



Mobile Network Solutions UltraWAVE Micro BTS

Installation and Commissioning Guide, Release 7.5

ADCP-77-021 • Issue 1 • 05/2008

Preliminary

Preliminary



Mobile Network Solutions UltraWAVE Micro BTS

Installation and Commissioning Guide, Release 7.5

ADCP-77-021 • Issue 1 • 05/2008

Preliminary

COPYRIGHT

© 2008, ADC Telecommunications, Inc.
All Rights Reserved

REVISION HISTORY

ISSUE	DATE	REASON FOR CHANGE
1	05/2008	Original

LIST OF CHANGES

The technical changes incorporated into this issue are listed below.

PAGE	IDENTIFIER	DESCRIPTION OF CHANGE
All		New publication

TRADEMARK INFORMATION

ADC is a registered trademark and FlexWave are registered trademarks and trademarks of ADC Telecommunications, Inc. All other products, company names, service marks, and trademarks mentioned in this document or website are used for identification purposes only and may be owned by other companies.

DISCLAIMER OF LIABILITY

Contents herein are current as of the date of publication. ADC reserves the right to change the contents without prior notice. **In no event shall ADC be liable for any damages resulting from loss of data, loss of use, or loss of profits and ADC further disclaims any and all liability for indirect, incidental, special, consequential or other similar damages. This disclaimer of liability applies to all products, publications and services during and after the warranty period.**

This publication may be verified at any time by contacting ADC's Technical Assistance Center at 1-800-366-3891, extension 73476 (in U.S.A. or Canada) or 952-917-3476 (outside U.S.A. and Canada), or by e-mail to wireless.tac@adc.com.



ADC Telecommunications, Inc.
P.O. Box 1101, Minneapolis, Minnesota 55440-1101
In U.S.A. and Canada: 1-800-366-3891
Outside U.S.A. and Canada: (952) 938-8080
Fax: (952) 917-1717

DECLARATIONS OF CONFORMITY

 <p style="text-align: center;">EC Declaration of Conformity Under R&TTE Directive 1999/5/EC</p> <p>Manufacturer Name : ADC Telecommunications, Inc. Address : 2495 Leghorn St Mountain View, CA 94043, U.S.A.</p> <p>Declares that the product Ultrawave Base Station Controller System</p> <p>Product Description : Base Station Controller</p> <p>Model Number : ASABxxxxxxxxxxxxxxxxxxxxxxxxxxxx (x = 0-9, A - Z or blank)</p> <p><i>Complies with appropriate essential requirements of the Article 3 of the R&TTE directive.</i></p> <p><i>Standard to which conformity is declared :</i></p> <p>Protection to Health and Safety: Directive: 73/23/EEC Protection with respect to EMC: Directive: 89/336/EEC</p> <p>EMC: ETSI EN 300 386 V1.2.1 (2000-03)</p> <p>Safety: EN 60950-1:2001+A11</p> <p>Name of authorized person; Mark Schutzer Position: Director, Hardware Engineering</p> <p>Date: 1/6/2008 Signature: </p> <p style="font-size: small;">Mailing Address: P.O. Box 1101, Minneapolis, Minnesota 55440-1101 World Headquarters: Minneapolis, Minnesota USA +1.952.938.8080 www.adc.com</p>	 <p style="text-align: center;">EC Declaration of Conformity Under R&TTE Directive 1999/5/EC</p> <p>Manufacturer Name : ADC Telecommunications, Inc. Address : 2495 Leghorn St Mountain View, CA 94043, U.S.A.</p> <p>Declares that the product Ultrawave BTS/BSPlus 850/900/1800MHz System</p> <p>Product Description : GSM Base Transceiver Station</p> <p>Model Number : AVADxxxxxxxxxxxxxxxxxxxxxxxxxxxx (x = 0-9, A - Z or blank)</p> <p><i>Complies with appropriate essential requirements of the Article 3 of the R&TTE directive.</i></p> <p><i>Standard to which conformity is declared :</i></p> <p>Protection to Health and Safety: Directive: 73/23/EEC Protection with respect to EMC: Directive: 89/336/EEC</p> <p>EMC: ETSI EN 301 489-1, 8 V1.4.1 (2002-8)</p> <p>Safety: EN 60950-1:2001+A11</p> <p>Radio: ETSI EN 301 502 V8.1.2 (2001-7)</p> <p>Name of authorized person; Mark Schutzer Position: Director, Hardware Engineering</p> <p>Date: 1/6/2008 Signature: </p> <p style="font-size: small;">Mailing Address: P.O. Box 1101, Minneapolis, Minnesota 55440-1101 World Headquarters: Minneapolis, Minnesota USA +1.952.938.8080 www.adc.com</p>
---	--

 EC Declaration of Conformity Under R&TTE Directive 1999/5/EC	 EC Declaration of Conformity Under R&TTE Directive 1999/5/EC
Manufacturer Name : ADC Telecommunications, Inc.	Manufacturer Name : ADC Telecommunications, Inc.
Address : 2495 Leghorn St. Mountain View, CA 94043, U.S.A.	Address : 2495 Leghorn St. Mountain View, CA 94043, U.S.A.
Declares that the product Ultrawave Micro BTS/BSPlus System	Declares that the product Ultrawave NIB System
Product Description : Wireless Network System	Product Description : Wireless Network System
Model Number : AyADxxxxxxxxxxxxxxxxxxxx (y=K,L, x=0-9, A-Z or blank)	Model Number : AMADxxxxxxxxxxxxxxxxxxxx (x=0-9, A-Z or blank)
<i>Complies with appropriate essential requirements of the Article 3 of the R&TTE directive.</i>	<i>Complies with appropriate essential requirements of the Article 3 of the R&TTE directive.</i>
<i>Standard to which conformity is declared :</i>	<i>Standard to which conformity is declared :</i>
Protection to Health and Safety: Directive: 73/23/EEC Protection with respect to EMC: Directive: 89/336/EEC	Protection to Health and Safety: Directive: 73/23/EEC Protection with respect to EMC: Directive: 89/336/EEC
EMC: ETSI EN 301 489-1, 8 V1.4.1 (2002-8)	EMC: ETSI EN 301 489-1, 8 V1.4.1 (2002-8)
Safety: EN 60950-1:2001+A11	Safety: EN 60950-1:2001+A11
Radio: ETSI EN 301 502 V8.1.2 (2001-7)	Radio: ETSI EN 301 502 V8.1.2 (2001-7)
Name of authorized person; Position: Mark Schutzer Director, Hardware Engineering	Name of authorized person; Position: Mark Schutzer Director, Hardware Engineering
Date: 1/6/2008  Signature	Date: 1/6/2008  Signature
Mailing Address: P.O. Box 1101, Minneapolis, Minnesota 55440-1101 World Headquarters: Minneapolis, Minnesota USA +1.952.938.8080 www.adc.com	Mailing Address: P.O. Box 1101, Minneapolis, Minnesota 55440-1101 World Headquarters: Minneapolis, Minnesota USA +1.952.938.8080 www.adc.com

