

**NEW CAR ASSESSMENT PROGRAM
FORWARD COLLISION WARNING CONFIRMATION TEST
NCAP-DRI-FCW-22-09**

2022 Nissan Sentra CVT

DYNAMIC RESEARCH, INC.

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29 April 2022

Final Report

Prepared Under Contract No. DTNH22-14-D-00333

**U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
New Car Assessment Program
1200 New Jersey Avenue, SE
West Building, 4th Floor (NRM-110)
Washington, DC 20590**

Prepared for the Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-14-D-00333.

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|--------------|------------------------|-----|-----------------------|
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|---|--|---|-----------|
| 1. Report No. NCAP-DRI-FCW-22-09 | 2. Government Accession No. | 3. Recipient's Catalog No. | |
| 4. Title and Subtitle Final Report of Forward Collision Warning Confirmation Test of a 2022 Nissan Sentra CVT. | | 5. Report Date 29 April 2022 | |
| | | 6. Performing Organization Code DRI | |
| 7. Author(s) Stephen Rhim, Senior Engineer John Partridge, Staff Engineer | | 8. Performing Organization Report No. DRI-TM-21-120 | |
| 9. Performing Organization Name and Address Dynamic Research, Inc. 355 Van Ness Ave, STE 200 Torrance, CA 90501 | | 10. Work Unit No. | |
| | | 11. Contract or Grant No. DTNH22-14-D-00333 | |
| 12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration New Car Assessment Program 1200 New Jersey Avenue, SE, West Building, 4th Floor (NRM-110) Washington, DC 20590 | | 13. Type of Report and Period Covered Final Test Report April 2022 | |
| | | 14. Sponsoring Agency Code NRM-110 | |
| 15. Supplementary Notes | | | |
| 16. Abstract These tests were conducted on the subject 2022 Nissan Sentra CVT in accordance with the specifications of the New Car Assessment Program's (NCAP's) most current Test Procedure in docket NHTSA-2006-26555-0134 to confirm the performance of a Forward Collision Warning system. The vehicle passed the requirements of the test for all three FCW test scenarios. | | | |
| 17. Key Words Forward Collision Warning, FCW, New Car Assessment Program, NCAP | | 18. Distribution Statement Copies of this report are available from the following: NHTSA Technical Reference Division National Highway Traffic Safety Administration 1200 New Jersey Avenue, SE Washington, DC 20590 | |
| 19. Security Classif. (of this report) Unclassified | 20. Security Classif. (of this page) Unclassified | 21. No. of Pages 111 | 22. Price |

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Section I

INTRODUCTION

This test evaluates the ability of a Forward Collision Warning (FCW) system to detect and alert drivers to potential hazards in the path of the vehicle as specified in the New Car Assessment Program's "Forward Collision Warning Confirmation" test procedure, dated February 2013. Three driving scenarios are utilized to assess this technology. In the first test, a Subject Vehicle (SV) approaches a stopped Principal Other Vehicle (POV) in the same lane of travel. The second test begins with the SV initially following the POV at the same constant speed. After a short while, the POV stops suddenly. The third test consists of the SV, traveling at a constant speed, approaching a slower moving POV, which is also being driven at a constant speed.

The purpose of the testing reported herein was to objectively quantify the performance of a Forward Collision Warning system installed on a 2022 Nissan Sentra CVT. This test is part of the New Car Assessment Program to assess Forward Collision Warning Systems sponsored by the National Highway Traffic Safety Administration under Contract No. DTNH22-14-D-00333.

Section II

DATA SHEETS

FORWARD COLLISION WARNING
DATA SHEET 1: TEST RESULTS SUMMARY

(Page 1 of 1)

2022 Nissan Sentra CVT

VIN: 3N1AB8CV5NY25xxxx

Test start date: 4/8/2022

Test end date: 4/8/2022

Forward Collision Warning setting: N/A

Test 1 – Subject Vehicle Encounters
Stopped Principal Other Vehicle: **Pass**

Test 2 – Subject Vehicle Encounters
Decelerating Principal Other Vehicle: **Pass**

Test 3 – Subject Vehicle Encounters
Slower Principal Other Vehicle: **Pass**

Overall: **Pass**

Notes:

FORWARD COLLISION WARNING

DATA SHEET 2: VEHICLE DATA

(Page 1 of 1)

2022 Nissan Sentra CVT

TEST VEHICLE INFORMATION

VIN: 3N1AB8CV5NY25xxxx

Body Style: Sedan

Color: Brilliant Silver

Date Received: 3/25/2022

Odometer Reading: 6 mi

DATA FROM VEHICLE'S CERTIFICATON LABEL

Vehicle manufactured by: NISSAN MOTOR CO., LTD.

Date of manufacture: 02/22

Vehicle Type: Passenger Car

DATA FROM TIRE PLACARD

Tires size as stated on Tire Placard: Front: 205/60R16

Rear: 205/60R16

Recommended cold tire pressure: Front: 230 kPa (33 psi)

Rear: 230 kPa (33 psi)

TIRES

Tire manufacturer and model: Hankook Kinergy GT

Front tire specification: 205/60R16 92H

Rear tire specification: 205/60R16 92H

Front tire DOT prefix: 1BC9X 1B H0

Rear tire DOT prefix: 1BC9X 1B H0

FORWARD COLLISION WARNING
DATA SHEET 3: TEST CONDITIONS

(Page 1 of 2)

2022 Nissan Sentra CVT

GENERAL INFORMATION

Test start date: 4/8/2022

Test end date: 4/8/2022

AMBIENT CONDITIONS

Air temperature: 29.4 C (85 F)

Wind speed: 4.1 m/s (9.2 mph)

 X Wind speed \leq 10 m/s (22 mph).

 X Tests were not performed during periods of inclement weather. This includes, but is not limited to, rain, snow, hail, fog, smoke, or ash.

 X Tests were conducted during daylight hours with good atmospheric visibility (defined as an absence of fog and the ability to see clearly for more than 5000 meters). The tests were not conducted with the vehicle oriented into the sun during very low sun angle conditions, where the sun is oriented 15 degrees or less from horizontal, and camera “washout” or system inoperability results.

VEHICLE PREPARATION

Verify the following:

All non-consumable fluids at 100% capacity: X

Fuel tank is full: X

Tire pressures are set to manufacturer's recommended cold tire pressure: X

Front: 230 kPa (33 psi)

Rear: 230 kPa (33 psi)

FORWARD COLLISION WARNING
DATA SHEET 3: TEST CONDITIONS

(Page 2 of 2)

2022 Nissan Sentra CVT

WEIGHT

Weight of vehicle as tested including driver and instrumentation:

Left Front: 469.9 kg (1036 lb)

Right Front: 437.7 kg (965 lb)

Left Rear: 297.1 kg (655 lb)

Right Rear: 298.0 kg (657 lb)

Total: 1502.7 kg (3313 lb)

FORWARD COLLISION WARNING

DATA SHEET 4: FORWARD COLLISION WARNING SYSTEM OPERATION

(Page 1 of 3)

2022 Nissan Sentra CVT

Name of the FCW option, option package, etc.:

Automatic Emergency Braking with Pedestrian Detection

Type and location of sensor(s) the system uses:

The front radar is located in the grille and the front view camera is located in the upper center windshield

Forward Collision Warning Setting used in test: N/A

How is the Forward Collision Warning presented to the driver? ☒ Warning light
(Check all that apply) ☒ Buzzer or auditory alarm
☐ Vibration
☐ Other _____

Describe the method by which the driver is alerted. For example, if the warning is a light, where is it located, its color, size, words or symbol, does it flash on and off, etc. If it is a sound, describe if it is a constant beep or a repeated beep. If it is a vibration, describe where it is felt (e.g., pedals, steering wheel), the dominant frequency (and possibly magnitude), the type of warning (light, auditory, vibration, or combination), etc.

The AEB system alerts the driver with a visual and auditory alert. The visual alert consists of a yellow flashing vehicle icon in the top left corner of the vehicle information display. The auditory alert consists of repeated beeps with a primary frequency of 1800 Hz.

FORWARD COLLISION WARNING

DATA SHEET 4: FORWARD COLLISION WARNING SYSTEM OPERATION

(Page 2 of 3)

2022 Nissan Sentra CVT

Is the vehicle equipped with a switch whose purpose is to render FCW inoperable? ☒ Yes
☐ No

If yes, please provide a full description including the switch location and method of operation, any associated instrument panel indicator, etc.

The AEB system can be turned on/off using the buttons on the left side of the steering wheel. The procedure is as follows:

1. Select the Left or Right button to reach the "Settings" menu in the vehicle information display.
2. Select the Up or Down button to reach the "Driver Assistance" menu and press "OK".
3. Select "Emergency Brake" and press "OK".
4. Select "Front" and press "OK" to turn the AEB system on/off.

When the AEB system is turned off, a warning light illuminates. The system is automatically enabled each time the engine switch is turned on.

Is the vehicle equipped with a control whose purpose is to adjust the range setting or otherwise influence the operation of FCW? ☐ Yes
☒ No

If yes, please provide a full description.

FORWARD COLLISION WARNING
DATA SHEET 4: FORWARD COLLISION WARNING SYSTEM OPERATION

(Page 3 of 3)

2022 Nissan Sentra CVT

| | | |
|---|---------------|-----|
| Are there other driving modes or conditions that render FCW inoperable or reduce its effectiveness? | <u> X </u> | Yes |
| | <u> </u> | No |

If yes, please provide a full description.

Refer to the owner's manual pages 5-108 to 5-115 shown in Appendix B pages B-7 to B-14.

Notes:

Section III

TEST PROCEDURES

A. Test Procedure Overview

Three test procedures were used, as follows:

Test 1. Subject Vehicle (SV) Encounters Stopped Principal Other Vehicle (POV)

Test 2. Subject Vehicle Encounters Decelerating Principal Other Vehicle

Test 3. Subject Vehicle Encounters Slower Principal Other Vehicle

With the exception of trials associated with Test 1, all trials were performed with SV and POV automatic transmissions in “Drive” or with manual transmissions in the highest gear capable of sustaining the desired test speed. Manual transmission clutches remained engaged during all maneuvers. Except for Test 2, the brake lights of the POV were not illuminated.

In order to pass the test, if the FCW system provides a warning timing adjustment for the driver, at least one setting must meet the criterion of the test procedure. Therefore, if the vehicle was equipped with a warning timing adjustment, only the most “conservative” (earliest warning) setting was tested.

An overview of each of the test procedures follows.

1. TEST 1 – SUBJECT VEHICLE ENCOUNTERS STOPPED PRINCIPAL OTHER VEHICLE ON A STRAIGHT ROAD

This test evaluates the ability of the FCW function to detect a stopped lead vehicle, as depicted in Figure 1.

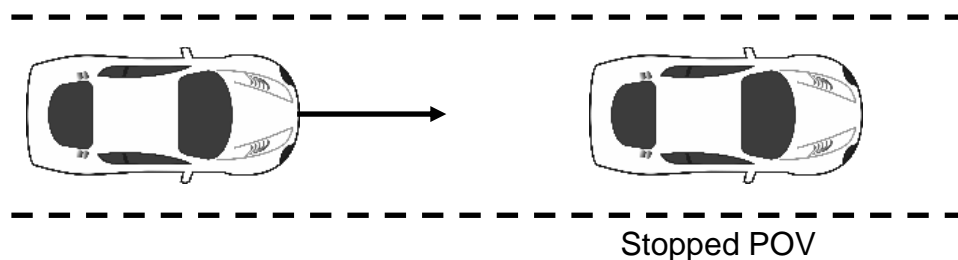


Figure 1. Depiction of Test 1

a. Alert Criteria

In order to pass the test, the FCW alert must be issued when the time-to-collision (TTC) is at least 2.1 seconds. The TTC for this test was calculated by considering the speeds of the SV and the POV at the time of the FCW alert (i.e., when the SV and POV speeds are nominally equal to 45 and 0 mph (72.4 and 0 km/h), respectively).

b. Procedure

The POV was parked in the center of a travel lane, with its longitudinal axis oriented parallel to the roadway edge and facing the same direction as the SV so that the SV approaches the rear of the POV.

The SV was driven at a nominal speed of 45 mph (72.4 km/h) in the center of the lane of travel, toward the parked POV. The test began when the SV was 492 ft (150 m) from the POV and ended when either of the following occurred:

- The required FCW alert occurred.
- The TTC to the POV fell to less than 90% of the minimum allowable range (i.e., $TTC = 1.9$ sec) for the onset of the required FCW alert.

The SV driver then steered and/or braked to keep the SV from striking the POV.

For an individual test trial to be valid, the following was required throughout the test:

- The SV vehicle speed could not deviate from the nominal speed by more than 1.0 mph (1.6 km/h) for a period of three seconds prior to (1) the required FCW alert or (2) before the range fell to less than 90% of the minimum allowable range for onset of the required FCW alert.
- The SV driver could not apply any force to the brake pedal before (1) the required FCW alert occurred or (2) the range fell to less than 90% of the minimum allowable range for onset of the required FCW alert.
- The lateral distance between the centerline of the SV, relative to the centerline of the POV, in road coordinates, could not exceed 2.0 ft (0.6 m).
- The yaw rate of the SV could not exceed ± 1 deg/sec during the test.

Nominally, the Test 1 series was comprised of seven individual trials. The FCW system must satisfy the TTC alert criteria for at least five of the seven test trials.

2. TEST 2 – SUBJECT VEHICLE ENCOUNTERS DECELERATING PRINCIPAL OTHER VEHICLE

The SV in this test initially followed the POV at a constant time gap and then the POV suddenly decelerated, as depicted in Figure 2. The test evaluates the ability of the FCW to recognize a decelerating lead vehicle and to issue an alert to SV driver in a timely manner.

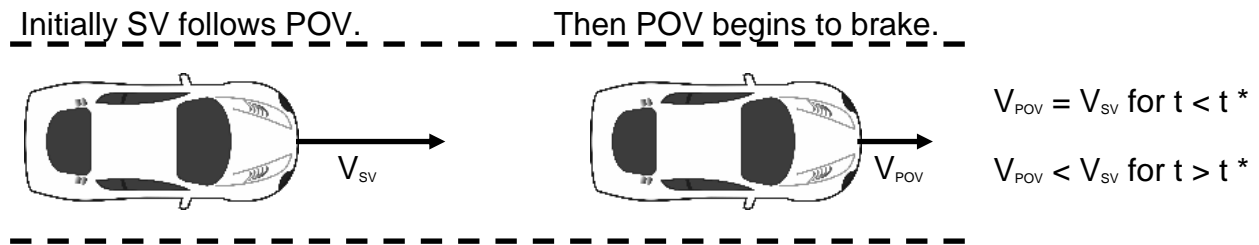


Figure 2. Depiction of Test 2

a. Alert Criteria

In order to pass the test, the FCW alert must be issued when TTC is at least 2.4 seconds. The TTC for this test, a prediction of the time it would take for the SV to collide with the POV, was calculated by considering three factors at the time of the FCW alert: (1) the speed of the SV, (2) the speed of the POV, and (3) the deceleration of the POV¹.

b. Procedure

Test 2 began with the SV and the POV traveling on a straight, flat road at a constant speed of 45.0 mph (72.4 km/h), in the center of the lane of travel. The headway from the SV to the POV was nominally maintained at 98.4 ft (30 m) until the POV braking was initiated.

The test began approximately 7 seconds before the driver of the POV started a braking maneuver in which the POV brakes were rapidly applied and modulated such that a constant deceleration of 0.3 g was achieved within 1.5 seconds after braking is initiated. The test ended when either of the following conditions was satisfied:

- The required FCW alert occurred.
- The TTC to the POV fell to less than 90% of the minimum allowable range (i.e., $TTC = 2.2$ sec) for the onset of the required FCW alert.

The SV driver then steered and/or braked to keep the SV from striking the POV.

¹To simplify calculation of the TTC for Test 2, the deceleration of the POV is assumed to remain constant from the time of the FCW alert until the POV comes to a stop (i.e., a "constant" rate of slowing is assumed).

For an individual test trial to be valid, the following was required throughout the test:

- The initial POV vehicle speed could not deviate from the nominal speed by more than 1.0 mph (1.6 km/h) for a period of 3 seconds prior to the initiation of POV braking.
- The speed of the SV could not deviate from the nominal speed by more than 1.0 mph (1.6 km/h) for a period of 3 seconds prior to (1) the required FCW alert or (2) before the range fell to less than 90% of the minimum allowable range for onset of the required FCW alert.
- The lateral distance between the centerline of the SV, relative to the centerline of the POV, in road coordinates, could not exceed 2.0 ft (0.6 m).
- The yaw rates of the SV and POV could not exceed ± 1 deg/sec during the test.
- The POV deceleration level was nominally required to be 0.3 g within 1.5 seconds after initiation of POV braking. The acceptable error magnitude of the POV deceleration was ± 0.03 g, measured at the time the FCW alert first occurred. An initial overshoot beyond the deceleration target was acceptable, however the first local deceleration peak observed during an individual trial could not exceed 0.375 g for more than 50 ms. Additionally, the deceleration could not exceed 0.33 g over a period defined from 500 ms after the first local deceleration peak occurs, to the time when the FCW alert first occurred.
- The tolerance for the headway from the SV to the POV was ± 8.2 ft (± 2.5 m), measured at two instants in time: (1) three seconds prior to the time the POV brake application was initiated and (2) at the time the POV brake application was initiated.
- SV driver could not apply any force to the brake pedal before (1) the required FCW alert occurred or (2) the range fell to less than 90% of the minimum allowable range for onset of the required FCW alert.

Nominally, the Test 2 series was comprised of seven individual trials. The FCW system must satisfy the TTC alert criteria for at least five of the seven test trials.

3. TEST 3 – SUBJECT VEHICLE ENCOUNTERS SLOWER PRINCIPAL OTHER VEHICLE

This test examines the ability of the FCW system to recognize a slower lead vehicle being driven with a constant speed and to issue a timely alert. As depicted in Figure 3, the scenario was conducted with a closing speed equal to 25.0 mph (40.2 km/h).

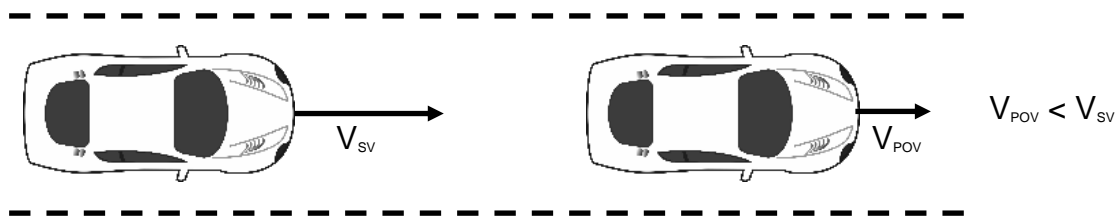


Figure 3. Depiction of Test 3

a. Alert Criteria

In order to pass the test, the FCW alert must be issued when TTC is at least 2.0 seconds. The TTC for this test, a prediction of the time it would take for the SV to collide with the POV, was calculated by considering the speeds of the SV and POV at the time of the FCW alert.

b. Procedure

Throughout the test, the POV was driven at a constant 20.0 mph (32.2 km/h) in the center of the lane of travel.

The SV was driven at 45.0 mph (72.4 km/h), in the center lane of travel, toward the slow-moving POV.

The test began when the headway from the SV to the POV was 329 ft (100 m) and ended when either of the following occurred:

- The required FCW alert occurred.
- The TTC to the POV fell to less than 90% of the minimum allowable range (i.e., $TT = 1.8$ sec) for the onset of the required FCW alert.

The SV driver then steered and/or braked to keep the SV from striking the POV.

For an individual test trial to be valid, the following was required throughout the test:

- The SV vehicle speed could not deviate from the nominal speed by more than 1.0 mph (1.6 km/h) for a period of 3 seconds prior to (1) the required FCW alert or (2) before the range fell to less than 90% of the minimum allowable range for onset of the required FCW alert.
- Speed of the POV could not deviate from the nominal speed by more than 1.0 mph (1.6 km/h) during the test.
- The lateral distance between the centerline of the SV, relative to the centerline of the POV, in road coordinates, could not exceed 2.0 ft (0.6 m).
- The yaw rates of the SV and POV could not exceed ± 1 deg/sec during the test.
- SV driver could not apply any force to the brake pedal before (1) the required

FCW alert occurred or (2) before the range fell to less than 90% of the minimum allowable range for onset of the required FCW alert.

Nominally, the Test 3 series was comprised of seven individual trials. The FCW system must satisfy the TTC alert criteria for at least five of the seven test trials.

B. Principal Other Vehicle

The vehicle used as the Principal Other Vehicle (POV) was a 2006 Acura RL. This satisfied the test requirement that the POV be a mid-size sedan. The vehicle had a rear license plate in order to provide a suitable representative radar profile. Vehicle loading consisted of the driver plus equipment and instrumentation.

C. Automatic Braking System

The POV was equipped with an automatic braking system, which was used in Test 2. The braking system consisted of the following components:

- Electronically controlled linear actuator, mounted on the seat rail and attached to the brake pedal. The actuator can be programmed for control of stroke and rate.
- PC module programmed for control of the stroke and rate of the linear actuator.
- Switch to activate actuator.

D. Instrumentation

Table 1 lists the sensors, signal conditioning, and data acquisition equipment used for these tests.

Table 1. Test Instrumentation and Equipment

| Type | Output | Range | Accuracy, Other Primary Specs | Mfr, Model | Serial Number | Calibration Dates Last Due |
|--|--|---|---|--|---------------|--|
| Tire Pressure Gauge | Vehicle Tire Pressure | 0-100 psi 0-690 kPa | < 1% error between 20 and 100 psi | Omega DPG8001 | 17042707002 | By: DRI Date: 10/5/2021 Due: 10/5/2022 |
| Platform Scales | Vehicle Total, Wheel, and Axle Load | 2200 lb/platform | 0.1% of reading | Intercomp SW wireless | 0410MN20001 | By: DRI Date: 2/11/2022 Due: 2/11/2023 |
| Differential Global Positioning System | Position, Velocity | Latitude: ± 90 deg Longitude: ± 180 deg Altitude: 0-18 km Velocity: 0-1000 knots | Horizontal Position: ± 1 cm Vertical Position: ± 2 cm Velocity: 0.05 km/h | Trimble GPS Receiver, 5700 (base station and in-vehicle) | 00440100989 | N/A |
| Multi-Axis Inertial Sensing System | Position; Longitudinal, Lateral, and Vertical Accels; Lateral, Longitudinal and Vertical Velocities; Roll, Pitch, Yaw Rates; Roll, Pitch, Yaw Angles | Accels $\pm 10g$, Angular Rate ± 100 deg/s, Angle > 45 deg, Velocity > 200 km/h | Accels .01g, Angular Rate 0.05 deg/s, Angle 0.05 deg, Velocity 0.1 km/h | | | By: Oxford Technical Solutions |
| | | | | SV: Oxford Inertial + | 2176 | Date: 6/26/2020 Due: 6/26/2022 |
| | | | | POV: | 2258 | Date: 4/28/2021 Due: 4/28/2023 |
| Real-Time Calculation of Position and Velocity Relative to Lane Markings (LDW) and POV (FCW) | Distance and Velocity to lane markings (LDW) and POV (FCW) | Lateral Lane Dist: ± 30 m Lateral Lane Velocity: ± 20 m/sec Longitudinal Range to POV: ± 200 m Longitudinal Range Rate: ± 50 m/sec | Lateral Distance to Lane Marking: ± 2 cm Lateral Velocity to Lane Marking: ± 0.02 m/sec Longitudinal Range: ± 3 cm Longitudinal Range Rate: ± 0.02 m/sec | Oxford Technical Solutions (OXTS), RT-Range | 97 | N/A |

Table 1. Test Instrumentation and Equipment (continued)

| Type | Output | Range | Accuracy, Other Primary Specs | Mfr, Model | Serial Number | Calibration Dates Last Due |
|--------------------------------|---|------------------------------------|--|---|-----------------|--|
| Microphone | Sound (to measure time at auditory alert) | Frequency Response: 80 Hz – 20 kHz | Signal-to-noise: 64 dB, 1 kHz at 1 Pa | Audio-Technica AT899 | N/A | N/A |
| Light Sensor | Light intensity (to measure time at visual alert) | Spectral Bandwidth: 440-800 nm | Rise time < 10 msec | DRI designed and developed Light Sensor | N/A | N/A |
| Accelerometer | Acceleration (to measure time at haptic alert) | ±5g | ≤ 3% of full range | Silicon Designs, 2210-005 | N/A | N/A |
| Coordinate Measurement Machine | Inertial Sensing System Coordinates | 0-8 ft 0-2.4 m | ±.0020 in. ±.051 mm (Single point articulation accuracy) | Faro Arm, Fusion | UO8-05-08-06636 | By: DRI Date: 1/6/2022 Due: 1/6/2023 |
| Type | Description | | | Mfr, Model | Serial Number | |
| Data Acquisition System | Data acquisition is achieved using a dSPACE MicroAutoBox II. Data from the Oxford IMU, including Longitudinal, Lateral, and Vertical Acceleration, Roll, Yaw, and Pitch Rate, Forward and Lateral Velocity, Roll and Pitch Angle are sent over Ethernet to the MicroAutoBox. The Oxford IMUs are calibrated per the manufacturer's recommended schedule (listed above). | | | dSPACE Micro-Autobox II 1401/1513 | | |
| | | | | Base Board | 549068 | |
| | | | | I/O Board | 588523 | |

For systems that implement auditory or haptic alerts, part of the pre-test instrumentation verification process is to determine the tonal frequency of the auditory warning or the vibration frequency of the tactile warning through use of the PSD (Power Spectral Density) function in Matlab. This is accomplished in order to identify the center frequency around which a band-pass filter is applied to subsequent auditory or tactile warning data so that the beginning of such warnings can be programmatically determined. The band-pass filter used for these warning signal types is a phaseless, forward-reverse pass, elliptical (Cauer) digital filter, with filter parameters as listed in Table 2.

Table 2. Auditory and Tactile Warning Filter Parameters

| Warning Type | Filter Order | Peak-to-Peak Ripple | Minimum Stop Band Attenuation | Passband Frequency Range |
|---------------------|---------------------|----------------------------|--------------------------------------|---------------------------------------|
| Auditory | 5 th | 3 dB | 60 dB | Identified Center Frequency \pm 5% |
| Tactile | 5 th | 3 dB | 60 dB | Identified Center Frequency \pm 20% |

APPENDIX A

Photographs

LIST OF FIGURES

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Figure A1. Front View of Subject Vehicle



Figure A2. Rear View of Subject Vehicle



2022 NISSAN SENTRA 2.0 SV CVT



Scan QR code for general
model information & options

Standard Equipment Included at No Extra Charge

MECHANICAL & PERFORMANCE

2.0 Liter DOHC 4-Cylinder Engine
149 Horsepower & 146 lb-ft Torque
Xtronic CVT™
Dual Pinion Electric Power Steering (DP-EPS)
Active Understeer Control (AUC)
Independent Strut and
Multilink Rear Suspension
Intelligent Trace Control (ITC)
Active Ride Control (ARC)

SAFETY AND SECURITY

Automatic Emergency Braking w/
Pedestrian Detection (AEB w/ Ped.)
Intelligent Forward Collision
Warning (I-FCW)
Rear Automatic Braking (RAB)
Blind Spot Warning (BSW)
Rear Cross Traffic Alert (RCTA)
Lane Departure Warning (LDW) w/
Haptic Steering Wheel
High Beam Assist (HBA)
RearView Monitor
Nissan Advanced Air Bag System (AABS) w/
Dual-Stage Supplemental Driver and
Passenger Front Air Bags
Roof-mounted Curtain Side-impact
and Rollover Supplemental Air Bags
Seat-mounted Driver and Front-passenger
Side-impact Supplemental Air Bags
Seat-mounted Rear Outboard Side-impact
Supplemental Air Bags
Driver and Passenger Supplemental
Knee Air Bags
Front and Rear Outboard Seat Belts w/
Pretensioners and Load Limiters
Anti-lock Braking System (ABS)
Electronic Brake Force Distribution (EBD)
Vehicle Dynamic Control System (VDC)
Traction Control System (TCS)
Tire Pressure Monitoring System (TPMS)
Easy Fill Tire Alert
LATCH System (Lower Anchors and
Tethers for Children)
Vehicle Security System

COMFORT & CONVENIENCE

Nissan Intelligent Key®
w/ Push Button Ignition
Intelligent Cruise Control (ICC)
Power Windows w/ Driver's One-Touch
Auto Up/Down Feature
Manual Tilt and Telescoping Steering Column
Intelligent Auto Headlamps
Intelligent Driver Alertness (I-DA)
Rear Door Alert

AUDIO AND ENTERTAINMENT

7" Advanced Drive-Assist® Display in Meter+
NissanConnect®
8" Color Touch-Screen Display
Apple CarPlay®+
Android Auto™+
SiriusXM® Radio w/ Advanced Audio Features+
Bluetooth® Hands-Free Phone System+
Streaming Audio via Bluetooth®+
(2) Front USB Ports (Type A & C) and
(1) Rear Charge-only USB Port (Type A)
6-Speaker Audio System

EXTERIOR

16" Alloy Wheels
Front and Rear Disc Brakes
205/60R16 All-Season Tires
Halogen Headlamps w/ Chrome Signature
Body-Color Heated Power Outside Mirrors

INTERIOR

6-Way Manual Driver's Seat
60/40 Split Fold-Down Rear Seat w/ Armrest
Leather-Wrapped Steering Wheel
Premium Cloth Seat Trim

+For more information, see dealer,
owner's manual, or
www.NissanUSA.com/connect/legal
+Optional Equipment Replaces
Standard Features

Manufacturer's Suggested
Retail Base Price: \$20,670.00

Options Included by Manufacturer
SPLASH GUARDS 225.00
CLEAR REAR BUMPER PROTECTOR 75.00
CARPETED FLOOR MATS WITH TRUNK MAT 260.00
DOOR SILL PLATES 80.00

DESTINATION CHARGES 1,025.00

Total* \$22,335.00

EPA DOT Fuel Economy and Environment

Gasoline Vehicle

Fuel Economy
33 MPG
combined city/hwy
29 city
39 highway
3.0 gallons per 100 miles

MIDSIZE CARS range from 14 to 142
MPG. The best vehicle rates 142 MPGe.

You save
\$1,250
in fuel costs
over 5 years
compared to the
average new vehicle.

