SANDIA aerospace

STX360 /STX360R

Installation Manual

Information Subject To Export Control Laws

Revision	Date	Description	Approval
1-ER	01/25/17	Initial Release	Gabriel Martinez
2-ER	01/27/17	Updated page 2 menu items	Gabriel Martinez
3-ER	02/02/17	Page 33,42 updates	Gabriel Martinez
4-ER	03/07/17	Warning label added	Gabriel Martinez
5-ER	03/24/17	emmision designator	Gabriel Martinez

Sandia Aerospace Three year limited warranty

"SANDIA Aerospace warrants to the end purchaser of SANDIA Aerospace products, that said products are free from defects in material and workmanship under normal use and service. The manufacturers obligation under this warranty shall be limited to repair, replacement, or exchange of any part or parts, at SANDIA Aerospace's option, which may thus prove defective under normal use and service within three years from the date of installation on aircraft of original purchaser, and which upon examination by the manufacturer, shall disclose to its satisfaction to be thus defective. This warranty is expressly in lieu of all other warranties, expressed or implied including warranties of merchantability and fitness for use, and of all other obligations or liabilities on our part. We neither assume, nor authorize any person to assume for us, any other liability in connection with the sale of SANDIA Aerospace products. This warranty shall not apply to these parts, nor any part thereof, which has been subject to accident, negligence, alteration, abuse, or misuse. We make no warranty whatsoever in respect to any accessories or parts not supplied by SANDIA Aerospace, nor do we make or extend any warranty with respect to improper installation of SANDIA Aerospace products. The term "original purchaser" as used in this warranty, shall be deemed to mean that person for whom the SANDIA Aerospace products were originally installed. This warranty gives you specific legal rights and you may have other rights, which may vary from state to state."

WARNINGS

Radio Frequency Radiation

FCC – RADIO EQUIPMENT WARNING STATEMENT

Under FCC regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by FCC. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the Equivalent Isotropically Radiated Power (EIRP) is not more than that necessary for successful communication.

To comply with Industry Canada RF radiation exposure limits for general population, the antenna(s) used for this transmitter must be installed to provide a minimum separation distance from the user and bystanders as stated below. The detailed RF exposure condition(s) are to be evaluated at the time of licensing. In addition, the antennas of this transmitter must not be collocated with other antennas or transmitters.

HUMAN EXPOSURE TO RADIO FREQUENCY RADIATION (FCC)

WARNING

TO COMPLY WITH THE MAXIMUM PERMISSIBLE EXPOSURE (MPE) LIMITS REFERENCED IN 47 CFR 1.1310 TABLE 1, THE FOLLOWING MINIMUM SAFE OPERATING DISTANCES MUST BE OBSERVED FOR THE GENERAL PUBLIC:

When using a 5.19 dBi (omni antenna) Frequency Range: 978 - 1090 MHz:

Safe distance ≥ 0.49 m

FCC PART 15 COMPLIANCE

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

Table of Contents

Index of Tables

Index of Figures

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1 General Description

1.1 Introduction

This manual describes the installation of the SANDIA aerospace STX360 and STX360R . It is intended for use by FAA certified repair stations to install the STX360 and STX360R radios and includes both mechanical and electrical installation information. Calibration, system configuration and checkout procedures are included. The installer should ensure that all functions are operating according to their intended purpose in their particular installation.

The latest documentation including the latest revision of this installation manual for the STX 360 can be found at www.sandia.aero in addition to other Sandia products. Information in this document is subject to change without notice.

1.2 Terminology

"STX 360" references will apply to the panel mount or remote unit unless specified. Some sections are specific to the remote or panel mount.

1.3 Acronyms

References in is document

AC……..Advisory Circular

ADS-B…….……...Automatic Dependent Surveillance-Broadcast

AIRMET…..……....Airmen's Meteorological Information

ASCII…….…….American Standard Code for Information Interchange

ARINC…….……...Aeronautical Radio Incorporated

ASSAP…….……...Airborne Surveillance and Separation Assurance Processing

ATCRBS…….Air Traffic Control Radar Beacon System

CAN……Controller Area Network

CBIT……...Continuous Built-In-Test

CPU ……Central Processuing Unit

CRC ……Cyclic Redundancy Check

DO……...……Document Order

EEPROM …….Electronically Eraseable Programmable Read Only Memory

EOC…….Executable Object Code

FIS-B……....Flight Information Service – Broadcast

FPGA……Field Programmable Gate Array

GPS……..Global Positioning System

METAR…….Meteorological Aerodrome Report

MSO……...…..Message Start Opportunity

NEXRAD……...Next Generation Weather Radar

NOTAM……Notice to Airmen

NVM……....Non-Volatile Memory

PBIT……...……Power-up Built-In-Test

PIREP……...Pilot Report

RF……...……Radio Frequency

RS……...……Recommended Standard

RTCA……....Radio Technical Commission for Aeronautics

SRD ……....Software Requirements Data

SIGMET……Significant Meteorological Information

SPECI……...Special Weather Report

SYS…….....System Requirements Document

TAF ……....Terminal Aerodrome Forecast

TIS-B……....Traffic Information Service – Broadcast

TSO ……....Technical Standard Order

TTCS……....Time Triggered Cooperative Scheduler

UAT ……..Universal Access Transciever

WAAS……....Wide Area Augmentation System

1.4 Scope

This installation manual covers equipment for the STC and is shown in Table 1. All equipment interfaced with the STX 360 must be installed in accordance with the manufacturers data. Equipment interfacing with the STX 360 in this manual are determined to be compatible.

Equipment covered by STC	Equipment not covered by STC
SANDIA STX 360	Transponder/ UAT Antenna
SANDIA STX 360R	GPS Antenna
WAAS GPS position sources as shown in Table 6	
Altitude Encoders as shown in Table 7	
Installation kit, mechanical and Electrical – section 3.2.1.1	

Table 1: Equipment under STC

1.5 STX 360 / STX 360R Product Description

The STX 360 is a self-contained, tray mounted ADSB dual mode radio that utilizes a Mode C transponder and UAT IN and OUT. The SANDIA STX 360 accepts position data from WAAS GPS position source such as the FREEFLIGHT WAAS/GPS 1201, the GARMIN 430W, 530W.

SANDIA STX 360 will accept a WAAS position source that has RS 232 or RS 422 interface.

SANDIA STX 360 accepts altitude data from altitude encoders:

- Air-Data (RS-232)
  - Icarus Format
  - Garmin G Format
    - SANDIA SAE 5-35 [Blind Encoder]
    - SANDIA SAC 7-35 [Air Data Computer]
    - SANDIA SAI 340 [Altitude Indicator]
- Air-Data (ARINC-429)

The STX 360R is a remote version that is also a self-contained ADSB dual mode radio that utilizes a MODE C transponder and UAT IN and OUT. The SANDIA STX 360R accepts attitude data from altitude encoders, such as the SANDIA SAE5-35, in either Gilham Grey code or RS 232 format. The SANDIA STX 360R accepts position data from WAAS GPS position source such as the FREEEFLIGHT WAAS/GPS 1201, the GARMIN 430 W and 530W.

SANDIA STX 360 will accept a WAAS position source that has RS 232 or RS 422 interface.

Both units reply to ATCRBS interrogations with one of 4096 possible ‘squawk’ codes and an “anonymous mode” when flying in VFR mode when enabled.

1.5.1 System Functions Panel Mount

The STX 360 panel mount unit performs the following functions:

- UAT ADS-B In and Out [XMT power 30W nom, RCV sensitivity -93dBm]
- Built in Mode C transponder [XMT power 200W nom, RCV sensitivity -74dBm]
- Built in Diplexer [single antenna installation]
- Display of traffic
- Display of METARs
- Single Entry for squawk code
- Built in Ethernet
- USB power - +5VDC @ 500mA max
- Automatic and Manual Brightness Control
- Display of aircraft power
- Selectable anonymous mode in VFR
- Built in emergency squawk codes
- Pass-thru TIS-B, FIS-B, ADS-B state and vector messages
- Tray Mounted

1.5.2 System Functions Remote Mount

- UAT ADS-B In and Out [XMT power 30W nom, RCV sensitivity -93dBm]
- Built in Mode C transponder [XMT power 53.4dBm, RCV sensitivity -74dBm]
- Built in Diplexer [single antenna installation]
- SMA connector
- Built in Ethernet
- USB power - +5VDC @ 500mA max
- Pass-thru TIS-B, FIS-B, ADS-B state and vector messages
- Anonymous mode in VFR
- Built in emergency squawk codes

1.5.3 Unit Outer Dimensions

1.5.3.1 STX 360 Panel Mount

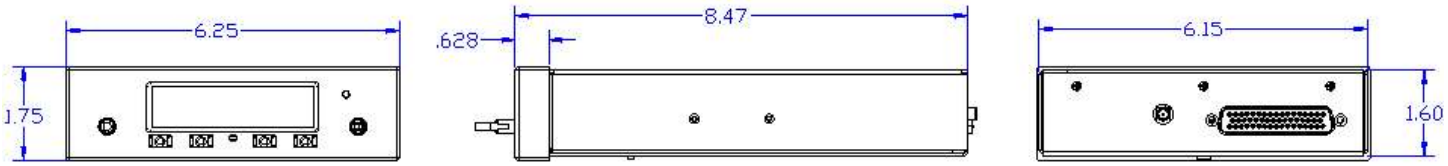

Figure 1: Physical dimensions of STX 360 panel mount

1.5.3.2 STX 360R Remote

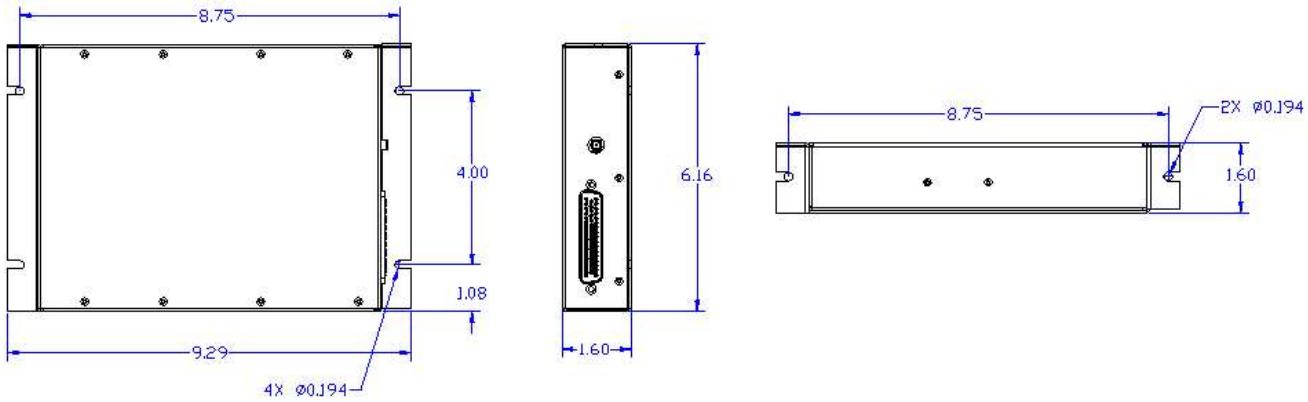

Figure 2: Physical dimensions of STX 360R remote

1.6 Specifications

1.6.1 Physical Characteristics

1.6.1.1 STX 360 Panel Mount

Mounting……..Refer to Figure 1: Physical dimensions of STX 360 panel mount

Bezel Dimensions ……...1.75” H x 6.25”W x .628” L

Behind Panel Dimensions……1.6” H x 6.15”W x 7.84” L

Weight…….. 2.25 Lbs. (1.020kg)

Viewing Angle……..> 160°

Operating Temp……-40°C to +55°C

Power Input……..11-32 VDC

Current…….0.9A@11VDC and 0.32A@32VDC

1.2.1.1 STX 360R Remote Mount Unit

Overall Dimensions…….1.6”H x 6.16W x 9.29” L

Weight…….. 2.25 Lbs. (1.020kg)

Operating Temp……-40°C to +55°C

Power Input……..11-32 VDC

Current……..0.9A@11VDC and 0.32A@32VDC

1.2.2 Performance Characteristics – STX 360 and STX 360R

1.3.2.1 MODE C Transponder

Power Out…….200Watts Nominal

Transmitter Frequency……..1090 MHz

Receiver Frequency……..1030 MHz

Receiver Sensitivity…….-74dBm Nominal at 90% reply rate

Modulation……Pulse Position – 15 long with each pulse 0.45uSec long with 0.1uSec maximum rise time and 0.2 uSec fall time. The 15 pulses are 12 information pulses spaced 1.45uSec between two framing pulses 20.3uSec apart.

Emission Designator……..14M0M1D

1.3.2.2 Universal Access Transceiver

Power Out…….40 Watts Maximum

Transmitter Frequency……..978 MHz

Receiver Frequency……..978 MHz

Receiver Sensitivity…….-93dBm Nominal at 90% reply rate

Tolerance……....+/- 20ppm

Data Rate……....1.04167 Mbps

Modulation…….2FSK

Emission Designator……1M30F1D

1.2.3 Operational Characterisics

1.2.3.1 STX 360 Panel Mount

Operational Voltage: 11 – 32Vdc

Current: All current readings are performed in Normal operation (UAT and Mode C):

Aircraft Power	PRF	Squawk Code	Watts	Current
14Vdc	500	7777	16	1.14
14Vdc	500	1200	10	.73

Aircraft Power	PRF	Squawk Code	Watts	Current
28Vdc	500	7777	16	.55
28Vdc	500	1200	10	.36

Altitude: -1000 ft to 18,000 ft

1.2.3.2 STX 360R Remote Unit

Operational Voltage: 11 – 32Vdc

Current: All current readings are performed in Normal operation (UAT and Mode C):

Aircraft Power	PRF	Squawk Code	Watts	Current
14Vdc	500	7777	16	1.14
14Vdc	500	1200	10	.73

Aircraft Power	PRF	Squawk Code	Watts	Current
28Vdc	500	7777	16	.55
28Vdc	500	1200	10	.36

Operating Temp: -20 deg C to +55 degC

Altitude: -1000 ft to 18,000 ft

1.2.4 Certification

Transponder……..TSO-C74d - Class A

ADS-B (UAT)..……TSO-C154c - Class A1S

ADS-B (FIS-B)……TSO-C157b - Class 1

ADS-B (TIS-B)..……...TSO-C195a - Class C1

Software……DO-178B Level C

Environmental……...DO-160G (See qualification table)

STX 360 (A1C1)X]CAB(SM)XXXXXZBAB[BC][TT]M[A3B2]XXXX

STX 360R (A1C1)X]CAB(SM)XXXXXZBAB[BC][TT]M[A3B2]XXXX

FCC ID……..YJL-DAGEDX

"The conditions and test required for TSO approval of this article are minimum performance standards. It is the responsibility of those desiring to install the article either on or within a specific type or class of aircraft to demonstrate that the aircraft installation conditions are within the TSO standards. The article may be installed only if installation of the article is approved by the Administrator."

