



**Lilee** Systems



# Lilee Systems™ TransAir™ PTC-3000 Family

## User Manual

August 27, 2012



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## 1 Before You Begin

Carefully remove and inspect the package contents. Refer to the Package Checklist below. Please adhere to the following Safety Considerations.

### 1.1 RF EXPOSURE COMPLIANCE REQUIREMENTS/EXIGENCES DE CONFORMITÉ DE L'EXPOSITION RF

The PTC-3000 family must be professionally installed and must ensure a minimum separation distance listed below between the radiating structure and any person.

Note that with PTC-3000 RF Board Fixed installation with highest gain antenna of 14.1dBi, the antenna of the product, under normal use condition, should be at 2.08 m away from the body of any user for fixed installation.

Note that with PTC-3000 RF Board Mobile installation with highest gain antenna of 5.2dBi, the antenna of the product, under normal use condition, should be at 1.41 m away from the body of any user for mobile installation.

Note that with PTC-3004 Fixed installation with highest gain antenna of 14.1dBi, the antenna of the product, under normal use condition, should be at 2.5 m away from the body of any user for fixed installation. Note that PTC-3004 RF exposure limits apply to all PTC-3000 family.

Note that with PTC-3004 Mobile installation with highest gain antenna of 5.2dBi, the antenna of the product, under normal use condition, should be at 1.74 m away from the body of any user for mobile installation. Note that PTC-3004 RF exposure limits apply to all PTC-3000 family.

The output power for fixed stations is factory set max limit at 45.5dBm on 220MHz antenna ports. The maximum EIRP is 50.4dBm based on max gain antenna of 14.1dBi and cable loss of 9.2dB. If user/installer exceeds this max EIRP, the installer must increase cable loss and/or lower power accordingly. Note that output power is variable, and the actual power is chosen at the time installation depending on cable losses, Antenna height and gain and terrain as per FCC/ IC licensing procedures.

The output power for mobile stations is factory set max limit at 44.5dBm on 220MHz antenna ports. The EIRP is 46.9dBm based on max gain antenna of 5.2dBi and cable loss of 2.8dB. If user/installer exceeds this max EIRP, the installer must increase cable loss and/or lower power accordingly. Note that output power is variable, and the actual power is chosen at the time installation depending on cable losses, Antenna height and gain and terrain as per FCC/ IC licensing procedures.

The concentrated energy from an antenna may pose a health hazard. People should not be in front of the antenna when the transmitter is operating. The installer of this equipment must



ensure the antenna is located or pointed such that it does not emit an RF field in excess of Health Canada limits for the general population. Recommended safety guidelines for the human exposure to radio frequency electromagnetic energy are contained in the Canadian Safety Code 6 (available from Health Canada) and the Federal Communications Commission (FCC) Bulletin 65.

Any changes or modifications not expressly approved by the party responsible for compliance (in the country where used) could void the user's authority to operate the equipment.

La famille PTC-3000 doit être installée par un professionnel et doit garantir une distance minimale de séparation entre énumérés ci-dessous la structure rayonnante et toute personne.

Notez qu'avec PTC-3000 RF Board Installation fixe avec antenne haut gain de 14.1dBi, l'antenne du produit, dans des conditions normales d'utilisation, doit être à 2,08 m du corps d'un utilisateur pour une installation fixe.

Notez qu'avec PTC-3000 RF Board Installation mobile avec antenne haut gain de 5.2dBi, l'antenne du produit, dans des conditions normales d'utilisation, doit être de 1,41 m à partir du corps d'un utilisateur pour une installation mobile.

Notez qu'avec PTC-3004 Installation fixe avec antenne haut gain de 14.1dBi, l'antenne du produit, dans des conditions normales d'utilisation, devrait être de 2,5 m à partir du corps d'un utilisateur pour une installation fixe. Notez que PTC-3004 les limites d'exposition RF s'appliquent à tous les PTC-3000 famille.

Notez qu'avec PTC-3004 Installation mobile avec antenne haut gain de 5.2dBi, l'antenne du produit, dans des conditions normales d'utilisation, doit être à 1,74 m à partir du corps d'un utilisateur pour une installation mobile. Notez que PTC-3004 les limites d'exposition RF s'appliquent à tous les PTC-3000 famille.

La puissance de sortie pour les stations fixes est réglé en usine limite max à 45.5dBm sur les ports d'antenne 220MHz. La pire maximale est basée sur 50.4dBm antenne à gain max de 14.1dBi et la perte de câble de 9.2dB. Si l'utilisateur / installateur dépasse ce maximum pire, l'installateur doit augmenter la perte de câble et / ou de puissance inférieure conséquence. Notez que la puissance de sortie est variable, et la puissance réelle est choisi au moment de l'installation en fonction de pertes dans les câbles, hauteur d'antenne et le gain de terrain et par la FCC / IC procédures d'octroi de licences.

La puissance de sortie pour les stations mobiles est réglé en usine limite max à 44.5dBm sur les ports d'antenne 220MHz. Le pire est 46.9dBm est basée sur l'antenne à gain max de 5.2dBi et la perte de câble de 2.8dB. Si l'utilisateur / installateur dépasse ce maximum pire, l'installateur doit augmenter la perte de câble et / ou de puissance inférieure conséquence. Notez que la puissance de sortie est variable, et la puissance réelle est choisi au moment

de l'installation en fonction de pertes dans les câbles, hauteur d'antenne et le gain de terrain et par la FCC / IC procédures d'octroi de licences.

Le concentré d'énergie à partir d'une antenne peut poser un risque pour la santé. Personnes ne doivent pas être en face de l'antenne lorsque l'émetteur est en marche. L'installateur de cet équipement doit s'assurer que l'antenne est située ou orientée de façon à ne pas émettre un champ RF dépassant les limite de Canada Santé pour la population générale. Consignes de sécurité recommandées pour l'exposition humaine à l'énergie électromagnétique de fréquence radio sont contenues dans le Code canadien de sécurité 6 (disponible auprès de Santé Canada) et la Federal Communications Commission (FCC) Bulletin 65.

Les changements ou modifications non expressément approuvés par la partie responsable de la conformité (dans le pays d'utilisation) peut annuler le droit de l'utilisateur à utiliser cet équipement..

## 1.2 Safety Considerations

Please ensure the following safety precautions are adhered to at all times.

- **Follow electrostatic precautions** whenever the PTC-3000 is installed. To prevent malfunction or damage which may be caused by Electrostatic Discharge, the PTC-3000 should be grounded. Before touching components or connecting/disconnecting cables, the installer should touch a metal object to dissipate body charge.
- **Make sure the power is turned off and the power cord is disconnected** whenever the PTC-3000 is being installed or moved.
- **Do not apply voltage levels that exceed the specified voltage range.** Doing so may cause fire and/or an electrical shock.
- **Do not open the chassis when the PTC-3000 is running: Electric shocks can occur.**
- **If considerable amounts of dust, water, or fluids enter the PTC-3000,** turn off the power supply immediately, unplug the power cord, and contact the distributor or sales representative.
- **DO NOT** do the following:
  - **DO NOT** drop the PTC-3000 onto a hard surface.
  - **DO NOT** use the PTC-3000 in a site where the ambient temperature exceeds the rated temperature.

