SkyTrax Series ADS-B Receiver Installation Manual

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1. Introduction

1.1 Acronyms

ADC	Air Data Computer
ADS-B	Automatic Dependent Surveillance Broadcast
ADS-R	Automatic Dependent Surveillance Rebroadcast
AHRS	Attitude Heading Reference System
ATC	Air Traffic Control
CCA	Circuit Card Assembly
CDTI	Cockpit Display of Traffic Information
DME	Distance Measuring Equipment
EFIS	Electronic Flight Information System
FCC	Federal Communications Commission
FAA	Federal Aviation Administration
FIS-B	Flight Information Services Broadcast
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
IFD	Integrated Flight Display
MFD	Multifunction Display
PC	Personal Computer
SBAS	Satellite-based Augmentation System
STC	Supplemental Type Certificate
SkyTrax	Traffic Advisory System
TCAS	Traffic Collision Alert System
TIS-A	Traffic Information Services provided by Mode S transponder
TIS-B	Traffic Information Services Broadcast
TSO	Technical Standard Order
UAT	Universal Access Transceiver
WAAS	Wide Area Augmentation System

1.2 Overview

This manual applies to the Avidyne SkyTrax 1xx and SkyTrax 2xx series of products, which will be collectively referred to as simply SkyTrax in the remainder of this manual. Where a specific model is being referenced, the full model name will be used. The SkyTrax system consists of a remote-mounted receiver and one external antenna. ADS-B, ADS-R and TIS-B traffic information is provided by all SkyTrax models. SkyTrax models with a UAT receiver are capable of receiving FIS-B weather data. The SkyTrax does not provide ADS-B out functionality.

The SkyTrax 1xx series of products provide ADS-B In capability for a single frequency (either 978MHz UAT or 1090MHz). The SkyTrax 2xx series of products provides dual-frequency ADS-B In capability.

All interfaces will be to aircraft equipment installed via separate installation approvals ; Avidyne Corporation's FlightMax EX600/EX500 Multifunction Display (MFD), Avidyne IFD4XX / IFD5XX Nav/Com/GPS/displays, Aspen EFD1000 displays, and Avidyne Release 9 Integrated Cockpit system. Function of other displays that may be compatible based on interface type must be validated by the installer.

This installation is intended for aircraft listed in STC SA00401BO Approved Model List, Avidyne document AVMLB-003.

Note that the AML for STC SA00401BOis restricted to Part 23 Class I and Class II (aircraft under 6000 lbs.) airplanes.

2. Installation Considerations

2.1 Installation

This manual stipulates the requirements for an airworthy installation under STC SA00401BO.

The Antenna must be installed no less than 2 feet from any L-Band (Transponder, TCAS, TAS, DME) antenna. Failure to adhere to this critical installation note will result in failure of the SkyTrax Receiver.

The STC does not support antenna installations on pressure vessels or composite aircraft without additional approved data. If additional approved data is required, contact Avidyne for guidance.

The STC has been evaluated to support FAR23 Class I and II aircraft in accordance with the current Approved Model List.

Installation of the SkyTrax in other aircraft classes will require alternate means of approval; i.e. STC, Field Approval.

2.2 Accessories and Packing List

2.2.1 Unpacking Equipment

Carefully unpack the equipment from the shipping container. Inspect the SkyTrax Receiver unit and the package contents for evidence of shipping damage. Retain the shipping container and packaging material for reshipment if necessary.

2.2.2 Package Contents

The items included in the SkyTrax package are listed in Tables 2-1and 2-2.

Table 2-1: SkyTrax Package Contents

Ship Kit Part Number	Qty	Description
850-00228-100	1	700-00190-100 SkyTrax Receiver and the associated Connector Kit (see Table 2-2 for details)
850-00228-101	1	700-00190-100 SkyTrax Receiver only

Table 2-2: SkyTrax Connector Kit Contents

Part Number	Qty	Description
205167-1	1	Receptacle Female, DSUB 37-pin
DC-24660-33	1	DSUB 37-pin back-shell
DC-51222-1	1	Connector DSUB Latch Slide 37 position
M39029/63-368	20	Crimp contact, DSUB, 20 to 24 AWG wire

3. Equipment Description

This unit receives messages from other ADS-B Out equipped aircraft and receives TIS-B and ADS-R messages from ADS-B Ground Stations. Models equipped with a UAT receiver will also receive FIS-B weather data from ADS-B Ground Stations. Data received by the SkyTrax Receiver is output to a display device.

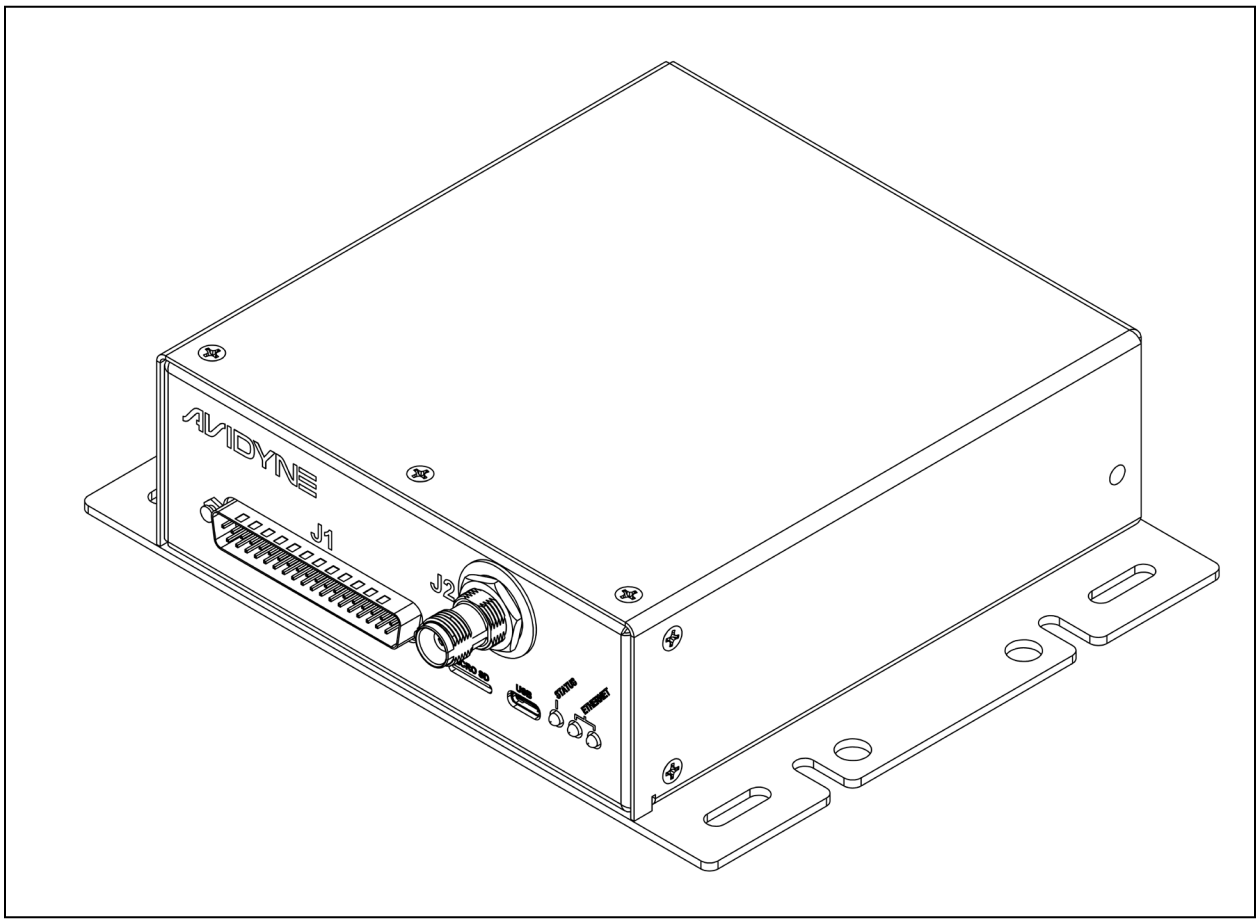


Figure 3-1: SkyTrax UAT Receiver

3.1 Overall Specifications

This section includes the physical, electrical, performance and environmental specifications for the SkyTrax ADS-B Receiver.

3.1.1 Physical

Height:	2.036 inches
Width:	7.367 inches (includes mounting bracket)
Depth:	6.812 inches
Weight:	1.3 lbs (excluding cables)

3.1.2 Environmental

Operating temperature:	-55°C to +70°C
Storage temperature:	-55°C to +85°C
Temperature variation:	5°C per minute
Maximum continuous altitude:	55,000 feet
External Cooling:	Not required

3.1.3 Electrical

Voltage:	9-33VDC
Input Current (6W nominal):	Steady State: 0.52A @ 14VDC 0.26A @ 28VDC

3.1.4 UAT Performance

Frequency:	978MHz
Tolerance:	± 20ppm
Data Rate:	1.04167 Mbps
Receiver Sensitivity:	Exceeds 90%MSR@-93dBm
Equipment Class:	A1S (single bottom UAT antenna)

3.1.5 1090ES Performance

Frequency:	1090MHz
Tolerance:	± 5.5MHz
Data Rate:	1 Mbps
Receiver Sensitivity:	-72dBm
Equipment Class:	A0 (single bottom UAT antenna)

3.1.6 Avionics Interfaces

Annunciator Outputs:	Capable of sinking 500mA for turning on annunciator lamp
Control Port:	RS232 asynchronous serial
Maintenance Port:	USB asynchronous serial
External Position Input:	RS232 asynchronous serial, or; ARINC743A GNSS sensor
Display/Control:	RS232 asynchronous serial (Pass-through or Traffic Alert interfaces) ARINC735 Traffic interface

3.1.7 Latency Timing Performance

Traffic Latency	Maximum traffic latency within the SkyTrax = 1.75 seconds
Ownship Position Latency	Maximum ownship position latency within the SkyTrax = 1.75 seconds Maximum ownship position latency from the position source = 1.0 seconds
Display Latency	Maximum permitted latency from receiving a traffic update to displaying an updated to the pilot = 0.75 seconds

3.1.8 Software Part Numbers

Table 3-1: Software Part Numbers.

Nomenclature/Name	Module/Component	P/N	Revision
SkyTrax System – SkyTrax 100B		700-00190-100	00
SkyTrax Field Loadable Components		530-00245-XXX	00
Flight Code	CPU	510-00347-000	00
Boot-Loader	CPU	510-00284-000	02
FPGA Flight Image	FPGA	052-00197-000	00
3.2 SkyTrax System – SkyTrax 200		700-00190-100	01
SkyTrax Field Loadable Components		530-00247-XXX	00
Flight Code	CPU	510-00350-000	00
Boot-Loader	CPU	510-00284-000	03
FPGA Flight Image	FPGA	052-00197-000	01

3.3 System Configurations

The SkyTrax Receiver may be configured with a GPS position source (required for traffic reception, but not required for FIS-B weather reception). The SkyTrax Receiver may also be configured with an indicator (e.g. IFD4XX, IFD5XX) to display ADS-B, ADS-R, TIS-B traffic and FIS-B weather. Figure 3-2 depicts the typical SkyTrax Receiver system configuration.

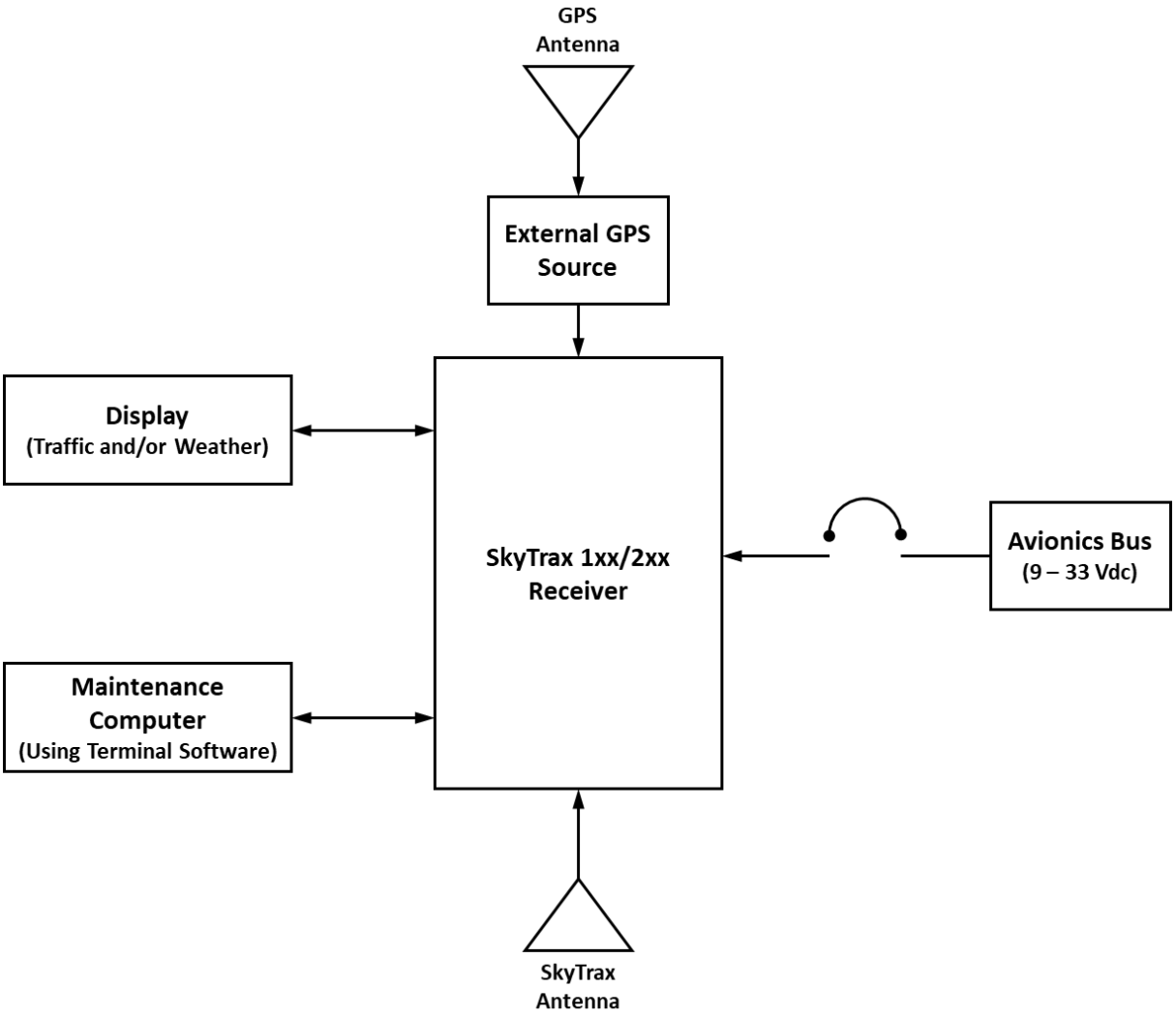


Figure 3-2: SkyTrax Receiver with External Compliant GPS

3.3.1 GPS Position Source

If traffic is to be displayed, then the SkyTrax must be configured with a GPS position source input. The GPS position source may be obtained externally via RS-232 (using ADS-B+ G or ADS-B+ G2 format) or ARINC-743. GPS position input sources to the SkyTrax other than from equipment identified in this manual must be verified by the installer.

3.3.2 Display

The SkyTrax outputs traffic and weather information to compatible displays. Traffic information can be provided using the Capstone protocol over an RS-232 interface (refer to section 3.7.3.2), or the ARINC-735B TCAS protocol over an ARINC-429 interface (refer to section 3.7.4). SkyTrax systems with UAT capability can also provide weather information using the Capstone protocol over an RS-232 interface. The SkyTrax Capstone output can be configured to provide traffic-only, weather-only or both traffic and weather. A display with multiple available communications interfaces can take advantage of the traffic-only and weather-only interfaces by dedicating the full bandwidth of one interface to traffic and the full bandwidth of a second interface to weather. The ability to display traffic and/or weather depends on the display device and software version. The following displays support the display of traffic and/or weather:

Table 3-2: Compatible Displays.

Avidyne Display	SkyTrax Output	Comments
IFD4XX, IFD5XX	Capstone RS-232	Requires software 10.2.0 or later, Trfc + Wx
IFD4XX, IFD5XX	Capstone RS-232 High Speed	Requires software 10.2.1 or later, Trfc + Wx
IFD4XX, IFD5XX	ARINC429	Requires software 10.0 or later, Trfc only
EX5000 MFD	Capstone RS-232	Requires software 8.2.1 or later, Wx only
EX5000 MFD	ARINC429	Requires software 8.2.1 or later, Trfc only
EX500, EX600 MFD	Capstone RS-232	Requires software 4.2.1 or later, Wx only
EX500, EX600 MFD	ARINC429	Requires software 4.2.1 or later, Trfc only
IFD5000 R9 IFD	Capstone RS-232	Requires software 9.4 or later, Wx only
IFD5000 R9 IFD	ARINC429	Requires software 9.4 or later, Trfc only
Aspen Display	SkyTrax Output	Comments
EFD1000	Capstone RS232	Requires software 2.8.3 or later Trfc + Wx
EFD1000	ARINC429	Requires software 2.8.3 or later Trfc only

3.3.3 Maintenance Port

The SkyTrax provides a communication port that is used to configure and monitor the status of the SkyTrax system via a computer. The maintenance port is required to be used to configure the ICAO Address, NACv Value, and to manually configure the RS232 com Tx ports if required. The SkyTrax should automatically "Discover" the RS232 Rx inputs. The maintenance port is located on the front of the SkyTrax and is a USB type C jack.

3.3.4 SkyTrax Configuration

The SkyTrax uses the internal Command Interface for configuration and troubleshooting. The Command Interface can be accessed using a computer running terminal emulation software by connecting it to the SkyTrax USB Maintenance Port. A USB type A to USB type C cable will typically be required to connect the computer to the SkyTrax.

3.4 Antenna Requirements

3.4.1 Antenna

The SkyTrax requires one antenna meeting the following specification: standard 50Ω vertically polarized L band antenna rated for 978MHz and 1090MHz. Table 3-4 contains a list of antennas that are recommended for use with the SkyTrax.

3.5 Installation

This section describes the installation of the SkyTrax Receiver and Antenna including mounting, wiring, and connections. A post installation checkout procedure is included at the end of this section.

3.5.1 Pre-Installation Information

Read this entire section before proceeding with the installation of the SkyTrax.

Perform the post installation checkout described in Section 3.8 prior to closing the work area to resolve wiring, mounting and configuration issues should they occur.

Follow avionics installation practices per FAA Advisory Circular (AC) 43.13-1B, 43-13-2A, or FAA approved revisions to these documents.

Perform an electrical load analysis on the aircraft prior to installation to ensure that the aircraft's electrical system is capable of carrying the SkyTrax load. Section 3.6.2 describes the power consumption of the SkyTrax.

3.5.2 Installation Overview

Installation of the SkyTrax Receiver and antenna requires determination of the location of the Receiver, circuit breaker, antenna, and cable/wire routing to interfacing equipment.

Installation of the identified compatible traffic/weather display is not covered in this manual and should be installed in a manner approved by the FAA.

Table 3-3 identifies the parts list for the installation of the SkyTrax. Everything except The SkyTrax is installer provided.

