AV-30-E

Installation Manual

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

2 Warnings / Disclaimers

All device operational procedures must be learned on the ground.

uAvionix is not liable for damages arising from the use or misuse of this product.

This equipment is classified by the United States Department of Commerce's Bureau of Industry and Security (BIS) as Export Control Classification Number (ECCN) 7A994.

These items are controlled by the U.S. Government and authorized for export only to the country of ultimate destination for use by the ultimate consignee or end-user(s) herein identified. They may not be resold, transferred, or otherwise disposed of, to any other country or to any person other than the authorized ultimate consignee or end-user(s), either in their original form or after being incorporated into other items, without first obtaining approval from the U.S. government or as otherwise authorized by U.S. law and regulations.

3 Limited Warranty

uAvionix products are warranted to be free from defects in material and workmanship for two years from the installation of AV-30-E on the aircraft. For the duration of the warranty period, uAvionix, at its sole option, will repair or replace any product which fails in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost.

Restrictions: This warranty does not apply to cosmetic damage, consumable parts, damage caused by accident, abuse, misuse, fire or flood, theft, damage caused by unauthorized servicing, or product that has been modified or altered.

Disclaimer of Warranty: IN NO EVENT, SHALL UAVIONIX BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE, OR INABILITY TO USE THE PRODUCT OR FROM DEFECTS IN THE PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

Warranty Service: Warranty repair service shall be provided directly by uAvionix. Proof of purchase for the product from uAvionix or authorized reseller is required to obtain and better expedite warranty service.

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.

4   Table of Contents

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
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.
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)

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. Each screen has access to a transponder control page.

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 or control of a compatible uAvionix ADS-B transponder such as the tailBeaconX.

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.

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 2 hours 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)
- Transponder control (DG / AI / MFD 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

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	2 Hrs. 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
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:
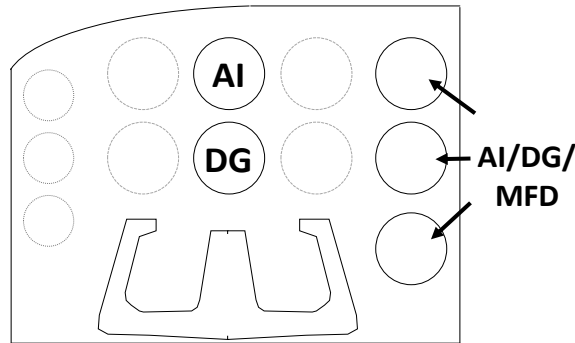
Figure 2 – Mechanical Gauge Replacement

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.
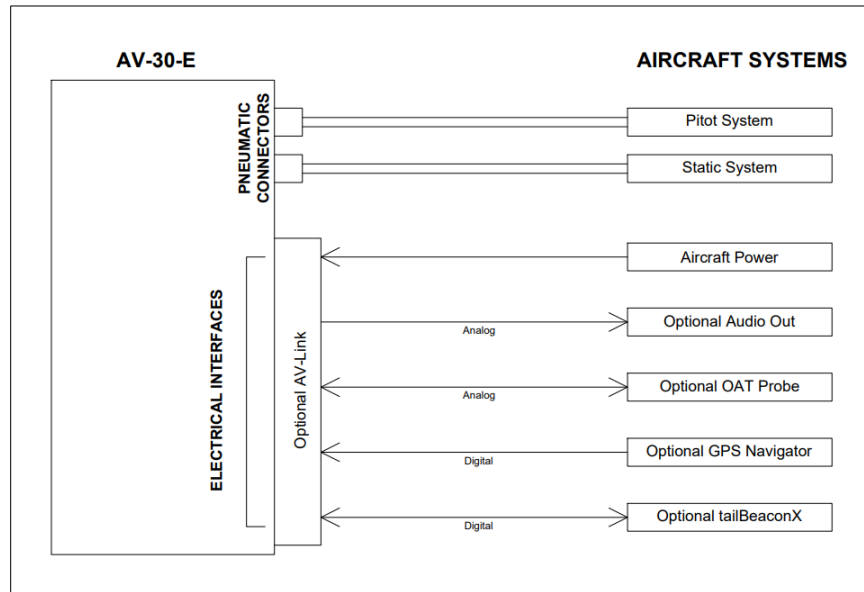
Figure 3 – AV-30 Aircraft Systems Interfaces – AI Mode
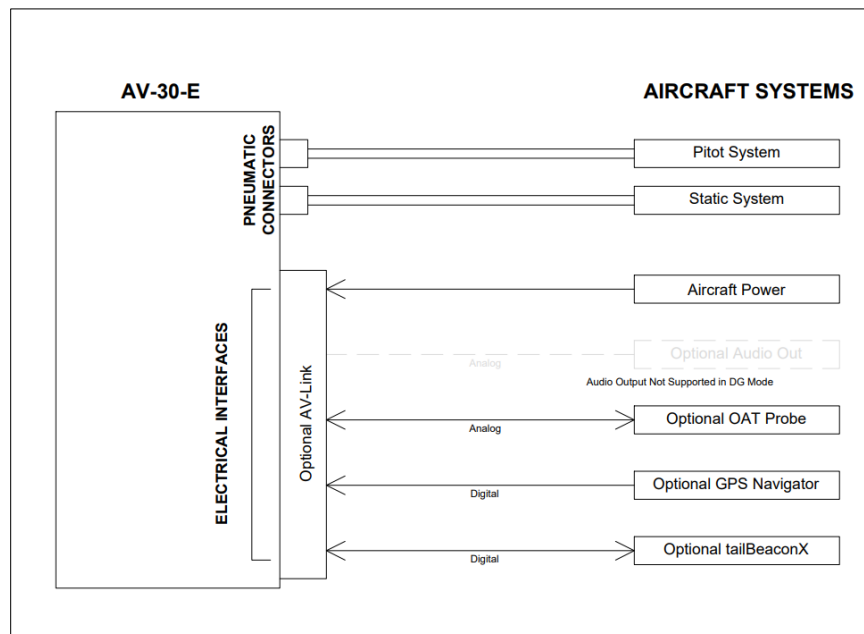
Figure 4 - AV-30 Aircraft Systems Interfaces – DG Mode