TABLE OF CONTENTS

Content	Page
TABLE OF CONTENTS	III
CHAPTER 1 - UNPACKING AND CONFIGURATION VERIFICATION	
1.1 UNPACKING AND INSPECTING	2
1.1.1 Unpacking the Cabinet	3
1.1.2 Unpacking and Inspecting a Rack Assembly	7
1.2 ELECTROSTATIC DISCHARGE (ESD)	8
1.3 INSPECTING COMPONENTS AND RECORDING PART NUMBERS	9
1.3.1 RF Adapter Plate	9
1.3.2 Micro Subrack Assembly	10
1.3.3 Power Supply	10
1.3.4 Rectifier, and Power Strip	11
1.3.5 Identifying the System Configuration	12
1.3.6 Verifying System Labels	14
1.4 VERIFYING AND DOCUMENTING CARDS AND MODULES	16
1.4.1 Required Equipment	16
1.4.2 Micro Subrack Assembly	16
1.4.3 Slot Assignments	17
1.4.4 Verification Procedure	18
1.5 VERIFYING CABLING	20
1.5.1 Verifying Internal Cabling	20
1.5.2 Verifying Enclosure Cabling	20
CHAPTER 2 - INSTALLATION	
2.1 ANALYZING SITE REQUIREMENTS	24
2.1.1 Environmental Conditions	24
2.1.2 Electrical Requirements	25
2.1.3 Chassis Requirements	25
2.2 MOUNTING THE MICRO BTS CHASSIS	30
2.2.1 Rack Installation	31
2.2.2 Enclosure Installation	37
2.3 CONFIGURING THE E1 OR T1 TRUNK CARD	41
2.3.1 Configuring Ground Jumpers on 75 Ohm E1 Cards	42
2.3.2 Configuring Cable Length DIP Switch Settings on T1 Cards	44
2.4 CONNECTING GROUND CABLES	46
2.4.1 Connecting the Grounding Cable	46
2.4.2 Grounding the Cabinet	47

2.5	CONNECTING POWER SUPPLIES	48
2.5.1	Connecting AC Power	50
2.5.2	Connecting DC Power	53
2.6	CONNECTING E1 OR T1 TRUNK CABLES	58
2.6.1	E1 Cables	58
2.6.2	100 Ohm T1 Cables	60
2.6.3	Connecting E1 or T1 Lines	60
2.6.4	Direct Cabling Between Multiple UltraWAVE or WAVEExpress Systems	61
2.7	CONNECTING ANTENNAS	62
2.7.1	Omni 1 TRX (O1) Configuration	63
2.7.2	Omni 2 TRX (O2) Configuration	64
2.7.3	Omni 3 TRX (O3) Configuration	64
2.7.4	Sectorized Three TRX (S111) Configuration	65
2.7.5	Three Sector Six TRX (S222) Configuration	66
2.7.6	RF Radiation Hazard	67
2.8	CONNECTING EXTERNAL ALARMS	69
2.9	MAKING A SERIAL CONNECTION TO THE PROCESSOR CARD	73
2.10	POST INSTALLATION CABLING AND CHECKS	74
2.10.1	Connecting the Chassis	74
2.10.2	Verifying External Cabling	74

CHAPTER 3 - OFF-LINE COMMISSIONING

3.1	PRE OFF-LINE COMMISSIONING	77
3.1.1	Visual Inspections	77
3.2	OFF-LINE COMMISSIONING OF THE MICRO BTS	79
3.2.1	Starting XWindows Using the Craft PC	80
3.2.2	Connecting the Craft PC to the ICP Processor Card	80
3.2.3	Setting Up a Serial Connection via the ICP Processor Card Serial Port	81
3.2.4	Power-On LED Tests	83
3.2.5	Configuring Boot Parameters	86
3.2.6	Setting Up an Ethernet Connection to the ICP Processor Card Ethernet Port	88
3.2.7	Verifying Telnet Communications with the Micro BTS over Ethernet	88
3.3	SOFTWARE VERIFICATION USING CRAFT PC	90
3.3.1	Verifying the Current Software Version and Patch Level	90
3.3.2	Checking the Flash Version Number	91
3.3.3	Running E1 or T1 POST Diagnostics	92
3.3.4	Running TRX POST Diagnostics	93
3.3.5	Reviewing POST Results	95
3.3.6	Rebooting the Micro BTS after Running POST	96
3.3.7	Terminating Serial Communications with the Micro BTS	96
3.3.8	Exiting XWindows on the Craft PC	96
3.4	UPGRADING THE MICRO BTS SOFTWARE VERSION (FLASH)	97

3.5 POST OFF-LINE COMMISSIONING 99

3.5.1 Post Off-Line Commissioning Procedures at the Staging Area 99

3.5.2 Post Off-Line Commissioning Procedures On-Site 99

**CHAPTER 4 -
OFF-LINE COMMISSIONING OF A DAISY CHAIN**

4.1 PREREQUISITES TO DAISY CHAINING 102

4.2 SETTING THE ABIS LAPD SIGNALING TIMESLOT 103

**CHAPTER 5 -
ON-LINE COMMISSIONING**

5.1 PRE ON-LINE COMMISSIONING REQUIREMENTS 106

5.2 ON-LINE COMMISSIONING 107

5.2.1 Unlocking the Abis Interface 109

5.2.2 Commissioning the Micro BTS 110

5.2.3 Recovery Tests 110

5.2.4 External Alarm Tests 110

5.2.5 TCH Timeslot Tests 111

5.3 ANTENNA CABLING AND POWER VERIFICATION 113

5.3.1 Setting up Power Measurements 113

5.3.2 Verifying TRX Output Power 113

5.3.3 Voltage Standing Wave Ratio (VSWR) Check 117

5.3.4 RX Signal Quality Measurements 118

5.4 POST ON-LINE COMMISSIONING PROCEDURES 120

**CHECKLIST 1 -
SITE READINESS CHECKLIST**

**CHECKLIST 2 -
INSTALLATION CHECKLIST**

**CHECKLIST 3 -
COMMISSIONING CHECKLIST**

Index 127

Blank

Preliminary

ABOUT THIS MANUAL

Welcome to the Micro BTS. It describes how to perform local installation and commissioning of the Micro BS Plus at the customer's site.

