



AV-30-E

Installation Manual



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1 Revision History

Revision	Date	Comments
A	6/2/2020	Initial release
B	1/12/2021	Software update 1.1.0
C	7/22/2021	Software update 2.1.1 Added Transponder control Added AV-Link installation Added definition of acronyms & terms section Added magnetometer aiding and calibration Added requirement of pitot and static
D	1/5/2022	Added AeroCruze/TruTrak installation and control
E	4/12/2022	Added AV-Mag external magnetometer installation and calibration instructions

2 Warnings / Disclaimers

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Please email or call uAvionix support with a description of the problem you are experiencing. Also, please provide the model, serial number, shipping address and a daytime contact number.

You will be promptly contacted with further troubleshooting steps or return instructions. It is recommended to use a shipping method with tracking and insurance.

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5 Introduction

5.1 Purpose

This installation manual applies to the following models:

- AV-30-E (non-certified)

Unless otherwise specified, all information in this document applies to all product variants.

5.2 Definition of Acronyms & Terms

Acronym	Definition
ADS-B	Automatic Dependent Surveillance - Broadcast
AI	Attitude Indicator
AoA	Angle of Attack
BARO	Barometer; barometric
DALT	Density Altitude
DG	Directional Gyroscope
GPS	Global Positioning System
HIRF	High-Intensity Radiated Field
IAS	Indicated Airspeed
MFD	Multi-Function Display
OAT	Outside Air Temperature
SALT	Selected Altitude or Set Altitude
SVS	Selected Vertical Speed or Set Vertical Speed
TAS	True Airspeed
TSO	Technical Standard Order
V_{MC}	Minimum controllable airspeed
V_{YSE}	Best rate-of-climb speed with one engine inoperative
V_2	Take-off safety speed. The lowest speed at which the aircraft complies with the handling criteria associated with the climb.
V_T	Threshold crossing speed; target speed (after V_2 has been reached)
V_{SO}	Minimum stall speed with gear and full flaps. The bottom end of the ASI white arc.
V_{S1}	Minimum steady flight velocity while still controllable. The bottom end of the ASI green arc.
V_{FE}	Maximum flap extended velocity. The top end of the ASI white arc.
V_{NO}	Maximum normal operating velocity. The top end of the ASI green arc.

Acronym	Definition
V_{NE}	Maximum velocity in smooth air (never exceed). The red line at the top end of the ASI yellow arc.
V_{MC}	Minimum control airspeed with the critical engine inoperative
V_{YSE}	Speed for best rate of climb OEI (single engine)
WMM	World Magnetic Model

6 AV-30 System Information

This document provides instructions on the installation requirements for the uAvionix AV-30 multi-mode instrument.

6.1 System Description

The uAvionix AV-30 is a fully digital multi-mode instrument that mounts in the legacy 3-1/8" round instrument panel. It can be field configured as either an Attitude Indicator (AI), a Directional Gyro (DG) indicator or Multi-Function Display (MFD). It is fully self-contained with dual-precision inertial and pressure sensors and allows for a wide variety of pilot customization. Transponder control is available in AI, DG, and MFD modes.



Figure 1 - AV-30 Multi Mode AI/DG/MFD/Transponder – Basic Display

When configured as an AI, primary attitude and slip are always displayed. The unused portions of the display area can be customized by the pilot to show a variety of textual and graphical data overlay fields.

Three pages may be customized by the pilot while a fourth page presents a fully decluttered view of only attitude and slip, while optionally presenting transponder controls.

When configured as a Directional Gyro (DG), direction of flight information is presented. The flight direction can be configured to be presented as a non-slaved heading or inertially stabilized GPS track when connected to an external GPS navigator. Multiple display presentations, including compass rose, GPS HSI, and GPS ARC views can be selected by the pilot. The unused portions of the display area can similarly be configured for a variety of textual data-overlays.

When configured to allow Multi-Function Display (MFD) functionality, ADS-B In traffic information can be displayed.

A presentation of the decluttered attitude and slip, optionally with transponder controls, is available as the last presentation in DG and MFD mode.

In all operating modes, the pilot may select from multiple visual styles which are intended to improve visual compatibility with legacy aircraft instrumentation and preserve the look-and-feel of older aircraft applications.

A wide variety of supplemental functions, including audio alerting, derived angle of attack presentation, g-load display, and more are provided. An internal, rechargeable battery allows for operation for a nominal 1 hour in the event of aircraft power loss in flight and 30 minutes minimum under all temperature conditions.

See *UAV-1004233-001, AV-30-E, Pilot's Guide* for additional details.

6.2 System Functions

Primary Functions:

- Primary Attitude (AI Mode)
- Primary Slip (AI Mode)

- Primary Direction of Flight Indication (DG Mode)

Supplemental Functions:

- Indicated Airspeed
- Altitude
- V-Speeds
- Angle of Attack
- Vertical Trend
- Vertical Speed
- Set Altitude
- Heading
- Bus Voltage
- G Load
- Outside Air Temp
- True Airspeed
- Density Altitude
- GPS Navigator / Waypoint Data
- GPS Navigator Nav Data
- GPS Navigator Route Line
- Heading Bug
- MFD traffic page with AV-Link
- Transponder control (DG / AI / MFD Mode)
- Autopilot control

Audio and Visual Alerting Functions:

- AoA Alerting
- G Limit Alerting
- Excessive Roll Alerting

Misc. Functions:

- Internal Battery Operation
- Auto / Manual Brightness

Table 1 - System Specifications

Electrical Attributes	
Input Voltage Nominal	+10 to +32 VDC
Input Voltage Max	+60 VDC
Input Power Nominal	6 Watts (0.5 Amps @ 12VDC)
Input Power Max	12 Watts (1.0 Amps @ 12VDC)
Required Circuit Breaker	2 Amp
Operation on Battery	1 Hr. Typ. @ 20°C / 30 Min Minimum @ -20C
Physical Attributes	
Mounting Configuration	3-1/8" Round Instrument Hole
Dimensions w/o Connector	3.38 x 3.38 x 1.6 Inches
Weight	0.56 Lbs.
Electrical Connector	15 Pin Male D-Sub
Pneumatic Connectors	1/4" OD Quick Connect
Mounting	(4X) #6-32 Machine Screws
Case Material	Billet Aluminum
Environmental	
Ground Survival Low	-55°C
Operating Low	-20°C
Ground Survival High	+85°C
Operating High	+55°C
Altitude	25,000 Feet (maximum)
Optical Characteristics	
Diagonal Size	3" Circular
Contrast Ratio (Typical)	500
Brightness (Typical)	1000 cd/m ²
Viewing Angle Left/Right	60°
Viewing Angle Up	45°

Viewing Angle Down	10°
Backlight Lifetime (Typical)	50,000 Hours

7 Design Standards

This installation manual provides mechanical and electrical information necessary to install the AV-30. The content of this manual assumes use by competent and qualified personnel using standard maintenance procedures in accordance with Title 14 of the Code of Federal Regulation (CFR) and other related accepted procedures.



The installer must ensure that all installation limitations as defined in this document are observed.

The internal battery capacity has been tested and verified to provide 30 minutes of operational capacity (with reserve), and meets the requirements defined in CFR 23.1311(a)(5) and 23.1353(h), allowing independent operation from the primary electrical power system.



For aircraft capable of acrobatic flight, the AoA indication may become unreliable for operation in inverted flight and maneuvers exceeding ± 8 G.



For panels with more than 15 degrees of panel tilt, the AoA indication may not indicate correctly.

7.1 Applicable Performance Standards

The AV-30 was designed to, and satisfied, the applicable performance requirements defined in the following design standards:

Table 2 - Applicable Performance Standards

MOPS	Title	Category
SAE AS8019	Airspeed Instruments	Type B
SAE AS392C	Altimeter, Pressure Actuated, Sensitive Type	Type I
SAE AS8005A	Minimum Performance Standard Temperature Instruments	Class IIIc
SAE AS8034	Minimum Performance Standard for Airborne Multipurpose Electronic Displays	N/A
RTCA DO-334	Minimum Operational Performance Standards (MOPS) for Strapdown Attitude and Heading Reference Systems (AHRS)	A5 H9 T7
SAE AS8013A	Minimum Performance Standard for Direction instrument, Magnetic (Gyroscopically Stabilized)	N/A
ASTM F3011-13	Standard Specification for Performance of Angle of Attack System	N/A
RTCA DO-347	Certification Test Guidance for Small and Medium Sized Rechargeable Lithium Batteries and Battery Systems	Medium Size

8 Installation Locations & Operating Modes

8.1 Installation Locations

The following figure shows a typical “six-pack” and one possible arrangement of instrument locations:

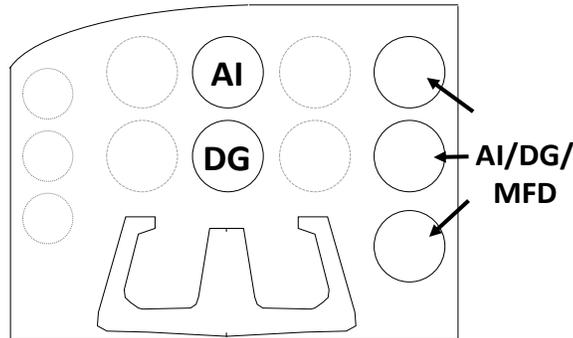


Figure 2 – Mechanical Gauge Replacement

Note that the physical arrangement in many aircraft varies from the configuration shown above. The AI/DG/MFD locations are examples of installation locations as a non-required instrument.



The existing mechanically based altimeter and airspeed indicator must remain in their factory locations for this installation configuration.

8.2 Operating Mode Configuration

The AV-30 operating mode is configured during installation and can be set as follows:

- Unit locked as a dedicated Attitude Indicator (AI Mode)
- Unit locked as a dedicated Direction Indicator (DG Mode)
- Unit unlocked; can be toggled between AI, DG, and MFD mode by the pilot.

If the functionality is not locked, pressing and holding the rotary knob will toggle between AI, DG, and MFD modes.

9 Functionality and Required Interfaces

9.1 Aircraft Systems Connections

All aircraft systems connections are provided on the single 15-Pin D-sub connector and two quick-connect pneumatic fittings. Various interfaces are optional as indicated in the following diagrams. Do not plug the pitot and static lines.

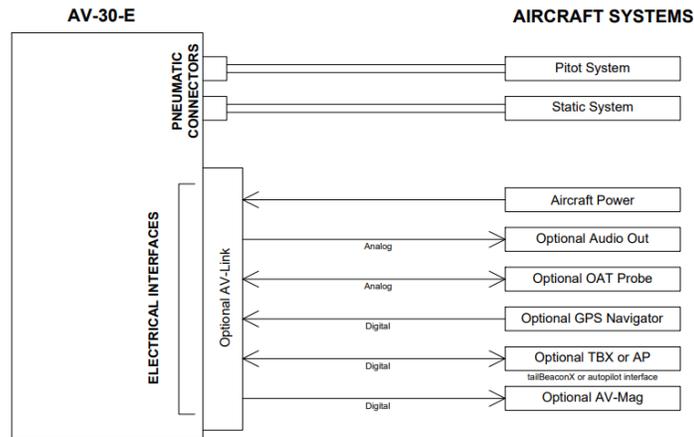


Figure 3 – AV-30 Aircraft Systems Interfaces – AI Mode

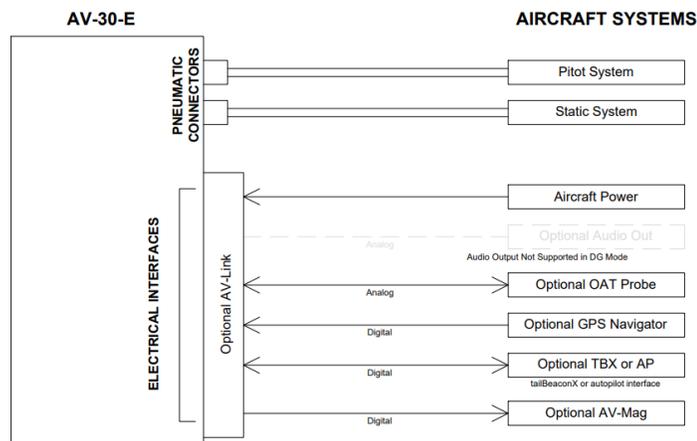


Figure 4 - AV-30 Aircraft Systems Interfaces – DG Mode

9.2 Feature Matrix

The following matrix shows primary and supplemental data and any required external interface.

