



UltraWAVE Micro BTS

Installation and Commissioning Guide

**SW Release 7.2
July 2006
P/N 214323**

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United States Federal Communications Commission Required User Information

Located on the equipment is a label that contains, among other information, the FCC registration number. If requested, this information must be provided to the telephone company.

The UltraWAVE BTS Series AUAC series complies with Part 22 of the FCC Rules.

The 1900 MHz WAVEXpress Series M50 complies with Part 24 of the FCC Rules.

The Breeze2000 BS Plus 800 MHz complies with Part 22 of the FCC Rules.

The Breeze2000 Pico BS Plus (800 MHz and 1900 MHz) comply with Part 22 and Part 24 of the FCC Rules and UL 1950 safety certification.

This equipment cannot be used on the telephone company-provided coin service. Connection to Party Line Service is subject to State Tariffs.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

If trouble is experienced with this equipment, please contact:

Alvarion, Inc.
 2495 Leghorn Drive
 Mountain View, CA 94043-1611 U.S.A.

If the trouble is causing harm to the telephone network, the telephone company may request you to remove the equipment from the network until the problem is resolved.

It is recommended that the customer install an AC surge arrester in the AC outlet to which that device is connected. This is to avoid damaging the equipment caused by local lightning strikes and other electrical surges.

This equipment uses the following USOC jacks and codes:

USOC Jacks and Codes

Model Name	Facility Interface Code	Service Order Code	Jack Type
340122	04DU9-BN	6.ON	RJ-48C
340122	04DU9-DN	6.ON	RJ-48C
340122	04DU9-1KN	6.ON	RJ-48C
340122	04DU9-1SN	6.ON	RJ-48C
340122	04DU9-1ZN	6.ON	RJ-48C

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to

cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes of modifications not expressly approved by Alvarion can void the user's authority to operate the equipment. FCC and IC certification labels denoting the product specific certification numbers may be found on the product.

Industry Canada Required User Information

CP-01, Issue 8, Part 1, Section 14.1

NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The standard connecting arrangement (telephone jack type) for this equipment is CA81A.

CP-01, Issue 8, Part 1, Section 14.2

NOTICE: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination of an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

This device complies with Industry Canada RSS-133 and SRSP-510 or RS132 & SRPS-503.



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Preface

Welcome!

Welcome to the UltraWAVE Micro BTS Installation and Commissioning Guide. This guide describes how to perform local installation and commissioning of the Micro BTS at the customer's site.

Assumptions, Purpose, and Audience

This document is intended for an Alvarion trained field service engineer (FSE) or operator who performs local installation and commissioning at a customer site. The FSE or operator should be equipped with the necessary tools for installation and commissioning, and a basic understanding of the GSM cellular network. The FSE or Operator should also be familiar with the use of Craft PC and procedures conducted using the Craft PC.

Alvarion assumes that pre-installation project planning has occurred, and is documented via a site survey report. This site survey should include items such as the location of antennas, chassis, power connections and other interface accesses and temperature control equipment.

Microwave Radio Radiation Warning

Although Alvarion products do not use microwave radio antennas, the equipment is often mounted in the vicinity of microwave radio antennas. Under normal operating conditions, microwave radio equipment complies with the limits for human exposure to radio frequency (RF) fields adopted by the Federal Communications Commission (FCC). All Alvarion microwave radio equipment is designed so that under normal working conditions, microwave radiation directly from the radio is negligible when compared with the permissible limit of continuous daily exposure recommended in the United States by ANSI/IEEE C95.1-1991 (R1997), Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

Microwave signal levels that give rise to hazardous radiation levels can exist within transmitter power amplifiers, associated RF multiplexers, and antenna systems.



Never look into the open end of a waveguide or any other open RF connection as eyes are particularly vulnerable to radiation. Do not disconnect RF coaxial connectors, open microwave units, or break down any microwave screening while the radio equipment is operating.

Related Documentation and Services

All manuals are available on a documentation CD-ROM in Adobe portable document format or in an online format via our protected Internet site. To order documentation, please contact Alvarion Sales department online at <http://www.alvarion.com>.

Updates to this manual will be posted on the Alvarion Customer Service Website at <http://www.alvarion.com>. Registered Alvarion customers can access the Alvarion on-line information and support service, available 24 hours a day, seven days a week. The Alvarion on-line service provides users with a wealth of up-to-date information, with documents being added or updated each month.

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- Any changes or modifications of equipment, including opening of the equipment not expressly approved by Alvarion Ltd. will void equipment warranty and any repair thereafter shall be charged for. It could also void the user's authority to operate the equipment.

Conventions Used in This Manual

The following type and style conventions are used in this manual:

Conventions Used in This Manual

Convention	Meaning
Body Text	Used for regular body text
Bold	Indicates a menu or button choice
Command	Indicates computer generated text and prompts
User Input	Indicates user input
<code><hostname></code>	In command syntax, indicates user-specified command line parameters
<code><variable></code>	In body text, indicates user-specified command line parameters
[BRACKETS]	Indicates a key on the keyboard or instrument
	Provides relevant additional information
	Provides important warning information that may affect operation of or maybe a potential threat to the system
	Used to tell the reader to STOP what they are doing and to read important instructions that are vital to prevent equipment or software damage

Chapter 1 - Unpacking and Configuration Verification

In this Chapter:

- [“Unpacking and Inspecting” on page 2](#)
- [“Electrostatic Discharge \(ESD\)” on page 7](#)
- [“Inspecting Components and Recording Part Numbers” on page 8](#)
- [“Verifying and Documenting Cards and Modules” on page 12](#)
- [“Verifying Cabling” on page 15](#)

This chapter provides instructions for opening the shipping container and inspecting the contents. When you have completed the procedures in this chapter, you will have confirmed that the hardware arrived undamaged and that everything you ordered is present and configured correctly.

1.1 Unpacking and Inspecting

The UltraWAVE Micro BTS is packed with great care, and all containers are inspected prior to shipment.

Micro BTS components that are shipped separately include:

- Micro subrack assembly
- Power supplies
- Power supply subrack assembly

The Micro subrack assembly includes RF Module(s), processor card, E1 or T1 card, TRX card(s) and the clock module.

Upon receipt of these packages, immediately inspect the outside of the shipping containers. If there is any visible damage, insist that a representative of the carrier is present when unpacking the contents.

Carefully inspect the system as it is unpacked. If any damage, such as dents or broken connections, is noticeable, immediately notify the carrier as well as Alvarion Customer Service.

Store the shipping containers for future use. If the unit has to be returned for upgrade or service, the specially designed shipping containers assure adequate protection for the equipment. If for some reason the containers are not reusable or if they are misplaced, please contact Alvarion to order new containers.

1.1.1 Unpacking the Cabinet

The UltraWAVE Micro BTS is shipped in a specially designed carton. The cabinet should remain in the packaging until shipped to its final destination. Use this procedure to unpack your cabinet.

- 1 Move the cabinet to a level, well illuminated area.
- 2 Cut all of the strapping on the outside of the shipping container. See [Figure 1-1](#).



Figure 1-1: UltraWAVE Packaging

- 3** Remove the cardboard top and set aside.
- 4** Locate the plastic latches, shown in [Figure 1-1](#). Pull on each latch to release the cardboard side.
- 5** Remove the cardboard enclosing the cabinet assembly.
- 6** Carefully remove the two boxes from the top of the cabinet assembly. These boxes contain the power supply units.
- 7** Remove the insulating material from the top and sides of the cabinet.
- 8** Cut the strapping which secures the cabinet to the pallet and remove the protective plastic.
- 9** Using an adjustable wrench, raise the rubber feet located at each corner on the bottom of the cabinet. See [Figure 1-2](#).



Figure 1-2: Adjustable Feet

- 10** Remove the angled slope and ramps from the pallet. See [Figure 1-3](#).

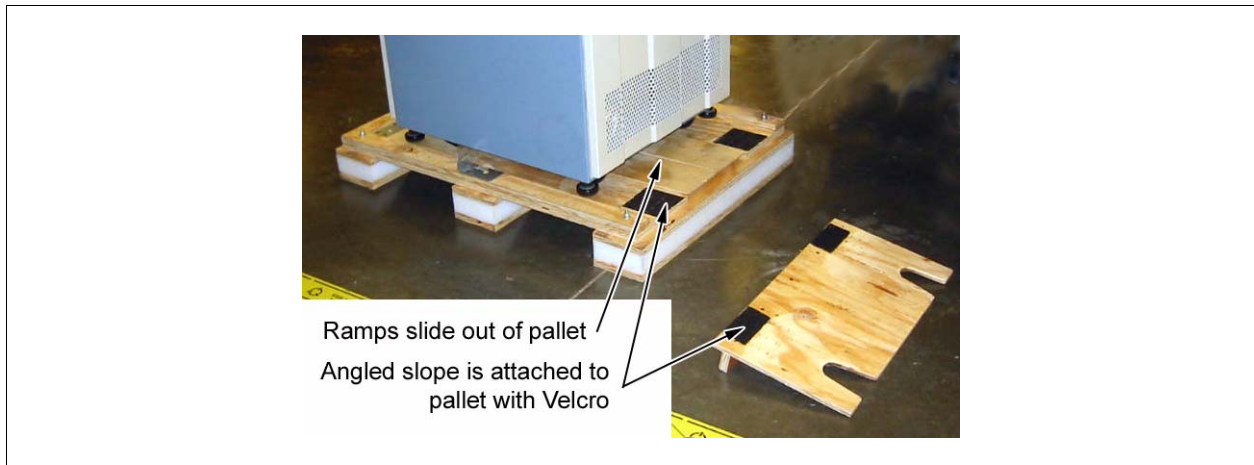


Figure 1-3: Pallet Accessories

- 11** Attach ramps to pallet using loop and hook fasteners and slide the sloped support underneath the ramps. See [Figure 1-4](#).

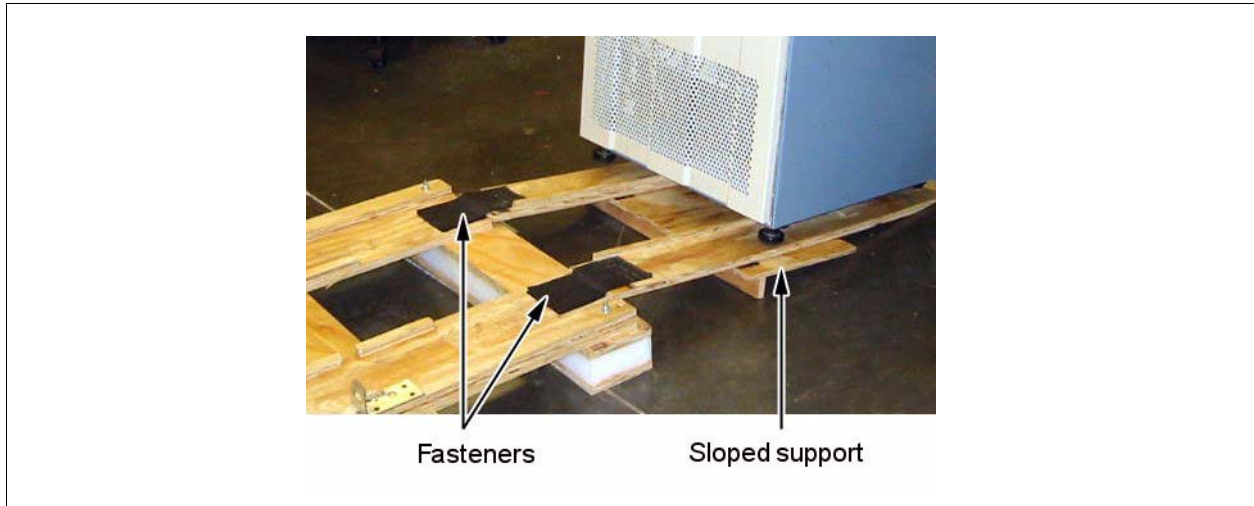


Figure 1-4: Pallet Ramps

- 12** Carefully roll the cabinet down the ramps and off of the pallet.
- 13** Store all packaging material in a safe, dry location.

1.1.2 Opening the Cabinet Assembly

The UltraWAVE Micro BTS is shipped pre-configured in a locking cabinet assembly as shown in [Figure 1-5](#).

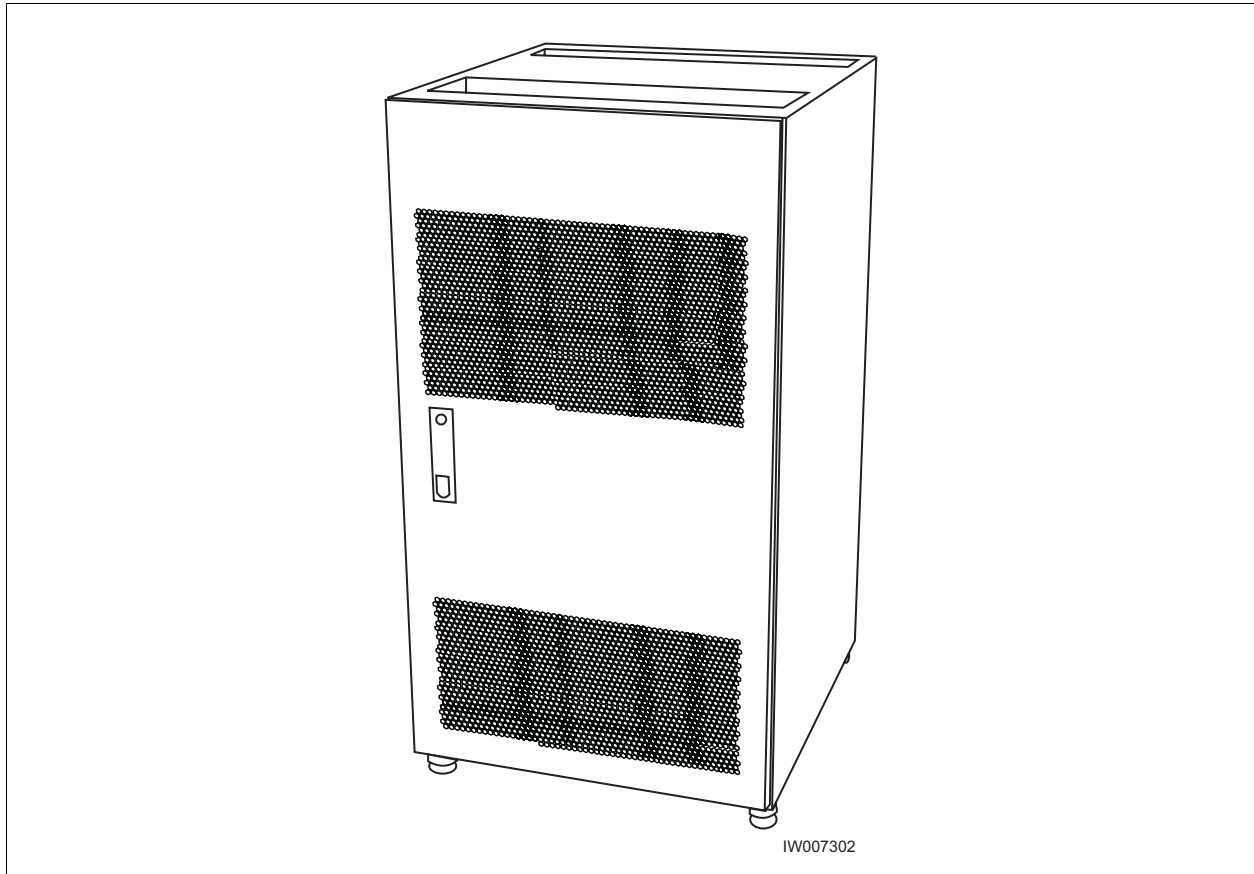


Figure 1-5: Locking Cabinet

Doors are provided for access to the front and rear of the internal assemblies. To open the doors:

- 1 Insert the key provided into the lock and turn to unlock.
- 2 Depress the lock mechanism to release the door latch handle.
- 3 Turn the door handle to unlatch and open the door.
- 4 Carefully remove the packaging material from inside the cabinet.

1.1.3 Unpacking and Inspecting the Rack Assembly

The Micro BTS may be shipped in a standard 19 inch rack assembly. Carefully inspect the system as it is unpacked. Ensure that the required cabling is included. If you notice any damage such as dents or broken connections, immediately notify the carrier as well as Alvarion Customer Service.

Store the shipping containers for future use. If the unit has to be returned for upgrade or service, the specially designed shipping containers assure adequate protection of the equipment. If for some reason the shipping containers are not reusable or if they are misplaced, please contact Alvarion to order new containers.

1.2 Electrostatic Discharge (ESD)

Electrostatic discharge is the movement of normally motionless electrical charges which can destroy common electrical and electronic equipment.

Alvarion recommends that you use an anti-static wrist strap when handling boards and components.

By using an anti-static wrist-strap, static electricity is constantly dispersed, via the snug-fitting wrist-band, down the cable and to the grounded connection at the other end, leaving hands free to work.

- Use either the provided anti-static wrist-strap or an ESD mat.
- Otherwise, touch the metal chassis to drain off any static electricity before touching the cards.
- Do not wear wool or polyester clothing.
- Dry air can prevent dangerous charges from harmlessly dissipating. Alvarion recommends a relative humidity of 50-60% when working on this equipment.
- Handle the cards as little as possible and only by the edges.



Before starting any of the following procedures, the Field Service Technician needs to ensure that anti-static precautions are taken.

1.3 Inspecting Components and Recording Part Numbers

The Micro BTS is shipped with all RF modules and cards installed in the Micro subrack assembly as ordered by the customer. The Micro BTS components include:

- Micro subrack assembly
- Processor card
- E1 or T1 card
- TRX cards
- RF modules
- Fan assemblies (located on the back of the chassis)
- Clock module
- Internal cabling
- Blank panel(s)
- Power supply modules and subrack assembly

Some of these components appear in [Figure 1-6](#).

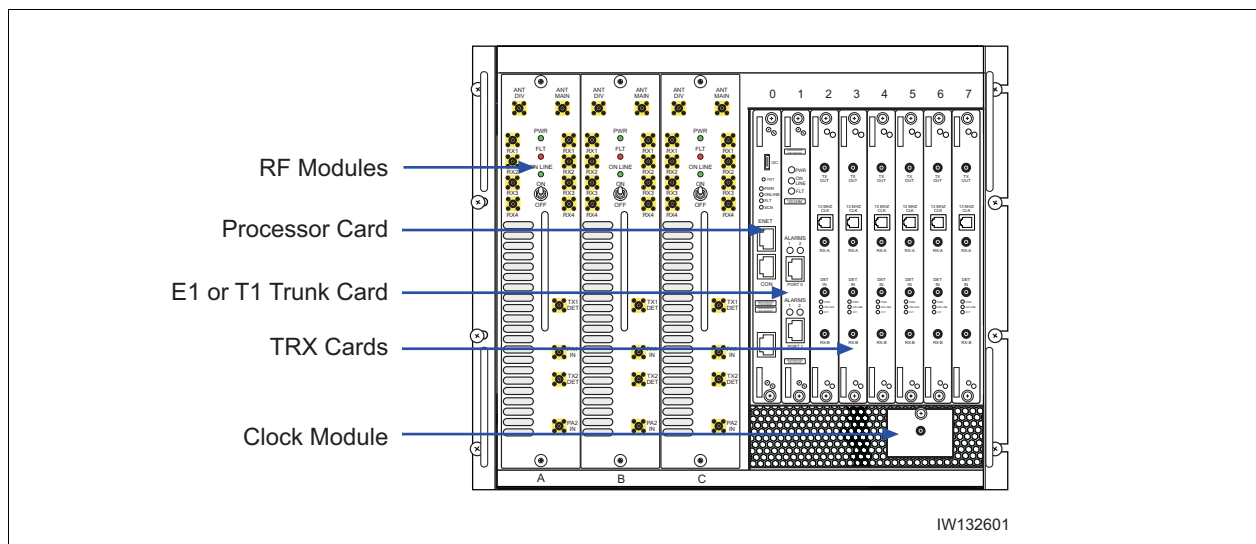


Figure 1-6: UltraWAVE Micro Subrack Assembly

1.3.1 Identifying the System Configuration

The UltraWAVE Micro BTS is available in a number of different configurations. Micro BTS available configurations are listed in [Table 1-1](#). Use this section to verify the configuration of your UltraWAVE Micro BTS.

Locate the main configuration label on the exterior of your shipping container or on the back of the Micro subrack assembly.

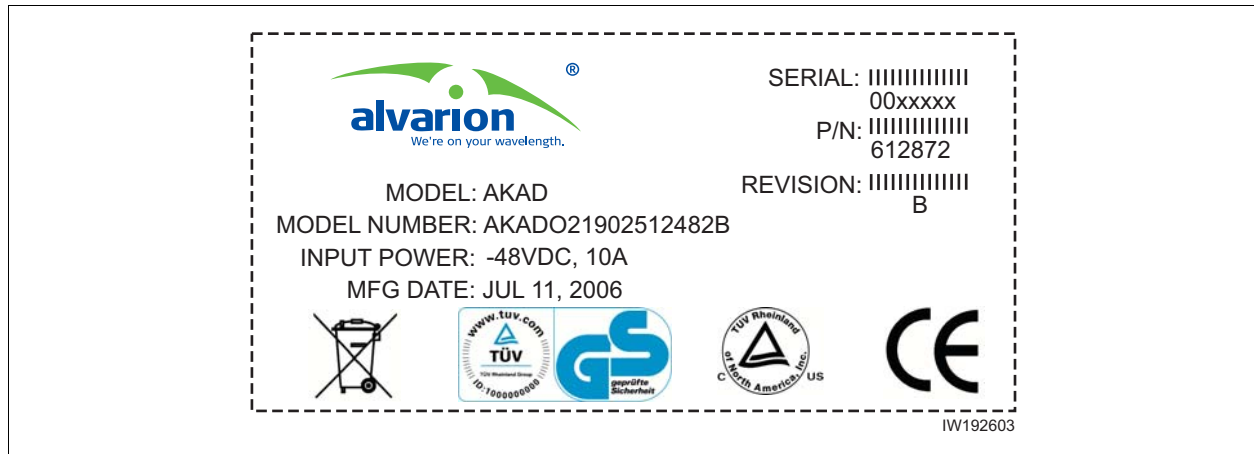


Figure 1-7: Configuration Label

The main configuration label includes the following details:

- Serial number (00xxxxxxx).
- P/N (xxxxxxx).
- Revision letter (X).
- Model (example: AKAD) - denotes the type of Alvarion system, in this case an UltraWAVE Micro BTS.
- Factory configuration number.
- Input Power (example: -48VDC, 10A).
- Manufacturing date (month, date, year).

[Table 1-1](#) lists Micro BTS configuration types and details.

Table 1-1: Configuration Type and Details

Configuration Type	Configuration Details
01	Omni single TRX (01); 15 Watt, 25 Watt, 40 Watt or 50 Watt, two antenna configuration
02	Omni two TRX (02); 15 Watt, 25 Watt, 40 Watt or 50 Watt, two antenna configuration
03	Omni three TRX (03); 15 Watt or 25 Watt, two antenna configuration
S111	Three sector, one TRX per sector (S111); 15 Watt, 25 Watt, 40 Watt or 50 Watt, six antenna configuration
S222	Three sector, two TRXs in one sector and one TRX in the other two sectors (S222), 15 Watt, 25 Watt, 40 Watt or 50 Watt, six antenna configuration

Record your model and configuration details in [Checklist 2 - Installation Checklist](#).

1.3.2 Verifying System Labels

This procedure requires you to record each components' part number, revision number and serial number in [Checklist 2 - Installation Checklist](#). The factory places up to three configuration labels on the front of each Micro BTS card, module and chassis to help identify the system's configuration. These labels identify the following:

- Part number -- Part number identifies the type of component. All identical components have the same part number. Part numbers use the format:

P/N NNNNNNN

- Revision or dash number -- Revision numbers record minor changes in design. Revision numbers use the format:

-NNN

- Serial number -- Each individual component has its own unique serial number. Serial numbers use the format:

S/N NNNNNNNNN

An example of the configuration labels appears in [Figure 1-8](#).

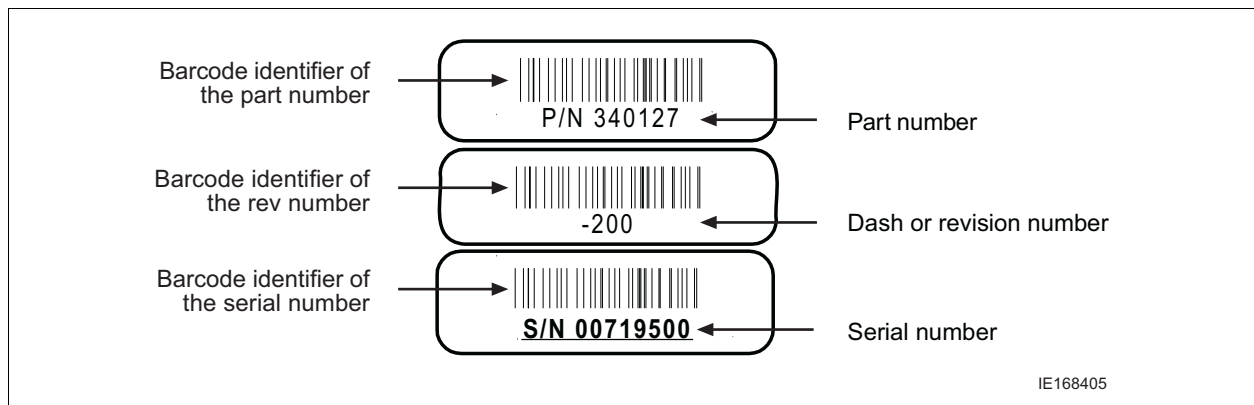


Figure 1-8: Sample Configuration Labels

1.4 Verifying and Documenting Cards and Modules

The cabinet contains two subrack assemblies.

The Micro contains:

- RF modules responsible for RF power amplification, duplexing and combining when required
- Processor Card, E1 or T1 trunk card, TRX cards, and clock module

The power supply consists of up to two power supply modules and a third slot covered with a blank panel.

1.4.1 Required Equipment

To verify and record your system configuration, you need:

- A copy of the Shipping Checklist. It is one of the papers inside the shipping container.
- A copy of [Checklist 2 - Installation Checklist](#).

1.4.2 Micro Subrack Assembly

The Micro subrack assembly provides three RF slots, starting on the left with slot A. Depending on your Micro BTS configuration, up to three slots will be required for RF modules. These modules are shipped pre-installed and cabled from the factory.

- 1 Locate the configuration part and serial numbers on your RF modules. [Figure 1-8](#) illustrates a sample of these labels.
- 2 Write down the part number, revision number and serial number in [Checklist 2 - Installation Checklist](#).

1.4.3 Slot Assignments

Beside the RF slots, the Micro BTS chassis layout provides eight standard slots, starting on the left with slot 0. See [Figure 1-9](#).

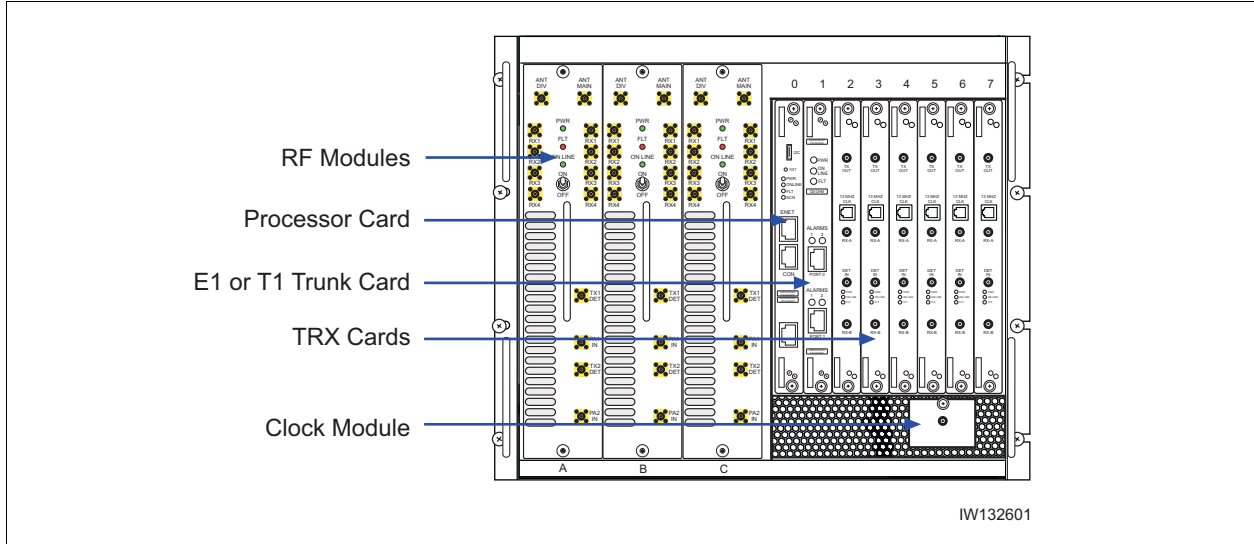


Figure 1-9: Micro BTS Chassis Layout

[Table 1-2](#) shows the Micro BTS slot assignments in the Micro subrack assembly.