This document is intended for an ADC trained field service engineer (FSE) or operator who performs local installation and commissioning at the customer's 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 the Craft PC and procedures conducted using the Craft PC.

ADC 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.

RELATED PUBLICATIONS

Listed below are related manuals, their content, and their publication numbers. Copies of these publications can be ordered by contacting the Technical Assistance Center at 1-800-366-3891, extension 73476 (in U.S.A. or Canada) or 952-917-3476 (outside U.S.A. and Canada).

Title/Description	ADCP Number
Mobile Network Solutions Documentation Index	ADCP-76

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 WAVE2000 BS Plus 800 MHz complies with Part 22 of the FCC Rules.

The WAVE2000 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, of 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 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 a 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:

MODEL NAME	FACILITY INTERFACE CODE	SERVICE ORDER CODE	JACK TYPE
340122/340133	04DU9-BN	6.ON	RJ-48C
340122/340133	04DU9-DN	6.ON	RJ-48C
340122/340133	04DU9-1KN	6.ON	RJ-48C
340122/340133	04DU9-1SN	6.ON	RJ-48C
340122/340133	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 ADC 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-O1, 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.

DISPOSAL OF ELECTRONIC AND ELECTRICAL WASTE



Pursuant to the WEEE EU Directive electronic and electrical waste must not be disposed of with unsorted waste. Please contact your local recycling authority for disposal of this product.

ADMONISHMENTS

Important safety admonishments are used throughout this manual to warn of possible hazards to persons or equipment. An admonishment identifies a possible hazard and then explains what may happen if the hazard is not avoided. The admonishments — in the form of Dangers, Warnings, and Cautions — must be followed at all times.

These warnings are flagged by use of an alert icon (seen below), and are listed in descending order of severity of injury or damage and likelihood of occurrence.



DANGER: Danger is used to indicate the presence of a hazard that **will** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.



WARNING: Warning is used to indicate the presence of a hazard that **can** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.



Caution: Caution is used to indicate the presence of a hazard that **will** or **can** cause minor personal injury or property damage if the hazard is not avoided.

MICROWAVE RADIO RADIATION WARNING

Although ADC 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 ADC 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.



WARNING: 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.

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
▶	Note: Provides relevant additional information

Blank

Preliminary

CHAPTER 1 - UNPACKING AND CONFIGURATION VERIFICATION

Content	Page
1.1 UNPACKING AND INSPECTING	2
1.1.1 Unpacking the Cabinet	3
1.1.2 Unpacking and Inspecting a Rack Assembly	7
1.2 ELECTROSTATIC DISCHARGE (ESD)	8
1.3 INSPECTING COMPONENTS AND RECORDING PART NUMBERS	9
1.3.1 RF Adapter Plate	9
1.3.2 Micro Subrack Assembly	10
1.3.3 Power Supply	10
1.3.4 Rectifier, and Power Strip	11
1.3.5 Identifying the System Configuration	12
1.3.6 Verifying System Labels	14
1.4 VERIFYING AND DOCUMENTING CARDS AND MODULES	16
1.4.1 Required Equipment	16
1.4.2 Micro Subrack Assembly	16
1.4.3 Slot Assignments	17
1.4.4 Verification Procedure	18
1.5 VERIFYING CABLING	20
1.5.1 Verifying Internal Cabling	20
1.5.2 Verifying Enclosure Cabling	20

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 can be shipped either in a cabinet (See [Section 1.1.2](#)) or as separate assemblies for installation in a 19 inch rack (See [Section 1.1.2](#)).

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 and assembly rack

Micro BTS systems running on an AC main power supply should also include:

- Rectifiers and assembly rack
- AC power strip (to power the rectifier 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 ADC 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 ADC to order new containers.

Continue with the following sections:

- “Unpacking the Cabinet” on page 3
- “Opening a Cabinet Assembly” on page 6
- “Unpacking and Inspecting a Rack Assembly” on page 7

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.

- 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

- Remove the angled slope and ramps from the pallet. See Figure 1-3.

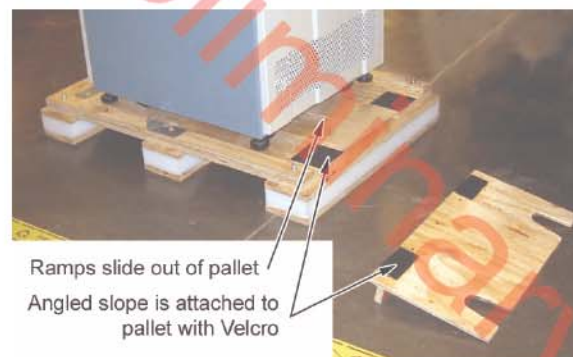


Figure 1-3: Pallet Accessories

- 11 Attach ramps to pallet using Velcro fasteners and slide the sloped support underneath the ramps. See Figure 1-4.

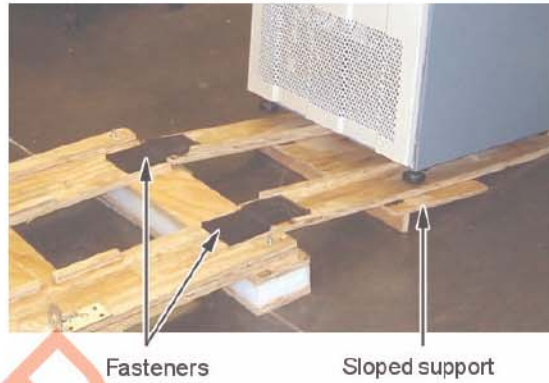


Figure 1-4: Pallet Ramps

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

1.1.1.1 Opening a Cabinet Assembly

The UltraWAVE Micro BTS may be shipped pre-configured in a locking cabinet assembly as shown in Figure 1-5.