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	✓	✗	None
Primary Slip	✓	✗	None
Reversionary Attitude / Slip	✗	✓	None
Primary Direction of Flight Indication			
Direction Tape (DG / GPS)	✓	✗	Pitot & static / GPS Navigator
Direction Rose (DG)	✗	✓	Pitot & Static
Direction Arc (GPS)	✗	✓	GPS Navigator
Direction HSI (GPS)	✗	✓	GPS Navigator
Supplemental Data Overlays – Pilot Configurable (Textual or Graphical)			
Indicated Airspeed (Textual)	✓	✗	Pitot / Static
V-Speeds (Graphical)	✓	✗	Pitot / Static
Baro Altitude (Textual)	✓	✗	Pitot / Static
Angle Of Attack (Graphical)	✓	✗	Pitot / Static
Vertical Trend (Graphical)	✓	✗	Pitot / Static
Vertical Speed (Textual)	✓	✗	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	✗	✓	GPS Navigator
Heading Bug			
Hdg Bug – Ref Only, no AP	✓	✓	None
Audio and Visual Alerting			
AoA Alerting	✓	✗	Pitot / Static
G Limit Alerting	✓	✗	None
Excessive Roll Alerting	✓	✗	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

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.

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 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 9.2 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.

9.2.7 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.

9.3 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 2 hours of operation at standard temperatures and 30 minutes (minimum) of operational capacity over the operational temperature range.

While on ground the AV-30 can go to battery mode in the following ways

1. While AV-30 is aligning the unit will continue to battery mode if battery master is shut off. Once aligned it will shut down.

2. If any button is pressed after power has been removed, the AV-30 will go to battery mode.

3. If the AV-30 senses airspeed, 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.

9.4 Internal Magnetometer (Optional)

9.4.1 General

The internal magnetometer, when available, is detected in software version 2.1.1 or later. 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. See Section 13.2 on how to calibrate the AV-30 magnetometer.

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.

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

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 Mechanical Drawing
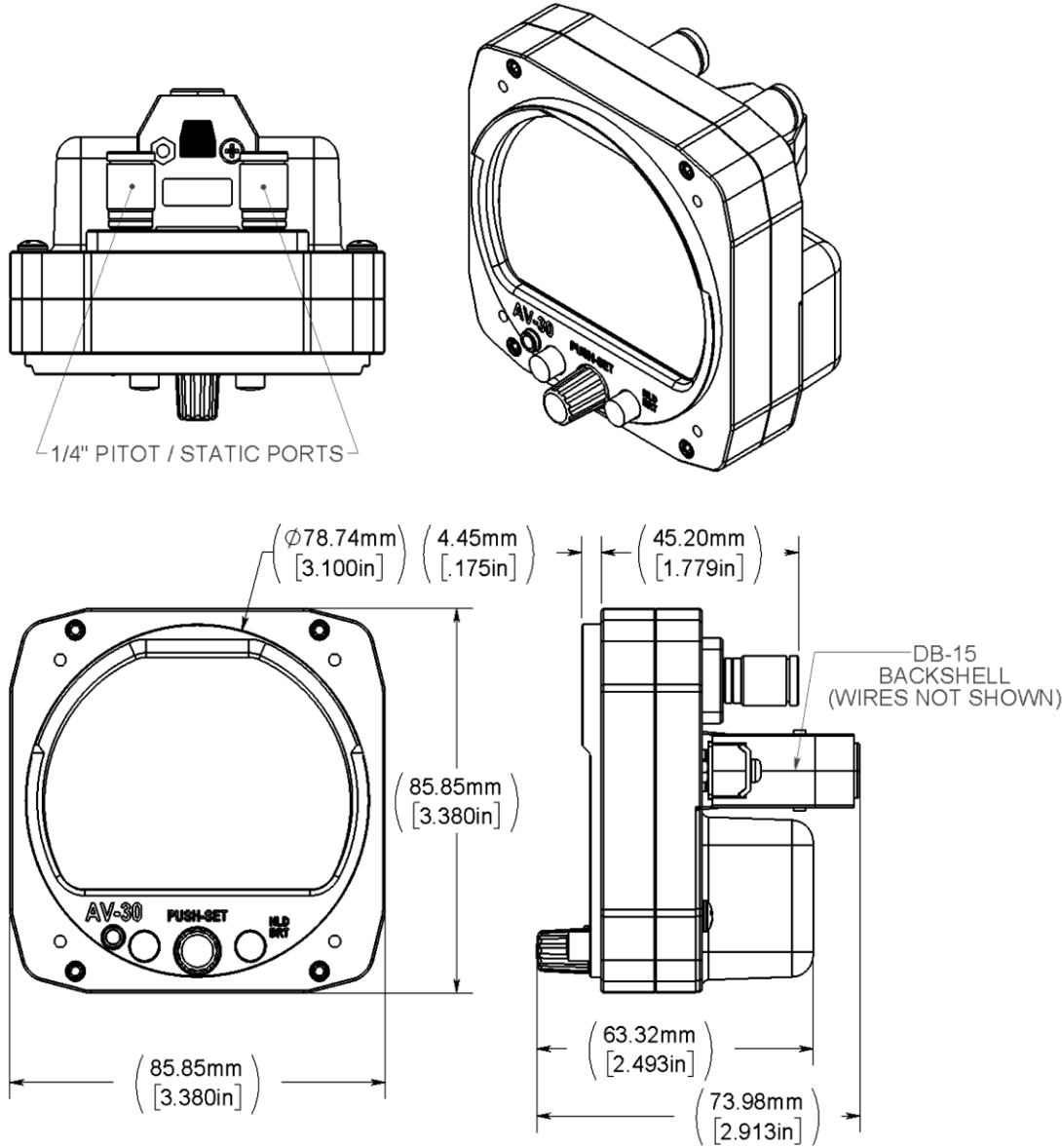
Figure 5 – Mechanical Drawing

