

OCAS-DRI-FCW-13-012

NCAP FORWARD COLLISION WARNING CONFIRMATION TEST

2013 Honda Accord

DYNAMIC RESEARCH, INC.

355 Van Ness Avenue, STE 200
Torrance, California 90501



30 January, 2013

Final Report

Prepared Under Contract No.: DTNH22-08-D-00095

**U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crash Avoidance Standards
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Prepared By: John Lenkeit

Approved By: Brian Kebschull

Approval Date: 30 January, 2013

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16. Abstract These tests were conducted on the subject 2013 Honda Accord in accordance with the specifications of the Office of Crash Avoidance Standards most current Test Procedure in docket NHTSA-2006-26555 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 "Forward Collision Warning Confirmation", March 2010. Three driving scenarios are utilized to assess this technology. In the first test, a subject vehicle (SV) approaches a stopped principle 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 SUMMARY

2013 Honda Accord

VIN: 1HGCR3F81DA0xxxx

Test Date: 1/10/2013

Forward Collision Warning setting: Long

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 2)

2013 Honda Accord

TEST VEHICLE INFORMATION

VIN: 1HGCR3F81DA0xxxx

Body Style: Sedan

Color: Silver

Date Received: 1/7/2013

Odometer Reading: 189 mi

Engine: 3.5 L V-6

Transmission: Automatic

Final Drive: FWD

Is the vehicle equipped with:

ABS X Yes No

Adaptive Cruise Control Yes X No

Collision Mitigating Brake System Yes X No

DATA FROM VEHICLE'S CERTIFICATON LABEL

Vehicle manufactured by: Honda of America Manufacturing, Inc

Date of manufacture: 09/12

DATA FROM TIRE PLACARD:

Tires size as stated on Tire Placard: Front: 215/55 R17

Rear: 215/55 R17

Recommended cold tire pressure: Front: 225 kPa (33 psi)

Rear: 225 kPa (33 psi)

FORWARD COLLISION WARNING

DATA SHEET 2: VEHICLE DATA

(Page 2 of 2)

2013 Honda Accord

TIRES

Tire manufacturer and model: Michelin Primacy MXV4

Front tire size: 215/55 R17

Rear tire size: 215/55 R17

VEHICLE ACCEPTANCE

Verify the following before accepting the vehicle

- ☒ All options listed on the "window sticker" are present on the test vehicle
- ☒ Tires and wheel rims are the same as listed.
- ☒ There are no dents or other interior or exterior flaws.
- ☒ The vehicle has been properly prepared and is in running condition.
- ☒ Verify that spare tire, jack, lug wrench, and tool kit (if applicable) is located in the vehicle cargo area.

FORWARD COLLISION WARNING
DATA SHEET 3: TEST CONDITIONS (Page 1 of 2)
2013 Honda Accord

GENERAL INFORMATION

Test date: 1/10/2013

AMBIENT CONDITIONS

Air temperature: 7.2 C (45 F)

Wind speed: 3.6 m/s (8.1 mph)

- X Wind speed $\leq$ 10 m/s (22 mph)
- X Tests were not performed during periods of inclement weather. This includes, but is not limited to, rain, snow, hail, fog, smoke, or ash.
- X Tests were conducted during daylight hours with good atmospheric visibility (defined as an absence of fog and the ability to see clearly for more than 5000 meters). The tests were not conducted with the vehicle oriented into the sun during very low sun angle conditions, where the sun is oriented 15 degrees or less from horizontal, and camera "washout" or system inoperability results.

VEHICLE PREPARATION

Verify the following:

All non consumable fluids at 100 % capacity : X

Fuel tank is full: X

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

Front: 225 kPa (33 psi)

Rear: 225 kPa (33 psi)

FORWARD COLLISION WARNING
DATA SHEET 3: TEST CONDITIONS (Page 2 of 2)
2013 Honda Accord

WEIGHT

Weight of vehicle as tested including driver and instrumentation

Left Front: 554.7 kg (1223 lb)

Right Front 526.2 kg (1160 lb)

Left Rear 352.0 kg (776 lb)

Right Rear 320.2 kg (706 lb)

Total: 1753.1 kg (3865 lb)

FORWARD COLLISION WARNING

DATA SHEET 4: FORWARD COLLISION WARNING SYSTEM OPERATION

(Page 1 of 3)

2013 Honda Accord

How is the Forward Collision Warning X Warning light
presented to the driver?
(Check all that apply) X Buzzer or audible
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 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, audible, vibration, or combination) etc.

The audible alert consists of a series of repeated beeps whose primary frequency is approximately 1278 Hz.

The visual alert consists of a row of yellow lights projected onto the windshield (HUD). The lights flash twice.

FORWARD COLLISION WARNING

DATA SHEET 4: FORWARD COLLISION WARNING SYSTEM OPERATION

(Page 2 of 3)

2013 Honda Accord

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.

"FCW off" is a setting which can be selected using the multi-information display in the top center of the dash, and the associated rotary knob, DISP and SELECT buttons located on the lower right side of lower display in the center of the dash. See below for details.

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

If yes please provide a full description

FCW settings can be adjusted using the multi-information display in the top center of the dash, and the associated rotary knob, DISP and SELECT buttons located on the lower right side of lower display in the center of the dash.

Menu hierarchy is:

Vehicle Settings

Driver Assist System Setup

Forward Collision Warning Distance

Long

Normal

Short

Off

FORWARD COLLISION WARNING

DATA SHEET 4: FORWARD COLLISION WARNING SYSTEM OPERATION

(Page 3 of 3)

2013 Honda Accord

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

If yes please provide a full description.

- The distance between your vehicle and the vehicle ahead of you is too short.
- A vehicle cuts in front of you at a slow speed, and it brakes suddenly.
- A vehicle suddenly crosses in front of you.
- When either your vehicle or the vehicle ahead of you accelerates rapidly.
- The vehicle ahead of you is a motorcycle, a small vehicle, or a unique vehicle such as a tractor.
- When you drive off-road or on a mountain road, or curved and winding road for an extended period that makes it difficult for the sensor/camera to properly detect a vehicle in front of you.
- When there are pedestrians or animals in front of your vehicle.
- When you drive in bad weather (rain, fog, etc.).
- A heavy load in the rear or modifications to the suspension tilts your vehicle.
- An abnormal tire condition is detected (wrong tire size, flat tire, etc.).
- When the windshield is blocked by dirt, mud, leaves, wet snow, etc.
- When the temperature inside the system is high.
- A sudden change between light and dark such as an entrance or exit of a tunnel.
- You drive into the sunlight (e.g. at dawn or dusk).
- When the windshield is dirty or cloudy.
- When streetlights are perceived as the taillight of a vehicle in front of yours.
- When driving at night, the vehicle ahead of you is running with either taillight bulb burned out.
- When you drive in the shadows of trees, buildings, etc.
- When your vehicle is towing a trailer.

Notes:

Speed at which FCW system becomes fully active is 10 mph

System Supplier is Magna Electronics

Model number: 101960AH/101961AH/101962AH

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) on a Straight Road
- 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.

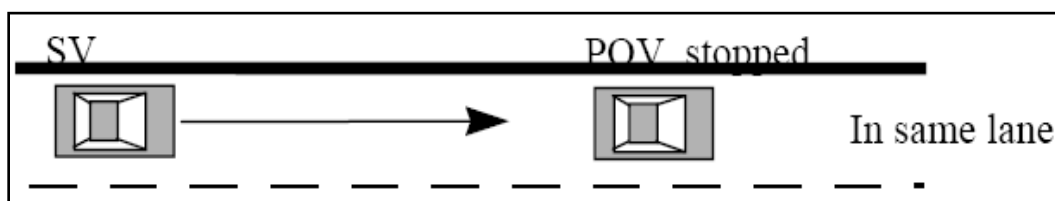


Figure 1. Depiction of Test 1

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. (Note: TTC values were computed in accordance with Ref 1). The TTC for this test was calculated by considering the speeds of the subject vehicle (SV) and the lead vehicle (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 kph), 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 the SV approaches the rear of the POV.

The SV was driven at a nominal speed of 45 mph (72.4 kph) 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 percent 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 kph) for a period of three seconds prior to (1) the required FCW alert or (2) before the range fell to less than 90 percent 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 the required FCW alert occurred, or before the range fell to less than 90 percent 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.

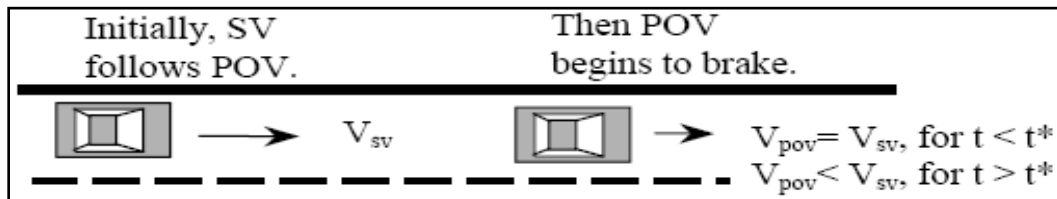


Figure 2. Depiction of Test 2

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

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).

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 kph), 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.

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 kph) 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 kph) for a period of 3 seconds prior to (1) the required FCW alert or (2) before the range fell to less than 90 percent 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 $\pm 0.03g$, 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 (1) 500 ms after the first local deceleration peak occurs, to (2) 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 the required FCW alert occurred, or before the range fell to less than 90 percent 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 issue a timely alert. As depicted in Figure 3, the scenario was conducted with a closing speed equal to 25.0 mph (40.2 kph).



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 kph) in the center of the lane of travel.

The SV was driven at 45.0 mph (72.4 kph), 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., $TTC = 1.8$ 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 kph) for a period of 3 seconds prior to (1) the required FCW alert or (2) before the range fell to less than 90 percent 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 kph) 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 the required FCW alert occurred, or before the range fell to less than 90 percent 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 2000 Honda Accord. This satisfied the test requirement of Ref 1 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:

- High pressure nitrogen bottle, strapped to the front passenger seat, with regulator and pressure gauges.
- Pneumatic piston-type actuator, with solenoid valve
- "Pickle" switch to activate brakes

D. Instrumentation

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

As part of the pre-test instrumentation verification process, the tonal frequency of the audible warning was determined through use of the PSD (Power Spectral Density) function in Matlab. This was accomplished in order to identify the center frequency around which a band-pass filter was applied to subsequent audible warning data such that the beginning of the audible warning could be programmatically determined. The band-pass filter used for the audible warning signal was a phase-less, forward-reverse pass, 5th order elliptical (Cauer) digital filter, with 3 dB peak-to-peak ripple, minimum stop-band attenuation of 60 dB, and a pass-band of center frequency $\pm 5\%$ of the identified center frequency.

TABLE 1. TEST INSTRUMENTATION AND EQUIPMENT

Type	Output	Range	Accuracy, Other Primary Specs	Mfr, Model
Tire Pressure Gauge	Vehicle Tire Pressure	0-100 psi 0-690 kPa	0.5 psi 3.45 kPa	Ashcroft, D1005PS
Platform Scales	Vehicle Total, Wheel, and Axle Load	8000 lb 35.6 kN	± 1.0% of applied load	Intercomp, SWII
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)
Multi-Axis Inertial Sensing System	Position; Longitudinal, Lateral, and Vertical Accels; Lateral, Longitudinal and Vertical Velocities; Roll, Pitch, Yaw Rates; Roll, Pitch, Yaw Angles	Latitude: ± 90 deg Longitude: ± 180 deg Altitude: 0-18 km Velocity: 0-1000 knots Accel: ± 100 m/s ² Angular Rate: ± 100 deg/s Angular Disp: ± 180 deg	Position: ± 2 cm Velocity: 0.05 km/h Accel: ≤ 0.01% of full range Angular Rate: ≤ 0.01% of full range Roll/Pitch Angle: ± 0.03 deg Heading Angle: ± 0.1 deg	Oxford Technical Solutions (OXTS), Inertial +
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

TABLE 1. TEST INSTRUMENTATION AND EQUIPMENT (CONTD)

Type	Output	Range	Accuracy, Other Primary Specs	Mfr, Model
Data Acquisition System [Includes amplification, anti-aliasing, and analog to digital conversion.]	Record Time; Position; Velocity; Distance to lane markings; Headway distance; Closing Velocity; Lateral, Longitudinal, and Vertical Accels; Roll, Yaw, and Pitch Rates; Roll, Yaw and Pitch Angles.	Sufficient to meet or exceed individual sensors	Sound digitized at 10 kHz, all other channels digitized at 100 Hz. Accuracy is sufficient to meet or exceed individual sensors	SoMat, eDaq ECPU processor
				SoMat, High level Board EHLS
Microphone	Sound (to measure time at alert)	Max SPL: 139 dB/SPL Frequency Response: 40 Hz – 20 kHz	≤ 3 dB over Freq. Resp. Range	Sennheiser, e614
Light Sensor	Light intensity (to measure time at alert)	Spectral Bandwidth: 440-800 nm	Rise time < 10 msec	DRI designed and developed Light Sensor
Accelerometer	Acceleration (to measure time at alert)	± 5g	≤ 3% of full range	Silicon Designs, 2210-005
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

APPENDIX A

Photographs

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Figure A1. Front View of Subject Vehicle



Figure A2. Rear View of Subject Vehicle

 HONDA		2013 ACCORD 4DR EX-L V6 EXT: ALABASTER SILVER M ENGINE NUMBER: _____ INT: BLACK	
STANDARD EQUIPMENT AT NO EXTRA COST			
* TECHNICAL FEATURES * 278hp 3.5-Liter SOHC 24-Valve i-VTEC V6 Variable Cylinder Management (VCM) Engine w/ Earth Dreams Technology 6-Speed Automatic Transmission 4-Wheel Disc Brakes - Front MacPherson Strut Suspension - Rear Multi-Link Suspension - Electric Power-Assisted Rack-and-Pinion Steering - Front and Rear Stabilizer Bars - ECO Assist System - Immobilizer Theft-Deterrent System * SAFETY FEATURES * - Driver's and Front Passenger's Dual-Stage Airbags (SRS) - Driver's and Front Passenger's Side Airbags w/ SmartVent - Side Curtain Airbags with Rollover Sensor - Forward Collision Warning - Lane Departure Warning - Vehicle Stability Assist (VSA) - Anti-Lock Braking System (ABS) - Brake Assist - Electronic Brake Distribution (EBD) - ACE II Body Structure - Tire Pressure Monitoring System - Side-Impact Door Beams - Daytime Running Lights (DRL) - LATCH System for Child Seats * INTERIOR FEATURES * - Leather-Trimmed Seats - Leather-Wrapped Steering Wheel - Intelligent Multi-Information Display (i-MID) w/ Rear Multi-View Camera 360-Watt AM/FM/CD/MP3 Audio Touch Screen System with 7 Speakers		Manufacturer's Suggested Retail Price \$30,070.00 Full Tank of Fuel No Charge -XM Satellite Radio Includes Free Activation and 3 Months Free Service (excl. AK & HI) KEY STANDARD FEATURES *Rearview Camera *Bluetooth HandsFreeLink *USB Audio Interface *Side Curtain Airbags with Rollover Sensor	
* EXTERIOR FEATURES * - One-Touch Power Moonroof 17" X 7.5" Alloy Wheels - P215/55 R17 All-Season Tires - Auto-On/Off Headlights - LED Taillights - Fog Lights - Heated Power Door Mirrors with Turn Indicators - Expanded View Driver's Mirror - Dual Chrome Exhaust Finishers - Smart Entry System with Security System		Destination and Handling 790.00 TOTAL VEHICLE PRICE (includes Pre-Delivery Service) \$30,860.00 License and title fees, state and local taxes and dealer options and accessories are not included in the manufacturer's suggested retail price.	
PORT OF ENTRY: MARYSVILLE DELIVERY POINT: LOS ANGELES SHIP#: _____ ROW/SPACE: 721-016 TRANS.METHOD: A70 SAN BERNARDINO VIN: 1HGCR3F81DA0_____		HW CODE: HW-2232 EMISSION: 50 STATE CONTROL NO: 054987 DEALER: _____	

EPA DOT	Fuel Economy and Environment	 Gasoline Vehicle
Fuel Economy  25 MPG combined city/hwy 4.0 gallons per 100 miles Midsize Cars range from 13 to 99 MPG. The best vehicle rates 112 MPGe.		You Save \$850 in fuel costs over 5 years compared to the average new vehicle.
Annual fuel cost \$2,150	Fuel Economy & Greenhouse Gas Rating (tailpipe only) 6 1 10 This vehicle emits 350 grams CO ₂ per mile. The best emits 0 grams CO ₂ per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.	Smog Rating (tailpipe only) 5 1 10 Best
Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 23 MPG and costs \$11,600 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.55 per gallon. MPGe 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		
		

PARTS CONTENT INFORMATION FOR VEHICLES IN THIS CARLINE U.S./Canadian Parts Content: 65 % Major Sources of Foreign Parts Content: JAPAN 25 % NOTE: Parts content does not include final assembly, distribution or other non-parts costs.	GOVERNMENT 5-STAR SAFETY RATINGS Overall Vehicle Score Based on the combine ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight. Not Rated <table border="1"> <tr> <td>Frontal Crash</td> <td>Driver Passenger</td> <td>Not Rated</td> </tr> <tr> <td colspan="3">Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.</td> </tr> <tr> <td>Side Crash</td> <td>Front seat Rear seat</td> <td>Not Rated</td> </tr> <tr> <td colspan="3">Based on the risk of injury in a side impact.</td> </tr> <tr> <td>Rollover</td> <td></td> <td>Not Rated</td> </tr> <tr> <td colspan="3">Based on the risk of rollover in a single vehicle crash.</td> </tr> </table> Star Ratings range from 1 to 5 stars (★★★★★) with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA) www.safercar.gov or 1-888-327-4236 This vehicle is equipped with a front bumper of a type that has been tested at an impact speed of 5 miles per hour, and a rear bumper of a type that has been tested at an impact speed of 5 miles per hour, resulting in no damage to the vehicle's body and safety systems and minimal damage to the bumper and attachment hardware. "Minimal damage to the bumper" means minor cosmetic damage that can be repaired with the use of common repair materials and without replacing any parts. The stronger the bumper, the less likely the vehicle will require repair after a low-speed collision. This vehicle exceeds the current federal bumper standard of 2.5 miles per hour.	Frontal Crash	Driver Passenger	Not Rated	Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.			Side Crash	Front seat Rear seat	Not Rated	Based on the risk of injury in a side impact.			Rollover		Not Rated	Based on the risk of rollover in a single vehicle crash.		
Frontal Crash	Driver Passenger	Not Rated																	
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.																			
Side Crash	Front seat Rear seat	Not Rated																	
Based on the risk of injury in a side impact.																			
Rollover		Not Rated																	
Based on the risk of rollover in a single vehicle crash.																			

Figure A3. Window Sticker (Monroney Label)

MFD. BY HONDA OF AMERICA MFG., INC. 09/'12

GVWR 4542LBS GAWR F 2491LBS R 2072LBS

GVWR 2060KG GAWR F 1130KG R 940KG

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

V.I.N.: 1HGCR3F81DA00

TYPE: PASSENGER CAR

T2G

D

AD7

- NH700M

- A

- A

Figure A4. Vehicle Certification Label



Figure A5. Front View of Principal Other Vehicle



Figure A6. Rear View of Principal Other Vehicle



Figure A7. DGPS and Inertial Measurement Unit Installed in Subject Vehicle

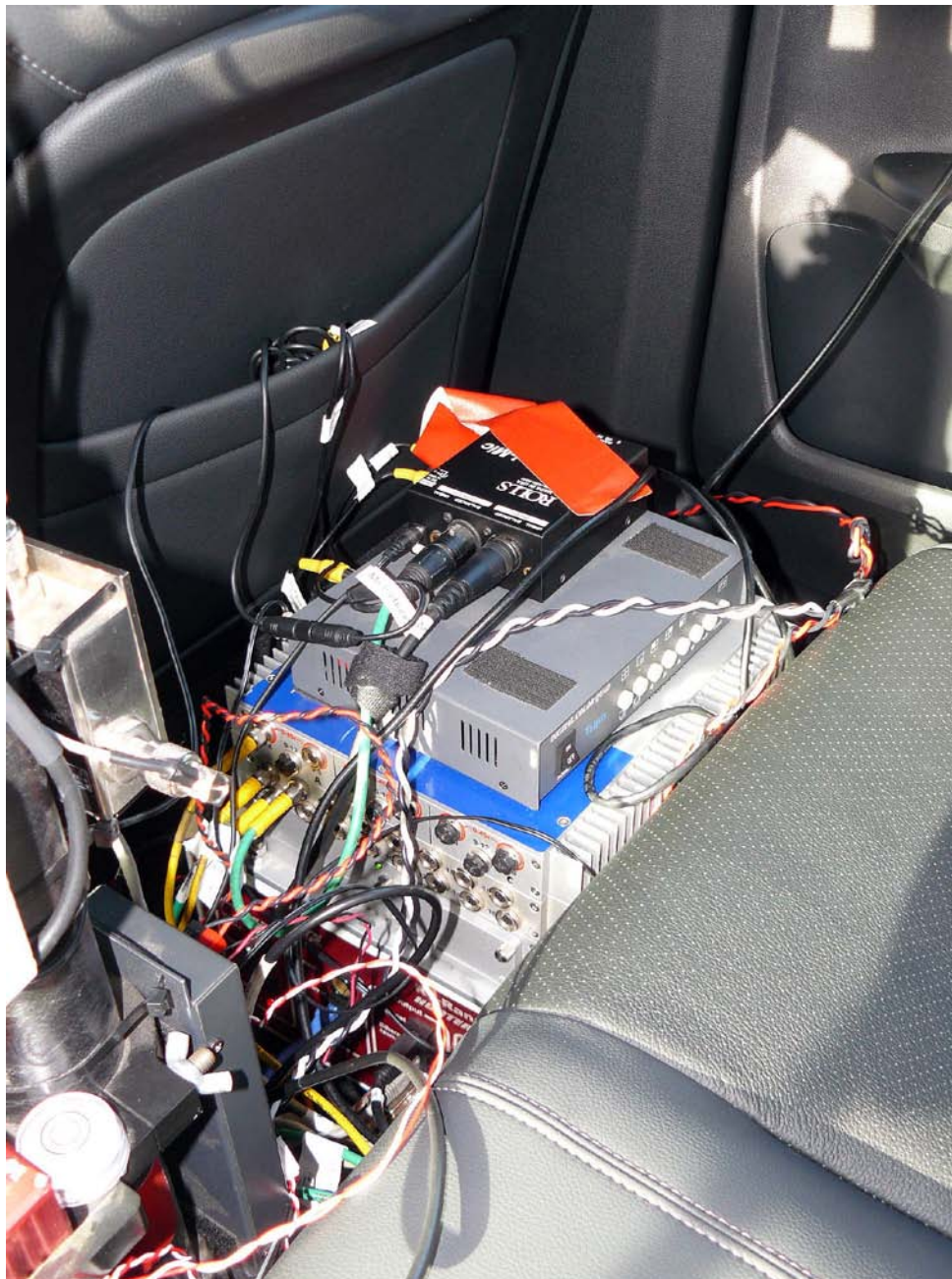


Figure A8. Data Acquisition System Installed in Subject Vehicle



Figure A9. Computer Installed in Subject Vehicle



Figure A10. Brake Actuation System Installed in Principal Other Vehicle



Figure A11. Sensors for Detecting Acoustic and Visual Alerts



Figure A12. Visual Warning Display



Figure A13. Menus for Adjusting FCW Settings

APPENDIX B

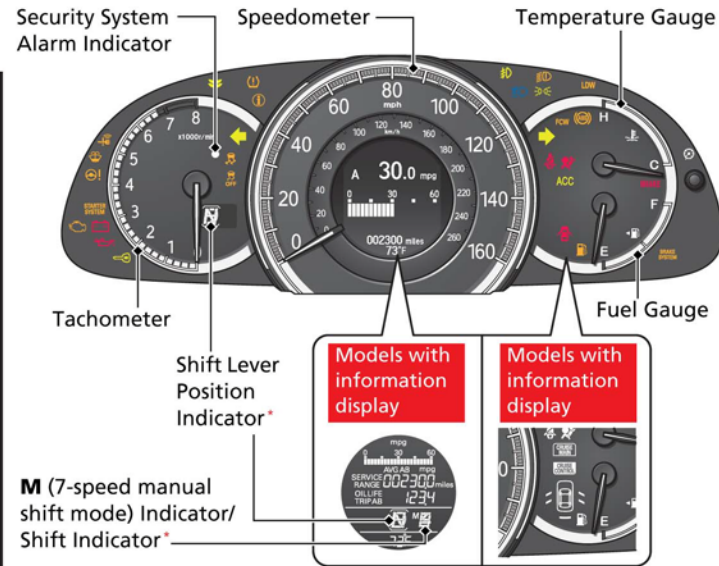
Excerpts from Owner's Manual

Instrument Panel [P. 67](#)

Gauges [P. 89](#) / Information Display* [P. 90](#) /
Multi-Information Display* [P. 93](#) / System Indicators [P. 68](#)

System Indicators

- Malfunction Indicator Lamp
- Low Oil Pressure Indicator
- Charging System Indicator
- Vehicle Stability Assist (VSA®) System Indicator
- VSA® OFF Indicator
- Immobilizer System Indicator
- Smart Entry System Indicator
- STARTER SYSTEM**
U.S. Starter System Indicator*
- Canada** Starter System Indicator*
- Electric Power Steering (EPS) System Indicator
- Washer Level Indicator*
- System Message Indicator*
- Maintenance Minder Indicator*



System Indicators

- Low Tire Pressure/TPMS Indicator
- ECON mode Indicator
- FCW** Forward Collision Warning (FCW) Indicator*
- LDW** Lane Departure Warning (LDW) Indicator*

Lights Reminders

- Lights On Indicator
- High Beam Indicator
- Fog Light Indicator*
- Light Control Indicator*

System Indicators

- Turn Signal and Hazard Warning Indicators
- Anti-lock Brake System (ABS) Indicator
- BRAKE**
U.S. Parking Brake and Brake System Indicator (Red)
- Canada** Parking Brake and Brake System Indicator (Red)
- BRAKE SYSTEM**
U.S. Brake System Indicator (Amber)
- Canada** Brake System Indicator (Amber)
- Door and Trunk Open Indicator
- Low Fuel Indicator
- Seat Belt Reminder Indicator
- Supplemental Restraint System Indicator
- ACC** Adaptive Cruise Control (ACC) Indicator*
- CRUISE MAIN** Indicator*
- CRUISE CONTROL** Indicator*

QRG

Quick Reference Guide - 2013 Accord Sedan

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* Not available on all models

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Instrument Panel

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Indicator	Name	On/Blinking	Explanation	Message*1	
FCW	Forward Collision Warning (FCW) Indicator*	- Comes on for a few seconds when you change the power mode to ON, then goes off. - Comes on when you have customized FCW to turn off. - Comes on if there is a problem with the FCW system.	Stays on constantly without FCW off - Have the vehicle checked by a dealer.	 	 
		Models with information display Blinks when the system detects a likely collision with a vehicle in front of you. The beeper sounds.	Blinks while driving - Take appropriate action to prevent a collision (apply the brakes, change lanes, etc.).	—	—
		All models Comes on when the FCW system shuts itself off.	Models with information display Stays on - The temperature inside the FCW system is too high. The system activates when the temperature inside the system cools down. Automatic shutoff P. 460		—
			Stays on - The radar sensor or the area around the camera is blocked by dirt, mud, etc. Stop your vehicle in a safe place, and wipe it off with a soft cloth. - Have your vehicle checked by a dealer if:		
			Models with multi-information display The indicator and message stay on after you cleaned the radar sensor cover. Models with information display The indicator and message come back on after you cleaned the area around the camera. Automatic shutoff P. 460	—	—

*1: Models with the smart entry system have an **ENGINE START/STOP** button instead of an ignition switch.

