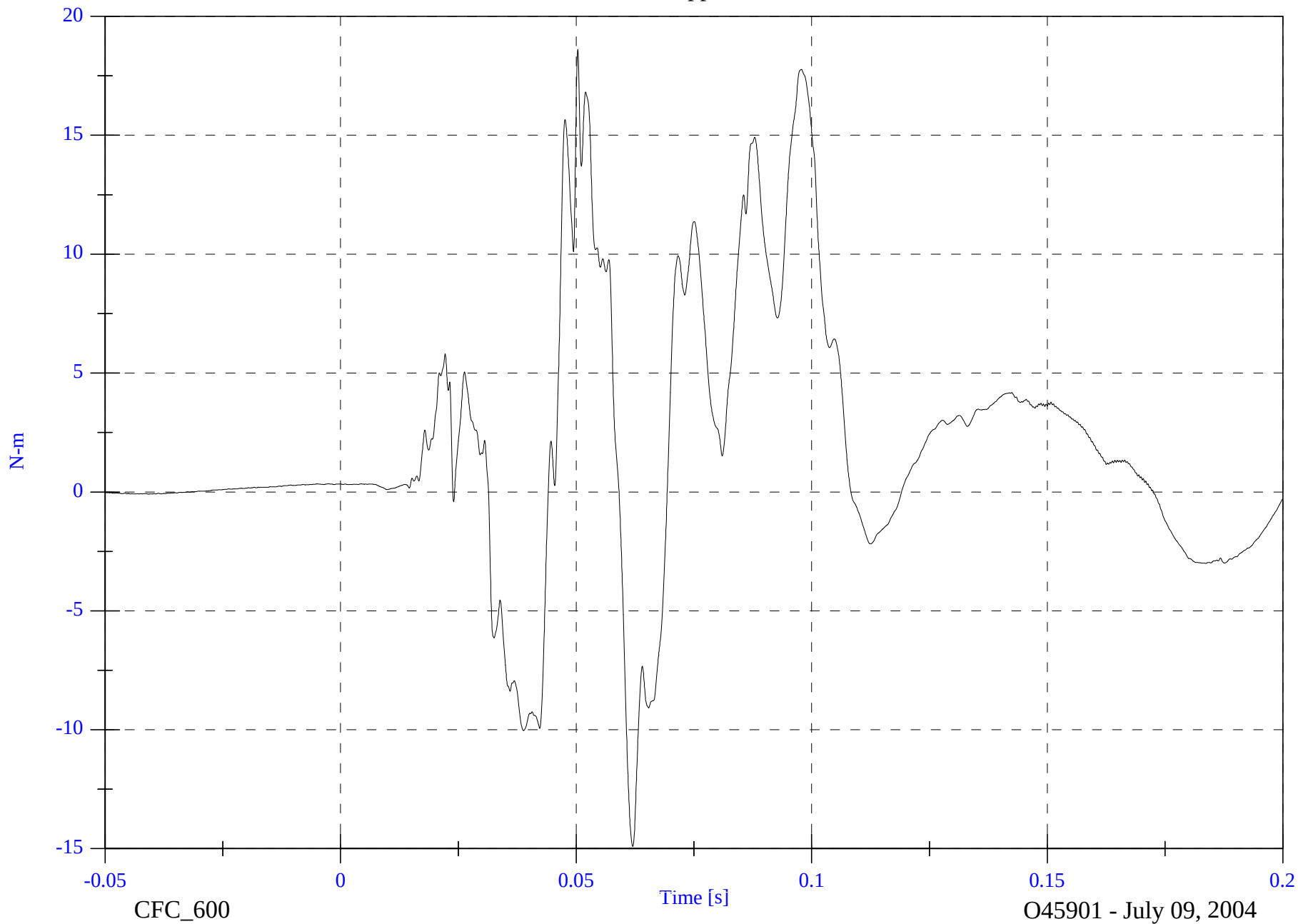
V1P1 Left Upper Tibia Mx

Max: 18.6 [N-m] at 0.050 [s]

Min: -14.9 [N-m] at 0.062 [s]

B-45

8748-01



NCAP Optional Test - 2004.5 Volvo S40

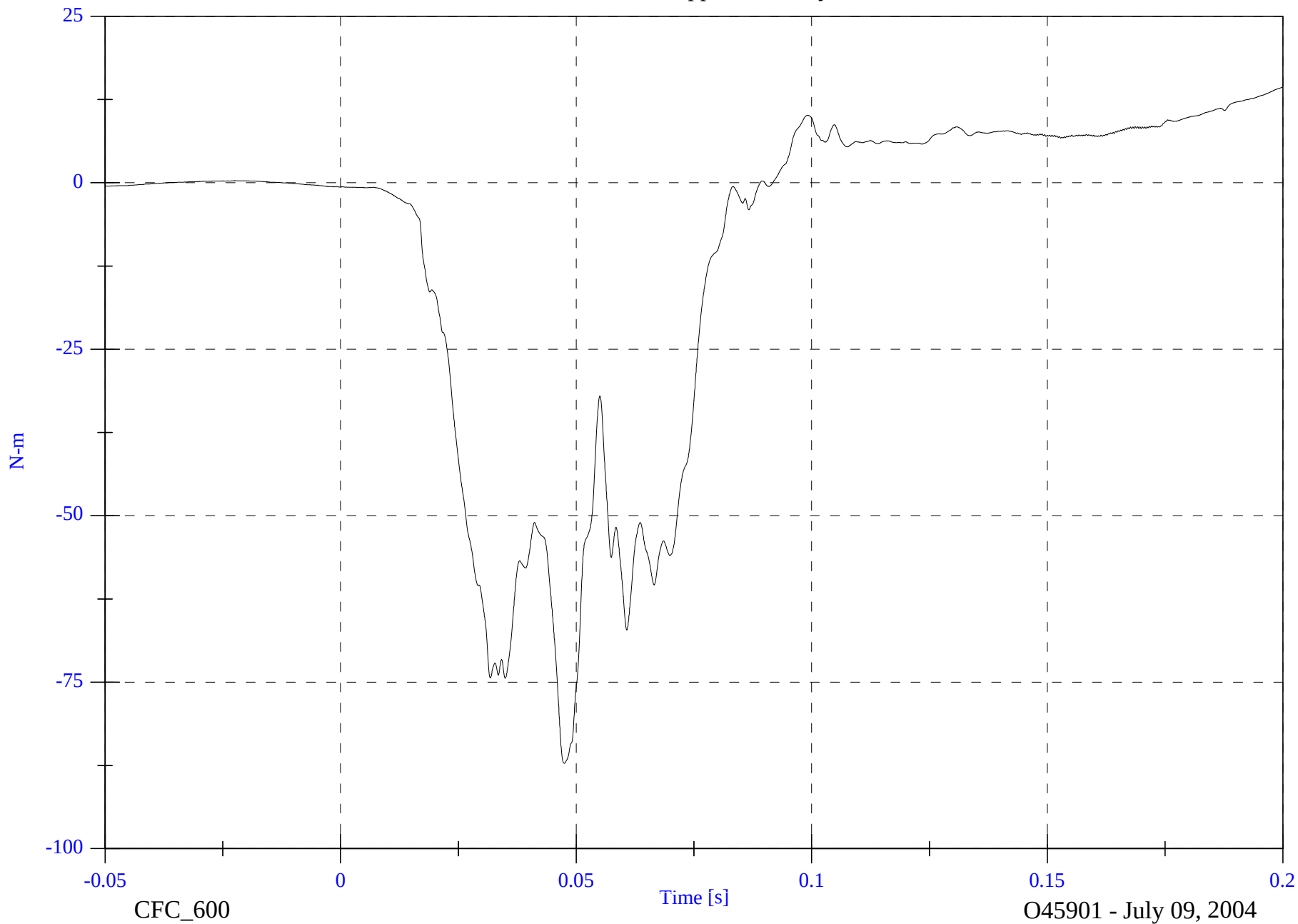
V1P1 Left Upper Tibia My

Max: 14.4 [N-m] at 0.200 [s]

Min: -87.2 [N-m] at 0.047 [s]

B-46

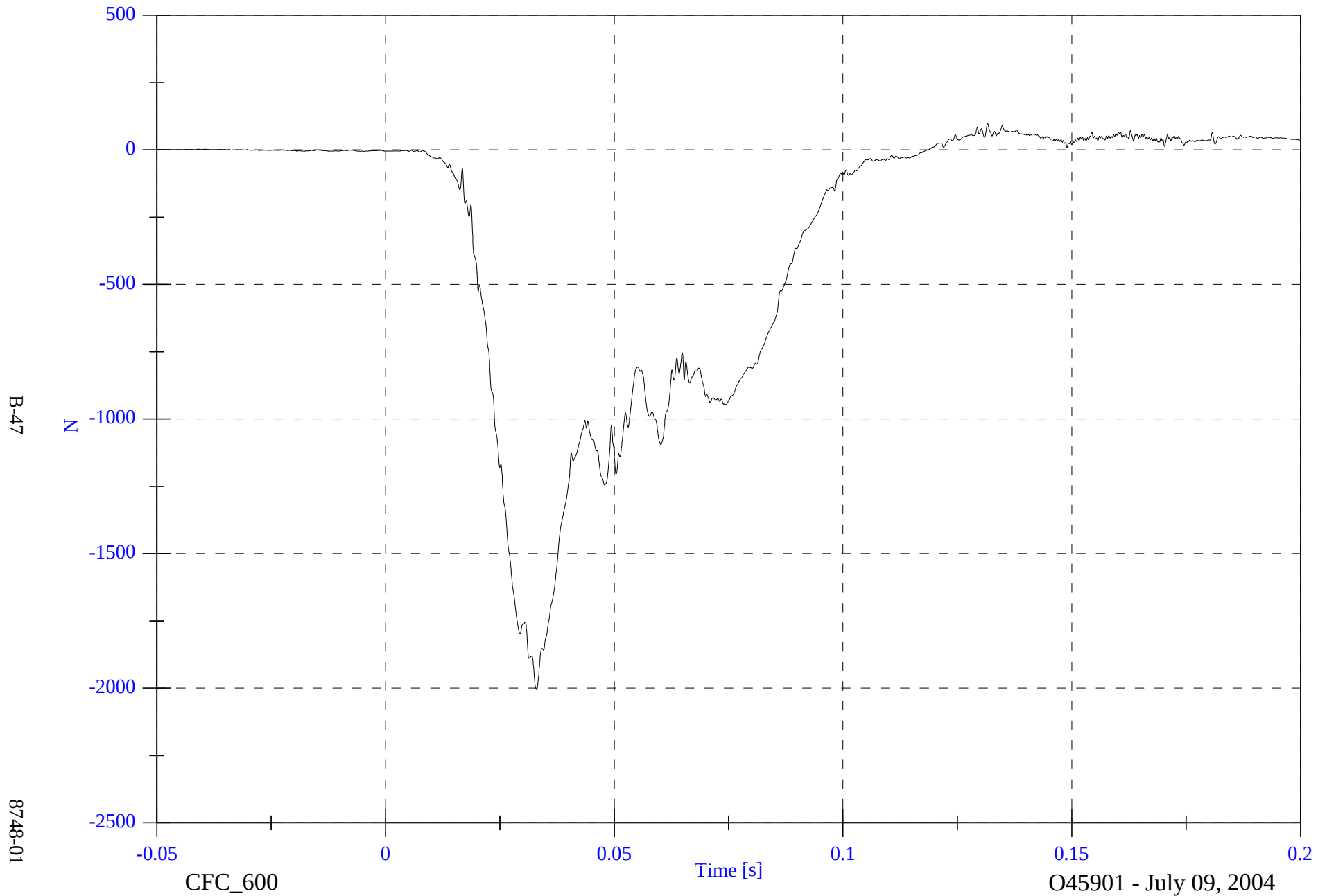
8748-01



NCAP Optional Test - 2004.5 Volvo S40

V1P1 Left Lower Tibia Fz

Max: 98.2 [N] at 0.132 [s]
Min: -2006.0 [N] at 0.033 [s]

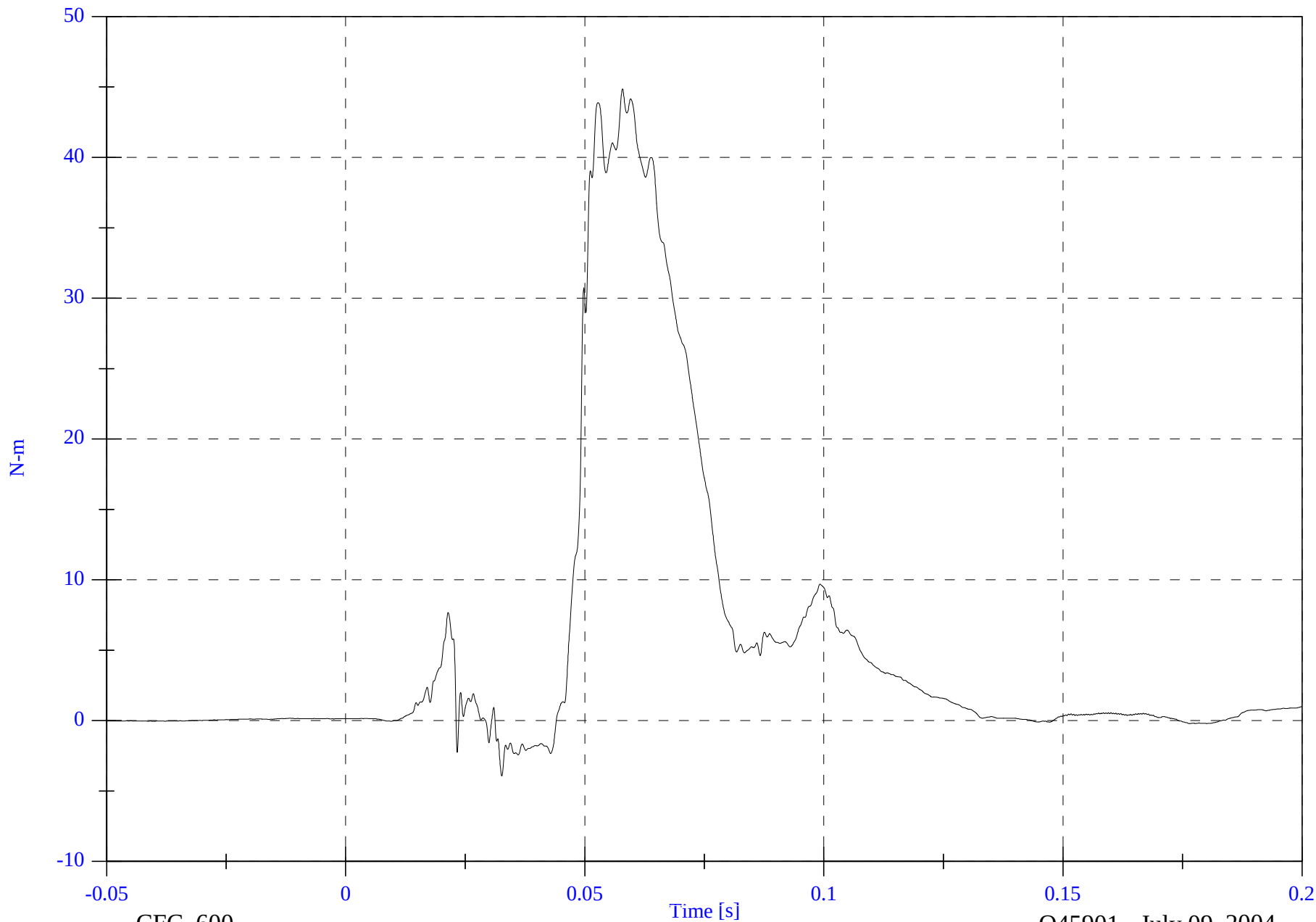


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Left Lower Tibia Mx

Max: 44.9 [N-m] at 0.058 [s]

Min: -3.9 [N-m] at 0.033 [s]



B-48

8748-01

CFC_600

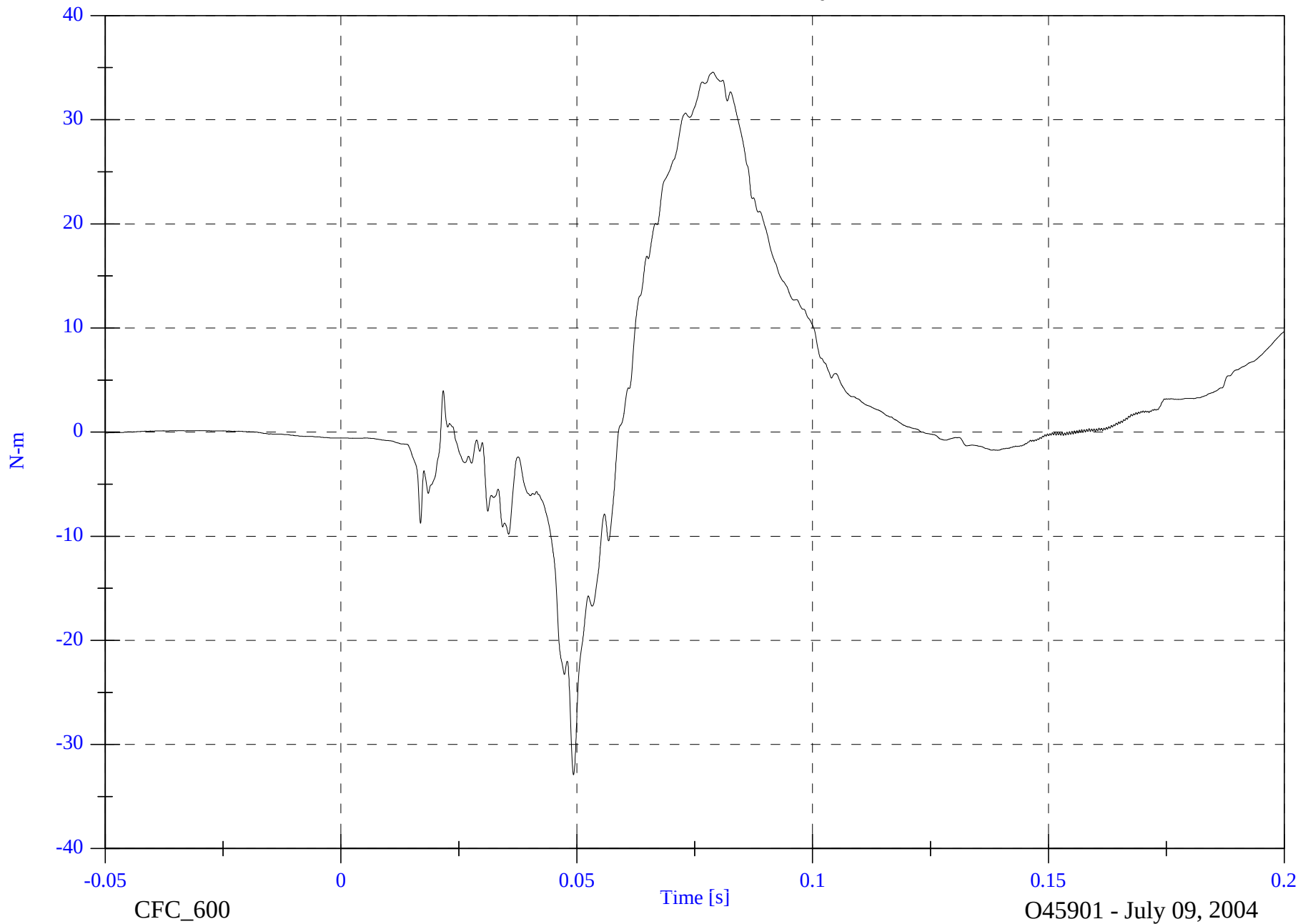
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P1 Left Lower Tibia My

Max: 34.6 [N-m] at 0.079 [s]

Min: -32.9 [N-m] at 0.049 [s]



B-49

8748-01

NCAP Optional Test - 2004.5 Volvo S40

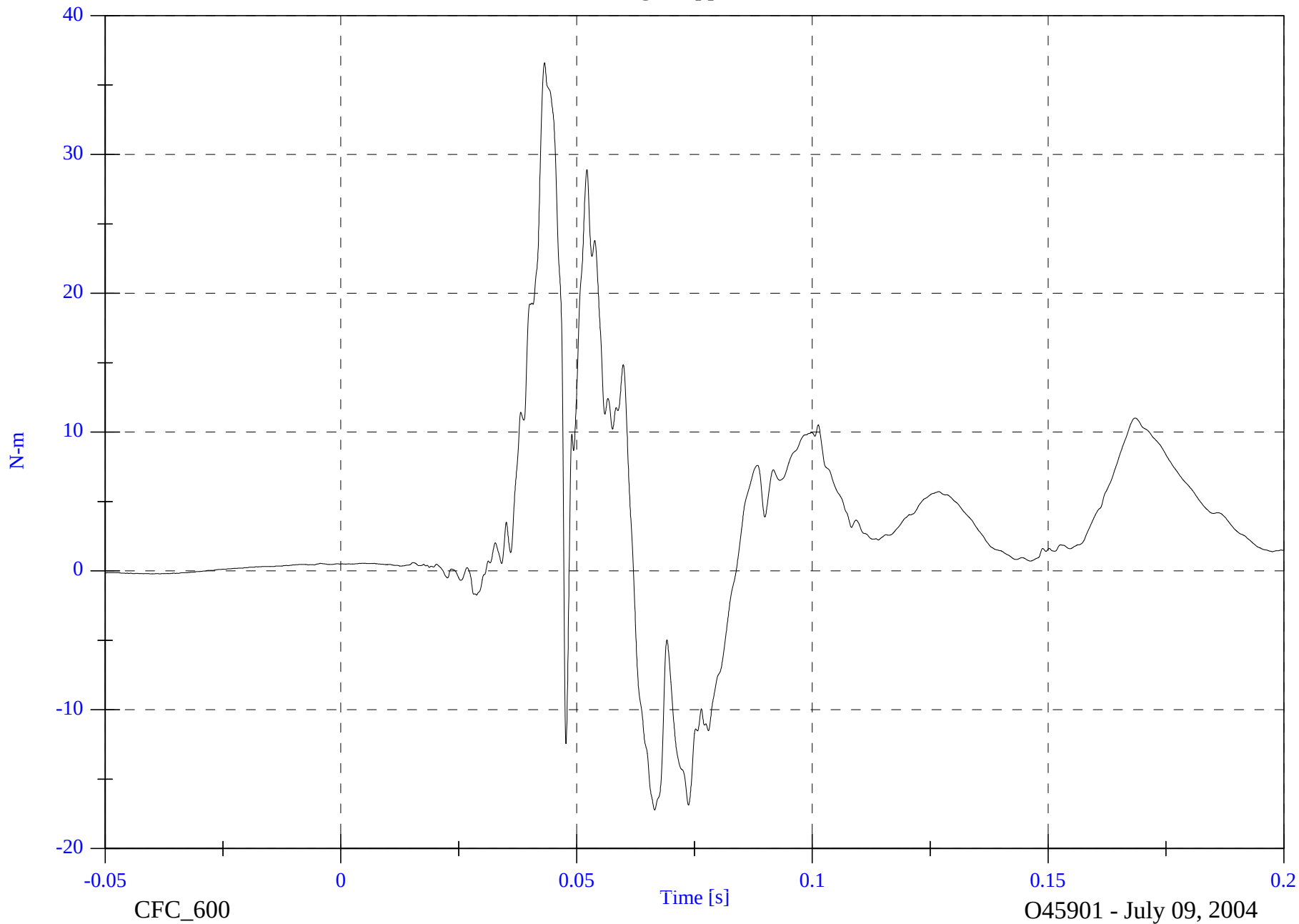
V1P1 Right Upper Tibia Mx

Max: 36.6 [N-m] at 0.043 [s]

Min: -17.2 [N-m] at 0.067 [s]

B-50

8748-01



NCAP Optional Test - 2004.5 Volvo S40

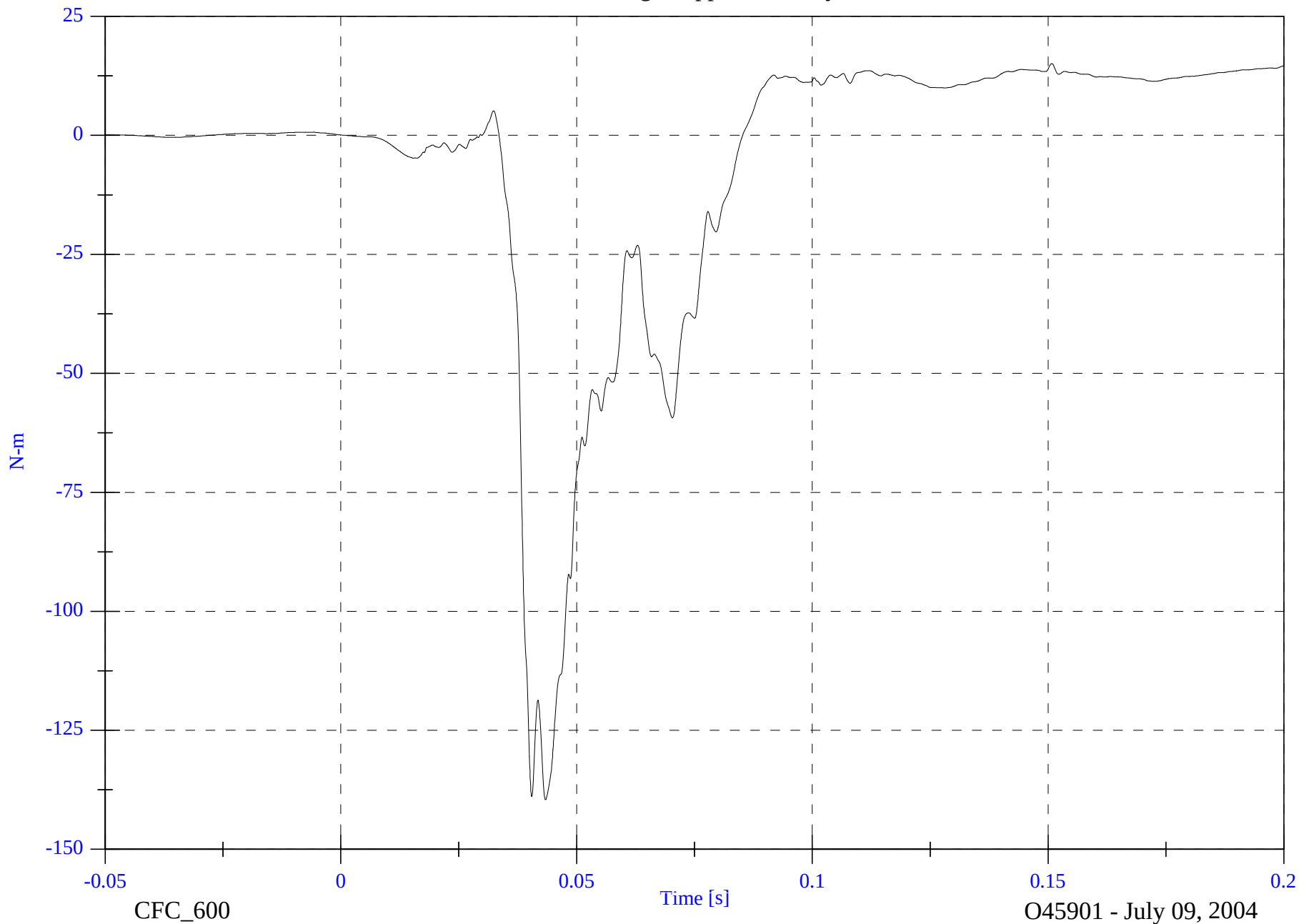
V1P1 Right Upper Tibia My

Max: 15.1 [N-m] at 0.151 [s]

Min: -139.6 [N-m] at 0.043 [s]

B-51

8748-01



CFC_600

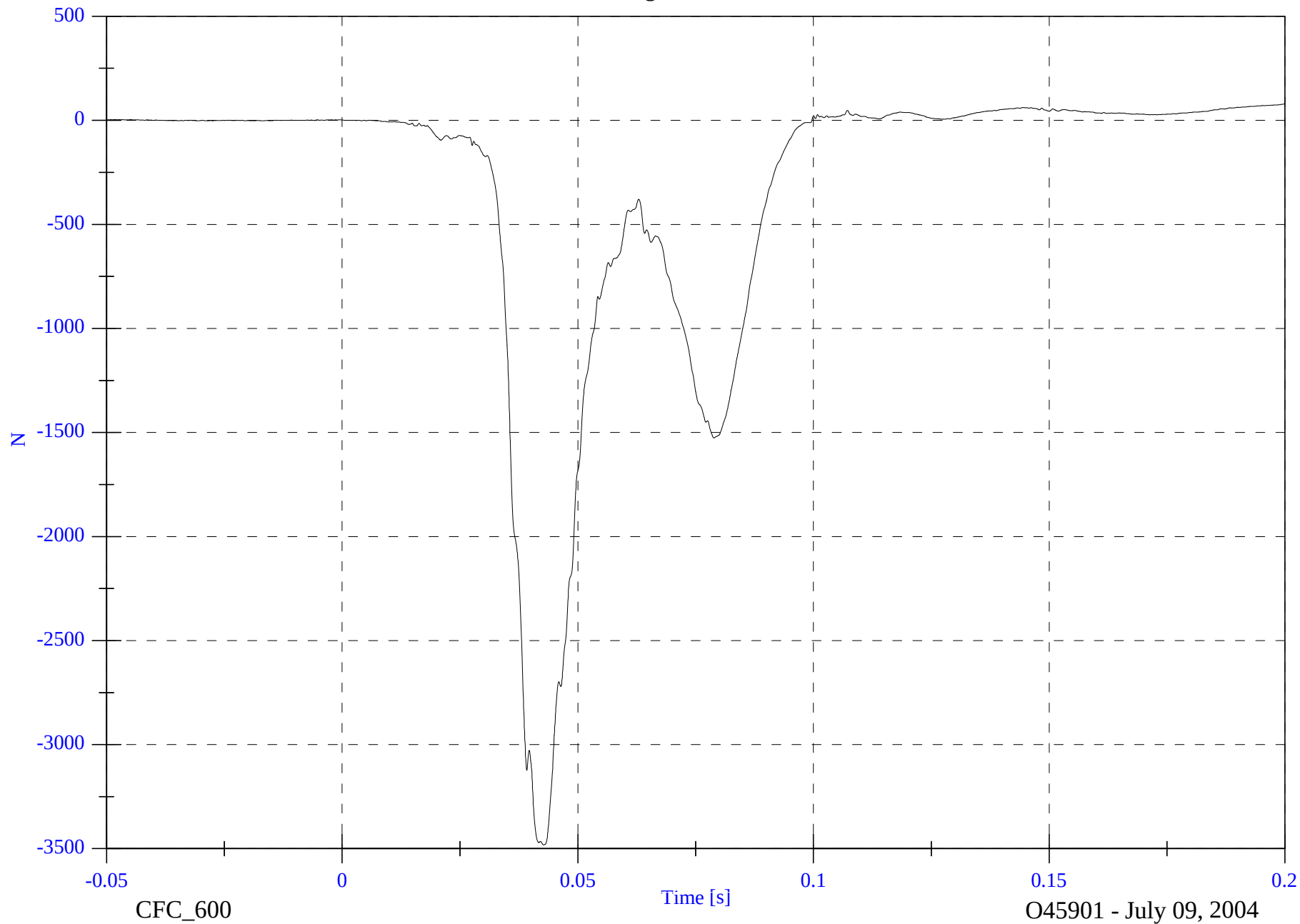
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P1 Right Lower Tibia Fz

Max: 79.6 [N] at 0.200 [s]

Min: -3481.7 [N] at 0.043 [s]



B-52

8748-01

CFC_600

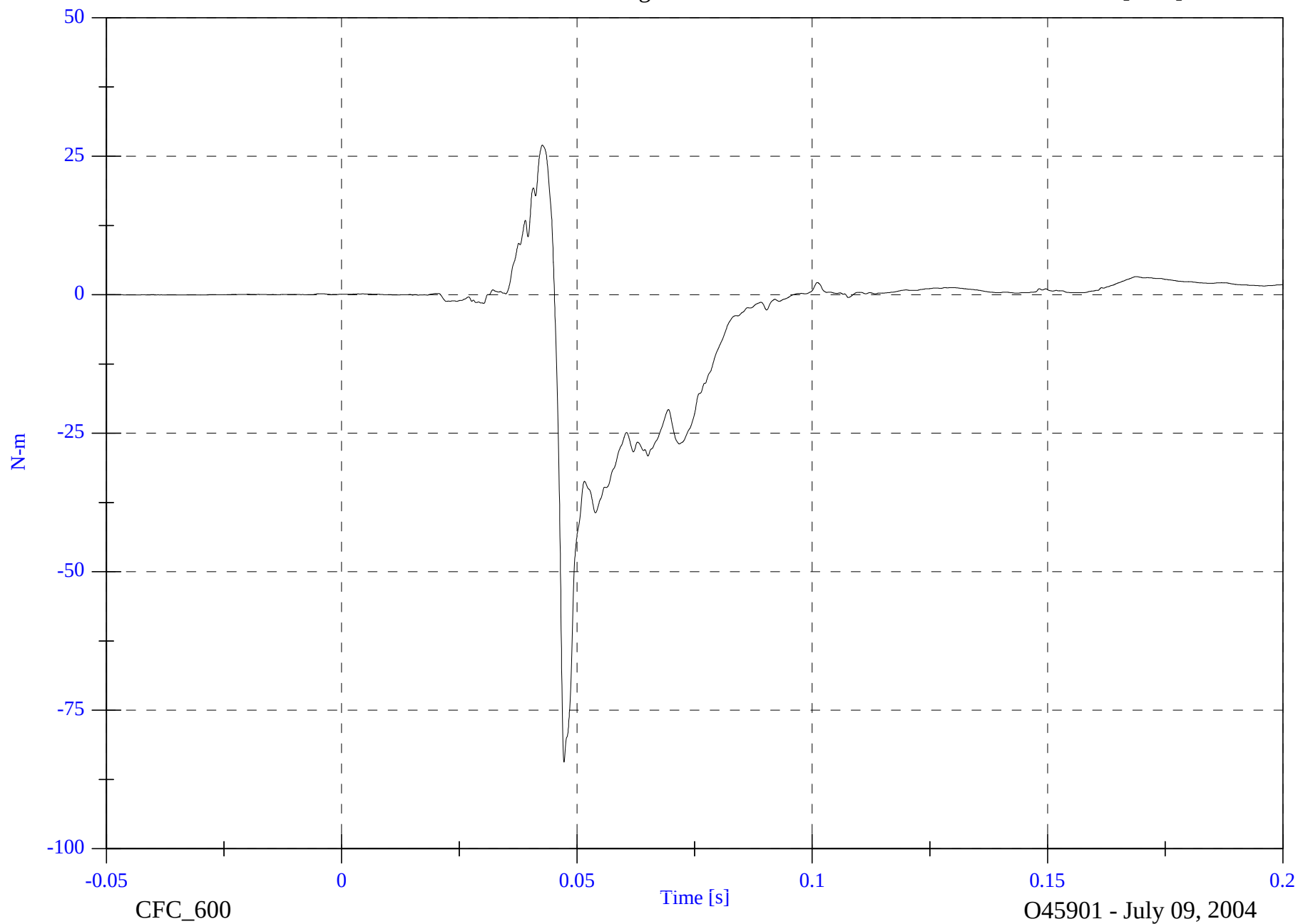
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P1 Right Lower Tibia Mx

Max: 27.0 [N-m] at 0.043 [s]

Min: -84.4 [N-m] at 0.047 [s]



B-53

8748-01

CFC_600

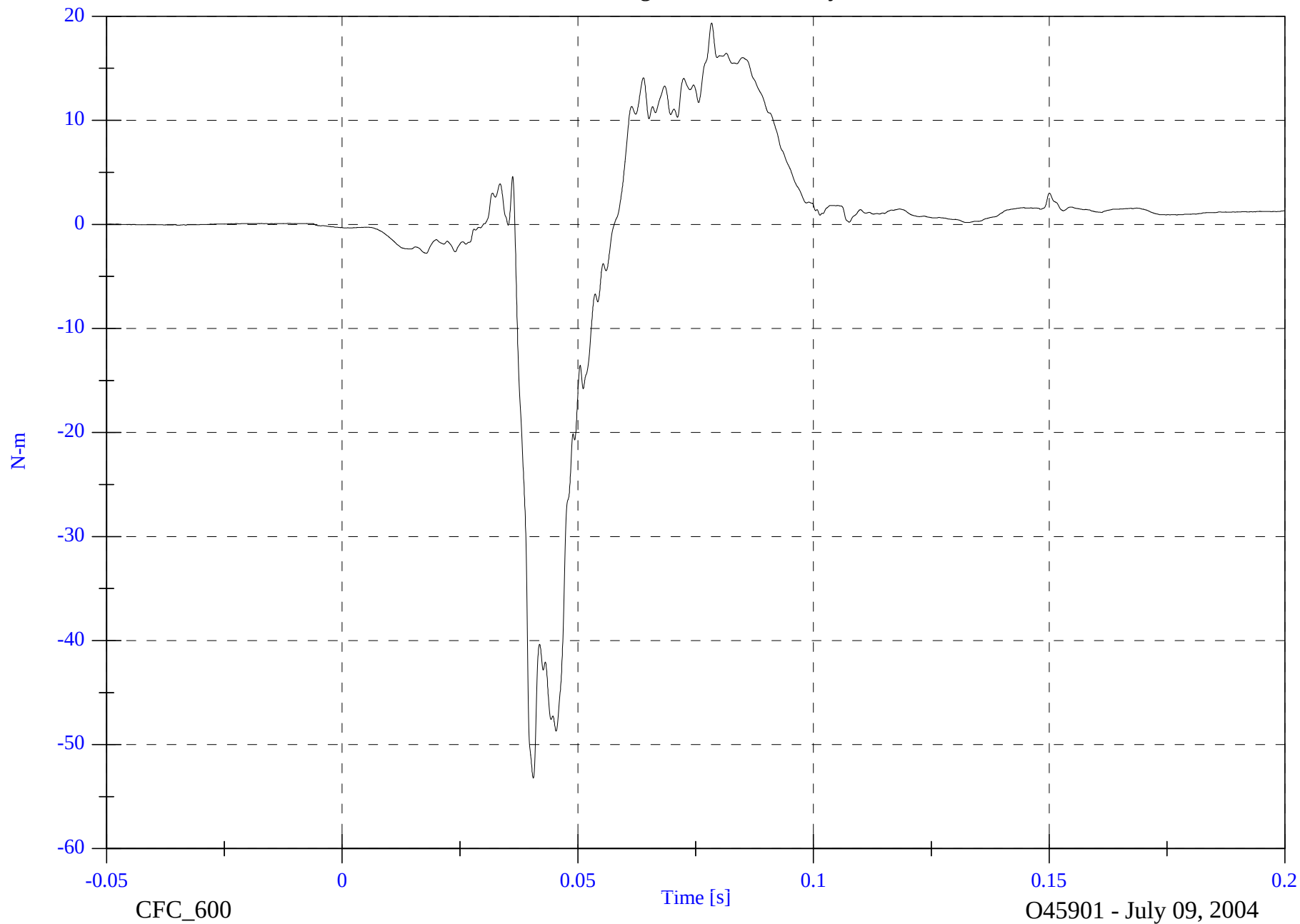
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P1 Right Lower Tibia My

Max: 19.4 [N-m] at 0.078 [s]

Min: -53.2 [N-m] at 0.041 [s]



B-54

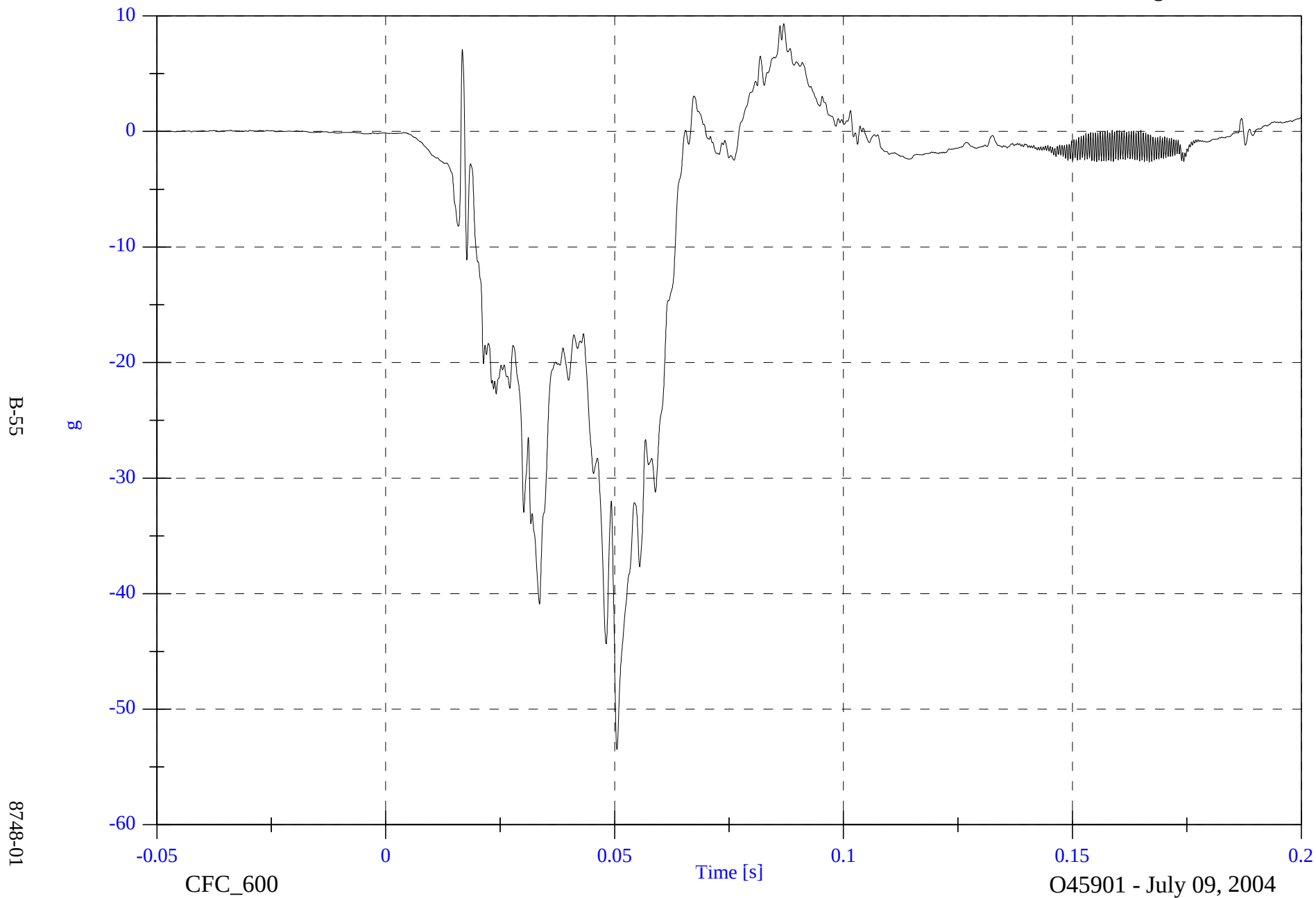
8748-01

NCAP Optional Test - 2004.5 Volvo S40

V1P1 Left Foot Aft x

Max: 9.3 [g] at 0.087 [s]

Min: -53.5 [g] at 0.051 [s]



NCAP Optional Test - 2004.5 Volvo S40

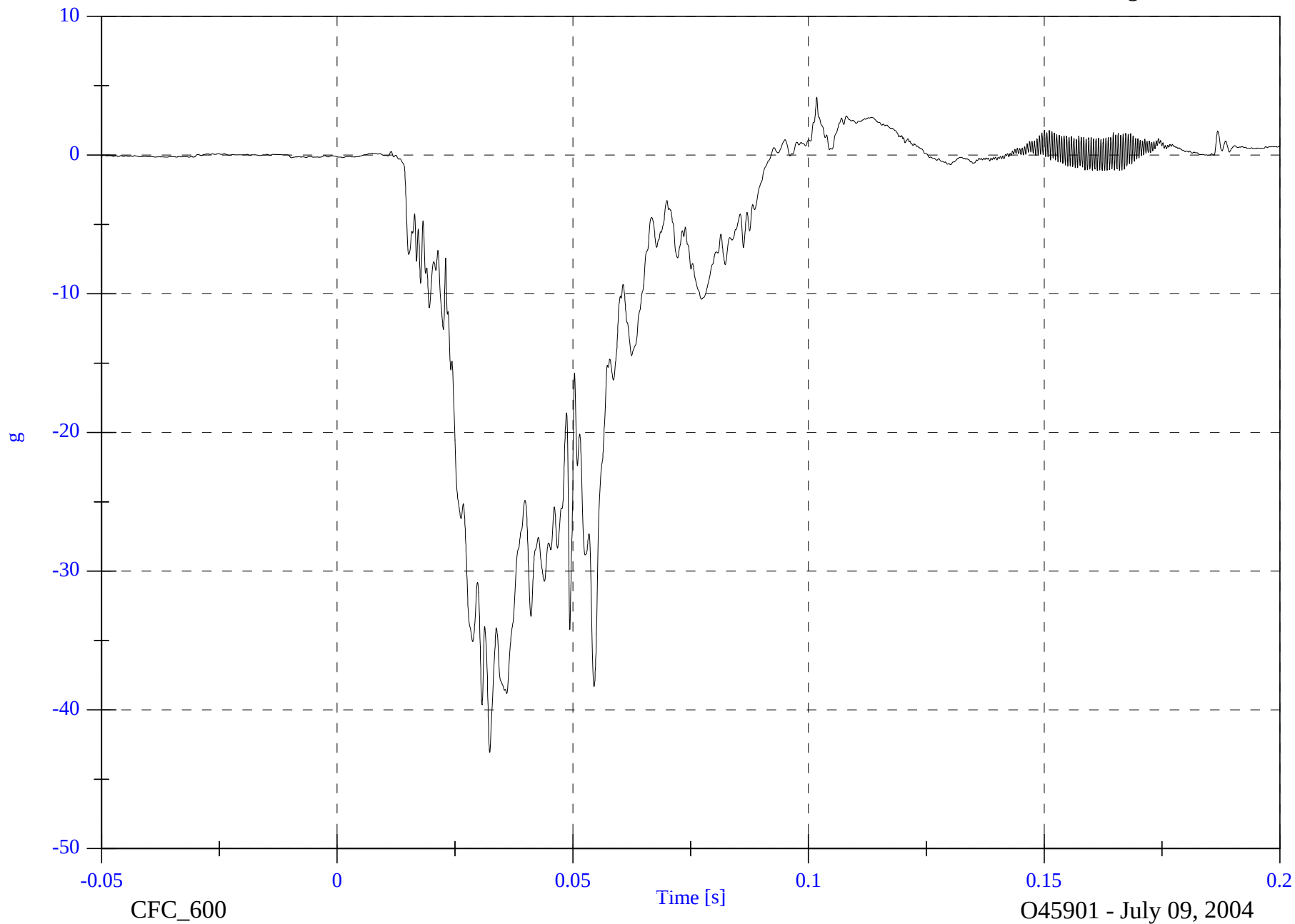
V1P1 Left Foot Aft z

Max: 4.2 [g] at 0.102 [s]

Min: -43.1 [g] at 0.032 [s]

B-56

8748-01



NCAP Optional Test - 2004.5 Volvo S40

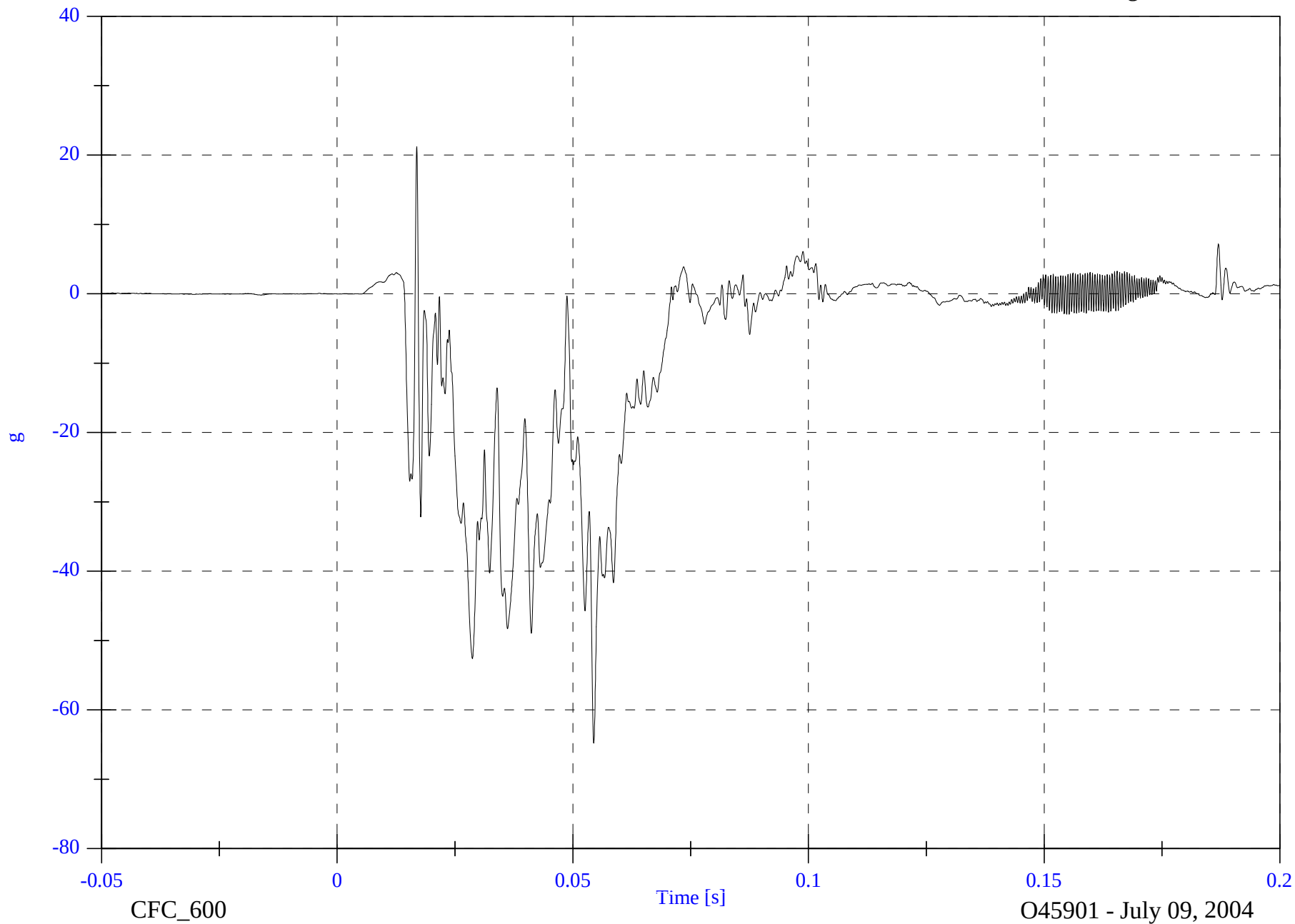
V1P1 Left Foot Fore z

Max: 21.2 [g] at 0.017 [s]

Min: -64.8 [g] at 0.054 [s]

B-57

8748-01

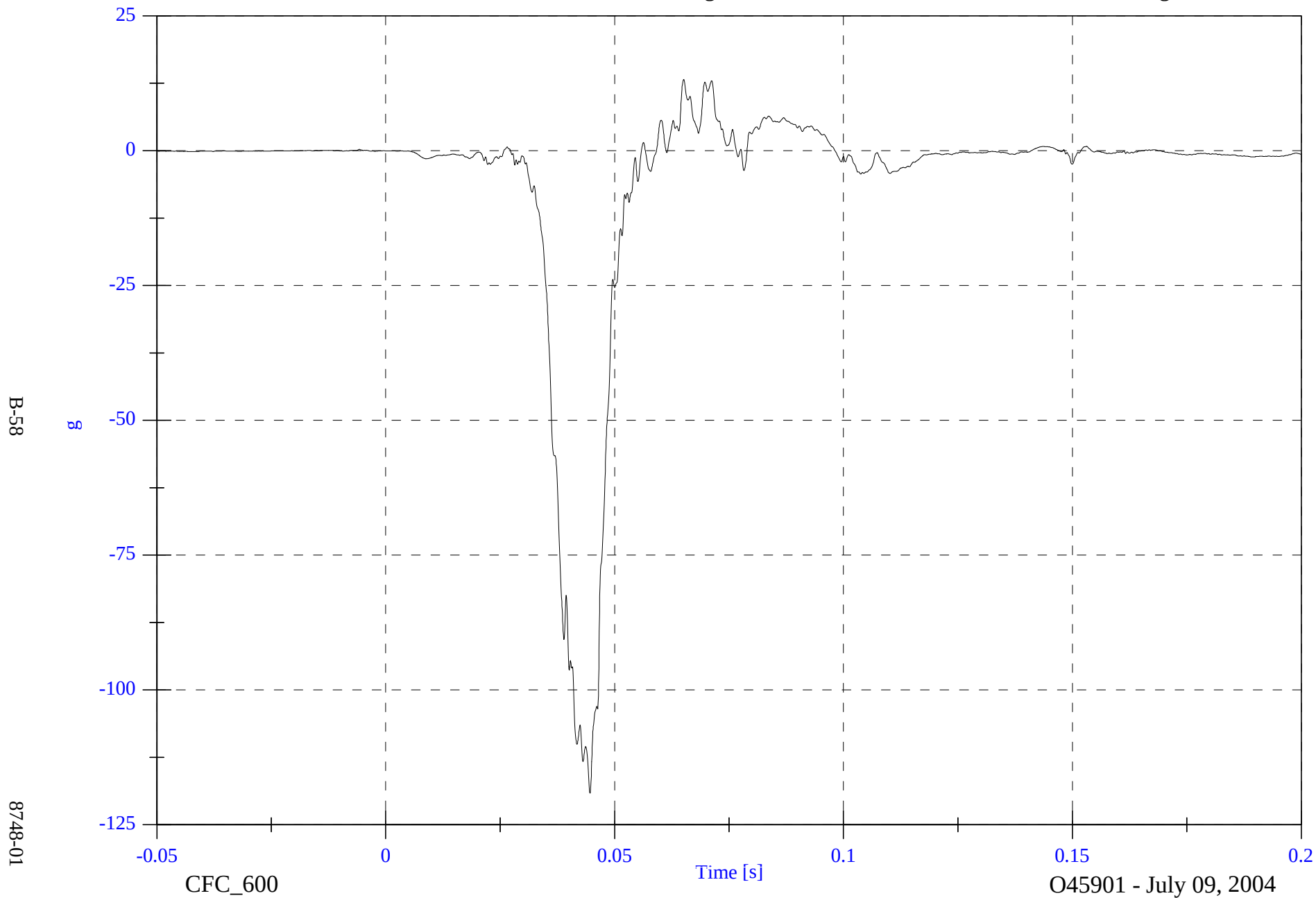


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Right Foot Aft x

Max: 13.2 [g] at 0.065 [s]

Min: -119.1 [g] at 0.045 [s]

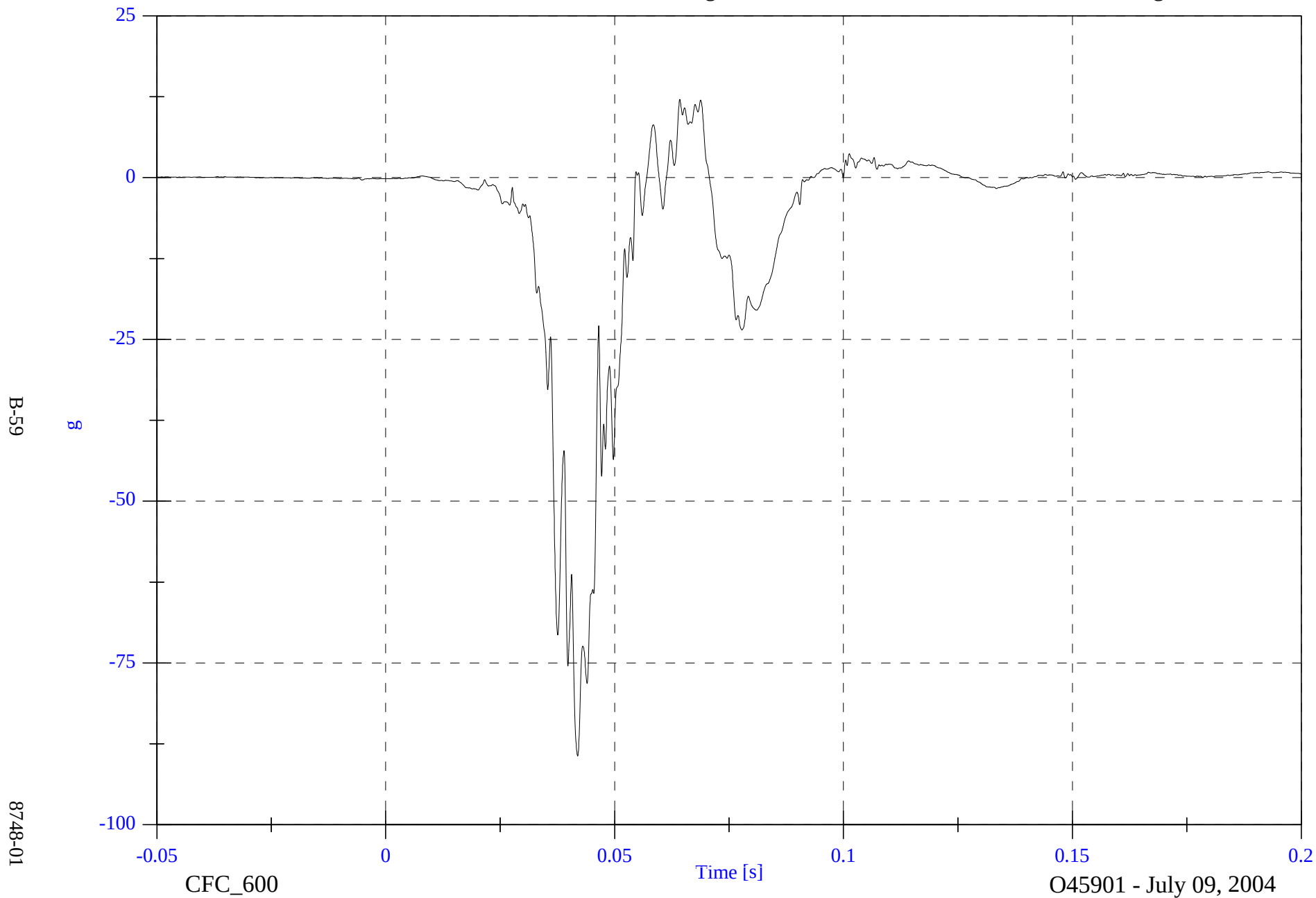


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Right Foot Aft z

Max: 12.1 [g] at 0.064 [s]

Min: -89.4 [g] at 0.042 [s]

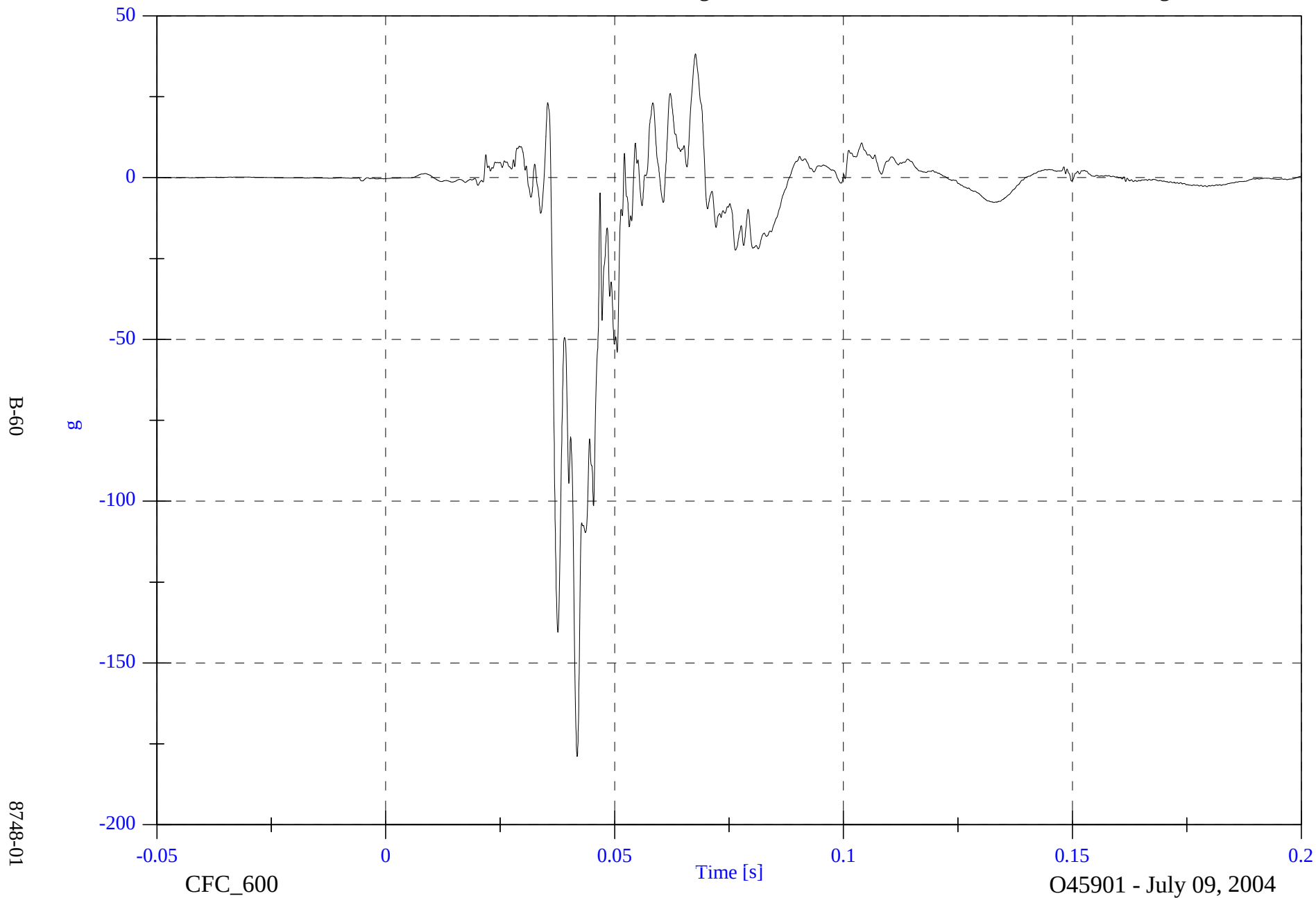


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Right Foot Fore z

Max: 38.2 [g] at 0.068 [s]

Min: -178.9 [g] at 0.042 [s]



NCAP Optional Test - 2004.5 Volvo S40

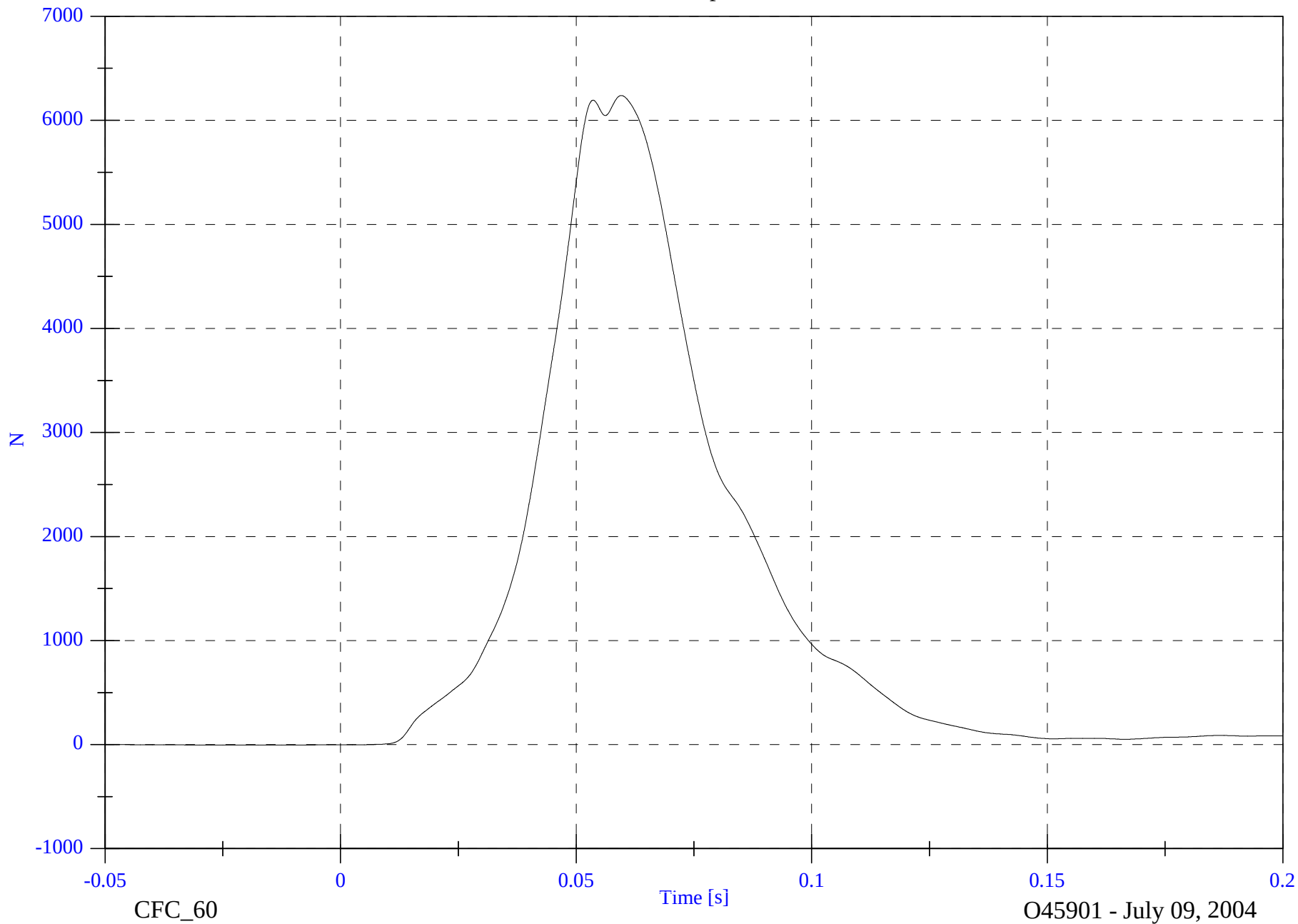
V1P1 Lap Belt

Max: 6238.5 [N] at 0.060 [s]

Min: -4.6 [N] at -0.019 [s]

B-61

8748-01

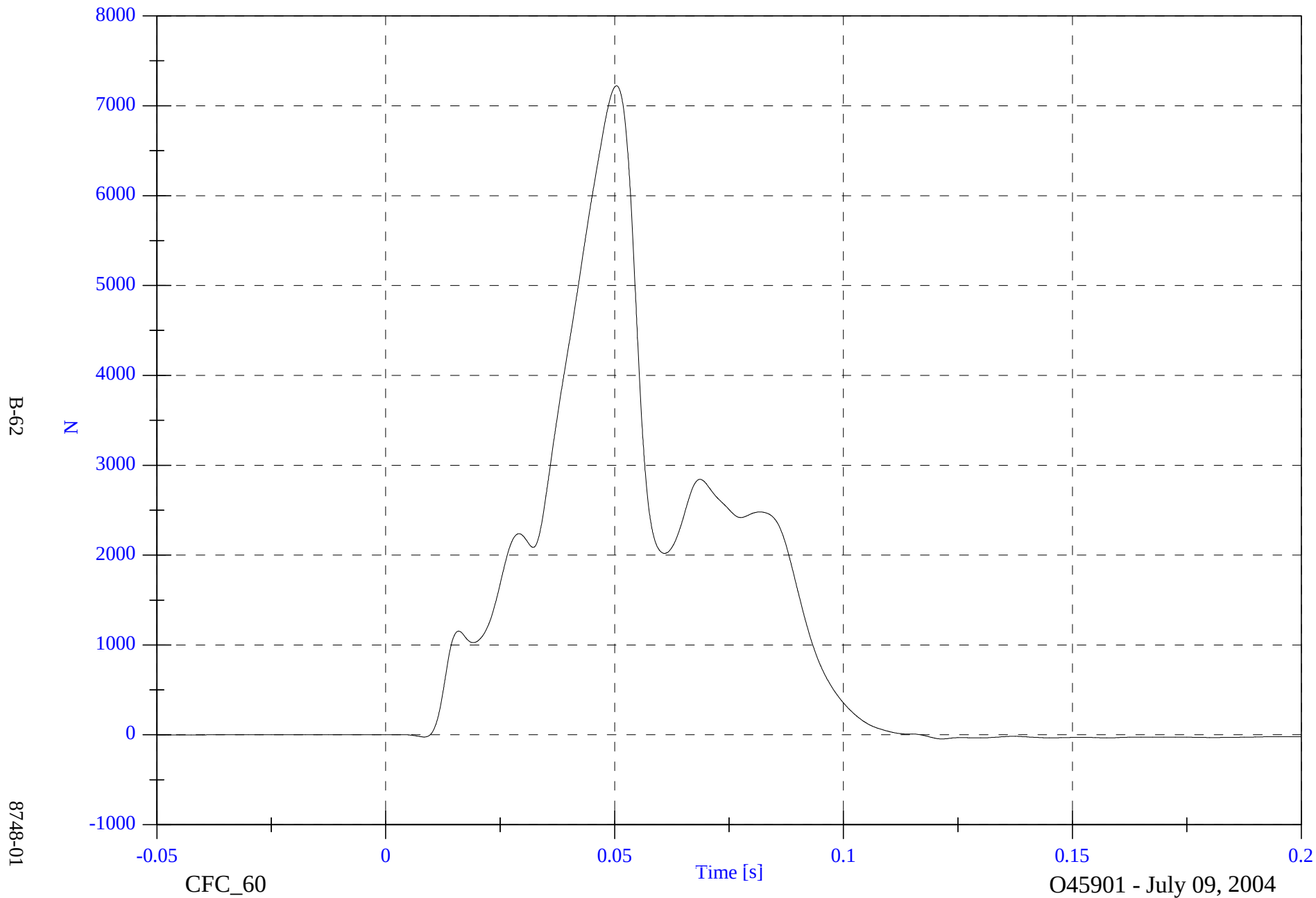


NCAP Optional Test - 2004.5 Volvo S40

V1P1 Torso Belt

Max: 7221.9 [N] at 0.050 [s]

Min: -44.9 [N] at 0.121 [s]



NCAP Optional Test - 2004.5 Volvo S40

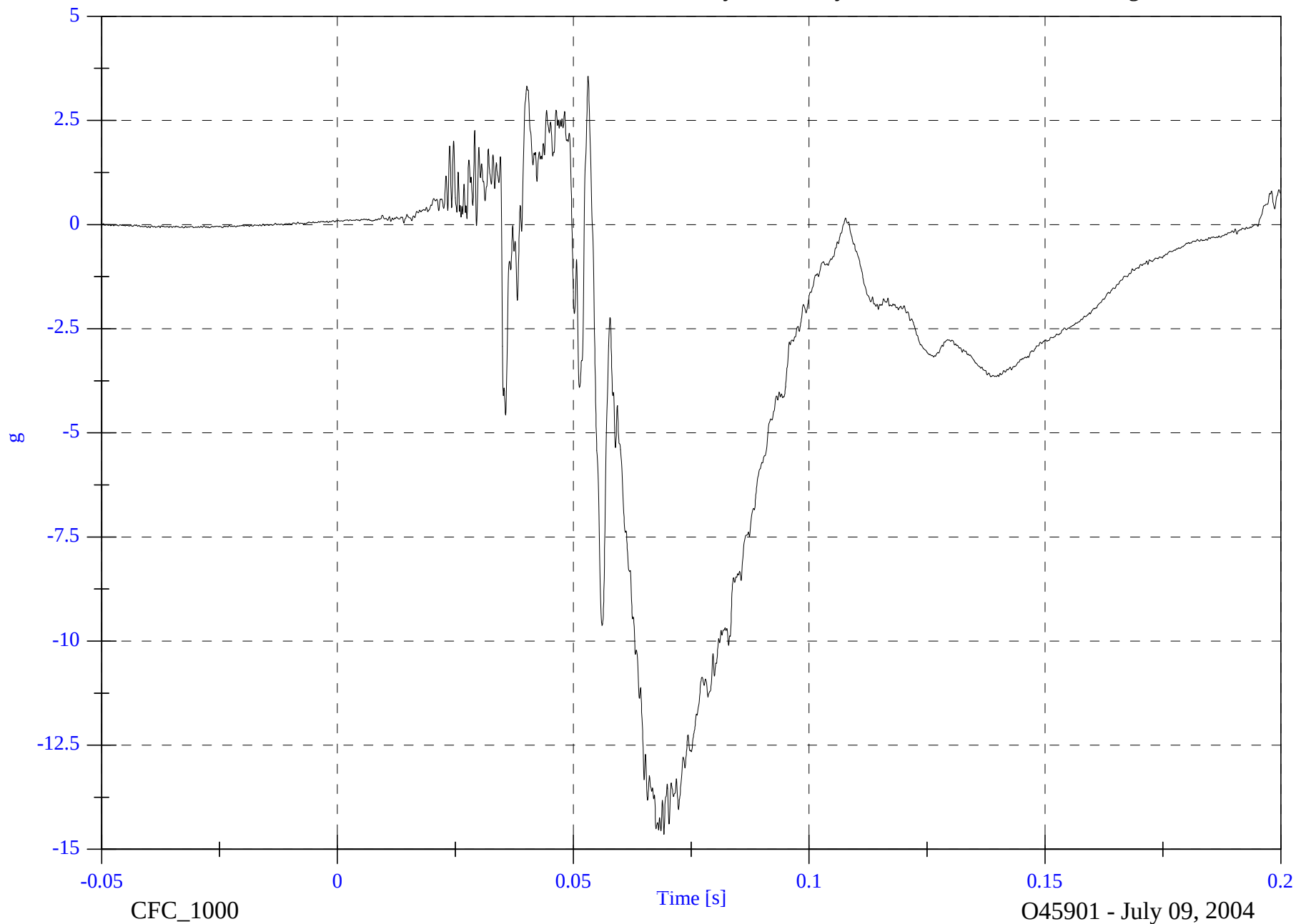
V1P2 Head 9 Array X Arm Ay

Max: 3.6 [g] at 0.053 [s]

Min: -14.6 [g] at 0.069 [s]

B-63

8748-01



NCAP Optional Test - 2004.5 Volvo S40

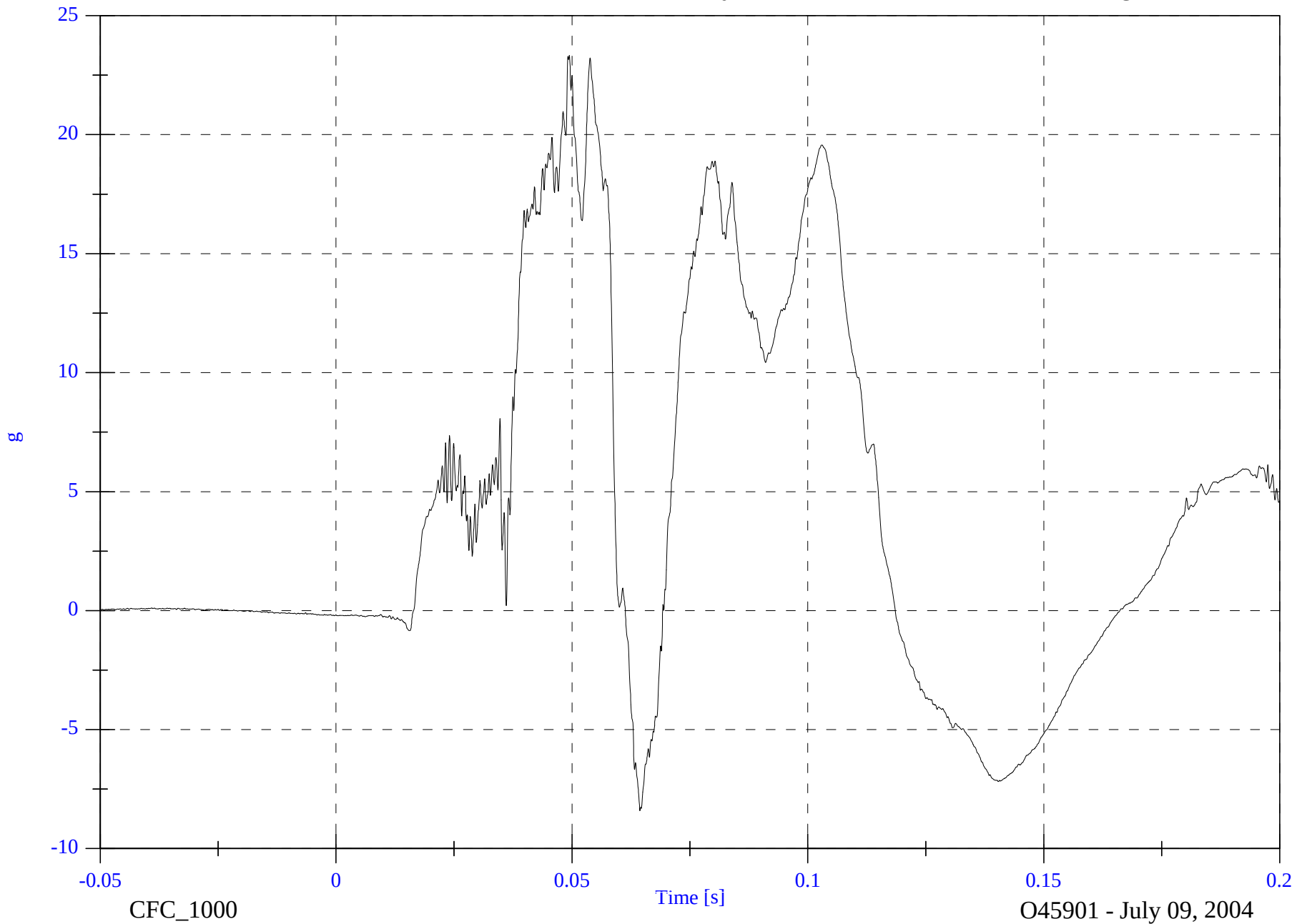
V1P2 Head 9 Array X Arm Az

Max: 23.3 [g] at 0.049 [s]

Min: -8.4 [g] at 0.064 [s]

B-64

8748-01



NCAP Optional Test - 2004.5 Volvo S40

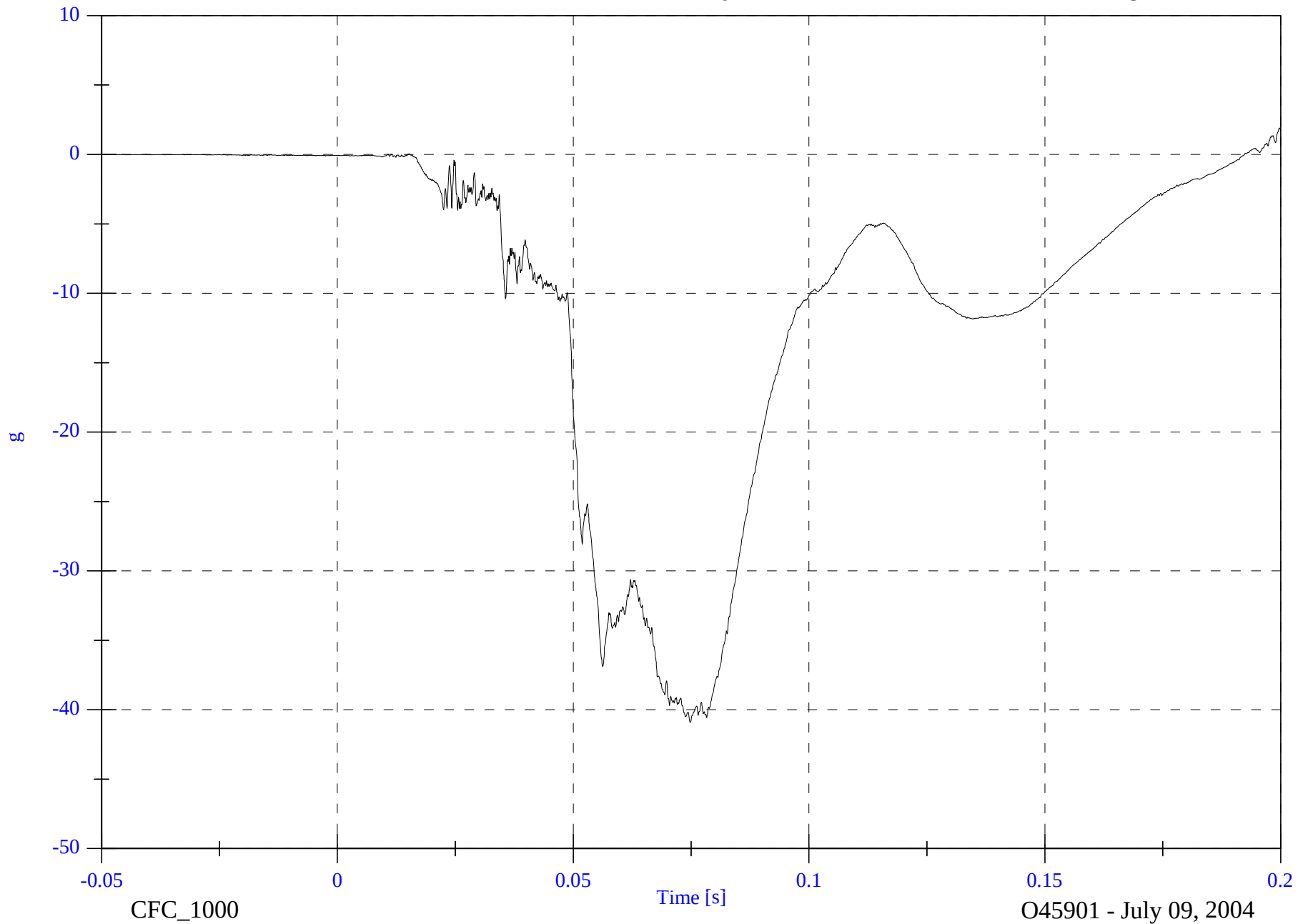
V1P2 Head 9 Array Y Arm Ax

Max: 1.9 [g] at 0.200 [s]

Min: -40.9 [g] at 0.075 [s]

B-65

8748-01

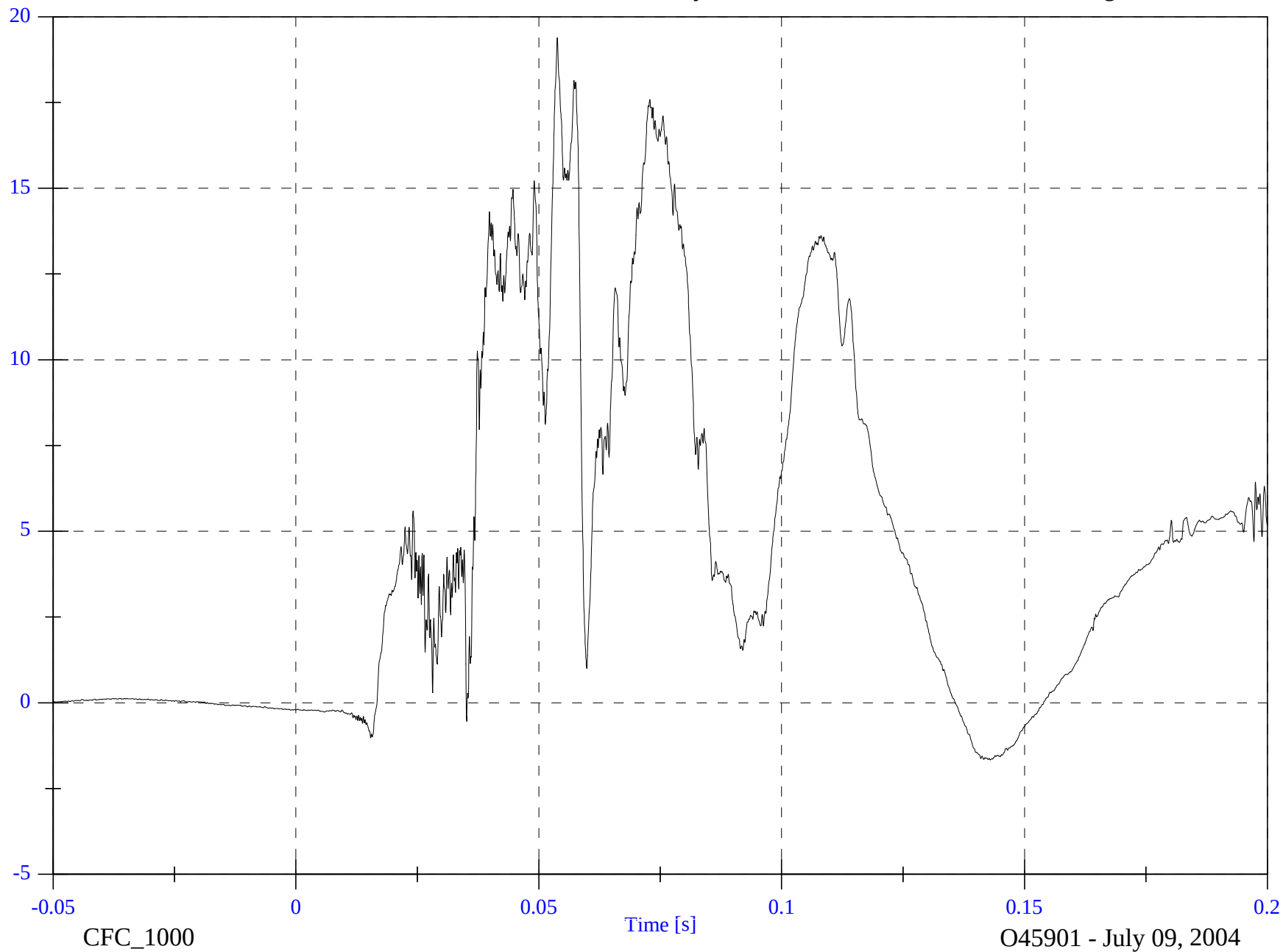


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Head 9 Array Y Arm Az

Max: 19.4 [g] at 0.054 [s]

Min: -1.7 [g] at 0.143 [s]



B-66

8748-01

NCAP Optional Test - 2004.5 Volvo S40

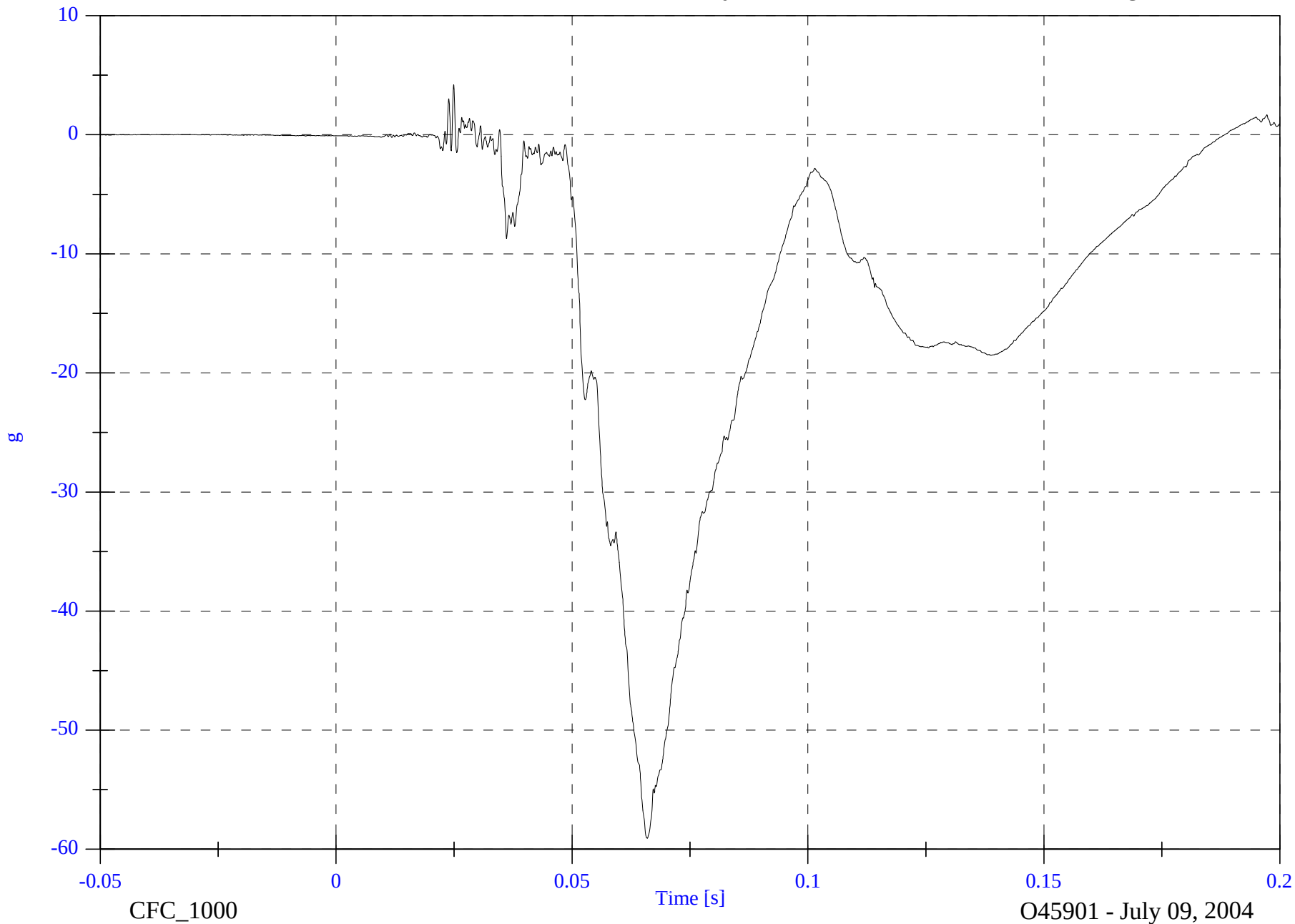
V1P2 Head 9 Array Z Arm Ax

Max: 4.2 [g] at 0.025 [s]

Min: -59.1 [g] at 0.066 [s]

B-67

8748-01



NCAP Optional Test - 2004.5 Volvo S40

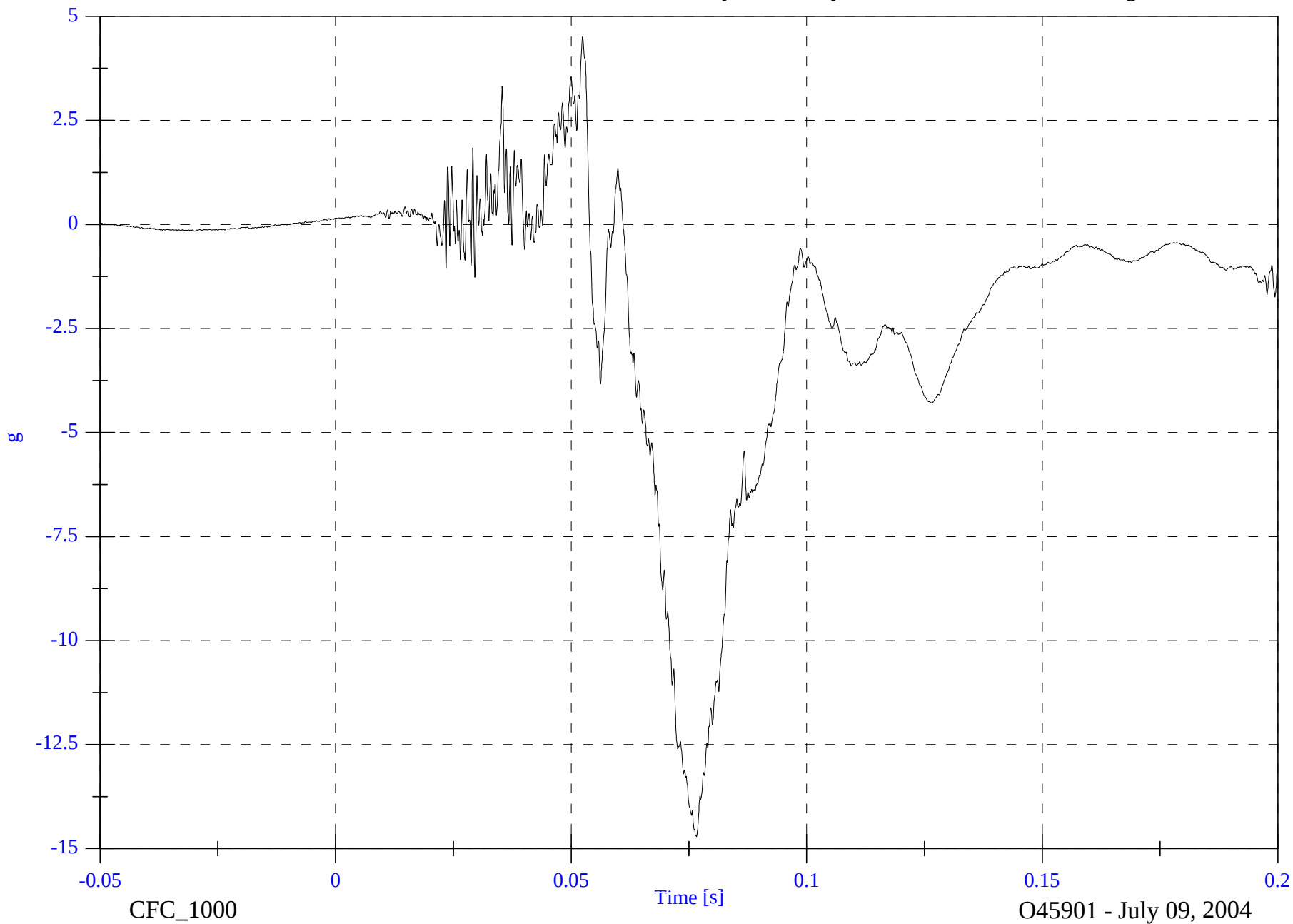
V1P2 Head 9 Array Z Arm Ay

Max: 4.5 [g] at 0.052 [s]

Min: -14.7 [g] at 0.077 [s]

B-68

8748-01



NCAP Optional Test - 2004.5 Volvo S40

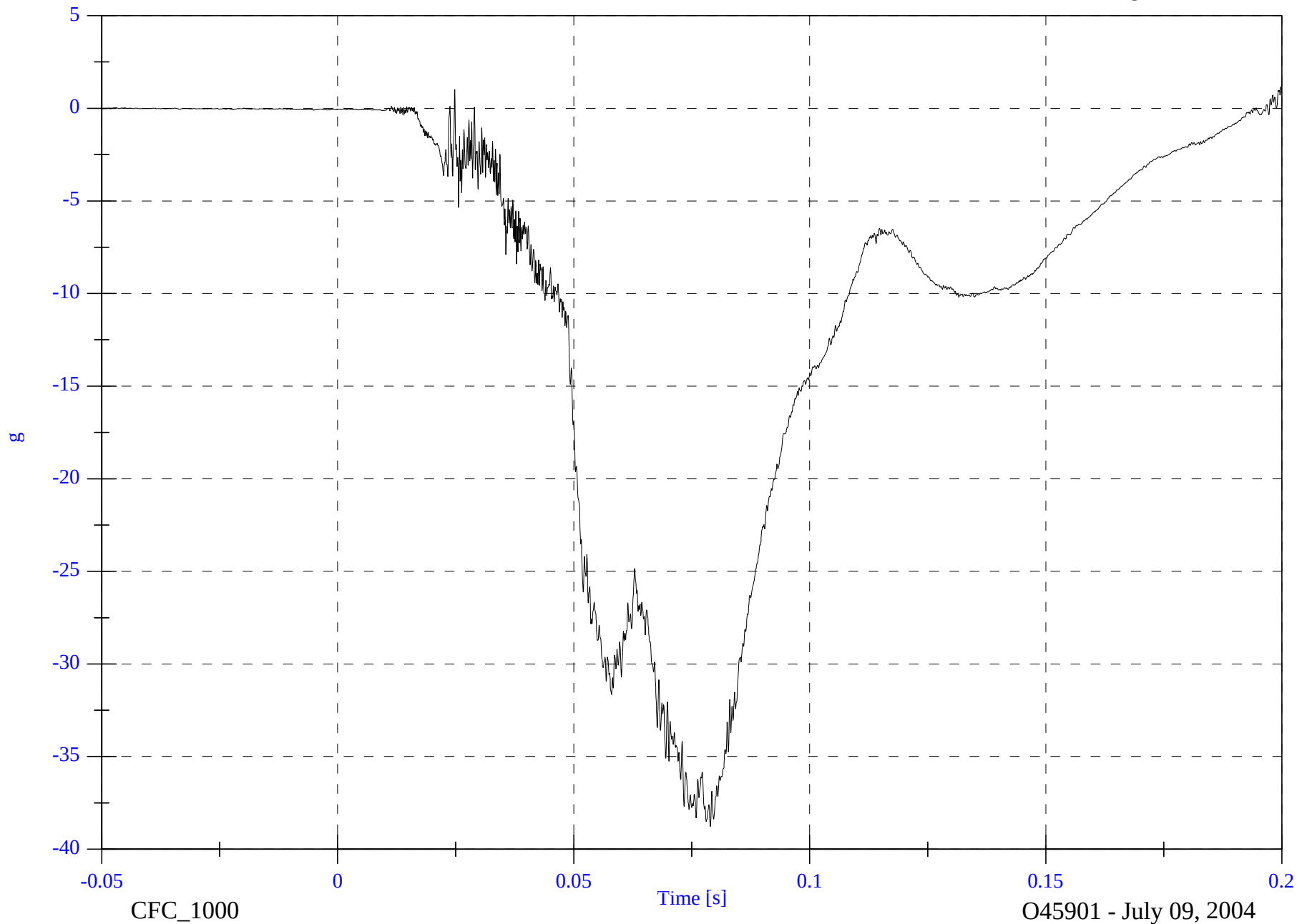
V1P2 Head CG x

Max: 1.2 [g] at 0.200 [s]

Min: -38.8 [g] at 0.079 [s]

B-69

8748-01



CFC_1000

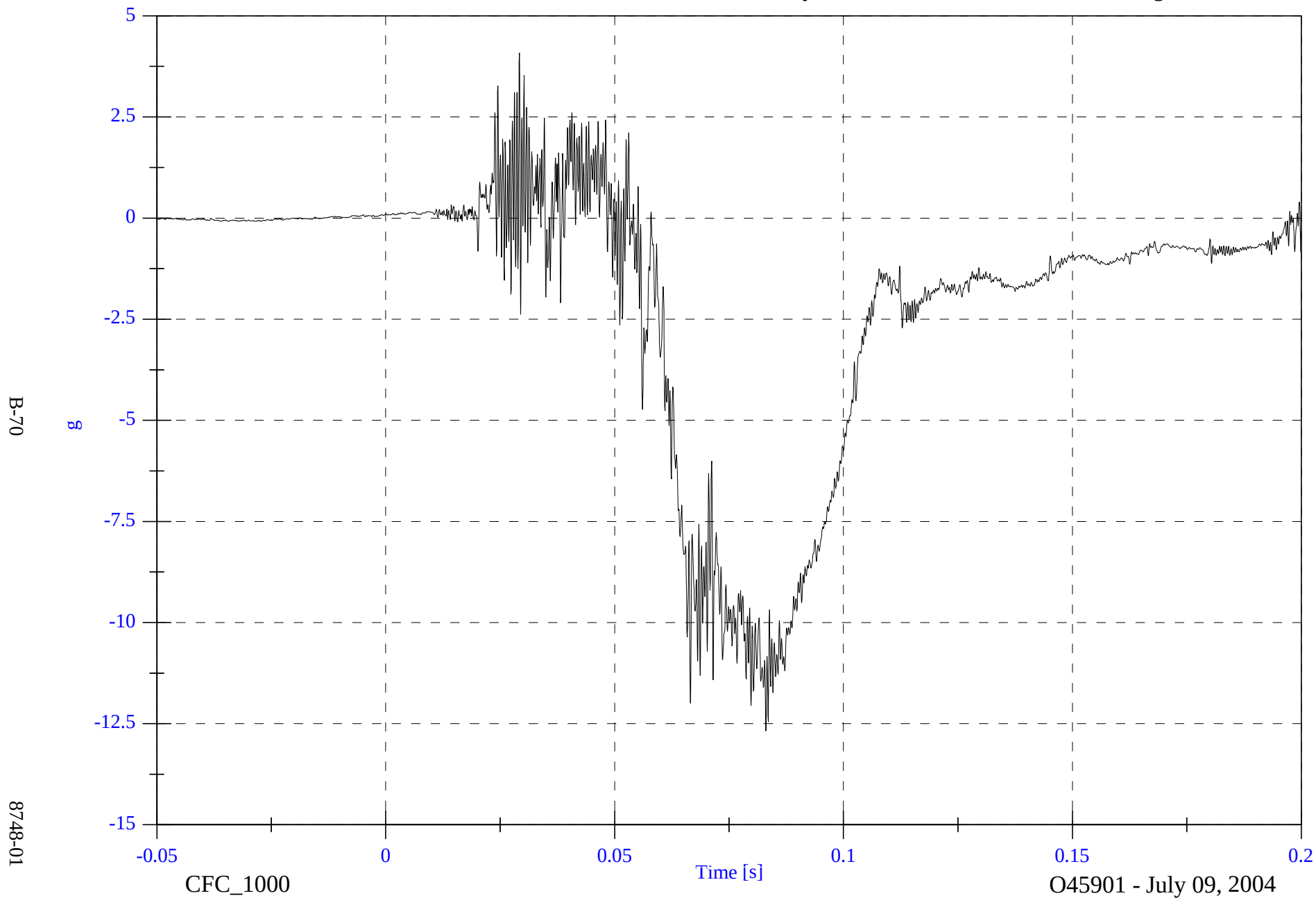
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P2 Head CG y

Max: 4.1 [g] at 0.029 [s]

Min: -12.7 [g] at 0.083 [s]

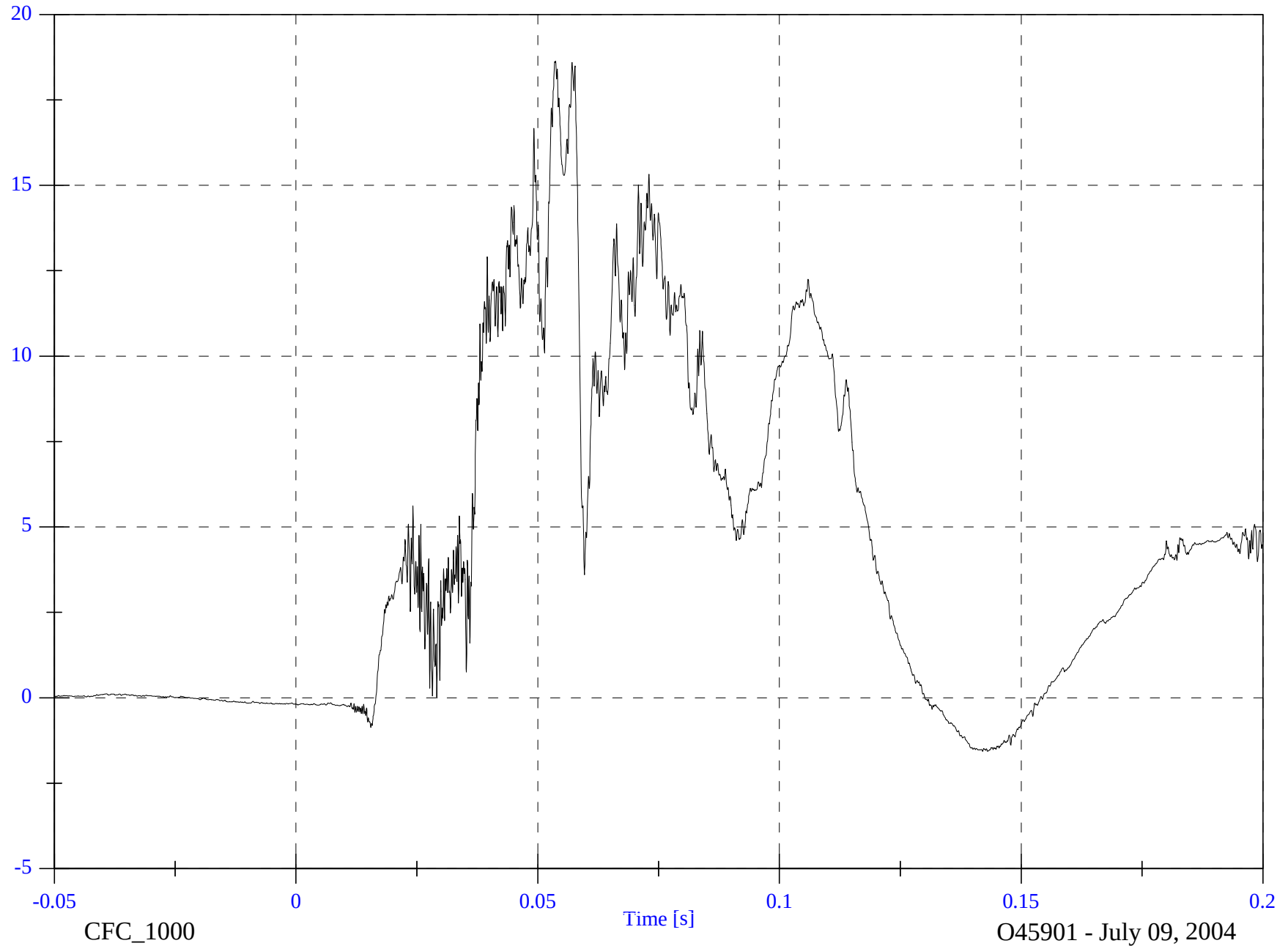


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Head CG z

Max: 18.6 [g] at 0.054 [s]

Min: -1.6 [g] at 0.142 [s]



B-71

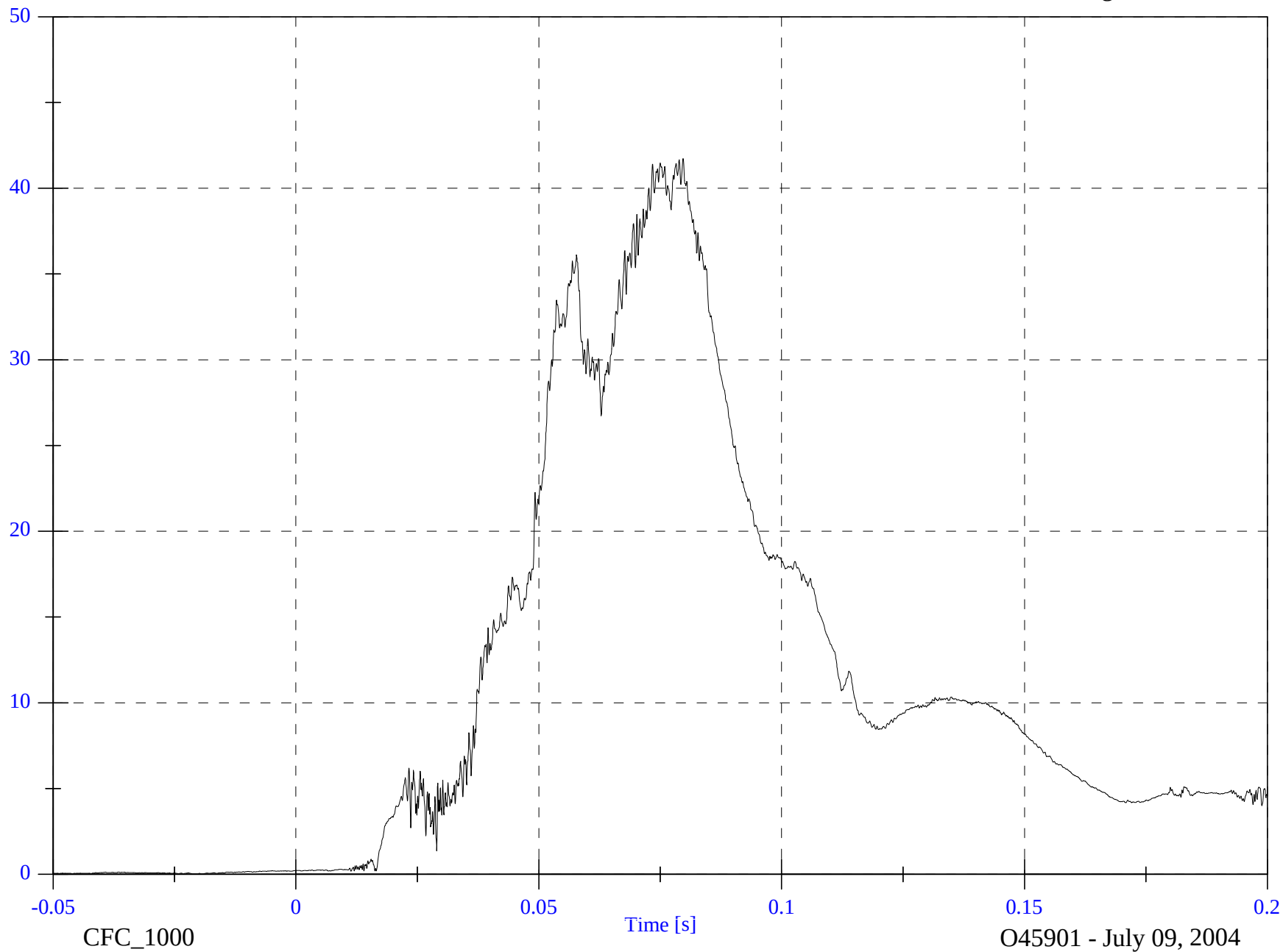
8748-01

NCAP Optional Test - 2004.5 Volvo S40

V1P2 Head CG Resultant

Max: 41.7 [g] at 0.080 [s]

Min: 0.0 [g] at -0.021 [s]

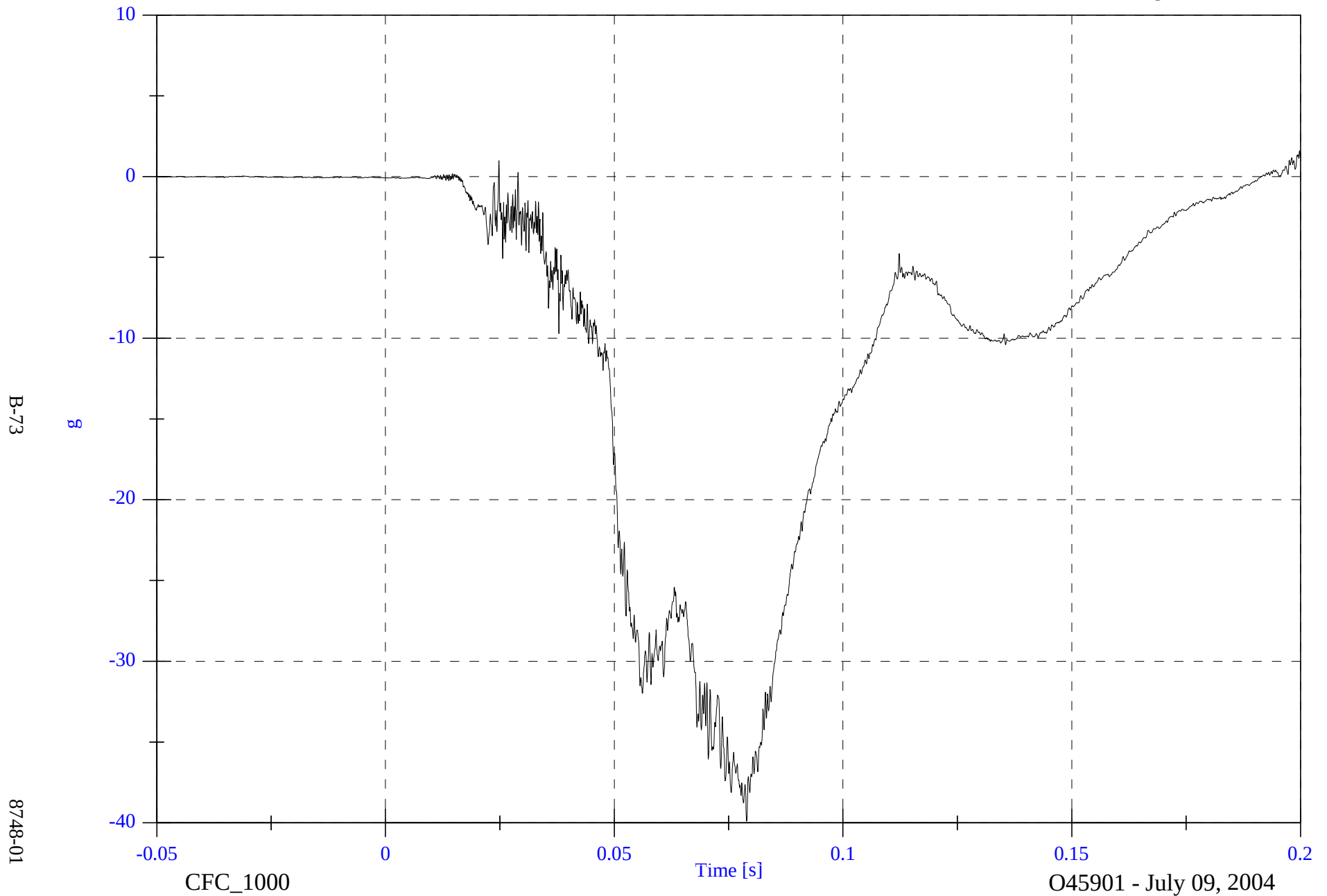


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Head CG Red x

Max: 1.6 [g] at 0.200 [s]

Min: -39.9 [g] at 0.079 [s]



