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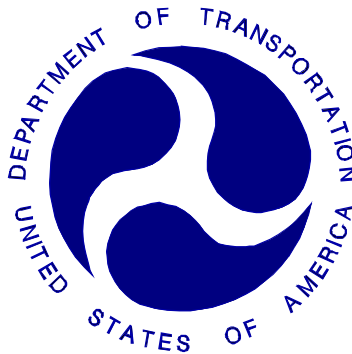
**NEW CAR ASSESSMENT PROGRAM (NCAP)  
FRONTAL BARRIER IMPACT TEST**

TOYOTA MOTOR MANUFACTURING  
2002 TOYOTA AVALON  
4-DOOR SEDAN

NHTSA NUMBER: M25103

VERIDIAN TEST NUMBER: 8642-NCAP-04

VERIDIAN ENGINEERING  
TRANSPORTATION SCIENCES CENTER  
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January 25, 2002

FINAL REPORT

PREPARED FOR:

U. S. DEPARTMENT OF TRANSPORTATION  
National Highway Traffic Safety Administration  
Safety Performance Standards  
Office of Crashworthiness Standards  
Mail Code: NPS-10  
400 Seventh Street, SW, Room No. 5313  
Washington, DC 20590

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FINAL REPORT ACCEPTANCE BY OCS:

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NHTSA, Office of Crashworthiness Standards

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Date of Report Acceptance

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COTR, New Car Assessment Program (NCAP)  
NHTSA, Office of Crashworthiness Standards

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Date of Report Acceptance

# **TECHNICAL REPORT STANDARD TITLE PAGE**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |                                                      |                        |                                                                                                                                                                                                                   |                        |
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| 15. Supplementary Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |                                                      |                        |                                                                                                                                                                                                                   |                        |
| 16. Abstract<br><br>A frontal load cell barrier test of a 2002 Toyota Avalon 4-Door Sedan was performed at Veridian Engineering crash test facility in Buffalo, New York, on January 25, 2002.<br>The impact velocity was 56.49 kph and the temperature at the barrier face was 21.1EC. The maximum post-test vehicle crush was 574 mm. The test vehicle was equipped with 3-point pretensioning restraint systems, knee bolsters, and airbags at both the driver and right outboard passenger seating positions.<br>With respect to FMVSS 208 "Occupant Crash Protection - Injury Criteria" both the driver and passenger appeared to comply with head, chest, and femur requirements. |            |                                                      |                        |                                                                                                                                                                                                                   |                        |
| <b>ATD Position</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>HIC</b> | <b>Clip (g's)</b>                                    | <b>Chest Disp (mm)</b> | <b>Left Femur (N)</b>                                                                                                                                                                                             | <b>Right Femur (N)</b> |
| <b>Driver (150)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 600.0      | 52.2                                                 | 31.5                   | 3881.7                                                                                                                                                                                                            | 3504.9                 |
| <b>Passenger (245)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 585.8      | 41.7                                                 | 27.7                   | 4051.6                                                                                                                                                                                                            | 3022.7                 |
| 17. Key Words<br>56 kph Frontal Barrier Impact test<br>New Car Assessment Program (NCAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |                                                      |                        | 18. Distribution Statement<br>Copies of this report are available from:<br>NHTSA Technical Reference Division<br>National Highway Traffic Safety Admin.<br>400 Seventh St., SW, Room 5108<br>Washington, DC 20590 |                        |
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## **SECTION 1**

### **PURPOSE AND SUMMARY OF TEST**

#### **1.1 PURPOSE**

This 56.49 kph frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-01-D-32005. The purpose of this 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 56.49 kph frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Indicant Test procedure.

#### **1.2 TEST PROCEDURE**

This 56.3-km/h 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 head, chest and pelvis triaxial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, left and right knee sliders, and lower leg instrumentation. The driver (position 1) ATD (Serial No. 150) and the right-front passenger (position 2) ATD (Serial No.245) 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 141 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 2002 Toyota Avalon 4-Door Sedan at a velocity of 56.49 kph. The test was performed at Veridian Engineering on January 25, 2002. 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.<br>(mm) | Left Femur<br>(N) | Right<br>Femur (N) | Belt Spool<br>(mm) | Belt Stretch<br>(mm/m) |
|--------------------------|-------|----------|---------------------|-------------------|--------------------|--------------------|------------------------|
| <b>Driver<br/>ATD</b>    | 600.0 | 52.2     | 31.5                | 3881.7            | 3504.9             | 108                | 0                      |
| <b>Passenger<br/>ATD</b> | 585.8 | 41.7     | 27.7                | 4051.6            | 3022.7             | 191                | 0                      |

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 574 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 upper center of the airbag, the back of the head to the outboard half of the head restraint, the chest to the airbag, the knees to the knee bolster. The passenger's visible contact points were as follows: The face to the outboard half of the airbag, the back of the head to the outboard half of the head restraint, the chest to the airbag, the left knee to the left quarter of the glove compartment door, the right knee to the center of the glove compartment door.

The 2002 Toyota Avalon 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.:             | M25103                          | Test Mode: | 56.3 kph Frontal Barrier |                                                                                                                                              |
| Test Date:                     | January 25, 2002                | Time:      | 11:45                    | Temperature: <span style="float: right;">°C</span><br><div style="border-bottom: 1px solid black; width: 100px; margin-top: 2px;">21.1</div> |
| Vehicle Make/Model/Body Style: | 2002 Toyota Avalon 4-Door Sedan |            |                          |                                                                                                                                              |
| Vehicle Test Weight:           | 1760.0                          | kg         |                          |                                                                                                                                              |
| Vehicle/Barrier Impact Angle:  | 0                               | °          |                          |                                                                                                                                              |
| Impact Velocity:               | 56.49                           | kph        |                          |                                                                                                                                              |
| Maximum Static Crush:          | 574                             | mm         |                          |                                                                                                                                              |
| Vehicle Rebound:               | 566                             | mm         |                          |                                                                                                                                              |

|                          |                                |                                |
|--------------------------|--------------------------------|--------------------------------|
| <u>DUMMIES:</u>          | <u>DRIVER</u>                  | <u>PASSENGER</u>               |
| Type:                    | 572E                           | 572E                           |
| Restraint System:        | Seatbelt, Airbag, Knee Bolster | Seatbelt, Airbag, Knee Bolster |
| Number of Data Channels: | 141                            |                                |
| Number of Cameras:       | 1                              | Real Time                      |
|                          | 16                             | High Speed                     |

|                           |                 |               |
|---------------------------|-----------------|---------------|
| <u>DOOR OPENING DATA:</u> | Closed/Operable | - Left Front  |
|                           | Closed/Operable | - Right Front |

|                                   |               |                  |
|-----------------------------------|---------------|------------------|
| Front Seat(s) Data:               | <u>DRIVER</u> | <u>PASSENGER</u> |
| Seat Track Failure: (mm of shift) | 0             | 0                |
| Seat Back Failure:                | None          | None             |

|                                      |                                                                                         |                                                                                                     |
|--------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <u>VISIBLE DUMMY CONTACT POINTS:</u> | <u>DRIVER</u>                                                                           | <u>PASSENGER</u>                                                                                    |
| Head:                                | Face to the upper centerline of airbag, back of head to outboard half of head restraint | Face to the outboard half of airbag, back of head to outboard half of head restraint                |
| Abdomen:                             | None                                                                                    | None                                                                                                |
| Chest:                               | Airbag                                                                                  | Airbag                                                                                              |
| Knees:                               | Left knee to left bolster; Right knee to right bolster                                  | Left knee to left quarter of glove compartment door; Right knee to center of glove compartment door |

DATA SHEET NO. 2 GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 2002 Toyota Avalon 4-Door Sedan

NHTSA No. : M25103 ; VIN: 4T1BF28B42U221021 ; Color: Green

Engine Data: 6 cylinders; - CID; 3.0 Liters; - cc

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

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

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

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

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

Date Received: 1/15/02 ; Odometer Reading 84 km

Selling Dealer: West Herr Toyota

& Address: S-4141 Southwestern Blvd., Orchard Park, NY 14127

DATA FROM TIRE VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: Toyota Motor Manufacturing

Date of Manufacture 10/01

GVWR: 2064 kg; GAWR: 1209 kg FRONT; 1209 kg REAR

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load: 300 kpa FRONT

300 kpa REAR

Recommended Tire Size: P205/65R15

\* Recommended Cold Tire Pressure: 210 kpa FRONT; 210 kpa REAR

Size of Tires on Test Vehicle: P205/65R15 ; Manufacturer: Continental

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) = 410 kg

No. of Occupants x 68.04 kg = 340.2 kg

Rated Cargo/Luggage Weight (RCLW) = 69.8 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>471.5</u>  | kg | Right Rear =             | <u>298.0</u> | kg |
| Left Front =                         | <u>472.5</u>  | kg | Left Rear =              | <u>301.5</u> | kg |
| TOTAL FRONT =                        | <u>944.0</u>  | kg | TOTAL REAR =             | <u>599.5</u> | kg |
| TOTAL DELIVERED WEIGHT =             | <u>1543.5</u> | kg |                          |              |    |
| % of Total Front of Vehicle Weight = | <u>61.2%</u>  |    | % of Total Rear Weight = | <u>38.8%</u> | %  |

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

|                                       |               |    |
|---------------------------------------|---------------|----|
| Total Delivered Weight (UDW) =        | <u>1543.5</u> | kg |
| Rated Cargo/Luggage Weight (RCLW) =   | <u>69.8</u>   | kg |
| Weight of 2 p.572 Dummies @ 76 each = | <u>152</u>    | kg |
| TARGET TEST WEIGHT =                  | <u>1765.3</u> | kg |

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 64.5 KG OF CARGO WEIGHT:

|                                                   |                                         |    |                          |              |    |
|---------------------------------------------------|-----------------------------------------|----|--------------------------|--------------|----|
| Right Front =                                     | <u>500.5</u>                            | kg | Right Rear =             | <u>368.5</u> | kg |
| Left Front =                                      | <u>511.5</u>                            | kg | Left Rear =              | <u>379.5</u> | kg |
| TOTAL FRONT =                                     | <u>1012.0</u>                           | kg | TOTAL REAR =             | <u>748.0</u> | kg |
| TOTAL TEST WEIGHT =                               | <u>1760.0</u>                           | kg |                          |              |    |
| % of Total Front Weight =                         | <u>57.5%</u>                            | %  | % of Total Rear Weight = | <u>42.5%</u> | %  |
| Weight of Ballast Secured in Vehicle Trunk Area = | <u>0</u>                                | kg |                          |              |    |
| Vehicle Components Removed for Weight Reduction:  | <u>Trunk and rear compartment trim.</u> |    |                          |              |    |

VEHICLE ATTITUDE (all dimension in millimeters):

|                             |                                                |            |    |            |    |            |    |            |
|-----------------------------|------------------------------------------------|------------|----|------------|----|------------|----|------------|
| AS DELIVERED:               | RF                                             | <u>692</u> | LF | <u>696</u> | RR | <u>718</u> | LR | <u>714</u> |
| FULLY LOADED:               | RF                                             | <u>680</u> | LF | <u>686</u> | RR | <u>679</u> | LR | <u>675</u> |
| AS TESTED:                  | RF                                             | <u>683</u> | LF | <u>686</u> | RR | <u>682</u> | LR | <u>682</u> |
| Vehicle's Wheel Base:       | <u>2709</u> mm                                 |            |    |            |    |            |    |            |
| Location of Vehicle's C.G.: | <u>1151</u> mm rearward of front wheel center. |            |    |            |    |            |    |            |

FUEL SYSTEM DATA:

|                                                                                                                                                                                                    |                          |                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------------------------------------|
| Fuel System Capacity From Owner's Manual =                                                                                                                                                         | <u>70</u>                | liters                                  |
| Usable Capacity Figure Furnished by COTR =                                                                                                                                                         | <u>70</u>                | liters                                  |
| Test Volume Range (92 to 94% of Usable Capacity) =                                                                                                                                                 | <u>64.4</u>              | to <u>65.8</u> liters                   |
| ACTUAL TEST VOLUME=                                                                                                                                                                                | <u>64.4</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>X</u>                 | Mechanical- <u>-</u>                    |
| Does Electric Pump operate with ignition switch "ON" & engine "OFF"                                                                                                                                | Yes- <u>X</u>            | No- <u>-</u>                            |
| <u>Details of Fuel System: Filler – On left side of vehicle quarter panel forward of the rear axle; Tank – on vehicle underbody forward of the rear wheels; Lines – along the left frame rail.</u> |                          |                                         |

DATA SHEET NO. 3 POST IMPACT DATA

TYPE OF TEST:

Type of Test: Frontal Barrier Impact Angle: 0°  
Test Date: January 25, 2002 Time: 11:45 Temperature: 21.1 °C  
Vehicle NHTSA No.: M25103  
Required Impact Velocity Range: 55.5 to 57.1 kph

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

Trap No. 1 = 56.49 kph; Trap No. 2 = 56.49 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>4832</u> ; C/L = <u>4887</u> ; Right = <u>4828</u> |
| Post-Test | Left = <u>4295</u> ; C/L = <u>4313</u> ; Right = <u>4269</u> |
| Crush     | Left = <u>537</u> ; C/L = <u>574</u> ; Right = <u>559</u>    |
| AVERAGE   | = <u>557</u> mm                                              |

VEHICLE REBOUND: (From rigid barrier only.)

Distance from front of test vehicle to impact point:

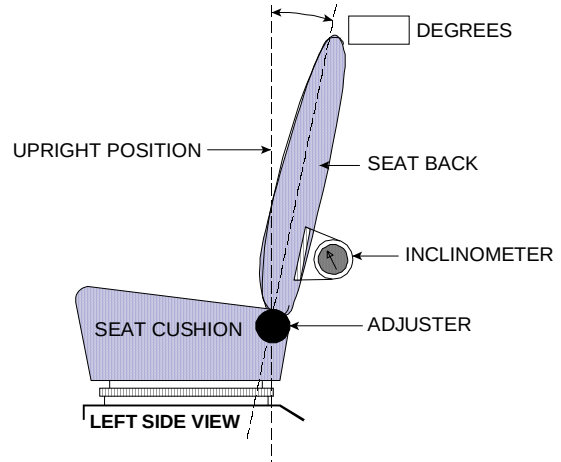
|         |                                                           |
|---------|-----------------------------------------------------------|
|         | Left = <u>566</u> ; C/L = <u>570</u> ; Right = <u>563</u> |
| AVERAGE | = <u>566</u> mm                                           |

## DATA SHEET NO. 4 TEST VEHICLE INFORMATION

### VEHICLE IDENTIFICATION:

Model Year : 2002 Vehicle Model: Toyota Avalon 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.



### FRONT SEAT ASSEMBLY

Seat back angle for driver's seat: 17 degrees

Measurement instructions: Recline seat back 6 degrees from its most upright position.

Seat back angle for passenger's seat: 17 degrees

Measurement instructions: Recline seat back 6 degrees from its most upright position.

2. Seat Fore and Aft Positioning

Positioning of the driver's seat: Place seat in mid-fore/aft travel position.

Positioning of the passenger's seat: Place seat in mid-fore/aft travel position.

3. Fuel Tank Capacity Data

3.1 A. "Usable Capacity" of the standard equipment fuel tank is 70 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 = 70 liters

3.2 Amount of Stoddard solvent added to vehicle(s) used for certification test(s) = 64.4 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 ignition is placed in the "on" position, the fuel pump operates briefly. The fuel pump operates continuously while the engine is running.

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

4. STEERING COLUMN ADJUSTMENTS:

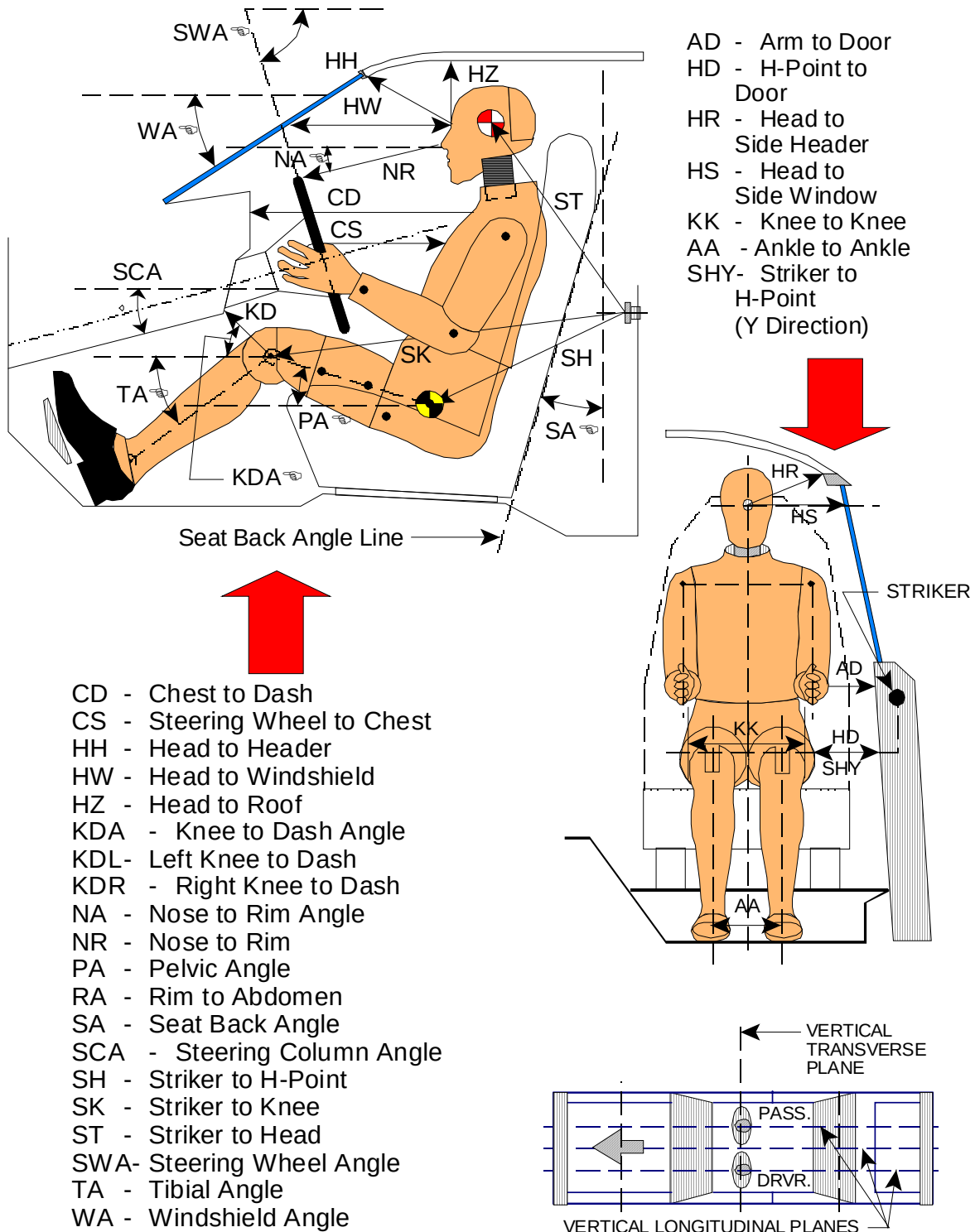
Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine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

Operational Instructions: Where the upper most position is defined as detent 0, place the steering  
column in detent 2 (25 degrees from vertical with the vehicle rocker panels level).

5. SEAT BELT UPPER ANCHORAGE

Nominal design riding position: Where the upper most position is defined as detent 0, place the upper  
anchorage in detent 1 (mid position).

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



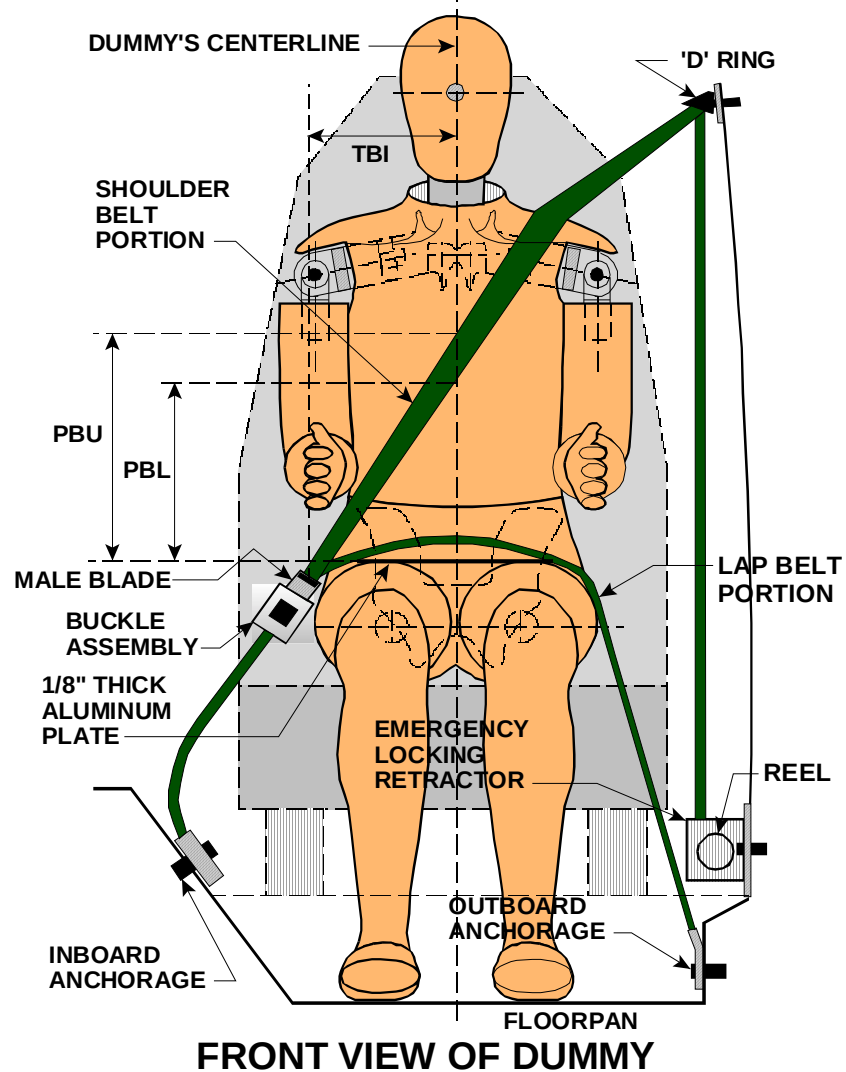
DATA SHEET NO. 5 FRONT SEAT DUMMY POSITIONING MEASUREMENTS IN VEHICLE (cont.)

|                  | DRIVER (Serial #150) |             |          | PASS. (Serial #245) |             |          |
|------------------|----------------------|-------------|----------|---------------------|-------------|----------|
| WA <sup>o</sup>  | 29 deg.              |             |          | N/A                 |             |          |
| SWA <sup>o</sup> | 62 deg.              |             |          | N/A                 |             |          |
| SCA <sup>o</sup> | 28 deg.              |             |          | N/A                 |             |          |
| SA <sup>o</sup>  | 17 deg.              |             |          | 17 deg.             |             |          |
| HZ               | 184                  |             |          | 173                 |             |          |
| HH               | 369                  |             |          | 363                 |             |          |
| HW               | 640                  |             |          | 616                 |             |          |
| HR               | 212                  |             |          | 212                 |             |          |
| NR               | 441                  | Angle       | 13 deg.  | N/A                 |             |          |
| CD               | 696                  |             |          | 590                 |             |          |
| CS               | 327                  |             |          | N/A                 |             |          |
| RA               | 218                  |             |          | N/A                 |             |          |
| KDL              | 199                  | Angle (KDA) | 25 deg.  | 210                 |             |          |
| KDR              | 185                  |             |          | 185                 | Angle (KDA) | 23 deg.  |
| PA <sup>o</sup>  | 22 deg.              |             |          | 22 deg.             |             |          |
| TA <sup>o</sup>  | 36 deg.              |             |          | 38 deg.             |             |          |
| KK               | 295                  |             |          | 200                 |             |          |
| AA               | 350                  |             |          | 188                 |             |          |
| ST               | 471                  | Angle       | 8 deg.   | 461                 | Angle       | 7 deg.   |
| SK               | 583                  | Angle       | 104 deg. | 602                 | Angle       | 102 deg. |
| SH               | 264                  | Angle       | 132 deg. | 257                 | Angle       | 135 deg. |
| SHY              | 257                  |             |          | 248                 |             |          |
| HS               | 365                  |             |          | 372                 |             |          |
| HD               | 188                  |             |          | 156                 |             |          |
| AD               | 124                  |             |          | 118                 |             |          |

Dimensions in millimeters

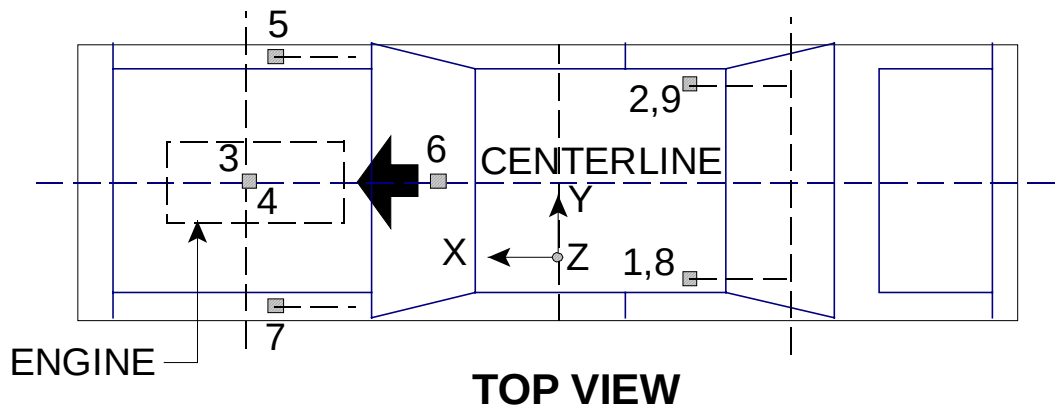
# DATA SHEET NO. 6 SEAT BELT POSITIONING DATA

## SEAT BELT POSITIONING DATA

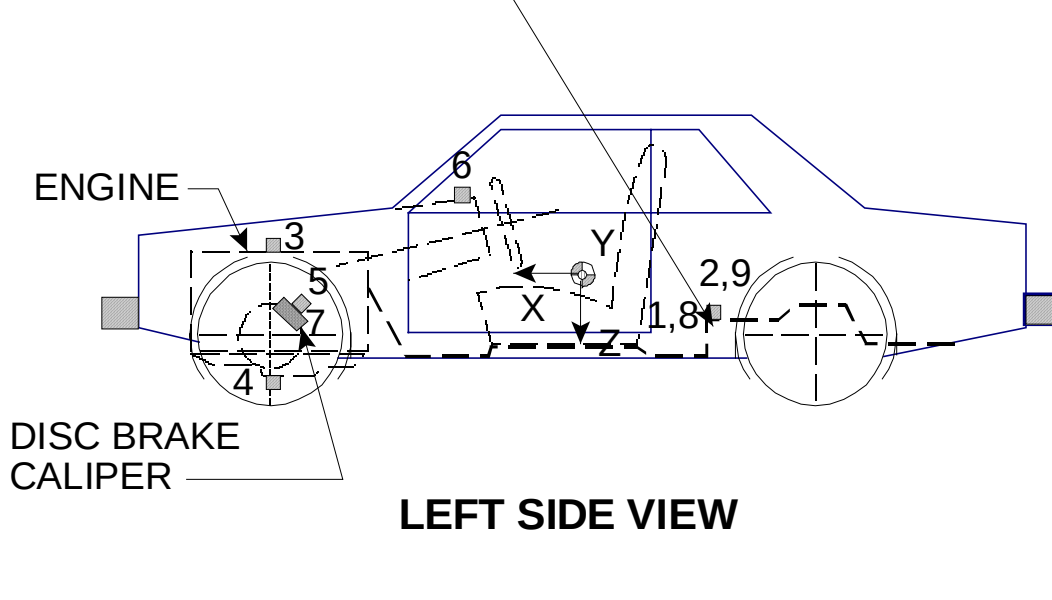


|                                                     | DRIVER DUMMY<br>(mm) | PASSENGER DUMMY<br>(mm) |
|-----------------------------------------------------|----------------------|-------------------------|
| PBU -- Top surface of alum. plate to upper edge     | 380                  | 362                     |
| PBL-- Top surface of alum. plate to belt lower edge | 302                  | 285                     |
| 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   | 1935                 | -565 | -388 |
| 2        | Right Rear Seat Cross Member X  | 1918                 | 558  | -382 |
| 3        | Top of Engine Block             | 4152                 | 125  | -831 |
| 4        | Bottom of Engine                | 3749                 | 70   | -174 |
| 5        | Disc Brake Caliper @ Right Side | 4065                 | 826  | -284 |
| 6        | Instrument Panel                | 3135                 | -2   | -793 |
| 7        | Disc Brake Caliper @Left Side   | 4057                 | -830 | -344 |
| 8        | Left Rear Seat Cross Member Z   | 1935                 | -565 | -388 |
| 9        | Right Rear Seat Cross Member Z  | 1918                 | 558  | -382 |

| LOCATION<br>NUMBER | DESCRIPTION                     | MAXIMUM VALUE (g's) |       |        |       |
|--------------------|---------------------------------|---------------------|-------|--------|-------|
|                    |                                 | Pos.                | msec. | Neg.   | msec. |
| 1                  | Left Rear Seat Cross Member X   | 2.3                 | 141.9 | -32.3  | 41.3  |
| 2                  | Right Rear Seat Cross Member X  | 1.6                 | 139.9 | -29.7  | 62.3  |
| 3                  | Top of Engine Block             | 33.2                | 46.3  | -91.1  | 33.0  |
| 4                  | Bottom of Engine                | 34.9                | 43.2  | -101.7 | 33.9  |
| 5                  | Disc Brake Caliper @ Right Side | 38.5                | 69.3  | -99.9  | 51.8  |
| 6                  | Instrument Panel                | 40.0                | 61.5  | -54.9  | 45.8  |
| 7                  | Disc Brake Caliper @Left Side   | 37.6                | 68.3  | -101.8 | 46.3  |
| 8                  | Left Rear Seat Cross Member Z   | 5.7                 | 64.1  | -4.6   | 30.2  |
| 9                  | Right Rear Seat Cross Member Z  | 7.7                 | 57.7  | -10.0  | 79.5  |

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES

Vehicle Year/Make/Model/Body Style: 2002 Toyota Avalon 4-Door Sedan

NHTSA Test No.: M25103 Test Date: January 25, 2002

|                          |      | MAXIMUM VALUE |       |        |       |           |       |        |       |
|--------------------------|------|---------------|-------|--------|-------|-----------|-------|--------|-------|
|                          |      | Driver        |       |        |       | Passenger |       |        |       |
| DESCRIPTION              | Unit | Pos           | msec  | Neg    | msec  | Pos       | msec  | Neg    | msec  |
| Head 9 Array X Arm Y     | g    | 6.1           | 56.9  | -6.6   | 69.6  | 13.1      | 61.9  | -14.3  | 95.0  |
| Head 9 Array X Arm Z     | g    | 29.1          | 54.6  | -12.0  | 68.6  | 27.6      | 53.6  | -5.5   | 86.8  |
| Head 9 Array Y Arm X     | g    | 14.7          | 225.7 | -56.3  | 78.9  | 18.7      | 237.7 | -68.7  | 81.7  |
| Head 9 Array Y Arm Z     | g    | 21.8          | 64.9  | -6.2   | 88.8  | 19.1      | 53.6  | -5.5   | 92.5  |
| Head 9 Array Z Arm X     | g    | 23.0          | 217.9 | -83.9  | 69.4  | 21.3      | 233.8 | -70.7  | 82.9  |
| Head 9 Array Z Arm Y     | g    | 4.4           | 110.3 | -6.2   | 81.2  | 9.1       | 72.1  | -13.4  | 99.5  |
| Head X                   | g    | 14.9          | 221.9 | -56.8  | 71.7  | 15.0      | 239.7 | -59.5  | 82.8  |
| Head Y                   | g    | 2.6           | 57.2  | -5.2   | 71.0  | 7.9       | 62.4  | -12.2  | 95.2  |
| Head Z                   | g    | 19.6          | 65.1  | -3.5   | 89.0  | 18.0      | 64.8  | -3.6   | 92.8  |
| Head Resultant           | g    | 57.7          | 71.7  | -      | -     | 60.3      | 82.8  | -      | -     |
| Redundant Head X         | g    | 15.0          | 218.4 | -57.5  | 71.7  | 15.0      | 239.7 | -59.4  | 81.2  |
| Redundant Head Y         | g    | 2.3           | 57.7  | -5.7   | 72.0  | 7.3       | 61.4  | -13.1  | 97.4  |
| Redundant Head Z         | g    | 19.5          | 65.1  | -3.5   | 88.0  | 17.8      | 53.4  | -3.7   | 91.8  |
| Redundant Head Resultant | g    | 58.4          | 71.7  | -      | -     | 60.4      | 81.2  | -      | -     |
| Upper Neck Fx            | N    | 739.1         | 69.1  | -401.5 | 52.0  | 519.5     | 87.1  | -208.4 | 49.3  |
| Upper Neck Fy            | N    | 132.8         | 238.1 | -119.6 | 72.0  | 74.4      | 39.7  | -171.1 | 96.9  |
| Upper Neck Fz            | N    | 1369.9        | 65.3  | -105.0 | 248.3 | 1085.0    | 66.7  | -88.2  | 268.4 |
| Upper Neck F Resultant   | N    | 1491.0        | 65.4  | -      | -     | 1085.7    | 66.7  | -      | -     |
| Upper Neck Mx            | N-m  | 8.1           | 71.5  | -6.6   | 44.0  | 23.0      | 92.5  | -15.0  | 130.1 |
| Upper Neck My            | N-m  | 64.2          | 68.2  | -27.1  | 88.5  | 20.2      | 64.2  | -17.1  | 266.1 |
| Upper Neck Mz            | N-m  | 4.6           | 86.8  | -3.2   | 140.5 | 18.5      | 111.4 | -8.5   | 180.9 |
| Upper Neck M Resultant   | N-m  | 64.5          | 68.2  | -      | -     | 24.0      | 92.8  | -      | -     |
| Chest X                  | g    | 4.6           | 162.7 | -53.3  | 77.2  | 5.3       | 227.5 | -41.4  | 88.3  |
| Chest Y                  | g    | 6.9           | 86.1  | -3.8   | 42.4  | 3.6       | 41.4  | -9.9   | 90.0  |
| Chest Z                  | g    | 6.0           | 64.6  | -6.4   | 83.4  | 7.1       | 98.3  | -1.0   | 38.7  |
| Chest Resultant          | g    | 53.4          | 77.2  | -      | -     | 42.3      | 88.5  | -      | -     |

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

Vehicle Year/Make/Model/Body Style: 2002 Toyota Avalon 4-Door Sedan  
 NHTSA Test No.: M25103 Test Date: January 25, 2002

|                           |      | MAXIMUM VALUE |       |         |      |           |       |         |       |
|---------------------------|------|---------------|-------|---------|------|-----------|-------|---------|-------|
|                           |      | Driver        |       |         |      | Passenger |       |         |       |
| DESCRIPTION               | Unit | Pos           | msec  | Neg     | msec | Pos       | msec  | Neg     | msec  |
| Redundant Chest X         | g    | 4.3           | 162.6 | -53.3   | 77.2 | 4.9       | 227.6 | -42.1   | 88.0  |
| Redundant Chest Y         | g    | 7.3           | 84.9  | -3.8    | 42.5 | 3.7       | 40.7  | -10.6   | 89.7  |
| Redundant Chest Z         | g    | 5.6           | 64.8  | -6.6    | 83.1 | 6.9       | 98.8  | -1.5    | 73.5  |
| Redundant Chest Resultant | g    | 53.4          | 77.3  | -       | -    | 43.1      | 88.1  | -       | -     |
| Chest Displacement        | mm   | 0.0           | 2.2   | -31.5   | 82.5 | 0.0       | -42.4 | -27.7   | 101.3 |
| Pelvic X                  | g    | 4.7           | 212.9 | -66.2   | 61.4 | 18.8      | 53.5  | -54.7   | 58.8  |
| Pelvic Y                  | g    | 10.0          | 75.7  | -11.7   | 40.3 | 37.2      | 50.8  | -7.7    | 74.1  |
| Pelvic Z                  | g    | 3.3           | 197.4 | -30.6   | 76.0 | 3.1       | 216.1 | -28.4   | 51.3  |
| Pelvic Resultant          | g    | 69.2          | 61.4  | -       | -    | 64.6      | 50.8  | -       | -     |
| Left Femur                | N    | 1014.9        | 54.6  | -3881.7 | 63.6 | 1083.7    | 53.4  | -4051.6 | 38.7  |
| Right Femur               | N    | 1174.1        | 54.6  | -3504.9 | 62.3 | 907.5     | 51.6  | -3022.7 | 58.8  |
| Left Knee Slider Dx       | mm   | 0.1           | 215.0 | -0.4    | 35.9 | 1.5       | 90.9  | -0.7    | 38.6  |
| Right Knee Slider Dx      | mm   | 0.6           | 122.6 | -2.7    | 64.5 | 0.4       | 107.7 | -0.3    | 36.6  |
| Left Upper Tibia Mx       | N-m  | 62.8          | 62.9  | -10.0   | 37.6 | 42.8      | 40.0  | -18.2   | 107.8 |
| Left Upper Tibia My       | N-m  | 21.9          | 203.9 | -96.9   | 64.0 | 43.8      | 199.5 | -199.8  | 47.2  |
| Left Lower Tibia Fz       | N    | 147.8         | 167.8 | -3519.0 | 34.0 | 247.6     | 205.4 | -7343.8 | 39.9  |
| Left Lower Tibia Mx       | N-m  | 90.2          | 62.3  | -7.6    | 34.5 | 24.6      | 40.0  | -51.4   | 48.4  |
| Left Lower Tibia My       | N-m  | 52.3          | 33.7  | -27.9   | 47.6 | 70.7      | 37.4  | -57.6   | 49.0  |
| Right Upper Tibia Mx      | N-m  | 55.5          | 64.0  | -23.0   | 75.8 | 25.6      | 36.6  | -23.7   | 55.5  |
| Right Upper Tibia My      | N-m  | 49.3          | 61.8  | -167.8  | 47.1 | 37.1      | 172.5 | -139.0  | 50.0  |
| Right Lower Tibia Fz      | N    | 181.2         | 165.3 | -5910.0 | 46.7 | 227.5     | 147.6 | -3786.9 | 35.4  |
| Right Lower Tibia Mx      | N-m  | 114.9         | 47.7  | -9.8    | 71.9 | 12.8      | 36.3  | -34.0   | 51.5  |
| Right Lower Tibia My      | N-m  | 41.7          | 36.4  | -54.3   | 50.0 | ⊥         | -     | ⊥       | -     |
| Left Foot Aft Ax          | g    | 30.5          | 32.4  | -46.1   | 45.8 | 20.1      | 70.0  | -145.2  | 47.3  |
| Left Foot Aft Az          | g    | 6.8           | 210.9 | -55.3   | 31.5 | 30.3      | 58.3  | -80.6   | 39.7  |
| Left Foot Fore Az         | g    | 85.7          | 66.5  | -69.2   | 15.4 | 41.1      | 78.1  | -94.5   | 30.7  |
| Right Foot Aft Ax         | g    | 34.2          | 35.6  | -117.9  | 46.0 | 21.2      | 69.6  | -112.9  | 49.7  |
| Right Foot Aft Az         | g    | 38.4          | 59.2  | -80.4   | 36.0 | 23.9      | 68.2  | -78.7   | 49.0  |
| Right Foot Fore Az        | g    | 37.3          | 78.6  | -123.8  | 45.6 | 69.9      | 49.9  | -136.2  | 43.4  |
| Lap Belt Load             | N    | -             | -     | -       | -    | -         | -     | -       | -     |
| Torso Belt                | N    | -             | -     | -       | -    | -         | -     | -       | -     |

⊥ Channel failed

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

Vehicle Year/Make/Model/Body Style: 2002 Toyota Avalon 4-Door Sedan

NHTSA Test No.: M25103 Test Date: January 25, 2002

| HEAD INJURY CRITERIA (HIC) |       |                       |                       |                                                          |
|----------------------------|-------|-----------------------|-----------------------|----------------------------------------------------------|
|                            | HIC** | t <sub>1</sub> (msec) | t <sub>2</sub> (msec) | Average Acceleration<br>t <sub>1</sub> to t <sub>2</sub> |
| Position #1 - Driver       | 600.0 | 53.0                  | 89.0                  | 48.9                                                     |
| Position #2 - Passenger    | 585.8 | 64.7                  | 100.7                 | 48.4                                                     |

\*\* HIC is as defined in FMVSS 208. The maximum time interval from t<sub>1</sub> to t<sub>2</sub> is 36 milliseconds.

| CLIP SUMMARY*           |            |                       |                       |       |
|-------------------------|------------|-----------------------|-----------------------|-------|
|                         | CLIP (g's) | t <sub>1</sub> (msec) | t <sub>2</sub> (msec) | CSI   |
| Position #1 - Driver    | 52.2       | 75.8                  | 78.8                  | 493.0 |
| Position #2 - Passenger | 41.7       | 87.4                  | 90.4                  | 369.6 |

\* 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: 2002 Toyota Avalon 4-Door Sedan

NHTSA Test No.: M25103 Test Date: January 25, 2002

| HEAD INJURY CRITERIA (HIC) <b>REDUNDANT</b> |       |                       |                       |                                                          |
|---------------------------------------------|-------|-----------------------|-----------------------|----------------------------------------------------------|
|                                             | HIC** | t <sub>1</sub> (msec) | t <sub>2</sub> (msec) | Average Acceleration<br>t <sub>1</sub> to t <sub>2</sub> |
| Position #1 - Driver                        | 600.3 | 53.1                  | 89.1                  | 48.8                                                     |
| Position #2 - Passenger                     | 568.8 | 64.9                  | 100.8                 | 47.8                                                     |

\*\* HIC is as defined in FMVSS 208. The maximum time interval from t<sub>1</sub> to t<sub>2</sub> is 36 milliseconds.

| CLIP SUMMARY* <b>REDUNDANT</b> |            |                       |                       |       |
|--------------------------------|------------|-----------------------|-----------------------|-------|
|                                | CLIP (g's) | t <sub>1</sub> (msec) | t <sub>2</sub> (msec) | CSI   |
| Position #1 - Driver           | 52.3       | 75.8                  | 78.8                  | 496.7 |
| Position #2 - Passenger        | 42.7       | 87.5                  | 90.5                  | 381.8 |

\* 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:

|                                                                                            | <u>Driver</u> | <u>Passenger</u> |
|--------------------------------------------------------------------------------------------|---------------|------------------|
| Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems. | <u>1700</u>   | <u>1725</u>      |
| Shoulder belt length as measured on Part 572 Dummy.                                        | <u>882</u>    | <u>895</u>       |
| Lap belt length as measured on Part 572 Dummy.                                             | <u>818</u>    | <u>830</u>       |

SHOULDER BELT SPOOL-OFF DATA:

|                                 |                                      |                                      |
|---------------------------------|--------------------------------------|--------------------------------------|
| As determined by film analysis. | Spool-on: 25 mm<br>Spool-off: 108 mm | Spool-on: 25 mm<br>Spool-off: 191 mm |
| As determined mechanically.     | <u>†</u>                             | <u>†</u>                             |
| As determined electronically.   | <u>†</u>                             | <u>†</u>                             |

BELT STRETCH DATA:

|                                                                           |             |             |
|---------------------------------------------------------------------------|-------------|-------------|
| Measured electronically between shoulder belt load cell and the "D" ring. | <u>†</u>    | <u>†</u>    |
| Measured mechanically.                                                    | <u>0 ††</u> | <u>0 ††</u> |

\_\_\_\_\_  
Dimensions in millimeters

† Seat belt was equipped with pretensioning retractors. These devices were not installed to prevent interference with the pretensioning system.

†† Belt stretch measurement was negligible.

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 9 mm molding.

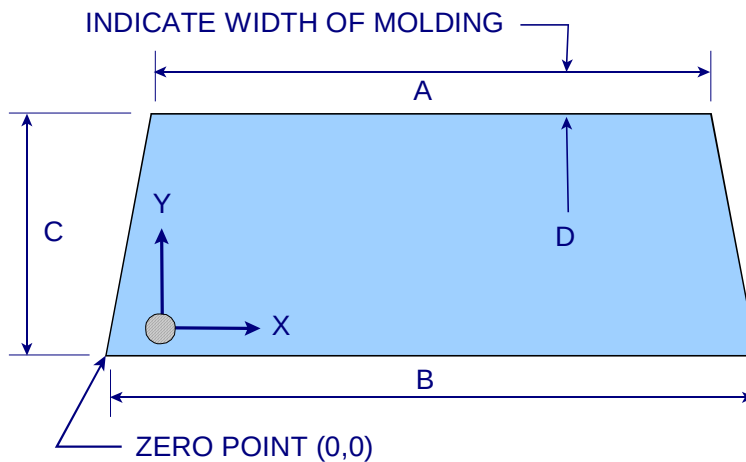
FMVSS 212 REQUIREMENTS:

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 | 2130.5               | 2130.5         | 100.0%         |
| LEFT SIDE  | 2130.5               | 2130.5         | 100.0%         |
| TOTAL      | 4261                 | 4261           | 100.0%         |

AREA OF RETENTION FAILURE:



| DIMENSIONS (mm) |      |
|-----------------|------|
| A               | 1248 |
| B               | 1483 |
| C               | 765  |
| D               | 9    |

**FRONT VIEW OF WINDSHIELD**

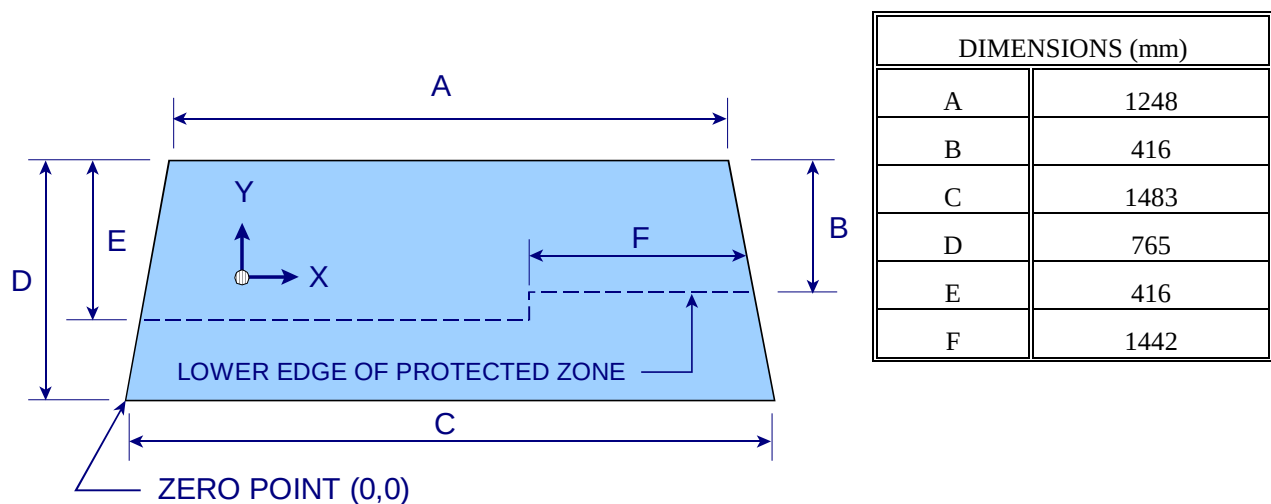
FAILURE DETAILS: None

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.: M25103 TEST DATE: January 25, 2002

VEHICLE MAKE/MODEL: 2002 Toyota Avalon 4-Door Sedan

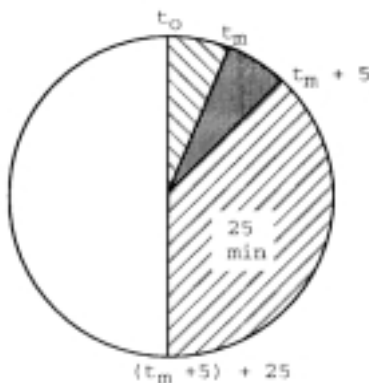
The test vehicle was filled from 92% to 94% of the manufacture's "usable" capacity. The electric fuel pump was operating if it will operate without engine operation. Two Part 572 anthropomorphic test devices were located at each of the front designated seating positions.

=====

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

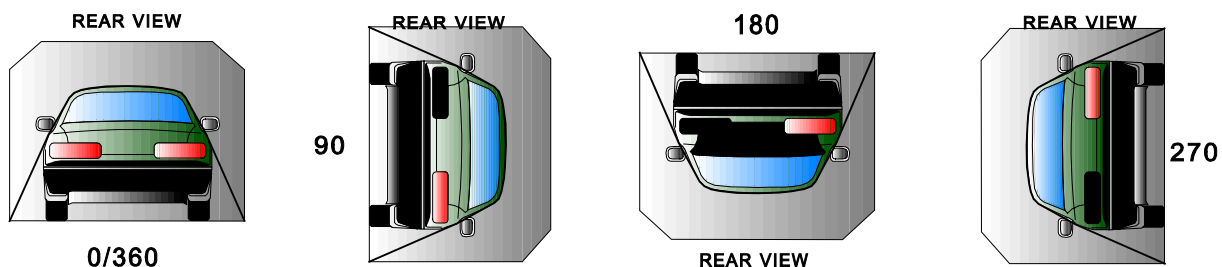
| ACTUAL | MAX ALLOWED |
|--------|-------------|
| 0      | 28 g        |
| 0      | 141 g       |
| 0      | 28 g/min.   |

SOLVENT SPILLAGE DETAILS: None

## DATA SHEET NO. 13 - ROLLOVER DATA

Vehicle: 2002 Toyota Avalon 4-Door Sedan

NHTSA No.: M25103



### 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 | 7  | seconds | 5                   | minutes | 6          | minutes | 7  | seconds | 7                          | minutes |
| 90° - 180°     | 1                              | minutes | 6  | seconds | 5                   | minutes | 6          | minutes | 6  | seconds | 7                          | minutes |
| 180°-270°      | 1                              | minutes | 12 | seconds | 5                   | minutes | 6          | minutes | 12 | seconds | 7                          | minutes |
| 270°-360°      | 1                              | minutes | 6  | seconds | 5                   | minutes | 6          | minutes | 6  | 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:

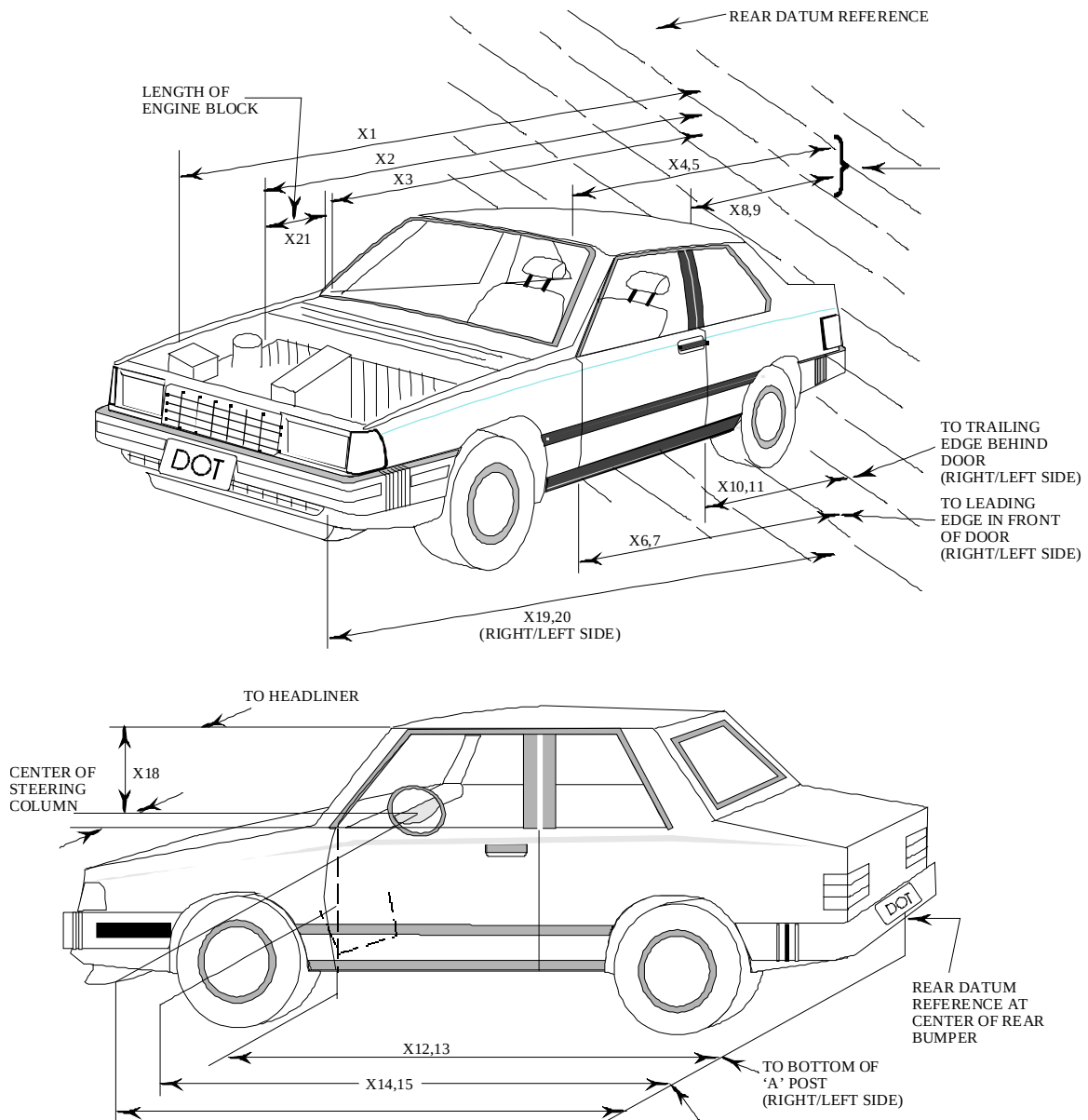
| Rollover Stage | First 5 minutes from onset of rotation (g) | 6th min. (g) | 7th min. (g) | 8th min. (if required) (g) |
|----------------|--------------------------------------------|--------------|--------------|----------------------------|
| 0° - 90°       | 0                                  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

# DATA SHEET NO. 14 TEST VEHICLE MEASUREMENTS

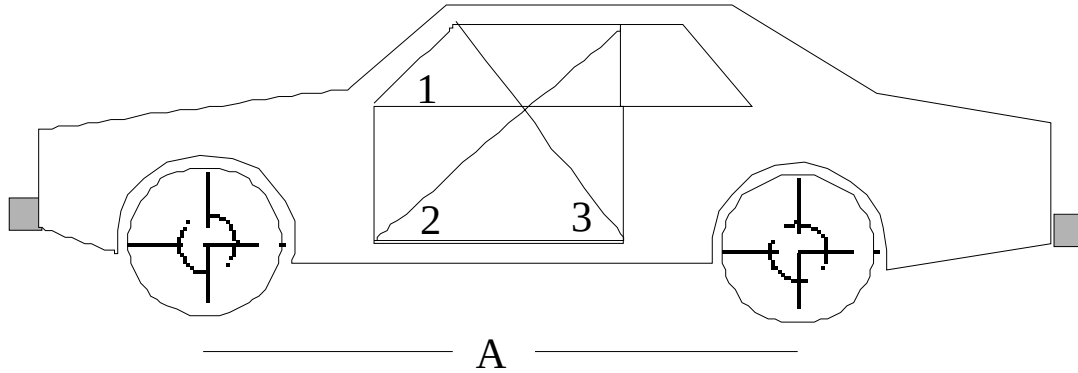


DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)

| No. |                                                              | Pre-Test | Post-Test | Difference |
|-----|--------------------------------------------------------------|----------|-----------|------------|
| X1  | Total Length of Vehicle at Centerline                        | 4887     | 4313      | 574        |
| X2  | Rear Surface of Vehicle to Front of Engine                   | 4335     | 4168      | 167        |
| X3  | Rear Surface of Vehicle to Firewall                          | 3755     | 3684      | 71         |
| X4  | Rear Surface of Vehicle to Upper Leading Edge of Right Door  | 3463     | 3471      | -8         |
| X5  | Rear Surface of Vehicle to Upper Leading Edge of Left Door   | 3462     | 3466      | -4         |
| X6  | Rear Surface of Vehicle to Lower Leading Edge of Right Door  | 3422     | 3435      | -13        |
| X7  | Rear Surface of Vehicle to Lower Leading Edge of Left Door   | 3419     | 3433      | -14        |
| X8  | Rear Surface of Vehicle to Upper Trailing Edge of Right Door | 2323     | 2327      | -4         |
| X9  | Rear Surface of Vehicle to Upper Trailing Edge of Left Door  | 2326     | 2328      | -2         |
| X10 | Rear Surface of Vehicle to Lower Trailing Edge of Right Door | 2303     | 2310      | -7         |
| X11 | Rear Surface of Vehicle to Lower Trailing Edge of Left Door  | 2297     | 2306      | -9         |
| X12 | Rear Surface of Vehicle to Bottom of "A" Post of Right Side  | 3541     | 3552      | -11        |
| X13 | Rear Surface of Vehicle to Bottom of "A" Post of Left Side   | 3539     | 3544      | -5         |
| X14 | Rear Surface of Vehicle to Firewall, Right Side              | 3721     | 3660      | 61         |
| X15 | Rear Surface of Vehicle to Firewall, Left Side               | 3698     | 3673      | 25         |
| X16 | Rear Surface of Vehicle to Steering Column                   | 2954     | 2957      | -3         |
| X17 | Center of Steering Column to "A" Post                        | 301      | 277       | 24         |
| X18 | Center of Steering Column to Headliner                       | 425      | 401       | 24         |
| X19 | Rear Surface of Vehicle to Right Side of Front Bumper        | 4828     | 4269      | 559        |
| X20 | Rear Surface of Vehicle to Left Side of Front Bumper         | 4832     | 4295      | 537        |
| X21 | Length of Engine Block                                       | 464      | 460       | 4          |
| RD  | Rear Surface of Vehicle to Right Side of Dash Panel          | 3110     | 3114      | -4         |
| CD  | Rear Surface of Vehicle to Center of Dash Panel              | 3343     | 3336      | 7          |
| LD  | Rear Surface of Vehicle to Left Side of Dash Panel           | 3112     | 3122      | -10        |

All Dimensions in mm

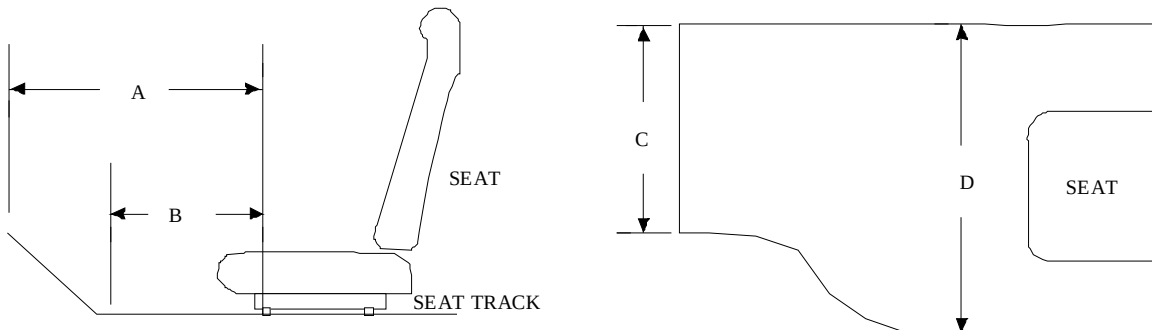
DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)  
 VEHICLE INTRUSION MEASUREMENTS  
 DOOR OPENING WIDTH



| UNITS (mm)  | LEFT |      |     | RIGHT |      |     |
|-------------|------|------|-----|-------|------|-----|
| MEASUREMENT | 1    | 2    | 3   | 1     | 2    | 3   |
| BEFORE TEST | 1054 | 1439 | 936 | 1060  | 1435 | 932 |
| AFTER TEST  | 1059 | 1450 | 942 | 1055  | 1442 | 934 |
| DIFFERENCE  | -5   | -11  | -6  | 5     | -7   | -2  |

| UNITS (mm)  | A = WHEELBASE LEFT | A = WHEELBASE RIGHT |
|-------------|--------------------|---------------------|
| BEFORE TEST | 2707               | 2711                |
| AFTER TEST  | 2629               | 2604                |
| DIFFERENCE  | 78                 | 107                 |

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



DRIVER

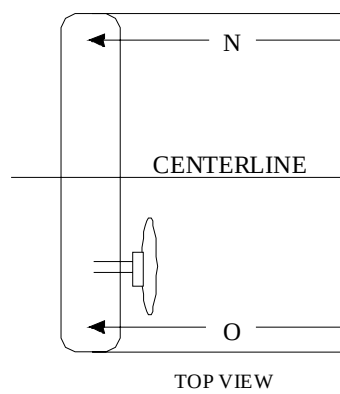
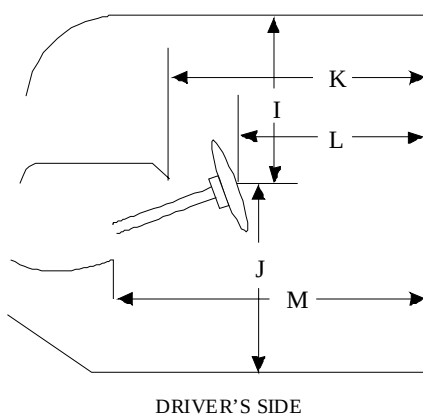
| Measurement | Pre-Test | Post-Test | Difference |
|-------------|----------|-----------|------------|
| A           | 770      | 690       | 80         |
| B           | 579      | 498       | 81         |
| C           | 431      | 417       | 14         |
| D           | 485      | 484       | 1          |

PASSENGER

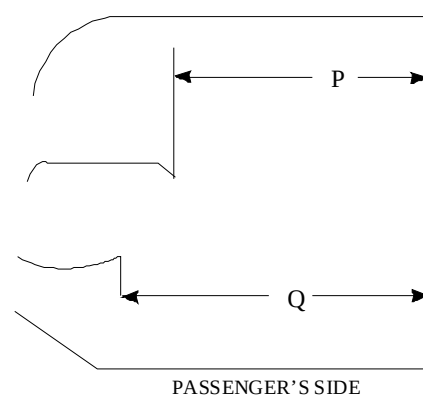
| Measurement | Pre-Test | Post-Test | Difference |
|-------------|----------|-----------|------------|
| A           | 767      | 612       | 155        |
| B           | 555      | 476       | 79         |
| C           | 457      | 451       | 6          |
| D           | 473      | 484       | -11        |

Units = mm

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



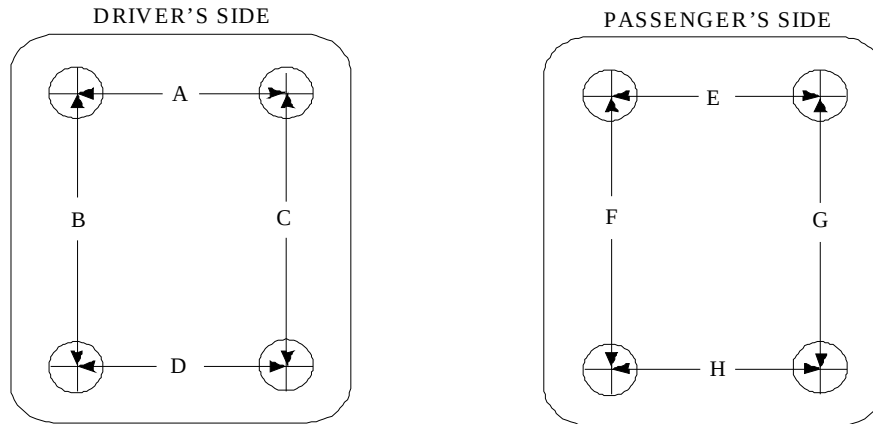
MEASUREMENTS  
FROM C-PILLAR  
BELT ANCHORAGE



| Measurement   | Pre-Test | Post-Test | Difference |
|---------------|----------|-----------|------------|
| I             | 425      | 401       | 24         |
| J             | 664      | 707       | -43        |
| K             | 2252     | 2256      | -4         |
| L             | 1904     | 1909      | -5         |
| M             | 2156     | 2156      | 0          |
| N             | 2063     | 2069      | -6         |
| O             | 2062     | 2073      | -11        |
| P = K (PASS.) | 2237     | 2238      | -1         |
| Q = M (PASS.) | 2184     | 2180      | 4          |

Units = mm

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

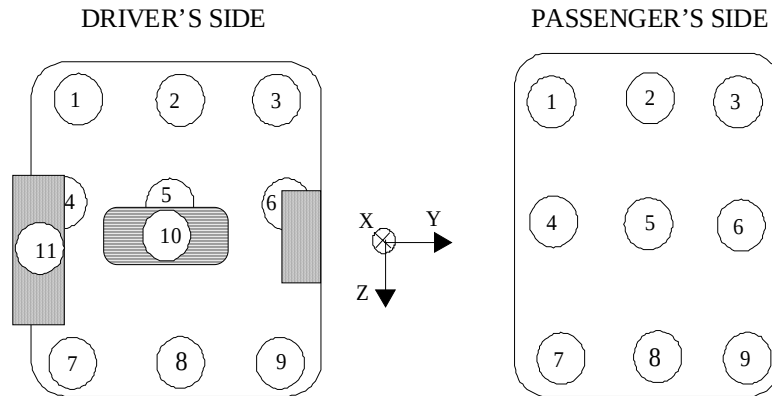


TOP VIEW THROUGH FLOOR PAN

| Measurement | Pre-Test | Post-Test | Difference |
|-------------|----------|-----------|------------|
| A           | 431      | 417       | 14         |
| B           | 445      | 461       | -16        |
| C           | 508      | 340       | 168        |
| D           | 485      | 484       | 1          |
| E           | 457      | 451       | 6          |
| F           | 378      | 375       | 3          |
| G           | 372      | 305       | 67         |
| H           | 473      | 484       | -11        |

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                | 3632               | 3567      | 65         | -501               | -518      | 17         |
| 2                | 3640               | 3573      | 67         | -491               | -521      | 30         |
| 3                | 3647               | 3588      | 59         | -492               | -490      | -2         |
| 4                | 3569               | 3495      | 74         | -351               | -403      | 52         |
| 5                | 3562               | 3491      | 71         | -356               | -381      | 25         |
| 6                | 3578               | 3491      | 87         | -355               | -368      | 13         |
| 7                | 3452               | 3410      | 42         | -251               | -282      | 31         |
| 8                | 3450               | 3381      | 69         | -256               | -283      | 27         |
| 9                | 3462               | 3375      | 87         | -261               | -282      | 21         |
| 10               | 3451               | 3470      | -19        | -428               | -431      | 3          |
| 11               | 3516               | 3492      | 24         | -395               | -406      | 11         |

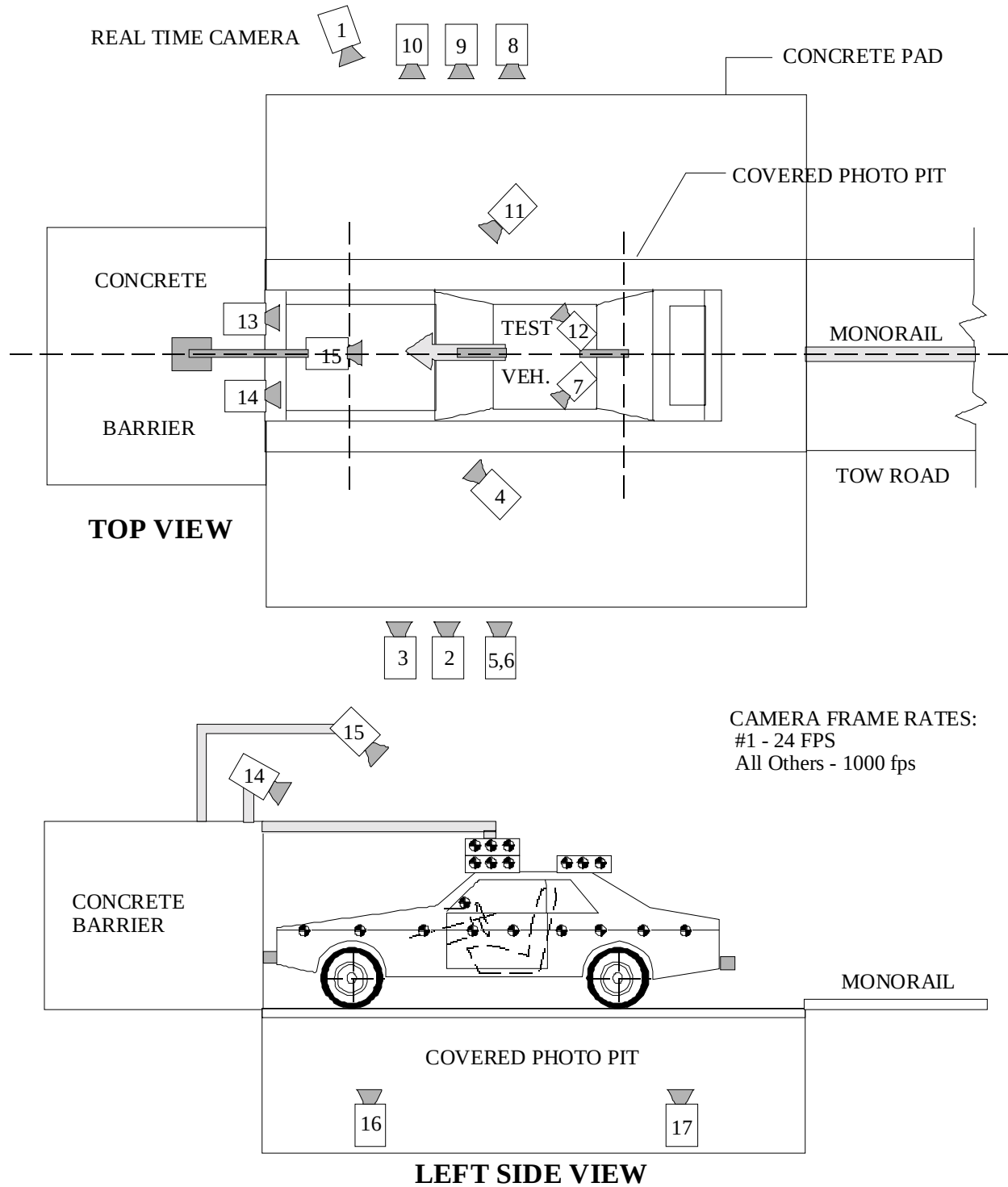
**Passenger Side Toe-pan Measurements**

| Toe-pan Location | X Deformation (mm) |           |            | Z Deformation (mm) |           |            |
|------------------|--------------------|-----------|------------|--------------------|-----------|------------|
|                  | Pre-Test           | Post-Test | Difference | Pre-Test           | Post-Test | Difference |
| 1                | 3637               | 3387      | 250        | -474               | -486      | 12         |
| 2                | 3636               | 3495      | 141        | -469               | -527      | 58         |
| 3                | 3592               | 3521      | 71         | -480               | -553      | 73         |
| 4                | 3547               | 3442      | 105        | -333               | -394      | 61         |
| 5                | 3555               | 3440      | 115        | -337               | -417      | 80         |
| 6                | 3534               | 3436      | 98         | -337               | -428      | 91         |
| 7                | 3434               | 3361      | 73         | -249               | -289      | 40         |
| 8                | 3423               | 3358      | 65         | -247               | -295      | 48         |
| 9                | 3424               | 3414      | 10         | -248               | -282      | 34         |

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.: M25103 Vehicle: 2002 Toyota Avalon 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          | Overall Left Side           | 6905                   | 1685 | 1095  | -1            | 6535                      | 12.5      | 1020        |
| 3          | Left Side View              | 8420                   | 1000 | 1080  | -2            | 8050                      | 25        | 1000        |
| 4          | Driver and Interior View    | 7800                   | 2765 | 2000  | -9            | -                         | 35        | 1005        |
| 5          | Steering Column (Bottom)    | 7680                   | 1954 | 1175  | -2            | 7310                      | 25        | 1015        |
| 6          | Steering Column (Top)       | 7680                   | 1954 | 1780  | -8            | 7310                      | 25        | 1005        |
| 7          | Left Belt                   | -                      | -    | -     | -             | -                         | 13        | 1005        |
| 8          | Overall Right Side          | 7006                   | 1985 | 1080  | -2            | 7310                      | 12.5      | 1005        |
| 9          | Right Side View             | 8220                   | 1238 | 1110  | -3            | 8524                      | 25        | 1010        |
| 10         | Right Passenger View        | 8050                   | 1782 | 1420  | -4            | 8354                      | 35        | 1000        |
| 11         | Passenger and Interior View | 7620                   | 2660 | 1970  | -7            | -                         | 35        | 1005        |
| 12         | Right Belt                  | -                      | -    | -     | -             | -                         | 13        | 1005        |
| 13         | Passenger Front View        | 620                    | -92  | 1987  | -37           | -                         | 13        | 1005        |
| 14         | Driver Front View           | 620                    | -92  | 1987  | -37           | -                         | 13        | 1005        |
| 15         | Windshield View             | 0                      | -530 | 3374  | -53           | -                         | 13        | 1000        |
| 16         | Pit View of Engine          | 0                      | 615  | -3048 | 90            | -                         | 13        | 1015        |
| 17         | Pit View of Fuel Tank       | 0                      | 2530 | -3048 | 90            | -                         | 13        | 1000        |

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

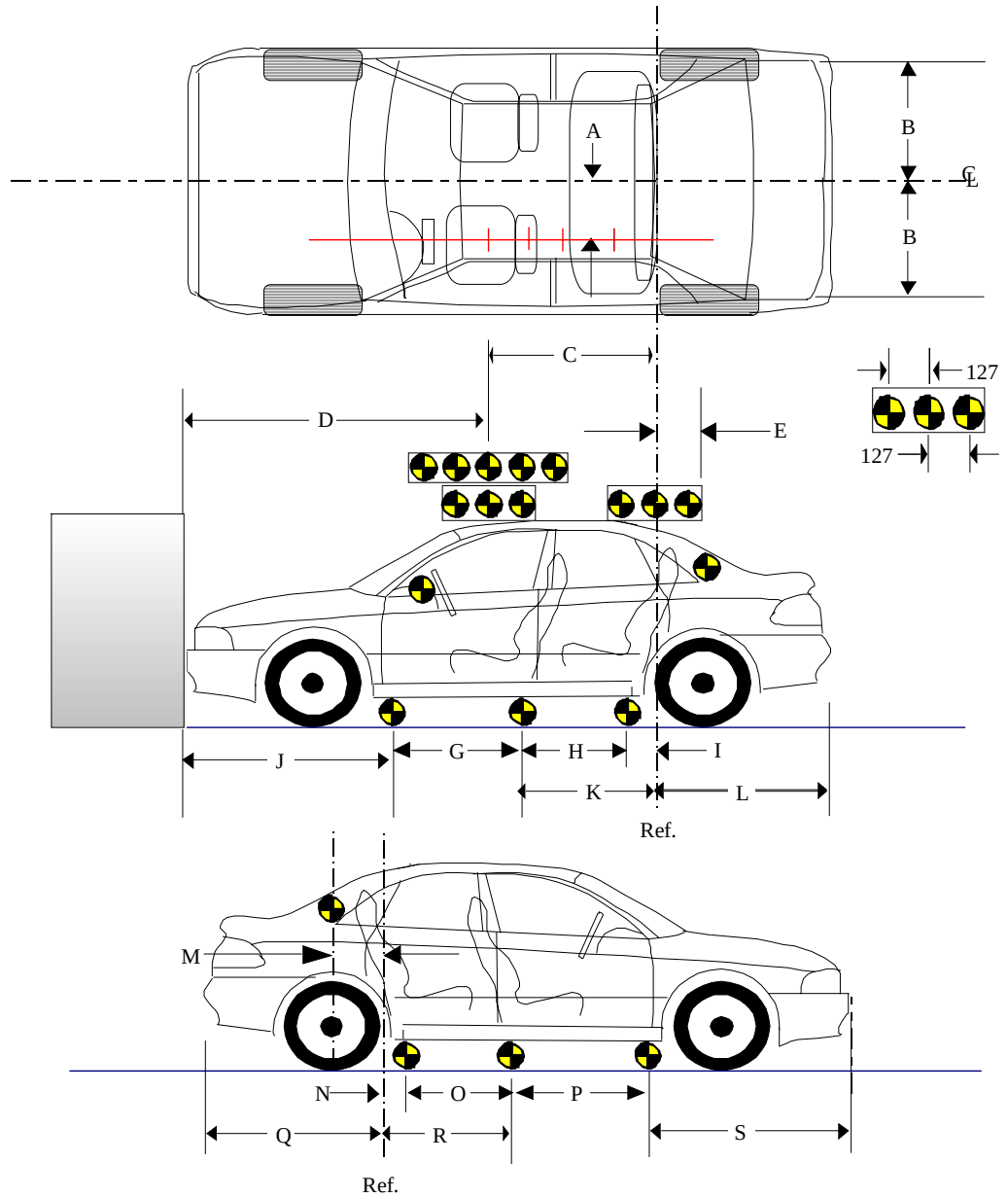
Y = film plane to impact location      N.T. indicates No Timing

Z = film plane to ground

# DATA SHEET NO. 16 VEHICLE REFERENCE PHOTO TARGET LOCATIONS

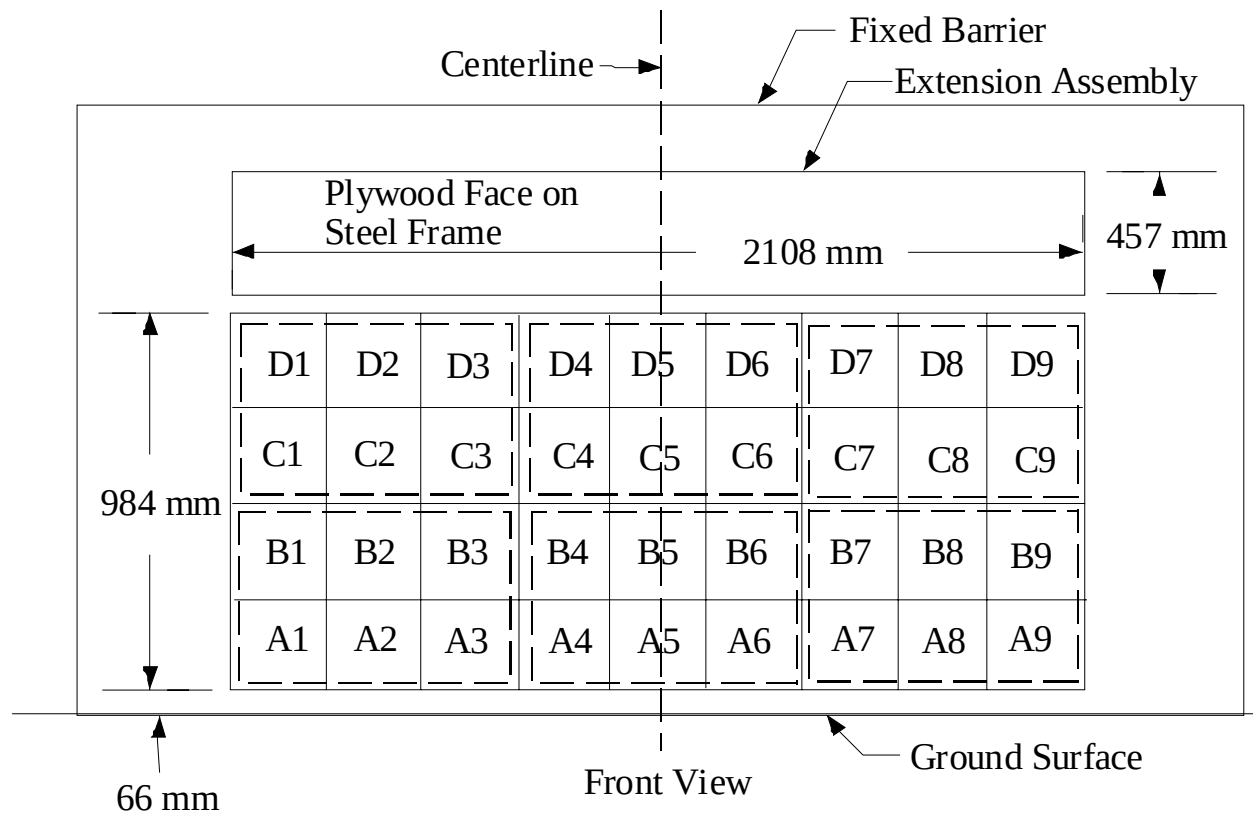
(Dimensions in millimeters)

|   |      |
|---|------|
| A | 380  |
| B | 674  |
| C | 911  |
| D | 2327 |
| E | 599  |
| F | 1511 |
| G | 1105 |
| H | 757  |
| I | 96   |
| J | 1380 |
| K | 853  |
| L | 1549 |
| M | 603  |
| N | 53   |
| O | 803  |
| P | 1060 |
| Q | 1585 |
| R | 856  |
| S | 1386 |



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<br>C1 thru D3 | Group 5<br>C4 thru D6 | Group 6<br>C7 thru D9 |
| Group 1<br>A1 thru B3 | Group 2<br>A4 thru B6 | Group 3<br>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.: M25103; Test Date: January 25, 2002; Technician: Lawrence Q. Valvo

Vehicle Model Year/Make/Model: 2002 Toyota Avalon 4-Door Sedan

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

B. Size of vent holes: (mm<sup>2</sup>) 707 -Driver 707 -Passenger

C. Total vent area: (mm<sup>2</sup>) 1414 -Driver 1414 -Passenger

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

Driver: 620 -Height; 620 -Width; 300 -Depth

Passenger: 600 -Height; 515 -Width; 540 -Depth

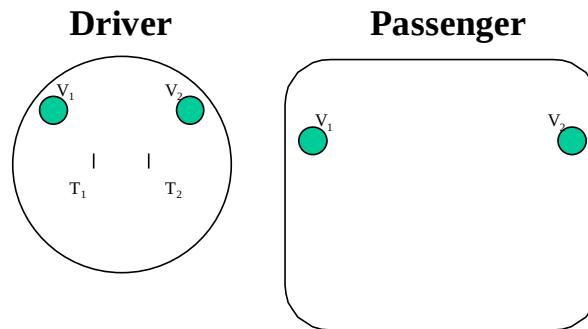
E. Is the air bag tethered?

Driver: X -Yes; - -No; If yes, record length of tether- 300

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

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<sub>n</sub> = Vent hole<sub>n</sub>, T<sub>n</sub> = Tether<sub>n</sub>).



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

Driver: Air bag: GA120-01700, CB1, 062361

Generator: \*TAT MX2 1 UBBA\*

Passenger: Air bag: \*TIJC264010109\*, 30316736B

Generator: 30314471D, C27617101MF2, 73960-07030-00

DATA SHEET NO. 19 ACCIDENT INVESTIGATION DIVISION DATA

FOR 56.3 KPH FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: Toyota Avalon 4-Door Sedan

NHTSA Test No.: M25103 VIN: 4T1BF28B42U221021

Model Year: 2002 Build Date: 10/01 Test Date: January 25, 2002

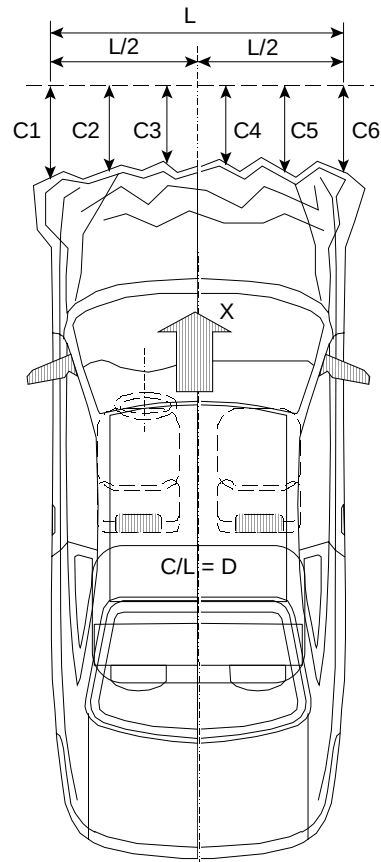
Vehicle Size Category: Passenger Car Test Weight: 1760.0 kg

Vehicle Wheelbase: 2709 mm; Front Overhang: 958 mm; Overall Width: 1820 mm

Collision Deformation Classification (CDC) Code: 12FDEW3

Crush Depth Dimensions

|      | PRE<br>(mm) | POST<br>(mm) | DIFF<br>(mm) |
|------|-------------|--------------|--------------|
| C1 = | 4687        | 4354         | 333          |
| C2 = | 4843        | 4295         | 548          |
| C3 = | 4880        | 4315         | 565          |
| C4 = | 4881        | 4310         | 571          |
| C5 = | 4846        | 4281         | 565          |
| C6 = | 4694        | 4308         | 386          |



Midpoint of Damage: D = Vehicle Centerline (Longitudinal)

Length of Damaged Region: L1= 1515 mm

L2= 757.5 mm

L5= 303 mm

**APPENDIX A**  
**PHOTOGRAPHS**

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Figure A-1: LOAD CELL LOCATIONS.



Figure A-2: PRE-TEST FRONT VIEW



Figure A-3: POST-TEST FRONT VIEW.



Figure A-4: PRE-TEST LEFT SIDE VIEW



Figure A-5: POST-TEST LEFT SIDE VIEW



Figure A-6: PRE-TEST RIGHT SIDE VIEW



Figure A-7: POST-TEST RIGHT SIDE VIEW



Figure A-8: PRE-TEST RIGHT FRONT THREE-QUARTER VIEW



Figure A-9: POST-TEST RIGHT FRONT THREE-QUARTER VIEW



Figure A-10: PRE-TEST LEFT REAR THREE-QUARTER VIEW



Figure A-11: POST-TEST LEFT REAR THREE-QUARTER VIEW



Figure A-12: PRE-TEST WINDSHIELD VIEW



Figure A-13: POST-TEST WINDSHIELD VIEW



Figure A-14: PRE-TEST ENGINE COMPARTMENT VIEW



Figure A-15: FUEL CAP VIEW

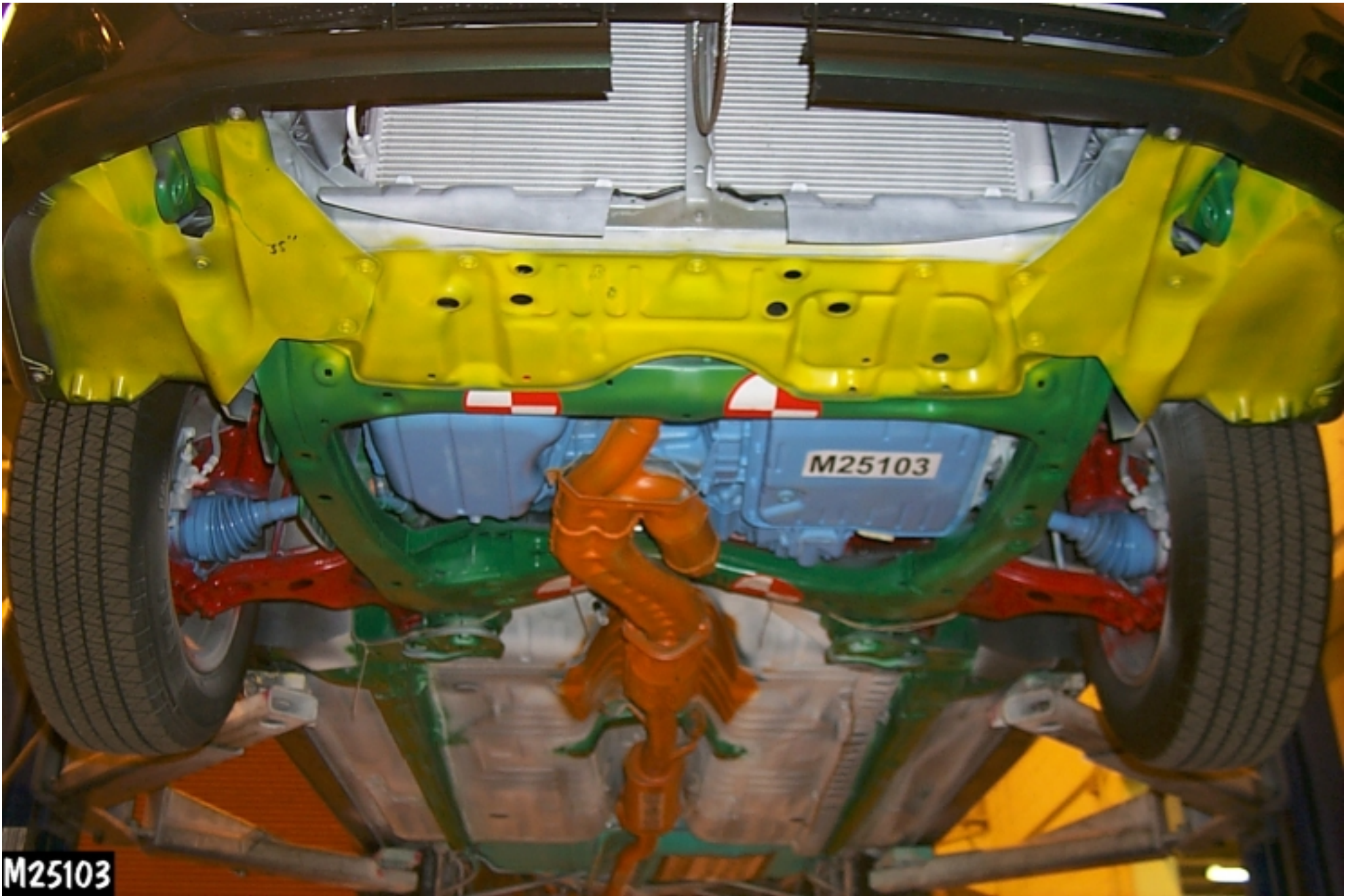


Figure A-16: PRE-TEST FRONT UNDERBODY VIEW



Figure A-17: POST-TEST FRONT UNDERBODY VIEW



Figure A-18: PRE-TEST FRONT SIDE UNDERBODY VIEW



Figure A-19: POST-TEST FRONT SIDE UNDERBODY VIEW



Figure A-20: PRE-TEST REAR UNDERBODY VIEW



Figure A-21: POST-TEST REAR UNDERBODY VIEW



Figure A-22: PRE-TEST DRIVER POSITION VIEW



Figure A-23: POST-TEST DRIVER POSITION VIEW



Figure A-24: PRE-TEST PASSENGER POSITION VIEW



Figure A-25: POST-TEST PASSENGER POSITION VIEW



Figure A-26: PRE-TEST DRIVER AND INTERIOR VIEW

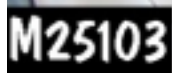


Figure A-27: POST-TEST DRIVER AND INTERIOR VIEW



Figure A-28: PRE-TEST PASSENGER AND INTERIOR VIEW



Figure A-29: POST-TEST PASSENGER AND INTERIOR VIEW

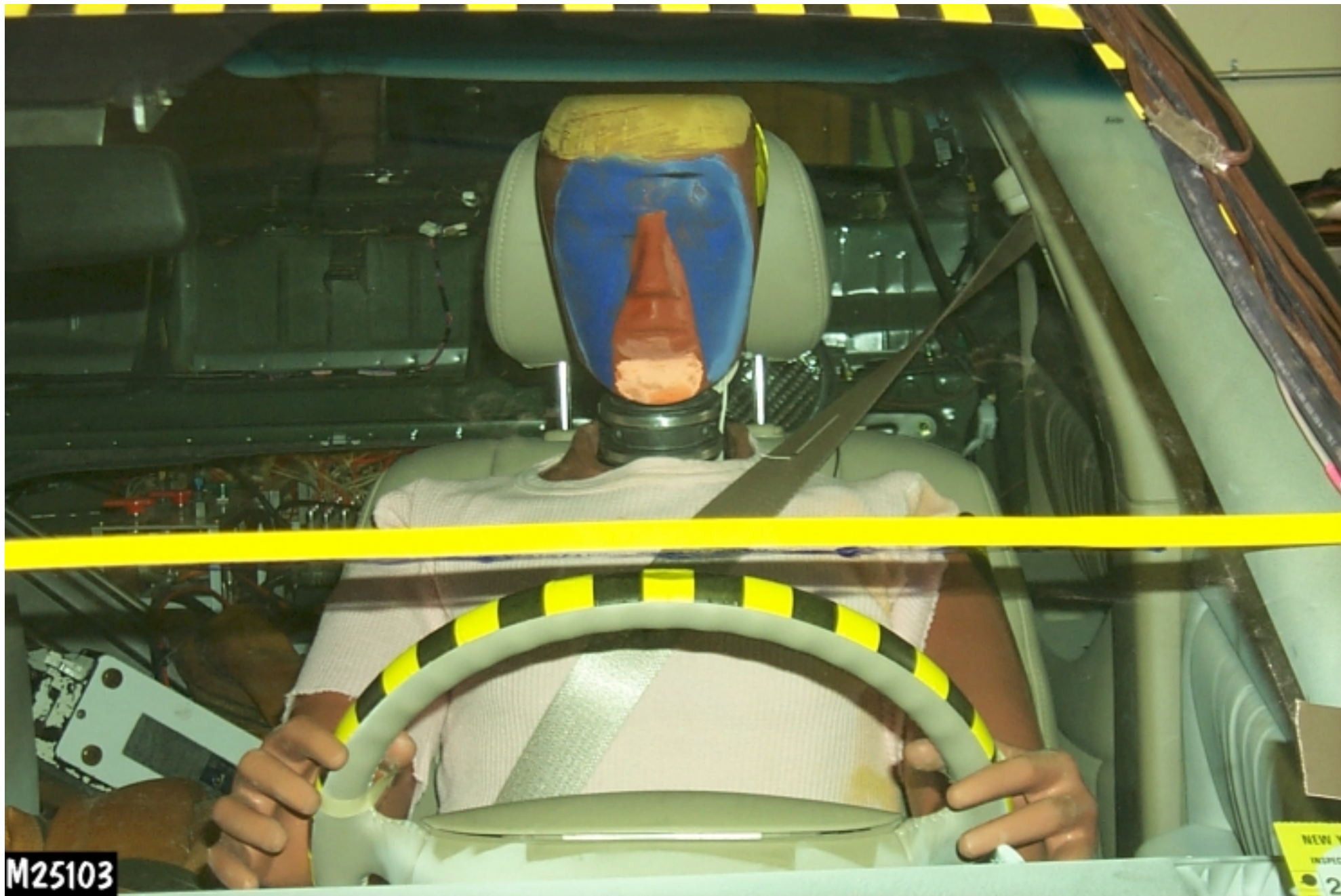


Figure A-30: PRE-TEST DRIVER HEAD LOCATION



Figure A-31: POST-TEST DRIVER HEAD LOCATION



Figure A-32: PRE-TEST PASSENGER HEAD LOCATION



Figure A-33: POST-TEST PASSENGER HEAD LOCATION



Figure A-34: PRE-TEST DRIVER FLOOR PAN VIEW



Figure A-35: POST-TEST DRIVER FLOOR PAN VIEW



Figure A-36: PRE-TEST PASSENGER FLOOR PAN VIEW



Figure A-37: POST-TEST PASSENGER FLOOR PAN VIEW



Figure A-38: ROLLOVER VIEW



Figure A-39: IMPACT VIEW

## **APPENDIX B**

### **DUMMY, VEHICLE AND LOAD CELL BARRIER RESPONSE DATA**

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

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

## DATA CHANNEL FILTER CLASS SUMMARY

NHTSA TEST NO. M25103

| DATA TYPE                         | SAE FILTER CLASS (Hz) |
|-----------------------------------|-----------------------|
| Dummy Head Accelerations          | 1000                  |
| Dummy Chest Accelerations         | 180                   |
| Dummy Chest Displacements         | 60                    |
| 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                    |

NCAP - 2002 Toyota Avalon

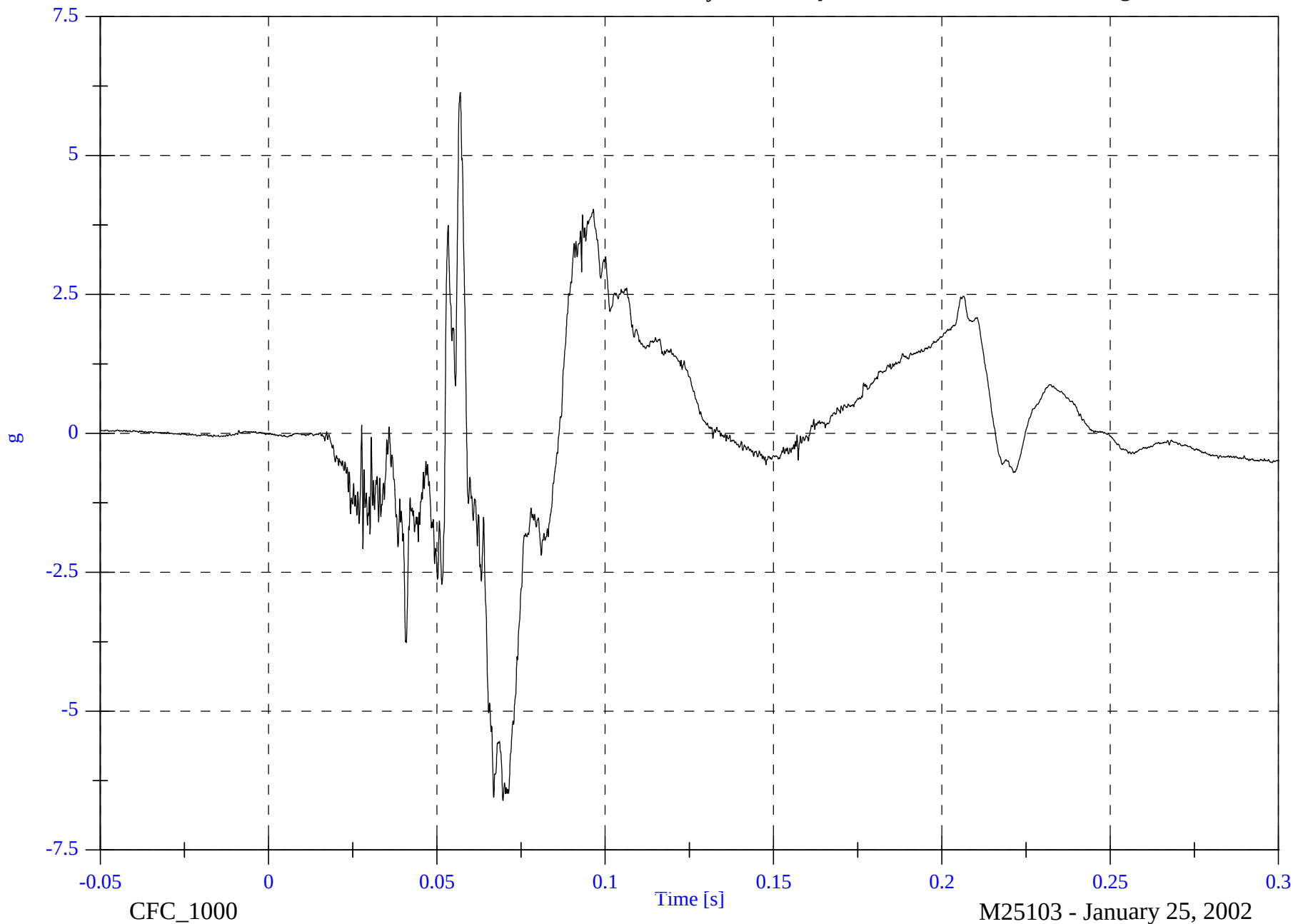
P1 Head 9 Array X Arm Ay

Max: 6.1 [g] at 0.057 [s]

Min: -6.6 [g] at 0.070 [s]

B-4

8642-NCAP-04

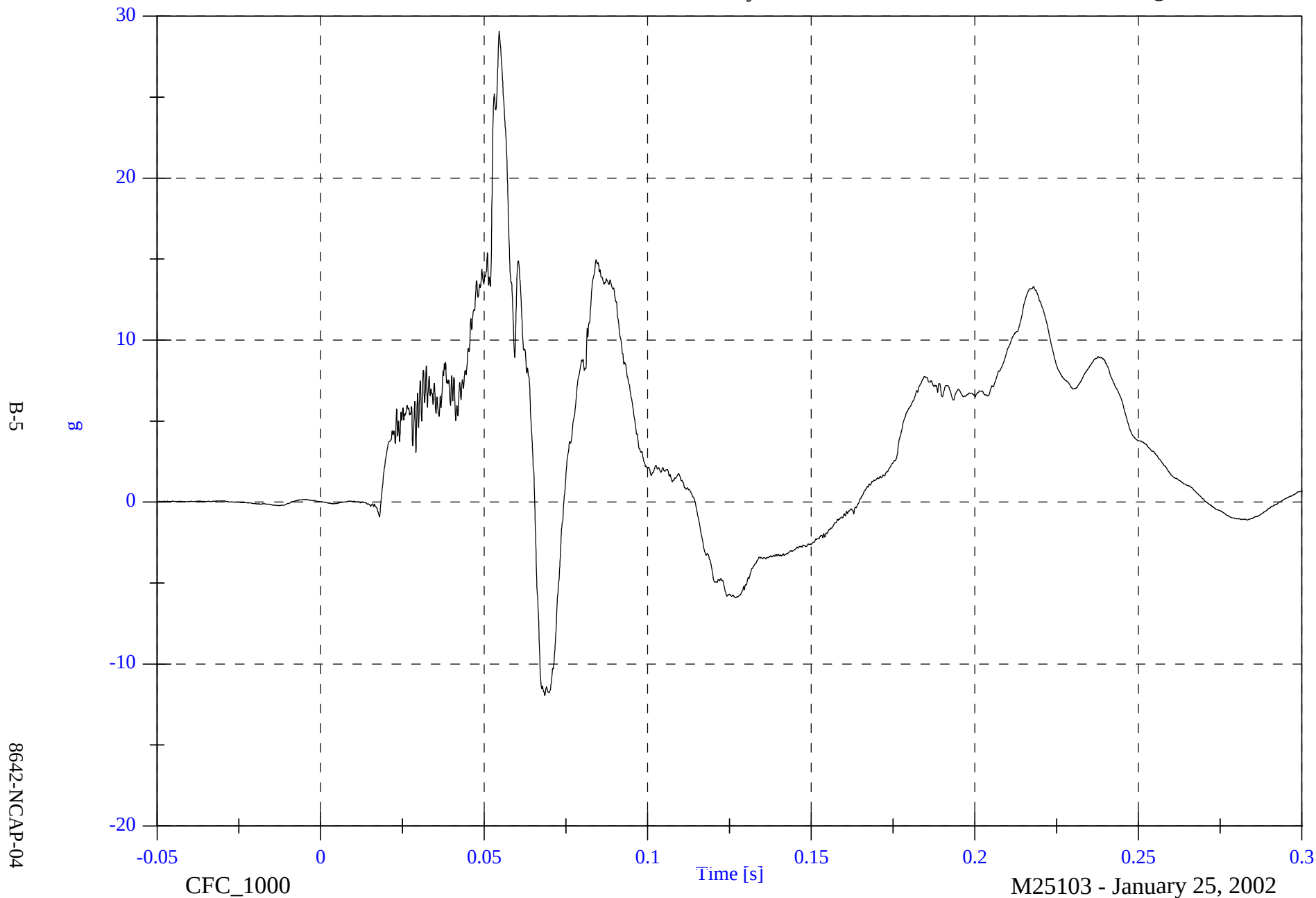


NCAP - 2002 Toyota Avalon

P1 Head 9 Array X Arm Az

Max: 29.1 [g] at 0.055 [s]