Annual fuel cost
\$1,050

Fuel Economy & Greenhouse Gas Rating (tailpipe only) Smog Rating (tailpipe only)

1 7 10 1 10
This vehicle emits 269 grams CO₂ per mile. The best emits 6 grams CO₂ per mile (tailpipe only). Production Best
distributing fuel also create emissions; learn more at fuelconomy.gov

Actual results will vary for many reasons, including driving conditions and how you drive and maintain
your vehicle. The average new vehicle gets 27 MPG and costs \$6,500 to fuel over 5 years. Cost estimates
are based on 15,000 miles per year at \$2.35 per gallon. MPGe is miles per gasoline gallon equivalent.
Vehicle emissions are a significant cause of climate change and smog.

fuelconomy.gov

Calculate personalized estimates and compare vehicles



GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score ★★★★★
Based on the combined ratings of frontal, side and rollover.
Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash Driver Passenger ★★★★★
Based on the risk of injury in a frontal impact.
Should ONLY be compared to other vehicles of similar size and weight.

Side Crash Front seat Rear seat ★★★★★
Based on the risk of injury in a side impact.

Rollover ★★★★★
Based on the risk of rollover in a single-vehicle crash.

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest.

Source: National Highway Traffic Safety Administration (NHTSA)
www.safercar.gov or 1-888-327-4236

This Vehicle qualifies for Nissan's Security+Plus Extended Protection Plan

The only service agreement backed by
Nissan Extended Services North America!
Ask your dealer for details, or call 1-800-NISSAN-1
for more information

THIS VEHICLE IS EQUIPPED WITH BUMPERS THAT CAN WITHSTAND AN IMPACT OF 2.5 MILES PER HOUR
WITH NO DAMAGE TO THE VEHICLE'S BODY AND SAFETY SYSTEMS. ALTHOUGH THE BUMPER AND
RELATED COMPONENTS MAY SUSTAIN DAMAGE, THE BUMPER SYSTEM ON THIS VEHICLE CONFORMS TO
THE CURRENT FEDERAL BUMPER STANDARD OF 2.5 MILES PER HOUR.

DELIVERY

VEHICLE COLORS:
EXT: BRILLIANT SILVER
INT: CHARCOAL
FINAL ASSEMBLY POINT:
AGUAS (ABV.) MEX
TRANSPORT METHOD:
TRUCK
DEALER:

VIN: 3N1AB8CV5NY25
EMS: 50 STATE EMISSIONS
MDL: 12112-250404 K23-G
OPT: F-B92B93C03L92N94

20220215230347AS5955

*Does not include dealer installed options and accessories, local taxes or license fees. This label has
been applied pursuant to federal law. Do not remove prior to delivery to the ultimate purchaser.

Figure A3. Window Sticker (Monroney Label)

MANUFACTURED BY NISSAN MOTOR CO., LTD.
DATE: 02/22. GVWR: 4001 LBS
GAWR FR: 2161 LBS GAWR RR: 1863 LBS

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

SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION.

VIN: 3N1AB8CV5NY25 PASSENGER CAR.

COLOR TRIM TRANS AXLE ENGINE

K23 'G 'REDF10D GS50 MR20 1997 CC

MODEL: BDRALDZB18DUA----- 4Z000



3N1AB8CV5NY25

Figure A4. Vehicle Certification Label



TIRE AND LOADING INFORMATION
RENSEIGNEMENTS SUR LES PNEUS ET LE CHARGEMENT

| | | | | |
|------------------|-------|---|-----------------|---|
| SEATING CAPACITY | TOTAL | 5 | FRONT AVANT | 2 |
| NOMBRE DE PLACES | TOTAL | | REAR ARRIÈRE | 3 |

The combined weight of occupants
and cargo should never exceed **400 kg** or **881 lbs.**
Le poids total des occupants et du chargement ne doit
jamais dépasser **400 kg** ou **881 lb.**

| TIRE PNEU | SIZE DIMENSIONS | COLD TIRE PRESSURE PRESSION DES PNEUS À FROID | |
|---------------------|--------------------|---|--------------|
| FRONT AVANT | 205/60R16 92H | 230kPa | 33PSI |
| REAR ARRIÈRE | 205/60R16 92H | 230kPa | 33PSI |
| SPARE DE SECOURS | T125/70D16 96M | 420kPa | 60PSI |

SEE OWNER'S
MANUAL FOR
ADDITIONAL
INFORMATION

VOIR LE MANUEL
DE L'USAGER
POUR PLUS DE
RENSEIGNEMENTS

BA 6LB0A

Figure A5. Tire Placard



Figure A6. Front View of Principal Other Vehicle



Figure A7. Rear View of Principal Other Vehicle



Figure A8. DGPS, Inertial Measurement Unit, and MicroAutoBox Installed in Subject Vehicle



Figure A9. Sensors for Detecting Auditory and Visual Alerts



Figure A10. Computer Installed in Subject Vehicle



Figure A11. Brake Actuation System Installed in Principal Other Vehicle



Figure A12. FCW System Control Buttons



Figure A13. FCW System Setup Menu



Figure A14. Visual Alert

APPENDIX B

Excerpts from Owner's Manual

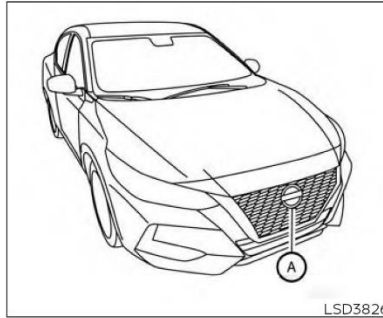
INTELLIGENT FORWARD COLLISION WARNING (I-FCW)

WARNING


Failure to follow the warnings and instructions for proper use of the I-FCW system could result in serious injury or death.

- The I-FCW system can help warn the driver before a collision occurs but will not avoid a collision. It is the driver's responsibility to stay alert, drive safely and be in control of the vehicle at all times.

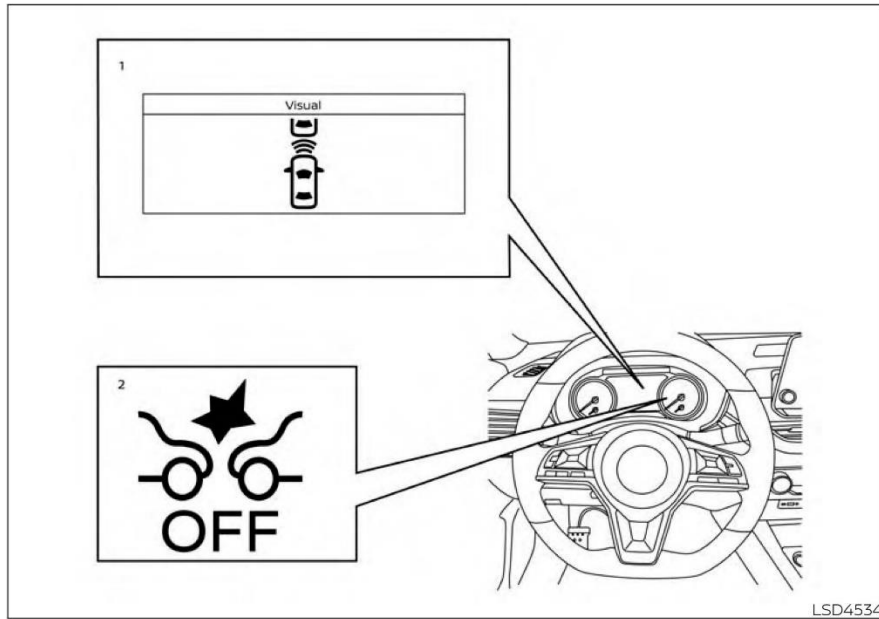
The I-FCW system can help alert the driver when there is a sudden braking of a second vehicle traveling in front of the vehicle ahead in the same lane.



LSD3826

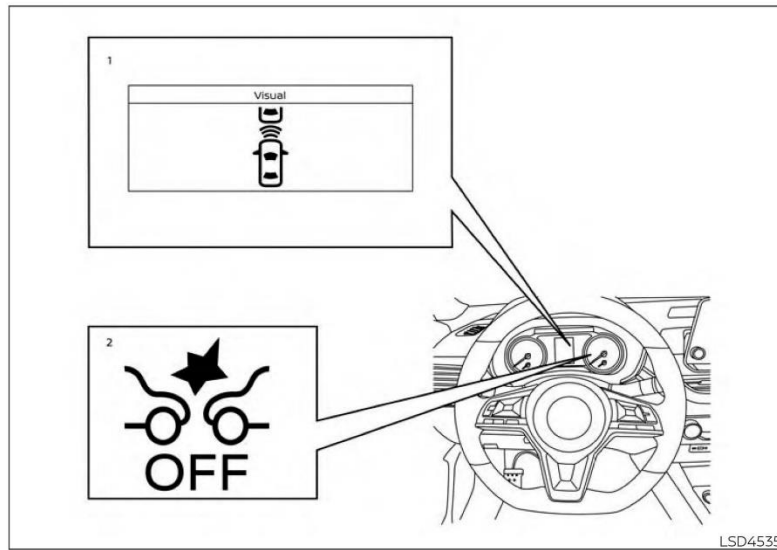
The I-FCW system uses a radar sensor  located on the front of the vehicle to measure the distance to the vehicle ahead in the same lane.

Starting and driving 5-103



For vehicles with the 7 inch meter display

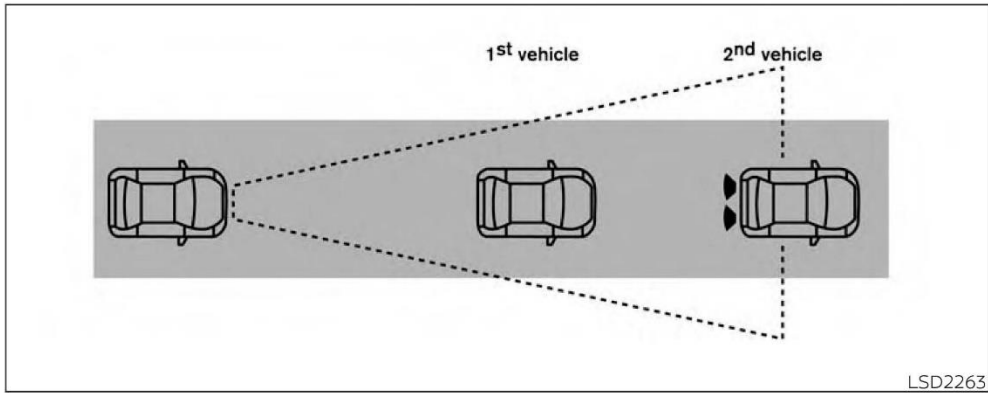
5-104 **Starting and driving**



1. Vehicle ahead detection indicator
2. AEB with Pedestrian Detection system warning light

For vehicles with the 4.2 inch meter display

Starting and driving 5-105

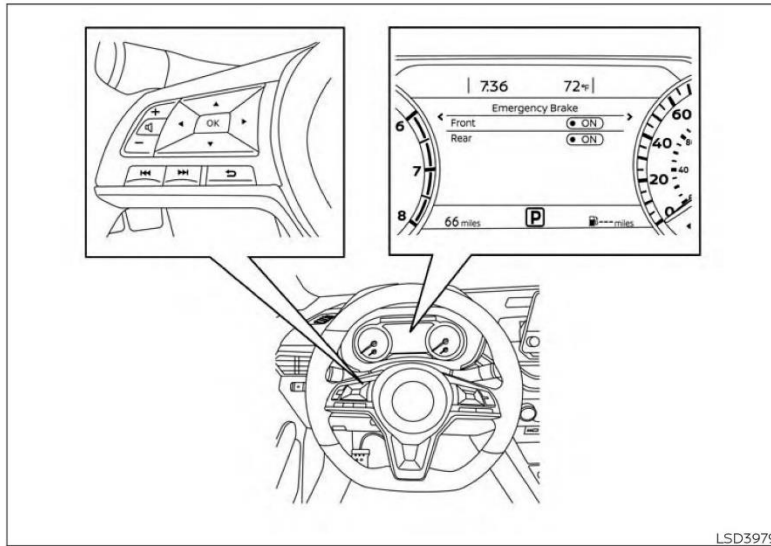


I-FCW SYSTEM OPERATION

The I-FCW system operates at speeds above approximately 3 mph (5 km/h).

If there is a potential risk of a forward collision, the I-FCW system will warn the driver by blinking the vehicle ahead detection indicator, and sounding an audible alert.

5-106 **Starting and driving**



For vehicles with the 7 inch meter display

TURNING THE I-FCW SYSTEM
ON/OFF

Perform the following steps to turn the I-FCW system ON or OFF:

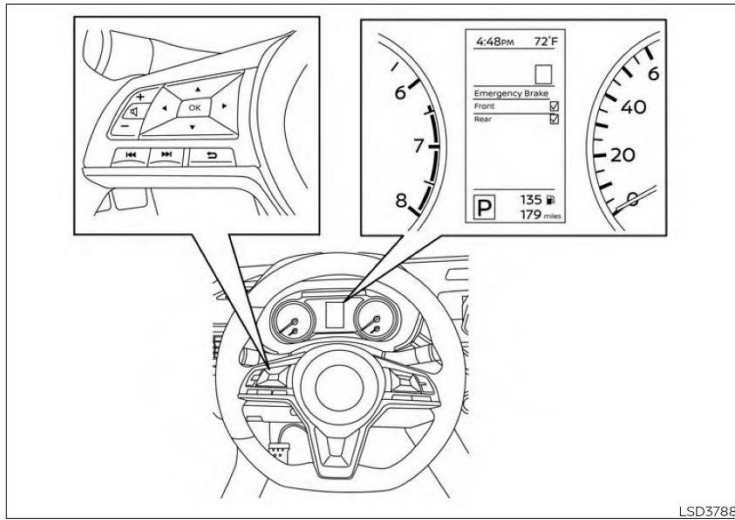
1. Press the button until "Settings" displays in the vehicle information display. Use the button to select "Driver Assistance." Then press the OK button.
2. Select "Emergency Brake" and press the OK button.
3. Select "Front" and press the OK button to turn the system on or off.

When the I-FCW system is turned off, the AEB with Pedestrian Detection system warning light illuminates.

NOTE:

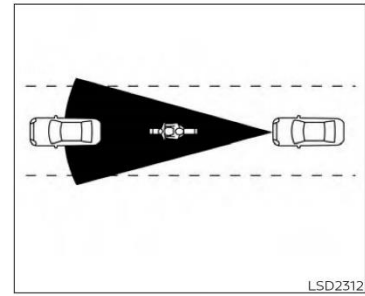
- The I-FCW system will be automatically turned on when the engine is restarted.
- The I-FCW system is integrated into the AEB with Pedestrian Detection system. There is not a separate selection in the vehicle information display for the I-FCW system. When the AEB with Pedestrian Detection system is turned off, the I-FCW system is also turned off.

Starting and driving 5-107



For vehicles with the 4.2 inch meter display

LSD3788



LSD2312

Illustration A
I-FCW SYSTEM LIMITATIONS

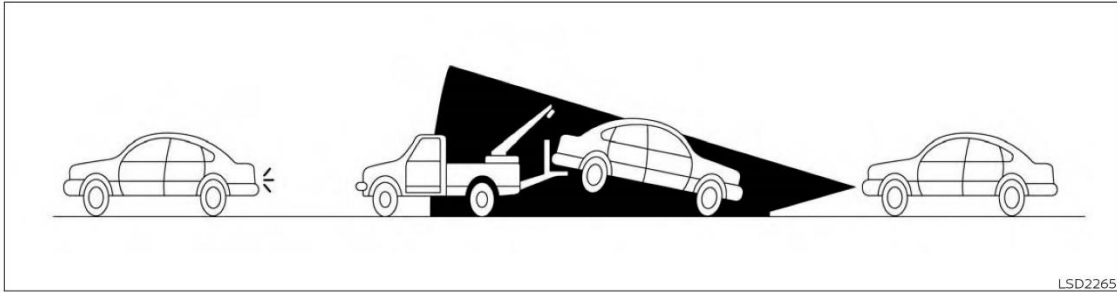


Illustration B

⚠ WARNING

Listed below are the system limitations for the I-FCW system. Failure to operate the vehicle in accordance with these system limitations could result in serious injury or death.

- The I-FCW system cannot detect all vehicles under all conditions.

- The radar sensor does not detect the following objects:
 - Pedestrians, animals or obstacles in the roadway
 - Oncoming vehicles
 - Crossing vehicles
- (Illustration A) The I-FCW system does not function when a vehicle ahead is a narrow vehicle, such as a motorcycle.

- The radar sensor may not detect a vehicle ahead in the following conditions:
 - Snow or heavy rain
 - Dirt, ice, snow or other material covering the radar sensor.
 - Interference by other radar sources.
 - Snow or road spray from traveling vehicles.
 - Driving in a tunnel
 - (Illustration B) When the vehicle ahead is being towed.

Starting and driving 5-109

- (Illustration C) When the distance to the vehicle ahead is too close, the beam of the radar sensor is obstructed.
- (Illustration D) When driving on a steep downhill slope or roads with sharp curves.
- The system is designed to automatically check the sensor's functionality, within certain limitations. The system may not detect some forms of obstruction of the sensor area such as ice, snow, stickers, etc. In these cases, the system may not be able to warn the driver properly. Be sure that you check, clean and clear the sensor area regularly.
- Excessive noise will interfere with the warning chime sound, and the chime may not be heard.

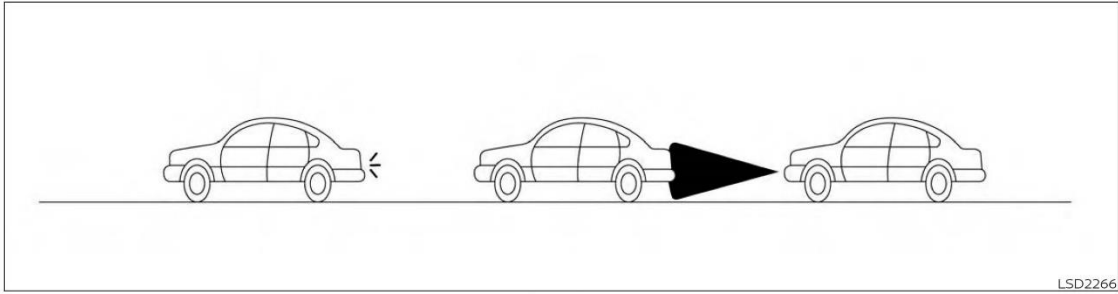


Illustration C

Starting and driving 5-111

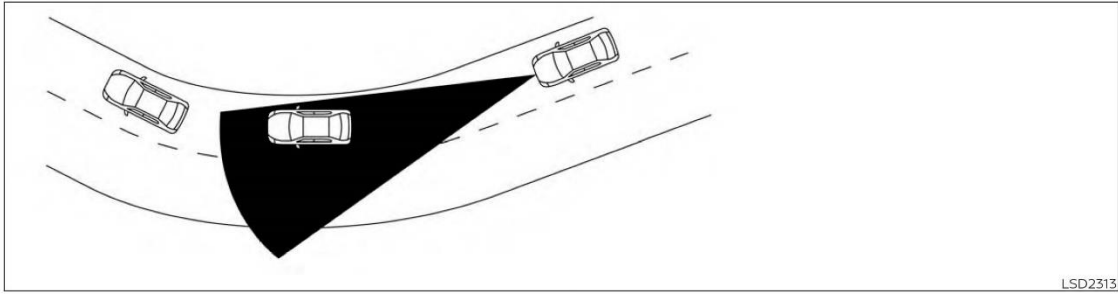
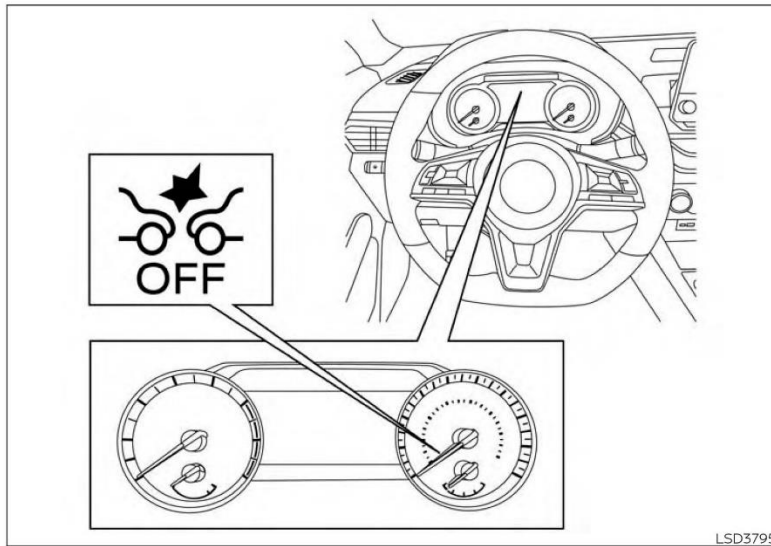


Illustration D

LSD2313

5-112 **Starting and driving**



For vehicles with the 7 inch meter display

SYSTEM TEMPORARILY
UNAVAILABLE

Condition A

When the radar sensor picks up interference from another radar source, making it impossible to detect a vehicle ahead, the I-FCW system is automatically turned off.

The AEB with Pedestrian Detection system warning light (orange) will illuminate.

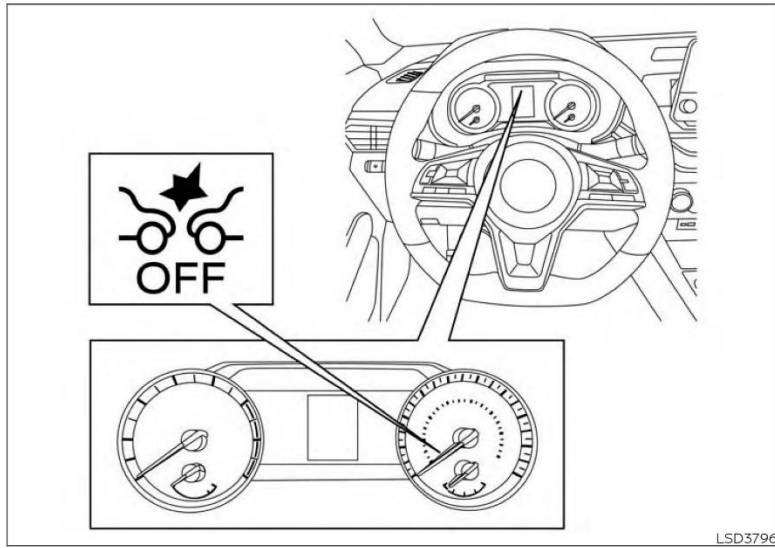
Action to take:

When the above conditions no longer exist, the I-FCW system will resume automatically.

Condition B

When there is inclement weather (rain, fog, snow, etc.) blocking the front radar sensor, the I-FCW system will automatically be canceled. The chime will sound and the "Forward Driving Aids Temporarily Disabled Front Sensor Blocked: See Owner's Manual" or "Driving Aids Temporarily Disabled Front Sensor Blocked: See Manual" warning message will appear in the vehicle information display.

Starting and driving 5-113



For vehicles with the 4.2 inch meter display

Action to take:

When the conditions listed above are no longer present, the warning message will no longer be available in the vehicle information display. If the "Forward Driving Aids Temporarily Disabled Front Sensor Blocked: See Owner's Manual" or "Driving Aids Temporarily Disabled Front Sensor Blocked: See Manual" warning message continues to be displayed, have the system checked. It is recommended that you visit a NISSAN dealer for this service.

Condition C

When the radar sensor of the front bumper is covered with mud, dirt, snow, ice, etc., or is obstructed, the I-FCW system will automatically be canceled, the chime will sound and the "Forward Driving Aids Temporarily Disabled Front Sensor Blocked: See Owner's Manual" or "Driving Aids Temporarily Disabled Front Sensor Blocked: See Manual" warning message will appear in the vehicle information display.

Action to take:

If the warning message appears, stop the vehicle in a safe place, place the shift lever in the P (Park) position, and turn the engine off. When the radar signal is temporarily interrupted, clean the sensor area of the front bumper and restart the engine. If the "Forward Driving Aids Temporarily Disabled Front Sensor Blocked: See Owner's Manual" or "Driving Aids Temporarily Disabled Front Sensor Blocked: See Manual" warning message continues to be displayed, have the system checked. It is recommended that you visit a NISSAN dealer for this service.

Condition D

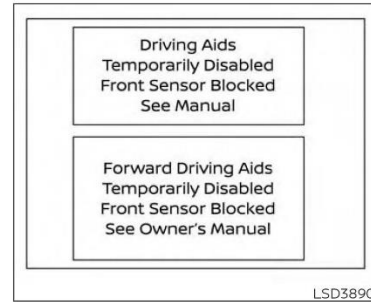
When driving on roads with limited road structures or buildings (for example, long bridges, deserts, snowfields, driving next to long walls), the system may illuminate the system warning light and display the "Forward Driving Aids Temporarily Disabled Front Sensor Blocked: See Owner's Manual" or "Driving Aids Temporarily Disabled Front Sensor Blocked: See Manual" message.

Action to take:

When the above driving conditions no longer exist, turn the system back on.

NOTE:

If the AEB with Pedestrian Detection system stops working, the I-FCW system will also stop working.

**SYSTEM MALFUNCTION**

If the I-FCW system malfunctions, it will be turned off automatically, a chime will sound, the AEB with Pedestrian Detection warning light (orange) will illuminate and the warning message [Malfunction] will appear in the vehicle information display.

Action to take

If the warning light (orange) comes on, stop the vehicle in a safe location, turn the engine off and restart the engine. If the warning light continues to illuminate, have the I-FCW system checked. It is recommended that you visit a NISSAN dealer for this service.

Starting and driving 5-115

APPENDIX C

Run Log

Subject Vehicle: **2022 Nissan Sentra CVT**

Test Date: **4/8/2022**

Principal Other Vehicle: **2006 Acura RL**

| Run | Test Type | Valid Run? | TTCW Sound (sec) | TTCW Light (sec) | TTCW Margin (sec) | Pass/Fail | Notes |
|-----|----------------------|------------|------------------|------------------|-------------------|-----------|----------------|
| 1 | Stopped POV | Y | 2.70 | 2.56 | 0.60 | Pass | |
| 2 | | Y | 2.72 | 2.50 | 0.62 | Pass | |
| 3 | | Y | 2.69 | 2.52 | 0.59 | Pass | |
| 4 | | Y | 2.69 | 2.48 | 0.59 | Pass | |
| 5 | | Y | 2.68 | 2.64 | 0.58 | Pass | |
| 6 | | Y | 2.70 | 2.62 | 0.60 | Pass | |
| 7 | | Y | 2.49 | 2.46 | 0.39 | Pass | |
| | | | | | | | |
| 19 | Decelerating POV, 45 | N | | | | | POV brakes |
| 20 | | N | | | | | POV brakes |
| 21 | | Y | 2.72 | 2.67 | 0.32 | Pass | |
| 22 | | N | | | | | Lateral offset |
| 23 | | Y | 2.72 | 2.49 | 0.32 | Pass | |
| 24 | | N | | | | | Lateral offset |
| 25 | | N | | | | | Lateral offset |
| 26 | | N | | | | | Lateral offset |
| 27 | | Y | 2.69 | 2.64 | 0.29 | Pass | |
| 28 | | Y | 2.71 | 2.63 | 0.31 | Pass | |

| Run | Test Type | Valid Run? | TTCW Sound (sec) | TTCW Light (sec) | TTCW Margin (sec) | Pass/Fail | Notes |
|-----|----------------------|------------|------------------|------------------|-------------------|-----------|---------------------------------|
| 29 | | Y | 2.62 | 2.58 | 0.22 | Pass | |
| 30 | | N | | | | | Lateral offset |
| 31 | | Y | 2.65 | 2.43 | 0.25 | Pass | |
| 32 | | N | | | | | Lateral offset |
| 33 | | N | | | | | Lateral offset |
| 34 | | N | | | | | Lateral offset |
| 35 | | N | | | | | Lateral offset |
| 36 | | N | | | | | POV brakes |
| 37 | | N | | | | | Lateral offset |
| 38 | | N | | | | | Lateral offset |
| 39 | | Y | 2.61 | 2.57 | 0.21 | Pass | |
| | | | | | | | |
| 8 | Slower POV, 45 vs 20 | Y | 2.68 | 2.65 | 0.68 | Pass | |
| 9 | | N | | | | | Unable to detect auditory alert |
| 10 | | N | | | | | GPS fix type |
| 11 | | Y | 2.67 | 2.63 | 0.67 | Pass | |
| 12 | | N | | | | | Lateral offset |
| 13 | | N | | | | | Lateral offset |
| 14 | | Y | 2.66 | 2.62 | 0.66 | Pass | |
| 15 | | Y | 2.65 | 2.53 | 0.65 | Pass | |
| 16 | | Y | 2.65 | 2.40 | 0.65 | Pass | |

| Run | Test Type | Valid Run? | TTCW Sound (sec) | TTCW Light (sec) | TTCW Margin (sec) | Pass/Fail | Notes |
|-----|-----------|------------|------------------|------------------|-------------------|-----------|-------|
| 17 | | Y | 2.62 | 2.38 | 0.62 | Pass | |
| 18 | | Y | 2.68 | 2.48 | 0.68 | Pass | |

APPENDIX D

Time History Plots

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Description of Time History Plots

A set of time history plots is provided for each valid run in the test series. Each set of plots comprises time varying data from both the Subject Vehicle (SV) and the Principal Other Vehicle (POV), as well as pass/fail envelopes and thresholds. The following is a description of data types shown in the time history plots, as well as a description of the color code indicating to which vehicle the data pertain.

Each time history plot consists of data pertinent to the test type under consideration, and therefore the data channels plotted vary according to test type. The test types (shown in the plot titles) include:

- FCW Test 1 – Stopped POV (SV at 45 mph)
- FCW Test 2 – Decelerating POV (Both vehicles at 45 mph with a 30 m gap, POV brakes at 0.3 g)
- FCW Test 3 – Slower Moving POV (SV at 45 mph, POV at 20 mph)

Time history figures include the following sub-plots:

- Warning – Displays the Forward Collision Warning Alert (which can be auditory, visual, or haptic). Depending on the type of FCW alert or instrumentation used to measure the alert, this can be any of the following:
 - Filtered, rectified, and normalized sound signal. The vertical scale is 0 to 1.
 - Filtered, rectified, and normalized acceleration (e.g., haptic alert, such as steering wheel vibration). The vertical scale is 0 to 1.
 - Light sensor signal.
- TTC (sec) – Indicates the Time to Collision as calculated up to the point of FCW alert issuance. The value of TTCW (Time to Collision at Warning) is given numerically on the right side of the figure. A passing value is indicated in green, while a failing value is indicated in red.
- SV Speed (mph) – Speed of the Subject Vehicle
- POV Speed (mph) – Speed of the Principal Other Vehicle
- Yaw Rate (deg/sec) – Yaw rate of both the Subject Vehicle and Principal Other Vehicle

- Lateral Offset (ft) – Lateral offset within the lane from the Subject Vehicle to the Principal Other Vehicle
- Ax (g) – Longitudinal acceleration of both the Subject Vehicle and Principal Other Vehicle
- Headway (ft) – Longitudinal separation between front of Subject Vehicle to rear of Principal Other Vehicle (Exclusive to test type 2)

Envelopes and Thresholds

Each of the time history plot figures can contain either green or yellow envelopes and/or black threshold lines. These envelopes and thresholds are used to programmatically and visually determine the validity of a given test run. Envelope and threshold exceedances are indicated with either red shading or red asterisks, and red text is placed to the right side of the plot indicating the type of exceedance.