* Not available on all models

Message	Condition	Explanation
	- Appears when there is a problem with the sensor on the battery. - Appears when the battery is not charging.	- Have your vehicle checked by a dealer. ▶ Checking the Battery P. 534 Appears along with the battery charging system indicator - Turn off the climate control system and rear defogger to reduce electricity consumption. ▶ If the Charging System Indicator Comes On P. 560
	Appears when the starting system has a problem.	As a temporary measure, press and hold the ENGINE START/STOP button for 15 seconds while pressing the brake pedal and manually start the engine. Have the vehicle checked by a dealer.
	Appears for about three seconds when ACC has been automatically canceled.	You can resume the set speed after the condition that caused ACC to cancel improves. Press the RES/+ button. ▶ ACC (Adaptive Cruise Control)* P. 450
	Flashes when the system senses a likely collision with a vehicle in front of you.	Take appropriate action to prevent a collision (apply the brakes, change lanes, etc.). ▶ Forward Collision Warning (FCW)* P. 458
	Appears when your vehicle is too close to the traffic lane lines. The beeper sounds.	Take appropriate action to keep your vehicle within the lane lines. ▶ Lane Departure Warning (LDW)* P. 462

* Not available on all models

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Customized Features

2013 Accord Sedan

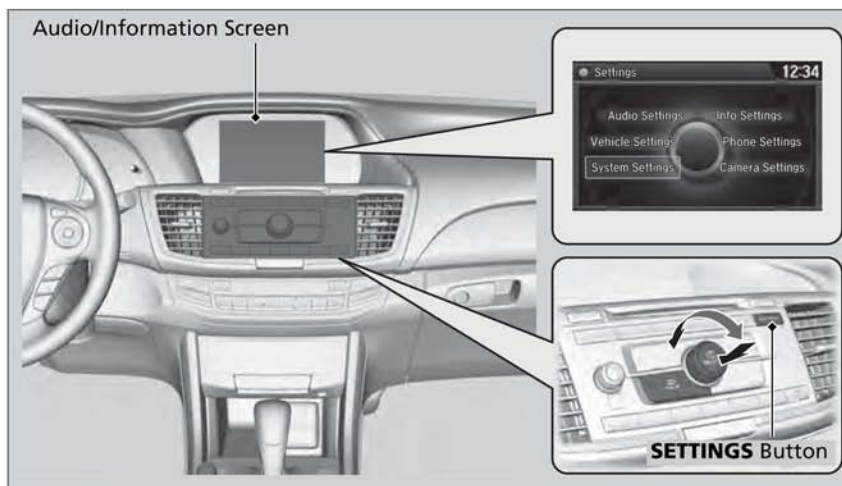
QRG

Use the audio/information screen to customize certain features.

■ How to customize

Models with one display

With the ignition switch is in ON ^{*1}, press the **SETTINGS** button. Rotate  to select **Audio Settings**, **Phone Settings**, **Camera Settings**, **Vehicle Settings**, **System Settings** or **Info Settings** and press .



*1: Models with the smart entry system have an **ENGINE START/STOP** button instead of an ignition switch.

Customized Features

Models without navigation system

When you customize settings:

- Make sure that the vehicle is at a complete stop.

Automatic transmission/CVT models

- Shift to **P**.

Manual transmission models

- Set the parking brake.

To customize other features, rotate , and press .

➤ [List of customizable options P. 313](#)

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Features

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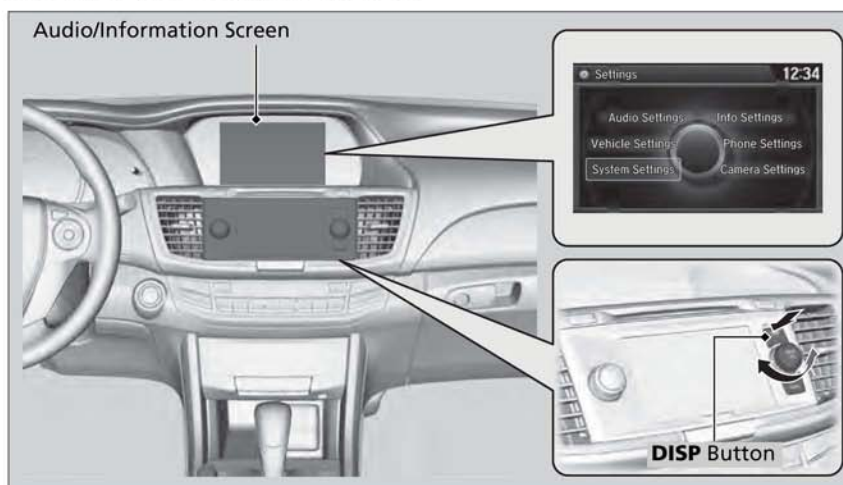
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Models with two displays

With the power mode in ON, press and hold the **DISP** button. Rotate  to select **Audio Settings**, **Phone Settings**, **Camera Settings**, **Vehicle Settings**, **System Settings** or **Info Settings** and press .



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Features

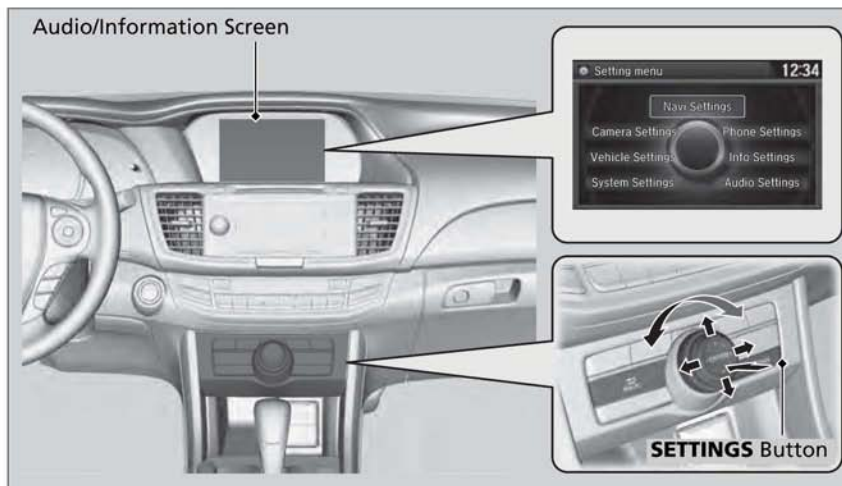
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■ How to customize

Models with navigation system

With the power mode in ON, press the **SETTINGS** button. Rotate  to select **Audio Settings**, **Phone Settings**, **Camera Settings**, **Vehicle Settings**, **System Settings**, **Info Settings**, or **Navi Settings** and press .



Customized Features

Models with navigation system

When you customize setting, make sure that the vehicle is at a complete stop and shift to **P**.

To customize other features, rotate , move , , , or , and press .

► [List of customizable options P. 323](#)

Continued

QRG

Models without navigation system

■ Customization flow

Models with one display

Press the **SETTINGS** button.

Models with two displays

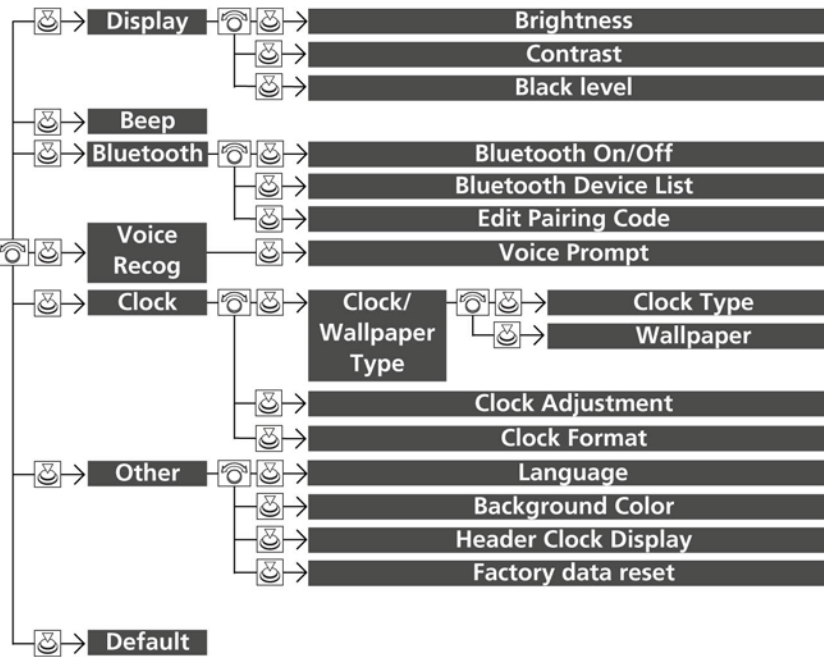
Press and hold the **DISP** button.

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Features

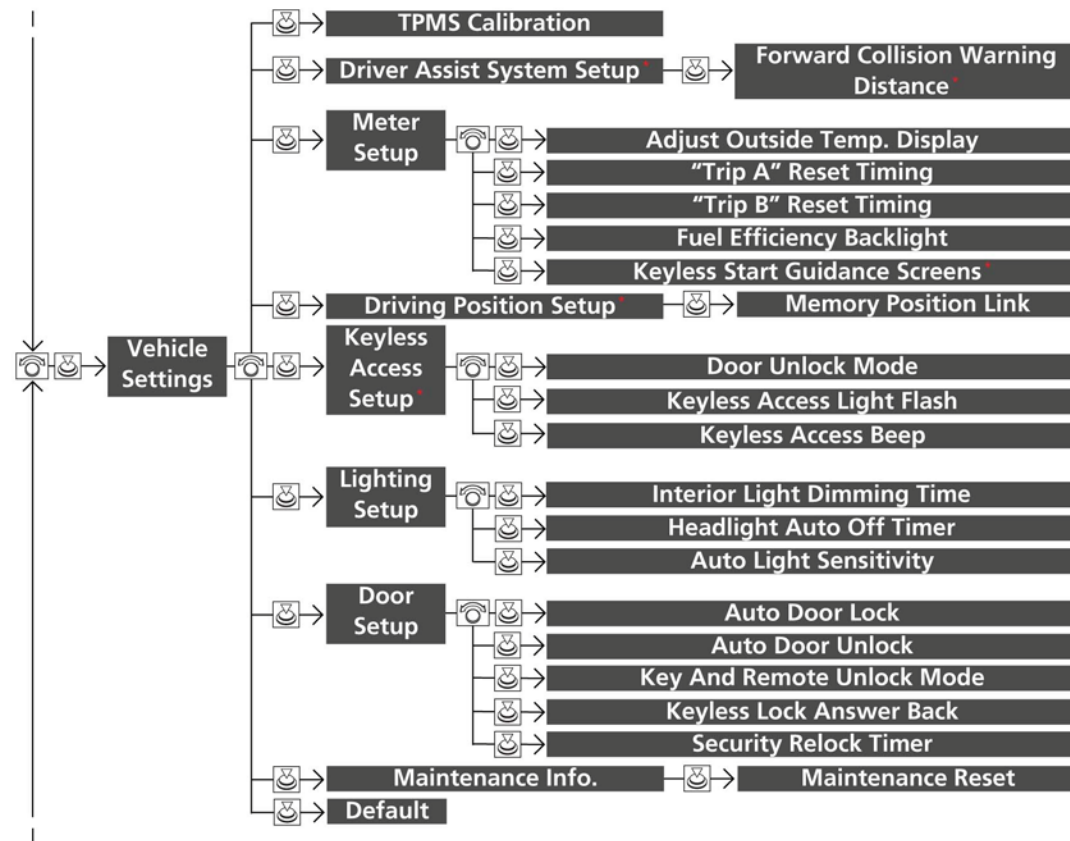


System Settings



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* Not available on all models

Continued

Setup Group	Customizable Features		Description	Selectable Settings
Vehicle Settings	TPMS Calibration		Cancels/Calibrates the TPMS.	Cancel^{*1}/Calibrate
	Driver Assist System Setup[*]	Forward Collision Warning Distance[*]	Changes at which distance FCW alerts, or turns FCW on and off.	Long/Normal^{*1}/Short/Off
	Meter Setup	Adjust Outside Temp. Display	Adjust the temperature reading by a few degrees.	-5°F ~ ±0°F^{*1} ~ +5°F (U.S.) -3°C ~ ±0°C^{*1} ~ +3°C (Canada)
		"Trip A" Reset Timing	Changes the setting of how to reset trip meter A and average fuel economy A.	With Refuel/IGN Off/Manually Reset^{*1}
		"Trip B" Reset Timing	Changes the setting of how to reset trip meter B and average fuel economy B.	With Refuel/IGN Off/Manually Reset^{*1}
		Fuel Efficiency Backlight	Turn the ambient meter feature on and off.	On^{*1}/Off
		Keyless Start Guidance Screens	Displays the push button start guidance when conditions are met to change power mode.	On^{*1}/Off
	Driving Position Setup[*]	Memory Position Link	Changes the driver's seat position to a stored setting.	On^{*1}/Off

^{*1}:Default Setting

^{*} Not available on all models

Continued

QRG

Forward Collision Warning (FCW) *

Alerts you when it detects the possibility of your vehicle colliding with the vehicle in front of yours.

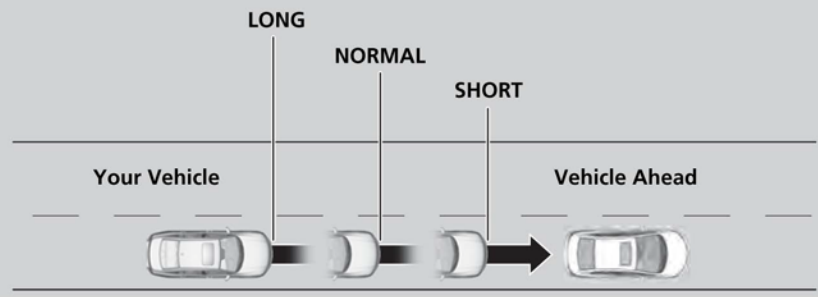
If the system determines a collision is possible, it gives both visual and audible alerts, including a heads-up warning that flashes on the windshield.

- Take appropriate action to prevent a collision (apply the brakes, change lanes, etc.).

■ How the system works

The system may give warnings of potential collisions when your vehicle speed is above 10 mph (15 km/h).

You can set **Long**, **Normal** or **Short** for when warnings start:



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Forward Collision Warning (FCW) *

Important Safety Reminder

FCW cannot detect all objects ahead and may not detect a given object; accuracy of the system will vary based on weather, speed and other factors. FCW does not include a braking function. It is always your responsibility to safely operate the vehicle and avoid collisions.

You can change the Forward Collision Warning Distance setting or turn the system on and off.

► [Customized Features](#) P. 97
P. 299

For the FCW system to work properly:

Models with multi-information display

- Always keep the radar sensor cover clean.
- Never use chemical solvents or polishing compounds to clean the sensor cover. Instead, clean it with water and a mild detergent.
- Do not put anything on the radar sensor cover. See a dealer if the radar sensor gets damaged or requires repair.

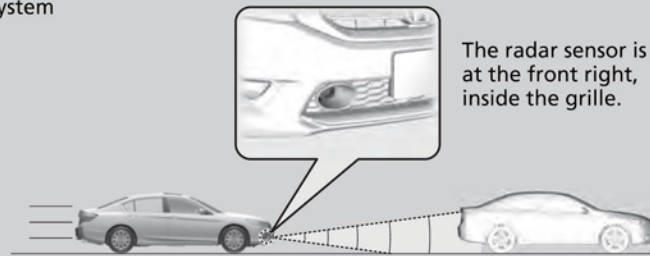
Models with information display

The camera is shared with Lane Departure Warning (LDW).

► [LDW Camera](#) P. 463

Models with multi-information display

Radar-based system



When your setting is:

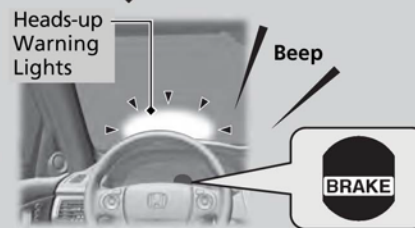
Long: The heads-up warning lights flash twice at **Long** distance.

When the **Short** distance is reached, the lights flash and the beeper sounds continuously until a possible collision is avoided.

Normal: The heads-up warning lights flash twice at the **Normal** distance.

When the **Short** distance is reached, the lights flash and the beeper sounds continuously until a possible collision is avoided.

Short: The heads-up warning lights flash and the beeper sounds continuously until a possible collision is avoided.



When the lights flash at any setting:
The **BRAKE** message appears until a possible collision is avoided.

* Not available on all models

Continued

Forward Collision Warning (FCW)*

Models with information display

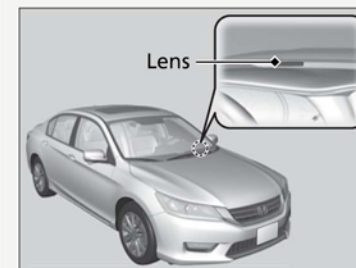
Never apply a film or attach any objects to the windshield that could obstruct the FCW camera's field of vision.

Scratches, nicks, and other damage to the windshield within the FCW camera's field of vision can cause the system to operate abnormally. If this occurs, we recommend that you replace the windshield with a genuine Honda replacement windshield. Making even minor repairs within the camera's field of vision or installing an aftermarket replacement windshield may also cause the system to operate abnormally. After replacing the windshield, have a dealer recalibrate the camera. Proper calibration of the FCW camera is necessary for the system to operate properly.

How the system works

The heads-up warning uses a lens located at the front end of the dashboard.

Do not cover the lens or spill any liquid on it.



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Driving

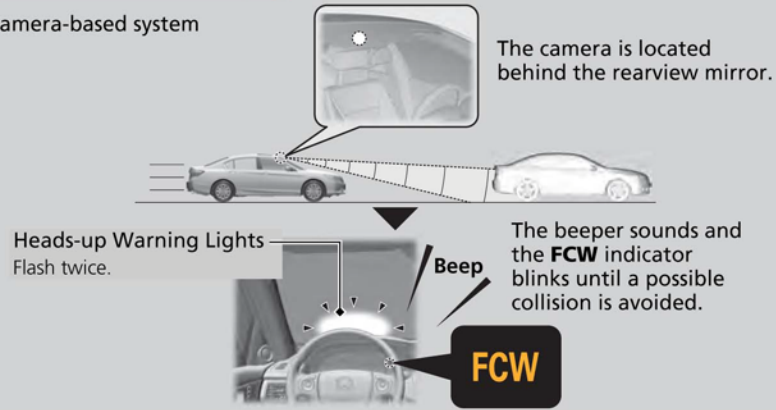
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Models with information display

Camera-based system



Automatic shutoff

FCW may automatically shut itself off and the **FCW** indicator comes and stays on when:

Models with information display

- The temperature inside the system is high.
- The windshield is blocked by dirt, mud, leaves, wet snow, etc.

Models with multi-information display

- You drive off-road or on a mountain road, or curved and winding road for an extended period.
- You drive in bad weather (rain, fog, snow, etc.).
- The radar sensor cover is blocked by dirt, mud, leaves, wet snow, etc.
- An abnormal tire condition is detected (wrong tire size, flat tire, etc.).

All models

Once the conditions that caused FCW to shut off improve or are addressed (e.g., cleaning), the system comes back on.

Automatic shutoff

Models with information display

To help reduce the likelihood that high interior temperatures will cause the camera system to shut off, when parking, find a shady area or face the front of the vehicle away from the sun. Also, do not use a reflective sun shade that can concentrate heat on the camera.

If the **CAMERA HOT** message appears:

- Use the climate control system to cool down the interior and, if necessary, the defroster mode when windows are fogged.
- Start driving the vehicle to lower the windshield temperature, which cools down the area around the FCW system.

* Not available on all models

■ FCW Limitations

FCW may not activate or may not detect a vehicle in front of your vehicle, and may activate even when you are aware of a vehicle ahead of you, or when there is no vehicle ahead under the following conditions.

Condition	Models with multi-information display	Models with information display
• The distance between your vehicle and the vehicle ahead of you is too short. • A vehicle cuts in front of you at a slow speed, and it brakes suddenly. • A vehicle suddenly crosses in front of you. • When either your vehicle or the vehicle ahead of you accelerates rapidly. • The vehicle ahead of you is a motorcycle, a small vehicle, or a unique vehicle such as a tractor. • When you drive off-road or on a mountain road, or curved and winding road for an extended period that makes it difficult for the sensor/camera to properly detect a vehicle in front of you. • When there are pedestrians or animals in front of your vehicle. • When you drive in bad weather (rain, fog, etc.). • A heavy load in the rear or modifications to the suspension tilts your vehicle. • An abnormal tire condition is detected (wrong tire size, flat tire, etc.).	✓	✓
• When the windshield is blocked by dirt, mud, leaves, wet snow, etc. • When the temperature inside the system is high. • A sudden change between light and dark such as an entrance or exit of a tunnel. • You drive into the sunlight (e.g. at dawn or dusk). • When the windshield is dirty or cloudy. • When streetlights are perceived as the taillight of a vehicle in front of yours. • When driving at night, the vehicle ahead of you is running with either taillight bulb burned out. • When you drive in the shadows of trees, buildings, etc. • When your vehicle is towing a trailer.	—	✓
• When the radar sensor cover is blocked by dirt, mud, leaves, wet snow, etc. • You drive under a low or narrow bridge at high speed. • You drive over speed bumps, steel road plates, etc., or your vehicle approaches train tracks or roadside objects (such as a traffic sign and guard rail) on a curve.	✓	—

* Not available on all models

APPENDIX C

Run Log

Subject Vehicle: 2013 Honda Accord Sedan

Date: 10 January 2013

Principal Other Vehicle: 2000 Honda Accord

Run	Test Type	Valid Run?	TTCW Sound (sec)	TTCW Light (sec)	TTCW Margin (sec, based on driver-detectable alerts)	Pass/Fail
1	FCW1 (Stopped)	N				
2		N				
3		Y	2.44	2.44	0.34	Pass
4		Y	2.74	2.75	0.65	Pass
5		Y	2.70	2.71	0.61	Pass
6		Y	2.41	2.40	0.31	Pass
7		Y	2.50	2.50	0.40	Pass
8		Y	2.63	2.61	0.53	Pass
9		Y	2.57	2.57	0.47	Pass
10	FCW3 (Slower)	Y	2.96	2.95	0.96	Pass
11		Y	2.69	2.68	0.69	Pass
12		Y	2.65	2.65	0.65	Pass
13		Y	2.83	2.82	0.83	Pass

Principal Other Vehicle: 2000 Honda Accord

Run	Test Type	Valid Run?	TTCW Sound (sec)	TTCW Light (sec)	TTCW Margin (sec, based on driver-detectable alerts)	Pass/Fail
14	FCW3 (Slower)	Y	2.46	2.45	0.46	Pass
15		Y	2.57	2.54	0.57	Pass
16		Y	2.58	2.58	0.58	Pass
17	FCW2 (Braking)	Y	2.68	2.68	0.28	Pass
18		Y	2.70	2.71	0.31	Pass
19		Y	2.47	2.45	0.07	Pass
20		Y	2.55	2.55	0.15	Pass
21		Y	2.53	2.51	0.13	Pass
22		N				
23		Y	2.81	2.79	0.41	Pass
24		Y	2.71	2.70	0.31	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 and the Principal Other Vehicle, 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.

Time History Plot Description

Each time history plot consists of data pertinent to the test type under consideration. The data shown in time history plots for test type 2 differs slightly from the data shown in test types 1 and 3, owing to the headway distance criterion which is used exclusively for test type 2.

Time history figures include the following sub-plots:

- Event – indicates timing of warning issued by FCW system. Depending on the type of FCW alert or instrumentation used to measure the alert, this can be any of the following,:
 - o Filtered and rectified sound signal
 - o Filtered and rectified acceleration (e.g., steering wheel vibration)
 - o Light sensor signal
 - o Discrete on/off value
- 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 test type 2, the plot indicating the longitudinal acceleration of the Principal Other Vehicle includes a solid black threshold line indicating the maximum deceleration (-0.33 g) allowed while braking. Exceedance of this threshold is indicated with red shading in the area between the measured time-varying data and 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

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.