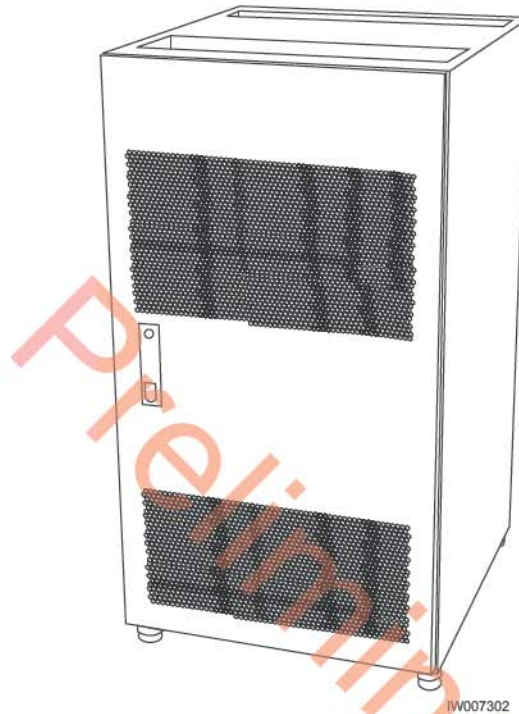


Figure 1-5: Locking Cabinet

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

- 1 Depress the lock mechanism to release the door latch handle.
- 2 Remove the keys provided from the interior of the front door (the key is affixed to the air filter assembly on the interior of the front door) into the lock and turn to unlock.
- 3 Carefully remove the packaging material from inside the cabinet.

1.1.2 UNPACKING AND INSPECTING A RACK ASSEMBLY

The Micro BTS may be shipped in a standard 19 inch rack assembly (or shipped as separate assemblies to be installed in a rack). 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 ADC 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 ADC to order new containers.

Preliminary

1.2 ELECTROSTATIC DISCHARGE (ESD)

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

ADC 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. ADC recommends a relative humidity of 50-60% when working on this equipment.
- Handle the cards as little as possible and only by the edges.



Caution: 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 UltraWAVE Micro BTS includes the following assemblies:

- RF adapter plate
- Subrack assembly
- Power supply assembly
- Rectifier assembly*
- Power strip



Note: The rectifier assembly and power strip are shipped only with the AC powered Micro BTS.

1.3.1 RF ADAPTER PLATE

In a rack mounted Micro BTS, an RF adapter plate acts as the interface between RF cables and the external antennas. The plate is equipped with N-type adapters. See Figure 1-6.

In a Micro BTS cabinet enclosure, the N-type (RF to antenna) interface is built-in to the top of the cabinet.



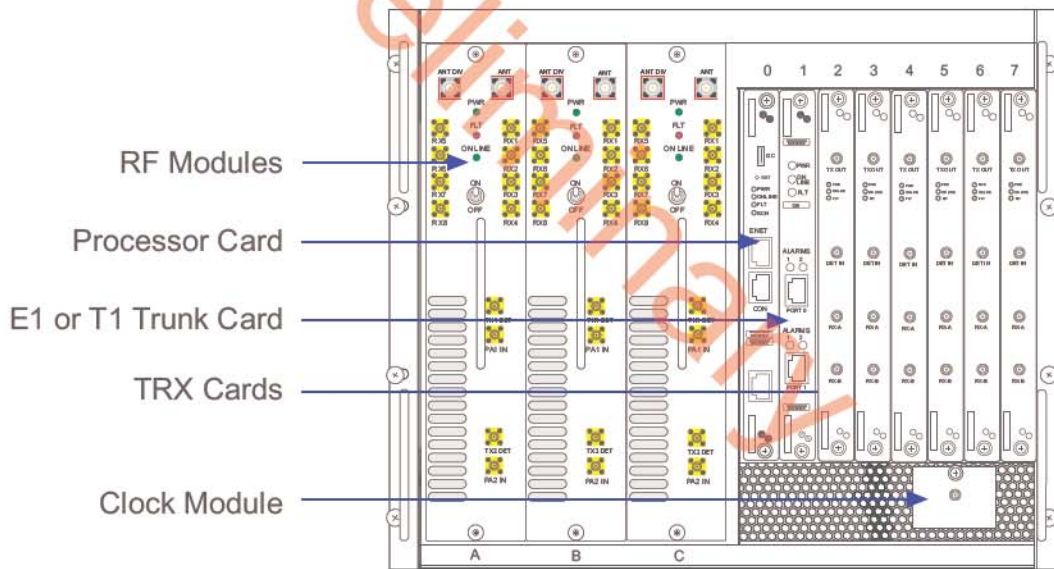
Figure 1-6: RF Adapter Plate

1.3.2 MICRO SUBRACK ASSEMBLY

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)
- Craft PC accessories

Some of these components appear in Figure 1-7.



AD228801

Figure 1-7: UltraWAVE Micro Subrack Assembly

1.3.3 POWER SUPPLY

The power supply assembly is shipped with the Micro BTS. The number of power supply modules depends on the Micro BTS configuration ordered by the customer. See Figure 1-8.

Rectifier and power strip assemblies are only required to support an AC main power supply.

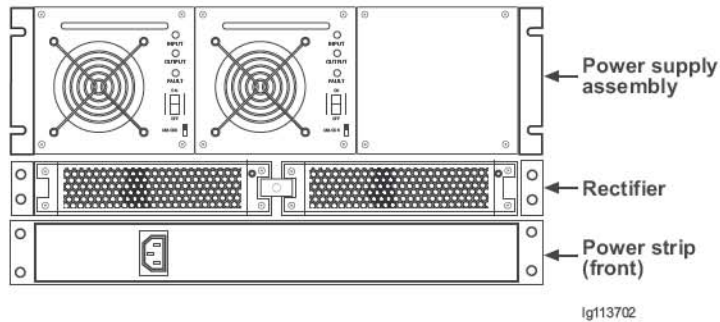


Figure 1-8: Power Supply, Rectifier, and Power Strip Front

1.3.4 RECTIFIER, AND POWER STRIP

For a Micro BTS using AC power, a rectifier assembly and power strip are required. Figure 1-9 displays a rectifier assembly and power strip mounted underneath the power supply of a Micro BTS. The power strip is mounted at the rear to support the rear of the rectifier assembly. The power strip shipped with the rectifier assembly should be used with the rectifier assembly ONLY. See Chapter 2 - Installation.



Figure 1-9: Power Supply, Rectifier, and Power Strip Rear

The power strip requires a 230V 10A current, and has a 10A circuit breaker. This is the lowest rated fuse on the system. The circuit breaker switch is used to reset the power strip. See Figure 1-10.



Figure 1-10: Power Strip Rear

Continue with the following sections:

- “Identifying the System Configuration” on page 12
- “Verifying System Labels” on page 14

1.3.5 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 as shown in Figure 1-11.