Table 3-3: SkyTrax Installation Parts List

Description	Qty.	Part Number	Model Number	Supplier
978MHzUniversal Access Transceiver (UAT) and /1090MHz Receiver (including items listed in Table 2-1 and Table 2-2)	1	700-00190-100	SkyTrax	Avidyne
UAT Indicator/Display *– all compatible displays listed*	1	700-00179-() 700-00182-() 700-00004-() & 700-00030-() 700-00007-() 700-00167-() 700-00083-() 700-0194-() 700-00195-() 910-00001-00X	IFD4XX IFD5XX EX5000 EX500 EX600 IFD5000 (R9) Atlas Helios EFD1000	Avidyne Aspen
(FAA TSO-C66c, TSO-C74c) UAT Antenna	1	See Table 3-2		
Circuit Protection 3A Circuit Breaker 14 Volt 2A Circuit Breaker 28 Volt	1	7277-5-2, 7277-5-3 7277-2-2, 7277-2-3 Or equivalent		Klixon Klixon
Receiver Attachment Hardware: Ring Terminal Bolts Steel Flat Washers Elastic Stop Nuts	 1 8 8 4	 323758 or equivalent AN3-3A or equivalent AN960-10L or equivalent MS21083-N3 or equivalent	 -	 Tyco
Antenna Attachment Hardware: Screws Steel Flat Washers Elastic Stop Nuts Doubling Plate	 AR AR AR 1	 MS24693-C27X or equivalent AN960L or equivalent MS21083-N3 or equivalent Locally Fabricated		
Wire	AR	MIL-W-22759/16 or equivalent		
Shielded Wire	AR	MIL-C-27500 or equivalent		
Coax Cable	AR	RG400 or equivalent		

Table 3-4: Acceptable Antennas

Manufacturer	Part Number	Connector
Comant	CI-110-40-30	C type
Comant	CI-110-41-30	C type
Comant	CI-110-60-30	C type
Comant	CI-110-61-30	C type

3.5.3 Tools Required

The D-Sub connector supplied with the SkyTrax uses crimp contacts.

Table 3-5: Acceptable crimp tooling

Type	Hand Crimping Tool	Positioner	Insertion/Extraction Tool
Military P/N	M22520/2-01	M22520/2-08	M81969/1-02
Positronic	9507	9502-5	M81969/1-02
AMP	601966-1	601966-5	91067-2
Daniels	AFM8	K13-1	M81969/1-02
Astro	615717	615724	M81969/1-02

3.5.4 SkyTrax Receiver Mounting

Select a mounting location on a sufficiently flat surface that has the ability to withstand the inertial forces imposed by the 1.3 pound receiver unit plus 0.5 pounds of cables. The CG of the unit is shown in the following figures. Reference AC 43.13-2B chapters 1 and 2 for installation and support structure requirements and guidance. Modification of primary aircraft structure will require separate approval. When locating the SkyTrax, allow for four inches of clearance on the connector side of the unit to provide room for wiring.

Mount the SkyTrax Receiver with 4 each AN3()A bolts, 4 each MS21083-N3 nuts and 8 each washers where the washers are placed on both the bolt and nut side. Nutplates such as MS21059-3 or MS21076-3 may be used in lieu of the nuts, installed using MS20426AD3 rivets. Bolt hole size should be 0.195 to 0.229 inches diameter. Refer to Figure 3-3 for the SkyTrax mounting hole pattern.

Refer to the bolt/nut fastener manufacturer for torque guidelines. The SkyTrax should be connected to the airframe ground via the mounting bolts or by use of a bonding strap such as MS25083-7AA().

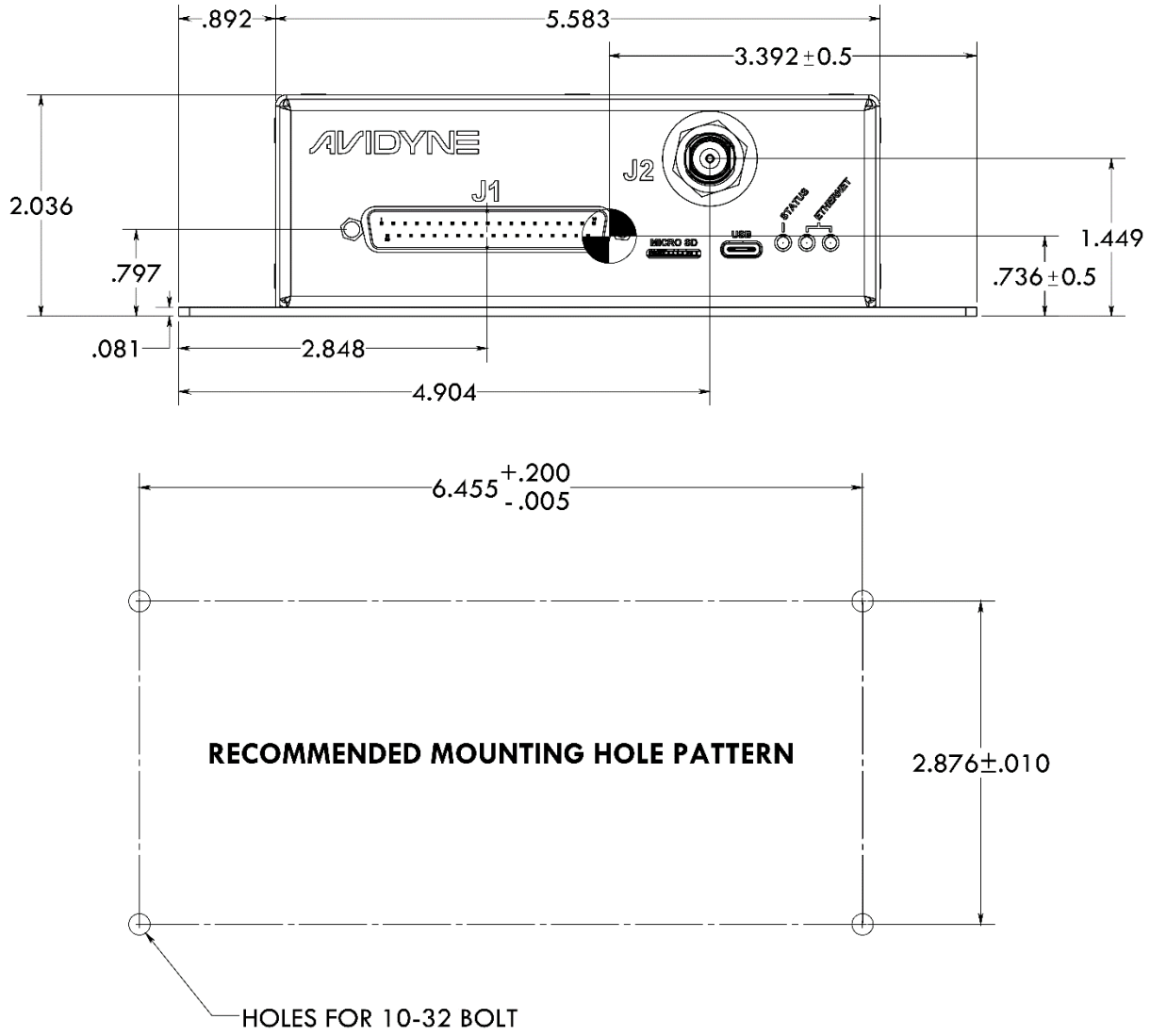
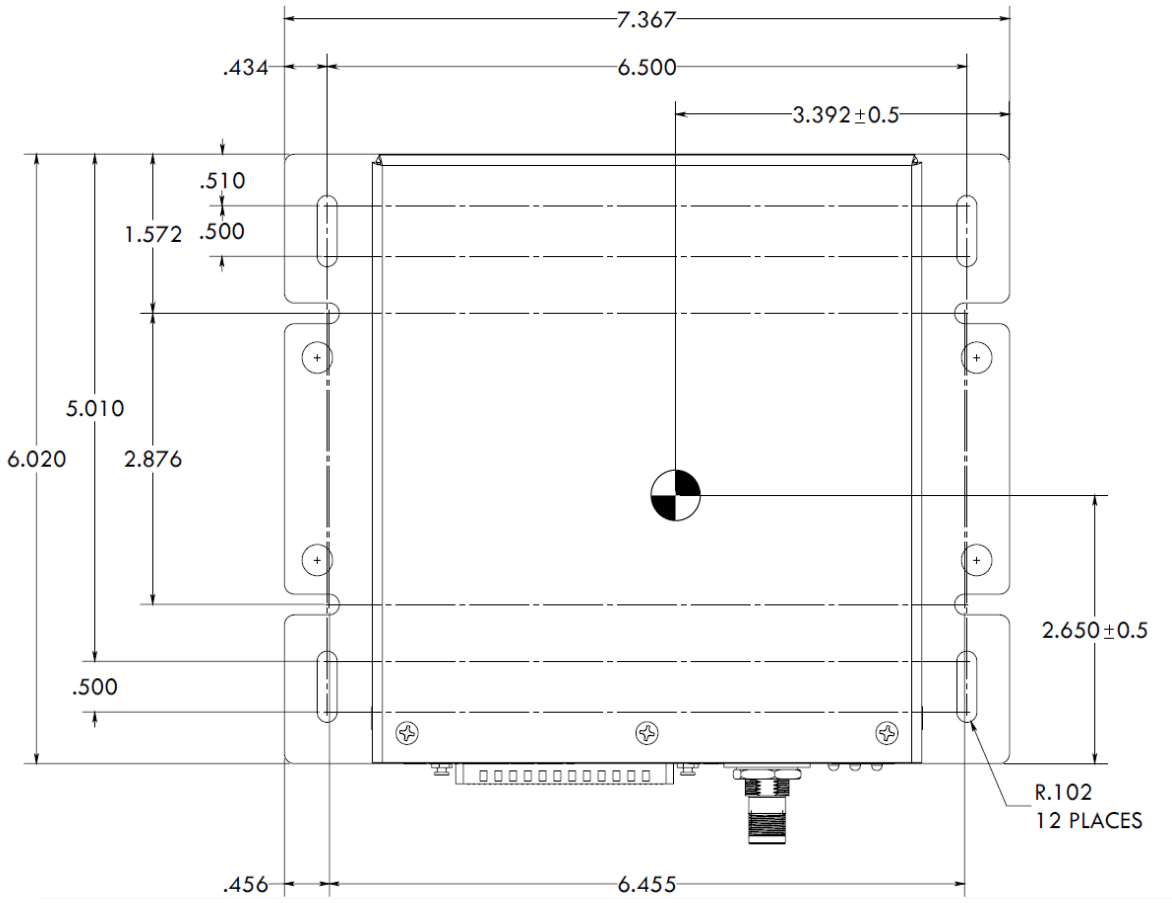


Figure 3-3: SkyTrax Mounting-Hole Pattern



3.5.5 SkyTrax Antenna Mounting

Select a mounting location on the underside of the aircraft that is at least 2 feet from any L-Band (Transponder, TCAS, TAS, DME) antenna and that will be aligned within +/-4 degrees of the longitudinal axis of the aircraft.

Reference AC 43.13-2B, Chapter 3 for installation and support structure requirements and guidance. A backing plate must be fabricated and installed that will restore the fuselage skin strength lost due to the antenna cable cutout as well as support the aerodynamic loads from the antenna as determined using the formula defined in AC 43.13-2B, Chapter 3, section303(e) and adequately distribute these loads to the fuselage structure. A separate approval may be required.

See Appendix C for mounting geometry for TSO-C66c and TSO-C74c Antennas.

3.5.6 Cabling and Wiring

Refer to the interconnect diagrams of Appendix A – Interconnect Diagrams for appropriate wiring connections to assemble the DB37 harness.

After the DB37 harness assembly is built and installed on the SkyTrax, route the wire bundle as appropriate. Use cable ties to secure the harness assembly. The ring terminals that are affixed to the cable shields of the harness assembly should be attached to ground via the DB-37 back shell cable clamp. See Figure 3-4 ground attachment.

The equipment wiring should be performed in accordance with AC 43.13-1B Chapter 11. Ensure that the harness assembly is not routed near high energy sources. Isolate the harness assembly from the engine. Install harness assembly in a protected area of the aircraft. Use 24 AWG or larger for all wiring except for power.

RG-400 coaxial cable is required for the Antenna. Antenna cable loss should not exceed 3 dB.

Figure 3-4: Clamp Ground Termination

3.5.7 Circuit Breaker

The circuit breaker is placarded as "UAT" or "ADSB RX", and the placard font size should be equivalent to the font size of the adjacent circuit breaker labels to ensure legibility. Select a mounting location that is co-located with the circuit breaker or fuse panel of the aircraft.

3.5.8 Air Circulation and Cooling

The SkyTrax meets all performance specifications without external cooling. However, as with all electronic equipment, lower operating temperatures will extend equipment life. It is not recommended to use outside forced air to cool the unit. Instead it is recommended that an electric forced air fan be installed to cool the equipment. If forced air cooling is installed, ensure that rainwater cannot enter or be sprayed on the SkyTrax.

3.6 Electrical Connections

The installation kit includes a D-Sub 37 pin connector and crimp contacts for the SkyTrax UAT Receiver. The crimp contacts are specified for 20 to 24 AWG wire. Route the harness to the SkyTrax. Cut to length, ensuring a small service loop exists for strain relief. For shielded cables, where the cable shield will not be grounded on the SkyTrax side, strip and trim the braided shield then cover the exposed area with heat shrink material to prevent the braid from contacting other wires in the bundle. Crimp and insert pins into the D-Sub 37 pin connector. After installing the pins, assemble the back shell for strain relief. Make the crimp connections with a crimp tool as specified in table 3.3

Table 3-6 describes the connectors supplied with the SkyTrax installation kit. The kit also contains crimp contacts for the D-Sub connector.

Table 3-6: Connectors

Ref	Description	Connector Type	Crimp Contact
P1	I/O	37 Pin D-Sub Receptacle	20-24 AWG socket contact
P2	Antenna	TNC jack	N/A

3.6.1 Protection

The SkyTrax is protected via a dedicated circuit breaker. Refer to guidelines in AC 43.13-1B, Chapter 11 Section 4. The circuit breaker is placarded with the description "UAT" or "ADSB RX".

Table 3-7: Circuit Breaker Protection

SkyTrax	14 VDC	28 VDC
**Circuit Protection	3 AMP	2 AMP

** If using a fuse, it must be a "slow blow" fuse type.

3.6.2 Electrical Current

Use Table 3-6 to aid in electrical load analysis computations.

Table 3-8: Electrical Load Requirement for P/N 700-00190-100

Input Voltage	14 VDC	28 VDC
Typical Current Consumption	0.52	0.26

3.6.3 DB-37 I/O Connector (P1)

A 37 pin D-Sub connector interfaces to external equipment and aircraft power. This connector can be found at the front of the SkyTrax unit.

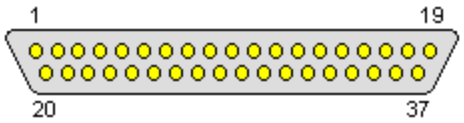


Figure 3-5: 37 Pin D-Sub Male Connector (P1) [View looking at SkyTrax]

The pin-out description for the I/O connector is defined in Table 3-9.

Table 3-9: I/O Connector Pin-Out (P1) for SkyTrax

Pin	I/O	Name	Description
1	--	Reserved	Reserved for future use
2	--	Reserved	Reserved for future use
3	--	Reserved	Reserved for future use
4	I	ARINC-429 Rx 2A	ARINC-429 Input Channel 2A
5	O	RS-232 Tx 1	RS-232 Transmit Port #1
6	--	Ground, Signal	Signal Ground
7	I	RS-232 Rx 3	RS-232 Receive Port #3
8	O	ARINC-429 Tx 1B	ARINC-429 Transmit Channel 1B
9	I	ARINC-429 Rx 1A	ARINC-429 Receive Channel 1A
10	O	Traffic Indicator	Discrete output for traffic (Ground = TA)
11	--	Reserved	Reserved for future use
12	O	Ethernet Tx -	10/100Base-T Ethernet Transmit -
13	I	Ethernet Rx+	10/100Base-T Ethernet Receive +
14	O	Status Indicator Out	Discrete Output for System Status (Ground = Fault)
15	O	RS-232 Tx 4	RS-232 Transmit Port 4
16	O	RS-232 Tx 2	RS-232 Transmit Port 2
17	--	Ground, Signal	Signal Ground
18	--	Power +	Main Aircraft Power Input (+9 to +33VDC)
19	--	Power +	Main Aircraft Power Input (+9 to +33VDC)
20	--	Reserved	Reserved for future use
21	--	Reserved	Reserved for future use
22	I	ARINC-429 Rx 2B	ARINC-429 Receive Channel 2B
23	--	Ground, Signal	Signal Ground
24	I	RS-232 Rx 1	RS-232 Receive Port 1

Pin	I/O	Name	Description
25	O	RS-232 Tx 3	RS-232 Transmit Port 3
26	--	Reserved	Reserved for future use
27	O	ARINC-429 TX 1A	ARINC 429 Transmit Channel 1A
28	I	ARINC-429 Rx 1B	ARINC-429 Receive Channel 1B
29	I	WOW	WOW discrete input (Low = on ground)
30	O	Ethernet Tx +	10/100Base-`T Ethernet Transmit +
31	I	Ethernet Rx -	10/100Base-T Ethernet Receive -
32	--	Ground, Signal	Signal Ground
33	I	RS-232 Rx 4	RS-232 Receive Port 4
34	I	RS-232 Rx 2	RS-232 Receive Port 2
35	--	Reserved	Reserved for Future Use
36	--	Power Ground	Main Aircraft Power Ground
37	--	Power Ground	Main Aircraft Power Ground

3.7 P1 Interface Descriptions

3.7.1 Power

Aircraft power is provided to the SkyTrax on the P1 I/O connector. The SkyTrax accepts input power from +9 to +33 VDC.

3.7.2 Discrete Interfaces

The SkyTrax has multiple optional discrete inputs and outputs to enhance the user experience.

3.7.2.1 WOW Input

The SkyTrax may be wired with a WOW input on pin 29 to display higher precision position information if both ownship and target are on the ground. Sends more traffic information to the display instead of FIS-B when on the ground. Configure the WOW source to provide a low input to the SkyTrax when on the ground.

3.7.2.2 Traffic Indicator

The SkyTrax will output a low from pin 10 to drive an external indicator lamp indicating a traffic alert.

3.7.2.3 Receiver Status Indicator

The SkyTrax has an internal status monitor from pin 14 that will output a low to drive an external lamp indicating a receiver failure.

3.7.3 Serial Interfaces

The SkyTrax provides four bi-directional RS-232 serial interfaces, one bi-directional USB interface, one bi-directional Ethernet 10/100Base-T interface, one ARINC 429 input/output, and one ARINC429 input. See Appendix A-2 for typical pinouts.

3.7.3.1 RS-232 GNSS Position Source

The SkyTrax may be wired to use the Avidyne IFD4XX or IFD5XX as its external GNSS Position Source input. The SkyTrax accepts RS232 data formatted in "ADS-B+ G (low speed 9,600 baud) or ADS-B+ G2 (high speed 38,400 baud)".

3.7.3.2 RS-232 Capstone Traffic and Weather

The SkyTrax provides four RS-232 serial interfaces. Each of these serial interfaces may be configured to provide Capstone traffic and/or weather data. The Capstone interfaces is a somewhat standard interface used for traffic and weather data, and is described in the GDL 90 Data Interface Specification, Jun 5, 2007, available from the FAA website. Each serial interface is independent, so it is possible to configure each for a different baud rate. It is also possible to configure the interface for Capstone Weather-Only or Traffic-Only. This permits optimal use of available bandwidth when multiple interfaces are available on the display device, or when only one type of data is needed.

3.7.4 ARINC-429

The SkyTrax provides two ARINC-429 input interfaces (P1-9/P1-28 and P1-4/P1-22) and one ARINC-429 output interface (P1-27/P1-8). The ARINC-429 input ports will automatically detect the speed of the connected interface. Equipment that supports the ARINC-429 labels identified in Table 3-10, Table 3-11, and Table 3-12 are eligible to operate with the SkyTrax.

The output labels are listed in Table 3-10.

The GPS Source input labels are listed in Table 3-11.

The Non-GPS source input labels are listed in Table 3-12.

Table 3-10: ARINC-429 Out Labels for ARINC-735B Traffic

Label Number	Parameter Name
130	Intruder Range
131	Intruder Altitude (relative)
132	Intruder Bearing Estimate
203	Pressure Altitude
270	Vertical RA Data Output
274	Selected Sensitivity Level
350	Fault Summary
357	Request to Send (RTS) or End of Transmission (ETX)
371	General Aviation Equipment ID
377	Equipment ID

⚠ Although the SkyTrax has two ARINC-429 inputs, only one TAS or TCAS I unit may be connected to the SkyTrax unit.

