

**NEW CAR ASSESSMENT PROGRAM
FORWARD COLLISION WARNING CONFIRMATION TEST
NCAP-DRI-FCW-22-08**

2022 Mitsubishi Outlander SE 2.5S-AWC

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12 January 2022

Draft Report

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16. Abstract These tests were conducted on the subject 2022 Mitsubishi Outlander SE 2.5S-AWC 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.			
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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.

Section II
DATA SHEETS

FORWARD COLLISION WARNING
DATA SHEET 1: TEST RESULTS SUMMARY

(Page 1 of 1)

2022 Mitsubishi Outlander SE 2.5S-AWC

VIN: JA4J4UA85NZ04xxxx

Test start date: 1/3/2022

Test end date: 1/4/2022

Forward Collision Warning setting: No options for warning timing

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 Mitsubishi Outlander SE 2.5S-AWC

TEST VEHICLE INFORMATION

VIN: JA4J4UA85NZ04xxxx

Body Style: SUV

Color: Alloy Silver Metallic

Date Received: 12/22/2021

Odometer Reading: 257 mi

DATA FROM VEHICLE'S CERTIFICATON LABEL

Vehicle manufactured by: Mitsubishi Motors Corporation

Date of manufacture: Oct 2021

Vehicle Type: MPV

DATA FROM TIRE PLACARD

Tires size as stated on Tire Placard: Front: P255/45R20

Rear: P255/45R20

Recommended cold tire pressure: Front: 240 kPa (35 psi)

Rear: 240 kPa (35 psi)

TIRES

Tire manufacturer and model: Bridgestone Ecopia H/L 422+

Front tire specification: P255/45R20 101W

Rear tire specification: P255/45R20 101W

Front tire DOT prefix: EL A9 CDJ

Rear tire DOT prefix: EL A9 CDJ

FORWARD COLLISION WARNING
DATA SHEET 3: TEST CONDITIONS

(Page 1 of 2)

2022 Mitsubishi Outlander SE 2.5S-AWC

GENERAL INFORMATION

Test start date: 1/3/2022 Test end date: 1/4/2022

AMBIENT CONDITIONS

Air temperature: 10.0 C (50 F)

Wind speed: 1.0 m/s (2.3 mph)

- Wind speed \leq 10 m/s (22 mph).
- Tests were not performed during periods of inclement weather. This includes, but is not limited to, rain, snow, hail, fog, smoke, or ash.
- 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: 240 kPa (35 psi)

Rear: 240 kPa (35 psi)

FORWARD COLLISION WARNING
DATA SHEET 3: TEST CONDITIONS

(Page 2 of 2)

2022 Mitsubishi Outlander SE 2.5S-AWC

WEIGHT

Weight of vehicle as tested including driver and instrumentation:

Left Front: 543.4 kg (1198 lb)

Right Front: 517.1 kg (1140 lb)

Left Rear: 420.5 kg (927 lb)

Right Rear: 397.8 kg (877 lb)

Total: 1878.8 kg (4142 lb)

FORWARD COLLISION WARNING

DATA SHEET 4: FORWARD COLLISION WARNING SYSTEM OPERATION

(Page 1 of 3)

2022 Mitsubishi Outlander SE 2.5S-AWC

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

Forward Collision Mitigation System (FCM)

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

The FCM system uses a camera installed behind the windshield and a radar sensor mounted in the front bumper

Forward Collision Warning Setting used in test: No options for warning timing

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.

If a risk of a forward collision is detected, the FCM system will first provide the warning to the driver by flashing the vehicle ahead detection indicator (yellow) in the multi-information display and providing an auditory alert.

FORWARD COLLISION WARNING

DATA SHEET 4: FORWARD COLLISION WARNING SYSTEM OPERATION

(Page 2 of 3)

2022 Mitsubishi Outlander SE 2.5S-AWC

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

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

Arrow buttons on the left side of the steering wheel are used to turn the FCM system on and off. The procedure is as follows:

1. Press the < > button until "Settings" appears in the multi-information display and then push the scroll dial. Use the scroll dial to select "Driver Assistance" and select by pushing the scroll dial.
2. Select "Emergency Brake" and select by pushing the scroll dial.
3. Select "Front" and use the scroll dial to turn the system on or off.

When the FCM system is turned off, the FCM system OFF warning light illuminates.

The FCM system will be automatically turned ON when the engine is restarted.

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

If yes, please provide a full description.

N/A

FORWARD COLLISION WARNING

DATA SHEET 4: FORWARD COLLISION WARNING SYSTEM OPERATION

(Page 3 of 3)

2022 Mitsubishi Outlander SE 2.5S-AWC

Are there other driving modes or conditions that render FCW inoperable or reduce its effectiveness? Yes
 No

If yes, please provide a full description.

Poor visibility (conditions such as rain, snow, fog, dust storms, sandstorms, and road spray from other vehicles) and so on, can reduce system effectiveness. System limitations are described in detail on pages 5-129 to 5-133 owner's manual shown in Appendix B, pages B-16 through B-20.

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.

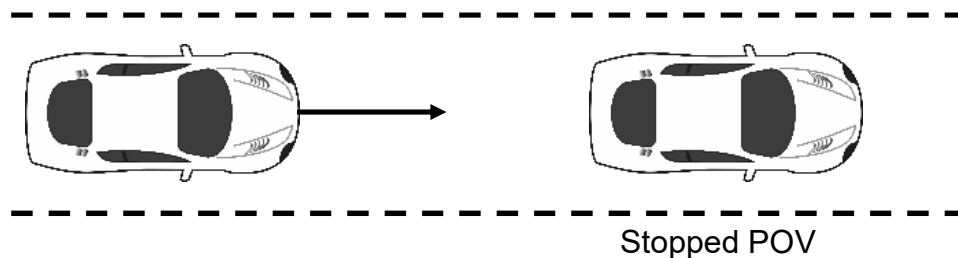


Figure 1. Depiction of Test 1

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.

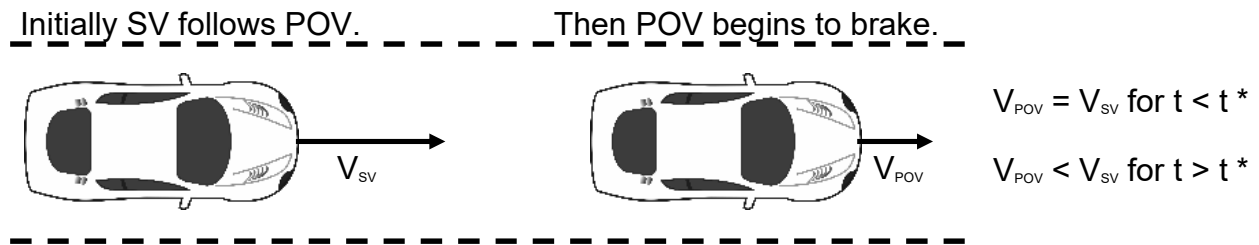


Figure 2. Depiction of Test 2

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).

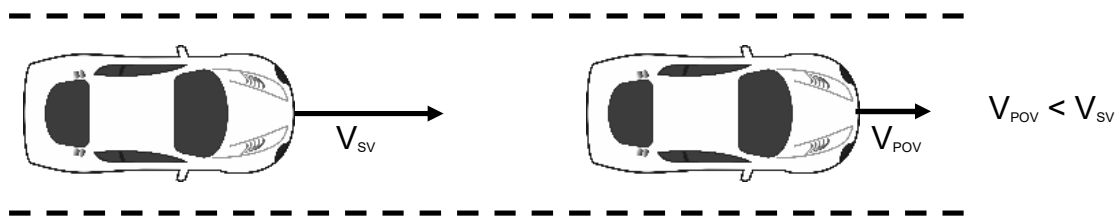


Figure 3. Depiction of Test 3

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: 2/10/2021 Due: 2/10/2022
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 ± 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: ±0.02m/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: 1/6/2021 Due: 1/6/2022
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

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Figure A1. Front View of Subject Vehicle



Figure A2. Rear View of Subject Vehicle



**2022 OUTLANDER SE 2.5 S-AWC
4-DOOR SUV
ALLOY SILVER METALLIC / BLACK**

2.5L DOHC 4-CYLINDER DIRECT-INJECTION
CONTINUOUSLY VARIABLE TRANSMISSION
50-STATE EMISSIONS STANDARD

Mechanical Features

- 2.5L DOHC 4-cylinder Direct-injection
- 6-Speed Continuously Variable Transmission (CVT)
- Super All-Wheel Control (S-AWC)
- Shift by wire
- Paddle shifters

Exterior Features

- LED low and high beam headlights
- LED fog lights
- LED daytime running lights
- Headlight washers
- Automatic headlights
- Body-colored front and rear bumpers
- Silver front and rear bumper lower trim
- Body-colored side mirrors w/ LED turn indicators
- Heated side mirrors
- Front wiper de-icer
- Front variable intermittent wipers w/integrated washers
- Front rain-sensing wipers
- Hands-free power liftgate with adjustable height
- Rear window defroster with timer
- Capless fuel filler
- Body-colored rear spoiler with LED high-mount stop light
- SE badge
- 5-AWC decal
- 20-inch two-tone alloy wheels
- P255/45 R20 all-season tires
- Tire repair kit

Interior Features

- Leather-wrapped steering wheel
- Leather-wrapped shift knob
- Gloss black shift panel
- Synthetic leather door insert
- 8-way power adjustable driver seat
- Heated front seats
- Synthetic leather suede seating surfaces
- 40/20/40 split type 2nd row seat with folding function
- 7 Passenger seating

Convenience Features

- 9.0" Navigation system with Smartphone-link Display Audio (SDA)
- Wireless Apple CarPlay*
- Google Android™ Auto
- SXM All Access and SXM Traffic & Travel Link with 90-day subscription
- 7.0" Multi-information display
- HD Radio**
- 6 speakers
- Smartphone wireless charger
- Bluetooth® wireless technology
- Steering wheel audio and phone controls
- Steering wheel voice recognition control
- Rear 1x USB-C and 1x USB-A
- Front 1x USB-C and 1x USB-A

Convenience Features (cont'd)

- Multi-view camera system
- Drive mode selector (Tarmac, Gravel, Snow, Normal, Eco, Mud)
- Dual-zone automatic climate control
- FAST-Key entry system w/ push button start
- Rear seat center armrest with cupholders

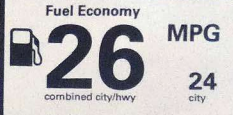
Safety & Security

- Anti-lock Braking System (ABS) with Electronic Brakeforce Distribution (EBD) and brake assist
- Electronic parking brake with auto hold
- Active Stability Control (ASC)
- Hill Start Assist (HSA)
- Trailer Stability Assist (TSA)
- Tire Pressure Monitoring System (TPMS) with tire fill notification
- Automatic High Beam (AHB)
- Forward Collision Mitigation (FCM) with pedestrian detection
- Driver Attention Alert (DAA)
- Mi-PILOT Assist w/ Nav-link
- Adaptive Cruise Control (ACC) with Stop & Go
- Lane Keep Assist (LKA)
- Lane Departure Prevention (LDP)
- Traffic Sign Recognition (TSR)
- Blind Spot Warning (BSW) w/ Lane Change Assist (LCA)
- Rear Cross Traffic Alert (RCTA)
- Rear Automatic Emergency Braking (Rear AEB)
- Lane Departure Warning (LDW)
- Front parking sensors
- Rear parking sensors
- Advanced dual-stage front airbags
- Driver and passenger SRS knee airbags
- Side curtain SRS airbags
- Rear outer-board seat-mounted SRS side airbags
- Front seat-mounted SRS Center airbag
- Adjustable front seat shoulder belt anchors
- Three-point seatbelts with pretensioner for driver, passenger, outer sides of 2nd row seat
- LATCH (Lower Anchors and Tethers for Children) for 2nd row
- Seatbelt reminder for all seating positions
- Child safety rear door locks
- Anti-theft alarm system
- Anti-theft engine immobilizer
- Rear seat alert

Additional Equipment

Full Tank of Gas	INCLUDED
Mitsubishi Connect Subscriptions	INCLUDED
24-month trial from the date of vehicle delivery (mobile app enrollment required)	
Safeguard Services	
Remote Services	
Cargo Package	\$180.00
Seat Back Net	
Cargo Management System	
Luggage Scuff Plate	
Acry Tonneau Cover	\$195.00
Acry Wheel Locks	\$75.00
Hood Badge, Black	\$110.00
Black hood badge	
Welcome Package	\$160.00
Carpeted floor mats and portfolio	
Touch Up Paint Pen	
Center Console Tray Mat	

EPA DOT Fuel Economy and Environment Gasoline Vehicle

Fuel Economy

26 MPG
 combined city/hwy
3.8 gallons per 100 miles

Small SUVs range from 16 to 125 MPG. The best vehicle rates 142 MPG.

You spend \$250
 more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$1,350

Fuel Economy & Greenhouse Gas Rating (tailpipe only) **5**

Smog Rating (tailpipe only) **6**

This vehicle emits 342 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.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 \$6500 to fuel over 5 years. Cost estimates are based on 15000 miles per year at \$2.35 per gallon. MPG is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
 Calculate personalized estimates and compare vehicles

10-year LIMITED POWERTRAIN WARRANTY

10^{years}/100,000^{miles} ANTI-CORROSION/PERFORATION WARRANTY
 7^{years}/100,000^{miles} ANTI-CORROSION/PERFORATION WARRANTY
 5^{years}/60,000^{miles} NEW VEHICLE LIMITED WARRANTY
 5^{years}/UNLIMITED^{miles} ROADSIDE ASSISTANCE

GOVERNMENT 5-STAR SAFETY RATINGS

This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash, or rollover risk.

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

Parts Content Information

For vehicles in this carline:
 U.S./Canadian Parts Content: 3%
 Major Sources of Foreign Parts Content: JAPAN 88%

For this vehicle:
 Final Assembly Point: OKAZAKI, JAPAN
 Country of Origin: JAPAN
 Engine: JAPAN
 Transmission: JAPAN

Note: Parts content does not include final assembly, distribution, or other non-parts costs.

Ship To: 05361
Sold To: (Same unless indicated)

Cumulative Accessory Weight is 17.8 lbs

Method of Transport: TRUCK
 Plant/Port of Entry: HUENEME, CA
 VIN: JA434UA85N204
 Route Code: TMP

Gasoline, license and title fees, applicable federal, state and local taxes and dealer and distributor installed options and accessories are not included in the manufacturer's suggested retail price. This label has been applied to this vehicle pursuant to federal law and cannot be moved or altered prior to delivery to the ultimate purchaser.

MSRP: **\$30,945.00**

Total Additional Equipment: **\$720.00**

Subtotal: **\$31,665.00**

Destination/Handling: **\$1,245.00**

Total MSRP: **\$32,910.00**

*MSRP (Manufacturer's Suggested Retail Price)

Visit us at www.mitsubishicars.com

Figure A3. Window Sticker (Monroney Label)

MFD. BY MITSUBISHI MOTORS CORPORATION, JAPAN

GWR 5192LBS/2355KG OCT 2021

GAWR FR 2668LBS/1210KG

WITH P255/45R20 TIRES 20X8.0J RIMS

GAWR RR 3009LBS/1365KG

WITH P255/45R20 TIRES 20X8.0J RIMS

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



JA4J4UA85NZ04

7430C 635

VEHICLE TYPE: MPV

Figure A4. Vehicle Certification Label

TIRE AND LOADING INFORMATION



SEATING CAPACITY | TOTAL 7 | FRONT 2 | REAR 5

The combined weight of occupants and cargo should never exceed 525 kg or 1157 lbs.

TIRE	SIZE	COLD TIRE PRESSURE
FRONT	P255/45R20	240 KPA, 35 PSI
REAR	P255/45R20	240 KPA, 35 PSI
SPARE	none	none

**SEE OWNER'S
MANUAL FOR
ADDITIONAL
INFORMATION**

7430C708

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

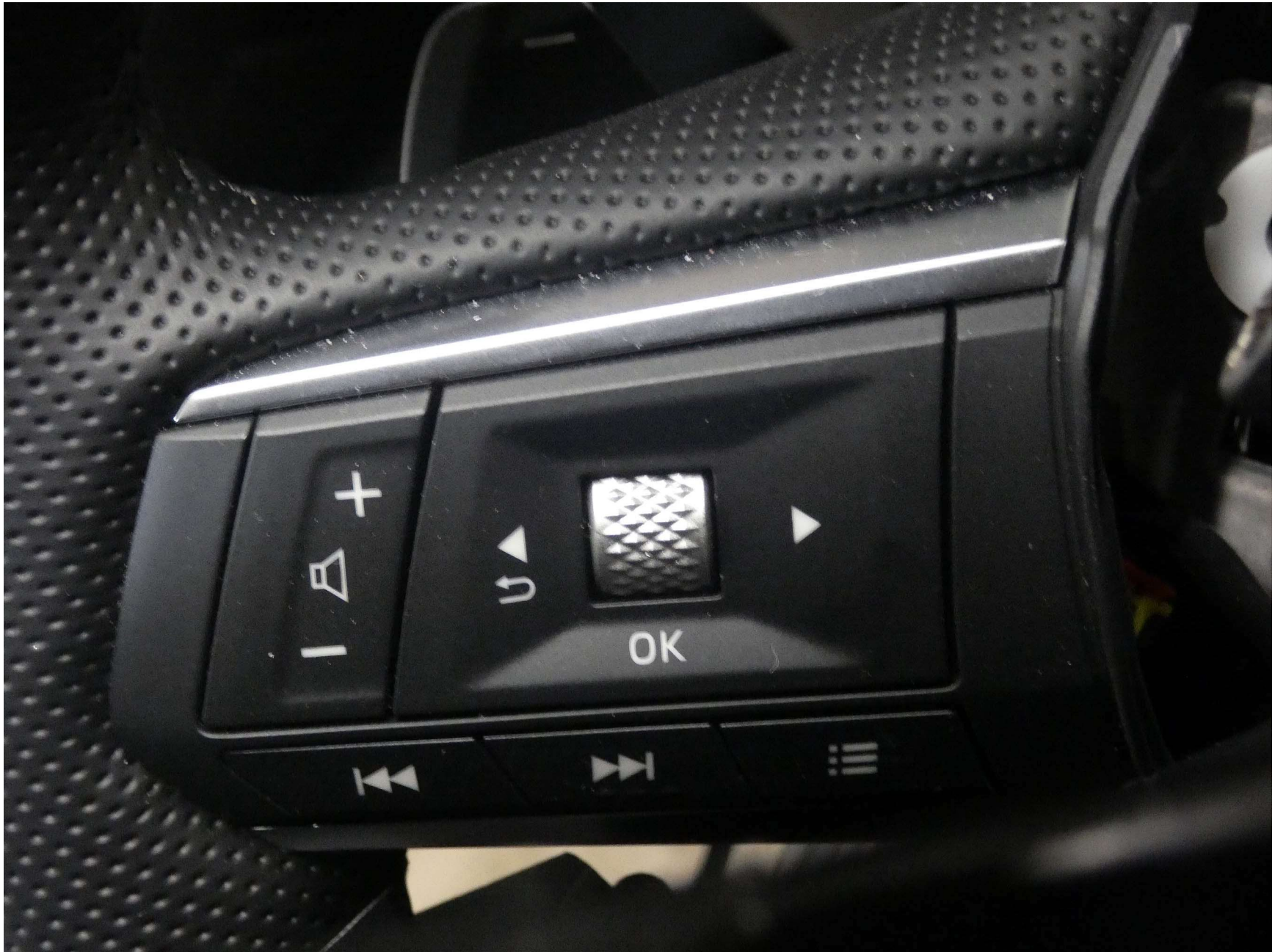


Figure A12. Button for Accessing Assist Menu



Figure A13. System Setup Menus

























Figure A14. FCW Visual Alert








APPENDIX B

Excerpts from Owner's Manual

WARNING AND INDICATOR LIGHTS



























Red light	Name	Page
	Brake warning light	2-13
		
	Charge warning light	2-14
	Electric shift control system warning light	2-14
	Electronic parking brake warning light	2-14
		
	Engine oil pressure warning light	2-14
	Front seat belt warning light	2-15
	Hands OFF warning light (if so equipped)	2-15
	Master warning light	2-15
	SRS airbag warning light	2-15

Yellow light	Name	Page
	Active stability control (ASC) warning light	2-16
	Active stability control (ASC) off indicator light	2-16
	Anti-lock Braking System (ABS) warning light	2-16
		
	Forward Collision Mitigation System (FCM) OFF warning light	2-16
	Electric power steering warning light	2-16
	Electronic parking brake warning light	2-17
	Low tire pressure warning light	2-17
	Malfunction Indicator Light (MIL)	2-18
	Master warning light	2-19
	Rear Automatic Emergency Braking (Rear AEB) system OFF warning light	2-19

Other light	Name	Page
	Automatic High Beam (AIB) indicator light	2-19
	Brake Auto Hold indicator light (white)	2-19
	Brake Auto Hold indicator light (green)	2-19
	Exterior light indicator	2-19
	Front fog light indicator light (if so equipped)	2-19
	High beam indicator light	2-20
	Turn signal/hazard indicator lights	2-20

Illustrated table of contents 0-11

WARNING LIGHTS, INDICATOR LIGHTS AND AUDIBLE REMINDERS


Warning/indicator lights (red)	Warning/indicator lights (yellow)	Warning/indicator lights (other)
 Brake warning light (red)	 Active stability control (ASC) warning light	 Automatic High Beam (AHB) indicator light
 Charge warning light	 Active stability control (ASC) off indicator light	 Brake Auto Hold indicator light (white)
 Electric shift control system warning light	 Anti-lock Braking System (ABS) warning light	 Brake Auto Hold indicator light (green)
 Electric parking brake warning light	 Forward Collision Mitigation System (FCM) OFF warning light	 Exterior light indicator
 Engine oil pressure warning light	 Electric power steering warning light	 Front fog light indicator light (if so equipped)
 Front seat belt warning light and chime	 Electric parking brake warning light (yellow)	 High beam indicator light
 Hands OFF warning light (if so equipped)	 Low tire pressure warning light	 Turn signal/hazard indicator lights
 Master warning light	 Malfunction Indicator Light (MIL)	
 SRS airbag warning light	 Master warning light	
	 Rear Automatic Emergency Braking (Rear AEB) system OFF warning light	

 **WARNING**

If the SRS airbag warning light is on, it could mean that the front airbag, side airbag, curtain airbag and/or pretensioner systems will not operate in an accident. To help avoid injury to yourself or others, have your vehicle checked. It is recommended you visit an authorized Mitsubishi Motors dealer for this service.

WARNING/INDICATOR LIGHTS (yellow)

See also "Multi-information display" (P.2-21).


 **Active stability control (ASC) warning light**

When the ignition switch is in the ON position, the Active stability control (ASC) warning light illuminates and then turns off.

The light will blink when the Active stability control (ASC) or the traction control system is operating, thus alerting the driver that the vehicle is nearing its traction limits. The road surface may be slippery.

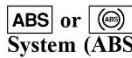
If the ASC warning light illuminates while the ASC is on, this light alerts the driver to the fact that the ASC's fail-safe mode is operating, for example the ASC may not be functioning

properly. Have the system checked. It is recommended you visit an authorized Mitsubishi Motors dealer for this service. If a malfunction occurs in the system, the ASC function will be canceled but the vehicle is still driveable. For additional information, see "Active stability control (ASC)" (P.5-159) of this manual.

 **Active stability control (ASC) off indicator light**

When the ignition switch is in the ON position, the Active stability control (ASC) off indicator light illuminates and then turns off.

The light comes on when the Active stability control (ASC) is turned OFF. This indicates that the ASC and traction control system are not operating.


 **Anti-lock Braking System (ABS) warning light**

When the ignition switch is in the ON position, the Anti-lock Braking System (ABS) warning light illuminates and then turns off. This indicates the ABS is operational.

If the ABS warning light illuminates while the engine is running, or while driving, it may indicate the ABS is not functioning properly. Have the system checked. It is recommended

you visit an authorized Mitsubishi Motors dealer for this service.


If an ABS malfunction occurs, the anti-lock function is turned off. The brake system then operates normally, but without anti-lock assistance. (See "Brake system" (P.5-156).)

 **Forward Collision Mitigation System (FCM) OFF warning light**

When the ignition switch is in the ON position, the FCM system OFF warning light illuminates. After starting the engine, the warning light turns off.

This light illuminates when the FCM system is set to OFF on the multi-information display.

If the light illuminates when the FCM system is ON, it may indicate that the system is unavailable. See "Forward Collision Mitigation System (FCM)" (P.5-126) or "Predictive Forward Collision Warning (PFCW)" (P.5-135).

 **Electric power steering warning light**

When the ignition switch is in the ON position, the electric power steering warning light illuminates. After starting the engine, the electric power steering warning light turns off. This indicates the electric power steering is operational.



High beam indicator light

This light illuminates when the headlight high beam is on and goes out when the low beam is selected.



Turn signal/hazard indicator lights

The light flashes when the turn signal switch lever or hazard switch is turned on.

AUDIBLE REMINDERS

Light reminder chime

The light reminder chime will sound when the driver side door is opened with the headlight switch in the or position, and the ignition switch is in the OFF position.

Turn the light switch off when you leave the vehicle.

Driving aid chimes

An audible alert/chime may be heard if any of the following systems are active (if so equipped):

- Forward Collision Mitigation System (FCM)
- Predictive Forward Collision Warning (PFCW)

- Blind Spot Warning (BSW)
- Active Blind Spot Assist (ABSA)
- Rear Cross Traffic Alert (RCTA)
- Lane Departure Prevention (LDP)
- Lane Departure Warning (LDW)
- MI-PILOT Assist
- Rear Automatic Emergency Braking (Rear AEB)
- Parking sensor system

For additional information, refer to the “Starting and driving” section of this manual.

Door lock warning chime

When the chime sounds, be sure to check both the vehicle and the F.A.S.T.-key. See “Troubleshooting guide” (P.3-13).

Brake pad wear warning

The disc brake pads have audible wear warnings. When a brake pad requires replacement, it will make a high pitched scraping sound when the vehicle is in motion. This scraping sound will first occur only when the brake pedal is depressed. After more wear of the brake pad, the sound will always be heard even if the brake pedal is not depressed. Have the brakes checked as soon as possible if the warning sound is heard.

Parking brake reminder chime

The parking brake reminder chime will sound if the vehicle is driven at more than 2 MPH (4 km/h) with the parking brake applied. Stop the vehicle and release the parking brake.

SETTINGS

The setting mode allows you to change the information displayed in the multi-information display. The following items are available if the vehicle is equipped with them:

- ASC Setting
- Driver Assistance
- Personal Display
- Head-Up Display
- ECO Mode Setting
- TPMS Setting
- Clock
- Vehicle Settings
- Maintenance
- Customize Display
- Units/Language
- Key- Linked Settings
- Factory Reset

ASC Setting

To change the setting, use the scroll dial to select and push it.

- System

This allows you to turn the Active stability control (ASC) ON or OFF. By default the ASC will be turned ON. If the ASC is turned off, the ASC OFF indicator light will illuminate.

NOTE:

The vehicle should be driven with the Active stability control (ASC) ON for most driving conditions. (See “Active stability control (ASC)” (P.5-159).)

Driver Assistance

To change the status, warnings or turn on or off any of the systems/warnings displayed in the “Driver Assistance” menu, use the scroll dial to select and change a menu item. The displayed menu items vary depending on the vehicle’s equipment.

- Steering Assist
- Lane
- Blind Spot
- Emergency Brake
- Traffic Sign
- Speed Adjust by Route
- Spd.Limit Assist
- Parking sensors
- Rear Cross Traffic Alert
- Driver Attention Alert
- Timer Alert
- Low Temp. Alert

Steering Assist:

- Allows user to turn the Lane Keep Assist (LKA) ON/OFF.

(See “MI-PILOT Assist” (P.5-90).)

Lane:

- Warning (LDW)
Allows user to turn the Lane Departure Warning (LDW) system ON/OFF.
- Prevention (LDP)
Allows user to turn the Lane Departure Prevention (LDP) system ON/OFF.
(See “Lane Departure Warning (LDW)” (P.5-33) and “Lane Departure Prevention (LDP)” (P.5-38).)

Blind Spot:

- Warning (BSW)
Allows user to turn the Blind Spot Warning (BSW) system ON/OFF.
- Active Assist (ABSA)
Allows user to turn the Active Blind Spot Assist (ABSA) system ON/OFF.
(See “Blind Spot Warning (BSW)” (P.5-43) and “Active Blind Spot Assist (ABSA)” (P.5-51).)

Emergency Brake:

Models without Rear Automatic Emergency Braking (Rear AEB) :

Allows user to turn the Forward Collision Mitigation System (FCM) system and Predictive Forward Collision Warning (PFCW) system ON/OFF.

Models with Rear Automatic Emergency Braking (Rear AEB) :

Allows user to turn the Forward Collision Mitigation System (FCM) system and Predictive Forward Collision Warning (PFCW) system ON/OFF

- Front
Allows user to turn the Forward Collision Mitigation System (FCM) system and Predictive Forward Collision Warning (PFCW) system ON/OFF
- Rear
Allows user to turn the Rear Automatic Emergency Braking (Rear AEB) system ON/OFF.

(See “Forward Collision Mitigation System (FCM)” (P.5-126), “Predictive Forward Collision Warning (PFCW)” (P.5-135) and “Rear Automatic Emergency Braking (Rear AEB)” (P.5-146).)

Traffic Sign:

This menu allows the customer to turn the Traffic Sign Recognition ON/OFF. (See “Traffic Sign Recognition (TSR)” (P.5-30).)

Speed Adjust by Route:

Allows user to turn the Speed Adjust by Route (MI-PILOT Assist with Navi-link) function ON/OFF. (See “Speed Adjust by Route - a feature of

MI-PILOT Assist with Navi-link” (P.5-110).)


Spd. Limit Assist:


Allows user to customize the Speed Limit Assist (MI-PILOT Assist with Navi-link) options.

- OFF
- Manual
- Auto

(See “Speed Limit Assist - a feature of MI-PILOT Assist with Navi-link” (P.5-108).)

Parking sensors:

To change the status or turn on or off any of the systems displayed in the “Parking sensors” menu, use the scroll dial  to select and change a menu item:

- Moving Object
Push the scroll dial  to turn the Moving Object Detection (MOD) ON/OFF.
- Auto Show Sonar
Allows user to turn the parking sensor system display ON/OFF.
- Front
Allows user to turn the front sensor ON/OFF.
- Rear
Allows user to turn the rear sensor ON/OFF.
- Distance
Allows user to select the sensor range

(Long, Medium or Short).