This configuration label details the system configuration and all of the modules and cards contained in the system.



Figure 1-11: Configuration Label (sample)

The main configuration label includes the following details:

- Serial number (00xxxxx)
- P/N (NSM-xxxx)
- Revision letter (x)
- Model (example: MICROBTS O2 850MHZ 2TRX 50W110/220 VAC)
The model denotes the main characteristics of the equipment. In this case: MICROBTS (Micro BTS), O2 (omni 2 Micro BTS equipped with 2TRX units), 850MHZ (operation in the 850 MHz GSM RF band plan), 2TRX (a total of 2 TRX units are included), 50W (RF output power per TRX), 110/220VAC (nominal AC voltage requirement).
- Configuration (example: AKADO21802512202B)
Type acceptance number assigned to this product.
- Input power (xx to xx VxC === xxA)
- 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
O1	Omni single TRX (O1); 40 and 50 Watt, two antenna configuration
O2	Omni two TRX (O2); 40 and 50 Watt, two antenna configuration
O3	Omni three TRX (O3); 25 Watt, two antenna configuration
S111	Three sector, one TRX per sector (S111); 40 and 50 Watt, six antenna configuration
S222	Three sector, two TRXs in one sector and one TRX in the other two sectors (S222); 25 and 50 Watt, six antenna configuration

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

1.3.6 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 four component labels on the front of each Micro BTS card, module and chassis to help identify the units as shown in [Figure 1-12](#). 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 NNNNNN

- Dash number -- Dash numbers indicate options or versions of the unit. Dash numbers use the format:

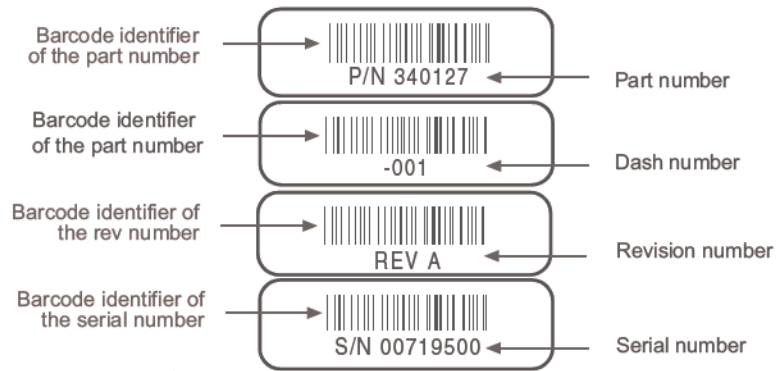
-NNN

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

S/N NNNNNNNN

- Revision letter-- A revision letter is used to indicate a minor manufacturing change to a unit.

REV *



AD207801

Figure 1-12: Sample Component Labels

Preliminary

1.4 VERIFYING AND DOCUMENTING CARDS AND MODULES

Depending on the type of external power input, the cabinet contains up to three assemblies:

- 1 The RF and baseband subrack assembly contains:
 - RF modules responsible for RF power amplification, duplexing and combining when required.
 - Processor, trunk, and TRX cards, and clock module.
- 2 The power supply consists of up to two power supply modules and a third slot covered with a blank panel.
- 3 The rectifier assembly contains up to two rectifier modules. This assembly must be included for VAC power input configurations.

Continue with the following sections:

- “Required Equipment” on page 17
- “Micro Subrack Assembly” on page 17
- “Slot Assignments” on page 18
- “Verification Procedure” on page 19

1.4.1 REQUIRED EQUIPMENT

To verify and record your system configuration, you need:

- A copy of the factory packing slip. 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 1-12](#) 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 1-13.

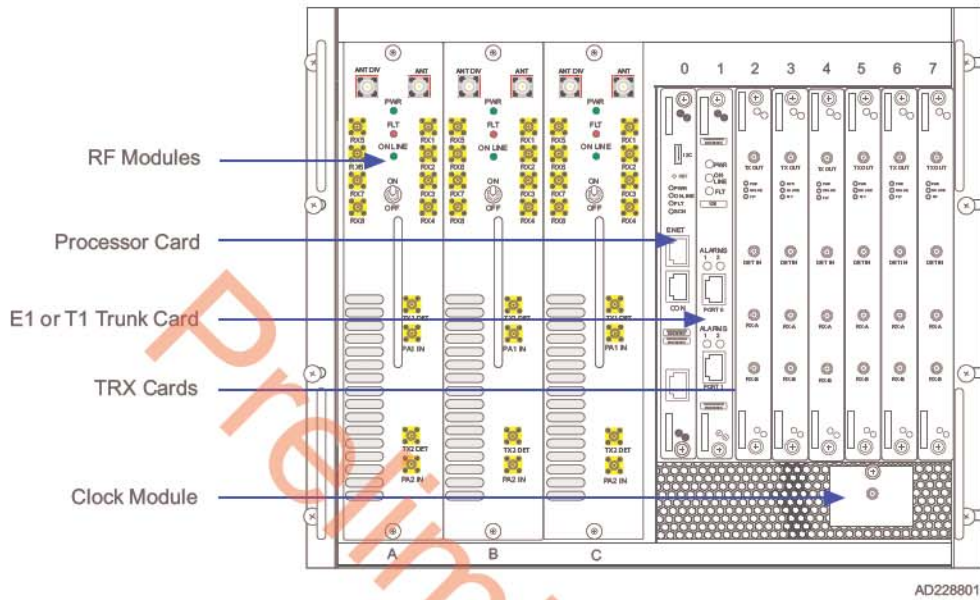


Figure 1-13: Micro BTS Chassis Layout

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 1-13 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 the 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 the Checklist 2 - Installation Checklist.
- 5 Slots 2 to 7 are for 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 in the Checklist 2 - Installation Checklist.

Table 1-3 lists TRX card part numbers.

Table 1-3: TRX Card Part Numbers

PART NUMBER	DESCRIPTION
741107-2	MODULE, ASSY, LCR2, 850 MHz
741100-4	MODULE, ASSY, LCR2, 900 MHz
741100-4	MODULE, ASSY, LCR2, EGSM, 900 MHz
741103-2	MODULE, ASSY, LCR2, 1800 MHz
741106-2	MODULE, ASSY, LCR2, 1900 MHz

- 6 Check the shipping checklist and verify that the power supply rack 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 or any open slot is covered with a blank panel.

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

Preliminary

Table 1-4 displays the supplied power supply part number.