Table 3-11: ARINC-429 In Labels for ARINC-743A GNSS/GPS

Label Number	Parameter Name
110	GNSS Latitude
111	GNSS Longitude
120	GNSS Latitude Fine
121	GNSS Longitude Fine
130	AUT Horizontal Integrity Limit
136	Vertical Figure of Merit
150	UTC
165	Vertical Velocity
166	North/South Velocity
174	East/West Velocity
247	Horizontal Figure of Merit
370	GNSS Height
377	Equipment ID

Table 3-10: ARINC-429 In Labels (Non-GPS)

Label Number	Parameter Name
147G	Magnetic variation.
164	Host radio altitude (BNR format)
165	Host radio altitude (BCD format)
203	Pressure altitude (uncorrected)
214	ICAO Aircraft Address (part 1)
216	ICAO Aircraft Address (part 2)
234	Barometric pressure (mb)
235	Barometric pressure (inches Hg)
275	Transponder to TCAS Control (24-bit aircraft address part 1)
276	Transponder to TCAS Control (24-bit aircraft address part 2)
314	True heading.
320	Magnetic heading.

3.8 SkyTrax Post Installation Check

3.8.1 Mounting/Wiring Check

Verify that the SkyTrax is secured to the aircraft as described in section 3.5.4. Verify that the antenna is securely cabled to the appropriate connectors as described in section 3.5.5. Verify that the power/ground are securely cabled to the DB37 connector of the SkyTrax. Ensure that the slide lock of the DB37 is in the locked position. If any SkyTrax cabling is routed near the aircraft controls, verify free movement of the aircraft controls.

3.8.2 Power and Ground Check

After the harness is installed and terminated, check for power and ground with a DVM (Digital voltmeter) at the following locations:

Ground	P1 – pin 36, P1 – pin 37
Power	P1 – pin 18, P1 – pin 19

3.8.3 Electromagnetic Interference/Compatibility Check

The EMI/EMC check verifies that all of the electronic systems installed on the aircraft are compatible. Operating the SkyTrax should not result in Nav flags, constant location lightning strikes, noise on COMM channels, or other phenomena.

Check the following systems:

- **Comm Radios**:
  Scan through radio channels to ensure there is no interference caused by the SkyTrax. Check random frequencies from 118MHZ through 136.975MHZ as well as your local ground and tower frequencies to ensure there is no break in squelch due to the installation.
- **GPS**:
  Ensure that correct position displays and that there is no change in satellite signal strength.
- **Autopilot**:
  Ensure that autopilot self-test passes OK with the SkyTrax operating.
- **Other Instruments**:
  Verify there is no adverse effect on other instruments with the SkyTrax powered on.
- **Other Equipment:**
  Verify no interference with any other approved electronics

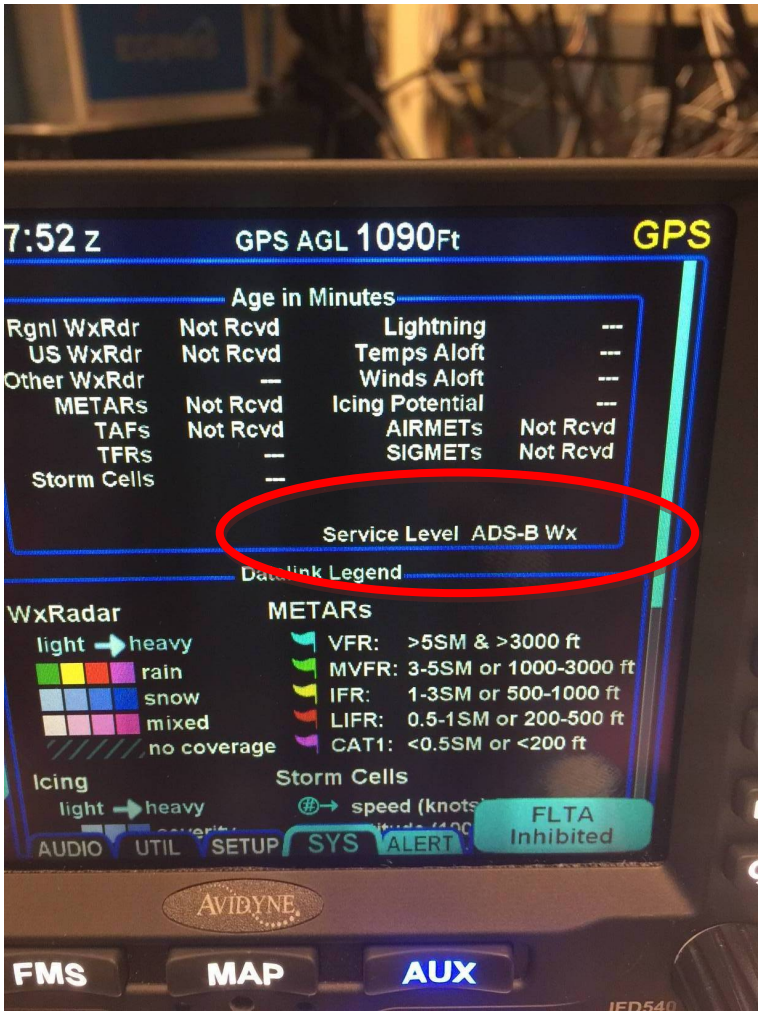
Also verify the SkyTrax is not affected by the operation of any other aircraft system.

3.8.4 Communication with Display Check

When connected to a properly configured IFD5XX or IFD4XX display, verification of communication between the display and SkyTrax can be accomplished via the following steps:

- Select the "AUX" page function key
- Select the "SYS" tab
- Press the "Status" LSK along the left edge until "Status Datalink" is displayed
- Verify the "Service Level" field circled in red in the image below displays "ADS-B Wx".

Figure 3-6: Communication Verification



3.8.5 Personal Computer Setup

Configuration of the SkyTrax is done using a computer connected to the USB Type C connector on the SkyTrax unit. This interface will emulate an RS-232 connection, so the computer will need terminal emulation software to communicate with the SkyTrax unit.

The following instructions describe how to configure either HyperTerminal (section 3.8.5.1) or PuTTY (section 3.8.5.2) for use with the SkyTrax maintenance interface. Follow the instructions in the applicable section below if you are using either HyperTerminal or PuTTY. Other terminal emulators may work; however, they are not recommended and support for their use will not be provided by Avidyne.

HyperTerminal is a terminal emulator available with early versions of Microsoft Windows. PuTTY is a free open-source terminal emulator. Hyperterminal is no longer provided with Windows, so PuTTY may be the better option for newer computers. The terminal emulator should be configured to communicate at 115200 bits per second with 8 data bits, no parity, one start bit, and no flow control. **If the computer is already set up, proceed to section 3.8.5.2.**

⚠ Your computer may have more than one COM port available, so you may need to try several of them until you find the one that is connected to the SkyTrax unit. If you are using a USB to RS-232 adapter on a Windows 7 or Windows 10 computer, then you can use the following procedure to determine the COM port being used.

1. Plug in the USB to RS-232 adapter.
2. Hold the Windows key and then press the R key on your keyboard.
3. Type "devmgmt.msc" into the Run dialog and then click on "OK".
4. Find the "Ports" section in the "Device Manager" window and expand it so that you can see the list of COM ports. The COM port number is shown in parenthesis at the end of each port.
5. Unplug the USB to RS-232 adapter.
6. Plug in the USB to RS-232 adapter. The COM port that appears in the list after plugging in the adapter is the one you will use for the terminal emulator.

3.8.5.1 Setting Up HyperTerminal

1. With the SkyTrax and the Portable Computer (PC) turned off, connect the USB Type A connector of a USB-A to USB-C cable to the computer and the USB Type C connector to the SkyTrax.

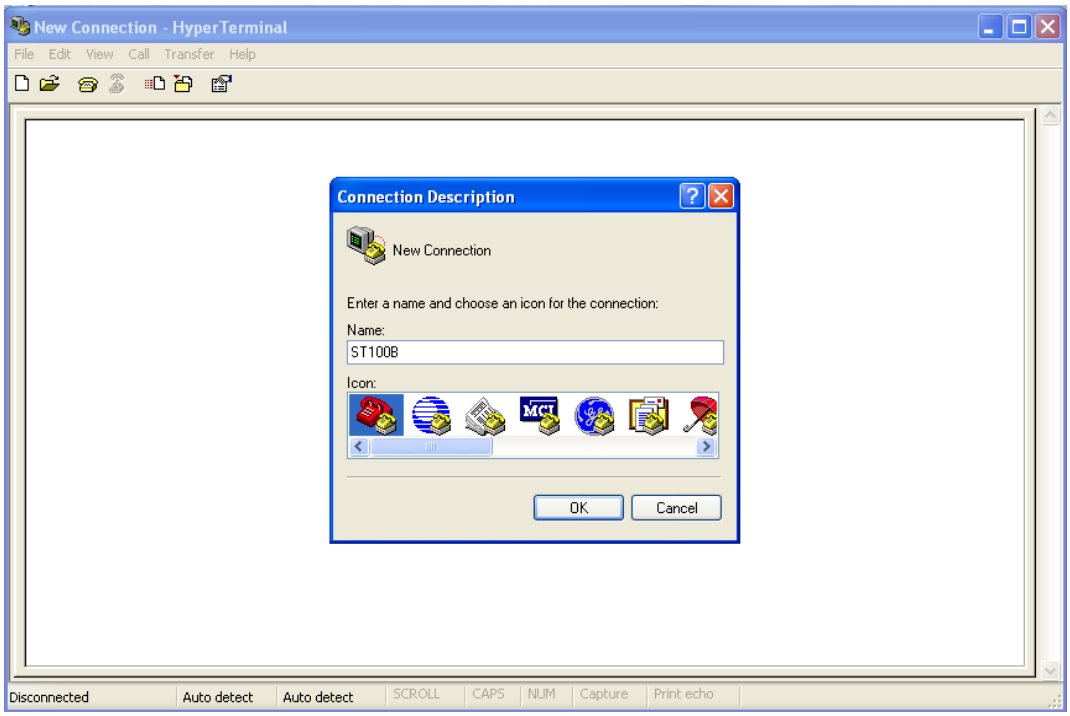
2. Verify the computer cabling and connections to the SkyTrax.

3. Turn on the PC.

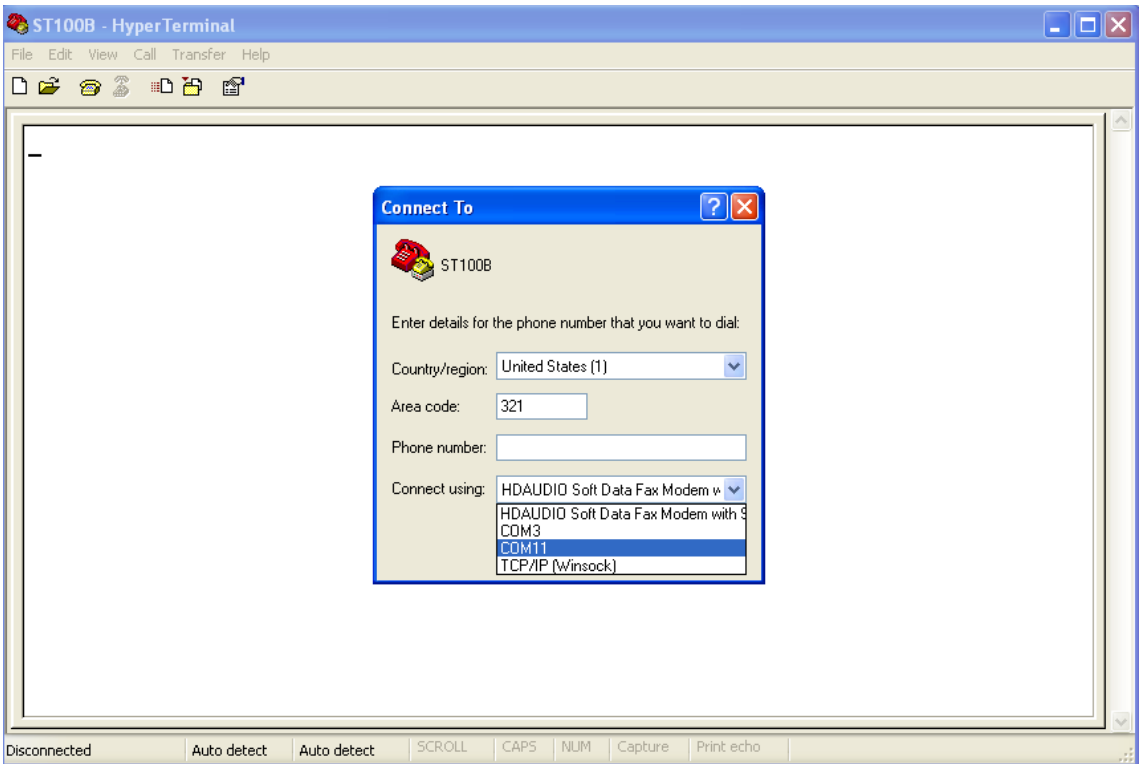
4. Turn on the SkyTrax.

5. Locate and start the HyperTerminal application:
   On Windows XP, HyperTerminal is available in the HyperTerminal folder under Start->Programs->Accessories menu>Communications.

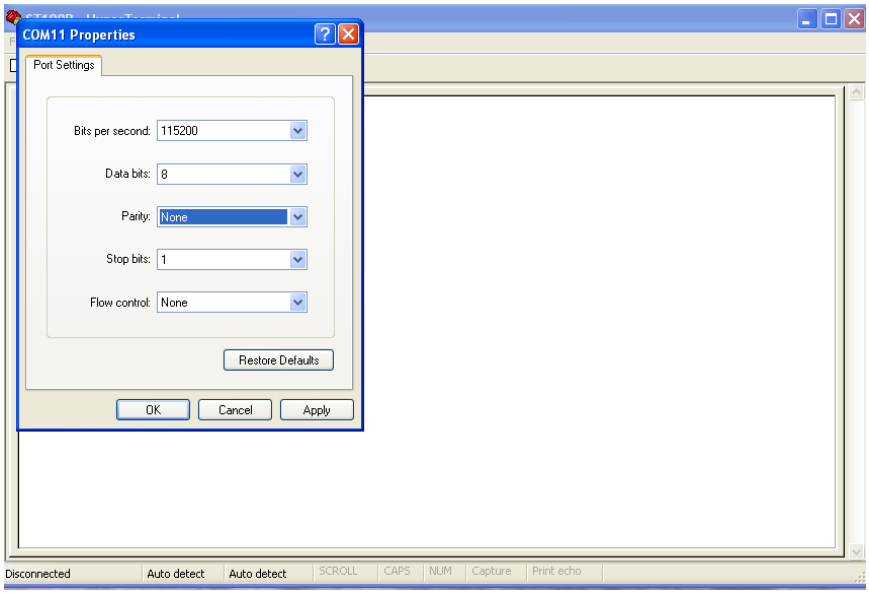
6. When the "new connection" dialog box appears asking for a connection name, type any name such as “SkyTrax” and click on "OK".



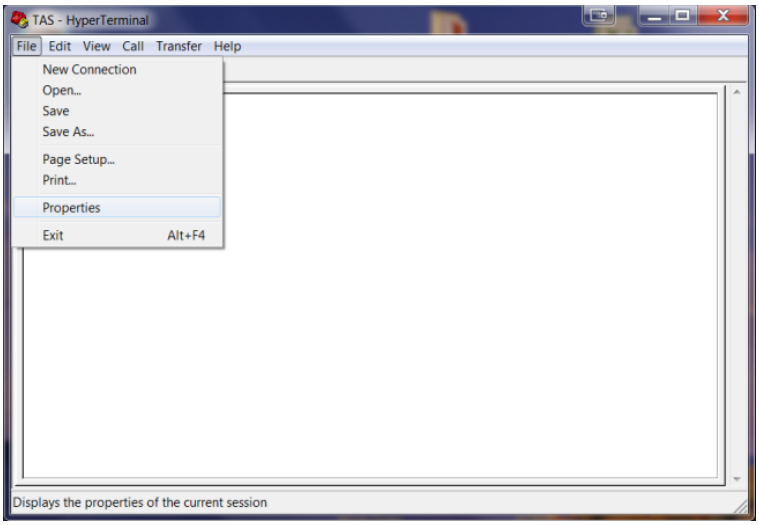
7. Open the “Connect using” drop-down box and select the COM port that you are using to connect to the SkyTrax unit and click “OK”. The examples shown use COM11.



8. The "COM Properties" dialog box appears next. Set "Bits per second" to 115200. Verify that "Data bits" is set to 8, "Parity" is set to "None", "Stop bits" is set to "1" and "Flow Control" is set to "None"; click "OK".



9. Select the File->Properties menu item.



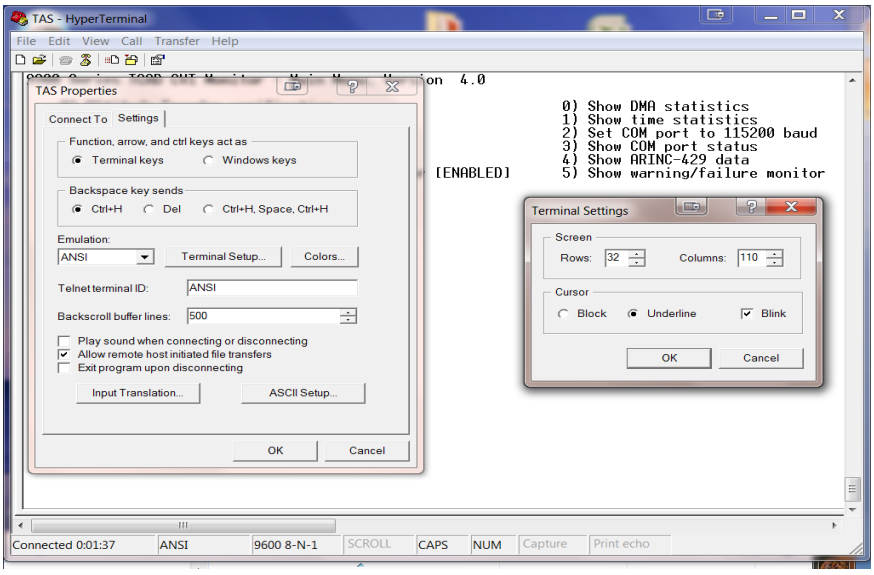
10. When the "Properties" dialog box appears, click the "Settings" tab at the top.

11. In the "Settings" dialog, verify that the “Emulation” is set to “ANSI”, then click the "ASCII Setup..." at the bottom.

12. In the "ASCII Setup" dialog box, verify that "Character delay" is zero, and that neither "send line ends with line feeds" nor "append line feeds to incoming line ends" are checked. Ignore the other selections. Click "OK".

13. Click on “Terminal Setup…”

14. In the “Terminal Settings” dialog, enter 32 rows, 110 columns.

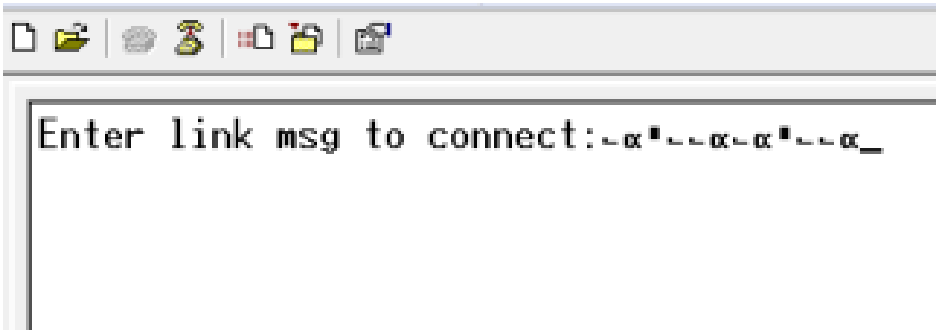


15. If you want to save the settings, then select File->Save.

16. In the terminal window, you should see the message "Enter link msg to connect:"

as shown below (this may take up to 20 seconds to appear). Recycle power on the SkyTrax if necessary.

⚠ You may see some digital "noise" in the terminal window before or after the "Enter link msg to connect:" message appears.



17. At this point the SkyTrax unit is ready to accept a link connection using the terminal emulation software running on the computer.