- Volume
Allows user to select sensor volume (High, Medium or Low).
(See “Moving Object Detection (MOD)” (P.4-23), “Parking sensor system” (P.5-164) and “Rear parking sensor system” (P.5-169).)

Rear Cross Traffic Alert:

Allows user to turn the Rear Cross Traffic Alert system ON/OFF. (See “Rear Cross Traffic Alert (RCTA)” (P.5-62).)

Driver Attention Alert:

Allows the customer to turn the Driver Attention Alert (DAA) on or off. (See “Driver Attention Alert (DAA)” (P.5-143).)

Timer Alert:

Allows user to adjust the Timer Alert or reset.

- Current Time/Set Time
- Reset

Low Temp. Alert:

Allows user to turn the Low Temperature Alert function ON/OFF.

26. Time for a Break? indicator

This indicator appears when the set “Time for a Break?” indicator activates. You can set the time for up to 6 hours.

27. Take a Break? indicator

This indicator appears when the Driver Attention Alert (DAA) system detects driver fatigue or that driver attention is decreasing. (See “Driver Attention Alert (DAA)” (P.5-143).)

28. Chassis Control System Error: See Owner’s Manual warning

This warning appears if the chassis control module detects an error in the chassis control system. Have the system checked. It is recommended that you visit an authorized Mitsubishi Motors dealer for this service. (See “Chassis control” (P.5-160).)

29. Malfunction warning

This warning appears when the following systems malfunction if the vehicle is equipped with them.

- Active Blind Spot Assist (ABSA)
- Rear Cross Traffic Alert (RCTA)
- Traffic Sign Recognition (TSR)
- Forward Collision Mitigation System (FCM)

- Predictive Forward Collision Warning (PFCW)

For more details, see “Active Blind Spot Assist (ABSA)” (P.5-51), “Rear Cross Traffic Alert (RCTA)” (P.5-62), “Traffic Sign Recognition (TSR)” (P.5-30), “Forward Collision Mitigation System (FCM)” (P.5-126) or “Predictive Forward Collision Warning (PFCW)” (P.5-135).

30. Unavailable High Cabin Temperature warning

This warning appears if the interior temperature of the vehicle has reached such a high temperature that the sensor for the Active Blind Spot Assist (ABSA), Lane Departure Warning (LDW) (if so equipped), Lane Departure Prevention (LDP) (if so equipped) or Traffic Sign Recognition (TSR) (if so equipped) system can no longer function reliably. Once the interior temperature has reached normal levels, the warning should disappear.

If the warning continues to display, have the system checked. It is recommended that you visit an authorized Mitsubishi Motors dealer for this service.

For additional information, refer to “Active Blind Spot Assist (ABSA)” (P.5-51), “Lane Departure Warning (LDW)” (P.5-33), “Lane Departure Prevention (LDP)” (P.5-38) or “Traffic Sign Recognition (TSR)” (P.5-30).

31. Not Available: Poor Road Conditions warning

This message appears when Adaptive Cruise Control System (ACC) or Active Blind Spot Assist (ABSA) system becomes unavailable because the road is slippery. For additional information, refer to “Adaptive Cruise Control System (ACC)” (P.5-71), “Adaptive Cruise Control System (ACC) with Stop & Go” (P.5-103) or “Active Blind Spot Assist (ABSA)” (P.5-51).

32. Currently not available warning

This message appears when the Active Blind Spot Assist (ABSA), Lane Departure Prevention (LDP) system or the Adaptive Cruise Control System (ACC) system becomes unavailable because the ASC is turned off. For additional information, refer to “Active Blind Spot Assist (ABSA)” (P.5-51), “Lane Departure Prevention (LDP)” (P.5-38), “Adaptive Cruise Control System (ACC)” (P.5-71) or “Adaptive Cruise Control System (ACC) with Stop & Go” (P.5-103).

33. Forward Driving Aids Temporarily Disabled Front Sensor Blocked See Owner's Manual warning

If the front radar sensor area is covered with dirt or obstructed, making it impossible to detect a vehicle ahead, Forward Collision Mitigation System (FCM), Predictive Forward Collision Warning (PFCW), Adaptive Cruise Control (ACC) or MI-PILOT Assist system is automatically turned off if the vehicle is equipped with them. The warning message will appear in the multi-information display. If the warning message appears, park the vehicle in a safe location and turn the engine off.

Check to see if the front radar sensor area is blocked. If the front radar sensor area is blocked, remove the blocking material. Restart the engine. If the warning message continues to appear, have the Forward Collision Mitigation System (FCM), Predictive Forward Collision Warning (PFCW), Adaptive Cruise Control (ACC) or MI-PILOT Assist system checked. It is recommended that you visit an authorized Mitsubishi Motors dealer for this service.

For more details, see "Forward Collision Mitigation System (FCM)" (P.5-126), "Predictive Forward Collision Warning (PFCW)" (P.5-135), "Adaptive Cruise Control System (ACC)" (P.5-71) or "MI-PILOT Assist" (P.5-90).

34. Unavailable Side Radar Obstruction warning

This warning appears when the Blind Spot Warning (BSW), Active Blind Spot Assist (ABSA) or Rear Cross Traffic Alert (RCTA) system becomes unavailable because a radar blockage is detected. (See "Blind Spot Warning (BSW)" (P.5-43), "Active Blind Spot Assist (ABSA)" (P.5-51) or "Rear Cross Traffic Alert (RCTA)" (P.5-62).)

35. Press Brake Pedal warning

This indicator appears in the following situations:

- The driver tries to release the electric parking brake manually without depressing the brake pedal.
- The vehicle is stopped on a steep hill and there is a possibility of moving backward, even if the electric parking brake is applied.
- This warning appears if the vehicle moves while the Brake Auto Hold is activated.

36. Lane Keep Assist (LKA) alert

This message may appear when the Lane Keep Assist (LKA) system is engaged.

It will be displayed under the following condition:

- When not holding the steering wheel or when there is no steering wheel operation.

Hold on the steering wheel immediately. When the steering operation is detected, the warning turns off and the Lane Keep Assist (LKA) function is automatically restored. For additional information, refer to "MI-PILOT Assist" (P.5-90).

37. Rear Seat Alert is Activated

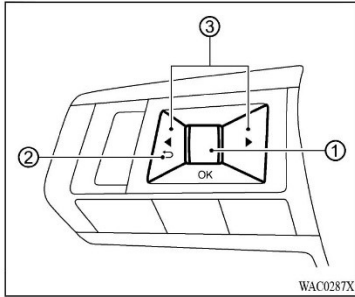
When the system is enabled, this message appears when the Rear Seat Alert system is active and can remind the driver to check the back seat.

- Using the steering switch, a driver can select "Dismiss Message" to clear the display for a period of time. If no selection is made, this message automatically turns off after a period of time.
- Using the steering switch, a driver can select "Disable Alert" to disable the horn alert for the remainder of the current trip.

For additional information, see "Rear Seat Alert" (P.2-62).

WARNING

Selecting "Dismiss Message" during a stop within a trip temporarily dismisses the message for that stop without turning the system off.



TRIP COMPUTER

Switches for the trip computer are located on the left side of the steering wheel.

- ① Scroll dial button - navigate through the items and change or select an item in multi-information display
- ② ↩ - go back to the previous menu
- ③ ◀ ▶ - change from one display screen to the next (i.e. Home, Fuel economy, S-AWC)

1. Driver assistance

The driver assistance mode shows the operating condition for the following systems if the vehicle is equipped with them.

- Lane Departure Warning (LDW)
- Lane Departure Prevention (LDP)
- Blind Spot Warning (BSW)
- Active Blind Spot Assist (ABSA)
- Forward Collision Mitigation System (FCM)
- Predictive Forward Collision Warning (PFCW)

For more details, see “Lane Departure Warning (LDW)” (P.5-33), “Lane Departure Prevention (LDP)” (P.5-38), “Blind Spot Warning (BSW)” (P.5-43), “Active Blind Spot Assist (ABSA)” (P.5-51), “Forward Collision Mitigation System (FCM)” (P.5-126) and “Predictive Forward Collision Warning (PFCW)” (P.5-135).

2. Speed and Average speed (model with type 1 display)

The Speed and Average speed mode shows the current vehicle speed and the average vehicle speed since the last reset. The Speed and Average speed mode have three modes of operation. You can push the scroll dial to switch between Manual reset1, Manual reset2 or Auto Refuel.

Manual reset1 can be reset only manually by using the scroll dial.

Manual reset2 will be reset manually by using the scroll dial, or automatically reset each time the ignition is placed in the OFF position.

Auto Refuel will be reset automatically each time when refueling.

3. Drive Computer

Average fuel consumption:

The average fuel consumption shows the average fuel consumption since the last reset.

Average speed:

The average speed shows the average vehicle speed since the last reset.

Trip odometer:

The trip odometer shows the total distance the vehicle has been driven since the last reset.

Elapsed time:

The elapsed time shows the time since the last reset.

The Drive Computer mode have three modes of operation. You can push the scroll dial to switch between Manual reset1, Manual reset2 or Auto Refuel.

Manual reset1 can be reset only manually by using the scroll dial.

- Reset Settings

NOTE:

Emergency information may display even if the HUD system is turned off.

For more details, refer to the separate Smartphone-link Display Audio (SDA) Owner's Manual.

This product includes the following software.

- (1) Panasonic Corporation or software developed for Panasonic Corporation
- (2) Third-party software licensed to Panasonic Corporation
- (3) Open source software

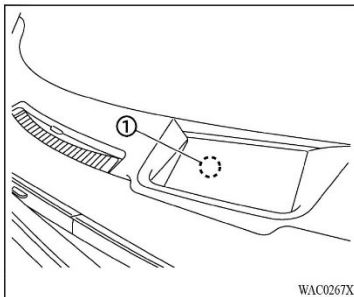
Regarding (3) Open source software, it includes open source software (OSS), including various software to which license information applies.

Refer to the license web site at: <http://car.panasonic.jp/oss/i021ln39>

Display brightness

The brightness of the display may be controlled in the multi-information display. The brightness will also be adjusted automatically according to the exterior ambient lighting brightness.

For more details, refer to the separate Smartphone-link Display Audio (SDA) Owner's Manual.



NOTE:

- **The HUD has a built-in sensor ① that controls the brightness of the displayed image. If you block the sensor with an object, the display will darken, making it difficult to see.**
- **Do not expose the HUD sensor to excessive light. This could cause failure or malfunction.**

DRIVER ASSISTANCE/NAVIGATION/TRAFFIC SIGN/AUDIO/TEL/SMS LINKING

The HUD will display driver assistance and navigation information (if so equipped).

The driver assistance display will display warning situations for the following systems if the vehicle is equipped with them:

- Forward Collision Mitigation System (FCM)
- Predictive Forward Collision Warning system
- Cruise control
- Adaptive Cruise Control System (ACC)
- MI-PILOT Assist
- Lane Departure Warning (LDW) system
- Lane Departure Prevention

The Navigation System linking display will display the following items (if so equipped):

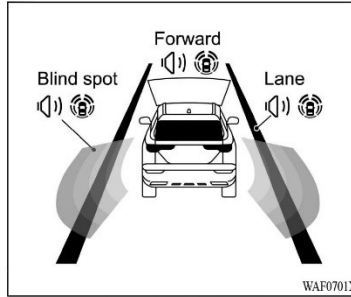
- Intersection names
- Arrows indicating turning direction
- Distance to the next intersection
- Recommended lane indicator

For the navigation system, refer to the separate Smartphone-link Display Audio (SDA) Owner's Manual.

The Traffic Signs Recognition System linking

OPERATING MI-PILOT ASSIST

1. Push the MI-PILOT Assist switch ④. This turns on the MI-PILOT Assist system.
 - The MI-PILOT Assist status indicator ⑤ illuminates in white.
 - A screen is displayed for a period of time that indicates the status of the Driving Aid functions.



Example (all enabled)

When the Driving Aids are enabled:

Zone	Driving Aid	Display
Forward	Forward Collision Mitigation System (FCM)	Outline
	Predictive Forward Collision Warning (PFCW)	
Lane	Lane Departure Warning (LDW)	Shaded
	Lane Departure Prevention (LDP)	Shaded

Blind Spot	Blind Spot Warning (BSW)	Outline
	Active Blind Spot Assist (ABSA)	Shaded

- When any of the “Warning” systems are enabled, the “(⚠)” mark is shown in each zone.
- When any of the “Intervention” systems are enabled, the “(Ⓞ)” mark is shown in each zone.
- When no system is enabled, “OFF” is shown in each zone.

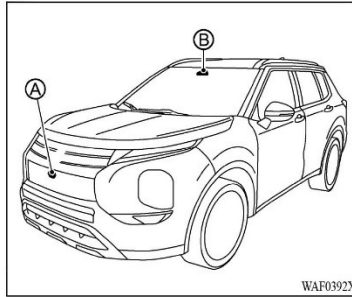
FORWARD COLLISION MITIGATION SYSTEM (FCM)


WARNING


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

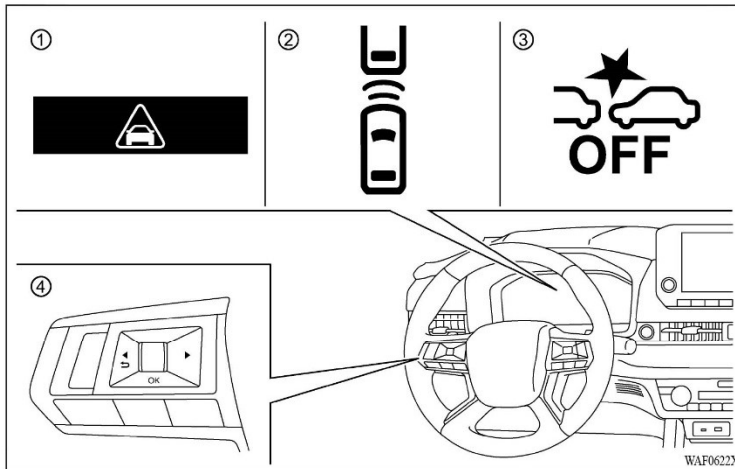
- The FCM system is a supplemental aid to the driver. It is not a replacement for the driver's attention to traffic conditions or responsibility to drive safely. It cannot prevent accidents due to carelessness or dangerous driving techniques.
- The FCM system does not function in all driving, traffic, weather and road conditions.

The FCM system can assist the driver when there is a risk of a forward collision with the vehicle ahead in the traveling lane or with a pedestrian.



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

For pedestrians, the FCM system uses a camera  installed behind the windshield in addition to the radar sensor.



- ① FCM emergency warning indicator
- ② Vehicle ahead detection indicator (on the multi-information display)
- ③ FCM system OFF warning light (on the meter panel)
- ④ Steering wheel remote control switches (left side)

FCM SYSTEM OPERATION

The FCM system will function when your vehicle is driven at speeds above approximately 3 MPH (5 km/h).

For the pedestrian detection function, the FCM system operates at speeds between 6 – 37 MPH (10 – 60 km/h).

If a risk of a forward collision is detected, the FCM system will firstly provide the warning to the driver by flashing the vehicle ahead detection indicator (yellow) in the multi-information display and providing an audible alert. In addition, the system applies partial braking.

If the driver applies the brakes quickly and forcefully after the warning, and the FCM system detects that there is still the possibility of a forward collision, the system will automatically increase the braking force.

If the driver does not take action, the FCM system provide the warning to the driver by flashing FCM emergency warning indicator (red) in the multi-information display and providing an audible alert. Then the system applies partial braking.

If the risk of a collision becomes imminent, the FCM system applies harder braking automatically.

While the FCM system is operating, you may hear the sound of brake operation. This is normal and indicates that the FCM system is operating properly.

NOTE:

The vehicle's stop lights come on when braking is performed by the FCM system.

Depending on vehicle speed and distance to the vehicle or pedestrian ahead, as well as driving

and roadway conditions, the system may help the driver avoid a forward collision or may help mitigate the consequences of a collision should one be unavoidable.

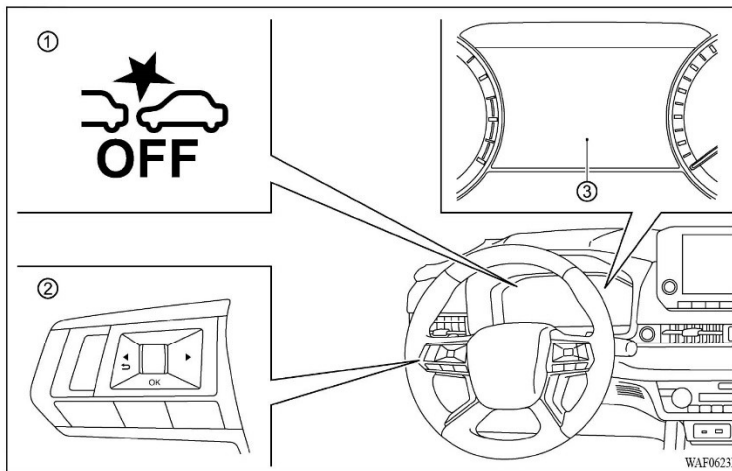
If the driver is handling the steering wheel, accelerating or braking, the FCM system will function later or will not function.

The automatic braking will cease under the following conditions:

- When the steering wheel is turned as far as necessary to avoid a collision.
- When the accelerator pedal is depressed.
- When there is no longer a vehicle or pedestrian detected ahead.

If the FCM system has stopped the vehicle, the vehicle will remain at a standstill for approximately 2 seconds before the brakes are released.

When the brake pedal is depressed while the brake is applied by the system, you may feel the pedal effort is changed and may hear a sound and vibration noise. This is normal and does not indicate a malfunction. In addition, the braking force can be increased by adding the pedal effort.



- ① FCM system OFF warning light (on the meter panel)
- ② Steering wheel remote control switches (left side)
- ③ Multi-information display


TURNING THE FCM SYSTEM ON/OFF

Perform the following steps to turn the FCM system on or off.

1. Press the ◀ ▶ button until “Settings” appears in the multi-information display ③

and then push the scroll dial. Use the scroll dial to select "Driver Assistance." Then push the scroll dial.

2. Select "Emergency Brake" and push the scroll dial.
3. Select "Front" and use the scroll dial to turn the system on or off.

When the FCM system is turned off, the FCM system OFF warning light illuminates .

NOTE:

- The FCM system will be automatically turned ON when the engine is restarted.
- The Predictive Forward Collision Warning (PFCW) system is integrated into the FCM system. There is not a separate selection in the display for the PFCW system. When the PFCW system is also turned off.

FCM SYSTEM LIMITATIONS

WARNING

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

- The FCM system cannot detect all vehicles or pedestrians under all conditions.

- The FCM system does not detect the following:

- Pedestrians that are small (for example, children), in a sitting position, operating toys/skateboards, on scooters or in wheelchairs, or not in an upright standing or walking position.

- Animals of any size.

- Obstacles (for example, cargo or debris) on the roadway or roadside.

- Oncoming or crossing vehicles.

- Vehicles where the tires are difficult to see or the shape of the rear of the vehicle is unclear or obstructed.

- Parked vehicles.

- The FCM system has some performance limitations.

- If a stationary vehicle is in the vehicle's path, the FCM system will not function when the vehicle is driven at speeds over approximately 50 MPH (80 km/h).

- For pedestrian detection, the FCM system will not function

when the vehicle is driven at speeds over approximately 37 MPH (60 km/h) or below approximately 6 MPH (10 km/h).

- The FCM system may not function for pedestrians in darkness or in tunnels, even if there is street lighting in the area.

- For pedestrians, the FCM system will not issue the first warning.

- The FCM system may not function if the vehicle ahead is narrow (for example a motorcycle).

- The FCM system may not function if speed difference between the two vehicles is too small.

- The FCM system may not function properly or detect a vehicle or pedestrian ahead in the following conditions:

- Poor visibility (conditions such as rain, snow, fog, dust storms, sandstorms, and road spray from other vehicles)

- Driving on a steep downhill slope or roads with sharp curves.

- Driving on a bumpy road surface, such as an uneven dirt road.

- If dirt, ice, snow, fog or other material is covering the radar sensor area or camera area of

the windshield.

- Interference by other radar sources.
- Strong light (for example, sunlight or high beams from oncoming vehicles) enters the front camera. Strong light causes the area around the pedestrian to be cast in a shadow, making it difficult to see.
- A sudden change in brightness occurs. (For example, when the vehicle enters or exits a tunnel or a shaded area or lightning flashes.)
- In dark or dimly lit conditions, such as at night or in tunnels, including cases where your vehicle's headlights are off or dim, or the tail lights of the vehicle ahead are off.
- When the direction of the camera is misaligned.
- When your vehicle's position or movement is changed quickly or significantly (for example, lane change, turning vehicle, abrupt steering, sudden acceleration or

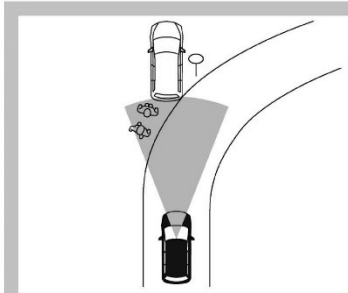
deceleration).

- When your vehicle or the vehicle or pedestrian ahead moves quickly or significantly such that the system cannot detect and react in time (for example, pedestrian moving quickly toward the vehicle at close range, vehicle cutting in, changing lanes, making a turn, steering abruptly, sudden acceleration or deceleration).
- When the vehicle or pedestrian is offset from the vehicle's forward path.
- If the speed difference between the two vehicles is small.
- The poor contrast of a person to the background, such as having clothing color or pattern which is similar to the background.
- The pedestrian's profile is partially obscured or unidentifiable due to the pedestrian transporting cargo, wearing bulky or very loose-fitting clothing or accessories.
- For approximately 15 seconds after starting the engine

- If the vehicle ahead has a unique or unusual shape, extremely low or high clearance heights, or unusual cargo loading or is narrow (for example, a motorcycle).
- When the vehicle or pedestrian is located near a traffic sign, a reflective area (for example, water on road), or is in a shadow.
- When multiple pedestrians are grouped together.
- When the view of the pedestrian is obscured by a vehicle or other object.
- While towing a trailer or other vehicle.
- The system performance may degrade in the following conditions:
 - The vehicle is driven on a slippery road.
 - The vehicle is driven on a slope.
 - Excessively heavy baggage is loaded in the rear seat or the cargo area of your vehicle.
- The system is designed to automatically check the sensor (radar and camera)'s functionality, within certain limitations. The system may not detect blockage of

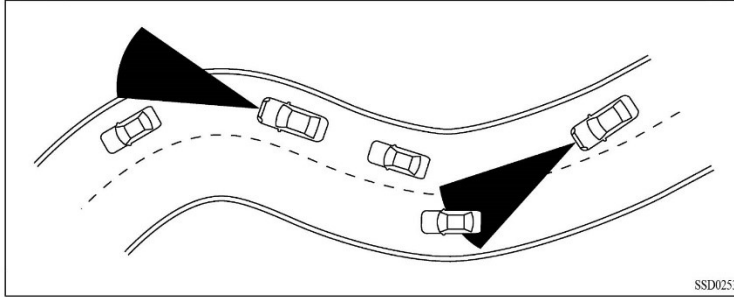
sensor areas covered by ice, snow or stickers, for example. In these cases, the system may not be able to warn the driver properly. Be sure that you check, clean and clear sensor areas regularly.

- In some road and traffic conditions, the FCM system may unexpectedly apply partial braking. When acceleration is necessary, depress the accelerator pedal to override the system.
- The FCM system may operate when a pattern, object, shadow or lights are detected that are similar to the outline of vehicles or pedestrians, or if they are the same size and position as a vehicle or motorcycle's tail lights.
- The system may keep operating when the vehicle ahead is turning right or left.
- The system may operate when your vehicle is approaching and passing a vehicle ahead.
- Depending on the road shape (curved road, entrance and exit of the curve, winding road, lane regulation, under construction, etc.), the system may operate temporarily for the oncoming vehicle in front of your vehicle.
- The FCM system may react to:
 - objects on the roadside (traffic sign, guardrail, pedestrian, cyclist, motorcycle, vehicle, etc.)



- objects above road (low bridge, traffic sign, etc.)
- objects on the road surface (railroad track, grate, steel plate, etc.)
- objects in the parking garage (beam, pillar, etc.)
- pedestrians, cyclists or motorcycles approaching the traveling lane
- vehicles, pedestrians, cyclists, motorcycles or objects in adjacent lane or close to the vehicle
- oncoming pedestrians

- cyclists
- objects on the road (such as trees)
- Braking distances increase on slippery surfaces.
- Do not use the FCM system if you are towing a trailer. The system may not detect a vehicle ahead.
- Do not use the FCM system when driving with a tire that is not within normal tire conditions (for example, tire wear, low tire pressure, installation of tire chains, non-standard wheels).
- Excessive noise will interfere with the warning chime sound, and the chime may not be heard.



When driving on some roads, such as winding, hilly, curved, narrow roads, or roads which are under construction or on a slope, the sensor may detect vehicles in a different lane, or may temporarily not detect a vehicle traveling ahead. This may cause the system to work inappropriately.

The detection of vehicles may also be affected by vehicle operation (steering maneuver or traveling position in the lane, etc.) or vehicle condition. **If this occurs, the system may warn you by blinking the system indicator and sounding the chime unexpectedly. You will have to manually control the proper distance away from the vehicle traveling ahead.**

SYSTEM TEMPORARILY UN-AVAILABLE

Condition A

If the following conditions, the FCM system OFF warning light will blink (no message appears in the multi-information display).

- Strong light is shining from the front of the vehicle.
- The cabin temperature is over approximately 104°F (40°C) in direct sunlight.
- The camera area of the windshield is misted or frozen.

- The camera unit detects its misalignment condition.
- The radar sensor picks up interference from another radar source.

Action to take:

When the above conditions no longer exist, the FCM system will resume automatically.

NOTE:

When the inside of the windshield on camera area is misted or frozen, it will take a period of time to remove it after air conditioner turns on. If dirt appears on this area, it is recommended you visit an authorized Mitsubishi Motors dealer.

Condition B

In the following condition, the FCM system OFF warning light will flash and the "Forward Driving Aids temporarily disabled Front Sensor blocked" warning message will appear in the multi-information display.

- The sensor area of the front of the vehicle is covered with dirt or is obstructed

Action to take:

If the warning light flashes, stop the vehicle in a safe place and turn the engine off. Clean the radar cover on the front of the vehicle with a soft cloth, and restart the engine. If the warning message continues to illuminate, check that the cover of the sensor is not covered by dirt, snow

or ice. If the warning light is still illuminated, have the FCM system checked. It is recommended that you visit an authorized Mitsubishi Motors dealer for this service.

- When driving on roads with limited road structures or buildings (for example, long bridges, deserts, snow fields, driving next to long walls).

Action to take:

When the above conditions no longer exist, the FCM system will resume automatically.

Condition C

When the Active stability control (ASC) is OFF, the FCM brake will not operate. In this case only visible and audible warning operates. The FCM system warning light (orange) will illuminate.

Action to take:

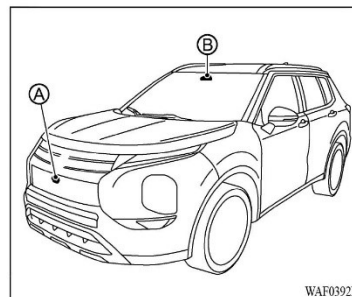
When the ASC is ON, the FCM system will resume automatically.

SYSTEM MALFUNCTION

If the FCM system malfunctions, it will be turned off automatically, a chime will sound, the FCM system warning light will (orange) will illuminate and the warning message "Malfunction" will appear in the multi-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 FCM system checked. It is recommended that you visit an authorized Mitsubishi Motors dealer for this service.



SYSTEM MAINTENANCE

The radar sensor ④ is located on the front of the vehicle. The camera ⑤ is located on the upper side of the windshield.

To keep the FCM system operating properly, be sure to observe the following:

- Always keep the sensor area on the front of the vehicle and windshield clean.
- Do not strike or damage the areas around the sensors (ex. vehicle front area, windshield).
- Do not cover or attach stickers or similar objects on the front of the vehicle near the sensor area. This could cause failure or malfunction.

- Do not attach metallic objects near the radar sensor area (brush guard, etc.). This could cause failure or malfunction.
- Do not place reflective materials, such as white paper or a mirror, on the instrument panel. The reflection of sunlight may adversely affect the camera unit's detection capability.
- Do not alter, remove or paint the front of the vehicle near the sensor area. Before customizing or restoring the sensor area, it is recommended that you visit an authorized Mitsubishi Motors dealer.

Radio frequency statement

For USA

Type approval number:

FCC ID: NF3-FR5CPEC

User Manual statement according to §15.19:

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

User Manual statement according to §15.21:

Changes or modifications made to this equipment not expressly approved by Robert BOSCH GmbH may void the FCC authorization to operate this equipment.

User Manual statement according to §15.105:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RF Exposure Information according to 2.1091/2.1093/OET bulletin 65:

Radiofrequency radiation exposure information:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body.

The transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

For Canada

Type approval number:

IC: 3387A-FR5CPEC

Legal warning for RF equipment:

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

APPENDIX C

Run Log

Subject Vehicle: **2022 Mitsubishi Outlander SE 2.5S-AWC** Test Date: **1/3/2022 - 1/4/2022**

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	2.68	1.63	0.58	Pass	
2		Y	2.72	2.66	0.62	Pass	
3		Y	2.66	2.63	0.56	Pass	
4		Y	2.66	2.61	0.56	Pass	
5		Y	2.68	2.65	0.58	Pass	
6		Y	2.66	2.63	0.56	Pass	
7		Y	2.64	2.59	0.54	Pass	
18	Decelerating POV	Y	2.50	2.47	0.10	Pass	
19		Y	2.60	2.55	0.20	Pass	
20		Y	2.61	2.52	0.21	Pass	
21		N					Lateral Offset
22		Y	2.59	2.52	0.19	Pass	
23		N					Lateral Offset
24		N					POV Speed
25		Y	2.60	2.57	0.20	Pass	
26		N					Lateral Offset, POV Brakes
27		N					Lateral Offset, POV Brakes
28		Y	2.62	2.56	0.22	Pass	
29		Y	2.61	2.53	0.21	Pass	

Run	Test Type	Valid Run?	TTCW Sound (sec)	TTCW Light (sec)	TTCW Margin (sec)	Pass/Fail	Notes
8	Slower POV	Y	2.64	2.62	0.64	Pass	
9		N					Lateral Offset
10		Y	2.70	2.65	0.70	Pass	
11		N					Lateral Offset
12		Y	2.66	2.59	0.66	Pass	
13		Y	2.61	2.54	0.61	Pass	
14		N					Lateral Offset
15		Y	2.60	2.53	0.60	Pass	
16		Y	2.61	2.56	0.61	Pass	
17		Y	2.62	2.55	0.62	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
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.