Table 1-2: Micro BTS Slot Assignments

Card	Slots	Width (slots)	Function
RF Modules	A, B, C	1	RF power amplification, duplexing and combining.
Processor card	0	1	ICP processor card.
E1 or T1	1	1	Each E1 or T1 card provides 2 E1 or T1 lines.
TRX	2, 3, 4, 5, 6, 7	1	Each TRX manages 8 radio channels.
Clock Module	NA	NA	The clock module is located directly underneath the TRX cards, and provides synchronization for the Air-interface and E1/ T1 modules.

The minimum configuration consists of a processor card in slot 0, one E1 or T1 card in slot 1, one TRX in slot 7, a clock module and an RF module in slot C. Any unused slots must be covered by a blank panel.

1.4.4 Verification Procedure

Use the following procedure to identify and record your system components. Compare components against those listed in the shipping checklist. See [Figure 1-9](#) for Micro BTS chassis component locations.

- 1 Verify that the subrack assembly has four fan assemblies on the power amplifier side on the rear of the chassis and two fans on the VME bus cards side on the rear of the chassis. Verify that the fans are securely fastened to the chassis.
- 2 Verify that the Micro BTS rack assembly contains an one or more RF modules in slots A, B and/or C of the Micro rack assembly. Write down the part number, revision number and serial number of each RF module in [Checklist 2 - Installation Checklist](#).
- 3 Verify that the chassis contains an ICP processor card in slot 0 of the Micro subrack assembly. Write down the processor card part number, revision number and serial number in [Checklist 2 - Installation Checklist](#).
- 4 Slot 1 of the Micro subrack assembly should contain an E1 or T1 card. From the shipping checklist, write down the part number, revision number and serial number of the E1 or T1 card in [Checklist 2 - Installation Checklist](#).
- 5 Slots 2 to 7 should contain one or more TRXs. Verify how many are required from the shipping checklist, then verify that they are all there. Write down the part number, revision number and serial number of each TRX card in [Checklist 2 - Installation Checklist](#).
- 6 Check the shipping checklist and verify that the power supply subrack assembly has one or two power supply modules and power supply fan assemblies. One or two power supply modules are required depending on your configuration. Verify that a third slot and any other open slot is covered with a blank panel.

For each power supply module, write down the part number, revision number and serial number in [Checklist 2 - Installation Checklist](#).

- 7 Verify that all empty slots are covered by blank panels. These are necessary for cooling, and to meet RF emission standards.

1.5 Verifying Cabling

In this section, you inspect the internal cabling and verify that it is configured correctly.

1.5.1 Verifying Internal Cabling

When the Micro BTS assembly and the power supply rack assembly are mounted in the rack enclosure, all E1 or T1 interfaces are routed directly to the trunk cards through a dust protector on the rack. The interface access area is mounted in the rear recessed area of the rack enclosure. The internal cabling also connects the power supply modules to the Micro subrack assembly and provides a plug on the exterior of the cabinet for connection to the power source.

The internal cabling of the Micro BTS is included for the rack enclosure configuration only, and is completed by the manufacturer. Due to its complexity, it is not recommended for you to move or disconnect internal cabling.

1.5.2 Verifying Enclosure Cabling

When the Micro subrack assembly and power supply modules are mounted in the rack enclosure, it is necessary to verify that the following cables are connected:

- Alarm cable and I²C interface cable
- Power supply cables

Ensure that:

- The alarm cable is connected to the power supply subrack assembly and the Micro assembly.
- A USB style cable is connected from the I²C interface to the I²C connector on the front of the ICP processor card.
- The power supply subrack assembly power cables are connected to the Micro subrack assembly. See [Figure 1-10](#), Power Supply Cable 1 and Power Supply Cable 2.
- The external power supply cable (Input Power Supply) is connected to the power supply subrack assembly.

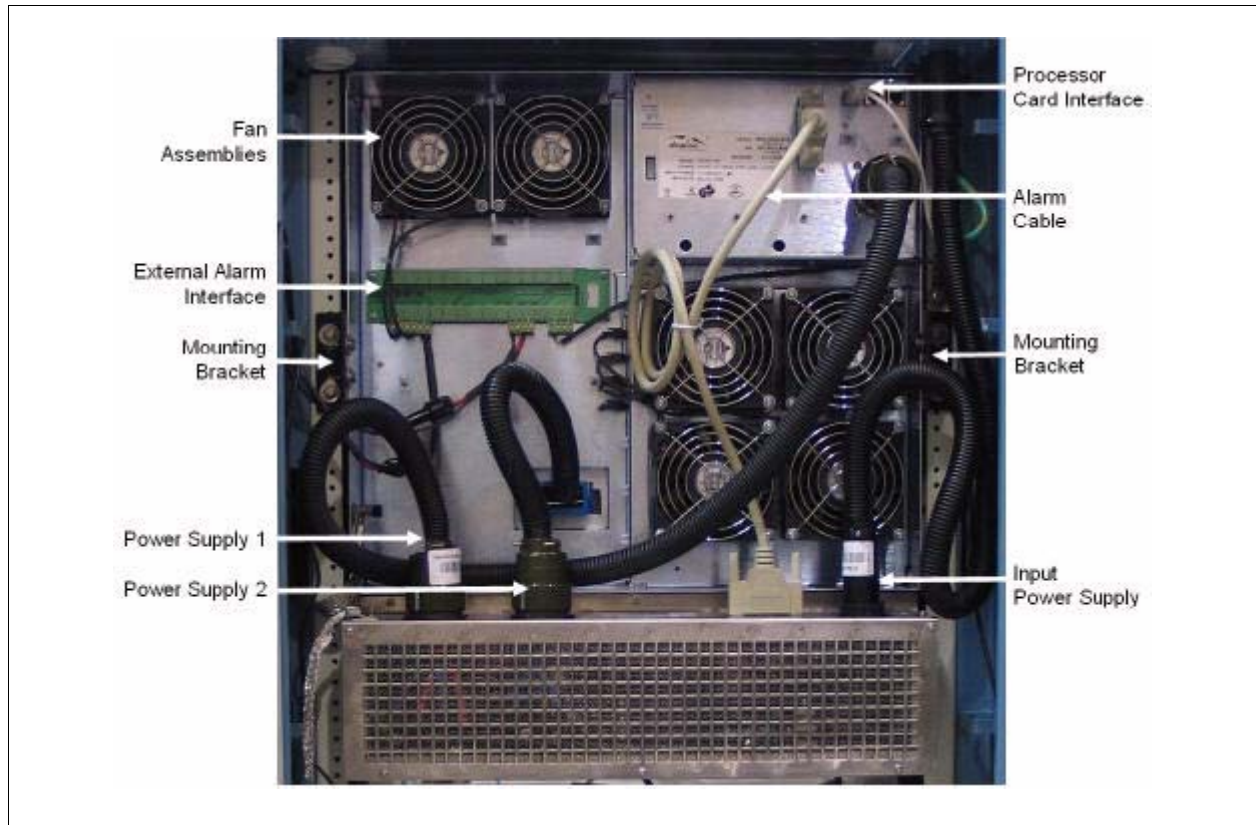


Figure 1-10: Micro Subrack and Power Supply Assembly Rear View

Figure 1-10 shows the location of the following components from the rear view of the Micro subrack assembly and power supply assembly:

- Fan Assemblies
- External Alarm Interface
- Mounting Brackets
- Power Supply 1 cable for slots A through C
- Power Supply 2 cable for slots 0 through 7
- Processor Card Interface

The ICP processor card uses an I²C interface and connects physically with a USB style cable between the processor card interface connector and the I²C connector on the front of the ICP processor card.

- Input Power Supply cable connection

Please proceed to [Chapter 2 - Installation](#) to install your Micro BTS.

Chapter 2 - Installation

In this Chapter:

- [“Analyzing Site Requirements” on page 18](#)
- [“Mounting the Micro BTS Chassis” on page 22](#)
- [“Configuring the E1 or T1 Trunk Card” on page 31](#)
- [“Connecting Ground Cables” on page 36](#)
- [“Connecting Power Supplies” on page 38](#)
- [“Connecting E1 or T1 Trunk Cables” on page 47](#)
- [“Connecting Antennas” on page 52](#)
- [“Connecting External Alarms” on page 60](#)
- [“Making a Serial Connection to the Processor Card” on page 64](#)
- [“Network Connections” on page 65](#)
- [“Post Installation Cabling and Checks” on page 66](#)

This chapter provides instructions for installing and configuring the Micro BTS hardware.

2.1 Analyzing Site Requirements

Before a site is chosen or equipment installed, a site survey must be carried out. The site survey checklist assists the surveyor with the inspection and the collection of site specific information such as environmental conditions, electrical requirements, and mechanical requirements.

The site survey checklist must be completed before installation begins. The necessary steps for site readiness are listed in [Checklist 1 - Site Readiness Checklist](#). The [GSM Network Implementation Manual](#) provides additional detailed site requirements.

The site readiness checklist assists the field service engineer or operator to ensure that the site is ready for equipment installation. It includes information about:

- Environmental conditions
- Electrical requirements
- Chassis requirements

The site readiness checklist is located in [Checklist 1 - Site Readiness Checklist](#). It must be completed as part of the installation process.

2.1.1 Environmental Conditions

The Micro BTS is designed to operate indoors only. To facilitate long-term operability and durability of the Micro BTS, observe specific environmental constraints.

Before installing the Micro BTS, ensure that the operating environment maintains a temperature and humidity within the ranges shown in [Table 2-1](#).



Make sure the ambient temperature around the unit (which may be higher than the room temperature) is within the specified limit for the unit.

Table 2-1: Micro BTS Operating Environment

Scale	Humidity (non-condensing)	Temperature (Celsius)	Temperature (Fahrenheit)
Maximum	90%	55 degrees	131 degrees
Minimum	10%	-5 degrees	23 degrees

2.1.2 Electrical Requirements

The Micro BTS is specified to operate on either AC or DC power. Requirements for the Micro BTS are dependent on the number of TRX cards supported.

Power Options

Main power supply options for the Micro BTS are:

- 110 VAC to 220 VAC auto-ranging, 30 A, 50-60 Hz
- -40 VDC to -60 VDC (-48 VDC nominal), 40 A

Table 2-2 shows the estimated power requirements for the different TRX configurations for the Micro BTS.

Table 2-2: Estimated Power Requirements for TRX Configurations

Product Configuration	-48 VDC	110 VAC	220 VAC
One TRX	261 Watts	350 Watts	345 Watts
Two TRXs	531 Watts	700 Watts	690 Watts
Three TRXs	801 Watts	1050 Watts	1035 Watts
Four TRXs	1071 Watts	1400 Watts	1380 Watts
Six TRXs	1611 Watts	2100 Watts	2070 Watts

Table 2-3 shows Micro BTS Power Specifications.

Table 2-3: Micro BTS Power Specifications

Power Requirements	Specification
Micro BTS voltage range: 110 VAC	90 to 264 VAC
Micro BTS power protection: 110 VAC	Dedicated 30 amp circuit breaker
Micro BTS voltage range: 220 VAC	90 to 264 VAC
Micro BTS power protection: 220 VAC	Dedicated 15 Amp circuit breaker
Micro BTS DC voltage range: -48 VDC	-40 to -60 VDC
Micro BTS DC power protection: -48 VDC	Dedicated 40 Amp fuse/circuit breaker

2.1.3 Chassis Requirements

Before installing the Micro BTS, ensure that adequate clearance space is allowed around the unit. Enough clearance should be provided from the front and back of the cabinet to fully open the doors. This requires at least 24 inches (61 cm) from the front and rear doors. The minimum clearance required on either side of the cabinet is 4.5 inches (11.4 cm) and the minimum clearance required below the cabinet is 1.8 inches (4.59 cm). The mounting site should also have ample clearance for the trunk and antenna cables to be attached to the connectors at the top of the cabinet.

The Micro BTS should be installed away from salt spray and in an area where there are minimal vibrations.

Table 2-4 lists the dimensions of the Micro BTS chassis.

Table 2-4: Micro BTS Chassis Dimensions

Scale	Height	Width	Depth
Metric	39.93 cm	48.26 cm	43.82 cm
Imperial	15.72 inches	19.0 inches	17.25 inches

Table 2-5 lists the weight and dimensions of the power supply rack.

Table 2-5: Power Supply Rack Weight and Dimensions

Scale	Weight (Maximum Configuration)	Height	Width	Depth
Metric	23.8 kg	12.5 cm (AC) 13 cm (DC)	48.26 cm	51.44 cm
Imperial	52.35 lbs	5 inches (AC) 5.2 inches (DC)	19.0 inches	20.25 inches

Table 2-6 and Figure 2-1 provide the dimensions of the BTS cabinet. For detailed cabinet dimensions, refer to Section 2.2.

Table 2-6: Micro BTS Cabinet Weight and Dimensions

Scale	Weight (Maximum Configuration)	Height	Width	Depth
Metric	166 kg	105.1 cm	56.0 cm	64.77 cm
Imperial	365 lbs	41.38 inches	22.05 inches	25.5 inches



When fully loaded, two people are required to lift the chassis. (The two man lift requirement applies to loads of over 80 kg.)

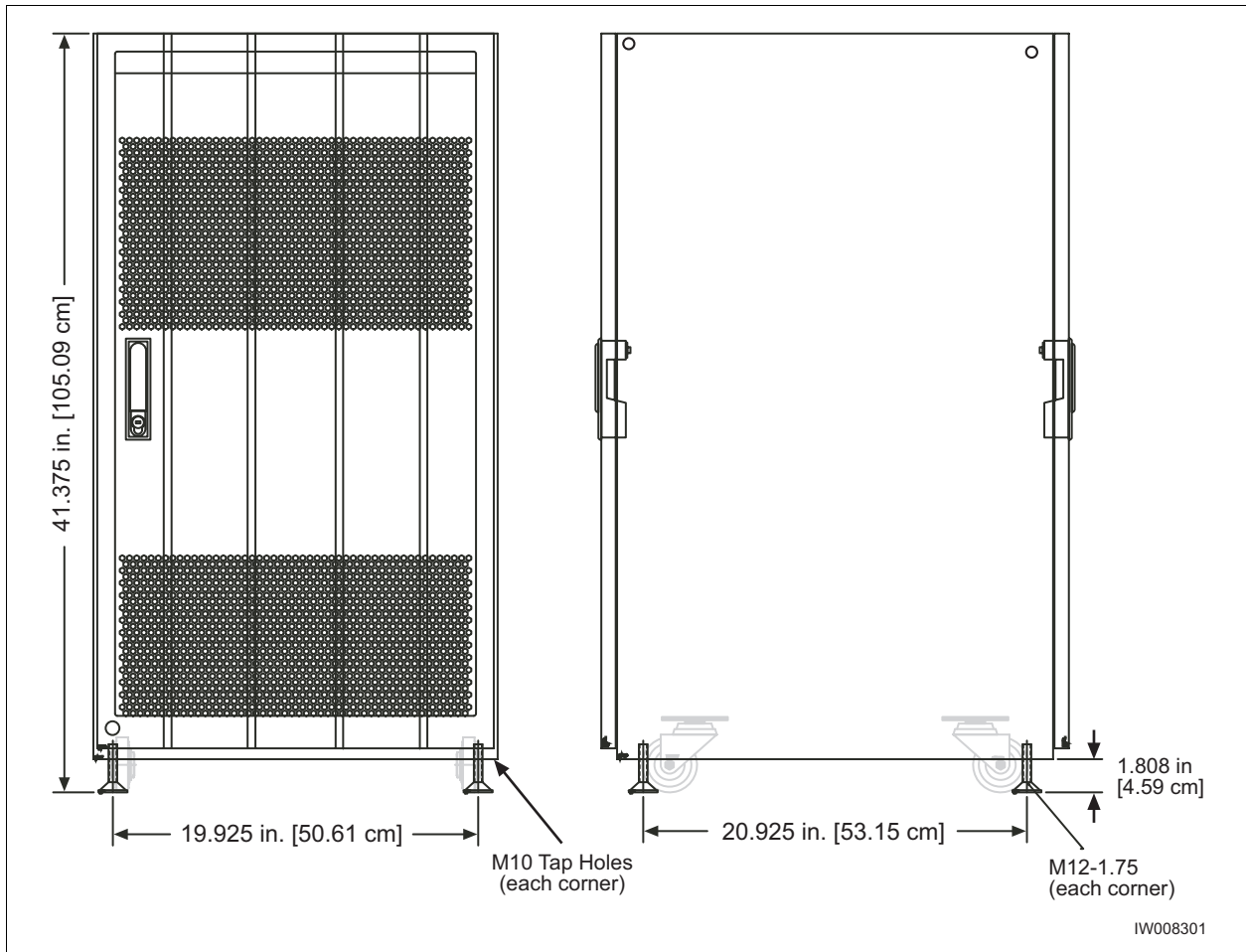


Figure 2-1: Cabinet Footing Dimensions



The steps for site readiness are listed in [Checklist 1 - Site Readiness Checklist](#).

2.2 Mounting the Micro BTS Chassis

The Micro BTS is offered in two different configurations:

- 19 inch (48.26 cm) rack assembly
- Cabinet enclosure assembly

Upon ordering the Micro BTS, the desired type of mounting must be specified, as a separate mounting kit is supplied for each option.

This section describes all the necessary steps for installing a Micro BTS. It is divided into two subsections. These two sections are:

- Rack installation. [Section 2.2.1](#)
- Enclosure mounting. [Section 2.2.2](#)

Each of these sections contain complete instructions on how to install the Micro BTS in different configurations. Please refer to the appropriate section.

Ensure that:



- The ambient temperature around the unit (which may be higher than the room temperature) is within the limit specified for the unit.
- There is sufficient airflow around the unit.
- The electrical circuits are not overloaded - consider the name plate rating of all the connected equipment and make sure you have over current protection.
- The equipment is properly grounded.
- No objects are placed on top of the unit.

2.2.1 Rack Installation

The Micro BTS may be ordered with or without a standard EIA 19 inch rack enclosure as defined in EIA standard RS-310-D Racks, Panels and Associated Equipment. If you ordered the rack enclosure, the Micro subrack assembly and the power supply subrack assembly will be mounted inside the rack enclosure with cable access to the outside of the enclosure.

The minimum clearance required above and below the chassis is 1.0" (2.54 cm) and the minimum clearance required behind the chassis is 1.0" (2.54 cm). The mounting site should also have ample clearance for the trunk cables to be attached to the front panel connectors.

Required Materials

- 12 standard customer-provided rack mount screws

Optional Materials

- One standard 19" (48.26 cm) rack mount shelf assembly

Required Tools

- Rack mount screwdriver

Rack Mount Advisory

To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Attention: Pour éviter toute blessure corporelle pendant les opérations de montage ou de réparation de cette unité en casier, il convient de prendre des précautions spéciales afin de maintenir la stabilité du système. Les directives ci-dessous sont destinées à assurer la protection du personnel:

- Si cette unité constitue la seule unité montée en casier, elle doit être placée dans le bas.
- Si cette unité est montée dans un casier partiellement rempli, charger le casier de bas en haut en plaçant l'élément le plus lourd dans le bas.

- Si le casier est équipé de dispositifs stabilisateurs, installer les stabilisateurs avant de monter ou de réparer l'unité en casier.

Warnung: Zur Vermeidung von Körperverletzung beim Anbringen oder Warten dieser Einheit in einem Gestell müssen Sie besondere Vorkehrungen treffen, um sicherzustellen, daß das System stabil bleibt. Die folgenden Richtlinien sollen zur Gewährleistung Ihrer Sicherheit dienen:

- Wenn diese Einheit die einzige im Gestell ist, sollte sie unten im Gestell angebracht werden.
- Bei Anbringung dieser Einheit in einem zum Teil gefüllten Gestell ist das Gestell von unten nach oben zu laden, wobei das schwerste Bauteil unten im Gestell anzubringen ist.
- Wird das Gestell mit Stabilisierungszubehör geliefert, sind zuerst die Stabilisatoren zu installieren, bevor Sie die Einheit im Gestell anbringen oder sie warten.

Installation Instructions

- 1 Allocate nine rack units of space in your 19" rack for the Micro subrack assembly and three rack units of space for the power supply subrack assembly.
- 2 The rack mount brackets have cutouts to accommodate the rack screws. Using two people, carefully align the Micro subrack assembly with the rack holes.
- 3 Mount the Micro BTS subrack assembly in the rack using customer-provided screws.
- 4 Using the same procedure, align and mount the power supply subrack assembly below the Micro BTS subrack assembly, as shown in [Figure 2-2](#).



Optionally, you can mount a rack mount shelf assembly and use the shelf to support the two rack assemblies. Both assemblies must also be secured to the rack unit.

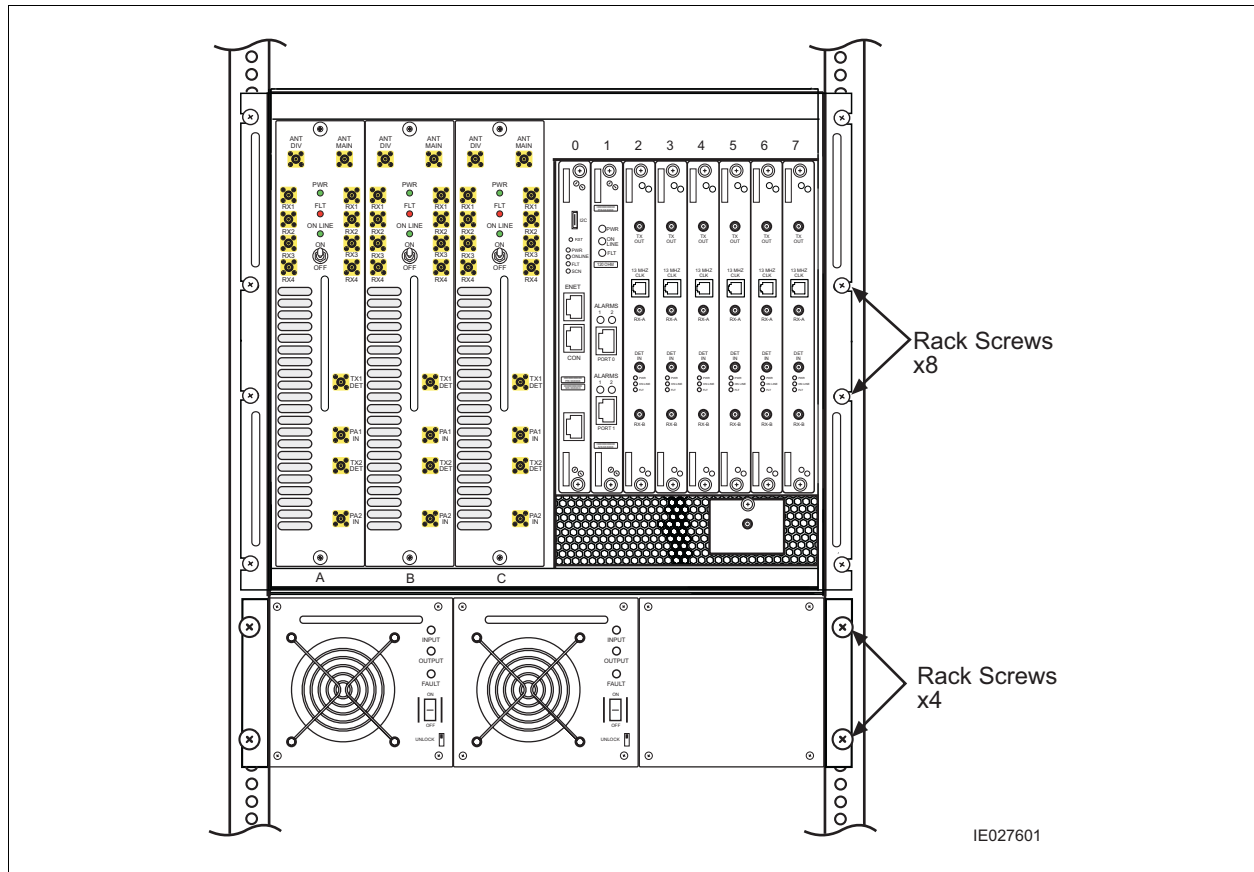


Figure 2-2: Attaching the Subrack Assemblies

- 5 Connect the alarm cable between the power supply subrack assembly and the Micro subrack assembly. See [Figure 2-3](#). Secure the cable by tightening the phillips screws.
- 6 Connect Power Supply Cable 1 and Power Supply Cable 2 between the power supply subrack assembly and the Micro BTS subrack assembly. See [Figure 2-3](#). The connector to the Micro subrack assembly will snap into place, while you must tighten the round quick disconnect connector by twisting the connector housing.

Refer to [Section 1.5](#) for more information on cabling and on verifying that cables are connected correctly.

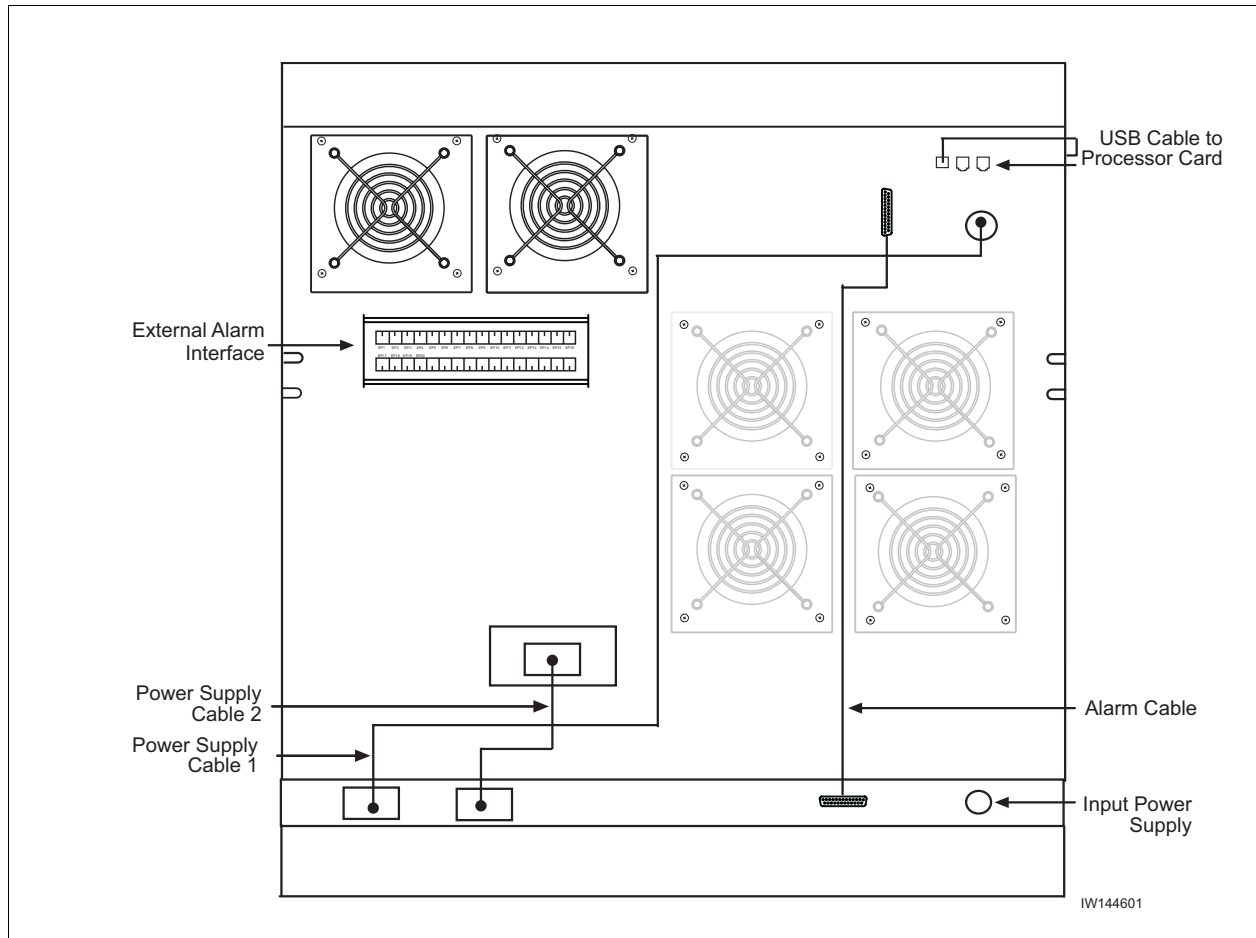


Figure 2-3: Power Cabling and Alarm Cabling

- 7 You have completed the hardware installation. Proceed to [Section 2.3](#) to continue the Micro BTS configuration.

2.2.2 Enclosure Mounting

The Micro BTS chassis should be mounted on a concrete pad of sufficient density to support the weight of the cabinet assembly. Alignment pins may be installed in the concrete pad at the locations provided in [Figure 2-4](#). The alignment pins should be 0.5 inches (1.27 cm) in diameter and protrude from 4.1 inches to 4.4 inches (10.41 cm to 11.18 cm) from the concrete pad.