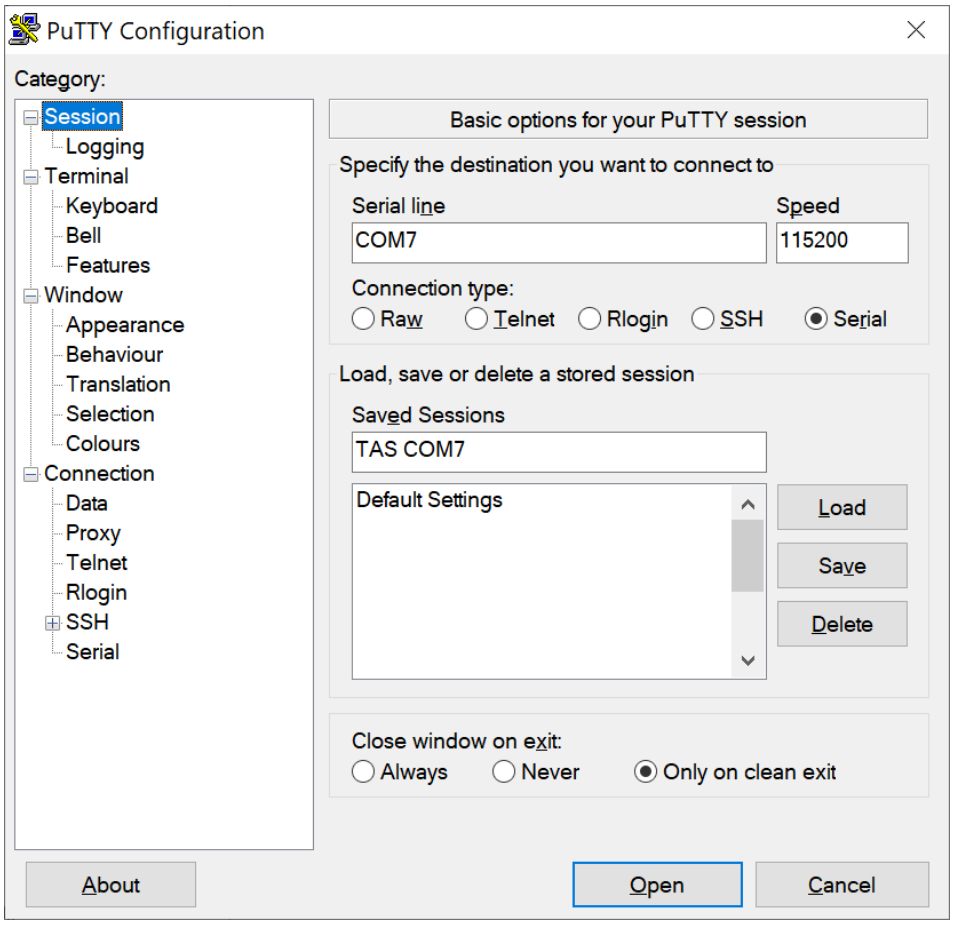
3.8.5.2 Setting Up PuTTY

1. With the SkyTrax and the Portable Computer (PC) turned off, connect the USB Type A connector of a USB-A to USB-C cable to the computer and the USB Type C connector to the SkyTrax.
2. Verify the computer cabling and connections to the SkyTrax.
3. Turn on the PC.
4. Turn on the SkyTrax.
5. Locate and start the PuTTY software.

6. The "PuTTY Configuration" dialog box appears after staring the software.
    a. Click on "Session" in the "Category" tree on the left.
    b. Type "SkyTrax" in the "Saved Sessions" text box.
    c. Select the "Serial" radio button under the "Connection Type".
    d. Type the COM port number being used in the "Serial Line" text box

        ⚠ The PuTTY default comes up as COM1.

    e. Enter "115200" for the "Speed".



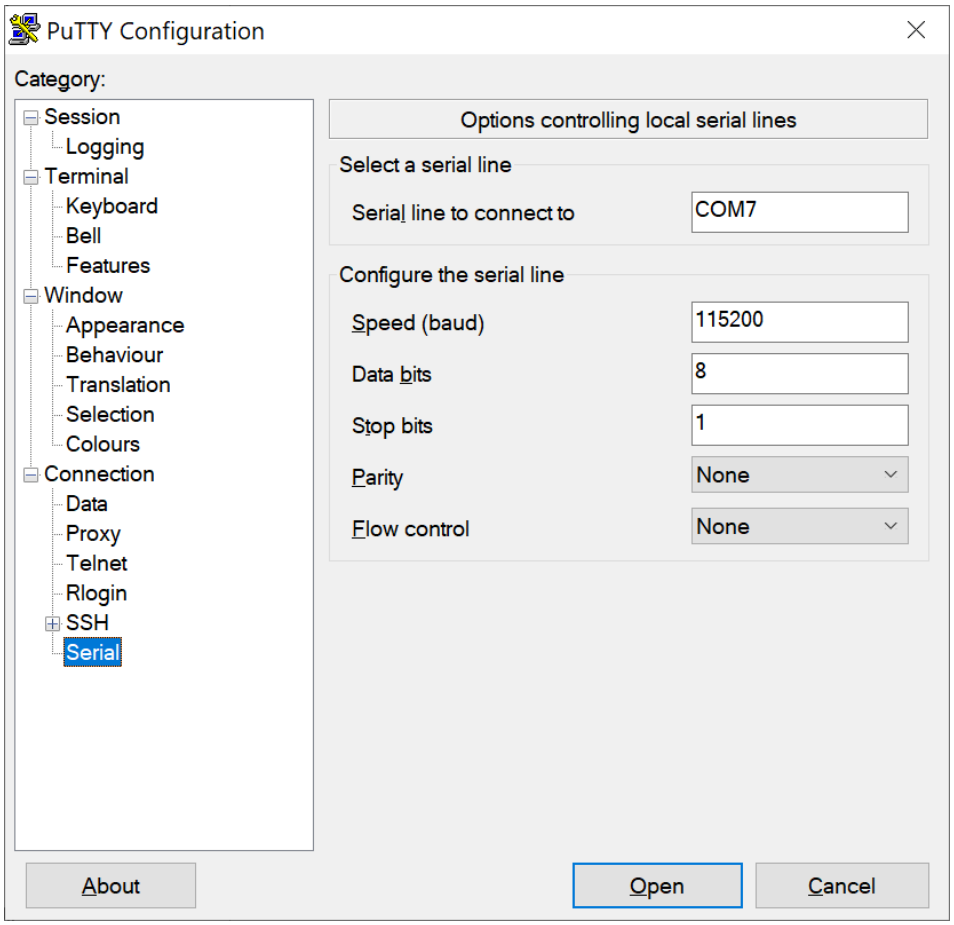
7. Select "Serial" from the "Category" tree on the left,

    a. Verify that the "Data bits" is 8.

    b. Verify that the "Stop bits" is 1.

    c. Verify that the "Parity" is "None".

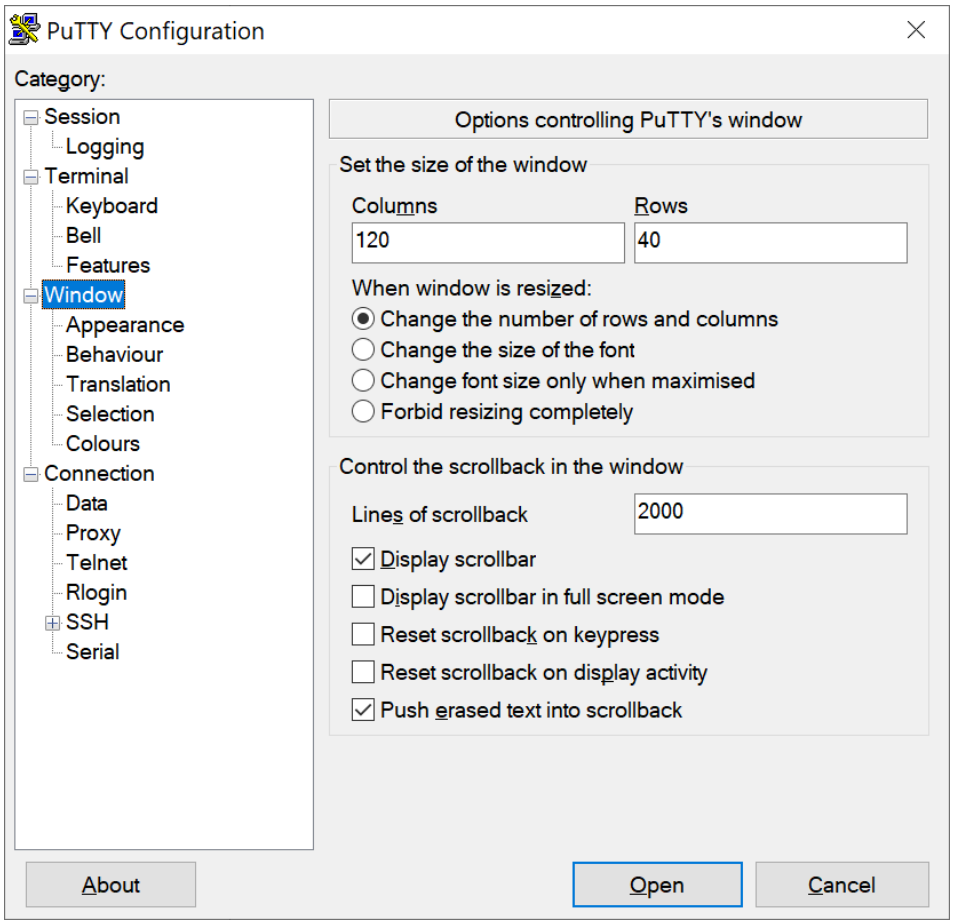
    d. Verify that the "Flow Control" is "None.



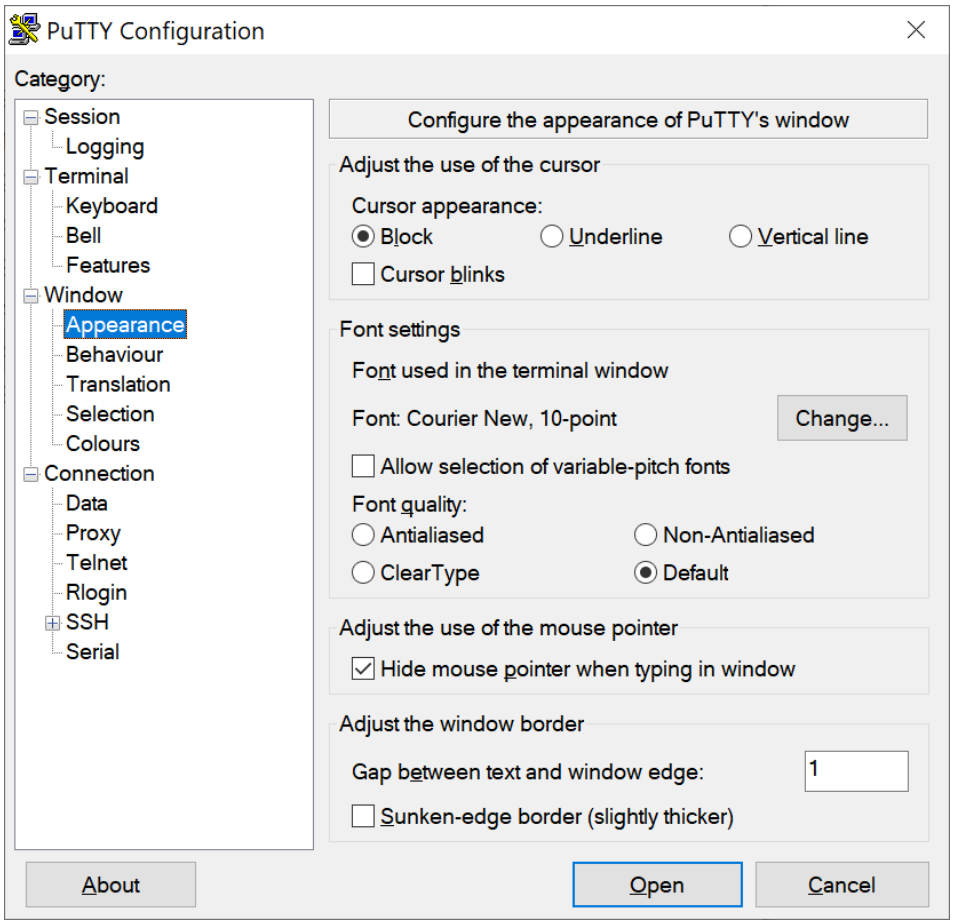
8. To expand the PuTTY terminal window to better display the SkyTrax command interface, click "Window" in the "Category" tree on the left.

    a. Enter 110 columns.

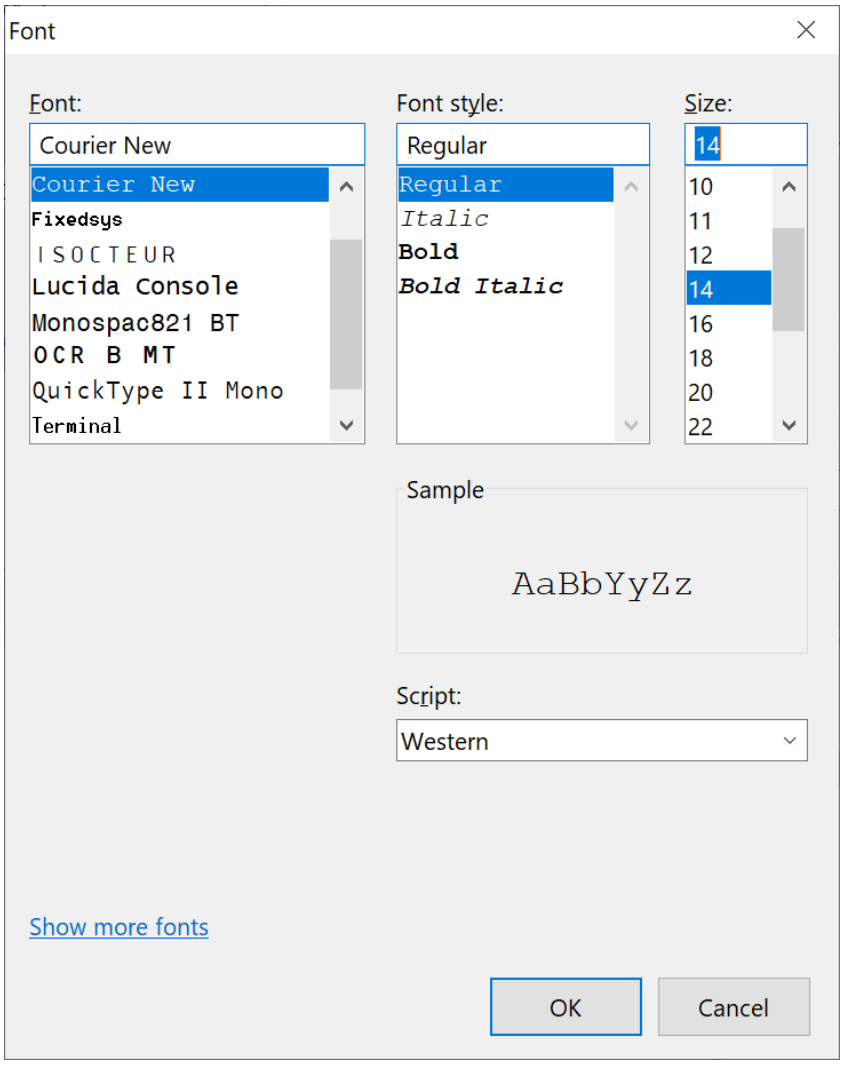
    b. Enter 40 rows.



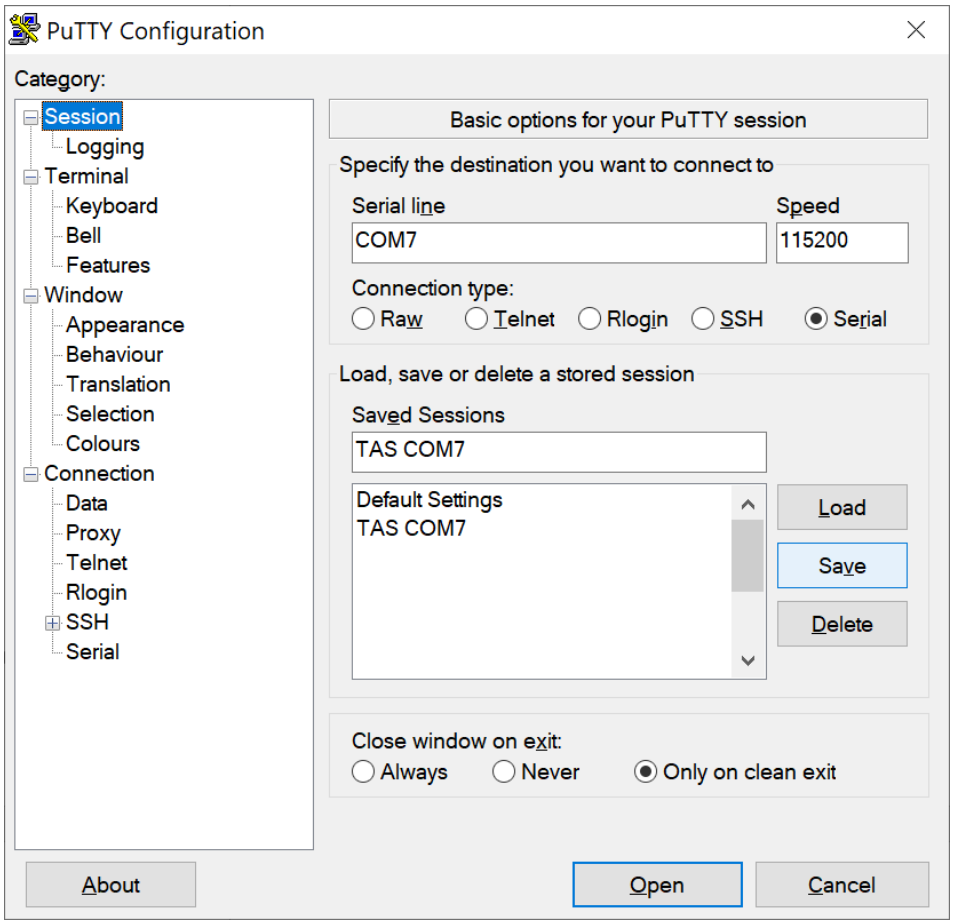
9. (optional) If you want to increase the terminal window font size for easier viewing, select "Appearance" in the "Category" tree on the left and click on the "Change…" button.



10. Select 14 (or whatever font size works for you) under "Size" and then click on the "OK" button.

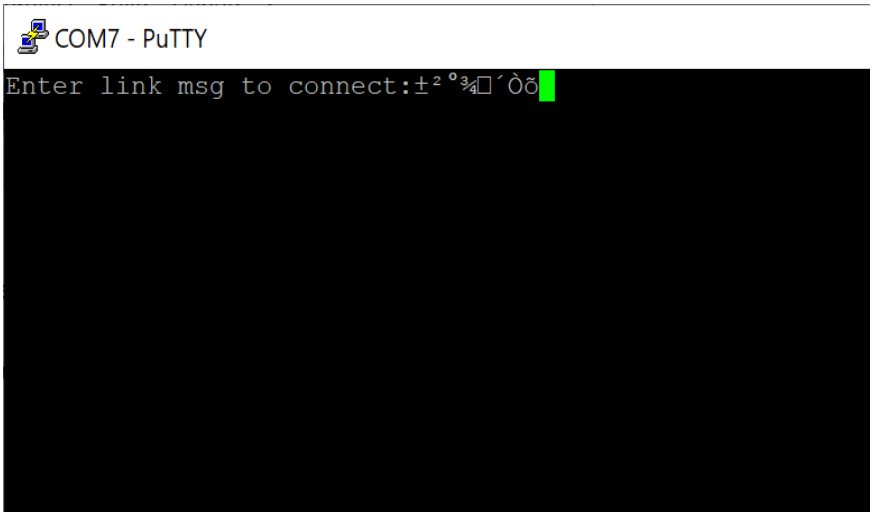


11. Select "Session" in the "Category" tree on the left and click on "Save" to save all your settings for SkyTrax. In the future, instead of going through all of the configuration steps, you can select the configuration from the "Saved Sessions" list and press "Load".