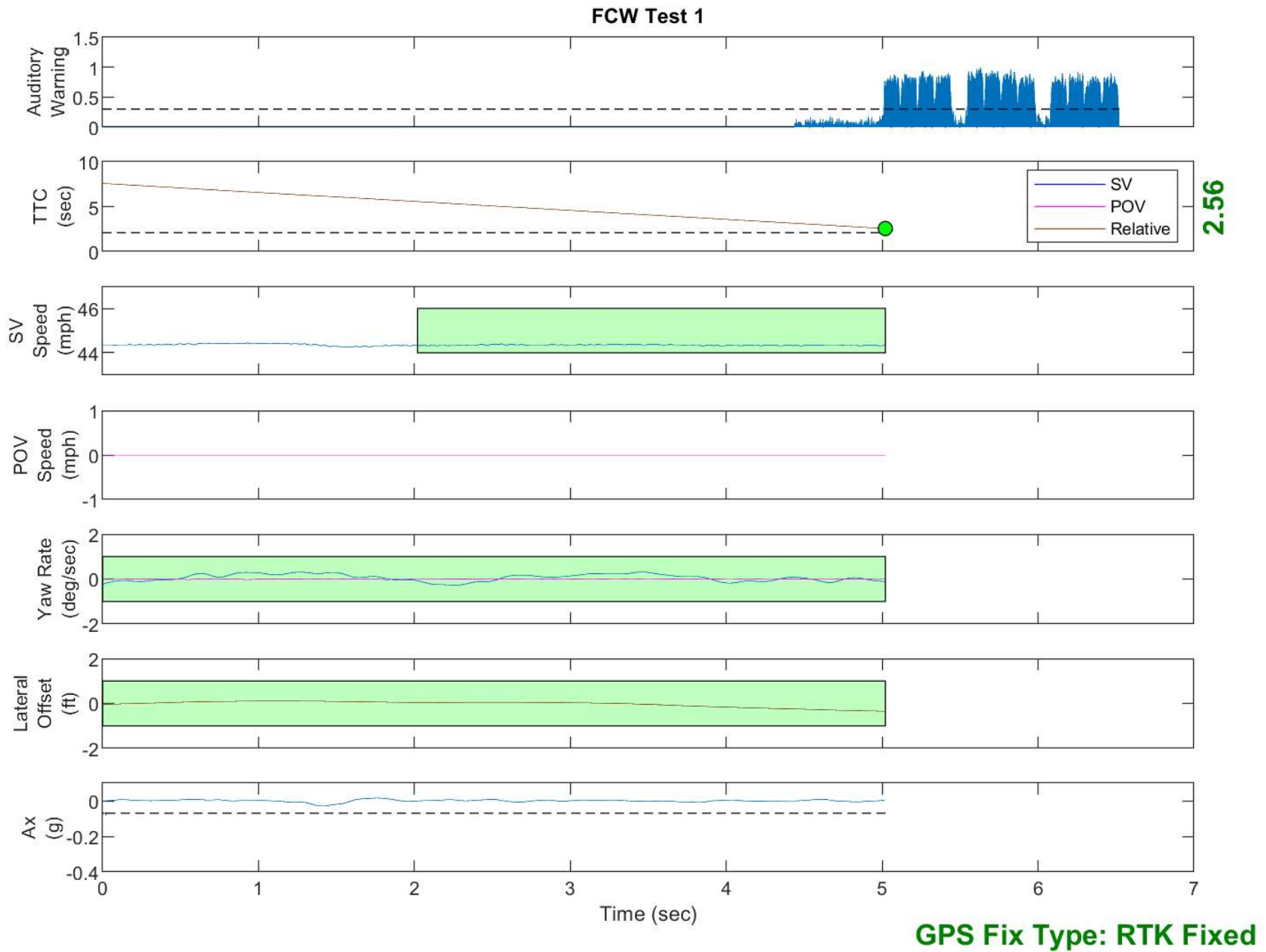


Figure D1. Example Time History for Test Type 1, Passing

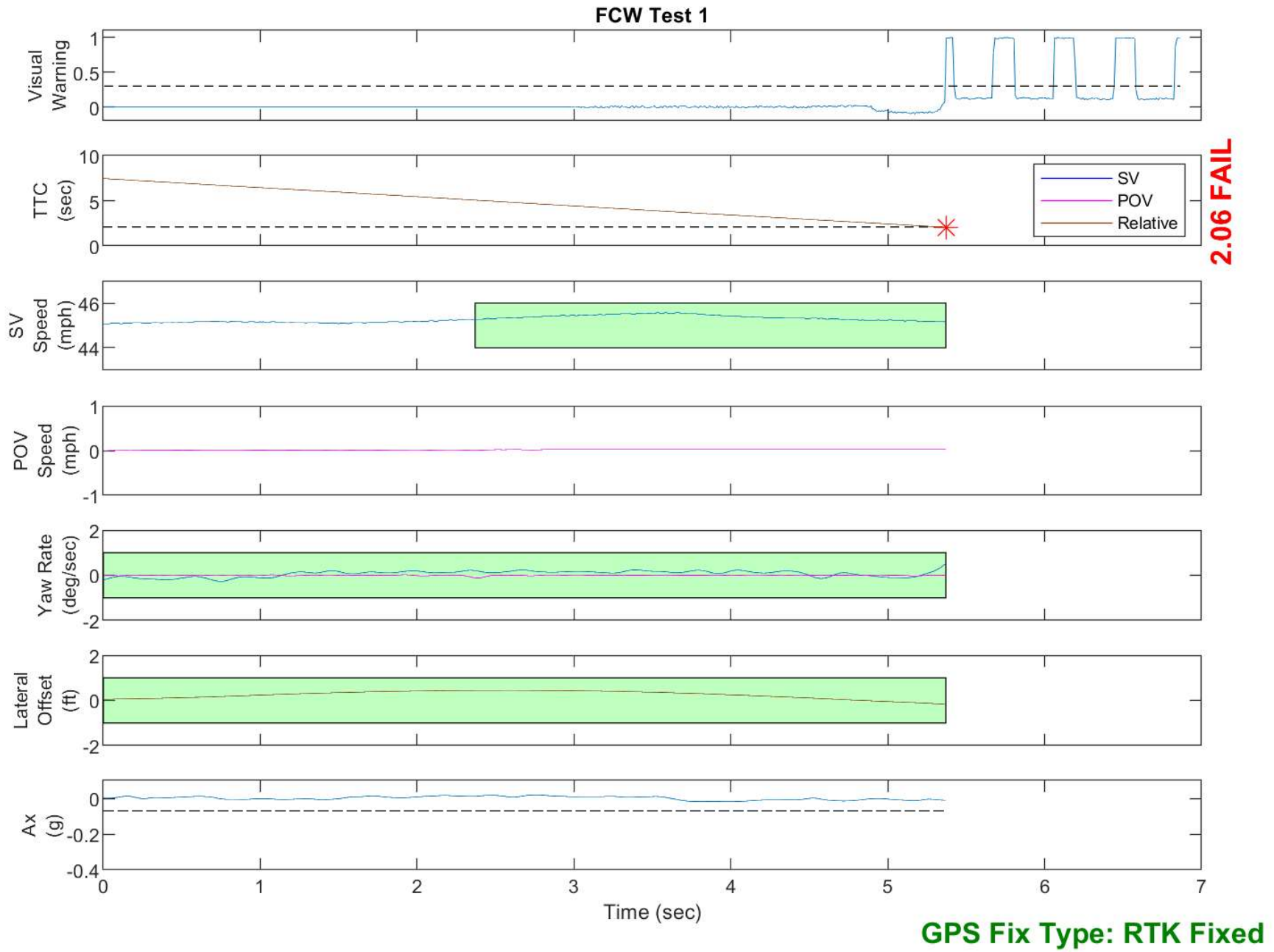
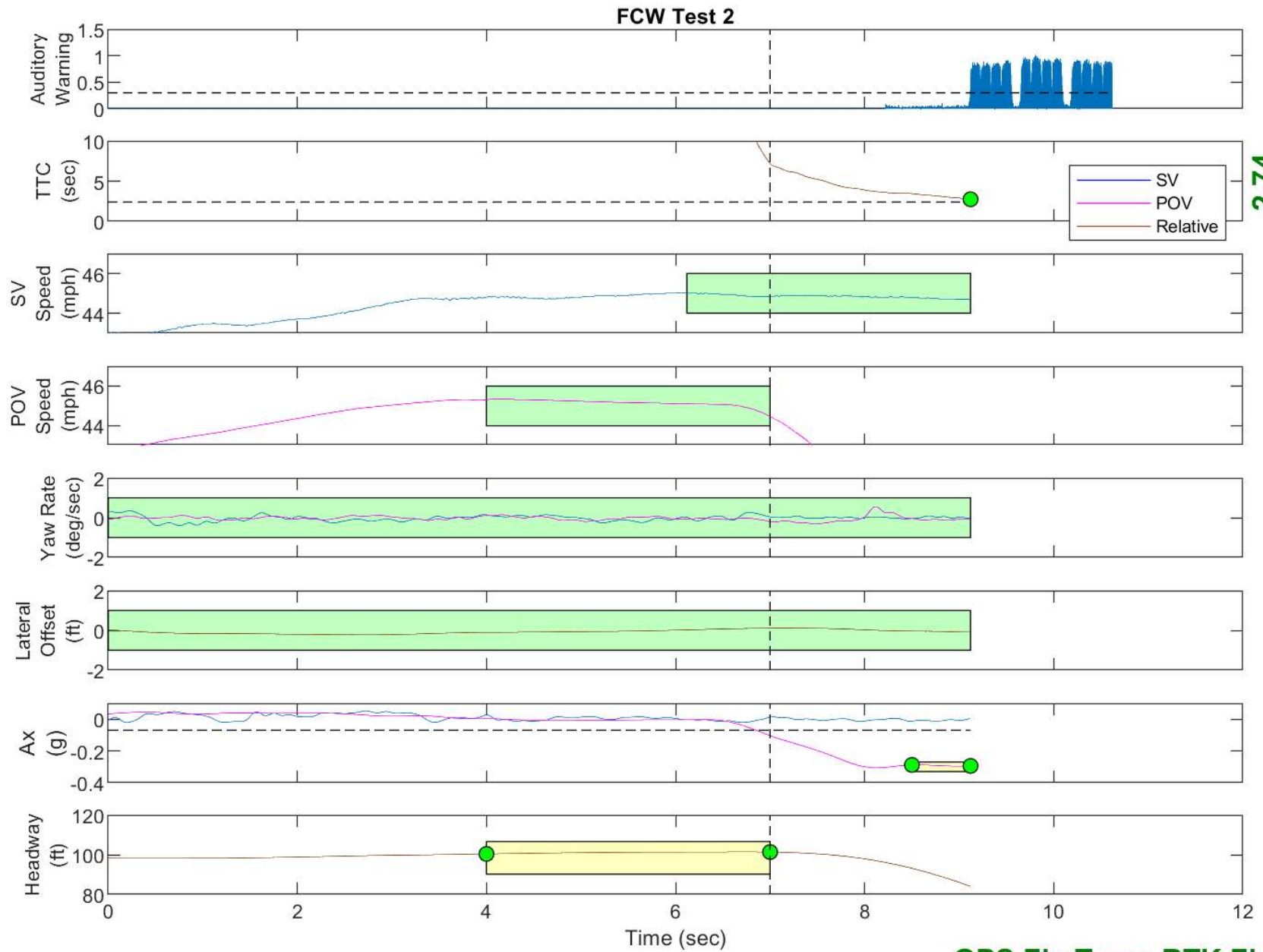