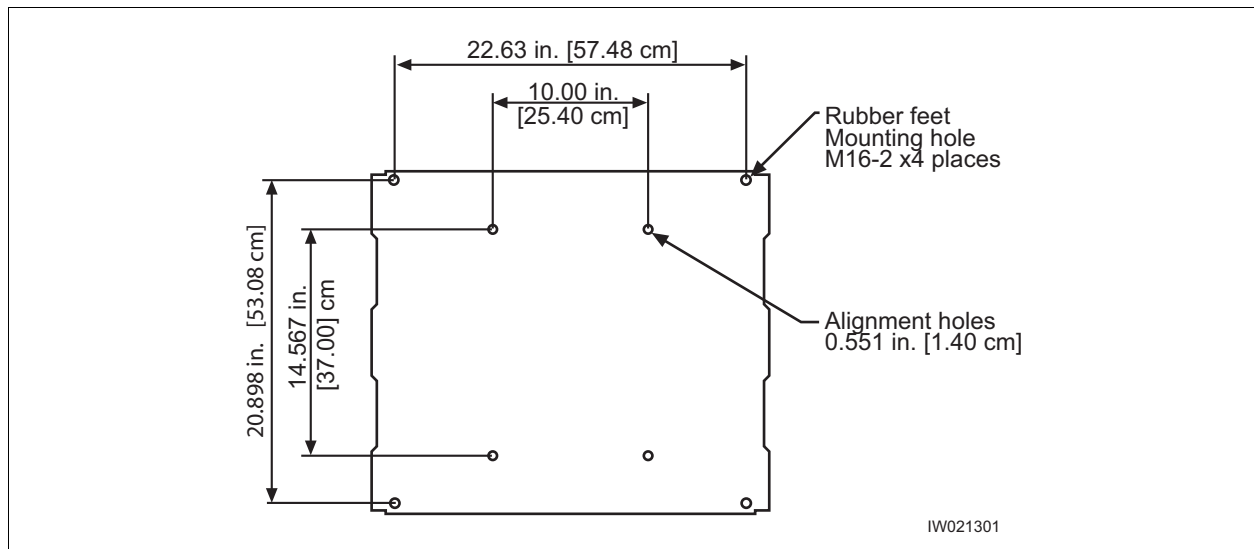


Figure 2-4: Cabinet Footprint

Enough clearance should be provided from the front and back of the cabinet to fully open the doors. This requires at least 24 inches (61 cm) from the front and rear doors. The minimum clearance required on either side of the cabinet is 4.5 inches (11.4 cm) and the minimum clearance required below the cabinet is 1.8 inches (4.59 cm). The mounting site should also have ample clearance for the trunk and antenna cables to be attached to the connectors at the top of the cabinet.

The required footprint for your cabinet installation must be at least 73.5 inches (186.7 cm) by 31.5 inches (80 cm). Be sure there is sufficient airflow around the unit.

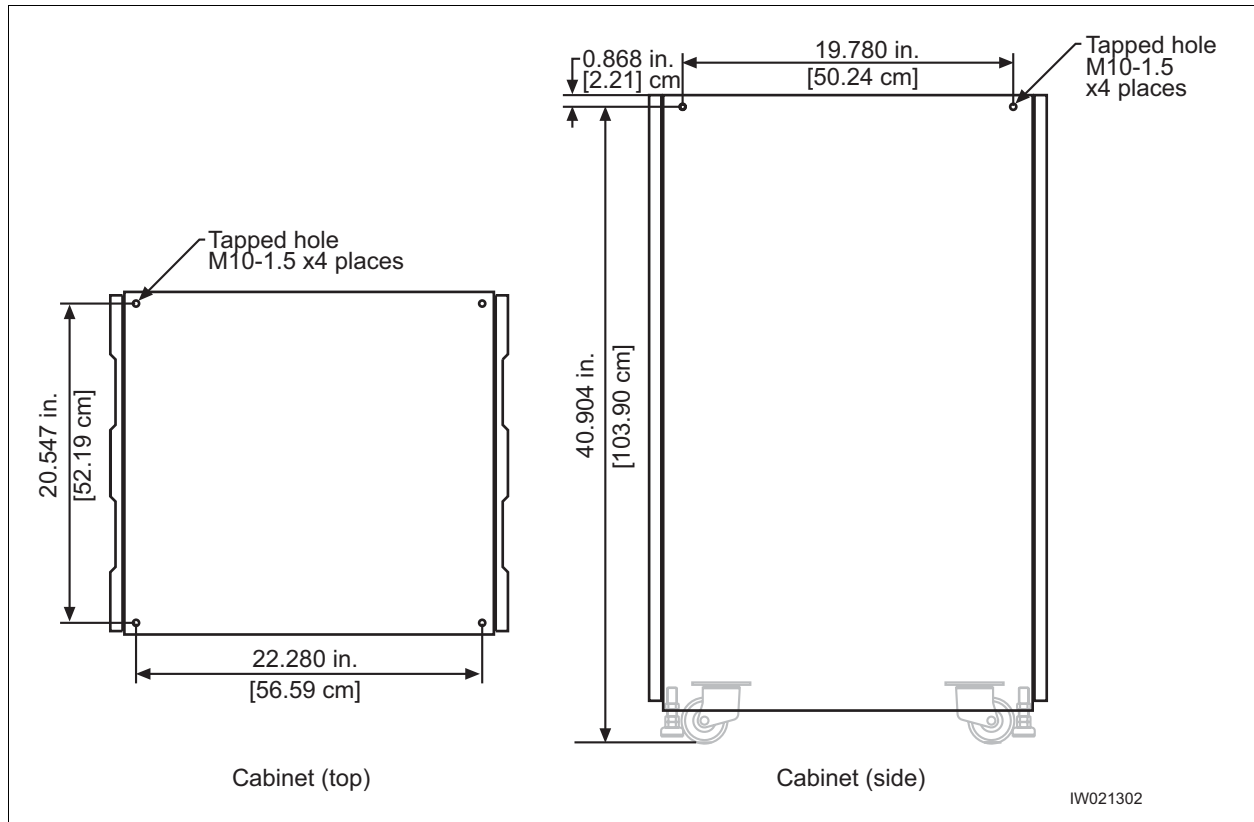


Figure 2-5: Cabinet Dimensions

The cabinet is mounted on casters and may be carefully moved from the unpacking site to its final mounting location. The cabinet has four rubber feet which will raise the cabinet off of the casters. The dimensions for the engagement height of the rubber feet is shown in [Figure 2-1](#). If you have alignment pins mounted in your concrete pad, use the procedure in this section.

If you do not have the alignment pins, [Figure 2-5](#) illustrates the location of eight M10 tap holes which may be used for additional mounting studs, eye hooks or angle brackets for securing the Micro BTS cabinet in its final location.



- Make sure the ambient temperature around the unit (which may be higher than the room temperature) is within the specified limit.
- Make sure there is sufficient airflow around the unit.
- Make sure electrical circuits are not overloaded - consider the nameplate rating of all the connected equipment, and make sure you have over current protection.
- Make sure the equipment is properly grounded.
- Make sure no objects are placed on the top of the unit.

Required Materials

- Angle brackets
- Four M10 machine screws and washers

Required Tools

- 15 mm open end wrench

Installation Instructions

- 1 Move the cabinet into its final location. If using alignment pins to prevent movement, move the cabinet into position over the pins.
- 2 Lower each of the rubber feet until each reaches the concrete pad.
- 3 Using the 15 mm open end wrench, lower each foot until the casters are raised from the concrete floor, approximately 0.25 inches (0.65 cm).
- 4 Remove the casters from the bottom of the cabinet.
- 5 Lower the cabinet to within 4.1 inches to 4.4 inches (10.41 cm to 11.18 cm) of the concrete pad. If you are using alignment pins, lower the cabinet until the pins enter the alignment holes no more than 0.25 inches (0.6 cm). Do not lower the cabinet too far over alignment pins as they may puncture internal components.
- 6 Secure locking nuts on foot studs.
- 7 Secure the cabinet using customer-provided 10 mm studs.



You may use the additional M10 tap holes to secure the cabinet as site-specific conditions allow.

Rack Mount Advisory

To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Attention: Pour éviter toute blessure corporelle pendant les opérations de montage ou de réparation de cette unité en casier, il convient de prendre des précautions spéciales afin de maintenir la stabilité du système. Les directives ci-dessous sont destinées à assurer la protection du personnel:

- Si cette unité constitue la seule unité montée en casier, elle doit être placée dans le bas.
- Si cette unité est montée dans un casier partiellement rempli, charger le casier de bas en haut en plaçant l'élément le plus lourd dans le bas.
- Si le casier est équipé de dispositifs stabilisateurs, installer les stabilisateurs avant de monter ou de réparer l'unité en casier.

Warnung: Zur Vermeidung von Körperverletzung beim Anbringen oder Warten dieser Einheit in einem Gestell müssen Sie besondere Vorkehrungen treffen, um sicherzustellen, daß das System stabil bleibt. Die folgenden Richtlinien sollen zur Gewährleistung Ihrer Sicherheit dienen:

- Wenn diese Einheit die einzige im Gestell ist, sollte sie unten im Gestell angebracht werden.
- Bei Anbringung dieser Einheit in einem zum Teil gefüllten Gestell ist das Gestell von unten nach oben zu laden, wobei das schwerste Bauteil unten im Gestell anzubringen ist.
- Wird das Gestell mit Stabilisierungszubehör geliefert, sind zuerst die Stabilisatoren zu installieren, bevor Sie die Einheit im Gestell anbringen oder sie warten.

2.3 Configuring the E1 or T1 Trunk Card

This section describes how to configure E1 or T1 trunk cards.

These procedures are designed for E1 or T1 cards that are shipped pre-configured in a system. To configure E1 or T1 cards that are shipped as configured or unconfigured replacements, refer to the [GSM Field Maintenance Guide](#).

Your system is shipped from the manufacturer configured with the correct cards for your site-specific application. These can be 75 Ohm E1, 120 Ohm E1 or 100 Ohm T1 cards. All cards are shipped with the appropriate connectors.



Cable runs of greater than 600 meters (1968 feet) are not supported directly from the card. If you are attempting a longer cable run between UltraWAVE chassis please contact Customer Service to determine if you need a repeater for your application.

[Table 2-7](#) lists the cards and the procedures that apply to each card type.

Table 2-7: Trunk Cards and Procedures

Label	Description	Operation
75 Ohm	75 Ohm E1 card	Set the ground to the Transmit or Receive side using the jumpers. Refer to Section 2.3.1 .
120 Ohm	120 Ohm E1 card	No configuration is required.
100 Ohm	100 Ohm T1 card	Configure the DIP switch based on cable length to the DSX-1 demarcation point. Refer to Section 2.3.2 . Note: No configuration is required unless connecting to a DSX-1 demarcation point greater than 133 feet.

2.3.1 Configuring Ground Jumpers on 75 Ohm E1 Cards

To configure the ground jumpers on a 75 Ohm E1 card:

- 1 Ensure that anti-static precautions are taken. Refer to [Section 1.2](#) for anti-static precautions.
- 2 Make note of the orientation of the cables and disconnect them from the selected card.
- 3 Using a Phillips screwdriver, fully loosen the two captive screws located at the top and bottom of the card.
- 4 Remove the card by firmly pulling the two white tabs located at the top and bottom of the card.
- 5 See [Figure 2-6](#) to locate jumpers P8 through P11.
- 6 Set the signal grounding to the Transmit or Receive Side.

Jumpers P8, P9, P10 and P11 control the signal grounding. Placing the jumper across Pins 1 and 2 sets the corresponding ground; otherwise the jumper should be placed across Pins 2 and 3.

The following table shows the jumper assignments:

Table 2-8: Ground Jumpers

Ground Selection	Port	Jumper Positions	
Receive Side	Port 0	P8 = 1 to 2	P9 = 2 to 3
	Port 1	P10 = 2 and 3	P11 = 1 and 2
Transmit Side	Port 0	P8 = 2 to 3	P9 = 1 to 2
	Port 1	P10 = 1 and 2	P11 = 2 and 3

Alvarion recommends grounding the receive (RX) side on 75 Ohm cards.



Only one side of the transmission link should be grounded. To ensure that only the one side is grounded, you should check the settings at the far end of the E1 transmission link when possible. These settings should be identified by experienced personnel.

- 7 Place the card into the slot and slide in the card until it completely rests inside the slot. Push the card firmly into place.
- 8 Using a Phillips screwdriver, tighten the two captive screws.

- 9 Reconnect all disconnected cables to their proper ports on the E1 card.

Figure 2-6 shows the location of the grounding jumpers.

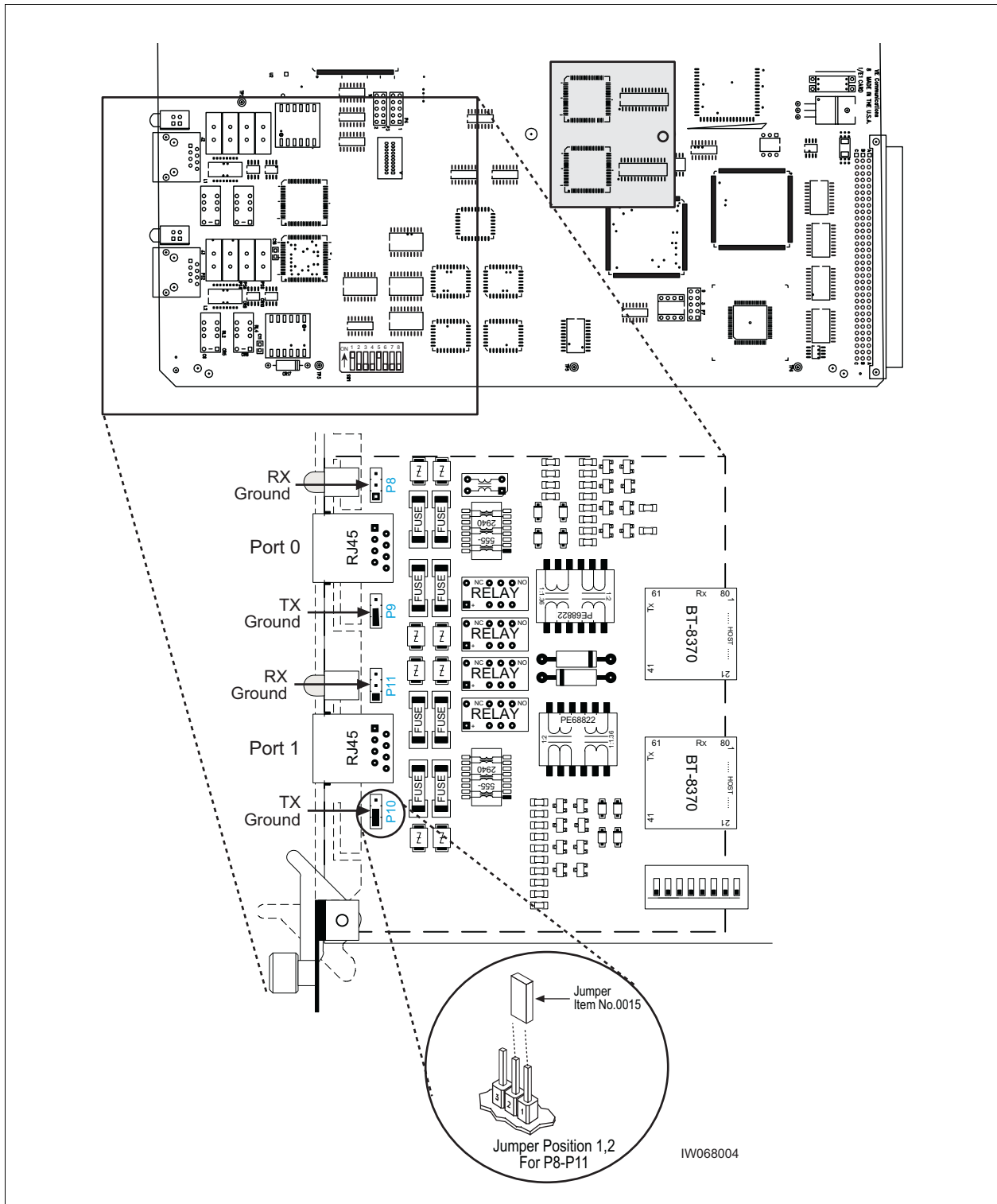


Figure 2-6: Ground Jumpers (P8 through P11)

2.3.2 Configuring Cable Length DIP Switch Settings on T1 Cards

To configure the DIP switch settings on a T1 card:

- 1 Ensure that anti-static precautions are taken. Refer to [Section 1.2](#) for anti-static precautions.
- 2 Make note of the orientation of the cables and disconnect them from the selected card.
- 3 Using a Phillips screwdriver, fully loosen the two captive screws located at the top and bottom of the card.
- 4 Remove the T1 card by firmly pulling the two white tabs located at the top and bottom of the card.
- 5 See [Figure 2-7](#) to locate the DIP switch.
- 6 On T1 cards, the DIP switch setting is determined by the cable distance from the card to the DSX-1 demarcation point. The following table provides the appropriate Port 0 and Port 1 DIP switch settings for DSX-1 demarcation points located within various cable distance ranges.



In [Table 2-9](#), the first setting (0-133 ft.) is the default and should be used for all T1 applications unless connecting to a DSX-1 demarcation point beyond 133 ft. When connecting two chassis you will always use the first setting regardless of distance (up to 600 m).

Table 2-9: T1 DIP Switch Settings

Port 0 Switch Setting 1-2-3-4	Port 1 Switch Setting 5-6-7-8	Cable distance from T1 Card to DSX-1 Demarcation Point Feet (Meters)
OFF-ON-ON-ON	OFF-ON-ON-ON	0-133 (0-40.57)
OFF-OFF-ON-ON	OFF-OFF-ON-ON	133-266 (40.57-81.13)
OFF-ON-OFF-ON	OFF-ON-OFF-ON	266-399 (81.13-121.7)
OFF-OFF-OFF-ON	OFF-OFF-OFF-ON	399-533 (121.7-162.57)
OFF-ON-ON-OFF	OFF-ON-ON-OFF	533-655 (162.57-199.78)

Note: ON refers to the DIP switch pin being in the “UP” position and OFF refers to the DIP switch pin being in the “DOWN” position. X = either ON or OFF.

- 7 Place the card into the slot and slide in the card until it completely rests inside the slot. Push the card firmly into place.
- 8 Using a Phillips screwdriver, tighten the two captive screws into the chassis through the trunk card.

Figure 2-7 shows the location of the DIP switch.

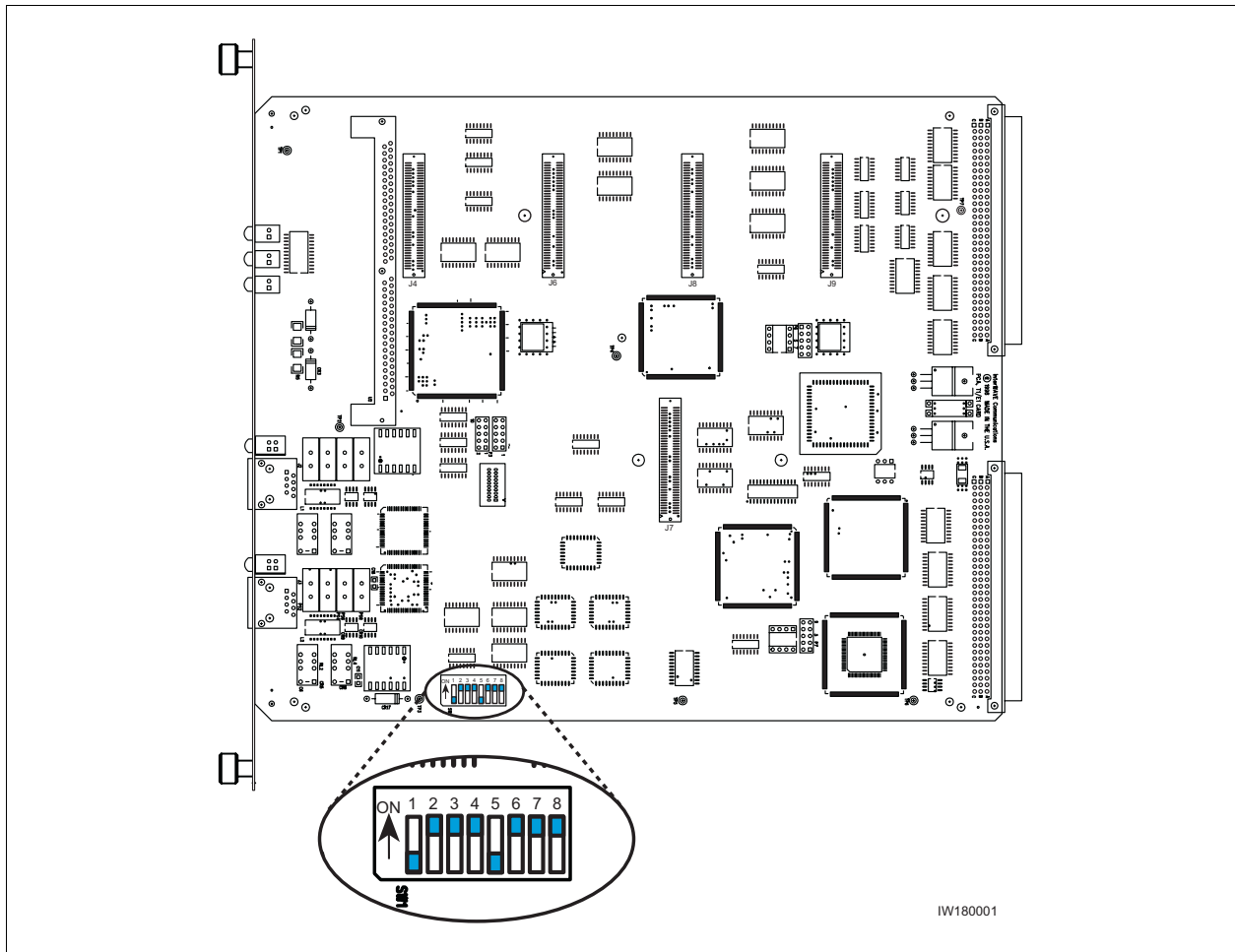


Figure 2-7: Location of DIP Switch on a T1 Trunk Card

2.4 Connecting Ground Cables

Use this section to connect your earth ground and power cables to the Micro BTS cabinet.

2.4.1 Connecting the Grounding Cable

The rack unit in which the Micro BTS subracks are being mounted should be properly grounded to the site earth ground ring. You must attach a ground strap to each subrack and to the rack unit or directly to the site ground ring.

- 1 Locate the ground lugs on each subrack assembly. See [Figure 2-8](#) for their location.

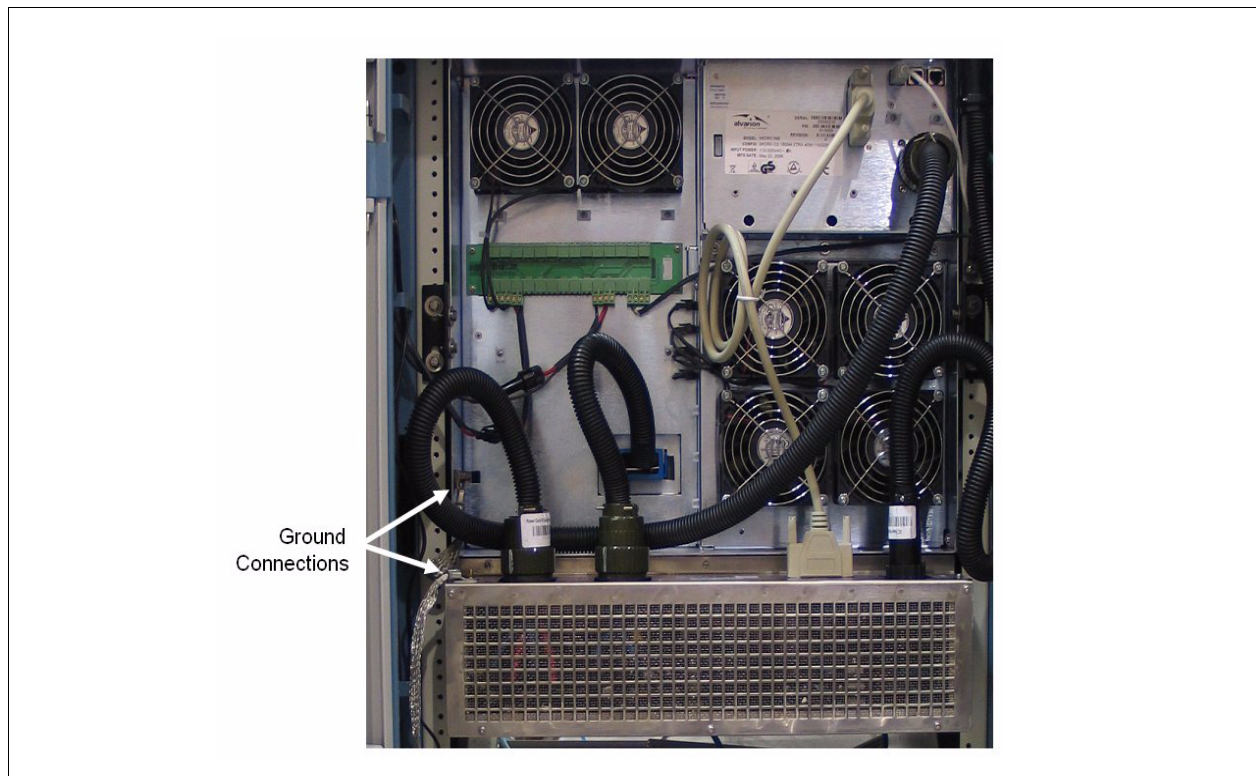


Figure 2-8: Ground Lugs

- 2 Remove the nut from each ground lug and connect a ground lead to each subrack. Secure the nut tightly on each subrack assembly.
- 3 Attach the ground cables to the properly grounded rack assembly or to the closest earth ground bus.

2.4.2 Grounding the Cabinet

The subrack assemblies are grounded to the cabinet by the manufacturer. The cabinet should be grounded to the site earth ground ring. Complete the following to connect an earth ground to the chassis.

- 1 Route a customer-supplied 10 AWG (2.5 mm) or larger copper wire to a grounding lug inserted into one of the M10 tap holes shown in [Figure 2-5](#).
- 2 Connect the other end of the lead stud to the closest grounding bus.

Caution: Grounding circuit continuity is vital for safe operation of machine. Never operate machine with grounding conductor disconnected.



Attention: Un circuit de terre continu est essentiel en vue du fonctionnement sécuritaire de l'appareil. Ne jamais mettre l'appareil en marche lorsque le câble de mise à la terre est débranché.

Warnung: Achtung, Hoher Ableitstrom! Schutzleiteranschluß vor dem Netzanschluß herstellen.

2.5 Connecting Power Supplies

In this section, you will connect the Micro BTS to your power source. Before beginning it is necessary to first:

- Identify your power configuration. This may be AC (110 V to 220 V, 30 A 50-60 Hz) or DC (-40 V to -60 V, 40 A).
- Install your AC or DC power supplies.

When you have completed these tasks, refer to the appropriate subsection to make either AC or DC power connections:

- Connecting AC power. See [Section 2.5.1](#)
- Connecting DC power. See [Section 2.5.2](#)

Warning: This product relies on the building's installation for short-circuit (over current) protection. Ensure that a fuse or circuit breaker no larger than 110 VAC, 30 A; 220 VAC, 15 A; or -48 VDC, 40 A is used on the phase conductors (all current-carrying conductors).



Attention: Pour ce qui est de la protection contre les courts-circuits (surtension), ce produit dépend de l'installation électrique du local. Vérifier qu'un fusible ou qu'un disjoncteur de 110 VAC, 30 A alt., 220 VAC, 15 A alt., -48 VDC 40 A est utilisé sur les conducteurs de phase (conducteurs de charge).

Warnung: Dieses Produkt ist darauf angewiesen, daß im Gebäude ein Kurzschluß- bzw. Überstromschutz installiert ist. Stellen Sie sicher, daß eine Sicherung oder ein Unterbrecher von nicht mehr als 110 V Wechselstrom, 30 A; 220 V Wechselstrom, 15 A; oder -48 V Gleichstrom, 40 A an den Phasenleitern (allen stromführenden Leitern) verwendet wird.

Identifying AC and DC Power Configurations

You can determine whether your system uses AC or DC power by checking the main configuration label. The main configuration label is located on either the exterior of your shipping container or on the rear of the Micro subrack assembly. See [Section 1.3.1](#) for the details included on the main configuration label. Use [Table 1-1](#) to identify your system power configuration.

Figure 2-9 displays the AC power supply modules. Figure 2-10 displays the DC power supply modules.