Table 3 - Feature Matrix

Feature	AI Mode	DG Mode	Required Interface
Primary Attitude and Slip			
Primary Attitude	✓	x	None
Primary Slip	✓	x	None
Reversionary Attitude / Slip	x	✓	None
Primary Direction of Flight Indication			
Direction Tape (DG / GPS)	✓	x	Pitot & static / GPS Navigator
Direction Rose (DG)	x	✓	Pitot & Static
Direction Arc (GPS)	x	✓	GPS Navigator
Direction HSI (GPS)	x	✓	GPS Navigator
Supplemental Data Overlays – Pilot Configurable (Textual or Graphical)			
Indicated Airspeed (Textual)	✓	x	Pitot / Static
V-Speeds (Graphical)	✓	x	Pitot / Static
Baro Altitude (Textual)	✓	x	Pitot / Static
Angle Of Attack (Graphical)	✓	x	Pitot / Static
Vertical Trend (Graphical)	✓	x	Pitot / Static
Vertical Speed (Textual)	✓	x	Pitot / Static
Set Altitude (Textual)	✓	✓	None
Heading (Textual)	✓	✓	Pitot / Static
Bus Voltage (Textual)	✓	✓	None
G Load (Textual)	✓	✓	None
Outside Air Temp (Textual)	✓	✓	OAT Probe
True Airspeed (Textual)	✓	✓	Pitot / Static / OAT Probe
Density Altitude (Textual)	✓	✓	Pitot / Static / OAT Probe
GPS Navigation / Waypoint Data			
Textual Nav Data	✓	✓	GPS Navigator
Graphical Nav Data	x	✓	GPS Navigator
Heading Bug			
Hdg Bug (Ref Only if no AP)	✓	✓	None
Audio and Visual Alerting			
AoA Alerting	✓	x	Pitot / Static
G Limit Alerting	✓	x	None
Excessive Roll Alerting	✓	x	None
Misc.			
Internal Battery Operation	✓	✓	Pitot / Static
Auto / Manual Brightness	✓	✓	None
Transponder Control	✓	✓	tailBeaconX serial & Pitot/static
Traffic display	✓	✓	AV-Link / GDL-90 / pitot / static

Internal Magnetometer aid	✓	✓	Optional hardware / Pitot / static
External Magnetometer aid	✓	✓	Optional hardware / Pitot / static
Set Vertical Speed Bug			
SVS Bug (Graphical)	✓	✘	Autopilot

9.2.1 Power Input (Required)

Power input is required in both AI, DG and MFD configurations and each unit has a dedicated circuit breaker. The power input is internally connected, and diode protected with the unit's internal battery via a processor-controlled switch. This architecture allows the unit to continue operation if external power fluctuates or is completely lost. Input range is compatible with both 12V and 24V aircraft.

Each AV-30 must have a dedicated, properly labeled, pilot resettable circuit breaker as part of the installation. Power for the unit should be supplied from the main battery master relay. It is recommended to shield the power wire.

9.2.2 Pitot and Static Interfaces (Required)

Pitot and static connections are required for DG, AI, and MFD mode.

Airspeed, altitude, derived angle of attack (AoA), True Airspeed (TAS), Density Altitude (DALT), DG heading, and traffic altitude all require pitot and static connections as they are based on either altitude or airspeed measured from those connections.

When installed as a DG, the pitot and static connections must be connected for Outside Air Temperature (OAT), backup battery in flight, and DG heading aid. TAS and DALT are the only air-data related parameters that can be displayed when in DG mode.

When installed as an MFD, the pitot and static connections are required for traffic relative altitude. If unconnected, incorrect relative altitudes may be displayed.

9.2.3 Outside Air Temp Input (Optional)

The optional outside air temperature interface requires a dedicated external analog probe. This port connection is compatible with the Davtron P/N C307PS (not supplied).

This is a differential two-wire current source based on the Analog Devices AD590KH component and supplies a current that corresponds to the ambient temperature.



If two displays are connected to the same probe, the current will be split between the two and incorrect readings will be shown by both.

The sensor reading must be trimmed during the installation process to compensate for probe-to-probe variations.

The OAT probe is automatically detected by the system, and when detected, allows temperature related parameters to be selected for display by the pilot.

If the OAT probe is not detected, display of these parameters will automatically be inhibited.

9.2.4 Audio Output (Optional)

The optional audio panel connection is a low-voltage analog output that is designed to connect directly to an audio panel (typically a non-switched or unswitched audio input). High power outputs capable of directly driving a cockpit speaker are not provided.

Other unswitched unmuted inputs can be used but they may need to be mixed with an existing audio source. Audio shields must be grounded only at audio panel to avoid ground loops. Contact audio manufacture for further instructions.

When installed as a DG, no audio alerting is supported, and this output should remain disconnected.



In non-metallic, IFR capable aircraft, this connection **MUST** remain disconnected due to lightning strike limitations.

9.2.5 GPS Interface (Optional)

The GPS interface is an optional RS-232 serial input that is compatible with the industry standard “Aviation” output provided by most panel mounted GPS units, and NMEA serial interfaces provided by most hand-held GPS units.

This is a text/binary protocol output by the GPS navigator that contains situational awareness information such as ground speed, track, distance to destination, cross track, etc., and is typically utilized by remote mapping/display products to provide additional pilot awareness.

This output does not provide IFR compliant lateral or vertical guidance, therefore all deviation related data presented is for VFR operations only.

The AV-30 does no computations or operations on the data obtained from the GPS navigator, and simply displays the received data in a textual or graphical format as configured by the pilot.



This serial interface may be connected in parallel between multiple AV-30 units and is supported in both AI and DG modes.

The supported protocols are contained in Section 15 - Serial Interface Specification.

9.2.6 Internal Magnetometer (Optional)

The internal magnetometer, when available, is detected in software version 2.1.1 or later. It is currently disabled by configuration. Application of magnetometer data requires calibration before use. If magnetometer is desired and is not detected, please contact uAvionix technical support to discuss upgrade options.

9.2.1 AV-Mag External Magnetometer (Optional)

The AV-Mag external magnetometer is supported in software version 2.3.0 or later. It is enabled with manual configuration in the installation menu. The installation of the AV-Mag magnetometer is sensitive to orientation and tilt so the installation instructions and measurements must be followed carefully. The magnetometer also requires calibration before use. The AV-Mag receives power from the AV-30 and will run off of the AV-30 backup battery in case of power loss. The AV-Mag transmits data to the AV-30 via an RS-232 serial interface.

9.2.2 Transponder Control (Optional)

The AV-30 has the option of being the control interface for select uAvionix transponders (including the BeaconX family). This provides pressure altitude, mode, squawk code and IDENT information to the transponder, and displays status and annunciations from the transponder. See Section 11.2 for more information on the installation of the tailBeaconX.



The transponder is not powered by the AV-30-E internal battery. Transponder operations will be unavailable during a power loss.

9.2.3 AV-Link Interface (Optional)

The AV-30 has the option of being a traffic display using AV-Link as an integrated Wi-Fi bridge that allows for communication between AV-30 and Wi-Fi capable ADS-B receivers. The AV-30 will display a separate MFD page with traffic when appropriate configured and connected to a supported receiver.



The AV-Link accessory is not powered by the AV-30-E internal battery. Wi-Fi traffic data provided to the MFD mode will be unavailable during a power loss.

9.2.4 Autopilot Interface (Optional)

The AV-30 has the option to act as a control input for the AeroCruze 100/TruTrak Vizion autopilot. The AV-30 displays the Set Altitude (SALT) in a textual format and displays the Set Vertical Speed (SVS) via a graphical SVS bug on the vertical trend indicator in AI mode. The AV-30 will send the SALT, the SVS, and the heading selection to the autopilot via a serial interface.

The AV-30 control of the autopilot is similar to the autopilot's "Altitude Select Mode" or "Altitude Pre-Select Mode" (see the "Operating Handbook for Vizion PMA Autopilot TruTrak Doc:167").

9.3 Internal Battery Operation

9.3.1 General

The internal battery consists of a rechargeable battery system with automatic recharge, self-test, and power switching capability. The internal battery capacity will provide approximately 1 hour of operation at standard temperatures and 30 minutes (minimum) of operational capacity over the operational temperature range.

When power is lost to the AV-30, the following will occur:

1. While AV-30 is aligning, the unit will continue to battery mode if power is lost. Once aligned it will shut down.
2. If any button is pressed after power is lost, the AV-30 will stay in battery mode.
3. If the AV-30 senses airspeed or GPS groundspeed, it will stay in battery mode. Make sure that the caps have been removed from the back of the AV-30 pitot and static ports.

If the AV-30 needs to be shut down after removing power, push and hold the left and right buttons until the unit shuts down.

See the Pilots Guide UAV-1004233-001 §10 Internal Battery Operation for additional operational information.

10 Equipment Installation

10.1 Overview

Installation consists of the following steps:

- Remove / relocate any legacy instrumentation
- Add or locate an appropriate power source / breaker
- Wire power and system interfaces as needed
- Mount the unit to the instrument panel with supplied screws
- Apply power and perform setup
- Connect pitot and static to both AI and DG. Perform leak check after installation
- (Optional) Install the AV-Mag external magnetometer and perform calibration

10.2 Supplied Components

Table 4 - Supplied Components

Component	Part Number	Description
AV-30-E Unit	UAV-1004035-001	AV-30-E Unit
	UAV-1004035-002	AV-30-E Unit with Internal Magnetometer
AV-30-E Installation Kit	UAV-1004091-001	Installation Kit
AV-30-E Operating Software	UAV-1004037-003	AV-30-E Operating Software v2.3.0
(Optional) AV-Link	UAV-1004413-001	AV-Link Wi-Fi Bridge
(Optional) AV-Mag	UAV-1006321-001	AV-Mag External Magnetometer

10.3 Non-Supplied Components

Table 5 - Non-Supplied Components

Component	Description
Pitot / Static Tubing	Length as required
Pitot Static T's	Quantity as required
Circuit Breakers (2A)	One required for each instrument
OAT Probe	Davtron P/N C307PS
Power and Interconnect Wire	See AC 43.13-1B Chapter 11, Section 7 for acceptable wire types

10.4 Installation Records

The date of installation should be recorded in the aircraft's log-book.

Entry should include instrument(s) being replaced (AI, DG, or both), or if the installation is being performed as a non-required instrument.

Entry should also include a description of any optional connections made.

Entry should include AV-Mag installation location, orientation, and attitude angles.

10.5 Mechanical Drawing

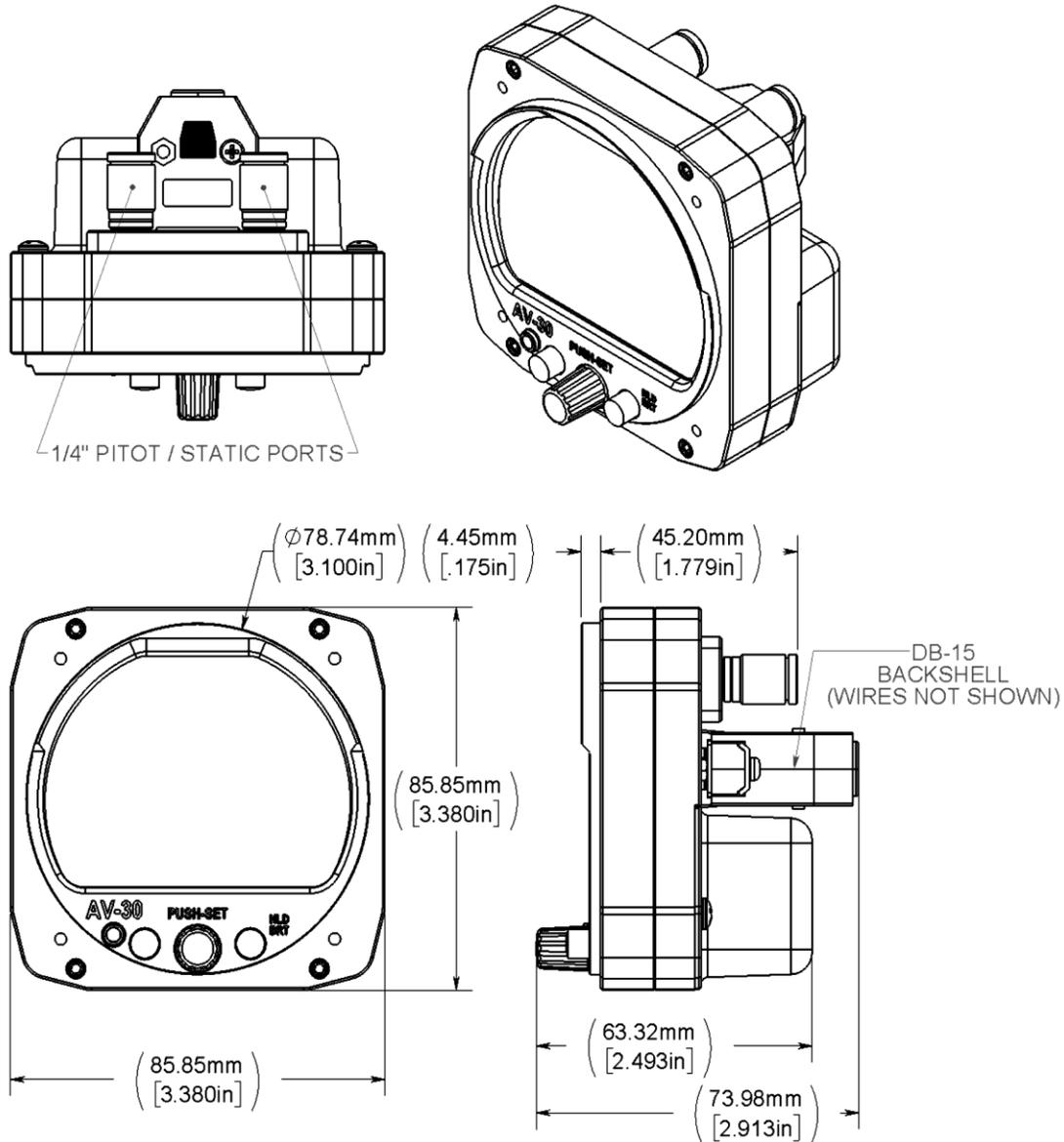


Figure 5 – Mechanical Drawing

10.6 Mounting Screw Length Restriction

The AV-30 is fastened to the instrument panel with four 6-32 screws. The unit mounts from the rear of the instrument panel, with the screws being inserted from the front of the panel.



