



MOTOROLA

Cellular Networks

APPLICANT: MOTOROLA

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Commissioning Manual Exhibit

UBS CDMA XMI Transceiver at 800MHz

1X UBS Macro BTS Optimization/ATP

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1X UBS Macro BTS Optimization/ATP

Revision history

Version information

The following shows the status of this document since it was first released.

Issue	Date of issue	Remarks
1	AUG 2007	Initial DRAFT
2	AUG 2007	DRAFT Update
3	AUG 2007	Preliminary - Added 800 and 1.9 MHz information to Appendix C and Created Appendix G for SSI Span and CIO Loopback Connector information.
4	AUG 2007	Preliminary - More Engineering updates.
5	SEP 2007	FOA - Added in EV-DO ATP reference to Chapter 4.

Resolution of Service Requests

The following Service Requests are resolved in this document:

Service Request	CMBP Number	Remarks
NA	NA	Initial release

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ALT-f or ALT+F	Press the Alt and F keys at the same time.
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Warning text and consequence for not following the instructions in the warning.

Cautions

Cautions precede instructions and are used when there is a possibility of damage to systems, software, or individual items of equipment within a system. However, this damage presents no danger to personnel. A caution has the following format:



Caution text and consequence for not following the instructions in the caution.

Notes

A note means that there is a possibility of an undesirable situation or provides additional information to help the reader understand a topic or concept. A note has the following format:



Note text.

Safety

General safety

The following general safety guidelines apply to Motorola equipment:

- The power jack and mating plug of the power cable must meet International Electrotechnical Commission (IEC) safety standards.



NOTE

Refer to *Grounding Guideline for Cellular Radio Installations – 68P81150E62*.

- Power down or unplug the equipment before servicing.
- Using non-Motorola parts for repair could damage the equipment or void warranty. Contact Motorola Warranty and Repair for service and repair instructions.
- Portions of Motorola equipment may be damaged from exposure to electrostatic discharge. Use precautions to prevent damage.

Electromagnetic energy

Relevant standards (USA and EC) applicable when working with RF equipment are:

- *ANSI IEEE C95.1-1991, IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.*
- Council recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (1999/519/EC) and respective national regulations.
- *Directive 2004/40/EC of the European Parliament and of the Council of 29 April 2004 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields) (18th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC).*

Caring for the environment

The following information describes national or regional requirements for the disposal of Motorola supplied equipment and for the approved disposal of surplus packaging.

Contact the Customer Network Resolution Center (CNRC) for assistance. The 24-hour telephone numbers are listed at <https://mynetworksupport.motorola.com>. Select **Customer Network Resolution Center contact information**. Alternatively if you do not have access to CNRC or the internet, contact the Local Motorola Office.

In EU countries

The following information is provided to enable regulatory compliance with the European Union (EU) directives identified and any amendments made to these directives when using Motorola equipment in EU countries.



Disposal of Motorola equipment

European Union (EU) Directive 2002/96/EC Waste Electrical and Electronic Equipment (WEEE)

Do not dispose of Motorola equipment in landfill sites. In the EU, Motorola in conjunction with a recycling partner ensures that equipment is collected and recycled according to the requirements of EU environmental law.

Disposal of surplus packaging

European Parliament and Council Directive 94/62/EC Packaging and Packaging Waste

Do not dispose of surplus packaging in landfill sites. In the EU, it is the individual recipient's responsibility to ensure that packaging materials are collected and recycled according to the requirements of EU environmental law.

In non-EU countries

In non-EU countries, dispose of Motorola equipment and all surplus packaging in accordance with national and regional regulations.

CMM labeling and disclosure table

The People’s Republic of China require that our products comply with China Management Methods (CMM) environmental regulations. (China Management Methods refers to the regulation *Management Methods for Controlling Pollution by Electronic Information Products*.) Two items are used to demonstrate compliance; the label and the disclosure table.

The label is placed in a customer visible position on the product.

- Logo 1 means the product contains no substances in excess of the maximum concentration value for materials identified in the China Management Methods regulation.
- Logo 2 means that the product may contain substances in excess of the maximum concentration value for materials identified in the China Management Methods regulation, and has an Environmental Friendly Use Period (EFUP) in years, fifty years in the example shown.



The Environmental Friendly Use Period (EFUP) is the period (in years) during which the Toxic and Hazardous Substances (T&HS) contained in the Electronic Information Product (EIP) will not leak or mutate causing environmental pollution, or bodily injury from the use of the EIP. The EFUP indicated by the Logo 2 label applies to a product and all its parts. Certain field-replaceable parts, such as battery modules, can have a different EFUP and are marked separately.

The Disclosure table is intended only to communicate compliance with China requirements. It is not intended to communicate compliance with EU RoHS or any other environmental requirements.

Disclosure table

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr ⁶⁺)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
金属部件	×	○	×	×	○	○
电路模块	×	○	×	×	○	○
电缆及电缆组件	×	○	×	×	○	○
塑料和聚合物部件	○	○	○	○	○	×

○： 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。
 ×： 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。

Motorola document set

The Motorola document sets provide the information to operate, install, and maintain the Motorola equipment.

Ordering documents and CD-ROMs

With internet access available, to view, download, or order documents (original or revised), visit the Motorola Lifecycles Customer web page at <https://mynetworksupport.motorola.com>, or contact your Motorola account representative.

Without internet access available, order hard copy documents or CD-ROMs with your Motorola Local Office or Representative.

If Motorola changes the content of a document after the original printing date, Motorola publishes a new version with the same part number but a different revision character.

Document banner definitions

A banner (oversized text on the bottom of the page, for example, **PRELIMINARY — UNDER DEVELOPMENT**) indicates that some information contained in the document is not yet approved for general customer use.

Data encryption

In order to avoid electronic eavesdropping, data passing between certain elements in the network is encrypted. In order to comply with the export and import requirements of particular countries, this encryption occurs at different levels as individually standardized, or may not be present at all in some parts of the network in which it is normally implemented. The document set, of which this document is a part, covers encryption as if fully implemented. Because the rules differ in individual countries, limitations on the encryption included in the particular software being delivered, are covered in the Release Notes that accompany the individual software release.

Supplemental information

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Introduction

Scope and Layout

Scope



CAUTION

The procedures in this manual require the use of Local Maintenance Facility (LMF) application software version 2.20.x.x or later.

This publication provides information pertaining to the optimization, calibration, and acceptance testing of the UBS Macro. Throughout the manual UBS Macro will be referred to as UBS.



NOTE

The equipment shown in many of the figures is typical. The actual appearance may vary slightly.