## 1.3 ESD Notice

To prevent malfunction or damage to this product, which may be caused by Electrostatic Discharge (ESD), the radio should be properly grounded at the time of installation. In addition, the installer or maintainer should follow proper ESD precautions, such as touching a bare metal object to dissipate body charge, prior to touching components or connecting/disconnecting cables.

## 1.4 FCC/IC Approval Notice/ Avis d'approbation FCC/IC

This device is offered as a licensed transmitter per FCC Parts 80, 90, & 95 and IC RSS-119. It is approved for use under the following conditions: Changes or modifications not expressly approved by the party responsible for compliance will void the user's authority to operate the equipment.

Cet appareil est un émetteur conforme à la FCC partie 80, 90, & 95 et IC RSS-119. Son utilisation est uniquement approuvée dans les conditions suivantes: Tout changement ou modification non expressément approuvé par la partie responsable de la conformité entraînera le retrait du droit d'exploiter l'équipement.

## 1.5 FCC Part 15 Notice/IC RSS-210\_GEN Avis

Operation of this device 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. Any unauthorized modification or changes to this device without the express approval of the

manufacturer may void the user's authority to operate this device. Furthermore, this device is intended to be used only when installed in accordance with the instructions outlined in this manual. Failure to comply with these instructions may void the user's authority to operate this device.

L'exploitation de cet appareil est soumise aux deux conditions suivantes:

(1) ce dispositif ne doit pas causer d'interférences nuisibles, et (2) cet appareil doit accepter toute interférence reçue, y compris les interférences qui peuvent provoquer un fonctionnement indésirable. Toute modification non autorisée de cet appareil sans l'approbation expresse du fabricant peut provoquer le retrait de l'autorisation d'exploiter cet appareil. De plus, ce dispositif est destiné à être utilisé uniquement lorsqu'il est installé conformément aux instructions décrites dans ce manuel. Toute infraction à ces instructions peut engendrer le retrait de l'autorisation d'exploiter l'appareil.

## **1.6 Equipment Modifications/Modifications apportées à l'équipement**

Caution: Any changes or modifications to this equipment not expressly approved by the party responsible for compliance (in the respective country of use) could void the user's authority to operate the equipment.

Attention: Tout changement ou modification apporté à cet équipement qui n'est pas expressément approuvé par la partie responsable de la conformité (dans le pays respectif d'utilisation) peut engendrer le retrait de l'autorisation d'exploiter l'appareil.

## **1.7 Radiated Power Limits/Limites de puissance rayonnées**

It's the responsibility of the licensee to comply with the effective radiated power limits based on operation frequency, geographic location, and effective antenna height set out in 47CFR Subpart T 90.729 et. Seq., or Industry Canada SRSP-512 section 6.3, as applicable.

Il est de la responsabilité du titulaire de la licence de se conformer aux limites légales de puissance rayonnées basées sur la fréquence de fonctionnement, l'emplacement géographique et la hauteur effective de l'antenne conformément à 47 CFR sous-section 90.729 et suivants ou dans Industry Canada PNRH-512 6.3, le cas échéant.

## 1.8 Antenna guidelines/ Les lignes directrices d'antenne

### OPERATIONAL & SAFETY NOTICES

The licensee is required to comply with all limits on frequency of operation, antenna location, power, and effective antenna height.

The installer must take the following into consideration:

- Antennas must be installed by professional antenna installers only.
- Refer to the RF Energy Exposure Guide for specific guidelines regarding the siting and installation of mobile and fixed antennas. RF exposure compliance at multiple transmitter sites must be addressed on a site-by-site basis. It is the responsibility of the licensee to ensure compliance with maximum exposure limits.
- When servicing the antennas, or working at distances closer than those listed above, ensure the transmitter has been disabled.
- Unauthorized antennas, equipment modifications or attachments could invalidate any equipment warranty or authority to transmit. Modification could damage the radio and may violate FCC or IC regulations.
- For FCC CFR 47 part 95F operation, the transmit power is limited to 4.48W at antenna port for Cell Transmitter Station (CTS), and 1W at antenna port for Response Transmitter Unit (RTU).
- For CFR47 part 95F operation, the Cell Transmitter Station (CTS) and Response Transmitter Unit (RTU) antenna heights must comply with FCC CFR 47 95.859.

### AVIS DE SECURITE ET NOTICES OPERATIONNELLES

Le titulaire est tenu de se conformer à toutes les limites sur la fréquence de fonctionnement, emplacement de l'antenne, la puissance, et la hauteur effective de l'antenne. L'installateur doit prendre les mesures suivantes en considération:

- Antennes doivent être installés par des installateurs d'antennes professionnels seulement.
- Reportez-vous au Guide de l'exposition de l'énergie RF pour des directives spécifiques concernant l'implantation et l'installation d'antennes mobiles et fixes. Le respect d'exposition aux RF sur les sites d'émetteurs multiples doit être abordée sur une base site par site. Il est de la responsabilité du titulaire de permis pour assurer le respect des limites maximales d'exposition.
- Lors de l'entretien des antennes, ou de travailler à des distances que ceux énumérés ci-dessus, que l'émetteur a été désactivé.

- Les antennes, modifications à l'équipement ou des pièces jointes peut annuler toute garantie de l'équipement ou de l'autorité de transmettre. Modification pourrait endommager la radio et de violer la réglementation de la FCC ou IC.
- Pour FCC CFR partie 47 95F opération, la puissance d'émission est limitée à 4.48W au port d'antenne pour station émettrice portable (CTS), et 1W au port d'antenne pour l'unité émetteur de réponse (RTU).
- Pour le fonctionnement CFR47 partie 95F, la station émettrice portable (CTS) et l'Unité émetteur de réponse (RTU) hauteurs d'antenne doit se conformer à la norme FCC CFR 47 95.859.

## 1.9 Package Checklist

The TransAir PTC-3000 is shipped with the following items. Inspect the package contents to ensure all the components are included. If any of these items are missing or damaged, contact the distributor or sales representative immediately.




Item and Part Number	Quantity	Image
Model #: PTC-3000 1U Model #: PTC-3201 2MCU Model #: PTC-3202 2MCU Model #: PTC-3203 2MCU Model #: PTC-3204 2MCU Model #: PTC-3004 4MCU Model #: PTC-3006 6MCU	1	
NAS622 mounting kit with four screws (PTC-3201~4 PTC-3004 and PTC-3006)	2 for 4MCU/6MCU 1 for 2MCU	
USB Flash Drive (all models)	1	

Table 1-1 – Package Checklist

### 1.10 Optional Starter Kit

The following optional starter kit is available made to order.