The four 6-32 Mounting screws **must** observe depth limits given the internal component design. The depth of the mounting hole is 1/8" or 0.125"



Torque screws to 6 (+/-1) inch-lbs. Do not over-torque or damage may occur.

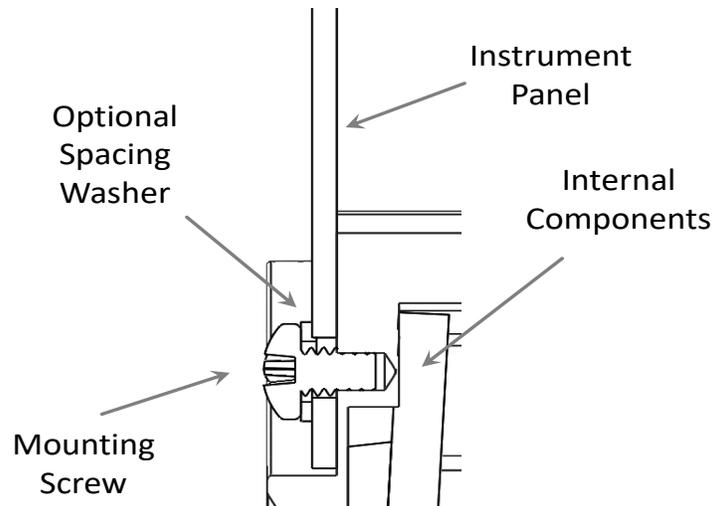


Figure 6 – Mounting Screw Dept Limits

Caution must be observed when mounting the AV-30. If too long a screw is used, damage to the unit can occur, and the unit may not be securely fastened to the panel. The installation kit contains multiple length screws to assist in compensating for different instrument panel thicknesses.

Correct screw length may be determined by inserting the supplied screw in the instrument panel (without the AV-30 installed) and ensuring that either three or four full threads are exposed on the opposite side of the panel. Select alternate lengths as needed.

10.7 Wiring Diagrams

The AV-30 performs different functions when installed as an AI or DG, and therefore wiring varies based on installation. Figure 7 and Figure 8 show connections for each configuration.

The primary difference is that the DG does not support audio alerting.

See AC 43.13-1B Chapter 11 § 7 for acceptable wire types for both power and interconnect purposes.

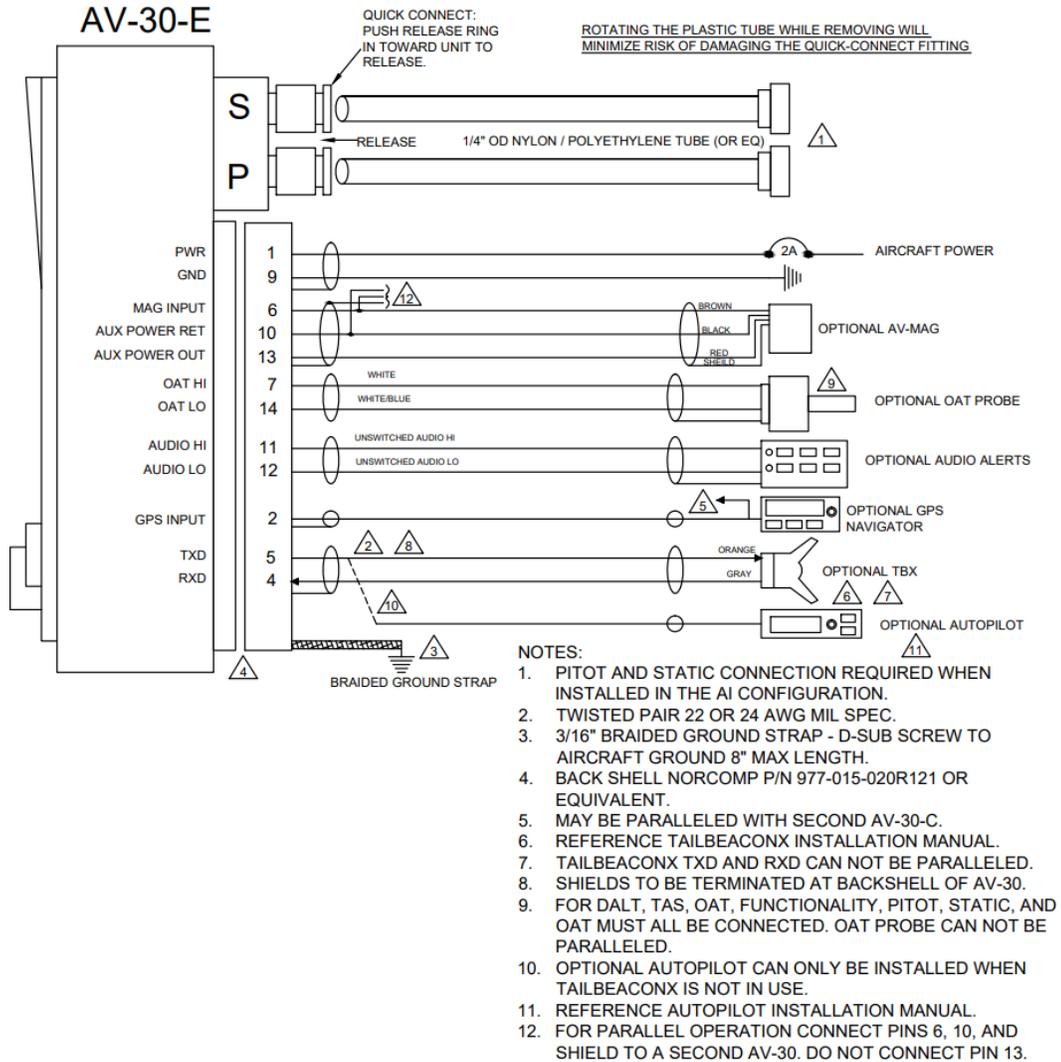


Figure 7 - Wiring Diagram – Attitude Indicator Position Installation

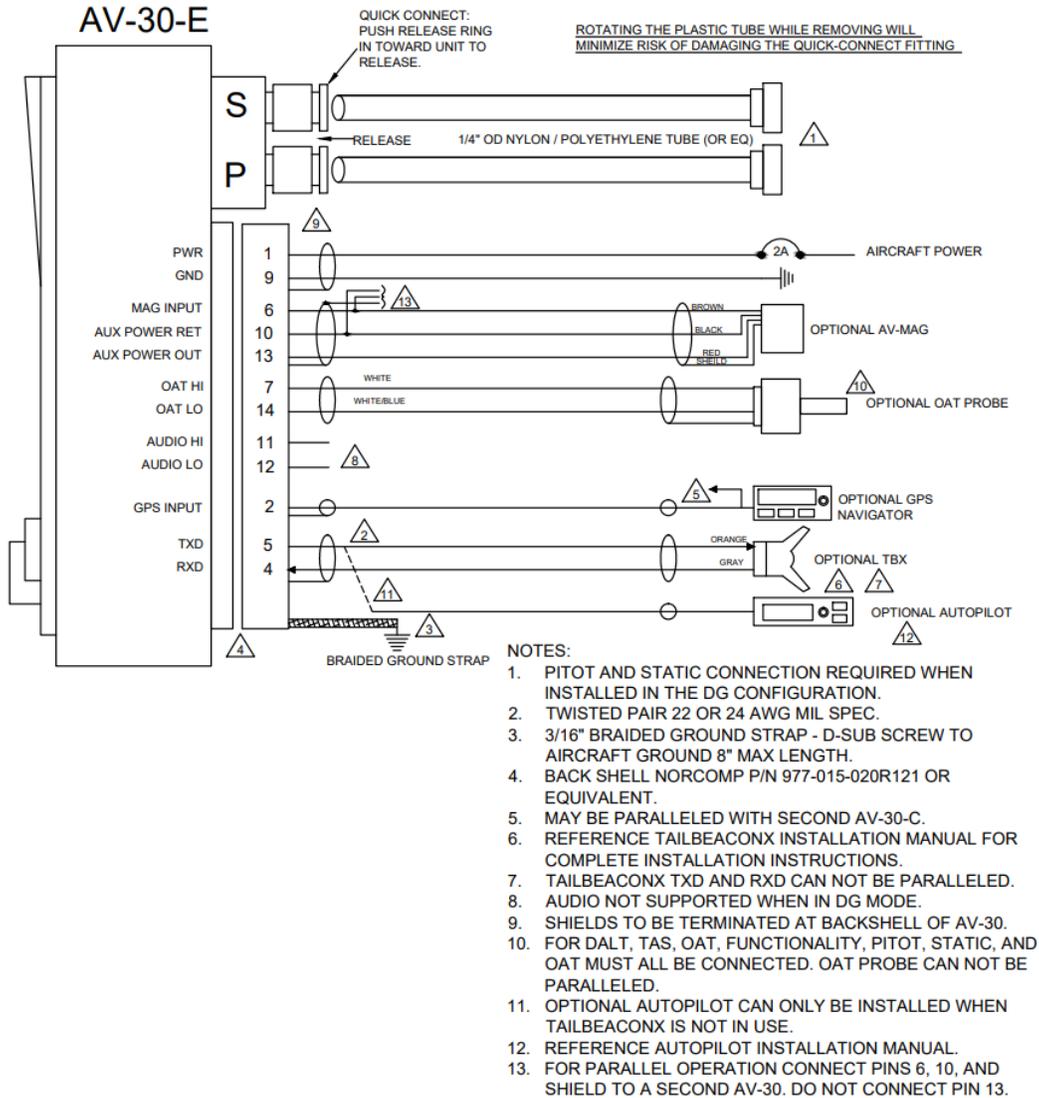


Figure 8 - Wiring Diagram – DG Position Installation

10.8 Bonding Requirements

The following figure shows the grounding requirements for the electrical connections. The two D-Sub screws are to be utilized for shield and ground strap connections.

The supplied ring terminal connectors are sized for these screws.

The ground braid strap is to be less than 8 inches in overall length and at least 3/16 width. Alpha Wire part number 1230 SV001 or equivalent.



Figure 9 - Ground Braid Strap – 8" or Less in Length

The exposed (non-shielded) portions of the interface cables AND the shield grounds are to remain less than 2.5 inches.

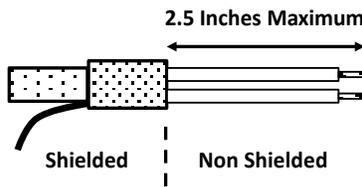


Figure 10 - Shielded Cable



The bond between the unit (measured at the D-sub screws) to the aircraft frame must be 2.5 milli-Ohms or less.