NCAP Optional Test - 2004.5 Volvo S40

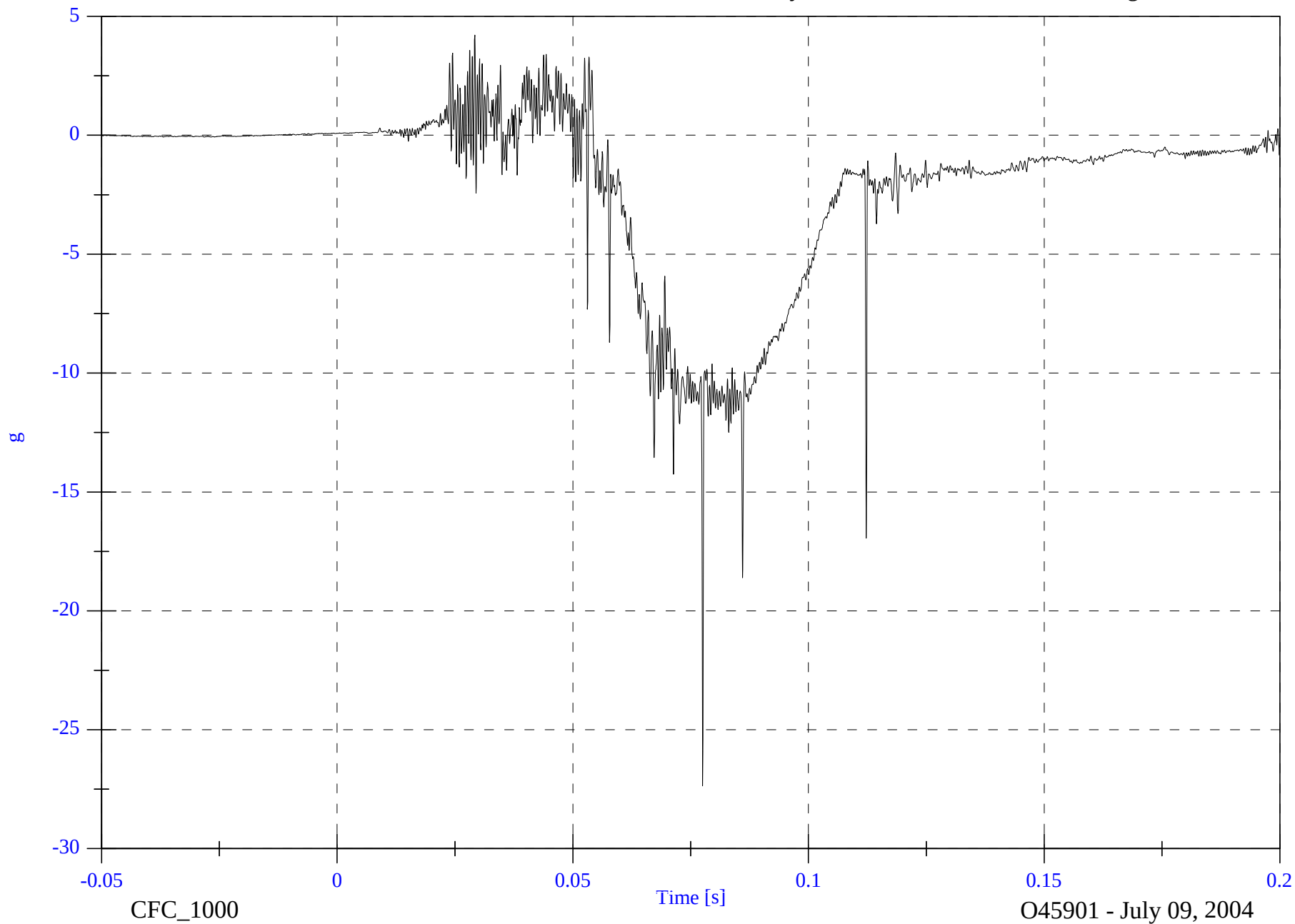
V1P2 Head CG Red y

Max: 4.2 [g] at 0.029 [s]

Min: -27.4 [g] at 0.078 [s]

B-74

8748-01



CFC_1000

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

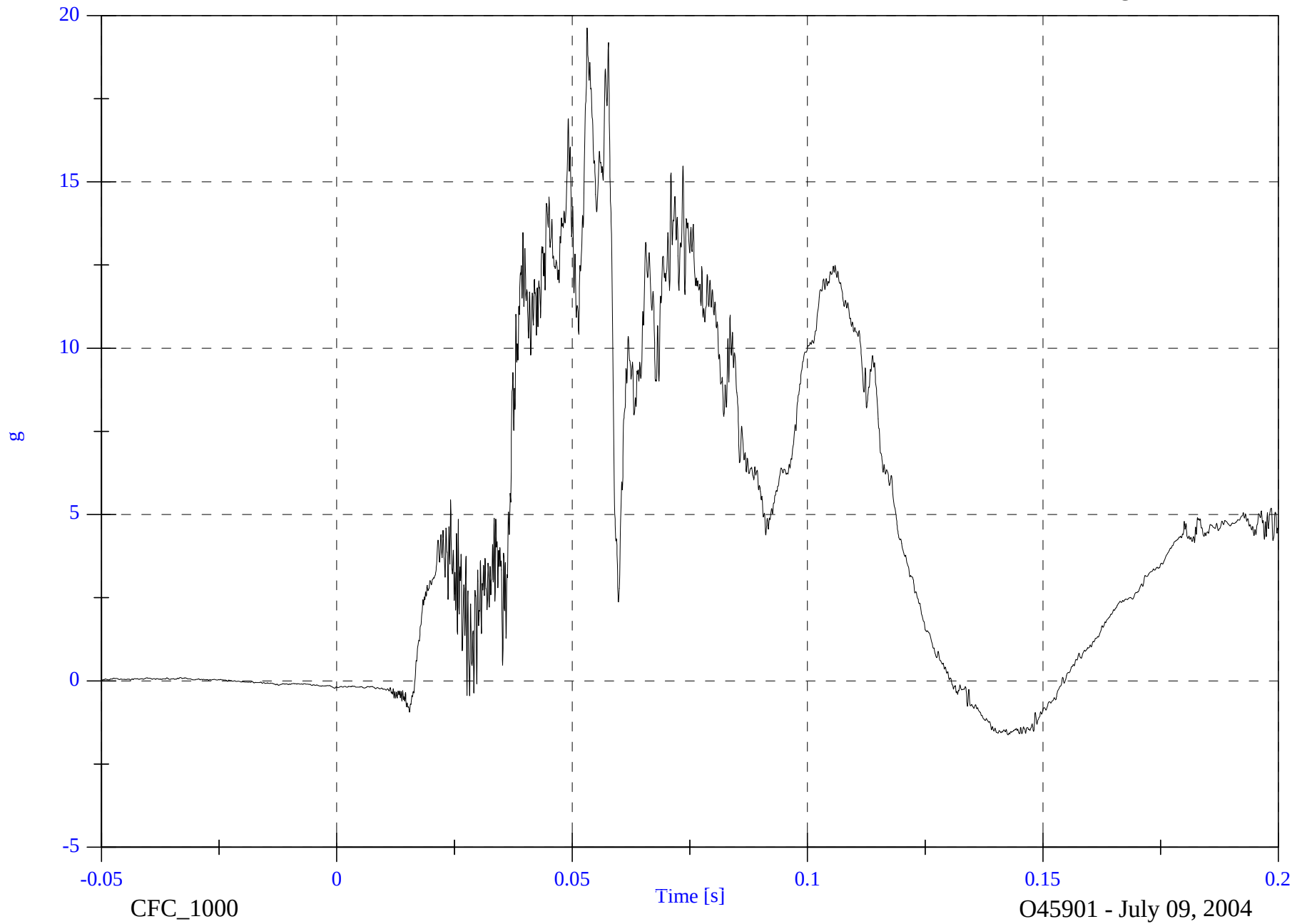
V1P2 Head CG Red z

Max: 19.6 [g] at 0.053 [s]

Min: -1.6 [g] at 0.143 [s]

B-75

8748-01



NCAP Optional Test - 2004.5 Volvo S40

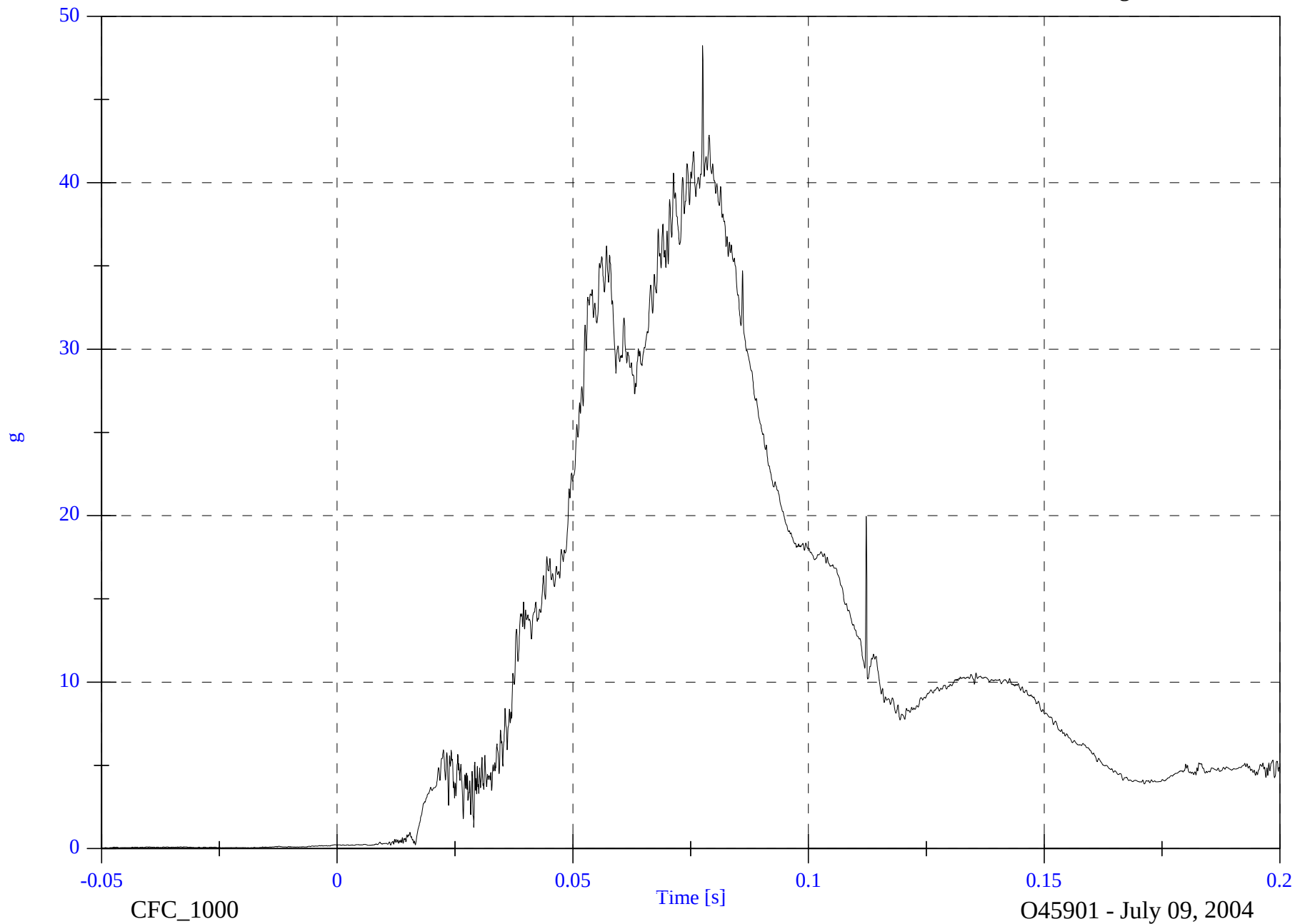
V1P2 Head CG Red Resultant

Max: 48.2 [g] at 0.078 [s]

Min: 0.0 [g] at -0.050 [s]

B-76

8748-01

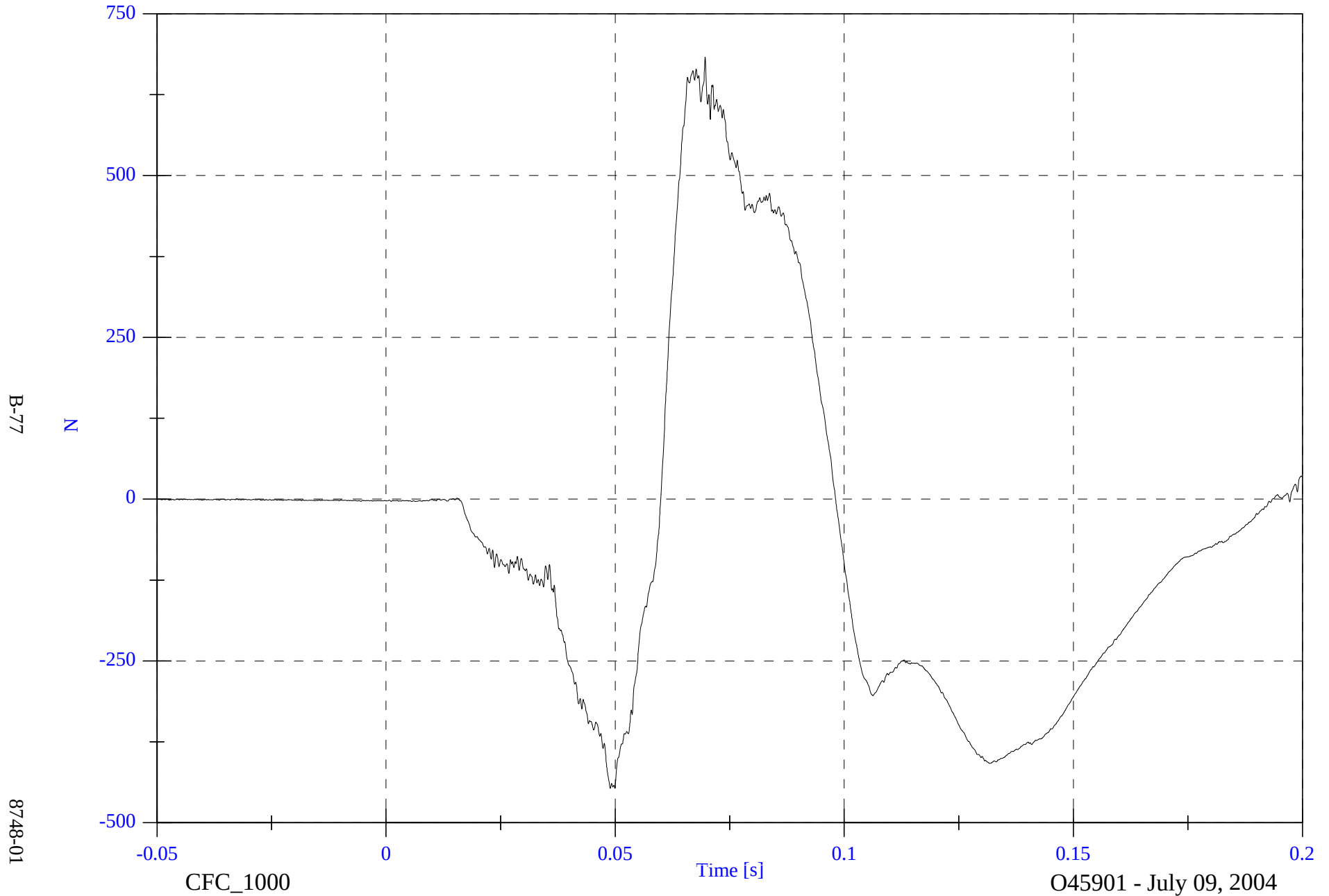


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Upper Neck Fx

Max: 683.0 [N] at 0.070 [s]

Min: -447.0 [N] at 0.049 [s]

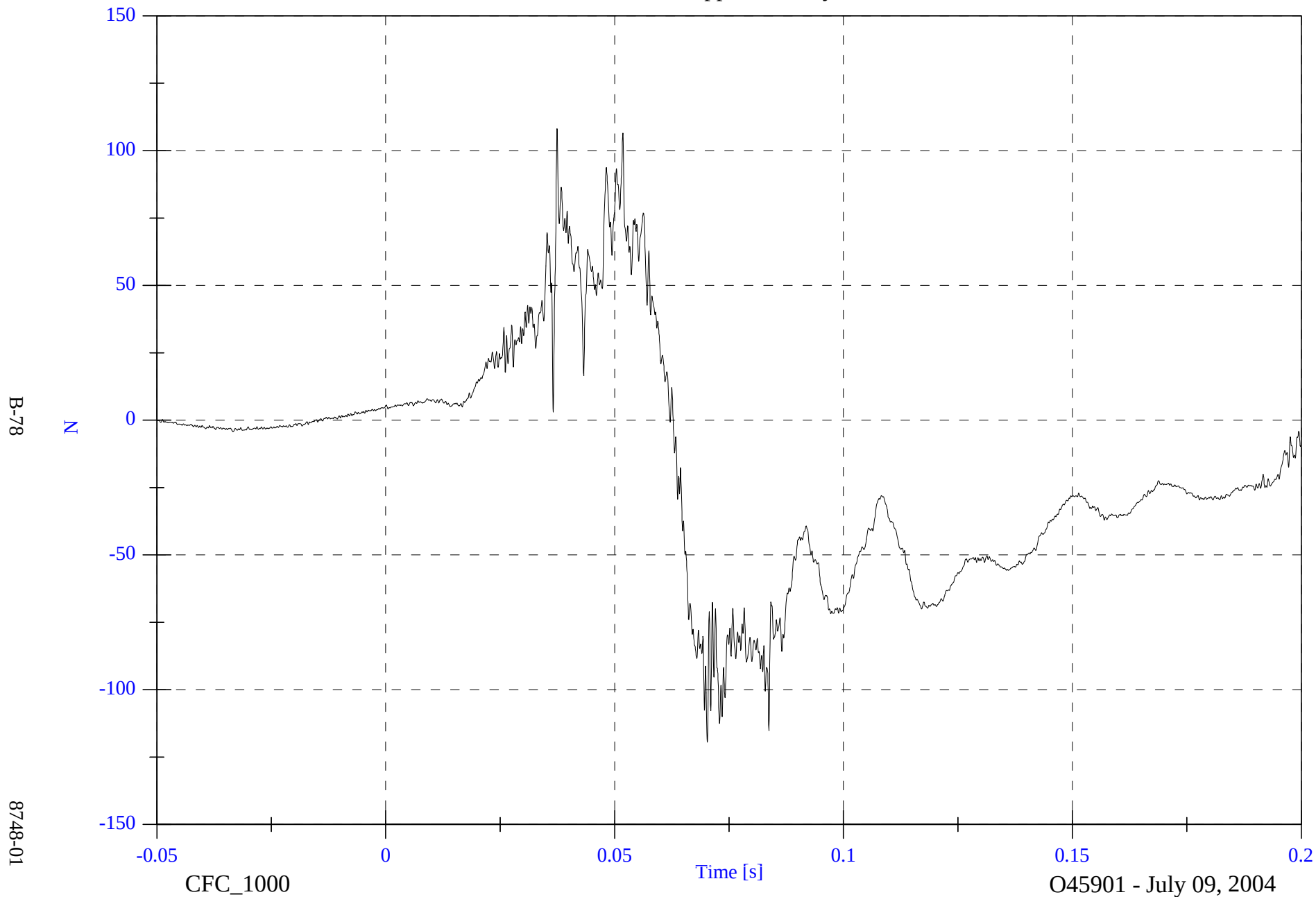


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Upper Neck Fy

Max: 108.2 [N] at 0.037 [s]

Min: -119.5 [N] at 0.070 [s]

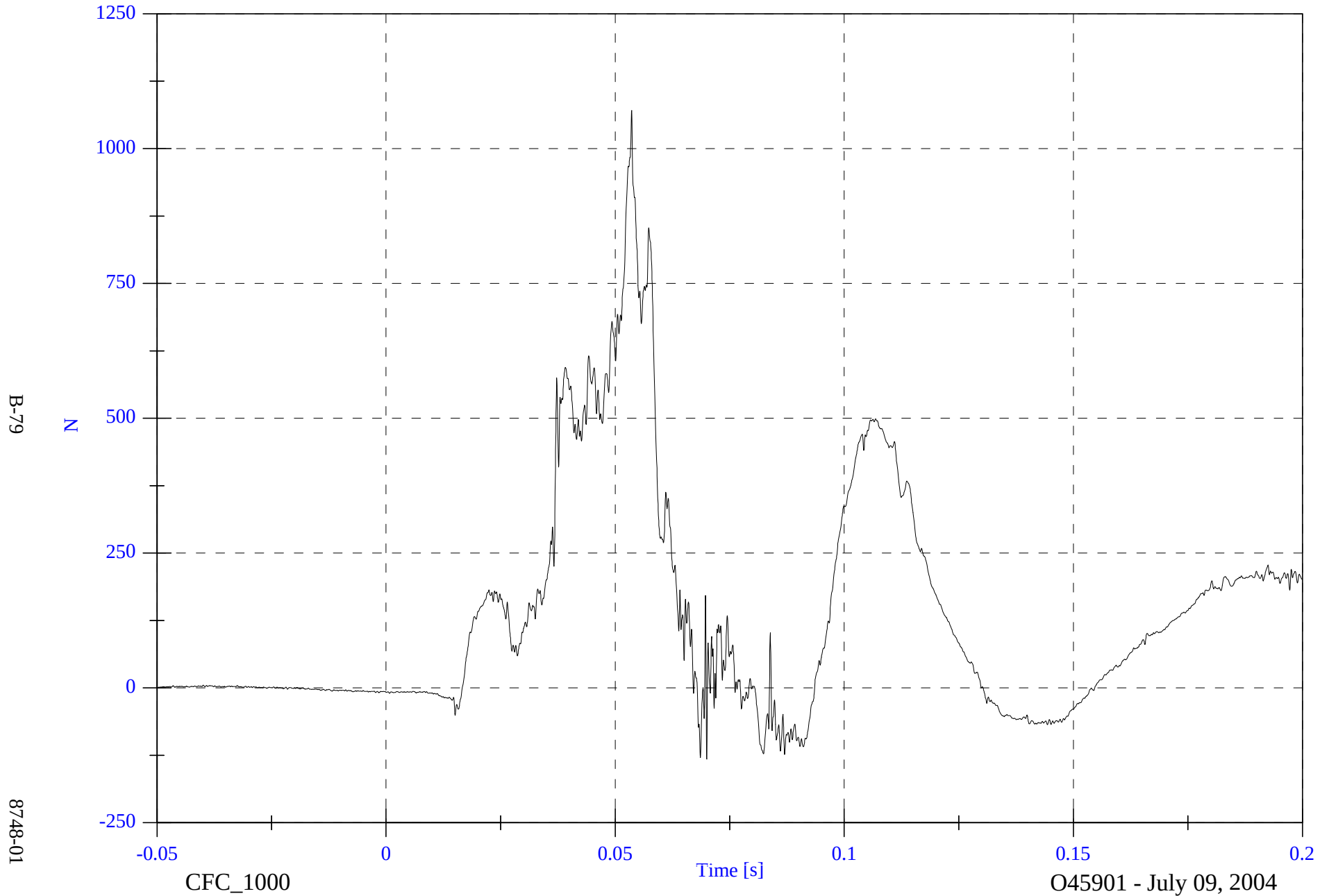


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Upper Neck Fz

Max: 1070.8 [N] at 0.054 [s]

Min: -132.0 [N] at 0.070 [s]

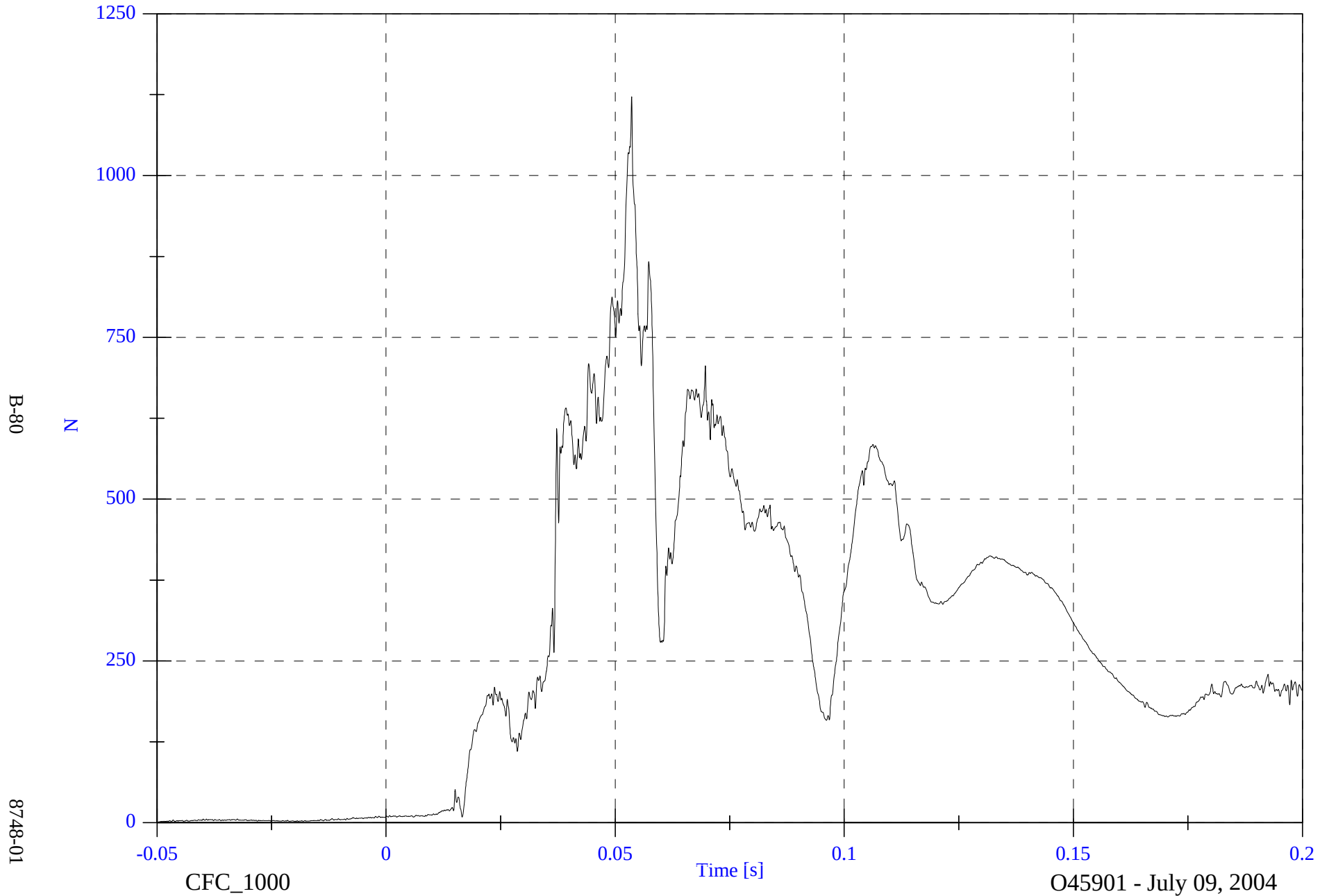


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Upper Neck F Resultant

Max: 1121.5 [N] at 0.054 [s]

Min: 0.5 [N] at -0.050 [s]

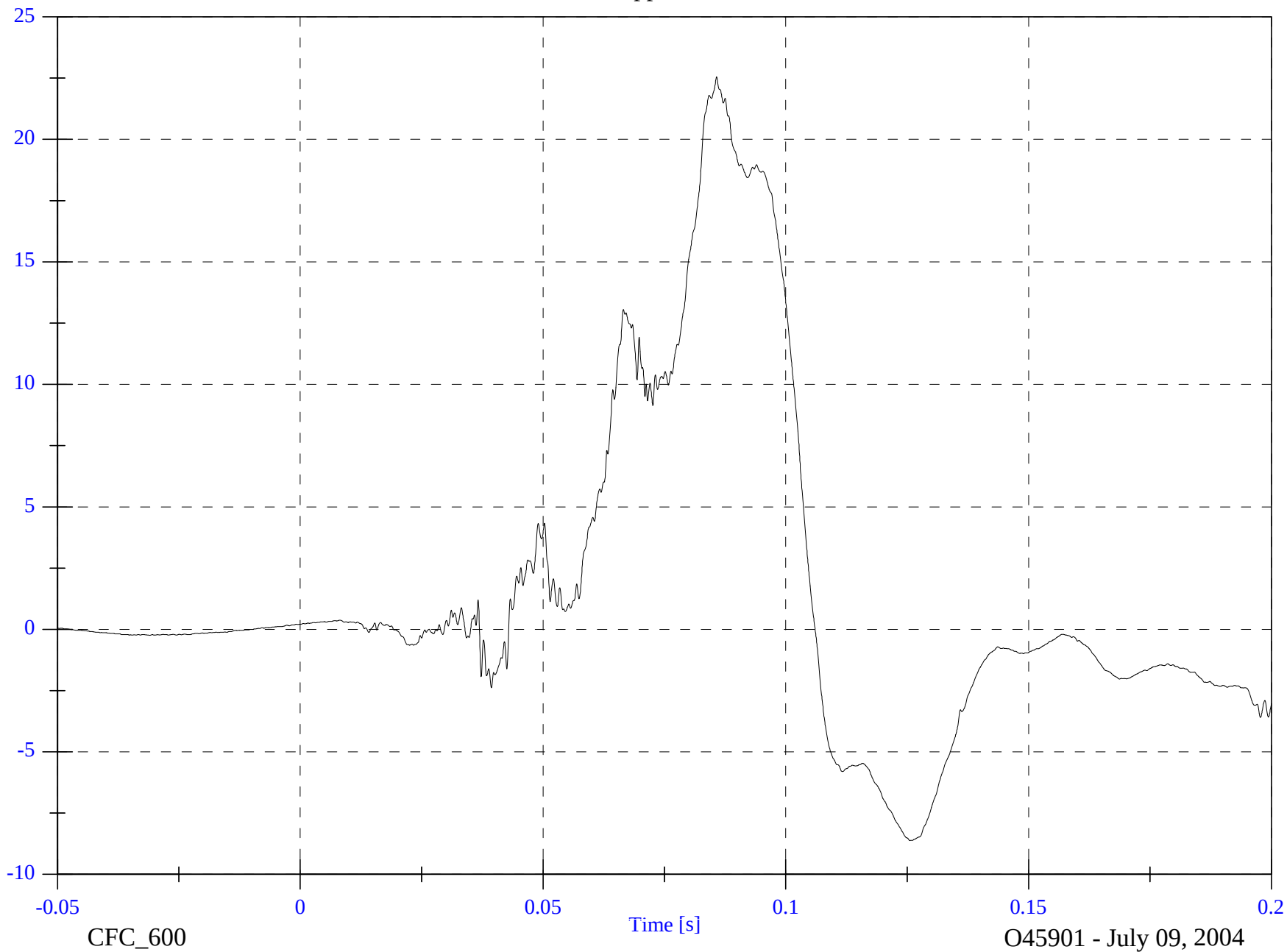


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Upper Neck Mx

Max: 22.6 [N-m] at 0.086 [s]

Min: -8.6 [N-m] at 0.126 [s]



B-81

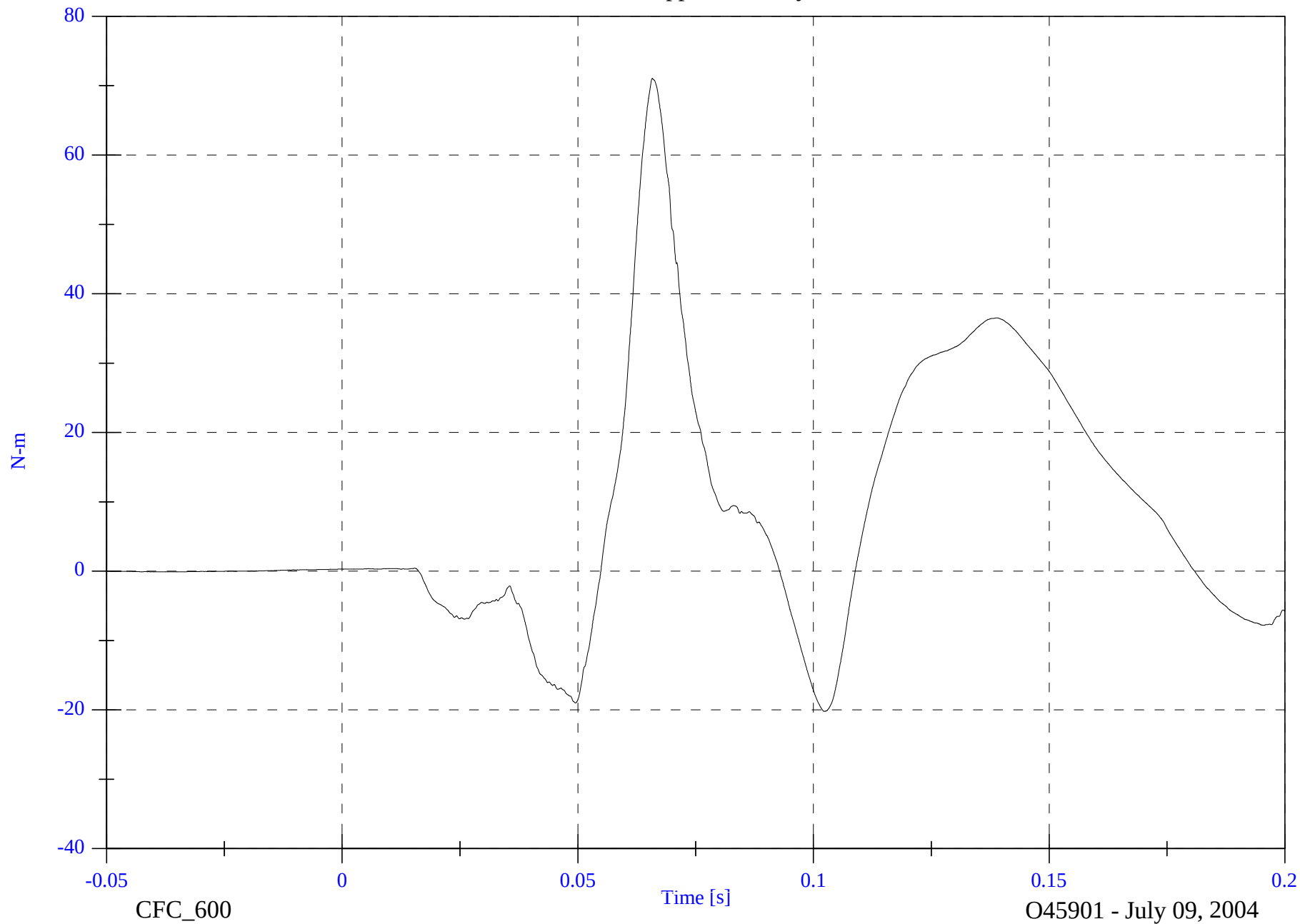
8748-01

NCAP Optional Test - 2004.5 Volvo S40

V1P2 Upper Neck My

Max: 71.1 [N-m] at 0.066 [s]

Min: -20.2 [N-m] at 0.102 [s]



B-82

8748-01

CFC_600

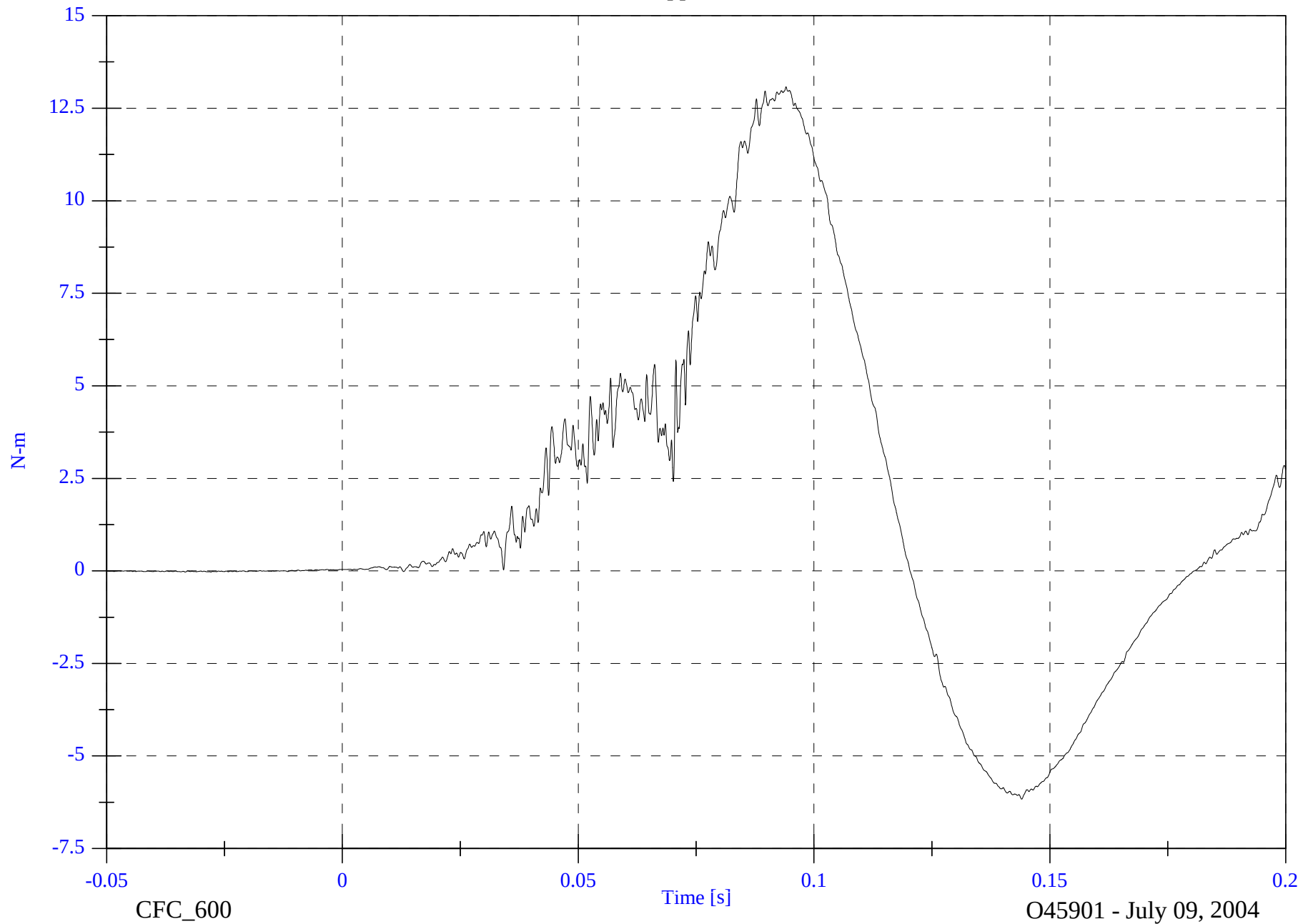
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P2 Upper Neck Mz

Max: 13.1 [N-m] at 0.094 [s]

Min: -6.2 [N-m] at 0.144 [s]



B-83

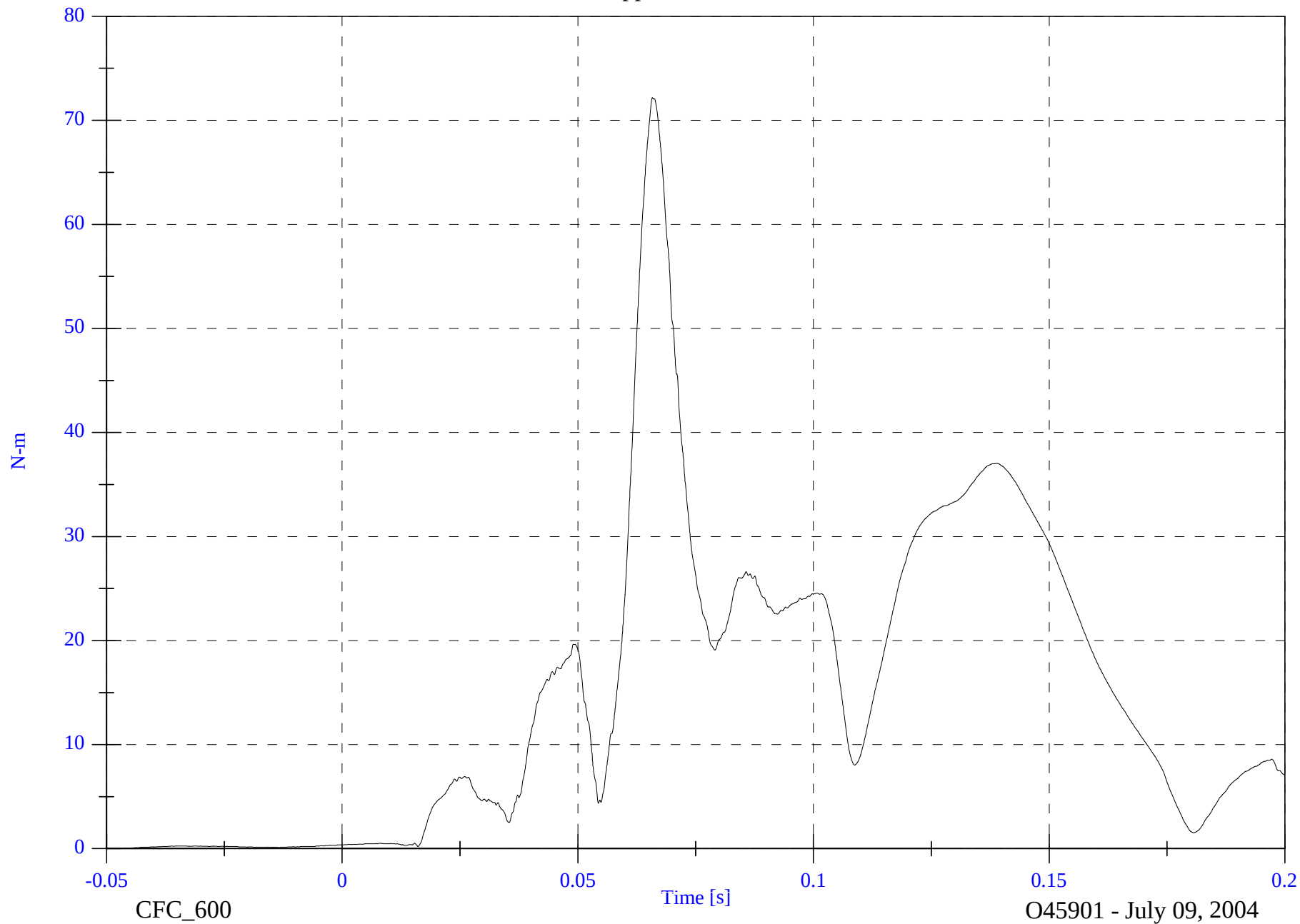
8748-01

NCAP Optional Test - 2004.5 Volvo S40

V1P2 Upper Neck M Resultant

Max: 72.2 [N-m] at 0.066 [s]

Min: 0.0 [N-m] at -0.048 [s]



B-84

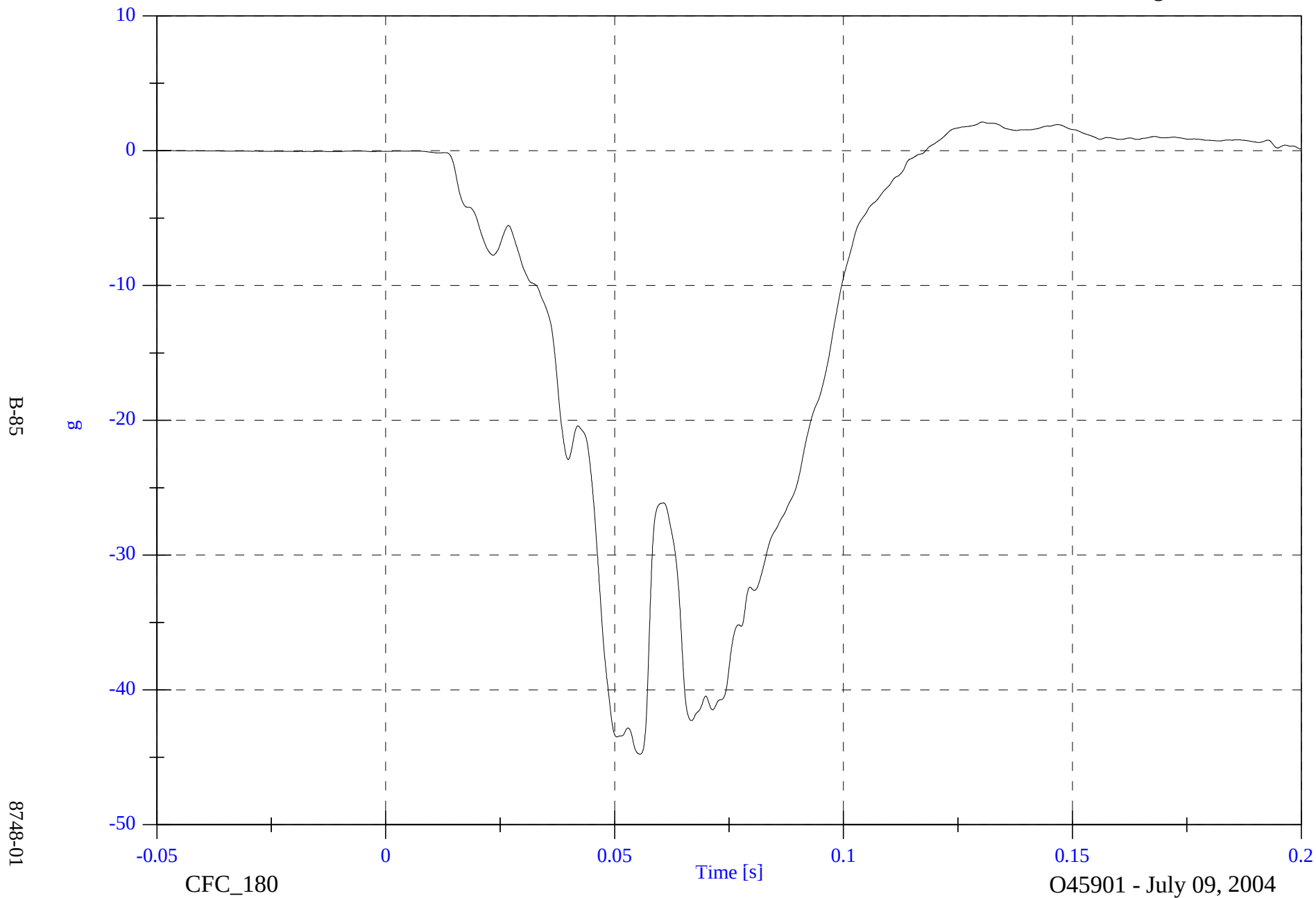
8748-01

NCAP Optional Test - 2004.5 Volvo S40

V1P2 Chest x

Max: 2.1 [g] at 0.130 [s]

Min: -44.8 [g] at 0.056 [s]

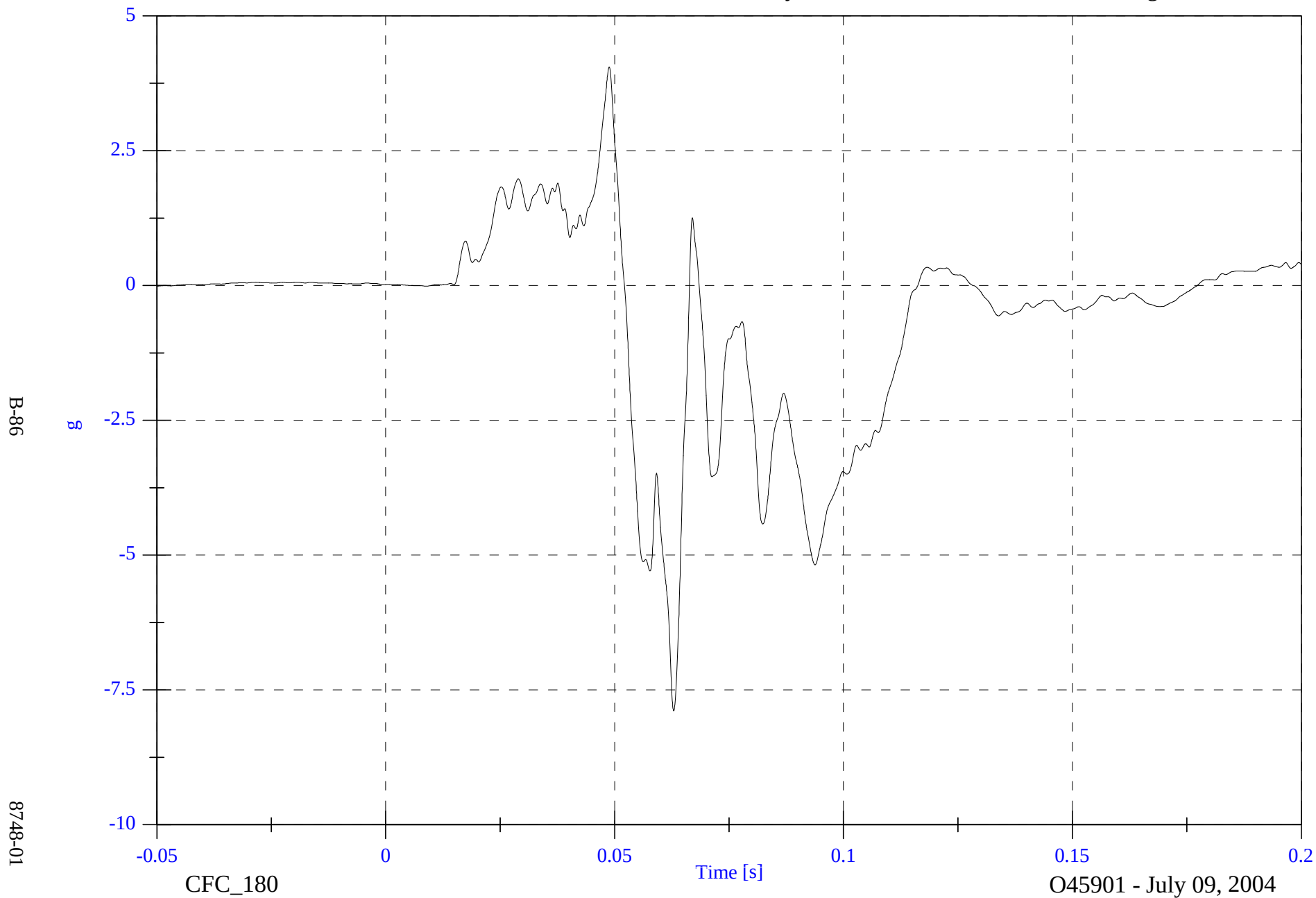


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Chest y

Max: 4.1 [g] at 0.049 [s]

Min: -7.9 [g] at 0.063 [s]

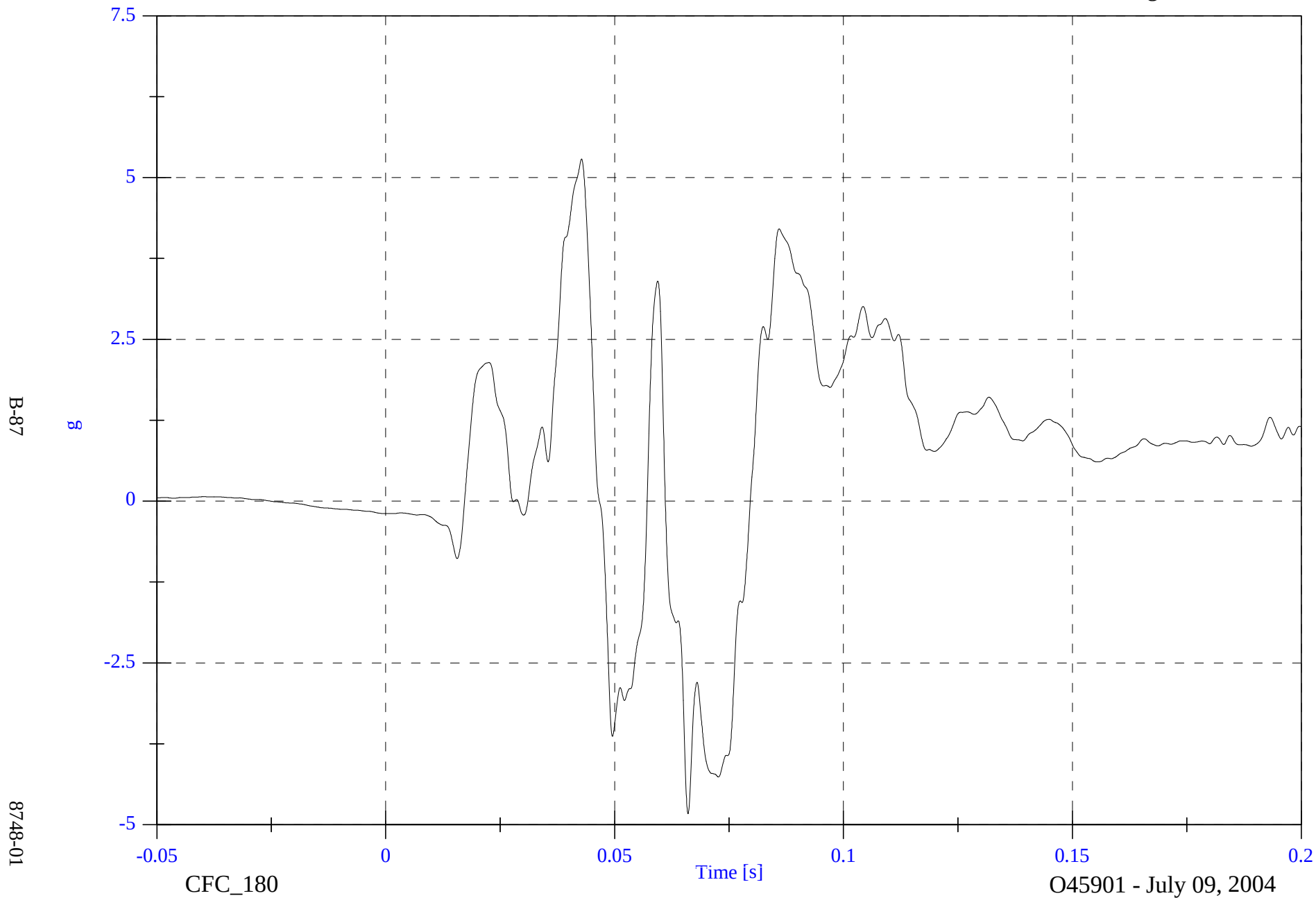


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Chest z

Max: 5.3 [g] at 0.043 [s]

Min: -4.8 [g] at 0.066 [s]



NCAP Optional Test - 2004.5 Volvo S40

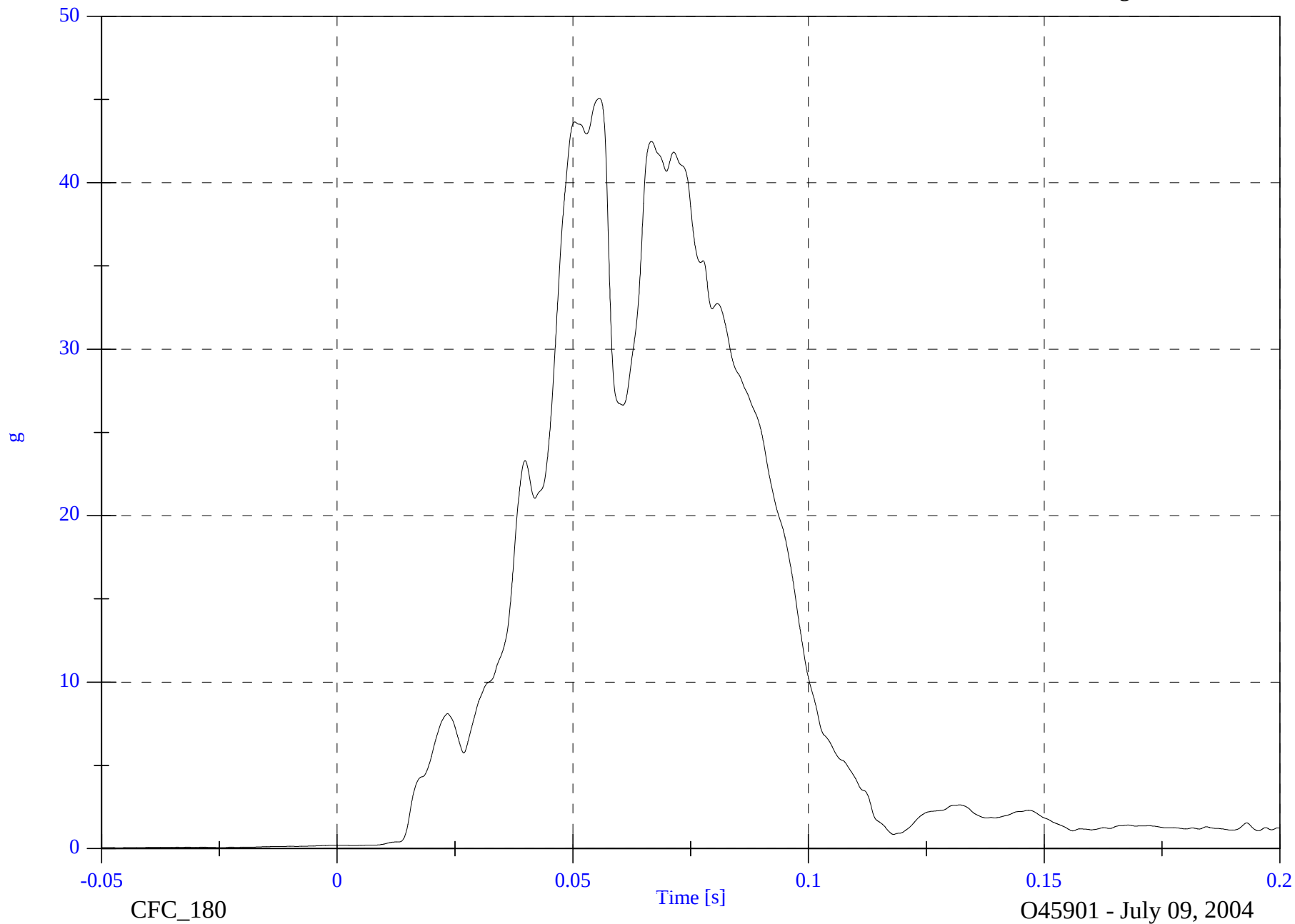
V1P2 Chest Resultant

Max: 45.1 [g] at 0.056 [s]

Min: 0.0 [g] at -0.046 [s]

B-88

8748-01

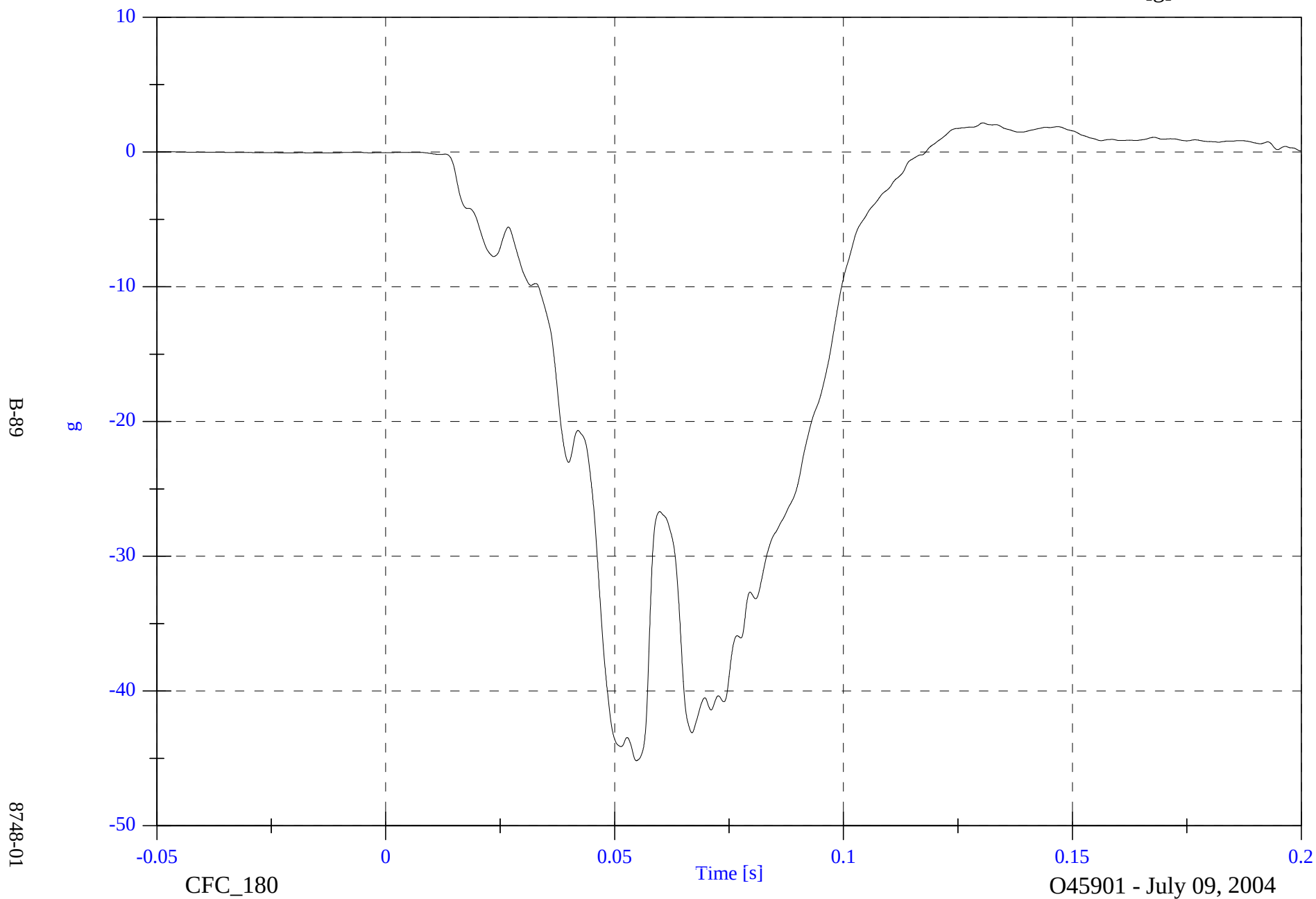


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Chest Red x

Max: 2.2 [g] at 0.130 [s]

Min: -45.2 [g] at 0.055 [s]

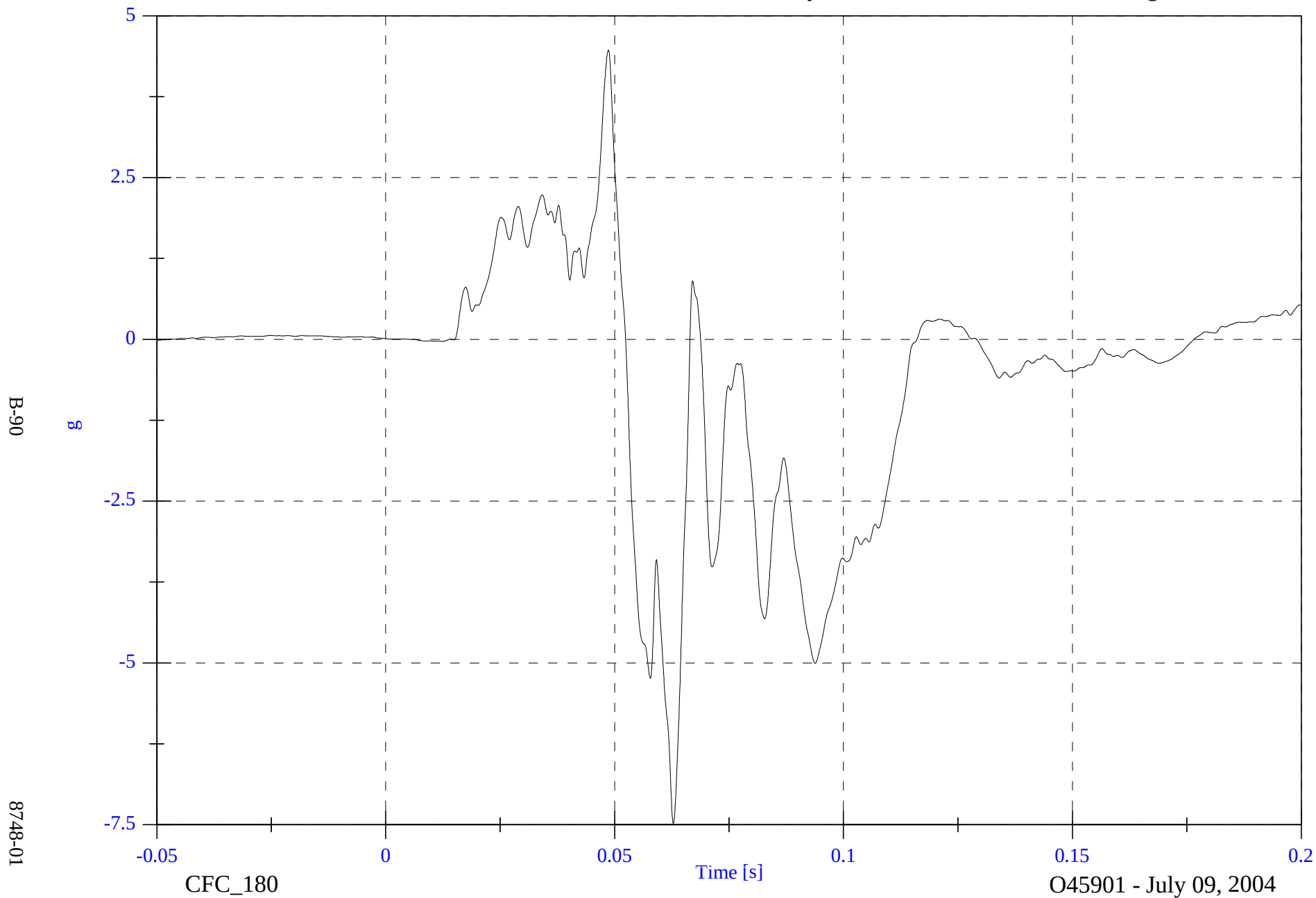


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Chest Red y

Max: 4.5 [g] at 0.049 [s]

Min: -7.5 [g] at 0.063 [s]

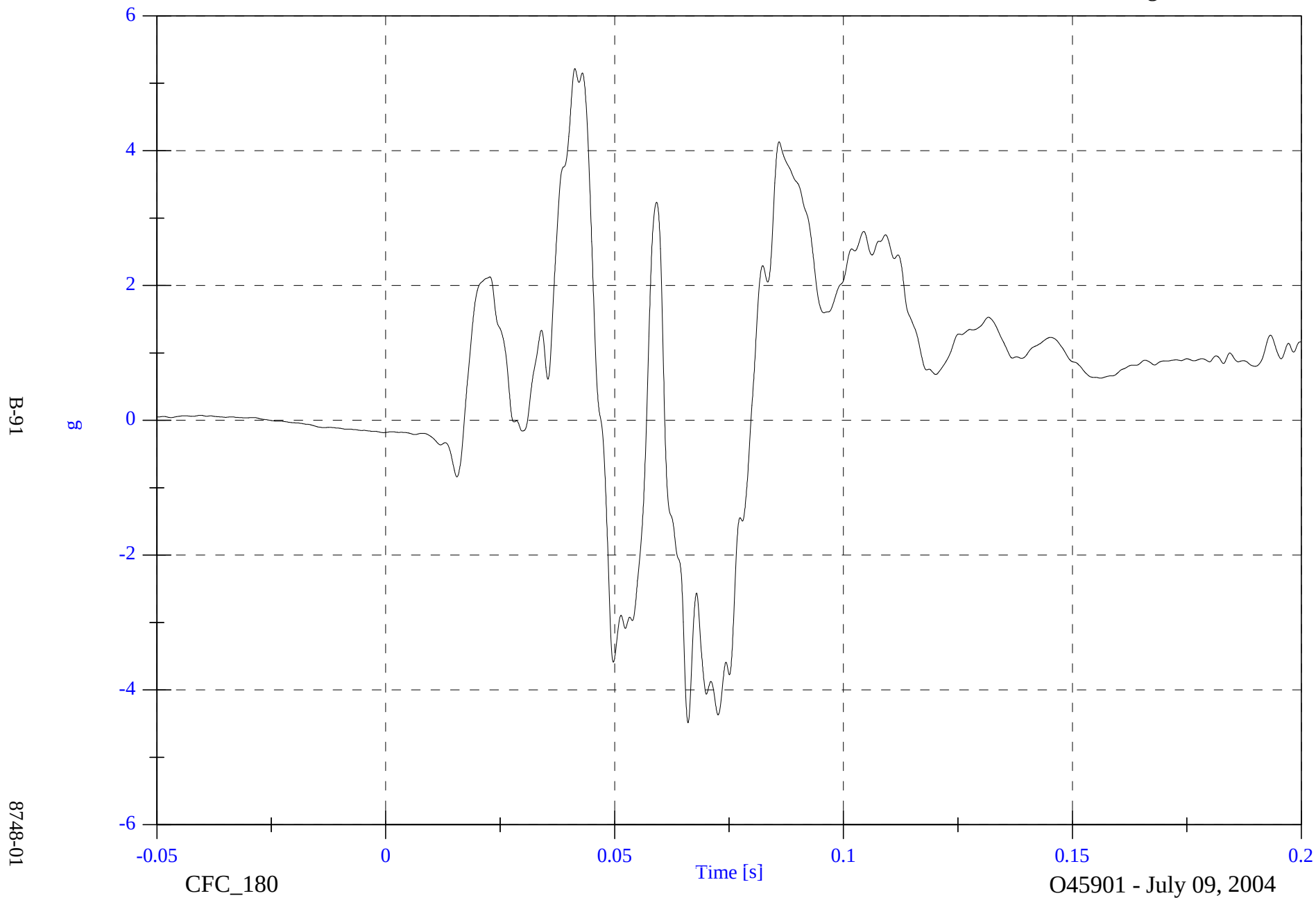


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Chest Red z

Max: 5.2 [g] at 0.041 [s]

Min: -4.5 [g] at 0.066 [s]

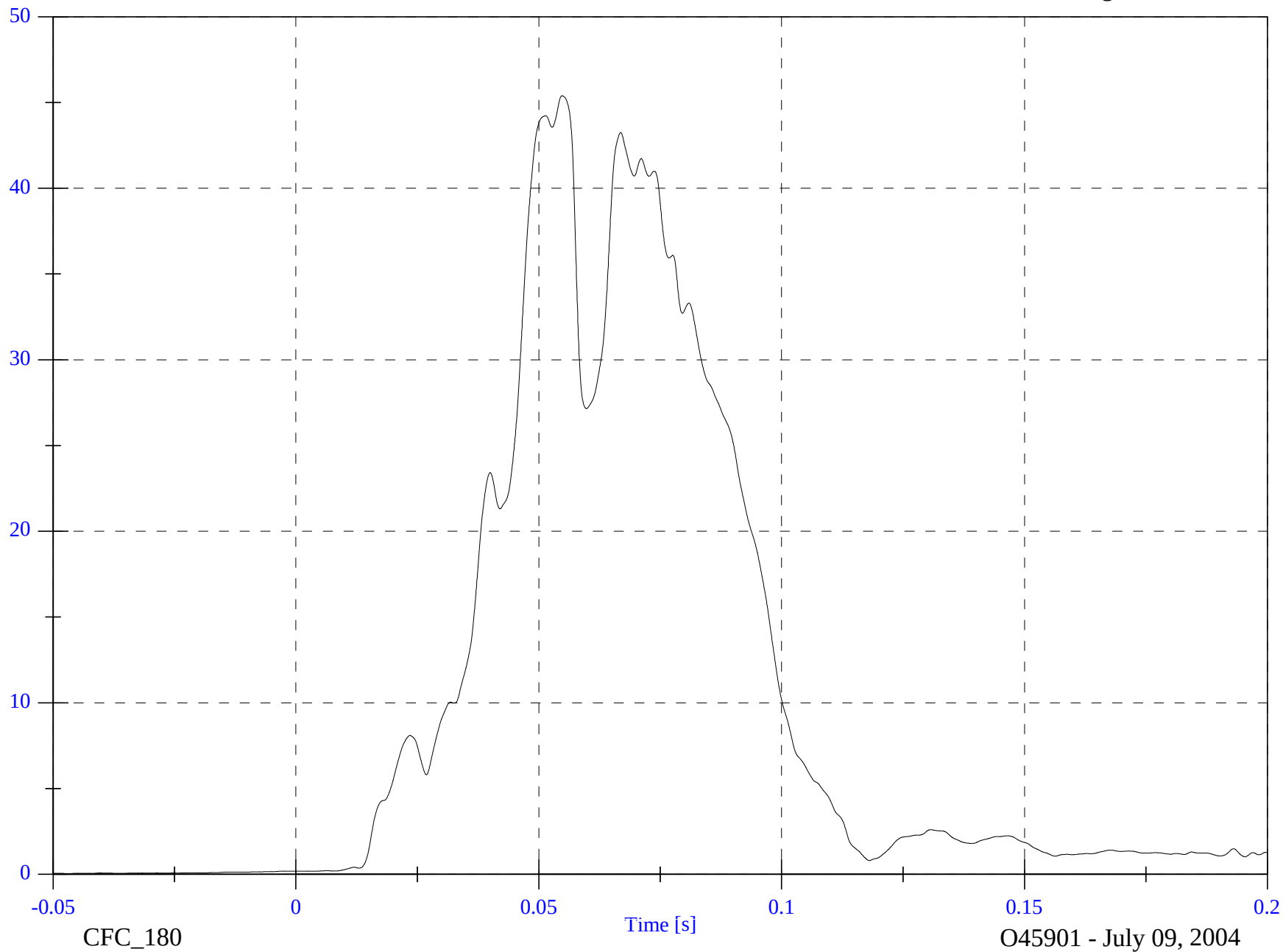


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Chest Red Resultant

Max: 45.4 [g] at 0.055 [s]

Min: 0.0 [g] at -0.047 [s]



B-92

8748-01

NCAP Optional Test - 2004.5 Volvo S40

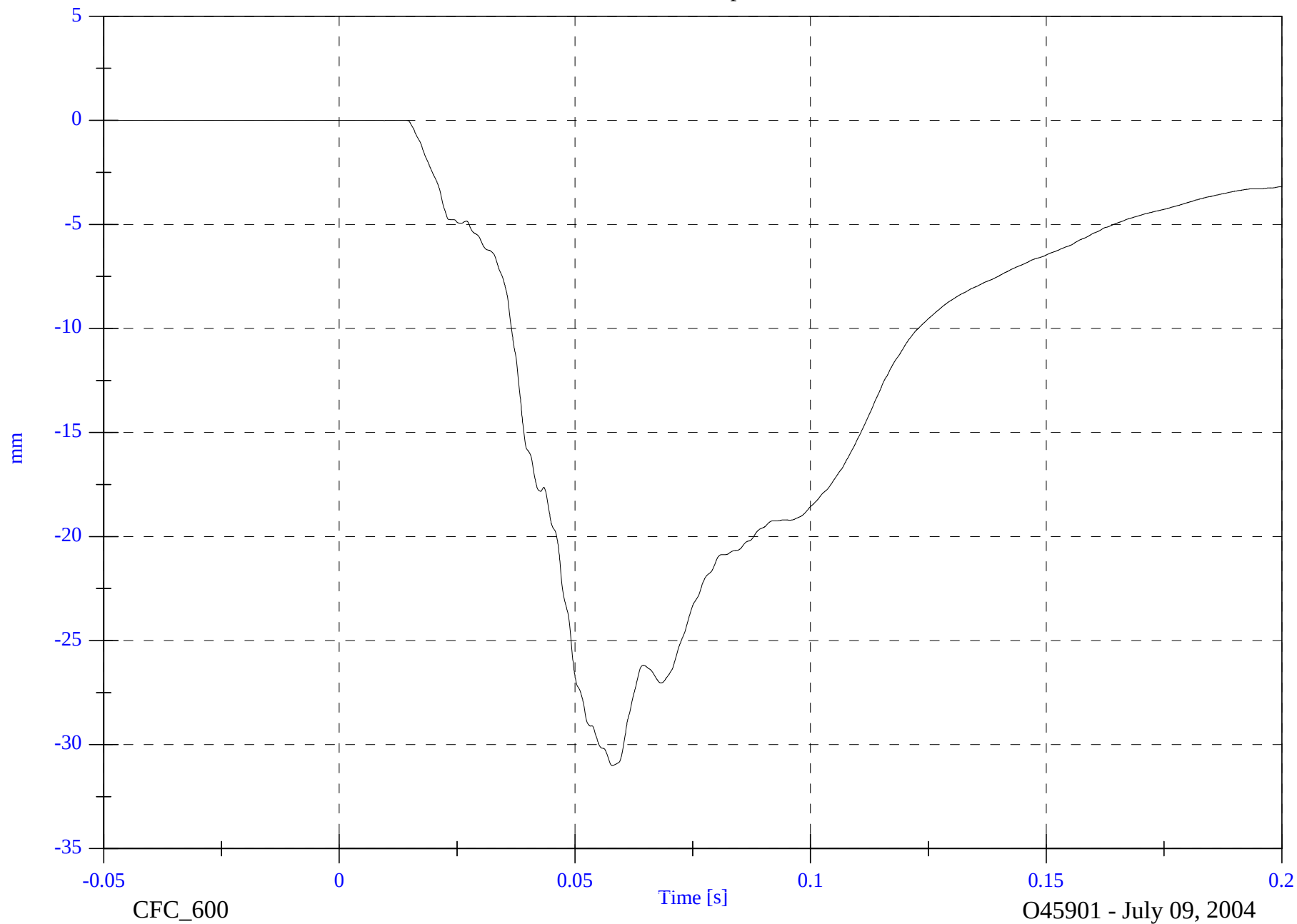
V1P2 Chest Compression x

Max: 0.0 [mm] at 0.009 [s]

Min: -31.0 [mm] at 0.058 [s]

B-93

8748-01

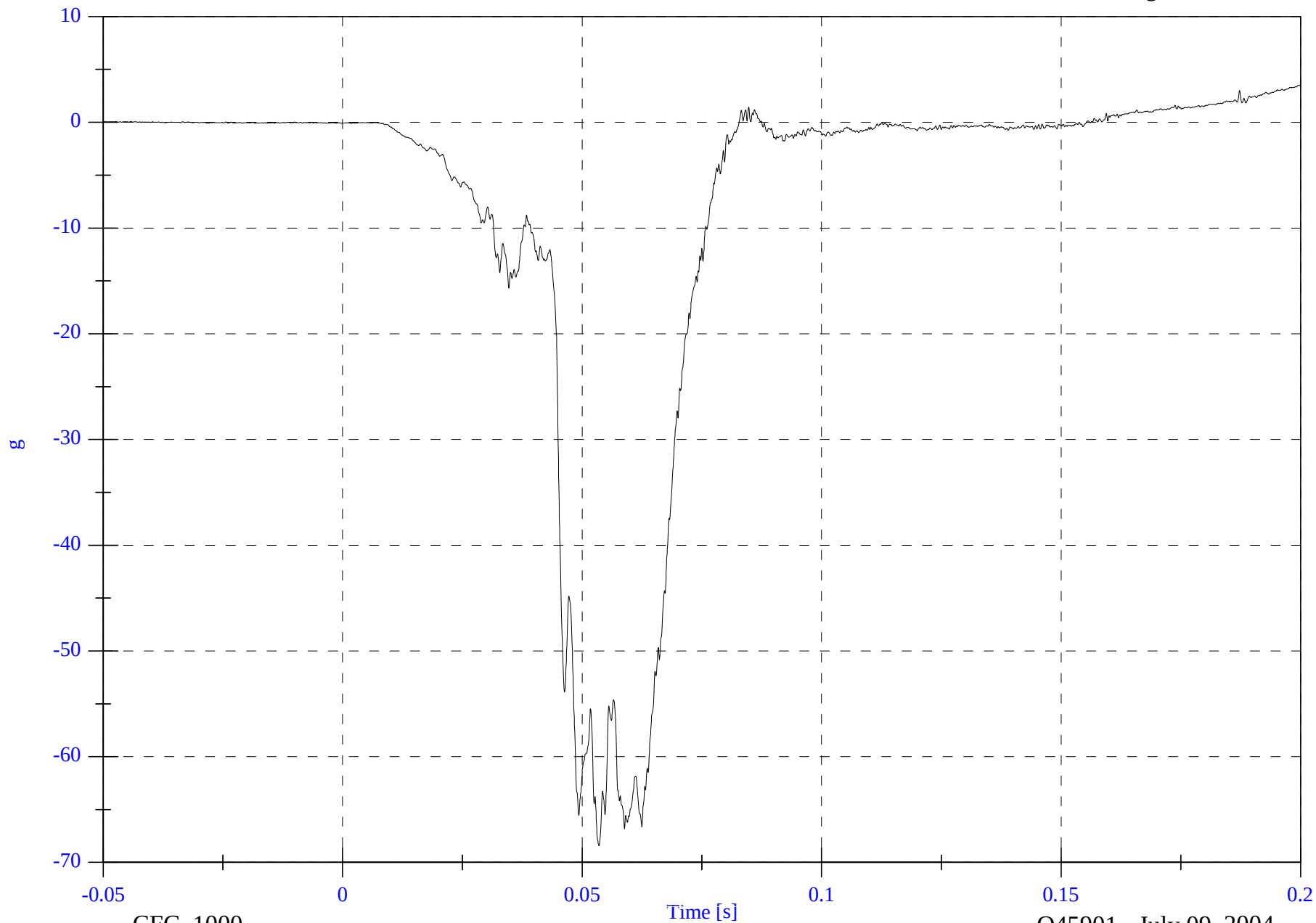


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Pelvic x

Max: 3.5 [g] at 0.200 [s]

Min: -68.4 [g] at 0.053 [s]



B-94

8748-01

CFC_1000

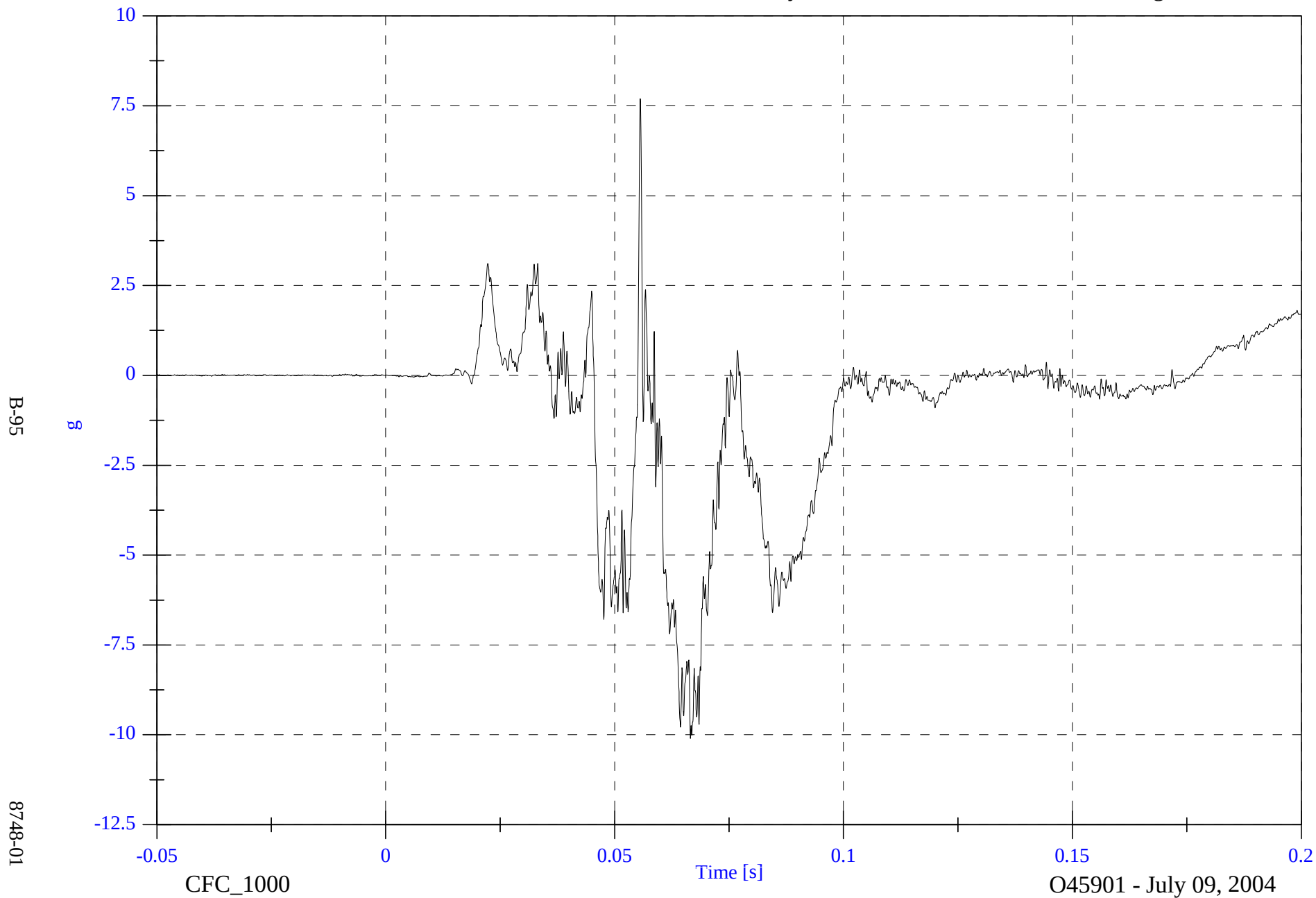
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P2 Pelvic y

Max: 7.7 [g] at 0.056 [s]

Min: -10.1 [g] at 0.067 [s]

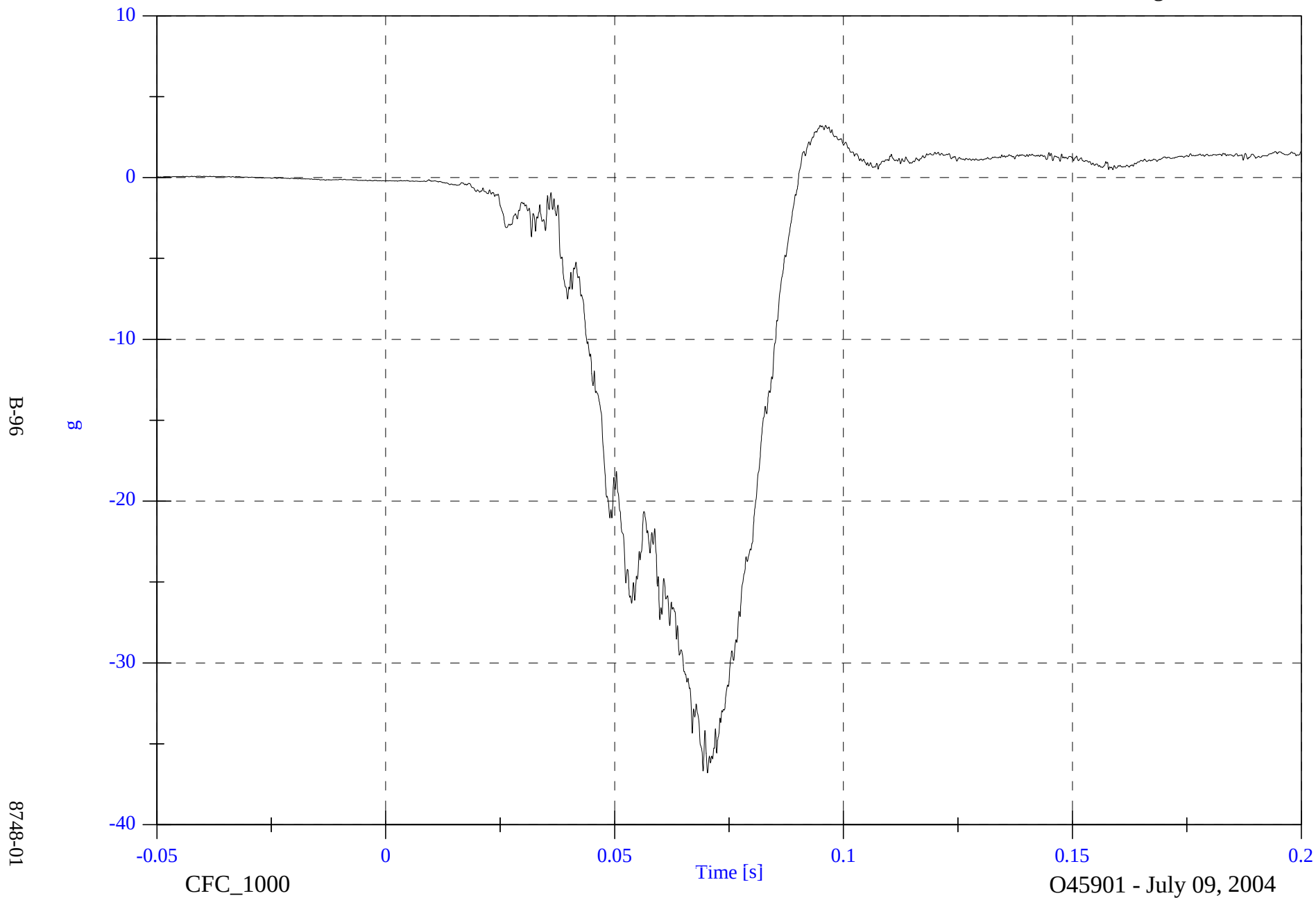


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Pelvic z

Max: 3.2 [g] at 0.095 [s]

Min: -36.8 [g] at 0.070 [s]

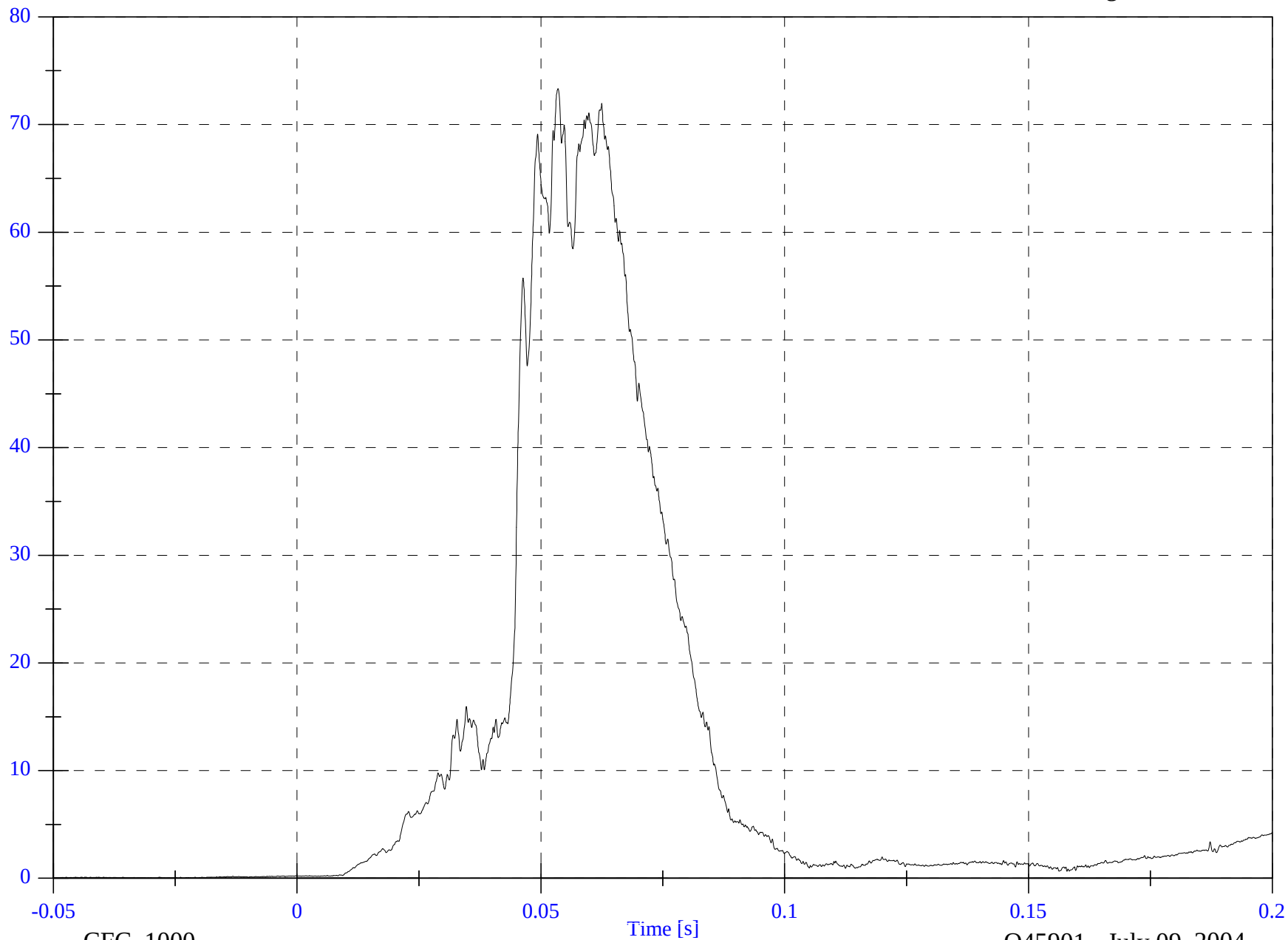


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Pelvic Resultant

Max: 73.4 [g] at 0.053 [s]

Min: 0.0 [g] at -0.024 [s]



B-97

8748-01

CFC_1000

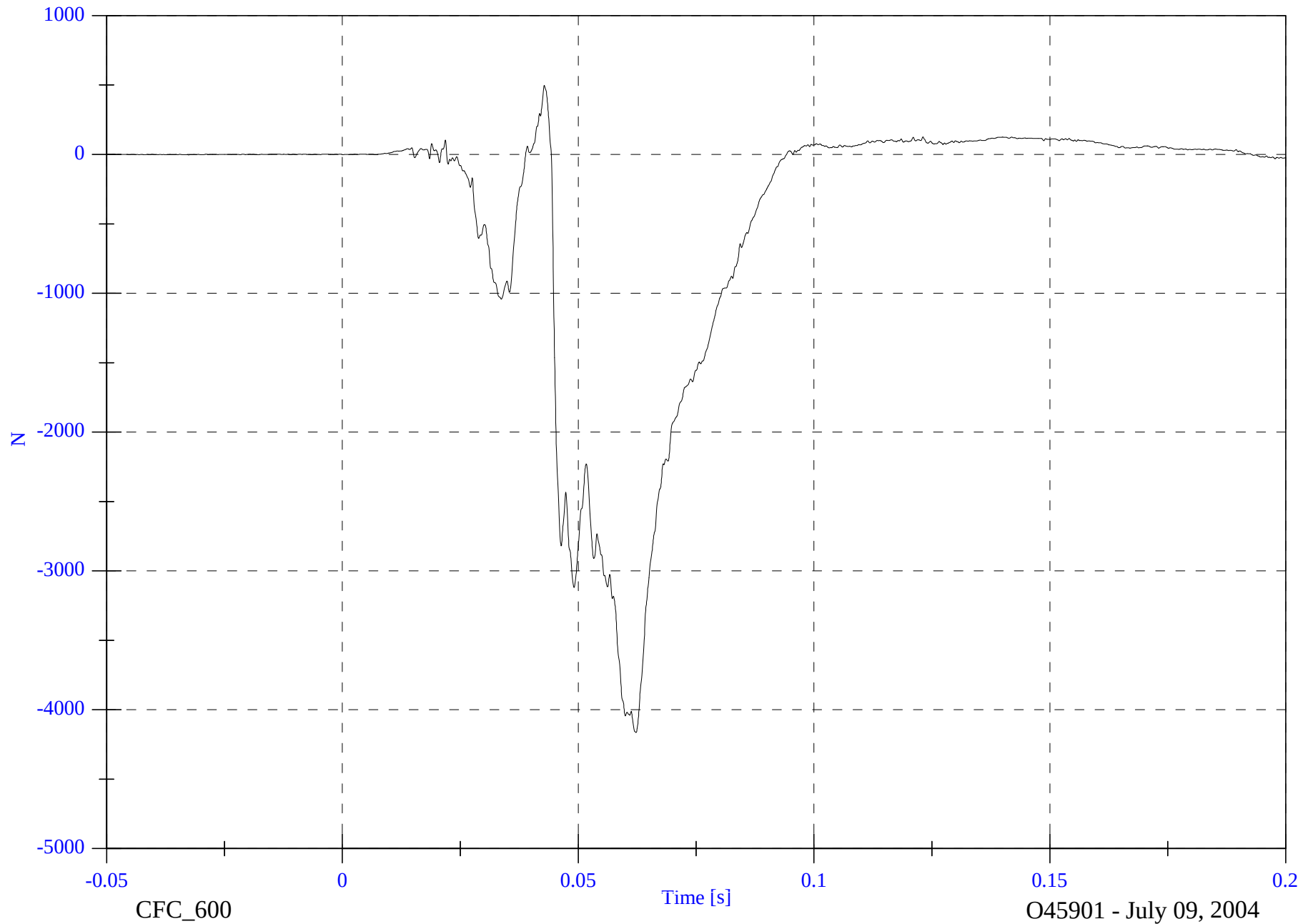
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P2 Left Femur z

Max: 497.5 [N] at 0.043 [s]

Min: -4163.7 [N] at 0.062 [s]

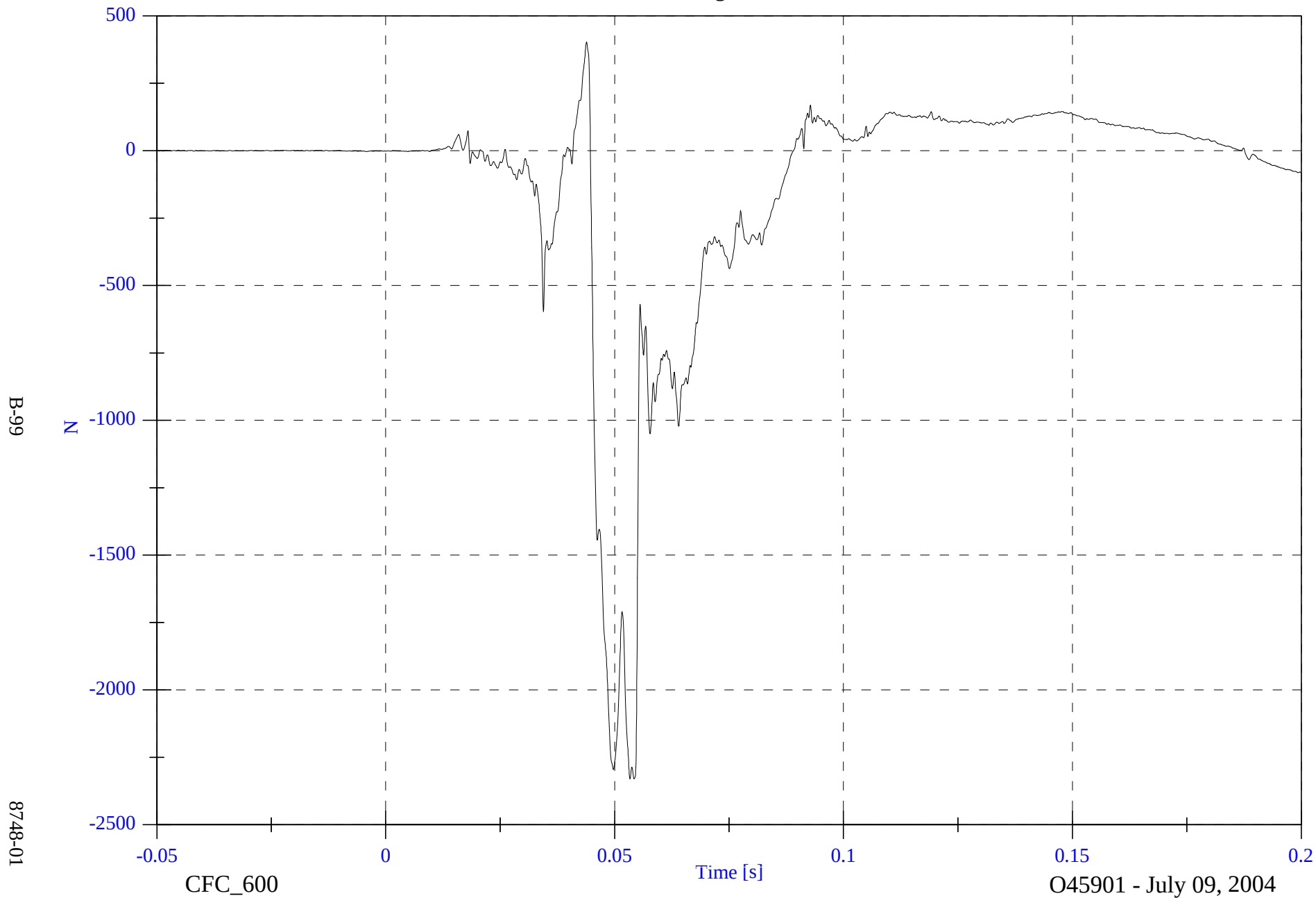


NCAP Optional Test - 2004.5 Volvo S40

Max: 403.5 [N] at 0.044 [s]

Min: -2330.5 [N] at 0.053 [s]

V1P2 Right Femur z



NCAP Optional Test - 2004.5 Volvo S40

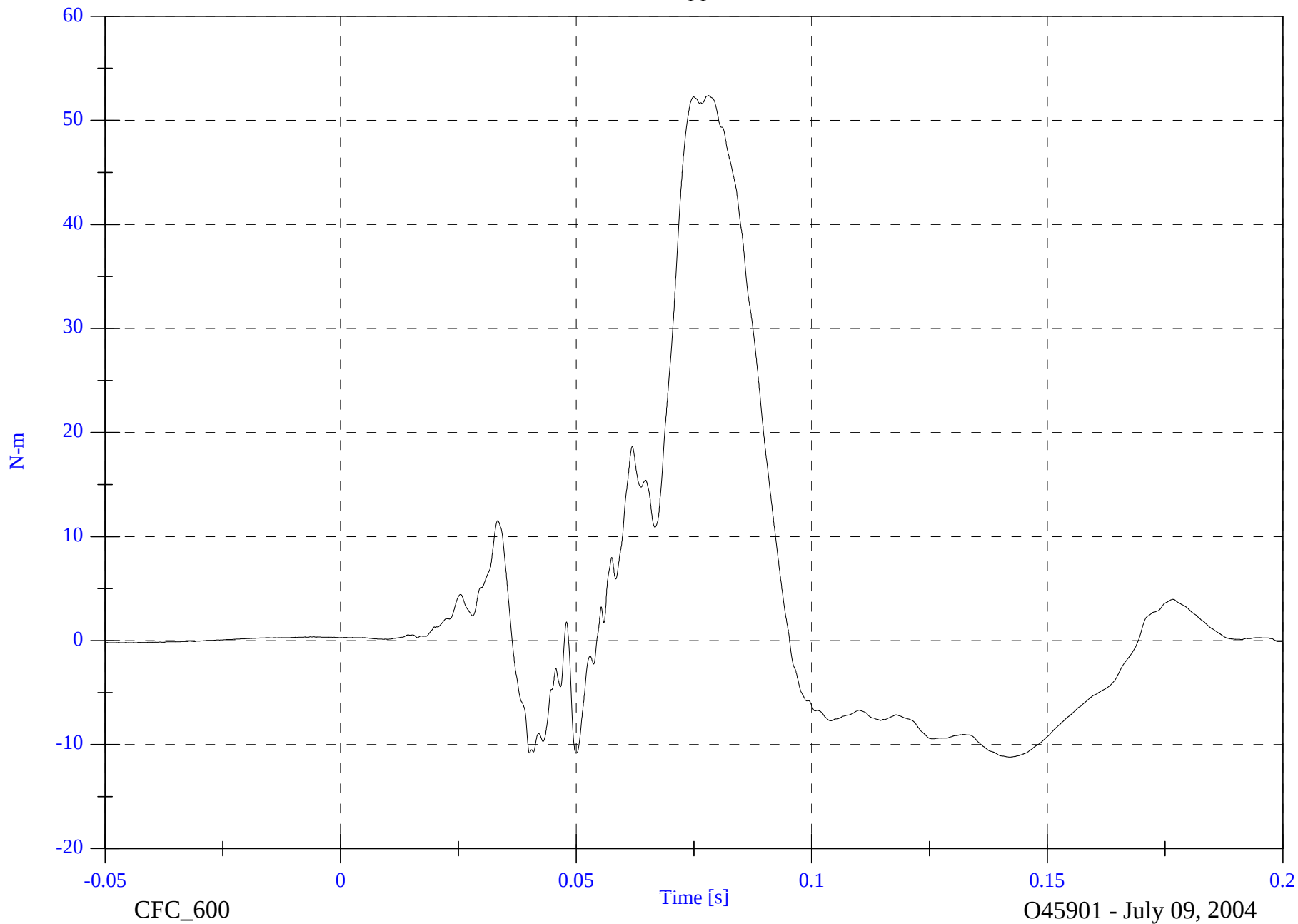
V1P2 Left Upper Tibia Mx

Max: 52.4 [N-m] at 0.078 [s]

Min: -11.2 [N-m] at 0.142 [s]

B-100

8748-01



NCAP Optional Test - 2004.5 Volvo S40

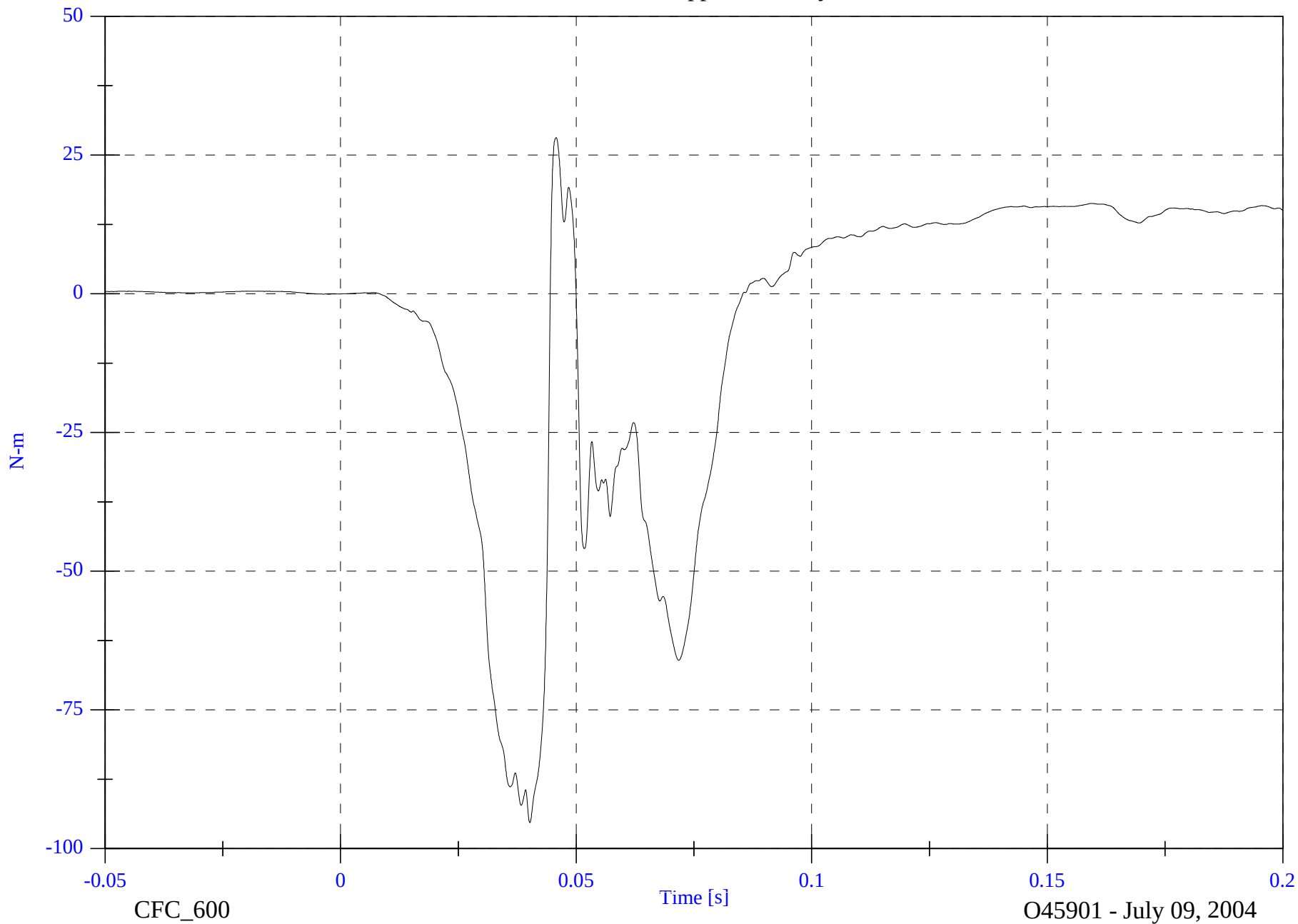
V1P2 Left Upper Tibia My

Max: 28.1 [N-m] at 0.046 [s]

Min: -95.3 [N-m] at 0.040 [s]

B-101

8748-01



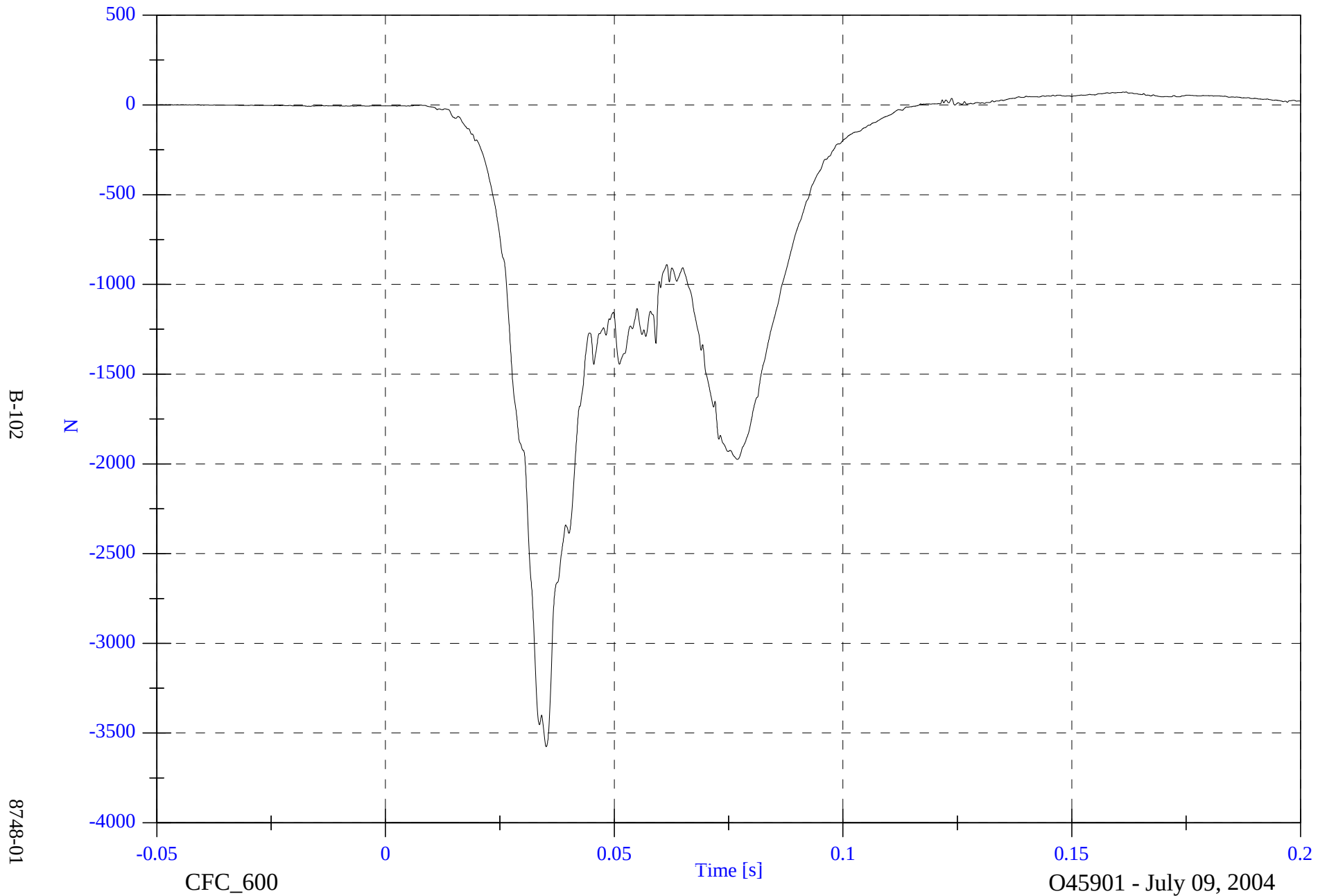
CFC_600

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P2 Left Lower Tibia Fz

Max: 72.0 [N] at 0.162 [s]
Min: -3576.4 [N] at 0.035 [s]

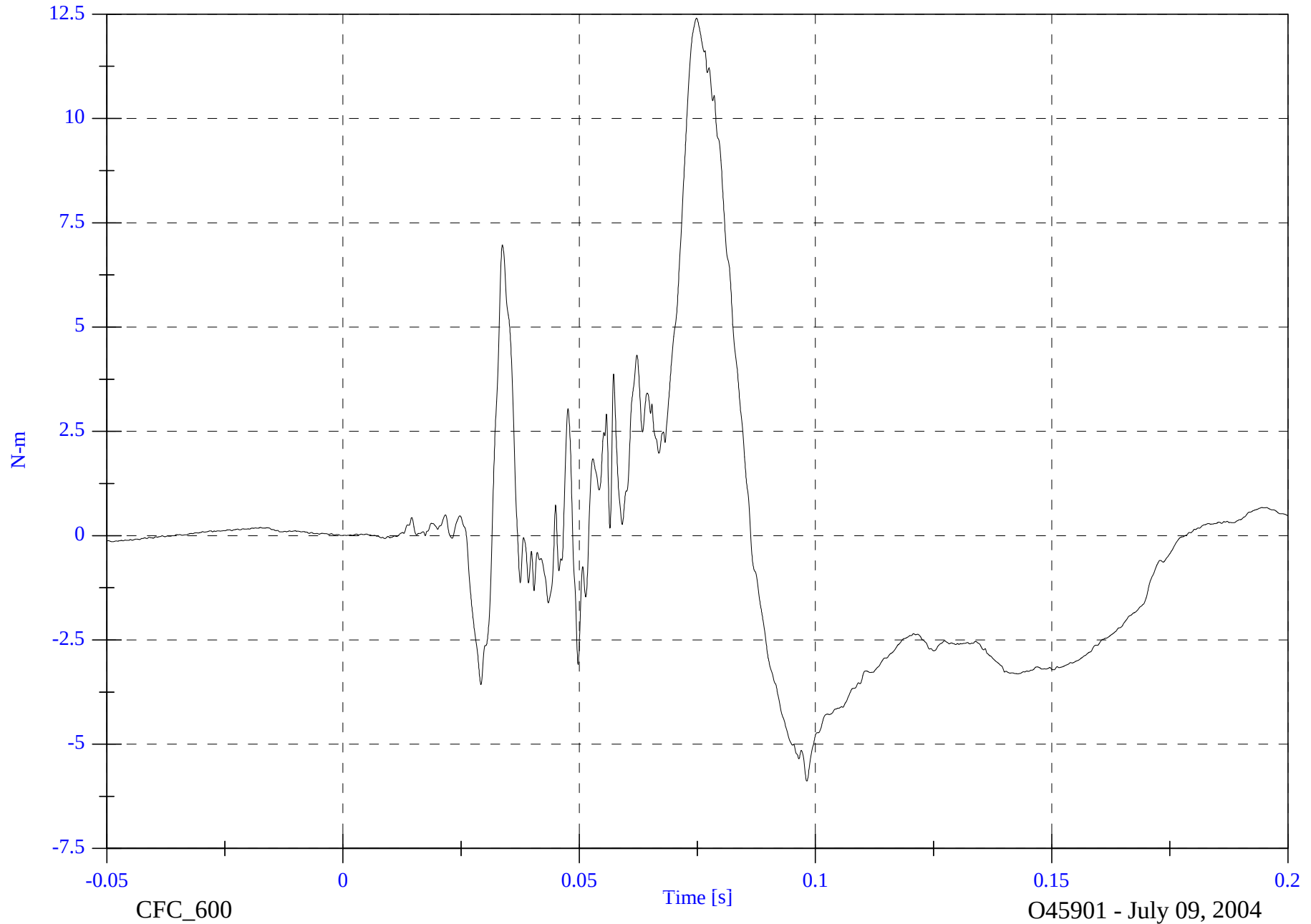


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Left Lower Tibia Mx

Max: 12.4 [N-m] at 0.075 [s]