Item and Part Number	Quantity	Image
RJ45 to DB9 cable (PTC-3001 only)	3	
3-pin terminal block to DC adapter cable (PTC-3001 only; NOTE: Professional installer need to provide ferrite 0461164281 or solid version (from fair-rite.com) or equivalent characteristic ferrite on the power supply line position as shown in the picture	1	
AC to DC adapter + power cord (for engineering sample purposes only; all models)	1	
M12 to DB9 cable (PTC-3201~4 PTC-3004 and PTC-3006)	3 for 4MCU and 6MCU/ 3 or less per 2MCU model	
M12 to RJ45 cable (PTC-3201~4 PTC-3004 and PTC-3006)	2 for 4MCU and 6MCU/ 2 or less per 2MCU model	
DC (M12) to +19 V adapter power cable (PTC-3201~4 PTC-3004 and PTC-3006)	1	
TNC to SMA male connector (all models)	4 for 4MCU and 6MCU / 4 or less for 2MCU model	

Table 1-2 – Optional Starter Kit



## 2 Introduction

The Lilee Systems TransAir PTC-3000 product family includes three components: TransAir Wayside, TransAir Base Station and TransAir Locomotive radios. The TransAir PTC product family's design is based on both ACSES and an interoperable train control (ITC) architecture that in conjunction with the Lilee Mobility Controller (LMC-5x00 series) enables seamless roaming and constant communication between central traffic control, wayside signals, and onboard locomotive networks. This combined solution can help freight railroads and transit operators maintain compliance with the Federal Rail Safety Improvement Act of 2008.

### 2.1 Features

Some of the features and benefits of the PTC-3000 are listed below:

- 220 MHz PTC System
- Wide operating temperature range and ruggedized metal housing for hazardous environments
- 3G, Wi-Fi and external satellite radio modem
- Redundant antenna
- GPS Timing/Location receiver
- Fast roaming for seamless wireless connections
- High security with AES encryption and powerful policy based filter and Access Control List

The PTC-3000 is designed with the following rugged features for harsh environments:

- Metal housing
- M12 connectors protect against shock and vibration (4MCU/6MCU locomotive units)
- Hardened mounting kit for flexible, secure installation
- Wide operating temperature range of -40 to 70 °C

In addition, the PTC-3000 provides specifications for railroad applications:

- Combines IP/Ethernet and transparent serial communications on the same network
- Fast handover for rapid locomotive roaming
- Status LED indicators (PWR, HEALTH, 220, 3G, WLAN, 1PPS, LAN1, LAN2) for onsite monitoring and diagnosis

### 3 Interface Panel Connectors

The connectors on the interface panel of the TransAir PTC-3000 are shown in the figures below.

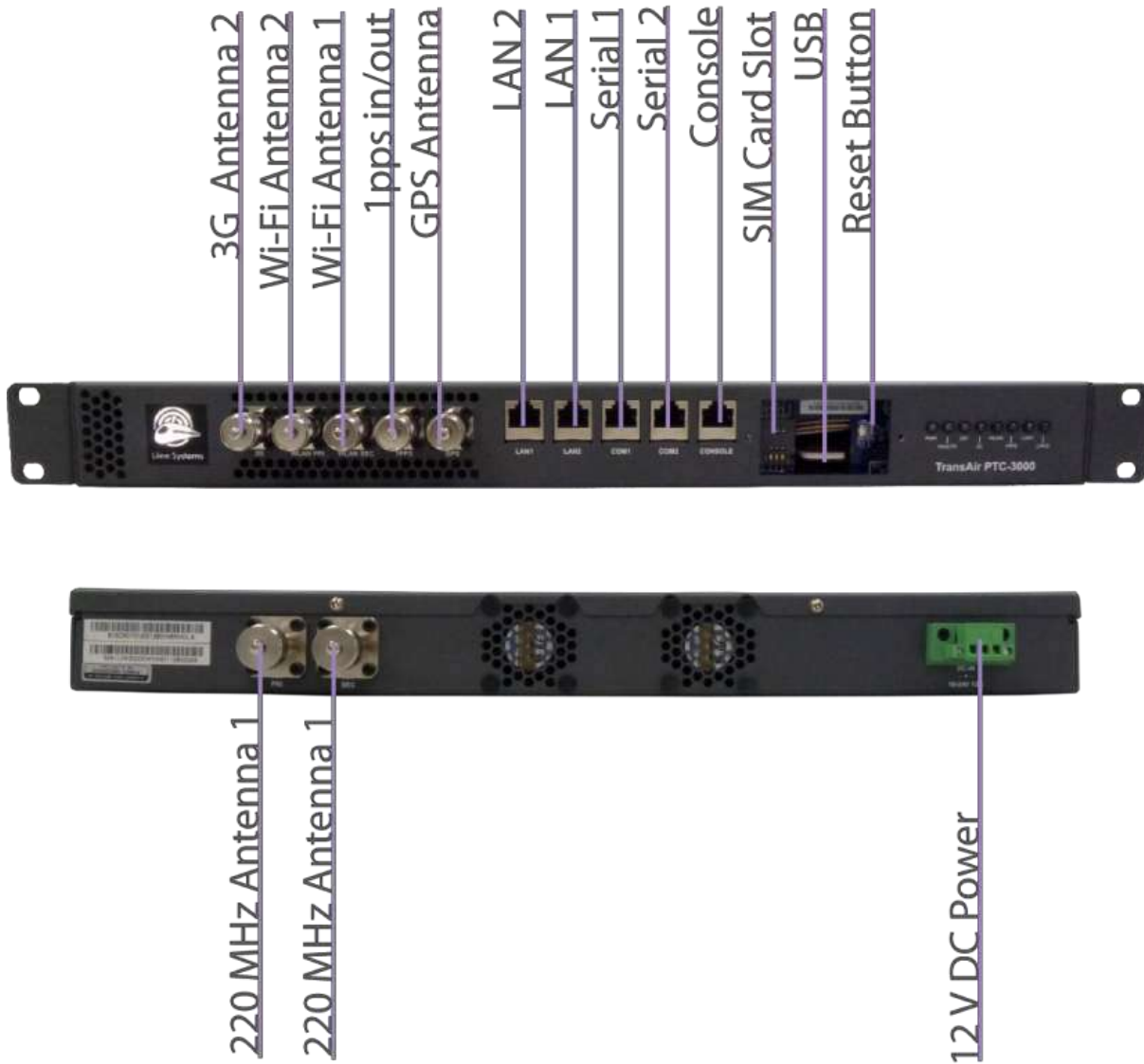


Figure 3-1 – PTC-3000-1U Interface Panel Connector Locations (Front and Rear) with SIM/USB/Reset panel cover removed