Assumptions

This document assumes that the UBS and cabling have been installed according to the following manuals:

- *Frame Mounting Guide; 68P09226A18*, which covers the physical *bolt down* of all equipment frames.
- *1X UBS Macro BTS Hardware Installation; 68P09283A62*, which covers installation and cabling configurations for the UBS Macro.

Audience

Motorola has attempted to incorporate into this document the many customer suggestions and comments received. Additionally, an attempt has been made to ensure that the scope of the document supports both the novice and expert site technician and engineer with the information required to successfully perform the task at hand. If, in some areas, the manual seems to cover a subject with too much or not enough detail, please keep this in mind.

Intended Reader Profile

The information in this manual set is intended for use by cellular communications personnel in the initial installation and configuration, as well as the day-to-day operation and maintenance of a UBS.

The user of this information must have a general understanding of telephony, as used in the operation of the Public Switched Telephone Network (PSTN), and must be familiar with these concepts as they are applied in the cellular and mobile/portable radio telephone maintenance environment.

The user also must have a working knowledge of Windows 2000 or Windows XP™.

Publication Composition

This publication covers the following areas.

- Introduction: preliminary background information (such as component and subassembly locations and UBS layouts) to be considered by the Cellular Field Engineer (CFE) before optimization or tests are performed.
- Preliminary Operations: UBS subassemblies, pre-power up tests, initial power application, and power-up tests for the UBS after installation.
- Optimization: code syncing all UBS processor boards, test equipment setup and calibration, UBS verification, radio frequency (RF) path verification, and RF calibration as necessary.
- Field Verification: At the site the UBS is assembled per the installation manual and tested using TX Audit and RSSI procedures.
- Acceptance Test Procedures (ATP): automated ATP scripts executed by the LMF and used to verify all major transmit (TX) and receive (RX) performance characteristics on all UBS equipment. Includes generating an ATP report. Using the full ATP is optional.
- Prepare to Leave the Site: site turnover process after ATP is completed.
- Basic Troubleshooting: procedures to perform when an ATP fails, as well as when incorrect results are obtained during logon, test equipment operation, audit, and Global Positioning System (GPS) operation. These tests are typically used to isolate faults down to the module level. Also provided is additional information necessary to better understand equipment operation.
- Appendices containing data sheets to be filled out manually by the CFE at the site, optimization/ATP matrix, output power data tables, CDMA operating frequency programming information, and manual test setup information. .

Purpose of Optimization

Why Optimize?

Proper optimization, also known as RF calibration or calibration, ensures that:

- Accurate downlink RF power levels are transmitted from the site.
- Accurate uplink signal strength determinations are made by the site.

What is Calibration?

Calibration compensates for the site-specific cabling and normal equipment variations. Site calibration takes into account the combined losses of the cables and the gain/loss characteristics and built-intolerances of each UBS do not accumulate and cause improper site operation.

UBS systems are fully calibrated prior to leaving the factory. Normal installations will not require additional calibration. Only those installations that deviate significantly from that described in the installation manual will require site calibration.



NOTE

Calibration at the site is an option for the UBS. Motorola provides this capability if the customer needs to perform calibration of one or more carriers.

What Happens During Calibration?

Overview

During calibration, the accumulated path loss or gain is first determined for each RF transmit path in the UBS. These transmit path loss or gain values are then stored in a database along with RF receive path default values.

RF Path Definitions

For definitions of the UBS transmit (TX) and receive (RX) paths, see *What is Bay Level Offset Calibration?* in the Bay Level Offset Calibration section.

UBS Calibration

Calibration of the UBS will not be performed at the site. At the factory the XMI (Transceiver Module Internal) is calibrated to a predetermined output level prior to installation in the UBS.

Using RF Path Gain/Loss Values

Since the XMI power levels are calibrated at the factory, only site-specific antenna feed line loss and antenna gain characteristics need to be factored in by the CFE when determining required site Effective Radiated Power (ERP) output power levels.

When to Perform UBS Acceptance Testing

This section summarizes Motorola-recommended UBS transmit RF path calibration, forward and reverse RF path integrity and operation verification, and other acceptance testing. Specific calibration and testing recommendations are included for troubleshooting and for use after the following listed installation/upgrade activities:

- New UBS installation
- Site RF re-configurations or repairs

New Installations Objectives

- Verify forward (transmit) RF paths
- Verify reverse (receive) RF path performance
- Verify HDModem operation for a new BTS installation

Recommended Actions

Perform the following actions after initial power-up, code syncing, and verifying GPS operation:

- TX Audit of all transmit RF paths to verify UBS calibration is within tolerance
- Perform RSSI on both RF receive paths
- Perform any other acceptance tests required to demonstrate compliance with applicable regulatory requirements.

Additional Action for a New UBS Installation

In addition to RF acceptance testing, the following non-RF setup and verification actions must be performed at a new UBS site:

- Configure Backhaul
- Customer Input/Output verification
- Span Line Loopback Test

Periodic Optimization

Periodic RF optimization or frequency calibration of a UBS Macro site is not typically required.

General Test Equipment Selection, Calibration, and Operation Requirements

Policy

General Requirements – To ensure consistent, reliable, and repeatable UBS calibration results, test equipment and software meeting the following technical criteria should be used for UBS calibration.

Test equipment substitution – Test equipment can be substituted with other test equipment models, but substitute items must meet the same technical specifications. All test equipment models selected for use in UBS calibration and acceptance testing must be supported by the LMF.

Measurement variances and test equipment substitution – It is the responsibility of the customer to account for any measurement variances and/or additional losses/inaccuracies which can be introduced as a result of test equipment item substitutions. Before beginning UBS calibration or troubleshooting, make sure that the test equipment needed is on-hand and operating properly.

Test Equipment Calibration

Optimal system performance and capacity depend on regular support equipment service and calibration prior to its use for UBS calibration. Follow the original equipment manufacturer (OEM) recommended maintenance and calibration schedules closely.

Test Cable Calibration

On-site cable calibration – Test cables can make critical differences in calibration accuracy. Motorola recommends that cable calibration be run at every UBS with the complete test equipment set. This method compensates for test cable insertion loss within the test equipment set itself. No other allowance for test cable insertion loss needs to be made during the performance of UBS calibration or acceptance tests.

In-shop cable characterization – Another method to account for cable loss is by entering it into the LMF prior to the calibration procedure. This method requires accurate test cable characterization using shop test equipment. Characterized cables should be tagged with the characterization information, and the measured losses entered into the LMF before performing UBS calibration.

Equipment Warm-up

After arriving at the a site, the test equipment should be plugged in and turned on to allow warm up and stabilization for as long as possible. The following test equipment items must be warmed up for a minimum of 60 minutes prior to use for UBS calibration.