12. In the terminal window, you should see the message "Enter link msg to connect:" as shown below (this may take up to 20 seconds to appear). Recycle power on the SkyTrax if necessary.

    ⚠ You may see some digital "noise" in the terminal window before or after the "Enter link msg to connect:" message appears.



13. At this point the SkyTrax unit is ready to accept a link connection using the terminal emulation software running on the computer.

3.8.6 Configuration and Verification Interface

Command interface access instructions

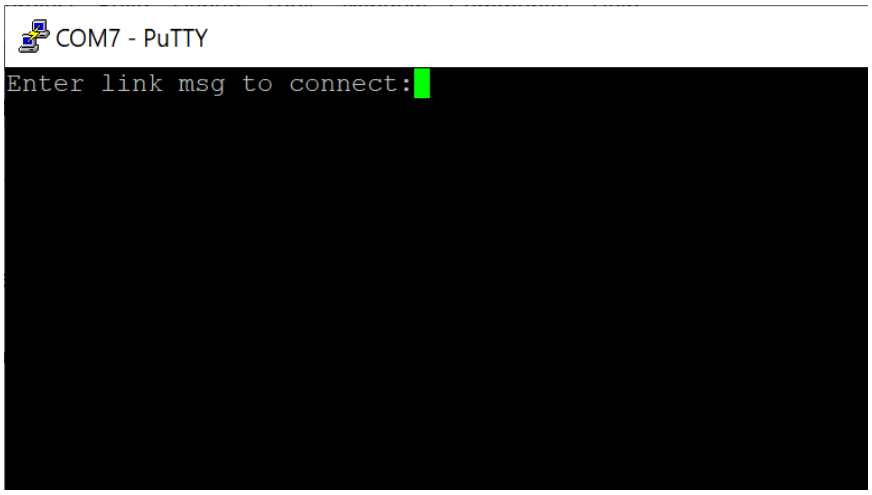
After following the instructions of section 3.8.5 to setup your terminal emulator software, the following instructions show how to access the Command Interface on the SkyTrax unit. Most of the SkyTrax configuration items would normally be unchanged and should only be changed if instructed to do so by Avidyne support, for future product releases, or in-depth troubleshooting.

⚠ Keep the following hints in mind when trying to link to the SkyTrax Command Interface:

- The SkyTrax RS-232 interfaces are continuously cycling between the supported baud rates about every 5 seconds. If you enter the link command when the SkyTrax interface is not at the same baud rate as the computer interface, then it will not recognize the link command.
- The first thing that the SkyTrax unit does after changing baud rates is to send "Enter link msg to connect" on the interface. As soon as you observe this message appear, it is time to quickly enter the link command.
- It can be difficult to know when the message appears, because the terminal program will continue to show the message it received the last time it was at the correct baud rate. Watching for the "noise" as mentioned in step 16 of section 3.8.5 can be helpful. When the noise clears off of the display, you know that the message has been updated.
- You will only have about 5 seconds to type the link command after seeing the message, so type quickly.

⚠ You must power-cycle the SkyTrax unit for communications port configuration changes to take effect.

1. When the "Enter link msg to connect" is displayed in the terminal emulation sofware, quickly type "command" into the terminal window.



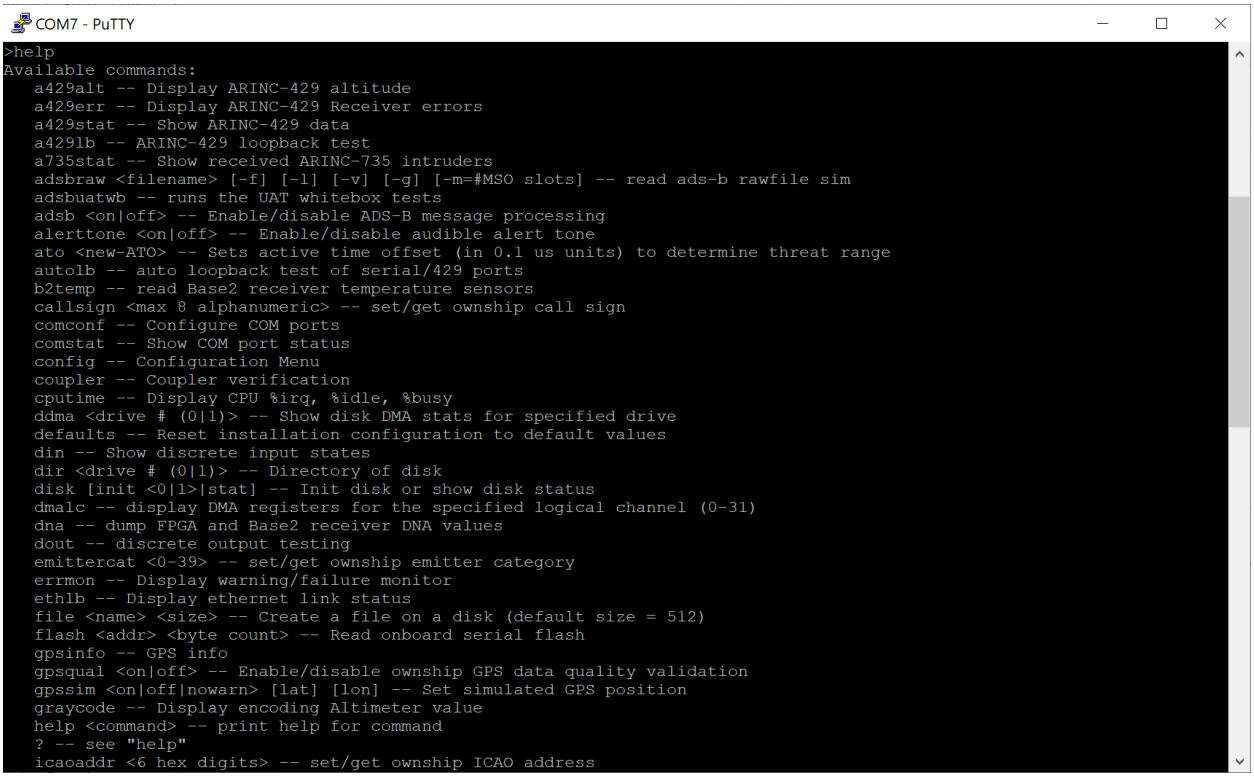
2. If the command interface was successfully activated, the terminal window will now display a ">" prompt. This is the command interface, and is where you type in the commands described in these instructions.

3. You can type "help" for a list of commands available in the command interface.

This information is for reference only. You should not alter anything unless directed to do so by these instructions, a Service Bulletin, or are instructed by an Avidyne Customer Service Representative.

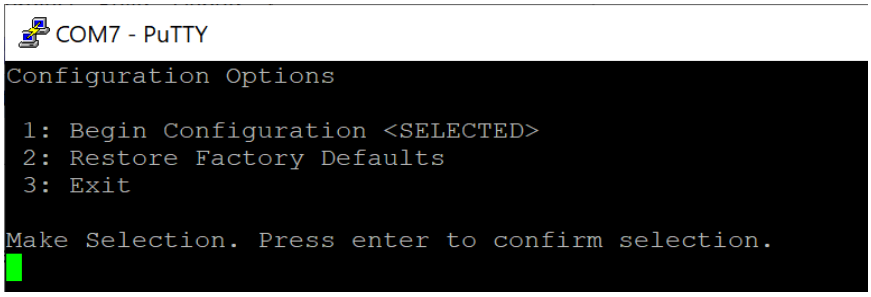
More detailed help on a specific command can be obtained by typing "help" followed by a space and then the command name you want help for.

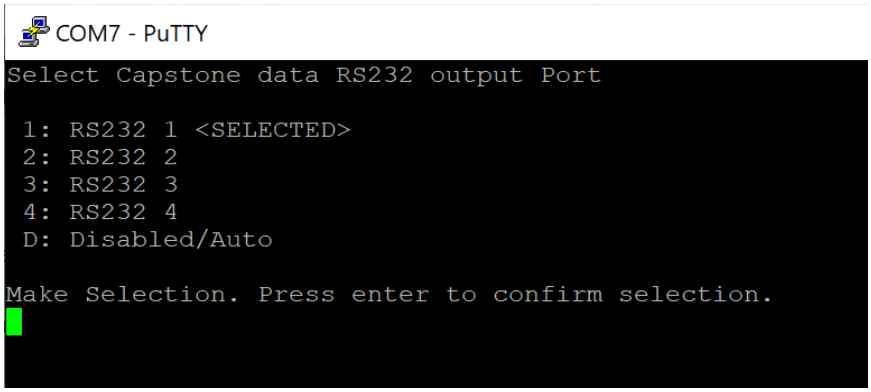
The following screen only shows a partial list of the commands and may not match the list you see when looking at the help.

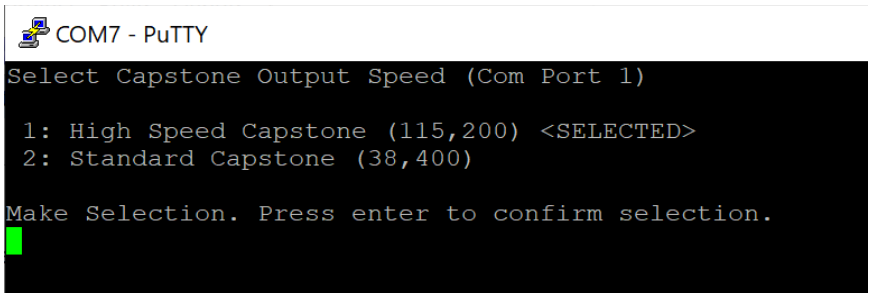


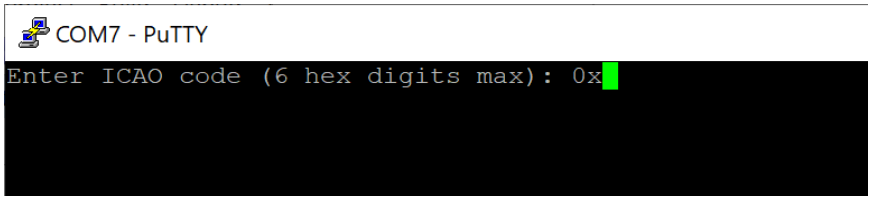
4. The first of two methods for configuring the communications ports is to use the guided configuration command, which will guide you through the basic setup steps. This is the simplest method, and in most cases will eliminate the need for any manual configuration (described later). To begin the guided configuration, use the "config" command and then select "1: Begin Configuration" by pressing the number 1 and pressing enter. After beginning the guided configuration, just follow the prompts to complete the basic configuration. The following images show the guided configuration prompts.

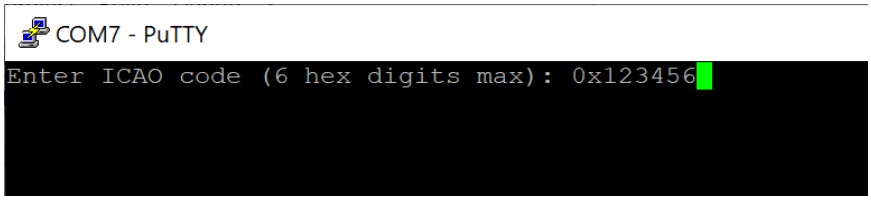
   The "config" command only permits configuration of the primary Capstone interface. Normally it is not necessary to configure ports for other devices, because the SkyTrax can auto-detect most devices. Additional interfaces can be manually configured using the "comconf" command described later.

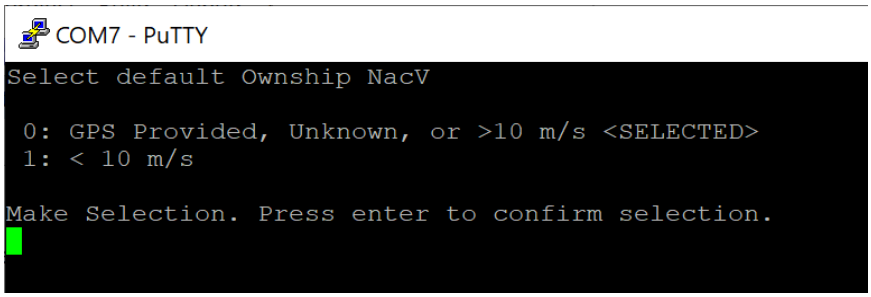


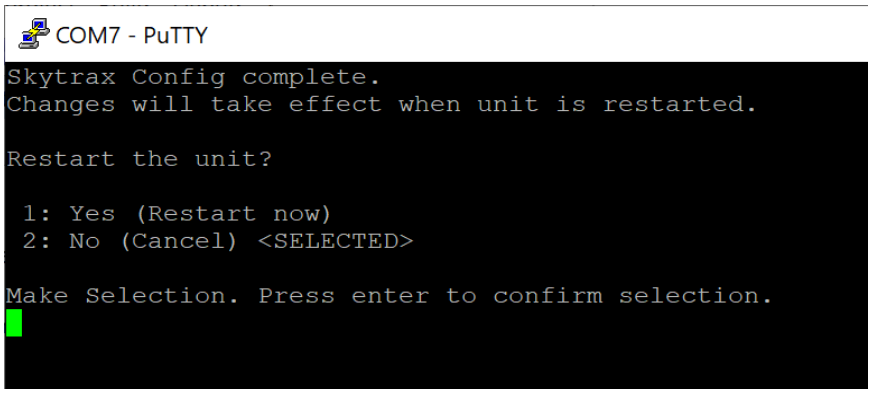










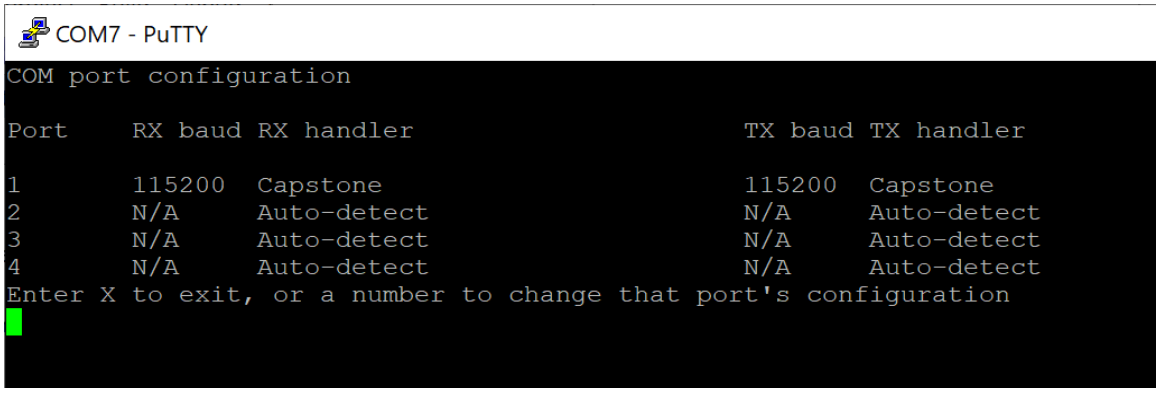


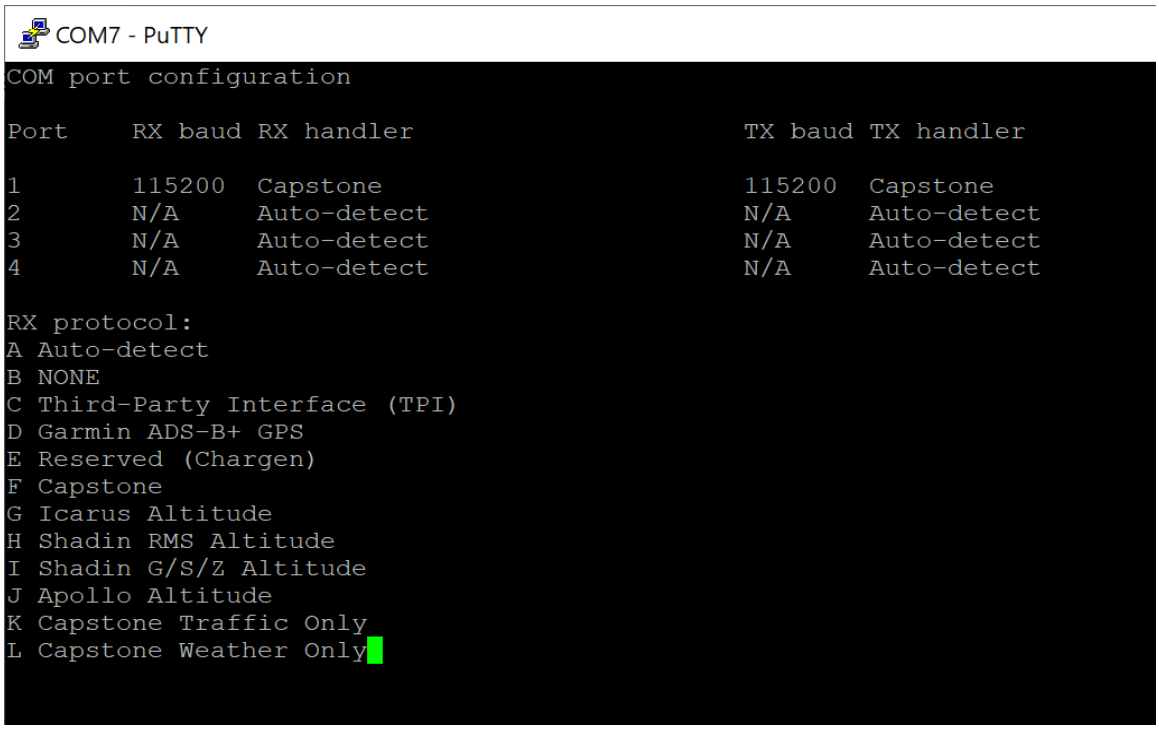
5. Communications interfaces can be manually configured using the "comconf" command. After starting the "comconf" command, select the port number you want to configure and follow the prompts. **Critical! Port 5 will always be the computer's Command Interface USB type C connection on the front of the SKYTRAX100B and should never be altered. If Port 5 is altered the SKYTRAX100B will not communicate with the laptop and the SKYTRAX100B will have to be returned to Avidyne for service.** The following images shows an example of manually configuring port 3 to use the Garmin ADS-B+ GPS protocol at 115,200 baud.

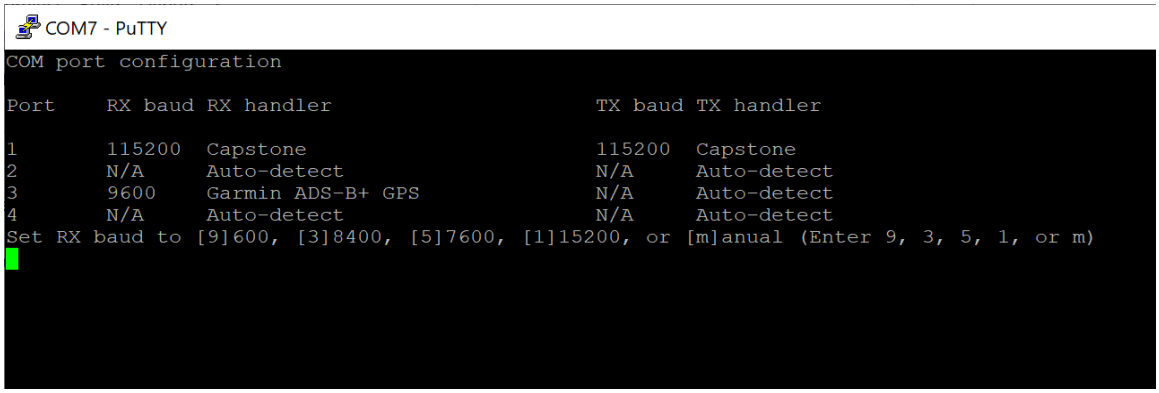
   When different devices are connected to the Tx and Rx sides of the same port, then both sides need to be manually configured for the correct I/O using the "comconf" command.

