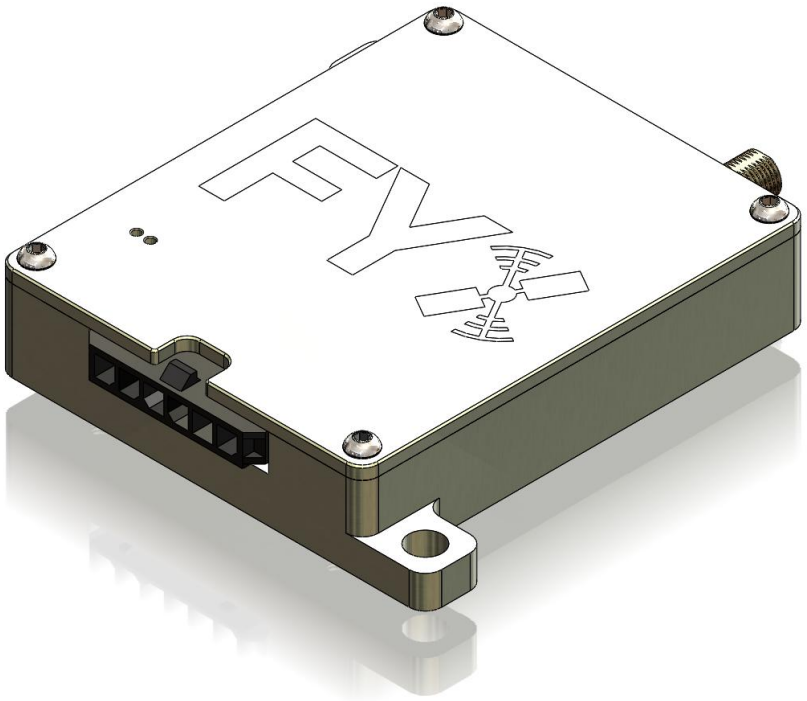
uAvionix

SKYFYX



Installation and Pilot's Guide

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1 Revision History

Revision	Date	Comments
A	4/24/2017	Initial release
B	06/28/2017	Updated mechanical data and images

2 Warnings / Disclaimers

All device operational procedures must be learned on the ground.

Received weather and traffic information is to be used as an aid to situational awareness, and is merely supplemental and advisory in nature.

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

3 Limited Warranty

uAvionix products are warranted to be free from defects in material and workmanship for one year from the of installation in 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, water, fire or flood, 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 warrant service.

Please email or call uAvionix with a description of the problem you are experiencing. Also, please provide the model, serial number (if applicable), 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

SkyFYX combines a high precision WAAS GNSS sensor with an integrated RAIM processor. Resilient against jamming, spoofing and GPS range errors—SkyFYX provides reliable navigation in challenging environments. SkyFYX is the most affordable ADS-B rule-compliant position source companion for the echoUAT ADS-B transceiver.

SkyFYX meets the performance requirements of 14 CFR 91.227.

The system is for use in Experimental and LSA aircraft only.

5.1 Features

- Performs in low sensitivity or high GPS multipath areas.
- Battery backup fast TTFF.
- Directly connects to EchoUAT transceiver.
- Connects to popular EFiS from Dynon, GRT and MGL Avionics.
- UTC timing output for multiple uses including UAT ADS-B medium synchronization.
- Integrated RAIM processor for Security and Integrity Protection.
- Advanced jamming and spoofing detection.
- Uses SBAS corrections and health messages to detect and correct satellite range errors.
- Satellite pseudo-range step errors detected and excluded.
- SBAS fast and long term corrections applied.

5.2 Regulatory Compliance

SkyFYX complies with the ADS-B Final Rule Technical Amendment, dated 2/9/2015, affecting 14 CFR 91.225 (b)(1)(ii) which permits ADS-B. Accordingly, when installed in accordance with the installation instructions of this guide, the device complies with the aircraft requirements of 14 CFR 91.227.

(Per the February 9, 2015 rule change to 14 CFR 91.225 (b)(1)(ii))
(A letter of authorization from the aircraft manufacturer is needed for installation in LSA aircraft)

5.3 Interfaces

SkyFYX has a single MCX antenna connection and a 6-pin Host interface.

