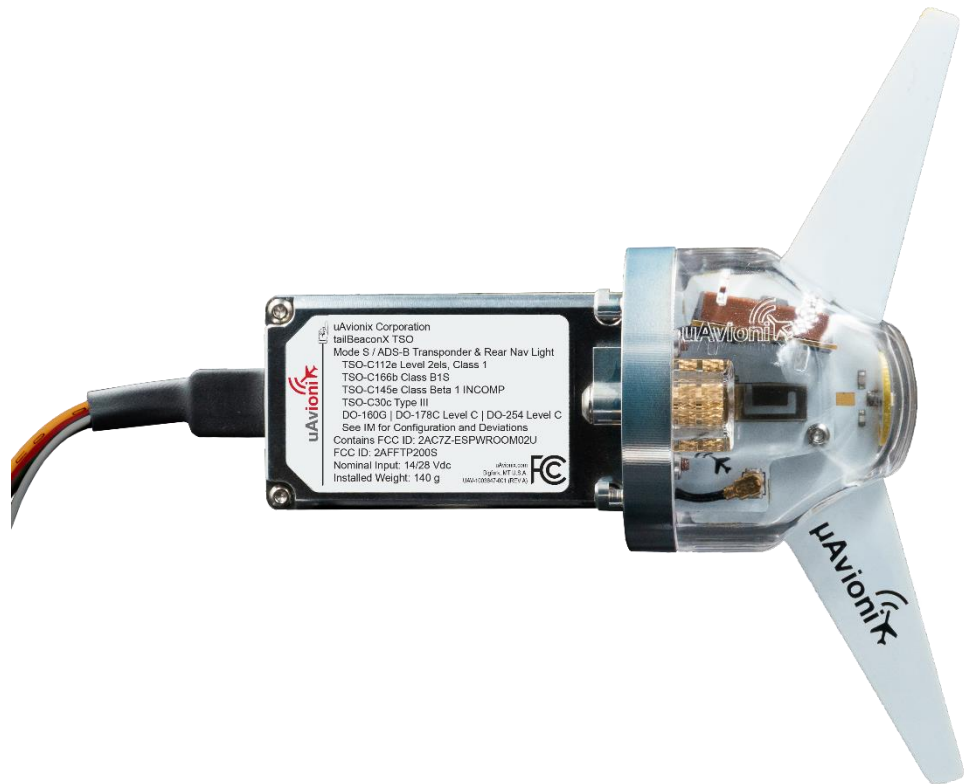




tailBeaconX™ STC

Installation Manual



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Patent uavionix.com/patents

1 Revision History

Revision	Date	Comments
A	2/3/2022	Initial release







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.

-  **DO NOT FORCE ROTATION; tailBeaconX should rotate with little resistance.**
-  **DO NOT connect the tailBeaconX to any high voltage sources. Safe operating voltage range is 14-28 volts DC.**
-  **Ensure that the tailBeaconX is oriented consistent with the installation direction indication on the labels. This ensures the GPS antenna is correctly oriented skyward.**
-  **Refer to the Aircraft Manufacturer's Service Manual to determine if control surface balancing is required and for balancing instructions.**
-  **Never hit, tap on, or flex the fin portions the tailBeaconX assembly. Doing so will cause undue stress and could void your warranty.**
-  **tailBeaconX must be enabled, typically in ALT mode, during all phases of flight including surface movement operations.**

3 Limited Warranty

uAvionix products are warranted to be free from defects in material and workmanship for two years from the installation of tailBeaconX 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.

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5 System Information

5.1 Certification

This installation manual provides mechanical and electrical information necessary to install tailBeaconX. 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 and other related accepted procedures.

Those installing this article on an aircraft listed on the Approved Models List shall verify the compatibility of existing STCs with the tailBeaconX STC prior to returning the aircraft to service.

For installations on non-US registered aircraft, verify validity of the tailBeaconX STC for your Make and Model with relevant authorities or consult the uAvionix tailBeaconX webpage country specific information.

This is an incomplete system intended to provide the functions identified in, and when installed according to this installation manual.

5.2 TSO Authorizations

5.2.1 tailBeaconX

tailBeaconX complies with the following TSOs when properly installed and interfaced with equipment as detailed in this guide.

Function	TSO/RTCA/SAE	Class/Type
Air Traffic Control Radar Beacon System/Mode Select (ATCRBS / Mode S) Airborne Equipment	TSO-C112e RTCA/DO-181E	Level 2els, Class 1 <i>[1]</i>
Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Service – Broadcast (TIS-B) Equipment Operating on the Radio Frequency of 1090 MHz	TSO-C166b RTCA/DO-260B	Class B1S
Airborne Navigation Sensor Using the Global Positioning System (GPS) Augmented by the	TSO-C145e INCOMP RTCA/DO-229E	Beta 1

Satellite Based Augmentation System (SBAS)		
Position Light (White)	TSO-C30c SAE/AS8037	Type III

[1] Anticipating RTCA/DO-181F Level 2 Transponder requirements, tailBeaconX does not support the UM protocol, does not support the Comm-A protocol, and does not have the capability to process and transmit air-initiated Comm-B messages.

5.2.2 tailBeaconX Universal Installation Kit

tailBeaconX Universal Installation Kit complies with TSO-C30c INCOMP when properly installed as detailed in this guide.

5.3 System Limitations

Installation

This article meets the **minimum** performance and quality control standards required by a technical standard order (TSO) and when installed on aircraft approved on the AML can be approved for return to service after installation. If you are installing this article on or in a specific type or class of aircraft, not listed on the AML you must obtain separate approval for installation.

SatCom

The tailBeaconX GPS has not been demonstrated as compatible with SatCom equipment and should not be installed on SatCom equipped aircraft.

TCAS/ACAS System

tailBeaconX does not support installation on aircraft with an active Airborne Collision Avoidance System (ACAS) with Resolution Advisory capability, such as TCAS II or ACAS X.

AV-30-C tailBeaconX STC

Installation of a uAvionix AV-30-C by FAA STC SA00410BO is a prerequisite for this tailBeaconX STC. tailBeaconX is not operable without an installed AV-30-C. See appropriate AV-30-C STC Installation Manual (UAV-1003947-001) for AV-30-C installation instructions.