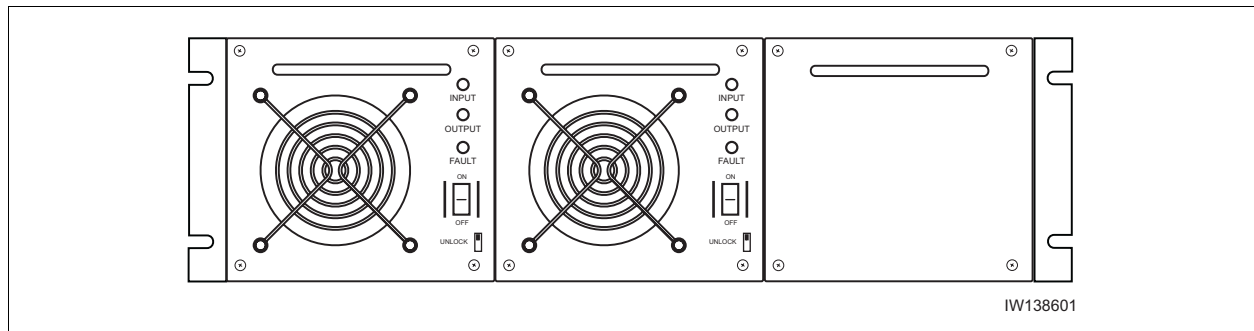


Figure 2-9: AC Power Supply Subrack Assembly

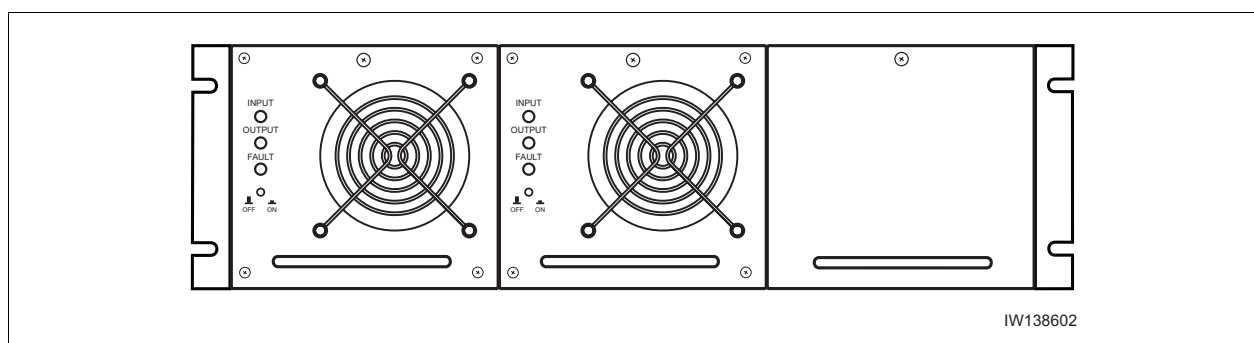


Figure 2-10: DC Power Supply Subrack Assembly

Installing AC Power Supply Modules

The customer ordered configuration determines the number of power supply modules included with the Micro BTS. The power supply modules must be installed according to the following procedure:

- 1 Remove the power supply module from the packaging.
- 2 Insert the power supply module in the first empty slot at the front left of the subrack assembly.
- 3 Slide the power supply module into the chassis until it locks into place.

Installing DC Power Supply Modules

The customer ordered configuration determines the number of power supply modules included with the Micro BTS. The power supply modules must be installed according to the following procedure:

- 1 Remove the power supply module from the packaging.
- 2 Insert the power supply module in the first empty slot at the front left of the subrack assembly.
- 3 Slide the power supply module into the chassis.
- 4 Twist the captive screws clockwise to secure the power supply module into place. If you are connecting directly to the power supply subrack assembly, [Figure 2-11](#) shows the input power connector location.

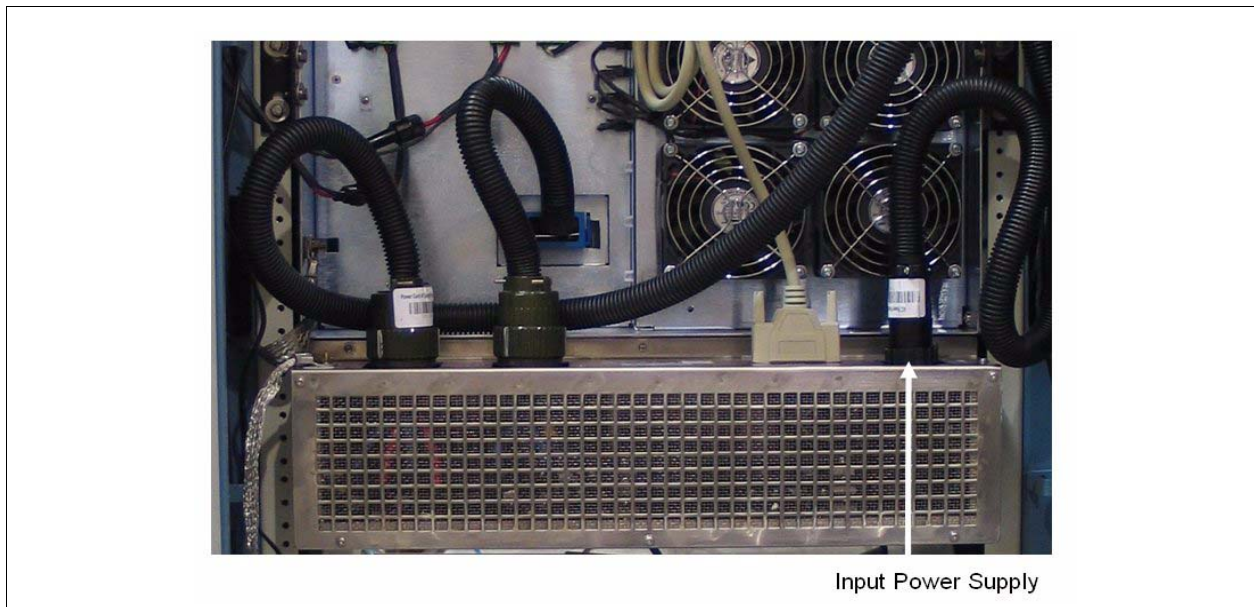


Figure 2-11: Power Supply Subrack Connection

2.5.1 Connecting AC Power

The Micro BTS is shipped from the factory with the internal cabling routed from the AC power supply subrack assembly to a round quick disconnect connector on the top rear of the cabinet.

The input power connector cable is supplied with the cabinet assemblies.

[Figure 2-12](#) shows the AC input power connector which attaches to the cabinet enclosure.



Figure 2-12: AC Input Power Connector and Cable

Connecting the AC Power Supply to the Cabinet

- 1 Verify the ground connection you made in [Section 2.4.1](#) is secure.
- 2 Make sure that the power switch located on all power supply modules is in the OFF position. See [Figure 2-13](#) for the location of the power supply power switches.

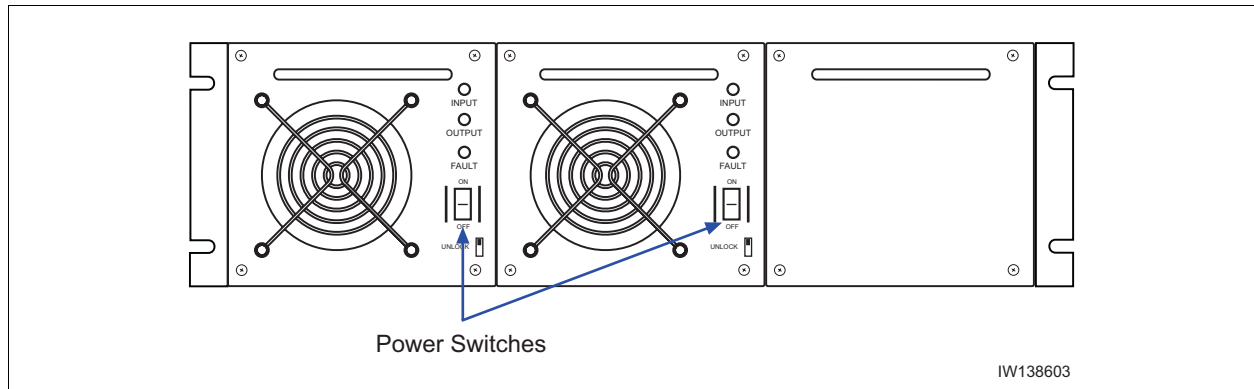


Figure 2-13: AC Power Supply Module ON/OFF Switches

- 3 Ensure the input power source is turned off and not supplying power to source power connection.
- 4 Plug the power cable into the electrical mains or connect the flat washers, shown in [Figure 2-12](#), directly to the input power source, as follows:
 - White is the neutral lead
 - Black is the line lead
 - Green is the ground lead
- 5 Plug the round quick disconnect connector as illustrated in [Figure 2-12](#) into the power connection on the top of the cabinet as illustrated in [Figure 2-14](#). Secure the connector by twisting the connector sleeve until the lines on the cable connector and chassis connector align.

If you have ordered the NIB as separate subrack assemblies, you will connect the input power cable directly to the power supply subrack assembly, shown in [Figure 2-11](#).

- 6 **Do not apply power to the chassis at this time.** Wait until you are performing the off-line commissioning procedures in the next chapter.



Figure 2-14: AC Power Supply Chassis Connection

Caution: The power supply cord is used as the main disconnect device, ensure that the socket-outlet is located/installed near the equipment and is easily accessible.



Attention: Le cordon d'alimentation est utilisé comme interrupteur général. La prise de courant doit être située ou installée à proximité du matériel et être facile d'accès.

Warnung: Das Netzkabel dient als Netzschalter. Stellen Sie sicher, dass die Steckdose einfach zugänglich ist.



The power supplies' INPUT LEDs will illuminate and power supply fans will start when connected to the power source. Do not power on the cabinet at this time.

2.5.2 Connecting DC Power

The Micro BTS is shipped from the factory with the internal cabling routed from the DC power supply subrack assembly to a round quick disconnect connector on the top rear of the cabinet.

The input power connector cable is supplied with the cabinet assemblies. This section explains how to assemble the input power connector and cable.

DC Input Power Connector Details

Figure 2-15 shows the DC quick disconnect power connector and cable.



Figure 2-15: DC Round Quick Disconnect Connector and Cable

The cable wires are connected to the input power supply as follows:

- Black is connected to the -48 VDC supply.
- Red is connected to the -48 VDC supply.
- White is a return and typically connected to the cabinet ground.
- Green is a return and typically connected to the cabinet ground.



Two wires carry -48 VDC and two wires must carry Return.

Connecting the DC Power Supply to the Cabinet

Use the following procedure:



The power main must be a Safe Extra-Low Voltage (SELV), -48 VDC supply as defined in IEC950 and EN60950.

- 1 Verify the ground connection you made in [Section 2.4.1](#) is secure. The cabinet is grounded through this connection. It is critical that this connection is made properly.
- 2 Make sure that the power button located on all power supply modules is in the raised OFF position. See [Figure 2-16](#) for the location of the power supply power buttons.

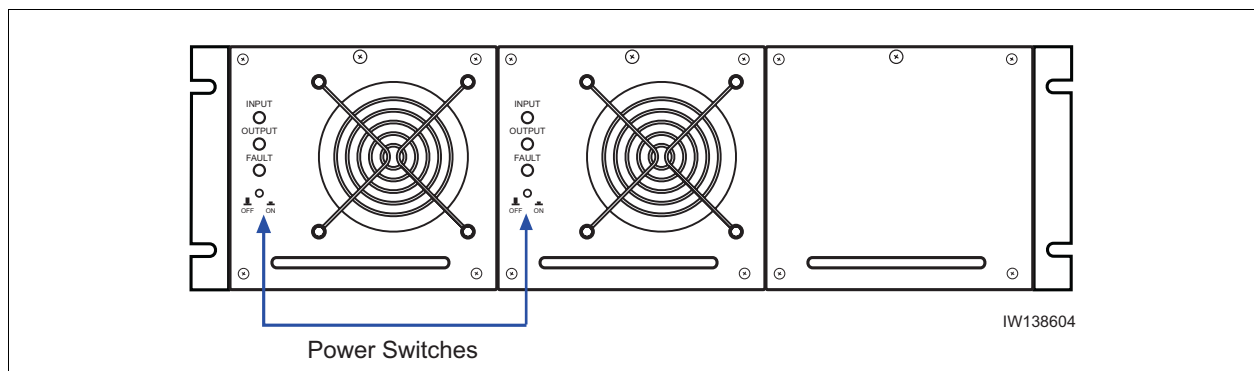


Figure 2-16: DC Power Supply Module ON/OFF Switches

- 3 Verify the -48 VDC power source is off.
- 4 The -48 VDC power cable has two wires for negative (-) connection and two wires for return (+) connection. This spreads the current draw across two pins of the round quick disconnect connector for each connection.
- 5 Attach the two return (+) cables (white and green) to the positive side of your -48 VDC power source or to ground if you are using a chassis ground for your return.
- 6 Attach the two negative (-) cables (black and red) to the negative side of your -48 VDC power source.
- 7 Plug the round quick disconnect connector as illustrated in [Figure 2-15](#) into the power connection on the top of the cabinet as illustrated in [Figure 2-17](#). Secure the connector by twisting the connector sleeve until the lines on the cable connector and chassis connector align.

- 8 Do not apply power to the chassis at this time.** Wait until you are performing the off-line commissioning procedures in the next chapter.

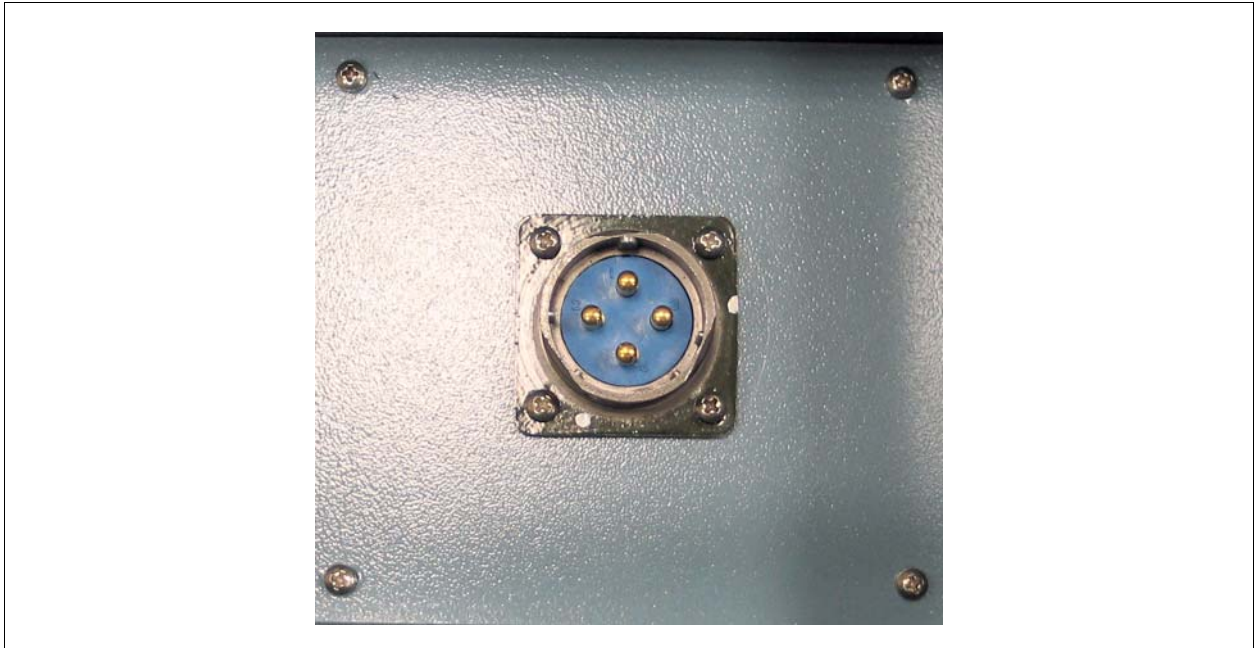


Figure 2-17: Power Supply Connection

Caution: The power supply cord is used as the main disconnect device, ensure that the socket-outlet is located/installed near the equipment and is easily accessible.



Attention: Le cordon d'alimentation est utilisé comme interrupteur général. La prise de courant doit être située ou installée à proximité du matériel et être facile d'accès.

Warnung: Das Netzkabel dient als Netzschalter. Stellen Sie sicher, dass die Steckdose einfach zugänglich ist.



The power supplies' INPUT LEDs will illuminate and power supply fans will start when connected to the power source. Do not power on the cabinet at this time.

2.6 Connecting E1 or T1 Trunk Cables

External trunk cabling depends on the configuration that the customer ordered and the site-specific requirements. These cables will be supplied by the customer. Failure to use electrically compliant T1 or E1 cables may cause transmission errors. Please refer to the appropriate subsections to determine your cable requirements.

The E1 or T1 trunk cables are routed directly to the E1 or T1 trunk card in the Micro subrack assembly. All three types of signaling (E1 75 Ohm, E1 120 Ohm and T1 100 Ohm) are terminated at the cabinet with RJ-48C port connectors.

2.6.1 E1 Cables

E1-75 Ohm

This is coaxial cable with a nominal impedance of 75 Ohm +/-5% at 1 MHz. The maximum allowable cable distance depends directly on the insertion loss of the cable at 1 MHz. In this mode, the E1 trunk card can accommodate up to 6 dB of cable loss.

E1-120 Ohm

This cable is individually shielded twisted pair with a nominal impedance of 120 Ohm +/-5% at 1 MHz. The maximum allowable cable distance depends directly on the insertion loss of the cable at 1 MHz. In this mode, the E1 trunk card can accommodate up to 9 dB of cable loss.

[Table 2-10](#) provides a description of cables required for installation and connection to an E1 network, but not supplied with the Micro BTS.



Before connecting E1 lines to the Micro BTS, it is assumed that the quality of the lines has been verified. It is recommended that Bit Error Ratio (BER) tests are completed to ensure that the BER is less than 10^{-8} .

Table 2-10: Customer-Supplied E1 Cabling

Cable Identity	Cable Type	Corresponding Cable Plug
E1, 120 Ohm	Shielded, Twisted, 2-Pair	RJ-48C Male
E1, 75 Ohm	Coaxial	RJ-48C Male
Antenna (external)	Coaxial	N-Type, Female

Note: The number of cables required depends on the ordered configuration of the Micro BTS.

Conversion Cables

If you are connecting into an existing E1 network with standard BNC or DSUB connectors, a conversion cable for either the 75 Ohm or 120 Ohm will be required. To purchase these cables from Alvarion, contact your local sales support representative.

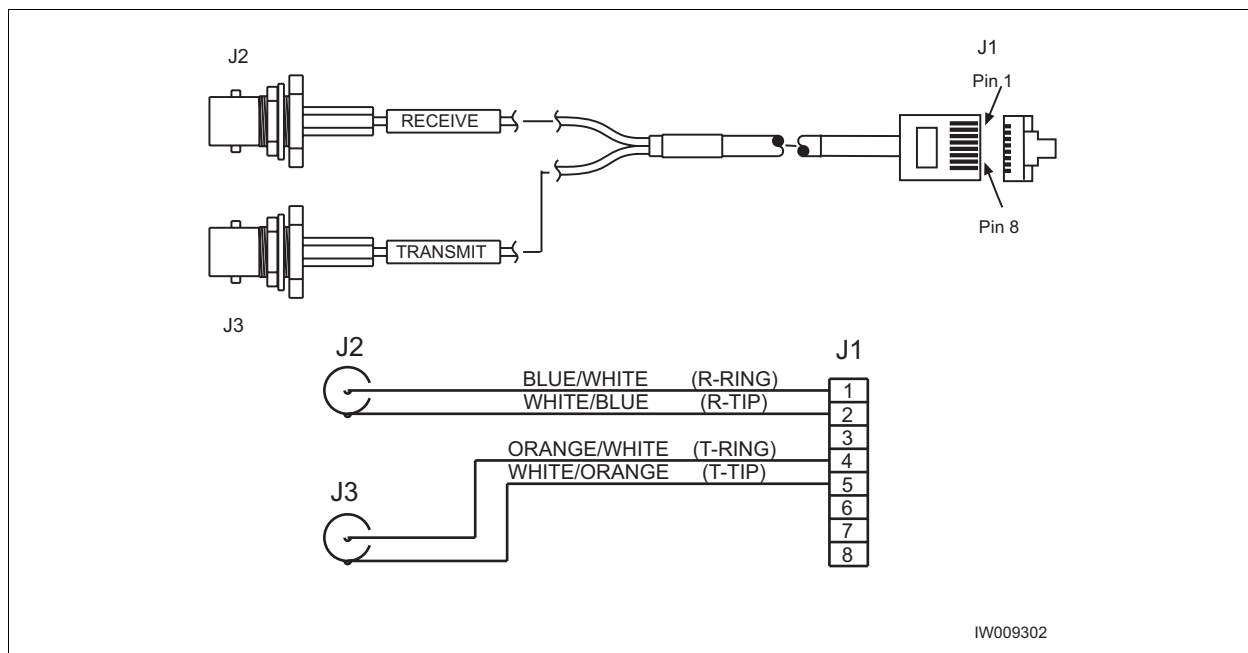


Figure 2-18: 75 Ohm BNC Conversion Cable

Figure 2-18 illustrates the pinout for an RJ-48C to 75 Ohm BNC conversion cable.

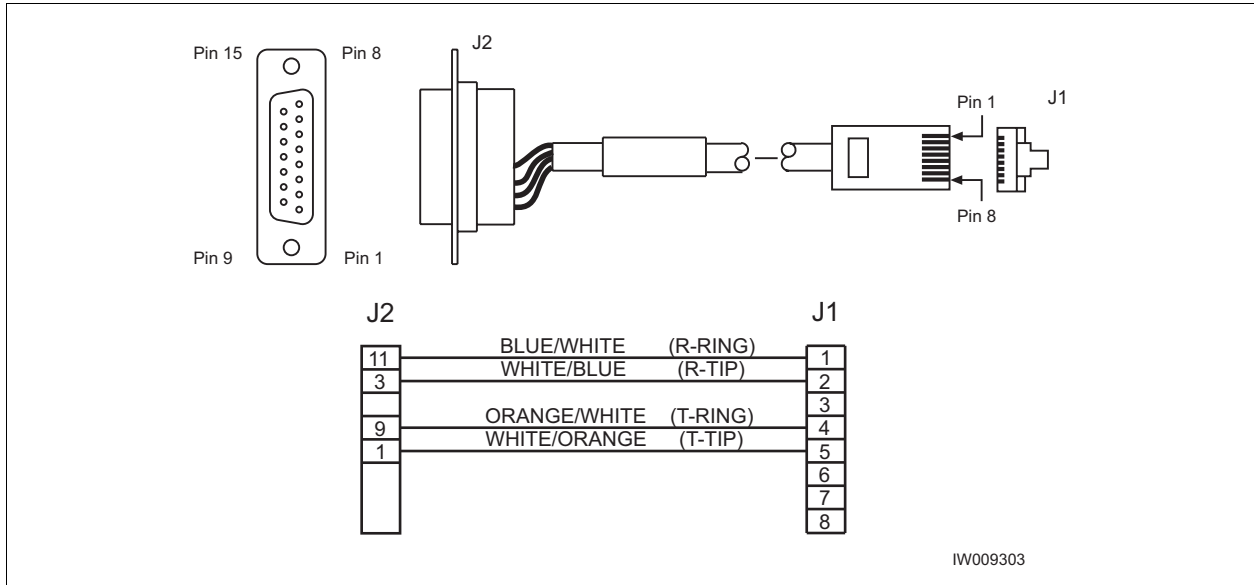


Figure 2-19: 120 Ohm Conversion Cable

Figure 2-19 illustrates the pinout for the RJ-48C to DSUB 120 Ohm conversion cable.

2.6.2 T1 Cables

T1-100 Ohm

For T1 connections, the proper cable is an individually shielded twisted pair with a nominal impedance of 100 Ohm +/-5% at 772 kHz. The maximum allowable cable distance depends directly on the insertion loss of the cable at 772 kHz. The T1 card can accommodate up to 9 dB of cable loss. When using 22 AWG ABAM cable, 9 dB of loss is approximately 2000 feet. When using Belden type 9729 (with a cable loss of 6 dB per 1000 feet at 772 kHz) the maximum cable distance is approximately 1500 feet.

Table 2-11 provides a description of cables required for installation and connection to a T1 network, but not supplied with the Micro BTS.



Before connecting T1 lines to the Micro BTS, it is assumed that the quality of the lines has been verified. It is recommended that BER tests be completed to ensure that the BER is less than 10^{-8} .

Table 2-11: Customer-Supplied T1 Cabling

Cable Identity	Cable Type	Corresponding Cable Plug
T1, 100 Ohm	Shielded, Twisted, 2-Pair	RJ-48C, Male
Note: The number of cables required depends on the ordered configuration of the Micro BTS.		

2.6.3 Connecting E1 or T1 Lines

All E1 or T1 cable routing should be installed per the site survey documentation in conjunction with the information identified in the [GSM Network Implementation Manual](#).

- Using the appropriate customer-supplied cables, connect the Abis interface E1 and/or T1 cables to the local E1 or T1 provider.

2.6.4 Direct Cabling Between Multiple UltraWAVE or WAVEXpress Systems

This section provides information for cabling between Alvarion equipment. The external cabling between your equipment will vary depending on the configuration of the cable management assembly of each chassis. This could consist of any combination of BNC, DSUB or RJ-48C connectors and either E1 or T1 signaling.



The direct cabling between systems requires crossover cables (Tx to Rx, and Rx to Tx), instead of the straight-through cabling used when connecting systems through a radio or telephone provider network.

Using Cross-Over RJ-48C Cables

When connecting a shielded twisted pair crossover cable between two UltraWAVE or WAVEXpress systems, the routing of the pins needs to comply with the cable mapping shown in [Figure 2-20](#). The RJ-48C cable connector may be of the conventional plastic body type with the shield and drain wires of the cable connected to a pigtail to pin 8 (Signal Ground), which is internally grounded to the card. However, a shielded cable plug may also be used, terminating the cable shield to an integral metal shell of the RJ-48 jack which then makes an electrical connection to the front panel when installed. [Figure 2-20](#) provides the pin assignments for the RJ-48C jacks.

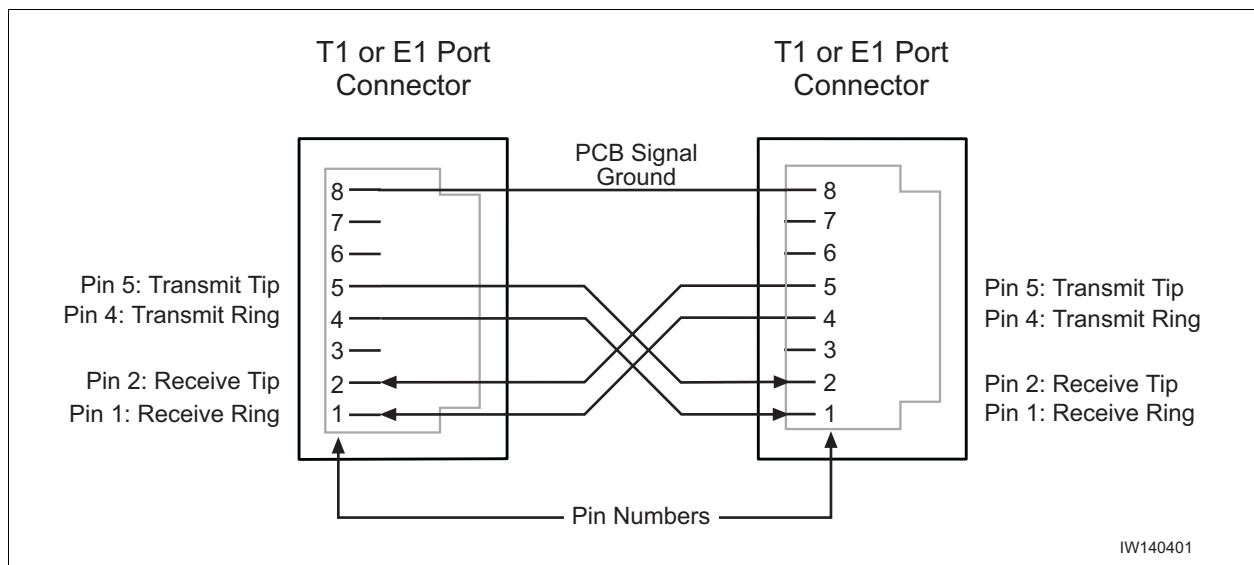


Figure 2-20: Cable Mapping of RJ-48C Crossover Cable

To connect two systems using RJ-48C cables, connect a crossover cable (see [Figure 2-20](#)) from port 1 of the first chassis to port 0 of the second chassis.

2.7 Connecting Antennas

The cabinet assembly provides external access to the male N-type connectors for your external antennas. Your antenna cable should terminate with a 90° N-type female connector or an N-type female to male elbow adapter may be used for a more convenient connection to the cabinet. Insertion loss for the elbow type of connector is typically between 0.1 and 0.2 dBm.

The antenna cabling for the Micro BTS can be configured in several ways depending on a number of factors including the number of TRXs, number of antennas and use of diversity. Your site specific configuration was determined during the network planning stage of implementation.

Table 2-12: Customer-Supplied Adapters and Cabling

Identity	Cable Type	Corresponding Cable Plug
Antenna cable (external)	Coaxial	N-type, Female
Adapter (optional)	90 degree elbow	N-type Female to N-type Male
Note: The number of cables required depends on the ordered configuration of the Micro BTS.		

In the subsequent sections, each RF configuration is detailed from the RF module connector to the internal RF connector. [Figure 2-21](#) illustrates the relationship between the three connectors. The RF modules are connected to the internal RF connectors at the factory and are pre-configured for your Micro BTS configuration.

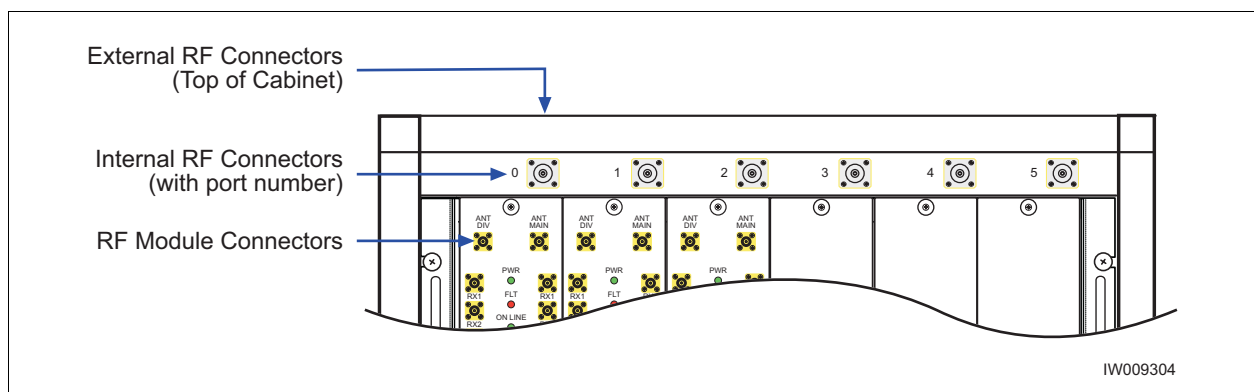



Figure 2-21: Antenna Cabling for Standard BTS Configurations

You will attach an elbow connector and your antenna cable to the external RF connector associated with the internal RF connector shown in the appropriate figure.

