Sky Connect Indoors Installation Manual

Revision 2.0

Dated March 15, 2006

Part # 1621-900 Rev.2.0

ICARUS INSTRUMENTS, INC. • 6930 CARROLL AVE, SUITE 501• TAKOMA PARK, MD 20912•301-891-0600

www.skyconnect.aero

Table of Contents

1.0 General

1.1 System Overview

Sky Connect

The Icarus Sky Connect series satellite communications device consists of a Transceiver, an L-band antenna, and a dialing/audio interface device. The transceiver is the heart of the system, and contains the Iridium satellite LBT (L-Band Transceiver). The LBT can be thought of as the "phone" in the satellite phone system, as it is the connection used to gain access to the Iridium network. The LBT is much more than a phone, however; allowing the two way transfer of voice and data. The Icarus Sky Connect Indoors system contains both a POTS (Plain Old Telephone System) and Iridium handset module allowing the LBT to be dialed and interfaced with remotely. Each Sky Connect telephone system also has the ability for data transfer at rates up to 10 Kbps (with compression), allowing the user to interface a laptop for email capability, and in a pinch, website browsing.

Indoors

The Icarus Sky Connect Indoors system consists of the Sky Connect Transceiver and L-band antenna, and can use the RJ11 port for standard telephones, or an optional corded RJ-45 Iridium handset for dialing/communicating. The Indoors configuration is limited to two RJ45 Iridium handsets with memory dialing functions, or one handset and one external RJ-45 SIM card reader. Up to five RJ 11 phones may use the port, or alternatively, a PBX system can be supported. The RJ11 port allows for party line communication just as a normal household system would. When the RJ45 Iridium handset is used in conjunction with the RJ-11 POTS line, access to the transceiver is on a first come, first serve basis. An externally mounted ringing alert can be purchased which is an RJ-11 ringer configurable for four different ring styles. Volume of the alert is selectable via an adjustable knob on the ringer. No length restriction is placed on the use of RJ11 Pots phones, cordless Pots phones, or PBX systems.

1.2 System Components

Part Number	Product	Description
Indoors		
1621-100-01	Single Line "In-building" dial tone system	Receiver/Transmitter, High Gain antenna, mast mount, 5 meter Antenna Cable
ACCESSORIES		
1621-201-01	Handset/Cup	Hang up cup
1621-401-02	Data Port extender	Extend data port to 1000m
1621-502-02	RJ11 Extender	Extend voice port to 1000m
1621-405-03	Fax Adapter	Future

1.3 Transceiver Specifications

Regulatory Compliance:	DO-160D
Temperature Range:	Section 4 Cat A1
Altitude Range:	Section 4 Cat A1
Vibration:	Section 8 Cat R
Temp Variation:	Section 8 Cat C
Power Input:	Section 16 Cat B
DC Spike:	Section 17 Cat B
Radiated Emissions	Section 21 Cat B
Weight (Unit, Rack, Hardware):	4.05 lbs.
Physical Dimensions: (Length)	10.500 Inches
(Width)	2.500 Inches
(Height)	4.500 Inches
Power Requirements (Voltage):	11-32Vdc
Power Requirements (Current):	>1 Amp @ 28Vdc
Transmit Power Average:	1.5 watts
Operating Frequency	1.616-1.626 GHz
Inputs/Outputs:	POTS (Plain Old Telephone Service), RS232, DSC, dc Level.
Connectors:	TNC female (Iridium), BNC female GPS, RJ45 Connector (2), RJ11 Connector, D Sub 9 connector
Mounting:	4-#8 holes

1.4 Indoors Specifications

Weight (Unit, Hardware):	.80 lbs
RJ45 Cradle/Phone Physical Dimensions:	
(Length)	8.5 Inches
(Width)	2.0 Inches
(Height)	1.5 Inches (2.00 Inches with phone in cradle)
Inputs:	DPL, Pots, Serial
Outputs:	DPL, Pots, Serial
Connectors:	RJ45, RJ11, DB9
Cradle Mounting:	4- 4mm tapped holes

2.0 Installation

2.1 Pre-Installation

Perform a visual inspection of the equipment for evidence of damage incurred during shipment.

Until the Iridium L-Band Transceiver has been registered on the network, there is very little you can do to test its operation. SIM card activation must be done at the user level, through an Iridium Service Provider. After the user has set up an account, the SIM card is activated. The SIM card is the identity of the user, and thus must travel with the user. In this case, the user's SIM card is installed in the Sky Connect Transceiver.