Figure D2. Example Time History for Test Type 1, Failing



2.74

GPS Fix Type: RTK Fixed

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

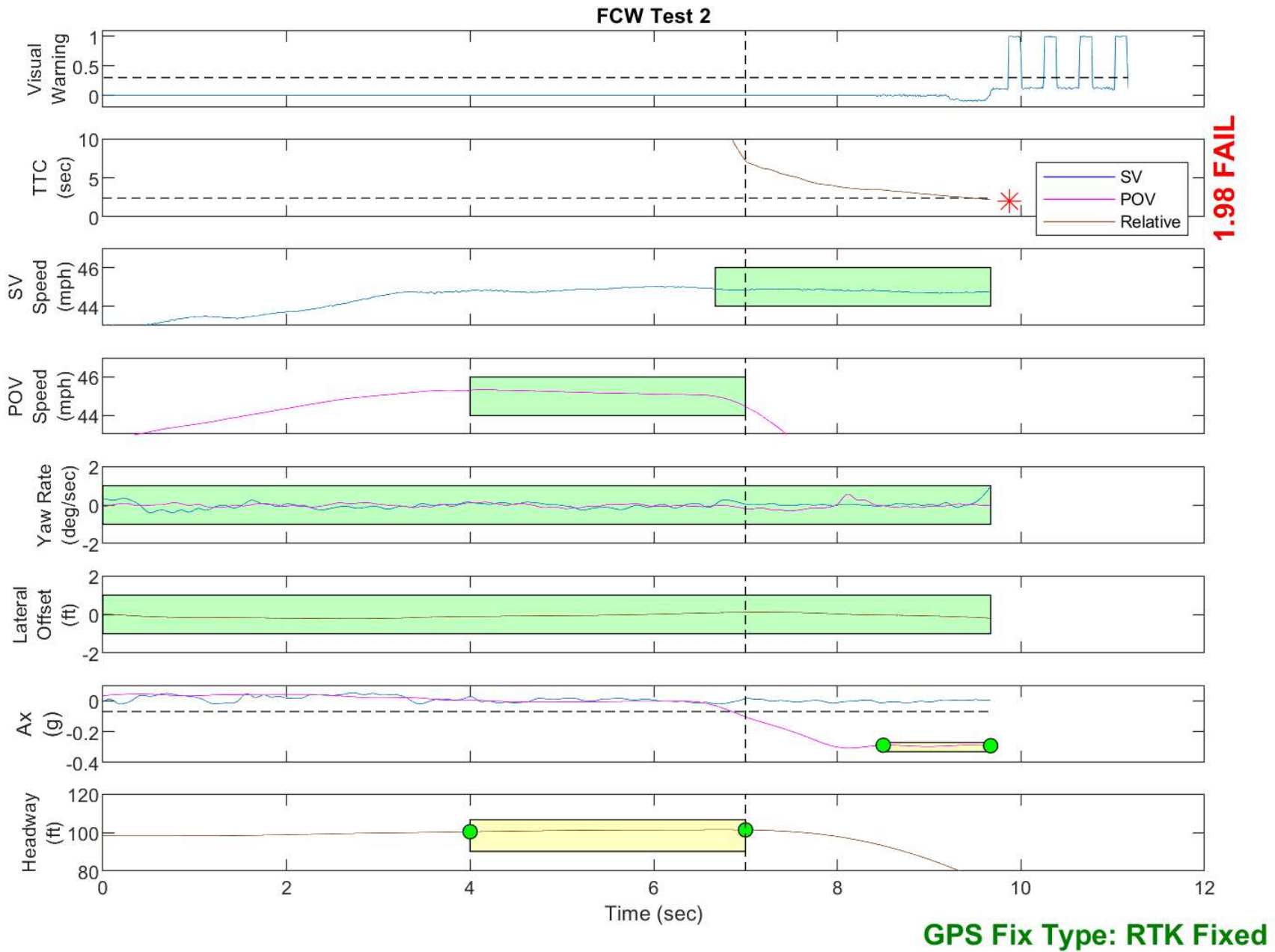


Figure D4. Example Time History for Test Type 2, Failing

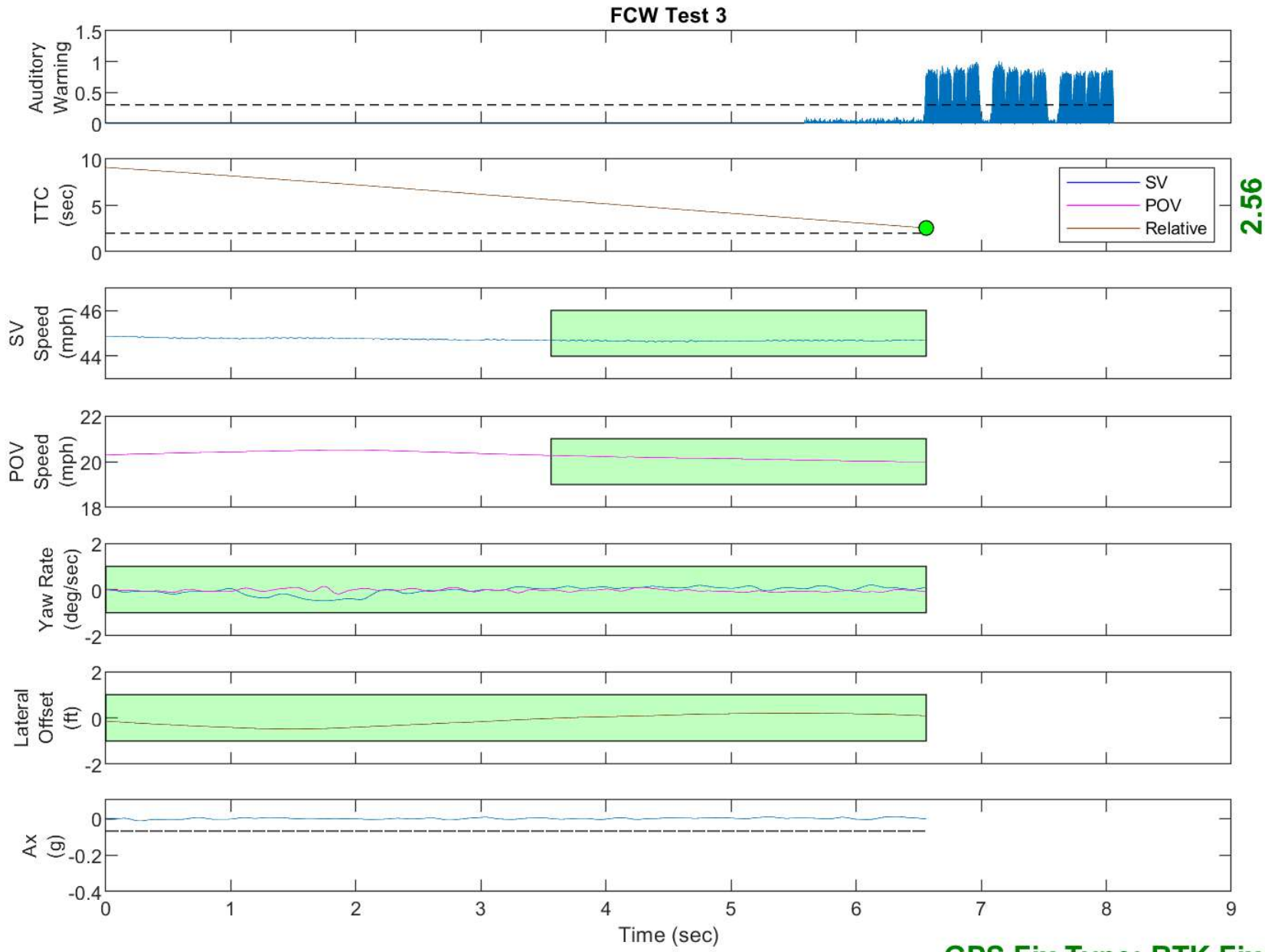


Figure D5. Example Time History for Test Type 3, Passing

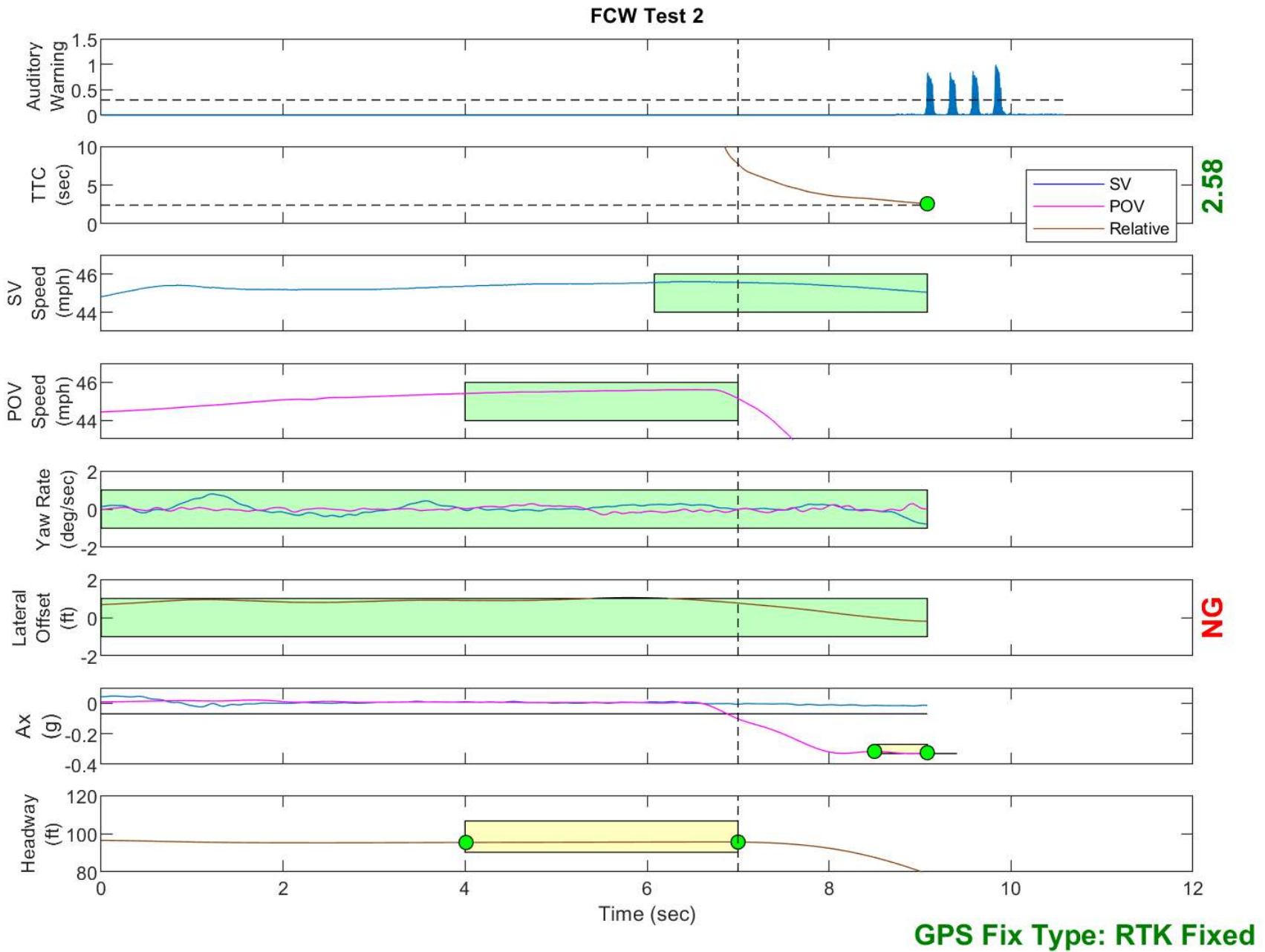


Figure D6. Example Time History Showing Invalid Lateral Offset Criteria

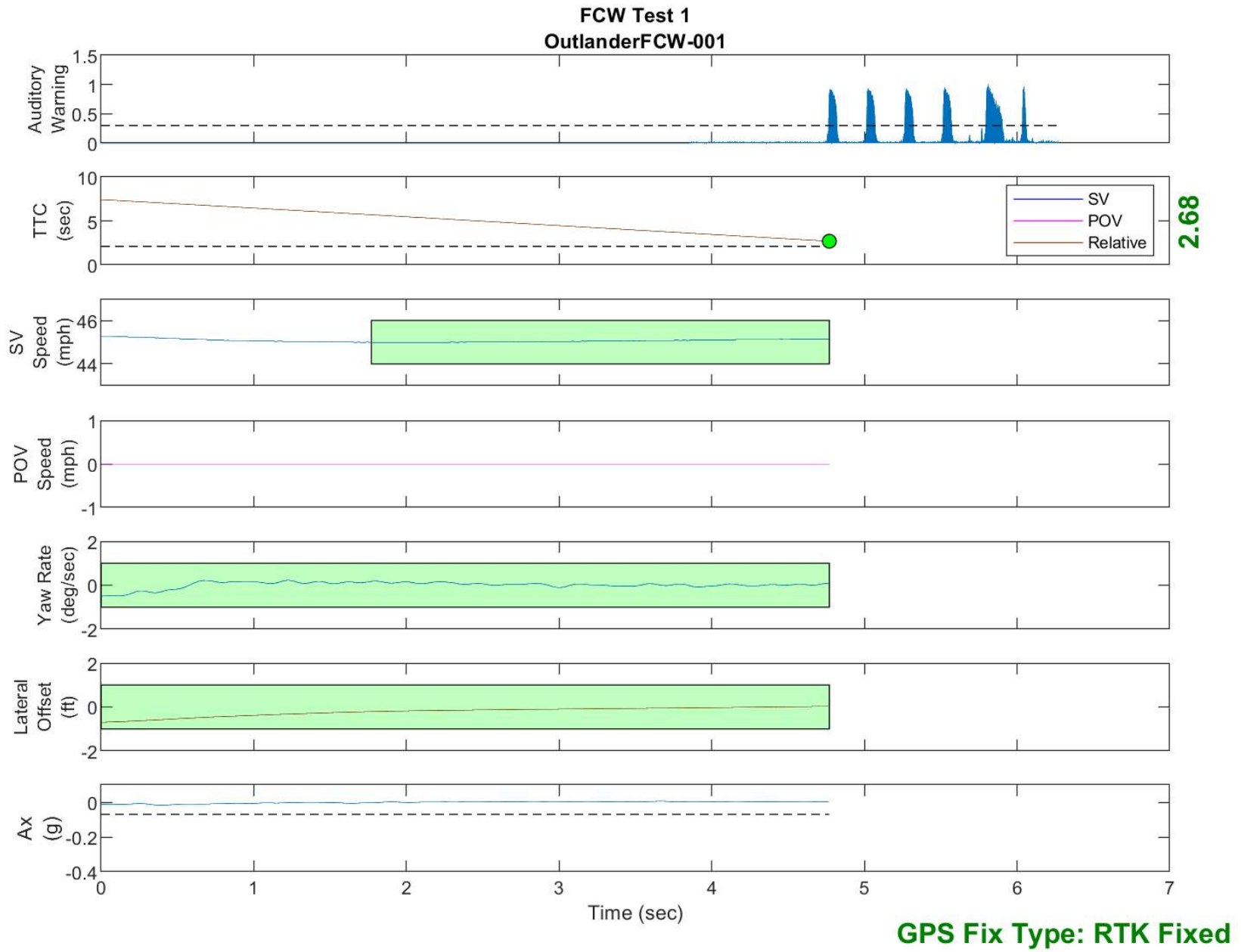


Figure D7. Time History for Run 1, FCW Test 1, Auditory Warning

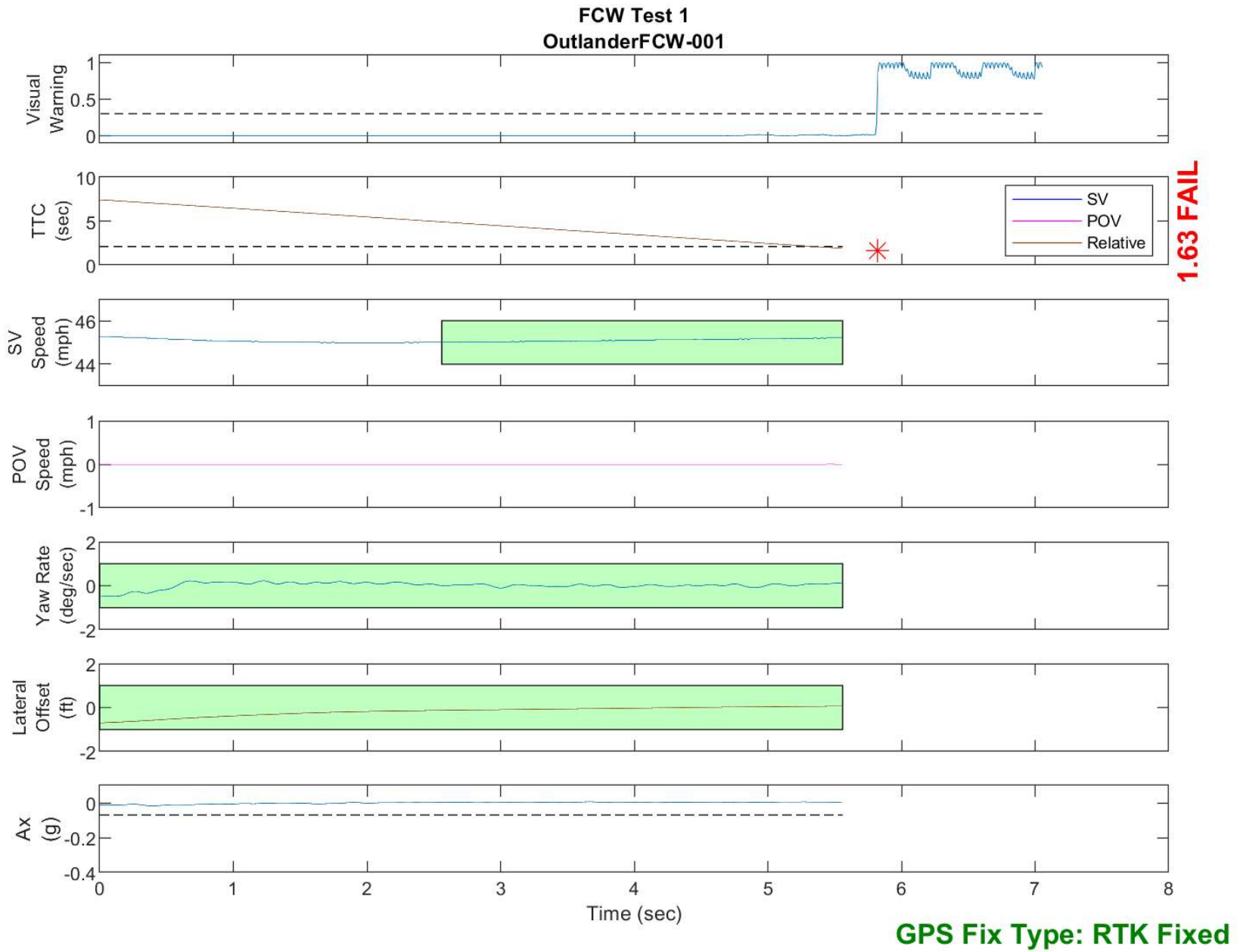


Figure D8. Time History for Run 1, FCW Test 1, Visual Warning

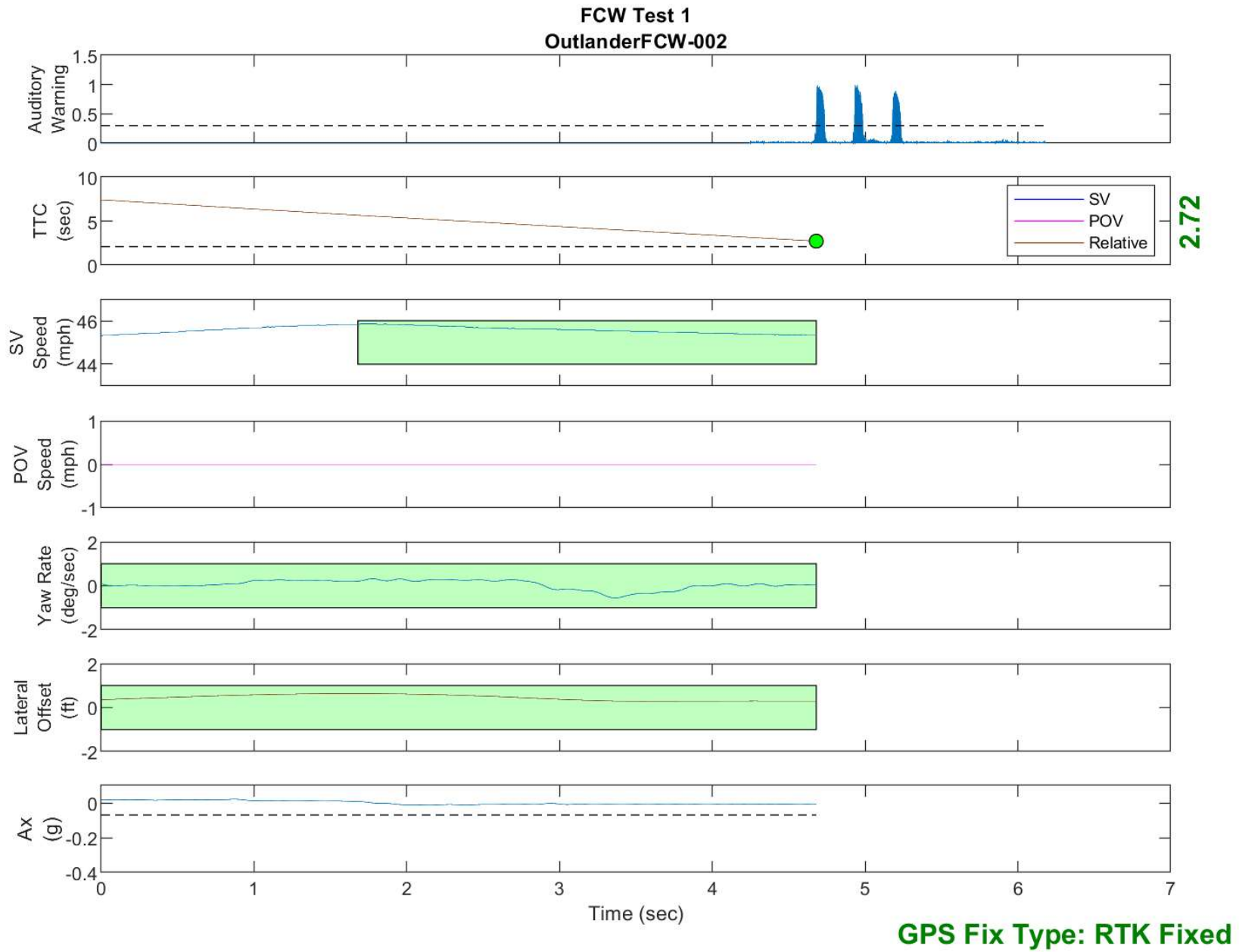


Figure D9. Time History for Run 2, FCW Test 1, Auditory Warning

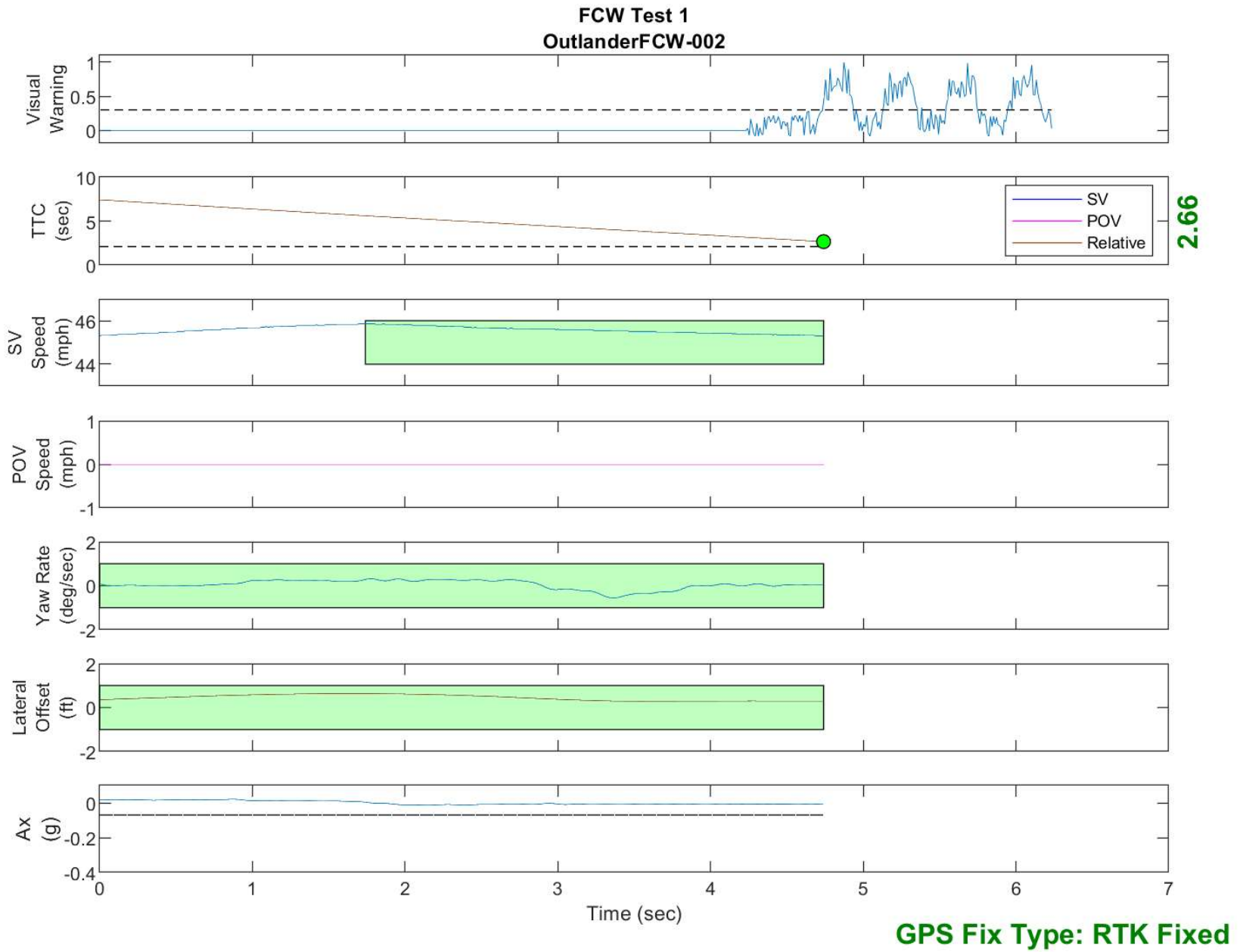


Figure D10. Time History for Run 2, FCW Test 1, Visual Warning

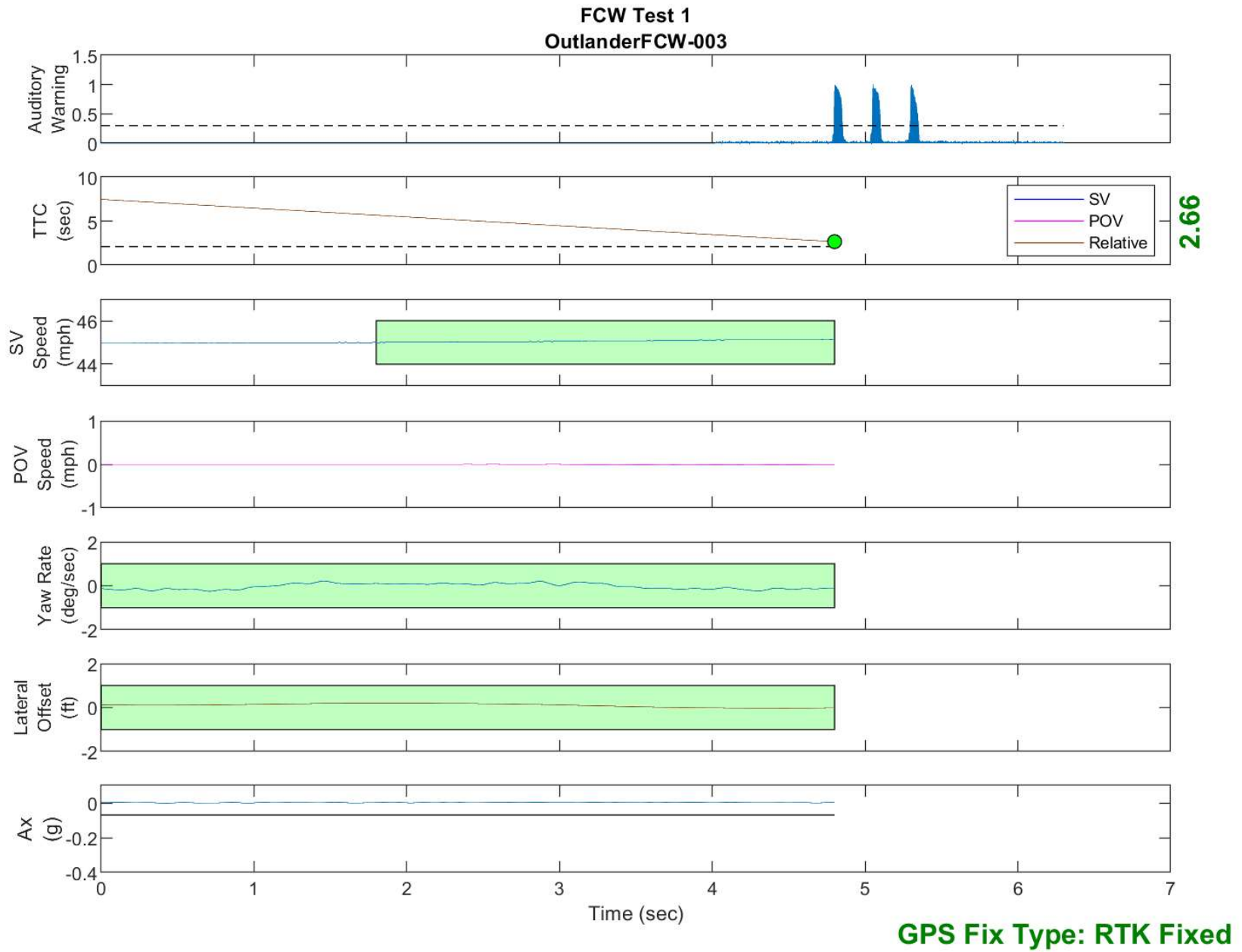


Figure D11. Time History for Run 3, FCW Test 1, Auditory Warning