Min: -12.0 [g] at 0.069 [s]



NCAP - 2002 Toyota Avalon

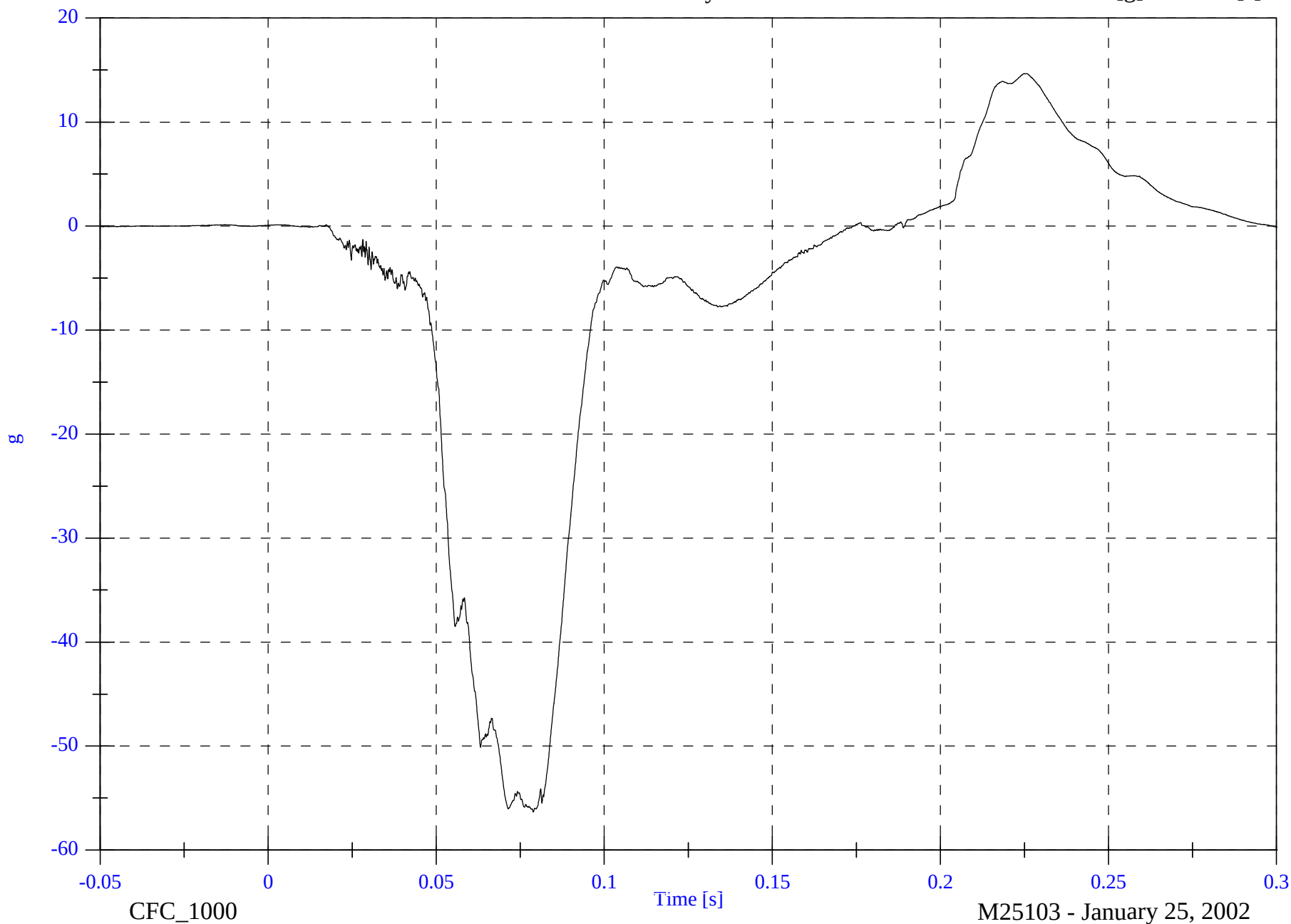
P1 Head 9 Array Y Arm Ax

Max: 14.7 [g] at 0.226 [s]

Min: -56.3 [g] at 0.079 [s]

B-6

8642-NCAP-04

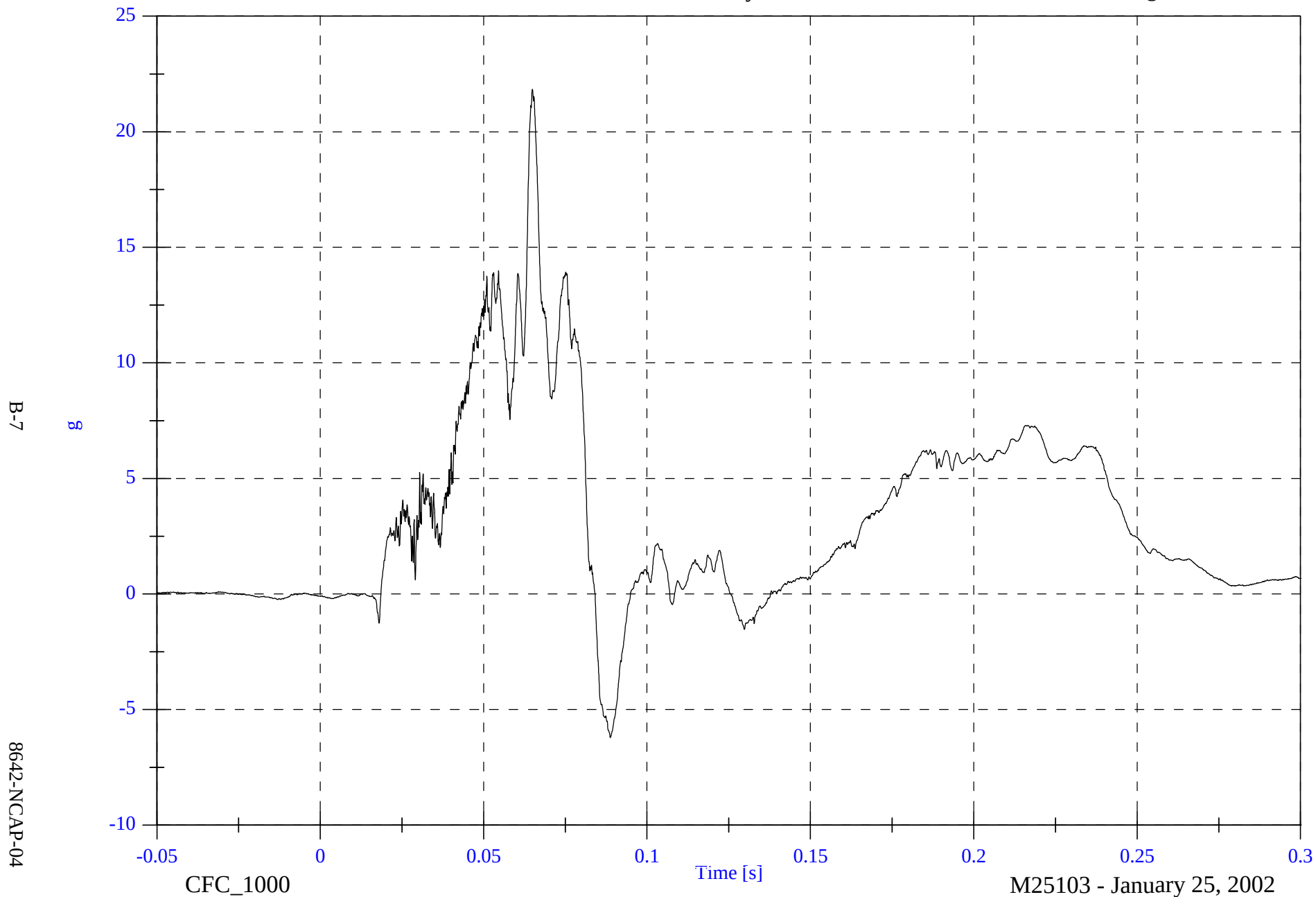


NCAP - 2002 Toyota Avalon

P1 Head 9 Array Y Arm Az

Max: 21.8 [g] at 0.065 [s]

Min: -6.2 [g] at 0.089 [s]

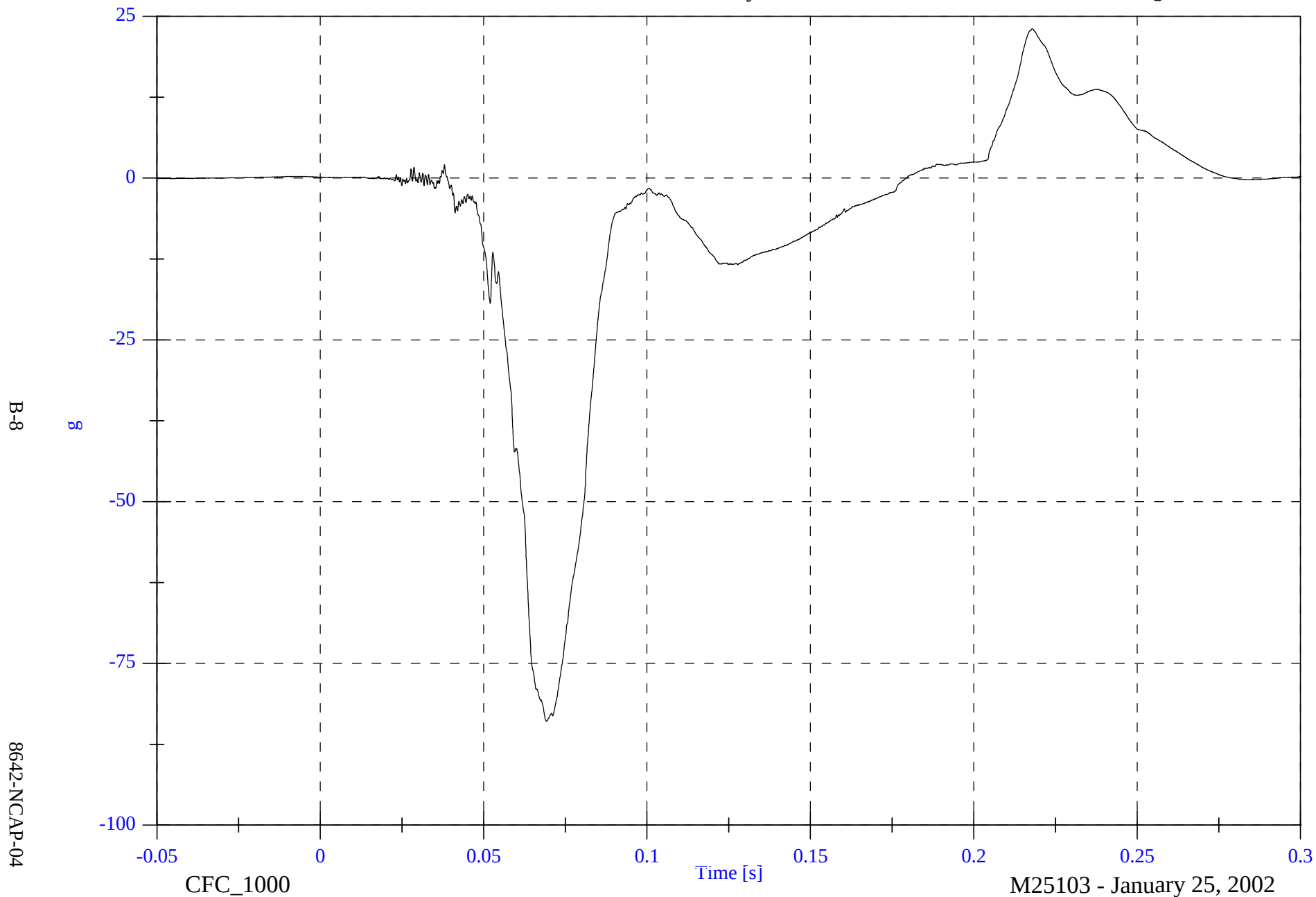


NCAP - 2002 Toyota Avalon

P1 Head 9 Array Z Arm Ax

Max: 23.0 [g] at 0.218 [s]

Min: -83.9 [g] at 0.069 [s]

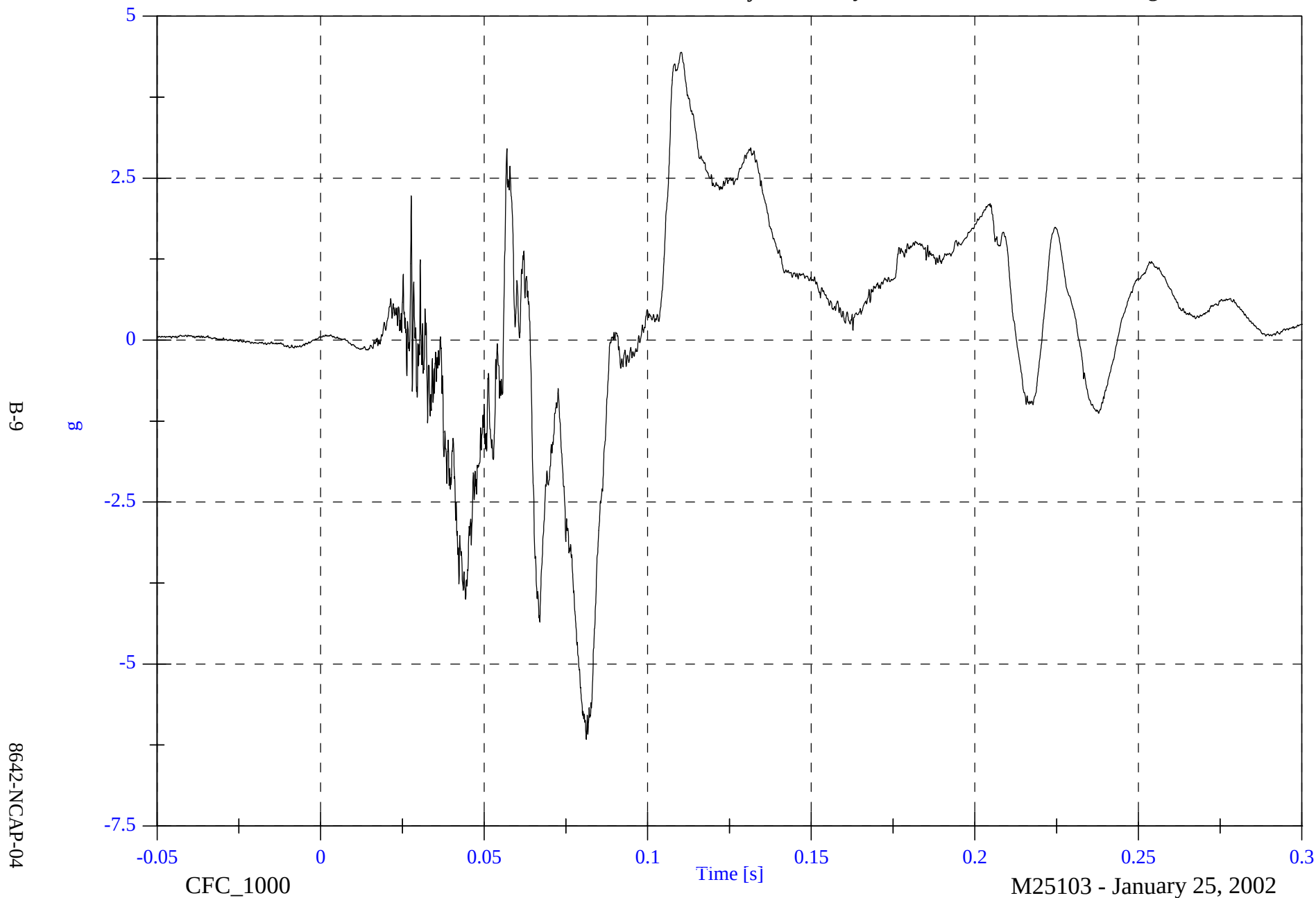


NCAP - 2002 Toyota Avalon

P1 Head 9 Array Z Arm Ay

Max: 4.4 [g] at 0.110 [s]

Min: -6.2 [g] at 0.081 [s]

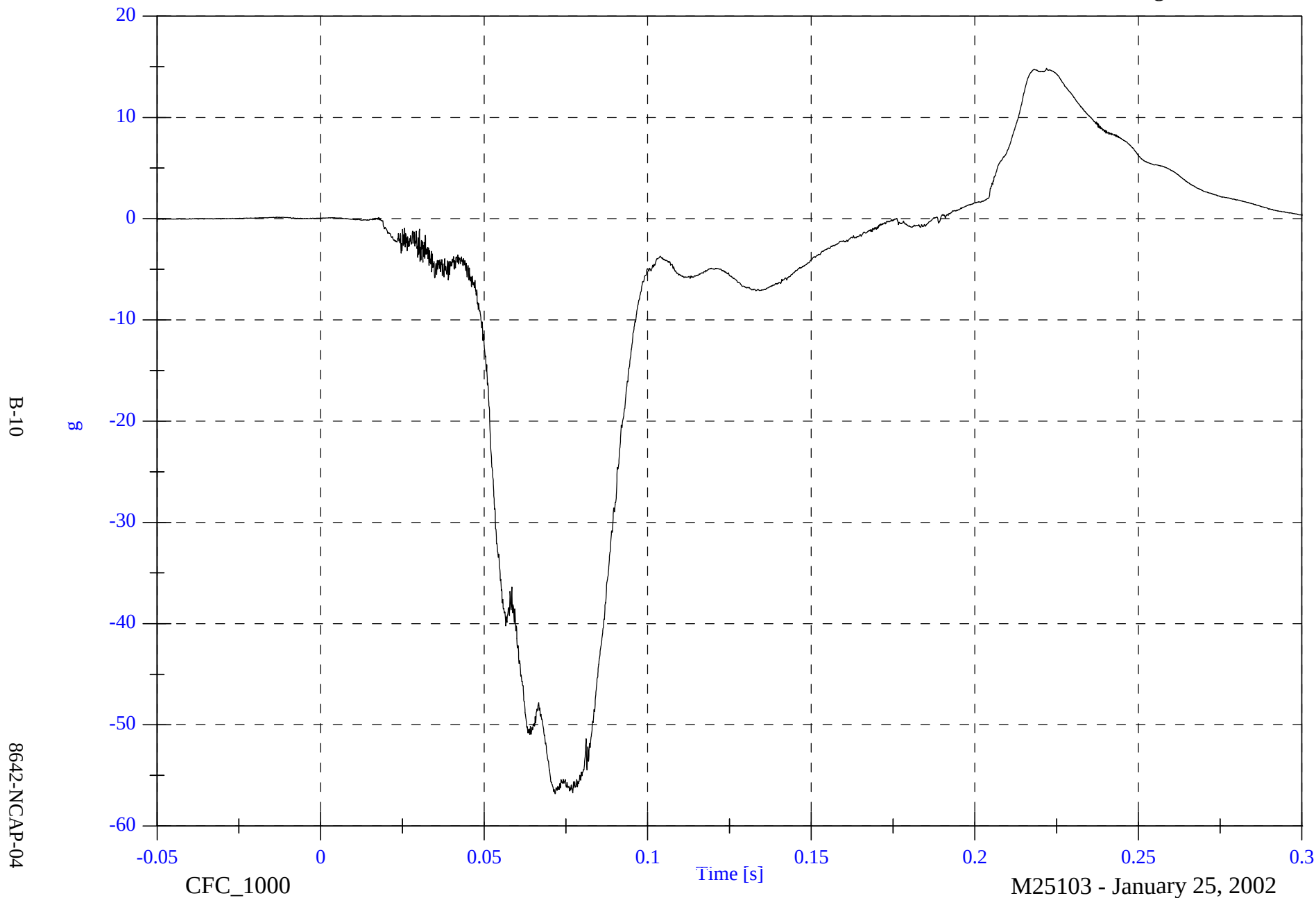


NCAP - 2002 Toyota Avalon

P1 Head CG x

Max: 14.9 [g] at 0.222 [s]

Min: -56.8 [g] at 0.072 [s]



NCAP - 2002 Toyota Avalon

P1 Head CG y

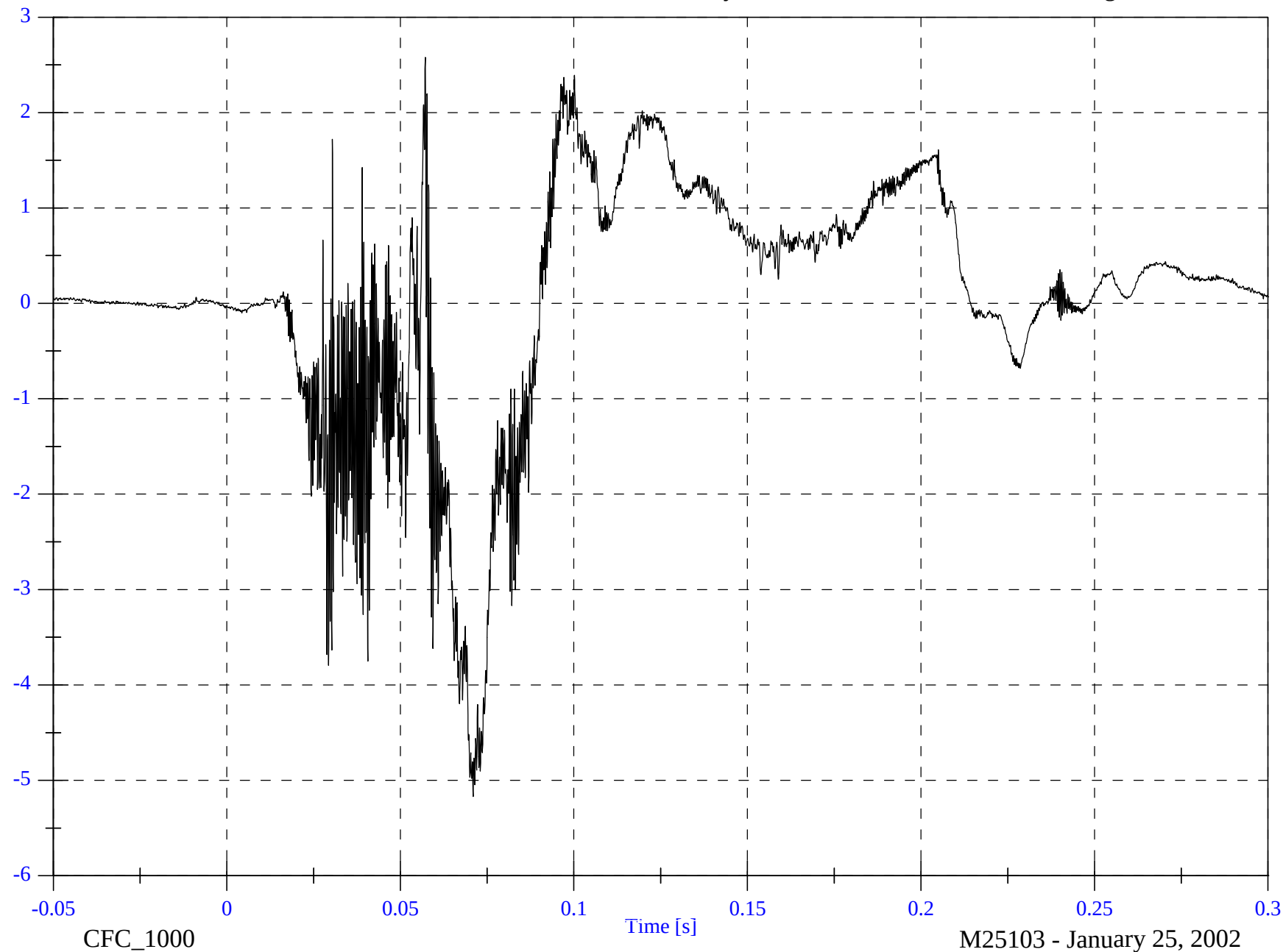
Max: 2.6 [g] at 0.057 [s]

Min: -5.2 [g] at 0.071 [s]

B-11

8642-NCAP-04

g

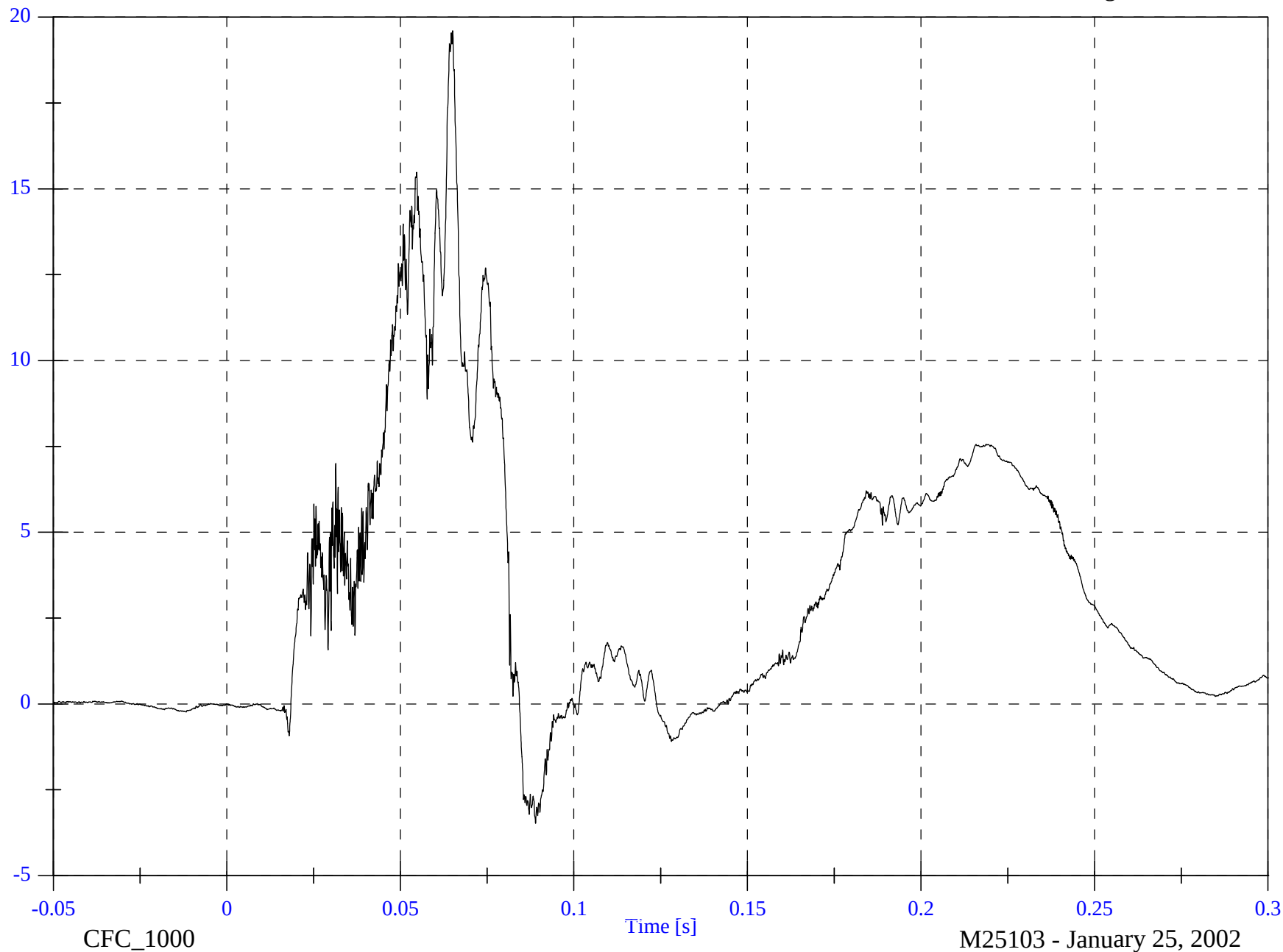


NCAP - 2002 Toyota Avalon

P1 Head CG z

Max: 19.6 [g] at 0.065 [s]

Min: -3.5 [g] at 0.089 [s]



B-12

8642-NCAP-04

NCAP - 2002 Toyota Avalon

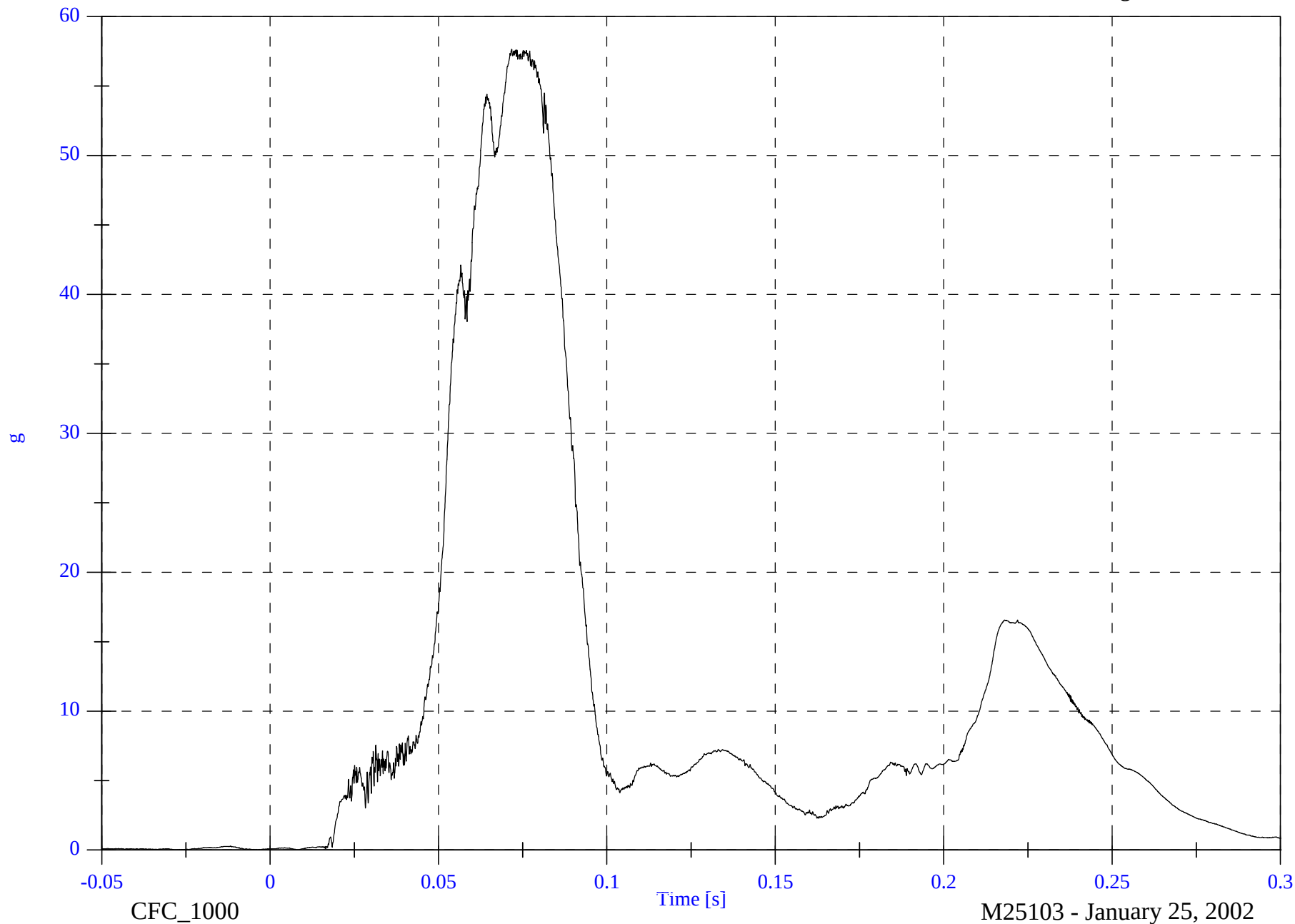
P1 Head CG Resultant

Max: 57.7 [g] at 0.072 [s]

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

B-13

8642-NCAP-04



NCAP - 2002 Toyota Avalon

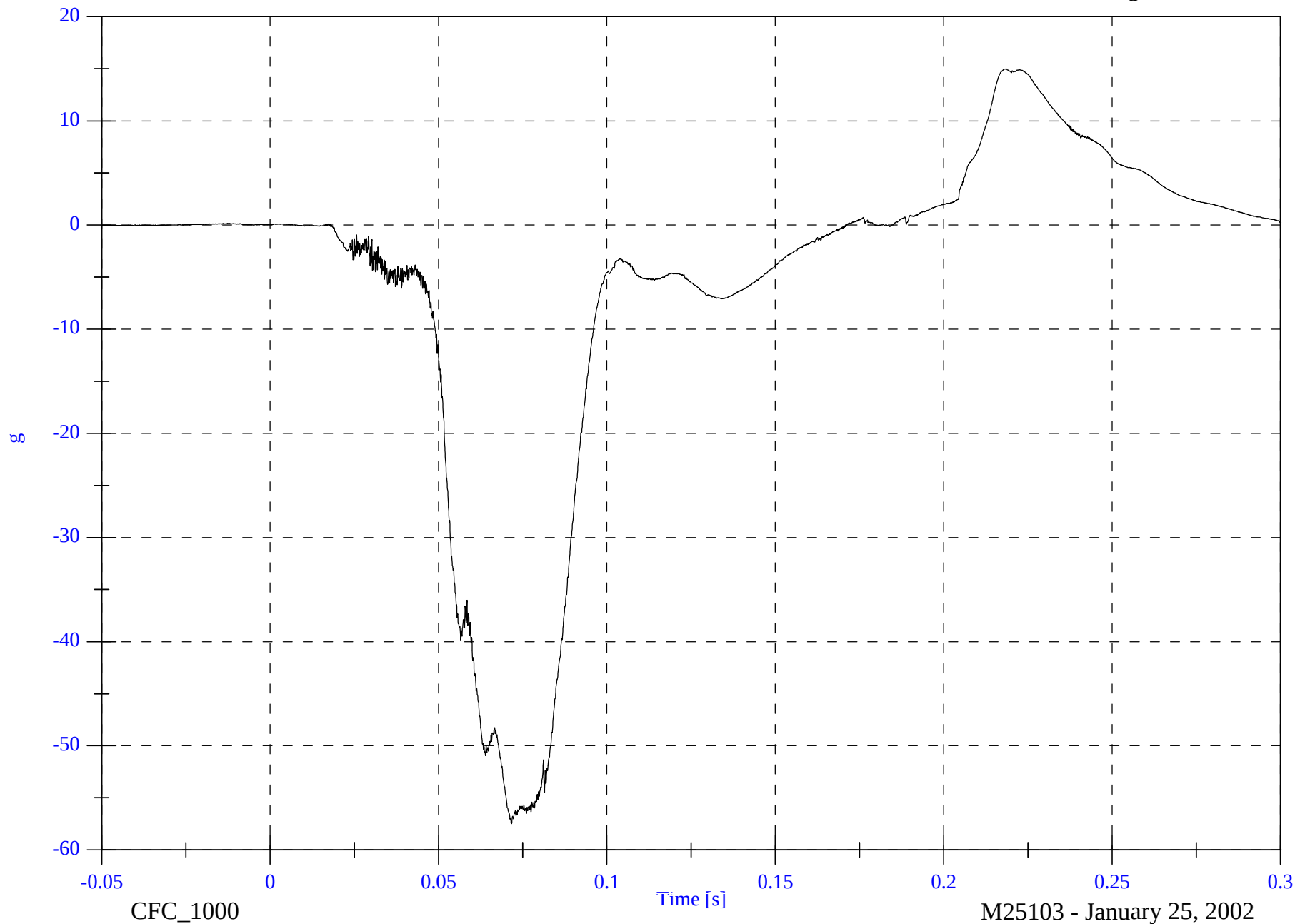
P1 Head CG Red x

Max: 15.0 [g] at 0.218 [s]

Min: -57.5 [g] at 0.072 [s]

B-14

8642-NCAP-04



NCAP - 2002 Toyota Avalon

P1 Head CG Red y

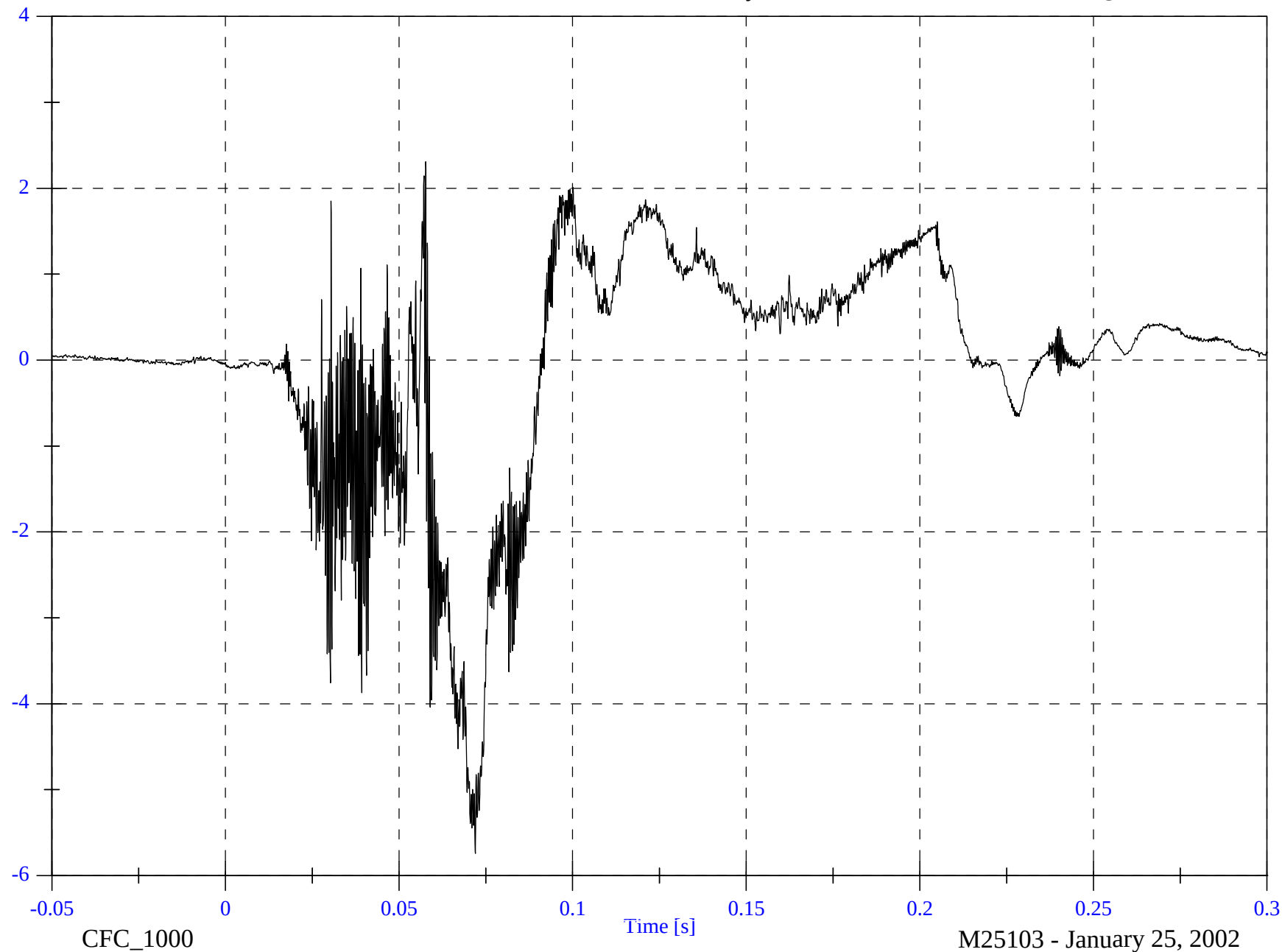
Max: 2.3 [g] at 0.058 [s]

Min: -5.7 [g] at 0.072 [s]

B-15

8642-NCAP-04

g



NCAP - 2002 Toyota Avalon

P1 Head CG Red z

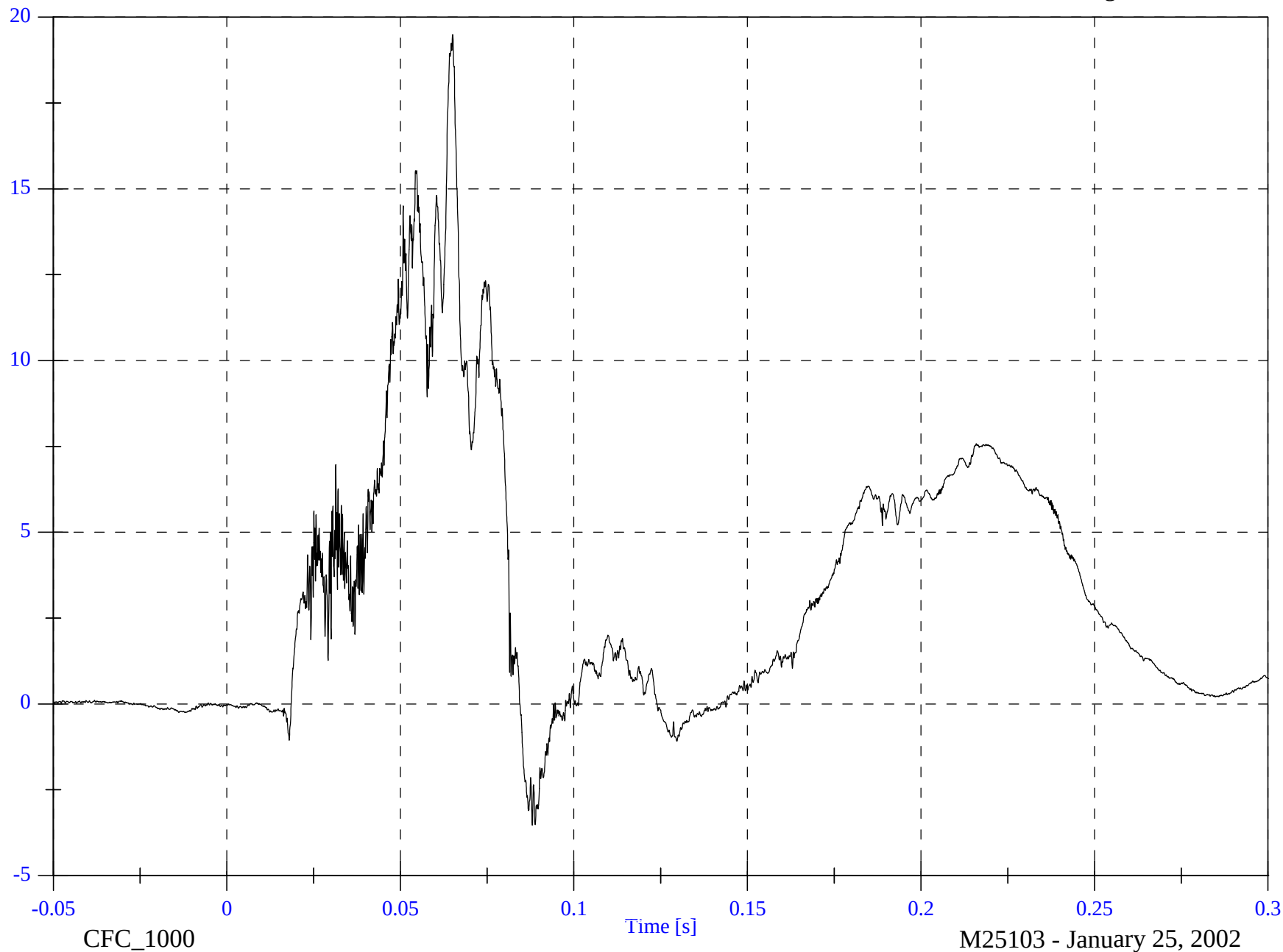
Max: 19.5 [g] at 0.065 [s]

Min: -3.5 [g] at 0.088 [s]

B-16

8642-NCAP-04

g



NCAP - 2002 Toyota Avalon

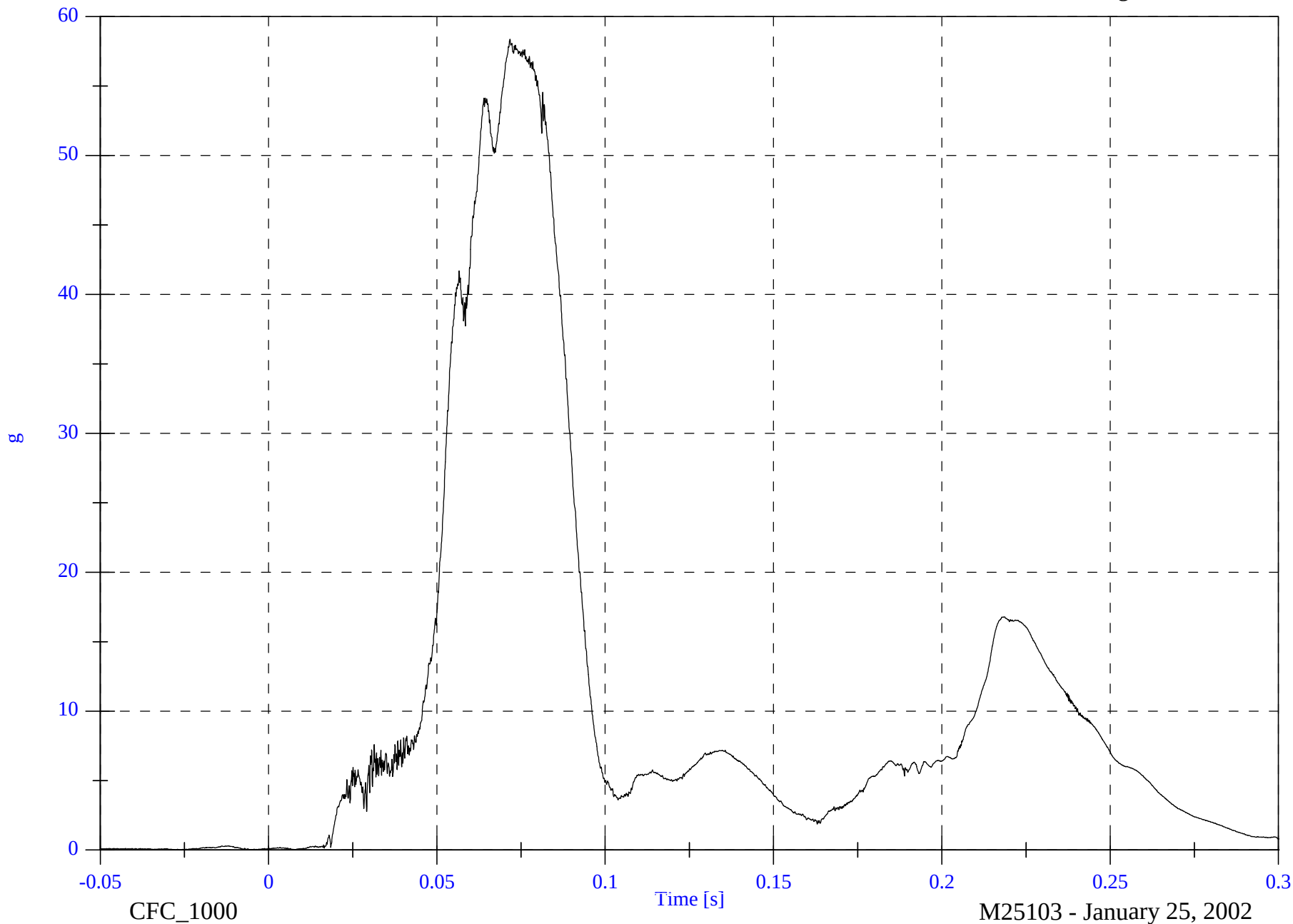
P1 Head CG Red Resultant

Max: 58.4 [g] at 0.072 [s]

Min: 0.0 [g] at -0.028 [s]

B-17

8642-NCAP-04



NCAP - 2002 Toyota Avalon

P1 Upper Neck Fx

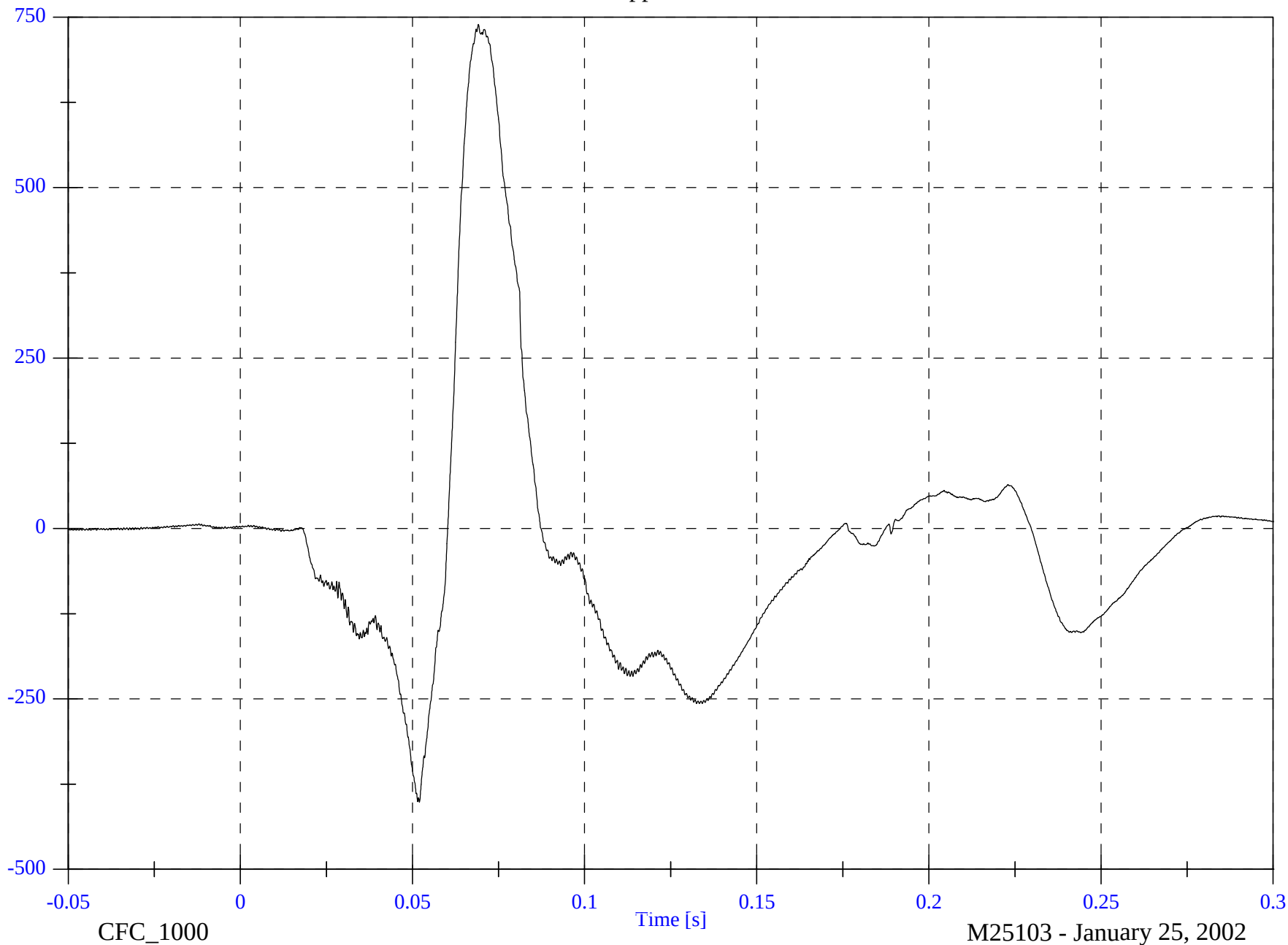
Max: 739.1 [N] at 0.069 [s]

Min: -401.5 [N] at 0.052 [s]

B-18

N

8642-NCAP-04

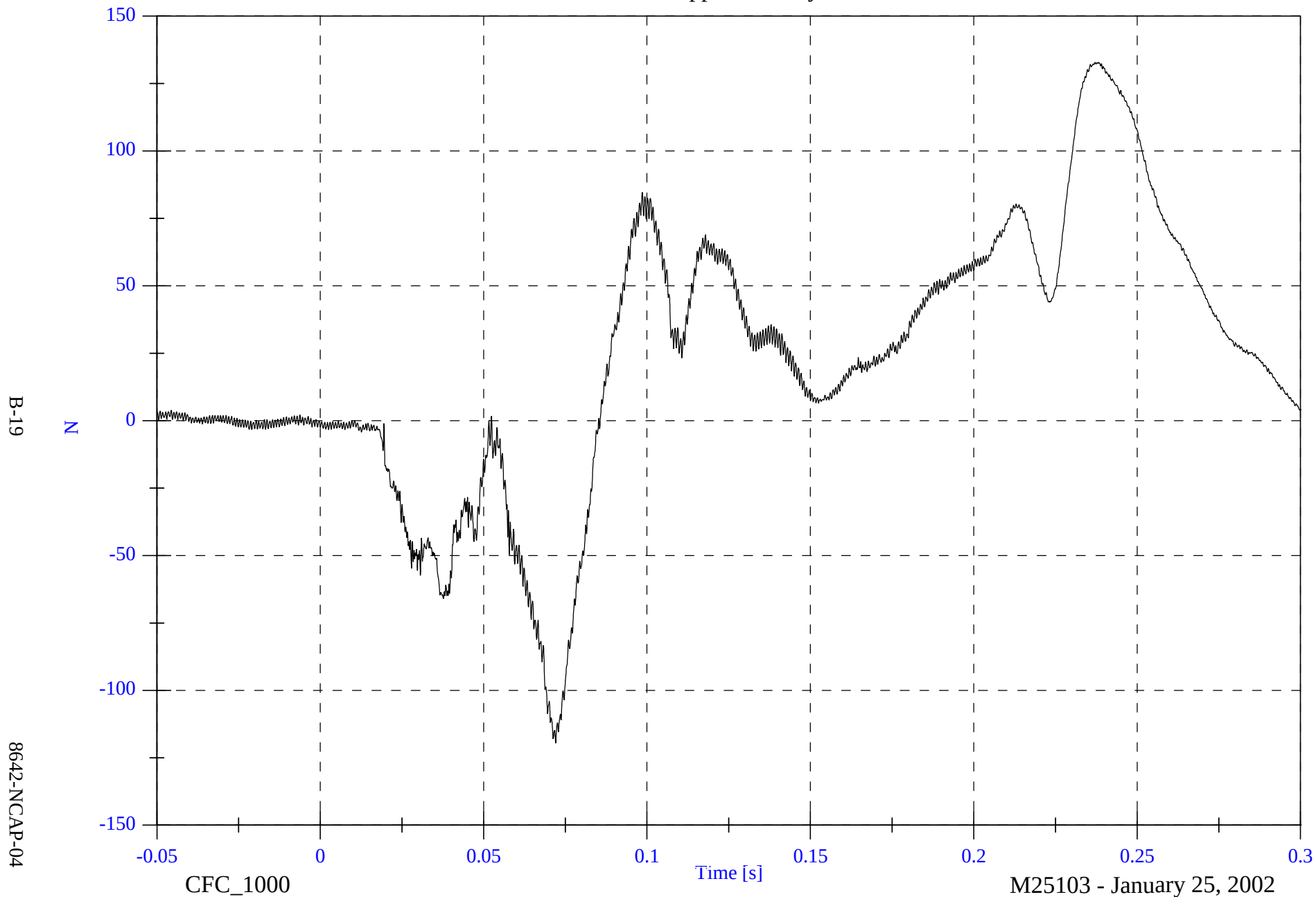


NCAP - 2002 Toyota Avalon

P1 Upper Neck Fy

Max: 132.8 [N] at 0.238 [s]

Min: -119.6 [N] at 0.072 [s]

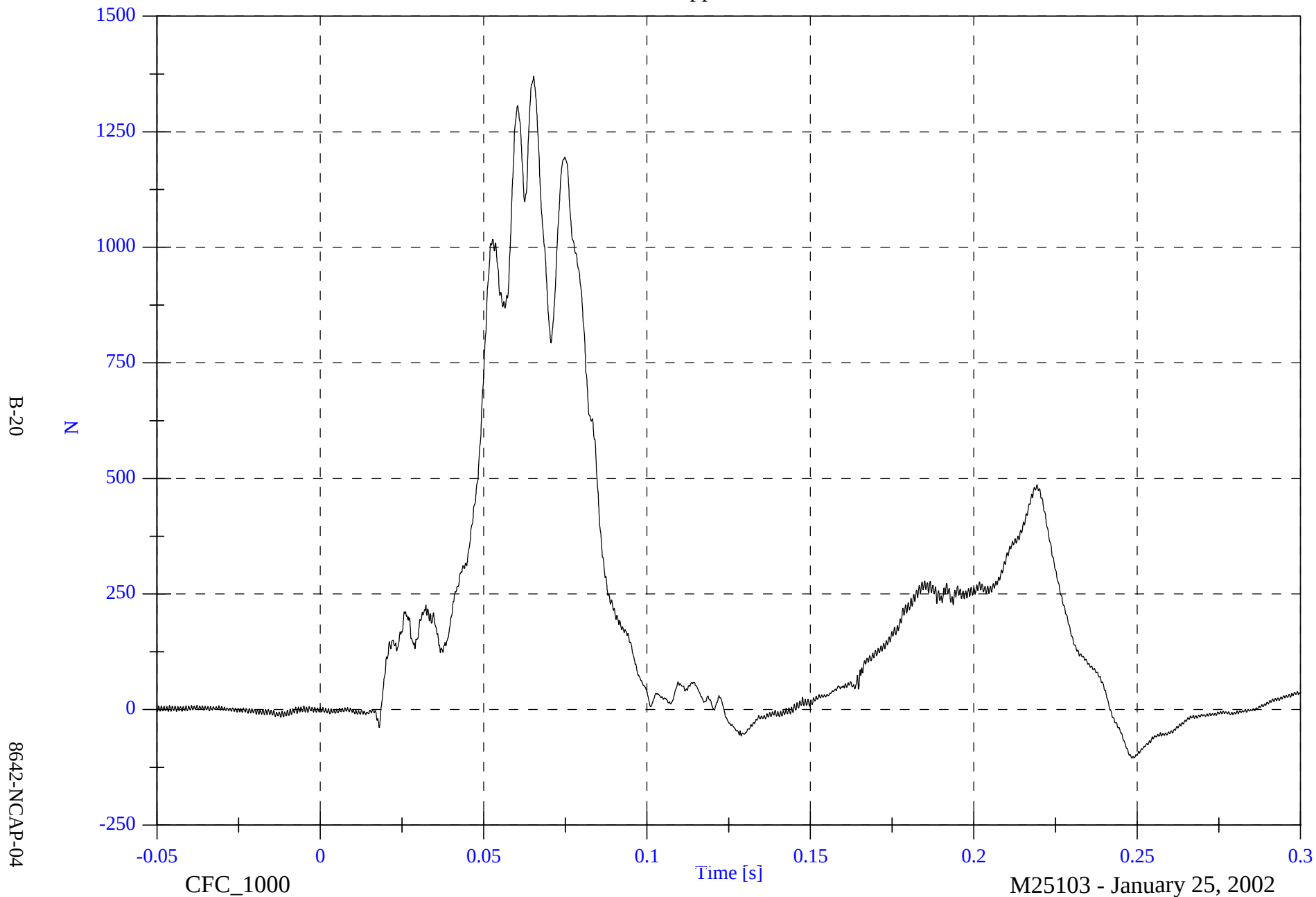


NCAP - 2002 Toyota Avalon

P1 Upper Neck Fz

Max: 1369.9 [N] at 0.065 [s]

Min: -105.0 [N] at 0.248 [s]



NCAP - 2002 Toyota Avalon

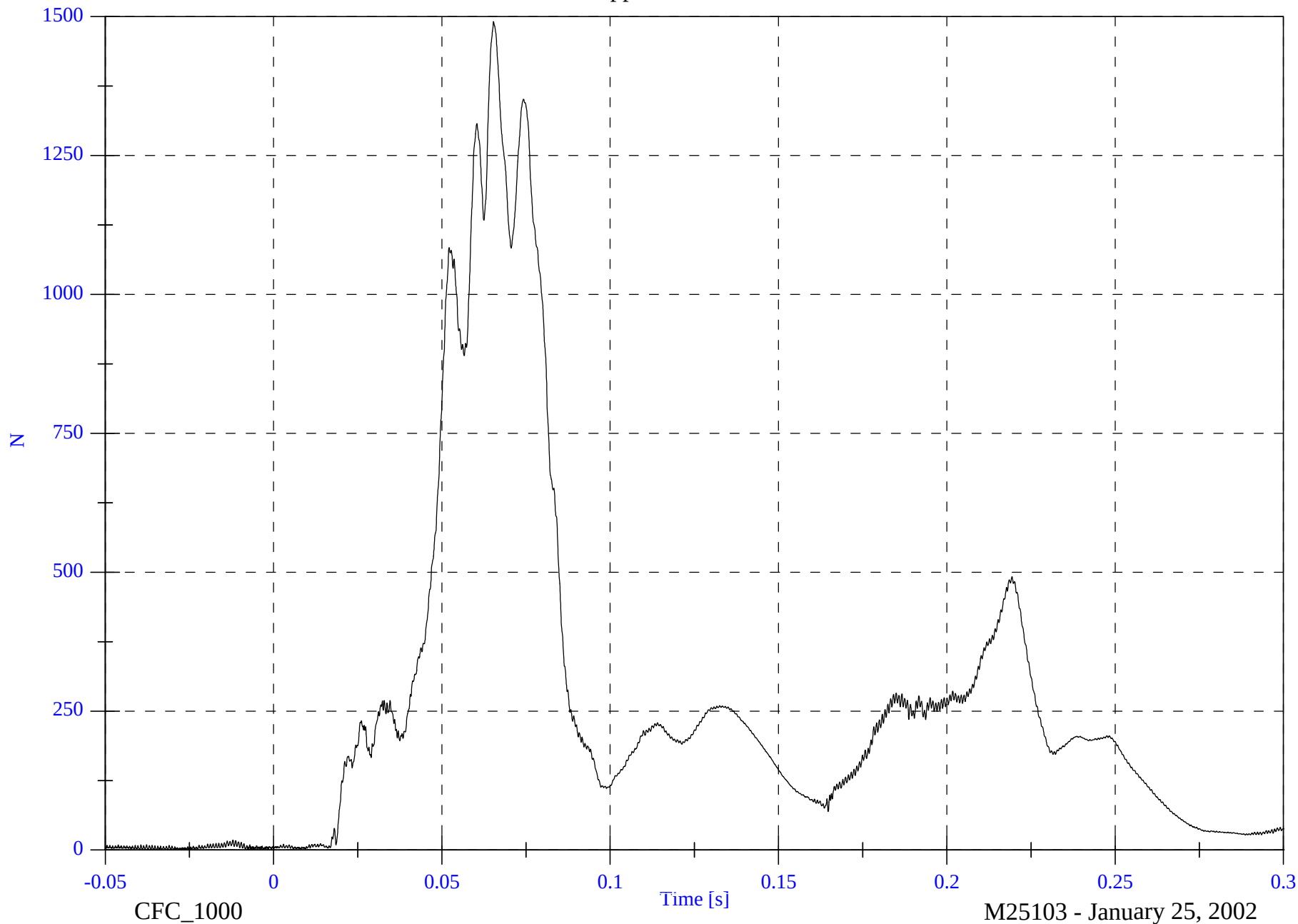
P1 Upper Neck F Resultant

Max: 1491.0 [N] at 0.065 [s]

Min: 0.5 [N] at -0.029 [s]

B-21

8642-NCAP-04



NCAP - 2002 Toyota Avalon

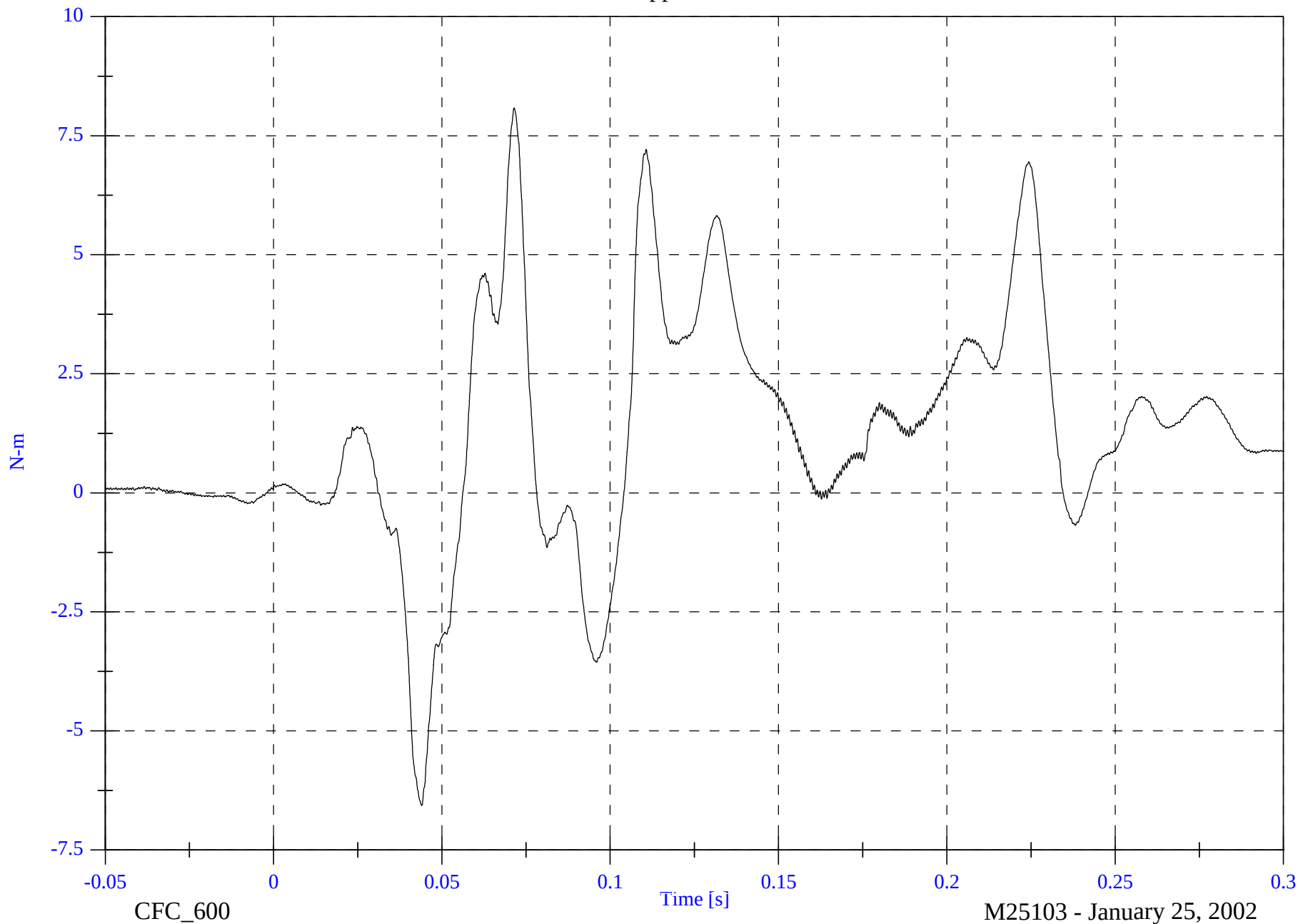
P1 Upper Neck Mx

Max: 8.1 [N-m] at 0.071 [s]

Min: -6.6 [N-m] at 0.044 [s]

B-22

8642-NCAP-04



NCAP - 2002 Toyota Avalon

P1 Upper Neck My

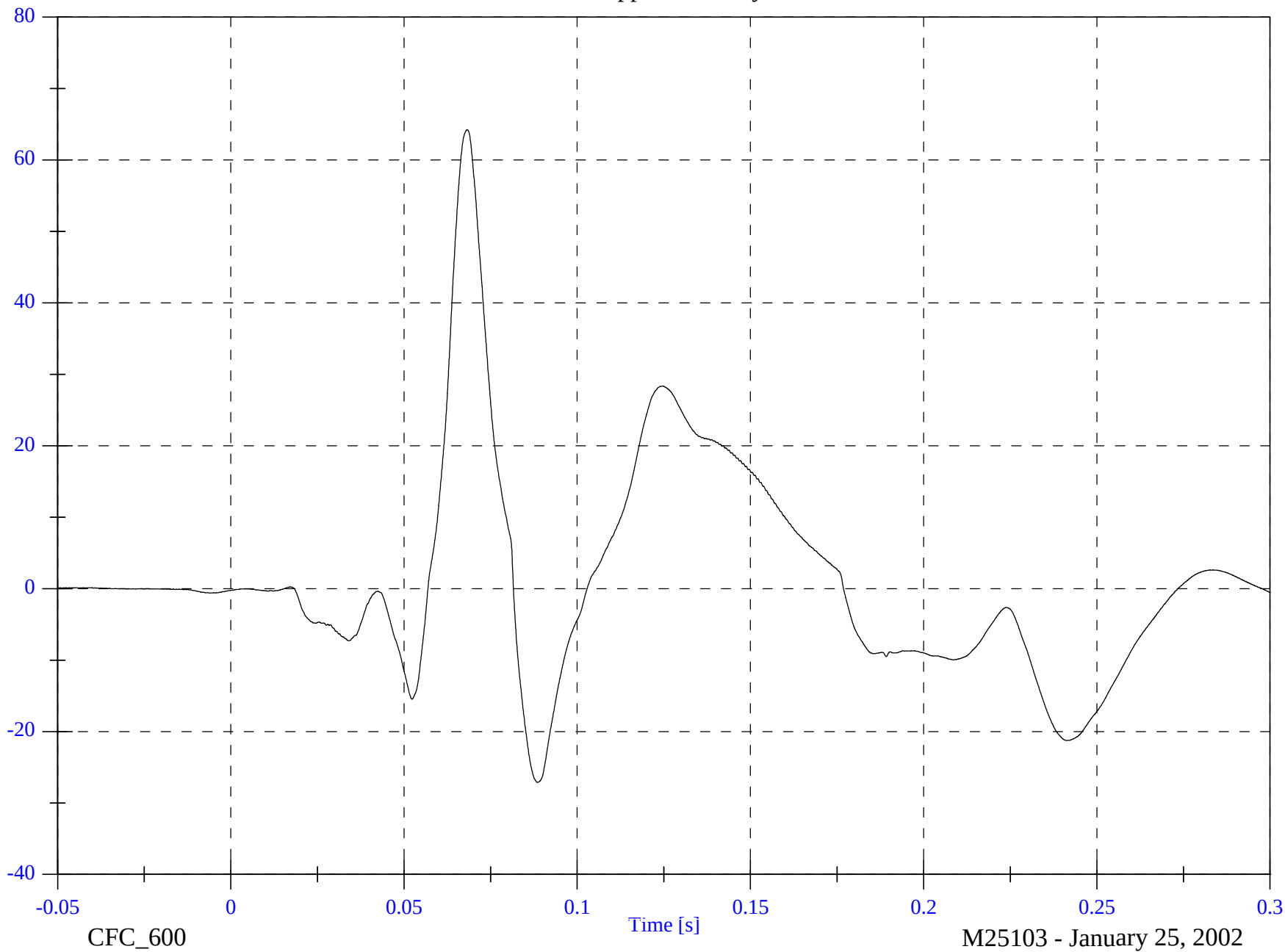
Max: 64.2 [N-m] at 0.068 [s]

Min: -27.1 [N-m] at 0.088 [s]

B-23

m-N

8642-NCAP-04

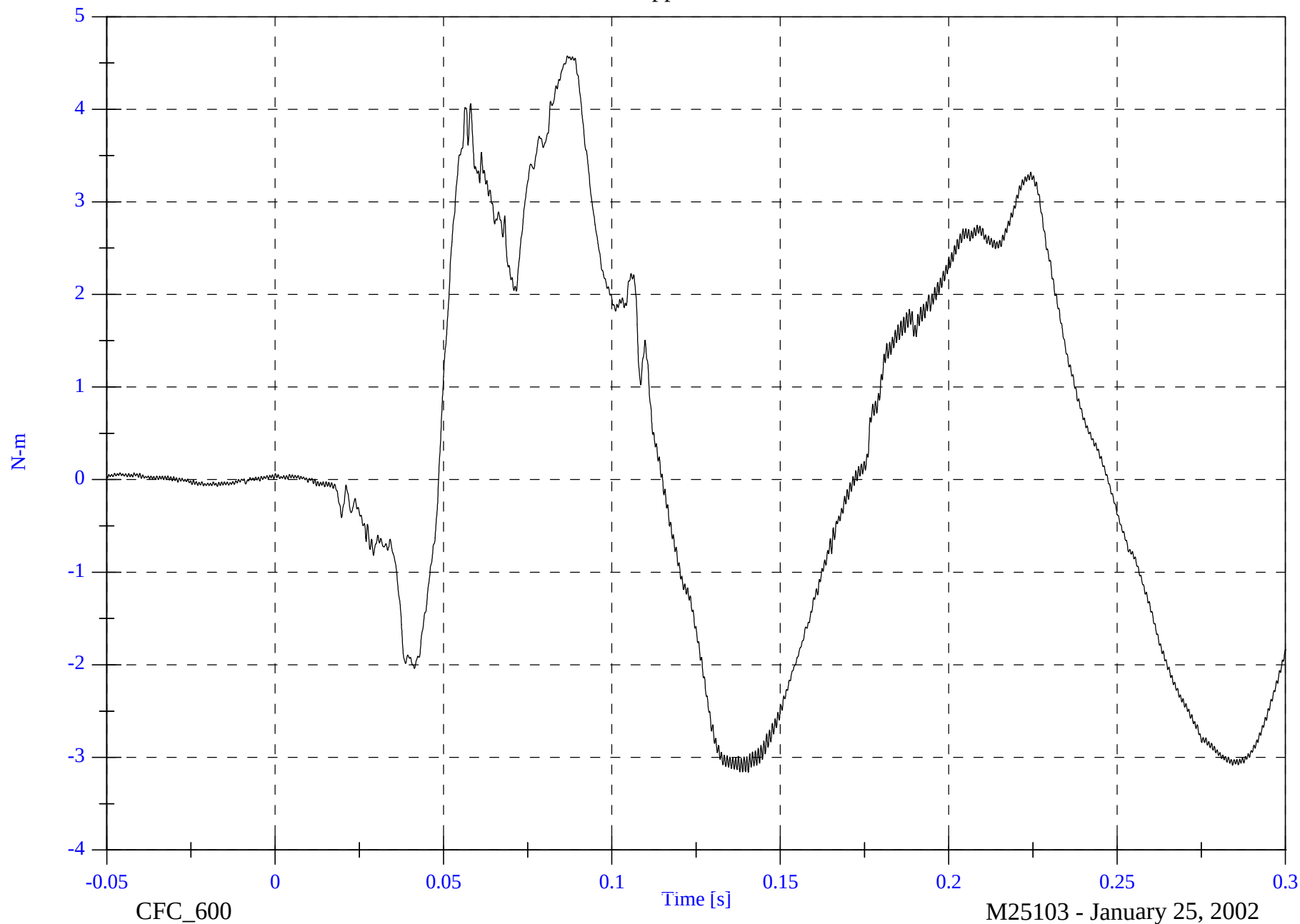


NCAP - 2002 Toyota Avalon

P1 Upper Neck Mz

Max: 4.6 [N-m] at 0.087 [s]

Min: -3.2 [N-m] at 0.141 [s]



B-24

8642-NCAP-04

CFC\_600

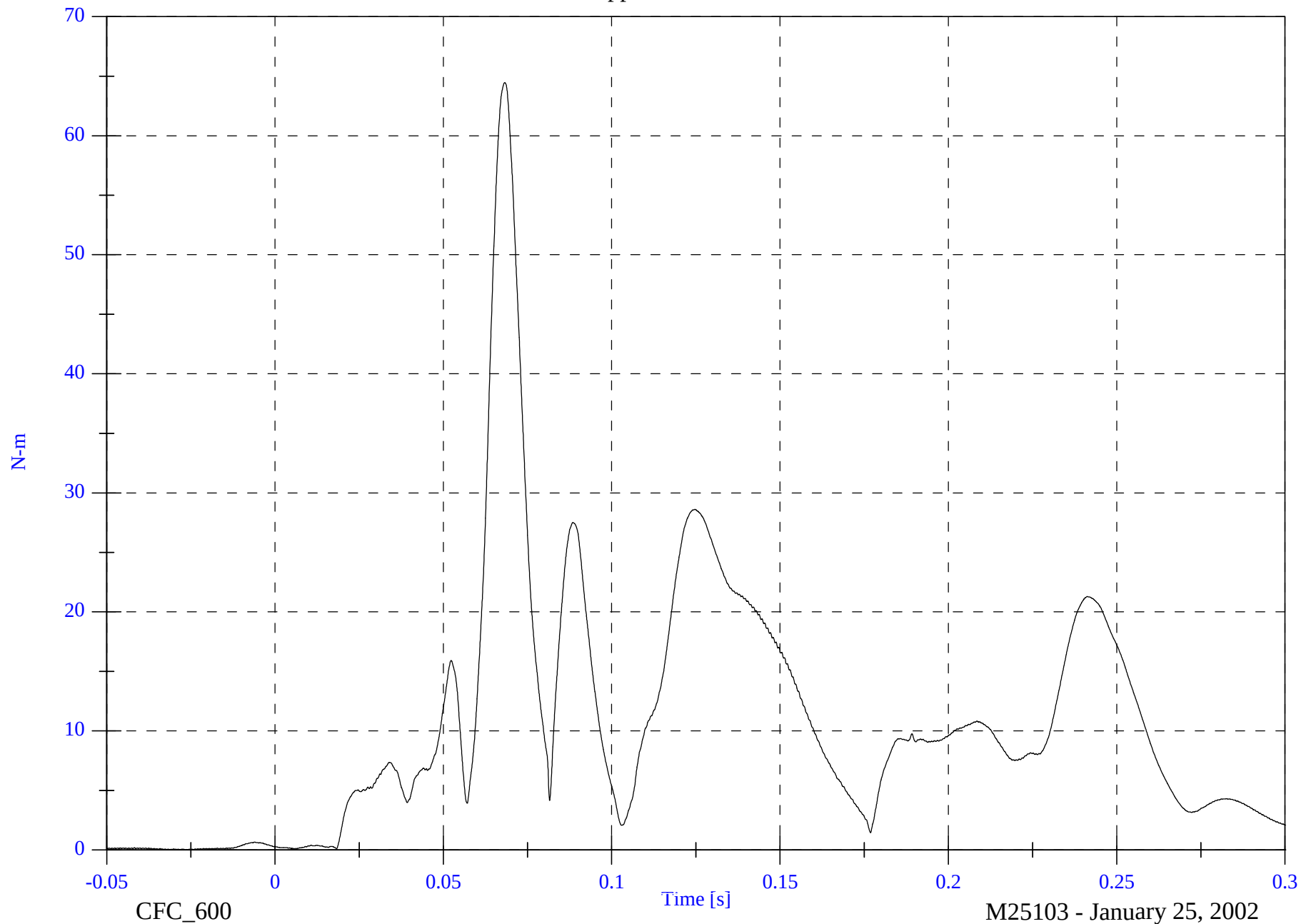
M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

P1 Upper Neck M Resultant

Max: 64.5 [N-m] at 0.068 [s]

Min: 0.0 [N-m] at -0.027 [s]



B-25

8642-NCAP-04

CFC\_600

M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

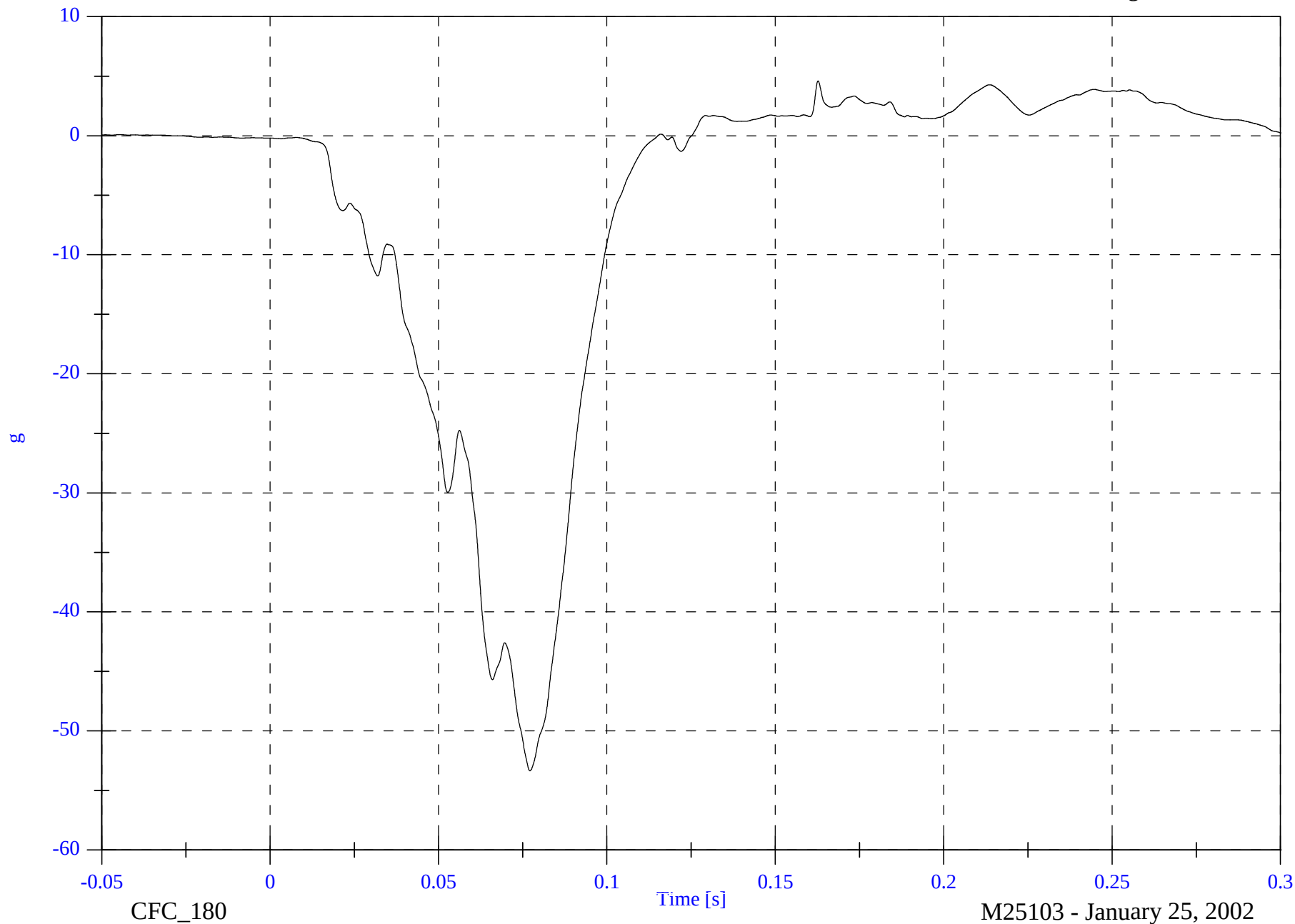
P1 Chest x

Max: 4.6 [g] at 0.163 [s]

Min: -53.3 [g] at 0.077 [s]

B-26

8642-NCAP-04



NCAP - 2002 Toyota Avalon

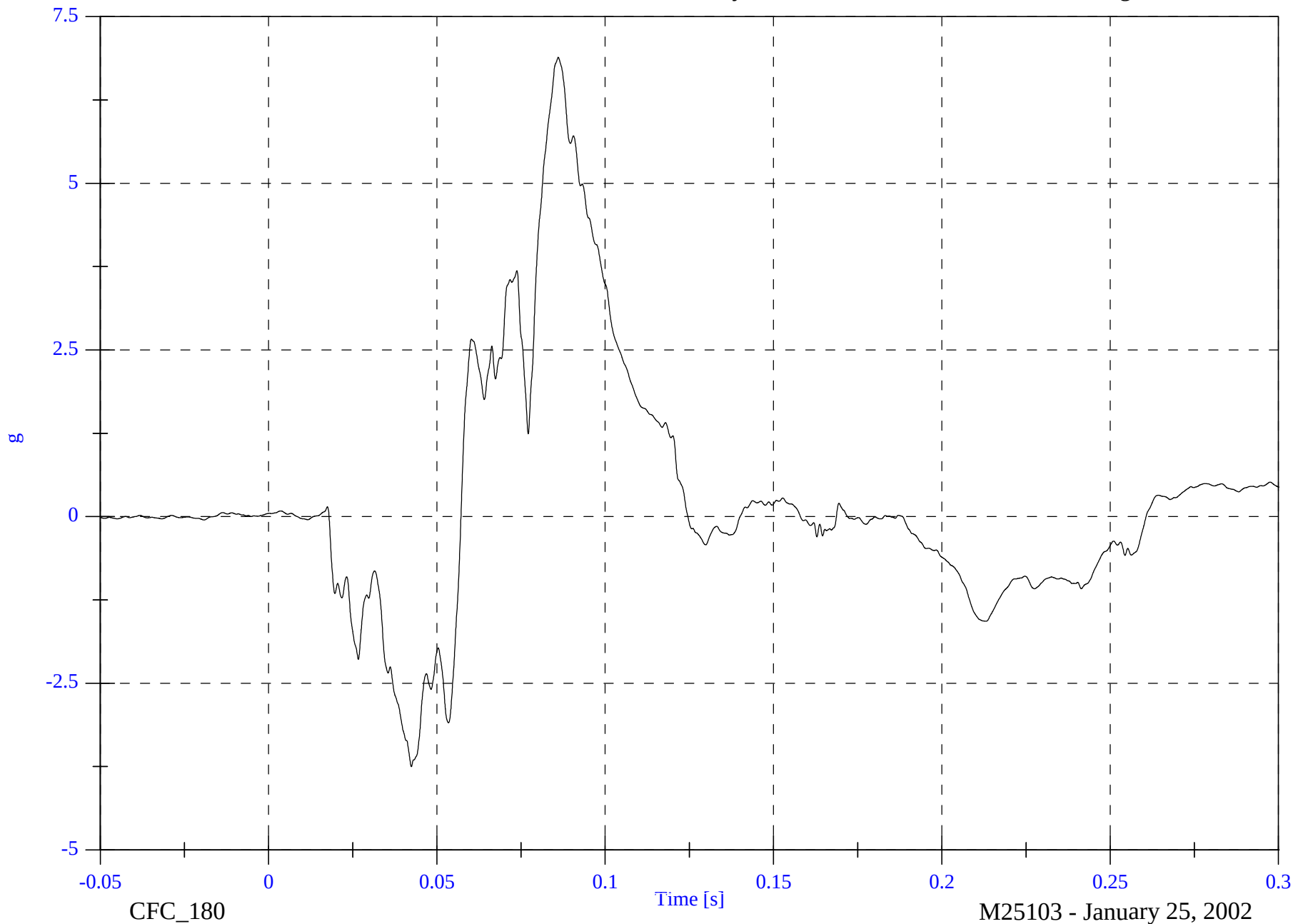
P1 Chest y

Max: 6.9 [g] at 0.086 [s]

Min: -3.8 [g] at 0.042 [s]

B-27

8642-NCAP-04

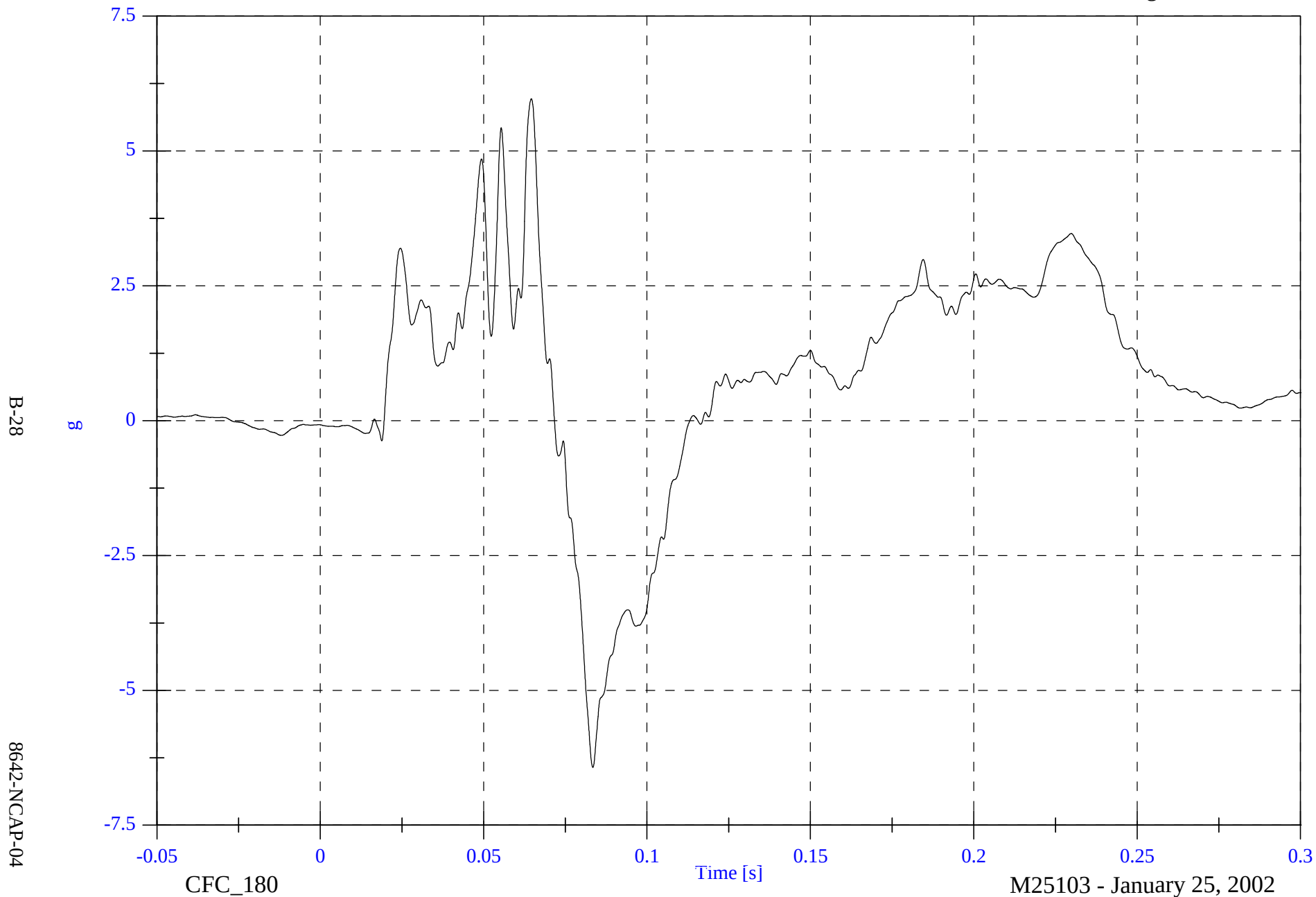


NCAP - 2002 Toyota Avalon

P1 Chest z

Max: 6.0 [g] at 0.065 [s]

Min: -6.4 [g] at 0.083 [s]



NCAP - 2002 Toyota Avalon

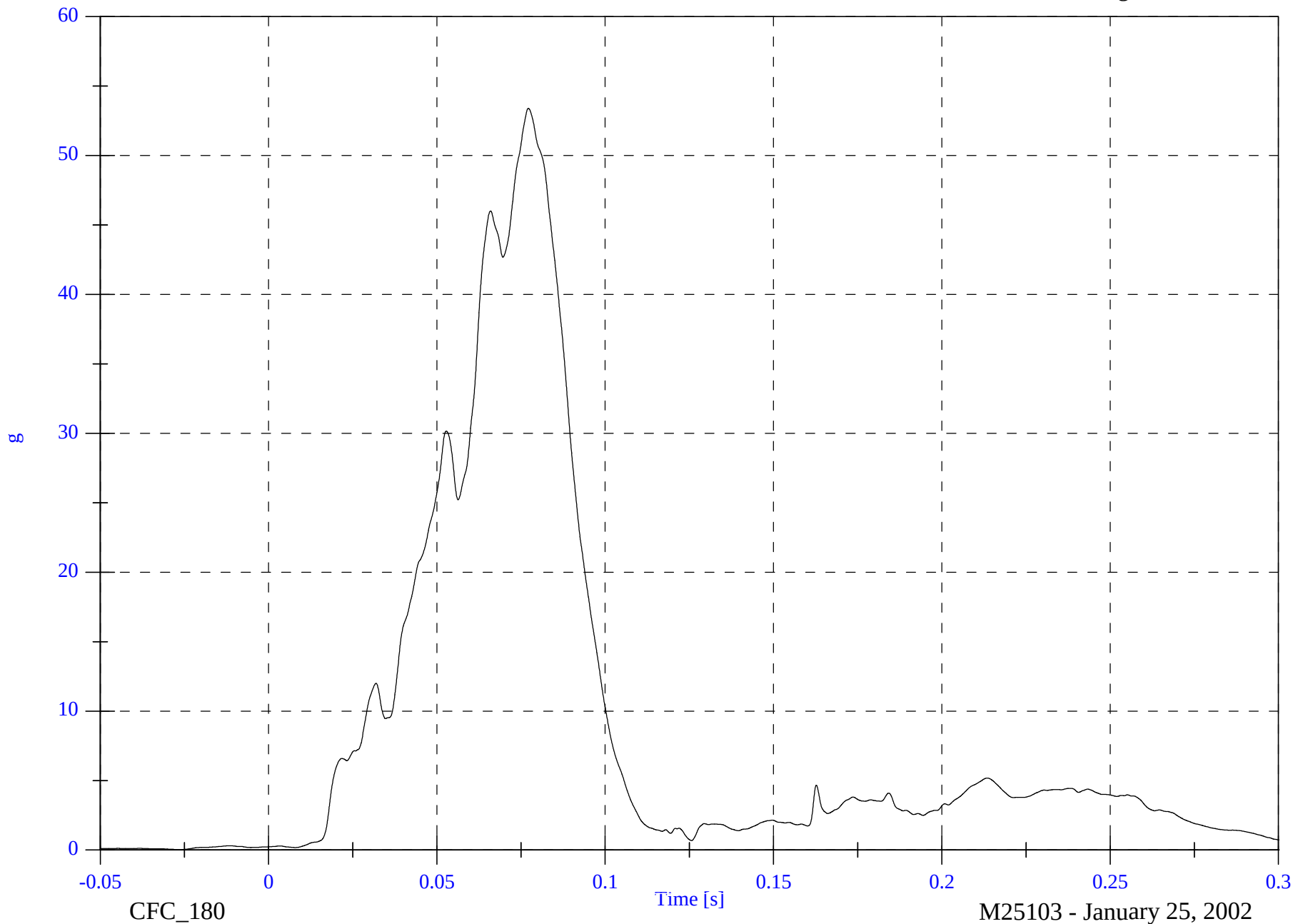
P1 Chest Resultant

Max: 53.4 [g] at 0.077 [s]

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

B-29

8642-NCAP-04

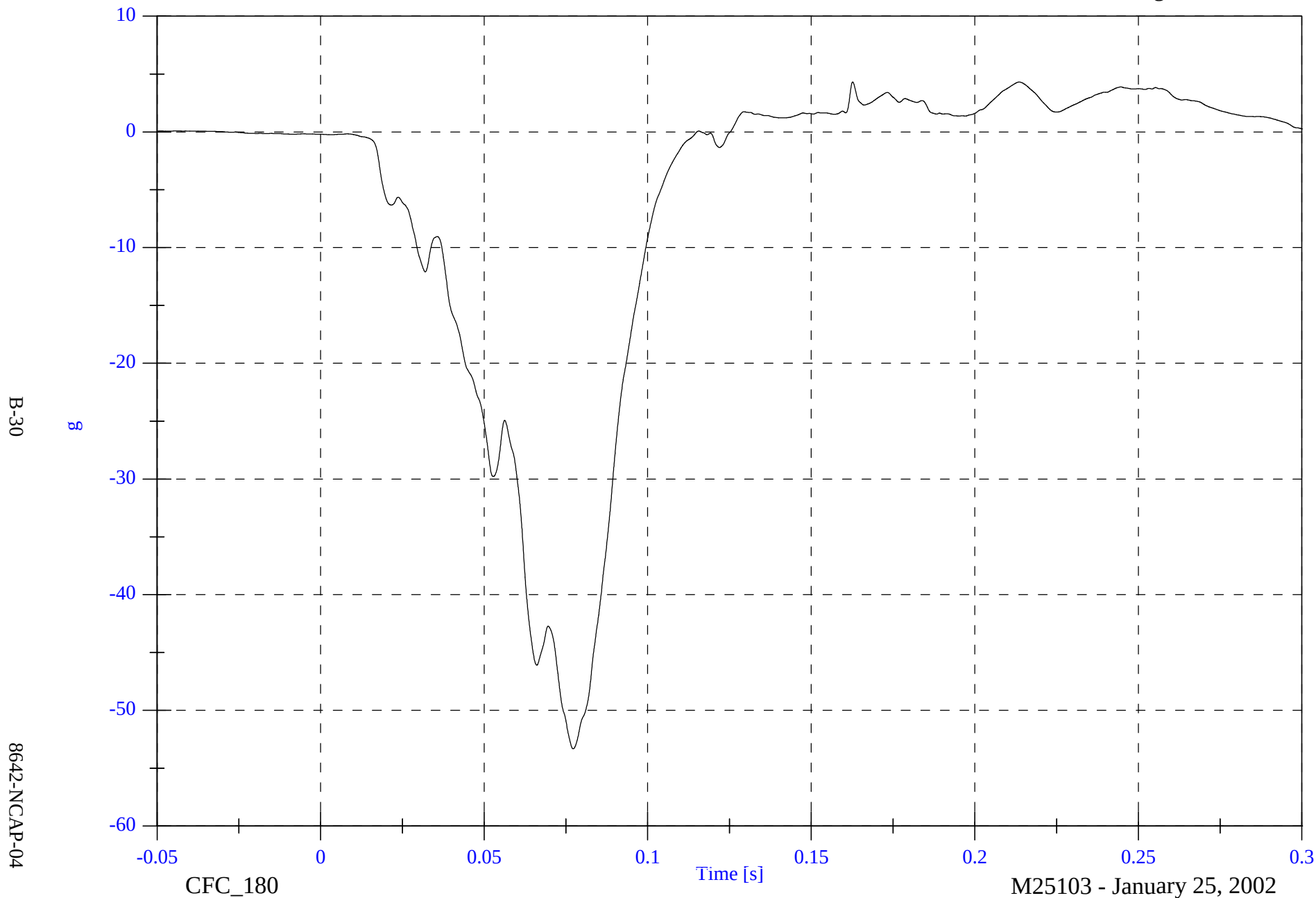


NCAP - 2002 Toyota Avalon

P1 Chest Red x

Max: 4.3 [g] at 0.163 [s]

Min: -53.3 [g] at 0.077 [s]



NCAP - 2002 Toyota Avalon

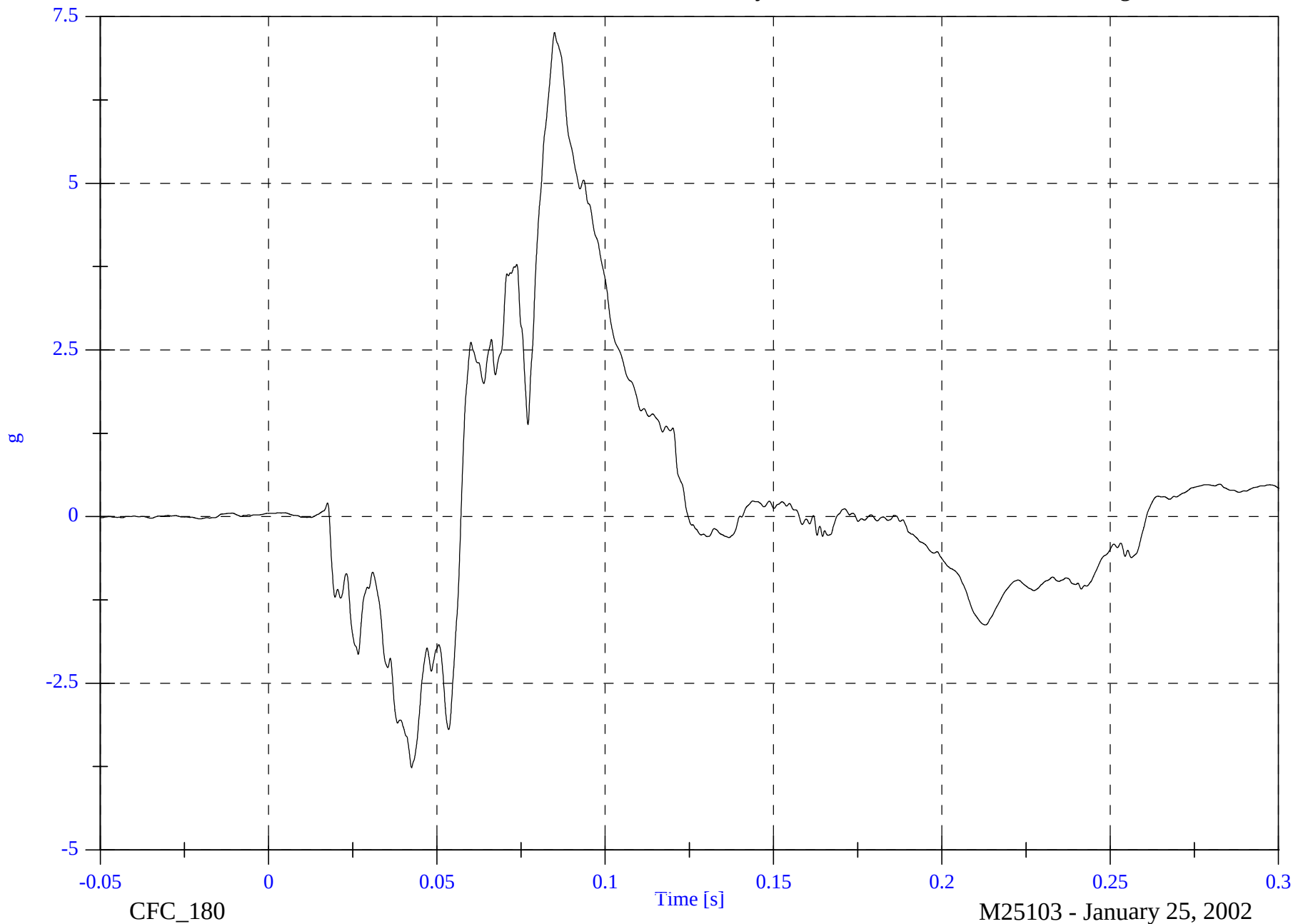
P1 Chest Red y

Max: 7.3 [g] at 0.085 [s]

Min: -3.8 [g] at 0.042 [s]