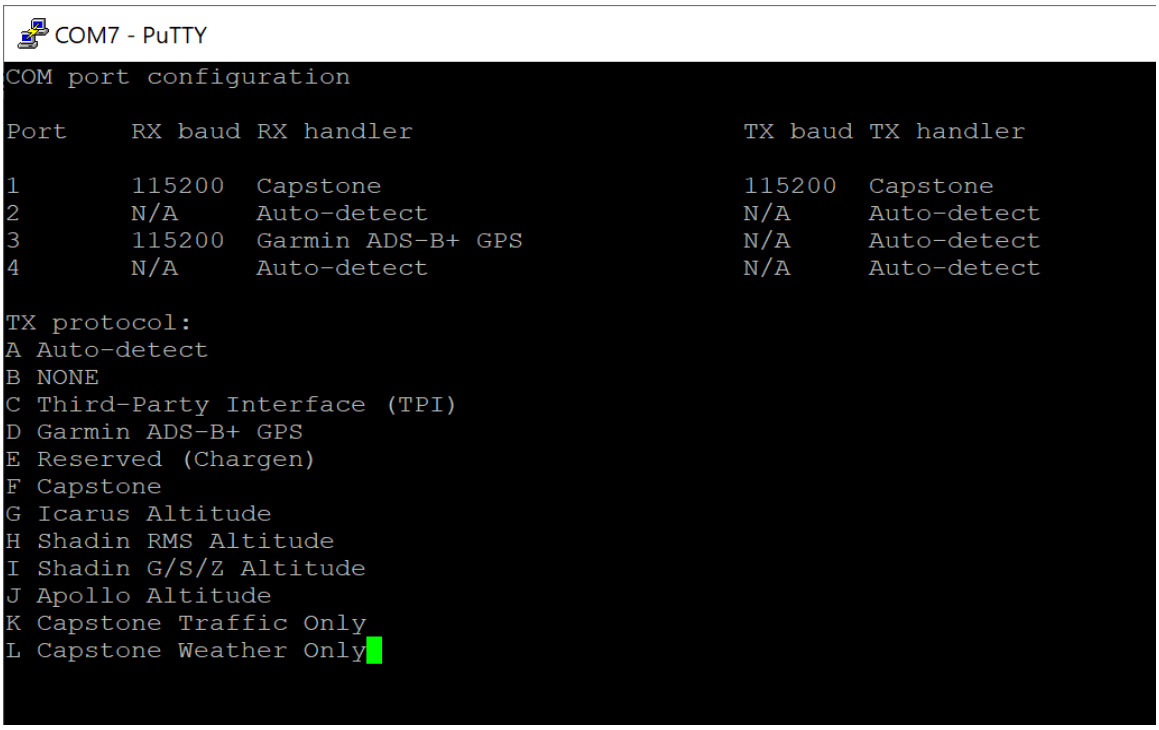
   Port 5 cannot be manually configured. Port 5 is the USB Type C port on the front of the SkyTrax and is reserved for use with the computer's Command Interface. **Critical! Port 5 will always be the computer's Command Interface USB type C connection on the front of the SKYTRAX100B and should never be altered. If Port 5 is altered the SKYTRAX100B will not communicate with the laptop and the SKYTRAX100B will have to be returned to Avidyne for service.**

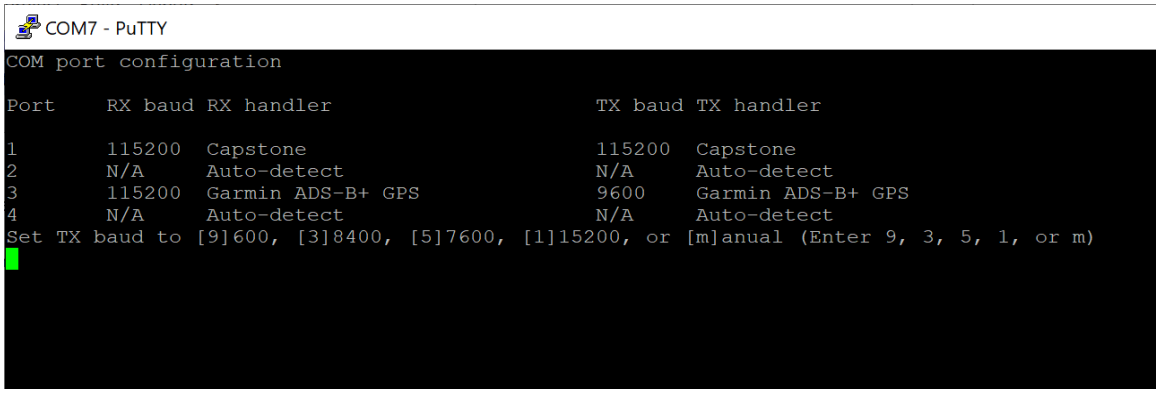
6.

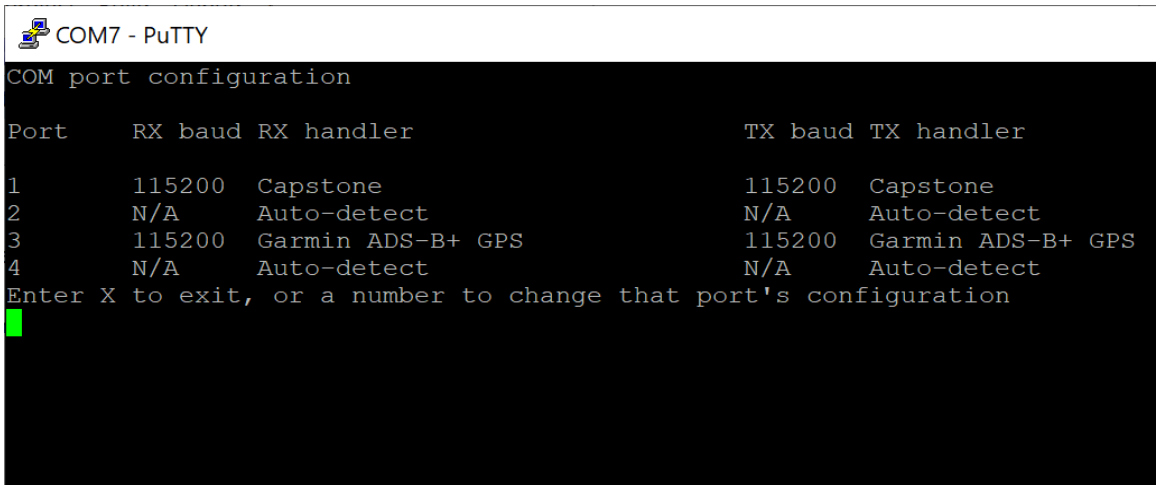






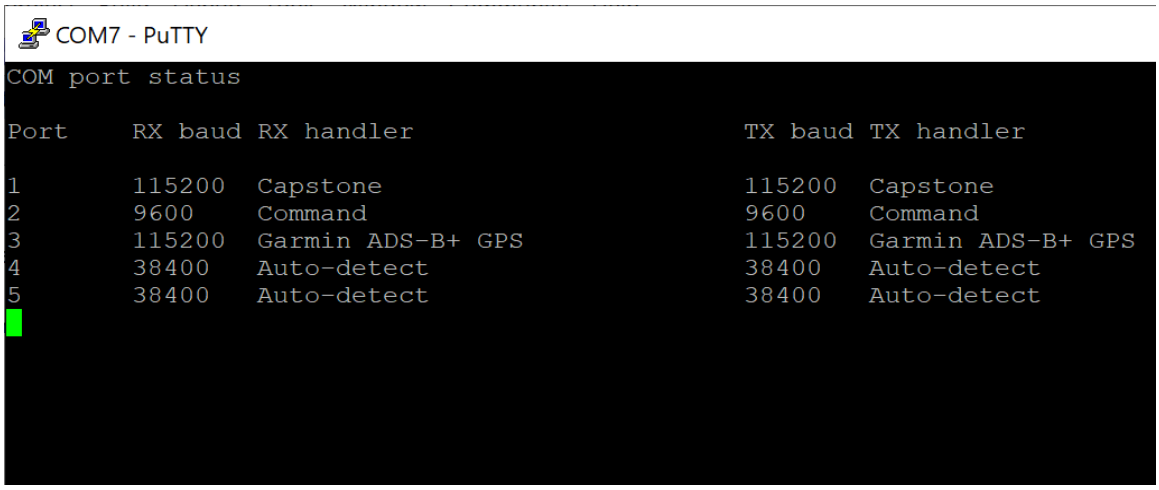






7. To check the status of your configuration when done, use the "comstat" command. The "comstat" command shows the protocol and baud rate currently being used for each port. The com port status will continuously update until a button is pressed.

   A manually configured port will always show the manual configuration. **Critical! Port 5 will always be the computer's Command Interface USB type C connection on the front of the SKYTRAX100B and should never be altered. If Port 5 is altered the SKYTRAX100B will not communicate with the laptop and the SKYTRAX100B will have to be returned to Avidyne for service.** A port that does not have a manual configuration will show "Auto-detect" until the SkyTrax identifies what type of equipment is connected to that port. Once the connected equipment is identified, the status will indicate what protocol and baud rate is being using to communicate with the equipment.



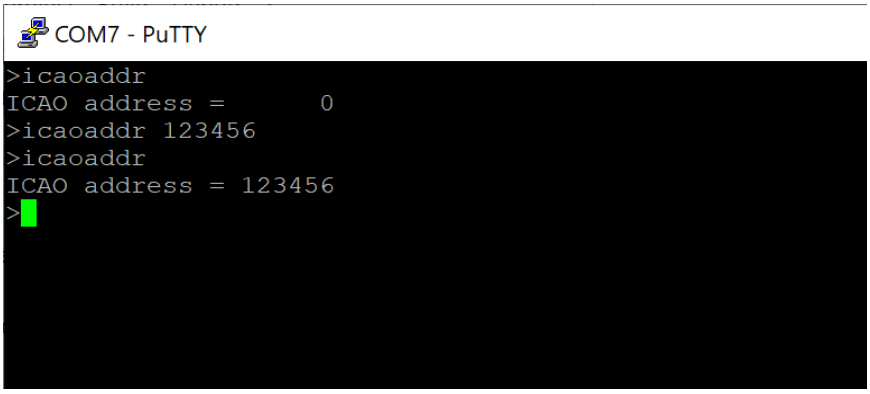
8. Use the "icaoaddr" command to view the currently configured own-ship ICAO address, or to manually change the ICAO address. Type in "icaoaddr" and press enter to view the currently configured own-ship ICAO address. To manually set or change the own-ship ICAO address, follow the "icaoaddr" command with a space and then the own-ship ICAO address.

   The 6-digit own-ship ICAO address for the aircraft must be entered in order for the own-ship shadow detection logic to function properly. Failure to properly

configure the own-ship ICAO address will result in the SkyTrax display the own-ship as if it were an intruder.

The "config" command will prompt you to enter the ICAO address. If you entered the ICAO address while running the "config" command, then there is no need to use the "icaoaddr" command to configure it. You can still use the "icaoaddr" command to verify that it is configured properly.

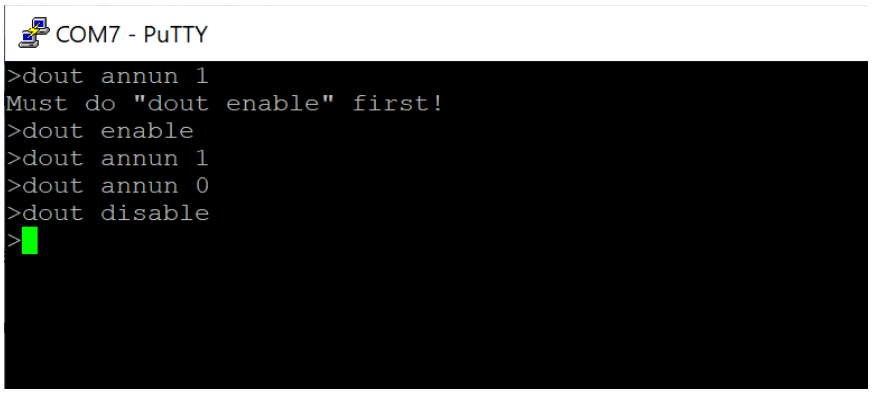
The default setting for ICAO address is 0, which is invalid. The SkyTrax will declare a system-wide warning condition if the ICAO address is set to 0 to remind the installer that it needs to be changed.



9. The SkyTrax annunciator light (if installed) can be tested with the "dout" command as follows:

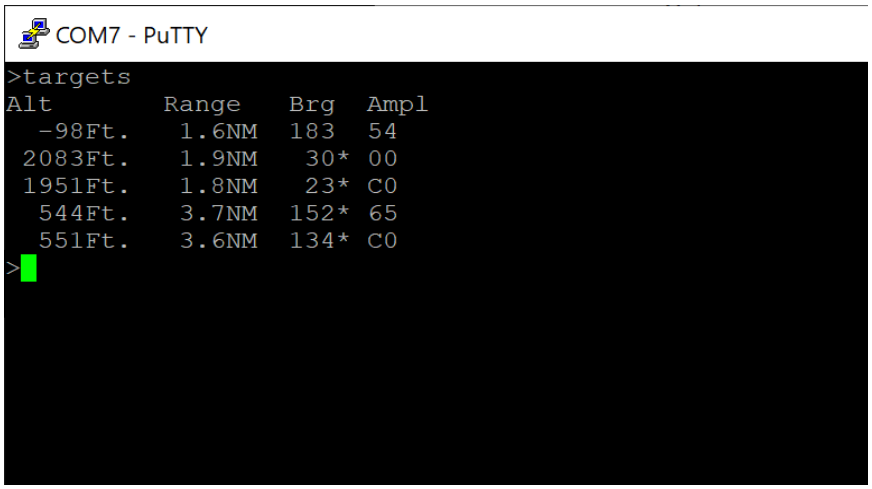
"dout enable"	enable the dout command functionality and bypass the flight code control of the discrete outputs, which will allow manual testing of those outputs.
"dout annun 1"	enable the annunciator output
"dout annun 0"	disable the annunciator output
"dout disable"	disable the dout command functionality and return control of the discrete outputs to the flight code.

Be sure to finish with the "dout disable" command to return control of the discrete outputs to the flight code. Power cycling the SkyTrax will also return control to the flight code.

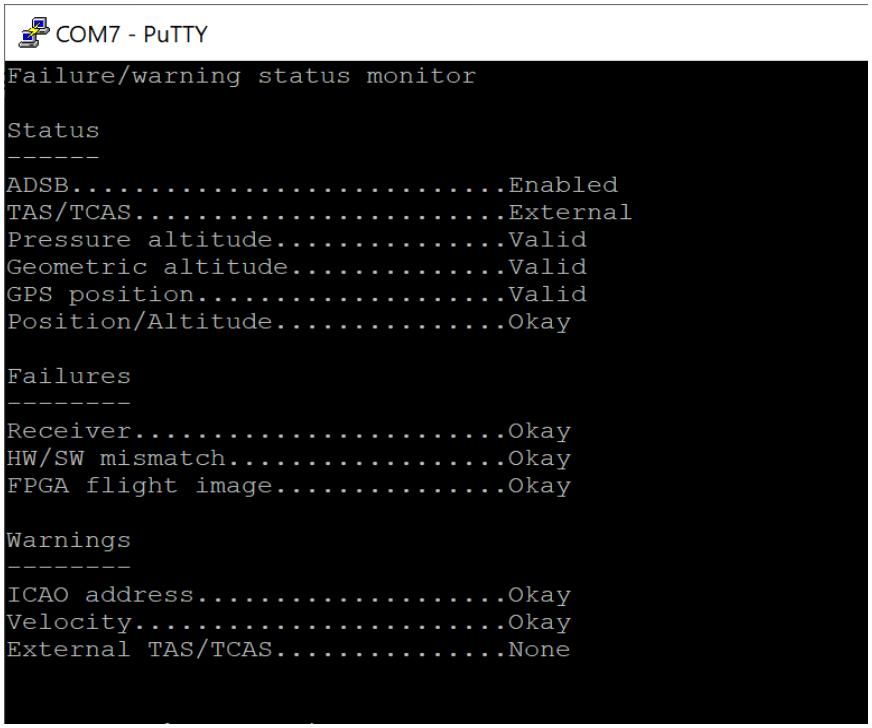


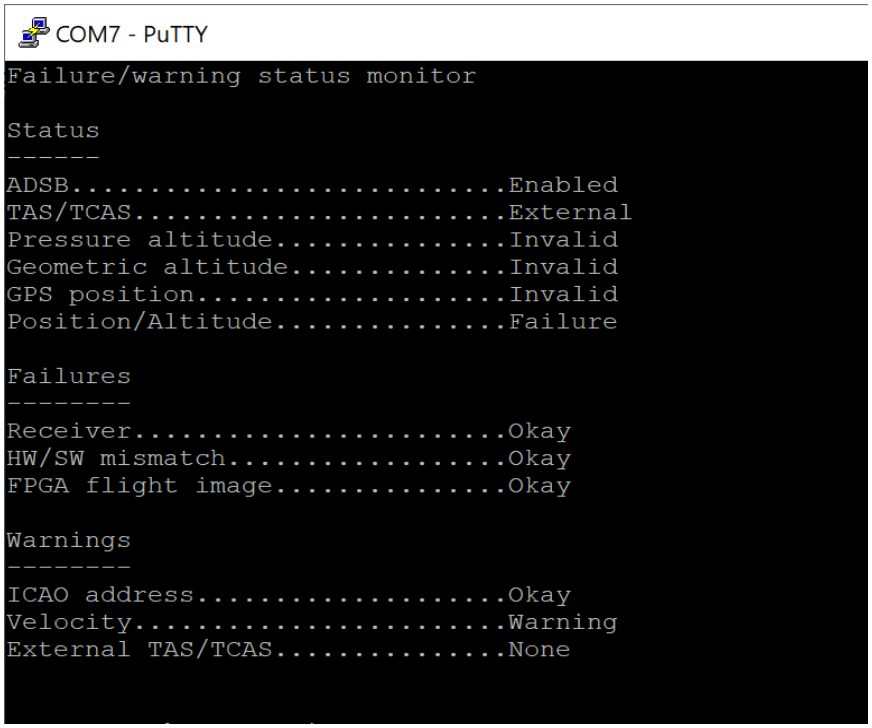
10. The default value for NACv is "0", which tells the SkyTrax to expect the own-ship position source to provide NACv. This is the recommended value and should not be changed unless directed by a Service Bulletin or instructed by an Avidyne Customer Service Representative. The NACv value can be set manually with the "nacv" command. Just type "nacv", a space, and then the value to use for NACv. To see the current NACv setting, use the "nacv" command without a value.

11. You can view a list of targets that the SkyTrax is tracking with the "targets" command.



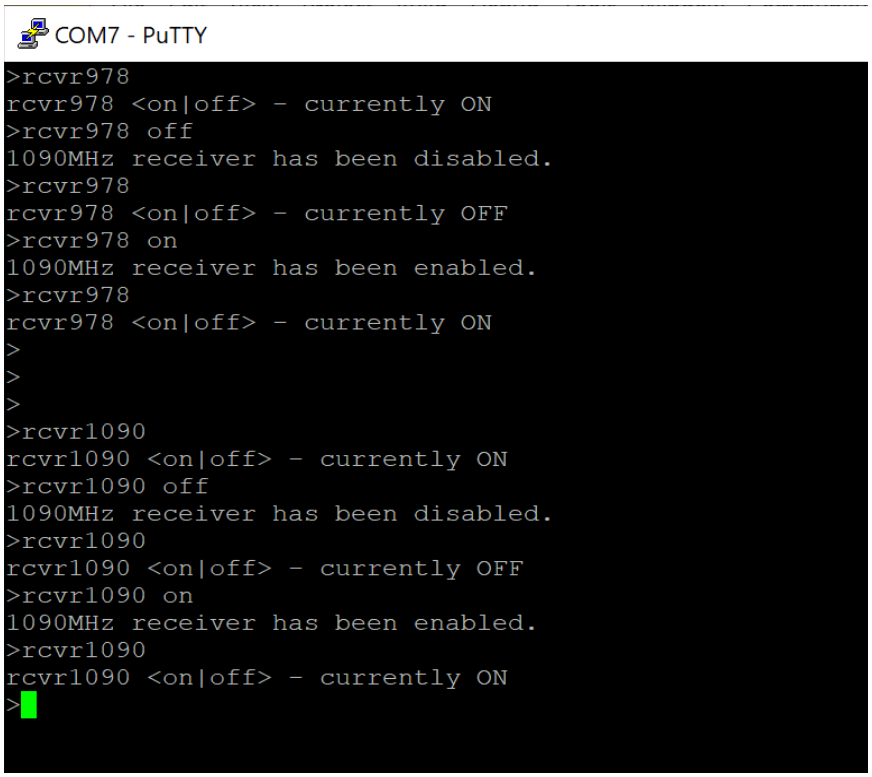
12. The "errmon" command can be used to view the SkyTrax status. This command shows the internal health monitor status and will continuously update until another button is pressed.