Environmental Qualification Form for the STX 360 Sentinel

NOMENCLATURE: STX 360, Airbourne ADSB Equipment

TYPE/MODEL/PART No: STX 360 / 306XXX- [XX] & Electrical Install Kit P/N 306XXX

TSO NUMBER: C74d (transponder)

C154c (ADSB) - Class A1S

C157b (FIS-B) - Class 1

C195a (ADSB) – Class C1

MANUFACTURE'S SPECIFICATION AND/OR OTHER APPLICABLE SPECIFICATION:

STX 360 INSTALL MANUAL, P/N 306467-00

QUALIFICATION TEST PLAN, STX 360 SENTINEL ADSB P/N 901XXX-QTP

MANUFACTURER: SANDIA AEROSPACE

ADDRESS: 3700 OSUNA RD NE, SUITE 711, ALBUQUERQUE, NM 87109

REVISION & CHANGE NUMBER OF DO-160: REV G DATED December 2010

DATE OF TESTS: 2016 STX 360 panel mount Environmental categories

Test Description	**DO-160G SEC-TION**	**Conditions and Notes**
Ground Survival and Operating Low Temperature	4.5.1 & 4.5.2	Category A1D1
Ground Survival and Operating High Temperature	4.5.3 & 4.5.4	Category A1D1
Altitude	4.6.1	Category A1D1
Decompression	4.6.2	Category A1D1
Overpressure	4.6.3	Category A1D1
Temperature Variation	5	Category B
Humidity	6.3	Category A
Operational Shock and Crash Safety	7	Category B
Sustained Crash Safety	7.3.3	Test Type 5
Vibration-standard	8.2.1.1	Category S – Curve B and M
Explosion	9	N/A
Waterproof	10	N/A
Fluid Susceptibility	11	N/A

Sand and Dust	12	N/A
Fungus	13	N/A
Salt Spray	14	N/A
Magnetic Effect	15.3	Category Z
Power Input – Normal Operating Conditions	16.6.1.1	Category A
Power Input – Momentary Power Interruptions	16.6.1.3	Category A
Power Input – Normal Surge	16.6.1.4	Category A
Power Input – Engine Start Under Voltage	16.6.1.5	Category A
Power Input – Abnormal Operating conditions	16.6.2	Category A
Power Input – Momentary Under Voltage	16.6.2.3	Category A
Power Input – Abnormal Surge	16.6.2.4	Category A
Voltage Spike	17	Category A
Audio Frequency Susceptibility	18	Category Z
Induced Signal Susceptibility – Magnetic fields induced	19.3.1	Category ZC
Induced Signal Susceptibility – Electric fields induced	19.3.2	Category ZC
Induced Signal Susceptibility - Magnetic fields in cable	19.3.3	Category ZC
Induced Signal Susceptibility – Electric fields in cable	19.3.4	Category ZC
Induced Signal Susceptibility – Spikes induced	19.3.5	Category ZC
Radio Frequency Susceptibility Radiated Radio Frequency Susceptibility Conducted	20 20	Category RR
Radio Frequency Emission - Radiated	21	Category H
Radio Frequency Emission - Conducted	21	Category H
Lightning – Cable Bundle	22	A3
Lightning – Pin Injection	22	B2
Lightning – Direct Effects	23	N/A
ICING	24	N/A
Electrostatic Discharge	25	N/A

Fire, Flammability	26	N/A

Environmental Qualification Form for the STX 360R Sentinel

NOMENCLATURE: STX 360, Airbourne ADSB Equipment

TYPE/MODEL/PART No: STX 360 / 306XXX- [XX] & Electrical Install Kit P/N 306XXX

TSO NUMBER: C74d (transponder)

C154c (ADSB) - Class A1H

C157b (FIS-B) - Class 1

C195a (ADSB) – Class C1

MANUFACTURE'S SPECIFICATION AND/OR OTHER APPLICABLE SPECIFICATION:

STX 360 INSTALL MANUAL, P/N 306XXX-XX

QUALIFICATION TEST PLAN, STX 360 SENTINEL ADSB P/N 901XXX-QTP

MANUFACTURER: SANDIA AEROSPACE

ADDRESS: 3700 OSUNA RD NE, SUITE 711, ALBUQUERQUE, NM 87109

REVISION & CHANGE NUMBER OF DO-160: REV G DATED December 2010

DATE OF TESTS: 2016

Test Description	DO-160G SECTION	Conditions and Notes
Ground Survival and Operating Low Temperature	4.5.1 & 4.5.2	Category A1D1
Ground Survival and Operating High Temperature	4.5.3 & 4.5.4	Category A1D1
Altitude	4.6.1	Category A1D1
Decompression	4.6.2	Category A1D1
Overpressure	4.6.3	Category A1D1
Temperature Variation	5	Category B
Humidity	6.3	Category A
Operational Shock and Crash Safety	7	Category B
Sustained Crash Safety	7.3.3	Test Type 5
Vibration-standard	8.2.1.1	Category S – Curve B and M
Explosion	9	N/A

Waterproof	10	N/A
Fluid Susceptibility	11	N/A
Sand and Dust	12	N/A
Fungus	13	N/A
Salt Spray	14	N/A
Magnetic Effect	15.3	Category Z
Power Input – Normal Operating Conditions	16.6.1.1	Category A
Power Input – Momentary Power Interruptions	16.6.1.3	Category A
Power Input – Normal Surge	16.6.1.4	Category A
Power Input – Engine Start Under Voltage	16.6.1.5	Category A
Power Input – Abnormal Operating conditions	16.6.2	Category A
Power Input – Momentary Under Voltage	16.6.2.3	Category A
Power Input – Abnormal Surge	16.6.2.4	Category A
Voltage Spike	17	Category A
Audio Frequency Susceptibility	18	Category Z
Induced Signal Susceptibility – Magnetic fields induced	19.3.1	Category ZC
Induced Signal Susceptibility – Electric fields induced	19.3.2	Category ZC
Induced Signal Susceptibility - Magnetic fields in cable	19.3.3	Category ZC
Induced Signal Susceptibility – Electric fields in cable	19.3.4	Category ZC
Induced Signal Susceptibility – Spikes induced	19.3.5	Category ZC
Radio Frequency Susceptibility Radiated Radio Frequency Susceptibility Conducted	20 20	Category RR
Radio Frequency Emission - Radiated	21	Category H
Radio Frequency Emission - Conducted	21	Category H
Lightning – Cable Bundle	22	A3
Lightning – Pin Injection	22	B2
Lightning – Direct Effects	23	N/A

ICING	24	N/A
Electrostatic Discharge	25	N/A
Fire, Flammability	26	N/A

2 Installation Considerations

2.1 General

The STX 360 Sentinel is a UAT IN/OUT ADS-B unit with a built-in Mode A/C transponder. The STX 360 can easily be installed in the same space as most existing panel mounted transponders, simplifying the installation. The STX 360 has an internal diplexer that allows both the transponder and the UAT to share a single antenna. Because it is a combination unit, there is a single point of entry for the squawk code which eliminates the possibility of reporting two different codes. The STX 360 requires altitude input from an encoder, such as the Sandia SAE 5-35, in RS 232 format as well as a position source from a WAAS GPS through a RS 232, or RS 422 interface.

The STX 360R is a remote version designed to be used with other navigation systems. SANDIA provides a Interface Control Document to those that wish to interface with the STX 360R. The ICD can be obtained from SANDIA Aerospace by contacting the factory at 505.341.2930. The STX 360R can be hard mounted in the aircraft. The STX 360R requires altitude input from an encoder, such as the Sandia SAE 5-35, in RS 232 format as well as a position source from a WAAS GPS through a RS 232, or RS 422 interface.

2.2 Mounting Considerations

2.2.1 STX 360 Panel Mount

The STX 360 is designed to be tray mounted in a standard cutout.

2.2.1.1 Optional

2.2.2 STX 360R Remote Mount

The STX 360R is designed to be mounted behind aircraft panel, or under the seat or other remote locations where panel space is available.

SECTION 3 Installation Procedures

3.1 General

The STX 360 and STX 360R are supplied with one 50 pin Sub-D mating connector and clam shell. The Sub-D connector use screws to secure the connector to the unit. Also supplied is a BMA connector for the panel mount STX 360 unit and a SMA coax for the STX 360R for connecting the antenna coax. Recommended coax should be RG400 or equivalent. It is important that proper installation techniques be observed in attaching wires and building the antenna cable. See section 3.6.3 for proper assembly of antenna cable.

The STX 1360 and STX 360R must never be turned on without the antenna connected. **FAILURE TO DO SO COULD CAUSE DAMAGE TO THE TRANSMITTER**.

3.2 Equipment Required

3.2.1 STX 360 Panel Mount

3.2.1.1 Supplied

Description	QTY	Sandia P/N
STX 360 Panel Mount	1	306430-00
STX 360 Electrical Installation Kit	1	306462-00
STX 360 Mechanical Installation Kit	1	306481-00

Table 2: STX 360 Panel Mount supplied components

The STX 360 Mechanical Installation kit (306481-00) comes with the following:

Description	QTY	Sandia P/N
STX 360 Tray	1	306438
Screw, 2-56, PHP, SS, 1/4"	3	305845-03
Screw, 4-40, PHP, SS, 1/4"	3	305042-03
Washer, Split Lock, SS #3	3	305179-02
Washer, Split Lock, SS #6	3	305179-04
Nut, Stn, Ptrn SS #2	3	305053-01

Table 3: STX 360 Mechanical Installation Kit

The STX 360 Electrical Installation kit (306462-00) comes with the following:

Description	QTY	Sandia P/N
Connector 50 pin Dsub	1	305065
Socket, Size 20 Crimp D Conn	51	205090-1
Backshell with cable clamp	1	306453
Conn, RF, BMA, Female, Flng Mnt	1	306364

Table 4: STX 360 Electrical Installation Kit

3.2.1.2 Required but not supplied

Coaxial cable will be required to connect to the STX 360 with the provided BMA Flange Mount RF connector. RG 400U or equivalent is recommended. When using an equivalent coaxial cable, ensure the diameter of the cable is equivalent for proper fit when installing the BMA Flange Mount RF connector.

Additionally hookup cable will be required to interface with STX 360 through the 50 pin D-sub connector.

3.2.1.3 Optional

Optional accessories are not sold through SANDIA, however call the factory for advice on locating the following options below:

- USB connector with circular panel mount for powering a device up to 500mA .
- Ethernet to WIFI adapter 3.2.2 STX 360R Remote Mount

3.2.2.1 Supplied

Description	QTY	Sandia P/N
STX 360 Remote Mount	1	306431-00
STX 360 Electrical Installation Kit	1	306462-10

Table 5: STX 360R Remote supplied in box

The STX 360R Electrical Installation kit (306462-10) comes with the following:

Description	QTY	Sandia P/N
Connector 50 pin Dsub	1	305065
Socket, Size 20 Crimp D Conn	51	205090-1
Backshell with cable clamp	1	306453
Connector, SMA, RG400, Crimp	1	306109

Table 6: STX 360R Remote Electrical Installation Kit

3.2.2.2 Required but not supplied

Coaxial cable will be required to connect to the STX 360 with the provided BMA Flange Mount RF connector. RG 400U or equivalent is recommended. When using an equivalent coaxial cable, ensure the diameter of the cable is equivalent for proper fit when installing the SMA RF connector.

Additionally hookup cable will be required to interface with STX 360 through the 50 pin D-sub connector.

3.3.2.3 Optional

Optional accessories are not sold through SANDIA, however call the factory for advice on locating the following options below:

- Ethernet to WIFI adapter

3.3 Electrical

The STX 360 and STX 360R operate on 11-32Vdc. Power should be protected by a 3 amp fuse or circuit breaker. Below in Table 7 is a summary of the STX 360 interfaces. Refer to section 3.7.2 for specifics on pin out information.

Interface Type	Number
RS232 TX/RX	6
RS422 TX/RX	2
ARINC 429 In	2
Ethernet (ADS-B)	1
Discrete Inputs	5
Discrete Outputs	6
5V power (USB)	1
Switch Power 11 – 33VDC out	1
RF port	1

Table 7: STX 360 Electrical interfaces

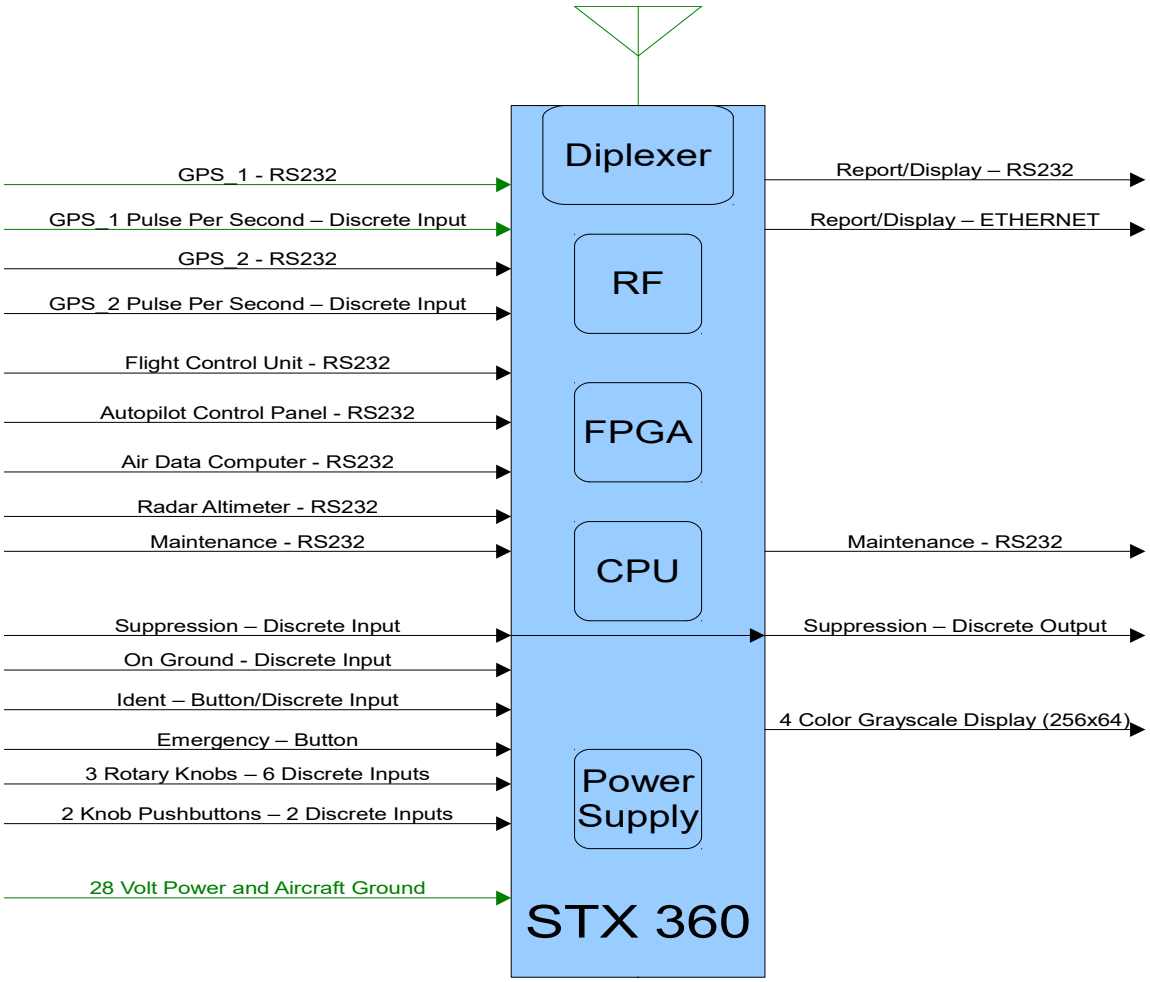

Figure 3: STX 360 system interface

WARNING: The STX 360 / STX 360R must NEVER be turned on without the antenna connected or a proper attenuator attached to the antenna output connector. Failure to do so will result in the failure of the transmitter output device. This type failure is not covered by the manufacturer's warranty

Installation to be in accordance with FAA AC 43.13-1B

3.4 AIRCRAFT MOUNTING

3.4.1 STX 360

3.4.1.1 Mounting Tray

The STX 360 tray is mounted first into the aircraft panel using 2 shop fabricated L brackets. Hole locations are provided to mount the L brackets to the tray.