This process should only need to be accomplished at initial installation. Should the unit need to be replaced, or transferred to another party, or in the event that a SIM card requires replacement, follow the SIM card installation instructions below in order to keep the SIM card account matched with the user.

SIM Card Installation

Please consult the factory in the event you need to install/remove a SIM card. Opening the SkyConnect Transceiver without approval will void the warranty. Should you need to install or remove a SIM card, remove the Sky Connect transceiver from its mount relocate to clean environment. Following standard ESD procedures to ensure protection of electronic components, remove the seven small screws from the outside edges of the case. Refer to Appendix A for detailed visual guidance.

Carefully remove the plate from the case, taking care not to damage the ribbon cable connecting the L-Band Transceiver. The TNC antenna connector is physically attached to the LBT, and so should be backed out of the external case very carefully. Once removed, flip the case lid upside down so the face of the LBT is visible. Remove the two Allen screws with a 5/64" Allen wrench. Removing this small access cover reveals the SIM card reader. Arrows on the card lock indicate the direction to slide the lock to release it, allowing the hinged SIM card holder to flip up.

Insert the SIM card so that the gold contacts on the card will be face down and in contact with the gold contacts in the reader. The tapered edge of the SIM card should end up at the top. Close the SIM card holder, and slide it opposite of the "open" arrows to lock it in place. The tapered edge of your card should match the tapered card etching on the plastic of the slide lock. Re-secure the SIM card lid, guide the LBT and cover plate back into place, and re-secure the Sky Connect Transceiver cover plate. The unit is now capable of registering on the Iridium network, provided the SIM card has been activated.

2.2 Antenna Placement

The Aero Antenna High Gain Helix L-Band antenna should be placed as far as practical from other transmitting antennae. A minimum of 30 inches is recommended to other L-Band transmitting antennae. The Iridium antenna is itself a transmitting antenna, and as such, an eighteen inch minimum spacing to susceptible antenna is recommended. The Iridium antenna requires full view of the sky above. Shadowing and interference can occur when mounted near structural elements.

The antenna should be mounted with the provided threaded rod which can be used as a coax conduit, as well as a clamping point for attaching to an appropriate structure.

> **Note: Inmarsat systems will greatly interfere with the performance of the Iridium antenna. This interference may appear to be intermittent with aircraft position as the Inmarsat transmitting antenna array is electrically steerable depending on azimuth to satellite. Do not be fooled, there is no way around it, Inmarsat will kill an Iridium antenna whenever active. Inmarsat should be disabled when Iridium is in use, alternatively, filters are available for Inmarsat systems which essentially act as an Iridium bandpass filter. Consult Icarus for more information.**

2.3 Antenna Cable

When routing antenna cable, avoid high current wiring, other transmitting antenna cables, and sharp bends. Antenna cable should be selected to obtain 3dB max loss at 1.6GHz. If, other than the provided antenna cable length is desired, the installer is responsible for providing antenna cables. Follow industry practices when assembling the TNC connectors. Pre assembled cable lengths can be ordered from ICARUS if needed.

2.4 Transceiver Structural Mounting

The Sky Connect Indoors Transceiver should be mounted in accordance with standard practices. The Transceiver should be mounted within the building and out of direct contact with the elements. If subjecting the transceiver to the elements is required, it is recommended that the transceiver be mounted inside an appropriate NEMA enclosure.

The structural mount consists of 4 #8 holes on the rear plate. Mount using approved #8 hardware. The locking power connector, antenna connector, and any of the following RJ11, RJ45, 9 pin D-subminiature connector, are all that is required to electrically connect the box once it has been structurally secured in place.

2.5 Indoors Structural Mounting

The Sky Connect Indoors Cradle if used should be installed in accordance with standard practices, install 4- 4mm screws into the rear of the cradle. Mount the cradle to the Icarus Cradle adapter bracket or any suitable structural member. The cradle can mount horizontally or vertically and has a locking detent. Mount the handset or cradle in a suitable location near the transceiver, as the handset plugs directly in to the transceiver using an RJ-45 connector. An external POTS ringer is available which will utilize the incoming ring signal on the RJ11 connector to provide an external ring. A volume control on the ringer allows selection of appropriate ring levels, and the type of ring is user configurable via internal DIP switches. Two #10 holes are provided for Indoors ringer mounting. Optionally, a standard POTS phone can be used as the ringer.

2.6 Electrical connections

An external AC/DC converter is supplied with the unit. All that is required to connect the converter is a line cord appropriate to your 50/60 Hz power outlet.