Green envelopes indicate that the time-varying data should not exceed the envelope boundaries at any time within the envelope. Exceedances of a green envelope are indicated by red shading in the area between the measured time-varying data and the envelope boundaries.

Yellow envelopes indicate that the time-varying data should not exceed the envelope only at the left and/or right ends. Exceedances at the left or right extent of a yellow envelope are indicated by red asterisks.

For the warning plot, a dashed black threshold line indicates the threshold used to determine the onset of the FCW alert. The alert is considered on the first time the alert signal crosses this threshold line.

For the TTC plot, a dashed black threshold line indicates the minimum allowable TTC for the given test scenario. If the FCW alert occurs before this minimum allowable TTC, a green dot appears. However, if there is no alert or the alert occurs after the minimum allowable TTC, a red asterisk is shown on the plot.

For the Ax plot, a dashed black threshold line is given for at a value of -0.05 g. For a test run to be valid, the longitudinal acceleration of the Subject Vehicle must not fall below this threshold (i.e. the driver cannot apply any brakes). Additionally, for test type 2, the plot indicating the longitudinal acceleration of the Principal Other Vehicle includes a yellow envelope indicating the deceleration ($0.3 \text{ g} \pm 0.03 \text{ g}$) allowed while braking. Exceedance of this threshold is indicated with red asterisks at the beginning and/or end of the threshold boundary.

Color Codes

Color codes have been adopted to easily identify which data correspond to which vehicle, as well as to indicate the types of envelopes and thresholds used in the plots.

Color codes can be broken into four categories:

1. Time-varying data
 1. Time-varying data
 2. Validation envelopes and thresholds
 3. Instantaneous samplings
 4. Text
1. Time-varying data color codes:
 - Blue = Subject Vehicle data
 - Magenta = Principal Other Vehicle data
 - Brown = Relative data between SV and POV (i.e., TTC, lateral offset and headway distance)
2. Validation envelope and threshold color codes:
 - Green envelope = time varying data must be within the envelope at all times in order to be valid
 - Yellow envelope = time varying data must be within limits at left and/or right ends
 - Black threshold (Solid) = time varying data must not exceed this threshold in order to be valid
 - Black threshold (Dashed) = for reference only – this can include warning level thresholds, TTC thresholds, and acceleration thresholds
3. Instantaneous sampling color codes:
 - Green circle = passing or valid value at a given moment in time
 - Red asterisk = failing or invalid value at a given moment in time
4. Text color codes:
 - Green = passing or valid value
 - Red = failing or invalid value

Other Notations

- ENV – For Ax plots only, indicates that the envelope for the POV braking was exceeded.
- NG – Indicates that the value for that variable was outside of bounds and therefore “No Good”.
- No Wng – No warning was detected.
- POV – Indicates that the value for the Principal Other Vehicle was out of bounds.
- SV – Indicates that the value for the Subject Vehicle was out of bounds.
- SR – Shows the speed reduction value.
- Thr – Indicates that the requirements for the throttle were not met.

The minimum (worst) GPS fix type is displayed in the lower right corner of each page. The only valid fix type is RTK fixed (displayed in green). If the fix type during any portion of the test was anything other than RTK fixed, then “RTK Fixed OR LESS!!” is displayed in red.

Examples of time history plots for each test type (including passing, failing and invalid runs) are shown in Figure D1 through Figure D6. Actual time history data plots for the vehicle under consideration are provided subsequently.

Notes

When vehicles provide more than one type of alert, and when it is possible to measure the timing of these alerts, plots will be shown of each alert for each run. Because alert timing nearly always differs between alert types, a plot may indicate a valid run for one of the alerts and invalid for another. Test run validity is based on the validity window of the earliest alert, but validity determination for each individual alert is based on the timing of that alert alone. As an example, a vehicle has both visual and auditory alerts. For a particular run, the auditory alert occurs first followed by the visual alert. The validity period for the run ends when the auditory alert occurs, at which time the driver steers and/or brakes to avoid the POV. Since the visual alert occurs after the auditory alert, the run is essentially already over by the time the visual alert occurs. Depending on the relative timing gap between alerts, it may be expected that the validity criteria (yaw rate, speed, etc.) based on the timing of the visual alert could indicate an invalid run.

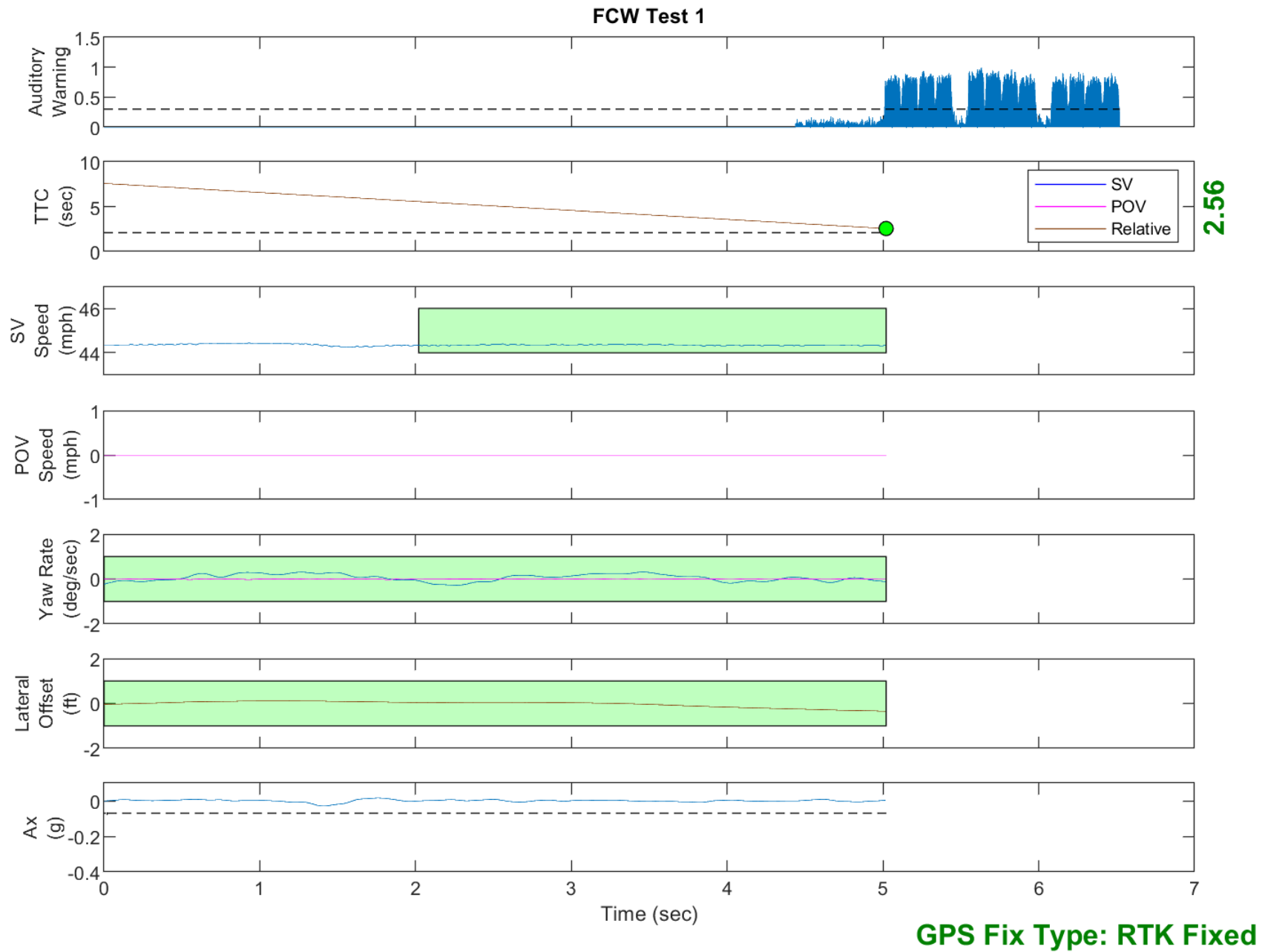


Figure D1. Example Time History for Test Type 1, Passing

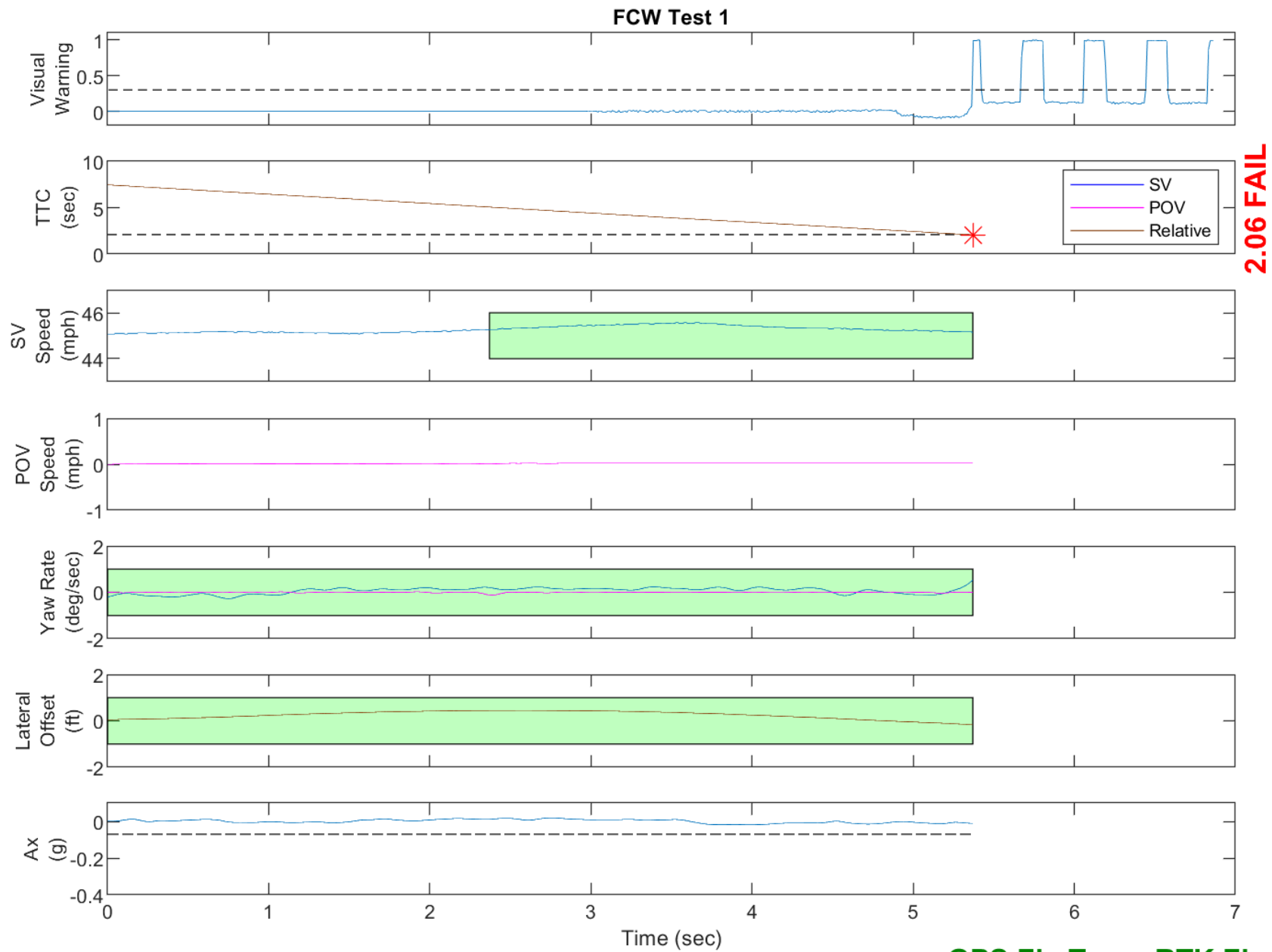


Figure D2. Example Time History for Test Type 1, Failing

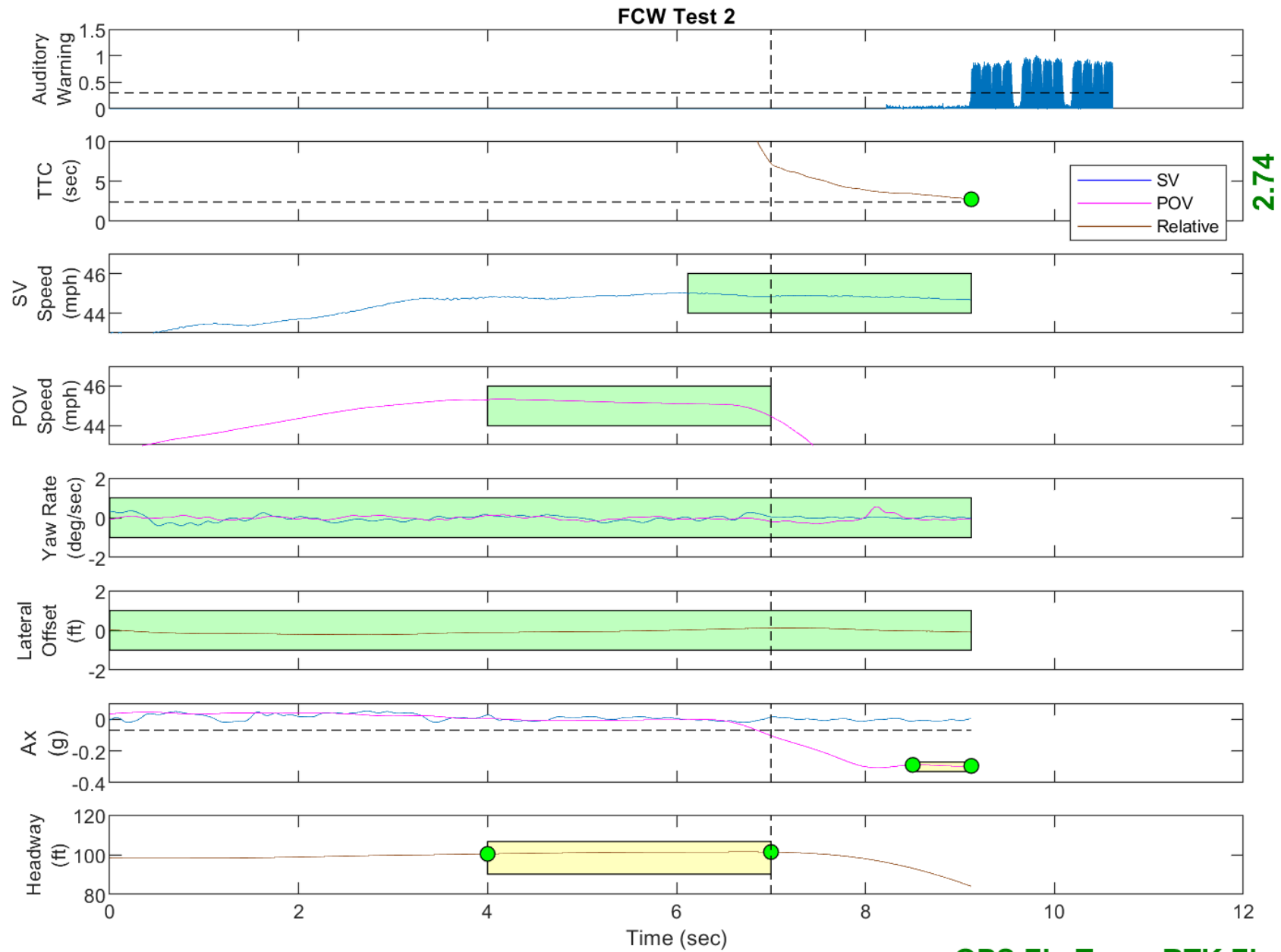
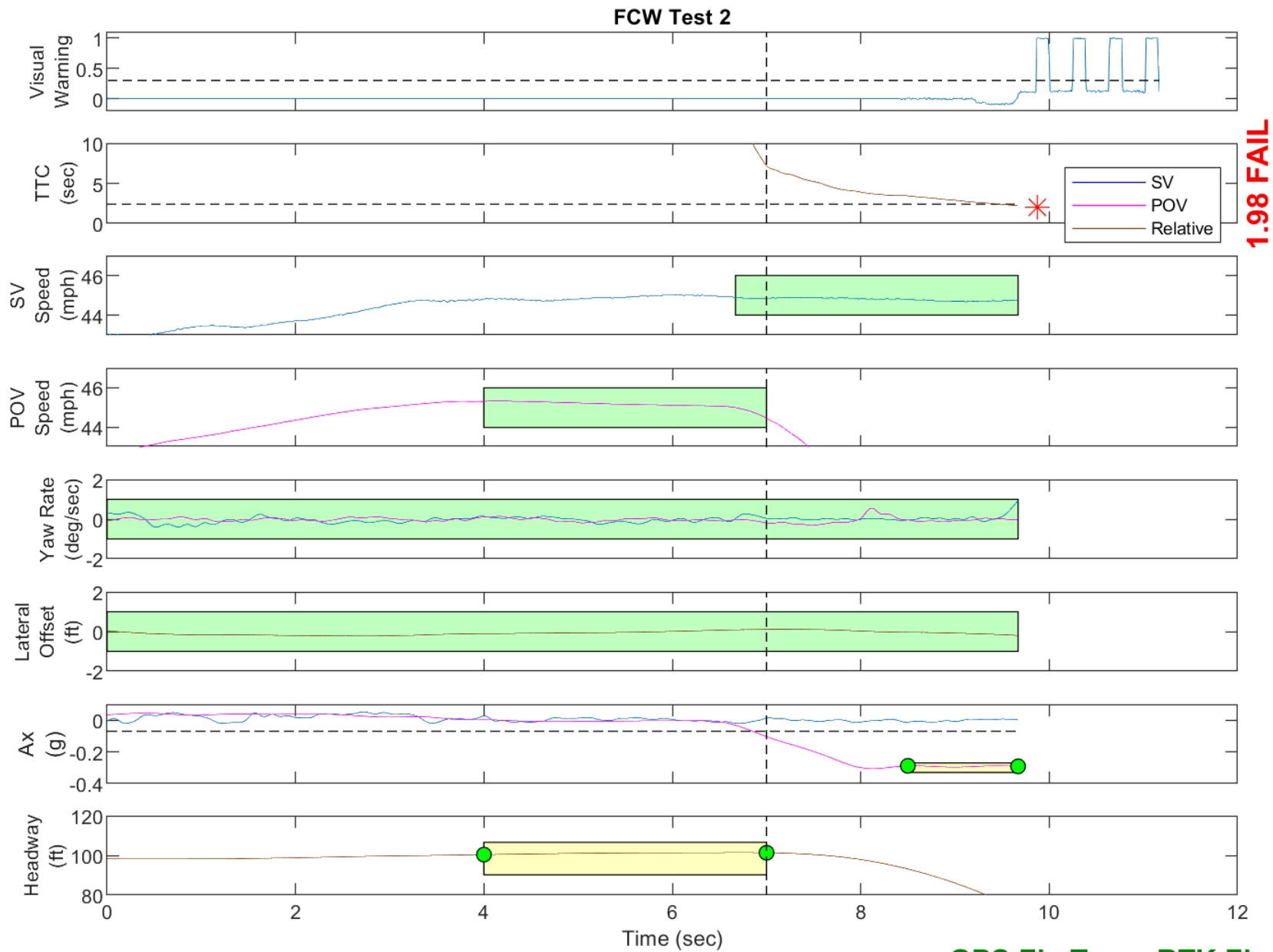