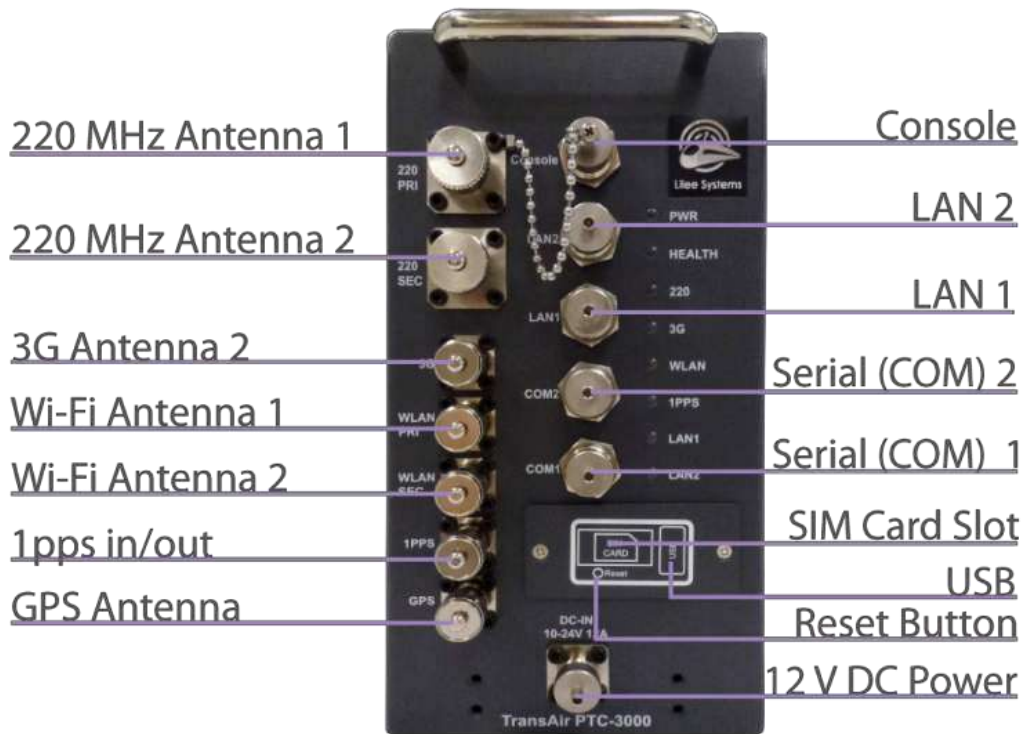


Figure 3-2 – PTC-3004 Interface Panel Connector Locations (PTC-3006 and PTC-3201~4 will have same or less ports and with similar functionalities)

The figure below shows the location of the SIM card slot, USB Flash Drive, and Reset button on the PTC-3201~4 PTC-3004 and PTC-3006 units.

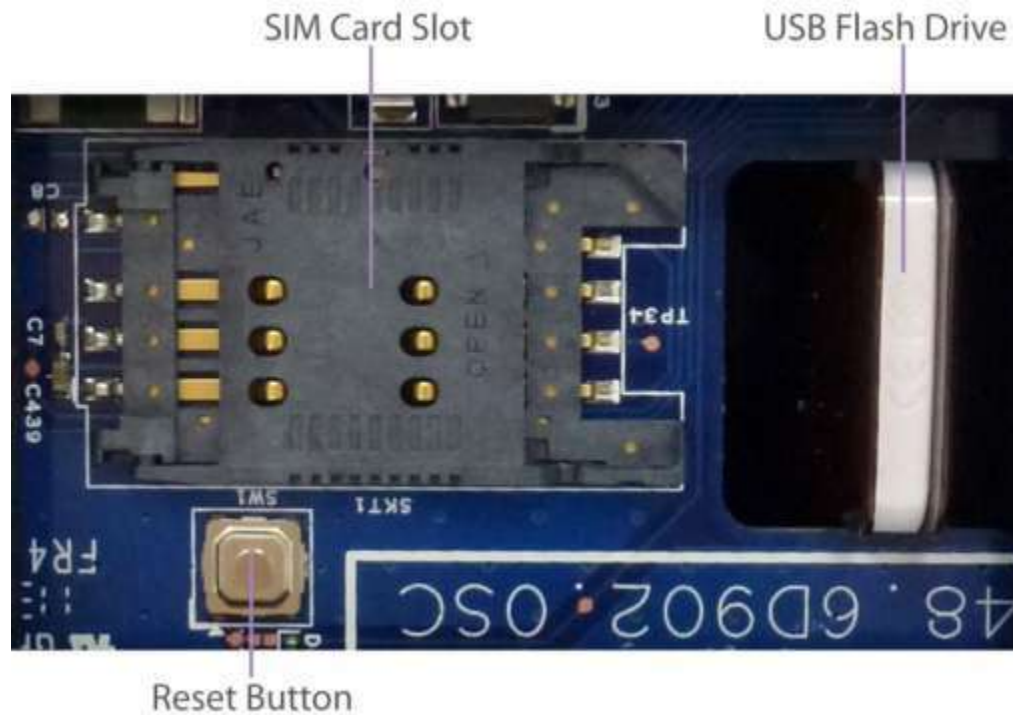


Figure 3-3 – SIM Card Slot, USB Flash Disk, and Reset Button Locations

The table below lists the connectors and type on the interface panel of the TransAir PTC-3000.

Connector	Type	
	1U	4MCU/6MCU/2MCU
1pps In/Out	TNC	TNC
12 V DC Power	3-pin terminal block	M12 with A-coding
220 MHz Antenna 1	N-Type	N-Type
220 MHz Antenna 2	N-Type	N-Type
3G	TNC	TNC
GPS	TNC	TNC
LAN 1	RJ45	M12
LAN 2	RJ45	M12
RS-232 Console	RJ45	M12
RS-232/422/485 Serial 1	RJ45	M12
RS-232/422/485 Serial 2	RJ45	M12
SIM Card	SIM card slot	SIM card slot
USB	Type-A (female) USB	Type-A (female) USB
Wi-Fi Antenna 1	TNC	TNC
Wi-Fi Antenna 2	TNC	TNC

**Table 3-1 – Interface Panel Connectors**

The following section describes the connectors on the interface panel of the TransAir PTC-3000. Refer to Figures 1 and 2 above for connector locations.

### 3.1 1pps In/Out

There is one 1pps in/out TNC connector on the PTC-3000 for syncing two PTC-3000 units for lab testing.

Pin No.	Description
Center	
Outer	GND

**Table 3-2 – 1pps In/Out Connector Pinouts**

### 3.2 12 V DC Power

There is one 3-pin terminal block connector on the PTC-3000-1U and one M12 with A-coding connector on the PTC-3000-4MCU/6MCU for connecting to a 12 V DC power adapter.

Pin No.	Description	
	1U (terminal block)	PTC-3201~4, PTC-3004, and PTC-3006 (M12)
1	GND	VDC
2	VDC	GND
3	GND	GND
4	N/A	VDC

**Table 3-3 – 12 V DC Power Connector Pinouts**

### 3.3 220 MHz Antenna

The TransAir PTC-3000 provides two N-Type connectors for connecting to 220 MHz antennas. The table below lists the pinouts for the 220 MHz Antenna connectors.

Pin No.	Description
Center	RF
Outer	GND

Table 3-4 – 220 MHz Antenna Connector Pinouts

When selecting cables for connecting the PTC-3000 to 220 MHz antennas, quality is critical. Poor quality cables can result in significant signal loss. Cable length should be kept at a minimum to reduce signal loss.

Cable Type	dB/100 ft	dB/100 m
CFD-400	1.9	6.1

Table 3-5 – Coaxial Cable Signal Loss at 220 MHz

### 3.4 3G Antenna

There is one TNC connector for connecting to a 3G antenna. The table below lists the pinouts for the Active 3G Antenna connector.

Pin No.	Description
Center	RF
Outer	GND

Table 3-6 – 3G Antenna Connector Pinouts

### 3.5 GPS Antenna

There is one TNC connector for connecting to a GPS antenna. The table below lists the pinouts for the GPS Antenna connector.

Pin No.	Description
Center	RF
Outer	GND

Table 3-7 – GPS Antenna Connector Pinouts

### 3.6 LAN

There are two RJ45 ports on the PTC-3001 and two M12 connectors on the PTC-3201~4, PTC-3004, and PTC-3006 for connecting to a local network. The following table lists the pinouts for the RJ45 ports and M12 connectors.