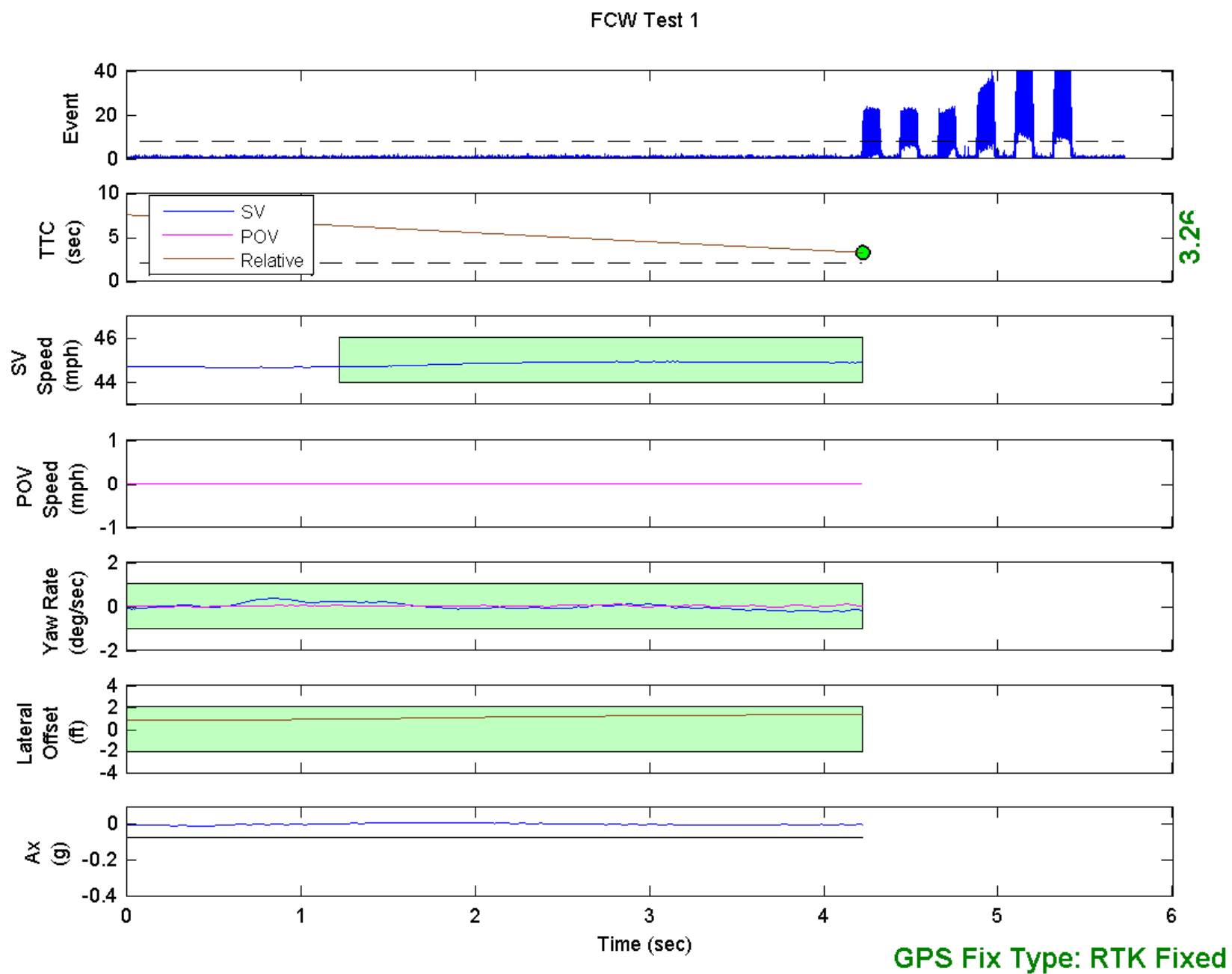


Figure D1. Example Time History for Test Type 1, Passing

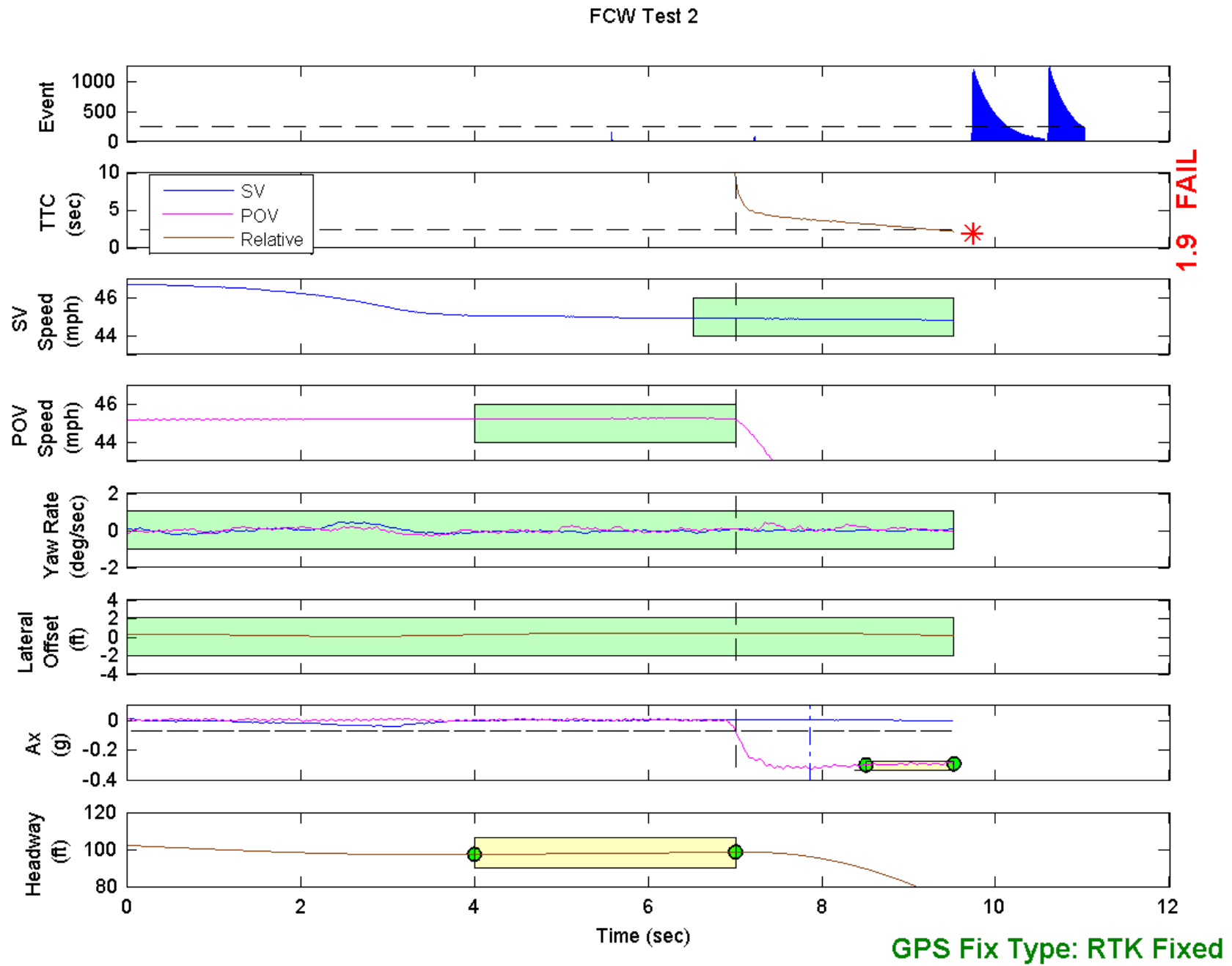


Figure D2. Example Time History for Test Type 2, Failing

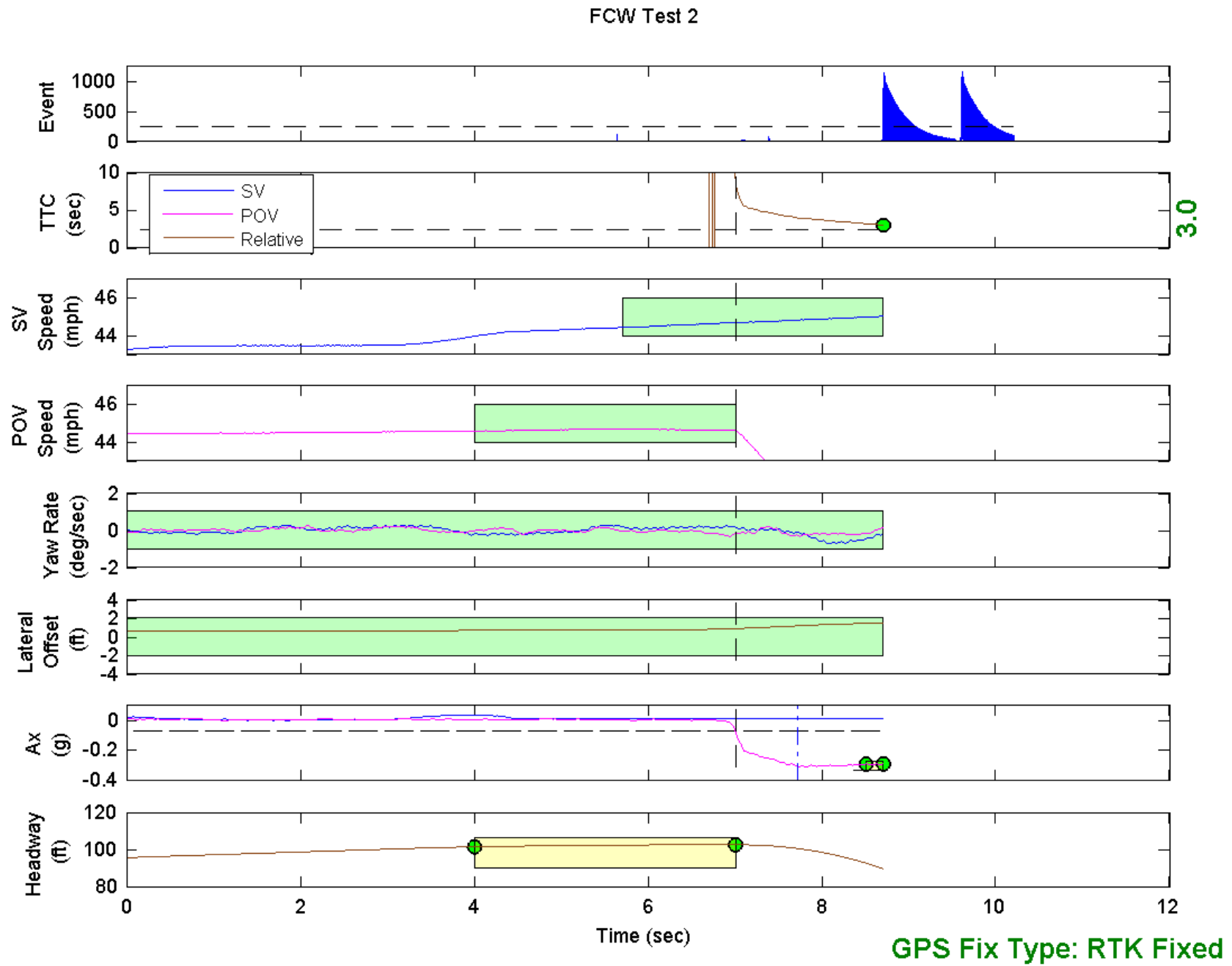


Figure D3. Example Time History for Test Type 2, Passing

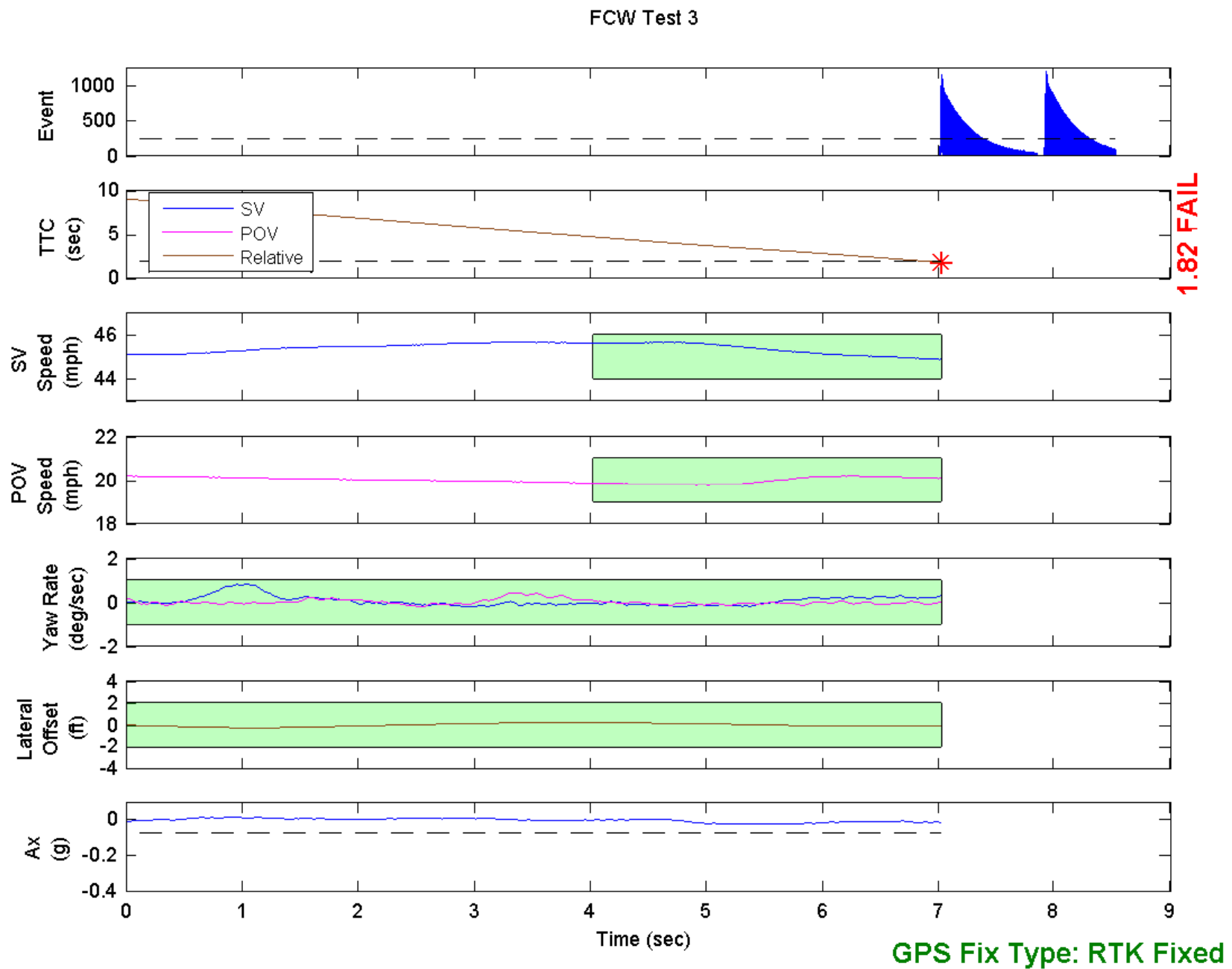


Figure D4. Example Time History for Test Type 3, Failing

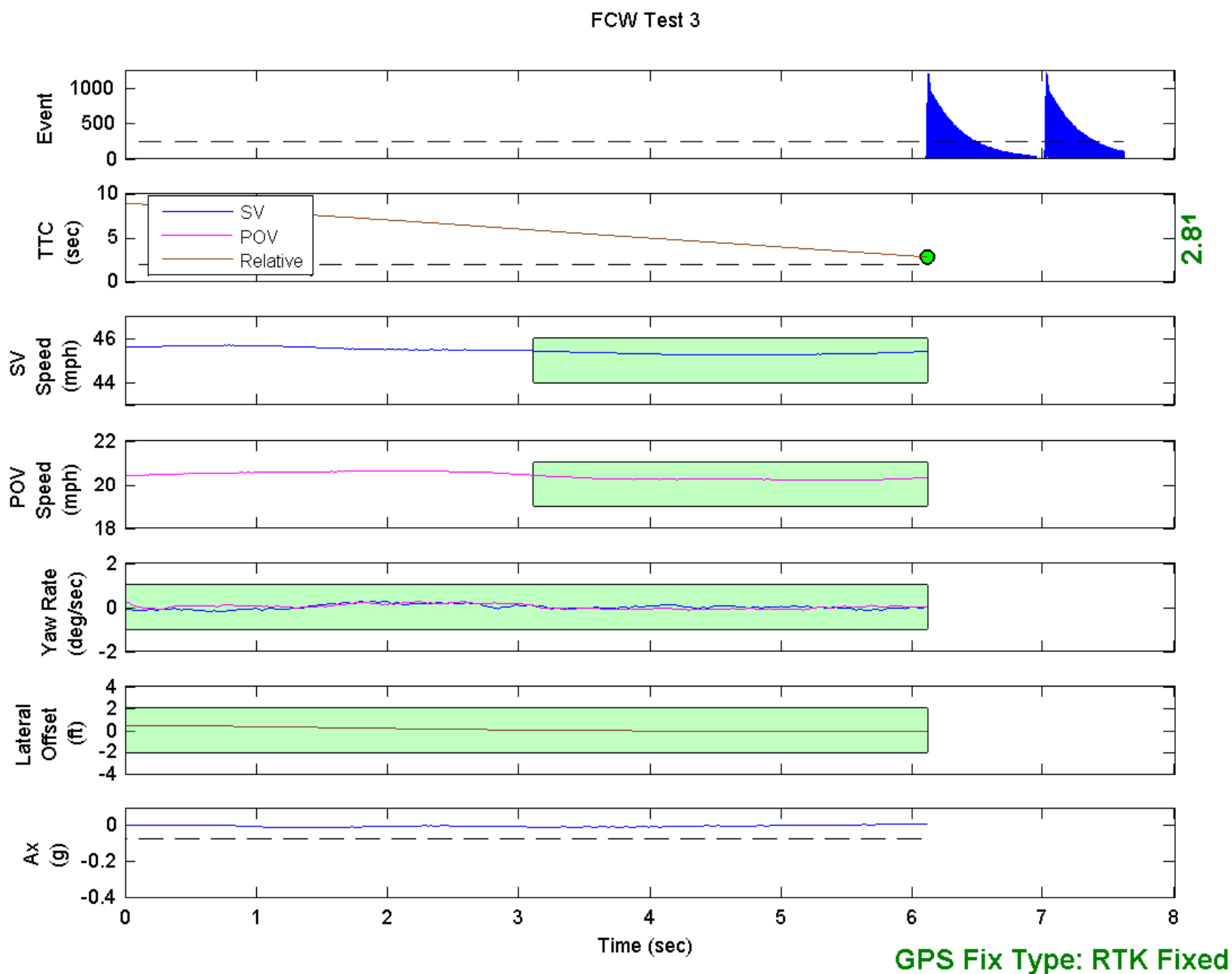


Figure D5. Example Time History for Test Type 3, Passing

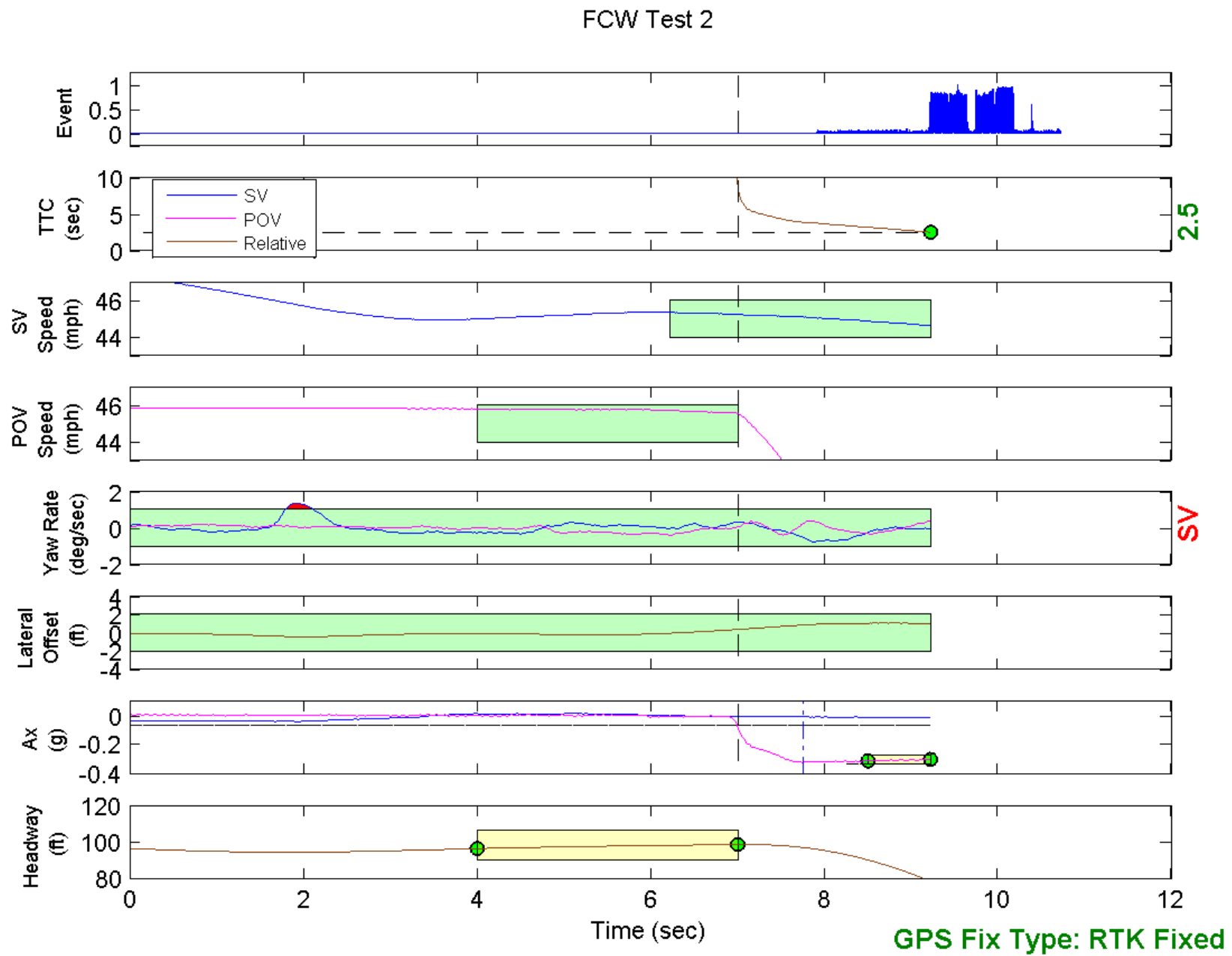


Figure D6. Example Time History for Test Type 2, Invalid Run Due to Subject Vehicle Yaw Rate