- Communications Test Set
- Power Meter

Required Test Equipment and Software

Overview

Test equipment and software described in this section is required for the calibration and acceptance testing procedures. Common tools such as screwdrivers and frame keys are also needed. Read the operators manual for all test equipment items to understand their individual operation before using them for calibration or acceptance testing.

LMF Computer and Software

LMF Hardware Requirements

An LMF computer platform that meets the following minimum requirements (or better) is recommended:

- 533 MHz (1 GHz or higher recommended) Pentium processor
- Windows 2000 or Windows XP operating system
- 4 GB internal hard disk drive or larger
- Color display with 1024 x 768
- Memory requirements: 256 MB (500 MB recommended)
- CD/DVD drive
- Serial port COM 1
- Serial port COM 2 for SC™ 6XX and serial versions of SC™ 3XX
- Ethernet Hub or Switch (recommended with 10Base2 port, for example 3Com® OfficeConnect® Ethernet Hub 4C) 10Base2/10BaseT Converter (only if switch doesn't have 10Base2 port, for example Unicom ETP-20038T)

LMF Software

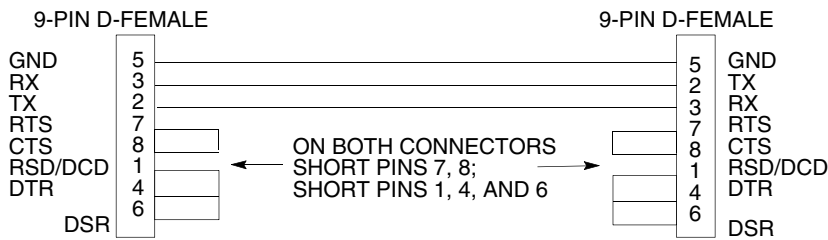
The Local Maintenance Facility (LMF) application program is a graphical user interface (GUI)-based software tool. This product is specifically designed to provide cellular communications field personnel with the capability to support the following UBS operations:

- Installation
- Maintenance
- Calibration

RS-232 to GPIB Interface

- National Instruments GPIB-232CT-A is used to interface the LMF to the test equipment.
- Standard RS-232 cable can be used with the following modifications (see [Figure 1-1](#))
 - This solution passes only the 3 minimum electrical connections between the LMF and the General Purpose Information Bus (GPIB) interface. The control signals are jumpered as enabled on both ends of the RS-232 cable (9-pin D). TX and RX signals are crossed as Null Modem effect. Pin 5 is the ground reference.
 - Short pins 7 and 8 together, and short pins 1, 4, and 6 together on each connector.

Figure 1-1 Null Modem Cable Detail



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Communications System Analyzer CDMA/Analog

Table 1-1 CDMA LMF Test Equipment Support Table

Item	Description	Test Capability
Test Sets		
Agilent 8935 (formerly HP8935)	Communication Test Set	CDMA 2000 Testing
Agilent E4406A (with E4432B)	Communications Analyzer with Agilent E4432B CDMA Signal Generator	CDMA 2000 testing
Advantest R3267 Analyzer (with R3562)	Communications Analyzer with Advantest R3562 Generator	CDMA 2000 testing
Agilent E7495A/B	Communications test set	CDMA 2000 testing
Anritsu™ MT8212B	Multi-purpose test set	CDMA 2000 testing
Power Meters		
Gigatronix 8541C	Power Meter	
Agilent E4418	Power Meter	

A combination of test equipment supported by the LMF may also be used during calibration and testing of the RF communications portion of UBS equipment when the communications system analyzer does not perform all of the following functions:

- Frequency counter
- RF power meter (average)
- RF signal generator (capable of CDMA modulation)
- Spectrum analyzer
- CDMA code domain analyzer

GPIB Cables

- Hewlett Packard 10833A or equivalent; 1 to 2 meters (3 to 6 feet) long used to interconnect test equipment and LMF terminal.

Timing Reference Cables

- Two BNC-male to BNC-male RG316 cables; 3.05 m (10 ft.) long. Used to connect the communications analyzer to the timing reference in the UBS frame.

Digital Multimeter

- Fluke Model 8062A with Y8134 test lead kit or equivalent; used for precision DC and AC measurements, requiring 4-1/2 digits.

LMT Cable

RJ-45 to RJ-45 Cable, 6-8 feet long.

High-impedance Conductive Wrist Strap

- Motorola Model 42-80385A59; used to prevent damage from Electrostatic Discharge (ESD) when handling or working with modules.

Test Set Calibration Support Items

The *Anritsu* MT8212B requires the following additional items to perform the indicated calibrations:

- For standard Open-Short-Load (OSL) calibration:
 - *Anritsu* 22N50 Open/Short, DC to 18 GHz, N(m) connector, 50 ohm
 - *Anritsu* SM/PL precision load, DC-to-4 GHz, 42 dB, N(m) connector, 50 ohm
- For standard InstaCal™ calibration:
 - *Anritsu* ICN50 *InstaCal* calibration module, 2 MHz to 4 GHz, N(m) connector, 50 ohm

Optional Test Equipment



NOTE

Not all optional equipment specified here will be supported by the LMF in automated tests or when executing various measure type command line interface (CLI) commands. It is meant to serve as a list of additional equipment that might be required during maintenance and troubleshooting operations.

High Stability 10 MHz Rubidium Standard

Stanford Research Systems SR625 or equivalent – required for Quartz High Stability Oscillator (QHSO) frequency verification.

Spectrum Analyzer

- Spectrum Analyzer (HP8594E with CDMA personality card) or equivalent; required for manual tests.

Oscilloscope

- Tektronics Model 2445 or equivalent; for waveform viewing, timing, and measurements or during general troubleshooting procedure.

Required Documents

Required Documents

The following documents are required to perform optimization of the cell site equipment:

- Site Document (generated by Motorola Systems Engineering), which includes:
 - General site information
 - Floor plan
 - RF power levels
 - Frequency plan (includes Site PN and operating frequencies)
 - Channel allocation (paging, traffic, etc.)
 - Site wiring list
- Demarcation Document (Scope of Work Agreement)
- Equipment manuals for non-Motorola test equipment

Reference Documents

Additional, detailed information about the installation, operation, and maintenance of the UBS and its components is included in the following publications:

- *LMF Help function on-line documentation*
- *1X UBS Macro BTS Hardware Installation; 68P09283A62*
- *1X UBS Macro BTS FRU; 68P09283A64*
- *1X UBS Macro BTS Upgrade; 68P09283A65*
- *Frame Mounting Guide; 68P09226A18*
- *WinLMF CDMA CLI Commands – 68P09275A12*
- *CRMS P110 User Guide; 68889192V22*
- *1x EV-DO System ATP; 68P09283A59*

Abbreviations and Acronyms

[Table 1-2](#) lists the acronyms and abbreviations used in this manual.