Pin No.	Description	
	PTC-3000-1U (RJ45)	PTC-3201~4, PTC-3004, and PTC-3006 (M12)
1	TX+	N/C
2	TX-	N/C
3	RX+	N/C
4	N/C	TX-
5	N/C	RX+
6	RX-	TX+
7	N/C	N/C
8	N/C	RX-

Table 3-8 – LAN Pinouts

### 3.7 RS-232 Console

There is one RJ45 port on the PTC-3000-1U and one M12 connector on the PTC-3201~4, PTC-3004, and PTC-3006 (M12) for an RS-232 connection to an on-board computer or other terminal for configuring the TransAir PTC-3000.

Pin No. (RJ45 Termination)	Description	Pin No. (DB9 Termination)
1	RTS	8
2	DTR	6
3	RX	3
4	N/C	1
5	TX	2
6	GND	5
7	DSR	4
8	CTS	7
N/A	N/C	9

Table 3-9 – RJ45 Console Port Pinouts and DB9 Termination Pinouts (PTC-3001)

See the following table for the Console port pinout definitions for the M12 connector on the PTC-3201~4, PTC-3004, and PTC-3006 and corresponding definitions on the DB9 console port end of a M12 to DB9 cable.

Pin No. (M12 Termination)	Description	Pin No. (DB9 Termination)
1	CTS	1
2	DTR	2
3	TX	3
4	N/C	4
5	GND	5
6	RX	6
7	DSR	7
8	RTS	8
N/A	N/C	9

Table 3-10 – M12 Console Port Pinouts and DB9 Termination Pinouts (PTC-3201~4, PTC-3004, and PTC-3006)

### 3.8 RS-232/422/485 Serial

There are two RJ45 ports on the PTC-3000 and two M12 connectors on the PTC-4MCU/6MCU for connecting to RS-232/422/484 serial devices.

See the following table for the Serial port pinout definitions for the RJ45 connector on the PTC-3000-1U and corresponding definitions on the DB9 serial port end of an M12 to DB9 cable.

Pin No. (RJ45 Termination)	Description	Pin No. (DB9 Termination)
1	RTS	8
2	DTR	6
3	RX	3
4	N/C	1
5	TX	2
6	GND	5
7	DSR	4
8	CTS	7
N/A	N/C	9

**Table 3-11 – RJ45 Serial Port Pinouts and DB9 Termination Pinouts (PTC-3000-1U)**

See the following table for Serial port pinout definitions for the M12 connector on the PTC-3000-4MCU/6MCU and corresponding definitions on the DB9 serial port end of an M12 to DB9 cable.

Pin No. (M12 Termination)	Description	Pin No. (DB9 Termination)
1	CTS	1
2	DTR	2
3	TX	3
4	N/C	4
5	GND	5
6	RX	6
7	DSR	7
8	RTS	8
N/A	N/C	9

**Table 3-12 – M12 Serial Port Pinouts and DB9 Termination Pinouts (PTC-3201~4, PTC-3004, and PTC-3006 )**

### 3.9 Wi-Fi Antenna

The TransAir PTC-3000 provides two TNC connectors for connecting to Wi-Fi antennas. The table below lists the pinouts for the Wi-Fi Antenna connectors.

Pin No.	Description
Center	RF
Outer	GND

**Table 3-13 – Wi-Fi Antenna Connector Pinouts**

### 3.10 LED Indicators

The front panel of the PTC-3000 contains several LED indicators. See the figure below for the location of each indicator.



Figure 3-4 – LED Indicators

The functions of each are described in the table below.

LED	Color	State	Description
Power	Green	On	Powered on.
		Off	Powered off or no power current.
Health	Green	On	System fault has occurred.
		Off	System is functioning normally.
220	Green	On	220 MHz interface is linked up.
		Off	220 MHz interface link is down.
3G	Green	On	3G interface is linked up.
		Off	3G interface is down.
WLAN	Green	On	WLAN interface is linked up.
		Off	WLAN interface is down.
1PPS	Green	On	PTC driver has loaded and GPS 1pps signal is locked.
		Off	PTC driver has not loaded and GPS 1pps signal is not locked.
LAN1		Off	No connection.
	Green	On	Cable is connected.
	Amber	On	Activity on link.
LAN2		Off	No connection.
	Green	On	Cable is connected.
	Amber	On	Activity on link.

Table 3-14 – LED Indicators



### 3.11 PTC-3000 RF (220MHz RF board)

The regulatory tested PTC-3000 RF (220MHz RF board) is an integral part of the wireless communication, with 2 RF ports, PRI and SEC, digital communication protocol and control from the host board, and single power supply input. This board is an embedded part of the PTC-3001, PTC3004, PTC3006, PTC3201, PTC3202, and PTC-3203 systems, and the commands to utilize this board are subpart of the commands used for the whole system. complies with FCC/IC Modular transmitters Section label requirement. PTC-3000 RF uses a permanently affixed label, and it's labeled with its own FCC/IC identification number (see below). Thus, the PTC-3001, PTC-3004, PTC-3006, PTC3201, PTC-3202, and PTC-3203 shall contain the PTC-3000 RF board limited modular transmitter FCC/IC ID's.