10.5 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.

☞ Torque screws to 6 (+/-1) inch-lbs.

The threaded hole in the AV-30 bottoms out prior to the internal components. Installing a mounting screw that is longer than optimal will not damage the unit but will result in the unit not being fully fastened to the panel.
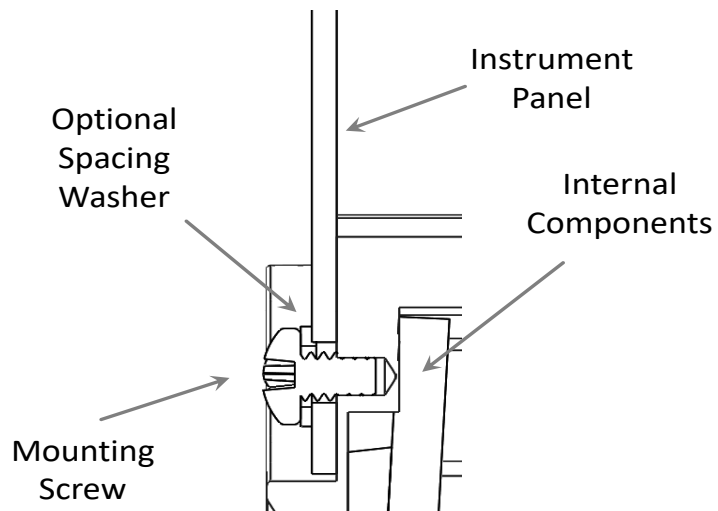
Figure 6 – Mounting Screw Dept Limits

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.

10.6 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.

NOTES:
1. PITOT AND STATIC CONNECTION REQUIRED WHEN INSTALLED IN THE DG& AI CONFIGURATION.
2. TWISTED PAIR 22 OR 24 AWG MIL SPEC.
3. 3/16" BRAIDED GROUND STRAP - D-SUB SCREW TO AIRCRAFT GROUND 8" MAX LENGTH.
4. BACK SHELL NORCOMP P/N 977-015-020R121 OR EQUIVALENT.
5. MAY BE PARALLELED WITH SECOND AV-30-C.
6. REFERENCE TAILBEACONX INSTALLATION MANUAL.
7. TAILBEACONX TXD AND RXD CAN NOT BE PARALLELED.
8. SHIELDS TO BE TERMINATED AT BACKSHELL OF AV-30.
9. FOR DALT, TAS, OAT, FUNCTIONALITY, PITOT, STATIC, AND OAT MUST ALL BE CONNECTED. OAT PROBE CAN NOT BE PARALLELED.