Indoors Wiring
Indoors handsets interface via an RJ11 or an RJ-45 connector. There is no practical length limitation on the RJ11 port.

3.0 Post-Installation

After the wiring polarity, quality, and routing has been assured, and the structural integrity of the Antenna, Transceiver, and dialing/audio interface has been verified, you are able to begin the configuration and testing process.

3.1 Transceiver Indications

The SkyConnect Transceiver is equipped with diagnostic lights on the face of the transceiver. The performance of these lights is very important as an aid to diagnosing performance problems. This section describes the purpose of each light.

On power up, all lights will come on briefly, followed by a blinking of the software revision. Software major designator is indicated by the green Signal Strength bars, while minor increment is indicated by the yellow bars. Two green flashes followed by three yellow flashes indicates version 2.3.

Signal Strength—When registered with the network, these lights will indicate your current signal strength by displaying zero to five bars. Anything less than

three bars will usually result in a failed call attempt. Signal strength changes as azimuth to satellite changes. The better the antenna's view of the horizon, the more consistent the signal strength will be.

Signal strength is not indicated when in a data call. As a result, the signal strength bars will alternate on and off (1,3, and 5, followed by 2, and 4). Throughout the duration of a data call.

Ringer—light will flash in a ringing cadence with any inbound voice call.

Power—light will remain solid at all times that external power is applied and the system is operational..

Off Hook—This light indicates when an RJ11 phone is off hook. When this light is on, you will hear dial tone, or busy signal in the handset.

Data Call—light indicates that DTR is high on the PC interface, and likely that a data call is in progress. This light is coincident with the flashing Signal Strength bars.

Voice Call—light indicates that a Voice call has connected and is in progress.

Register—light will blink while a unit is attempting to register with the network. This process happens each time the unit is powered. The light will go solid once registration has occurred. Registration implies that at some point, at least one bar of signal strength was available for roughly ten seconds, though a registered phone does not necessarily mean you currently have adequate signal strength for a call. A registered unit means that a valid SIM card is installed, an account is active with a service provider, and the Antenna subsystem is sufficient to provide one bar of coverage.

SC1—Factory Use.

3.2 Phone configuration and testing

SIM PIN removal (All systems)

If your SIM card has the PIN protection feature enabled, you must enter the PIN code when prompted. This PIN can be disabled from the factory, but may be requested on, and will always be on when a SIM card other than from the factory is initially inserted. On the Indoors systems using the RJ11 port, the prompt for the PIN is a melodic three tone sequence. Enter "*1* PINCODE #". On a Classic handset, you will be prompted to "Enter Pin." Do so, and press "OK". You will be prompted for the PIN each time the system is started unless the PIN is disabled. This can be done on the Indoors RJ45 handset by pressing "Menu," selecting "Phone Setup," "Require SIM Card," "Off." Consult factory for disabling instructions using RJ11 handsets.

> **Do not attempt to make a phone call with an active SIM pin. Changing the SIM card in the field to a different provider's SIM card necessitates the removal of the PIN for proper operation. If a PIN is entered incorrectly three times, you will lock the phone and be unable to do any testing until the problem is resolved by the factory.**