Min: -5.9 [N-m] at 0.098 [s]



B-103

8748-01

CFC_600

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

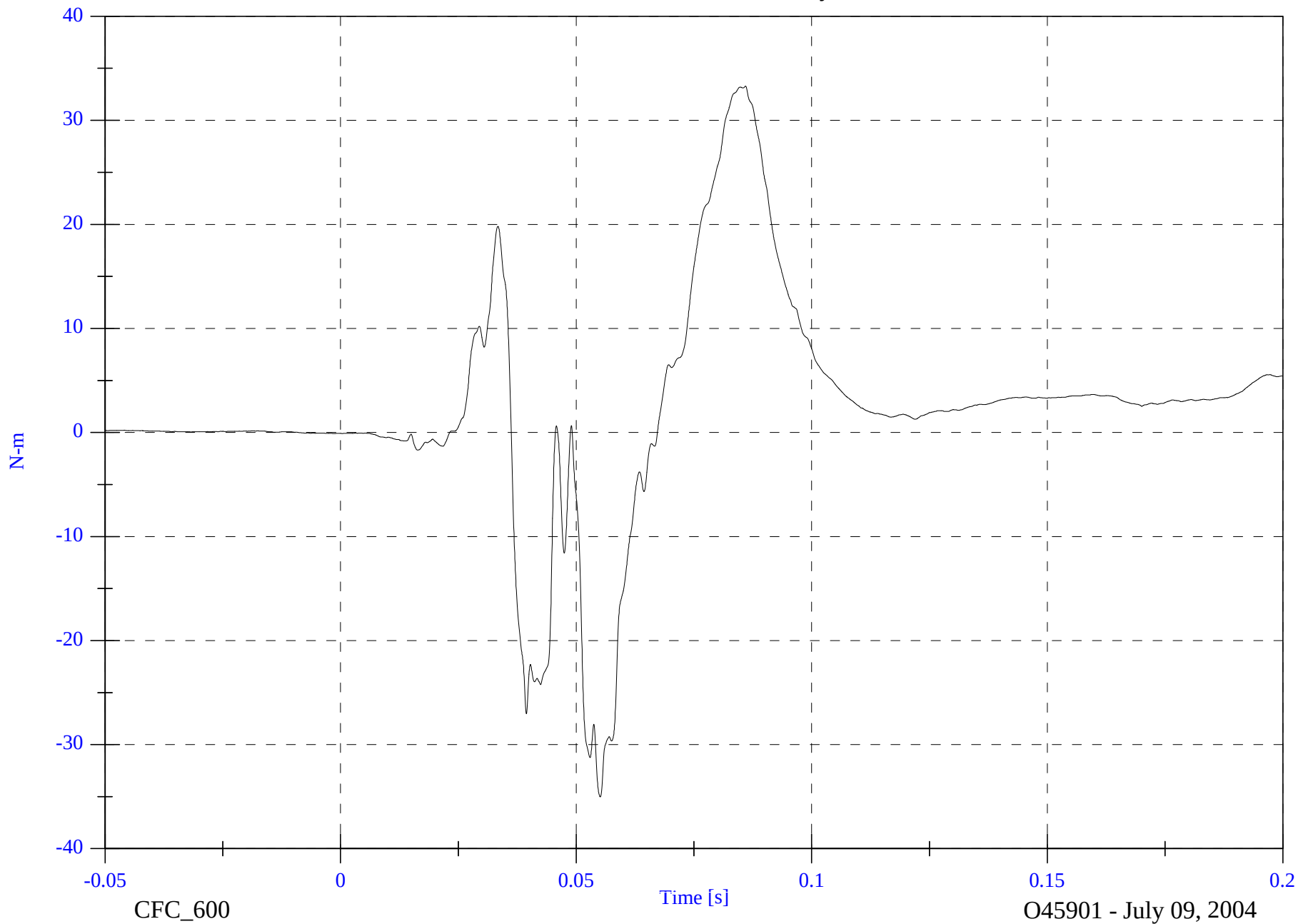
V1P2 Left Lower Tibia My

Max: 33.3 [N-m] at 0.086 [s]

Min: -35.0 [N-m] at 0.055 [s]

B-104

8748-01

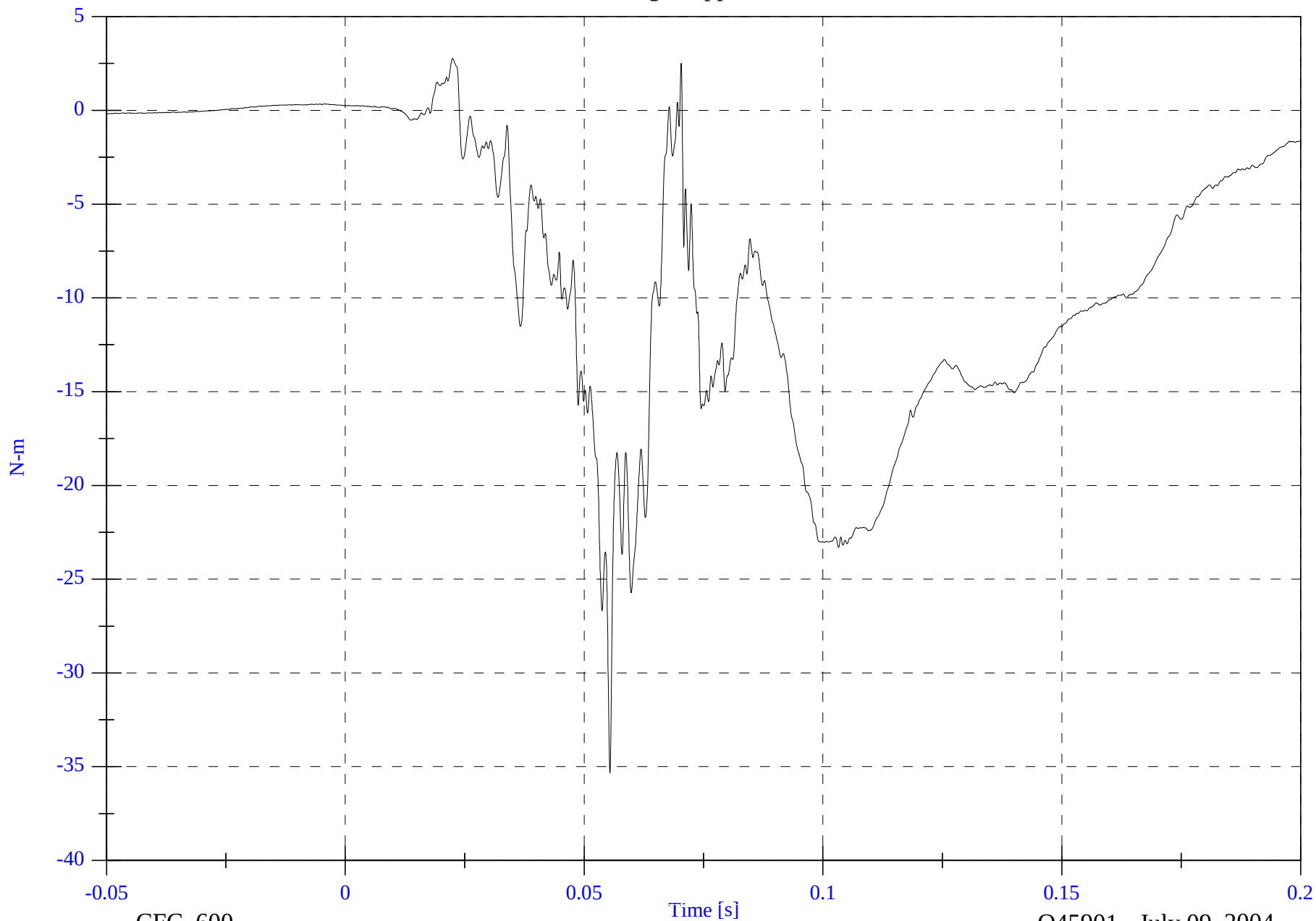


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Right Upper Tibia Mx

Max: 2.8 [N-m] at 0.022 [s]

Min: -35.3 [N-m] at 0.055 [s]



B-105

8748-01

CFC_600

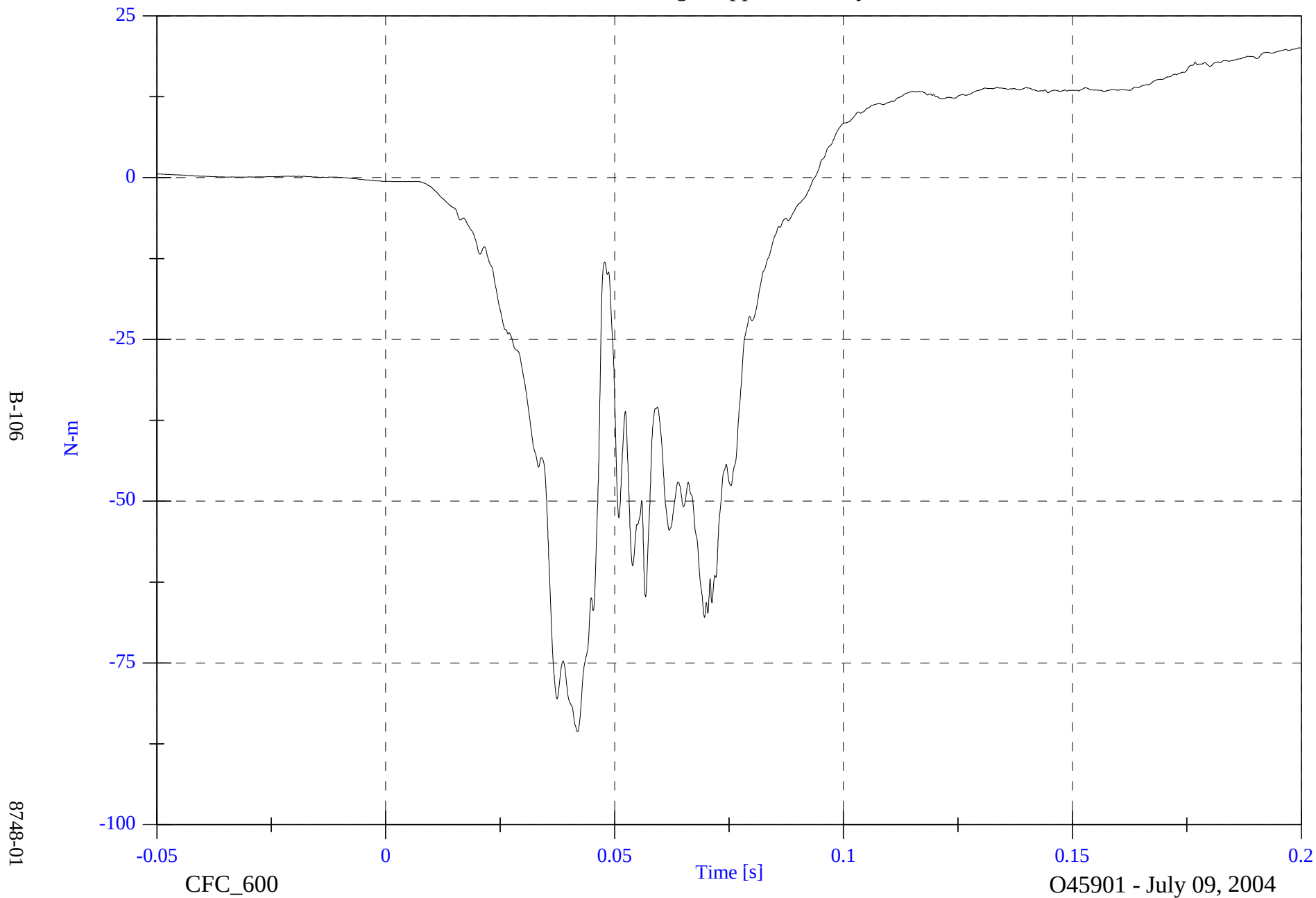
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P2 Right Upper Tibia My

Max: 20.1 [N-m] at 0.200 [s]

Min: -85.6 [N-m] at 0.042 [s]

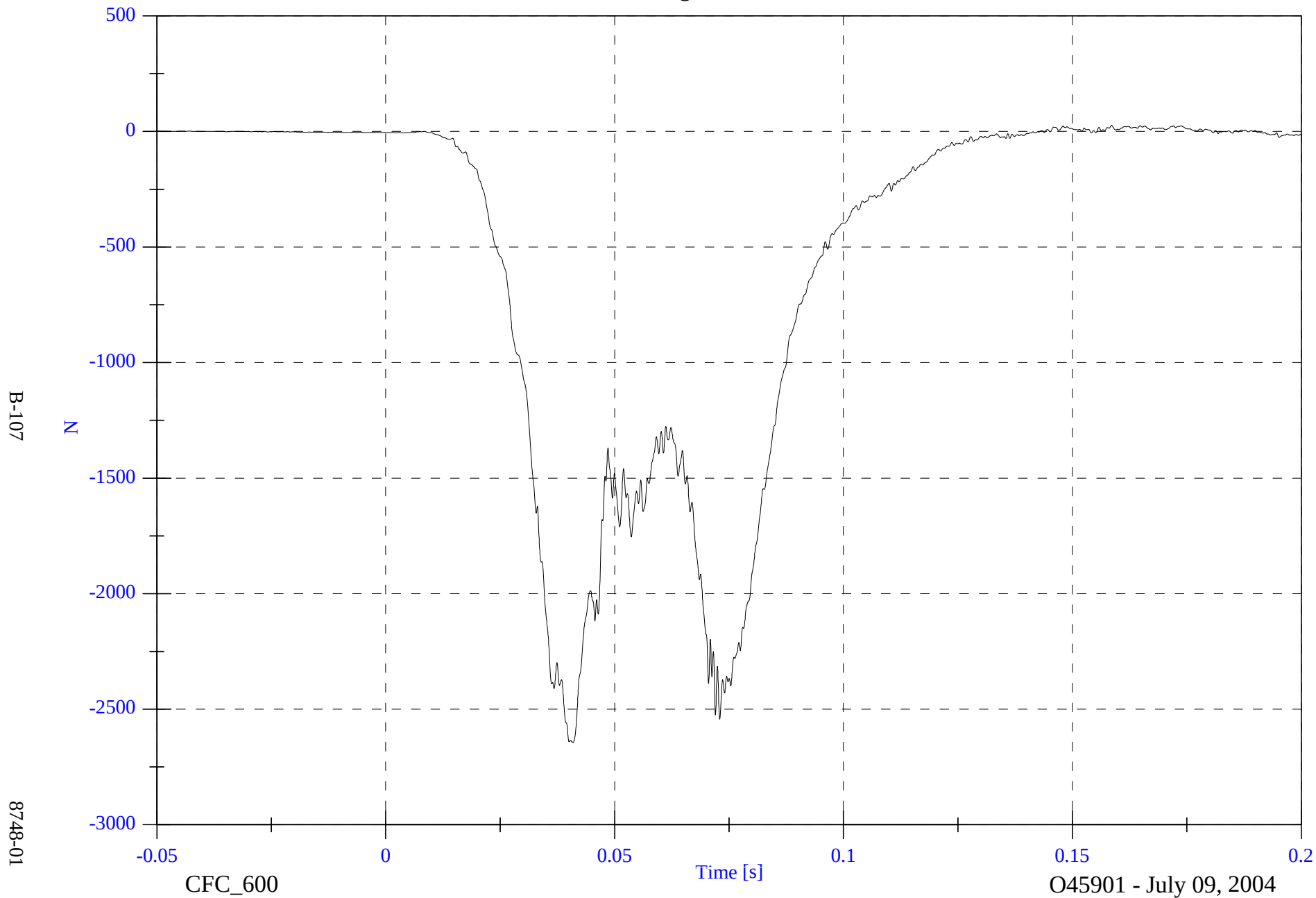


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Right Lower Tibia Fz

Max: 26.0 [N] at 0.159 [s]

Min: -2644.1 [N] at 0.041 [s]

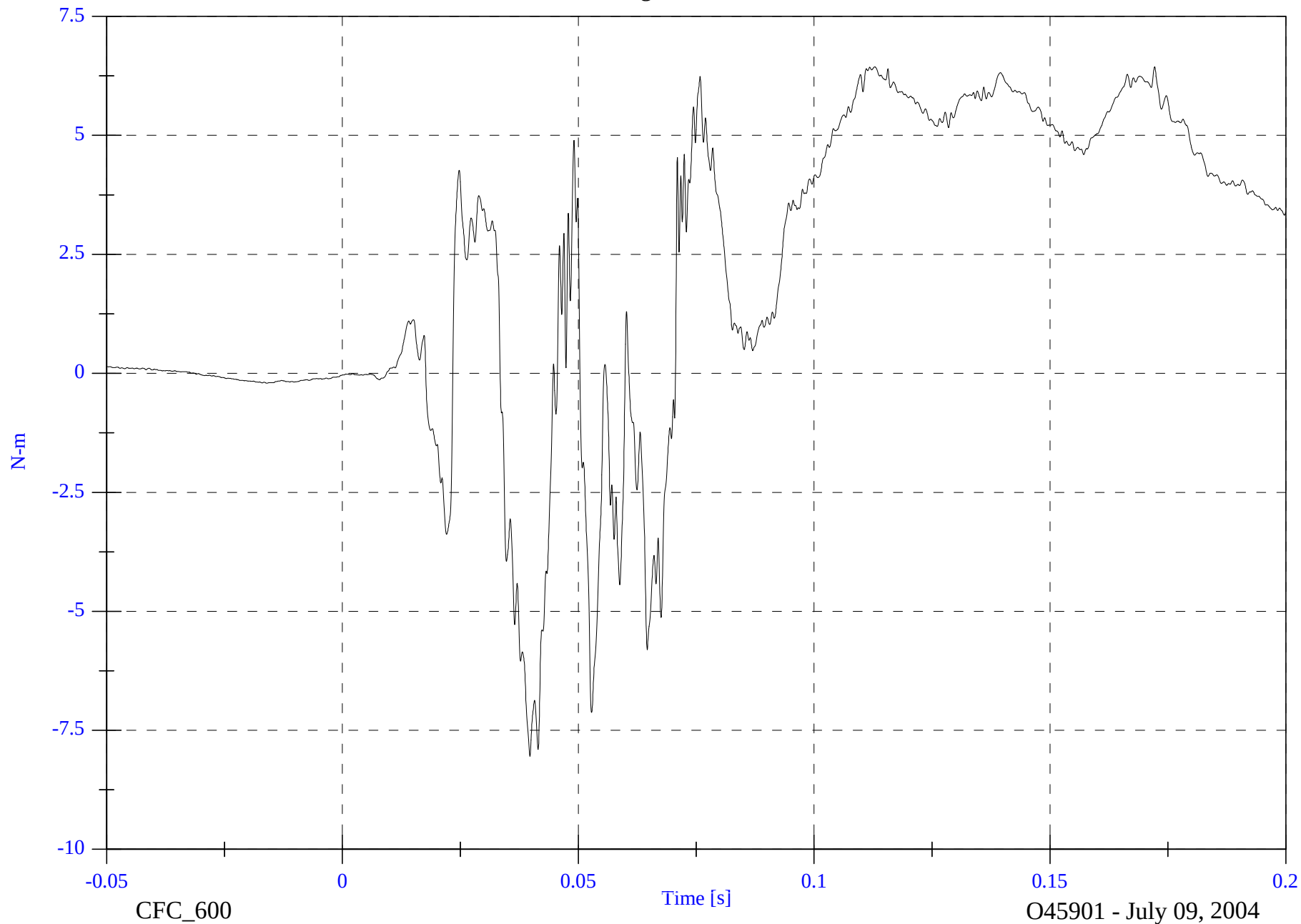


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Right Lower Tibia Mx

Max: 6.4 [N-m] at 0.172 [s]

Min: -8.0 [N-m] at 0.040 [s]



B-108

8748-01

CFC_600

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

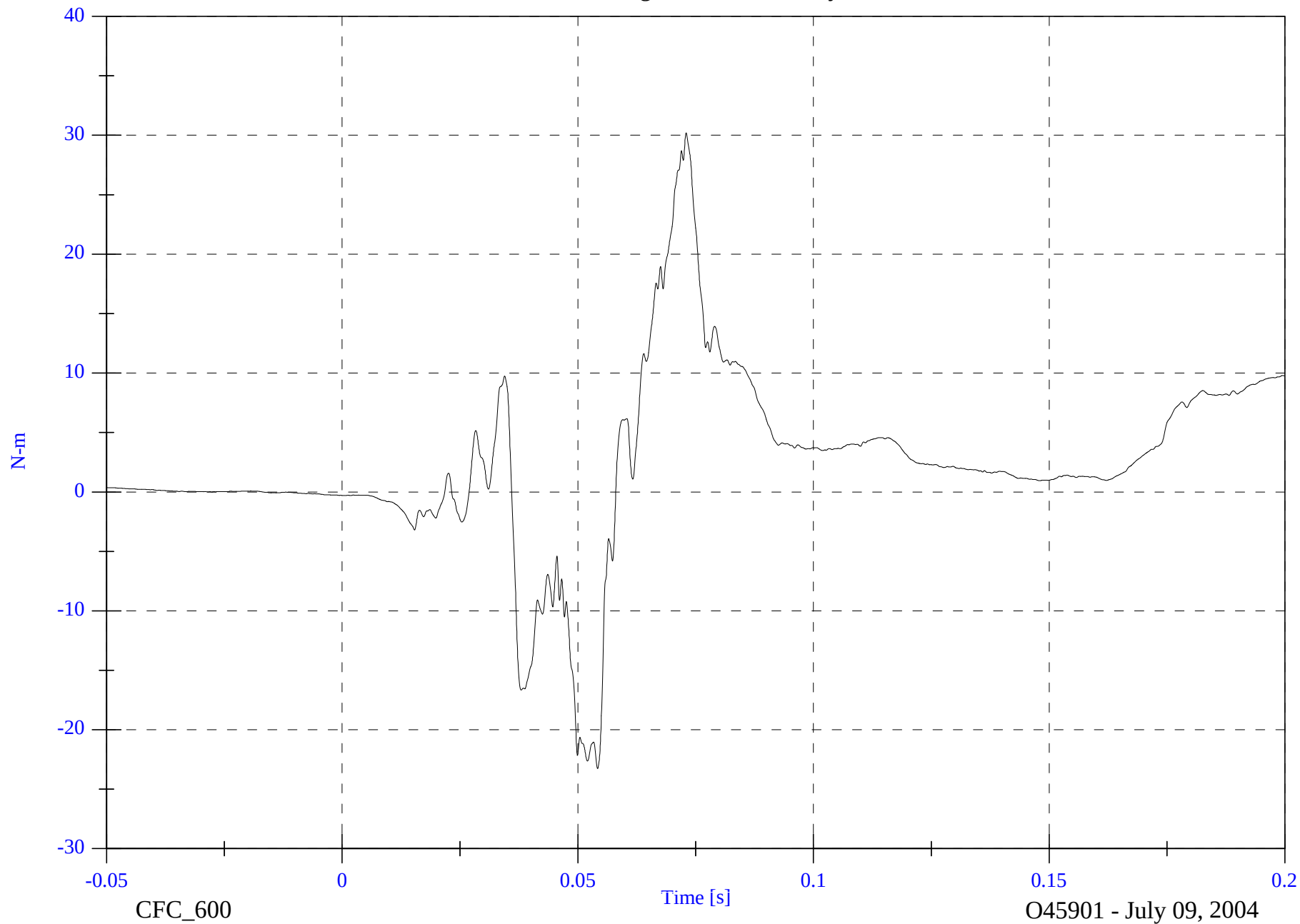
V1P2 Right Lower Tibia My

Max: 30.2 [N-m] at 0.073 [s]

Min: -23.3 [N-m] at 0.054 [s]

B-109

8748-01



NCAP Optional Test - 2004.5 Volvo S40

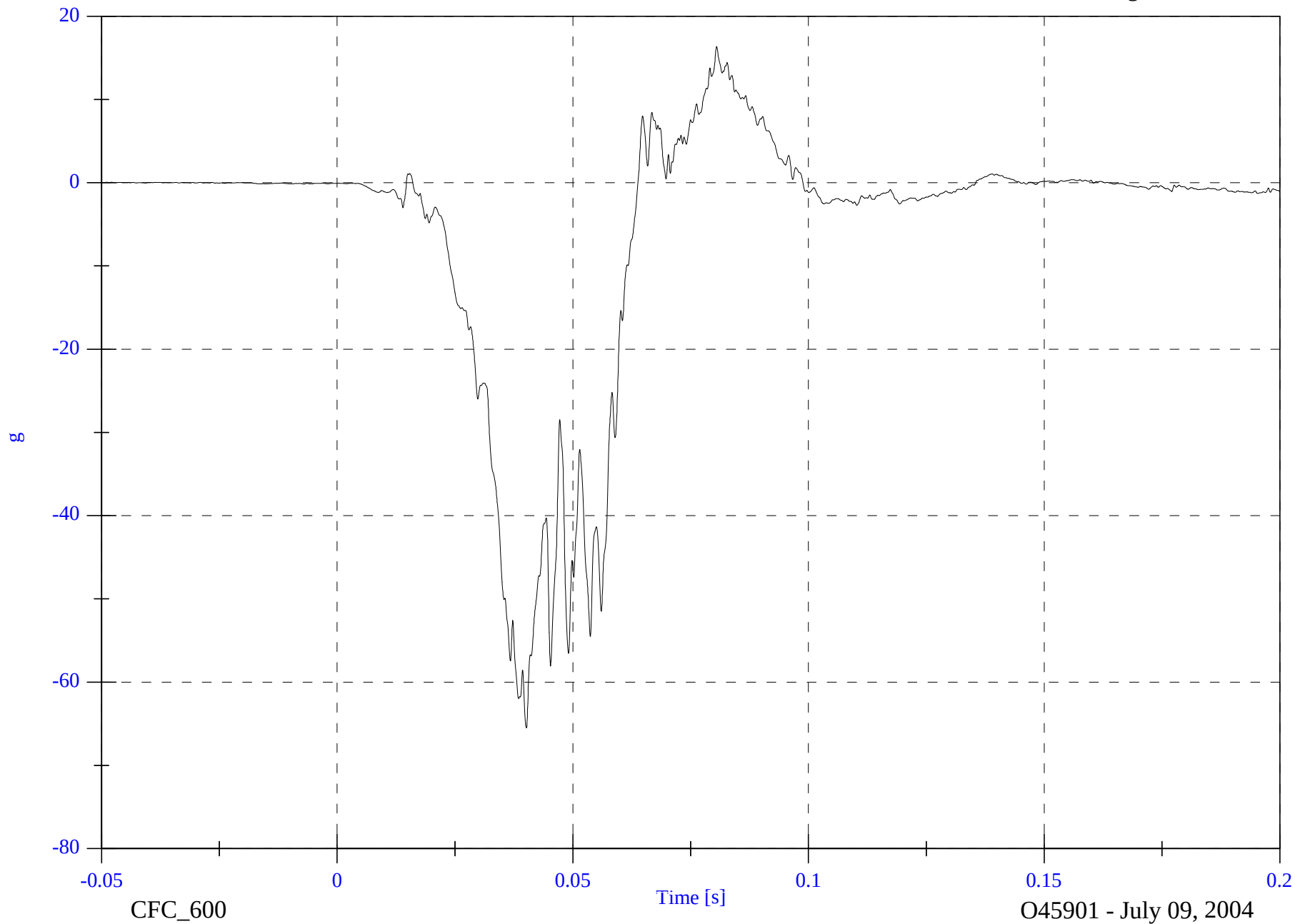
V1P2 Left Foot Aft x

Max: 16.4 [g] at 0.080 [s]

Min: -65.5 [g] at 0.040 [s]

B-110

8748-01



NCAP Optional Test - 2004.5 Volvo S40

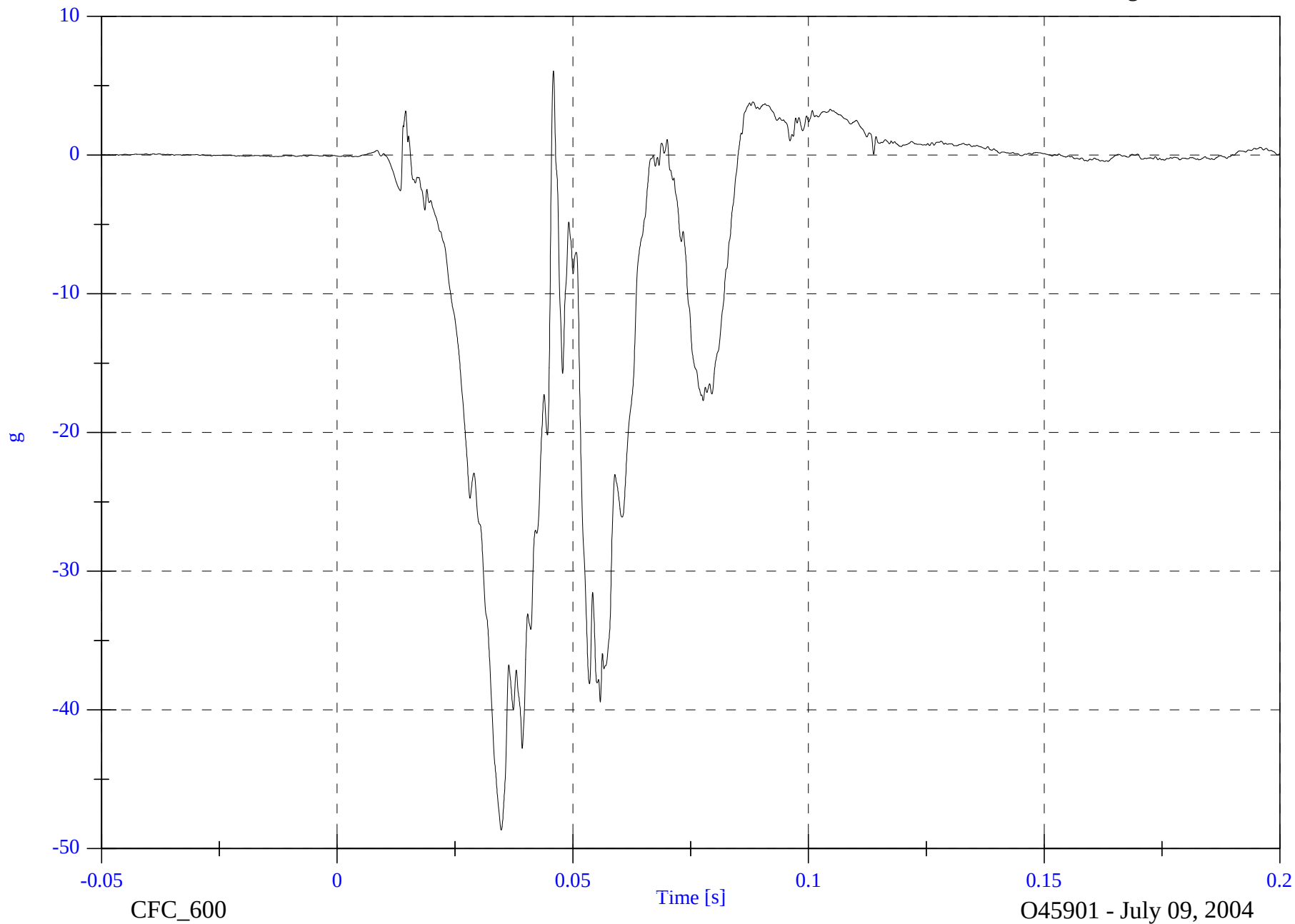
V1P2 Left Foot Aft z

Max: 6.1 [g] at 0.046 [s]

Min: -48.7 [g] at 0.035 [s]

B-111

8748-01

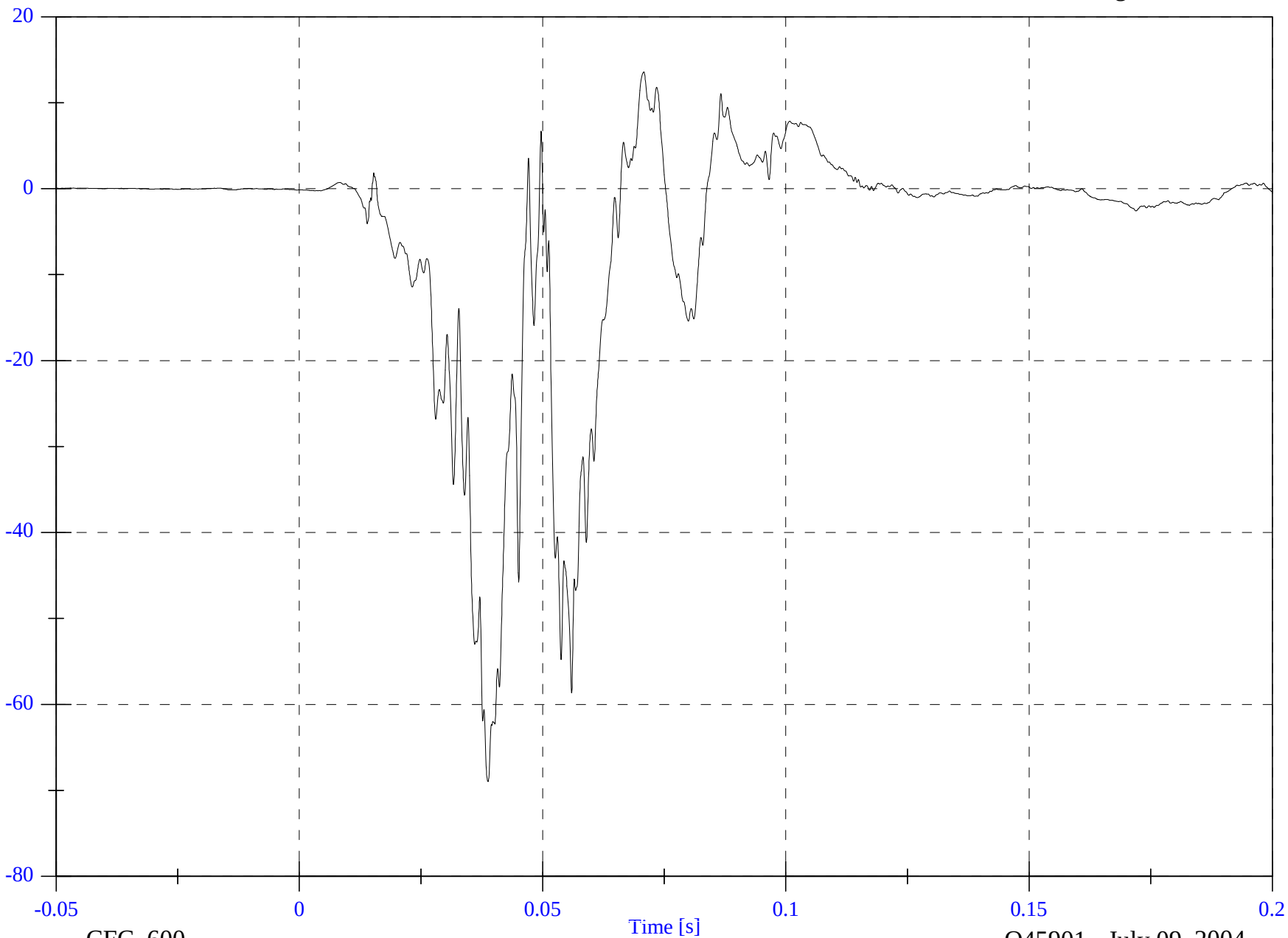


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Left Foot Fore z

Max: 13.6 [g] at 0.071 [s]

Min: -69.0 [g] at 0.039 [s]



B-112

8748-01

CFC_600

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

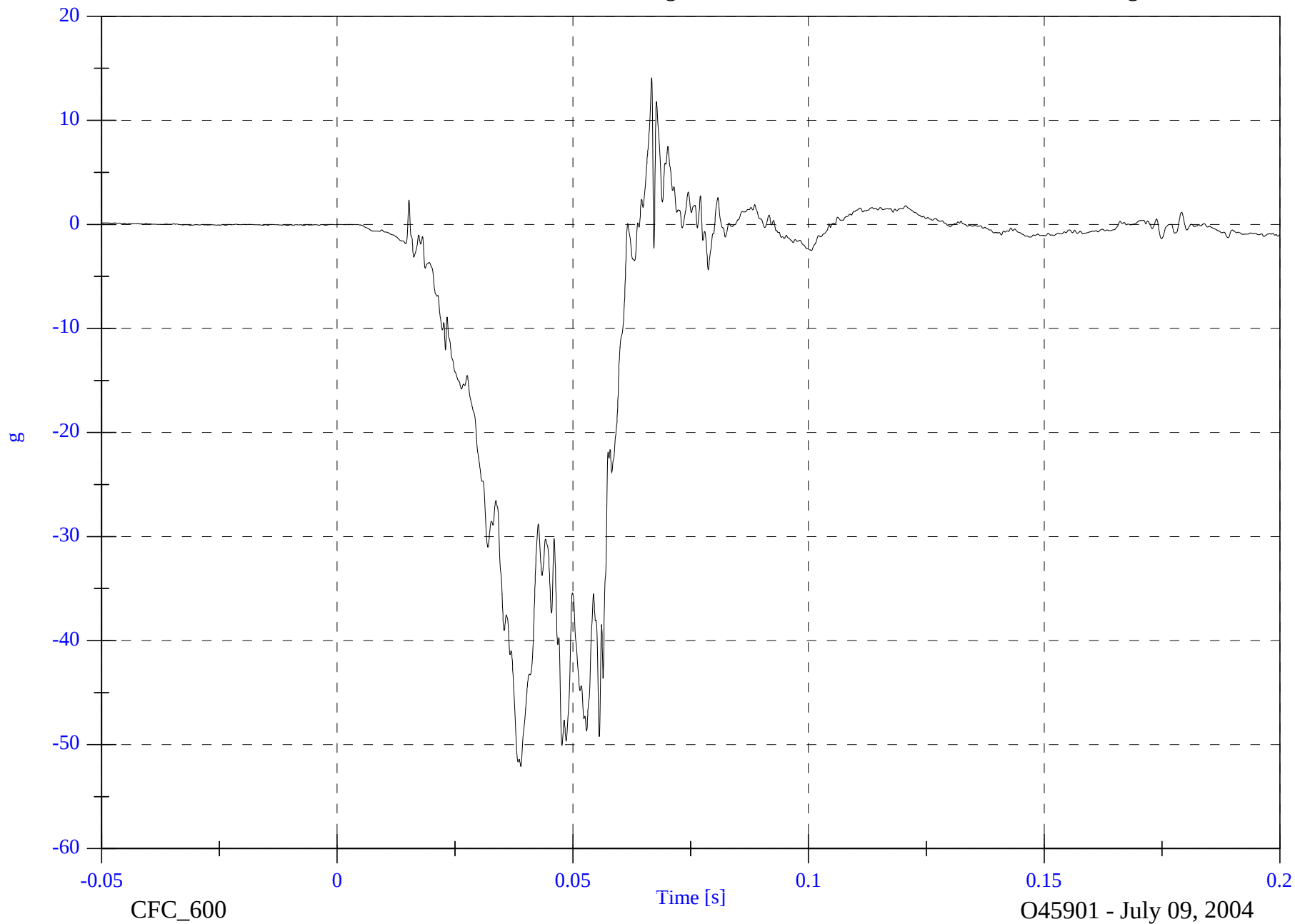
V1P2 Right Foot Aft x

Max: 14.1 [g] at 0.067 [s]

Min: -52.1 [g] at 0.039 [s]

B-113

8748-01

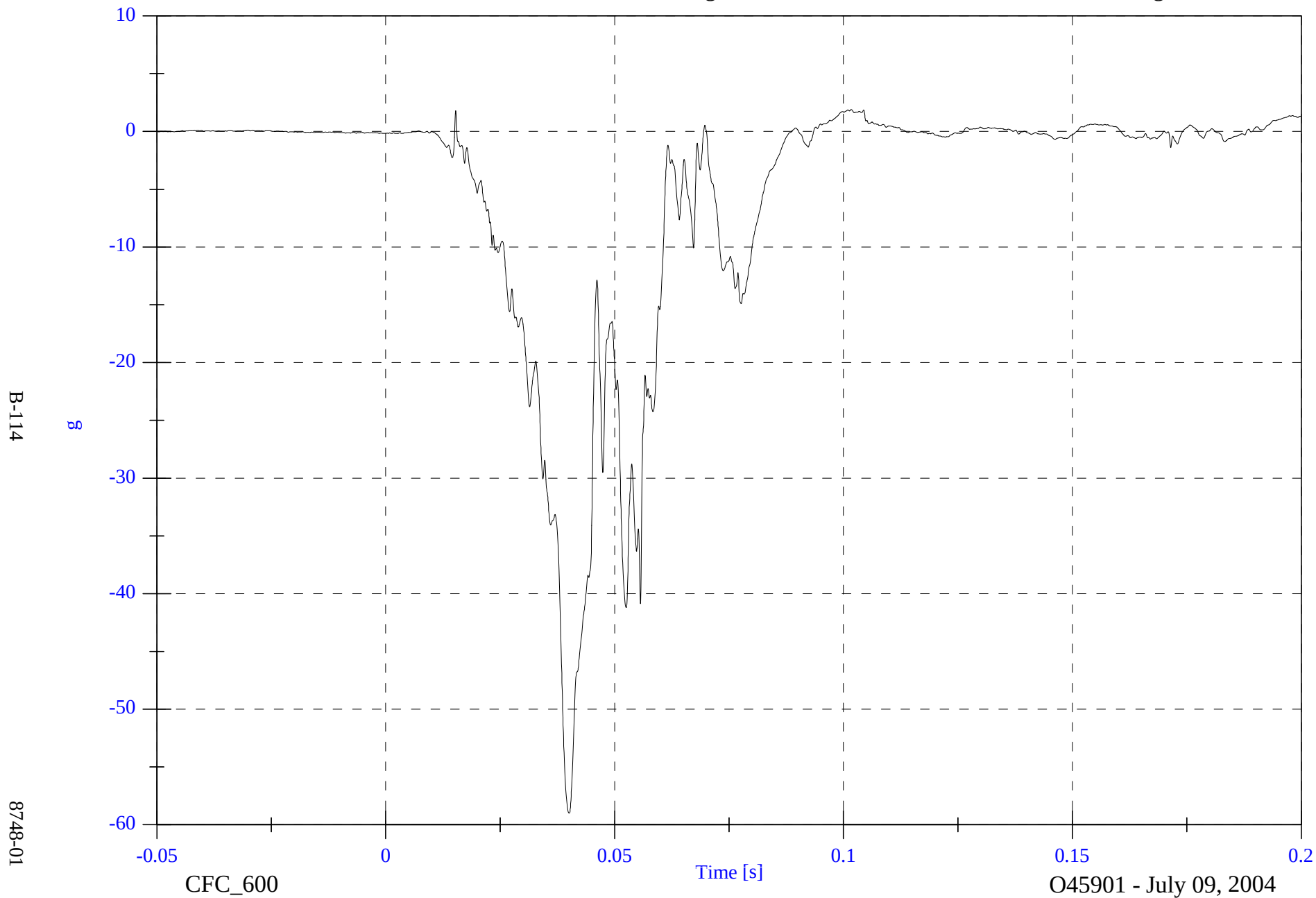


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Right Foot Aft z

Max: 1.9 [g] at 0.102 [s]

Min: -59.0 [g] at 0.040 [s]



NCAP Optional Test - 2004.5 Volvo S40

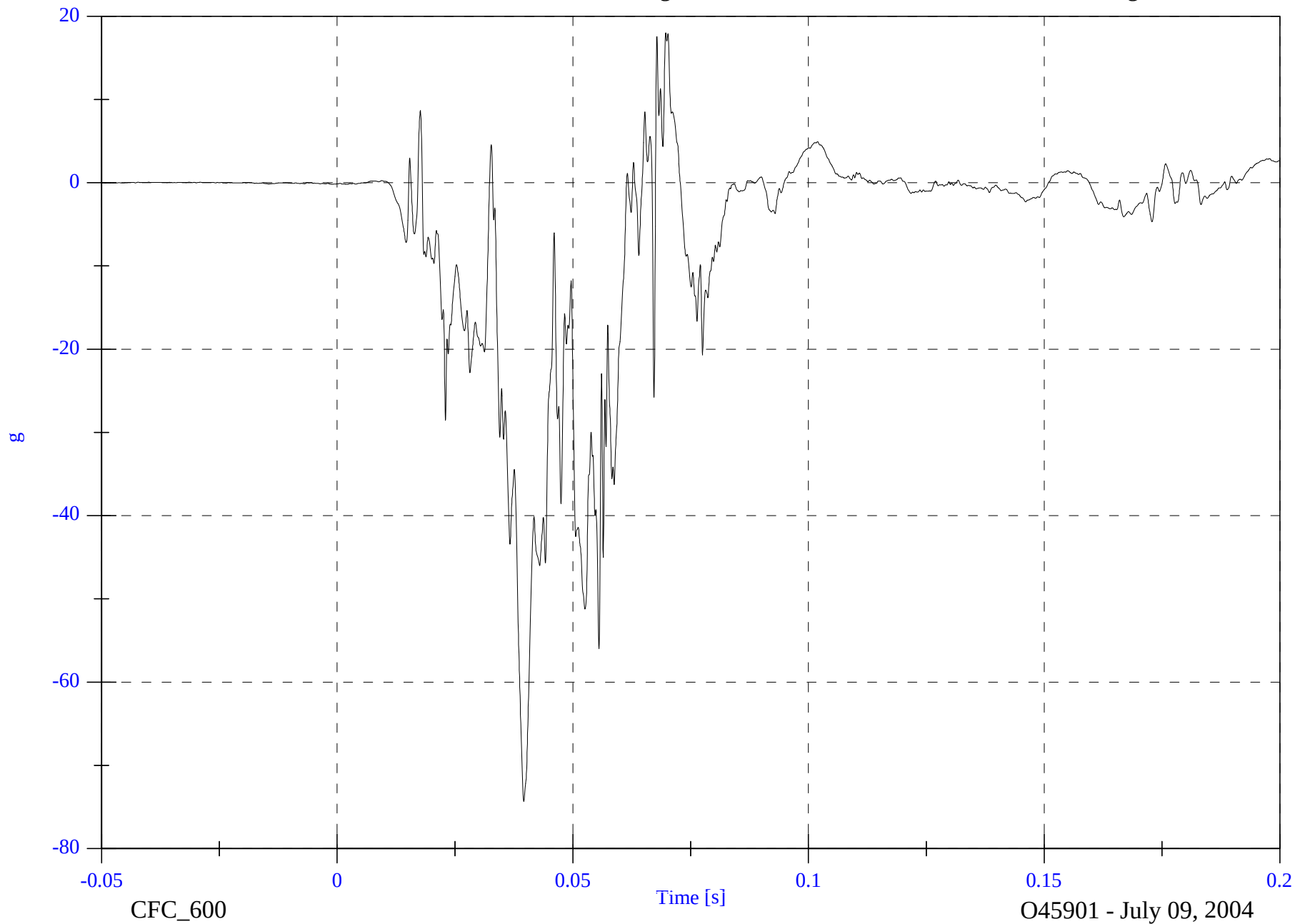
V1P2 Right Foot Fore z

Max: 18.0 [g] at 0.070 [s]

Min: -74.3 [g] at 0.040 [s]

B-115

8748-01

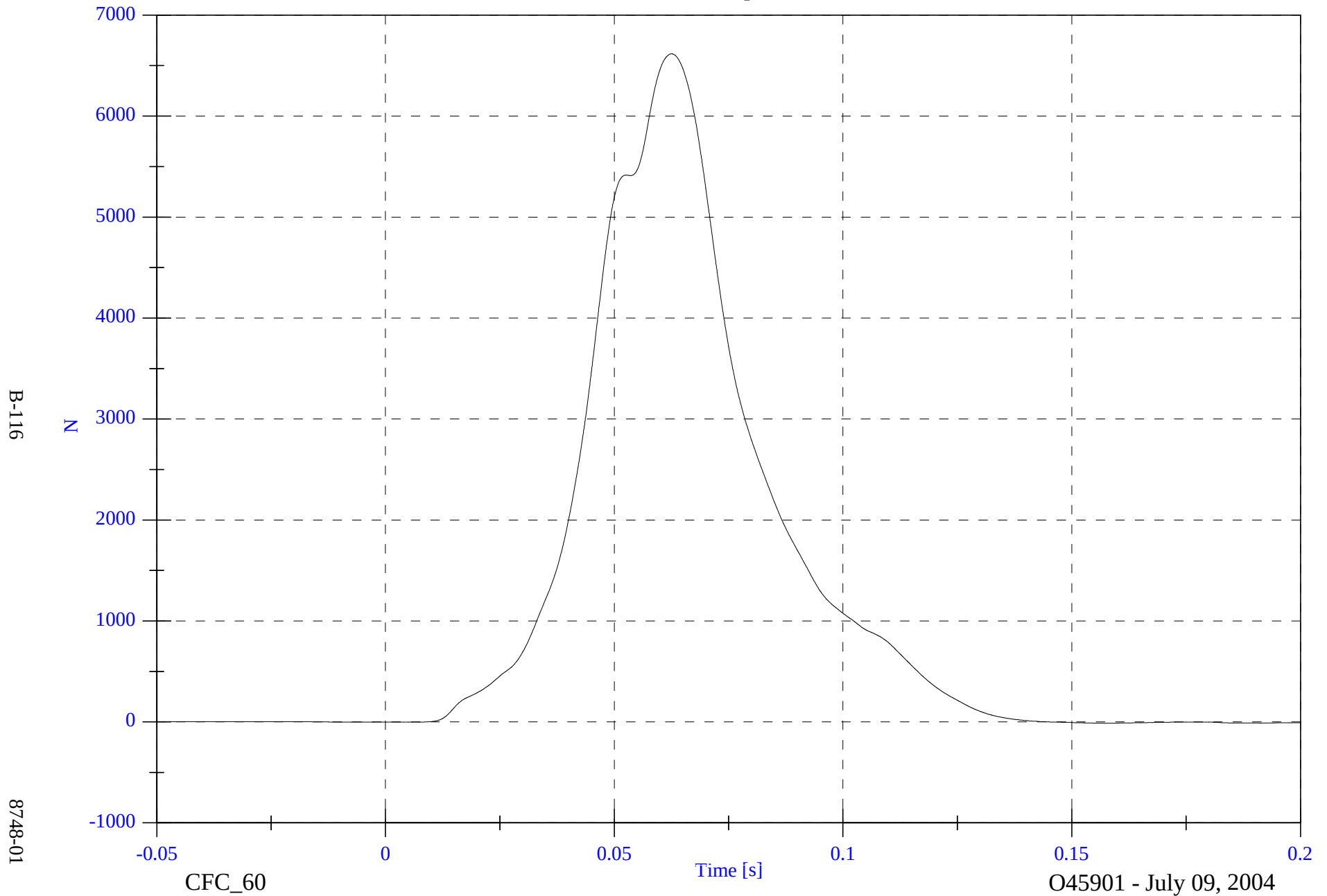


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Lap Belt

Max: 6616.5 [N] at 0.063 [s]

Min: -12.1 [N] at 0.158 [s]

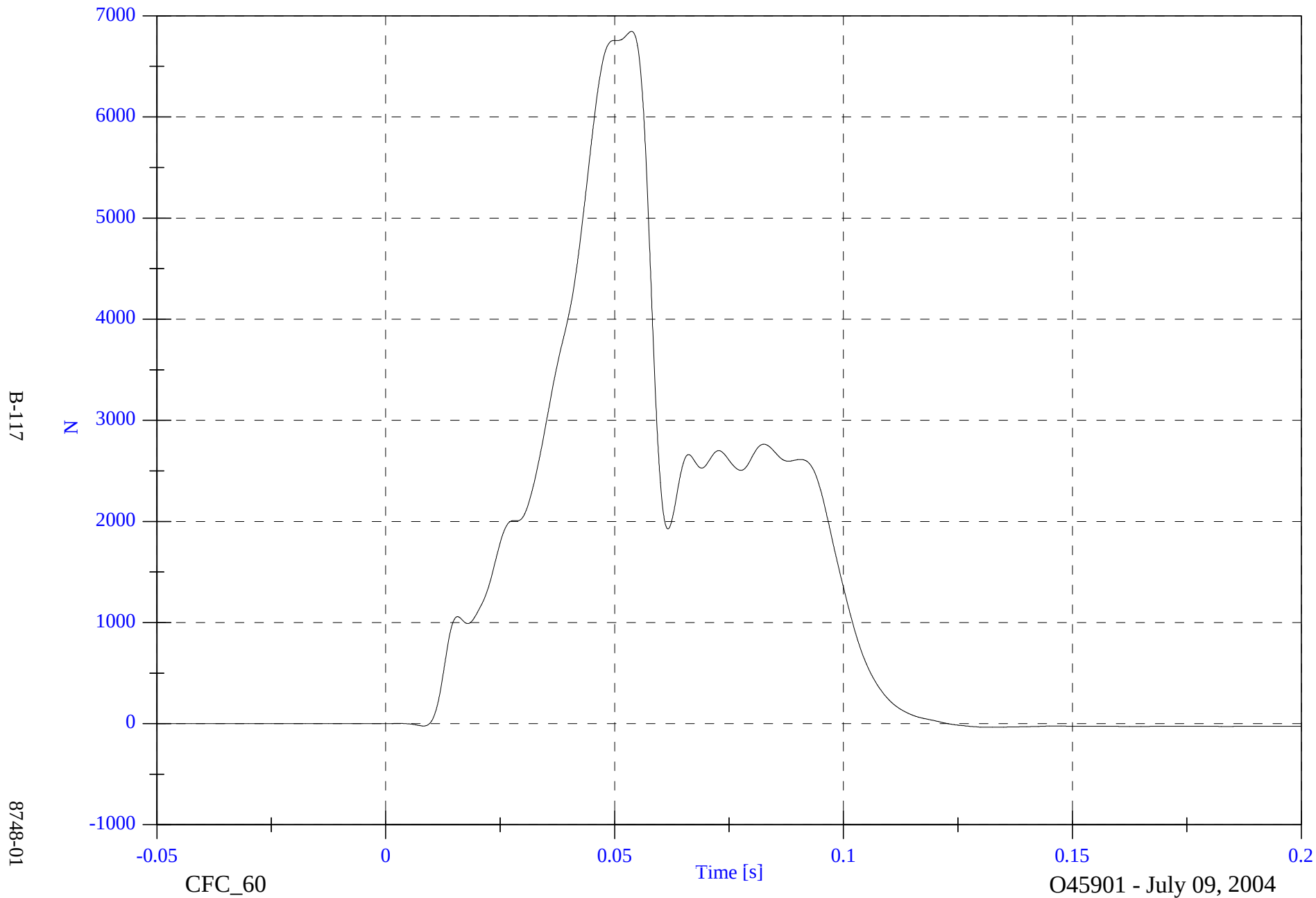


NCAP Optional Test - 2004.5 Volvo S40

V1P2 Torso Belt

Max: 6846.7 [N] at 0.054 [s]

Min: -36.1 [N] at 0.132 [s]

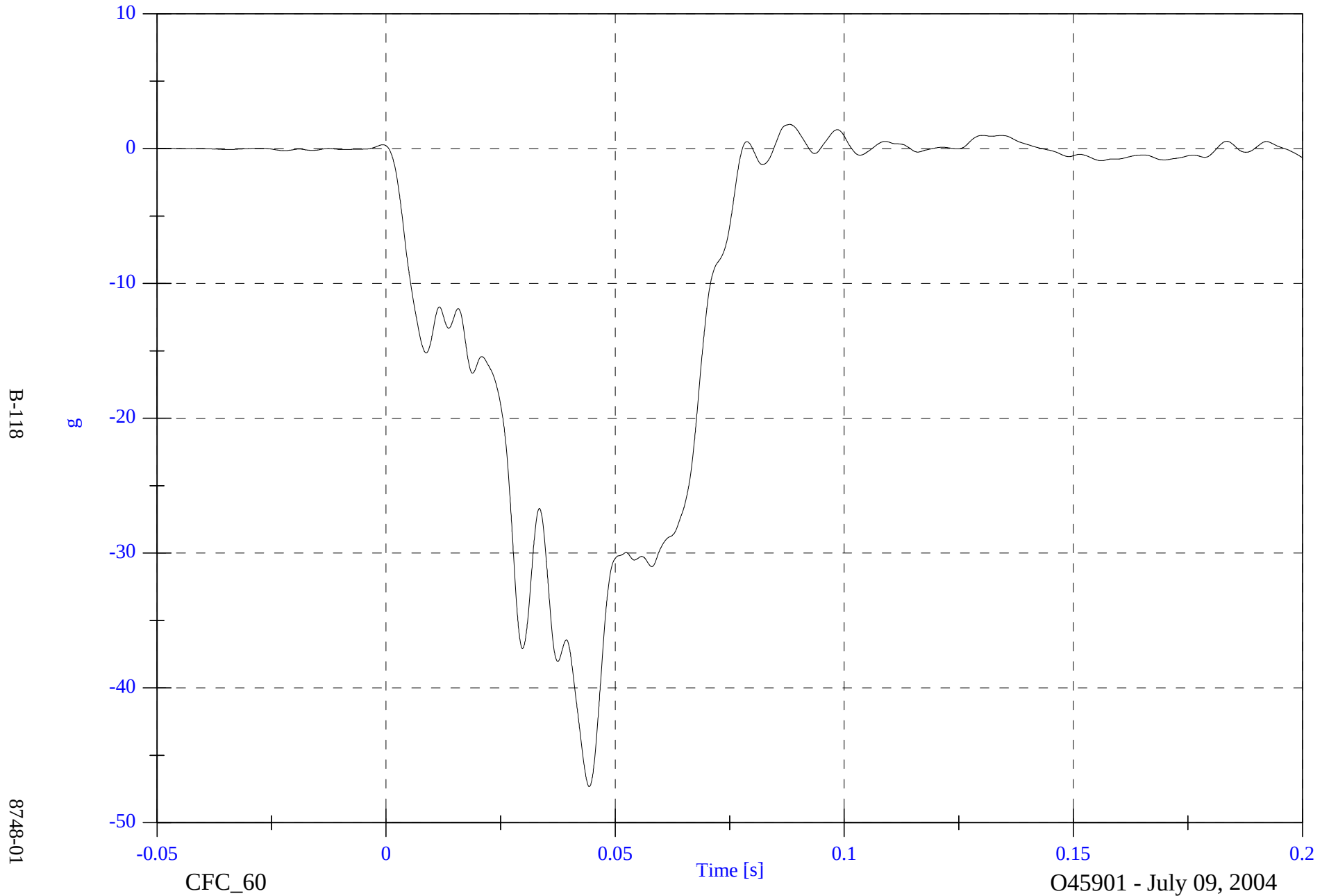


NCAP Optional Test - 2004.5 Volvo S40

V1 Left Rear #1x

Max: 1.8 [g] at 0.088 [s]

Min: -47.3 [g] at 0.044 [s]

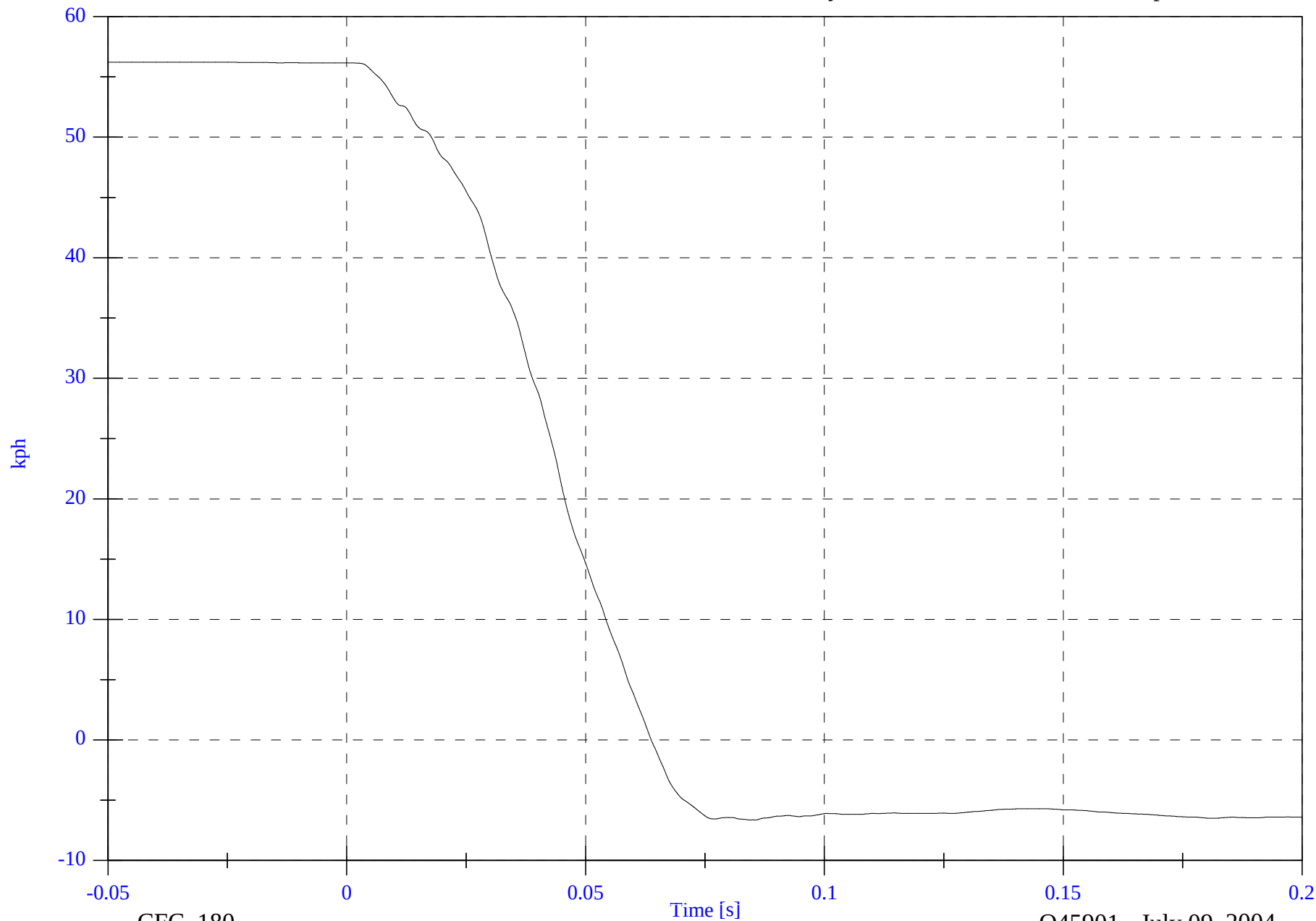


NCAP Optional Test - 2004.5 Volvo S40

V1 Left Rear #1x Velocity

Max: 56.2 [kph] at -0.045 [s]

Min: -6.6 [kph] at 0.084 [s]



B-119

8748-01

CFC_180

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

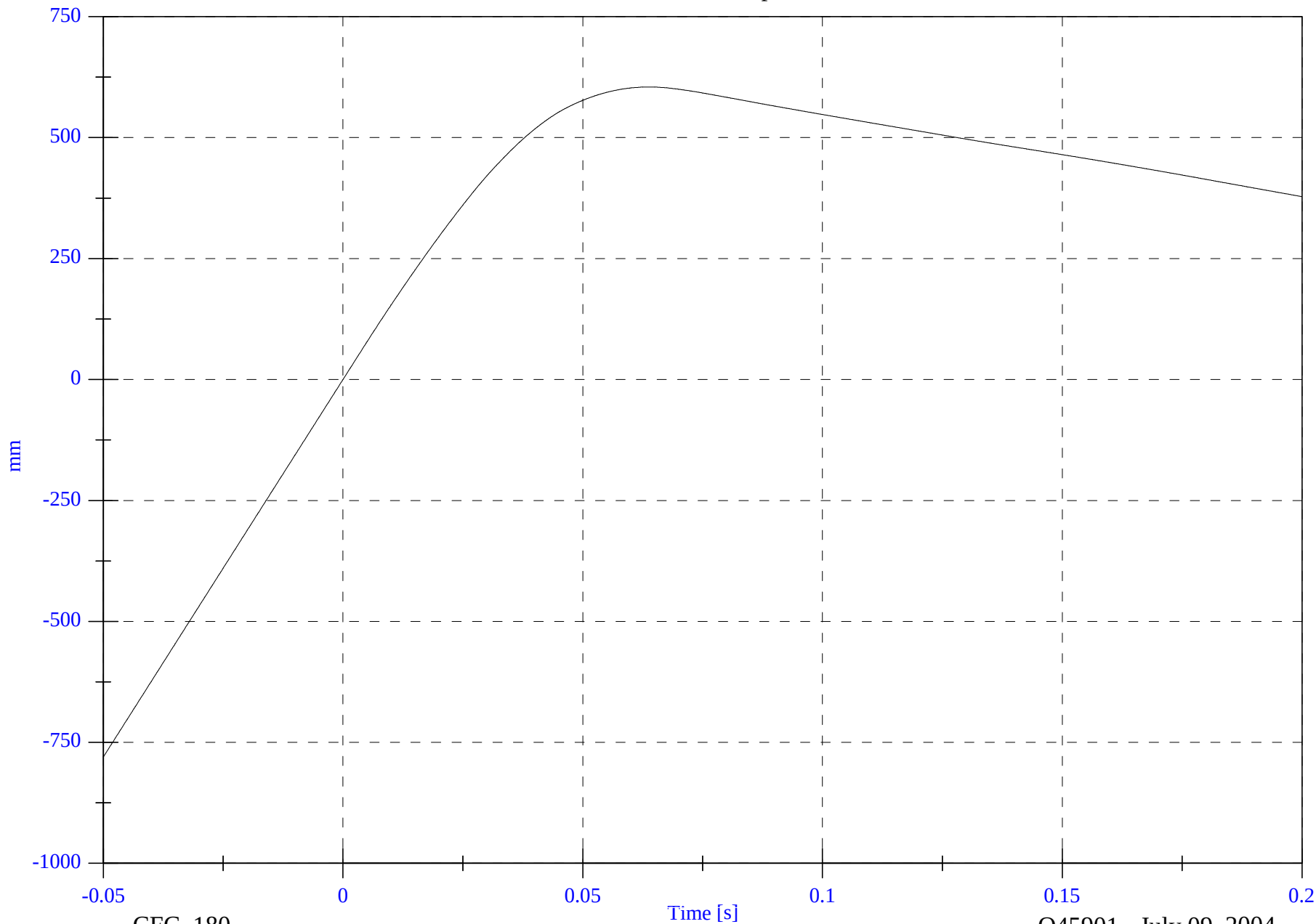
V1 Left Rear #1x Displacement

Max: 604.5 [mm] at 0.064 [s]

Min: -780.5 [mm] at -0.050 [s]

B-120

8748-01



CFC_180

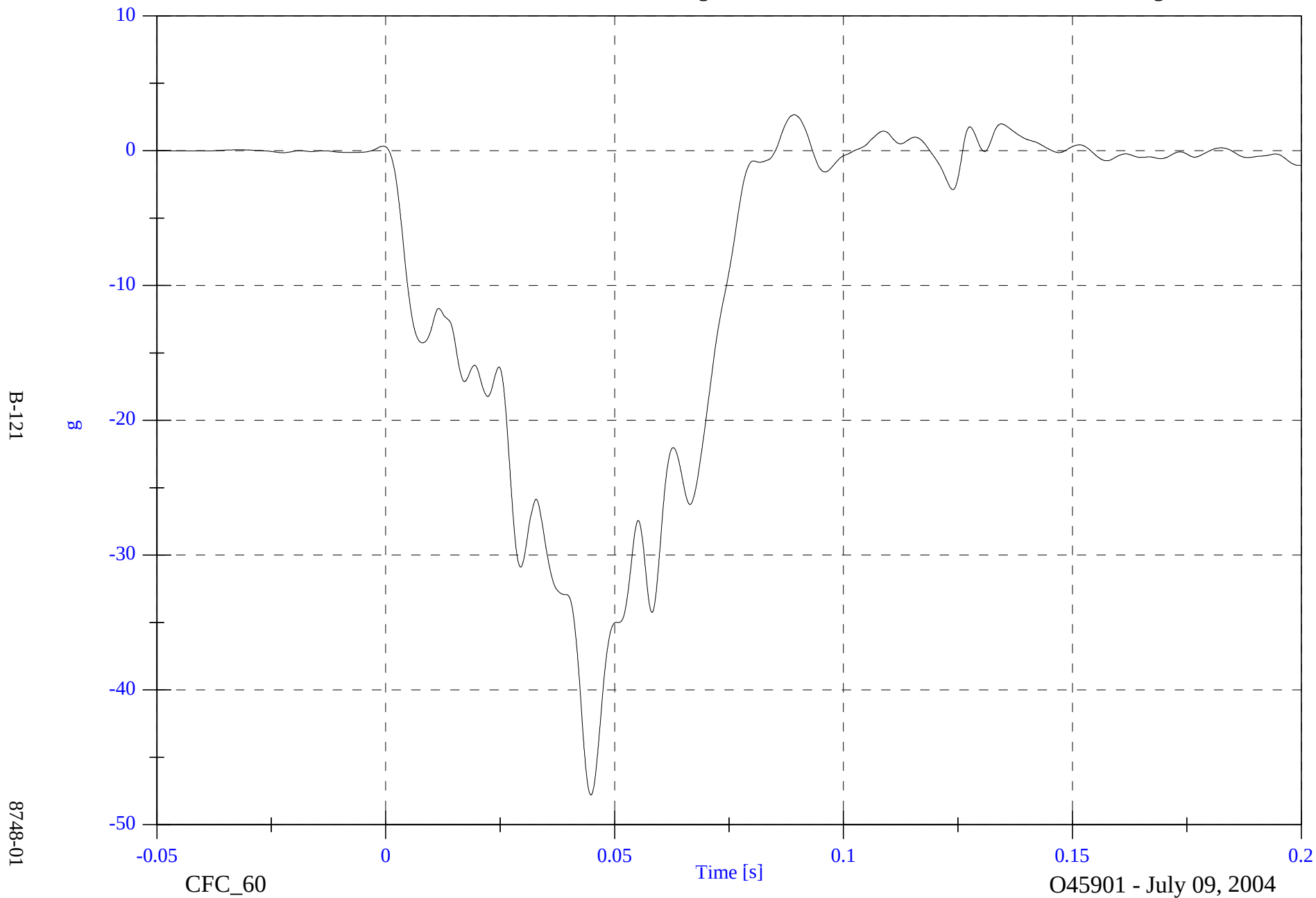
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1 Right Rear #2x

Max: 2.7 [g] at 0.089 [s]

Min: -47.8 [g] at 0.045 [s]

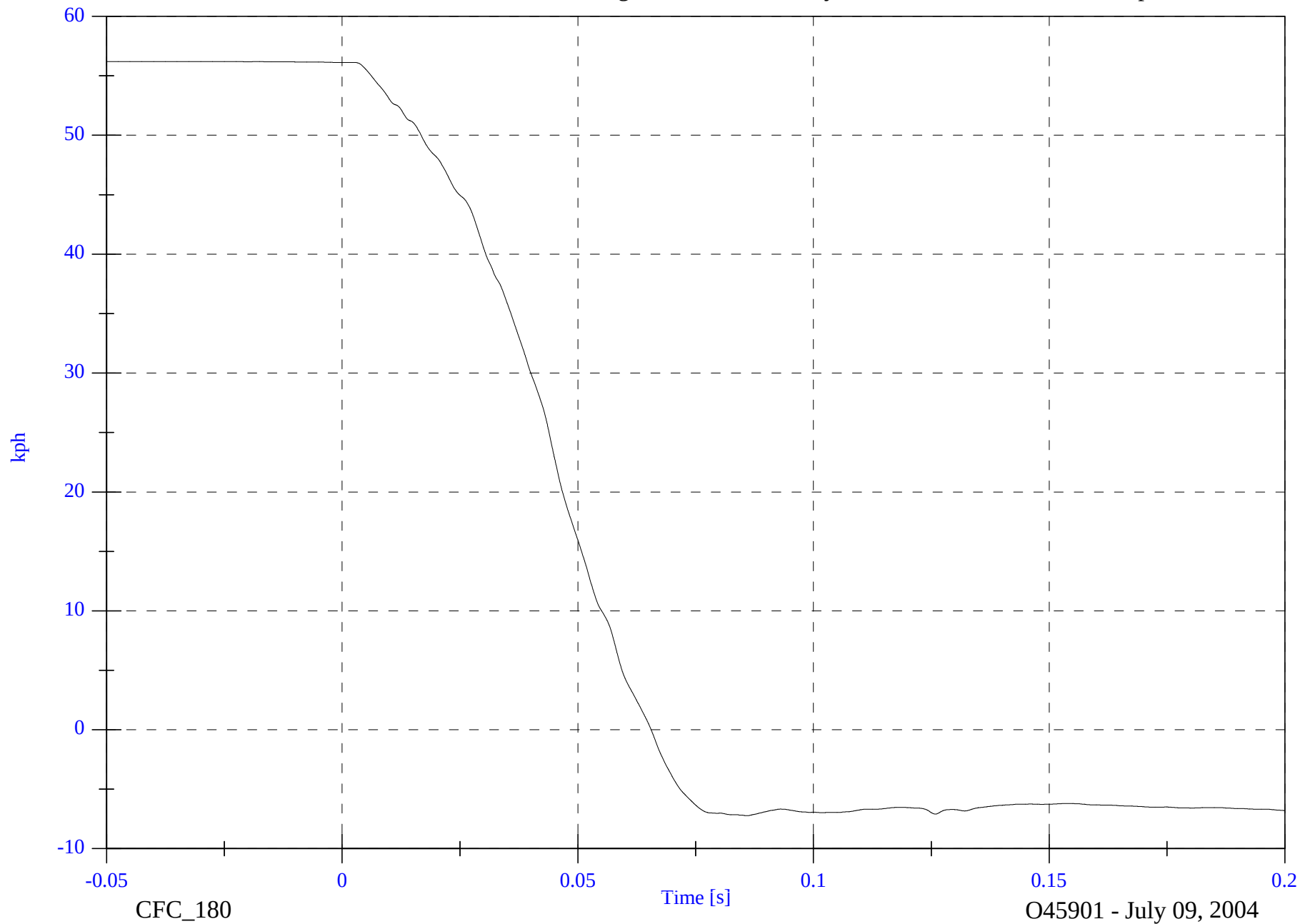


NCAP Optional Test - 2004.5 Volvo S40

V1 Right Rear #2x Velocity

Max: 56.2 [kph] at -0.027 [s]

Min: -7.2 [kph] at 0.086 [s]



B-122

8748-01

CFC_180

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

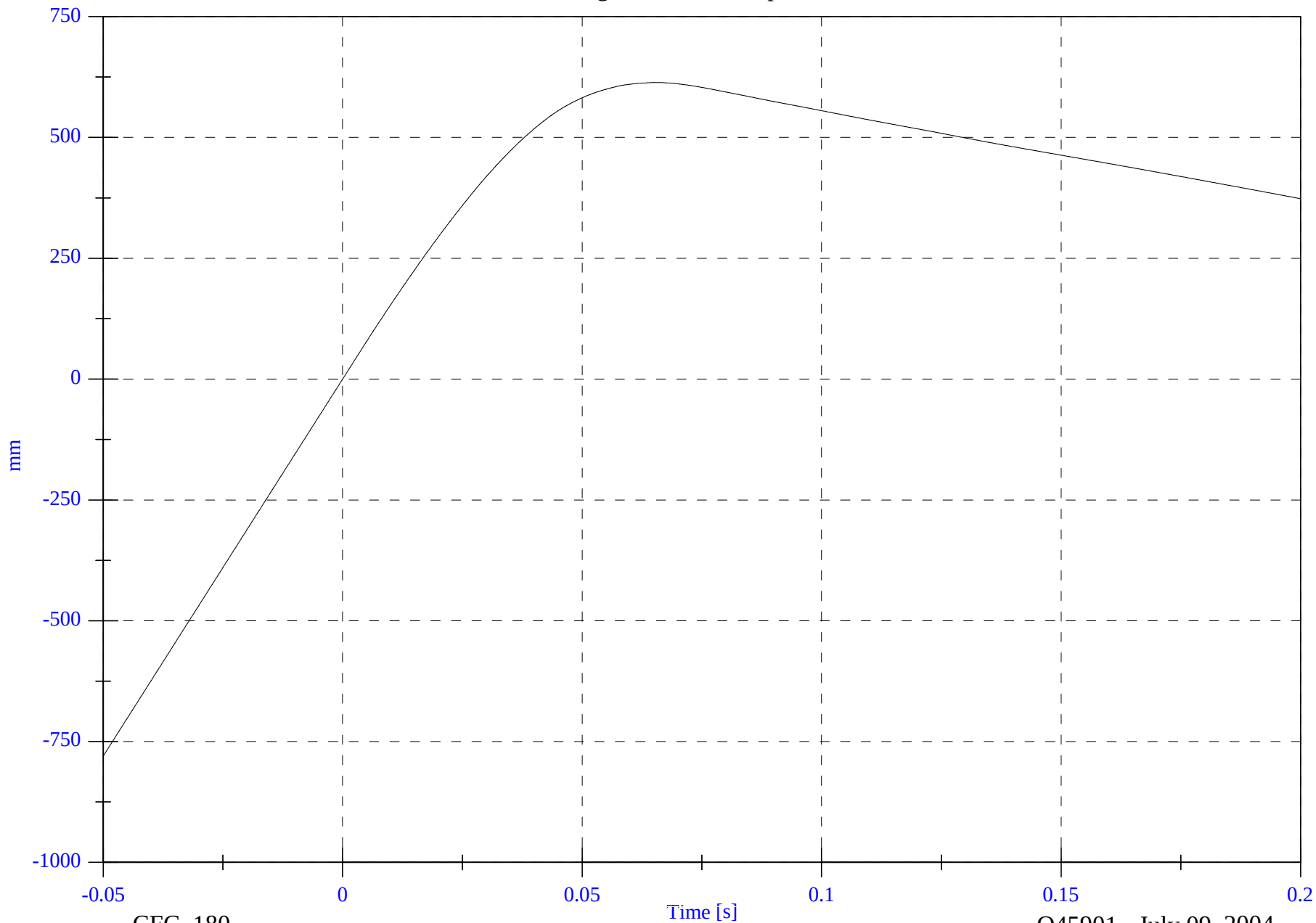
V1 Right Rear #2x Displacement

Max: 613.5 [mm] at 0.066 [s]

Min: -780.3 [mm] at -0.050 [s]

B-123

8748-01



CFC_180

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

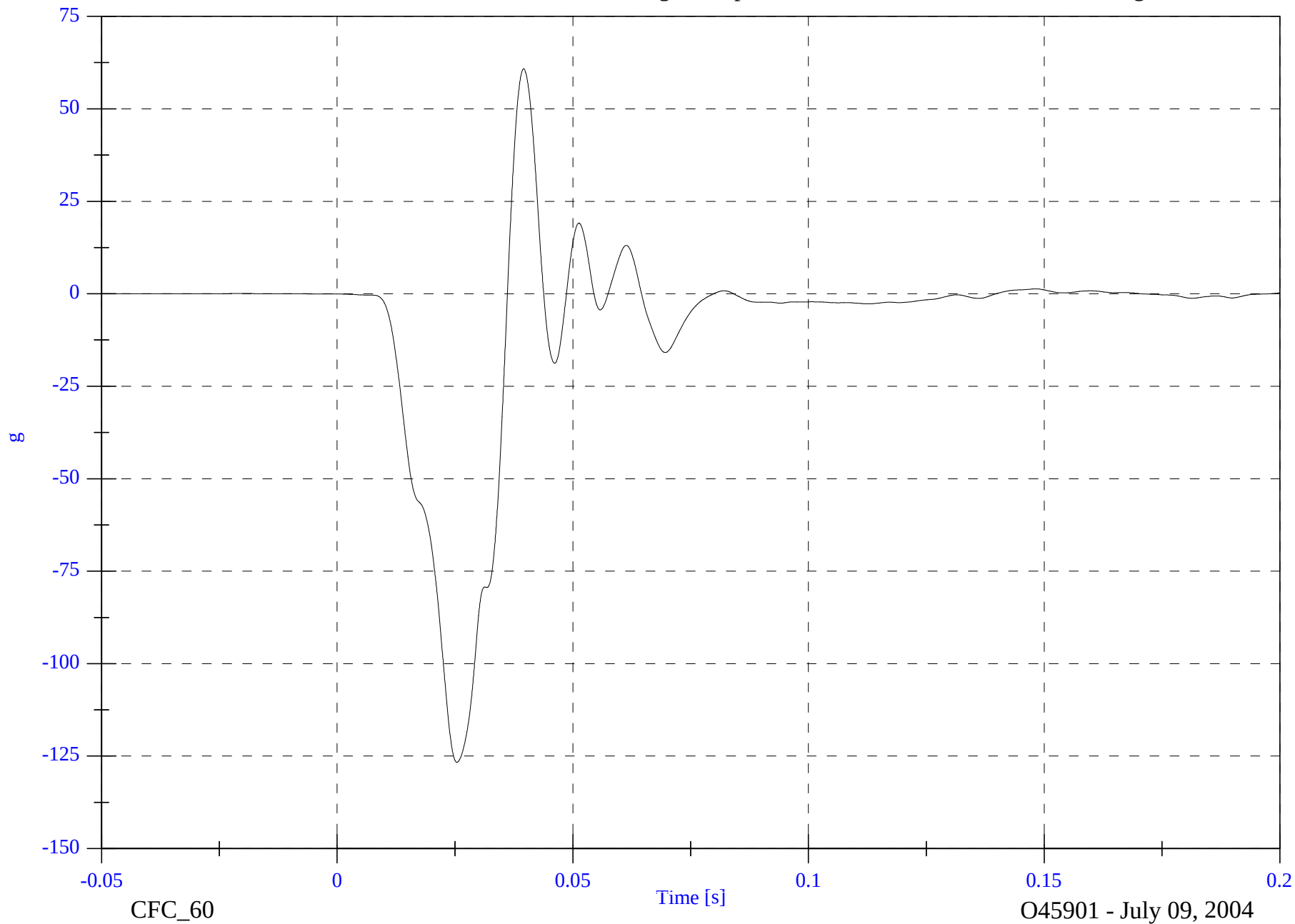
V1 Engine Top #3x

Max: 60.8 [g] at 0.040 [s]

Min: -126.6 [g] at 0.025 [s]

B-124

8748-01

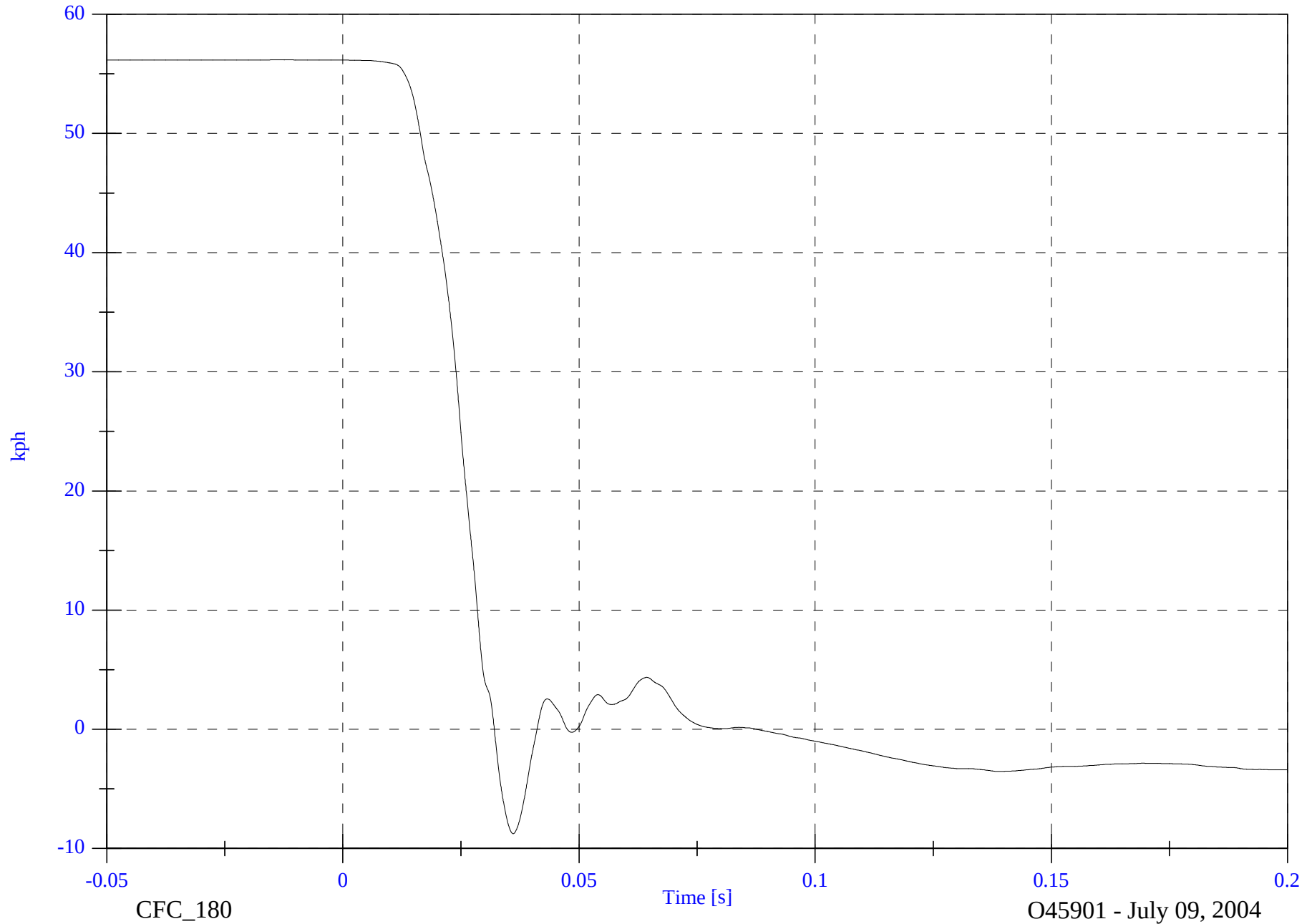


NCAP Optional Test - 2004.5 Volvo S40

V1 Engine Top #3x Velocity

Max: 56.2 [kph] at -0.014 [s]

Min: -8.8 [kph] at 0.036 [s]



B-125

8748-01

CFC_180

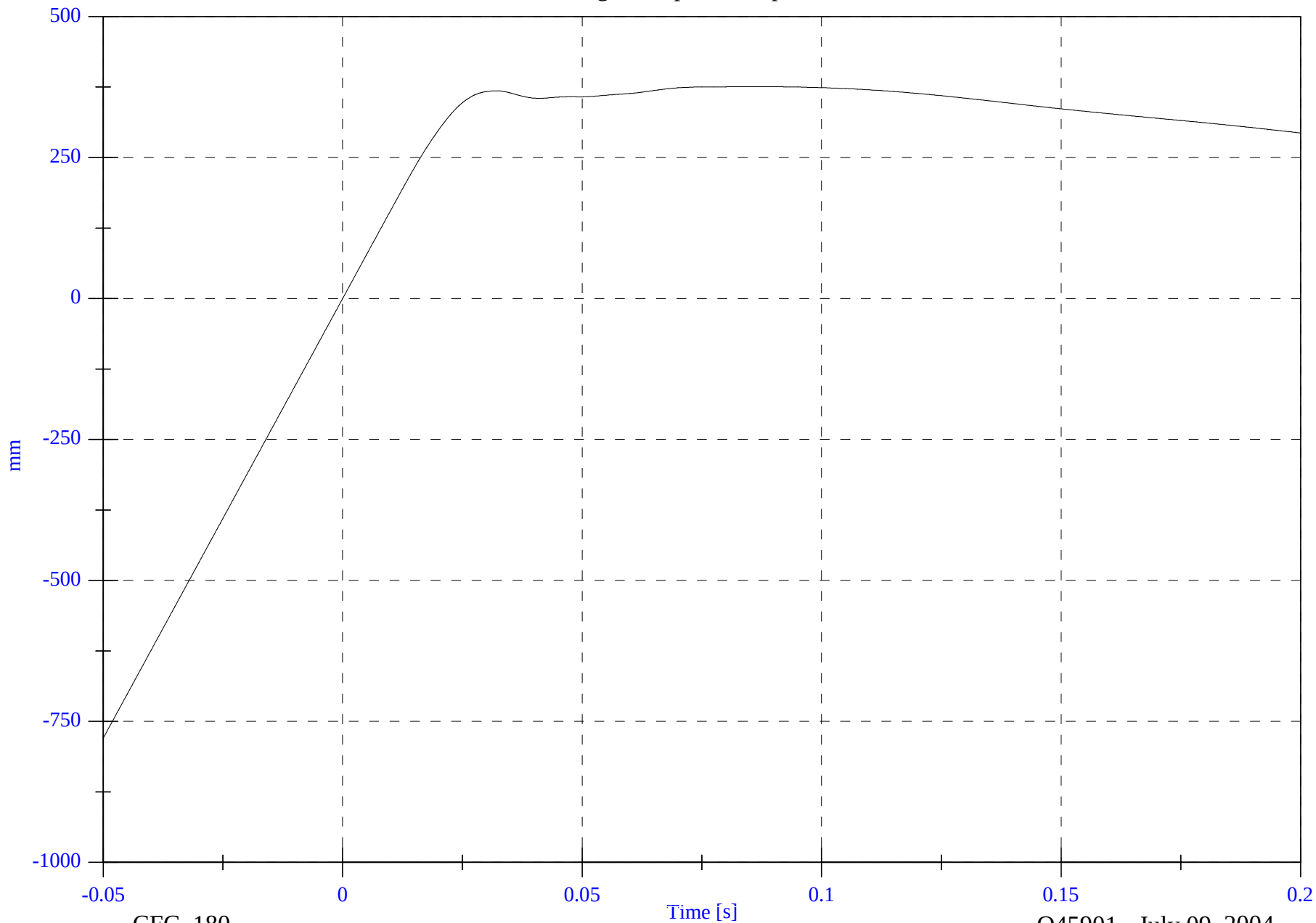
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1 Engine Top #3x Displacement

Max: 375.7 [mm] at 0.088 [s]

Min: -779.9 [mm] at -0.050 [s]



B-126

8748-01

CFC_180

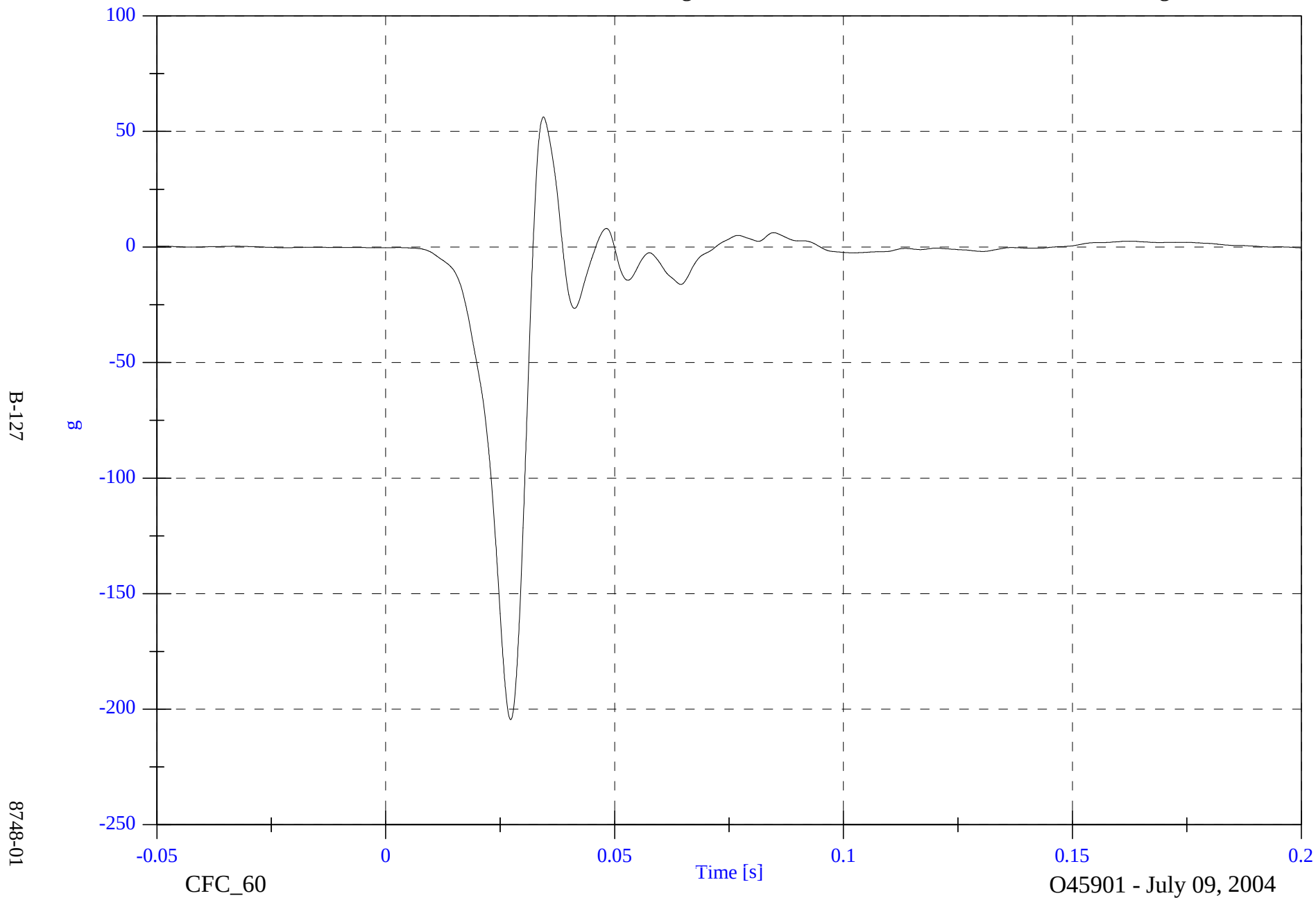
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1 Engine Bottom #4x

Max: 56.2 [g] at 0.034 [s]

Min: -204.5 [g] at 0.027 [s]



NCAP Optional Test - 2004.5 Volvo S40

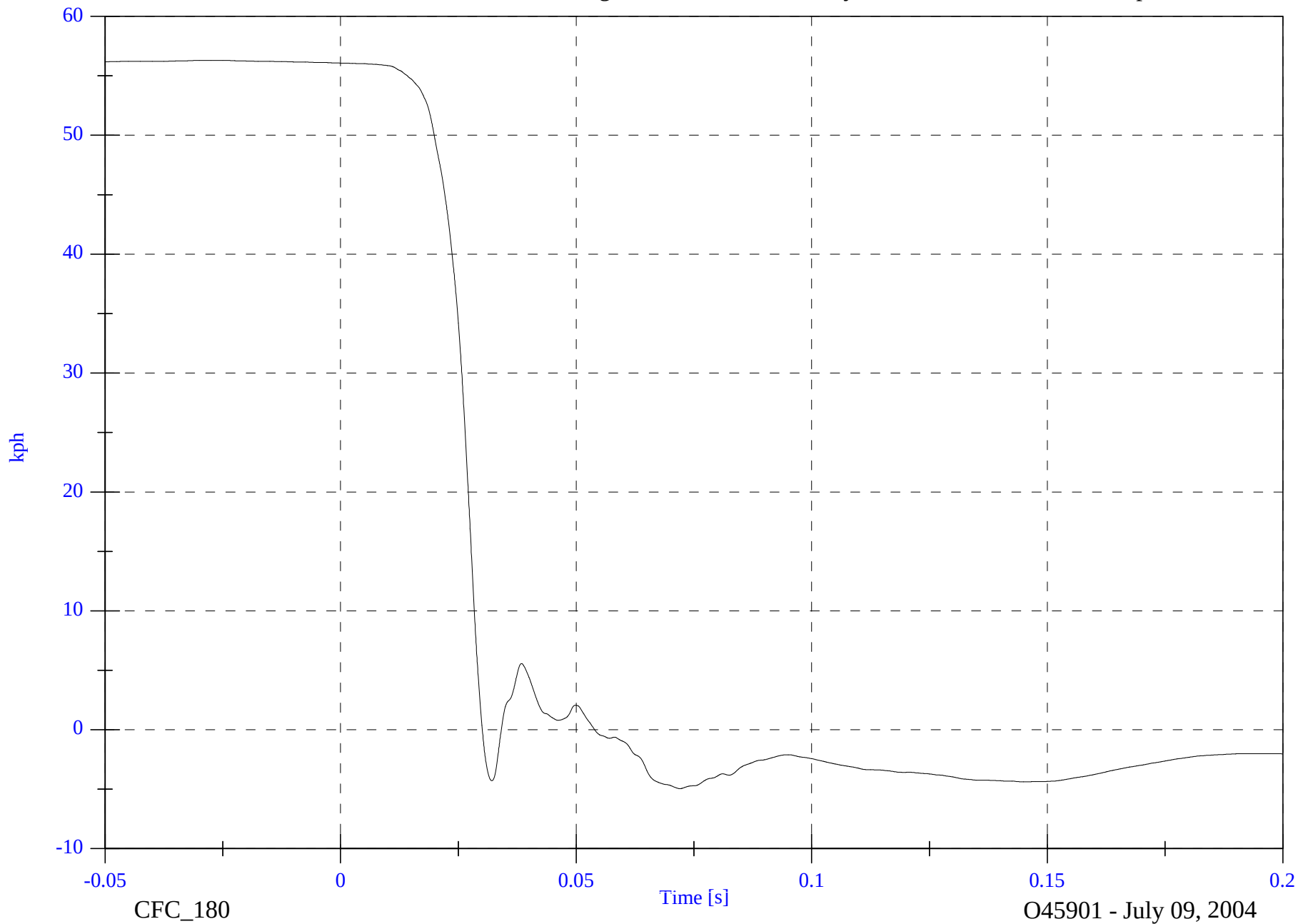
V1 Engine Bottom #4x Velocity

Max: 56.3 [kph] at -0.027 [s]

Min: -5.0 [kph] at 0.072 [s]

B-128

8748-01

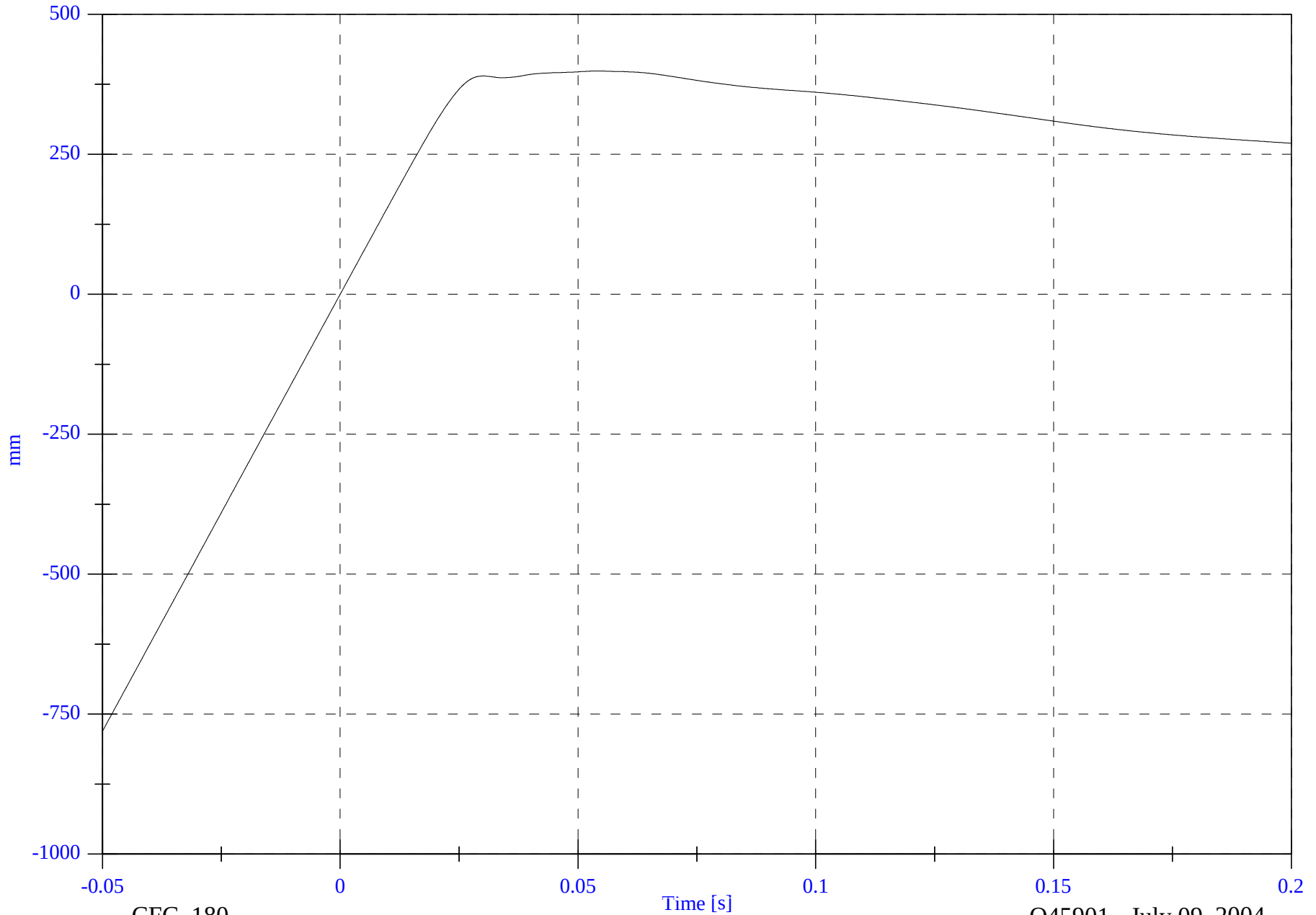


NCAP Optional Test - 2004.5 Volvo S40

V1 Engine Bottom #4x Displacement

Max: 398.5 [mm] at 0.054 [s]

Min: -780.7 [mm] at -0.050 [s]



B-129

8748-01

CFC_180

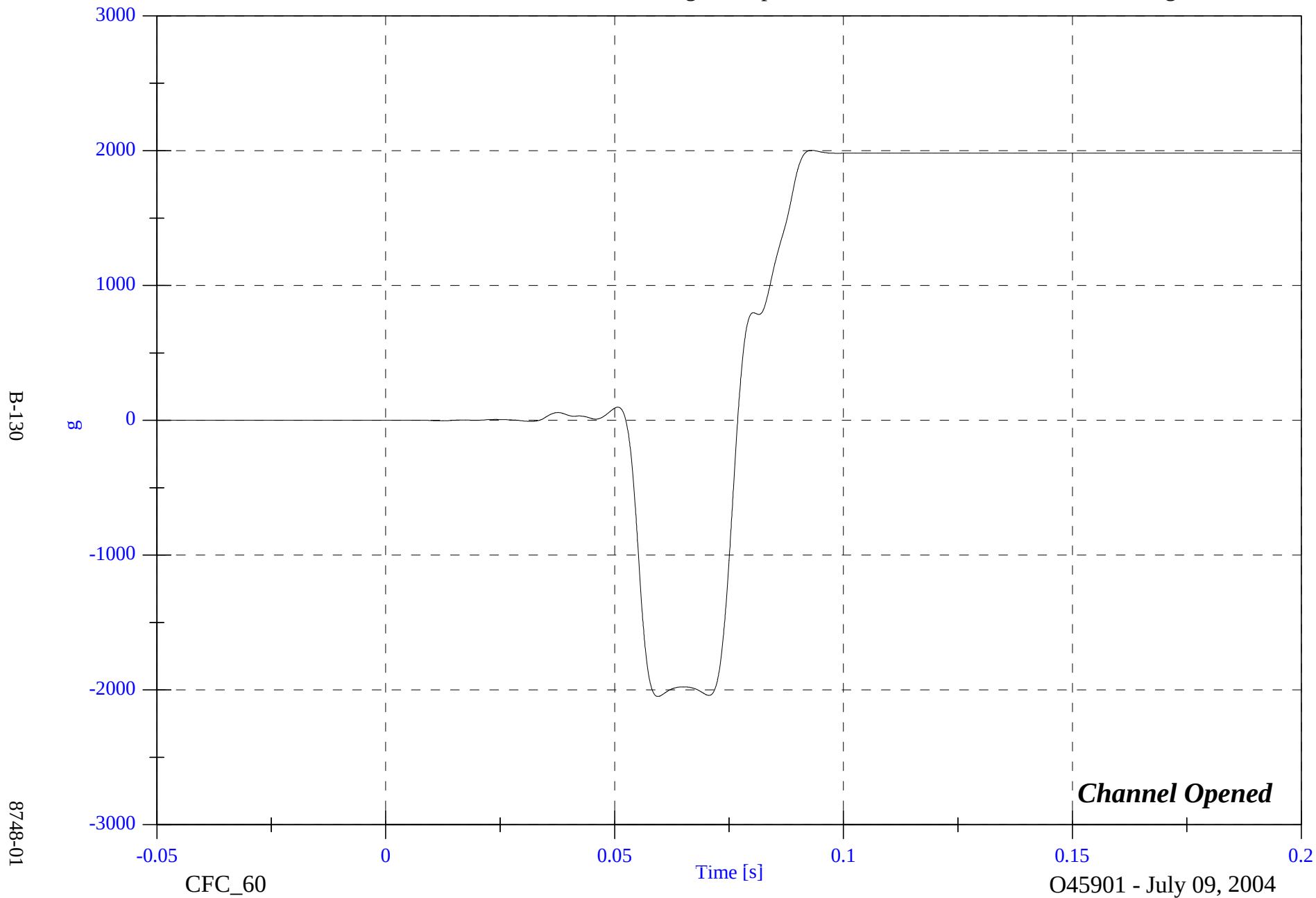
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1 Right Caliper #5x

Max: 2002.8 [g] at 0.093 [s]

Min: -2048.4 [g] at 0.059 [s]

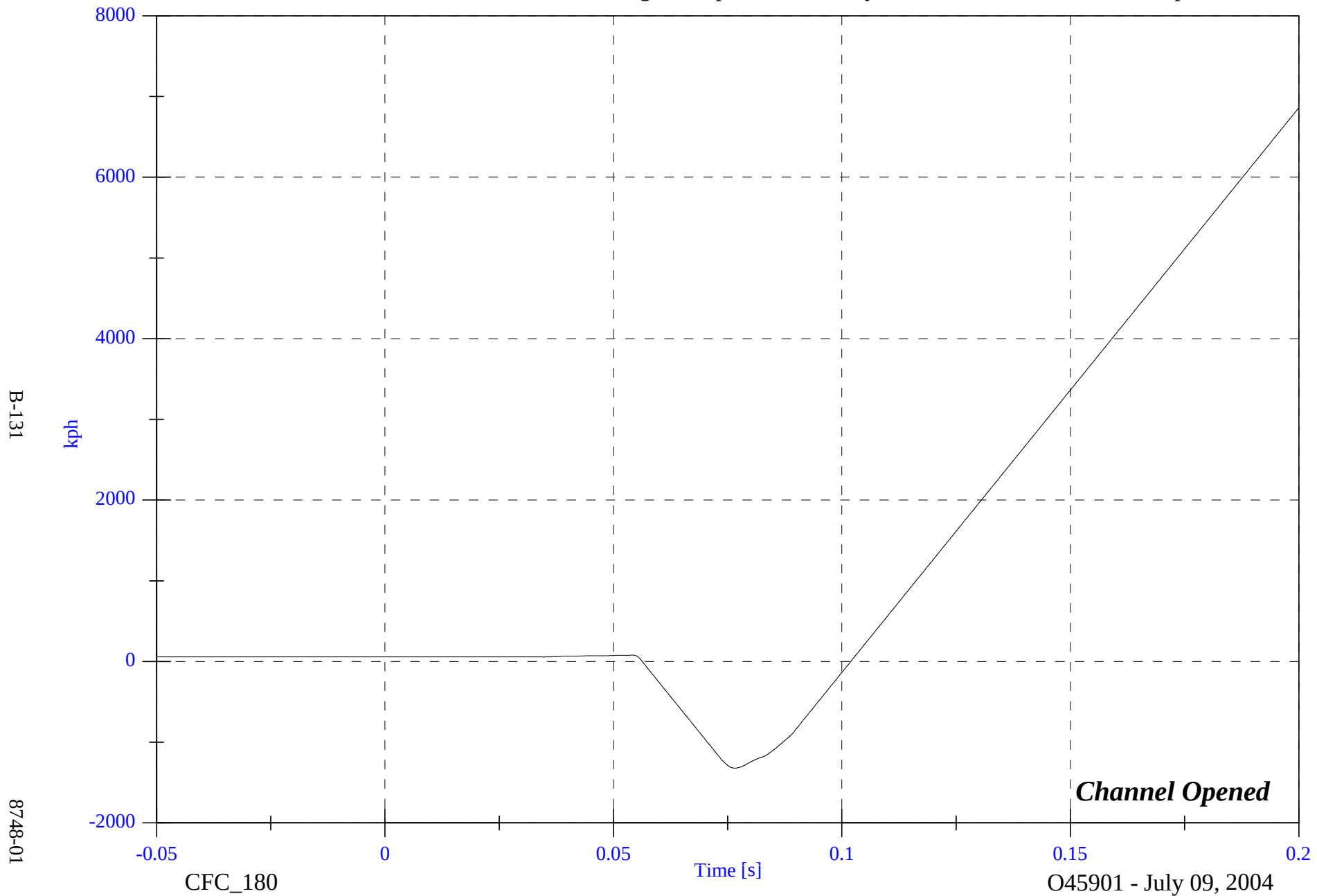


NCAP Optional Test - 2004.5 Volvo S40

V1 Right Caliper #5x Velocity

Max: 6858.1 [kph] at 0.200 [s]

Min: -1320.9 [kph] at 0.077 [s]

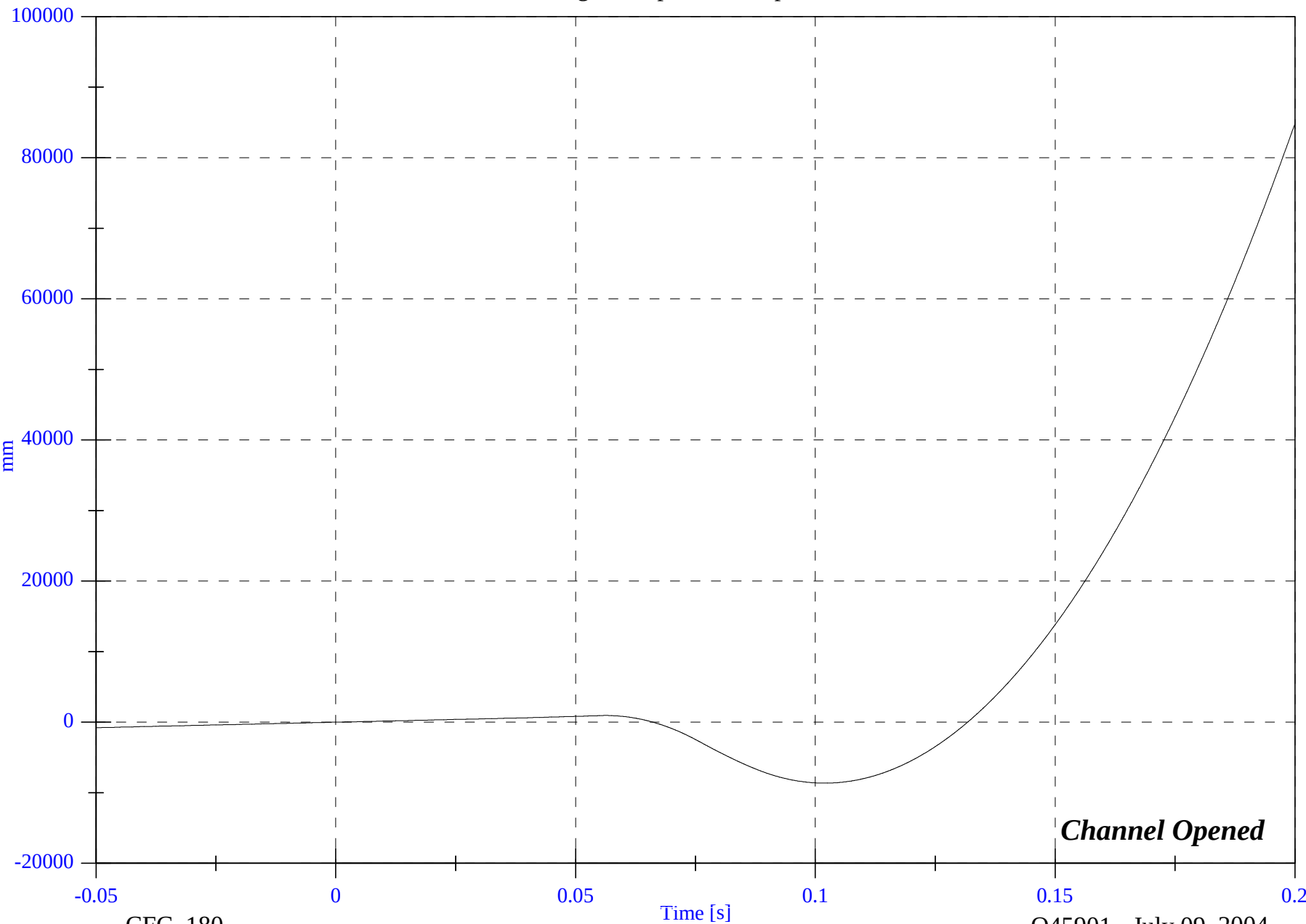


NCAP Optional Test - 2004.5 Volvo S40

V1 Right Caliper #5x Displacement

Max: 84733.8 [mm] at 0.200 [s]

Min: -8635.4 [mm] at 0.102 [s]