Once the tray is secured in place, the STX 360 will not require any additional mechanical support. The panel cut out is a standard "Mark" width and in many cases utilizes the existing cutout from the removal of a transponder. Allow enough room behind the panel for the unit, connectors and harness.

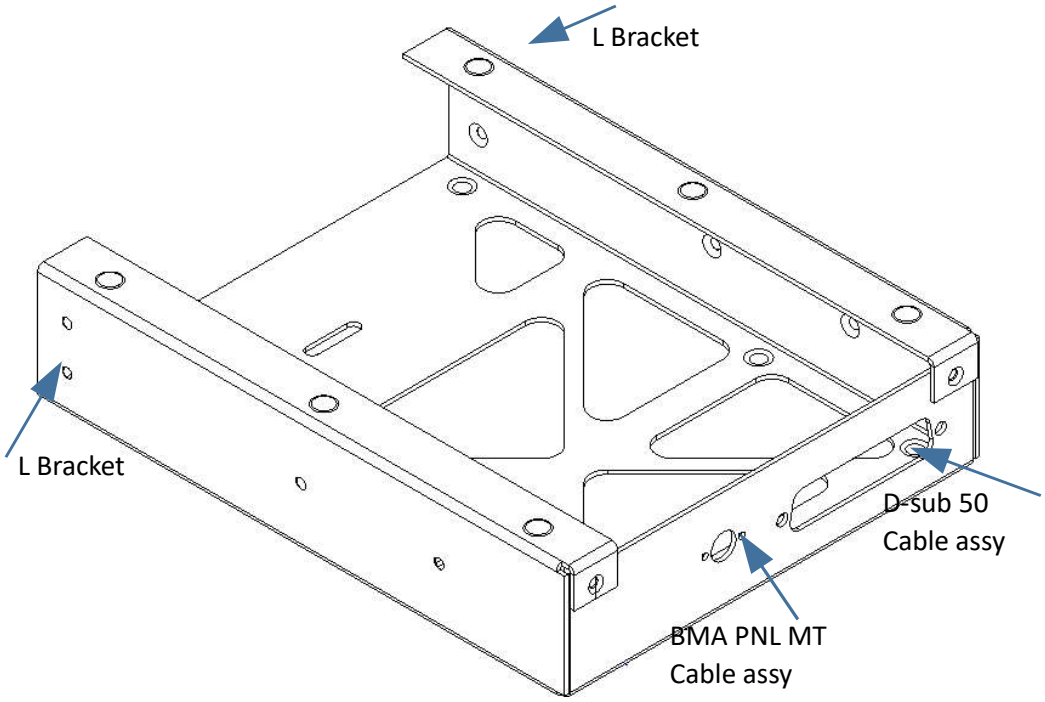

Figure 4: STX 360 panel mount tray

For new panel installations where a cutout has not been performed before the panel cutout dimensions are shown below:

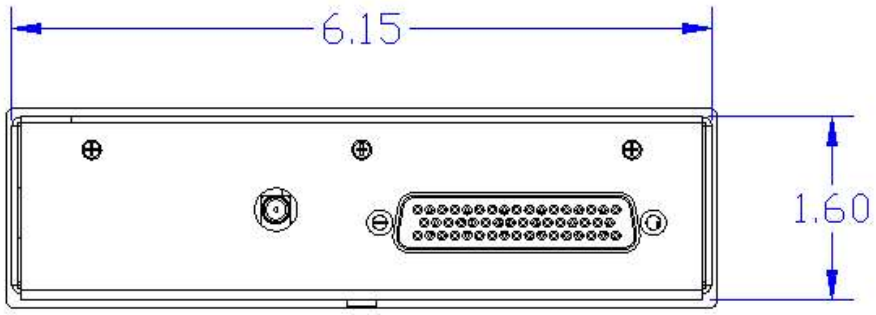

Figure 5: STX 360 panel mount hole dimensions

3.4.2 STX 360R

The STX 360R can be mounted either vertically or horizontally using the flanges on the outer case.

3.4.2.2 STX 360R Flange Mounting

The STX 360R can be hard mounted to the aircraft using the slotted flanges on the unit using either number 6 or number 8 mounting screws. It can be mounted in either axis. When mounted on the narrow edge two screws are used to fasten the unit. When on the wide edge, either three or four mounting screws are required. When mounting the unit, ensure that enough clearance is allowed for the mating connectors.

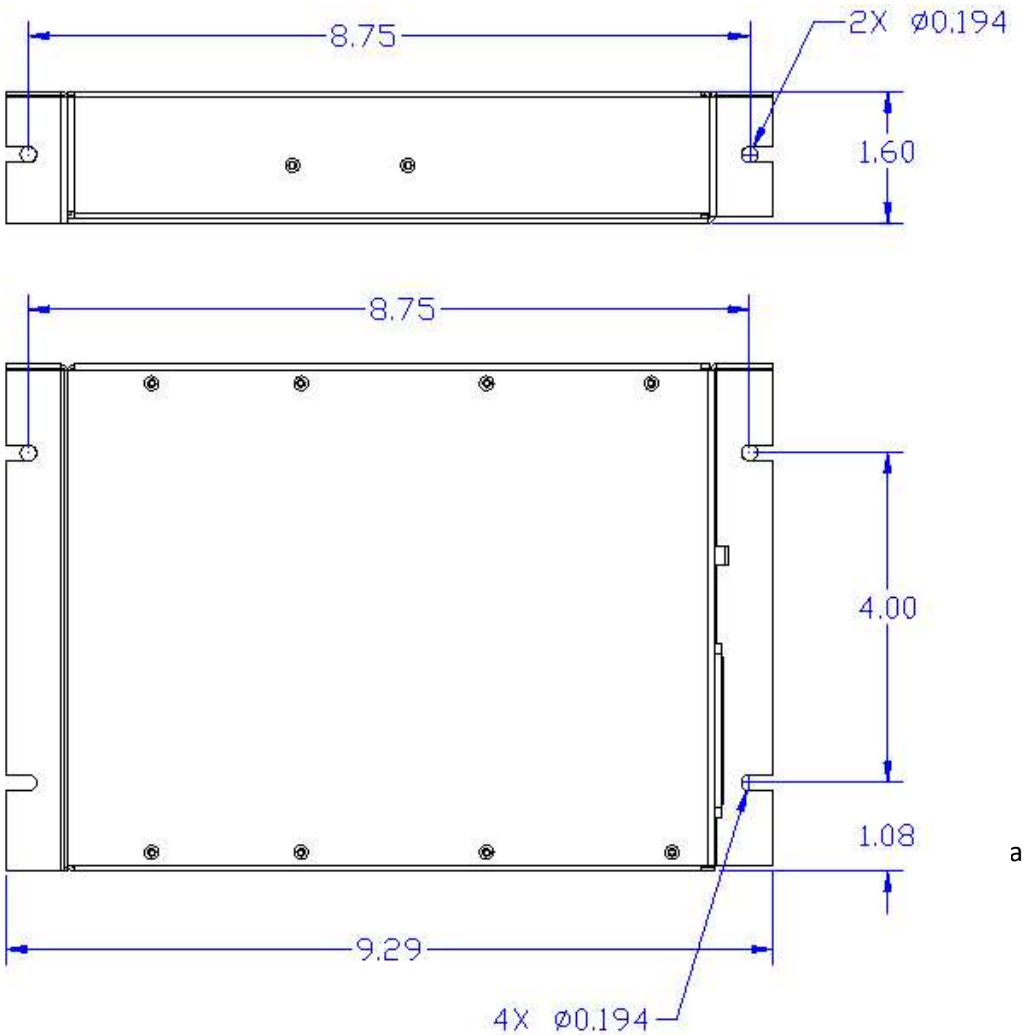

Figure 6: STX 360R Remote physical dimensions

3.6 Electrical Connection

The STX 360 and STX 360R are designed to operate on 11-32Vdc without any special wiring considerations. Power should be supplied from aircraft power through a 2 amp fuse or circuit breaker to protect the Sentinel ADS-B unit. The STX 360 and STX 360R also output unswitched aircraft power (J4 pin 4 – see section 3.7.1 for more details) to operate other avionics. If this output is used (a Maximum of 1 Amp), the fuse or breaker size should be adjusted to accommodate the other system. Power and ground wires are 20 AWG. All other wires are 22 AWG unless otherwise noted.

3.6.1 STX 360 Panel Mounted Unit

The minimum installation for an operable STX 360 is Aircraft Power, Aircraft Ground, Antenna, pressure altitude from an altitude encoder and WAAS GPS position source. Aircraft power and ground are both found on J4 of the 50 pin D-sub connector. The STX 360 receives encoder altitude data in either RS 232 or ARINC 429. The STX 360 receives GPS position source through RS232 or RS422. The STX 360 has the ability to have two positions sources connected through either protocol as a primary or secondary. A radar altimeter can also be connected through a configurable high/low ARINC429 interface. ADS-B information such as TIS-B and FIS-B can be sent through ethernet or a configurable RS232 interface. An additional RS232 [38400-N-8-1] can be used for a flight control unit. An additional RS232 [115200-N-8-1] is used for remote operation or maintenance port. See table 1 for all connection details on D-sub 50 (J4).

3.6.2 STX 360R Remote Mounted Unit

The minimum installation for an operable STX 360R is Aircraft Power, Aircraft Ground, Antenna, pressure altitude from an altitude encoder and WAAS GPS position source. Aircraft power and ground are both found on J4 of the 50 pin D-sub connector. The STX 360 receives encoder altitude data in either RS 232 or ARINC 429. The STX 360 receives GPS position source through RS232 or RS422. The STX 360 has the ability to have two positions sources connected through either protocol as a primary or secondary. A radar altimeter can also be connected through a configurable high/low ARINC429 interface. ADS-B information such as TIS-B and FIS-B can be sent through ethernet or a configurable RS232 interface. An additional RS232 [38400-N-8-1] can be used for a flight control unit. An additional RS232 [115200-N-8-1] is used for remote operation or maintenance port. See table 1 for all connection details on D-sub 50 (J4).

3.6.3 Antenna Connector

3.6.3.1 STX 360 Panel Mounted Unit

The STX 360 panel mount ADS-B antenna (installer supplied) should be mounted vertically on the bottom of the aircraft. The antenna requires the use of a ground plane that should have a minimum radius of approximately 4". The STX 360 uses a BMA Panel mount RF connector (supplied). Instructions for assembling the BMA connector are shown below and a graphical stripping dimensions are shown in Figure 3-6.3.1 .

The BMA panel mount connector is a rear mount floating connector that utilizes RG 400 or equivalent coaxial cable. Figure 3.6.3.1 shows how to to prepare the coaxial cable.

1. Place the provided heat-shrink tubing and outer sleeve on the cable

2. Remove approximately 1" of the cable jacket

3. Strip the cable braid to length as shown

4. Strip the cable with the inner conductor length as shown.

5. Flare the cable braid from the dielectric

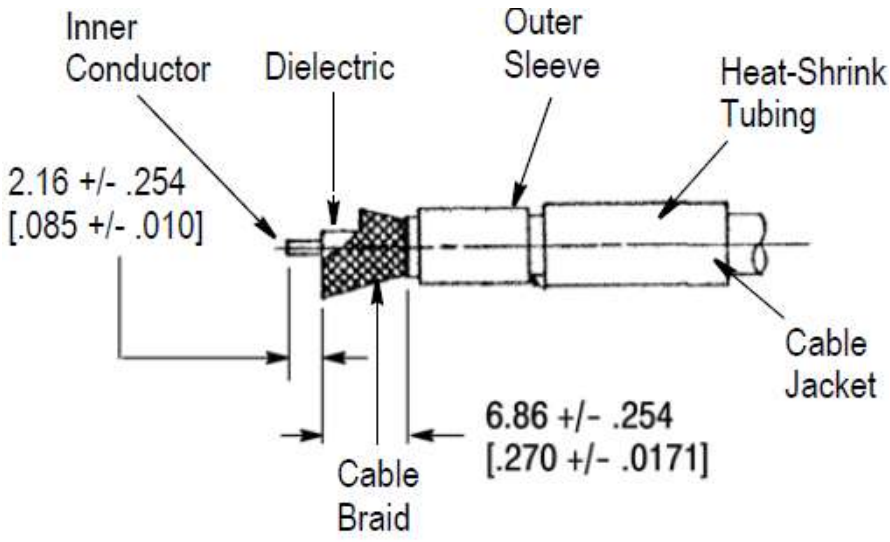

Figure 7: RG 400 coax or equivalent preparation for BMA Flange Mnt connector

6. Tin the inner conductor of the cable

7. Push the center contact over the inner conductor of the cable and push firmly against cable dielectric while heating the pin with a soldering iron.