Table 1-2 Abbreviations and Acronyms

Name	Description
1X	One of two bandwidths currently defined in the IS-2000 CDMA specification, which extends the capability of the IS-95A and B specifications. 1X bandwidth provides wireless packet voice and data transmission capability at up to 144 Mbps.
ATP	Acceptance Test Procedure
BLO	Bay Level Offset
CA IN	Customer Alarm Input
CDMA	Code Division Multiple Access
CD Power	Code Domain Power
CD ROM	Disk Read Only Memory
CE	Channel Element
CFE	Cellular Field Engineer
CLI	Command Line Interface
CRMS	Cellular Remote Monitoring System
dB	Decibel
dBm	Decibel referenced to 1 milliwatt.
DMI	Digital Module Internal
DMM	Digital Multimeter
E-GPS	External Global Positioning System
EID	Electronic Identification
ENET	Ethernet
ESD	Electrostatic Discharge
EV-DO	Evolution Data Only
FER	Frame Erasure Rate
FREF OUT	Frequency Reference Output
FRU	Field Replaceable Unit
FTP	File Transfer Protocol
GPIB	General Purpose Interface Bus
GUI	Graphical User Interface
IDRF	Integrated Duplexer and Filter
INS	In Service
IP	Input (Customer alarm)
LMF	Line Maintenance Facility
LMT	Local Maintenance Tool

Continued

Table 1-2 Abbreviations and Acronyms (Continued)

Name	Description
MMI	Man-Machine Interface
MSO	Motorola Standard Oscillator (Medium Stability Oscillator)
NECB	Network Element Configuration Baseline. LMF will only read NECB files.
NECF	Network Element Configuration File. Term which includes both the NECB and NECJ files (<i>see NECB and NECJ</i>).
NECJ	Network Element Configuration Journal. NECJ contains subsequent, persistent changes to the database that are different from the data in the NECB file. In cases where the NECB and NECJ files indicate different values for the same parameter, BTS will use the value in the NECJ instead of the NECB
NIC	Network Interface Card
OCNS	Orthogonal Channel Noise Source
OCXO	Oven Controlled Crystal Oscillator (See MSO)
OEM	Original Equipment Manufacturer
OMC-R	Operation and Maintenance Center-Radio
OOS	Out-of-Service
OP	Output (Customer Alarm)
PN	Part Number
PDU	Power Distribution Unit
PSM	Power Supply Module
QHSO	Quartz High Stability Oscillator
RF GPS	Radio Frequency Global Positioning System
RGPS	Remote Global Positioning System
Rho	TX Waveform Quality
RSSI	Receive Signal Strength Indicator
Rtrn	Return
RX	Receive
SSI	Site Span Input / Output
TCH	Traffic Channels
TCP	Transmission Control Protocol
TREF OUT	Timing Reference Output
TX	Transmit
TX Mask	Transmit Mask

Continued

Table 1-2 Abbreviations and Acronyms (Continued)

Name	Description
UBS	Universal Base Station
UDP	User datagram Protocol
VSWR	Voltage Standing Wave Ratio
XMI	Transceiver Module Internal

UBS Equipment Identification

Introduction

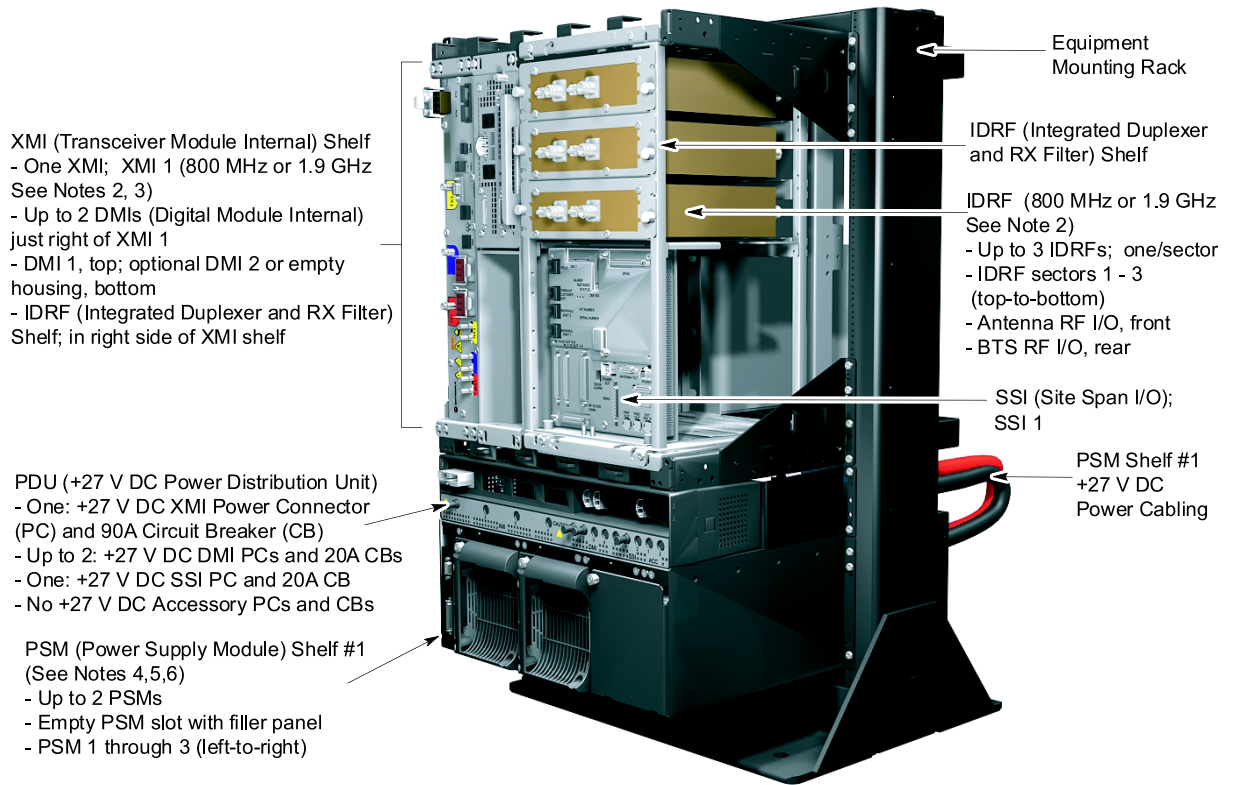
The UBS can be powered by the following nominal voltages:

- +27 VDC
- 154 to 300 VAC
- -48 VDC

The AC and -48V configurations require their respective Power Supply Modules (PSMs) be used.