Figure D3. Example Time History for Test Type 2, Passing



GPS Fix Type: RTK Fixed

Figure D4. Example Time History for Test Type 2, Failing

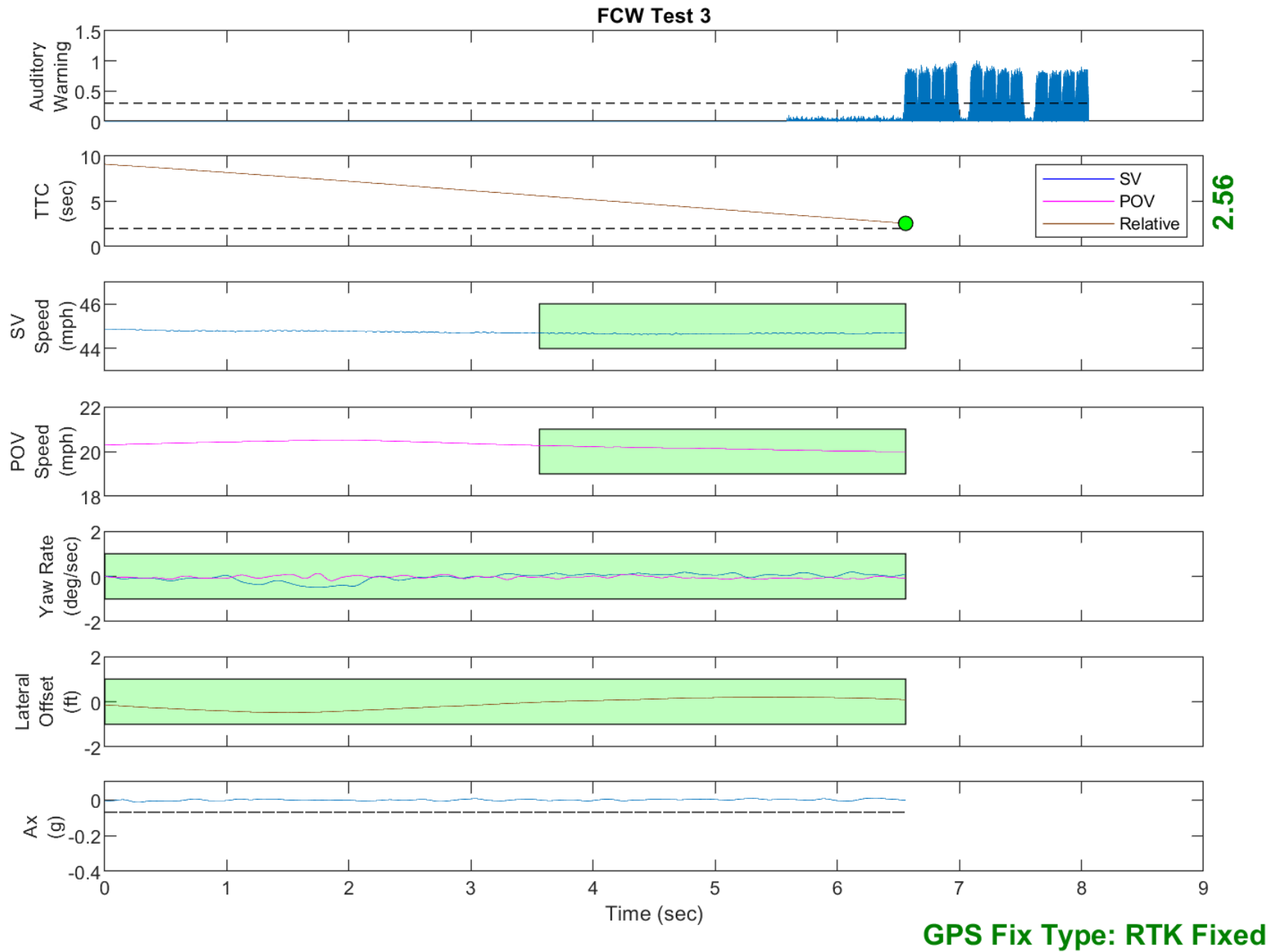


Figure D5. Example Time History for Test Type 3, Passing

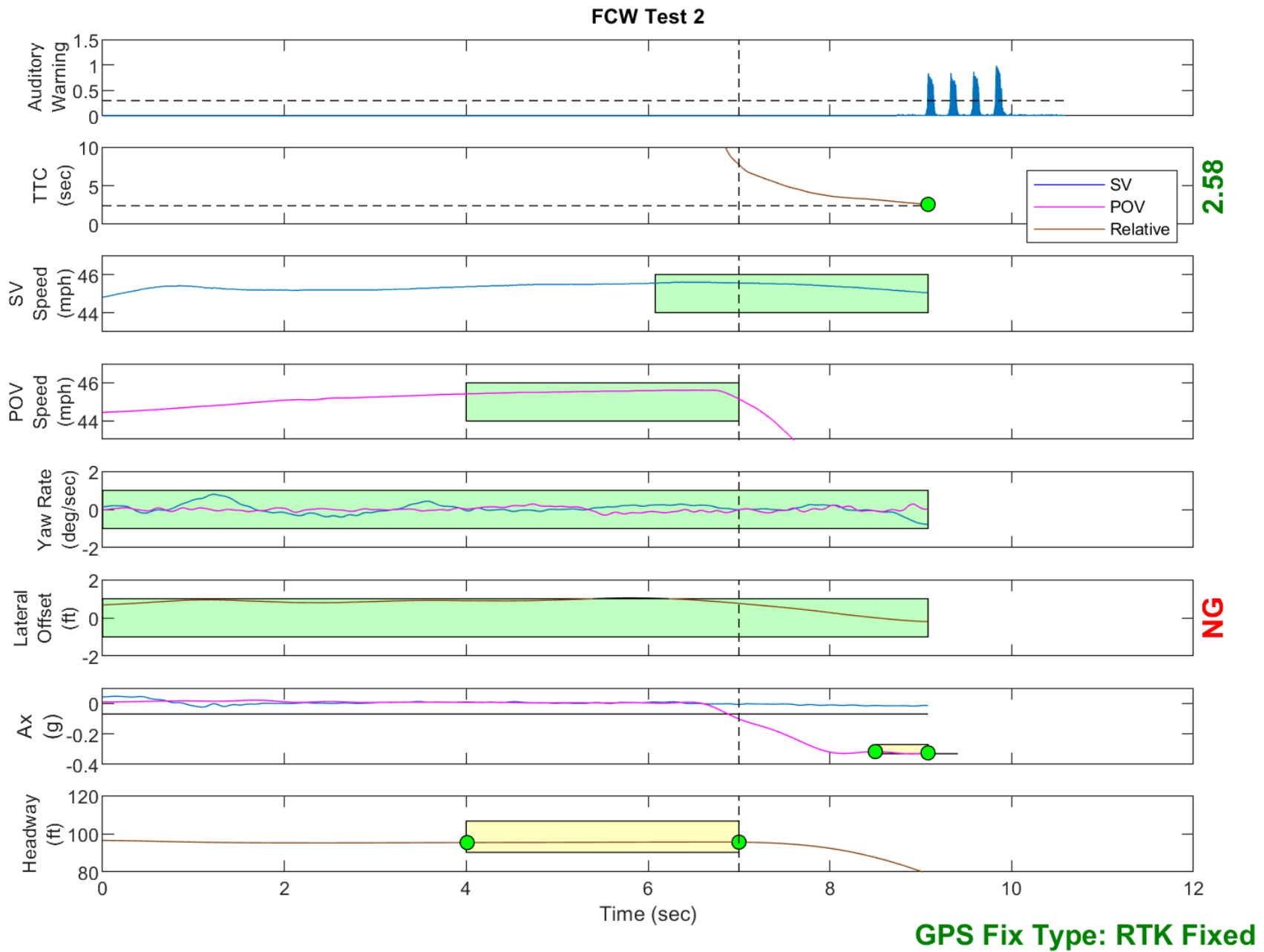


Figure D6. Example Time History Showing Invalid Lateral Offset Criteria

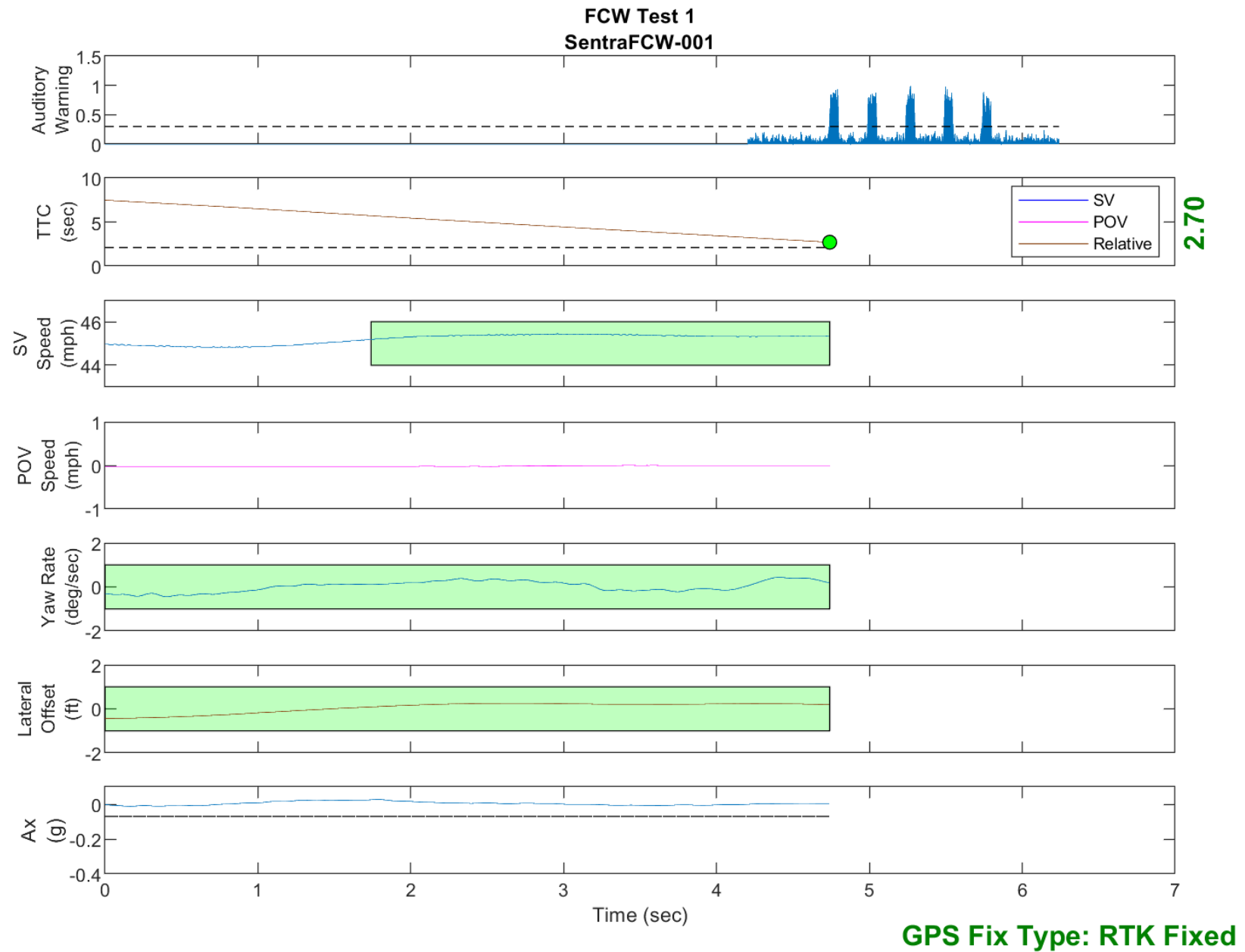


Figure D7. Time History for Run 1, Test 1 - Stopped POV, Auditory Warning

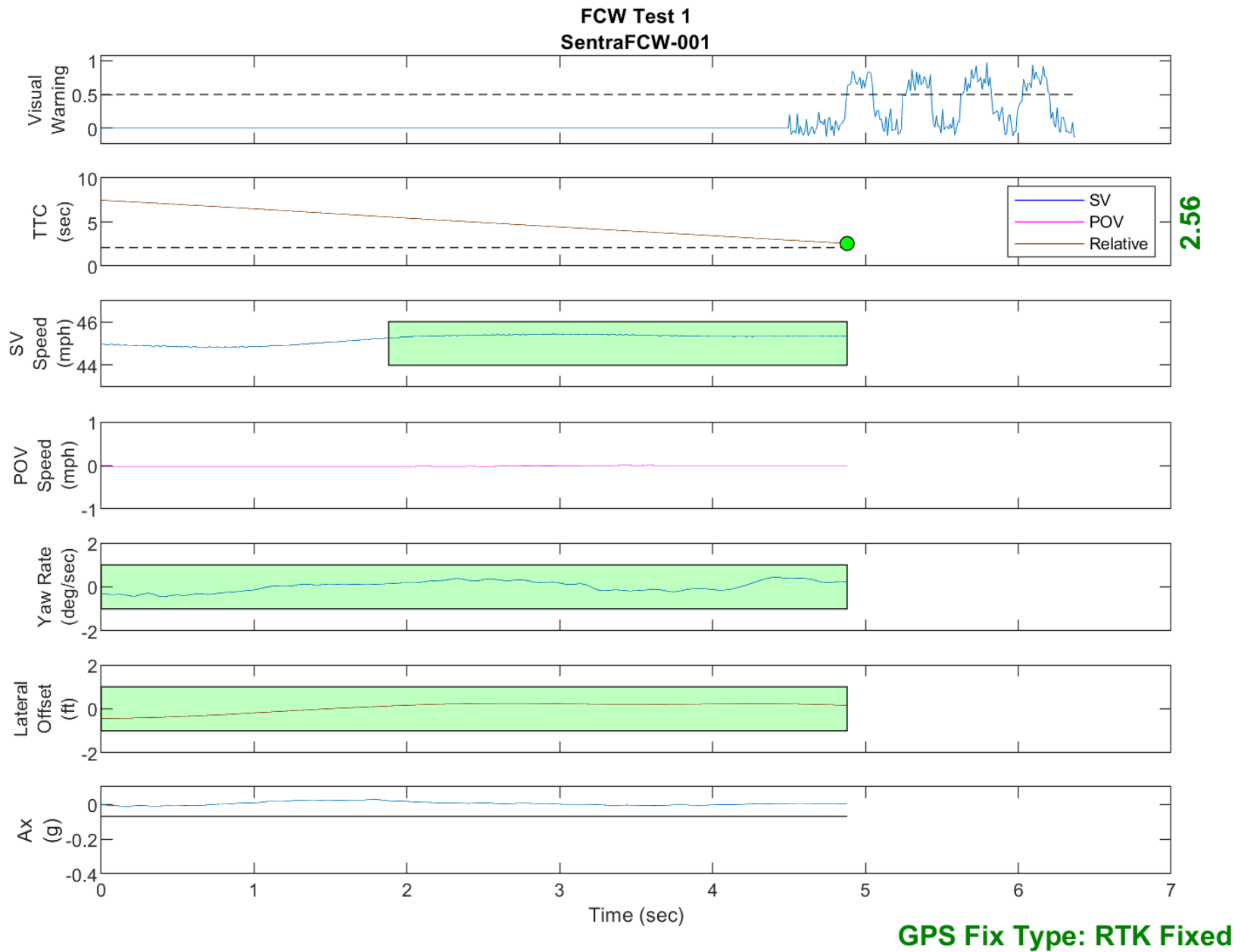


Figure D8. Time History for Run 1, Test 1 - Stopped POV, Visual Warning

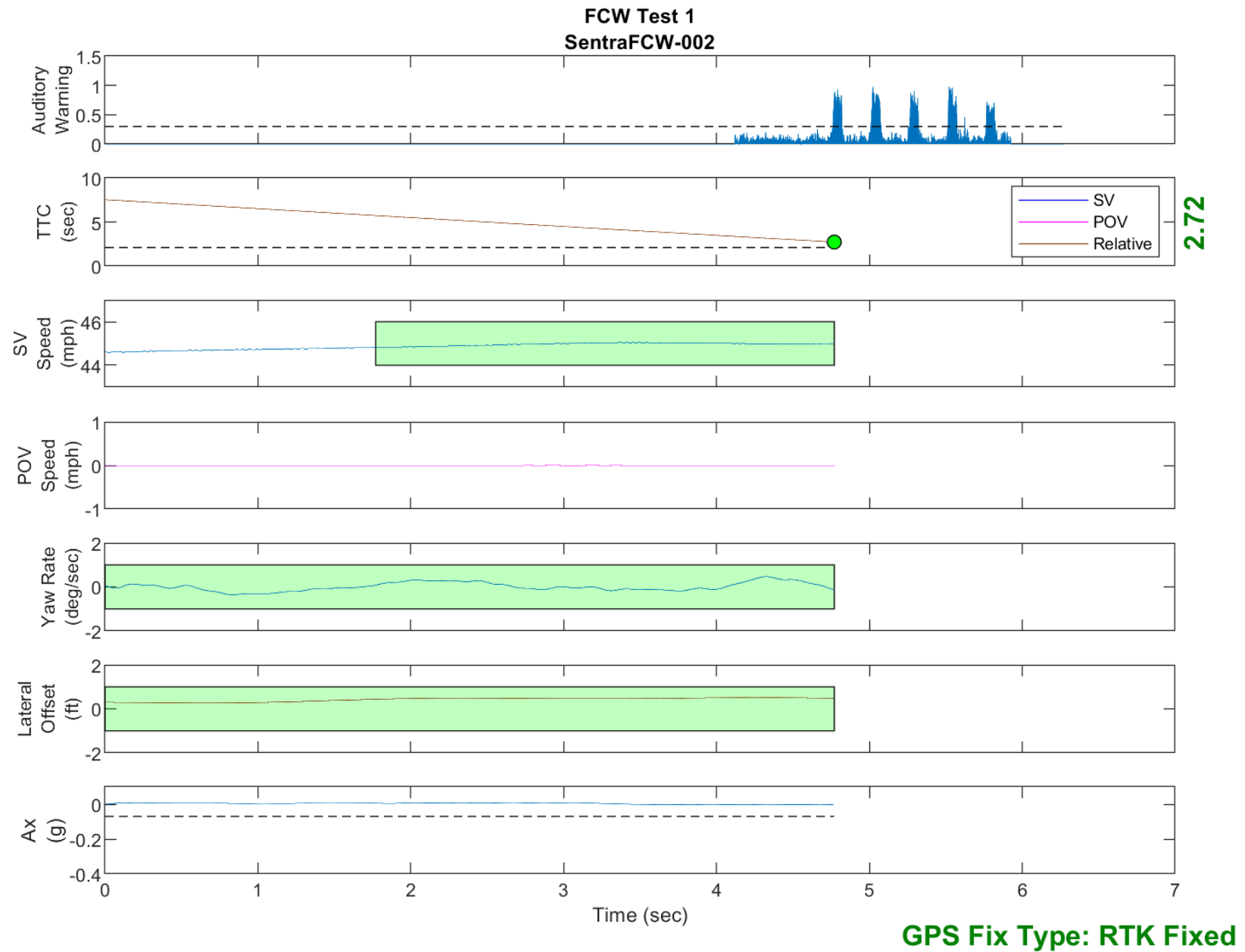


Figure D9. Time History for Run 2, Test 1 - Stopped POV, Auditory Warning

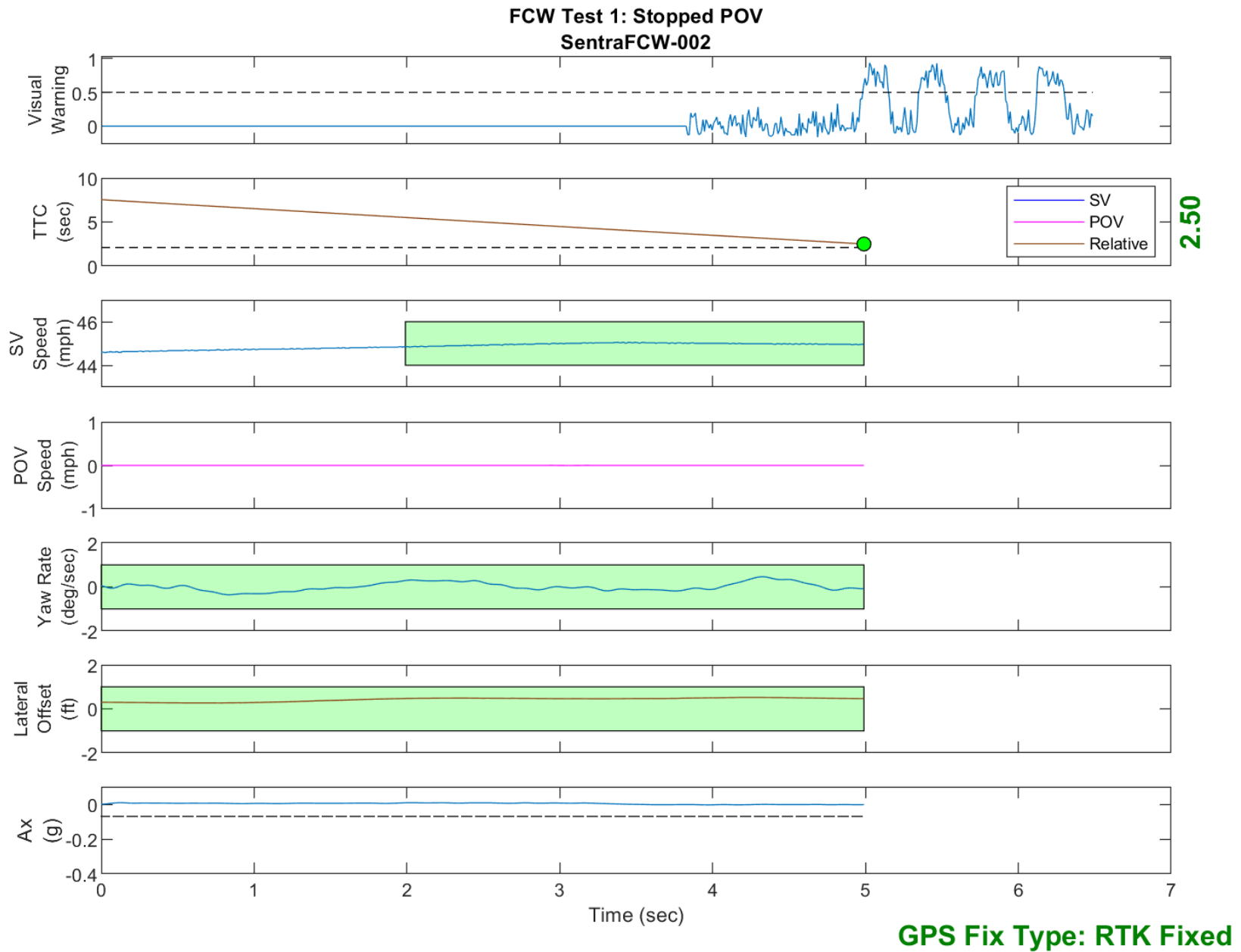


Figure D10. Time History for Run 2, Test 1 - Stopped POV, Visual Warning

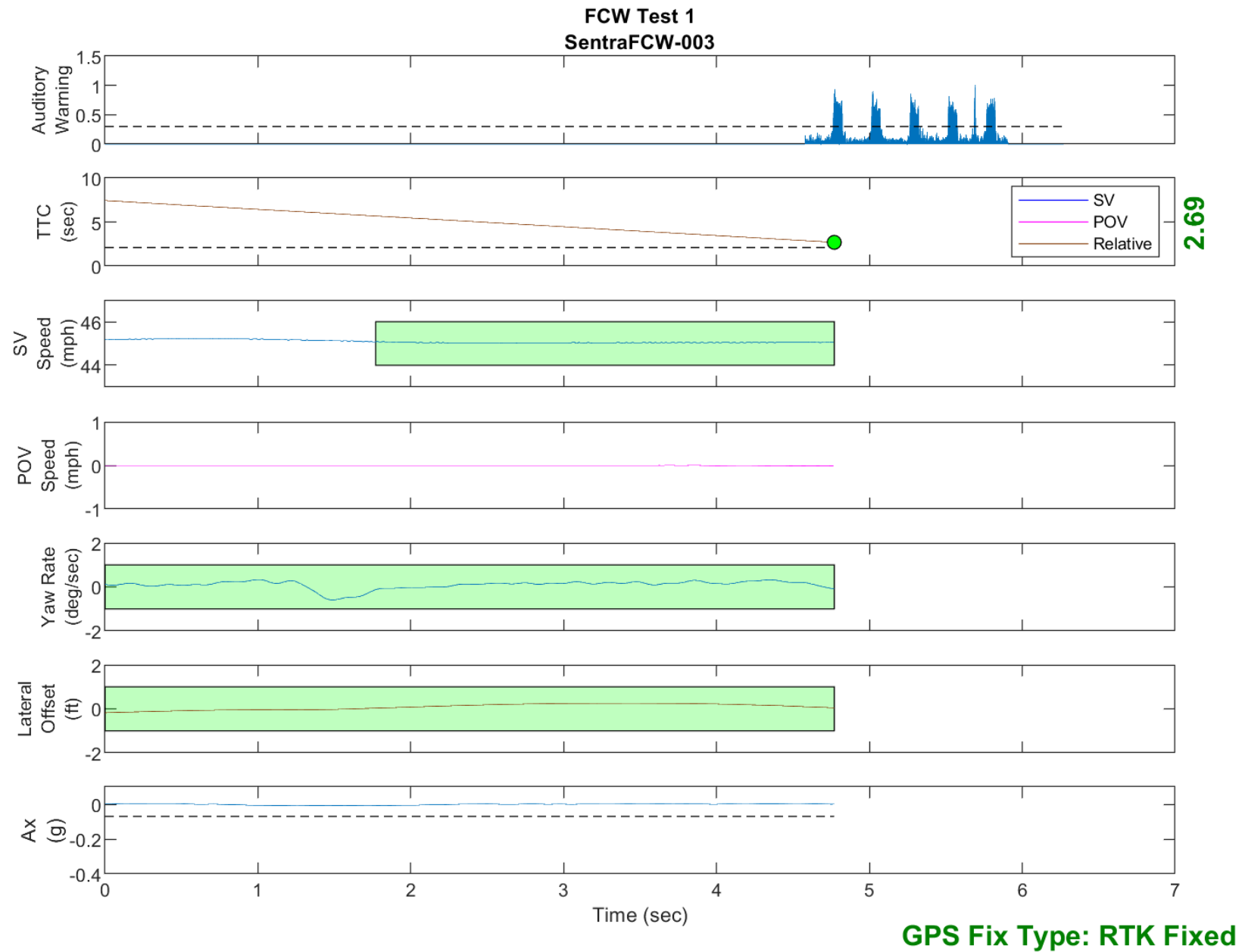


Figure D11. Time History for Run 3, Test 1 - Stopped POV, Auditory Warning

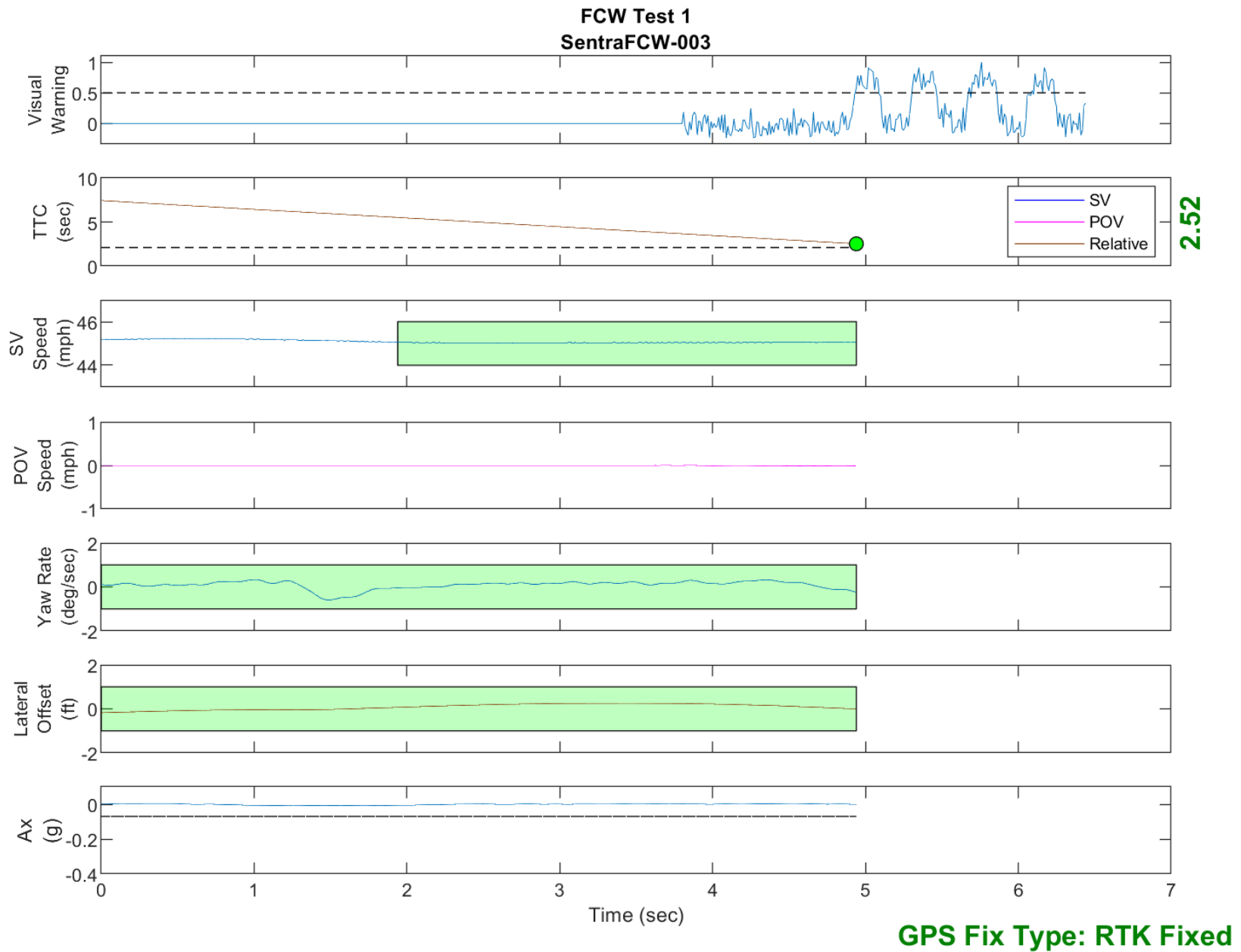


Figure D12. Time History for Run 3, Test 1 - Stopped POV, Visual Warning