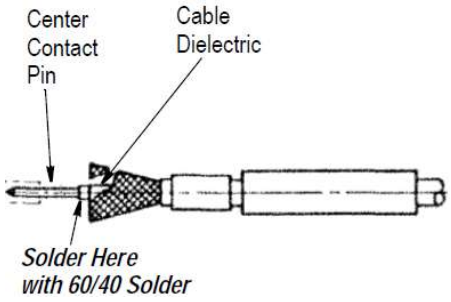

Figure 8: BMA center pin and final assembly on RG 400 or equivalent coax

8. Insert the cable into the BMA connector and seat firmly.

9. Slide the outer sleeve over the flared portion of the cable braid

10. Hold the assembly securely and bring the outer sleeve over the cable braid and crimp in place.

11. Slide the heat shrink tubing over the cable and housing subassembly.

12. Apply heat to shrink tubing

3.6.3.2 STX 360R Remote Mounted Unit

The Sentinel ADS-B antenna (installer supplied) should be mounted vertically on the bottom of the aircraft. The antenna requires the use of a ground plane that should have a radius of approximately 4". The STX 360R uses a SMA connector (supplied). Instruction for assembling the SMA connector are shown in Figure 3-6.3.2. A BNC to SMA adapter can also be use without any measurable degradation of Transponder and UAT transceiver performance. This adapter can be obtained from your avionics parts supplier.

The SMA panel mount connector is a rear mount floating connector that utilizes RG 400 or equivalent coaxial cable. Figure 3.6.3.1 shows how to to prepare the coaxial cable.

1. Place the provided heat-shrink tubing and outer sleeve on the cable

2. Remove approximately 1" of the cable jacket

3. Strip the cable braid to length as shown

4. Strip the cable with the inner conductor length as shown.

5. Flare the cable braid from the dielectric

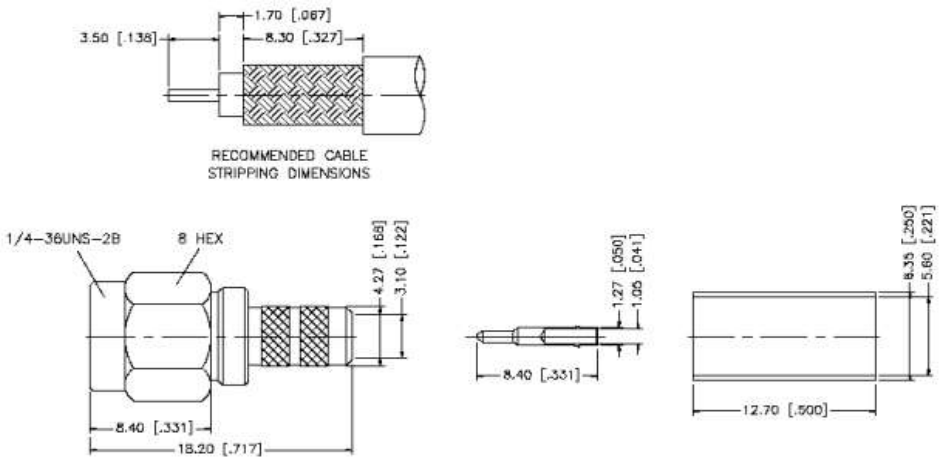

Figure 9: RG 400 coax or equivalent preparation for SMA connector

7. Tin the inner conductor of the cable

8. Push the center contact over the inner conductor of the cable and push firmly against cable dielectric while heating the pin with a soldering iron.

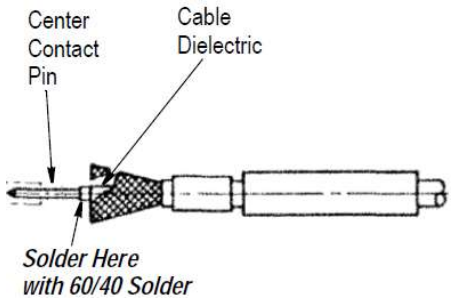

Figure 10: SMA center pin and final assembly on RG 400 or equvalent coax

9. Insert the cable into the SMA connector and seat firmly.
10. Slide the outer sleeve over the flared portion of the cable braid
11. Hold the assembly securely and bring the outer sleeve over the cable braid and crimp in place.
12. Slide the heat shrink tubing over the cable and housing subassembly.
13. Apply heat to shrink tubing

3.7 Connector Pin Out

3.7.2 STX 360 Panel Mounted Unit

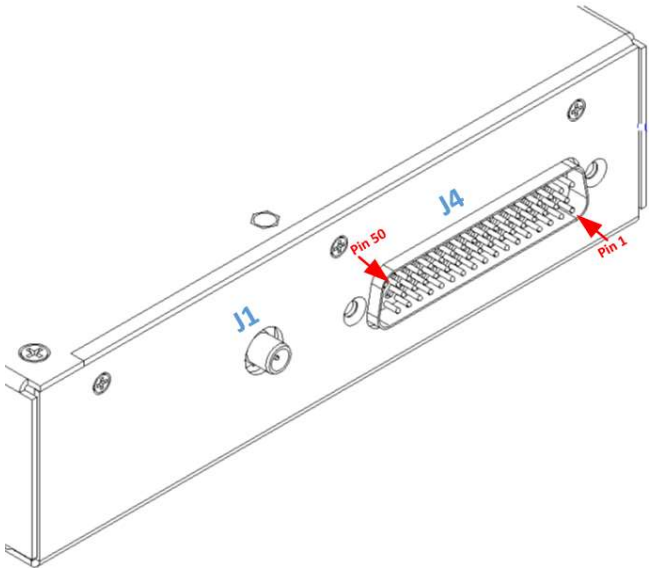

Figure 11: STX 360 panel mount with connections shown for installation

Located on the back of the STX 360 panel mount IN/OUT ADS-B unit is a 50 pin D-sub connector (J4) and a BMA RF connector (J1). From the bottom right is pin 1 and top left is pin 50 as shown in the figure above. A 50 pin D-sub female connector with crimp insertion pins in provided in the STX 360 panel mount installation kit (306462-10). Table 9 on the next page describes each pin of the 50 pin D-sub connector (J4).

Follow instructions in 3.6.3.1 for interfacing and preparation of coax with J1 (BMA RF connector).

Description	Pinout	Protocol	Format
Aircraft Power 11- 33VDC	1		
Aircraft GND	2		
Aircrft Power 11 - 33VDC	3		
Switch Power 11 - 33VDC	4		OUTPUT
Maintenence / Remote	5	RS232:RXA	
	6	RS232:TXA	
Altitude Encoder	7	RS232:RXB	
	8	RS232:TXB	
USB Power	9	USB Power	
	10	USB Ground	
FAULT (open collector)	11	Open/Closed switch Sinks up to 500mA to drive an LED/Lamp annunuciator	Open – UAT is operational Close – UAT is failed
Pulse Per Second Out	12	RS-422 Level Output	Pass through of first GPS or second GPS depending on usage
Suppression	13	28V/GND (In/Out)	High – Other equipment should not transmit Low – Other equipment may transmit
Remote ON/OFF	14	Remote ON/OFF	Open = ?? Ground = Holding it low for 3

Description	Pinout	Protocol	Format
			sec, turns the unit off
Flight Control Unit (FCU)	15	RS232:RXC	<Config>-N-8-1
	16	RS232:TXC	<Config>-N-8-1
	17	USB-	Not available
GPS0	18	RS232:RXD	<Config>-N-8-1
	19	RS232:TXD	<Config>-N-8-1
GPS1 – PPS	20	RS422B_RXA	Pulse per Second for GPS1
	21	RS422B_RXB	Pulse per Second for GPS1
	22	GND	
GPS1	23	RS232:RXE	<Config>-N-8-1
	24	RS232:TXE	<Config>-N-8-1
	25	NC	
	26	GND	
	27	NC	
ADS-B	28	Ethernet:LAN-TD+	10/100 Mbit
	29	Ethernet:LAN-TD-	10/100 Mbit
	30	Ethernet:LAN-RD+	10/100 Mbit
	31	Ethernet:LAN-RD-	10/100 Mbit
GPS0-PPS	32	RS422A_RXA	Pulse per Second for GPS0
	33	RS422A_RXB	Pulse per Second for GPS0
	34	GND	
	35	RS232:RXF	115200-N-8-1

Description	Pinout	Protocol	Format
	36	RS232:TXF	115200-N-8-1
On 2nd NAV	37	Open/Closed switch	Open – First GPS is being used. Close – Second GPS is being used
Radar Altimeter	38	ARINC 429: RX A	<Configurable High/Low>
	39	ARINC 429: RX B	<Configurable High/Low>
No Position	40	Open/Closed switch, Sinks up to 500mA to drive a LED/Lamp annunciator	Open – Position Available Close – Position from GPS source not available
Traffic	41	Open/Closed switch	Open – No Traffic in vicinity Close – Traffic in the vicinity
	42	GND	
	43	ARINC 429: RX A	<Configurable High/Low>
	44	ARINC 429: RX B	<Configurable High/Low>
Ext_Ident	45	Open/Ground	Open = Ident not requested Ground = Ident requested
	46	USB+	Not available
Press Inibit	47	Open/Ground	Reserved
Use 2nd NAV	48	Open/Ground	Reserved
Air/Ground Discrete	49	Open/Ground	Open = On Ground Ground = In Air
Anonymous	50	Open/Ground	Open = Anonymous not requested Ground = Anonymous requested

3.7.3 STX 360 Remote Mounted Unit

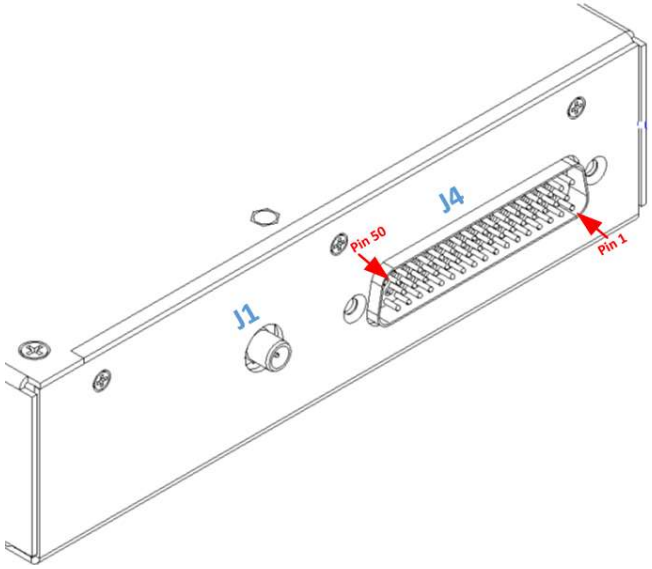

Figure 12: STX 360R Remote connections shown for installation

Located on the back of the STX 360R remote IN/OUT ADS-B unit is a 50 pin D-sub connector (J4) and a SMA RF connector (J1). From the bottom right is pin 1 and top left is pin 50 as shown in the figure above. A 50 pin D-sub female connector with crimp insertion pins in provided in the STX 360R remote mount installation kit (306462-10). Table 9 on the previous page describes each pin of the 50 pin D-sub connector (J4).

Follow instructions in 3.6.3.2 for interfacing and preparation of coax with J1 (SMA RF connector).

3.8 Calibration Procedures- STX 360 Panel Mount Unit

No calibration necessary. The STX 360 is ready to be used once the minimum connections performed. This includes Aircraft Power, Aircraft Ground, Antenna, pressure altitude from an altitude encoder and WAAS GPS position source.

3.9 Installation Configuration- STX 360 Panel Mount

The STX 360 is to be used with a GPS position source and a pressure altitude source. In most cases the GPS and Encoder are items many pilots have on the aircraft and intended to be used with the STX 360. Below is a system block diagram of the STX 360 with the minimum connections:

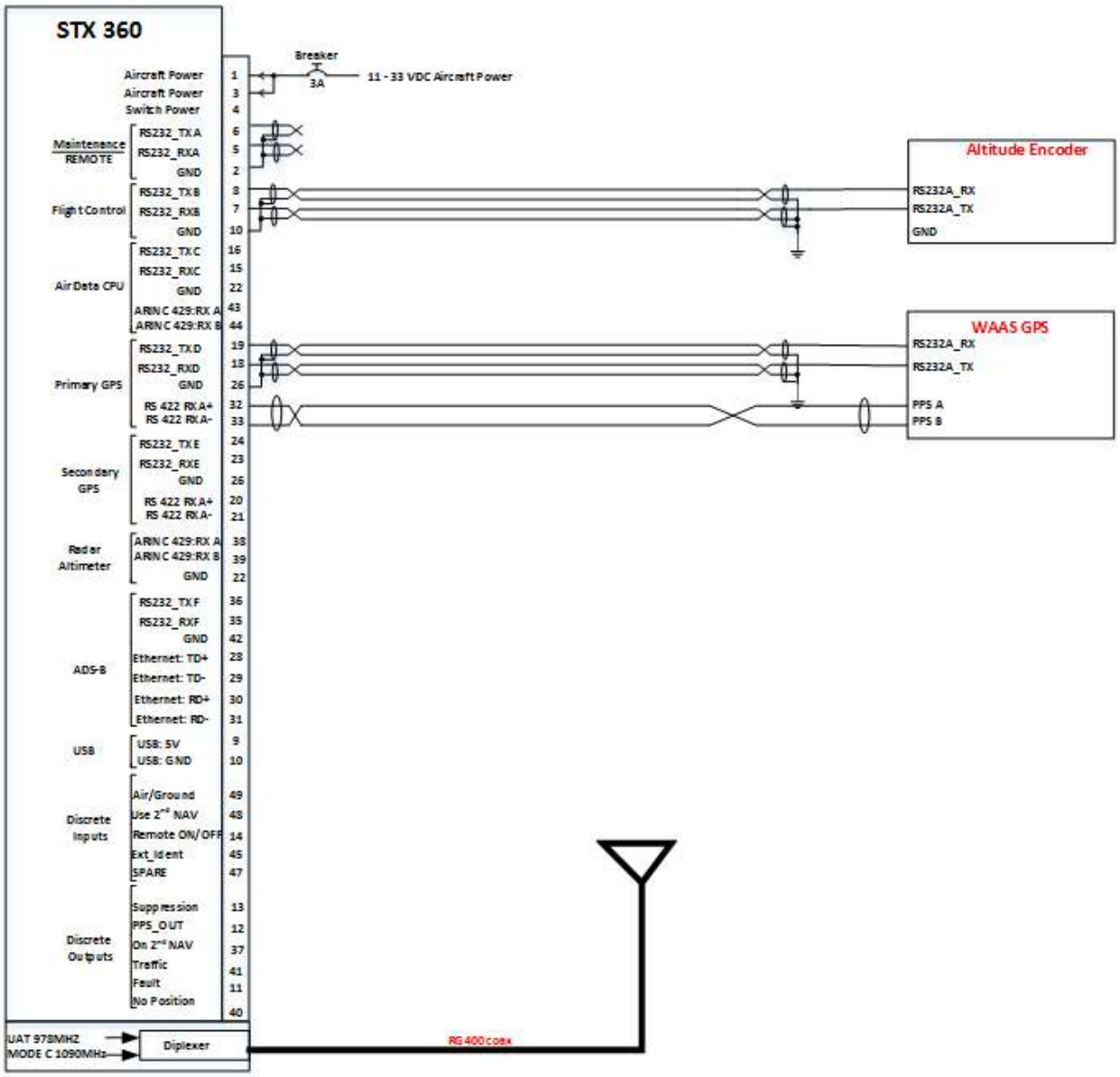

Figure 13: System block diagram of STX360 with minimum external interfaces

3.9.1 WAAS GPS position source

The STX 360 SENTINEL allows for a primary and secondary GPS position input. This position input can be in either a RS232 or RS422 format. The RS232 is configurable on the STX 360 which allows easy transition to any WAAS position source with the RS232 or RS422 format. A list of the following position sources can be used. This list is always growing and therefore if position source is not listed, please contact the factory for details of inclusion.