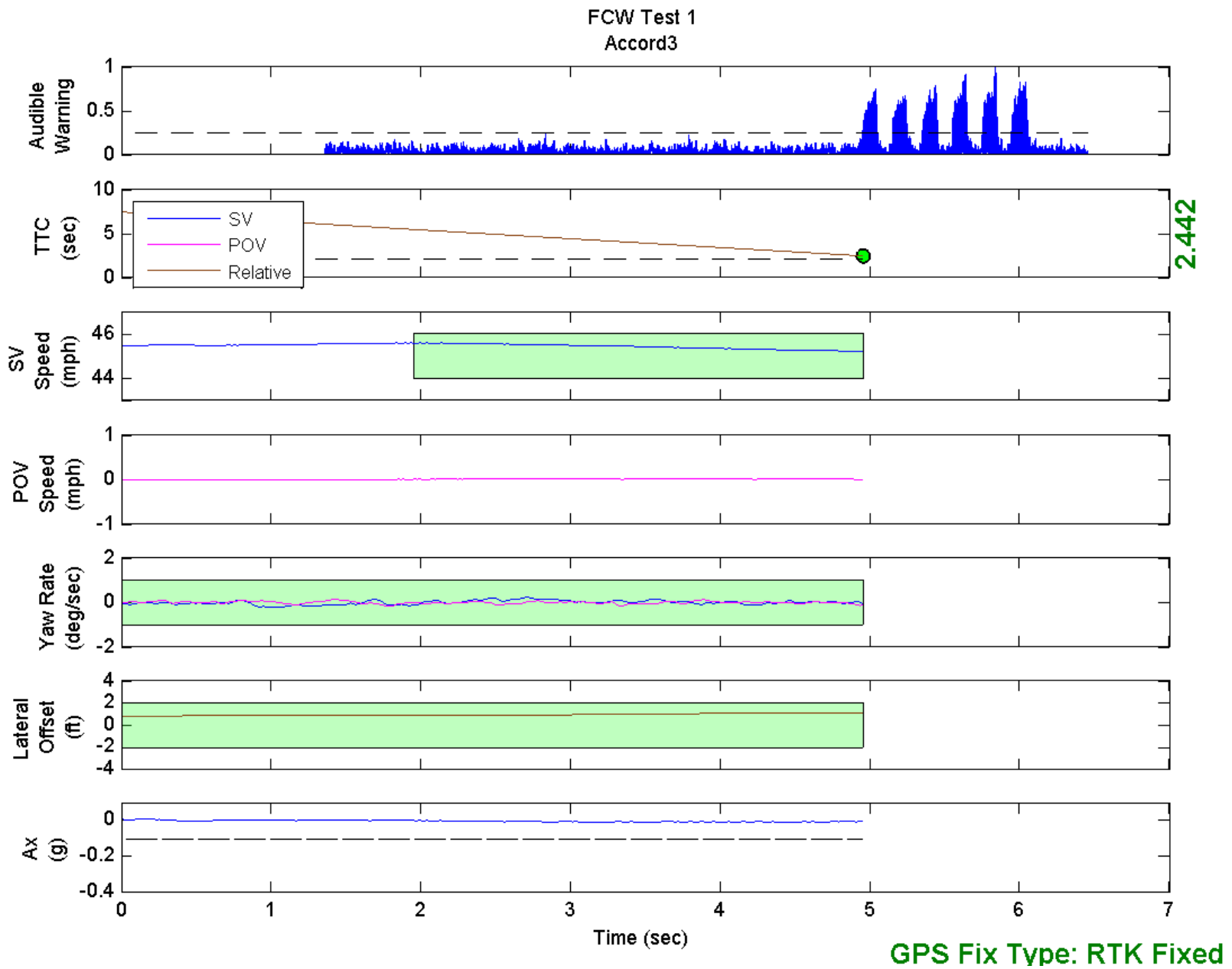


Figure D7. Time History for Run 3, FCW Test 1, Audible Warning

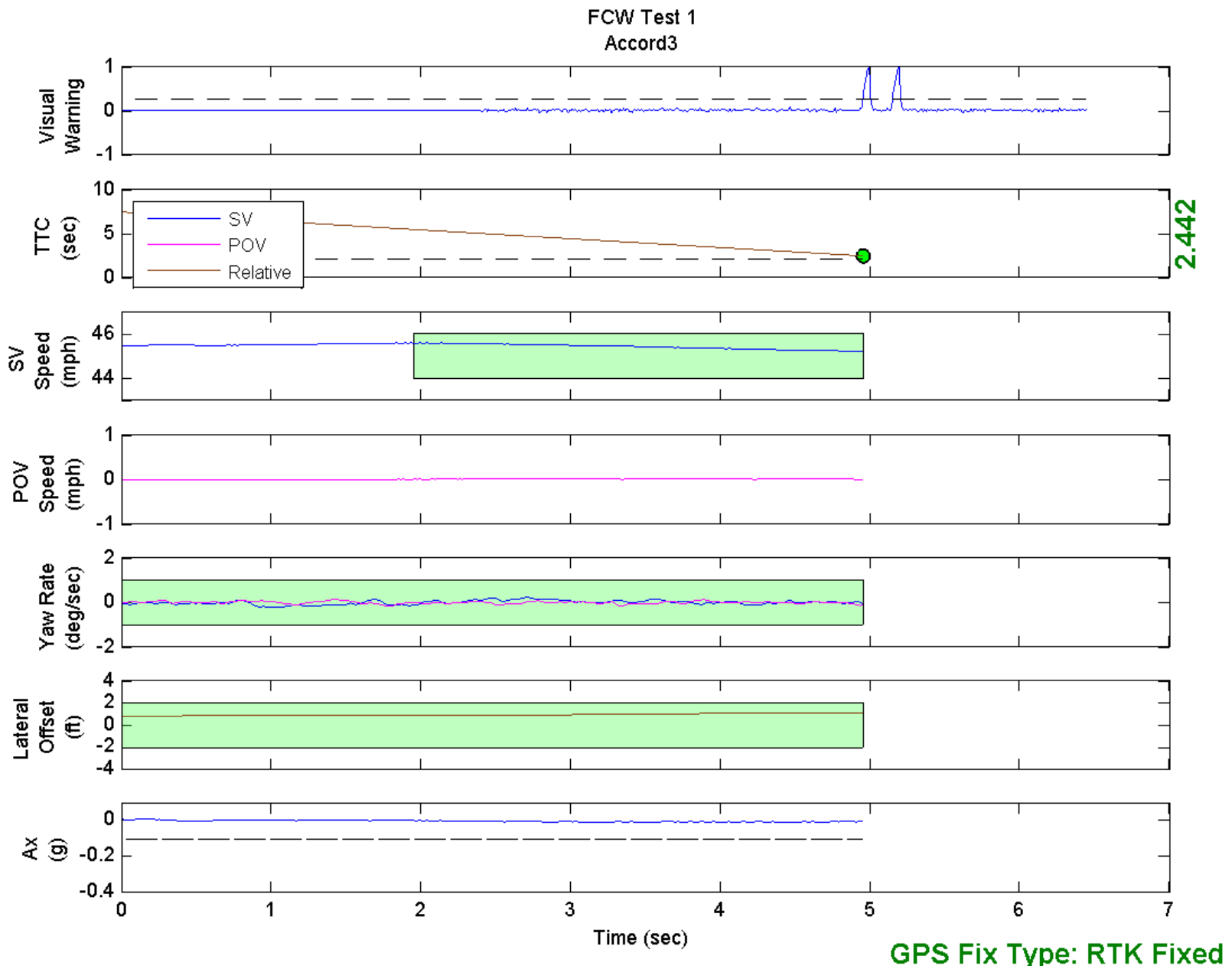


Figure D8. Time History for Run 3, FCW Test 1, Visual Warning

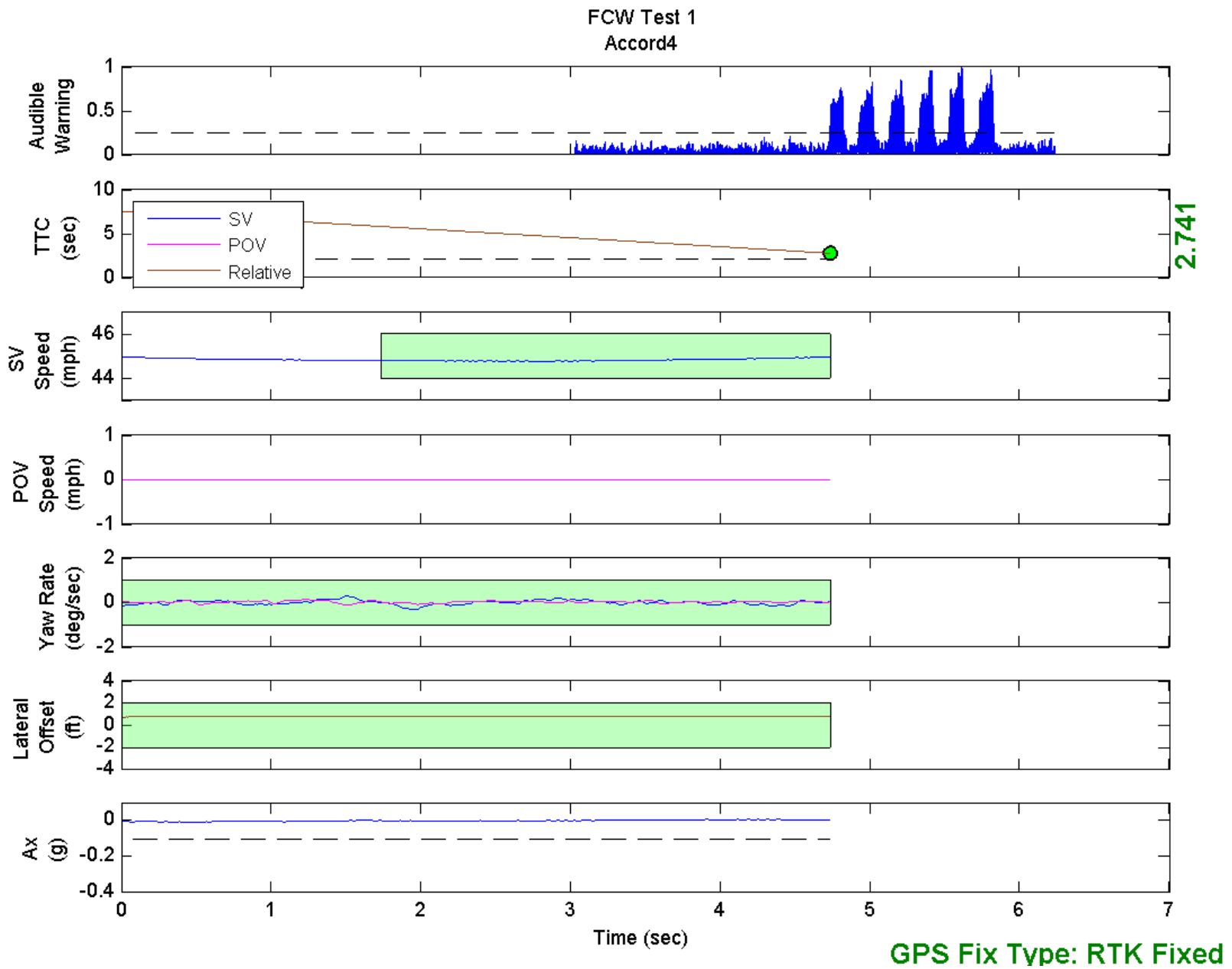


Figure D9. Time History for Run 4, FCW Test 1, Audible Warning

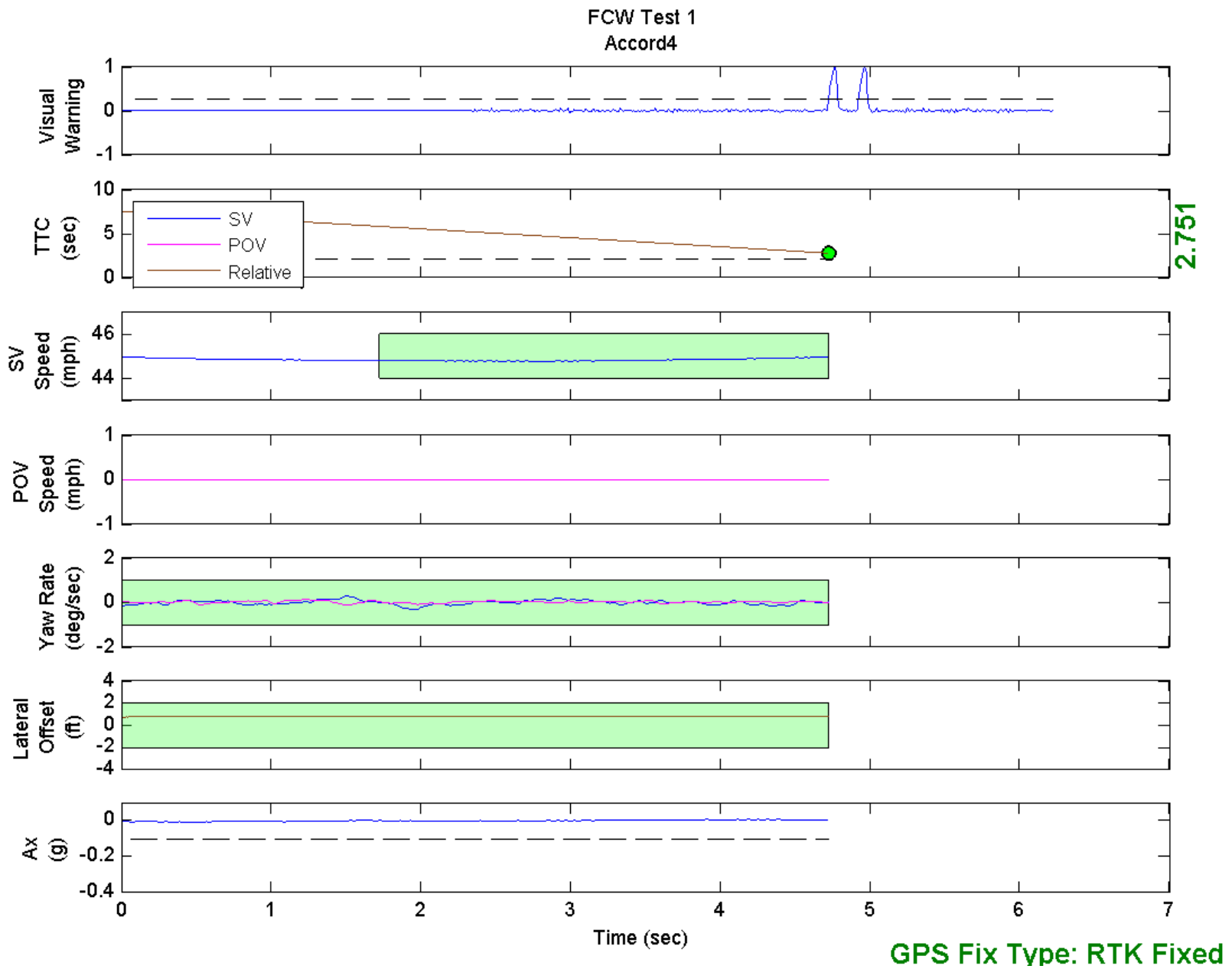


Figure D10. Time History for Run 4, FCW Test 1, Visual Warning

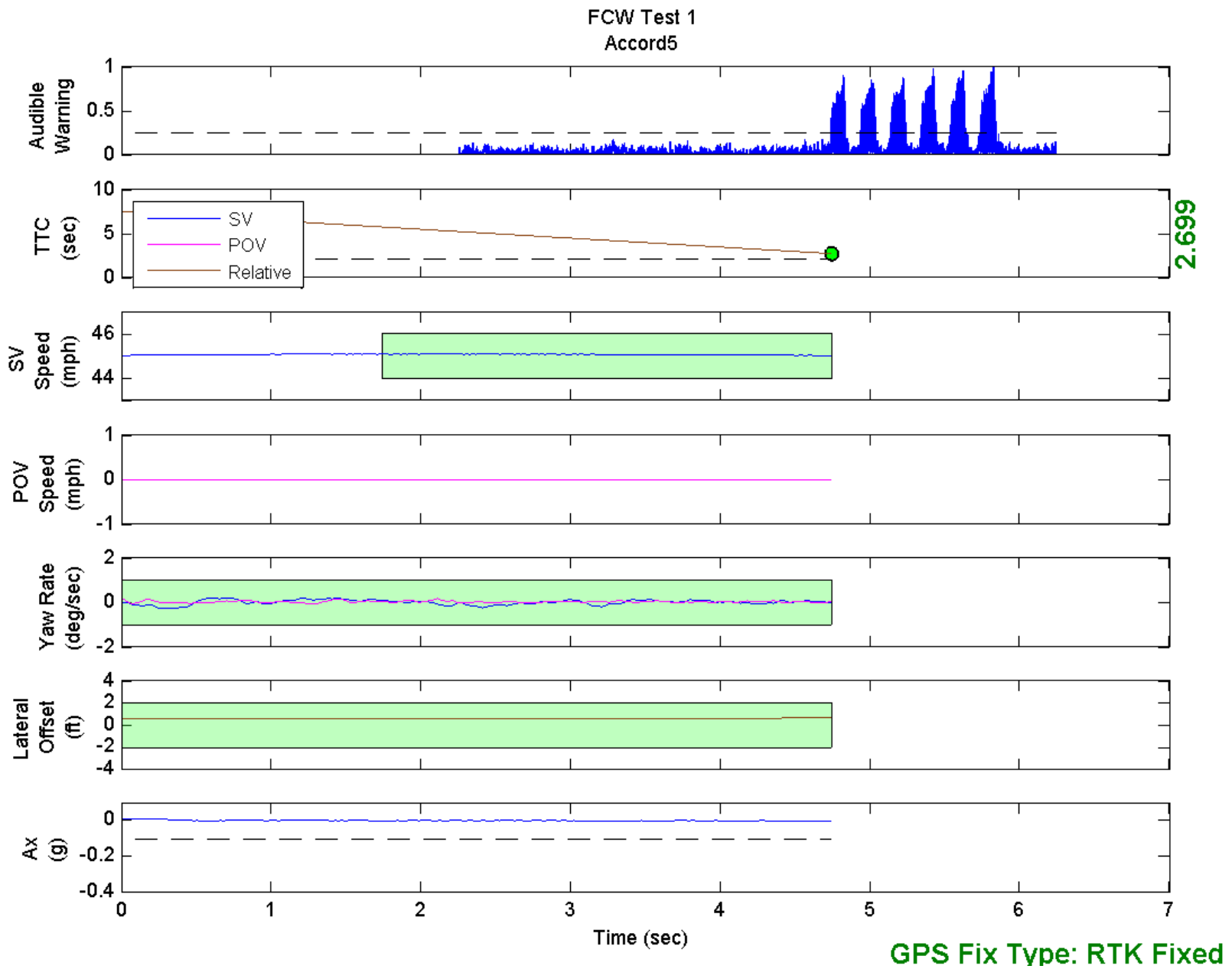


Figure D11. Time History for Run 5, FCW Test 1, Audible Warning

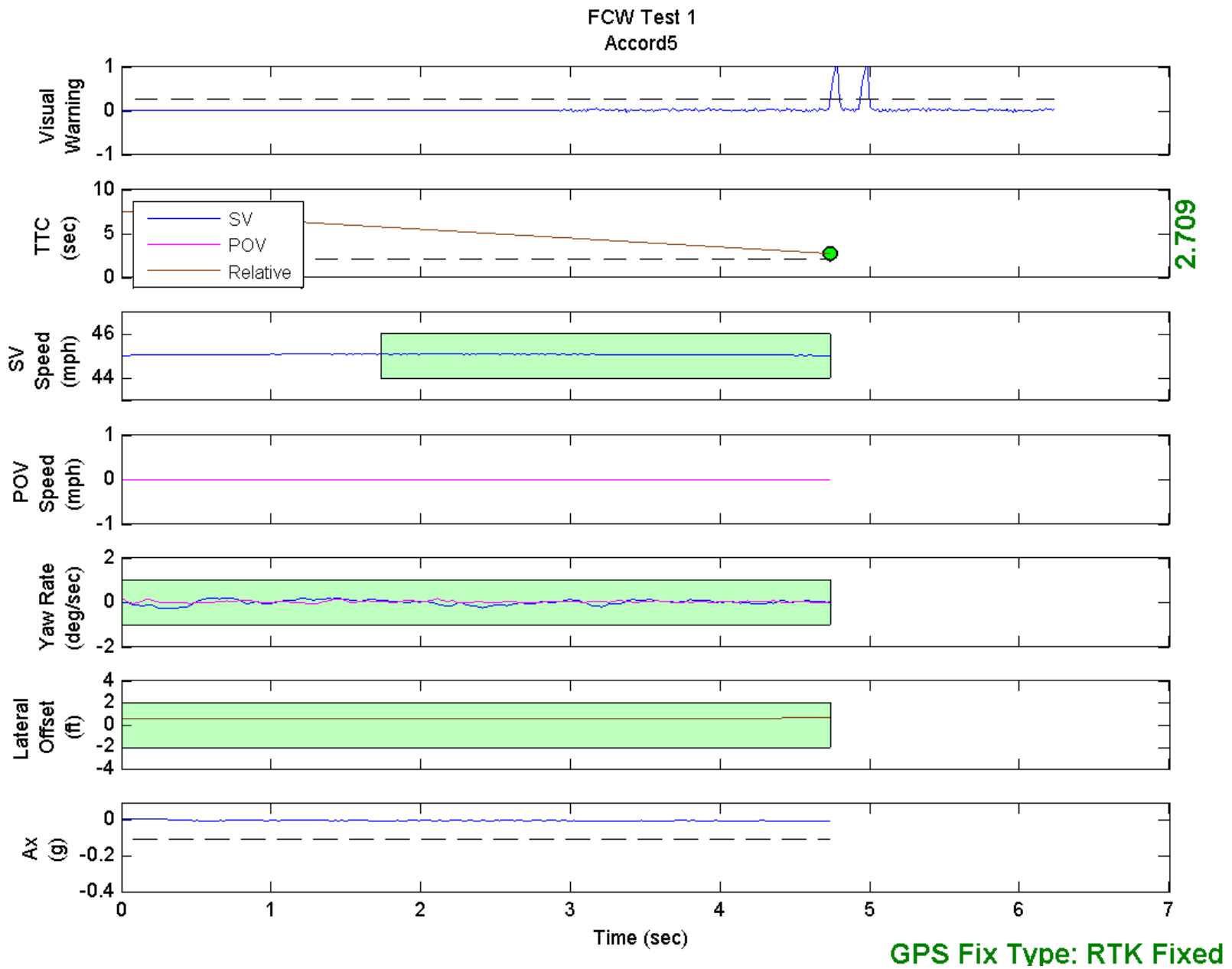


Figure D12. Time History for Run 5, FCW Test 1, Visual Warning

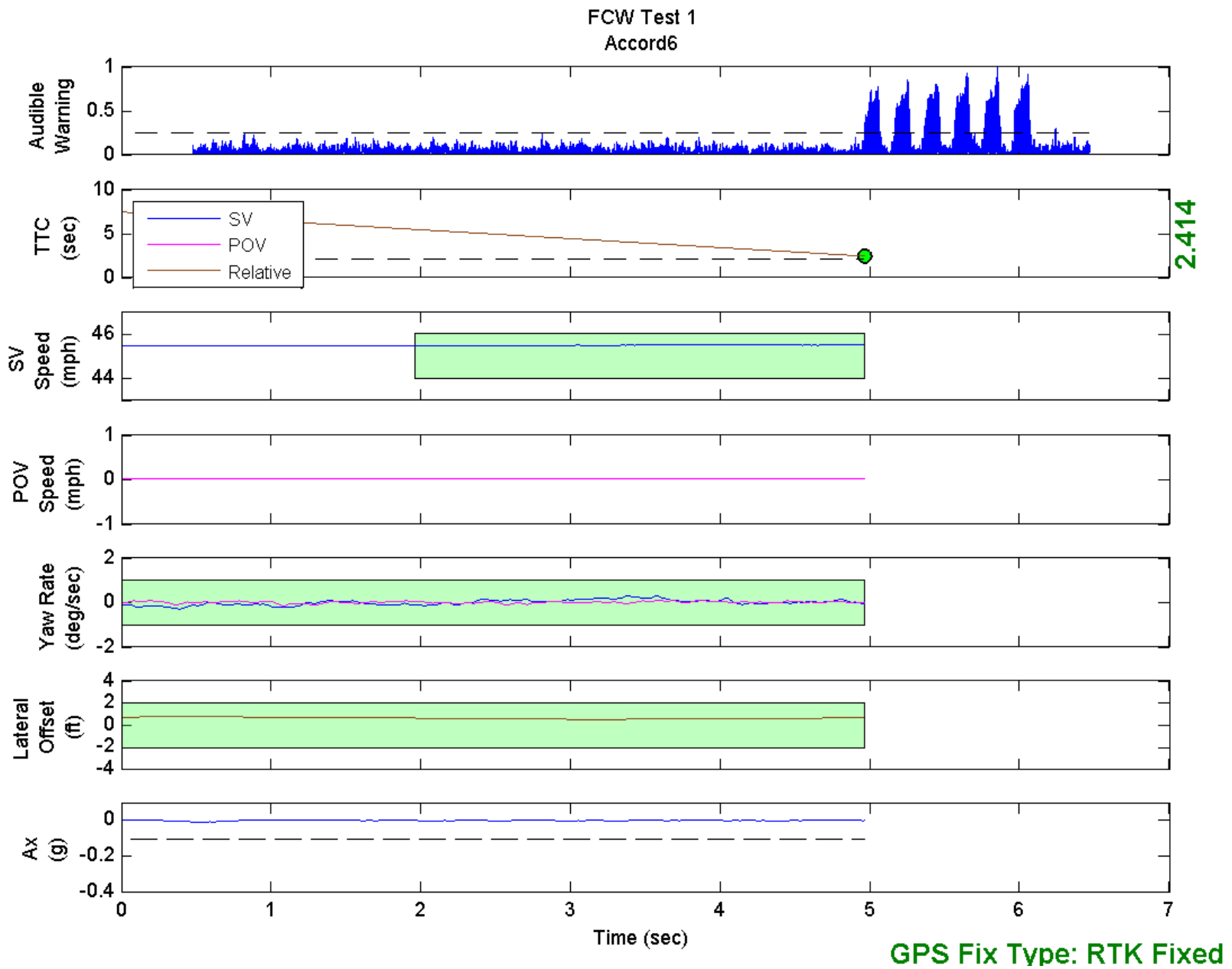


Figure D13. Time History for Run 6, FCW Test 1, Audible Warning

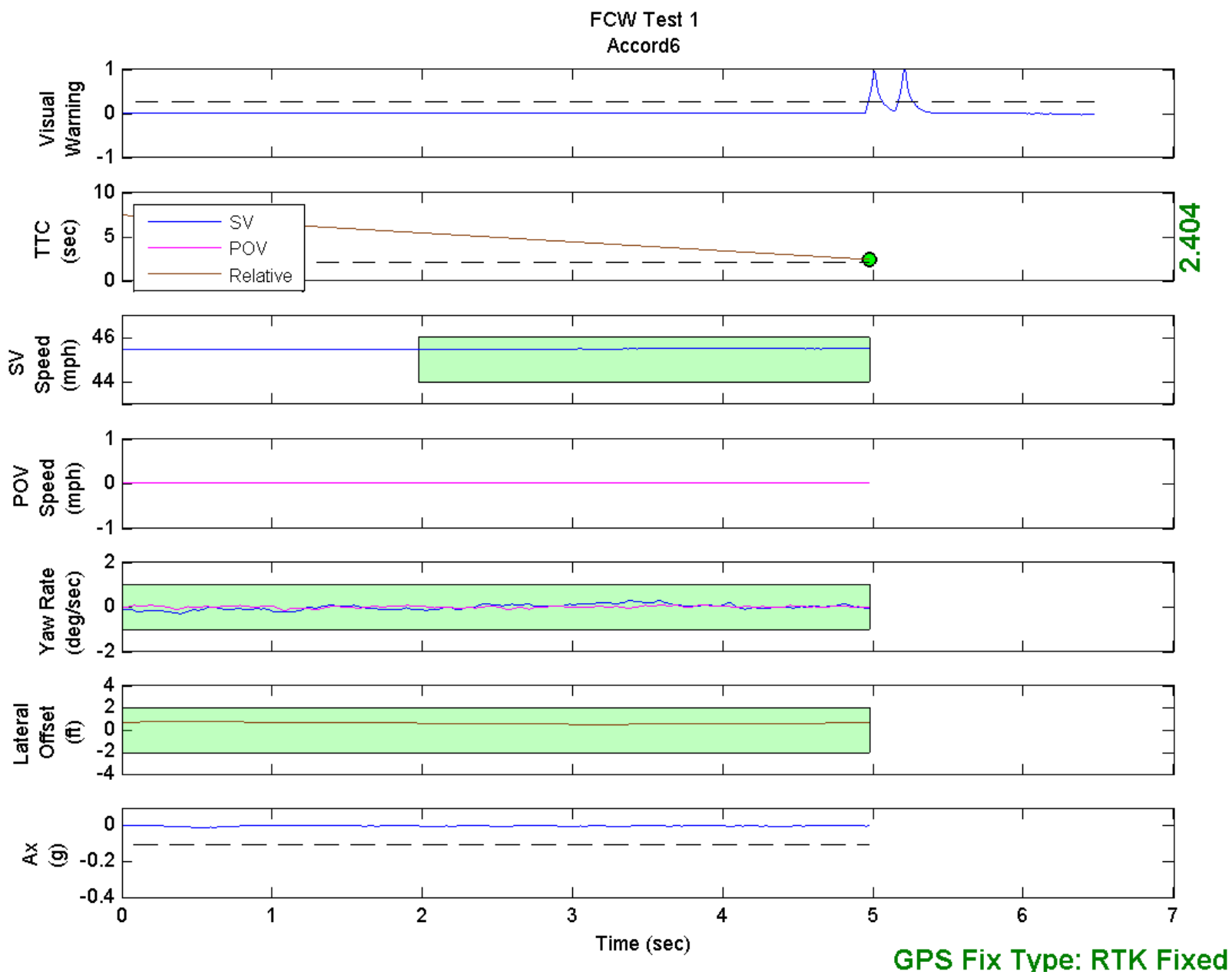