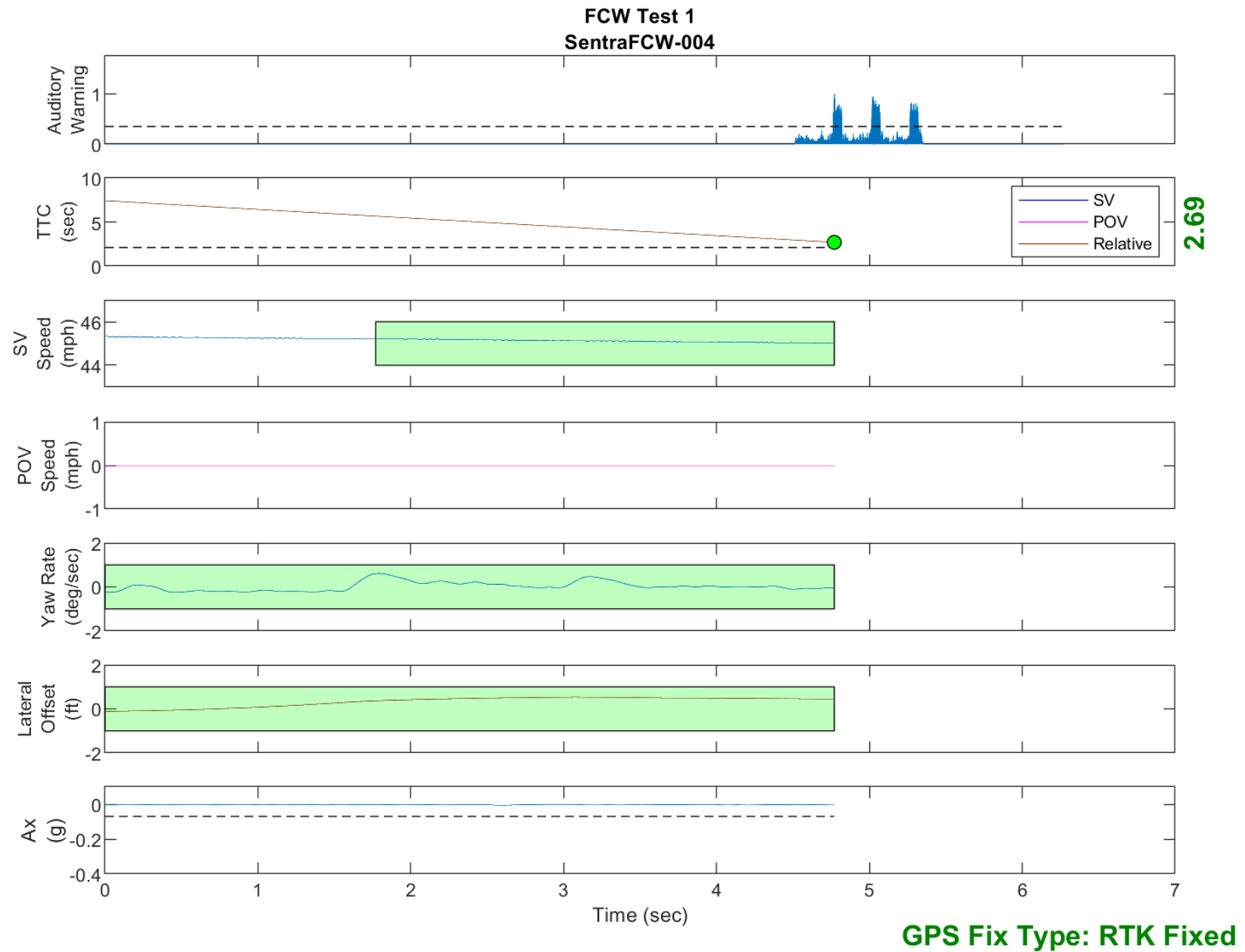


Figure D13. Time History for Run 4, Test 1 - Stopped POV, Auditory Warning

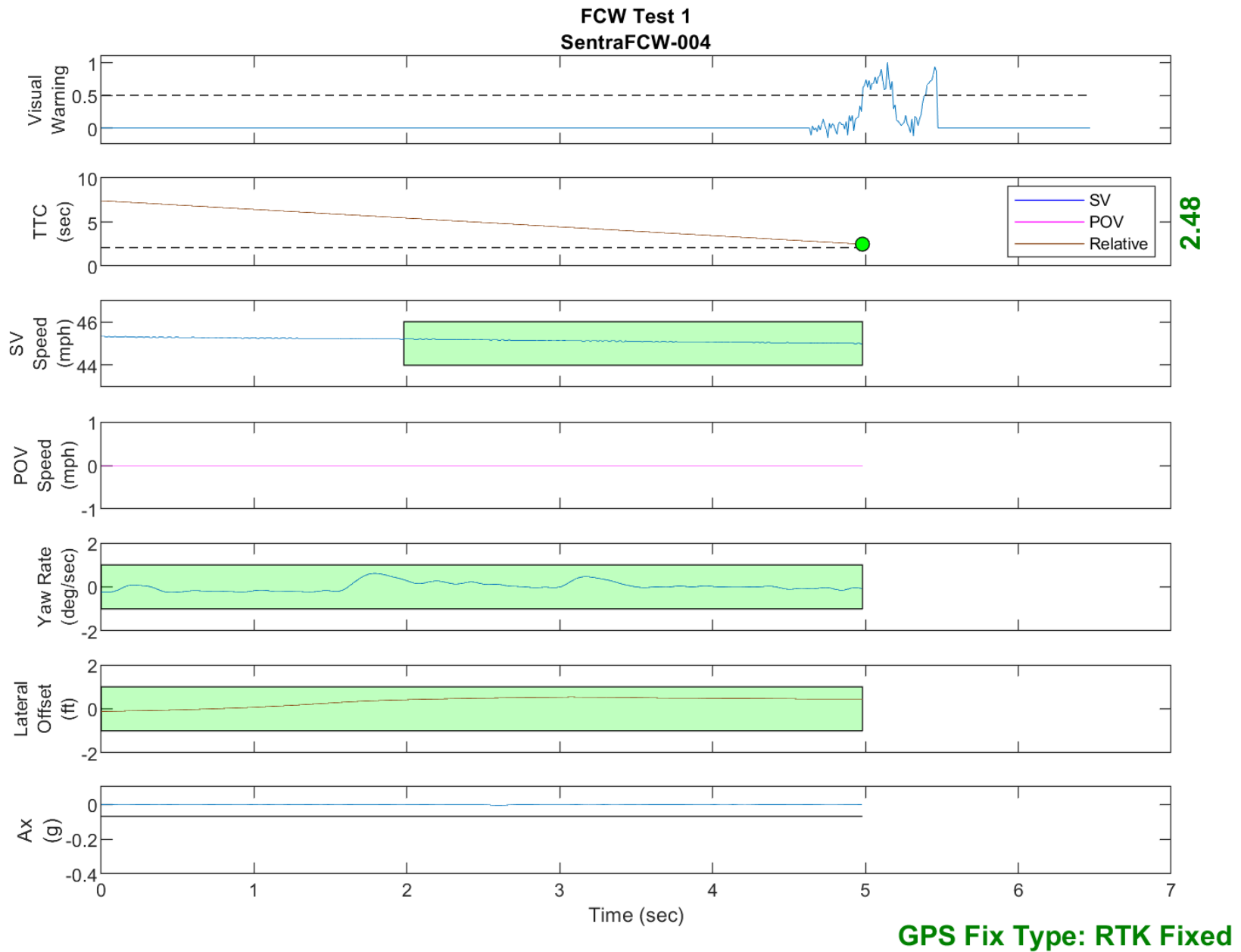


Figure D14. Time History for Run 4, Test 1 - Stopped POV, Visual Warning

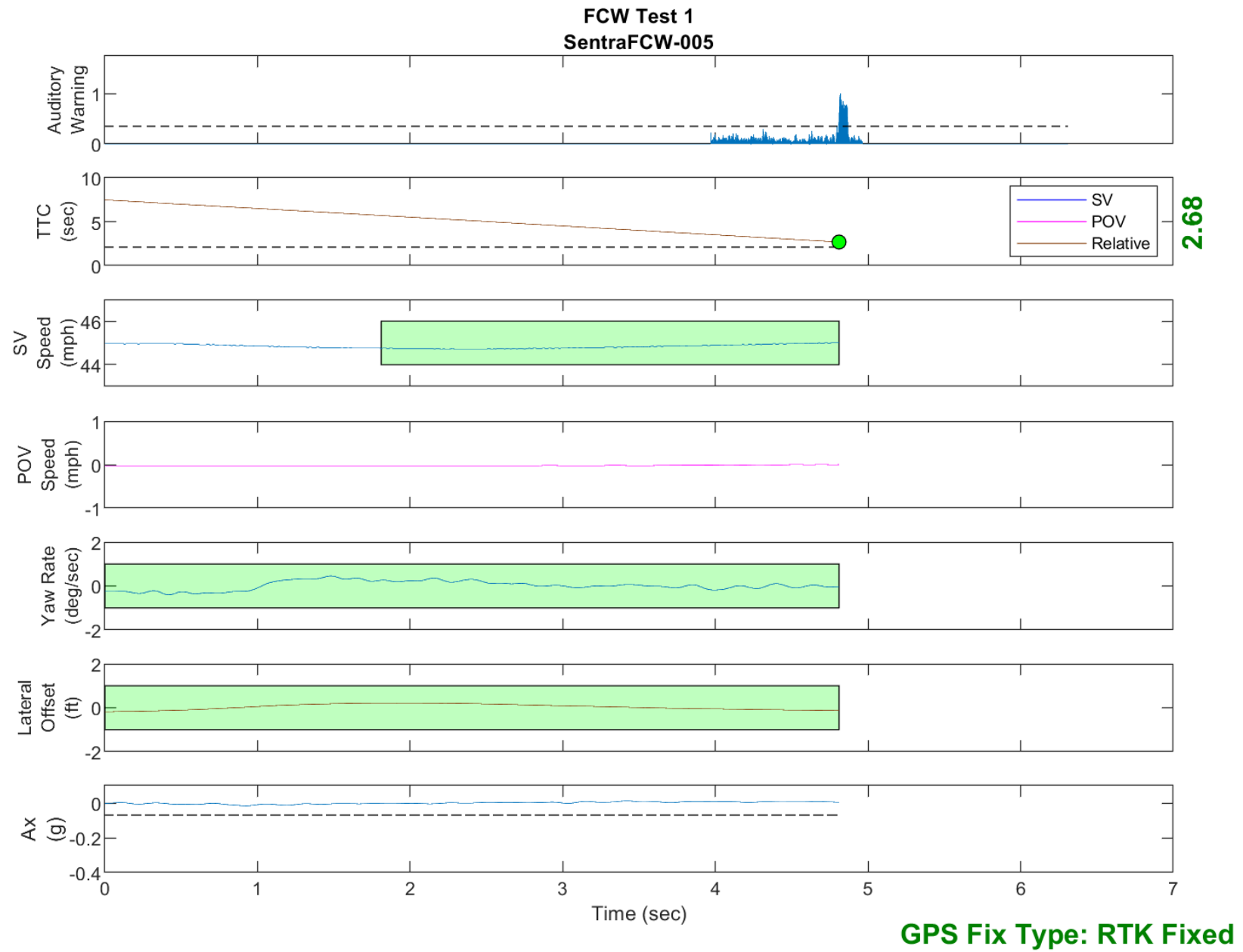


Figure D15. Time History for Run 5, Test 1 - Stopped POV, Auditory Warning

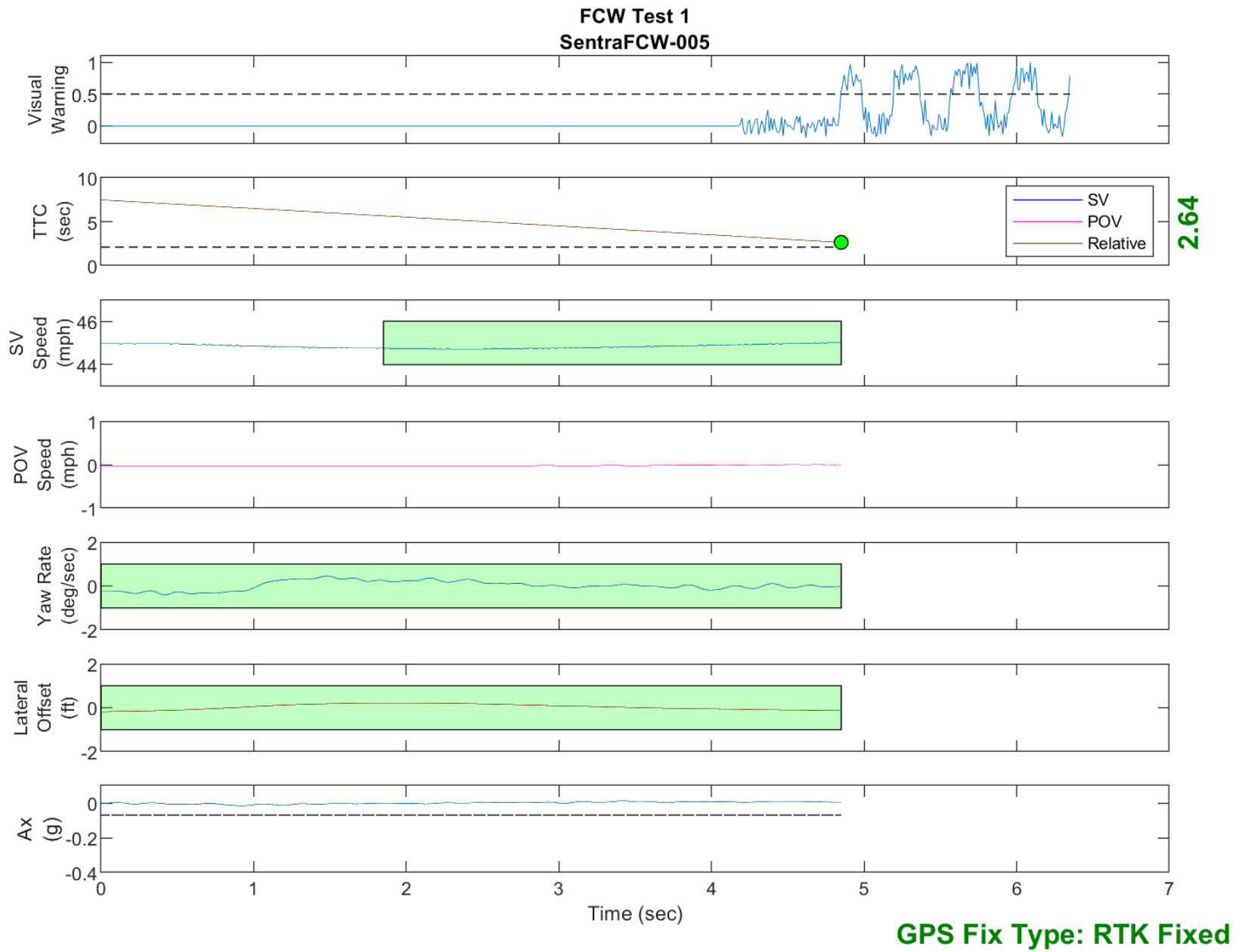


Figure D16. Time History for Run 5, Test 1 - Stopped POV, Visual Warning

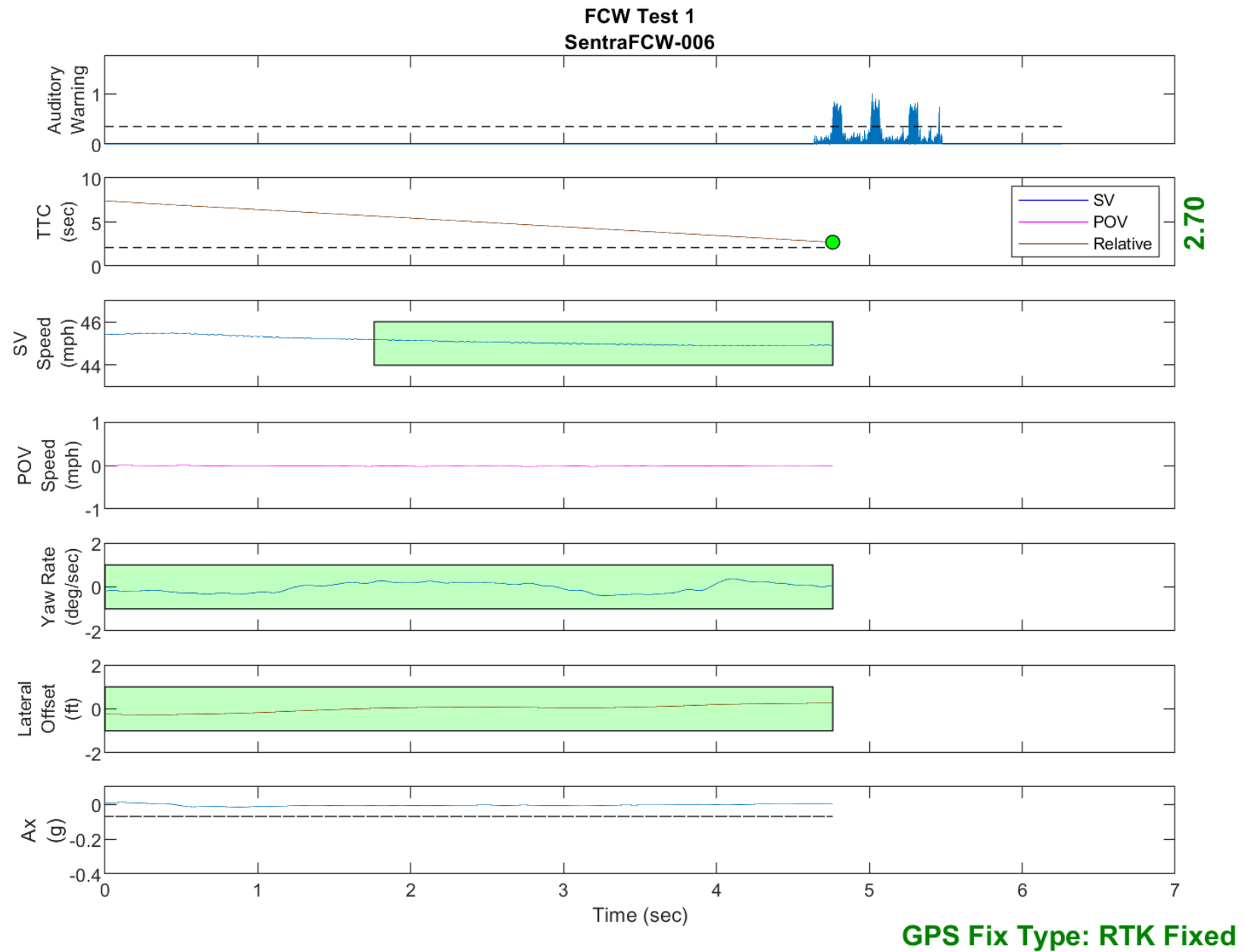


Figure D17. Time History for Run 6, Test 1 - Stopped POV, Auditory Warning

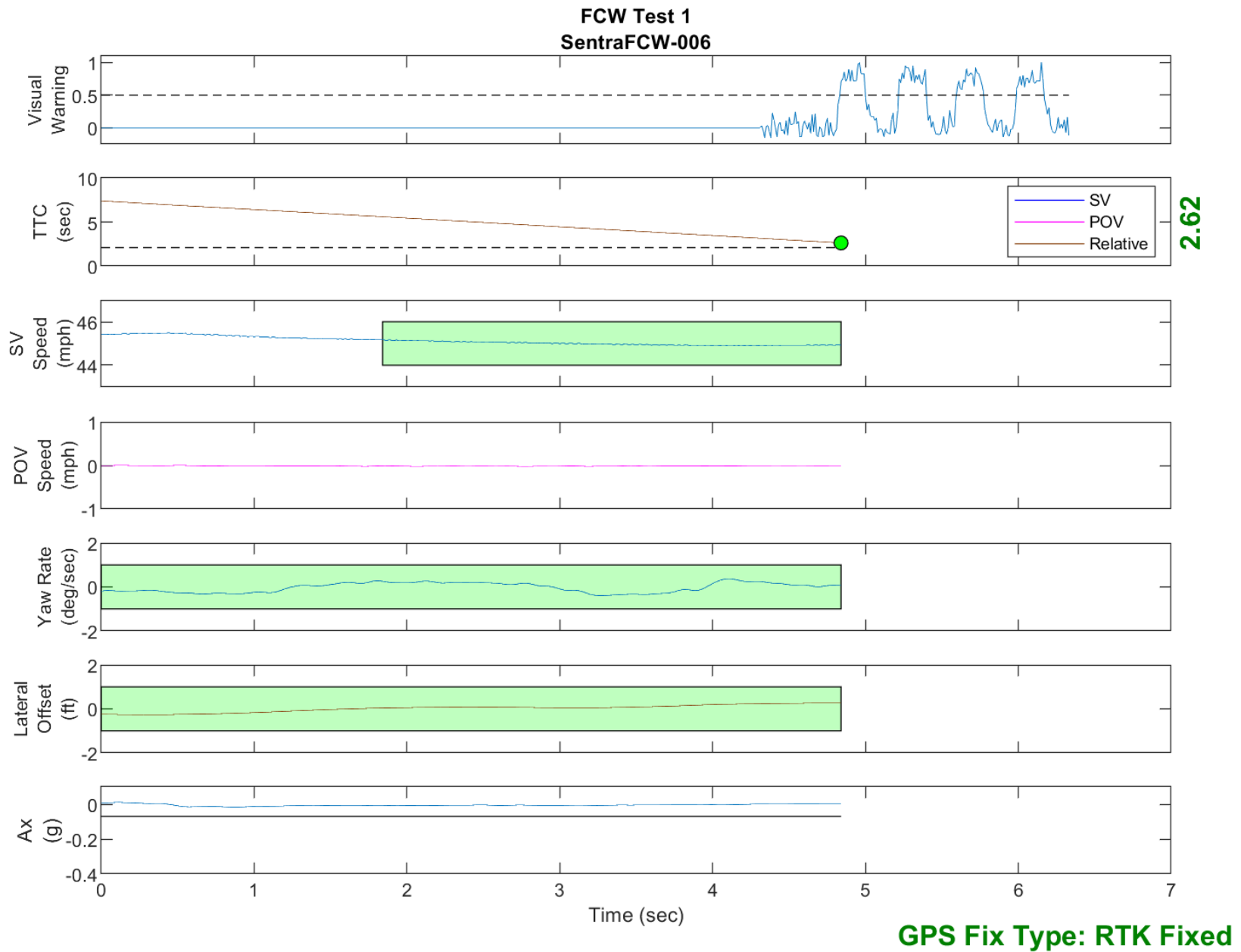


Figure D18. Time History for Run 6, Test 1 - Stopped POV, Visual Warning

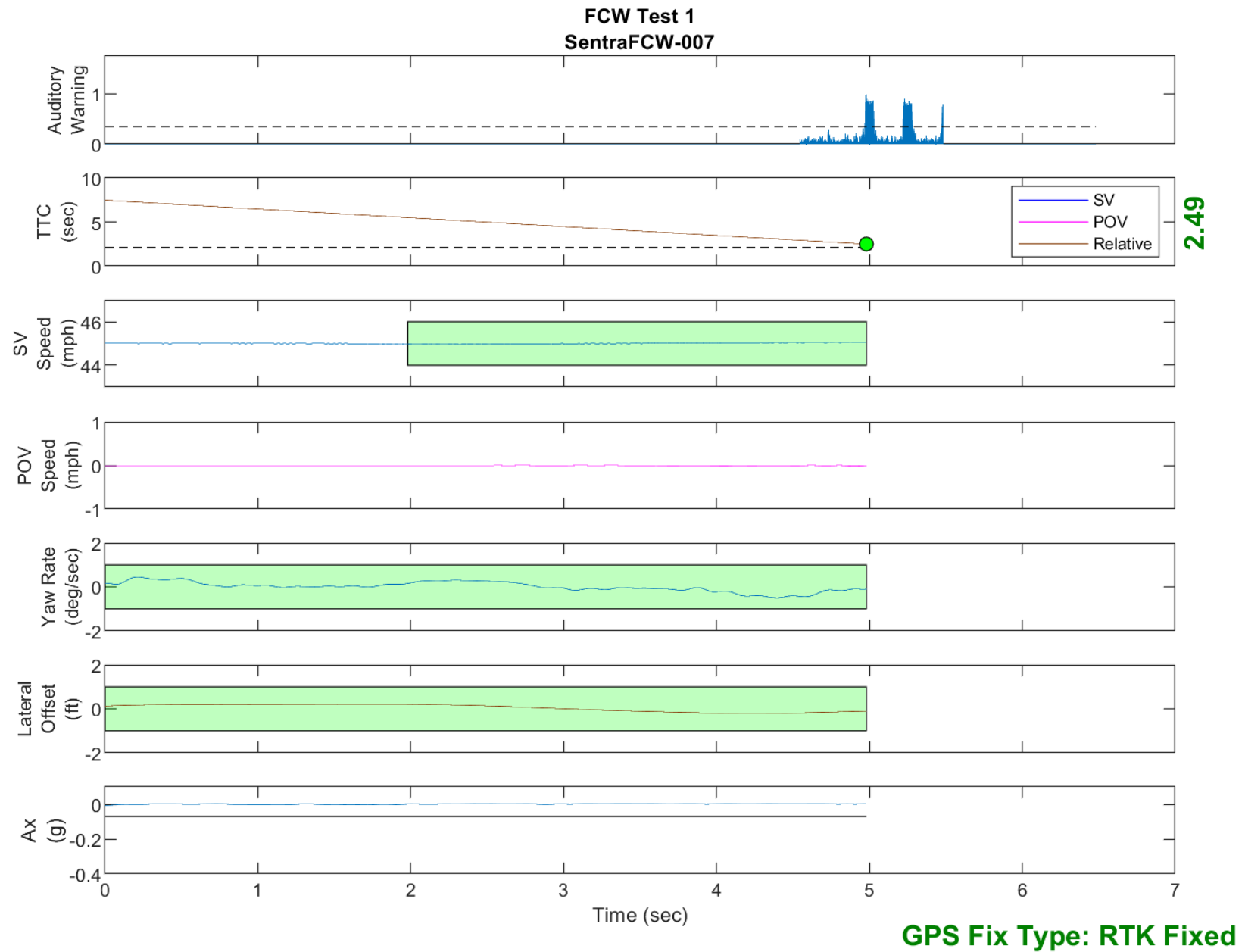


Figure D19. Time History for Run 7, Test 1 - Stopped POV, Auditory Warning

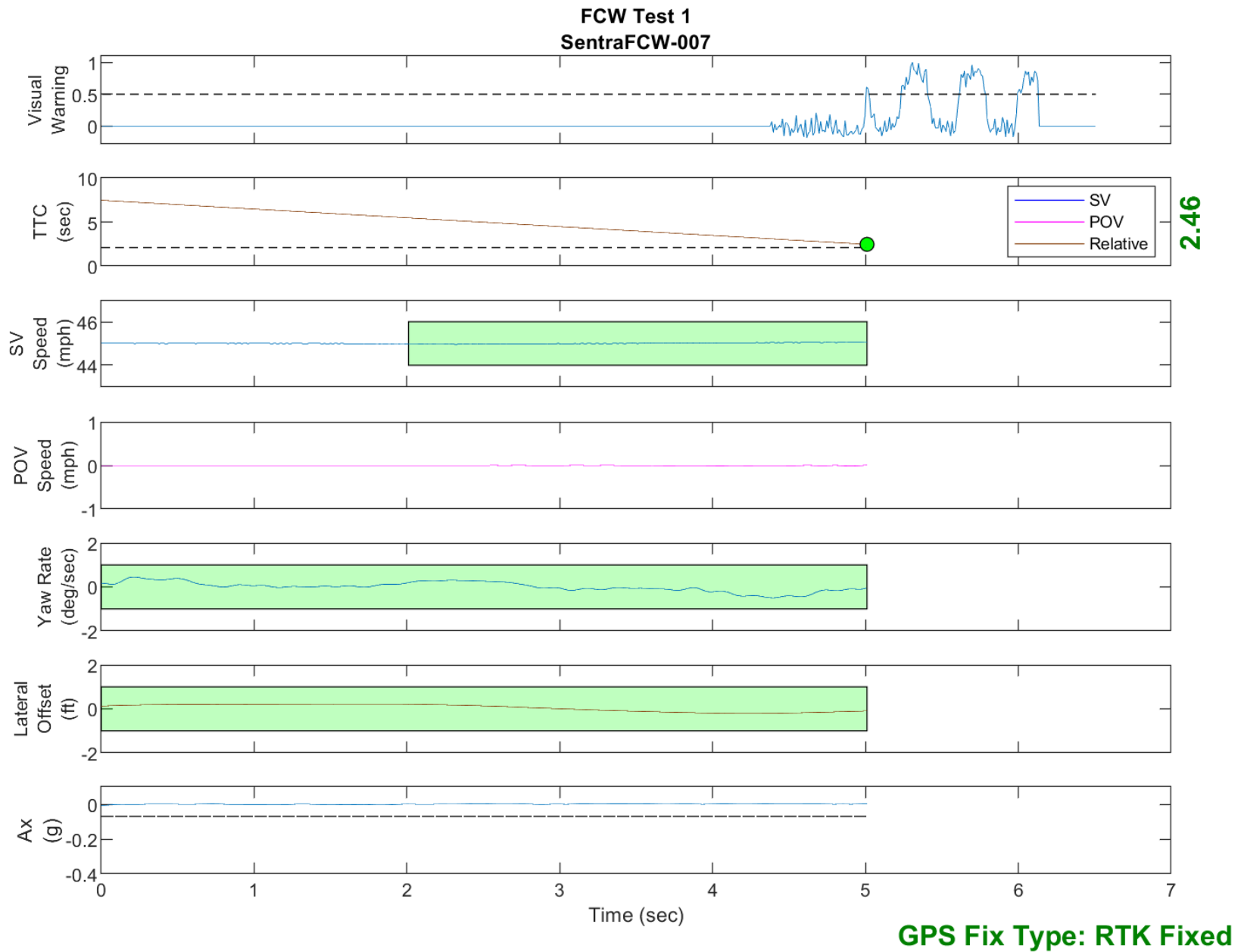


Figure D20. Time History for Run 7, Test 1 - Stopped POV, Visual Warning

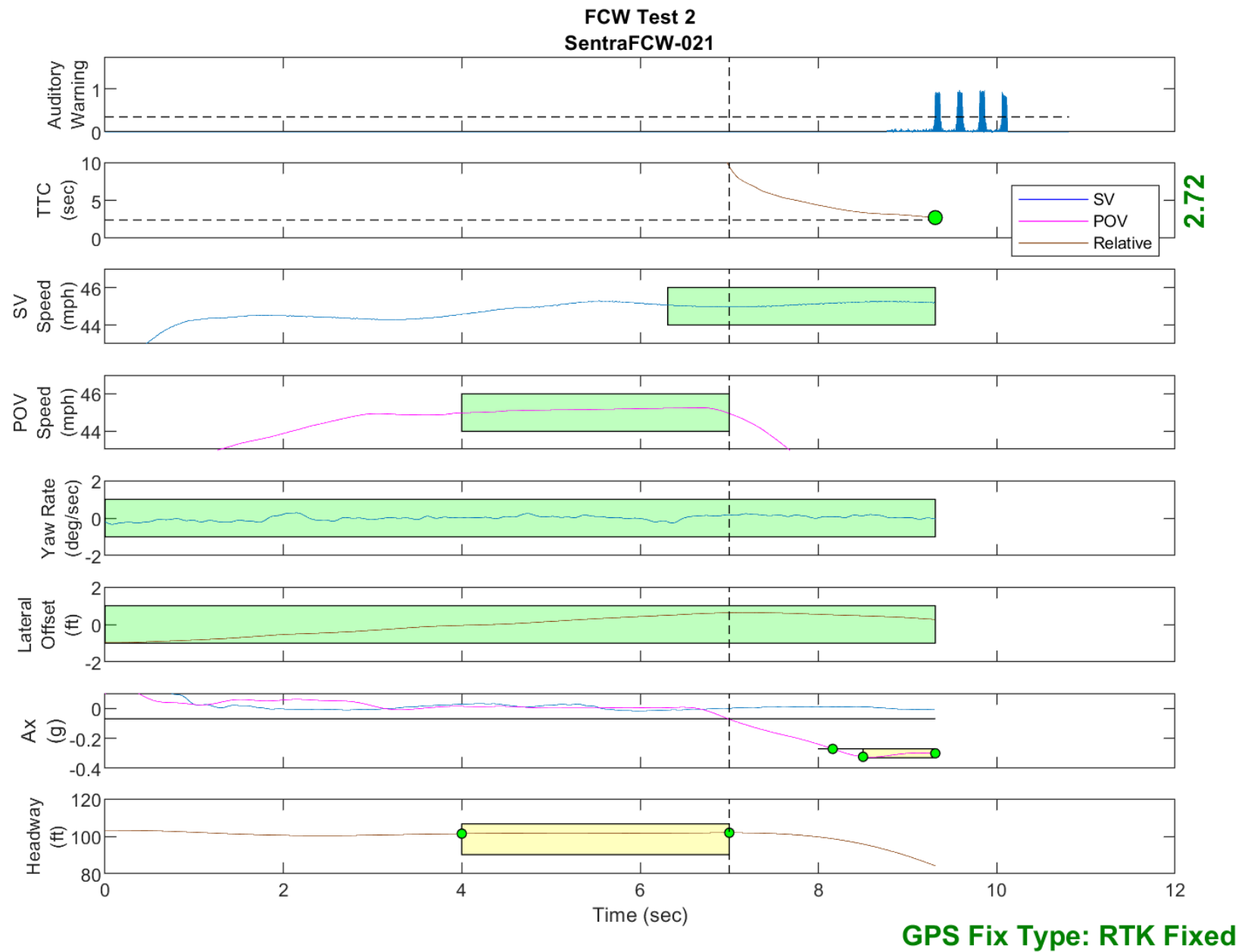


Figure D21. Time History for Run 21, Test 2 - Decelerating POV, Auditory Warning

