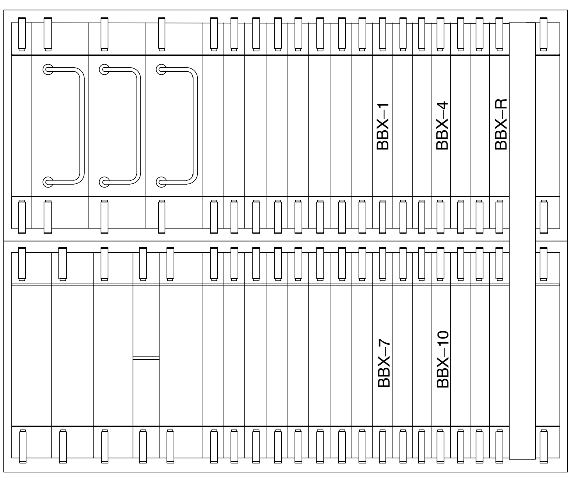
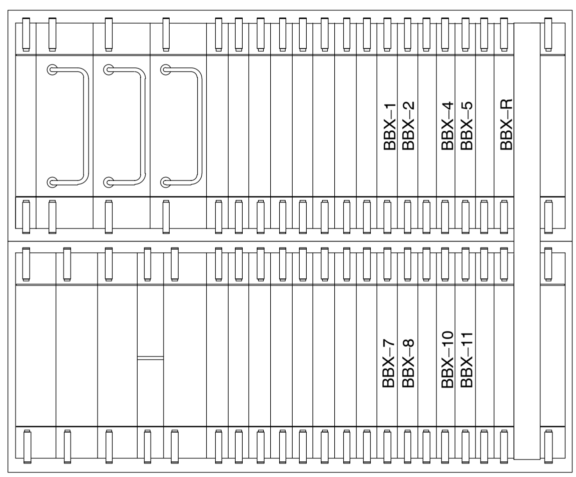
NOTE

1. Figure 1-17 identifies which BBXs are used for Omni and 2-Sector configurations.
2. The fourth PA quadrant (quadrant D) is populated with CLPAs only when the 4x4 ETM is used.
3. **PHYSICAL APPEARANCE OF FRAMES:** The physical appearance of the frame, especially the location of the MCM, Power Amplifier cage, and Power Distribution/Combiner cage, and the particular I/O plate used, may differ on frames converted from early version *SC*4812T BTSs. Functionally however, and for the purpose of optimization and acceptance testing, those frames are identical
4. For an *SC*4812T BTS frame which has been converted to multicarrier capability, a *fourth* three–sector carrier, using BBX–10 through BBX–12, is supported in R16.4 and later software releases. In a converted multicarrier frame, PA slot 4 in *all* PA quadrants should *never* be populated. (see Figure 1-21).

Figure 1-18: BBXs Used for Omni and Two–Sector Operation



C–CCP (Omni)



C–CCP (2 Sector)

Figure 1-19: TX Filter and 50Ω Termination Requirements for Omni, Two–sector, and Three–sector Configurations – OEM Multicarrier and Converted Multicarrier Frames (Minimum Power Configuration Shown)

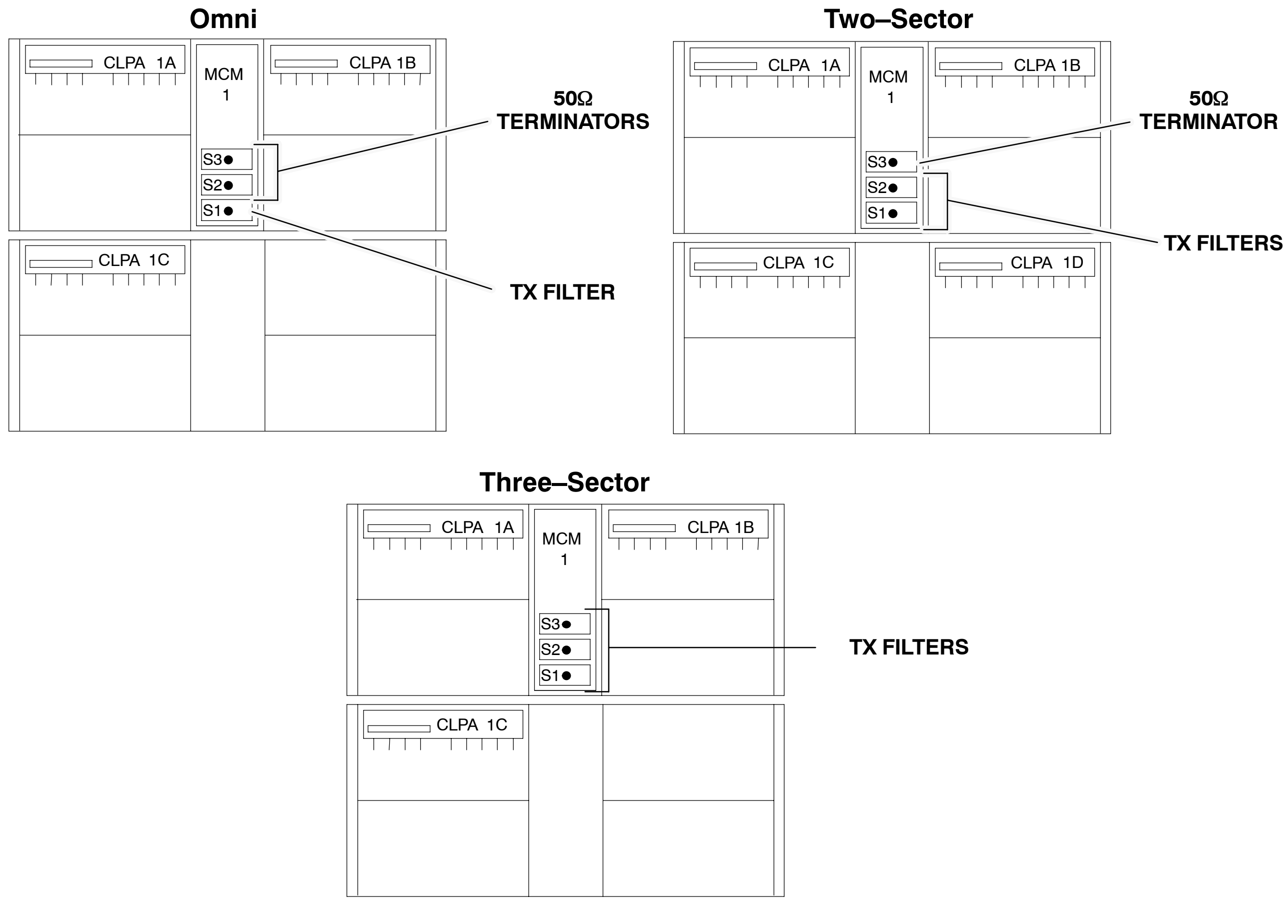


Figure 1-20: Omni, Two–sector, and Three–sector PA Configurations – OEM Multicarrier Frame

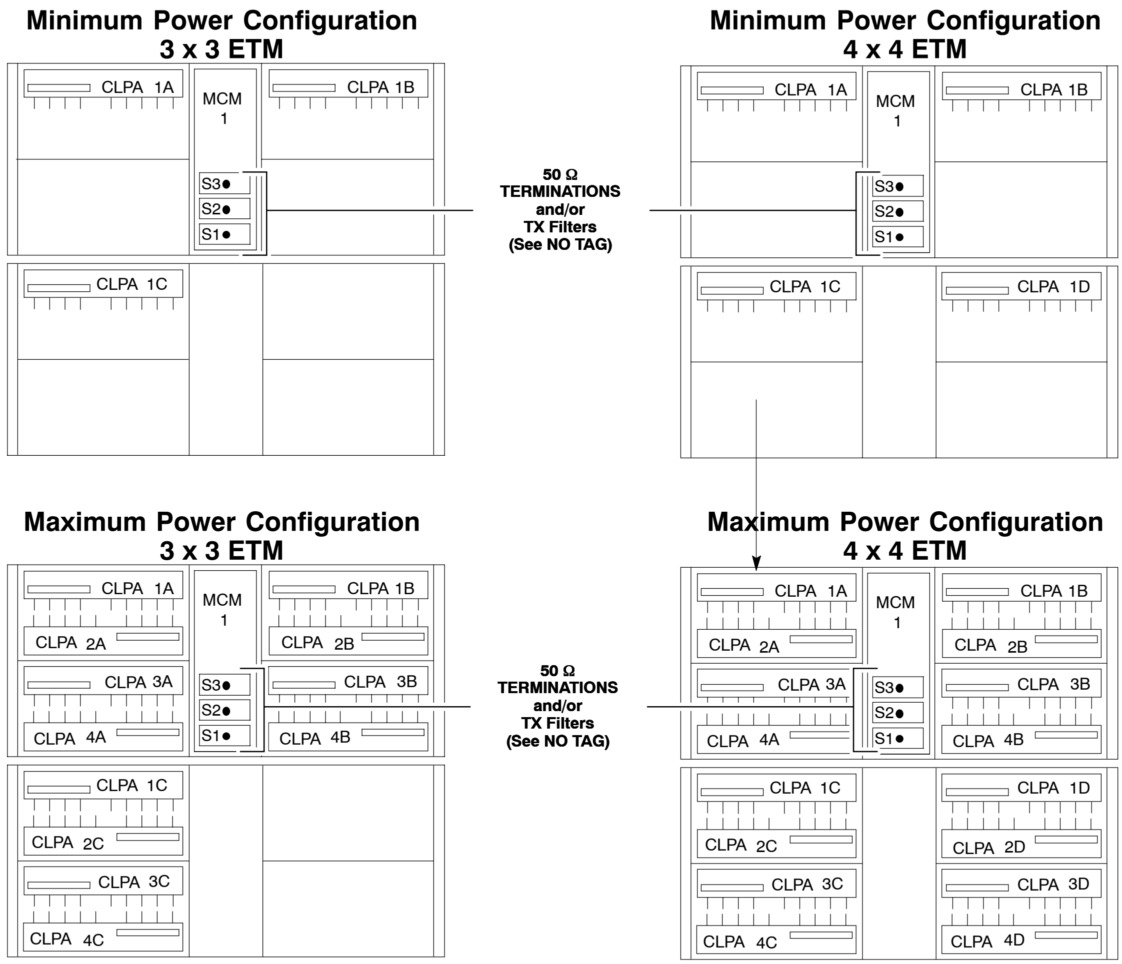


Figure 1-21: Omni, Two–sector, and Three–sector PA Configurations – Converted Multicarrier Frame

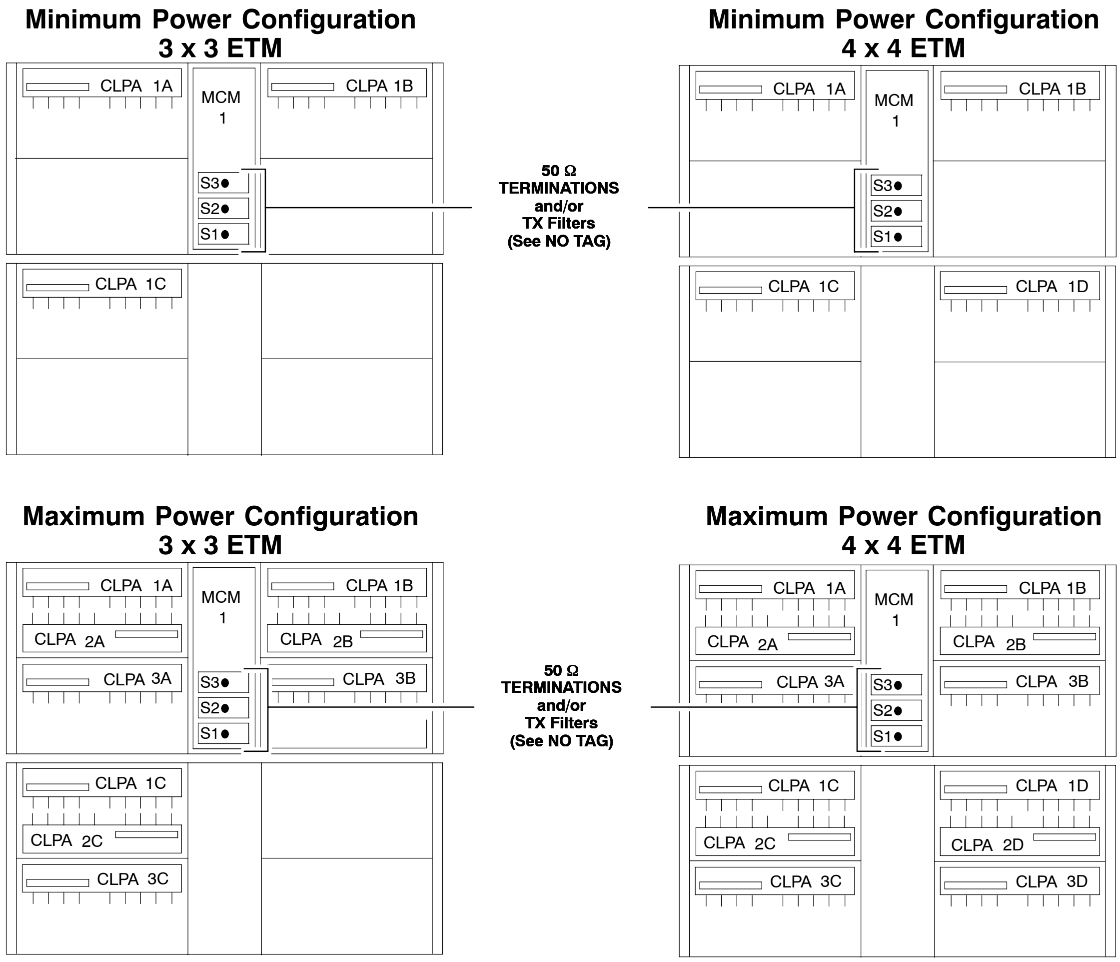
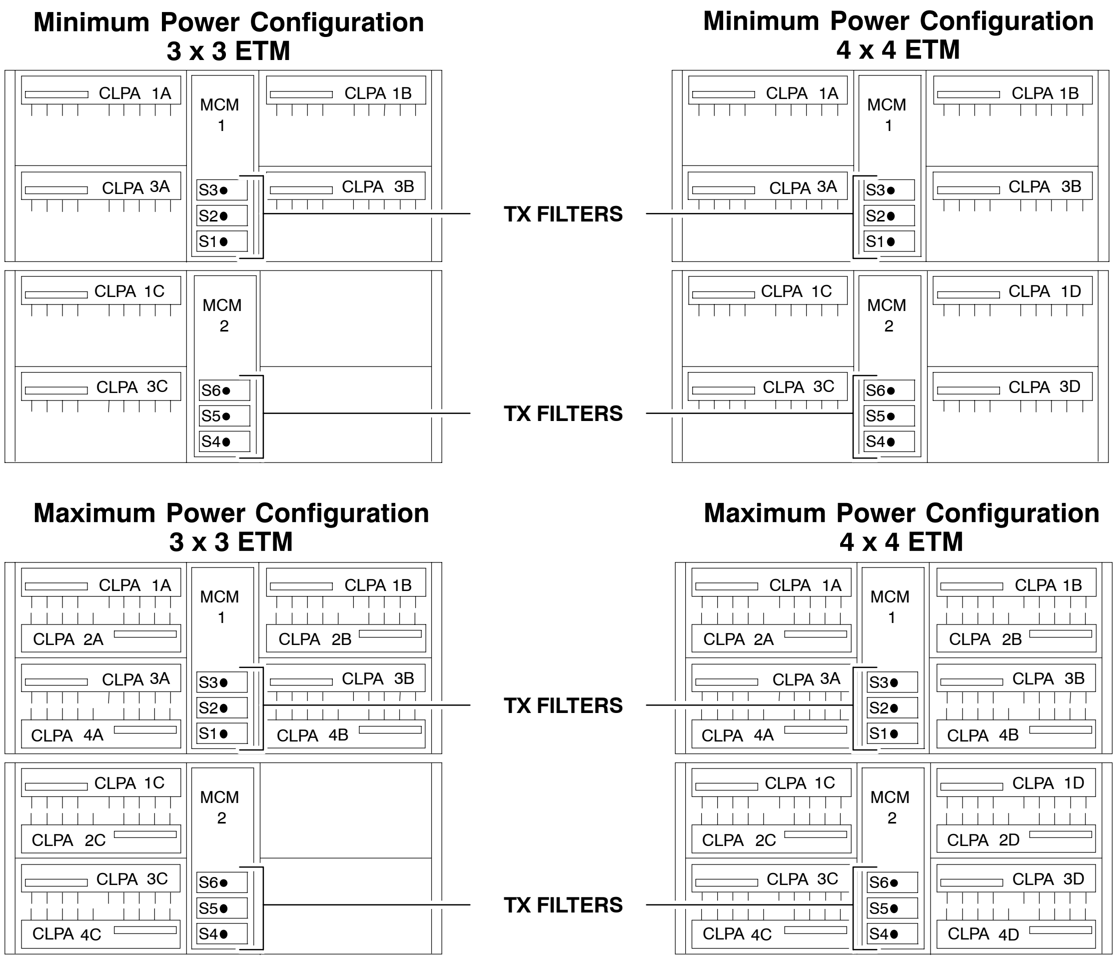


Figure 1-22: Six–sector PA Configurations – OEM Multicarrier Frames Only



Chapter 2: Preliminary Operations

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2

Notes

Introduction

This section first verifies proper frame equipage. This includes verifying module placement, jumper, and dual in–line package (DIP) switch settings against the site-specific documentation supplied for each BTS application. Next, pre-power up and initial power-up procedures are presented.

Cell Site Types

Sites are configured as Omni with a maximum of 4 carriers, 3–sectored with a maximum of 4 carriers, and 6–sectored with a maximum of 2 carriers. Each type has unique characteristics and must be optimized accordingly. For more information on the differences in site types, please refer to the *1X SC 4812T-MC BTS Hardware Installation* manual.

CDF or NEC

The Configuration Data File (CDF) (circuit BTS) or Network Element Configuration (NEC) files (packet BTS) contains site type and equipage data information and passes it directly to the LMF during optimization. The number of modem frames, C–CCP shelves, BBX boards, MCC boards (per cage), and power amplifier assignments are some of the equipage data included in the CDF or NEC files.

CAUTION

Be sure that the correct `bts–#.cdf` and `cbsc–#.cdf` or `NECB*bts#.xml` and `NECJ*bts#.xml` files are used for the BTS. These should be the CDF or NEC files that are provided for the BTS by the OMC–R. Failure to use the correct CDF or NEC files can cause system errors. **Failure to use the correct CDF or NEC files to log into a live (traffic carrying) site can shut down the site.**

Site Equipage Verification

Review the site documentation. Match the site engineering equipage data to the actual boards and modules shipped to the site. Physically inspect and verify the equipment provided for the BTS or Modem frame and ancillary equipment frame.

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 bag.

2

Initial Installation of Boards/Modules

Follow the procedure in Table 2-1 to verify the initial installation of boards/modules.

Table 2-1: Initial Installation of Boards/Modules

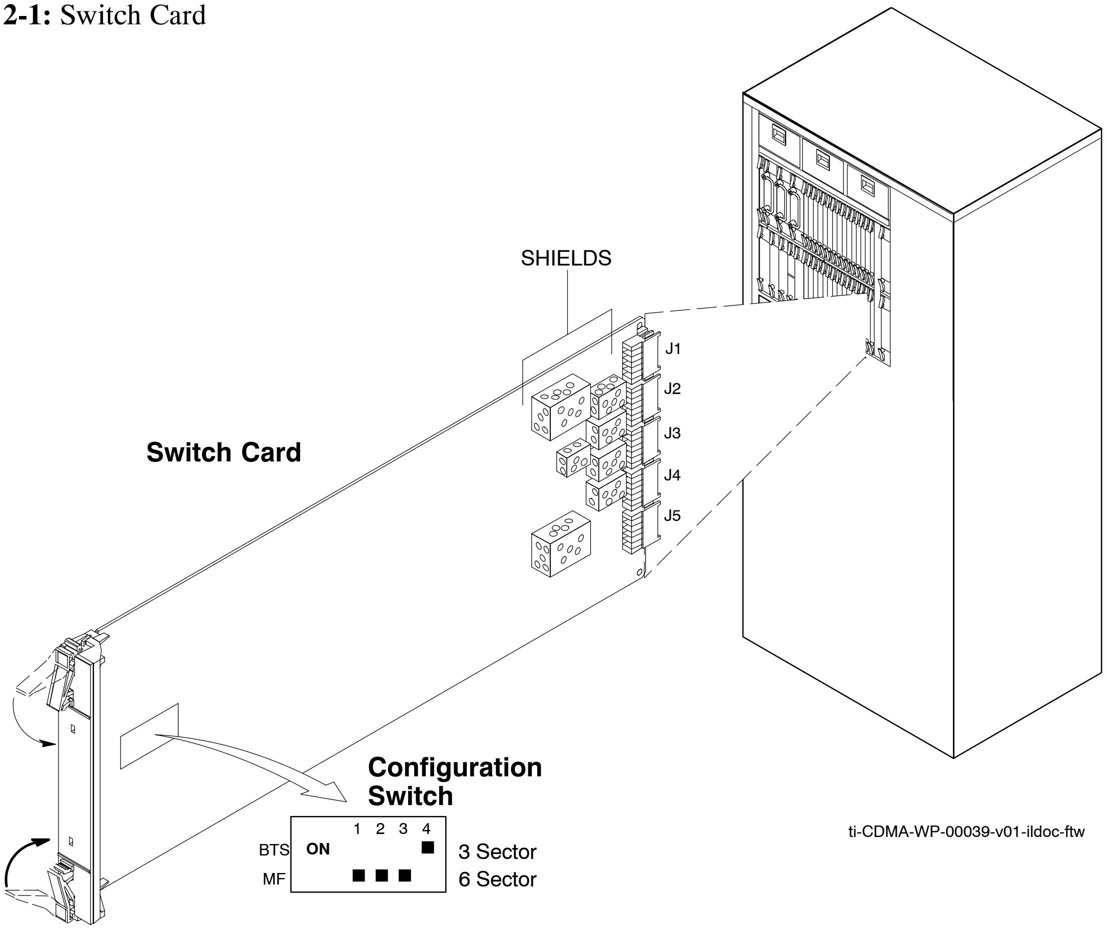
Step	Action
1	Refer to the site documentation and install all boards and modules into the appropriate shelves as required. **Verify they are NOT SEATED at this time.**
	NOTE The Switch Card has a configuration switch that must match the site configuration (see Figure 2-1).
2	As the actual site hardware is installed, record the serial number of each module on a “Serial Number Checklist” in the site logbook.