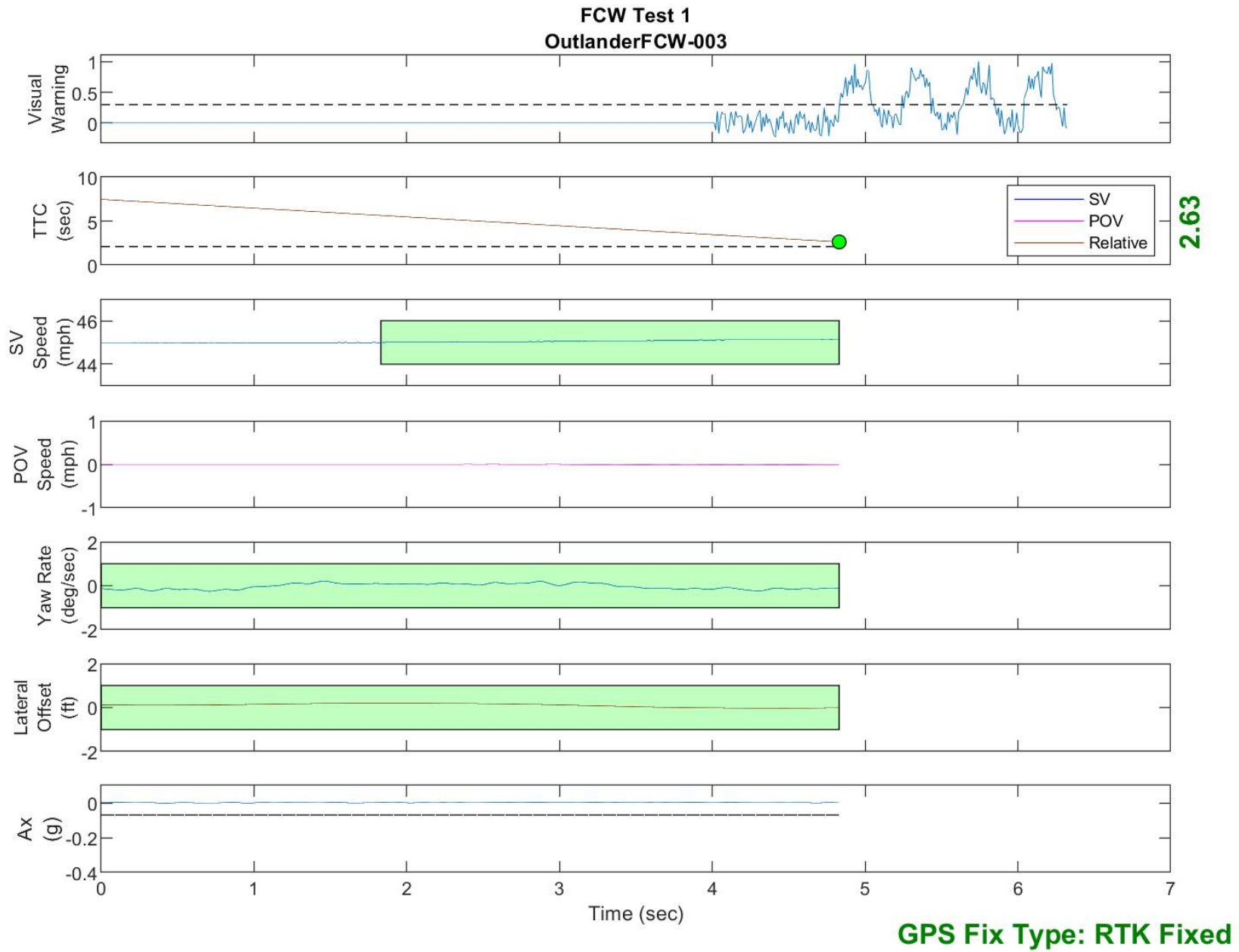


Figure D12. Time History for Run 3, FCW Test 1, Visual Warning

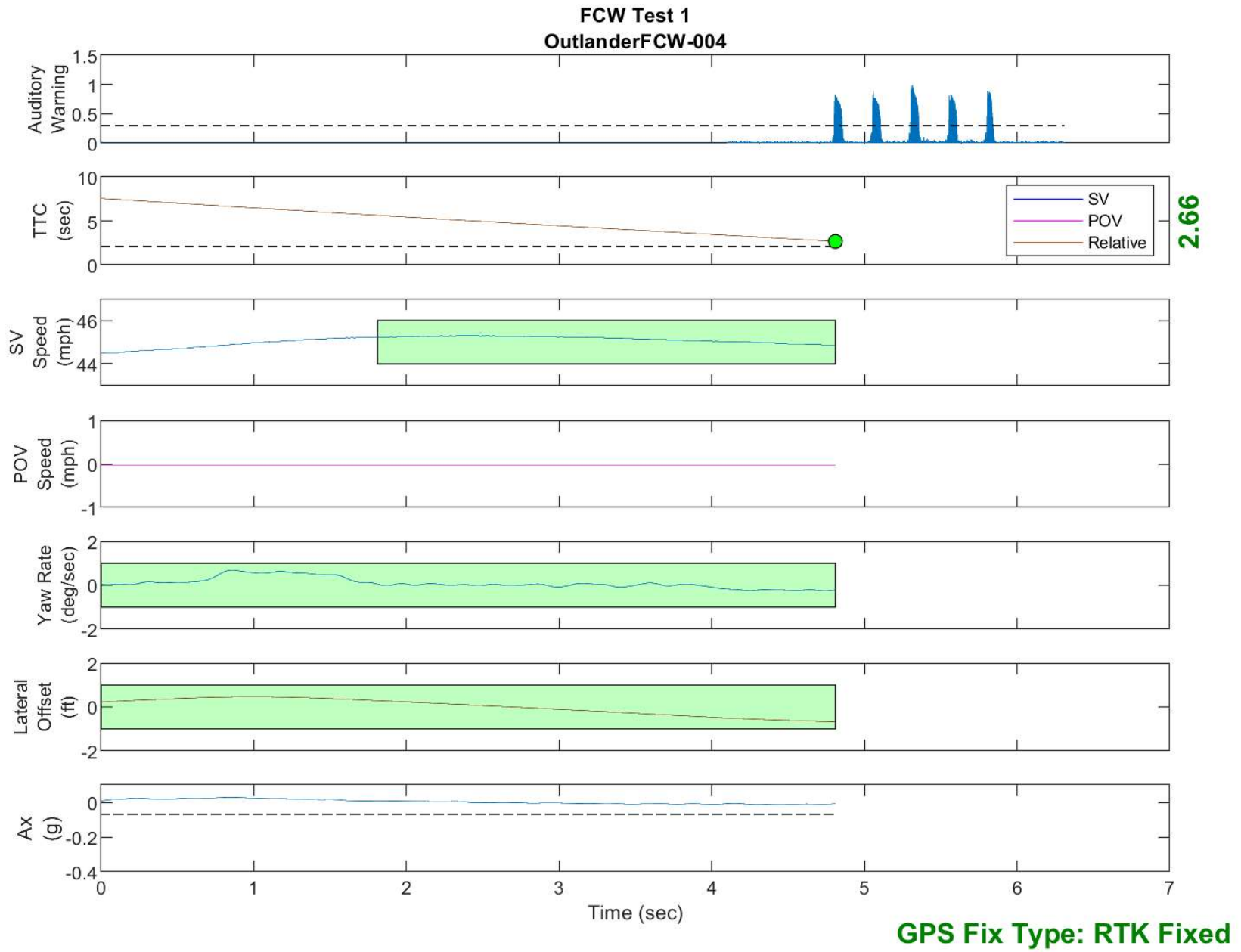


Figure D13. Time History for Run 4, FCW Test 1, Auditory Warning

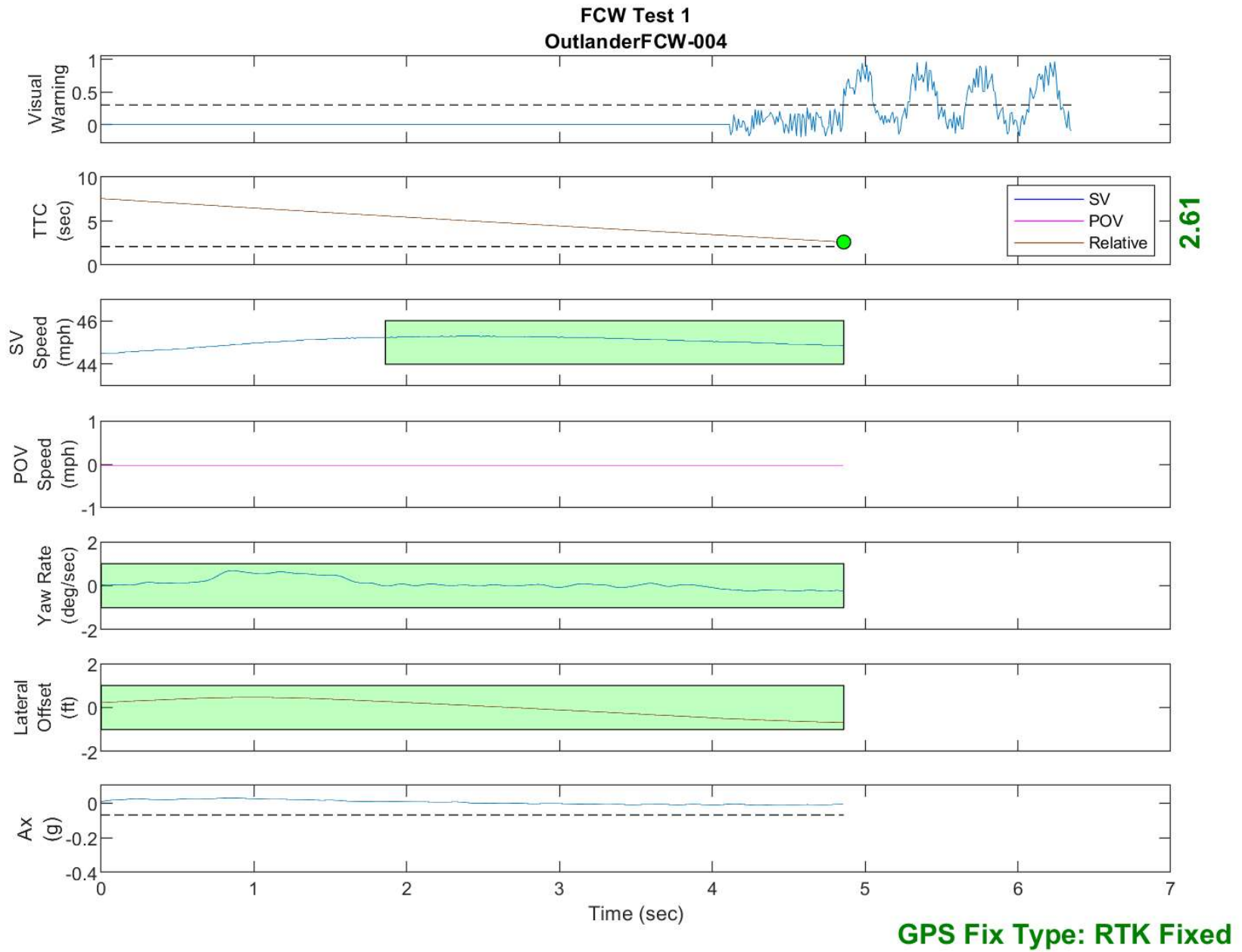


Figure D14. Time History for Run 4, FCW Test 1, Visual Warning

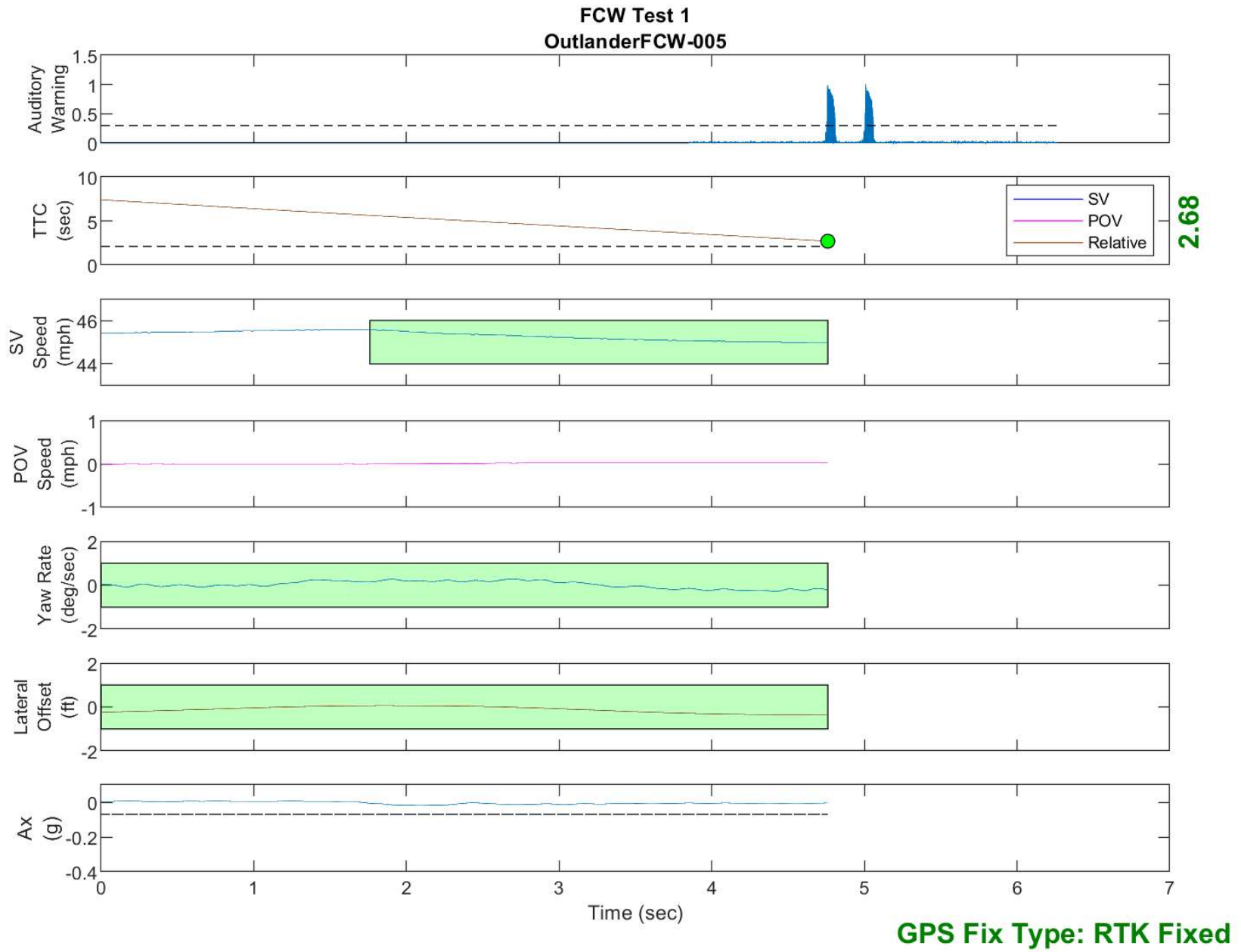


Figure D15. Time History for Run 5, FCW Test 1, Auditory Warning

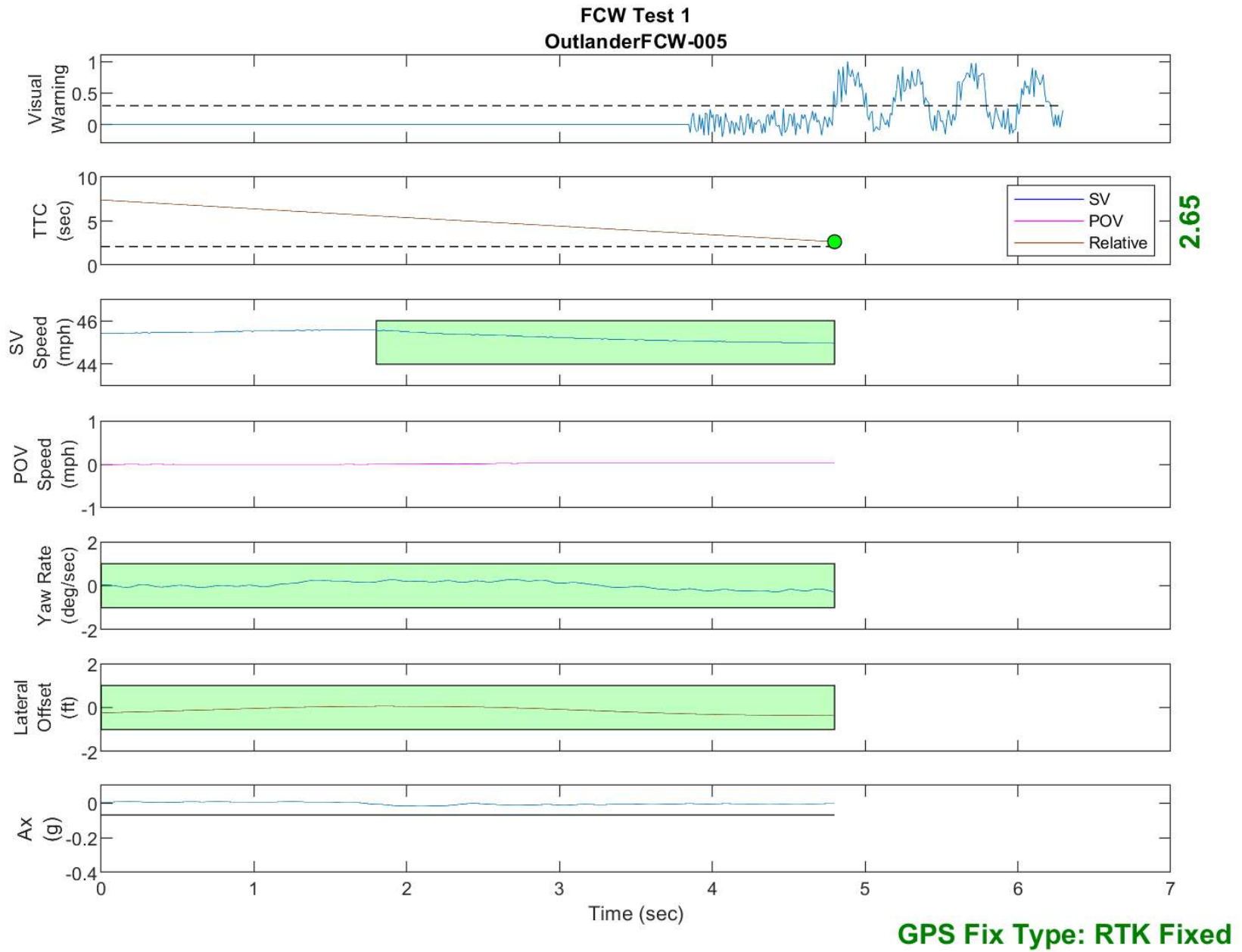


Figure D16. Time History for Run 5, FCW Test 1, Visual Warning

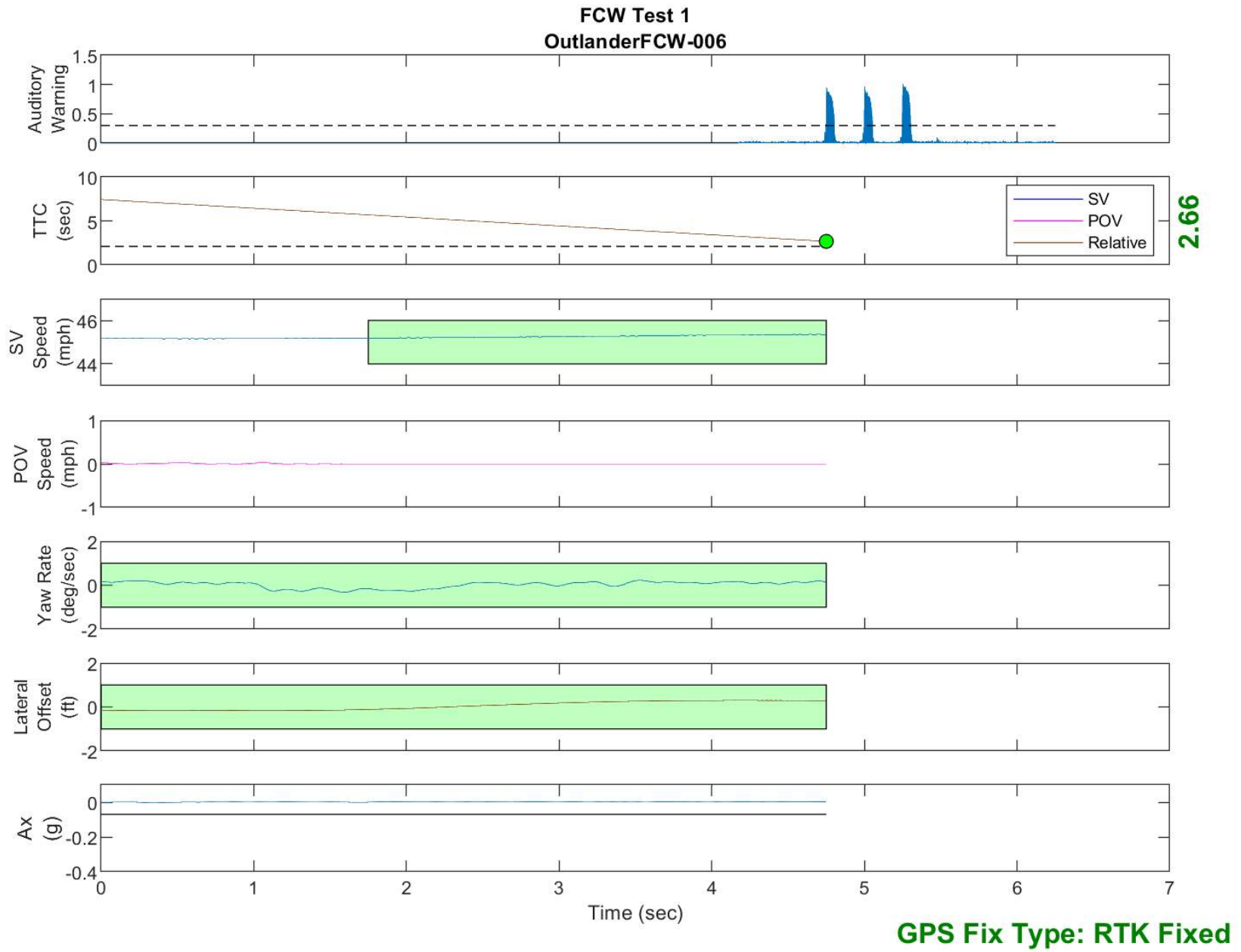


Figure D17. Time History for Run 6, FCW Test 1, Auditory Warning

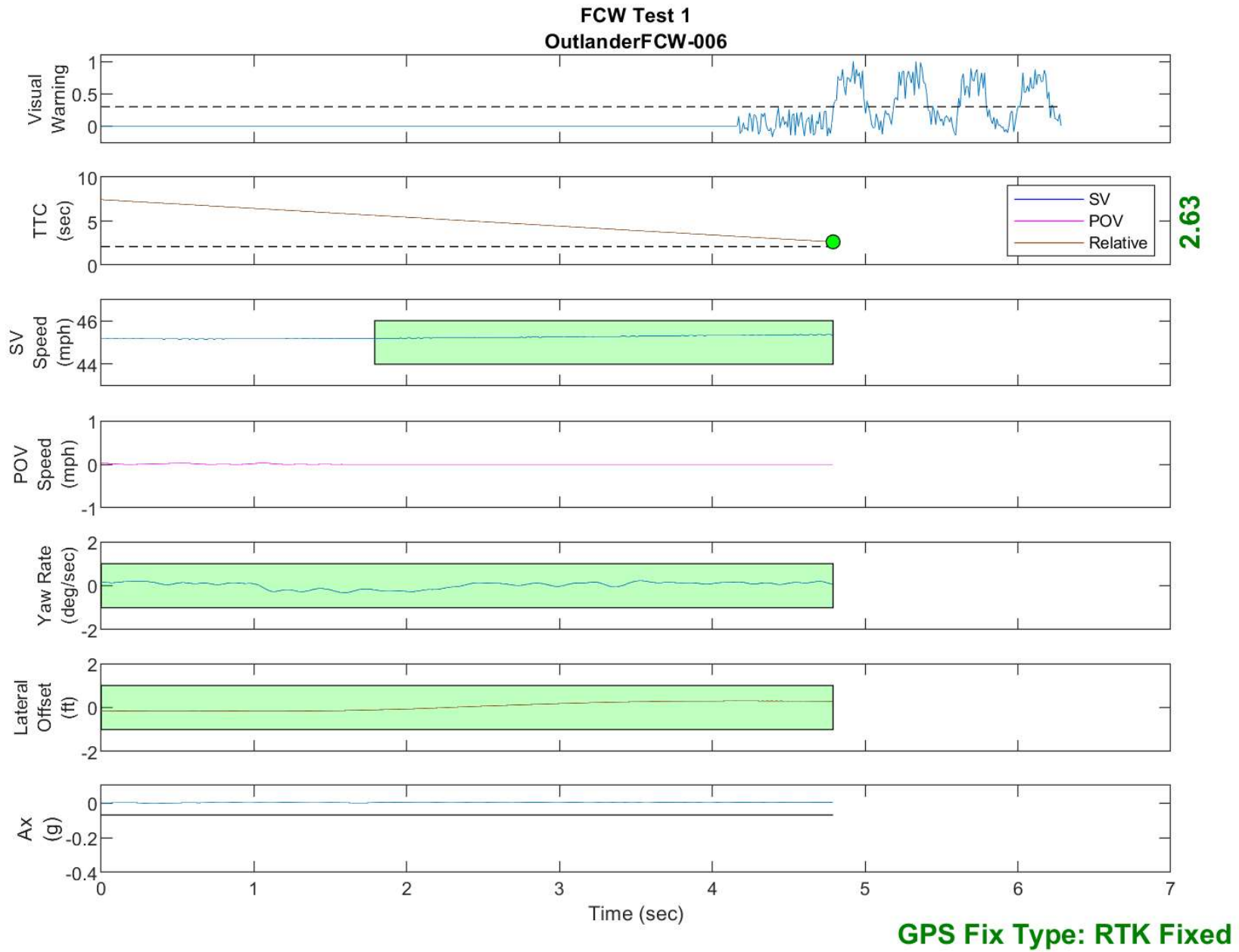


Figure D18. Time History for Run 6, FCW Test 1, Visual Warning

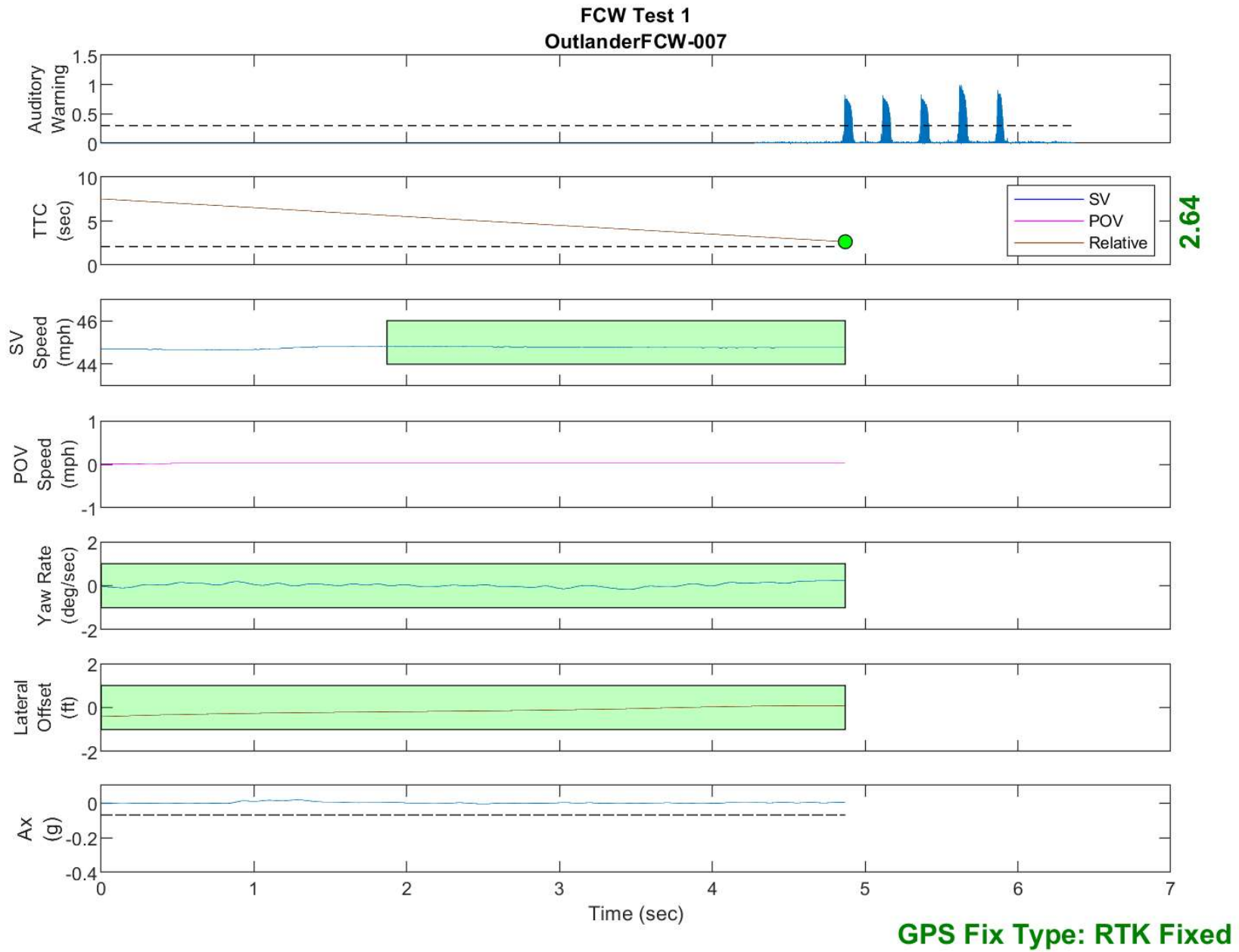


Figure D19. Time History for Run 7, FCW Test 1, Auditory Warning

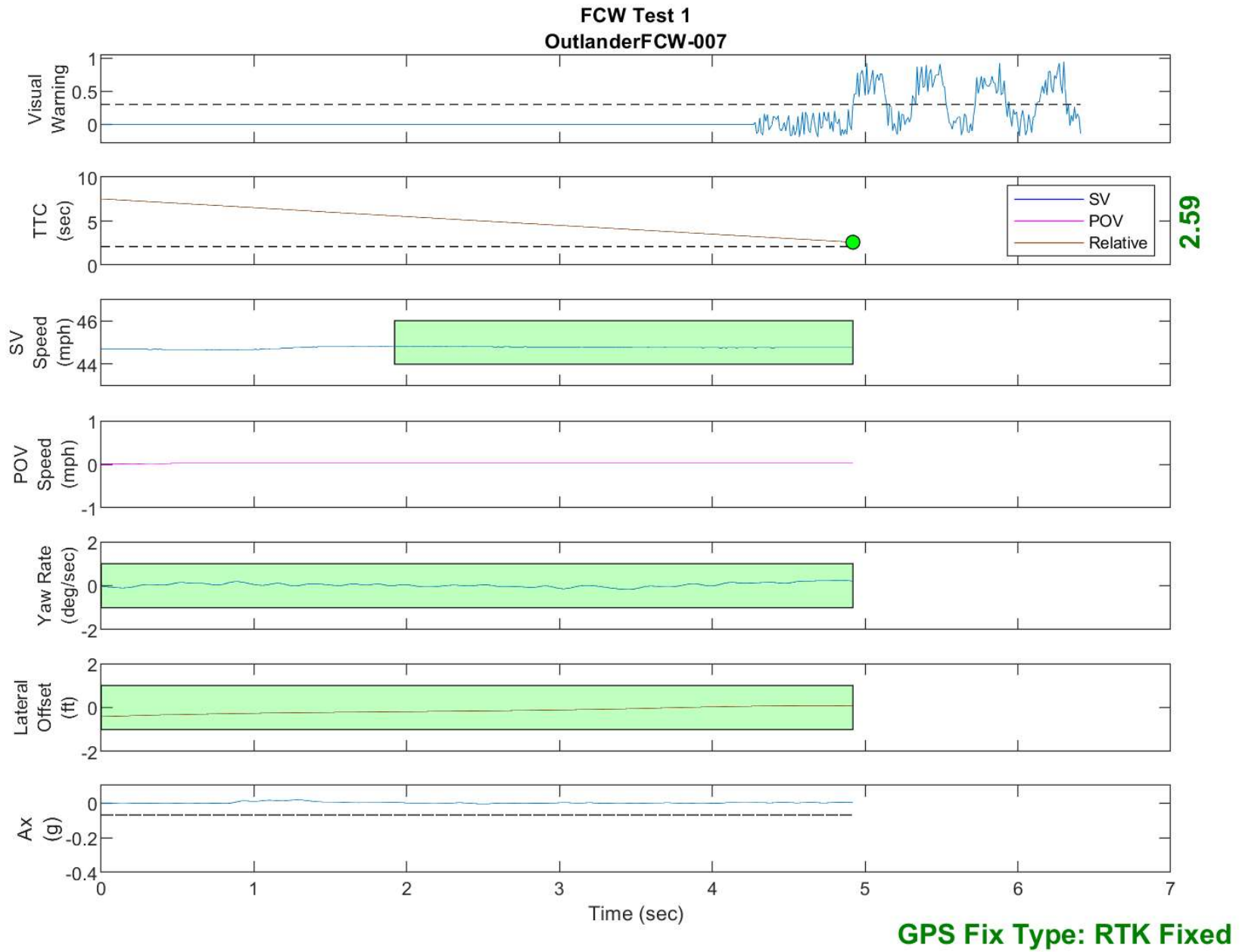


Figure D20. Time History for Run 7, FCW Test 1, Visual Warning

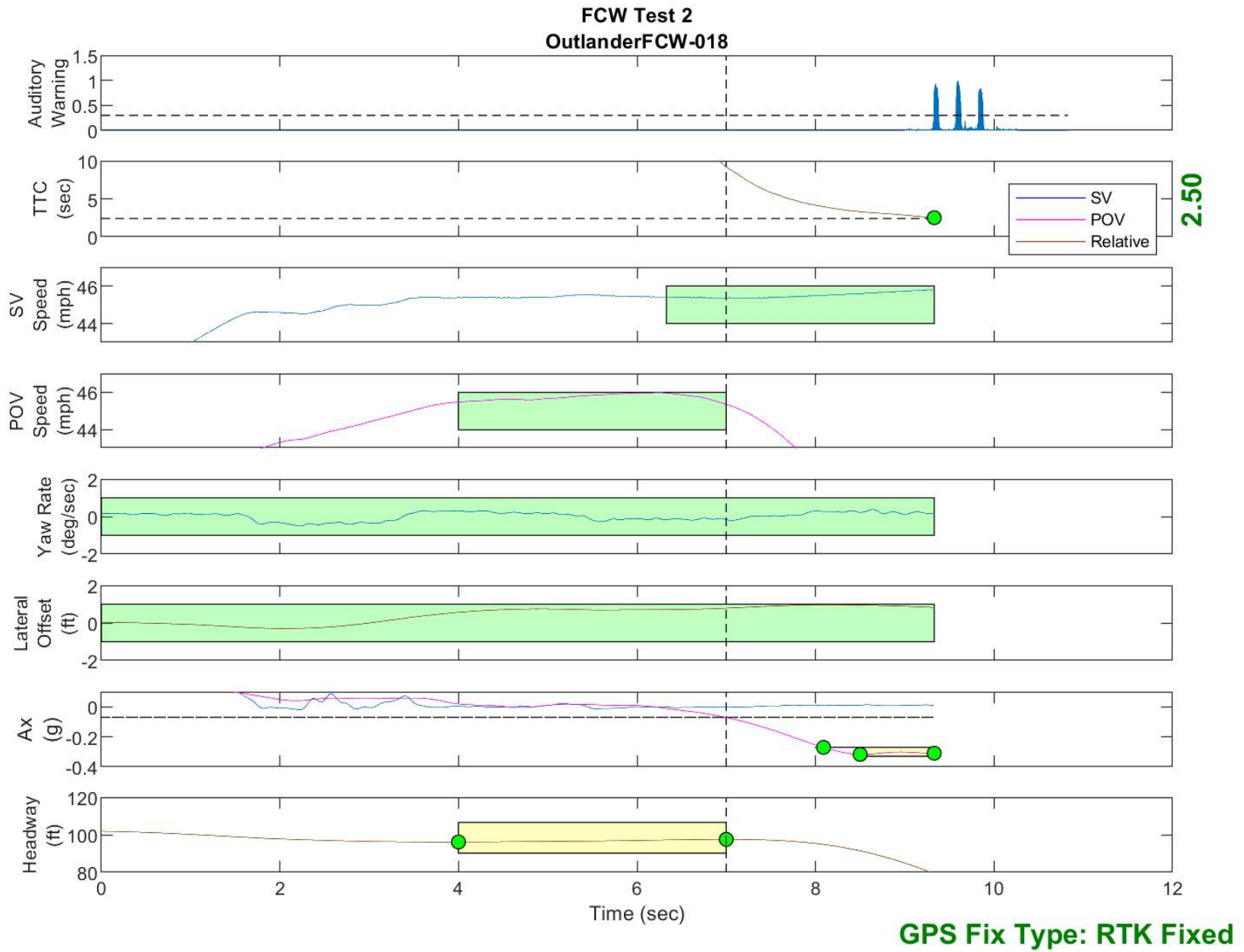