B-31

8642-NCAP-04

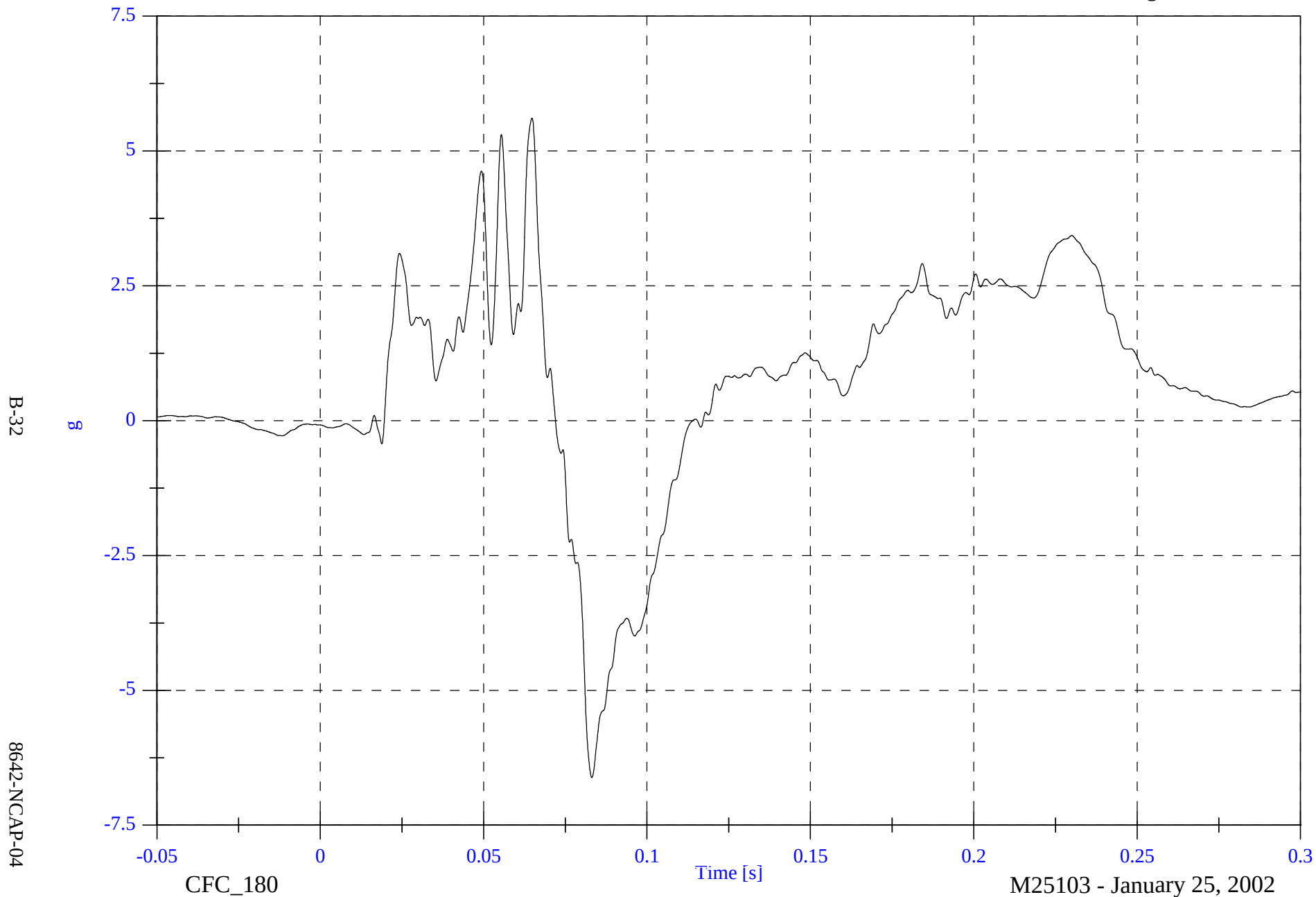


NCAP - 2002 Toyota Avalon

P1 Chest Red z

Max: 5.6 [g] at 0.065 [s]

Min: -6.6 [g] at 0.083 [s]



NCAP - 2002 Toyota Avalon

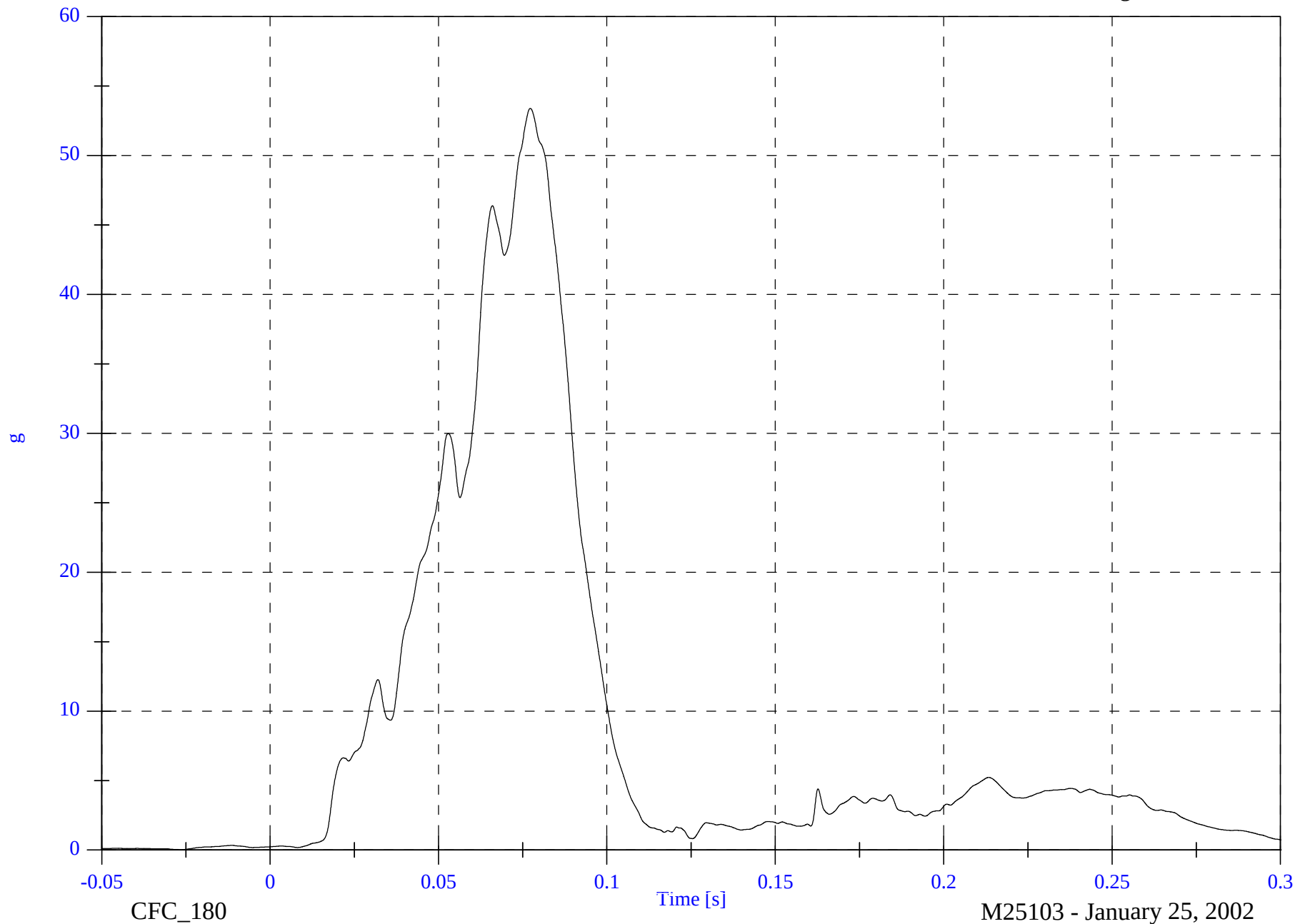
P1 Chest Red Resultant

Max: 53.4 [g] at 0.077 [s]

Min: 0.0 [g] at -0.026 [s]

B-33

8642-NCAP-04



NCAP - 2002 Toyota Avalon

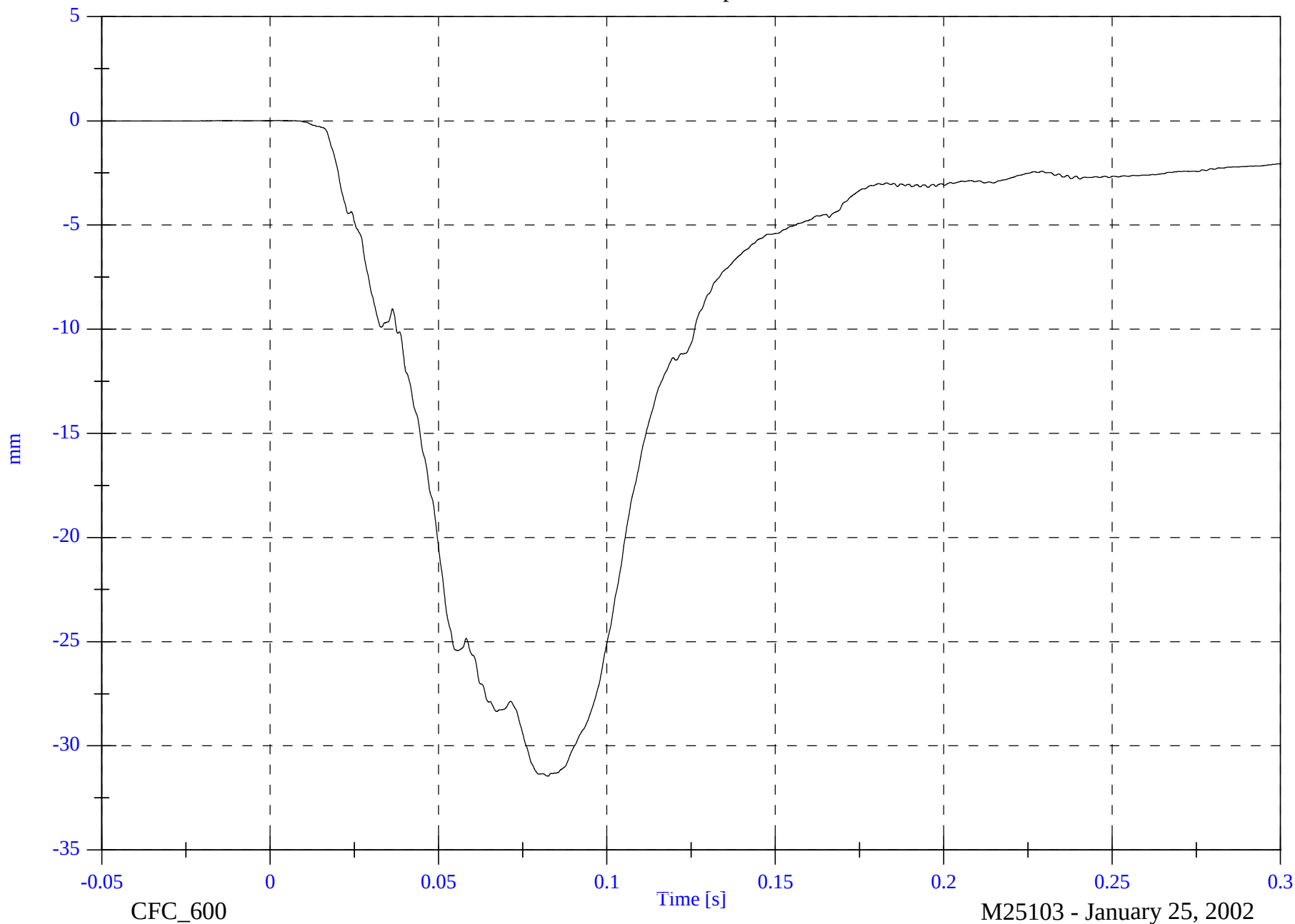
P1 Chest Compression

Max: 0.0 [mm] at 0.002 [s]

Min: -31.5 [mm] at 0.083 [s]

B-34

8642-NCAP-04



CFC\_600

Time [s]

M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

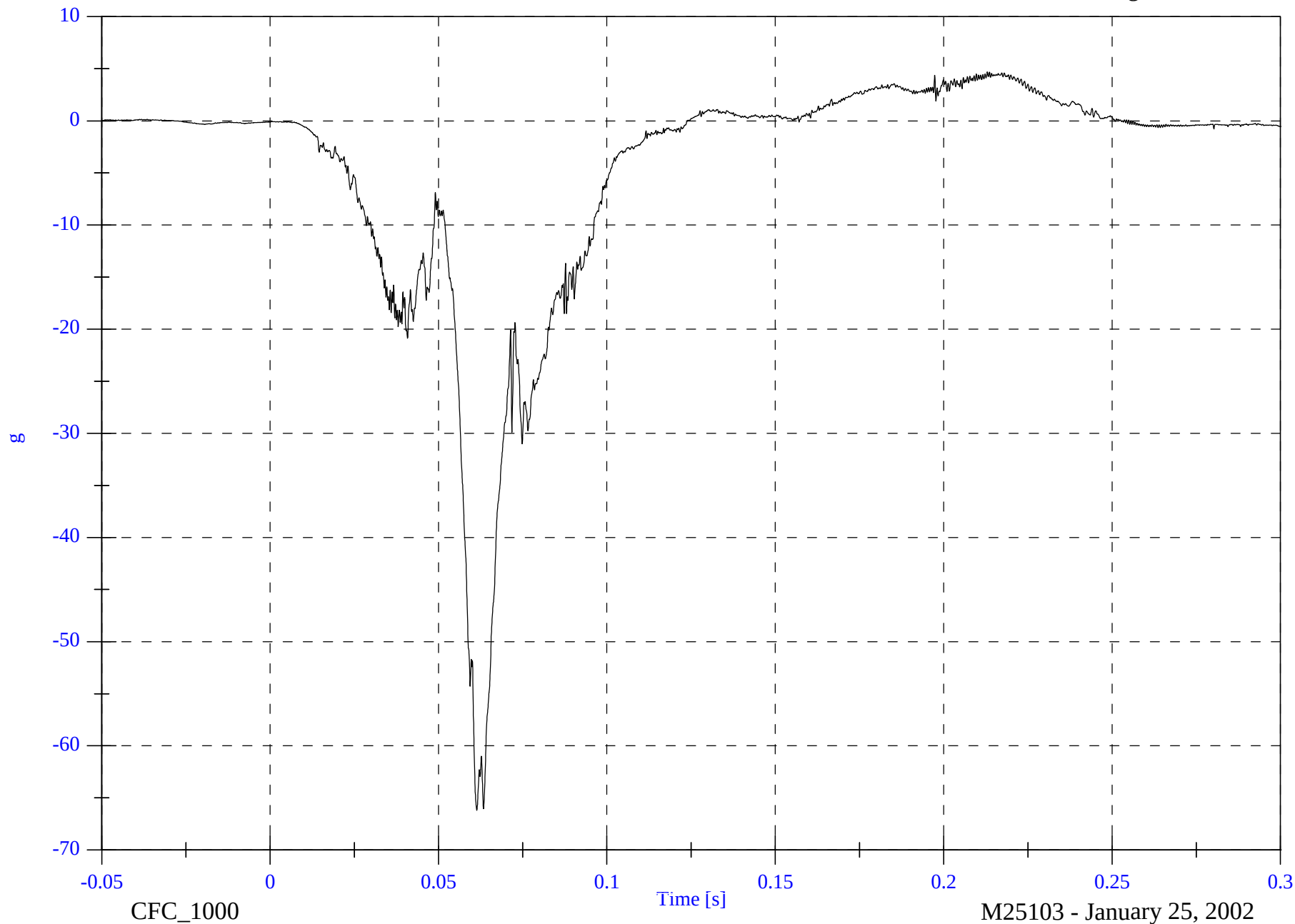
P1 Pelvic x

Max: 4.7 [g] at 0.213 [s]

Min: -66.2 [g] at 0.061 [s]

B-35

8642-NCAP-04



NCAP - 2002 Toyota Avalon

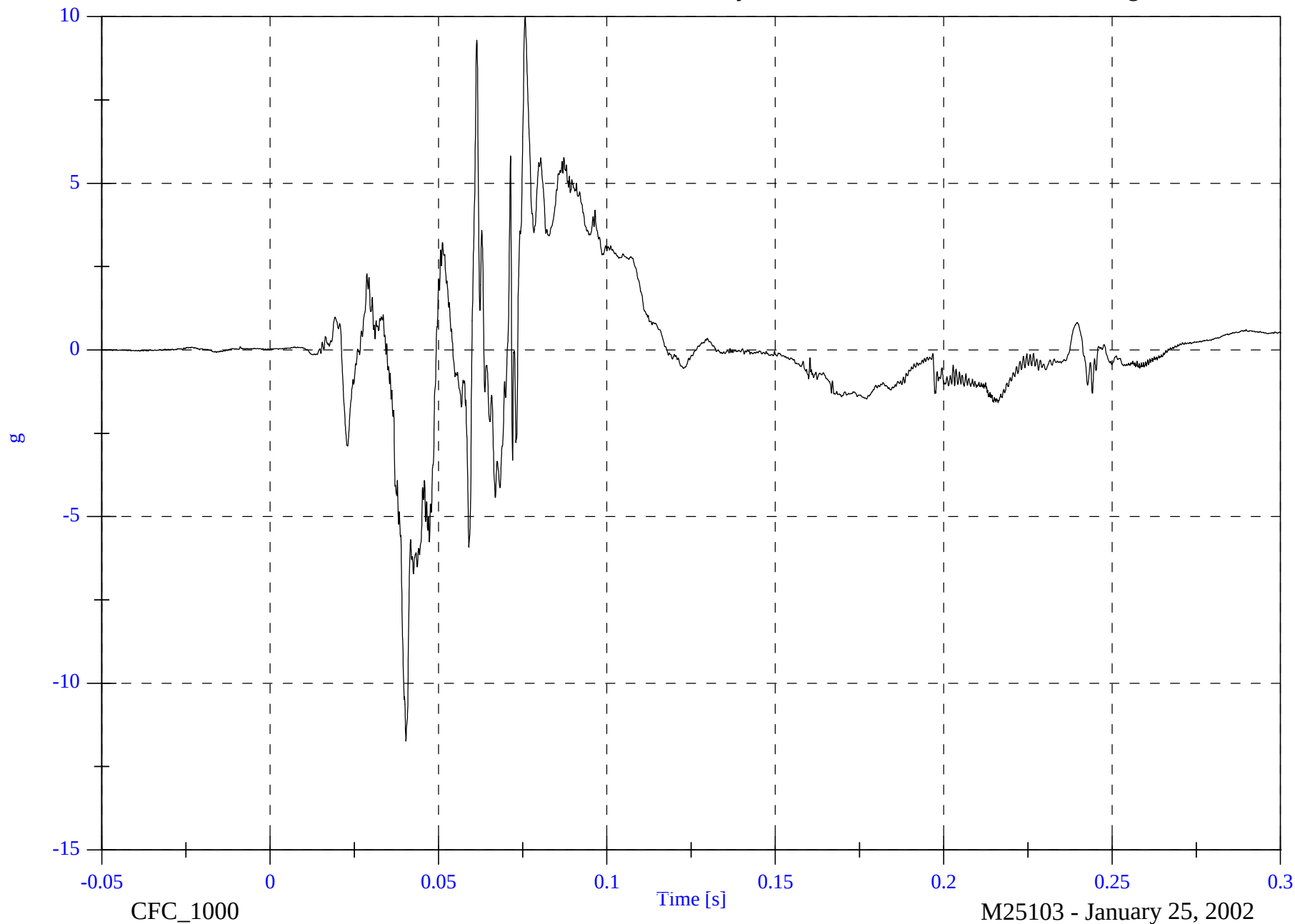
P1 Pelvic y

Max: 10.0 [g] at 0.076 [s]

Min: -11.7 [g] at 0.040 [s]

B-36

8642-NCAP-04



NCAP - 2002 Toyota Avalon

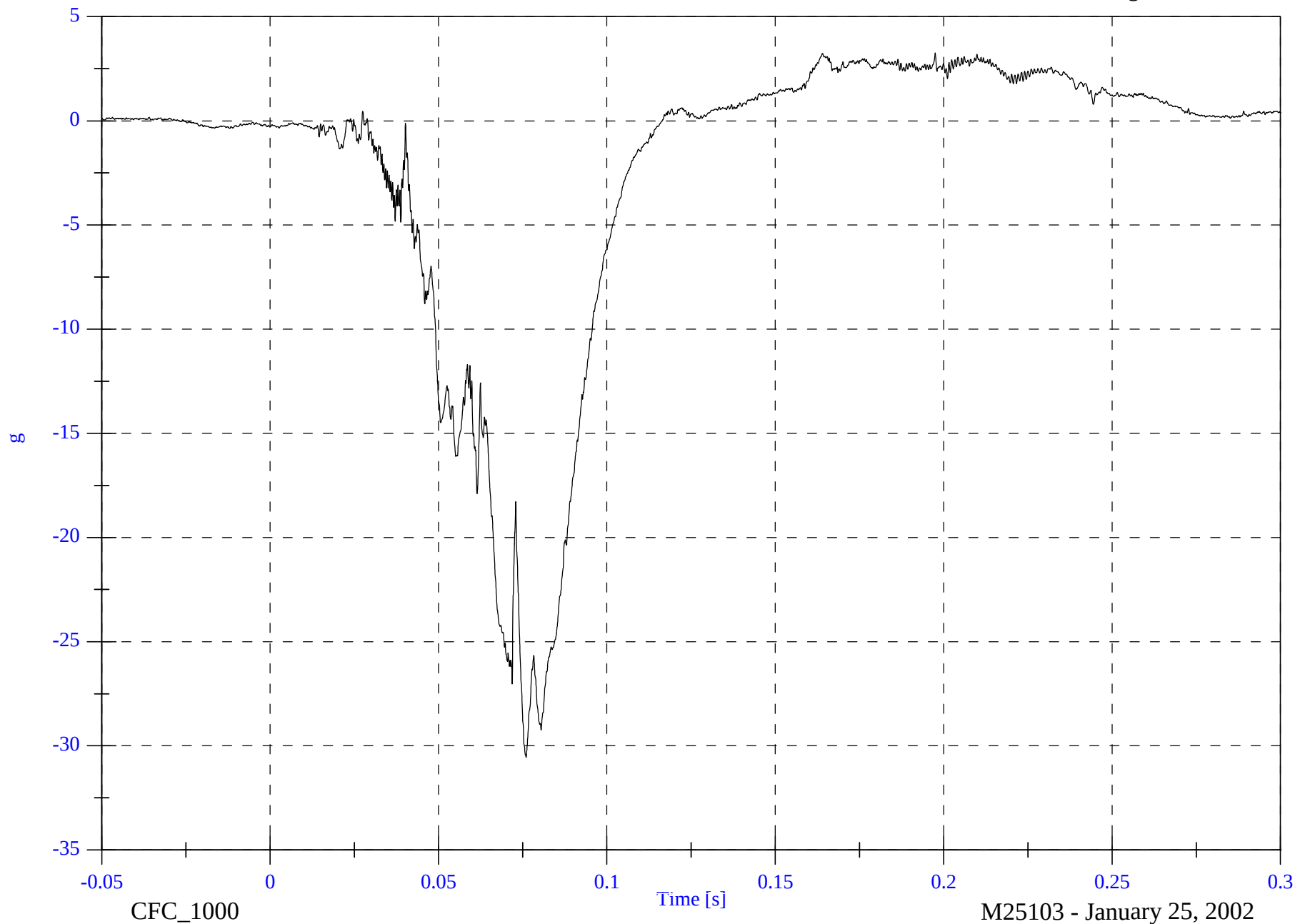
P1 Pelvic z

Max: 3.3 [g] at 0.197 [s]

Min: -30.6 [g] at 0.076 [s]

B-37

8642-NCAP-04



NCAP - 2002 Toyota Avalon

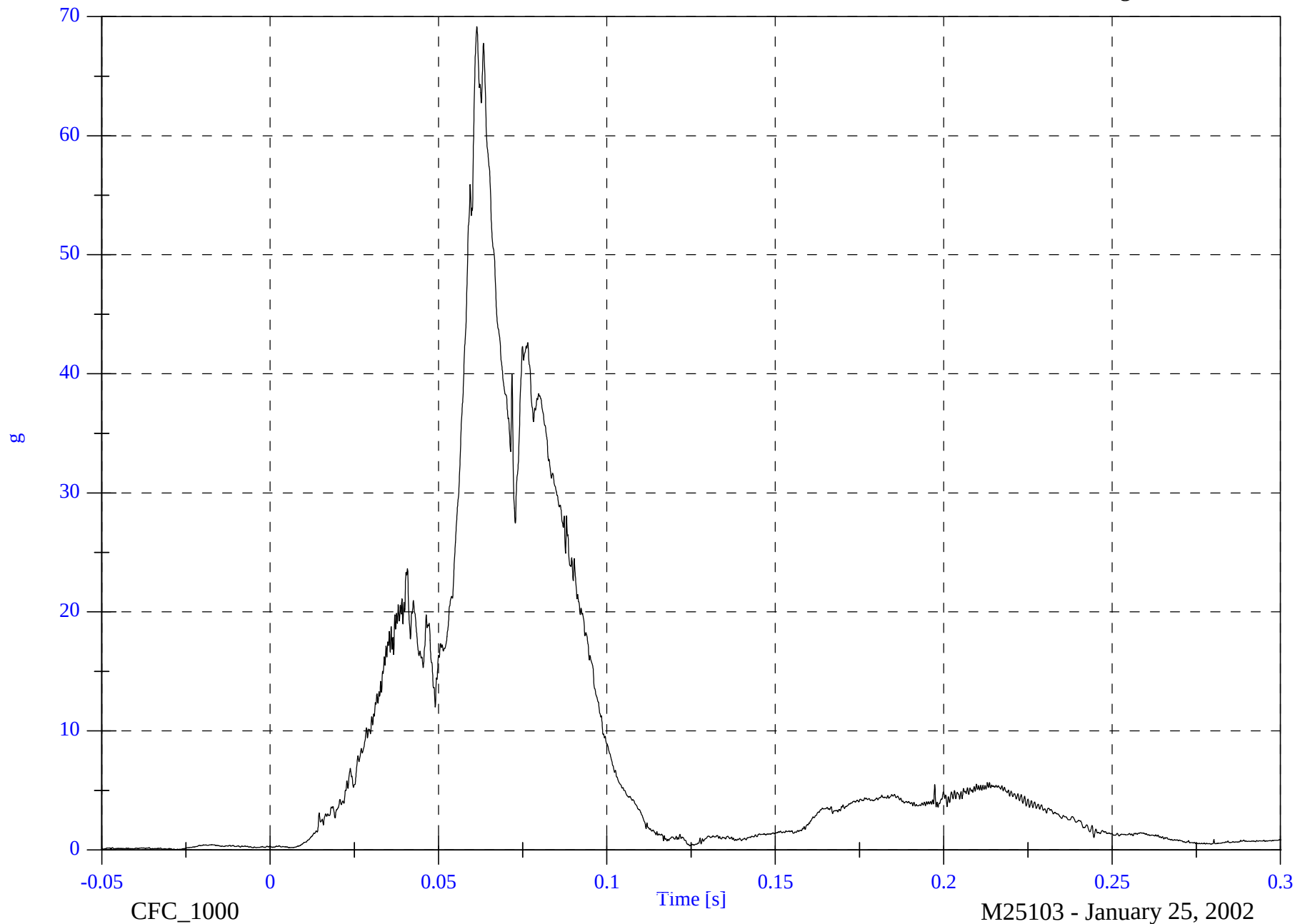
P1 Pelvic Resultant

Max: 69.2 [g] at 0.061 [s]

Min: 0.0 [g] at -0.028 [s]

B-38

8642-NCAP-04

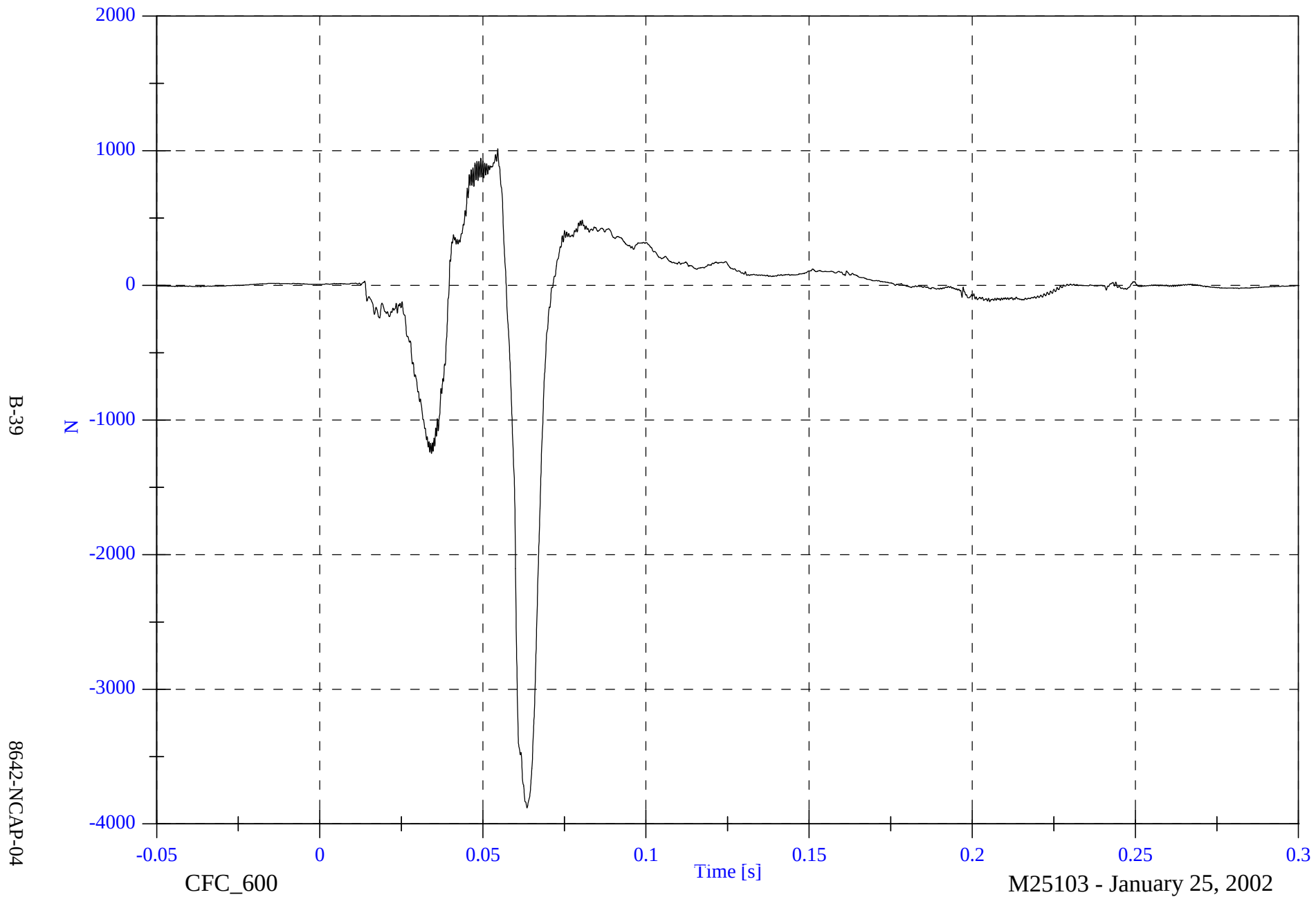


NCAP - 2002 Toyota Avalon

P1 Left Femur

Max: 1014.9 [N] at 0.055 [s]

Min: -3881.7 [N] at 0.064 [s]

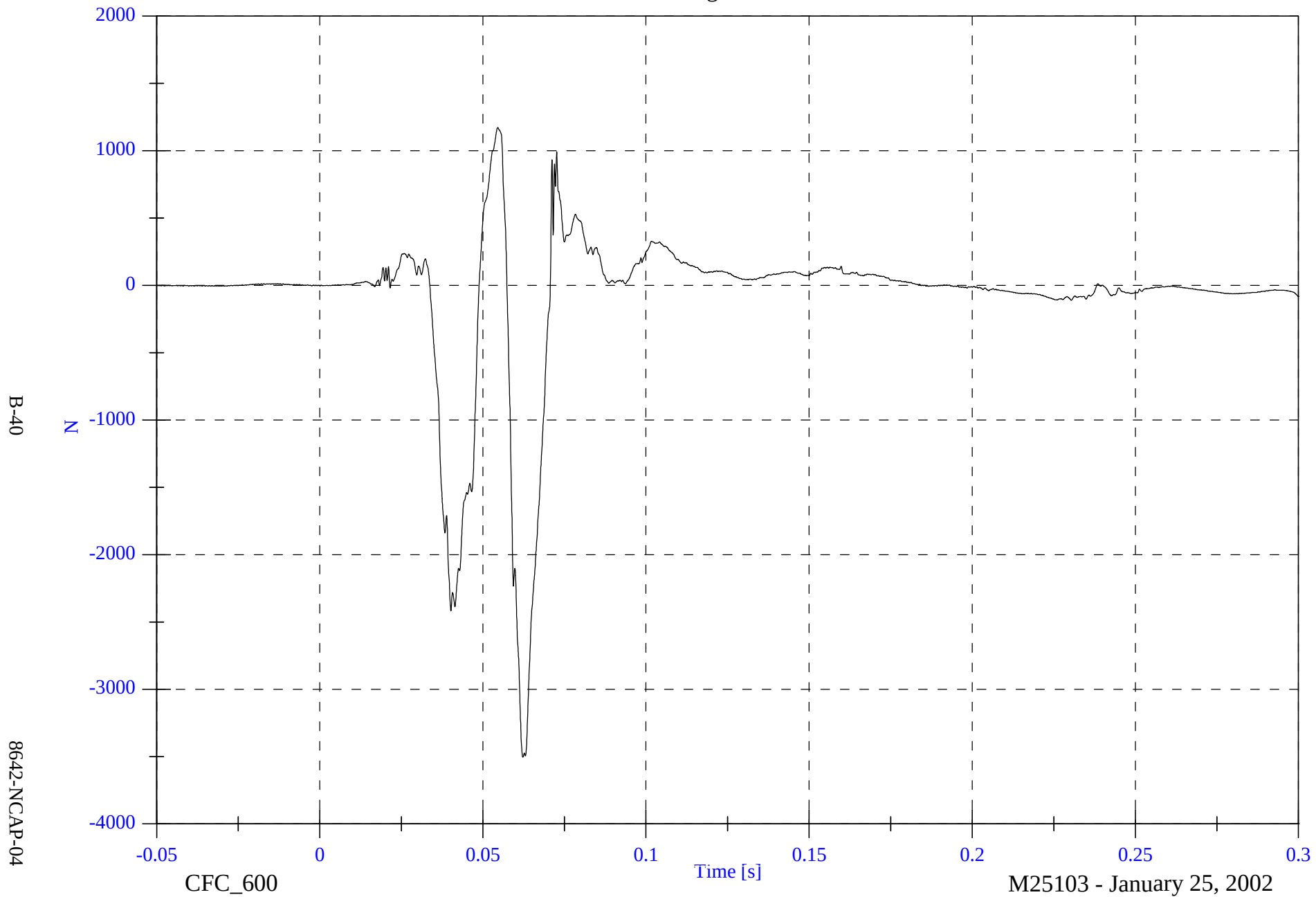


NCAP - 2002 Toyota Avalon

P1 Right Femur

Max: 1174.1 [N] at 0.055 [s]

Min: -3504.9 [N] at 0.062 [s]



NCAP - 2002 Toyota Avalon

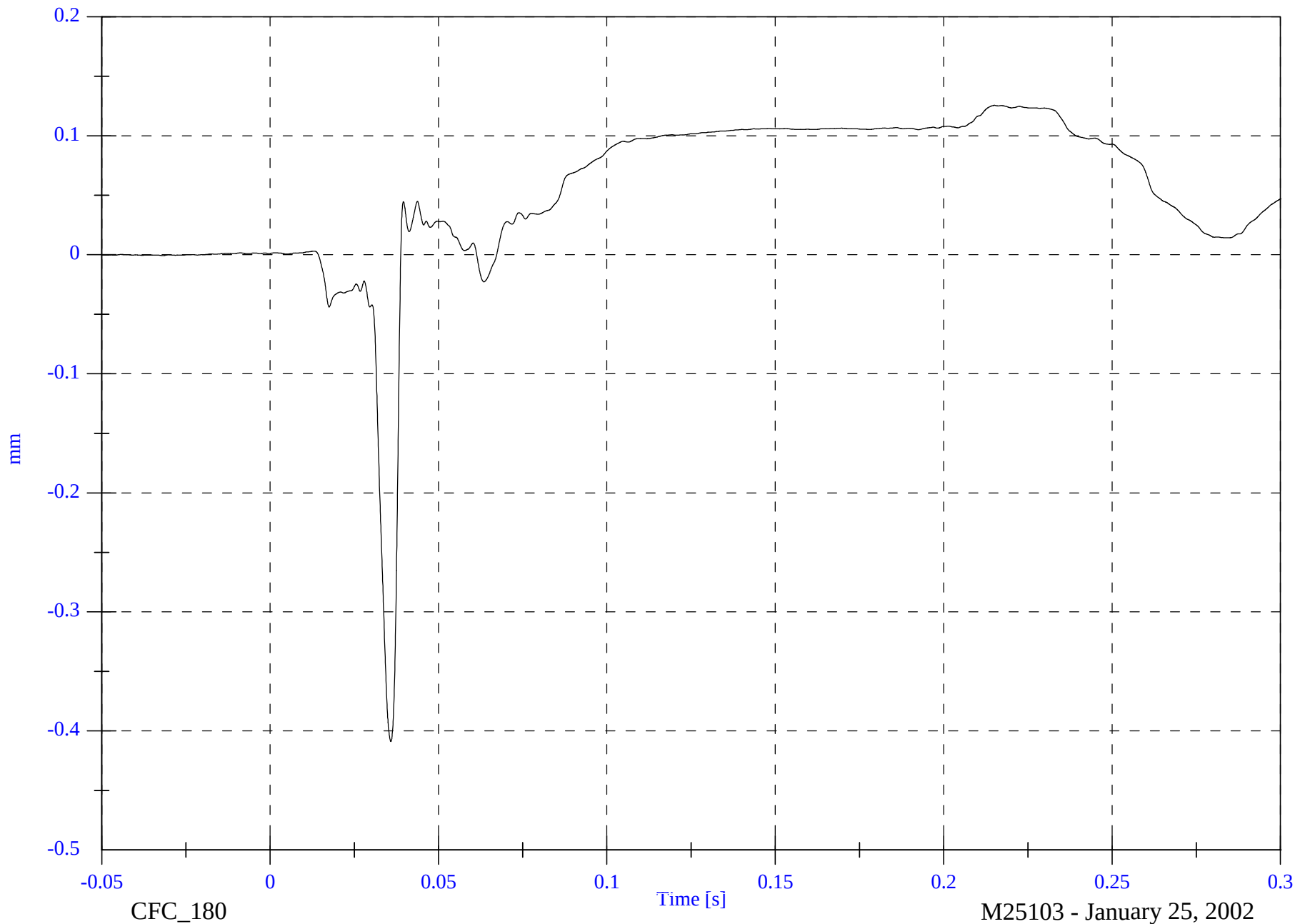
P1 Left Knee Shear

Max: 0.1 [mm] at 0.215 [s]

Min: -0.4 [mm] at 0.036 [s]

B-41

8642-NCAP-04



NCAP - 2002 Toyota Avalon

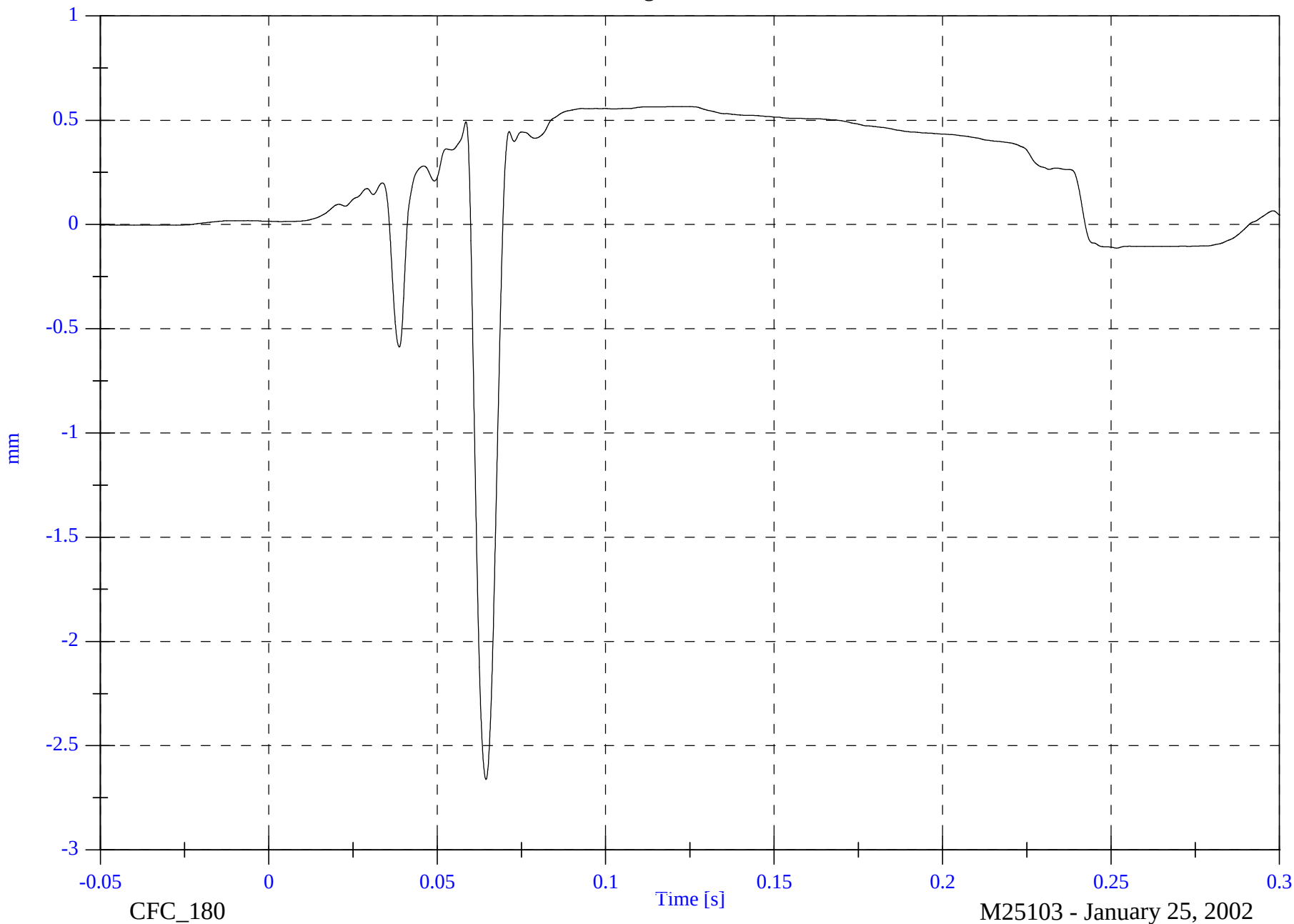
P1 Right Knee Shear

Max: 0.6 [mm] at 0.123 [s]

Min: -2.7 [mm] at 0.064 [s]

B-42

8642-NCAP-04



NCAP - 2002 Toyota Avalon

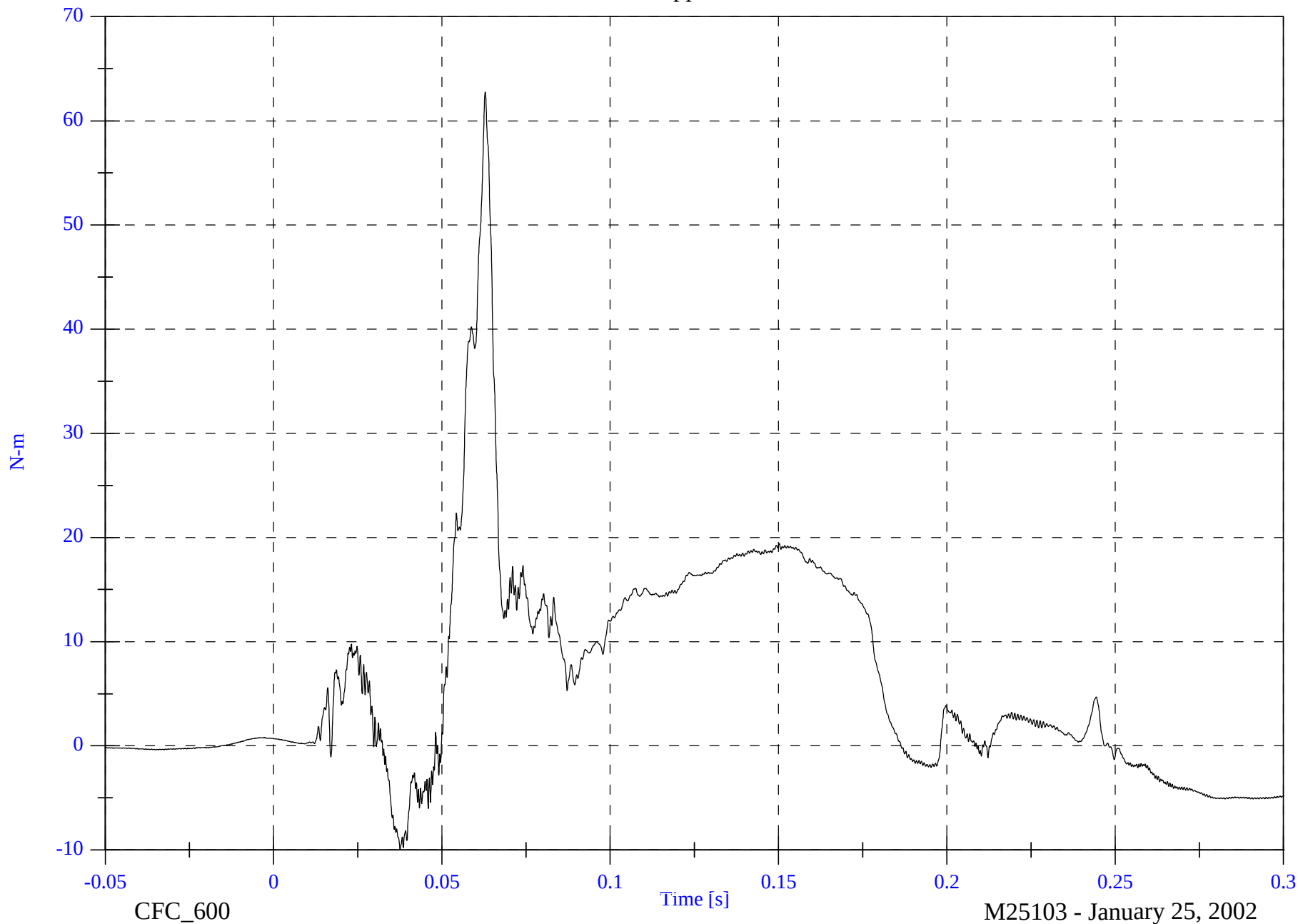
P1 Left Upper Tibia Mx

Max: 62.8 [N-m] at 0.063 [s]

Min: -10.0 [N-m] at 0.038 [s]

B-43

8642-NCAP-04



NCAP - 2002 Toyota Avalon

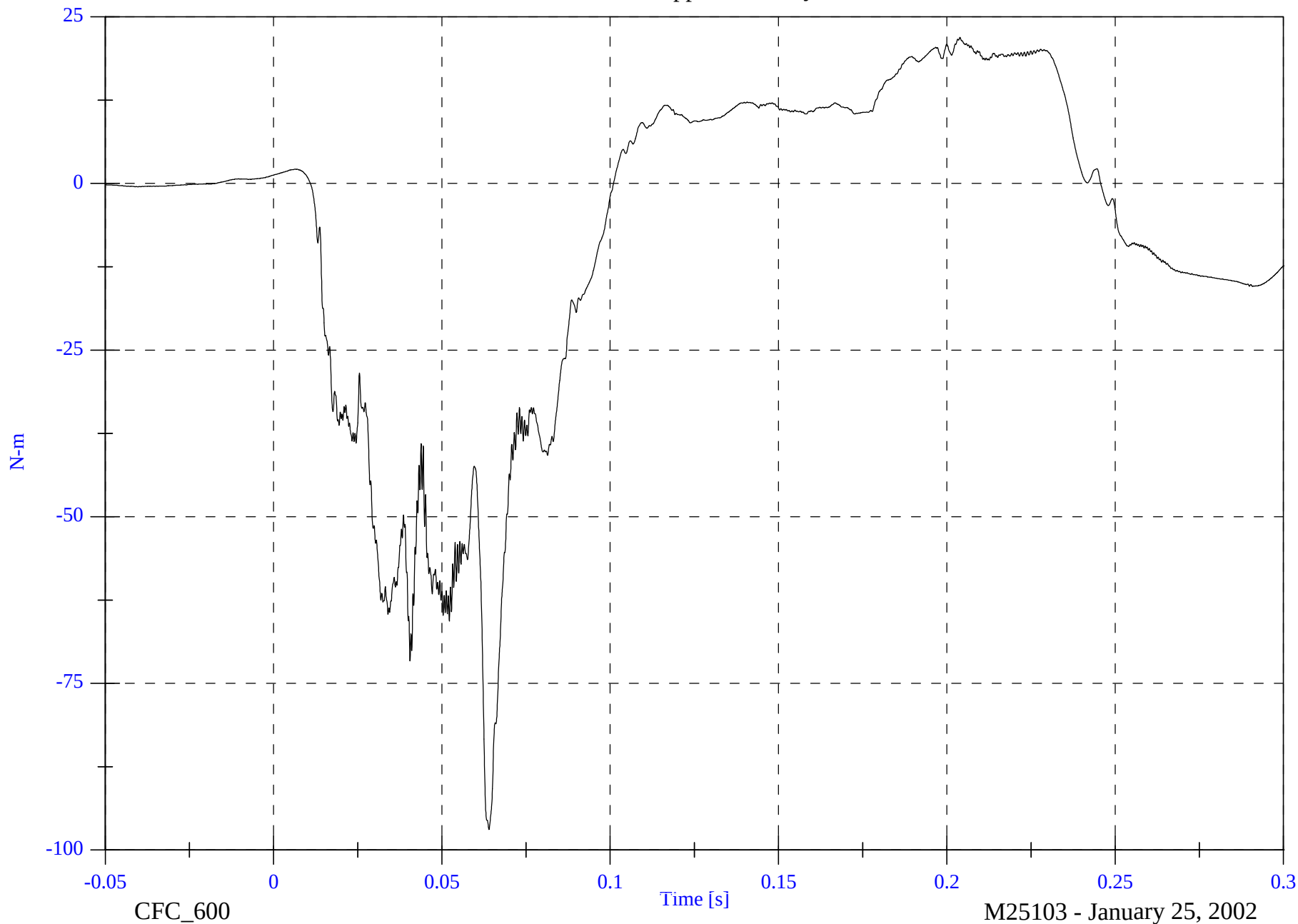
P1 Left Upper Tibia My

Max: 21.9 [N-m] at 0.204 [s]

Min: -96.9 [N-m] at 0.064 [s]

B-44

8642-NCAP-04

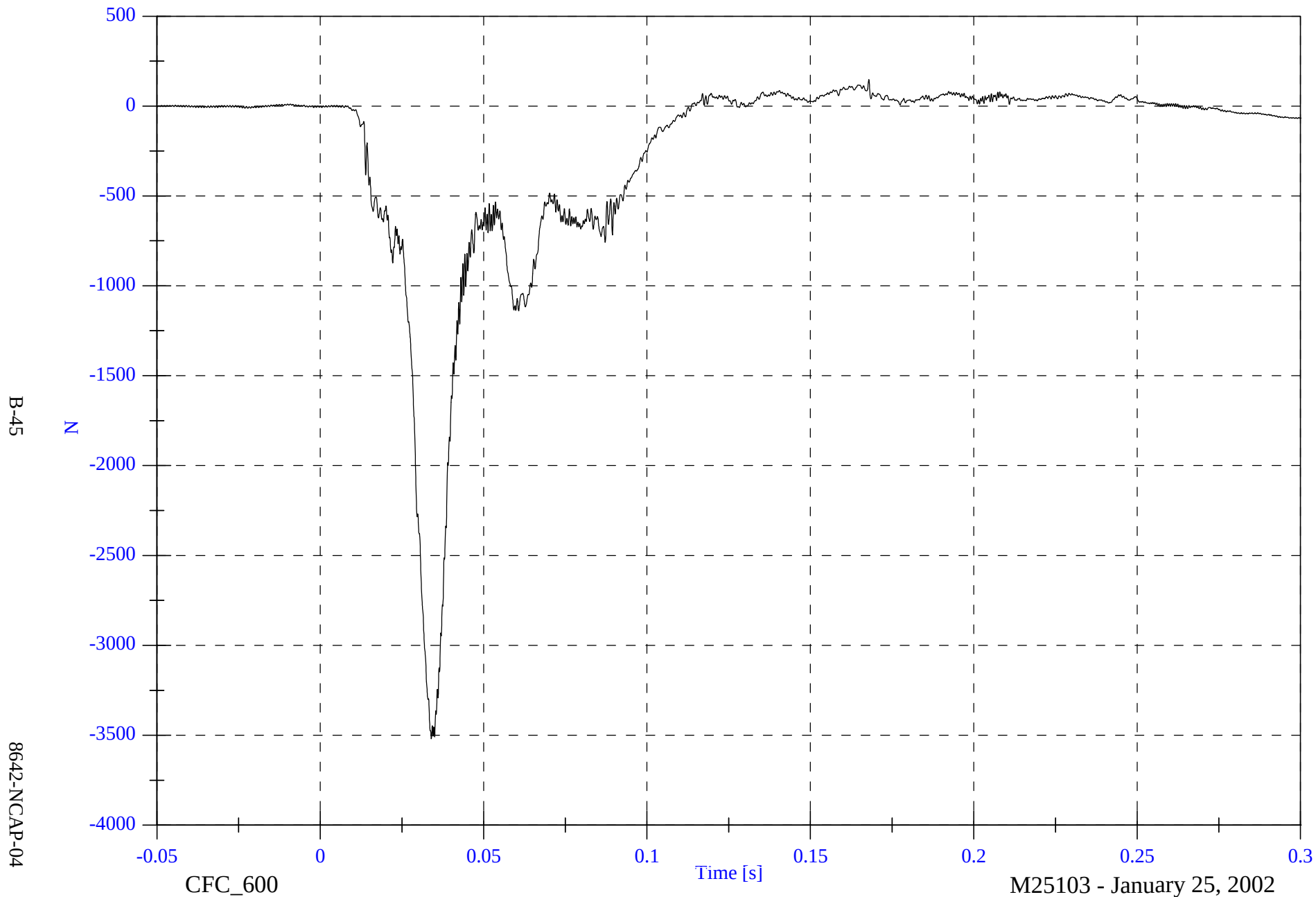


NCAP - 2002 Toyota Avalon

P1 Left Lower Tibia Fz

Max: 147.8 [N] at 0.168 [s]

Min: -3519.0 [N] at 0.034 [s]

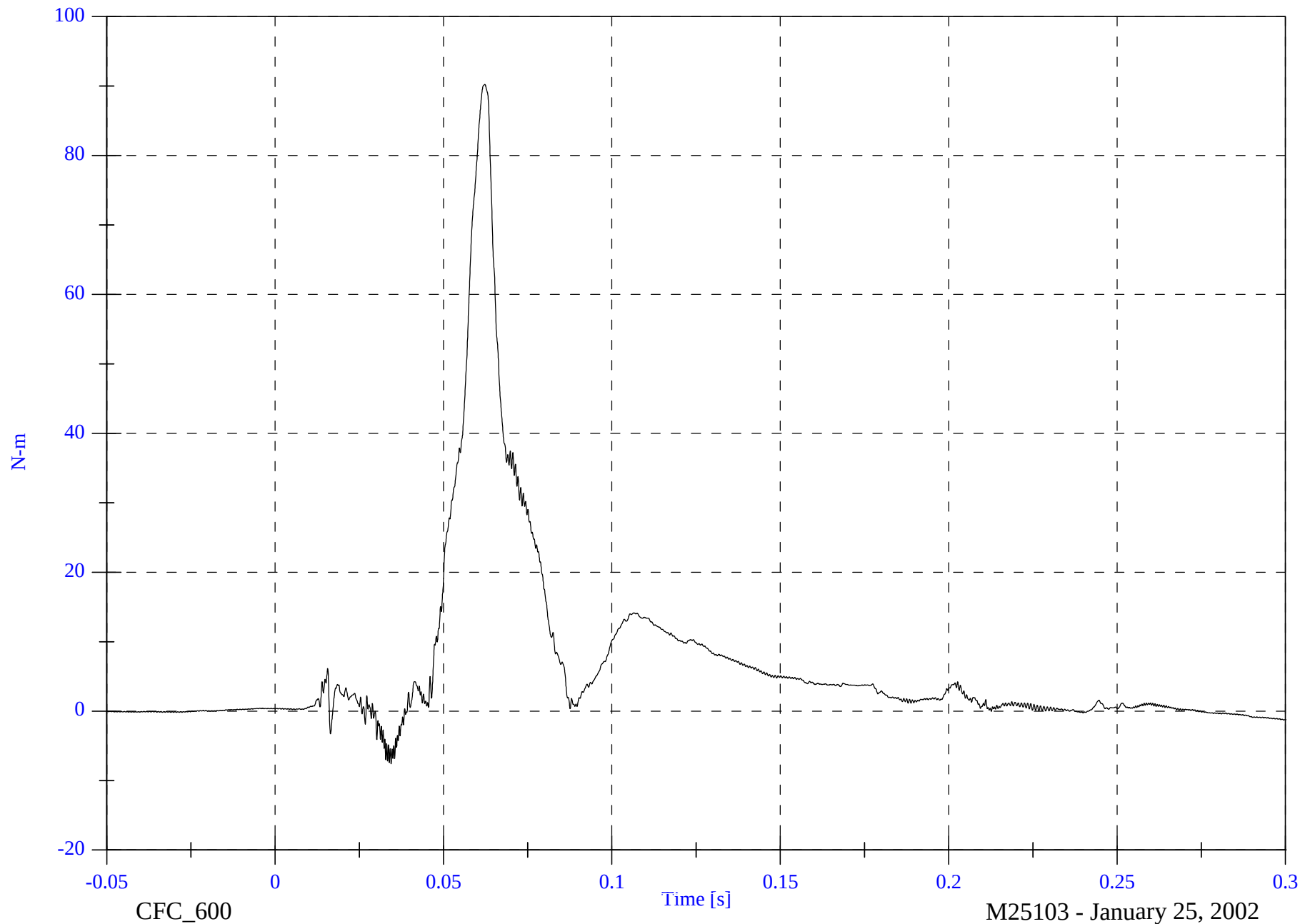


NCAP - 2002 Toyota Avalon

P1 Left Lower Tibia Mx

Max: 90.2 [N-m] at 0.062 [s]

Min: -7.6 [N-m] at 0.034 [s]



B-46

8642-NCAP-04

CFC\_600

M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

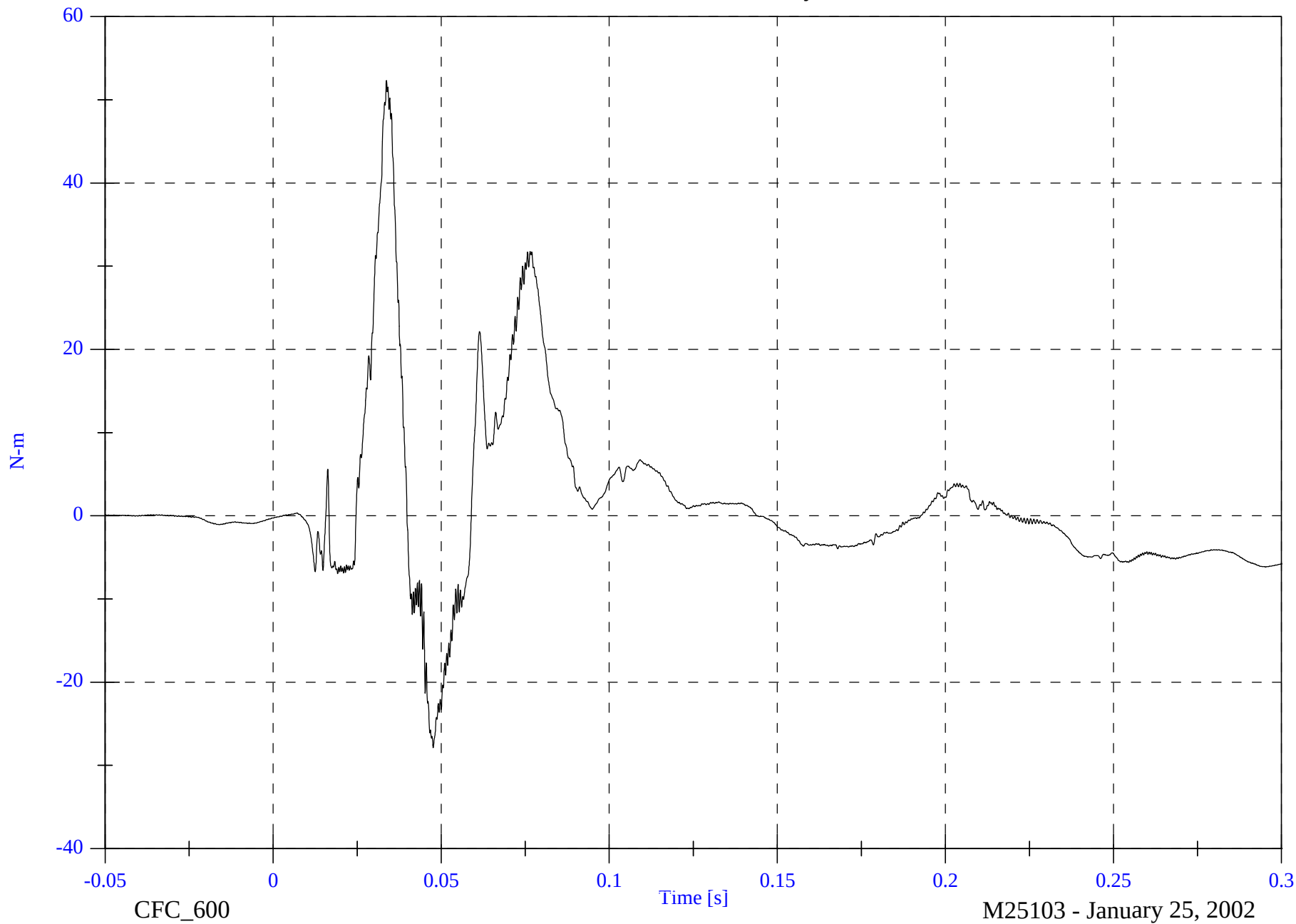
P1 Left Lower Tibia My

Max: 52.3 [N-m] at 0.034 [s]

Min: -27.9 [N-m] at 0.048 [s]

B-47

8642-NCAP-04



NCAP - 2002 Toyota Avalon

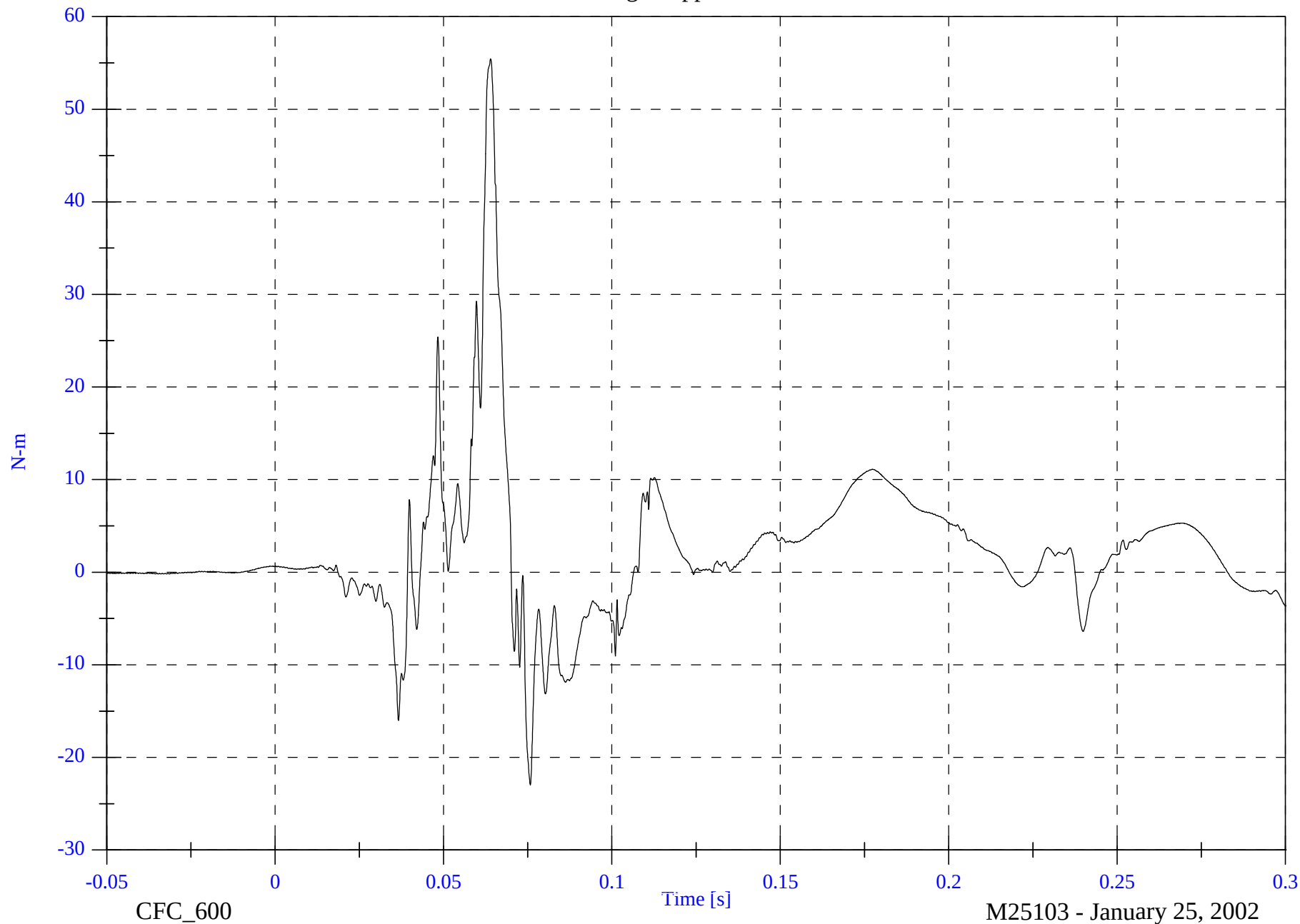
P1 Right Upper Tibia Mx

Max: 55.5 [N-m] at 0.064 [s]

Min: -23.0 [N-m] at 0.076 [s]

B-48

8642-NCAP-04

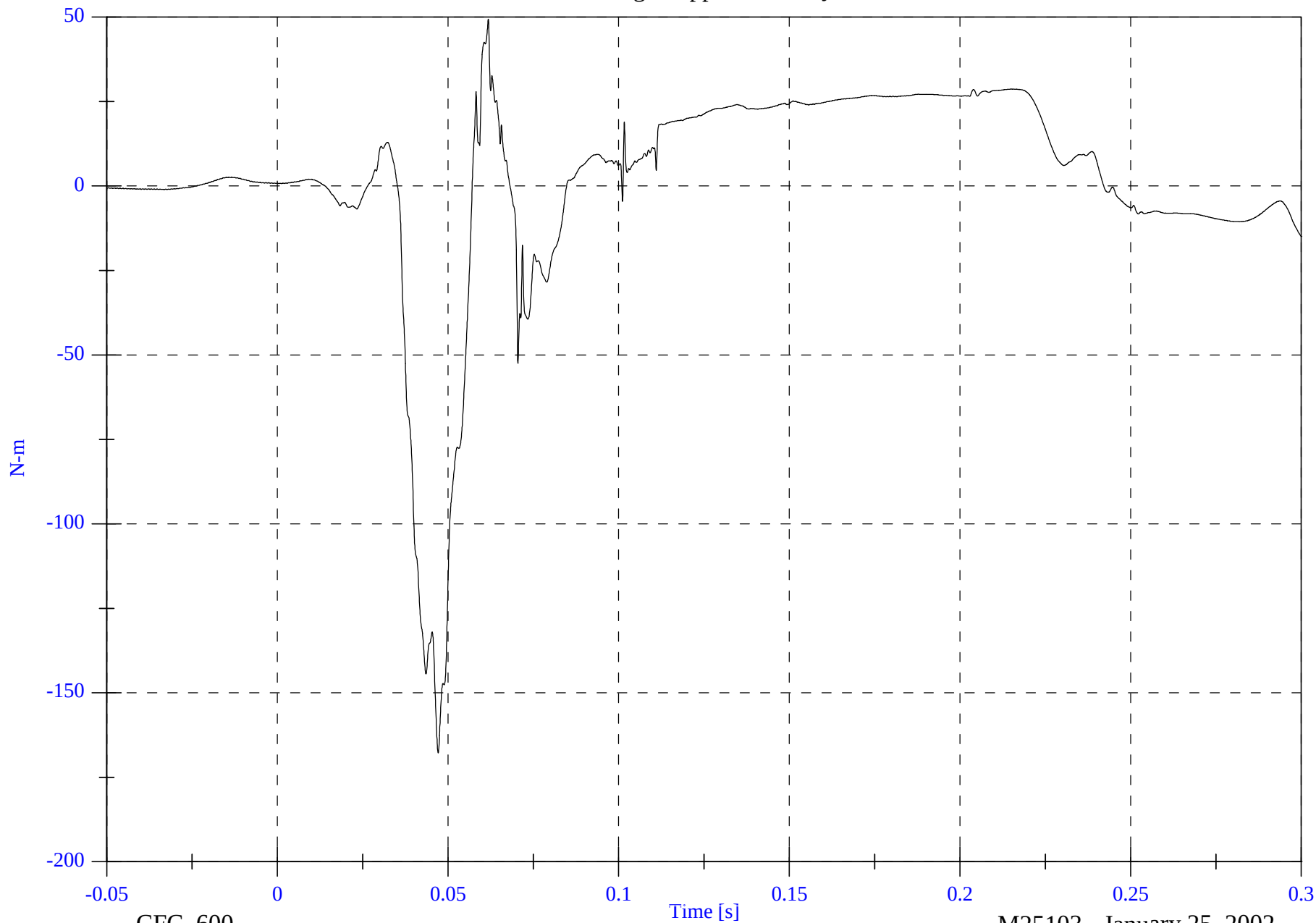


NCAP - 2002 Toyota Avalon

P1 Right Upper Tibia My

Max: 49.3 [N-m] at 0.062 [s]

Min: -167.8 [N-m] at 0.047 [s]



B-49

8642-NCAP-04

CFC\_600

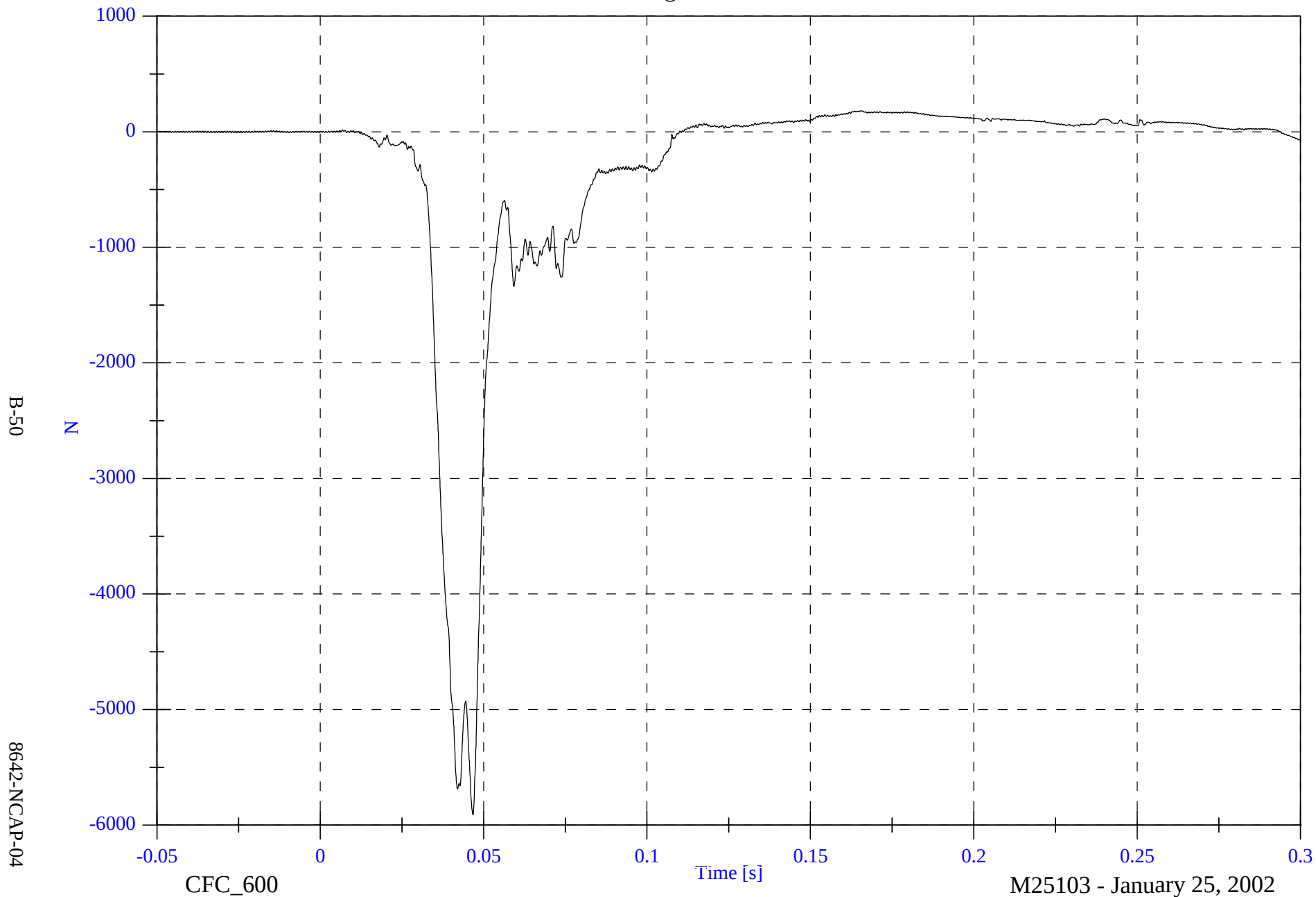
M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

P1 Right Lower Tibia Fz

Max: 181.2 [N] at 0.165 [s]

Min: -5910.0 [N] at 0.047 [s]



NCAP - 2002 Toyota Avalon

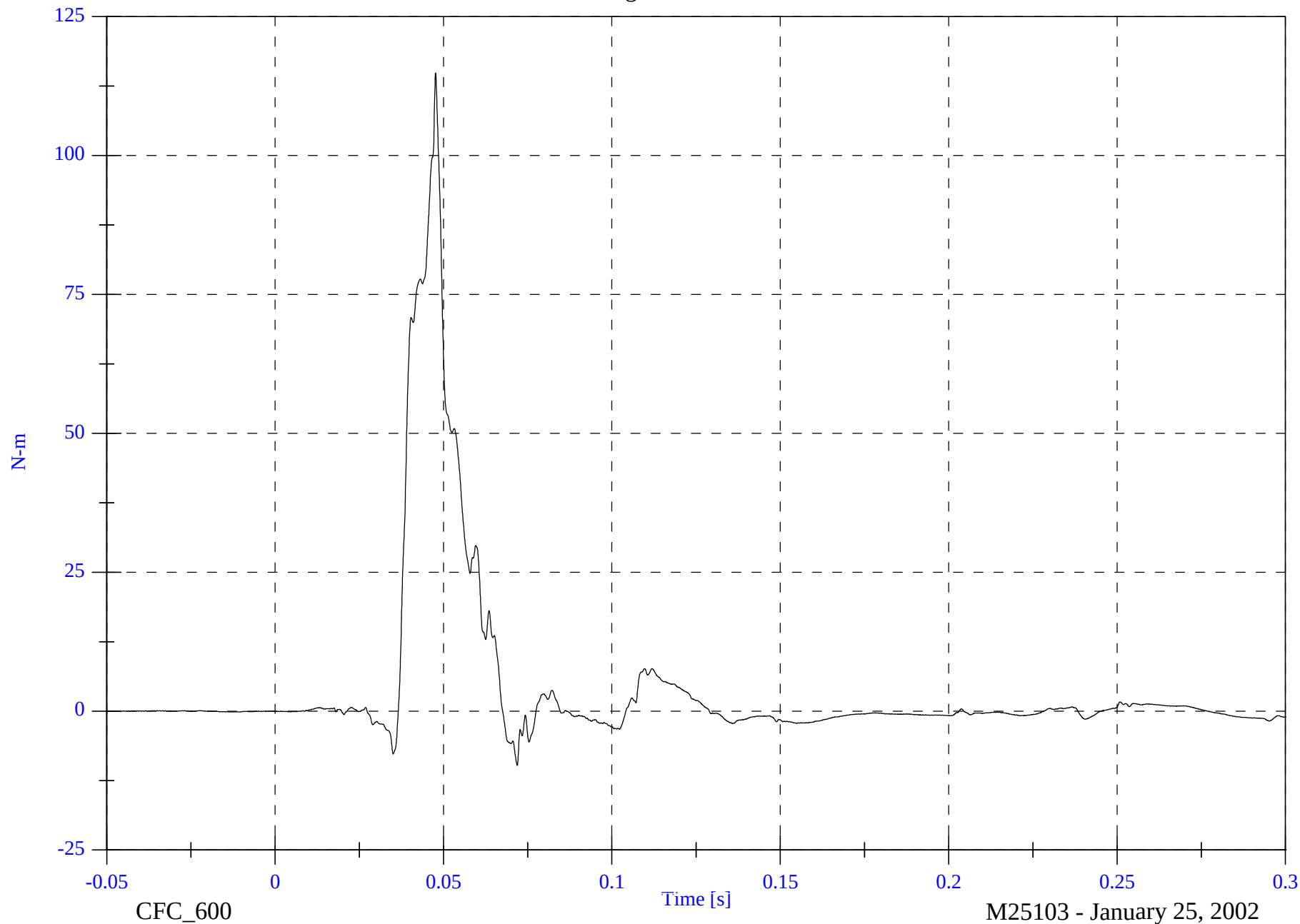
P1 Right Lower Tibia Mx

Max: 114.9 [N-m] at 0.048 [s]

Min: -9.8 [N-m] at 0.072 [s]

B-51

8642-NCAP-04



NCAP - 2002 Toyota Avalon

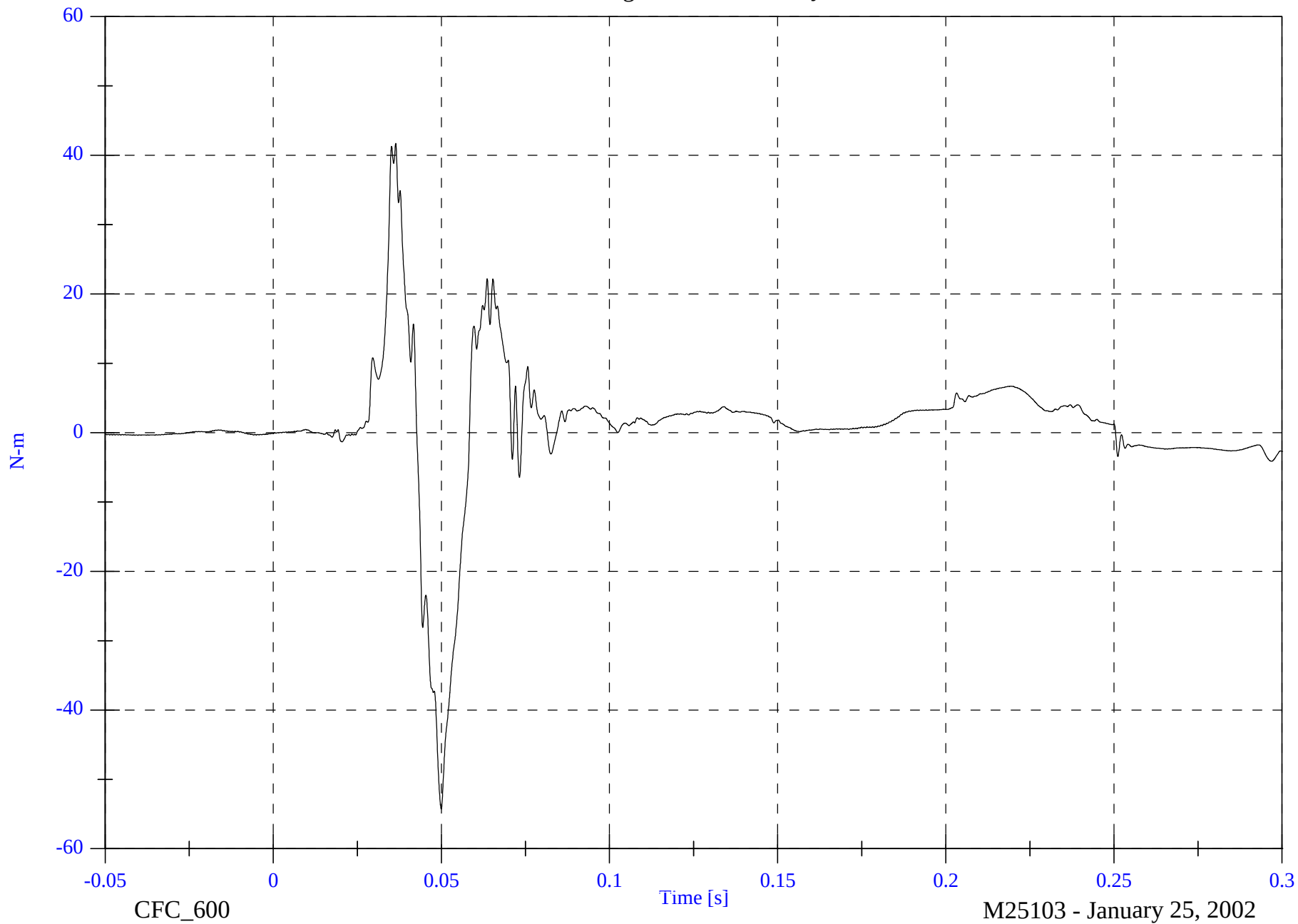
P1 Right Lower Tibia My

Max: 41.7 [N-m] at 0.036 [s]

Min: -54.3 [N-m] at 0.050 [s]

B-52

8642-NCAP-04



NCAP - 2002 Toyota Avalon

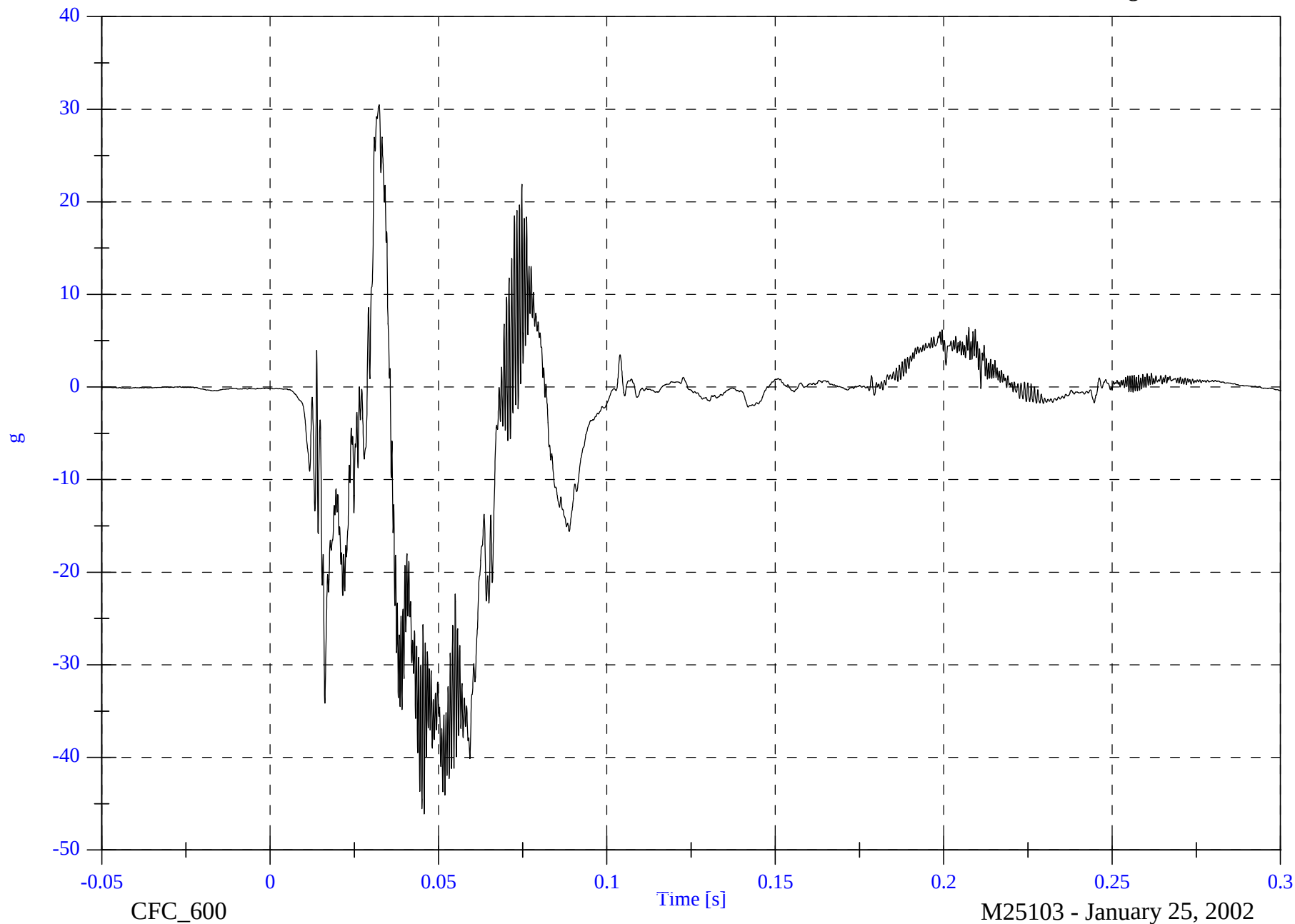
P1 Left Foot Aft x

Max: 30.5 [g] at 0.032 [s]

Min: -46.1 [g] at 0.046 [s]

B-53

8642-NCAP-04

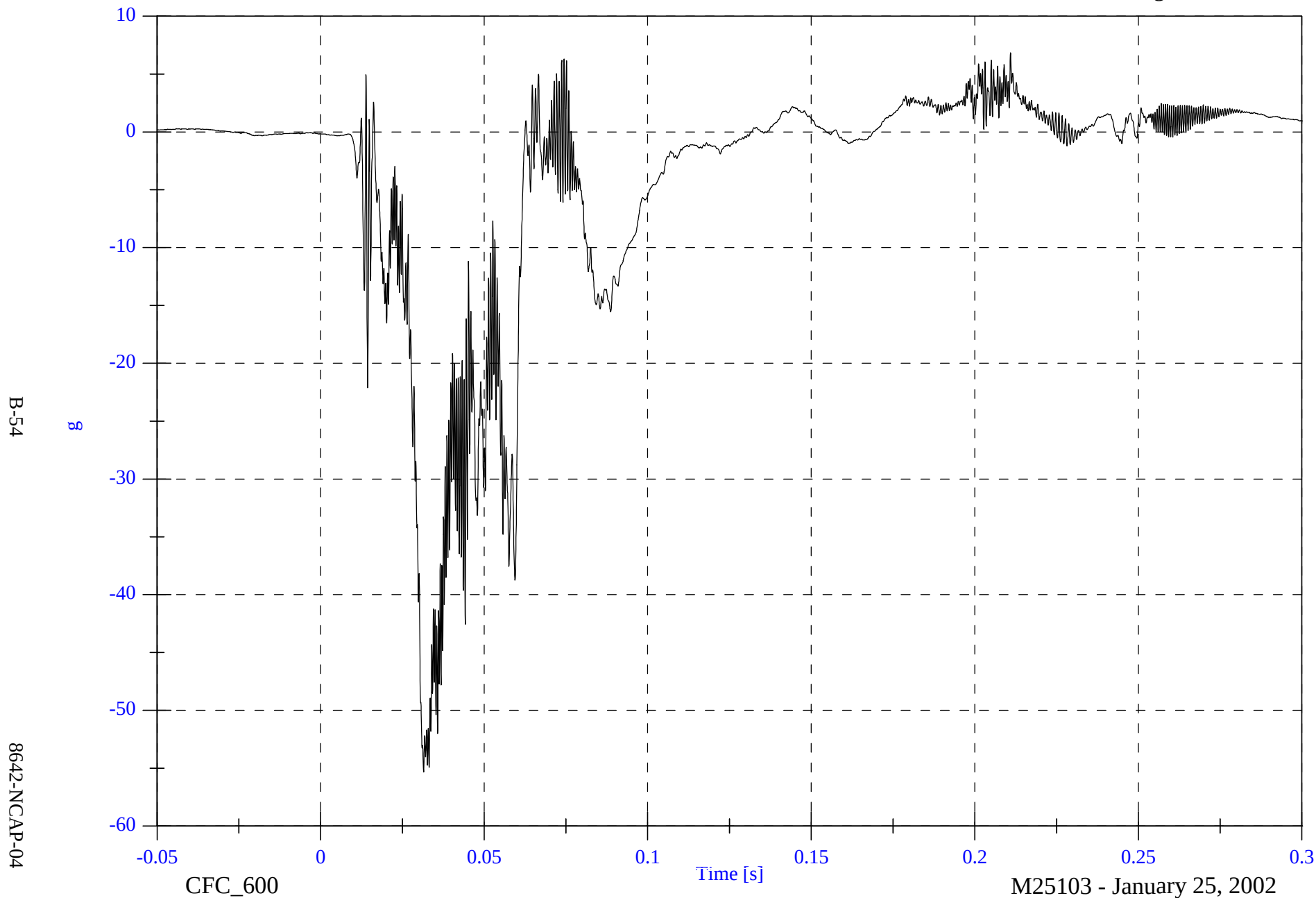


NCAP - 2002 Toyota Avalon

P1 Left Foot Aft z

Max: 6.8 [g] at 0.211 [s]

Min: -55.3 [g] at 0.032 [s]



NCAP - 2002 Toyota Avalon

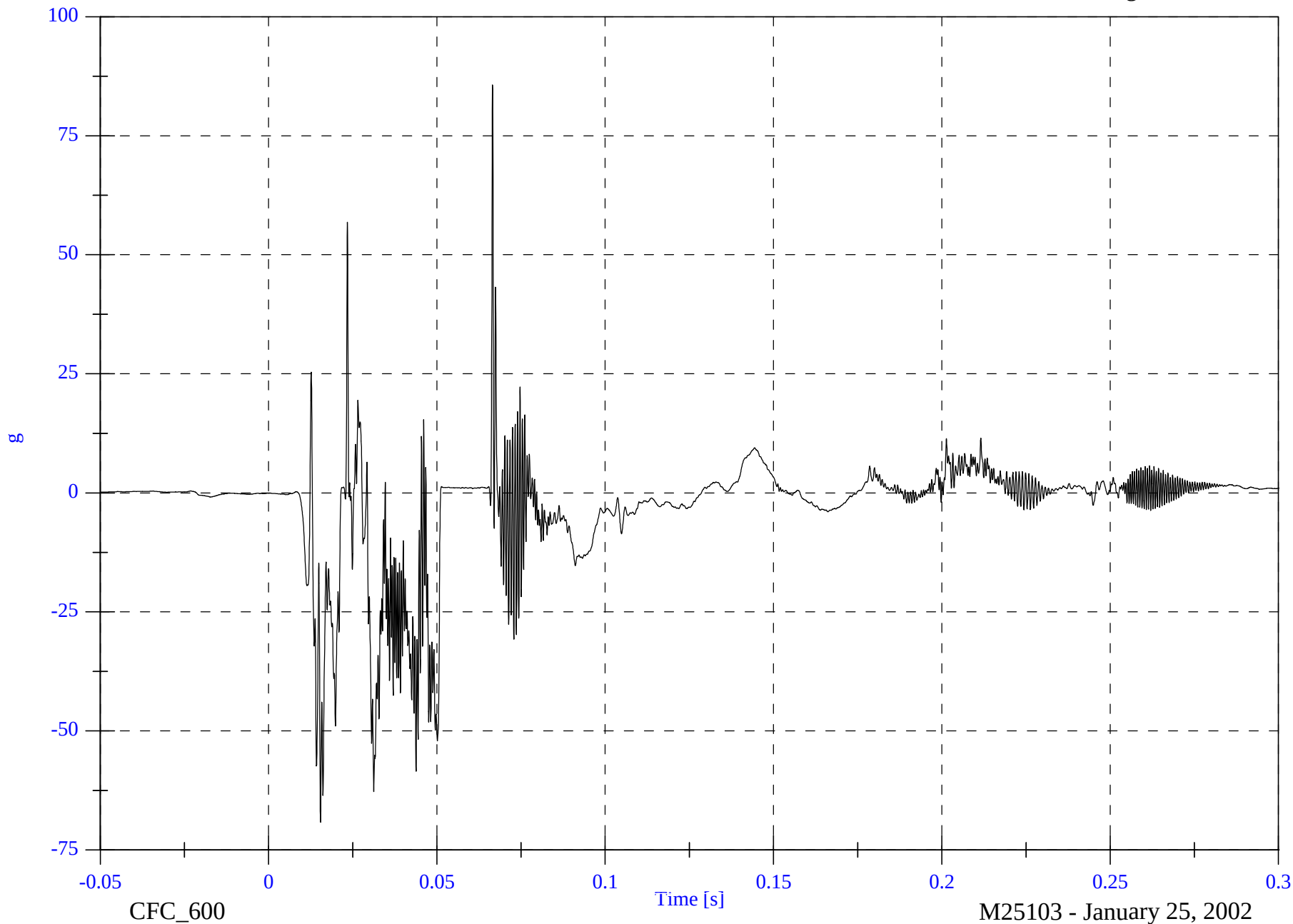
P1 Left Foot Fore z

Max: 85.7 [g] at 0.067 [s]

Min: -69.2 [g] at 0.015 [s]

B-55

8642-NCAP-04

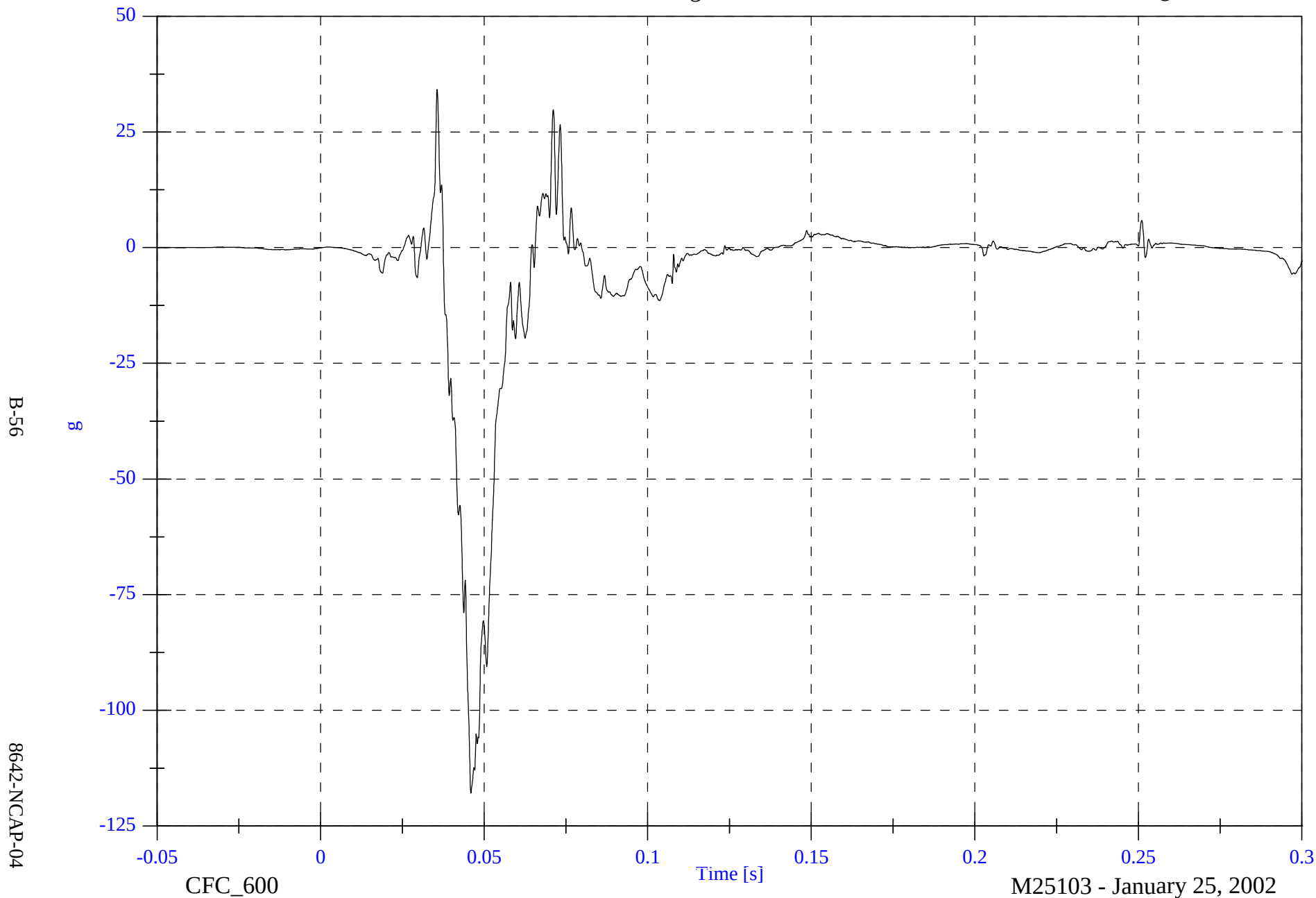


NCAP - 2002 Toyota Avalon

P1 Right Foot Aft x

Max: 34.2 [g] at 0.036 [s]

Min: -117.9 [g] at 0.046 [s]



NCAP - 2002 Toyota Avalon

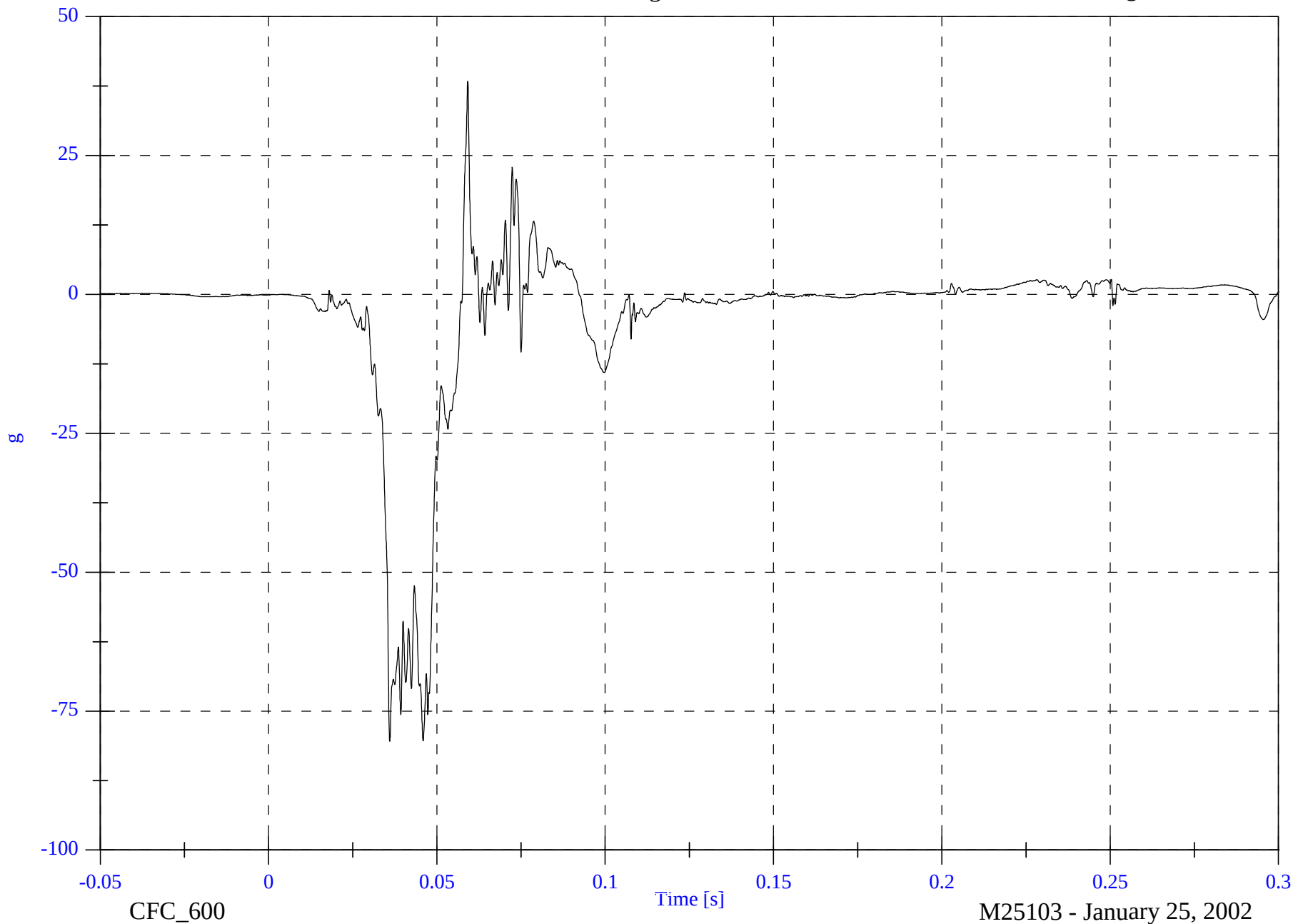
P1 Right Foot Aft z

Max: 38.4 [g] at 0.059 [s]

Min: -80.4 [g] at 0.036 [s]

B-57

8642-NCAP-04

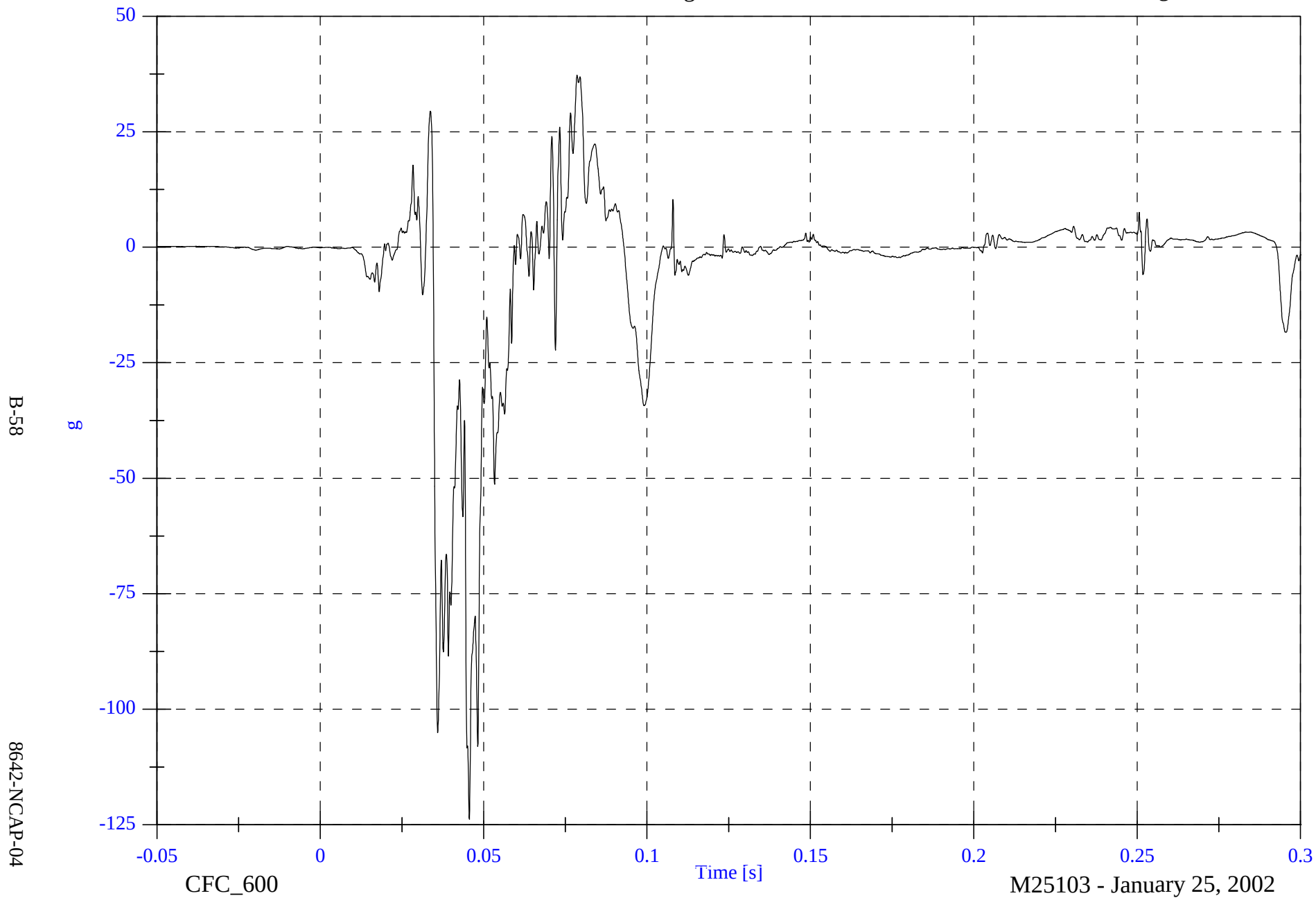


NCAP - 2002 Toyota Avalon

P1 Right Foot Fore z

Max: 37.3 [g] at 0.079 [s]