Table 1-4: Power Supply Part Numbers

PART NUMBER	DESCRIPTION
610209 for DC	PSU,48VIN/27V/12V/5V, ULTRAWAVE

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

Preliminary

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 cables
- Power cables

Ensure that:

- The alarm cable is connected to the power supply subrack assembly and the Micro subrack assembly.
- The USB 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 1-14](#), 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.

If you are using AC power as your external power supply, this should connect to a rectifier. Verify that the DC power cable is connected from the rectifier assembly to the power supply assembly, and that the power cables from the power strip are connected to the rectifier module.

[Figure 1-14](#) 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 and the RF Module power supply cabling for slots A through C
- Power Supply 2 and the power supply cabling for slots 0 through 7
- Processor Card Interface

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

- Input Power Supply
- Rectifier assembly, featuring two rectifiers*
- 10A power strip (See Figure 1-10)



Note: Rectifier and power strip assemblies are only required to support an AC main power supply.

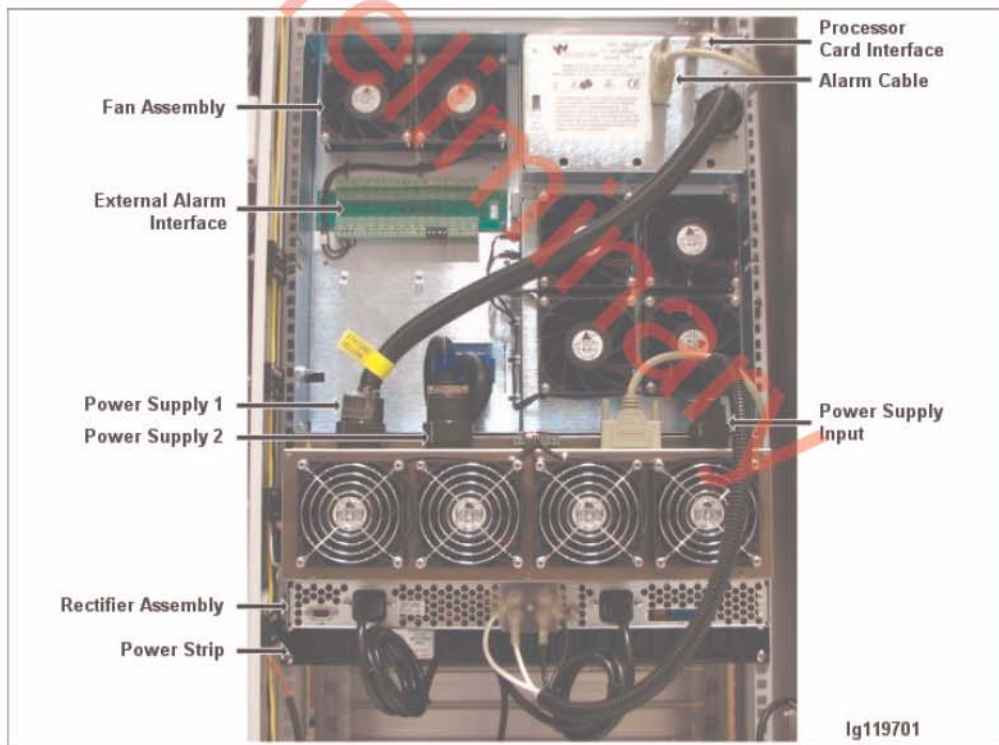


Figure 1-14: Micro Subrack and Power Supply Assembly Rear View

Please proceed to Chapter 2 - Installation to install your Micro BTS.

CHAPTER 2 - INSTALLATION

Content	Page
2.1 ANALYZING SITE REQUIREMENTS	24
2.1.1 Environmental Conditions	24
2.1.2 Electrical Requirements	25
2.1.3 Chassis Requirements	25
2.2 MOUNTING THE MICRO BTS CHASSIS	30
2.2.1 Rack Installation	31
2.2.2 Enclosure Installation	37
2.3 CONFIGURING THE E1 OR T1 TRUNK CARD	41
2.3.1 Configuring Ground Jumpers on 75 ohm E1 Cards	42
2.3.2 Configuring Cable Length DIP Switch Settings on T1 Cards	44
2.4 CONNECTING GROUND CABLES	46
2.4.1 Connecting the Grounding Cable	46
2.4.2 Grounding the Cabinet	47
2.5 CONNECTING POWER SUPPLIES	48
2.5.1 Connecting AC Power	50
2.5.2 Connecting DC Power	53
2.6 CONNECTING E1 OR T1 TRUNK CABLES	58
2.6.1 E1 Cables	58
2.6.2 100 ohm T1 Cables	60
2.6.3 Connecting E1 or T1 Lines	60
2.6.4 Direct Cabling Between Multiple UltraWAVE or WAVExpress Systems	61
2.7 CONNECTING ANTENNAS	62
2.7.1 Omni 1 TRX (O1) Configuration	63
2.7.2 Omni 2 TRX (O2) Configuration	64
2.7.3 Omni 3 TRX (O3) Configuration	64
2.7.4 Sectorized Three TRX (S111) Configuration	65
2.7.5 Three Sector Six TRX (S222) Configuration	66
2.7.6 RF Radiation Hazard	67
2.8 CONNECTING EXTERNAL ALARMS	69
2.9 MAKING A SERIAL CONNECTION TO THE PROCESSOR CARD	73
2.10 POST INSTALLATION CABLING AND CHECKS	74
2.10.1 Connecting the Chassis	74
2.10.2 Verifying External Cabling	74

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 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](#).



Caution: 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: Operating Environment

SCALE	HUMIDITY (NON-CONDENSING)	TEMPERATURE (CELSIUS)	TEMPERATURE (FAHRENHEIT)
Minimum	10%	-5 degrees	23 degrees
Maximum	90%	55 degrees	131 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.

2.1.2.1 Power Options

Main power supply options for the Micro BTS are:

- 220 VAC auto-ranging, 50-60 Hz (using a rectifier)
- -40 VDC to -60 VDC (-48 VDC input), 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 shows the weights of various components of the Micro BTS subrack assembly.

Table 2-4: Micro BTS Component Weights

COMPONENT	WEIGHT (IMPERIAL, METRIC)
Chassis	48 lbs (21.77 kg)
RF Module	19 lbs (8.62 kg)
ICP	1.5 lbs (0.68 kg)
E1card	1 lb (0.45 kg)
Clock	0.25 lb (0.11 kg)

Table 2-5 shows the dimensions of the Micro BTS subrack assembly.