6 System Specifications

6.1 Wi-Fi

Wi-Fi is intended only for on-ground configuration. **Wi-Fi is only enabled in standby (STBY) mode** and disabled when in ALT or ON mode.

To restore Wi-Fi functionality after flight, the device must be set back to STBY mode.

6.2 Call Sign

Your call sign may be adjusted on the ground using the skyBeacon Installer app, or at any time by use of an appropriately featured control head. This allows your call sign to be configured to correspond with ATC communications and flight plans, for use during commercial, medical, or volunteer flight operations. When changing the call sign using skyBeacon Installer smartphone app, ensure no other installation parameters are adjusted. For typical operations, the call sign should be set to the entire aircraft registration text. For example, U.S. registered aircraft must include the leading “N”.

6.3 Suppression Input

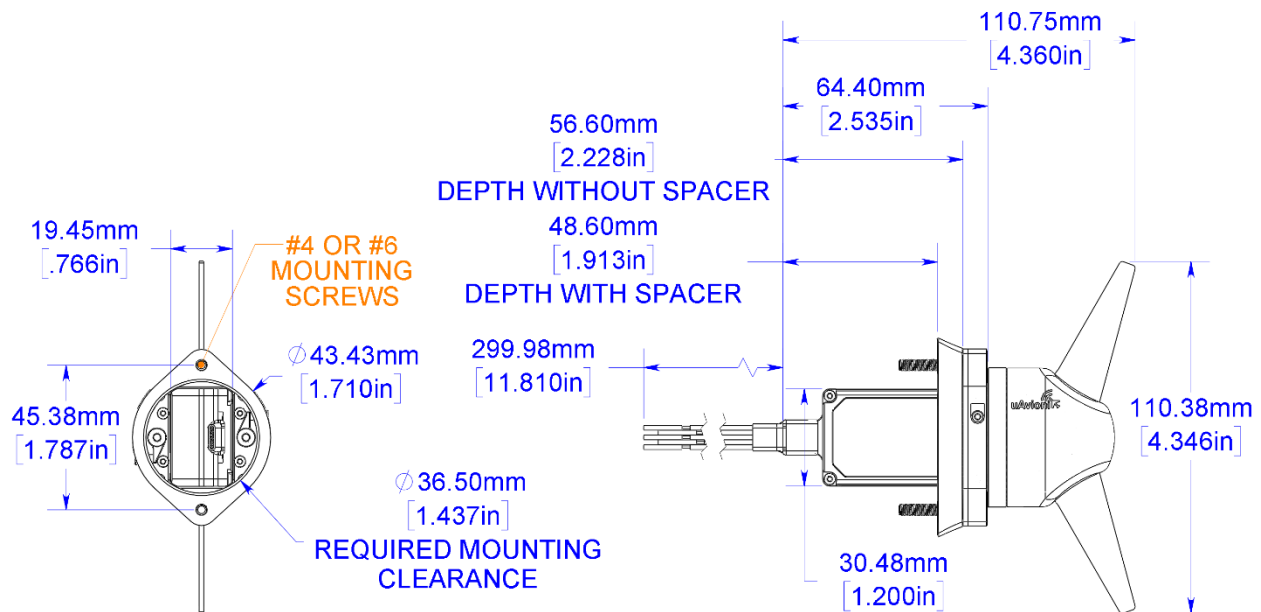
The external suppression input can be connected to the suppression output of other L-band equipment, such as DME. Driven high, tailBeaconX will suppress transmissions. The suppression input must be driven to an input voltage of at least 10 VDC. **The input must be connected to ground when not in use.**

Note: See Appendix B for external suppression unit connections

6.4 Physical Specifications

Characteristics	Specifications
Width	43.43mm
Height	110.38mm
Depth	110.75mm
Weight	3.24 oz (92 grams)
Operating temperature range	-45°C to +70°C
Maximum pressure altitude	35,000ft
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



Note: Shown with Universal Installation Kit UAV-1003793-001, including spacer

6.5 Wired Control Interface Specifications

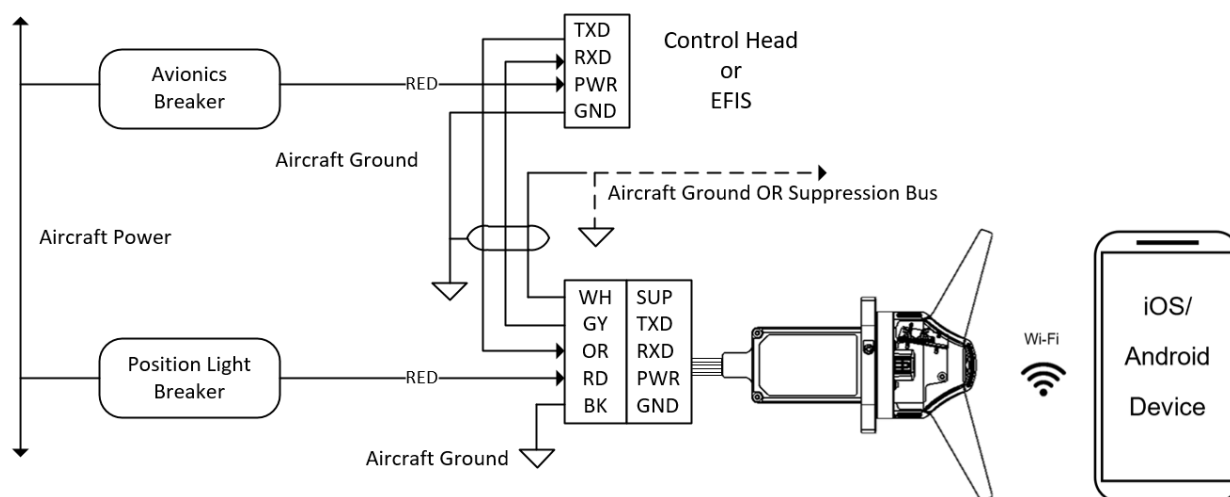
Characteristics	Specifications
Physical	RS-232
Rate and properties	2400 bps 8N1
Protocols	UCP and UCP-HD
Suppression Input	10 VDC minimum

For more control interface details, see Appendix A.