Min: -123.8 [g] at 0.046 [s]



NCAP - 2002 Toyota Avalon

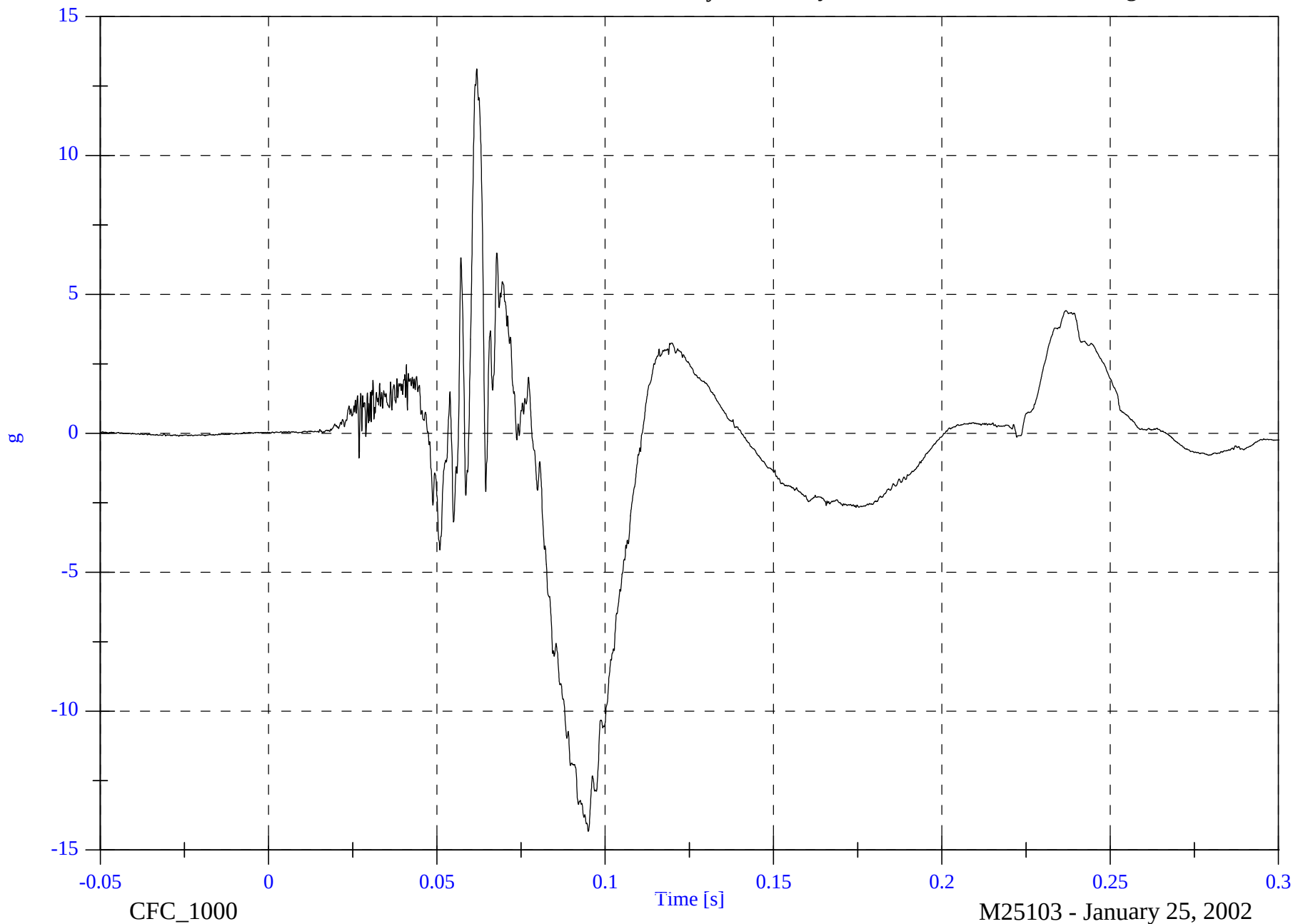
P2 Head 9 Array X Arm Ay

Max: 13.1 [g] at 0.062 [s]

Min: -14.3 [g] at 0.095 [s]

B-59

8642-NCAP-04



NCAP - 2002 Toyota Avalon

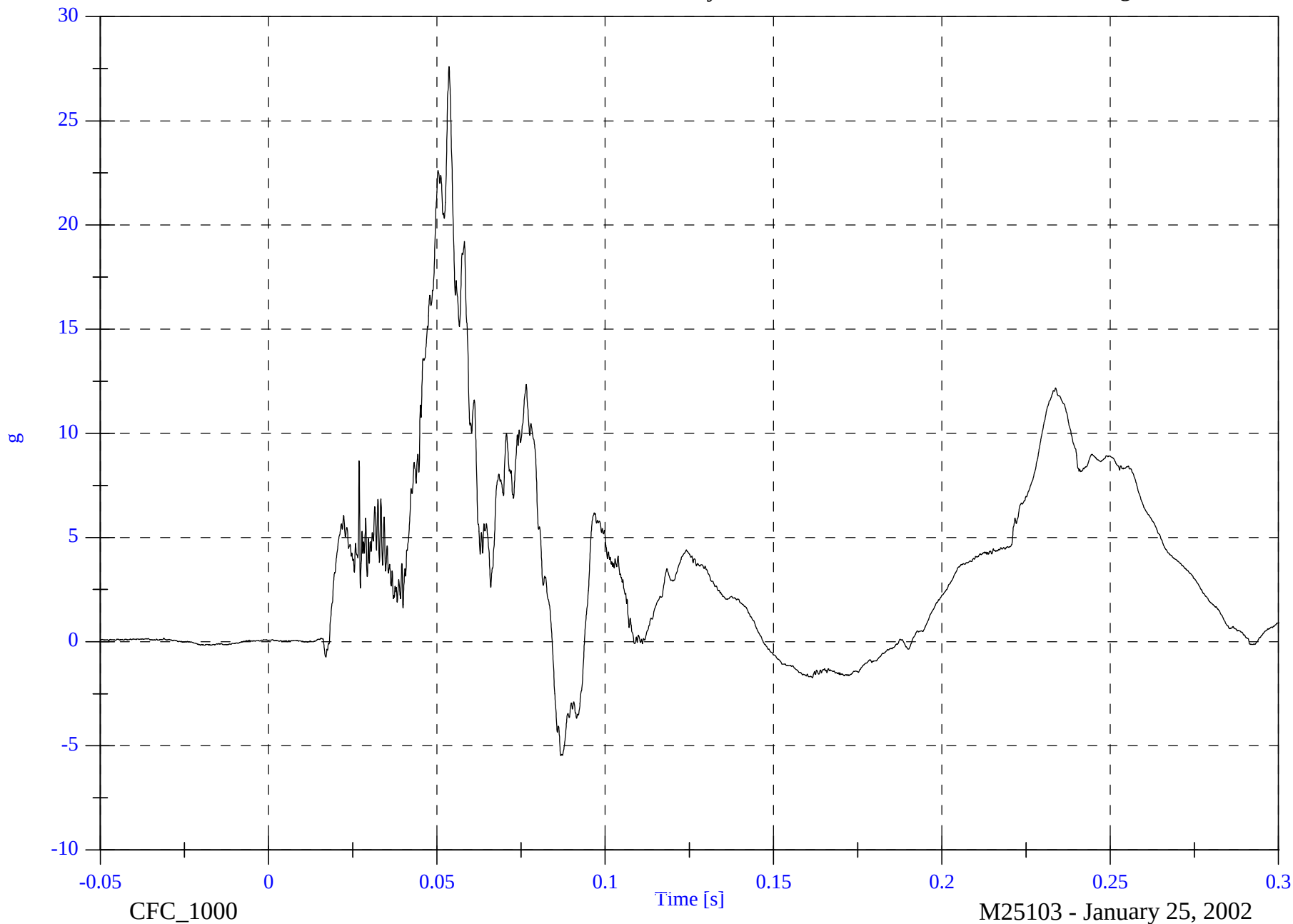
P2 Head 9 Array X Arm Az

Max: 27.6 [g] at 0.054 [s]

Min: -5.5 [g] at 0.087 [s]

B-60

8642-NCAP-04



NCAP - 2002 Toyota Avalon

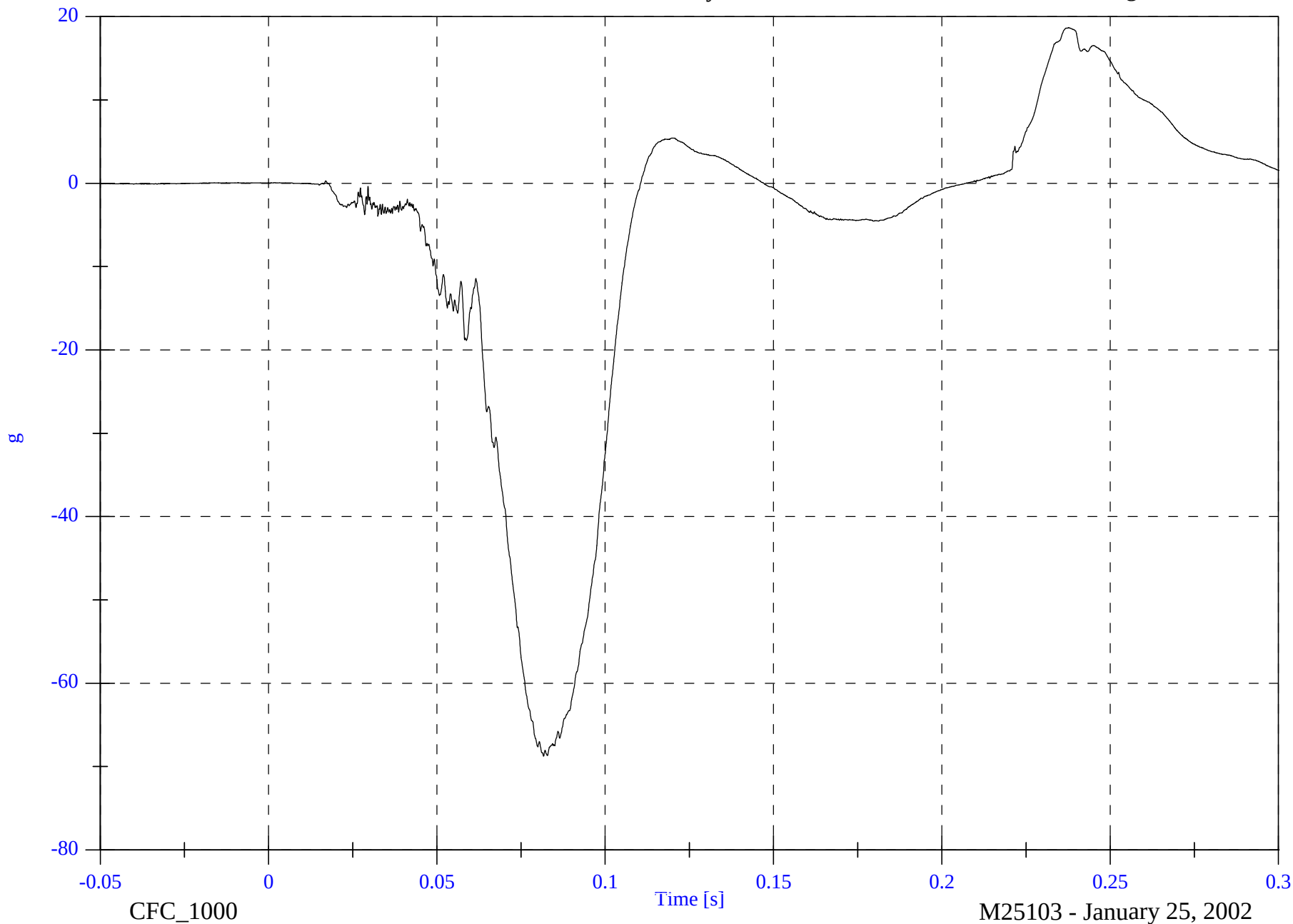
P2 Head 9 Array Y Arm Ax

Max: 18.7 [g] at 0.238 [s]

Min: -68.7 [g] at 0.082 [s]

B-61

8642-NCAP-04



NCAP - 2002 Toyota Avalon

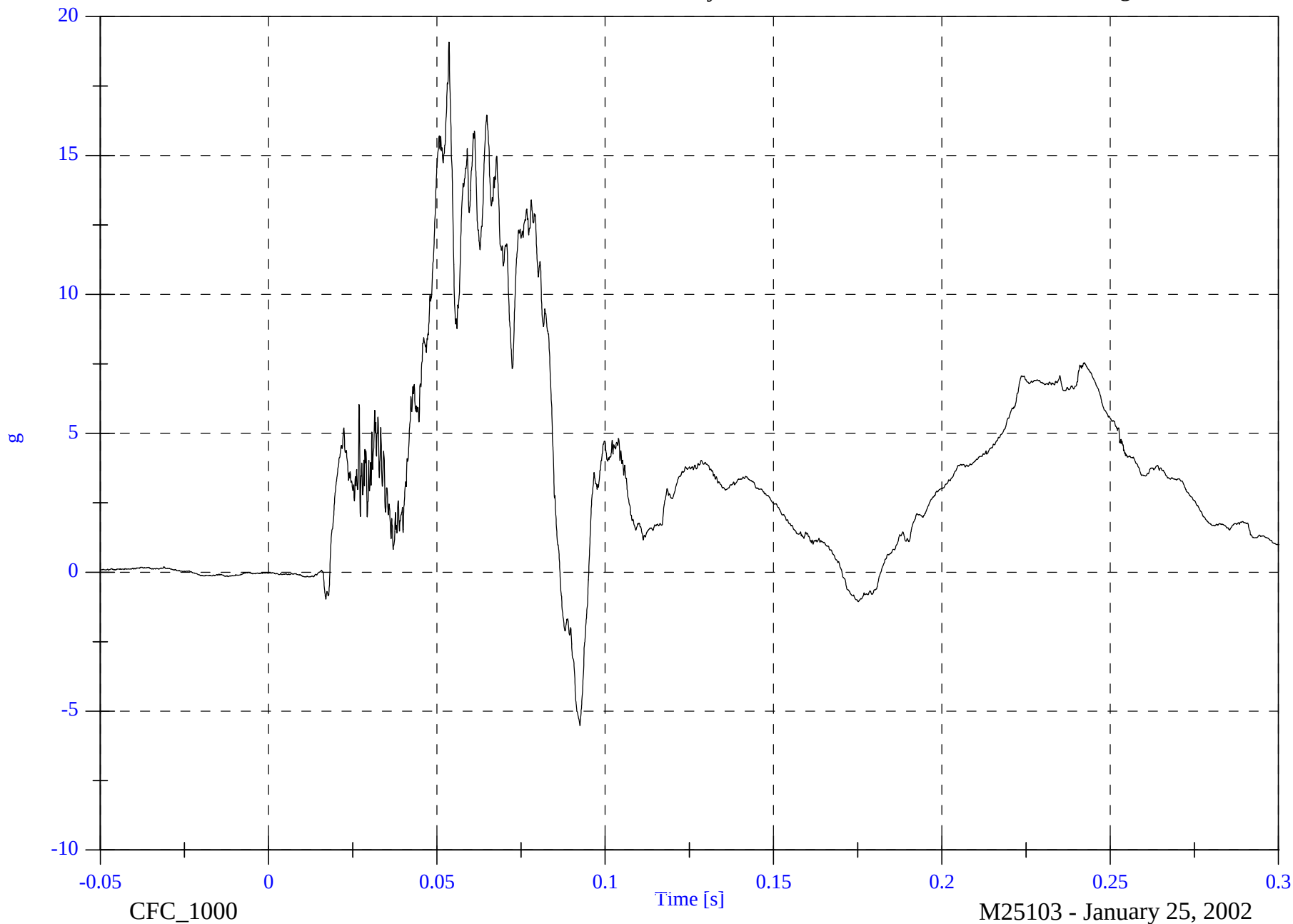
P2 Head 9 Array Y Arm Az

Max: 19.1 [g] at 0.054 [s]

Min: -5.5 [g] at 0.093 [s]

B-62

8642-NCAP-04



NCAP - 2002 Toyota Avalon

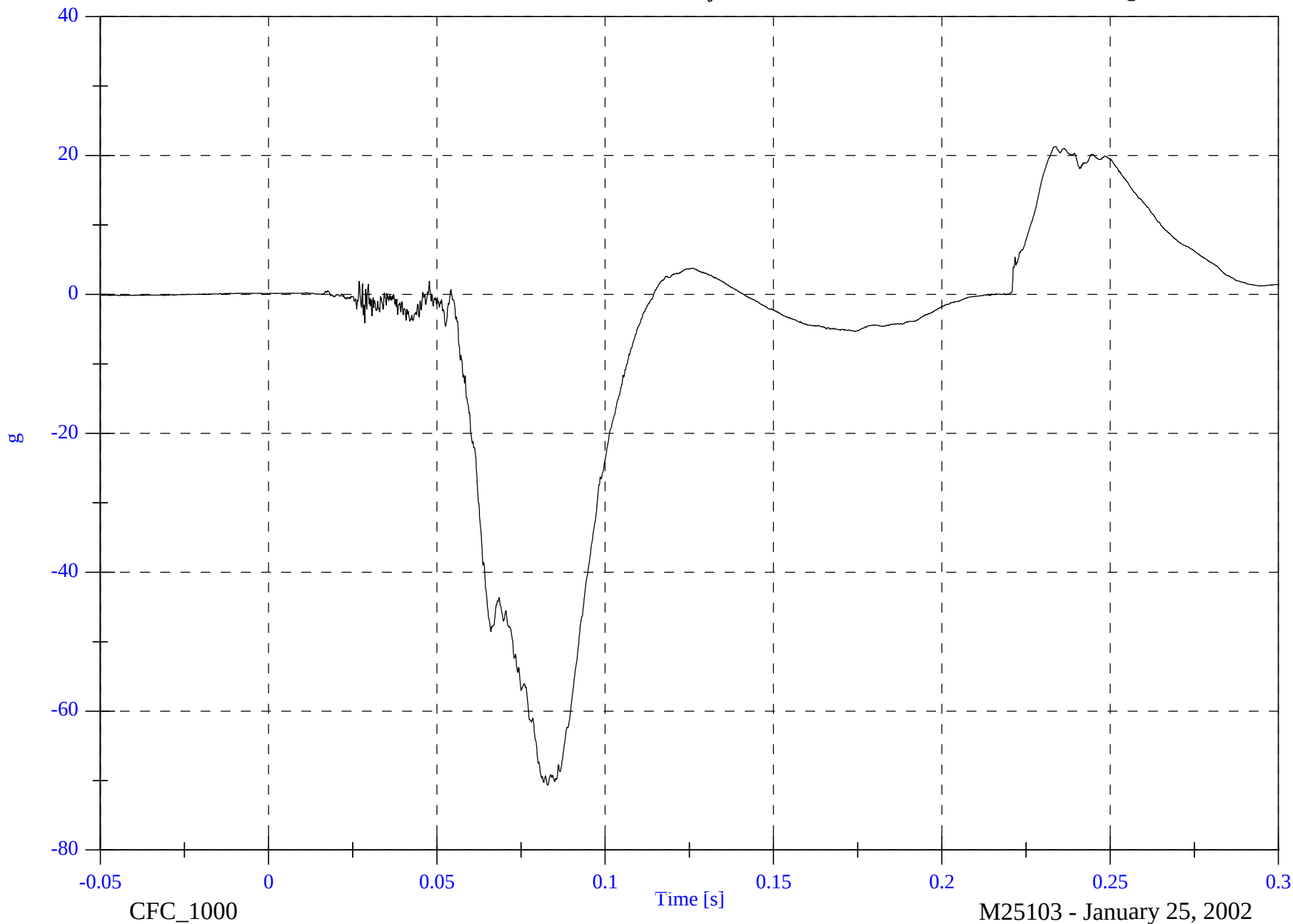
P2 Head 9 Array Z Arm Ax

Max: 21.3 [g] at 0.234 [s]

Min: -70.7 [g] at 0.083 [s]

B-63

8642-NCAP-04



NCAP - 2002 Toyota Avalon

P2 Head 9 Array Z Arm Ay

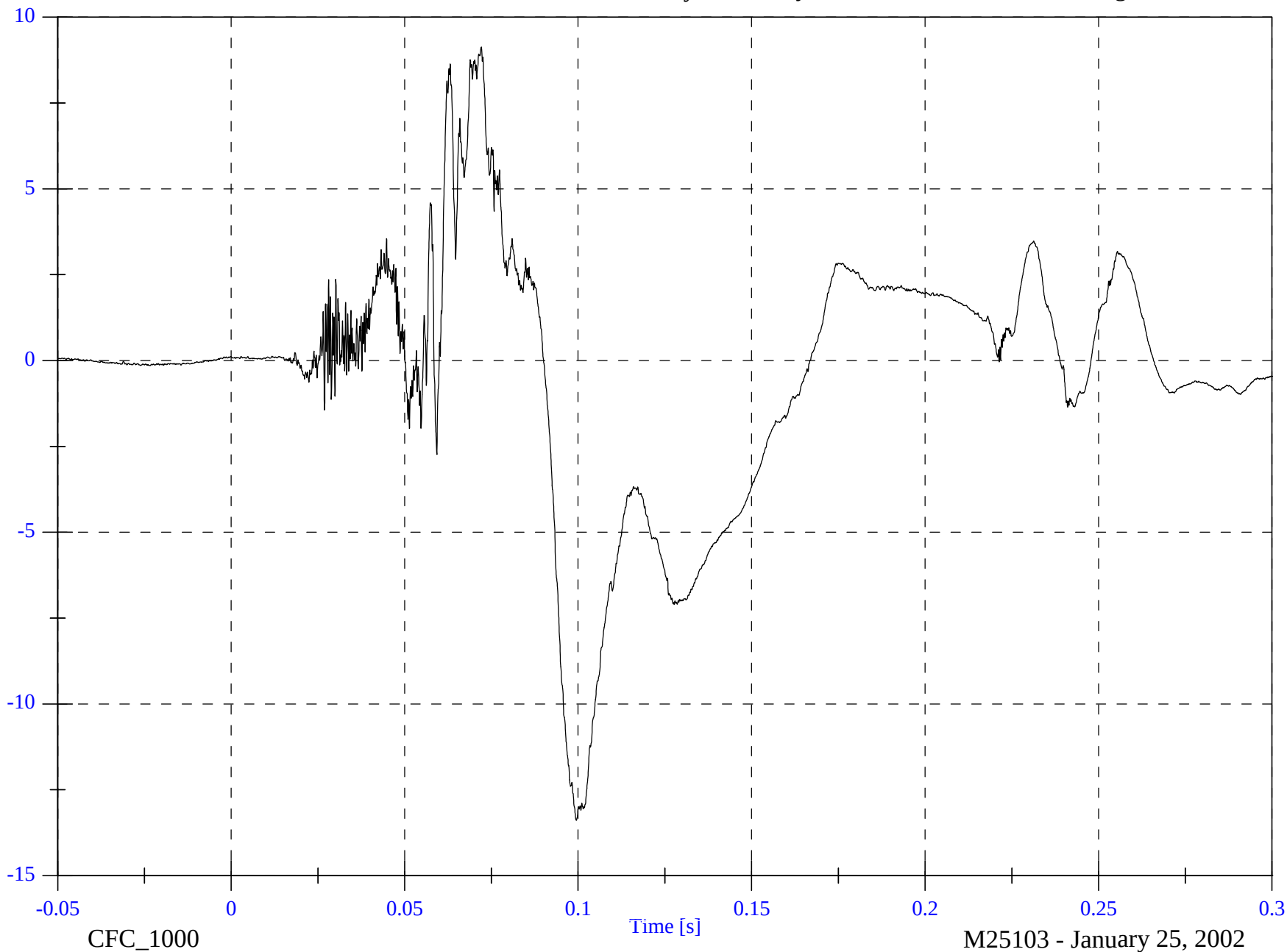
Max: 9.1 [g] at 0.072 [s]

Min: -13.4 [g] at 0.099 [s]

B-64

8642-NCAP-04

g



NCAP - 2002 Toyota Avalon

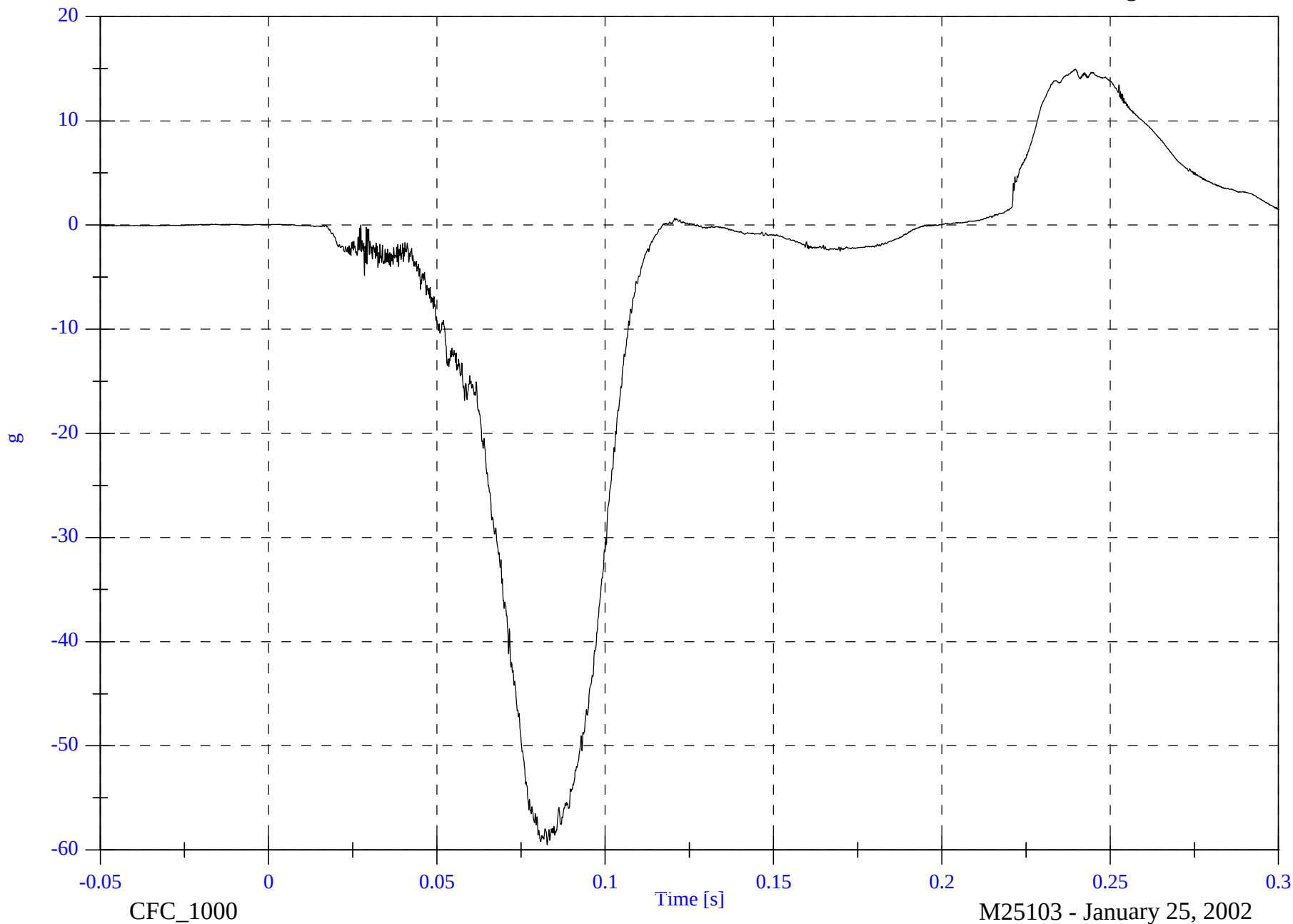
P2 Head CG x

Max: 15.0 [g] at 0.240 [s]

Min: -59.5 [g] at 0.083 [s]

B-65

8642-NCAP-04



NCAP - 2002 Toyota Avalon

P2 Head CG y

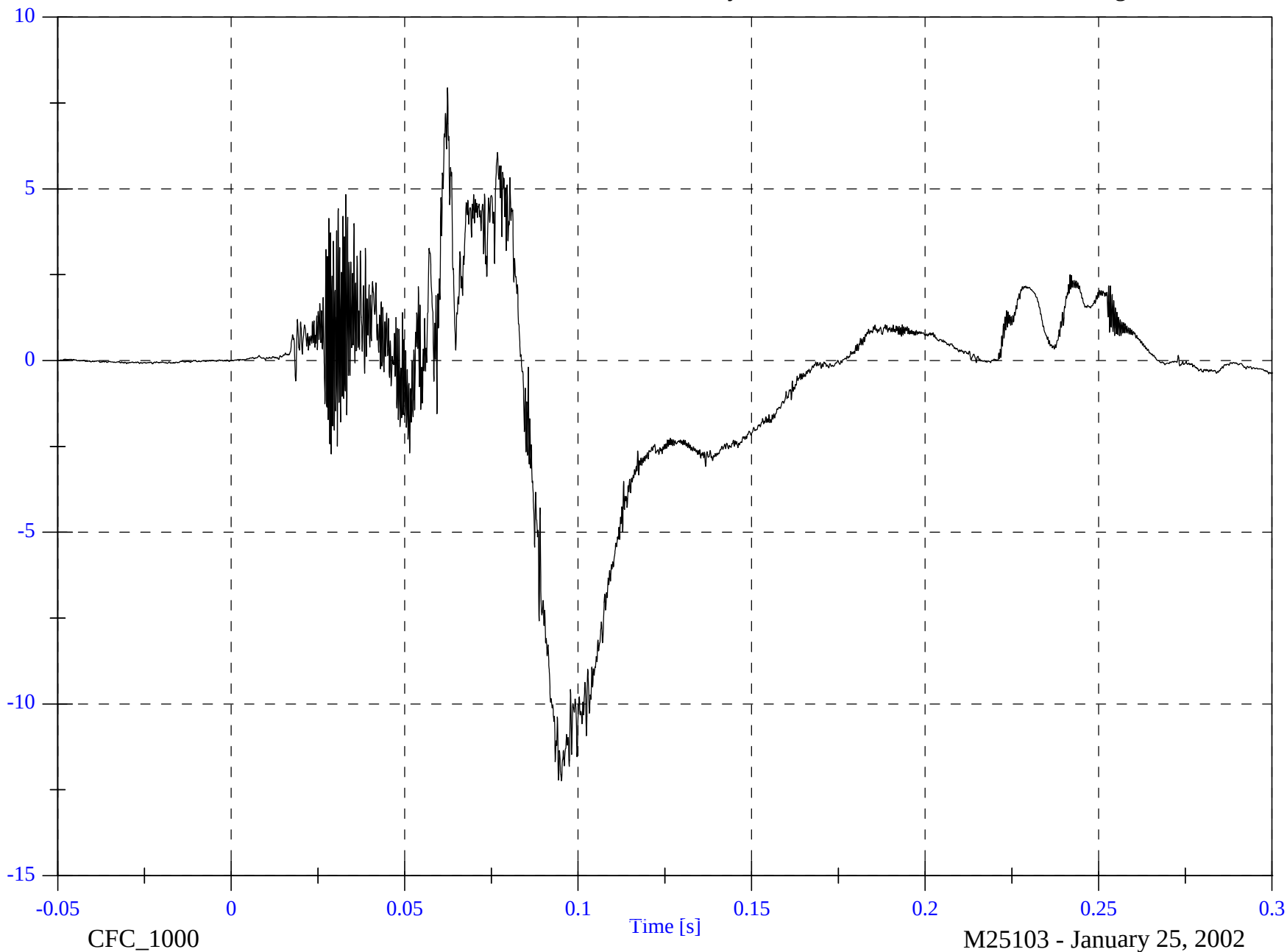
Max: 7.9 [g] at 0.062 [s]

Min: -12.2 [g] at 0.095 [s]

B-66

8642-NCAP-04

g

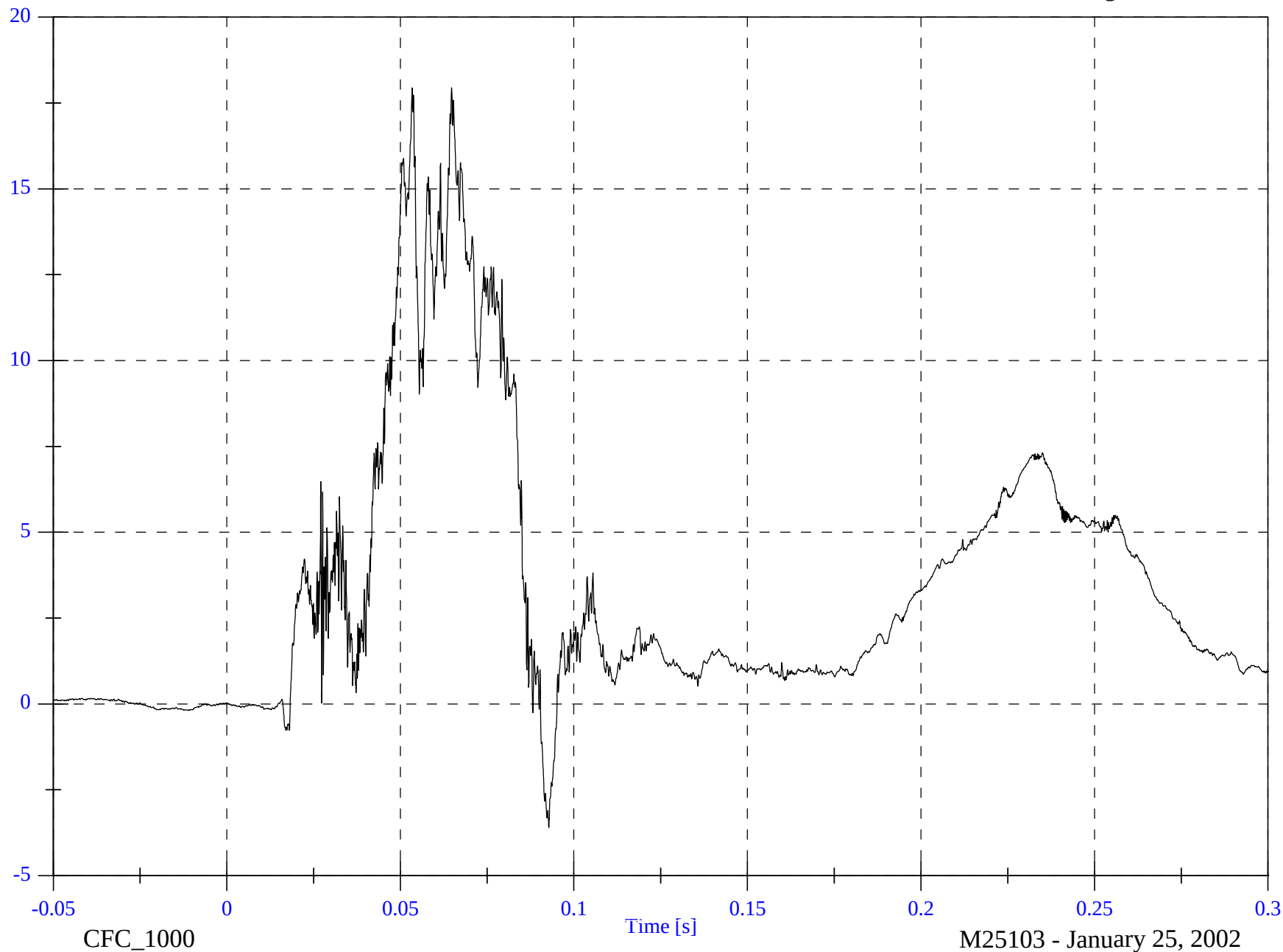


NCAP - 2002 Toyota Avalon

P2 Head CG z

Max: 18.0 [g] at 0.065 [s]

Min: -3.6 [g] at 0.093 [s]



B-67

8642-NCAP-04

NCAP - 2002 Toyota Avalon

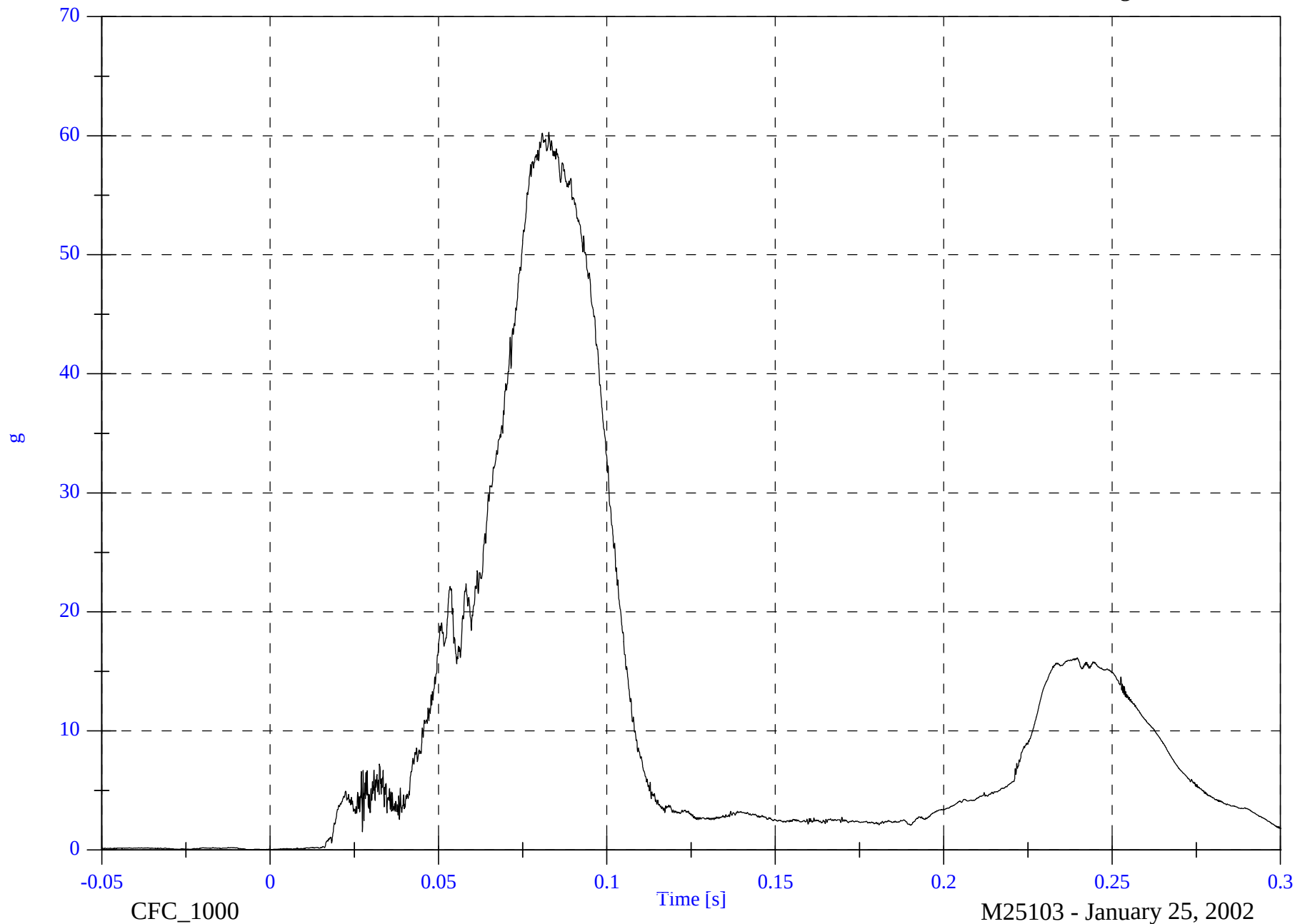
P2 Head CG Resultant

Max: 60.3 [g] at 0.083 [s]

Min: 0.0 [g] at -0.006 [s]

B-68

8642-NCAP-04



NCAP - 2002 Toyota Avalon

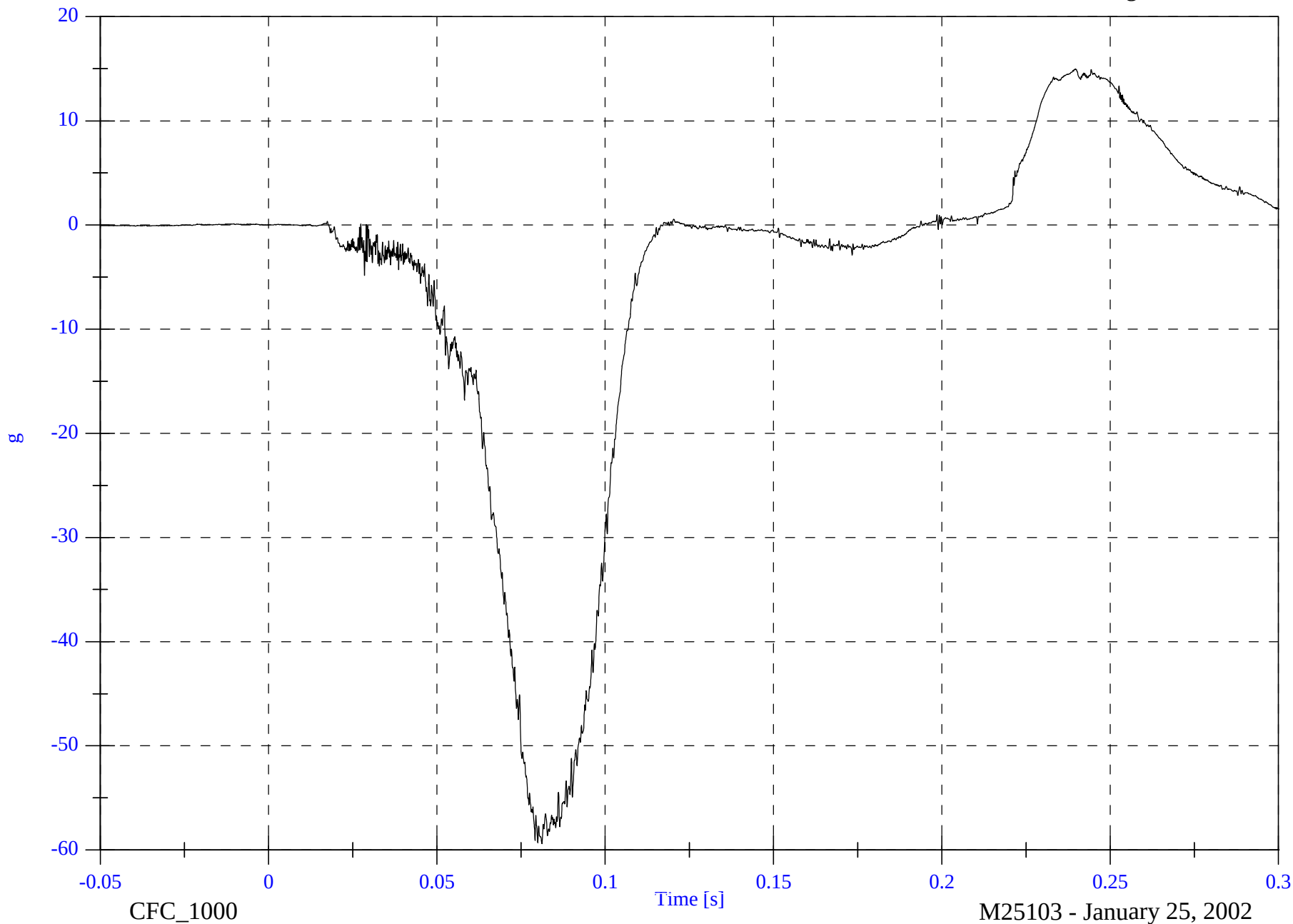
P2 Head CG Red x

Max: 15.0 [g] at 0.240 [s]

Min: -59.4 [g] at 0.081 [s]

B-69

8642-NCAP-04

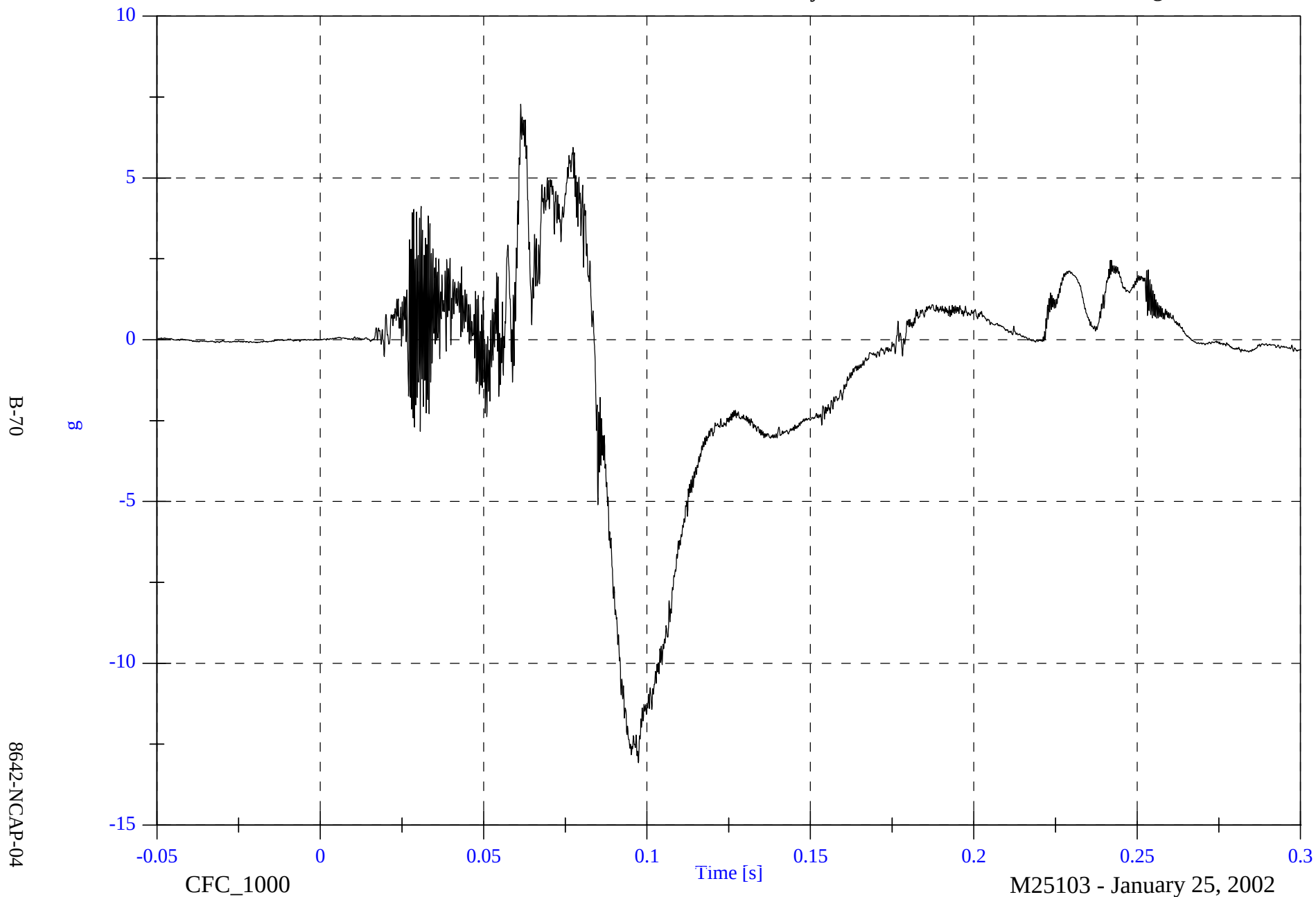


NCAP - 2002 Toyota Avalon

P2 Head CG Red y

Max: 7.3 [g] at 0.061 [s]

Min: -13.1 [g] at 0.097 [s]



NCAP - 2002 Toyota Avalon

P2 Head CG Red z

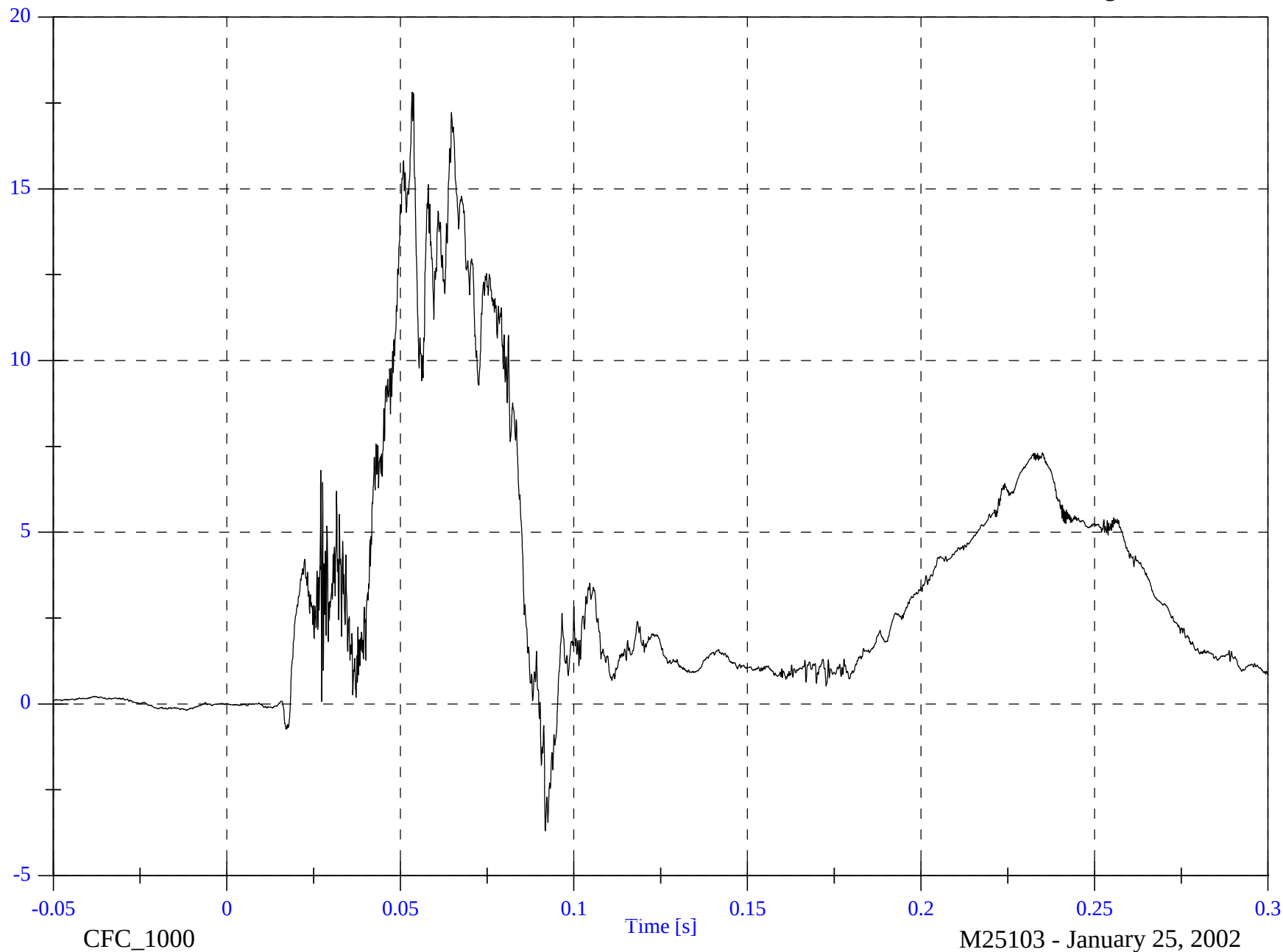
Max: 17.8 [g] at 0.053 [s]

Min: -3.7 [g] at 0.092 [s]

B-71

8642-NCAP-04

g



CFC\_1000

Time [s]

M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

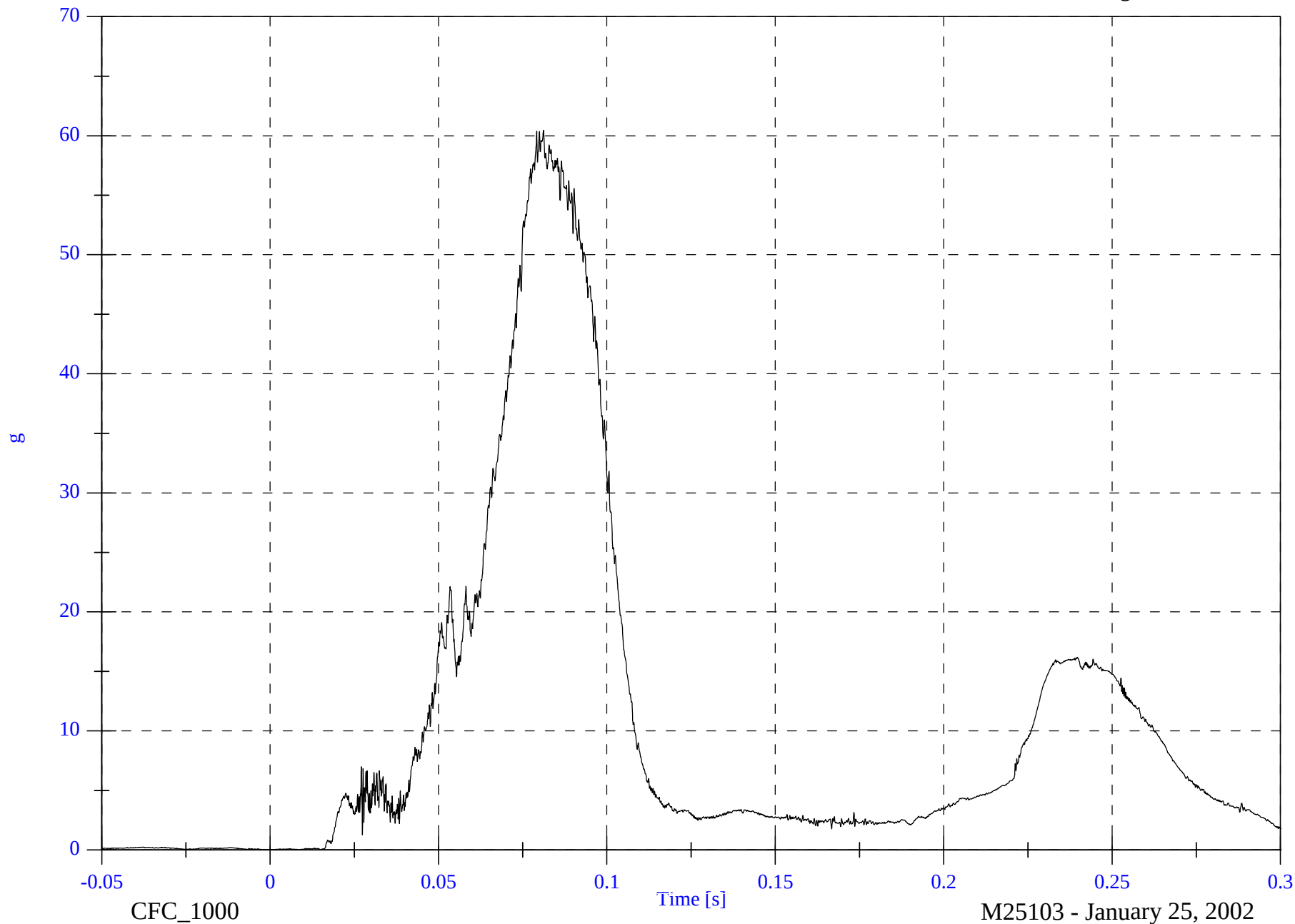
P2 Head CG Red Resultant

Max: 60.4 [g] at 0.081 [s]

Min: 0.0 [g] at -0.001 [s]

B-72

8642-NCAP-04

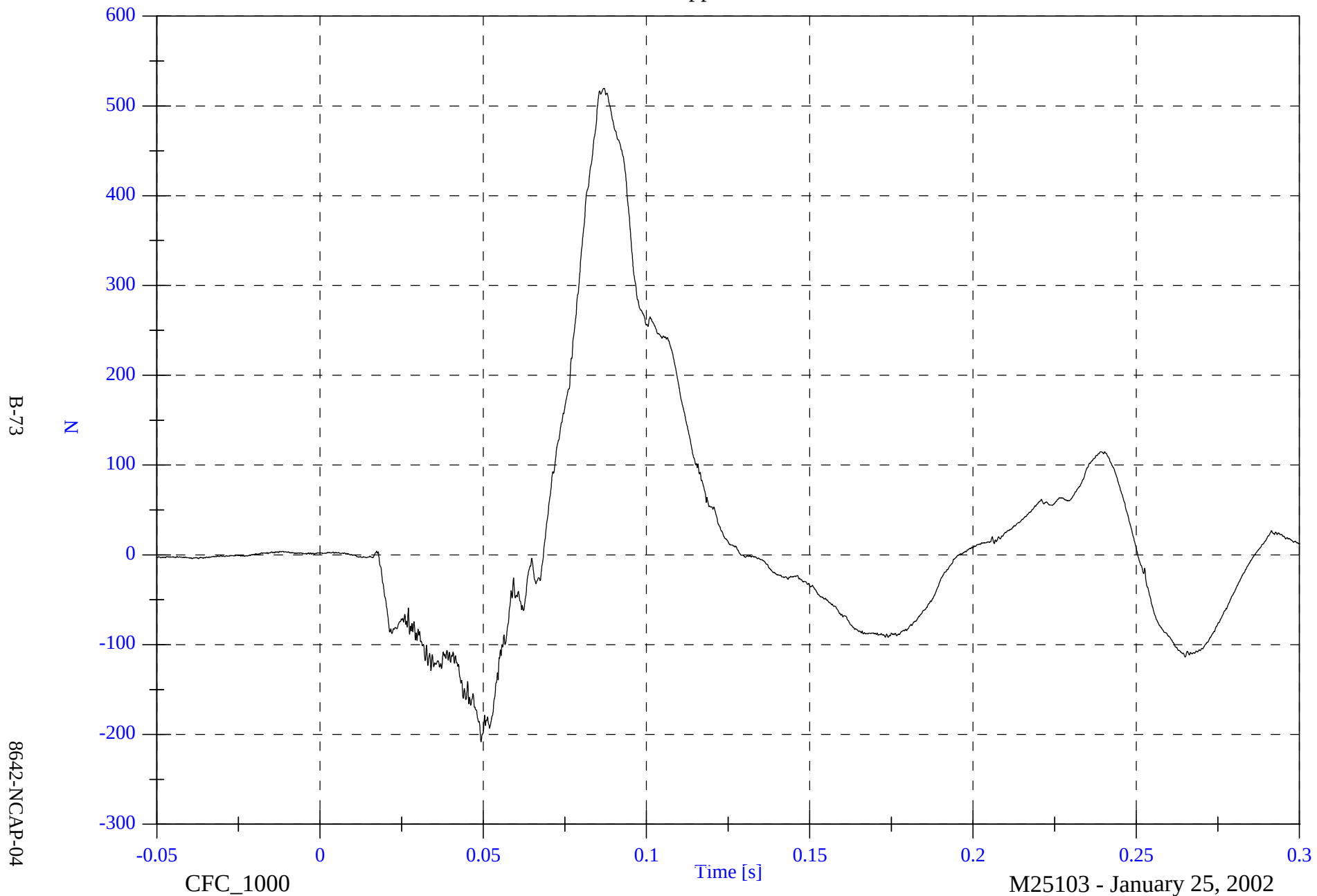


NCAP - 2002 Toyota Avalon

P2 Upper Neck Fx

Max: 519.5 [N] at 0.087 [s]

Min: -208.4 [N] at 0.049 [s]

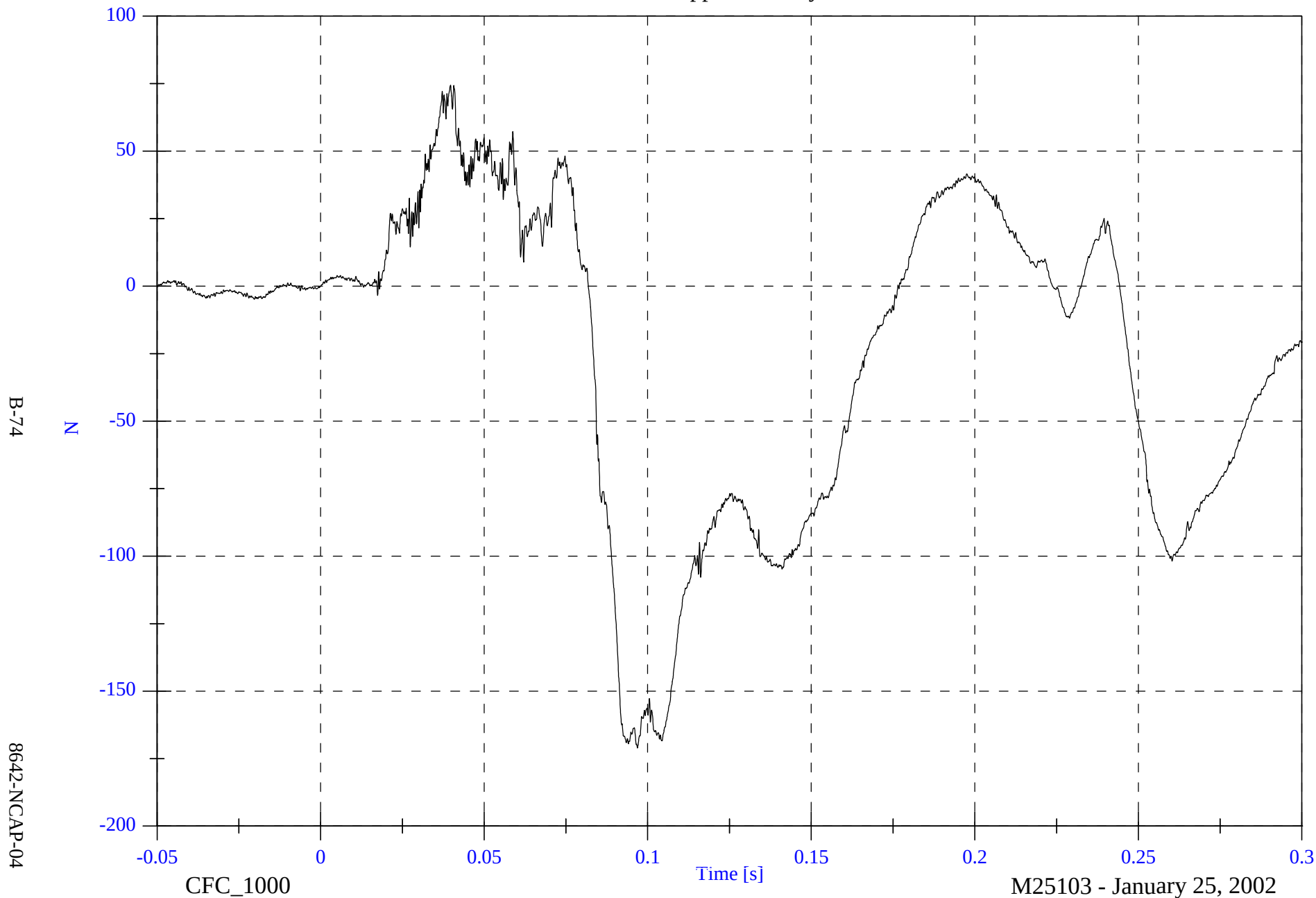


NCAP - 2002 Toyota Avalon

P2 Upper Neck Fy

Max: 74.4 [N] at 0.040 [s]

Min: -171.1 [N] at 0.097 [s]

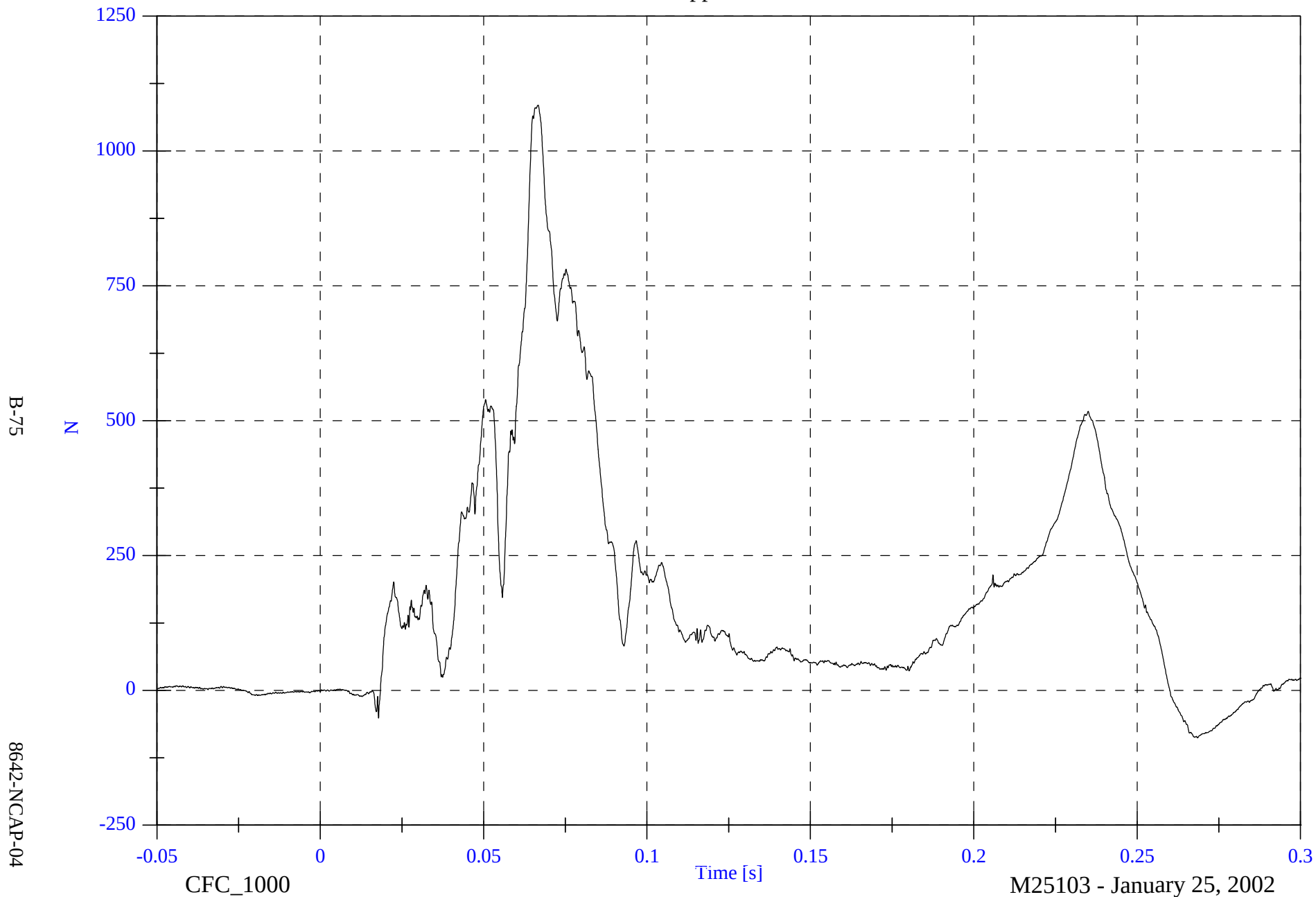


NCAP - 2002 Toyota Avalon

P2 Upper Neck Fz

Max: 1085.0 [N] at 0.067 [s]

Min: -88.2 [N] at 0.268 [s]



NCAP - 2002 Toyota Avalon

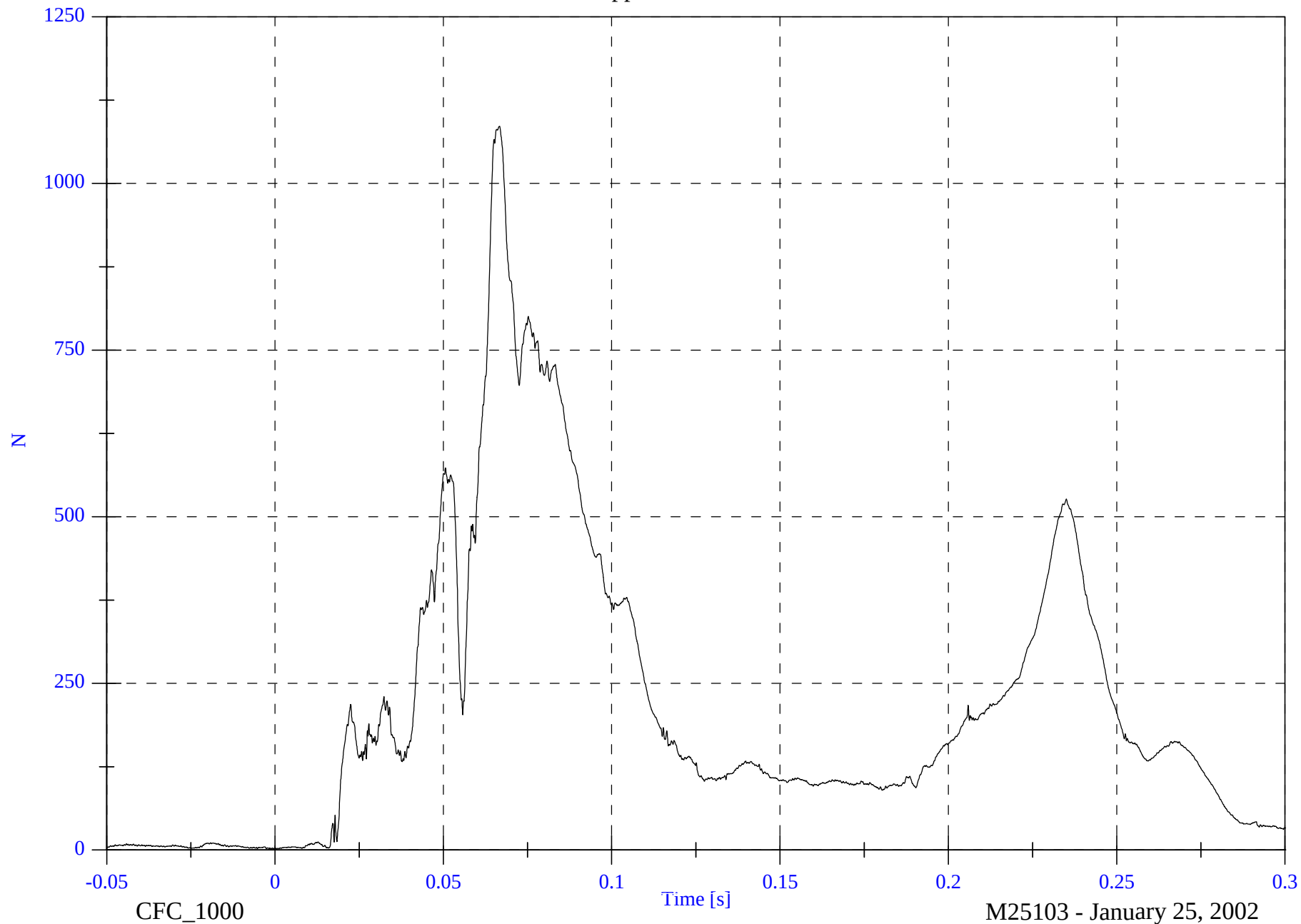
P2 Upper Neck F Resultant

Max: 1085.7 [N] at 0.067 [s]

Min: 2.0 [N] at -0.001 [s]

B-76

8642-NCAP-04

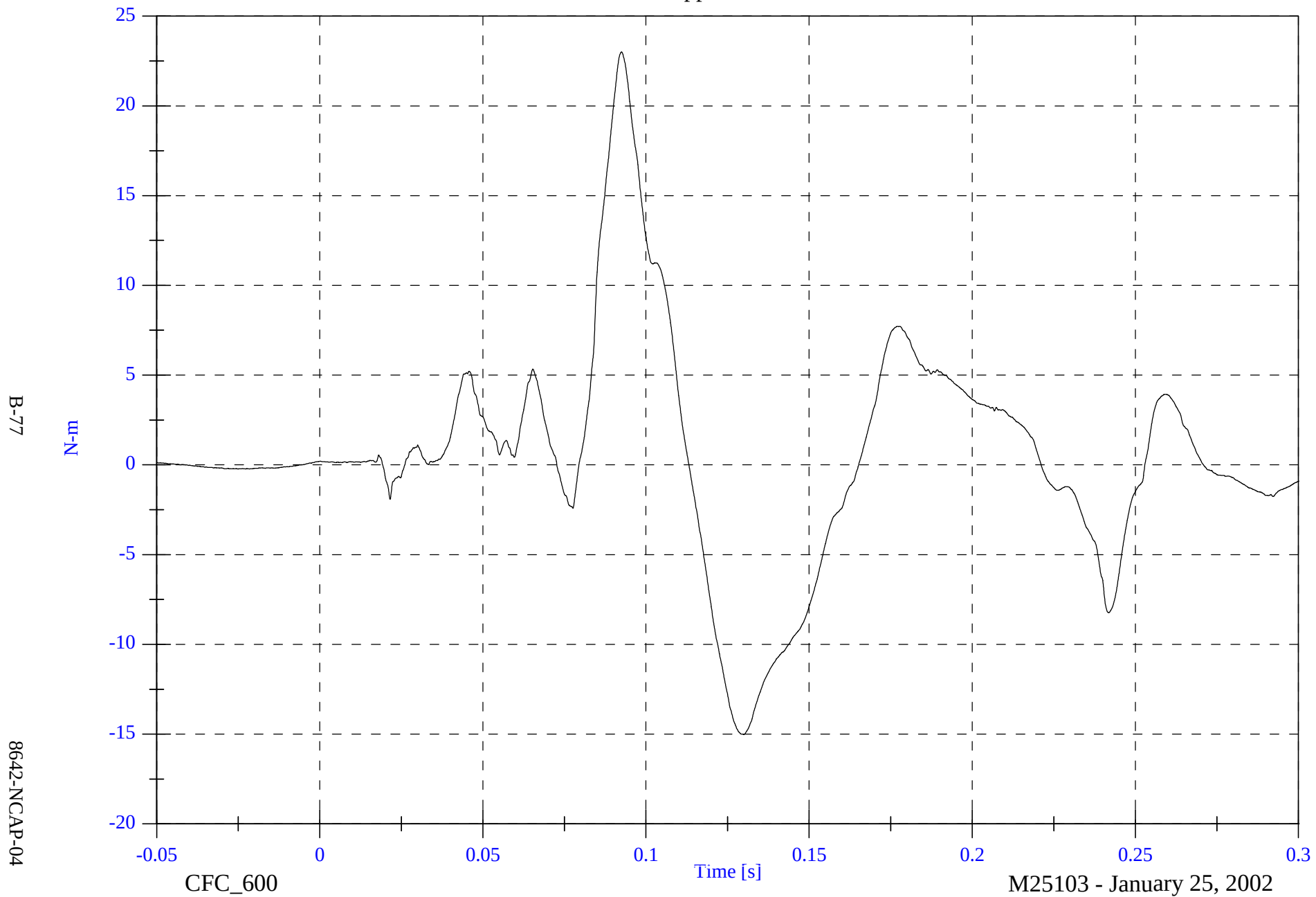


NCAP - 2002 Toyota Avalon

P2 Upper Neck Mx

Max: 23.0 [N-m] at 0.093 [s]

Min: -15.0 [N-m] at 0.130 [s]



NCAP - 2002 Toyota Avalon

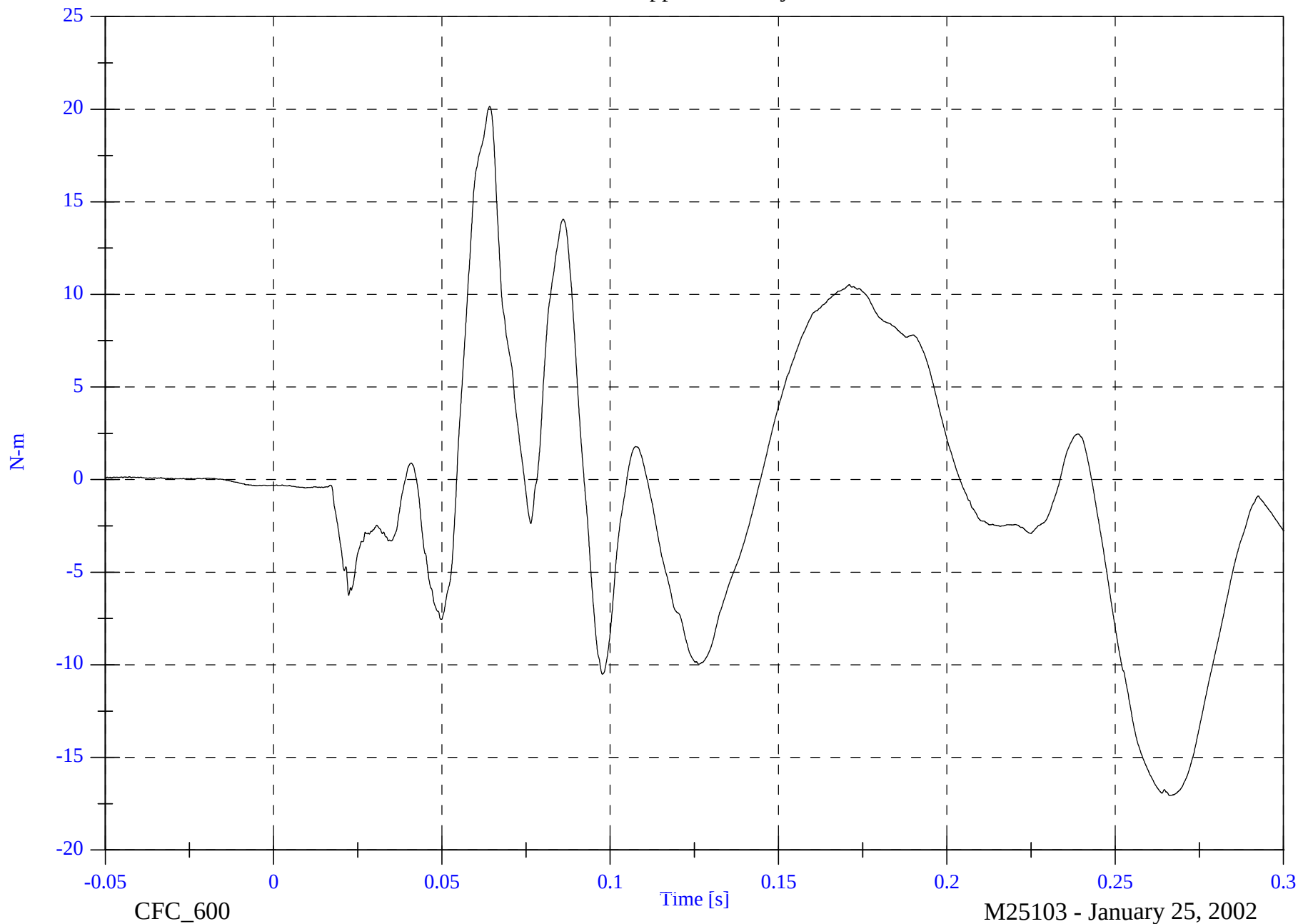
P2 Upper Neck My

Max: 20.2 [N-m] at 0.064 [s]

Min: -17.1 [N-m] at 0.266 [s]

B-78

8642-NCAP-04



NCAP - 2002 Toyota Avalon

P2 Upper Neck Mz

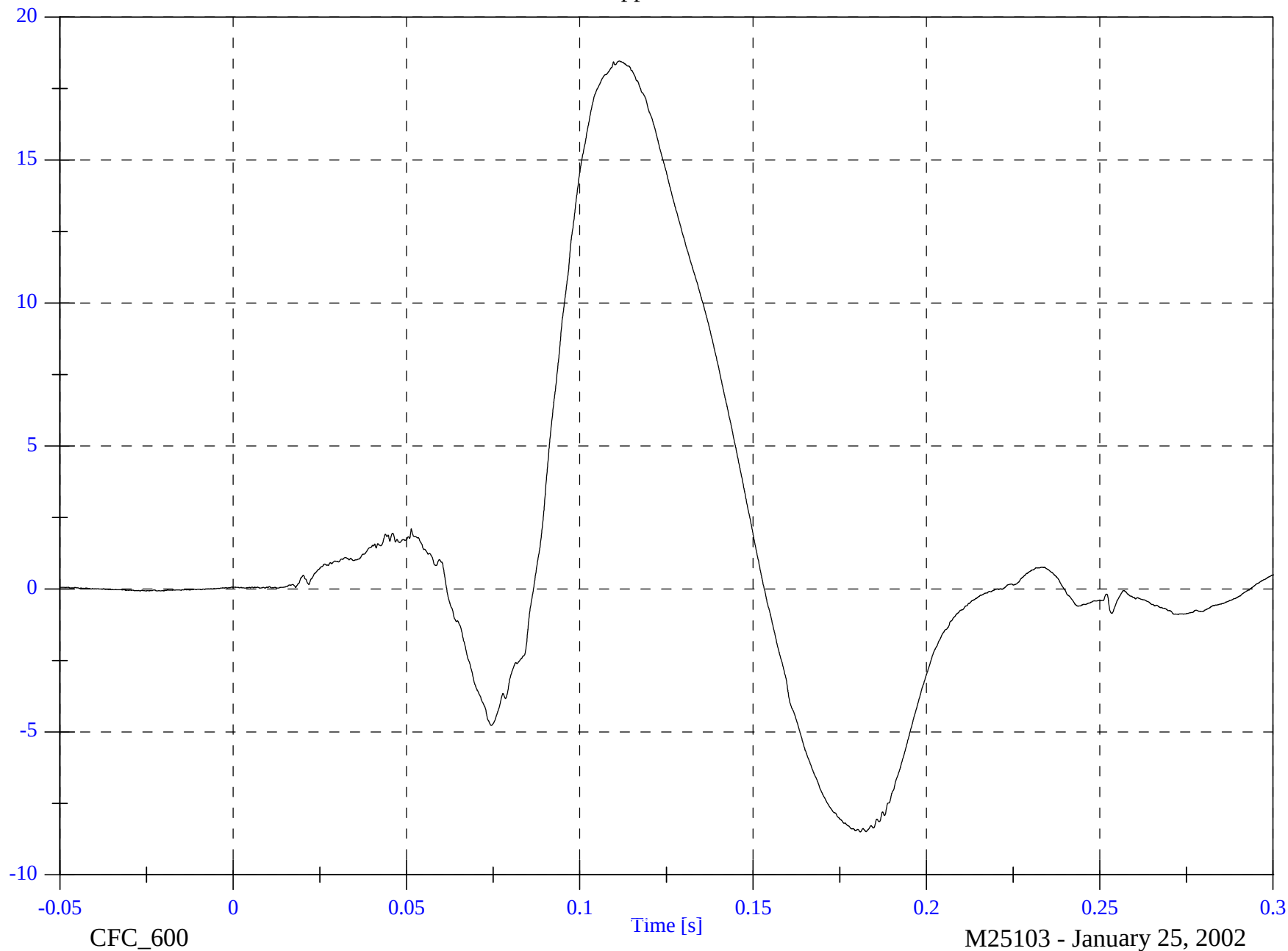
Max: 18.5 [N-m] at 0.111 [s]

Min: -8.5 [N-m] at 0.181 [s]

B-79

N-m

8642-NCAP-04



CFC\_600

M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

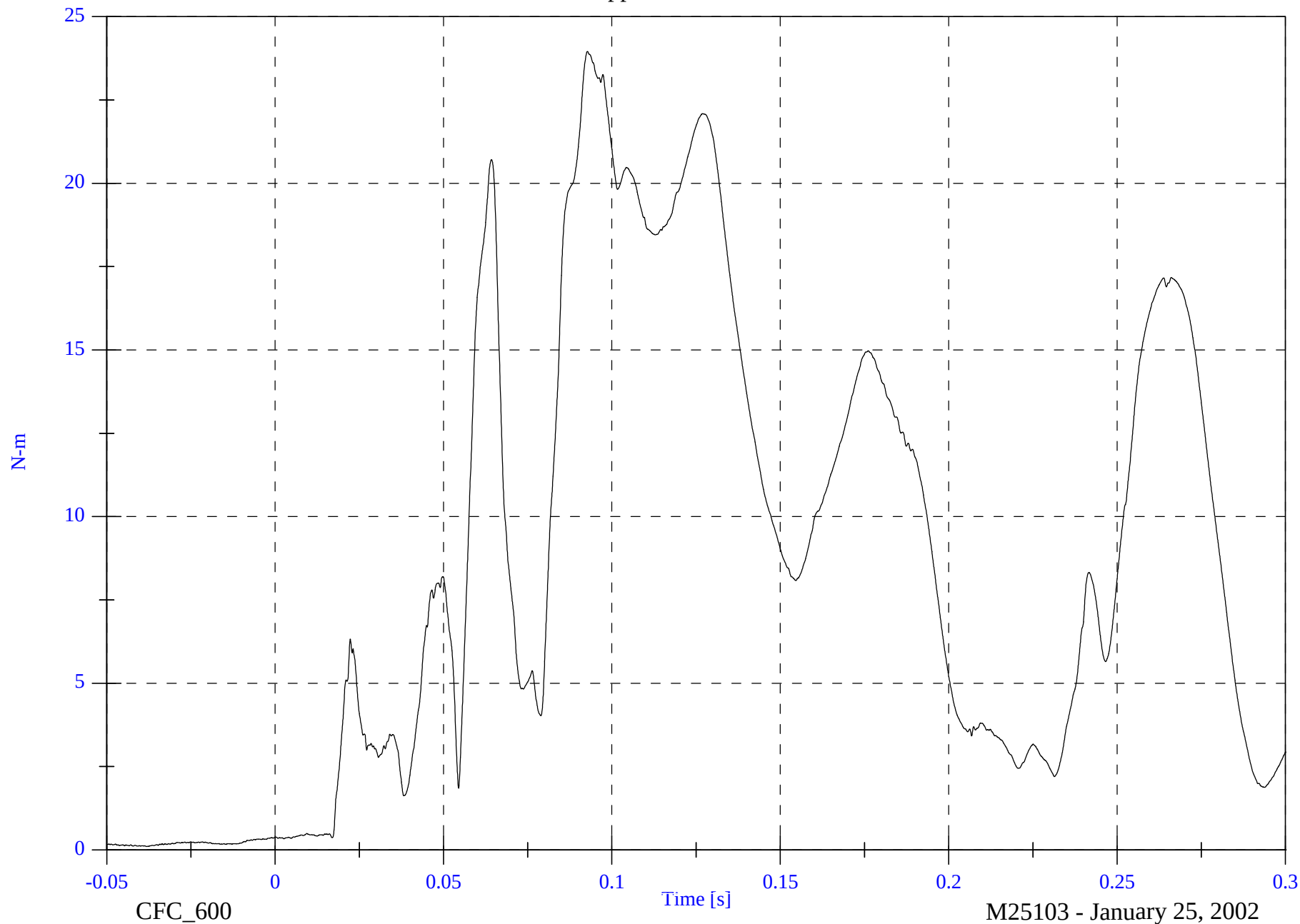
P2 Upper Neck M Resultant

Max: 24.0 [N-m] at 0.093 [s]

Min: 0.1 [N-m] at -0.038 [s]

B-80

8642-NCAP-04

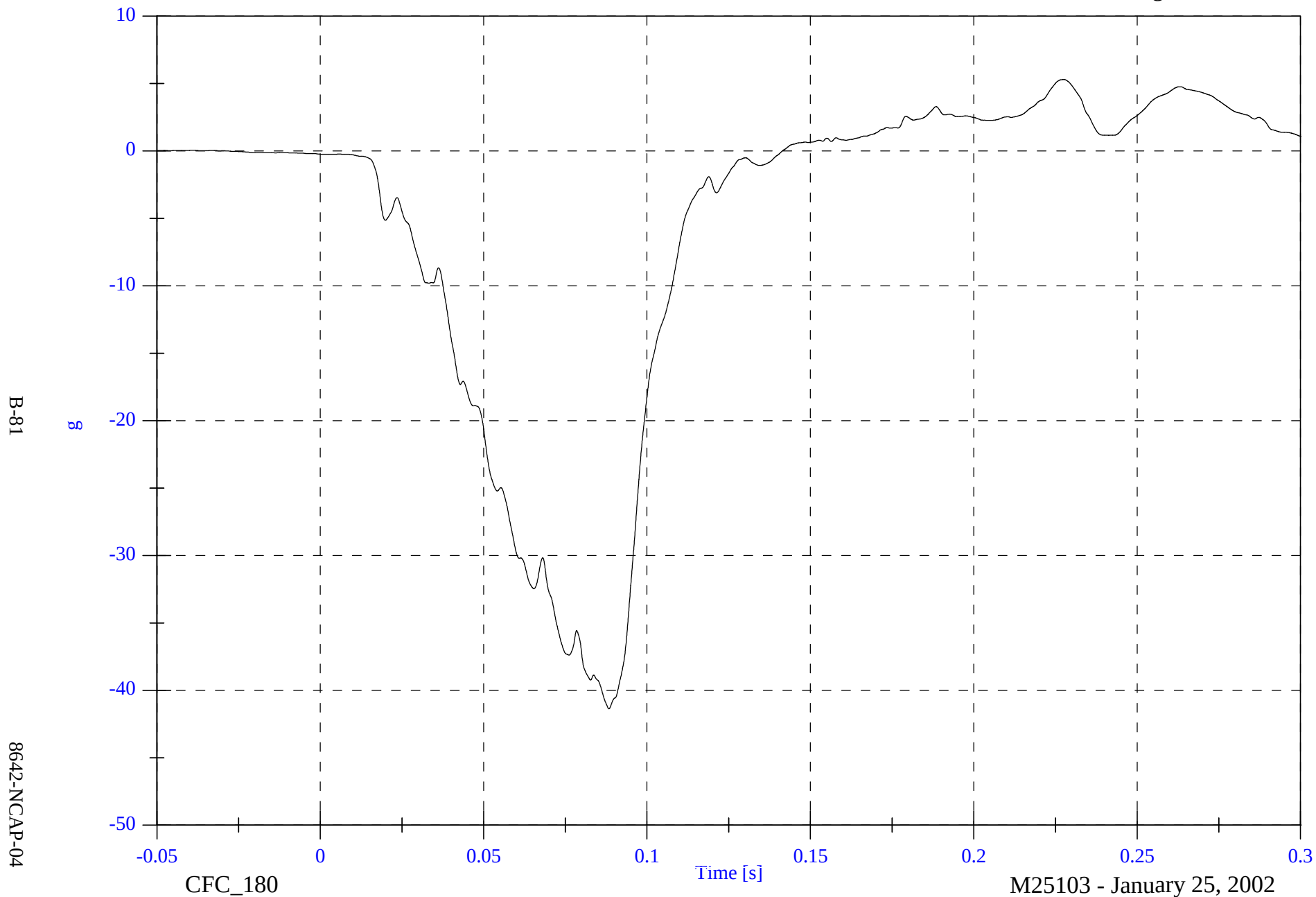


NCAP - 2002 Toyota Avalon

P2 Chest x

Max: 5.3 [g] at 0.228 [s]

Min: -41.4 [g] at 0.088 [s]

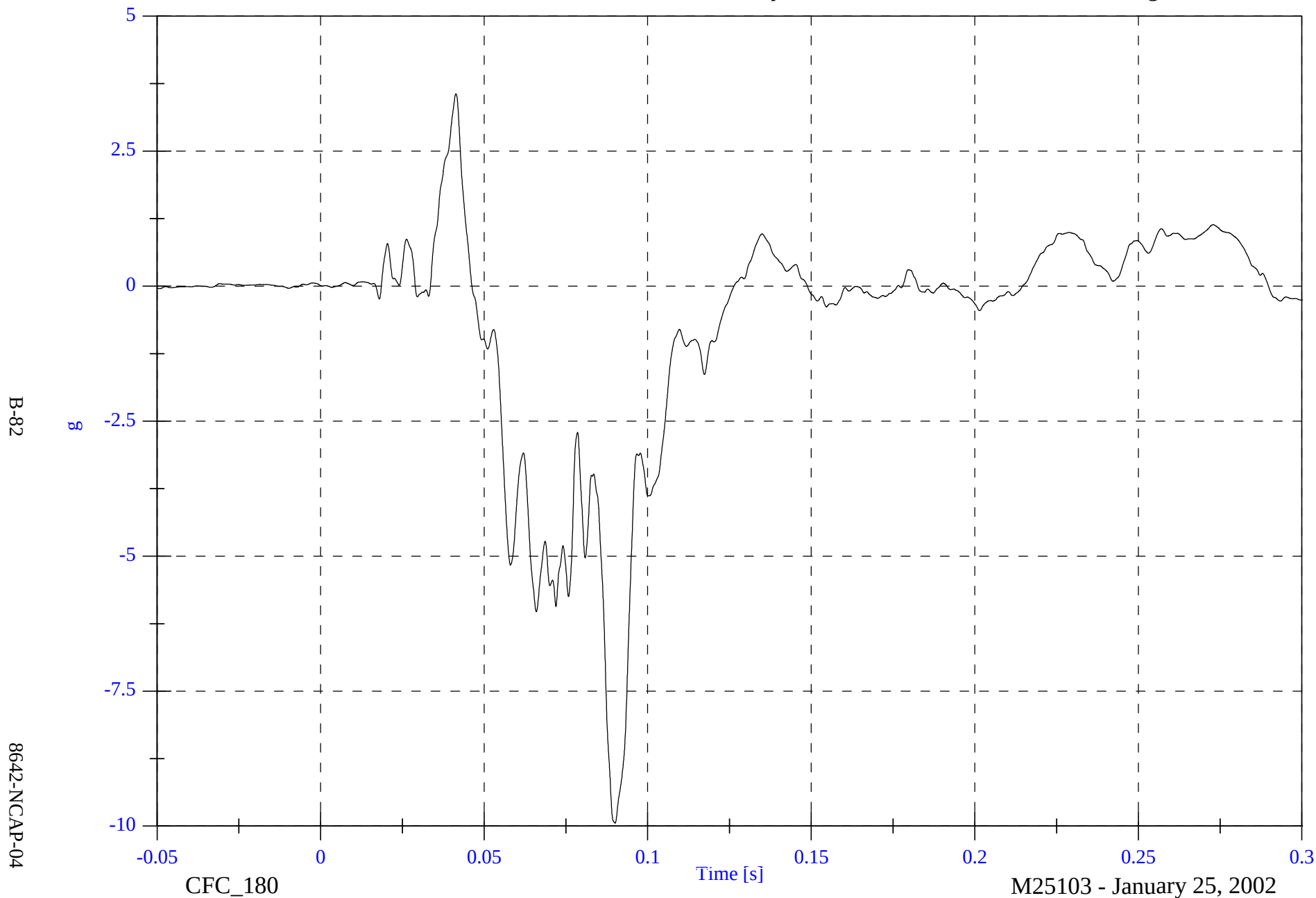


NCAP - 2002 Toyota Avalon

P2 Chest y

Max: 3.6 [g] at 0.041 [s]

Min: -9.9 [g] at 0.090 [s]

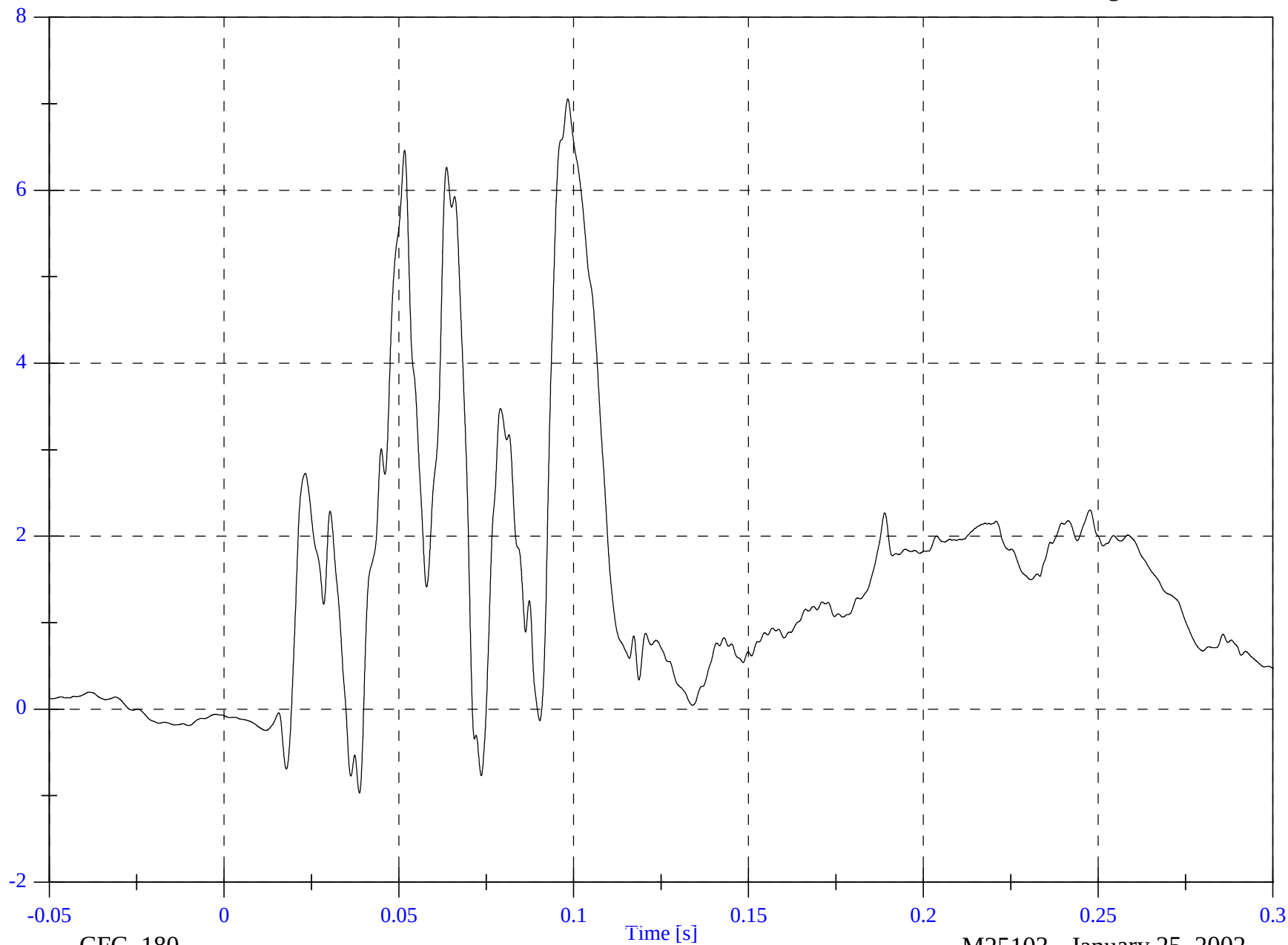


NCAP - 2002 Toyota Avalon

P2 Chest z

Max: 7.1 [g] at 0.098 [s]

Min: -1.0 [g] at 0.039 [s]



B-83

8642-NCAP-04

CFC\_180

M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

P2 Chest Resultant

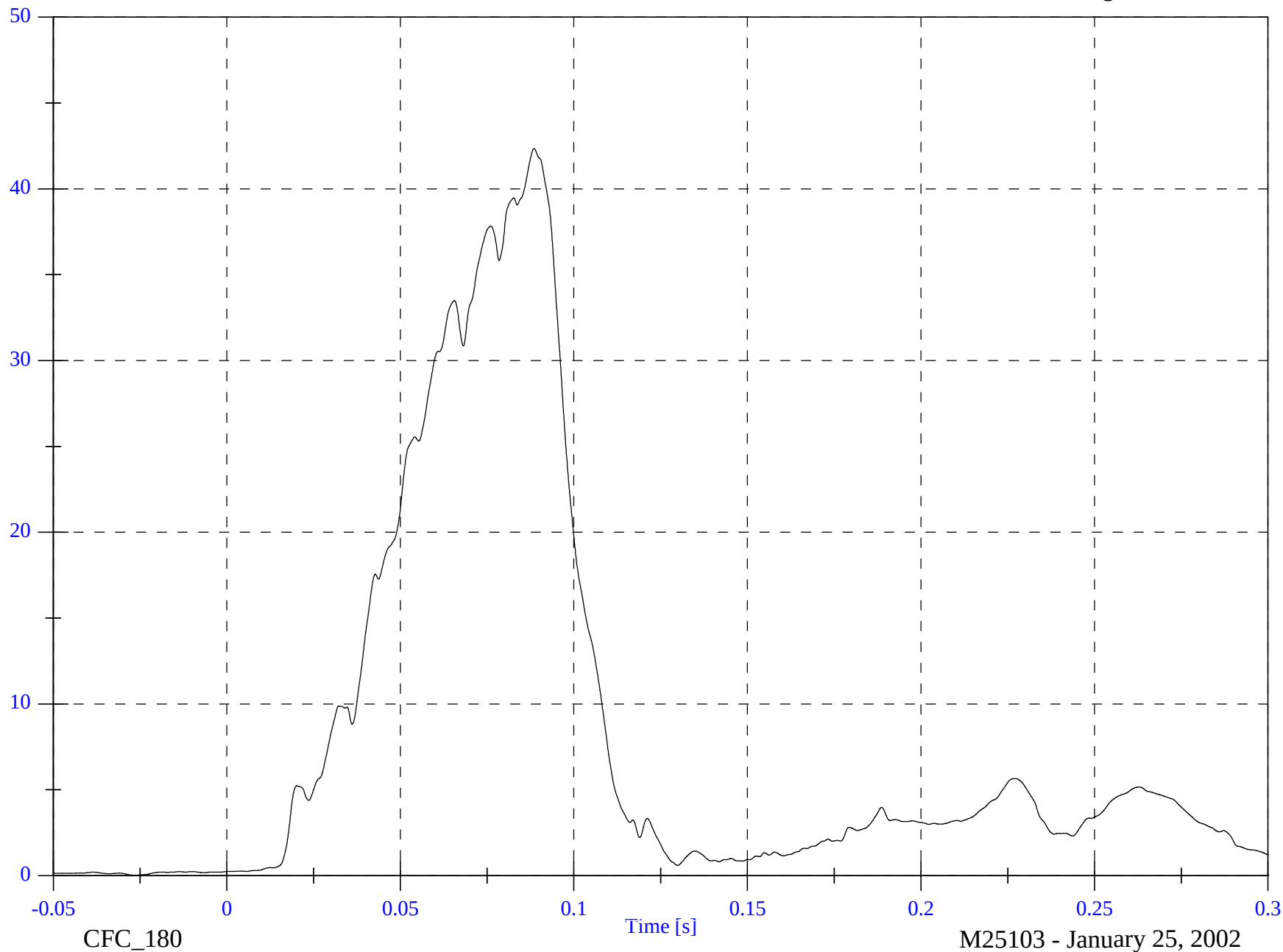
Max: 42.3 [g] at 0.089 [s]

Min: 0.0 [g] at -0.026 [s]