The following figures show the various configurations of the UBS Macro.

Figure 1-2 UBS Macro Low Capacity / Low Tier



NOTES:

1. Interconnect cabling not shown for clarity.
2. 800 MHz equipment shown; 1.9 GHz similar.
3. 800 MHz XMI is 86 mm wide. 1.9 GHz XMI is 106.3 mm wide.
4. PSM shelf is optional and used instead of +27 V DC power Input.
5. PSM shelf is either -48 V DC or AC.
6. Only -48 V DC PSMs can be used in -48 V DC PSM shelf. Only AC PSMs can be used in AC PSM shelf.

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Figure 1-3 Low Capacity / High Tier

IDR (Integrated Duplexer and FX Filter) Shelf
 - Upto 3 IDRs (800 MHz or 1.9GHz
 See Note 2) one per sector
 - IDR Sector 1 through sector 3 (left-to-right)
 - Antenna FF I/O, top
 - BTS RF I/O, bottom

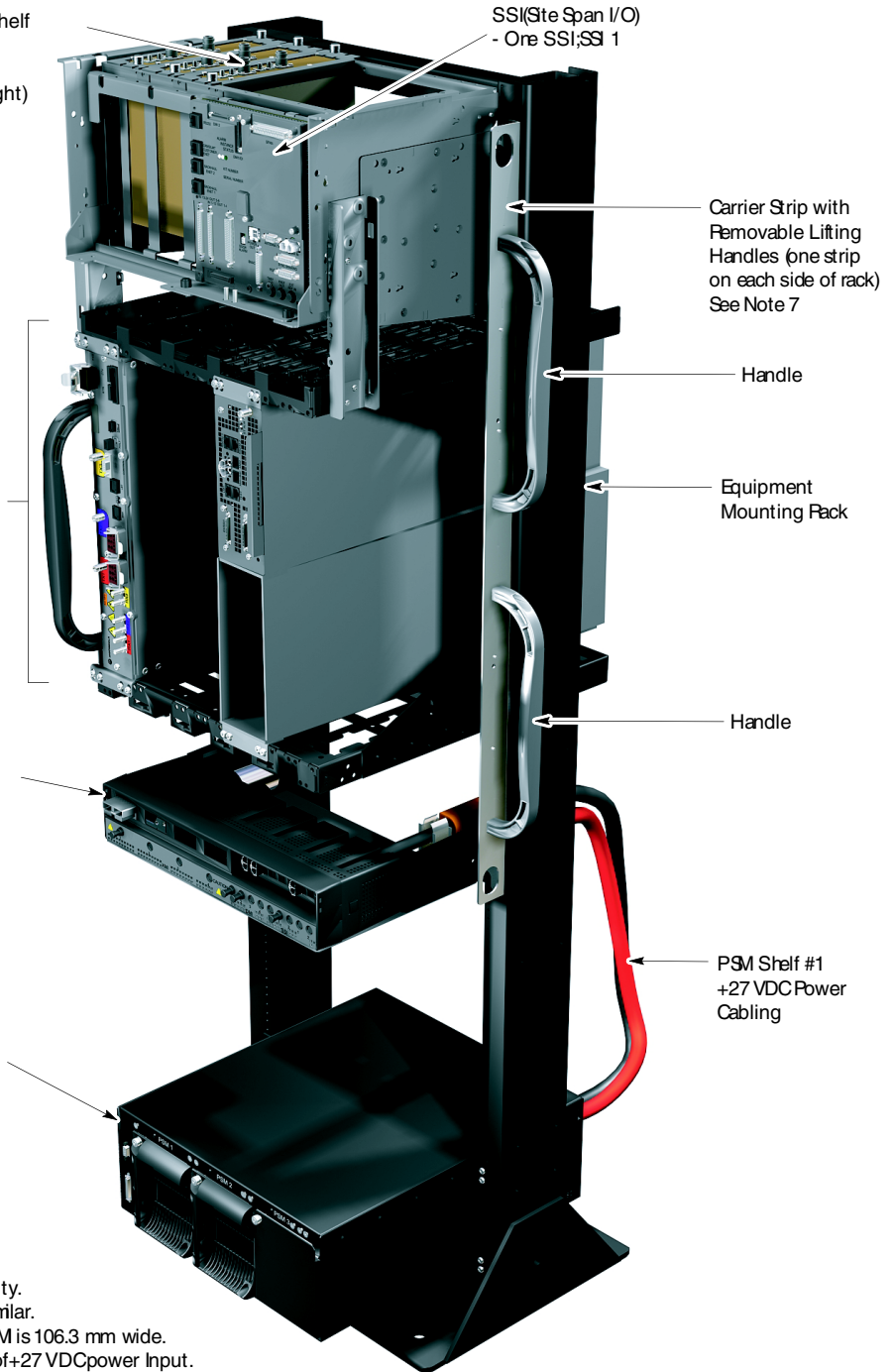
XMI (Transceiver Module Internal) Shelf
 - One XMI; XMI 1 (800 MHz or 1.9GHz
 See Notes 2, 3) XMI shelf slot 1
 - Upto 2 DMIs (Digital Module Internal)
 XMI shelf slot 4
 - DMI 1, top; optional DM 2 or empty
 housing, bottom

PDU (+27VDC Power Distribution Unit)
 See Note 8
 - One: +27VDC XMI Power Connector
 (PC) and 90A Circuit Breaker (CB)
 - Up to 2: +27VDC DMPs and 20A CBs
 - One: +27VDC SBFC and 20A CB
 - No +27VDC Accessory PCs and CBs

PSM (Power Supply Module) Shelf #1
 (See Notes 4,5,6)
 - Upto 3 PSMs
 - Empty PSM slot with filler panel
 - PSM 1 through 3 (left-to-right)

NOTES:

1. Interconnect cabling not shown for clarity.
2. 800 MHz equipment shown; 1.9 GHz similar.
3. 800 MHz XMI is 86 mm wide. 1.9 GHz XM is 106.3 mm wide.
4. PSM shelf is optional and used instead of +27 VDC power input.
5. PSM shelf is either -48 VDC or AC.
6. Only -48 VDC PSMs can be used in -48 VDC PSM shelf. Only AC PSMs can be used in AC PSM shelf.
7. Carrier strips are removable.
8. PDU may be moved down 6 rack units to ease future expansion.