The subsequent sections identify the cable routing for the different Micro BTS antenna configurations that you identified in [Chapter 1 - Unpacking and Configuration Verification](#). You must install the antennas such that the general population is kept at least 164 inches from the main beam of the antenna. For more information on the RF radiation properties of the UltraWAVE, refer to [Section 2.7.6](#).

Proceed to the appropriate subsection to connect your site-specific antenna cable configuration.

All RF cabling must be completed with the chassis powered off and, preferably, with the power cable disconnected from the cabinet.

 **Do not** disconnect RF coaxial connectors on the Alvarion equipment or antenna systems while the radio equipment is operating. **Never** place any body part over or look into any RF connector while the radio equipment is transmitting.

RF signal levels that give rise to hazardous radiation levels can exist within the transmitter, power amplifiers, associated RF multiplexers and antenna systems.

2.7.1 Omni 1 TRX (O1) Configuration

The Omni 1 TRX (O1) configuration is available as a 15 Watt, 25 Watt, 40 Watt or a 50 Watt, two antenna configuration. See [Table 2-13](#).

Table 2-13: Omni 1 TRX (O1) Configuration

Output Power	Available Frequencies
15 W (42 dBm)	1800 MHz, 1900 MHz
25 W (44 dBm)	850 MHz, 900 MHz
40 W (46 dBm)	1800 MHz, 1900 MHz
50 W (47 dBm)	850 MHz, 900 MHz

For the 15 Watt, 25 Watt, 40 Watt, 50 Watt Omni 1 TRX (O1) configurations, connect your antennas as shown in [Figure 2-22](#).

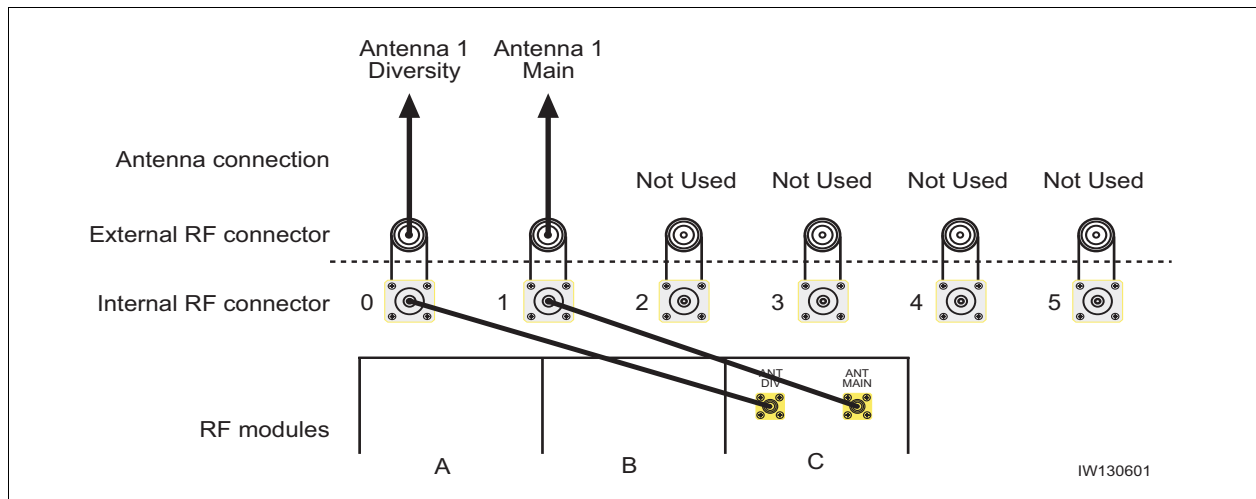


Figure 2-22: Antenna Cabling for O1 Configuration

2.7.2 Omni 2 TRX (O2) Configuration

The Omni 2 TRX (O2) configuration is available as a 15 Watt, 25 Watt, 40 Watt or a 50 Watt, two antenna configuration. See [Table 2-14](#).

Table 2-14: Omni 2 TRX (O2) Configuration

Output Power	Available Frequencies
15 W (42 dBm)	1800 MHz, 1900 MHz
25 W (44 dBm)	850 MHz, 900 MHz
40 W (46 dBm)	1800 MHz, 1900 MHz
50 W (47 dBm)	850 MHz, 900 MHz

For the 15 Watt, 25 Watt, 40 Watt and 50 Watt Omni 2 TRX (O2) configurations, connect your antennas as shown in [Figure 2-23](#).

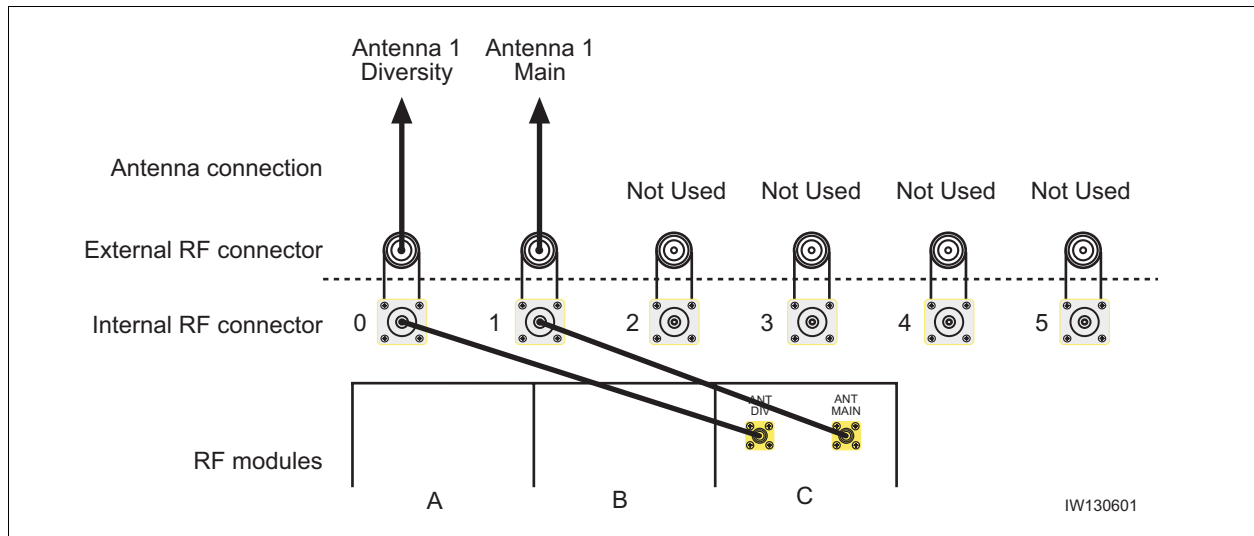


Figure 2-23: Antenna Cabling for O2 Configuration

2.7.3 Omni 3 TRX (O3) Configuration

The Omni 3 TRX (O3) configuration is available as a 15 Watt or a 25 Watt, two antenna configuration. See [Table 2-15](#).

Table 2-15: Omni 3 TRX (O3) Configuration

Power Output	Available Frequencies
15 W (42 dBm)	1800 MHz, 1900 MHz
25 W (44 dBm)	850 MHz, 900 MHz

For both the 15 Watt and 25 Watt Omni 3 TRX (O3) configurations, connect your antennas as shown in [Figure 2-24](#).

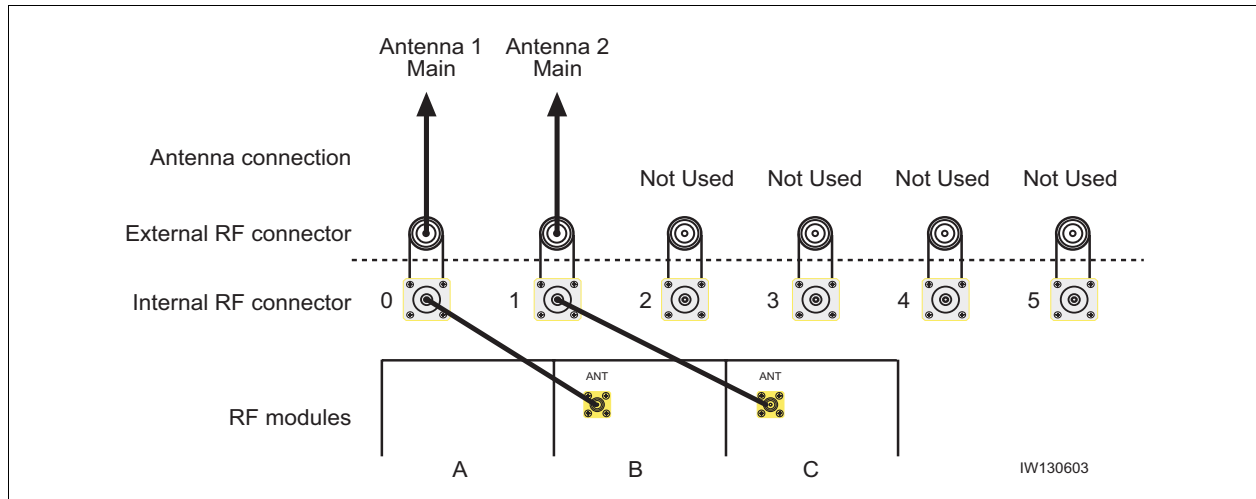



Figure 2-24: Antenna Cabling for O3 Configuration

 For the Omni 3 TRX (O3), a spatial diversity of 10 lambdas is required between antennas.

2.7.4 Sectorized Three TRX (S111) Configuration

The sectorized three TRX (S111) configuration is available as a 15 Watt, 25 Watt, 40 Watt or a 50 Watt six antenna configuration. See [Figure 2-16](#).

Table 2-16: Sectorized Three TRX (S11) Configuration Frequencies

Configurations	Available Frequencies
15 W (42 dBm)	1800 MHz, 1900 MHz
25 W (44 dBm)	850 MHz, 900 MHz
40 W (46 dBm)	1800 MHz, 1900 MHz
50 W (47 dBm)	850 MHz, 900 MHz

This configuration has three sectors with one TRX per sector. For the 15 Watt, 25 Watt, 40 Watt and 50 Watt configurations, connect your antennas as shown in [Figure 2-25](#).

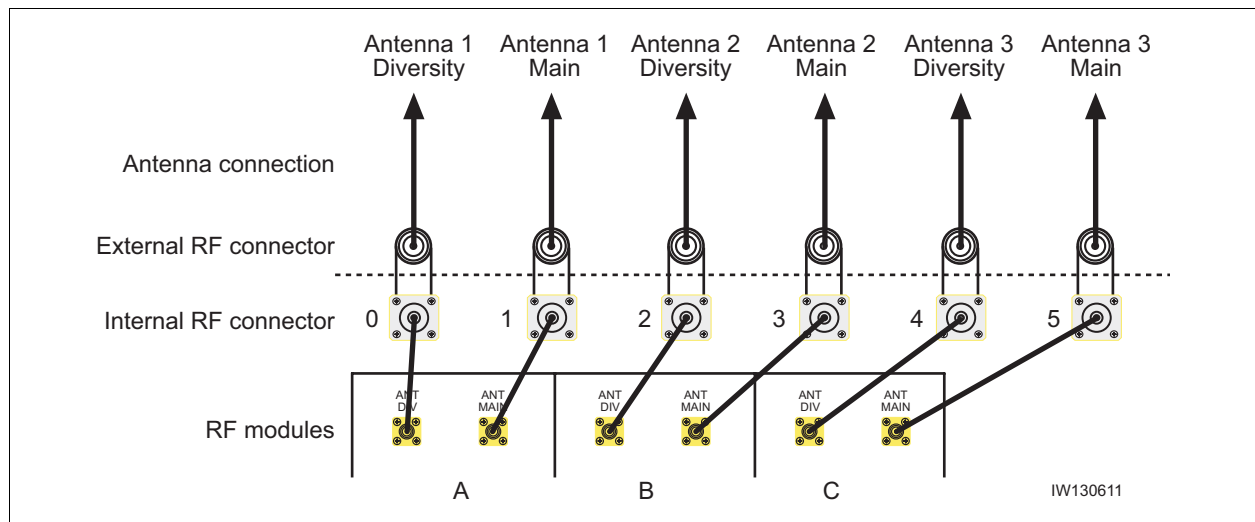


Figure 2-25: Antenna Cabling for S111 Configuration

2.7.5 Three Sector Six TRX (S222) Configuration

The three sector, six TRX (S222) configuration is available as a 15 Watt, 25 Watt, 40 Watt or a 50 Watt, six antenna configuration. See [Table 2-17](#).

Table 2-17: Three Sector Six TRX (S222) Configuration Frequencies

Configuration	Available Frequencies
15 W (42 dBm)	1800 MHz, 1900 MHz
25 W (44 dBm)	850 MHz, 900 MHz
40 W (46 dBm)	1800 MHz, 1900 MHz
50 W (47 dBm)	850 MHz, 900 MHz

This configuration has three sectors with two TRXs in one sector and one TRX in the other two sectors. For the 15 Watt, 25 Watt, 40 Watt and 50 Watt S222 configurations, connect your antennas as shown in [Figure 2-26](#).

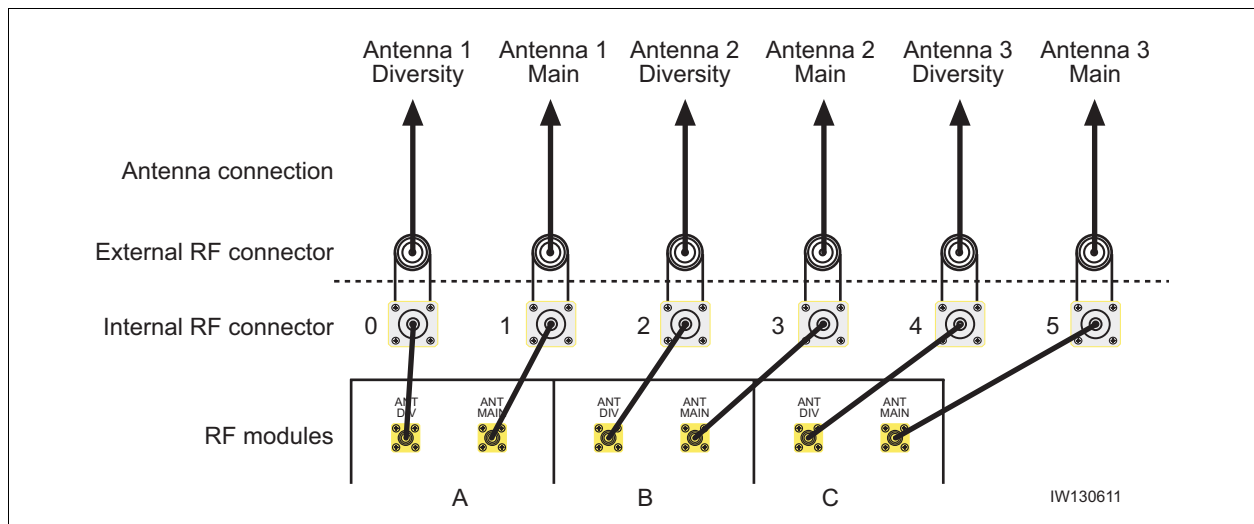


Figure 2-26: Antenna Cabling for S222 Configuration

2.7.6 RF Radiation Hazard

As of October 15, 1997, all products must address the issue of Human Exposure to RF electromagnetic fields. Referring to OET Bulletin 65, RF radiation limits for the 300 - 1500 MHz range are $f / 300 \text{ mW/cm}^2$ for occupational exposure, and $f / 1500 \text{ mW/cm}^2$ for general population exposure (where f is frequency in MHz). At the 869 MHz cellular band these limits are 2.90 mW/cm^2 for occupational exposure, and 0.58 mW/cm^2 for general population exposure.

The UltraWAVE base station may consist of up to six separate transceivers, with each of the transmitters operating at a maximum output power of +47 dBm

(50 W). The UltraWAVE base station transmitters operate in the U.S. cellular band of 869 to 894 MHz.

As the UltraWAVE is intended to be operated in cellular service, each of its transmitters is typically connected to a 65 - 120 degree sector antenna or omni directional antenna. For the purpose of the MPE calculations, it will be assumed that the UltraWAVE is fully equipped with six transceivers, and that two different transmitters are used in each 120 degree sector. For the MPE calculations this would be the worst case radiation levels as the equivalent RF power of +50 dBm (100 Watt) would be transmitted into a 120 degree sector.

The typical gain of 65 - 120 degree sector antenna is in the range of +6 to +18 dBi. However, there is the highest ERP limitation on the Part22 requirement which is 500 Watt (57 dBd).

The duty cycle of the transmitter is 100%. Assuming two transmitters are operating into the same 120 degree sector, a maximum of +47 dBm of RF energy would be transmitted into two antennas, with total EIRP=61 dBi would be the worst case.

RF power density can be calculated with the equation: $S = P * G / 4\pi R^2$, where S = power density in mW/cm, P = power input to the antenna in mW, G = power gain of the antenna, and R = distance to the center of radiation of the antenna in cm. By rearranging this equation, the relationship between distance (R) and Power Density (S) can be found.

Rearranging $R = \sqrt{PG/4\pi S}$, and solving for the maximum limits of 2.90 mW/cm², and 0.58 mW/cm² we have:

$$R(2.90 \text{ mW/cm}^2) = \sqrt{(1,260,000 \text{ mW}/4\pi * 2.90)} = 186 \text{ cm, or 73 inches.}$$

$$R(0.58 \text{ mW/cm}^2) = \sqrt{(1,260,000 \text{ mW}/4\pi * 0.58)} = 416 \text{ cm, or 164 inches.}$$



1,260,000 mW is used to account for two 50,000 mW transmitters operating into each 120 degree sector.

These results show that the general population RF exposure limits are not exceeded as long as the general population is kept 164 inches from the feed point of the antenna.

The propagation characteristics at 870 MHz dictate a line-of-sight type of RF path. As such, typical installation locations are up on rooftops or masts to get above ground level path obstructions. When the UltraWAVE antennas are installed in this manner, the general population will be further than 164 inches from the antenna, and RF exposure limits will be met.

2.8 Connecting External Alarms

The OMC supports many alarms from the Micro BTS. The external alarms are reflected at the OMC operator station, and may be used for site alarms, such as open door, temperature and battery back-up alarms. These customer defined alarms are sampled every two minutes by default and will report an alarm when sent by the Micro BTS alarm controller.

Using the details provided in these sections, make your connections for external alarm inputs.



If you are replacing an existing system which has external alarms connected directly to the processor card, you may connect your existing RJ-45 alarm cable directly into the ICP processor card alarm connector. Optionally, you can re-route your existing alarms to the UltraWAVE alarm terminal block or add additional external alarms.

The OMC operator can set the alarm text as described in the [UltraVIEW OMC Setup and System Administration Guide](#).

Identifying the Terminal Block

The alarms are processed on the alarm interface module located on the rear of the Micro subrack assembly. The alarm interface module has connections for incoming signals from external alarms and the power supplies and an outgoing connection to the ICP processor card through a USB type cable. The interfaces are shown in [Figure 2-27](#).

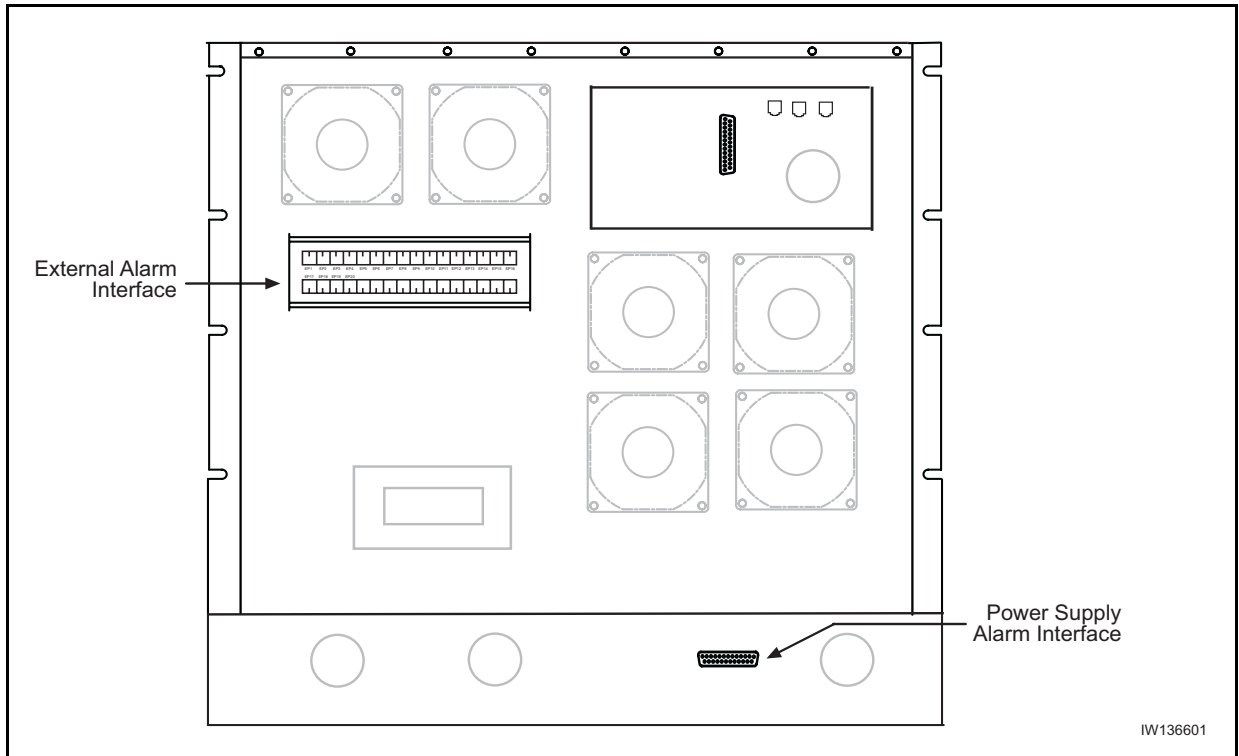


Figure 2-27: Alarm Interface Module

This terminal block provides a plug connection for up to 17 external alarms. The plugs supplied with the Micro BTS provide an alarm loop for connection to a normally open alarm mechanism. The plug identifiers correspond to the alarm codes sent to the OMC. See [Table 2-18](#) for Terminal Block pin assignments, and see [Figure 2-28](#) for external alarm terminal block details.

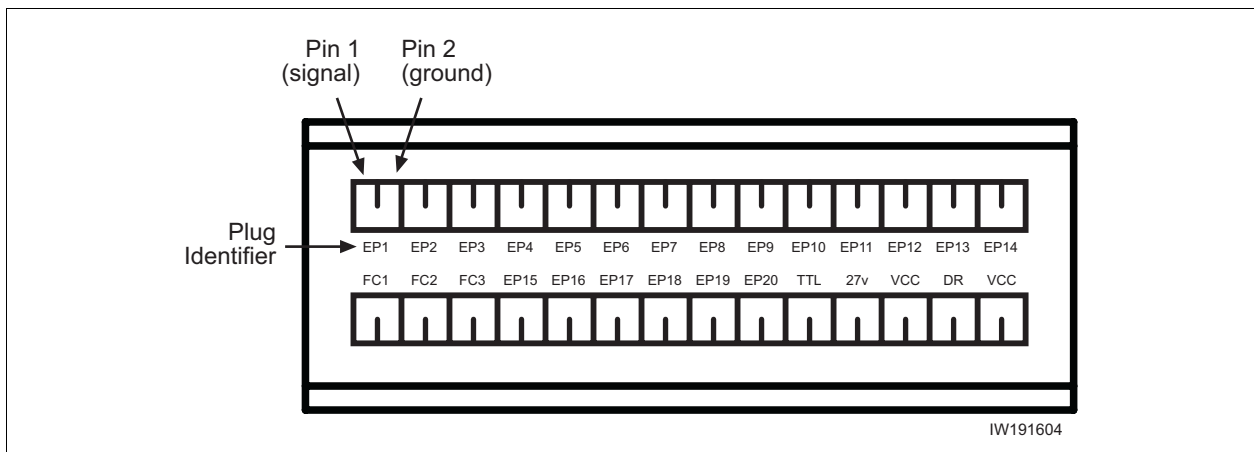


Figure 2-28: Customer-Defined External Alarm Connections

Table 2-18: External Alarm Terminal Block Pin Assignment

Plug Identifier	Alarm Code	Major Alarm Type
EP1	2326	Customer definable UltraWAVE External Alarm 1
EP2	2327	Customer definable UltraWAVE External Alarm 2
EP3	2328	Customer definable UltraWAVE External Alarm 3
EP4	2329	Customer definable UltraWAVE External Alarm 4
EP5	2330	Customer definable UltraWAVE External Alarm 5
EP6	2331	Customer definable UltraWAVE External Alarm 6
EP7	2332	Customer definable UltraWAVE External Alarm 7
EP8	2333	Customer definable UltraWAVE External Alarm 8
EP9	2334	Customer definable UltraWAVE External Alarm 9
EP10	2335	Customer definable UltraWAVE External Alarm 10
EP11	2336	Customer definable UltraWAVE External Alarm 11
EP12	2337	Customer definable UltraWAVE External Alarm 12
EP13	2338	Customer definable UltraWAVE External Alarm 13
EP14	2339	Customer definable UltraWAVE External Alarm 14
EP15	2340	Customer definable UltraWAVE External Alarm 15
EP16	2341	Customer definable UltraWAVE External Alarm 16
EP17	2342	Customer definable UltraWAVE External Alarm 17

To connect the external alarm contacts to the external alarm terminal block:



Only the EP1 through EP17 plugs shown in [Figure 2-28](#) use the signal and ground alarm input pins. DO NOT connect EP1 through EP17 plugs to FC, TTL, 27V, VCC or DR connection pins, or you can cause serious damage to the system.

- 1 Route the external alarm input cables from the external equipment through the cable gland on the external interface to the external alarm terminal block.

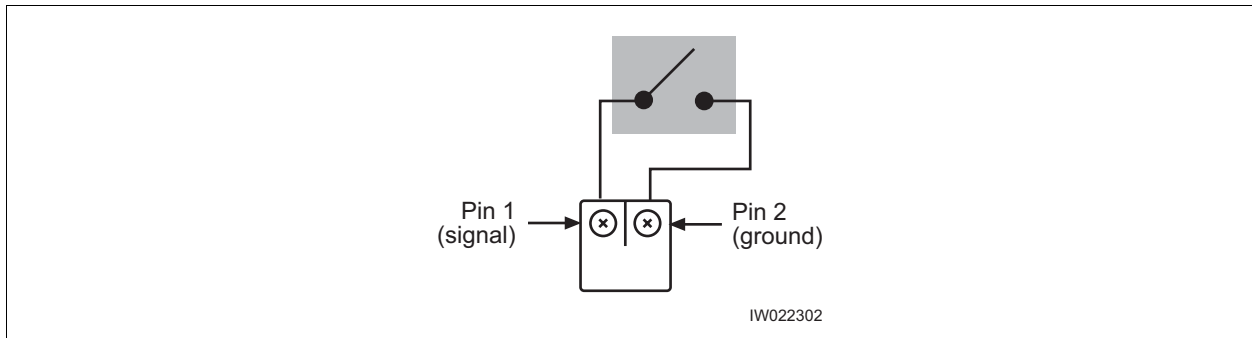


Figure 2-29: External Alarm Plug

- 2 Using the details provided in [Figure 2-29](#), connect the normally-open alarm inputs from the external equipment to the external alarm plug.
- 3 Connect the alarm plug to the terminal block. Note the plug identifier and using [Table 2-18](#) inform the OMC operator which alarm code corresponds to the external alarm that you have just installed.



Inputs from external alarms should be normally open. When the external contacts close, the Micro BTS sends an alarm to the OMC.

2.9 Making a Serial Connection to the Processor Card

The serial connection is used to check the software version installed on the processor card, verify boot parameters and monitor test results. An RJ-11 to RJ-11 cable and an RJ-11 to DB-9 adapter is normally used to connect the Craft PC to the ICP CON serial port. This hardware is supplied in the Craft PC Accessories kit.

This adapter is not included with the Craft PC accessories kit.

See [Figure 2-30](#) for the ICP CON serial port pin-out.