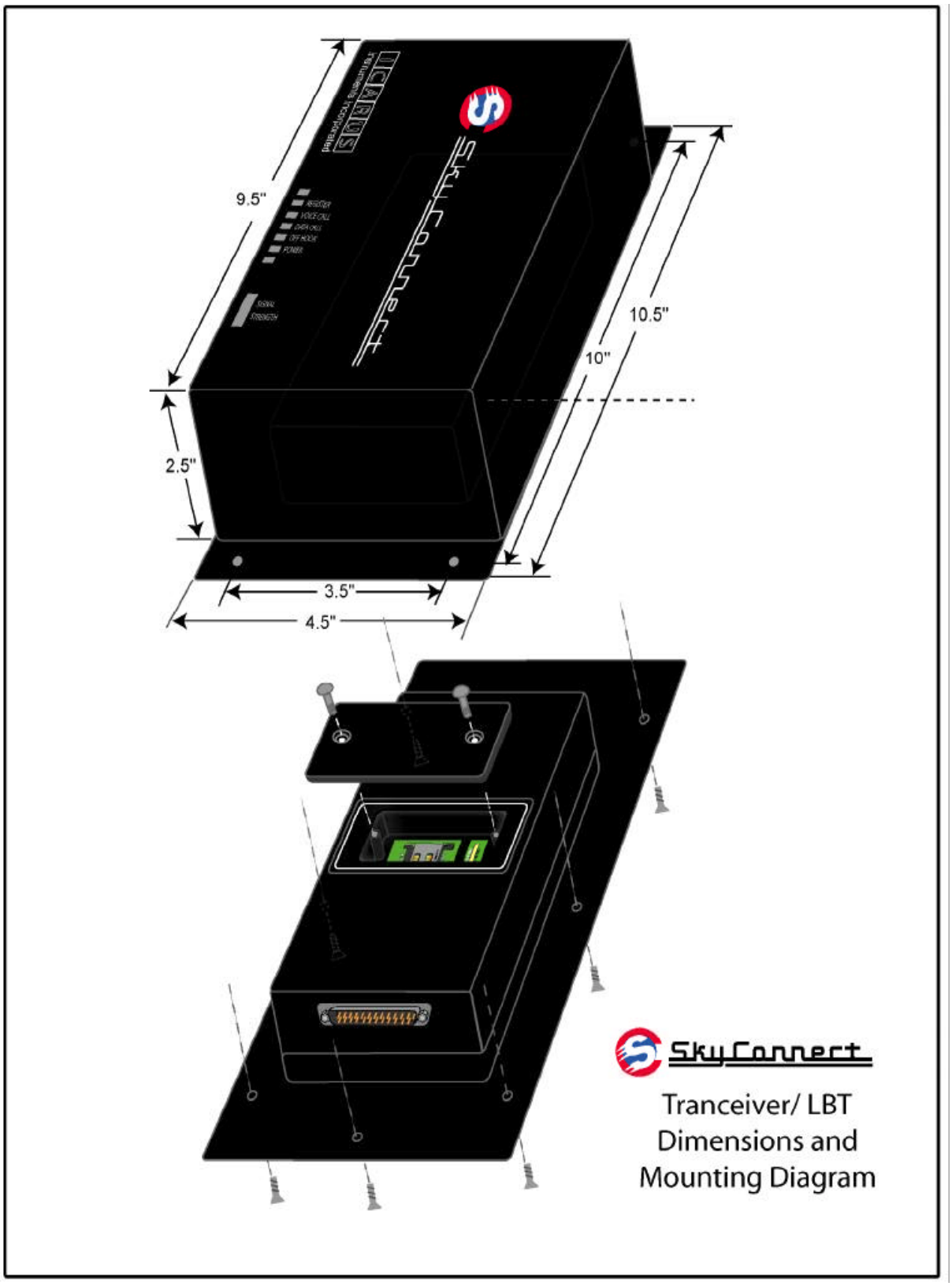
How to Dial Calls (RJ11 POTS interface)