Figure D14. Time History for Run 6, FCW Test 1, Visual Warning

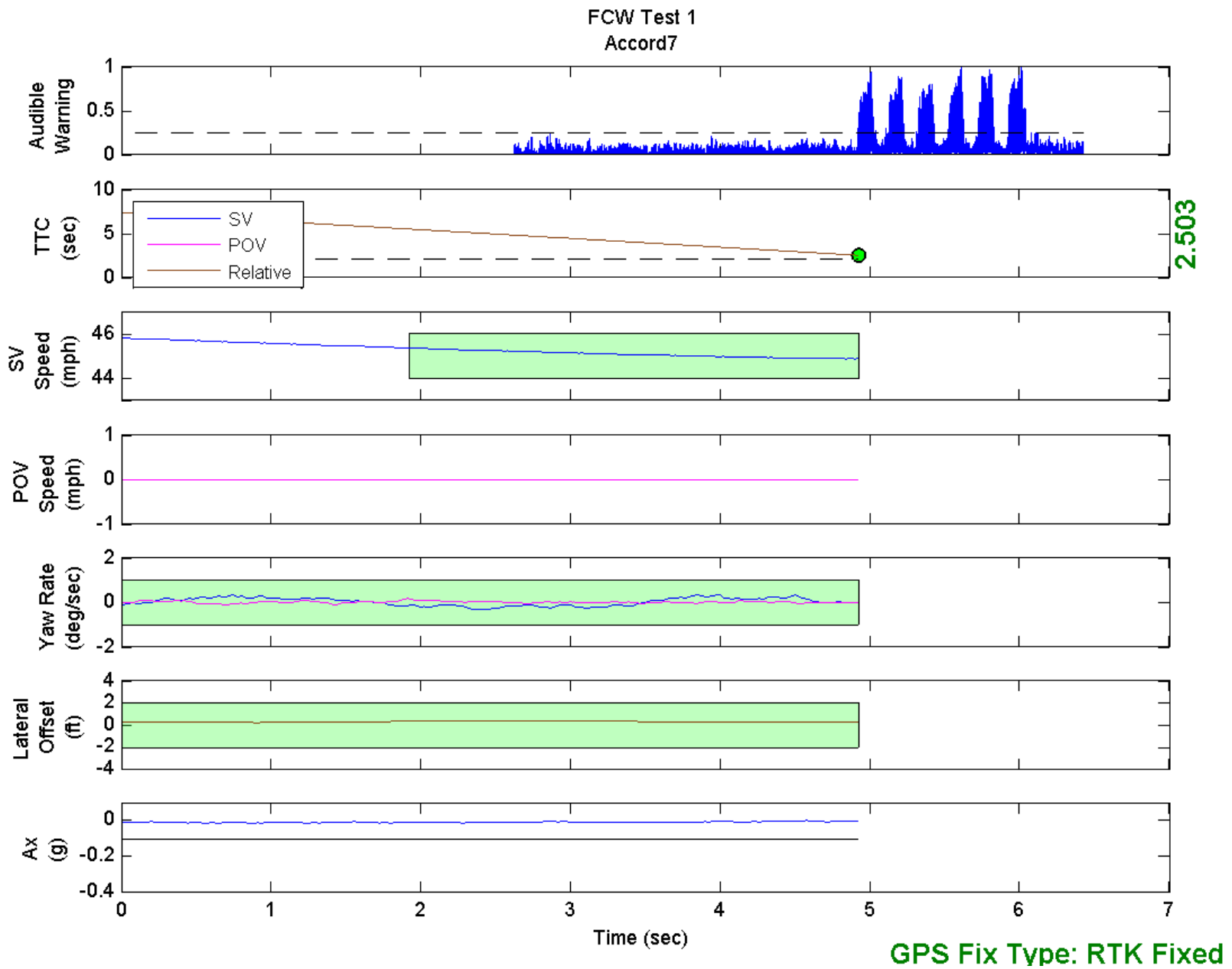


Figure D15. Time History for Run 7, FCW Test 1, Audible Warning

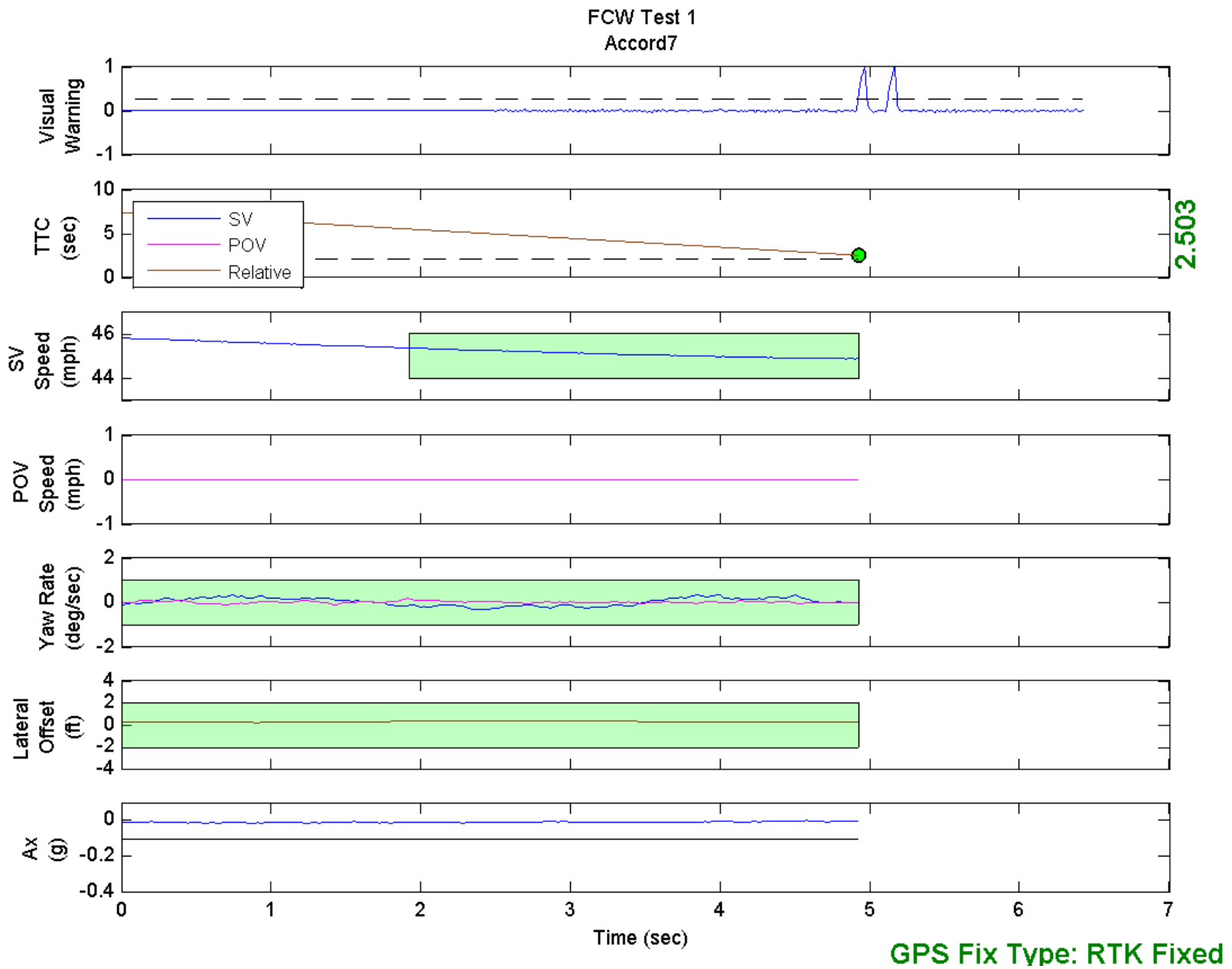


Figure D16. Time History for Run 7, FCW Test 1, Visual Warning

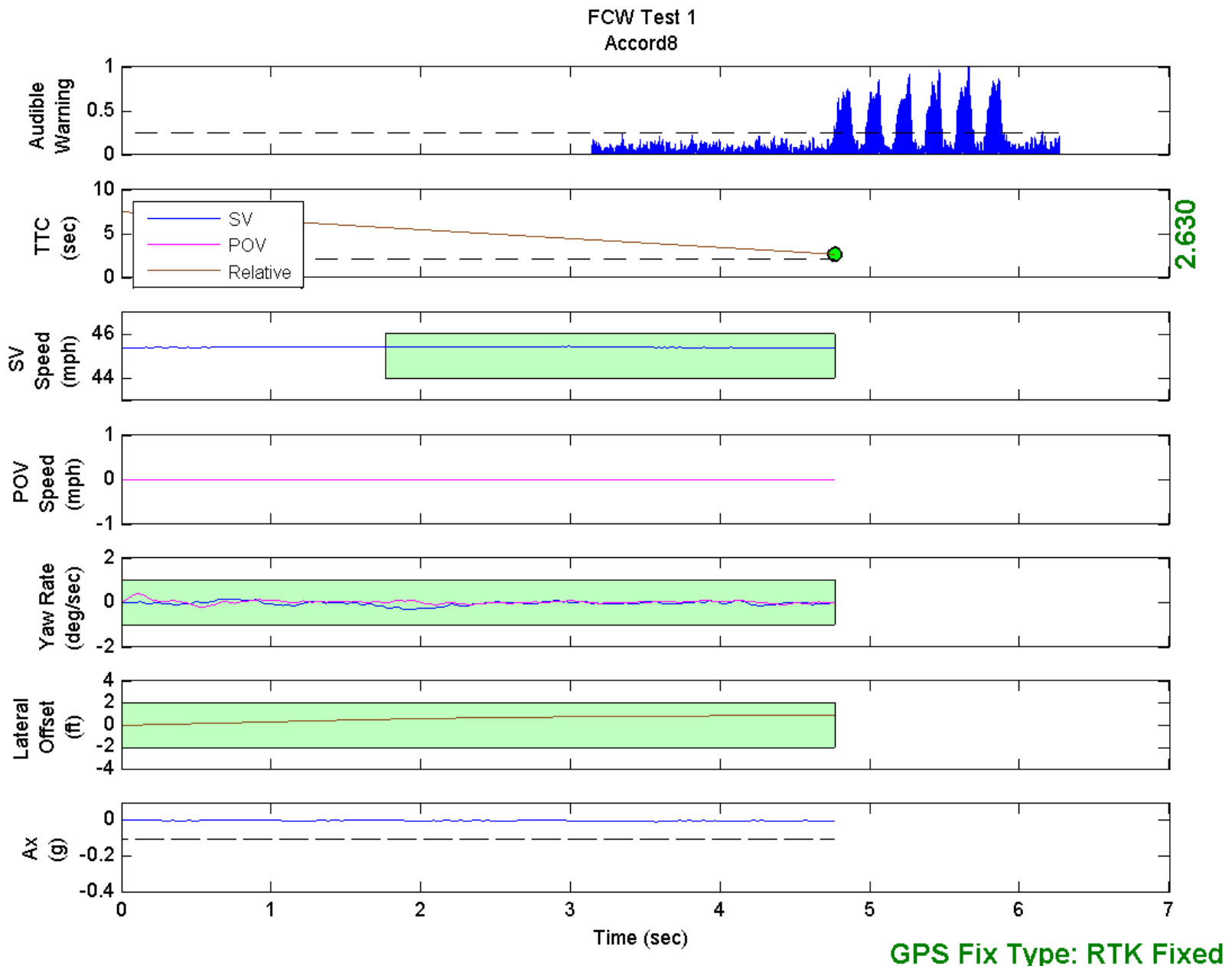


Figure D17. Time History for Run 8, FCW Test 1, Audible Warning

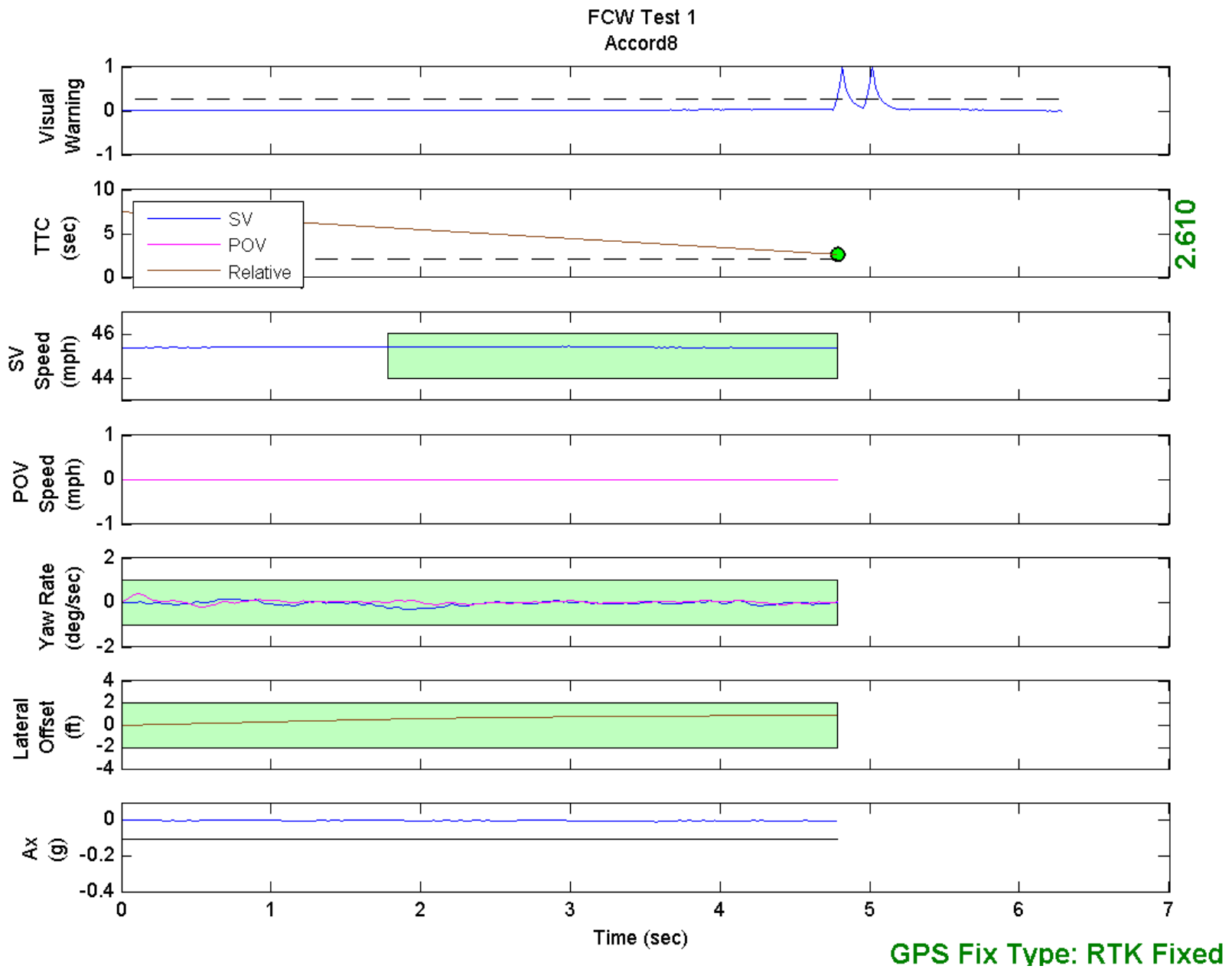


Figure D18. Time History for Run 8, FCW Test 1, Visual Warning

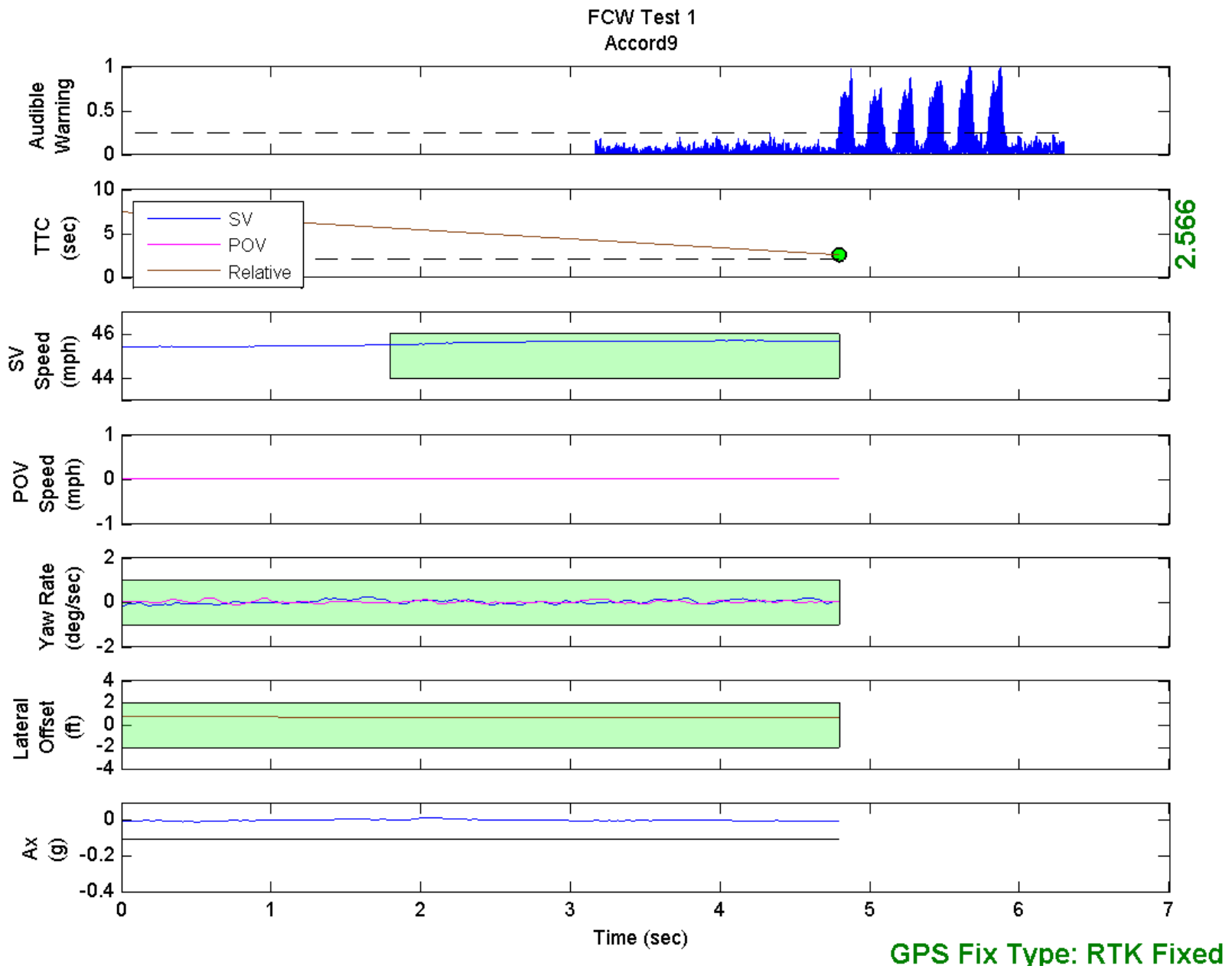


Figure D19. Time History for Run 9, FCW Test 1, Audible Warning

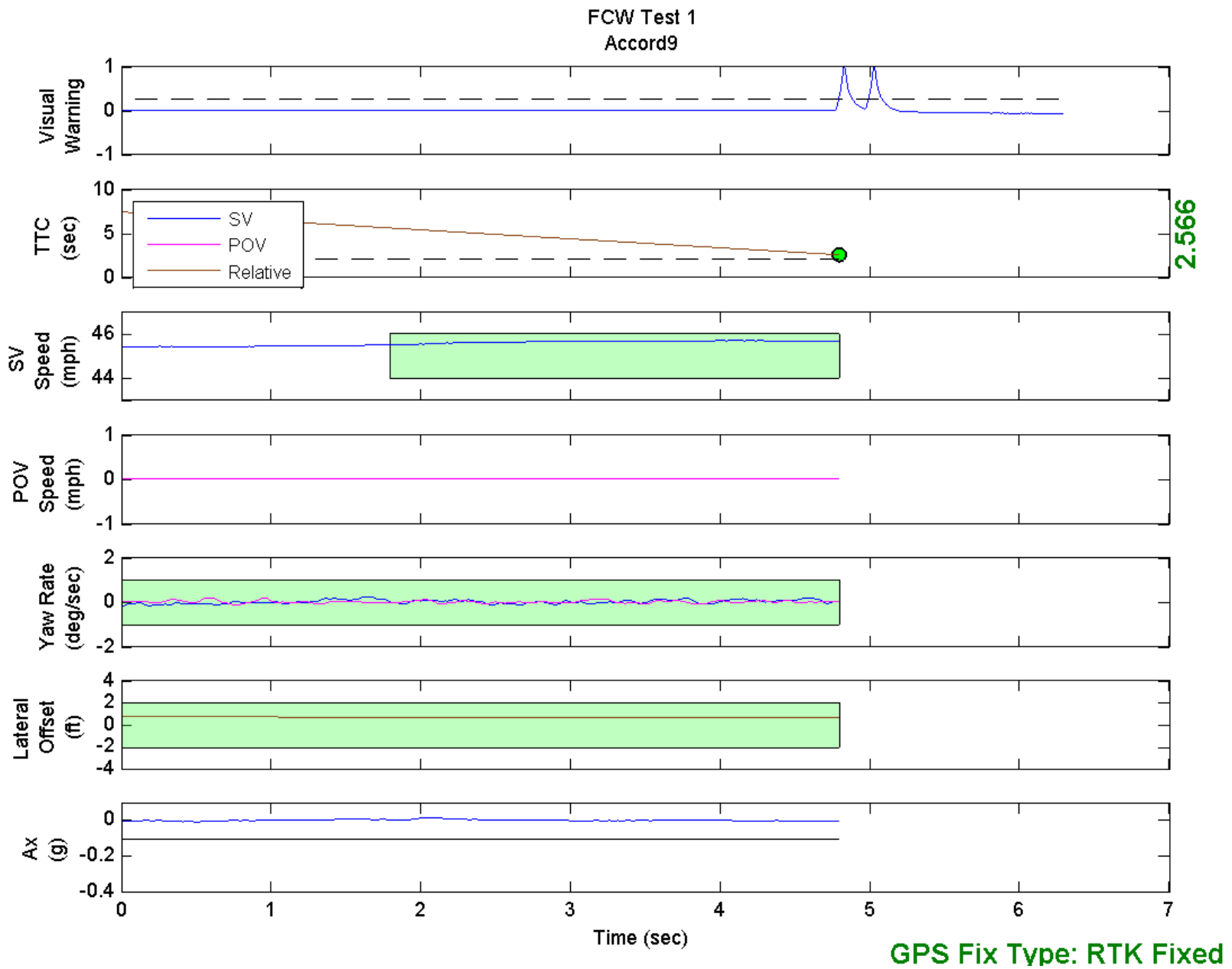


Figure D20. Time History for Run 9, FCW Test 1, Visual Warning

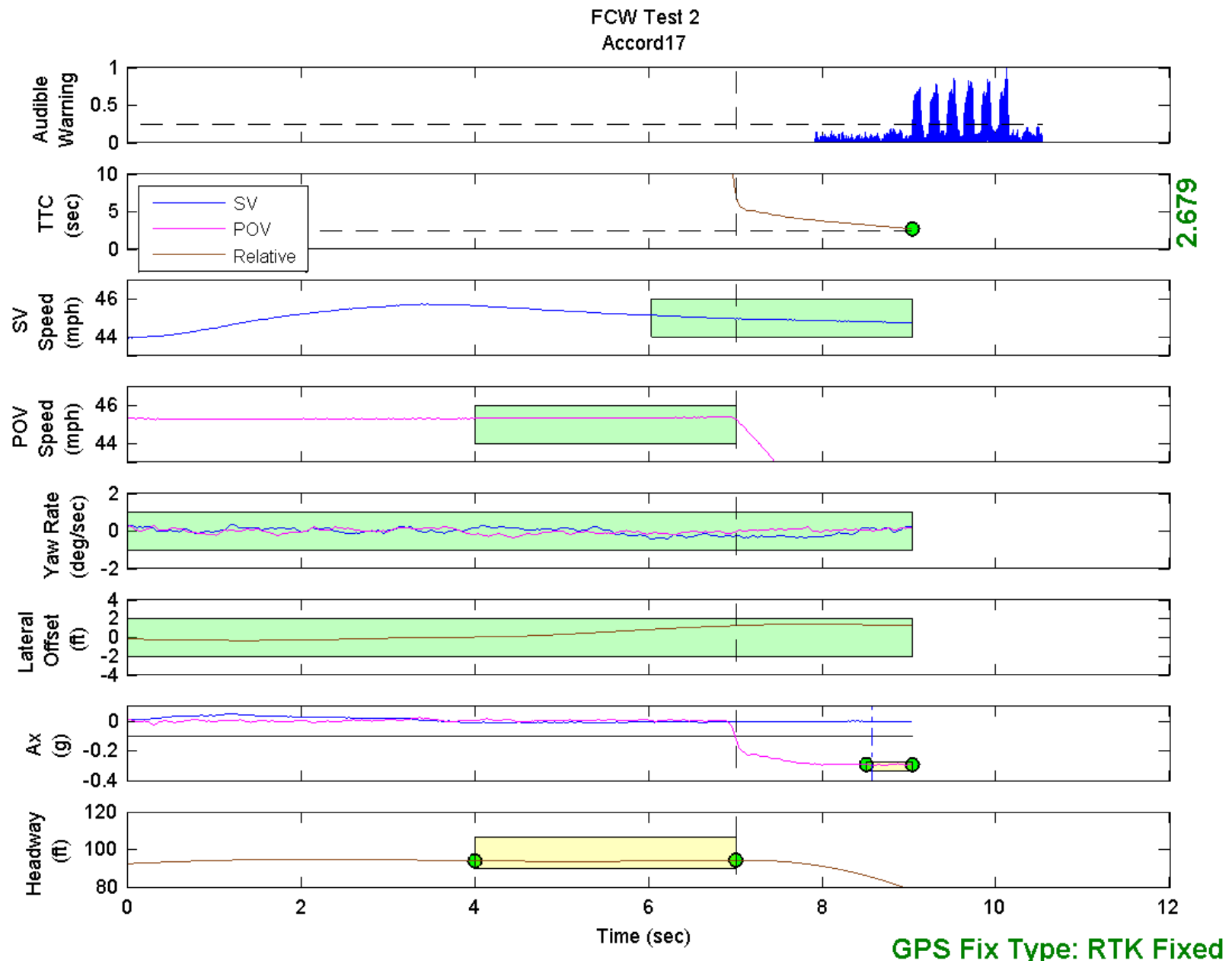


Figure D21. Time History for Run 17, FCW Test 2, Audible Warning