Function	GARMIN	Avidyne	Free Flight	GRT	MGL	DYON	Advance Flight
WAAS GPS	430W	IFD440	1201	Hxr			
	530W	IFD540					
	GNS 480						

Table 8: WAAS Position source manufacturers with compatible format

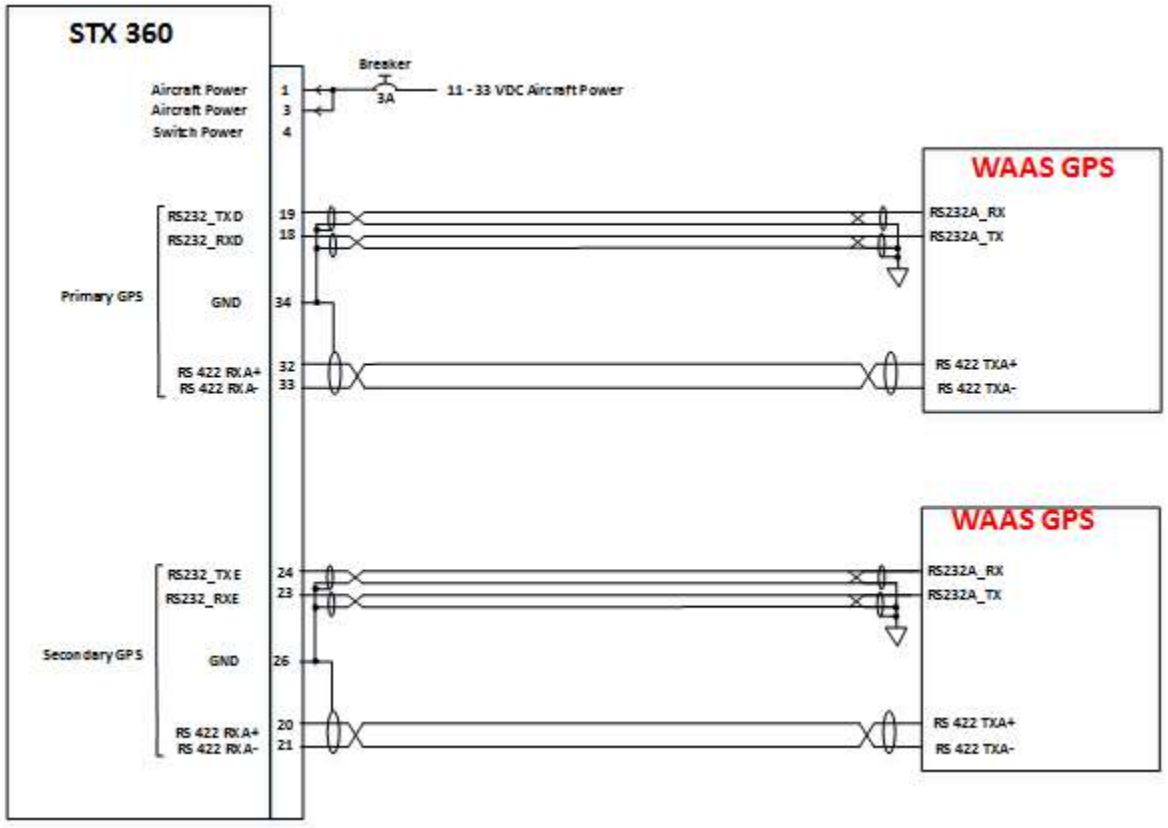

Figure 14: STX 360 WAAS GPS connections for GPS0 and GPS1

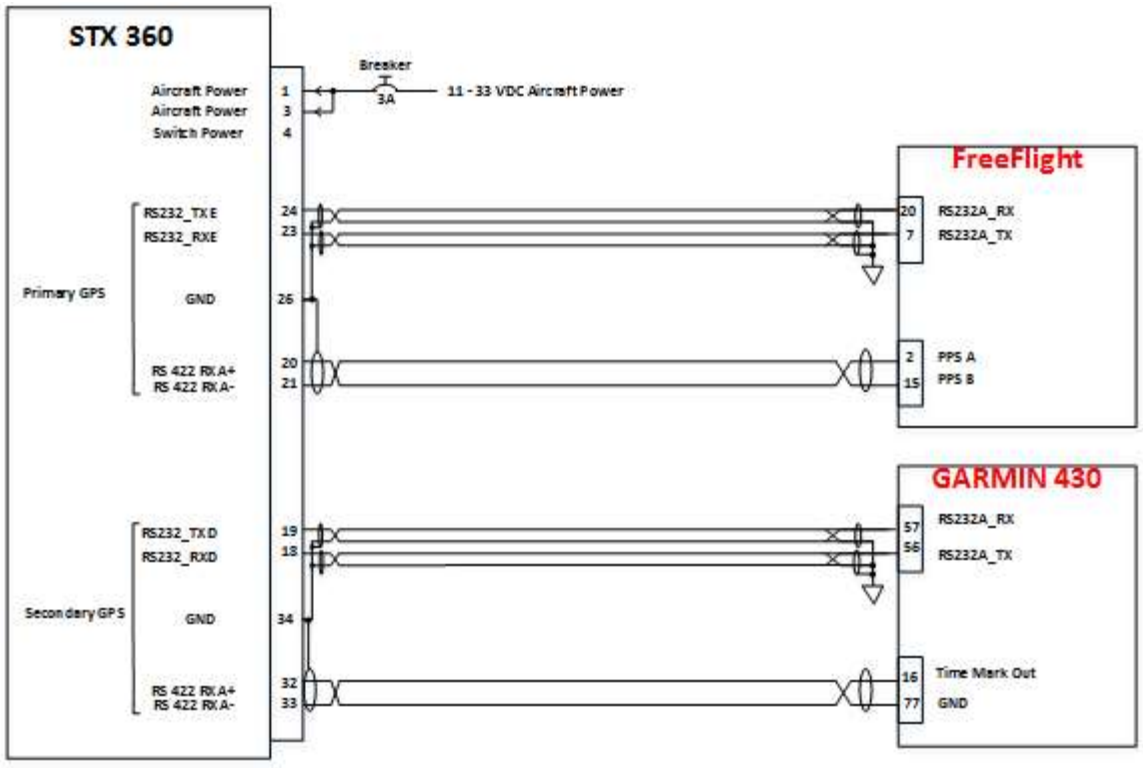

Figure 15: GARMIN 430 as GPS0 and FreeFlight 1201 as GPS1

3.9.2 Altitude Encoder

Any encoders that have a RS232 or ARINC 429 communication format can be used to interface with the STX 360. The STX 360 RS232 baud rate is configurable so that any altitude encoder with a RS232 interface can be used. Additionally the ARINC 429 is configurable for high or low data rates so that any altitude encoder with a ARINC 429 interface can be used.

A SANDIA SAE-35 Altitude encoder is recommended, however an existing encoder used from a previous installation can be used with the STX 360 through RS232 or ARINC 429 inteface. Please refer to table 9 for exact pin out information. Below is a list of Sandia Aerospace encoders that can be used as well:

Function	Sandia Aero	Cofiguration	Notes
Encoder	SAI 340	57600, 8 1 N	Attitude indicator
	SAC 7-35	1200, 9600, 19200 or 38400 8 1 N	Air data computer
	SAE5-35	9600, 8 1 N	Altitude encoder

Table 9: Sandia Aerospace Altitude Encoders

Below is a electrical block diagram showing connections to a RS 232 and ARINC 429 interface altitude encdoder. Please refer to table 9 for all pinouts of the STX 360.

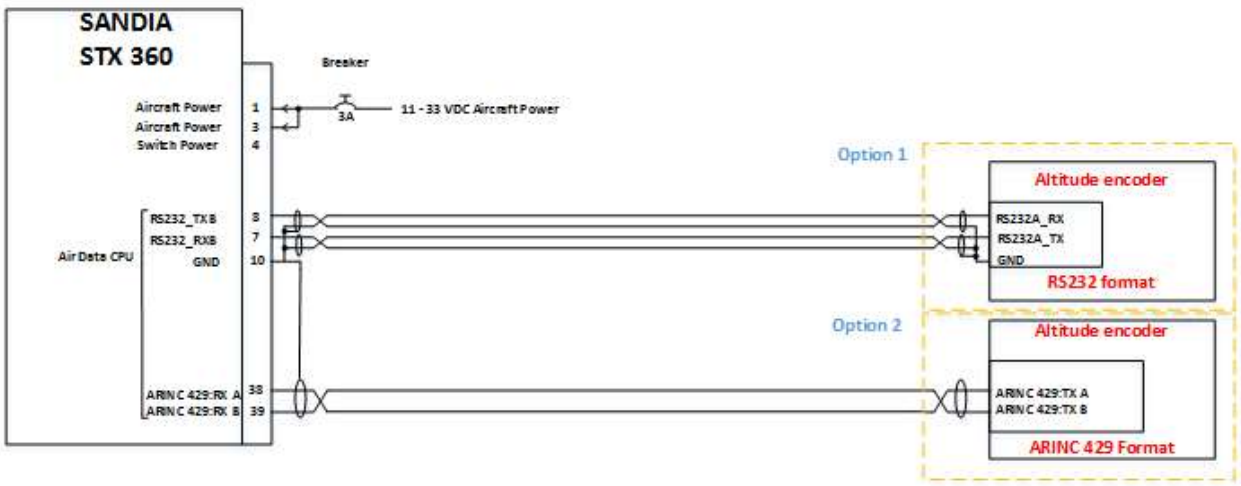

Figure 16: STX 360 Altitude connections through a RS 232 or ARINC 429 interface

3.9.3 External Display for ADS-B information

An Android or IPAD can be used to display FIS-B weather, ADS-B traffic information, GPS position and attitude information through a setup "hotspot" in the aircraft cockpit. Below is a table of some of the applications that are currently supported. If a particular application is not shown, please contact the factory for support information. Support on most software suites on IPAD/Android for displaying weather (FIS-B) and Traffiic (TIS-B), through a common ethernet to WIFI adapter. However in some cases customers may want to display weather and traffic on their EFIS. ADS-B formated data will be sent through a configurable RS232 on the STX 360 to a EFIS with this protocol.

Software Package	IPAD	Android	Notes
ForeFlight			
WingX Pro	X	X	
FlyQ EFB	X		
AeroWeather			
iFlightPlanner			
AirWX Aviation Weather			
FP Legacy			
FltPlan Go			
FlightView			
SkewTLogPro			
eKneeBoard			

Table 10: ADS-B traffic and weather through Android/IPAD applications

3.9.3.1 Ethernet to WIFI adaptor

An ethernet to wifi adapter can be used to create a "hotspot" within the cockpit. The adapter is connected to the STX 360 through a RJ45 connector and using the wiring pin information in table 9. Once a WIFI hotspot is created, a tablet of choice can be connected and utilize the ADS-B features with your flight software of choice as shown in the table above. Below is a system block detailing connections on STX 360 for connecting to a EFIS on the RS 232 port and interfacing Ethernet to an Ethernet to WIFI adapter.

3.9.3.2 EFIS support

For an EFIS that is not supported through RS232 format, such as weather (FIS-B) and traffic (TIS-B), can be displayed on most EFIS through the ARINC429 interface. This will require a RS232 to ARINC429 converter. Using a Sandia Aerospace RS232 to ARINC429 converter or equivalent will enable ADS-B information to be displayed.

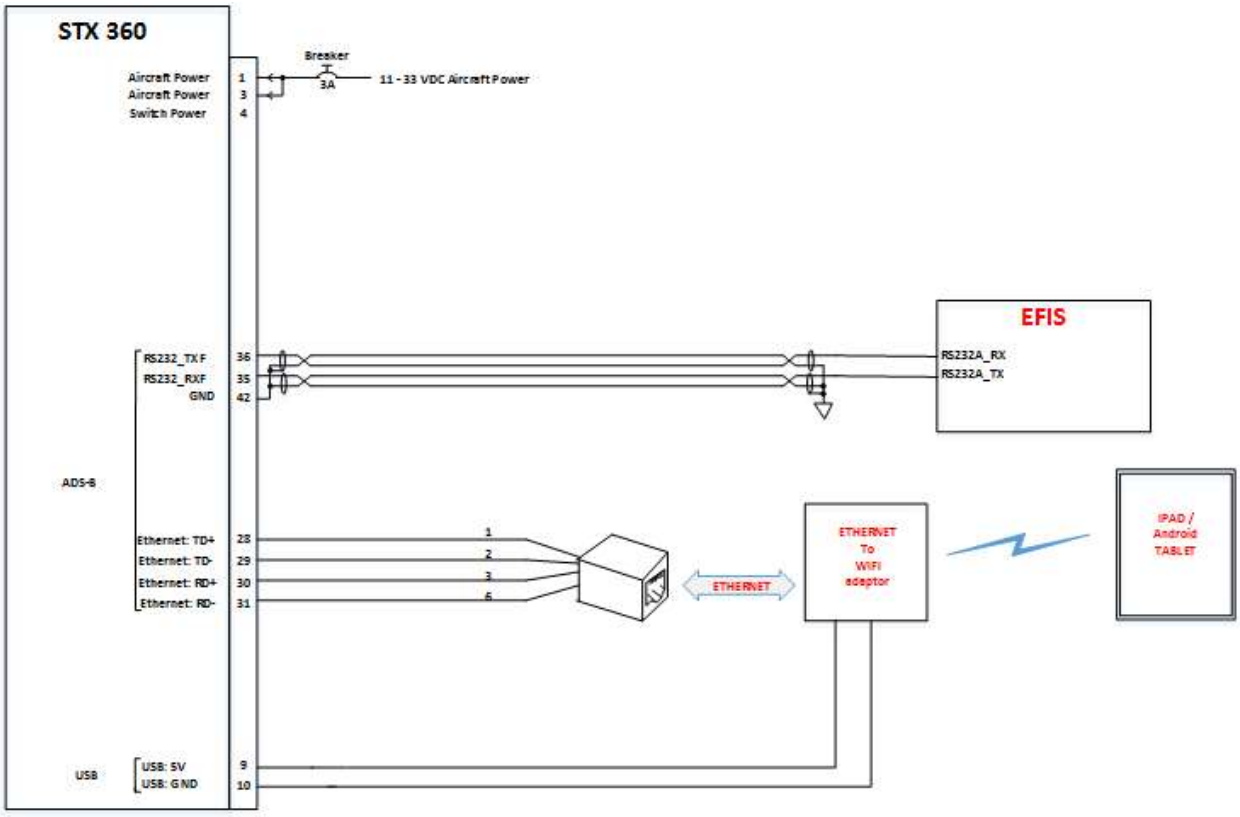

Figure 17: STX 360 ADS-B display suport through RS 232 or Ethernet.