NOTE

Configuration Switch in Figure 2-1 shown for 3 Sector Multicarrier BTS. (Switches 1 and 4 control configuration)

For Multicarrier, switch 1 should be Down; switch 4 depends on whether the frame supports 3 or 6 sector.

Figure 2-1: Switch Card



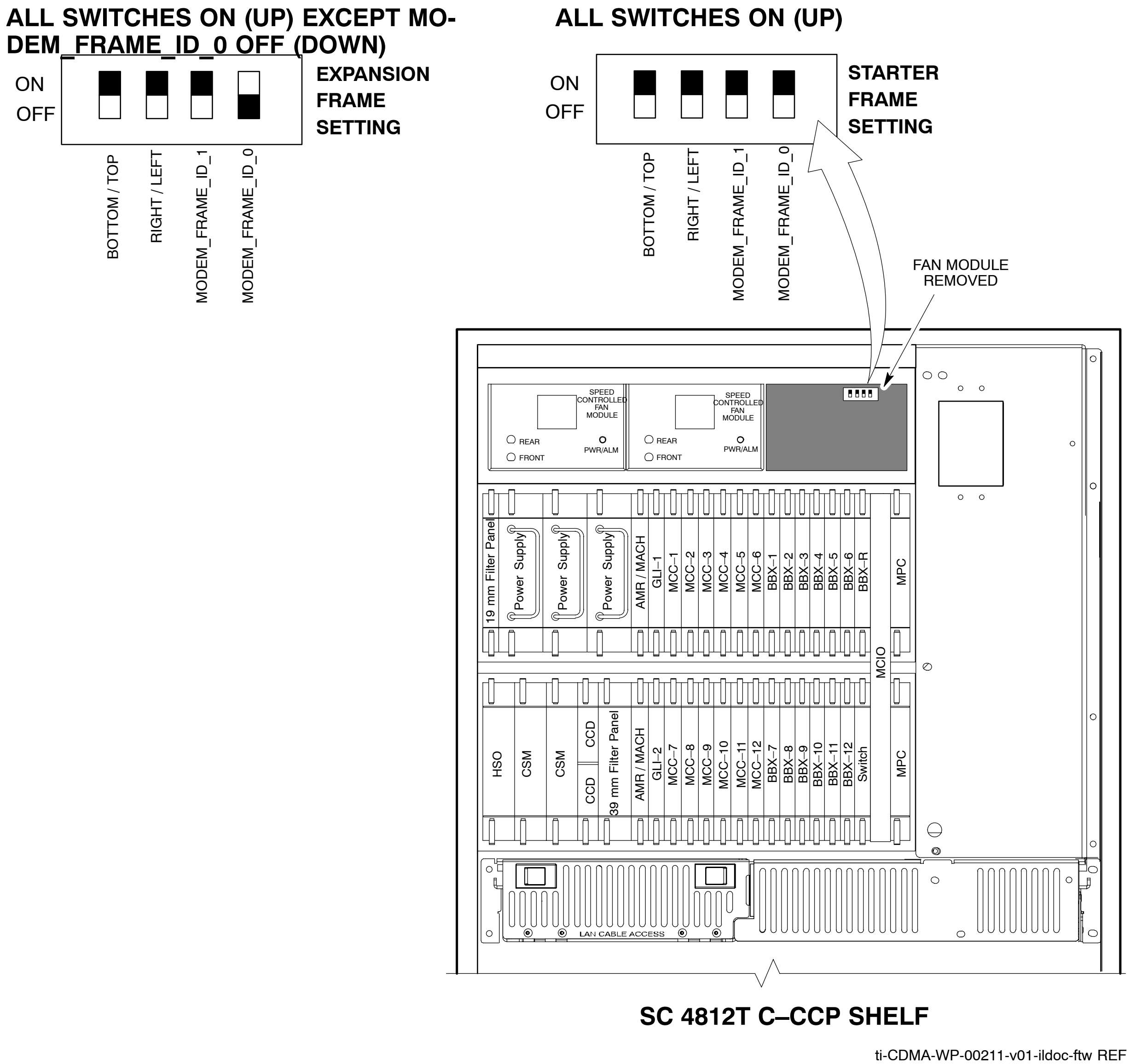
Setting Frame C–CCP Shelf Configuration Switch

The backplane switch settings behind the fan module nearest the breaker panel should be set as shown in Figure 2-2.

The switch setting must be verified and set before power is applied to the BTS equipment.

- Starter Frame – all dip switches set to ON (UP)
- Expansion Frame – all dip switches ON (UP) except MODEM_FRAME_ID_0 OFF (DOWN)

Figure 2-2: Backplane DIP Switch Settings



Pre–Power Up Tests

Objective

This procedure checks for any electrical short circuits and verifies the operation and tolerances of the cellsite and BTS 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 the any circuit card/module to prevent damage by ESD.

Cabling Inspection

Using the site-specific documentation generated by Motorola Systems Engineering, verify that the following cable systems are properly connected:

- Receive RF cabling – up to 12 RX cables
- Transmit RF cabling – up to six TX cables
- GPS

DC Power Pre-test (BTS Frame)

Before applying any power to the BTS frame, follow the procedure in Table 2-2 while referring to Figure 2-3 to verify there are no shorts in the BTS frame DC distribution system.

Table 2-2: DC Power Pre–test (BTS Frame)

Step	Action
1	*Physically verify* that all DC power sources supplying power to the frame are **OFF** or disabled.
2	*On each frame:* • *Unseat* all circuit boards (except CCD and CIO cards) in the C–CCP shelf and LPA shelves, but leave them in their associated slots. • Set C–CCP shelf breakers to the **OFF** position by *pulling out* power distribution breakers (labeled **C–CCP 1, 2, 3**) located on the power distribution panel. • Set LPA breakers to the **OFF** position by *pulling out* the LPA breakers (8 breakers, labeled **1A–1B** through **4C–4D**) located on the power distribution panel. Continue with Step 3 for –48 V or Step 4 for +27 V.

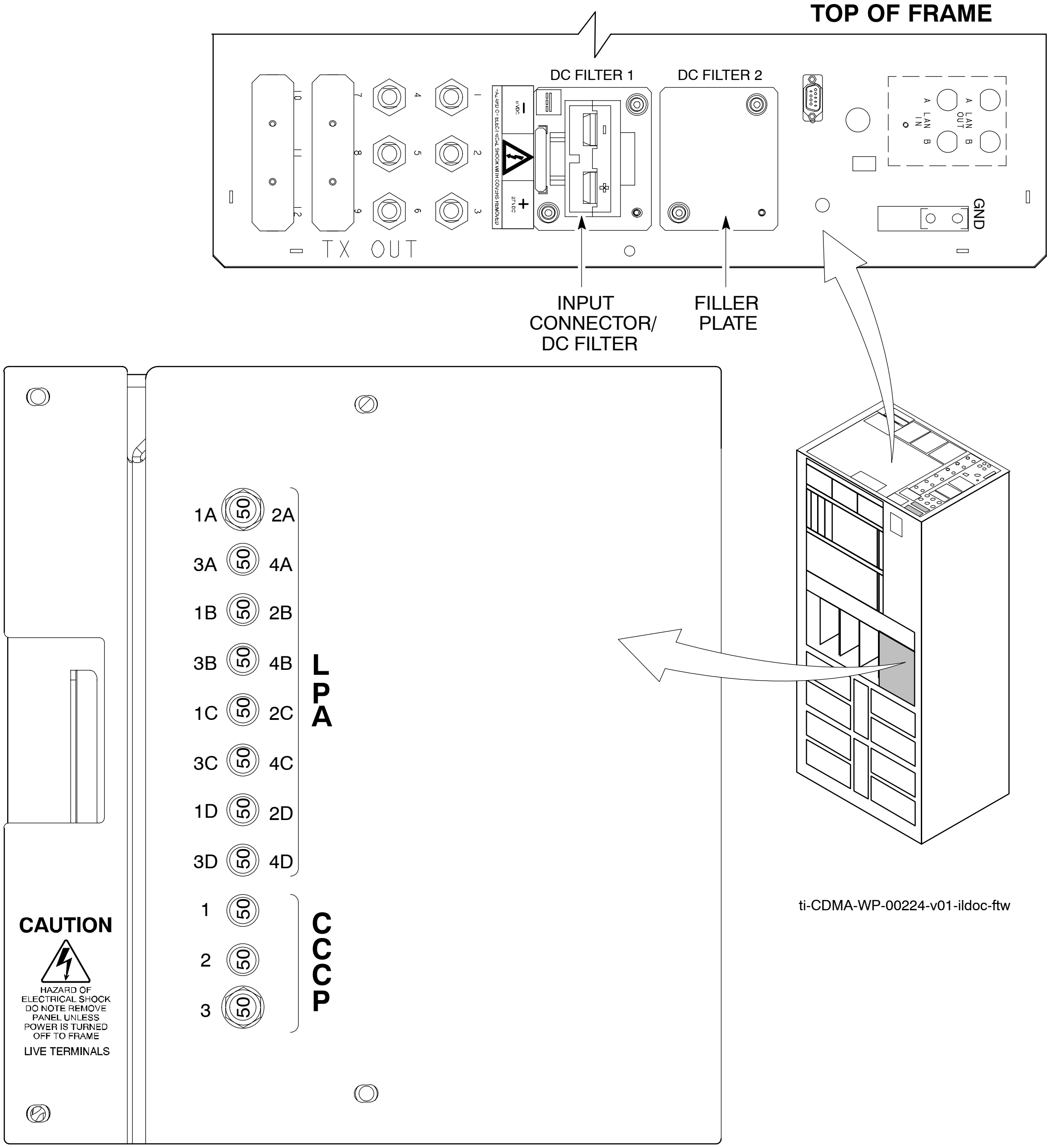
. . . continued on next page

<table>
<tr><th colspan="2">Table 2-2: DC Power Pre–test (BTS Frame)</th></tr>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>3</td><td>For –48 V configurations ONLY:
Verify the resistance on the –48 V bus:
– Remove the Power Supply Modules (PSMs).
– Verify that the resistance from the power (–) feed terminal with respect to the ground terminal on the top of the frame measures ≥ 500 Ω (see Figure 2-3).
Verify the resistance on the +27 V bus:
– Remove PSM#1 or the filler panel.</td></tr>
<tr><td></td><td>! CAUTION
Do not put probes inside Elcon connectors.
– Place the Digital Multimeter probes on the mounting screws on the Elcon connector (bottom two Elcon connectors).
– If reading is < 500 Ω, a short may exist somewhere in the DC distribution path supplied by the breaker. Isolate the problem before proceeding. A reading > 3 MΩ could indicate an open (or missing) bleeder resistor (installed across the filter capacitors behind the breaker panel).</td></tr>
<tr><td>4</td><td>For +27 V configurations ONLY:
Verify that the resistance from the power (+ or –) feed terminals with respect to the ground terminal on the top of the frame measures ≥ 500 Ω (see Figure 2-3).
– If reading is < 500 Ω, a short may exist somewhere in the DC distribution path supplied by the breaker. Isolate the problem before proceeding. A reading > 3 MΩ could indicate an open (or missing) bleeder resistor (installed across the filter capacitors behind the breaker panel).</td></tr>
<tr><td>5</td><td>Set the C–CCP breakers to the ON position by pushing them IN one at a time. Repeat Step 3 (for –48 V) or Step 4 (for +27 V) after turning on each breaker.
NOTE
If the multimeter stays at 0 Ω after inserting any board/module, a short probably exists in that board/module. Replace the suspect board/module and repeat the test. If test still fails, isolate the problem before proceeding.</td></tr>
<tr><td>6</td><td>Insert and lock the DC/DC converter modules for the C–CCP shelf and into their associated slots one at a time. Repeat Step 3 (for –48 V) or Step 4 (for +27 V) after inserting each module.
– A typical response is that the ohmmeter steadily climbs in resistance as capacitors charge, finally indicating approximately 500 Ω.</td></tr>
<tr><td></td><td>! CAUTION
Verify the correct power/converter modules by observing the locking/retracting tabs appear as follows:
STPN4009B
PWR C–CCP 4812 +27V</td></tr>
<tr><td>7</td><td>Insert and lock all remaining circuit boards and modules into their associated slots in the C–CCP shelf. Repeat Step 3 (for –48 V) or Step 4 (for +27 V) after inserting and locking each board or module.
– A typical response is that the ohmmeter steadily climbs in resistance as capacitors charge, stopping at approximately 500 Ω..</td></tr>
</table>

. . . continued on next page

Table 2-2: DC Power Pre–test (BTS Frame)	
Step	**Action**
8	Set the **LPA** breakers **ON** by pushing them in. Repeat Step 3 (for –48 V) or Step 4 (for +27 V) after turning on each breaker. – A typical response is that the ohmmeter will steadily climb in resistance as capacitors charge, stopping at approximately **500** Ω..
	NOTE Engage circuit breakers only for LPAs that are equipped.
9	In the –48V BTS, insert PSMs one at a time in their associated slots, verifying that LED is green. Repeat Step 3 after inserting each module.
10	Seat all LPA and associated LPA fan modules into their associated slots in the shelves *one at a time*. Repeat Step 3 (for –48 V) or Step 4 (for +27 V) after seating each LPA and associated LPA fan module. • A typical response is that the ohmmeter will steadily climb in resistance as capacitors charge, stopping at approximately **500** Ω..

Figure 2-3: +27V Breaker Panel (–48V is similar)



Power-up Procedures

WARNING

Potentially lethal voltage and current levels are routed to the BTS 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, power will first be verified at the input to each BTS frame. After power is verified, cards and modules within the frame itself will be powered up and verified one at a time.

Before applying any power, verify the correct power feed and return cables are connected between the power supply breakers and the power connectors at the top of each BTS frame. Verify correct cable position referring to Figure 2-3.

NOTE

For positive power applications (+27 V):

- The positive power cable is red.
- The negative power cable is black.

For negative power applications (–48 V):

- The negative power cable is red or blue.
- The positive power cable (ground) is black.

Motorola recommends that the DC input power cable used to connect the frame to the main DC power source conforms to the guidelines outlined in Table 2-3.

Table 2-3: DC Input Power Cable Guidelines

Maximum Cable Length	Wire Size
30.38 m (100 ft)	107 mm^2 (AWG #4/0)
54.864 m (180 ft)	185 mm^2 (350 kcmil)
Greater that 54.864 m (180 ft)	Not recommended

NOTE

Make sure the connector adapters are securely attached to each of the BTS power feeds and returns. Also, make sure the cables have been properly installed into each connector.

Common Power Supply Verification

The procedure in Table 2-4 must be performed on any BTS frame connected to a common power supply at the site *after the common power supply has been installed and verified per the power supply OEM suggested procedures.*

Perform the following steps to verify the power input is within specification *before* powering up the individual cards/modules with the frames themselves.

CAUTION

While handling any circuit card/module, always wear a conductive, high impedance wrist strap to prevent damage by ESD. Extreme care should be taken during the removal and installation of any card/module. After removal, the card/module should be placed on a conductive surface or back into the anti–static bag in which it was shipped.

Table 2-4: Common Power Supply Verification

Step	Action
1	Physically verify that all DC power sources supplying the frame are **OFF** or disabled.
2	*On each frame:* • *Unseat* all circuit boards (except CCD and CIO cards) in the C–CCP shelf and LPA shelves, but leave them in their associated slots. • Set breakers to the **OFF** position by *pulling out* C–CCP and LPA breakers (see Figure 2-3 for breaker panel layout if required). – C–CCP shelf breakers are labeled **CCCP–1**, **2**, **3**. – LPA breakers are labeled **1A–1B** through **4C–4D.**
3	*On –48 V BTS:* Remove the –48 V to +27 V Power Supply Modules.
4	Inspect input cables, verify correct input power polarity via decal on top of frame.
5	Apply power to BTS frames, *one at a time*, by setting the appropriate breaker in the power supply that supplies the frame to the **ON** position.
6	After power is applied to each frame, use a digital voltmeter to verify power supply output voltages at the top of each BTS frame are within specifications: *On –48 V BTS:* **–48 Vdc nominal** *On +27 V BTS:* **+27 Vdc nominal**
7	*On –48 V BTS:* Plug in PSMs one at a time and verify ’Green’ LEDs on PSMs light.

Initial Power-up (BTS)

The procedure must be performed on each frame after input power from the common power supply has been verified. Follow the steps in Table 2-5 to apply initial power to the cards/modules within the frame itself, verifying that each is operating within specification.

Table 2-5: Initial Power–up (BTS)

Step	Action
1	At the BTS, set the C–CCP (POWER) power distribution breakers (see Figure 2-3) to the **ON** position by *pushing in* the breakers.
2	Insert the C–CCP fan modules. Observe that the fan modules come on line.
3	**! CAUTION** Verify the correct C–CCP power supplies by observing the locking/retracting tabs appear as follows: STPN 4009B PWR C–CCP 4812 +27V Insert and lock the power supplies into their associated slots *one at a time*. • If no boards have been inserted, all three **PWR/ALM** LEDs would indicate RED to notify the user that there is no load on the power supplies. – If the LED is RED, do not be alarmed. After Step 4 is performed, the LEDs should turn GREEN; if not, then a faulty power supply is indicated and should be replaced *before proceeding*.
4	Seat and lock all remaining circuit cards and modules in the C–CCP shelf into their associated slots.
5	Seat the first equipped PA module pair into the assigned slot in the upper PA shelf including PA fan.
6	Repeat Step 5 for all remaining PAs. **NOTE** Engage circuit breakers only for PAs that are equipped.
7	Set the PA breakers to the ON position (*per configuration*) by pushing them IN. See NO TAG for breaker panel layout. Engage (push) PA circuit breakers. • Confirm LEDs on PAs light.
8	After all cards/modules have been seated and verified, use a digital voltmeter to verify power supply output voltages at the top of the frame remain within specifications: *On –48 V BTS:* **–48 Vdc nominal** *On +27 V BTS:* **+27 Vdc nominal**
9	Repeat Steps 1 through 8 for additional co–located frames (if equipped).

Notes

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Notes

Introduction to Optimization & Calibration

Overview

This section describes procedures for isolating the BTS from the span lines, preparing and using the LMF, downloading system operating software, CSM reference verification/optimization, set up and calibration of the supported test equipment, transmit/receive path verification, and verifying the customer defined alarms and relay contacts are functioning properly.

3

NOTE

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

Optimization Process Summary

After a BTS is physically installed and the preliminary operations, such as power up, have been completed, the LMF is used to optimize the BTS. The basic optimization process consists of the following:

1. Download MGLI–1 with code and data and then enable MGLI–1.

NOTE

GLIs may be GLI2s or GLI3s.

2. Use the status function and verify that all of the installed devices of the following types respond with status information: CSM, BBX, GLI, and MCC. If a device is installed and powered up but is not responding and is colored gray in the BTS display, the device is not listed in the CDF or NEC files. The CDF or NEC files must be corrected before the device can be accessed by the LMF.
3. Download code and data to all devices of the following types:
   – CSM
   – BBX (multicarrier uses BBX–1X)
   – GLI (other than MGLI–1)
   – MCC (may be MCC–8E, MCC24, or MCC–1X)
4. Verify the operation of the GPS and HSO signals.
5. Enable the following devices (in the order listed):
   – Secondary CSM
   – Primary CSM
   – All MCCs
6. Connect the required test equipment for a full optimization.
7. Select the test equipment.

3

8. Calibrate the TX and RX test cables if they have not previously been calibrated using the CDMA LMF that will be used for the optimization/calibration. The cable calibration values can also be entered manually.

> **NOTE**
>
> All PAs must be INS during any TX testing.

9. If the TX calibration fails, repeat the optimization for any failed paths.
10. If the TX calibration fails again, correct the problem that caused the failure and repeat the optimization for the failed path.
11. If the TX calibration and audit portion of the optimization passes for a path but some of the TX or RX tests fail, correct the problem that caused the failure and run the individual tests as required until all TX and RX tests have passed for all paths.

Cell Site Types

Sites are configured as Omni/Omni or Sector/Sector (TX/RX). Each type has unique characteristics and must be optimized accordingly.

> **NOTE**
>
> For more information on the differences in site types, refer to the applicable *BTS Hardware Installation* manual.

Configuration Files

The Configuration Data File (CDF) and the Network Element Configuration (NEC) files contain information that defines the BTS and data used to download files to the devices. The BTS CDF (`bts–#.cdf`) and CBSC CDF (cbsc–#.cdf) files are used by circuit BTSs. The NEC Base (NECB – `NECB*bts#.xml`) and NEC Journaling (NECJ – `NECJ*bts#.xml`) files are used by packet BTSs. CDF or NEC files must be placed in the applicable BTS folder before the LMF can be used to log into that BTS. CDF and NEC files are normally obtained from the CBSC using a floppy disk. A file transfer protocol (ftp) method can be used if the LMF computer has that capability.

The CDF and NEC files include the following information:

- Download instructions and protocol
- Site specific equipage information
- C–CCP shelf allocation plan
  - BBX equipage (based on cell–site type) including redundancy
  - CSM equipage including redundancy
  - MCC (MCC24E, MCC8E, or MCC–1X) channel element allocation plan. This plan indicates how the C–CCP shelf is configured, and how the paging, synchronization, traffic, and access channel elements (and associated gain values) are assigned among the (up to 12) MCCs in the shelf.