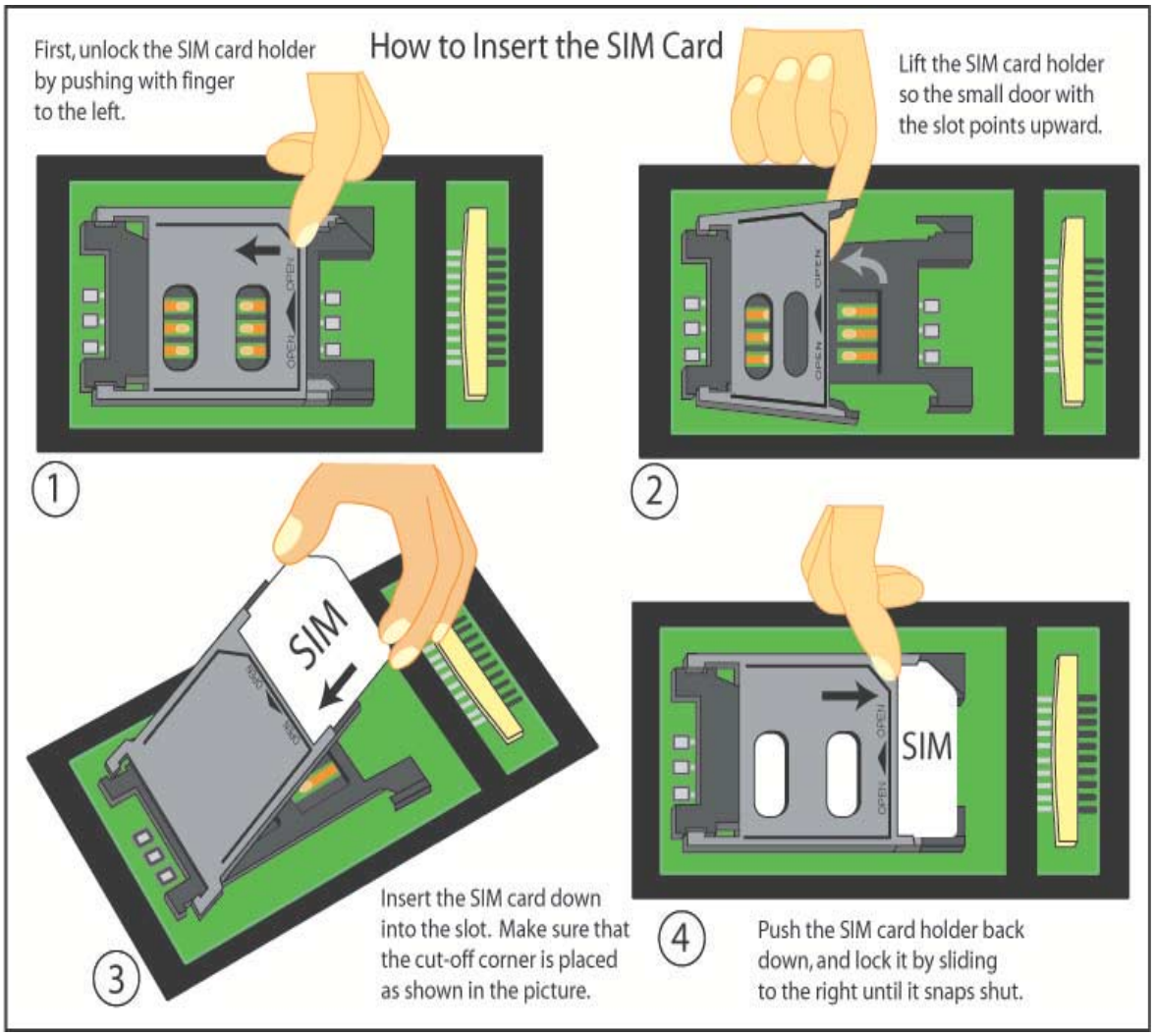
Lift handset key to get a dial tone.
Dial "00," the country code, area code, and number followed by the pound key. The pound key is required to alert the phone that the end of the dial string has been reached. No call will be initiated without the pound key. You will hear call progress tones followed by the ringing sound. For calls within the US, for example, dial as follows: 001-301-891-0600-#, where "00" is international access, "1" is the country code for the US, and "#" is the end of the dialing string.

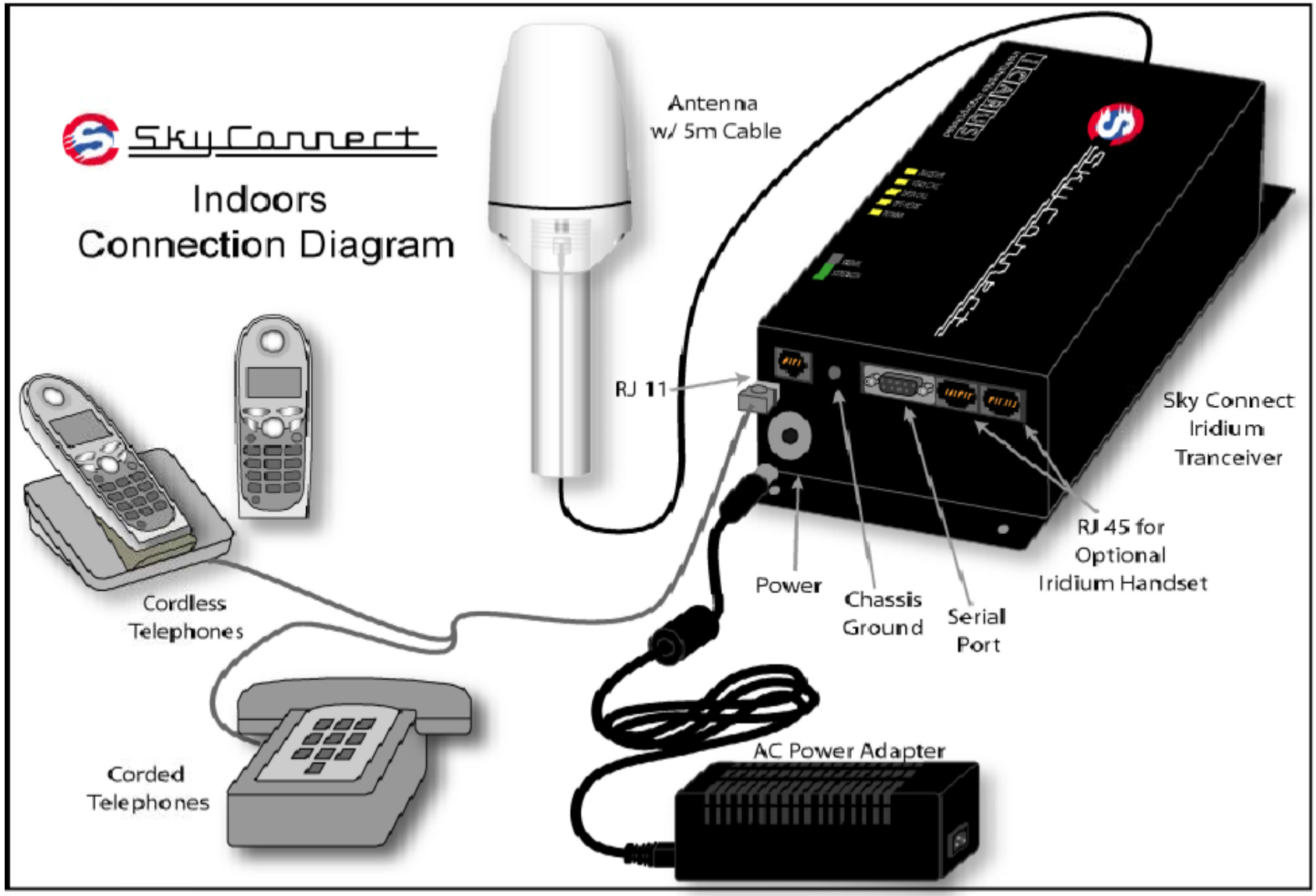
How to Dial Calls (RJ45 Iridium handset)