Figure D21. Time History for Run 18, FCW Test 2, Auditory Warning

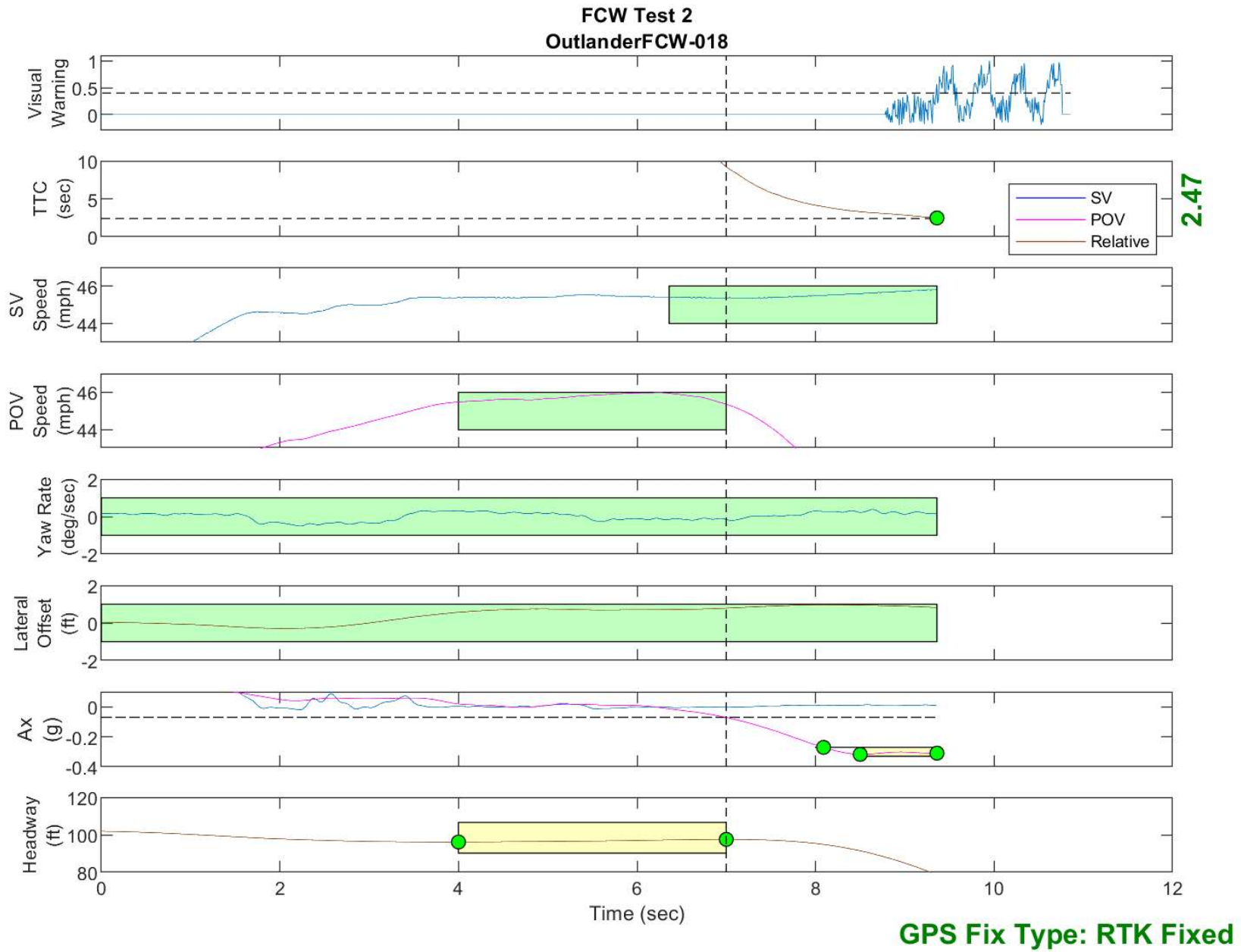


Figure D22. Time History for Run 18, FCW Test 2, Visual Warning

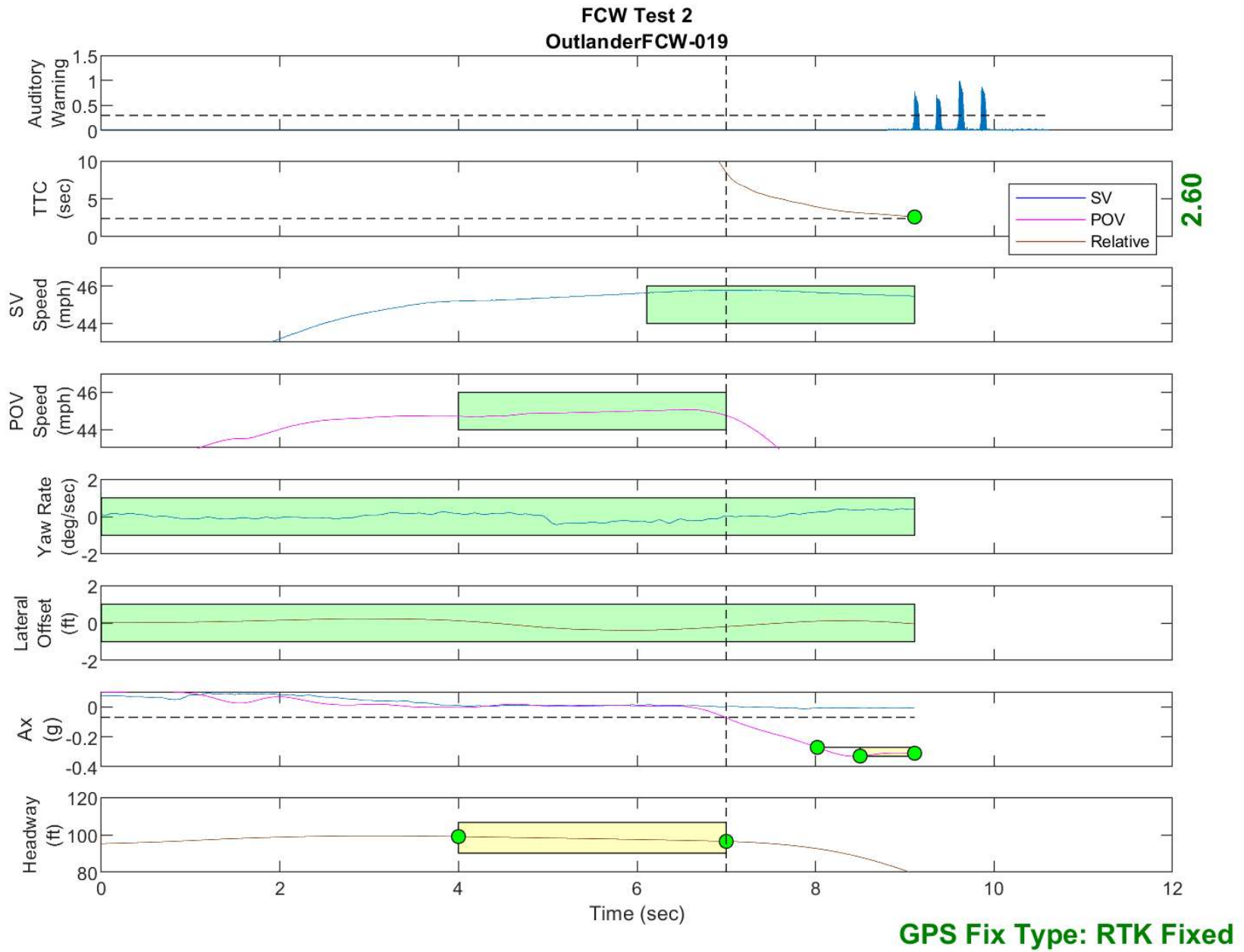


Figure D23. Time History for Run 19, FCW Test 2, Auditory Warning

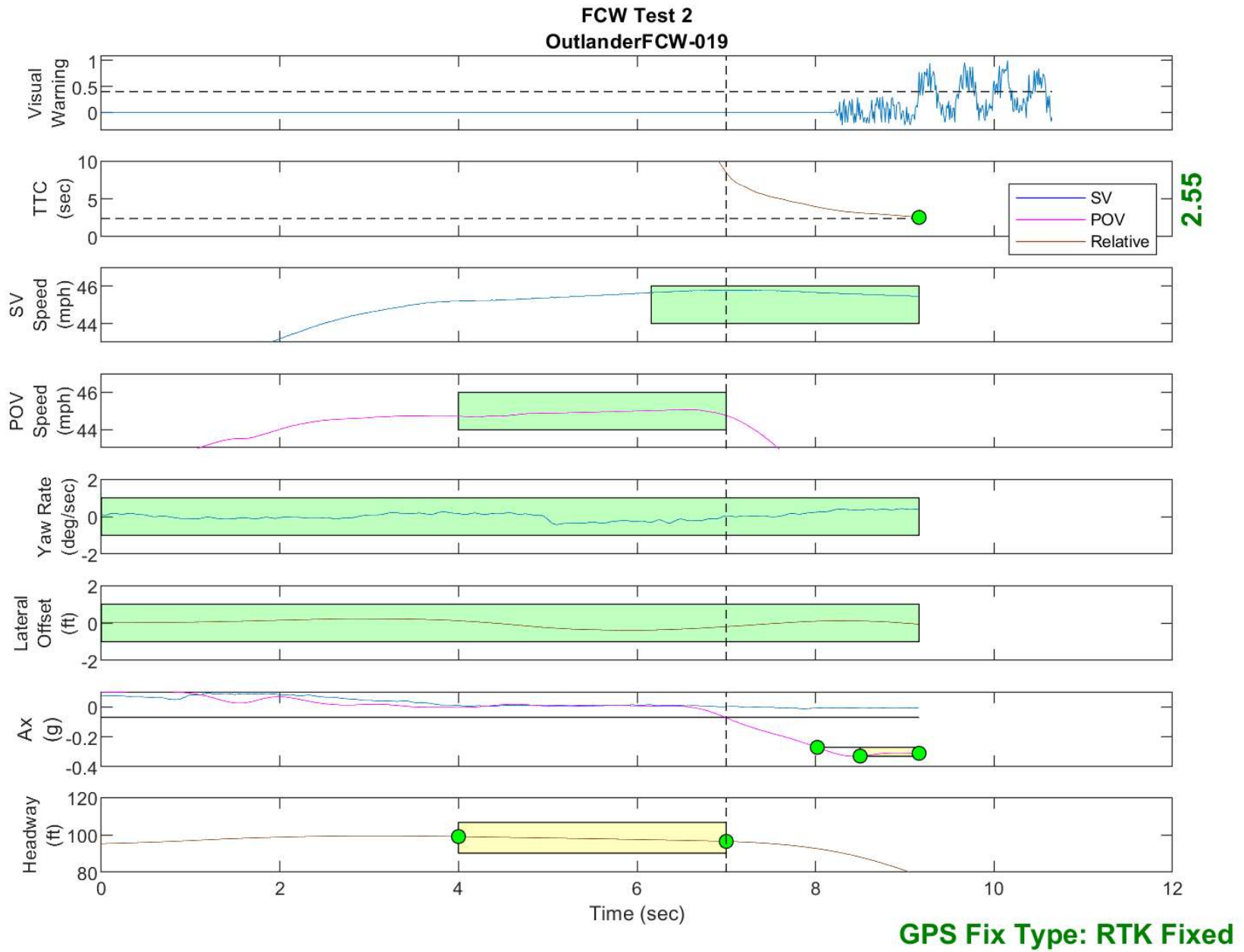


Figure D24. Time History for Run 19, FCW Test 2, Visual Warning

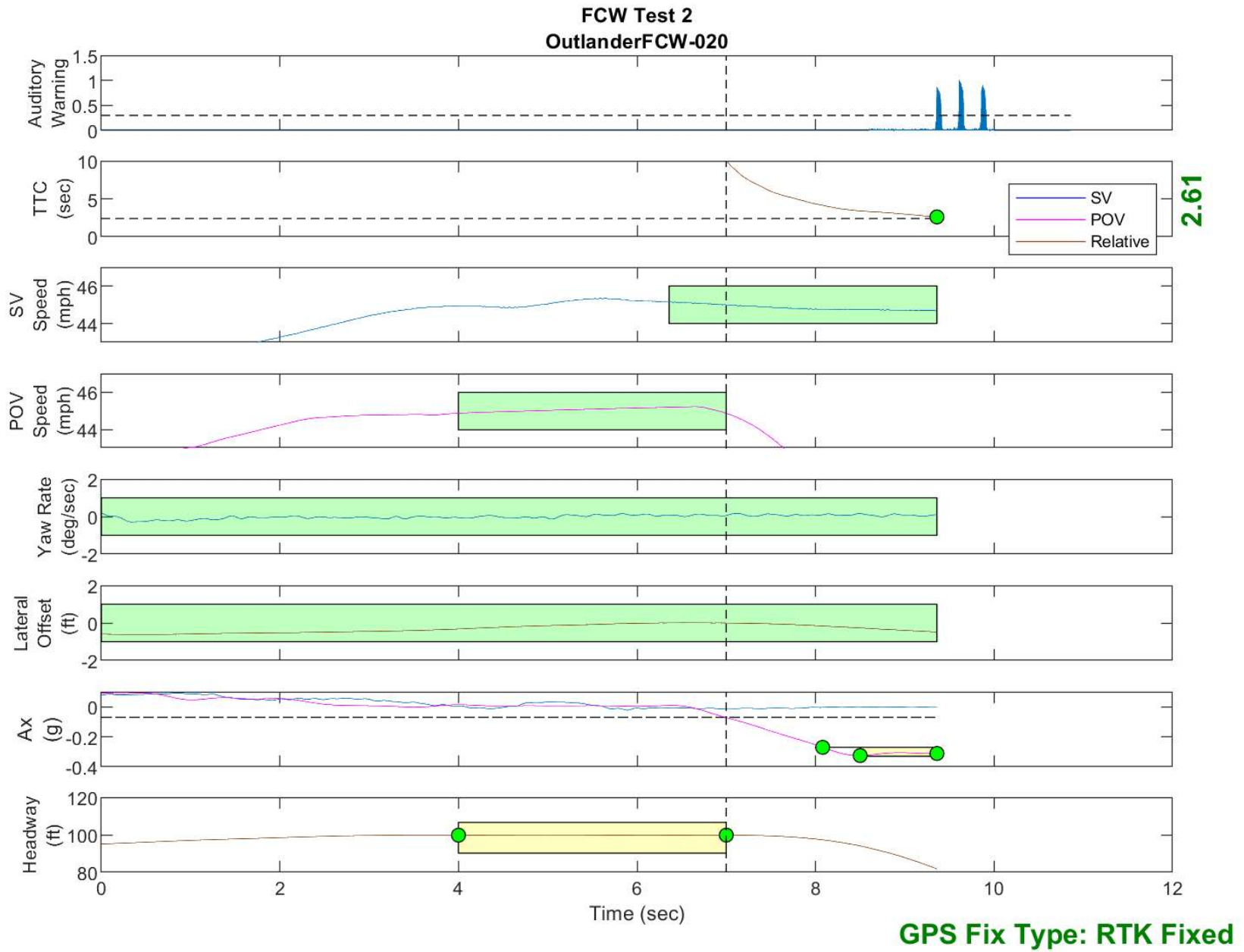


Figure D25. Time History for Run 20, FCW Test 2, Auditory Warning

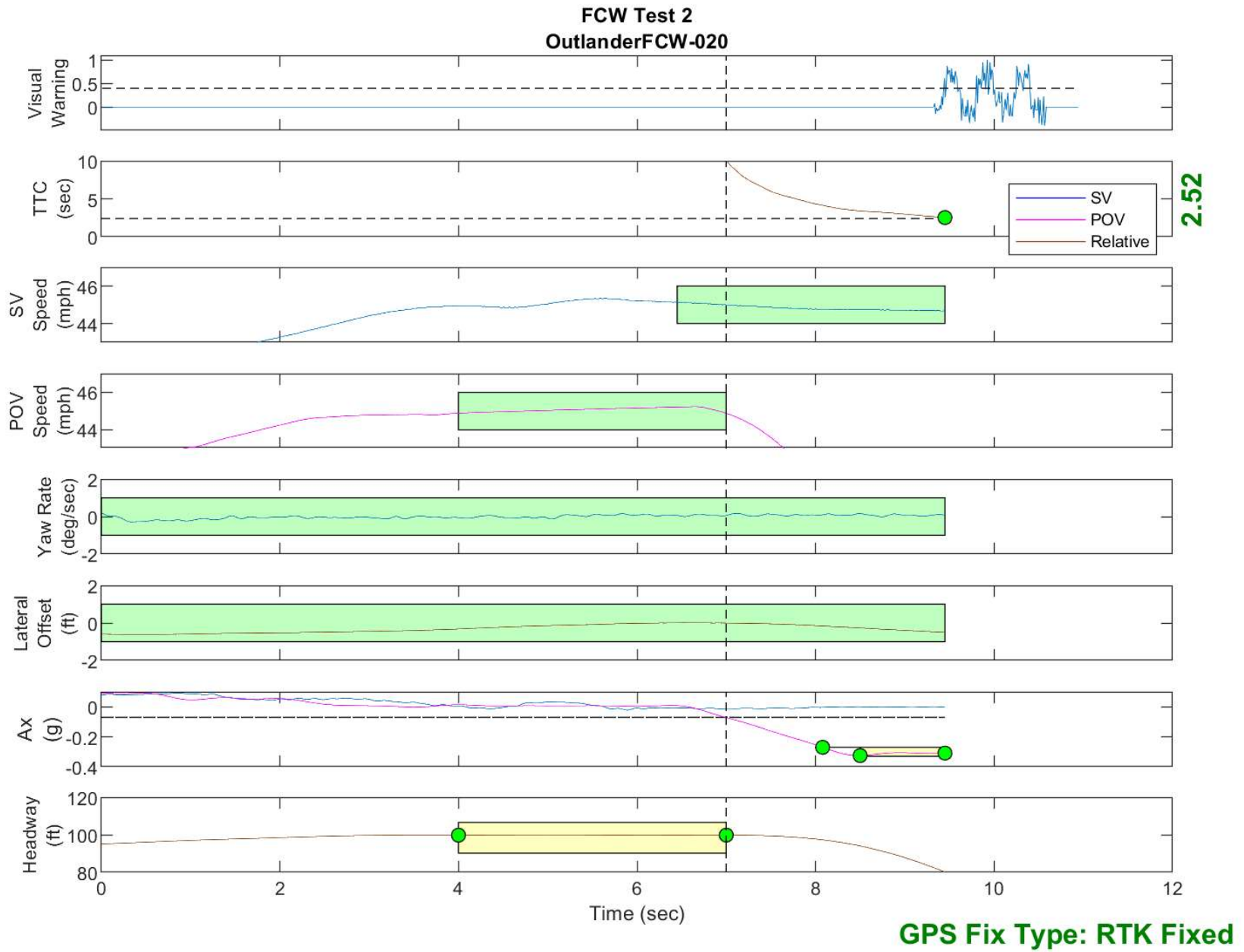


Figure D26. Time History for Run 20, FCW Test 2, Visual Warning

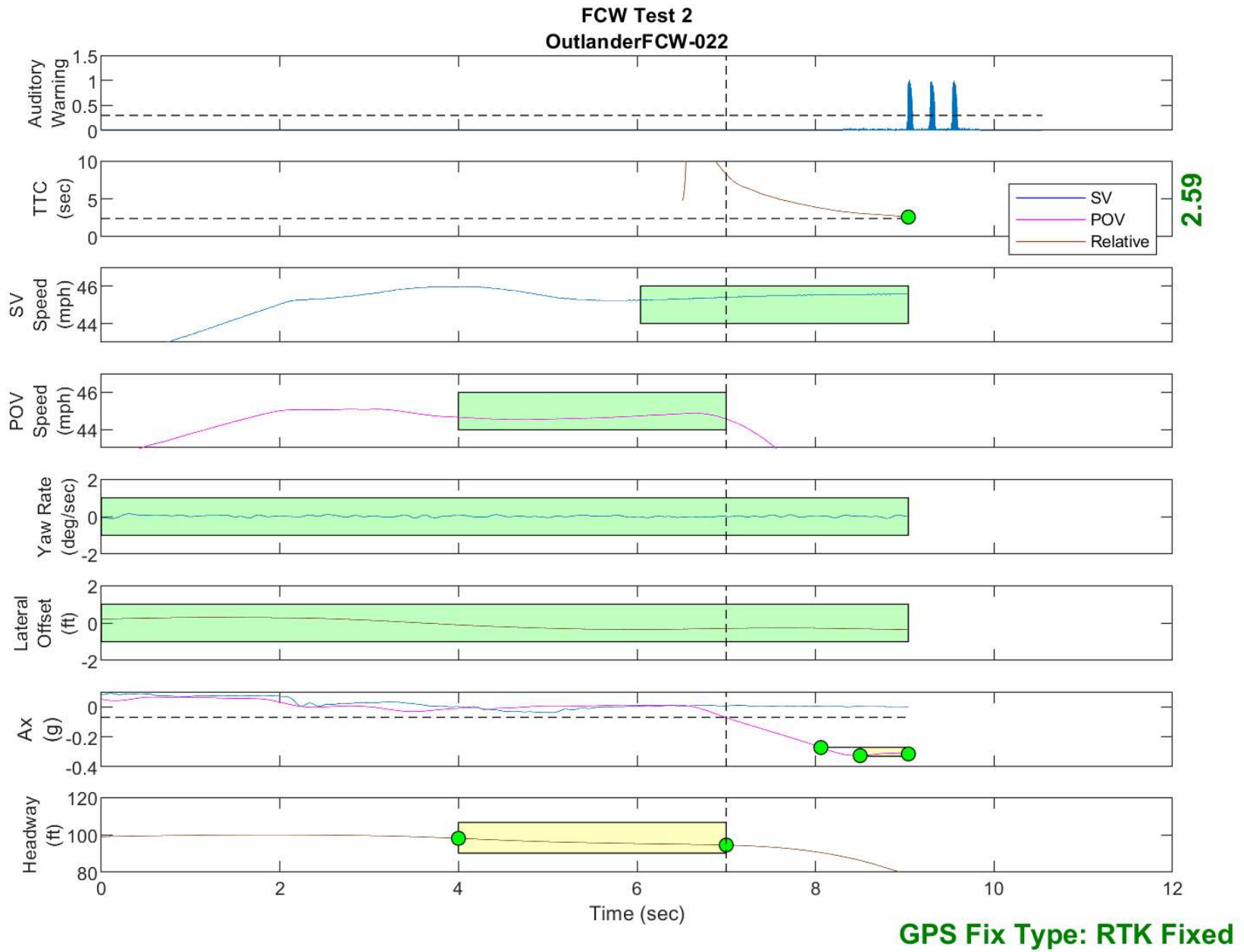


Figure D27. Time History for Run 22, FCW Test 2, Auditory Warning

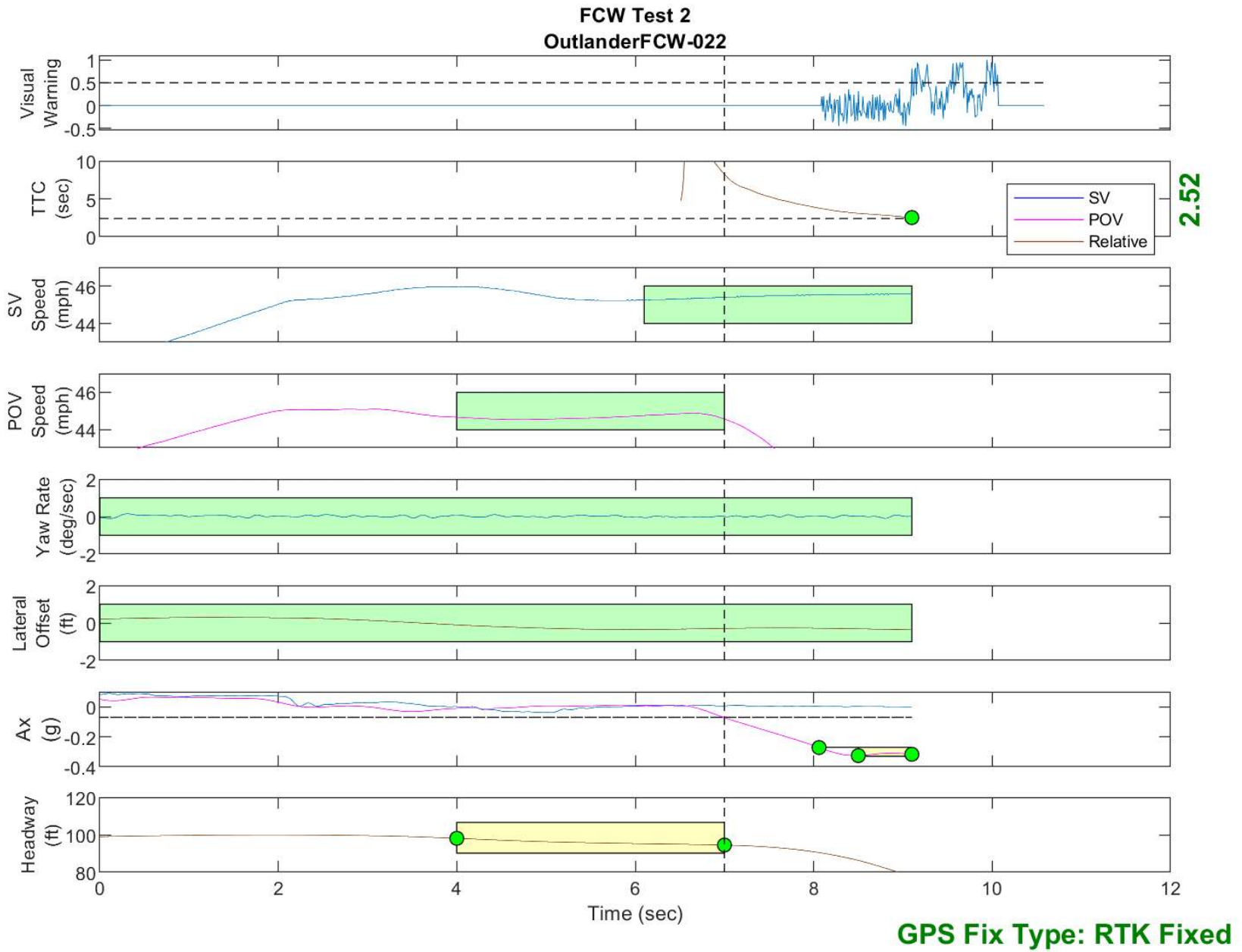


Figure D28. Time History for Run 22, FCW Test 2, Visual Warning

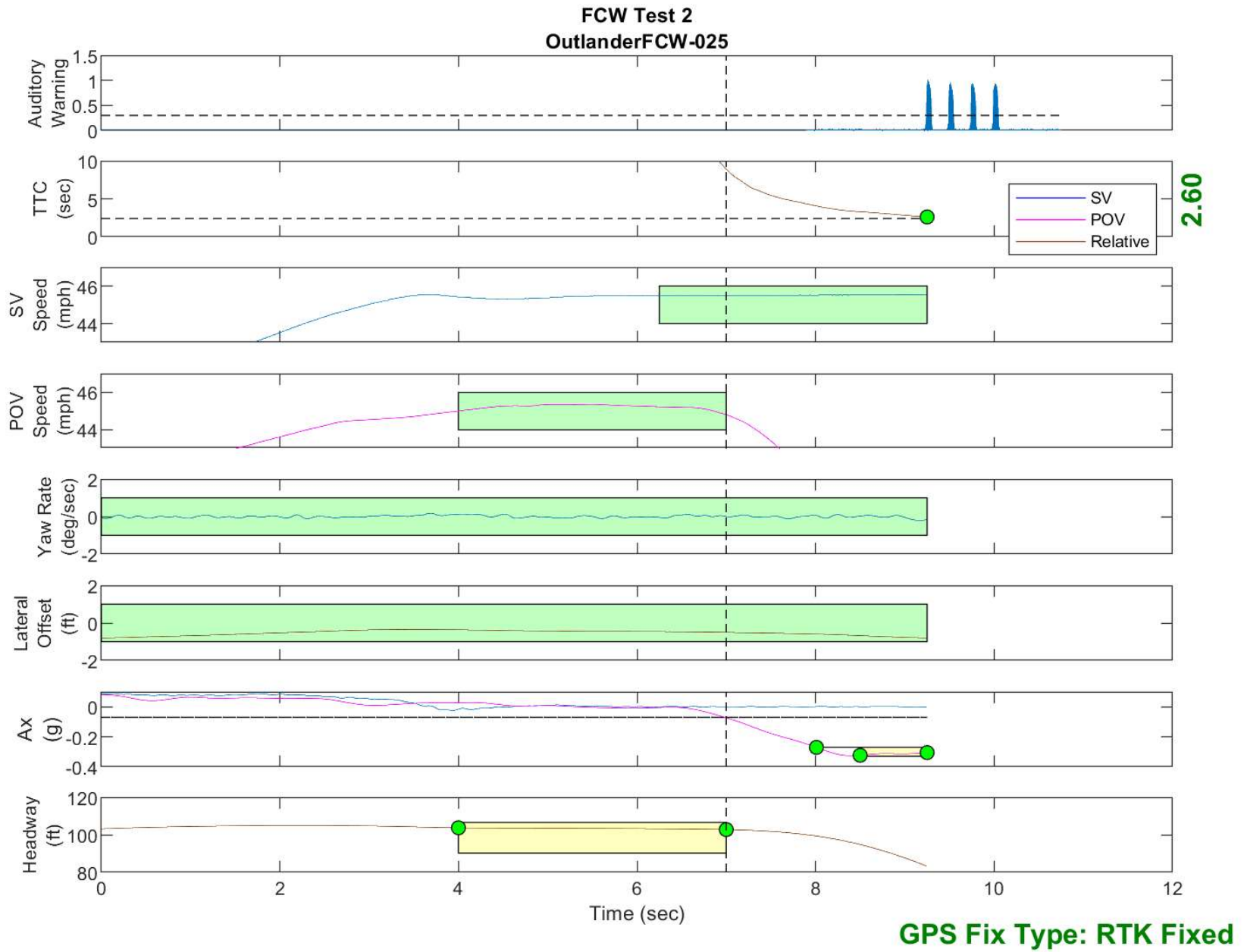


Figure D29. Time History for Run 25, FCW Test 2, Auditory Warning

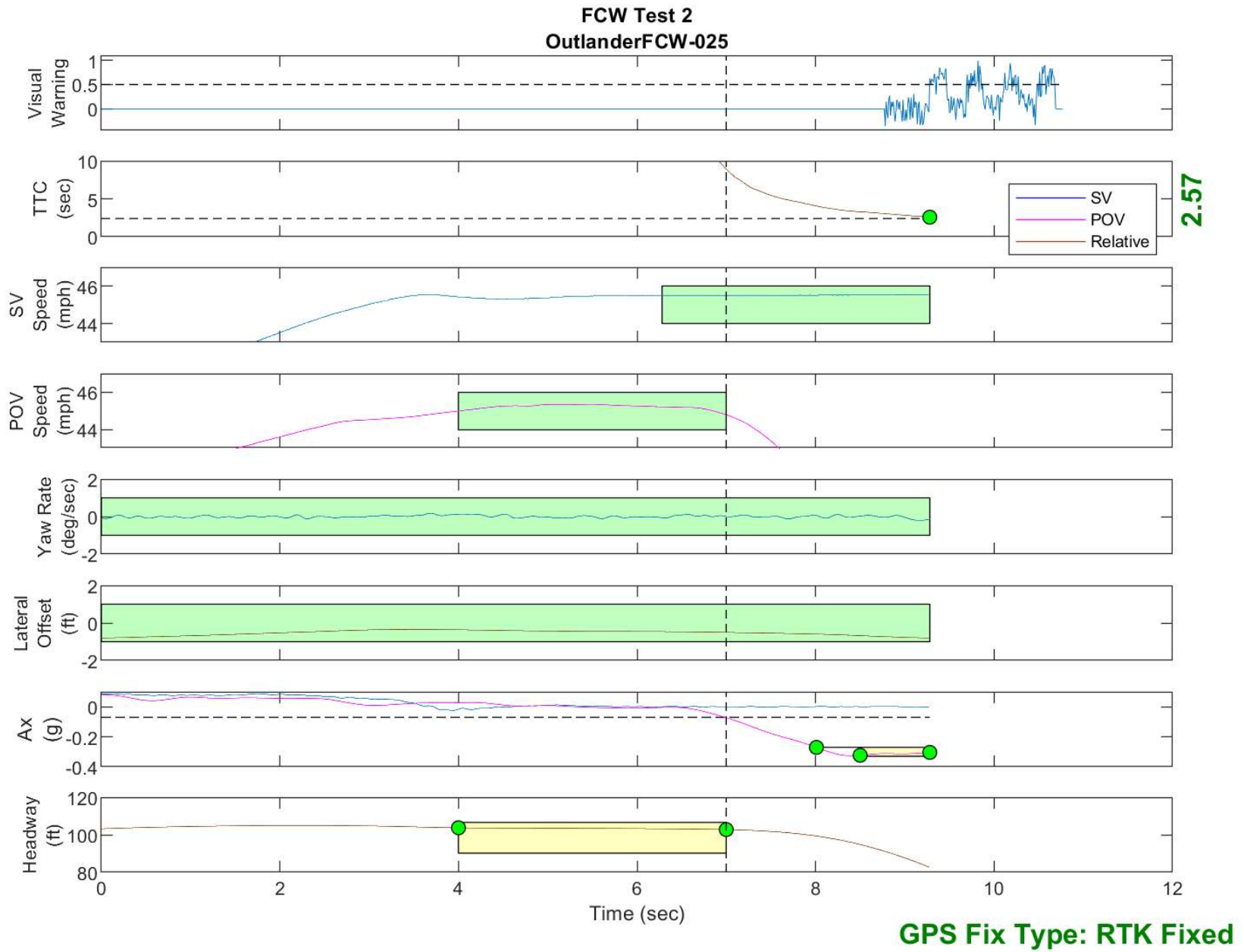