Interface	Specification	Protocol
COM1 TX	GPS Position	NMEA 0183 V4.1 + RAIM

5.4 Software and Airborne Electronic Hardware Configuration.

Part	Part Number	Revision
Software	UAV-1001103-001	A
Airborne Electronic Hardware	UAV-1001104-001	A

5.5 Supplied Accessories

Part	Part Number	Revision
skyFXY	UAV-1000969-001	A
Wiring Harness	UAV-1001010-001	
GPS Antenna	UAV-1001106-001	
skyFYX User Manual	UAV-1001102-001	A

6 Technical Specifications

Specification	Characteristics
SIL	3
SDA	2
Power Requirements	11 – 33VDC. Typical 1.5W DO-160G Category Z
Altitude	18,000ft
Operating Temperature	-45°C to +70°C
Humidity	Tested to Category DO-160G Category B2
Weight	36grams
Height	13mm
Length	65mm
Width	61mm
Sensitivity	
Tracking	-166dBm
Reacquisition	-160dBm
Cold Start	-148dBm
Hot Start	-156dBm

7 Equipment Limitations

7.1 Installation

7.1.1 Modifications and Use Outside of Intended Scope

This device has been designed and tested to conform to all applicable standards in the original form and when configured with the components shipped with the device. It is not permissible to modify the device, use the device for any use outside of the intended scope.

7.1.2 Configurable Options

Accessing or altering configurable options not intended to be operated may cause pilot distraction.

7.1.3 Approvals

Approvals do not cover adaptations to the aircraft necessary to accommodate ancillary equipment such as power provisions, mounting devices or external antennas; such items must still be approved under existing minor modification/change processes applicable to the aircraft.

7.2 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.

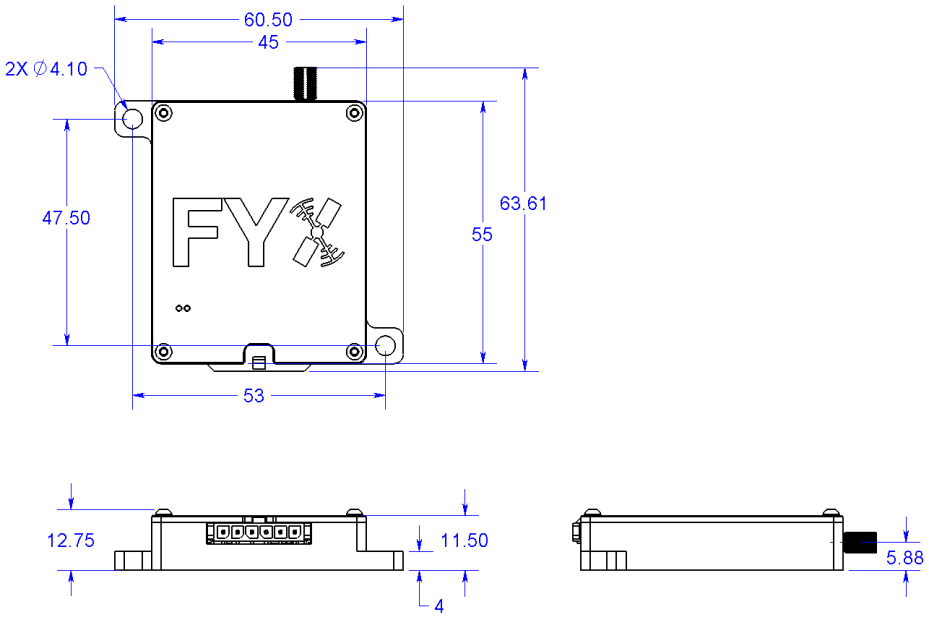
7.3 Mounting

SkyFYX is designed to be mounted in any convenient location in the cockpit, the cabin, or an avionics bay.

The following installation procedure should be followed, remembering to allow adequate space for installation of cables and connectors.

- Select a position in the aircraft that is not too close to any high external heat source. SkyFYX is not a significant heat source itself and does not need to be kept away from other devices for this reason.
- Avoid sharp bends and placing the cables too near to the aircraft control cables.
- Secure the transceiver to the aircraft via the four (4) mounting holes. It should be mounted on a flat surface.

Note: Installation of the SkyFYX must be in accordance with AC43.13-2B, Chapter 1



7.4 Connections

7.5 Connector Pin Assignments

Pin	Type	Physical	Default Config	Default Protocol
1	Ground			
2	Aircraft Power	11-33V		
3	COM1 TX	RS232 Out	115200bps 81N	NMEA
4	NC			
5	NC			
6	NC			
Mating Connector: Molex 0436450600, Pins: 0462350001				

LED	SOLID	FLASHING
RED	Powered	
GREEN	Powered	GPS Locked

7.6 Cooling Requirements

SkyFYX is designed to meet all applicable TSO requirements without forced-air cooling.

Attention should, however, be given to the incorporation of cooling provisions to limit the maximum operating temperature if the SkyFYX is installed in close proximity to other avionics. The reliability of equipment operating in close proximity in an avionics bay can be degraded if adequate cooling is not provided.

7.7 Wiring Considerations

SkyFYX was designed and tested using unshielded, untwisted wiring. There may, however, be technical benefits of improved electromagnetic emissions and susceptibility to and from the transponder system. The use of twisted wire can reduce interference and break-through on adjacent audio wiring if it is not possible to route them separately.