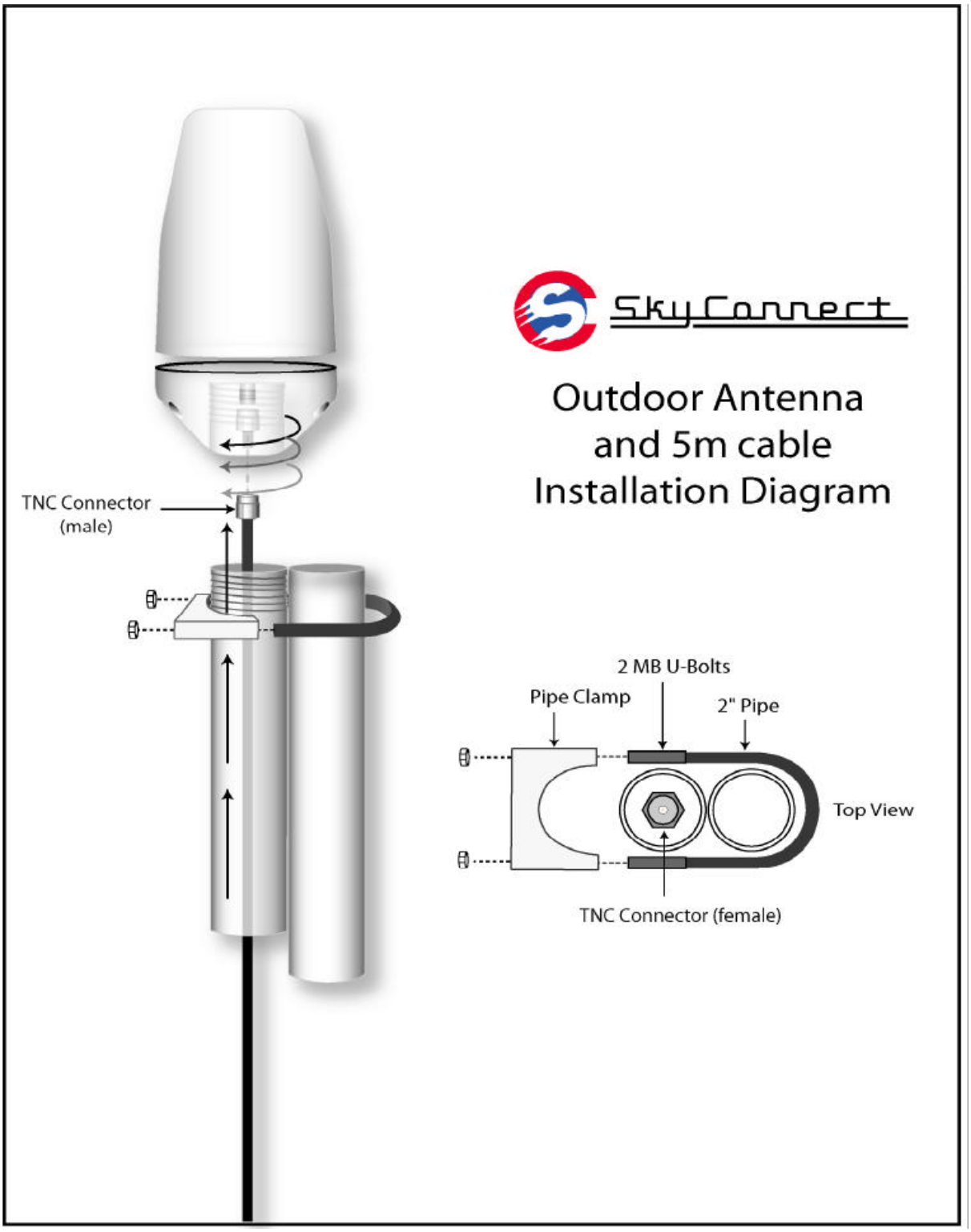
Dial "00," the country code, area code, and number followed by the "OK" key. The "Send" key is required to alert the phone that the end of the dial string has been reached. No call will be initiated without the "Send" key. You will hear call progress tones followed by the ringing sound. For calls within the US, for example, dial as follows: 001-301-891-0600-Send, where "00" is international access, and the "1" is the country code for the US. Optionally, dialing strings can be stored in phone memory locations.