**Model: PTC-3000 RF**  
**FCC ID: XTC-TRANSAIRP3RF**  
**IC: 10249A-TAIRP3PRF**

Figure 3-5 – PTC-3000 RF label

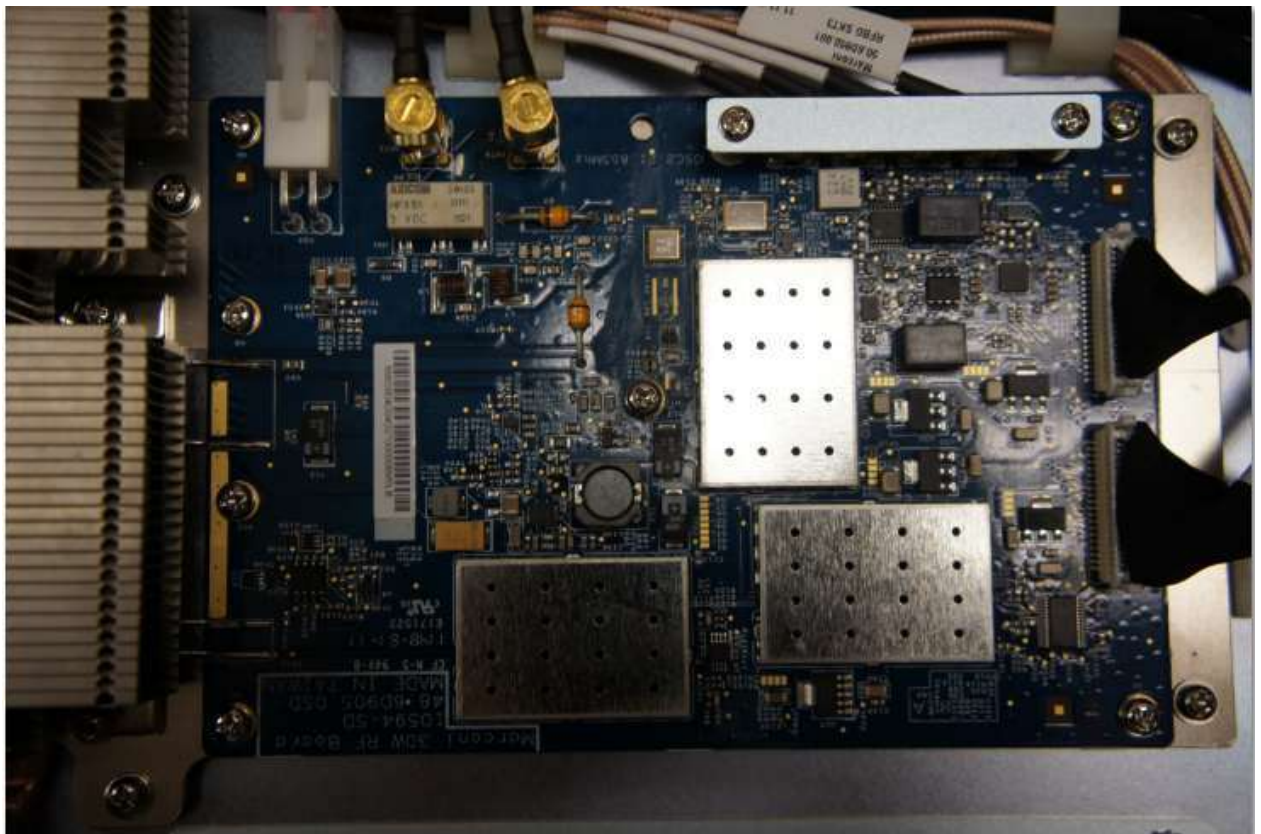


Figure 3-6 – 220MHz RF board

## 4 Installation

### 4.1 Connecting Cables

Please see **Chapter 3 Interface Panel Connectors** for pinout details of the connectors on the PTC-3000. The following section describes how to connect cables and devices to the PTC-3000. Connect according to your configuration requirements.

#### 4.1.1 RJ45 to DB9 Console Cable (PTC-3000-1U)

- Step 1: Locate the RJ45 Console connectors.** The location of the RJ45 Console port connector is shown in **Figure 1**.
- Step 2: Align the connectors.** Align the RJ45 connector on the LAN cable with the RJ45 Console port connector on the PTC-3000.
- Step 3: Insert the RJ45 to DB9 cable RJ45 connector.** Once aligned, gently insert the LAN cable RJ45 connector into the PTC-3000 RJ45 connector.
- Step 4: Connect to a PC.** Locate a serial port connector on the PC to be used to configure the PTC-3000.
- Step 5: Insert the DB9 cable RJ45 connector.** Insert the LAN cable RJ45 cable connector into the RJ45 connector to a PC.

#### 4.1.2 M12 to DB9 Console Cable (PTC-3201~4, PTC-3004, and PTC-3006 (M12))

- Step 1: Locate the M12 Console connectors.** The location of the M12 Console connectors is shown in **Figure 2**.
- Step 2: Align the connectors.** Align the M12 connector on the LAN cable with the M12 Console connectors on the PTC-3000.
- Step 3: Insert the LAN cable RJ45 connector.** Once aligned, gently insert the LAN cable RJ45 connector into the PTC-3000 RJ45 connector.
- Step 4: Connect to a LAN router/switch.** Locate the RJ45 connector on the PC to be used to configure the PTC-3000.
- Step 5: Insert the LAN cable RJ45 connector.** Insert the LAN cable RJ45 cable connector into the RJ45 connector on the LAN router or switch.

### 4.1.3 RJ45 LAN Cable (PTC-30001)

- Step 1: Locate the RJ45 LAN connectors.** The locations of the LAN connectors are shown in **Figure 1**.
- Step 2: Align the connectors.** Align the RJ45 connector on the LAN cable with one of the RJ45 connectors on the PTC-3000.
- Step 3: Insert the LAN cable RJ45 connector.** Once aligned, gently insert the LAN cable RJ45 connector into the PTC-3000 RJ45 connector.
- Step 4: Connect to a LAN router/switch.** Locate the RJ45 connector on the LAN router or switch.
- Step 5: Insert the LAN cable RJ45 connector.** Insert the LAN cable RJ45 cable connector into the RJ45 connector on the LAN router or switch.

### 4.1.4 M12 to RJ45 LAN Cable (PTC-30001)

- Step 1: Locate the M12 LAN connectors.** The locations of the LAN connectors are shown in **Figure 2**.
- Step 2: Align the connectors.** Align the M12 connector on the LAN cable with one of M12 LAN connectors on the PTC-3000.
- Step 3: Insert the LAN cable M12 connector.** Once aligned, gently insert the LAN cable M12 connector into the PTC-3000 M12 connector.
- Step 4: Secure the M12 connector.** Turn the locking cover of the M12 connector end of the cable clockwise to secure the cable to the connector on the PTC-3000.
- Step 5: Connect to a LAN router or switch.** Locate the RJ45 connector on the LAN router or switch.
- Step 6: Insert the LAN cable RJ45 connector.** Insert the LAN cable RJ45 cable connector into the RJ45 connector on the LAN router or switch.

### 4.1.5 RJ45 to DB9 Serial Device Cable (PTC-30001)

- Step 1: Locate the RJ45 serial connector.** The location of the RJ45 serial port connector is shown above in **Figure 1**.
- Step 2: Insert the RJ45 to DB-9 cable.** Insert the RJ45 end of the cable into the RJ45 connector of the PTC-3000.
- Step 3: Insert the serial connector.** Insert the DB-9 connector of a serial device into the DB-9 connector on the cable.
- Step 4: Secure the connector.** Secure the serial device connector to the external interface by tightening the two retention screws on either side of the connector.

#### 4.1.6 M12 to DB9 Serial Device Cable (PTC-3201~4, PTC-3004, and PTC-3006)

- Step 1: Locate the M12 serial connector.** The location of the M12 serial port connector is shown above in **Figure 2**.
- Step 2: Insert the M12 to DB-9 cable.** Insert the M12 end of the cable into the M12 serial connector of the PTC-3000.
- Step 3: Secure the M12 connector.** Turn the locking cover of the M12 connector end of the cable clockwise to secure the cable to the connector on the PTC-3000.
- Step 4: Insert the serial connector.** Insert the DB-9 connector of a serial device into the DB-9 connector on the cable.
- Step 5: Secure the connector.** Secure the serial device connector to the external interface by tightening the two retention screws on either side of the connector.

#### 4.1.7 TNC to SMA Male Connector for Wi-Fi Antennas with SMA Connectors

- Step 1: Locate the TNC Wi-Fi connector.** The location of the TNC Wi-Fi antenna connector is shown above in **Figure 1** and **Figure 2**.
- Step 2: Insert the TNC to SMA connector (with center pin).** Insert the TNC end of the connector into the TNC connector of the PTC-3000.
- Step 3: Secure the TNC to SMA connector.** Turn the locking cover of the TNC connector end of the TNC to SMA connector clockwise to secure connector on the PTC-3000.
- Step 4: Connect a Wi-Fi antenna.** Insert the SMA connector end of a Wi-Fi antenna to the SMA connector end of the TNC to SMA connector.