B-132

8748-01

CFC_180

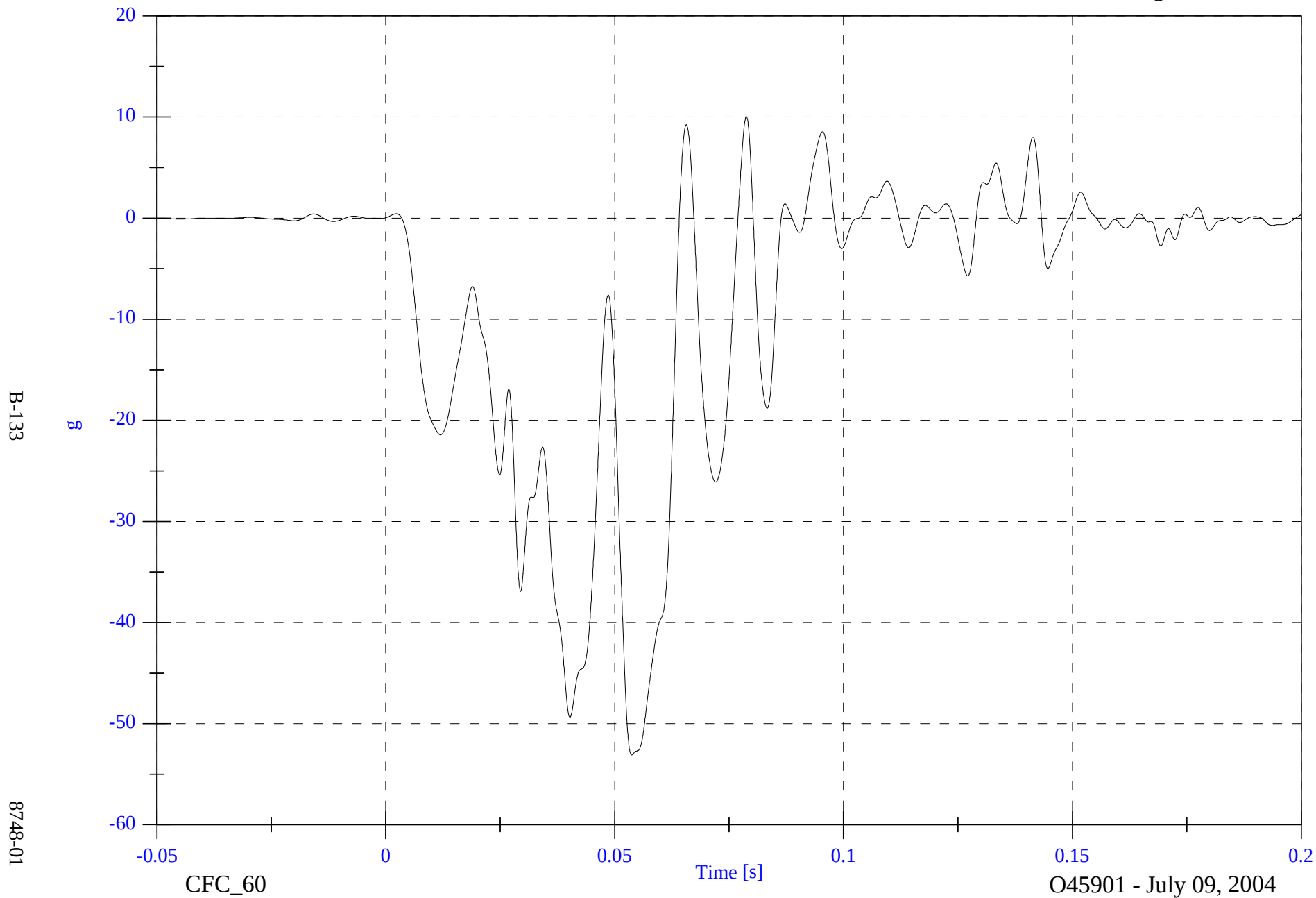
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1 Instrument Panel #6x

Max: 10.1 [g] at 0.079 [s]

Min: -53.1 [g] at 0.054 [s]

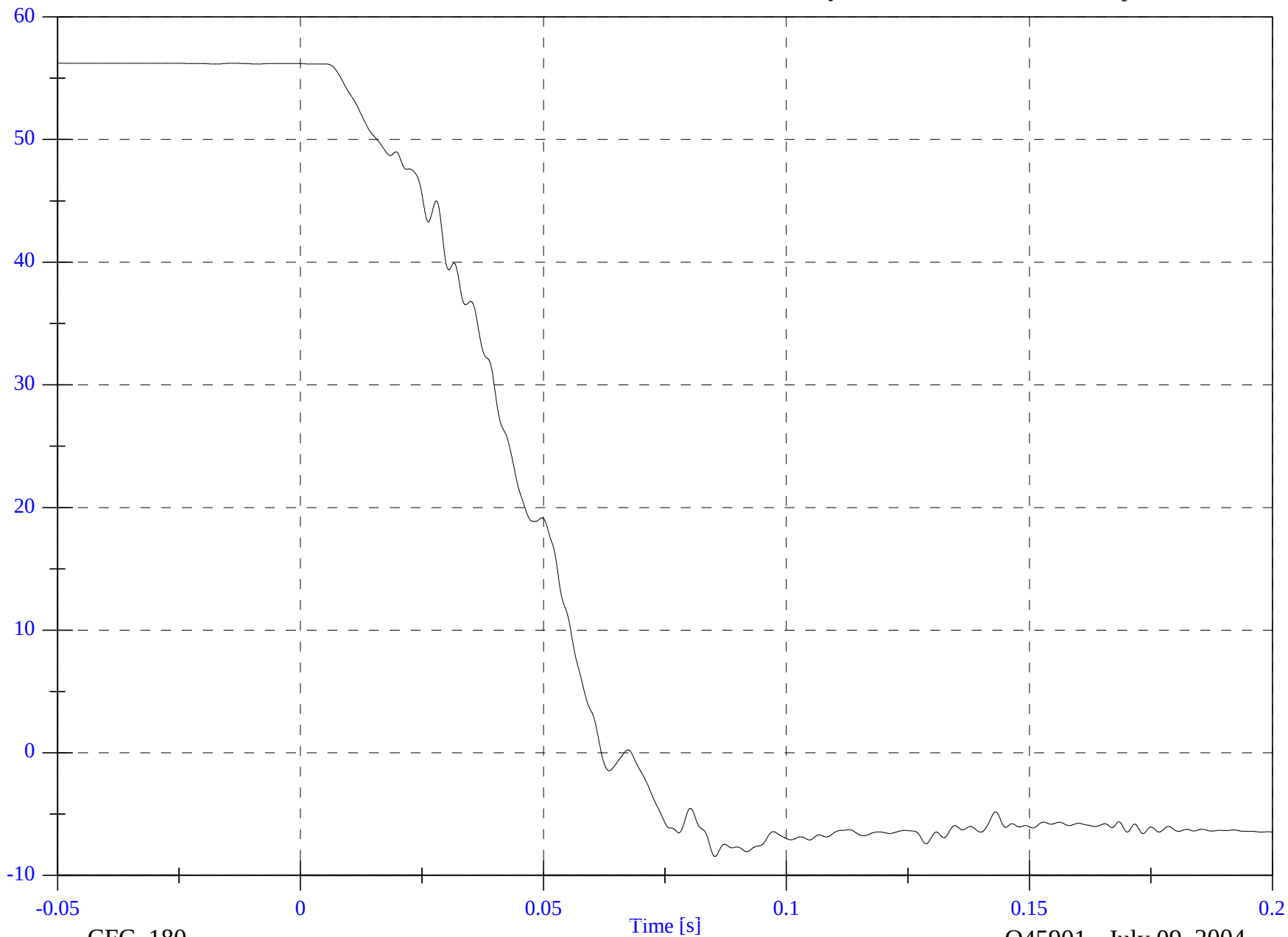


NCAP Optional Test - 2004.5 Volvo S40

V1 Instrument Panel #6x Velocity

Max: 56.2 [kph] at -0.050 [s]

Min: -8.5 [kph] at 0.085 [s]



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8748-01

CFC_180

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

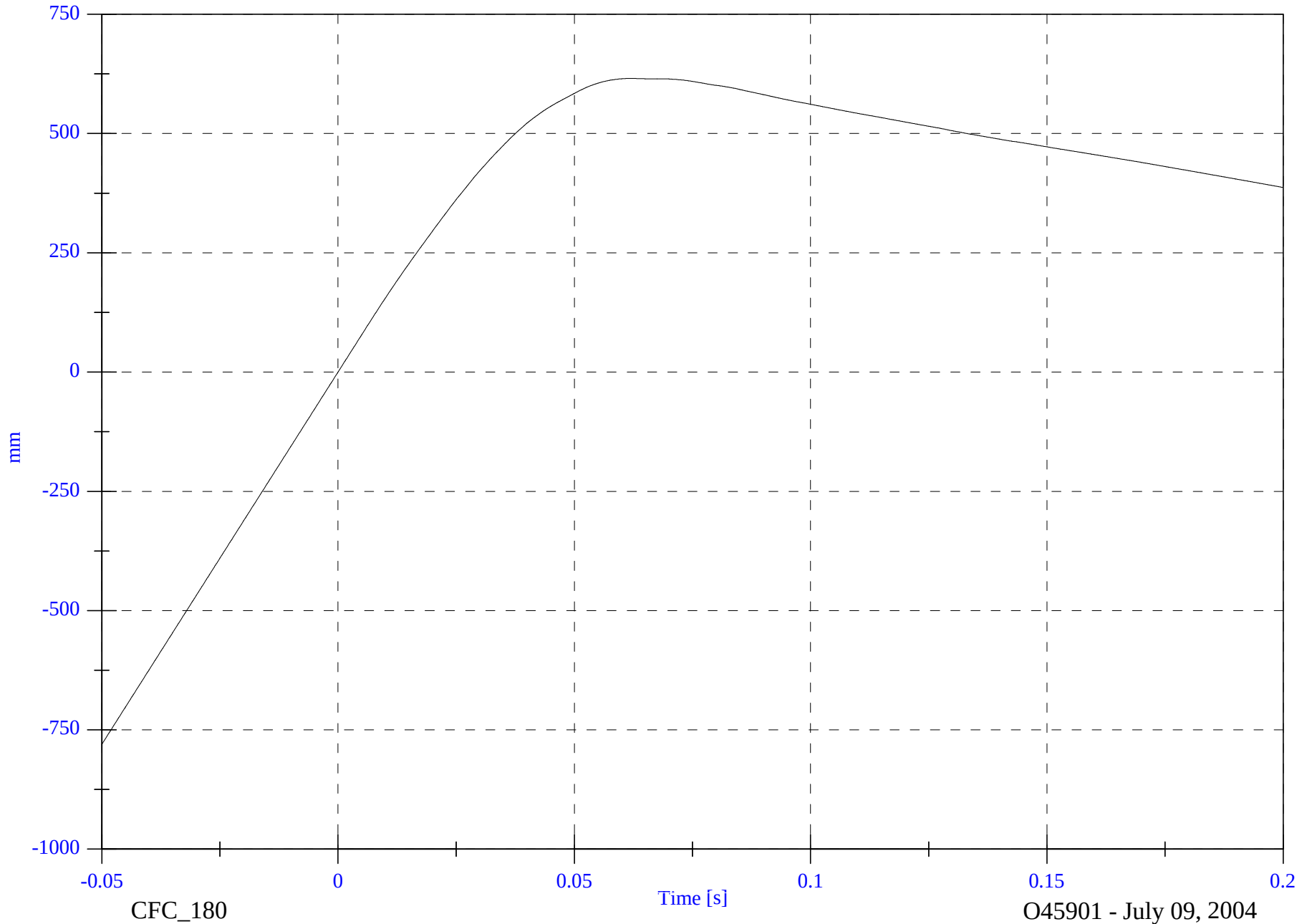
V1 Instrument Panel #6x Displacement

Max: 615.6 [mm] at 0.062 [s]

Min: -780.5 [mm] at -0.050 [s]

B-135

8748-01



CFC_180

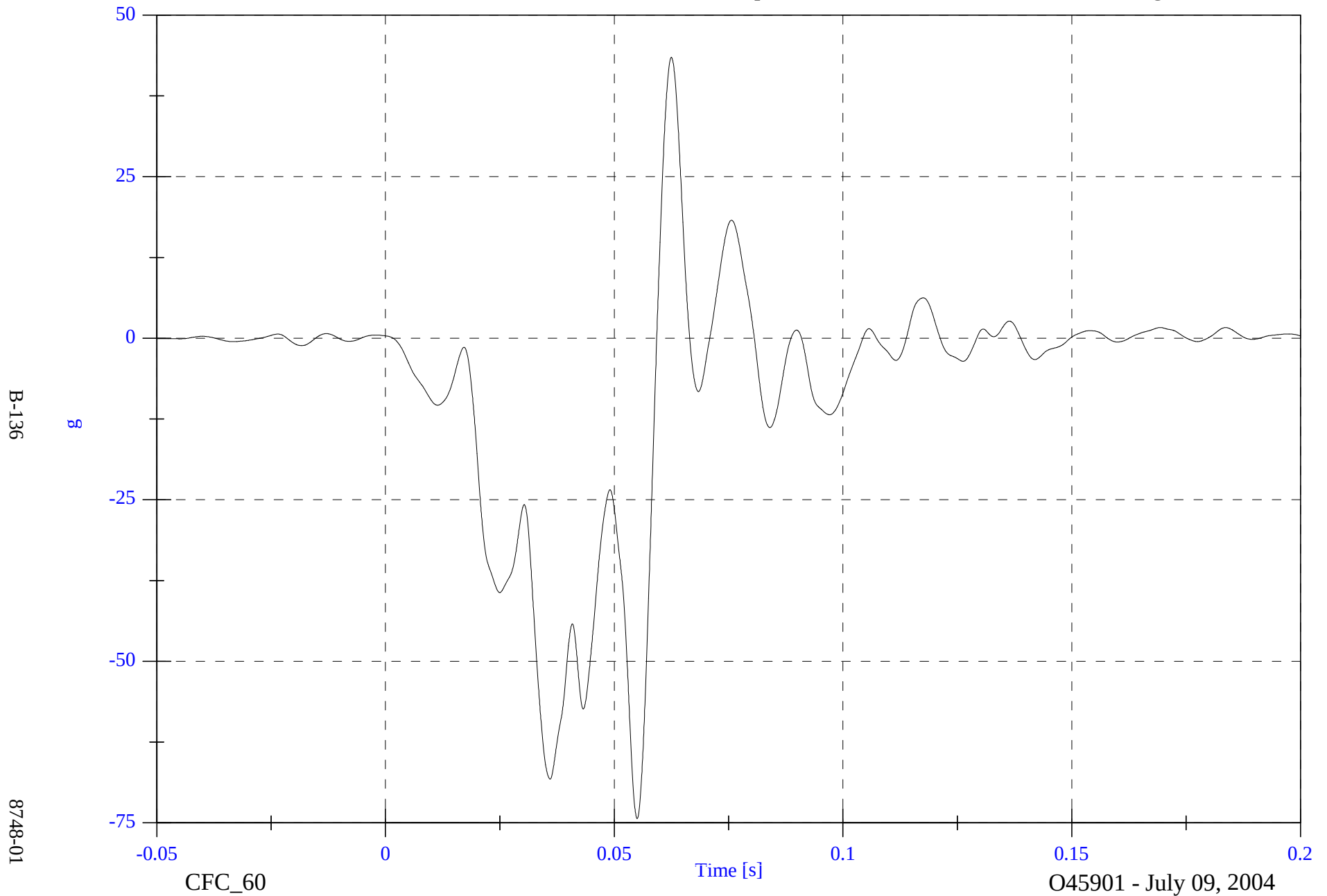
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1 Left Caliper #7x

Max: 43.5 [g] at 0.062 [s]

Min: -74.3 [g] at 0.055 [s]



NCAP Optional Test - 2004.5 Volvo S40

V1 Left Caliper #7x Velocity

Max: 56.3 [kph] at -0.037 [s]

Min: -8.5 [kph] at 0.059 [s]



B-137

8748-01

CFC_180

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

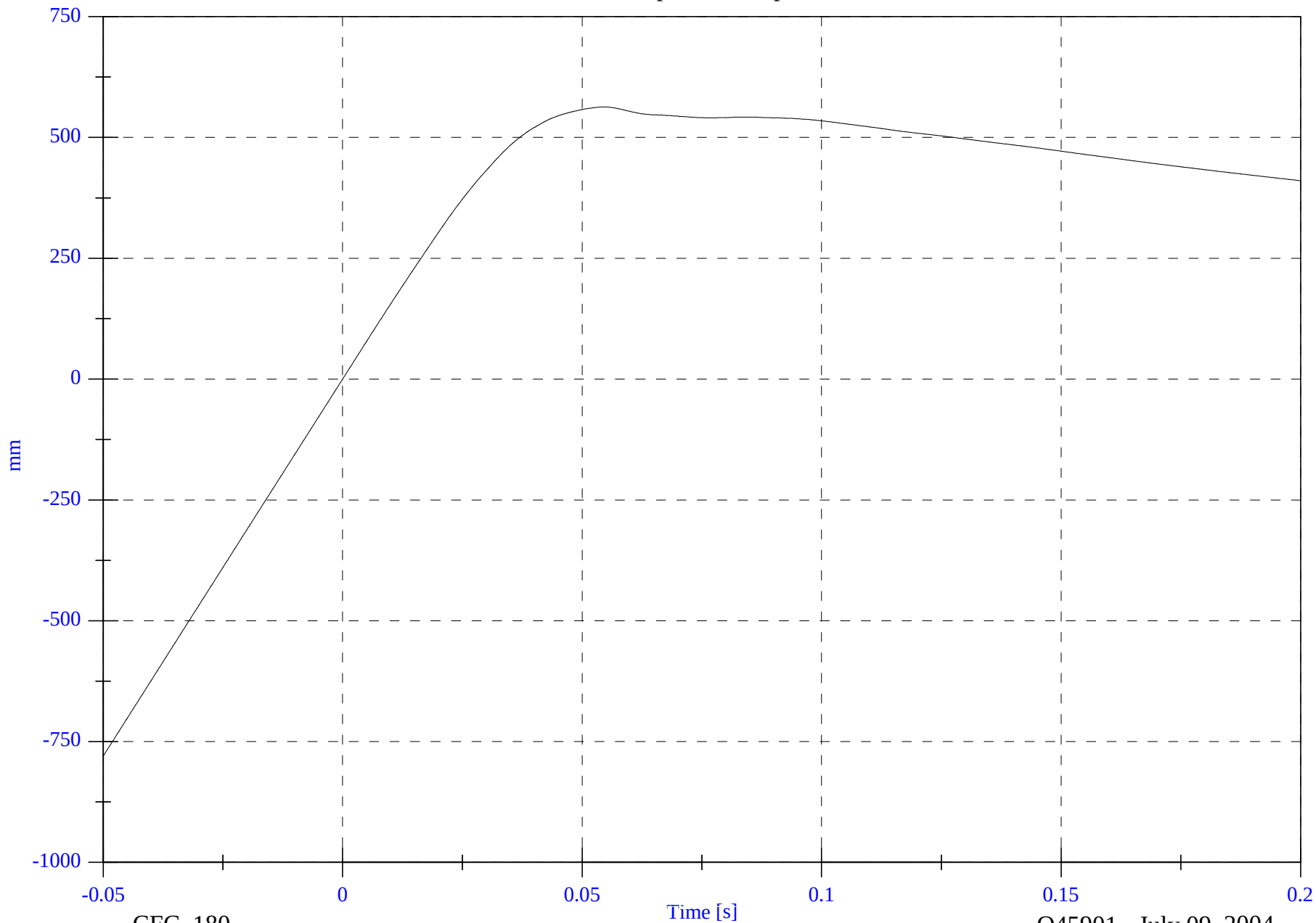
V1 Left Caliper #7x Displacement

Max: 563.1 [mm] at 0.055 [s]

Min: -780.3 [mm] at -0.050 [s]

B-138

8748-01



CFC_180

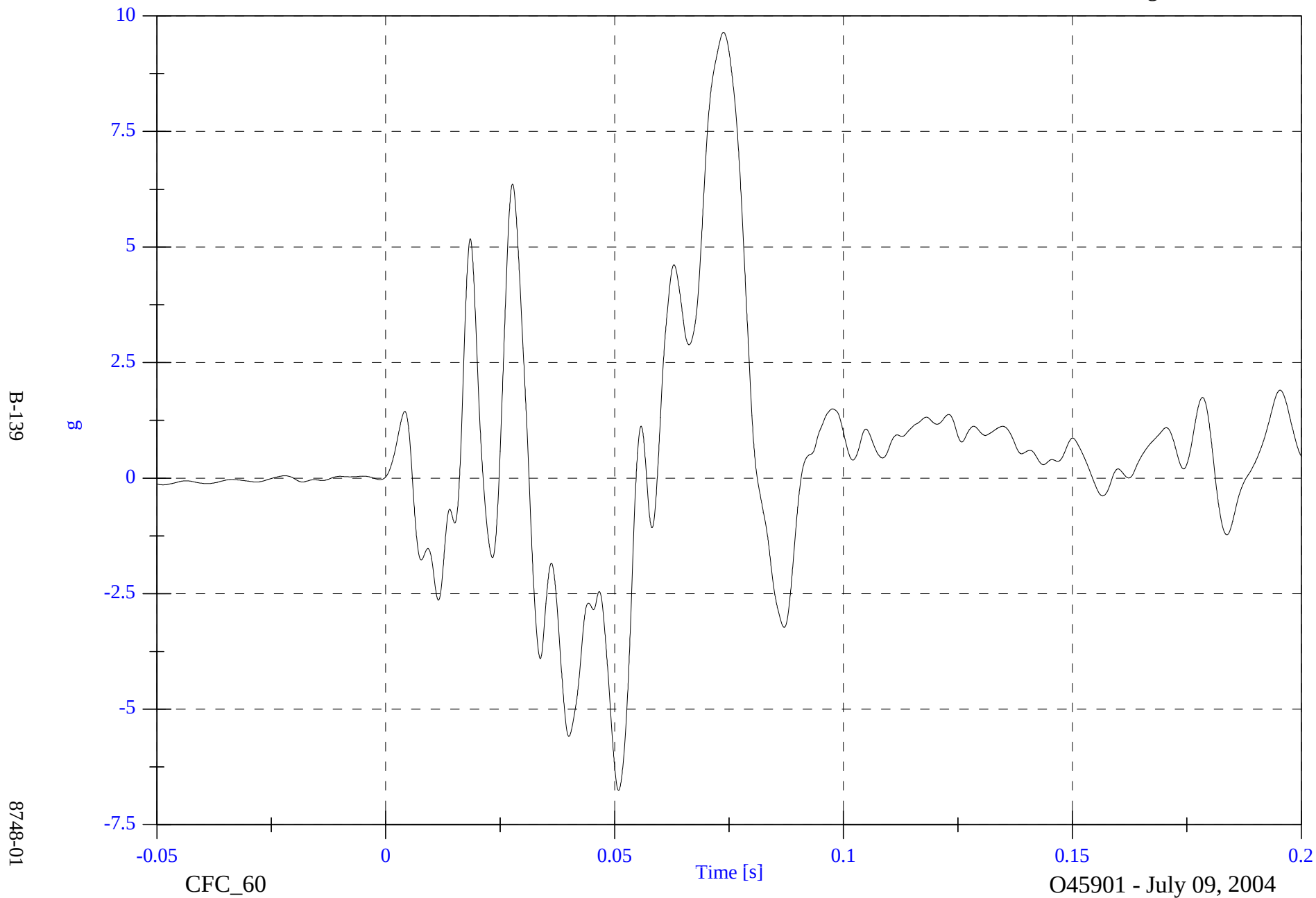
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1 Left Rear #8z

Max: 9.6 [g] at 0.074 [s]

Min: -6.8 [g] at 0.051 [s]

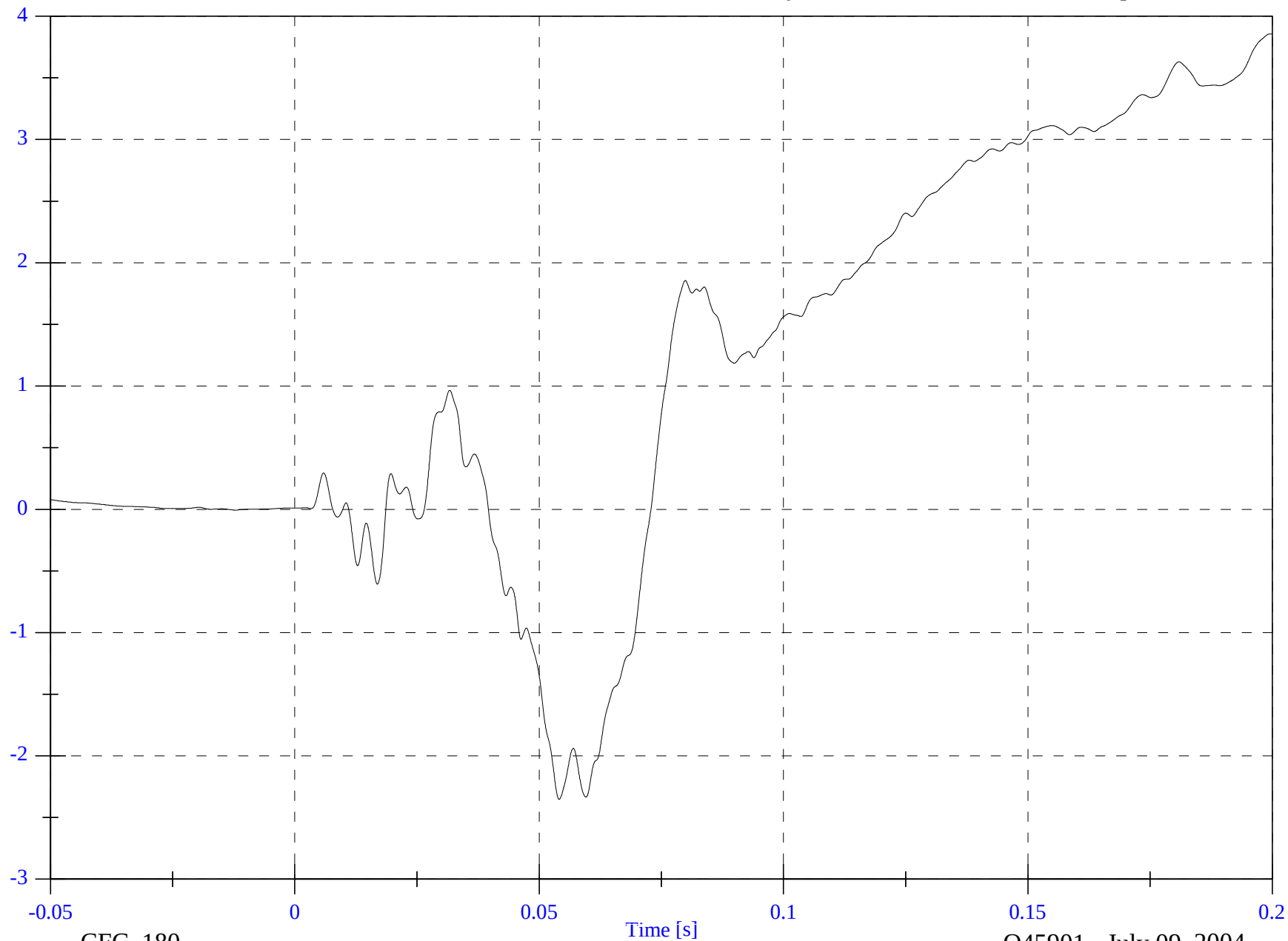


NCAP Optional Test - 2004.5 Volvo S40

V1 Left Rear #8z Velocity

Max: 3.9 [kph] at 0.200 [s]

Min: -2.4 [kph] at 0.054 [s]



B-140

8748-01

CFC_180

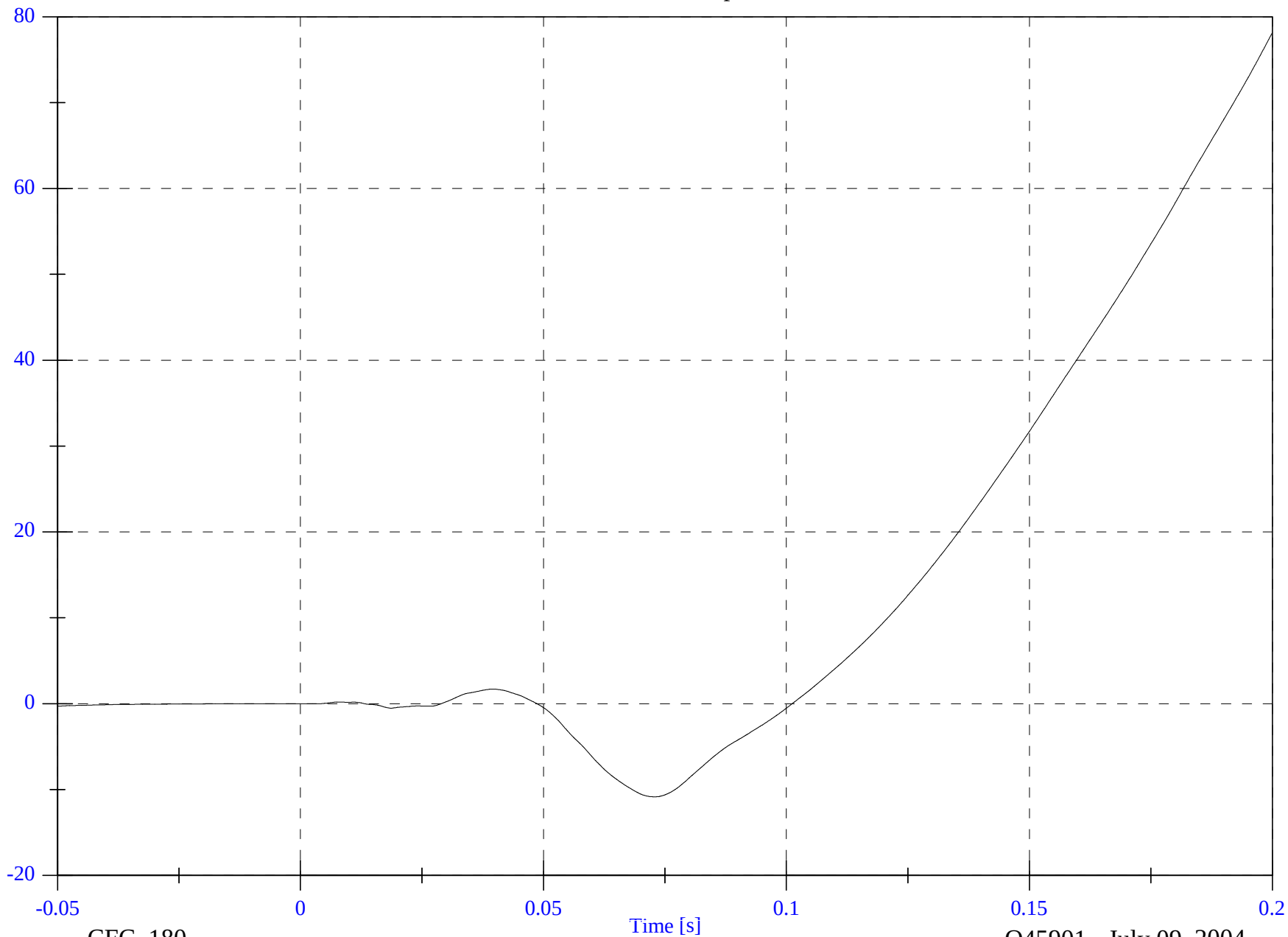
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1 Left Rear #8z Displacement

Max: 78.1 [mm] at 0.200 [s]

Min: -10.8 [mm] at 0.073 [s]



B-141

8748-01

CFC_180

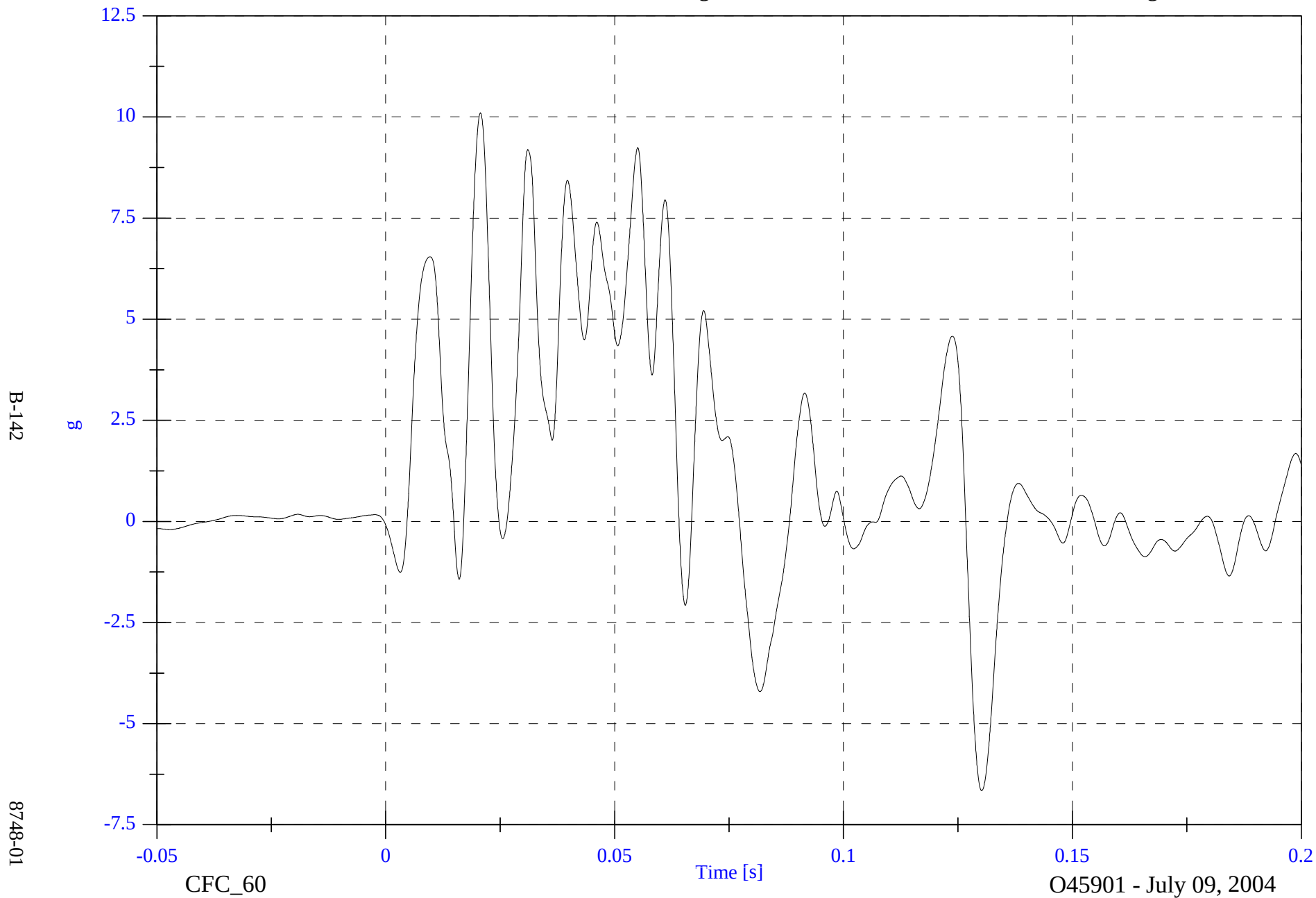
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1 Right Rear #9z

Max: 10.1 [g] at 0.021 [s]

Min: -6.7 [g] at 0.130 [s]

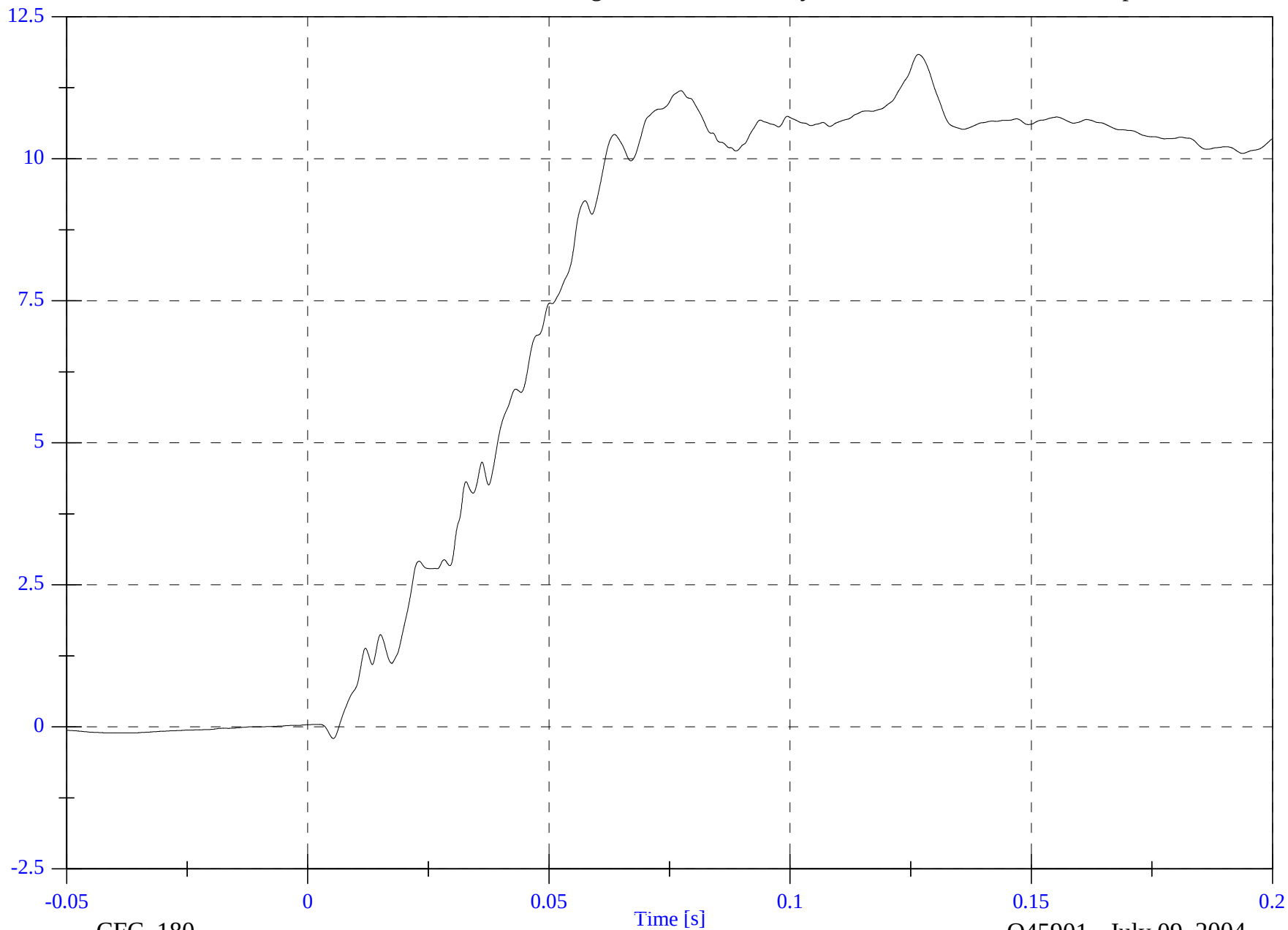


NCAP Optional Test - 2004.5 Volvo S40

V1 Right Rear #9z Velocity

Max: 11.8 [kph] at 0.127 [s]

Min: -0.2 [kph] at 0.005 [s]



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8748-01

CFC_180

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

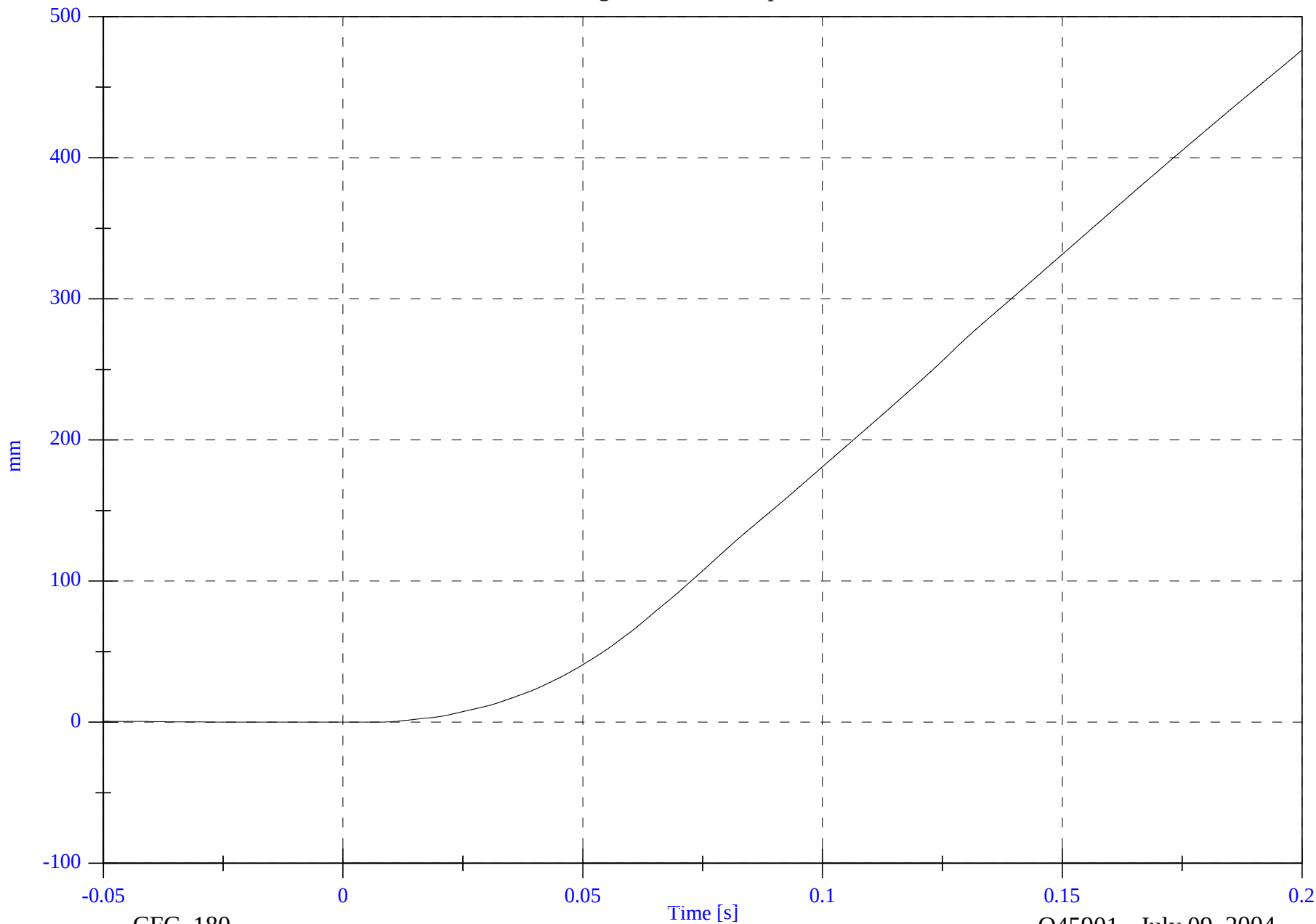
V1 Right Rear #9z Displacement

Max: 476.2 [mm] at 0.200 [s]

Min: -0.1 [mm] at 0.006 [s]

B-144

8748-01



CFC_180

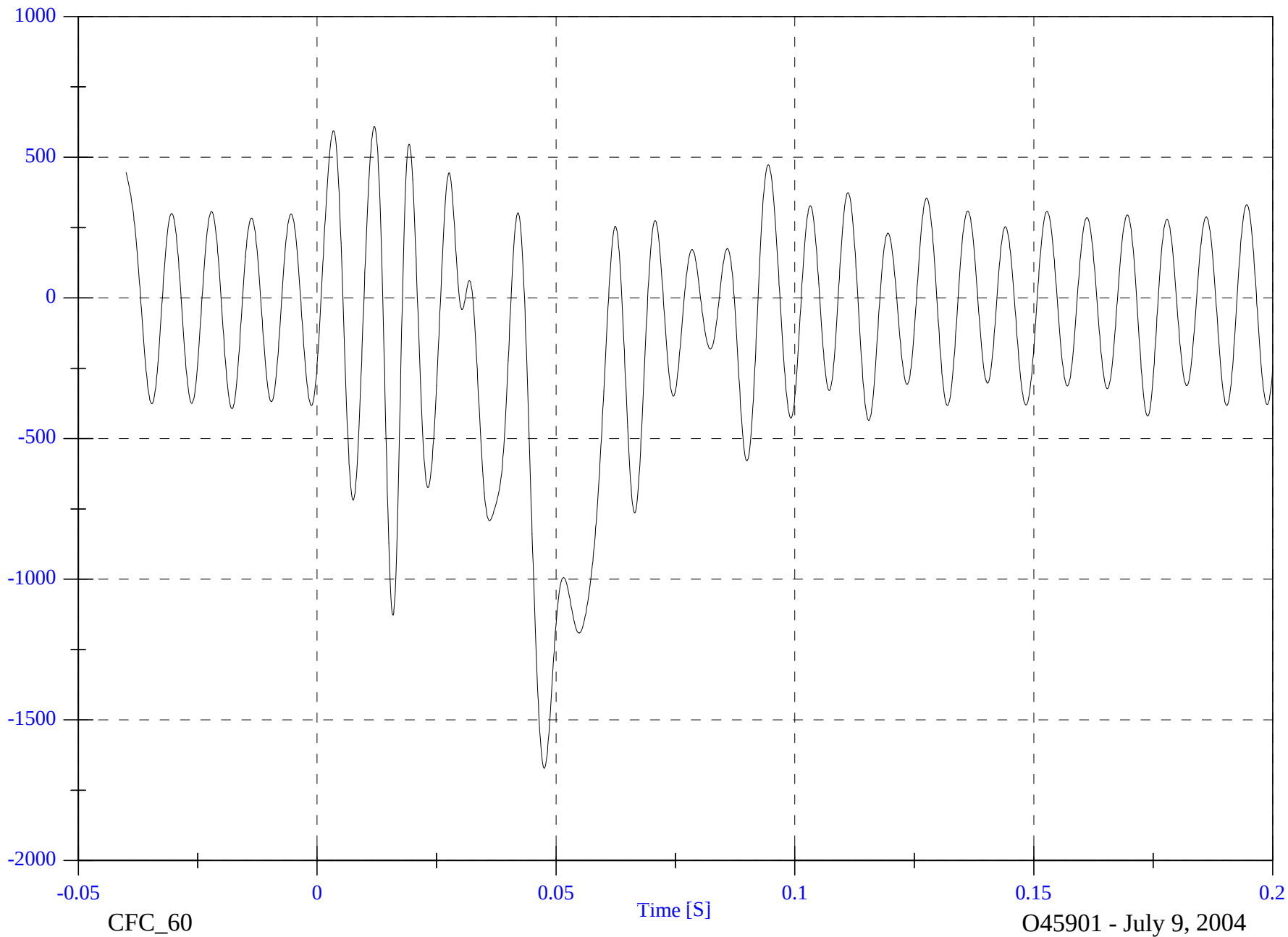
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell A1 Fx

Max: 609.2 [] at 0.012 [S]

Min: -1671.9 [] at 0.047 [S]

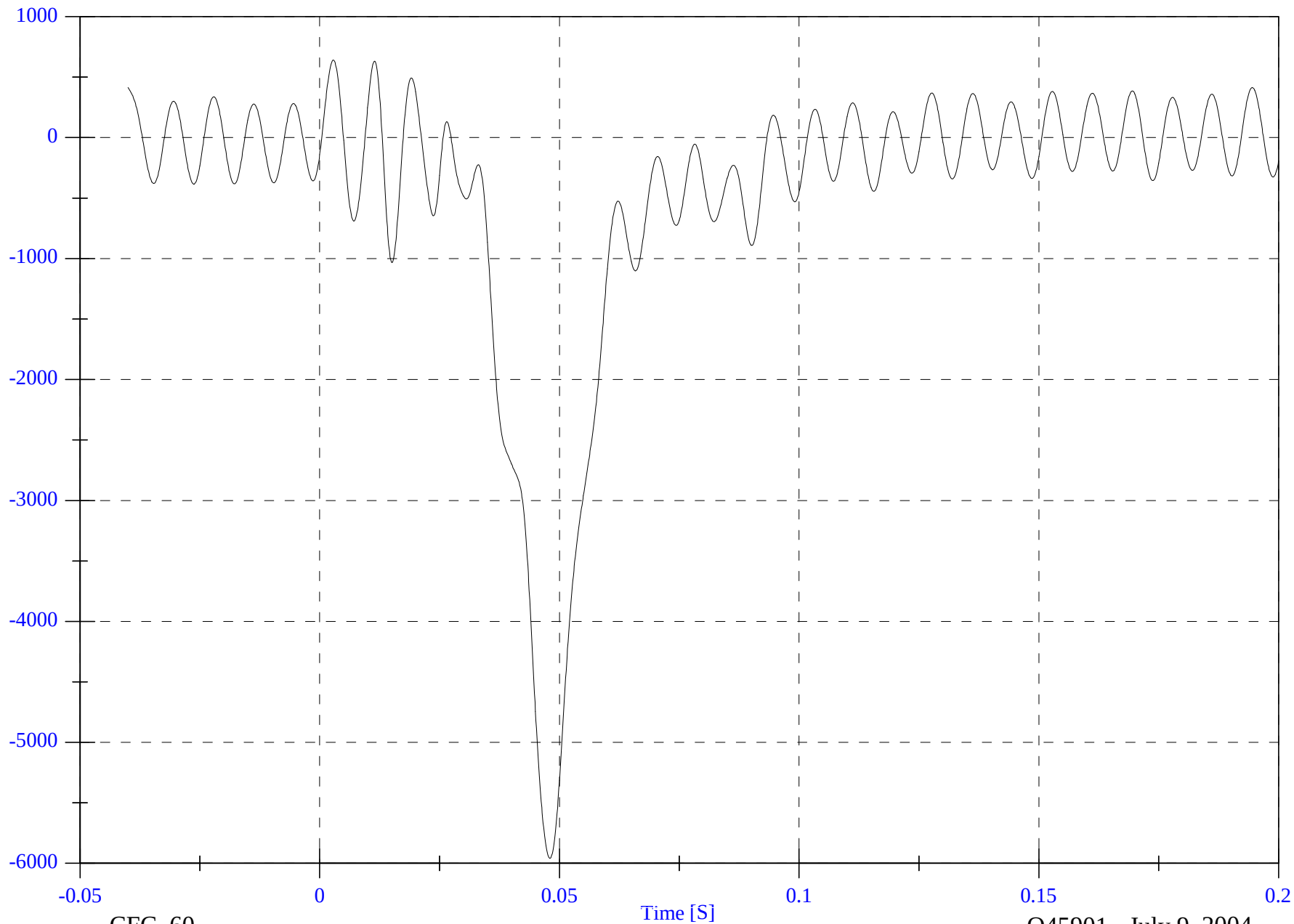


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell A2 Fx

Max: 640.3 [] at 0.003 [S]

Min: -5958.3 [] at 0.048 [S]



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8748-01

CFC_60

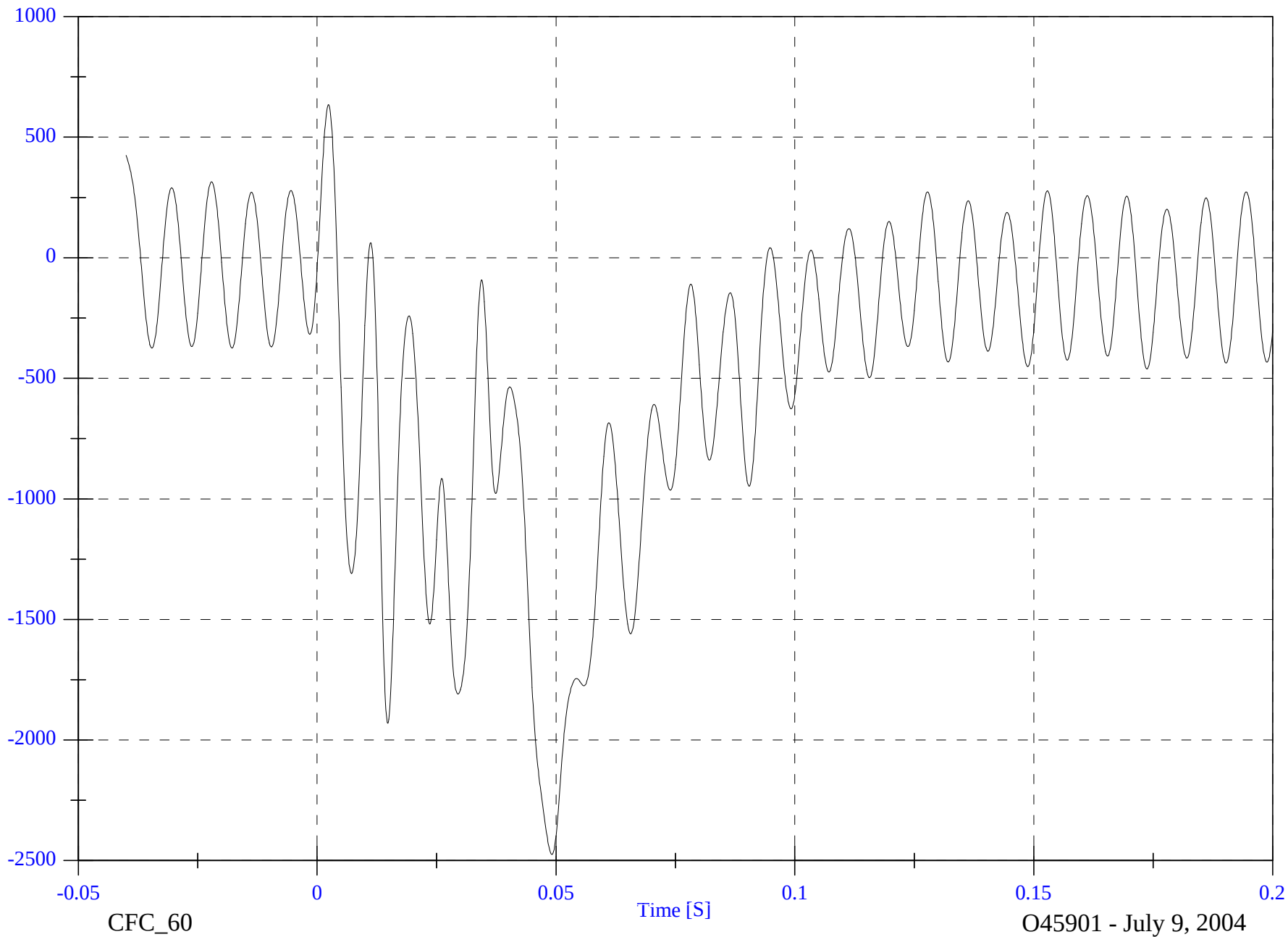
O45901 - July 9, 2004

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell A3 Fx

Max: 634.7 [] at 0.002 [S]

Min: -2474.8 [] at 0.049 [S]



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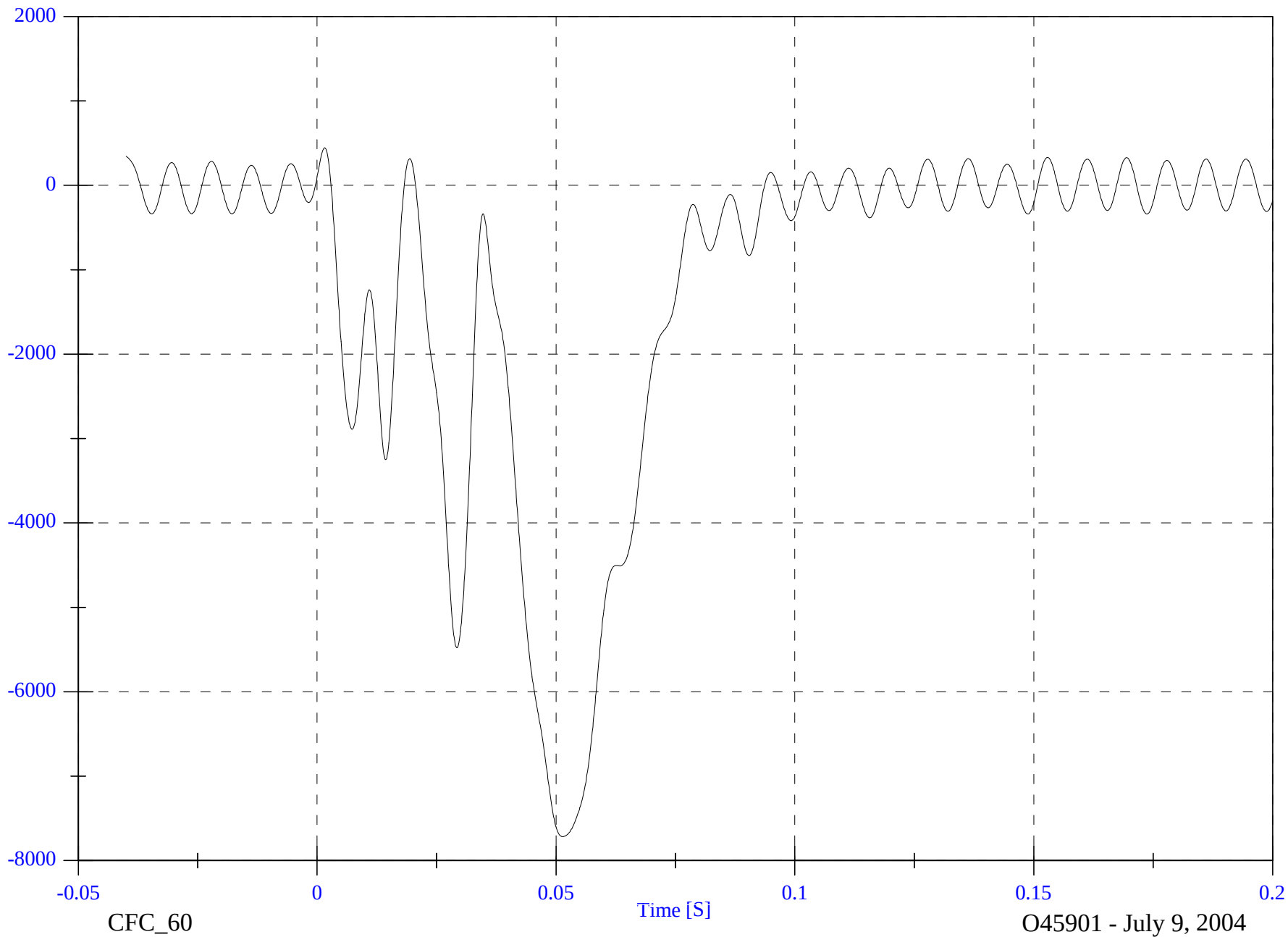
8748-01

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell A4 Fx

Max: 443.7 [] at 0.002 [S]

Min: -7715.9 [] at 0.051 [S]



B-148

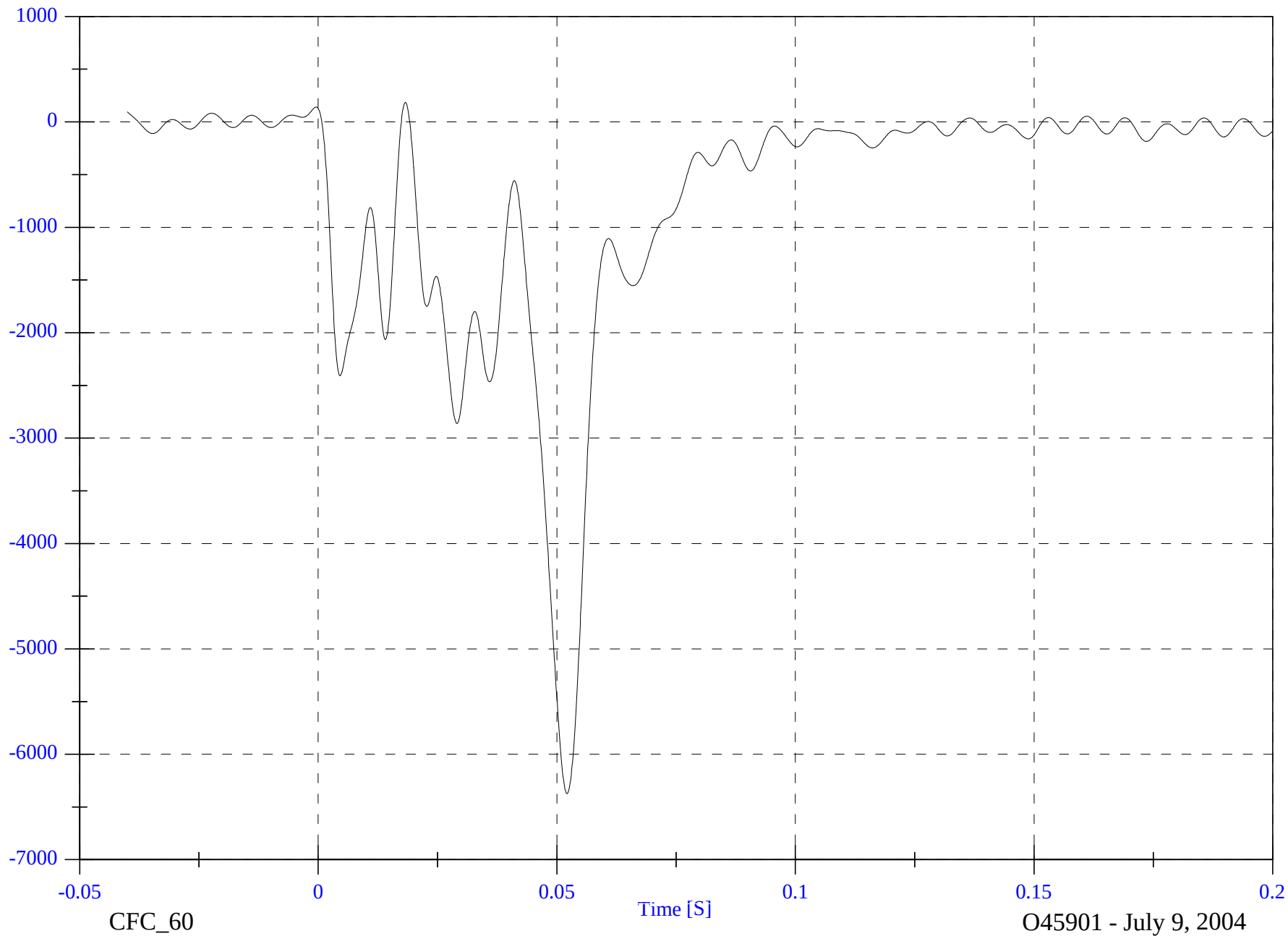
8748-01

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell A5 Fx

Max: 184.5 [] at 0.018 [S]

Min: -6373.4 [] at 0.052 [S]



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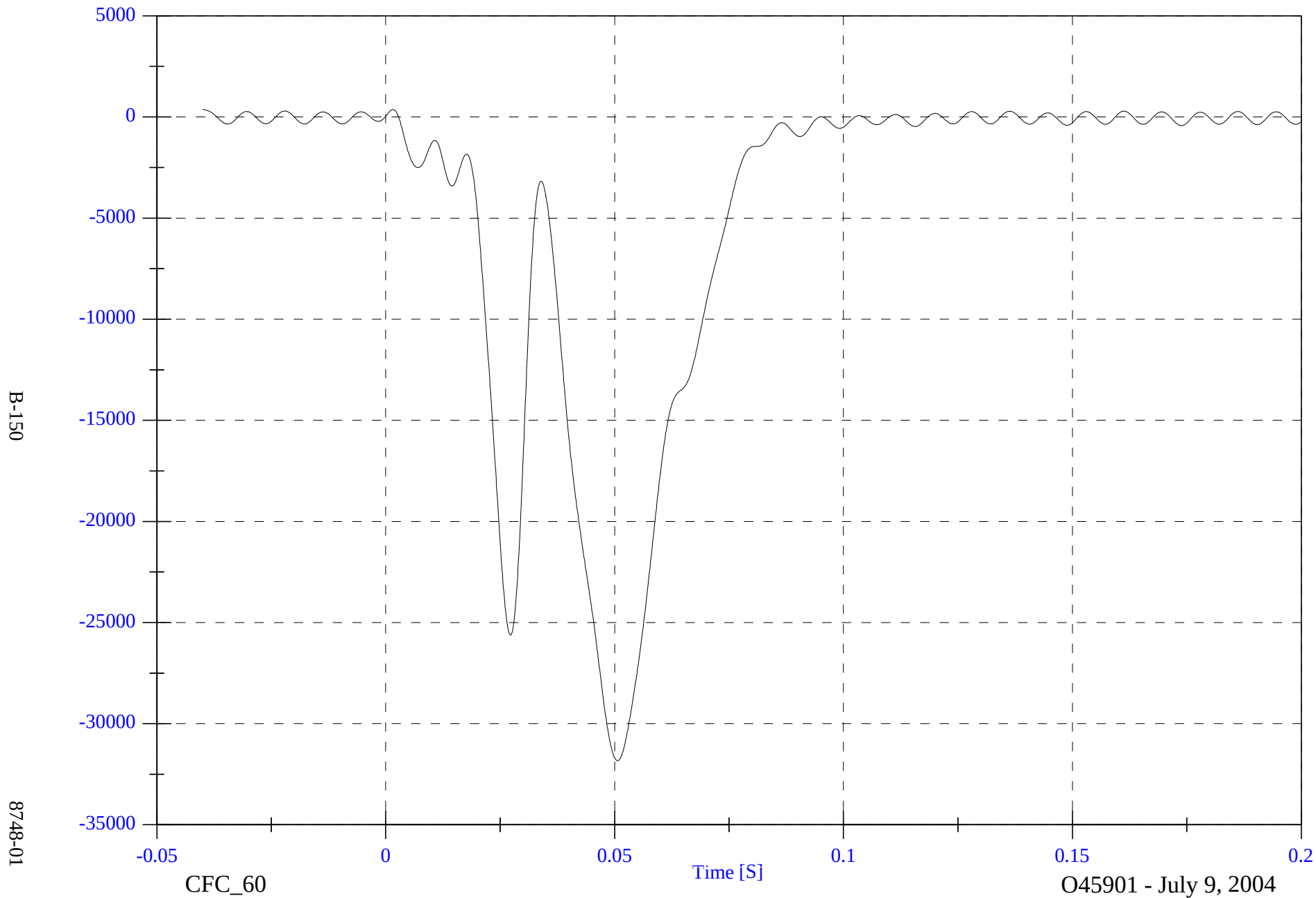
8748-01

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell A6 Fx

Max: 380.8 [] at -0.040 [S]

Min: -31837.0 [] at 0.051 [S]

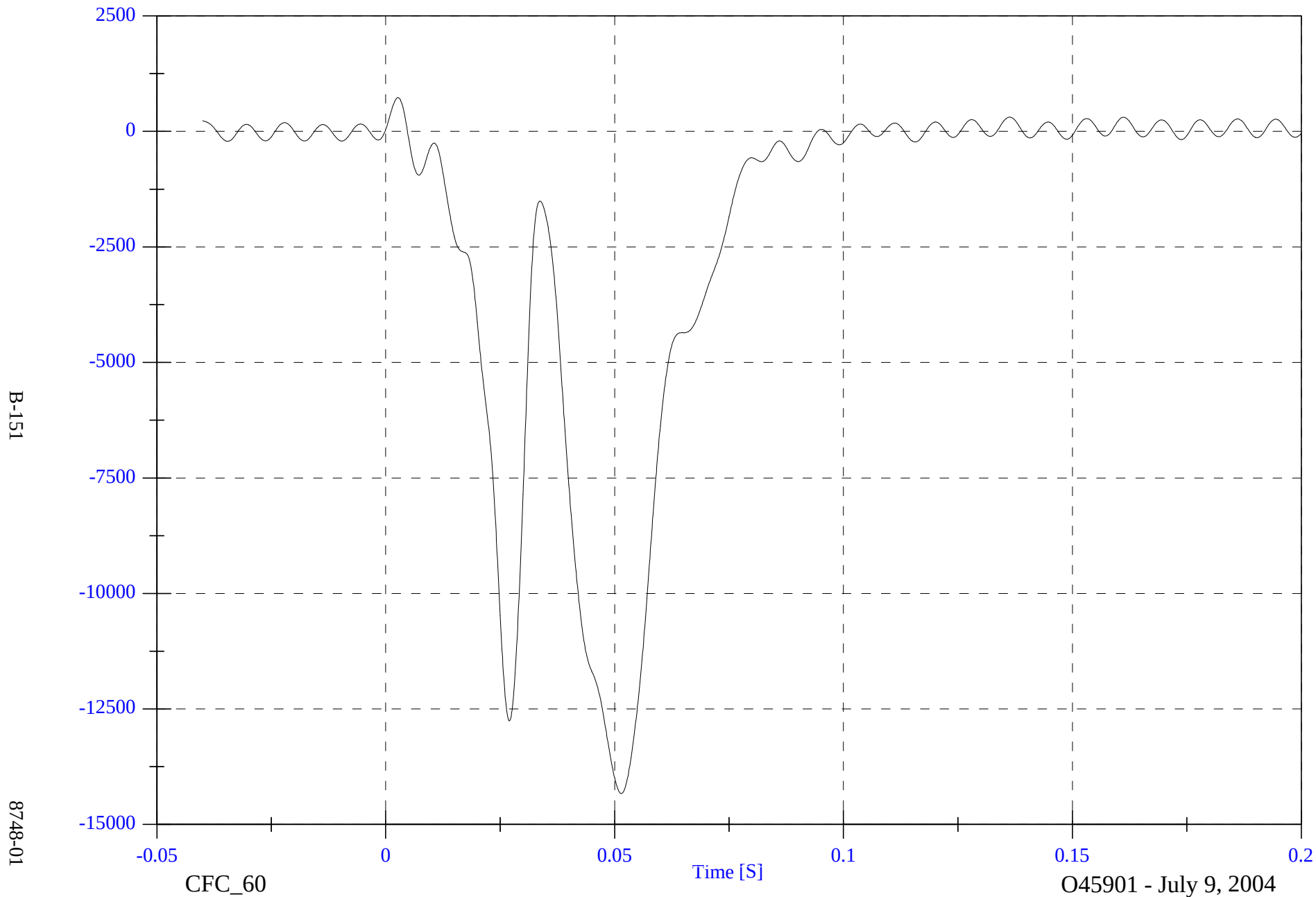


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell A7 Fx

Max: 731.3 [] at 0.003 [S]

Min: -14329.7 [] at 0.051 [S]

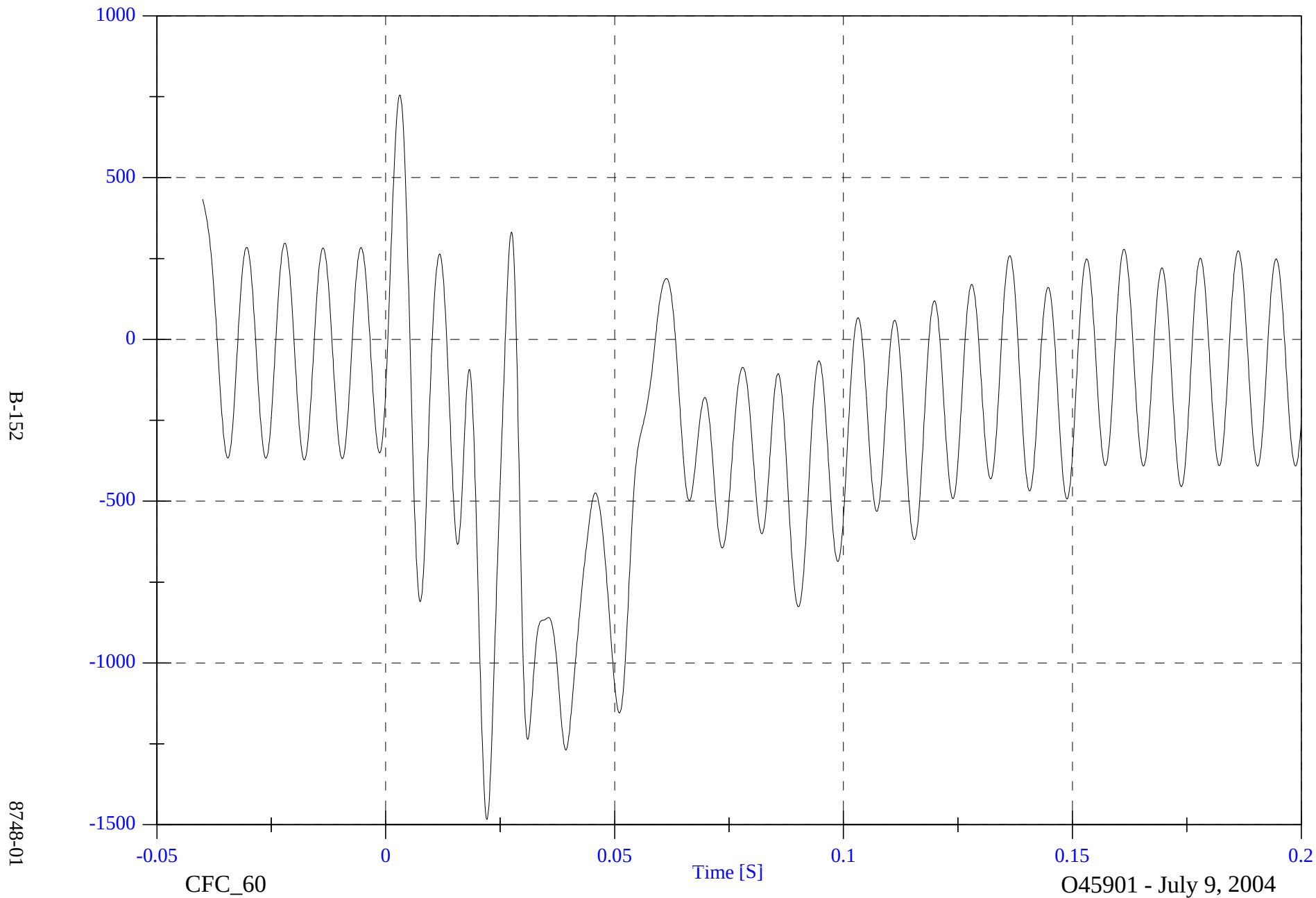


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell A8 Fx

Max: 755.6 [] at 0.003 [S]

Min: -1484.2 [] at 0.022 [S]

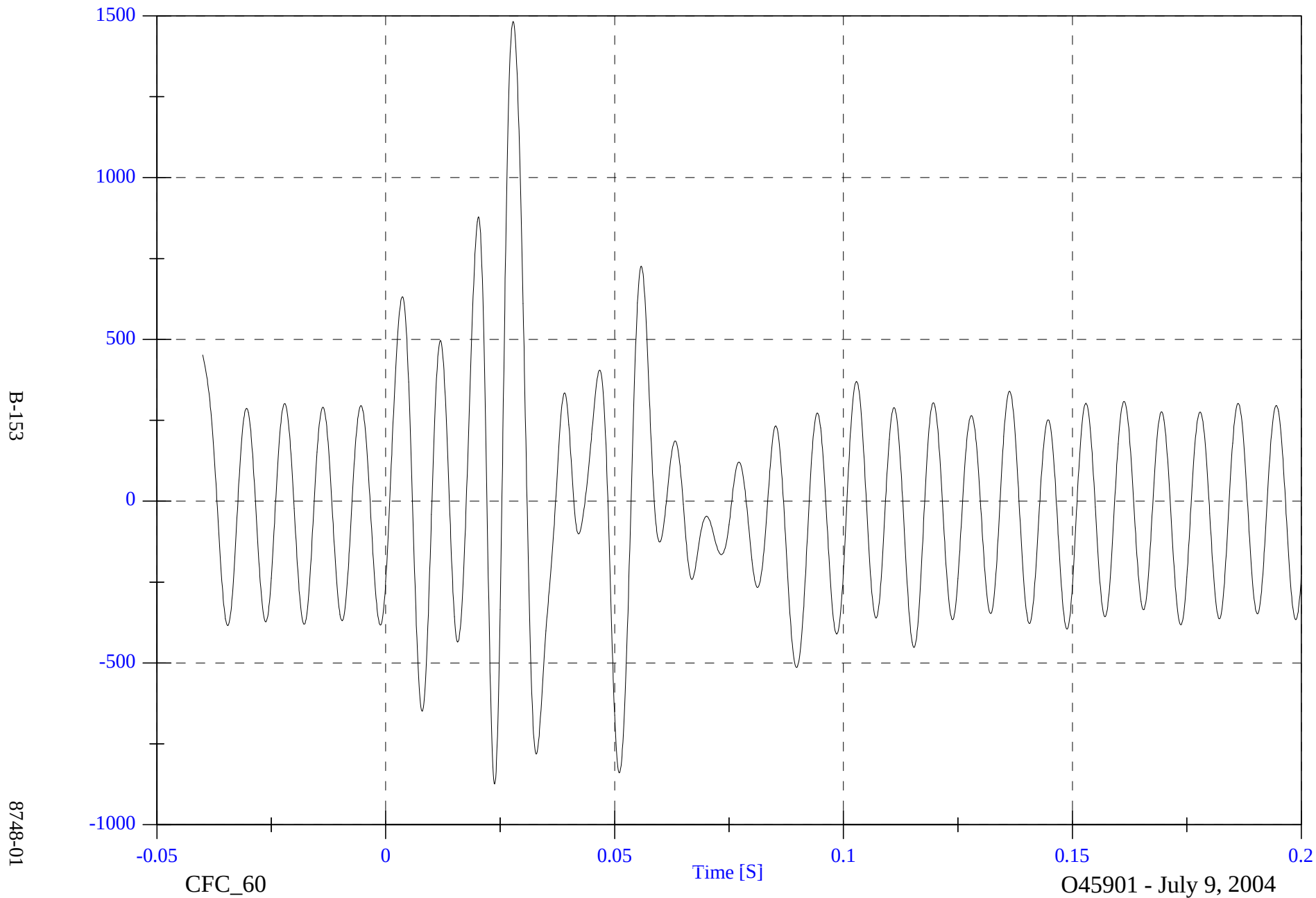


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell A9 Fx

Max: 1482.9 [] at 0.028 [S]

Min: -874.3 [] at 0.024 [S]

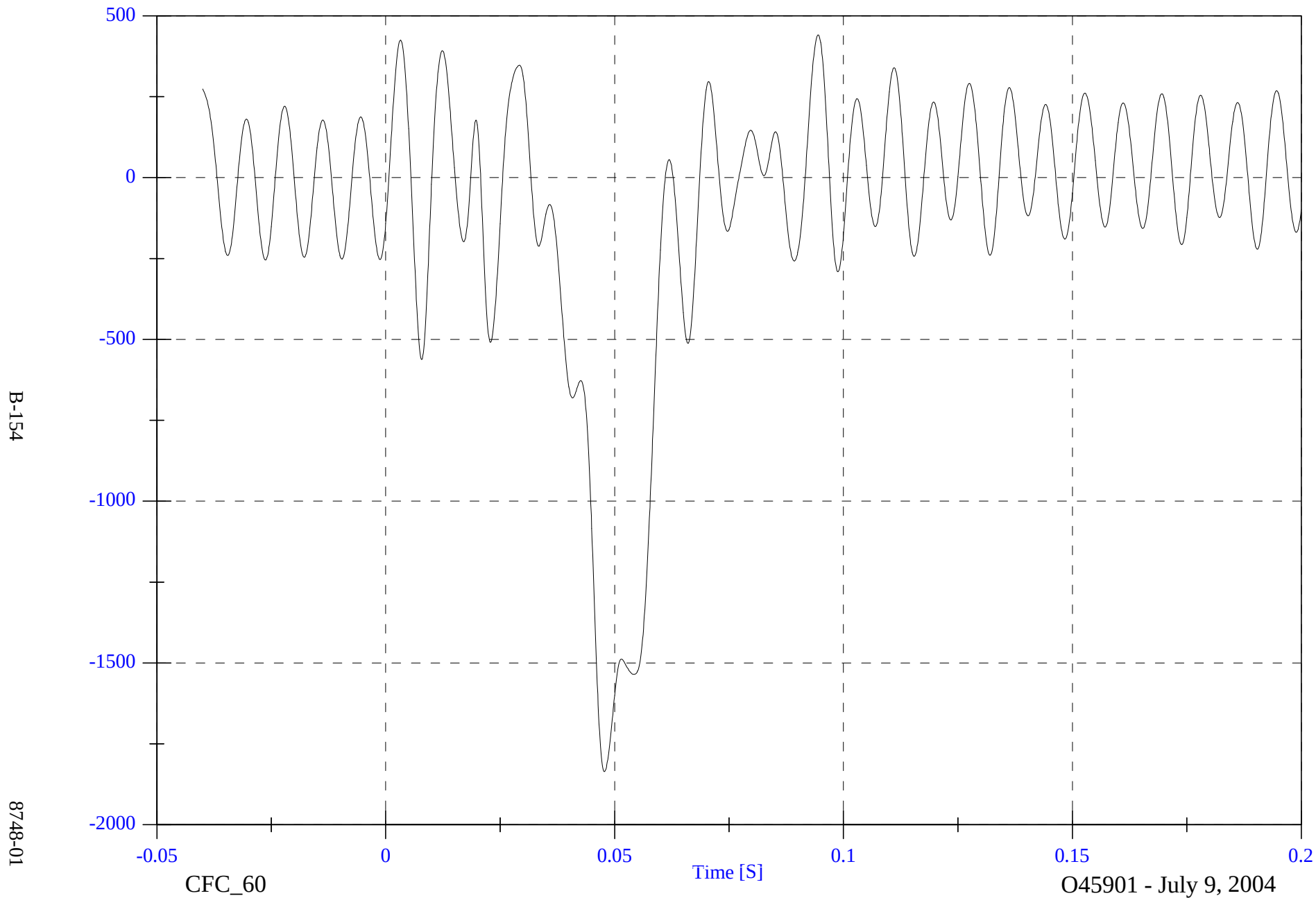


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell B1 Fx

Max: 441.1 [] at 0.094 [S]

Min: -1835.9 [] at 0.048 [S]

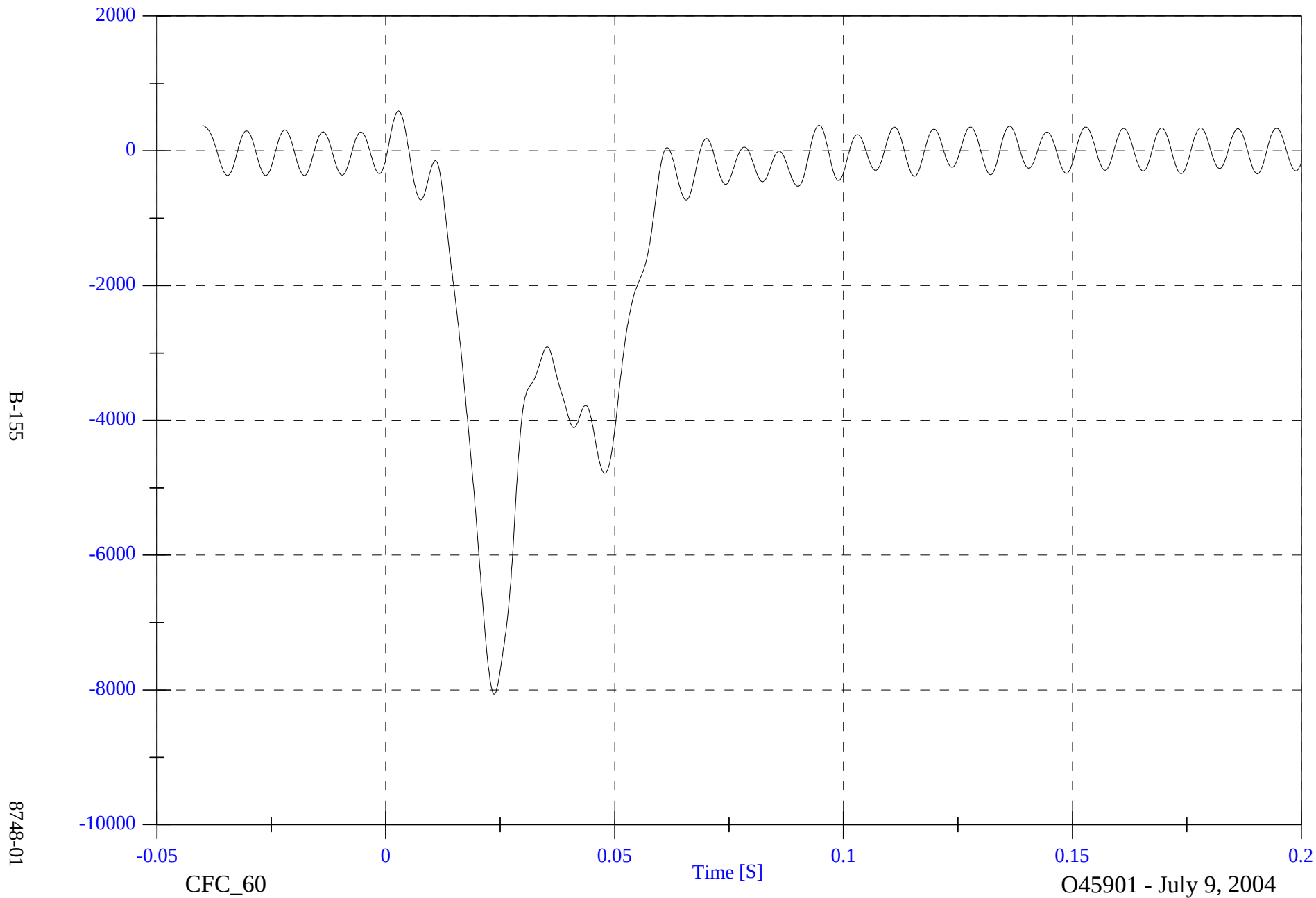


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell B2 Fx

Max: 589.5 [] at 0.003 [S]

Min: -8063.7 [] at 0.024 [S]

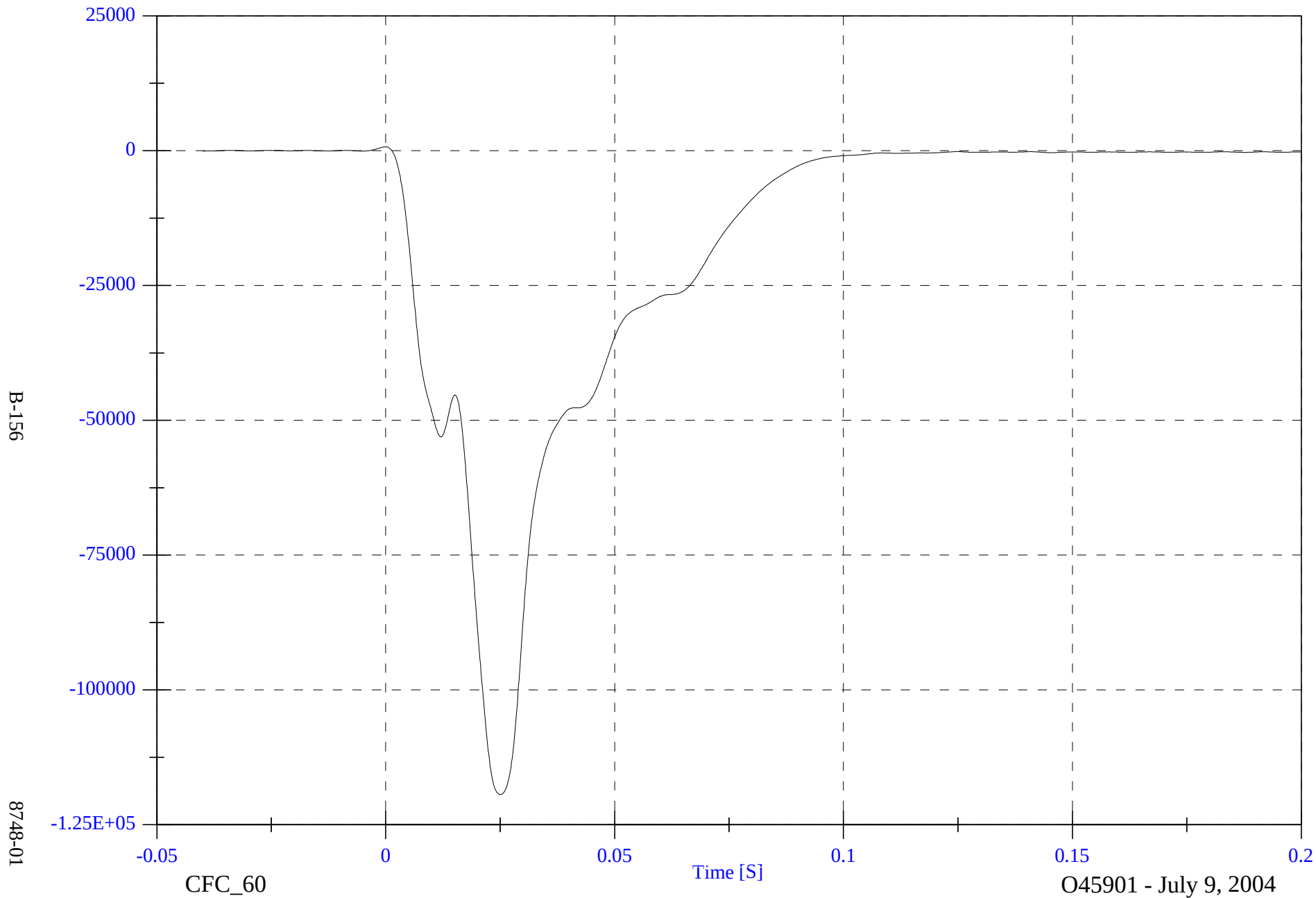


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell B3 Fx

Max: 707.6 [] at -0.000 [S]

Min: -119383.4 [] at 0.025 [S]

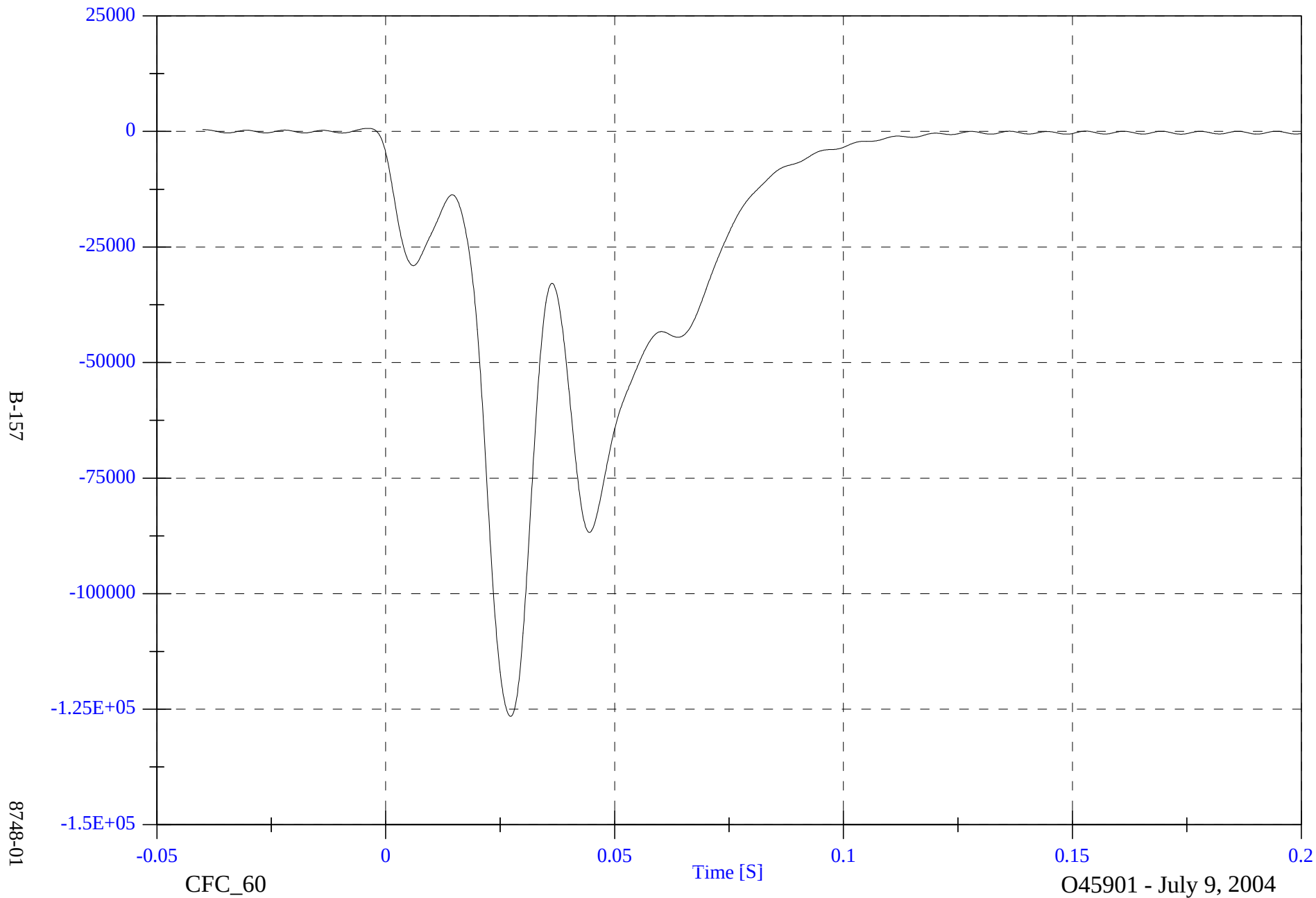


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell B4 Fx

Max: 675.2 [] at -0.004 [S]

Min: -126534.7 [] at 0.027 [S]



NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell B5 Fx

Max: 734.1 [] at -0.004 [S]

Min: -61155.1 [] at 0.027 [S]



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CFC_60

Time [S]

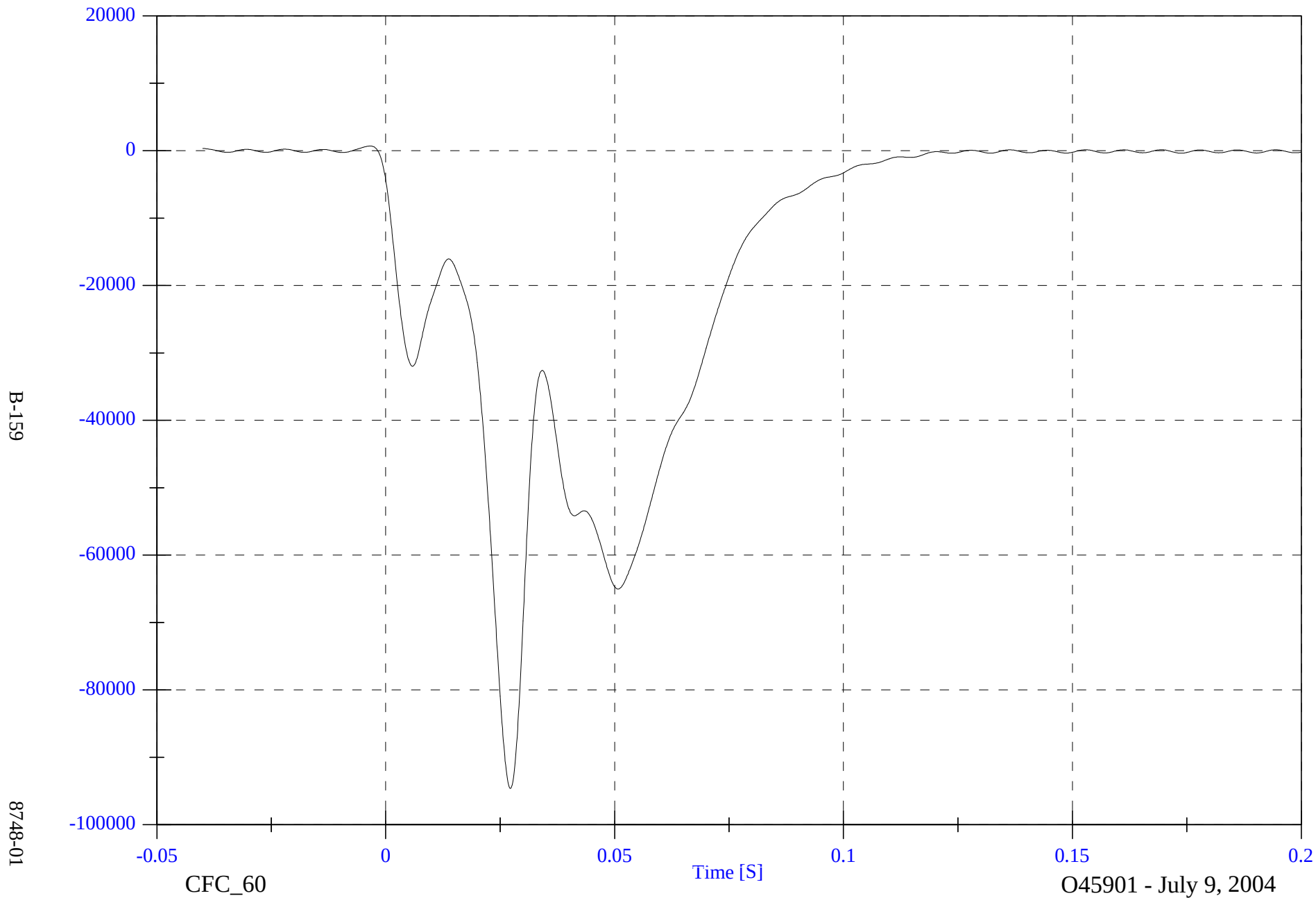
O45901 - July 9, 2004

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell B6 Fx

Max: 696.9 [] at -0.003 [S]

Min: -94596.0 [] at 0.027 [S]



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8748-01

CFC_60

Time [S]

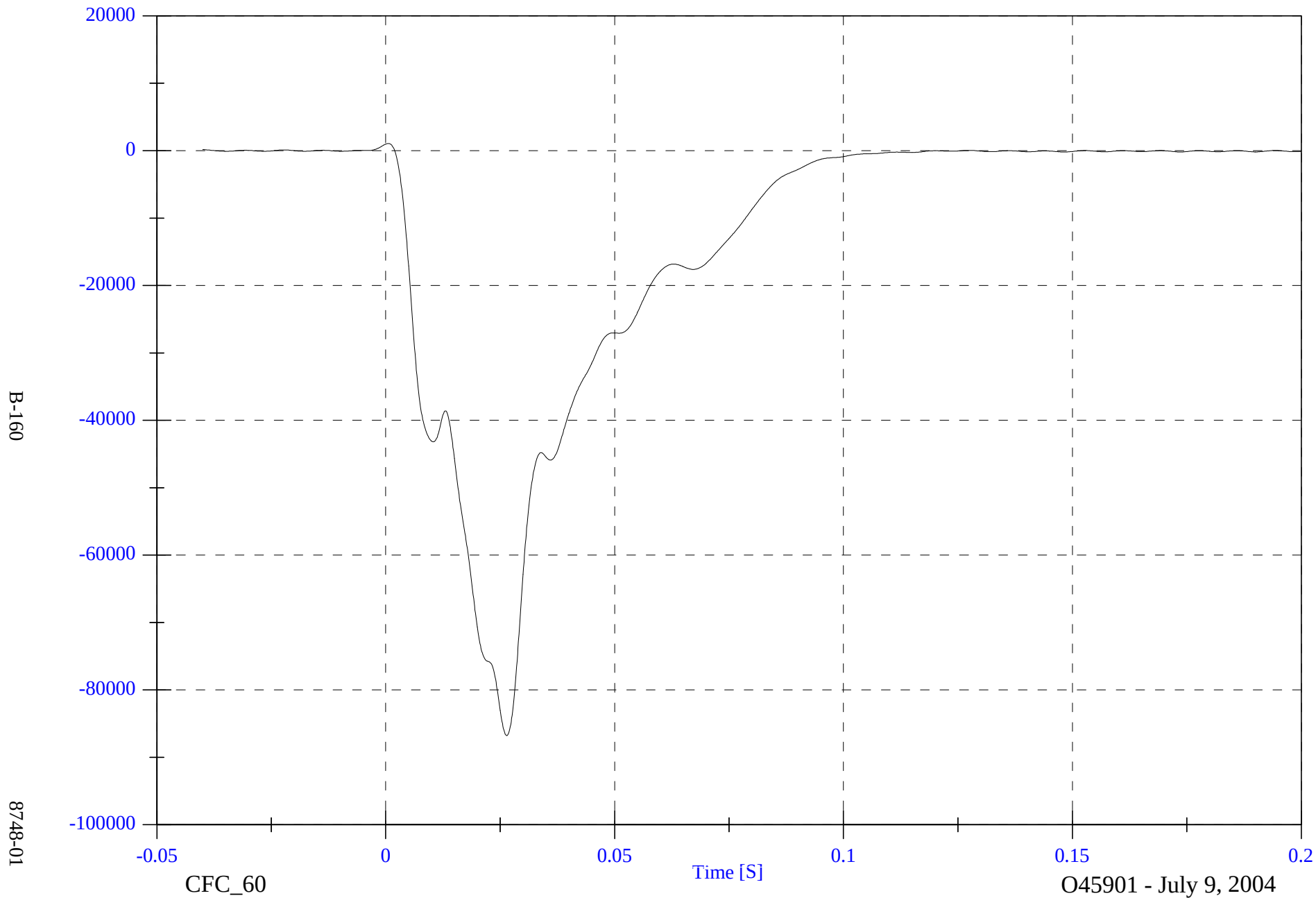
O45901 - July 9, 2004

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell B7 Fx

Max: 1073.1 [] at 0.001 [S]

Min: -86769.4 [] at 0.026 [S]

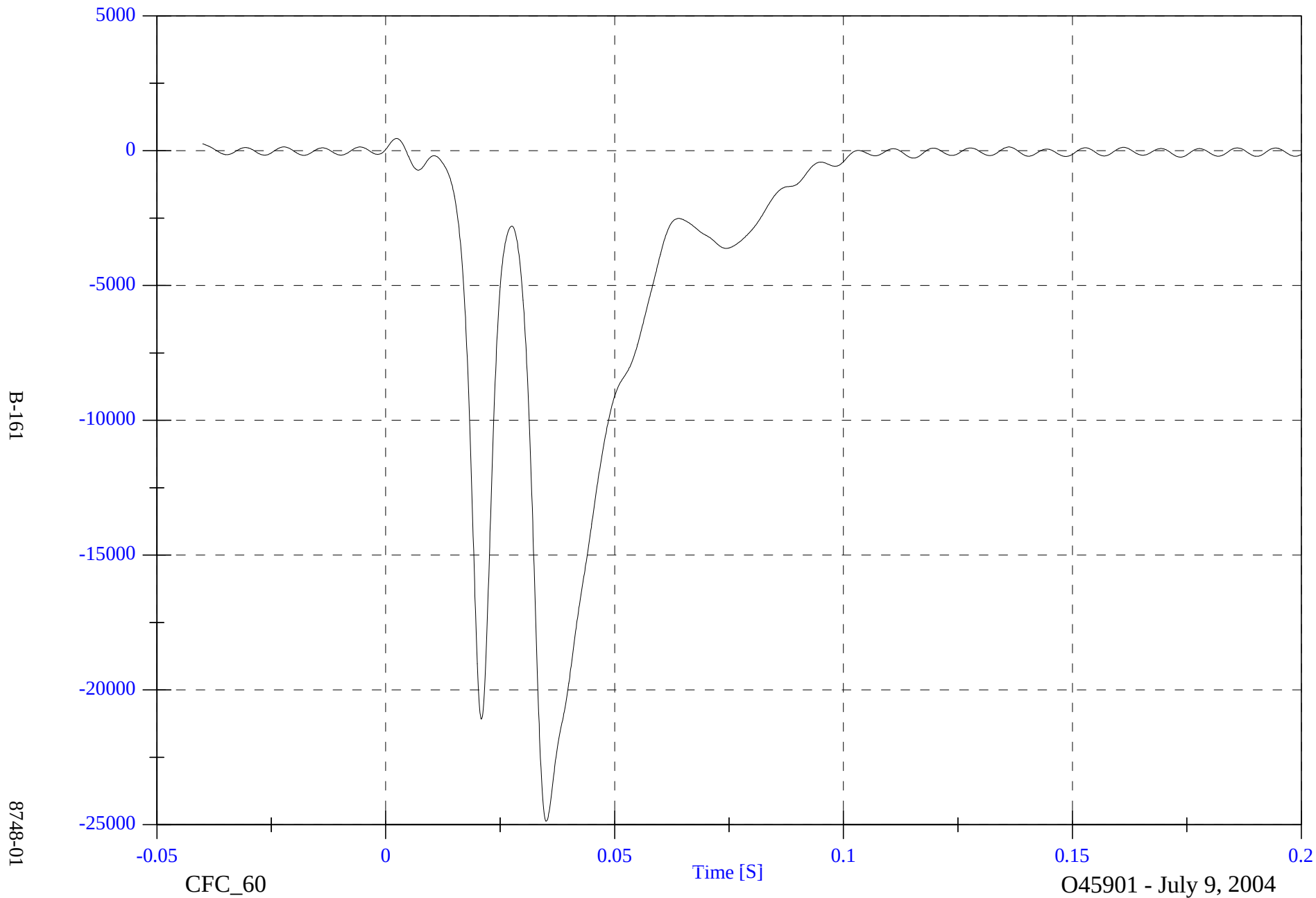


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell B8 Fx

Max: 454.1 [] at 0.002 [S]

Min: -24869.8 [] at 0.035 [S]



NCAP Optional Test - 2004.5 Volvo S40

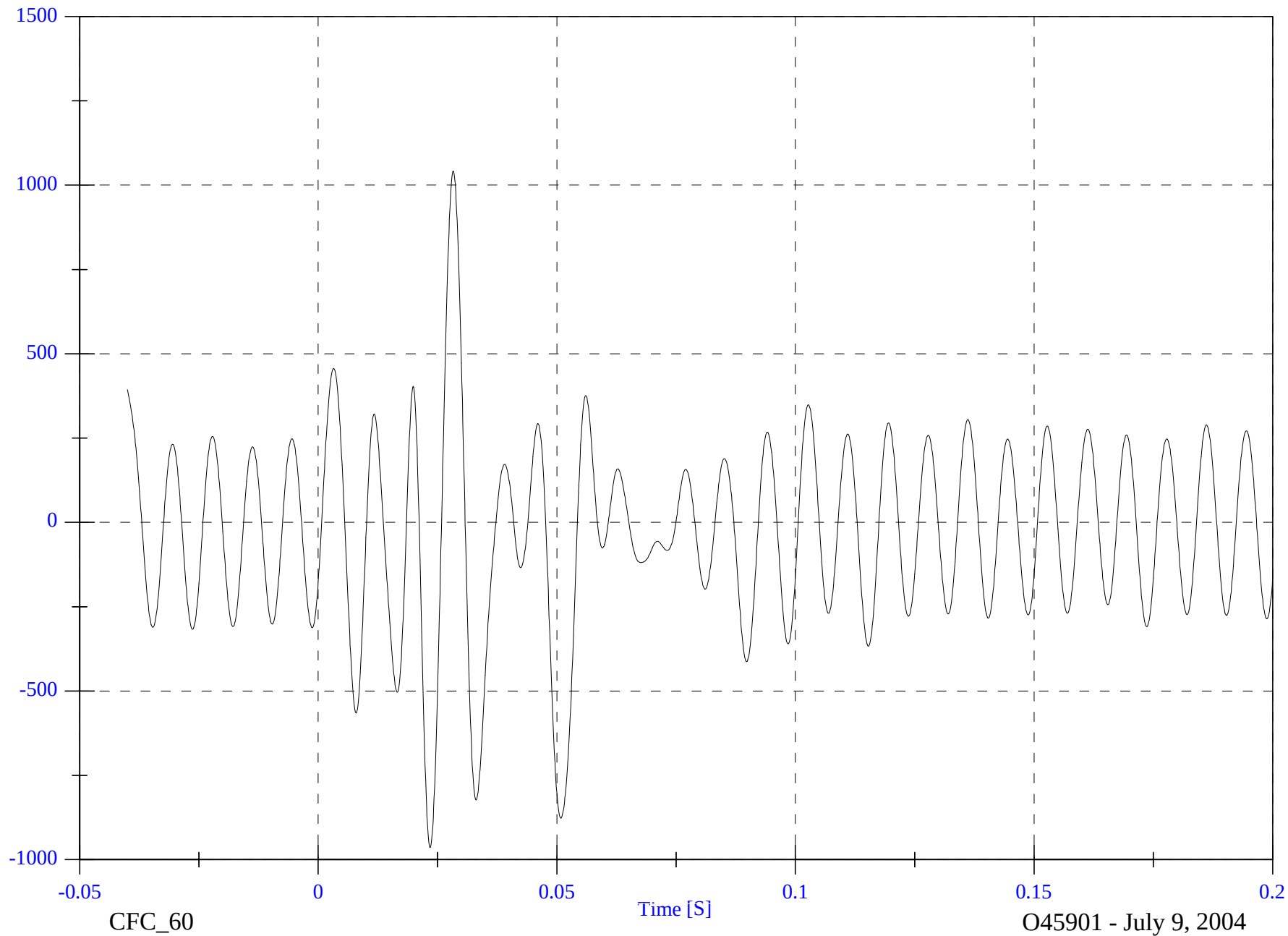
Barrier Load Cell B9 Fx

Max: 1042.4 [] at 0.028 [S]

Min: -964.1 [] at 0.023 [S]

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8748-01

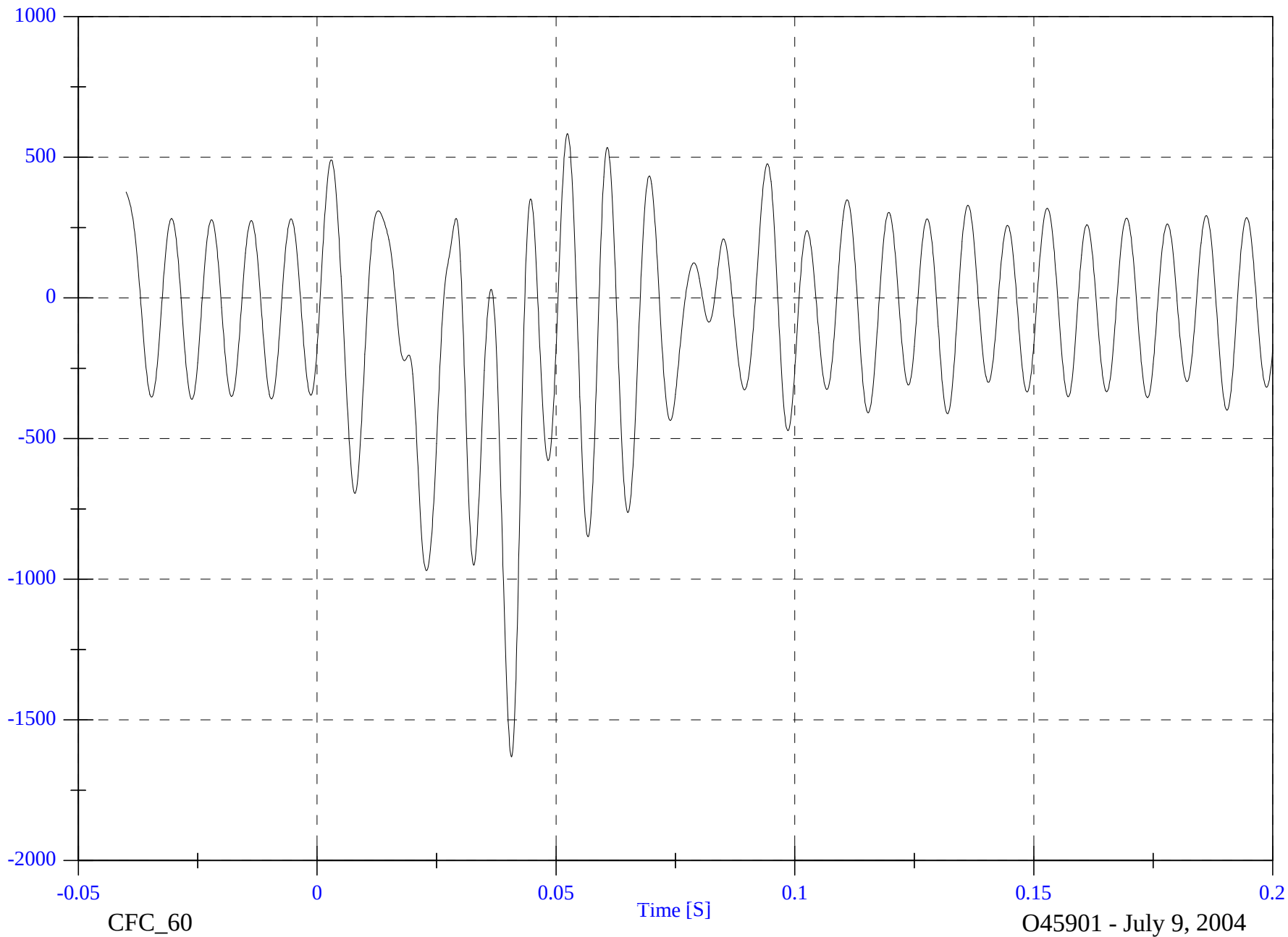


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell C1 Fx

Max: 583.9 [] at 0.052 [S]

Min: -1630.9 [] at 0.041 [S]



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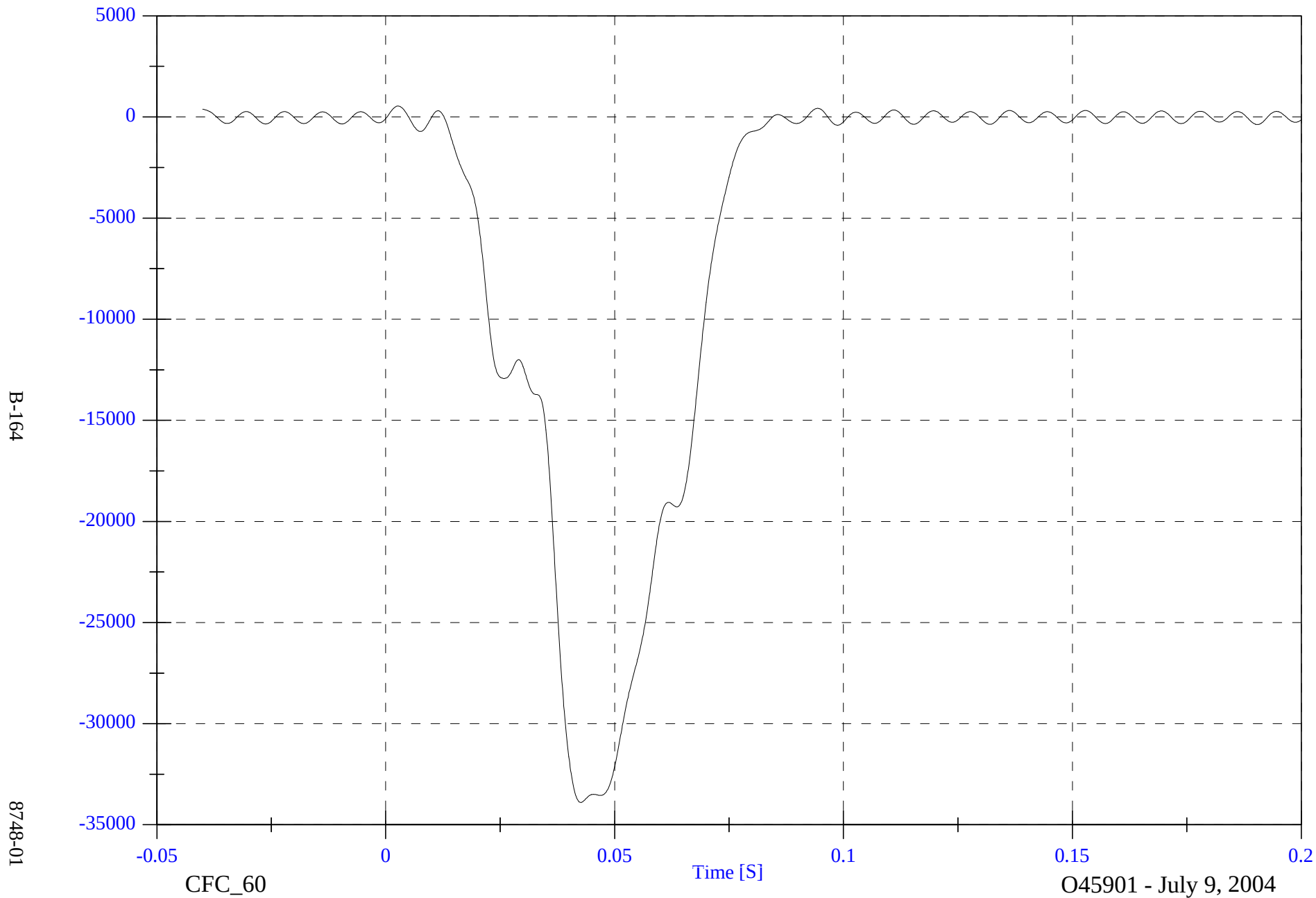
8748-01