6.6 Wireless Configuration Interface Specifications

Characteristics	Specifications
Standard	802.11b/g/n Wi-Fi Access Point
Security	WPA2-PSK with unique key
SSID	Beacon-XXXX where XXXX is a hexadecimal 16-bit unique identifier
Frequency	2412 MHz (Channel 1)
Maximum clients	4
Protocol	UCP

6.6.1 System Interfaces



WARNING: Do not connect the power wire to a Xenon strobe power pack. This can damage the device and voids the warranty.

7 Installation

7.1 Unpacking and Inspecting

Carefully unpack the device and make a visual inspection of the unit for evidence of any damage incurred during shipment. If the unit is damaged, notify the shipping company to file a claim for the damage. To justify your claim, save the original shipping container and all packing materials.

7.2 Authorized Part Numbers

tailBeaconX

Item	P/N
tailBeaconX Hardware	UAV-1003648-001
tailBeaconX Software	UAV-1002393-004

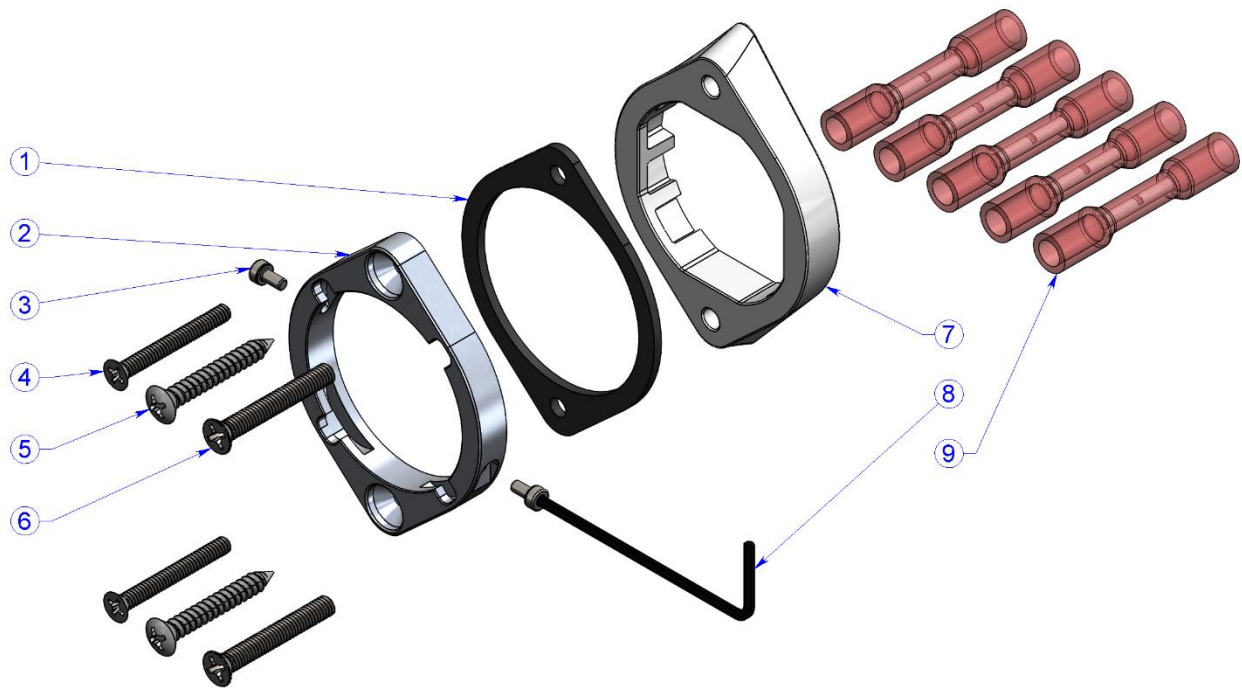
tailBeaconX TSO Installation Kits

Item	P/N
tailBeaconX Universal Installation Kit	UAV-1003793-001

7.2.1 tailBeaconX Universal Installation Kit UAV-1003793-001

The tailBeaconX Universal Installation Kit consists of the following parts:

#	Item	P/N
1	Mounting Gasket, tailBeacon	UAV-1001756-001
2	Mounting Plate, tailBeaconX	UAV-1003125-001
3	Socket Head Cap Screw, M2 x 4, VT (2)	UAV-1002820-003
4	Flat Head Phillips Screw, 4-40 x 1in (2)	UAV-1002184-001
6	Dome Head Phillips Screw, #6 Coarse Thread (2)	UAV-1003792-001
5	Flat Head Phillips Screw, 6-32 x 1in (2)	UAV-1003563-001
7	tailBeaconX Spacer	UAV-1003562-001
8	Hex L Wrench, 1.5mm	UAV-1002817-001
9	Wire Splice (5)	UAV-1001487-001



7.3 Installation Materials and Tools

In addition to the available installation kit(s), tailBeaconX may require standard aviation parts for installation. Parts may include:

- Wire (MIL-W-22759/16)
- Shielded wire (1 and/or 2 conductor) (MIL-C-27500)
- Circuit breakers (1A) (pull-type)
- Environmental splices
- Ring terminals for grounding
- Thread locking compound (keep away from lenses and antennas of tailBeaconX). We recommend Loctite® 242 or 243 which works well with stainless steel hardware.
- Solder Sleeves (M83519/2-X)
- Raychem (D-436)

Minimally, tailBeaconX installation requires access to the following tools:

- Phillips screwdriver
- 1.5mm hex driver (included)
- Appropriate crimping tool(s)
 - AFM8 Daniels crimpers (or similar)
 - K13-1 density pin positioner
 - M22520/37-01 (or equivalent)
 - M81969/1-02 (removal tool)

7.4 Additional Required Equipment

tailBeaconX is a “remote” transponder; to function it requires connection to a compatible control head. The following table details what functions are provided directly by tailBeaconX.