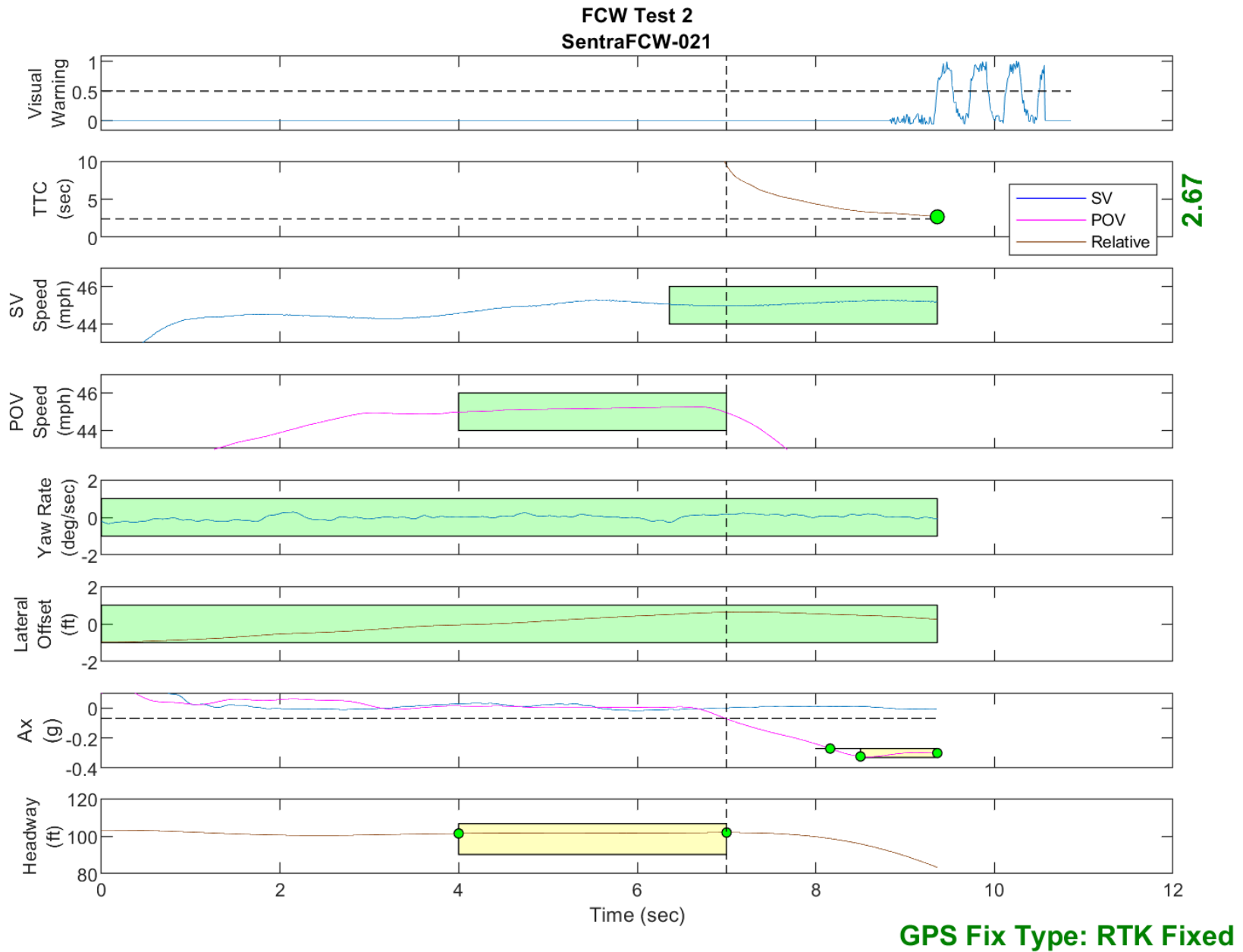


Figure D22. Time History for Run 21, Test 2 - Decelerating POV, Visual Warning

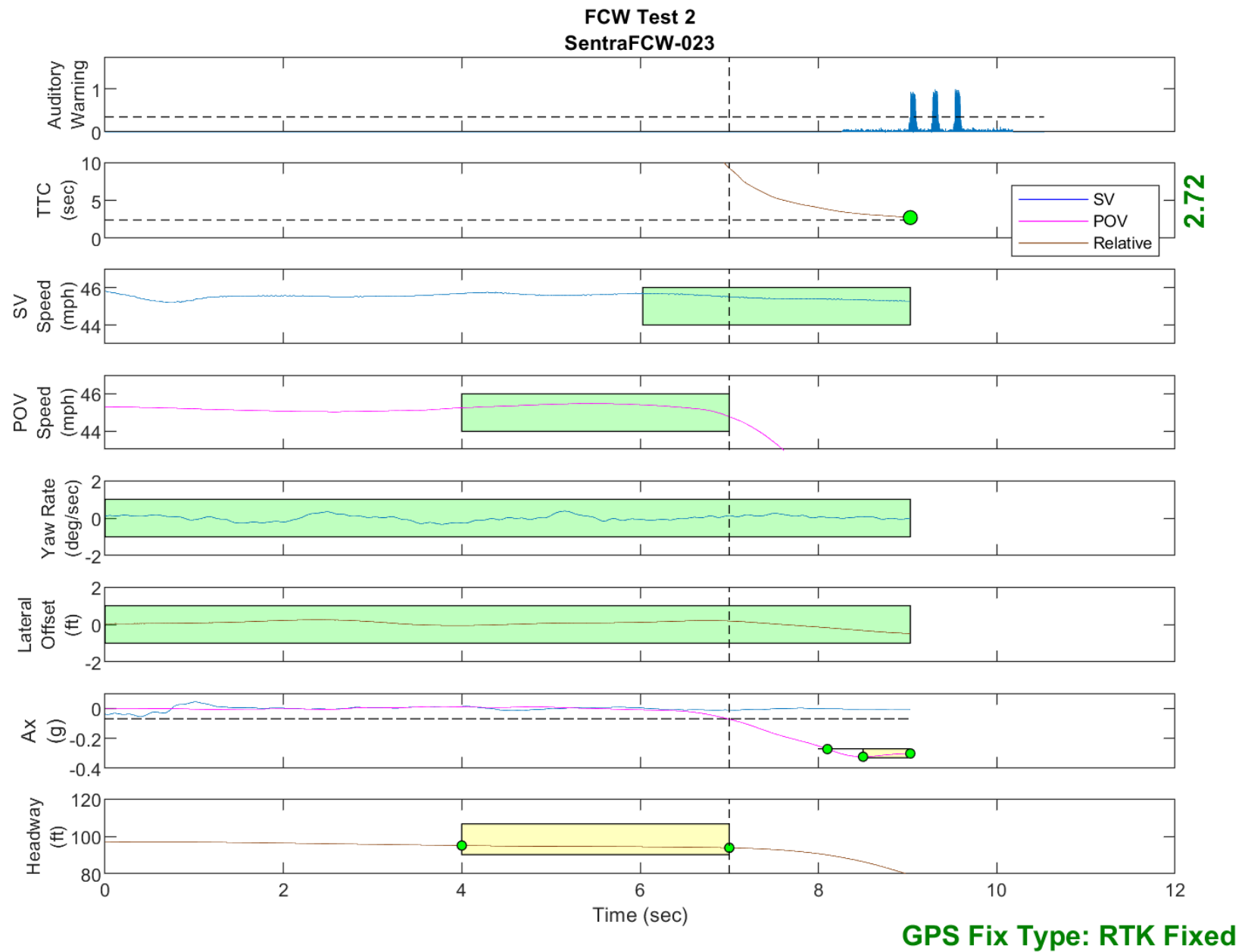


Figure D23. Time History for Run 23, Test 2 - Decelerating POV, Auditory Warning

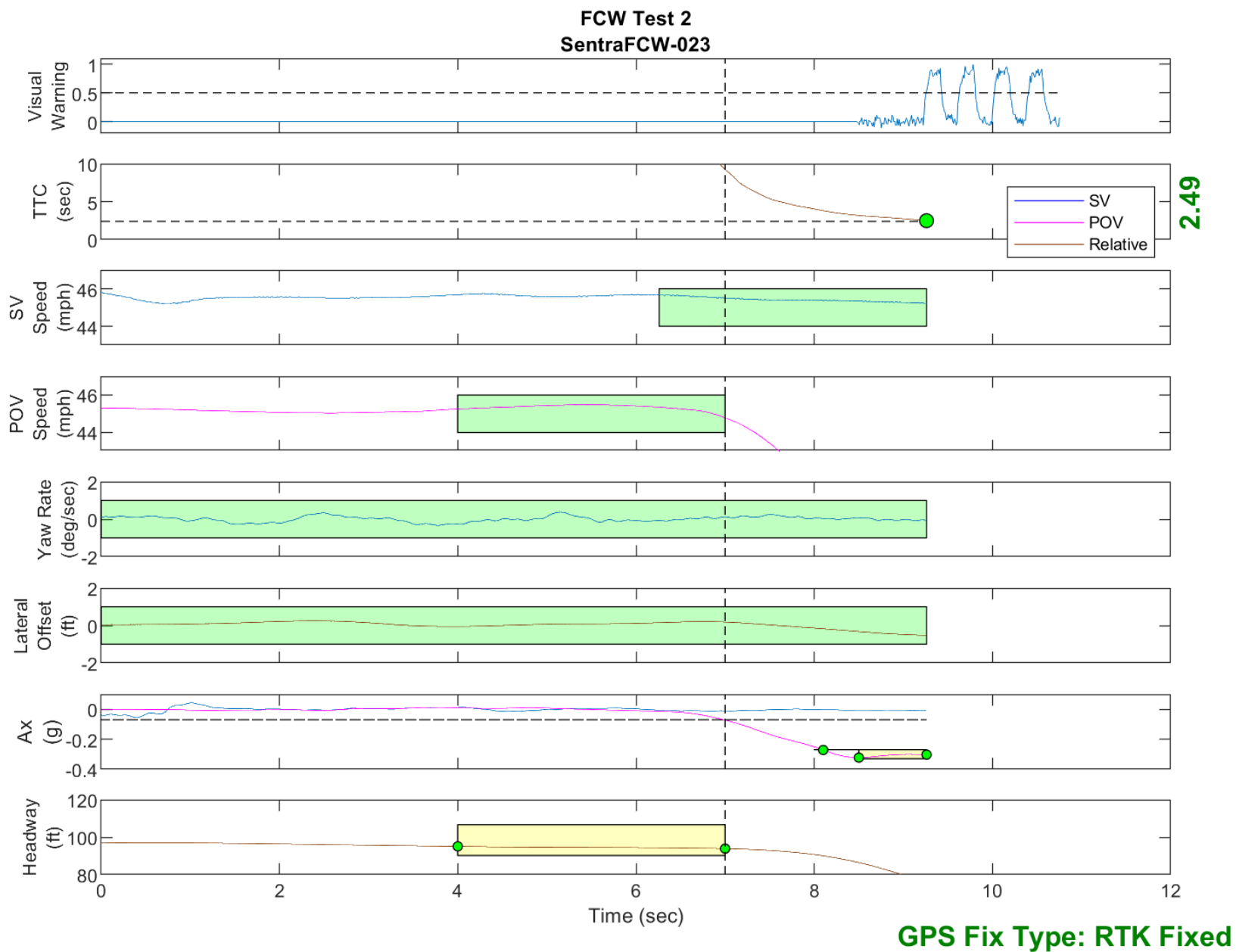


Figure D24. Time History for Run 23, Test 2 - Decelerating POV, Visual Warning

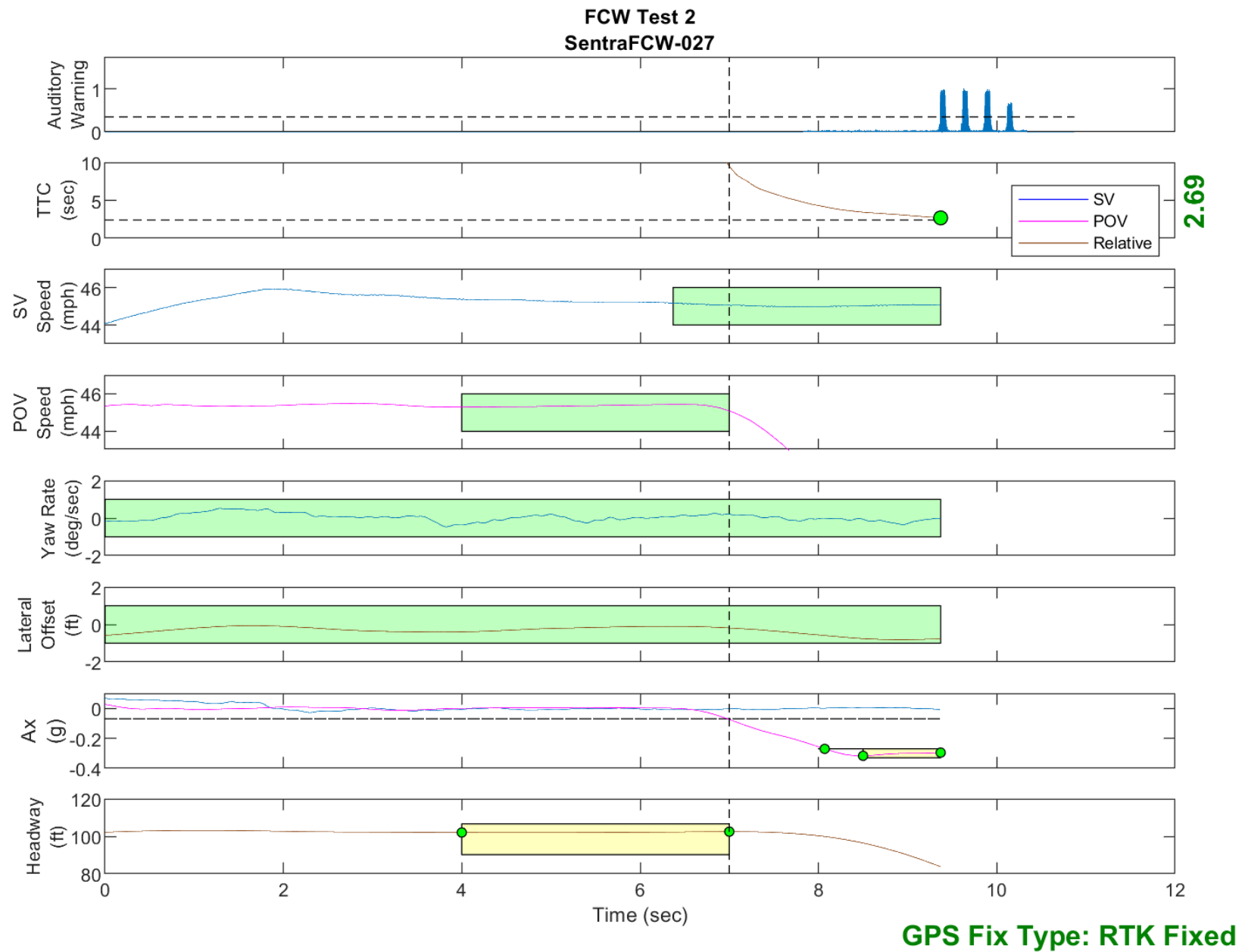


Figure D25. Time History for Run 27, Test 2 - Decelerating POV, Auditory Warning

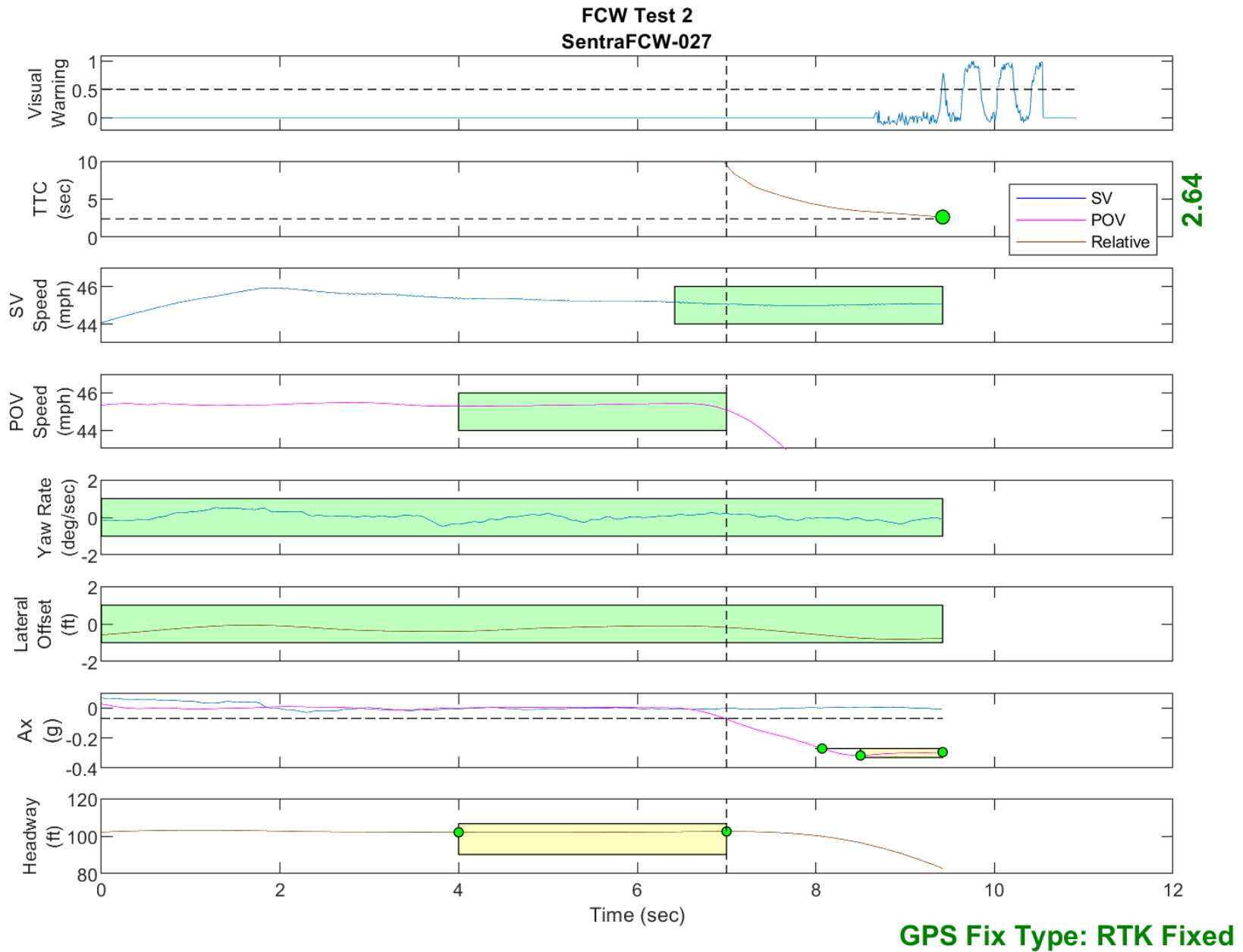


Figure D26. Time History for Run 27, Test 2 - Decelerating POV, Visual Warning

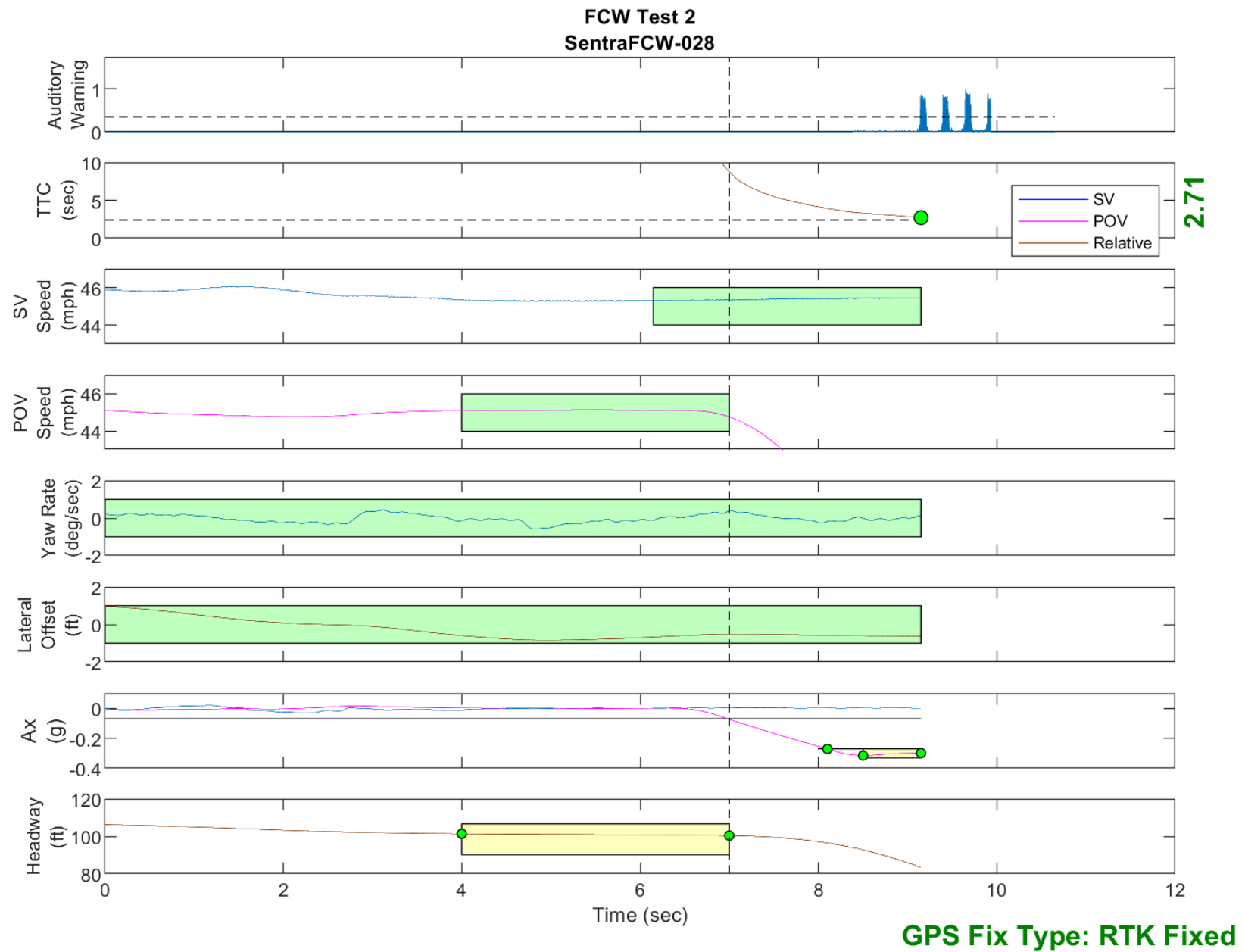


Figure D27. Time History for Run 28, Test 2 - Decelerating POV, Auditory Warning

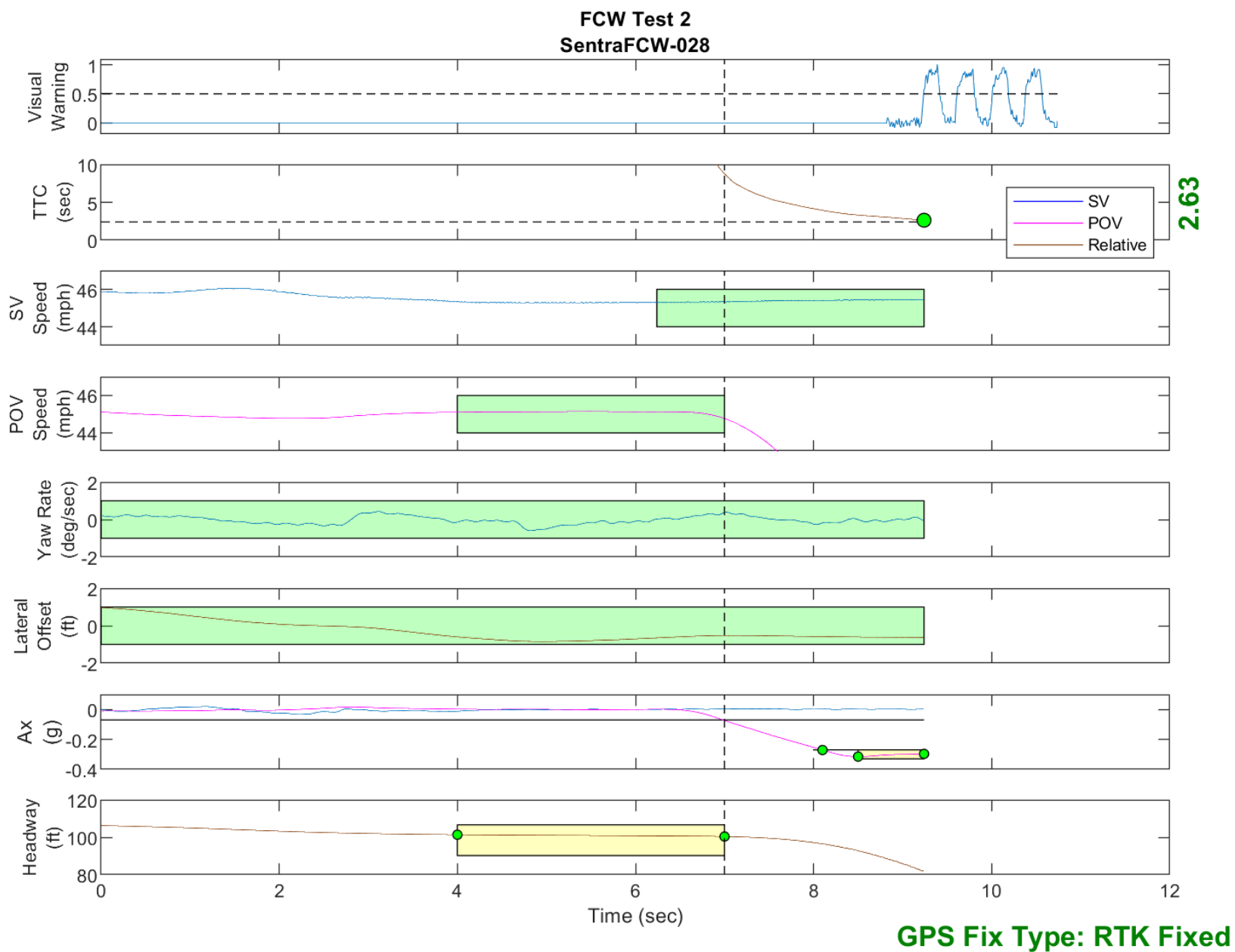


Figure D28. Time History for Run 28, Test 2 - Decelerating POV, Visual Warning

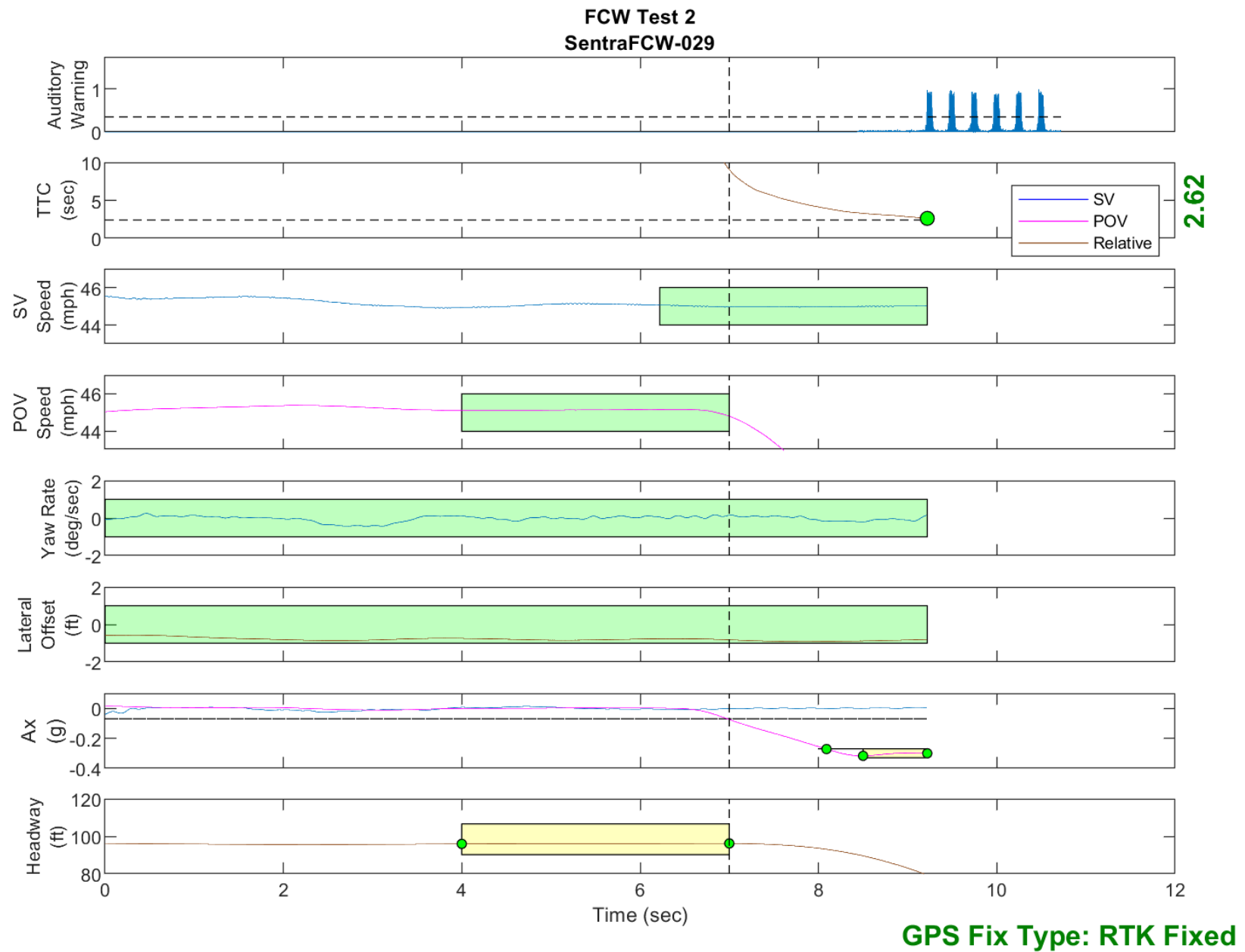


Figure D29. Time History for Run 29, Test 2 - Decelerating POV, Auditory Warning

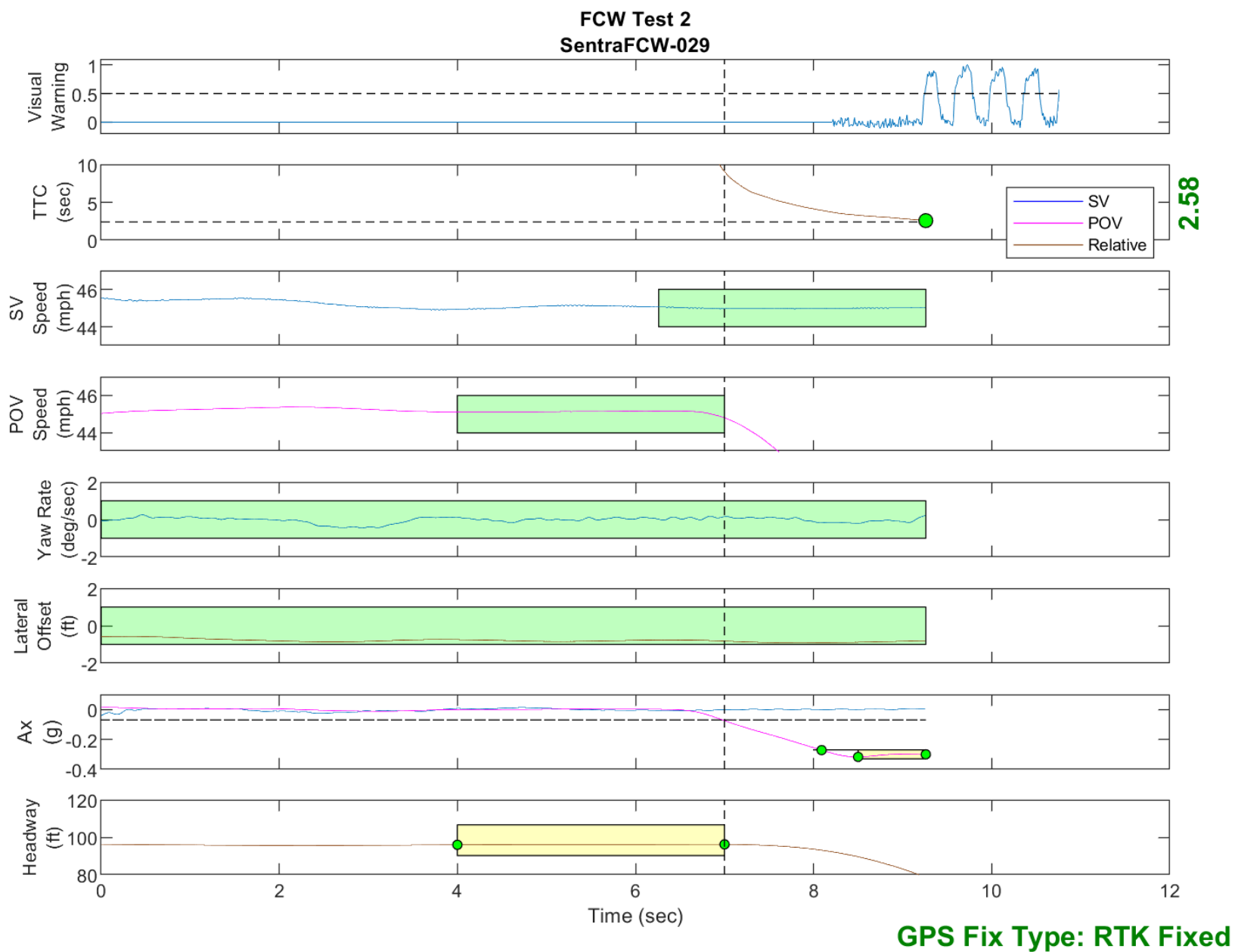