3.9.4 Annuciator connections

The Annunciator circuit supplies a ground. Do not connect voltage directly to this input as it may cause damage to internal circuitry. The annunciator light is required when no display is used and alerts the pilot when a fault or position source has been lost.

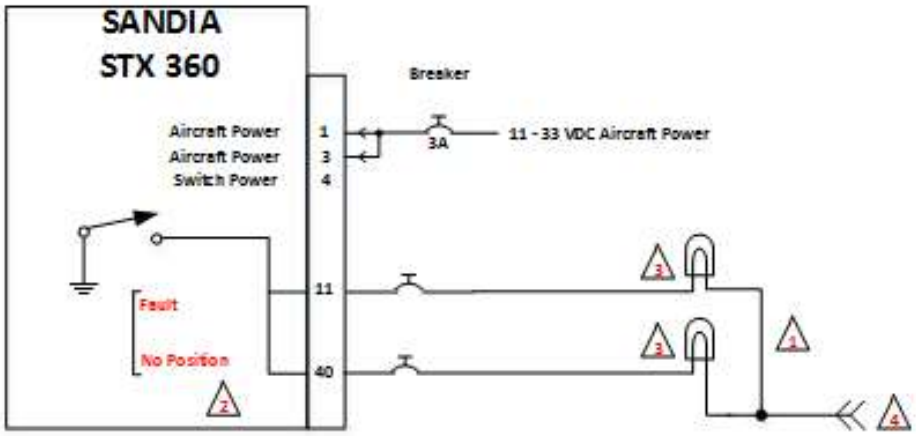

Figure 18: Annunciator connections for STX 360

1. All wires should be a minimum of 22 AWG.
2. ADS-B annunciation controls necessary for installations without a display.
3. Use MS25041-8 light with [28VDC dimmer] MS25237-327 lamp or [14VDC dimmer] MS25237-330 lamp.
4. Lamp voltage from annunciator dimmer circuit

3.9.5 Typical installation

Below is a typically installation the includes the STX 360, SAI 340 attitude indicator (Encoder) , WAAS position source and the use of Ipad/Android tablet to display the ADS-B data using an application of choice.

3.9.5.1 Ethernet to WIFI

Ethernet connection on the STX 360 may be used to interface directly to a device or through a Ethernet to WIFI adapter. Below are the necessary connections to interface the STX 360 to a CAT5 patch cable. Above in figure 19 is an example of wiring an CAT5 cable and below is a table showing STX 360 pin number with a CAT5 patch cable.

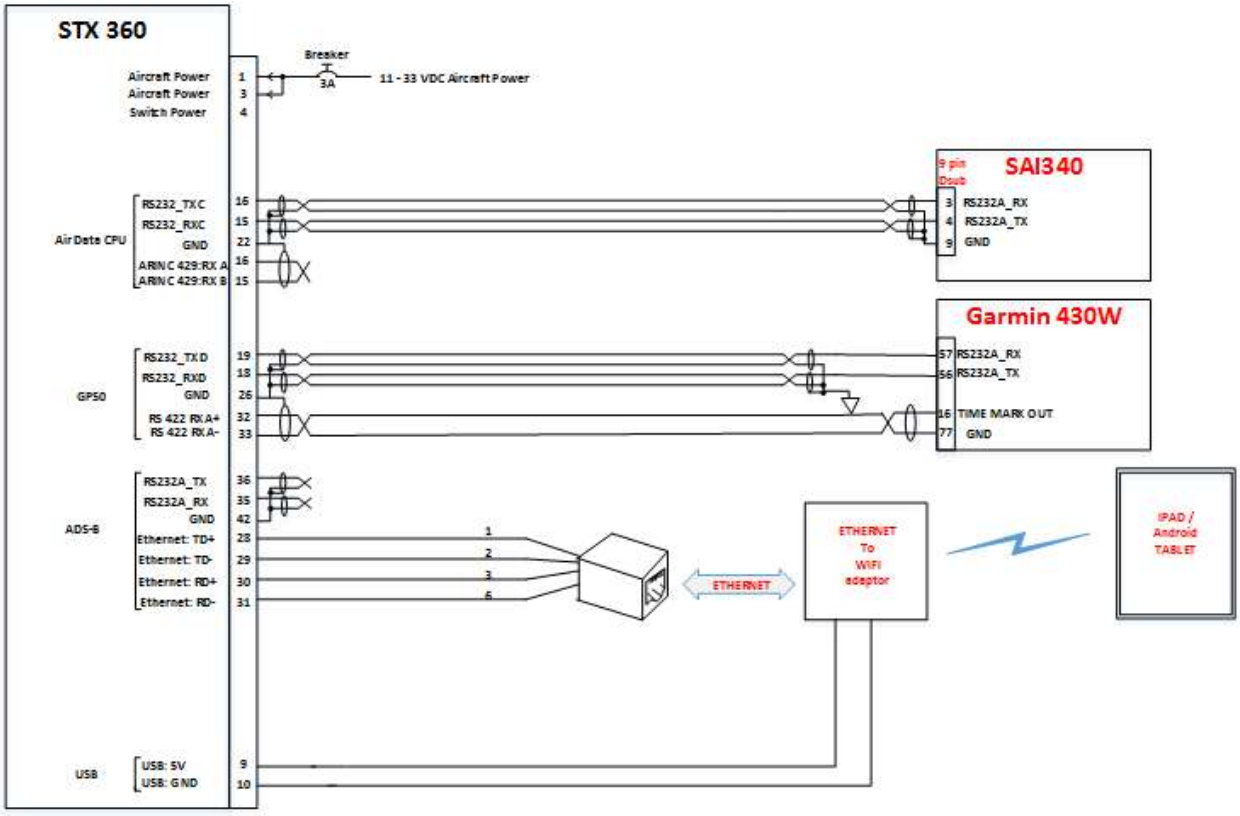

Figure 19: Installation of STX 360 with WAAS position source, encoder and optional output to table through WIFI

Connection	STX 360 pin #	CAT5 cable color	CAT5 pin #
Ethernet:LAN-TD+	28	Orange / White	1
Ethernet:LAN-TD-	29	Orange	2
Ethernet:LAN-RD+	30	Green / White	3
Ethernet:LAN-RD-	31	Green	6

3.9.5.2 USB Power

The STX 360 provides 500mA of USB power that is intended for powering a Ethernet to WIFI adapter, however it can be used to power other devices of choice. An example of USB power is shown in figure 19. Below is a table showing typical power connections:

Connection	STX 360 pin #	USB cable	DC power plug
USB+	9	Red cable / Positive	Red cable / Positive
USB-	10	Black cable / negative	Black cable / negative

3.10 Antenna Considerations

The RF section is very important as to ensuring termination of the STX360 to the type of coax cable type used to considerations of mounting the antenna.

3.10.1 STX 360 termination

The STX360 antenna output should always be terminated prior to turning on the unit. Testing of the unit prior to installation should have a 50 ohm load terminated on STX360. Prior to powering STX360 in aircraft, ensure that all coaxial cable is routed and terminated to the tray (STX360) or terminated directly to unit (STX360R) and the other end of the coaxial cable terminated to an aircraft transponder antenna. For coaxial cable and antenna considerations, please see sub-sections below for specifics.

3.10.2 Coaxial selection

When routing the antenna cable, sharp bends and routing near motors and generators should be avoided. The antenna cable should be kept as short as possible. The length of coaxial should be < 1.5 dB of insertion loss (S21). RG 400U or equivalent is the recommended coax to use for the antenna cable.

Coaxial Type	Insertion Loss (dB/100ft)	Maximum Length	Insertion Loss (S21)
RG-400	18.5	8.5ft	1.57dB
RG-393	9.2	17ft	1.564dB
RG-304	11.1	14ft	1.554dB

Table 11: STX360 coaxial cable examples

Note: coaxial types above is for reference only to emphasize cable loss by type. Pleas refer to manufacturers data sheet to get exact insertion loss per foot information.

3.10.2 STX360 antenna

The typical antenna used is a monopole that adheres to the following specifications:

- 50 ohm impedance
- VSWR ≤ 1.7:1 for UAT (978MHz) and VSWR ≤ 1.5:1 for ATCRBS (1090MHz)
- TSO-C74 / TSO-C66 / TSO-C112 antennas meeting VSWR specification.

Manufacturer	Type	MFN P/N	Connector	Impedance	Polarization	Frequency	VSWR	DC impedance
COMANT	DME/Transponder	CI-105	BNC	50	Vertical	960 - 1220MHz	1.5:1 960 to 1220 MHz 1.3:1 1030 to 1090 MHz	Open circuit
COMANT	DME/Transponder	CI -105-16	BNC	50	Vertical	960 - 1220MHz	1.5:1 960 to 1220 MHz 1.3:1 1030 to 1090 MHz	Open circuit
COMANT	DME/Transponder	CI -105-6	BNC	50	Vertical	960 - 1220MHz	1.5:1 960 to 1220 MHz 1.3:1 1030 to 1090 MHz	Open circuit
COMANT	DME/Transponder	CI -105-3	BNC	50	Vertical	960 - 1220MHz	1.5:1 960 to 1220 MHz 1.3:1 1030 to 1090 MHz	Open circuit
COMANT	DME/Transponder	CI -105-9	BNC	50	Vertical	960 - 1220MHz	1.5:1 960 to 1220 MHz 1.3:1 1030 to 1090 MHz	Open circuit
COMANT	DME/Transponder	CI110-40	C	50	Vertical	960 - 1220MHz	1.5:1 960 to 1220 MHz	Open circuit
COMANT	DME/Transponder	CI -110-60-30	C	50	Vertical	960 - 1220MHz	1.5:1 960 to 1220 MHz	Open circuit
RAMI	DME/Transponder	AV74-1	BNC	50	Vertical	960 - 1220MHz	1.5:1 960 to 1220 MHz	Open circuit
RAMI	Transponder	AV-22	BNC	50		1030-1090MHz	1.3:1 Max	

Table 12: STX 360 antennas

Note: antennas listed in table 12 above are not a complete list but an example of antennas that meet the VSWR specification.

3.10.2.1 Antenna location

The antenna should be at least 3 feet away from the STX360

3.10.2.2 Antenna Installation

4.1 MODE C functionality

1 – Squawk Code
2 – Flight Level (From Altitude input – non baro corrected)
3 – Transponder Mode
4 – Reply Light Blinker
5 – Message Indicator
6 – Information Pages with scroll bar

Figure 20: STX 360 display with Transponder information

4.1.1 RS 232 BAUD Rate Selection

The STX 360 RS 232 baud rate is configurable to work with any altitude encoders baud rate. The factory default setting is 9600 baud

4.1.2 MAX REPLY RATE

TSO requires a replay rate of 500 PRF to 1200 PRF. The factory default for the replay rate is 1200 PRF and this is the recommended setting. In some instances where the STX 360 is operating on a battery the operator may wish this setting to be lower than the maximum of 1200 in order to conserve battery power. 1. Rotate the Data knob to select the MAX REPLY RATE page 2. Press the Enter pushbutton. The brackets will extinguish and the Reply Rate will begin blinking. 3. Rotate the Data knob counter clockwise to decrease the replay rate (a minimum of 500 PRF) and clockwise to increase the reply rate (a maximum of 1200 PRF)

4.1.3 Exit Installer Set Up Mode

To exit the installer set up mode, Press the Mode pushbutton twice.

4.2 USER SET UP MODE

4.2.1 Altitude Unit

This changes the altitude display to the pilot between feet and meters. All altitude functions will be set to the selected unit. 1. Rotate the Select knob counter clockwise to select Meters display and clockwise to select Feet display.

4.2.2 AUTO MODE C ALT

The STX 360 can be set to automatically select Mode C either at turn on or at a pre specified altitude after take off. The altitude after take off is the differential altitude from where the aircraft was tuned on as sensed by the external encoder. This function can also be turned off, in which case it will turn on and stay in the SBY Mode until the pilot selects an alternative mode.

1. Rotate the Data knob until the Auto Mode C Alt page is selected.

2. Press the Enter pushbutton. The brackets will extinguish and the data will blink.

3. Rotate the Data knob to select the differential altitude at which you wish the Mode C to be automatically selected. Note that if you select 0 feet, Mode C will be selected at unit turn on.

4. Press the Enter pushbutton to select the EFT Altitude.

4.2.3 MIN BRIGHTNESS

The STX 360 uses a photo cell to sense the ambient light conditions and automatically adjust the brightness of the display. This page allow the pilot to set the minimum brightness of the display to match other panel displays or his preference. Note that the maximum brightness is preset at the factory and not adjustable.

1. Rotate the Data knob to display the MIN Brightness page.

2. Press the Enter pushbutton. The brackets will extinguish and the display will show the level of the minimum brightness selected.

3. Rotate the Data knob clockwise to increase the minimum brightness and counter clockwise to decrease the minimum brightness to the desired level.

4. Press the Enter pushbutton.

4.2.4 DEFAULT VFR CODE

The factory default VFR code is set to 1200, the normal US VFR code. The pilot can change the VFR code to the one used in his local area.

1. Rotate the Data knob to select DEFAULT VFR

2. Press the Enter pushbutton. The brackets will extinguish and the first digit in the squawk code will blink, indicating it is ready for programming.

3. Rotate the Data knob to select the desired digit.

4. Rotate the Select knob clockwise and the second digit will blink showing that it can now be programmed.

5. Continue 3 and 4 above until all digits are programmed to the desired squawk code.

6. Press the Enter pushbutton.

4.2.5 Exit User Set Up Mode

To exit the user set up mode, Press the Mode pushbutton once

4.3 UAT Tranceiver Functionality – Main Menu

The main menu has 8 pages, with each page shown as a solid bar at the bottom of the UAT display. Page 1 displays traffic, page 2 displays METAR data, page 3 displays WAAS GPS information, page 4 displays LCD brightness, page 5 displays call sign/tail number, page 6 displays communication status and aircraft voltage, page 7 displays

software information. Each of these pages can be selected by rotating the Select knob clockwise or counter clockwise to the highlighted page. Once a page is selected, the Select knob, Data knob and Data button are used to change/select values on each page.