- CSM equipage including redundancy
- Effective Rated Power (ERP) table for all TX channels to antennas respectively. Motorola System Engineering specifies the ERP of a transmit antenna based on site geography, antenna placement, and government regulations. Working from this ERP requirement, the antenna gain, (dependent on the units of measurement specified) and antenna feed line loss can be combined to determine the required power at the top of the BTS frame. The corresponding BBX output level required to achieve that power level on any channel/sector can also be determined.

NOTE

Refer to the *LMF Help function on–line documentation* for additional information on the layout of the LMF directory structure (including CDF or NEC file locations and formats).

BTS System Software Download

BTS system software must be successfully downloaded to the BTS processor boards before optimization can be performed. BTS operating code is loaded from the LMF computer terminal.

CAUTION

Before using the LMF for optimization/ATP, the correct `bts–#.cdf` and `cbsc–#.cdf` or `NECB*bts#.xml` and `NECJ*bts#.xml` files for the BTS must be obtained from the OMC–R and put in a **bts–#** folder in the LMF. Failure to use the correct CDF or NEC files can cause improper or unpredictable BTS operation. **Failure to use the correct CDF or NEC files to log into a live (traffic carrying) site can shut down the site**.

The CDF or NEC files are normally obtained from the OMC–R on a DOS formatted diskette, or through a file transfer protocol (ftp) if the LMF computer has ftp capability. Refer to the *LMF Help function on–line documentation* for the procedure.

Site Equipage Verification

If it has not already done, use an editor to view the CDF or NEC files, and review the site documentation. Verify the site engineering equipage data in the CDF or NEC files matches the actual site hardware using a CDF or NEC file conversion table.

3

CAUTION

Use extreme care not to make any changes to the CDF or NEC file content while viewing the file. Changes to the CDF or NEC file can cause the site to operate unreliably or render it incapable of operation.

CAUTION

Always wear an approved anti–static wrist strap while handling any circuit card/module to prevent damage by ESD. Extreme care should be taken during the removal and installation of any card/module. After removal, the card/module should be placed on a conductive surface or back into the anti–static container in which it was shipped.

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).

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 (see page NO TAG for current supported version of LMF)
- CDF or NEC files for each supported BTS (on diskette or available from the CBSC)
- CBSC CDF file for each supported *circuit* BTS (on diskette or available from the CBSC)

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

3

Overview of Packet BTS files

R16.0 and earlier software releases used the CDF configuration file for each BTS and CBSC supported by the LMF. In a *packet* BTS operating with Software Release 16.1 or later, the CDF is replaced by the NEC files. There are two NEC files. These are:

- NEC Base (NECB) file
- NEC Journal (NECJ) file

The NECB contains the baseline configuration information and is analogous to the CDF, while the NECJ contains all the changes made to the configuration since the last time the NECB was re–generated. Once the NECJ reaches 80% of its maximum size, the NECB is re–generated by the OMC–R, and all updates from the NECJ file are rolled into it.

The NEC files play much more extensive role than the previously–used CDF files.

Additional important, LMF–related facts about the the NEC files are:

- Both files (NECB and NECJ) are in eXtensible Markup Language (XML) format.
- NECB contains all the up-to-date static configuration information and NECJ contains all the recent changes (including operations) which are not updated in the NECB.
- Both files can be viewed in any XML viewer (most easily available is Internet Explorer V5.0 and higher). They can be also viewed by any other word or text processor, but the XML tags will also be seen when using these types of applications.
- These files will be created by OMC–R from MIB and reflect the BTS provisioning.
- These files will be regenerated for each software release upgrade on the system for each BTS.

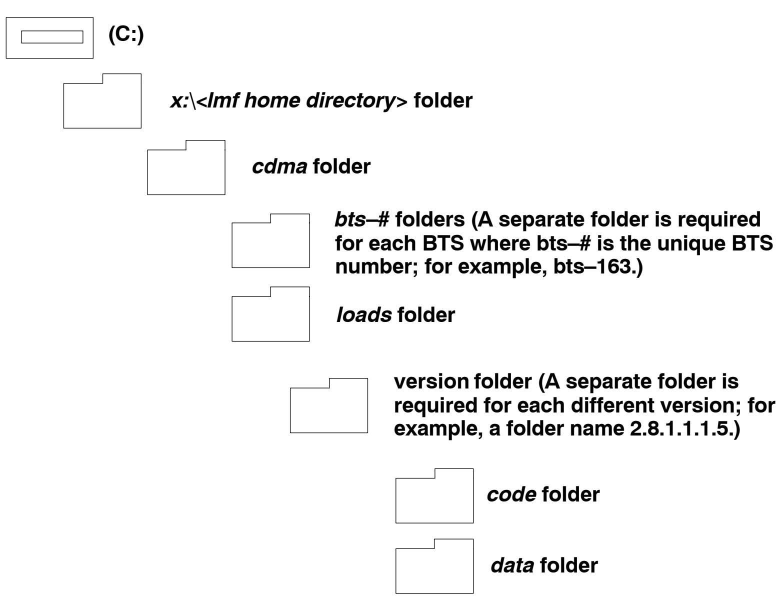
- Unlike the CDF file, the NEC files will reside on both OMC–R and GLI3s operating in packet mode. The NEC files will be synchronized periodically between the OMC–R and GLI3s in each BTS.
- Both the NECB and NECJ files contain a “SoftwareVersion” field in their header section indicating the system release version of these files.
- Instead of the `bts–#.cdf` file, the packet LMF uses `NECB*bts#.xml` and `NECJ*bts#.xml` files, which are copies of the NEC files.
- A GLI3 operating in packet mode will need the NECB and NECJ files for site initialization.
- The scope of the NEC files has grown much broader than that of the CDF and has much more BTS–centric information. This is principally because the role of the GLI card has expanded significantly with the introduction of the GLI3 card and packet backhaul.

CAUTION	*Never use a generic NEC file*. The specific, site–unique information for the BTS must be included in the NEC file for the site to operate properly.

LMF File Structure Overview

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

Figure 3-1: LMF Folder Structure



NOTE

The “loads” folder and all the folders below it are not available from the LMF for Software Release R2.16.4.1. These folders may be present as as a legacy from previous software versions or downloaded from the CBSC/OMC–R.

Any existing code in the directory is not affected by an SR 16.1 installation.

The user will need to manually add the directories to a newly installed LMF when they add the code loads to be downloaded.

LMF Home Directory

The CDMA LMF installation program creates the default home directory, c:\wlmf, and installs the application files and subdirectories (folders) in it. Because this can be changed at installation, the CDMA LMF home directory will be referred to with the generic convention of:

<x>:\<lmf home directory>

Where:

<x> = the LMF computer drive letter where the CDMA LMF home directory is located.

<lmf home directory> = the directory path or name where the CDMA LMF is installed.

Filename Conventions and Directory Location

NEC Files

The naming conventions for the NECB and NECJ files are:

NECB*bts#.xml

NECJ*bts#.xmlNECJ*bts#.xml

Where:

* = any characters can be substituted

= the actual integer BTS number; for example, NECB–2.16.4.1.40–bts*480*.xml

The NECB and its corresponding NECJ must have the exact same name, except for the “B” and “J” after the initial NEC characters.

The NECB and the NECJ must reside in the <LMF_HOME>\cdma\bts–# directory for the BTS to which they apply.

Load Information File (LIF)

The LIF contains all the devices binaries available for the specified System Software Release. It is the functional equivalent of the Object List File (OLF) file that was used pre–Packet.

The naming convention for the LIF is:

NE_LIF.xml

The LIF must reside in the <LMF_HOME>\cdma\loads\<Software Release Number> directory, where <LMF_HOME> = the home directory in which the LMF is installed, usually C:\wlmf <Software Release Number> = the System Software Release Number (e.g. 2.16.1.0.10).

3

Cal File

The Cal File still resides in the <LMF_HOME>\cdma\bts–# directory and is named `bts–#.cal`, where # is the actual integer number of the BTS.

LMF Operating System Installation

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

NOTE

First Time Installation Sequence:

1. Install Java Runtime Environment (JRE)
2. Install U/WIN K–shell emulator
3. Install LMF application programs
4. Install/create BTS folders

NOTE

Any time U/WIN is installed, the LMF application software must also be installed. This is because the LMF application installation modifies some of the files that are installed during the U/Win installation. These modifications are necessary for proper LMF operation. Installing U/Win over–writes these modifications.

There are multiple binary image packages for installation on the CD–ROM. When prompted, choose the load that corresponds to the software release currently installed in the network. Perform the Device Images installation after the LMF installation.

If applicable, a separate CD ROM of BTS Binaries may be available for binary updates.

Follow the procedure in Table 3-1 to install the LMF application program using the LMF CD ROM.

Table 3-1: LMF Application Program Installation

✓	Step	Action
	1	Insert the LMF Program CD ROM into the LMF CD ROM drive.
	1a	– If the Setup screen appears, follow the instructions displayed on the screen.

. . . continued on next page

Table 3-1: LMF Application Program Installation		
✓	Step	Action
	1b	– If the Setup screen is not displayed, proceed to Step 2.
	2	Click on the **Start** button**.**
	3	Select **Run.**
	4	Enter **d:\autorun** In the Open box and click **OK**. **NOTE** If applicable, replace the letter **d** with the correct CD ROM drive letter.

Copy BTS and CBSC CDF or NEC Files to the LMF Computer

Before logging on to a BTS with the LMF computer to execute optimization/ATP procedures, the correct `bts–#.cdf` and `cbsc–#.cdf` or `NECB*bts#`.xml and `NECJ*bts#`.xml files must be obtained from the CBSC and put in a **bts-#** folder in the LMF computer. This requires creating versions of the CBSC CDF files on a DOS–formatted floppy diskette and using the diskette to install the CDF or NEC files on the LMF computer.

NOTE

- If the LMF has ftp capability, the ftp method can be used to copy the CDF files from the CBSC.
- On Sun OS workstations, the **unix2dos** command can be used in place of the **cp** command (for example, unix2dos bts–248.cdf bts–248.cdf). This should be done using a copy of the CBSC CDF file so the original CBSC CDF file is not changed to DOS format.

NOTE

When copying CDF or NEC files, comply with the following to prevent BTS login problems with the LMF:

- The numbers used in the `bts–#.cdf` and `cbsc–#.cdf` or `NECB*bts#`.xml and `NECJ*bts#`.xml filenames must correspond to the locally assigned numbers for each BTS and its controlling CBSC.
- The generic `cbsc–1.cdf` file supplied with the LMF works with locally numbered *circuit* BTS CDF files. Using this file *will not provide a valid optimization* unless the generic file is edited to replace default parameters (for example, channel numbers and corresponding set power out) with the operational parameters used locally.

The procedure in Table 3-2 lists the steps required to transfer the CDF or NEC files from the CBSC to the LMF computer. For further information, refer to the *LMF Help function on line documentation*.

Table 3-2: Copying CBSC CDF or NEC Files to the LMF		
✓	**Step**	**Action**
AT THE CBSC:		
	1	Login to the CBSC workstation.
	2	Insert a DOS formatted diskette in the workstation drive.
	3	Type **eject –q** and press the **<Enter>** key.
	4	Type **mount** and press the **<Enter>** key. **NOTE** • Look for the "*floppy/no_name*" message on the last line displayed. • If the **eject** command was previously entered, *floppy/no_name* will be appended with a number. Use the explicit *floppy/no_name* reference displayed when performing step 7.
	5	Change to the directory containing the file by typing **cd** *<directory name>* (ex. **cd bts–248**) and pressing **<Enter>**.
	6	Type **ls <Enter>** to display the list of files in the directory.
	7	With *Solaris versions of Unix, create DOS–formatted versions* of the **bts–#.cdf** and **cbsc–#.cdf** or **NECB*bts#.xml** and **NECJ*bts#.xml** files on the diskette by entering the following command: **unix2dos** *<source filename>* **/floppy/no_name/***<target filename>* For example, **unix2dos bts–248.cdf** *or* **NECB–2.16.4.41–bts248.xml /floppy/no_name/bts–248.cdf**. **NOTE** • Other versions of Unix do not support the unix2dos and dos2unix commands. In these cases, use the Unix **cp** (copy) command. The *copied* files will be difficult to read with a DOS or Windows text editor because Unix files do not contain line feed characters. Editing copied CDF or NEC files on the LMF computer is, therefore, not recommended. • Using **cp,** multiple files can be *copied* in one operation by separating each filename to be copied with a space and ensuring the destination directory (*floppy/no_name*) is listed at the end of the command string following a space (for example, **cp bts–248.cdf cbsc–6.cdf /floppy/no_name**).
	8	Repeat steps 5 through 7 for each bts–# that must be supported by the LMF.
	9	When all required files have been copied to the diskette, type **eject** and press the **<Enter>** key.
	10	Remove the diskette from the CBSC.
AT THE LMF:		
	11	Start the Windows operating system.
	12	Insert the diskette into the LMF.

. . . continued on next page

Table 3-2: Copying CBSC CDF or NEC Files to the LMF		
✓	Step	Action
	13	Using *Windows* Explorer (or equivalent program), create a corresponding bts–# folder in the <lmf home directory>\cdma directory for each `bts–#.cdf` and `cbsc–#.cdf` or `NECB*bts#.xml` and `NECJ*bts#.xml` file pair copied from the CBSC.
	14	Use *Windows* Explorer (or equivalent program) to transfer the `bts–#.cdf` and `cbsc–#.cdf` or `NECB*bts#.xml` and `NECJ*bts#.xml` files from the diskette to the corresponding **<lmf home directory>\cdma\bts–#** folders created in step 13.

Creating a Named HyperTerminal Connection for MMI Sessions

Confirming or changing the configuration data of certain BTS Field Replaceable Units (FRUs) requires establishing an MMI communication session between the LMF and the FRU. Using features of the *Windows* operating system, the connection properties for an MMI session can be saved on the LMF computer as a named Windows HyperTerminal connection. This eliminates the need for setting up connection parameters each time an MMI session is required to support optimization.

Once the named connection is saved, a shortcut for it can be created on the Windows desktop. Double clicking the shortcut icon will start the connection without the need to negotiate multiple menu levels.

Follow the procedure in Table 3-3 to establish a named HyperTerminal connection and create a WIndows desktop shortcut for it.

Table 3-3: Creating a Named HyperTerminal Connection for MMI Sessions	
Step	Action
1	From the Windows Start menu, select: **Programs>Accessories**
2	Select **Communications,** double click the **Hyperterminal** folder, and then double click on the **Hyperterm.exe** icon in the window that opens. **NOTE** • If a **Location Information Window** appears, enter the required information, then click **Close**. (This is required the first time, even if a modem is not to be used.) • If a **You need to install a modem.....** message appears, click **NO**.
3	When the **Connection Description** box opens: – Type a name for the connection being defined (for example, MMI Session) in the **Name:** window. – Highlight any icon preferred for the named connection in the **Icon:** chooser window. – Click **OK.**

. . . continued on next page

Table 3-3: Creating a Named HyperTerminal Connection for MMI Sessions	
Step	**Action**
4	**NOTE** For LMF configurations where COM1 is used by another interface such as test equipment and a physical port is available for COM2, select COM2 to prevent conflicts. From the **Connect using**: pick list in the **Connect To** box displayed, select the RS–232 port to be used for the connection (e.g., **COM1** or **COM2** (*Win NT)* – or **Direct to Com 1** or **Direct to Com 2** (*Win 98*), and click **OK.**
5	In the **Port Settings** tab of the **COM# Properties** window displayed, configure the RS–232 port settings as follows: • Bits per second: 9600 • Data bits: 8 • Parity: None • Stop bits: 1 • Flow control: None
6	Click **OK**.
7	Save the defined connection by selecting: **File>Save**
8	Close the HyperTerminal window by selecting: **File>Exit**
9	Click **Yes** to disconnect when prompted.
10	Perform one of the following: • If the **Hyperterminal** folder window is still open (*Win 98)* proceed to step 12 • From the Windows Start menu, select **Programs > Accessories**
11	Perform one of the following: • For *Win NT*, select **Hyperterminal** and release any pressed mouse buttons. • For *Win 98*, select **Communications** and double click the **Hyperterminal** folder.
12	Highlight the newly created connection icon by moving the cursor over it (*Win NT*) or clicking on it (*Win 98*).
13	*Right click and drag* the highlighted connection icon to the Windows desktop and release the right mouse button.
14	From the pop–up menu displayed, select **Create Shortcut(s) Here**.
15	If desired, reposition the shortcut icon for the new connection by dragging it to another location on the Windows desktop.

T1/E1 Span Interface

NOTE

At active sites, the OMC/CBSC must disable the BTS and place it out of service (OOS). **DO NOT** remove the 50–pin TELCO cable connected to the BTS frame site I/O board **J1** connector until the OMC/CBSC has disabled the BTS!

Each frame is equipped with one Site I/O and two Span I/O boards. The Span I/O J1 connector provides connection for 25 wire pairs. A GLI card can support up to six spans. In *SC*4812T BTS frames, spans A, C, and E terminate on the Span "A" I/O; and spans B, D, and F terminate on the Span "B" I/O.

NOTE

Span Lines will interface to the BTS through the Span I/O cards *only* in circuit mode with either circuit or split backhaul.

Before connecting the LMF to the frame LAN, the OMC–R must disable the BTS and place it OOS to allow the LMF to control the CDMA BTS. This prevents the OMC–R from inadvertently sending control information to the BTS during LMF–controlled tests. Refer toFigure 3-2 and Figure 3-3 as required.

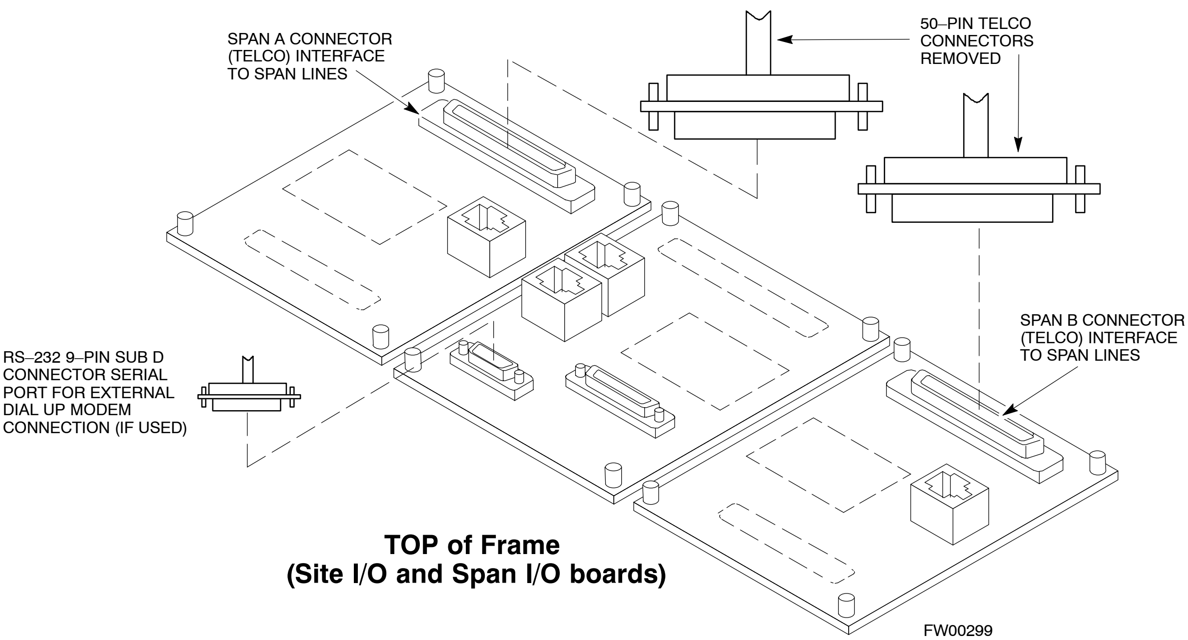
Isolate BTS from T1/E1 Spans

To ensure the LMF will maintain control of the BTS, disable the BTS and isolate the spans as described in Table 3-4.

Table 3-4: T1/E1 Span Isolation

Step	Action
1	Have the OMC/CBSC place the BTS OOS.
2	Remove the T1/E1 span 50–pin TELCO cable connected to the SPAN I/O cards (Figure 3-2). **NOTE** – If a third party is used for span connectivity, the third party must be informed before disconnecting the span line. – Verify that the SPAN cable connector is removed, *not* the “MODEM/TELCO” connector.