Figure D30. Time History for Run 29, Test 2 - Decelerating POV, Visual Warning



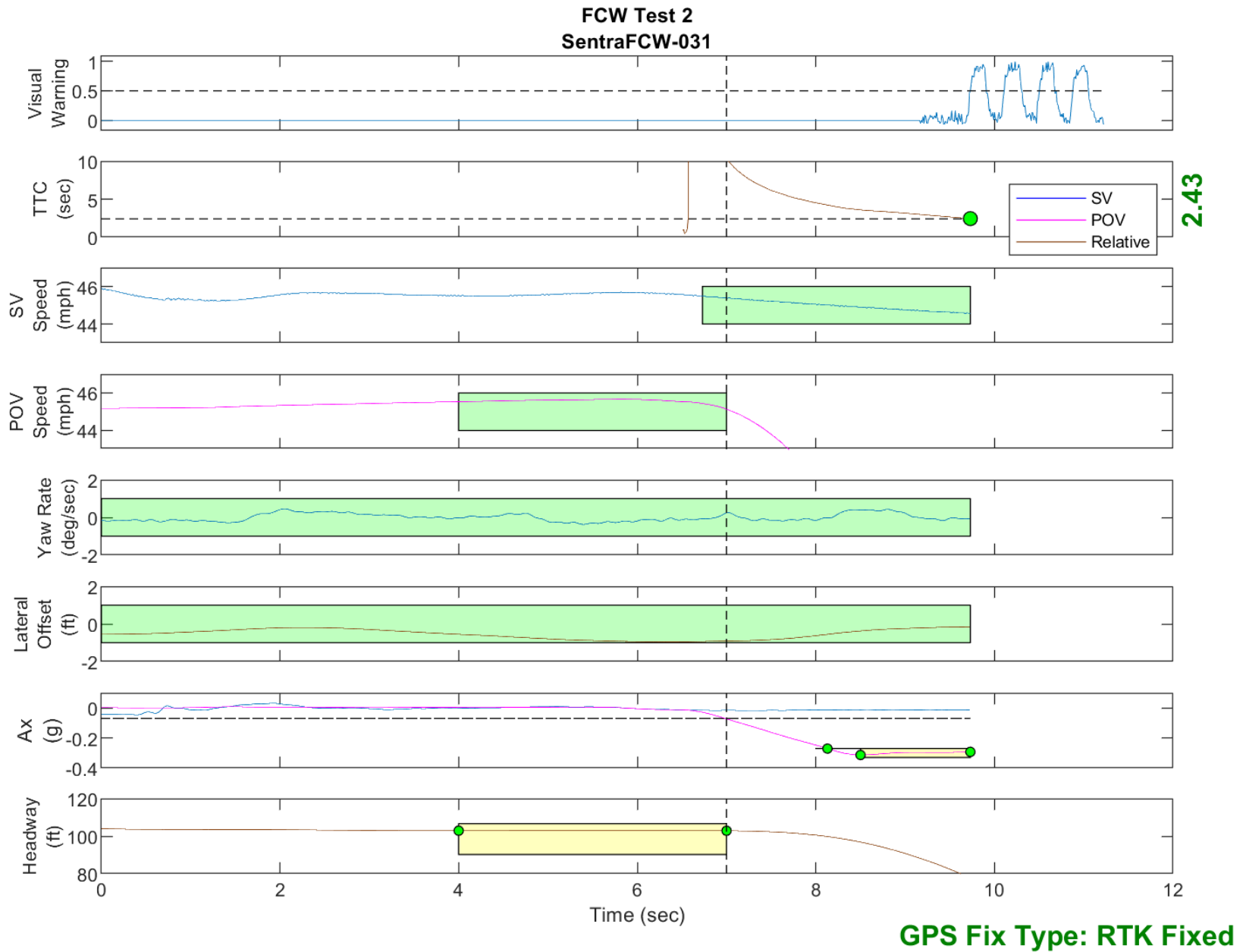


Figure D32. Time History for Run 31, Test 2 - Decelerating POV, Visual Warning

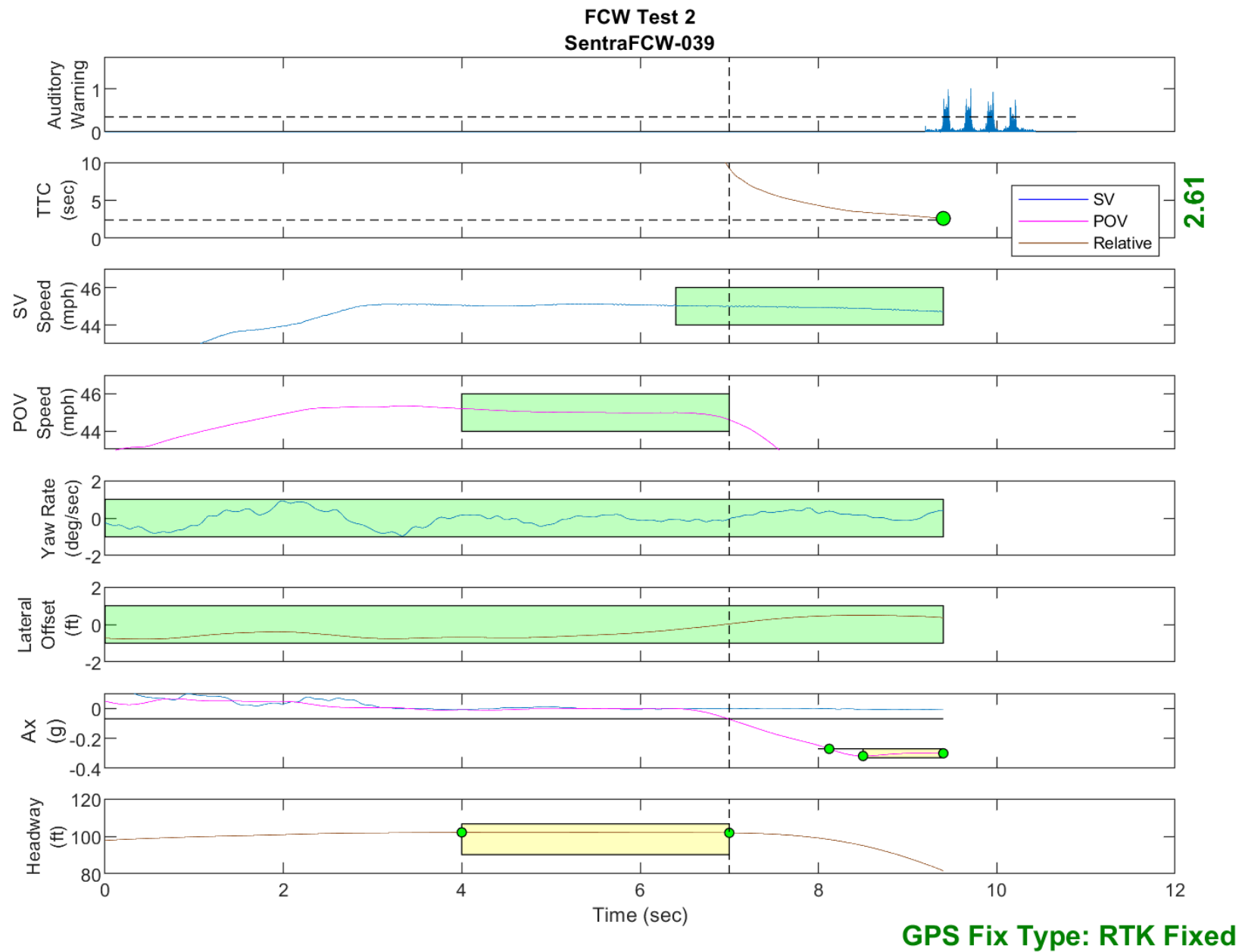


Figure D33. Time History for Run 39, Test 2 - Decelerating POV, Auditory Warning

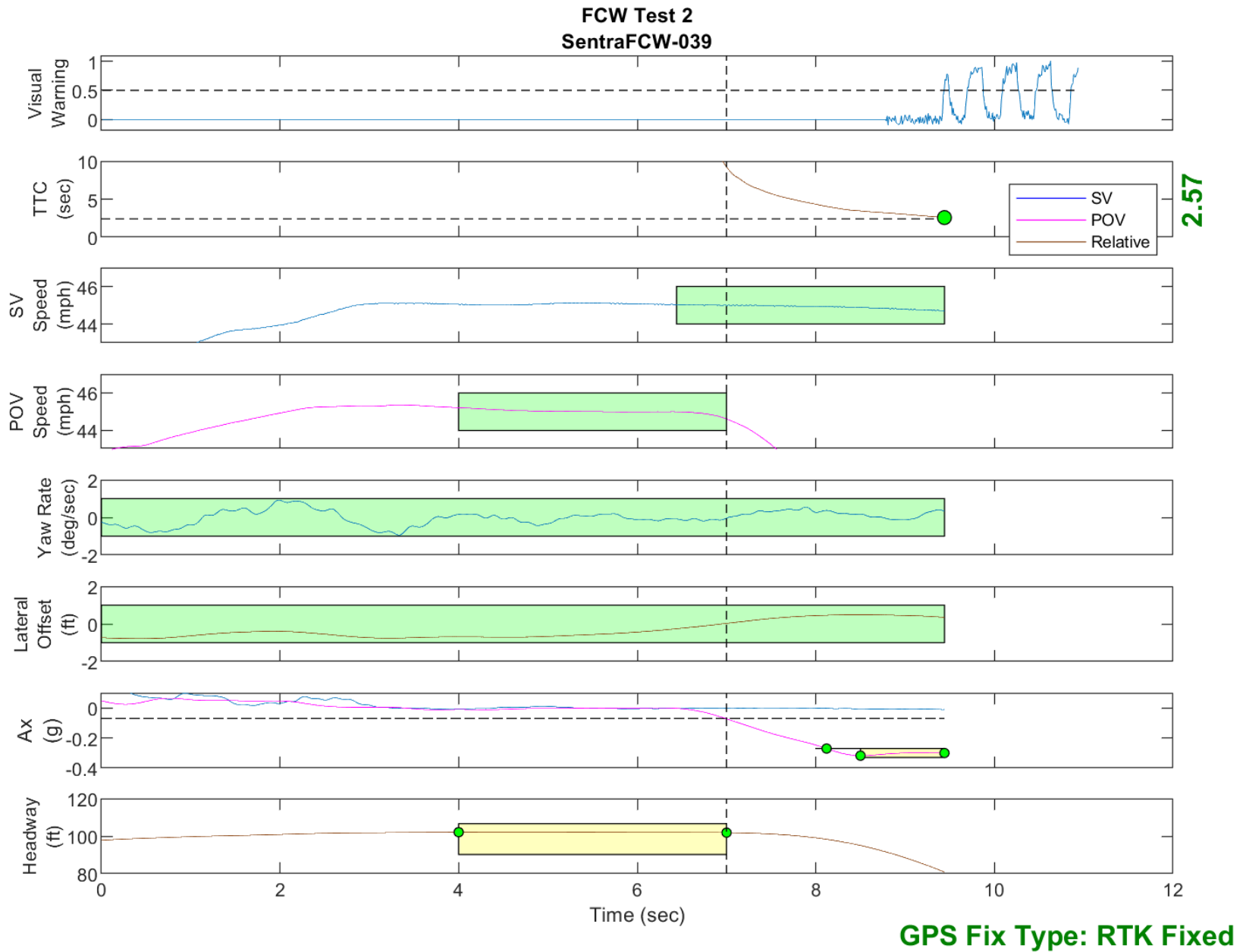


Figure D34. Time History for Run 39, Test 2 - Decelerating POV, Visual Warning

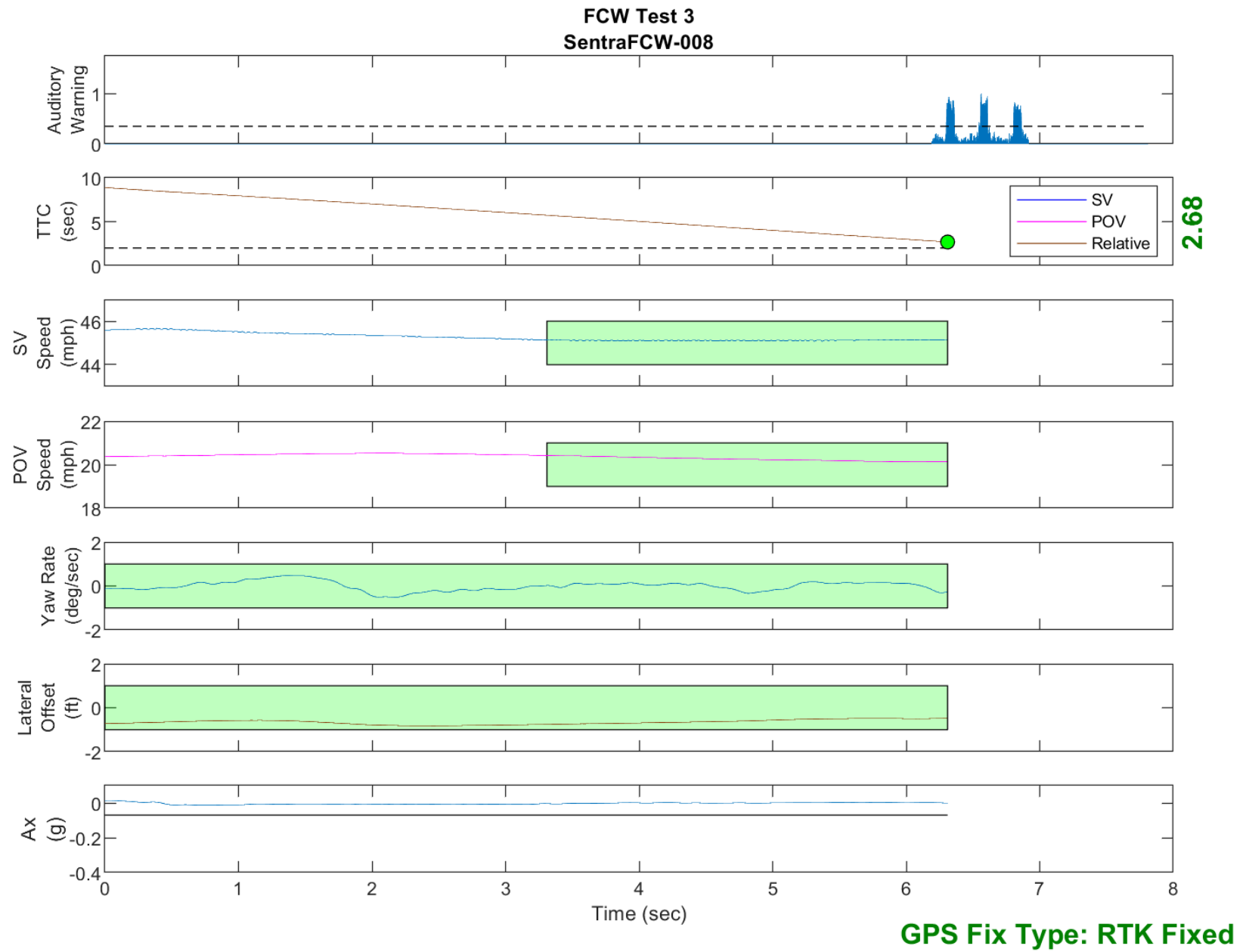


Figure D35. Time History for Run 8, Test 3 - Slower Moving POV, Auditory Warning

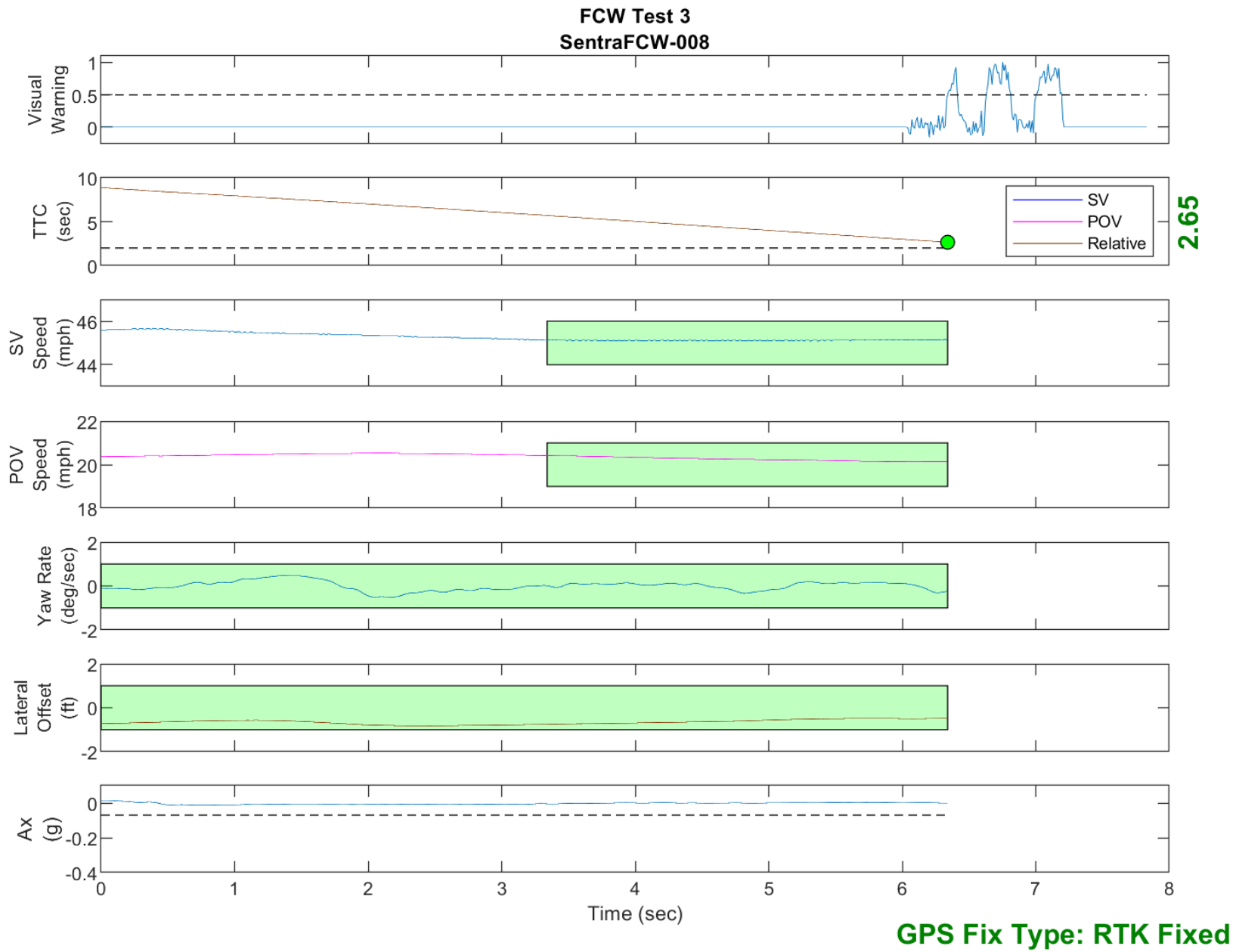


Figure D36. Time History for Run 8, Test 3 - Slower Moving POV, Visual Warning

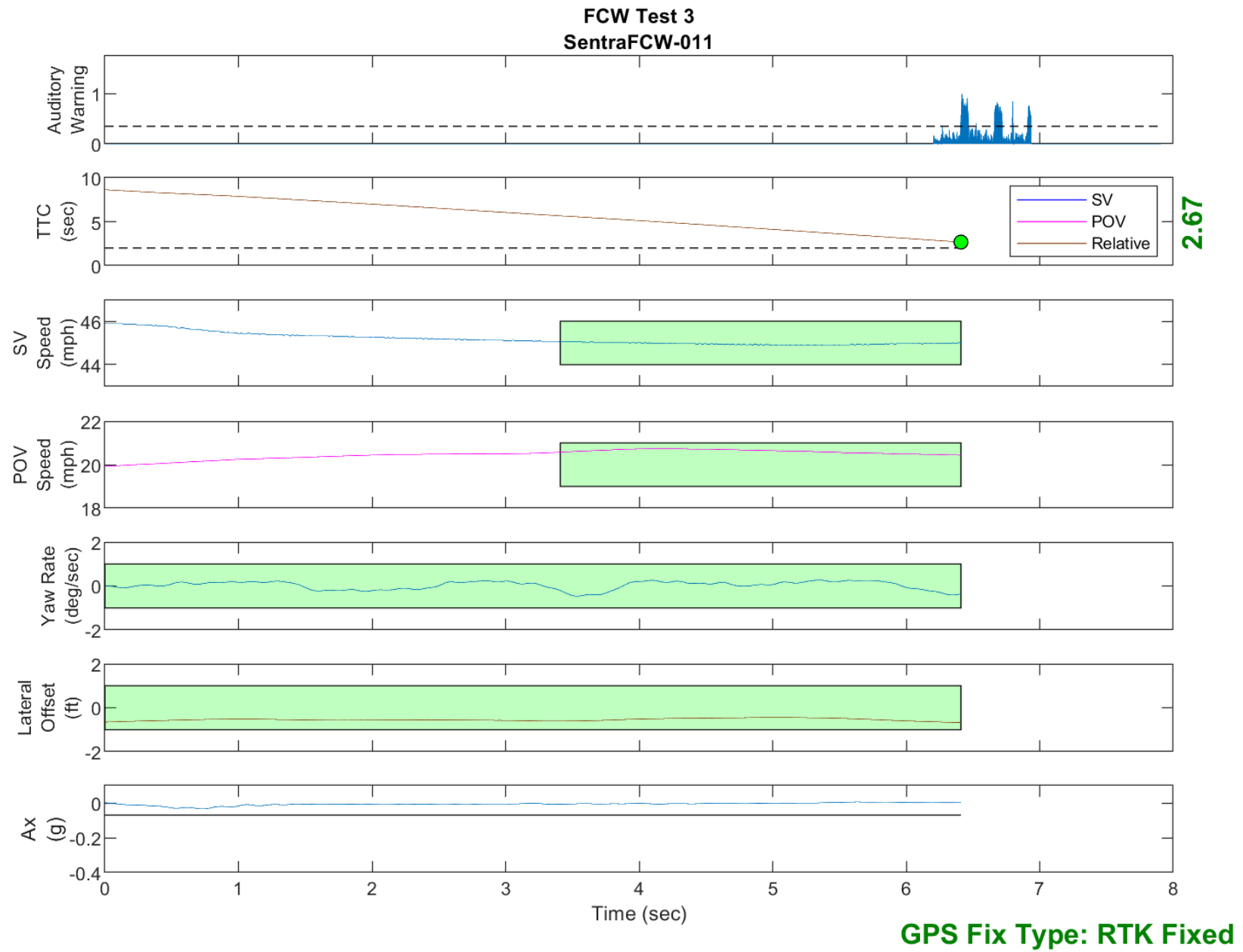


Figure D37. Time History for Run 11, Test 3 - Slower Moving POV, Auditory Warning

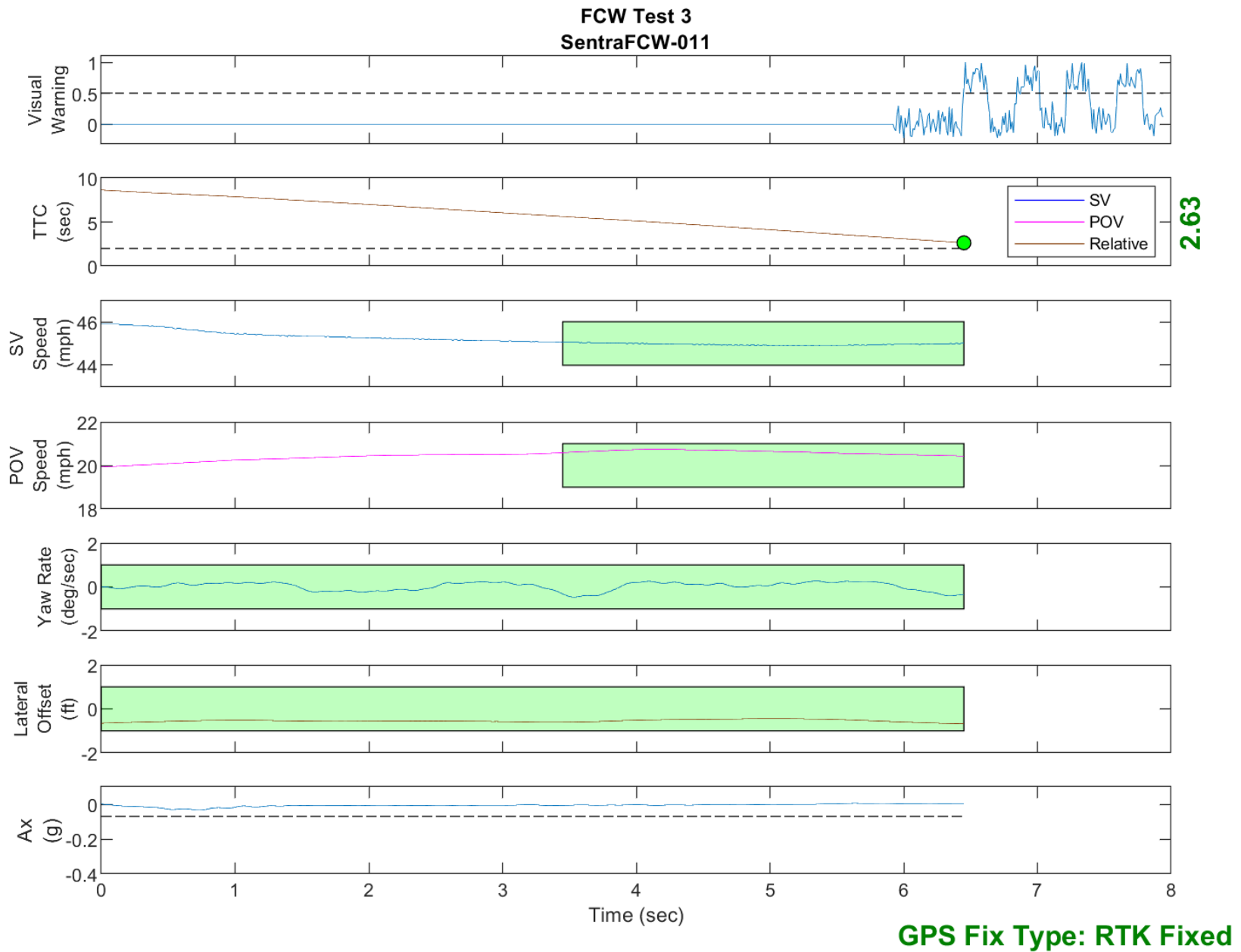


Figure D38. Time History for Run 11, Test 3 - Slower Moving POV, Visual Warning

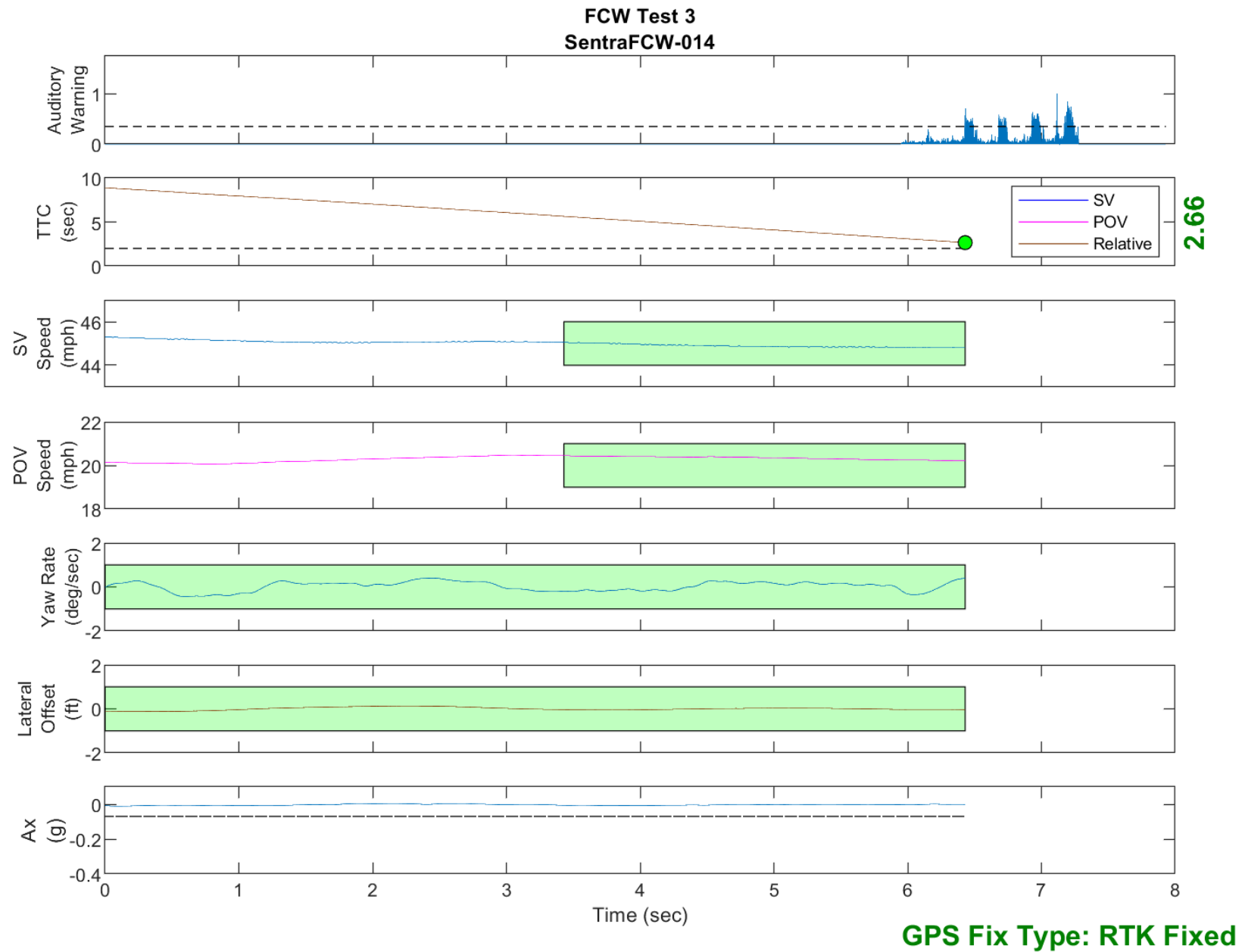


Figure D39. Time History for Run 14, Test 3 - Slower Moving POV, Auditory Warning