Transponder	ADS-B Transmitter	GPS Receiver	Transponder Antenna	GPS Antenna	Control Head w/ Annunciation	Altitude Encoder	Rear Position Light
X	X	X	X	X			X

For the described installation configuration, the uAvionix AV-30-C provides control, display, annunciation, and pressure altitude information.

7.5 Mounting

tailBeaconX is a rear, aft position light. Ensure that when mounted, the fin antennas and the top of the assembly are free from obstructions such as the rudder or vertical stabilizer. tailBeaconX requires a clear view of the sky for optimal GPS performance. It may not be suitable for installation on aircraft where aircraft elevators or other structures would block visibility to the sky. Control surfaces must move freely through their entire range without interference.

! tailBeaconX is NOT designed to replace an existing rotating anti-collision beacon.

Determine if tailBeaconX will be mounted to a fixed surface or a moving control surface. **If installed on a moving control surface, specific attention must be paid to proper balance. Refer to the Aircraft Manufacturer's Service Manual to determine if balancing is required and for balancing instructions.**

7.5.1 Direct Mounting

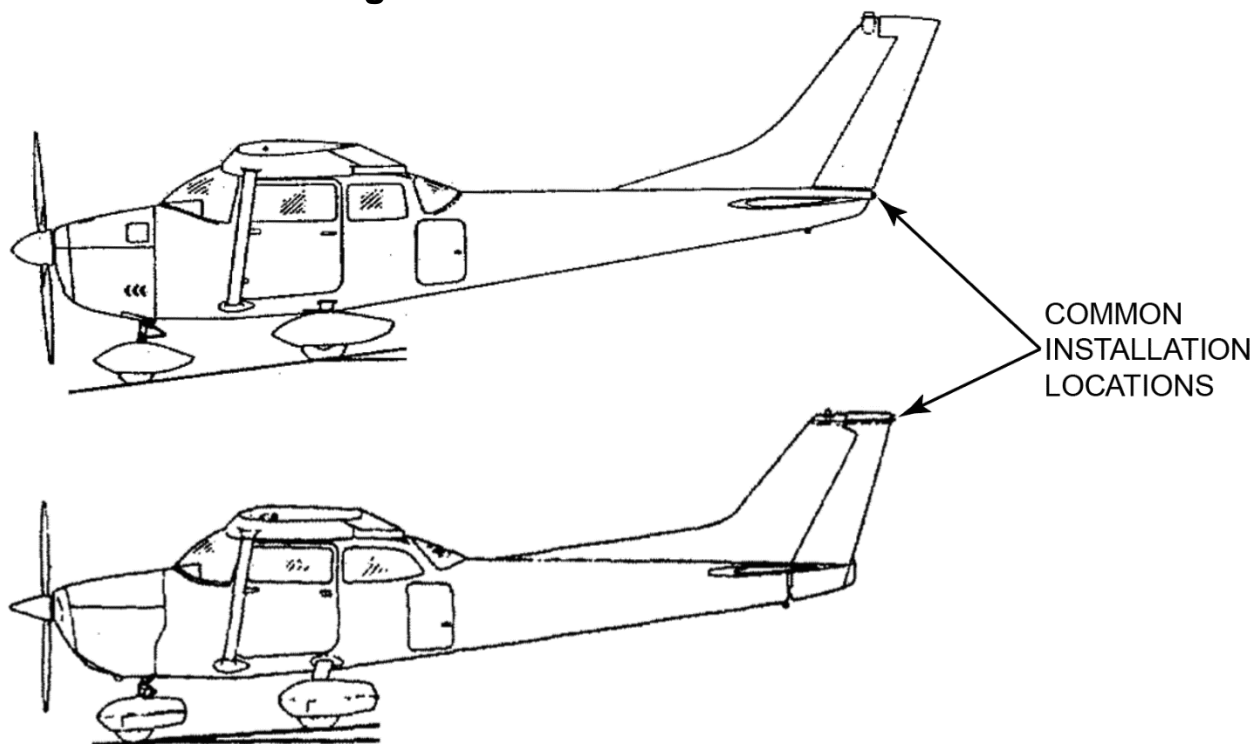
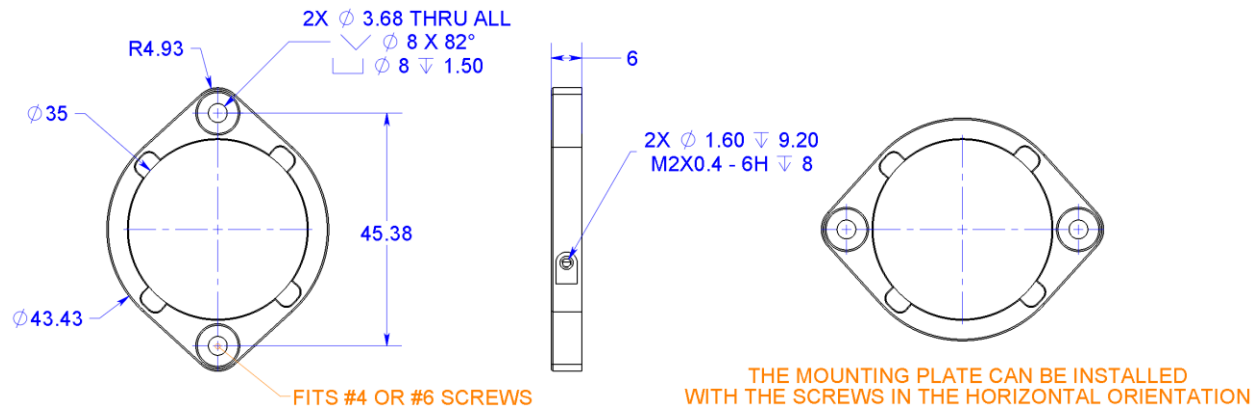


Figure 1: Generic representation of direct mounting

7.5.1.1 Direct Mounting Dimensions

Direct mounting plate UAV-1003125-001 shown.