Figure 7 - Wiring Diagram – Attitude Indicator Position Installation
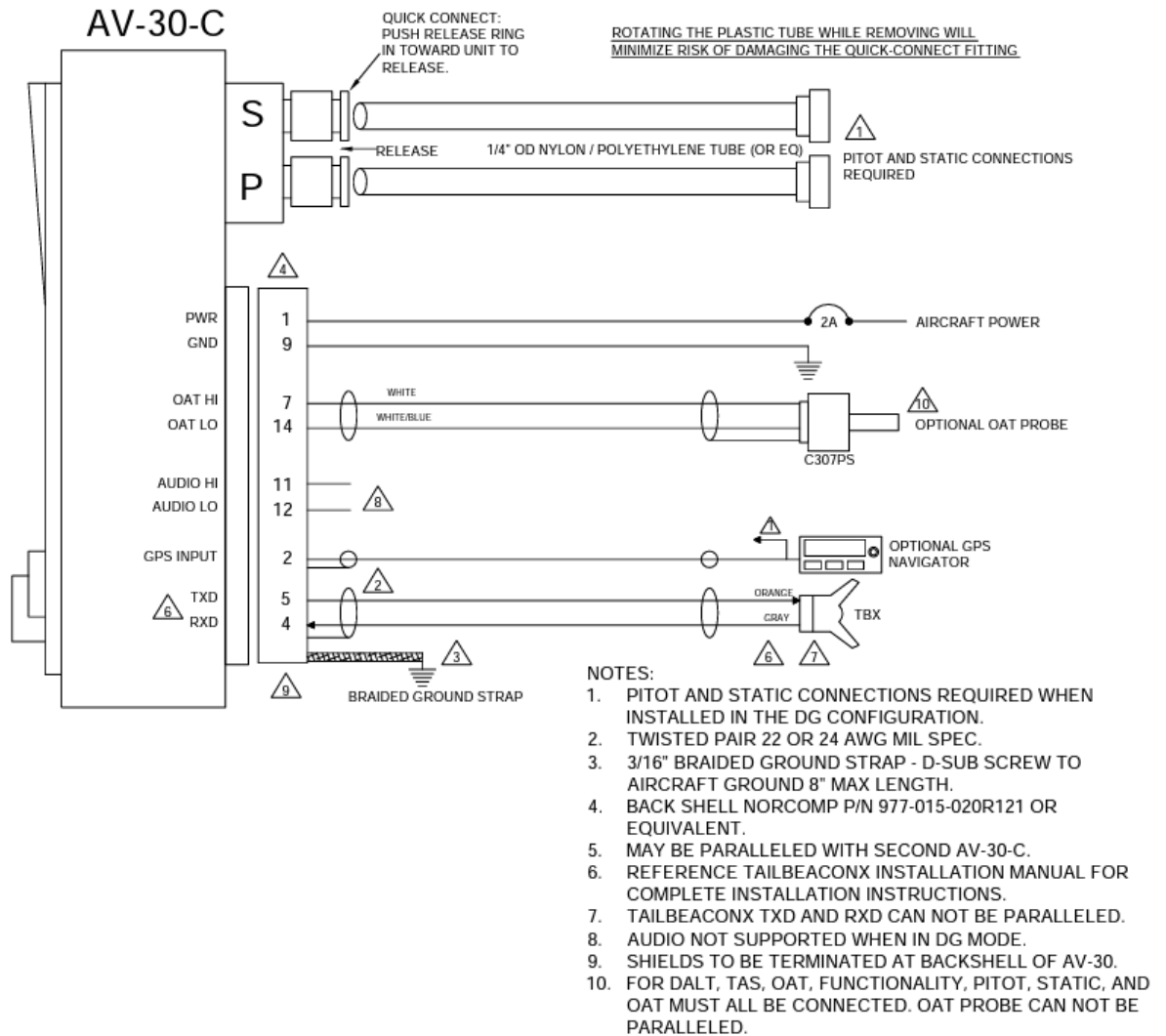
Figure 8 - Wiring Diagram – DG Position Installation

10.7 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.
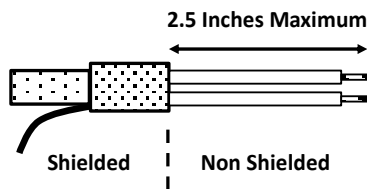
Figure 9 - Shielded Cable

⚠ The bond between the unit (measured at the D-sub screws) to the aircraft frame must be 2.5 milli-Ohms or less.
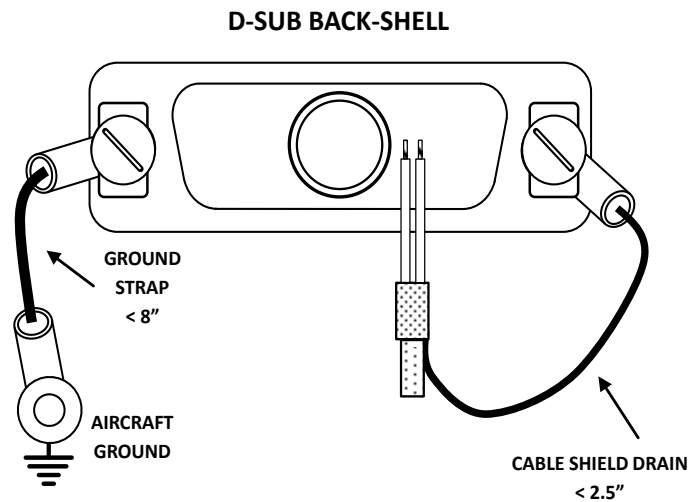
Figure 10 – Cable Shields and Ground Strap