B-84

8642-NCAP-04

g

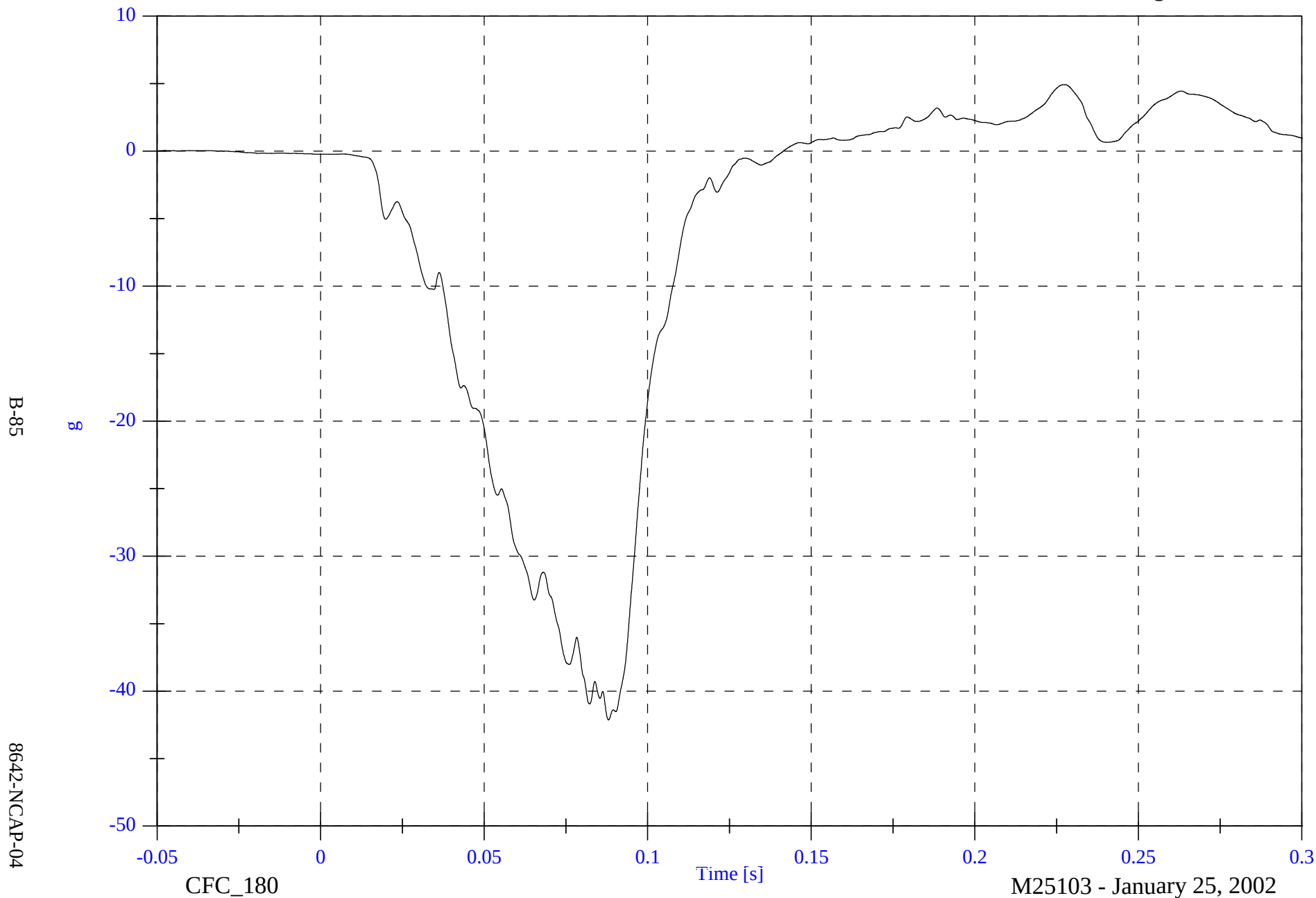


NCAP - 2002 Toyota Avalon

P2 Chest Red x

Max: 4.9 [g] at 0.228 [s]

Min: -42.1 [g] at 0.088 [s]

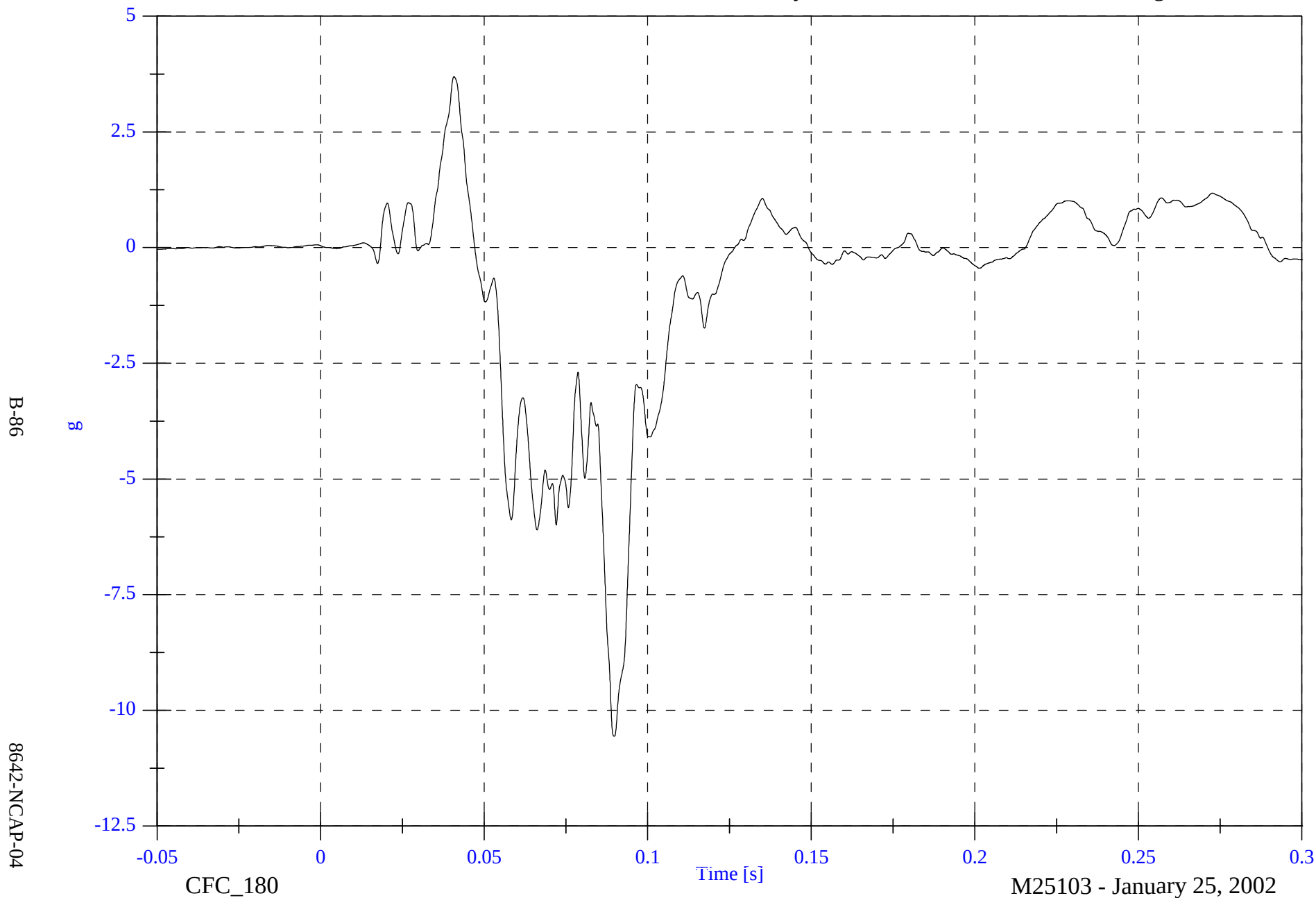


NCAP - 2002 Toyota Avalon

P2 Chest Red y

Max: 3.7 [g] at 0.041 [s]

Min: -10.6 [g] at 0.090 [s]

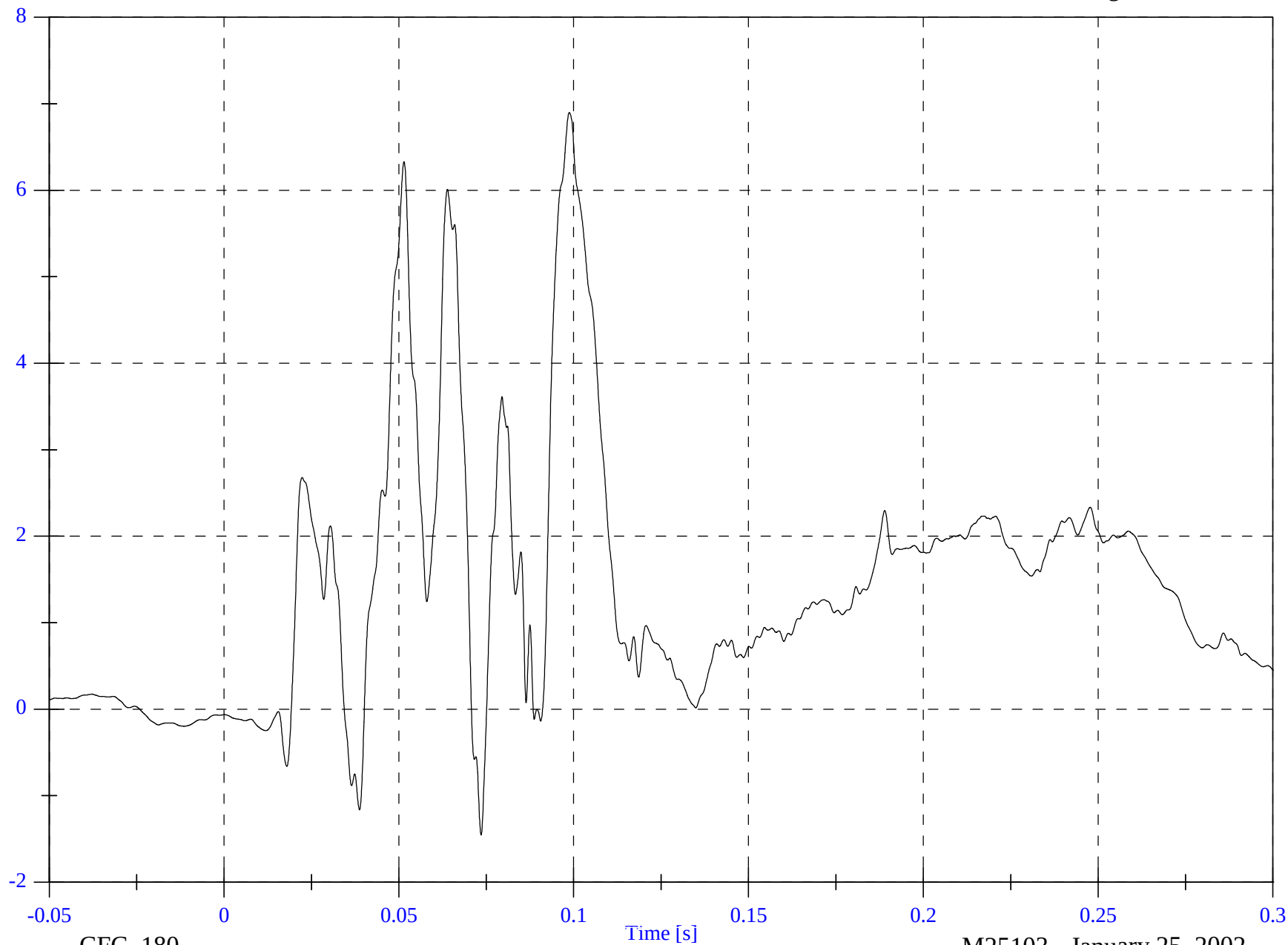


NCAP - 2002 Toyota Avalon

P2 Chest Red z

Max: 6.9 [g] at 0.099 [s]

Min: -1.5 [g] at 0.074 [s]



B-87

8642-NCAP-04

CFC\_180

M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

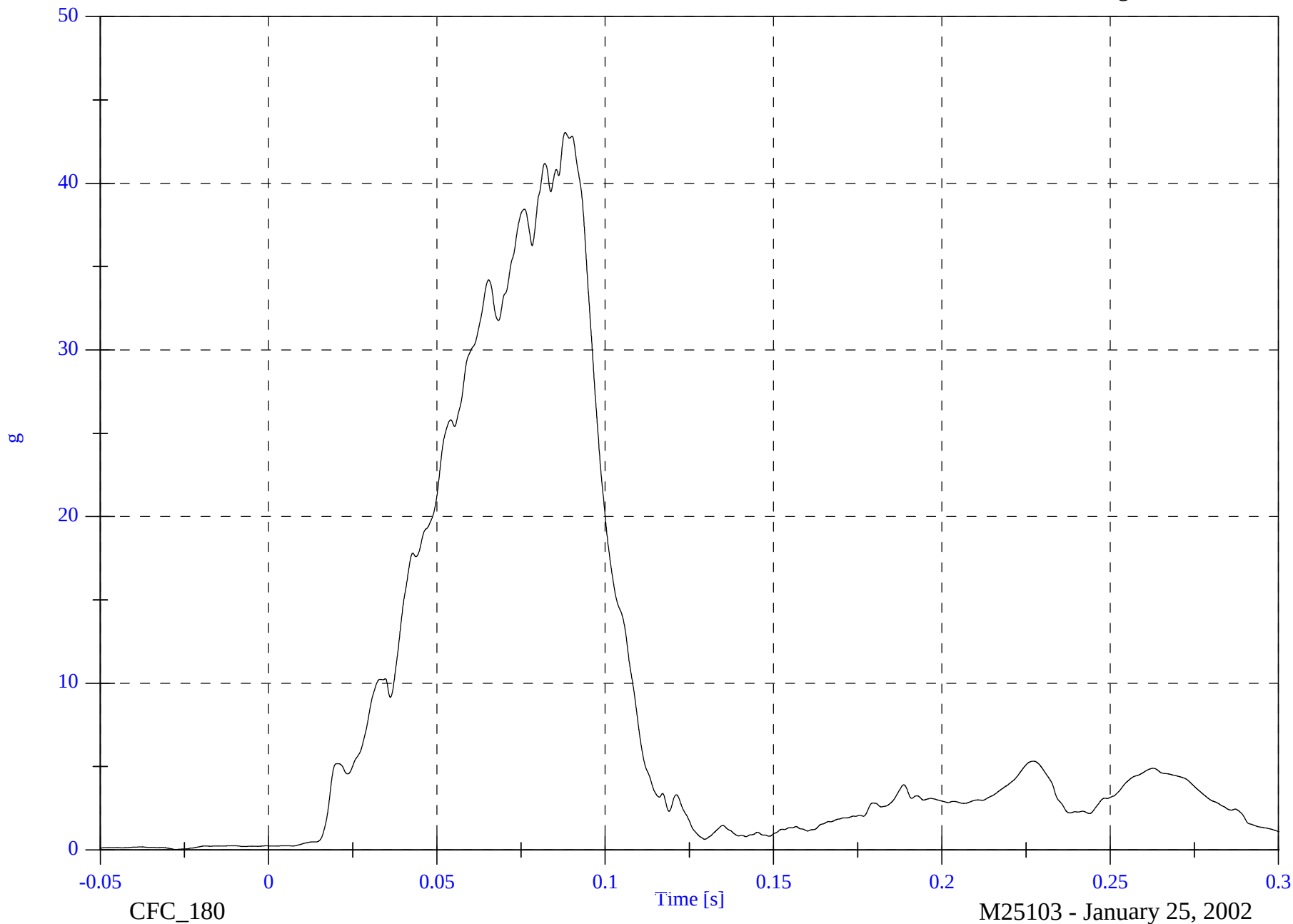
P2 Chest Red Resultant

Max: 43.1 [g] at 0.088 [s]

Min: 0.0 [g] at -0.028 [s]

B-88

8642-NCAP-04



NCAP - 2002 Toyota Avalon

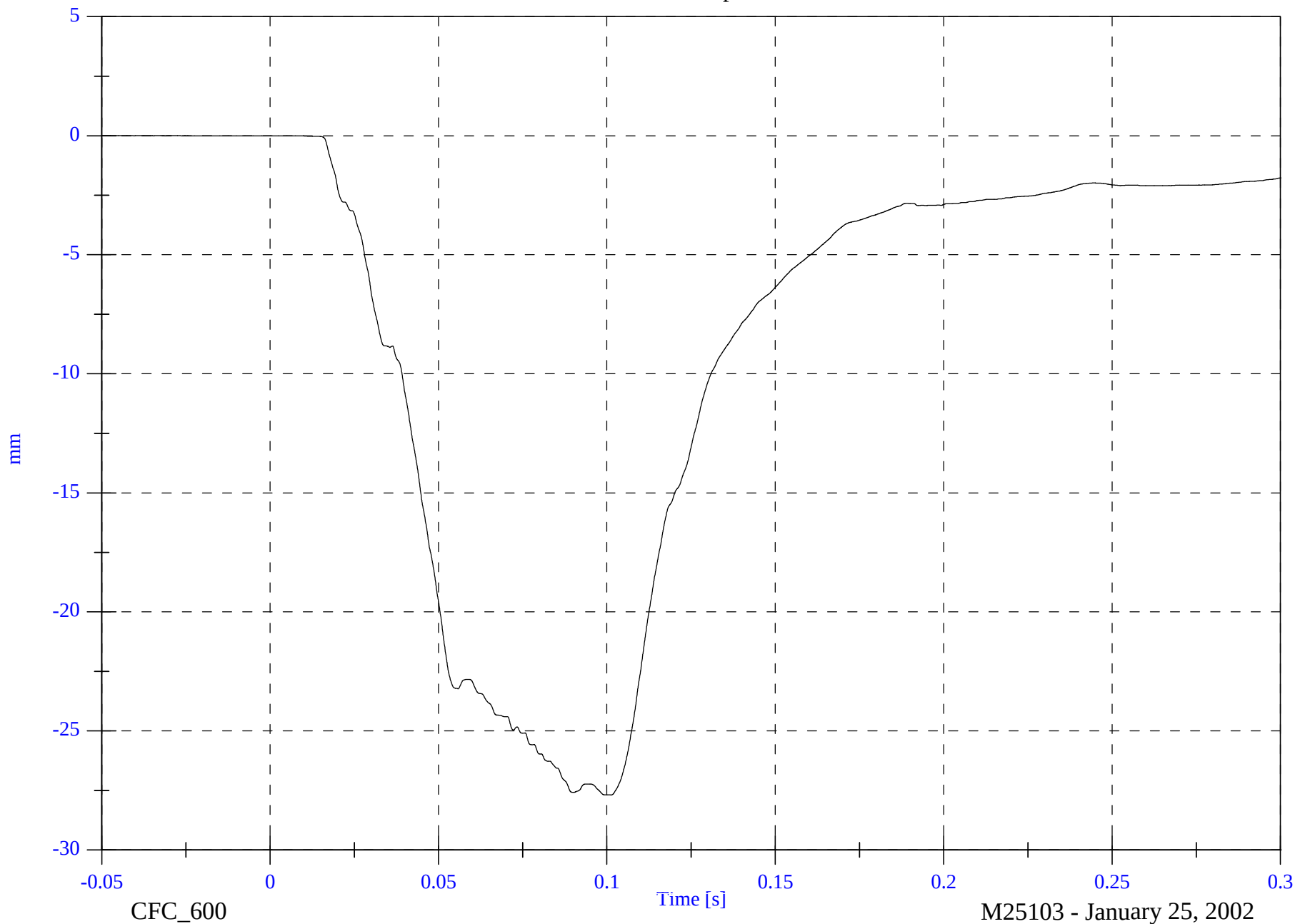
P2 Chest Compression

Max: 0.0 [mm] at -0.042 [s]

Min: -27.7 [mm] at 0.101 [s]

B-89

8642-NCAP-04



NCAP - 2002 Toyota Avalon

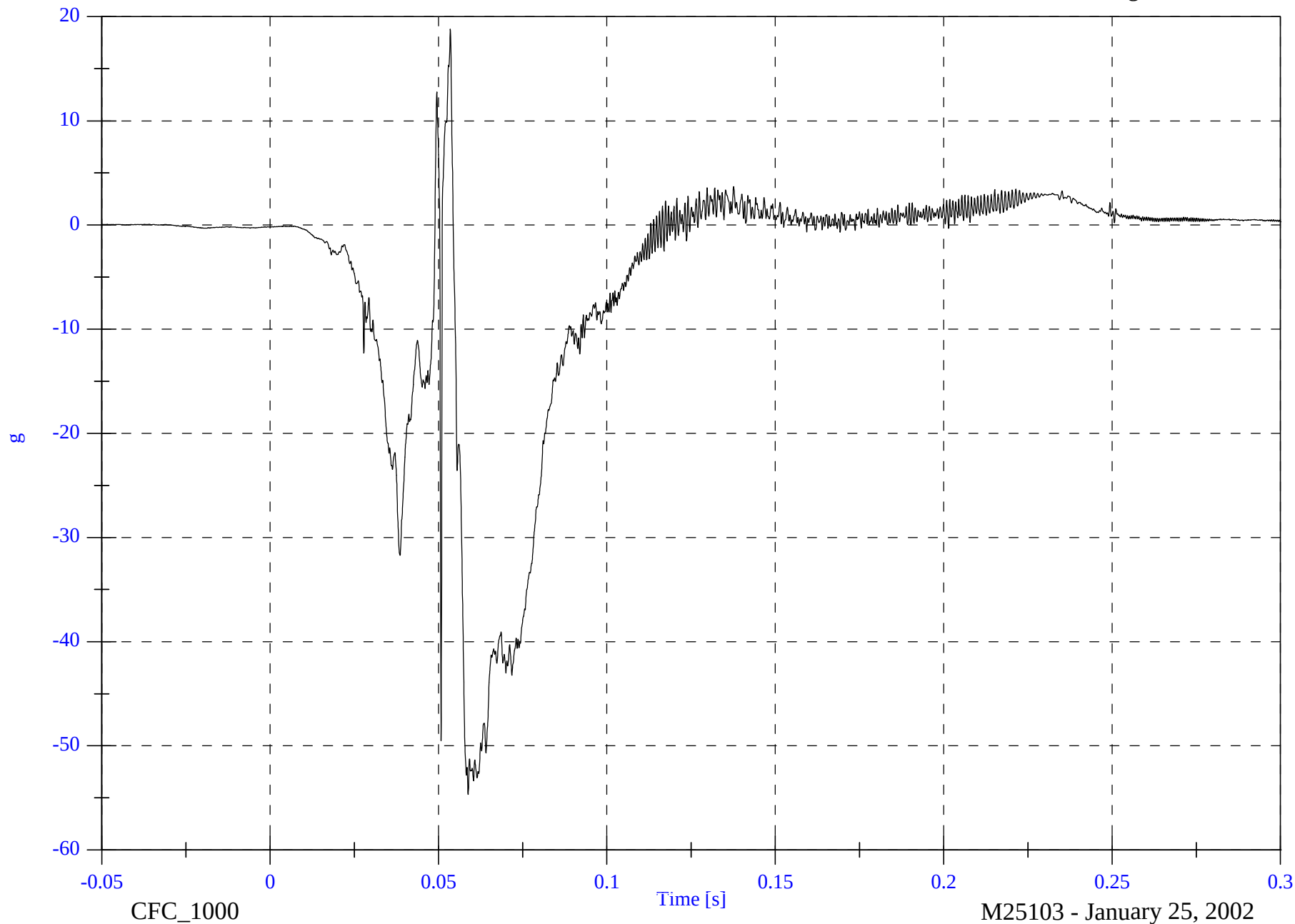
P2 Pelvic x

Max: 18.8 [g] at 0.054 [s]

Min: -54.7 [g] at 0.059 [s]

B-90

8642-NCAP-04



NCAP - 2002 Toyota Avalon

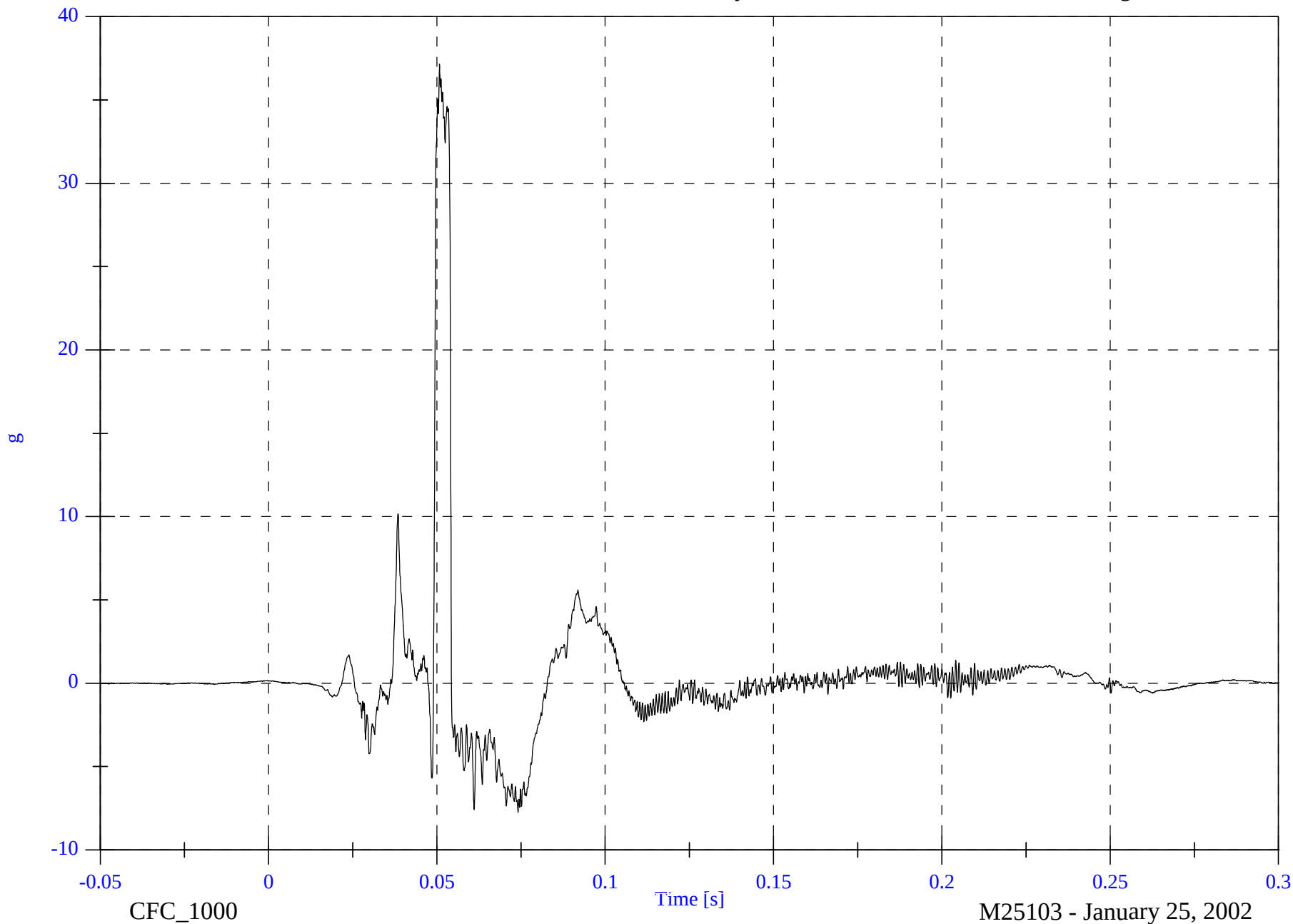
P2 Pelvic y

Max: 37.2 [g] at 0.051 [s]

Min: -7.7 [g] at 0.074 [s]

B-91

8642-NCAP-04



NCAP - 2002 Toyota Avalon

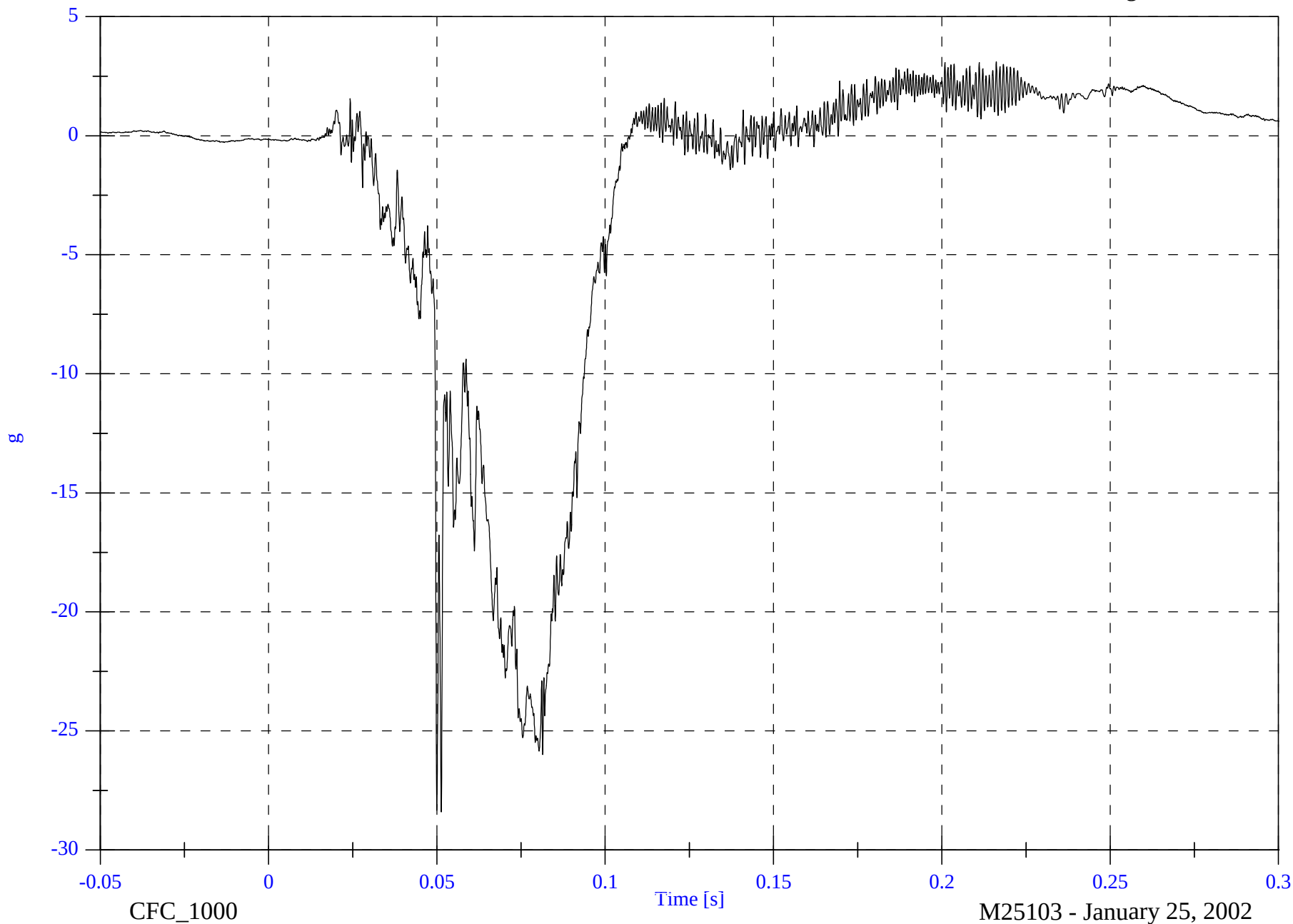
P2 Pelvic z

Max: 3.1 [g] at 0.216 [s]

Min: -28.4 [g] at 0.051 [s]

B-92

8642-NCAP-04



NCAP - 2002 Toyota Avalon

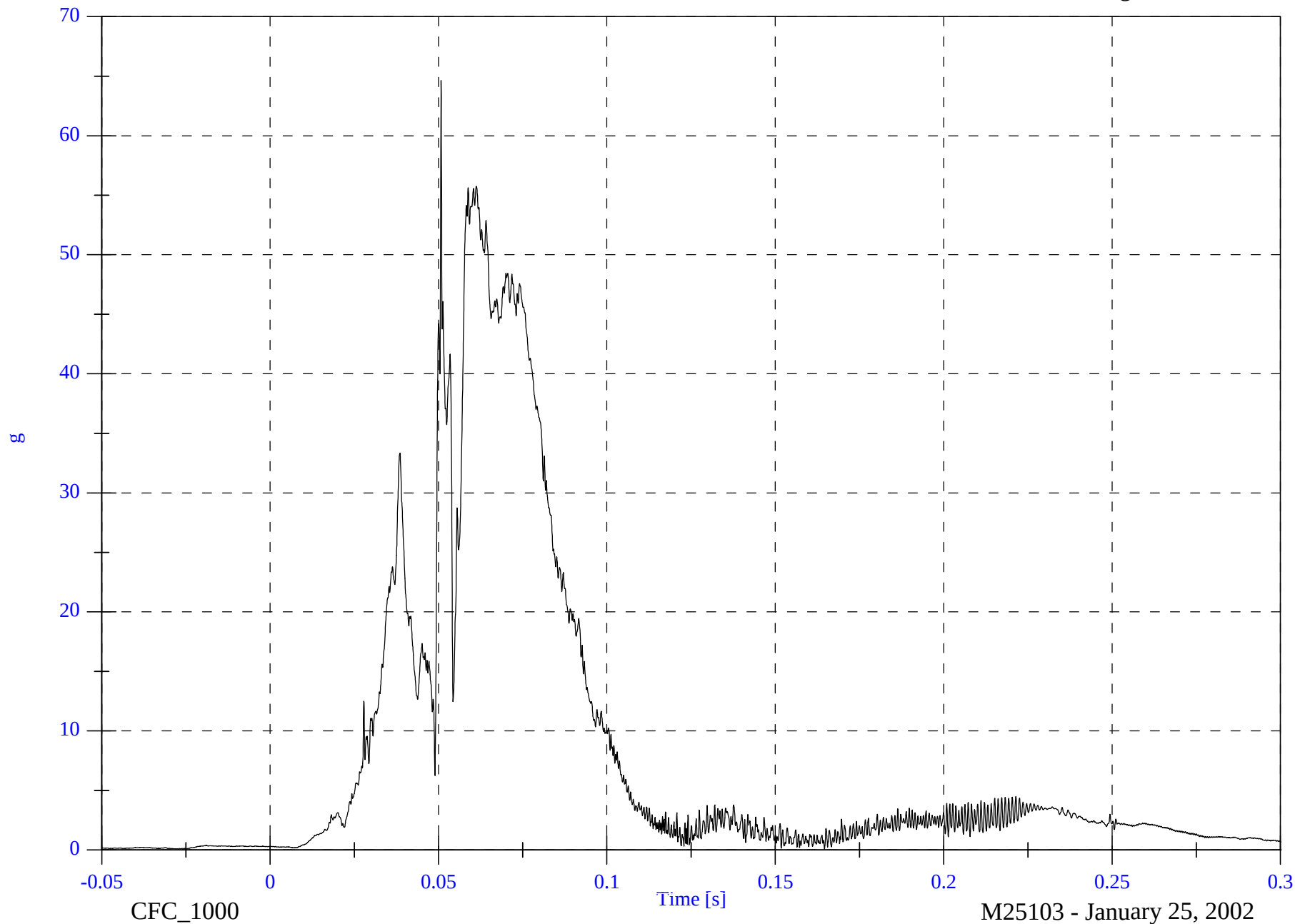
P2 Pelvic Resultant

Max: 64.6 [g] at 0.051 [s]

Min: 0.0 [g] at 0.165 [s]

B-93

8642-NCAP-04

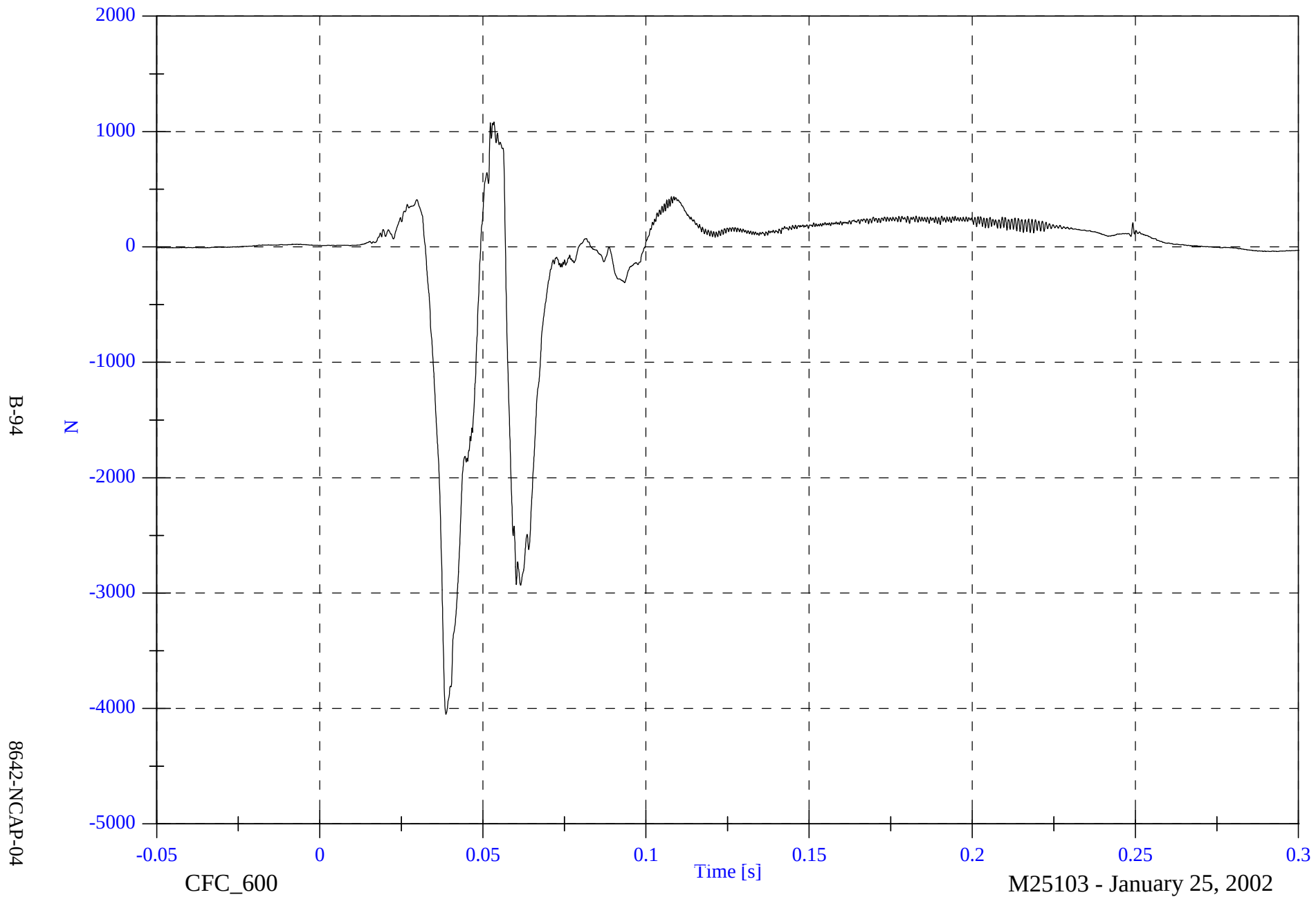


NCAP - 2002 Toyota Avalon

P2 Left Femur

Max: 1083.7 [N] at 0.053 [s]

Min: -4051.6 [N] at 0.039 [s]

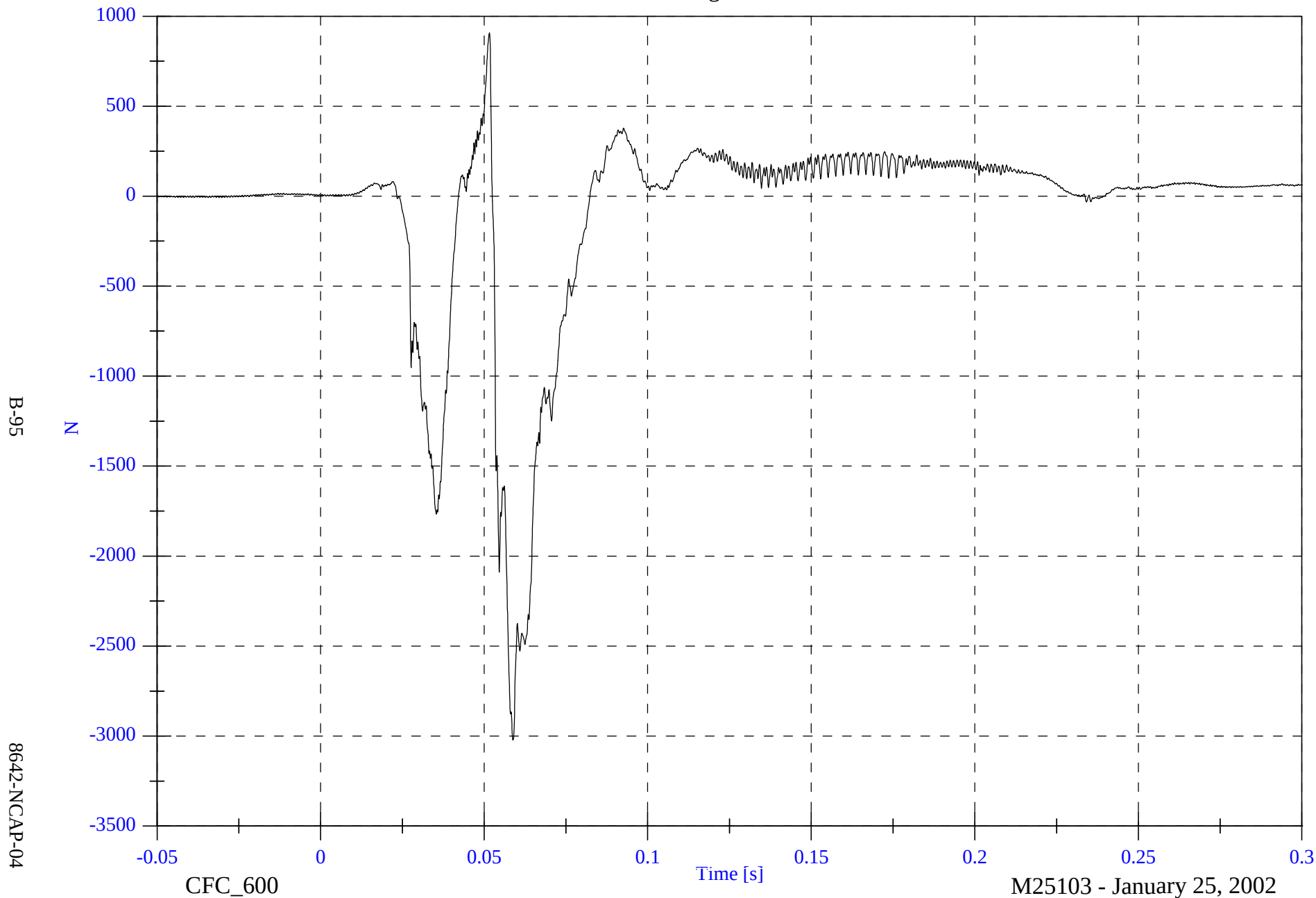


NCAP - 2002 Toyota Avalon

P2 Right Femur

Max: 907.5 [N] at 0.052 [s]

Min: -3022.7 [N] at 0.059 [s]



NCAP - 2002 Toyota Avalon

P2 Left Knee Shear

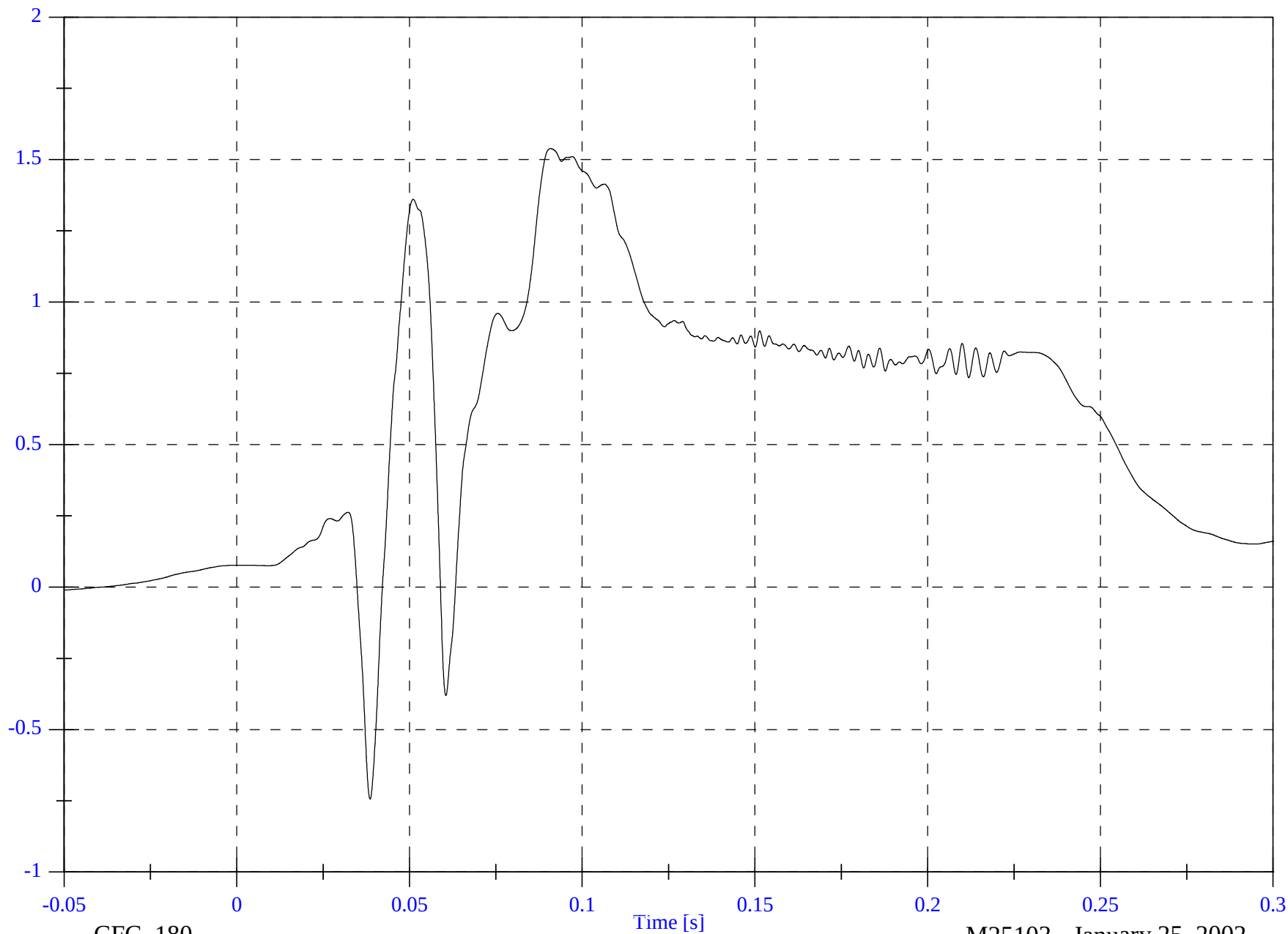
Max: 1.5 [mm] at 0.091 [s]

Min: -0.7 [mm] at 0.039 [s]

B-96

8642-NCAP-04

mm



CFC\_180

M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

P2 Right Knee Shear

Max: 0.4 [mm] at 0.108 [s]

Min: -0.3 [mm] at 0.037 [s]

B-97

8642-NCAP-04



CFC\_180

M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

P2 Left Upper Tibia Mx

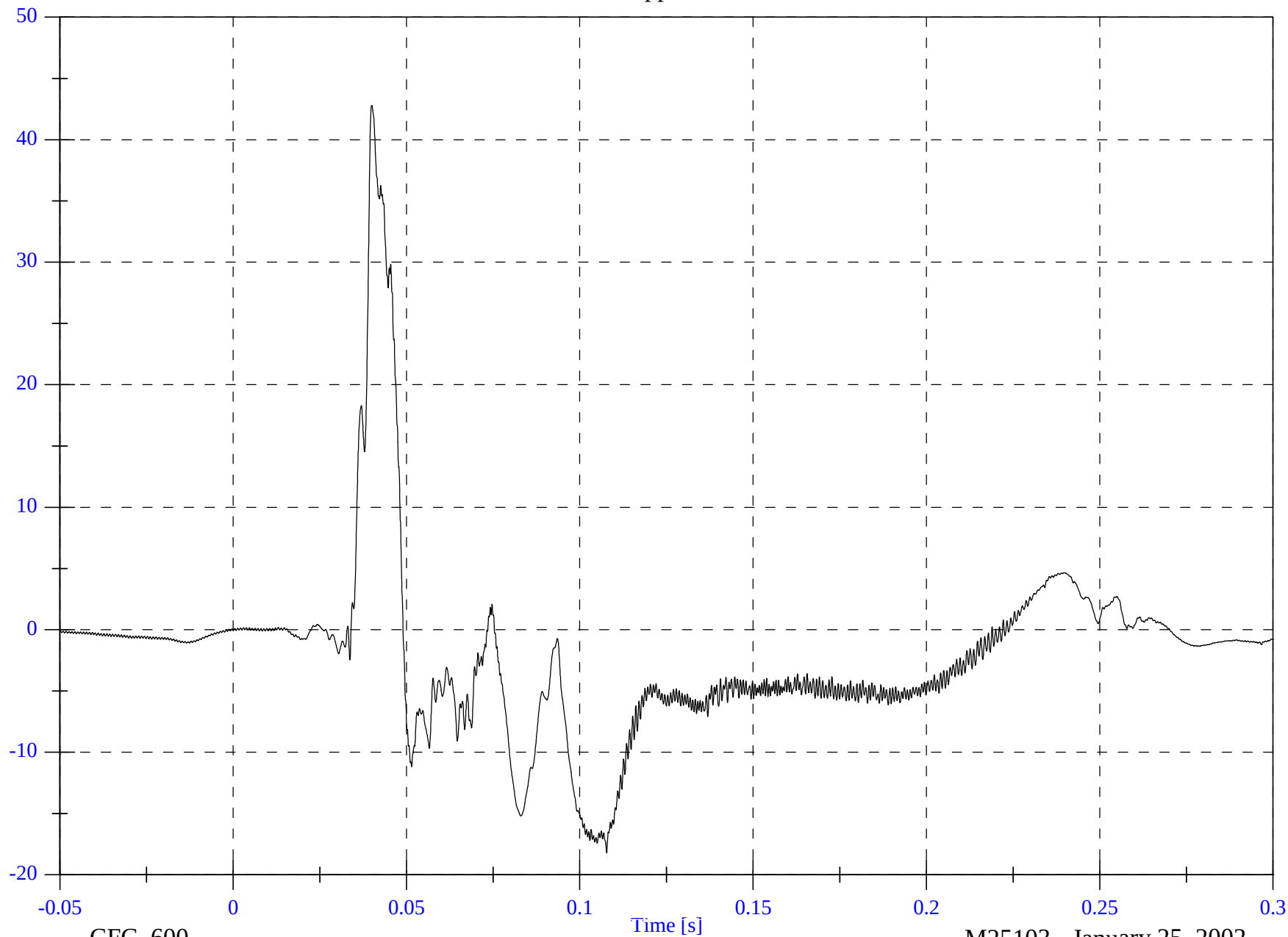
Max: 42.8 [N-m] at 0.040 [s]

Min: -18.2 [N-m] at 0.108 [s]

B-98

N-m

8642-NCAP-04



CFC\_600

M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

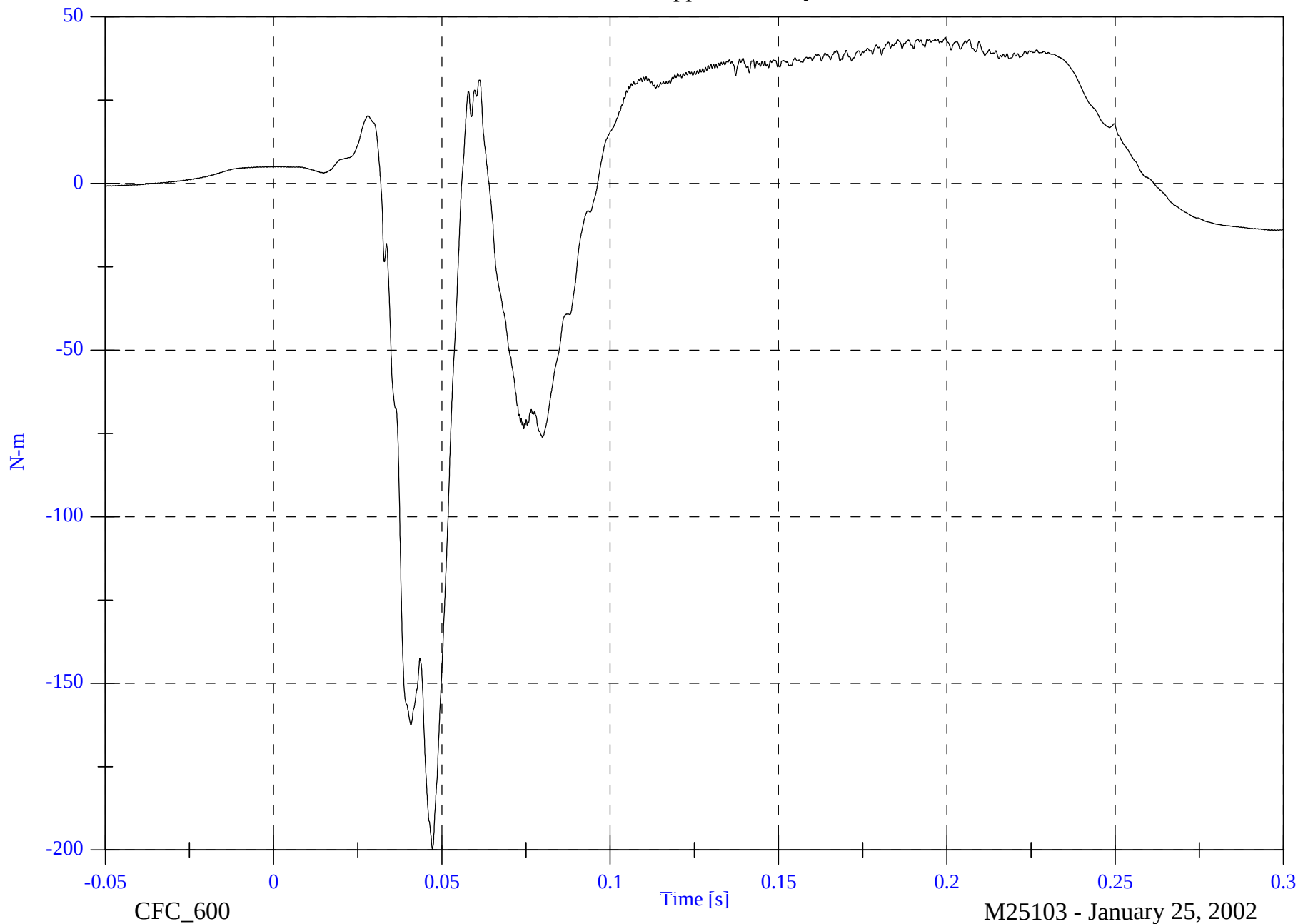
P2 Left Upper Tibia My

Max: 43.8 [N-m] at 0.199 [s]

Min: -199.8 [N-m] at 0.047 [s]

B-99

8642-NCAP-04

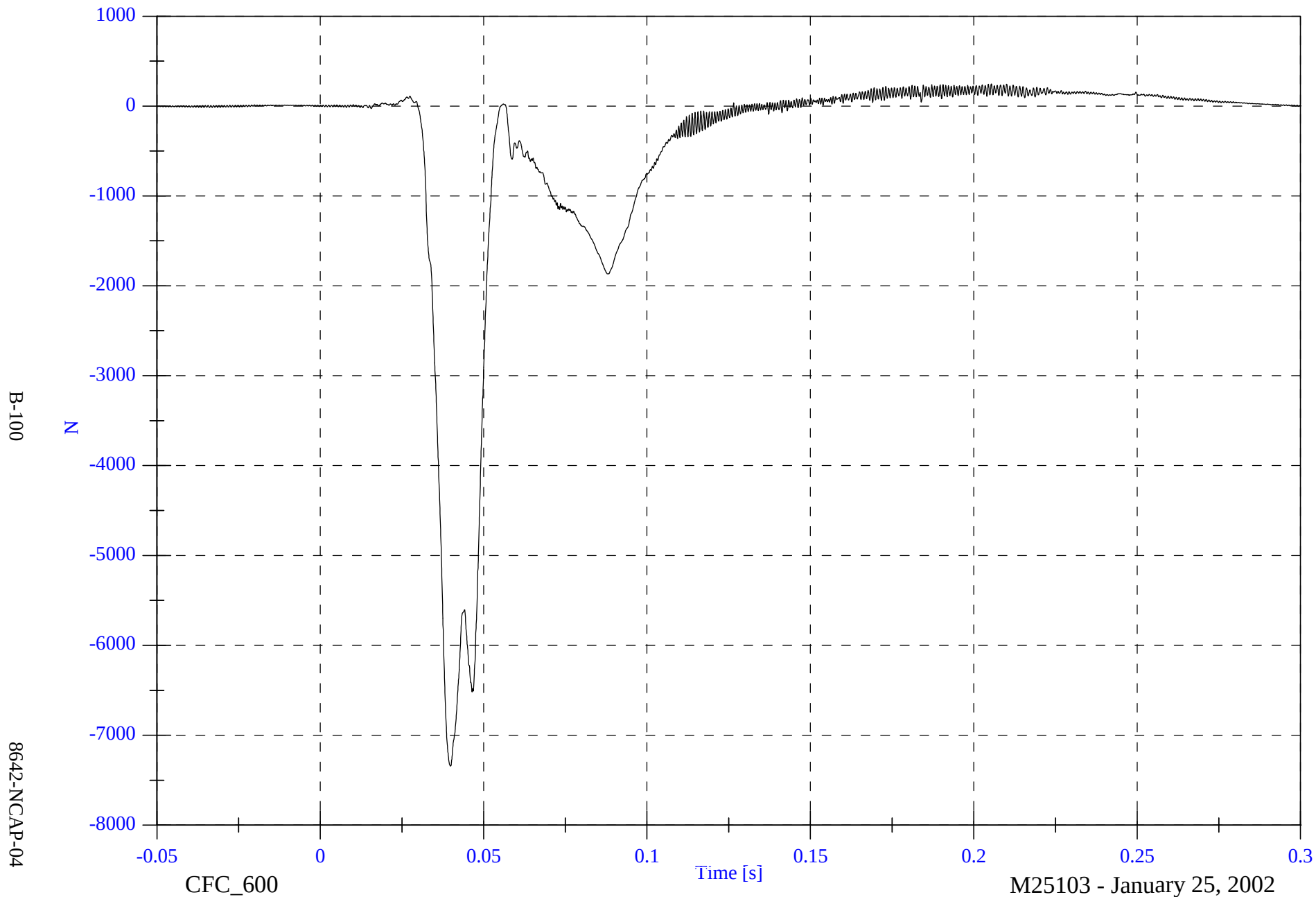


NCAP - 2002 Toyota Avalon

P2 Left Lower Tibia Fz

Max: 247.6 [N] at 0.205 [s]

Min: -7343.8 [N] at 0.040 [s]



NCAP - 2002 Toyota Avalon

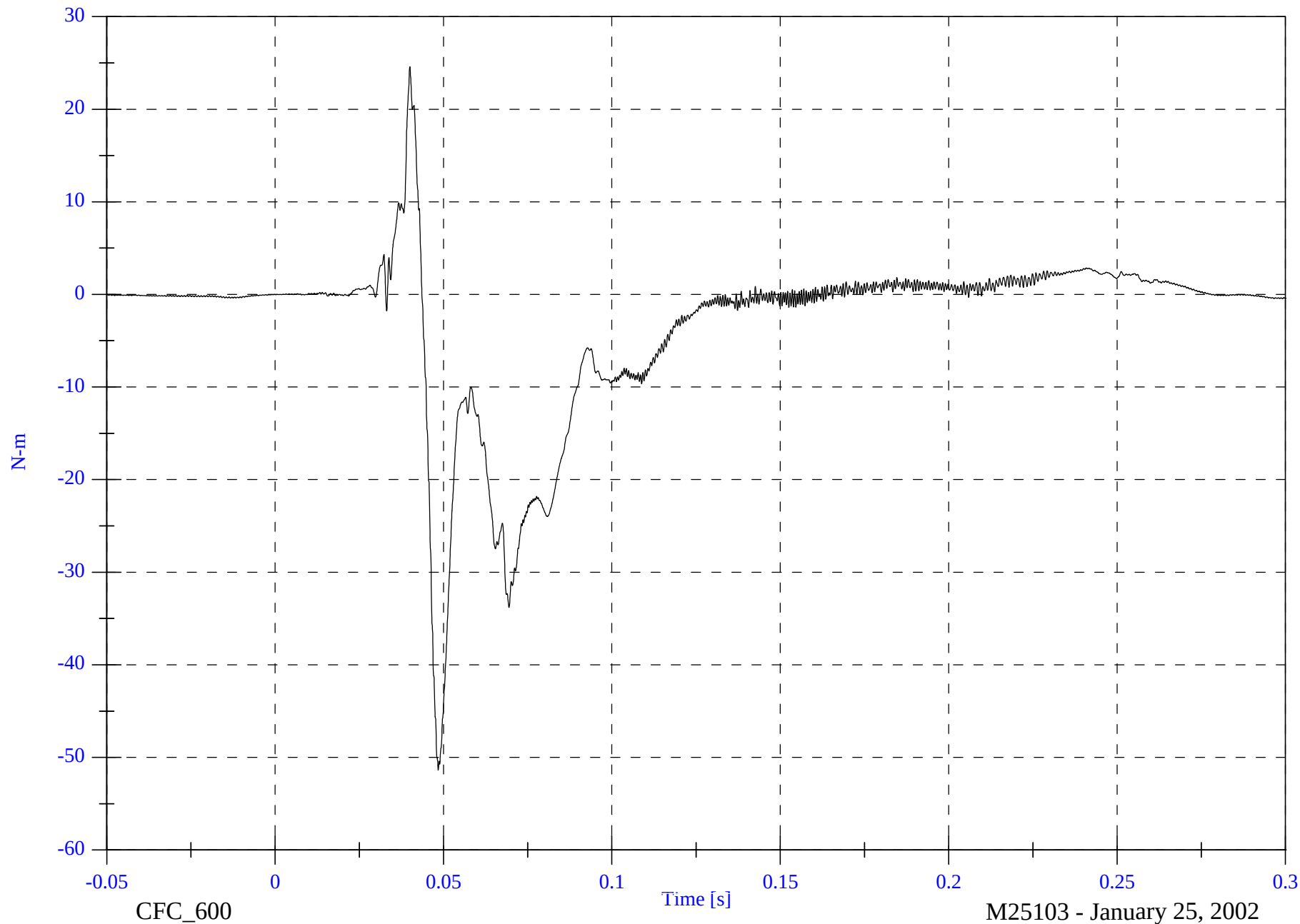
P2 Left Lower Tibia Mx

Max: 24.6 [N-m] at 0.040 [s]

Min: -51.4 [N-m] at 0.048 [s]

B-101

8642-NCAP-04



NCAP - 2002 Toyota Avalon

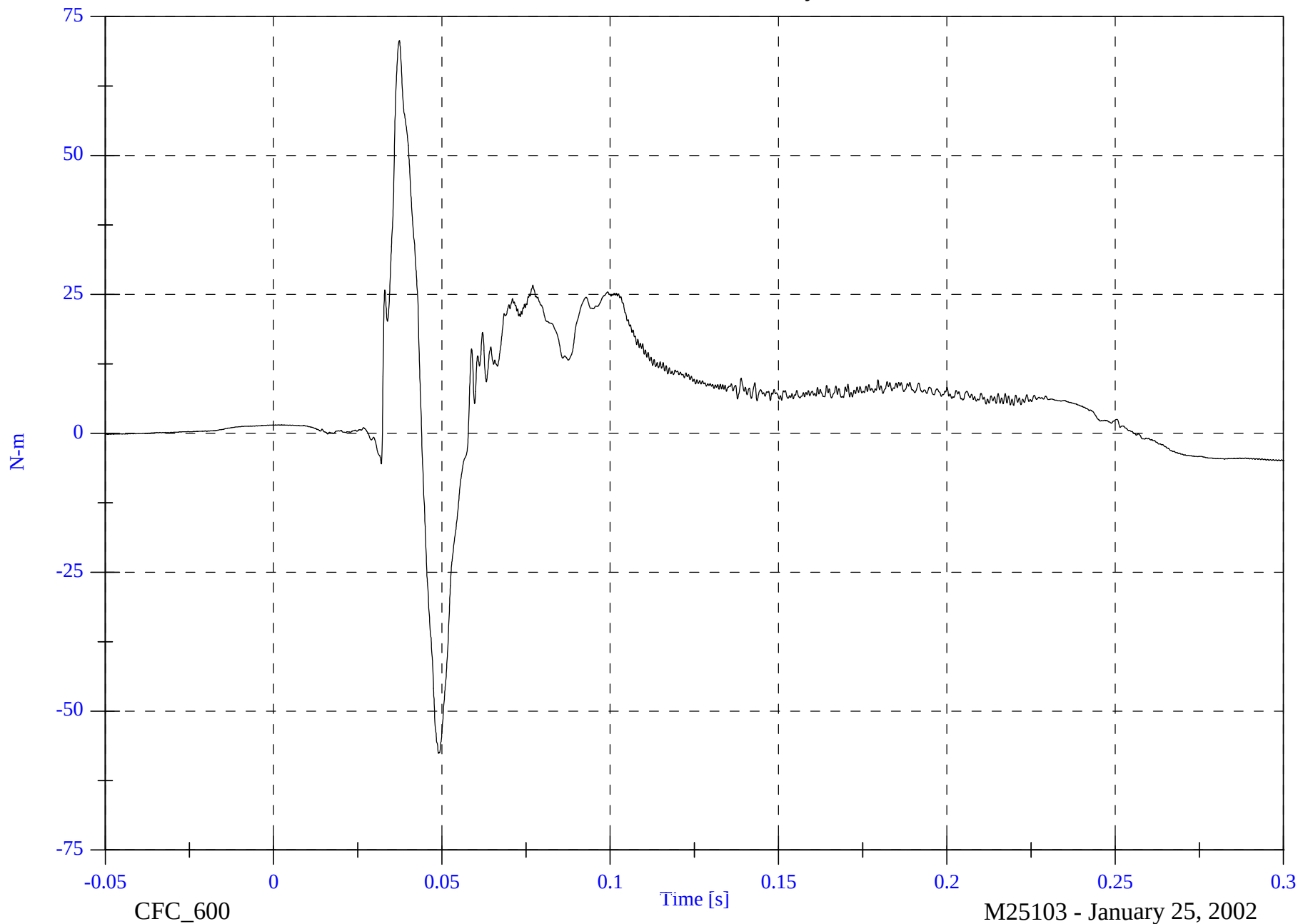
P2 Left Lower Tibia My

Max: 70.7 [N-m] at 0.037 [s]

Min: -57.6 [N-m] at 0.049 [s]

B-102

8642-NCAP-04



NCAP - 2002 Toyota Avalon

P2 Right Upper Tibia Mx

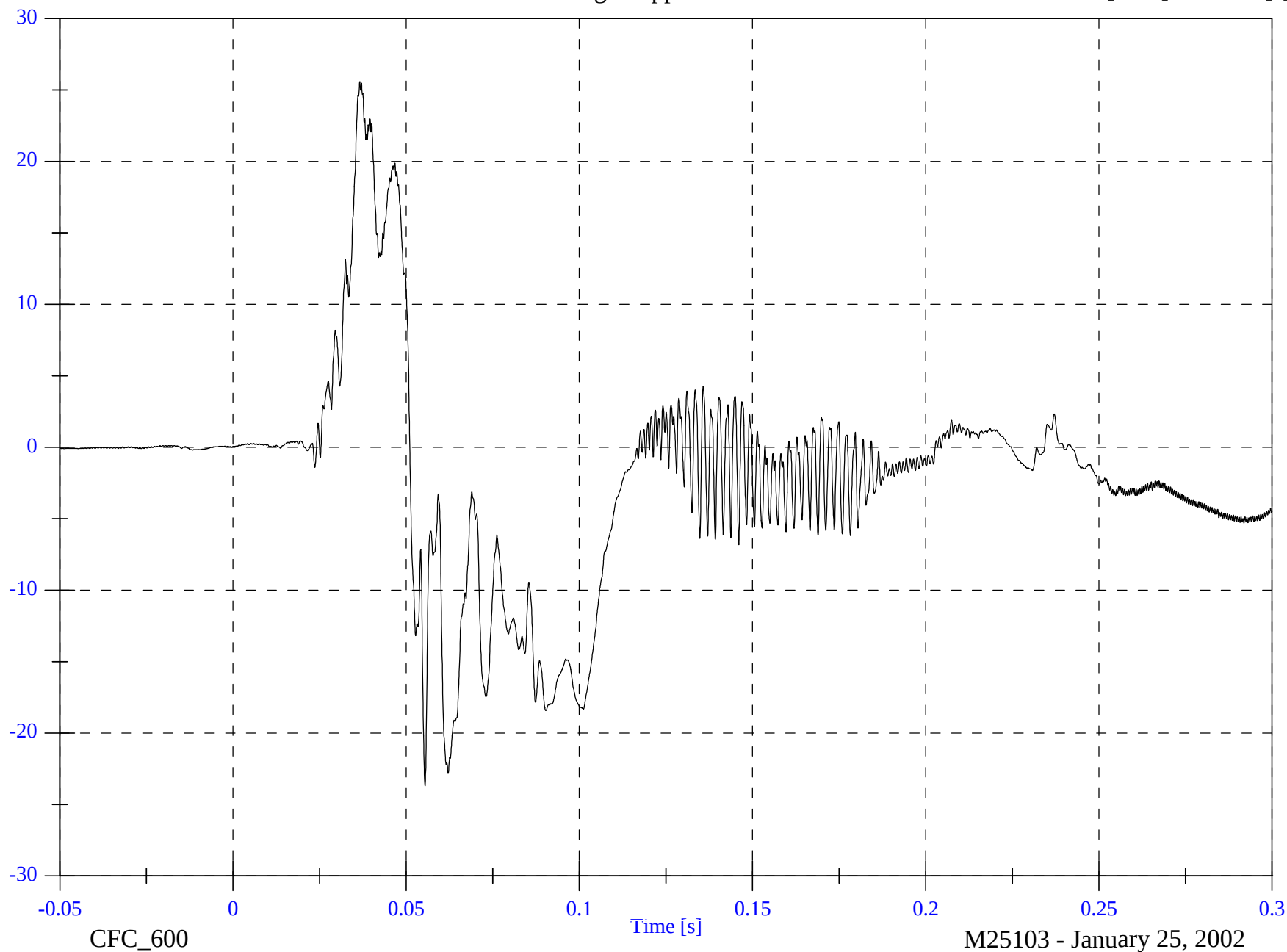
Max: 25.6 [N-m] at 0.037 [s]

Min: -23.7 [N-m] at 0.055 [s]

B-103

N-m

8642-NCAP-04



NCAP - 2002 Toyota Avalon

P2 Right Upper Tibia My

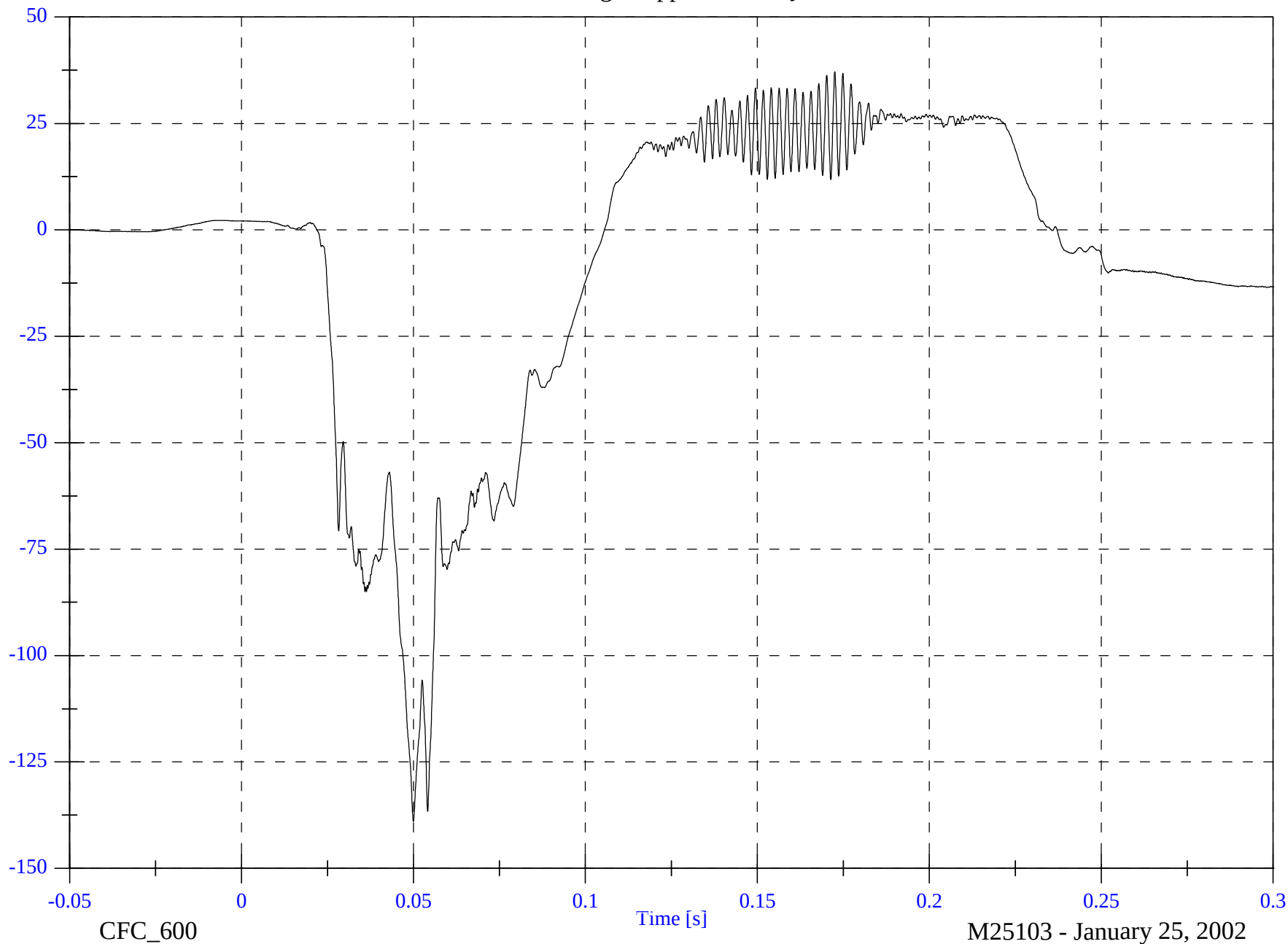
Max: 37.1 [N-m] at 0.172 [s]

Min: -139.0 [N-m] at 0.050 [s]

B-104

N-m

8642-NCAP-04

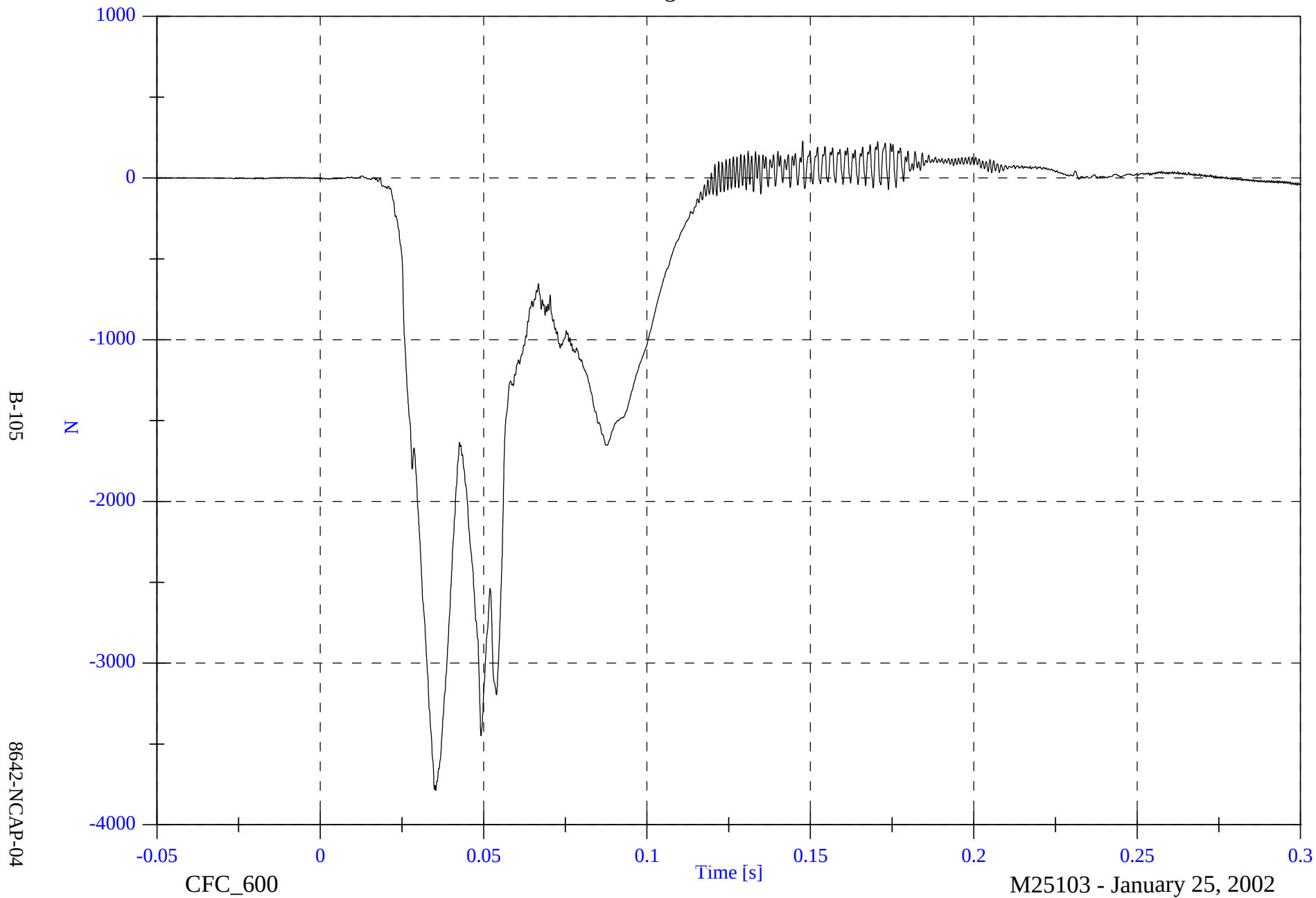


NCAP - 2002 Toyota Avalon

P2 Right Lower Tibia Fz

Max: 227.5 [N] at 0.148 [s]

Min: -3786.9 [N] at 0.035 [s]



NCAP - 2002 Toyota Avalon

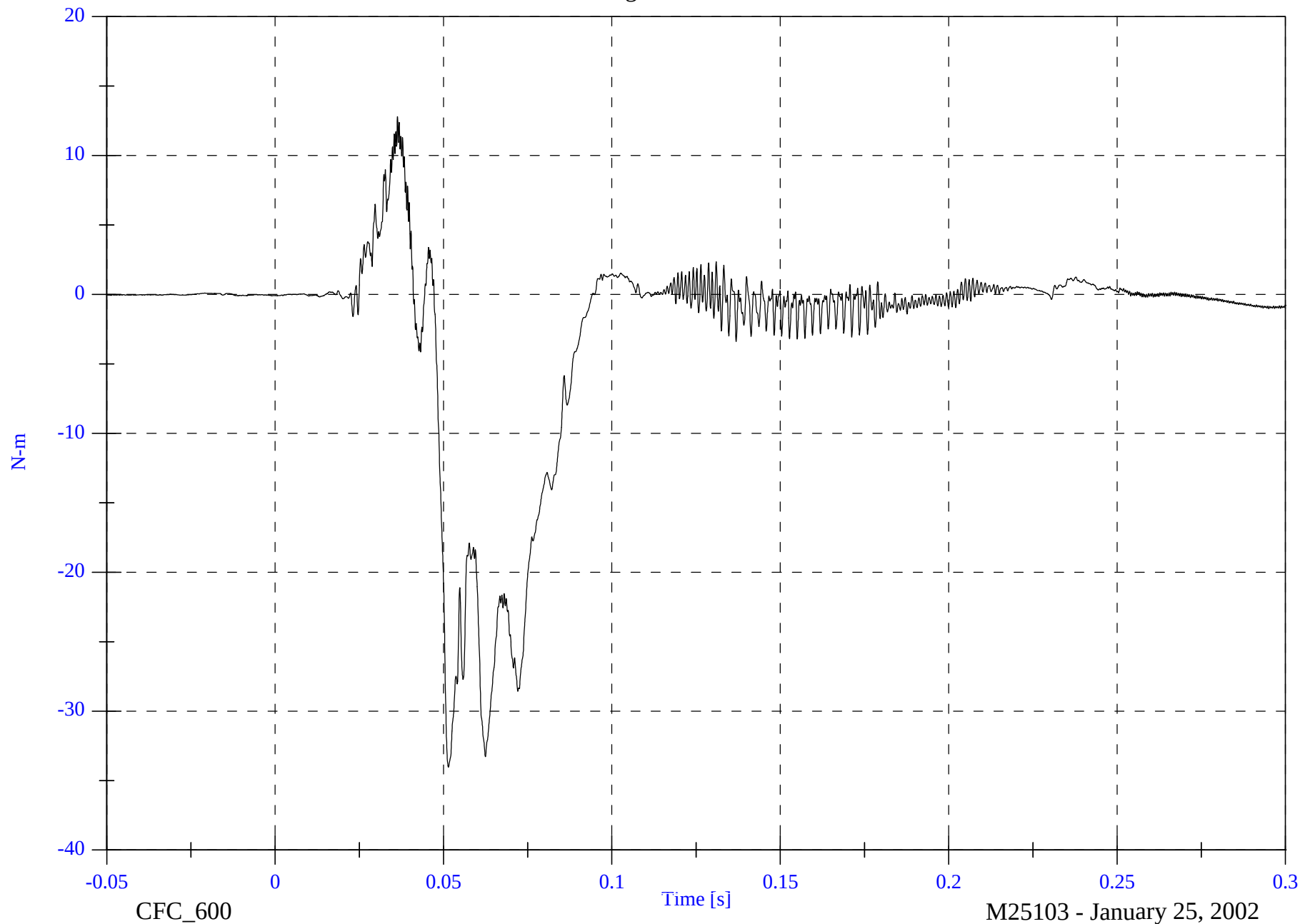
P2 Right Lower Tibia Mx

Max: 12.8 [N-m] at 0.036 [s]

Min: -34.0 [N-m] at 0.051 [s]

B-106

8642-NCAP-04



NCAP - 2002 Toyota Avalon

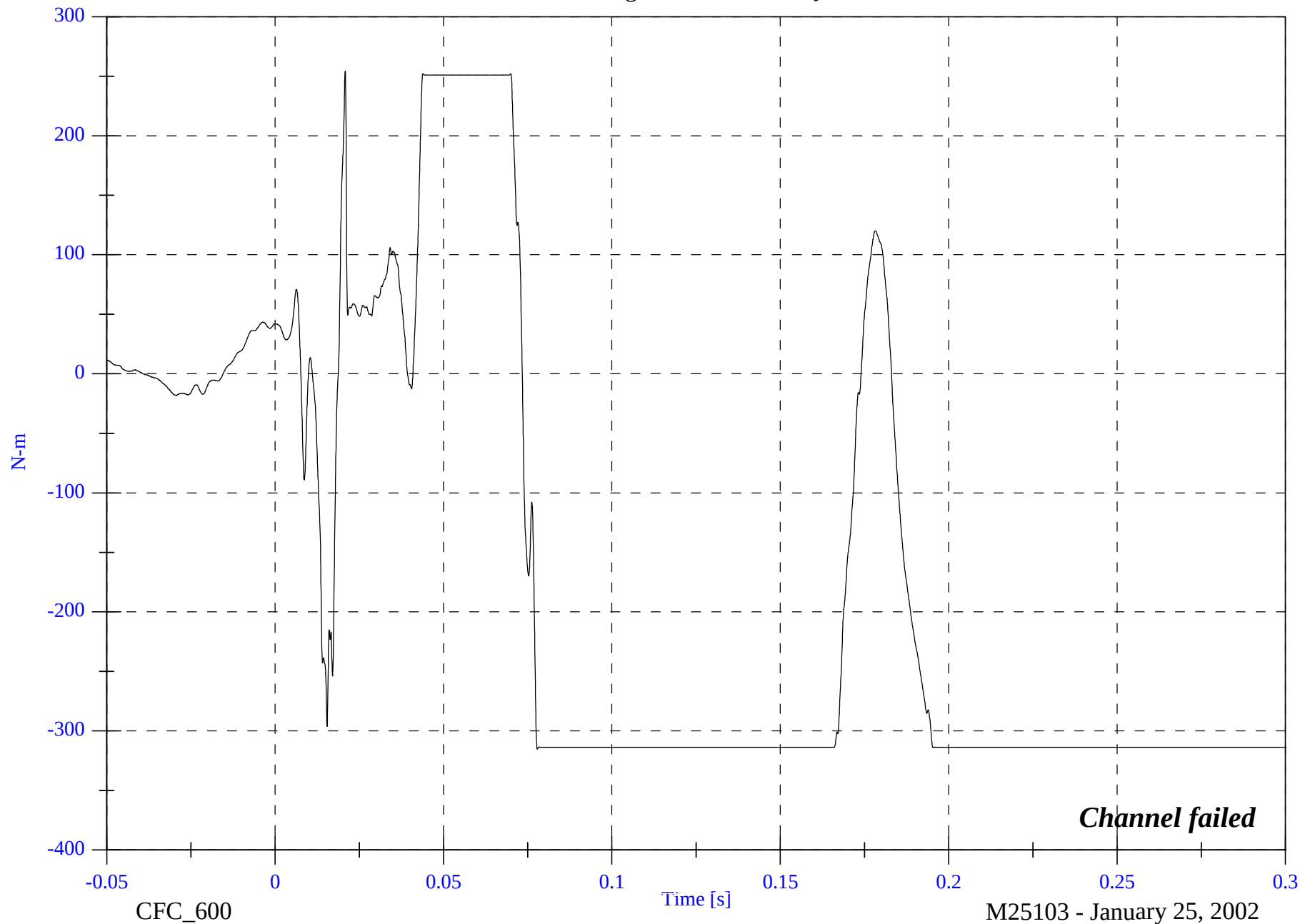
P2 Right Lower Tibia My

Max: 254.4 [N-m] at 0.021 [s]

Min: -315.4 [N-m] at 0.078 [s]

B-107

8642-NCAP-04



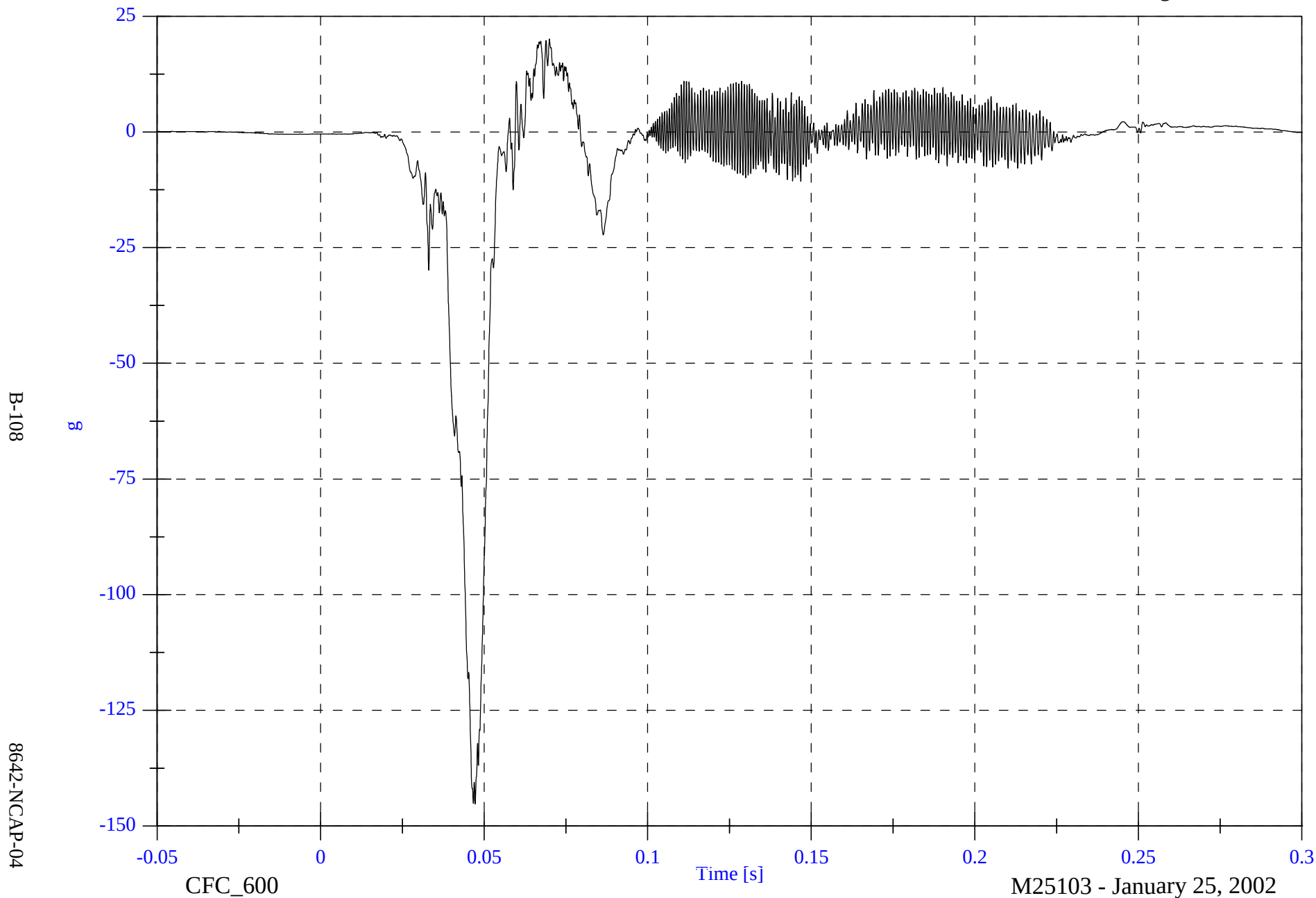
*Channel failed*

NCAP - 2002 Toyota Avalon

P2 Left Foot Aft x

Max: 20.1 [g] at 0.070 [s]

Min: -145.2 [g] at 0.047 [s]



NCAP - 2002 Toyota Avalon

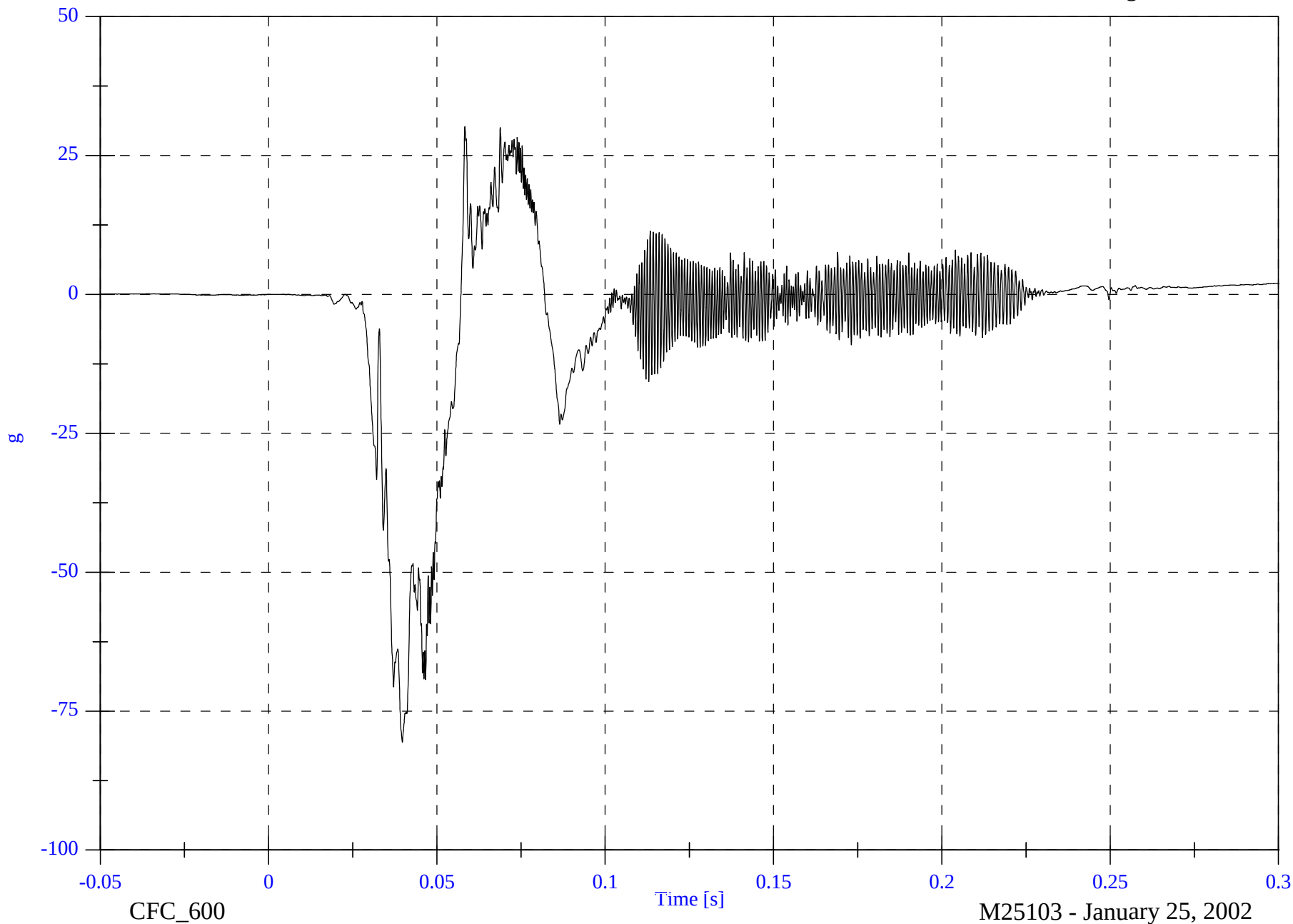
P2 Left Foot Aft z

Max: 30.3 [g] at 0.058 [s]

Min: -80.6 [g] at 0.040 [s]

B-109

8642-NCAP-04



NCAP - 2002 Toyota Avalon

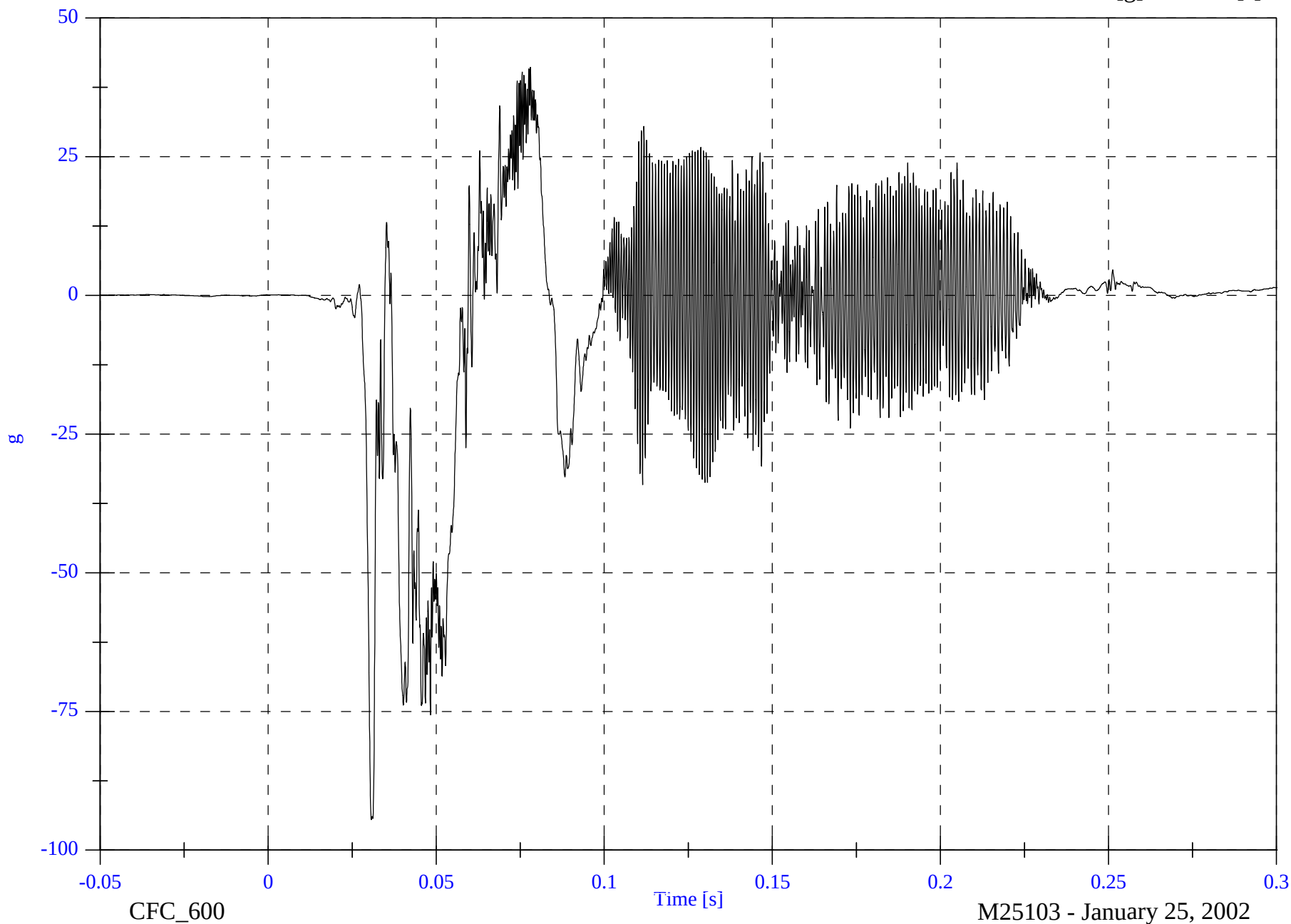
P2 Left Foot Fore z

Max: 41.1 [g] at 0.078 [s]

Min: -94.5 [g] at 0.031 [s]

B-110

8642-NCAP-04



NCAP - 2002 Toyota Avalon

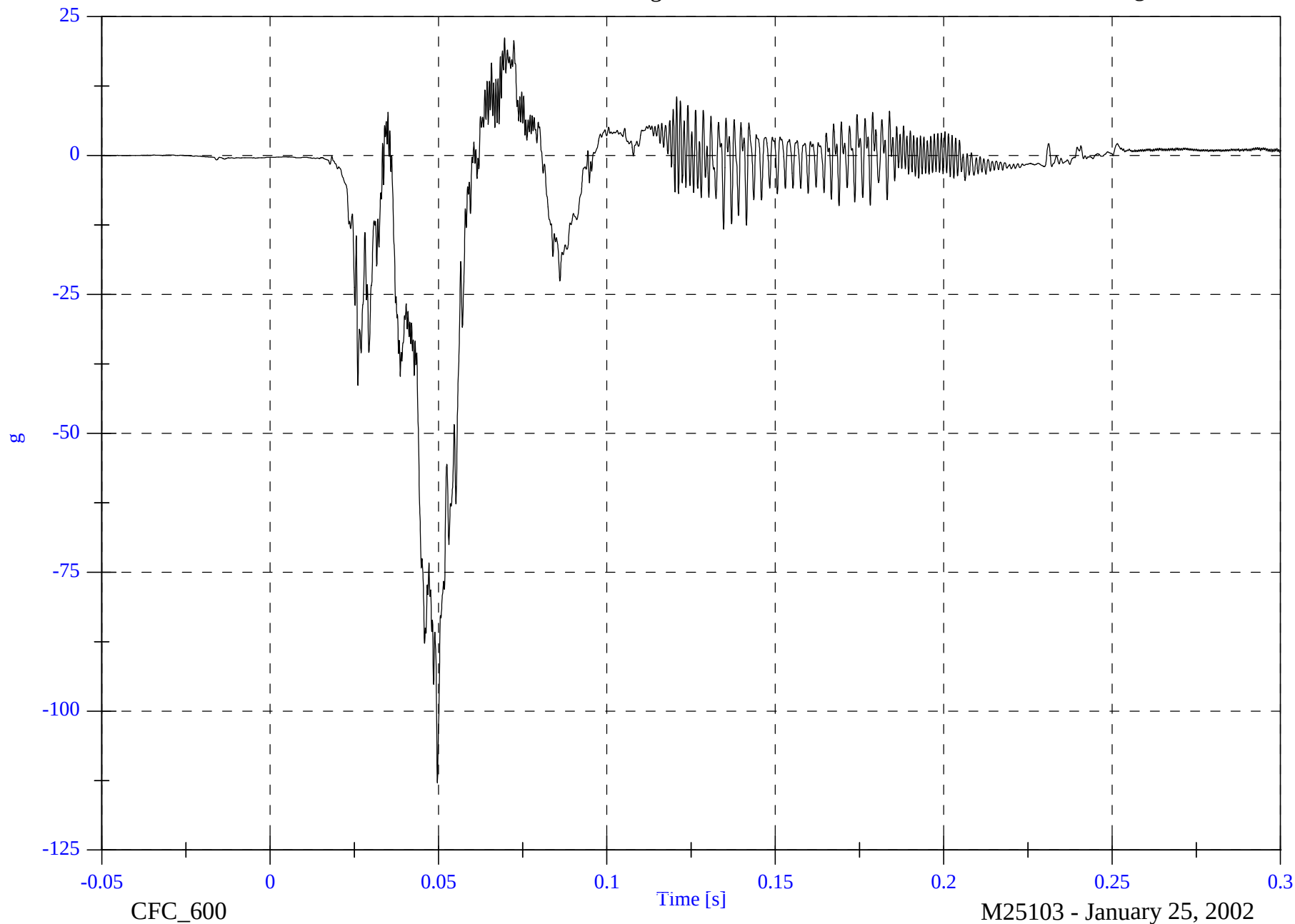
P2 Right Foot Aft x

Max: 21.2 [g] at 0.070 [s]

Min: -112.9 [g] at 0.050 [s]