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell C2 Fx

Max: 540.6 [] at 0.003 [S]

Min: -33901.6 [] at 0.043 [S]

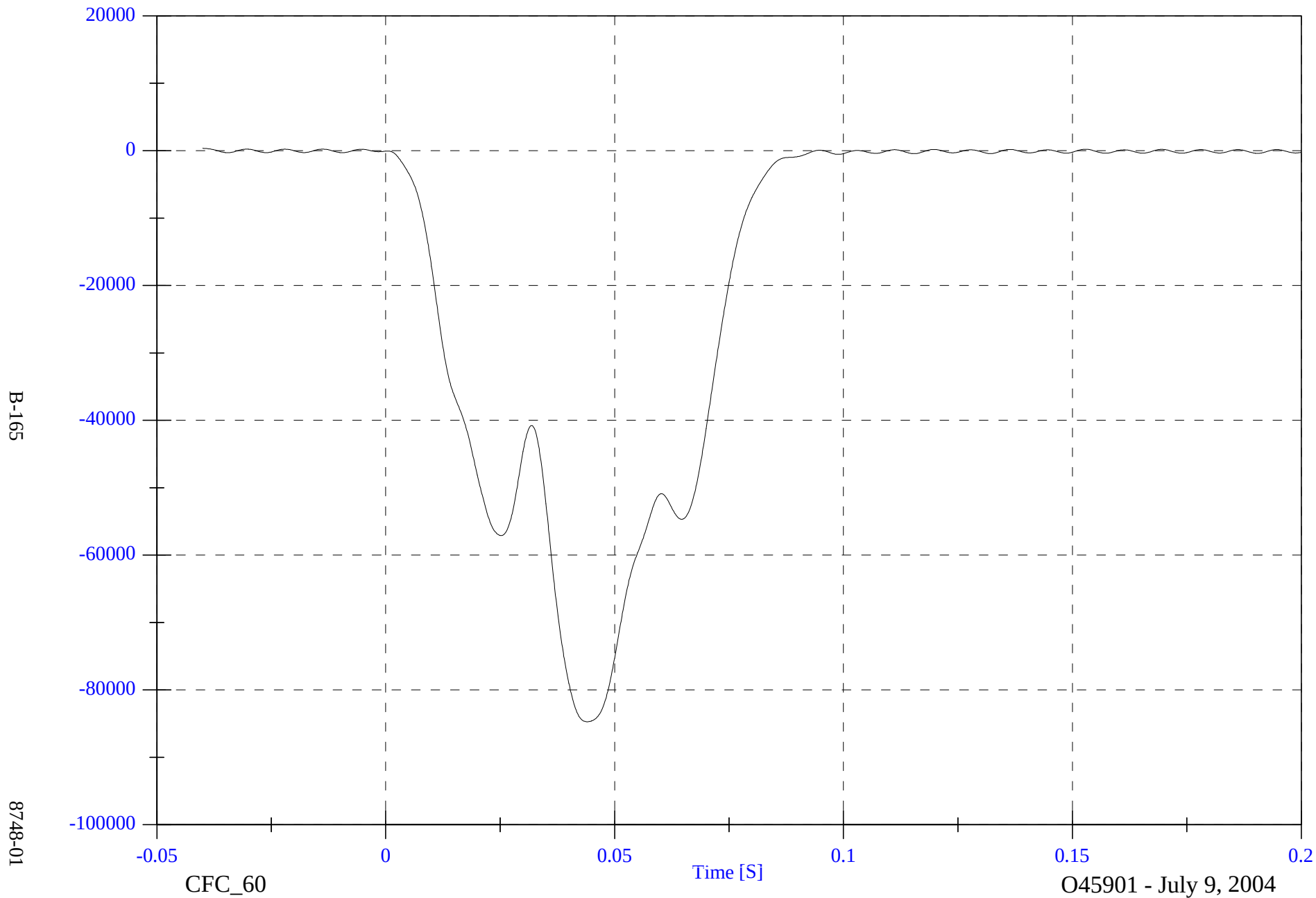


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell C3 Fx

Max: 353.4 [] at -0.040 [S]

Min: -84718.7 [] at 0.044 [S]

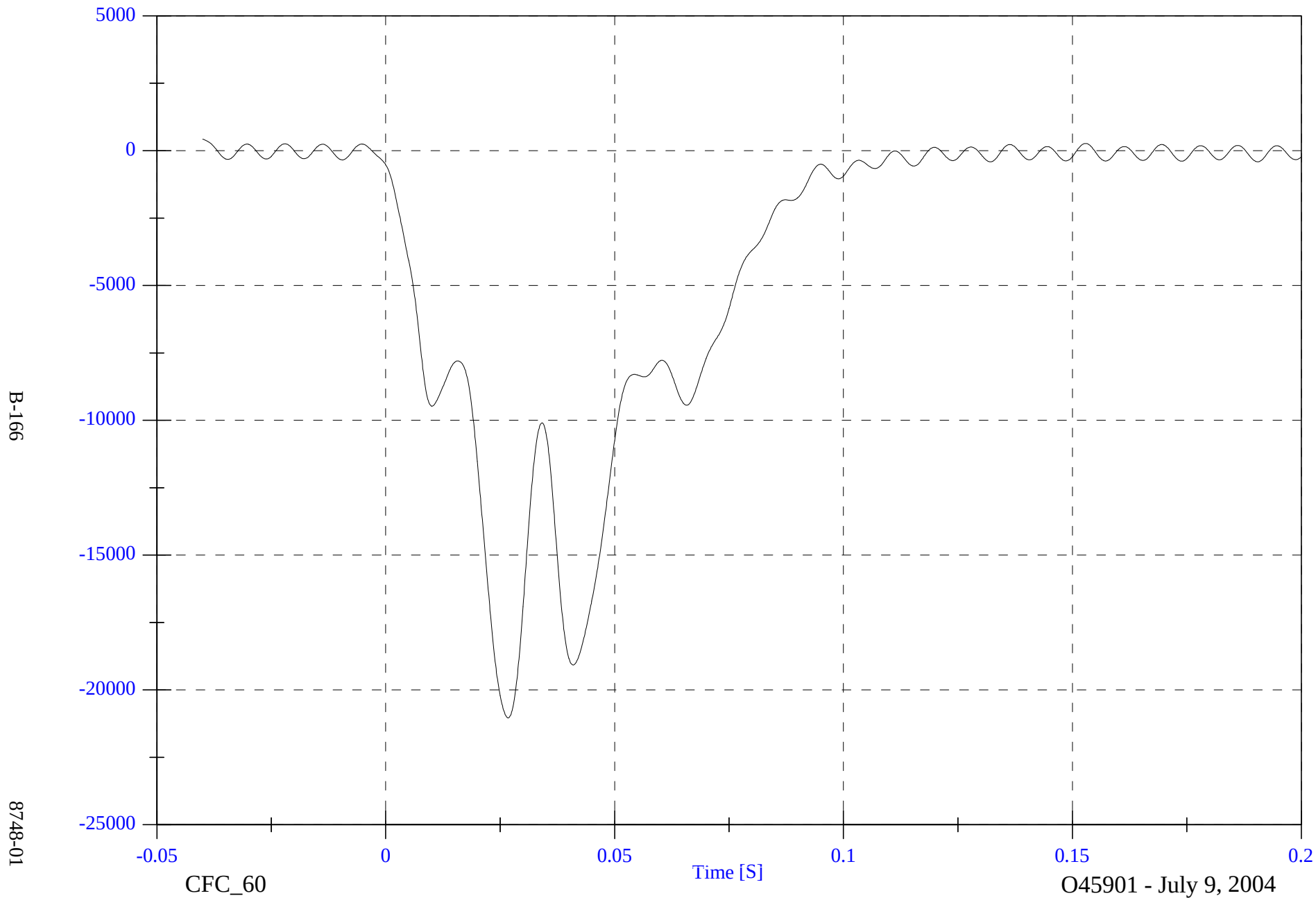


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell C4 Fx

Max: 430.7 [] at -0.040 [S]

Min: -21038.3 [] at 0.027 [S]

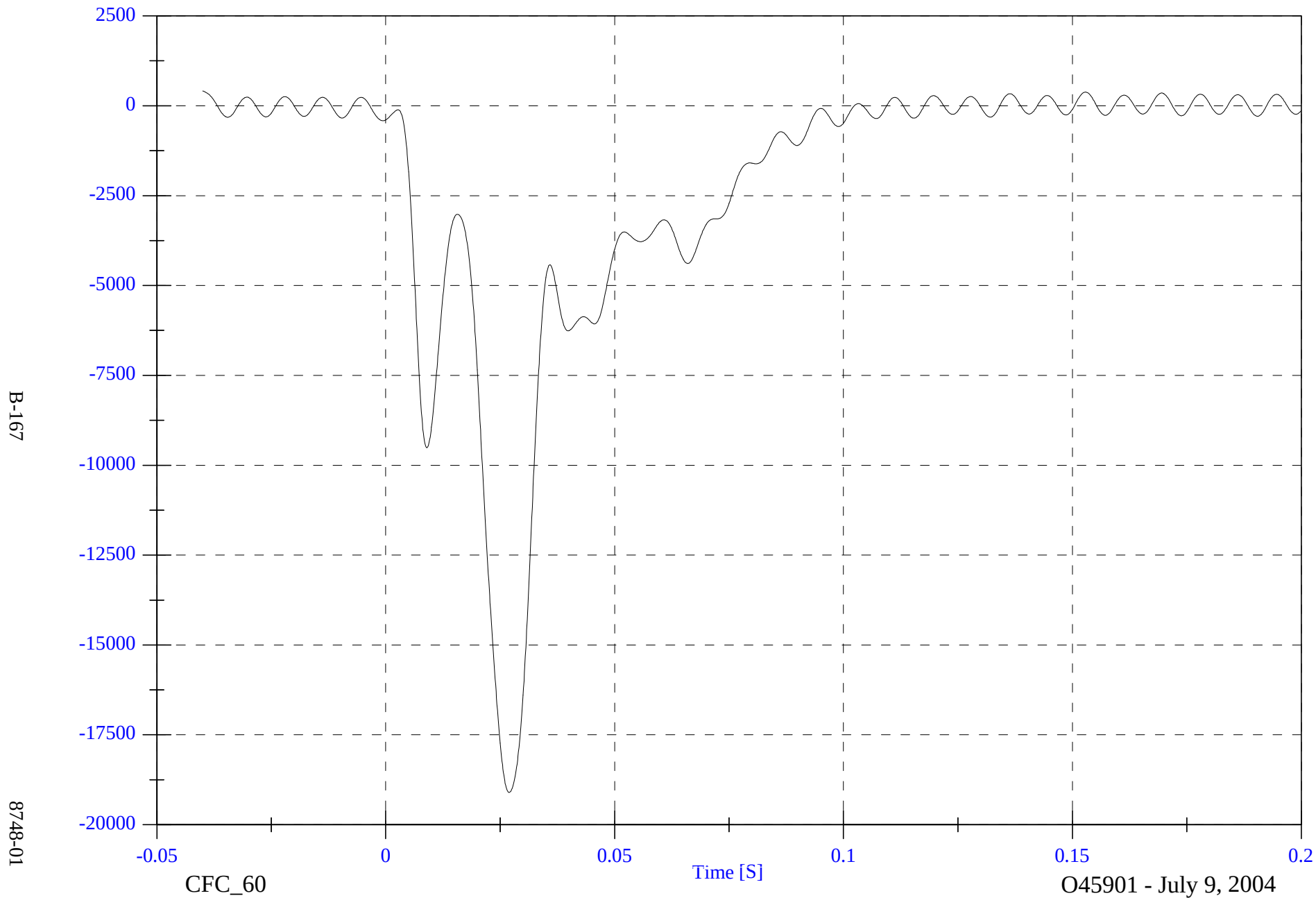


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell C5 Fx

Max: 413.5 [] at -0.040 [S]

Min: -19101.5 [] at 0.027 [S]



NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell C6 Fx

Max: 403.5 [] at -0.040 [S]

Min: -30154.4 [] at 0.027 [S]

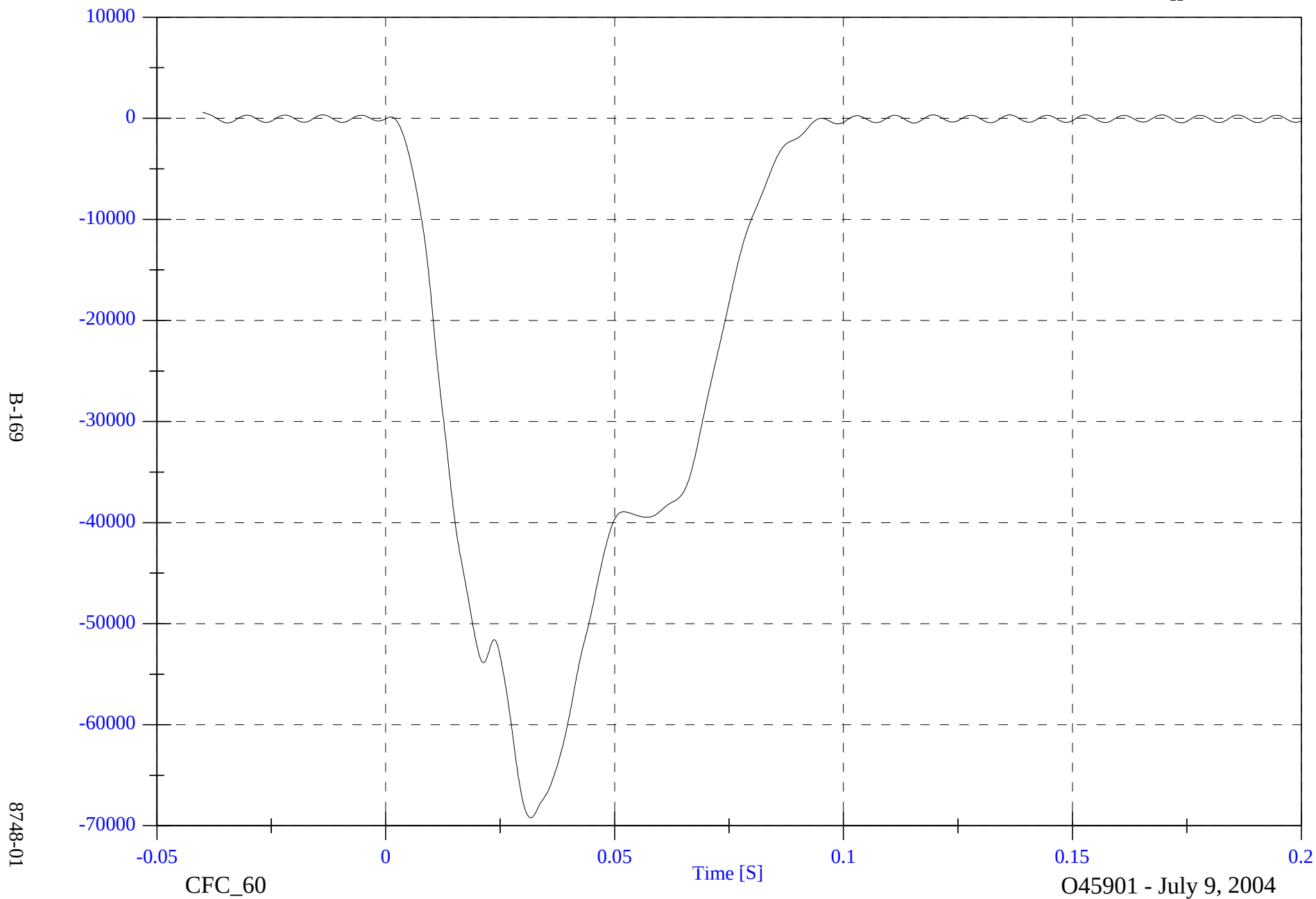


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell C7 Fx

Max: 587.8 [] at -0.040 [S]

Min: -69201.0 [] at 0.032 [S]

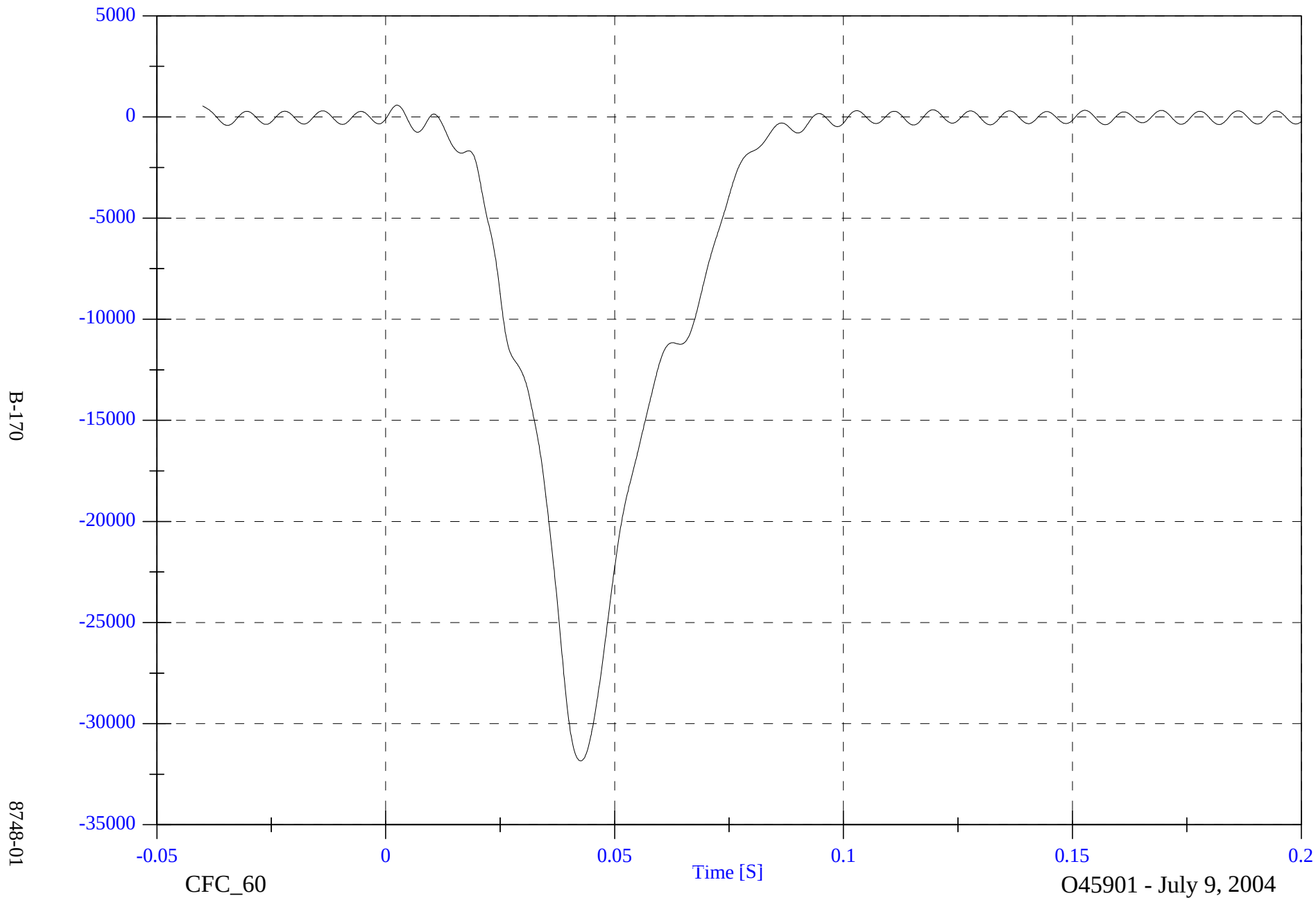


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell C8 Fx

Max: 584.0 [] at 0.002 [S]

Min: -31839.7 [] at 0.043 [S]



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8748-01

CFC_60

Time [S]

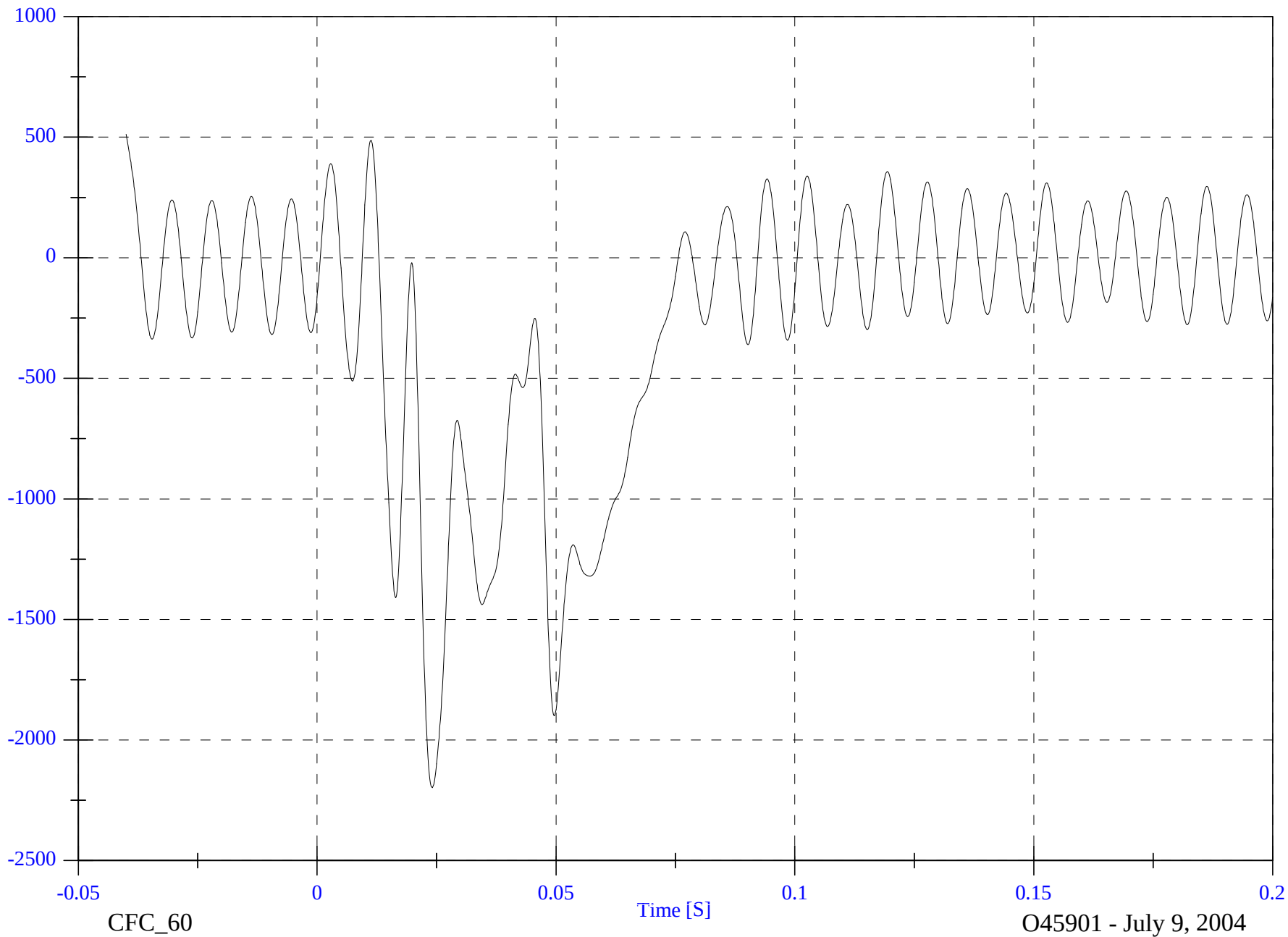
O45901 - July 9, 2004

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell C9 Fx

Max: 512.1 [] at -0.040 [S]

Min: -2197.5 [] at 0.024 [S]



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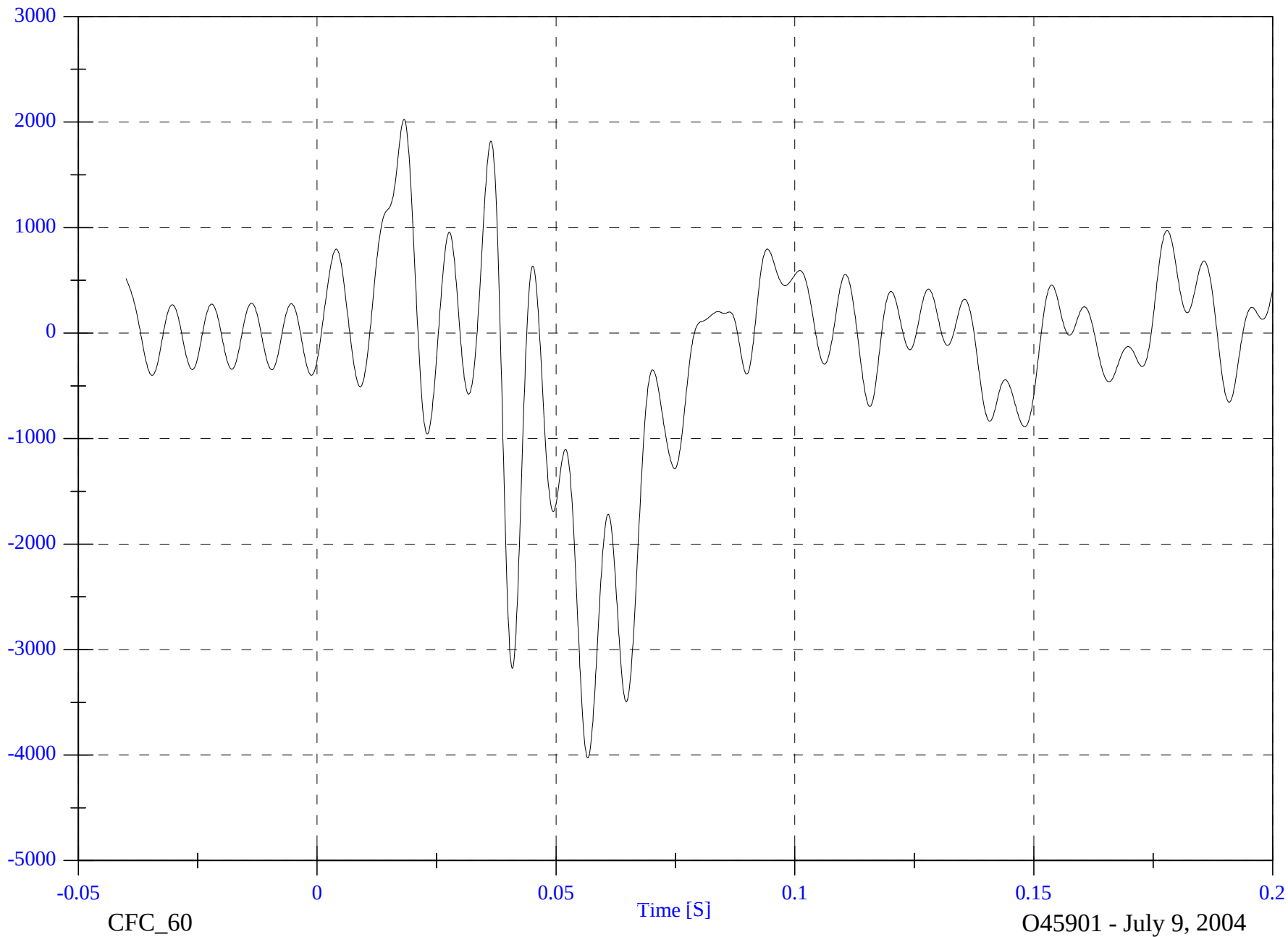
8748-01

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell D1 Fx

Max: 2026.9 [] at 0.018 [S]

Min: -4025.9 [] at 0.057 [S]



B-172

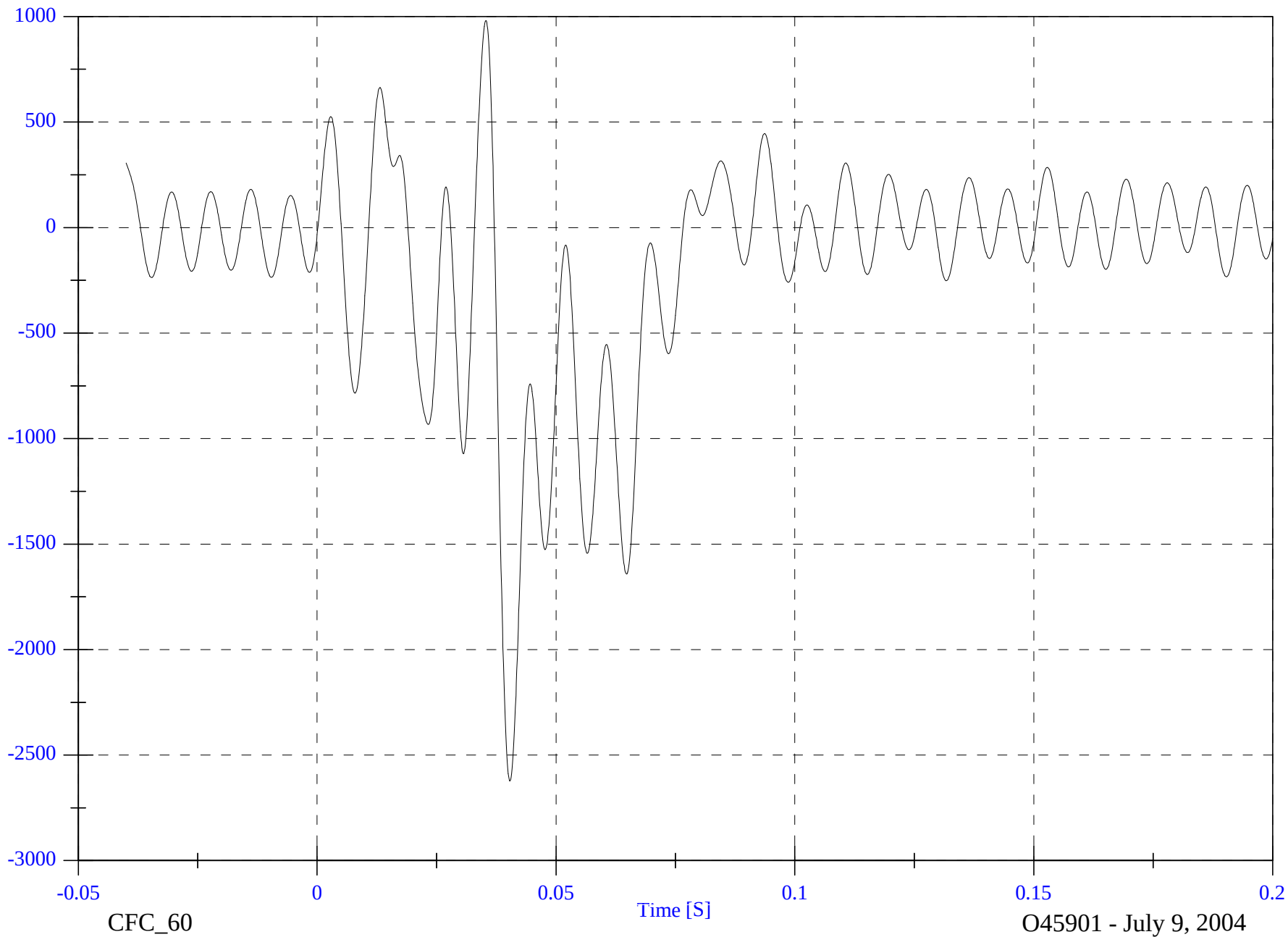
8748-01

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell D2 Fx

Max: 981.0 [] at 0.035 [S]

Min: -2623.3 [] at 0.040 [S]



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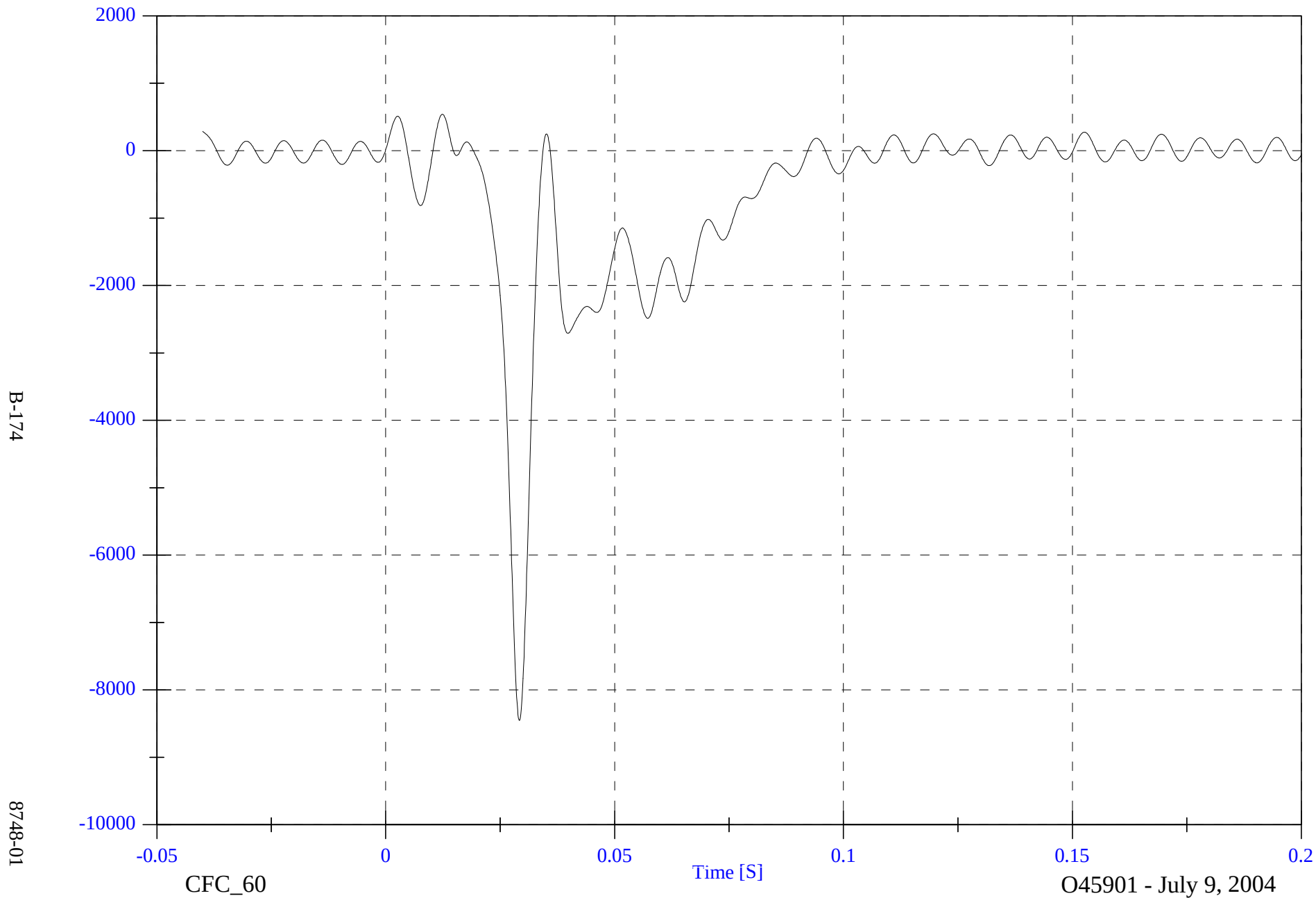
8748-01

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell D3 Fx

Max: 539.6 [] at 0.012 [S]

Min: -8454.3 [] at 0.029 [S]

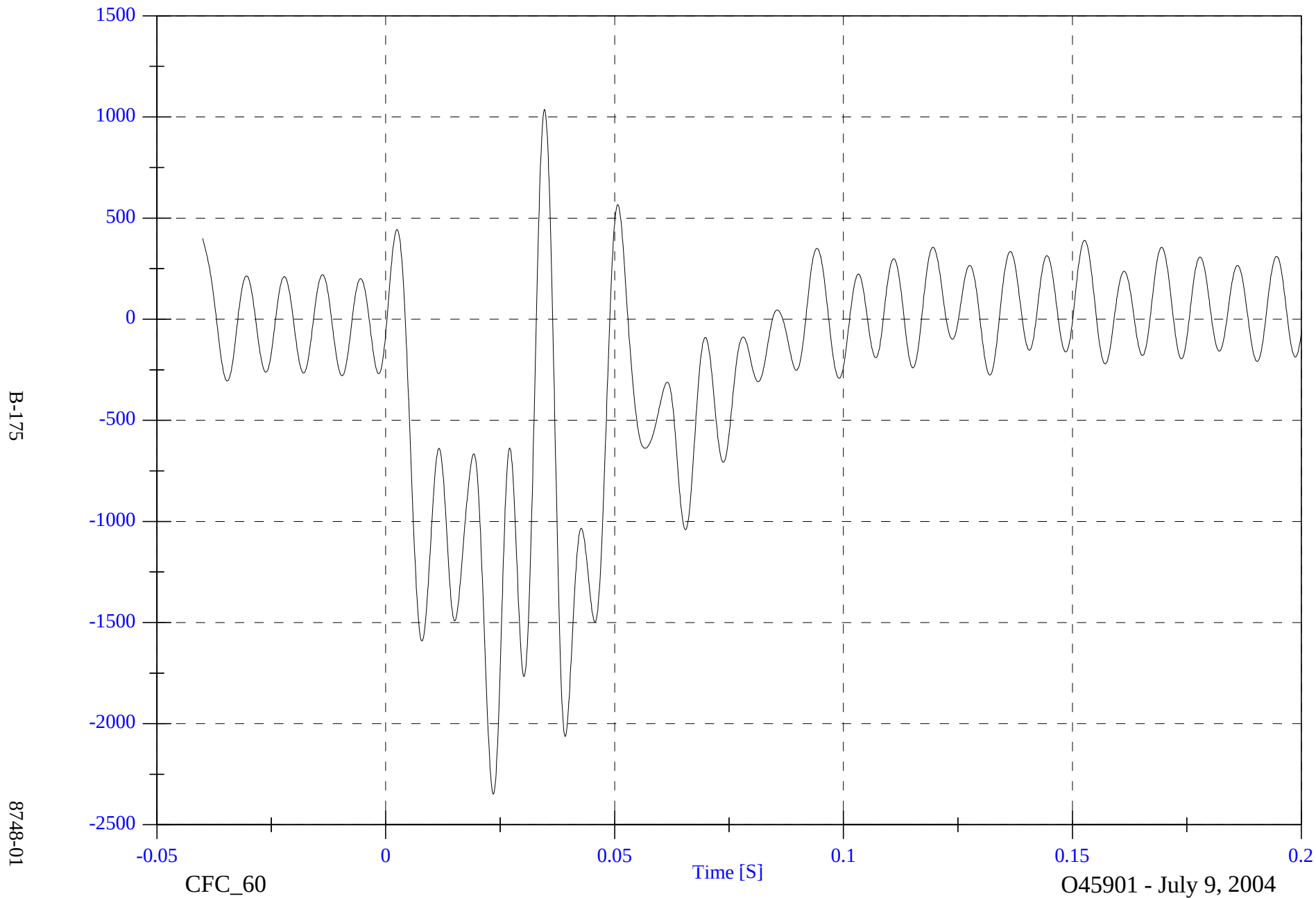


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell D4 Fx

Max: 1037.1 [] at 0.035 [S]

Min: -2348.9 [] at 0.023 [S]

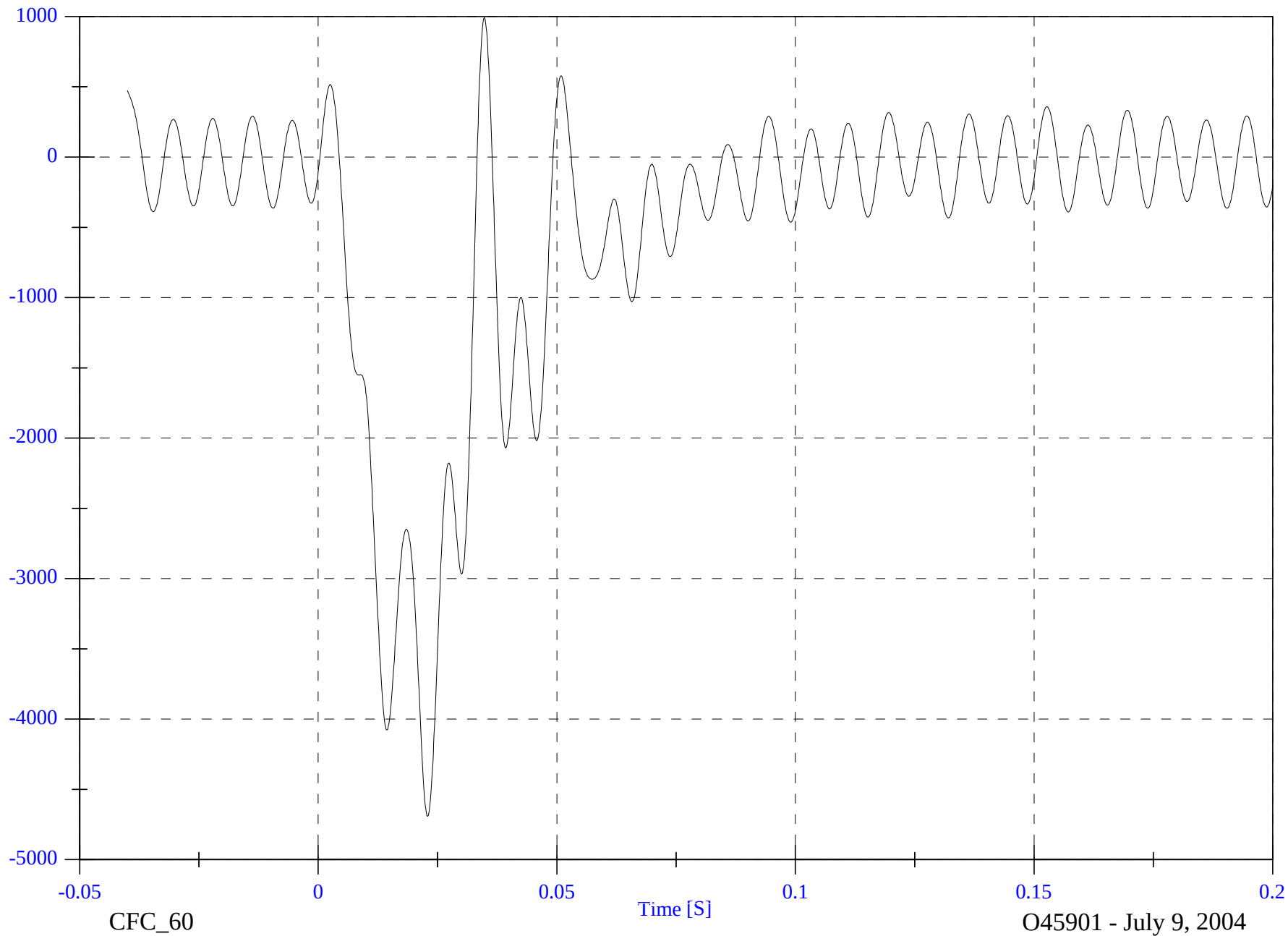


NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell D5 Fx

Max: 992.5 [] at 0.035 [S]

Min: -4691.7 [] at 0.023 [S]



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8748-01

CFC_60

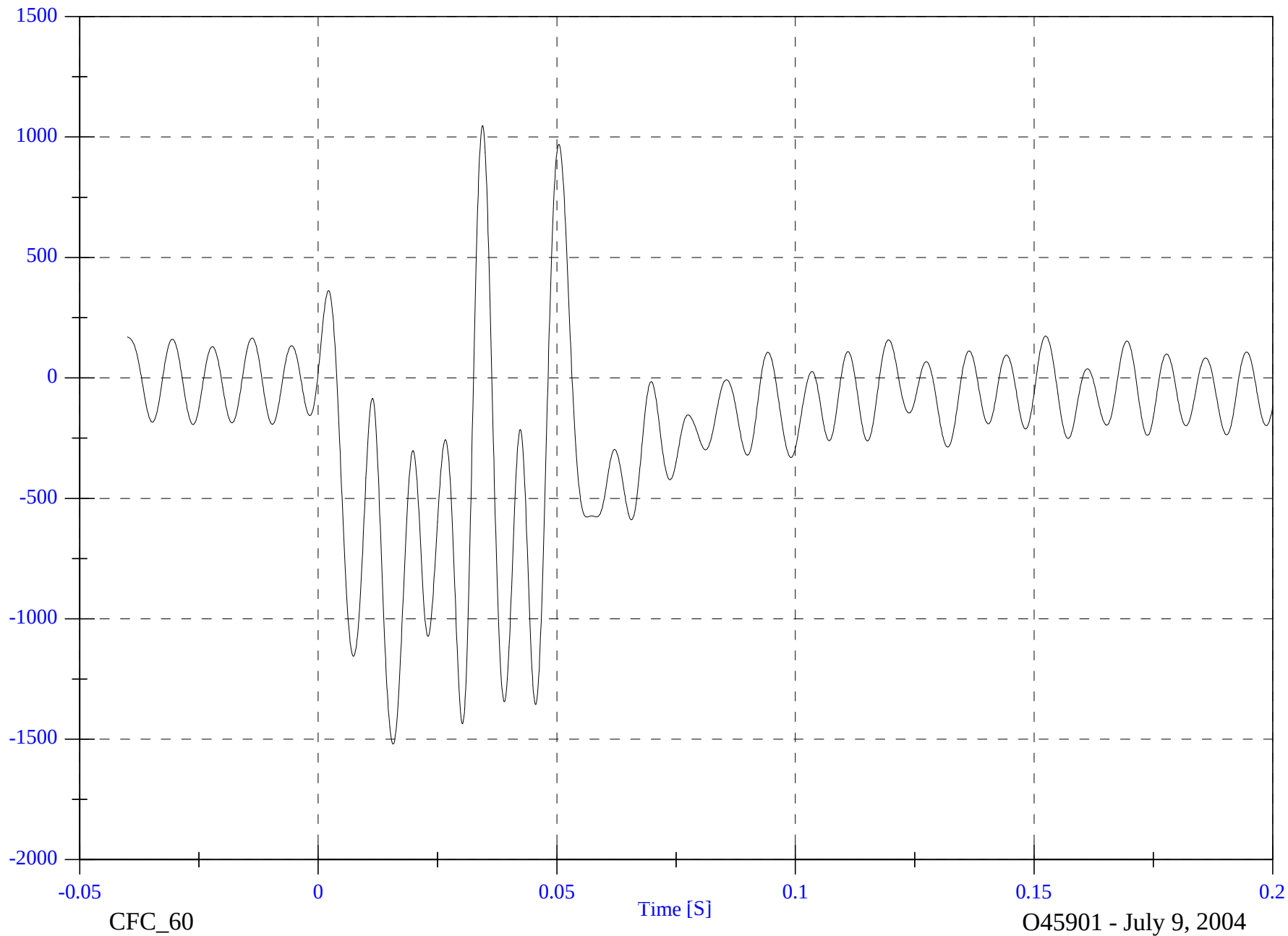
O45901 - July 9, 2004

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell D6 Fx

Max: 1047.3 [] at 0.034 [S]

Min: -1520.1 [] at 0.016 [S]



B-177

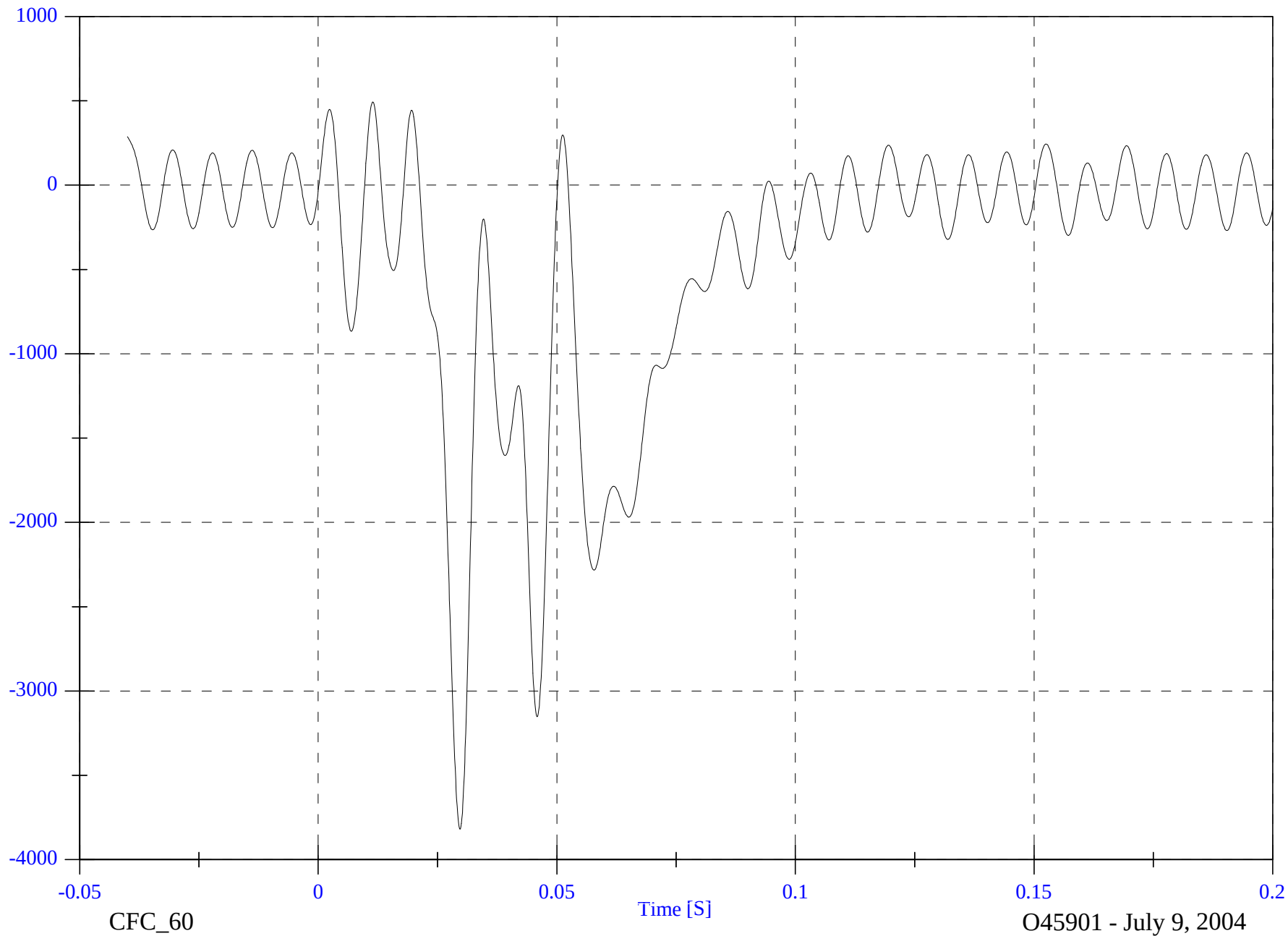
8748-01

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell D7 Fx

Max: 493.2 [] at 0.011 [S]

Min: -3819.7 [] at 0.030 [S]



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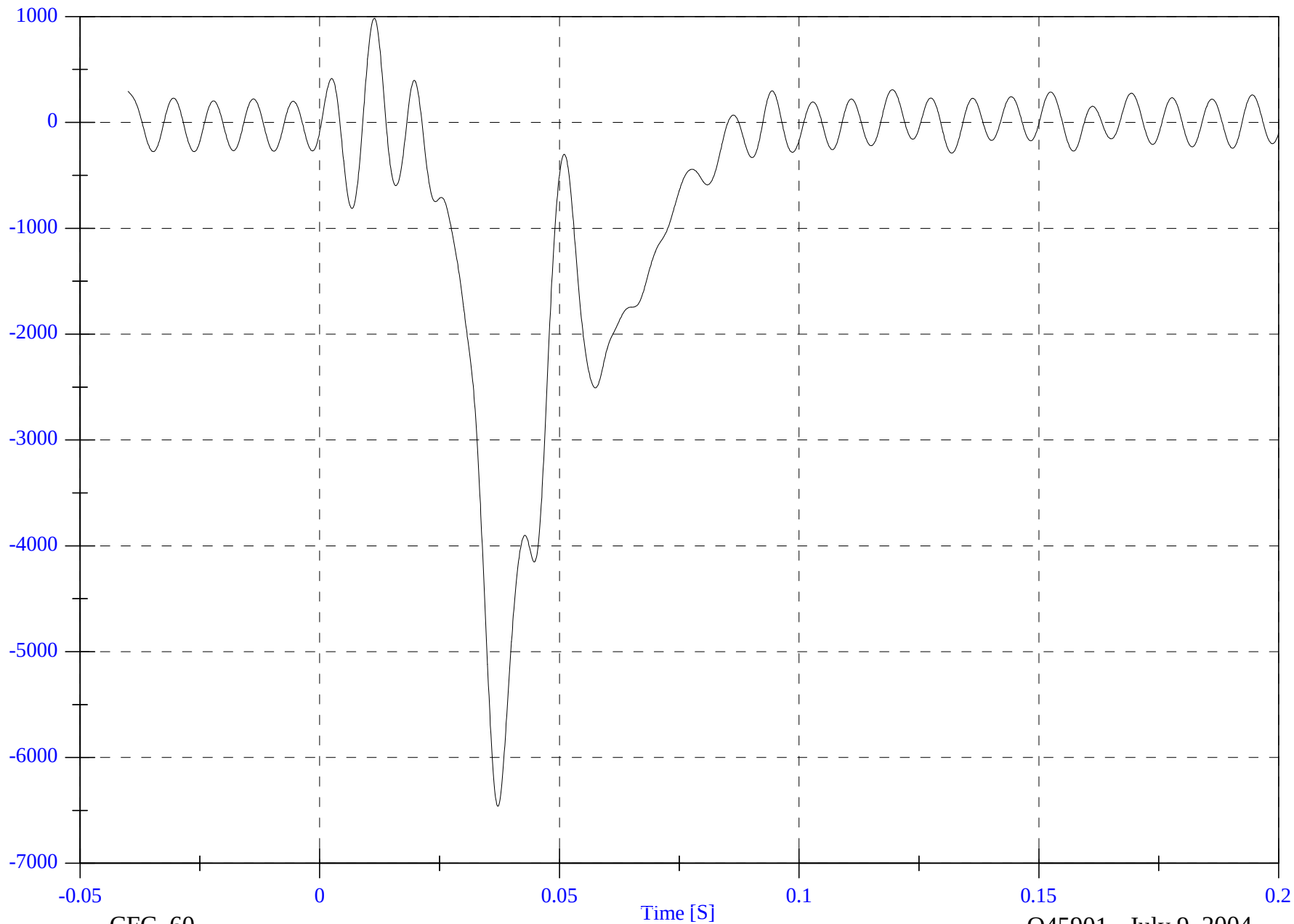
8748-01

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell D8 Fx

Max: 983.7 [] at 0.011 [S]

Min: -6459.4 [] at 0.037 [S]



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8748-01

CFC_60

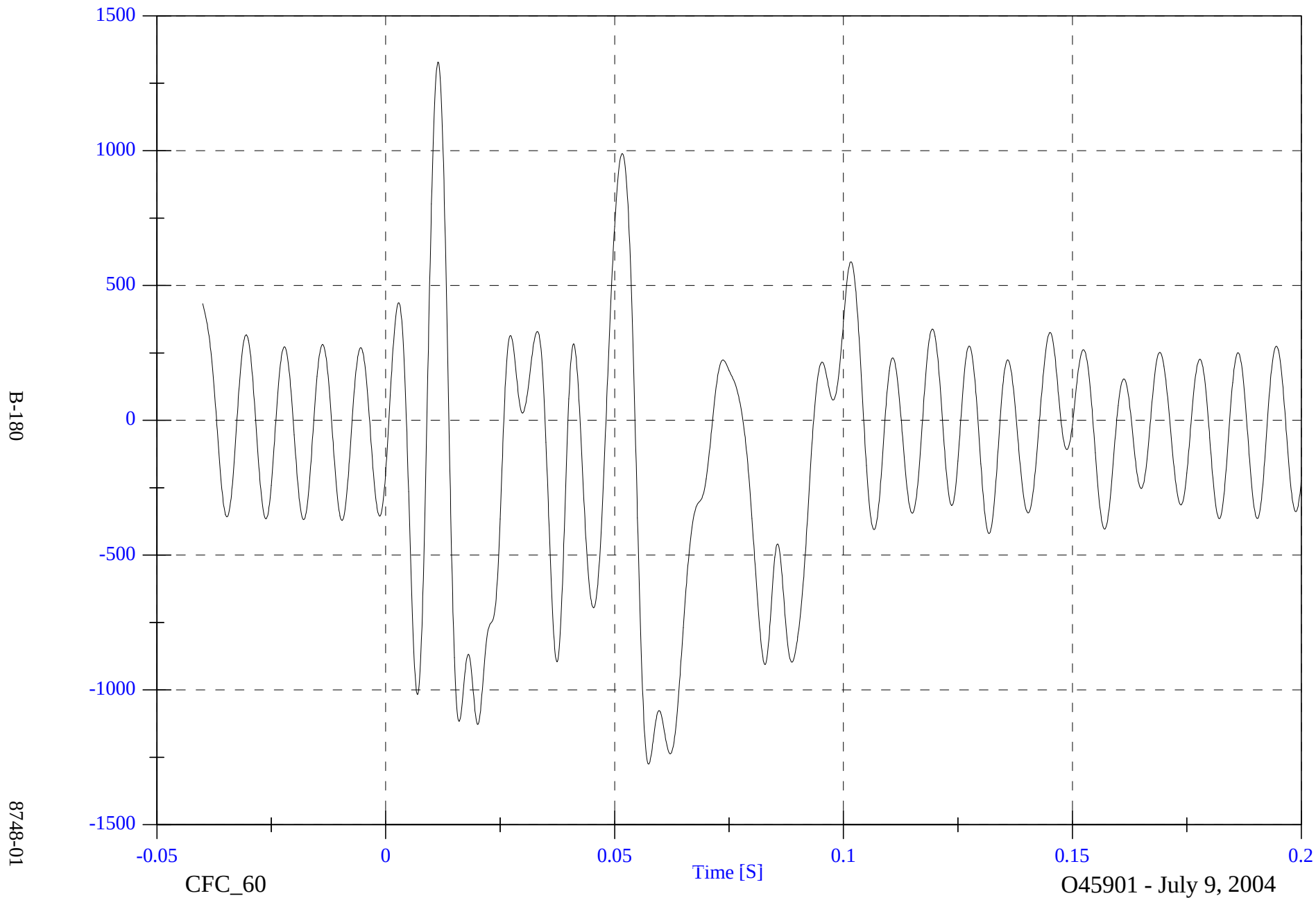
O45901 - July 9, 2004

NCAP Optional Test - 2004.5 Volvo S40

Barrier Load Cell D9 Fx

Max: 1328.4 [] at 0.011 [S]

Min: -1275.4 [] at 0.057 [S]

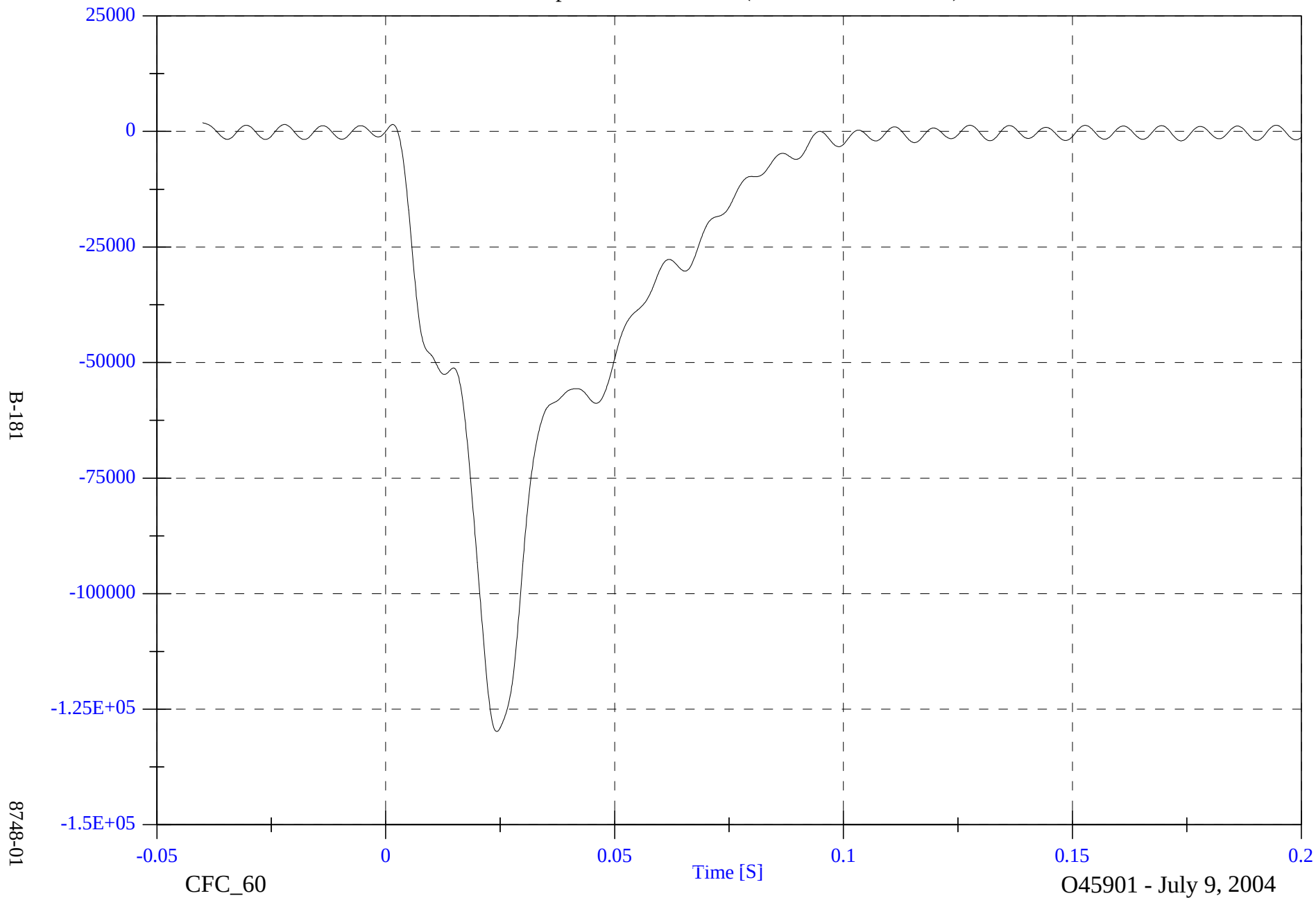


NCAP Optional Test - 2004.5 Volvo S40

Group 1 Load Cell Sum (A1,A2,A3,B1,B2,B3)

Max: 1863.9 [] at -0.040 [S]

Min: -129819.5 [] at 0.024 [S]

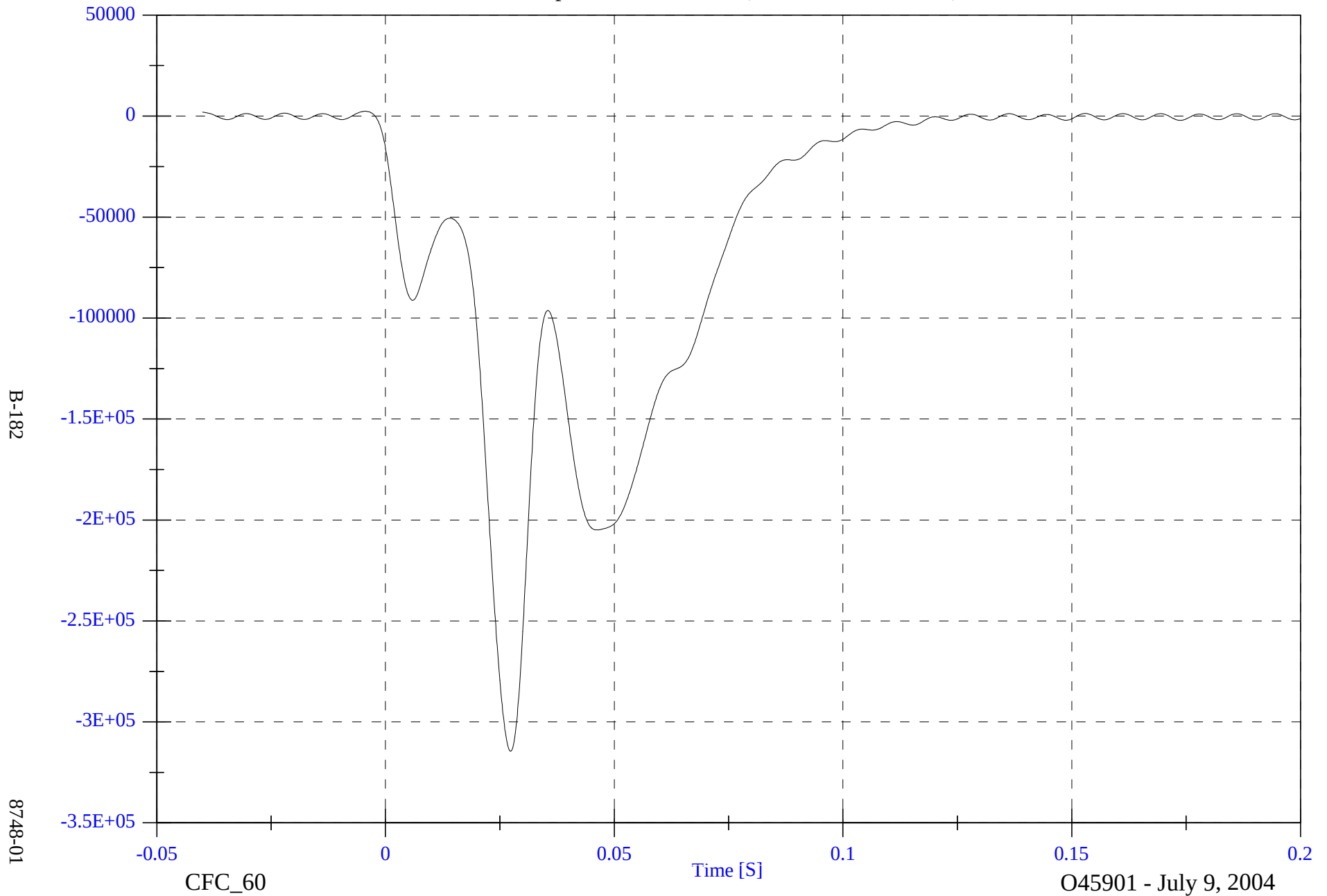


NCAP Optional Test - 2004.5 Volvo S40

Group 2 Load Cell Sum (A4,A5,A6,B4,B5,B6)

Max: 2390.0 [] at -0.004 [S]

Min: -314506.4 [] at 0.027 [S]

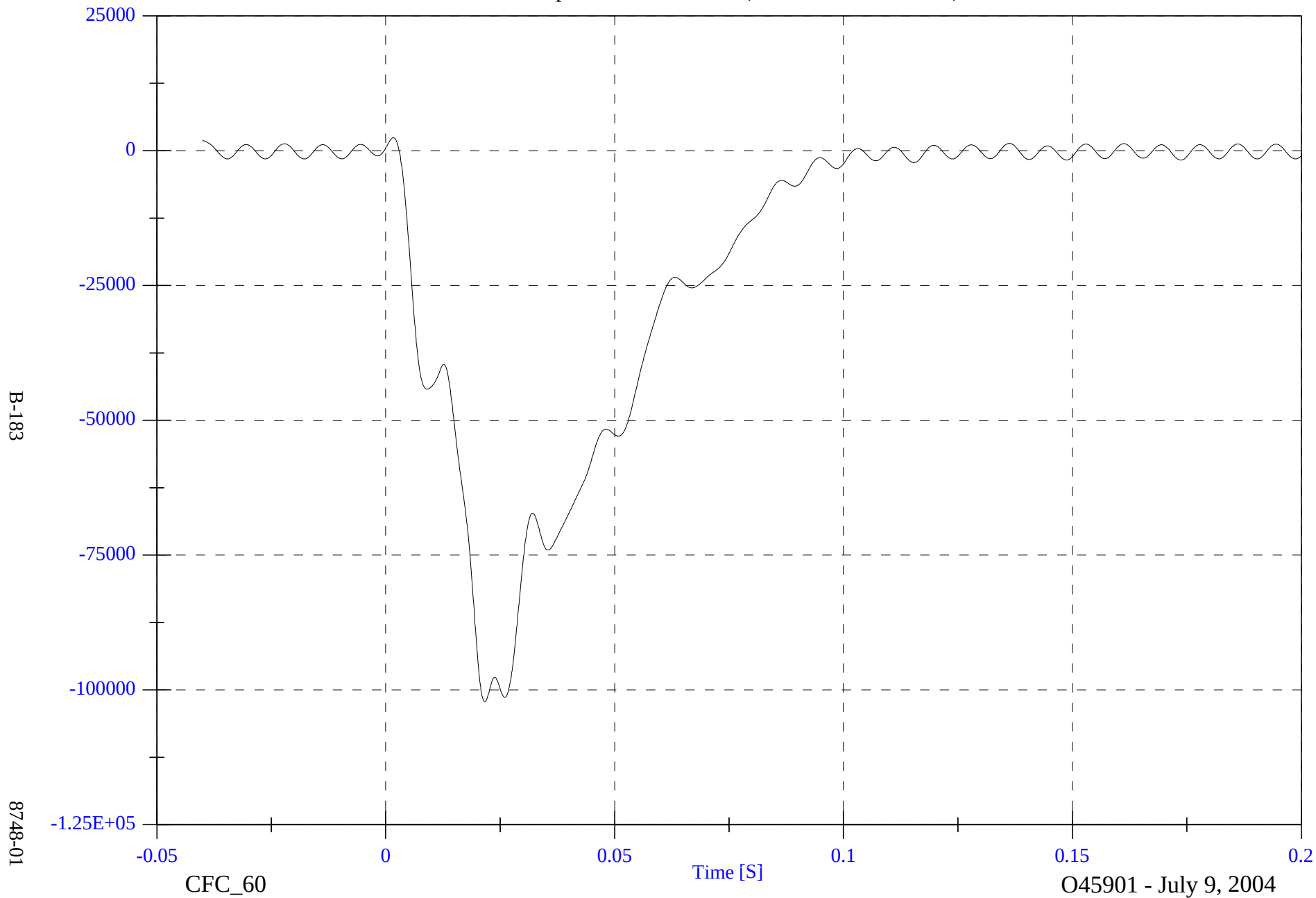


NCAP Optional Test - 2004.5 Volvo S40

Group 3 Load Cell Sum (A7,A8,A9,B7,B8,B9)

Max: 2399.9 [] at 0.002 [S]

Min: -102222.3 [] at 0.022 [S]

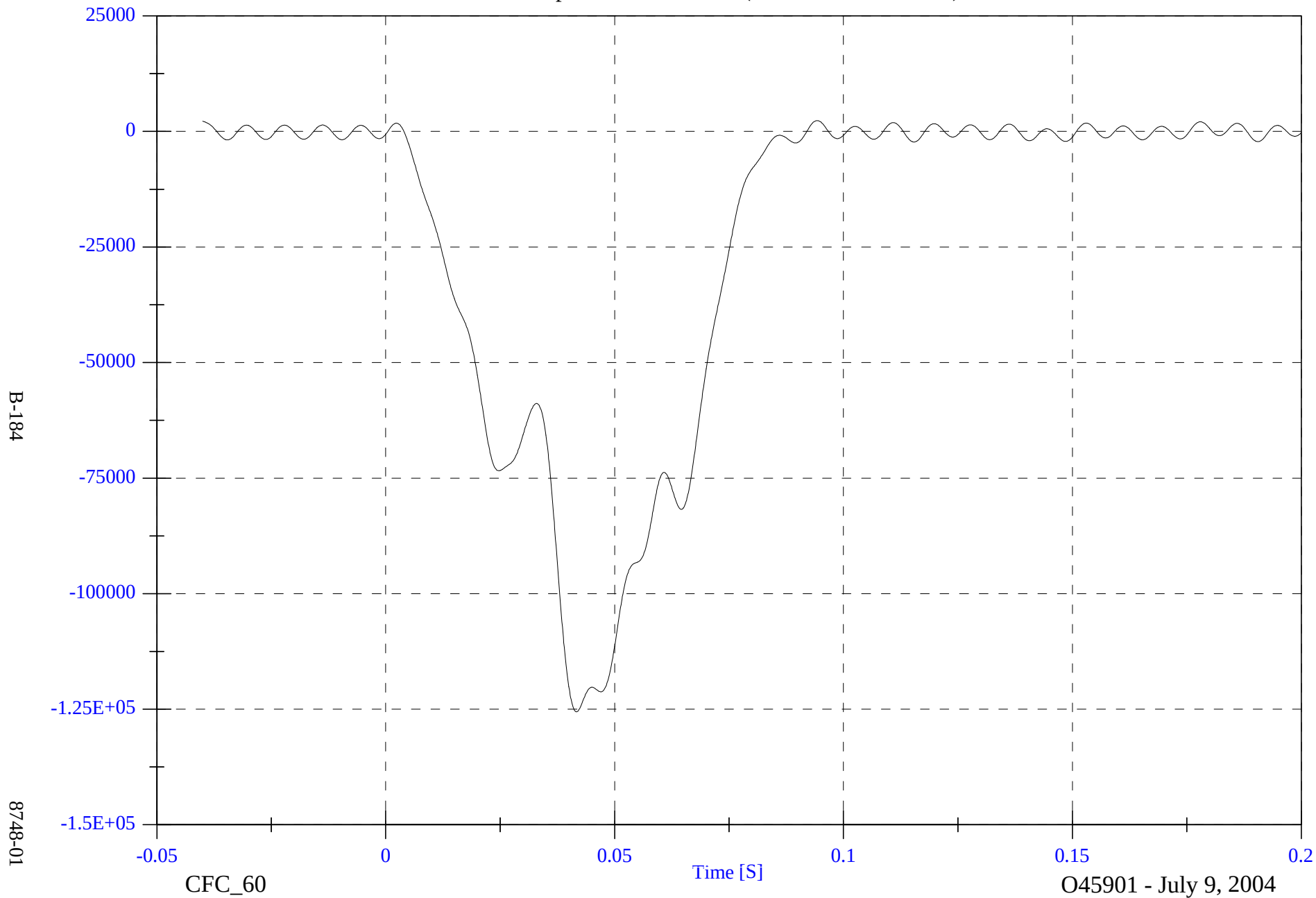


NCAP Optional Test - 2004.5 Volvo S40

Group 4 Load Cell Sum (C1,C2,C3,D1,D2,D3)

Max: 2339.8 [] at 0.094 [S]

Min: -125561.9 [] at 0.042 [S]

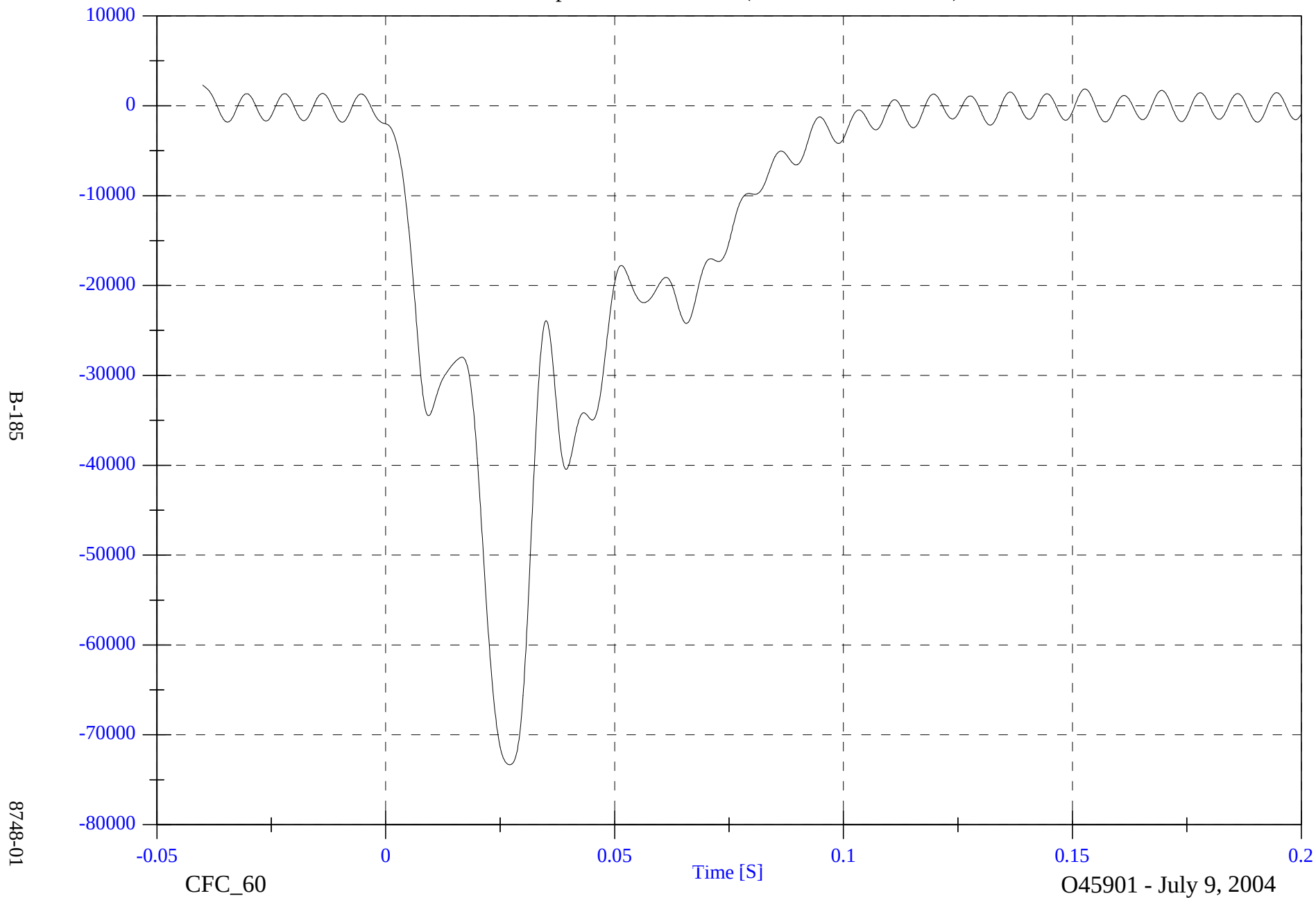


NCAP Optional Test - 2004.5 Volvo S40

Group 5 Load Cell Sum (C4,C5,C6,D4,D5,D6)

Max: 2288.0 [] at -0.040 [S]

Min: -73312.6 [] at 0.027 [S]

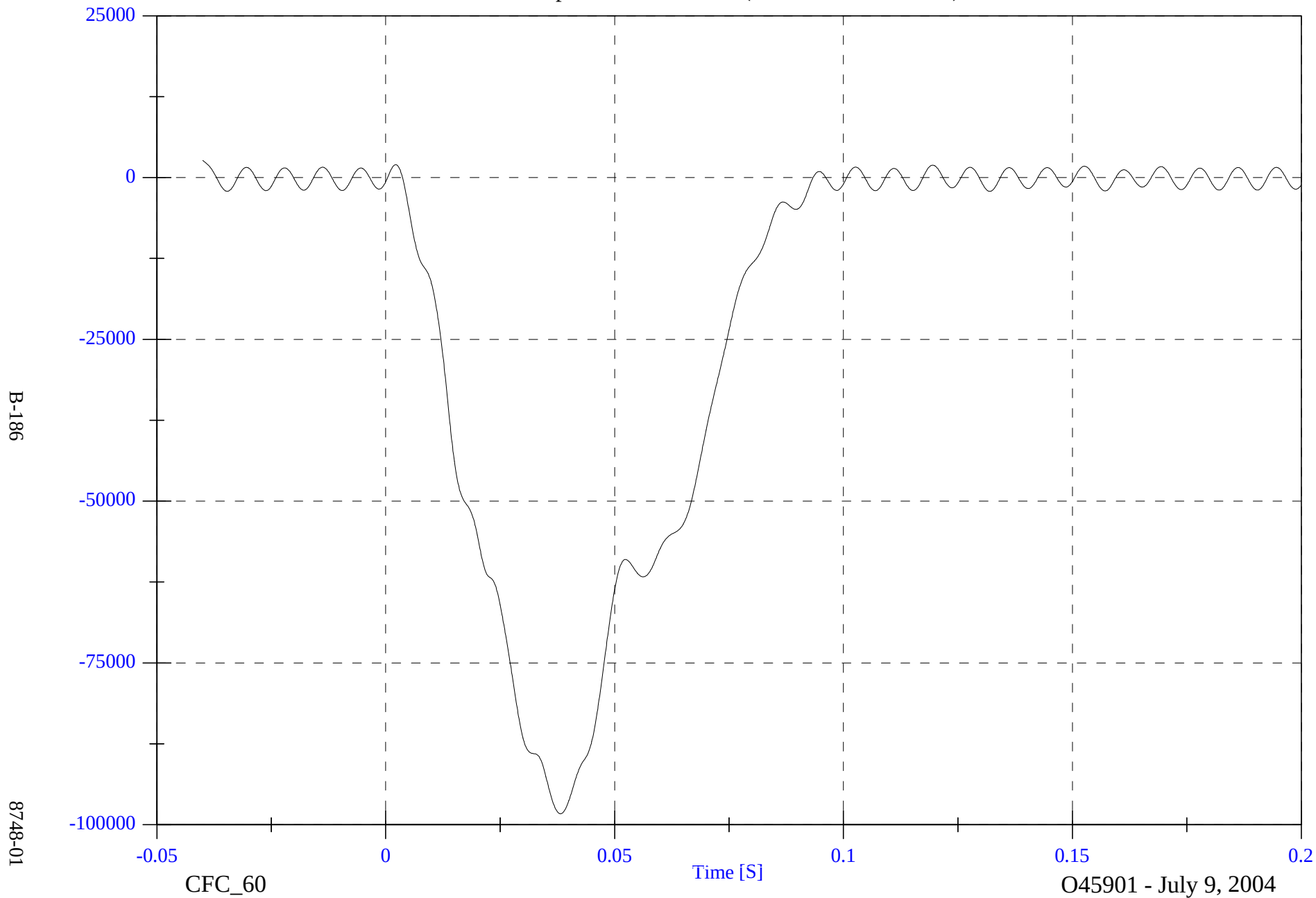


NCAP Optional Test - 2004.5 Volvo S40

Group 6 Load Cell Sum (C7,C8,C9,D7,D8,D9)

Max: 2652.3 [] at -0.040 [S]

Min: -98301.0 [] at 0.038 [S]

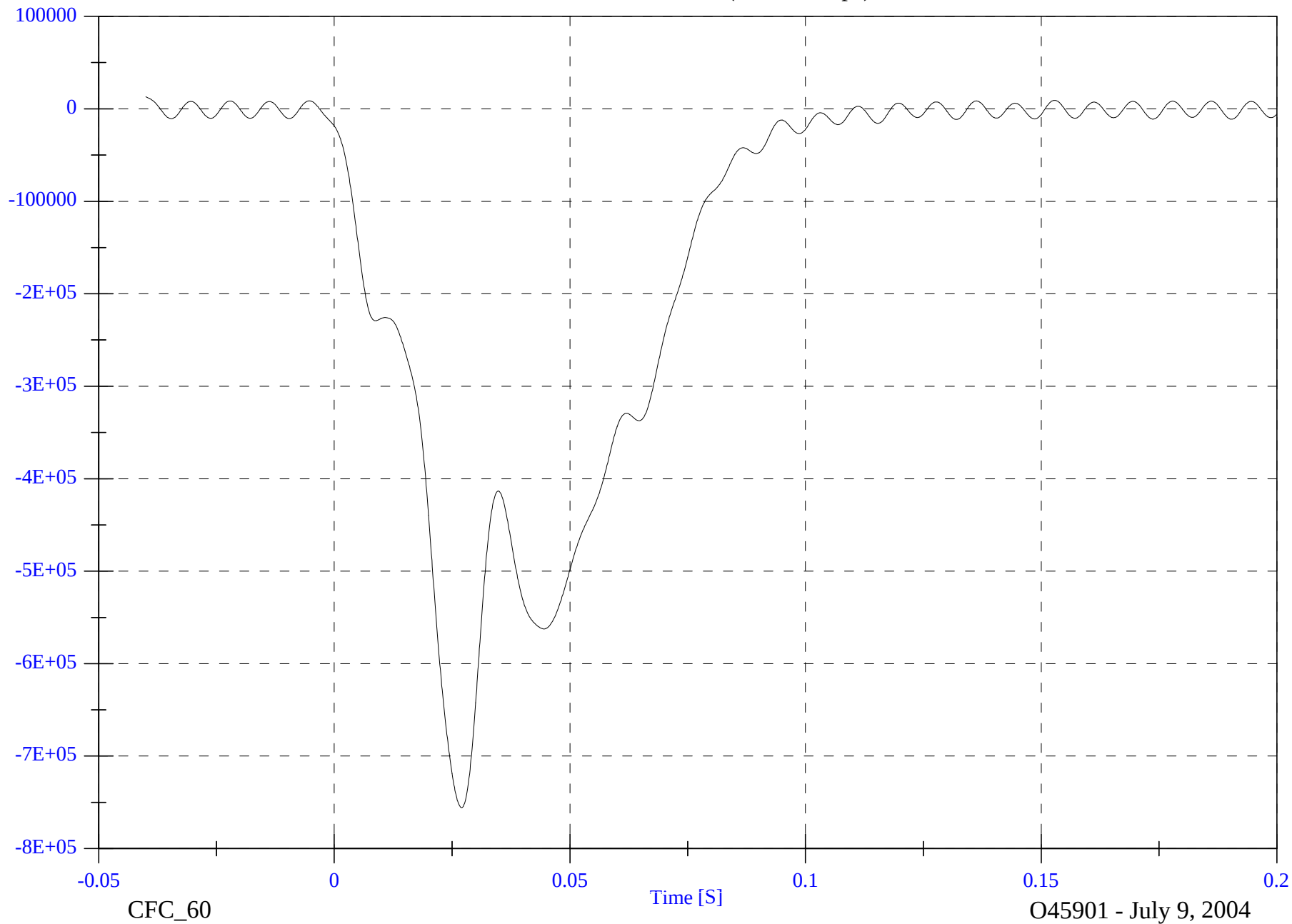


NCAP Optional Test - 2004.5 Volvo S40

Total Load Cell Sum (All 6 Groups)

Max: 12929.6 [] at -0.040 [S]

Min: -755629.8 [] at 0.027 [S]



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8748-01

CFC_60

O45901 - July 9, 2004

APPENDIX C

PART 572B/E DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA SHEETS

Appendix C contains the results from certification tests performed on the 50th percentile male anthropomorphic test devices utilized for this crash test. The results indicate that the dummies meet all of the performance requirements of the six standard tests as specified in 49 CFR Part 572, Federal Register, Volume 42, No. 25, dated February 7, 1977.

The tests were conducted at the Dummy Certification Test Facility of General Dynamics . A summary of the test results, and Part 572 specifications are included in this Appendix.

Dummy serial numbers and certification dates are:

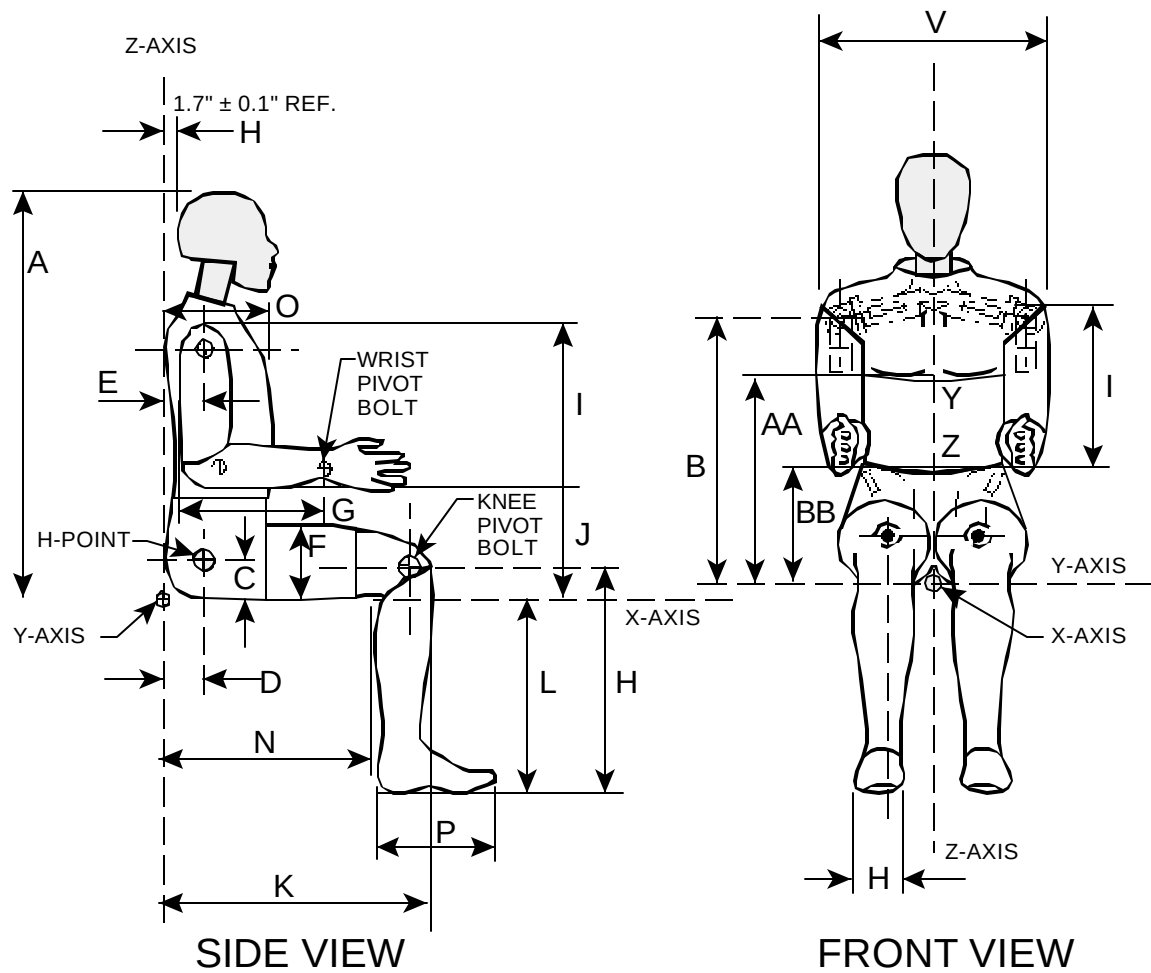
<u>Position No./Location</u>	<u>Serial No.</u>	<u>Completion Date</u>
#1/Driver	061	July 1, 2004
#2/Right Front Passenger	064	July 1, 2004

Electronic Test Equipment

The complement of signal conditioning, recording and display equipment, in conjunction with dummy certification testing, can be found in New Car Assessment and Standards Indicant Testing Final Report No. 6525-V-1.

DUMMY CONFIGURATION DIMENSIONS

EXTERNAL DIMENSIONS SPECIFICATIONS



NOTE: Figure is referenced to the erect seated position. The curved lumbar does not allow the Hybrid III to be positioned in a perfect erect attitude.
(REF: S572.31(A)(6))

PART 572E
HEAD DROP TEST

Dummy Serial Number 061
Sequential Test Number 1
Date June 25, 2004
Workfile 061H 06-25-04

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	66-78 Deg F	70.0
Relative Humidity	10% - 70%	31.00
Peak Resultant Acceleration	225-275 G's	240.35
Peak Lateral Acceleration	15 G's Max	4.47
Is Acceleration Curve Unimodal?	YES	YES

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
NECK FLEXION TEST

Dummy Serial Number	061	
Sequential Test Number	1	
Date	June 28, 2004	6 Axis Neck Transducer
Workfile	061NF1 06-28-04	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	70.00
Relative Humidity		10% - 70%	37.00
Impact Velocity		22.60 - 23.40 Ft/s	23.00
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	22.70
	20 ms	17.60 - 22.60 G's	20.73
	30 ms	12.50 - 18.50 G's	17.21
Max Pendulum G's Above 30 ms		29 G's Max	17.21
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	38.92
D Plane Rotation	Max	64 - 78 Deg	66.02
	Time	57 - 64 ms	57.82
Moment About Occipital Condyle	Max	88.13 – 108.47 Nm	105.23
	Time	47 - 58 ms	51.02
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	115.12
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	98.42

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
NECK EXTENSION TEST

Dummy Serial Number	061	
Sequential Test Number	2	
Date	June 28, 2004	6 Axis Neck Transducer
Workfile	061N2 06-28-04	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	70.00
Relative Humidity		10% - 70%	37.00
Impact Velocity		19.50 - 20.30 Ft/s	19.70
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	19.63
	20 ms	14.00 - 19.00 G's	18.76
	30 ms	11.00 - 16.00 G's	14.18
Max Pendulum G's Above 30 ms		22 G's Max	14.18
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	38.00
D Plane Rotation	Max	81 - 106 Deg	90.76
	Time	72 - 82 ms	72.50
Moment About Occipital Condyle	Max	-79.99 - -52.88 Nm	-71.12
	Time	65 - 79 ms	67.70
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	154.80
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	130.50

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
THORA X IMPACT TEST

Dummy Serial Number 061
Sequential Test Number 1
Date July 1, 2004 061T 07-01-04
Workfile

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	69-72 Deg F	70.00
Relative Humidity	10% - 70%	37.00
Pendulum Velocity	21.6 - 22.4 Ft/s	21.93
Maximum Deflection	2.50 - 2.86 in	2.57
Maximum Resistive Force	1160 - 1325 Lbs	1232.32
Internal Hysteresis	69 - 85 %	75.07

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number 061
Sequential Test Number 1
Date June 29, 2004
Workfile 061LF 06-29-04/061RF 06-29-04

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	66 - 78 Deg F	70.00
Relative Humidity	10% - 70%	31.00
Probe Velocity	6.8 - 7.0 Ft/s	7.00
Peak Knee Impact Force	1060 - 1300 Lbs	1296.37
RIGHT KNEE		
Temperature	66 - 78 Deg F	70.00
Relative Humidity	10% - 70%	31.00
Probe Velocity	6.8 - 7.0 Ft/s	7.00
Peak Knee Impact Force	1060 - 1300 Lbs	1258.68

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 061
Sequential Test Number 1
Date July 1, 2004

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			70.00
Relative Humidity			37.00
Location for Chest Circumference	AA	16.9 - 17.1 in	17.0
Location for Waist Circumference	BB	8.9 - 9.1 in	9.0
Chest Circumference (With Jacket)	Y	38.2 - 39.4 in	39.2
Waist Circumference	Z	32.9 - 34.1 in	33.6
Chest Depth	O	8.4 - 9.0 in	8.4
H-Point Height	C	3.3 - 3.5 in	3.4
H-Point from Backline	D	5.3 - 5.5 in	5.4
Skull Cap to Backline	H	1.6 - 1.8 in	1.7
Total Sitting Height	A	34.6 - 35.0 in	34.8
Thigh Clearance	F	5.5 - 6.1 in	6.0
Buttock Knee Length	K	22.8 - 23.8 in	23.6
Buttock Popliteal Length	N	17.8 - 18.8 in	18.4
Popliteal Height	L	16.9 - 17.9 in	17.7
Knee Pivot Height	M	19.1 - 19.7 in	19.4
Foot Length	P	9.9 - 10.5 in	10.1
Foot Breadth	W	3.6 - 4.2 in	3.8
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.5
Shoulder Breadth	V	16.6 - 17.2 in	16.8
Shoulder Pivot Height	B	19.9 - 20.5 in	20.1
Elbow Rest Height	J	7.5 - 8.3 in	7.8
Shoulder - Elbow Length	I	13.0 - 13.6 in	13.4
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.6

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
HEAD DROP TEST

Dummy Serial Number 064
Sequential Test Number 1
Date June 25, 2004
Workfile 064H 06-25-04

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	66-78 Deg F	70.00
Relative Humidity	10% - 70%	31.00
Peak Resultant Acceleration	225-275 G's	228.86
Peak Lateral Acceleration	15 G's Max	1.92
Is Acceleration Curve Unimodal?	YES	YES

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
NECK FLEXION TEST

Dummy Serial Number	064	
Sequential Test Number	2	
Date	June 30, 2004	6 Axis Neck Transducer
Workfile	064NF2 06-30-04	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	70.00
Relative Humidity		10% - 70%	28.00
Impact Velocity		22.60 - 23.40 Ft/s	23.00
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	22.58
	20 ms	17.60 - 22.60 G's	20.33
	30 ms	12.50 - 18.50 G's	16.42
Max Pendulum G's Above 30 ms		29 G's Max	16.42
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	38.40
D Plane Rotation	Max	64 - 78 Deg	70.50
	Time	57 - 64 ms	60.60
Moment About Occipital Condyle	Max	88.13 – 108.47 Nm	98.74
	Time	47 - 58 ms	51.90
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	121.00
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	98.50

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
NECK EXTENSION TEST

Dummy Serial Number	064	
Sequential Test Number	1	
Date	June 30, 2004	6 Axis Neck Transducer
Workfile	064NE 06-30-04	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	70.00
Relative Humidity		10% - 70%	28.00
Impact Velocity		19.50 - 20.30 Ft/s	19.70
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	18.53
	20 ms	14.00 - 19.00 G's	18.76
	30 ms	11.00 - 16.00 G's	15.88
Max Pendulum G's Above 30 ms		22 G's Max	15.88
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	38.20
D Plane Rotation	Max	81 - 106 Deg	97.57
	Time	72 - 82 ms	76.70
Moment About Occipital Condyle	Max	-79.99 - -52.88 Nm	-72.73
	Time	65 - 79 ms	71.00
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	159.90
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	134.50

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number 064
Sequential Test Number 1
Date July 1, 2004
Workfile 064T 07-01-04

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	69-72 Deg F	70.00
Relative Humid ity	10% - 70%	37.00
Pendulum Velocity	21.6 - 22.4 Ft/s	21.88
Maximum Deflection	2.50 - 2.86 in	2.62
Maximum Resistive Force	1160 - 1325 Lbs	1256.01
Internal Hysteresis	69 - 85 %	73.08

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number 064
Sequential Test Number 1
Date June 29, 2004
Workfile 064LF 06-29-04/064RF 06-29-04

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	66 - 78 Deg F	70.00
Relative Humidity	10% - 70%	31.00
Probe Velocity	6.8 - 7.0 Ft/s	7.00
Peak Knee Impact Force	1060 - 1300 Lbs	1200.16
RIGHT KNEE		
Temperature	66 - 78 Deg F	70.00
Relative Humidity	10% - 70%	31.00
Probe Velocity	6.8 - 7.0 Ft/s	7.00
Peak Knee Impact Force	1060 - 1300 Lbs	1293.28

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 064
Sequential Test Number 1
Date July 1, 2004

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			70.00
Relative Humidity			37.00
Location for Chest Circumference	AA	16.9 - 17.1 in	17.0
Location for Waist Circumference	BB	8.9 - 9.1 in	9.0
Chest Circumference (With Jacket)	Y	38.2 - 39.4 in	39.2
Waist Circumference	Z	32.9 - 34.1 in	34.0
Chest Depth	O	8.4 - 9.0 in	8.6
H-Point Height	C	3.3 - 3.5 in	3.4
H-Point from Backline	D	5.3 - 5.5 in	5.4
Skull Cap to Backline	H	1.6 - 1.8 in	1.7
Total Sitting Height	A	34.6 - 35.0 in	34.8
Thigh Clearance	F	5.5 - 6.1 in	6.0
Buttock Knee Length	K	22.8 - 23.8 in	23.6
Buttock Popliteal Length	N	17.8 - 18.8 in	18.4
Popliteal Height	L	16.9 - 17.9 in	17.3
Knee Pivot Height	M	19.1 - 19.7 in	19.4
Foot Length	P	9.9 - 10.5 in	10.2
Foot Breadth	W	3.6 - 4.2 in	3.8
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.6
Shoulder Breadth	V	16.6 - 17.2 in	16.8
Shoulder Pivot Height	B	19.9 - 20.5 in	20.4
Elbow Rest Height	J	7.5 - 8.3 in	8.0
Shoulder - Elbow Length	I	13.0 - 13.6 in	13.4
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.6

Remarks:

Laboratory Technician:

B. Swiecicki

APPENDIX D

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(Six Month Calibration Minimum)

DRIVER DUMMY (S/N 061)		Manufacturer	Serial #	Calibration	
				Last	Next
Head 9 Array	X Arm Y	ENDEVCO	AC-P21399	07-Jun-04	07-Dec-04
	X Arm Z	ENDEVCO	AC-P23282	07-Jun-04	07-Dec-04
	Y Arm X	ENDEVCO	AC-P23155	07-Jun-04	07-Dec-04
	Y Arm Z	ENDEVCO	AC-P23358	07-Jun-04	07-Dec-04
	Z Arm X	ENDEVCO	AC-P18731	07-Jun-04	07-Dec-04
	Z Arm Y	ENDEVCO	AC-P19217	07-Jun-04	07-Dec-04
	Z Arm Z	ENDEVCO	AC-P19217	07-Jun-04	07-Dec-04
Head	X	ENDEVCO	AC-P18516	17-Jun-04	17-Dec-04
	Y	ENDEVCO	AC-P19222	17-Jun-04	17-Dec-04
	Z	ENDEVCO	AC-P18558	17-Jun-04	17-Dec-04
Head	X (R)	ENDEVCO	AC-P18663	17-Jun-04	17-Dec-04
	Y (R)	ENDEVCO	AC-P18639	17-Jun-04	17-Dec-04
	Z (R)	ENDEVCO	AC-P18537	17-Jun-04	17-Dec-04
Neck Load Cell	X	DENTON	LC-076Fx	24-Sep-03	24-Sep-04
	Y	DENTON	LC-076Fy	24-Sep-03	24-Sep-04
	Z	DENTON	LC-076Fz	24-Sep-03	24-Sep-04
Neck Moment	X	DENTON	LC-076Mx	24-Sep-03	24-Sep-04
	Y	DENTON	LC-076My	24-Sep-03	24-Sep-04
	Z	DENTON	LC-076Mz	24-Sep-03	24-Sep-04
Chest	X	ENDEVCO	AC-P21373	07-Jun-04	07-Dec-04
	Y	ENDEVCO	AC-P22639	07-Jun-04	07-Dec-04
	Z	ENDEVCO	AC-P21297	07-Jun-04	07-Dec-04
Chest	X (R)	ENDEVCO	AC-P21171	07-Jun-04	07-Dec-04
	Y (R)	ENDEVCO	AC-P23136	07-Jun-04	07-Dec-04
	Z (R)	ENDEVCO	AC-P23128	07-Jun-04	07-Dec-04
Chest Deflection	X	SERVO	DS-061	11-Nov-03	11-Nov-04
Pelvic	X	ENDEVCO	AC-P18792	08-Jun-04	08-Dec-04
	Y	ENDEVCO	AC-P17535	08-Jun-04	08-Dec-04
	Z	ENDEVCO	AC-P23134	08-Jun-04	08-Dec-04

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(Six Month Calibration Minimum)

DRIVER DUMMY (S/N 061)		Manufacturer	Serial #	Calibration	
				Last	Next
Left Femur Load Cell	Fz	DENTON	LC-231	03-Dec-03	03-Dec-04
Right Femur Load Cell	Fz	DENTON	LC-232	03-Dec-03	03-Dec-04
Left Upper Tibia	Mx	DENTON	LC-038Mx	26-Sep-03	26-Sep-04
	My	DENTON	LC-038My	26-Sep-03	26-Sep-04
Left Lower Tibia	Fz	DENTON	LC-124Fz	26-Sep-03	26-Sep-04
	Mx	DENTON	LC-124Mx	26-Sep-03	26-Sep-04
	My	DENTON	LC-124My	26-Sep-03	26-Sep-04
Right Upper Tibia	Mx	DENTON	LC-023Mx	26-Sep-03	26-Sep-04
	My	DENTON	LC-023My	26-Sep-03	26-Sep-04
Right Lower Tibia	Fz	DENTON	LC-111Fz	26-Sep-03	26-Sep-04
	Mx	DENTON	LC-111Mx	26-Sep-03	26-Sep-04
	My	DENTON	LC-111My	26-Sep-03	26-Sep-04
Left Foot Rear	X	ENTRAN	AC-00L13-F04	14-May-04	14-Nov-04
	Z	ENTRAN	AC-01G18-F15	15-May-04	15-Nov-04
Left Foot Front	Z	ENTRAN	AC-01G18-F14	15-May-04	15-Nov-04
Right Foot Rear	X	ENTRAN	AC-01G18-F05	15-May-04	15-Nov-04
	Z	ENTRAN	AC-01G18-F03	15-May-04	15-Nov-04
Right Foot Front	Z	ENTRAN	AC-01J02-F09	15-May-04	15-Nov-04
Lap Belt Load Cell		First Technology	LC-156	16-Sep-03	16-Sep-04
Shoulder Belt Load Cell		First Technology	LC-155	16-Sep-03	16-Sep-04

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(Six Month Calibration Minimum)

PASSENGER DUMMY (S/N 064)		Manufacturer	Serial#	Calibration	
				Last	Next
Head 9 Array	X Arm Y	ENDEVCO	AC-P18532	09-Jun-04	09-Dec-04
	X Arm Z	ENDEVCO	AC-P17237	08-Jun-04	08-Dec-04
	Y Arm X	ENDEVCO	AC-P16662	09-Jun-04	09-Dec-04
	Y Arm Z	ENDEVCO	AC-P17299	09-Jun-04	09-Dec-04
	Z Arm X	ENDEVCO	AC-P21441	08-Jun-04	08-Dec-04
	Z Arm Y	ENDEVCO	AC-P19197	09-Jun-04	09-Dec-04
Head	X	ENDEVCO	AC-J33018	08-Jun-04	08-Dec-04
	Y	ENDEVCO	AC-J32185	08-Jun-04	08-Dec-04
	Z	ENDEVCO	AC-J31011	08-Jun-04	08-Dec-04
Head	X (R)	ENDEVCO	AC-J31020	08-Jun-04	08-Dec-04
	Y (R)	ENDEVCO	AC-J31101	08-Jun-04	08-Dec-04
	Z (R)	ENDEVCO	AC-J31059	08-Jun-04	08-Dec-04
Neck Load Cell	X	DENTON	LC-441Fx	25-Sep-03	25-Sep-04
	Y	DENTON	LC-441Fy	25-Sep-03	25-Sep-04
	Z	DENTON	LC-441Fz	25-Sep-03	25-Sep-04
Neck Moment	X	DENTON	LC-441Mx	25-Sep-03	25-Sep-04
	Y	DENTON	LC-441My	25-Sep-03	25-Sep-04
	Z	DENTON	LC-441Mz	25-Sep-03	25-Sep-04
Chest	X	ENDEVCO	AC-P15534	15-Jun-04	15-Dec-04
	Y	ENDEVCO	AC-P16576	15-Jun-04	15-Dec-04
	Z	ENDEVCO	AC-P19255	15-Jun-04	15-Dec-04
Chest	X (R)	ENDEVCO	AC-P15526	15-Jun-04	15-Dec-04
	Y (R)	ENDEVCO	AC-P23303	15-Jun-04	15-Dec-04
	Z (R)	ENDEVCO	AC-P19216	11-Jun-04	15-Dec-04
Chest Deflection	X	SERVO	DS-064	20-Nov-03	20-Nov-04
Pelvic	X	ENDEVCO	AC-P23174	08-Jun-04	08-Dec-04
	Y	ENDEVCO	AC-P23164	08-Jun-04	08-Dec-04
	Z	ENDEVCO	AC-P23137	08-Jun-04	08-Dec-04

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(Six Month Calibration Minimum)

PASSENGER DUMMY (S/N 064)		Manufacturer	Serial #	Calibration	
				Last	Next
Left Femur Load Cell	Fz	GSE	LC-723	03-Dec-03	03-Dec-04
Right Femur Load Cell	Fz	GSE	LC-955	03-Dec-03	03-Dec-04
Left Upper Tibia	Mx	DENTON	LC-045Mx	26-Sep-03	26-Sep-04
	My	DENTON	LC-045My	26-Sep-03	26-Sep-04
Left Lower Tibia	Fz	DENTON	LC-125Fz	26-Sep-03	26-Sep-04
	Mx	DENTON	LC-125Mx	26-Sep-03	26-Sep-04
	My	DENTON	LC-125My	26-Sep-03	26-Sep-04
Right Upper Tibia	Mx	DENTON	LC-016Mx	26-Sep-03	26-Sep-04
	My	DENTON	LC-016My	26-Sep-03	26-Sep-04
Right Lower Tibia	Fz	DENTON	LC-123Fz	26-Sep-03	26-Sep-04
	Mx	DENTON	LC-123Mx	26-Sep-03	26-Sep-04
	My	DENTON	LC-123My	26-Sep-03	26-Sep-04
Left Foot Rear	X	ENDEVCO	AC-J18059	04-Feb-04	04-Aug-04
	Z	ENDEVCO	AC-J36176	04-Feb-04	04-Aug-04
Left Foot Front	Z	ENDEVCO	AC-J18662	04-Feb-04	04-Aug-04
Right Foot Rear	X	ENDEVCO	AC-AJ8C0	04-Feb-04	04-Aug-04
	Z	ENDEVCO	AC-J19868	04-Feb-04	04-Aug-04
Right Foot Front	Z	ENDEVCO	AC-J34378	04-Feb-04	04-Aug-04
Lap Belt Load Cell		First Technology	LC-170	10-Oct-03	10-Oct-04
Shoulder Belt Load Cell		First Technology	LC-174	10-Oct-03	10-Oct-04

INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS
(Six Month Calibration Minimum)

	Manufacturer	Serial #	Calibration	
			Last	Next
Left Seat Rear Crossmember X	GS SENSORS	AC-9440-046	09-Jun-04	09-Dec-04
Right Rear Seat Crossmember X	GS SENSORS	AC-9440-017	09-Jun-04	09-Dec-04
Top of Engine	GS SENSORS	AC-9450-039	09-Jun-04	09-Dec-04
Bottom of Engine	GS SENSORS	AC-9440-011	09-Jun-04	09-Dec-04
Right Disc Brake Caliper	GS SENSORS	AC-9440-006	09-Jun-04	09-Dec-04
Instrument Panel	ENDEVCO	AC-J30041	29-Apr-04	29-Oct-04
Left Disc Brake Caliper	GS SENSORS	AC-9440-039	09-Jun-04	09-Dec-04
Left Seat Rear Crossmember Z	GS SENSORS	AC-9440-023	09-Jun-04	09-Dec-04
Right Seat Rear Crossmember Z	GS SENSORS	AC-9440-032	09-Jun-04	09-Dec-04

REPORT NUMBER: 8748-01

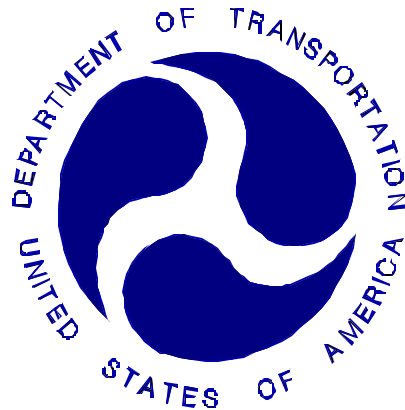
NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

EVENFLO VANGUARD 5 FORWARD FACING CONVERTIBLE WITH LATCH AND TOP TETHER
GRACO MYCARGO BOOSTER

NHTSA NUMBER: O45901

GENERAL DYNAMICS REPORT NUMBER: C42216-1001-2146

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July 9, 2004

FINAL REPORT

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Rulemaking
Office of Crashworthiness Standards
Mail Code: NVS-111
400 Seventh Street, SW, Room No. 5313
Washington, DC 20590

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

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7. Author(s) Patrick G. MacDiarmid, Jr., Project Engineer David J. Travale, Program Manager				8. Performing Organization Report No. 8748-01	
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15. Supplementary Notes					
16. Abstract This CRS test was performed in conjunction with a New Car Assessment Program (NCAP) load cell barrier test. An Evenflo Vanguard 5 Forward facing convertible with LATCH and top tether forward facing convertible was secured in Position 3 (P3) with the LATCH system and top tether. A Graco MyCarGo booster seat was placed in Position 4 (P4) to secure the P4 occupant using the vehicle seat. This test was conducted at the General Dynamics Crash Test Facility in Buffalo, New York, on July 9, 2004.					
ATD Position		HIC 15		HIC 36	
P3 (Right Rear) (142)		1249.2		1472.5	
P4 (Left Rear) (186)		1160.9 ¹		1558.6 ¹	
¹ Head Y data is inaccurate – Calculated using Head X and Head Z accelerations only					
17. Key Words New Car Assessment Program (NCAP)				18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Reference Division Room 5111 (NAD-52) 400 Seventh St., S.W. Washington, D.C. 20590 Telephone No. (202) 366-4946 ATTN: Robert Hornicle	
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SECTION 1

PURPOSE AND SUMMARY OF TEST O45901

The purpose of this test was to obtain CRS performance data in a frontal impact NCAP condition. The 56.17 kph NCAP frontal impact test was conducted in accordance with the Office of Crashworthiness Standards (OCS) NCAP Laboratory Test Procedure.

SUMMARY

A forward facing convertible 5-point belt CRS and a 3 year old child dummy (serial no. 142) was secured in the right rear occupant position (Position 3 or P3). A 6 year old child dummy (serial no. 186) was secured in the left rear occupant position (Position 4 or P4) using a booster seat with the vehicle safety belt. The 3 Year Old Hybrid III (P572 P) child dummy was instrumented with head, chest, and pelvic triaxial accelerometers, a chest displacement sensor, and upper and lower six axial neck force and moment load cells as well as a head rear Z-direction accelerometer. The 6 Year Old Hybrid III (P572N) child dummy was instrumented with head, chest, and pelvic triaxial accelerometers, a chest displacement sensor, and upper and lower neck force and moment load cells. The dummies were calibrated previous to this test and the certification information is found in section 5.

The right rear child dummy's HIC (15 ms) was 1249.2, the HIC over 36 ms was 1472.5, the maximum chest deceleration over 3 ms was 73.0 g's. The left rear child dummy's HIC (15 ms) was 1160.9, the HIC over 36 ms was 1558.6, the maximum chest deceleration over 3 ms was 60.3 g's.