Figure 3-2: Span I/O Board Span Isolation



Connect the LMF to the BTS

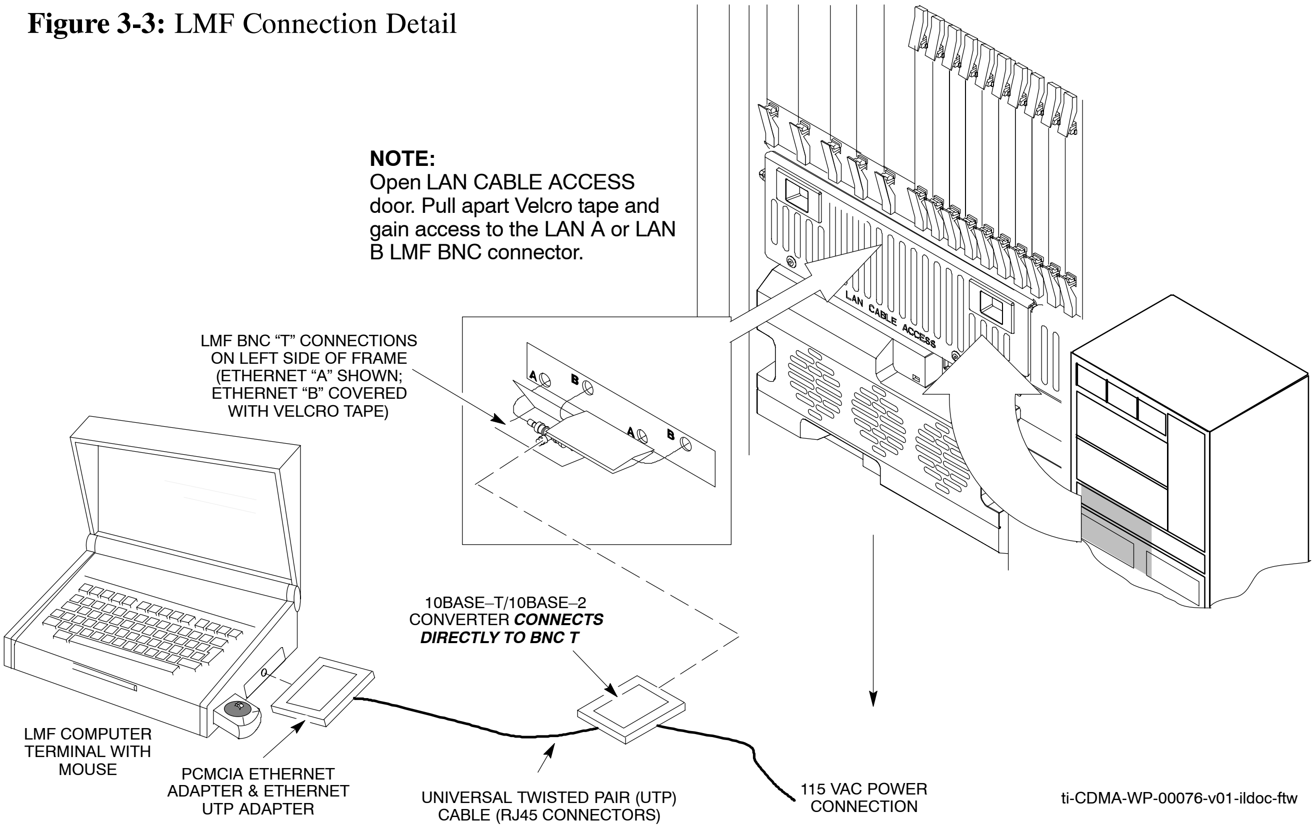
The LMF is connected to the LAN A or B connector located on the left side of the frame's lower air intake grill, behind the LAN Cable Access door (see Figure 3-3).

Table 3-5: LMF to BTS Connection

Step	Action
1	To gain access to the connectors on the BTS, open the LAN Cable Access door, then pull apart the Velcro® tape covering the BNC "T" connector (see Figure 3-3).
2	Connect the LMF to the LAN A BNC connector via PCMCIA Ethernet Adapter with an unshielded twisted–pair (UTP) Adapter and 10BaseT/10Base2 converter (powered by an external AC/DC transformer).
3	Start the LMF application (see Table 3-6 or Table 3-7) and test the connection. – If there is no login response, connect the LMF to the LAN B connector. – If there is still no login response, see Table 6-1, Login Failure Troubleshooting Procedures.
	NOTE – Xircom Model PE3–10B2 or equivalent can also be used to interface the LMF Ethernet connection to the frame connected to the PC parallel port, powered by an external AC/DC transformer. In this case, ***the BNC cable must not exceed 91 cm (3 ft) in length***. – The LAN shield is isolated from chassis ground. The LAN shield (exposed portion of BNC connector) **must not touch the chassis** during optimization.

3

Figure 3-3: LMF Connection Detail



Basic LMF Operation

LMF Coverage in This Publication – There are LMF application programs to support maintenance of both CDMA and SAS BTSs. All references to the LMF in this publication are for the CDMA application program.

Operating Environments – The LMF application program allows the user to work in the two following operating environments which are accessed using the specified desktop icons:

- Graphical User Interface (GUI) using the WinLMF icon
- Command Line Interface (CLI) using the WinLMF CLI icon

The GUI is the primary optimization and acceptance testing operating environment. The CLI environment provides additional capability to the user to perform manually controlled acceptance tests and audit the results of optimization and calibration actions.

Basic Operation – Basic operation of the LMF in either environment includes performing the following:

- Selecting and deselecting BTS devices
- Enabling devices
- Disabling devices
- Resetting devices
- Obtaining device status

The following additional basic operation can be performed in a GUI environment:

- Sorting a status report window

For detailed information on performing these and other LMF operations, refer to the *LMF On-Line Help, Software Release 2.16.4.x* .

> **NOTE**
>
> *Unless otherwise noted*, LMF procedures in this manual are performed using the GUI environment.

Online Help – Task oriented online help is available in the LMF by clicking on **Help** from the menu bar.

The LMF Display and the BTS

BTS Display – When the LMF is logged into a BTS, a frame tab is displayed for each BTS frames. The frame tab will be labeled with “CDMA” and the BTS number, a dash, and the frame number (for example, **BTS–812–1** for BTS 812, RFMF 1). If there is only one frame for the BTS, there will only be one tab.

3

CDF or NEC file Requirements – For the LMF to recognize the devices installed in the BTS, a BTS CDF or NEC files which include equipage information for all the devices in the BTS must be located in the applicable ***<x>*:\\<*lmf home directory*>\\cdma\\bts–#** folder. To provide the necessary channel assignment data for *circuit* BTS operation, a CBSC CDF file which includes channel data for all BTS RFMFs is also required in the folder.

RFDS Display – If an RFDS is included in the CDF or NEC files, an **RFDS** tab labeled with "RFDS," a dash and the BTS number–frame number combination (for example, **RFDS–812–1**) will be displayed.

Graphical User Interface Overview

The LMF uses a Graphical User Interface (GUI), which supports the following functions:

- Selecting a device or devices.
- Selecting an action to apply to selected device(s).
- Status report window displaying progress of actions taking place and related information.
- Notification when an action is complete and related information such as indication of success or failure
- An **OK** button to close the status report window.

Understanding GUI Operation

The following screen captures are provided to help understand how the GUI operates:

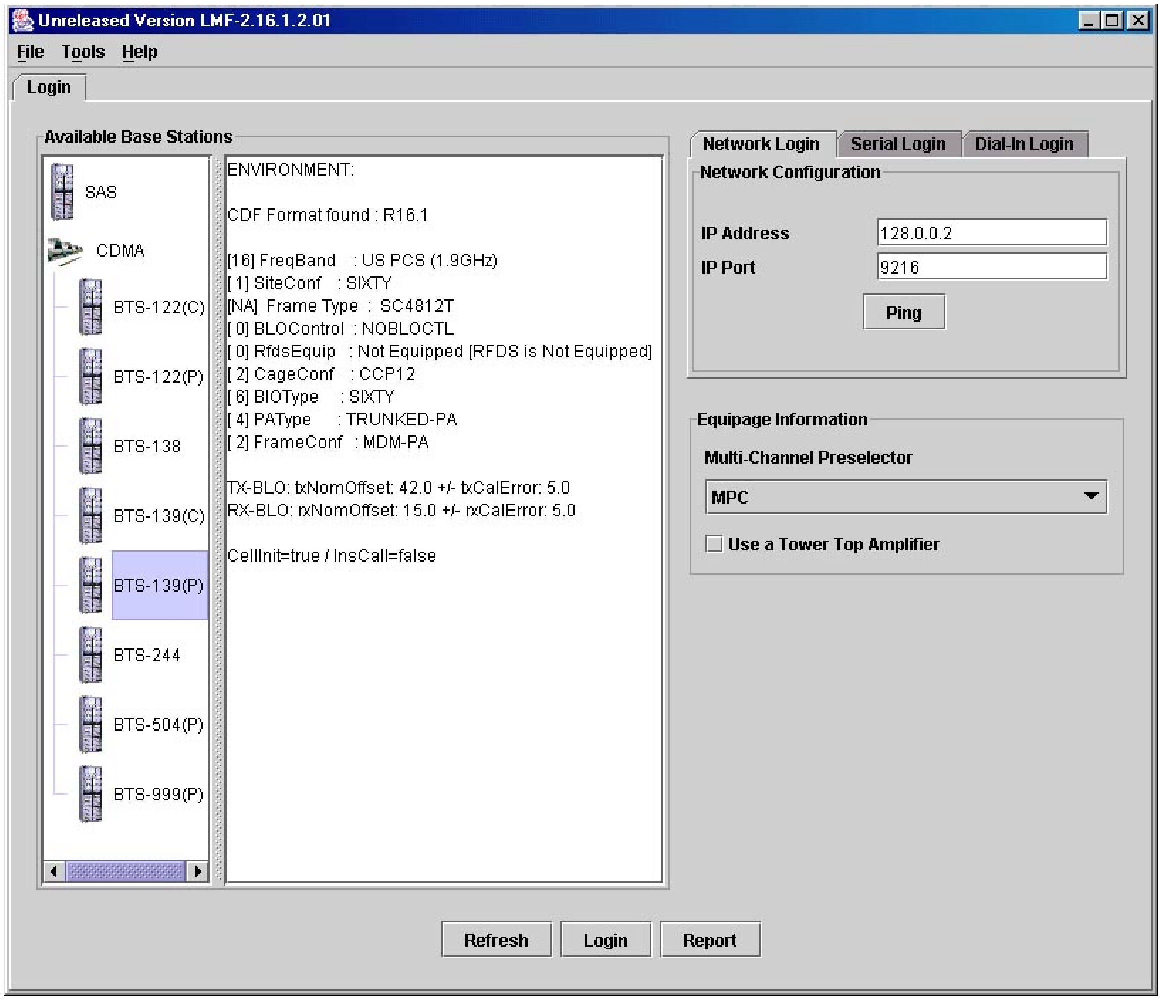
– Figure 3-4 shows the differences between packet and circuit BTS representations on the LMF login screen. If there is a packet configuration file (NEC) for the BTS, the "(P)" is added as a suffix to the BTS number.

– Figure 3-5 shows the Self-Managed Network Elements (NE) state of a packet–mode BTS (*SC*4812T shown). An "X" is displayed on the front of each card that is under Self–Managed NE control by the GLI3 card.

– Figure 3-6 shows three of the available packet mode commands. Normally the GLI3 has Self-Managed NE control of all cards as shown inFigure 3-6 identified with an "X". In that state, the LMF may only status a card. In order to download code or test a card, the LMF must request Self-Managed NE control of the card by using the dropdown menu shown. The LMF also uses this menu to release control of the card back to the GLI3. The GLI3 will also assume control of the cards after the LMF logs out of the BTS. The packet mode GLI3 normally is loaded with a tape release and NECB and NECJ files which point to a tape release stored on the GLI3. When the GLI3 has control of a card it will maintain that card with the code on that tape release.

– Figure 3-7 depicts a packet–mode BTS that has the MCC–1 and the BBX–1 cards under LMF control. Notice that the “X” is missing from the front of these two cards.

Figure 3-4: BTS Login screen – identifying circuit and packet BTS files



For detailed information on performing these and other LMF operations, refer to the *LMF Help function on–line documentation*.

Figure 3-5: Self–Managed Network Elements (NEs) state of a packet mode SC4812T

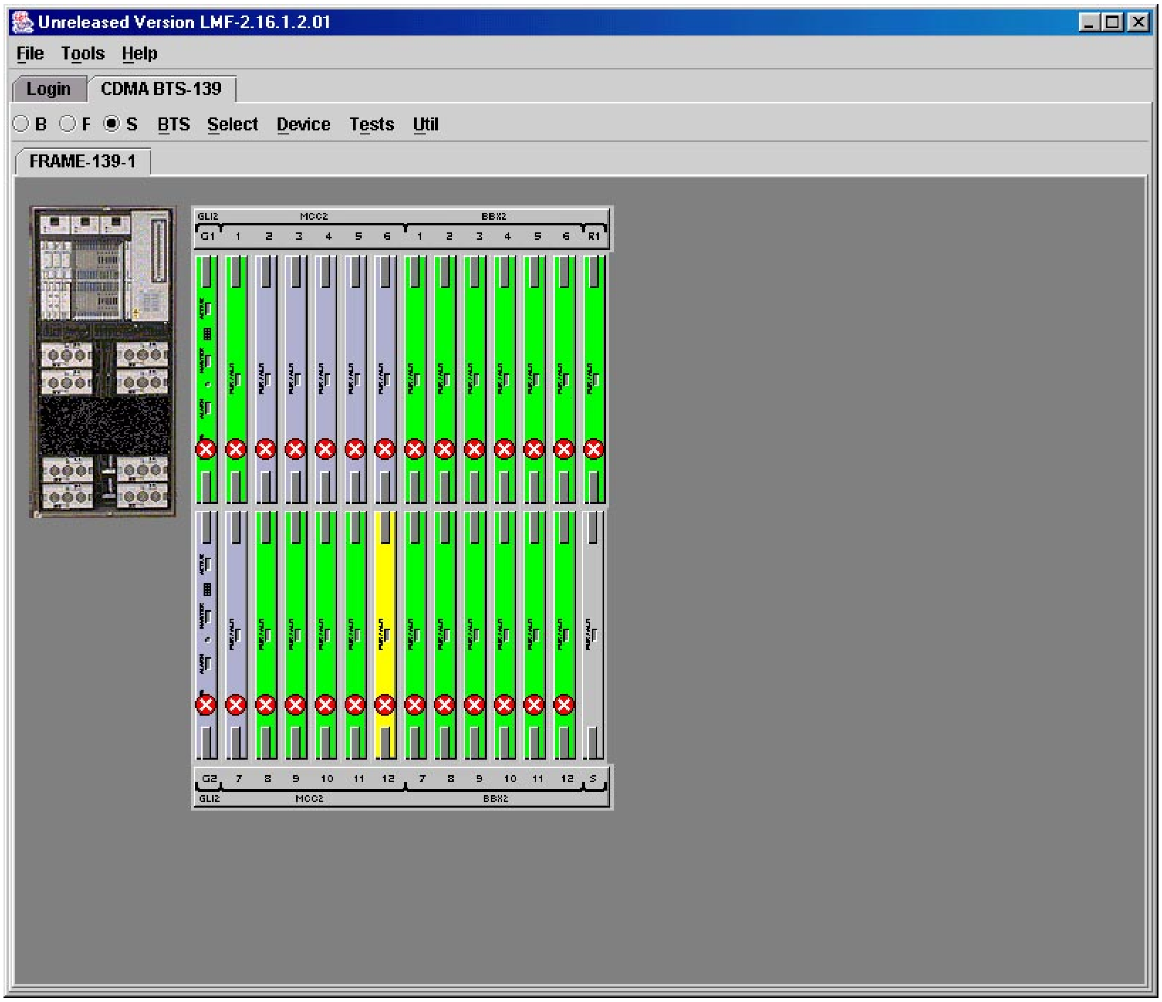


Figure 3-6: Available packet mode commands

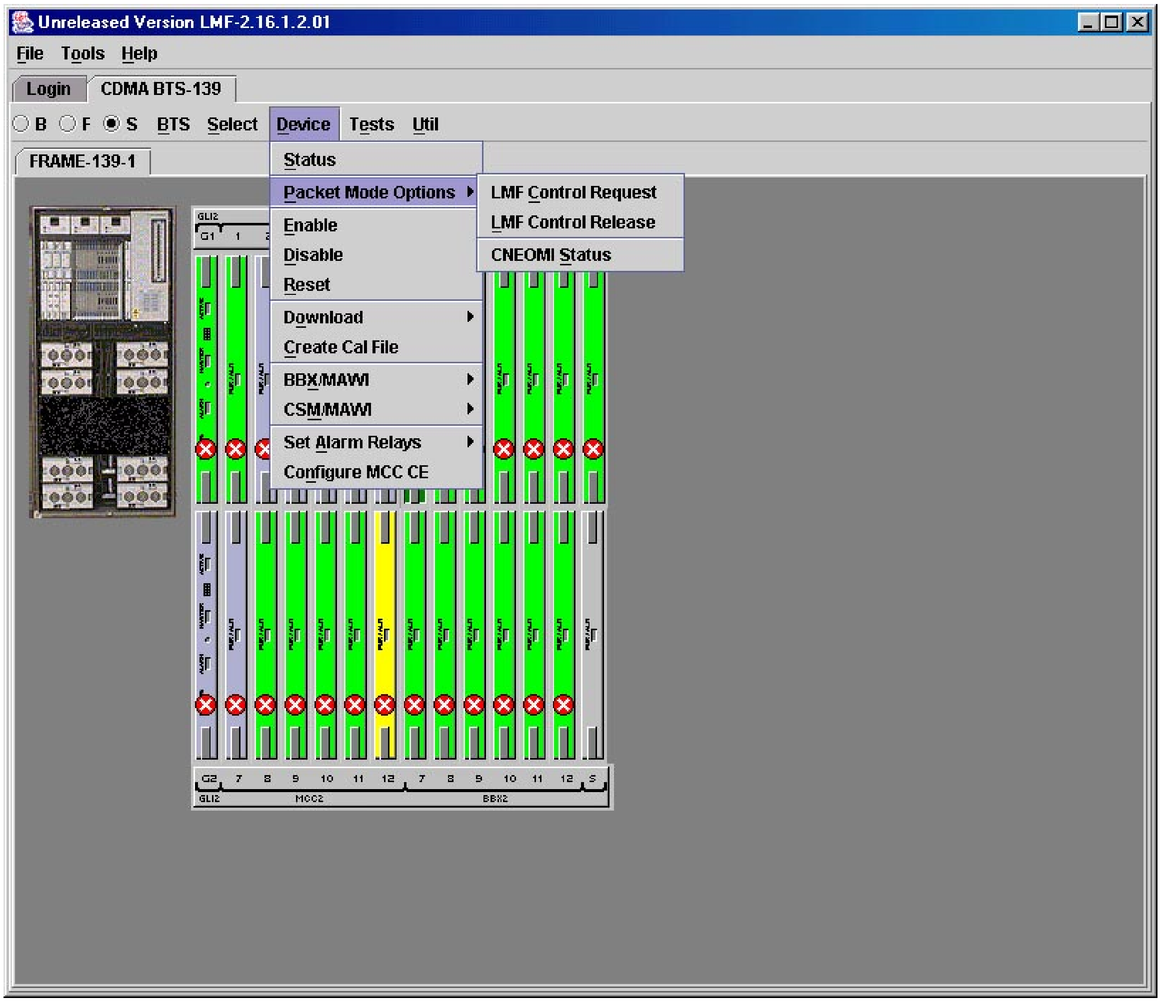
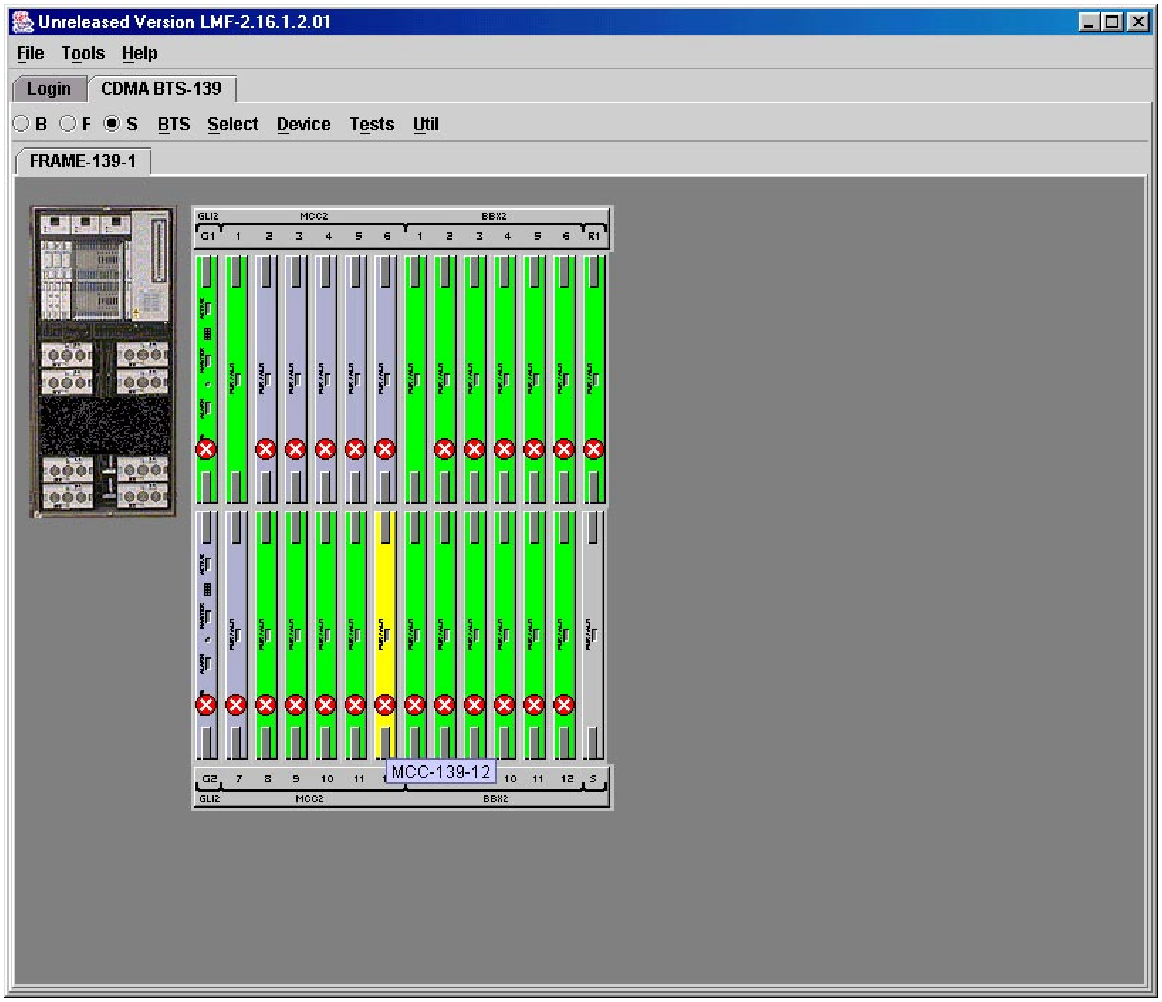


Figure 3-7: cket mode BTS with MCC–1 and BBX–1 under LMF control



Command Line Interface Overview

The LMF also provides Command Line Interface (CLI) capability. Activate the CLI by clicking on a shortcut icon on the desktop. The CLI cannot be launched from the GUI, only from the desktop icon.