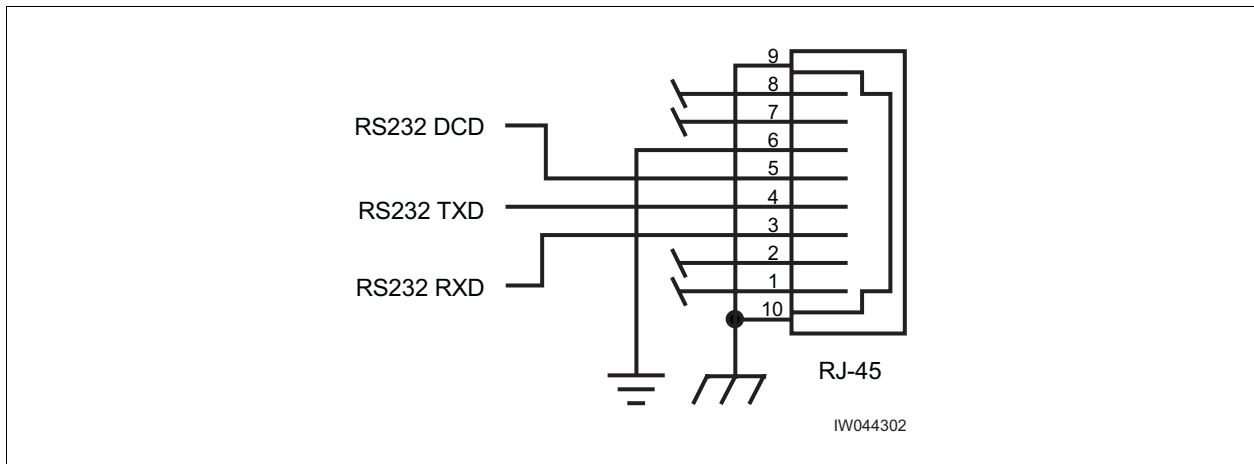


Figure 2-30: ICP Serial Pin-Out



For more information pertaining to pinouts and cables, please refer to the [GSM Craft PC Guide](#).

2.10 Network Connections

External cabling is dependent upon the customer-ordered configuration and site-specific requirements. These cables will be supplied by the customer. Failure to use electrically compliant T1 or E1 cables may cause transmission errors. Please refer to the appropriate subsections to determine your cable requirements.

Installing the Physical E1 or T1 Links

For the first E1 or T1 link between the Micro BTS and the BSC, connect Port 0 of the Micro BTS E1 or T1 card in slot 1 to the BSC. For additional E1 or T1 links, you can use any other port on any other Micro BTS (or BTS) E1 or T1 card. After connecting the E1 or T1 link(s) between the Micro BTS and the BSC, connect the BSC to the OMC.



The E1 or T1 connections at the trunk cards and the BSC must comply with the pin assignments detailed in [Chapter 2 - Installation](#). This chapter also explains the E1 or T1 trunk card DIP switch, which must be set to reflect the E1 or T1 cable characteristics.

Commissioning the E1 or T1 Links

The E1 or T1 links between the Micro BTS and the BSC are commissioned using the W&G (Wandel & Goltermann) PA-25 multifunction communication analyzer, or equivalent.

2.11 Post Installation Cabling and Checks

You should ensure that all internal and external cabling is correctly connected.

2.11.1 Connecting the Chassis

Before commissioning the equipment, ensure that:

- The Abis interface E1 and/or T1 cables are routed to the telephone provider.
- The DIP switch settings on the E1 or T1 trunk cards are set correctly and if you are using the 75 Ohm E1 trunk card that the ground jumper is in the correct position. Refer to [Section 2.3](#) for E1 and/or T1 DIP switch settings.
- The chassis power is turned off.
- Antenna cables are connected to RF antenna port connectors as appropriate.

2.11.2 Verifying External Cabling

- It is the operator's responsibility to verify that all inter-chassis E1 and/or T1 links are ordered, installed and certified by the telephone provider according to ANSI T1.403 specifications before on-line commissioning is performed.
- The operator should also perform end-to-end bit error ratio or Bit Error Rate (BER) tests over a 20-minute period on the E1 and T1 Abis interface link(s), and verify that the BER is 10^{-8} or better.

Chapter 3 - Off-Line Commissioning

In this Chapter:

- [“Pre Off-Line Commissioning” on page 69](#)
- [“Off-Line Commissioning of the Micro BTS” on page 71](#)
- [“Software Verification using Craft PC” on page 83](#)
- [“Upgrading the Micro BTS Software Version \(Flash\)” on page 90](#)
- [“Post Off-Line Commissioning” on page 92](#)

The off-line commissioning process includes the following steps:

- Pre off-line commissioning, where you ensure that the system is in an appropriate state. This includes:
 - Visual inspection
 - Compliance checks
- Startup verification, where you verify that the system boots up correctly by observing the LEDs on the front panel.
- Craft PC tests, where you use the Craft PC to verify the software configuration and run tests.
- Post off-line commissioning, where you prepare the system for on-line commissioning.

The rest of this chapter includes detailed instructions for these steps.



Under normal operating conditions, Alvarion Communications radio equipment complies with the limits for human exposure to radio frequency (RF) fields adopted by the Federal Communications Commission (FCC). All Alvarion Communications, Inc. radio equipment is designed so that under normal working conditions radio frequency radiation directly from the radio is negligible when compared with the permissible limit of continuous daily exposure recommended in the United States of America by ANSI/IEEE C95.1-19991 (R1997), Safety Levels with Respect to Human Exposure to RF Electromagnetic Fields, 3 kHz to 300 GHz.

RF signal levels that give rise to hazardous radiation levels can exist within the transmitter, power amplifiers, associated RF multiplexers and antenna systems.

Do not disconnect RF coaxial connectors on the Alvarion equipment or antenna systems while the radio equipment is operating. **Never** place any body part over or look into any RF connector while the radio equipment is transmitting.



The BSS software used in the UltraWAVE Micro BTS is highly complex. **Before proceeding**, contact Customer Service to verify that you have the latest available software. You must **have** the correct software CD-ROM and **know** the current patch level for your software version before commissioning the UltraWAVE Micro BTS. Contact your Level 2 support representative for additional assistance.



The off-line commissioning steps are listed in [Checklist 3 - Commissioning Checklist](#).

3.1 Pre Off-Line Commissioning

The following sections must be completed before doing the off-line commissioning. The off-line commissioning of the Micro BTS must take place on-site after installation. It is critical that all RF connections have been completed before proceeding with the off-line commissioning.

3.1.1 Visual Inspections

Complete the following inspections to ensure that the system is ready for off-line commissioning.

On-Site Visual Inspection

If you are doing your visual inspection on-site, check that:

- The chassis has been securely installed at the appropriate site.
- The chassis power supplies are OFF.
- The chassis is connected to a suitable power source.
- Power supply fans are running and INPUT LEDs are illuminated.
- The chassis is correctly grounded.
- All cables are available and secured in their correct positions.
- All cards and modules are correctly seated and populated according to the original purchase order.
- E1 or T1 transmission cables are available and labeled.
- RF transmission cables are connected to antennas.

Compliance and Power Checks

- Cross-check with the site specific data to ensure that the Micro BTS is correctly configured with all cards and modules.
- Ensure that you have access to [Checklist 2 - Installation Checklist](#) and that all serial numbers of all cards are listed there. This should have been completed in [Chapter 1 - Unpacking and Configuration Verification](#).
- Verify that any test equipment to be used has a current calibration certificate.
- Verify that the voltage for the installation site match those of the chassis power supply modules (either 230 VAC, 110 VAC, or -48 VDC, as specified on the front panel).

Label and Disconnect Cables

- 1 Verify that all E1 or T1 cables connected to the chassis are properly labeled.
- 2 Disconnect all E1 or T1 cables from the top of the cabinet if there are any cables connected.

3.2 Off-Line Commissioning of the Micro BTS

The verification procedures for off-line commissioning are run on the processor card in the Micro BTS. Locate the processor card in the Micro BTS subrack assembly as shown in [Figure 3-1](#).

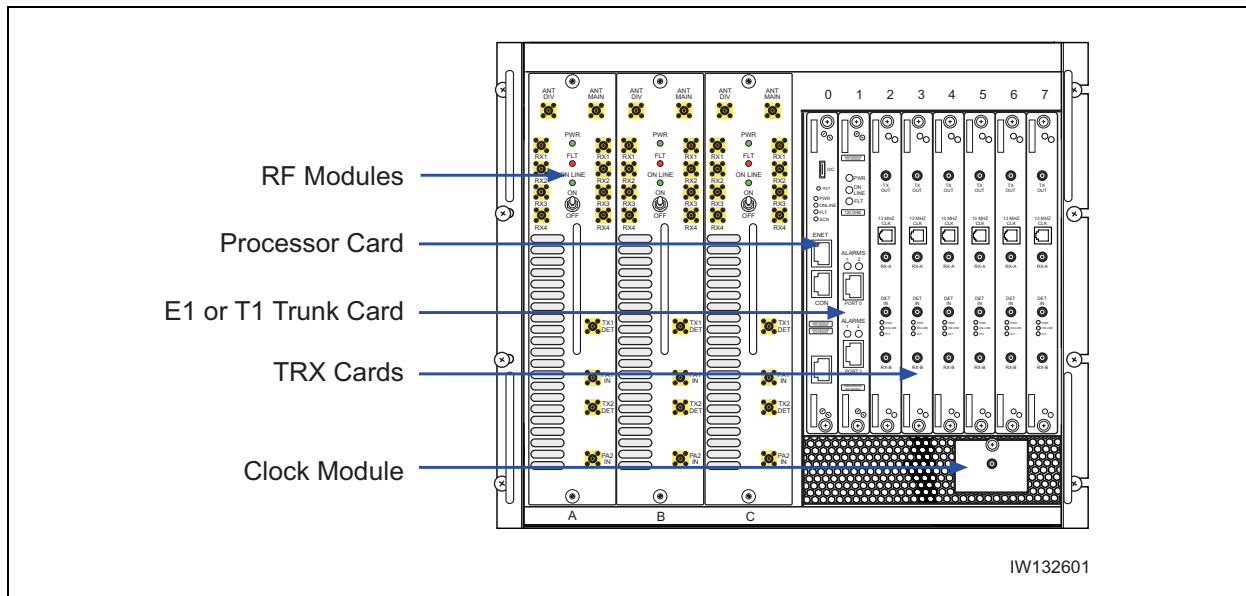


Figure 3-1: Micro BTS Subrack Assembly

3.2.1 Starting XWindows Using the Craft PC

In this chapter, you will use the Craft PC to verify the software configuration and other aspects of the Micro BTS operation. This section describes how to start the Craft PC and the Windows environment while subsequent sections will provide connection, test and verification procedures.



The following sections describe procedures performed using the Craft PC. For more information pertaining to the use of the Craft PC, please refer to the [GSM Craft PC Guide](#). Note that all commands in bold are those entered by the user.

- 1 Login to your PC as the build user.
- 2 With your left mouse button, double click the Craft PC icon on the desktop or navigate through the **Start** menu -> **Programs** -> **IWV Software** -> **Craft PC**.

If you get an error message, or if the XWindows environment does not allow you to create new XWindows, stop the Craft PC environment by pressing [ALT-F4] and restart the environment.

The XWindows environment now starts.



Before starting, set the xterm window to its maximum width. This prevents wordwrap.

3.2.2 Connecting the Craft PC to the ICP Processor Card

You will be making two connections from the Craft PC to the ICP processor card. The first is a slow-speed serial connection used for checking the software version installed on the card, verifying boot parameters and monitoring test results. The second is a faster Ethernet connection used for opening telnet sessions with the ICP. Telnet sessions are required for downloading software to the ICP. The serial and Ethernet connections are both required to configure and test the Micro BTS.

Required Hardware

The following hardware is required to connect the Craft PC to the ICP processor card through an Ethernet and serial connection. Note that this hardware is supplied with the Craft PC:

- One Windows 2000, NT or XP compatible Ethernet port
- One 3 meter standard RJ-11 patch cable
- One 3 meter standard Ethernet crossover cable
- One RJ-11 to DB-9 adapter

3.2.3 Setting Up a Serial Connection via the ICP Processor Card Serial Port

- 1 Connect one end of the RJ-11 patch cable to ICP processor card connector labeled CON.
- 2 Connect the opposite end of the RJ-11 patch cable to the DB-9 adapter and connect the DB-9 adapter to the serial port on the back of the Craft PC, as shown in the [Figure 3-2](#).

[Figure 3-2](#) shows a physical serial port connection between the Craft PC and the ICP processor card.

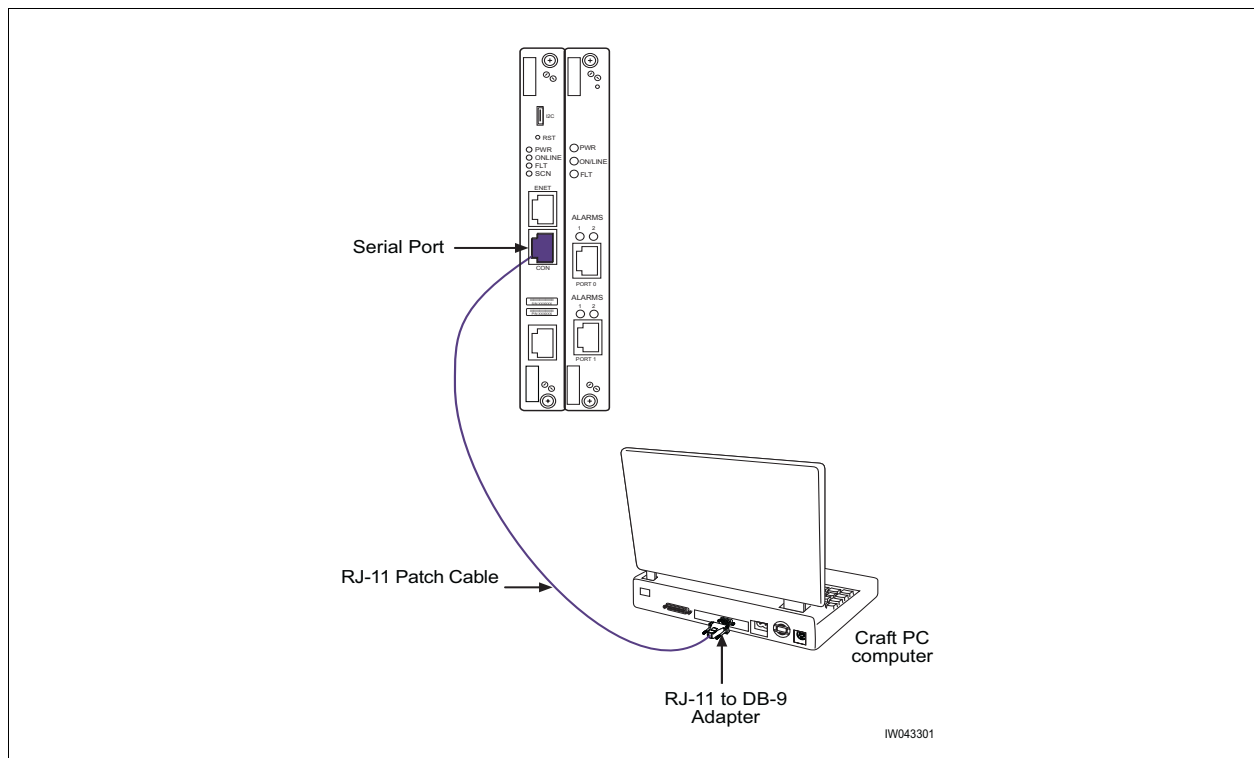


Figure 3-2: Connecting the Craft PC to the ICP Serial Port



In order to establish a serial connection between the Craft PC and the Micro BTS, there cannot be an existing telnet or rlogin connection on the Micro BTS. In the case where a user using the Craft PC tries to establish a connection locally and a user using the OMC tries to establish a connection remotely, the remote user has priority access to the Micro BTS over the local user.



The following section describes procedures performed using the Craft PC. For more information pertaining to the use of the Craft PC, please refer to the [GSM Craft PC Guide](#).

- 1 If not already done, connect the Craft PC to the Micro BTS as described in [Section 3.2.3](#), and start XWindows on the Craft PC as described in [Section 3.2.1](#).
- 2 There are two methods to open a serial connection. You can use Hyper Terminal or open the serial session in the Craft PC environment.

To use Hyper Terminal:

- A Launch the application by navigating: Start -> Programs -> Accessories -> Communications -> **Hyper Terminal**
- B Enter CraftPC for the connection name and select an icon. Then click the **OK** button.
- C The Connect To dialog box displays. You select **COM1** from the Connect using drop-down list and click the **OK** button. If you know that your serial port is configured on a different port, select that port from this drop-down list.
- D The COM1 Properties dialog box displays. Set the following properties and then click the **OK** button. See [Figure 3-3](#).

Bits per second: **9600**

Data bits: **8**

Parity: **None**

Stop bits: **1**

Flow control: **None**

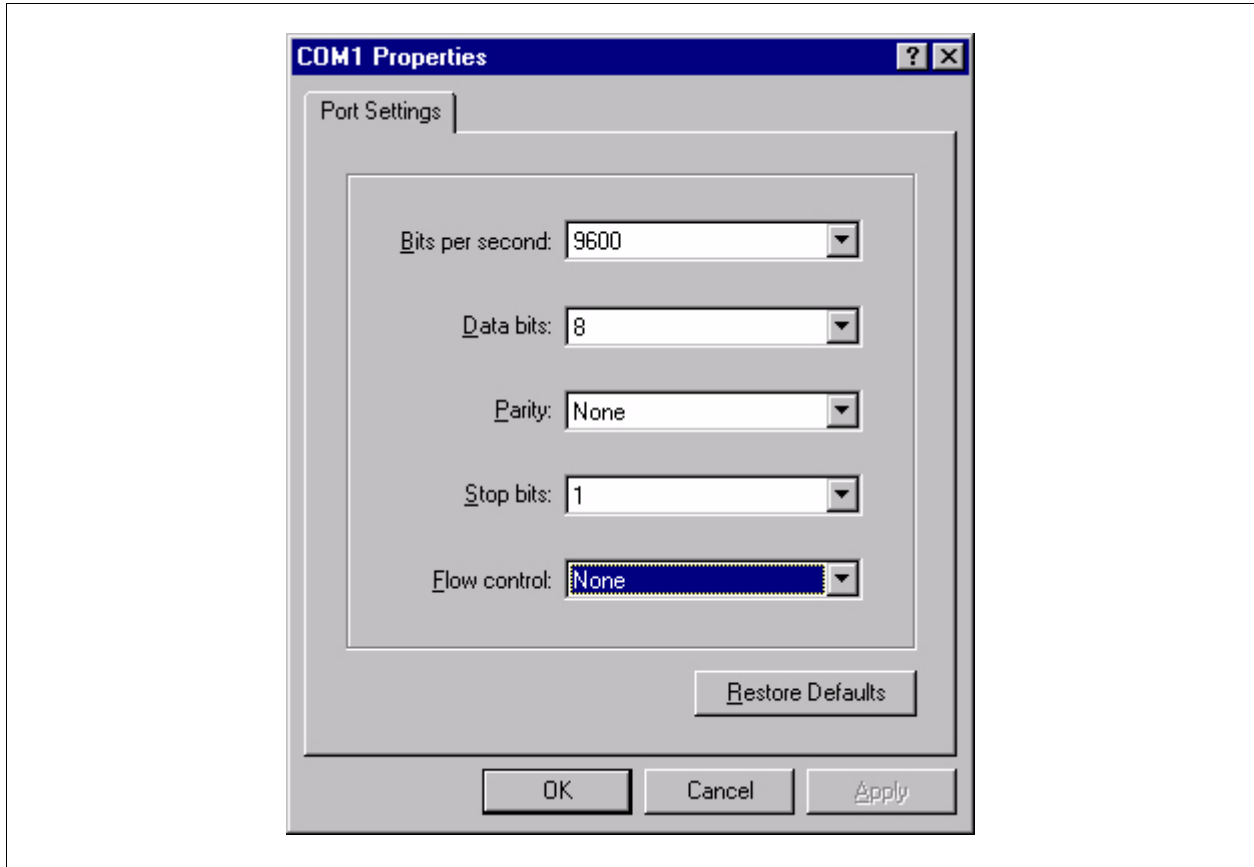


Figure 3-3: Serial Session Properties

- E** Select **OK** to connect to the processor card. At this time, you will not see a prompt. Proceed to [Section 3.2.4](#) to power on the chassis.

If you do not have the Hyper Terminal application, you can open a serial session in the Craft PC application. In an Xterm window, type:

```
build@craftpc:~> cu -l ttyS0 [ENTER]
```

Connected.

3.2.4 Power-On LED Tests

This section describes how to power-on the Micro BTS and verify that the cards in the system come up properly by viewing the Light Emitting Diodes (LEDs) on the front panel. The purpose of these tests is to verify that the LEDs come up in the correct state, indicating that the system is operating normally.

When you power-on the Micro BTS, it automatically runs its power on self tests (POST), downloads software to the E1 or T1 cards, and then attempts to bring up the cards. While it is bringing up the cards and when it is finished, the LEDs indicate the state of each card.

Use the following procedure to power on the chassis and verify the LEDs:

- 1 Turn the power to the chassis on by simultaneously switching on two power supplies. The power supply switches are shown in [Figure 2-13](#) and [Figure 2-16](#). This will share the start up load across the power supplies.
- 2 Verify that the front-panel LEDs flash in the sequence shown in [Figure 3-4](#).

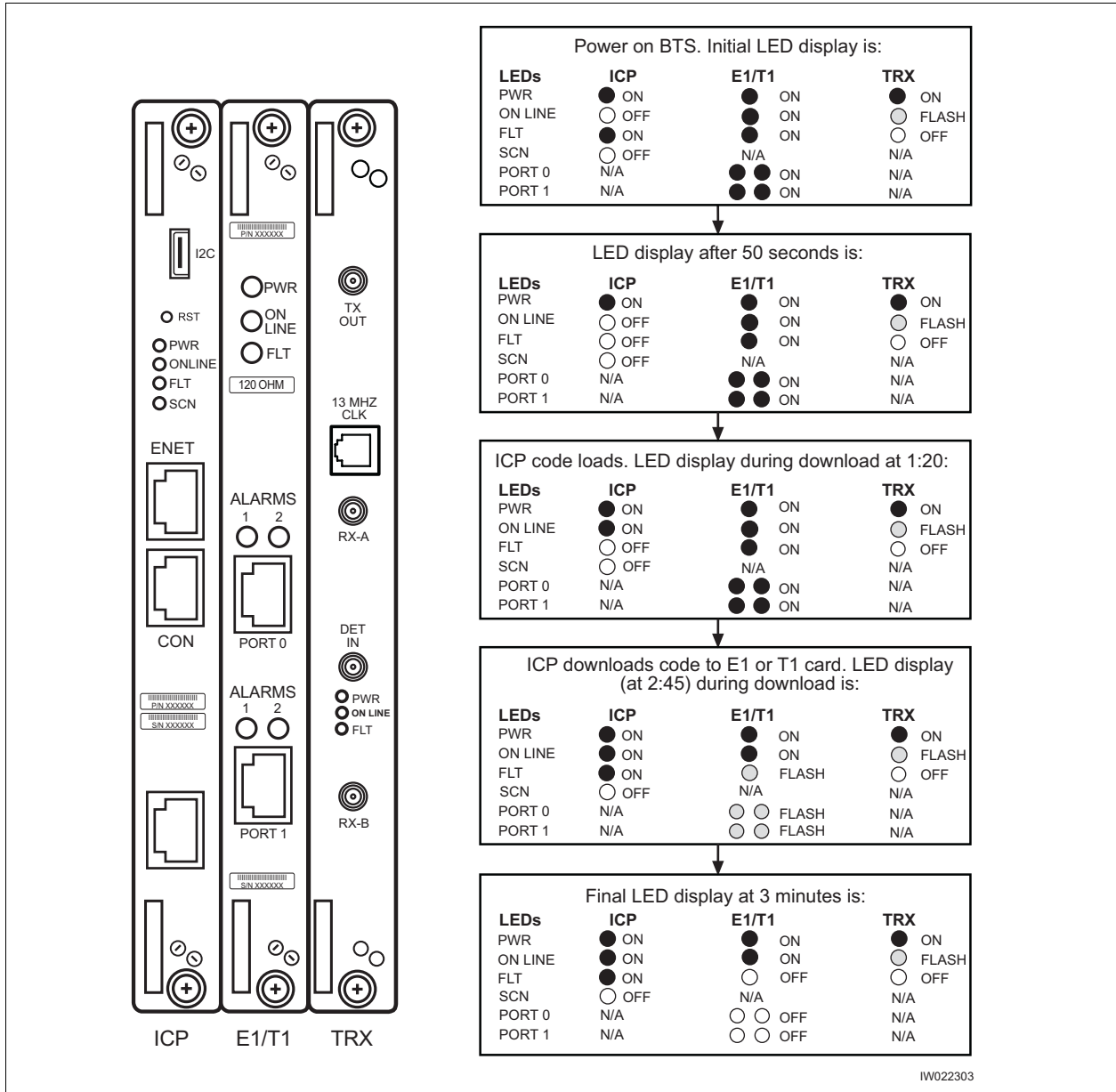



Figure 3-4: LED Sequence During the Boot Process

- 3 When the sequence is completed, verify that the LEDs appear as shown in [Table 3-1](#).

Table 3-1: Normal LED Indications

LED	Description
SCN	Green LED, lit when processor card is operational.
PWR	Green LED, lit when card has power supplied. The PWR LED of the ICP and E1 or T1 cards will be lit after all cards have completed the boot-up process.
ON LINE	Green LED, lit when card is on-line, and card BOOT process has been performed successfully. The On-LINE LED of the ICP and E1 or T1 cards will be lit after all cards have completed the boot-up process. The TRX cards will not go on-line until they are unlocked by the OMC operator.
FLT	Red LED, lit when card detects a fault or is not downloaded. FLT LEDs will be lit on the TRX cards until their code is downloaded.

- 4 If your LEDs appear as described above, you have completed the LED power up tests.
- 5 If your LEDs do not appear as described above, you can either:
 - Refer to the [GSM Field Maintenance Guide](#) for troubleshooting procedures
 - Contact Customer Service



For more information about these unsuccessful power-up cases and corrective actions to be taken upon unsuccessful power up, refer to the [GSM Field Maintenance Guide](#).

- 6 You can monitor the status of the boot process using the serial session opened in [Section 3.2.3](#).

Once the LEDs on the processor cards have reached their final online status, press the [ENTER] key. The prompt now changes to the following:

```
bts->
```

3.2.5 Configuring Boot Parameters

In this section, you verify the boot parameters and change them if necessary. There are two reasons to change boot parameters:

- If they are configured incorrectly, you must set them to the values shown here.
- If your system is connected to the Ethernet, you must set the IP address to support the Craft PC IP address 172.16.80.43. To make a connection with the Craft PC, set the processor card IP address to 172.16.80.42:ffff000.

After changing the boot parameters, the Micro BTS must be rebooted before the changes take effect.

- 1 If not already done, establish serial communications with the Micro BTS as described in [Section 3.2.3](#). If the Micro BTS starts rebooting endlessly, refer to the [GSM Craft PC Guide](#) for corrective measures. If the Micro BTS boots normally, type:

```
bts-> bootChange [ENTER]
```

- 2 A list of boot parameters appears. Edit the parameter values using the commands in [Table 3-2](#).

Table 3-2: Changing Boot Parameters

Command	Action
[ENTER]	Accepts the current parameter value and proceeds to the next parameter.
. [ENTER]	Erases the current parameter value and proceeds to the next parameter.
- [ENTER]	Returns to the previous parameter.
[CTRL][d]	Aborts all changes and reverts to the current values.

[Figure 3-5](#) shows the default bootChange parameters for the ICP processor card.

```
'.' = clear field; '-' = go to previous field; ^D = quit

boot device          : motfcc
processor number     : 0
host name            : craftpc
file name            : /home/target/vxWorks
inet on ethernet (e) : 172.16.80.42:fffff000
inet on backplane (b):
host inet (h)        : 172.16.80.43
gateway inet (g)     :
user (u)             : target
ftp password (pw) (blank = use rsh):
flags (f)            : 0x0
target name (tn)     : bts
startup script (s)   : /home/target/bsxstart.ppc
other (o)            : motfcc

value = 0 = 0x0
bts->
```

Figure 3-5: Boot Parameters for ICP Processor Card



You must edit the boot parameters to contain EXACT values, or the equipment will not bootup properly.

- 3 For the new parameters to take effect, reboot the Micro BTS by pressing the key combination [CTRL][x].

3.2.6 Setting Up an Ethernet Connection to the ICP Processor Card Ethernet Port

- 1 Connect the Ethernet crossover cable to the ICP processor card Ethernet port labeled ENET.
- 2 Connect the other end of the cable to the Ethernet port on the Craft PC.

Figure 3-6 shows a typical Ethernet port connection between the Craft PC and the ICP processor card.