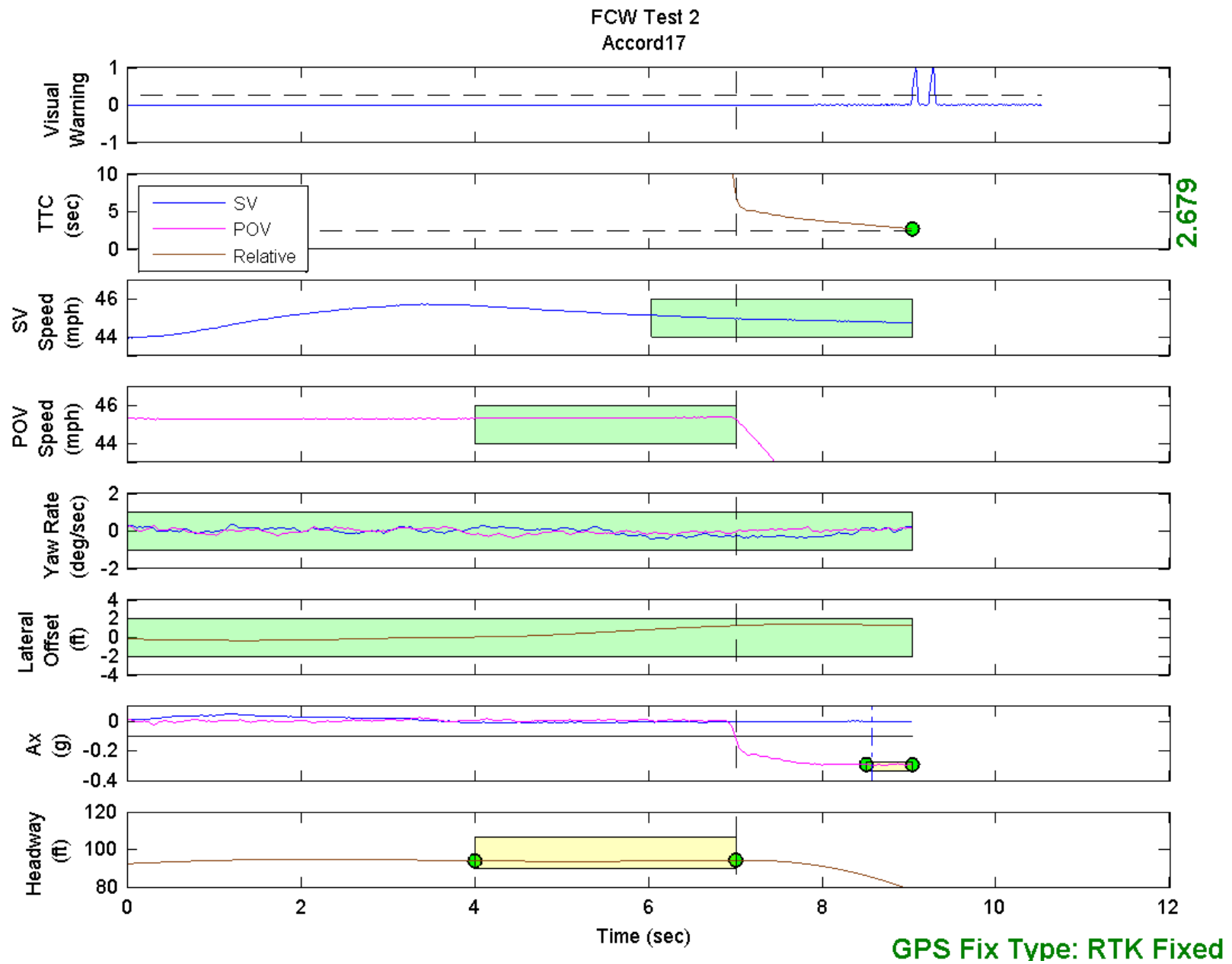


Figure D22. Time History for Run 17, FCW Test 2, Visual Warning

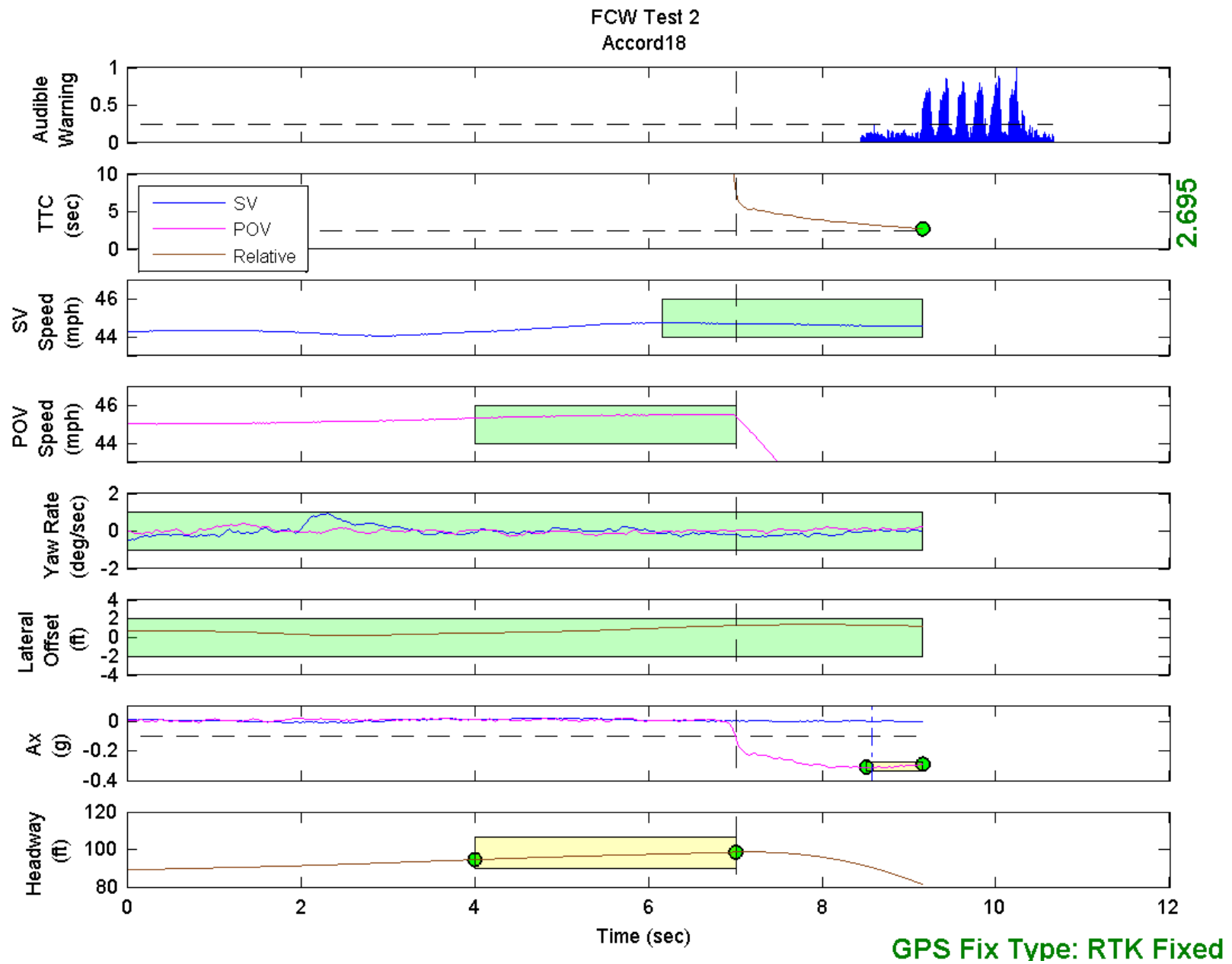


Figure D23. Time History for Run 18, FCW Test 2, Audible Warning

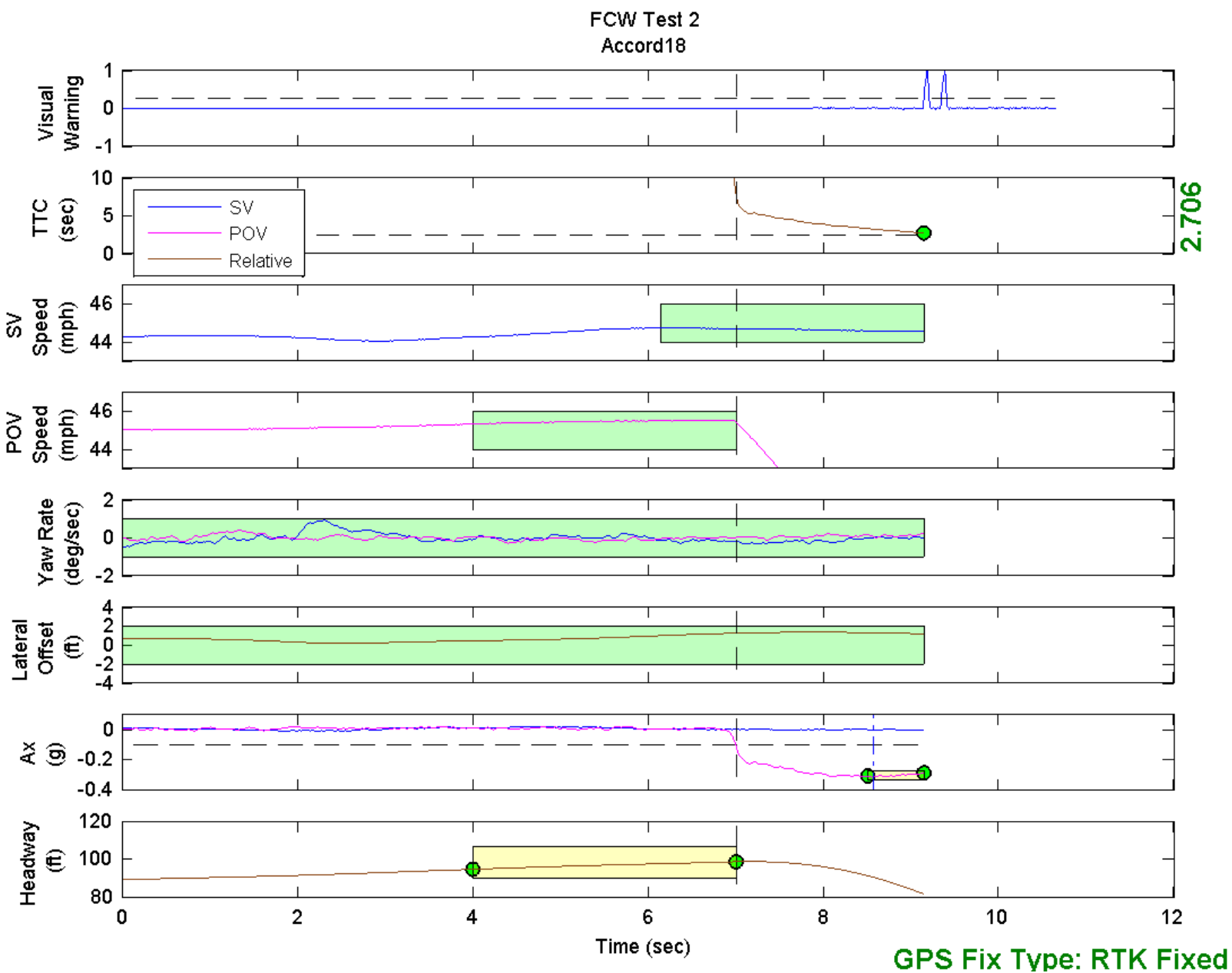


Figure D24. Time History for Run 18, FCW Test 2, Visual Warning

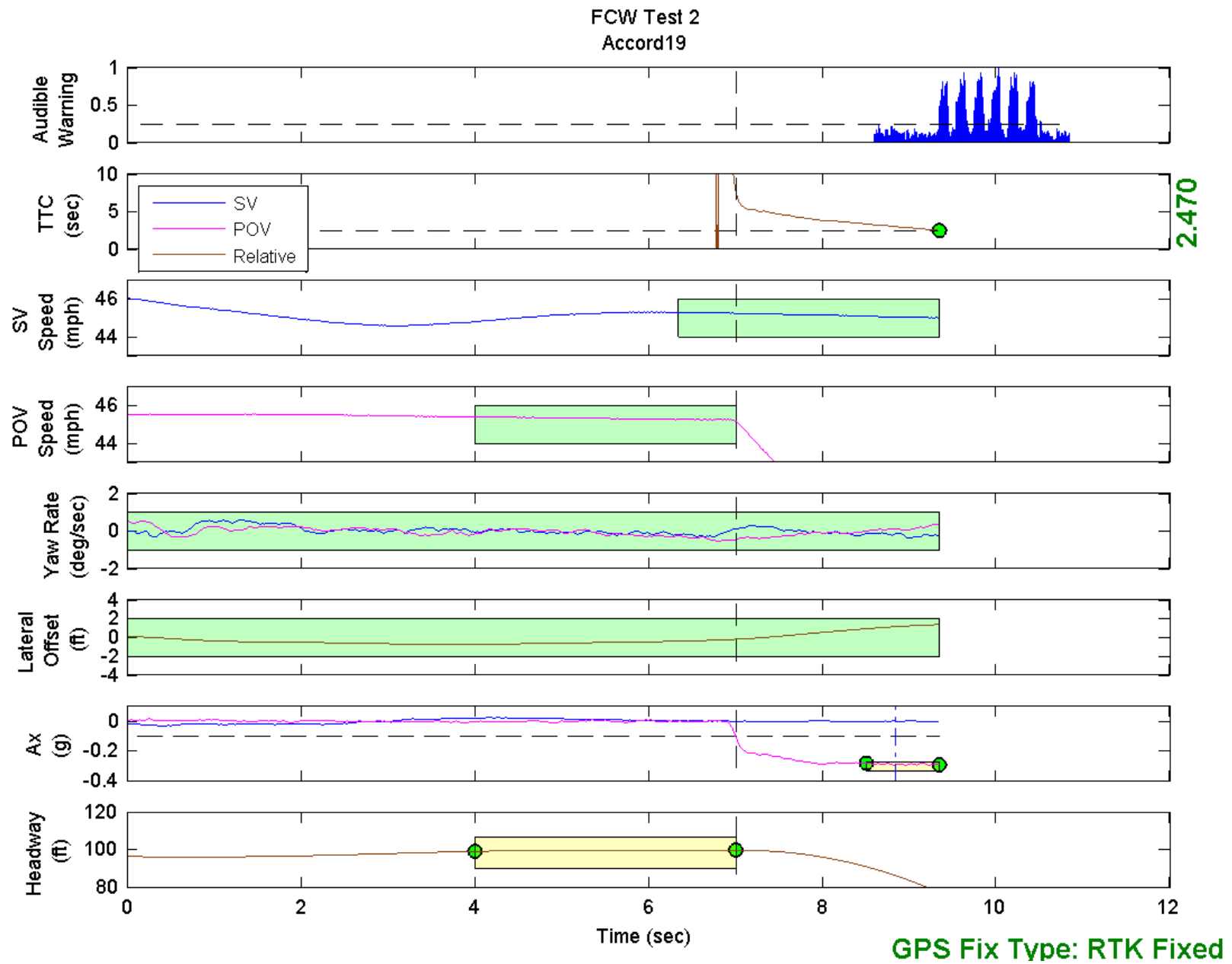


Figure D25. Time History for Run 19, FCW Test 2, Audible Warning

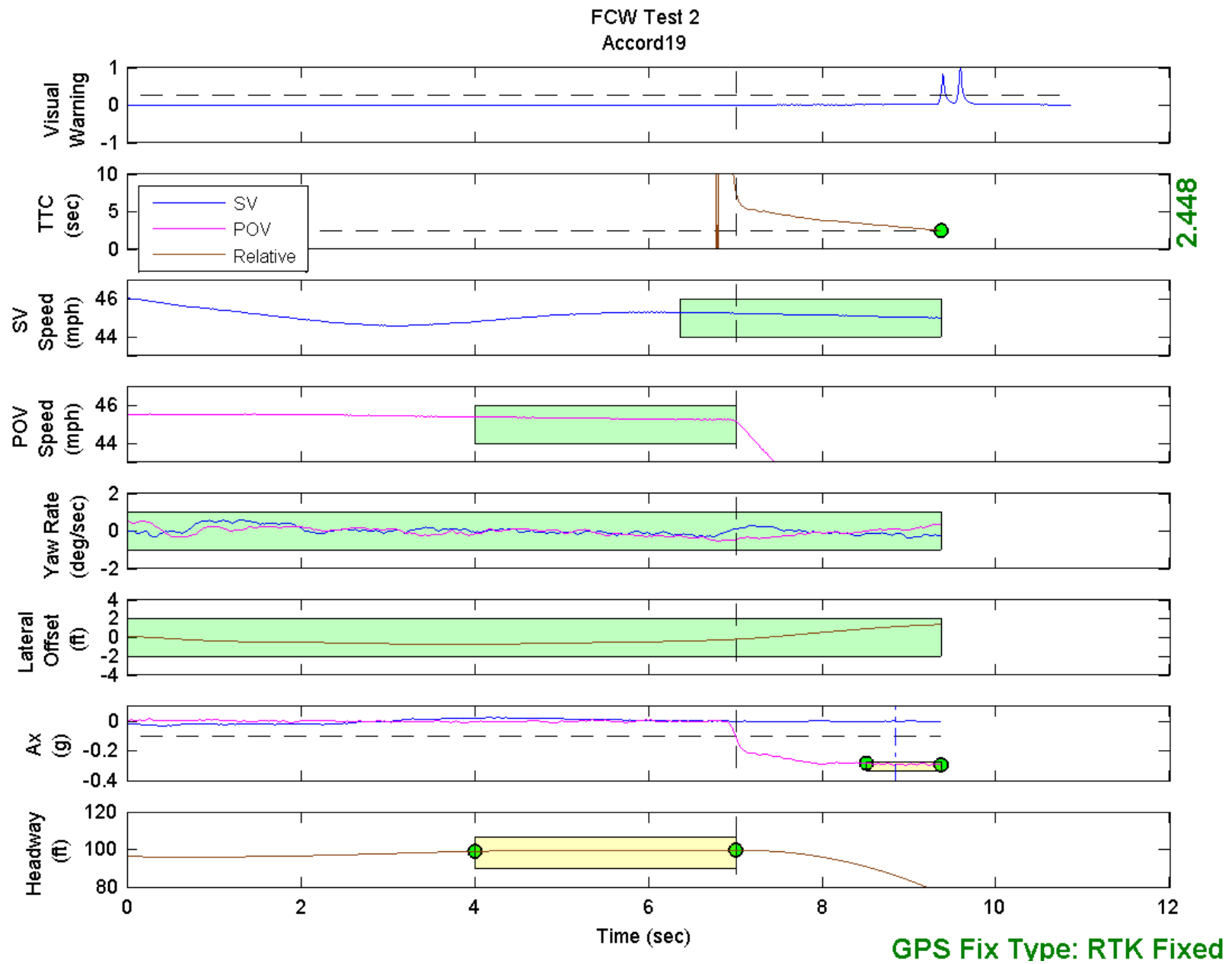


Figure D26. Time History for Run 19, FCW Test 2, Visual Warning

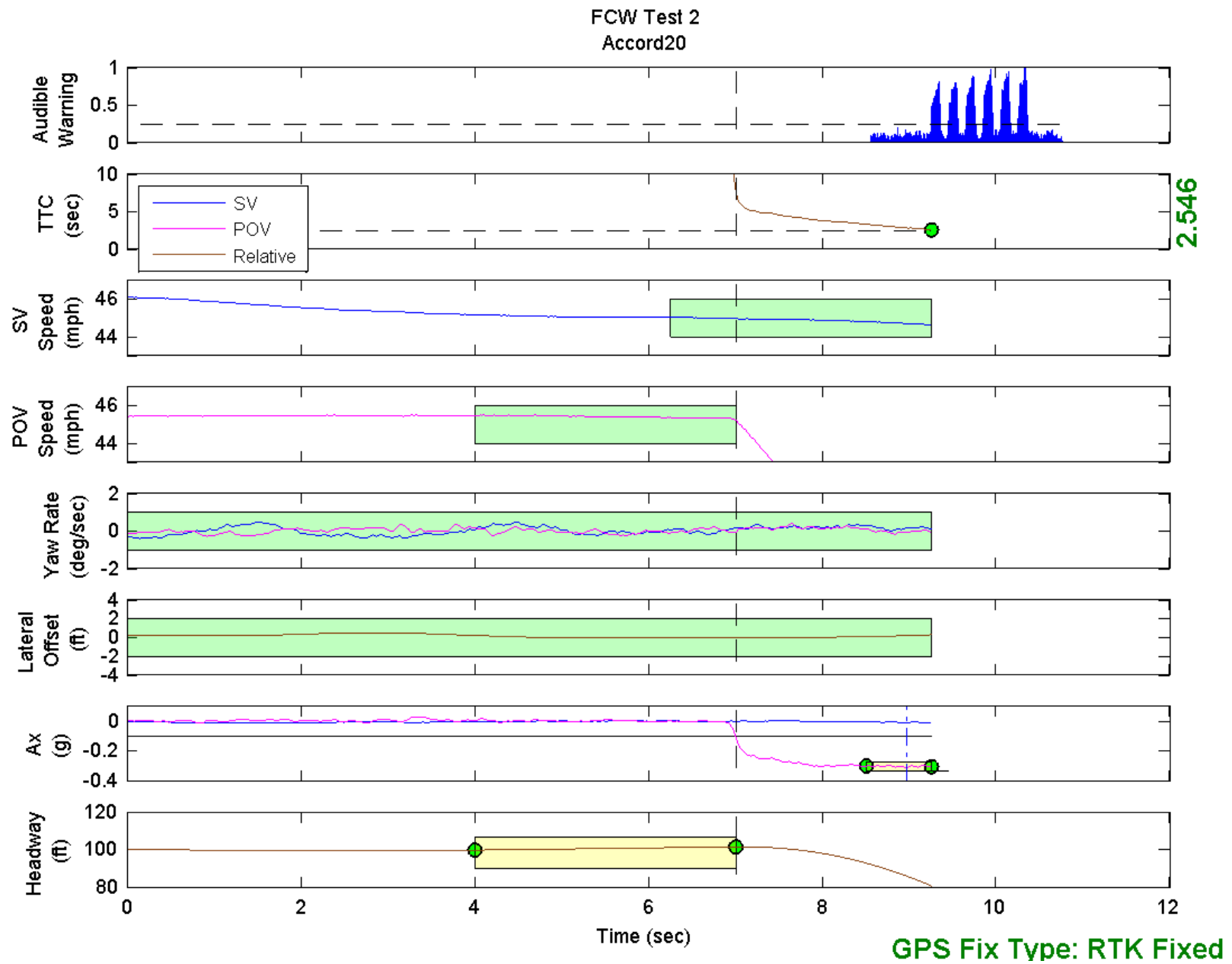
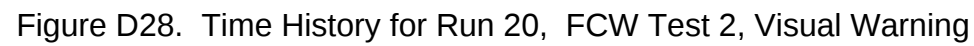


Figure D27. Time History for Run 20, FCW Test 2, Audible Warning



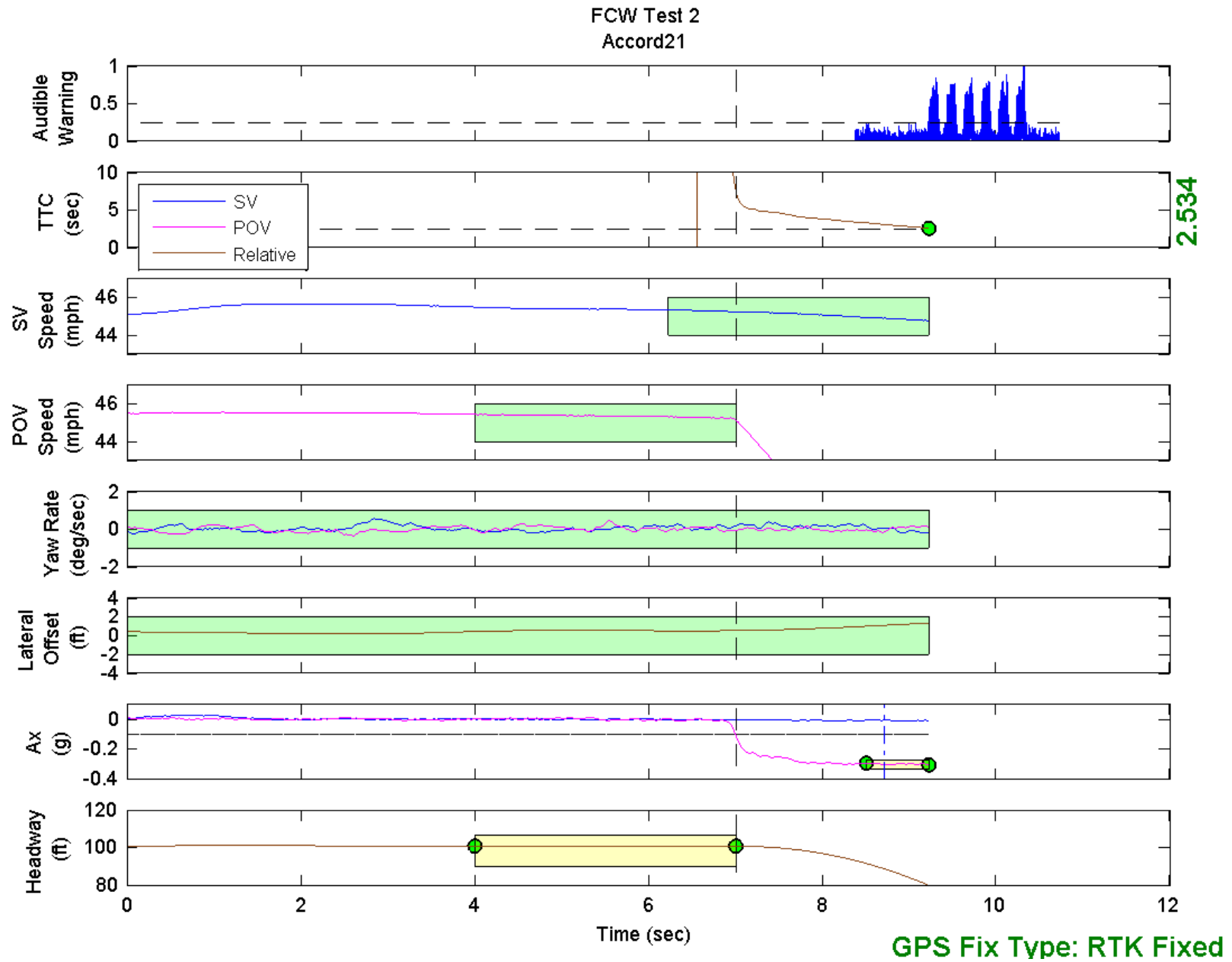
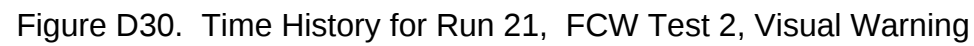