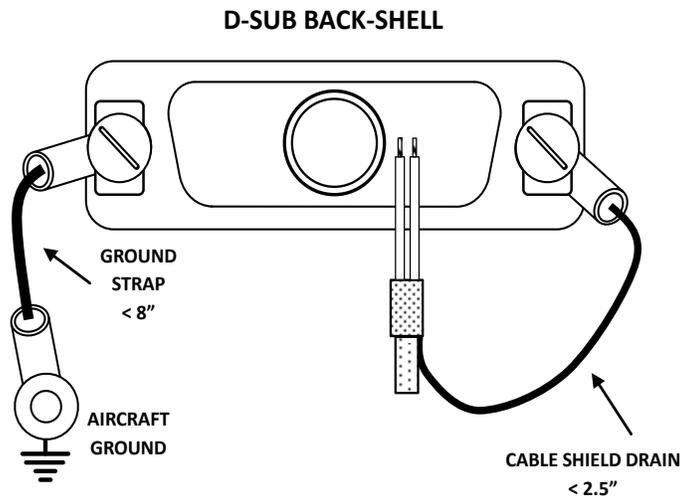


Figure 11 - Cable Shields and Ground Strap

10.9 Unit Pinout

Table 6 - Connector Pinout

Pin	Function	Type	Comment
1	Power	Power	+12 to +28 VDC
2	GPS Navigator	Input	GPS RS-232
3	Spare Serial	Output	Reserved - Do Not Connect
4	Serial 2	Input	Transponder
5	Serial 2	Output	Transponder OR Autopilot RS-232
6	Spare Serial	Input	AV-Mag Data
7	OAT Supply	Output	White Probe Wire
8	MFG Serial	Input	Reserved
9	Ground	Power	Aircraft Ground
10	Aux Power Ret	Power	AV-Mag / Auxiliary Power return
11	Audio H	Output	Audio Alerts hi
12	Audio L	Output	Audio Panel lo
13	Aux Power Out	Power	AV-Mag / Auxiliary Power
14	OAT Return	Input	White / Blue Probe Wire
15	MFG Serial	Output	Reserved

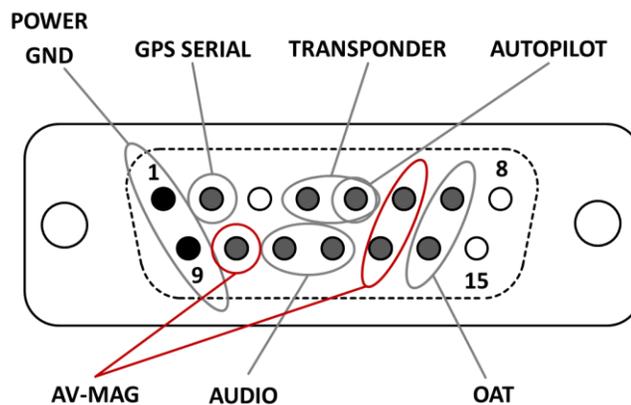


Figure 12 - Unit Connections – DB-15, Male (Rear Unit View)

11 Optional Equipment Installation

11.1 AV-Link

AV-Link (P/N UAV-1004413-001) is an integrated Wi-Fi bridge that allows for communication between AV-30 and Wi-Fi enabled devices. Software updates for AV-Link and AV-30 can be performed via a web page. Configuration settings and device status are accessible through the embedded web page. See § 11.1.15 for steps on updating firmware using the AV-Link.

This installation manual provides mechanical and electrical information necessary to install AV-Link. It is not equivalent to an approved airframe-specific maintenance manual, installation design drawing, or installation data package. The content of this manual assumes use by competent and qualified personnel using standard maintenance procedures in accordance with Title 14 of the Code of Federal Regulation (CFR) and other related accepted procedures. This is an incomplete system intended to provide the functions identified in, and when installed according to this installation manual.

11.1.1 System Function

AV-Link and AV-30, when paired with an ADS-B receiver, can display traffic information. This information is supplemental and for advisory use only. It cannot replace required equipment.

11.1.2 FCC ID

Table 7 - FCC ID

Model	FCC ID
AV-Link Contains	2AC7Z-ESPWROOM02U

11.1.3 AV-Link Specifications

Table 8 - AV-Link Specifications

Characteristics	Specifications
Part Number	UAV-1004413-001
Width	52.06 mm
Height	25.91 mm
Depth	52.63 mm
Weight	1.1 oz (32.2 grams)
Operating temperature range	-45°C to +70°C
Maximum pressure altitude	35,000 ft
Input voltage range	9 to 30.3 VDC
14V current	0.2A idle 0.25A typical 0.5A maximum
28V current	0.1A idle 0.125A typical 0.25A maximum

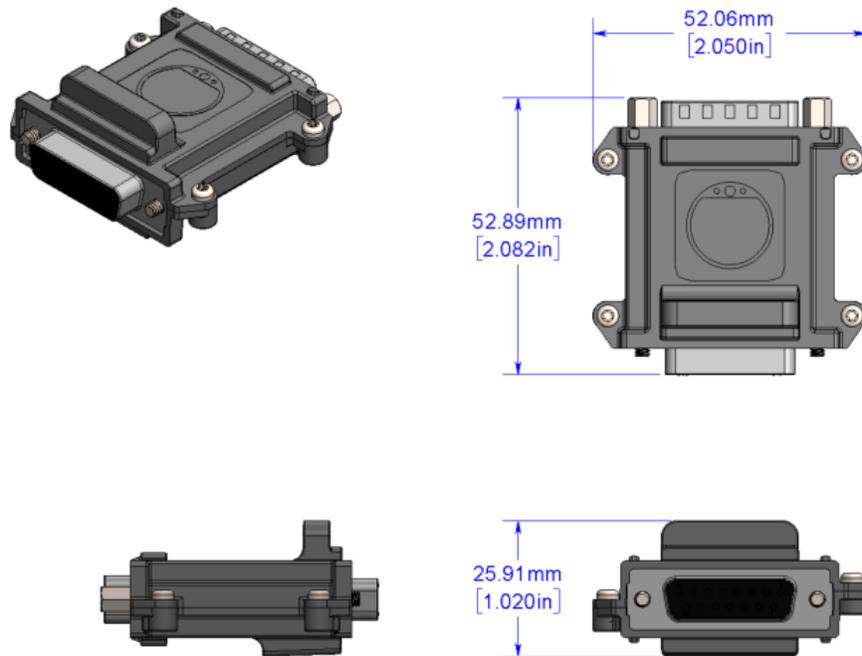


Figure 13 – AV-Link Mechanical Drawing

11.1.4 AV-Link Software

The software contained in AV-Link device is identified by electronic marking. Software version information can be accessed via an embedded web page.

11.1.5 AV-Link Installation Materials and Tools

AV-Link installation requires access to these tools:

- Flat Screwdriver
- 3/16" Nut Driver

11.1.6 Additional Required Equipment

AV-Link is designed to interface with an existing AV-30 display. To take advantage of AV-Link the following equipment is required:

- AV-30 3-1/8" Display

11.1.7 Mounting

AV-Link is mounted in series between the AV-30 and the AV-30 backshell connector.

11.1.8 Removing AV-30 From Instrument Panel (Optional)

It may be necessary, because of space limitations, to remove the AV-30 unit for performing AV-Link installation. Using a Phillips screwdriver, remove the four [4] screws that attach the AV-30 to the aircraft instrument panel. Pull unit down to a workable position. Note that it may also be necessary to disconnect the Pitot and Static lines to bring into reach. Ensure that the lines are properly labeled before disconnecting.

11.1.9 AV-30 Backshell Connector Removal

Using a flat screwdriver, loosen the two [2] screws that hold the backshell connector to the DB-15 connector on the back of the AV-30 until the backshell connector is free to detach from the AV-30. If present, leave the bonding/ground strap attached to the backshell connector.



Figure 14 - AV-Link Backshell Connector Removal

11.1.10 AV-Link Attachment

Do not attempt to remove the two [2] captive Jack Screws from the AV-Link housing. Attach AV-Link to the back of the AV-30 by inserting the unit into the DB-15 connector on the back of the AV-30.

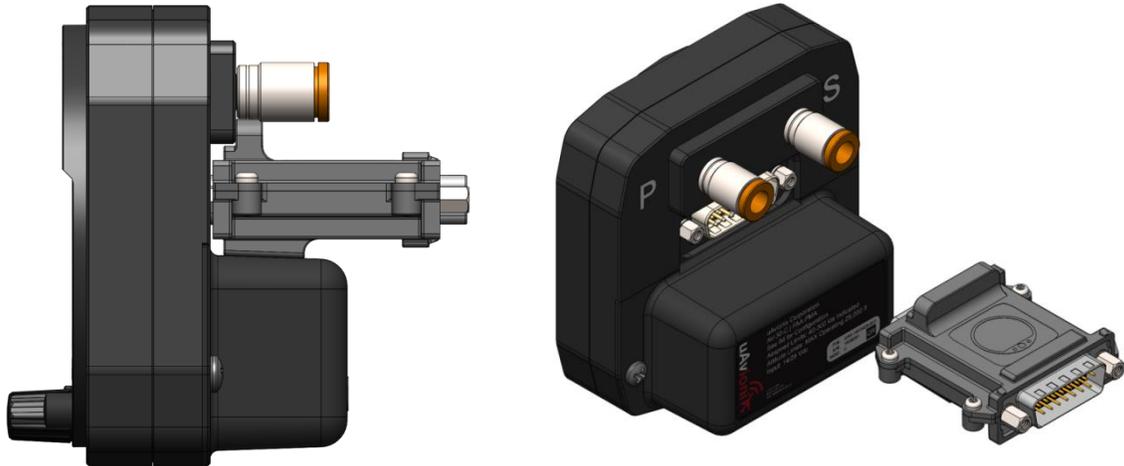


Figure 15 - AV-Link attachment

Do not push against the Jack Screws as they will stop against the screw bosses on the AV-30 connector preventing proper seating of AV-Link. Also, make sure to seat AV-Link completely before tightening the Jack Screws.

Do not attempt to use the Jack Screws to pull AV-Link into the AV-30 connector. AV-Link should seat firmly into the AV-30 as shown in Figure 16.



Figure 16- AV-Link installed

Using a 3/16" nut driver, tighten the two [2] Jack Screws to 5 in-lbs. maximum. **Do Not Overtighten!**

Reattach the original AV-30 Backshell Connector. Using a flat screwdriver, tighten the two [2] screws to 5 in-lbs. maximum.

Do Not Overtighten!



Figure 17 - AV-Link attachment with backshell

11.1.11 AV-30 Reinstallation in Instrument Panel

If the AV-30 was removed from the aircraft instrument panel, reinstall the unit. If the original screws have been misplaced, please observe § 10.6 Mounting Screw Length Restriction.

11.1.12 Continued Airworthiness

Maintenance of AV-Link is "on condition" only. Periodic regulatory function checks must be performed. The aircraft must be returned to service in a means acceptable to the appropriate aviation authority.

11.1.13 System Limitations

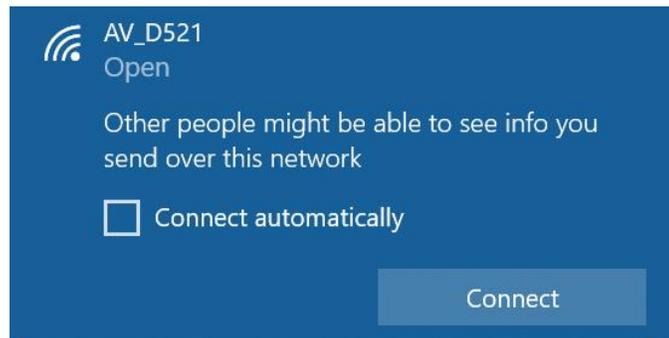
AV-Link is designed to supplement an AV-30. System limitations for AV-Link are determined by AV-30 limitations.

11.1.14 Connecting to the AV-Link Web Browser

As shipped from the factory, the AV-Link will function in default mode and may not need customization. If customization is required, or firmware updates need applied, then connect to the AV-Link web browser with your personal computer.

Support for Windows, MacOS, iOS and other devices are supported, using the built-in web browser support on your computer. To connect to the AV-Link browser, configure your computer to connect to the AV-Link Wi-Fi connection.

1. Power AV-Link by attaching the AV-Link to AV-30 to provide power.
2. Once the AV-Link is powered, on your computer, connect to the AV-Link Wi-Fi hotspot, which will have an “AV_XXXX” SSID, where XXXX is a combination of alpha-numeric characters.

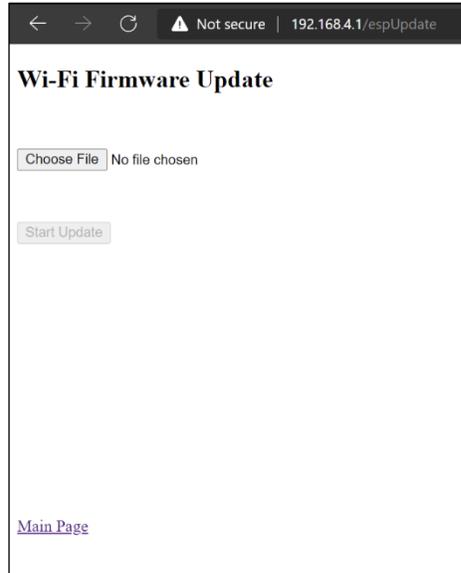


3. Once connected, use your web browser to navigate to 192.168.4.1/espUpdate. From there, you will see the AV-Link Firmware Update web page.

11.1.15 Wi-Fi Firmware Update Page

Note: All settings changes should be performed while on the ground. Accessing the AV-Link web pages while in flight is not recommended and may disrupt normal operations of AV-30 and AV-Link.

The AV-Link firmware update page permits firmware updating of AV-Link.



Click on Choose File. Select the AV-Link firmware update file to load and then click the OK button.

Click on Start Update to begin the firmware update process.

11.2 Transponder (tailBeaconX)



For complete installation guidance, see tailBeaconX TSO Installation Manual, UAV-1004270-001 and *tailBeaconX STC Installation Manual UAV-1003599-001*.



For operation of tailBeaconX using the AV-30, see Pilot's Guide, UAV-1004233-001.

tailBeaconX is a complete Mode S Extended Squitter (ES) ADS-B OUT transponder, integrated with an internal SBAS/WAAS GPS and all necessary antennas into an LED rear position light. tailBeaconX is designed to meet the transponder and ADS-B requirements for operating in controlled airspace worldwide, while minimizing installation costs.

tailBeaconX can optionally provide GPS information to the AV-30, including magnetic track and groundspeed.