Figure 21: STX 360 front panel functionality

1 – [MODE] Left Encoder with push button

2 – VFR Button

3 – IDENT Button

4 – Pages available on main menu. Highlighted bar is the current page.

5 – Message Button

The STX 360 displays errors/notifications in the Message page. Message indicator field (left side of display) blinks when a new message arrives and stays highlighted as long as there are active messages. Once all the messages becomes inactive, the highlight goes away. The system could generate the following five messages.

Message	Priority Level
INVALID ICAO ADDRESS	1
GPS POSITION ERROR	2
TRANSMIT INCAPABLE	3
GDL90 FAULT	4
ANONYMOUS NOT ACTIVE	5
EMERGENCY NOT ACTIVE	6

Table 13: STX 360 messages and priority

When multiple messages are active, the messages shall be listed on a scrollable list based on their priority as listed in Table 13. The highest priority message will be listed at the top.

6 – Emergency Button

Emergency button adds the convenience of built in emergency squawk codes.

7 – Light Sensor

8 – [Select / Data] Dual concentric Encoder with push button

4.3.1 Traffic display screen

When the unit powers up, the STX 360 defaults to the first page. This first page displays the traffic. Items that can be changed on this window are:

Each of these items above can be easily changed by first rotating the Data knob one rotation and then rotating the Select knob to the desired function (highlighted). Once the desired function is highlighted, the Data knob is rotated to pick the correct setting by rotating clockwise or counter clockwise.

Field	Possible Values
Range	0.2, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 40 nm
Traffic Type	BOTH, ON GND, IN AIR
Altitude Disc in Flight Level	±10,15,20,25,30,35,40,45,50,60,70,80,90,99
Track Type	TRK UP, NRTH UP
Ownship Position	Bottom of the screen to Top of the screen.

4.3.2 METAR display screen

Rotating the Select knob clockwise one click (page 2) displays the METAR page. METARs are acquired over time through ground stations and aircraft. The newest airport information will show on top while the last will be the bottom of the list. The left pane displays the airport and the right pane displays the METAR data.

4.3.3 GPS Information screen

Rotating the Select knob clockwise two clicks (page 3) displays the GPS page. This page displays the latitude and longitude, GPS altitude, UTC time, ground speed and On Ground/In air status. This allows the user to easily see GPS information in a clear and concise format. GPS page shall display above listed information if they are available, otherwise dashes are displayed.

4.3.4 brightness display screen

The brightness page displays/controls the current LCD brightness in terms of percentage. Turning the Top Right Encoder clockwise/counter clockwise while on Brightness Page shall increase/decrease the brightness of the display in between 4% to 100% and set the brightness to the selected value disabling the auto brightness adjustment.

4.3.5 CALL SIGN / TAIL number display screen

The call sign/tail number page allows the user to change the flight id to match to the aircraft. Additionally the mode C transponder anonymous mode can be changed from this screen.. It must be noted that the anonymous mode can only be used in VFR mode.

The following steps **shall** be followed to edit a FLIGHT ID.

1. Press Right Encoder Switch to enable field selection on the current page.
2. Use Bottom Right Encoder to select the FLIGHT ID for editing.

3. Press Right Encoder Switch to initiate editing.
4. Only the first character will be present.
5. Use the Top Right Encoder to select an alphanumeric character.
6. Turn the Bottom Right Encoder clockwise to move to the next character.
7. Steps 5 and 6 can be repeated up to 8 times to select 8 FLIGHT ID characters.
8. Turning the Bottom Right Encoder counter clockwise will delete the previously entered characters.
9. Pressing Right Encoder Switch at any time will set the new Flight Id.
10. No activity for 5±1 seconds will timeout the editing and will restore the previous flight id.

ANONYMOUS MODE field could be selected to be either YES or NO. The following steps shall be followed to change the ANONYMOUS MODE state:

1. Press Right Encoder Switch to enable field selection on the current page.
2. Use Bottom Right Encoder to select the ANONYMOUS MODE for editing.
3. Turn Top Right Encoder to select between YES or NO.
4. Pressing Right Encoder Switch or no activity for 5±1seconds will timeout the editing.

If ANONYMOUS MODE is selected YES when the Squawk Code is not the same as the VFR code (coded setup during configuration), it shall keep the ANONYMOUS MODE to NO and display a message “NOT IN VFR MODE” until Right Encoder Switch is pressed.

4.3.6 Status Information screen

The Status screen displays how many towers were communicated with,

4.3.7 Software information display screen

4.4 UAT system configuration

4.4.1 GPS1 SOURCE

GPS 1 Source	
	Not Installed
	GARMIN ADSB OUT
	GARMIN ADSB OUT+
	FFS1201
	ARINC 429 1
	ARINC 429 2

4.4.2 GPS2 source selection screen

GPS 2 Source	
	Not Installed
	GARMIN ADSB OUT
	GARMIN ADSB OUT+
	FFS1201
	ARINC 429 1
	ARINC 429 2

4.4.3 Airdata source selection screen

Air data Source	
	Not Installed
	SANDIA ICARUS
	SANDIA EXTENDED
	GARMIN Z FORMAT
	SAI 340
	KING C
	ARINC 429 1
	ARINC 429 2

4.4.4 Radar Altimeter source selection screen

RALT Source	
	NOT INSTALLED
	ARINC 429 1
	ARINC 429 2

4.4.5 Altitude source selection screen

Altitude Source	
	Pressure – ADC
	GEOMETRIC – GPS

4.4.6 AIR/GROUND Discrete selection screen

AIR / GROUND DISCRETE	
	VALID
	INVALID

4.4.7 AIR VEHICLE LENGTH

Menu of lengths from < 15 m to >85m and widths from < 23m to > 80m

Air Vehicle Length	
	Not Available
	Length <15m Width<23m
	Length <25m Width<28.5m
	Length <25m Width<34m
	Length <35m Width<33m
	Length <35m Width<38m
	Length <45m Width<39.5m
	Length <45m Width<45m
	Length <55m Width<45m
	Length <55m Width<52m
	Length <65m Width<59.5m
	Length <65m Width<67m
	Length <75m Width<72.5m
	Length <75m Width<80m
	Length <85m Width<80m
	Length >=85m Width>=80m

4.4.8 GPS 0 ANTENNA LAT OFFSET MENU

GPS 0 ANTENNA LAT OFFSET	
	NOT AVAILABLE
	2 METERS TO LEFT
	4 METERS TO LEFT
	6 METERS TO LEFT
	0 METERS TO RIGHT
	2 METERS TO RIGHT
	4 METERS TO RIGHT
	6 METERS TO RIGHT

4.4.9 GPS 0 ANTENNA LON OFFSET MENU

GPS 0 ANTENNA LON OFFSET
NOT AVAILABLE
OFFSET APPLIED BY GPS
2 METERS FROM NOSE
4 METERS FROM NOSE
6 METERS FROM NOSE
8 METERS FROM NOSE
10 METERS FROM NOSE
12 METERS FROM NOSE
14 METERS FROM NOSE
16 METERS FROM NOSE
18 METERS FROM NOSE
20 METERS FROM NOSE
22 METERS FROM NOSE
24 METERS FROM NOSE
26 METERS FROM NOSE
28 METERS FROM NOSE
30 METERS FROM NOSE
32 METERS FROM NOSE
34 METERS FROM NOSE
36 METERS FROM NOSE
38 METERS FROM NOSE
40 METERS FROM NOSE
42 METERS FROM NOSE
44 METERS FROM NOSE
46 METERS FROM NOSE
48 METERS FROM NOSE
50 METERS FROM NOSE
52 METERS FROM NOSE
54 METERS FROM NOSE
56 METERS FROM NOSE
58 METERS FROM NOSE
60 METERS FROM NOSE

4.4.10 GPS 1 ANTENNA LAT OFFSET MENU

GPS 1 ANTENNA LAT OFFSET
NOT AVAILABLE
2 METERS TO LEFT
4 METERS TO LEFT
6 METERS TO LEFT
0 METERS TO RIGHT
2 METERS TO RIGHT
4 METERS TO RIGHT
6 METERS TO RIGHT

4.4.11 GPS 1 ANTENNA LON OFFSET MENU

GPS 1 ANTENNA LON OFFSET
NOT AVAILABLE
OFFSET APPLIED BY GPS
2 METERS FROM NOSE
4 METERS FROM NOSE
6 METERS FROM NOSE
8 METERS FROM NOSE
10 METERS FROM NOSE
12 METERS FROM NOSE
14 METERS FROM NOSE
16 METERS FROM NOSE
18 METERS FROM NOSE
20 METERS FROM NOSE
22 METERS FROM NOSE
24 METERS FROM NOSE
26 METERS FROM NOSE
28 METERS FROM NOSE
30 METERS FROM NOSE
32 METERS FROM NOSE
34 METERS FROM NOSE
36 METERS FROM NOSE
38 METERS FROM NOSE
40 METERS FROM NOSE
42 METERS FROM NOSE
44 METERS FROM NOSE
46 METERS FROM NOSE
48 METERS FROM NOSE
50 METERS FROM NOSE
52 METERS FROM NOSE
54 METERS FROM NOSE
56 METERS FROM NOSE
58 METERS FROM NOSE
60 METERS FROM NOSE

4.4.12 EMITTER CATEGORY

Emitter Category	
	No Aircraft Information
	Light < 15500 lbs
	Small 15500 to 75000 lbs
	Large 75000 to 300000 lbs
	high vortex large
	Heavy > 300000 lbs
	Highly Maneuverable > 5G
	Rotorcraft
	Glider Sailplane
	Lighter than air
	Parachutist Sky Diver
	Ultralight Glider
	Unmanned Aerial Vehicle
	Transatmospheric Vehicle
	Surface Emergency Vehicle
	Surface Service Vehicle
	Point Obstacle
	Tethered Balloons
	Cluster Obstacle
	Line Obstacle

4.4.13 OUTPUT MESSAGE FORMAT MENU

Output Message Format	
	GDL 90
	RAW

4.4.14 ETHERNET FORMAT MENU

Ethernet Format	
	GDL 90
	WINGX PRO
	FOREFLIGHT

4.4.15 CALL SIGN ID TRANSMIT MENU

Call Sign ID transmit	
	ENABLED
	DISABLED

4.4.16 STALL SPEED

Configurable from 0 Knots to 150 Knots

4.4.17 ADC ALTITUDE ACCURACY

Configurable from 0 Feet to 125 Feet

4.4.18 GPS LON OFFSET

Configurable from 0 Feet to 125 Feet

4.4.19 MAX GROUND MSG PER SEC

Configurable from 1 message per second to 5 messages per second

4.4.20 AUTO MODE C ALTITUDE

Configurable from 0 Feet to 500 Feet

4.4.21 XPDR REPLY RATE LIMIT

Configurable from500 replies per second to 12 replies per second

4.4.22 A/C LOW VOLTAGE THRESHOLD

Configurable from 10 Volts to 32 Volts

4.4.23 Default VFR

Squawk code default is 1200, however this squawk code can be defaulted to any squawk code. Once configured, pressing the VFR button will show the defaulted squawk code.

4.4.24 ICAO ADDRESS

ICAO address default is ADFBA4, however this address can be set from 000000 to FFFFFF. This is accomplished by pressing the data encoder to highlight the digit. The highlighted digit is then changed by turning the data encoder clockwise/counterwise. Once the correct value is selected, turning the select clockwise/counterwise to advance to the next/previous digit. Pressing the Data button will deselect the highlighted value. Once the new address is correct and shown with brackets, press the Mode button to return to main menu.

4.5 Continued Airworthiness

4.5.1 STX 360 Panel Mounted Unit

Continued Airworthiness of the STX 360 panel mount is on condition only

4.5.2 STX 360R Remote

Continued Airworthiness of the STX 360R Remote is on condition only

5.0 Wiring Interconnection diagrams

This section shows the different types of equipment that interface with the STX 360 SENTINEL.

Appendix A – Sandia Aerospace STX360 configuration application

Figure 22: Sandia Aerospace Configuration tool

This appendix describes the Sandia Aerospace configuration tool that can be used for configuring all menus described in section 4.4 UAT system configuration . Following the steps below for configuring the STX 360 and STX 360R.

1. Make sure the Windows computer that will be used has a serial port or a USB to serial port adapter working prior to the next step.
2. Go to www.sandia.aero and get the lastest STX 360 Configurator installer download.
3. Run the windows installer and follow the steps.
4. Before running the program, make sure to connect the serial port on the PC to the maintenance port on the STX 360. Please see pin out information located in section 3.7.2, section 3.7.3 and figure 26 shows the the minimum interfaces while using the STX 360 Configurator.
5. Connect an altitude encoder as shown in figure 16. Verify all connections per section 3.7.2 and section 3.7.3.

6. Connect an WAAS GPS source as shown in figure 14. Verify all connections per section 3.7.2 and section 3.7.3.
7. Ensure the STX 360 antenna port is connected to a load /antenna prior to powering up the unit.
8. Power up the STX 360, the green light should be present. If not check the wiring connection to the maintenance port [pins 6, 7].
9. Once connections are made, run the software. The software will try to communicate with the STX 360. If a connection is made, a green light will be visible on the top right corner of the software. This indicates a communication link has been established.
10. Select the proper GPS timing source from the pull down menu.
11. Power GPS and make sure it is connected to the STX 360. If the connections are correct, GPS status information should be present. If only dotted lines are present, review the connections between the STX 360 and the GPS. Additionally make sure the correct GPS is selected from the pull down menu.
12. Select the proper encocoder from the pull down menu.
13. Power Encoder and make sure it is connected to the STX 360. If the connections are correct, encoder status information should be present. If only dotted lines are present, review the connections between the STX 360 and the encoder. Additionally make sure the correct encoder is selected from the pull down menu.
14. The other pull down menus are for configuring the STX 360 and as long as the STX 360 light is green, the data selected will be sent to the STX 360.