Figure D29. Time History for Run 21, FCW Test 2, Audible Warning



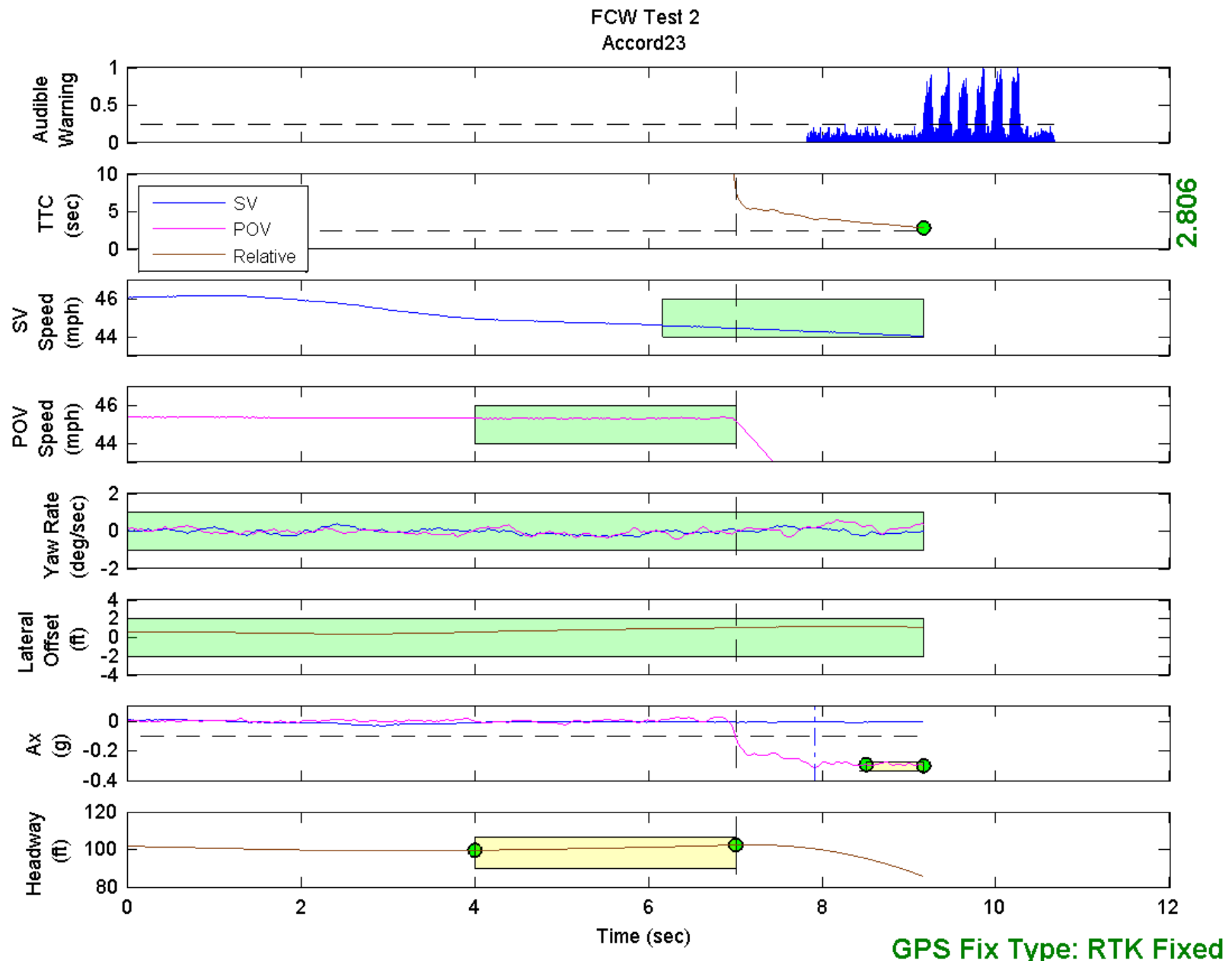


Figure D31. Time History for Run 23, FCW Test 2, Audible Warning

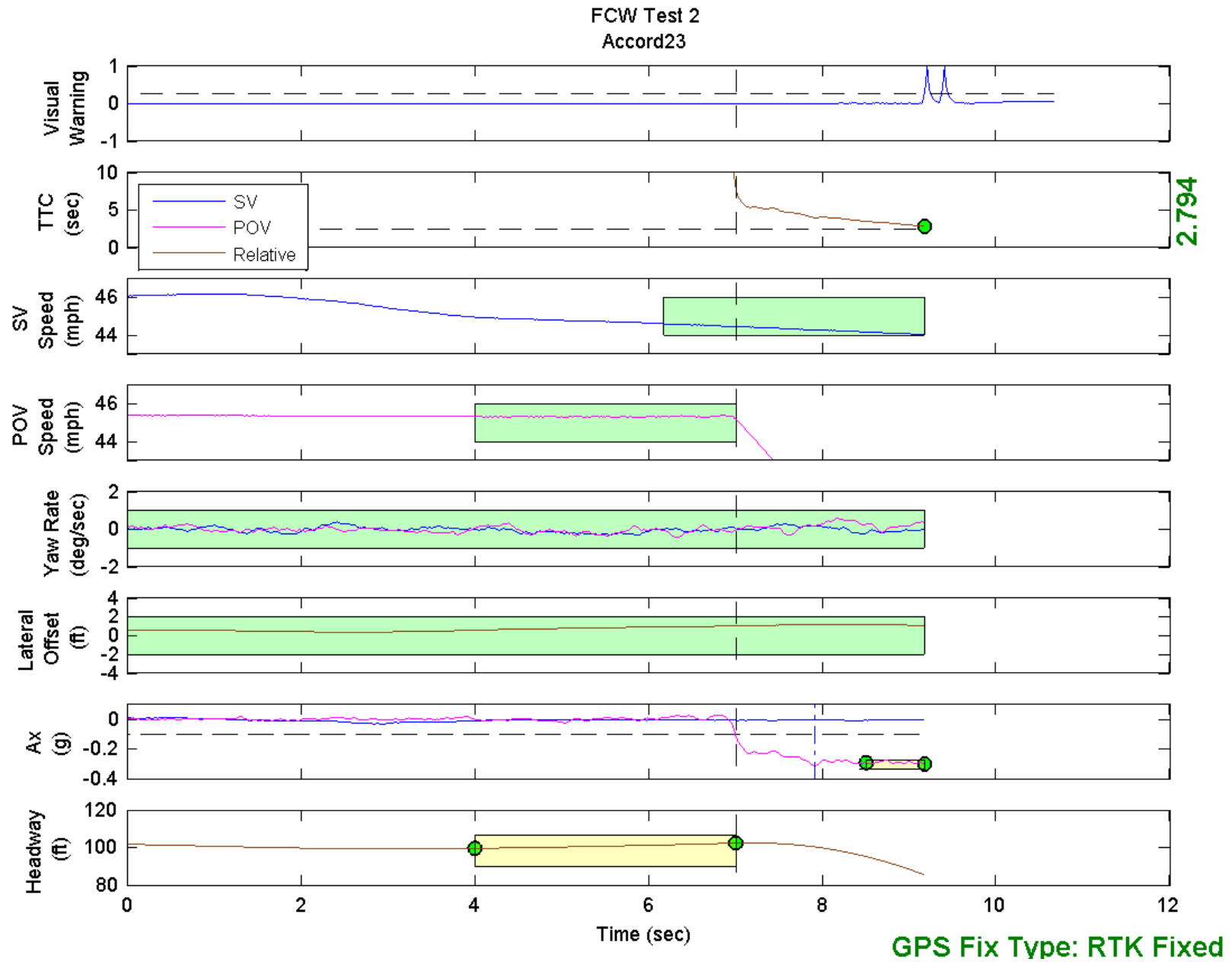


Figure D32. Time History for Run 23, FCW Test 2, Visual Warning

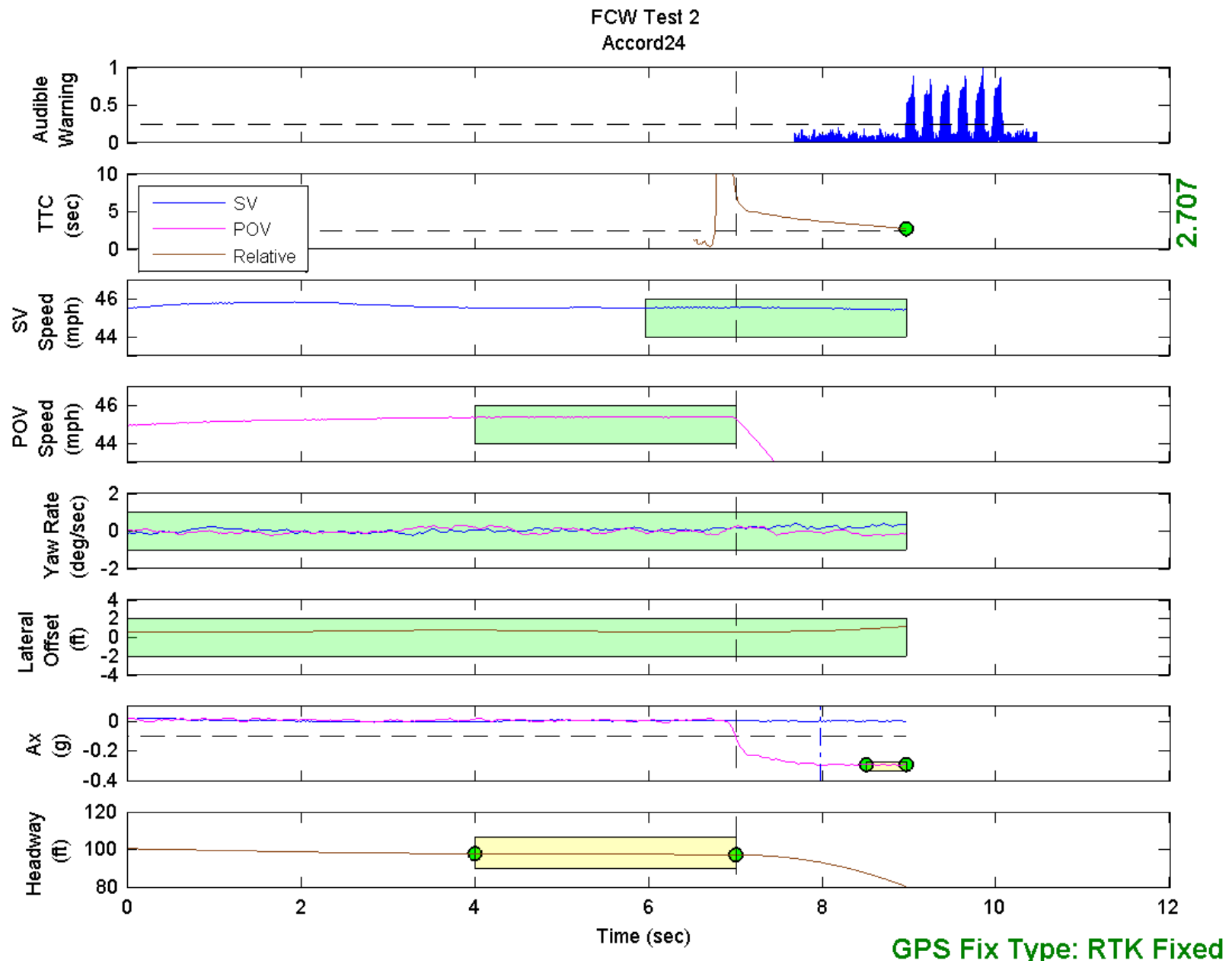


Figure D33. Time History for Run 24, FCW Test 2, Audible Warning

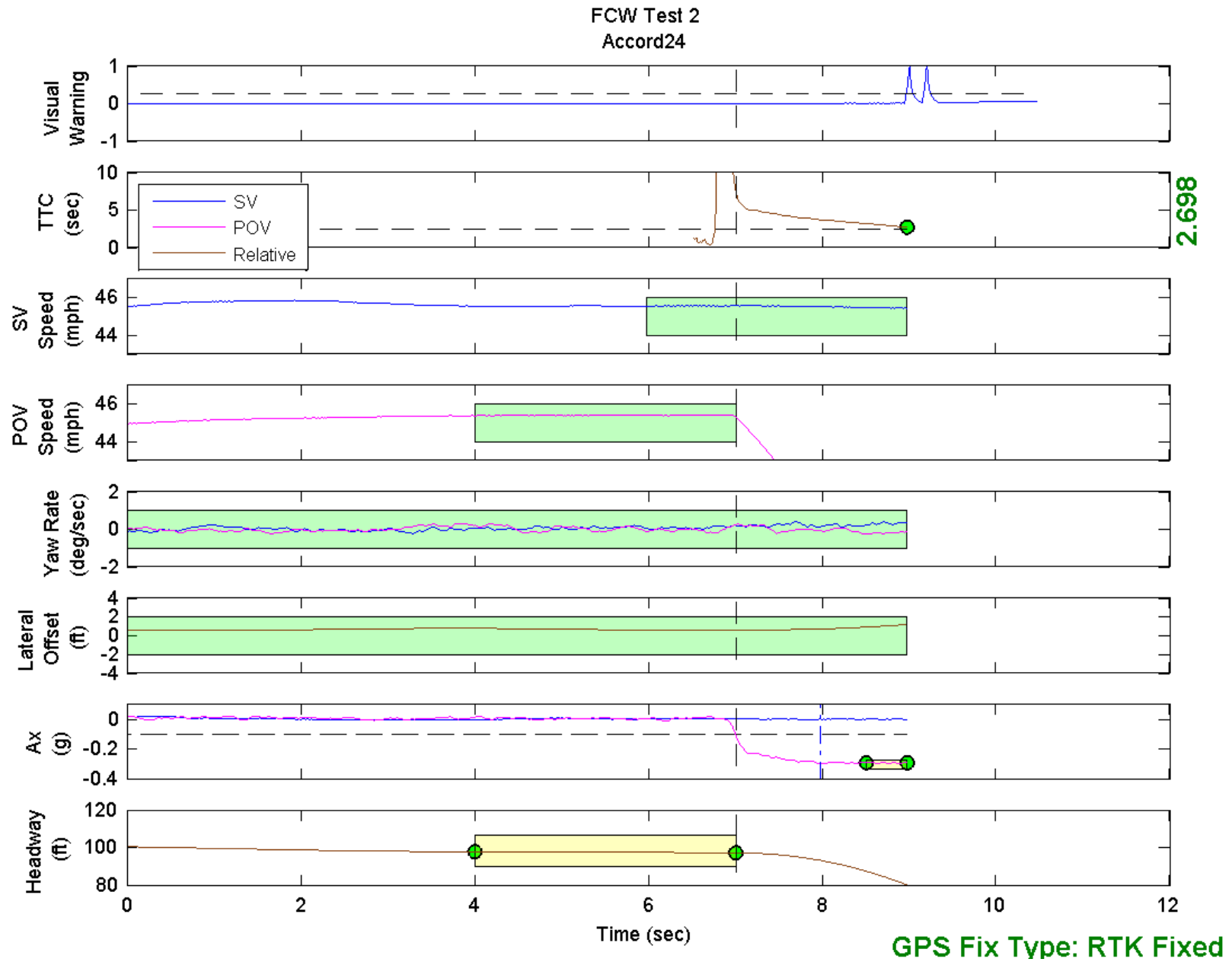


Figure D34. Time History for Run 24, FCW Test 2, Visual Warning

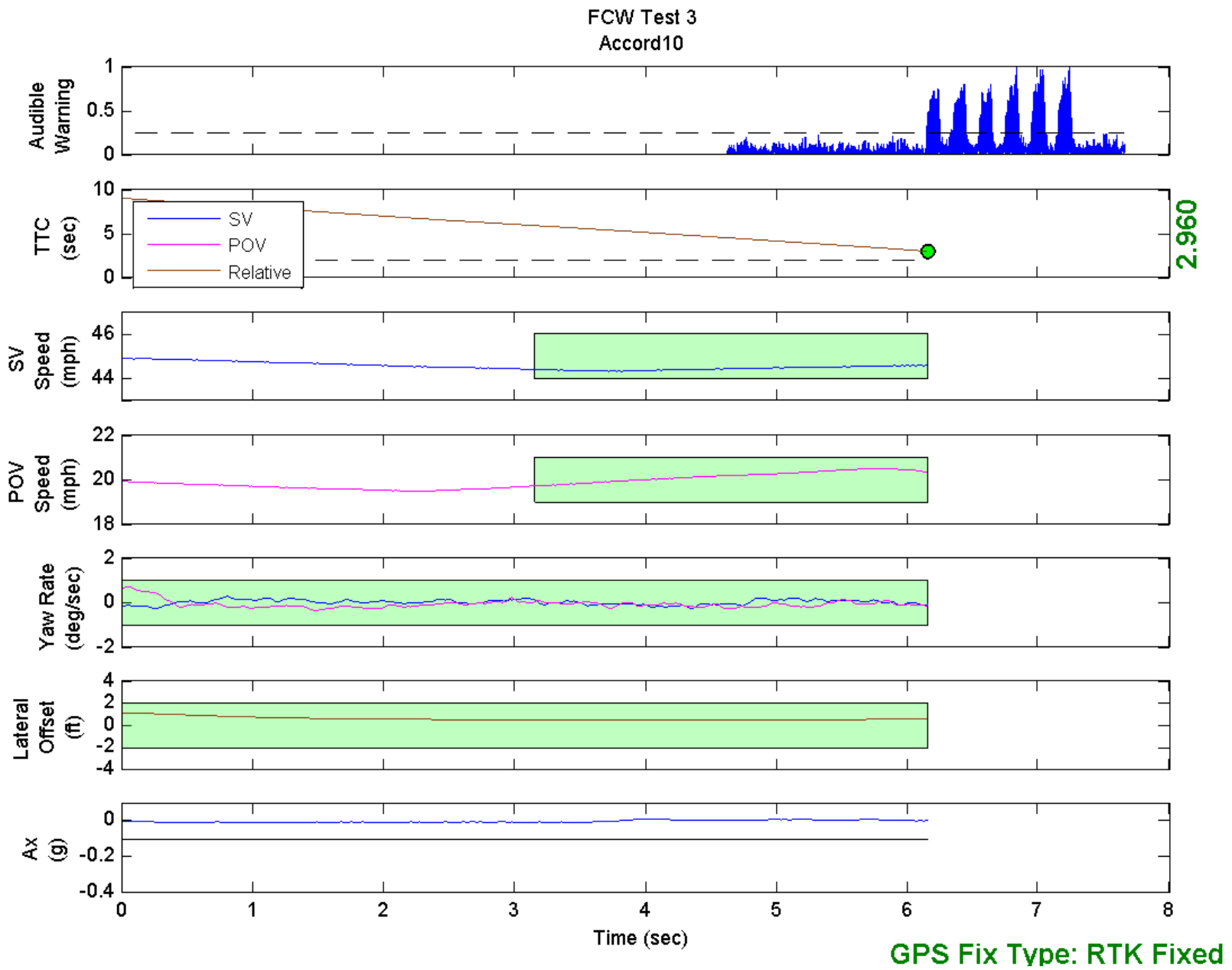


Figure D35. Time History for Run 10, FCW Test 3, Audible Warning

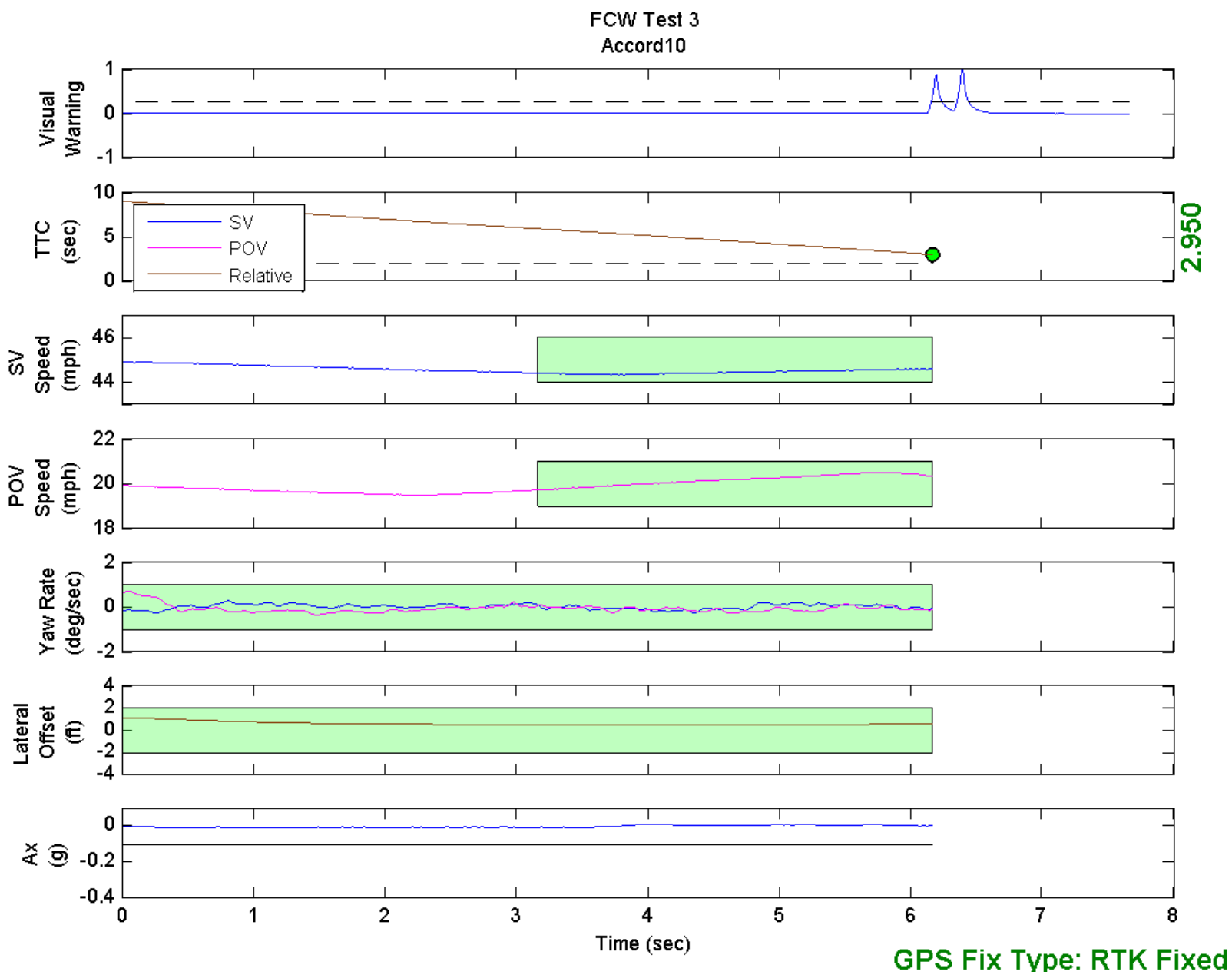


Figure D36. Time History for Run 10, FCW Test 3, Visual Warning

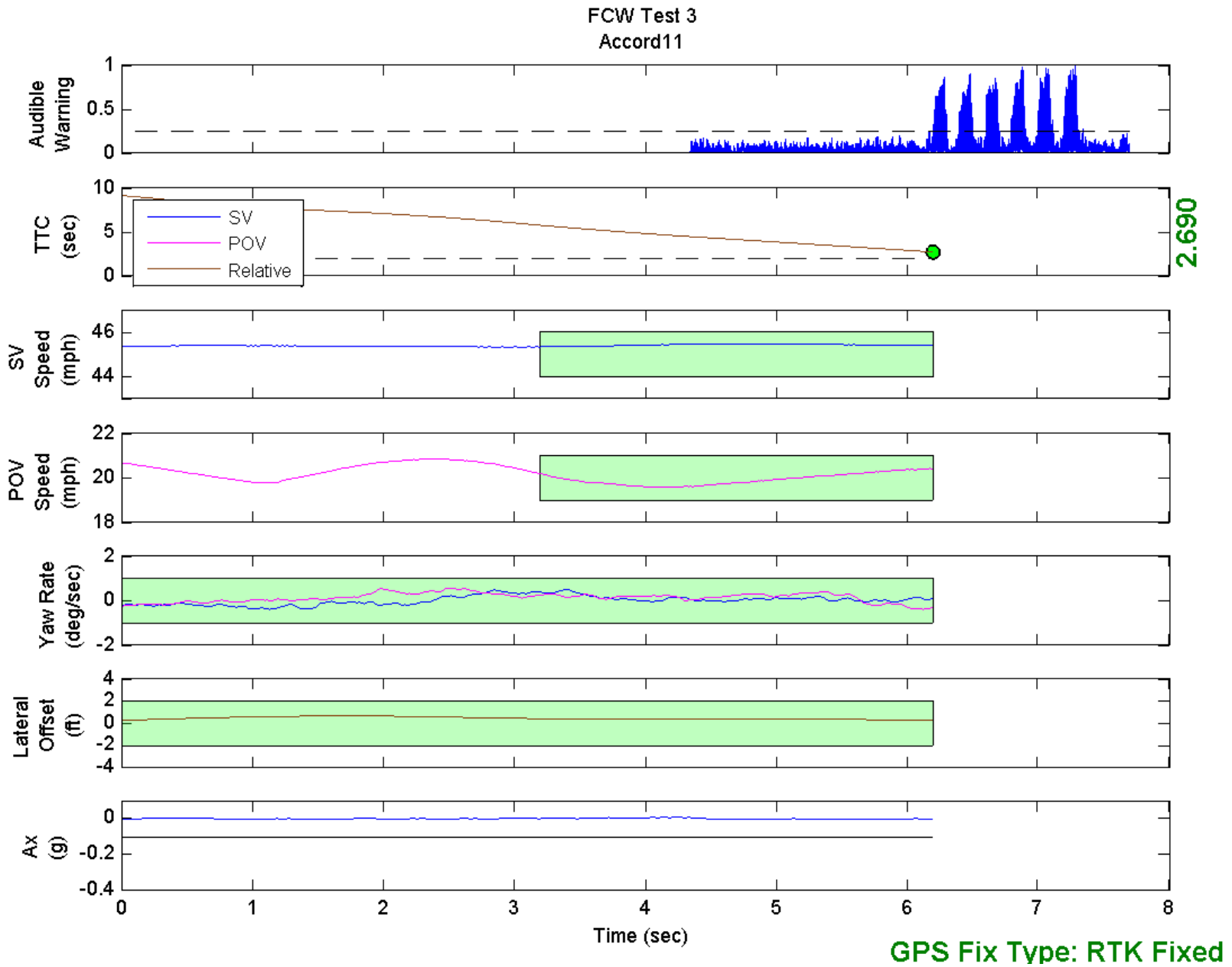


Figure D37. Time History for Run 11, FCW Test 3, Audible Warning

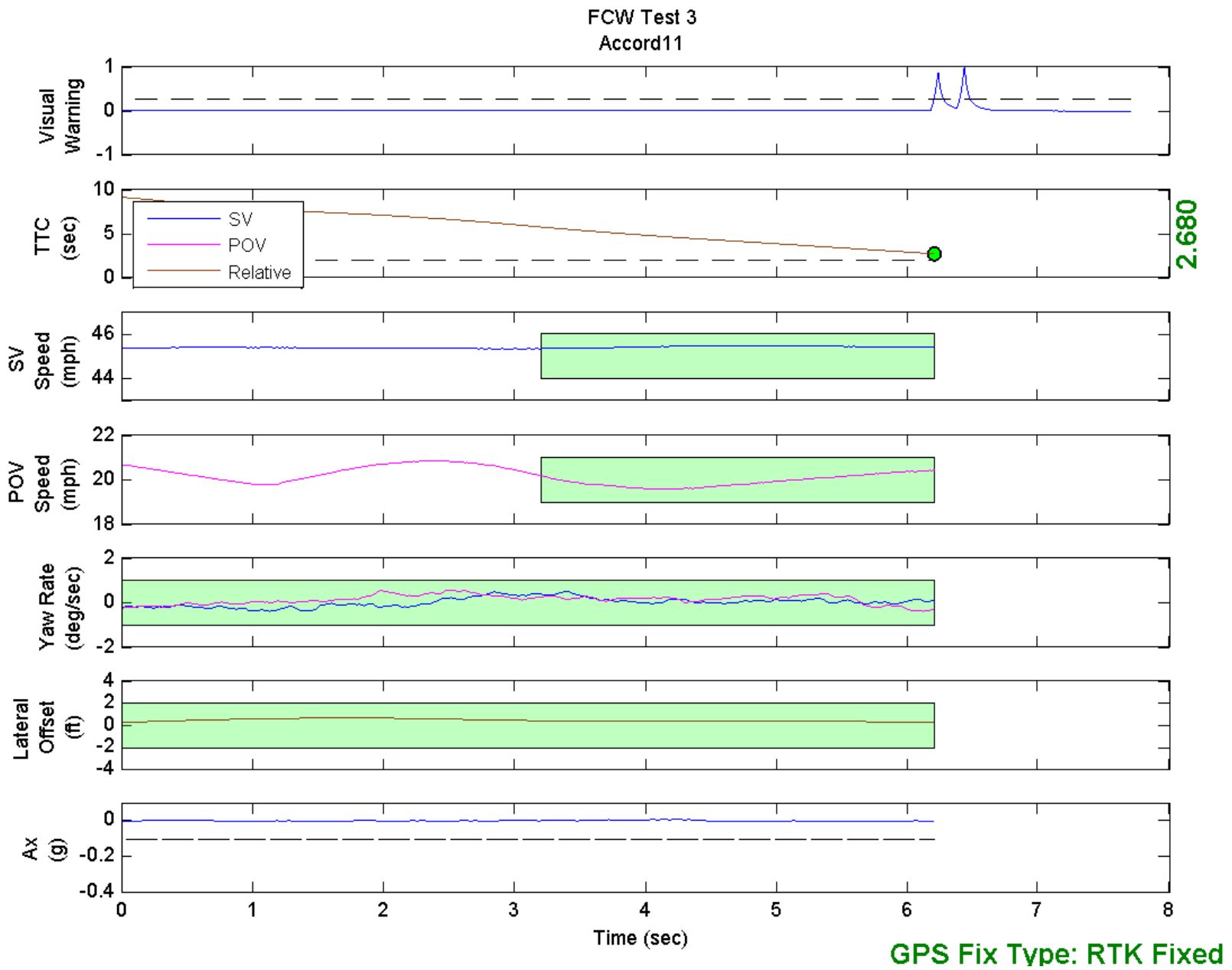


Figure D38. Time History for Run 11, FCW Test 3, Visual Warning

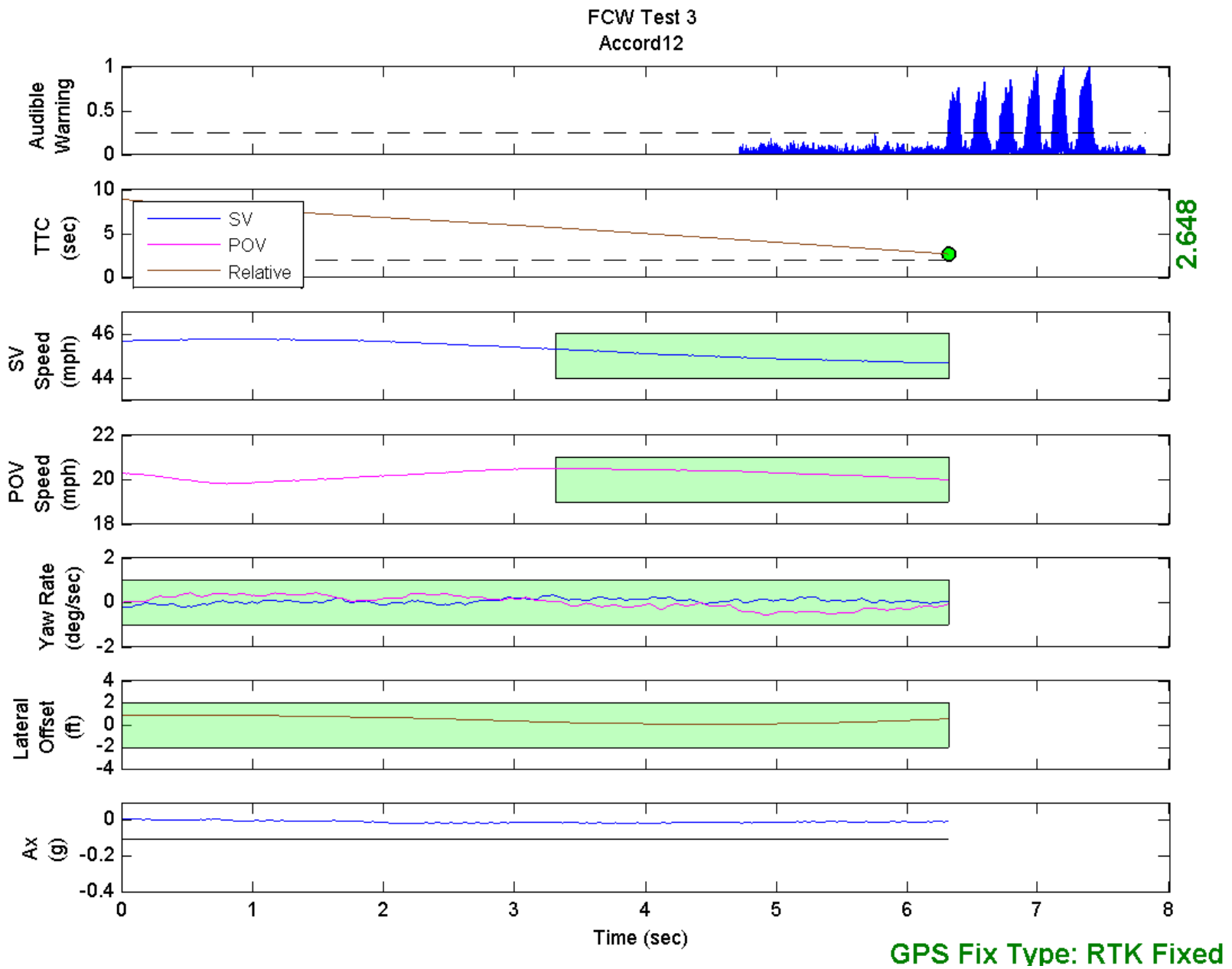