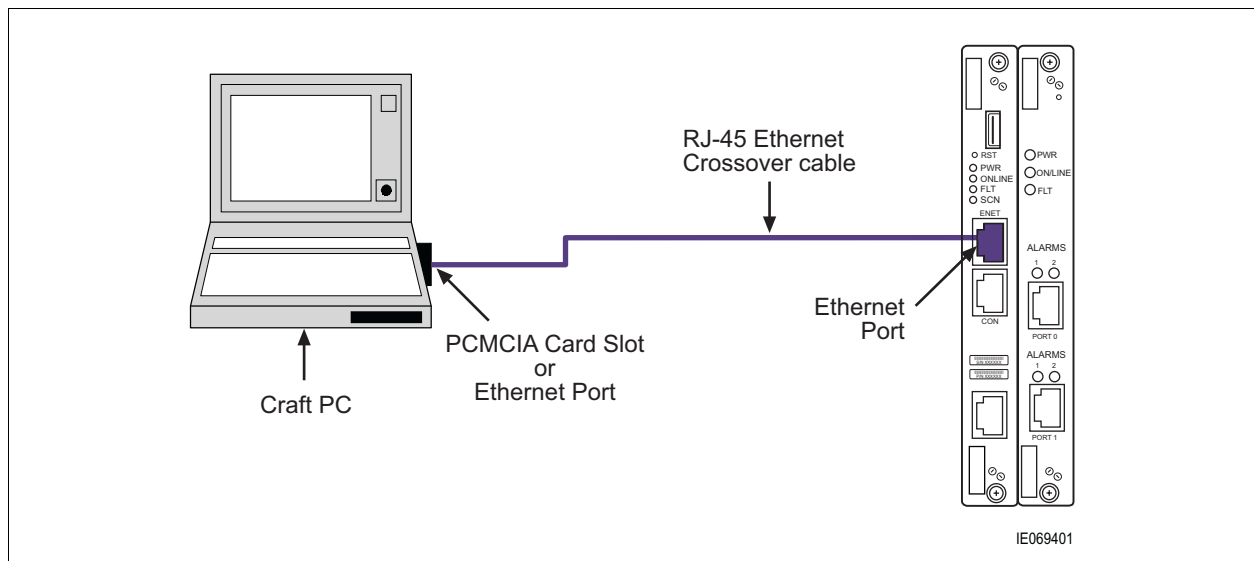


Figure 3-6: Connection to the Craft PC via the ICP Ethernet Port

3.2.7 Verifying Telnet Communications with the Micro BTS over Ethernet

The Craft PC uses telnet communications across the Ethernet connection for code downloads. Before performing any of the following procedures, ensure that you can establish and terminate a telnet communications session as described in the following procedures.



For more information about the Craft PC, please refer to the [GSM Craft PC Guide](#).

Establishing a Telnet Communications Session over Ethernet

- 1 Start a new Xterm window in the Craft PC environment.
- 2 Establish a telnet communications session by typing:

```
build@craftpc:-> telnet iwbox [ENTER]
```



If the Craft PC hangs when attempting to establish a telnet session, press the key combination [CTRL][c] to abort the failed connection. Check the boot parameters and repeat the connection procedures. Also verify that the Craft PC host table contains the hostname of your equipment in reference to the default IP address.

- 3 The Craft PC prompt now changes to `bts->`. This prompt verifies that the telnet session can be established. If this is not the case, verify the Ethernet wiring and retry.

Terminating a Telnet Communications Session over Ethernet

After verifying that a telnet communications session can be established, terminate the telnet session as follows.



Once a telnet session has been established between the Craft PC and the processor card, it must be terminated before the Craft PC is powered off. **Failure to do this will result in a hung connection on the BSS system.**

- 1 Activate the Xterm window in which the telnet communications session was established.
- 2 To terminate the telnet session, type in the Xterm window containing the telnet session:

```
bts-> logout [ENTER]
```

- 3 The return message should read `Connection closed by foreign host` and the prompt changes back to `build@craftpc->`. The telnet session has now been terminated.

3.3 Software Verification using Craft PC

In this section, you use the Craft PC to verify the software configuration and other aspects of the Micro BTS operation. It is assumed that you have:

- Made the physical Craft PC connections to the processor card
- An active serial session

3.3.1 Verifying the Current Software Version and Patch Level



The following section describes procedures performed using the Craft PC. For more information about the Craft PC, refer to the [GSM Craft PC Guide](#).

- 1 If not already done, establish serial communications with the Micro BTS as described in [Section 3.2.3](#).
- 2 After the `bts->` prompt appears, verify the current software version and patch level by typing:

```
bts-> iwversion [ENTER]

BTS code version: iw07_00.ZZZ
Release number: 7.0
ABIS version: 1.1
Packages Installed:
  Encryption: A5/1
Patches Installed:
  patch<#> <file directory> <patch size> <iw07_00.ZZZ>
```

The current software version is displayed, represented above by the parameter `iw07_00.ZZZ`. This number should correspond to the software version detailed in the release notes included with the CD-ROM. Keep this number for your records.

- 3 Verify under `Patches Installed:` that the most current patch is installed, if applicable. Refer to the [GSM Craft PC Guide](#) for procedures to install required patches. If you are unsure if you require software patches, contact your Level 2 support representative for additional assistance.



If the displayed software version number does not coincide with the software version being run on the network for which this Micro BTS is going to be used, refer to [Section 3.4](#) for instructions on how to install a different software version on the processor card.

3.3.2 Checking the Flash Version Number

In order to verify that the correct software build is loaded into flash memory, go to your serial Xterm window and type:

```
bts-> printConfigBlocks [ENTER]
```

The screen displays information relating to the flash images. [Figure 3-7](#) shows Image 0, Image 1 and Image 2 from the ICP card configuration.

```
**** Current Image = 1 ****

***** Image 0 *****
Image IW version   : iw07_00.010
Image creation date: 04/15/02 13:44
Image crc          : 1ff03d8d

***** Image 1 *****
Image IW version   : iw7_00.012
Image creation date: 04/09/02 12:07
Image crc          : e3b05e8c

***** Image 2 *****
Image IW version   : iw07_00.010
Image creation date: 04/09/02 12:07
Image crc          : e3b05e8c
```

Figure 3-7: Determining the Flash Version on an ICP Processor Card

The ICP configuration states `Current Image = N` where `N` is either 0 or 1. The flash version have lines in the format:

```
iw07_00.ZZZ
```

where `iw07_00.ZZZ` indicates the flash version.

The flash version number should be iw07_00.012 or higher for BTS TRX POST diagnostics to be able to run. If it is not, the flash version number will have to be changed and the Micro BTS rebooted.



Flash Image 2 is reserved for Alvarion Customer Service use ONLY.

3.3.3 Running E1 or T1 POST Diagnostics

- 1 Disconnect all E1 and/or T1 lines from the BTS. This ensures that no Abis connection exists. If an Abis connection does exist, the TRX POST might not run properly.
- 2 Wait until the `bts->` prompt appears, and type:

```
bts-> reboot [ENTER]
```

This action reboots the Micro BTS. The VxWorks kernel is started, several E1 or T1 trunk card tests run sequentially, and the results of each test are listed as PASSED/FAILED. Only if all seven tests passed successfully will the E1 or T1 POST diagnostics be considered successful. The E1 or T1 POST results will be displayed after the boot process has been completed.



The coding for the E1 or T1 trunk card, its modules and scripts generically refer to the E1 or T1 trunk card objects as “E1”, whether the corresponding ports are configured as E1 or T1.

```
1 (eldiag) E1 CARD in SLOT 1: STARTING POST/OFFLINE Test
2 (eldiag) testsPtr 0xffb33ab4 testsPtr[0] 0x5
3 (eldiag) testsPtr 0xffb33ab4 testsPtr[0] 0x5 result 0x0 i 1
4 (eldiag) E1(1) TID01: Initialize Peripheral Registers: PASSED
5 (eldiag) testsPtr 0xffb33ab4 testsPtr[0] 0x5 result 0x0 i 2
6 (eldiag) E1(1) TID02: Peripheral Register Test: PASSED
7 (eldiag) testsPtr 0xffb33ab4 testsPtr[0] 0x5 result 0x0 i 3
8 (eldiag) E1(1) TID03: Framer Register Test: PASSED
9 (eldiag) testsPtr 0xffb33ab4 testsPtr[0] 0x5 result 0x0 i 4
10 (eldiag) E1(1) TID04: VME to CPU FIFO Flag Test: PASSED
11 (eldiag) testsPtr 0xffb33ab4 testsPtr[0] 0x5 result 0x0 i 5
12 (eldiag) E1(1) TID05: Initialize Time/Space sw Chip: PASSED
13 (eldiag) testsPtr 0xffb33ab4 testsPtr[0] 0x5 i 6
14 (eldiag) E1 CARD in SLOT 1: COMPLETED POST/OFFLINE Test: PASSED
```

Figure 3-8: E1 or T1 POST Results

- 3 [Figure 3-8](#) shows the E1 or T1 POST results that would appear if the E1 or T1 POST diagnostics ran successfully on the E1 or T1 trunk card in slot 1. The format for each diagnostic line is:

```
[line number][action][E1 or T1 number][test number][test
description][test result]
```

In the case of an error, a FAILED message would appear following the test that failed. In addition, the following message would be displayed in Line 8:

```
E1 CARD in SLOT 1: COMPLETED POST/OFFLINE Test: FAILED
```



If an E1 or T1 trunk card fails the POST diagnostics, remove the failed card and return it to Alvarion along with its test results file. The defective card needs to be replaced with a new one, and POST diagnostics should be run again on the new card.

3.3.4 Running TRX POST Diagnostics

This section explains how to use the Craft PC to run the TRX POST diagnostics on the Micro BTS.

- 1 Verify that you can establish and terminate a telnet communications session as described in [Section 3.2.7](#).
- 2 Verify that you can establish a serial connection as described in [Section 3.2.3](#).
- 3 After the Micro BTS has booted up and the E1 or T1 POST has run during the boot process, the TRX POST diagnostics can be initiated. Type:

```
bts-> runtrxpost [ENTER]
```

- 4 A set of TRX POST diagnostic tests run sequentially over the Ethernet connection and the results of each test will be listed as PASSED/FAILED. Only if all tests pass successfully will the TRX POST diagnostics be considered successful. The TRX POST results will be displayed after the boot process has been completed.



The TRX ON LINE LED flashes continuously when TRX POST diagnostics are being run and does not stop flashing until the Micro BTS is rebooted. The flashing LED can be used as a reminder to reboot the system after successfully completing the TRX POST and other diagnostics.

The format for each diagnostic line is:

[line number][action][TRX number][test number][test description]
[test result]

For example:

14 (Diag) ISR(2) TF22: Test Basic op of VME/RTP FIFOs: PASSED

where:

Table 3-3: Description of the TRX POST Results

Line Entry	Description
14	Line number
Diag	Diagnostic test being run
ISR(2)	ISR TRX 2 is being tested
TF22	Test number
Test Basic op of VME/RTP FIFOs	Test description
PASSED	Indicates that the TRX passed this test

Figure 3-9 shows the TRX POST results for a TRX in slot 2 of the Micro BTS and shows that the TRX POST diagnostics ran successfully on the TRX card.

```

SerialNumber: 16 (txpostf) STARTING BTS FUNCTIONAL CODE...
a3 a8 0 0 1 0 20 4a
SerialNumber: a3 28 0 0 1 0 20 a0
SerialNumber: a3 2d 0 0 1 0 20 4b
SerialNumber: a3 50 1 0 1 0 20 54
SerialNumber: a3 95 0 0 1 0 20 ed
SerialNumber: a3 a9 0 0 1 0 20 7d
17 (Diag ) TRX CARD IN SLOT 2 : STARTING TRX POST OFFLINE Test
18 (Diag ) ISR(2) tf 5 Test VME Access ..... PASSED
19 (Diag ) ISR(2) tf 12 Load FPGA (TDM) ..... PASSED
20 (Diag ) ISR(2) tf 13 Load FPGA (RC) ..... PASSED
21 (Diag ) ISR(2) tf 16 Load DSP (Coder) ..... PASSED
22 (Diag ) ISR(2) tf 17 Load DSP (Equalizer) ..... PASSED
23 (Diag ) ISR(2) tf 18 Load DSP (Modulator) ..... PASSED
24 (Diag ) ISR(2) tf 19 Ping DSP (Coder) ..... PASSED
25 (Diag ) ISR(2) tf 20 Ping DSP (Equalizer) ..... PASSED
26 (Diag ) ISR(2) tf 46 Ping DSP (Modulator) ..... PASSED
27 (Diag ) ISR(2) tf 22 DSP Diag Mode ON (Coder) ..... PASSED
28 (Diag ) ISR(2) tf 27 Test External RAM (Coder) ..... PASSED
29 (Diag ) ISR(2) tf 24 DSP Diag Mode ON (Equalizer) ..... PASSED
30 (Diag ) ISR(2) tf 28 Test External RAM (Equalizer) ..... PASSED
31 (Diag ) ISR(2) tf 47 Test Mdltr DSP Serial Bus loopback .... PASSED
32 (Diag ) ISR(2) tf 30 Test TDM Control Store RAM ..... PASSED
33 (Diag ) ISR(2) tf 34vvvvvvvvvvvTest TDM Loop-back ..... PASSED
34 (Diag ) ISR(2) tf 36 Test RC to Equalizer Serial Bus ..... PASSED
35 (Diag ) ISR(2) tf 39 Test Coder to RC Serial Bus ..... PASSED
36 (Diag ) ISR(2) tf 40 Test Equalizer To Coder Serial Bus .... PASSED
37 (Diag ) ISR(2) tf 43 Test Tuner Register Read/Write ..... PASSED
lowChannel = 128, highChannel = 251
38 (Diag ) ISR(2) tf 41 Test Channel Synthesizers ..... PASSED
39 (Diag ) ISR(2) tf 48 Test Power Ramp External RAM ..... PASSED
40 (Diag ) ISR CARD IN SLOT 2 : COMPLETED POST OFFLINE Test : PASSED
    
```

Figure 3-9: TRX POST Results

3.3.5 Reviewing POST Results

This section explains how to review E1 or T1 POST and TRX POST diagnostics results after POST has been completed on the Micro BTS.



The following procedure assumes that E1 or T1 and TRX POST have just been completed on the selected Micro BTS and a serial connection is still active between the Craft PC and the Micro BTS. If this is not the case, reboot the Micro BTS and run POST again.

- 1 Turn on basic logging by typing:

```
bts-> log_none
```



This will result in extra output being displayed in the xterm, subsequent commands entered may run into several lines as a result of the extra logs.

- 2 To display the most current E1 or T1 and TRX POST results after POST has been completed, type:

```
bts-> postReportE1Trx [ENTER]
```

Figure 3-10 displays a summary of the E1 or T1 and TRX POST results that will be displayed (note that some tests may not run).

```
bts:> postReportE1Trx
***** E1 DIAGNOSTICS REPORT *****
*****
Slot:1
E1(1)TID01: Initialize Peripheral Registers : PASS
E1(1)TID02: Peripheral Register Test : PASS
E1(1)TID03: Framer Register Test : PASS
E1(1)TID04: VME to CPU FIFO Flag Test : PASS
E1(1)TID05: Initialize Time/Space sw Chip : PASS
E1(1)TID06: Software Download Test : Not-Run
E1(1)TID07: Memory Test : Not-Run
E1(1)TID08: CPM download Test : Not-Run
E1(1)TID09: TRAU DSP Test : Not-Run
E1(1)TID10: Cross Connect Test : Not-Run
*****
***** TRX DIAGNOSTICS REPORT *****
*****
Slot 2
-----
All Tests PASSED
*****
value=58=0x3a='="
bts:>
```

Figure 3-10: Reviewing E1 or T1 and TRX POST Results



There are five tests that are not run but show up in the results section when the user manually retrieves the POST results. These tests are not displayed when running POST by rebooting the BTS. They are:

- T1(1) TID06: Software Download Test : Not-Run
- T1(1) TID07: Memory Test : Not-Run
- T1(1) TID08: CPM Download Test : Not-Run
- T1(1) TID09: TRAU DSP Test : Not-Run
- T1(1) TID10: Cross Connect Test : Not-Run

3.3.6 Rebooting the Micro BTS after Running POST

- 1 In the serial communications window, type:

```
bts-> reboot [ENTER]
```

This action places the TRX in an on-line and operational state.

- 2 Reconnect all E1 or T1 lines to the Micro BTS.

3.3.7 Terminating Serial Communications with the Micro BTS



If you are going to perform the Racal tests described in the [GSM Radio Test Procedures](#) at this time, ensure that you have rebooted the chassis. Also, leave the Craft PC connected to the ICP card and a serial communications session active.

- 1 To terminate the serial communications between the Craft PC and the BTS in an xterm, type:


```
bts-> ~.
```
- 2 After a few seconds the returned message should read `Disconnected`, and the display will revert back to `build@craftpc:->` prompt.
- 3 Close the Hyper Terminal window if you are using Hyper Terminal for serial communications.

3.3.8 Exiting XWindows on the Craft PC

This section explains how to close XWindows running the Windows 2000/XP operating system on the Craft PC.

- Left click the X in the upper right hand corner of your XWindows window.

3.4 Upgrading the Micro BTS Software Version (Flash)

Use this procedure if the procedures in [Section 3.3.1](#) indicate that you need to update your software version.

The Micro BTS stores its release software in Flash RAM. This section explains how to upgrade the Micro BTS Flash boot image locally using the Craft PC.



In order to update the BTS Flash boot image locally using the Craft PC, the Craft PC hard drive must contain the software version (Flash boot image) to be installed.

If the required release is not installed on your Craft PC, use the procedures in the [GSM Craft PC Guide](#) to install it.

- 1 Power up the Craft PC and start the XWindows environment. For Craft PC power-up procedures, refer to [Section 3.2.2](#). For XWindows start-up procedures, refer to [Section 3.2.1](#).
- 2 Verify that a telnet session can be established with the Micro BTS. In an Xterm window, type:

```
build@craftpc:~> telnet iwbox [ENTER]
```

- 3 If the Ethernet connection is setup correctly, then the Craft PC returns the vxWorks `bts->` prompt. If this is not the case, refer to [Section 3.2.7](#) for setup procedures.
- 4 Once the Ethernet connection has been tested, terminate the telnet session by typing:

```
bts-> logout [ENTER]
```

The Craft PC returns the `build@craftpc:~>` prompt.

- 5 Establish a serial session with the Micro BTS. Refer to [Section 3.2.3](#).
- 6 Change the working directory to the directory containing the new software version you wish to upgrade to the Micro BTS, type:

```
cd ~/home/build/iw07_00.ZZZ/iwlib/platform/bspppc" [ENTER]
```

The `iw07_00.ZZZ` parameter represents the new software version you wish to load on the Micro BTS.

- 7 To find out which Flash image in which the current software version resides, type:

```
bts-> getCurrentImage [ENTER]  
value = 0 = 0x0
```

- 8 Make a note of the returned value, which might be either 0 or 1. This is the active image in which the current Flash resides. The binary opposite of this value will be used to load the new Flash in the following steps:

If Current Image Value is 0 (value = 0 = 0x0)

- 9 Load the new Flash in the inactive image. At the `bts->` prompt, type:

```
bts-> writeFlashImage "btsflash.bin", 1 [ENTER]
```

- 10 This takes about one minute. When the `bts->` prompt returns, set the inactive image containing the new Flash as the active or current image, type:

```
bts-> setImageCurrent 1 [ENTER]
```

- 11 Reboot the Micro BTS for the new Flash image to take effect by pressing the key combination `[CTRL][x]`.

If Current Image Value is 1 (value = 1 = 0x1)

- 12 Load the new Flash in the inactive image. At the `bts->` prompt, type:

```
bts-> writeFlashImage "btsflash.bin", 0 [ENTER]
```

- 13 This takes about one minute. When the `bts->` prompt returns, set the inactive image containing the new Flash as the active or current image, type:

```
bts-> setImageCurrent 0 [ENTER]
```

- 14 Reboot the Micro BTS for the new Flash image to take effect by pressing the key combination `[CTRL][x]`.

The Flash boot image has been upgraded to the new software version and set as the default.



Flash Image 2 is reserved for Alvarion Customer Service use ONLY.

3.5 Post Off-Line Commissioning

The following post off-line commissioning procedures are necessary to ensure that the Micro BTS is ready for on-line commissioning. In the case of off-line commissioning at a staging area, these procedures ensure that the Micro BTS is ready for installation. In the case of off-line commissioning after on-site installation, these procedures ensure that the Micro BTS is ready for on-line commissioning.

3.5.1 Post Off-Line Commissioning Procedures at the Staging Area

- 1 Repack the Micro BTS in its original shipping containers and make sure that it is shipped to the site where it will be installed.
- 2 Once the Micro BTS is installed at its final site as described in [Chapter 2 - Installation](#), continue with the next section.

3.5.2 Post Off-Line Commissioning Procedures On-Site

- 1 Reconnect the E1 or T1 cables to the digital distribution frame.
- 2 Power on the Micro BTS if it is not already on. Verify that all PWR and ON LINE LEDs are green.
- 3 Inform the OMC operator that the Micro BTS is ready for network configuration.
- 4 After the OMC operator has configured the Micro BTS, continue with on-line commissioning tests in the next chapter.

Chapter 4 - Off-Line Commissioning of a Daisy Chain

In this Chapter:

- [“Prerequisites to Daisy Chaining” on page 108.](#)
- [“Setting the Abis LAPD Signaling Timeslot” on page 109.](#)

Up to five external Micro BTSs can be incorporated into a daisy chain connected to a BSC. If this configuration is used, each Micro BTS must be installed separately, and must have off-line commissioning procedures independently performed. Once each Micro BTS is installed and commissioned, the Micro BTSs can be daisy chained together.



If the power fails to one of the units or one of the units in a daisy chain is rebooted, communication with the downstream units will not be lost.

4.1 Prerequisites to Daisy Chaining

- 1 Ensure that all Micro BTSs comprising the daisy chain are installed and off-line commissioned.

Refer to [Chapter 2 - Installation](#) and [Chapter 3 - Off-Line Commissioning](#) for instructions on how to install and off-line commission the Micro BTSs that are part of the daisy chain.

- 2 Ensure that the Abis Manager timeslot has been set for each Micro BTS in the daisy chain as described in [Section 4.2](#). Each Abis link within this daisy chain MUST be allocated a unique Abis timeslot number.
- 3 Turn the power to all units off.
- 4 Using the instructions in [Section 2.6.3](#), verify that all E1 and/or T1 lines are in place and commissioned by the operator from the BSC to the first Micro BTS, and between all successive Micro BTSs comprising the daisy chain.

4.2 Setting the Abis LAPD Signaling Timeslot

This procedure sets the Abis LAPD timeslot between the MSC and each Micro BTS. If the Abis timeslot is not set, it automatically defaults to 16.

This procedure is optional for a star configured Micro BTS, but is required for all BTSs which will be used in a daisy chain. In this case, each Micro BTS must have its Abis timeslot set to a unique number in the chain. This information will be used by the OMC operator to configure the daisy chain.



This procedure must be performed after the Micro BTS is tested using a Racal test set. Refer to the [GSM Field Maintenance Guide](#) for further instructions.

- 1 Ensure that the Craft PC is connected to the Micro BTS over a serial line, and that a serial connection is established. Refer to [Chapter 3 - Off-Line Commissioning](#) for instructions on how to do this.
- 2 In an Xterm window, type:

```
bts-> getFlashE1Chan [ENTER]
```

This displays the timeslot reserved for the Abis LAPD signalling timeslot, which is by default set to 16. To change this value, type:

```
bts-> setFlashE1Chan <number> [ENTER]
```

where **<number>** is the Abis LAPD signaling timeslot assigned to an unassigned T1 channel between 1 and 24 or to an unassigned E1 channel between 1 and 31.



The Abis signaling timeslot for each Micro BTS in the daisy chain must be set to a different number. For example:

- Micro BTS 1 in the chain = Set timeslot 16 as the Abis timeslot
- Micro BTS 2 in the chain = Set timeslot 17 as the Abis timeslot
- Micro BTS 3 in the chain = Set timeslot 18 as the Abis timeslot
- Micro BTS 4 in the chain = Set timeslot 19 as the Abis timeslot

Make sure that this information is communicated to the OMC operator.

- 3 To double-check that the timeslot was changed, type again:

```
bts-> getFlashE1Chan [ENTER]
```

The new Abis signaling timeslot number should be displayed.

- 4 If the Abis signaling timeslot was changed, the Micro BTS must be rebooted.
Type:

```
bts-> reboot [ENTER]
```

Chapter 5 - On-Line Commissioning

In this Chapter:

- “Pre On-Line Commissioning Requirements” on page 113
- “On-Line Commissioning” on page 114
- “Antenna Cabling and Power Verification” on page 121
- “Post On-Line Commissioning Procedures” on page 129

On-line commissioning takes place on-site after installation and off-line commissioning. Its purpose is to verify that the equipment is operational and can be integrated into the telecommunications network.

On-line commissioning requires the participation of two people; a field technician who operates and tests the Micro BTS on-site and an OMC operator who remains at the OMC console. These two must work together, performing the procedures in this chapter in conjunction with the procedures in the [UltraVIEW OMC Configuration Guide](#).

Radio Frequency Radiation Warning



Under normal operating conditions, Alvarion radio equipment complies with the limits for human exposure to radio frequency (RF) fields adopted by the Federal Communications Commission (FCC). All Alvarion, Inc. radio equipment is designed so that under normal working conditions RF radiation directly from the radio is negligible when compared with the permissible limit of continuous daily exposure recommended in the United States of America by ANSI/IEEE C95.1-19991 (R1997), Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

RF signal levels that give rise to hazardous radiation levels can exist within the transmitter, power amplifiers, associated RF multiplexers and antenna systems.

Do not disconnect RF coaxial connectors on the Alvarion equipment or antenna systems while the radio equipment is operating. **Never** place any body part over, or look into any RF connector while the radio equipment is transmitting.

5.1 Pre On-Line Commissioning Requirements

Before on-line commissioning begins, the field technician or the OMC operator must verify that:

- The BSC, or Micro BTS, and the MSC are fully commissioned, in service and connected to each other.
- The OMC is in service and connected to the Micro BTS via the MSC as defined in the [GSM Network Implementation Manual](#).
- The database questionnaire is completed, with all necessary Micro BTS parameters listed, as defined in the [GSM Network Implementation Manual](#).
- The OMC operator has successfully created and configured the Micro BTS object on the OMC and downloaded this information to the Micro BTS. Refer to the procedures described in the [UltraVIEW OMC Configuration Guide](#).
- The RF frequencies are cleared to transmit.



Once the E1 or T1 link has been properly connected to the Micro BTS E1 or T1 trunk card, both port alarm LEDs for the connected port should turn off. If one or both LEDs remain illuminated, an E1 or T1 link problem exists related to either a faulty connector or the E1 or T1 link itself. Refer to the [GSM Field Maintenance Guide](#) for additional information.

- The MSC-Micro BTS E1 or T1 link is properly certified. Note that the certification should state length of testing and BER results.



It is the operator's responsibility to verify that all Micro BTS E1 or T1 Abis links are ordered, installed and certified by the local telephone provider. Certification should include a bit error ratio/rate test of at least 20 minutes on the Abis interface, with a BER of 10^{-8} or better.

- The HLR subscriber data has been entered into the HLR using the Subscriber Management GUI, as described in the [GSM Subscriber Management Guide](#). In particular, the HLR must be configured to support the SIM cards of the mobiles used by the field technician.

5.2 On-Line Commissioning

The network commissioning procedures must be performed at the OMC and at the Micro BTS. This requires two persons working from two different documentation sets:

- A field technician who remains on-site. They must have a filled out copy of [Checklist 2 - Installation Checklist](#) and a copy of this manual.
- An OMC operator who remains at the OMC. They must have a copy of the [UltraVIEW OMC Configuration Guide](#).

The flow chart shown in [Figure 5-1](#) provides a high-level view of the procedures. The procedures in the following sections provide detailed, numbered steps.



[Checklist 3 - Commissioning Checklist](#) summarizes the steps for on-line commissioning.



Before starting any of the following procedures, the field technician needs to ensure that anti-static precautions are taken. Refer to [Section 1.2](#).

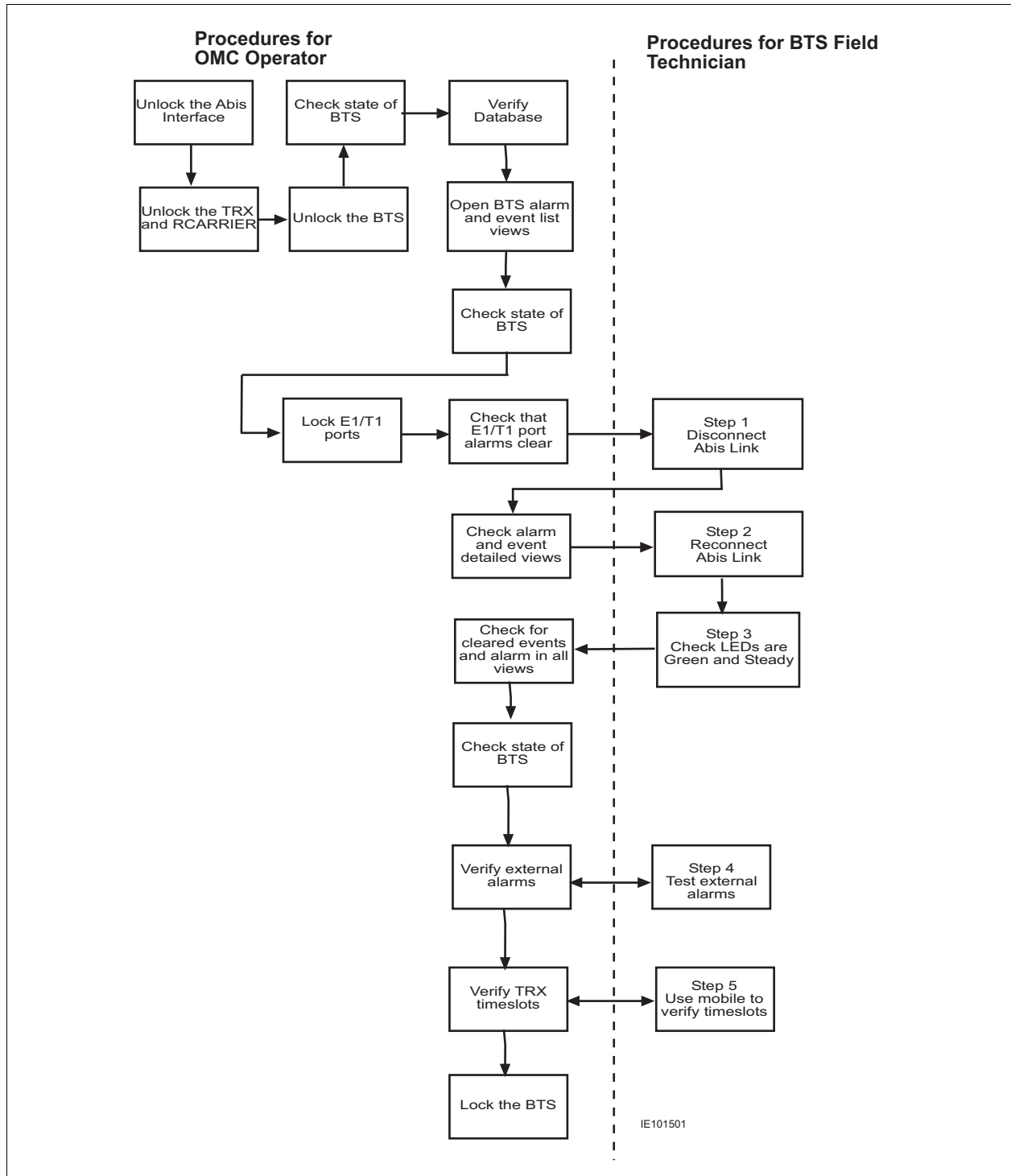



Figure 5-1: On-Line Commissioning Procedures

5.2.1 Unlocking the Abis Interface

The Abis interface between the BSC and BTS is established via a PPP link over E1 or T1 lines. Make the E1 or T1 connections to the provider and set up the Abis signaling link to the OMC as described in [Chapter 4 - Off-Line Commissioning of a Daisy Chain](#). Once the Abis link is established it must be unlocked at the OMC to allow the BSC to download the TRX code to the BTS. Refer to the [UltraVIEW OMC Configuration Guide](#) for procedures to unlock the Abis. As the code downloads, the TRXs run POST to verify their operation. This takes up to fifteen minutes depending the number of TRXs in the system.