B-111

8642-NCAP-04



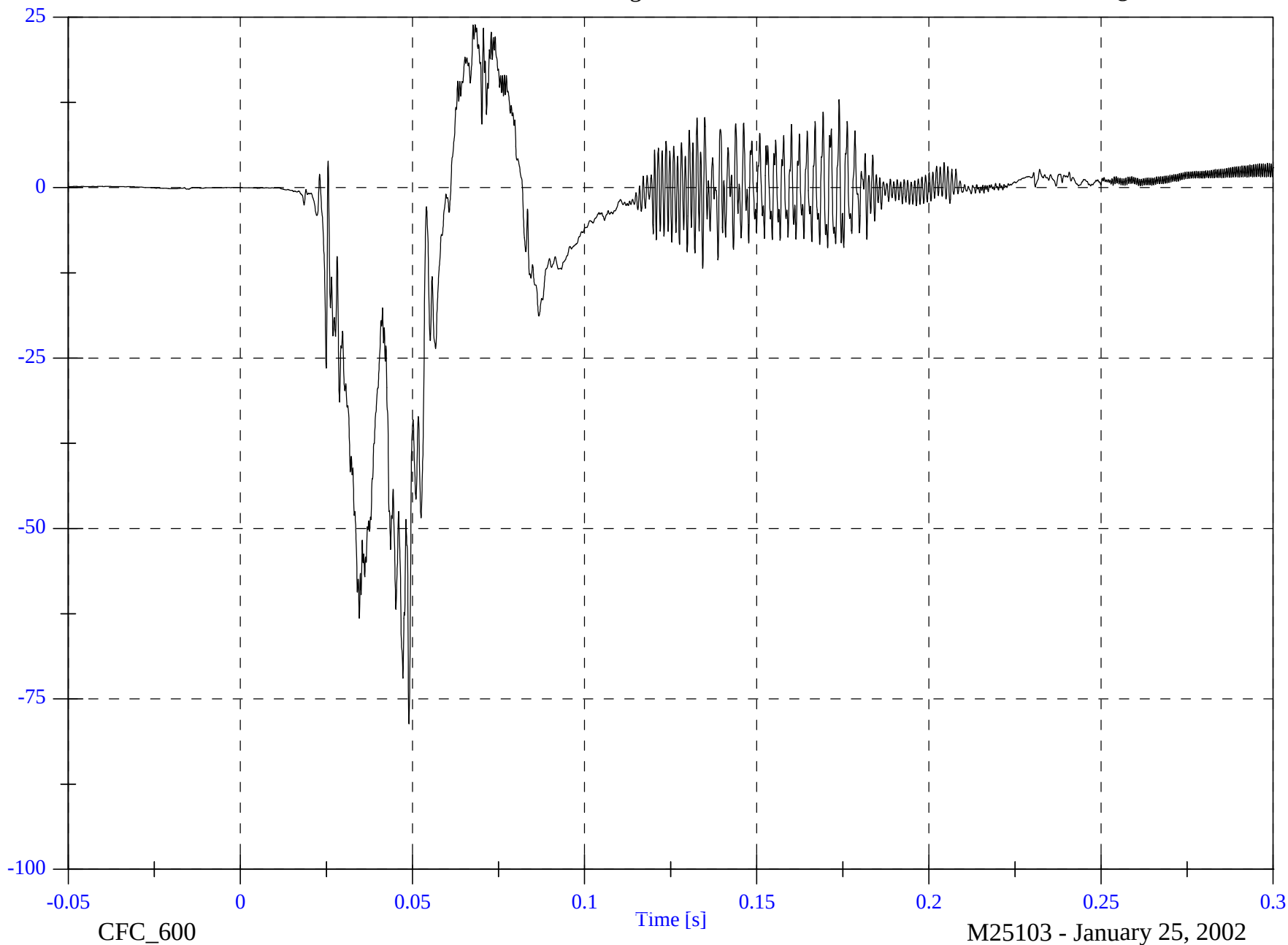
M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

P2 Right Foot Aft z

Max: 23.9 [g] at 0.068 [s]

Min: -78.7 [g] at 0.049 [s]



B-112

8642-NCAP-04

CFC\_600

Time [s]

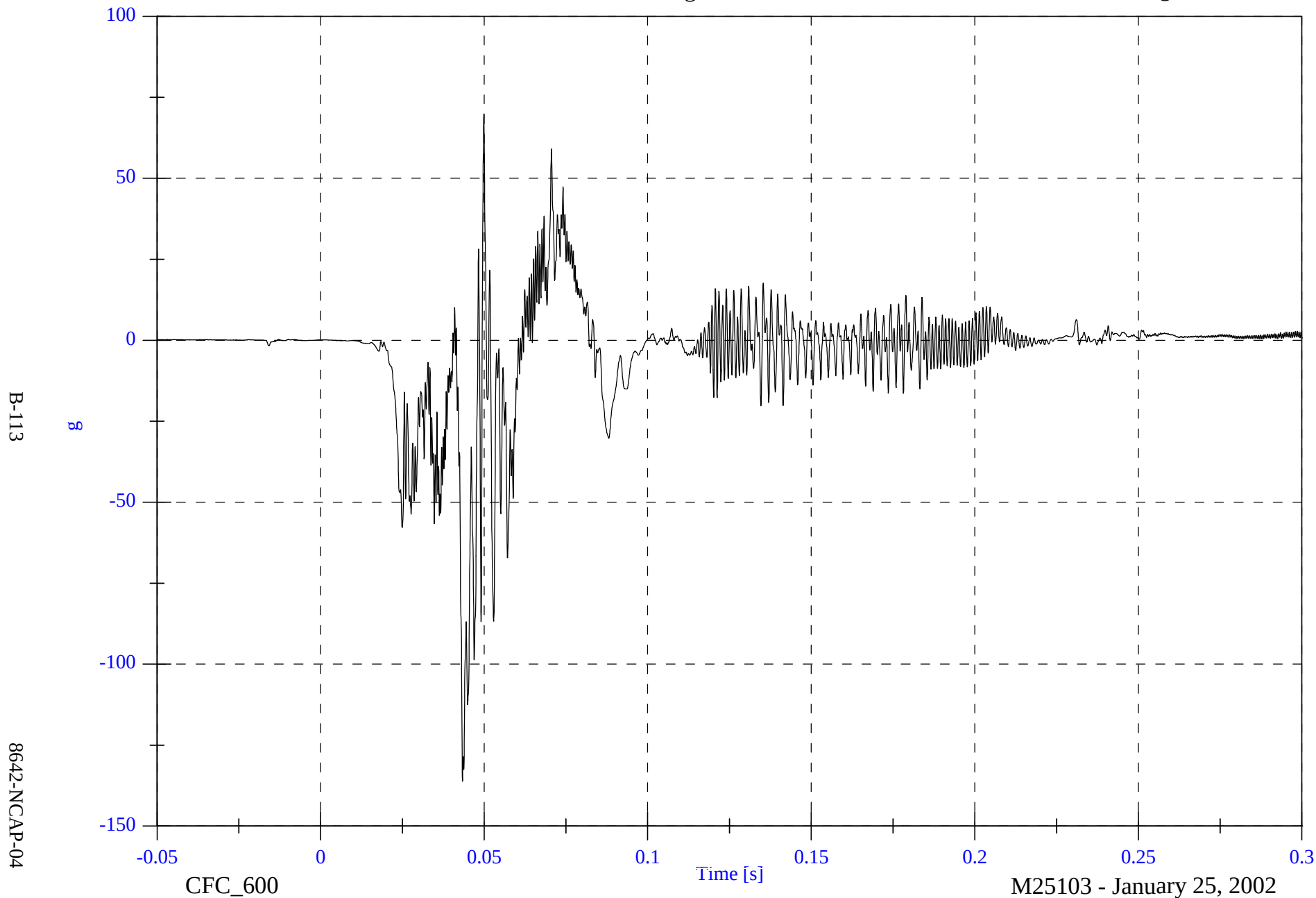
M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

P2 Right Foot Fore z

Max: 69.9 [g] at 0.050 [s]

Min: -136.2 [g] at 0.043 [s]



NCAP - 2002 Toyota Avalon

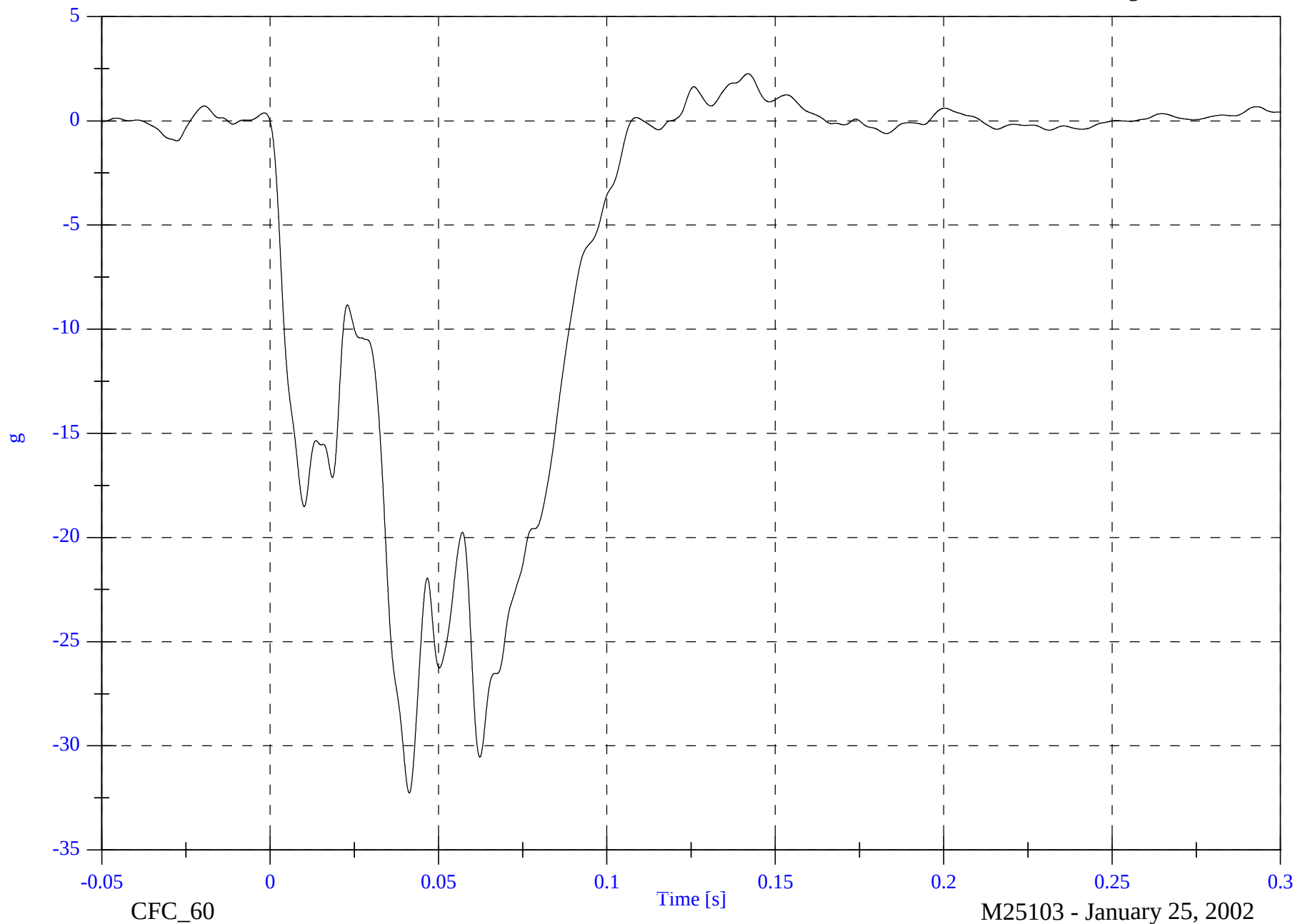
Left Rear #1x

Max: 2.3 [g] at 0.142 [s]

Min: -32.3 [g] at 0.041 [s]

B-114

8642-NCAP-04



NCAP - 2002 Toyota Avalon

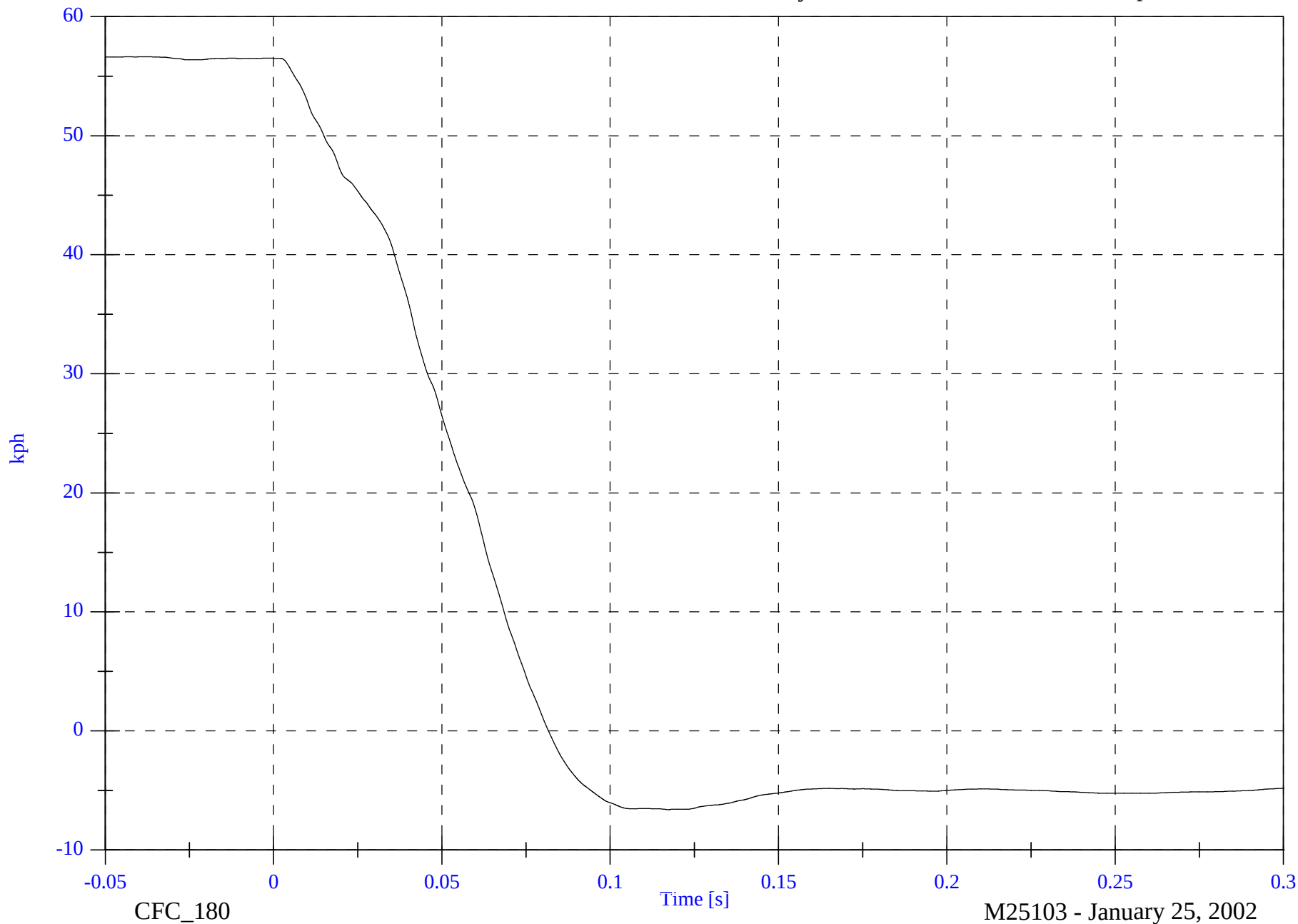
Left Rear #1x Velocity

Max: 56.6 [kph] at -0.037 [s]

Min: -6.6 [kph] at 0.117 [s]

B-115

8642-NCAP-04



NCAP - 2002 Toyota Avalon

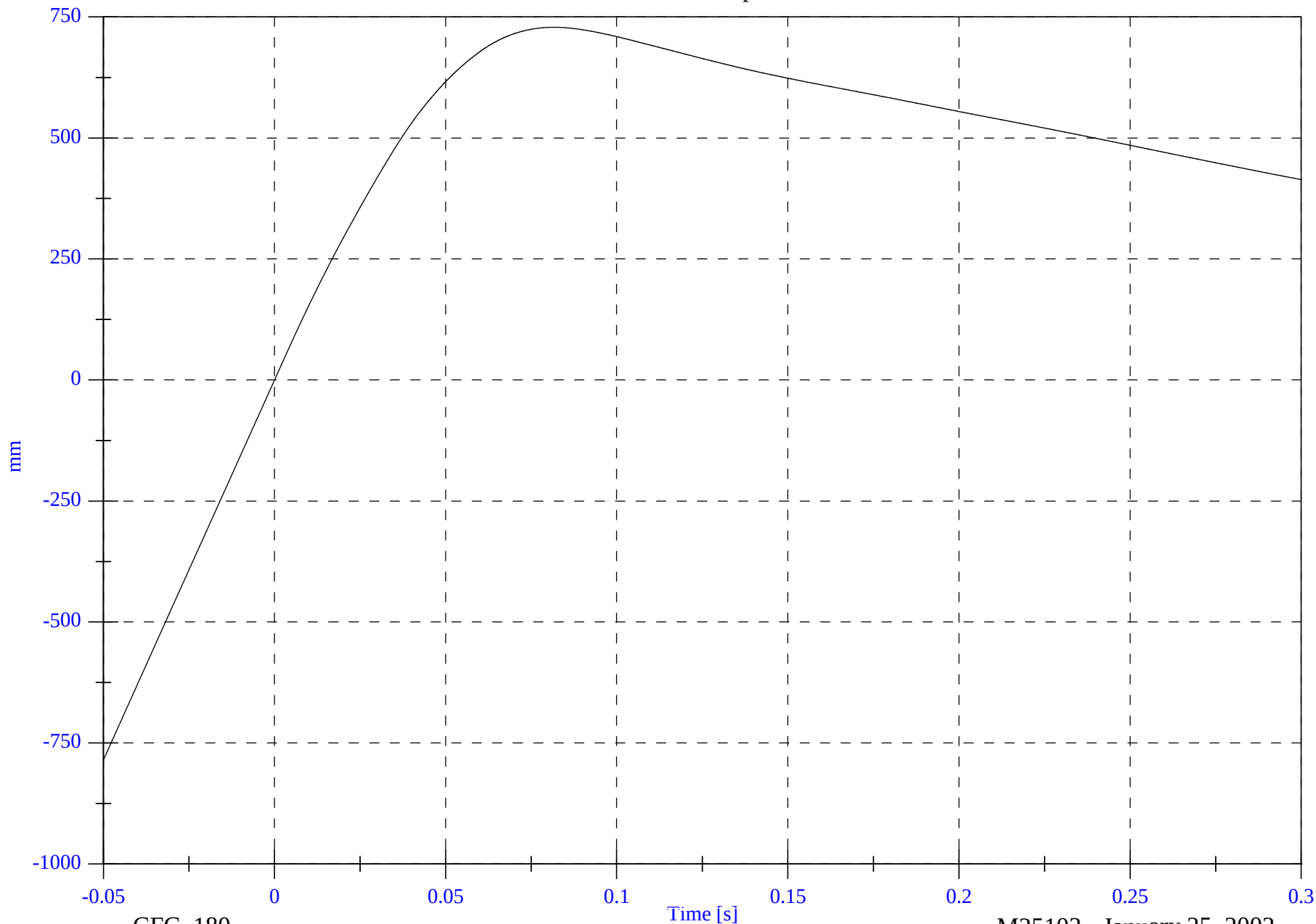
Left Rear #1x Displacement

Max: 728.7 [mm] at 0.082 [s]

Min: -785.1 [mm] at -0.050 [s]

B-116

8642-NCAP-04



CFC\_180

M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

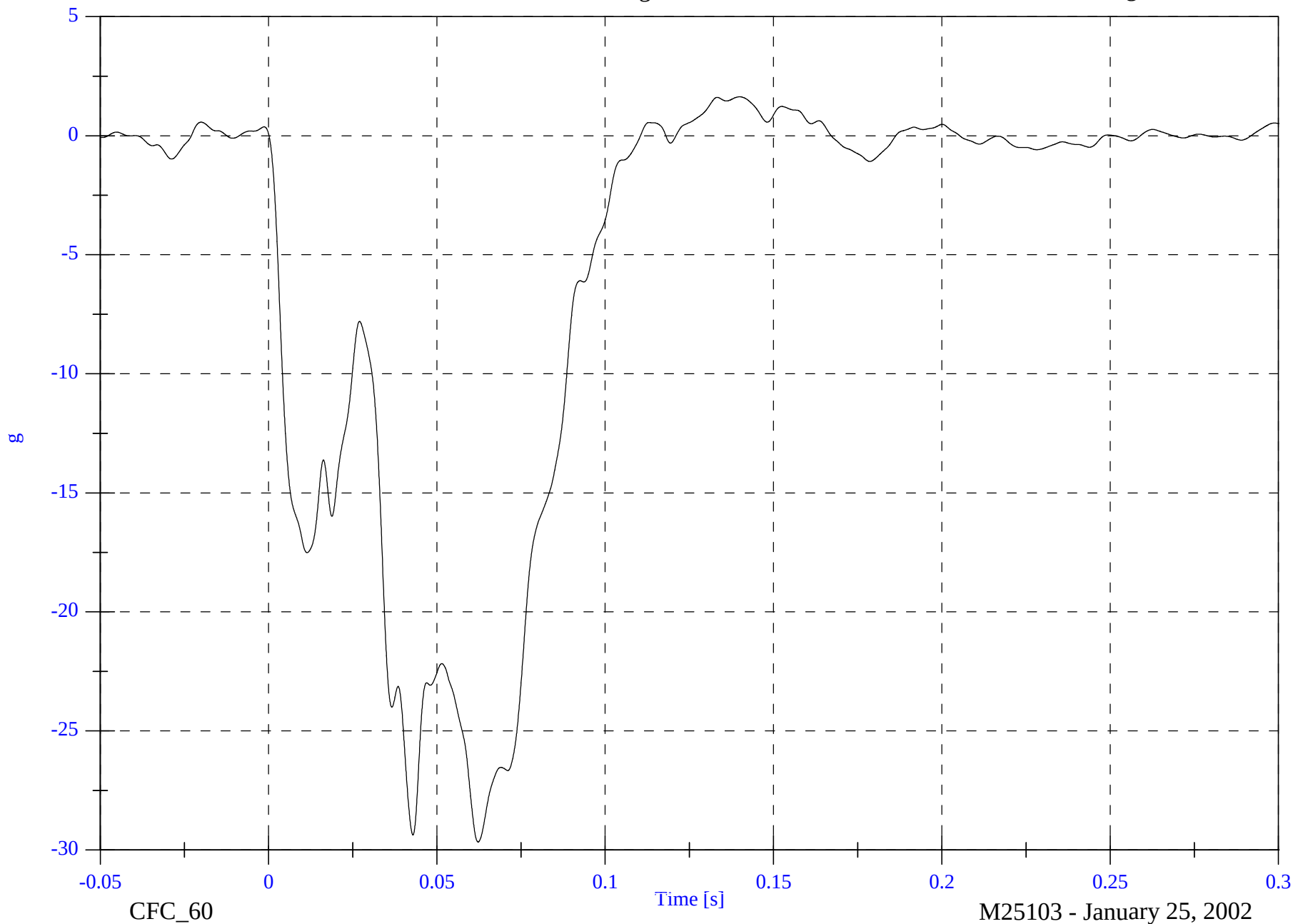
Right Rear #2x

Max: 1.6 [g] at 0.140 [s]

Min: -29.7 [g] at 0.062 [s]

B-117

8642-NCAP-04

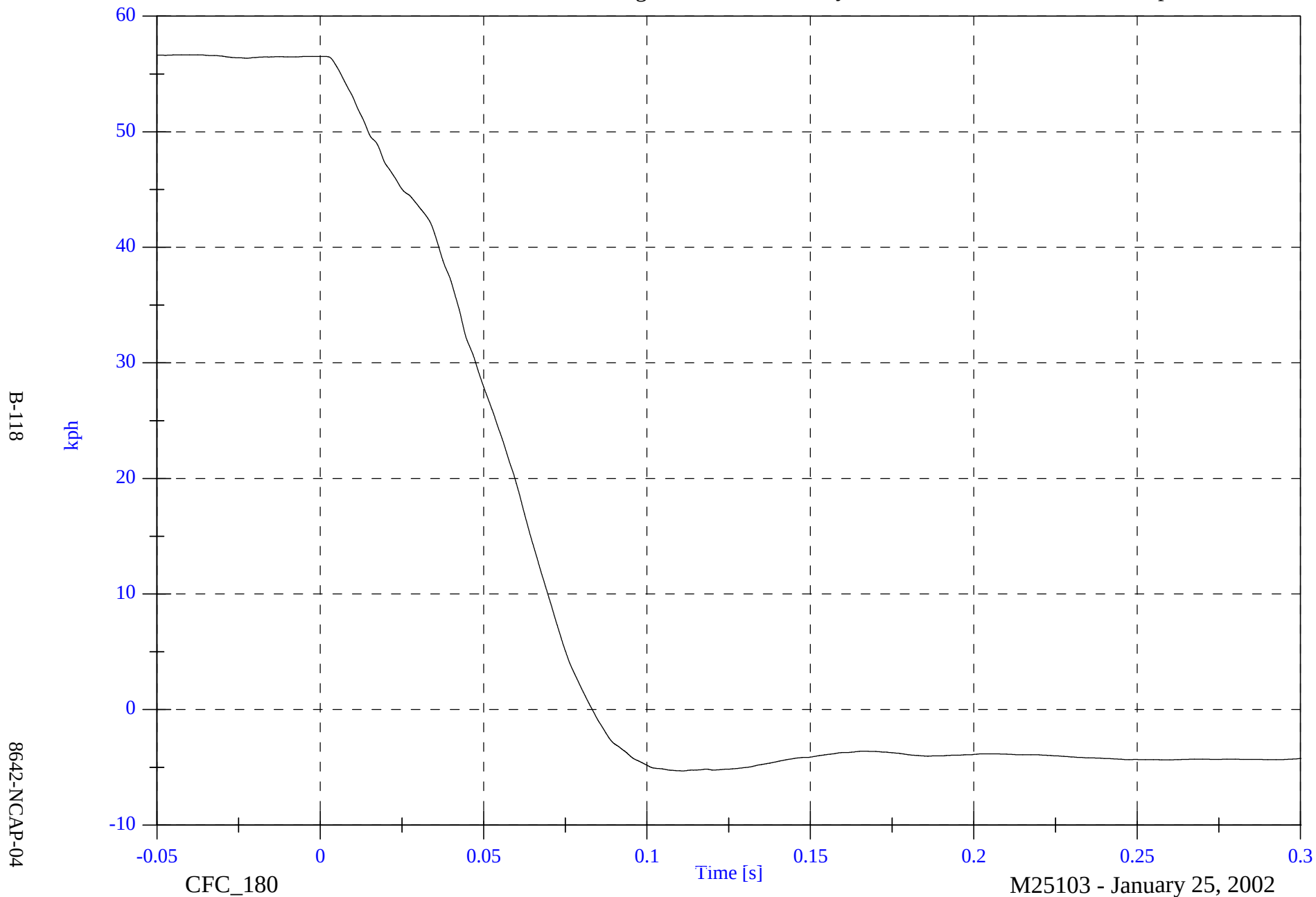


NCAP - 2002 Toyota Avalon

Max: 56.7 [kph] at -0.043 [s]

Min: -5.3 [kph] at 0.111 [s]

Right Rear #2x Velocity



NCAP - 2002 Toyota Avalon

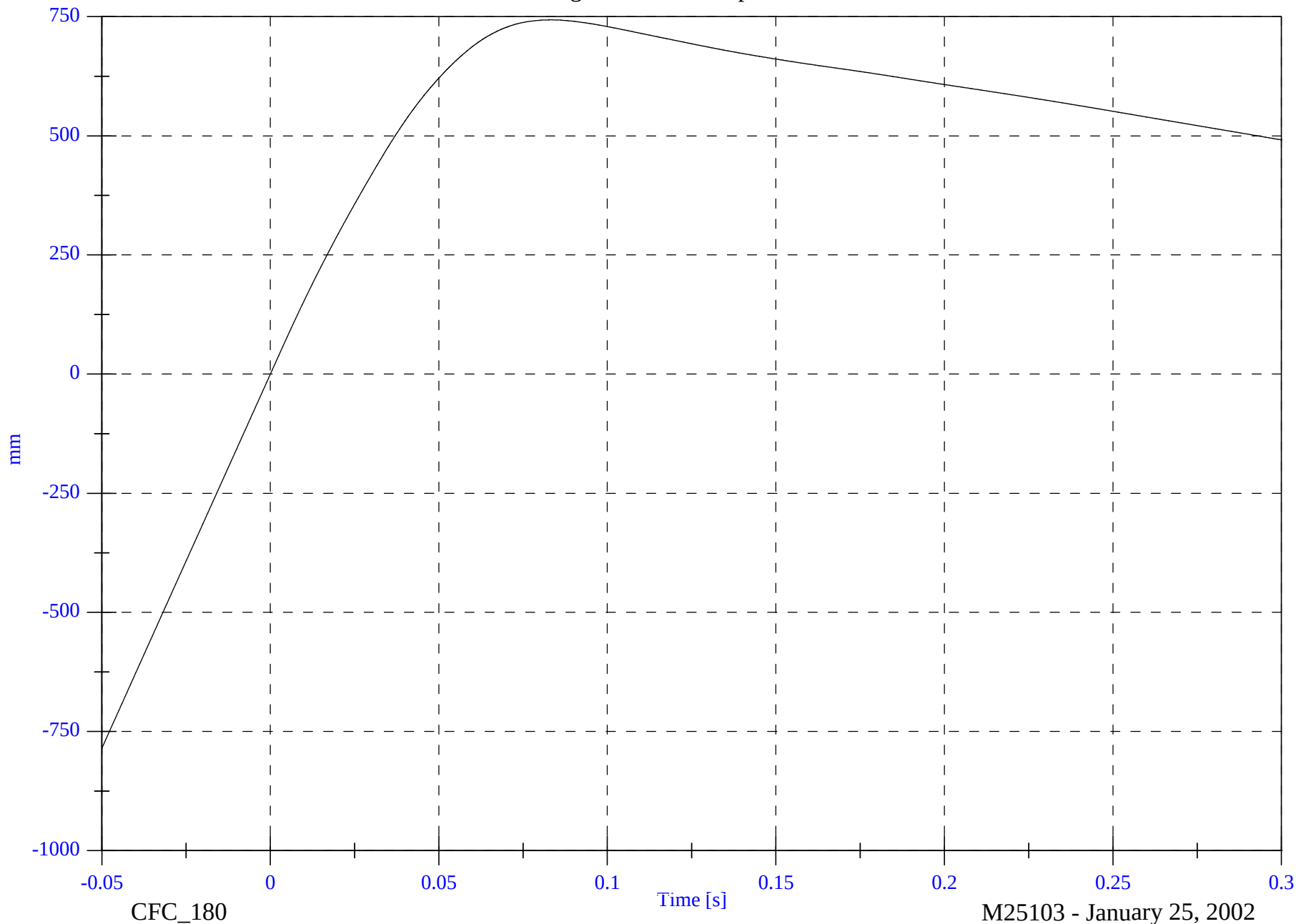
Right Rear #2x Displacement

Max: 743.4 [mm] at 0.083 [s]

Min: -785.2 [mm] at -0.050 [s]

B-119

8642-NCAP-04



CFC\_180

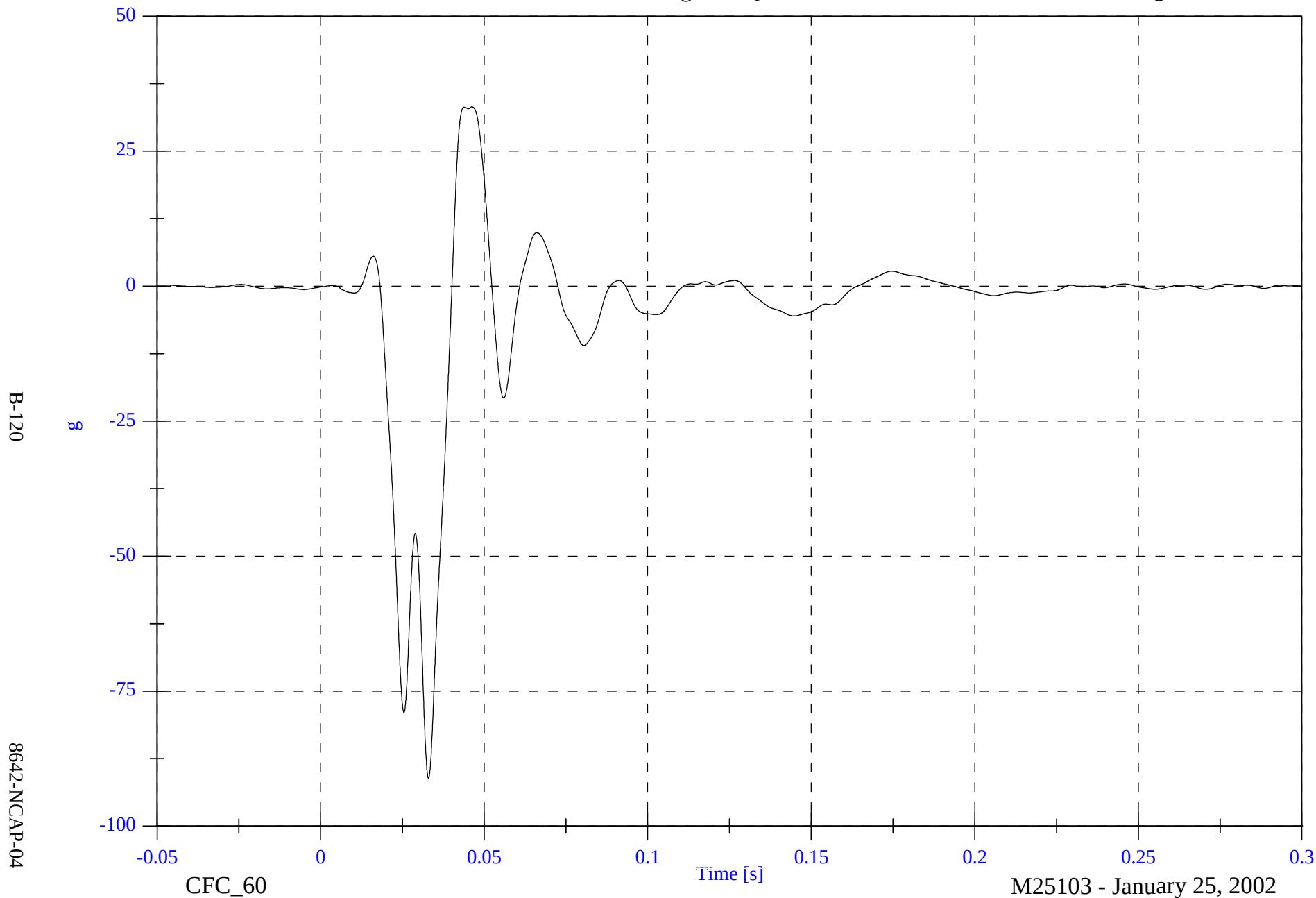
M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

Engine Top #3x

Max: 33.2 [g] at 0.046 [s]

Min: -91.1 [g] at 0.033 [s]



NCAP - 2002 Toyota Avalon

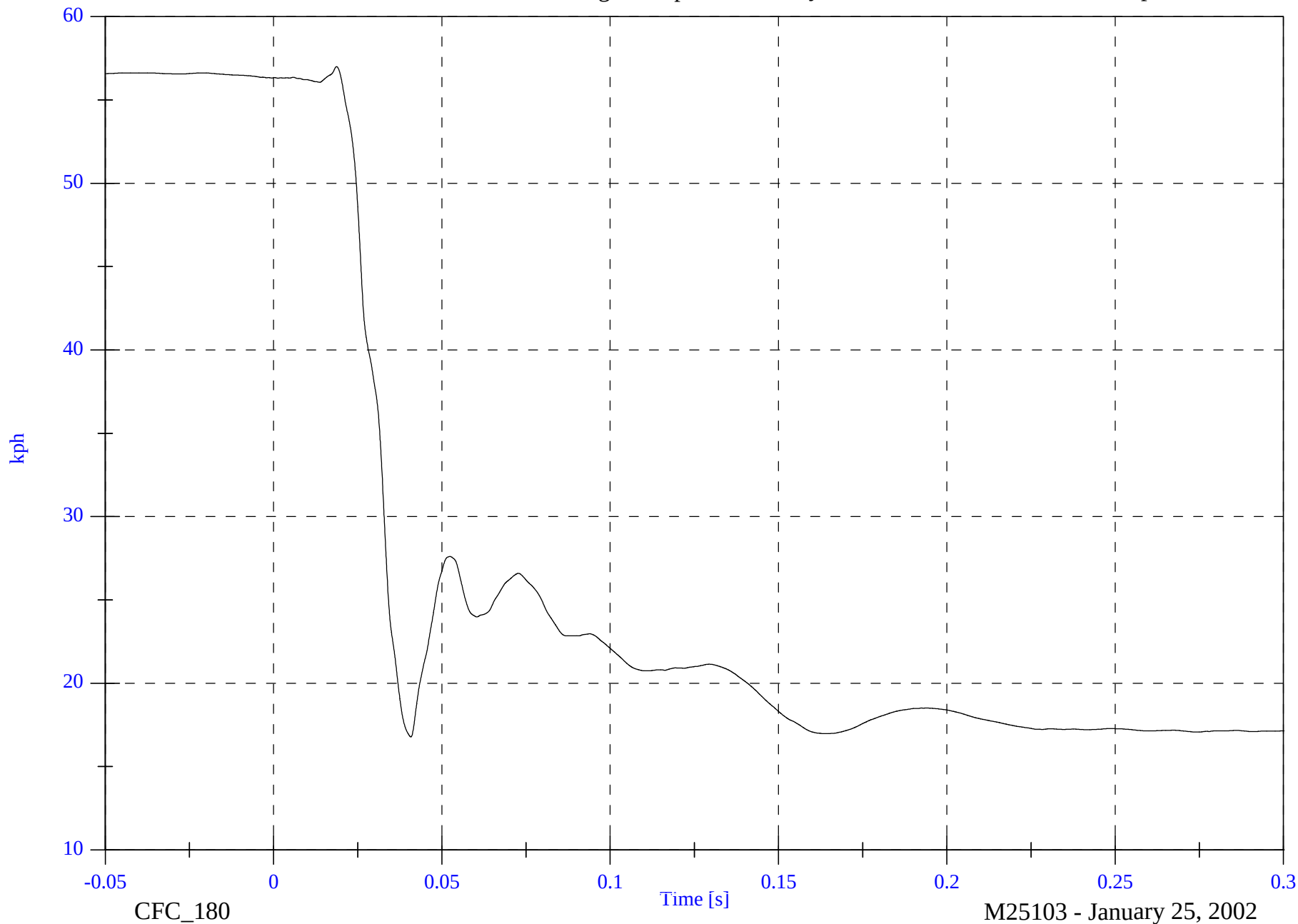
Engine Top #3x Velocity

Max: 57.0 [kph] at 0.019 [s]

Min: 16.8 [kph] at 0.041 [s]

B-121

8642-NCAP-04



NCAP - 2002 Toyota Avalon

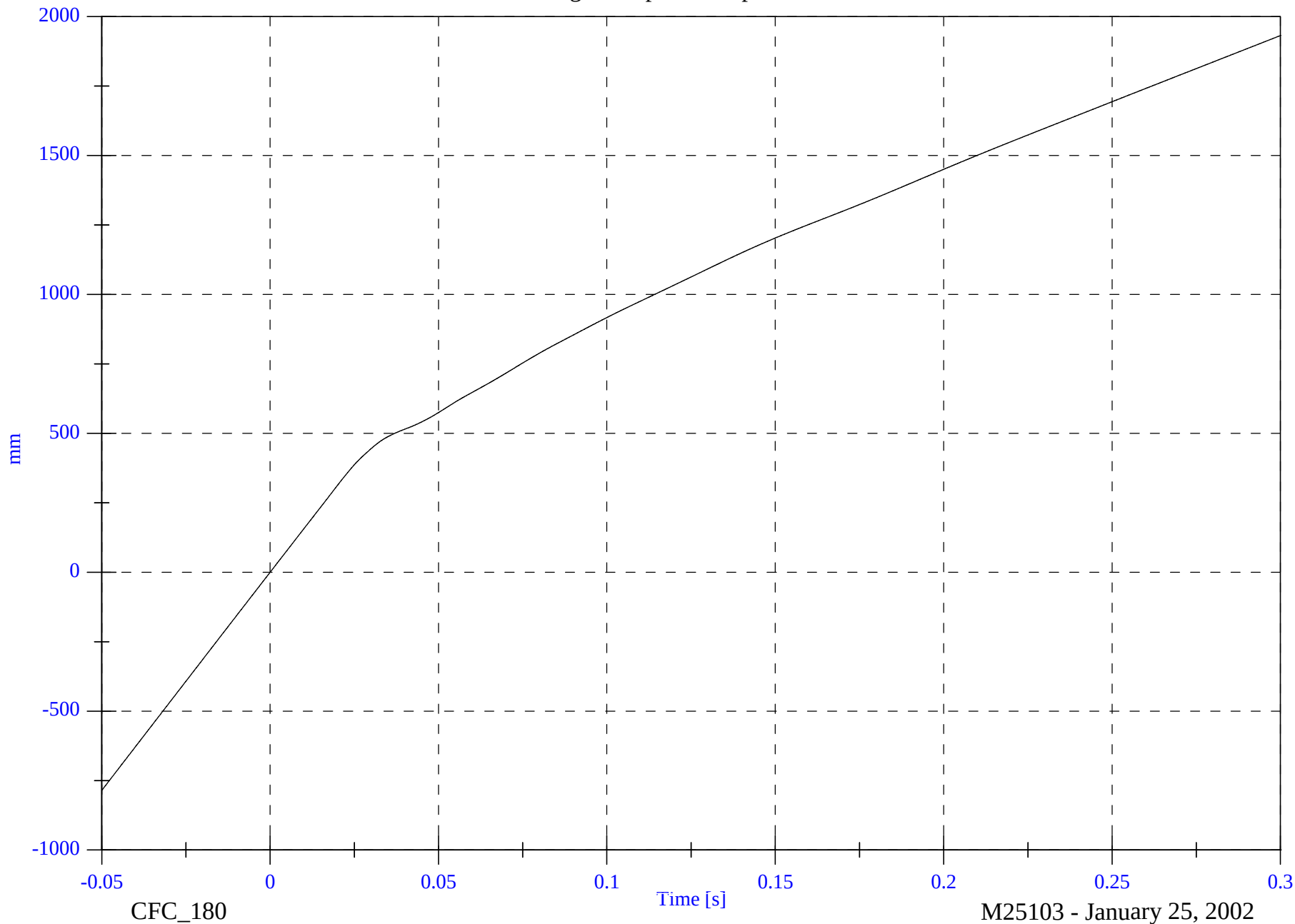
Engine Top #3x Displacement

Max: 1931.9 [mm] at 0.300 [s]

Min: -785.4 [mm] at -0.050 [s]

B-122

8642-NCAP-04

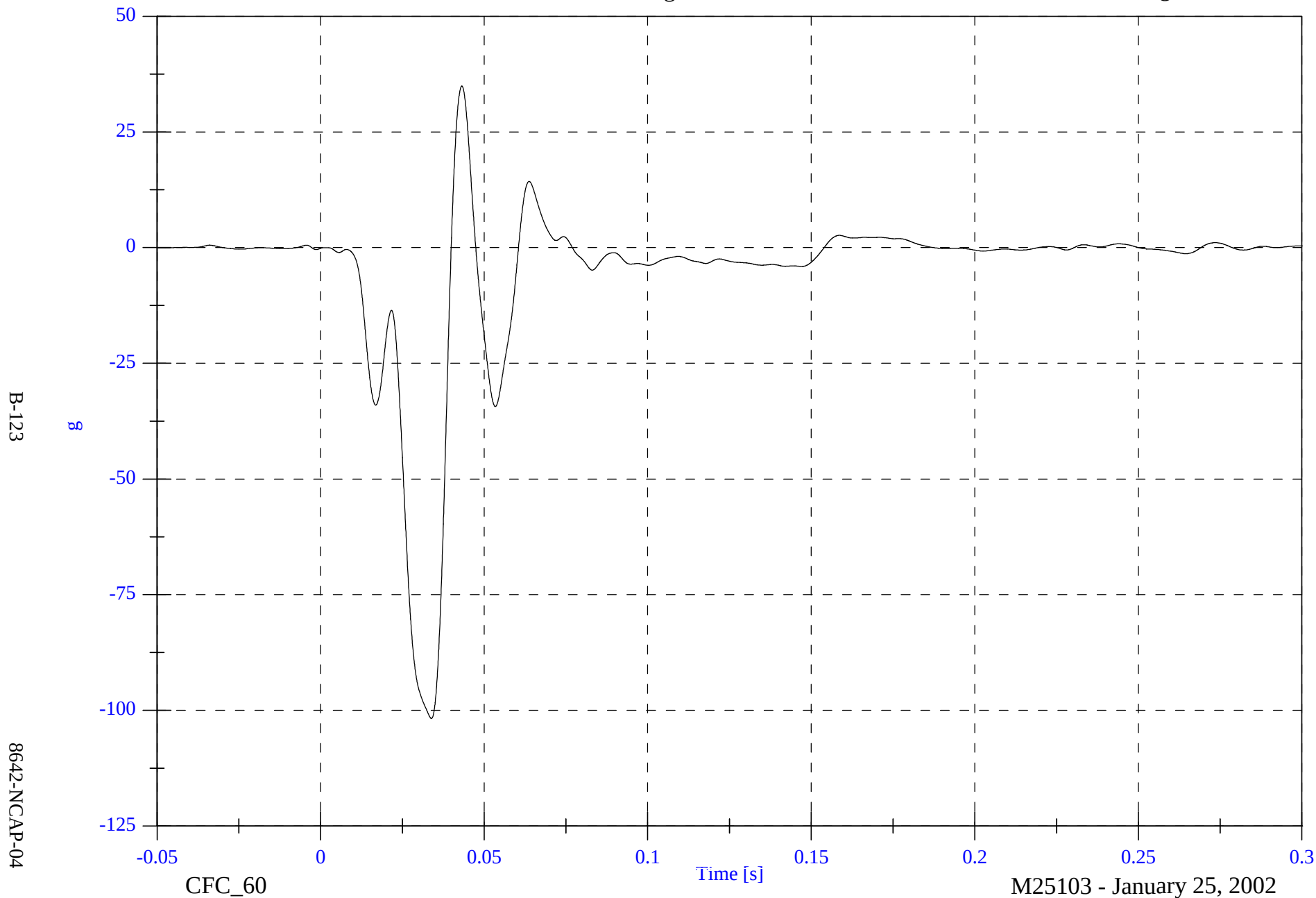


NCAP - 2002 Toyota Avalon

Engine Bottom #4x

Max: 34.9 [g] at 0.043 [s]

Min: -101.7 [g] at 0.034 [s]



NCAP - 2002 Toyota Avalon

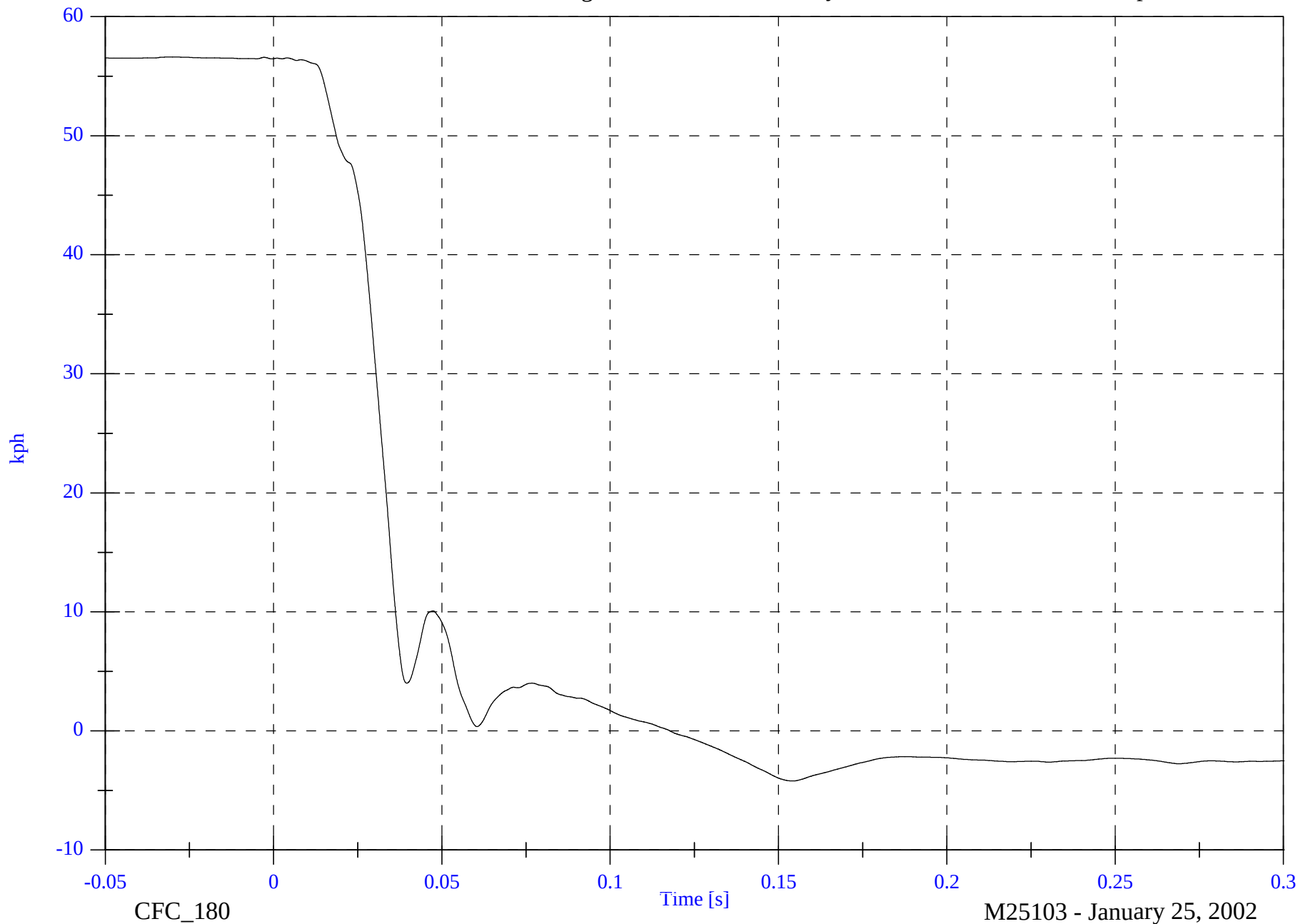
Engine Bottom #4x Velocity

Max: 56.6 [kph] at -0.030 [s]

Min: -4.2 [kph] at 0.154 [s]

B-124

8642-NCAP-04

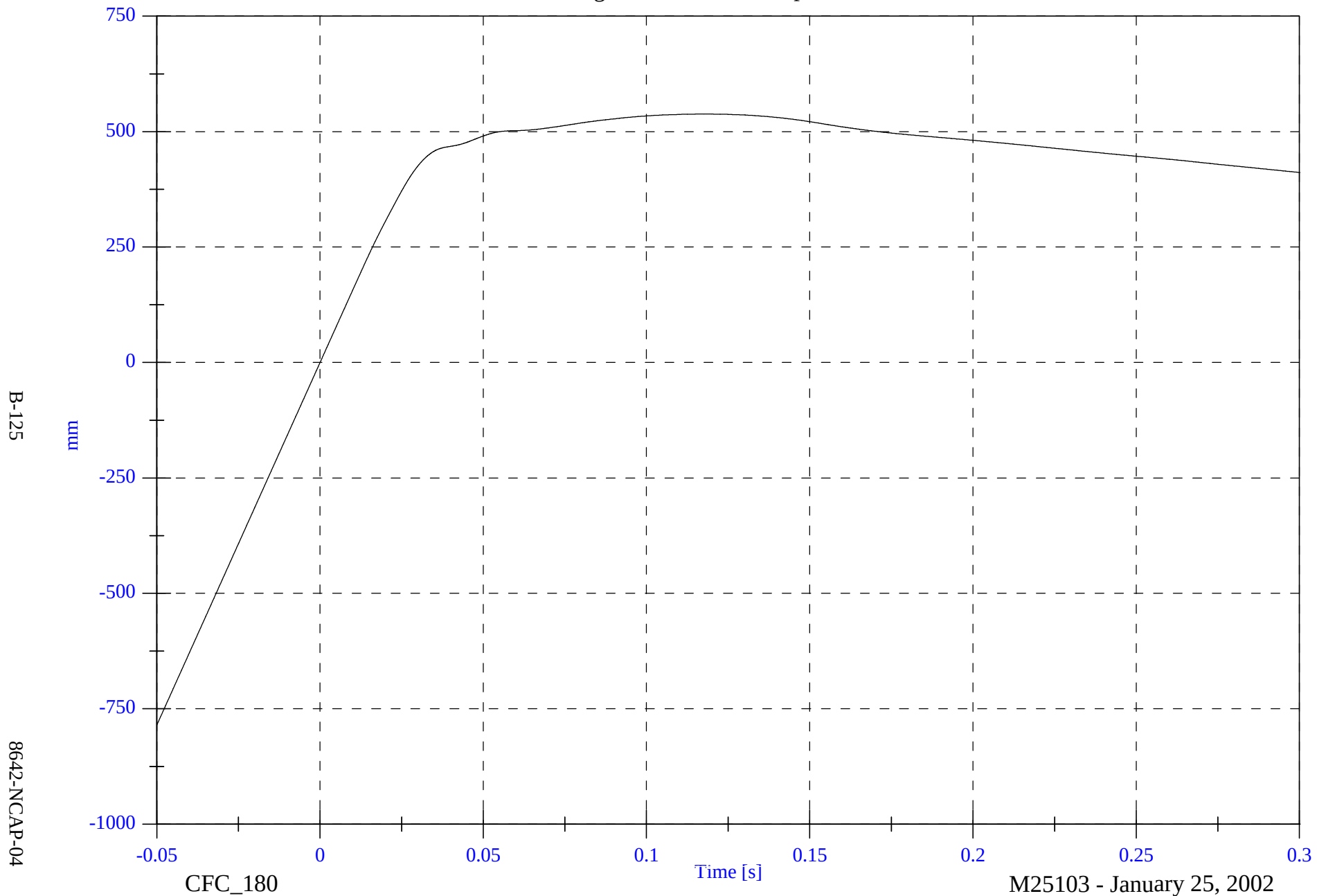


NCAP - 2002 Toyota Avalon

Engine Bottom #4x Displacement

Max: 538.1 [mm] at 0.118 [s]

Min: -785.2 [mm] at -0.050 [s]



NCAP - 2002 Toyota Avalon

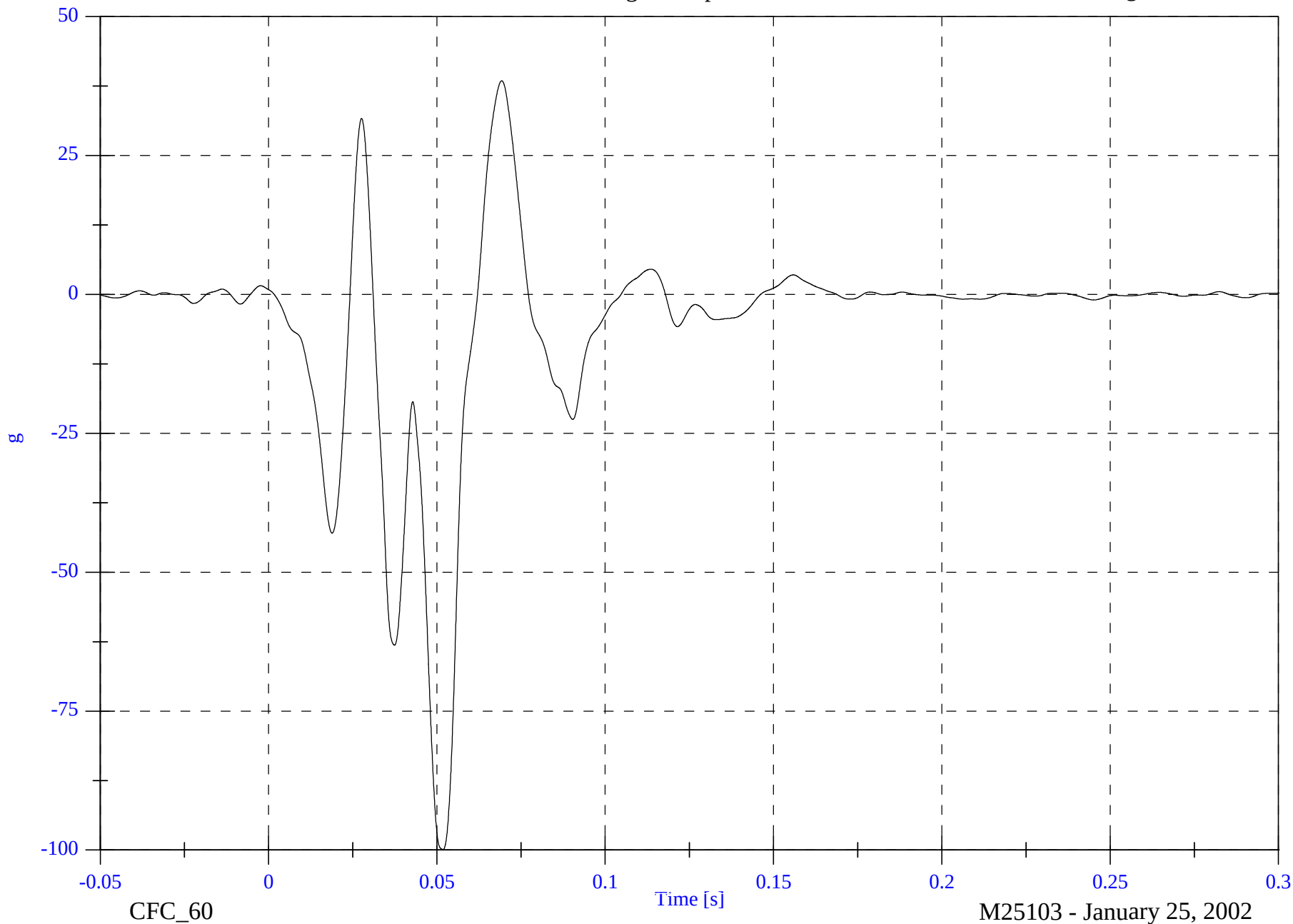
Right Caliper #5x

Max: 38.5 [g] at 0.069 [s]

Min: -99.9 [g] at 0.052 [s]

B-126

8642-NCAP-04

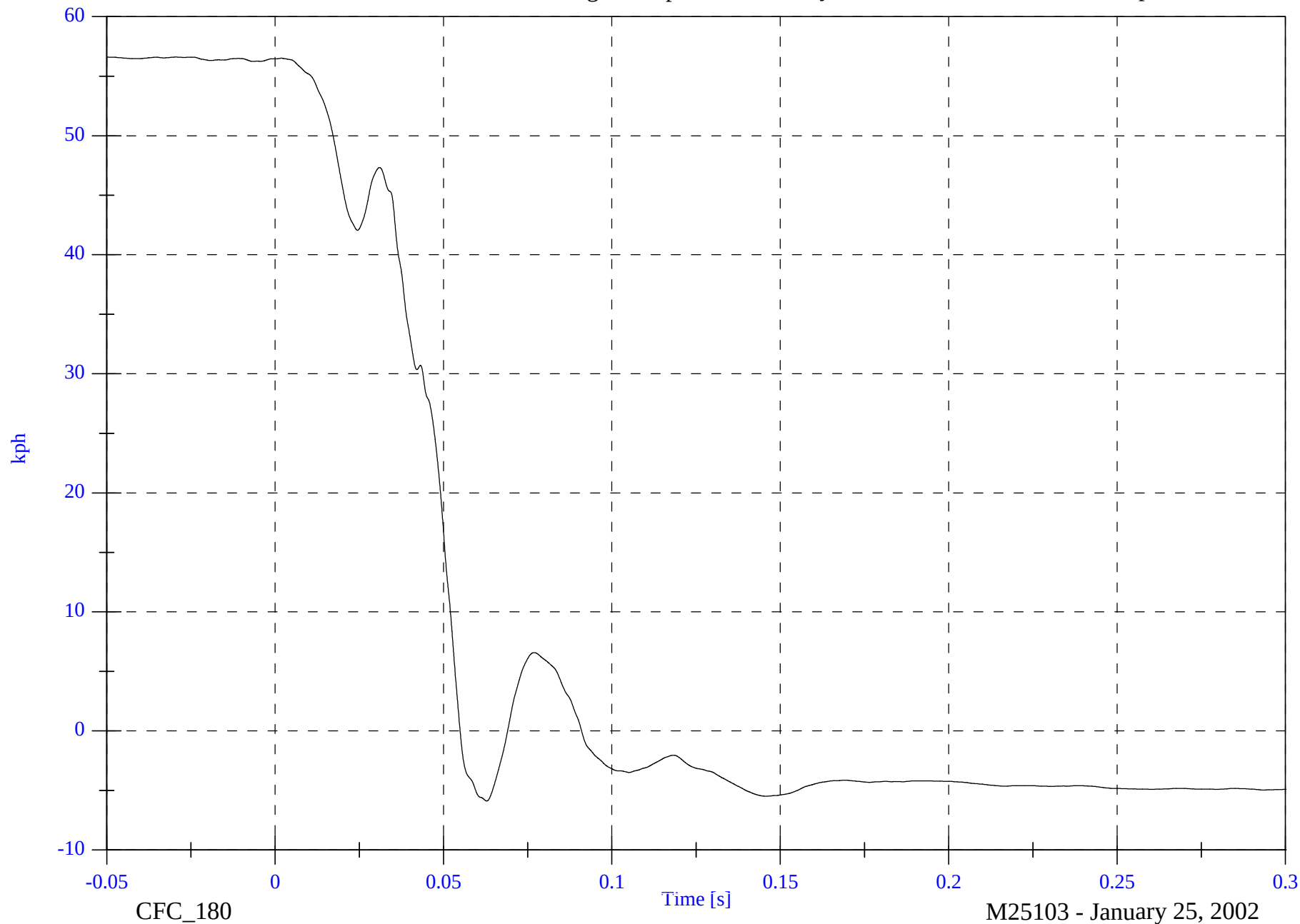


NCAP - 2002 Toyota Avalon

Right Caliper #5x Velocity

Max: 56.6 [kph] at -0.030 [s]

Min: -5.9 [kph] at 0.063 [s]



B-127

8642-NCAP-04

CFC\_180

Time [s]

M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

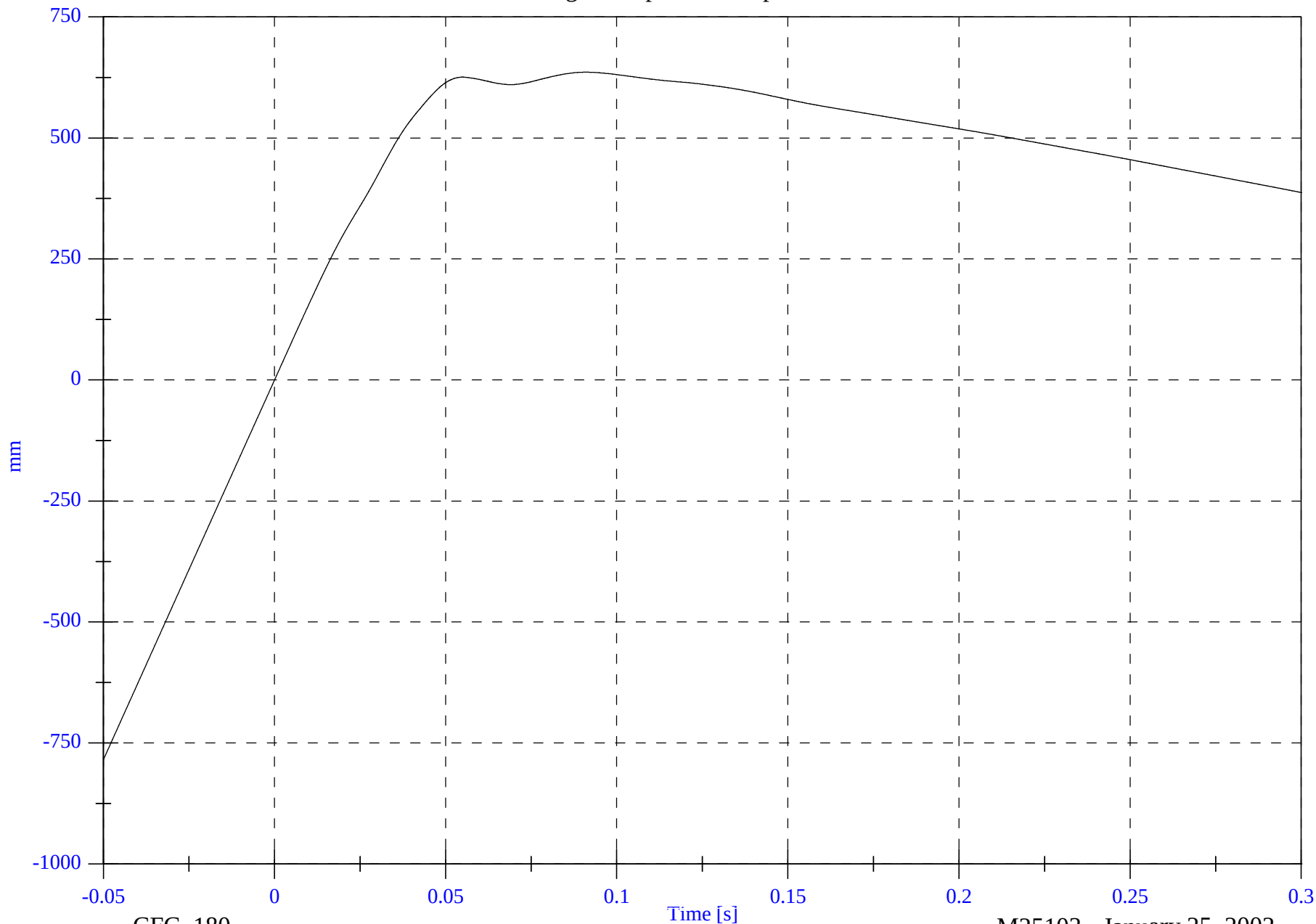
Right Caliper #5x Displacement

Max: 636.1 [mm] at 0.091 [s]

Min: -784.4 [mm] at -0.050 [s]

B-128

8642-NCAP-04



CFC\_180

M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

Instrument Panel #6x

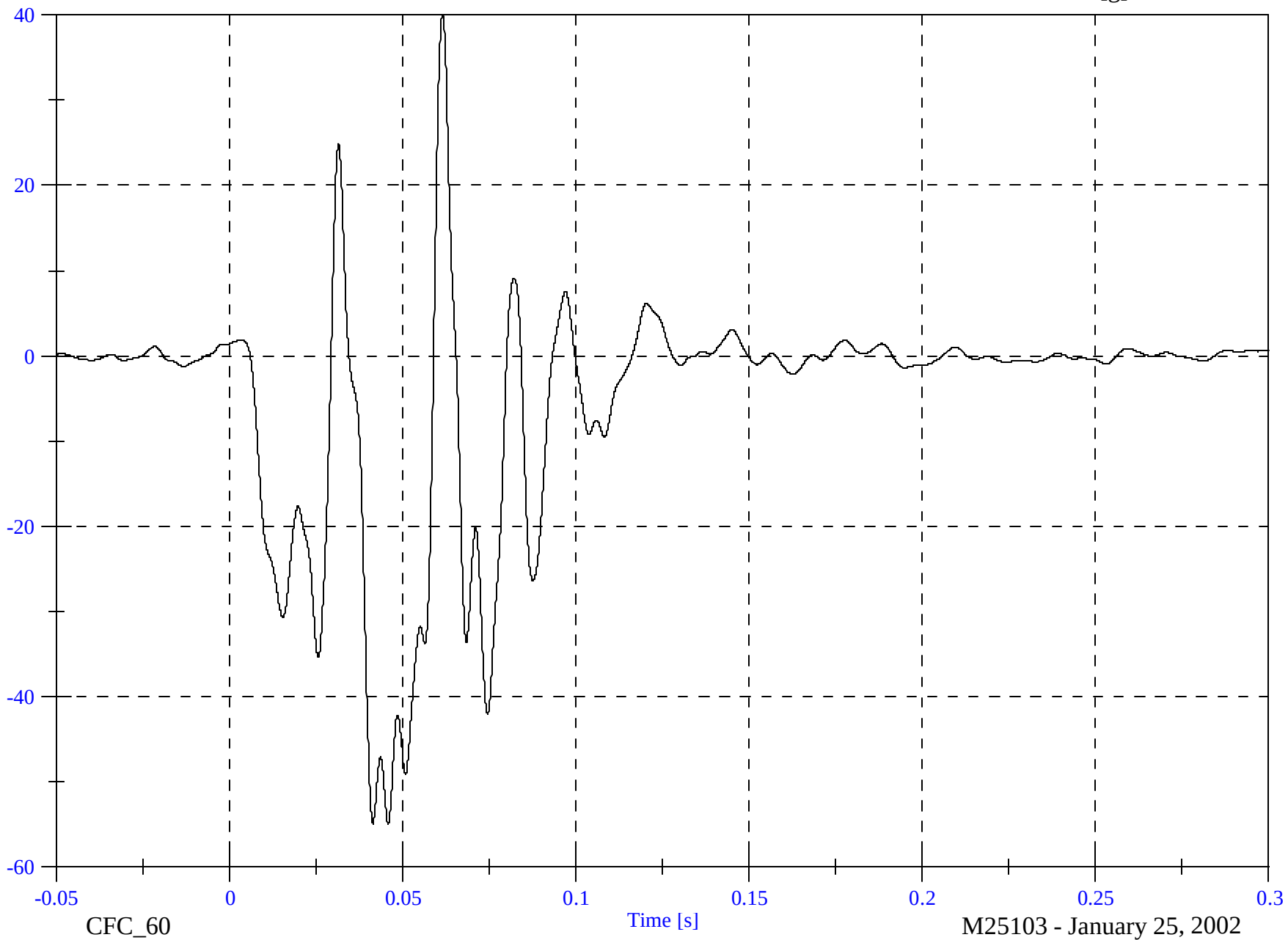
Max: 40.0 [g] at 0.062 [s]

Min: -54.9 [g] at 0.046 [s]

B-129

8642-NCAP-04

g



CFC\_60

Time [s]

M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

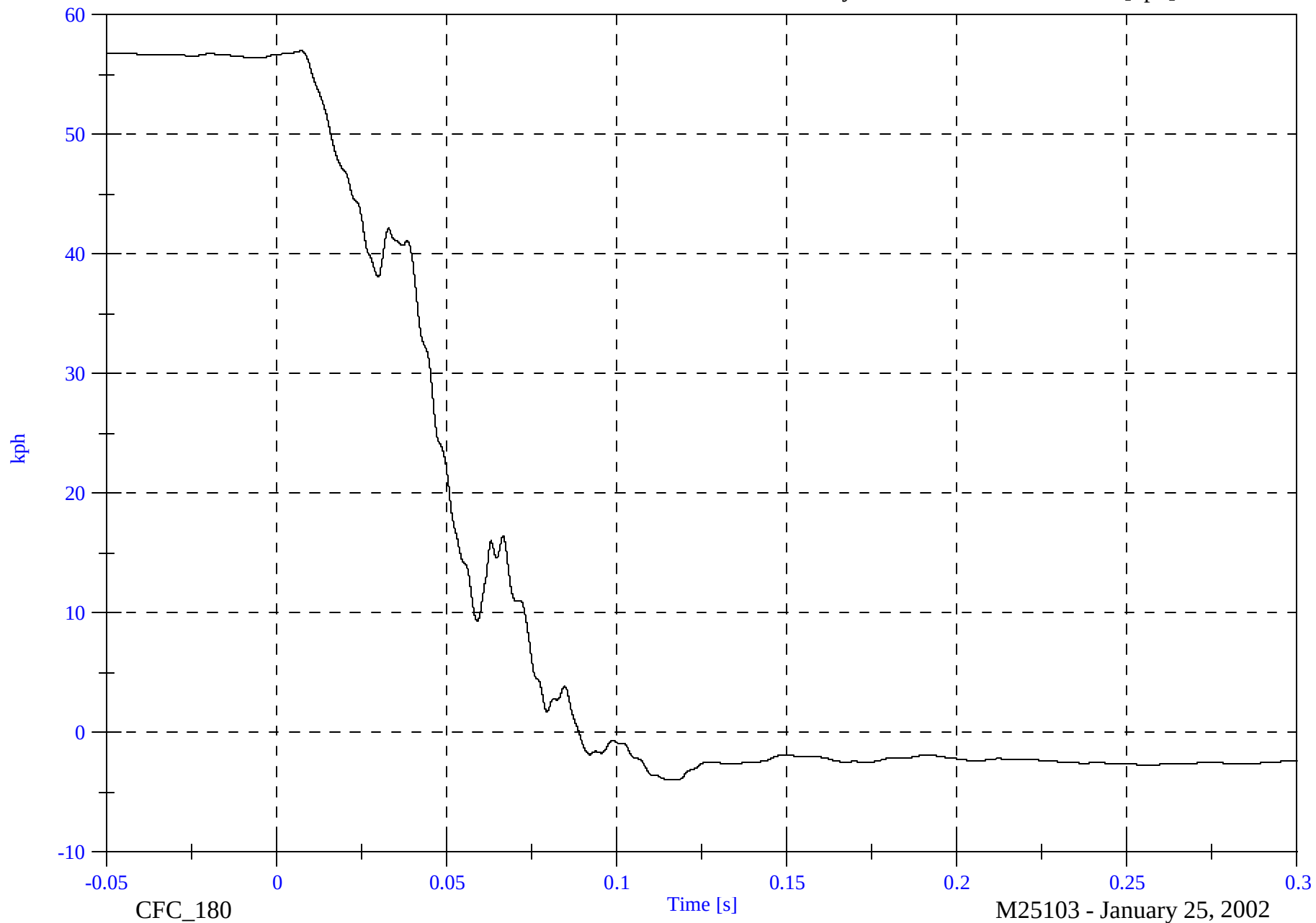
Instrument Panel #6x Velocity

Max: 57.0 [kph] at 0.007 [s]

Min: -4.0 [kph] at 0.117 [s]

B-130

8642-NCAP-04



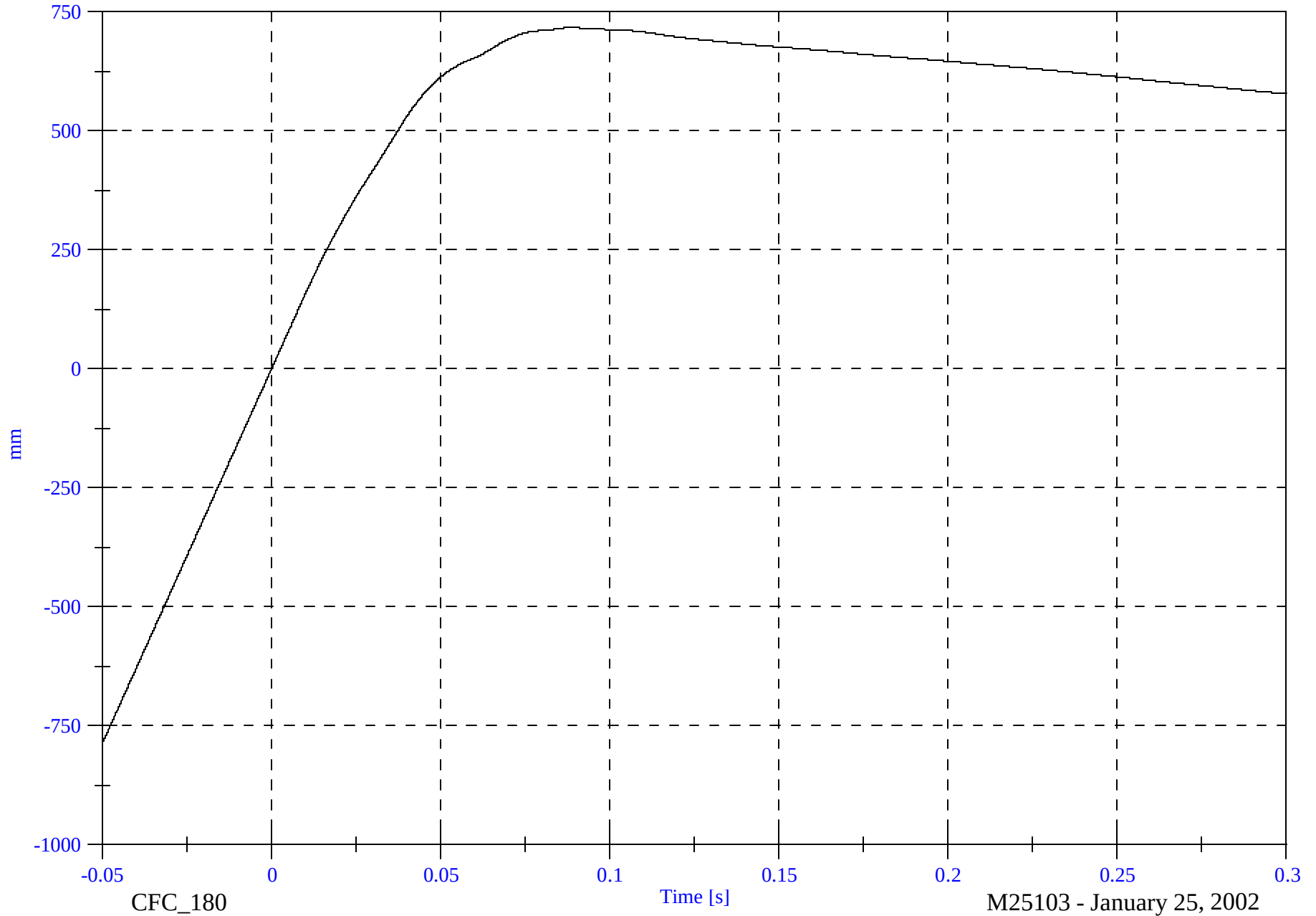
NCAP - 2002 Toyota Avalon

Instrument Panel #6x Displacement

Max: 716.9 [mm] at 0.089 [s]  
Min: -786.6 [mm] at -0.050 [s]

B-131

8642-NCAP-04



NCAP - 2002 Toyota Avalon

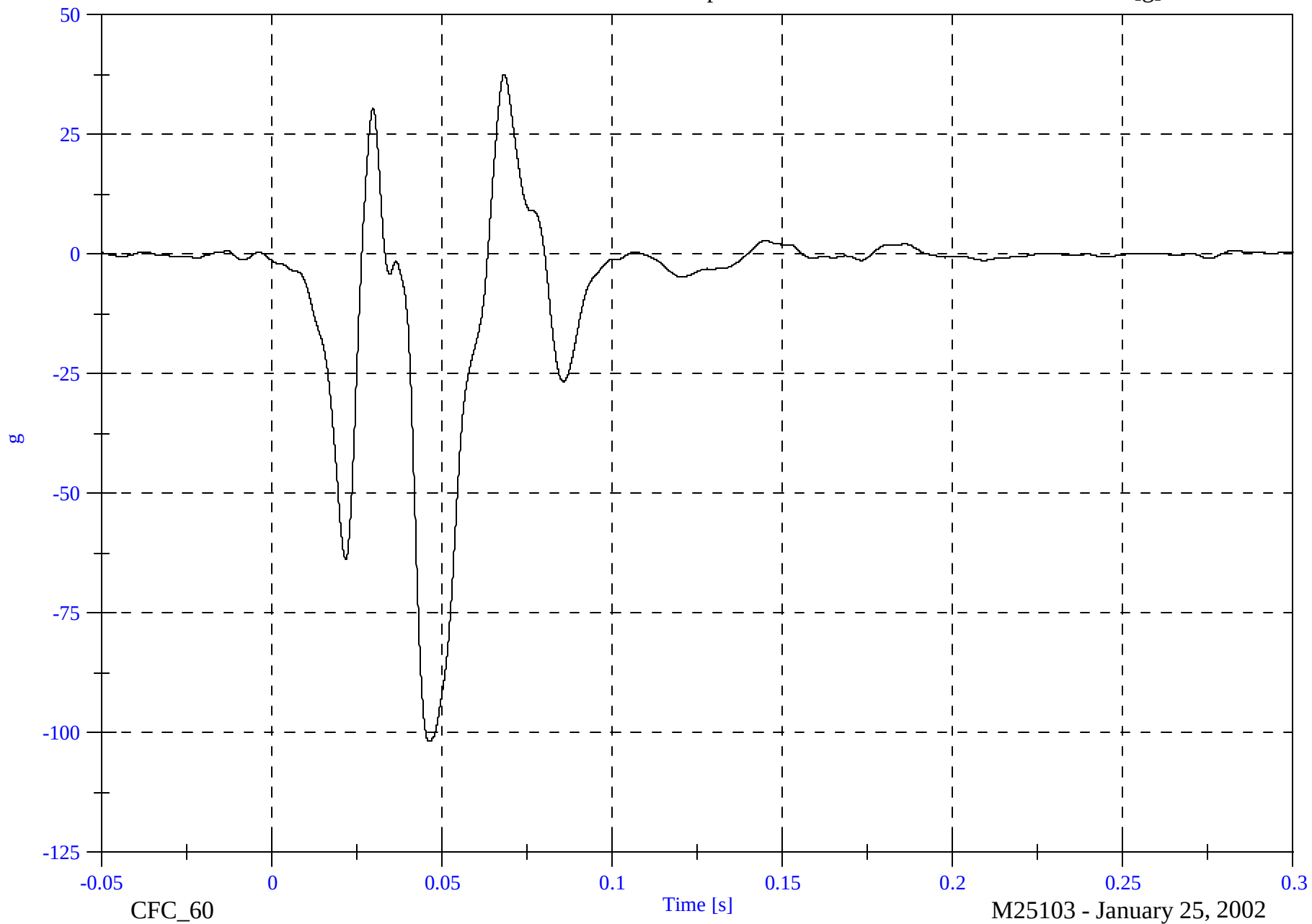
Left Caliper #7x

Max: 37.6 [g] at 0.068 [s]

Min: -101.8 [g] at 0.046 [s]

B-132

8642-NCAP-04



NCAP - 2002 Toyota Avalon

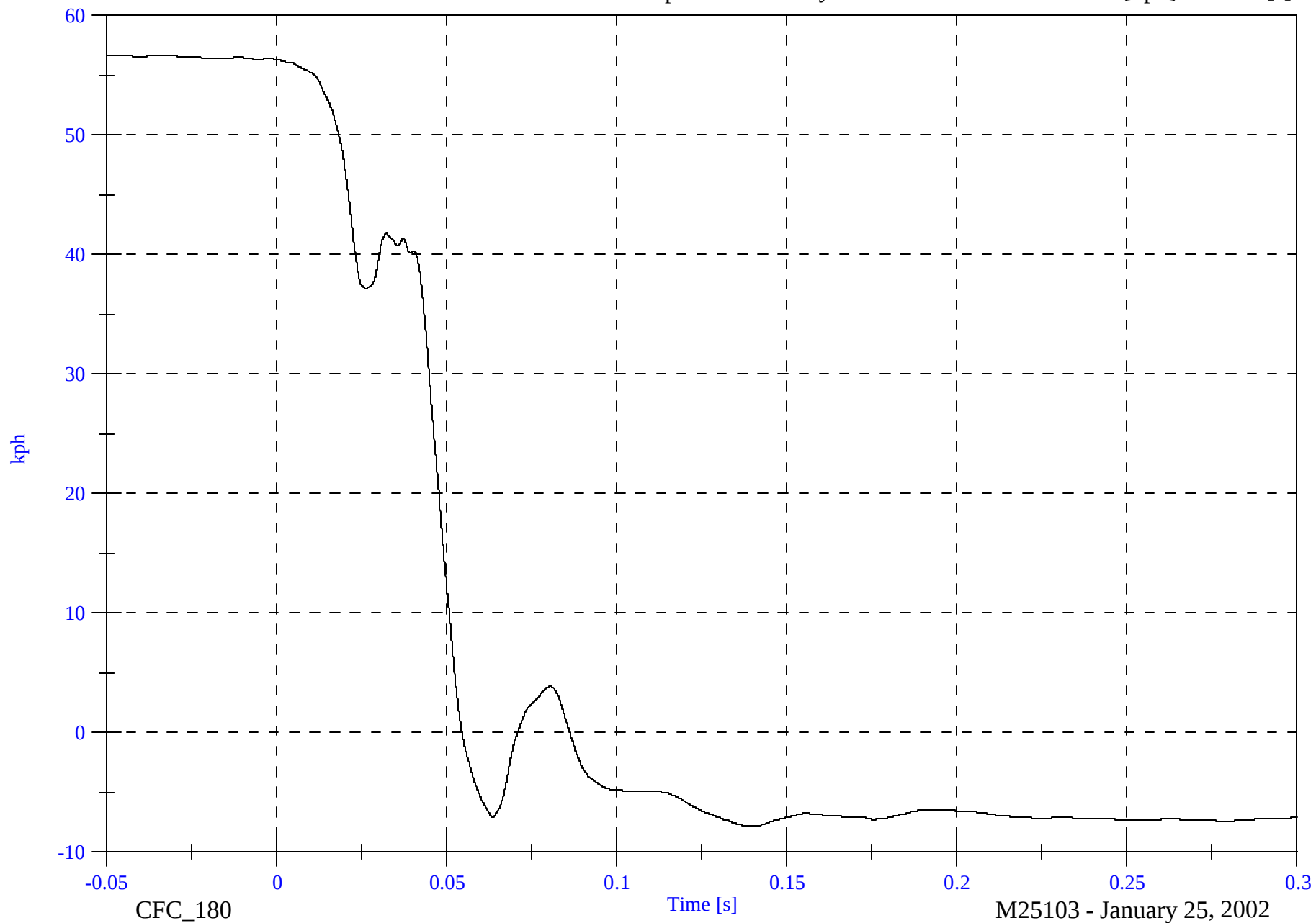
Left Caliper #7x Velocity

Max: 56.7 [kph] at -0.048 [s]

Min: -7.8 [kph] at 0.139 [s]

B-133

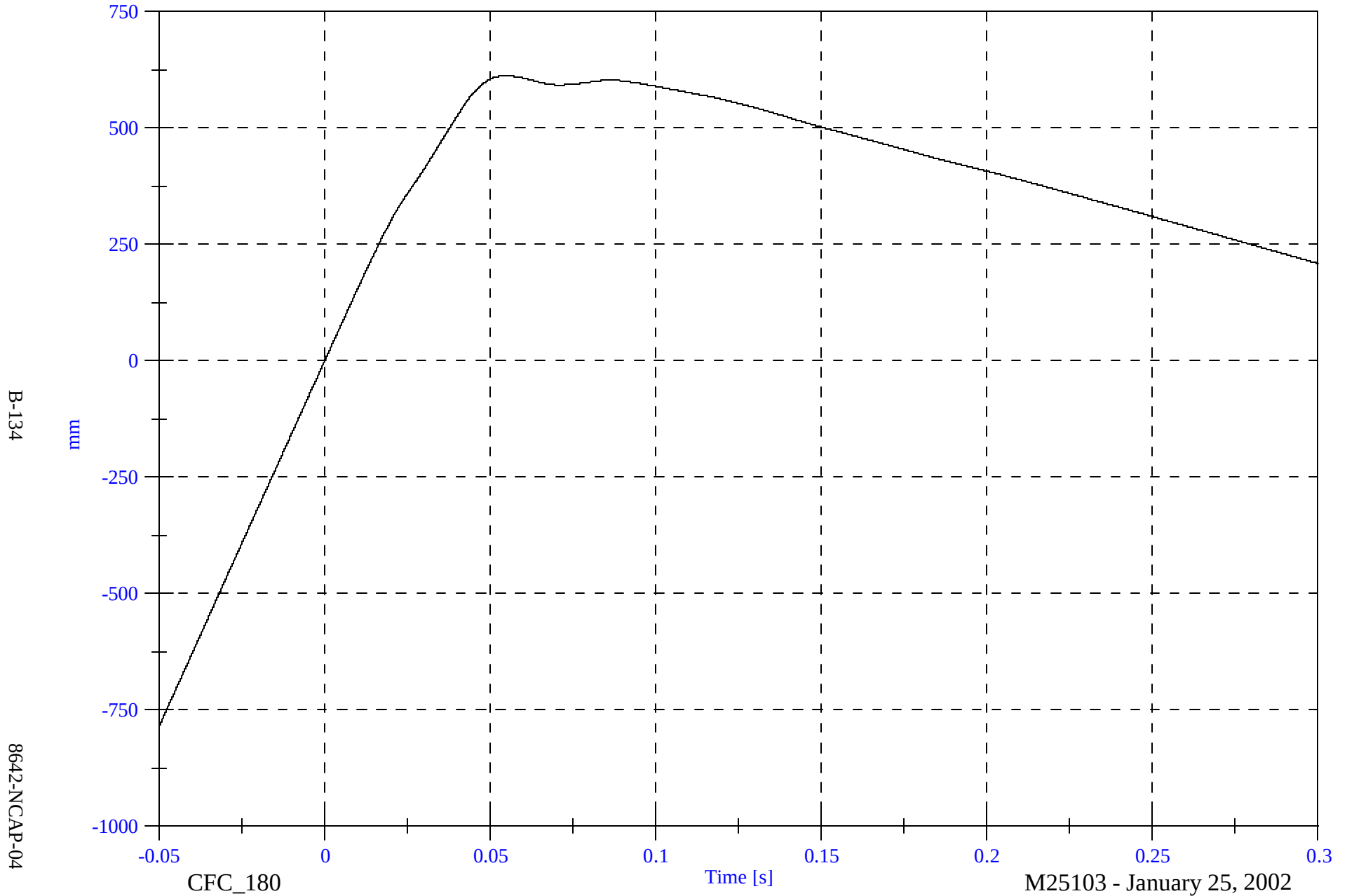
8642-NCAP-04



NCAP - 2002 Toyota Avalon

Left Caliper #7x Displacement

Max: 611.9 [mm] at 0.055 [s]  
Min: -785.0 [mm] at -0.050 [s]

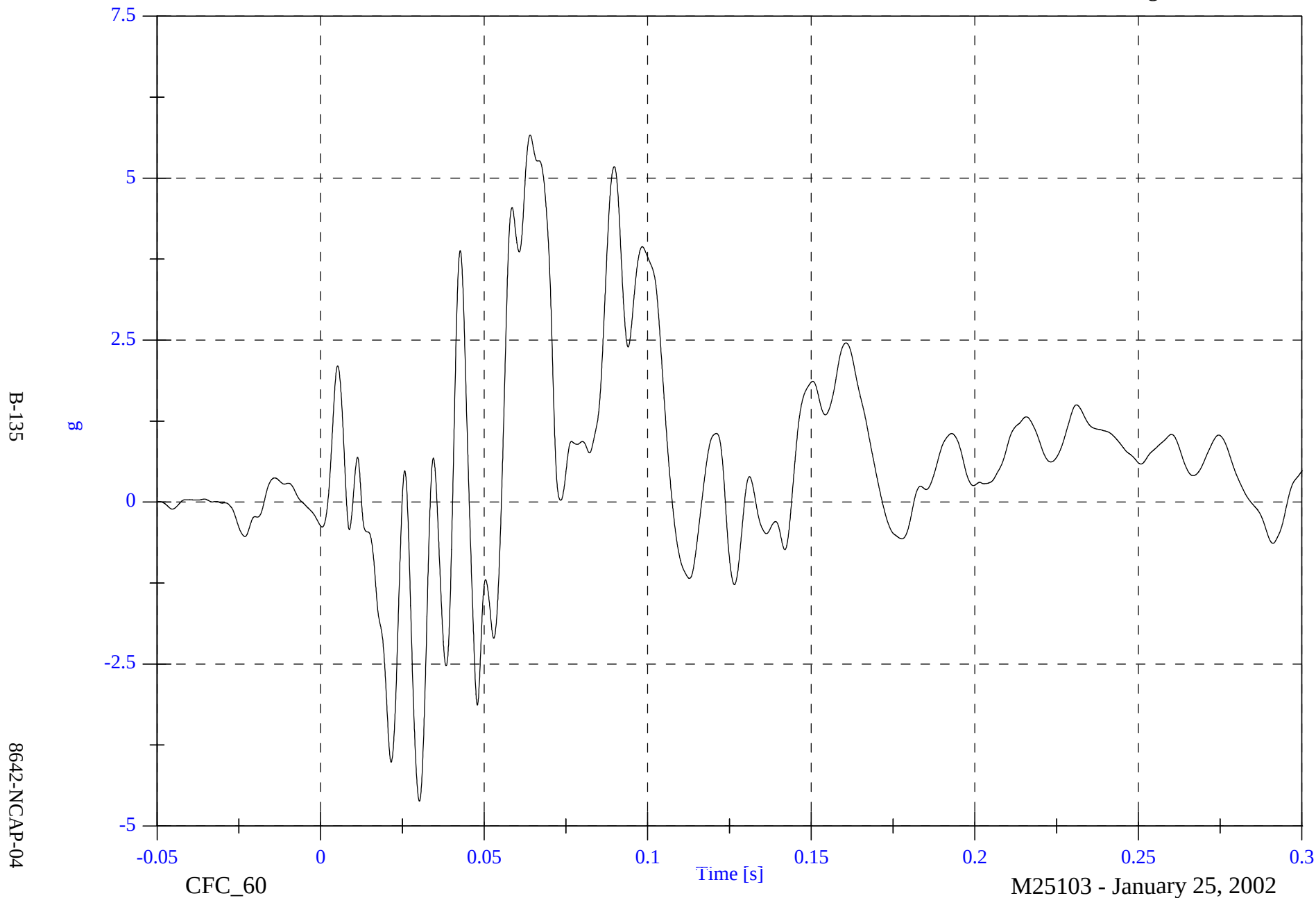


NCAP - 2002 Toyota Avalon

Left Rear #8z

Max: 5.7 [g] at 0.064 [s]

Min: -4.6 [g] at 0.030 [s]

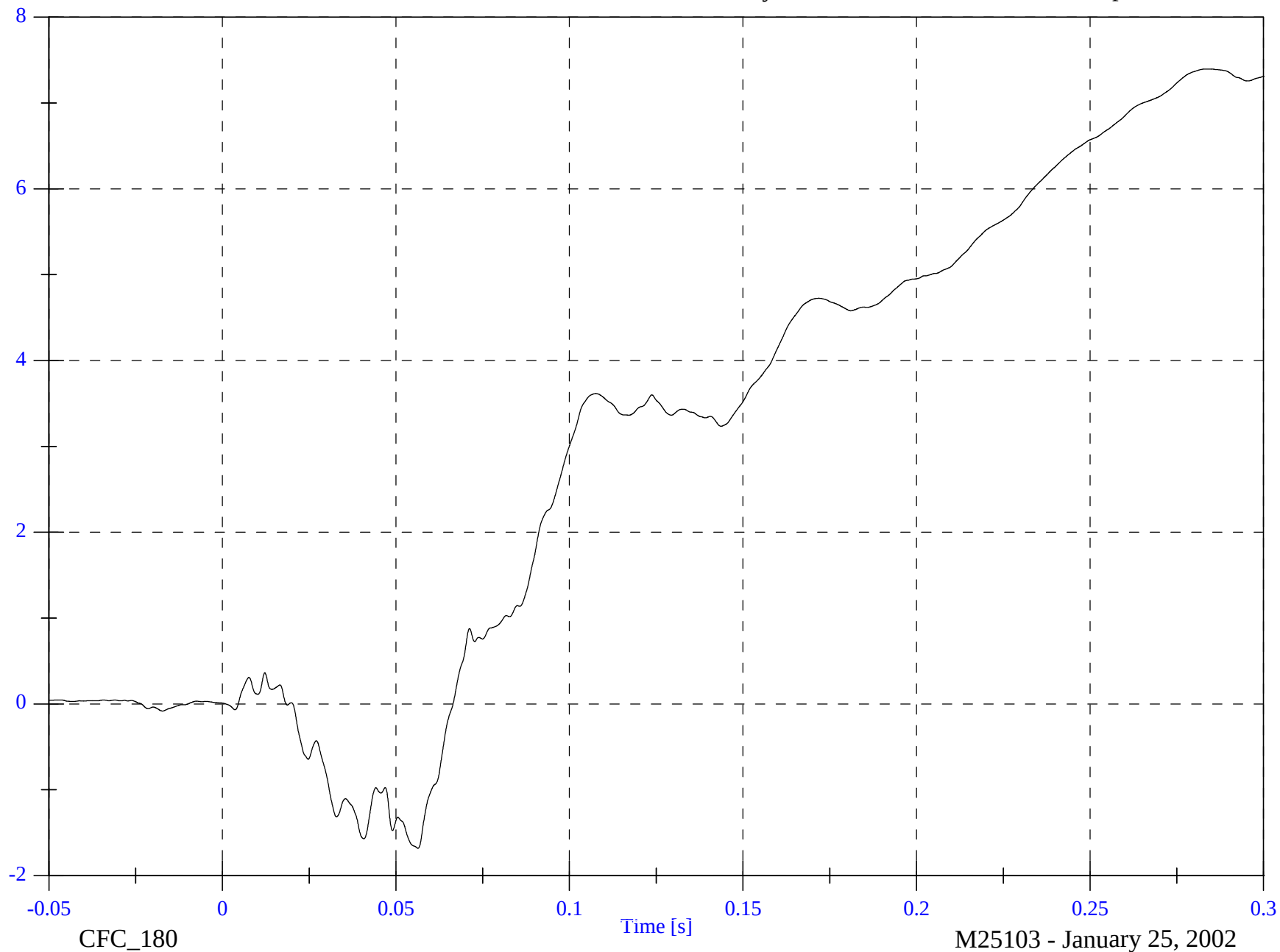


NCAP - 2002 Toyota Avalon

Left Rear #8z Velocity

Max: 7.4 [kph] at 0.284 [s]

Min: -1.7 [kph] at 0.056 [s]



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8642-NCAP-04

CFC\_180

Time [s]

M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

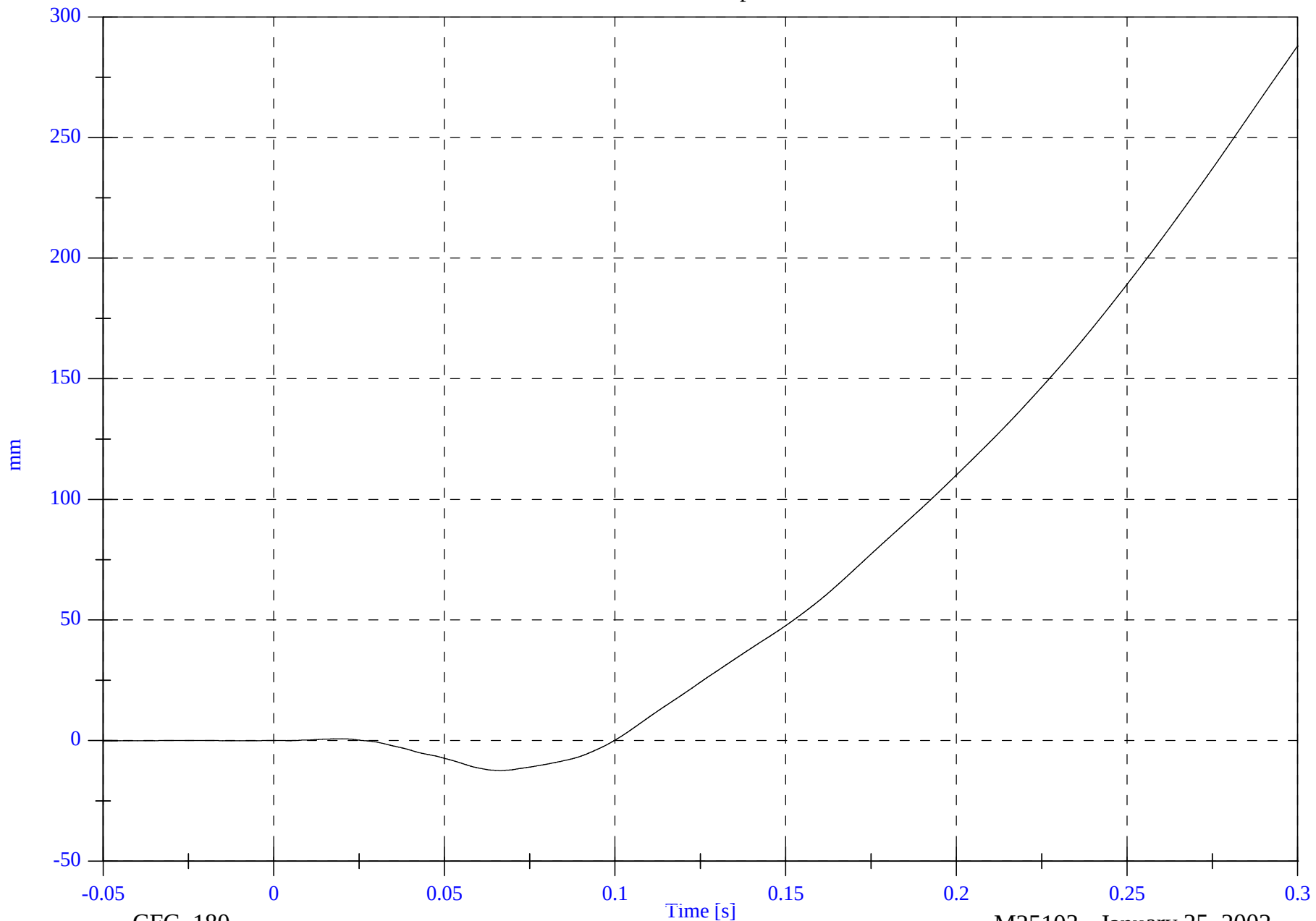
Left Rear #8z Displacement

Max: 287.9 [mm] at 0.300 [s]

Min: -12.4 [mm] at 0.066 [s]

B-137

8642-NCAP-04



CFC\_180

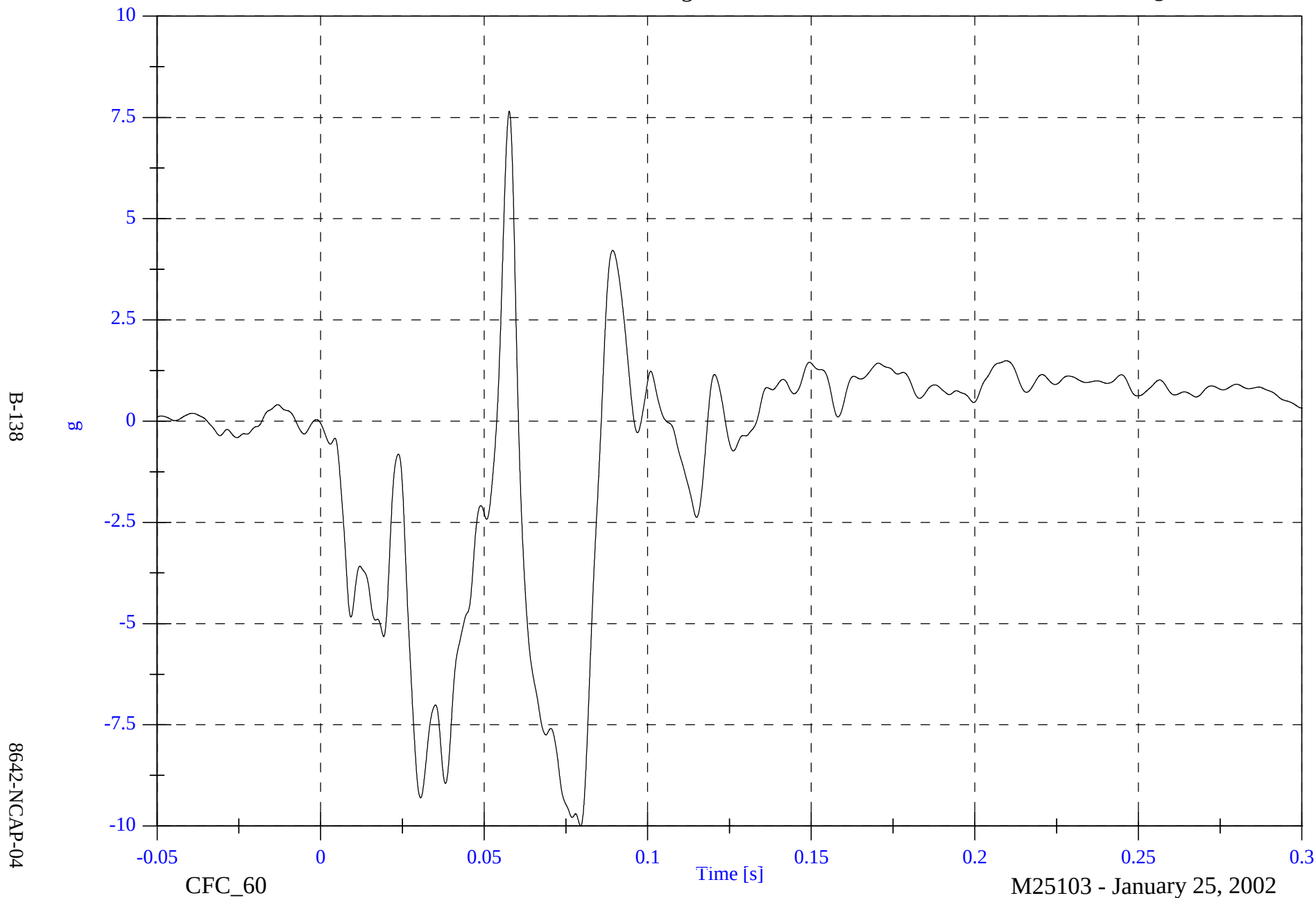
M25103 - January 25, 2002

NCAP - 2002 Toyota Avalon

Right Rear #9z

Max: 7.7 [g] at 0.058 [s]