11.2.1 Transponder Control

Transponder controls are enabled by selecting “BEACON X” on the “SERIAL 2” installation menu. See AV-30-E Pilot’s Guide UAV-1004233-001 for transponder control interface configuration.

11.2.2 Transponder Testing with tailBeaconX

- Set tailBeaconX in STBY mode using the AV-30.
- Connect to tailBeaconX Wi-Fi and open the mobile installation application on your mobile device (uAvionix SkyBeacon Installer).
- On the Monitor tab, scroll to the bottom of the page and select “Enable Ground Test Mode”.
- Set tailBeaconX in ALT mode using the AV-30.
- tailBeaconX will now respond to All-Calls on transponder test sets.
- When test is complete, cycle power.

11.3 AV-Mag External Magnetometer

11.3.1 Magnetometer Overview

AV-Mag external magnetometer (P/N UAV-1006321-001) is a 3-axis electronic compass. It is able to precisely measure the earth’s magnetic field and aid the AV-30 gyroscopic heading measurement, improving long-term accuracy.

For the AV-Mag to be effective, the installation and calibration must be done with accuracy and precision.

11.3.2 System Function

The AV-Mag, when paired with an AV-30, can provide consistent and accurate heading. The AV-Mag is an aiding device and does not provide full slaving to the AV-30.

11.3.3 AV-Mag Specifications

Table 9 - AV-Mag Specifications

Characteristics	Specifications
Part Number	UAV-1006321-001
Width	1.49 Inches
Height	0.67 Inches
Depth	2.38 Inches
Weight	1.4 oz (40.0 grams)
Operating temperature range	-40°C to +70°C
Maximum pressure altitude	35,000 ft
Input voltage range	7 VDC typical (from AV-30 auxiliary power output)
7V current	12 mA typical

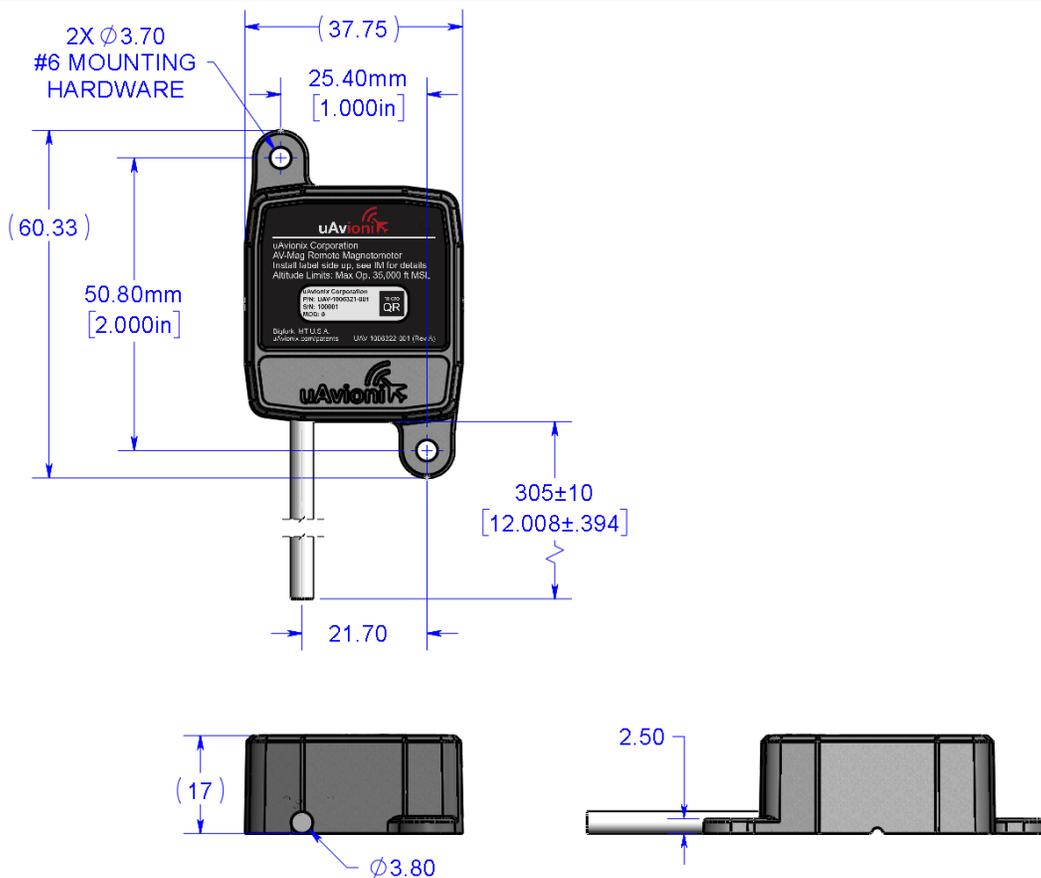


Figure 18 - AV-Mag Mechanical Drawing

11.3.4 AV-Mag Software

The software contained in the AV-Mag device is identified by electronic marking. Software version information is sent in a serial message after power-up. The first screen of the AV-Mag installation menu shows the current AV-Mag software version (see Section 11.3.8). If AV-Mag is not properly connected, the version will indicate “Not detected”.

11.3.5 AV-Mag Installation Overview

An overview of the installation process is provided below. Further detail for the process may be found starting in Section 11.3.8.

1. Wire and mount the AV-Mag
 - a. In the AV-30 installation menu, set SERIAL 4 to AVMAG to enable the AV-Mag.
 - b. Enter the AV-Mag installation menu (AVMAG INSTL) found in the AV-30 installation menu.
 - c. Input the local magnetic field strength of the Earth.
2. Wire and mount the AV-Mag
 - a. Identify a potential mounting location in the tail or wings.
 - b. Run wires from the AV-30 to the mounting location and connect to the AV-Mag.
 - c. Check the mounting location for magnetic interference using the interference monitor in the AVMAG INSTL menu.
 - If magnetic interference is excessive at the mounting location, select a different mounting location.
 - d. Mount and align the AV-Mag using brass screws.
 - e. Enter the orientation of the AV-Mag into the AV-30.
 - f. Measure the AV-MAG mounting angles, adjust mounting to match AV-30 installation attitude, and enter final angles into the AV-30.
 - If necessary, build a bracket for the AV-Mag for mounting in the correct orientation and alignment.
3. Perform AV-Mag Calibration
 - a. Run a calibration procedure on the installed AV-Mag and AV-30 pair.

- b. If necessary, set the AV-Mag's installed Yaw angle into the AV-30.
- c. Perform a final check of heading.

Record your work in the provided tables and aircraft log book.

11.3.6 AV-Mag Installation Materials and Tools

AV-Mag installation requires access to these tools:

- Non-magnetic Screwdriver and wrench
- Non-magnetic digital level or digital protractor/angle gauge. For example: Johnson Level & Tool 1886-0000 Magnetic Digital Angle Locator (unscrew the back of the case to remove the built-in magnets)
- Fish tape for pulling wire from cockpit through wing structures
- Drill and drill bit
- Brass fasteners

11.3.7 Additional Required Equipment

AV-Mag is designed to interface with an existing AV-30 display. To take advantage of AV-Mag the following equipment is required:

- AV-30 3-1/8" Display

11.3.8 Enable the AV-Mag

Use of the AV-Mag is enabled through the AV-30 installation menu.

Before applying power, push and hold the center rotary knob and apply power. As the AV-30 splash screen appears, check that a minimum version of 2.3.0 is displayed. AV-Mag support is not available on units with software versions prior to 2.3.0.

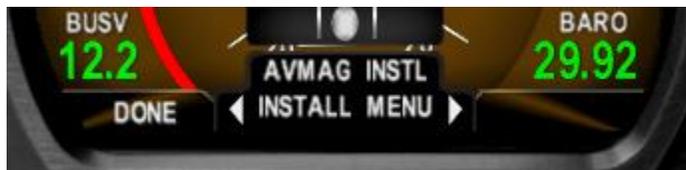
Enter the AV-30 installation menu and navigate to the serial 4 interface option (SERIAL 4). Set SERIAL 4 to AVMAG.



While SERIAL 4 is set to AVMAG, the AHRS aiding mode (AID MODE) will automatically be set to AVMAG and cannot be changed.



Enter the AV-30 installation menu again and navigate to the AV-Mag installation menu (AVMAG INSTL). Push the center rotary knob, then press the right button to begin the installation process. If AV-Mag is not properly connected, the version will indicate “Not detected”.



11.3.9 Earth Magnetic Field

Optimal performance of the AV-Mag is achieved by using the best available data for the Earth's magnetic field at the time of calibration, as the Earth's magnetic field varies by location and over time. The second screen of the AVMAG INSTL menu provides three source options (ERTH MAG SRC) for Earth's magnetic field data: DEFAULT, GPS-WMM, and USER.



The DEFAULT source option derives the magnetic field strength from the average magnetic field magnitude in the United States, which is 50 microteslas (μT), and can be used if the other two options which follow cannot be used for your installation.

The GPS-WMM source option is available if your AV-30 is connected to a GPS receiver and utilizes the World Magnetic Model (WMM) to derive the Earth's magnetic field at the location and time of installation. Without a GPS installation and valid GPS fix, the GPS-WMM option will be unavailable.



The USER source option can be selected to allow for manual entry of the Earth's magnetic field magnitude in case a GPS is not part of your installation. The magnetic field strength of your location can be found on the WMM webpage and entered into the AV-30 on the third screen of the AVMAG INSTL menu. Note that the magnitude of the field is used during calibration but not during flight, so the entered field should match the location where the calibration is performed and not necessarily the location where the aircraft is operated.

The WMM webpage is found at the following URL:

<https://www.ngdc.noaa.gov/geomag/calculators/magcalc.shtml?#igrfwmm>



The third screen of the AVMAG INSTL menu shows, in μT , the magnetic field (ERTH MAG VAL) derived from the chosen source. If DEFAULT or GPS+WMM was set as the source, ERTH MAG VAL will be view-only. If the source was set to USER, the magnetic field strength can be set using the rotary knob.



11.3.10 AV-Mag Installation Location and Interference Monitor

Identify a mounting location on the aircraft. Suitable mounting locations include the tail and either wing. The cockpit is an unsuitable mounting location for the AV-Mag.

Proximity to ferrous materials and current-generated magnetic fields can negatively affect AV-Mag performance. Avionics, engines, wing spars, pitot heaters, lights, etc. are all potential sources of interference. Any interference which varies during flight may generate erroneous headings from the AV-Mag. Because of this, the installation location should be as far as practical from these types of interferers. Inspect existing wiring near the installation location and repair or refresh any deteriorated insulation or corroded connections. Because wire loops generate magnetic fields, avoid locations near wires forming physical loops.

The fourth screen of the AVMAG INSTL menu is a magnetic field interference monitor with a checklist of aircraft systems which may be sources of interference.



Use the rotary knob to step through each system in the checklist and monitor the magnetic field deviation value.



The deviation value indicates the magnitude and direction of the magnetic reading with respect to the expected Earth magnetic field at your location. A deviation of zero indicates no magnetic field interference, while a negative or positive deviation indicates the AV-Mag is sensing magnetic fields in addition to those Earth fields expected at your location.

At the end of the checklist, a REVIEW screen identifies which systems caused the largest deviations. Identifying systems that cause interference, especially those that generate temporary magnetic fields, can aid in proper site selection for installing the AV-Mag. The interference range indicates fluctuating magnetic fields which will negatively impact calculated magnetic heading values, so a good installation requires this range to be as small as possible. If the range is greater than 10%, attempts should be made to re-site the AV-Mag location or to mitigate interferers.



11.3.11 AV-Mag Installation Orientation and Attitude

The AV-Mag can be installed in a number of orientations. The chosen installation orientation must be entered into the fifth page of the AVMAG INSTL menu according to Table 10. Figure 19 depicts the label and wire directions referenced in the table.