Both the GUI and the CLI use a program known as the handler. Only one handler can be running at one time. Due to architectural limitations, the GUI must be started before the CLI if it is desired that the GUI and CLI to use the same handler. When the CLI is launched after the GUI, the CLI automatically finds and uses an in–progress login session with a BTS initiated under the GUI. This allows the use of the GUI and the CLI in the same BTS login session. If a CLI handler is already running when the GUI is launched (this happens if the CLI window is already running when the user starts the GUI, or if another copy of the GUI is already running when the user starts the GUI), a dialog window displays the following warning message:

```
The CLI handler is already running.
This may cause conflicts with the LMF.
```

```
Are you sure that you want to start the application?
            Yes                     No
```

Selecting the **yes** button starts the application. Selecting the **no** button terminates the application.

CLI Format Conventions

The CLI command can be broken down in the following way:

- verb
- device including device identifier parameters
- switch
- option parameters consisting of:
  - keywords
  - equals signs (=) between the keywords and the parameter values
  - parameter values

Spaces are required between the verb, device, switch, and option parameters. A hyphen is required between the device and its identifiers. Following is an example of a CLI command.

measure bbx–<bts_id>**–**<bbx_id> **rssi channel=6 sector=5**

Refer to the *LMF CDMA CLI Reference, Software Release 2.16.4.x* manual for a complete explanation of the CLI commands and their use.

Logging into a BTS

Logging into a BTS establishes a communications link between the BTS and the LMF. An LMF session can be logged into only one BTS at a time.

Prerequisites

Before attempting to log into the BTS,

Before attempting to login to a BTS, ensure the following have been completed:

- The LMF is properly connected to the BTS (see Figure 3-3).
- The LMF application program is correctly installed and prepared.
- A ***bts-#*** folder with the correct CDF and CBSC files or NEC files exists.
- The LMF computer was connected to the BTS before starting the *Windows* operating system and LMF software. If necessary, restart the computer after connecting it to the BTS in accordance with Table 3-5 and Figure 3-3.

3

NOTE

Be sure that the correct `bts–#.cdf` and `cbsc–#.cdf` or `NECB*bts#`.xml and `NECJ*bts#`.xml files are used for the BTS. These should be the CDF or NEC files that are provided for the BTS by the OMC–R. Failure to use the correct CDF or NEC files can result in invalid optimization. **Failure to use the correct CDF or NEC files to log into a live (traffic carrying) site can shut down the site.**

BTS Login from the GUI Environment

Follow the procedure in Table 3-6 to log into a BTS when using the GUI environment.

Table 3-6: BTS GUI Login Procedure

✓	Step	Action
	1	Start the CDMA LMF GUI environment by double clicking on the WinLMF desktop icon (if the LMF is not running). **NOTE** If a warning similar to the following is displayed, select **No**, shut down other LMF sessions which may be running, and start the CDMA LMF GUI environment again: `The CLI handler is already running.` `This may cause conflicts with the LMF` `Are you sure you want to start the application?` `Yes` **`No`**
	2	Click on the **Login** tab (if not displayed).
	3	If no base stations are displayed in the **Available Base Stations** pick list, double click on the **CDMA** icon.
	4	Click on the desired BTS number.
	5	Click on the **Network Login** tab (if not already in the forefront).
	6	Enter the correct IP address (normally **128.0.0.2** for a field BTS) if not correctly displayed in the **IP Address** box. **NOTE** 128.0.0.2 is the default IP address for MGLI–1 in field BTS units. 128.0.0.1 is the default IP address for MGLI–2.
	7	Type in the correct IP Port number (normally **9216**) if not correctly displayed in the **IP Port** box.

. . . continued on next page

Table 3-6: BTS GUI Login Procedure		
✓	Step	Action
	8	Click on **Ping**. – If the connection is successful, the **Ping Display** window shows text similar to the following: `Reply from 128 128.0.0.2: bytes=32 time=3ms TTL=255` – If there is no response the following is displayed: `128.0.0.2:9216:Timed out` If the MGLI fails to respond, reset and perform the ping process again. If the MGLI still fails to respond, typical problems are shorted BNC to inter–frame cabling, open cables, crossed A and B link cables, missing 50–Ohm terminators, or the MGLI itself.
	9	Change the **Multi-Channel Preselector** (from the **Multi-Channel Preselector** pick list) selection, normally **MPC,** to correspond to the BTS configuration, if required. **NOTE** When performing RX tests on expansion frames, do not choose EMPC if the test equipment is connected to the starter frame.
NOTE "**Use a Tower Top Amplifier**" is not applicable to the SC4812T–MC.		
	10	Click on **Login**. A BTS tab with a graphical representation of the BTS CCP cage is displayed. **NOTE** • If login is attempted to a BTS that is already logged on, all devices will be gray. • For Software Release 2.16.4.0 and earlier, a Mode Selection box asking if the BTS is Trunked or Multicarrier will pop up. *Multicarrier* must be selected for the SC4812T–*MC* BTS. • There may be instances where the BTS initiates a log out due to a system error (than is, a device failure). • If the MGLI is OOS_ROM (blue), it will have to be downloaded with code before other devices can be seen. • If the MGLI is OOS_RAM (yellow), it must be enabled before other installed devices can be seen.

BTS Login from the CLI Environment

Follow the procedure in Table 3-7 to log into a BTS when using the CLI environment.

3

NOTE

If the CLI and GUI environments are to be used at the same time, the *GUI must be started first and BTS login must be performed from the GUI*. Refer to Table 3-6 to start the GUI environment and log into a BTS.

Table 3-7: BTS CLI Login Procedure

✓	Step	Action
	1	Double click the WinLMF CLI desktop icon (if the LMF CLI environment is not already running). **NOTE** If a BTS was logged into under a GUI session when the CLI environment was started, the CLI session will be logged into the same BTS, and step 2 is not required.
	2	At the `/wlmf` prompt, enter the following command: **login bts–**<*bts#*> **host=**<*host*> **port=**<*port*> where: host = MGLI card IP address (defaults to address last logged into for this BTS or 128.0.0.2 if this is first login to this BTS). port = IP port of the BTS (defaults to port last logged into for this BTS or 9216 if this is first login to this BTS). A response similar to the following will be displayed: `LMF>` `13:08:18.882 Command Received and Accepted` `             COMMAND=login bts–33` `13:08:18.882 Command In Progress` `13:08:21.275 Command Successfully Completed` `             REASON_CODE=”No Reason”`

3

Logging Out

Logging out of a BTS is accomplished differently for the GUI and the CLI operating environments.

NOTE

The GUI and CLI environments use the same connection to a BTS. If a GUI and the CLI session are running for the same BTS at the same time, logging out of the BTS in either environment will log out of it for both. When either a login or logout is performed in the CLI window, there is no GUI indication that logout has occurred.

Logging Out of a BTS from the GUI Environment

Follow the procedure in Table 3-8 to logout of a BTS when using the GUI environment.

Table 3-8: BTS GUI Logout Procedure

✓	Step	Action
	1	Click on **BTS** on the BTS tab menu bar.
	2	Click the **Logout** item in the pull–down menu (a **Confirm Logout** pop–up message appears).
	3	Click on **Yes** or press the **<Enter>** key to confirm logout. The screen display returns to the **Login** tab. **NOTE** If a logout was previously performed on the BTS from a CLI window running at the same time as the GUI, a **Logout Error** pop–up message appears stating the system should not log out of the BTS. When this occurs, the GUI must be exited and restarted before it can be used for further operations.
	4	If a **Logout Error** pop–up message appears stating that the system could not log out of the Base Station because the given BTS is not logged in, perform the following actions: – Click **OK.** – Select **File>Exit** in the window menu bar. – Click **Yes** in the **Confirm Logout** pop–up. – Click **Yes** in the **Logout Error** pop–up which appears again.
	5	If further work is to be done in the GUI, restart it. **NOTE** • The **Logout** item on the BTS menu bar will only log the LMF out of the displayed BTS. • Logging out of all BTS sessions and exiting the LMF can be done by clicking on the **File** selection in the menu bar and selecting **Exit** from the **File** menu list. A **Confirm Logout** pop–up message will appear.

3

Logging Out of a BTS from the CLI Environment

Follow the procedure in Table 3-9 to logout of a BTS when using the CLI environment.

Table 3-9: BTS CLI Logout Procedure

✓	Step	Action
		NOTE If the BTS is also logged into from a GUI running at the same time and further work must be done with it in the GUI, proceed to step 2.
	1	Logout of a BTS by entering the following command: **logout bts–<*bts#*>** A response similar to the following is displayed: `LMF>` `12:22:58.028 Command Received and Accepted` `Command=logout bts–33` `12:22:58.028 Command Received and Accepted` `12:22:58.028 Command Successfully Completed` `REASON_CODE=”No Reason”`
	2	If desired, close the CLI interface by entering the following command: **exit** A response similar to the following is displayed before the window closes: `Killing background processes....`

Establishing an MMI Communication Session

For those procedures that require MMI communications between the LMF and BTS FRUs, follow the procedure in Table 3-10 to initiate the communication session.

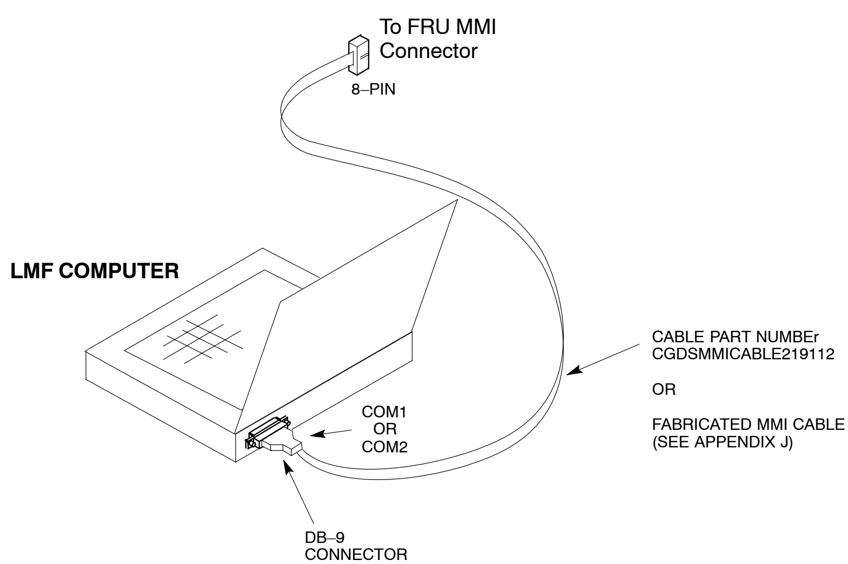
Table 3-10: Establishing MMI Communication

Step	Action
1	Connect the LMF computer to the equipment as detailed in the applicable procedure that requires the MMI communication session and Figure 3-8 or Figure 3-9.
2	If the LMF computer has only one serial port (COM1) and the LMF is running, disconnect the LMF from COM1 by performing the following:
2a	– Click on **Tools** in the LMF window menu bar, and select **Options** from the pull–down menu list. — An **LMF Options** dialog box will appear.
2b	– In the **Test Equipment** tab of the dialog box, select **COM1** in the **Comm Port** pulldown on the **Serial Connection** tab.

. . . continued on next page

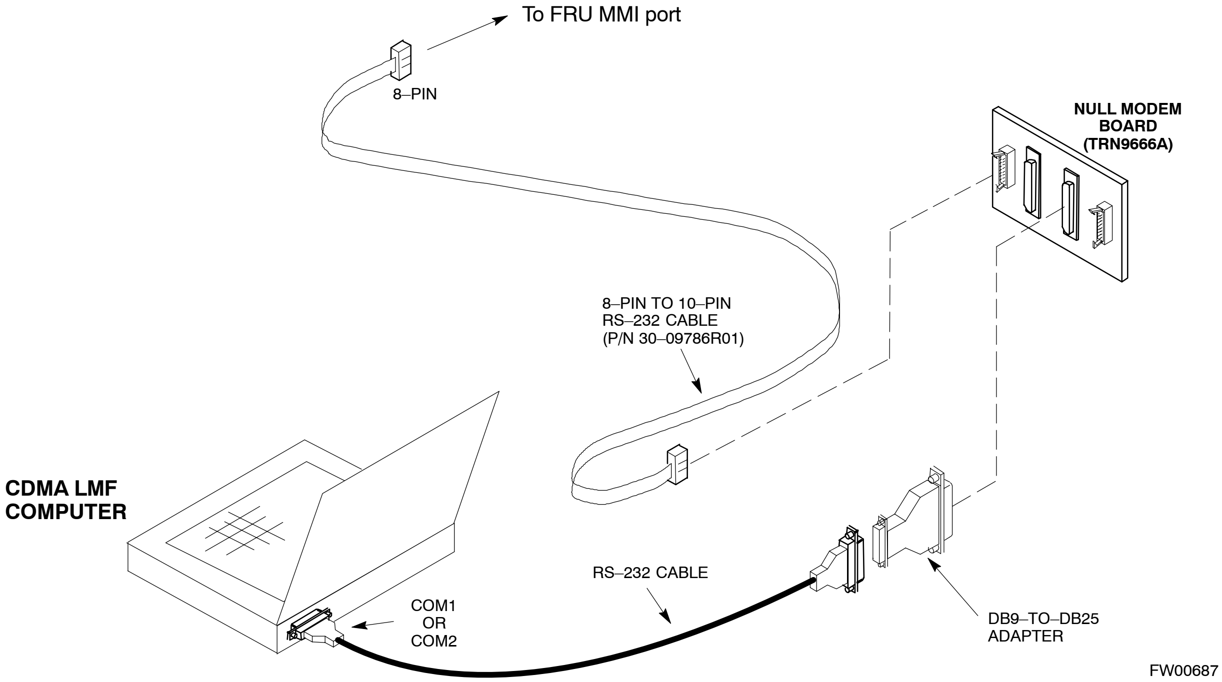
Table 3-10: Establishing MMI Communication	
Step	**Action**
2c	– ,Click the **Disconnect Port** button on the **Serial Connection** tab.
3	Start the named HyperTerminal connection for MMI sessions by double clicking on its *Windows* desktop shortcut. **NOTE** If a *Windows* desktop shortcut was not created for the MMI connection, access the connection from the *Windows* Start menu by selecting: **Programs > Accessories > Hyperterminal > HyperTerminal > <*Named HyperTerminal Connection (e.g., MMI Session)*>**
4	Once the connection window opens, establish MMI communication with the BTS FRU by pressing the LMF computer Enter key until the prompt identified in the applicable procedure is obtained.

Figure 3-8:CDMA LMF Computer Common MMI Connections – Cable CGDSMMICABLE219112 or Fabricated MMI Cable



3

Figure 3-9: CDMA LMF Computer Common MMI Connections – Motorola MMI Interface Kit, SLN2006A



Online Help

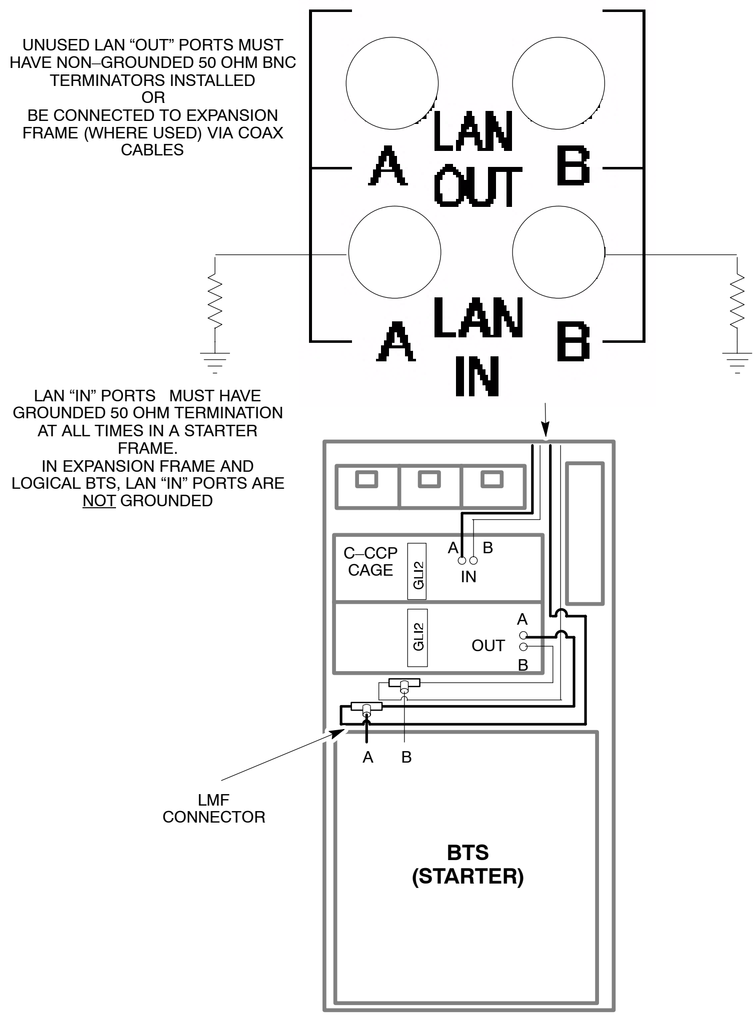
Task oriented online help is available in the LMF by clicking on **Help** in the window menu bar, and selecting **LMF Help** from the pull–down menu.

Pinging the Processor

For proper operation, the integrity of the Ethernet LAN A and B links must be be verified. Figure 3-10 represents a typical BTS Ethernet configuration. The drawing depicts one (of two identical) links, A and B.

Ping is a program that routes request packets to the LAN network modules to obtain a response from the specified “targeted” BTS.

Figure 3-10: BTS LAN Diagram



Follow the procedure in Table 3-11 and refer to Figure 3-10, as required, to ping each processor (on both LAN A and LAN B) and verify LAN redundancy is operating correctly.

CAUTION

Always wear an approved anti–static wrist strap while handling any circuit card/module to prevent damage by ESD.

NOTE

The Ethernet LAN A and B cables must be installed on each frame/enclosure before performing this test. All other processor board LAN connections are made via the backplanes.

Table 3-11: Pinging the Processors

✓	Step	Action
	1	If it has not already been done, connect the LMF to the BTS (see Table 3-5 on page 3-15).
	2	From the Windows desktop, click the **Start** button and select **Run.**
	3	In the **Open** box, type **ping** and the <*`MGLI IP address`*> (*fo*r example, **ping 128.0.0.2**). **NOTE** 128.0.0.2 is the default IP address for MGLI–1 in field BTS units. 128.0.0.1 is the default IP address for MGLI–2.
	4	Click on the **OK** button.
	5	If the connection is successful, text similar to the following is displayed: `Reply from 128 128.0.0.2: bytes=32 time=3ms TTL=255` `If there is no response the following is displayed:` `Request timed out` If the MGLI fails to respond, reset and perform the ping process again. If the MGLI still fails to respond, typical problems are shorted BNC–to–inter-frame cabling, open cables, crossed A and B link cables, missing 50–Ohm terminators, or the MGLI itself.

Download the BTS

Overview

Before a BTS can operate, each equipped device must contain device initialization (ROM) code. ROM code is loaded in all devices during manufacture or factory repair. Device application (RAM) code and data must be downloaded to each equipped device by the user before the BTS can be made fully functional for the site where it is installed.

ROM Code

Downloading ROM code to BTS devices from the LMF is *NOT routine maintenance nor a normal part of the optimization process.* It is only done in unusual situations where the resident ROM code in the device does not match the release level of the site operating software *AND* the CBSC cannot communicate with the BTS to perform the download. If ROM code must be downloaded, refer to Appendix H.

Before ROM code can be downloaded from the LMF, the correct ROM code file for each device to be loaded must exist on the LMF computer. ROM code must be manually selected for download.

NOTE

The ROM code file is not available for GLI3s. GLI3s are ROM code loaded at the factory.

RAM Code

Before RAM code can be downloaded from the CDMA LMF, the correct RAM code file for each device must exist on the LMF computer. RAM code can be automatically or manually selected depending on the **Device** menu item chosen and where the RAM code file for the device is stored in the CDMA LMF file structure. The RAM code file is selected automatically if the file is in the *\lmf\cdma\loads\n.n.n.n\code* folder (where *n.n.n.n* is the version number of the download code). The RAM code file in the code folder must have the correct hardware bin number.

RAM code can be downloaded to a device that is in any state. After the download is started, the device being downloaded changes to OOS-ROM (blue). When the download is completed successfully, the device changes to OOS-RAM (yellow). When code is downloaded to an MGLI, the LMF automatically also downloads data, and then enables the MGLI. When enabled, the MGLI changes to INS (green).

For non–MGLI devices, data must be downloaded after RAM code is downloaded. To download data, the device state must be OOS–RAM (yellow).

Prior to downloading a device, a code file must exist. The code file is selected automatically if the code file is in the */lmf/cdma/n.n.n.n/code* folder (where *n.n.n.n* is the version number of the download code that matches the “NextLoad” parameter in the CDF or NEC files). The code file in the code folder must have the correct hardware bin number. Code can be automatically or manually selected.

The devices to be loaded with RAM code and data are::

- Master Group Line Interface (MGLI)
- Group Line Interface (GLI)
- Clock Synchronization Module (CSM)
- Multi Channel Card (MCC24E, MCC8E or MCC–1X)
- Broadband Transceiver (BBX)

NOTE

The MGLI *must* be successfully downloaded with code and data, and put INS *before* downloading any other device. The download code process for an MGLI automatically downloads data and enables the MGLI before downloading other devices. The other devices can be downloaded in any order.

Verify GLI ROM Code Loads

Devices should not be loaded with a RAM code version which is not compatible with the ROM code with which they are loaded. Before downloading RAM code and data to the processor cards, follow the procedure in Table 3-12 to verify the GLI devices are loaded with the correct ROM code for the software release used by the BSS.

Prerequisite

Identify the correct GLI ROM code load for the software release being used on the BSS by referring to the Version Matrix section of the SC™ CDMA Release Notes (supplied on the tapes or CD–ROMs containing the BSS software).