#### 4.1.8 TNC to SMA Female Connector for GPS or 3G

- Step 1: Locate the TNC connector for GPS, 3G.** The location of the TNC connectors is shown above in **Figure 1** and **Figure 2**.
- Step 2: Insert the TNC to SMA connector (without center pin).** Insert the TNC end of the connector into the TNC connector of the PTC-3000.
- Step 3: Secure the TNC to SMA connector.** Turn the locking cover of the TNC connector end of the TNC to SMA connector clockwise to secure connector on the PTC-3000.
- Step 4: Connect to a GPS or 3G antenna.** Insert the SMA connector end of a GPS or 3G antenna (or antenna cable) to the SMA connector end of the TNC to SMA connector.

#### 4.1.9 TNC to TNC Cable for Syncing PTC-3000 Units

- Step 1: Locate the 1pps TNC connectors.** The location of the 1pps TNC connectors is shown above in **Figure 1** and **Figure 2**.
- Step 2: Insert the TNC cable.** Insert one end of the TNC connector into the 1pps TNC connector of one PTC-3000.
- Step 3: Secure the TNC cable.** Turn the locking cover of the TNC connector end of the TNC connector clockwise to secure connector on the PTC-3000.
- Step 4: Connect to second PTC-3000.** Repeat **Steps 2** and **3** to connect to the TNC cable to the 1pps connector on the second PTC-3000.

#### 4.1.10 Power Cable and Power Adapter

When other cable connections are complete, connect the PTC-3000 to a power source according to the following steps.

- Step 1: Locate the power connector.** Please see **Figure 1** and **Figure 2** to locate the power connector on the PTC-3000.
- Step 2: Insert the 3-pin terminal block to +19 V power cable or M12 to +19 V power cable.** Insert the 3-pin terminal block end or M12 end of the power cable into the 3-pin terminal block power connector or M12 connector on the PTC-3000.
- Step 3: Insert the +19 V end of the power cable to the power adapter.**
- Step 4: Connect the power cord to the power adapter.**
- Step 5: Connect the power cord to the power outlet.**

## 4.2 USB Flash Disk Removal and Installation

### 4.2.1 Remove SIM/USB/Reset Panel Cover

- Step 1: Locate Cover.** Locate the SIM/USB/Reset button panel cover on the front panel of the PTC-3000.
- Step 2: Unfasten Screws.** Using a screwdriver, unfasten the screws by turning counterclockwise.
- Step 3: Remove Cover.**



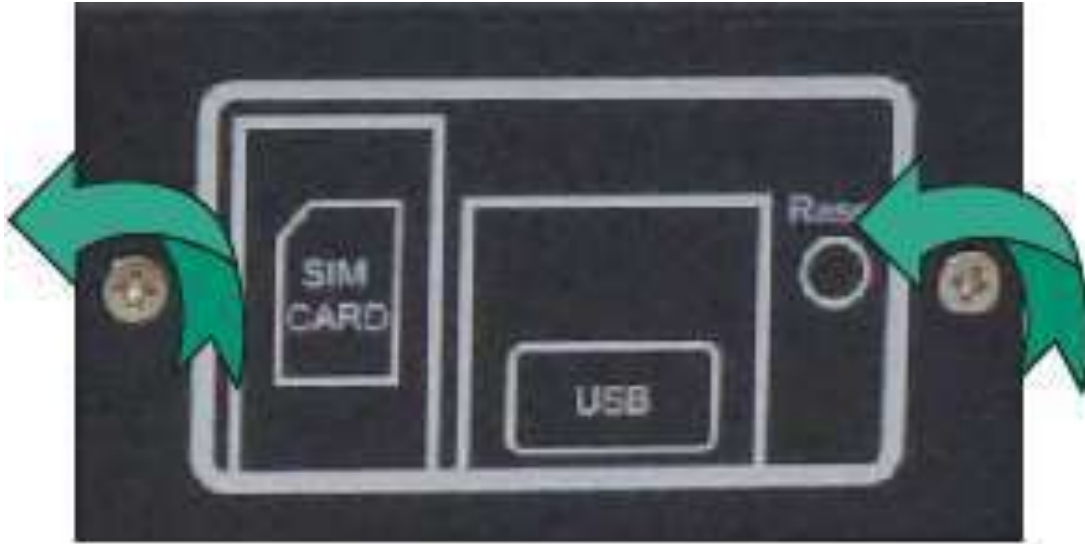


Figure 4-1 – SIM/USB/Reset Panel Cover

#### 4.2.2 USB Flash Drive Removal

**Step 1:** Grasp USB Flash Drive from the top and bottom of the flat surface as shown in the figure below (yellow arrows).

**Step 2:** Pull outward to remove (green arrow).

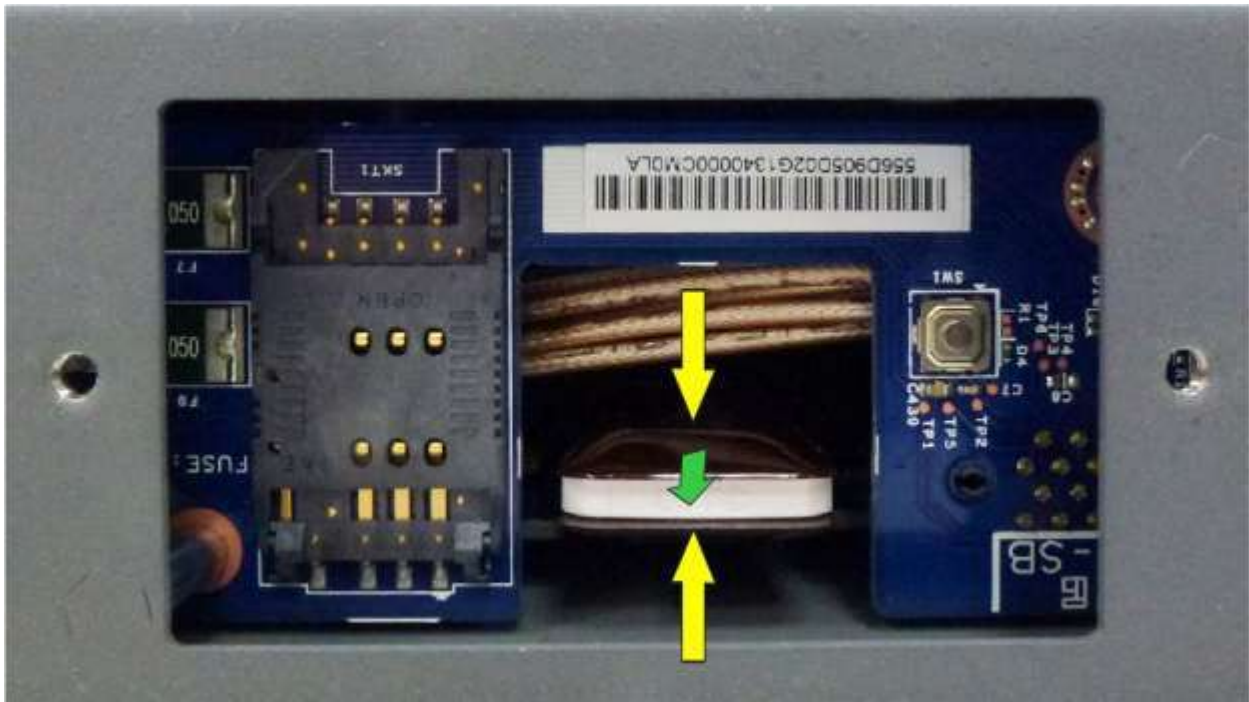


Figure 4-2 – USB Flash Drive Removal (1U unit shown)