Table 10 - AV-Mag Orientation Options

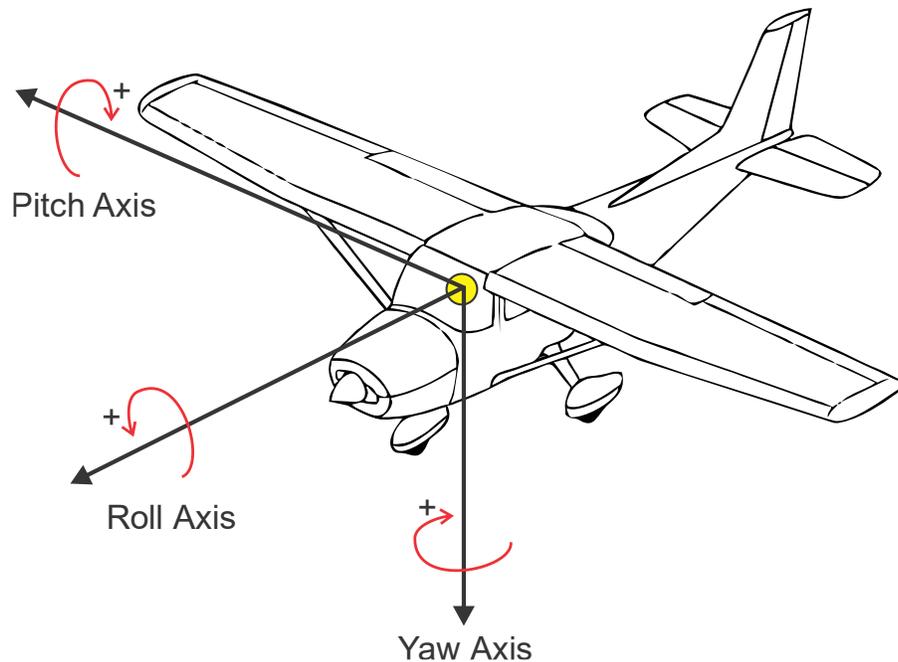
Menu Option	Label direction	Wire direction
LUP+WAFT	Upward (facing up)	Toward tail (wires aft)
LUP+WFOR	Upward	Toward nose (wires fore)
LUP+WLT	Upward	Toward left wingtip
LUP+WRT	Upward	Toward right wingtip
LDN+WAFT	Downward (facing down)	Toward tail
LDN+WFOR	Downward	Toward nose
LRT+WAFT	Right wingtip (facing starboard)	Toward tail
LRT+WFOR	Right wingtip	Toward nose
LLT+WAFT	Left wingtip (facing port)	Toward tail
LLT+WFOR	Left wingtip	Toward nose



Figure 19 - AV-Mag Orientation Reference

In addition to the installation orientation, the mounting attitude of the AV-Mag must be determined as well. Though a small amount of angular mismatch between the installation attitudes of the AV-Mag and AV-30 is tolerable, the AV-Mag is ideally installed with the same roll, pitch, and yaw as the AV-30.

To match angles of the two devices, reference the fifth page of the AVMAG INSTL menu, which displays the roll and pitch angles of the AV-30 as mounted in the aircraft.



Use a non-magnetic digital level to measure the AV-Mag installation, then use non-ferrous shims or washers or an adjustable mounting bracket to adjust the AV-Mag mounting attitude to match that of the AV-30 as closely as possible. Simultaneously, the AV-Mag should be oriented as parallel to the line of flight as possible.

Once mounting adjustment is complete, enter the roll angle and pitch angle as measured with the digital level on the case of the AV-Mag into the sixth and seventh pages of the AVMAG INSTL menu. These values

can be reviewed and committed on the eighth page. It is critical that the aircraft not be moved between measuring and entering the angles.



Once these values are committed, the AV-30 will calculate the differences in mounting angles for use in the heading solution. Once entered, changing these values without remeasurement of the AV-Mag angles will invalidate the installation calculation.



After roll and pitch angles have been entered, calibration may begin. Record the installation selections and parameters in Table 13 of Section 13.2.4.



11.3.12 Calibration

Calibration is the process of detecting and compensating for minor magnetic field and ferrous material interferences coming from the aircraft. If the AV-Mag is relocated or is removed and reinstalled, a re-calibration must be performed. AV-Mag orientation, roll and pitch installation angles, and earth magnetic field values must be up-to-date at the time of calibration. Only the AV-Mag yaw angle is set after calibration.

The calibration menu appears as AVMAG CAL in the AV-30 installation menu. The calibration process requires the aircraft with AV-30 and AV-Mag installed to be oriented to each of 12 headings, with a 10 second measurement time at each orientation. Any interfering systems that must be on during flight (e.g., navigation lights) must also be on during calibration.

Calibration is discussed in further detail in Section 13.2.4.

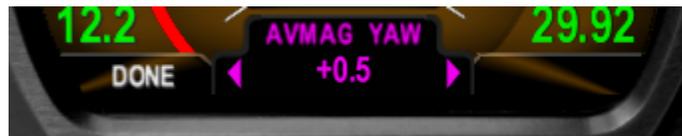
11.3.13 AV-Mag Yaw Angle

Upon completion of calibration, the displayed heading at each of the 12 orientations should be checked and recorded in Table 14. If every heading is off by the same value, then the yaw angle of the installed AV-Mag is likely to be imperfectly aligned with the aircraft line of flight.

To account for this misalignment, set AVMAG YAW option in the AV-30 installation menu, entering the amount to add or subtract from the heading. For example, if the heading is off by +3 degrees, enter a value of -3.0.

If the heading deviation varies at each of the twelve orientations and deviates by more than 2 degrees, then the installation should be double-checked for magnetic interference and accuracy of AV-Mag installation angles entered into the AV-30.

If the AV-Mag yaw angle is off by a large amount, it is recommended that the mounting of the AV-Mag be adjusted to straighten the device and recalibrated.



11.4 Autopilot (AeroCruze 100/TruTrak Vizion)



For complete installation guidance, see *Installation Guide For Vizion PMA Autopilot, Trutrak Doc: 166 and Vizion Series Autopilots Dynon SkyView Interface Supplement 8300-087 Rev IR.*

The AV-30 supports the BendixKing xCruze / AeroCruze 100 or equivalently the TruTrak Vizion (385 and PMA).

Select 'TRUTRAK' in the Serial 2 installation menu. The serial baud rate is set to match the autopilot default of 9600 N,8,1 and is not configurable on the AV-30.

11.4.1 Autopilot Control

See "Operating Handbook for Vizion PMA Autopilot TruTrak Doc:167" for detailed operation of the autopilot.

- Power on the autopilot and sync the altimeter on the autopilot

- Leave the autopilot disengaged until the AV-30 is powered on and operational.

See AV-30-E Pilot's Guide UAV-1004233-001 for detailed operation of the autopilot control interface.

11.4.2 Autopilot Testing



Display and Input Set Altitude (SALT)

- If the AV-30 is not already in AI mode, switch it to AI mode by pressing and holding the center knob to cycle through the available modes
- Select a display field in which to display Set Altitude (SALT). This is done by pressing and releasing the left button under 'Menu' and rotating the center knob until a blank field is selected
- Press and release the center knob to enable selection
- Rotate the center knob until 'SET ALT' is selected
- Press and release the center knob to save the selection
- Press and release the left button under 'Done'

- Press and release the center knob until 'SET ALT' appears
- Turn the center knob to select an altitude
- Press and release the center knob to save



Display and Input Set Vertical Speed (SVS)

- Subsequent to saving the SET ALT value, you should now be presented with a 'SET VS' input. Inputting a Set Altitude is always followed by inputting a Set Vertical Speed. If you do not get the 'SET VS' input prompt, go back to the installation menu and verify that SERIAL 2 is set to TRUTRAK.
- Turn the center knob to select a vertical speed
- Press and release the center knob to save the SVS value



Display the Heading Indicator

- If the horizontal DG indicator is not already displayed, use the following instructions
- Press and release the left button under 'Menu'. The field at the top of the inner circle will be highlighted
- Press and release the center knob to enable selection
- Rotate the center knob until 'DG HDG' is displayed
- Press and release the center knob to save the selection
- Press and release the left button under 'Done'



Display and Input the Heading Bug

- Press and release the center knob 3 clicks until 'HDG BUG' is displayed
- Turn the center knob to adjust the heading bug
- Press and release the center knob to save the selection



Display the SVS Bug

- Press 'Menu' and rotate the center knob clockwise 4 clicks to select and enable the Vertical Trend indicator on the right side of the inner circle
- Press and release the center knob
- Rotate the center knob until 'V TREND' is selected
- Press and release the center knob to save the selection
- Press the left button under 'Done'

Engage the Autopilot

- The AV-30 is now sending serial data to the autopilot
- Engage the autopilot by pressing and releasing the autopilot's center knob.
- Put the autopilot into SkyView mode by pressing and releasing the autopilot's Mode button. 'SKYVIEW' will appear in the upper left corner if the autopilot is receiving data from the AV-30.

- Verify that the autopilot 'ALT' display is the same as the selected altitude, 'SALT' on the AV-30.
- On the AV-30, change the 'SALT' and verify that the changed value appears on the autopilot 'ALT' display
- Verify that the autopilot 'Set VS' display is the same as the 'SVS' on the AV-30.
- On the AV-30, change the value of 'Set VS' and verify that the changed value appears on the autopilot 'SVS' display
- Verify that the autopilot 'SEL' display is the same as the heading bug 'HDG BUG' on the AV-30.
- On the AV-30, change the heading bug and verify that the changed value appears on the autopilot 'SEL' display
- On the autopilot, exit SkyView mode by pressing and releasing the autopilot's Mode button
 - Disengage the autopilot by pressing and holding the autopilot's knob until 'AP OFF' is displayed.

12 Setup & Configuration

12.1 Startup and Common Controls

When powered on, the initial splash screen presents the company logo, unit model number, and the currently installed software version.



Figure 20 - Splash Screen

Operation in both AI and DG modes share common user interface controls as follows:

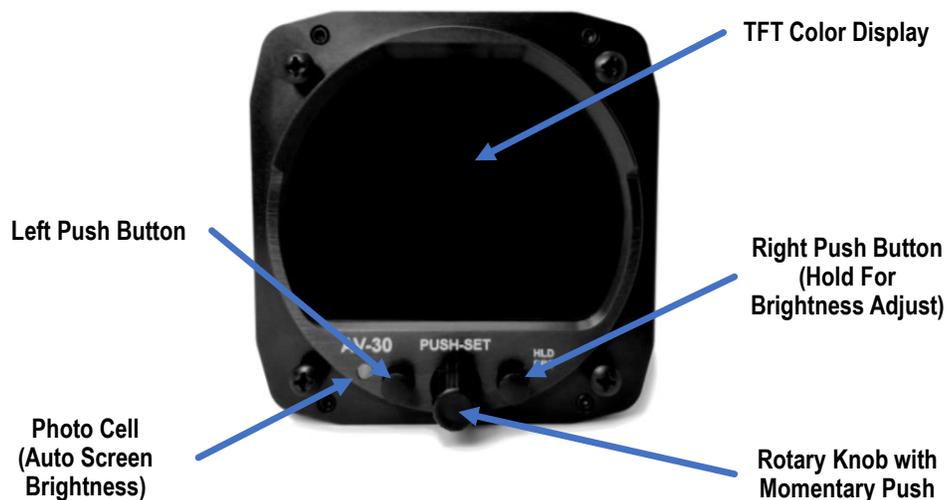


Figure 21 - Common User Interface Components

12.2 Available Menus

Setup and configuration menus are divided into three categories as follows:

- Edit Fields Menu (Pilot accessible)
- Setup Menu (Pilot accessible)
- Install Menu (Non-Pilot accessible)

The edit fields menu allows the pilot to configure the display to show the various supplemental parameters in the desired locations. Details of this are covered in *UAV-1004233-001, AV-30-E Pilot's Guide* and not addressed here.

The Setup Menu allows the pilot to set various configurations and alerting limits as desired for the type of operations being performed. These are also covered in the Pilot's Guide referenced above.

The installer may wish to pre-configure some or all these settings for the pilot, but the default settings are acceptable.



The install menu is for settings that are not normally required to be adjusted during flight. The installer must review and set these according to the installation configuration.

13 Installation Menu

The installation menu is used to configure the AV-30 after installation and should only be accessed on the ground and changed by the installer.

To enable access the installation menu, ensure the unit is completely turned off. Push and hold the main control knob in while power is applied.



Figure 22 - Installation Menu Access

Keep the knob pressed until the startup logo has cleared. The installation menu will now be enabled for access but will not automatically appear on the screen.

Ensure the unit is in AI or DG mode; select the mode by pushing and holding the center button until the mode display changes. When in AI or DG mode, press and release the left MENU button three times until “INSTALL /

ROT TO SEL” appears. The sequence of fields displayed is shown in Figure 23.



Figure 23 - Installation Menu Access

Rotating the knob left and right will access the various parameters that may be configured. Pressing the knob when the desired field is shown will allow the associated setting to be adjusted.

After adjustment, pressing the knob again will exit the editing mode but the installation menu will remain active.



Figure 24 - Exiting Edit Mode

Pressing DONE or a lack of user input for 30 seconds will exit the installation menu and return to the primary screen.



Figure 25 - Setup Done / Exit Option

Record configured values on a printed copy of Table 11, and retain in aircraft records.