Table 3-12: Verify GLI ROM Code Loads

Step	Action
1	***If it has not already been done***, start a *GUI* LMF session and log into the BTS (refer to Table 3-6).
2	Select all GLI devices by clicking on them, and select **Device > Status** from the BTS menu bar.
3	In the status report window which opens, note the number in the **ROM Ver** column for each GLI.
4	If the ROM code loaded in the GLIs is *not* the correct one for the software release being used on the BSS, perform the following:
4a	– Log out of the BTS as described in Table 3-8 or Table 3-9, as applicable.
4b	– Disconnect the LMF computer.
4c	– Reconnect the span lines as described in Table 5-7.

. . . continued on next page

Table 3-12: Verify GLI ROM Code Loads	
Step	**Action**
4d	– Have the CBSC download the correct ROM code version to the BTS devices.
5	When the GLIs have the correct ROM load for the software release being used, be sure the span lines are disabled as outlined in Table 3-4 and proceed to downloading RAM code and data.

Download RAM Code and Data to MGLI Cards

Prerequisite

Prior to performing this procedure, ensure a code file exists for each of the devices to be downloaded.

Procedure

Follow the procedure in Table 3-13 to download the firmware application code for the MGLI. The download code action downloads data and also enables the MGLI.

Table 3-13: Download and Enable MGLI

✓	Step	Action
	1	Note the active LAN to which the LMF computer is connected.
	2	At the top of the frame, remove the 50 Ω termination from the LAN OUT connector of the LAN to which the LMF is *not* connected.
	3	Select **Tools > Update Next Load > CDMA** function to ensure the Next Load parameter is set to the correct code version level.
	4	Note the LAN IP address in the Network Login section of the LMF Login tab, and determine which GLI the LMF is logged into based on the following IP addresses: – Card in GLI slot 1: 128.0.0.2 – Card in GLI slot 2: 128.0.0.1
	5	Download code to the MGLI which the LMF is logged into by clicking on the MGLI. – From the **Device** pull down menu, select **Download > Code/Data**. A status report confirms change in the device(s) status. – Click **OK** to close the status window. *(The MGLI should automatically be downloaded with data and enabled.)*
	6	If the card accepts the download and enables, skip to step 10.
	7	If the BTS connection is lost during or after the download process, click on the LMF Login tab and log into the BTS again using the same IP address.

. . . continued on next page

Table 3-13: Download and Enable MGLI		
✓	Step	Action
	8	If the log–in attempt fails, set the LAN IP address to the GLI card which was *not* downloaded and log into the BTS through the other GLI card.
	9	Select the MGLI logged into in step 8, above, and download to it by repeating step 5 for that card.
	10	Select the remaining GLI card and download to it, but do not enable it at this time.
	11	Re–install the 50 Ω termination removed from the frame–top LAN OUT connector in step 2, above.

Download Code and Data to Non–GLI Devices

Non–GLI devices can be downloaded individually or all equipped devices can be downloaded with one action. Follow the procedure in Table 3-14 to download code and data to the non–GLI devices.

NOTE

When downloading multiple devices, the download may fail for some of the devices (a time out occurs). These devices can be downloaded separately after completing the multiple download.

CSM devices are RAM code–loaded at the factory. RAM code is downloaded to CSMs only if updating to a newer software version.

Table 3-14: Download Code and Data to Non–GLI Devices		
✓	Step	Action
	1	**Select** all devices to be downloaded.
	2	From the **Device** pull down menu, select **Download>Code/Data**. A status report displays the result of the download for each selected device.
	3	Click **OK** to close the status window when downloading is complete.

Table 3-14: Download Code and Data to Non–GLI Devices		
✓	Step	Action
		NOTE – After the download has started, the device being downloaded changes to blue. If the download is completed successfully, the device changes to yellow (OOS-RAM with code loaded). – After a BBX, CSM or MCC is successfully downloaded with code and has changed to OOS-RAM, the status LED should be rapidly flashing GREEN. – The command in Step 2 loads both code and data. Data can be downloaded without doing a code download anytime a device is OOS–RAM using the command in Step 4.
	4	To download the firmware application data to each device, select the target device and select: **Device>Download>Data**

Select CSM Clock Source and Enable CSMs

A CSM can have three different clock sources. The **Clock Source** function can be used to select the clock source from each of the three inputs. This function is only used if the clock source for a CSM needs to be changed. The **Clock Source** function provides the following clock source options:

- Local GPS
- Mate GPS
- Remote GPS
- HSO (only for sources 2 & 3)
- HSOX (only for sources 2 & 3)
- 10 MHz (only for sources 2 & 3)
- NONE (only for sources 2 & 3)

Prerequisites

MGLI=INS_ACT

CSM= OOS_RAM or INS_ACT

Follow the procedure in Table 3-15 to select a CSM Clock Source.

Table 3-15: Select CSM Clock Source		
✓	Step	Action
	1	Select the applicable CSM(s).
	2	Click on **Device** in the BTS menu bar and select **CSM/MAWI > Select Clock Source...** in the pull down menu – a clock source selection window is displayed.

. . . continued on next page

Table 3-15: Select CSM Clock Source		
✓	Step	Action
	3	Select the applicable clock source in the **Clock Reference Source** pick lists. Uncheck the related check boxes for Clock Reference Sources 2 and 3 if the displayed pick list items should not be used.
	4	Click on the **OK** button – a status report window displays the results of the selection action.
	5	Click on the **OK** button to close the status report window.

NOTE

For non–RGPS sites only, verify the CSM configured with the GPS receiver “daughter board” is installed in the CSM–1 slot before continuing.

Enable CSMs

NOTE

CSMs are code loaded at the factory. This data is retained in EEPROM. The download code procedure is required in the event it becomes necessary to code load CSMs with updated software versions. Use the status function to determine the current code load versions.

The CSM(s) to be enabled must have been downloaded with code (Yellow, OOS–RAM) and data.

Each BTS CSM system features two CSM boards per site. In a typical operation, the primary CSM locks its Digital Phase Locked Loop (DPLL) circuits to GPS signals. These signals are generated by either an on–board GPS module (RF–GPS) or a remote GPS receiver (R–GPS). The CSM2 card is required when using the R–GPS. The GPS receiver (mounted on CSM–1) is the primary timing reference and synchronizes the entire cellular system. CSM–2 provides redundancy but does not have a GPS receiver.

The BTS may be equipped with a remote GPS, LORAN–C, HSO 10 MHz Rubidium source, or HSOX for expansion frames, which the CSM can use as a secondary timing reference. In all cases, the CSM monitors and determines what reference to use at a given time.

Follow the procedure in Table 3-16 to enable the CSMs.

Table 3-16: Enable CSMs		
✓	Step	Action
	1	Verify the CSM(s) have been downloaded with code (Yellow, OOS–RAM) and data.
	2	Click on the target CSM. From the **Device** pull down, select **Enable**. **NOTE** – If equipped with two CSMs, enable CSM–2 first and then CSM–1. A status report confirms change in the device(s) status. Click **OK** to close the status window. – FAIL may be shown in the status table for enable action. If Waiting For Phase Lock is shown in the Description field, the CSM changes to the enabled state after phase lock is achieved. CSM–1 houses the GPS receiver. The enable sequence can take up to ***one hour*** to complete. – The GPS satellite system satellites are not in a geosynchronous orbit and are maintained and operated by the United States Department of Defense (D.O.D.). The D.O.D. periodically alters satellite orbits; therefore, satellite trajectories are subject to change. A GPS receiver that is INS contains an “almanac” that is updated periodically to take these changes into account. – If an installed GPS receiver has not been updated for a number of weeks, it may take up to one hour for the GPS receiver “almanac” to be updated. – Once updated, the GPS receiver must track at least four satellites and obtain (hold) a 3-D position fix for a minimum of 45 seconds before the CSM will come in-service. (In some cases, the GPS receiver needs to track only one satellite, depending on accuracy mode set during the data load.) – If equipped with two CSMs, the LMF should display CSM-1 as bright GREEN (INS–ACT) and CSM–2 as dark green (INS–STB). After the CSMs have been successfully enabled, the PWR/ALM LEDs are steady green (alternating green/red indicates the card is in an alarm state).
	3	If more than an hour has passed, refer to Table 3-20 to determine the cause.

3

Enable MCCs

Follow the procedure in Table 3-17 to enable the MCCs.

NOTE

The MGLI, and primary CSM must be downloaded and enabled (IN–SERVICE ACTIVE), before downloading and enabling the MCC.

Table 3-17: Enable MCCs		
✓	Step	Action
	1	Verify the MCC(s) have been downloaded with code (Yellow, OOS–RAM) and data.
	2	Select the MCCs to be enabled or from the **Select** pulldown menu choose **MCCs**.
	3	From the **Device** menu, select **Enable** – a status report confirms change in the device(s) status.

Table 3-17: Enable MCCs		
✓	Step	Action
	4	Click on **OK** to close the status report window.

Enable Redundant GLIs

Follow the procedure in Table 3-18 to enable the redundant GLI(s).

Table 3-18: Enable Redundant GLIs		
✓	Step	Action
	1	Select the target redundant GLI(s).
	2	From the **Device** menu, select **Enable** – a status report window confirms the change in the device(s) status and the enabled GLI(s) is green.
	3	Click on **OK** to close the status report window.

CSM & HSO Background

The primary function of the Clock Synchronization Manager (CSM) boards (slots 1 and 2) is to maintain CDMA system time. The CSM in slot 1 is the primary timing source while slot 2 provides redundancy. The CSM2 card (CSM second generation) is required when using the remote GPS receiver (R–GPS). R–GPS uses a GPS receiver in the antenna head that has a digital output to the CSM2 card. CSM2 can have a daughter card as a local GPS receiver to support an RF–GPS signal.

The CSM2 switches between the primary and redundant units (slots 1 and 2) upon failure or command. CDMA Clock Distribution Cards (CCDs) buffer and distribute even–second reference and 19.6608 MHz clocks. CCD–1 is married to CSM–1 and CCD–2 is married to CSM 2. A failure on CSM–1 or CCD–1 cause the system to switch to redundant CSM–2 and CCD–2.

In a typical operation, the primary CSM locks its Digital Phase Locked Loop (DPLL) circuits to GPS signals. These signals are generated by either an on–board GPS module (RF–GPS) or a remote GPS receiver (R–GPS). The CSM2 card is required when using the R–GPS. DPLL circuits employed by the CSM provide switching between the primary and redundant unit upon request. Synchronization between the primary and redundant CSM cards, as well as the HSO back–up source, provides excellent reliability and performance.

Each CSM board features an ovenized, crystal oscillator that provides 19.6608 MHz clock, even second tick reference, and 3 MHz sinewave reference, referenced to the selected synchronization source (GPS, Receiver, or High Stability Oscillator (HSO), T1 Span, or external reference oscillator sources). The 3 MHz signals are also routed to the RDM EXP 1A & 1B connectors on the top interconnect panel for distribution to co–located frames at the site.

Fault management has the capability of switching between the GPS synchronization source and the HSO backup source in the event of a GPS receiver failure on CSM–1. During normal operation, the CSM–1 board selects GPS as the primary source (see Table 3-20). The source selection can also be overridden via the LMF or by the system software.

All boards are mounted in the C–CCP shelf at the top of the BTS frame. Figure 1-14 illustrates the location of the boards in the BTS frame.

Front Panel LEDs

The status of the LEDs on the CSM boards are as follows:

- Steady Green – Master CSM locked to GPS (INS).
- Rapidly Flashing Green – Standby CSM locked to GPS (STBY).
- Flashing Green/Rapidly Flashing Red – CSM OOS_RAM attempting to lock on GPS signal.
- Rapidly Flashing Green and Red – Alarm condition exists. Trouble Notifications (TNs) are currently being reported to the GLI.

High Stability Oscillator

CSM and HSO – The CSM handles the overall configuration and status monitoring functions of the HSO. In the event of GPS failure, the HSO is capable of maintaining synchronization initially established by the GPS reference signal.

HSO – The HSO is a high stability 10 MHz oscillator with the necessary interface to the CSMs. The HSO is typically installed in those geographical areas not covered by the LORAN–C system. Since the HSO is a free–standing oscillator, system time can only be maintained for 24 hours after 24 hours of GPS lock.

Upgrades and Expansions: HSO2/HSOX

HSO2 (second generation cards) both export a timing signal to the expansion or logical BTS frames. The associated expansion or logical frames require an HSO–expansion (HSOX). The HSOX accepts input from the starter frame and interfaces with the CSM cards in the expansion frame. HSO, HSO2, and HSOX use the same source code in source selection (see Table 3-19).

NOTE

Allow the **base site and test equipment to warm up for 60 minutes** after any interruption in oscillator power. CSM board warm-up allows the oscillator oven temperature and oscillator frequency to stabilize prior to test. Test equipment warm-up allows the Rubidium standard timebase to stabilize in frequency before any measurements are made.

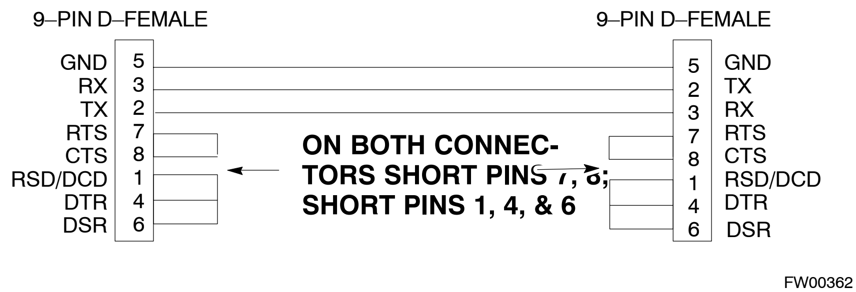
CSM Frequency Verification

The objective of this procedure is the initial verification of the CSM boards before performing the RF path verification tests. Parts of this procedure will be repeated for final verification *after* the overall optimization has been completed.

Null Modem Cable

A null modem cable is required. It is connected between the LMF COM1 port and the RS232–GPIB Interface box. Figure 3-11 shows the wiring detail for the null modem cable.

Figure 3-11: Null Modem Cable Detail



Prerequisites

Ensure the following prerequisites have been met before proceeding:

- The LMF is **NOT** logged into the BTS.
- The COM1 port is connected to the MMI port of the primary CSM via a null modem board.

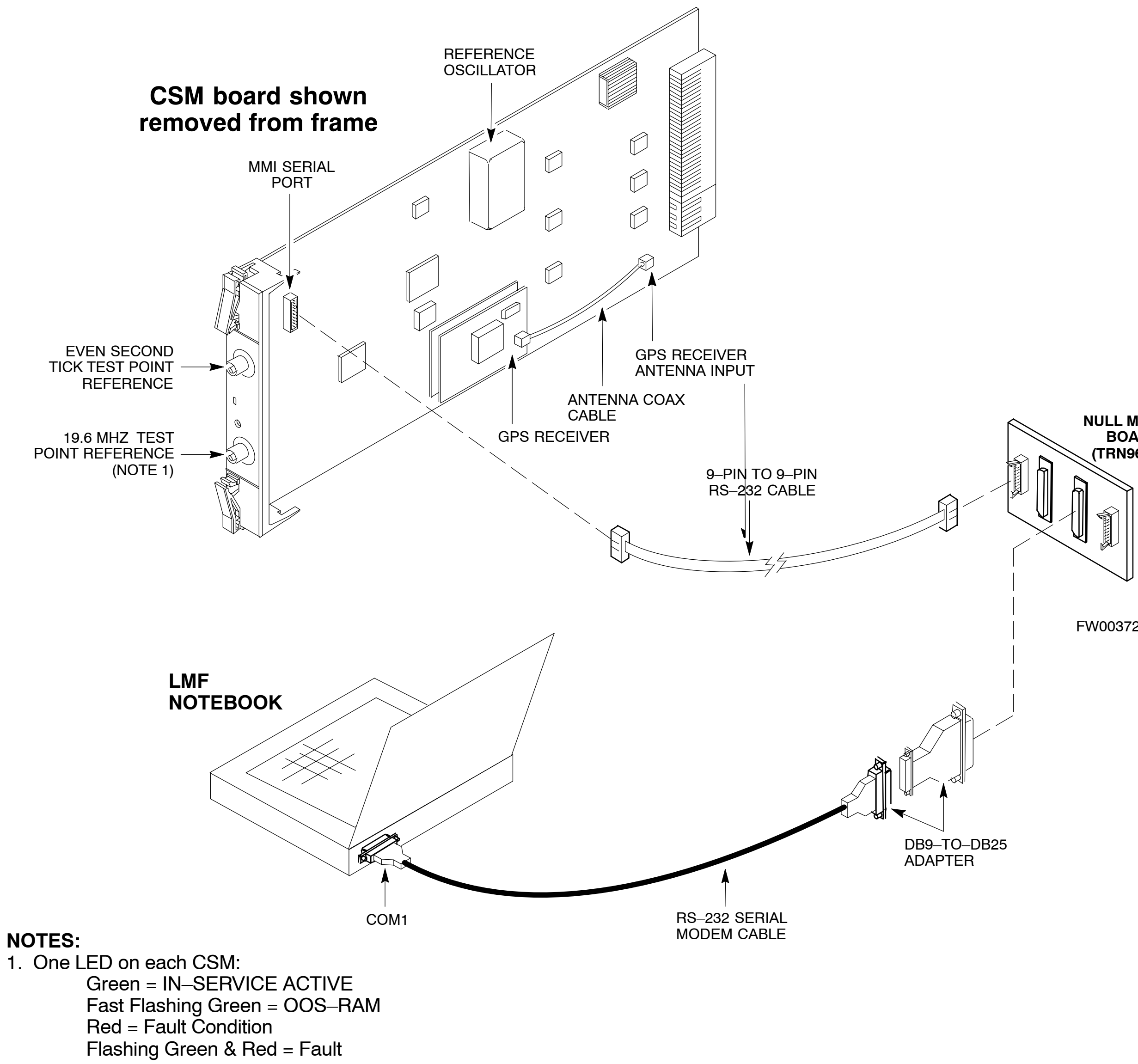
Test Equipment Setup: GPS & HSO Verification

Follow the procedure in Table 3-19 to set up test equipment while referring toFigure 3-12 as required.

Table 3-19: Test Equipment Setup (GPS & HSO Verification)

Step	Action
1	Perform one of the following operations: – For **local GPS** (RF–GPS), verify a CSM board with a GPS receiver is installed in primary CSM slot 1 and that CSM–1 is INS. This is verified by checking the board ejectors for kit number **SGLN1145** on the board in slot 1. – For **Remote GPS** (RGPS), verify a CSM2 board is installed in primary slot 1 and that CSM–1 is INS. This is verified by checking the board ejectors for kit number **SGLN4132ED** (or later).
2	Remove CSM–2 (if installed) and connect a serial cable from the LMF COM 1 port (via null modem board) to the MMI port on CSM–1.
3	Reinstall CSM–2.
4	Start an MMI communication session with CSM–1 by using the Windows desktop shortcut icon (see Table 3-3) **NOTE** The LMF program must not be running when a Hyperterminal session is started if COM1 is being used for the MMI session.
5	When the terminal screen appears, press the **<Enter>** key until the **CSM>** prompt appears.

Figure 3-12: CSM MMI terminal connection



GPS Initialization/Verification

Follow the procedure in Table 3-20 to initialize and verify proper GPS receiver operation.

Prerequisites

Ensure the following prerequisites have been met before proceeding:

- The LMF is not logged into the BTS.
- The COM1 port is connected to the MMI port of the primary CSM via a null modem board (see Figure 3-12).
- The primary CSM and HSO (if equipped) have been warmed up for at least 15 minutes.

CAUTION

Connect the GPS antenna to the GPS RF connector **ONLY**. Damage to the GPS *antenna* and/or *receiver* can result if the GPS antenna is inadvertently connected to any other RF connector.

Table 3-20: GPS Initialization/Verification

Step	Action
1	To verify that `Clock alarms (0000)`, `Dpll is locked and has a reference source`, and `GPS self test passed` messages are displayed within the report, issue the following MMI command **bstatus** – Observe the following typical response: `Clock Alarms (0000):` `DPLL is locked and has a reference source.` `GPS receiver self test result: passed` `Time since reset 0:33:11, time since power on: 0:33:11`
2	Enter the following command at the `CSM>` prompt to display the current status of the Loran and the GPS receivers. **sources** – Observe the following typical response for systems equipped with HSO: `Num Source Name Type TO Good Status Last Phase Target Phase Valid` `0 Local GPS Primary 4 Yes Good 3 0 Yes` `1 HSO Backup 4 No N/A timed–out* Timed–out* No` ***NOTE** "Timed–out" should only be displayed while the HSO is warming up. "Not–Present" or "Faulty" should not be displayed. If the HSO does not appear as one of the sources, then configure the HSO as a back–up source by entering the following command at the CSM> prompt: **ss 1 12** After a maximum of 15 minutes, the Rubidium oscillator should reach operational temperature and the LED on the HSO should now have changed from red to green. After the HSO front panel LED has changed to green, enter **sources <cr>** at the CSM> prompt. Verify that the HSO is now a valid source by confirming that the bold text below matches the response of the "sources" command. The HSO should be valid within one (1) minute, assuming the DPLL is locked and the HSO rubidium oscillator is fully warmed. `Num Source Name Type TO Good Status Last Phase Target Phase Valid` `0 Local GPS Primary 4 Yes Good 3 0 Yes` `1 HSO Backup 4 Yes N/A xxxxxxxxxxx xxxxxxxxxxx Yes`
3	HSO information (underlined text above, verified from left to right) is usually the #1 reference source. If this is not the case, have the *OMCR* determine the correct BTS timing source has been identified in the database by entering the **display bts csmgen** command and correct as required using the **edit csm csmgen refsrc** command.