10.8 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 RS-232
5	Serial 2	Output	Transponder RS-232
6	Spare Serial	Input	Reserved - Do Not Connect
7	OAT Supply	Output	White Probe Wire
8	MFG Serial	Input	Reserved - Do Not Connect
9	Ground	Power	Aircraft Ground
10	Aux Power Ret	Power	Reserved - Do Not Connect
11	Audio H	Output	Audio Alerts hi
12	Audio L	Output	Audio Panel lo
13	Aux Power Out	Power	Reserved - Do Not Connect
14	OAT Return	Input	White / Blue Probe Wire
15	MFG Serial	Output	Reserved – Do Not Connect
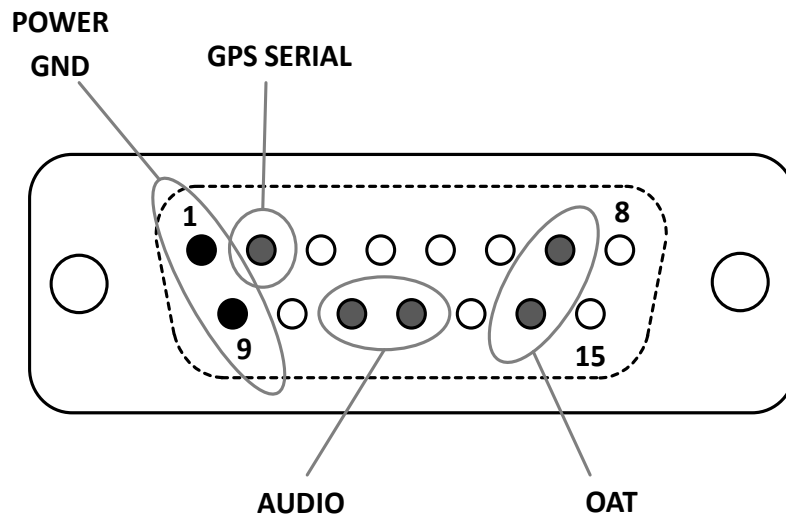
Figure 11 – Unit Connections – DB-15, Male (Rear Unit View)

11 Optional Equipment Installation

11.1 AV-Link

AV-Link 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 8 – FCC ID

Model	FCC ID
AV-Link Contains	2AC7Z-ESPWROOM02U

11.1.3 AV-Link Specifications

Characteristics	Specifications
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
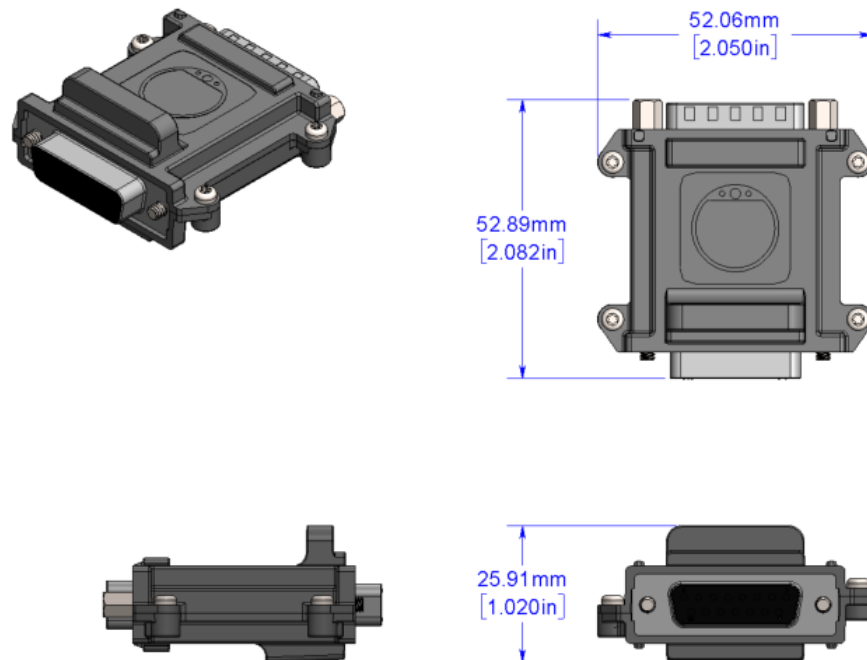
Figure 12 – AV-Link connector size

11.1.4   AV-Link Firmware

The firmware contained in AV-Link is identified by electronic marking. Firmware 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 10 - 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.
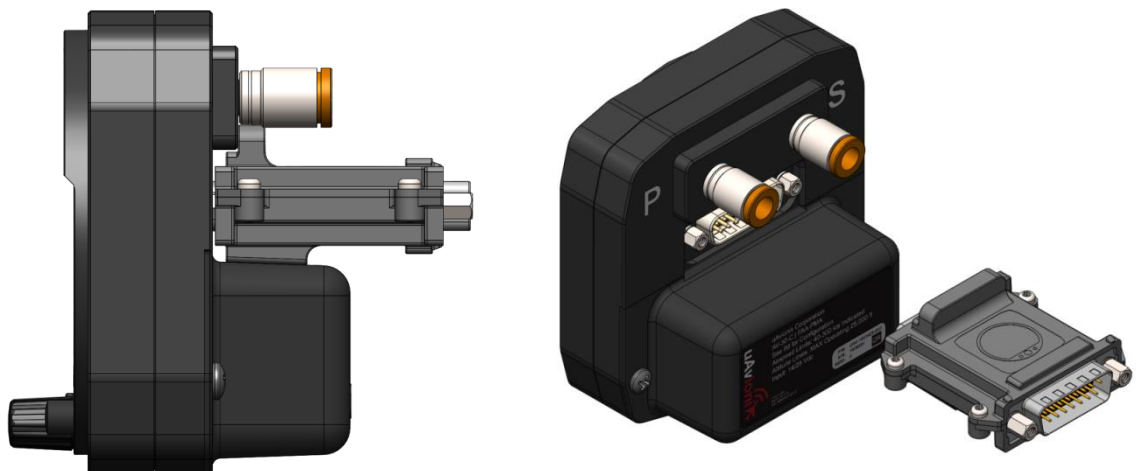
Figure 11 - AV-Link attachment