Figure D39. Time History for Run 12, FCW Test 3, Audible Warning

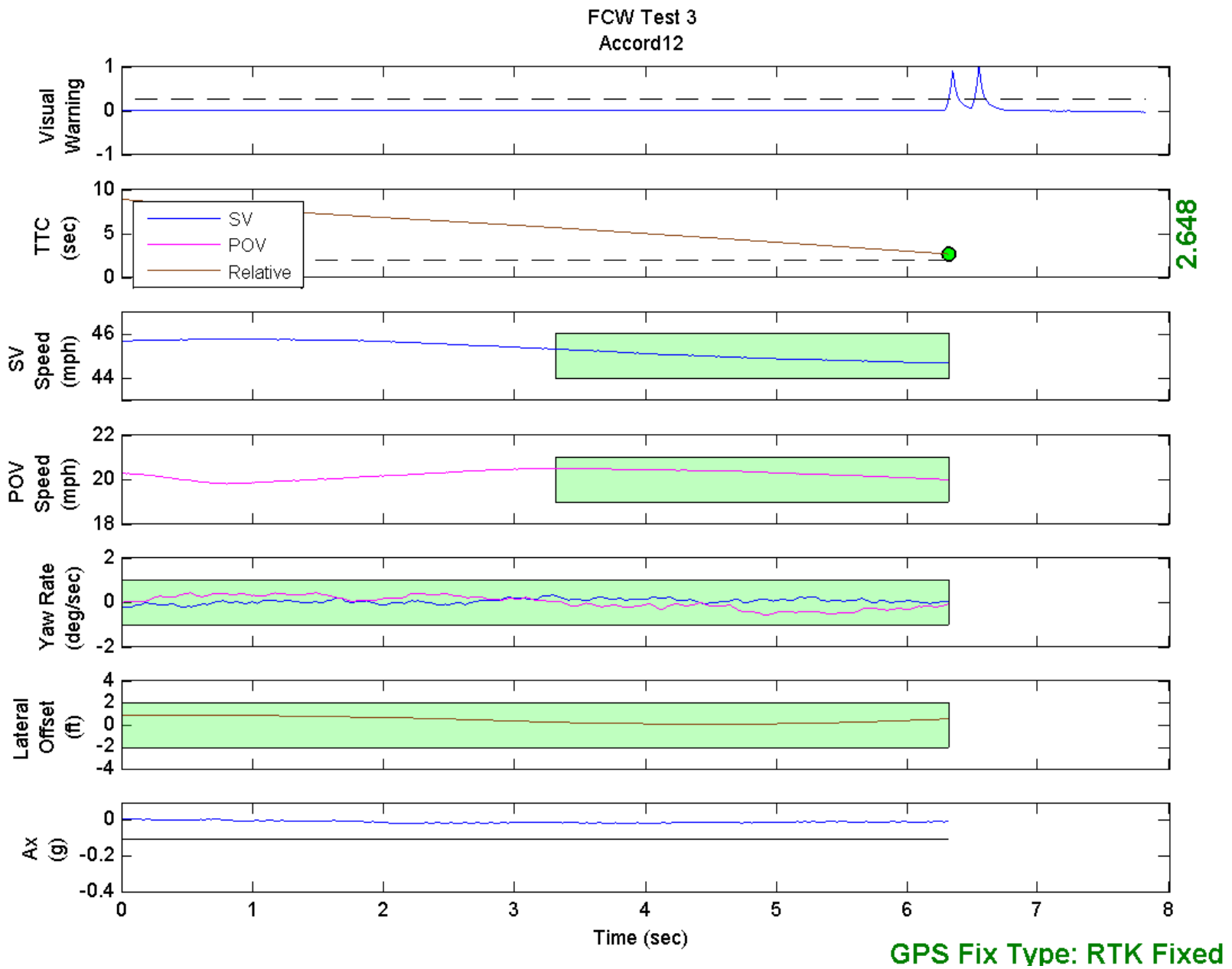


Figure D40. Time History for Run 12, FCW Test 3, Visual Warning

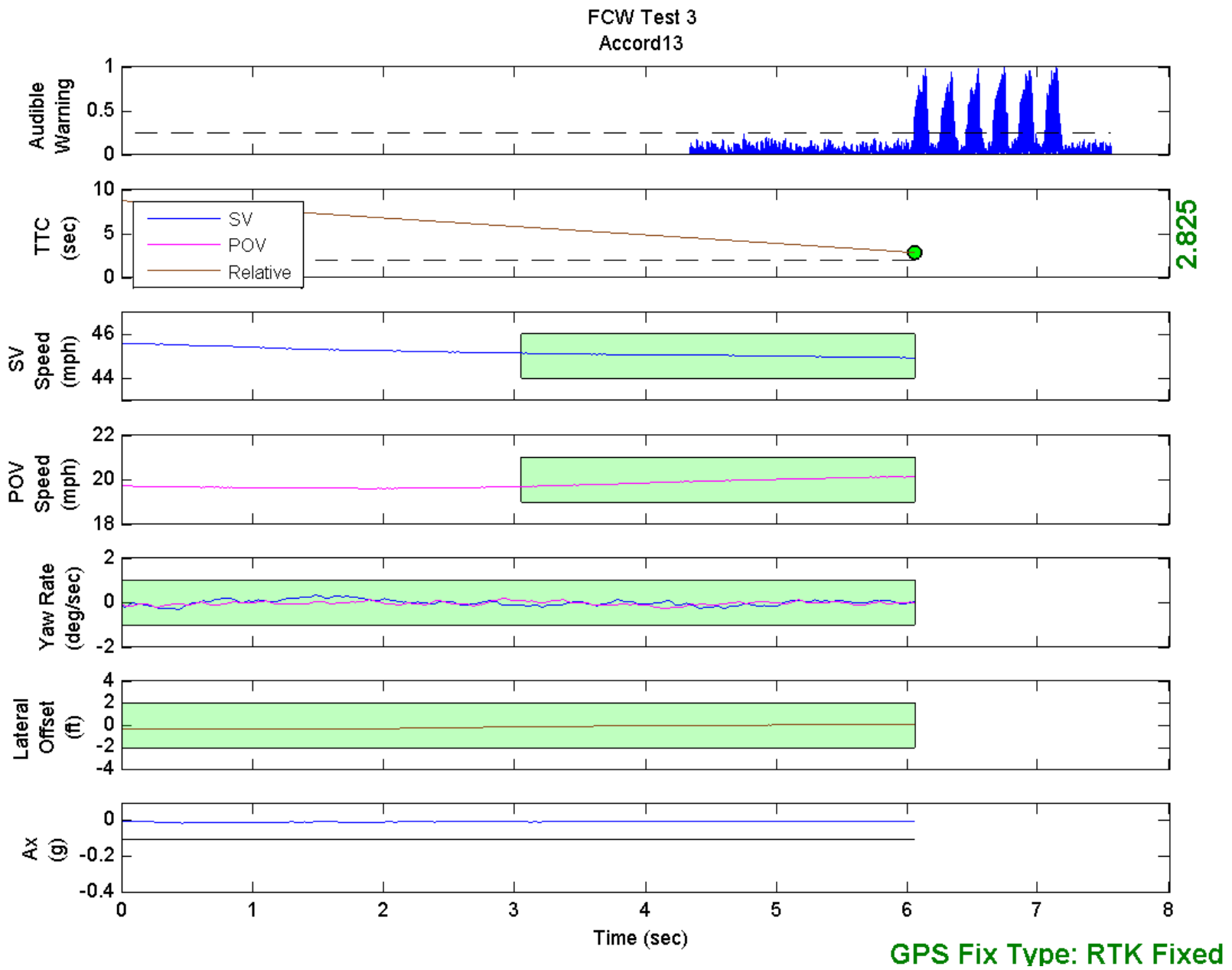


Figure D41. Time History for Run 13, FCW Test 3, Audible Warning

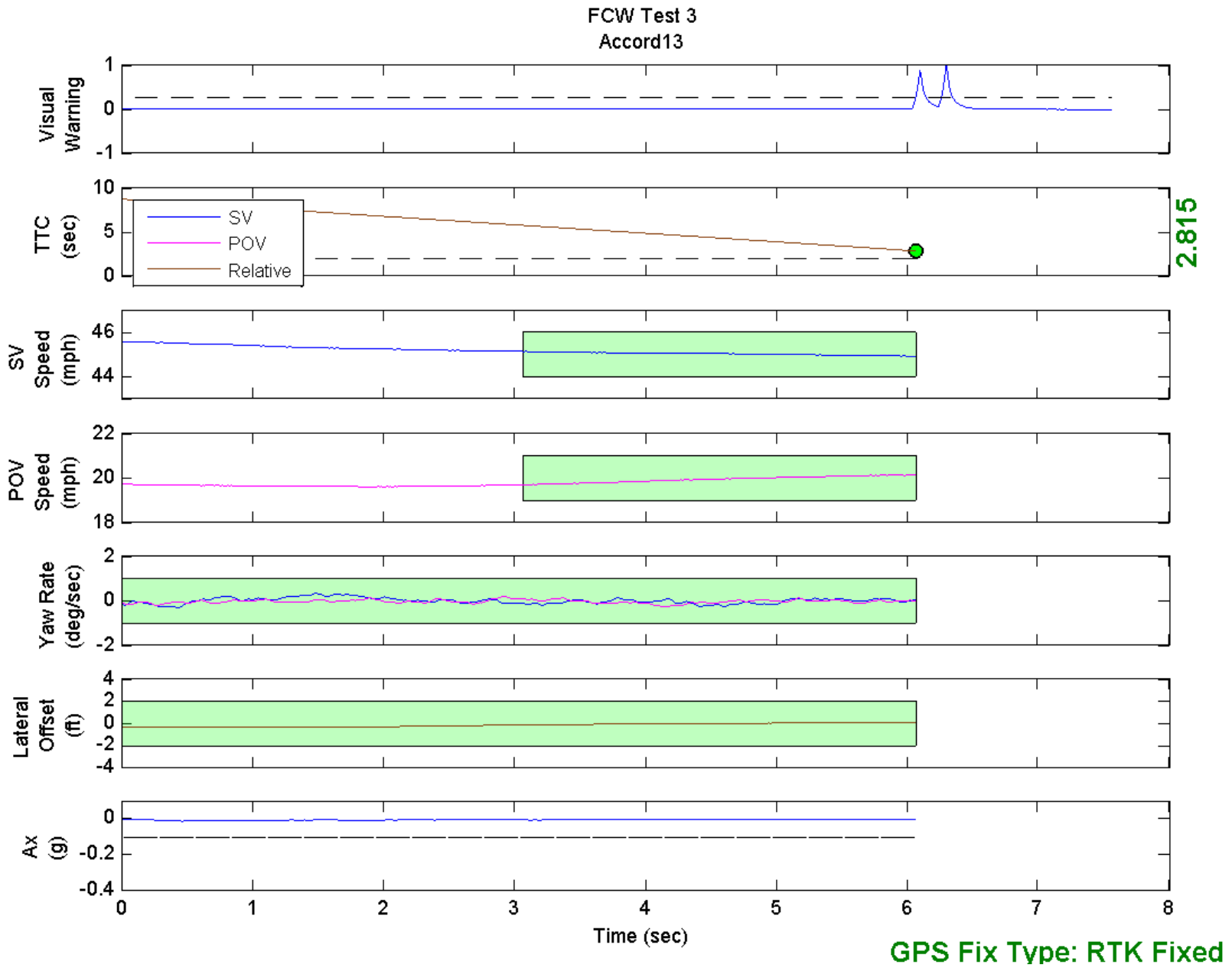


Figure D42. Time History for Run 13, FCW Test 3, Visual Warning

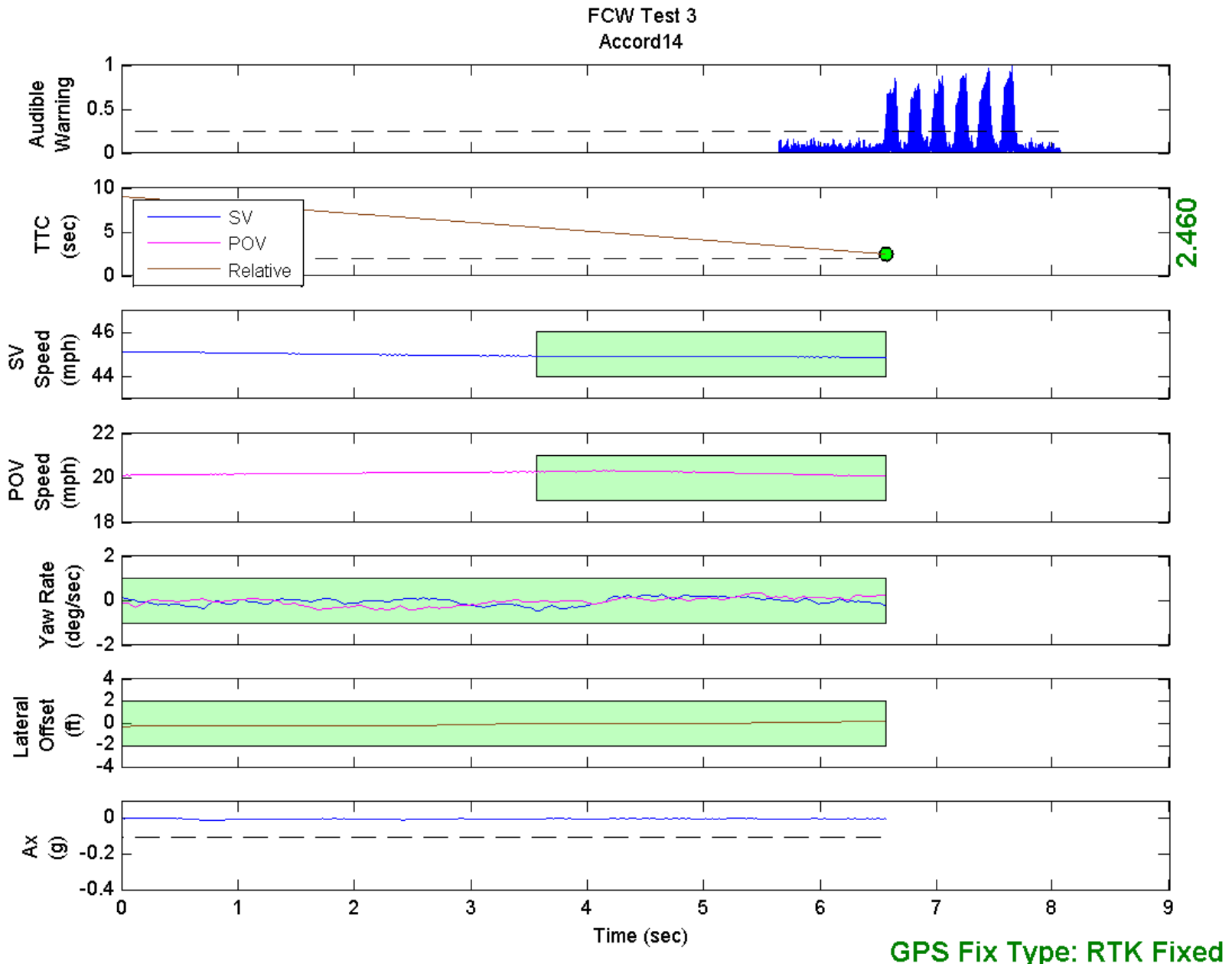


Figure D43. Time History for Run 14, FCW Test 3, Audible Warning

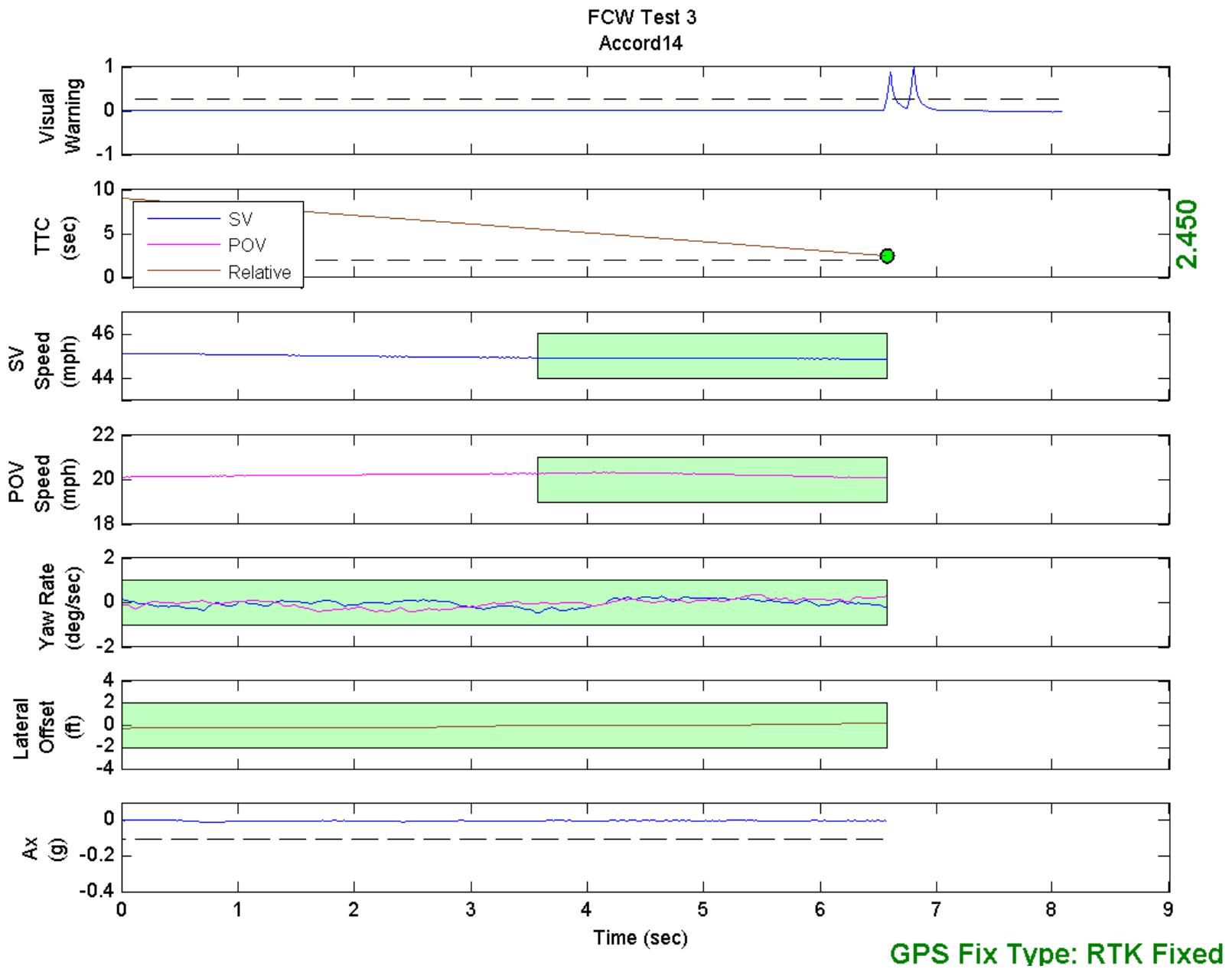


Figure D44. Time History for Run 14, FCW Test 3, Visual Warning

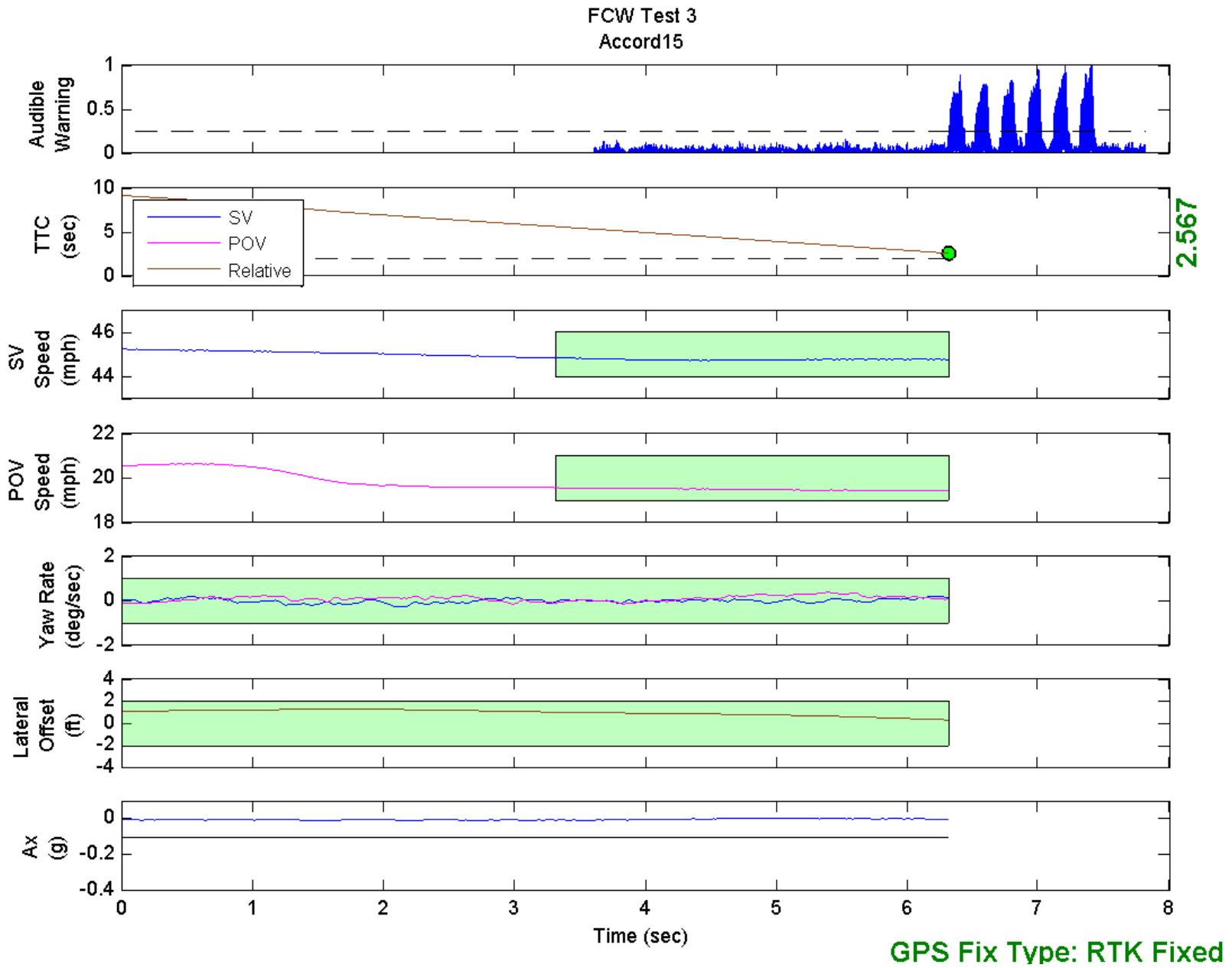


Figure D45. Time History for Run 15, FCW Test 3, Audible Warning

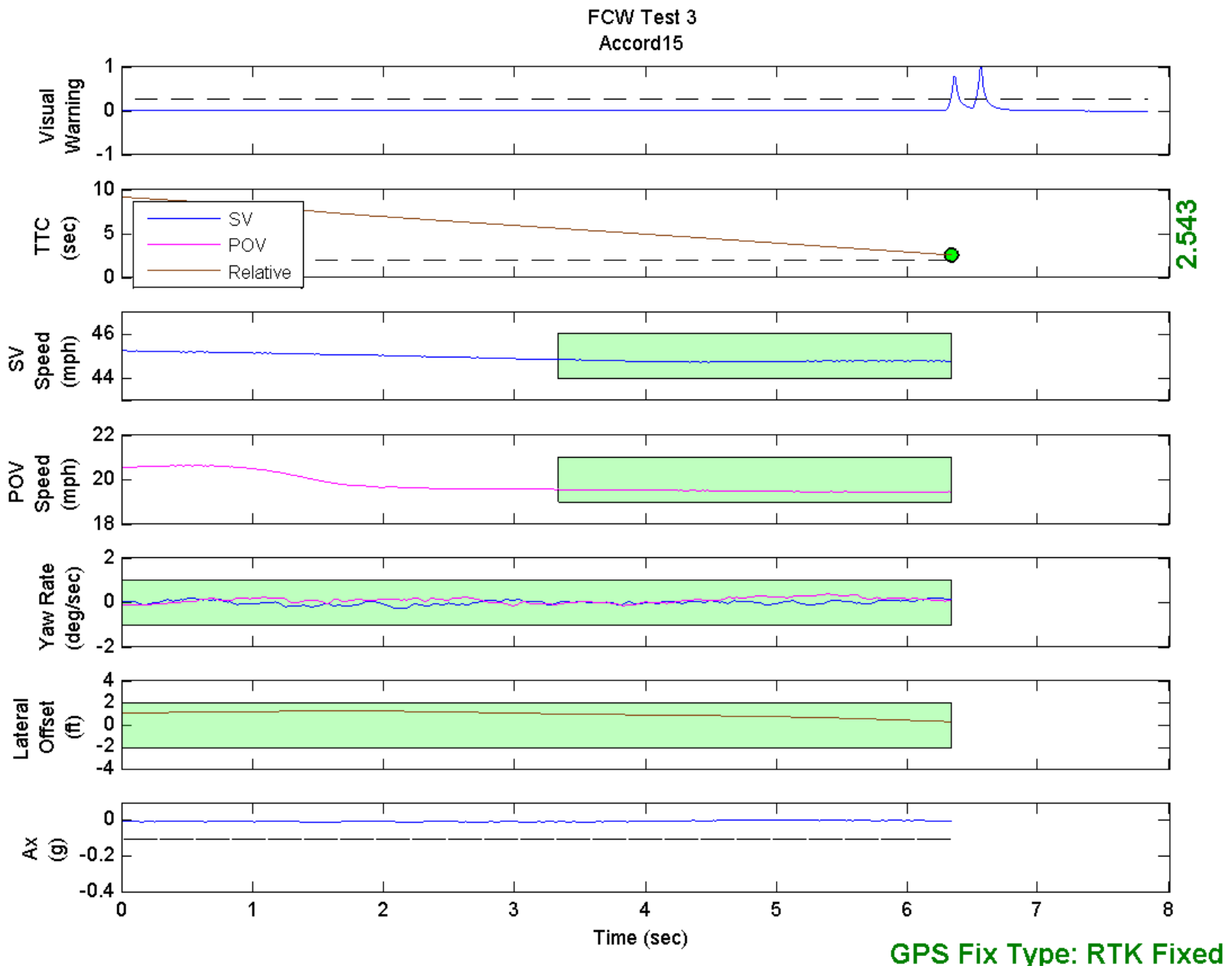


Figure D46. Time History for Run 15, FCW Test 3, Visual Warning

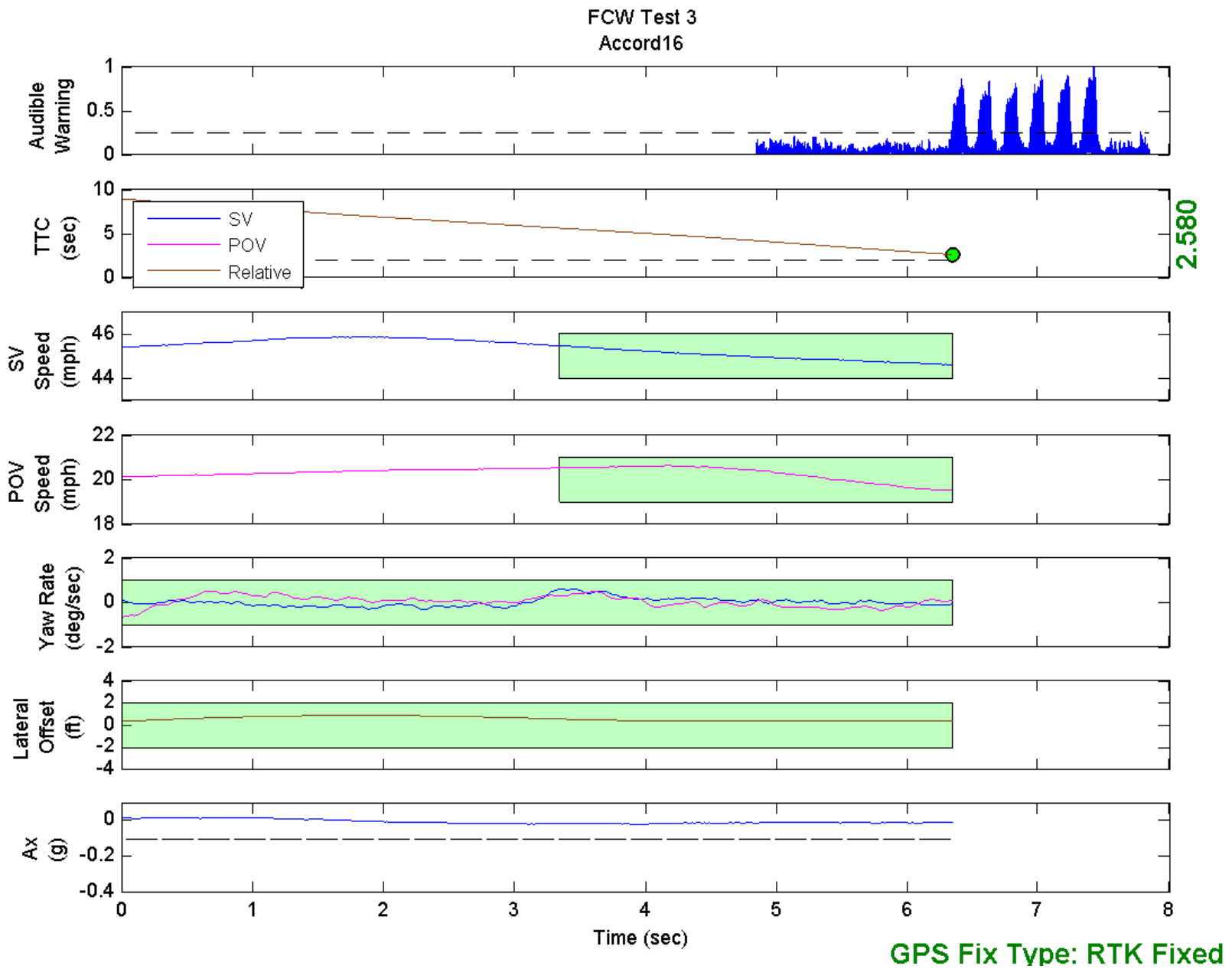


Figure D47. Time History for Run 16, FCW Test 3, Audible Warning

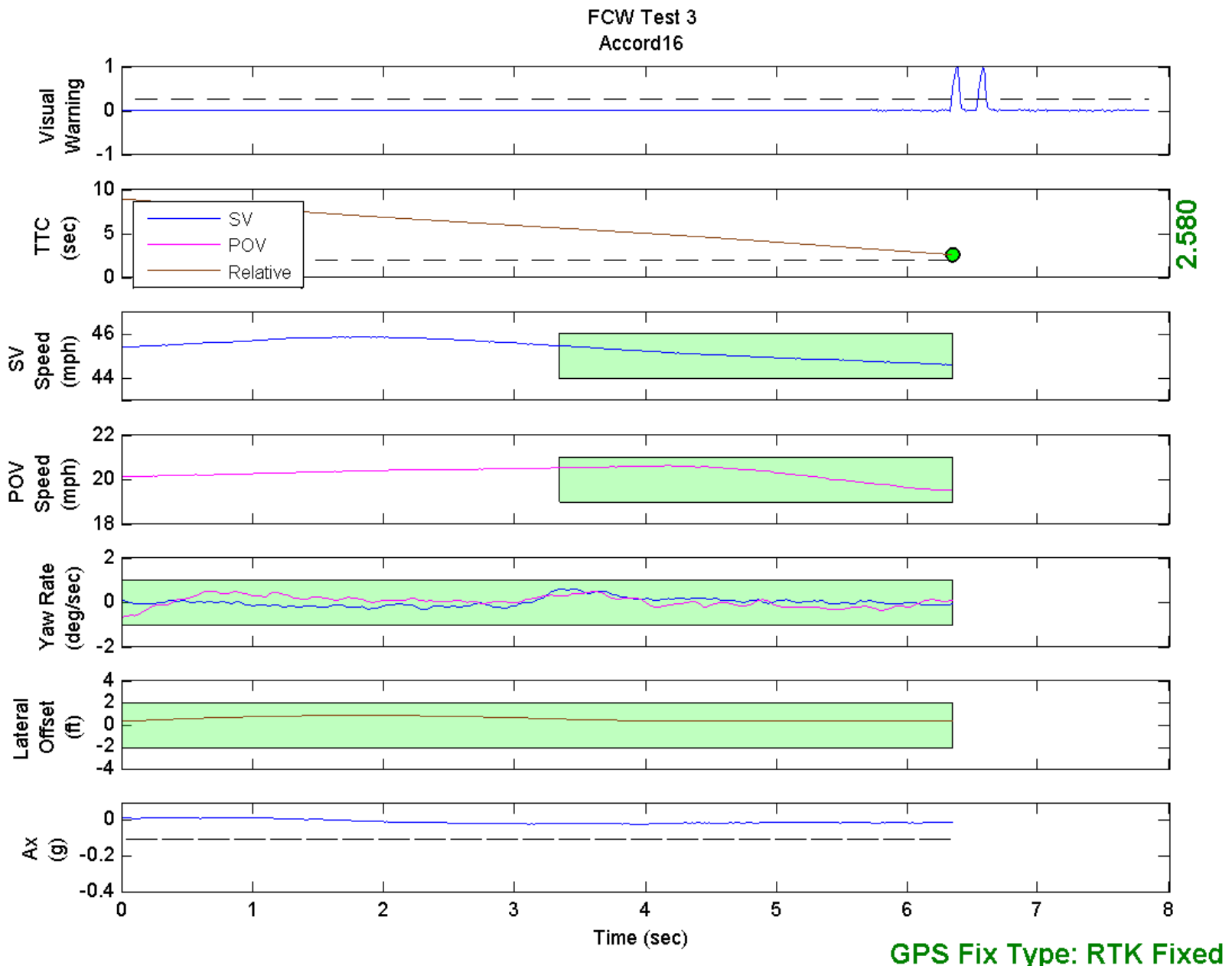


Figure D48. Time History for Run 16, FCW Test 3, Visual Warning