Figure D30. Time History for Run 25, FCW Test 2, Visual Warning

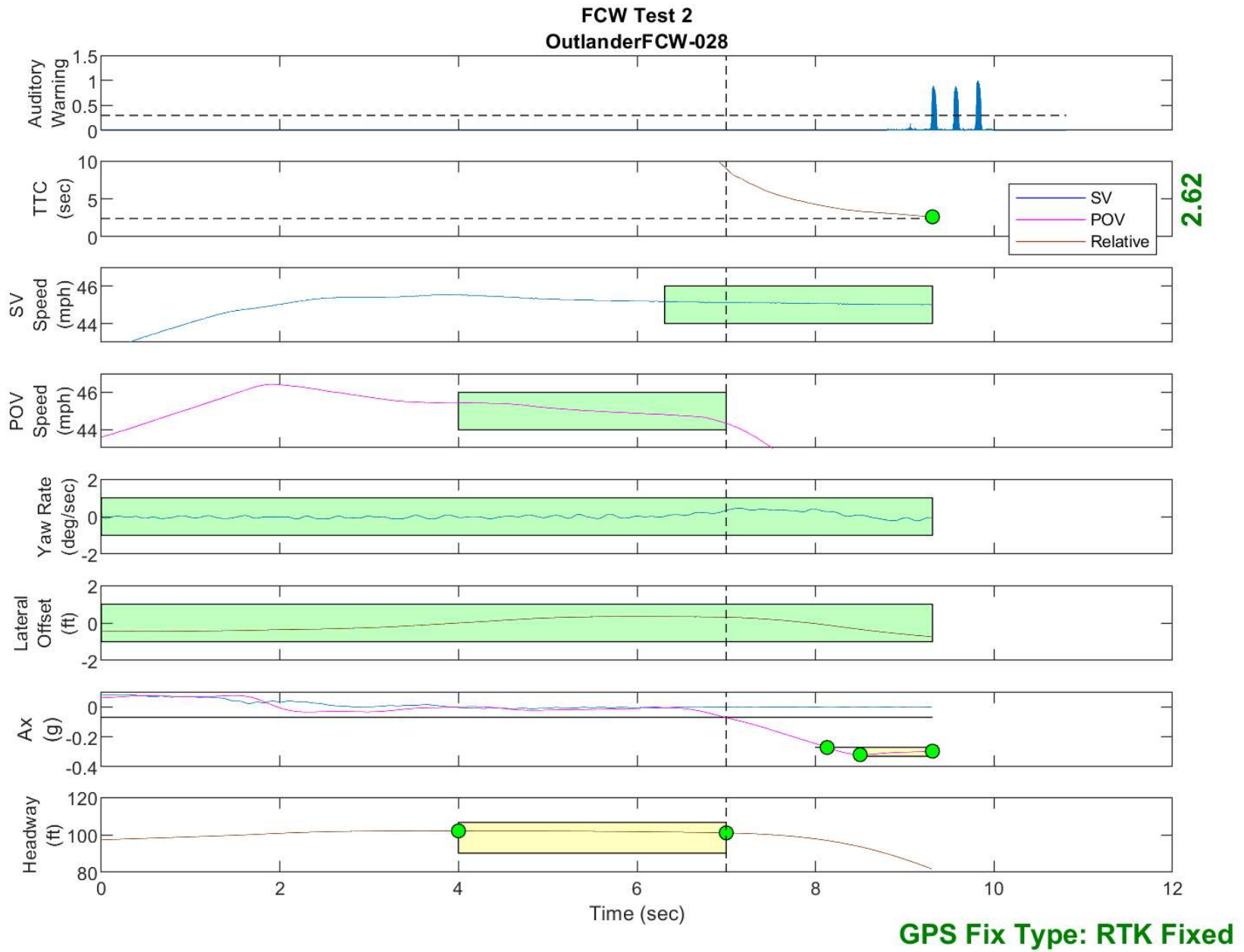


Figure D31. Time History for Run 28, FCW Test 2, Auditory Warning

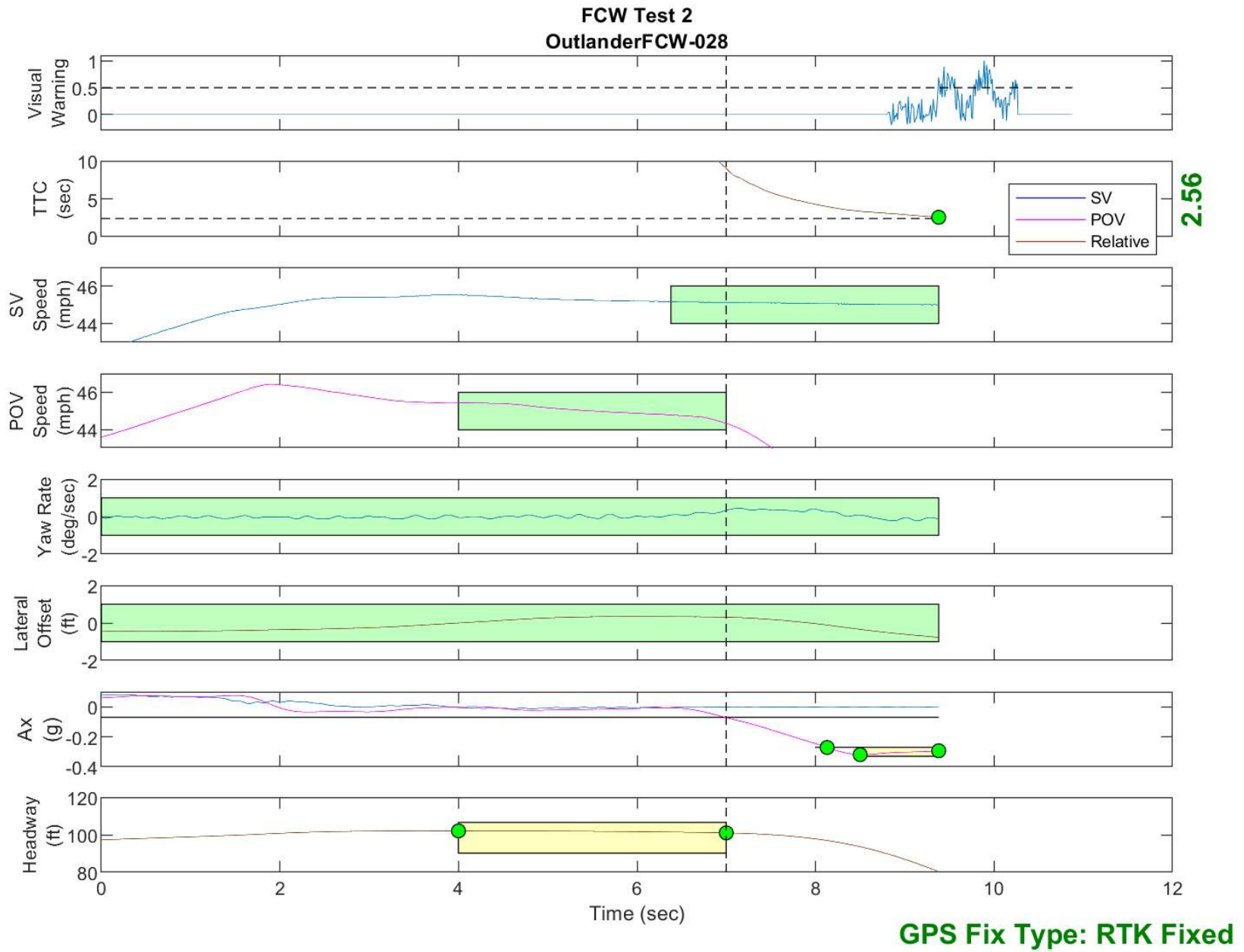


Figure D32. Time History for Run 28, FCW Test 2, Visual Warning

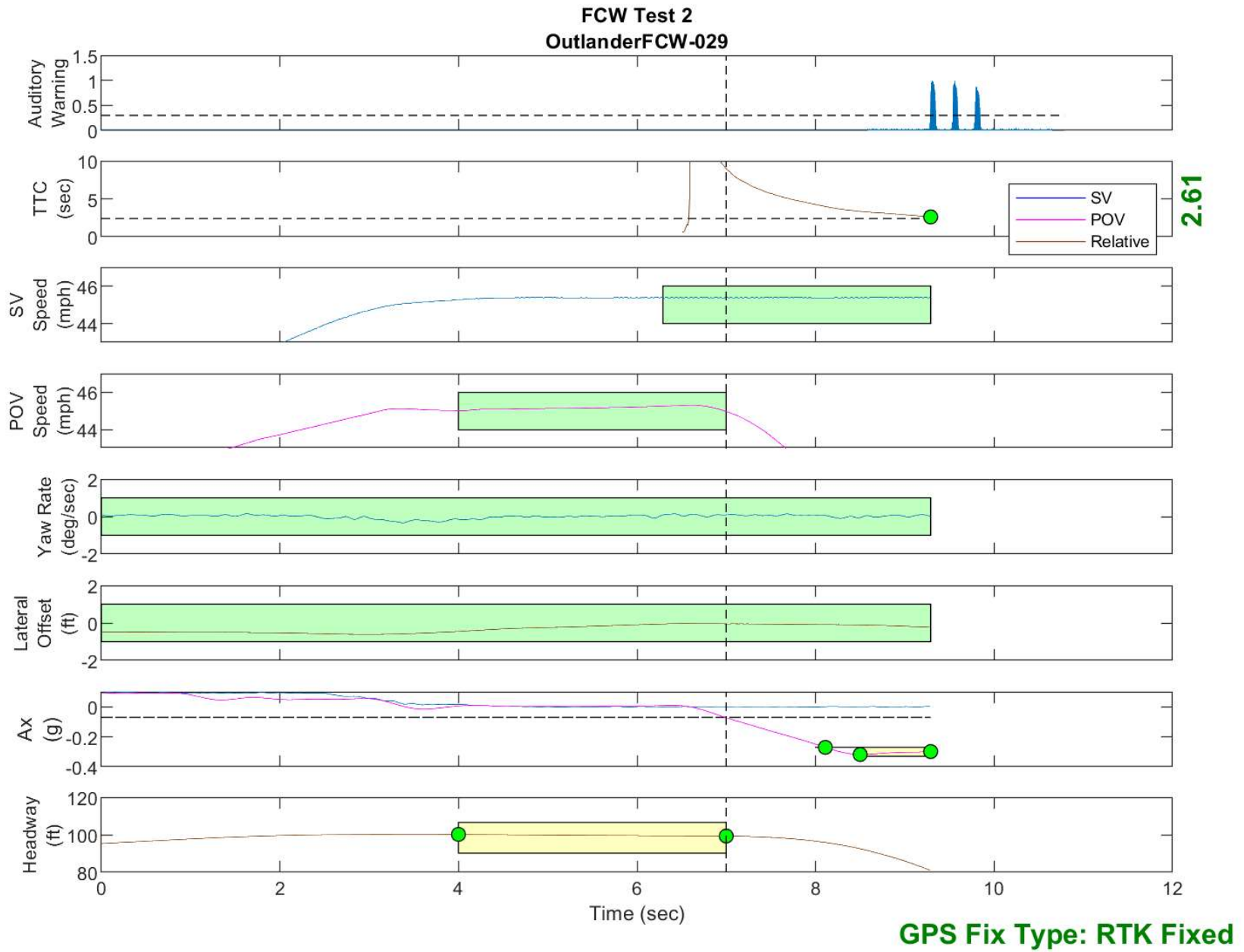


Figure D33. Time History for Run 29, FCW Test 2, Auditory Warning

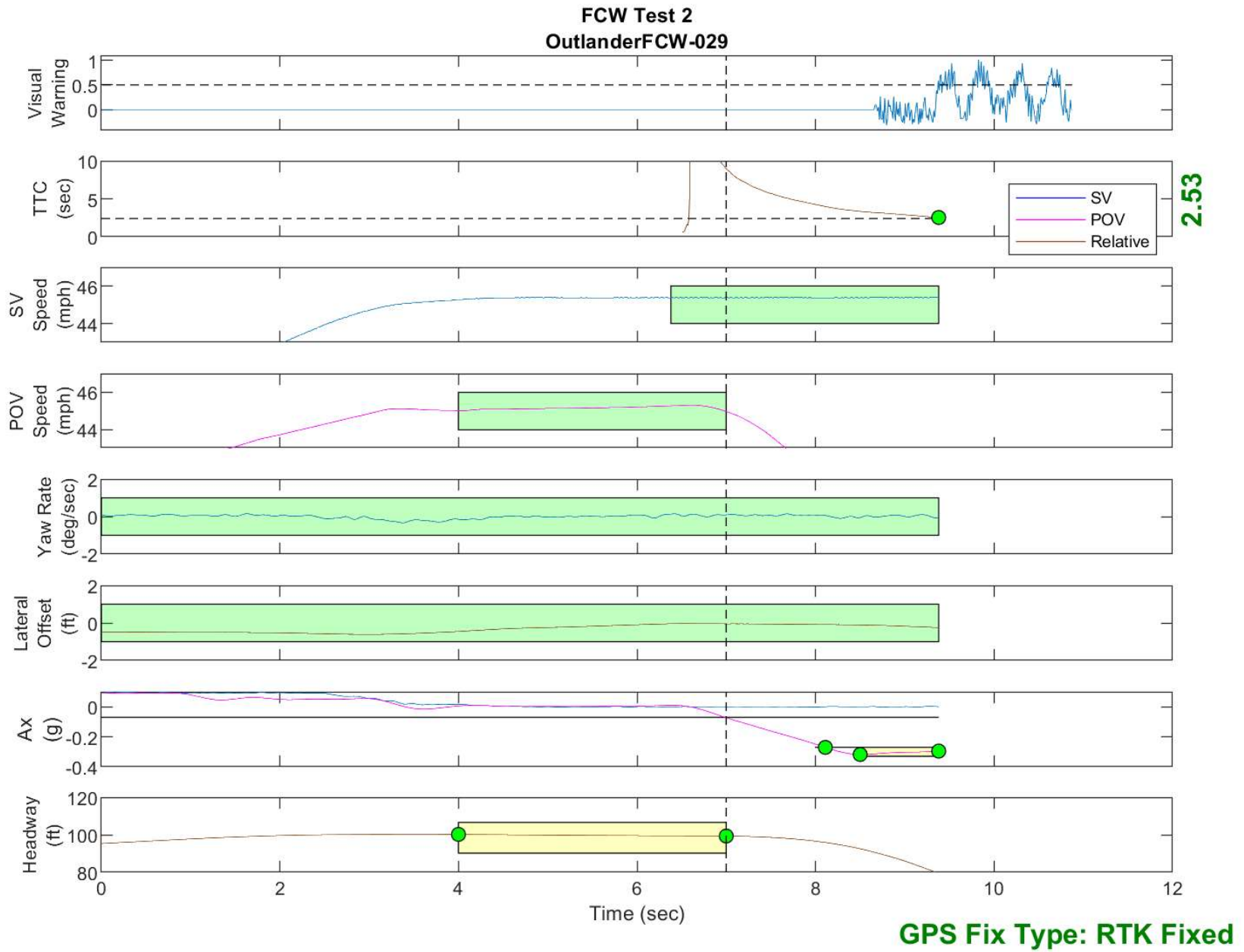


Figure D34. Time History for Run 29, FCW Test 2, Visual Warning

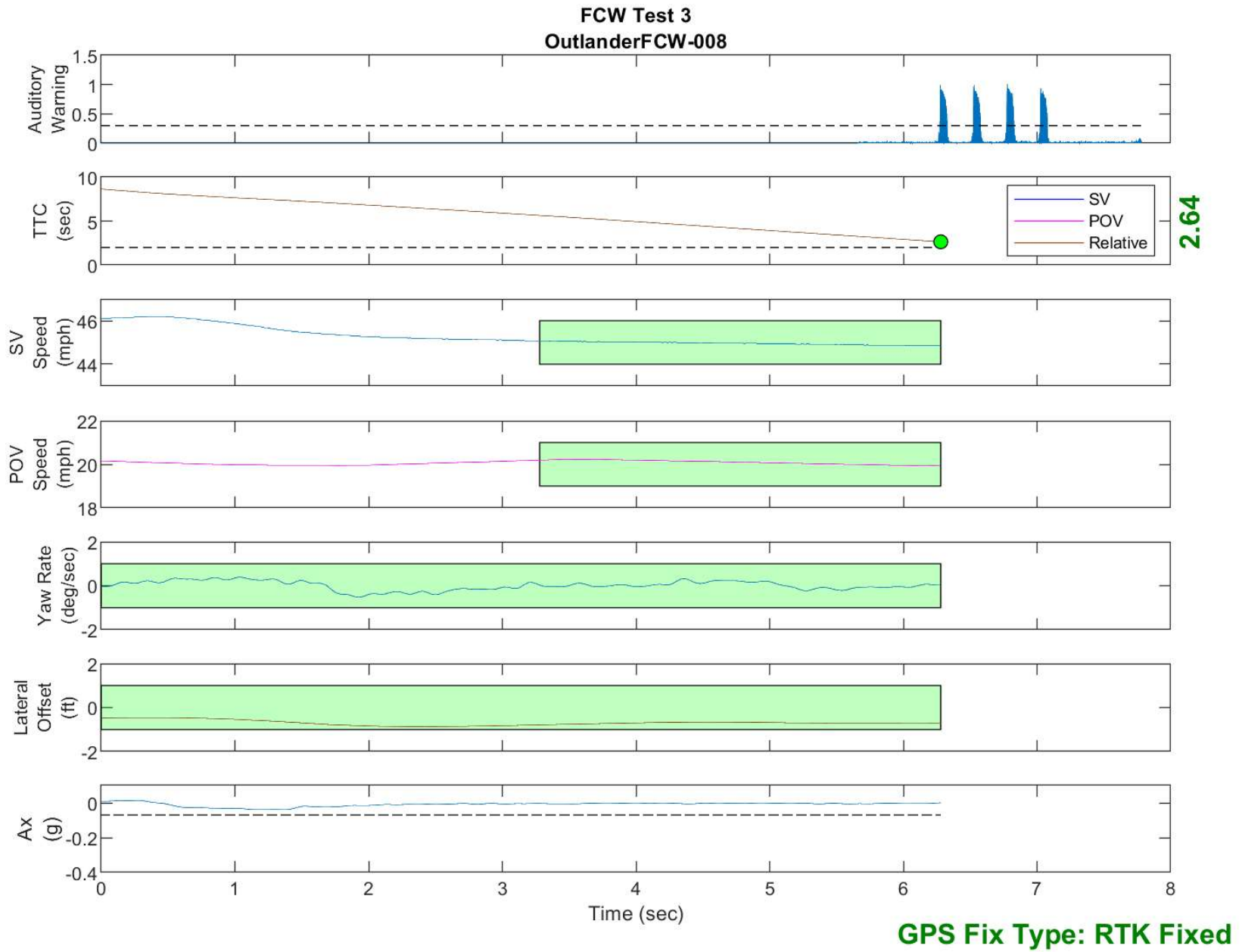


Figure D35. Time History for Run 8, FCW Test 3, Auditory Warning

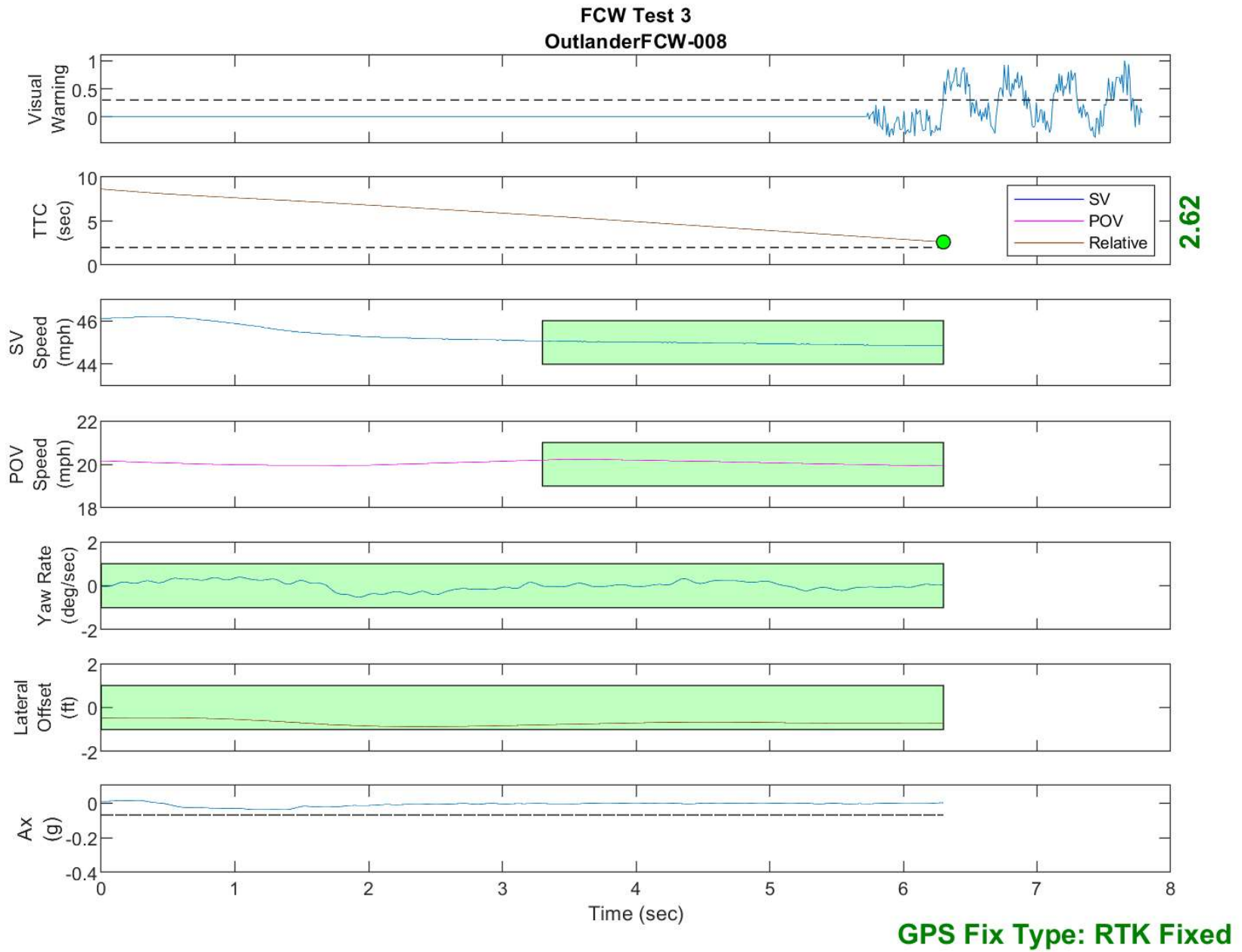


Figure D36. Time History for Run 8, FCW Test 3, Visual Warning

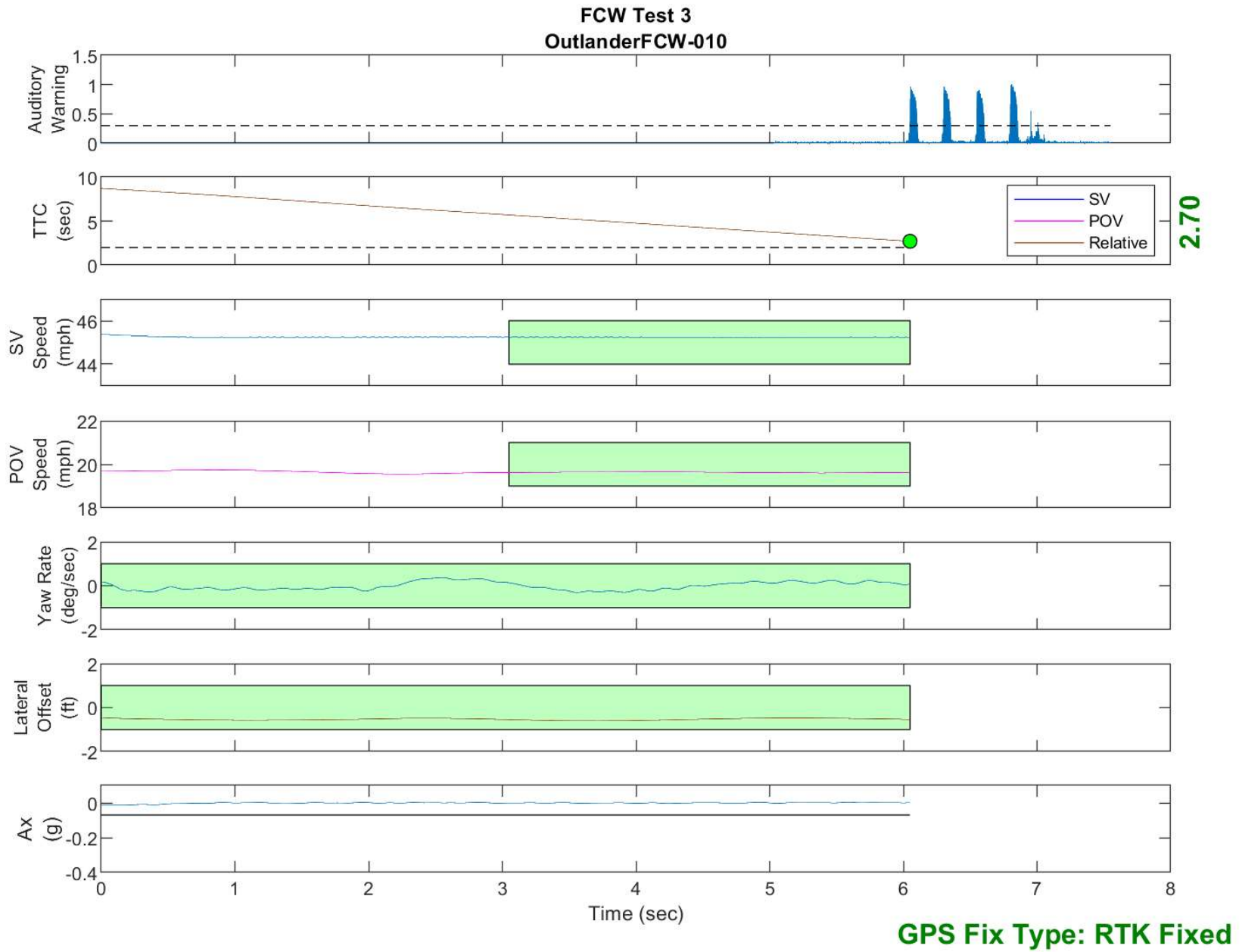


Figure D37. Time History for Run 10, FCW Test 3, Auditory Warning

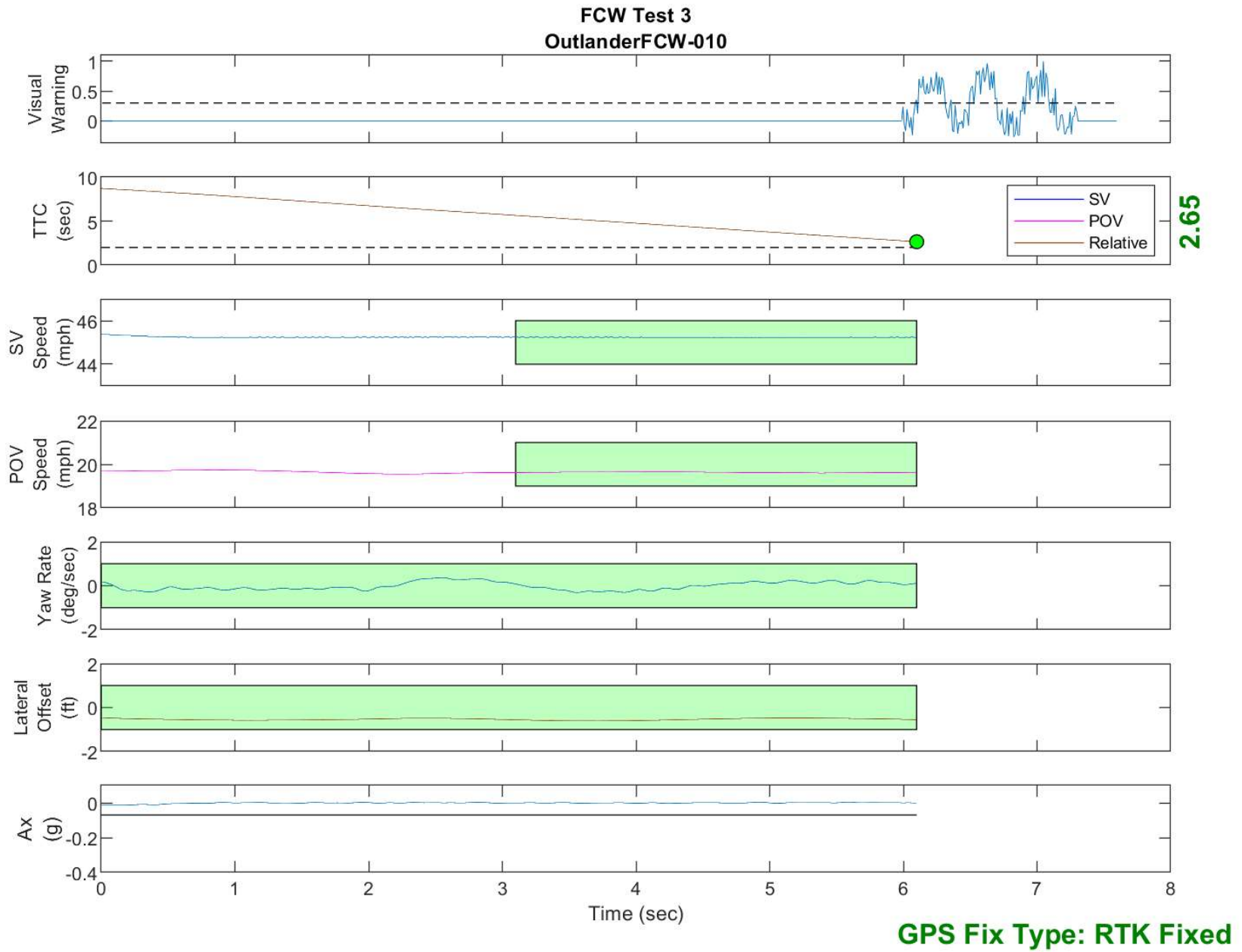


Figure D38. Time History for Run 10, FCW Test 3, Visual Warning

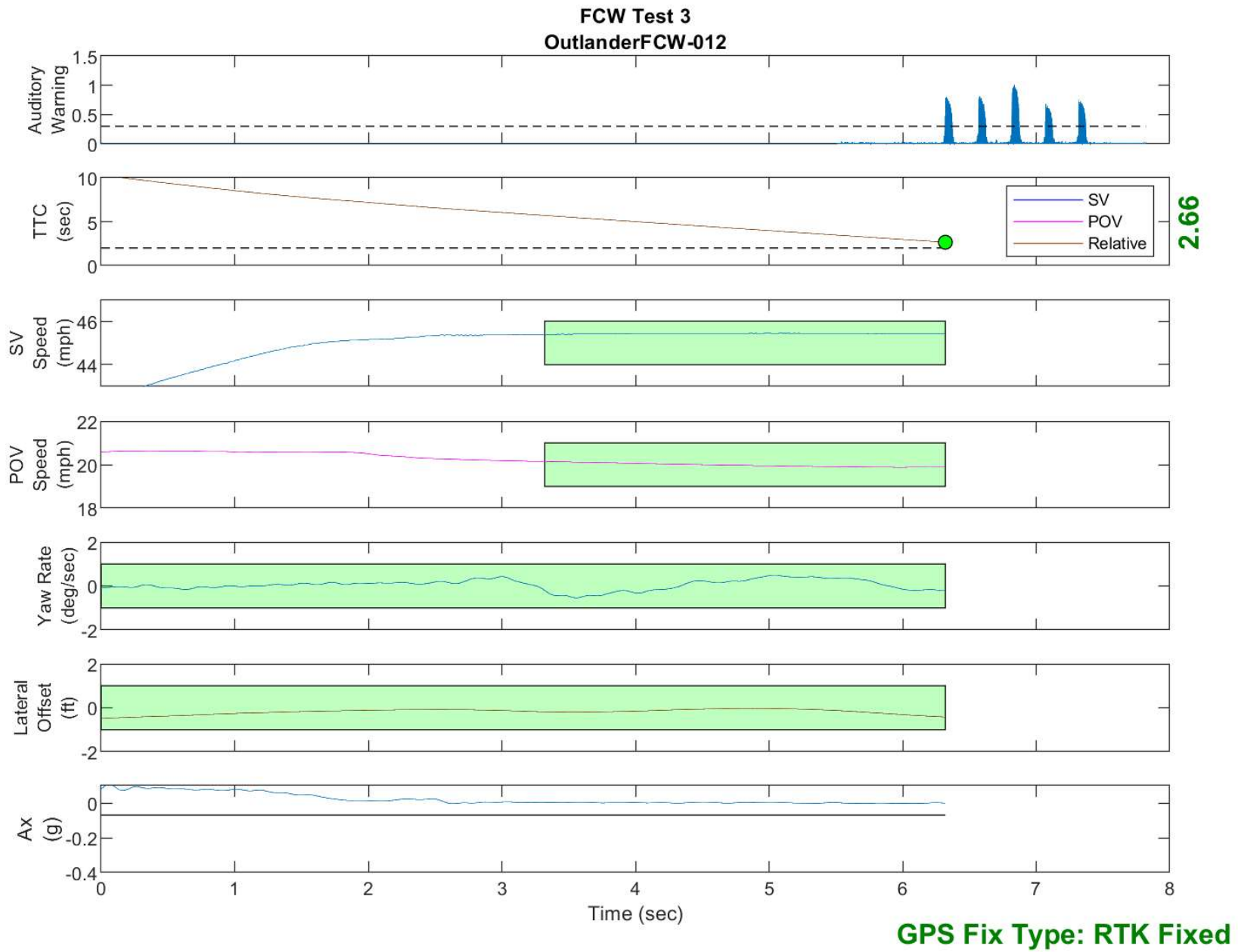


Figure D39. Time History for Run 12, FCW Test 3, Auditory Warning