Table 11 - Installation Menu Setting

Label	Description	Possible Values	Configured Value(s)
UNIT FUNCTION	Unit functionality	Set to default mode: AI* or DG	
FUNCTION LOCK	Functionality Lock	If locked, pilot may not change unit function	
PITCH TRIM	Pitch trim	Trim as needed: ± 20 Degrees (0*)	
ROLL TRIM	Roll trim	Trim as needed: ± 5 Degrees (0*)	
SLIP TRIM	Slip trim	Trim as needed: ± 5 Degrees (0*)	
OAT TRIM	OAT probe trim	Trim as needed: ± 200 (Unitless) (0*)	
IAS TRIM	IAS trim	Trim as needed: ± 50 KTS or MPH (0*)	
ALT TRIM	Barometric altitude trim	Trim as needed: ± 500 Feet	
AOA FUNC	Angle of Attack Alert	ENABLED*, DISABLED	
IAS UNITS	IAS display units	Knots* (KTS) or Miles Per Hour (MPH)	
IAS VSO	Stalling speed in landing configuration	Set to match limits: 40 to 300 knots (50*)	
IAS VS1	Stalling speed in a specific configuration	Set to match limits: 40 to 300 knots (60*)	
IAS VFE	Maximum flap extended speed	Set to match limits: 40 to 300 knots (100*)	
IAS VNO	Maximum structural cruising speed	Set to match limits: 40 to 300 knots (150*)	
IAS VNE	Never exceed speed	Set to match limits: 40 to 300 knots (175*)	
IAS VMC	Minimum control airspeed with the critical engine inoperative	Set to match limits: 40 to 300 knots or disabled*	
IAS VYSE	Speed for best rate of climb OEI (single engine)	Set to match limits: 40 to 300 knots or disabled*	
BARO UNITS	Altimeter barometric units	Inches of Mercury* (INHG), Millibars (MB)	
TEMP UNITS	OAT units	Celsius* (C) or Fahrenheit (F)	

GPS NAV SRC	Serial GPS format	NONE*, AV1 9600, NMEA1 4800, NMEA1 9600, BEACON X	
SERIAL 2	Auxiliary serial input	NONE*, BEACON X, APA MINI, TRUTRAK	
SERIAL 3	MFD page enable	NONE, AVLINK*	
SERIAL 4	AV-Mag serial input	NONE, AVMAG	
AID MODE	AHRS aiding mode	NONE ^[1] , MAG1*, MAG2, AVMAG ^[2]	
AVMAG INSTL	AV-Mag Installation	See Table 12 for submenu description	See Table 12
AVMAG CAL	Calibrates external magnetometer	Perform calibration after installation – only available for units with external magnetometer	
AVMAG YAW	AV-Mag installed Yaw angle trim	Trim as needed: ±15 Degrees (0°)	
MAG MONITOR	Magnetometer monitor	Push to view	
VIBE MONITOR	Vibration monitor	Push to view	
GYRO CAL	Calibrates aircraft gyros	Perform at installation or software update	
INT MAG CAL	Calibrates internal magnetometer	Perform calibration after installation – only available for units with internal magnetometer	
DEMO MODE	Demo mode	DISABLED*, MODE 1, MODE 2	
SW PART NUM	Software part number	For reference	
SW VERSION	Software version	For reference	
SW CHECKSUM	Software checksum	For reference	
SW CERT	Software certification	For reference	

* Initial factory value

^[1] Initial and only option for units without magnetometer

^[2] Only valid for AV-Mag

Table 12 - AV-Mag Submenu

Label	Description	Possible Values	Configured Value(s)
ERTH MAG SRC	Source of Magnetic Field Value	DEFAULT*, GPS-WMM, USER	
ERTH MAG VAL	Magnetic field value, editable if USER source selected	25.0 to 65.0 μ T (50.0*)	
INTERFERENCE	Checklist of systems to exercise and monitor for excessive interference with the AV-Mag	LIGHTS, AVIONICS, CONTROLS, OTHER, ALL ON, REVIEW	
INSTL ORIENT	Orientation of the installed AV-Mag	See Table 10 for more details	
AV-30	Angles of the AV-30 instrument in the stationary aircraft.	No user entry. Information for AV-Mag installation only. AV-Mag should be installed as closely as possible to the AV-30 angles.	
ROLL ANGLE	Roll angle of the AV-Mag as mounted in the stationary aircraft	Trim as needed: ± 10 degrees (0.0*)	
PITCH ANGLE	Pitch angle of the AV-Mag as mounted in the stationary aircraft	Trim as needed: ± 10 degrees (0.0*)	
SAVE (Y/N)	Option to save changes to input roll and pitch angles	YES, Y/N?, NO. Only save when installing and a valid measurement of the angles AS THE AIRCRAFT SITS. Do not 're-save' the values when reviewing as this will trigger re-calculations that will be invalid if the aircraft has been moved.	
COMPLETE	Final screen of installation submenu. The next step of installation is to run the calibration procedure.	Information only	

* Initial factory value

13.1 Mandatory Settings

The following settings are mandatory for each installation.

13.1.1 Unit Function

- Set to AI if installation is replacing an existing Attitude Indicator.
- Set to DG if installation is replacing an existing Direction Indicator.
- Set to either when installation is as a non-required instrument. In this mode, this setting is the initial default operating mode if the function

lock below is not set to locked. With this setting, pilot may toggle mode.

13.1.2 Function Lock

Enable function lock for primary AI and DG installations. This prevents the pilot from toggling the operating mode.

Installation on a non-required instrument may be locked or not locked, based on owner preferences. Pressing and holding the center knob when functionality is not locked will toggle between AI, DG, and MFD modes.

13.1.3 Trim

Set Pitch, Roll and Slip Trim to accommodate any mounting variations.

Accurate pitch, roll and slip trim is important to ensure optimal performance

Set IAS and Altitude Trims to match existing instrumentation as needed.

Trim the OAT values to match that of a secondary temperature source such as ATIS. Set trim in Celsius.

13.1.4 Angle of Attack

Angle of Attack alerts are enabled by default but may be disabled if desired.

13.1.5 V-Speeds

Set each of the V-Speeds to the values that correspond to the installation aircraft in knots.

13.1.6 Display Units

Set the IAS units to match that of the existing airspeed indicator.

Set the Baro units to match that of the existing altimeter.

Set OAT units to owner / pilot preference.

13.1.7 Serial Inputs

GPS NAV SRC

Most handhelds are NMEA outputs while most panel mounted navigators are Aviation format. A tailBeaconX can also supply GPS input by selecting BEACON X.

Set to the corresponding GPS navigator input type.

Value	GPS Source
NONE	None available
AV1 9600	Aviation format (9600 bps)
NMEA1 4800	NMEA format (4800 bps)
NMEA1 9600	NMEA format (9600 bps)
BEACON X	tailBeaconX is installed

SERIAL 2

If using the AV-30 as a control head for a tailBeaconX, set SERIAL 2 to BeaconX, otherwise, set to the corresponding input type.

Value	Serial 2 Source
NONE	None available
BEACON X	tailBeaconX is installed
APA MINI	(Future use)
TRUTRAK	AeroCruze 100 /TruTrak Vizion autopilot

SERIAL 3

If using the AV-Link, set SERIAL 3 to AVLINK to enable MFD page.

Value	Serial 3 Source
NONE	None available
AVLINK	AV-Link is installed, MFD enabled

SERIAL 4

If using the AV-Mag, set SERIAL 4 to AVMAG to enable the external magnetometer aiding.

Value	Serial 4 Source
NONE	None available
AVMAG	AV-Mag is installed

13.1.8 AID Mode

There are up to 3 options for the AID MODE, which controls the method of aiding the AHRS DG functionality.

Value	AHRS Aiding Source
NONE	None used
MAG1	Internal magnetometer provides correction data to DG.
MAG2	Internal magnetometer provides correction data to DG and aiding to core AHRS algorithm
AVMAG	External magnetometer provides continuous heading data to DG and aiding to core AHRS algorithm. AV-Mag only.

Rotate the center knob until “AID MODE” is displayed. If the internal magnetometer is available (P/N UAV-1004035-002) then you will have a choice of NONE, MAG1, and MAG2. If the internal magnetometer is not found, only “NONE” will be displayed. If Serial 4 is set to AVMAG, AID MODE will be automatically set to AVMAG and is not otherwise settable.



Figure 26 - AID Mode Selection

Push the center knob and rotate to select your choice of Magnetometer aiding and then push the center button to confirm your choice.

13.1.9 Demo Mode

Set Demo Mode to DISABLED.

13.2 System Checkout

The following procedures must be performed prior to returning the aircraft to service.

13.2.1 Alignment

During initial startup, the ALIGN annunciator should be presented and flash. This indicates internal sensor stabilization is occurring. During the alignment, do not move the aircraft.

This should extinguish within 3 minutes, at which point valid attitude or direction indication is displayed.

If power is removed from the unit while it is still aligning the unit will go to battery mode until it has completed the alignment process.



Figure 27 - Aligning Annunciator

If the indicator is not extinguished within 3 minutes, reference Section 14 of this document for troubleshooting information.

13.2.2 Gyro Calibration

As units age or experience unusual conditions, the precision gyroscopic sensors may need to be re-calibrated. This can be accomplished in the field using the procedure noted here. At least 15 minutes of warmup is required before performing the AV-30 gyro calibration.

1. Before applying power, push and hold the center rotary knob and apply power. As the splash screen appears, check that a minimum version of 2.1.1 is displayed. Gyro Calibration must be completed on all units with software version 2.1.1 or later
2. With the AV-30 in the AI mode, enter the "Install menu" page by pressing and releasing the left button repeatedly until the 3rd menu is displayed. The aircraft must be on the ground with no movement.



Figure 28 - Install Mode Selection

3. It is critical to ensure the aircraft is completely motionless and on the ground during the next several steps. The aircraft should be in a hangar and must not be affected by wind or other sources of aircraft movement. Do not leave the aircraft during the countdown.
4. Enter the “Install Menu” again. Rotate to Gyro Cal and push the center button to choose calibration. If sufficient warmup time has not elapsed, a “Not ready to calibrate” message and countdown will be indicated. Otherwise, initiate calibration by pressing the right button.



Figure 29 - Gyro Calibration Selection

5. “Calibration in progress” will be displayed with a completion percentage.

- A success screen will be presented upon successful calibration. Push the left button under “DONE” and the calibration will be complete. If an error is shown, repeat the calibration process.



Figure 30 - Gyro Calibration Procedure

If any post-accomplishment check fails, please contact uAvionix support.

13.2.3 In-Flight Internal Magnetometer Calibration

Units with an internal magnetometer (P/N UAV-1004035-002) require an in-flight magnetic calibration procedure to be performed. When calibration needs to be performed, in the absence of other flags, a red flag (NOMAG) will appear.



Figure 31 – NOMAG Flag and INT MAG CAL Selection

- The internal magnetometer calibration feature is found in the install menu. Hold down the center button while applying power. The installation menu can now be accessed until the next power cycle.
- Once established in flight, select INT MAG CAL, then press CALIB. Note that on units without an internal magnetometer, INT MAG CAL will be disabled.



Figure 32 - INT MAG CAL Entry and Progress

3. Fly for 10 minutes. Four 360-degree, standard-rate turns will need to be completed. Each turn will represent 25% of the total.
4. Click the left button under “Done” when completed. Once complete, the red flag will extinguish. If the calibration failed, please complete again.



Figure 33 - INT MAG CAL Success and Failure Screens

The AV-30 will retain all calibration unless a hard reset is executed. Internal magnetometer and external magnetometer calibration data are stored independently.

13.2.4 On-Ground External Magnetometer Calibration

Prior to calibration, all installation steps and measurements from Section 11.3 AV-Mag External Magnetometer must be completed. Failure to complete all installation steps will result in an invalid calibration.

Units with an external magnetometer (P/N UAV-1006321-001) require an on-ground 12-point magnetic calibration procedure to be performed. When calibration needs to be performed, in the absence of other flags, a red flag (NOMAG) will appear.



Figure 34 - NOMAG Flag and AVMAG CAL Selection

1. The external magnetometer calibration feature is found in the install menu. Hold down the center button while applying power. The installation menu can now be accessed until the next power cycle.
2. Move the aircraft to a location that is as level as possible and is far from power lines, metal structures, or reinforcement steel underground or nearby.
3. Enter the INSTALL menu and select AVMAG CAL, then press CALIB. Note that on units without an external magnetometer, AVMAG CAL will be disabled.



Figure 35 - AVMAG Calibration Entry



The aircraft will need to be oriented to twelve headings, each separated by 30 degrees. Calibration is sensitive to the angle between each of the heading orientations; if an

accurate airfield compass rose is not available, measurements for each turn can be obtained using a calibrated magnetic compass or an electro-mechanical gyro. The AV-30 will also provide an on-screen turning guide to each calibration point.

4. Follow the on-screen instructions, pressing the right button once the aircraft is oriented to heading 360. Keep the aircraft as motionless as possible while the “Calibration in progress” message is displayed.



Figure 36 - AVMAG CAL In-Progress

5. Repeat step 4 for each orientation as directed by the on-screen instructions. The bottom-center display indicates the degrees and direction to the next orientation and will turn green when the aircraft is oriented correctly.



Figure 37 - AVMAG CAL Orientation Guide

6. Upon completion, the raw data will be processed. If a good calibration is possible, the red NOMAG flag will extinguish and the screen shall display a success message. If the calibration failed, please review the procedure steps and execute them again.