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 12.
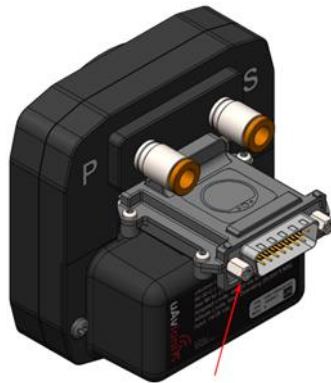
Figure 12- AV-Link installed

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

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

<u>Do Not Overtighten</u>!
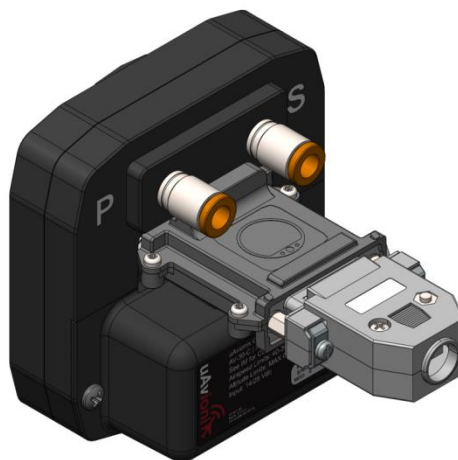
Figure 15 – AV-Link attachment with backshell

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 § 10.5 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.
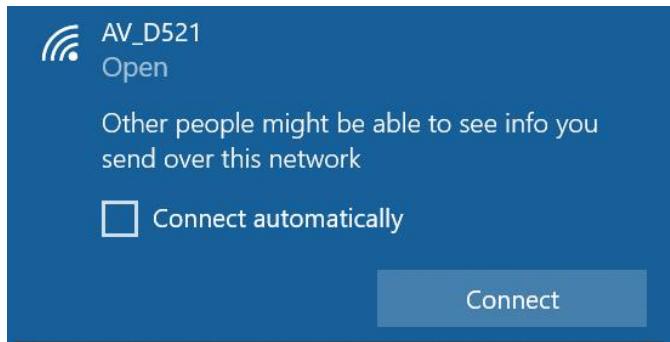
3. Once connected, use your web browser to navigate to 192.168.4.1/espUpdate. From there, you will see the AV-Link Firmware Update web page.

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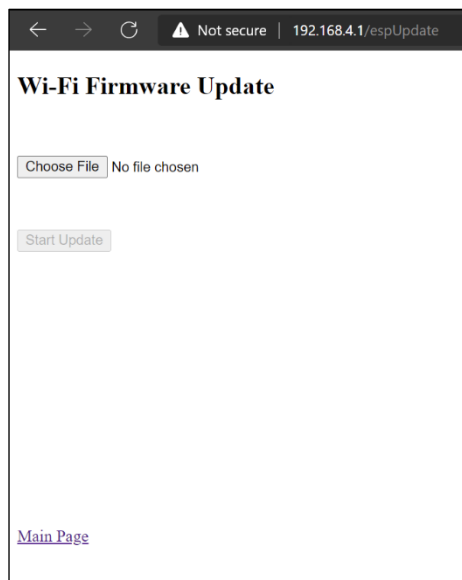
Click on Choose File. Select the AV-Link firmware update file to load and then click the OK button.

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.

👉 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.

11.2.1 Transponder Control

See AV-30-E Pilot's Guide UAV-1004233-001 for transponder control interface configuration.

11.2.2 Transponder Testing with tailBeaconX

- Set AV-30 in STBY mode by following the above procedures.
- Go to the tailBeaconX and connect to Wi-Fi and connect to the tailBeacon application.
- When it is connected go to the bottom of the page and click "GND TEST MODE".
- Set the AV-30 to ALT mode.
- tailBeaconX will now respond to all calls on transponder test sets.
- When test is complete cycle power.