Min: -10.0 [g] at 0.080 [s]



NCAP - 2002 Toyota Avalon

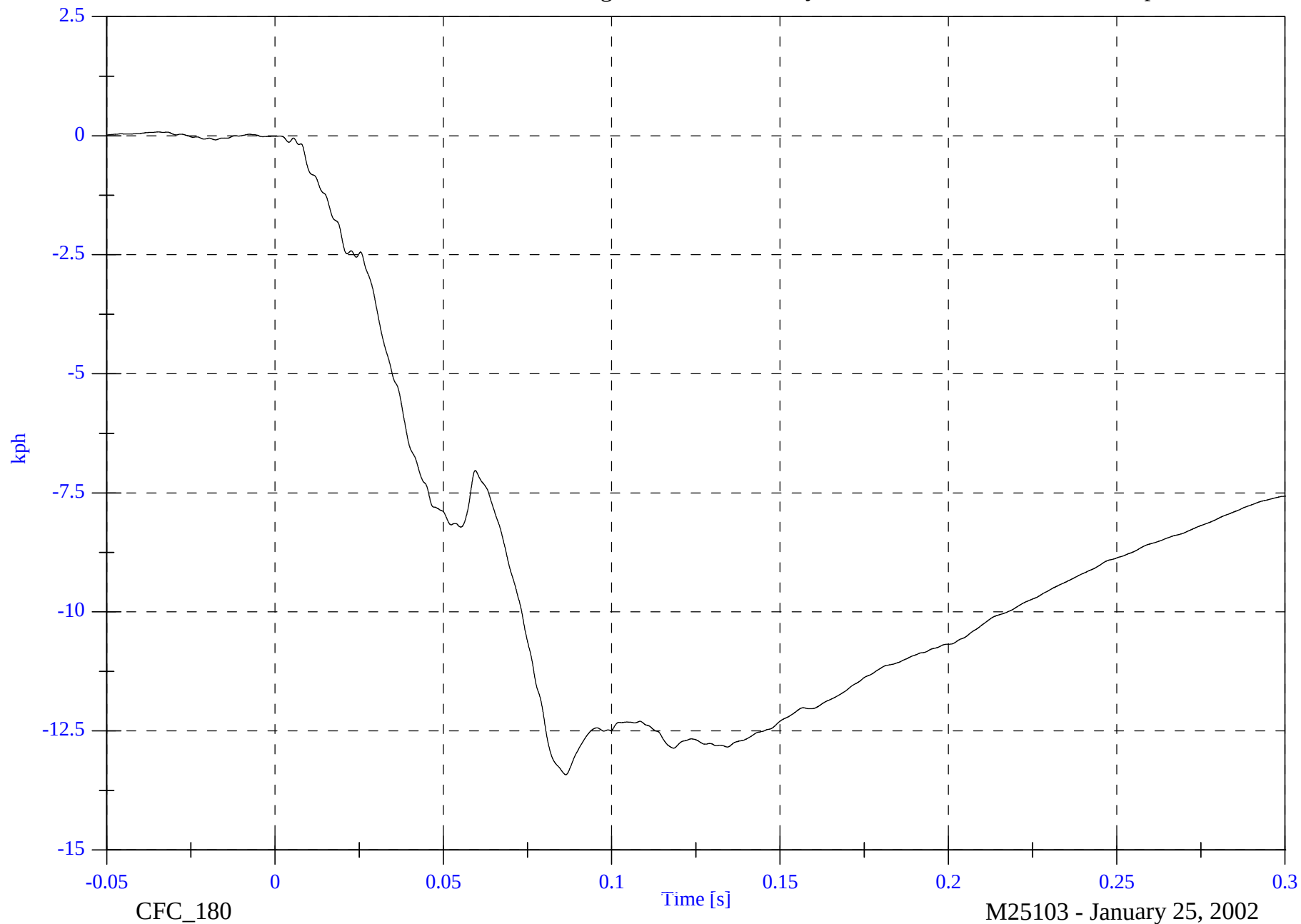
Right Rear #9z Velocity

Max: 0.1 [kph] at -0.035 [s]

Min: -13.4 [kph] at 0.086 [s]

B-139

8642-NCAP-04

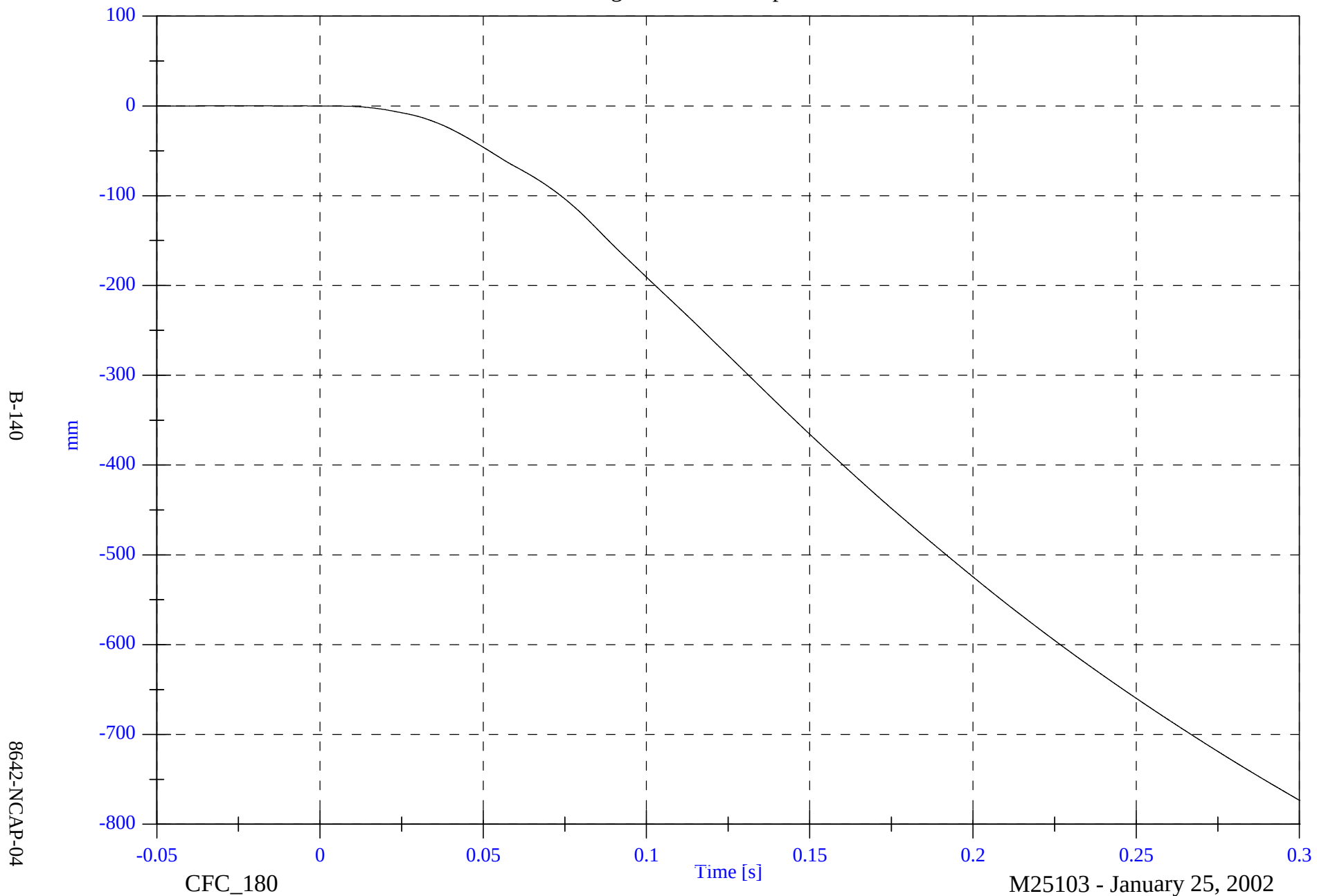


NCAP - 2002 Toyota Avalon

Right Rear #9z Displacement

Max: 0.2 [mm] at -0.026 [s]

Min: -773.3 [mm] at 0.300 [s]

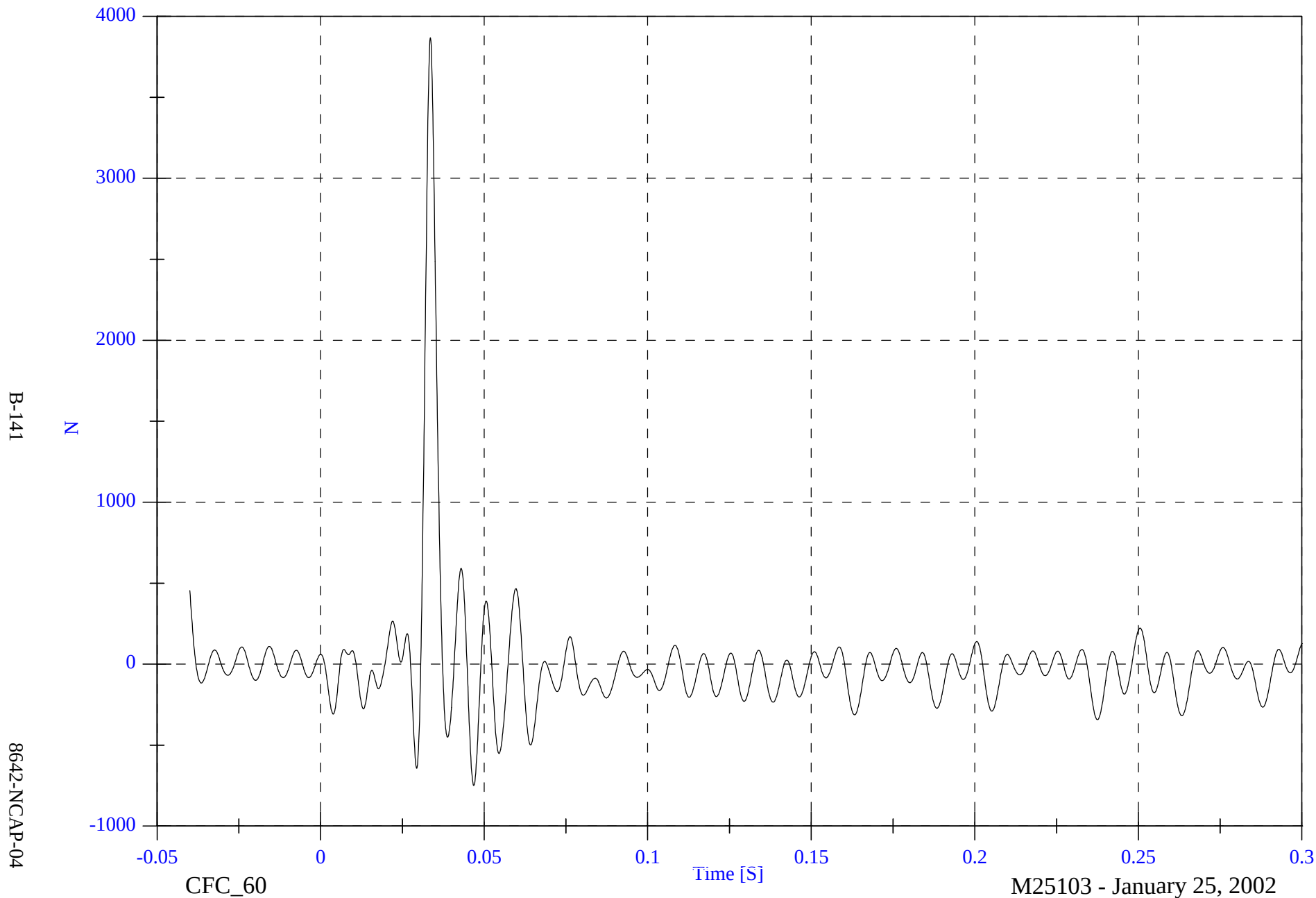


NCAP - 2002 Toyota Avalon

Barrier Load Cell A1 Fx

Max: 3867.1 [N] at 0.034 [S]

Min: -749.7 [N] at 0.047 [S]

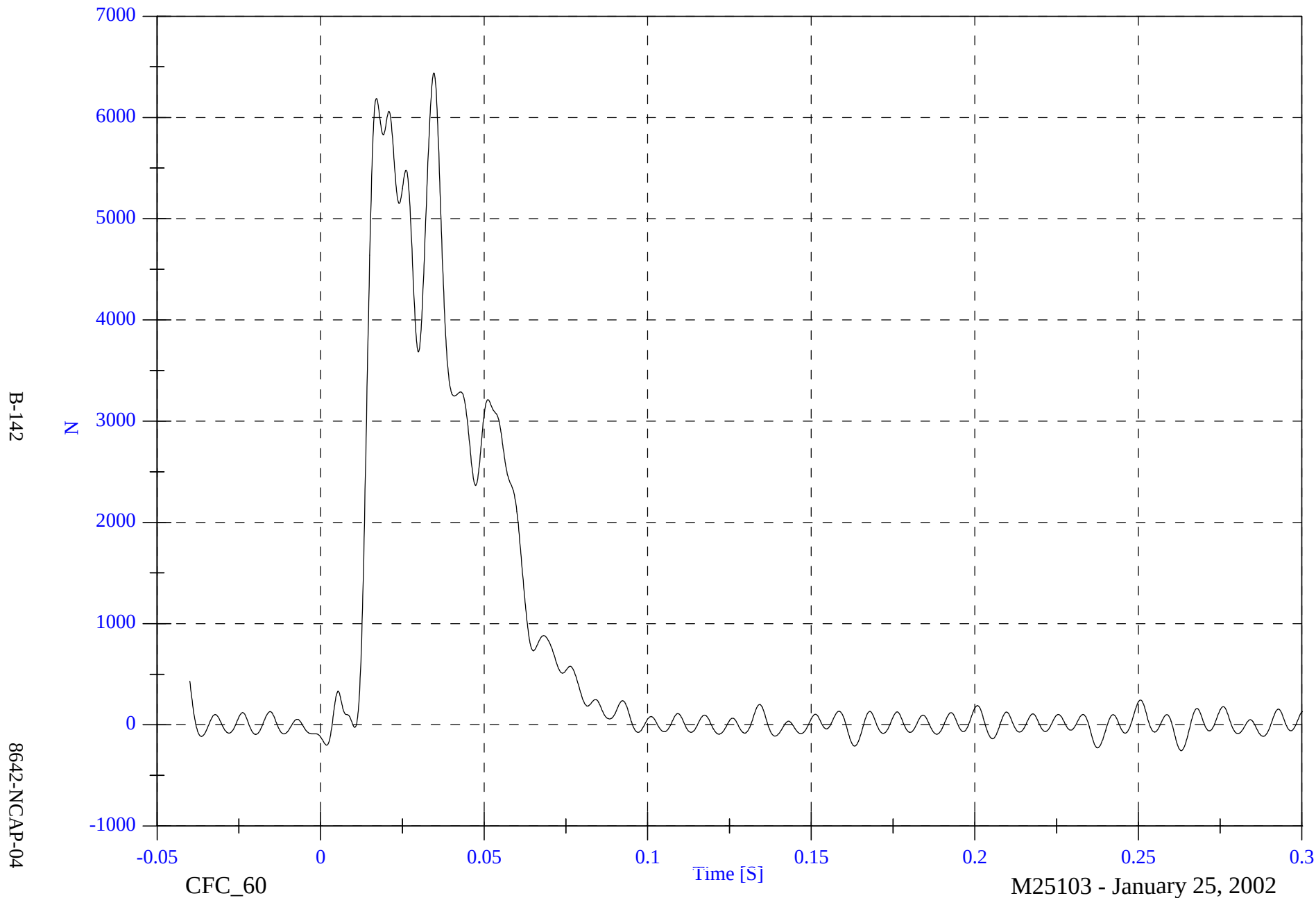


NCAP - 2002 Toyota Avalon

Barrier Load Cell A2 Fx

Max: 6440.8 [N] at 0.035 [S]

Min: -254.7 [N] at 0.263 [S]

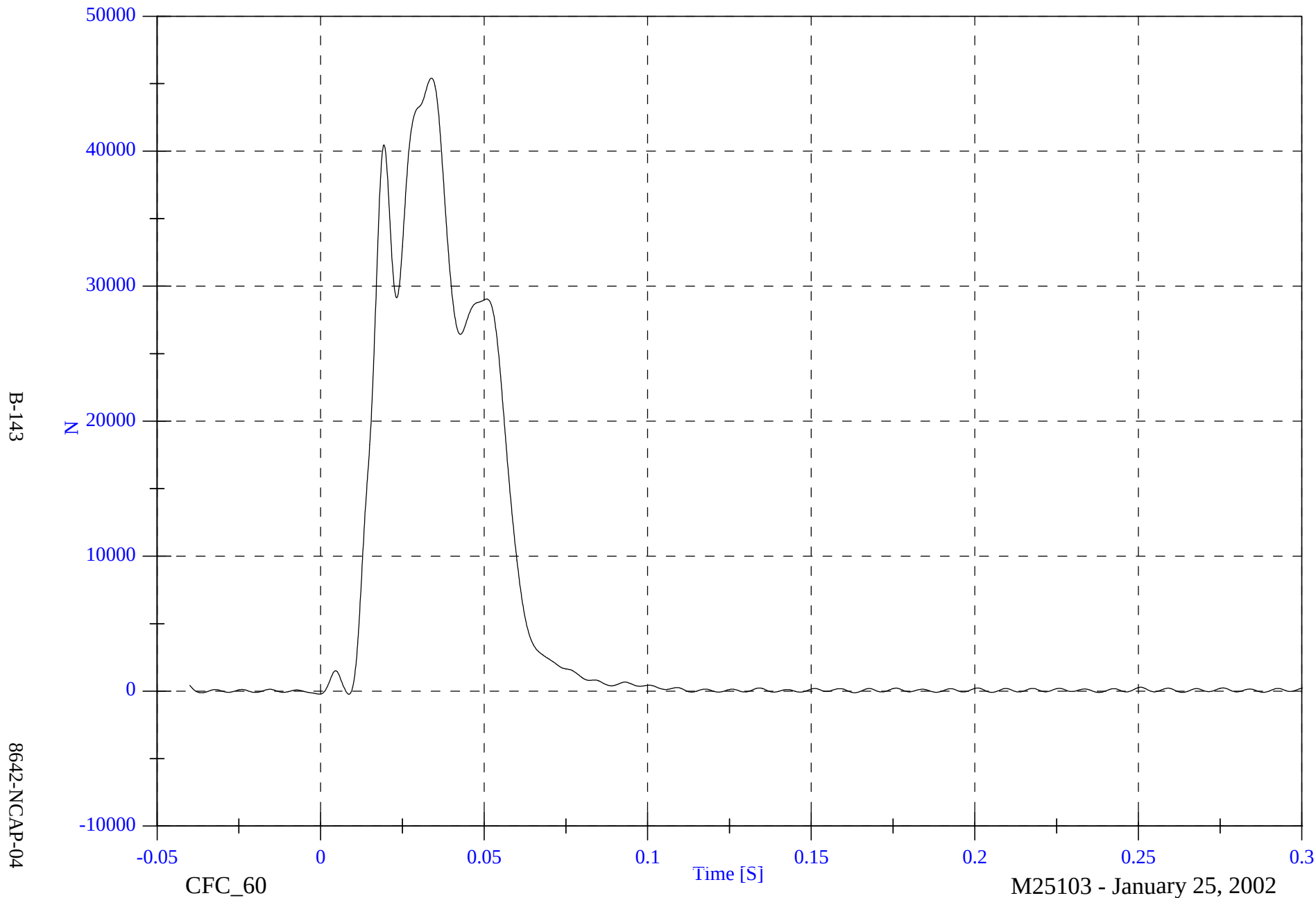


NCAP - 2002 Toyota Avalon

Barrier Load Cell A3 Fx

Max: 45410.6 [N] at 0.034 [S]

Min: -236.5 [N] at 0.009 [S]

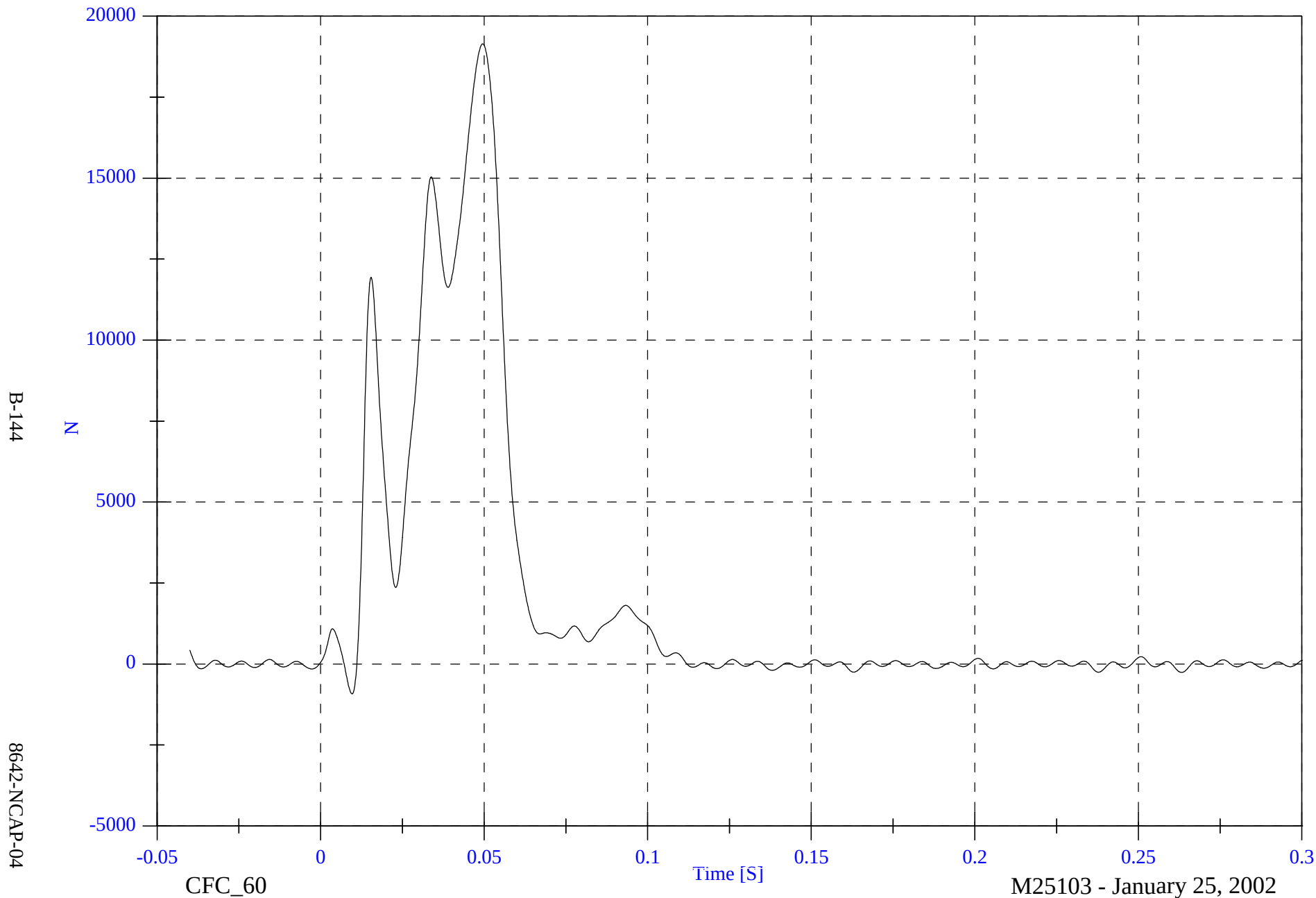


NCAP - 2002 Toyota Avalon

Barrier Load Cell A4 Fx

Max: 19147.7 [N] at 0.049 [S]

Min: -922.0 [N] at 0.010 [S]

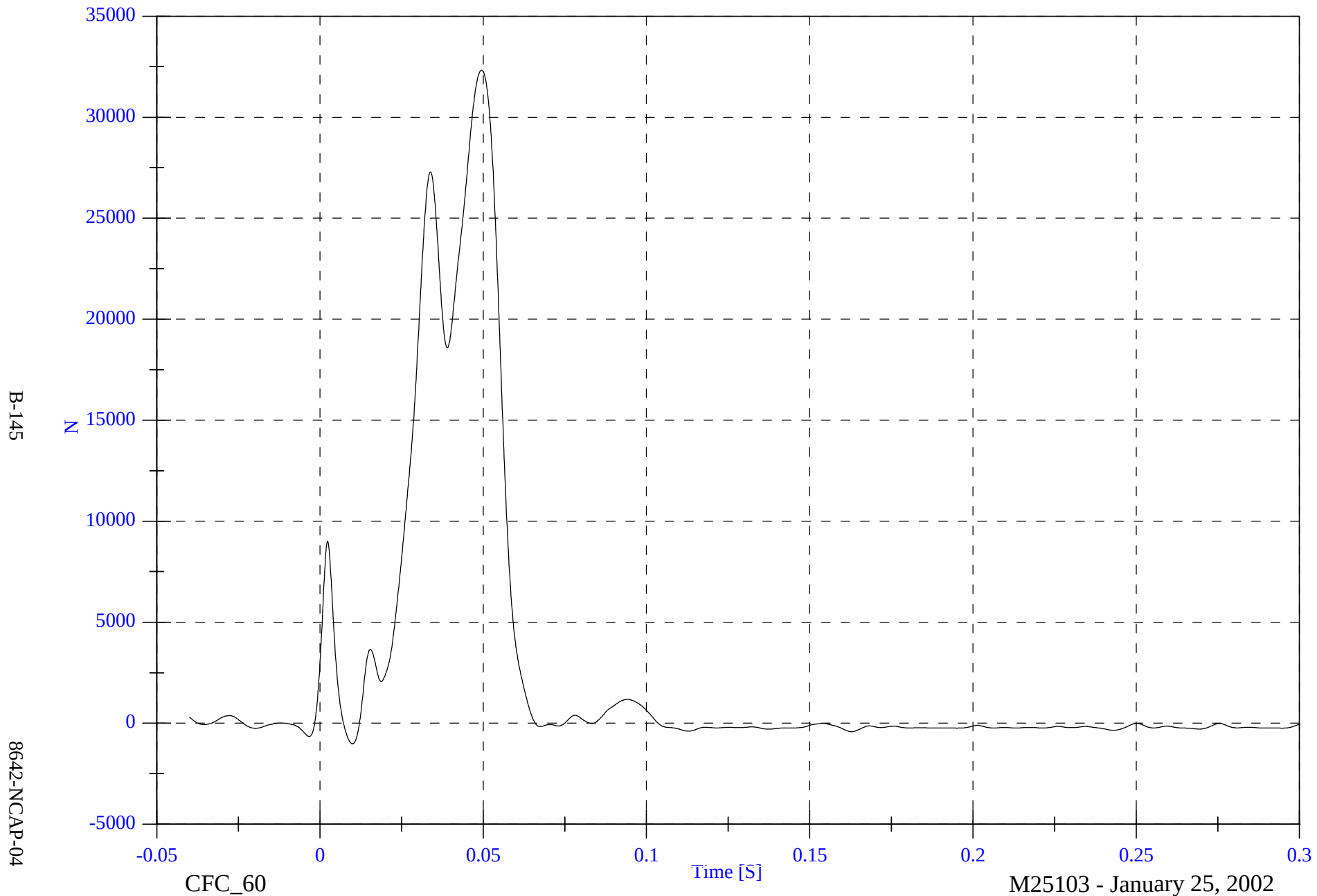


NCAP - 2002 Toyota Avalon

Barrier Load Cell A5 Fx

Max: 32331.4 [N] at 0.049 [S]

Min: -1021.7 [N] at 0.010 [S]

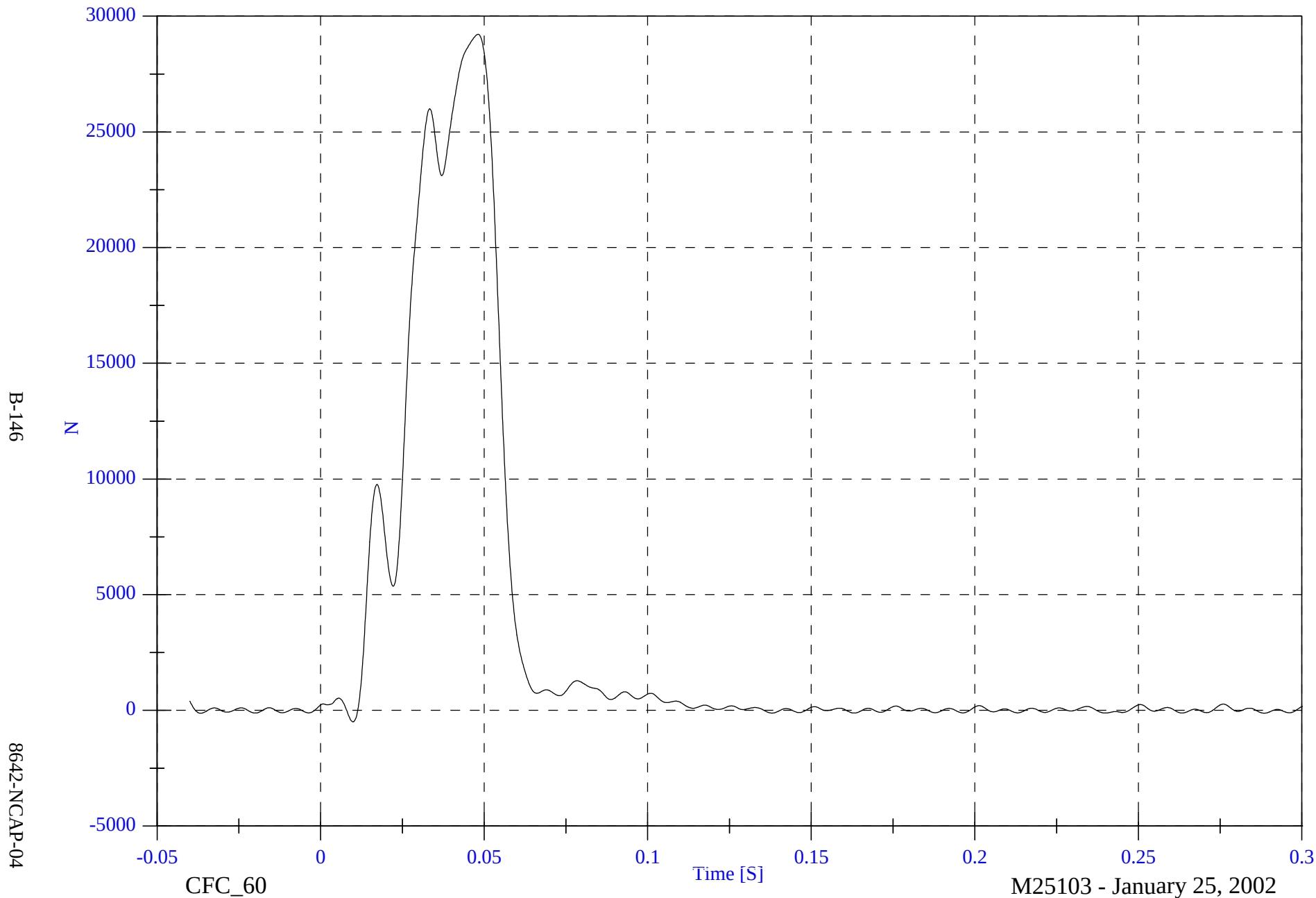


NCAP - 2002 Toyota Avalon

Barrier Load Cell A6 Fx

Max: 29216.7 [N] at 0.048 [S]

Min: -494.8 [N] at 0.010 [S]

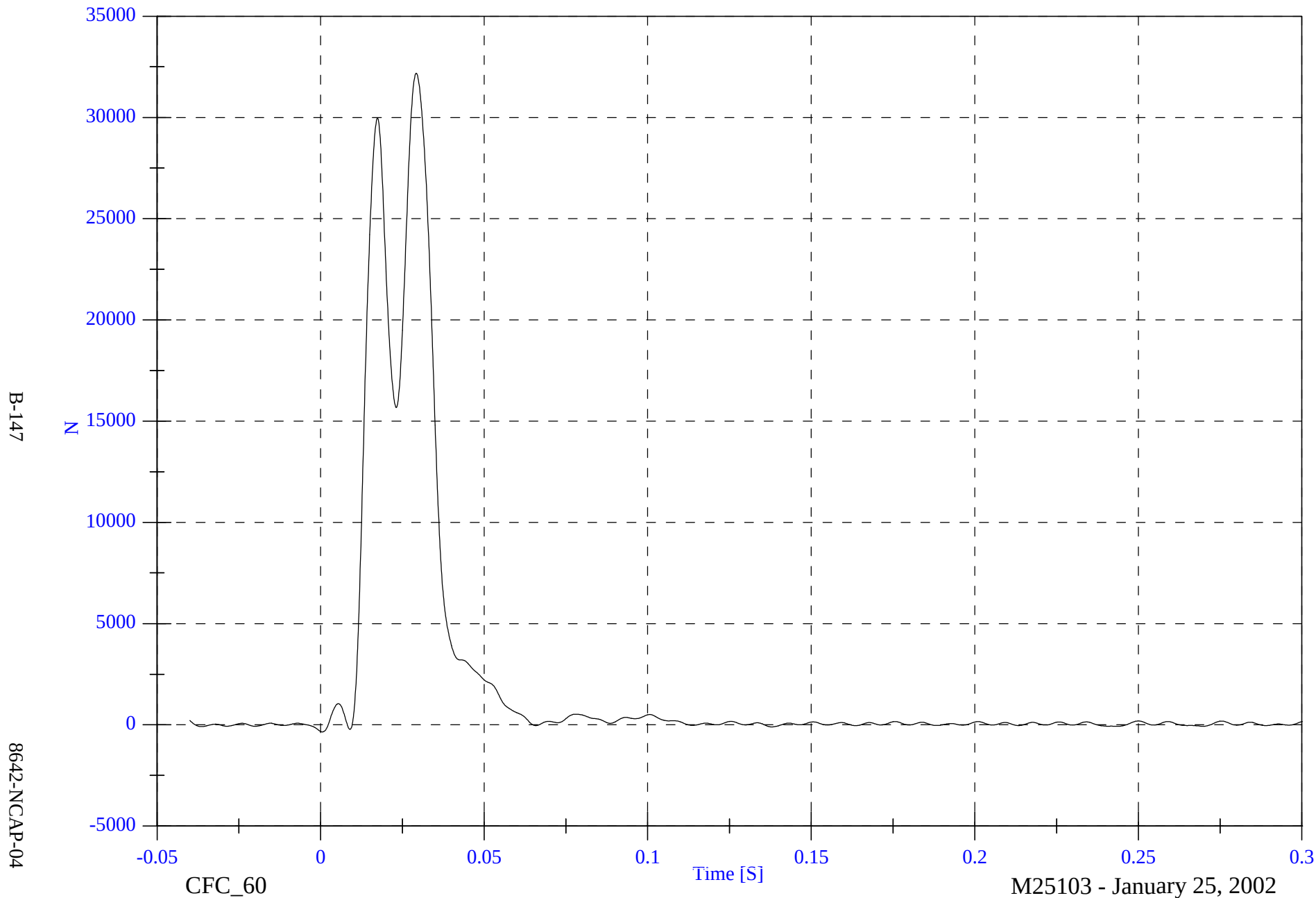


NCAP - 2002 Toyota Avalon

Barrier Load Cell A7 Fx

Max: 32184.2 [N] at 0.029 [S]

Min: -356.0 [N] at 0.000 [S]



NCAP - 2002 Toyota Avalon

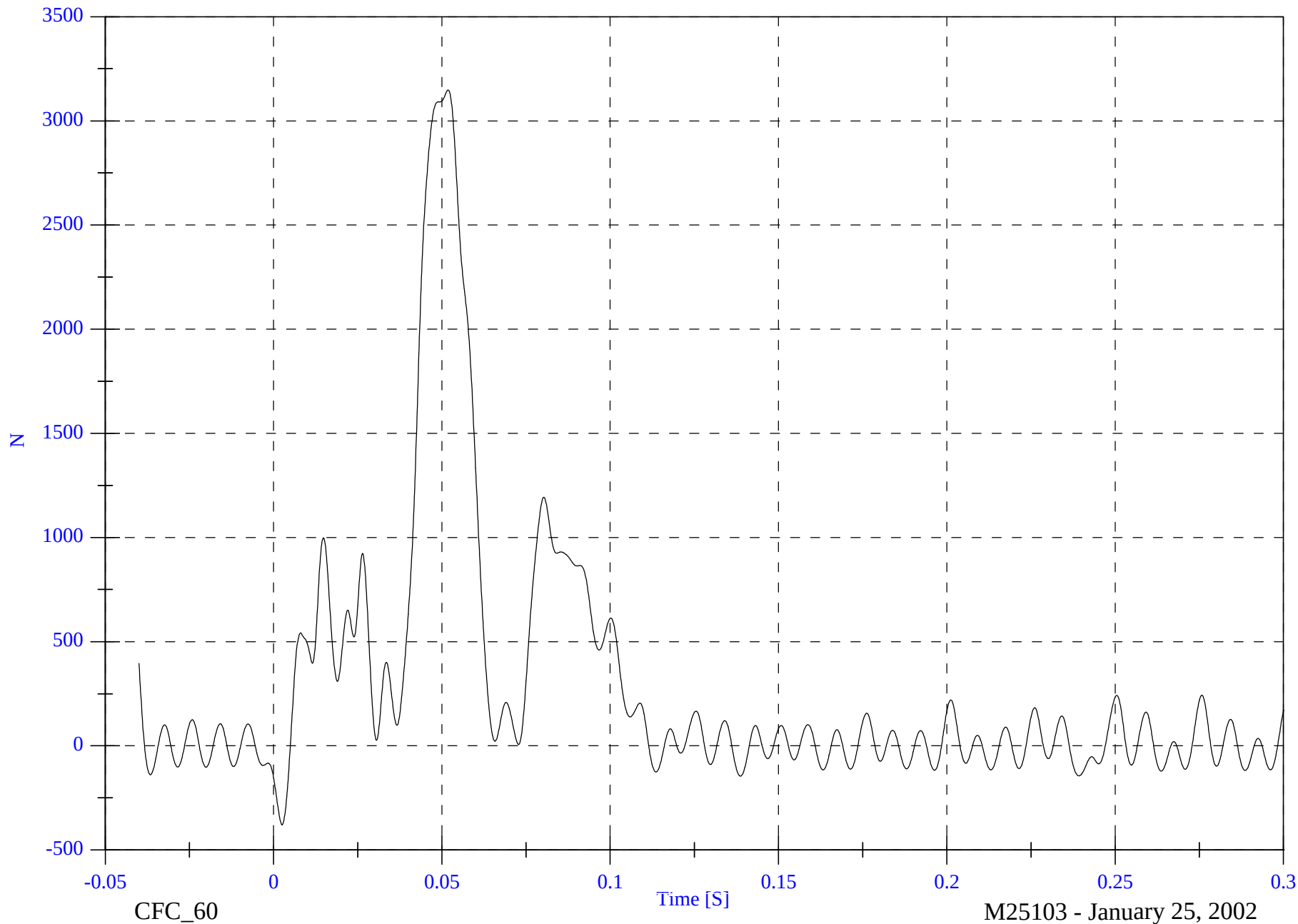
Barrier Load Cell A8 Fx

Max: 3148.1 [N] at 0.052 [S]

Min: -379.4 [N] at 0.002 [S]

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8642-NCAP-04

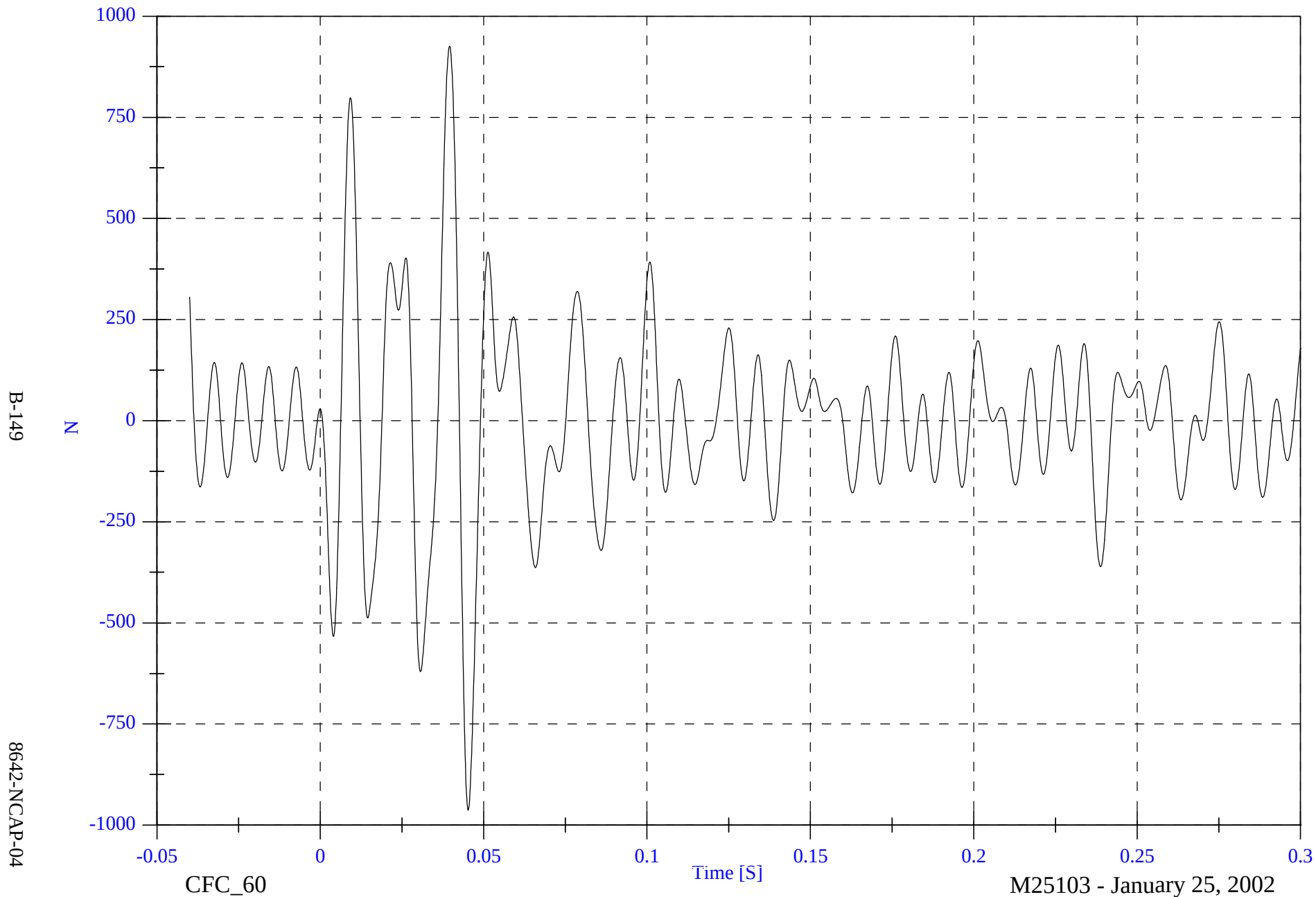


NCAP - 2002 Toyota Avalon

Barrier Load Cell A9 Fx

Max: 925.5 [N] at 0.040 [S]

Min: -963.1 [N] at 0.045 [S]

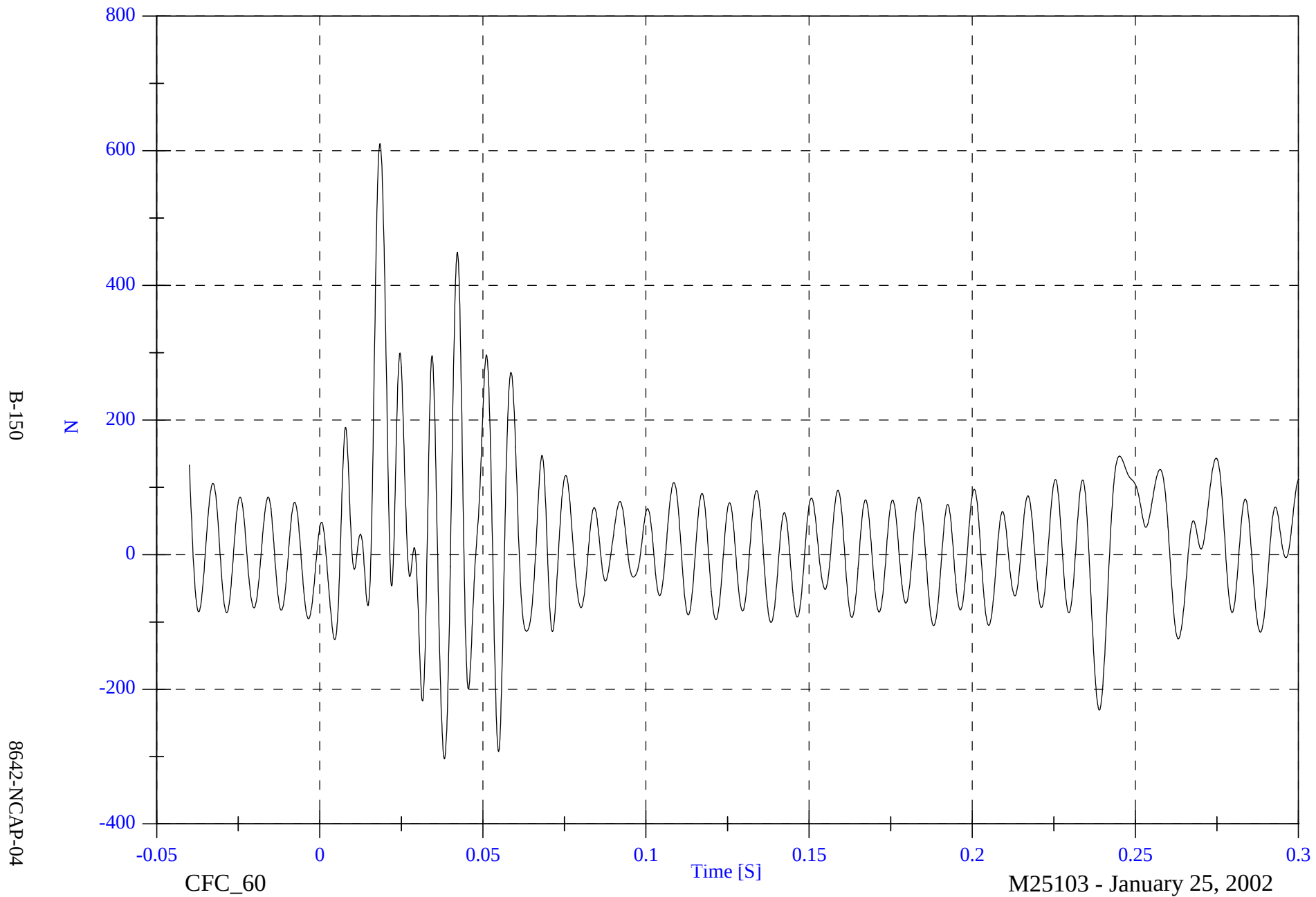


NCAP - 2002 Toyota Avalon

Barrier Load Cell B1 Fx

Max: 610.6 [N] at 0.018 [S]

Min: -303.5 [N] at 0.038 [S]

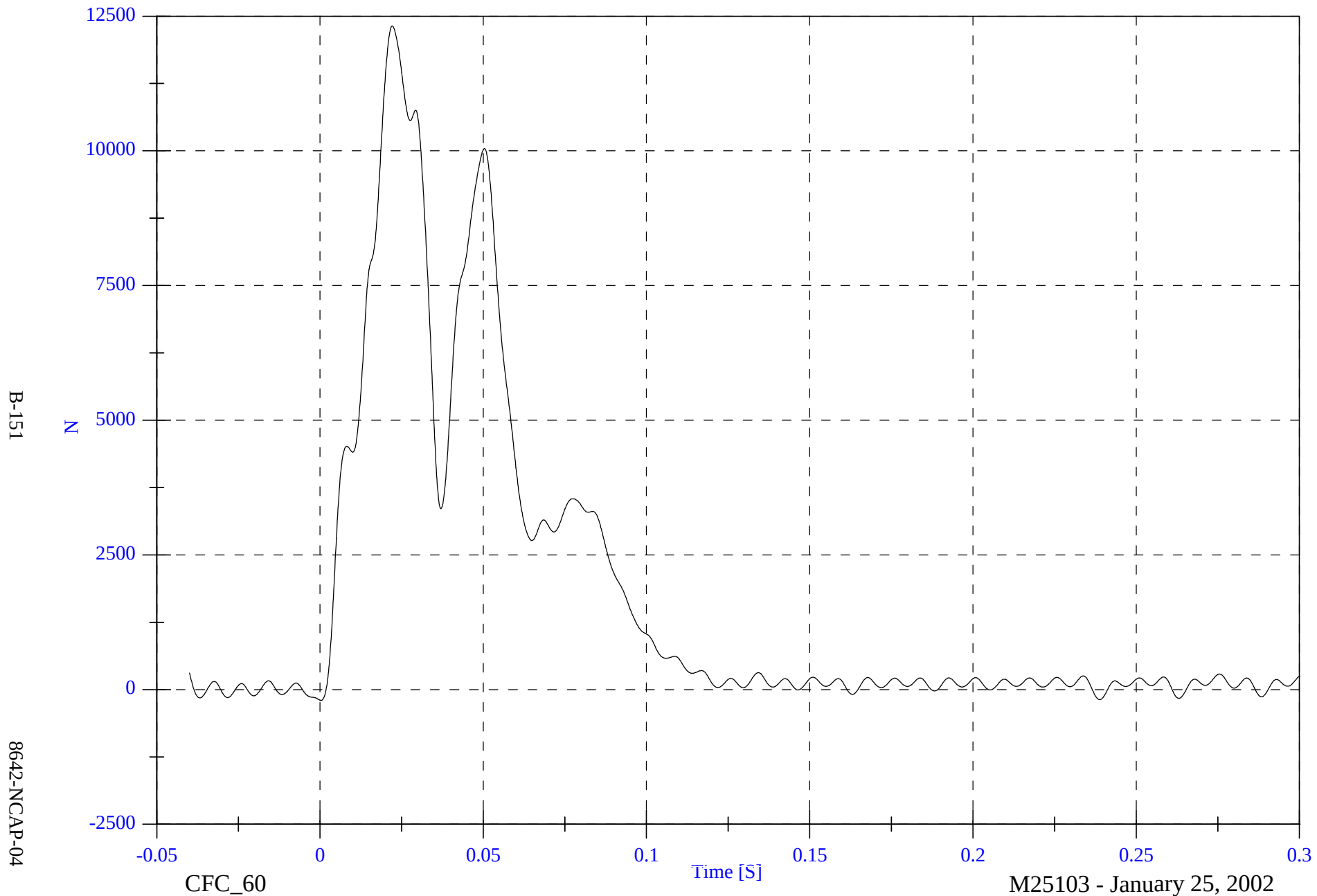


NCAP - 2002 Toyota Avalon

Barrier Load Cell B2 Fx

Max: 12318.8 [N] at 0.022 [S]

Min: -200.4 [N] at 0.000 [S]

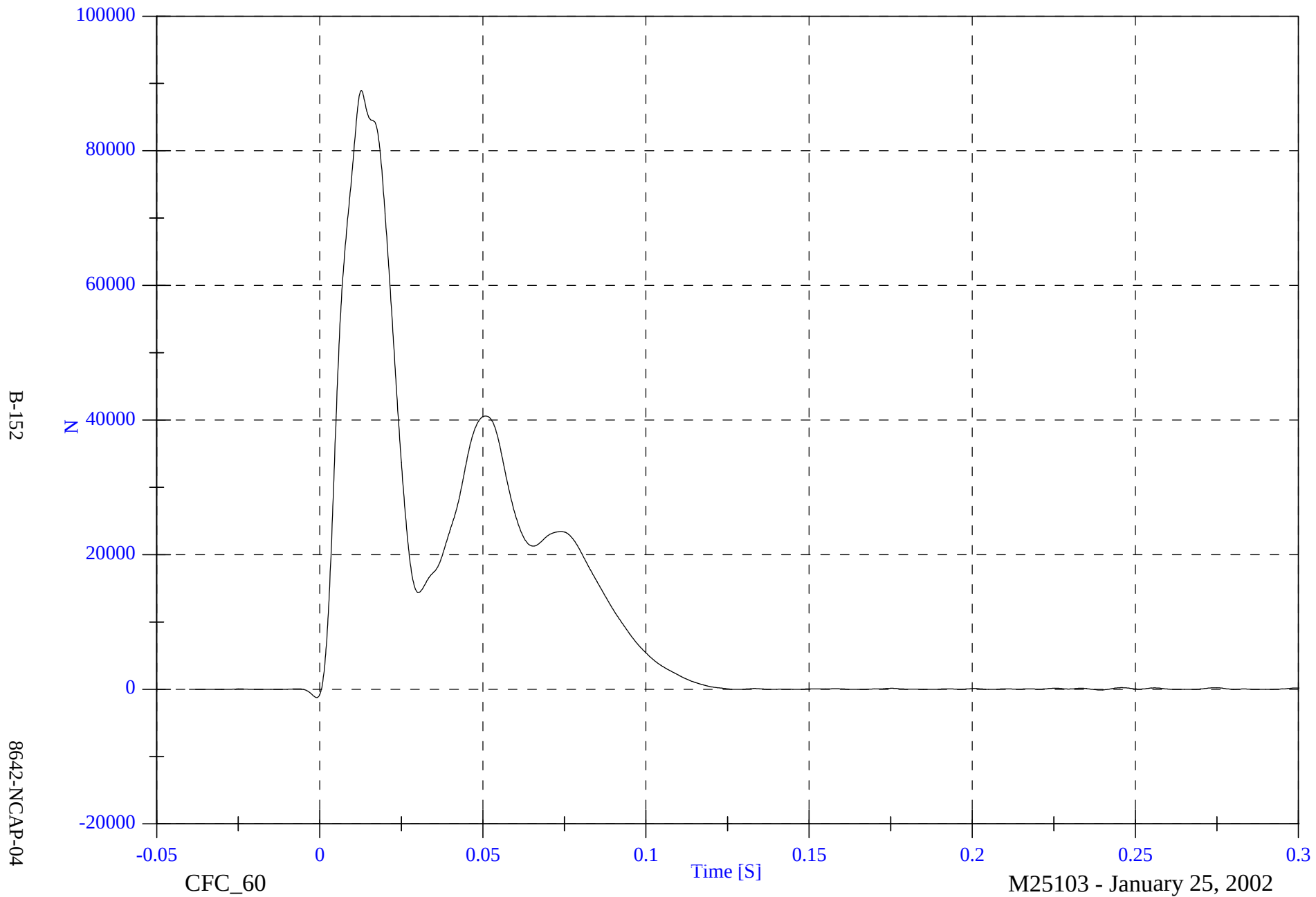


NCAP - 2002 Toyota Avalon

Barrier Load Cell B3 Fx

Max: 88958.0 [N] at 0.013 [S]

Min: -1235.3 [N] at -0.001 [S]

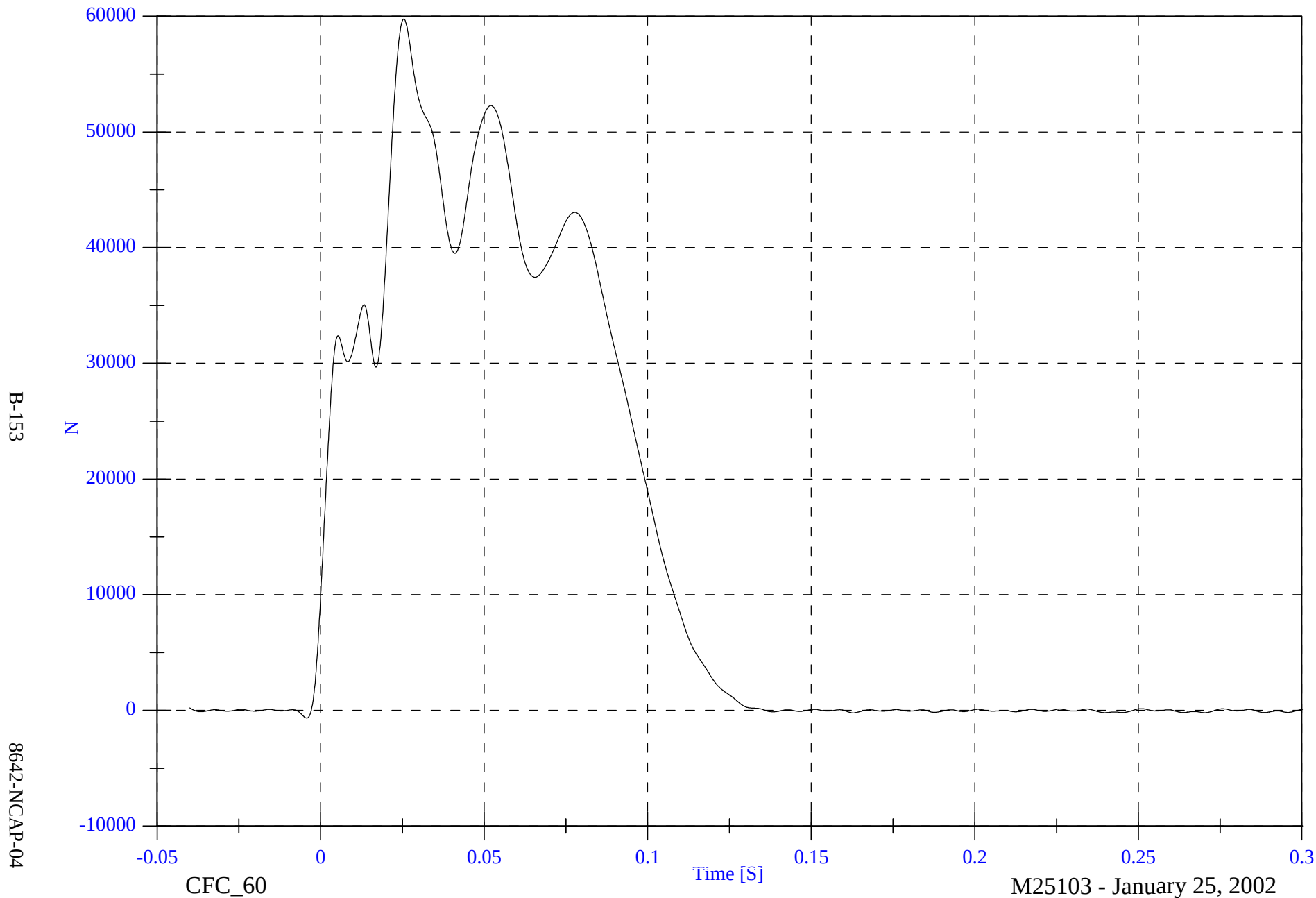


NCAP - 2002 Toyota Avalon

Barrier Load Cell B4 Fx

Max: 59764.3 [N] at 0.025 [S]

Min: -669.6 [N] at -0.004 [S]

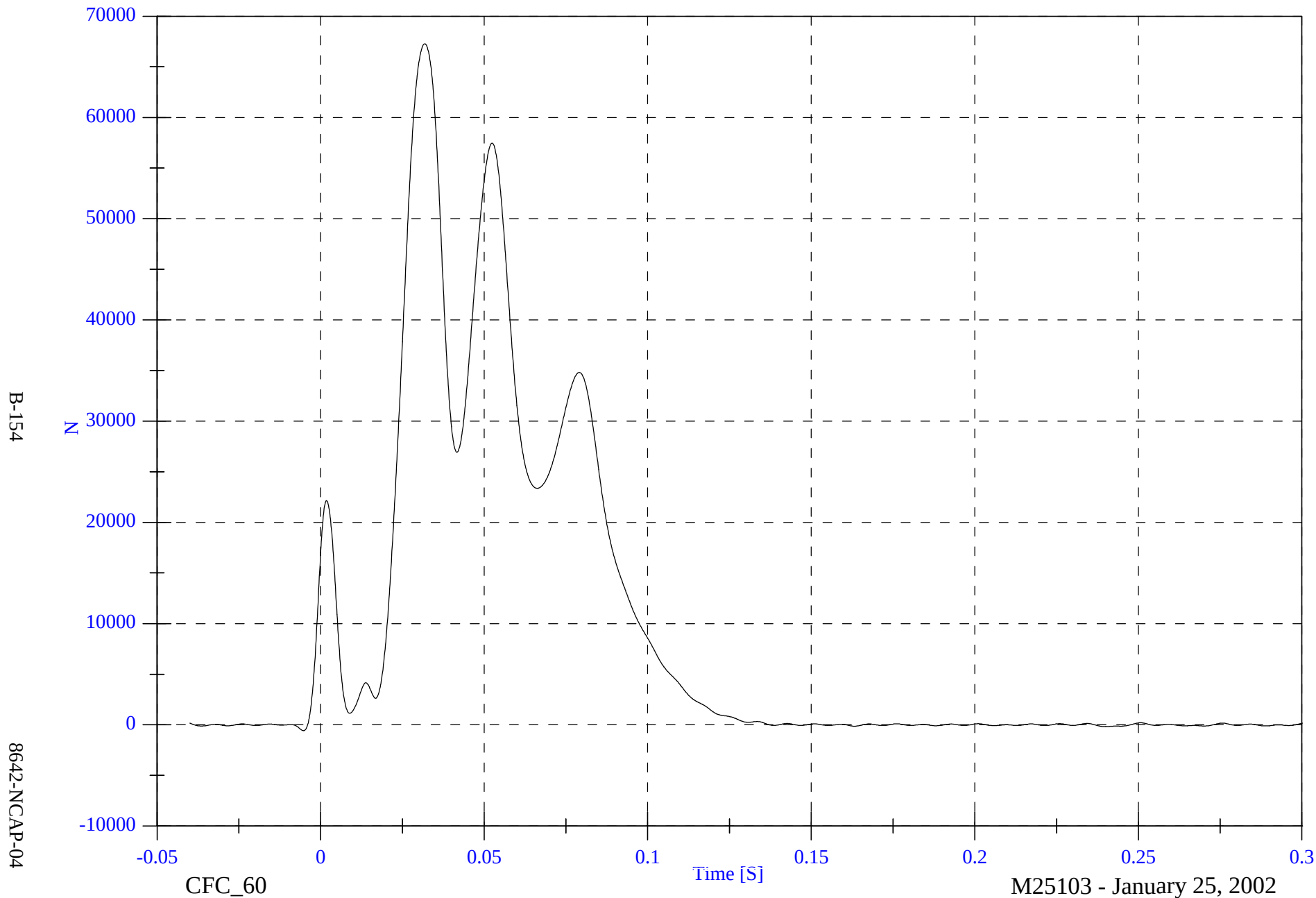


NCAP - 2002 Toyota Avalon

Barrier Load Cell B5 Fx

Max: 67276.2 [N] at 0.032 [S]

Min: -573.6 [N] at -0.005 [S]

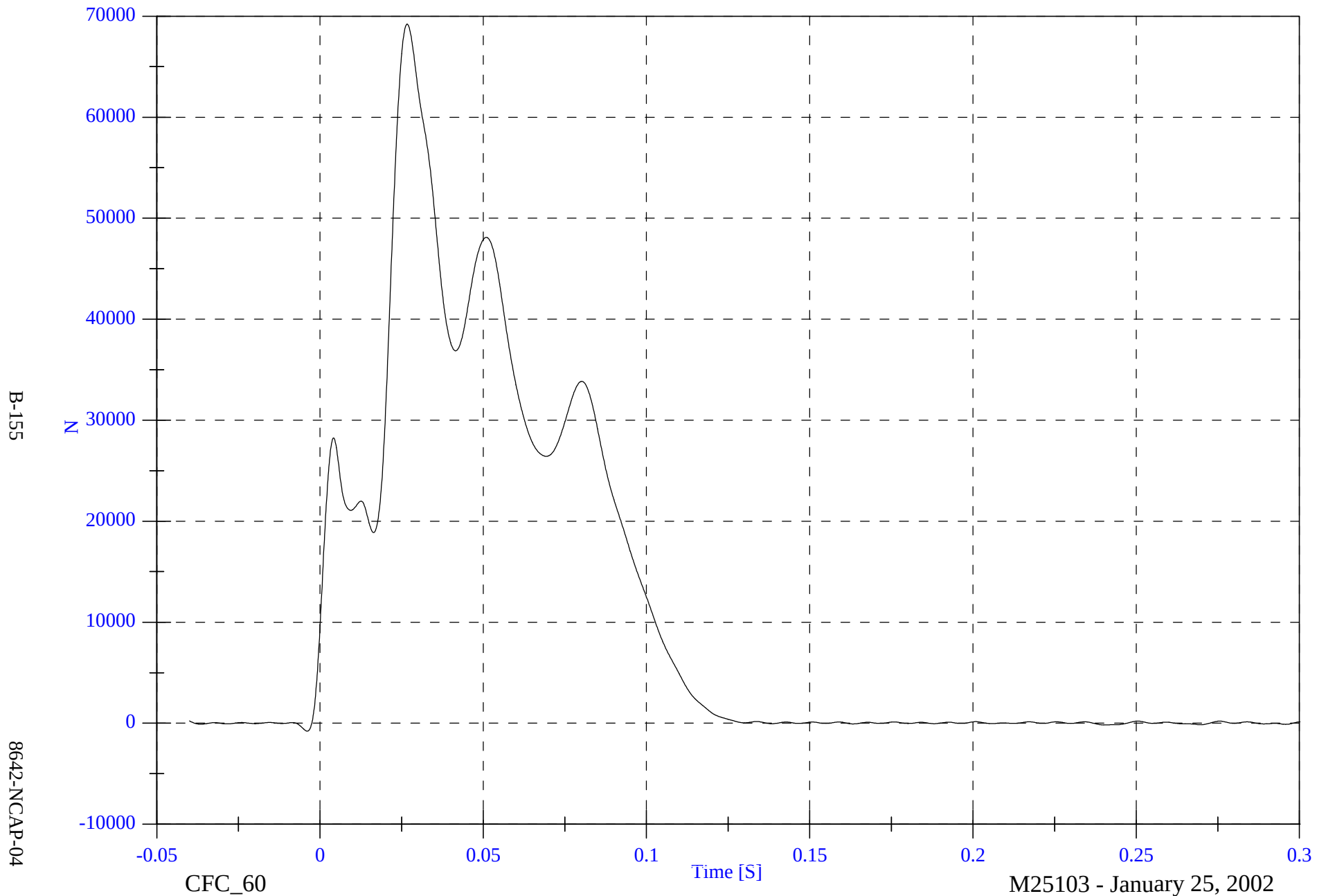


NCAP - 2002 Toyota Avalon

Barrier Load Cell B6 Fx

Max: 69220.6 [N] at 0.027 [S]

Min: -788.3 [N] at -0.004 [S]

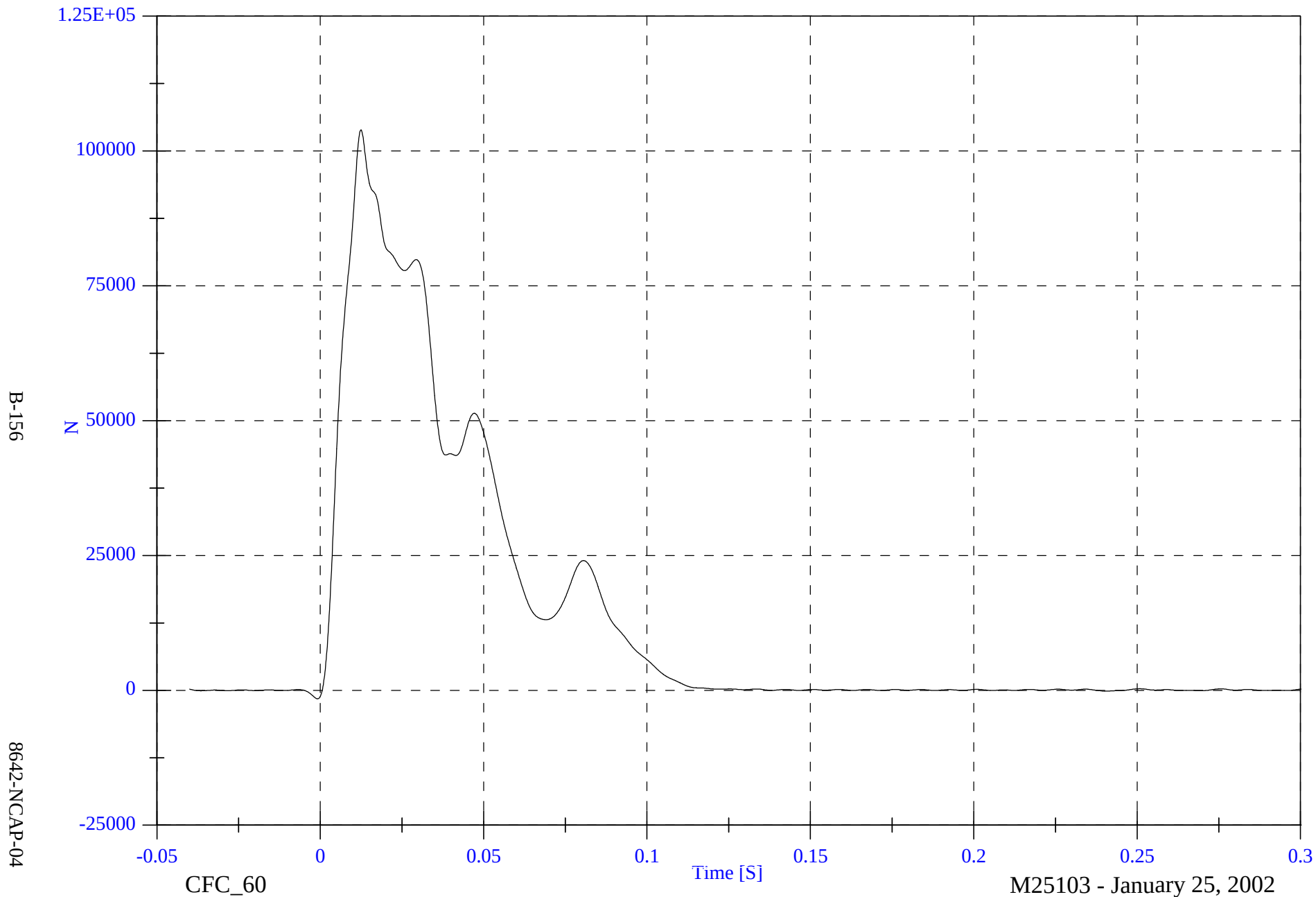


NCAP - 2002 Toyota Avalon

Barrier Load Cell B7 Fx

Max: 103917.9 [N] at 0.012 [S]

Min: -1578.3 [N] at -0.001 [S]

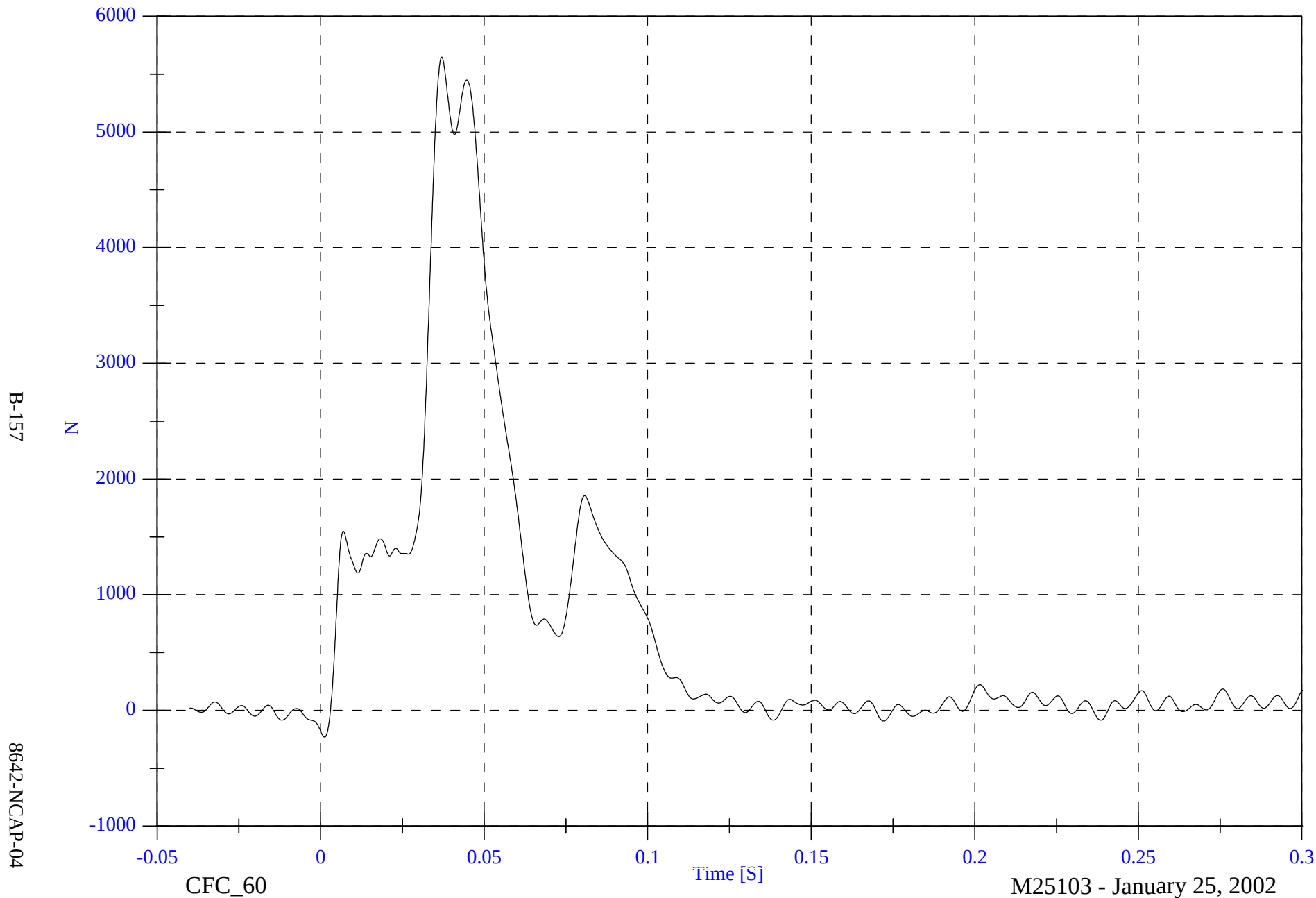


NCAP - 2002 Toyota Avalon

Barrier Load Cell B8 Fx

Max: 5647.2 [N] at 0.037 [S]

Min: -230.8 [N] at 0.001 [S]

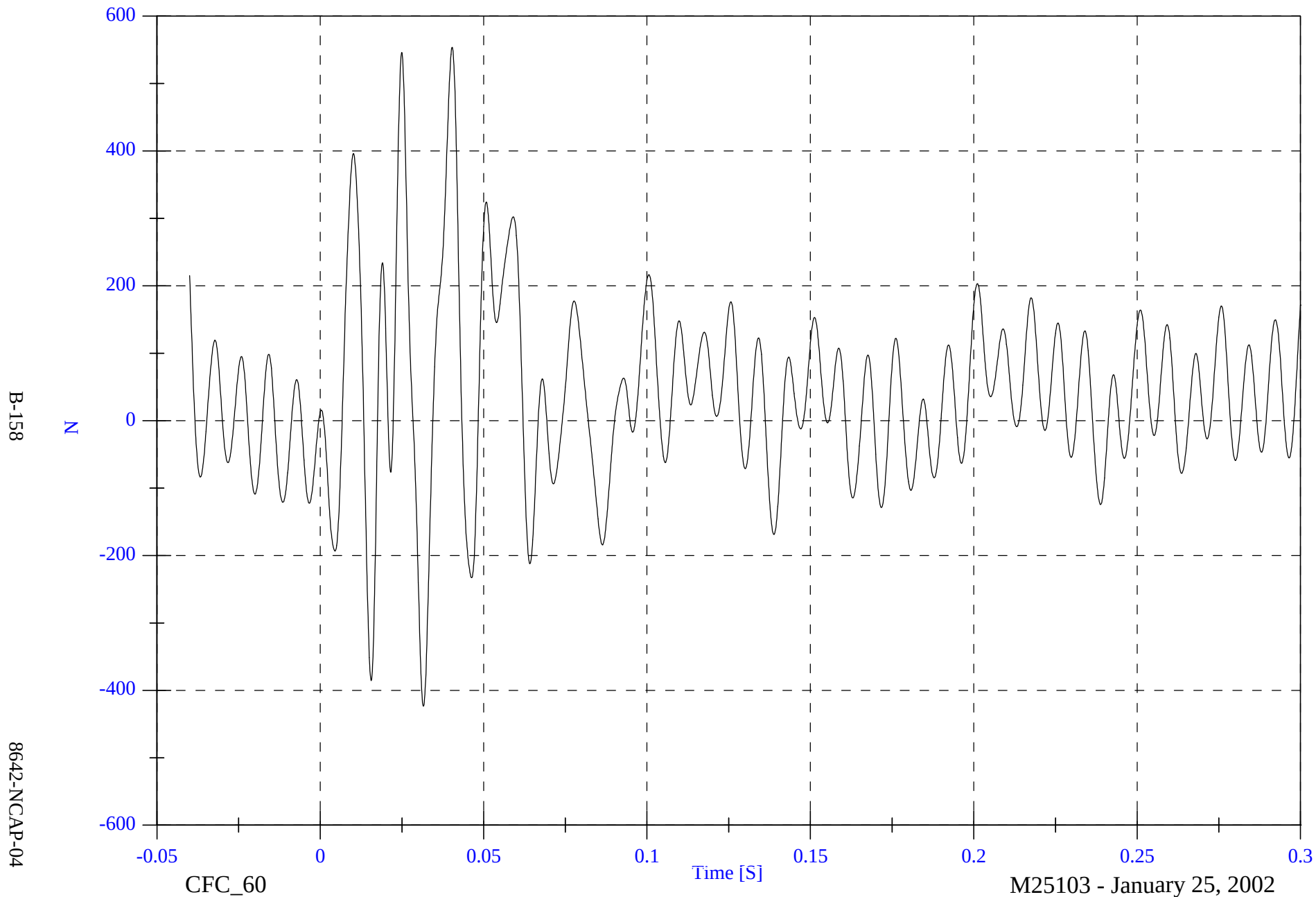


NCAP - 2002 Toyota Avalon

Barrier Load Cell B9 Fx

Max: 553.7 [N] at 0.040 [S]

Min: -423.5 [N] at 0.031 [S]

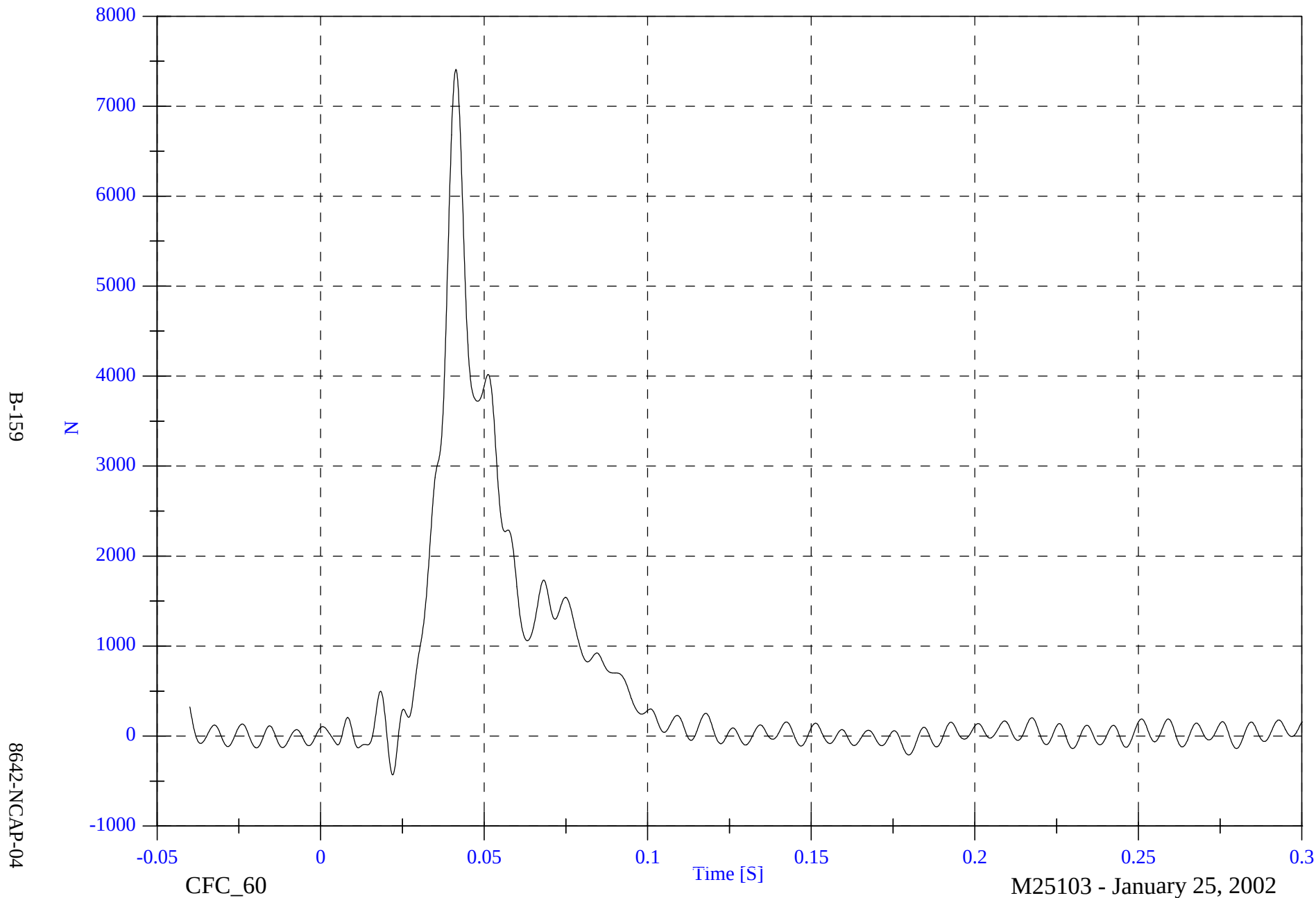


NCAP - 2002 Toyota Avalon

Barrier Load Cell C1 Fx

Max: 7409.5 [N] at 0.041 [S]

Min: -431.5 [N] at 0.022 [S]

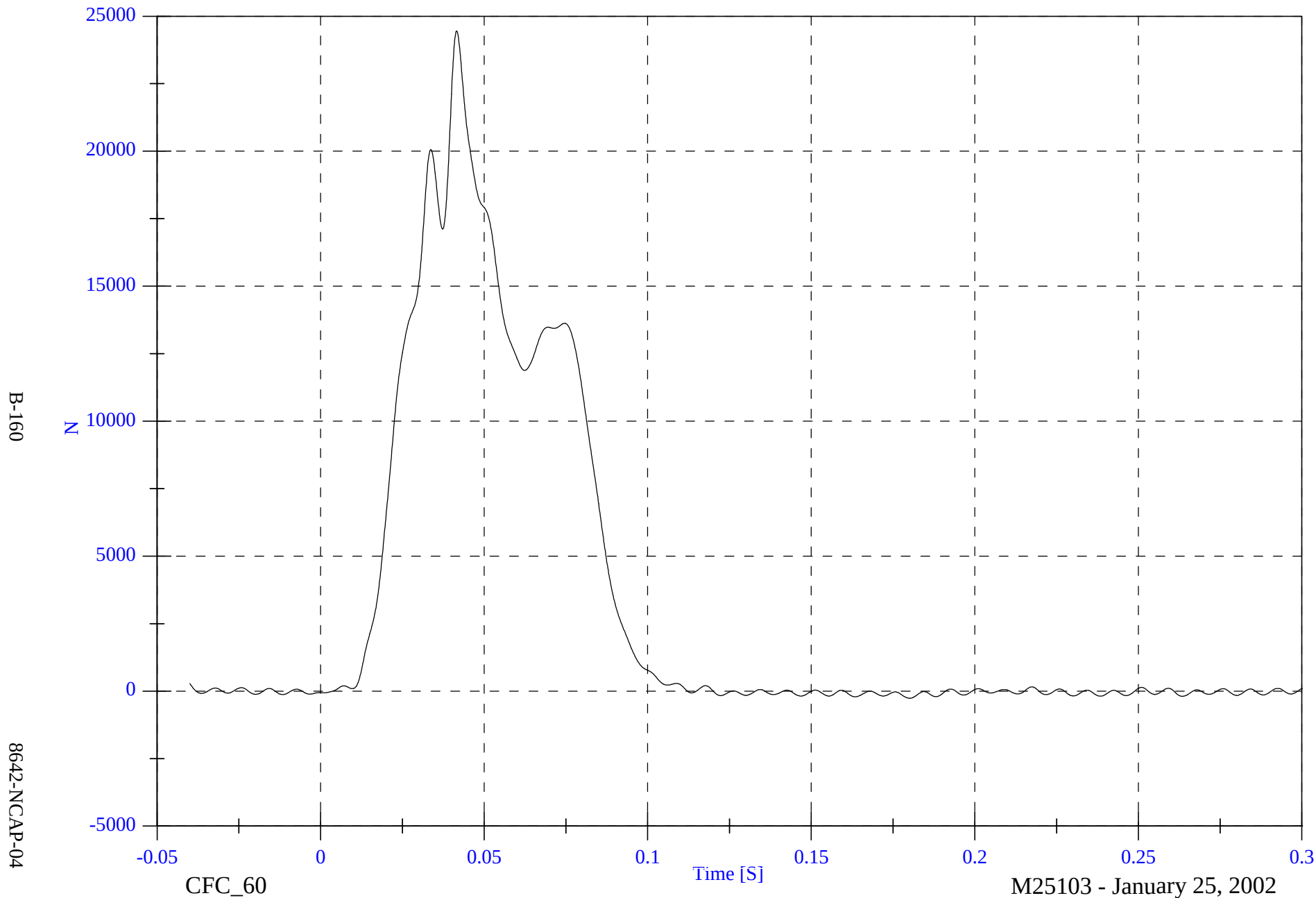


NCAP - 2002 Toyota Avalon

Barrier Load Cell C2 Fx

Max: 24455.8 [N] at 0.042 [S]

Min: -264.9 [N] at 0.180 [S]

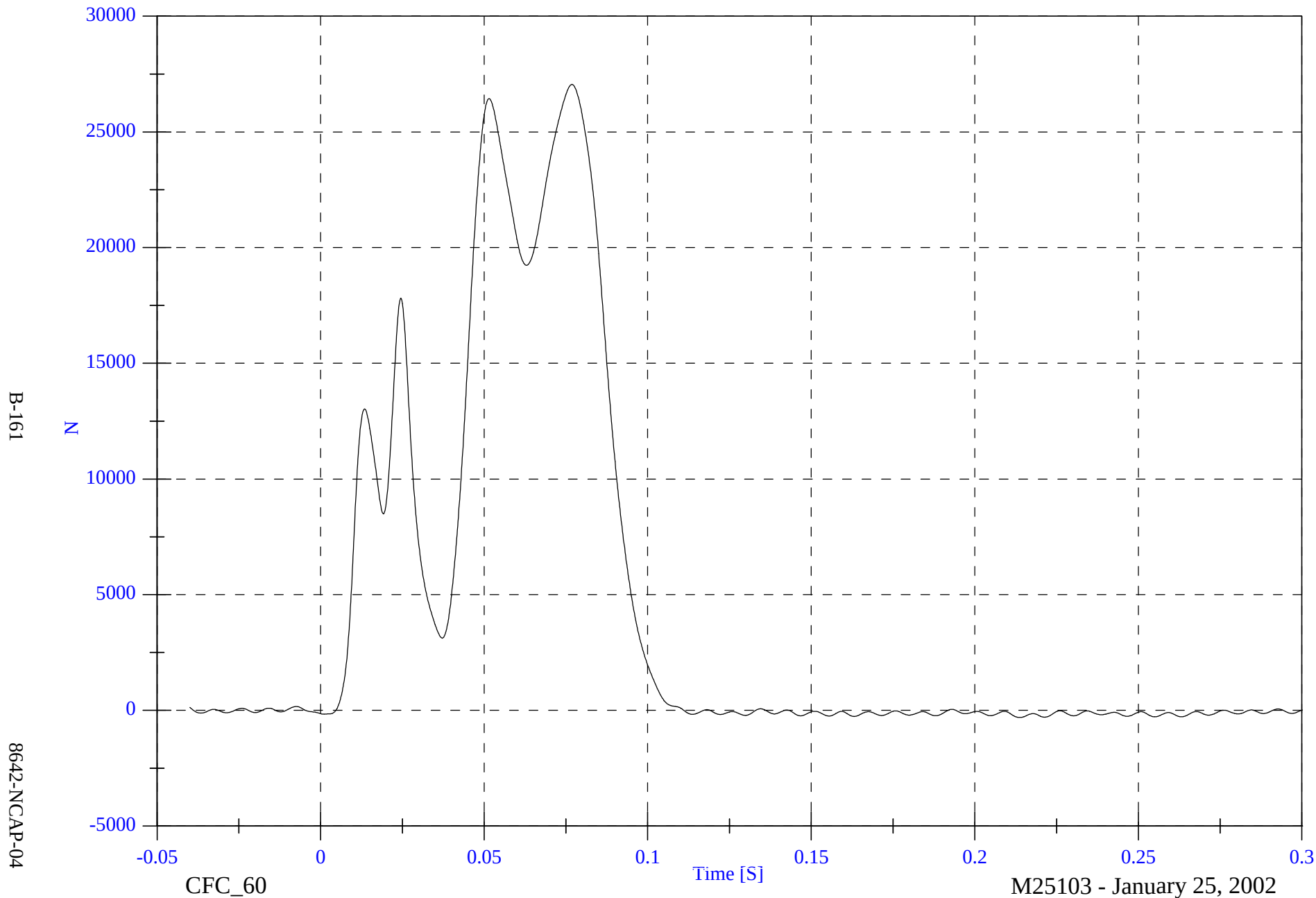


NCAP - 2002 Toyota Avalon

Barrier Load Cell C3 Fx

Max: 27052.0 [N] at 0.077 [S]

Min: -309.6 [N] at 0.214 [S]

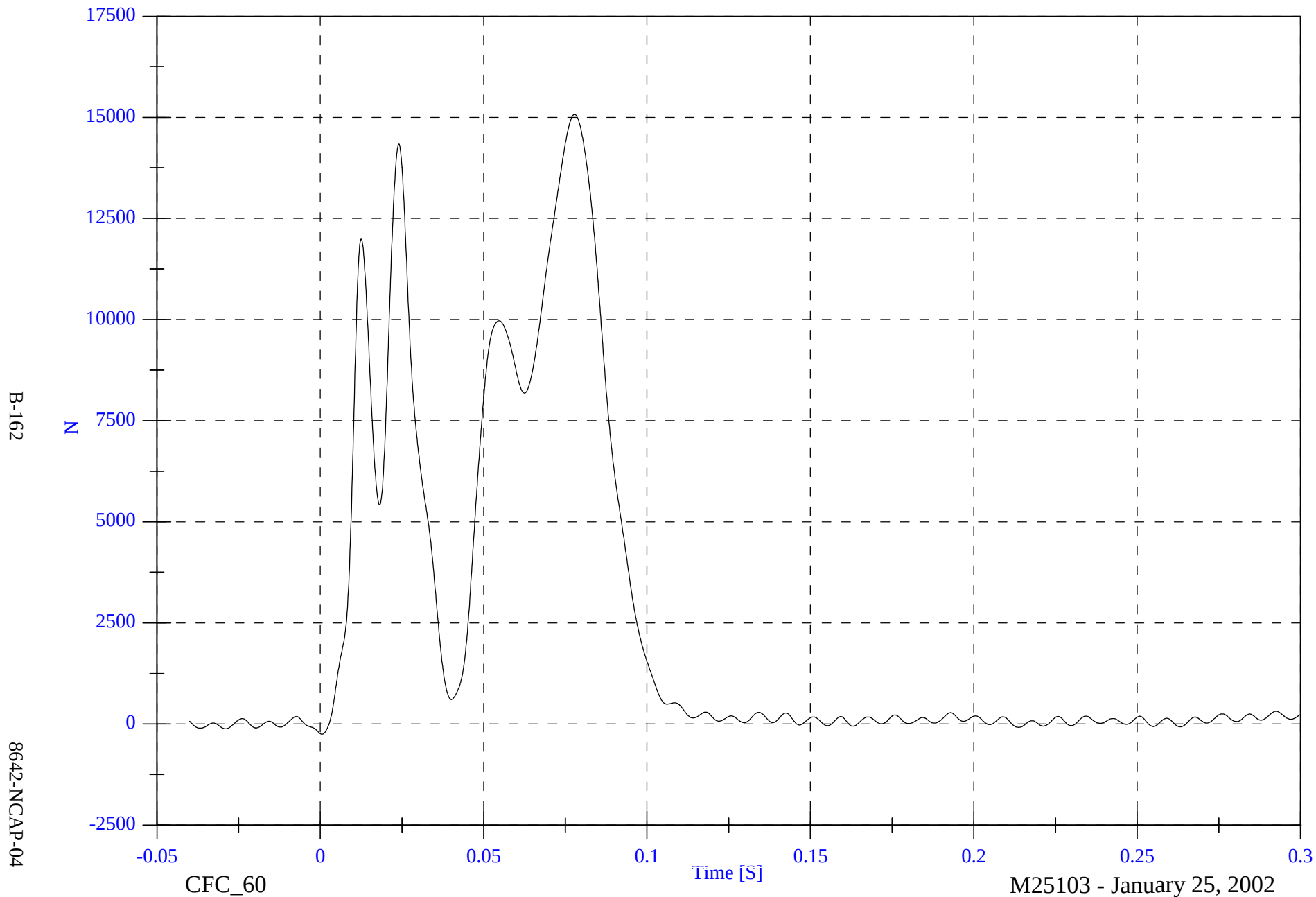


NCAP - 2002 Toyota Avalon

Barrier Load Cell C4 Fx

Max: 15070.6 [N] at 0.078 [S]

Min: -253.0 [N] at 0.000 [S]

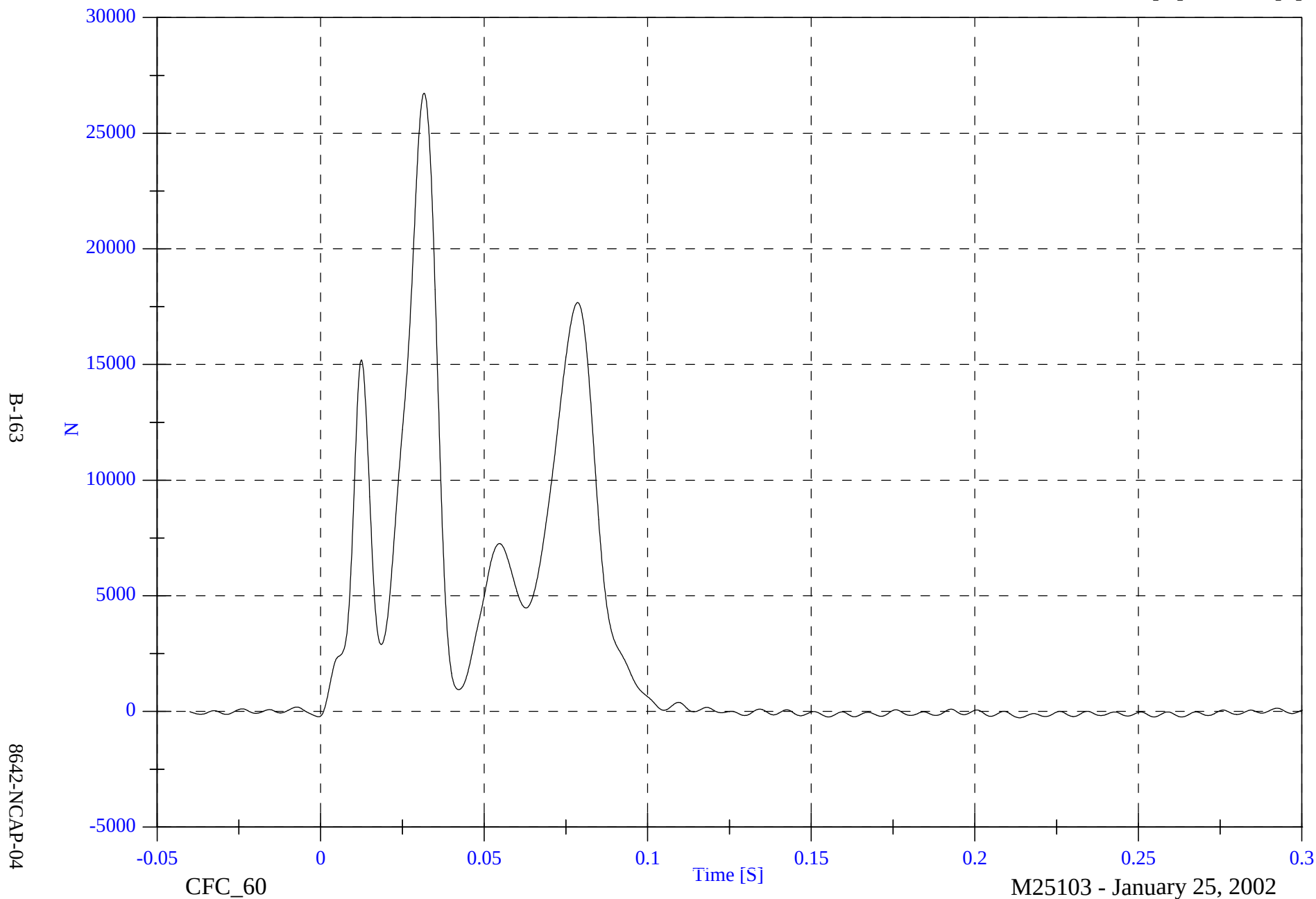


NCAP - 2002 Toyota Avalon

Barrier Load Cell C5 Fx

Max: 26735.3 [N] at 0.032 [S]

Min: -270.6 [N] at 0.214 [S]

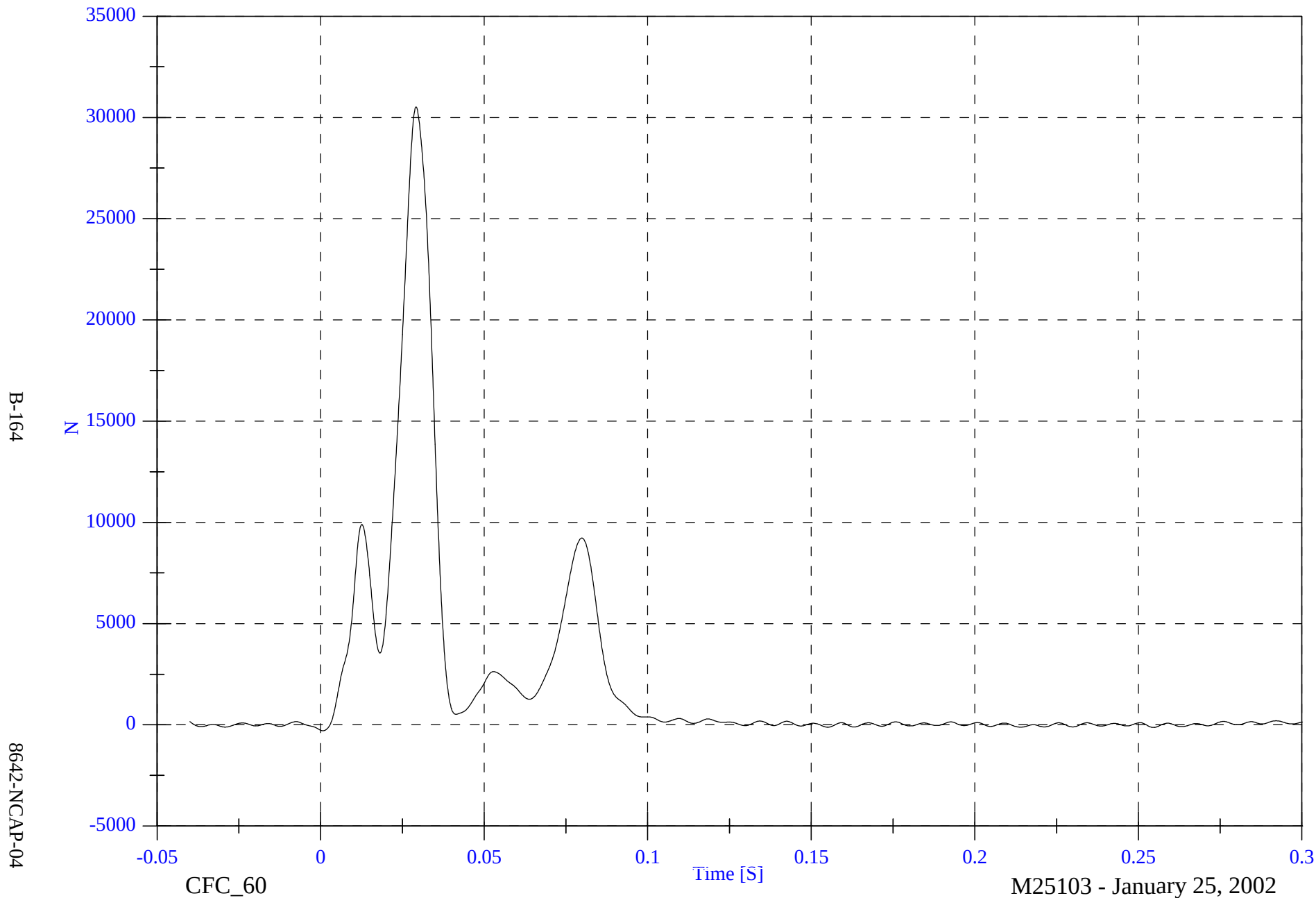


NCAP - 2002 Toyota Avalon

Barrier Load Cell C6 Fx

Max: 30527.7 [N] at 0.029 [S]

Min: -290.9 [N] at 0.001 [S]