. . . continued on next page

DRAFT

<table>
<tr><th colspan="2">Table 3-20: GPS Initialization/Verification</th></tr>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>4</td><td>NOTE
If any of the above mentioned areas fail, verify:
– If LED is RED, verify that HSO had been powered up for at least 5 minutes. After oscillator temperature is stable, LED should go GREEN Wait for this to occur before continuing !
– If "timed out" is displayed in the Last Phase column, suspect the HSO output buffer or oscillator is defective
– Verify the HSO is FULLY SEATED and LOCKED to prevent any possible board warpage</td></tr>
<tr><td>5</td><td>Verify the following GPS information (underlined text above):
– GPS information is usually the 0 reference source.
– At least one Primary source must indicate "Status = good" and "Valid = yes" to bring site up.</td></tr>
<tr><td>6</td><td>Enter the following command at the CSM> prompt to verify that the GPS receiver is in tracking mode.
gstatus
– Observe the following typical response:
<pre>
24:06:08 GPS Receiver Control Task State: tracking satellites.
24:06:08 Time since last valid fix: 0 seconds.
24:06:08
24:06:08 Recent Change Data:
24:06:08 Antenna cable delay 0 ns.
24:06:08 Initial position: lat 117650000 msec, lon –350258000 msec, height 0 cm (GPS)
24:06:08 Initial position accuracy (0): estimated.
24:06:08
24:06:08 GPS Receiver Status:
24:06:08 Position hold: lat 118245548 msec, lon –350249750 msec, height 20270 cm
24:06:08 Current position: lat 118245548 msec, lon –350249750 msec, height 20270 cm
(GPS)
24:06:08 8 satellites tracked, receiving 8 satellites, 8 satellites visible.
24:06:08 Current Dilution of Precision (PDOP or HDOP): 0.
24:06:08 Date & Time: 1998:01:13:21:36:11
24:06:08 GPS Receiver Status Byte: 0x08
24:06:08 Chan:0, SVID: 16, Mode: 8, RSSI: 148, Status: 0xa8
24:06:08 Chan:1, SVID: 29, Mode: 8, RSSI: 132, Status: 0xa8
24:06:08 Chan:2, SVID: 18, Mode: 8, RSSI: 121, Status: 0xa8
24:06:08 Chan:3, SVID: 14, Mode: 8, RSSI: 110, Status: 0xa8
24:06:08 Chan:4, SVID: 25, Mode: 8, RSSI: 83, Status: 0xa8
24:06:08 Chan:5, SVID: 3, Mode: 8, RSSI: 49, Status: 0xa8
24:06:08 Chan:6, SVID: 19, Mode: 8, RSSI: 115, Status: 0xa8
24:06:08 Chan:7, SVID: 22, Mode: 8, RSSI: 122, Status: 0xa8
24:06:08
24:06:08 GPS Receiver Identification:
24:06:08 COPYRIGHT 1991–1996 MOTOROLA INC.
24:06:08 SFTW P/N # 98–P36830P
24:06:08 SOFTWARE VER # 8
24:06:08 SOFTWARE REV # 8
24:06:08 SOFTWARE DATE 6 AUG 1996
24:06:08 MODEL #   B3121P1115
24:06:08 HDWR P/N # _
24:06:08 SERIAL #   SSG0217769
24:06:08 MANUFACTUR DATE 6B07
24:06:08 OPTIONS LIST   IB
24:06:08 The receiver has 8 channels and is equipped with TRAIM.
</pre></td></tr>
</table>

. . . continued on next page

Table 3-20: GPS Initialization/Verification

Step	Action
7	**Verify** the following GPS information (shown above in underlined text): – At least 4 satellites are tracked, and 4 satellites are visible. – GPS Receiver Control Task State is "tracking satellites". ***Do not continue until this occurs!*** – Dilution of Precision indication is not more that 30. **Record** the current position base site latitude, longitude, height and height reference (height reference to Mean Sea Level (MSL) or GPS height (GPS). (GPS = 0 MSL = 1).
8	**If steps 1 through 7 pass, the GPS is good.**
	NOTE If any of the above mentioned areas fail, verify that: – If *Initial position accuracy* is "estimated" (typical), at least 4 satellites must be tracked and visible (1 satellite must be tracked and visible if actual lat, log, and height data for this site has been entered into CDF or NEC files). – If *Initial position accuracy* is "surveyed", position data currently in the CDF or NEC files is assumed to be accurate. GPS will not automatically survey and update its position. – The GPS antenna is not obstructed or misaligned. – GPS antenna connector center conductor measures approximately +5 Vdc with respect to the shield. – There is no more than 4.5 dB of loss between the GPS antenna OSX connector and the BTS frame GPS input. – Any lightning protection installed between GPS antenna and BTS frame is installed correctly.
9	Enter the following commands at the `CSM>` prompt to verify that the CSM is warmed up and that GPS acquisition has taken place. **debug dpllp** Observe the following typical response if the CSM is not warmed up (15 minutes from application of power) ***(If warmed–up proceed to step 10)*** `CSM>DPLL Task Wait. 884 seconds left.` `DPLL Task Wait. 882 seconds left.` `DPLL Task Wait. 880 seconds left.   ...........etc.`
	NOTE The **warm** command can be issued at the MMI port used to force the CSM into warm–up, but the reference oscillator will be unstable.

. . . continued on next page

3

Table 3-20: GPS Initialization/Verification

Step	Action
10	Observe the following typical response if the CSM is warmed up. `c:17486 off: –11, 3, 6 TK SRC:0 S0: 3 S1:–2013175,–2013175` `c:17486 off: –11, 3, 6 TK SRC:0 S0: 3 S1:–2013175,–2013175` `c:17470 off: –11, 1, 6 TK SRC:0 S0: 1 S1:–2013175,–2013175` `c:17486 off: –11, 3, 6 TK SRC:0 S0: 3 S1:–2013175,–2013175` `c:17470 off: –11, 1, 6 TK SRC:0 S0: 1 S1:–2013175,–2013175` `c:17470 off: –11, 1, 6 TK SRC:0 S0: 1 S1:–2013175,–2013175`
11	Verify the following GPS information (underlined text above, from left to right): – Lower limit offset from tracked source variable is not less than –60 (equates to 3μs limit). – Upper limit offset from tracked source variable is not more than +60 (equates to 3μs limit). – TK SRC: 0 is selected, where SRC 0 = GPS.
12	Enter the following commands at the `CSM>` prompt to exit the debug mode display. **debug dpllp**

HSO Initialization/Verification

The HSO module is a full–size card that resides in the C–CCP Shelf. This completely self contained high stability 10 MHz oscillator interfaces with the CSM via a serial communications link. The CSM handles the overall configuration and status monitoring functions of the HSO. In the event of GPS failure, the HSO is capable of maintaining synchronization initially established by the GPS reference signal for a limited time.

The HSO is typically installed in those geographical areas not covered by the LORAN–C system and provides the following major functions:

- Reference oscillator temperature and phase lock monitor circuitry
- Generates a highly stable 10 MHz sine wave.
- Reference divider circuitry converts 10 MHz sine wave to 10 MHz TTL signal, which is divided to provide a 1 PPS strobe to the CSM.

Prerequisites

- The LMF is not logged into the BTS.
- The COM1 port is connected to the MMI port of the primary CSM via a null modem board.
- The primary CSM and the HSO (if equipped) have warmed up for 15 minutes.

If the BTS is equipped with an HSO, follow the procedure in Table 3-21 to configure the HSO.

<table>
<tr><th colspan="2">Table 3-21: HSO Initialization/Verification</th></tr>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>At the BTS, slide the HSO card into the cage.
NOTE
The LED on the HSO should light red for no longer than 15-minutes, then switch to green. The CSM must be locked to GPS.</td></tr>
<tr><td>2</td><td>On the LMF at the CSM> prompt, enter sources <cr>.
– Observe the following typical response for systems equipped with HSO:
<pre>
Num Source Name Type   TO Good   Status Last Phase Target Phase Valid
____
 0   Local GPS   Primary 4   Yes   Good   0   0   Yes
 1   HSO   Backup   4   Yes   N/A   xxxxxxx   -69532   Yes
 2   Not used
Current reference source number: 0
</pre>
When the CSM is locked to GPS, verify that the HSO “Good” field is Yes and the “Valid” field is Yes.</td></tr>
<tr><td>3</td><td>If source “1” is not configured as HSO, enter at the CSM> prompt: ss 1 12 <cr>
Check for Good in the Status field.</td></tr>
<tr><td>4</td><td>At the CSM> prompt, enter sources <cr>.
Verify the HSO valid field is Yes. If not, repeat this step until the “Valid” status of Yes is returned. The HSO should be valid within one (1) minute, assuming the DPLL is locked and the HSO Rubidium oscillator is fully warmed.</td></tr>
</table>

Connecting Test Equipment to the BTS

The following equipment is required to perform optimization:

- LMF
- Test set
- Directional coupler and attenuator
- RF cables and connectors
- Null modem cable (see Figure 3-11)
- GPIB interface box

Refer to Table 3-22 and Table 3-23 for an overview of connections for test equipment currently supported by the LMF. In addition, see the following figures:

- Figure 3-15 and Figure 3-16 show the test set connections for TX calibration.
- Figure 3-18 and Figure 3-19 show test set connections for IS–95 A/B optimization/ATP tests.
- Figure 3-20 shows test set connections for IS–95 A/B and CDMA 2000 optimization/ATP tests.
- Figure 3-22 and Figure 3-23 show typical TX and RX ATP setup with a directional coupler.

Test Equipment GPIB Address Settings

All test equipment is controlled by the LMF through an IEEE–488/GPIB bus. To communicate on the bus, each piece of test equipment must have a GPIB address set which the LMF will recognize. The standard address settings used by the LMF for the various types of test equipment items are as follows:

- Signal generator address: **1**
- Power meter address: **13**
- Communications system analyzer: **18**
- Signal generator address: **19**

Using the procedures included in the Setting GPIB Addresses section of Appendix F, verify and, if necessary, change the GPIB address of each piece of test equipment used to match the above

Supported Test Equipment

CAUTION

To prevent damage to the test equipment, all TX test connections must be through the directional coupler and in-line attenuator as shown in the test setup illustrations.

IS–95 A/B Testing

Optimization and ATP testing for IS–95A/B may be performed using one of the following test sets:

- CyberTest
- Hewlett–Packard HP 8935
- Hewlett–Packard HP 8921 and HP 437B or Gigatronics Power Meter
- Advantest R3465 and HP 437B or Gigatronics Power Meter

The equipment listed above cannot be used for CDMA 2000 testing.

CDMA 2000 Testing

NOTE

IS–95 C is the same as CDMA 2000.

Optimization and ATP testing for IS–95A/B and CDMA2000 1X sites or carriers may be performed using the following test equipment:

- Advantest R3267 Analyzer with Advantest R3562 Signal Generator
- Agilent E4406A with E4432B Signal Generator
- Agilent 8935 series E6380A communications test set (formerly HP 8935) with option 200 or R2K and with E4432B signal generator for 1X FER
- Agilent E7495A communications test set

The E4406A/E4432B pair, or the R3267/R3562 pair, should be connected together using a GPIB cable. In addition, the R3562 and R3267 should be connected with a serial cable from the Serial I/O to the Serial I/O. This test equipment is capable of performing tests in both IS–95 A/B mode and CDMA 2000 mode if the required options are installed.

Optional test equipment

- Spectrum Analyzer (HP8594E) – can be used to perform cable calibration.

Test Equipment Preparation

See Appendix F for specific steps to prepare each type of test set and power meter to perform calibration and ATP.

The Agilent E7495A communications test set requires additional setup and preparation. This is described in detail in Appendix F.

Test Equipment Connection Charts

To use the following charts to identify necessary test equipment connections, locate the communications system analyzer being used in the COMMUNICATIONS SYSTEM ANALYZER columns, and read down the column. Where a dot appears in the column, connect one end of the test cable to that connector. Follow the horizontal line to locate the end connection(s), reading up the column to identify the appropriate equipment and/or BTS connector.

IS–95A/B–only Test Equipment Connections

Table 3-22 depicts the interconnection requirements for currently available test equipment supporting IS–95A/B only which meets Motorola standards and is supported by the LMF.

Table 3-22: IS–95A/B–only Test Equipment Interconnection

	COMMUNICATIONS SYSTEM ANALYZER				ADDITIONAL TEST EQUIPMENT				
SIGNAL	Cyber–Test	Advantest R3465	HP 8921A	HP 8921 W/PCS	Power Meter	GPIB Interface	LMF	Attenuator & Directional Coupler	BTS
EVEN SECOND SYNCHRONIZATION	EVEN SEC REF	EVEN SEC SYNC IN	EVEN SECOND SYNC IN	EVEN SECOND SYNC IN					SYNC MON-ITOR
19.6608 MHZ CLOCK	TIME BASE IN	CDMA TIME BASE IN	CDMA TIME BASE IN	CDMA TIME BASE IN					FREQ MON-ITOR
CONTROL IEEE 488 BUS	IEEE 488	GPIB	HP–I B	HP–IB	HP–IB	GPIB	SERIAL PORT		
TX TEST CABLES	RF IN/OUT	INPUT 50Ω	RF IN/OUT	RF IN/OUT				20 DB ATTEN. BTS PORT	TX1–6
RX TEST CABLES	RF GEN OUT	RF OUT 50Ω	DUPLEX OUT	RF OUT ONLY					RX1–6

NOTE

TX Test cables are set up as follows: TX 1–3 for 3-sector BTS and TX 1–6 for 6-sector.

RX Test Cables are set up as follows: RX 1–6 for 3-sector and RX 1–12 for 6-sector.

CDMA2000 1X/IS–95A/B–capable Test Equipment Connections

Table 3-23 depicts the interconnection requirements for currently available test equipment supporting both CDMA 2000 1X and IS–95A/B which meets Motorola standards and is supported by the LMF.

Table 3-23: CDMA2000 1X/IS–95A/B Test Equipment Interconnection

SIGNAL	COMMUNICATIONS SYSTEM ANALYZER				ADDITIONAL TEST EQUIPMENT						BTS
	Agilent 8935 (Option 200 or R2K)	Agilent E7495A	Advan test R3267	Agilent E4406A	Agilent E4432B Signal Generator	Advantest R3562 Signal Generator	Power Meter	GPIB Interface	LMF	30 dB Directional Coupler & 20 dB Pad*	
EVEN SECOND SYNCHRONIZATION	EXT TRIG IN	EVEN SECOND SYNC IN	EXT TRIG	TRIGGER IN	PATTERN TRIG IN	EVEN SECOND SYNC IN					SYNC MONITOR
	●				●						●
		●									●
			●								●
				●	●						●
19.6608 MHZ CLOCK	MOD TIME BASE IN			EXT REF IN		EXT REF IN					FREQ MONITOR
	●										●
				●							●
						●					●
CONTROL IEEE 488 BUS	IEEE 488		GPIB	HP–IB	GPIB	HP–IB	HP–IB	GPIB	SERIAL PORT		
	●							●	●		
			●				●	●	●		
				●			●	●	●		
10 MHZ	10 MHZ IN		10 MHZ OUT	10 MHZ OUT (SWITCHED)	10 MHZ IN	SYNTHE REF IN					
	●				●						
			●			●					
				●	●						
SIGNAL SOURCE CONTROLLED SERIAL I/O			SERIAL I/O			SERIAL I/O					
			●			●					
TX TEST CABLES	RF IN/OUT	PORT 2 RF IN	RF IN	RF INPUT 50 OHM	RF OUTPUT 50 OHM	RF IN/OUT				30 DB COUPLER AND 20 DB ATTEN	TX1–6
	●									●	●
		●								●	●
			●							●	●
				●						●	●
RX TEST CABLES	DUPLEX OUT *	PORT 1 RF OUT	RF OUT 50–OHM	RF OUT ONLY	RF OUTPUT 50–OHM	RF OUT 50 OHM					RX1–6
	●										●
		●								●	●
					●						●
						●					●

* WHEN USED ALONE, THE AGILENT 8935 WITH OPTION 200 OR R2K SUPPORTS IS–95A/B RX TESTING BUT NOT CDMA2000 1X RX TESTING.

Equipment Warm-up

NOTE

Warm-up *BTS equipment for a minimum of 60 minutes* prior to performing the BTS optimization procedure. This assures BTS site stability and contributes to optimization accuracy. (Time spent running initial power-up, hardware/firmware audit, and BTS download counts as warm-up time.)

WARNING

Before installing any test equipment directly to any BTS **TX OUT** connector, verify there are **NO** CDMA BBX channels keyed. At active sites, have the OMC-R/CBSC place the antenna (sector) assigned to the PA under test OOS. Failure to do so can result in serious personal injury and/or equipment damage.

Automatic Cable Calibration Set–up

Figure 3-13 and Figure 3-14 show the cable calibration setup for various supported test sets. The left side of the diagram depicts the location of the input and output ports of each test set, and the right side details the set up for each test.

Manual Cable Calibration

If manual cable calibration is required, refer to the procedures in Appendix F.

Figure 3-13: Cable Calibration Test Setup

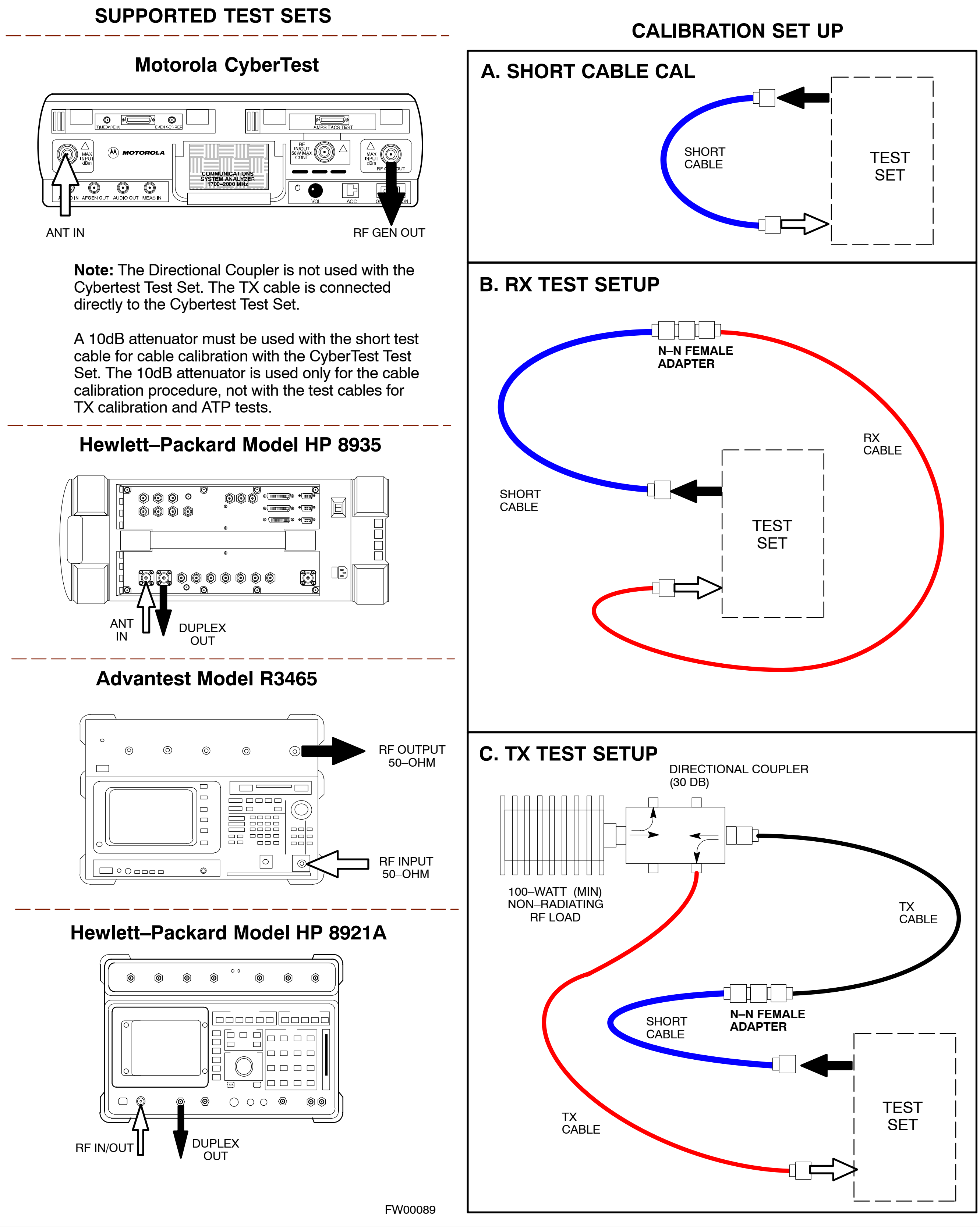
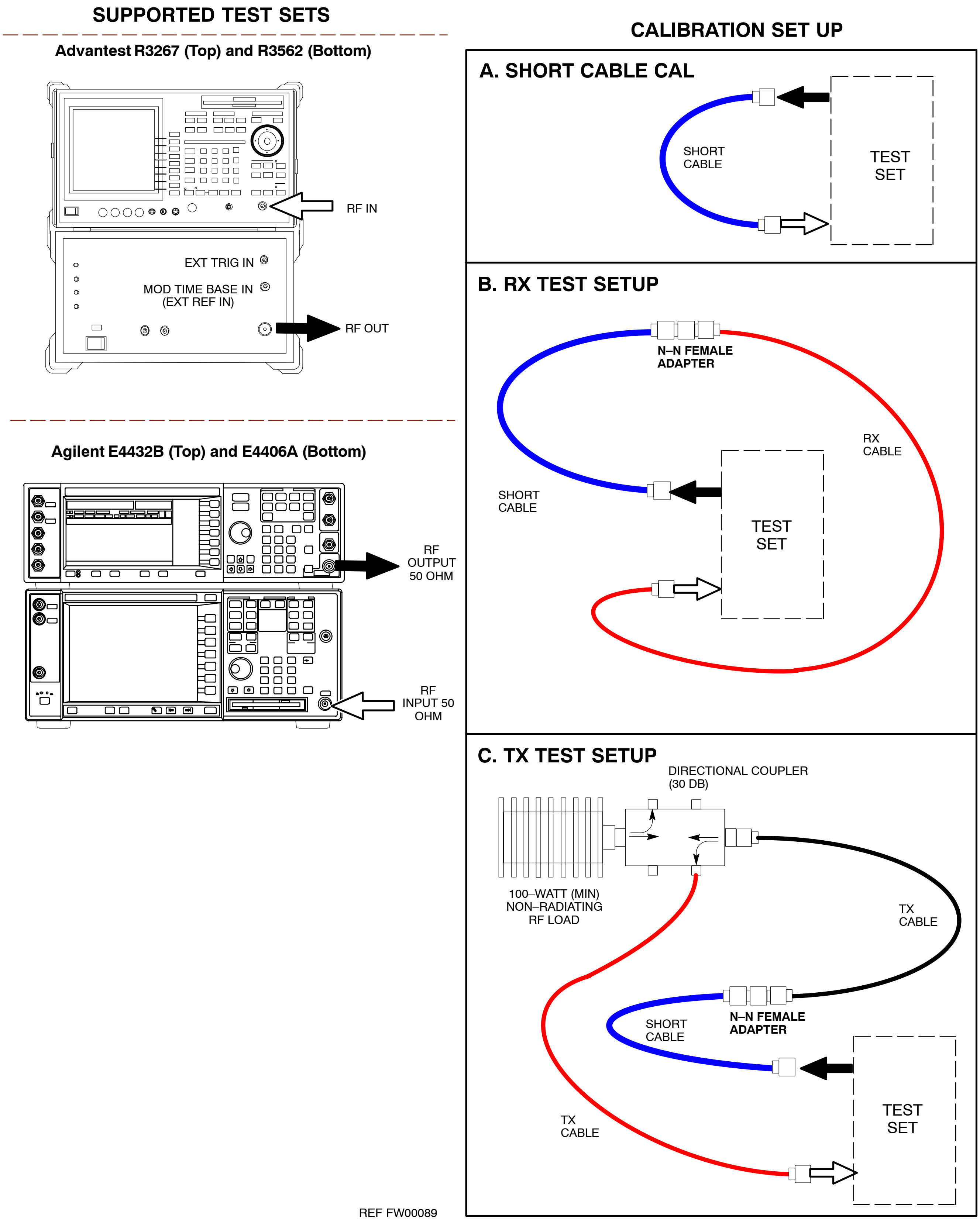


Figure 3-14: Cable Calibration Test Setup (Advantest R3267, Agilent E4406A)



Set-up for TX Calibration

Figure 3-15 and Figure 3-16 show the test set connections for TX calibration.