Table 2-5: Micro BTS Chassis Dimensions

SCALE	HEIGHT	WIDTH	DEPTH
Metric	39.93 cm	48.26 cm	43.82 cm
Imperial	15.72 in	19.0 in	17.25 in

Table 2-6 shows the dimensions of the power supply rack.

Table 2-6: Power Supply Rack Dimensions

SCALE	WEIGHT (MAXIMUM CONFIGURATION)	HEIGHT	WIDTH	DEPTH
Metric	23.8 kg	13 cm (DC)	48.26 cm	51.44 cm
Imperial	52.35 lbs	5.2 in (DC)	19.0 in	20.25 in

Table 2-7 and Figure 2-1 provide the dimensions of the BTS cabinet. For detailed cabinet dimensions, refer to Section 2.2.

Table 2-7: Micro BTS Cabinet Dimensions

SCALE	WEIGHT (MAXIMUM CONFIGURATION)	HEIGHT	WIDTH	DEPTH
Metric	213 kg	105.1 cm	56.0 cm	64.77 cm

Table 2-7: Micro BTS Cabinet Dimensions

SCALE	WEIGHT (MAXIMUM CONFIGURATION)	HEIGHT	WIDTH	DEPTH
Imperial	470 lbs	41.38 in	22.05 in	25.5 in



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

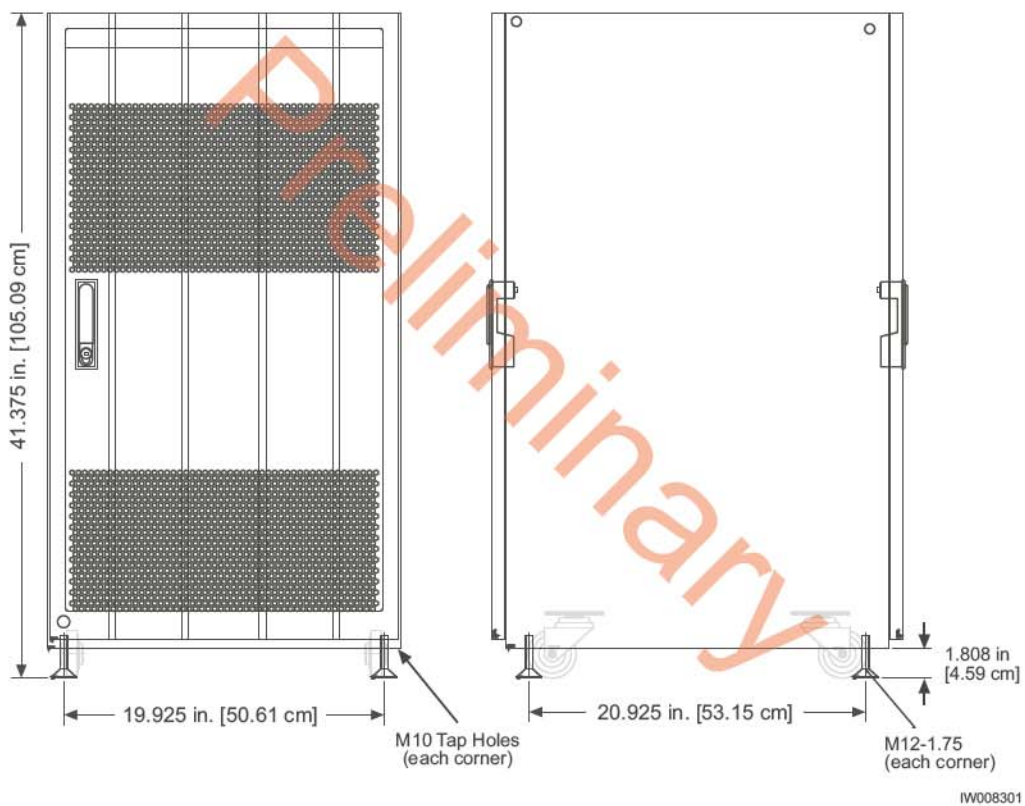


Figure 2-1: Cabinet Footing Dimensions



Note: The steps for site readiness are listed in Checklist 1 - Site Readiness Checklist.

2.1.3.1 VAC Configurations

Micro BTS configurations running on an AC power supply require a rectifier in addition to the above equipment.

On AC configurations a rectifier assembly **MUST** be used to provide DC power to the Micro BTS power supply. Table 2-8 details the weight and dimensions of the supplied 1U rectifier assembly. The assembly contains two rectifiers, each with its own AC input. The rectifier assembly outputs a -48 VDC to the Micro BTS power supply.

Table 2-8: Rectifier Assembly Dimensions

SCALE	WEIGHT	HEIGHT	WIDTH	DEPTH
Metric	11.1 kg	4.5 cm	44.12 cm	47.93 cm
Imperial	24.5 lbs	1.75 in	17.37 in	18.87 in

VAC power is supplied to the rectifiers via a 10A power strip (See Table 2-9). This is fixed underneath the rear of the rectifier assembly to support its weight. See Figure 2-2.

The 10A power strip supplies 230 VAC 10A power to the rectifier. Table 2-9 displays the weight and dimensions of the 1U power strip. A 10A circuit breaker switch and power switch are located at the rear of the power strip. Eight power sockets are also located on the rear but only two of these may be used - one each to power the two rectifier modules in the rectifier assembly.



Note: The power strip **SHOULD NOT** be used to power anything other than the rectifier assembly.

Table 2-9: Power Strip Dimensions

SCALE	WEIGHT	HEIGHT	WIDTH	DEPTH
Metric	1.16 kg	4.5 cm	44.45 cm	7.62 cm
Imperial	2.55 lbs	1.75 in	17.5 in	3 in

Figure 2-2 displays how the rectifier and power strip assemblies are fixed underneath the power supply.