### 4.2.3 USB Flash Drive Installation

**Step 1:** Locate USB port (see figure below).

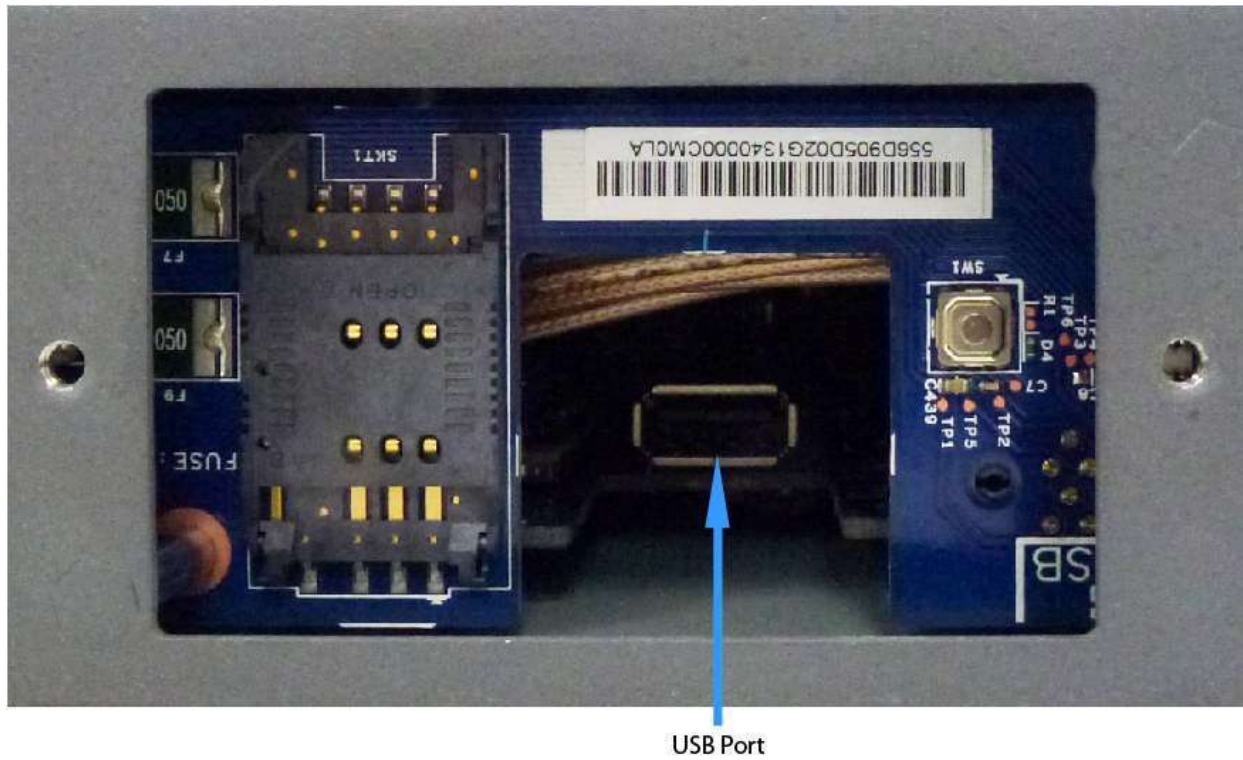


Figure 4-3 – USB Port Location (1U unit shown)

**Step 2:** Insert USB Flash Drive into USB port as shown in the figure below.



Figure 4-4 – USB Flash Drive Installation (1U unit shown)

#### 4.2.4 Replace SIM/USB/Reset Panel Cover

**Step 1:** Replace Cover.

**Step 2:** Refasten screws. Using a screwdriver, fasten the screws by turning clockwise.



Figure 4-5 – Replace SIM/USB/Reset Panel Cover

#### 4.3 SIM Card Installation

**Step 1:** Remove SIM/USB/Reset Panel Cover as in 4.2.1 Remove SIM/USB/Reset Panel Cover.

**Step 2:** Open SIM card slot protective cover. Slide SIM card slot protective cover down as show below (yellow arrow). Open SIM card slot protective cover.



Figure 4-6 – Slide SIM Card Slot Protective Cover Down



- Step 3: Insert SIM card.** Slide SIM card into the protective cover with the card's metallic contact facing toward the slot.
- Step 4: Close SIM card slot protective cover.**
- Step 5: Lock SIM card slot protective cover.** Slide SIM card slot upward.
- Step 6: Replace SIM/USB/Reset Panel Cover** as in **4.2.4 Replace SIM/USB/Reset Panel Cover**.

## 5 Configuring the PTC-3000

### 5.1 Configuration Commands

To begin configuring the PTC-3000, use a terminal emulation program like HyperTerminal, PuTTY, or Tera Term to connect to the PTC-3000 and enter configuration commands. Configure the terminal emulation program serial port settings as in the table below (also see example configuration in Tera Term below):

Terminal Emulation Program Serial Port Settings	Value
Port	COM#
Baud Rate	115200
Data	8 bit
Parity	None
Stop	1 bit
Flow Control	None

Table 5-1 – LED Indicators

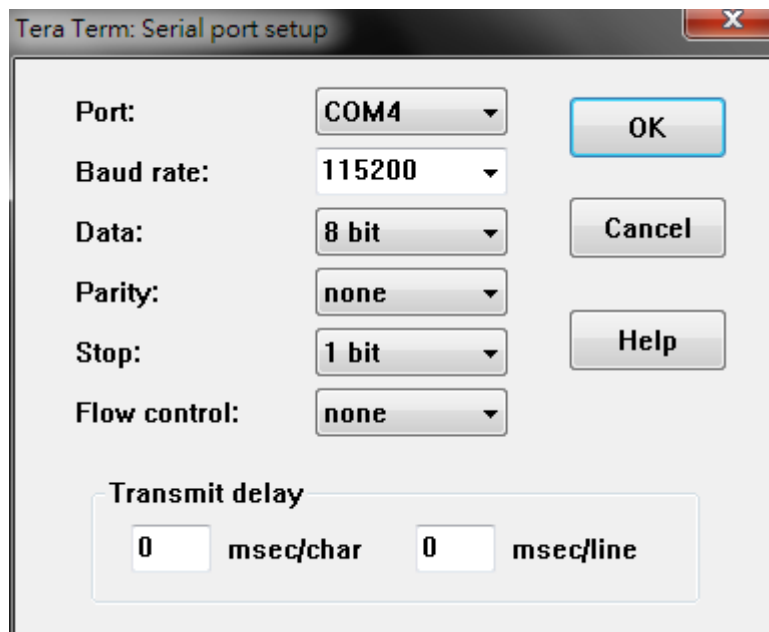


Figure 5-1 – Serial Port Settings

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