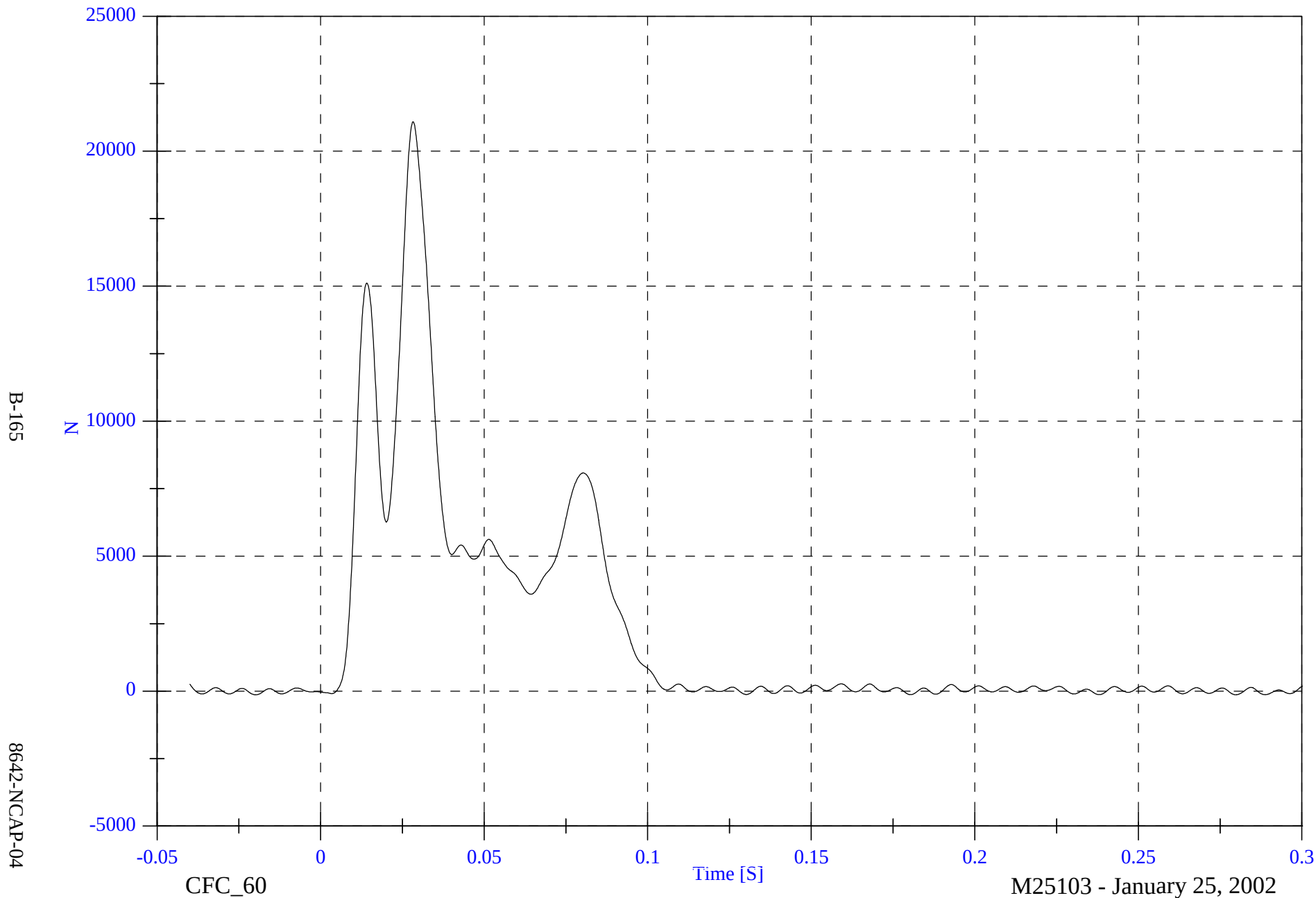


NCAP - 2002 Toyota Avalon

Barrier Load Cell C7 Fx

Max: 21090.1 [N] at 0.028 [S]

Min: -138.3 [N] at -0.020 [S]

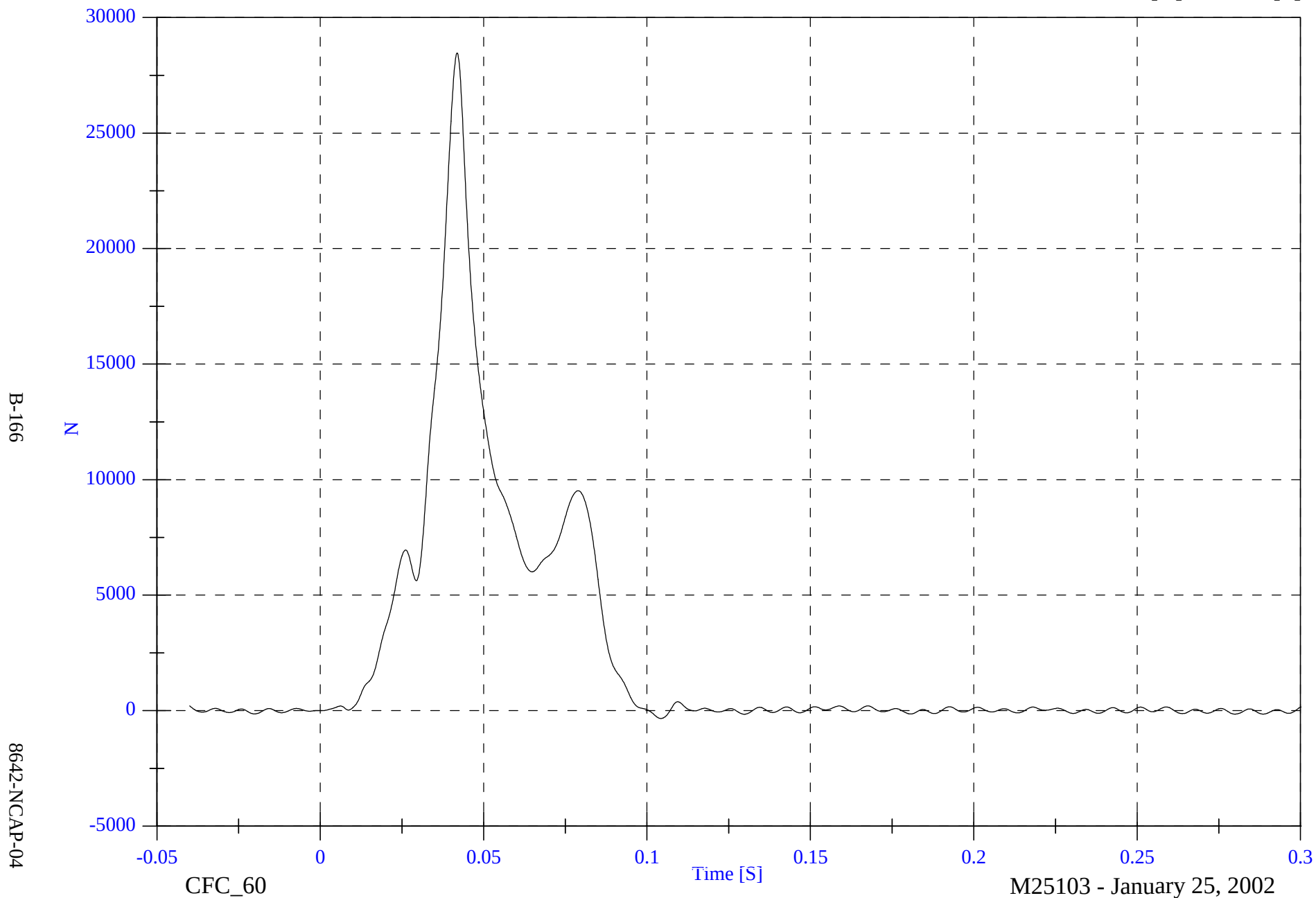


NCAP - 2002 Toyota Avalon

Barrier Load Cell C8 Fx

Max: 28467.5 [N] at 0.042 [S]

Min: -337.4 [N] at 0.104 [S]

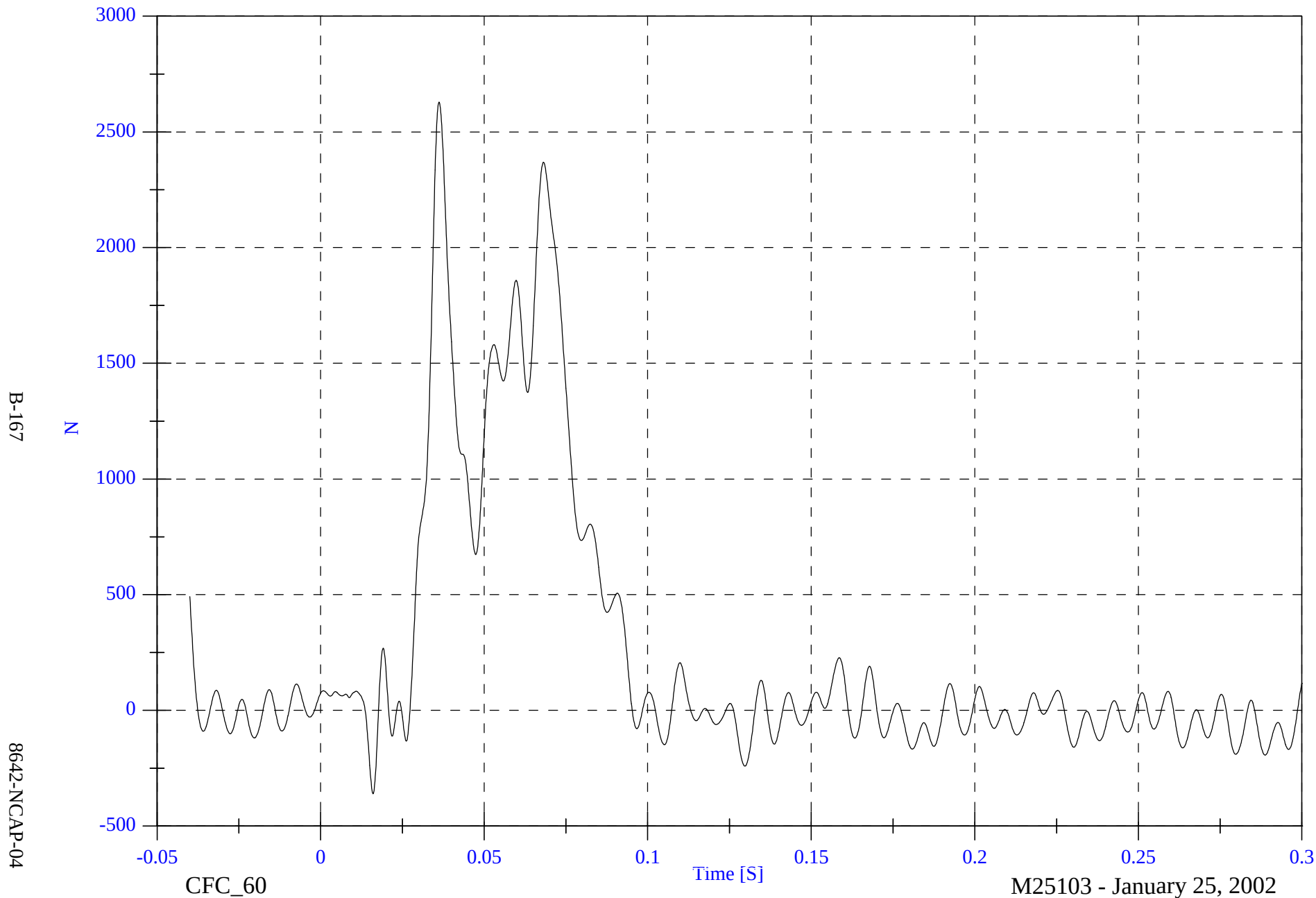


NCAP - 2002 Toyota Avalon

Barrier Load Cell C9 Fx

Max: 2629.4 [N] at 0.036 [S]

Min: -360.9 [N] at 0.016 [S]

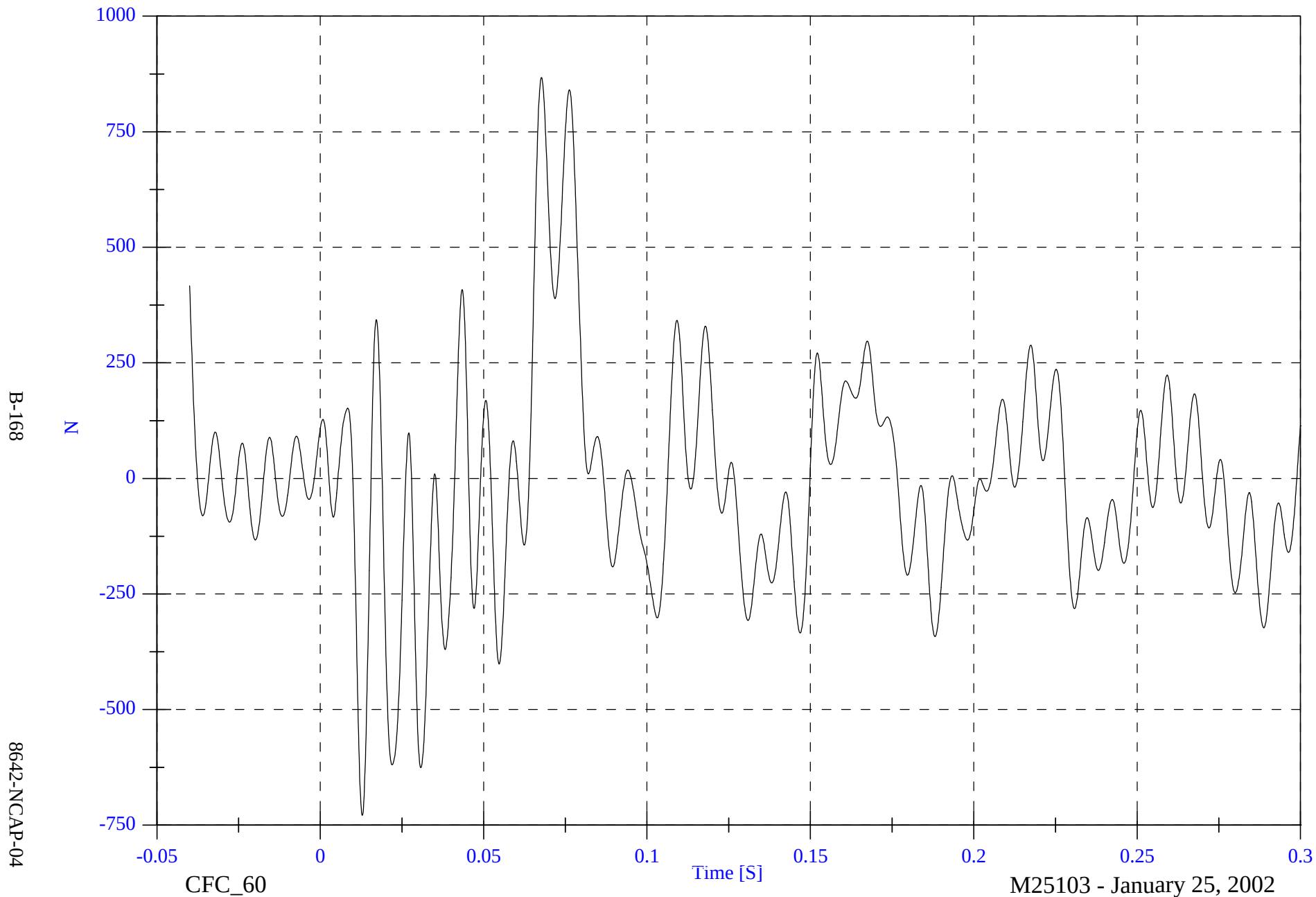


NCAP - 2002 Toyota Avalon

Barrier Load Cell D1 Fx

Max: 867.3 [N] at 0.068 [S]

Min: -729.0 [N] at 0.013 [S]

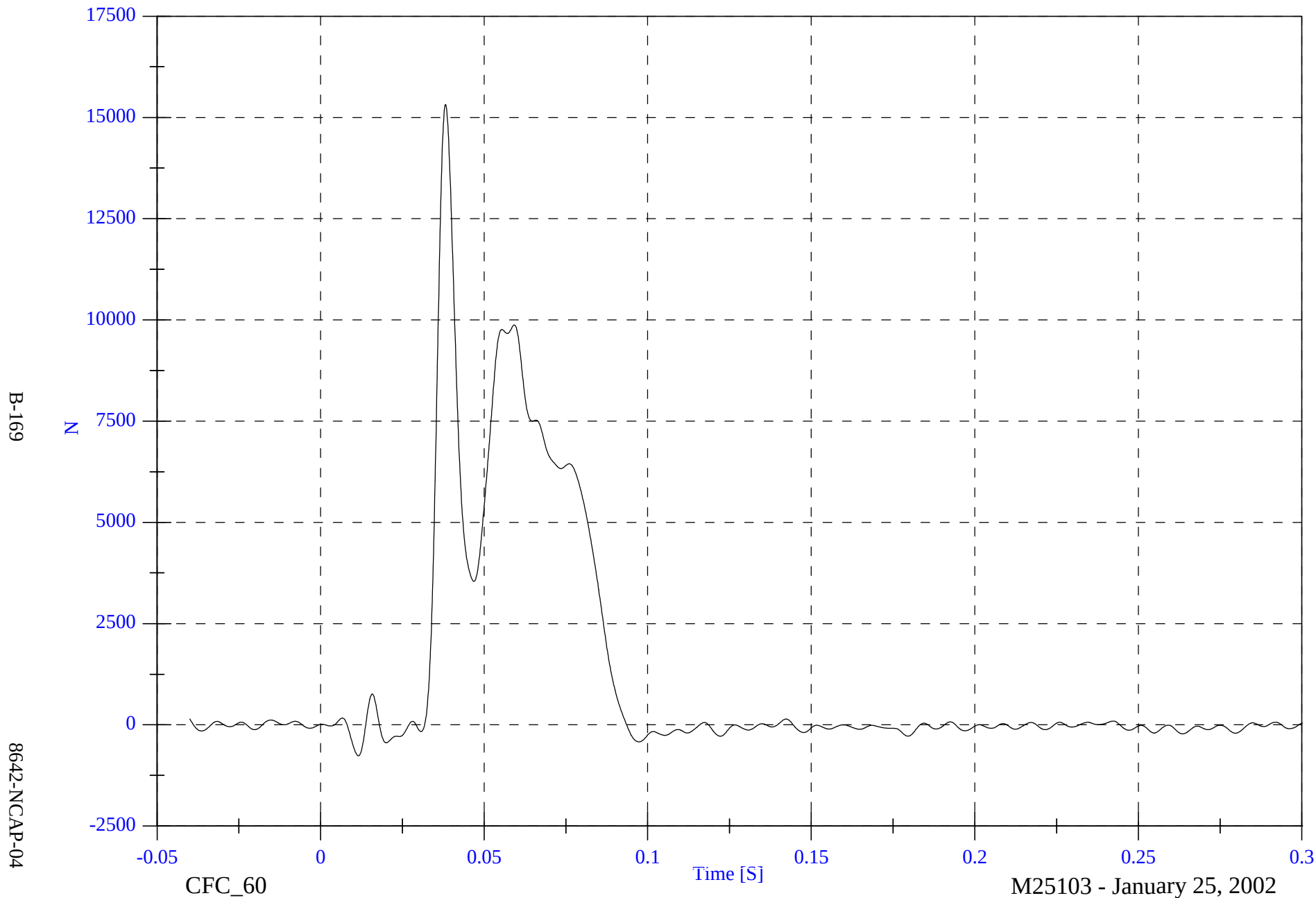


NCAP - 2002 Toyota Avalon

Barrier Load Cell D2 Fx

Max: 15322.7 [N] at 0.038 [S]

Min: -765.8 [N] at 0.011 [S]

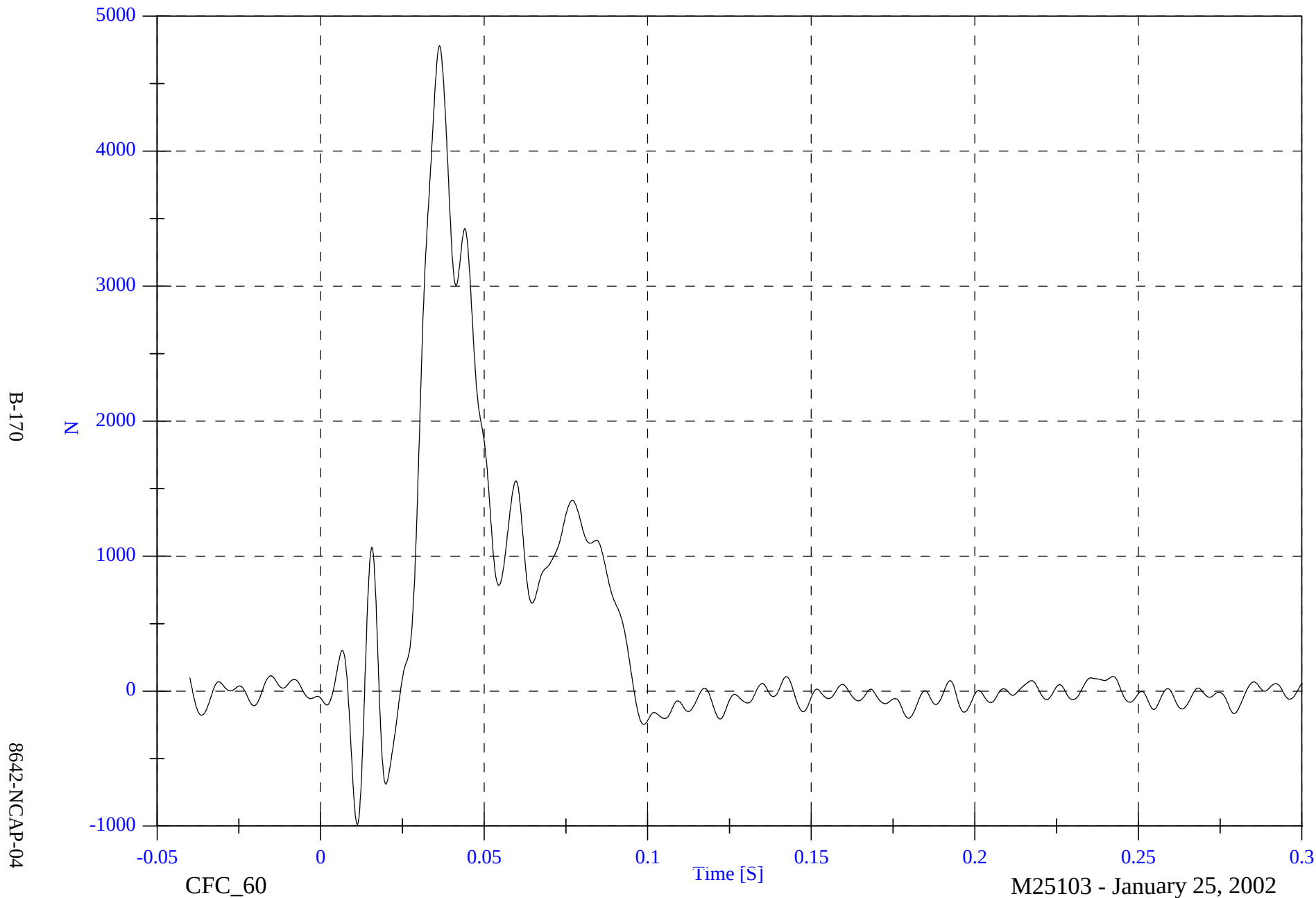


NCAP - 2002 Toyota Avalon

Barrier Load Cell D3 Fx

Max: 4782.3 [N] at 0.036 [S]

Min: -990.1 [N] at 0.011 [S]

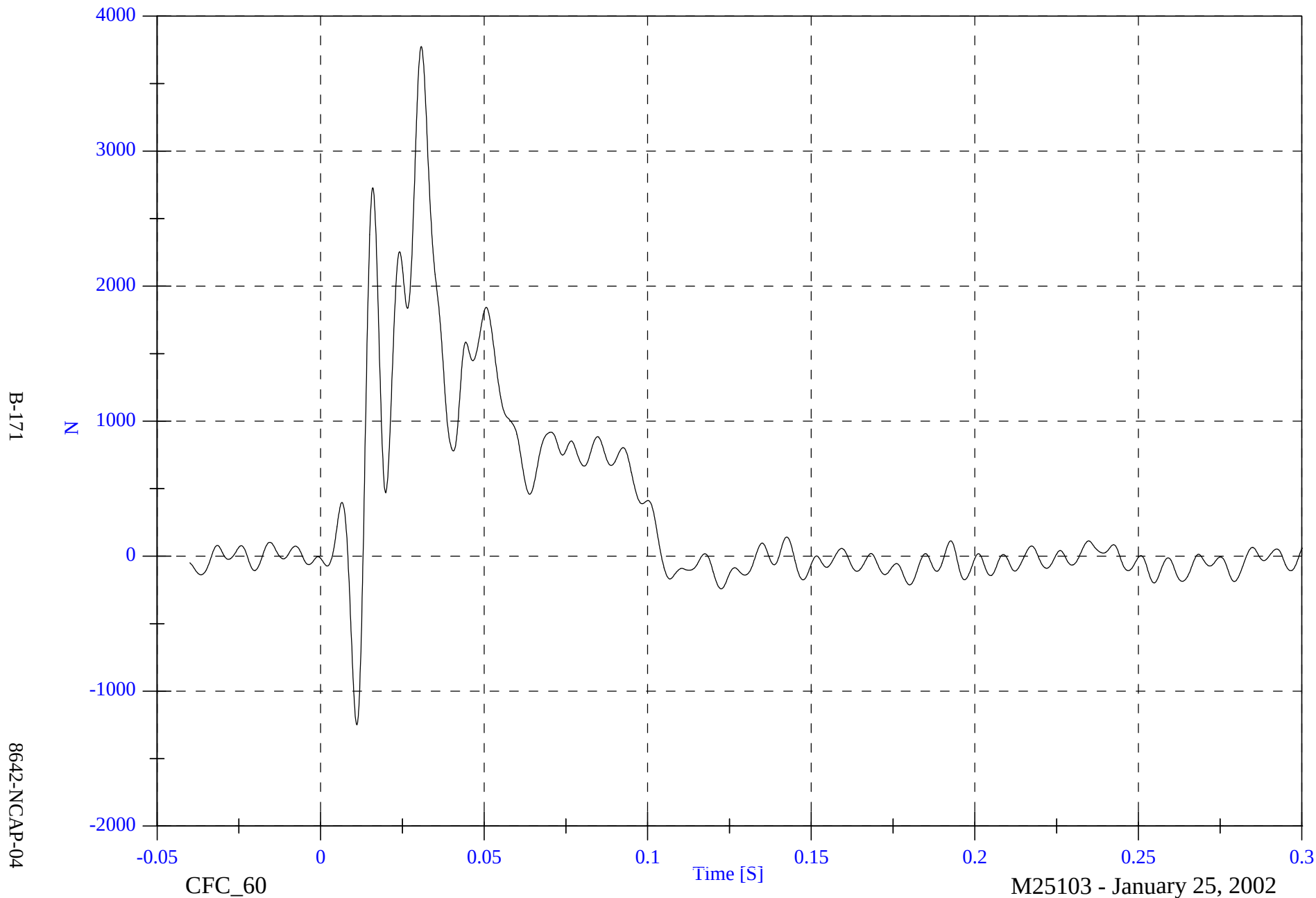


NCAP - 2002 Toyota Avalon

Barrier Load Cell D4 Fx

Max: 3774.9 [N] at 0.031 [S]

Min: -1250.6 [N] at 0.011 [S]

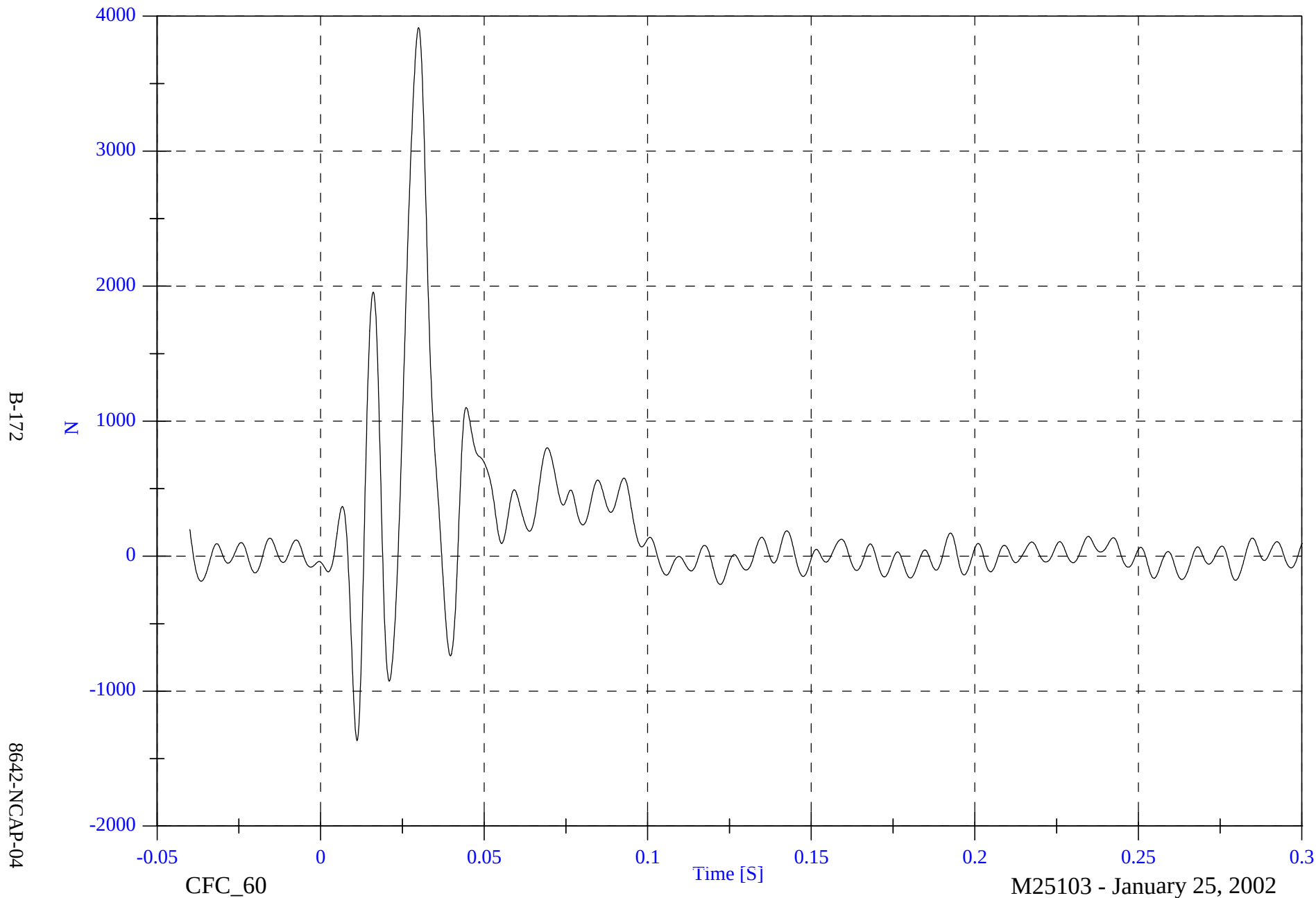


NCAP - 2002 Toyota Avalon

Barrier Load Cell D5 Fx

Max: 3915.2 [N] at 0.030 [S]

Min: -1366.7 [N] at 0.011 [S]

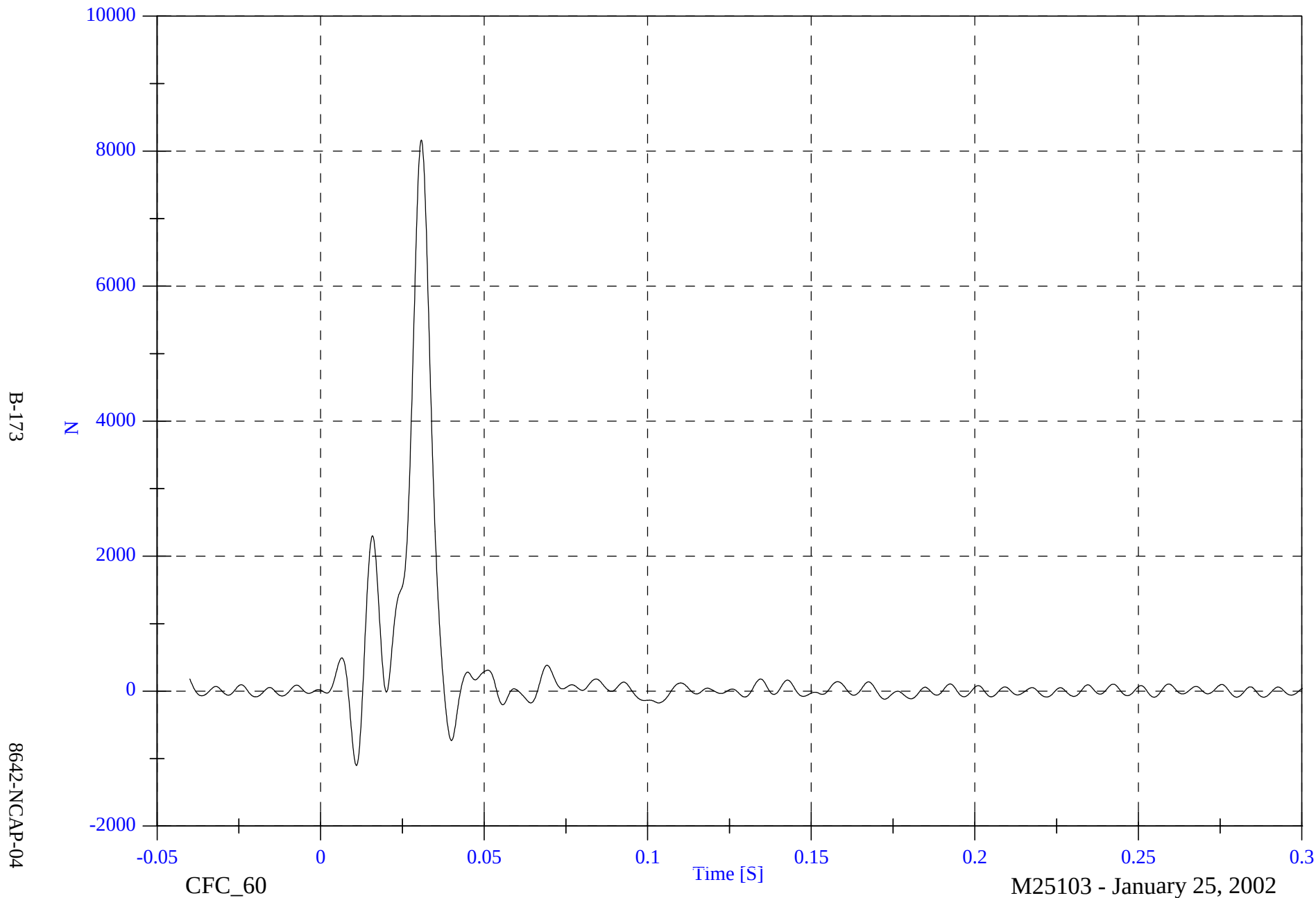


NCAP - 2002 Toyota Avalon

Barrier Load Cell D6 Fx

Max: 8165.5 [N] at 0.031 [S]

Min: -1101.9 [N] at 0.011 [S]

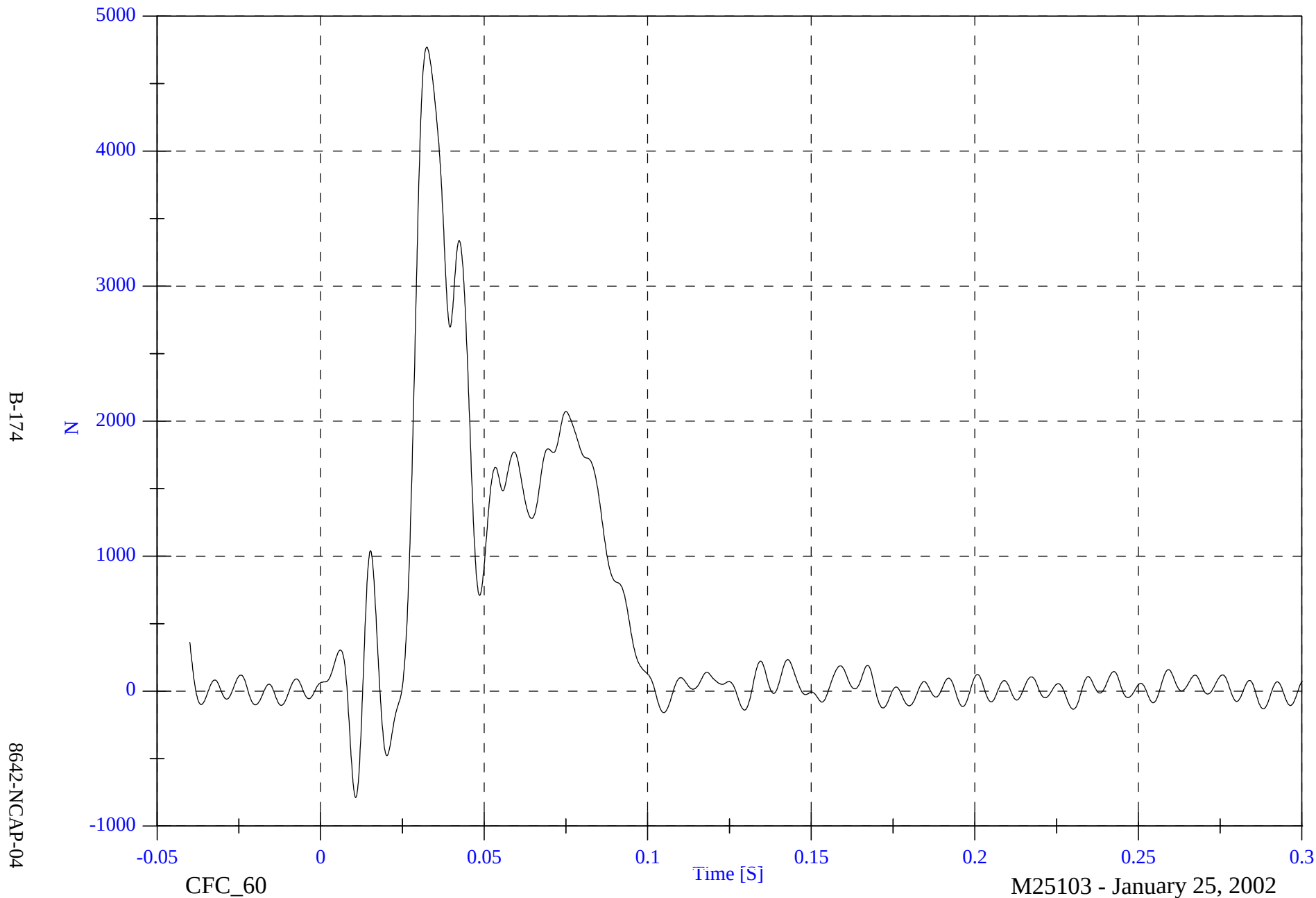


NCAP - 2002 Toyota Avalon

Barrier Load Cell D7 Fx

Max: 4771.2 [N] at 0.032 [S]

Min: -788.4 [N] at 0.011 [S]

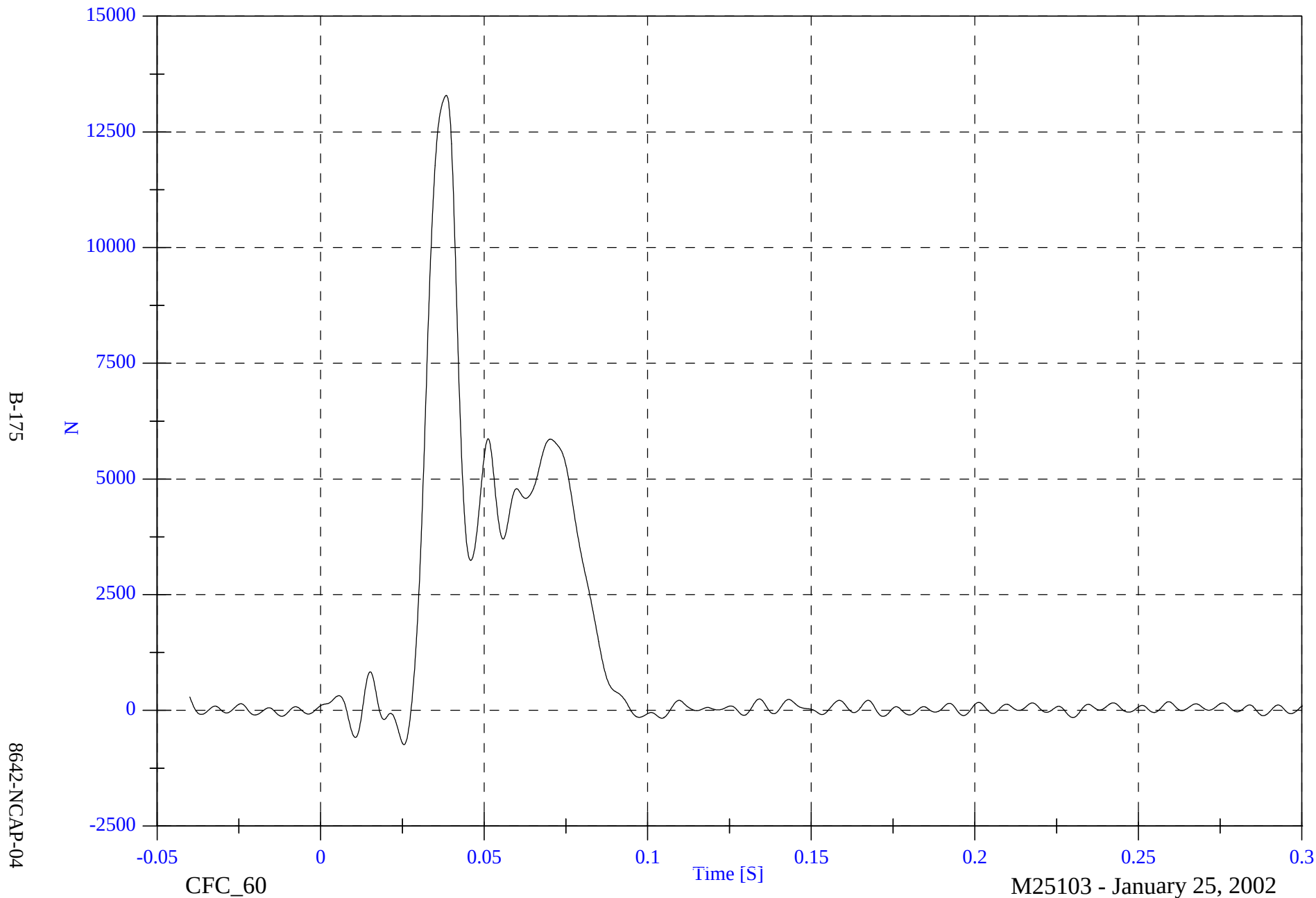


NCAP - 2002 Toyota Avalon

Barrier Load Cell D8 Fx

Max: 13289.6 [N] at 0.038 [S]

Min: -741.3 [N] at 0.025 [S]

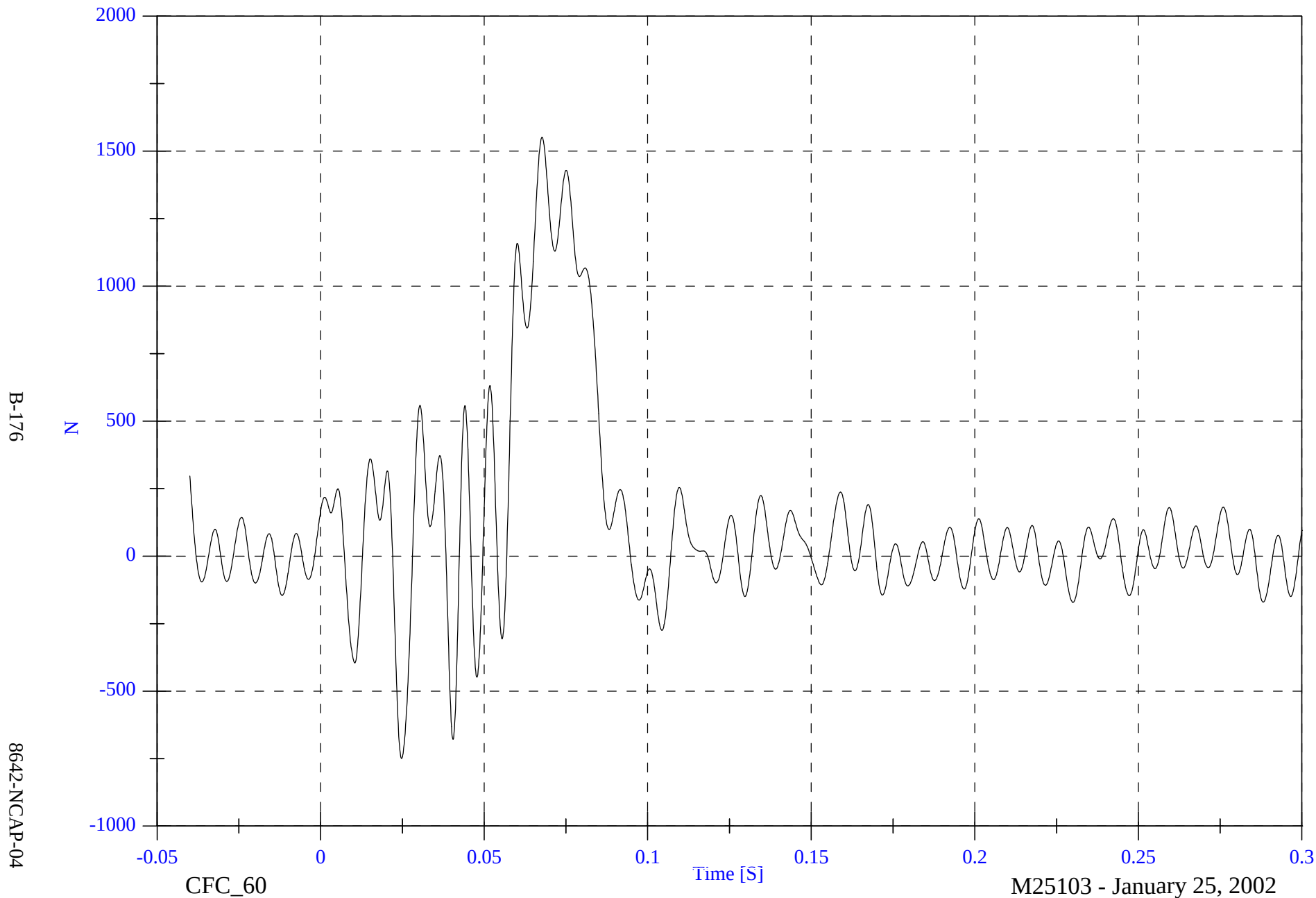


NCAP - 2002 Toyota Avalon

Barrier Load Cell D9 Fx

Max: 1551.7 [N] at 0.068 [S]

Min: -749.6 [N] at 0.025 [S]

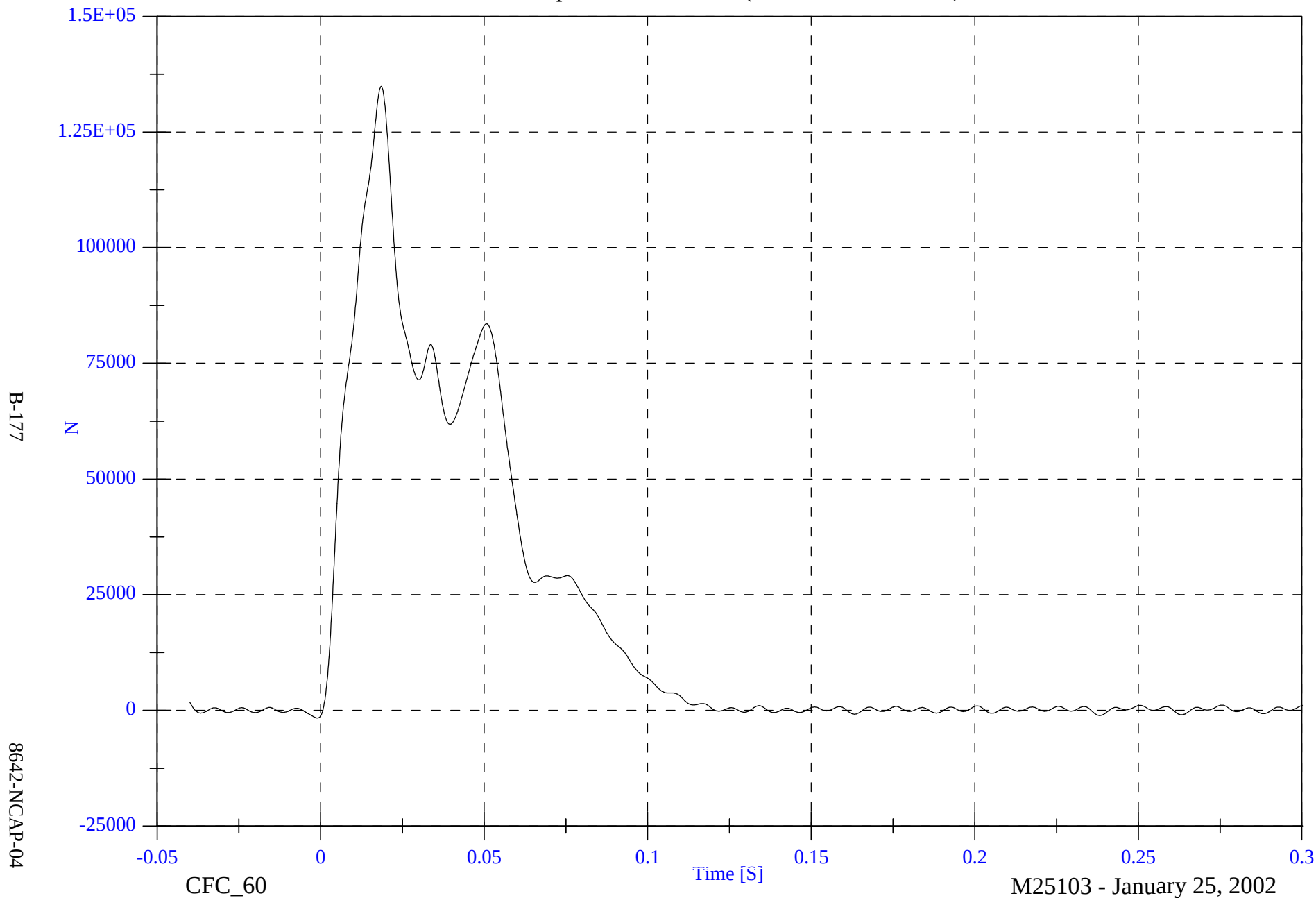


NCAP - 2002 Toyota Avalon

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

Max: 134842.3 [N] at 0.018 [S]

Min: -1667.9 [N] at -0.001 [S]

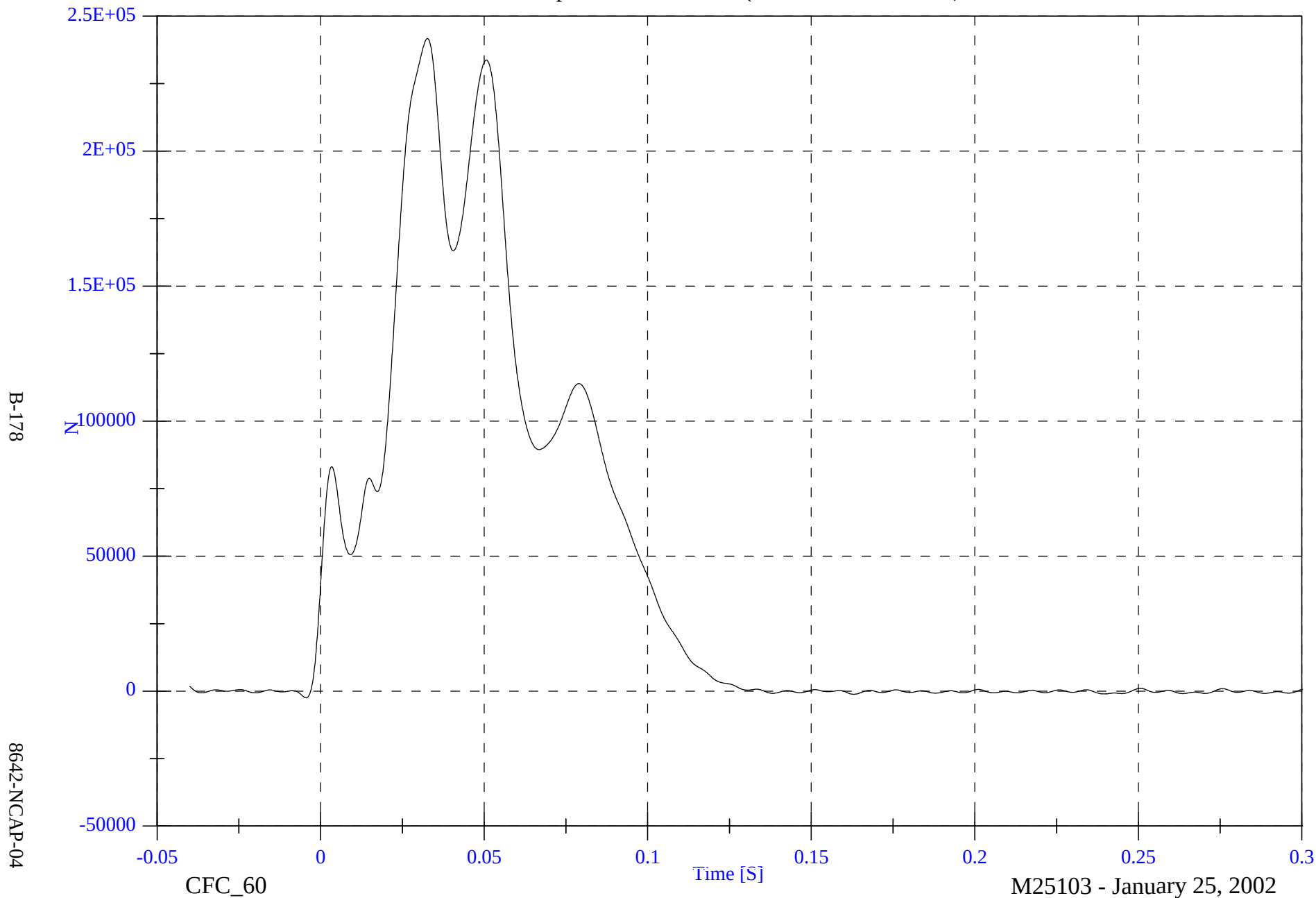


NCAP - 2002 Toyota Avalon

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

Max: 241761.0 [N] at 0.033 [S]

Min: -2485.9 [N] at -0.005 [S]

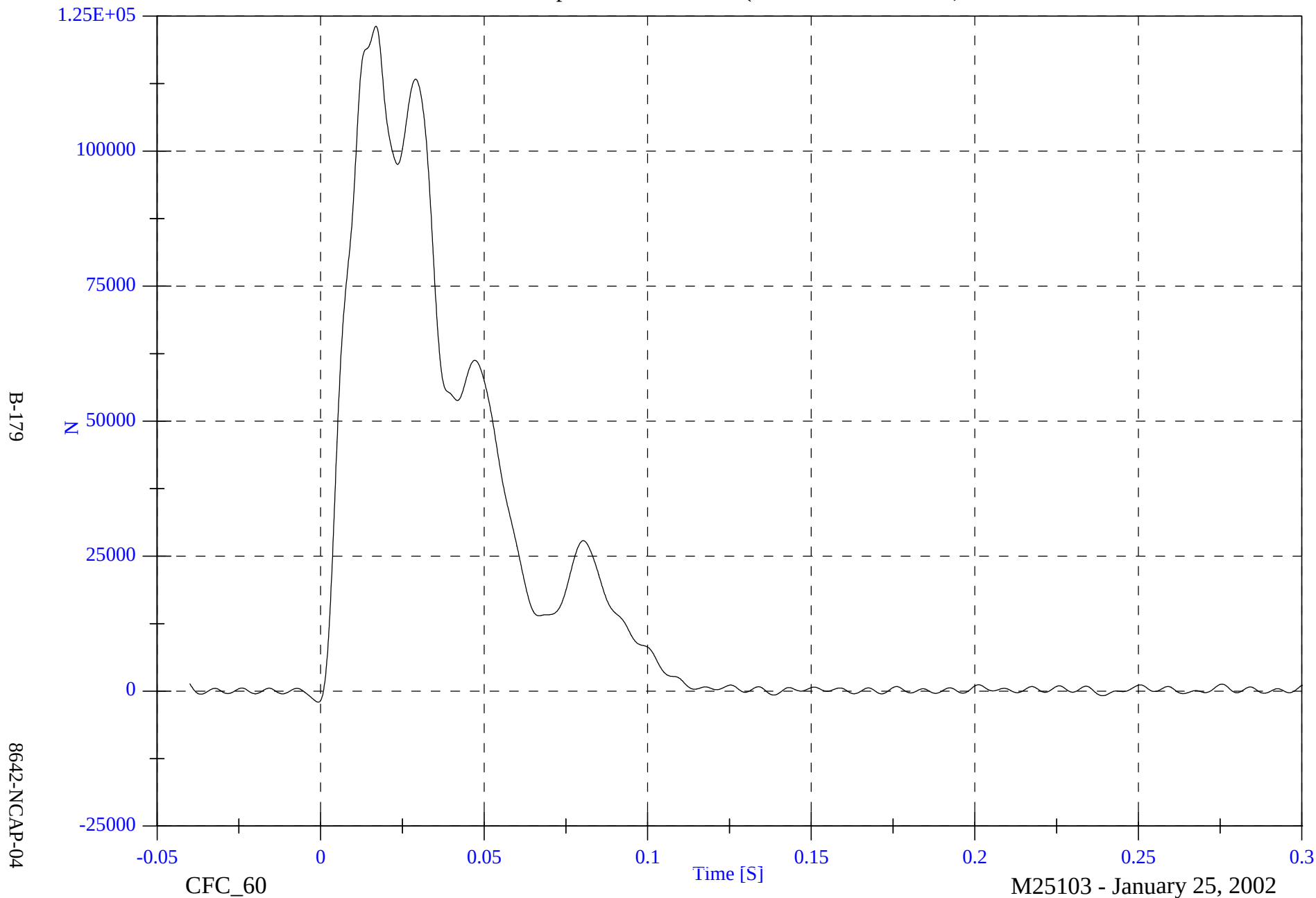


NCAP - 2002 Toyota Avalon

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

Max: 123149.0 [N] at 0.017 [S]

Min: -2060.8 [N] at -0.001 [S]

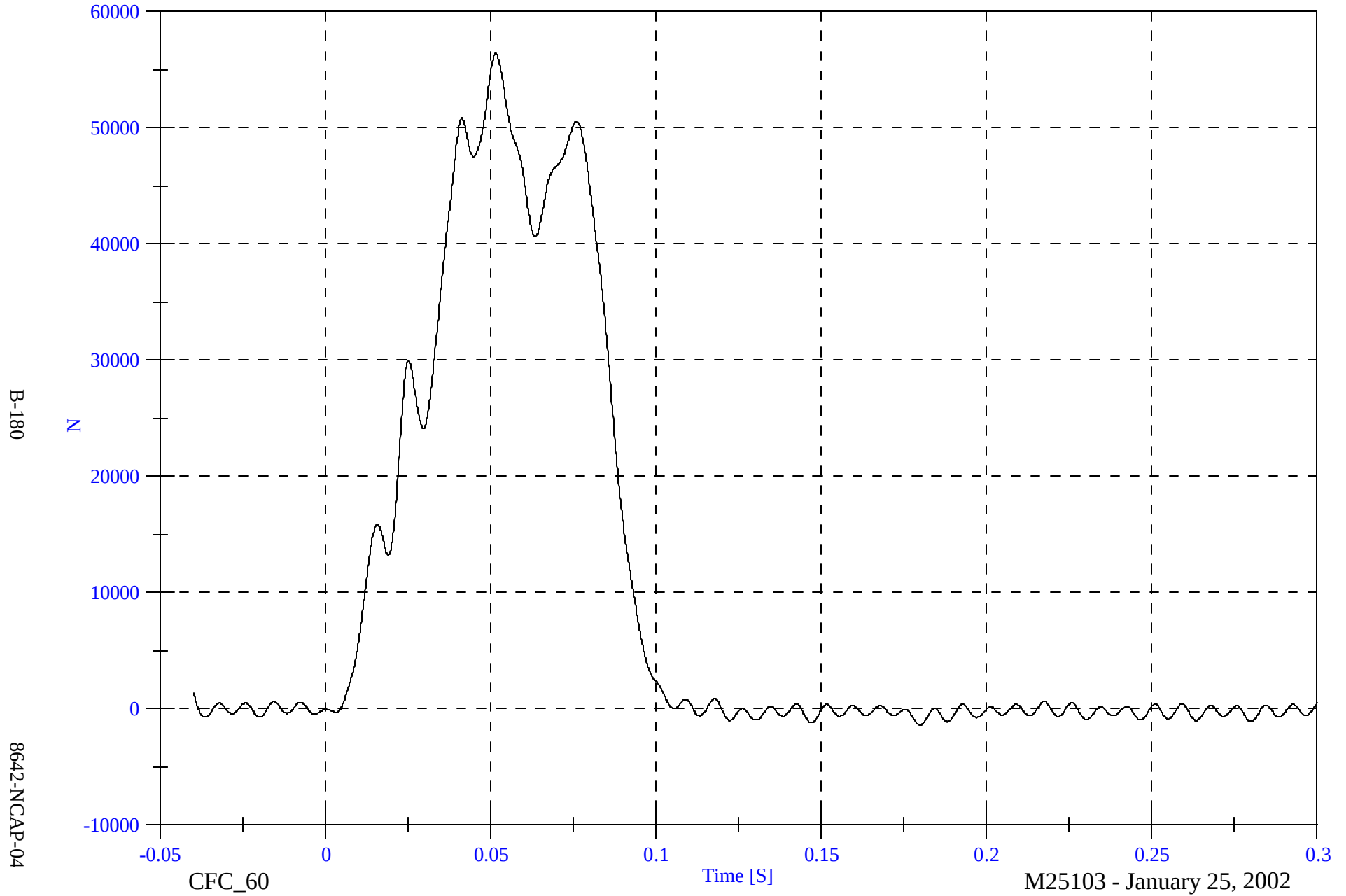


NCAP - 2002 Toyota Avalon

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

Max: 56384.4 [N] at 0.051 [S]

Min: -1366.0 [N] at 0.180 [S]

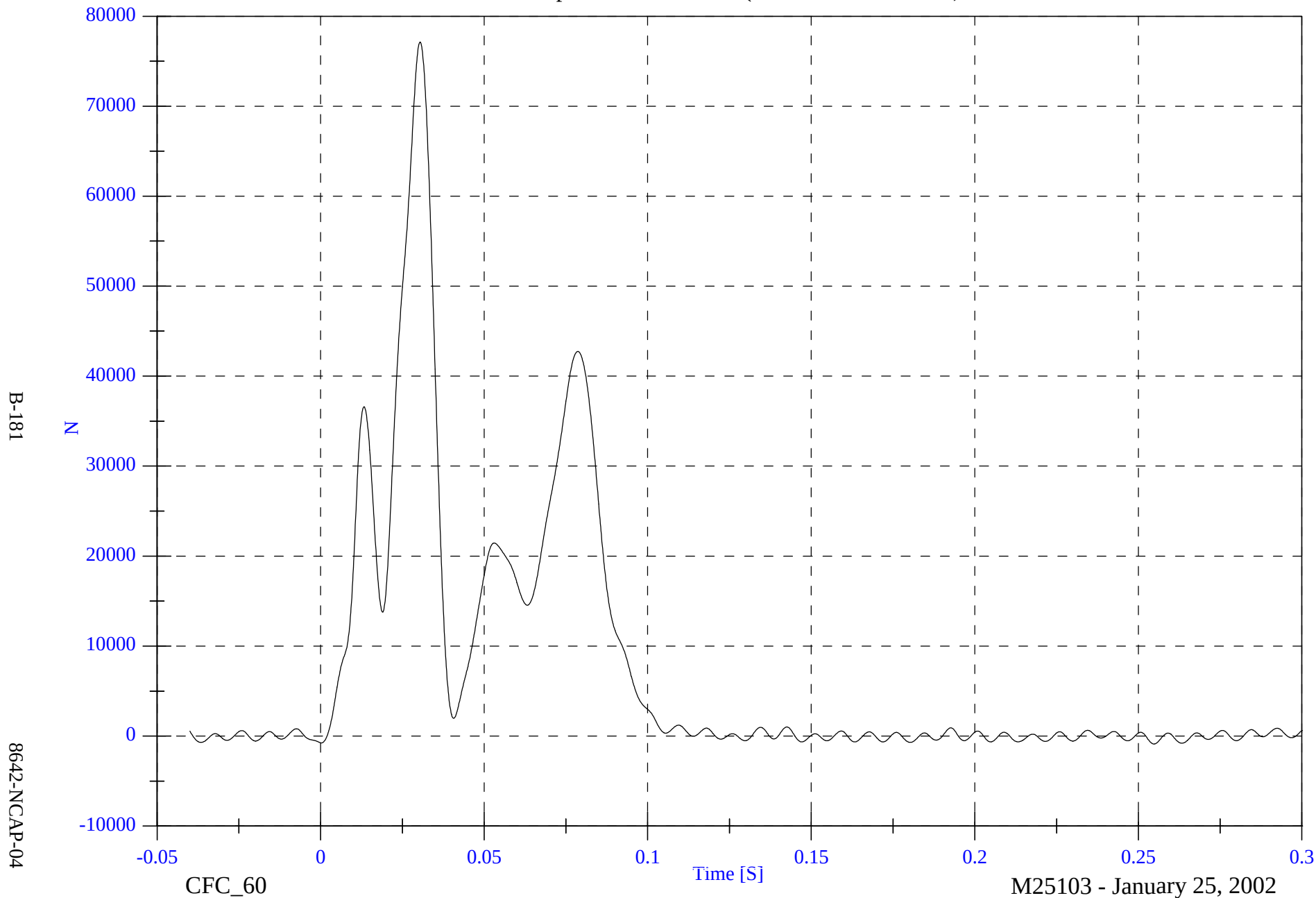


NCAP - 2002 Toyota Avalon

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

Max: 77143.7 [N] at 0.030 [S]

Min: -881.5 [N] at 0.255 [S]

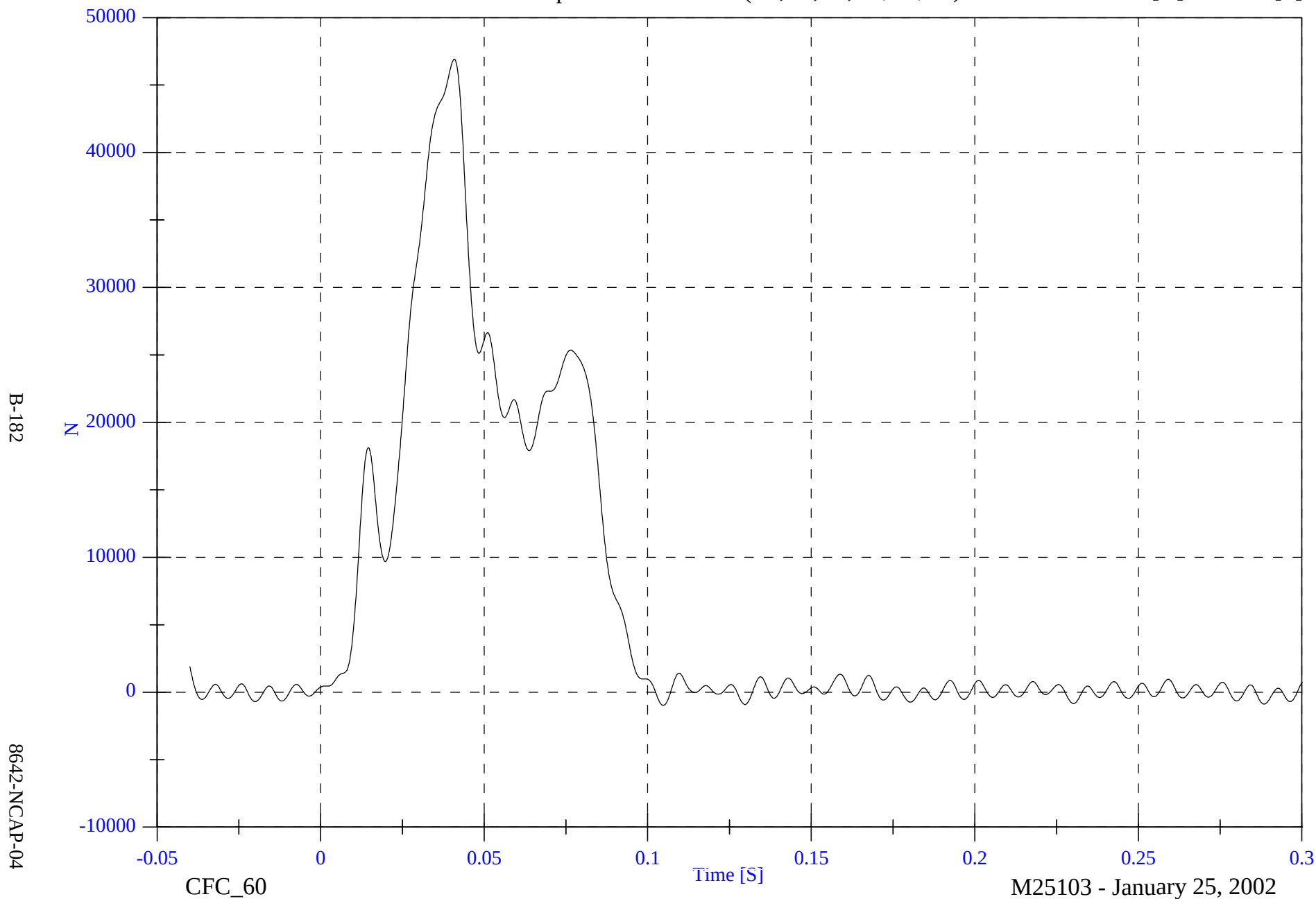


NCAP - 2002 Toyota Avalon

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

Max: 46912.9 [N] at 0.041 [S]

Min: -977.0 [N] at 0.105 [S]

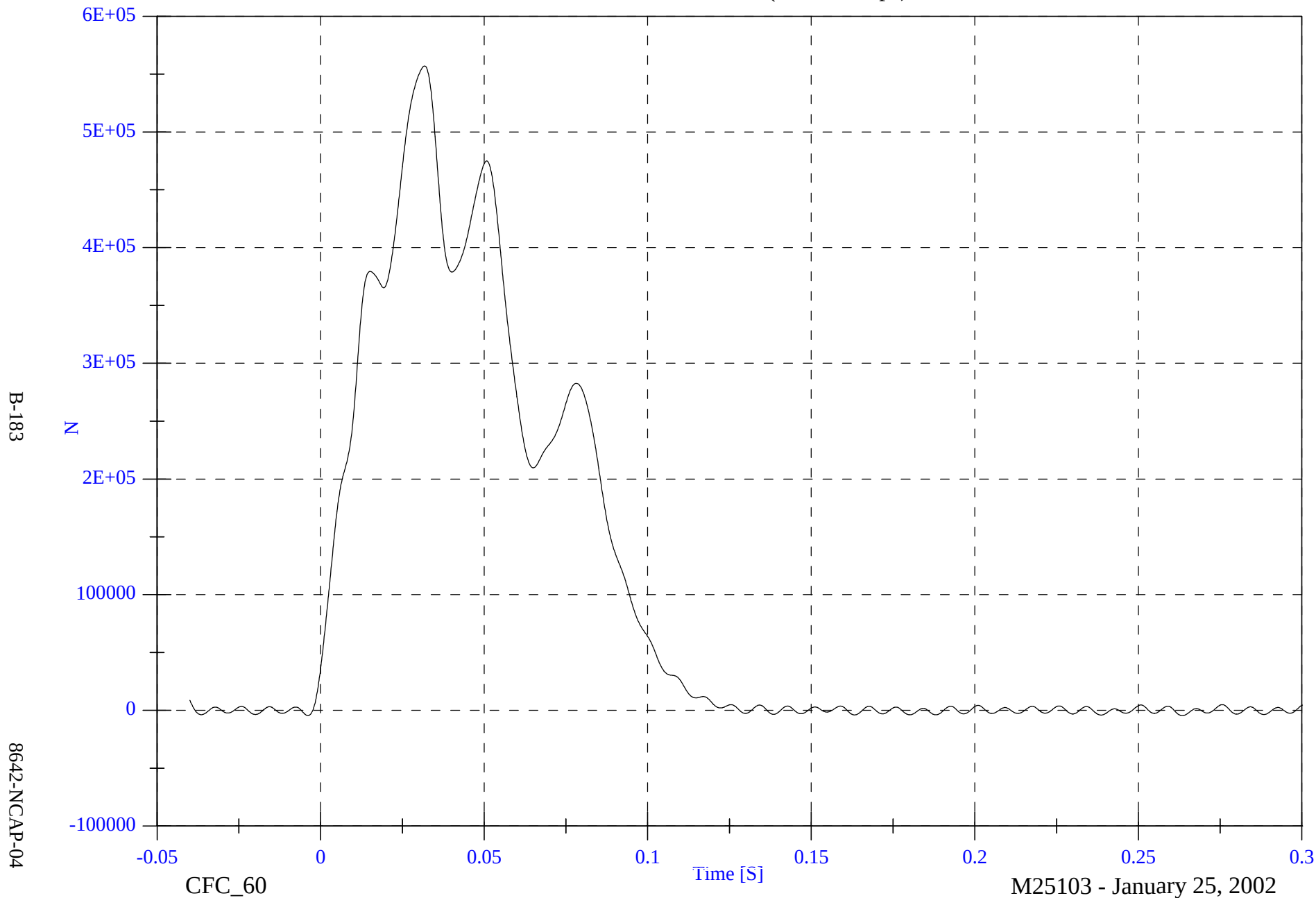


NCAP - 2002 Toyota Avalon

Total Load Cell Sum (All 6 Groups)

Max: 556994.2 [N] at 0.032 [S]

Min: -4576.4 [N] at 0.263 [S]



## **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 Veridian Engineering. A summary of the test results, and Part 572 specifications are included in this Appendix.

Dummy serial numbers and certification dates are:

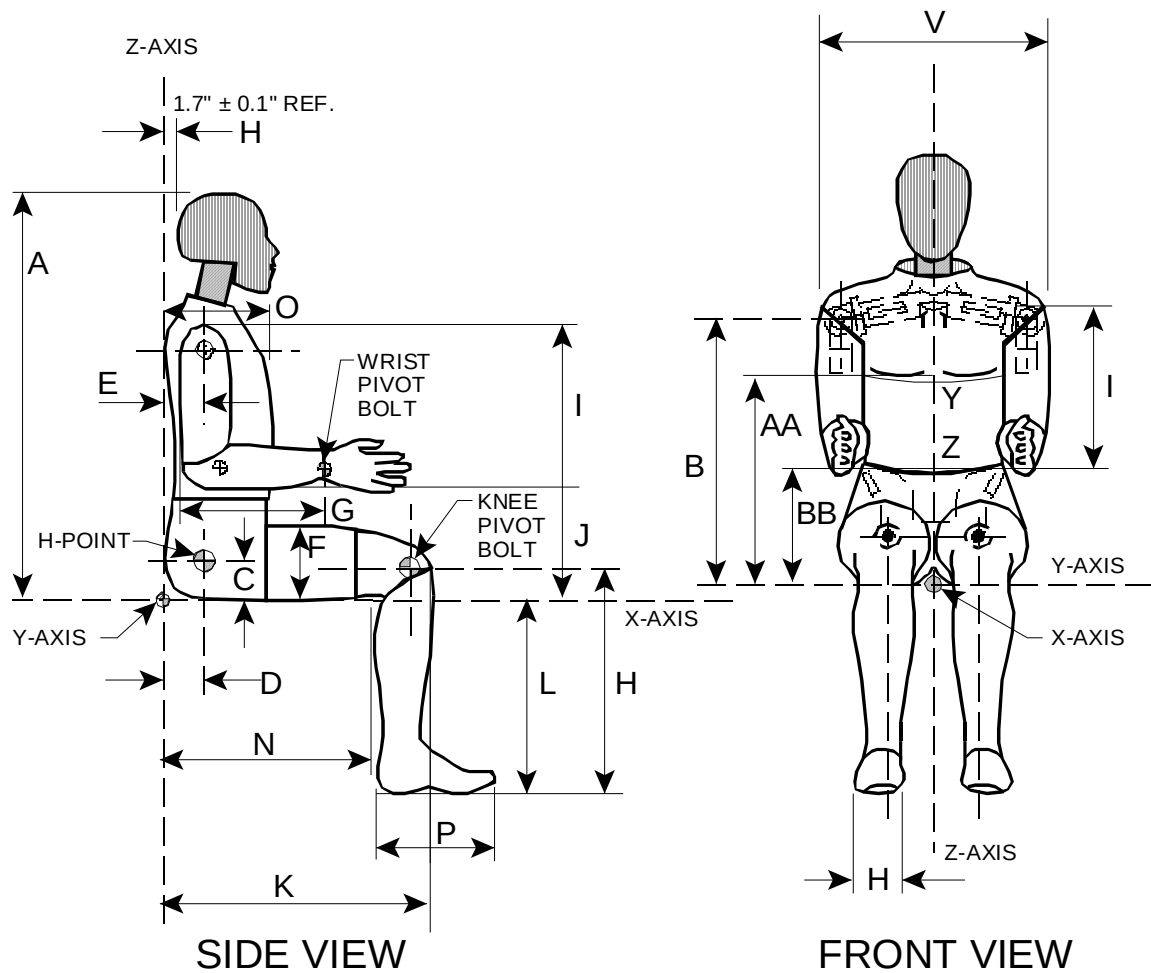
| <u>Position No./Location</u> | <u>Serial No.</u> | <u>Completion Date</u> |
|------------------------------|-------------------|------------------------|
| #1/Driver                    | 150               | 1/23/02                |
| #2/Right Front Passenger     | 245               | 1/23/02                |

#### 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 150  
Sequential Test Number 1  
Date 1/18/02  
Workfile 150H 1-18-02

| TEST PARAMETER                  | SPECIFICATION | TEST RESULTS |
|---------------------------------|---------------|--------------|
| Temperature                     | 66-78 Deg F   | 70           |
| Relative Humidity               | 10% - 70%     | 30           |
| Peak Resultant Acceleration     | 225-275 G's   | 235.4        |
| Peak Lateral Acceleration       | 15 G's Max    | 7.0          |
| Is Acceleration Curve Unimodal? | YES           | Yes          |

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E  
NECK FLEXION TEST

|                        |            |                        |
|------------------------|------------|------------------------|
| Dummy Serial Number    | 150        |                        |
| Sequential Test Number | 1          |                        |
| Date                   | 1/22/02    | 6 Axis Neck Transducer |
| Workfile               | 150102.nfl |                        |

| TEST PARAMETER                                  |       | SPECIFICATION      | TEST RESULTS |
|-------------------------------------------------|-------|--------------------|--------------|
| Temperature                                     |       | 69-72 Deg F        | 70           |
| Relative Humidity                               |       | 10% - 70%          | 30           |
| Impact Velocity                                 |       | 22.60 - 23.40 Ft/s | 23.0         |
| Pendulum Deceleration                           | 10 ms | 22.50 - 27.50 G's  | 24.91        |
|                                                 | 20 ms | 17.60 - 22.60 G's  | 22.09        |
|                                                 | 30 ms | 12.50 - 18.50 G's  | 15.91        |
| Max Pendulum G's Above 30 ms                    |       | 29 G's Max         | 15.91        |
| Deceleration - Time Curve Decay Time to 5 G's   |       | 34 - 42 ms         | 39.38        |
| D Plane Rotation                                | Max   | 64 - 78 Deg        | 74.48        |
|                                                 | Time  | 57 - 64 ms         | 58.62        |
| Moment About Occipital Condyle                  | Max   | 65 - 80 Ft-Lbs     | 79.37        |
|                                                 | Time  | 47 - 58 ms         | 50.88        |
| Rotation Angle - Time Curve Decay Time to Zero  |       | 113 - 128 ms       | 113.25       |
| Positive Moment - Time Curve Decay Time to Zero |       | 97 - 107 ms        | 97.25        |

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E  
NECK EXTENSION TEST

|                        |            |                        |
|------------------------|------------|------------------------|
| Dummy Serial Number    | 150        |                        |
| Sequential Test Number | 1          |                        |
| Date                   | 1/21/02    | 6 Axis Neck Transducer |
| Workfile               | 150102.nex |                        |

| TEST PARAMETER                                  |       | SPECIFICATION        | TEST RESULTS |
|-------------------------------------------------|-------|----------------------|--------------|
| Temperature                                     |       | 69-72 Deg F          | 71           |
| Relative Humidity                               |       | 10% - 70%            | 29           |
| Impact Velocity                                 |       | 19.50 - 20.30 Ft/s   | 19.70        |
| Pendulum Deceleration                           | 10 ms | 17.20 - 21.20 G's    | 18.93        |
|                                                 | 20 ms | 14.00 - 19.00 G's    | 16.42        |
|                                                 | 30 ms | 11.00 - 16.00 G's    | 13.40        |
| Max Pendulum G's Above 30 ms                    |       | 22 G's Max           | 13.64        |
| Deceleration - Time Curve Decay Time to 5 G's   |       | 38 - 46 ms           | 43.38        |
| D Plane Rotation                                | Max   | 81 - 106 Deg         | 96.59        |
|                                                 | Time  | 72 - 82 ms           | 78.62        |
| Moment About Occipital Condyle                  | Max   | -59.0 - -39.0 Ft-Lbs | -45.37       |
|                                                 | Time  | 65 - 79 ms           | 73.88        |
| Rotation Angle - Time Curve Decay Time to Zero  |       | 147 - 174 ms         | 160.88       |
| Positive Moment - Time Curve Decay Time to Zero |       | 120 - 148 ms         | 135.75       |

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E  
THORAX IMPACT TEST

Dummy Serial Number           150  
Sequential Test Number        1  
Date                               1/23/02  
Workfile                         150102.th3

| TEST PARAMETER          | SPECIFICATION    | TEST RESULTS |
|-------------------------|------------------|--------------|
| Temperature             | 69-72 Deg F      | 70           |
| Relative Humidity       | 10% - 70%        | 30           |
| Pendulum Velocity       | 21.6 - 22.4 Ft/s | 22.1         |
| Maximum Deflection      | 2.50 - 2.86 in   | 2.52         |
| Maximum Resistive Force | 1160 - 1325 Lbs  | 1318.42      |
| Internal Hysteresis     | 69 - 85 %        | 73.3         |

Remarks:

Laboratory Technician:

B. Swiecicki

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PART 572E  
KNEE IMPACT TEST

Dummy Serial Number           150  
Sequential Test Number        1  
Date                               1/23/02  
Workfile                         150102.lf / 150102.rf

| TEST PARAMETER         | SPECIFICATION   | TEST RESULTS |
|------------------------|-----------------|--------------|
| <b>LEFT KNEE</b>       |                 |              |
| Temperature            | 66 - 78 Deg F   | 70           |
| Relative Humidity      | 10% - 70%       | 30           |
| Probe Velocity         | 6.8 - 7.0 Ft/s  | 7.0          |
| Peak Knee Impact Force | 1060 - 1300 Lbs | 1214.61      |
| <b>RIGHT KNEE</b>      |                 |              |
| Temperature            | 66 - 78 Deg F   | 70           |
| Relative Humidity      | 10% - 70%       | 30           |
| Probe Velocity         | 6.8 - 7.0 Ft/s  | 7.0          |
| Peak Knee Impact Force | 1060 - 1300 Lbs | 1202.13      |

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E  
EXTERNAL DIMENSIONS

Dummy Serial Number           150  
Sequential Test Number        1  
Date                                1/22/02

| TEST PARAMETER                    |    | SPECIFICATION  | TEST RESULTS |
|-----------------------------------|----|----------------|--------------|
| Temperature                       |    |                | 70           |
| Relative Humidity                 |    |                | 31           |
| 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 | 39.1         |
| Waist Circumference               | Z  | 32.9 - 34.1 in | 34.0         |
| 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   | 5.8          |
| Buttock Knee Length               | K  | 22.8 - 23.8 in | 23.4         |
| Buttock Popliteal Length          | N  | 17.8 - 18.8 in | 18.4         |
| Popliteal Height                  | L  | 16.9 - 17.9 in | 17.8         |
| Knee Pivot Height                 | M  | 19.1 - 19.7 in | 19.6         |
| 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   | 3.7          |
| Shoulder Breadth                  | V  | 16.6 - 17.2 in | 16.8         |
| Shoulder Pivot Height             | B  | 19.9 - 20.5 in | 20.2         |
| Elbow Rest Height                 | J  | 7.5 - 8.3 in   | 8.1          |
| Shoulder - Elbow Length           | I  | 13.0 - 13.6 in | 13.2         |
| Back of Elbow to Wrist Pivot      | G  | 11.4 - 12.0 in | 11.5         |

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E  
HEAD DROP TEST

Dummy Serial Number 245  
Sequential Test Number 1  
Date 1/18/02  
Workfile 245H 1-18-02

| TEST PARAMETER                  | SPECIFICATION | TEST RESULTS |
|---------------------------------|---------------|--------------|
| Temperature                     | 66-78 Deg F   | 70           |
| Relative Humidity               | 10% - 70%     | 30           |
| Peak Resultant Acceleration     | 225-275 G's   | 235.4        |
| Peak Lateral Acceleration       | 15 G's Max    | 3.0          |
| Is Acceleration Curve Unimodal? | YES           | Yes          |

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E  
NECK FLEXION TEST

|                        |            |                        |
|------------------------|------------|------------------------|
| Dummy Serial Number    | 245        |                        |
| Sequential Test Number | 1          |                        |
| Date                   | 1/21/02    | 6 Axis Neck Transducer |
| Workfile               | 245102.nfl |                        |

| TEST PARAMETER                                  |       | SPECIFICATION      | TEST RESULTS |
|-------------------------------------------------|-------|--------------------|--------------|
| Temperature                                     |       | 69-72 Deg F        | 71           |
| Relative Humidity                               |       | 10% - 70%          | 29           |
| Impact Velocity                                 |       | 22.60 - 23.40 Ft/s | 23.06        |
| Pendulum Deceleration                           | 10 ms | 22.50 - 27.50 G's  | 25.45        |
|                                                 | 20 ms | 17.60 - 22.60 G's  | 22.41        |
|                                                 | 30 ms | 12.50 - 18.50 G's  | 17.28        |
| Max Pendulum G's Above 30 ms                    |       | 29 G's Max         | 17.28        |
| Deceleration - Time Curve Decay Time to 5 G's   |       | 34 - 42 ms         | 37.62        |
| D Plane Rotation                                | Max   | 64 - 78 Deg        | 76.86        |
|                                                 | Time  | 57 - 64 ms         | 60.38        |
| Moment About Occipital Condyle                  | Max   | 65 - 80 Ft-Lbs     | 77.26        |
|                                                 | Time  | 47 - 58 ms         | 50.88        |
| Rotation Angle - Time Curve Decay Time to Zero  |       | 113 - 128 ms       | 117.38       |
| Positive Moment - Time Curve Decay Time to Zero |       | 97 - 107 ms        | 97.88        |

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E  
NECK EXTENSION TEST

|                        |            |                        |
|------------------------|------------|------------------------|
| Dummy Serial Number    | 245        |                        |
| Sequential Test Number | 1          |                        |
| Date                   | 1/21/02    | 6 Axis Neck Transducer |
| Workfile               | 245102.nex |                        |

| TEST PARAMETER                                  |       | SPECIFICATION        | TEST RESULTS |
|-------------------------------------------------|-------|----------------------|--------------|
| Temperature                                     |       | 69-72 Deg F          | 71           |
| Relative Humidity                               |       | 10% - 70%            | 29           |
| Impact Velocity                                 |       | 19.50 - 20.30 Ft/s   | 19.62        |
| Pendulum Deceleration                           | 10 ms | 17.20 - 21.20 G's    | 18.46        |
|                                                 | 20 ms | 14.00 - 19.00 G's    | 16.87        |
|                                                 | 30 ms | 11.00 - 16.00 G's    | 13.19        |
| Max Pendulum G's Above 30 ms                    |       | 22 G's Max           | 13.19        |
| Deceleration - Time Curve Decay Time to 5 G's   |       | 38 - 46 ms           | 44.38        |
| D Plane Rotation                                | Max   | 81 - 106 Deg         | 98.46        |
|                                                 | Time  | 72 - 82 ms           | 77.75        |
| Moment About Occipital Condyle                  | Max   | -59.0 - -39.0 Ft-Lbs | -49.96       |
|                                                 | Time  | 65 - 79 ms           | 72.62        |
| Rotation Angle - Time Curve Decay Time to Zero  |       | 147 - 174 ms         | 156.0        |
| Positive Moment - Time Curve Decay Time to Zero |       | 120 - 148 ms         | 141.5        |

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E  
THORAX IMPACT TEST

Dummy Serial Number        245  
Sequential Test Number       1  
Date                                1/22/02  
Workfile                         245102.th3

| TEST PARAMETER          | SPECIFICATION    | TEST RESULTS |
|-------------------------|------------------|--------------|
| Temperature             | 69-72 Deg F      | 70           |
| Relative Humidity       | 10% - 70%        | 29           |
| Pendulum Velocity       | 21.6 - 22.4 Ft/s | 21.96        |
| Maximum Deflection      | 2.50 - 2.86 in   | 2.52         |
| Maximum Resistive Force | 1160 - 1325 Lbs  | 1320.0       |
| Internal Hysteresis     | 69 - 85 %        | 72.6         |

Remarks:

Laboratory Technician:

B. Swiecicki

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PART 572E  
KNEE IMPACT TEST

Dummy Serial Number           245  
Sequential Test Number        1  
Date                               1/23/02  
Workfile                         245102.lf

| TEST PARAMETER         | SPECIFICATION   | TEST RESULTS |
|------------------------|-----------------|--------------|
| <b>LEFT KNEE</b>       |                 |              |
| Temperature            | 66 - 78 Deg F   | 70           |
| Relative Humidity      | 10% - 70%       | 30           |
| Probe Velocity         | 6.8 - 7.0 Ft/s  | 7.0          |
| Peak Knee Impact Force | 1060 - 1300 Lbs | 1199.2       |
| <b>RIGHT KNEE</b>      |                 |              |
| Temperature            | 66 - 78 Deg F   | 70           |
| Relative Humidity      | 10% - 70%       | 30           |
| Probe Velocity         | 6.8 - 7.0 Ft/s  | 7.0          |
| Peak Knee Impact Force | 1060 - 1300 Lbs | 1198.7       |

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E  
EXTERNAL DIMENSIONS

Dummy Serial Number           245  
Sequential Test Number        1  
Date                                1/22/02

| TEST PARAMETER                    |    | SPECIFICATION  | TEST RESULTS |
|-----------------------------------|----|----------------|--------------|
| Temperature                       |    |                | 70           |
| Relative Humidity                 |    |                | 31           |
| 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 | 33.8         |
| 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 | 34.7         |
| Thigh Clearance                   | F  | 5.5 - 6.1 in   | 6.0          |
| Buttock Knee Length               | K  | 22.8 - 23.8 in | 23.4         |
| Buttock Popliteal Length          | N  | 17.8 - 18.8 in | 18.4         |
| Popliteal Height                  | L  | 16.9 - 17.9 in | 17.5         |
| Knee Pivot Height                 | M  | 19.1 - 19.7 in | 19.2         |
| 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 | 20.2         |
| Elbow Rest Height                 | J  | 7.5 - 8.3 in   | 8.0          |
| Shoulder - Elbow Length           | I  | 13.0 - 13.6 in | 13.2         |
| 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 150) |         | Manufacturer | Serial #  | Calibration |          |
|------------------------|---------|--------------|-----------|-------------|----------|
|                        |         |              |           | Last        | Next     |
| Head 9 Array           | X Arm Y | ENDEVCO      | AC-P17531 | 08/29/01    | 02/27/02 |
|                        | X Arm Z | ENDEVCO      | AC-P14965 | 08/29/01    | 02/27/02 |
|                        | Y Arm X | ENDEVCO      | AC-P17563 | 08/29/01    | 02/27/02 |
|                        | Y Arm Z | ENDEVCO      | AC-P18551 | 08/29/01    | 02/27/02 |
|                        | Z Arm X | ENDEVCO      | AC-P17539 | 08/29/01    | 02/27/02 |
|                        | Z Arm Y | ENDEVCO      | AC-P18718 | 08/29/01    | 02/27/02 |
| Head                   | X       | ENDEVCO      | AC-P16832 | 08/23/01    | 02/21/02 |
|                        | Y       | ENDEVCO      | AC-P16591 | 08/23/01    | 02/21/02 |
|                        | Z       | ENDEVCO      | AC-P16286 | 09/04/01    | 03/05/02 |
| Head                   | X (R)   | ENDEVCO      | AC-P17141 | 08/23/01    | 02/21/02 |
|                        | Y (R)   | ENDEVCO      | AC-P17242 | 08/23/01    | 02/21/02 |
|                        | Z (R)   | ENDEVCO      | AC-P17152 | 01/07/02    | 07/08/02 |
| Neck Load Cell         | X       | DENTON       | LC-269FX  | 01/17/02    | 07/18/02 |
|                        | Y       | DENTON       | LC-269FY  | 01/17/02    | 07/18/02 |
|                        | Z       | DENTON       | LC-269FZ  | 01/17/02    | 07/18/02 |
| Neck Moment            | X       | DENTON       | LC-269MX  | 01/17/02    | 07/18/02 |
|                        | Y       | DENTON       | LC-269MY  | 01/17/02    | 07/18/02 |
|                        | Z       | DENTON       | LC-269MZ  | 01/17/02    | 07/18/02 |
| Chest                  | X       | ENDEVCO      | AC-P17235 | 08/23/01    | 02/21/02 |
|                        | Y       | ENDEVCO      | AC-P14393 | 08/23/01    | 02/21/02 |
|                        | Z       | ENDEVCO      | AC-P17285 | 08/23/01    | 02/21/02 |
| Chest                  | X (R)   | ENDEVCO      | AC-P16863 | 08/23/01    | 02/21/02 |
|                        | Y (R)   | ENDEVCO      | AC-P17248 | 08/23/01    | 02/21/02 |
|                        | Z (R)   | ENDEVCO      | AC-P17283 | 08/23/01    | 02/21/02 |
| Chest Deflection       | X       | SERVO        | DS-150    | 08/23/01    | 02/21/02 |
| Pelvic                 | X       | ENDEVCO      | AC-J30041 | 08/23/01    | 02/21/02 |
|                        | Y       | ENDEVCO      | AC-P13355 | 08/23/01    | 02/21/02 |
|                        | Z       | ENDEVCO      | AC-P13329 | 08/23/01    | 02/21/02 |

INSTRUMENT CALIBRATION FOR DRIVER DUMMY  
(Six Month Calibration Minimum)

| DRIVER DUMMY (S/N 150)  |    | Manufacturer        | Serial #  | Calibration |          |
|-------------------------|----|---------------------|-----------|-------------|----------|
|                         |    |                     |           | Last        | Next     |
| Left Femur Load Cell    | Fz | GSE                 | LC-418    | 01/24/02    | 07/25/02 |
| Right Femur Load Cell   | Fz | GSE                 | LC-419    | 01/24/02    | 07/25/02 |
| Left Knee Shear         | Dx | SPACEAGE<br>CONTROL | DS-821    | 12/07/01    | 06/07/02 |
| Right Knee Shear        | Dx | SPACEAGE<br>CONTROL | DS-817    | 12/07/01    | 06/07/02 |
| Left Upper Tibia        | Mx | DENTON              | LC-016MX  | 09/05/01    | 03/06/02 |
|                         | My | DENTON              | LC-016MY  | 09/05/01    | 03/06/02 |
| Left Lower Tibia        | Fz | DENTON              | LC-123FZ  | 09/05/01    | 03/06/02 |
|                         | Mx | DENTON              | LC-123MX  | 09/05/01    | 03/06/02 |
|                         | My | DENTON              | LC-123MY  | 09/05/01    | 03/06/02 |
| Right Upper Tibia       | Mx | DENTON              | LC-023MX  | 09/05/01    | 03/06/02 |
|                         | My | DENTON              | LC-023MY  | 09/05/01    | 03/06/02 |
| Right Lower Tibia       | Fz | DENTON              | LC-111FZ  | 09/05/01    | 03/06/02 |
|                         | Mx | DENTON              | LC-111MX  | 09/05/01    | 03/06/02 |
|                         | My | DENTON              | LC-111MY  | 09/05/01    | 03/06/02 |
| Left Foot Rear          | X  | ENDEVCO             | AC-P19343 | 08/27/01    | 02/25/02 |
|                         | Z  | ENDEVCO             | AC-P16583 | 08/27/01    | 02/25/02 |
| Left Foot Front         | Z  | ENDEVCO             | AC-P18728 | 08/27/01    | 02/25/02 |
| Right Foot Rear         | X  | ENDEVCO             | AC-P18628 | 08/27/01    | 02/25/02 |
|                         | Z  | ENDEVCO             | AC-P18741 | 08/27/01    | 02/25/02 |
| Right Foot Front        | Z  | ENDEVCO             | AC-P16587 | 08/27/01    | 02/25/02 |
| Lap Belt Load Cell      |    | -                   | -         | -           | -        |
| Shoulder Belt Load Cell |    | -                   | -         | -           | -        |
| Belt Stretch Transducer |    | -                   | -         | -           | -        |

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY  
(Six Month Calibration Minimum)

| PASSENGER DUMMY (S/N 245) |         | Manufacturer | Serial #  | Calibration |          |
|---------------------------|---------|--------------|-----------|-------------|----------|
|                           |         |              |           | Last        | Next     |
| Head 9 Array              | X Arm Y | ENDEVCO      | AC-P18558 | 08/28/01    | 02/26/02 |
|                           | X Arm Z | ENDEVCO      | AC-P19212 | 08/28/01    | 02/26/02 |
|                           | Y Arm X | ENDEVCO      | AC-P19197 | 08/28/01    | 02/26/02 |
|                           | Y Arm Z | ENDEVCO      | AC-P18738 | 08/29/01    | 02/27/02 |
|                           | Z Arm X | ENDEVCO      | AC-P19217 | 08/28/01    | 02/26/02 |
|                           | Z Arm Y | ENDEVCO      | AC-P18739 | 08/29/01    | 02/27/02 |
| Head                      | X       | ENDEVCO      | AC-J32184 | 08/22/01    | 02/20/02 |
|                           | Y       | ENDEVCO      | AC-J32185 | 08/22/01    | 02/20/02 |
|                           | Z       | ENDEVCO      | AC-J31011 | 08/22/01    | 02/20/02 |
| Head                      | X (R)   | ENDEVCO      | AC-J31020 | 08/24/01    | 02/22/02 |
|                           | Y (R)   | ENDEVCO      | AC-J31101 | 08/22/01    | 02/20/02 |
|                           | Z (R)   | ENDEVCO      | AC-J31059 | 08/22/01    | 02/20/02 |
| Neck Load Cell            | X       | DENTON       | LC-076FX  | 01/17/02    | 07/18/02 |
|                           | Y       | DENTON       | LC-076FY  | 01/17/02    | 07/18/02 |
|                           | Z       | DENTON       | LC-076FZ  | 01/17/02    | 07/18/02 |
| Neck Moment               | X       | DENTON       | LC-076MX  | 01/17/02    | 07/18/02 |
|                           | Y       | DENTON       | LC-076MY  | 01/17/02    | 07/18/02 |
|                           | Z       | DENTON       | LC-076MZ  | 01/17/02    | 07/18/02 |
| Chest                     | X       | ENDEVCO      | AC-J34019 | 08/22/01    | 02/20/02 |
|                           | Y       | ENDEVCO      | AC-J33018 | 08/22/01    | 02/20/02 |
|                           | Z       | ENDEVCO      | AC-J32783 | 08/22/01    | 02/20/02 |
| Chest                     | X (R)   | ENDEVCO      | AC-J31066 | 08/22/01    | 02/20/02 |
|                           | Y (R)   | ENDEVCO      | AC-P16979 | 08/22/01    | 02/20/02 |
|                           | Z (R)   | ENDEVCO      | AC-J31022 | 08/22/01    | 02/20/02 |
| Chest Deflection          | X       | SERVO        | DS-245    | 08/22/01    | 02/20/02 |
| Pelvic                    | X       | ENDEVCO      | AC-J31034 | 08/22/01    | 02/20/02 |
|                           | Y       | ENDEVCO      | AC-P17258 | 08/22/01    | 02/20/02 |
|                           | Z       | ENDEVCO      | AC-J31010 | 08/22/01    | 02/20/02 |

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY  
(Six Month Calibration Minimum)

| PASSENGER DUMMY (S/N 245) |    | Manufacturer        | Serial #  | Calibration |          |
|---------------------------|----|---------------------|-----------|-------------|----------|
|                           |    |                     |           | Last        | Next     |
| Left Femur Load Cell      | Fz | GSE                 | LC-551    | 01/24/02    | 07/25/02 |
| Right Femur Load Cell     | Fz | GSE                 | LC-951    | 01/24/02    | 07/25/02 |
| Left Knee Shear           | Dx | SPACEAGE<br>CONTROL | DS-819    | 12/07/01    | 06/07/02 |
| Right Knee Shear          | Dx | SPACEAGE<br>CONTROL | DS-815    | 12/07/01    | 06/07/02 |
| Left Upper Tibia          | Mx | DENTON              | LC-045MX  | 09/05/01    | 03/06/02 |
|                           | My | DENTON              | LC-045MY  | 09/05/01    | 03/06/02 |
| Left Lower Tibia          | Fz | DENTON              | LC-125FZ  | 09/05/01    | 03/06/02 |
|                           | Mx | DENTON              | LC-125MX  | 09/05/01    | 03/06/02 |
|                           | My | DENTON              | LC-125MY  | 09/05/01    | 03/06/02 |
| Right Upper Tibia         | Mx | DENTON              | LC-038MX  | 09/05/01    | 03/06/02 |
|                           | My | DENTON              | LC-038MY  | 09/05/01    | 03/06/02 |
| Right Lower Tibia         | Fz | DENTON              | LC-124FZ  | 09/05/01    | 03/06/02 |
|                           | Mx | DENTON              | LC-124MX  | 09/05/01    | 03/06/02 |
|                           | My | DENTON              | LC-124MY  | 09/05/01    | 03/06/02 |
| Left Foot Rear            | X  | ENDEVCO             | AC-J30491 | 08/28/01    | 02/26/02 |
|                           | Z  | ENDEVCO             | AC-J31026 | 08/28/01    | 02/26/02 |
| Left Foot Front           | Z  | ENDEVCO             | AC-J32831 | 08/28/01    | 02/26/02 |
| Right Foot Rear           | X  | ENDEVCO             | AC-J33376 | 08/28/01    | 02/26/02 |
|                           | Z  | ENDEVCO             | AC-J32832 | 08/28/01    | 02/26/02 |
| Right Foot Front          | Z  | ENDEVCO             | AC-J31095 | 08/28/01    | 02/26/02 |
| Lap Belt Load Cell        |    | -                   | -         | -           | -        |
| Shoulder Belt Load Cell   |    | -                   | -         | -           | -        |
| Belt Stretch Transducer   |    | -                   | -         | -           | -        |

INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS  
(Six Month Calibration Minimum)

|                               | Manufacturer | Serial #  | Calibration |          |
|-------------------------------|--------------|-----------|-------------|----------|
|                               |              |           | Last        | Next     |
| Left Seat Rear Crossmember X  | ICS          | AC-X92    | 09/25/01    | 03/26/02 |
| Right Rear Seat Crossmember X | ICS          | AC-D36    | 10/30/01    | 04/30/02 |
| Top of Engine                 | ENDEVCO      | AC-B11073 | 01/07/02    | 07/08/02 |
| Bottom of Engine              | ENDEVCO      | AC-J26604 | 10/05/01    | 04/05/02 |
| Right Disc Brake Caliper      | ENDEVCO      | AC-J32186 | 09/05/01    | 03/06/02 |
| Instrument Panel              | ENDEVCO      | AC-J24754 | 09/25/01    | 03/26/02 |
| Left Disc Brake Caliper       | ENDEVCO      | AC-J32791 | 08/20/01    | 02/18/02 |
| Left Seat Rear Crossmember Z  | ENDEVCO      | AC-J27927 | 10/05/01    | 04/05/02 |
| Right Seat Rear Crossmember Z | ENDEVCO      | AC-J29805 | 08/13/01    | 02/11/02 |