TEST DUMMY INFORMATION:

DESCRIPTION	Position #3 CRS	Position #4 CRS
ATD Type/Serial No.	Hybrid III 3C/ 142	Hybrid III 6C /186
Restraint System:	Evenflo Vanguard 5 Forward facing convertible with LATCH and top tether	Graco MyCarGo Booster

<u>Number of Data Channels</u>	<u>52</u>	
<u>Number of Cameras:</u>	<u>1</u>	<u>Real Time</u>
	<u>2</u>	<u>High Speed</u>

POST TEST DOOR OPENING

DESCRIPTION	FRONT	REAR
Left Side Doors	Closed, Latched and Operable without tools	Closed, Latched and Operable without tools
Right Side Doors	Closed, Latched and Operable without tools	Closed, Latched and Operable without tools
Hatch/Other Door	N/A	N/A

POST TEST SEAT DATA

LOCATION	SEAT MOVEMENT (mm)	SEAT BACK FAILURE
P1 (Left Front)	30 mm forward	None
P2 (Right Front)	5 mm forward	None
P3 (Right Rear)	0	None
P4 (Left Rear)	0	None

VISIBLE DUMMY CONTACT POINTS

	Position #3 CRS	Position #4 CRS
Head Contact:	The face and chin to the chest and the back of the head to the child restraint	The face and chin to the chest and the back of the head to the child restraint
Upper Torso Contact:	None	None
Lower Torso Contact:	None	None
Left Knee Contact:	None	None
Right Knee Contact:	None	None

DATA SHEET NO. 2

CRS PARAMETER DATA

CRS: Evenflo Vanguard 5 Forward facing convertible with LATCH and top tether and a Graco MyCarGo Booster Seat

NHTSA No. O45901

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Delivered Weight of Vehicle with Maximum Fluids = 1460 kg (A)

AS TESTED WEIGHT OF VEHICLE

(2 P572E + 1 P572P w/ CRS + 1 P572N w/ CRS +CARGO + EQUIPMENT & INSTRUMENTATION):

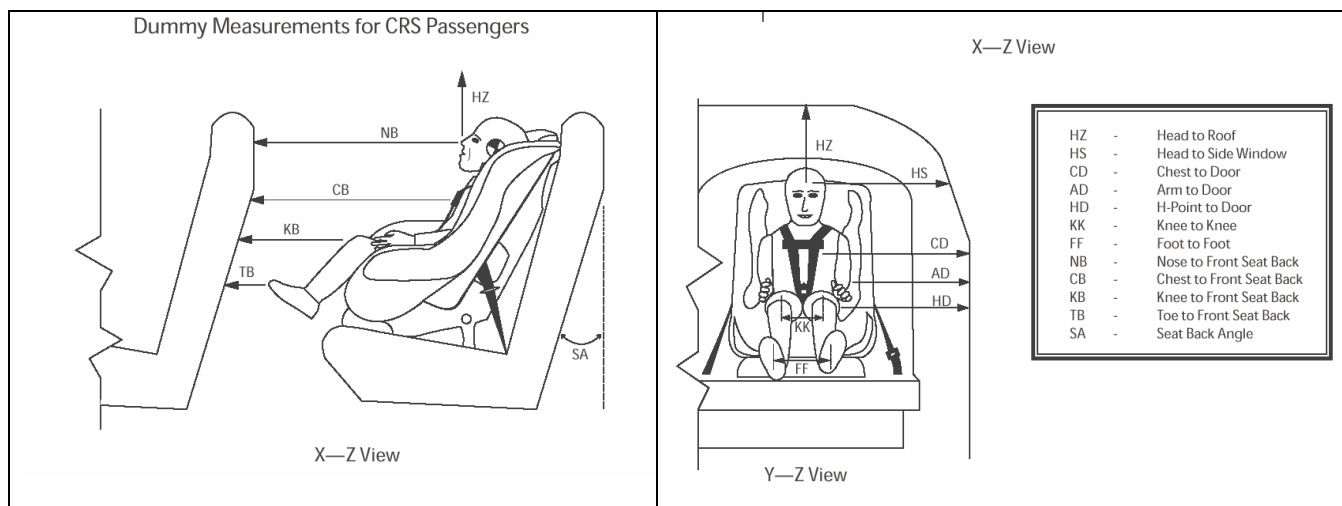
Left Front	=	<u>462.0</u>	kg	Left Rear	=	<u>378.0</u>	kg
Right Front	=	<u>480.0</u>	kg	Right Rear	=	<u>378.0</u>	kg
TOTAL FRONT	=	<u>942.0</u>	kg	TOTAL REAR	=	<u>756.0</u>	kg
TOTAL TEST WEIGHT =		<u>1698.0</u>	kg				

DATA SHEET NO. 3

CHILD DUMMY POSITIONING IN VEHICLE

CRS: Evenflo Vanguard 5 Forward facing convertible with LATCH and top tether and a
Graco MyCarGo Booster Seat

NHTSA No. O45901



Measurement	P3 CRS (142)	P4 CRS (186)
SA	25	15
HS	442	367
CD	342	323
AD	213	170
HD	267	181
HZ	328	311
NB	563	580
CB	543	523
KK	185	161
FF	208	153
KB – LEFT	350	294
KB – RIGHT	350	284
TB – LEFT	65	55
TB – RIGHT	65	45

All dimensions in mm (unless noted)

P3 – Right Rear Passenger (CRS #1)

P4 – Left Rear Passenger (CRS #2)

DATA SHEET 4

CHILD DUMMY INJURY CRITERIA VALUES

CRS: Evenflo Vanguard 5 Forward facing convertible with LATCH and top tether and a
Graco MyCarGo Booster Seat

NHTSA No. O45901

		MAXIMUM VALUE							
		Position #3				Position #4			
DESCRIPTION	Unit	Pos	msec	Neg	msec	Pos	msec	Neg	msec
Head X	g	150.3	181.0	-25.5	63.0	95.7	174.4	-49.2	86.9
Head Y	g	6.9	121.2	-21.6	181.7	†	†	†	†
Head Z	g	102.8	80.4	-9.7	58.4	5.1	183.9	-93.8	69.0
Head Resultant	g	154.9	181.0	0.0	-47.4	†	†	†	†
Head Rear Z	g	101.3	85.8	-80.1	180.6	-	-	-	-
Upper Neck Fx	N	269.6	176.9	-566.2	64.7	855.9	73.9	-85.0	199.6
Upper Neck Fy	N	72.8	189.7	-86.4	180.7	45.5	90.5	-36.9	50.8
Upper Neck Fz	N	2293.6	81.1	-279.1	57.4	3084.0	71.9	-401.5	197.8
Upper Neck F Resultant	N	2337.6	81.1	0.4	-49.3	3198.5	72.4	0.4	-38.2
Upper Neck Mx	N-m	8.0	91.4	-4.7	108.7	9.9	57.0	-8.6	75.4
Upper Neck My	N-m	13.2	176.6	-11.6	188.6	8.2	85.0	-40.6	186.6
Upper Neck Mz	N-m	3.3	199.9	-2.0	143.7	2.2	49.1	-2.6	68.8
Upper Neck M Resultant	N-m	13.4	176.7	0.0	-49.6	40.6	186.6	0.1	-35.0
Lower Neck Fx	N	331.7	177.6	-1468.8	76.4	191.6	174.8	-2527.3	75.2
Lower Neck Fy	N	50.1	190.6	-227.7	73.5	100.1	34.7	-835.0	75.0
Lower Neck Fz	N	1643.3	80.8	-767.7	59.0	1554.6	68.1	-469.8	89.9
Lower Neck F Resultant	N	2185.9	80.8	0.4	-48.8	2828.2	69.4	0.5	-41.8
Lower Neck Mx	N-m	†	†	†	†	1.7	36.1	-43.3	77.5
Lower Neck My	N-m	110.3	80.5	-18.6	178.3	204.5	86.3	-48.3	171.9
Lower Neck Mz	N-m	12.0	71.9	-3.8	106.7	17.3	49.8	-23.4	76.6
Lower Neck M Resultant	N-m	†	†	†	†	209.2	86.2	0.1	-37.4
Chest X	g	24.2	173.9	-39.4	63.6	8.6	150.6	-51.3	52.3
Chest Y	g	5.1	61.1	-4.7	188.0	14.9	68.1	-10.5	47.8
Chest Z	g	30.8	89.4	-62.2	60.4	10.2	86.1	-46.4	64.3
Chest Resultant	g	73.3	60.2	0.0	-48.8	62.8	64.3	0.0	-41.8
Chest Displacement	mm	0.0	-31.1	-25.5	68.0	§	§	§	§

† - Sensor is not accurate – Data is Meaningless

§ - Data clipped

DATA SHEET 4**CHILD DUMMY INJURY CRITERIA VALUES (CONTINUED)**

CRS: Evenflo Vanguard 5 Forward facing convertible with LATCH and top tether and a
Graco MyCarGo Booster Seat

NHTSA No. O45901

		MAXIMUM VALUE							
		Position #3				Position #4			
DESCRIPTION	Unit	Pos	msec	Neg	msec	Pos	msec	Neg	msec
Pelvic X	g	26.1	120.5	-63.2	64.2	22.1	105.5	-46.2	54.6
Pelvic Y	g	5.8	118.3	-13.4	81.8	12.3	71.2	-11.0	41.7
Pelvic Z	g	20.9	86.9	-54.8	53.9	10.2	197.8	-69.0	67.6
Pelvic Resultant	g	82.9	52.8	0.0	-49.9	74.5	67.6	0.0	-37.2
Lap Belt Load	N	-	-	-	-	2604.0	54.9	-14.0	108.8

DATA SHEET 4

CHILD DUMMY INJURY CRITERIA VALUES (CONTINUED)

CRS: Evenflo Vanguard 5 Forward facing convertible with LATCH and top tether and a
Graco MyCarGo Booster Seat

NHTSA No. O45901

HEAD INJURY CRITERIA (HIC)								
HIC15					HIC36			
	t ₁ (msec)	t ₂ (msec)	Average Acceleration t ₁ to t ₂		t ₁ (msec)	t ₂ (msec)	Average Acceleration t ₁ to t ₂	
HIC				HIC				
Position #3 - Right	1249.2	74.0	89.0	92.9 g	1472.5	66.8	96.0	76.0 g
Position #4 - Left ¹	1160.9	64.3	79.3	90.3 g	1558.6	55.0	91.0	71.5 g

¹ Head Y data is inaccurate – Calculated using Head X and Head Z accelerations only

CLIP SUMMARY*				
	CLIP (g's)	t ₁ (msec)	t ₂ (msec)	CSI
Position #3 - Right	73.0	59.5	63.1	876.7
Position #4 - Left	60.3	52.2	55.2	727.2

* The maximum chest resultant acceleration is defined as the maximum acceleration which exceeds 0.003 seconds in duration.

DATA SHEET NO. 5

CRS PERFORMANCE DATA

CRS: Evenflo Vanguard 5 Forward facing convertible with LATCH and top tether and a Graco MyCarGo Booster Seat

NHTSA No. O45901

		MAXIMUM VALUE			
DESCRIPTION	Unit	Positive	Time (ms)	Negative	Time (ms)
P3 CRS X	g	26.4	133.9	-72.0	100.2
P3 CRS Y	g	16.4	144.8	-29.4	137.5
P3 CRS Z	g	45.9	138.1	-51.9	54.9
P3 CRS Resultant	g	72.1	100.2	0.0	-39.9
P4 CRS X	g	82.7	141.2	-69.3	70.6
P4 CRS Y	g	10.6	197.0	-22.0	60.9
P4 CRS Z	g	24.4	178.1	-56.7	52.1
P4 CRS Resultant	g	83.7	141.2	0.0	-33.4

DATA SHEET NO. 5**CRS PERFORMANCE DATA (CONTINUED)**

CRS: Evenflo Vanguard 5 Forward facing convertible with LATCH and top tether and a
Graco MyCarGo Booster Seat

NHTSA No. O45901

POSITION #3 CRS POST-TEST INSPECTION (Serial No. 3691331 P1 10NOV03)

LOCATION	DAMAGE	REMARKS
Upper Tether Strap	No	None
Upper Tether Buckle	No	None
Upper Tether Hook	No	None
Vehicle Upper Tether Anchor	No	None
Lower Anchor Strap	No	None
Lower Anchor Buckle	No	None
Lower Anchor Hooks	No	None
Vehicle Lower CRS Anchors	No	None
Five Point Harness Connections	No	None
Cracks on CRS	No	None
Fabric Tears on CRS	No	None
Vehicle Seat Structure	No	None
Vehicle Seat Fabric Tears	No	None
Child Dummy	No	None

POSITION #4 CRS POST-TEST INSPECTION (Serial No. 8481LAN 050403)

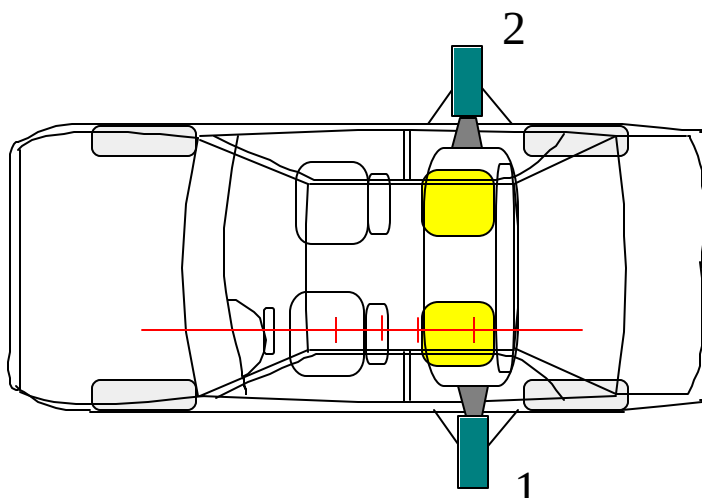
LOCATION	DAMAGE	REMARKS
Upper Tether Strap	NA	None
Upper Tether Buckle	NA	None
Upper Tether Hook	NA	None
Vehicle Upper Tether Anchor	NA	None
Lower Anchor Strap	NA	None
Lower Anchor Buckle	NA	None
Lower Anchor Hooks	NA	None
Vehicle Lower CRS Anchors	NA	None
Five Point Harness Connections	NA	None
Cracks on CRS	No	None
Fabric Tears on CRS	No	None
Vehicle Seat Structure	No	None
Vehicle Seat Fabric Tears	No	None
Child Dummy	Yes	Head skin dislodged during the event.

DATA SHEET NO. 6

CRS CAMERA DATA

CRS: Evenflo Vanguard 5 Forward facing convertible with LATCH and top tether and a Graco MyCarGo Booster Seat

NHTSA No. O45901



Camera No.	View	Coordinates (millimeters)			Angle** (deg.)	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Left side CRS lateral view	3178	2616	2277	-18	28	1000
2	Right side CRS lateral view	7208	2731	2200	-18	28	1000

* Reference (from point of impact); all measurements accurate to within ± 6 mm

** = referenced to horizontal plane

X = film plane to monorail centerline

Y = film plane to impact location

Z = film plane to ground

SECTION 3

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Figure 3-1 CLOSE-UP VIEW OF POSITION 3 CRS LABEL



Figure 3-2 PRE-TEST FRONTAL VIEW OF POSITION 3 CRS



Figure 3-3 POST-TEST FRONTAL VIEW OF POSITION 3 CRS



Figure 3-4 PRE-TEST REAR VIEW OF POSITION 3 CRS



Figure 3-5 POST-TEST REAR VIEW OF POSITION 3 CRS



Figure 3-6 PRE-TEST LEFT SIDE VIEW OF POSITION 3 CRS



Figure 3-7 POST-TEST LEFT SIDE VIEW OF POSITION 3 CRS



Figure 3-8 PRE-TEST RIGHT SIDE VIEW OF POSITION 3 CRS



Figure 3-9 POST-TEST RIGHT SIDE VIEW OF POSITION 3 CRS

WARNING  ...at increases the risk of ... stop or crash.

...ve paid the ...
...is part

Consumer: Just fill in your name and address. Please print.

Your first name

Your last name

Your street address

City

State Zip Code -

CHILD RESTRAINT REGISTRATION CARD

MODEL **8481LAN**
Manufactured in 050403 10
GRACO CHILDREN'S PRODUCTS, INC.
EXTON, PA 19341 1-888-224-6549
Made in U.S.A.

PB-25777

LAPC0063A

Figure 3-10 CLOSE-UP VIEW OF POSITION 4 CRS LABEL



Figure 3-11 PRE-TEST FRONTAL VIEW OF POSITION 4 CRS



Figure 3-12 POST-TEST FRONTAL VIEW OF POSITION 4 CRS



Figure 3-13 PRE-TEST REAR VIEW OF POSITION 4 CRS



Figure 3-14 POST-TEST REAR VIEW OF POSITION 4 CRS



Figure 3-15 PRE-TEST LEFT SIDE VIEW OF POSITION 4 CRS



Figure 3-16 POST-TEST LEFT SIDE VIEW OF POSITION 4 CRS



Figure 3-17 PRE-TEST RIGHT SIDE VIEW OF POSITION 4 CRS



Figure 3-18 POST-TEST RIGHT SIDE VIEW OF POSITION 4 CRS



Figure 3-19 PRE-TEST POSITION 3 LEFT SIDE VIEW



Figure 3-20 POST-TEST POSITION 3 LEFT SIDE VIEW



Figure 3-21 PRE-TEST POSITION 4 LEFT SIDE VIEW



Figure 3-22 POST-TEST POSITION 4 LEFT SIDE VIEW



Figure 3-23 PRE-TEST POSITION 3 RIGHT SIDE VIEW



Figure 3-24 POST-TEST POSITION 3 RIGHT SIDE VIEW



Figure 3-25 PRE-TEST POSITION 4 RIGHT SIDE VIEW



Figure 3-26 POST-TEST POSITION 4 RIGHT SIDE VIEW



Figure 3-27 PRE-TEST POSITION 3 FRONT VIEW



Figure 3-28 POST-TEST POSITION 3 FRONT VIEW



Figure 3-29 PRE-TEST POSITION 4 FRONT VIEW



Figure 3-30 POST-TEST POSITION 4 FRONT VIEW

SECTION 4

CHILD DUMMY RESPONSE AND CRS DATA TRACES

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NCAP Optional Test - 2004.5 Volvo S40

V1P3 Head x

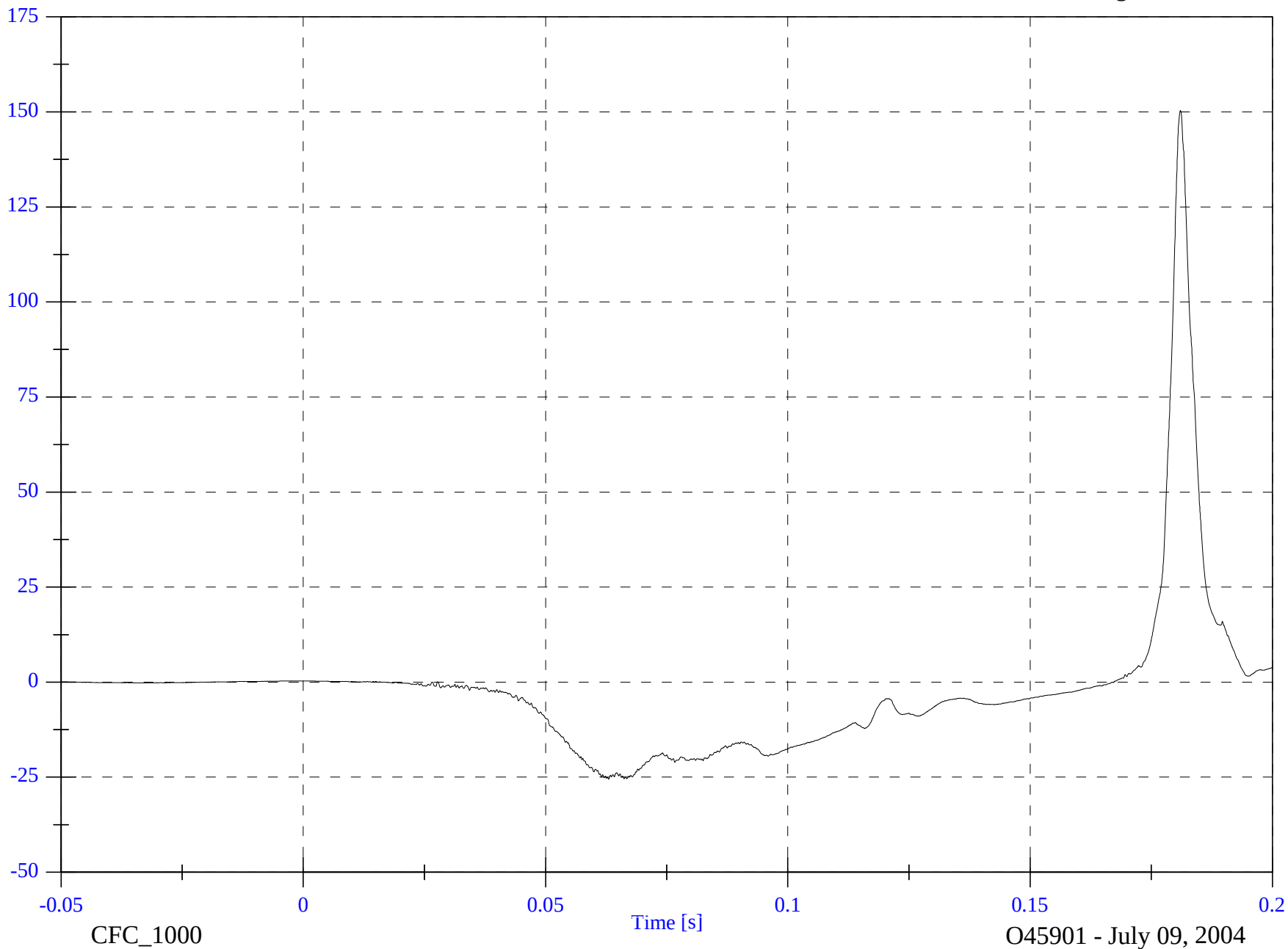
Max: 150.3 [g] at 0.181 [s]

Min: -25.5 [g] at 0.063 [s]

4-4

g

8748-01

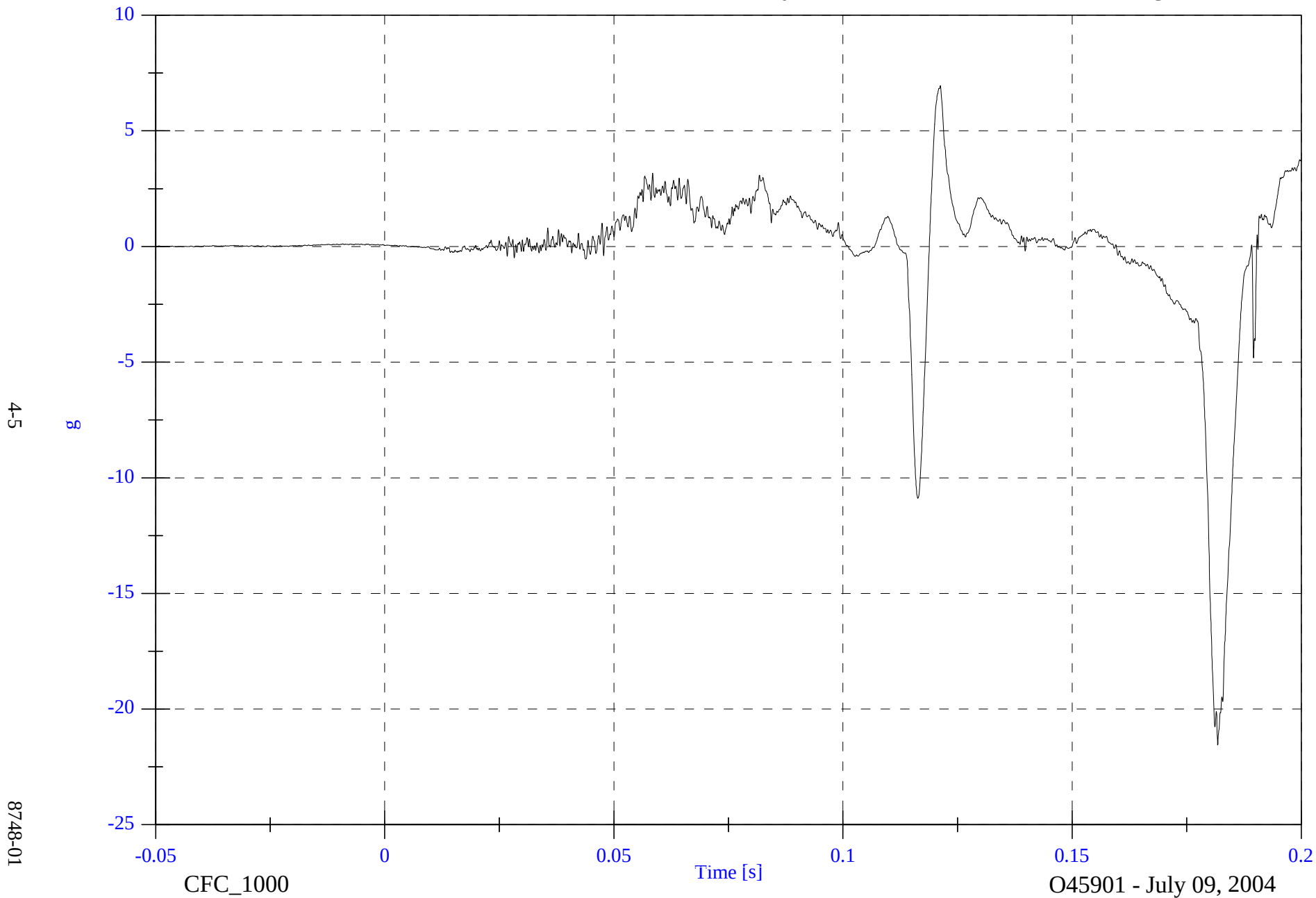


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Head y

Max: 6.9 [g] at 0.121 [s]

Min: -21.6 [g] at 0.182 [s]

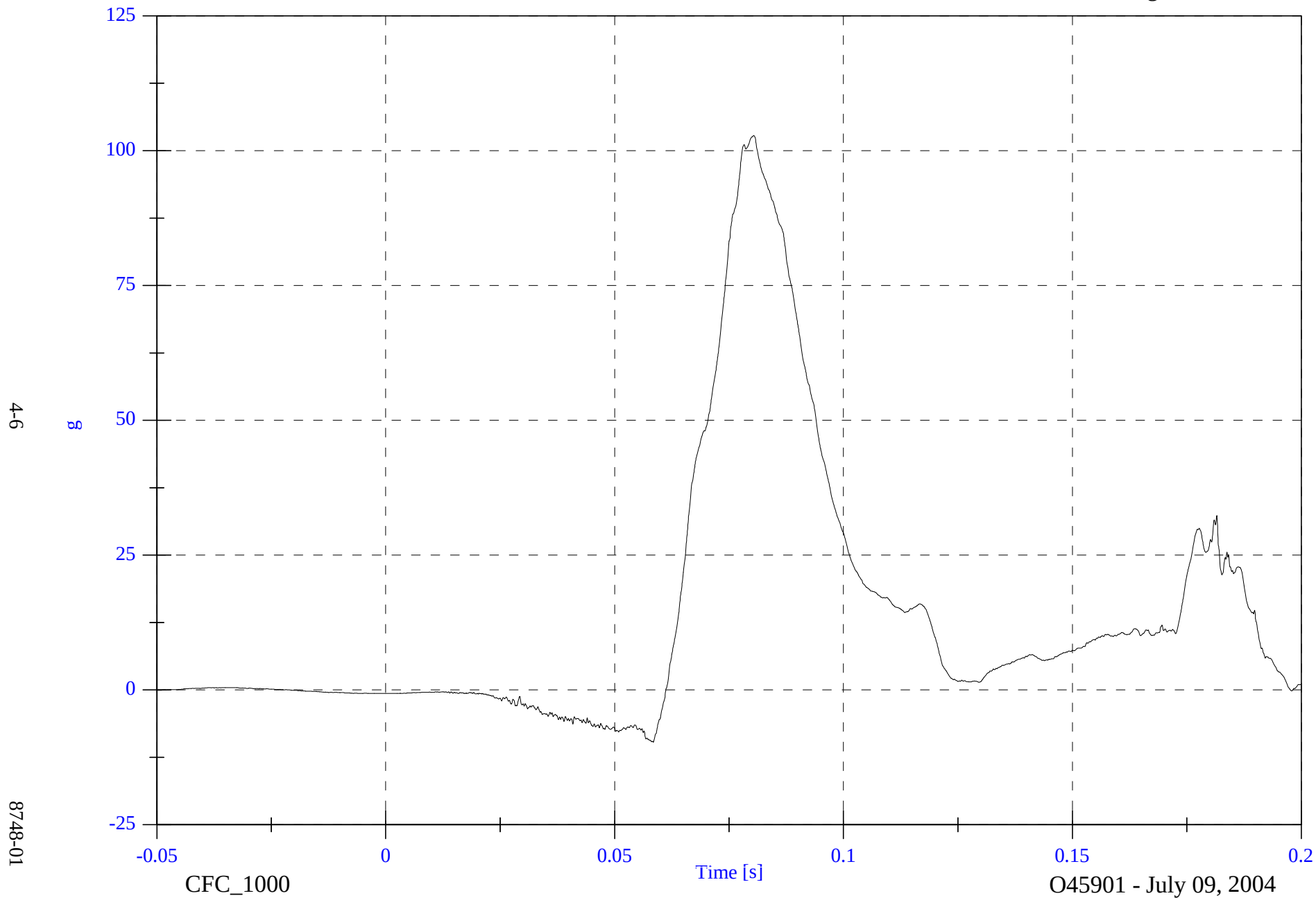


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Head z

Max: 102.8 [g] at 0.080 [s]

Min: -9.7 [g] at 0.058 [s]



NCAP Optional Test - 2004.5 Volvo S40

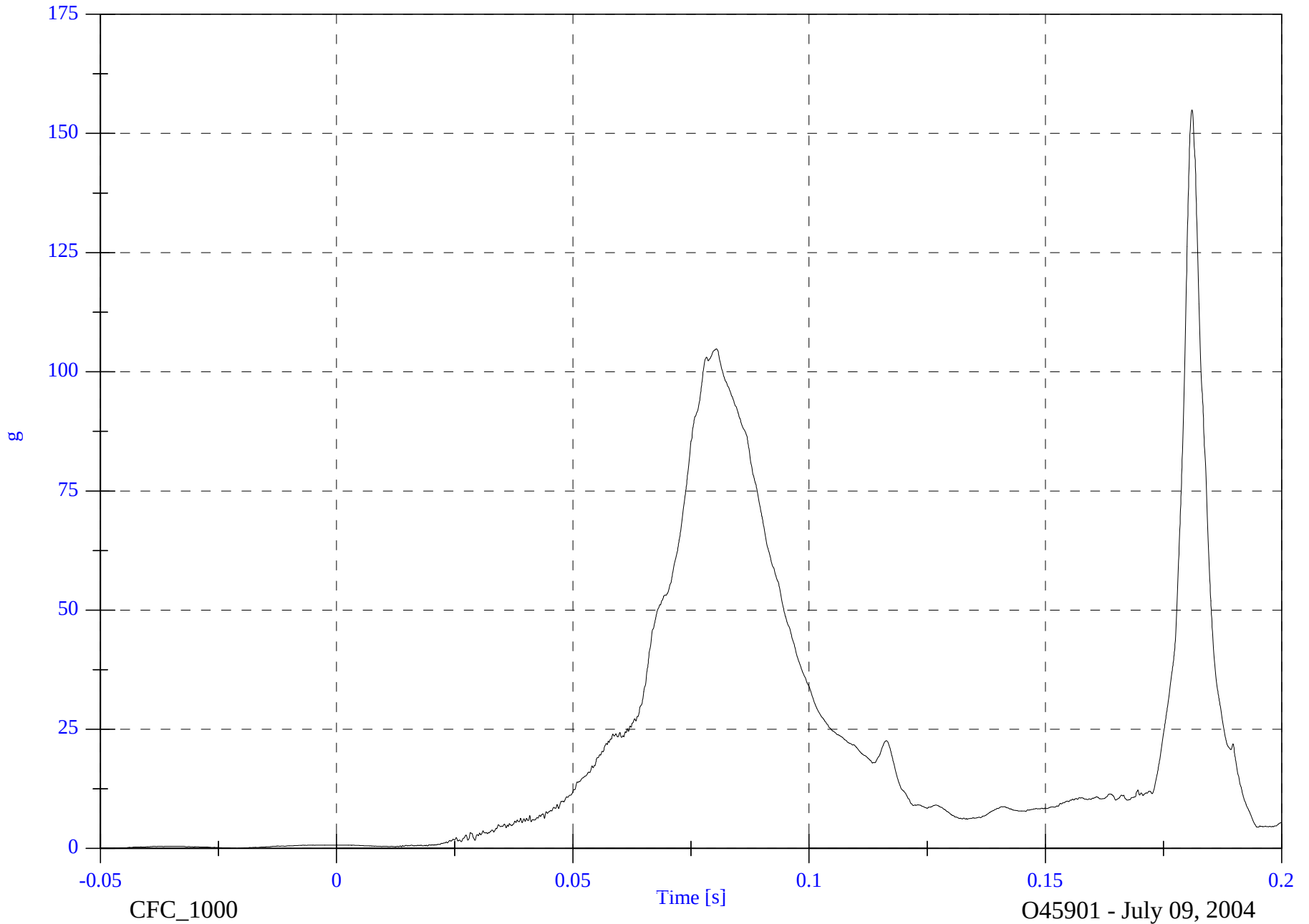
V1P3 Head Resultant

Max: 154.9 [g] at 0.181 [s]

Min: 0.0 [g] at -0.047 [s]

4-7

8748-01

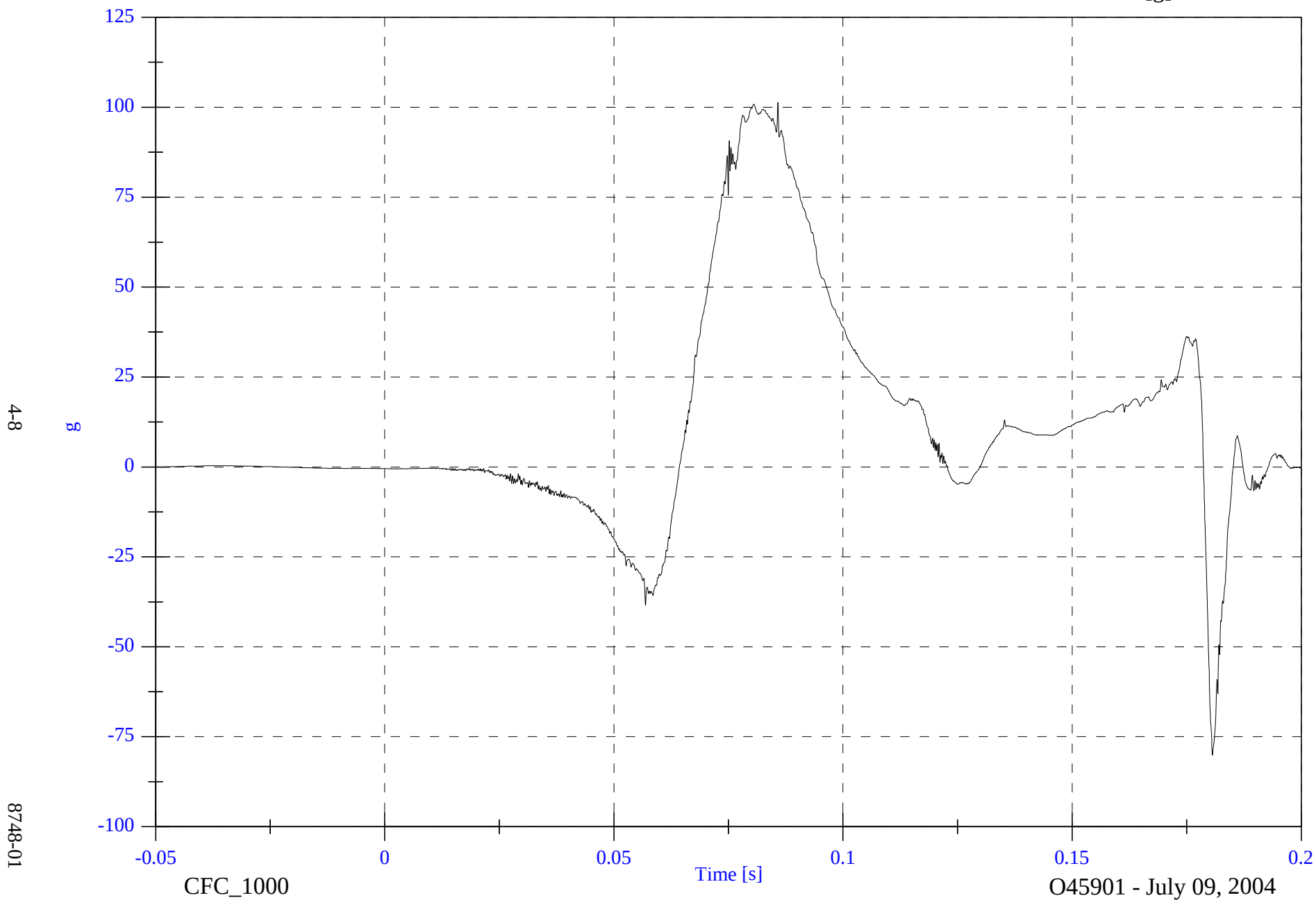


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Head Rear z

Max: 101.3 [g] at 0.086 [s]

Min: -80.1 [g] at 0.181 [s]

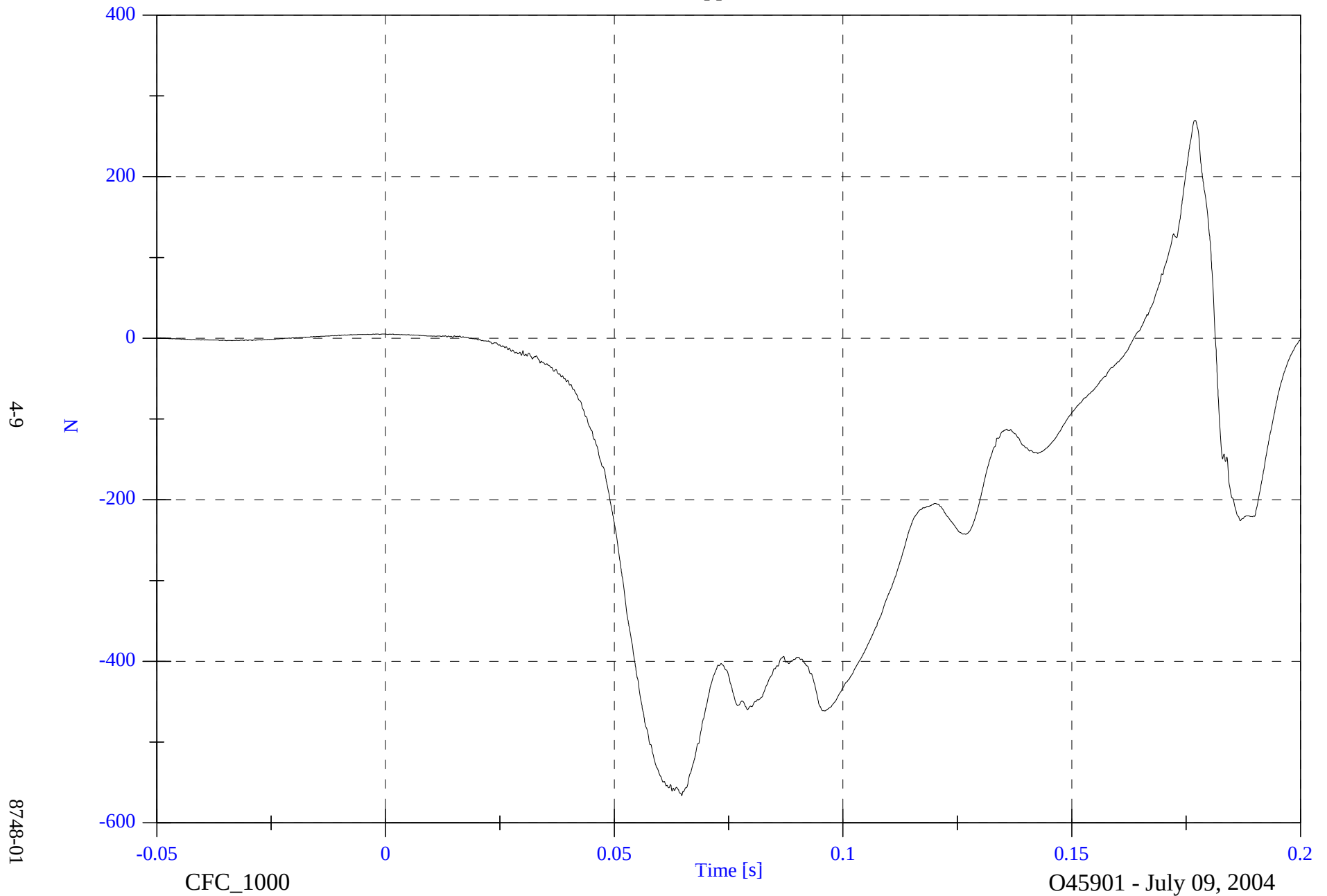


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Upper Neck Fx

Max: 269.6 [N] at 0.177 [s]

Min: -566.2 [N] at 0.065 [s]

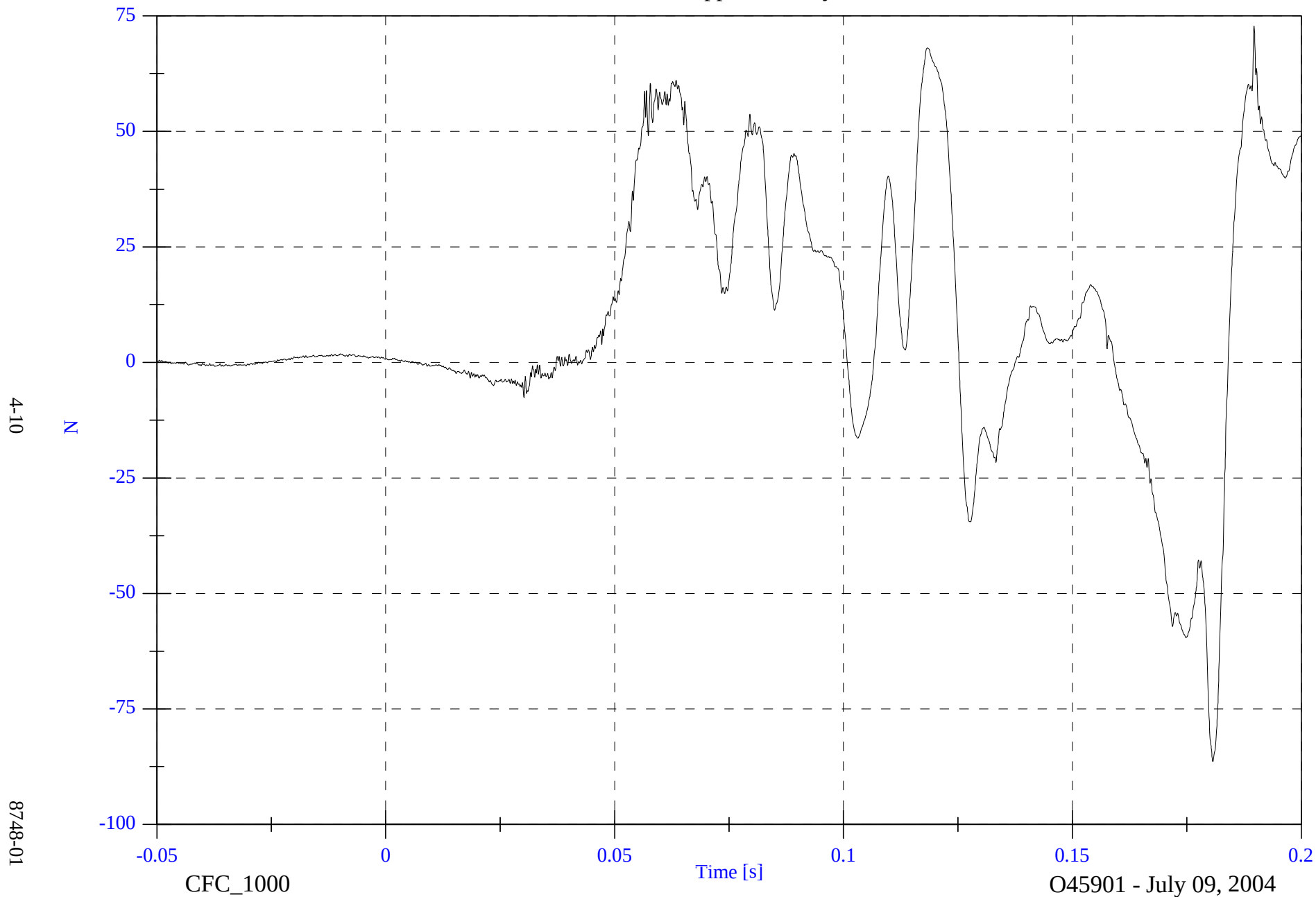


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Upper Neck Fy

Max: 72.8 [N] at 0.190 [s]

Min: -86.4 [N] at 0.181 [s]



4-10

N

8748-01

CFC_1000

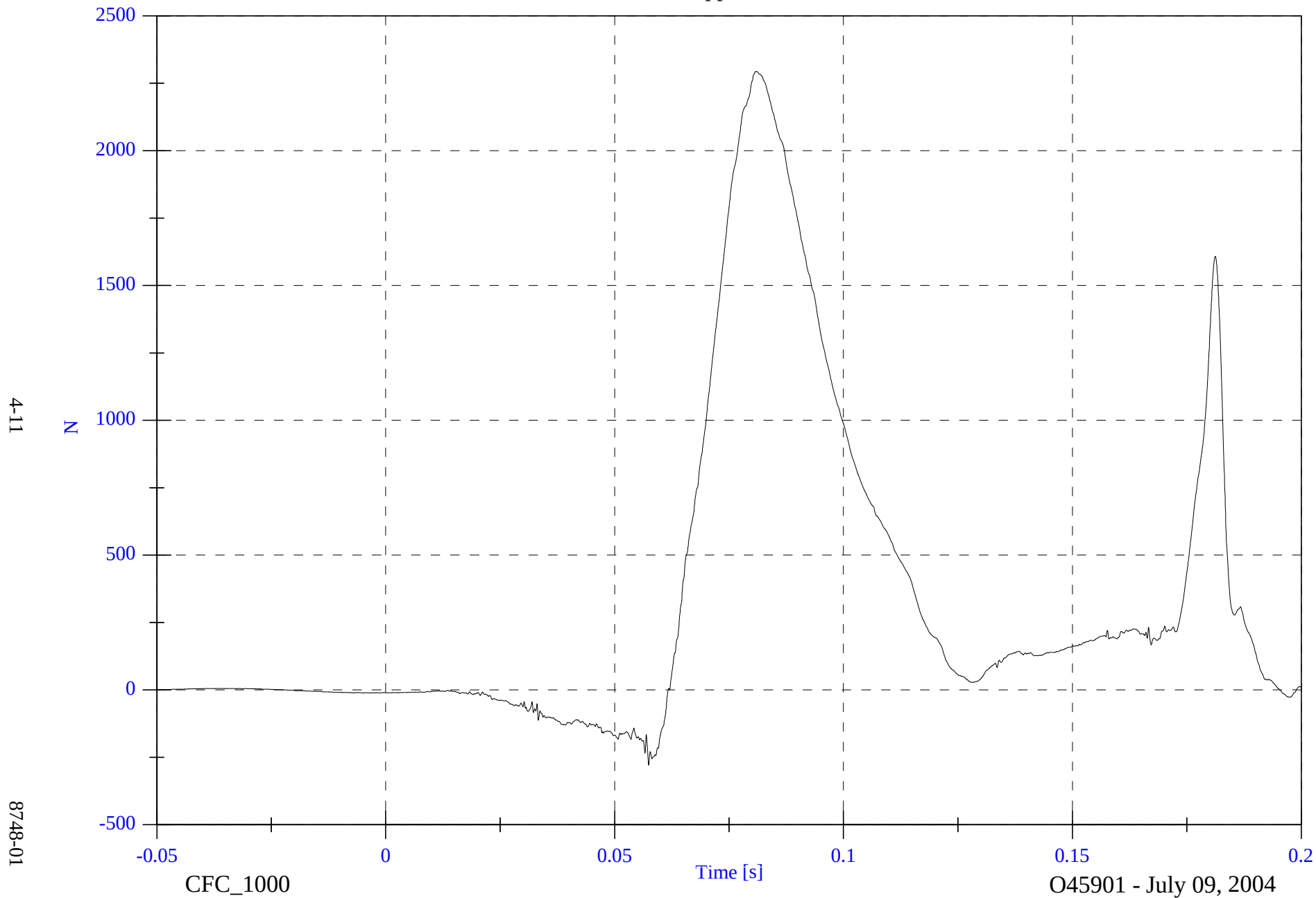
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P3 Upper Neck Fz

Max: 2293.6 [N] at 0.081 [s]

Min: -279.1 [N] at 0.057 [s]

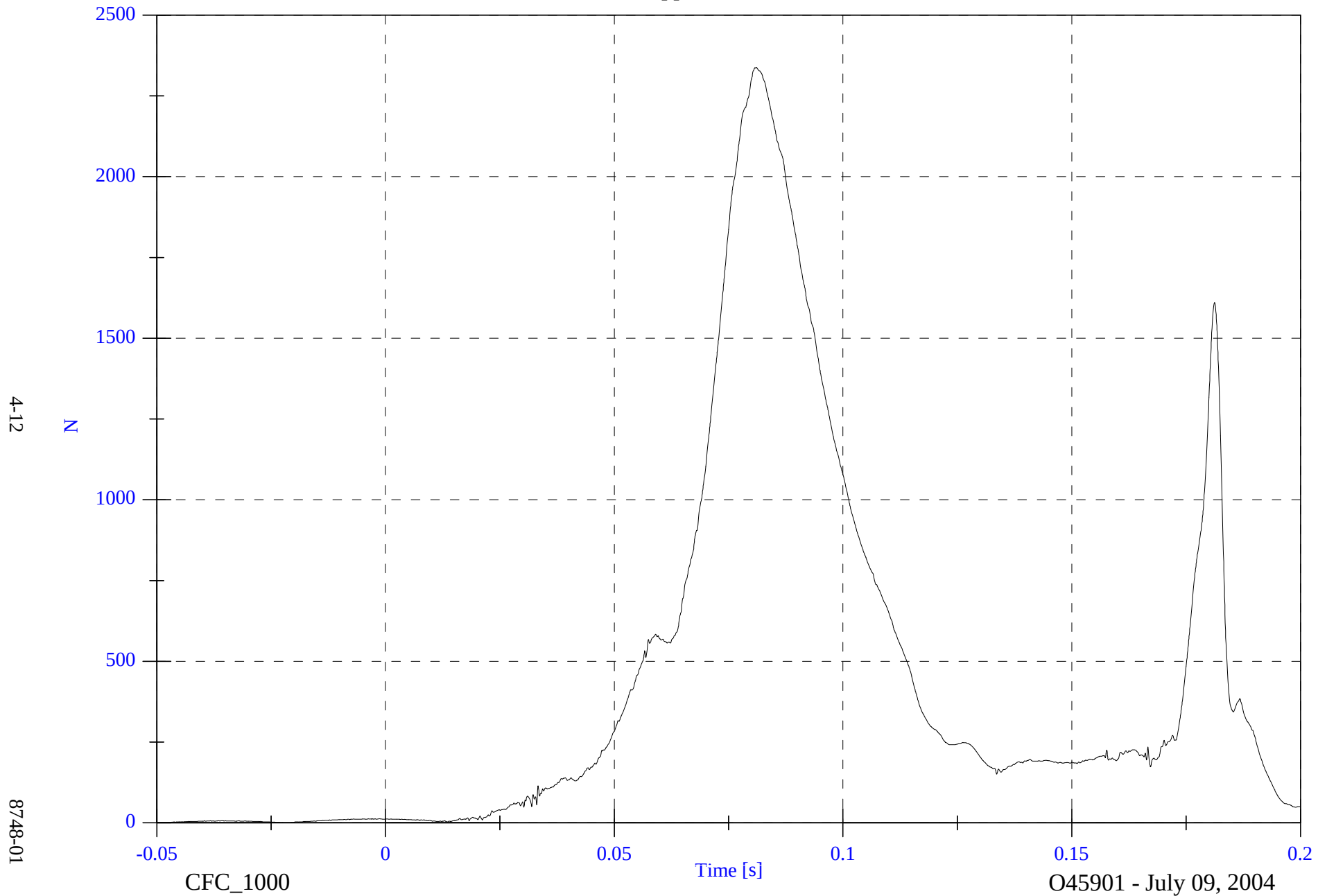


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Upper Neck F Resultant

Max: 2337.6 [N] at 0.081 [s]

Min: 0.4 [N] at -0.049 [s]

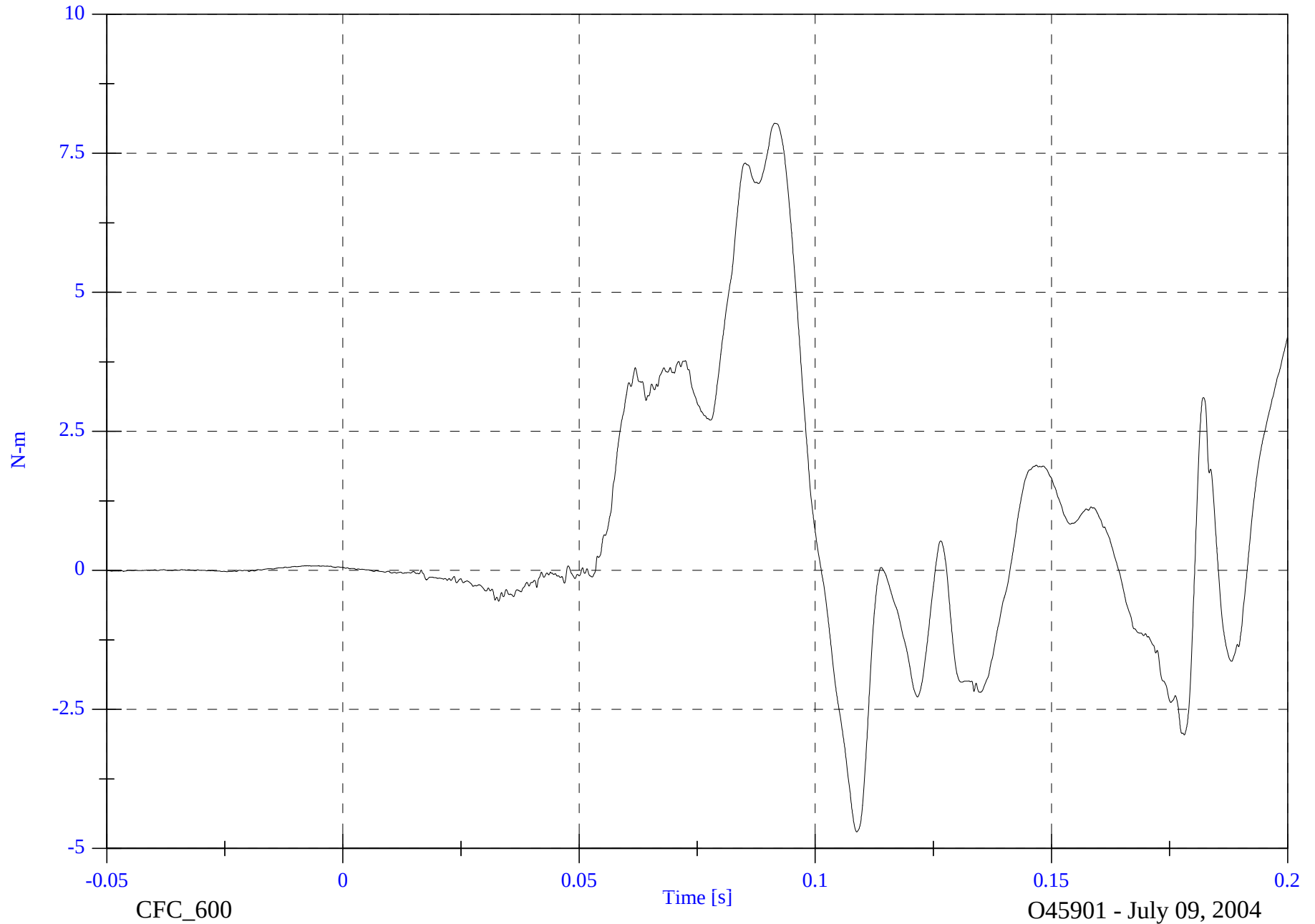


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Upper Neck Mx

Max: 8.0 [N-m] at 0.091 [s]

Min: -4.7 [N-m] at 0.109 [s]



4-13

8748-01

NCAP Optional Test - 2004.5 Volvo S40

V1P3 Upper Neck My

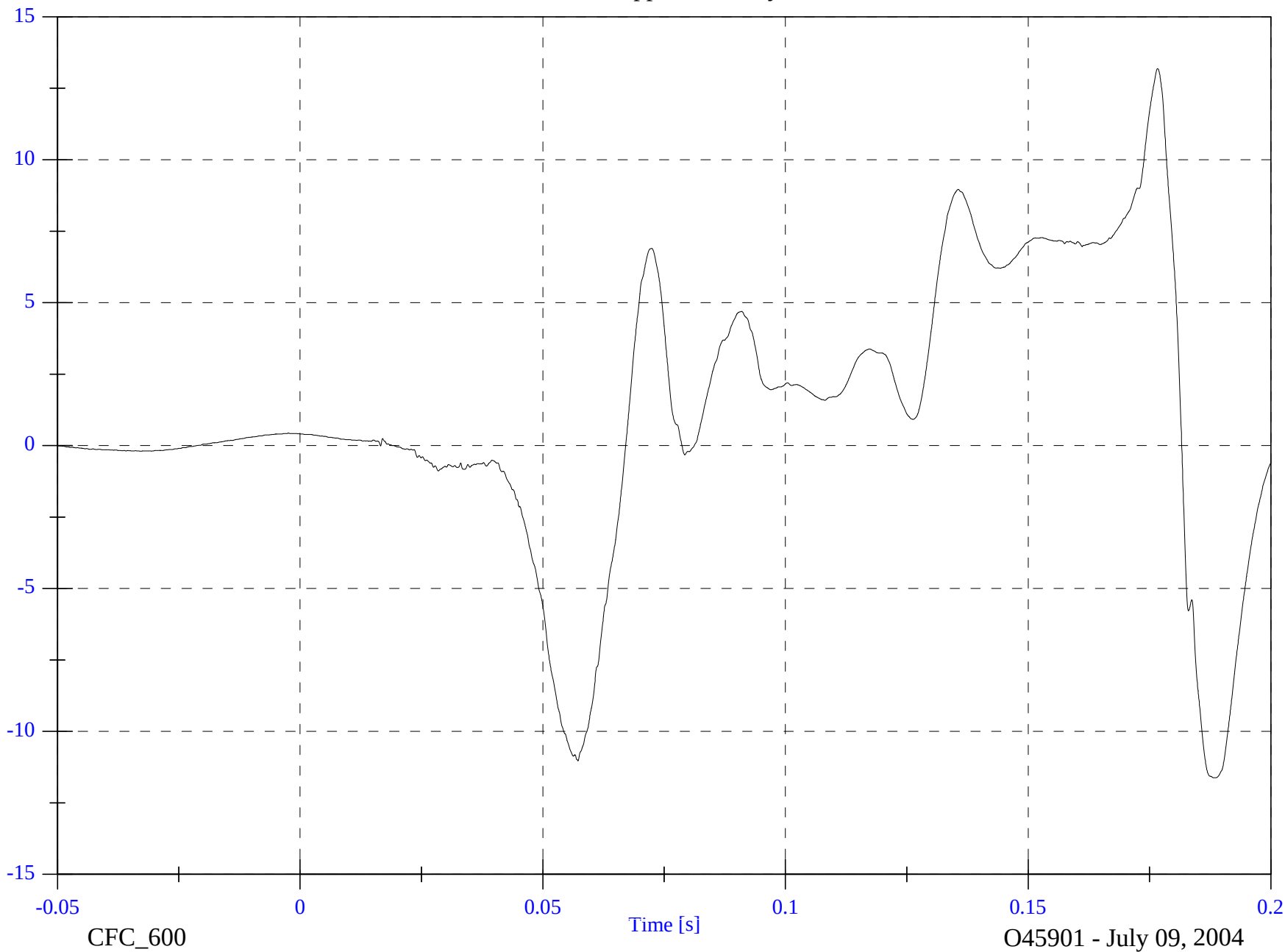
Max: 13.2 [N-m] at 0.177 [s]

Min: -11.6 [N-m] at 0.189 [s]

4-14

N-m

8748-01

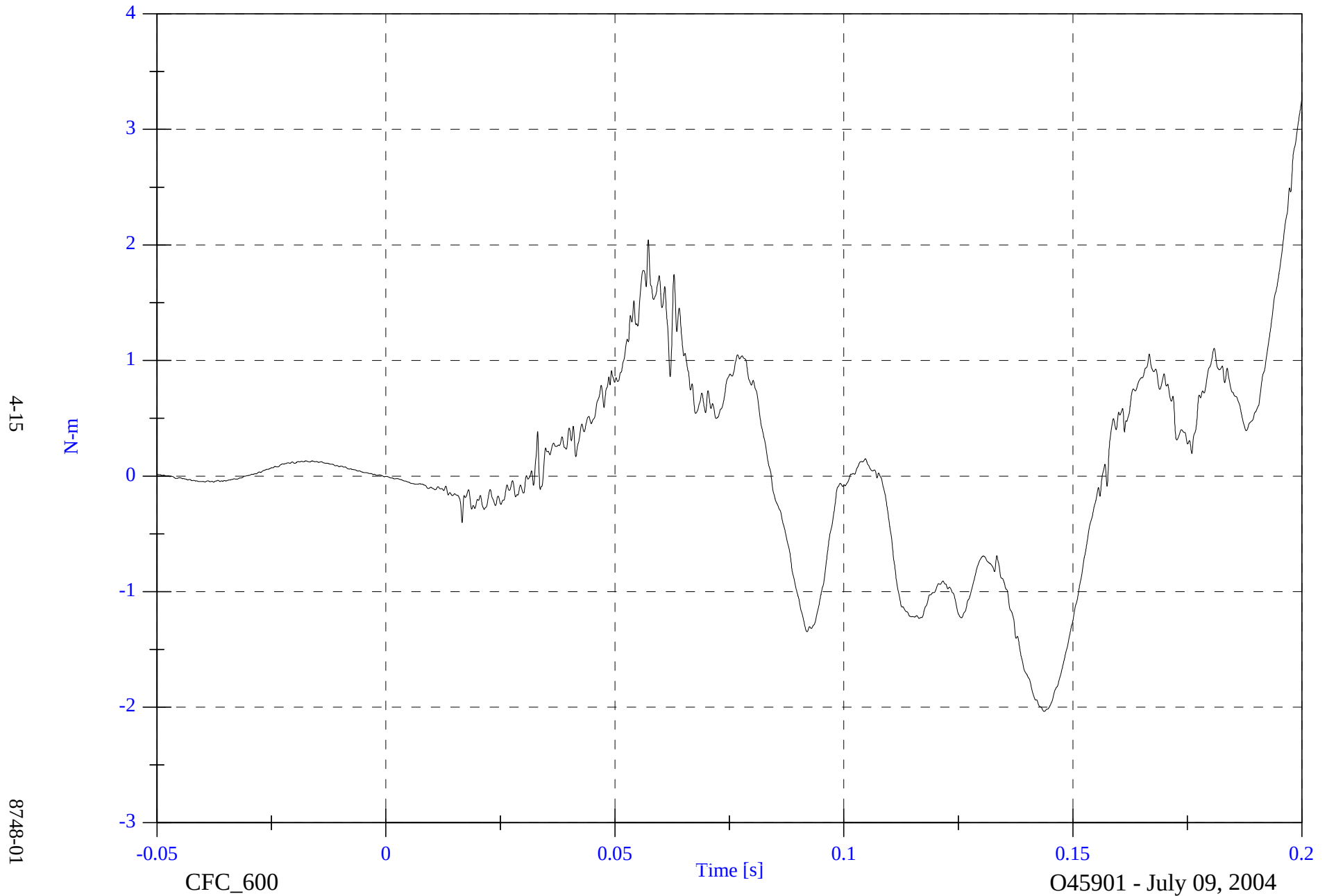


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Upper Neck Mz

Max: 3.3 [N-m] at 0.200 [s]

Min: -2.0 [N-m] at 0.144 [s]

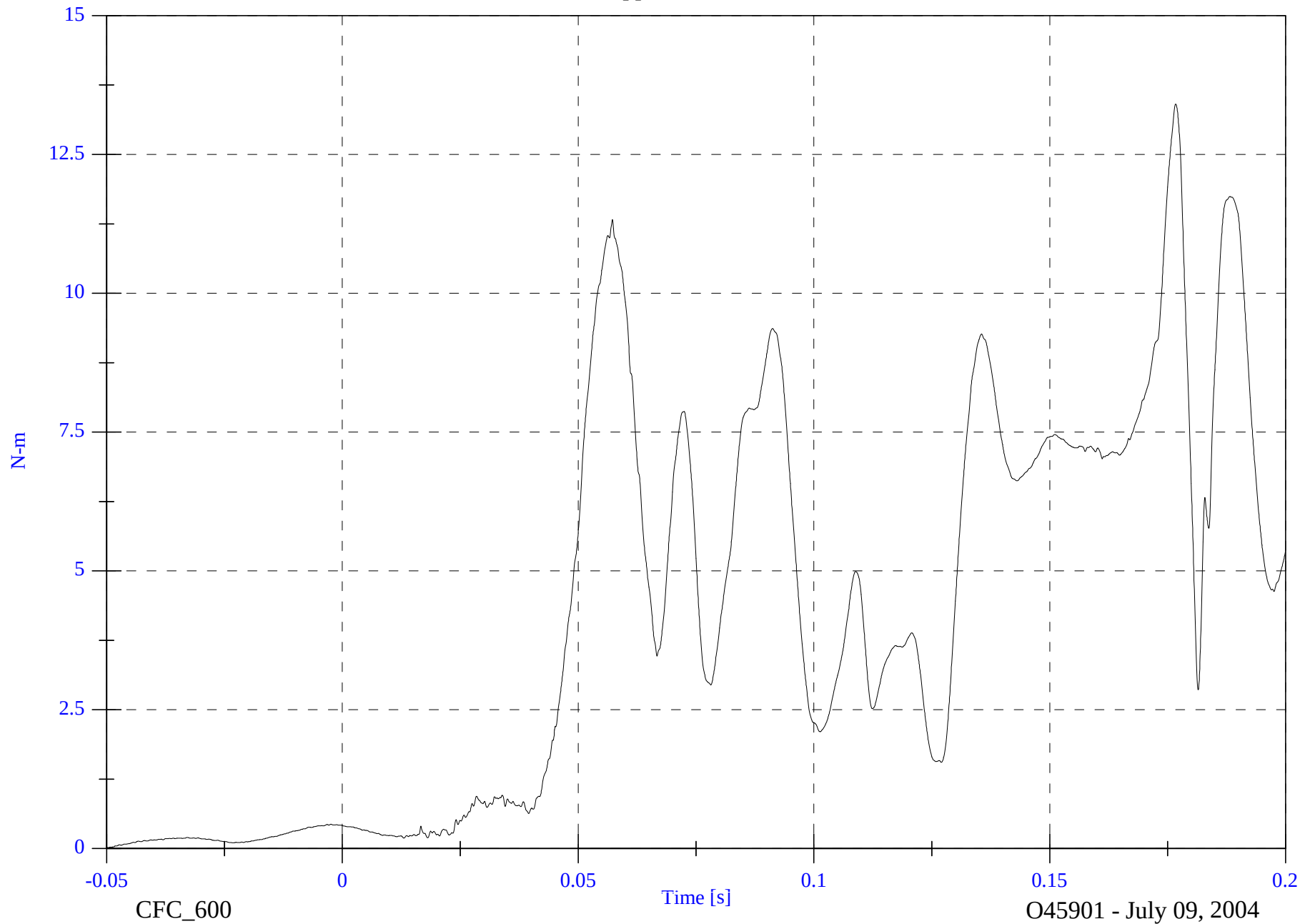


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Upper Neck M Resultant

Max: 13.4 [N-m] at 0.177 [s]

Min: 0.0 [N-m] at -0.050 [s]



4-16

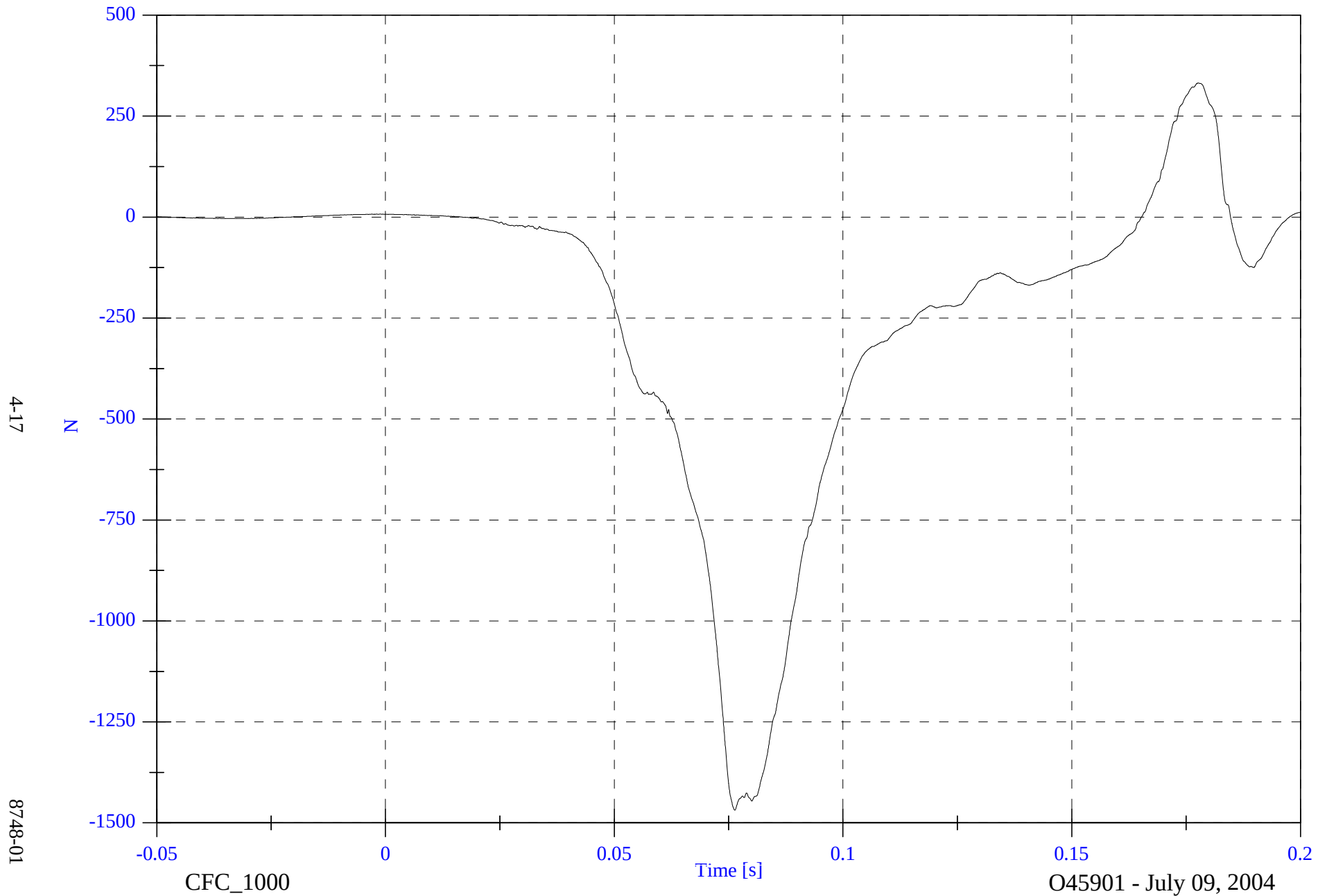
8748-01

NCAP Optional Test - 2004.5 Volvo S40

V1P3 Lower Neck Fx

Max: 331.7 [N] at 0.178 [s]

Min: -1468.8 [N] at 0.076 [s]

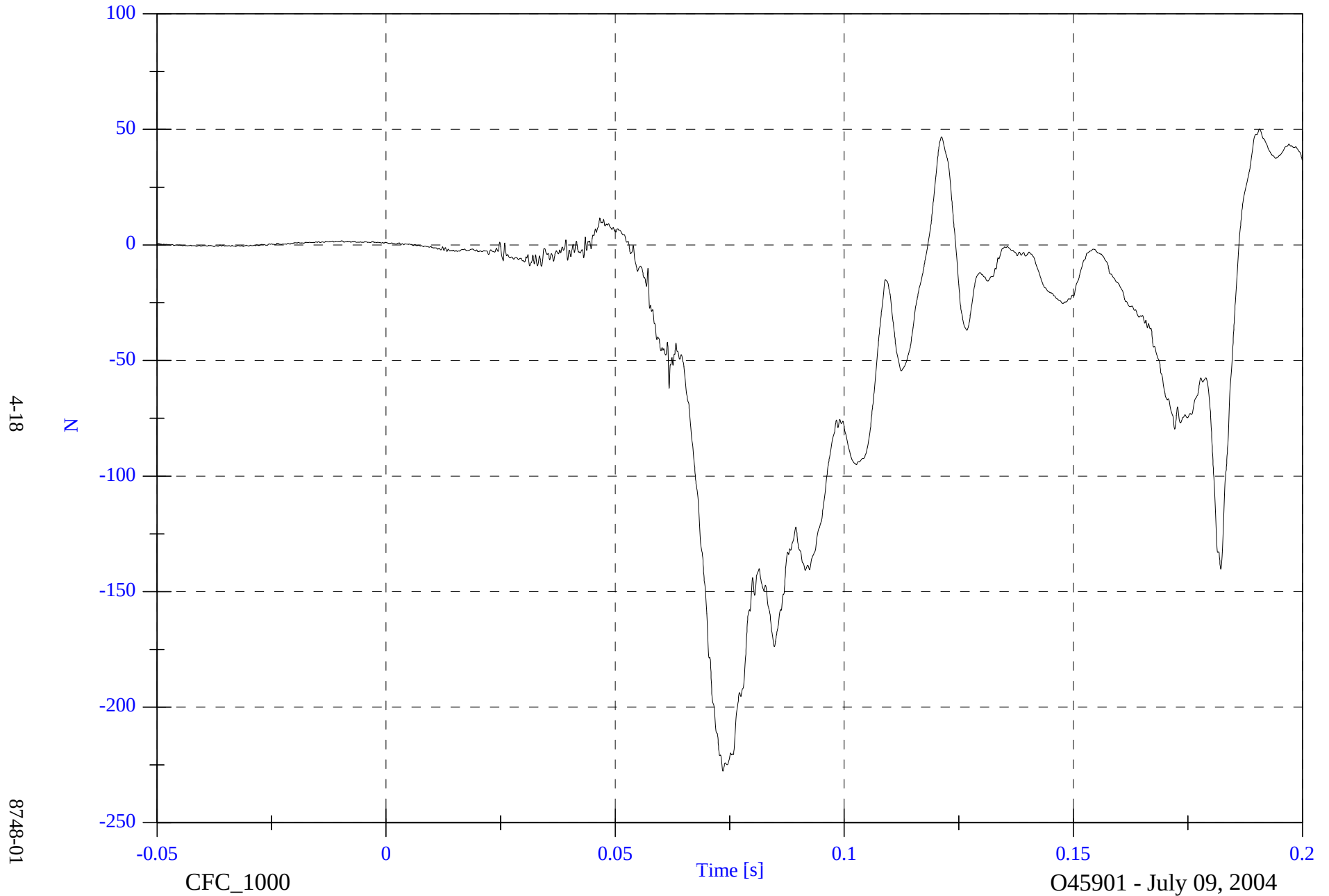


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Lower Neck Fy

Max: 50.1 [N] at 0.191 [s]

Min: -227.7 [N] at 0.073 [s]

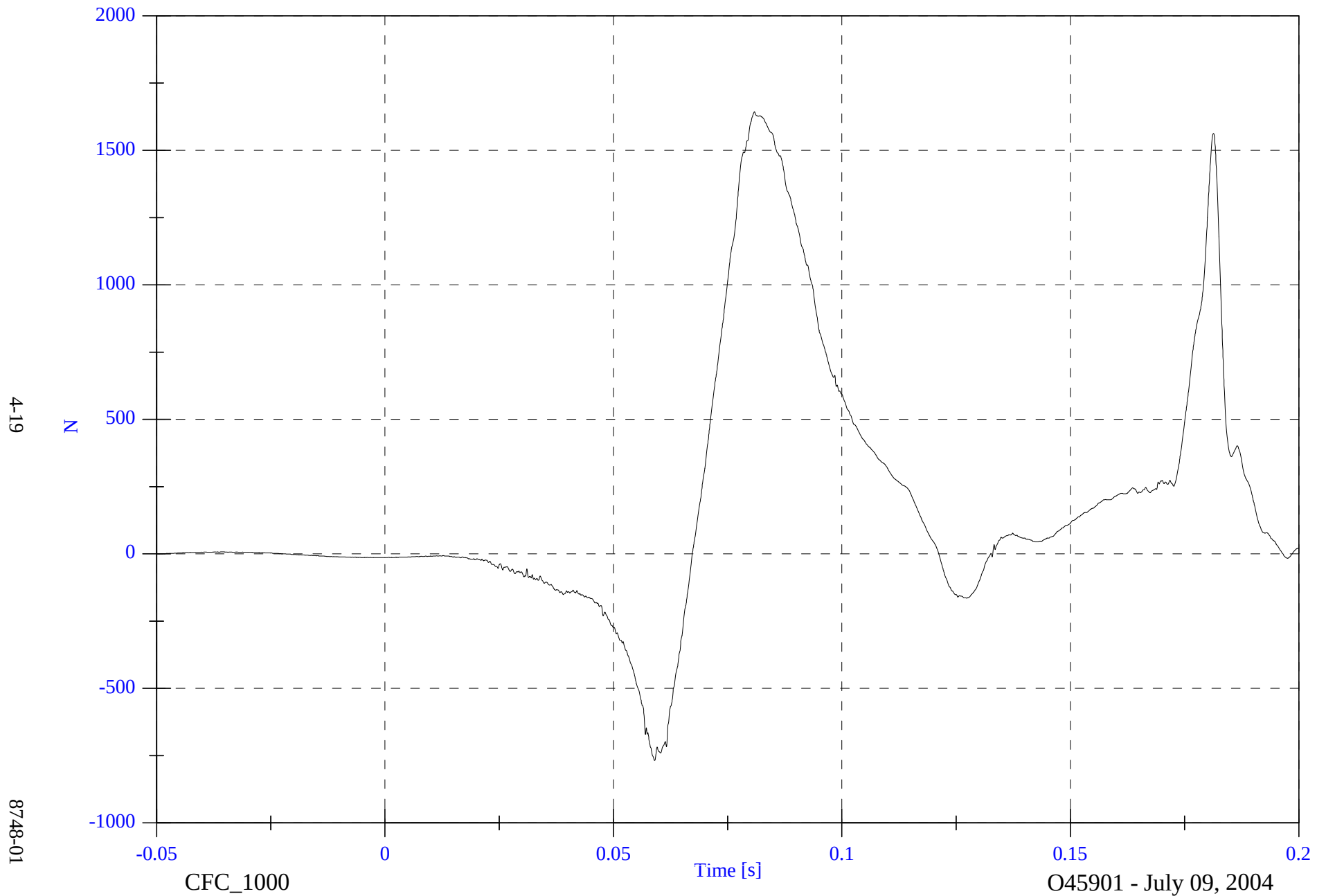


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Lower Neck Fz

Max: 1643.3 [N] at 0.081 [s]

Min: -767.7 [N] at 0.059 [s]



4-19

8748-01

CFC_1000

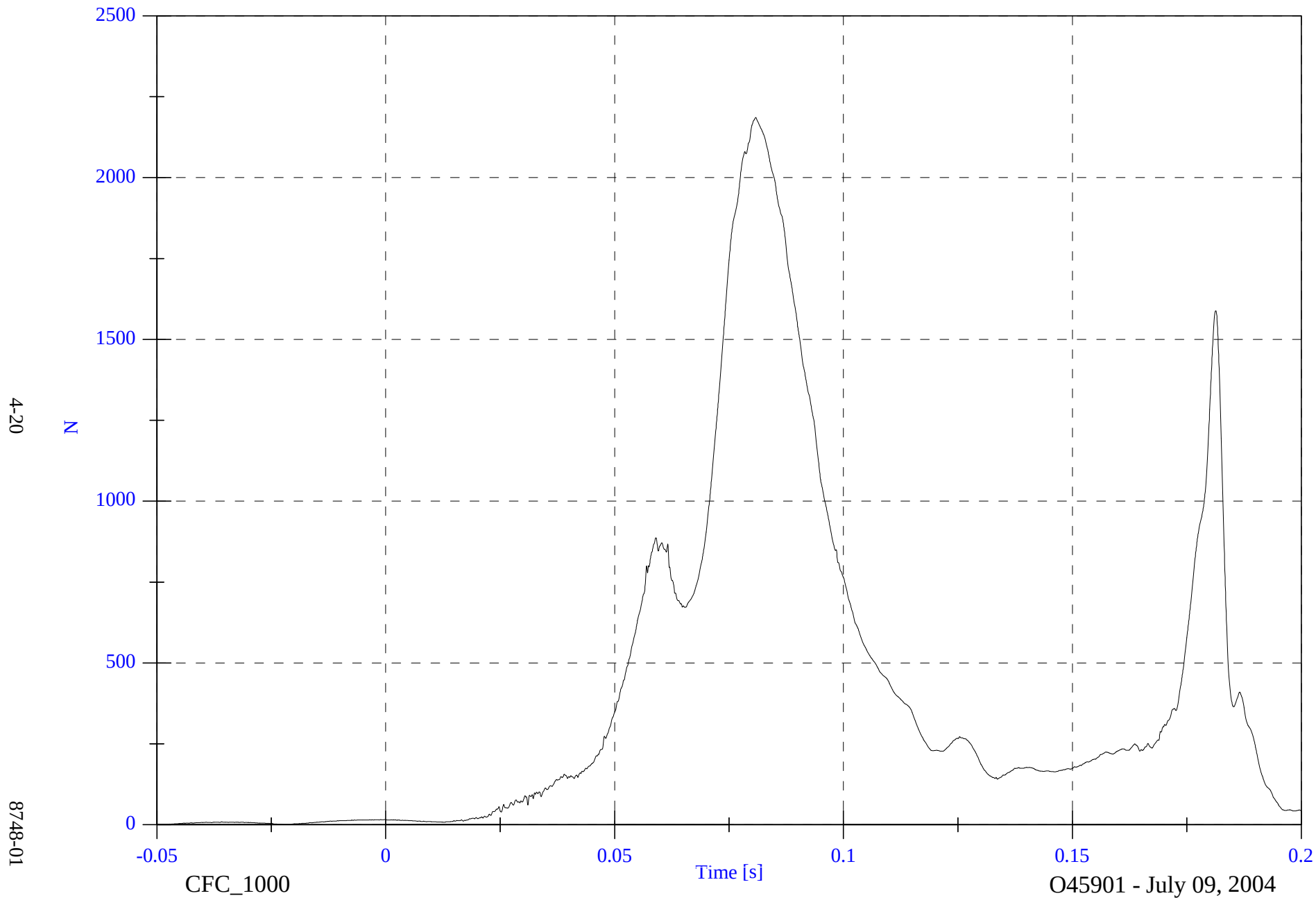
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P3 Lower Neck F Resultant

Max: 2185.9 [N] at 0.081 [s]

Min: 0.4 [N] at -0.049 [s]

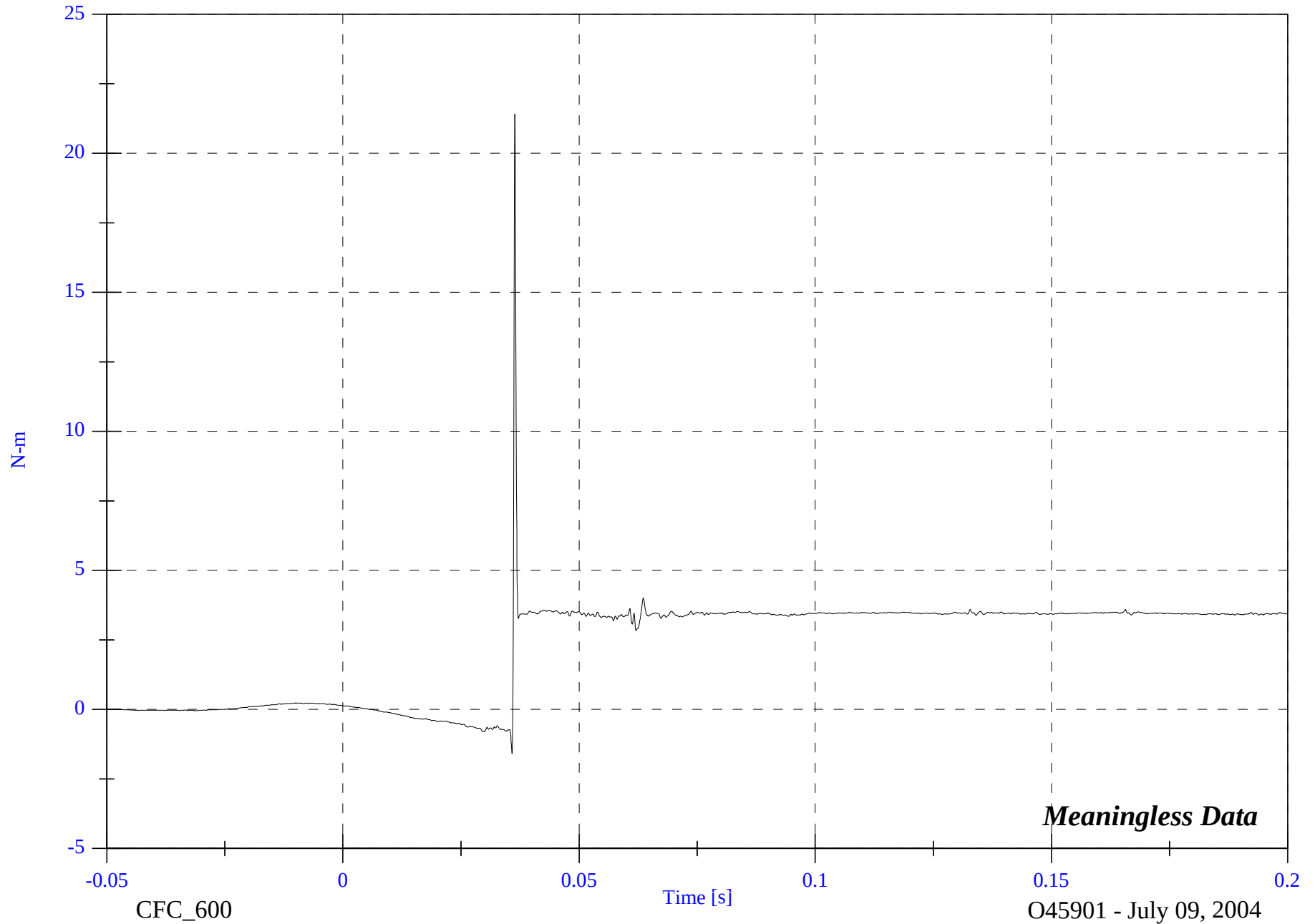


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Lower Neck Mx

Max: 21.4 [N-m] at 0.036 [s]

Min: -1.6 [N-m] at 0.036 [s]

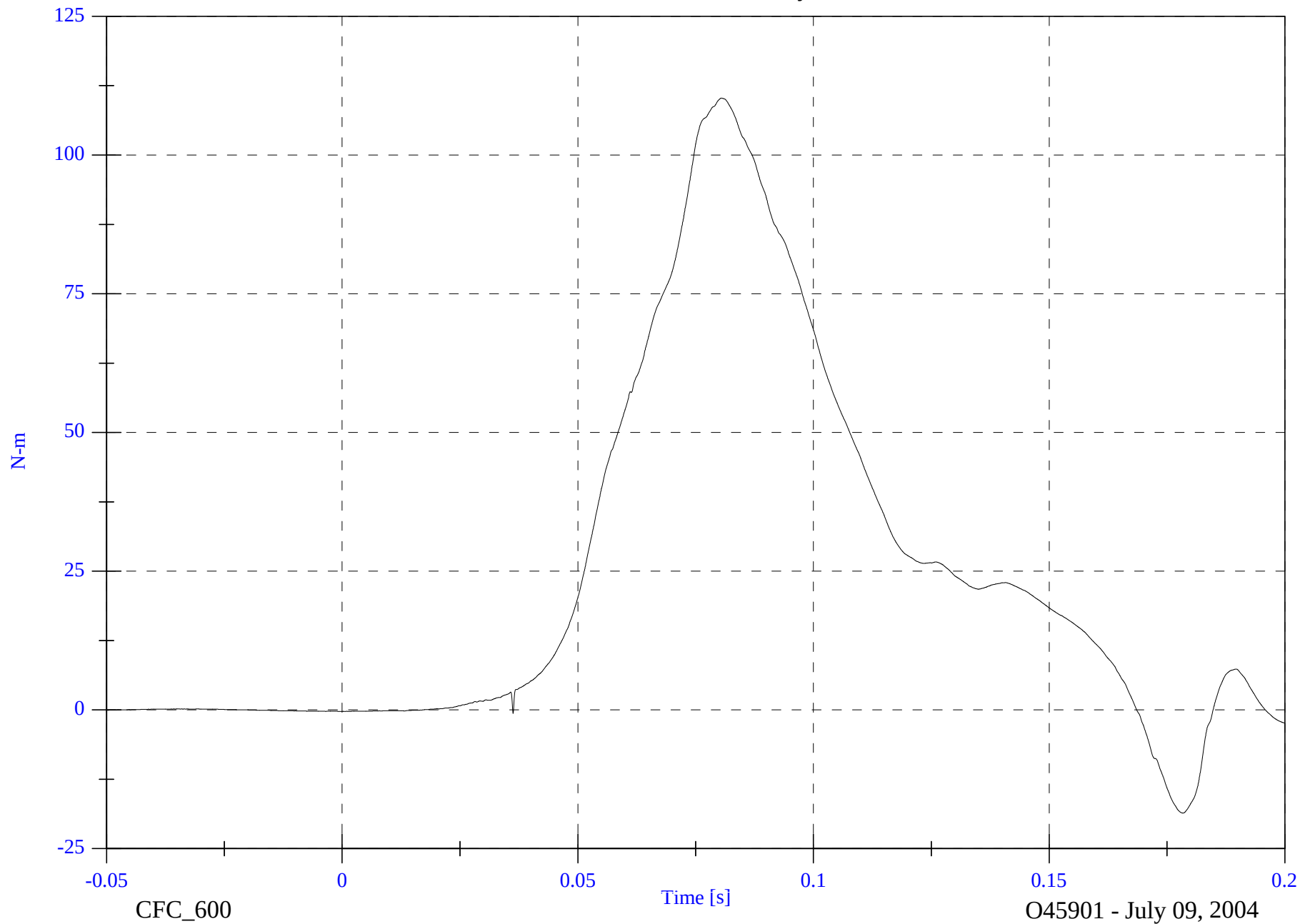


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Lower Neck My

Max: 110.3 [N-m] at 0.080 [s]

Min: -18.6 [N-m] at 0.178 [s]



4-22

8748-01

CFC_600

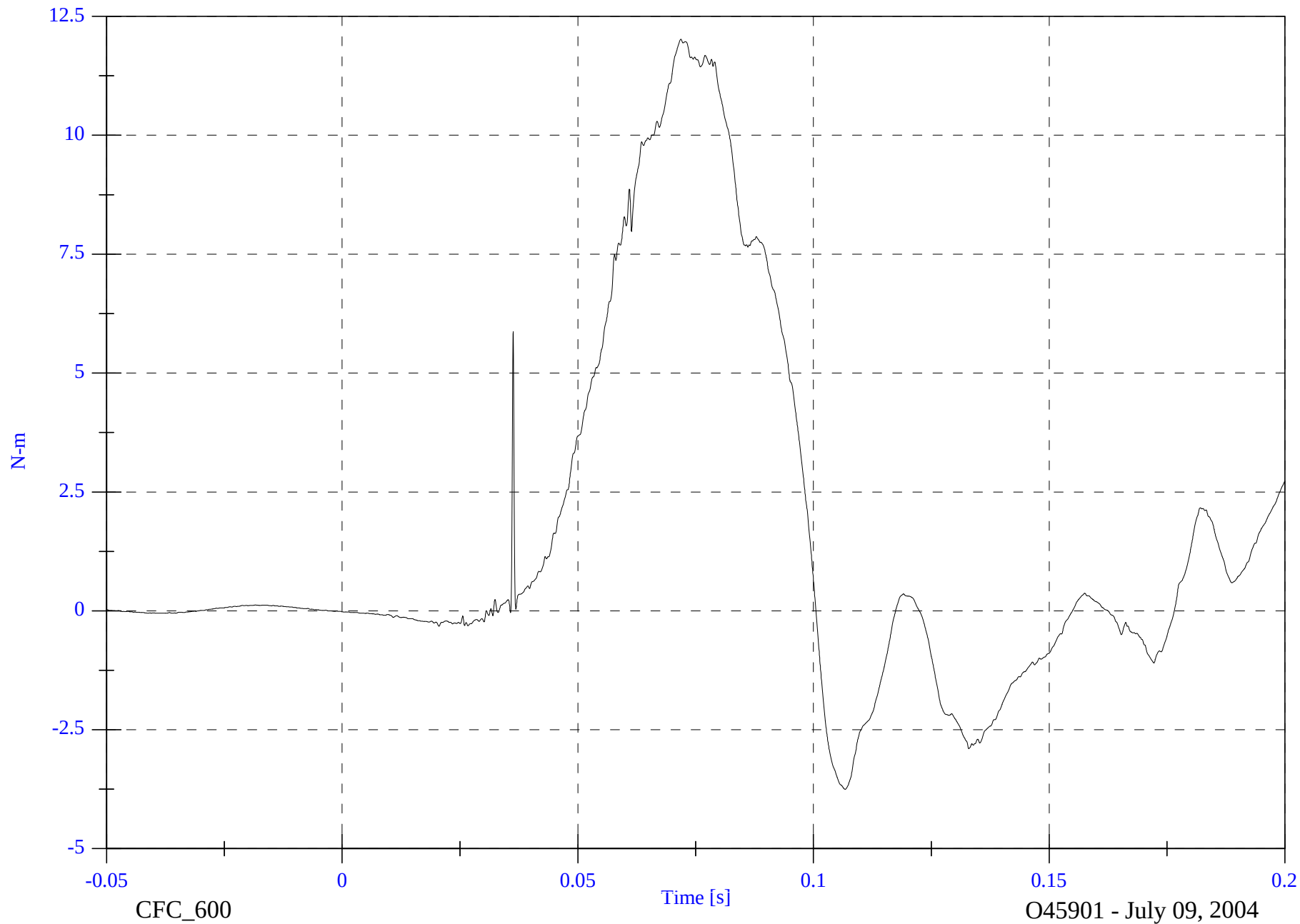
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P3 Lower Neck Mz

Max: 12.0 [N-m] at 0.072 [s]

Min: -3.8 [N-m] at 0.107 [s]



4-23

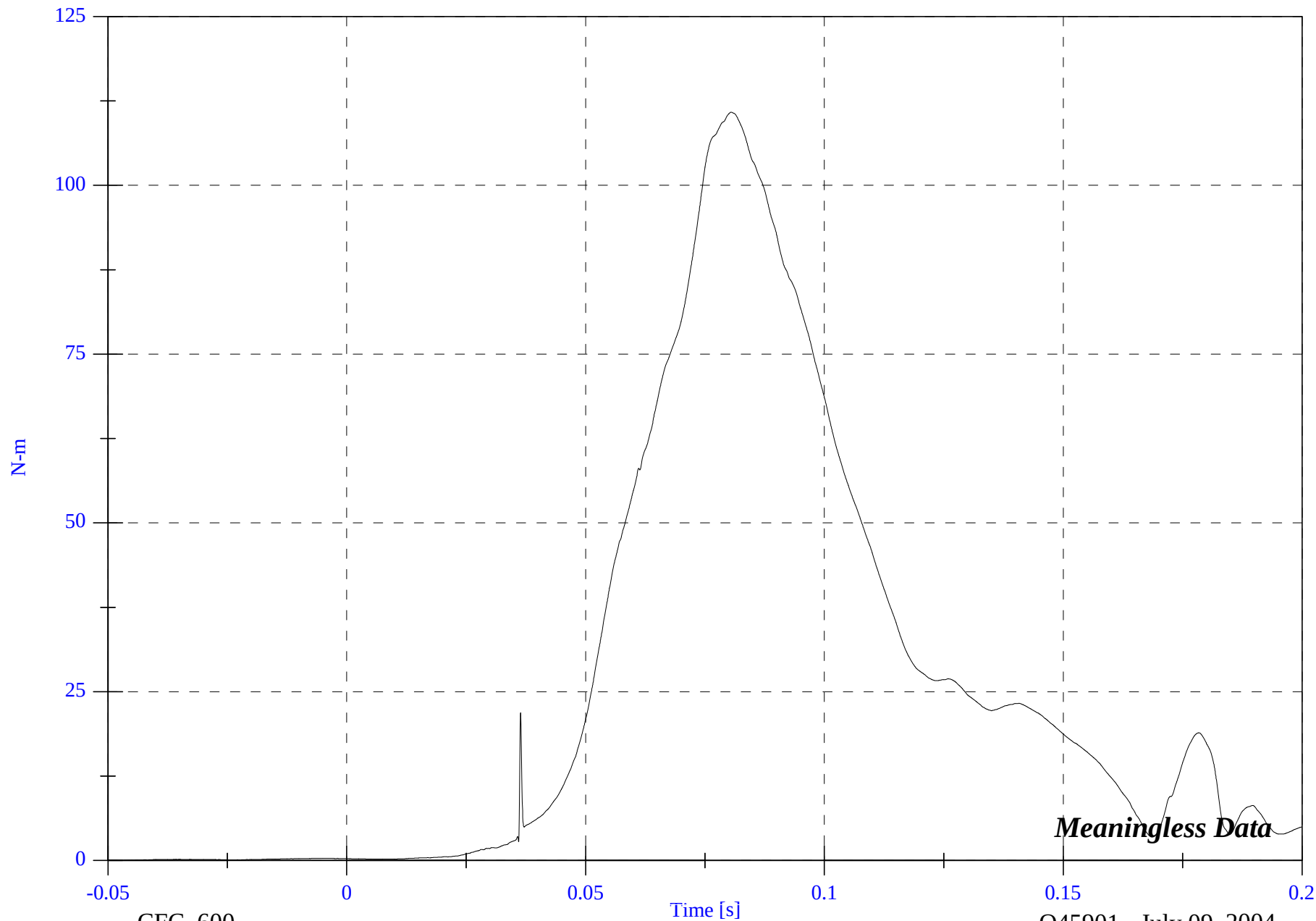
8748-01

NCAP Optional Test - 2004.5 Volvo S40

V1P3 Lower Neck M Resultant

Max: 110.8 [N-m] at 0.080 [s]

Min: 0.0 [N-m] at -0.047 [s]



4-24

8748-01

CFC_600

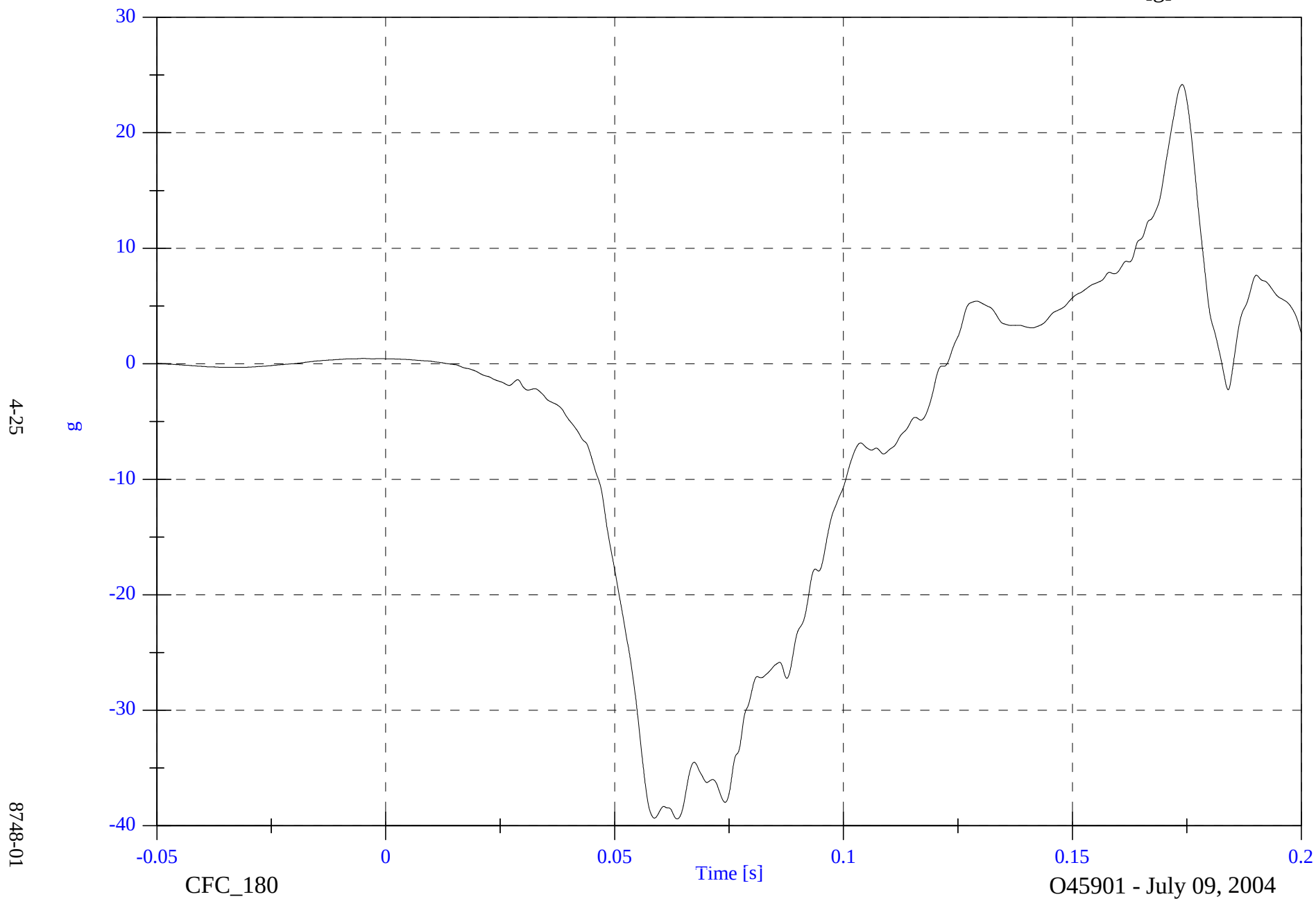
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P3 Chest x

Max: 24.2 [g] at 0.174 [s]

Min: -39.4 [g] at 0.064 [s]

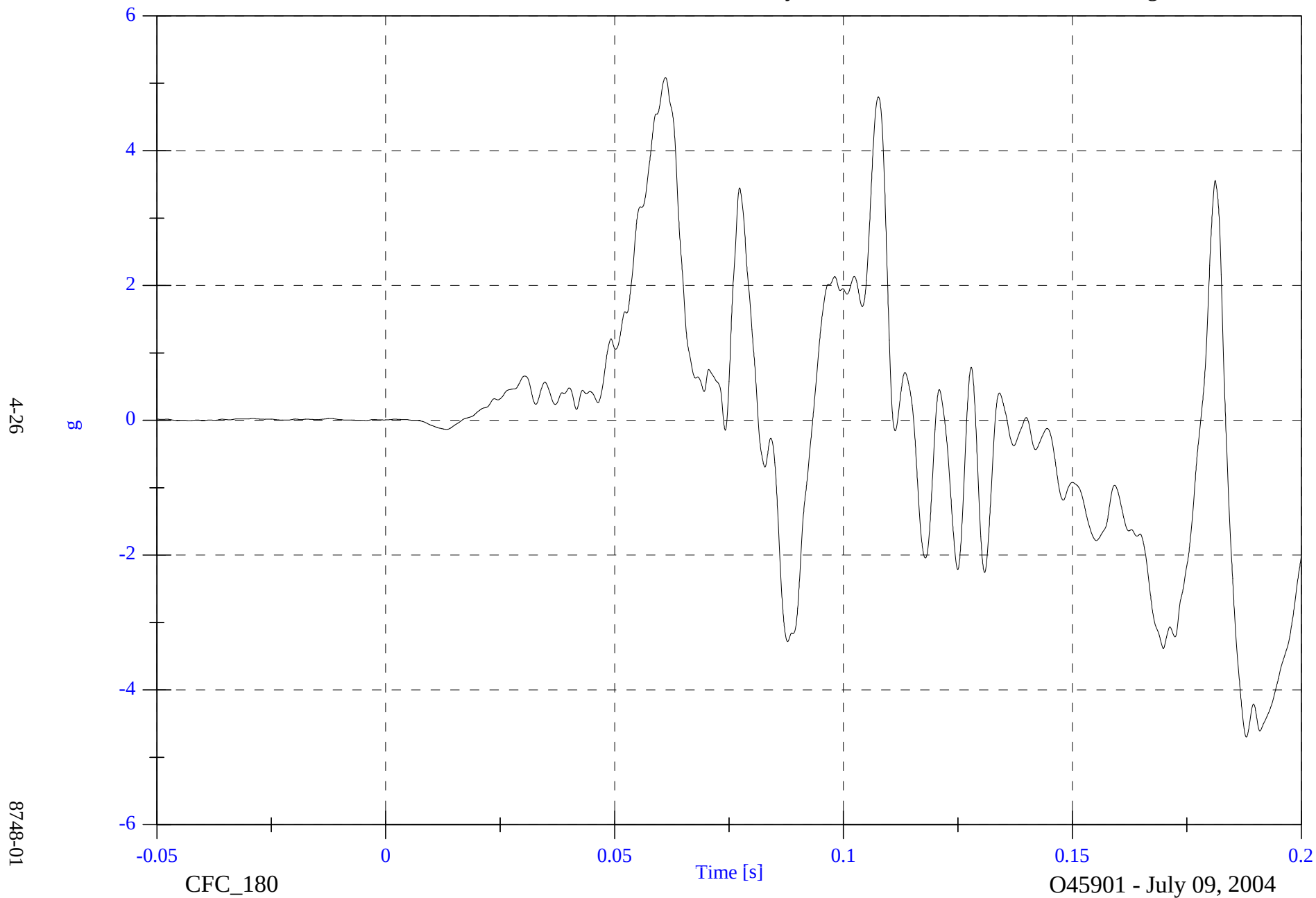


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Chest y

Max: 5.1 [g] at 0.061 [s]

Min: -4.7 [g] at 0.188 [s]

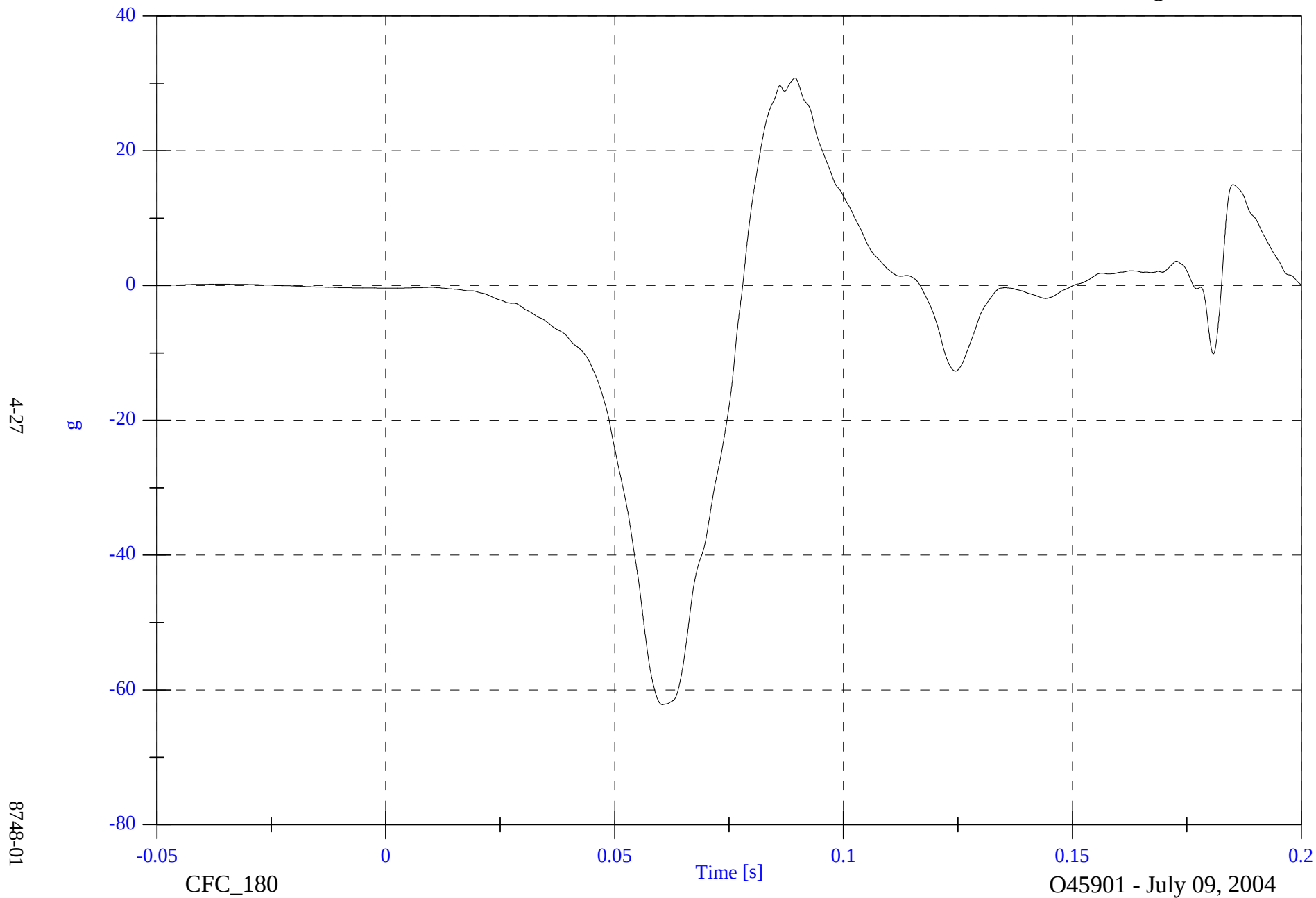


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Chest z

Max: 30.8 [g] at 0.089 [s]

Min: -62.2 [g] at 0.060 [s]



NCAP Optional Test - 2004.5 Volvo S40

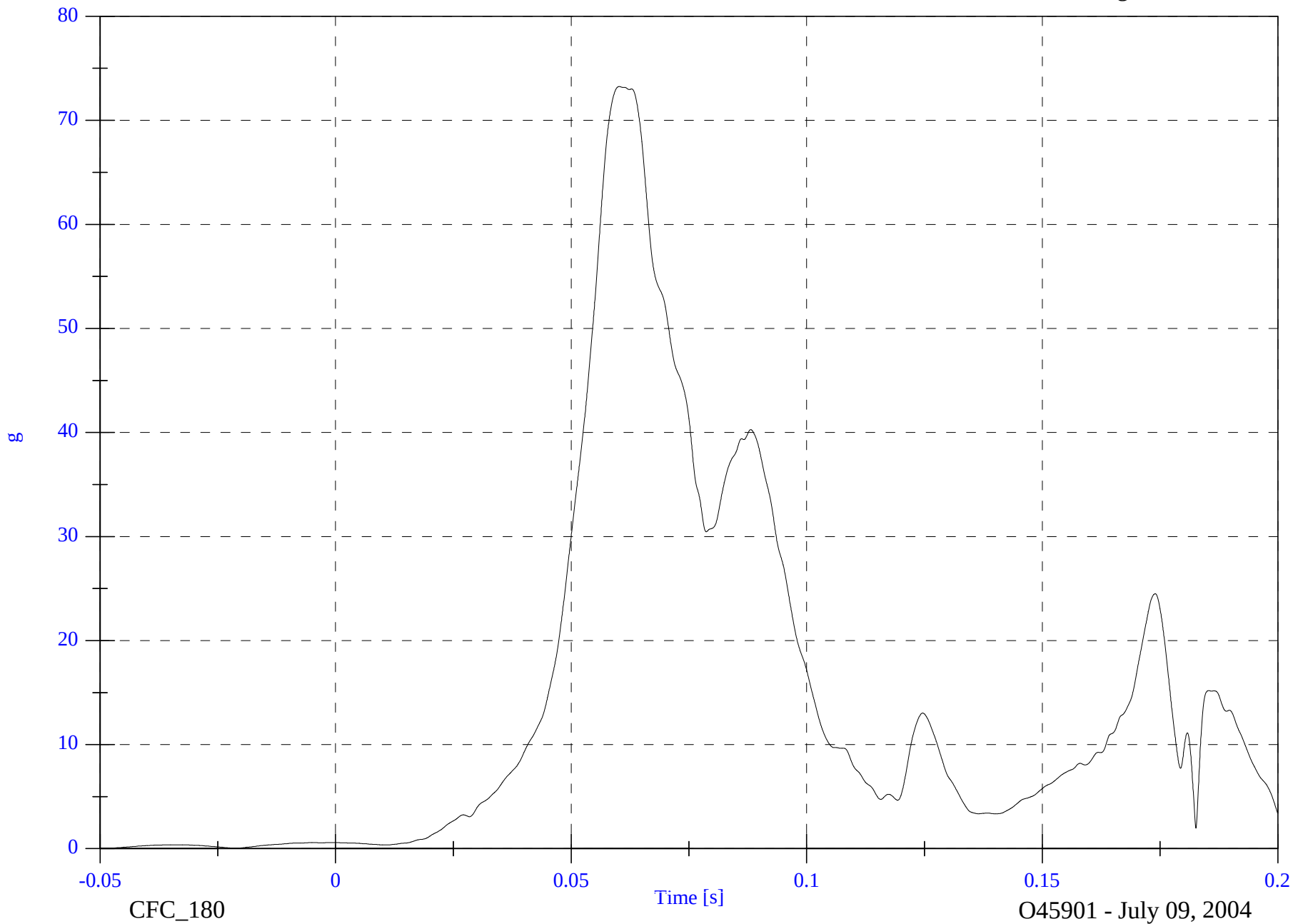
V1P3 Chest Resultant

Max: 73.3 [g] at 0.060 [s]