The distance between the SkyFYX and the power source is limited by the impedance of the wire between them. The SkyFYX is powered directly from aircraft power, and, therefore, the acceptable voltage drop in the power line is what limits the distance.

SkyFYX requires an impedance of less than 0.5ohm in the power line for satisfactory operation. The following table provides guidance for a typical aircraft hook-up wire. Note that different brands may vary – please check your supplier for more details.

Gauge	ohm/km	Length for 0.5ohm
20 AWG	35	14.2m
22 AWG	64	7.8m
24 AWG	99	5.0m

An alternative to a harness built from individual wires, particularly for a long cable run, is to use a multi-core cable. Aviation grade cables with 6 or more cores are often more expensive than individual wires, and, therefore, are not generally a good choice. For aircraft where those situations do not apply, an attractive alternative solution may be to use 3 or 4 pair data cable.

Please note that not all data cable is suitable for this application. Cables with solid cores should not be used. Cables should be selected based on the wear characteristics of their insulation material, including temperature rating, resistance to solvents and oils, and flammability. Most inexpensive commercial data cables have poor flammability properties.

Use a 1A circuit breaker between the power source and SkyFYX.

7.8 Antenna Installation

7.8.1 Antenna

The antenna should be installed according to the manufacturer's instructions.

The following considerations should be taken into account when determining an acceptable location for the antenna.

- The antenna should be mounted with a clear view of the sky and in a horizontal position when the aircraft is in level flight.

Electrical connection to the antenna should be protected to avoid loss of efficiency due to exposure to liquids and moisture. All antenna feeders shall be installed in such a way to minimize RF energy radiated inside the aircraft.

7.8.2 Antenna Cable

Excessive loss in the cable and connectors will degrade the receiver sensitivity.

An acceptable cable:

- has less than 1.5dB loss for the run length needed,
- has a characteristic impedance of 50ohms,
- has double braid screens or has foil and braid screen.

When routing the cable:

- Route the cable away from any significant heat sources

- Route the cable wiring away from potential interference sources such as ignition wiring, 400Hz generators, fluorescent lighting and electric motors
- Allow a minimum separation of 300mm from an ADF antenna cable
- Keep the cable run as short as possible
- Avoid routing the cable around tight bends
- Avoid kinking the cable, even temporarily, during installation
- Secure the cable so that it cannot interfere with other systems

8 Environmental Qualification Forms

Nomenclature	SkyFYX WAAS GPS RECEIVER	
Part No:	UAV-1000969-001	
Manufacturer	uAvionix Inc	
Address	380 Portage Ave, Palo Alto, CA 94306	
Conditions	**DO-160G Section**	**Description of Conducted Tests**
Temperature and Altitude	4.0	Equipment tested to Category B2
Low temperature ground survival	4.5.1	-55°C
Low Temperature Short-Time Operating	4.5.1	-45°C
Low Temperature Operating	4.5.2	-45°C
High Temperature Operating	4.5.4	+70°C
High Temperature Short-Time Operating	4.5.3	+70°C
High Temperature Ground Survival	4.5.3	+85°C
Loss of Cooling	4.5.5	Cooling air not required (+70°C operating without cooling)
Altitude	4.6.1	35,000feet
Decompression	4.6.2	Equipment identified as Category B2 – no test
Overpressure	4.6.3	Equipment identified as Category B2 – no test
Temperature Variation	5.0	Equipment tested to Category B2
Humidity	6.0	Equipment tested to Category B2
Operation Shocks	7.2	Equipment tested to Category B
Crash Safety	7.3	Equipment tested to Category B type 5
Vibration	8.0	Aircraft zone 2: type 3, 4, 5 to Category S level M, type 1 (Helicopters) to Category U level G
Explosion	9.0	Equipment identified as Category X – no test
Waterproofness	10.0	Equipment identified as Category X – no test
Fluids Susceptibility	11.0	Equipment identified as Category X – no test
Sand and Dust	12.0	Equipment identified as Category X – no test
Fungus	13.0	Equipment identified as Category X – no test
Salt Spray	14.0	Equipment identified as Category X – no test
Magnetic Field	15.0	Equipment identified as Category Z
Power Input	16.0	Equipment identified as Category ZX
Voltage Spike	17.0	Equipment identified as Category B
AF Conducted Susceptibility	18.0	Equipment identified as Category B
Induced Signal Susceptibility	19.0	Equipment identified as Category AC
RF Susceptibility	20.0	Equipment identified as Category TT
RF Emissions	21.0	Equipment identified as Category B
Lightening Induced Transient Susceptibility	22.0	Equipment identified as Category XXXX – no test
Lightening Direct Effects	23.0	Equipment identified as Category X – no test
Icing	24.0	Equipment identified as Category X – no test
Electrostatic Discharge	25.0	Equipment identified as Category X – no test
Fire, Flammability	26.0	Equipment identified as Category C

Appendix A – Interconnect Diagrams