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 16 – Splash Screen

Operation in both AI and DG modes share common user interface controls as follows:
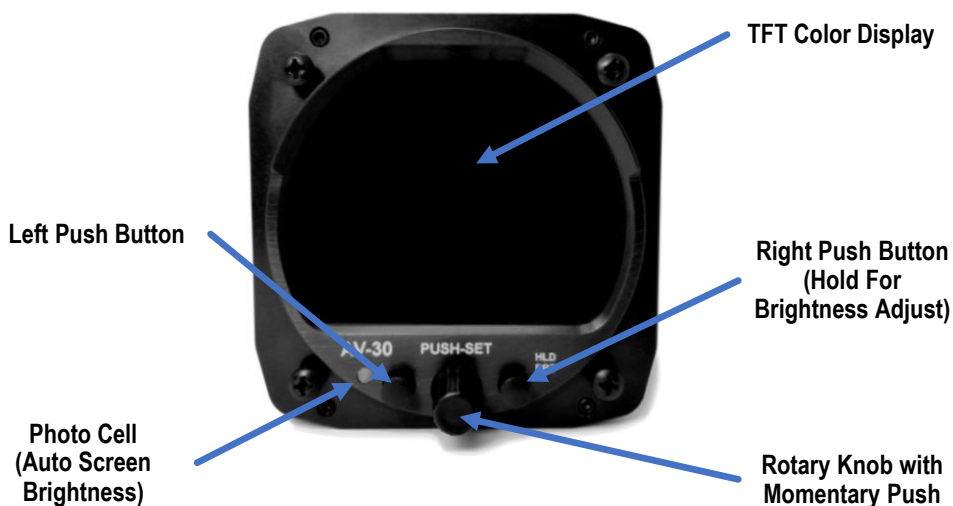
Figure 17 - Common User Interface Components

12.2 Available Menus

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

- Edit Fields Menu
- Setup Menu
- Install Menu

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 prior to flight.

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 13 - 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 14.

Figure 14 - 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 15 - 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 16 - Setup Done / Exit Option

Table 7 - Installation Menu Setting

Label	Description	Values
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
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
SERIAL 3	MFD page enable	NONE, AVLINK*
AID MODE	AHRS aiding mode	NONE[1], MAG1*, MAG2
VIBE MONITOR	Vibration monitor	Push to view
GYRO CAL	Calibrates aircraft gyros	Perform at installation or software update
MAG CAL	Calibrates internal magnetometer	Perform in-flight calibration after installation – only available for units with 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

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 and 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.
- 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   V-Speeds

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

13.1.5   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.

13.1.6 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 select NONE.

Set to the corresponding input type.

Value	Serial 2 Source
NONE	None available
BEACON X	tailBeaconX is installed
APA MINI	(Future use)

- SERIAL 3

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

Set to corresponding input type

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

13.1.7　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	Magnetometer provides correction data to DG
MAG2	Magnetometer provides correction data to DG and aiding to core AHRS algorithm

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.

Figure 17 - AID Mode Selection
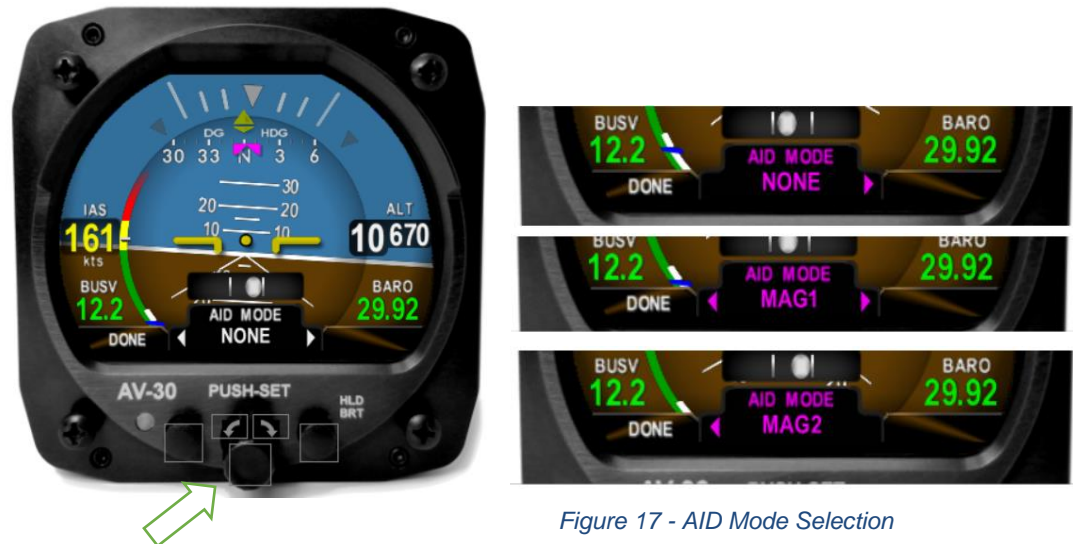
Push the center knob and rotate to select your choice of Magnetometer aiding and then push the center button to confirm your choice.

13.1.8　Demo Mode

Set Demo Mode to DISABLED.

13.2 System Checkout

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 18 - Aligning Annunciator

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

13.2.2   Gyro Calibration

Before using the AV-30 for navigation, please complete the following in AI or DG modes. At least 15 minutes of warmup is required before AV-30 gyro calibration. The AV-30 will display a countdown in seconds until the unit can be calibrated:

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 19 - 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. Confirm by pressing the right button.

Figure 20 - Gyro Calibration Selection

5. "Calibration in progress" will be displayed with a percentage complete.

Figure 21 - Gyro Calibration Procedure

6. AV-30 will indicate "Calibration successfully completed Press DONE".

Push the left button under "DONE" and the calibration will be complete. If an error is shown, repeat the calibration process.