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

4-28

8748-01

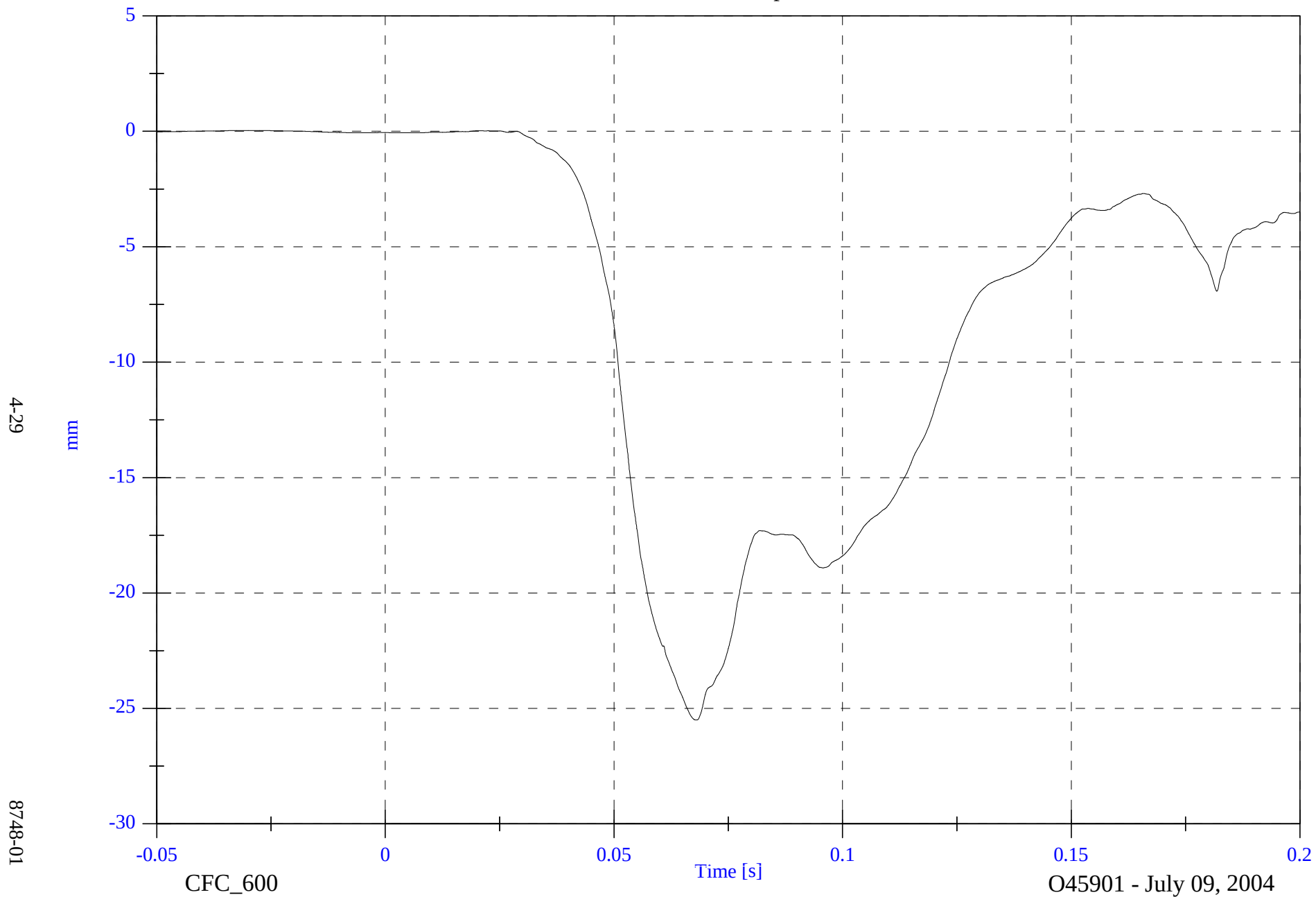


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Chest Compression

Max: 0.0 [mm] at -0.031 [s]

Min: -25.5 [mm] at 0.068 [s]

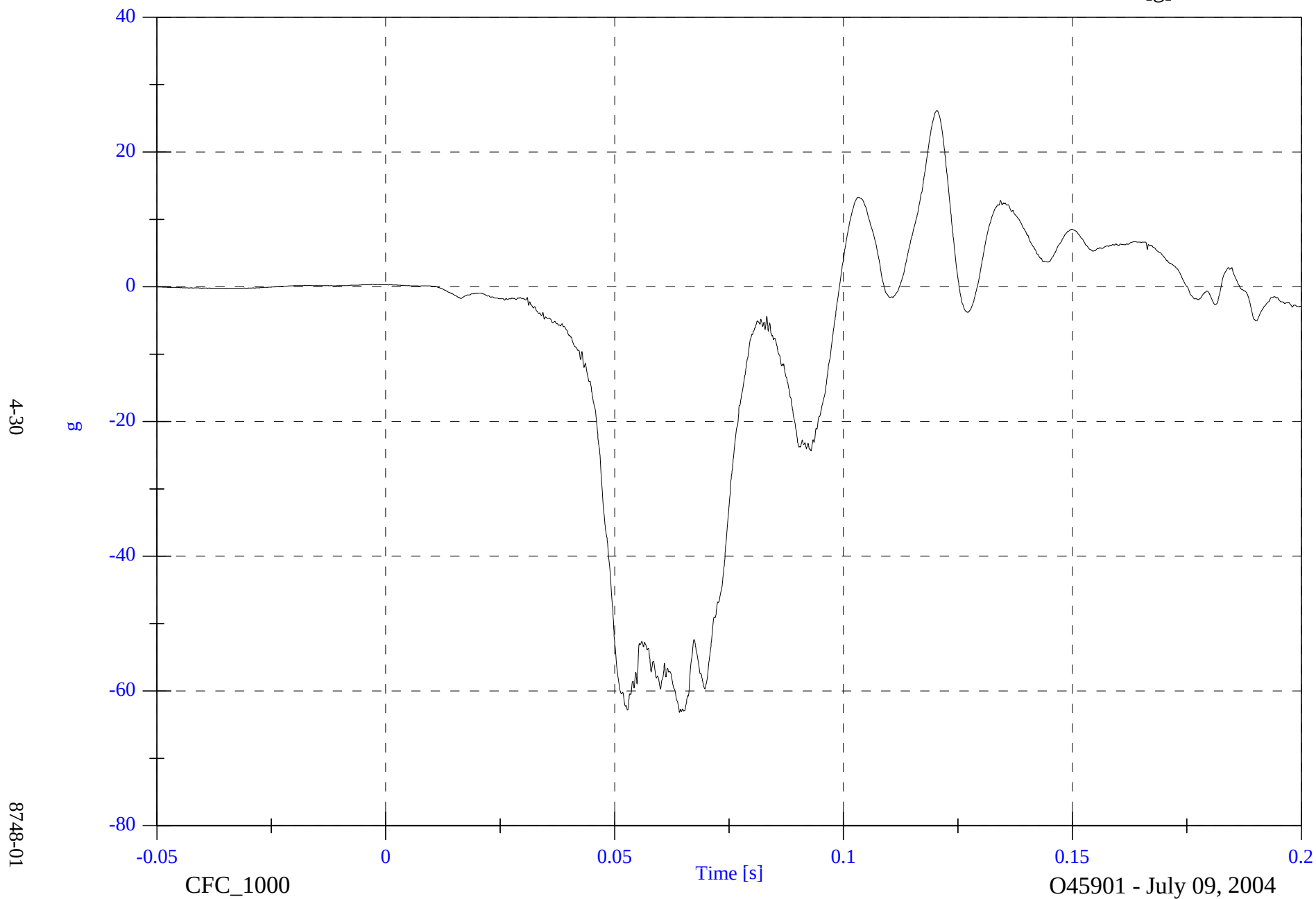


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Pelvic x

Max: 26.1 [g] at 0.120 [s]

Min: -63.2 [g] at 0.064 [s]



NCAP Optional Test - 2004.5 Volvo S40

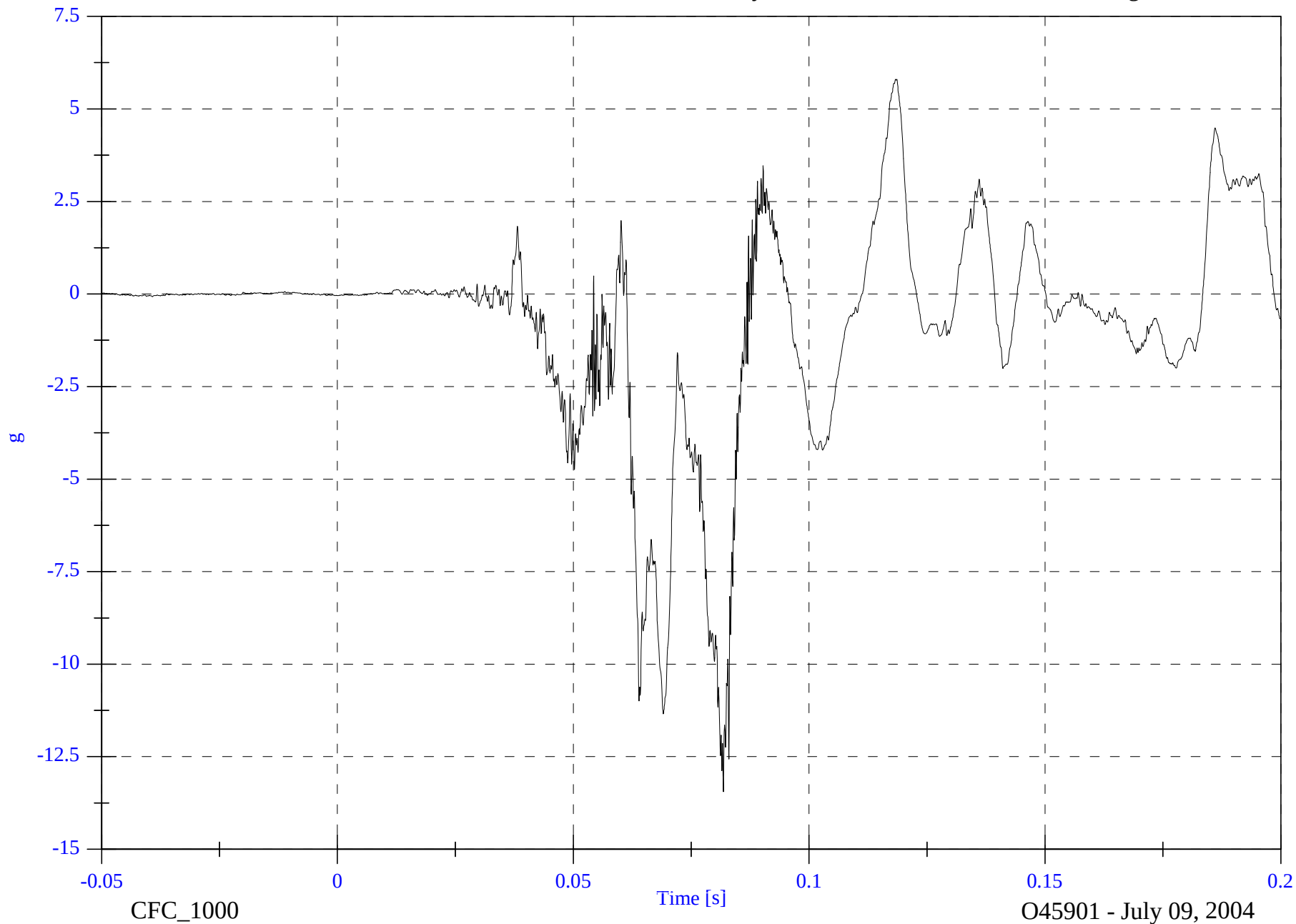
V1P3 Pelvic y

Max: 5.8 [g] at 0.118 [s]

Min: -13.4 [g] at 0.082 [s]

4-31

8748-01



NCAP Optional Test - 2004.5 Volvo S40

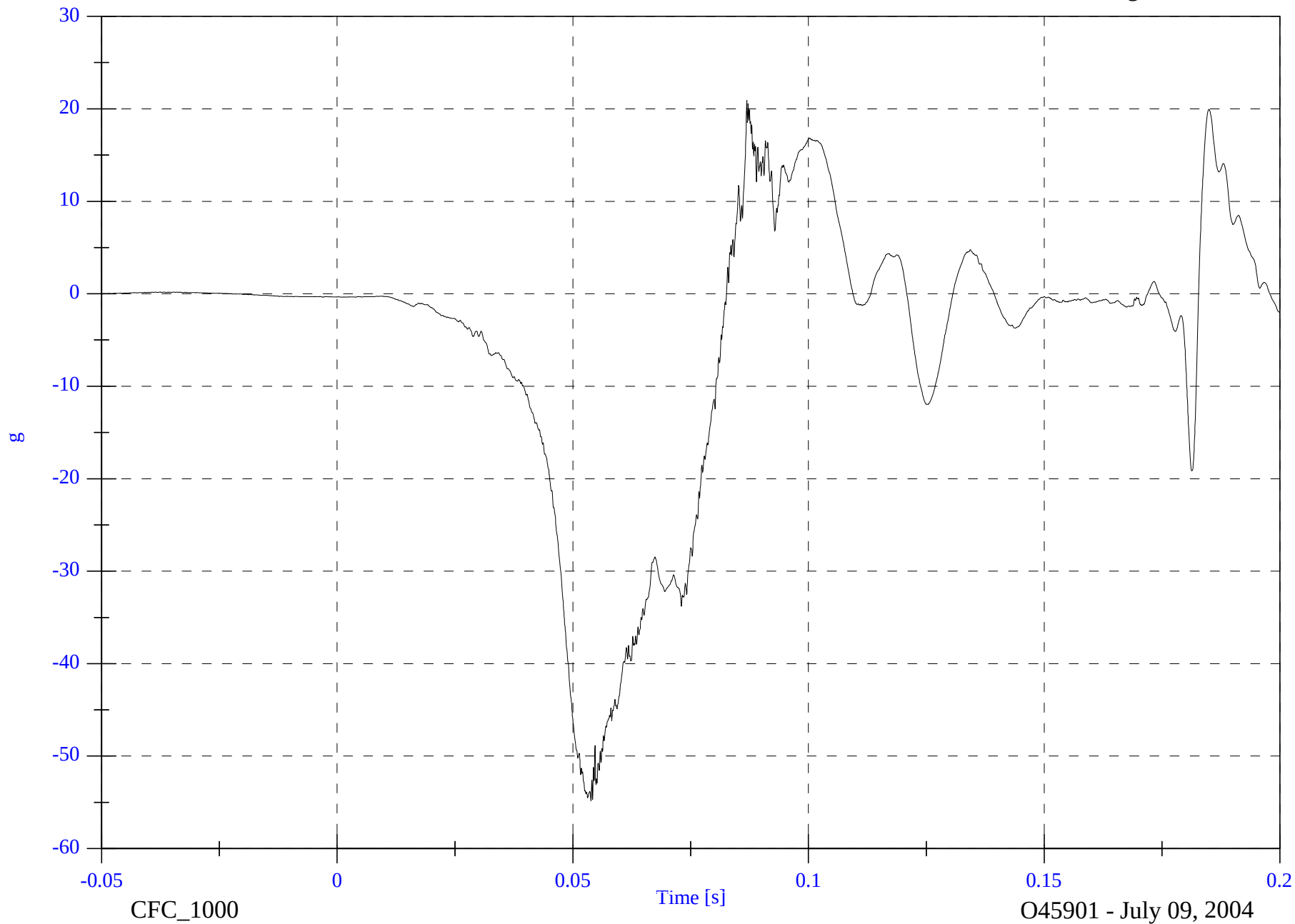
V1P3 Pelvic z

Max: 20.9 [g] at 0.087 [s]

Min: -54.8 [g] at 0.054 [s]

4-32

8748-01

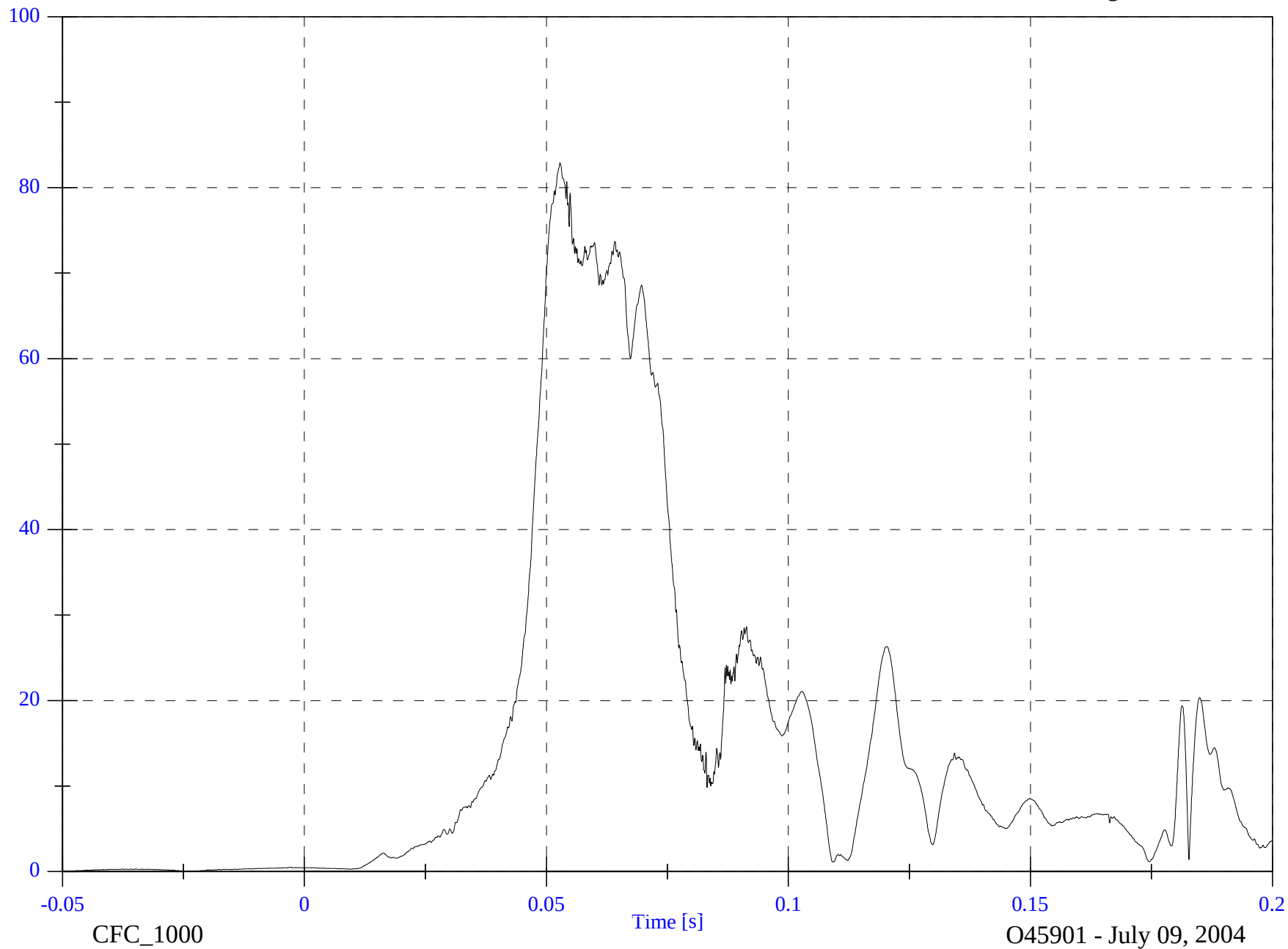


NCAP Optional Test - 2004.5 Volvo S40

V1P3 Pelvic Resultant

Max: 82.9 [g] at 0.053 [s]

Min: 0.0 [g] at -0.050 [s]



4-33

8748-01

NCAP Optional Test - 2004.5 Volvo S40

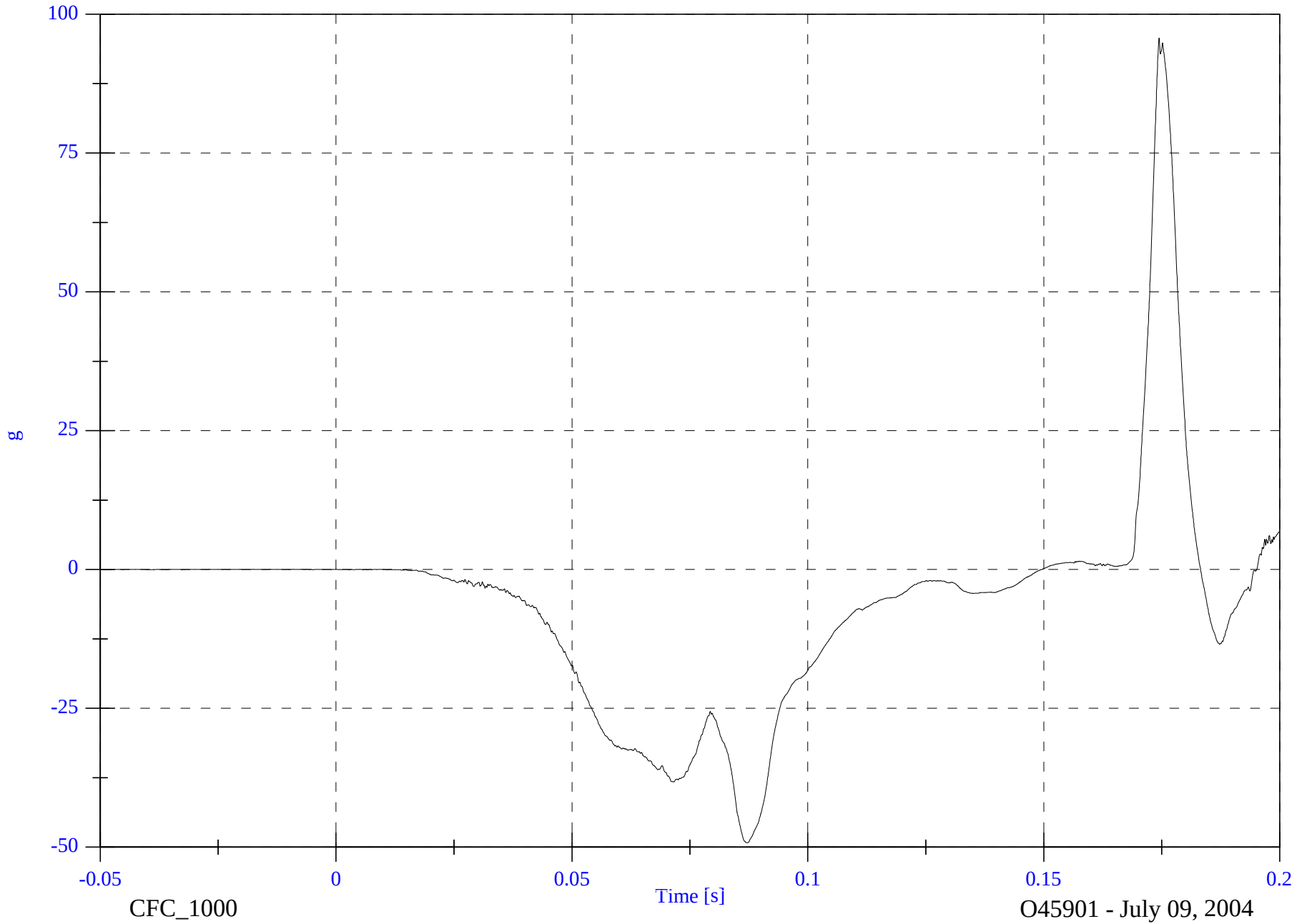
V1P4 Head x

Max: 95.7 [g] at 0.174 [s]

Min: -49.2 [g] at 0.087 [s]

4-34

8748-01



NCAP Optional Test - 2004.5 Volvo S40

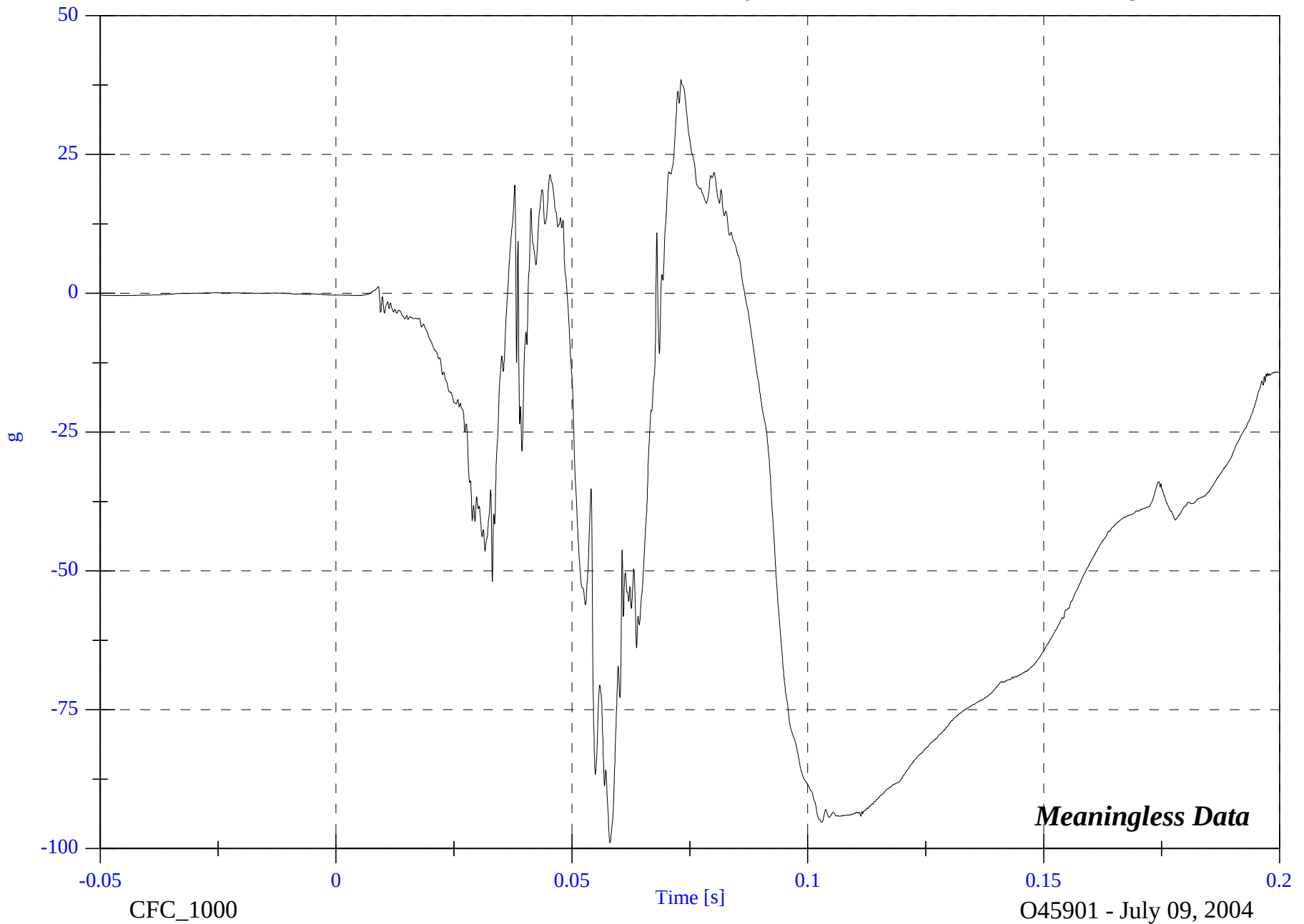
V1P4 Head y

Max: 38.5 [g] at 0.073 [s]

Min: -98.9 [g] at 0.058 [s]

4-35

8748-01



NCAP Optional Test - 2004.5 Volvo S40

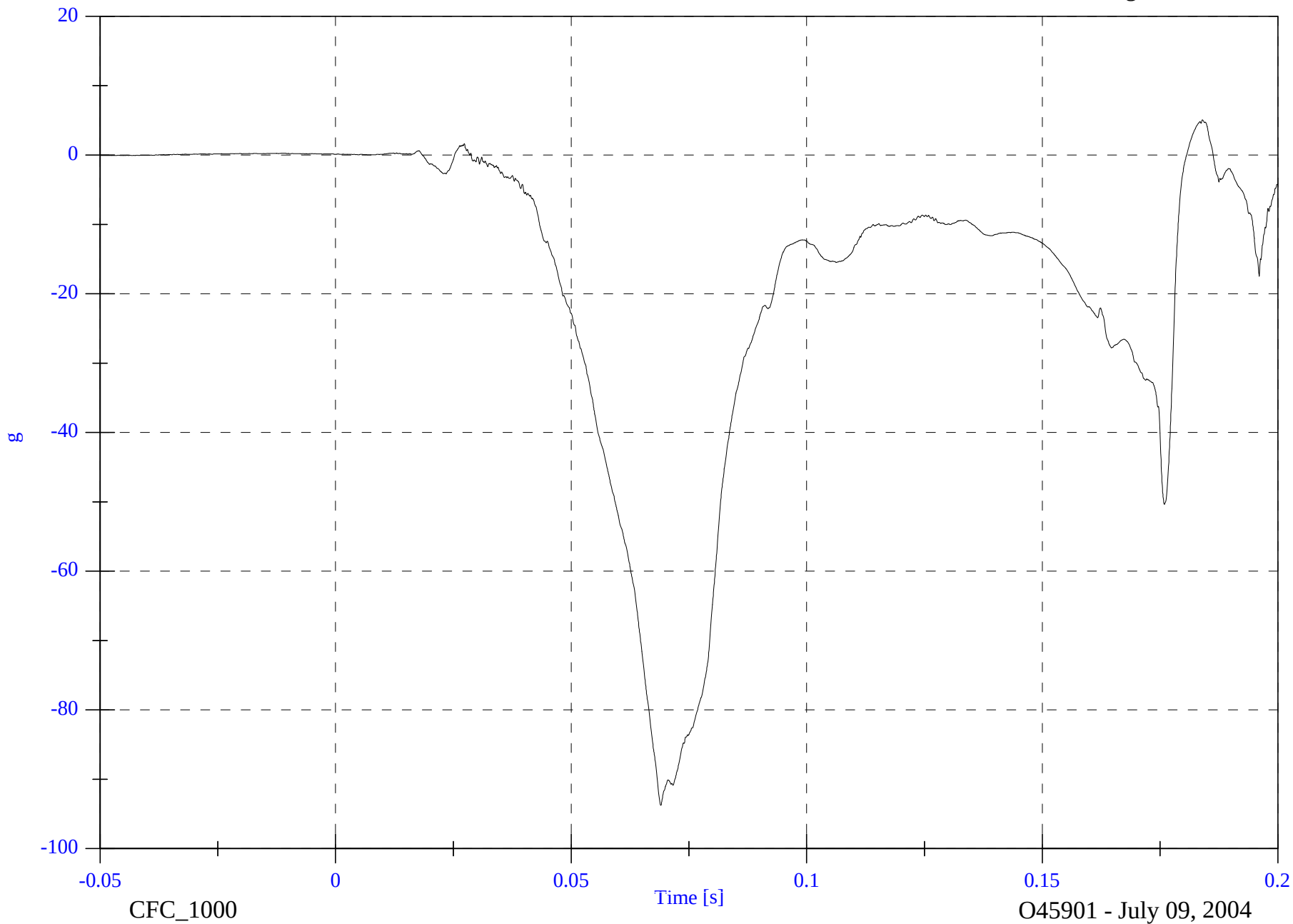
V1P4 Head z

Max: 5.1 [g] at 0.184 [s]

Min: -93.8 [g] at 0.069 [s]

4-36

8748-01



NCAP Optional Test - 2004.5 Volvo S40

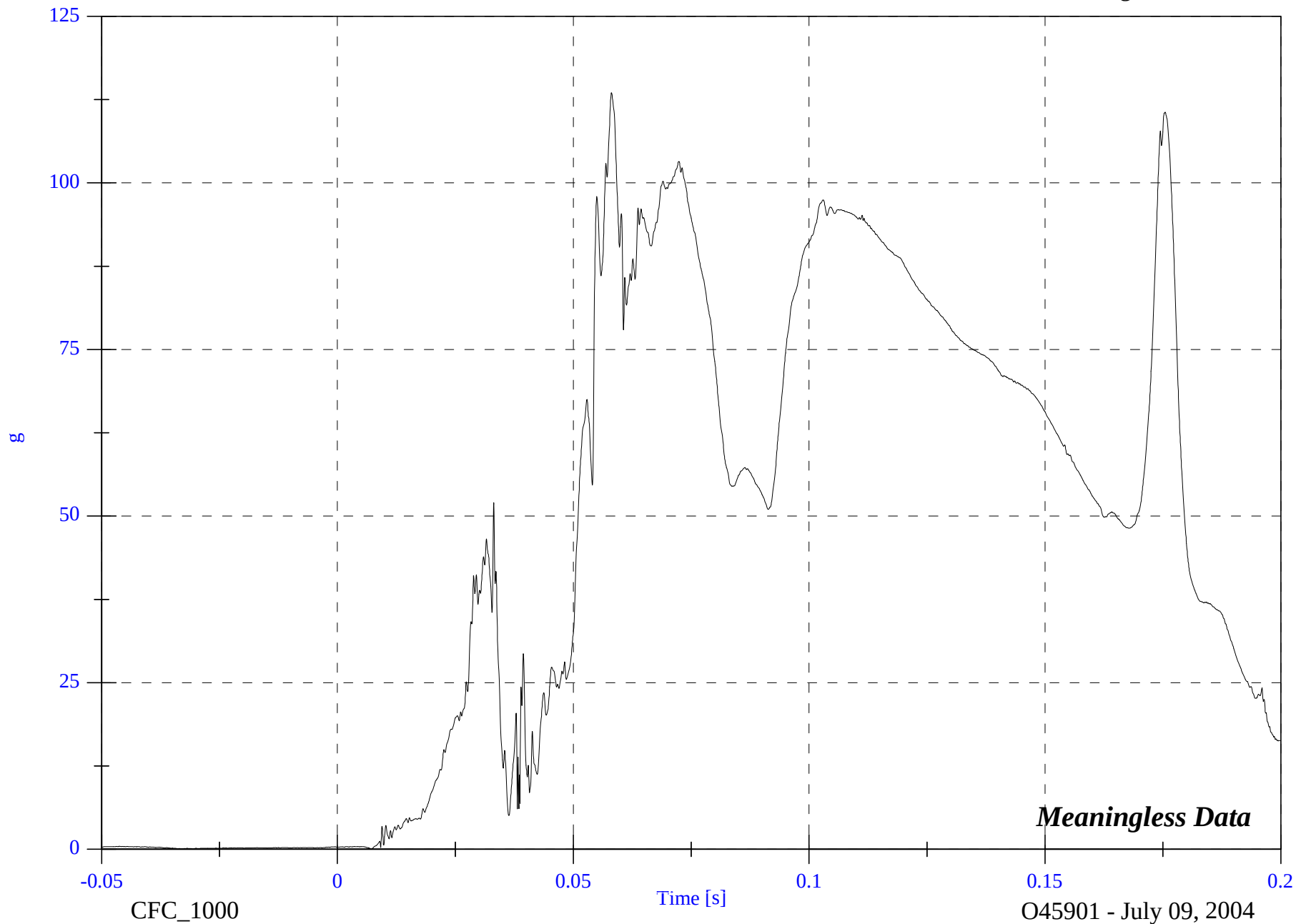
V1P4 Head Resultant

Max: 113.6 [g] at 0.058 [s]

Min: 0.0 [g] at 0.007 [s]

4-37

8748-01



NCAP Optional Test - 2004.5 Volvo S40

V1P4 Upper Neck Fx

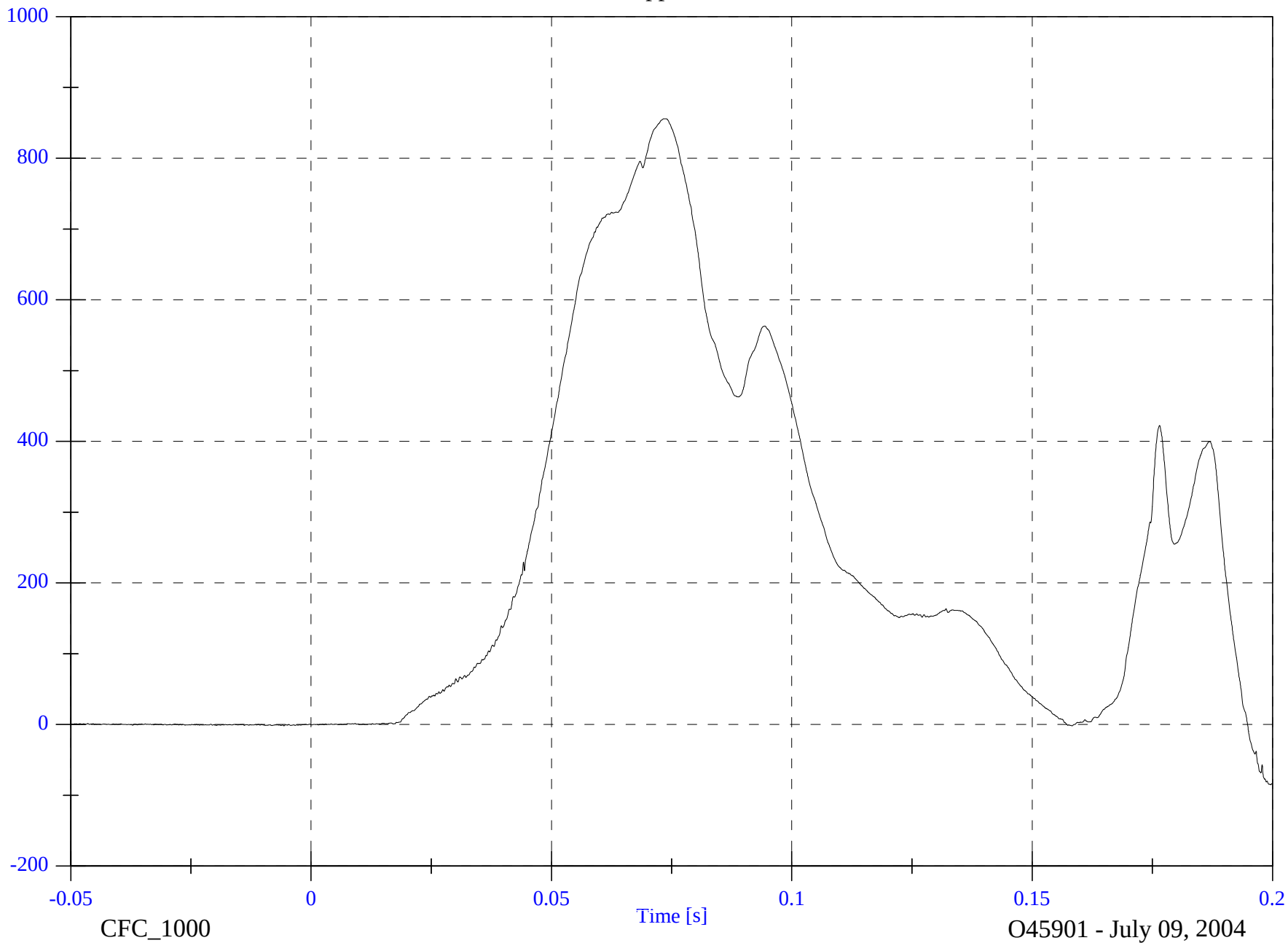
Max: 855.9 [N] at 0.074 [s]

Min: -85.0 [N] at 0.200 [s]

4-38

N

8748-01

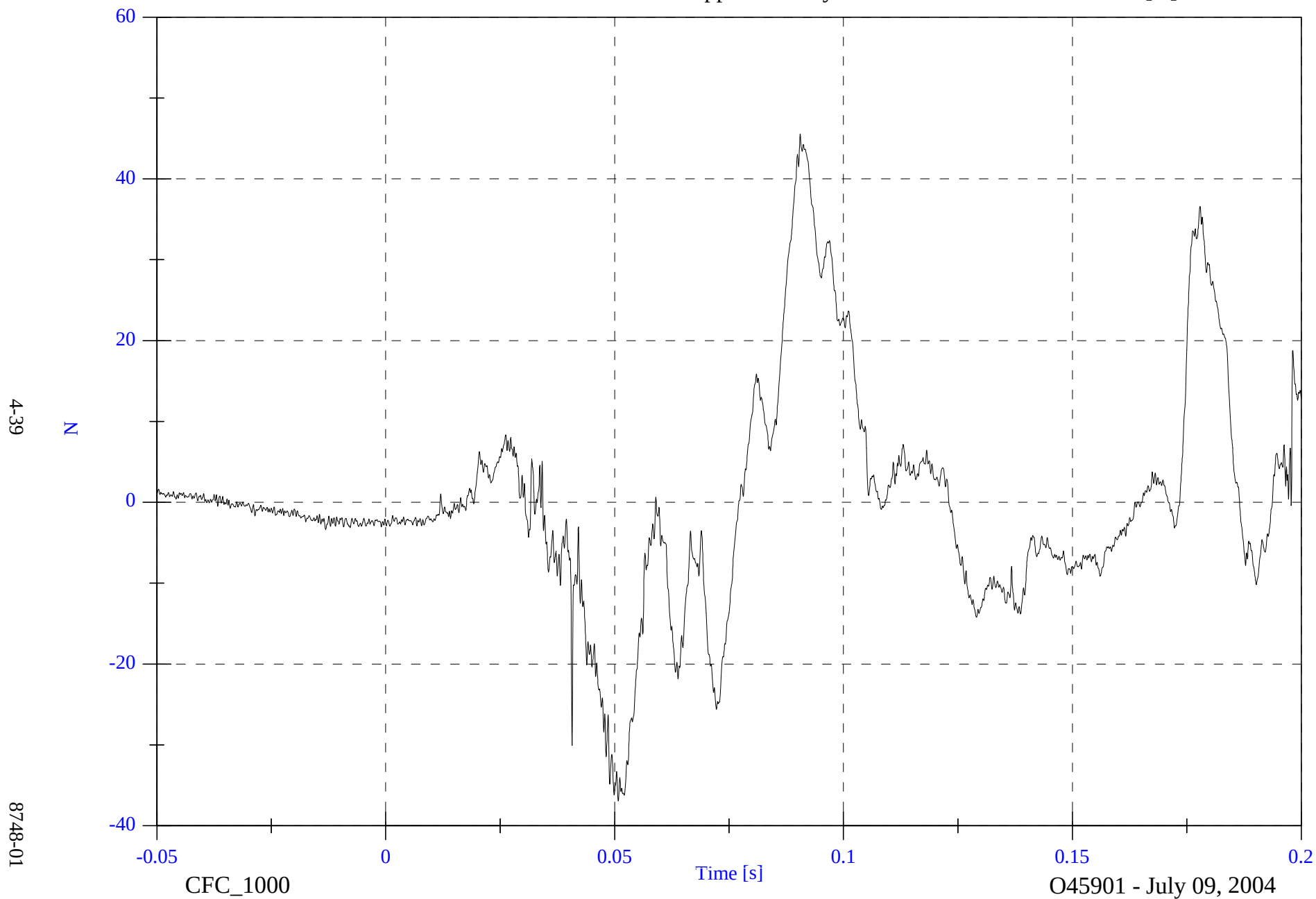


NCAP Optional Test - 2004.5 Volvo S40

V1P4 Upper Neck Fy

Max: 45.5 [N] at 0.090 [s]

Min: -36.9 [N] at 0.051 [s]

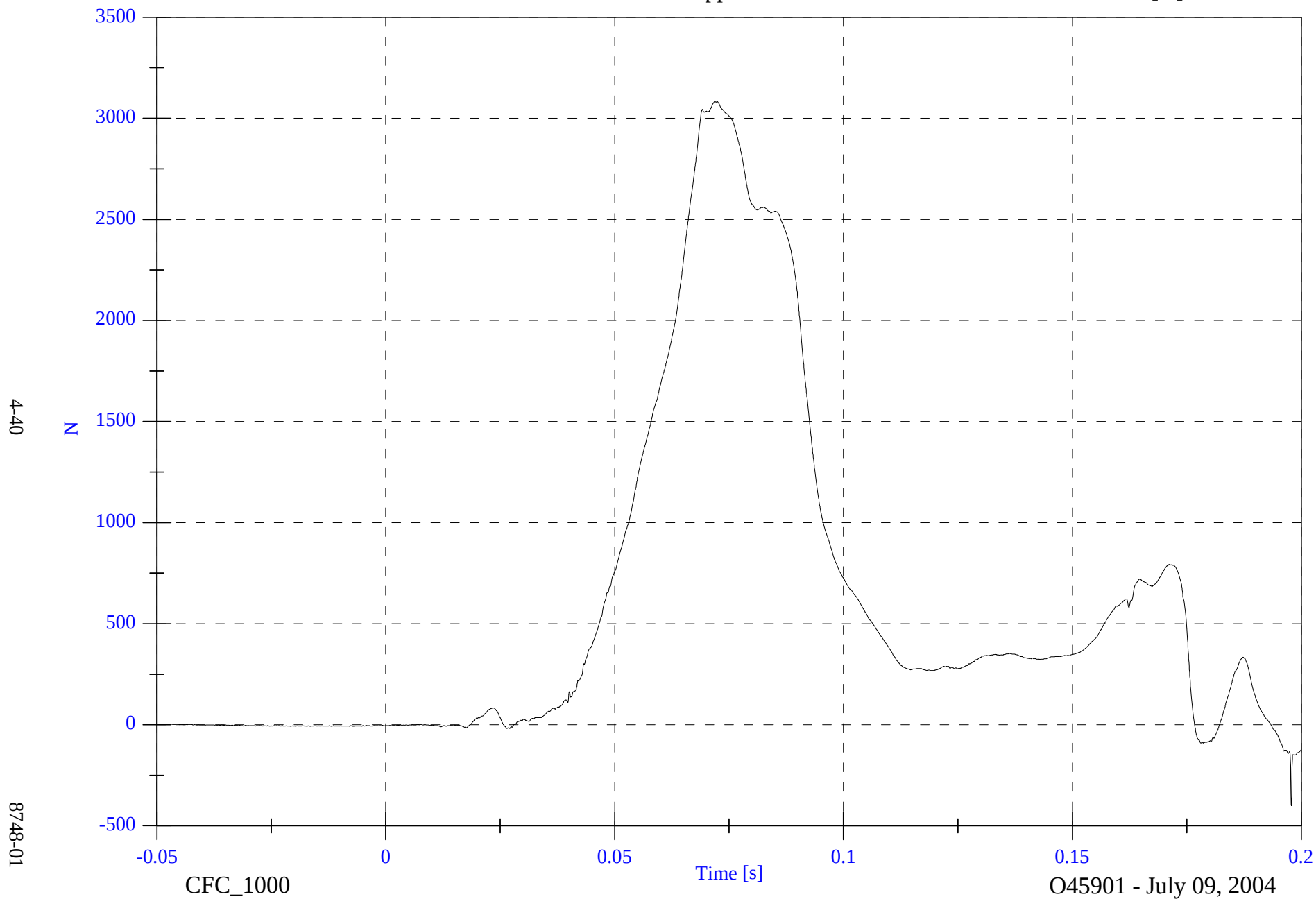


NCAP Optional Test - 2004.5 Volvo S40

V1P4 Upper Neck Fz

Max: 3084.0 [N] at 0.072 [s]

Min: -401.5 [N] at 0.198 [s]



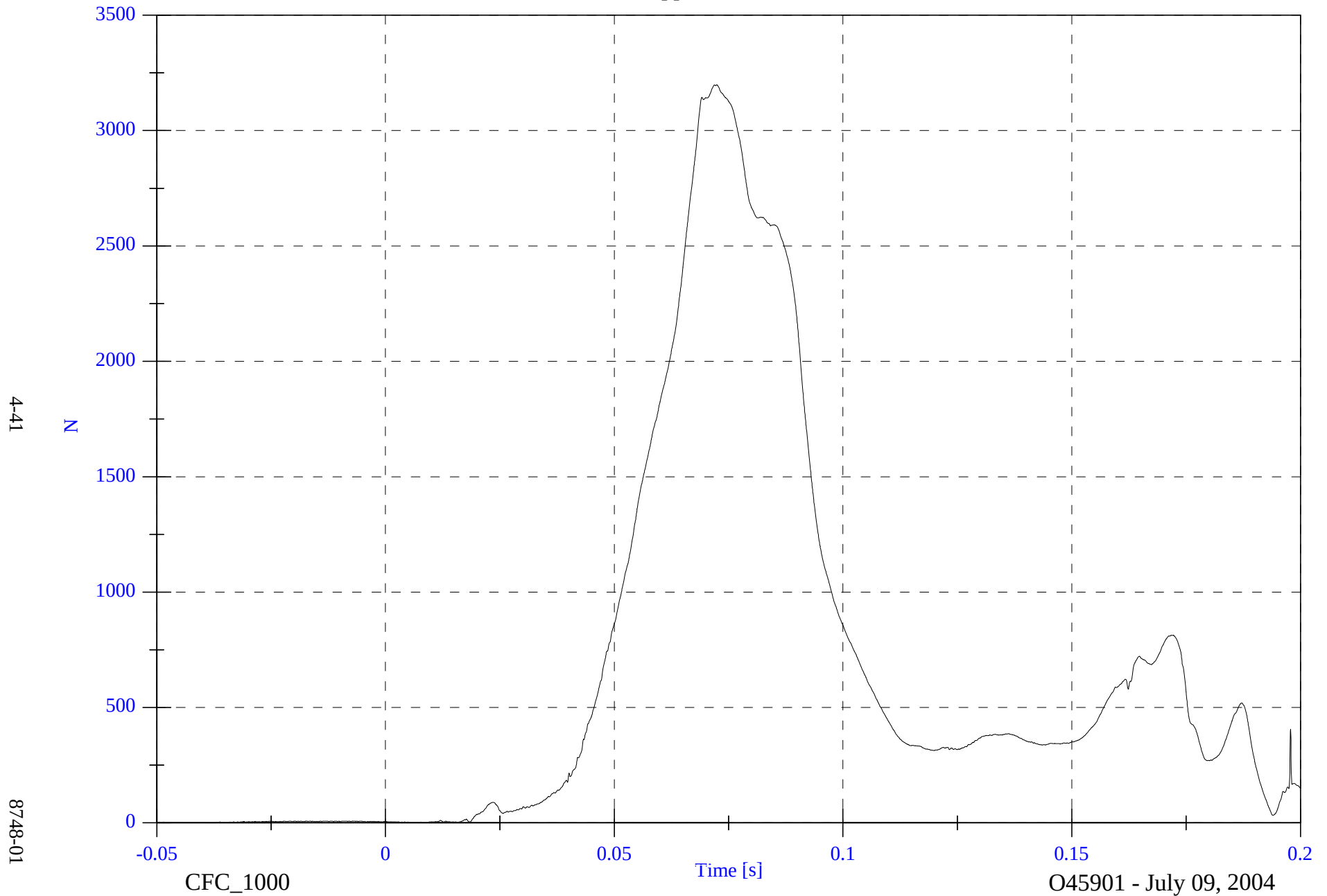
8748-01

NCAP Optional Test - 2004.5 Volvo S40

V1P4 Upper Neck F Resultant

Max: 3198.5 [N] at 0.072 [s]

Min: 0.4 [N] at -0.038 [s]

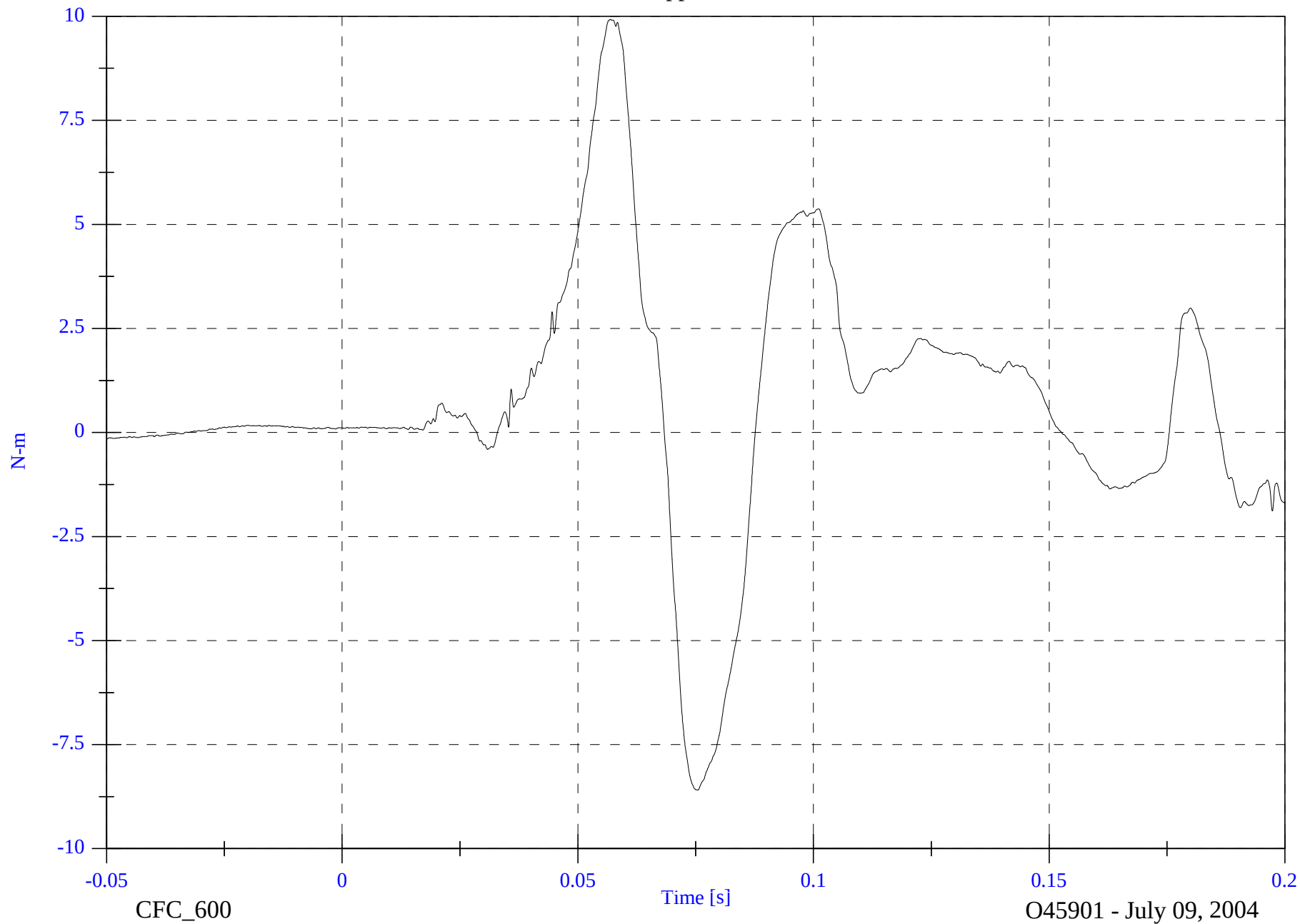


NCAP Optional Test - 2004.5 Volvo S40

V1P4 Upper Neck Mx

Max: 9.9 [N-m] at 0.057 [s]

Min: -8.6 [N-m] at 0.075 [s]



4-42

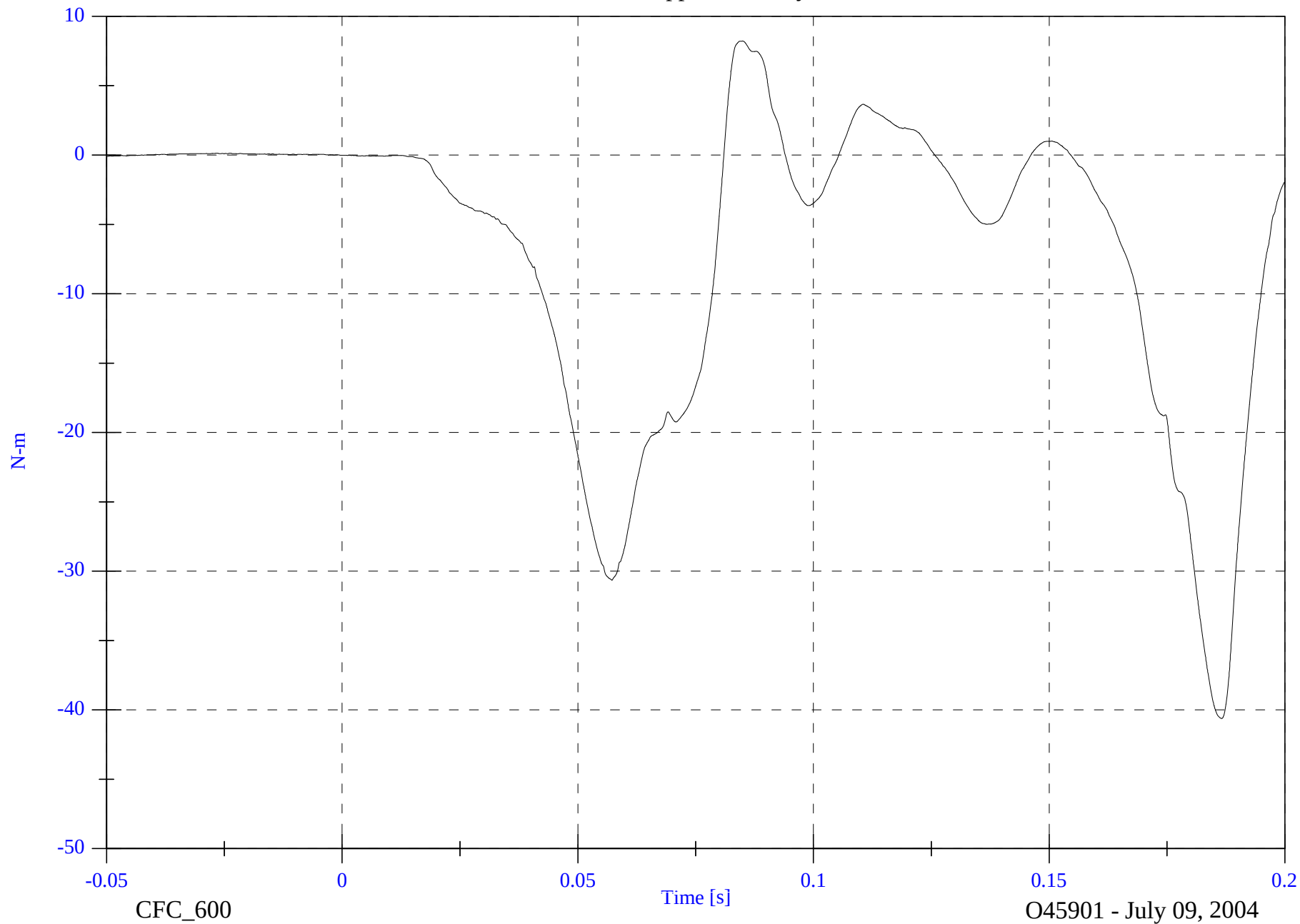
8748-01

NCAP Optional Test - 2004.5 Volvo S40

V1P4 Upper Neck My

Max: 8.2 [N-m] at 0.085 [s]

Min: -40.6 [N-m] at 0.187 [s]



4-43

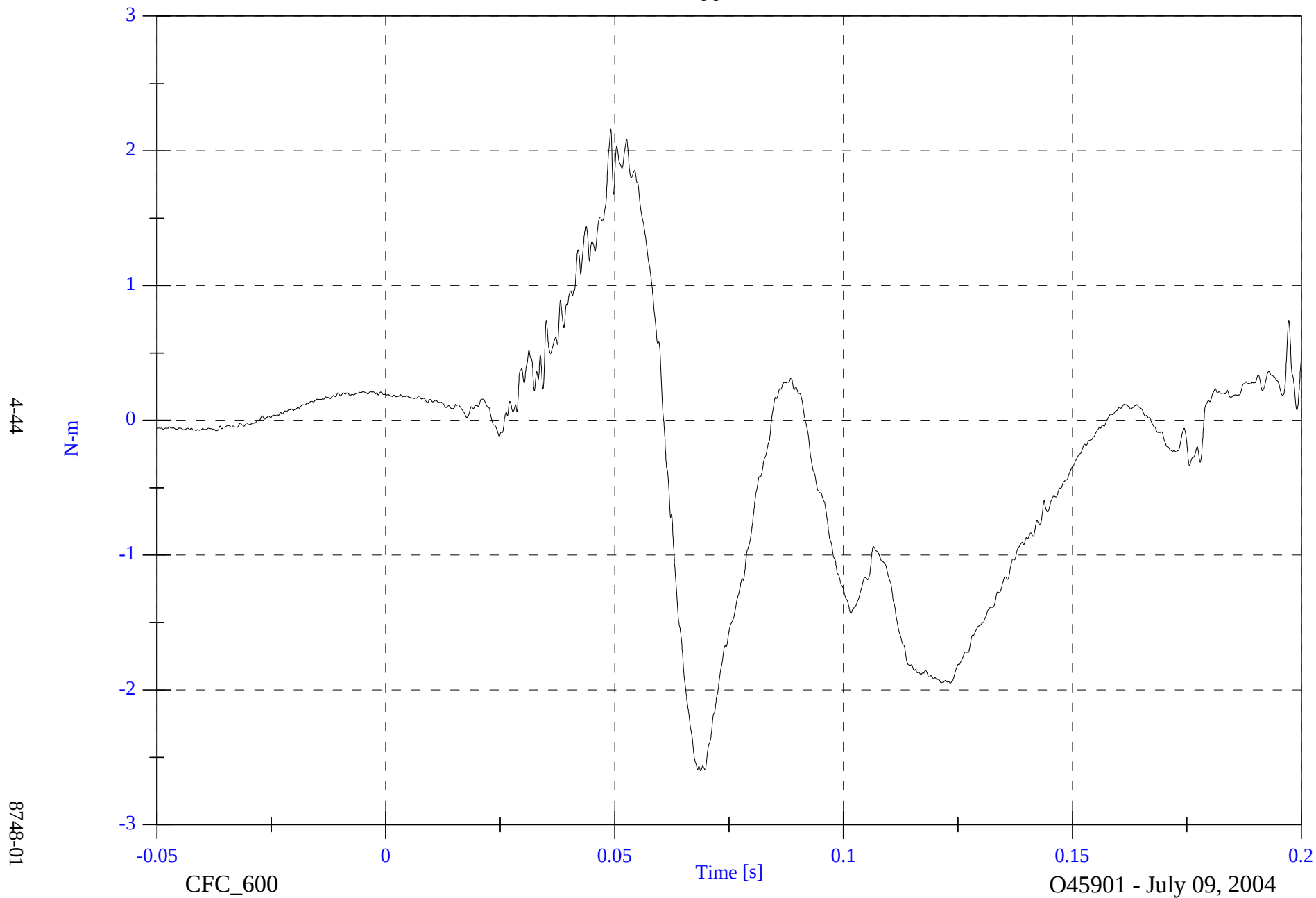
8748-01

NCAP Optional Test - 2004.5 Volvo S40

V1P4 Upper Neck Mz

Max: 2.2 [N-m] at 0.049 [s]

Min: -2.6 [N-m] at 0.069 [s]

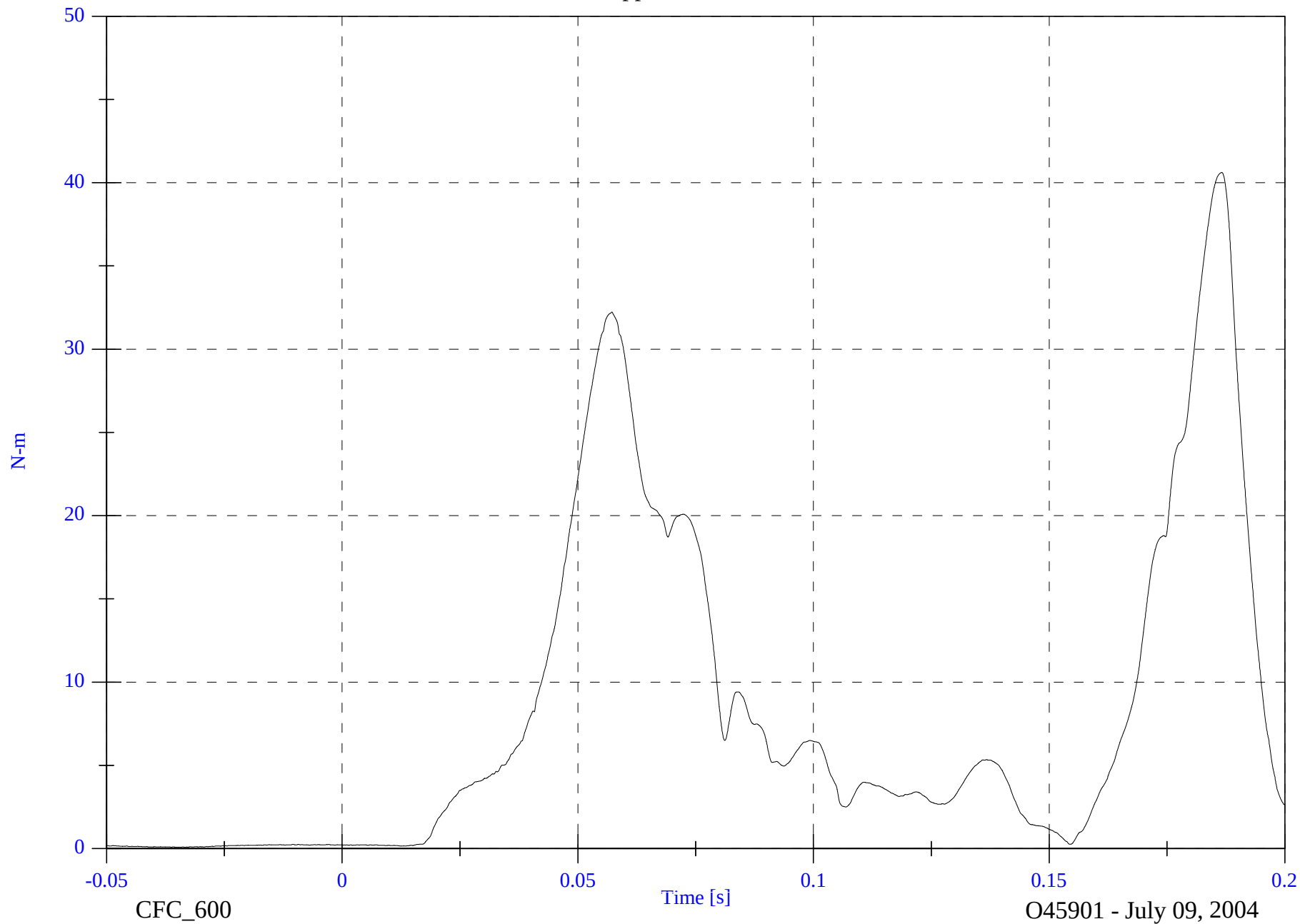


NCAP Optional Test - 2004.5 Volvo S40

V1P4 Upper Neck M Resultant

Max: 40.6 [N-m] at 0.187 [s]

Min: 0.1 [N-m] at -0.035 [s]



4-45

8748-01

CFC_600

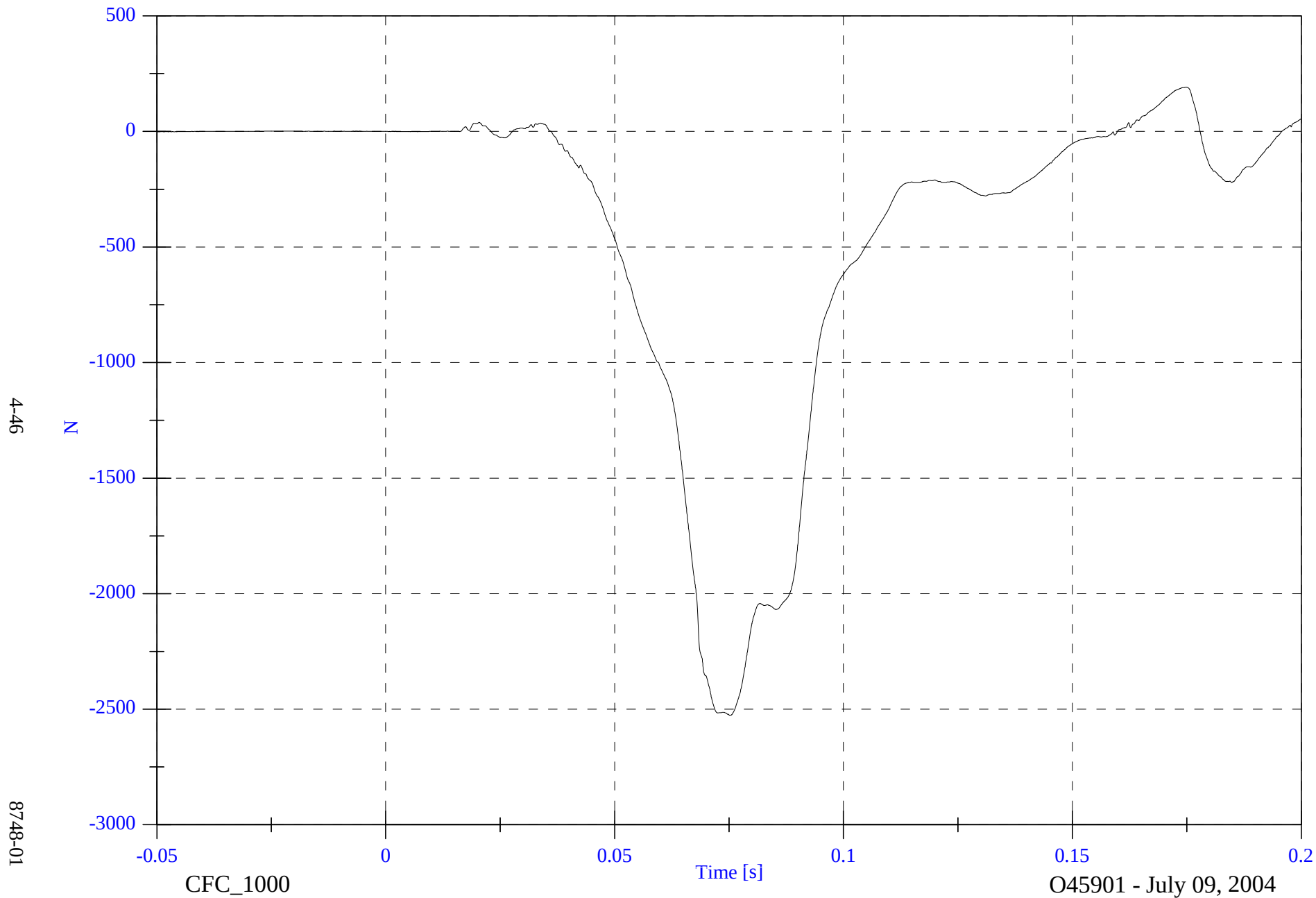
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P4 Lower Neck Fx

Max: 191.6 [N] at 0.175 [s]

Min: -2527.3 [N] at 0.075 [s]

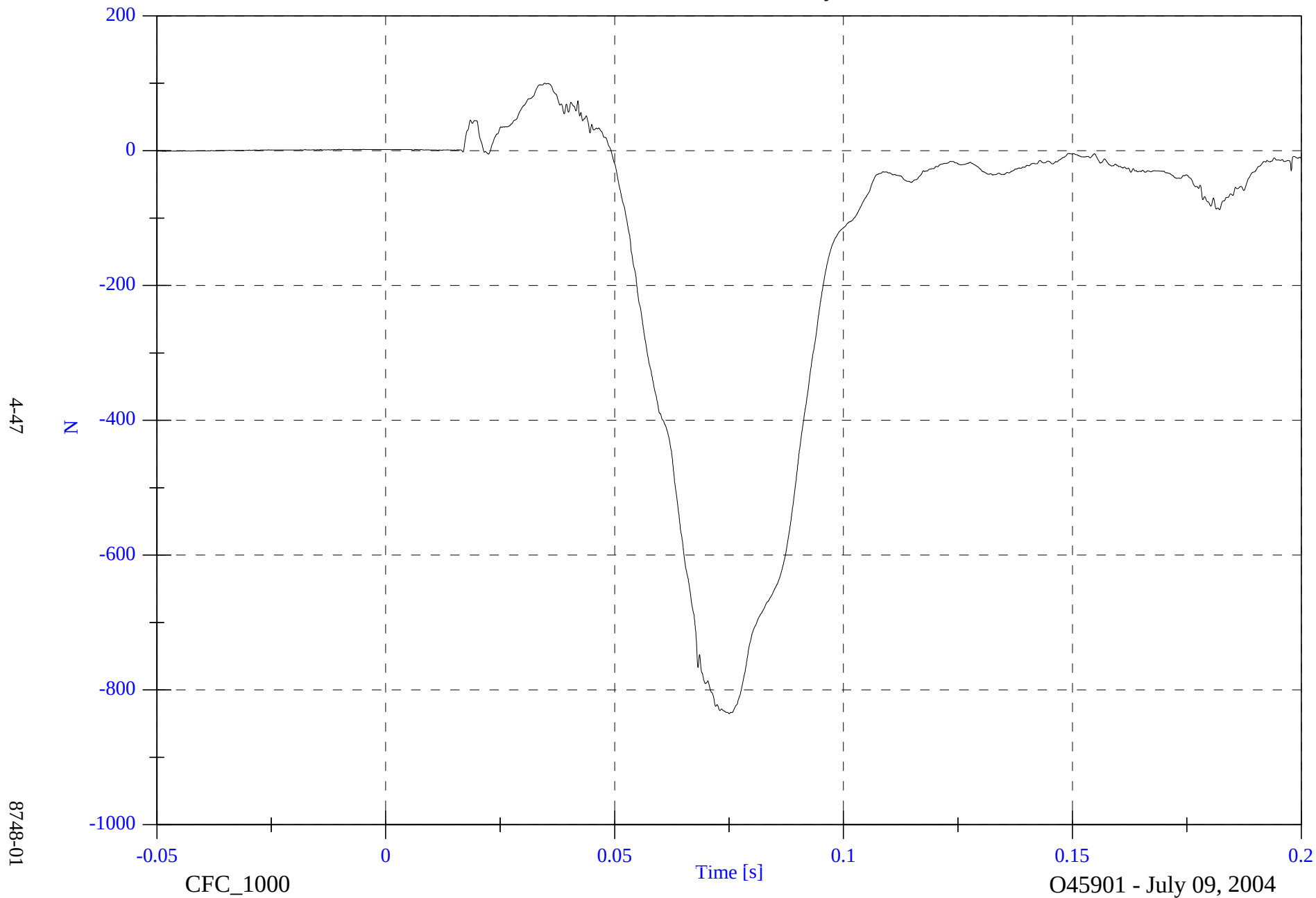


NCAP Optional Test - 2004.5 Volvo S40

V1P4 Lower Neck Fy

Max: 100.1 [N] at 0.035 [s]

Min: -835.0 [N] at 0.075 [s]

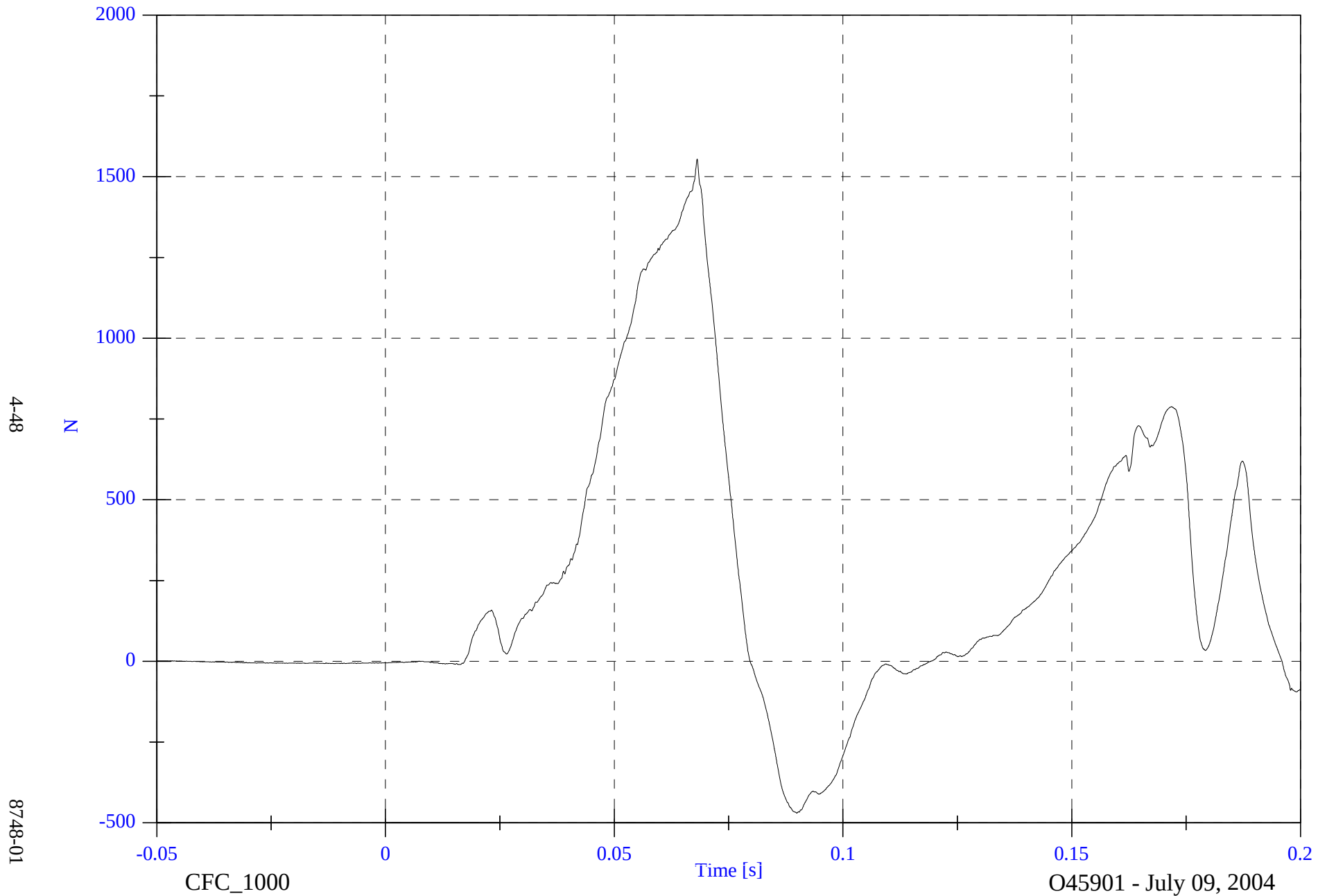


NCAP Optional Test - 2004.5 Volvo S40

V1P4 Lower Neck Fz

Max: 1554.6 [N] at 0.068 [s]

Min: -469.8 [N] at 0.090 [s]

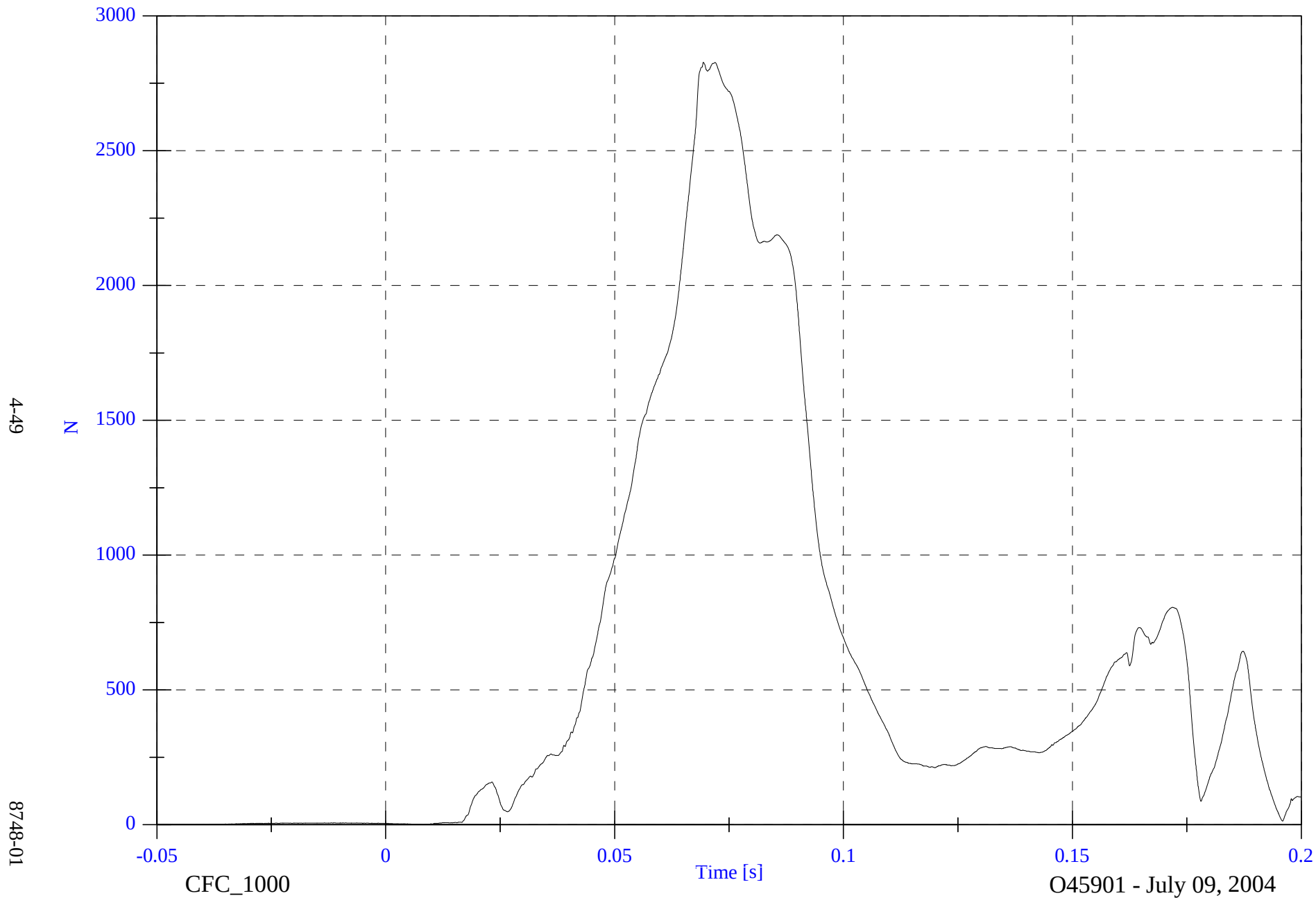


NCAP Optional Test - 2004.5 Volvo S40

V1P4 Lower Neck F Resultant

Max: 2828.2 [N] at 0.069 [s]

Min: 0.5 [N] at -0.042 [s]

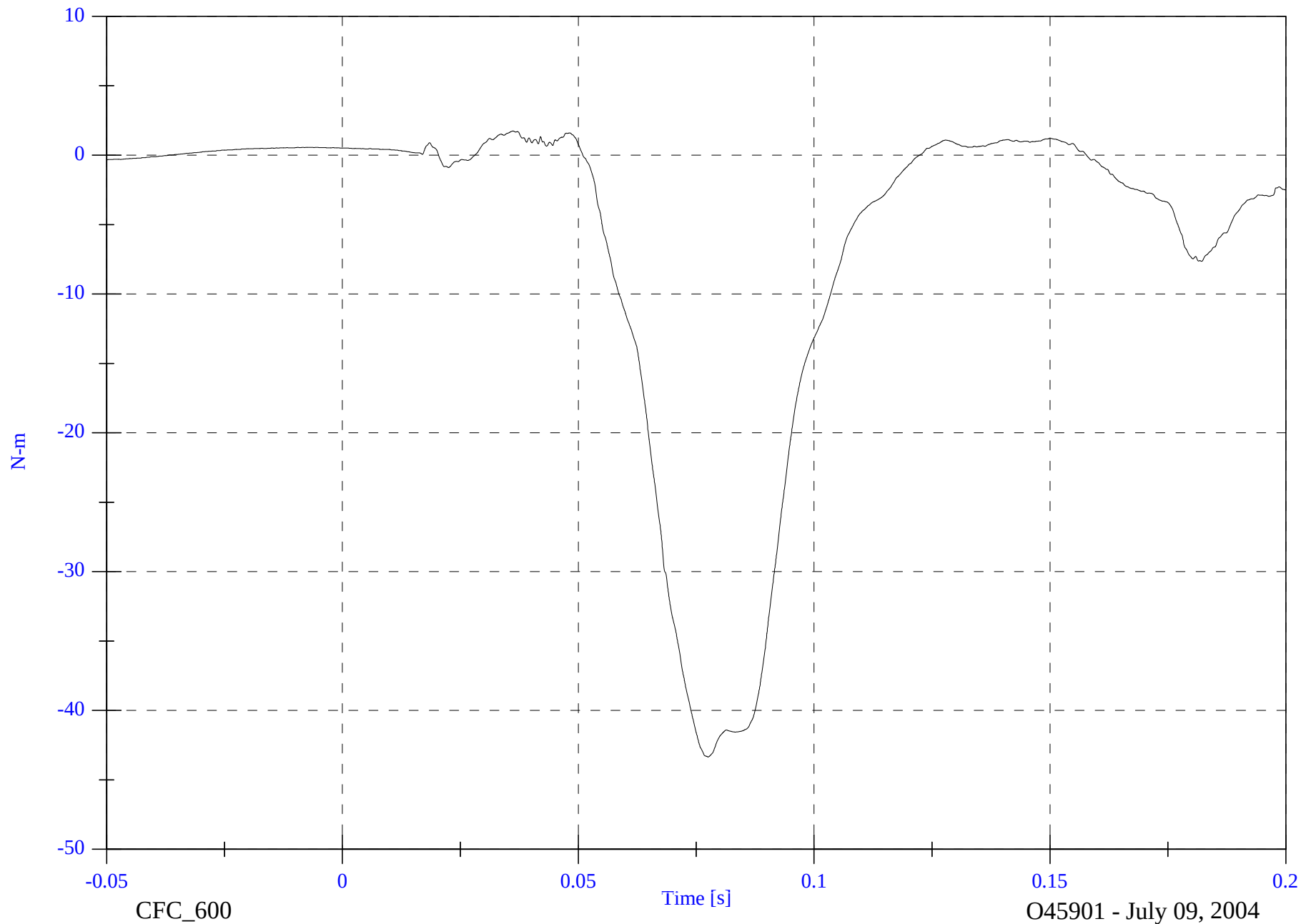


NCAP Optional Test - 2004.5 Volvo S40

V1P4 Lower Neck Mx

Max: 1.7 [N-m] at 0.036 [s]

Min: -43.3 [N-m] at 0.077 [s]



4-50

8748-01

CFC_600

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

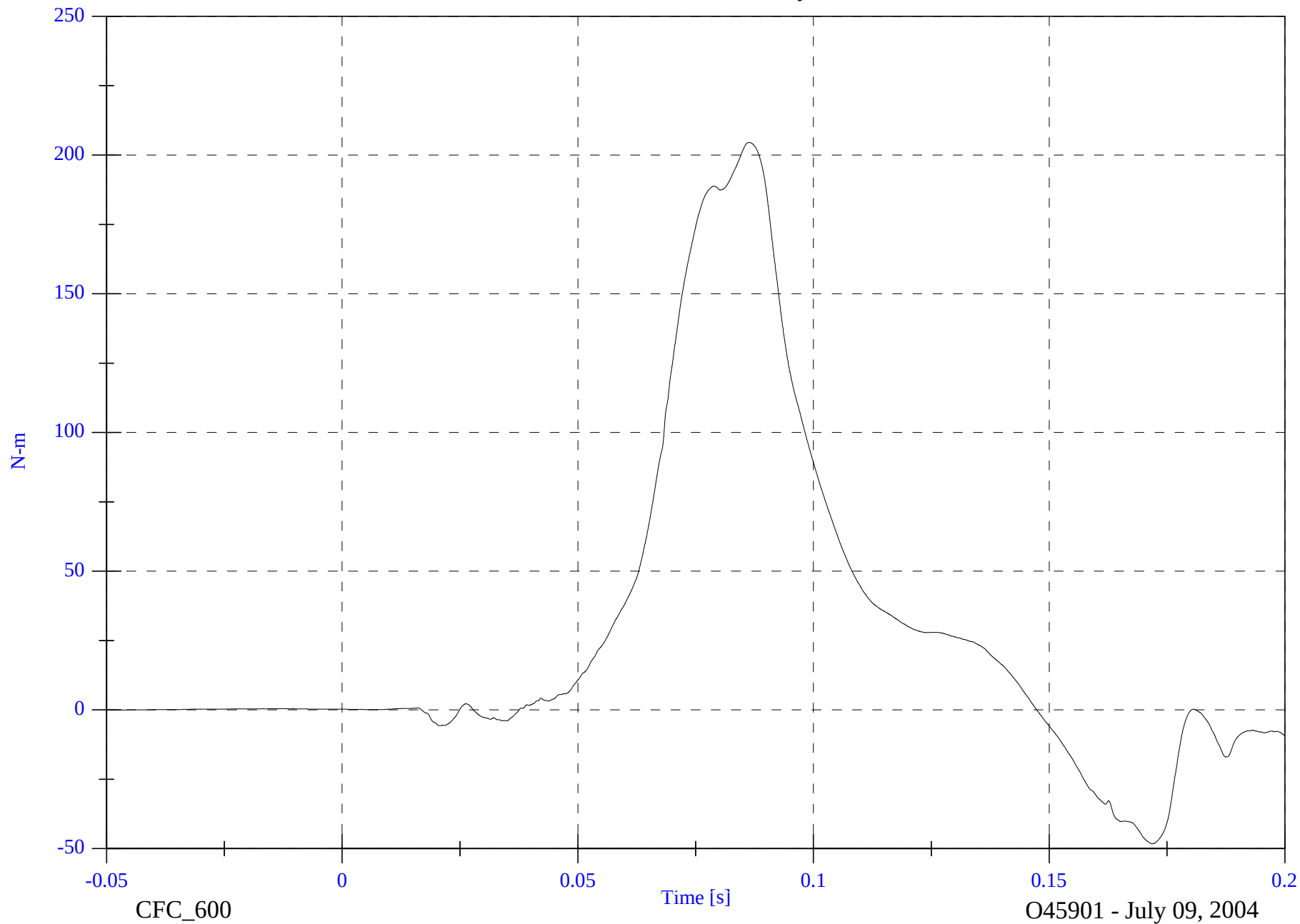
V1P4 Lower Neck My

Max: 204.5 [N-m] at 0.086 [s]

Min: -48.3 [N-m] at 0.172 [s]

4-51

8748-01

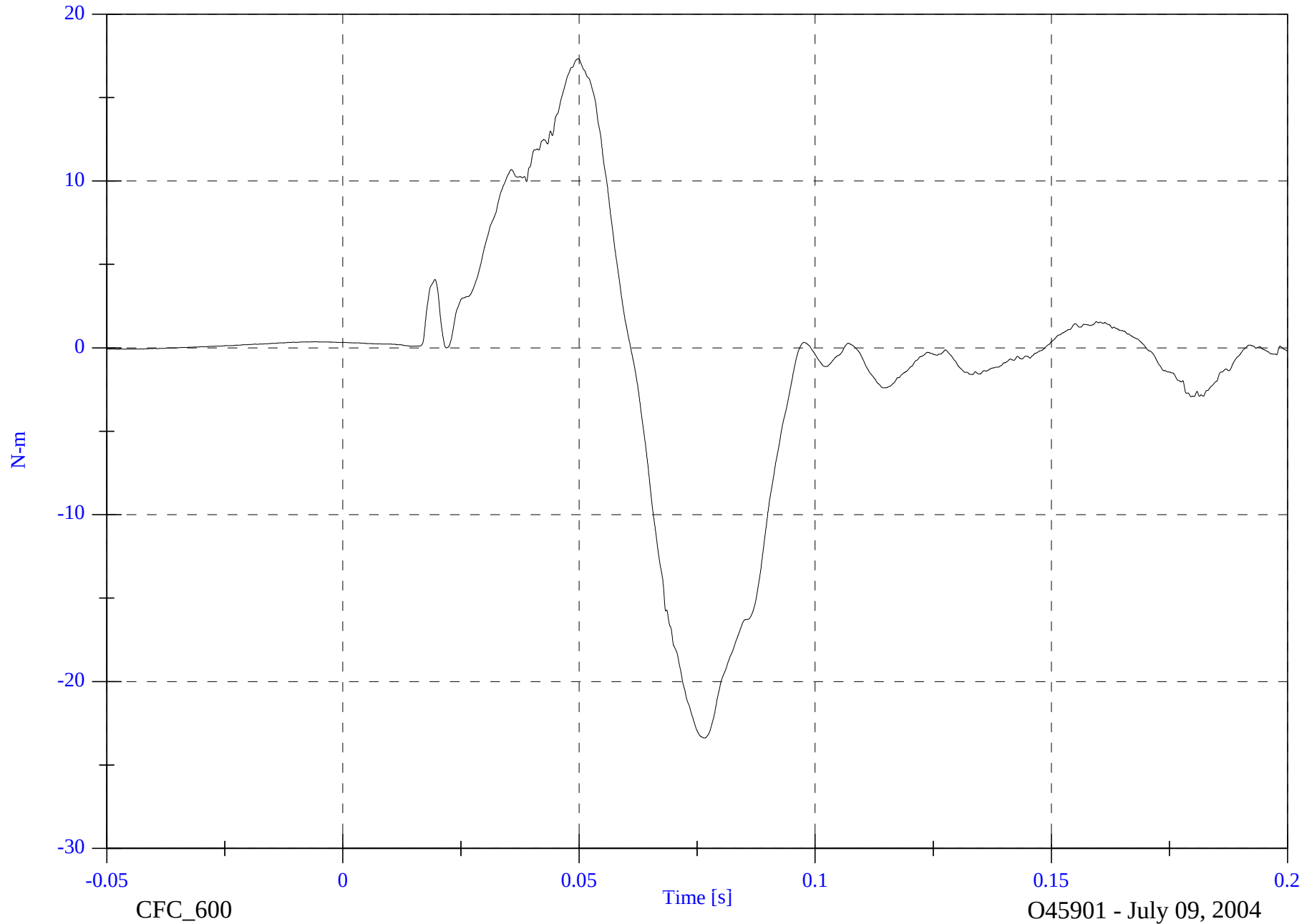


NCAP Optional Test - 2004.5 Volvo S40

V1P4 Lower Neck Mz

Max: 17.3 [N-m] at 0.050 [s]

Min: -23.4 [N-m] at 0.077 [s]



4-52

8748-01

CFC_600

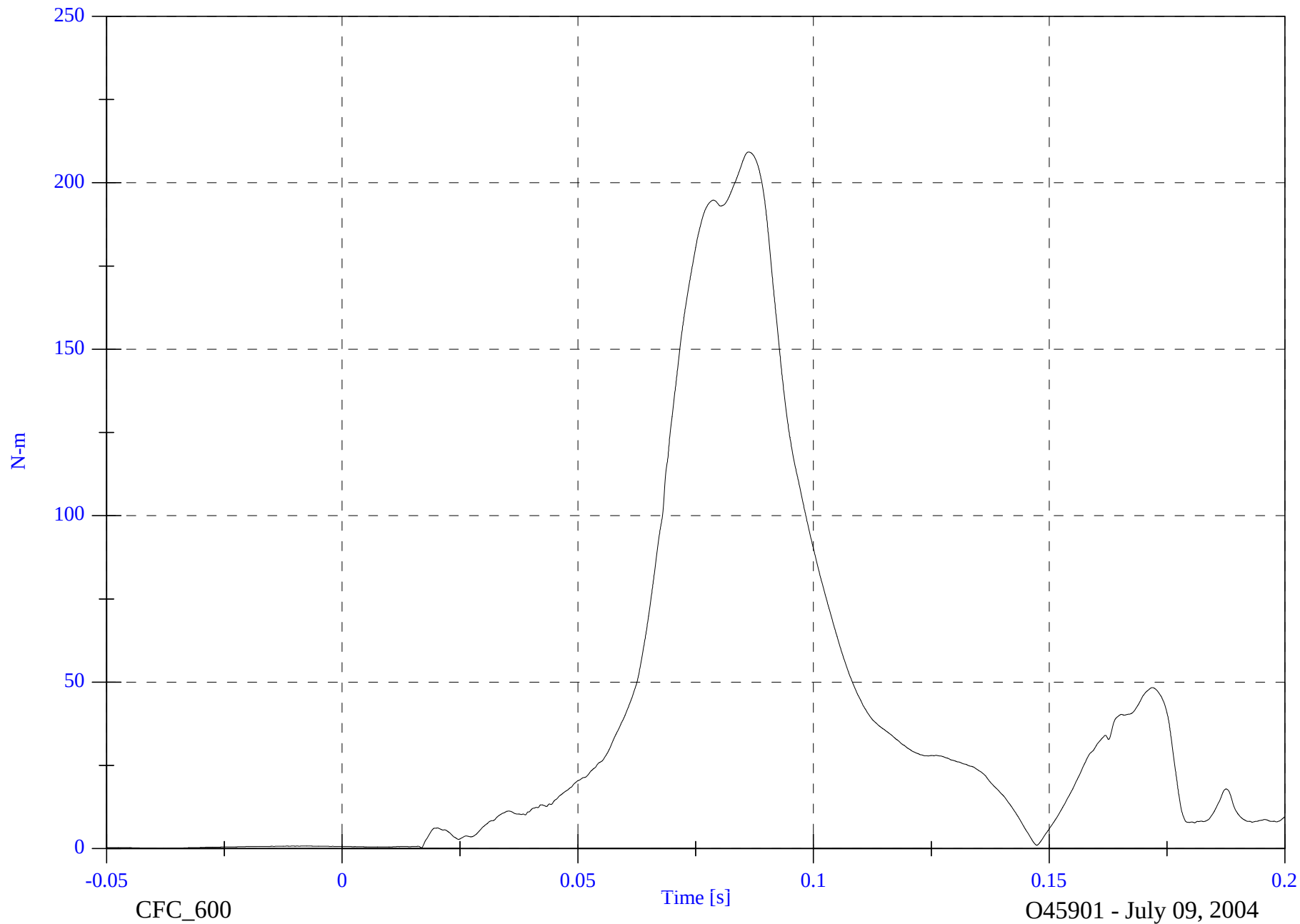
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P4 Lower Neck M Resultant

Max: 209.2 [N-m] at 0.086 [s]

Min: 0.1 [N-m] at -0.037 [s]



NCAP Optional Test - 2004.5 Volvo S40

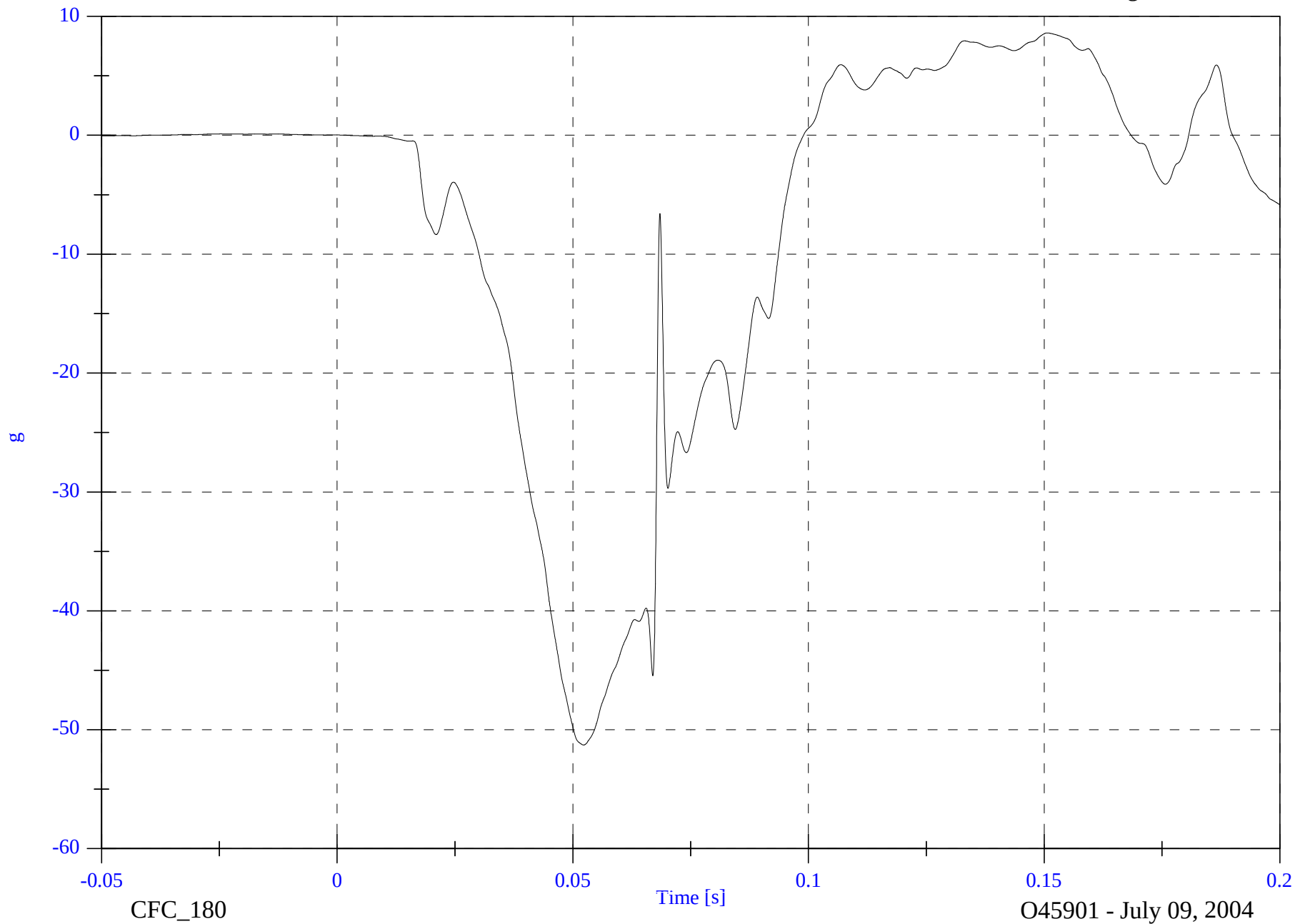
V1P4 Chest x

Max: 8.6 [g] at 0.151 [s]

Min: -51.3 [g] at 0.052 [s]

4-54

8748-01

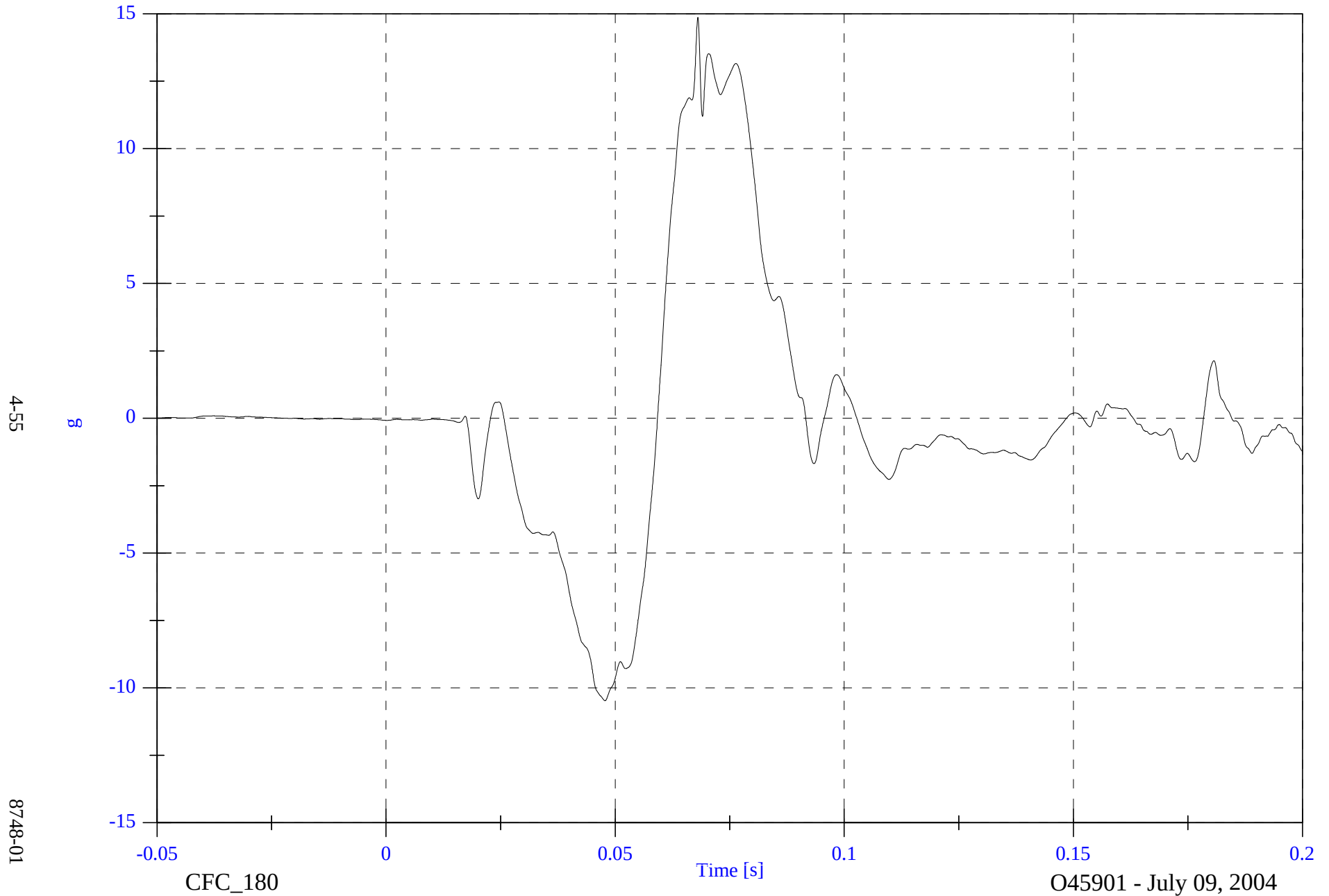


NCAP Optional Test - 2004.5 Volvo S40

V1P4 Chest y

Max: 14.9 [g] at 0.068 [s]

Min: -10.5 [g] at 0.048 [s]

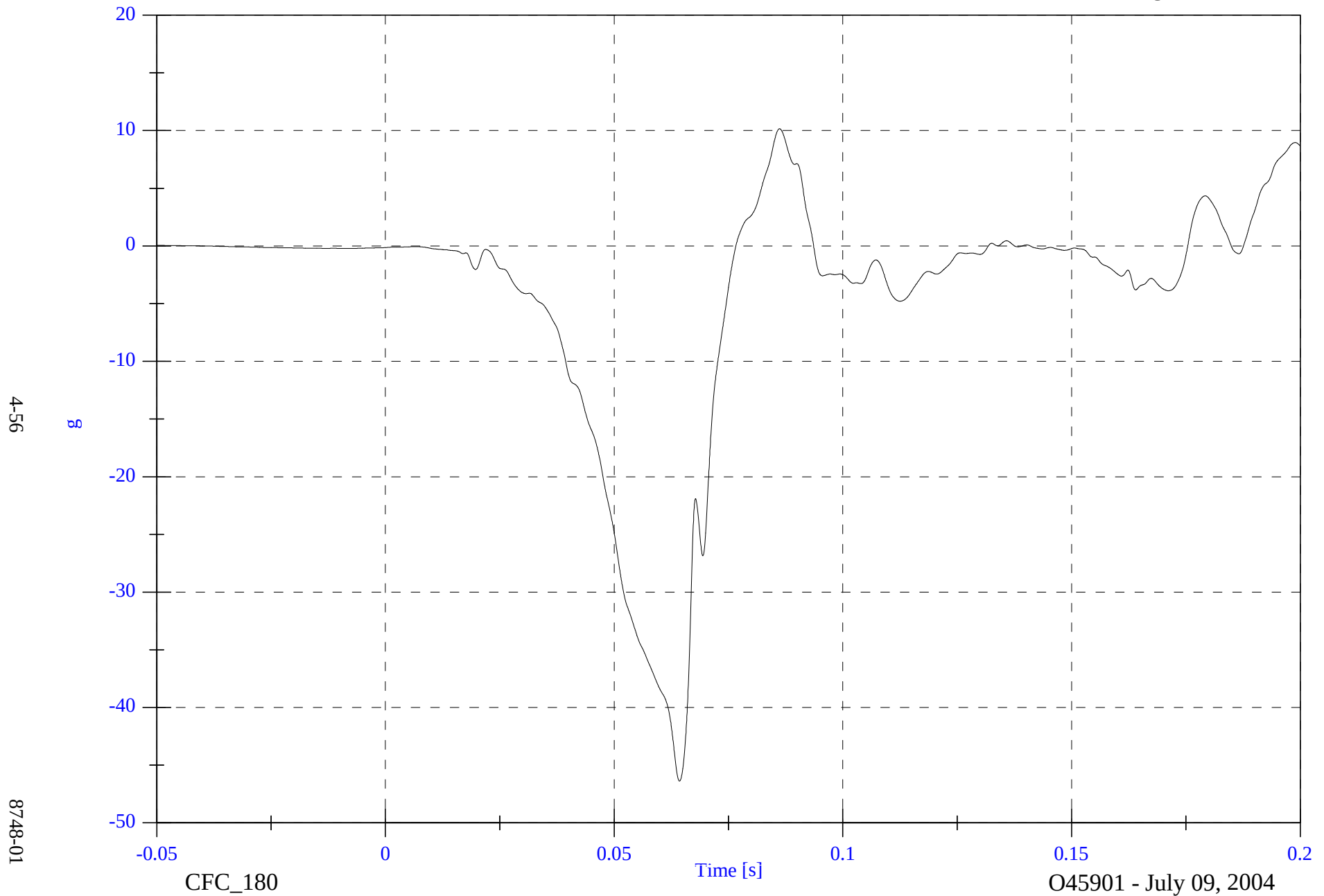


NCAP Optional Test - 2004.5 Volvo S40

V1P4 Chest z

Max: 10.2 [g] at 0.086 [s]

Min: -46.4 [g] at 0.064 [s]

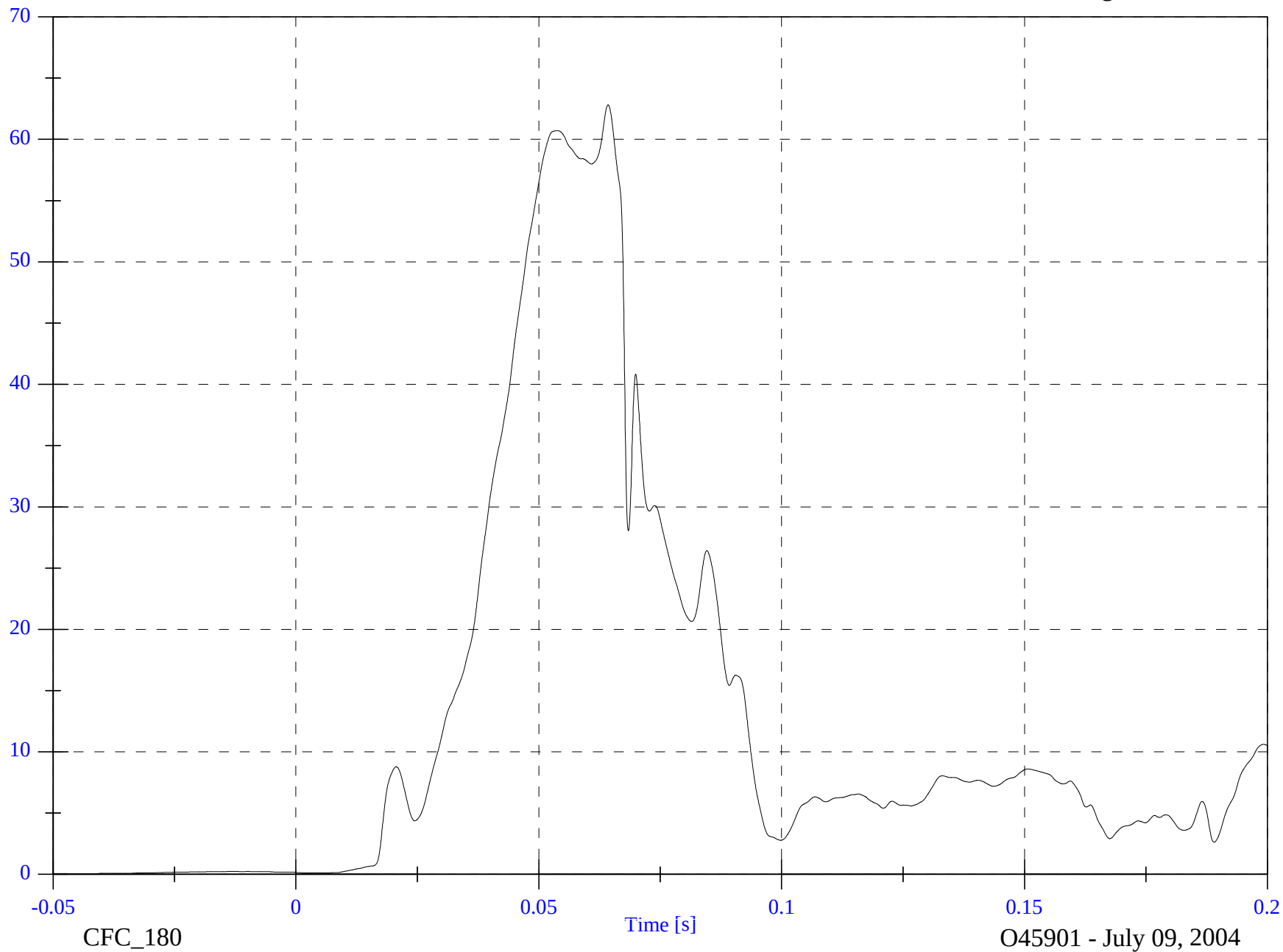


NCAP Optional Test - 2004.5 Volvo S40

V1P4 Chest Resultant

Max: 62.8 [g] at 0.064 [s]

Min: 0.0 [g] at -0.042 [s]