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Figure 1-4 Mid-Capacity

IDRF (Integrated Duplexer and RX Filter) Shelf
 - Up to 6 IDRFs (800 MHz or 1.9 GHz See Note 2); two sets of IDRFs, each set with one IDRF per sector
 - IDRF sector 1 through sector 3 (left-to-right)
 - Antenna RF I/O, top
 - BTS RF I/O, bottom

SSI (Site Span I/O)
 - One SSI; SSI 1

XMI (Transceiver Module Internal) Shelf
 - Two XMIs (800 MHz or 1.9 GHz See Notes 2, 3); XMI 1, XMI 2 in XMI shelf slots 1, 2
 - Two DMIs (Digital Module Internal) XMI shelf slot 4
 - DMI 1, top; DMI 2, bottom

Carrier Strip with Removable Lifting Handles (one strip on each side of rack) See Note 7

Handle

Equipment Mounting Rack

RX Splitter

Handle

PDU (+27 VDC Power Distribution Unit)
 See Note 8
 - One: +27 VDC XMI Power Connector (PC) and 90A Circuit Breaker (CB)
 - Up to 2: +27 VDC DMI PCs and 20A CBs
 - One: +27 VDC SSI PC and 20A CB
 - No +27 VDC Accessory PCs and CBs

PSM Shelf #1
 +27 VDC Power Cabling

PSM (Power Supply Module) Shelf #1
 (See Notes 4,5,6)
 - Up to 3 PSMs
 - Empty PSM slot with filler panel
 - PSM 1 through 3 (left-to-right)

NOTES:

1. Interconnect cabling not shown for clarity.
2. 800 MHz equipment shown; 1.9 GHz similar.
3. 800 MHz XMI is 86 mm wide. 1.9 GHz XMI is 106.3 mm wide.
4. PSM shelf is optional and used instead of +27 VDC power Input.
5. PSM shelf is either -48 VDC or AC.
6. Only -48 VDC PSMs can be used in -48 VDC PSM shelf. Only AC PSMs can be used in AC PSM shelf.
7. Carrier strips are removable.
8. PDU may be moved down 6 rack units to ease future expansion.

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UBS Component Identification

The UBS is comprised of the following modules (see [Figure 1-2](#)):

- Power Distribution Unit (PDU)
- DMI (Digital Module Internal)
- XMI (Transceiver Module Internal)
- SSI (Site Span I/O)
- IDRf (Integrated Duplexers & RF Filters)
- CRMS (Cellular Remote Monitoring System)
- External GPS (Optional)
- QHSO (Optional)