> **Note: There are some inherent delays and audio quality degradation in the use of satellite communications. These anomalies can come and go depending on current azimuth to the satellite in use, and even specific satellite characteristics. Calls will occasionally be dropped due to momentary signal loss in excess of 12 seconds. This sometimes frustrating characteristic is a normal aspect of all wireless communications.**


9.5"
10.5"
10"
2.5"
3.5"
4.5"
SkyConnect
Tranceiver/ LBT
Dimensions and
Mounting Diagram


How to Insert the SIM Card
First, unlock the SIM card holder by pushing with finger to the left.
Lift the SIM card holder so the small door with the slot points upward.
1
2
SIM
SIM
Insert the SIM card down into the slot. Make sure that the cut-off corner is placed as shown in the picture.
3
4
Push the SIM card holder back down, and lock it by sliding to the right until it snaps shut.


SkyConnect
Indoors
Connection Diagram
Antenna
w/ 5m Cable
RJ 11
Sky Connect
Iridium
Tranceiver
RJ 45 for
Optional
Iridium Handset
Power
Chassis
Ground
Serial
Port
Cordless
Telephones
Corded
Telephones
AC Power Adapter


SkyConnect
Outdoor Antenna
and 5m cable
Installation Diagram
TNC Connector
(male)
2 MB U-Bolts
Pipe Clamp
2" Pipe
Top View
TNC Connector (female)

Parts;

RJ45-1 RJ45-2	Supplied
RJ11	User supplied
DB9-1	Not used
DB9-2	M24308/4-1F 9 pin male w/M39029/64-369 contacts and Hood P/N DE-24657
DB9-3 P1	M24308/2-1F 9 pin female w/M39029/63-368 contacts and Hood P/N DE-24657
Power Supply	1621-602-01 110VAC Optional in place of DC supply 1621-602-02 220VAC

Revision	Date	Description
1.0	8/8/05	Re draw of the schematic and notes

NOTES;

1.) Ensure proper engagement of slide lock.

2.) Deleted

3.) Tracker switch connections are optional. Use diodes if connected to anything except ground.

4.) NMEA GPS Input, requires ground return.

5.) Diagnostics configuration is required for Tracker operation.
Connect to a PC using a female to female cable or regular cable using a gender changer.
An additional connector (P1) may be installed to make this easier.
If done, use P1 connector at left and use a standard serial cable.