13. In models that have a dual-link receiver, there may be situations when it would be desirable to disable one or the other receiver frequencies. This may be accomplished using the "rcvr1090" and "rcvr978" commands. Setting the associated receiver to "ON" will enable the receiver, and setting it to "OFF" will disable the associated receiver.

    It is not possible to enable a frequency that is not supported by the model.



14. To exit the Command Interface program, type in "quit" after the ">" prompt and hit enter.

3.8.7 Weight and Balance

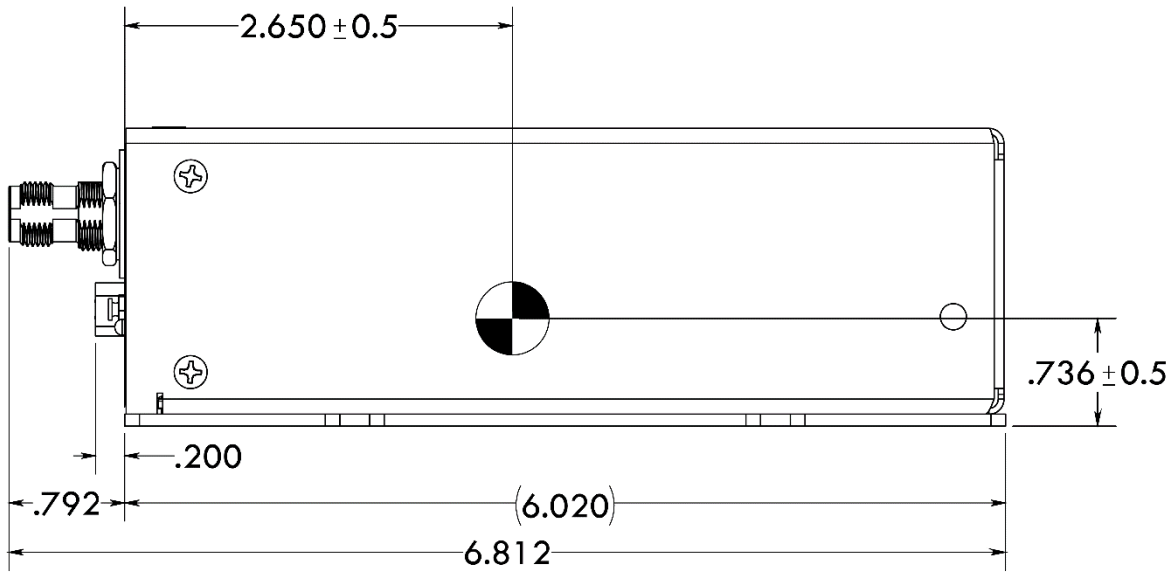
An aircraft weight and balance is required after installation of the SkyTrax. Follow the guidelines in AC 43.13-1B, Chapter 10, Section 2. Update the aircraft equipment list

indicating the items relocated, added or removed. Table 3-12 identifies the weight of the SkyTrax equipment. Figure 3-7 depicts the SkyTrax center of gravity.

Table 3-12: SkyTrax Weight

Part Number	Weight
SkyTrax	1.3 lbs

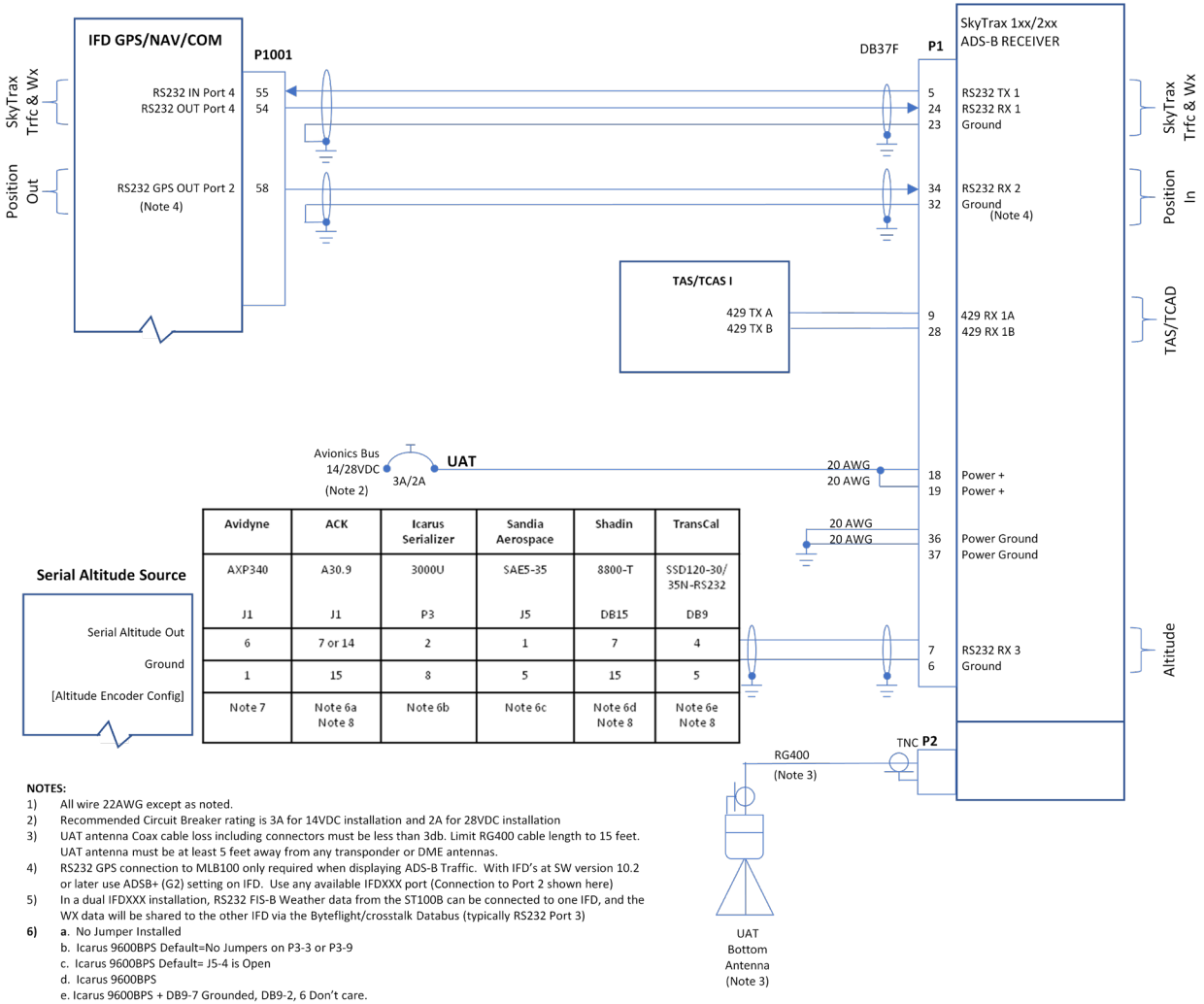
Figure 3-7: SkyTrax Center of Gravity



Appendix A – Interconnect Diagrams

The following diagrams contain the relevant Interconnect Wiring diagrams for the SkyTrax.

A.1 Interconnect Diagram: SkyTrax w/IFD (5XX/4XX/Atlas/Helios)

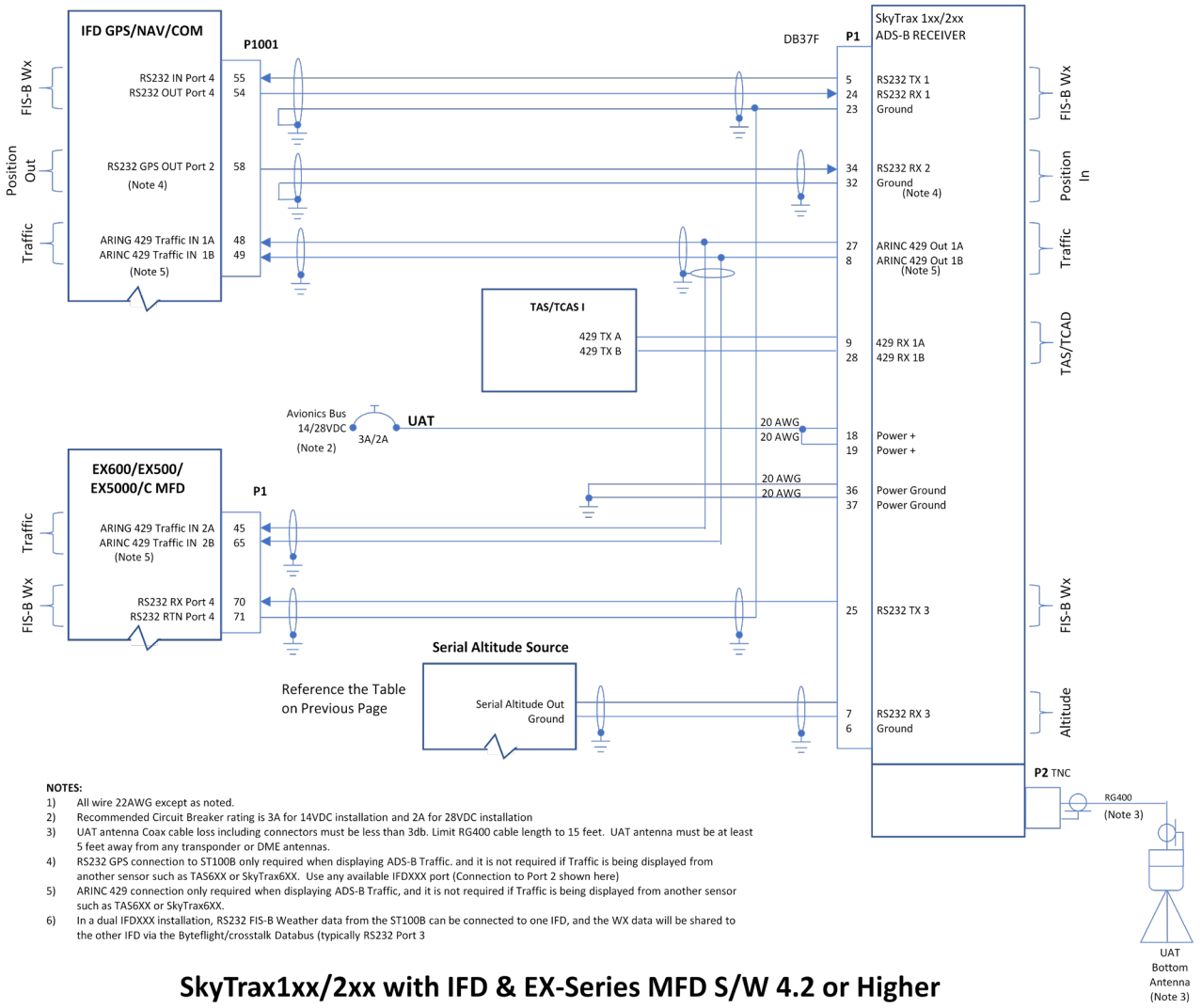


NOTES:

1) All wire 22AWG except as noted.
2) Recommended Circuit Breaker rating is 3A for 14VDC installation and 2A for 28VDC installation
3) UAT antenna Coax cable loss including connectors must be less than 3db. Limit RG400 cable length to 15 feet. UAT antenna must be at least 5 feet away from any transponder or DME antennas.
4) RS232 GPS connection to MLB100 only required when displaying ADS-B Traffic. With IFD's at SW version 10.2 or later use ADSB+ (G2) setting on IFD. Use any available IFDXXX port (Connection to Port 2 shown here)
5) In a dual IFDXXX installation, RS232 FIS-B Weather data from the ST100B can be connected to one IFD, and the WX data will be shared to the other IFD via the Byteflight/crosstalk Databus (typically RS232 Port 3)
6) **a**. No Jumper Installed
   b. Icarus 9600BPS Default=No Jumpers on P3-3 or P3-9
   c. Icarus 9600BPS Default= J5-4 is Open
   d. Icarus 9600BPS
   e. Icarus 9600BPS + DB9-7 Grounded, DB9-2, 6 Don't care.
7) This should only be used if the AXP340 is receiving altitude via gray code
8) Configure for "Icarus" protocol

SkyTrax1xx/2xx with IFD S/W 10.2 or Higher

A.2 Interconnect Diagram: SkyTrax w/IFD (5XX/4XX/Atlas/Helios) & EX-Series MFD's

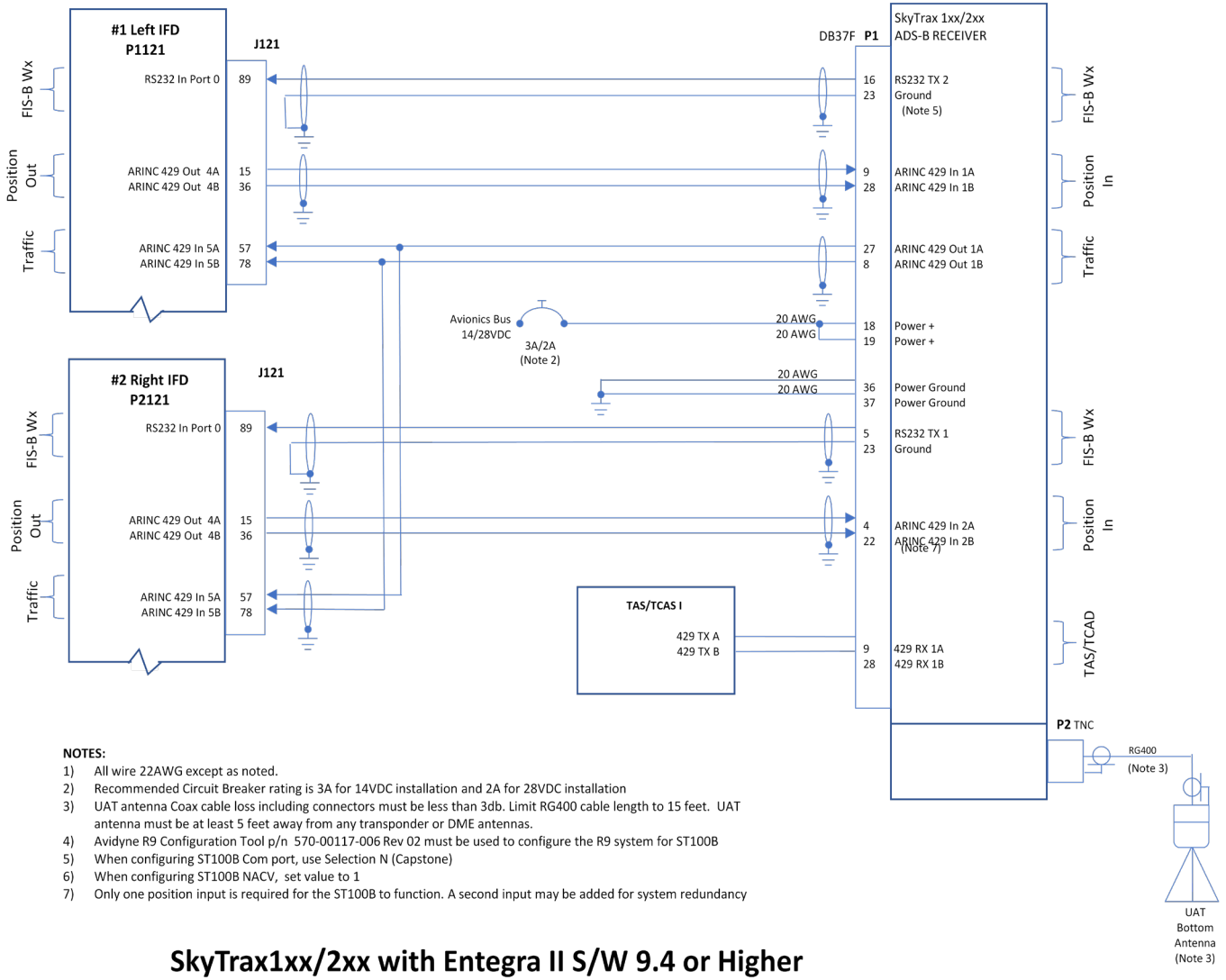


NOTES:

1) All wire 22AWG except as noted.
2) Recommended Circuit Breaker rating is 3A for 14VDC installation and 2A for 28VDC installation
3) UAT antenna Coax cable loss including connectors must be less than 3db. Limit RG400 cable length to 15 feet. UAT antenna must be at least 5 feet away from any transponder or DME antennas.
4) RS232 GPS connection to ST100B only required when displaying ADS-B Traffic. and it is not required if Traffic is being displayed from another sensor such as TAS6XX or SkyTrax6XX. Use any available IFDXXX port (Connection to Port 2 shown here)
5) ARINC 429 connection only required when displaying ADS-B Traffic, and it is not required if Traffic is being displayed from another sensor such as TAS6XX or SkyTrax6XX.
6) In a dual IFDXXX installation, RS232 FIS-B Weather data from the ST100B can be connected to one IFD, and the WX data will be shared to the other IFD via the Byteflight/crosstalk Databus (typically RS232 Port 3

SkyTrax1xx/2xx with IFD & EX-Series MFD S/W 4.2 or Higher

A.3 Interconnect Diagram: SkyTrax w/Entegra II

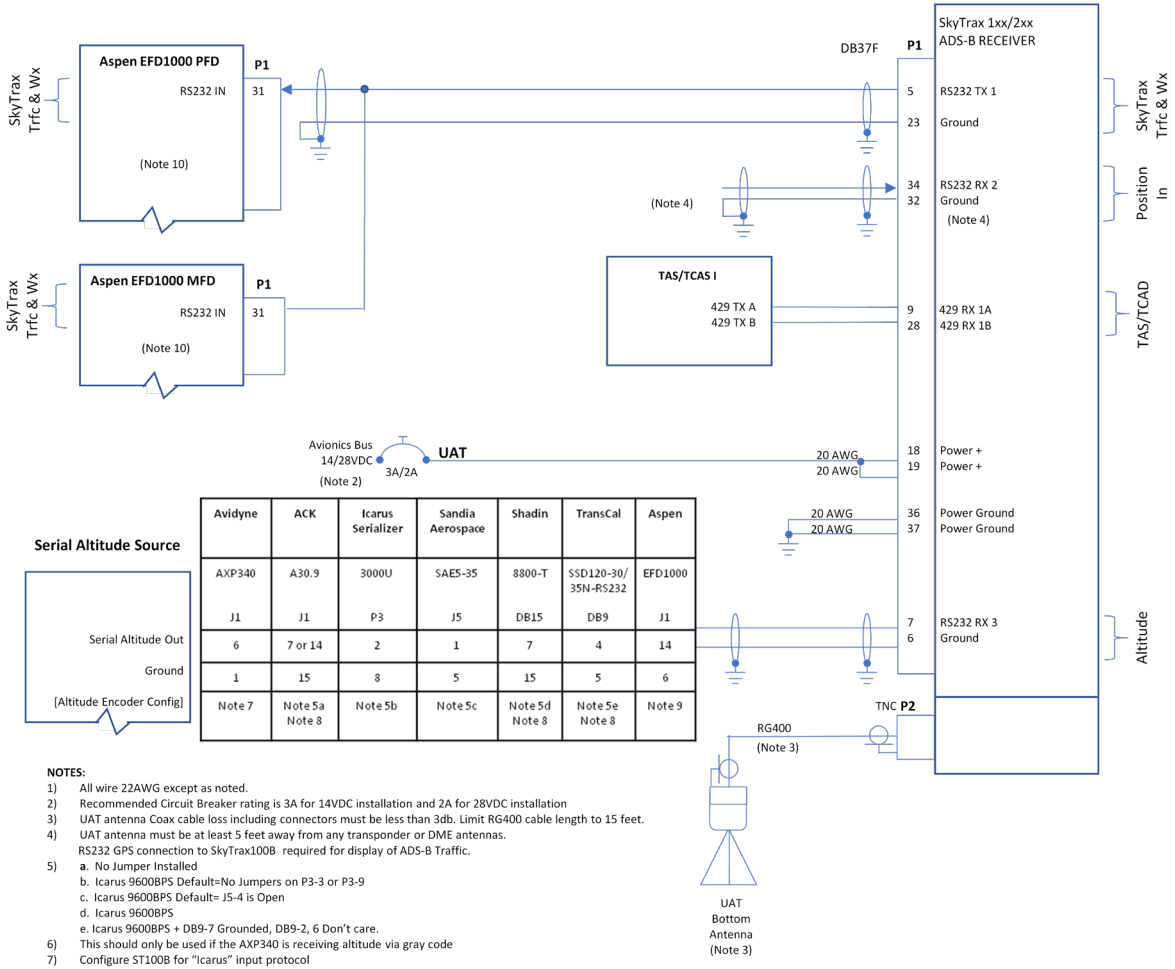


NOTES:

1) All wire 22AWG except as noted.
2) Recommended Circuit Breaker rating is 3A for 14VDC installation and 2A for 28VDC installation
3) UAT antenna Coax cable loss including connectors must be less than 3db. Limit RG400 cable length to 15 feet. UAT antenna must be at least 5 feet away from any transponder or DME antennas.
4) Avidyne R9 Configuration Tool p/n 570-00117-006 Rev 02 must be used to configure the R9 system for ST100B
5) When configuring ST100B Com port, use Selection N (Capstone)
6) When configuring ST100B NACV, set value to 1
7) Only one position input is required for the ST100B to function. A second input may be added for system redundancy

SkyTrax1xx/2xx with Entegra II S/W 9.4 or Higher

A.4 Interconnect Diagram: SkyTrax w/Aspen EFD1000



Avidyne	ACK	Icarus Serializer	Sandia Aerospace	Shadin	TransCal	Aspen
AXP340	A30.9	3000U	SAE5-35	8800-T	SSD120-30/ 35N-RS232	EFD1000
J1	J1	P3	J5	DB15	DB9	J1
6	7 or 14	2	1	7	4	14
1	15	8	5	15	5	6
Note 7	Note 5a Note 8	Note 5b	Note 5c	Note 5d Note 8	Note 5e Note 8	Note 9

NOTES:

1) All wire 22AWG except as noted.
2) Recommended Circuit Breaker rating is 3A for 14VDC installation and 2A for 28VDC installation
3) UAT antenna Coax cable loss including connectors must be less than 3db. Limit RG400 cable length to 15 feet.
4) UAT antenna must be at least 5 feet away from any transponder or DME antennas.
   RS232 GPS connection to SkyTrax100B required for display of ADS-B Traffic.
5) **a**. No Jumper Installed
   b. Icarus 9600BPS Default=No Jumpers on P3-3 or P3-9
   c. Icarus 9600BPS Default= J5-4 is Open
   d. Icarus 9600BPS
   e. Icarus 9600BPS + DB9-7 Grounded, DB9-2, 6 Don't care.
6) This should only be used if the AXP340 is receiving altitude via gray code
7) Configure ST100B for "Icarus" input protocol
8) Configure for Aspen "Airdata Type 1" output protocol and ST100B for "Shadin G/S/Z" input protocol
9) An unlock card maybe required to activate this software feature. See Aspen Tech Note 2014-02

SkyTrax1xx/2xx with Aspen EFD1000 S/W 2.8.3 or Later

Appendix B - SkyTrax Environmental Qual Form

Nomenclature:	SkyTrax		
Part Number:	700-00190-100		
Manufacturer	Avidyne Corp. 710 North Drive Melbourne, FL 32934		
Date Tested:	104/301/20		
Environmental Condition	**DO-160G Section**	**Test Category**	**Notes**
Temperature and Altitude	4	F2	Controlled temperature, internal Operating low temp -55° C Operating high temp +55° C Short time operating low temp -55° C Short time operating high temp +70° C Ground survival low temp -55° C Ground survival high temp +85° C Non-pressurized to 55,000' Decompression N/A for Category F2 Overpressure N/A for Category F2 No external cooling required (Category X)
Temperature Variation	5	X	Not Applicable, Not tested
Humidity	6	X	Not Applicable, Not tested
Operational Shock and Crash Safety	7	E	Standard operational shock Helicopter and all fixed wing. 20g up, down, forward, aft, side.
Vibration (fixed wing and Helicopter	8	X	Not Applicable, Not tested
Explosion	9	X	Not Applicable, Not tested
Waterproofness	10	X	Not Applicable, Not tested
Fluids Susceptibility	11	X	Not Applicable, Not Tested
Sand and Dust	12	X	Not Applicable, Not tested
Fungus Resistance	13	X	Not Applicable, Not tested
Salt Spray	14	X	Not Applicable, Not tested
Magnetic Effect	15	Z	Causes < 1.0 deg deflection to compass 0.3 meter away
Power Input Momentary Interruptions and all others	16	X	Not Applicable, Not tested

Voltage Spike	17	X	Not Applicable, Not tested
Audio Freq Conducted Susceptibility	18	X	Not Applicable, Not tested
Induced Signal Susceptibility	19	X	Not Applicable, Not tested
RF Susceptibility	20	X	Not Applicable, Not tested
RF Emissions	21	M	Significant EM apertures, not in direct view of radio receiver antenna (Equip mounted in cockpit or cabin area)
Lighting Induced Transient	22	X	Not Applicable, Not tested
Lightning Direct Effects	23	X	Not Applicable, Not tested
Icing	24	X	Not Applicable, Not tested
ESD	25	X	Not Applicable, Not tested
Fire and Flammability	26	X	Not Applicable, Not tested

Appendix C - Antenna Mounting (TSO-C66c, TSO-C74c)

Antenna Electrical Bonding

The antenna needs to be checked for proper bonding after mounting. Follow the guidelines in section 5.8 of SAR-ARP-1870 for installation. Resistance cannot exceed 2.5 milliohms to the fuselage.

Antenna Cable

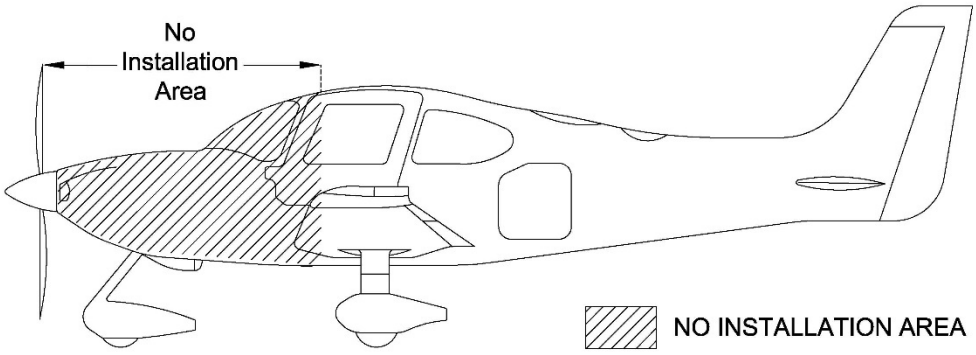
An installation that has the shortest length cable is recommended. Allow for a service loop. One end of the Antenna RG-400 coax cable has a TNC male connector. The other end is terminated with a C male connector for attachment to the antenna.

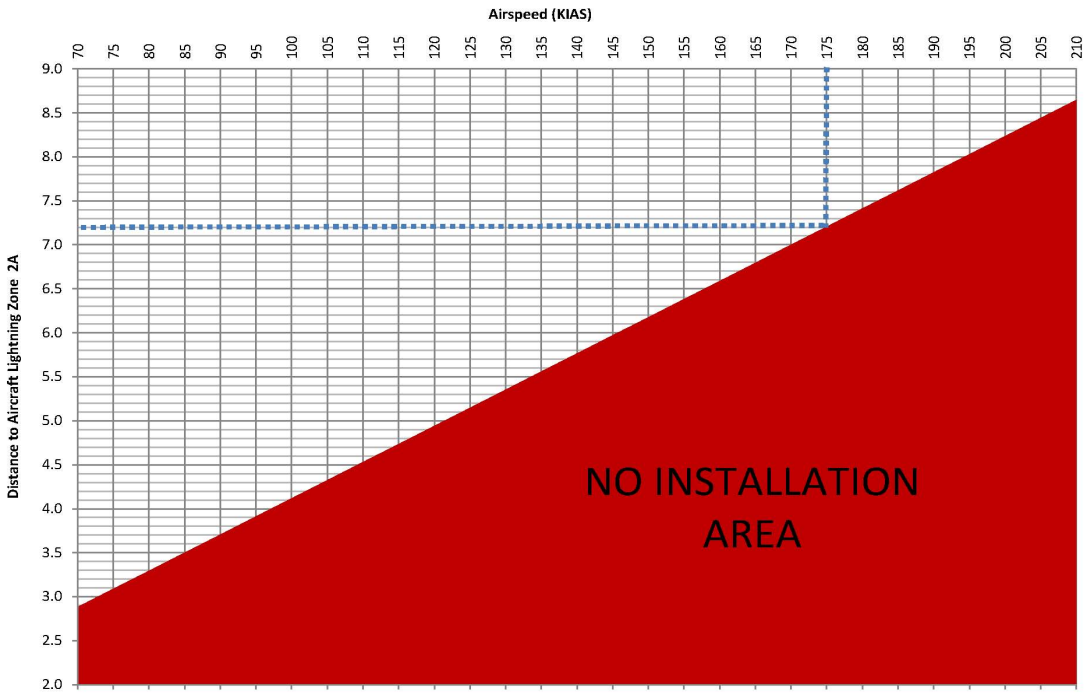
Composite, Pressurized and FIKI Approved Aircraft Installations.

- No airframe specific installation instructions are currently available. Additional approved data is required for composite aircraft installs.
- No airframe specific installation instructions are currently available. Additional approved data is required for pressure vessel aircraft installs.
- Any aircraft that is approved for flight in known icing (FIKI) will require additional approved data for the antenna installation.

Aircraft Lightning Zone calculation

The antenna must be installed in a zone 2A lightning area as defined by SAE ARP5414A and RTCA DO-160G. The antenna listed in table 3-2 is qualified to be installed in aircraft lightning zone 2A. This distance is found by defining a zone immediately aft of the nose of the aircraft, or propeller in the case of single engine propeller driven aircraft, where the antenna should not be installed. Aircraft locations aft of the ***No Installation Area*** are acceptable to install the UAT antenna.





Procedure:

1. Determine the Maximum Cruising Speed (V_{no}) for the aircraft.
   Note: Indicated Airspeed in knots (KIAS) must be used in the table.
2. Locate the Airspeed for the aircraft on the Horizontal Axis of the table. Draw a vertical line from the Airspeed to the No Installation Area.
3. Draw a horizontal line from the No Installation Area, found in Step 2, to the Vertical Axis on the chart.
4. Determine the Distance (in feet) to Aircraft Lightning Zone 2A for the aircraft on the Vertical Axis.

   Example:

   For example, if an aircraft shown has a V_{no} of 175 KIAS, the No Installation Area will be 7.2 feet.

   Aircraft with a V_{no} greater than 210 KIAS may install the antenna 8.6 feet aft of the nose of the aircraft (excluding propeller).

Figure C-1: Antenna Mounting 4 Hole Pattern CI-110-4X

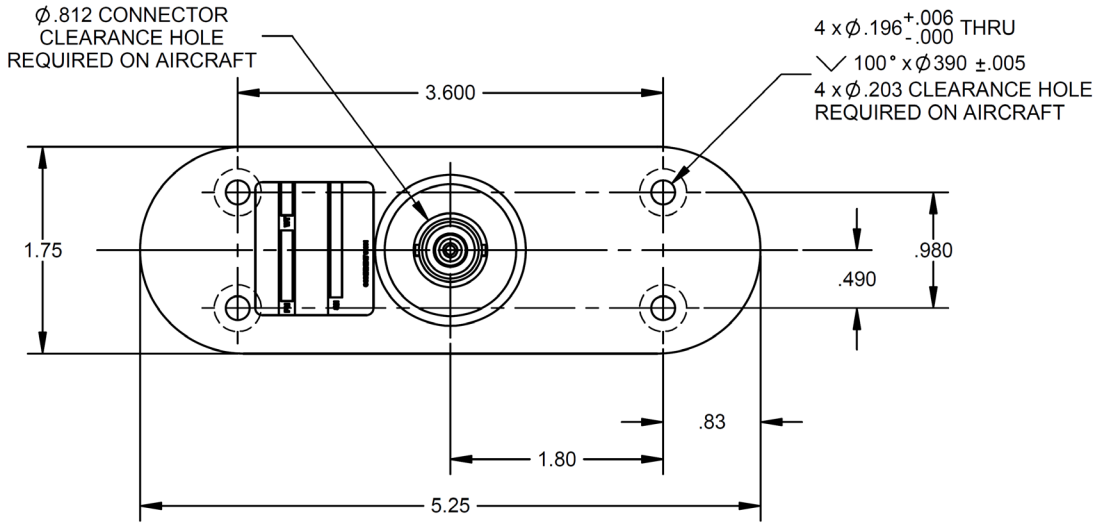
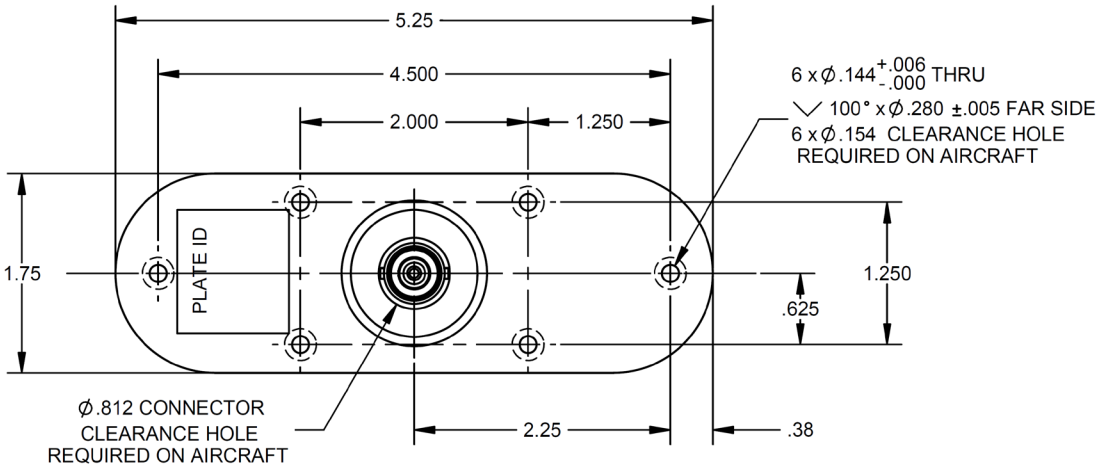


Figure C-2: Antenna Mounting 6 Hole Pattern CI-110-6X



Appendix D - Latency Timing Block Diagrams

Installations of the SkyTrax are required to meet the latency requirements of AC 20-172B. In order to aid in the traffic and own-ship position latency analysis the following information is provided. Figures A-1 and A-2 from AC 20-172B has been duplicated below with the latency numbers replaced with the actual numbers to be used for a SkyTrax installation.

Note that it may appear that higher latency would be permitted within the CDTI based upon the allowable latency from AC 20-172B; however, compliance with the numbers provided here will also assure compliance with the traffic and own-ship position time of applicability requirements from AC 20-172B. Avidyne does not make detailed time of applicability data available for installation analysis, so compliance with the latency values below is the only way to assure compliance with AC 20-172B time of applicability requirements.

- Maximum traffic latency within the SkyTrax (including serial interface transmission delays) = 1.75s
- Maximum own-ship position latency within the SkyTrax (including serial interface transmission delays) = 1.75s
- Maximum allowed latency of own-ship position from the position source = 1s
- Maximum allowed latency between the time a display receives a complete update and the time the update is displayed to the pilot = 0.75s

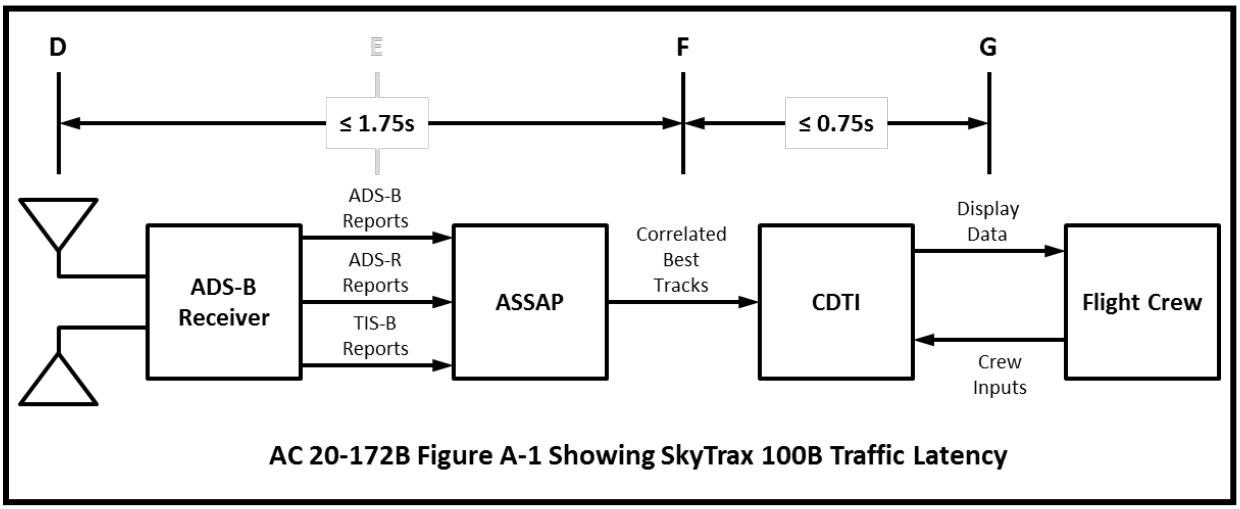


Figure D8: SkyTrax Traffic Latency

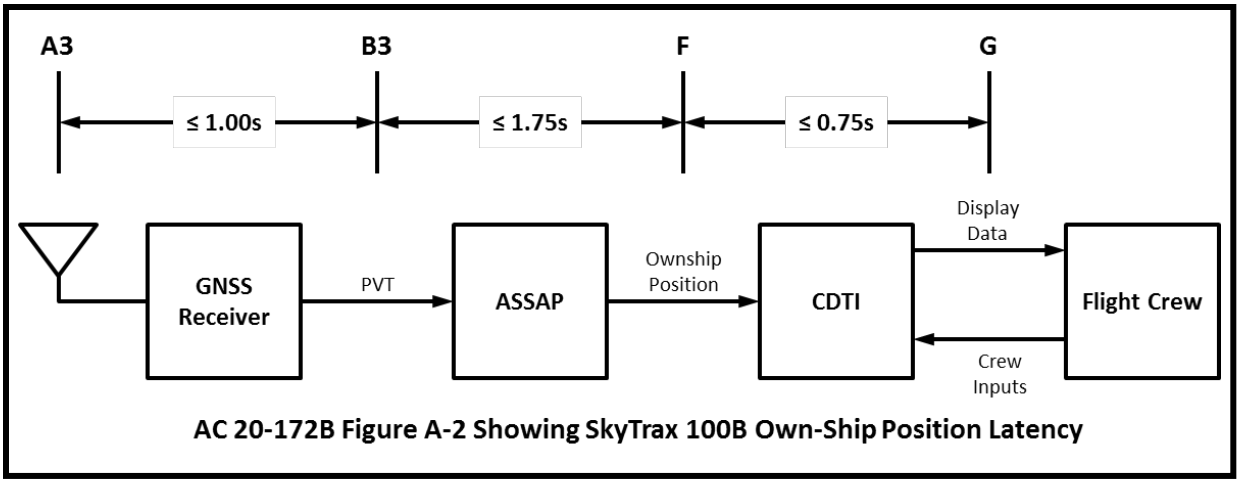


Figure D9: SkyTrax Ownship Position Latency

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