7.5.1.2 Direct Mounting Procedure

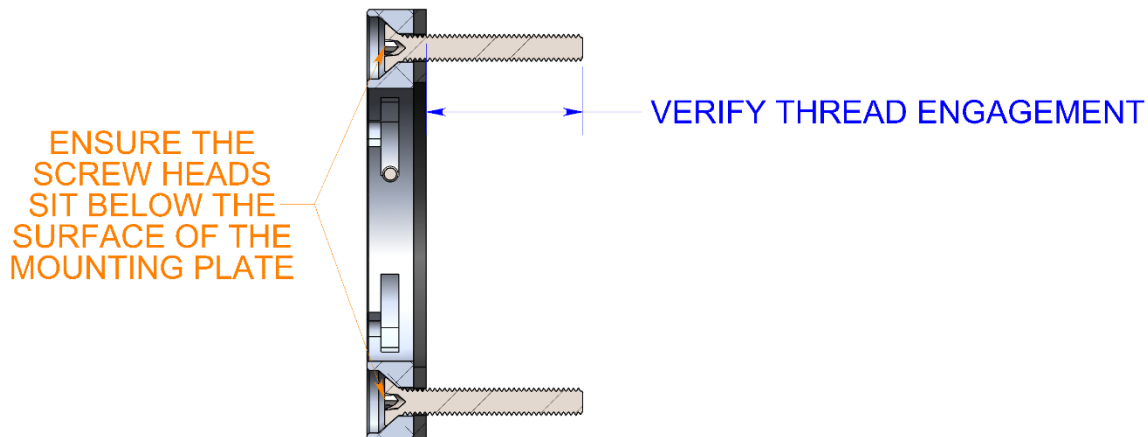
The mounting plate utilizes either the included #4-40 or #6-32 mounting hardware. The mounting plate can be installed with the screw pattern oriented either vertically or horizontally as shown above. Determine the orientation of the existing aft position light mounting hardware, and install the mounting plate accordingly.



1. Remove the existing aft position light.
2. Detach the power wire(s) and protect them from damage.
3. Ensure the thru-hole in the tail cone or rudder is at least 36.5mm in diameter and allows straight passage of the tailBeaconX main body.

Trimming the thru-hole maybe necessary for proper clearance and fitment.

4. Peel the backing from the Mounting Gasket and affix to the Mounting Plate.
5. Temporarily align the Mounting Plate to the opening, and ensure the depth of the cavity is sufficient to fully contain the tailBeaconX body. If not, follow the Spacer Mounting installation procedure in Section 7.5.2.
6. Install the Mounting Plate, in the appropriate orientation for your aircraft, using either the supplied #4 or #6 hardware, or as defined below.
 - a. If the included hardware does not match the thread type of your aircraft, it is acceptable to use standard aviation hardware compatible with the thread types required, only if when installed, the screw heads do not protrude from the surface of the mounting plate as shown below.



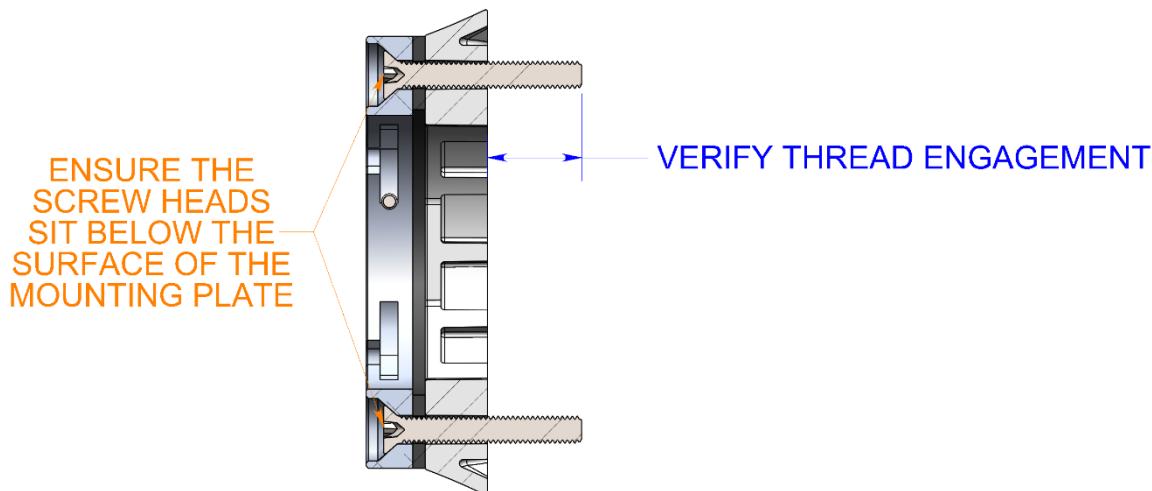
Note: Installation of the tailBeaconX must be in accordance with AC 43.13-2B, Chapter 1.

7.5.2 Spacer Mounting

Aircraft with an installation cavity shallower than required to mount using the Direct Mounting method, or with other mounting interference issues, may use the spacer included with Installation Kit (UAV-1003793-001).

Follow instructions in Section 7.5.1, but additionally install the optional spacer between the aircraft surface and Mounting Gasket. Ensure proper

engagement of the mounting hardware, considering the additional spacer thickness.



Note: Installation of the tailBeaconX must be in accordance with AC 43.13-2B, Chapter 1 and aircraft maintenance manuals.

7.6 Wiring

In most cases, tailBeaconX will require less electrical power than the legacy light it is replacing. However, a load analysis must be conducted based on the Section 6.4 power requirements to ensure adequate overcurrent protection and power supply availability.