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

13.2.3   Mag Calibration Flight

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

Figure 22 - Mag Calibration Flag and Selection

1. The Mag Cal 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. Once established in flight, select MAG CAL. Note that on units without an internal magnetometer, MAG CAL will be disabled.

Figure 23 - Mag Calibration Selection

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. The AV-30 will retain all calibration unless a hard reset is accomplished.

13.2.4   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.
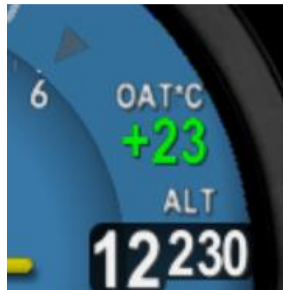

Figure 24 - OAT Indicator

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

13.2.5   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 25 - 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.

14 Troubleshooting

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

Table 11 - 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	Make sure you are running the newest software
	Complete Gyro Cal and Mag Cal (if installed)
Unit flashes "NO MAG" on right side	Complete the Mag Cal flight in section 12.2.3
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 12 - GPS Serial Specification

Parameter Name	Aviation Packet	NMEA Packet
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.
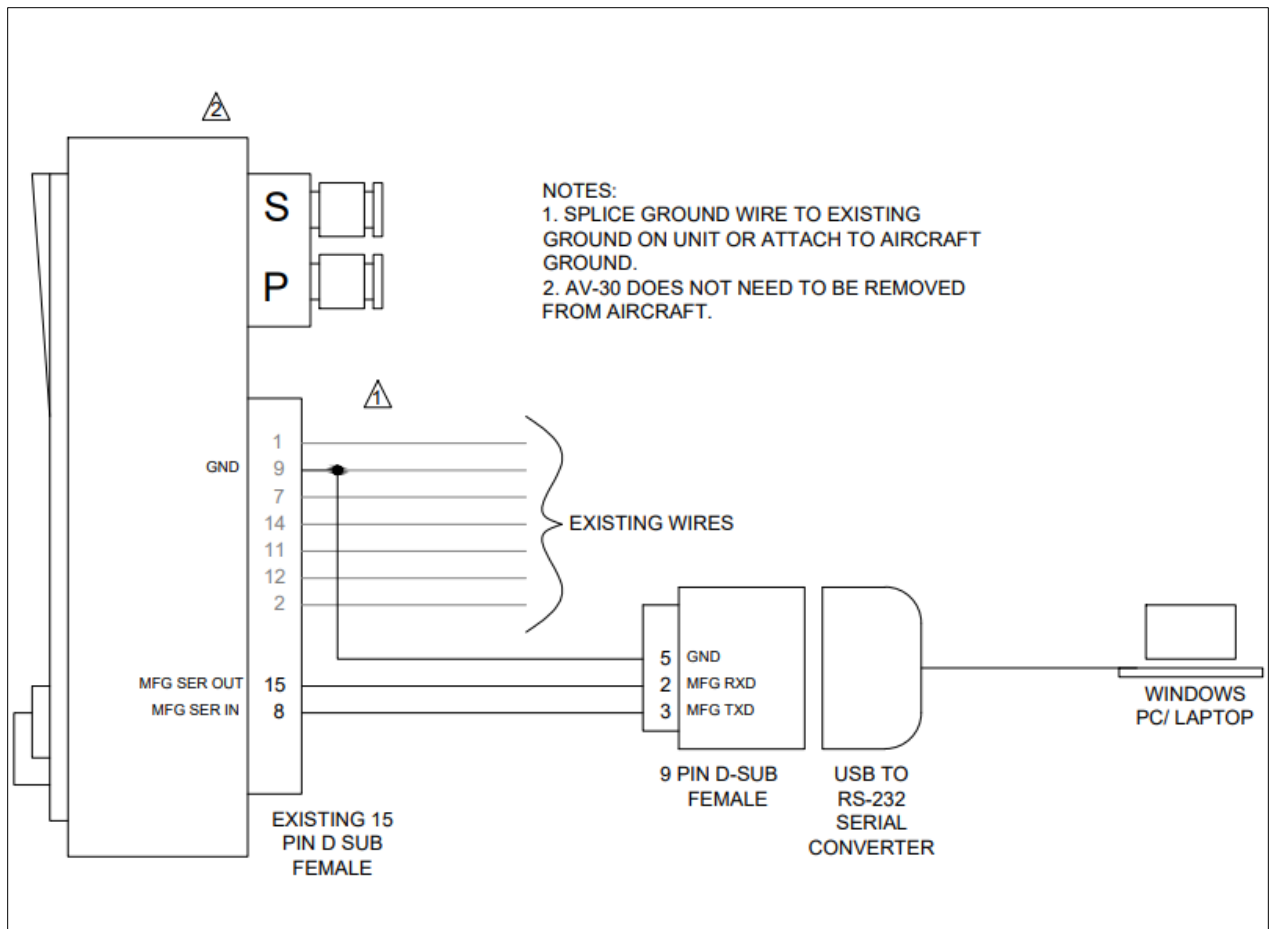

Figure 26 - Field Update Interface Diagram