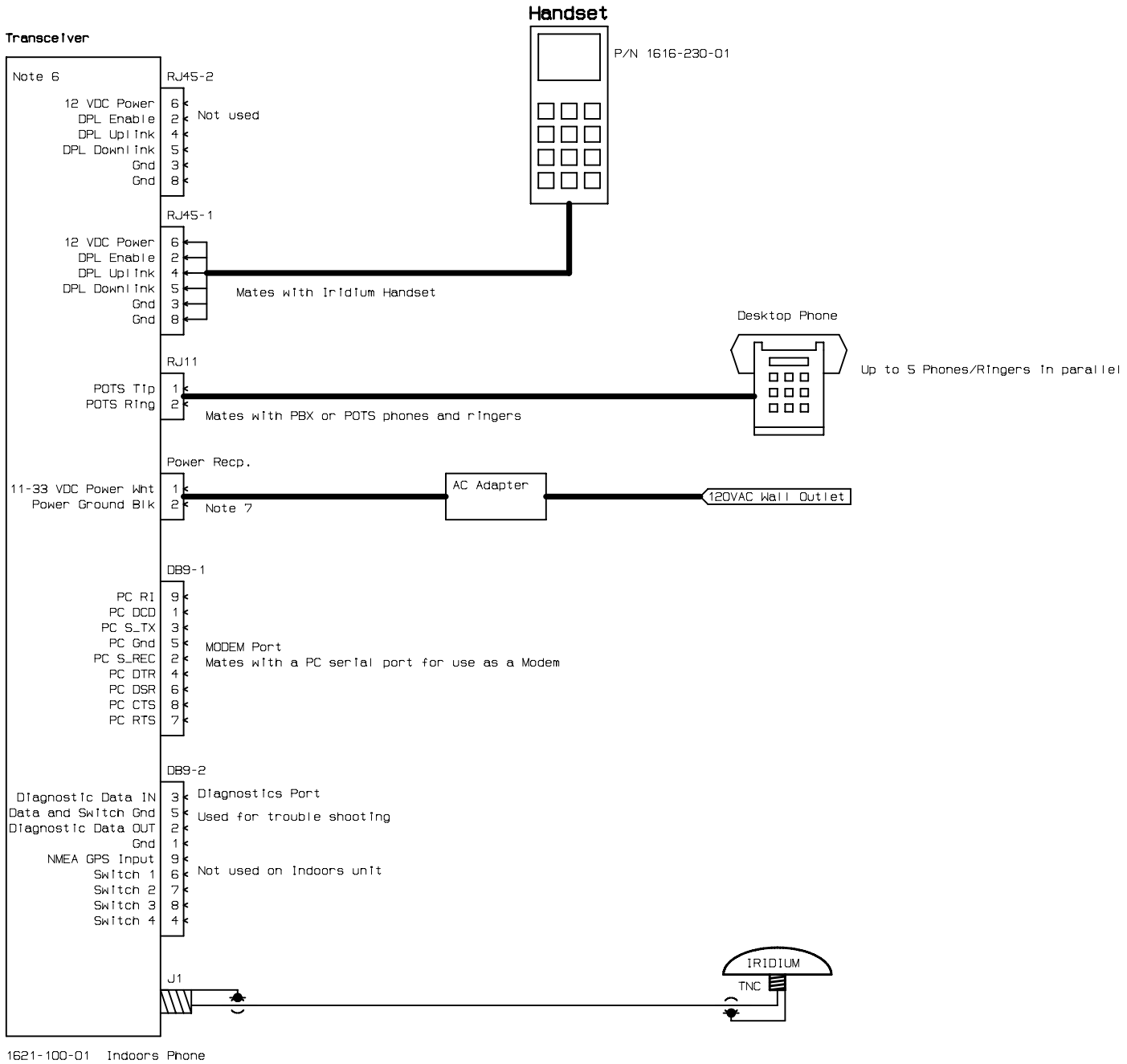
6.) DO NOT plug, unplug connectors with power applied, damage will result.

7.) Optional power from a battery cable is possible, connect 10-32VDC cable here and power with battery or DC supply.

PARTS, NOTES and REVISIONS PAGE

Dwg# 1631-900-01

SKY CONNECT LLC	
File: c:\cktcrt\my schematics\marine skyconnect.sch	
Title: Marine/Indoors Units	
Sheet: Parts, Notes and revisions	No: 1 Rev: 1.0
Drawn: Mike Freyder	
Engineer:	Created: 8-AUG-2005 10:30
Approved: Mike Freyder	Changed: 23-MAR-2006 13:35



Indoors Unit Install Dwg# 1621-900-01

SKY CONNECT LLC	
File: c:\cktcrt\my schematics\marine skyconnect.sch	
Title: Marine/Indoors Units	
Sheet: Indoors Installation	No: 3 Rev: 1.0
Drawn: Mike Freyder	
Engineer:	Created: 8-AUG-2005 10:30
Approved: Mike Freyder	Changed: 23-MAR-2006 15:18