Figure 1-5 UBS Site Span I/O Panel

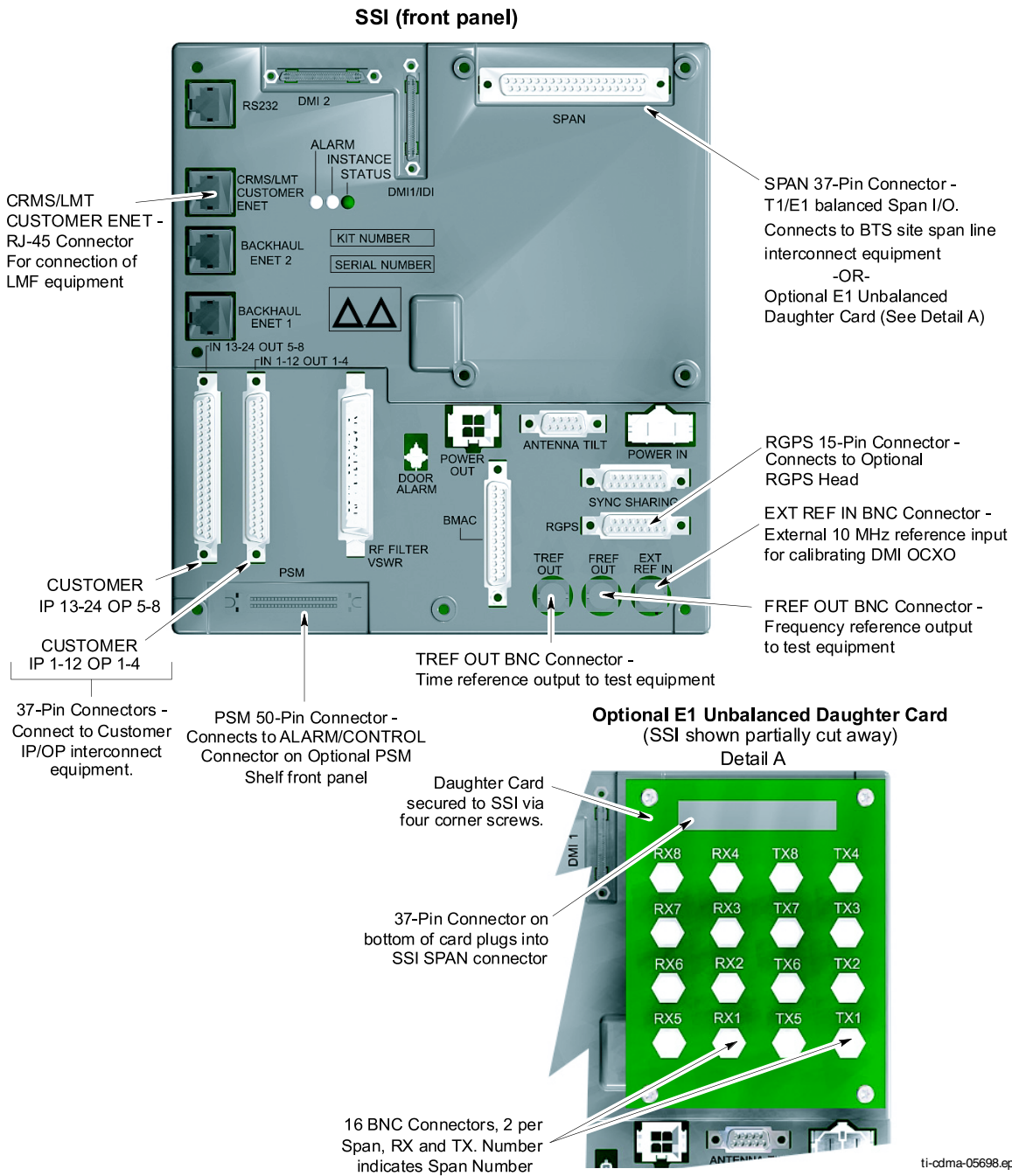
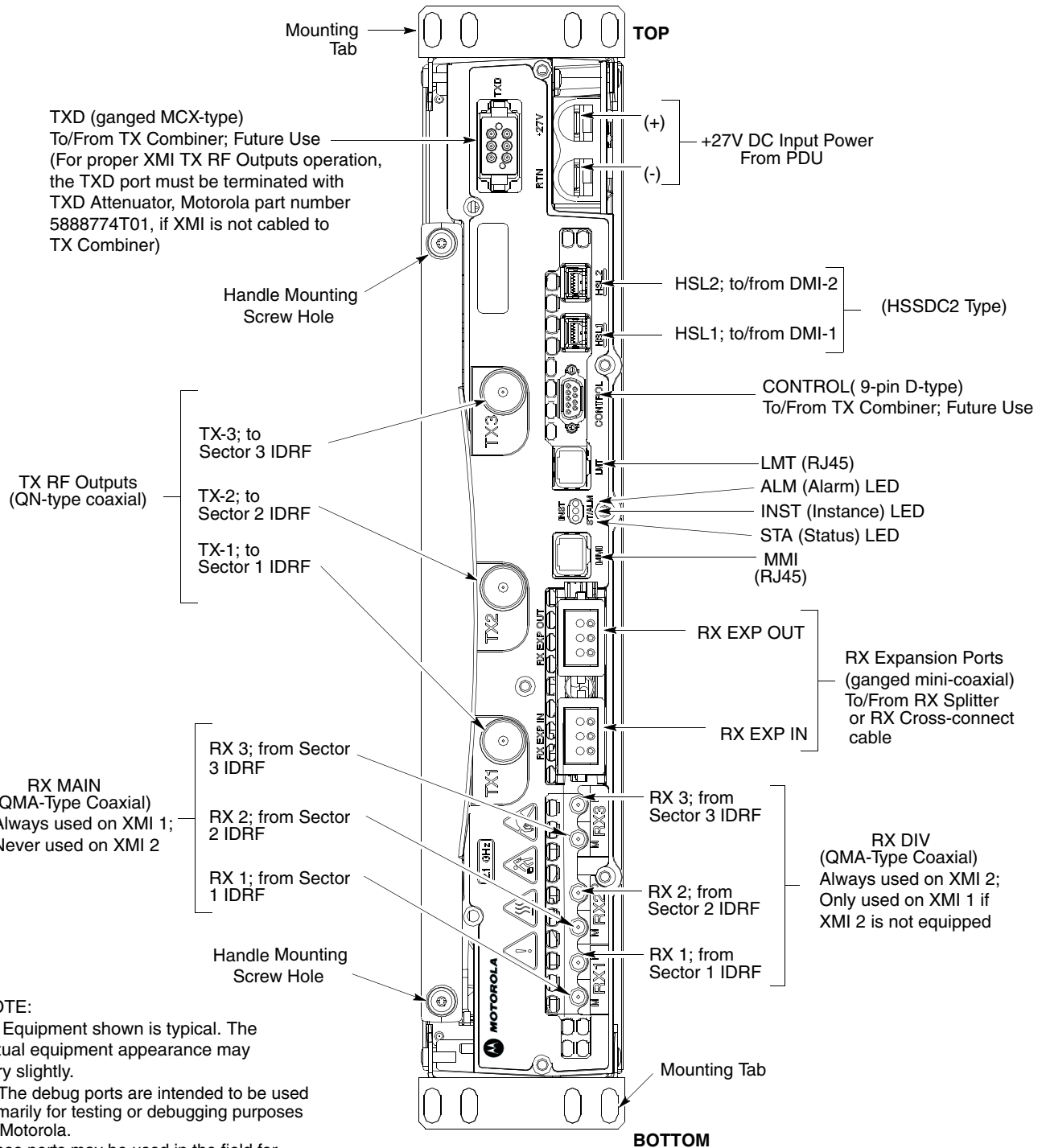
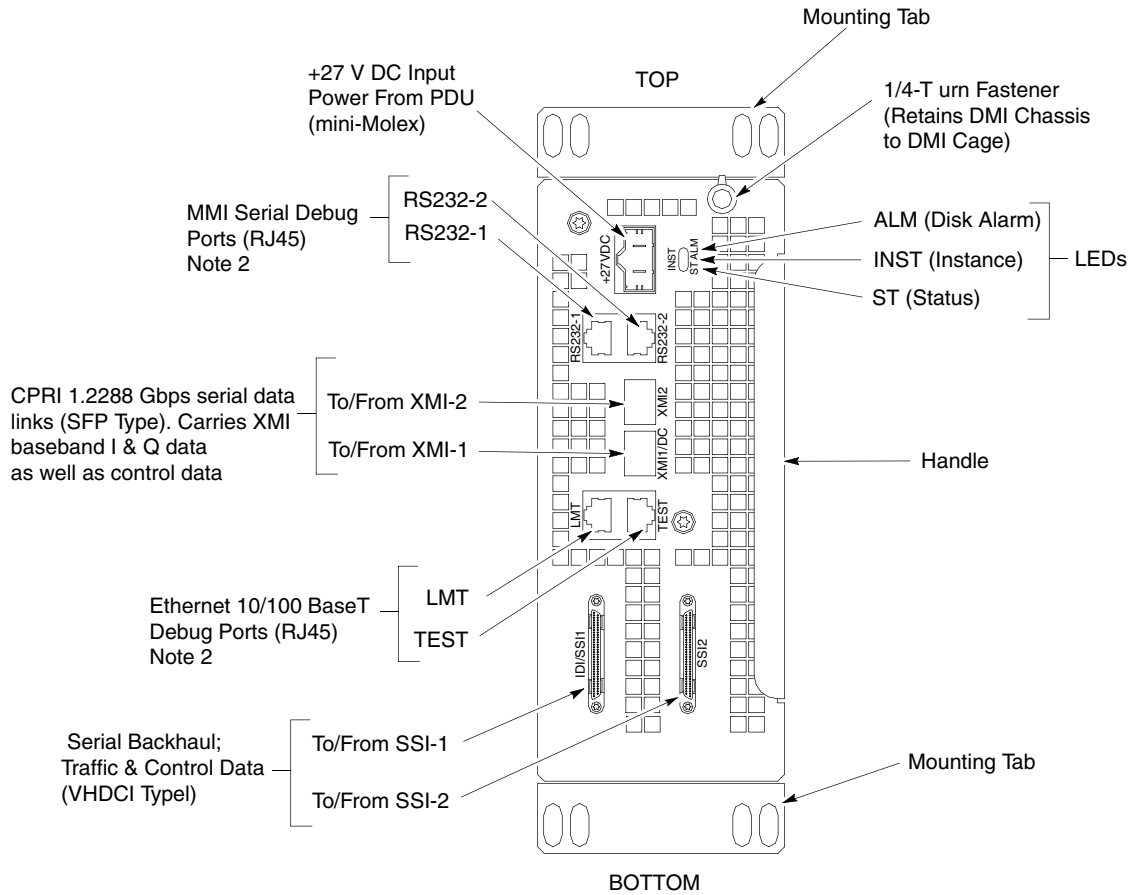


Figure 1-6 XMI Front Panel



ti-cdma-06106.eps

Figure 1-7 DMI Front Panel



NOTES:

1. Equipment shown is typical. The actual equipment appearance may vary slightly.
2. The debug ports are intended to be used primarily for testing or debugging purposes by Motorola. These ports may be used in the field for maintenance purposes by customers. Carefully follow written procedures when using these ports in the field. Failure to do so could result in an inoperable FRU.

ti-cdma-06111.eps

Preliminary Operations

Introduction

This section first verifies proper frame equipage.