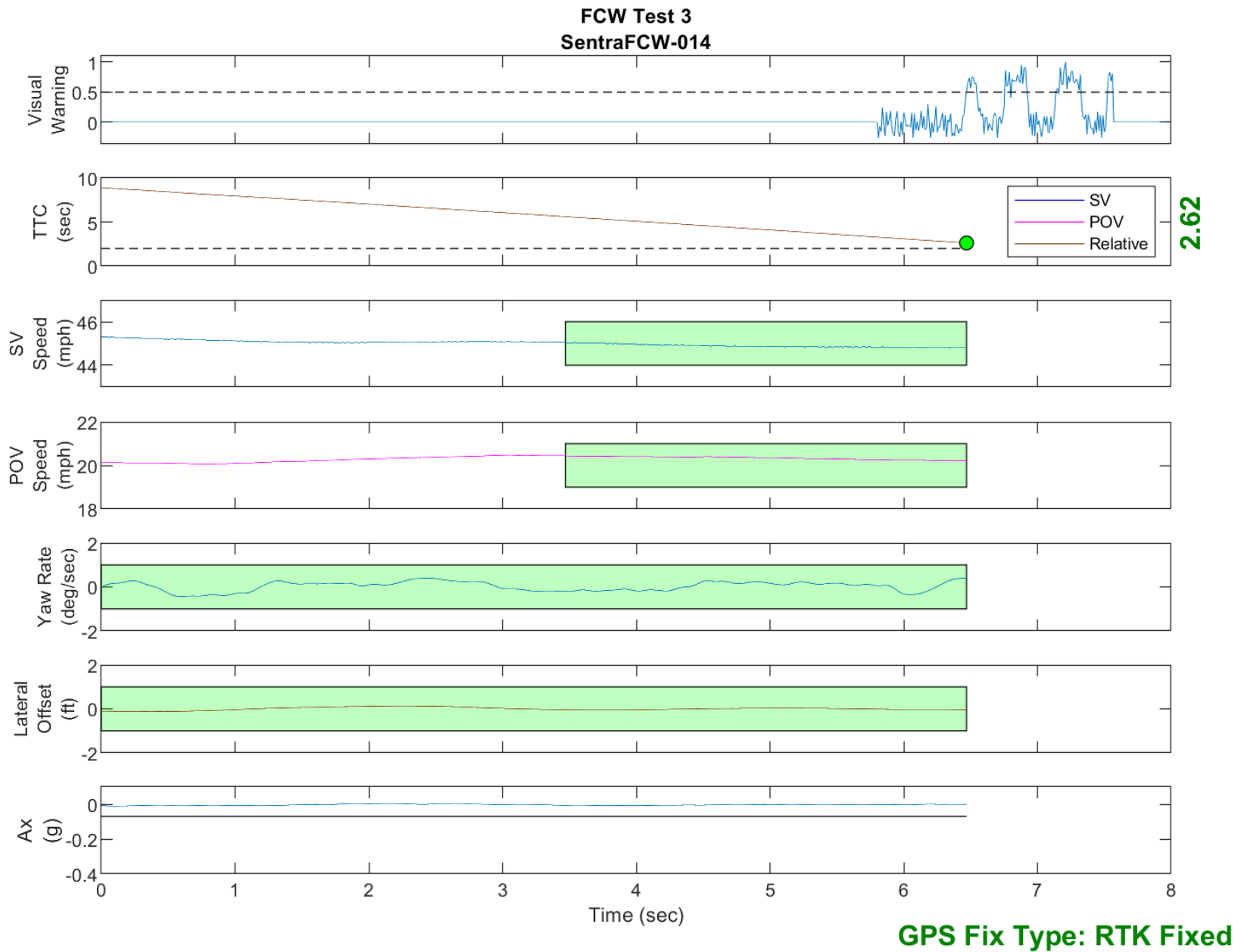


Figure D40. Time History for Run 14, Test 3 - Slower Moving POV, Visual Warning

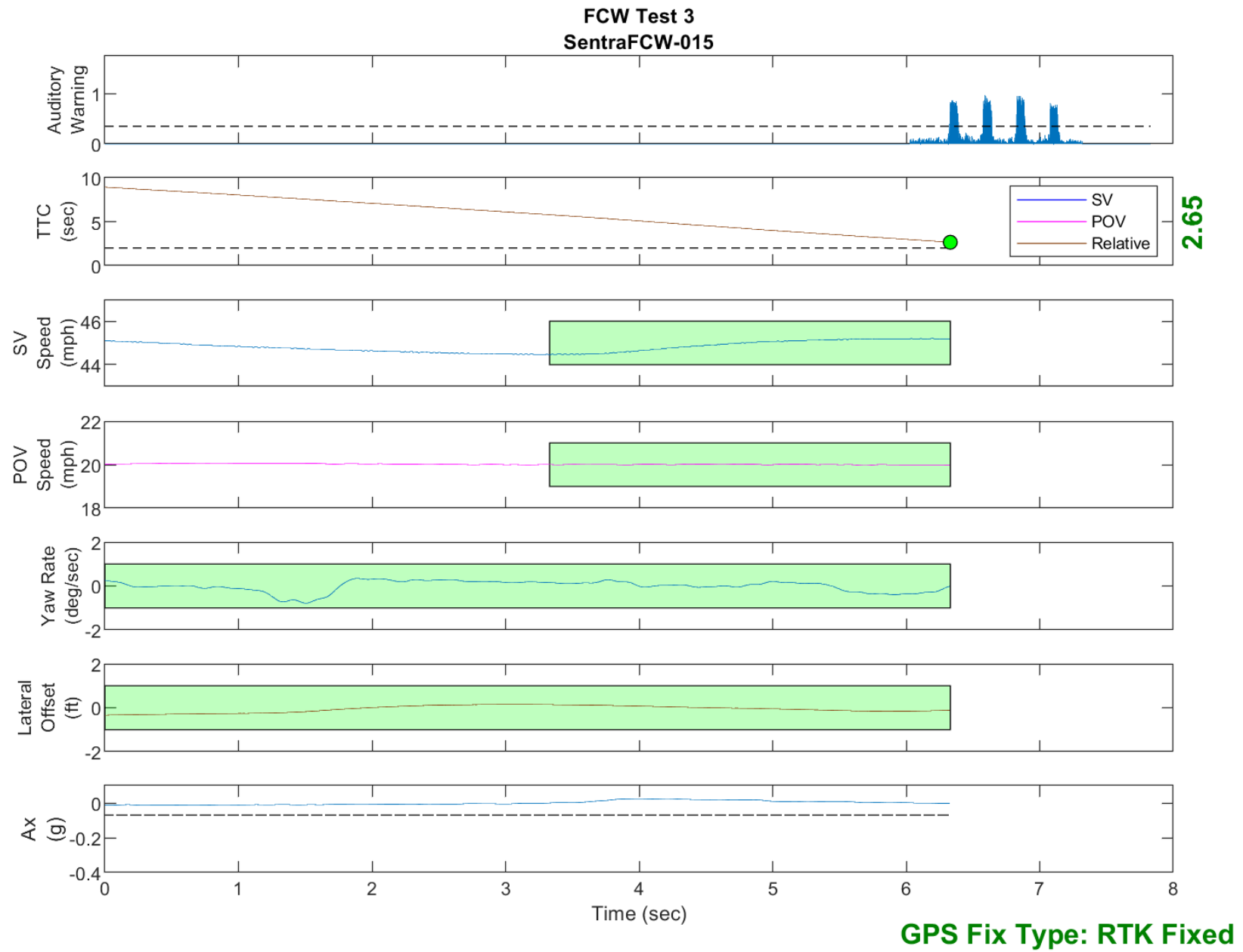


Figure D41. Time History for Run 15, Test 3 - Slower Moving POV, Auditory Warning

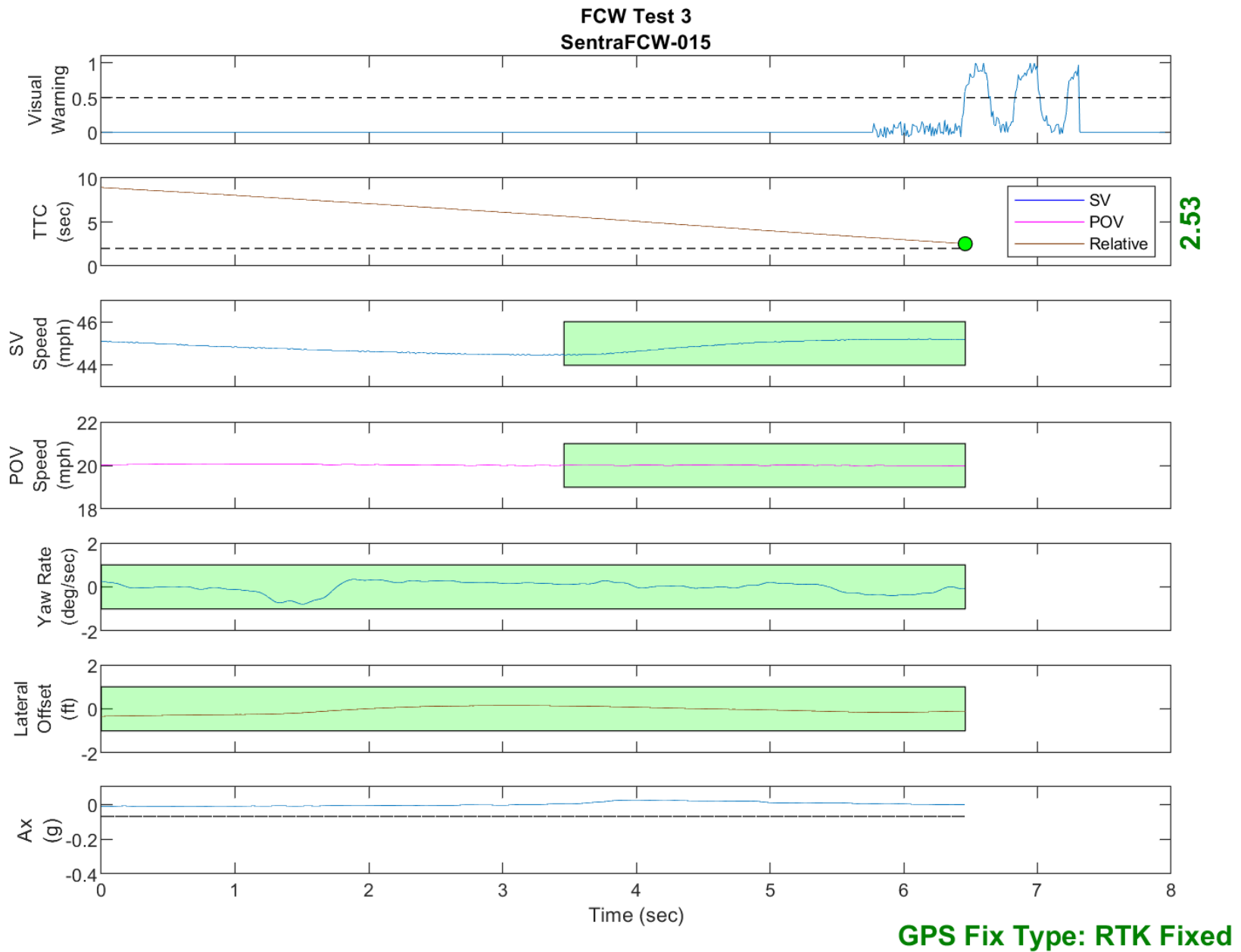


Figure D42. Time History for Run 15, Test 3 - Slower Moving POV, Visual Warning

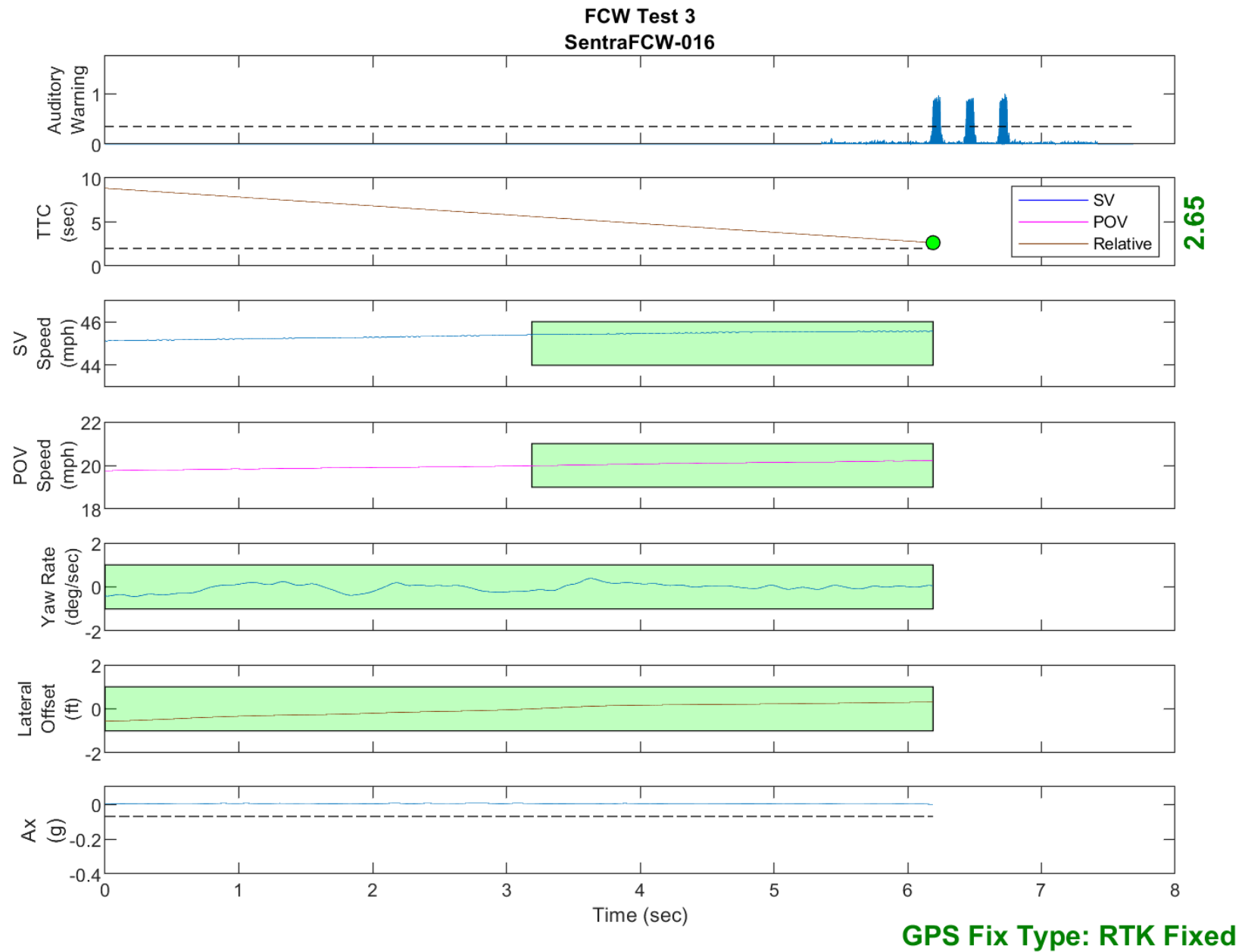


Figure D43. Time History for Run 16, Test 3 - Slower Moving POV, Auditory Warning

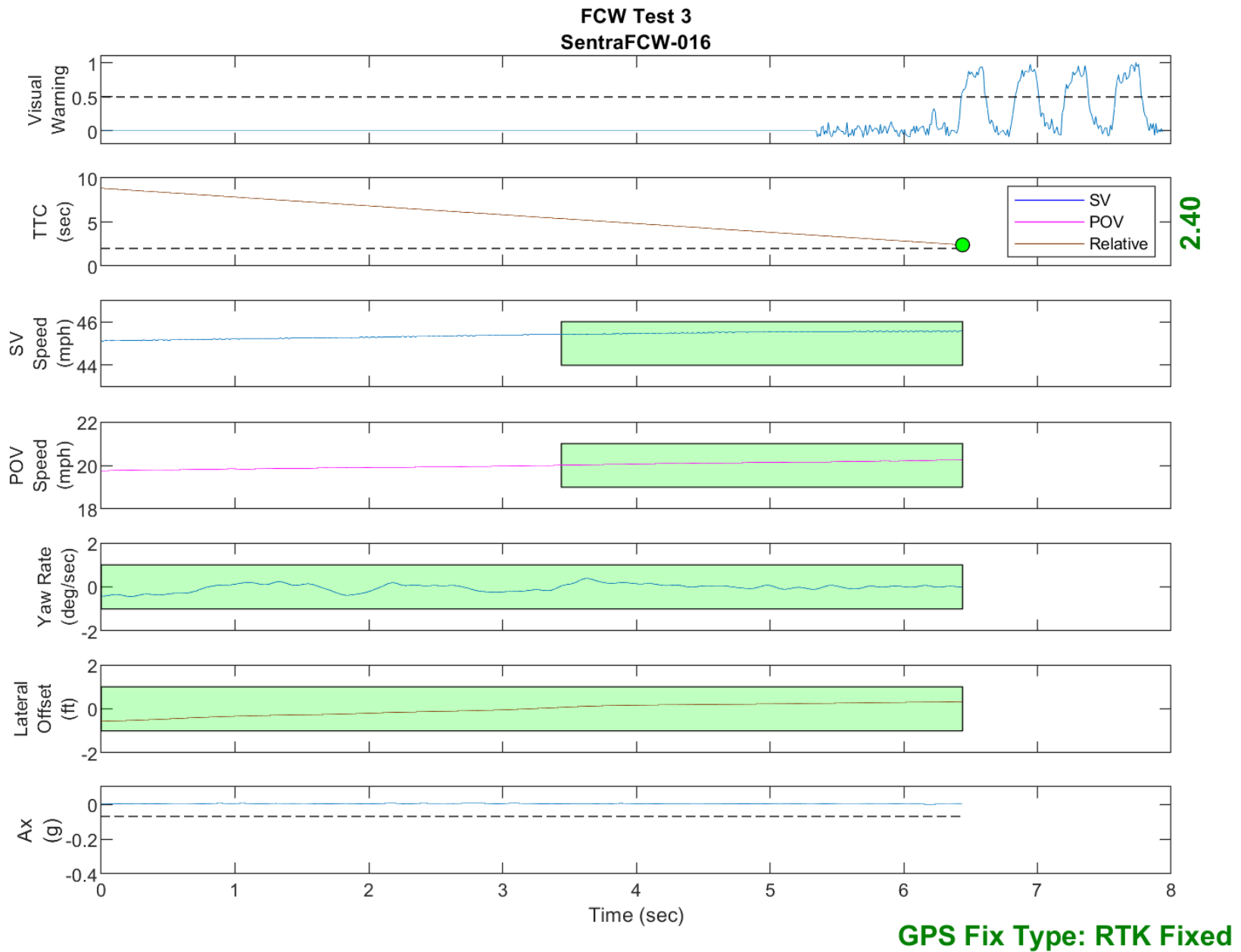


Figure D44. Time History for Run 16, Test 3 - Slower Moving POV, Visual Warning

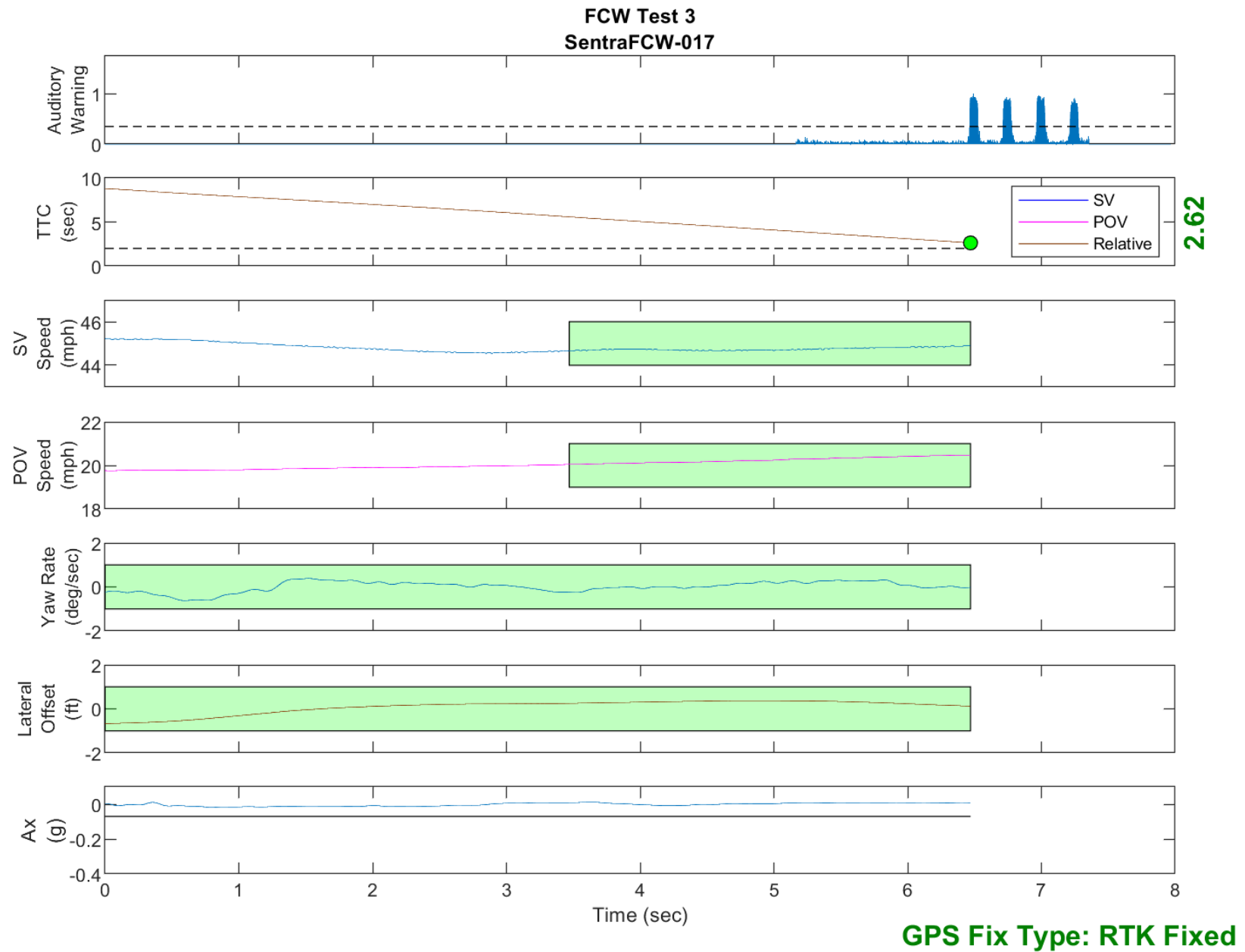


Figure D45. Time History for Run 17, Test 3 - Slower Moving POV, Auditory Warning

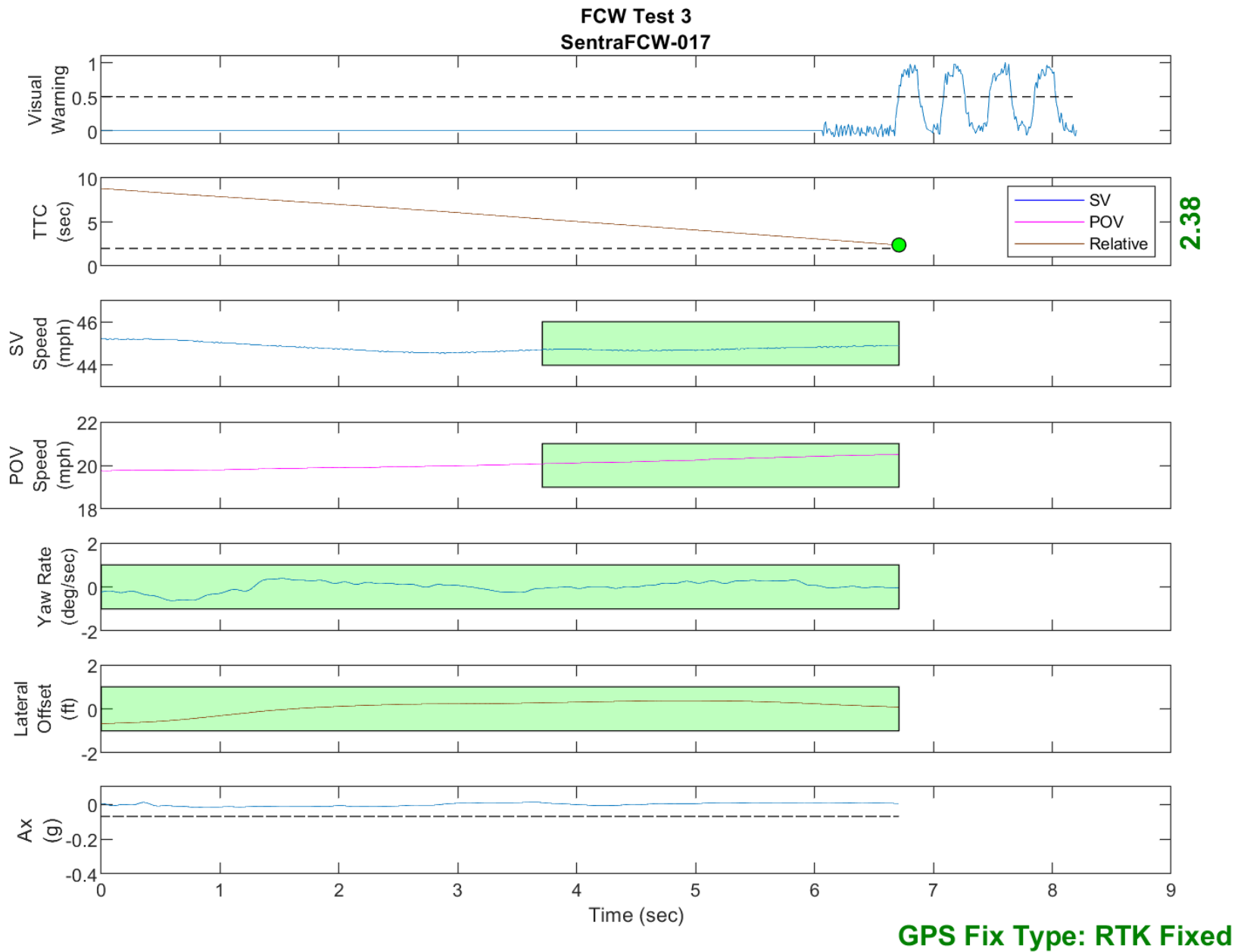


Figure D46. Time History for Run 17, Test 3 - Slower Moving POV, Visual Warning

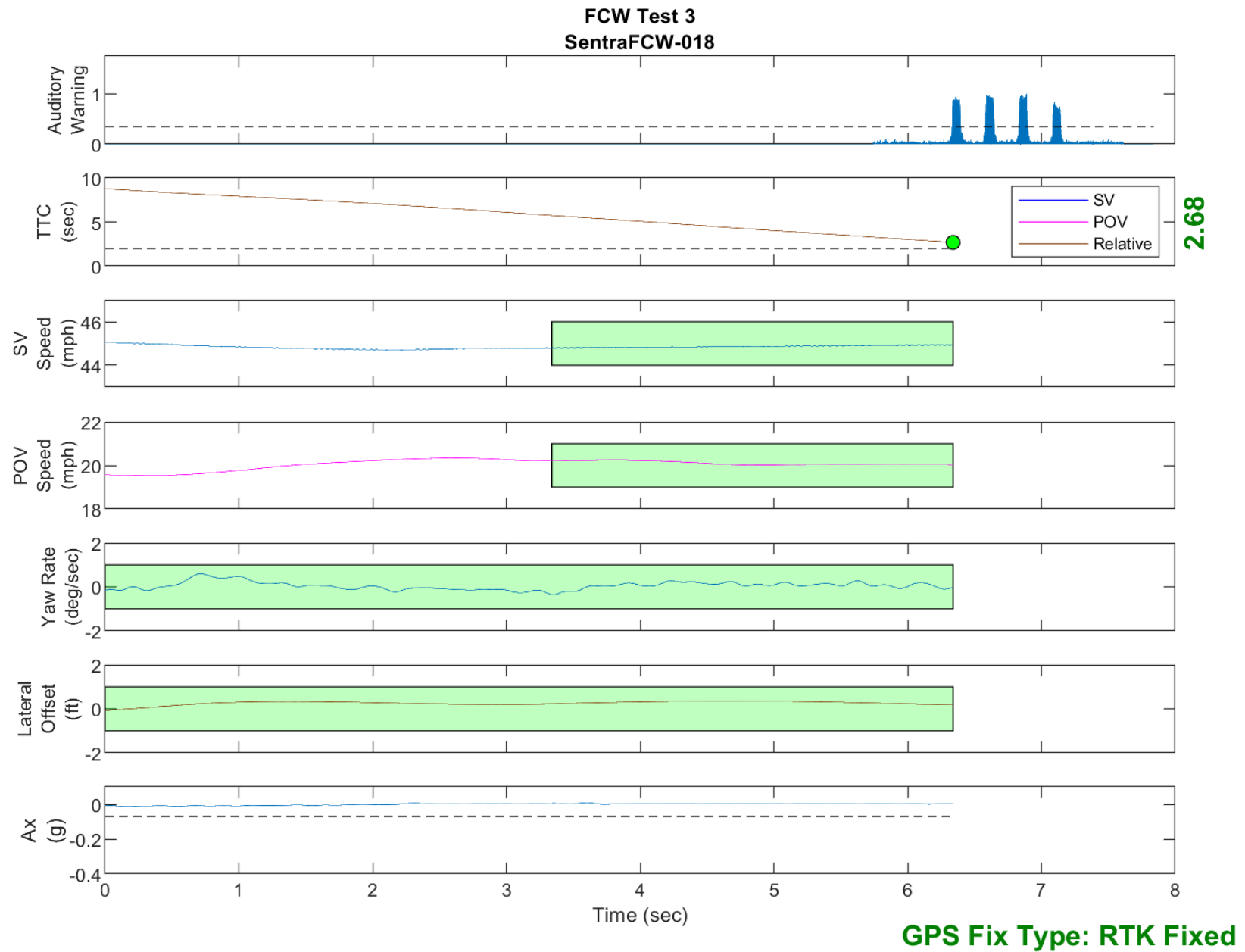


Figure D47. Time History for Run 18, Test 3 - Slower Moving POV, Auditory Warning

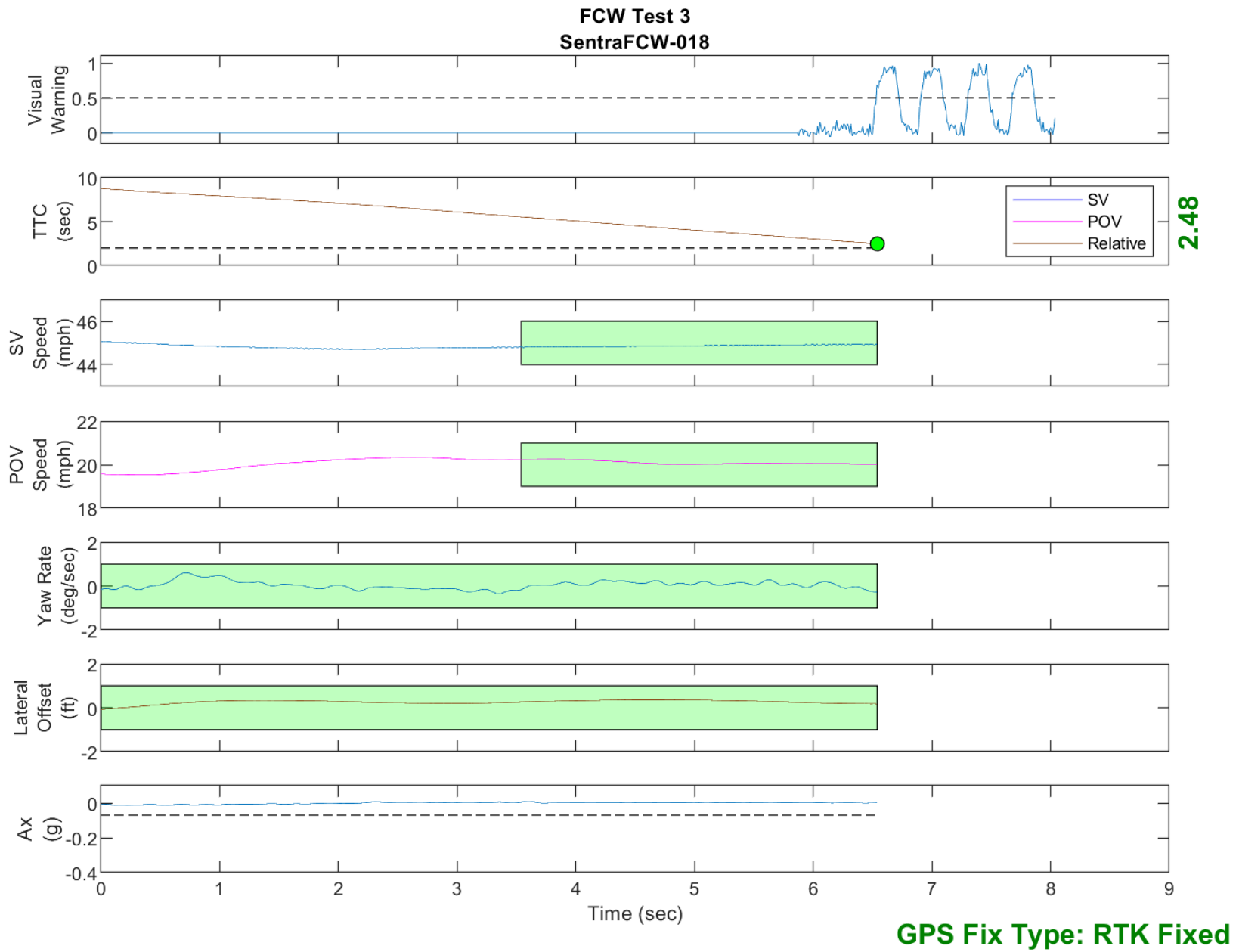


Figure D48. Time History for Run 18, Test 3 - Slower Moving POV, Visual Warning