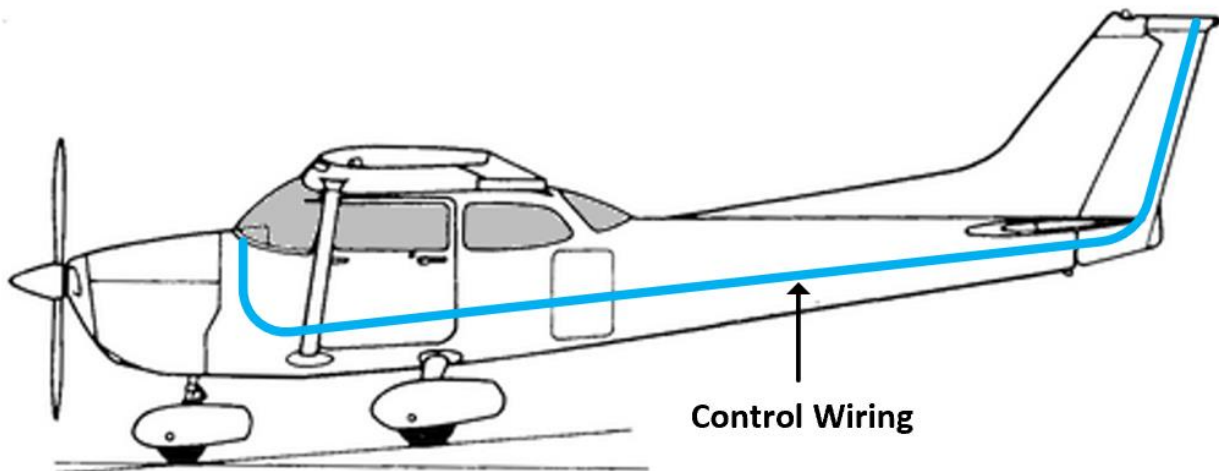
tailBeaconX requires connections to power, ground, an RS-232 control interface and optional suppression input.

Color	Type	Function
Red	Power	Aircraft Power (14-28 Vdc)
Black	Power	Aircraft Ground
Grey	Output	RS-232 Transmit (to control head)
Orange	Input	RS-232 Receive (from control head)
White	Input	Suppression Input (as required)

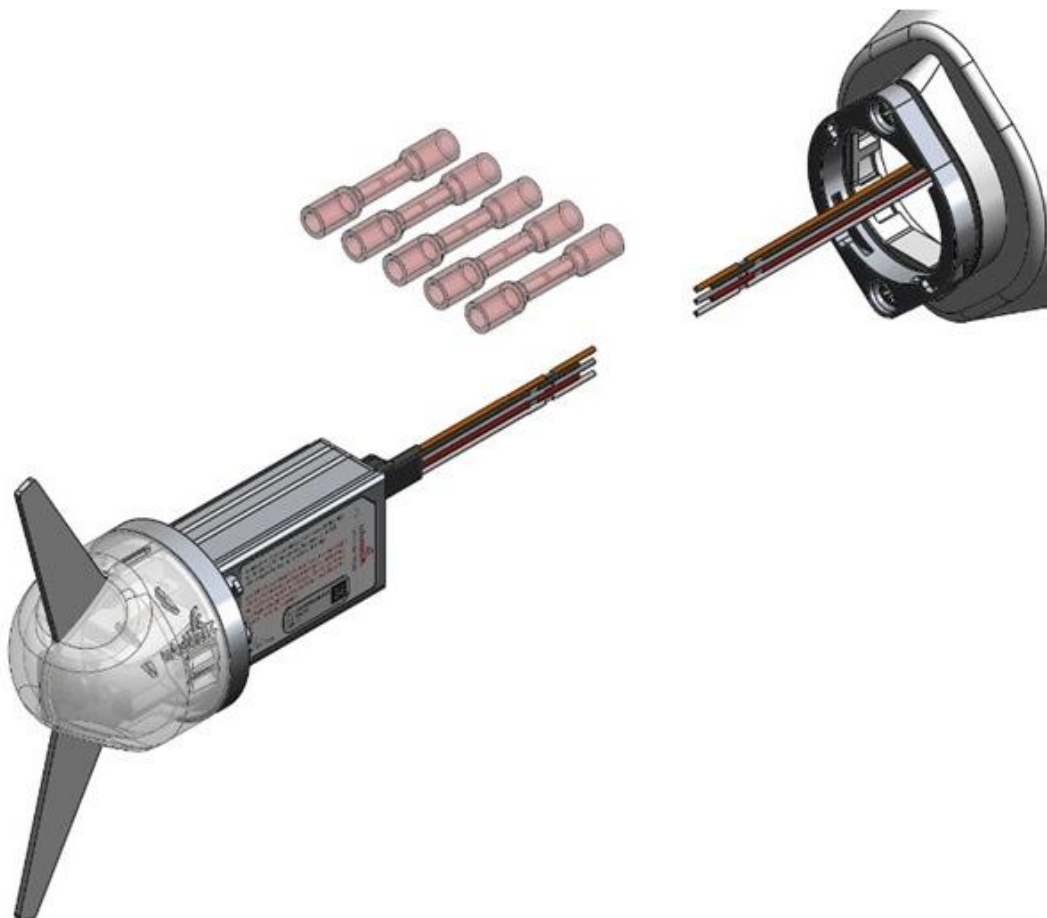
tailBeaconX is designed to use existing position light power wiring, but it is highly recommended to run new wire from tailBeaconX to power and ground. See AC 43.13-1B Chapter 11 for guidance. The wiring should present an impedance of less than 0.5ohm. The following table provides guidance for typical aircraft hook-up wire.

Gauge	ohm/km	Maximum Length for 0.5ohm
20 AWG	35	14.2m
22 AWG	64	7.8m

1. Prepare the aircraft wiring for connection.
 - a. Install a shielded 24AWG twisted pair cable from the cockpit to the tailBeaconX installation location. This cable is used for interface control (data). Installations requiring suppression input should install a separate single shielded wire. Installations not requiring suppression input require only 4 total conductors to provide power, ground, serial receive, and serial transmit (control).



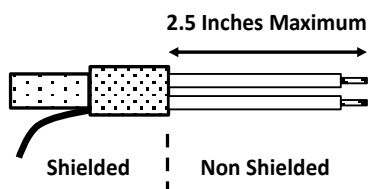
- b. Install a ground wire from the aircraft airframe or battery ground. Prepare bonded surfaces for best contact. Resistance of connection to ground should be less than 0.003 ohms. (AC43.13-2B chapter 11)



NOTE: Wires shown trimmed to an appropriate length

2. Connect the tailBeaconX red wire to the switched position light power wire using environmental splices or equivalent.
3. Connect the tailBeaconX black wire to the battery or airframe ground.
4. Connect the tailBeaconX orange and grey wires to the 2 twisted pair conductors connected to the control head or equivalent equipment. See Section 7.6.1 for details.