4-57

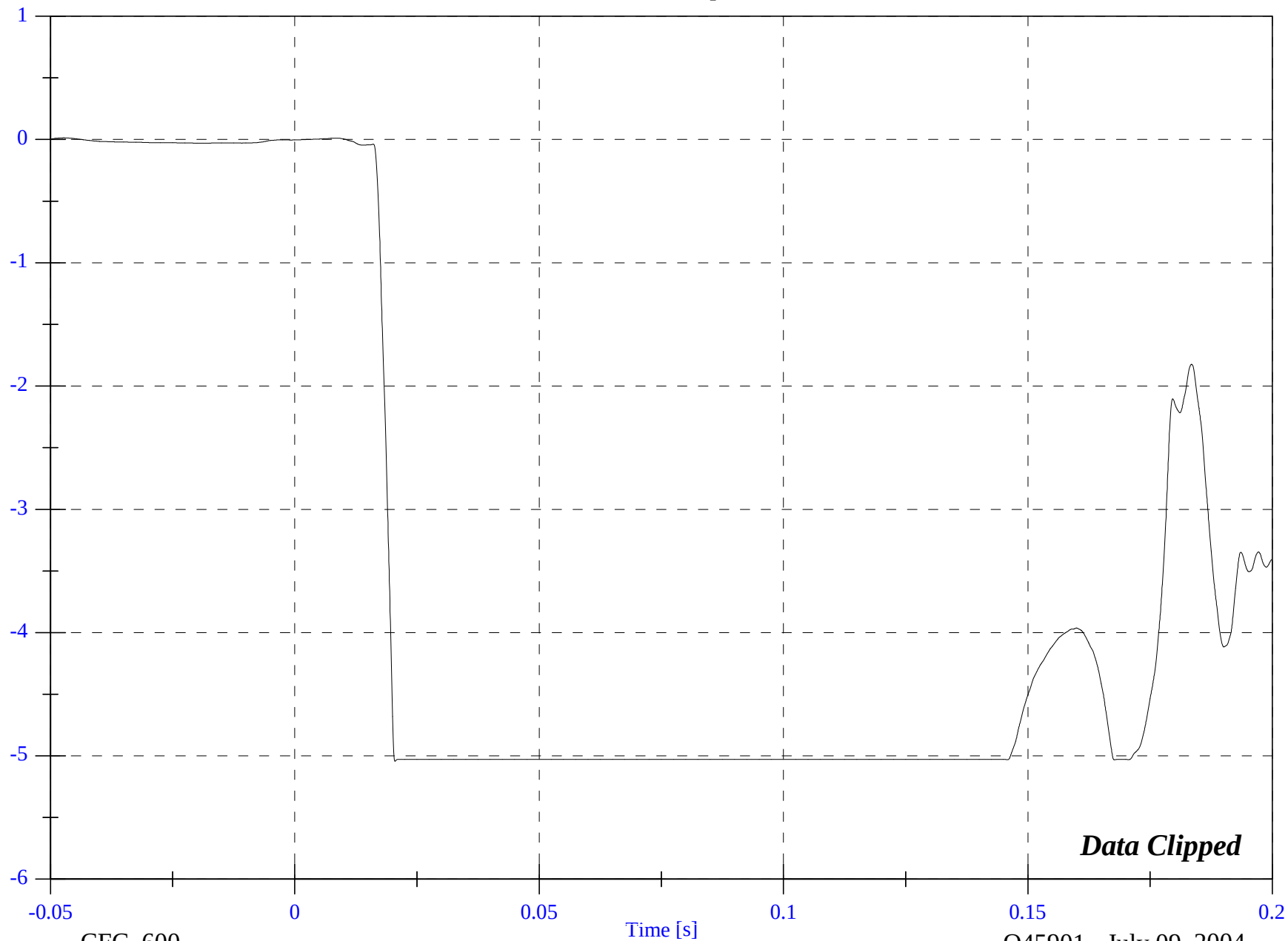
8748-01

NCAP Optional Test - 2004.5 Volvo S40

V1P4 Chest Compression

Max: 0.0 [mm] at -0.047 [s]

Min: -5.0 [mm] at 0.020 [s]



4-58

8748-01

CFC_600

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

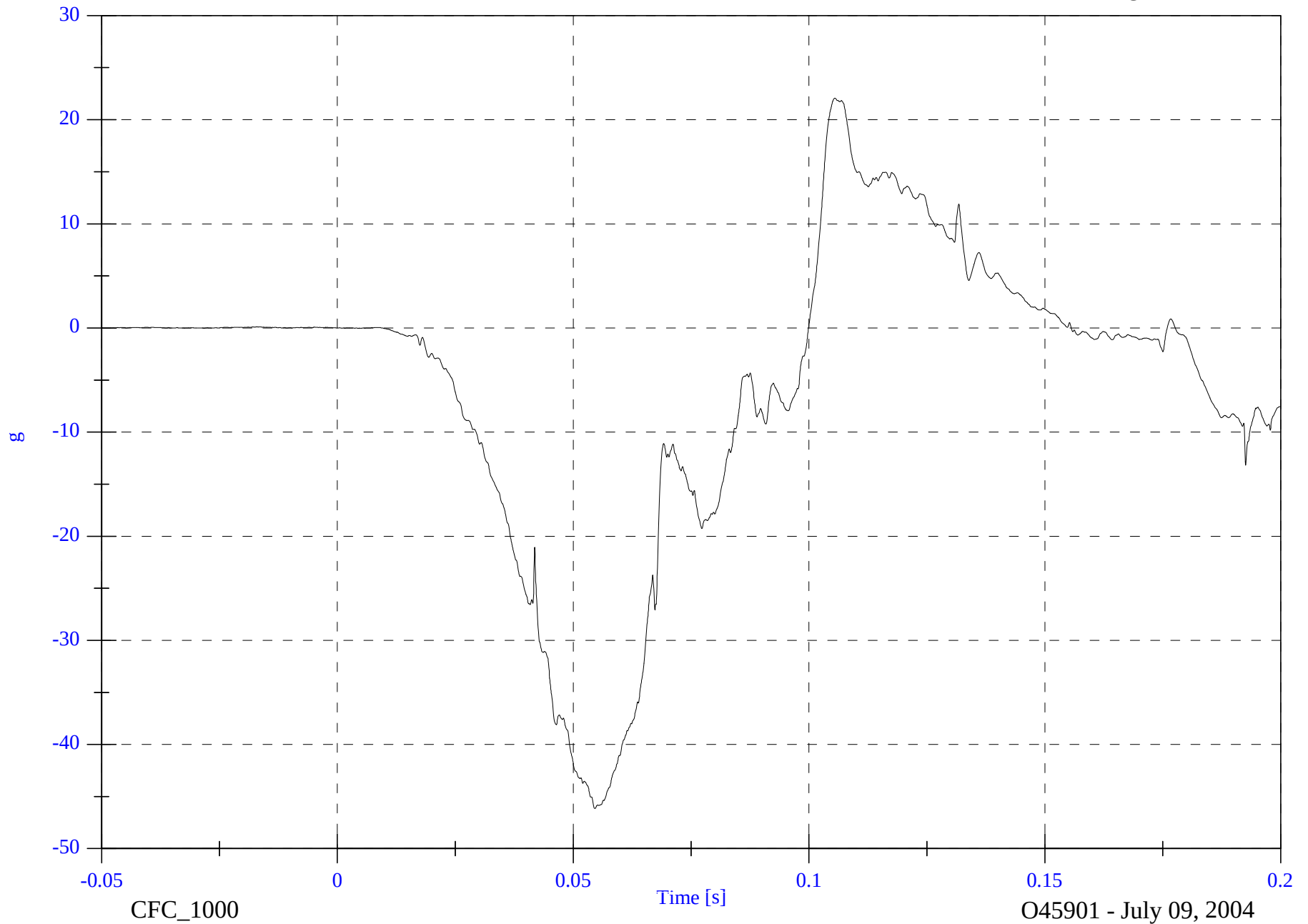
V1P4 Pelvic x

Max: 22.1 [g] at 0.105 [s]

Min: -46.2 [g] at 0.055 [s]

4-59

8748-01

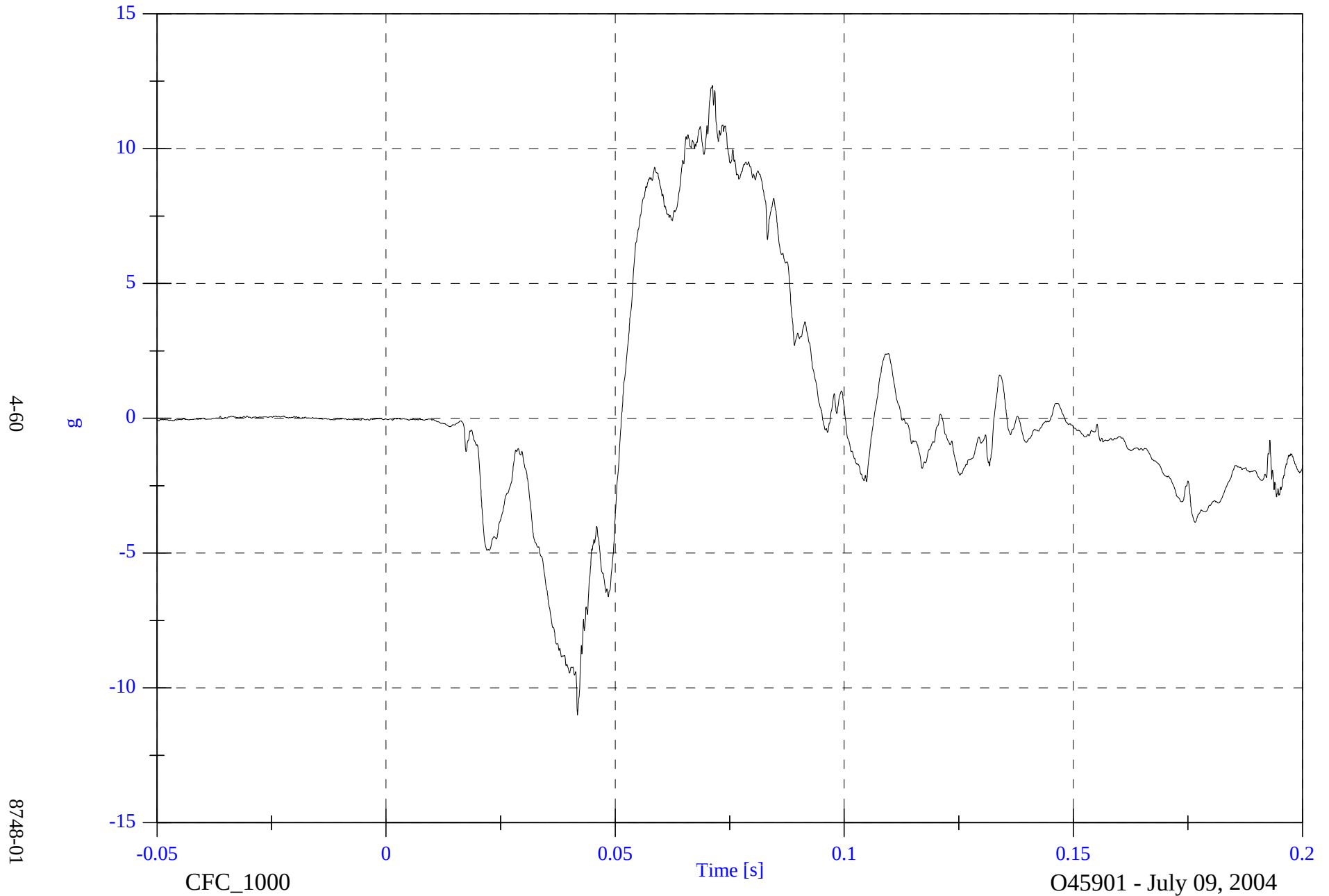


NCAP Optional Test - 2004.5 Volvo S40

V1P4 Pelvic y

Max: 12.3 [g] at 0.071 [s]

Min: -11.0 [g] at 0.042 [s]



NCAP Optional Test - 2004.5 Volvo S40

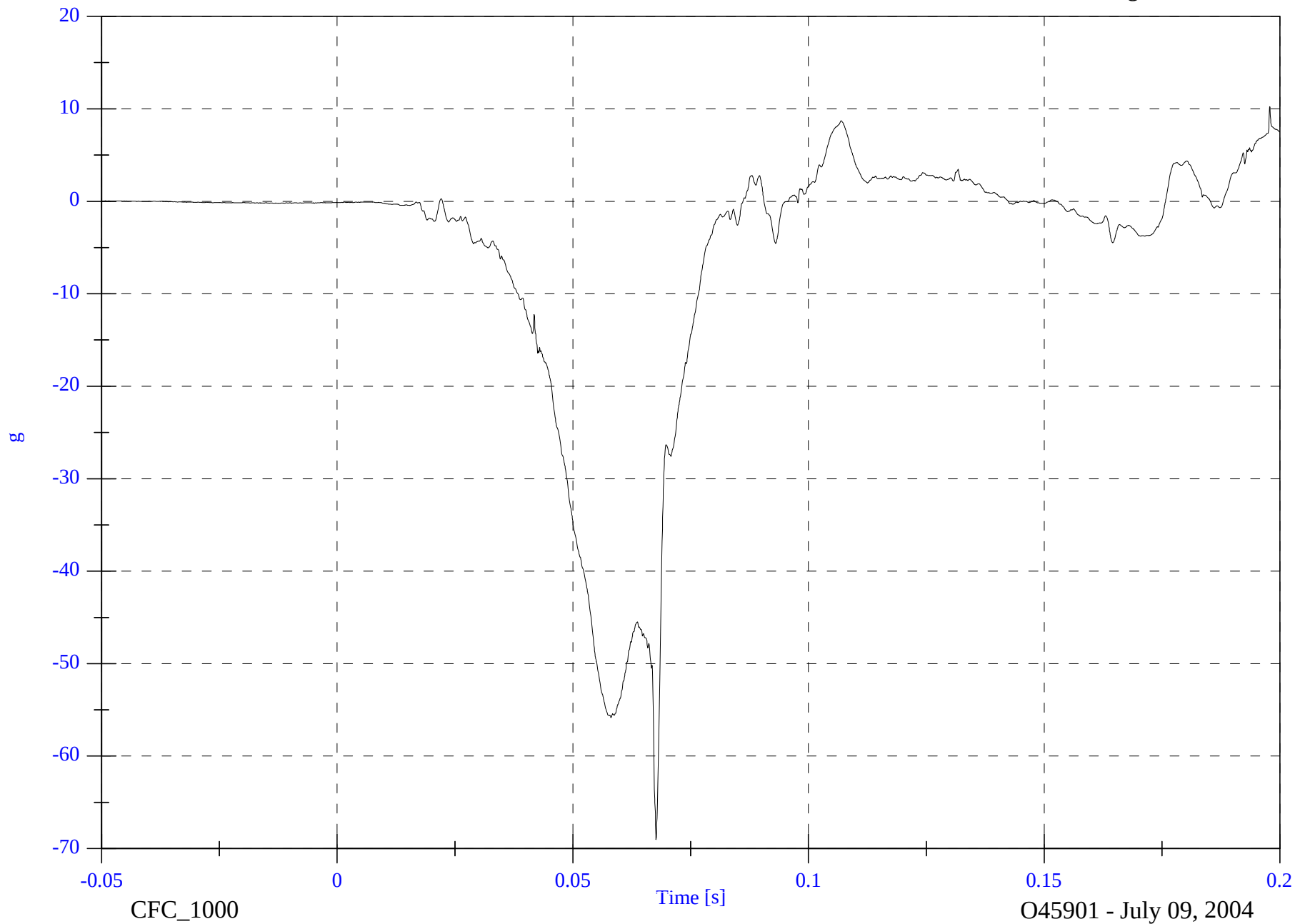
V1P4 Pelvic z

Max: 10.2 [g] at 0.198 [s]

Min: -69.0 [g] at 0.068 [s]

4-61

8748-01

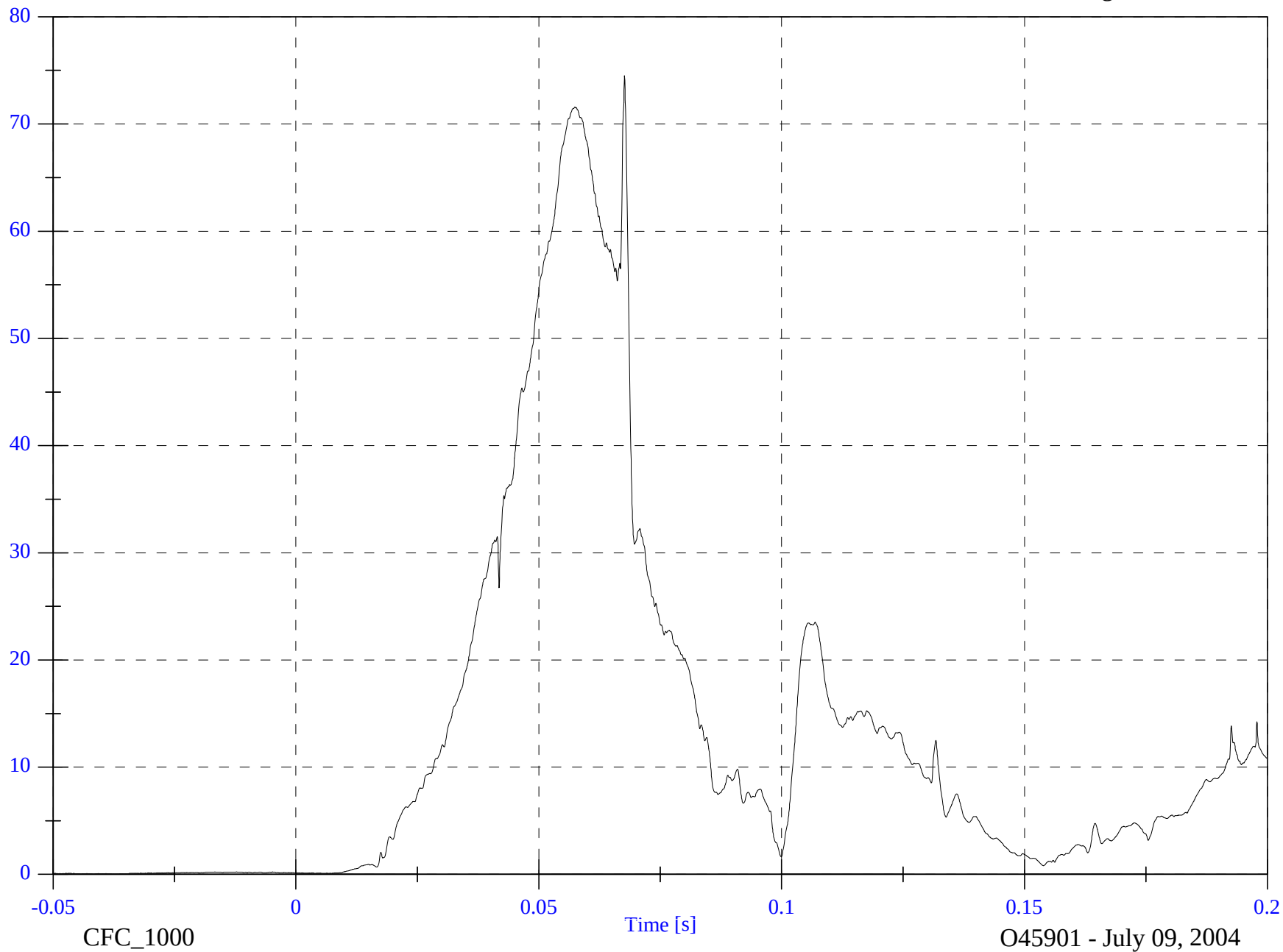


NCAP Optional Test - 2004.5 Volvo S40

V1P4 Pelvic Resultant

Max: 74.5 [g] at 0.068 [s]

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



4-62

8748-01

CFC_1000

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

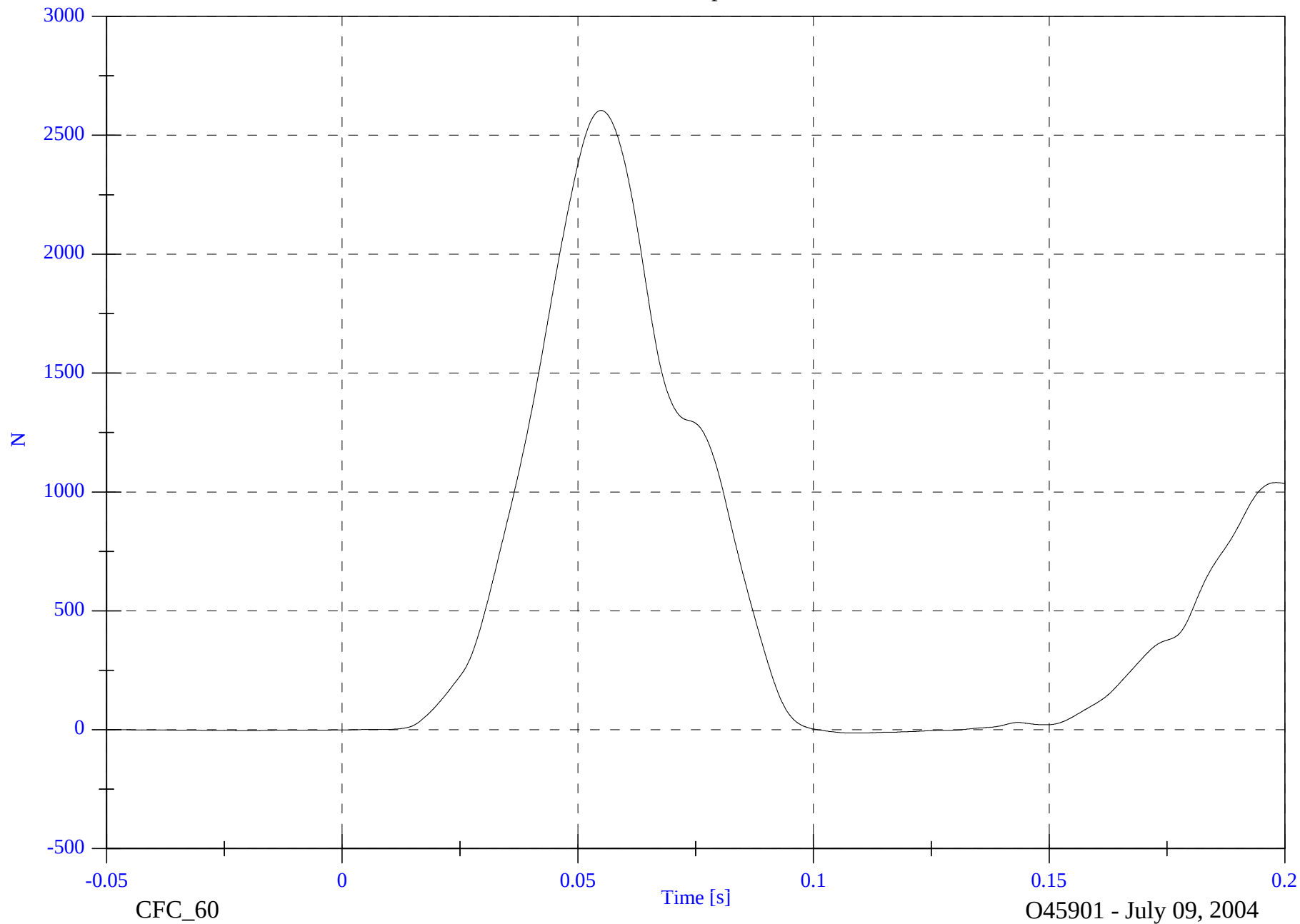
V1P4 Lap Belt

Max: 2604.0 [N] at 0.055 [s]

Min: -14.0 [N] at 0.109 [s]

4-63

8748-01

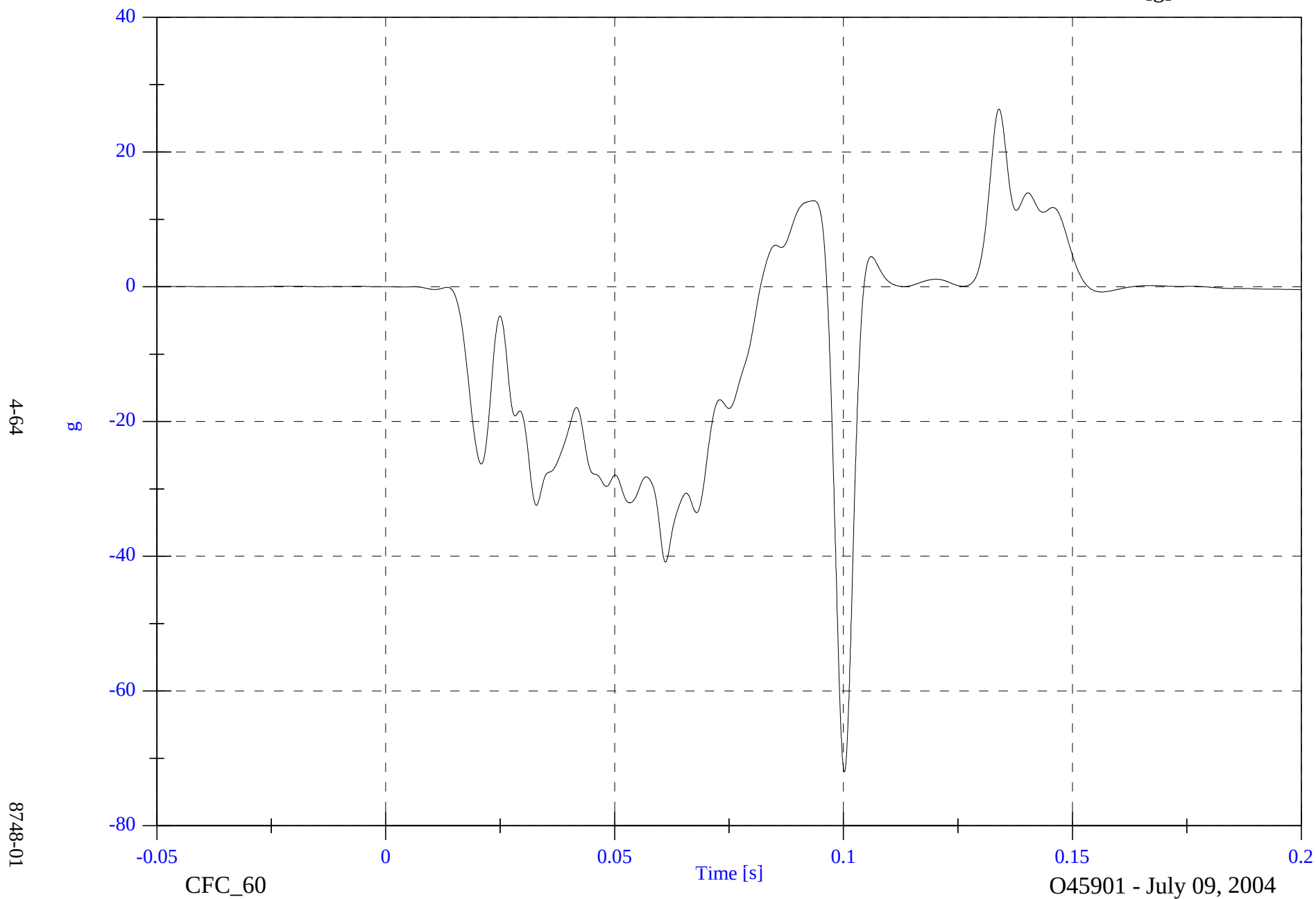


NCAP Optional Test - 2004.5 Volvo S40

V1P3 CRS x

Max: 26.4 [g] at 0.134 [s]

Min: -72.0 [g] at 0.100 [s]

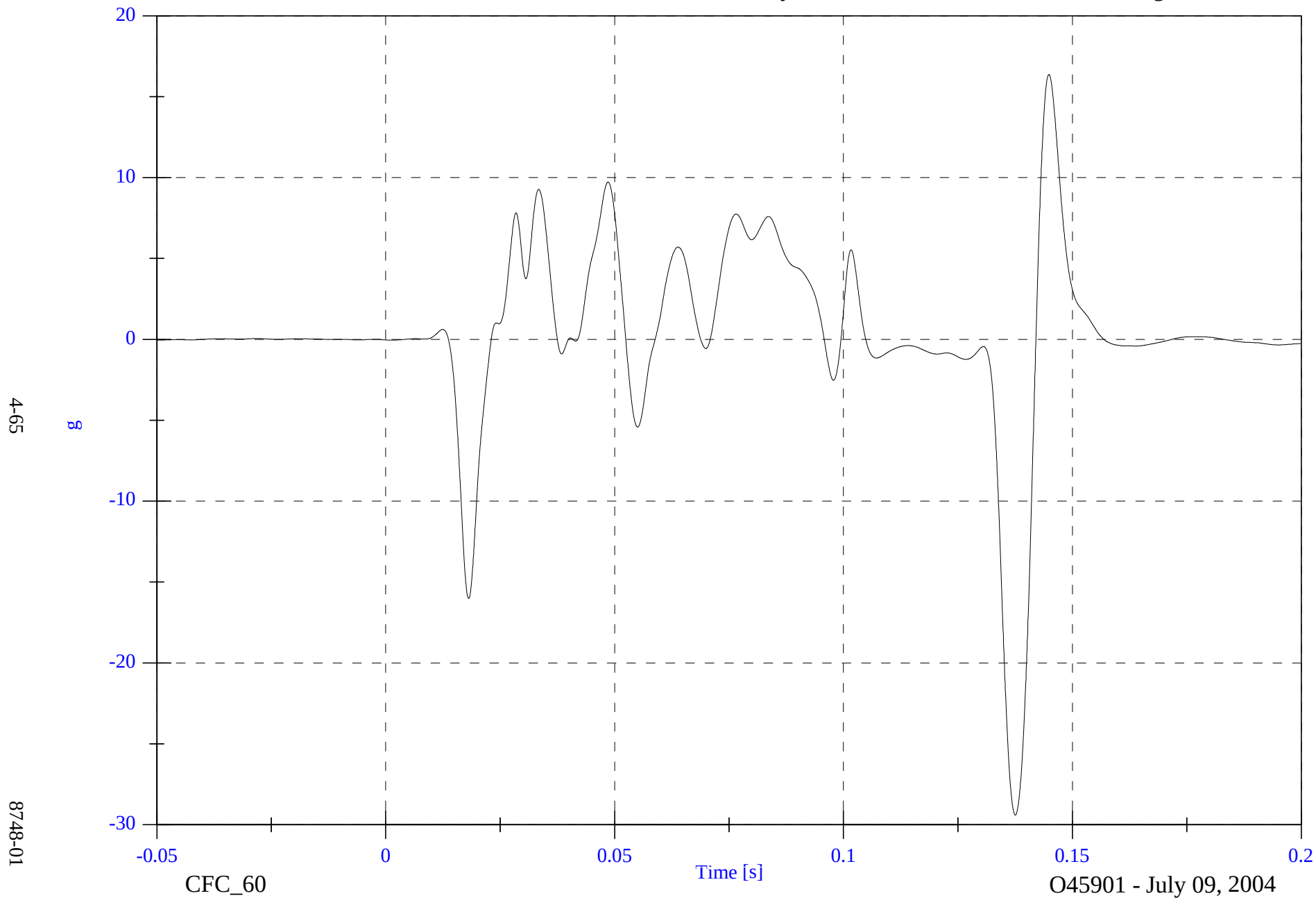


NCAP Optional Test - 2004.5 Volvo S40

V1P3 CRS y

Max: 16.4 [g] at 0.145 [s]

Min: -29.4 [g] at 0.138 [s]

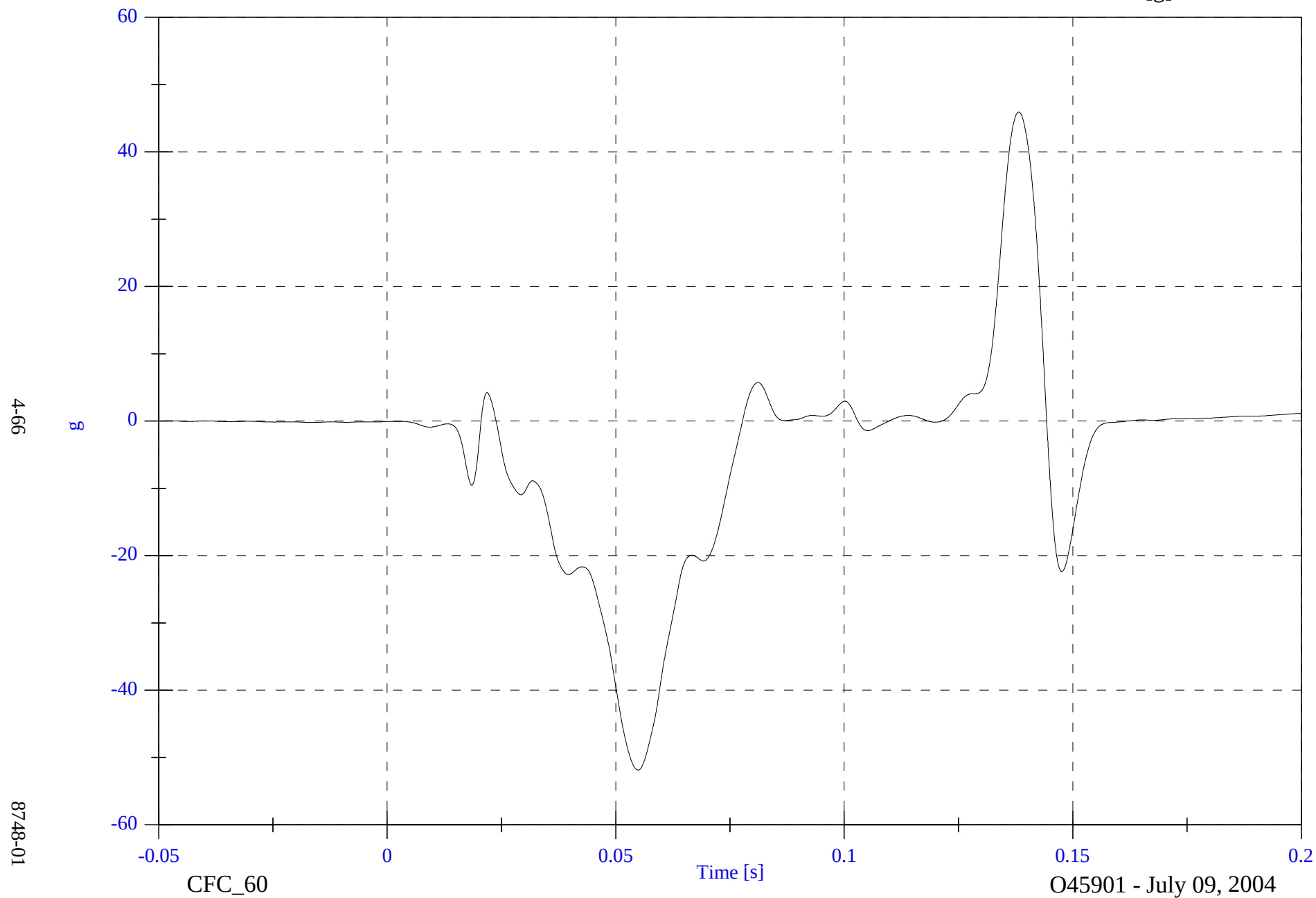


NCAP Optional Test - 2004.5 Volvo S40

V1P3 CRS z

Max: 45.9 [g] at 0.138 [s]

Min: -51.9 [g] at 0.055 [s]



NCAP Optional Test - 2004.5 Volvo S40

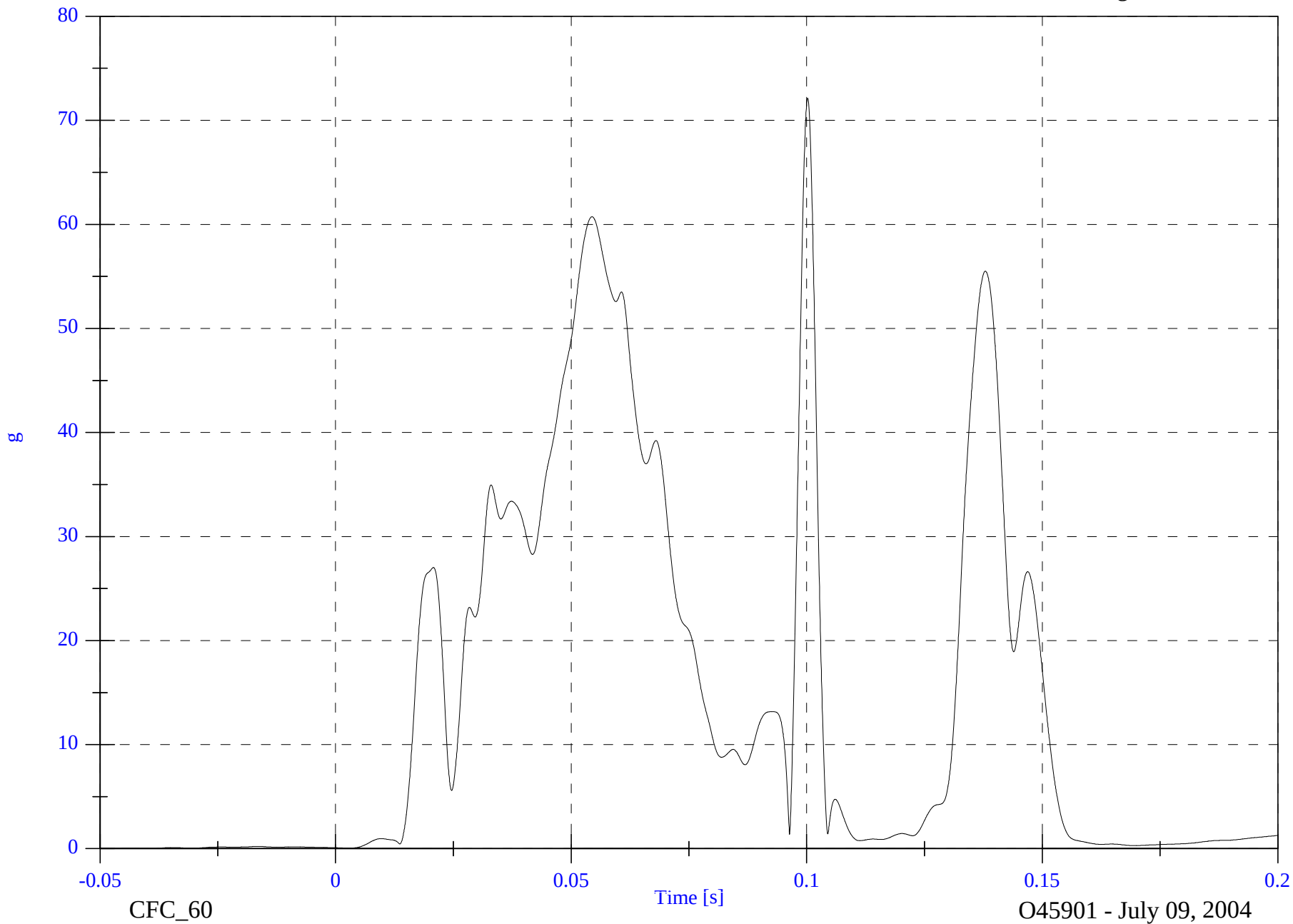
V1P3 CRS Resultant

Max: 72.1 [g] at 0.100 [s]

Min: 0.0 [g] at -0.040 [s]

4-67

8748-01



NCAP Optional Test - 2004.5 Volvo S40

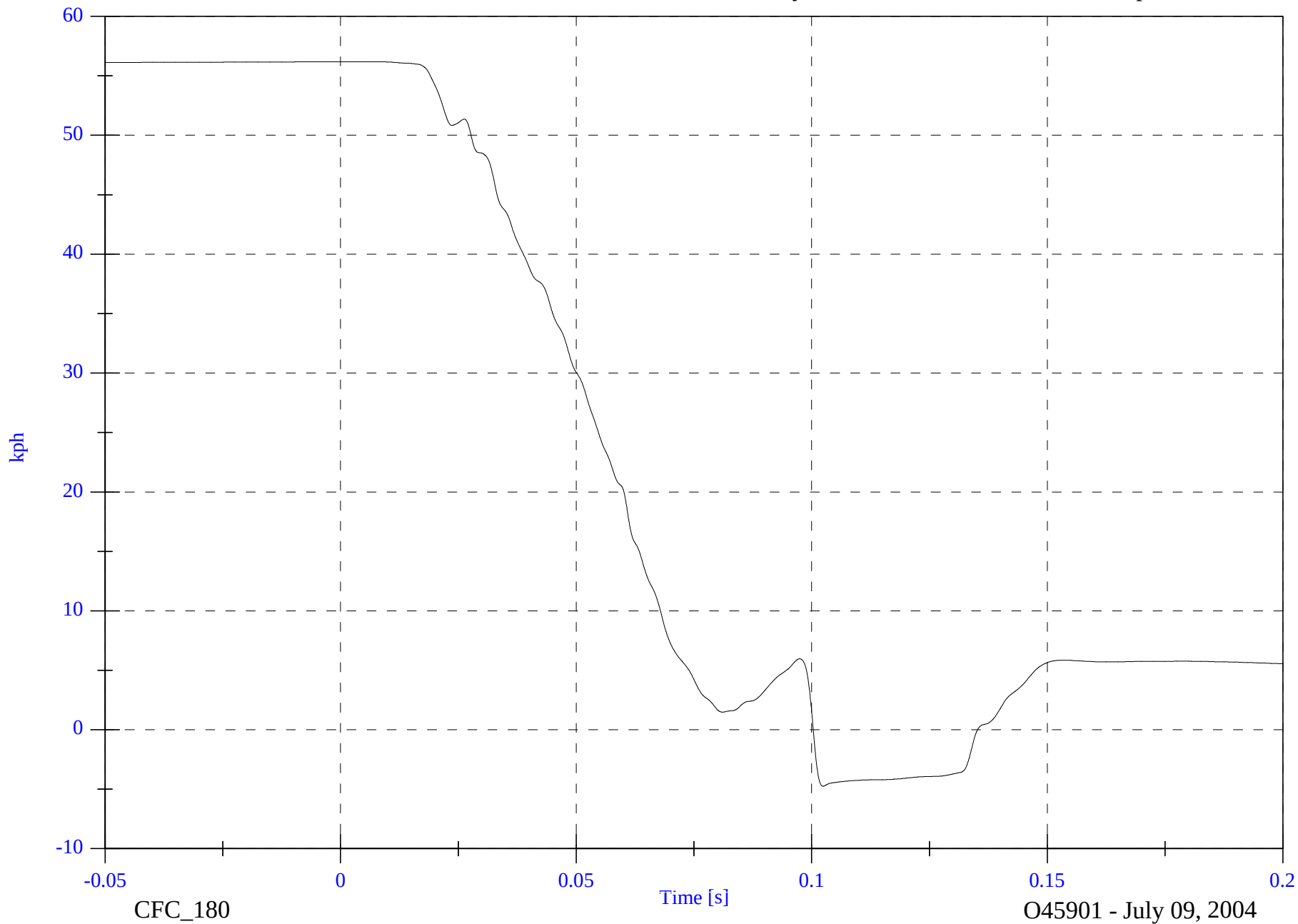
V1P3 CRS x Velocity

Max: 56.2 [kph] at -0.003 [s]

Min: -4.8 [kph] at 0.102 [s]

4-68

8748-01



NCAP Optional Test - 2004.5 Volvo S40

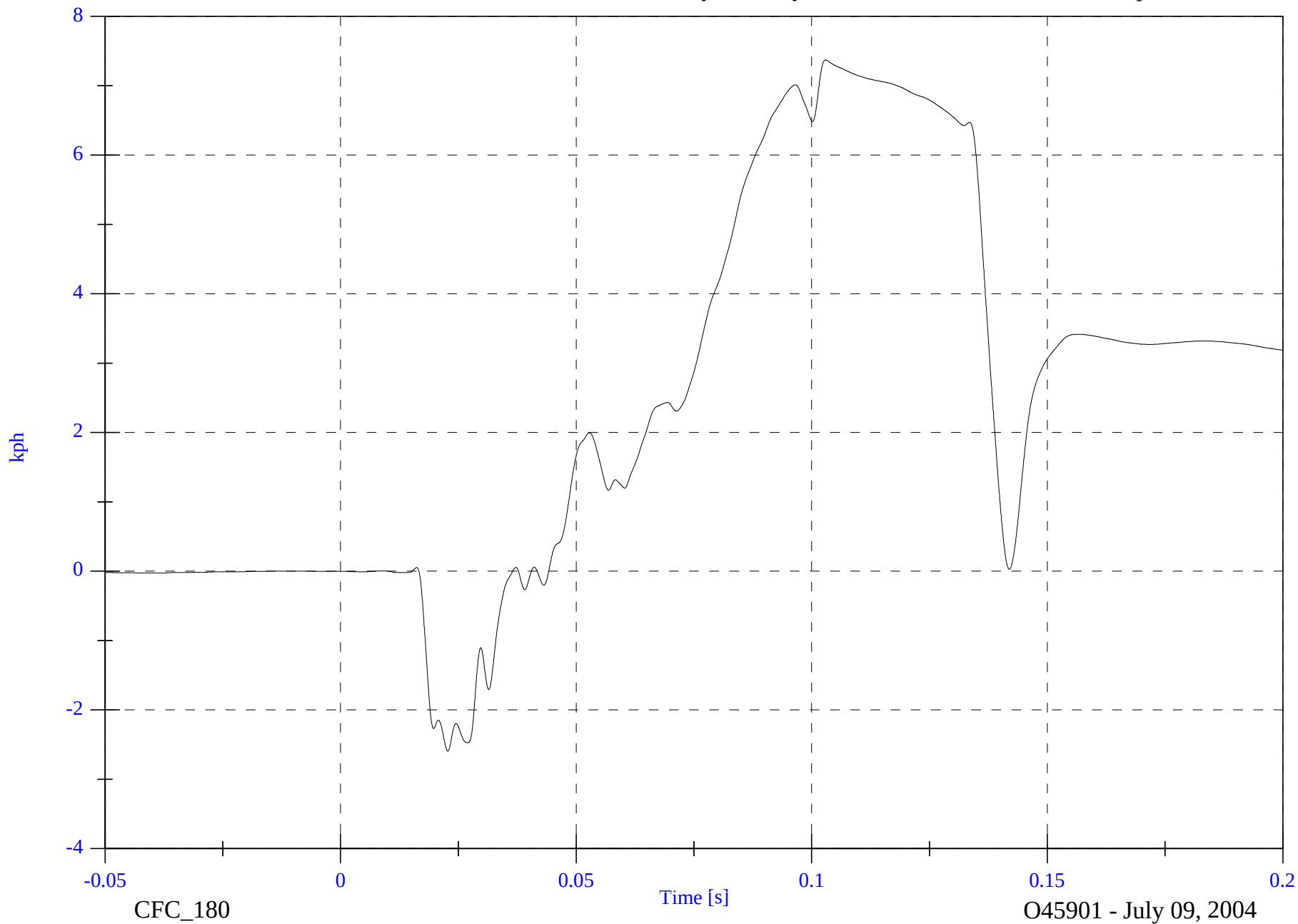
V1P3 CRS y Velocity

Max: 7.4 [kph] at 0.103 [s]

Min: -2.6 [kph] at 0.023 [s]

4-69

8748-01

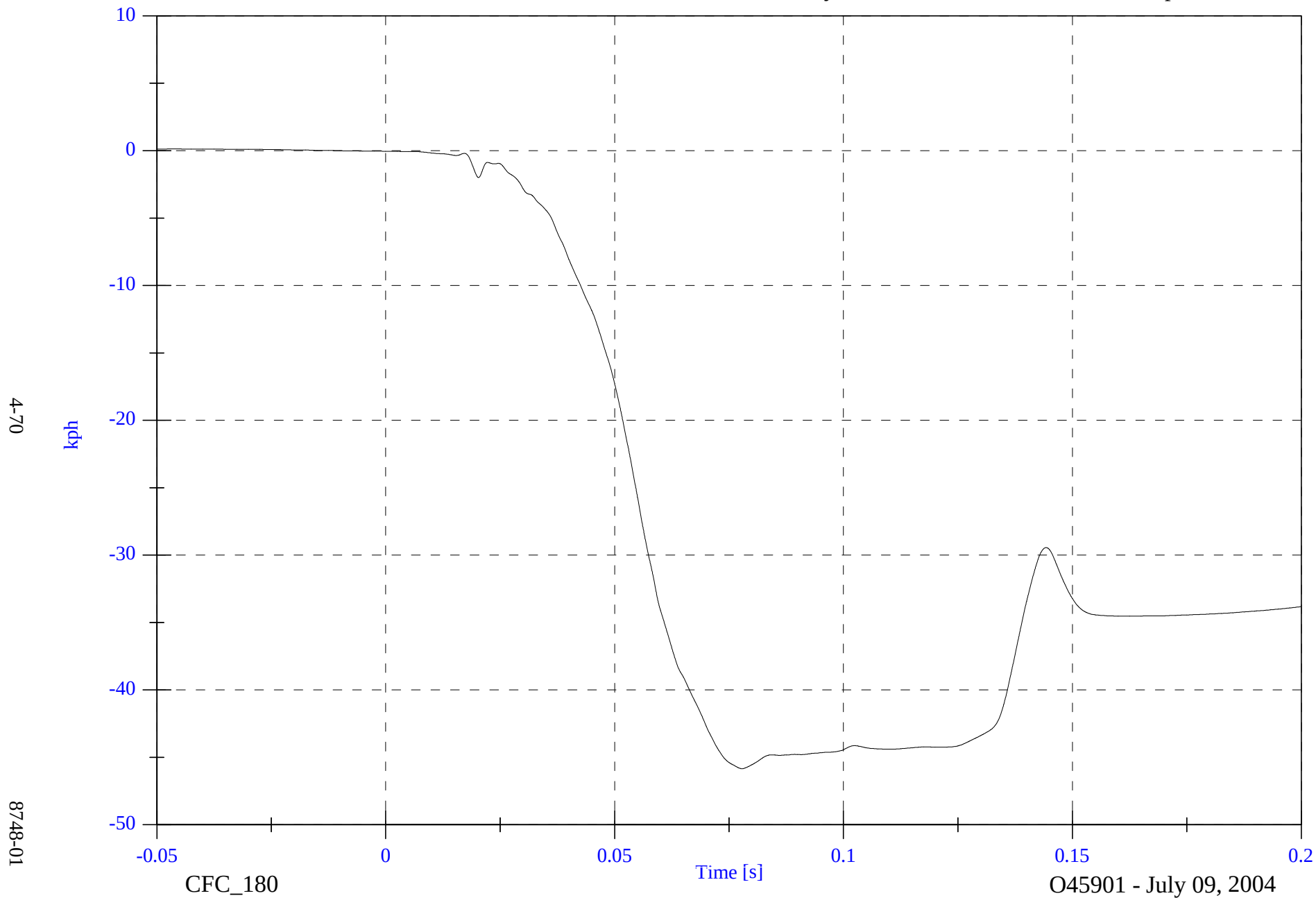


NCAP Optional Test - 2004.5 Volvo S40

V1P3 CRS z Velocity

Max: 0.1 [kph] at -0.046 [s]

Min: -45.8 [kph] at 0.078 [s]



NCAP Optional Test - 2004.5 Volvo S40

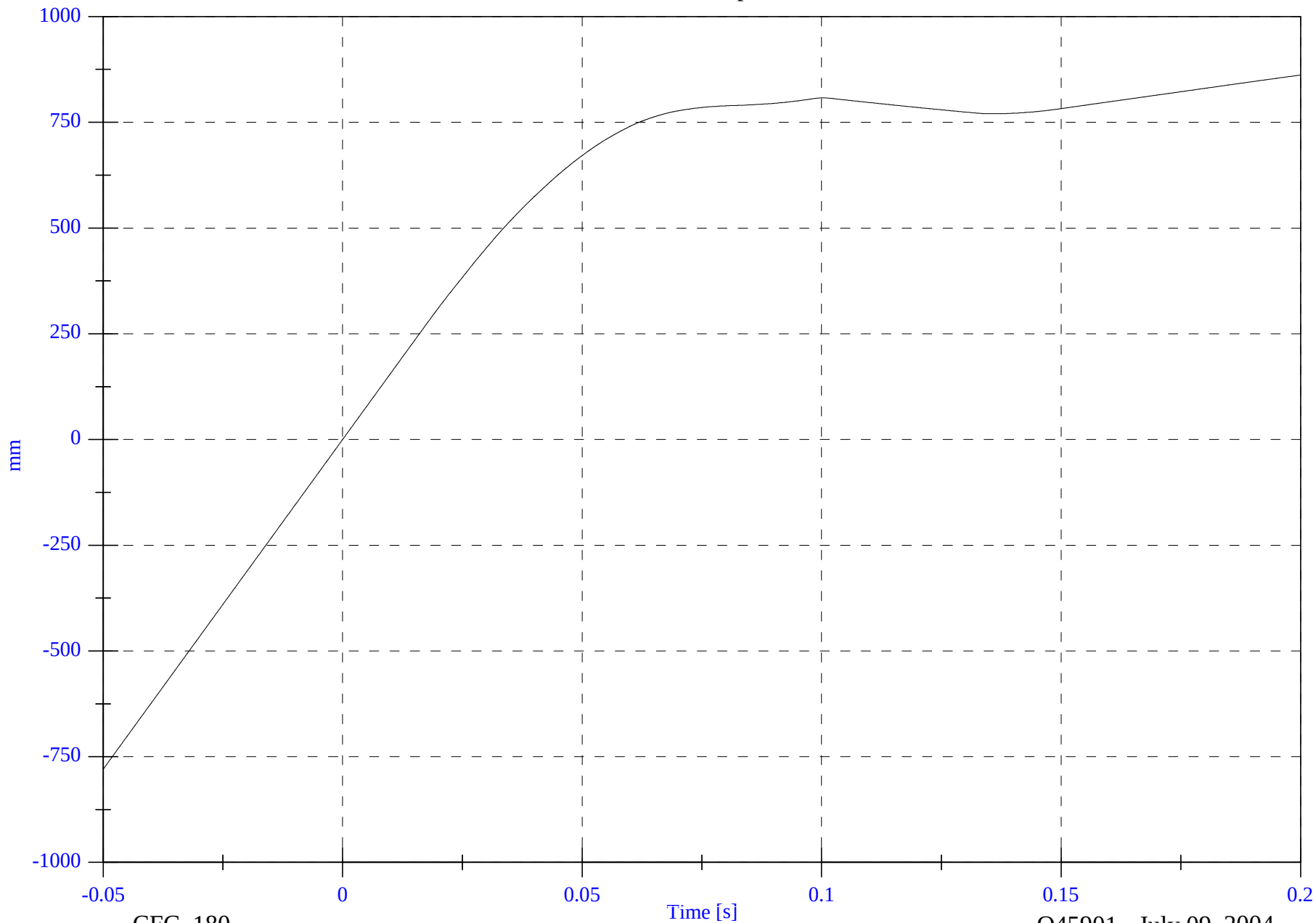
V1P3 CRS x Displacement

Max: 861.7 [mm] at 0.200 [s]

Min: -779.8 [mm] at -0.050 [s]

4-71

8748-01



CFC_180

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

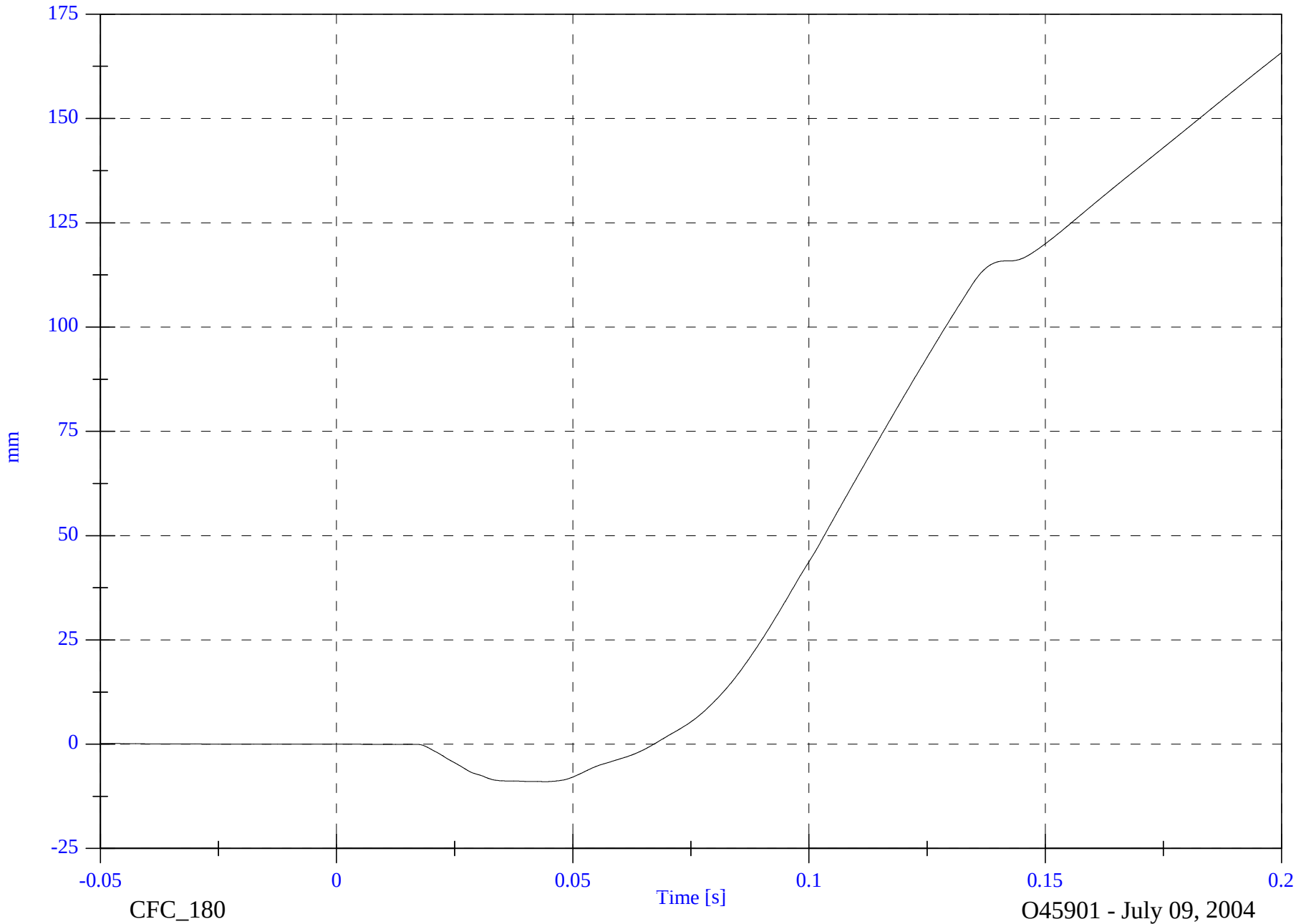
V1P3 CRS y Displacement

Max: 165.7 [mm] at 0.200 [s]

Min: -9.0 [mm] at 0.044 [s]

4-72

8748-01



NCAP Optional Test - 2004.5 Volvo S40

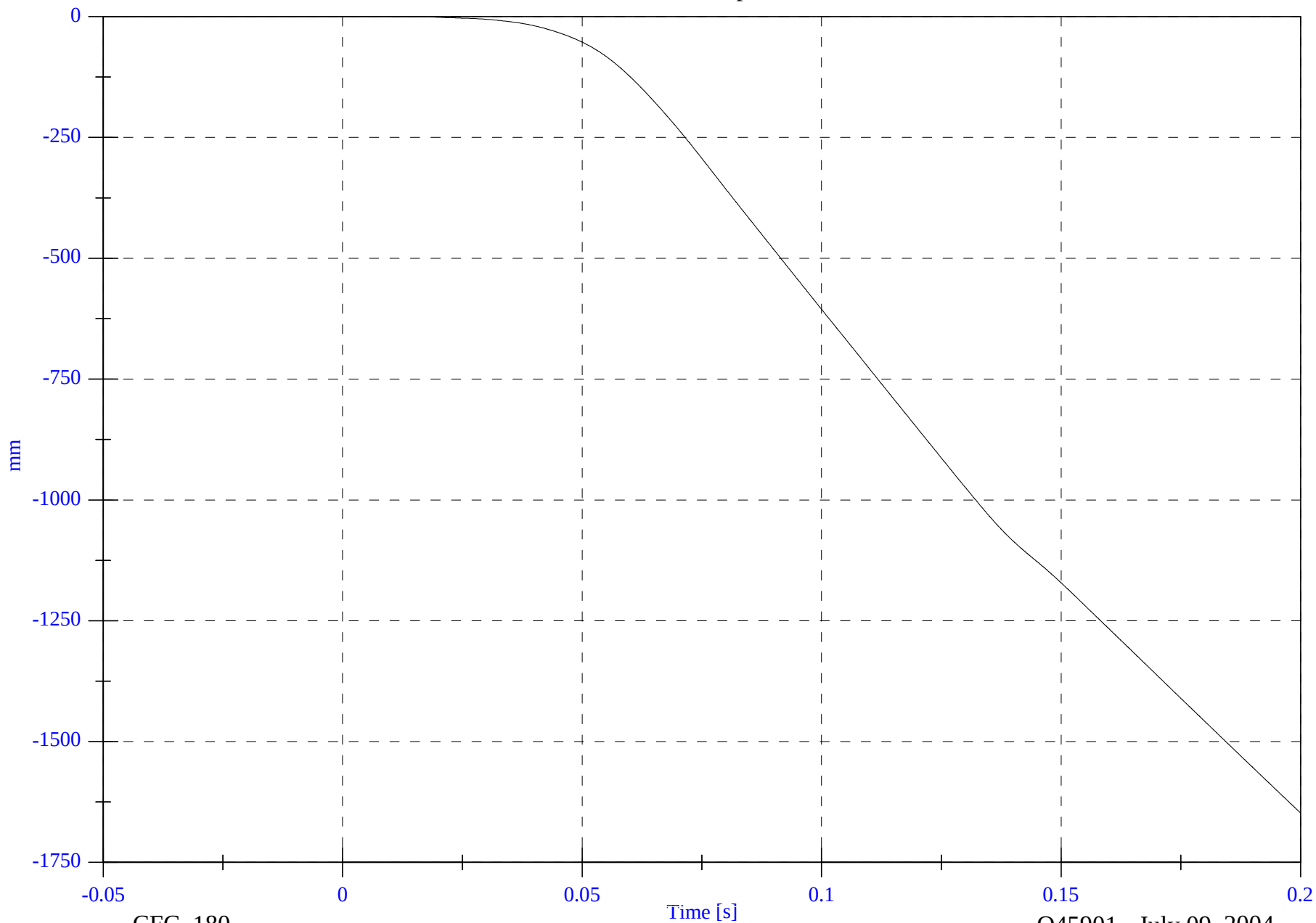
V1P3 CRS z Displacement

Max: 0.1 [mm] at -0.010 [s]

Min: -1647.4 [mm] at 0.200 [s]

4-73

8748-01



CFC_180

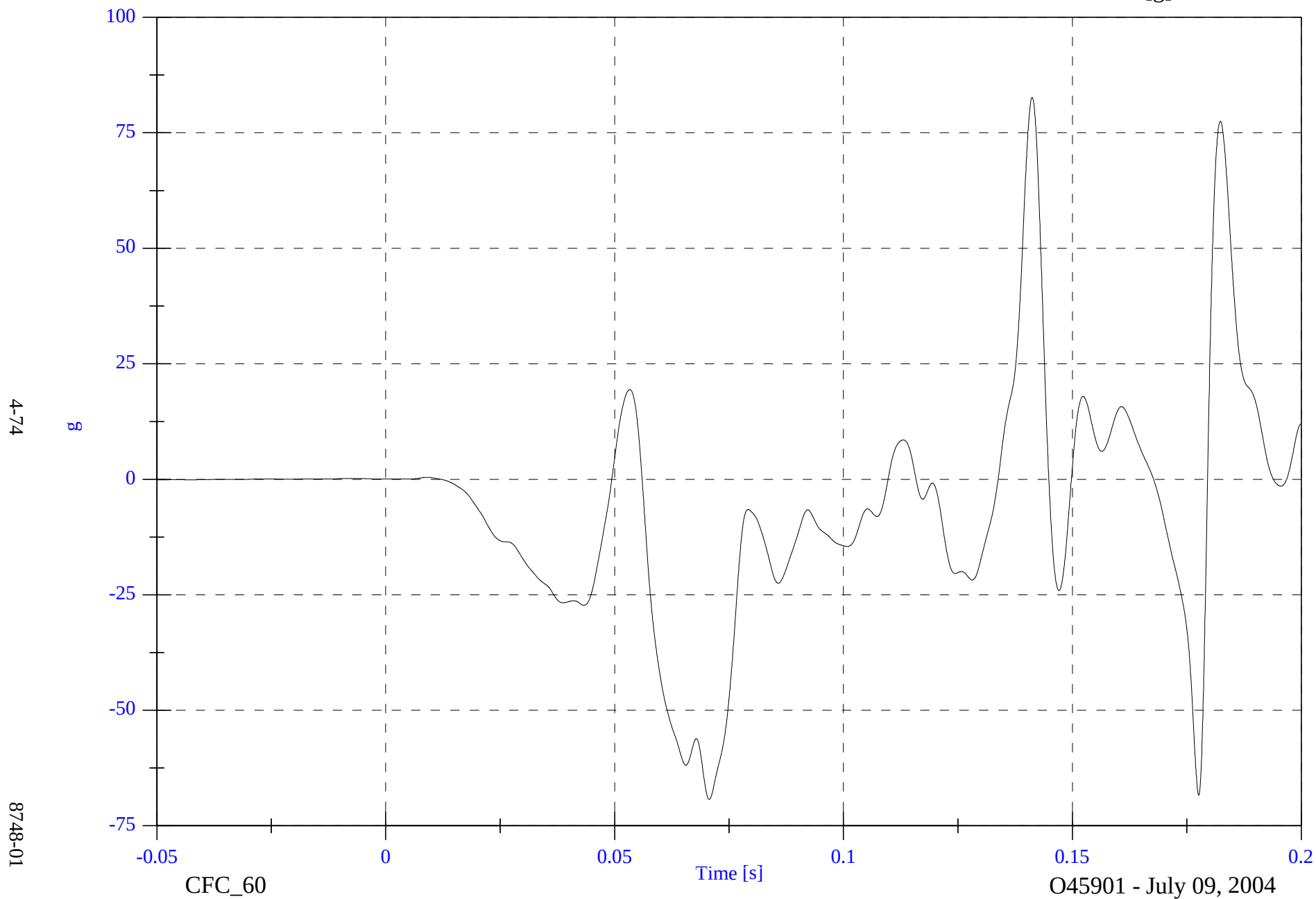
O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

V1P4 CRS x

Max: 82.7 [g] at 0.141 [s]

Min: -69.3 [g] at 0.071 [s]



NCAP Optional Test - 2004.5 Volvo S40

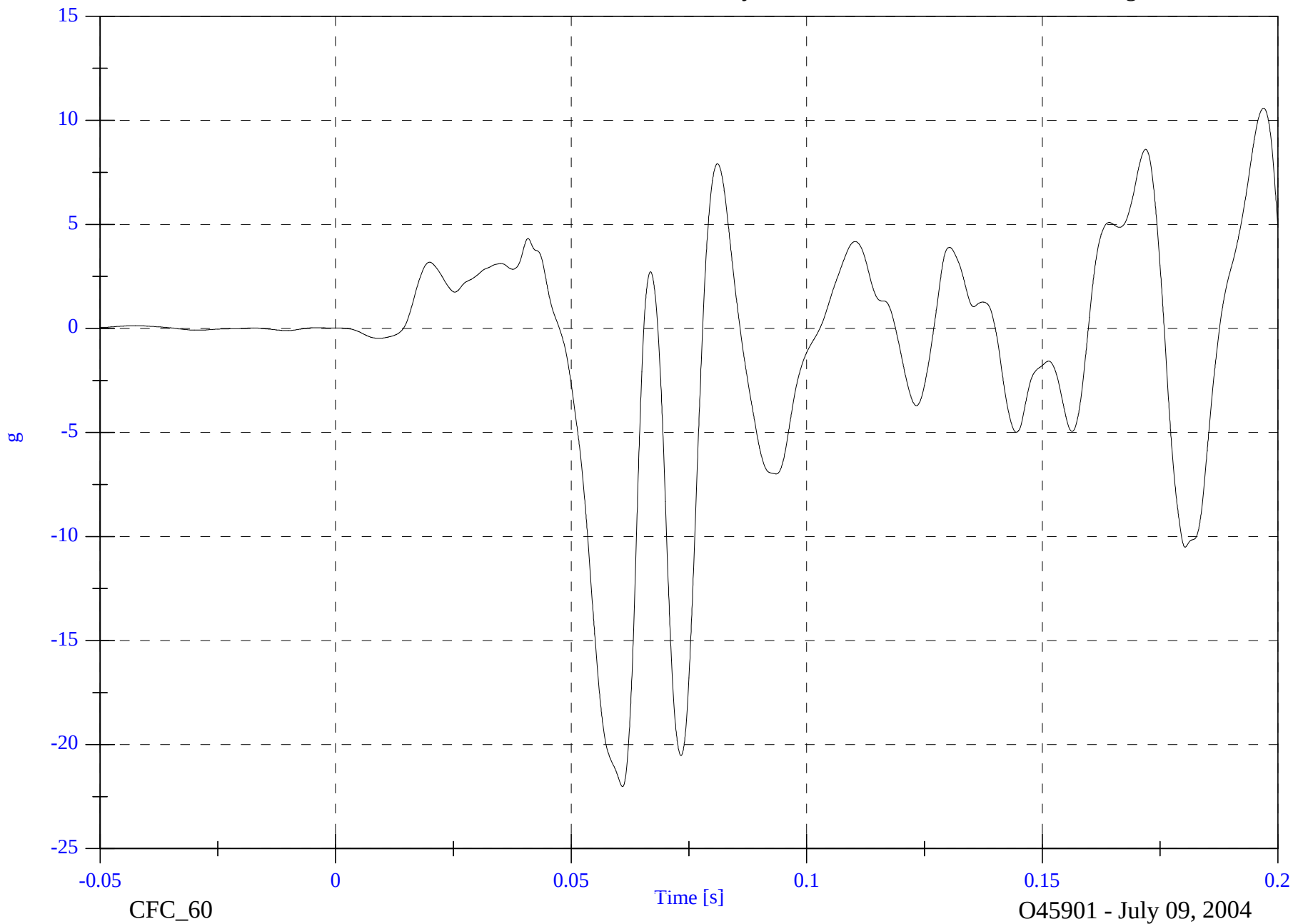
V1P4 CRS y

Max: 10.6 [g] at 0.197 [s]

Min: -22.0 [g] at 0.061 [s]

4-75

8748-01

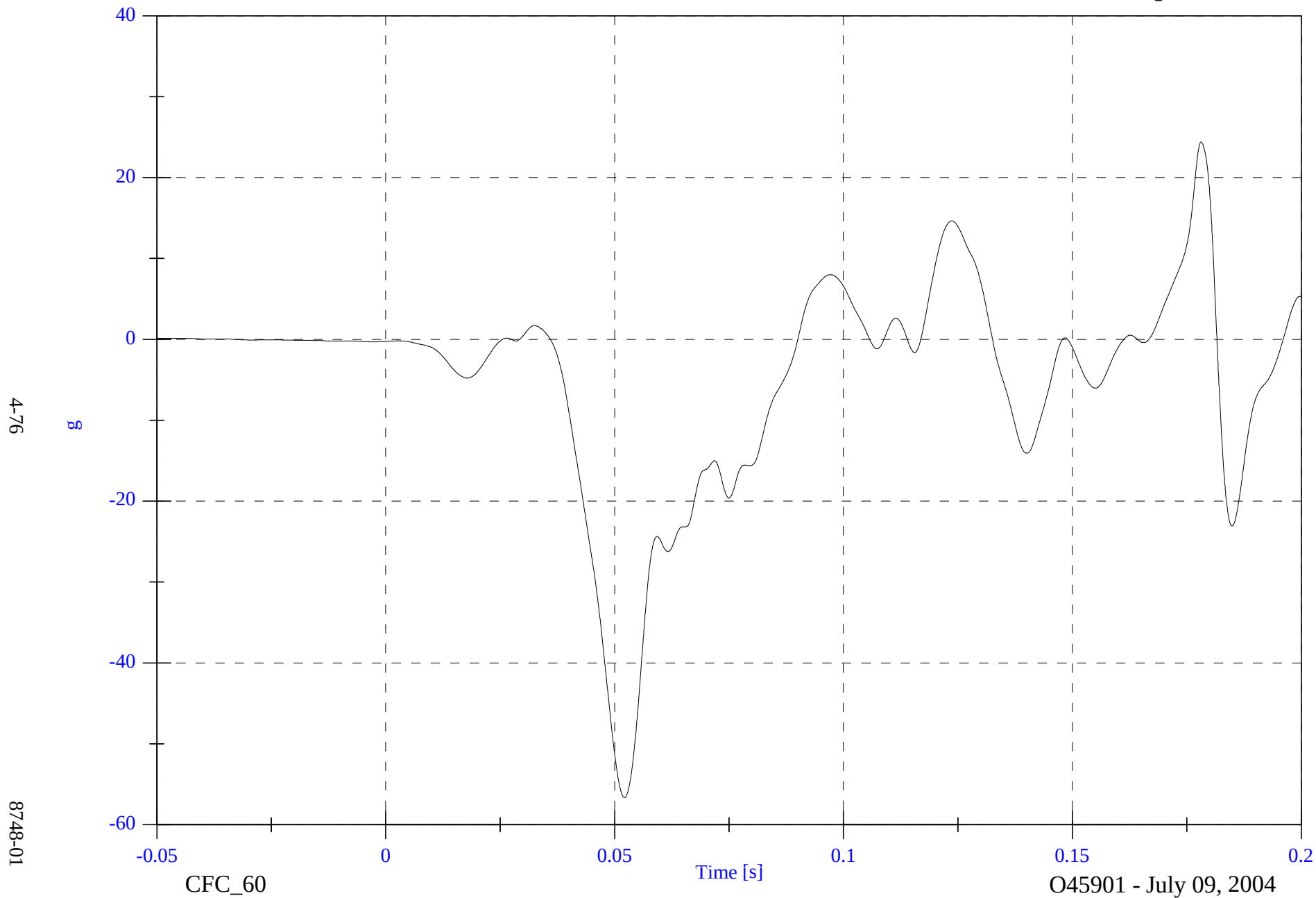


NCAP Optional Test - 2004.5 Volvo S40

V1P4 CRS z

Max: 24.4 [g] at 0.178 [s]

Min: -56.7 [g] at 0.052 [s]



NCAP Optional Test - 2004.5 Volvo S40

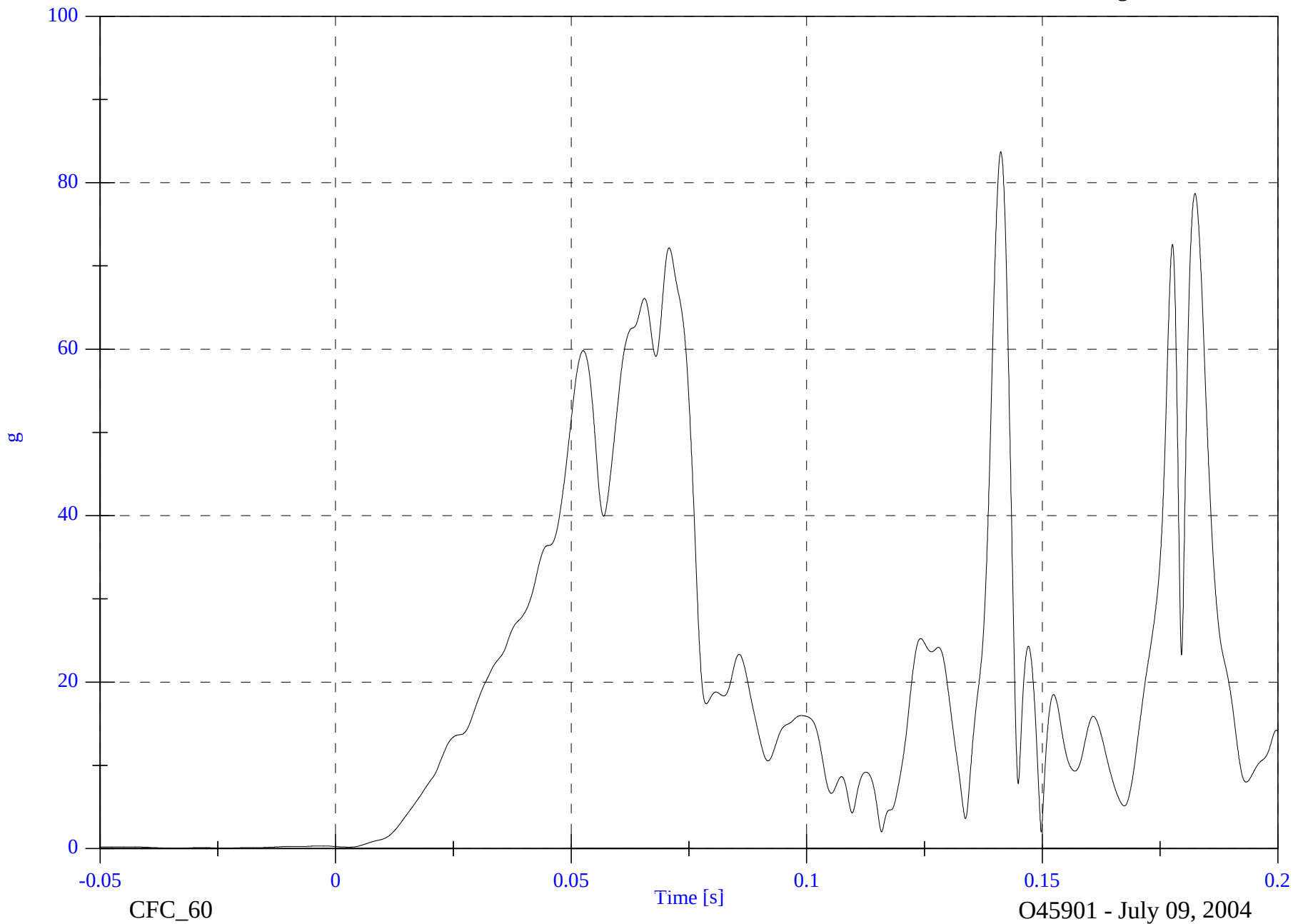
V1P4 CRS Resultant

Max: 83.7 [g] at 0.141 [s]

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

4-77

8748-01



NCAP Optional Test - 2004.5 Volvo S40

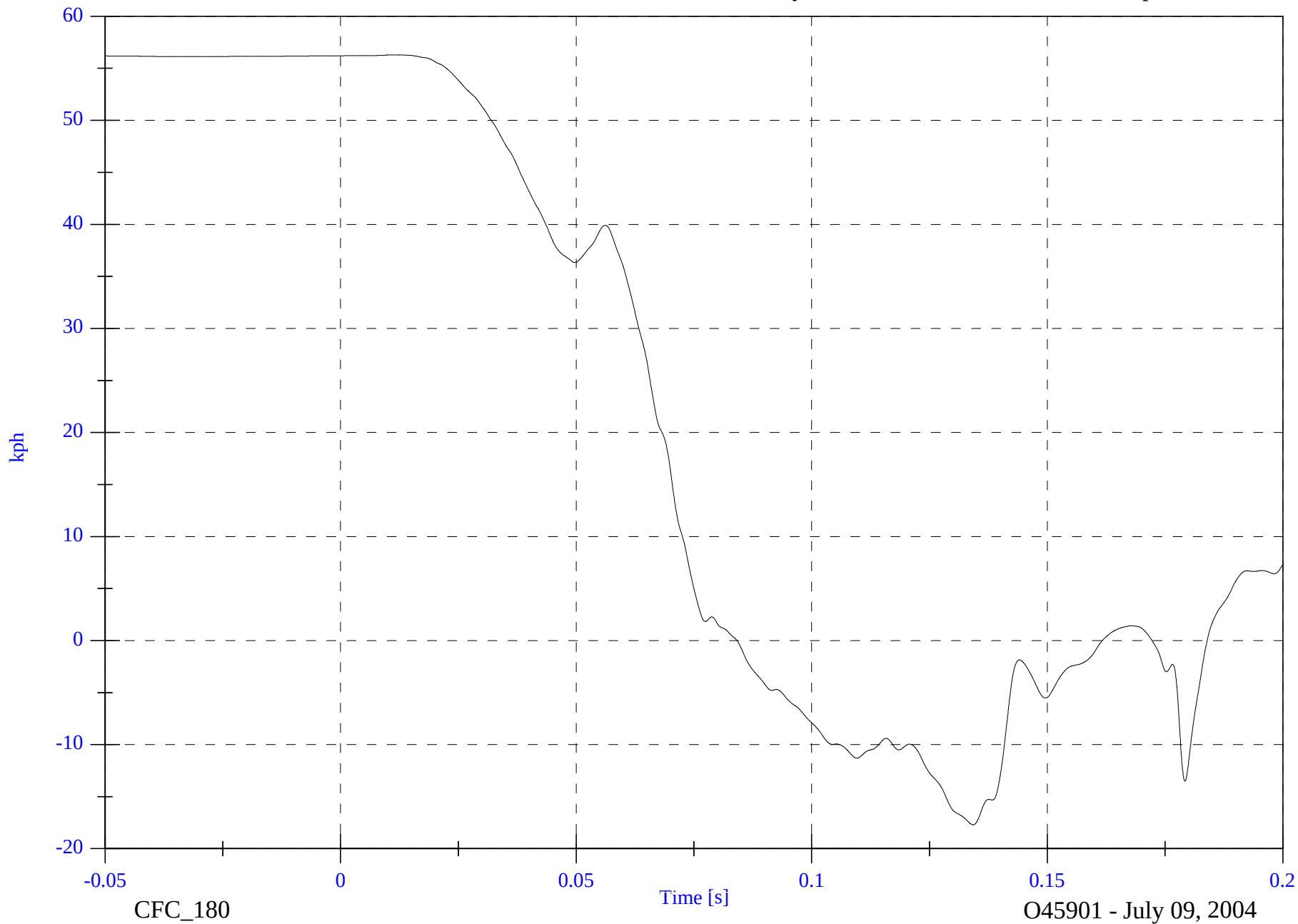
V1P4 CRS x Velocity

Max: 56.3 [kph] at 0.011 [s]

Min: -17.7 [kph] at 0.134 [s]

4-78

8748-01

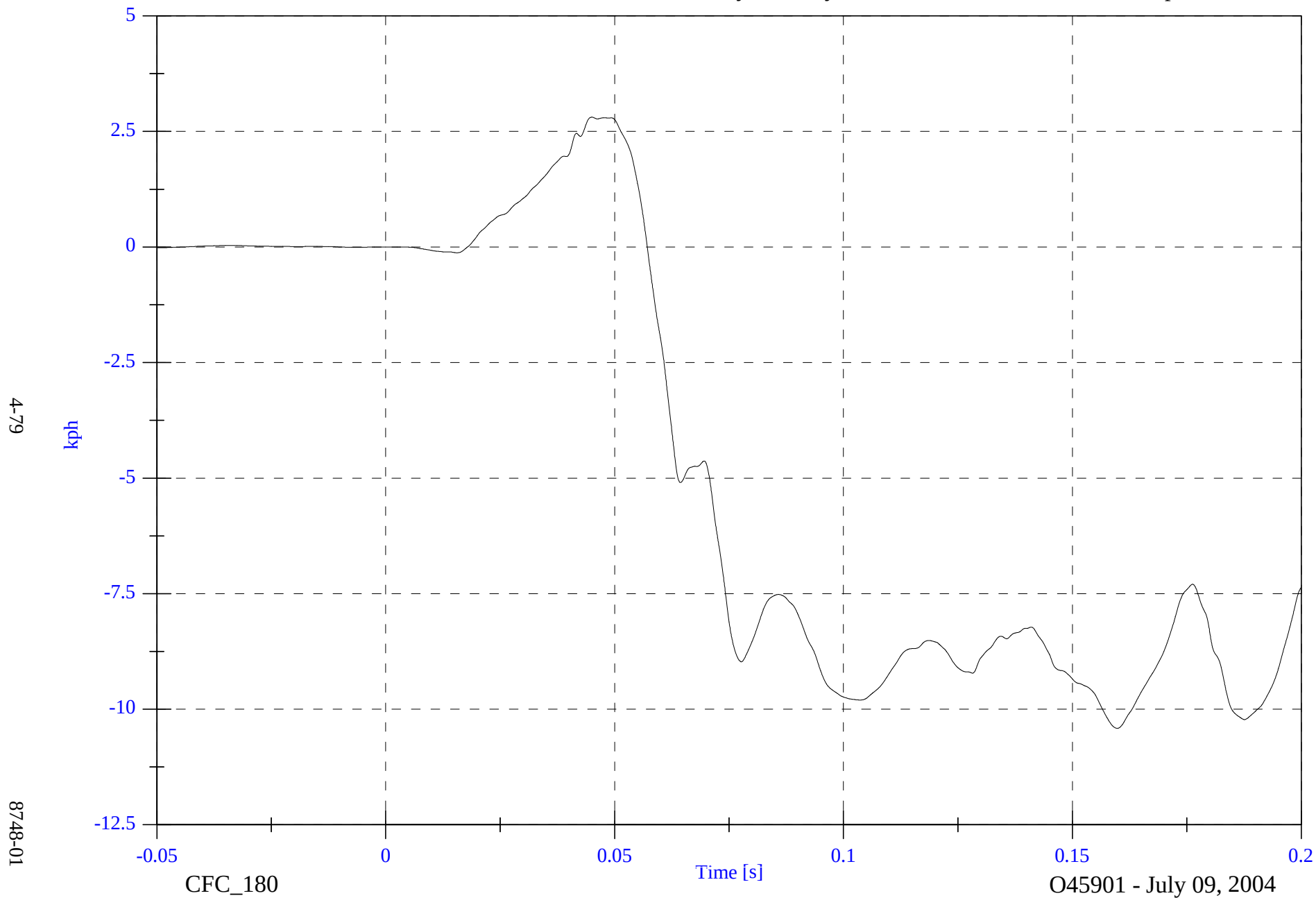


NCAP Optional Test - 2004.5 Volvo S40

V1P4 CRS y Velocity

Max: 2.8 [kph] at 0.045 [s]

Min: -10.4 [kph] at 0.160 [s]

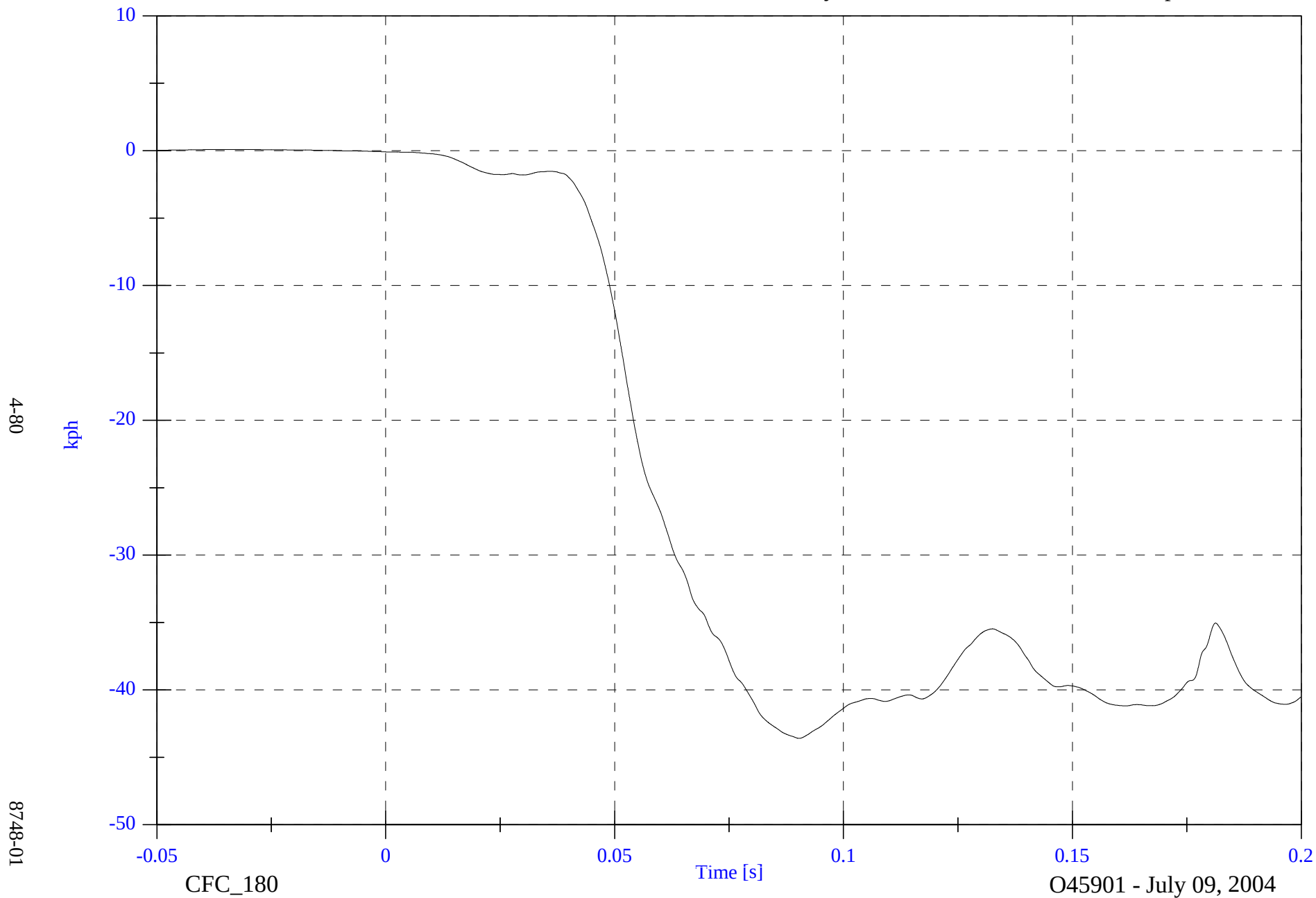


NCAP Optional Test - 2004.5 Volvo S40

V1P4 CRS z Velocity

Max: 0.1 [kph] at -0.033 [s]

Min: -43.6 [kph] at 0.090 [s]



NCAP Optional Test - 2004.5 Volvo S40

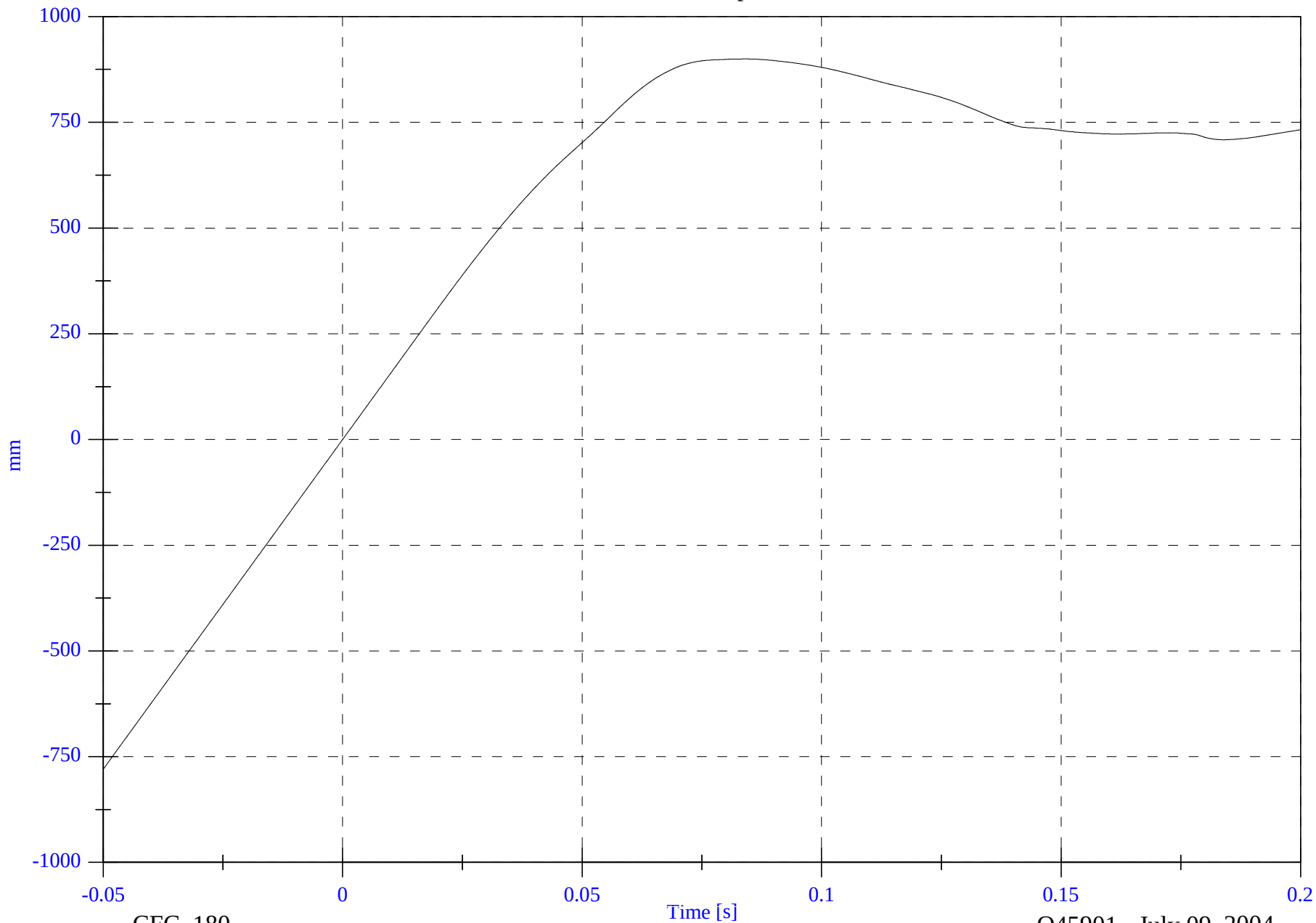
V1P4 CRS x Displacement

Max: 899.9 [mm] at 0.084 [s]

Min: -780.0 [mm] at -0.050 [s]

4-81

8748-01



CFC_180

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

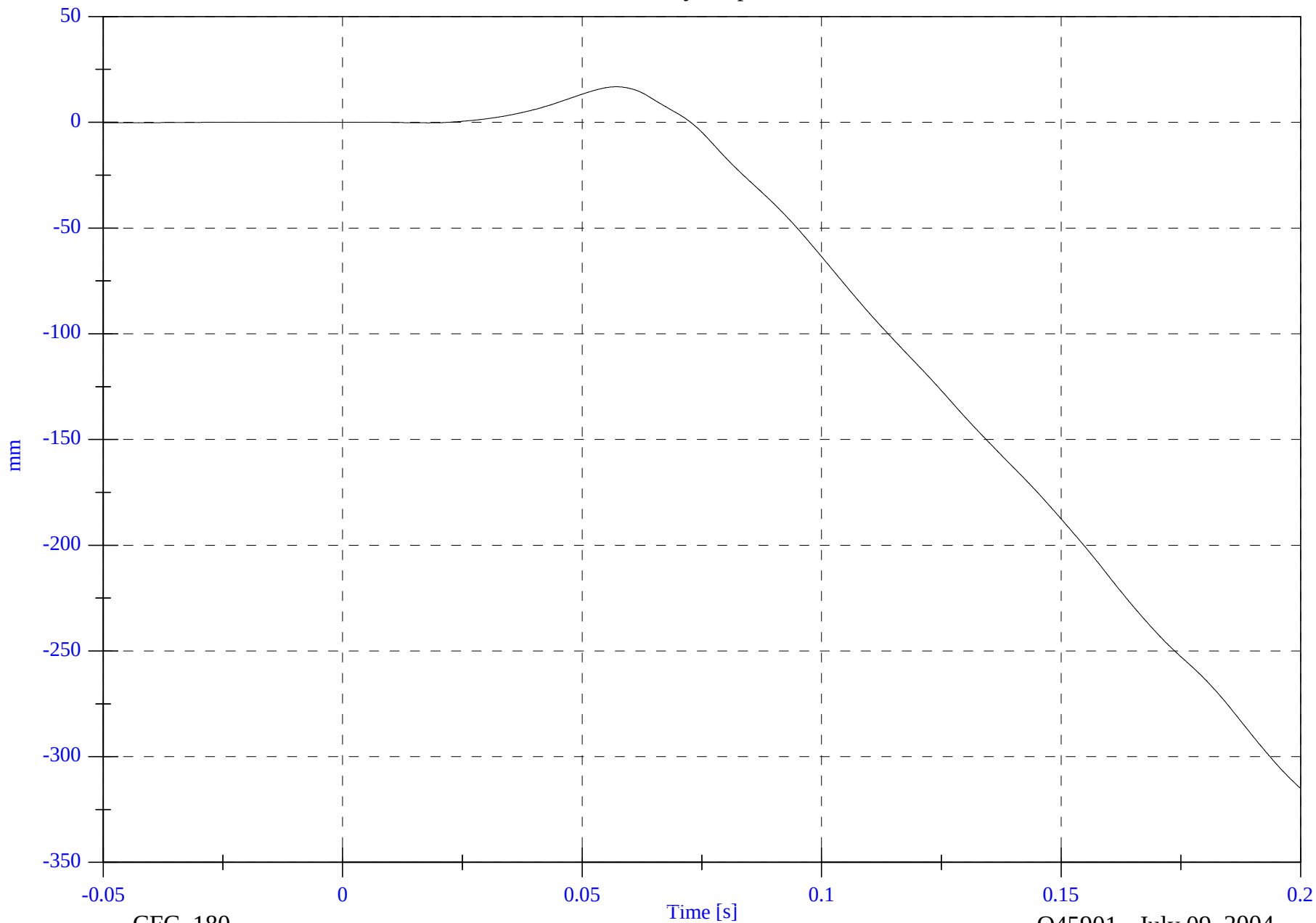
V1P4 CRS y Displacement

Max: 16.8 [mm] at 0.057 [s]

Min: -314.9 [mm] at 0.200 [s]

4-82

8748-01



CFC_180

O45901 - July 09, 2004

NCAP Optional Test - 2004.5 Volvo S40

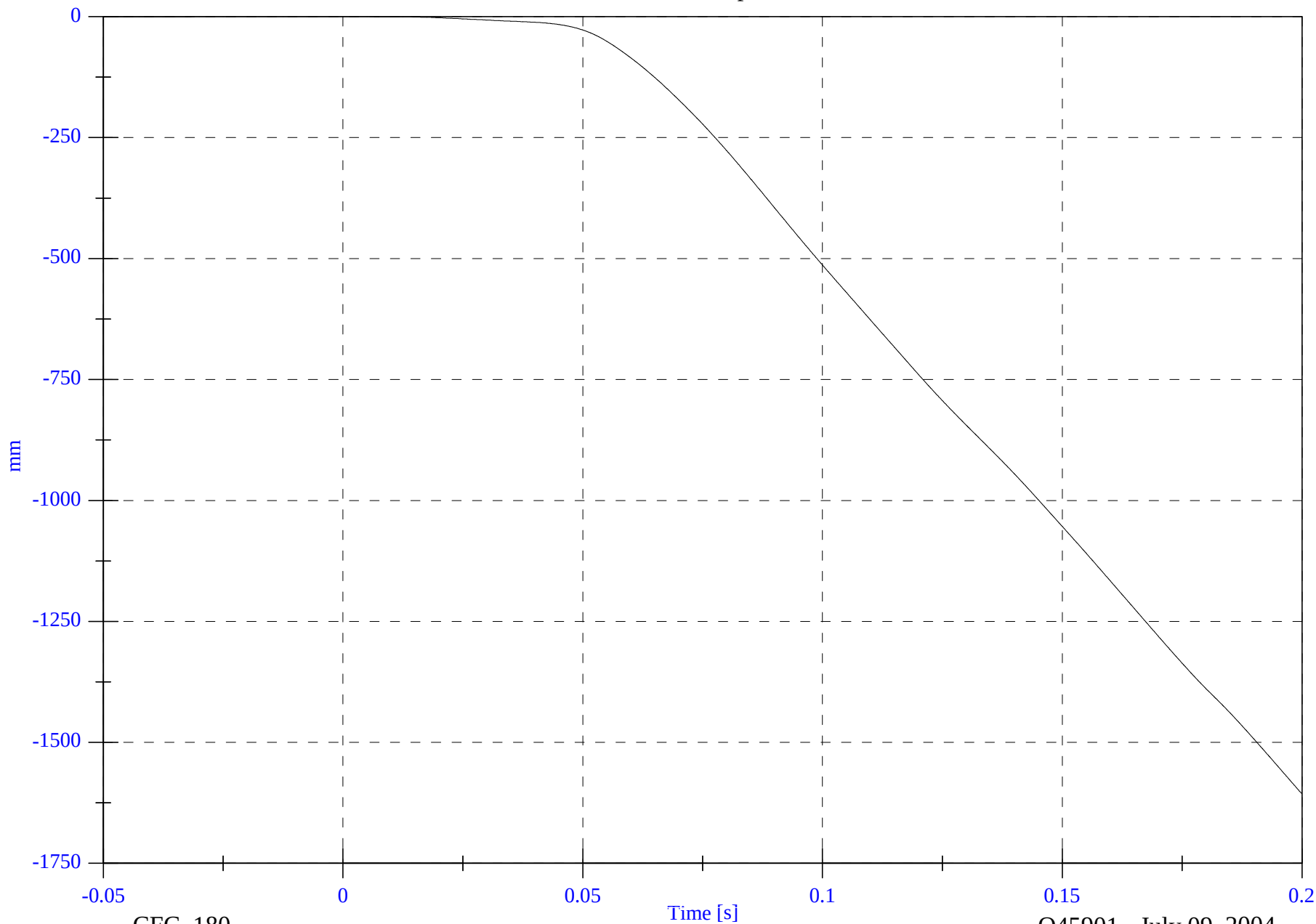
V1P4 CRS z Displacement

Max: 0.1 [mm] at -0.010 [s]

Min: -1606.2 [mm] at 0.200 [s]

4-83

8748-01



CFC_180

O45901 - July 09, 2004

SECTION 5

CHILD DUMMY CALIBRATION INFORMATION

PART 572P
HEAD DROP TEST

Dummy Serial Number 142
Sequential Test Number 1
Date 01-12-2004
Workfile 142H2 01-12-04

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	66-78 Deg F	70.00 F
Relative Humidity	10% - 70%	33.00 %
Peak Resultant Acceleration	250-280 G's	263.52 Gs
Peak Lateral Acceleration	15 G's Max	12.48 Gs
Is Acceleration Curve Unimodal?	<10%	4.38 %

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572P
NECK FLEXION TEST

Dummy Serial Number 142
Sequential Test Number 1
Date 12-11-03
Workfile 142nf 12-11-03

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.11
Relative Humidity		10% - 70%	27.0
Pendulum Speed		5.40-5.60 m/s	5.55
Pendulum Pulse	10 ms	2.00 – 2.70 m/s	2.05
	15 ms	3.00 – 4.00 m/s	3.03
	20 ms	4.00 – 5.10 m/s	4.13
D Plane Rotation	Max	70.0 – 82.0 Deg	80.64
Maximum Occipital Moment		42.00 - 53.00 N-m	42.46
Occipital Moment Decay		60.0 - 80.0 ms	69.60

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572P
NECK EXTENSION TEST

Dummy Serial Number 142
Sequential Test Number 2
Date 12-11-03
Workfile 142ne2 12-11-03

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.11
Relative Humidity		10% - 70%	27.00
Pendulum Speed		3.55 – 3.75 m/s	3.60
Pendulum Pulse	10 ms	1.00 – 1.40 m/s	1.10
	15 ms	1.90 – 2.50 m/s	2.02
	20 ms	2.80 – 3.50 m/s	2.85
D Plane Rotation	Max	83.0 – 93.0 Deg	83.64
Maximum Occipital Moment		-53.30 - -43.70 N-m	-52.76
Occipital Moment Decay		60.0 - 80.0 ms	72.40

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572P
THORAX IMPACT TEST

Dummy Serial Number 142
Sequential Test Number 1
Date 12-12-03
Workfile 142T 12-12-03

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	69-72 Deg F	70.0
Relative Humidity	10% - 70%	35.0
Pendulum Velocity	19.40 – 20.00 Ft/s	19.70
Maximum Deflection	1.30 – 1.50 in	1.30
Maximum Resistive Force	152.90 – 182.10 Lbs	167.53
Internal Hysteresis	65 - 85 %	76.46
Sternum Force Criteria	193.30 lbf	179.91

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572P
EXTERNAL DIMENSIONS

Dummy Serial Number 142
Sequential Test Number 1
Date 12-11-03

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Total Sitting Height	A	21.2 – 21.8 in	21.2
Shoulder Pivot Height	B	12.1 - 12.7 in	12.4
H-Point Height	C	1.35 – 1.75 in	1.55
H-Point from Backline	D	2.24 – 2.64 in	2.5
Shoulder Pivot from Backline	E	2.40 – 2.80 in	2.6
Thigh Clearance	F	3.19 – 3.59 in	3.5
Back of Elbow to Fingertip	G	9.74 – 10.34 in	10.1
Head back from Backline	H	1.9 – 2.3 in	2.1
Shoulder - Elbow Length	I	7.3 – 7.9 in	7.7
Elbow Rest Height	J	5.26 – 5.86 in	5.5
Buttock to Knee Length	K	11.21 – 11.81 in	11.5
Popliteal Height	L	8.60 – 9.20 in	8.9
Knee Pivot Height	M	9.51 – 10.11 in	9.75
Buttock Popliteal Length	N	8.58 - 9.18 in	9.0
Chest Depth with Jacket	O	5.45 - 6.05 in	5.8
Foot Length	P	5.42 – 5.82 in	5.8
Stature	Q	36.7 – 37.7 in	37.0
Buttock to Knee Pivot Length	R	9.9 - 10.3 in	10.25
Head Breadth	S	5.15 – 5.55 in	5.4
Head Depth	T	6.59 - 7.19 in	6.9
Hip Breadth	U	7.9 – 8.5 in	8.1
Shoulder Breadth	V	9.31 – 9.91 in	9.9
Foot Breadth	W	2.11 – 2.51 in	2.3
Head Circumference	X	19.7 – 20.3 in	20.3
Chest Circumference (With Jacket)	Y	20.75 – 21.75 in	21.4
Waist Circumference	Z	20.75 – 21.75 in	21.4
Location for Chest Circumference	AA	9.8 – 10.2 in	10.00
Location for Waist Circumference	BB	6.3 – 6.7 in	6.50

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572N
HEAD DROP TEST

Dummy Serial Number 186
Sequential Test Number 01
Date June 16, 2004

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 – 25.6 Deg C	20.7
Relative Humidity	10% - 70%	56
Peak Resultant Acceleration	245-300 G's	279.2
Peak Lateral Acceleration	15 G's Max	-5.0
Is Acceleration Curve Unimodal?	<10%	YES

Remarks:

Laboratory Technician: V. O.

PART 572N
NECK FLEXION TEST

Dummy Serial Number 186
Sequential Test Number 01-1
Date June 16, 2004

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	20.7
Relative Humidity		10% - 70%	54
Pendulum Speed		4.83 -5.07 m/s	4.99
Pendulum Pulse	10 ms	1.20 – 1.60 m/s	1.50
	15 ms	2.40 – 3.40 m/s	2.83
	20 ms	3.80 – 5.00 m/s	4.05
D Plane Rotation	Max	74.0 – 92.0 Deg	76.3
Maximum Occipital Moment		27.00 - 33.00 N-m	29.69
Occipital Moment Decay		103.0 - 120.0 ms	116.08

Remarks:

Laboratory Technician: V. O.

PART 572N

NECK EXTENSION TEST

Dummy Serial Number	186
Sequential Test Number	01-1
Date	June 16, 2004

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	20.8
Relative Humidity		10% - 70%	55.0
Pendulum Speed		4.18 – 4.42 m/s	4.35
Pendulum Pulse	10 ms	1.00 – 1.40 m/s	1.30
	15 ms	2.20 – 3.00 m/s	2.41
	20 ms	3.20 – 4.20 m/s	3.53
D Plane Rotation	Max	85.0 – 103.0 Deg	94.2
Maximum Occipital Moment		-19.0 - -24.0 N-m	-21.67
Occipital Moment Decay		123.0 - 137.4 ms	138.72

Remarks:

Laboratory Technician:

V. O.

PART 572N
TORSO FLEXION TEST

Dummy Serial Number 186
Sequential Test Number 01
Date June 4, 2004

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2° C	21.7
Relative Humidity	10% - 70%	44.0
Initial Angle of Unsupported Dummy	= 22°	15.8
Maximum Force at 45° during 10 second period	147 – 200 N	192.5
Return Angle		22.3
Difference between Return and Initial Angles	± 8° of Initial Angle	6.5
Rate	0.5 – 1.5 Deg/sec	1.02

Remarks:

Laboratory Technician:

V. O.

PART 572N
THORAX IMPACT TEST

Dummy Serial Number 186
Sequential Test Number 01-4
Date June 17, 2004

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2 Deg C	20.7
Relative Humidity	10% - 70%	54.0
Pendulum Velocity	6.59 – 6.83 m/s	6.78
Maximum Deflection	-46.0 - -38.0 mm	-38.3
Maximum Resistive Force	1150 – 1380 N	1212
Internal Hysteresis	65 - 85 %	81.0
Maximum Resistive Force between 12.5 mm and 38 mm of Deflection.	<= 1500 N	1393.0

Remarks:

Laboratory Technician:

V. O.

PART 572N
KNEE IMPACT TEST

Dummy Serial Number 186
Sequential Test Number 01-2/01-1
Date June 18, 2004

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	18.9 – 25.6 °C	20.8
Relative Humidity	10 – 70 %	55.0
Pendulum Velocity	2.07 – 2.13 m/s	2.09
Maximum Pendulum Force	2000 – 3000 N	2684.0
RIGHT KNEE		
Temperature	18.9 – 25.6 °C	20.8
Relative Humidity	10 – 70 %	55.0
Pendulum Velocity	2.07 – 2.13 m/s	2.08
Maximum Pendulum Force	2000 – 3000 N	2580.0

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572N
EXTERNAL DIMENSIONS

Dummy Serial Number	186
Sequential Test Number	01
Date	06/16/2004

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Total Sitting Height	A	622.3 – 647.7	637
Shoulder Pivot Height	B	348.0 – 363.2	354
H-Point Height	C	63.5 – 73.7	68
H-Point from Backline	D	88.9 – 99.1	94
Shoulder Pivot from Backline	E	53.3 – 63.5	61
Thigh Clearance	F	88.9 – 104.1	94
Back of Elbow to Fingertip	G	182.9 – 198.1	197
Head back from Backline	H	17.8 – 22.8	21
Shoulder - Elbow Length	I	215.9 – 231.1	217
Elbow Rest Height	J	157.4 – 177.8	162
Buttock to Knee Length	K	370.8 – 391.2	389
Popliteal Height	L	269.2 – 289.6	277
Knee Pivot Height	M	307.4 – 322.6	313
Buttock Popliteal Length	N	320.0 – 340.4	322
Chest Depth with Jacket	O	129.6 – 144.8	137
Foot Length	P	170.2 – 185.4	174
Stature	Q	1099.9 – 1181.1	1137
Buttock to Knee Pivot Length	R	342.9 – 363.2	349
Head Breadth	S	137.1 – 147.3	138
Head Depth	T	167.6 – 177.8	177
Hip Breadth	U	208.3 – 223.5	221
Shoulder Breadth	V	259.1 – 274.3	274
Foot Breadth	W	62.3 – 77.5	65
Head Circumference	X	510.5 – 530.9	520
Chest Circumference (With Jacket)	Y	596.9 – 622.3	608
Waist Circumference	Z	558.8 – 584.2	559
Location for Chest Circumference	AA	325.1 – 335.3	330
Location for Waist Circumference	BB	153.7 – 163.9	154

Remarks:	All dimensions in millimeters
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Laboratory Technician: V. Walter

SECTION 6

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

HYBRID III INSTRUMENTATION

	POSITION #3 (RIGHT) SERIAL NO.: 142		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
HEAD AX	AC-P32218	ENDEVCO	17-Feb-04
HEAD AY	AC-99102-F12	ENTRAN	24-Feb-04
HEAD AZ	AC-00L13-F03	ENDEVCO	22-Jun-04
HEAD REAR AZ	AC-P16979	ENDEVCO	08-Jun-04
UPPER NECK FX	LC-213Fx	Denton	01-Oct-03
UPPER NECK FY	LC-213Fy	Denton	01-Oct-03
UPPER NECK FZ	LC-213Fz	Denton	01-Oct-03
UPPER NECK MX	LC-213Mx	Denton	01-Oct-03
UPPER NECK MY	LC-213My	Denton	01-Oct-03
UPPER NECK MZ	LC-213Mz	Denton	01-Oct-03
LOWER NECK FX	LC-214Fx	Denton	01-Oct-03
LOWER NECK FY	LC-214Fy	Denton	01-Oct-03
LOWER NECK FZ	LC-214Fz	Denton	01-Oct-03
LOWER NECK MX	LC-214Mx	Denton	01-Oct-03
LOWER NECK MY	LC-214My	Denton	01-Oct-03
LOWER NECK MZ	LC-214Mz	Denton	01-Oct-03
CHEST AX	AC-99108-F30	ENTRAN	24-Feb-04
CHEST AY	AC-99108-F28	ENTRAN	24-Feb-04
CHEST AZ	AC-99H30-Z04	ENTRAN	24-Feb-04
CHEST DISPLACEMENT X	DS-142	SERVO	18-Sep-03
PELVIS AX	AC-99102-F06	ENTRAN	23-Feb-04
PELVIS AY	AC-99102-F15	ENTRAN	23-Feb-04
PELVIS AZ	AC-99G29-Q13	ENTRAN	23-Feb-04

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

HYBRID III INSTRUMENTATION

	POSITION #4 (LEFT) SERIAL NO.: 186		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
HEAD AX	AC-03D03D16-F03	ENTRAN	29-Jun-04
HEAD AY	AC-99H30-Z09	ENTRAN	29-Jun-04
HEAD AZ	AC-01J02-F08	ENTRAN	29-Jun-04
UPPER NECK FX	LC-1632Fx	DENTON	12-Aug-03
UPPER NECK FY	LC-1632Fy	DENTON	12-Aug-03
UPPER NECK FZ	LC-1632Fz	DENTON	12-Aug-03
UPPER NECK MX	LC-1632Mx	DENTON	12-Aug-03
UPPER NECK MY	LC-1632My	DENTON	12-Aug-03
UPPER NECK MZ	LC-1632Mz	DENTON	12-Aug-03
LOWER NECK FX	LC-138Fx	DENTON	16-Apr-03
LOWER NECK FY	LC-138Fy	DENTON	16-Apr-03
LOWER NECK FZ	LC-138Fz	DENTON	16-Apr-03
LOWER NECK MX	LC-138Mx	DENTON	16-Apr-03
LOWER NECK MY	LC-138My	DENTON	16-Apr-03
LOWER NECK MZ	LC-138Mz	DENTON	16-Apr-03
CHEST AX	AC-02I02I05-F10	ENTRAN	29-Jun-04
CHEST AY	AC-02I02I16-A04	ENTRAN	29-Jun-04
CHEST AZ	AC-03E03E20-N18	ENTRAN	29-Jun-04
CHEST DISPLACEMENT X	DS-186	SERVO	19-May-04
PELVIS AX	AC-02I02I05-F05	ENTRAN	29-Jun-04
PELVIS AY	AC-98H14-K13	ENTRAN	29-Jun-04
PELVIS AZ	AC-02I02I16-A10	ENTRAN	29-Jun-04
LAP BELT LOAD	LC-175	First Technology	10-Oct-03

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

CRS INSTRUMENTATION

	CRS ACCELEROMETERS		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
P3 CRS AX	AC-P14388	ENDEVCO	18-Mar-04
P3 CRS AY	AC-P16575	ENDEVCO	17-Mar-04
P3 CRS AZ	AC-P21135	ENDEVCO	18-Mar-04
P4 CRS AX	AC-P23999	ENDEVCO	22-Mar-04
P4 CRS AY	AC-P23993	ENDEVCO	22-Mar-04
P4 CRS AZ	AC-P23939	ENDEVCO	22-Mar-04