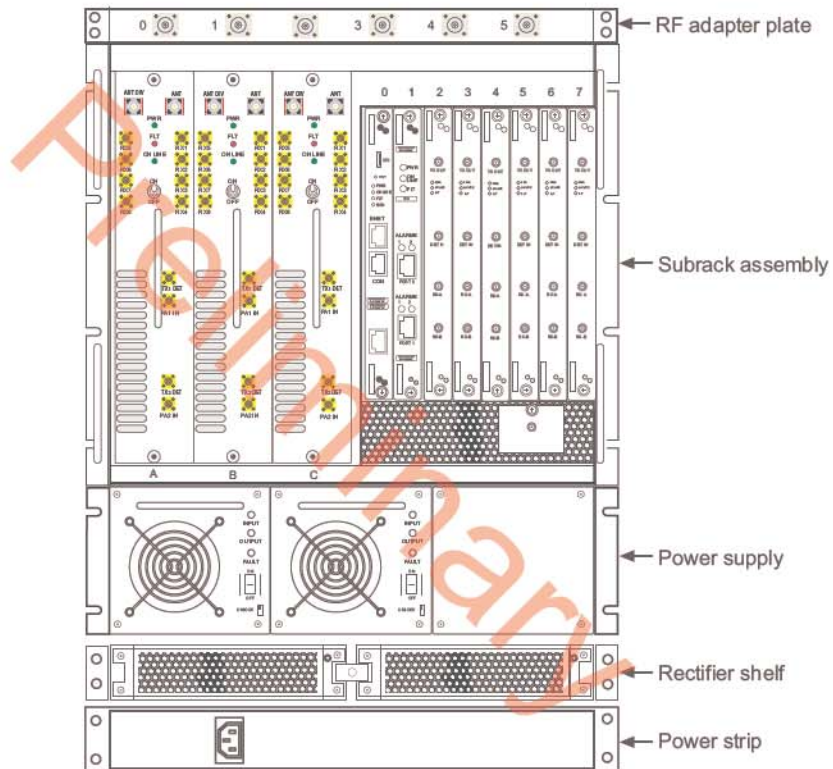
Figure 2-2: Power Supply, Rectifier, and Power Strip Rear

Preliminary

2.2 MOUNTING THE MICRO BTS CHASSIS

The Micro BTS chassis is available either pre-assembled in a cabinet enclosure, or as separate assemblies to be installed in a rack. These assemblies include an RF adapter interface, a subrack assembly, and a power supply.

In a VAC configuration, the Micro BTS also requires rectifier and power strip assemblies. Configurations using VDC as an external power supply do not need a rectifier or power strip.



AD228802

Figure 2-3: Micro BTS Assemblies

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 installation. 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.



Note: 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 inch (2.54 cm) and the minimum clearance required behind the chassis is 1 inch (2.54 cm). The mounting site should also have ample clearance for the trunk cables to be attached to the front panel connectors.

2.2.1.1 Required Materials

- 20 standard 19" (48.26 cm) rack mount screws (customer-provided)
- One standard 19" rack mount shelf assembly, shown in Figure 2-4, including:
 - 1U N-type RF adapter plate
 - 1U Power supply support bracket
 - N-type to N-type rigid RF cable

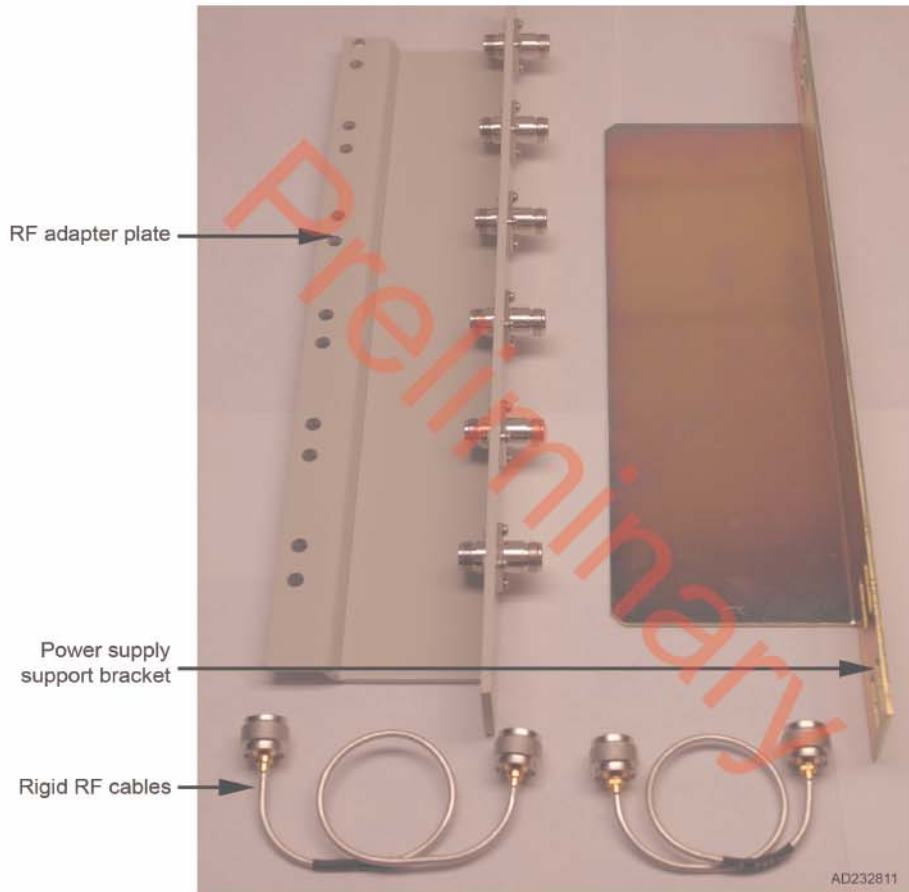


Figure 2-4: Rack Mount Assembly

2.2.1.2 Optional Materials

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

2.2.1.3 Required Tools

- Rack mount screwdriver

2.2.1.4 Rack Mount Advisory

Caution: 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.

2.2.1.5 Installation Instructions

- 1 Depending on your Micro BTS configuration, you will need space in your rack for the following:
 - Nine rack units of space in your 19" rack for the Micro BS Plus card cage assembly
 - Three rack units of space for the power supply module rack assembly
 - One rack unit of space for the RF adapter plate

If using AC current to power the unit, you ALSO need:

- One rack unit of space for the rectifier assembly
 - One rack unit of space for the AC power strip
- 2 The rack mount brackets have cutouts to accommodate the 19" (48.26 cm) rack screws. Using two people, carefully align the power supply assembly with the rack holes and identify rack holes for the rear power supply support bracket.
 - 3 Mount and secure the rear power supply support bracket using customer-provided rack screws.
 - 4 Carefully mount and secure the power supply assembly, as shown in Figure 2-5, ensuring the rear of the assembly is supported by the support bracket.
 - 5 Using the same procedure, align and mount the power supply subrack assembly below the Micro BTS subrack assembly, as shown in Figure 2-5.



Note: 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.