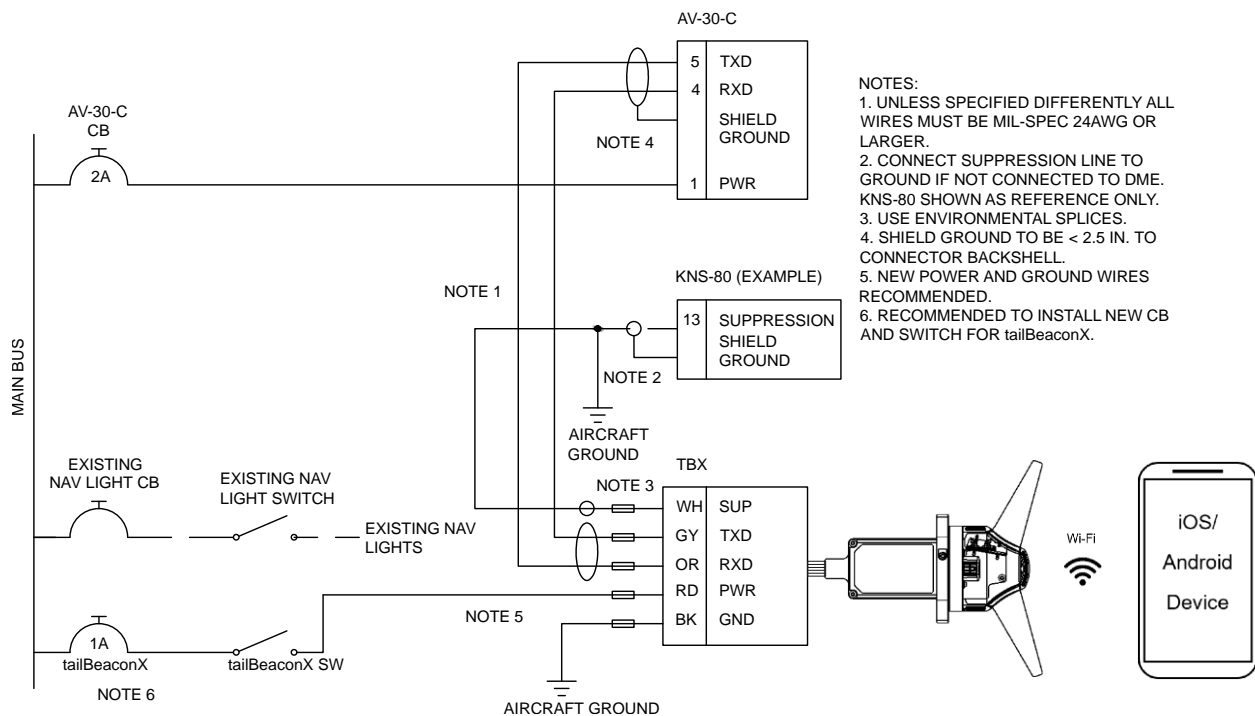
The exposed (non-shielded) portions of the interface conductors AND ground drains are to remain less than 2.5 inches. Shield should be grounded at control head only.



5. Where required, connect the tailBeaconX white wire to the twisted pair conductor connected to the aircraft suppression bus. tailBeaconX implements suppression input only. **If not used, connect the white wire to aircraft ground.**
6. Connect the twisted pair shield to the local airframe ground at the control head.
7. Ensure the twisted pair conductors are terminated to the control head and terminate the suppression to DME unit or to ground.
8. Route new wires away from coax, strobe wires, and other existing wires that might interfere. Secure wires so they do not touch or rub control surfaces or pulleys.

7.6.1 uAvionix AV-30-C Wiring

Connect the RS-232 transmit and receive wires from the tailBeaconX to the AV-30-C, as shown below.

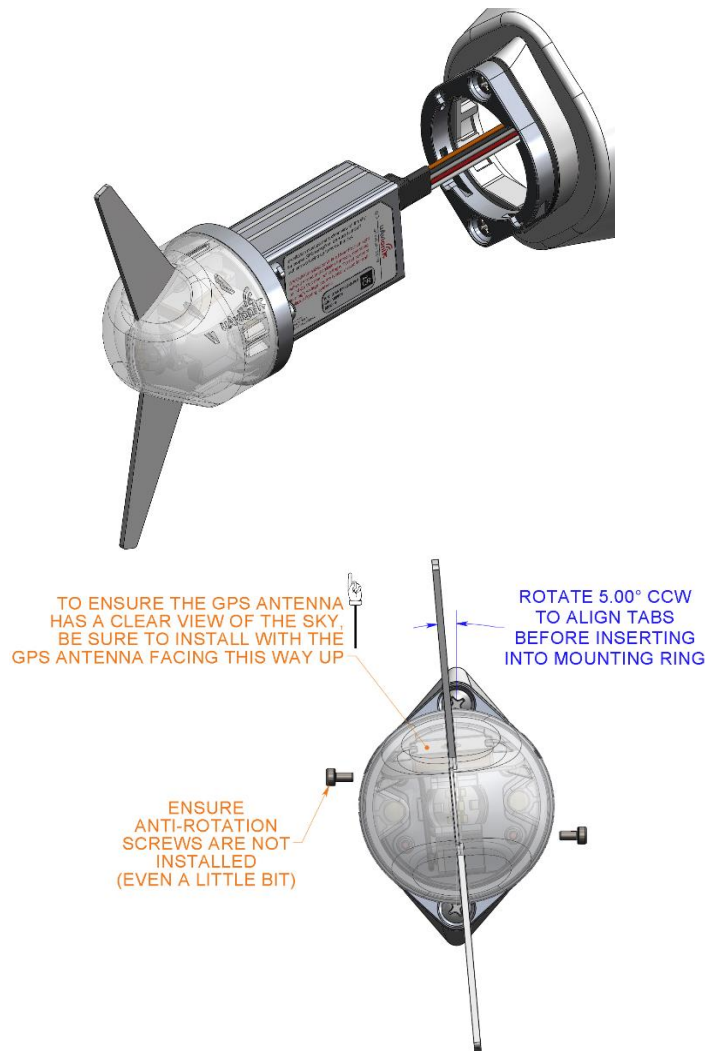


7.7 Unit Installation

The tailBeaconX unit must be electrically connected, then installed into the Mounting Plate by aligning the mounting tabs on the tailBeaconX with the cut-outs in the Mounting Plate. This requires you to rotate the unit 5° Counter-Clockwise from vertical before inserting. Once inserted gently, rotate Clockwise to vertical and secure with M2 anti-rotation screws.