Figure 38 - AVMAG CAL Success and Failure Screens

The AV-30 will retain all magnetometer calibration data unless a hard reset is executed. Internal magnetometer and external magnetometer calibration data are stored independently.

Table 13 AV-Mag Installation Parameters

Parameter	Value
Installation Location on Aircraft	
Earth Magnetic Field Source	
Earth Magnetic Field Value	
AV-Mag Orientation	
Interference Range	
Max Interferer	
Min Interferer	
AV-Mag Roll Angle	
AV-Mag Pitch Angle	
AV-Mag Yaw Angle (post-calibration)	

Table 14 - Calibrated Heading Check

Magnetic Heading	AV-30+AV-Mag Reported Heading	Magnetic Heading	AV-30+AV-Mag Reported Heading
0		180	
30		210	
60		240	
90		270	
120		300	
150		330	

13.2.5 OAT Interface

If an Outside Air Temperature (OAT) probe is connected, utilize the display customization guidance provided in the Pilots Guide to configure the display to show OAT in at least one textual display field.



Figure 39 - OAT Indicator

Note that OAT calibration is performed in the Setup procedures. This step only ensures that the OAT probe is detected properly.

13.2.6 GPS Navigator Interface

If a GPS Navigator is connected, utilize the display customization guidance provided in the Pilot's Guide to configure the display to show GPS navigational data in at least one textual display field.

The image below shows a typical configuration that the pilot may setup.



Figure 40 - GPS Data Elements

On the GPS navigator, set a destination waypoint and initiate a direct-to sequence. Note that not all navigators will output serial data until a waypoint has been selected and navigation initiated.

13.2.7 Vibration Check

Prior to flight, a vibration check **must** be completed. The vibration check helps ensure the vibration characteristics of the aircraft and installation are suitable for use. The check procedure is performed during an engine run-up.

1. Before applying power to the AV-30-E, press and hold the center rotary knob and apply power. As the splash screen appears, check that a minimum version of 2.1.1 is displayed.
2. Enter the “Install Menu” page by pressing and releasing the left button repeatedly until the 3rd menu is displayed.
3. Rotate to “VIBE MONITOR” and press the center button.



Figure 41 - Vibe Monitor Selection

4. The Vibration Monitor will display current and peak values for the Accelerometer and Gyroscope.



Figure 42 - Vibe Monitor Operation

5. Perform an engine run-up, slowly increase engine power from idle to full and back to idle.
6. Record the peak values observed for both the Accelerometer and Gyroscope.

Peak values for the Accelerometer should not exceed **110**, and for the Gyroscope should not exceed **40**. If excessive values are observed, vibration must be mitigated to ensure expected performance. Consider the following:

- Ensure proper propeller balance. Perform dynamic propeller balancing.
- Replace worn engine mounts and address causes of high engine vibration.
- Ensure the AV-30-E is not mounted in a location subject to high vibration. This can often be detected by placing your hand on various locations in the panel, and can be caused by poorly supported panel regions, adjacent equipment, or proximity to engine structure.
- On isolated panels, replace the grommets; concurrently, ensure isolated panels have a ground strap.
- Ensure all mounting hardware is firmly attached.
- Check for rub marks on the AV-30-E case.

Ensure connectors are firmly attached, and all cabling is firmly supported and not causing undue flex. The cabling must not be hitting or close to a moving surface (e.g., control yoke).

13.2.1 EMC Checkout

An EMC check should be performed after the AV-30-E installation is complete. The EMC check verifies that the newly installed equipment is not producing interference to other avionics and that the existing avionics are not producing interference to the AV-30-E. The testing assumes the AV-30-E operational check has been completed and that the installed avionics to be tested are all in working condition.

1. Power on all avionics except the AV-30-E.
2. Verify all existing avionics are functioning properly. Some systems may require startup messages to be acknowledged/cleared to verify proper function.
3. After confirming all existing avionics are functioning properly, power off all existing equipment.
4. Power on the AV-30-E and perform the following tests as they apply to the existing aircraft equipment.
5. Observe load shedding procedures as appropriate for the aircraft during testing to ensure adequate power to complete the testing while maintaining enough reserve to support pre-flight and engine start.

VHF COM RADIOS

Verify AV-30-E operates without interference from the VHF COM operation.

1. Power on the VHF COM radio.
2. Transmit on a low, medium, and high frequency. Unused frequencies are recommended for this test. Example frequencies: 118.0, 126.0, and 135.0 Mhz.
3. During each transmission verify the AV-30-E continues to operate properly.

Verify each radio operates without interference from the AV-30-E.

1. Monitor a local frequency and verify there are no unintended squelch breaks or other tones that would interfere with communications.
2. Monitor a remote (distant) frequency and verify there are no unintended squelch breaks or other tones that would interfere with communications.
3. Monitor an unused frequency and verify there are no unintended squelch breaks or other tones that would interfere with communications.

VHF NAV RADIOS

Verify VHF NAV operates without interference from the AV-30-E.

1. Power on the VHF NAV radio.
2. Monitor a local, remote, and unused frequency.
3. Verify there are no misleading navigation indications during the monitoring of each frequency.
4. Verify audible station ID and that the station is clear of audio interference that would prevent identification.

ADDITIONAL AVIONICS

Additional Avionics should be tested according to the manufacturer EMC/EMI test procedures. This testing assumes the existing equipment is functional and operating correctly at time of testing. The following summarizes a typical EMC test.

1. Operate the AV-30-E.
2. Operate the existing installed avionics according to manufacturer instructions. If capable, utilize the device transmit and receive functions through a range of values.
3. Verify no errors, warnings, or unexpected operation is observed on the AV-30-E during operation of the installed avionics.
4. Verify no errors, warnings, or unexpected operation is observed on the installed avionics during operation of the AV-30-E.

14 Troubleshooting

The following steps are to aid in identifying installation or unit performance related issues:

Table 15 - Troubleshooting

Issue	Possible Reason
Power	
Unit does not power-on	Check associated breakers
	Ensure aircraft battery is greater than 10 VDC
	Check wiring and pinouts
Unit will not shut off, even if power is removed	Ensure no pitot or static blockage or line kinks are present (locking pressure and airspeed indication over 40 knots)
Stabilization	
Unit will not stabilize and aligning annunciator remains on	Return to factory for service if unit does not align within 3 minutes of power-on
DG drifts more than 30 degrees per hour	Ensure running latest available software; perform Vibration Check as described in Section 13.2.7
	Perform Gyro Calibration as described in Section 13.2.2
	Enable magnetometer aiding, if internal or AV-Mag external magnetometer is available - see Section 13.1.8
Unit flashes "NO MAG" on right side	Check that you have selected the intended internal or AV-Mag external magnetometer function. Complete the Mag Calibration flight in Section 13.2.3 if using the internal magnetometer. Check the AV-Mag wiring connection or complete the on-ground 12-point calibration in Section 13.2.4 if using the external magnetometer.
Battery	
Battery indication shows FAIL	Contact uAvionix support
Trim	
Roll, Pitch or Slip show small but constant error	Ensure unit is level in panel (using a bubble level or similar)
	Set trim adjustment in Installation menu. See Installation Manual for instructions
Airspeed or Altitude shows small but constant error	Set trim adjustment in Installation menu. See Installation Manual for instructions

Interface	
GPS information is expected but does not show up in data overlays	Check GPS input is configured to match the connected GPS serial data type and speed
	Set direction indication to GPS TRK
“NO DATA” is shown	Check interface cables and pinouts
“NO GPS” is shown	Check GPS input is configured to match the connected GPS serial data type and speed
Alerts	
Audio alerts not heard over the audio system	Check wiring and ensure alerts are enabled in the Setup menu
	Ensure unswitched input is available on the audio panel
	Verify volume setting is sufficiently high in the Setup menu
Nuisance alerts are generated	Ensure alerting limits are configured as desired in the Setup menu

15 Serial Interface Specification

GPS serial input is compatible with the “Aviation” and NMEA serial protocols. Aviation protocol is 9600 Baud, No Parity, 8 Data Bits, 1 Stop bit. NMEA is either 4800 or 9600 Baud, No Parity, 8 Data Bits, 1 Stop Bit.

The packets received are as follows:

Table 16 - GPS Serial Specification

Parameter Name	Aviation Packet	NMEA Packet
GPS Latitude	“A” Packet	\$GPRMC, Fields 3,4
GPS Longitude	“B” Packet	\$GPRMC, Fields 5,6
GPS Track	“C” Packet	\$GPRMC, Field 8
GPS Ground Speed	“D” Packet	\$GPRMC, Field 7
Distance to Waypoint	“E” Packet	\$GPRMB, Field 10
Cross Track Error	“G” Packet	\$GPRMB, Field 2
Desired Track	“I” Packet	Computed
Waypoint ID	“K” Packet	\$GPRMB, Field 5
Bearing to Waypoint	“L” Packet	\$GPRMB, Field 11
Magnetic Variation	“Q” Packet	\$GPRMC, Field 10
AT Master Flag	“T” Packet, Flag 4	\$GPGGA, Field 6
Garmin Master Flag	“S” Packet, Flag 5	N/A

16 Field Update Capability

The unit software can be field updated. Updating requires either an in-line harness and Windows based PC, or the optional AV-Link accessory to be installed. Contact uAvionix support for additional information, or reference available Service Bulletins.

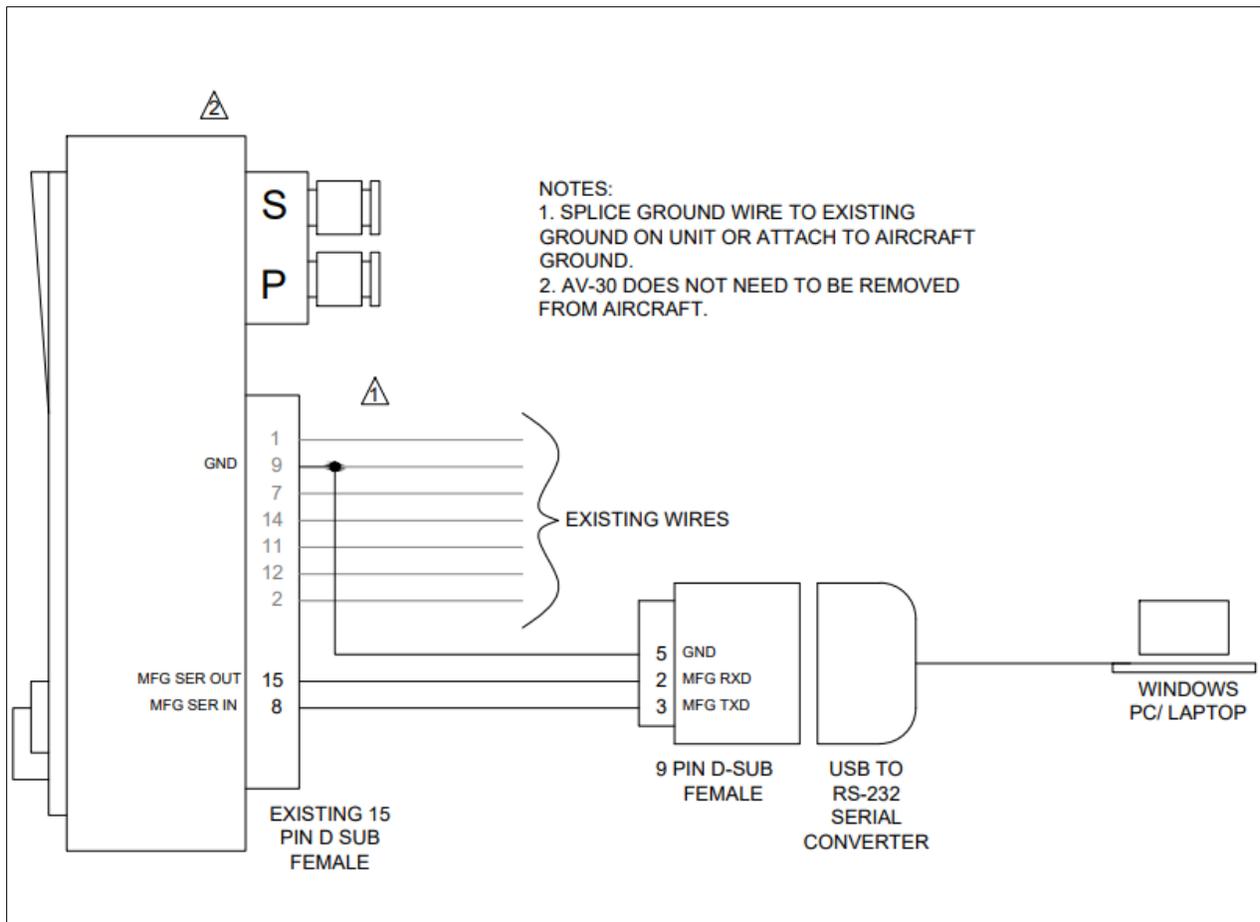


Figure 43 - Field Update Interface Diagram