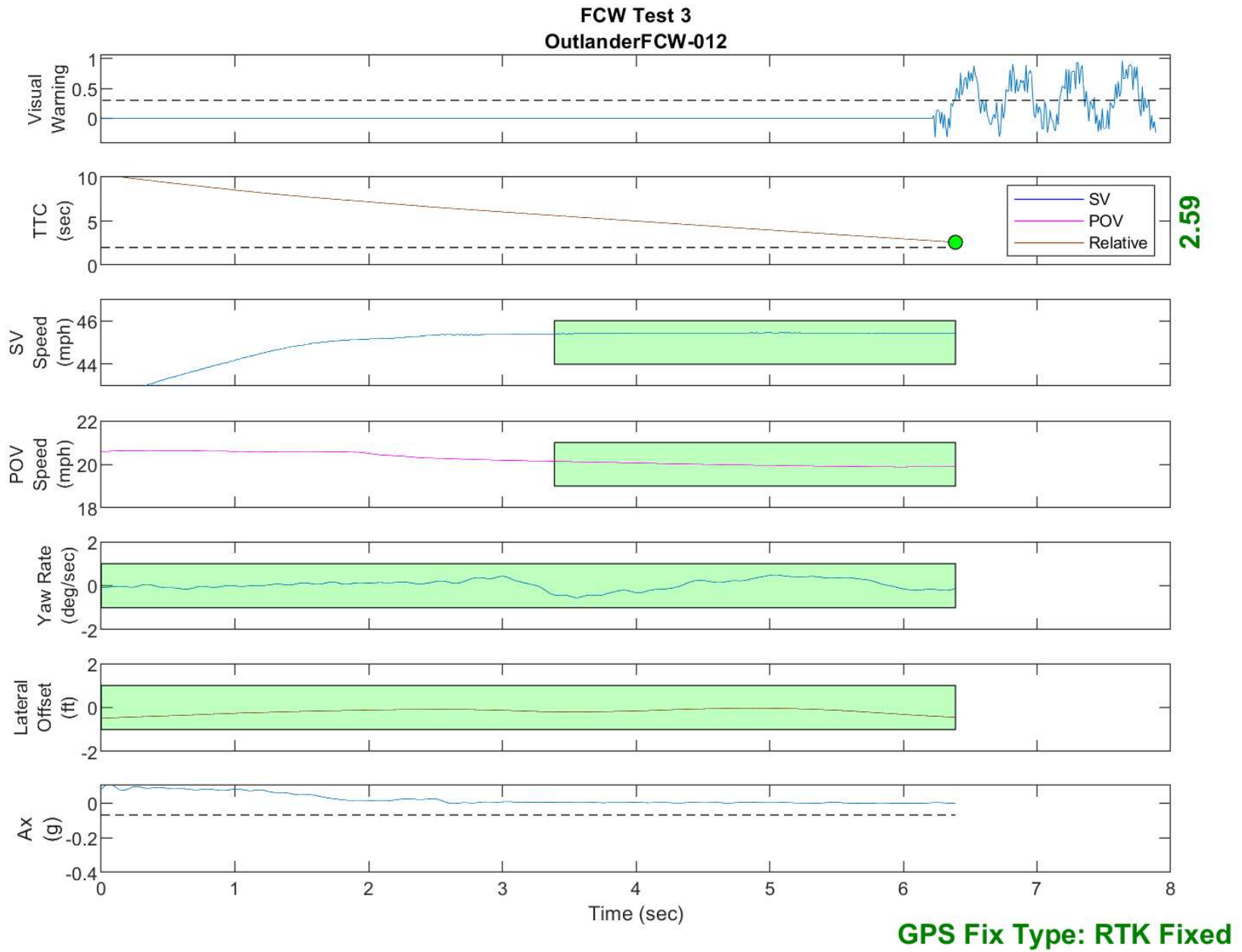


Figure D40. Time History for Run 12, FCW Test 3, Visual Warning

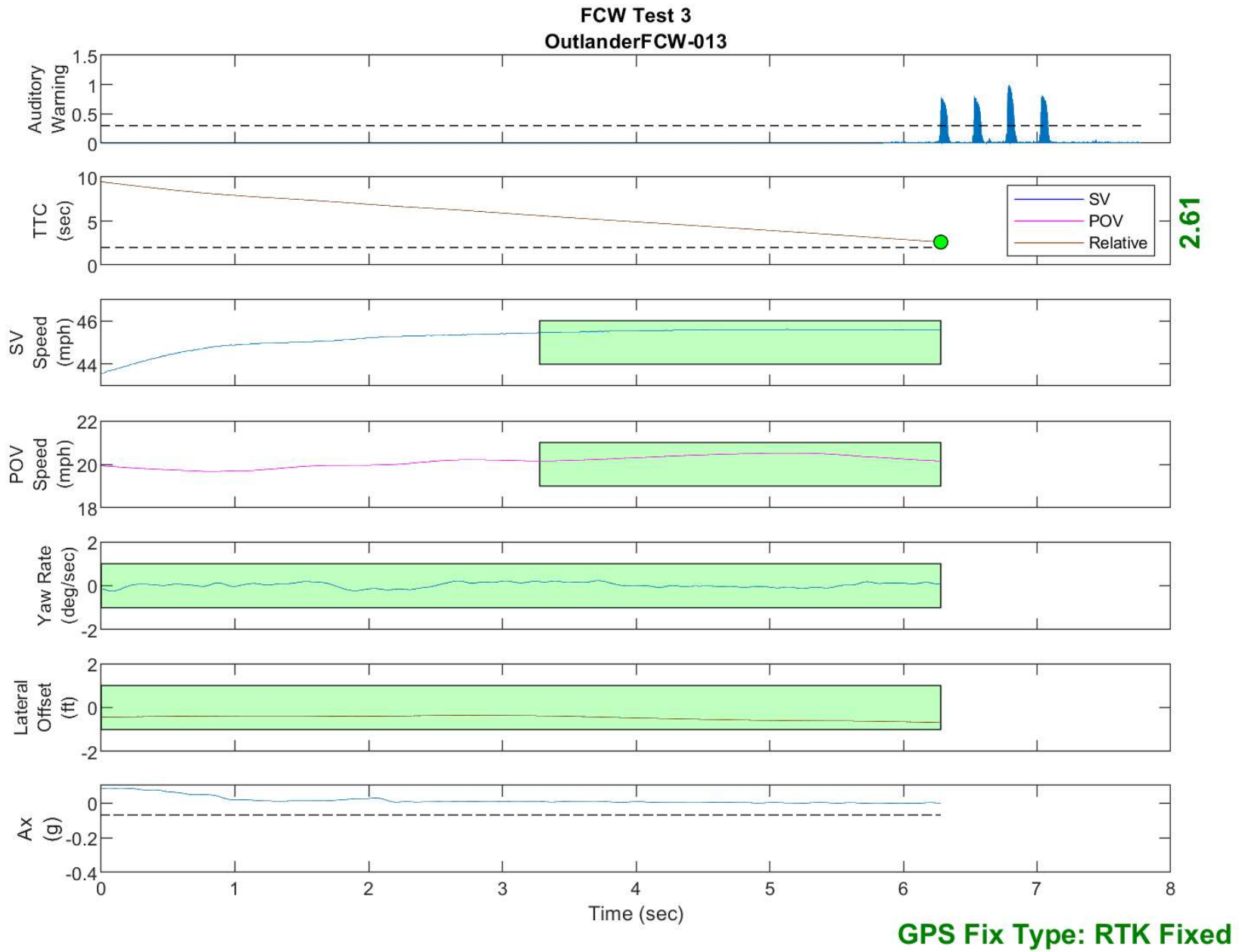


Figure D41. Time History for Run 13, FCW Test 3, Auditory Warning

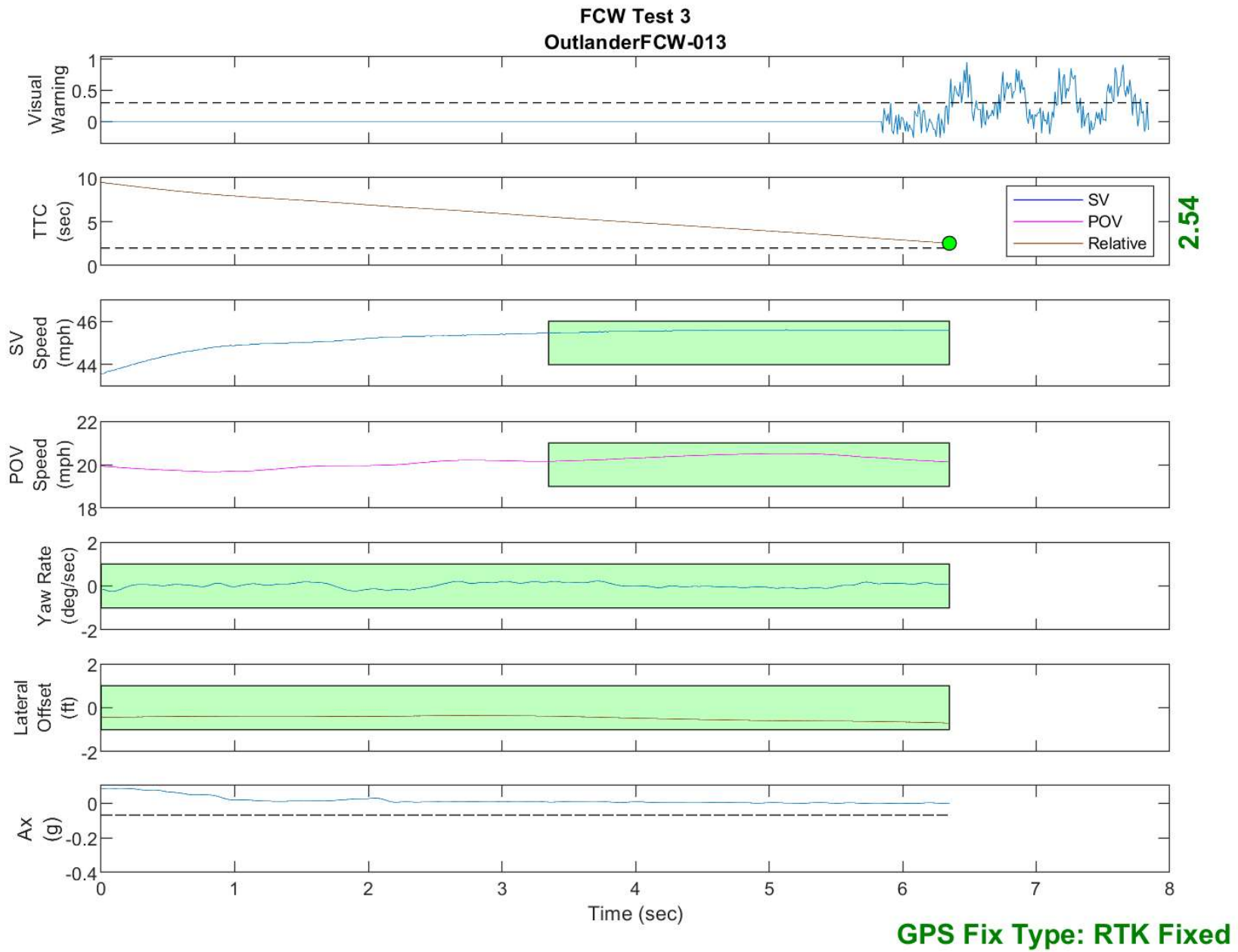


Figure D42. Time History for Run 13, FCW Test 3, Visual Warning

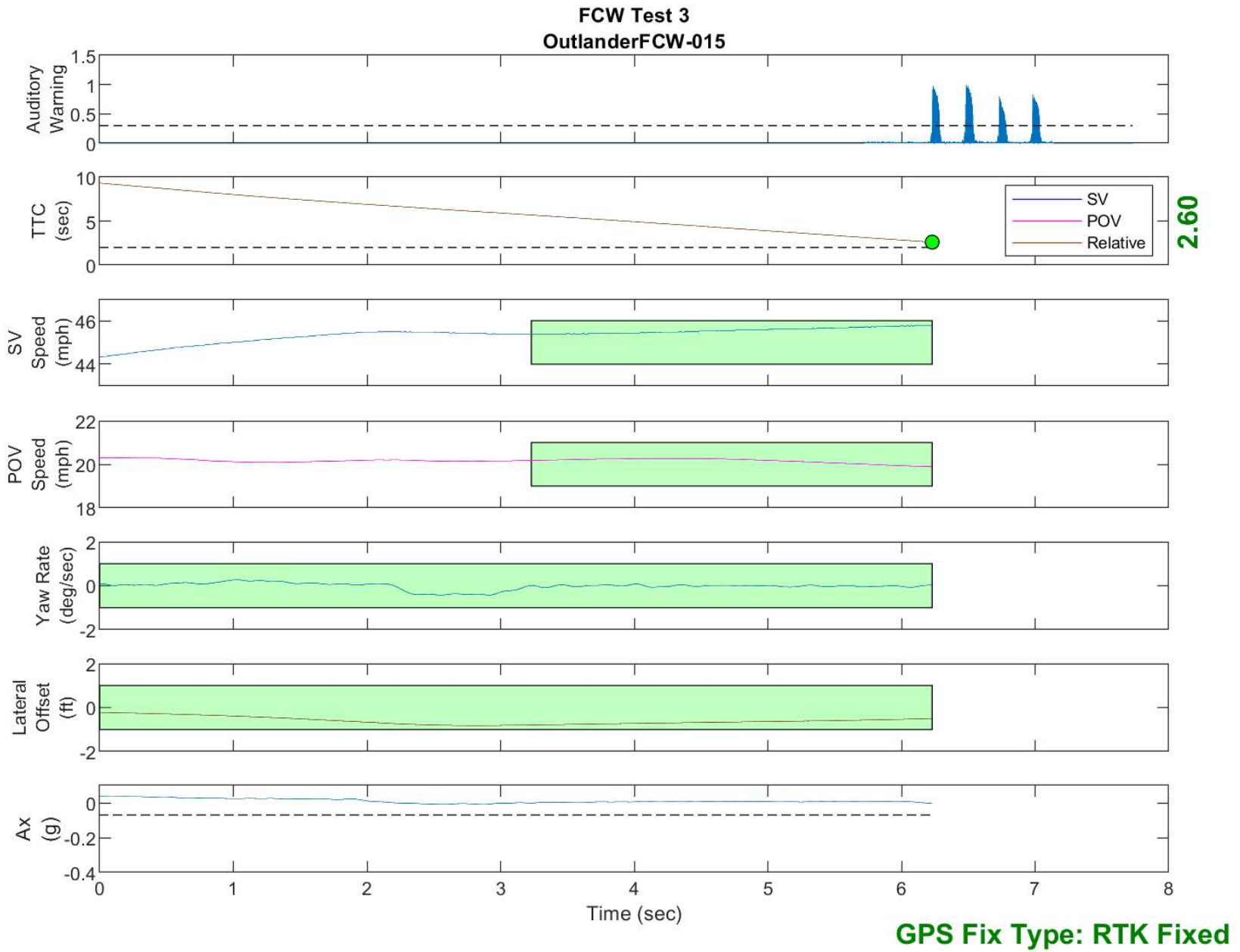


Figure D43. Time History for Run 15, FCW Test 3, Auditory Warning

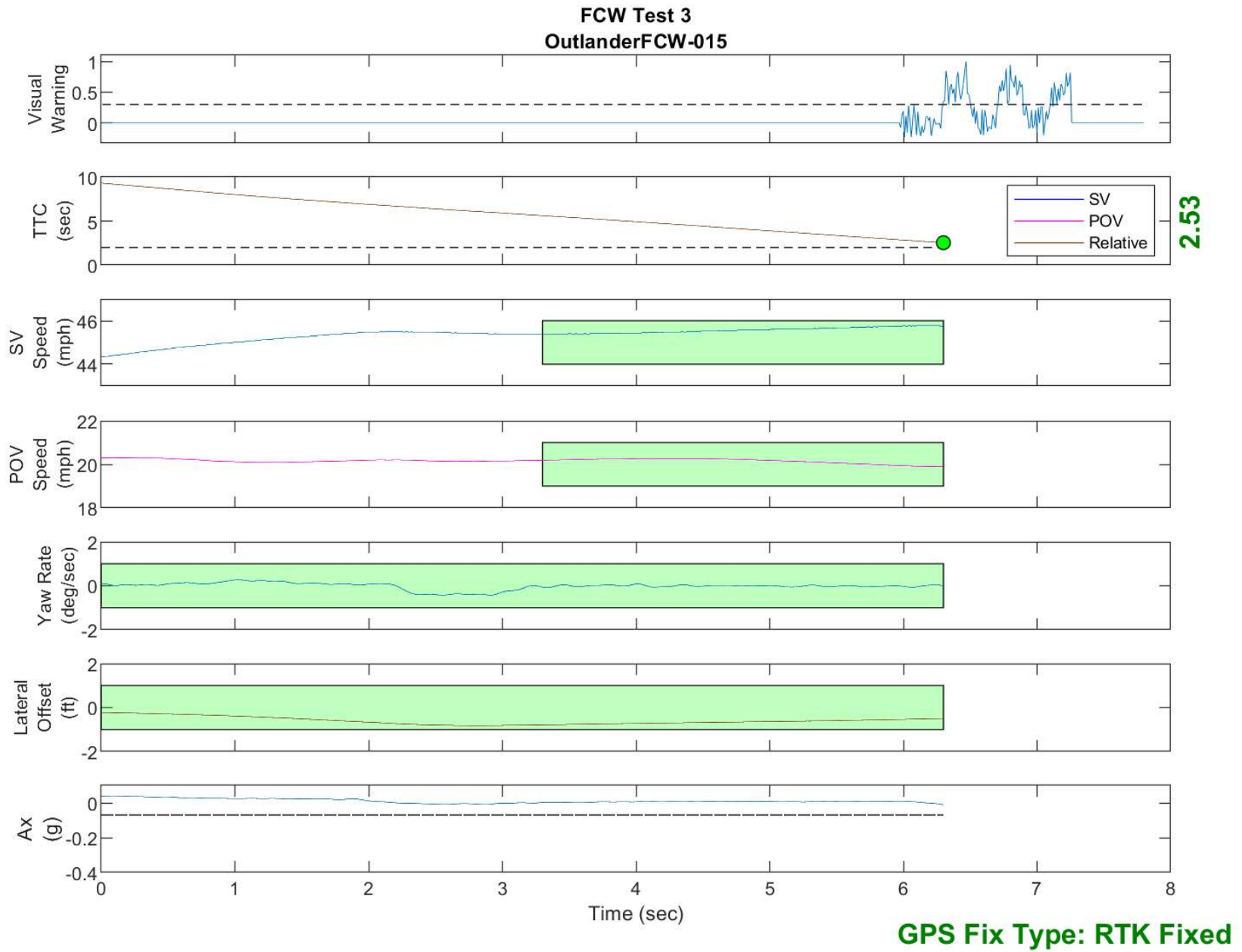


Figure D44. Time History for Run 15, FCW Test 3, Visual Warning

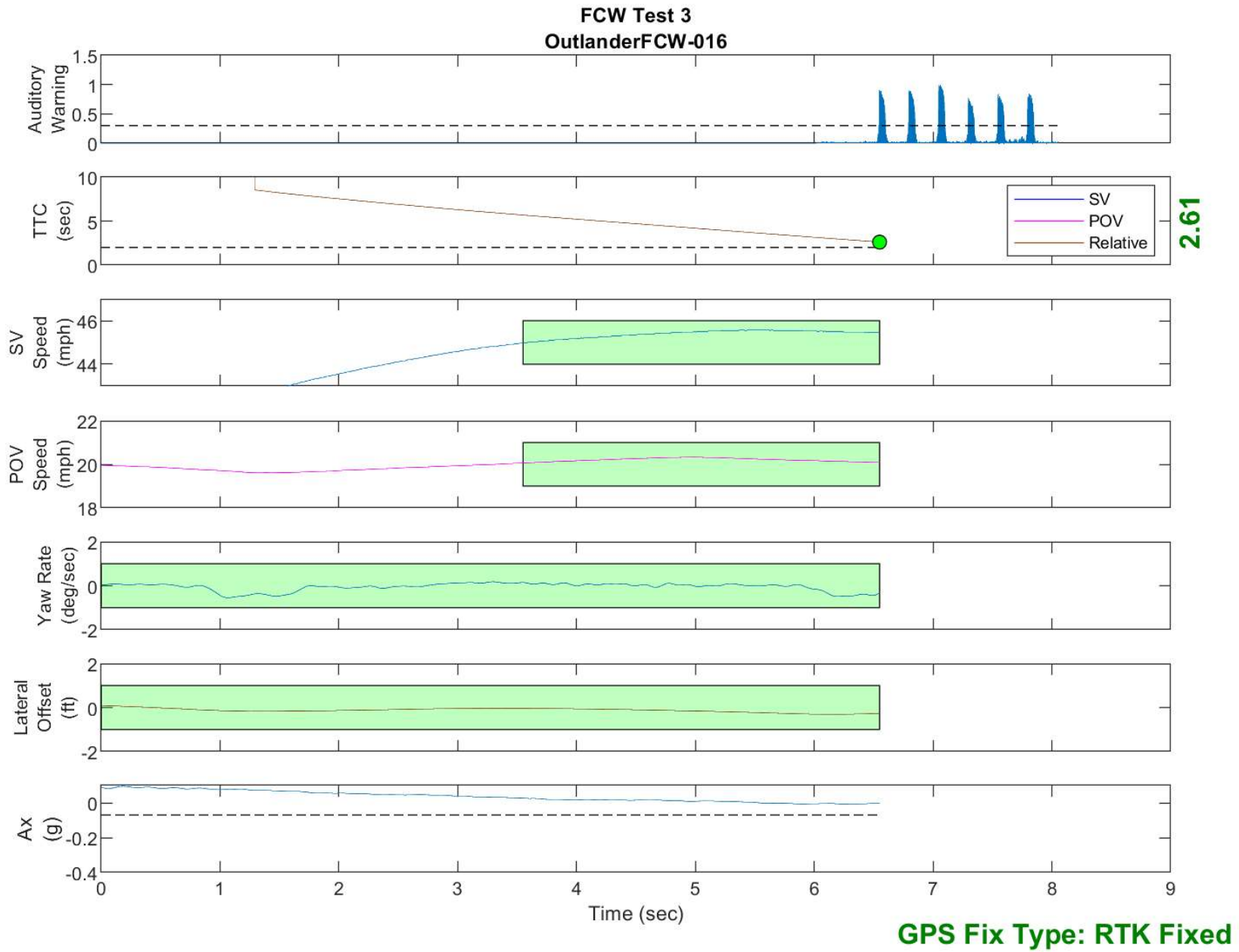


Figure D45. Time History for Run 16, FCW Test 3, Auditory Warning

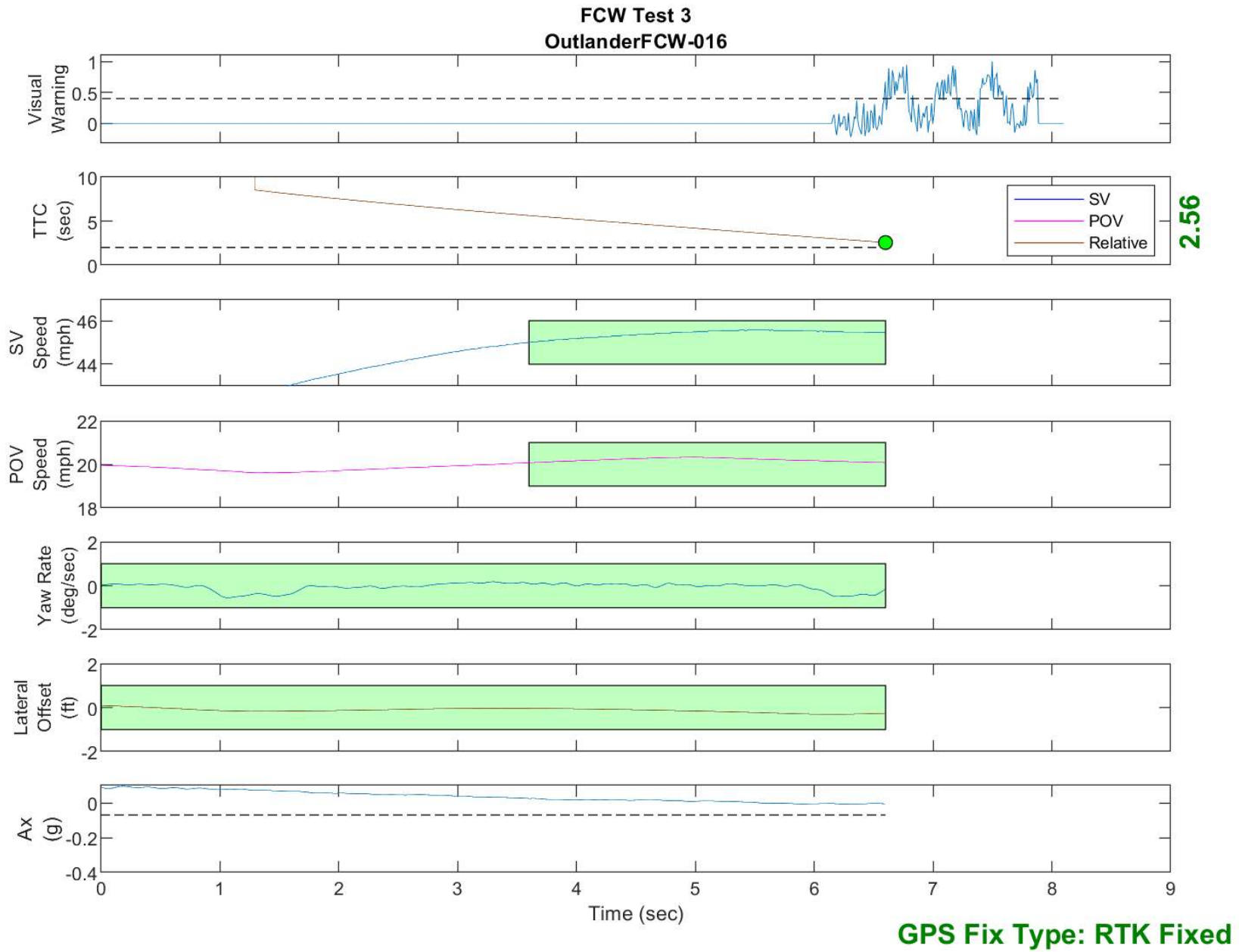


Figure D46. Time History for Run 16, FCW Test 3, Visual Warning

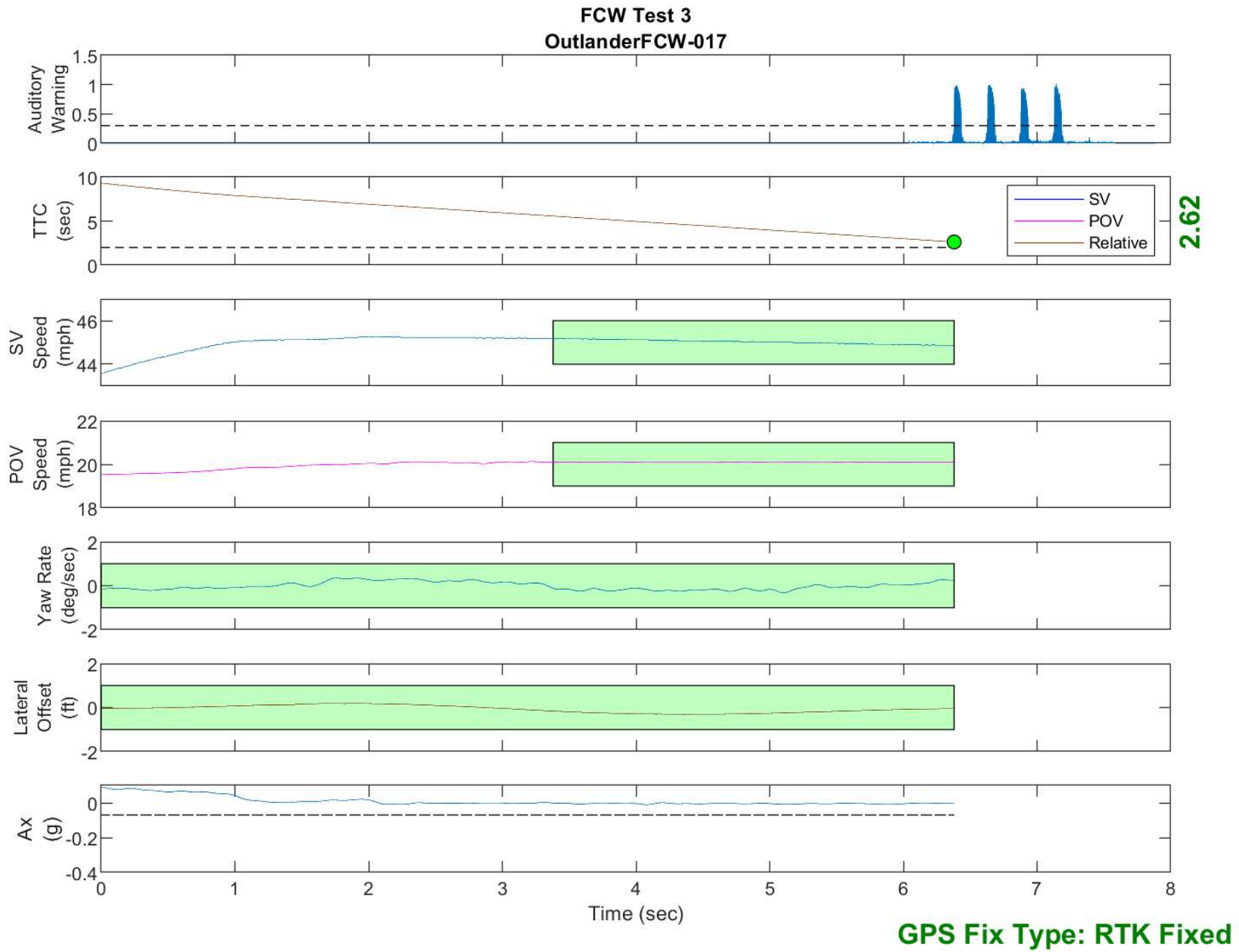


Figure D47. Time History for Run 17, FCW Test 3, Auditory Warning

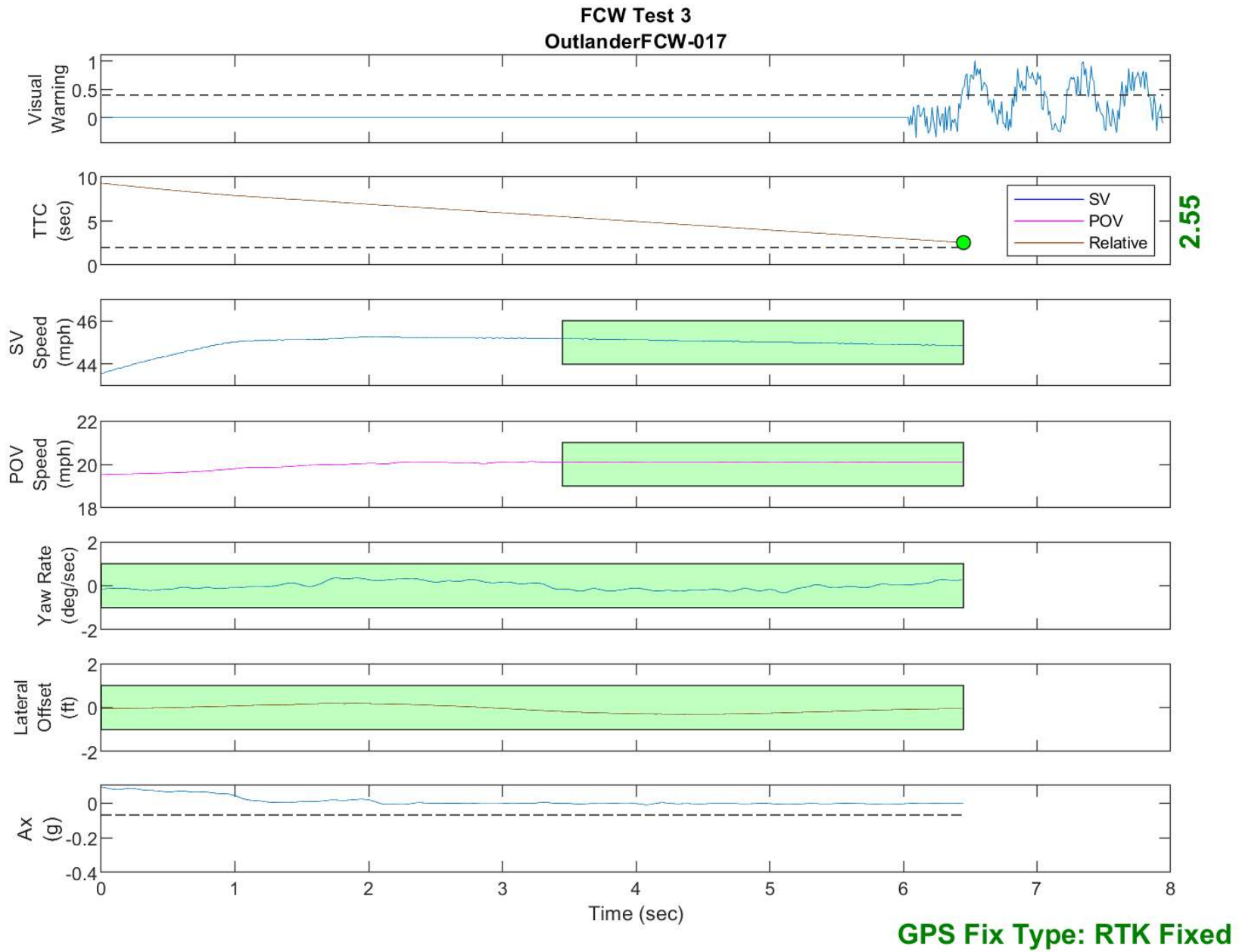


Figure D48. Time History for Run 17, FCW Test 3, Visual Warning