Cell Site Types

Sites are configured as omni, 2-sector or 3-sector with a maximum of two carriers. For more information on the differences in site types, please refer to the 1X UBS Macro BTS Hardware Installation manual.

NEC Files

The Network Element Configuration (NEC) files contains site type and equipage data information and passes it directly to the LMF during optimization. The number of sector-carriers and carrier frequency assignments are two of the equipage data included in the NEC files.



CAUTION

Be sure that the correct `NECB-<version information>-bts#.xml` and `NECJ-<version information>-bts#.xml` files are used for the specific UBS site. These should be the NEC files that are provided for the UBS by the OMC-R. Code version of the UBS should be synched with the code in the OMC-R before leaving the site. Failure to use the correct NEC files can cause system errors. Failure to use the correct NEC files to log into a site can cause incorrect calibration information to be generated.

Site Equipage Verification

Review the site documentation. Match the site engineering equipage data to the UBS and optional equipment installed at the site. Physically inspect and verify the equipment provided for the UBS.



CAUTION

Always wear a conductive, high impedance wrist strap while handling any circuit card/module to prevent damage by ESD. After removal, the card/module should be placed on a conductive surface or back into the anti-static shipping container.

Pre-Powerup Tests

Objective

This procedure checks for any electrical short circuits and verifies the operation and tolerances of the cell site and UBS power supply units prior to applying power for the first time.

Test Equipment

The following test equipment is required to complete the pre-power-up tests:

- Digital Multimeter (DMM)



CAUTION

Always wear a conductive, high impedance wrist strap while handling any circuit card/module to prevent damage by Electrostatic Discharge (ESD).

Cabling Inspection

Using the site-specific documentation generated by Motorola Systems Engineering, verify that the following cable systems are properly installed according to the 1X UBS Macro Installation manual:

- Receive RF cabling
- Transmit RF cabling
- GPS cabling to E-GPS (GPS RF cable or RGPS cable from the RGPS antenna (if the EGPS option is not used))

DC Power Pre-Test

Before applying any power to the UBS, follow the procedure in [Procedure 2-1](#) to verify there are no shorts in the UBS DC distribution system.

Procedure 2-1 DC Power Pre-test (UBS)**NOTE**

When handling circuit boards and modules, be sure to wear a grounding strap to prevent damages caused by Electrostatic Discharge (ESD).

1	Verify that unit is a DC powered unit. <i>Physically verify</i> that all DC power sources supplying power to the UBS are OFF or disengaged.
2	Ensure that all available circuit breakers on PDU are disengaged (pulled out).
3	Verify that DC power cable is properly connected.
4	Enable power at the source. Use a DMM to verify that the power to the UBS is within specification.

Initial Power-up Tests

Power-up Procedures



WARNING

Potentially lethal voltage and current levels are routed to the UBS equipment. This test must be performed with a second person present, acting in a safety role. Remove all rings, jewelry, and wrist watches prior to beginning this test.

DC Input Power

In the tests to follow, before applying any power, verify the correct power feed and return cables are connected between the power supply breakers and the power connectors of the UBS.

Power will first be verified at the input to each UBS. After power is verified, modules within the UBS itself will be powered up and verified one at a time.

Motorola recommends that the DC input power cable used to connect the UBS to the main DC power source conforms to the guidelines outlined in *1X UBS Macro BTS Hardware Installation – 68P09283A62*.

Common Power Supply Verification

Perform [Procedure 2-2](#) on any UBS connected to the common power supply at the site after the common power supply has been installed and verified per the power supply OEM suggested procedures.



WARNING

Make sure the connector adapters are securely attached to each of the UBS power feeds and returns. Also, make sure the cables have been properly installed into each connector. Loose power cables may cause a fire.

Continued

Procedure 2-2 Procedure for Common Power Supply Verification

1	<i>Physically verify</i> that all DC power sources supplying the UBS are OFF or disengaged.
2	Visually inspect input cables, verify correct input power polarity. (Cables should be marked.)
3	Engage all available circuit breakers on PDU.
4	After power is applied to the UBS, use a DMM to verify power supply output voltages are within specifications.

Initial Power-up (Frame)

This procedure must be performed on each frame after input power from the common power supply has been verified. Follow the procedure in [Procedure 2-3](#) to apply initial power to the frame itself, verifying that it is operating within specification.

Procedure 2-3 Procedure for Initial Power-up (Frame)

1	Verify that power cable is properly connected. Set UBS power switch to ON.
2	Use a DMM to verify power supply output voltage remains within nominal specifications: +27V (<i>nominal</i>).

LMF Operation

Optimization/Calibration Introduction

Introduction

This section describes for using the Line Maintenance Facility (LMF) to verify the proper operation of the installed UBS system. Test setup and calibration are provided in support of the installation verification and optimization.



NOTE

Before using the WinLMF, use an editor to view the *CAVEATS* section in the *readme.html* file in the c:\wlmf folder for any applicable information.

Preparing the LMF

Overview

Before optimization can be performed, the LMF application software must be installed and configured on a computer platform meeting Motorola-specified requirements (see Recommended Test Equipment and Software in [Chapter 1 Introduction](#)).

Software and files for installation and updating of the LMF are provided on CD ROM disks. The following installation items must be available:

- LMF Program on CD ROM

The following section provides information and instructions for installing and updating the LMF software and files.

WinLMF File Structure Overview

The WinLMF uses a `<x>:\lmf home directory` folder that contains all of the essential data for installing and maintaining the UBS. The following list outlines the folder structure for LMF. Except for the UBS-# folders, these folders are created as part of the LMF installation. Refer to the *CDMA LMF Operator's Guide* for a complete description of the folder structure.