Below are error conditions when STX 360 link is not established, GPS link failure and Encoder link failure:

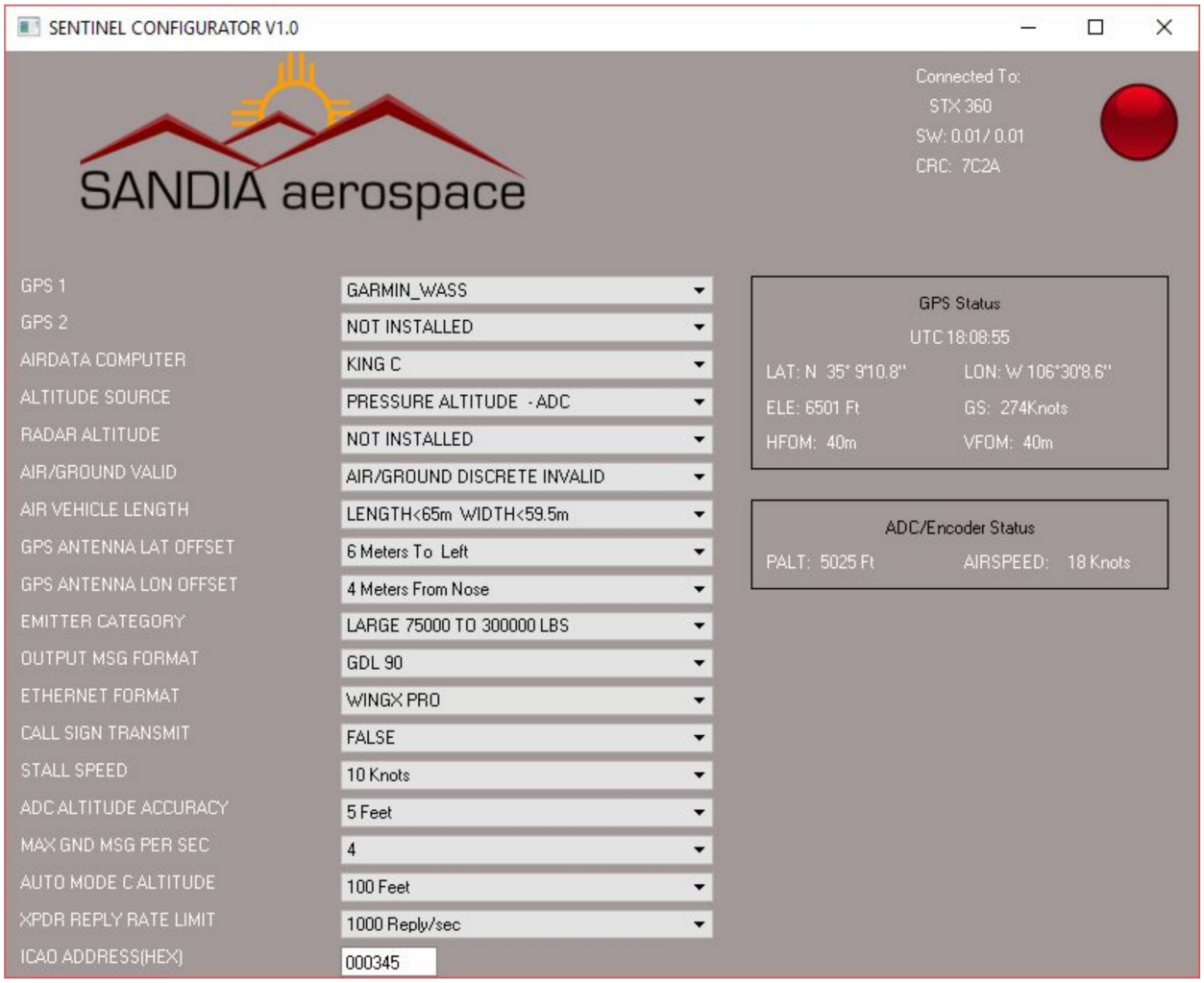

Figure 23: Failure to establish link to STX 360 with Sandia Aerospace configuration tool

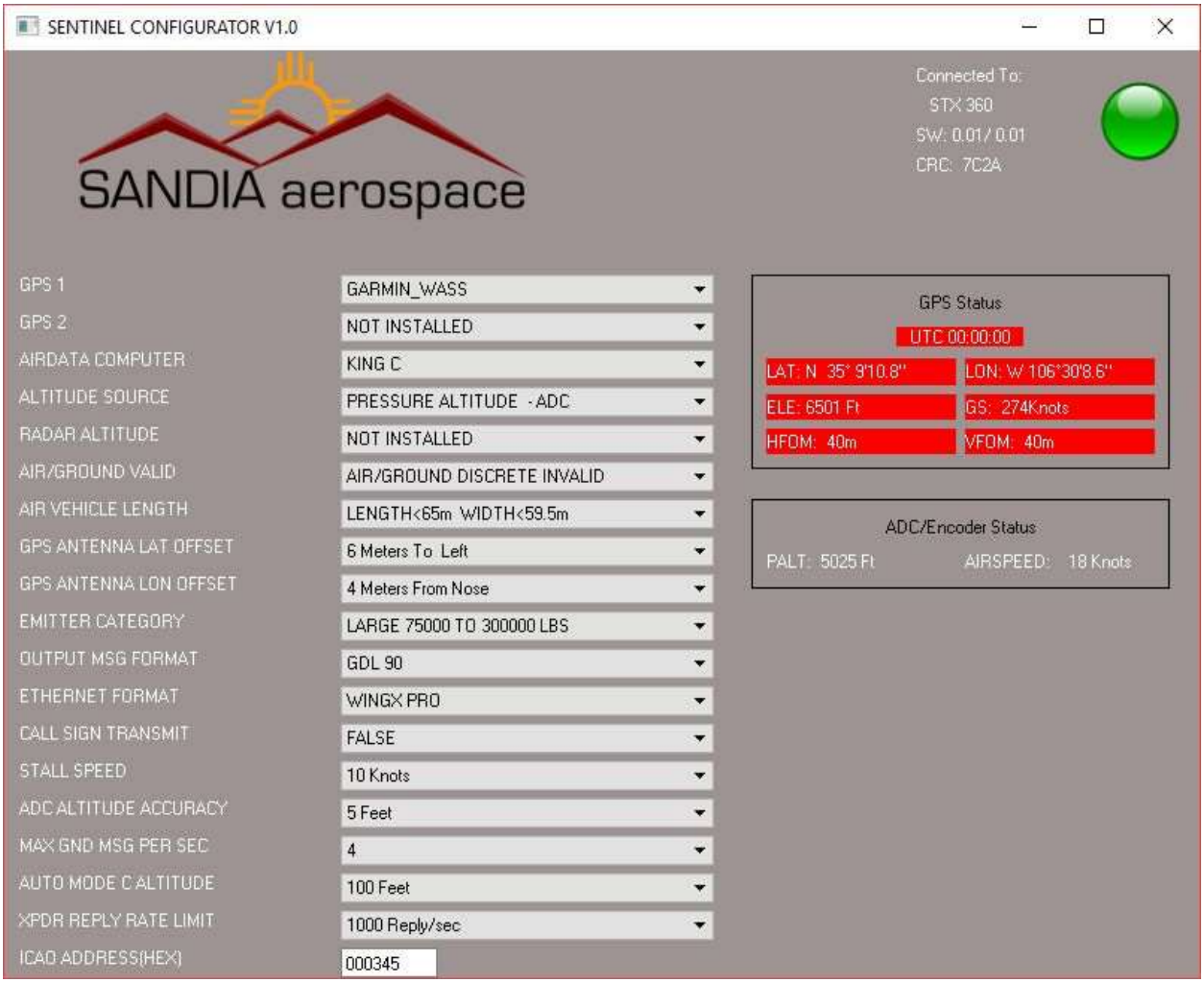

Figure 24: Failure to establish link with GPS

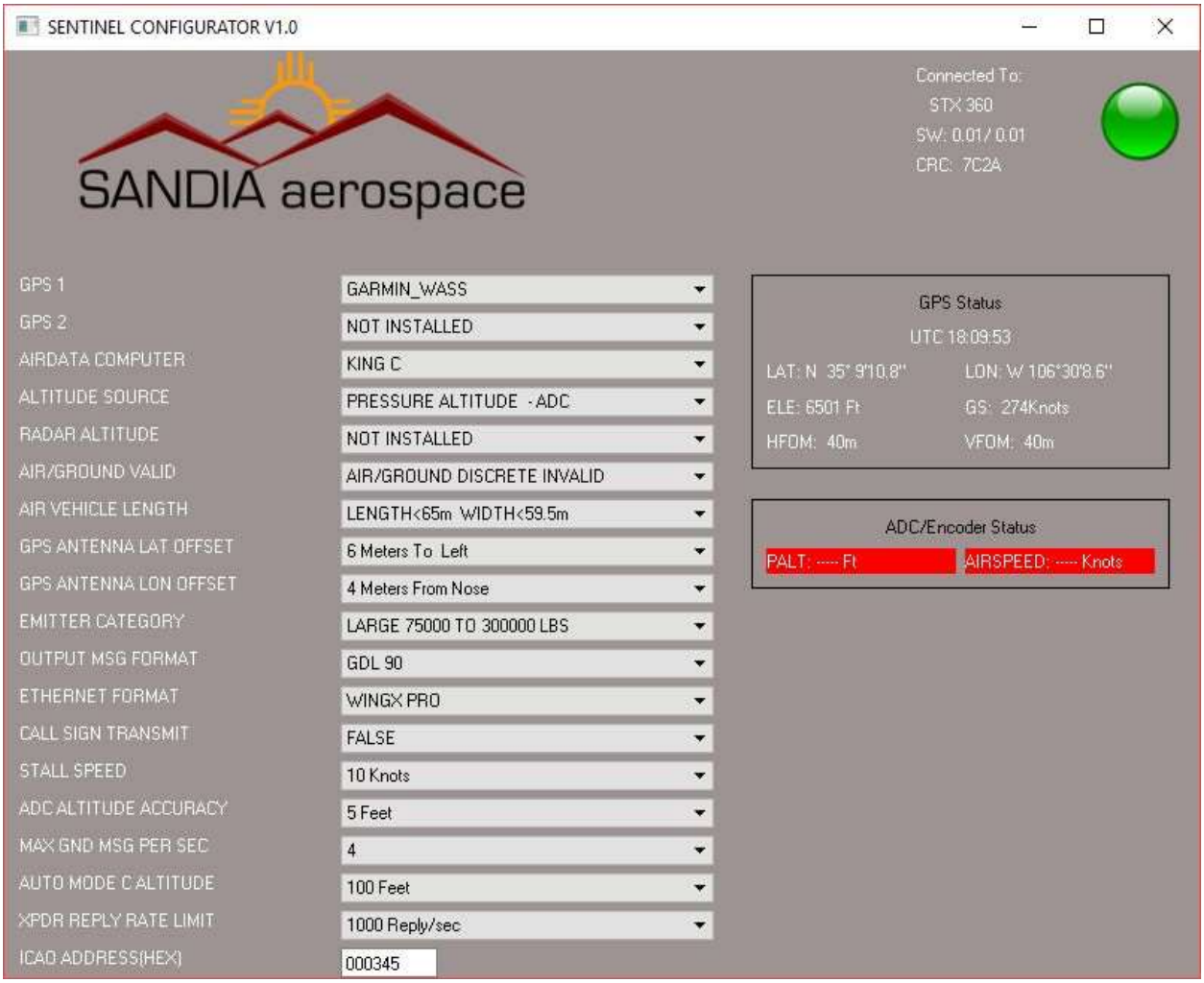

Figure 25: Failure to establish link with Encoder

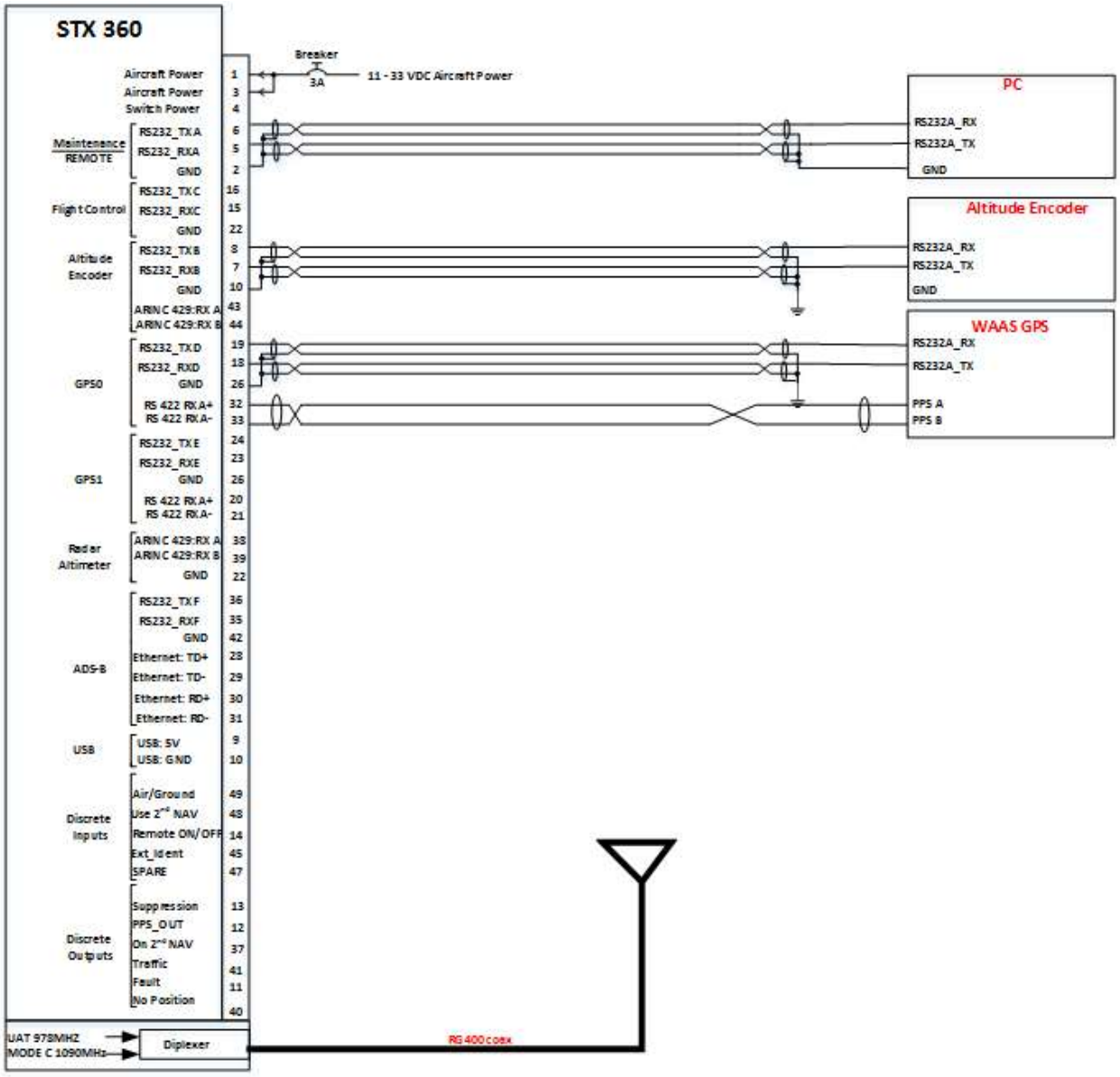

Figure 26: Minimum system setup when using the STX 360 Configuator software