! DO NOT FORCE ROTATION; tailBeaconX should rotate with little resistance.

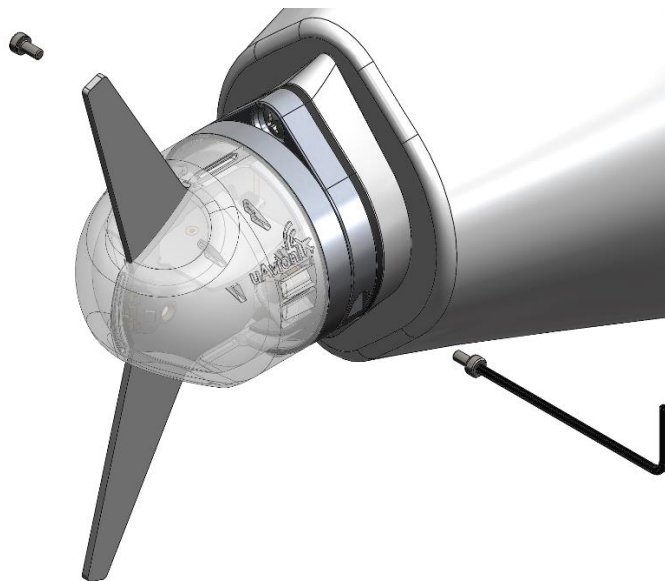
1. Insert tailBeaconX into the Mounting Plate and twist clockwise to the vertical position.





Ensure that the tailBeaconX is oriented consistent with the installation direction indication on the labels. This ensures the GPS antenna is correctly oriented skyward.

2. Secure the tailBeaconX to the Mounting Plate using the two supplied M2 anti-rotation screws and the included 1.5mm hex driver. Ensure threads are fully coated in thread locking compound before installation. Tighten the anti-rotation screws until snug (3-4 in-lb) **DO NOT** overtighten. The head of the screw may have some clearance under it; this is okay if the proper torque is achieved.



3. If tailBeaconX has been installed on a moving control surface, specific attention must be paid to proper balance. **Refer to the Aircraft Manufacturer's Service Manual to determine if balancing is required and for balancing instructions.**

7.8 Post Installation Checks

7.8.1 Ground Tests

Transponder testing can be conducted to verify Mode A/C/S and Extended Squitter operation. See tailBeaconX Instructions for Continued Airworthiness (UAV-1003600-001) for test procedures.

7.8.2 ADS-B Out Performance Test

If the owner desires to further confirm the tailBeaconX was installed and configured properly, perform a flight within ADS-B airspace coverage and request a FAA flight test compliance report.

To perform an ADS-B Out flight check requires flying in airspace where ADS-B coverage exists. In some areas in the country, you may need to be at a higher altitude to ensure coverage. Use of a portable ADS-B In receiver with an EFB (or equivalent) can provide the pilot an indication that the airplane is within ADS-B coverage.

If a dedicated flight is desired, perform a take-off, climb, simple maneuvers (standard rate turns around a point for example), descend and land. **Do not perform any aerobatic maneuvers.** Further guidance for flight test procedures can be found in AC 20-165B.

Upon completion of the flight, request an ADS-B Aircraft Operation Compliance Report (ACR) at the Public ADS-B Performance Report Request Internet site:

<https://adsbperformance.faa.gov/PAPRRequest.aspx>

8 System Configuration

8.1 tailBeaconX Configuration

8.1.1 Verify Software Version

Before configuring the tailBeaconX, verify that the version of software installed on the tailBeaconX matches the software version identified in the table below. To do so:

- Use the “skyBeacon Installer Application” on iOS or Android, and navigate to the “Monitor” tab.

Item / Part	Version	CRC
ADS-B (tailBeaconX Software) UAV-1002393-004	3.3.1	0x560e7a54

8.1.2 Configure Device

Follow instructions provided in the “tailBeaconX TSO User and Installation Guide” (UAV-1004270-001) Section 9 to configure the system and perform post-installation checks.

8.2 AV-30-C Configuration

AV-30-C must be configured for tailBeaconX control. From the AV-30-C “Install” menu, configure “SERIAL 2” to “BEACON X”.



See AV-30-C STC Installation Manual (UAV-1003947-001) for additional details on AV-30-C setup and configuration.

9 Support

For additional questions or support please visit:

<https://www.uavionix.com/support/>

Appendix A AV-30-C Control Head

The AV-30-C is the control interface to the tailBeaconX. Pilot inputs shown below.



A	Configured Callsign
B	Current Squawk Code
C	Transponder Mode (STBY, ON, ALT)
D	GPS NIC (integrity metric)
E	GPS NACp (accuracy metric)
F	Pressure Altitude – Green indicates radar interrogation and will change to IDT if IDENT is active.
G	Communication status (OK, TMOUT)

Mode

STBY The transponder is on but will not reply to any interrogations.

ON The transponder will respond to all interrogations, but altitude reporting is suppressed.

ALT The transponder will respond to all interrogations.

When airborne, the transponder should always be set to ALT unless otherwise directed by Air Traffic Control. When you are taxiing on the ground, the transponder should be set to ALT.

For operating instructions on control of the tailBeaconX via AV-30-C, see AV-30-C Pilot's Guide (UAV-1003946-001) and AV-30-C Flight Manual Supplement (UAV-1004044-001).

Appendix B Suppression Interface

tailBeaconX supports mutual suppression *input* only. tailBeaconX will suppress 1090Mhz Mode A/C/S and Extended Squitter transmissions when the suppression input is above 10VDC to eliminate interference with on-board electronics such as DME and TAS systems.