For systems equipped with multiple TRXs, the TRXs download their code and run POST simultaneously. If viewing the output in a serial window, the POST messages will be mixed among different TRXs while in progress.

[Figure 5-2](#) illustrates the LED display during the POST process and [Figure 5-3](#) illustrates the final LED display.

Abis connection to BSC completes TRX code download to each card sequentially. LED display during POST is:

LEDs	ICP	E1/T1	TRX 1-6
PWR	● ON	● ON	● ON
ON LINE	● ON	● ON	○ FAST FLASH
FLT	○ OFF	○ OFF	○ OFF
SCN	● ON	N/A	N/A
PORT 0	N/A	○ ○ OFF	N/A
PORT 1	N/A	○ ○ OFF	N/A

IE144501

Figure 5-2: LED Display During POST

Abis connection to BSC completes TRX code download to each card sequentially. After 10 minutes, the final LED display is:

LEDs	ICP	E1/T1	TRX 1-6
PWR	● ON	● ON	● ON
ON LINE	● ON	● ON	○/● ON or OFF*
FLT	○ OFF	○ OFF	○ OFF
SCN	● ON	N/A	N/A
PORT 0	N/A	○ ○ OFF	N/A
PORT 1	N/A	○ ○ OFF	N/A

* Note: TRX ON LINE will display ON if it is unlocked, or OFF if it is locked (in the OMC database).

IE144502

Figure 5-3: Final LED Display

5.2.2 Commissioning the Micro BTS

Before disconnecting the E1 or T1 cables, the field technician must make sure that the cable is labeled in a way that clearly identifies its origin (a particular E1 or T1 port on the Micro BTS, or a particular port of an E1 or T1 panel, etc.) and destination (a particular E1 or T1 slot and port on the Micro BTS).

- Provide the OMC operator with all part, revision and serial numbers for the Micro BTS cards and modules. This information was gathered during the physical installation and is available in [Checklist 2 - Installation Checklist](#).

5.2.3 Recovery Tests

You should have the OMC operator lock the E1 or T1 ports and verify that the port status changes to Locked, Enabled, Online. Then perform the following steps:

- 1 At the Micro BTS, disconnect the physical OAM link cable. Monitor the LED sequence of the Micro BTS as described in [Chapter 3 - Off-Line Commissioning](#).
- 2 Coordinate with the OMC operator to ensure the proper alarms have appeared on the OMC. Reconnect the physical OAM link cable to the Micro BTS E1 or T1 trunk card.
- 3 Monitor the LED sequence of the Micro BTS as described in [Chapter 3 - Off-Line Commissioning](#).
- 4 Test external alarms. See [Section 5.2.4](#).

5.2.4 External Alarm Tests

- 1 Test external alarms using the following procedures:
 - A Open the door of the Micro BTS.
 - B After a delay, the OMC operator must observe an alarm event.
 - C Close the door.
 - D After a delay, the alarm state displayed at the OMC changes from open to closed.

- 2 For each external alarm that you connected in [Section 2.8](#), verify that it is propagated to the OMC.
 - A Close the alarm relay (i.e. trigger the first customer-defined alarm).
 - B After a delay, the OMC operator must observe an alarm event.
 - C Close the alarm relay by opening the alarm contact.
 - D After a delay, the alarm state displayed at the OMC changes from open to closed.

5.2.5 TCH Timeslot Tests

- In this test, the OMC operator unlocks individual TCH timeslots and the field technician places a mobile-to-mobile call over each timeslot using a mobile handset in debug mode. Refer to the documentation provided by the module handset manufacturer for the proper procedures.

For each timeslot, the commissioner should verify that:

- The timeslot displayed on the handset corresponds to the timeslot unlocked by the OMC operator.
- A two-way call is completed successfully.
- The call has good audio quality and power, and low interference.

The number of timeslots to be tested differs depending on whether you have one, two or three TRXs. [Table 5-1](#) provides the sequence for one TRX.

[Table 5-2](#) provides the sequence for two or more TRXs.

Table 5-1: Timeslots Needing Testing in a One-TRX BTS

TRX Number	Timeslot Number	Channel Type	Testing Necessary
First TRX	0	BCCH Combined	No
	1	TCH	Yes
	2	TCH	Yes
	3	TCH	Yes
	4	TCH	Yes
	5	TCH	Yes
	6	TCH	Yes
	7	TCH	Yes

Note: To run an abbreviated version of this test, test any one of timeslots 0-3 and of timeslots 4-7 on each TRX.

Table 5-2: Timeslots Needing Testing in BTS with More Than One TRX

TRX Number	Timeslot Number	Channel Type	Testing Necessary
First TRX (Note)	0	BCCH	No
	1	SDCCH	No
	2	TCH	Yes
	3	TCH	Yes
	4	TCH	Yes
	5	TCH	Yes
	6	TCH	Yes
	7	TCH	Yes
Second through Sixth TRX (Note)	0	TCH	Yes
	1	TCH	Yes
	2	TCH	Yes
	3	TCH	Yes
	4	TCH	Yes
	5	TCH	Yes
	6	TCH	Yes
	7	TCH	Yes
<p>Note: The BCCH can be assigned to any TRX within the BTS. The label “First TRX” applies to the TRX to which is assigned the BCCH. The OMC operator may determine which physical TRX is the “First” or beacon TRX. All TCH timeslots on the second through sixth TRX must be tested.</p>			

5.3 Antenna Cabling and Power Verification

Use the procedures in this section to verify the output power and antenna cabling. After the hardware installation is complete, forward and reverse power needs verification.

5.3.1 Setting up Power Measurements

After performing the BTS commissioning as described in the previous section, use the following procedure to check the performance of an on-line Micro BTS without using a Racal test procedure.



This procedure is NOT a substitute for the Racal tests. Please refer to the [GSM Radio Test Procedures](#) to test the output power of the BTS.

Required Test Equipment

- Thruline RF Watt Meter (by Bird Electronics) or equivalent
- Appropriate power sensors for watt meter according to frequency and output power of the BTS under test
- Calibrated RF cable for connection between equipment and watt meter
- 100 Watt, 30 dBm attenuator, if required
- Two mobile telephones

Required Network Configuration

To perform satisfactory RF performance tests, the Micro BTS must be connected to an operational BSC/MSC and OMC to enable call processing, as the SS7 must be enabled for the BTS to transmit. Make sure you commission the Micro BTS as described in the previous section before performing this procedure.

5.3.2 Verifying TRX Output Power

Starting with the first TRX, this procedure must be completed for each TRX in the Micro BTS. The OMC operator will need to know what TRX is under test to enable the BCCH on that specific TRX and lock all other TRXs.



You must be an experienced RF field technician to perform these procedures. **Do not** disconnect RF coaxial connectors on the equipment or antenna systems while the radio equipment is operating. **Never** place any body part over, or look into any RF connector while the radio equipment is transmitting.

Use the following procedure:

- 1 At the OMC, make sure that the Micro BTS is in a locked state. Refer to the [UltraVIEW OMC Configuration Guide](#).

At the Micro BTS, check the TRX ONLINE LEDs are OFF. Do not disconnect the RF connectors if the TRX is ONLINE!

- 2 Determine the appropriate power sensor for your test. Power sensors are specific for frequency (850 MHz, 900 MHz, 1800 MHz or 1900 MHz) and power range.

For the forward power measurement, you should be using a 100 Watt, 50 Watt or 25 Watt power sensor depending on the output power of equipment that you are testing. The sensor rating must have a higher Watt rating than the RF power output than you are testing, or an inline attenuator must be used to bring the output power down to the range acceptable to your power sensor.

For the reflected power measurement, you should be using a 10 Watt or 5 Watt power sensor.

- 3 Disconnect the appropriate antenna cable from the equipment. This cable will correspond to the TRX which you are testing. See [Section 2.7](#) for additional RF cabling information.

- 4 Connect the antenna cable from the TRX port that you are testing to the “out” port of the RF watt meter. See [Figure 5-4](#).

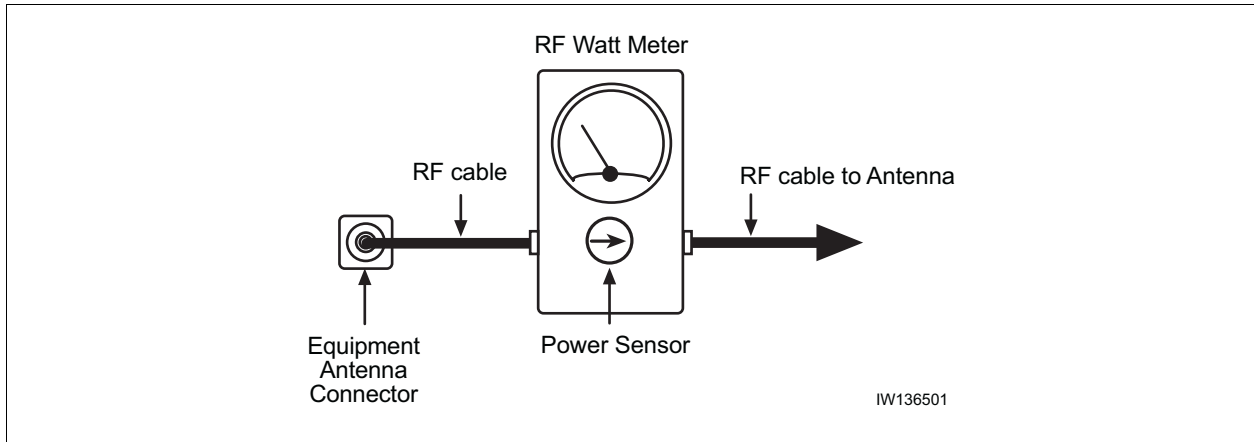


Figure 5-4: Direct RF Connection

- 5 Connect the RF cable between the Micro BTS RF output port (antenna connector) and the RF watt meter, as shown in [Figure 5-4](#). This is the recommended method of testing forward and reflected power. Typical test cable loss is listed in [Table 5-3](#).

Table 5-3: Typical Test Cable Loss

Cable Type	Description	Loss (900 MHz)	Loss (1800 MHz)
LMR195 or RG142	Outer diameter: 0.2 inch Length: four feet	0.7 dB; add 0.1 dB per foot if longer than four feet	1.0 dB; add 0.17 dB per foot if longer than four feet
RG214 or RG8	Outer diameter: 0.4 inch Length: four feet	0.5 dB	0.7 dB
LMR400	Outer diameter: 0.4 inch Length: four feet	0.4 dB	0.5 dB
0.5 inch Heliax Jumper	Hard corrugated copper outer conductor; Outer diameter: 0.6 inch; Length: six feet	0.3 dB	0.4 dB
Note: It is strongly recommended NOT to use RG-58/U cable as a test cable because of its poor RF performance.			

If you do not have a high power sensor, you need to reduce the output power for the forward power measurement. Connect the appropriate attenuator (50 Watt or more, 10-20 dB) inline between the Micro BTS RF output port and the “in” port of the RF watt meter, as shown in [Figure 5-5](#). You must figure the power loss of both cables and the attenuator in this scenario. You cannot measure the reflected power using this test setup. You must use the setup without the attenuator, as shown in [Figure 5-4](#), making sure the power sensor direction arrow points toward the Micro BTS.

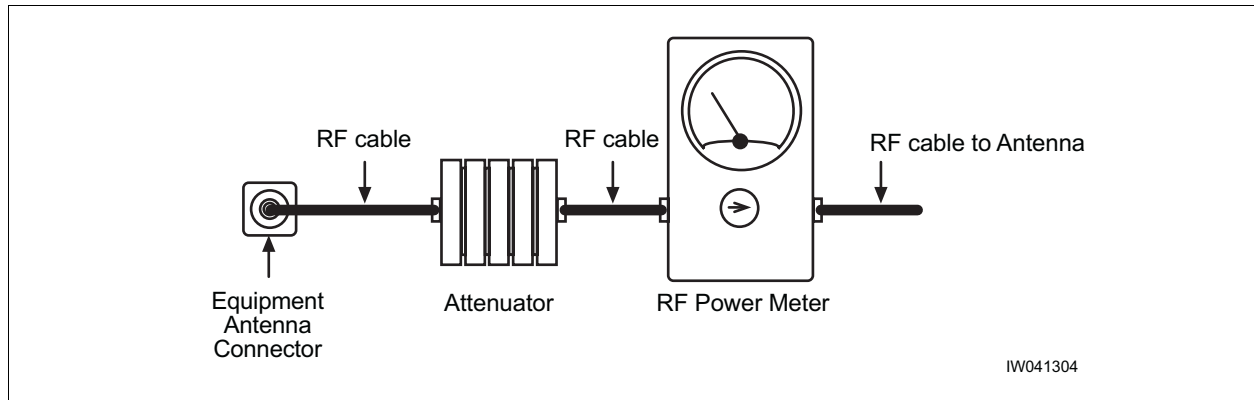


Figure 5-5: Attenuated Power Connection

- 6 Work with the OMC operator to ensure that the OMC is configured so that the BCCH is on the TRX you are testing.



The procedure for BCCH configuration can be found in the Network Configuration section of the [UltraVIEW OMC Configuration Guide](#).

- 7 To measure forward (output) power, the arrow on the power sensor should point toward the antenna, as shown in [Figure 5-4](#).
- 8 At the OMC, change the TRX state to unlocked. The operator should be sure that the output power for the TRX under test is set to “Static Power Control Level 0” (full power). Note the ONLINE LED for the TRX under test turns green at the Micro BTS site.
- 9 In the serial session at the Micro BTS site, enter the following commands to display the power control status for each TRX.

```
bts-> log_none
```

```
bts-> isr_debug_calb=1
```

- 10** Record the output power of the TRX on the power meter. This will be displayed in either Watts or dBm. Your final reading should account for losses at the cables and connectors, and if used the loss through the attenuator. [Table 5-4](#) provides the allowable readings given a Thruline Watt Meter and the cable losses referenced in [Step 5](#).

Table 5-4: Allowable Power Meter Reading Range (Watts)

Nominal Output Power	Reading Range	0.3 dB Cable Loss	0.4 dB Cable Loss	0.5 dB Cable Loss	0.7 dB Cable Loss	1.0 dB Cable Loss
15 Watt	Maximum	18	17	17	16	15
	Minimum	11	11	11	10	9
25 Watt	Maximum	29	29	28	27	25
	Minimum	19	18	18	17	16
40 Watt	Maximum	47	46	45	43	40
	Minimum	30	29	28	27	25
50 Watt	Maximum	59	57	56	54	50
	Minimum	37	36	35	34	32

- 11** To test the reflected power, remove the power sensor from the watt meter, and put the 10 Watt or 5 Watt sensor into the meter with the arrow pointing toward the equipment. It is not necessary to disconnect the meter or turn off the Micro BTS power. You only need to exchange the power sensor and point it in the direction of the Micro BTS.

If the measured reflected power is equal or less than 4% of the forward power measured in the previous step, the installation is acceptable. If the measurement is more than 4%, contact the responsible party for the antenna and feeder installation. [Section 5.3.3](#) provides more detail about the Voltage Standing Wave Ratio.

- 12** Complete these steps for each TRX in the Micro BTS.

If a TRX falls out of the above guideline margins, it is still within the operable tolerance based on the GSM standard or 11.21 test requirement as long as the power does not go beyond 25% of the maximum value or 20% less than the minimum value.

For example, if the cable loss is 0.4 dB, the nominal power is 25 Watts and the measured power is 16 Watts. It is out of the range of [Table 5-4](#), but still operable because it is above the 14.4 Watts which is the absolute minimum to operate a Micro BTS according to the GSM standard. If a TRX falls below this range, contact Customer Service.

5.3.3 Voltage Standing Wave Ratio (VSWR) Check

The antenna and feeder cable VSWR measurement should be performed before the Micro BTS installation and commissioning by the team responsible for the antenna installation using a VSWR meter. The required VSWR is 1.5 or less. It is very important to confirm the antenna and feeder installation to ensure the Micro BTS transmits its signal power to the air effectively.

The purpose of this check is to ensure the integrity of the antenna and the antenna connection under the actual full power condition by determining whether the reflected power reading is lower than the required value. The reflected power is derived from the antenna and feeder VSWR. [Table 5-5](#) shows the direct relationship between VSWR and reflected power.

Table 5-5: VSWR and Reflected Power

VSWR	Reflected Power (% of the Output Power)
1.2	0.8%
1.3	1.7%
1.4	2.8%
1.5	4.0%
1.6	5.3%
1.7	6.7%
2.0	11.1%
3.0	25.0%
4.0	36.0%

The recommended test approach is to use an in-line, forward/reflected power meter (for example, Thruline Watt Meter by Bird Electronics or the NAS model by Rohde and Scorers) inserted between the Micro BTS chassis and the antenna cable. This approach validates that the antenna and cable are good. It also verifies that the transmit power from the chassis is within tolerance limits. Record the reflected power which should be less than 4% of the output power as measured in [Step 10](#).

If the measured reflected power is more than 4% of the forward power, it indicates power installation of the antenna or a bad feeder cable. Contact the responsible party for the antenna and feeder cable installation to have the problem fixed.

5.3.4 RX Signal Quality Measurements

The objectives of this test are to verify the performance of the Receive path of the Micro BTS and the operation of the RX module in the TRX. Before these tests can take place, the Micro BTS must be returned to its original “on air” working state with call processing possible.

- 1 From an Xterm window on the OMC, telnet to the Micro BTS to be tested, or alternatively connect directly to the Micro BTS with the Craft PC.

The field technician can also open a serial session directly with the Micro BTS, and proceed to [Step 4](#).

- 2 From the iwbox prompt find the IP address of the Micro BTS by typing:

```
HD:iwbox-> ifShow "ppp" [ENTER]
```

A list of PPP connections will then be displayed. Look for the IP address of the Micro BTS you will be testing. The last number of the 192.168.5.x address relates to the BtsMgr number of the Micro BTS.

- 3 From the iwbox prompt type the following to connect to the Micro BTS:

```
HD:iwbox-> rlogin "192.168.5.x" [ENTER]
```

If this is successful you will receive the bts-> prompt.

- 4 From the Micro BTS prompt type the following to activate the RX RSSI and quality data logging:

```
bts-> log_none [ENTER]
```

```
bts-> ho_log_on_bts [ENTER]
```

- 5 Place a mobile to mobile call through the Micro BTS. The RSSI and Quality for the call will be displayed, as illustrated in [Figure 5-6](#).

```

210 (bts ) (4 0xe)UL:63/63 0/0 F AVG 63 0 DL:63/63 0/0 F AVG 63 0 NBR
211 (bts ) (4 0xe)UL:63/63 0/0 F AVG 63 0 DL:63/63 0/0 F AVG 63 0 NBR
212 (bts ) (4 0xe)UL:63/63 0/0 F AVG 63 0 DL:63/63 0/0 F AVG 63 0 NBR
213 (bts ) (4 0xe)UL:63/63 0/0 F AVG 63 0 DL:63/63 0/0 F AVG 63 0 NBR
214 (bts ) (4 0xe)UL:63/63 0/0 F AVG 63 0 DL:63/63 0/0 F AVG 63 0 NBR
215 (bts ) (4 0xa)UL:63/63 0/0 F AVG 61 0 DL:63/63 0/0 F AVG 63 0 NBR
216 (bts ) (4 0xe)UL:63/63 0/0 F AVG 63 0 DL:63/63 0/0 F AVG 63 0 NBR
217 (bts ) (4 0xa)UL:59/60 0/0 F AVG 62 0 DL:63/63 0/0 F AVG 63 0 NBR
218 (bts ) (4 0xe)UL:63/63 0/0 F AVG 63 0 DL:63/63 0/0 F AVG 63 0 NBR

```

Uplink RSSI/Quality Downlink RSSI/Quality

Figure 5-6: RSSI and Quality Log

The sample log shows typical results for strong signals on both the uplink and downlink where RSSI of 63 is the highest number. The quality should generally be 0 when the RSSI is above 40 (strong signal). If you have any 2 or higher numbers in RX quality, you have some receiver problems and should contact Customer Service.

5.4 Post On-Line Commissioning Procedures

- 1** Leave the power to the OMC and Micro BTS on.
- 2** Check that all E1, T1 and power cable connections between the MSC and Micro BTS are tight.
- 3** Close and lock the Micro BTS door.
- 4** Inform the OMC operator that the Micro BTS is ready for integration testing and connections to external BTSs.
- 5** Ensure that the Micro BTS site is left in a tidy state.

This concludes the commissioning of the Micro BTS. The field technician can now leave the Micro BTS site.

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Checklist 1 - Site Readiness Checklist

Table C1-1: Site Details

Site Name	
IP Address	
Micro BTS Name	
MSC Name	
Site/Access Phone Number	

Environmental requirements

- 1 __ Ground and soil resistance measured.
- 2 __ Air conditioning available.

Electrical requirements

- 1 __ Site ground plate/ring installed and grounding rods connected.
- 2 __ Grounding bar installed on shelter/cabinet and bonded to site ground plate/ring.
- 3 __ Main feeder bend radius verified.
- 4 __ Power cable entry supports/conduits installed.
- 5 __ Main power cable installed and ready for connection.
- 6 __ Power utility meter installed and connected.
- 7 __ Main power supply available.
- 8 __ MCC & MNC frequencies assigned and confirmed.
- 9 __ Local electrician/power provider available.

Chassis requirements

- 1 __ Shelter/Cabinet anchored in position.
- 2 __ Foundation pad for shelter/cabinet constructed.
- 3 __ Backbone trunking equipment and installation material on site.
- 4 __ Shelter/Cabinet waterproofed.
- 5 __ PLMN/PSTN/E1/T1 lines installed (BER link measurements).

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Checklist 2 - Installation Checklist

Table C2-1: Site Details

Site Name	
IP Address	
IP Name (optional)	
MSC Name	
Micro BTS Name	
Site/Access Phone Number	

Table C2-2: Micro BTS Rack Assembly Equipment

Micro BTS Rack Assembly	Slot	Part Number	Revision Number	Serial Number
RF Module	A			
RF Module	B			
RF Module	C			
ICP processor card	0			
E1 or T1 Trunk card	1			
TRX card	2			
TRX card	3			
TRX card	4			
TRX card	5			
TRX card	6			
TRX card	7			
Clock Module	-			

Table C2-3: Power Supply Subrack Equipment

Power Supply Subrack	Number	Part Number	Revision Number	Serial Number
PS Module				
PS Module				

Unpacking the Micro BTS

- 1 __ Check for visible damage to shipping materials. Contact Alvarion Customer Service if any visible damage is found.
- 2 __ All parts included per shipping invoice.
- 3 __ Cross check with site specific data to ensure Micro BTS is correctly configured with all cards.

Mounting the Micro BTS on a Rack (if applicable)

- 1 __ Attach mounting brackets to chassis.
- 2 __ Mount chassis in rack.
- 3 __ Ground chassis.
- 4 __ Connect power supply: 110 VAC to 220 VAC, 30 A, 50-60 Hz or -40 VDC to -60 VDC, 40 A.

Connecting the Micro BTS

- 1 __ Connect "A Interface" E1 or T1 trunk cables to local telephone provider demarcation.
- 2 __ Configure E1 or T1 trunk card DIP switch settings.
- 3 __ Ensure power to BTS is **off**.

Verifying the MSC-Micro BTS Link

It is the operator's responsibility to verify that all MSC-Micro BTS E1 or T1 links are ordered, installed and certified by the local telephone facilities/operator. Verify bit error rates on a nominal 20 minute soak test on the E1 or T1 A-interface (end-to-end BER test to include E1 or T1 trunk cables). The Micro BTS is now ready for commissioning tests.

C3

Checklist 3 - Commissioning Checklist

Table C3-1: Site Details

Site Name	
IP Address	
IP Name (optional)	
MSC Name	
Micro BTS Name	
Site/Access Phone Number	

Pre-Commissioning Visual Checks

- 1 __ Installation secure.
- 2 __ Power to the chassis is off.
- 3 __ The chassis is connected to a power source.
- 4 __ The chassis is grounded.
- 5 __ Equipment cables are labeled and secured.
- 6 __ Cards are seated securely.
- 7 __ Transmission cables are available and labeled.

Compliance Checks

- 1 __ Cross check with site-specific data to ensure the Micro BTS is correctly configured with all cards.
- 2 __ Serial number of all cards are recorded.
- 3 __ Verify correct operating voltage supplied: AC (110 V to 220 V, 30 A, 50-60 Hz) or DC (-40 V to -60 V, 40 A).

Powering On the Micro BTS

- 1 __ Disconnect all E1 and/or T1 cables from Micro BTS (if connected).
- 2 __ Turn power to the chassis on.
- 3 __ Verify all card power LEDs and processor and on-line LEDs are green.

Micro BTS Off-Line Commissioning

- 1 __ Connect the Craft PC to the processor card using a serial and ethernet cable.
- 2 __ Establish a serial connection.
- 3 __ Check software version.
- 4 __ Start NMI.
- 5 __ Check the Micro BTS configuration database (refer to Steps 6 through 9 below).
- 6 __ Delete existing database files.
- 7 __ Verify that all E1 or T1 trunk cards are logically represented.
- 8 __ Check the serial numbers, revision numbers and part numbers of all E1 or T1 trunk cards.
- 9 __ Verify that DSP daughtercards are logically represented and tested.

POST Tests

- 1 __ Verify POST tests successfully passed.
- 2 __ Exit NMI. Disconnect Craft PC from the Micro BTS.

Connecting the BTS

- 1 __ Connect all E1 or T1 cables to the telephone provider demarcation at the MSC.
- 2 __ Connect all E1 or T1 cables to the telephone provider demarcation at the Micro BTSs.
- 3 __ Inform Micro BTS operator (ready for on-line tests).
- 4 __ Leave power to Micro BTS on.

On-Line Commissioning

- 1 __ Micro BTS in service and connected to external Micro BTSs (if applicable).
- 2 __ BSC in service and connected to Micro BTS.
- 3 __ Micro BTS connected to MSC.
- 4 __ Database questionnaire completed with Micro BTS parameters defined.
- 5 __ OMC downloaded Micro BTS configuration with correct operational parameters.
- 6 __ Operator's responsibility to verify all E1 or T1 links properly installed and certified by local telephone provider. Certification must rate Length of Testing and BER results.

Verifying E1 or T1 Operation

- 1 __ Verify bit error rates on a nominal 20-minute soak test on the Abis interface to remote Micro BTS(s) if applicable.
- 2 __ Verify bit error rates on a nominal 20-minute soak test on the A-interface.

Verifying Recovery

- 1 __ Unlock A-interface, A-Links and Micro BTS objects from Micro BTS.
- 2 __ Confirm A-interface re-establishes communications to MSC after E1 or T1 disconnects.
- 3 __ Confirm Abis interface re-establishes communications to remote Micro BTS(s) after E1 or T1 disconnects.

Checking Clock Synchronization

- 1 __ Verify Micro BTS clock is free of error

Verifying the Database

- 1 __ Verify Micro BTS database matches Micro BTS physical configuration

Final Commissioning and On-Line Tests

- 1 __ Reconnect all E1 or T1 cables to telephone provider demarcation
- 2 __ Power off and then on the BTS locally. Verify that all LEDs are green
- 3 __ Inform Micro BTS operator that Micro BTS is ready for integration tests
- 4 __ Leave power to Micro BTS on

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Alvarion, Inc.
2594 Leghorn Street
Mountain View CA, USA 94043
Phone: +1.650.314.2500
www.alvarion.com

Part Number 214323
July 2006 Version B