Figure 3-15: TX Calibration Test Setup (CyberTest, HP 8935, and Advantest)

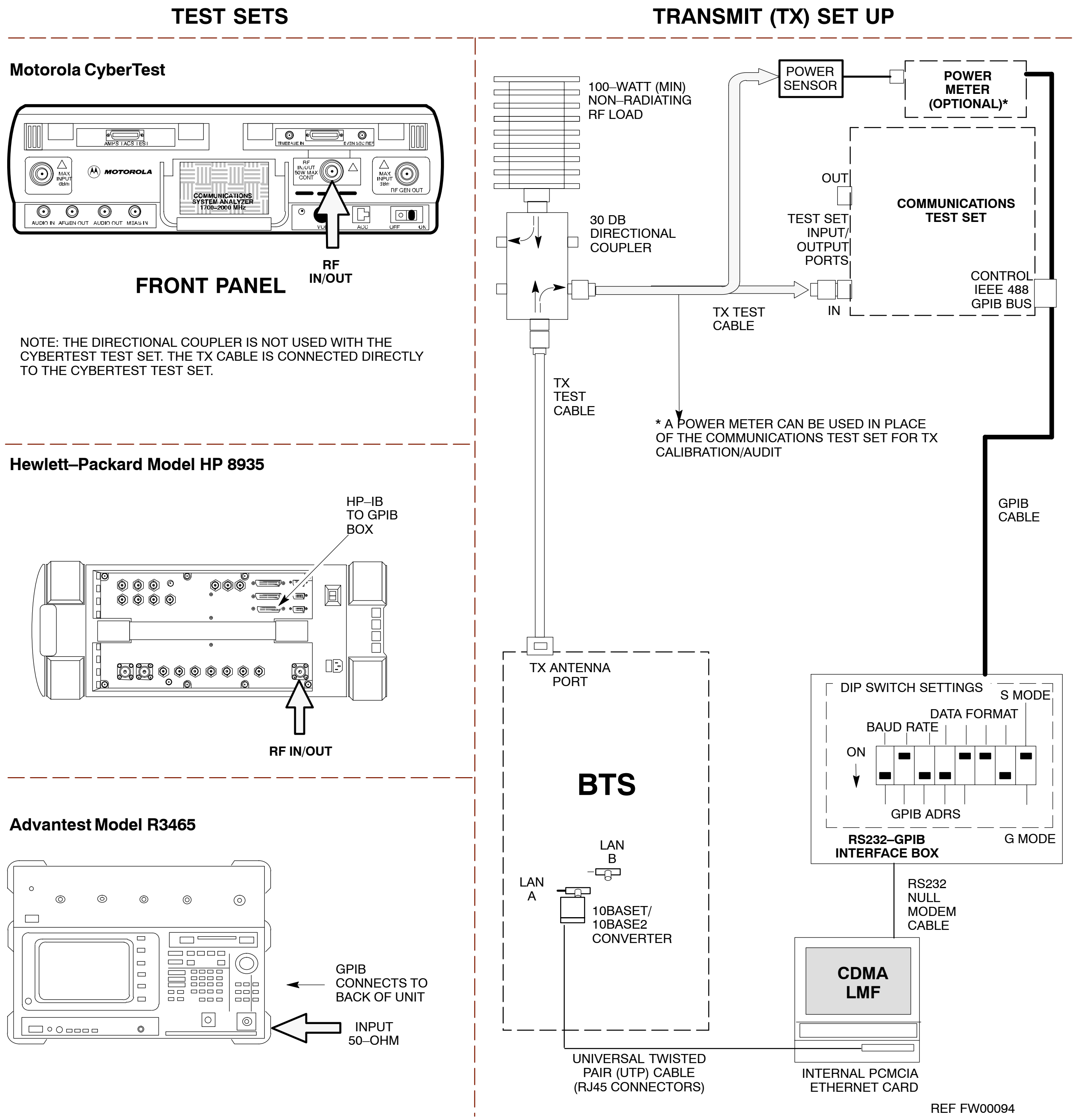


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Figure 3-16: TX Calibration Test Setup (Advantest R3267 and Agilent E4406A)

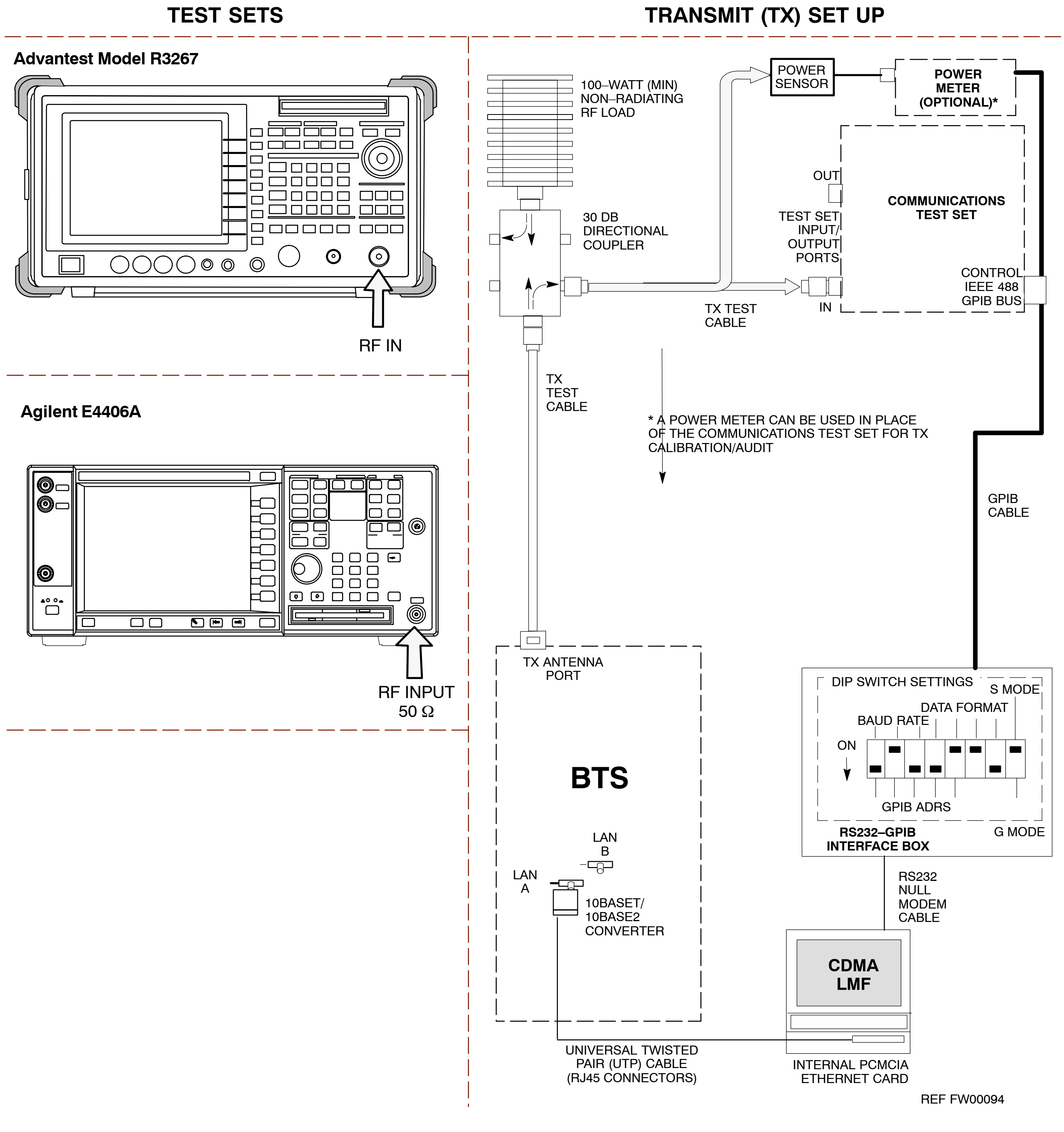
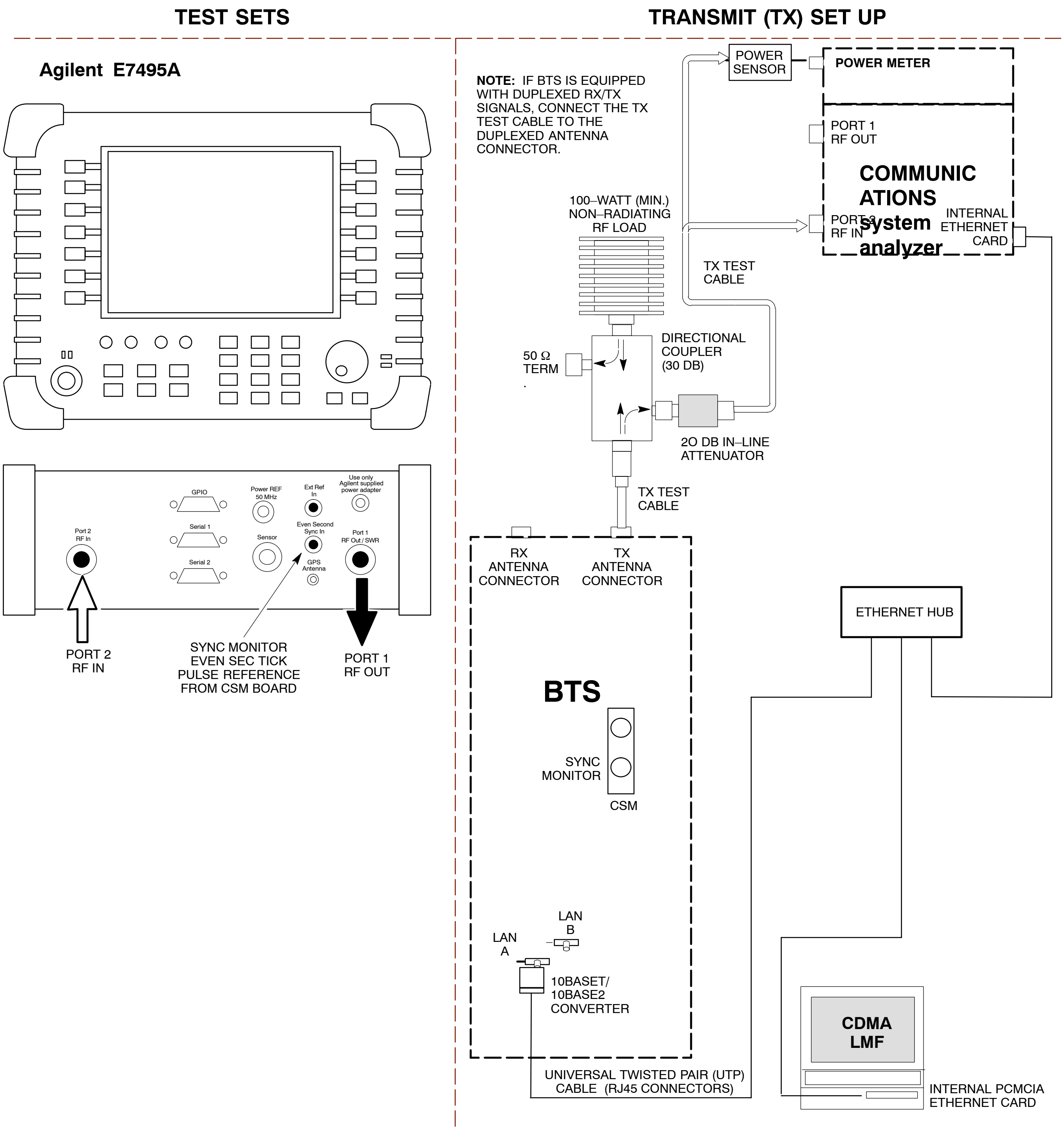


Figure 3-17: TX Calibration Test Setup – Agilent E7495A (IS–95A/B and CDMA2000 1X)



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Setup for Optimization/ATP

Figure 3-18 and Figure 3-19 show test set connections for IS–95 A/B optimization/ATP tests. Figure 3-20 shows test set connections for IS–95 A/B and CDMA 2000 optimization/ATP tests.

Figure 3-18: IS–95 A/B Optimization/ATP Test Setup Calibration Using Directional Coupler (CyberTest, HP 8935 and Advantest)

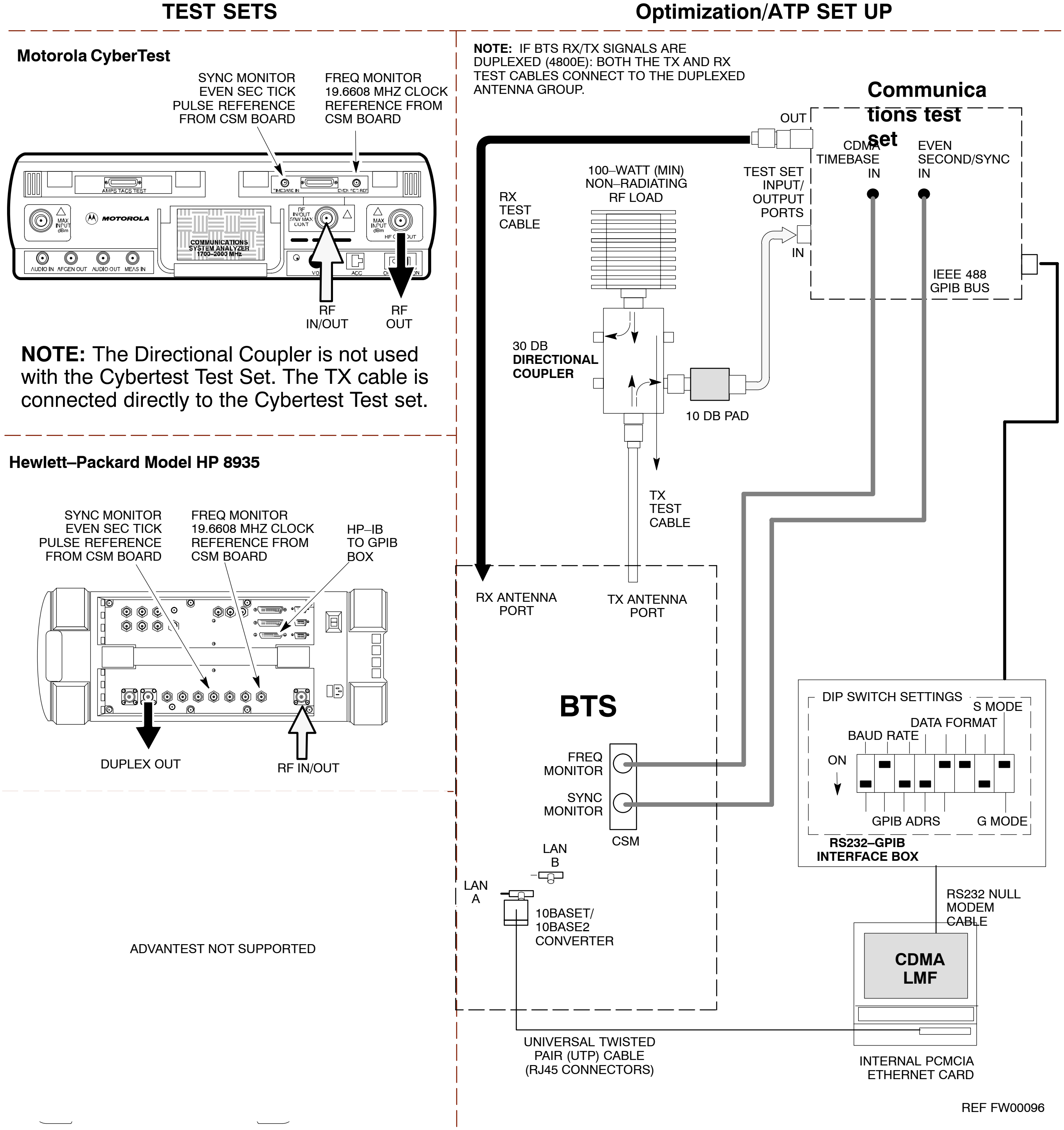

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Figure 3-19: Optimization/ATP Test Setup HP 8921A

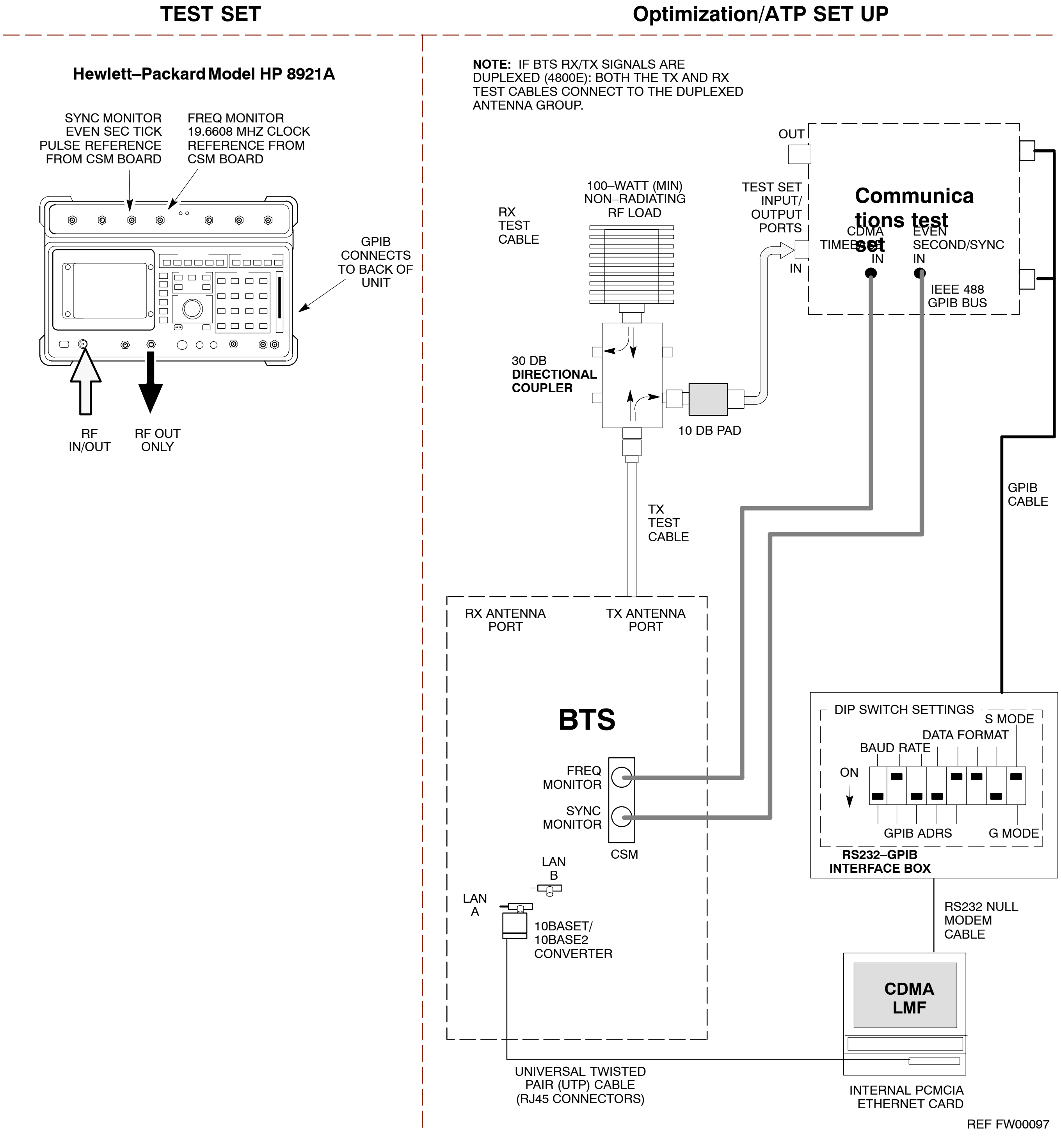
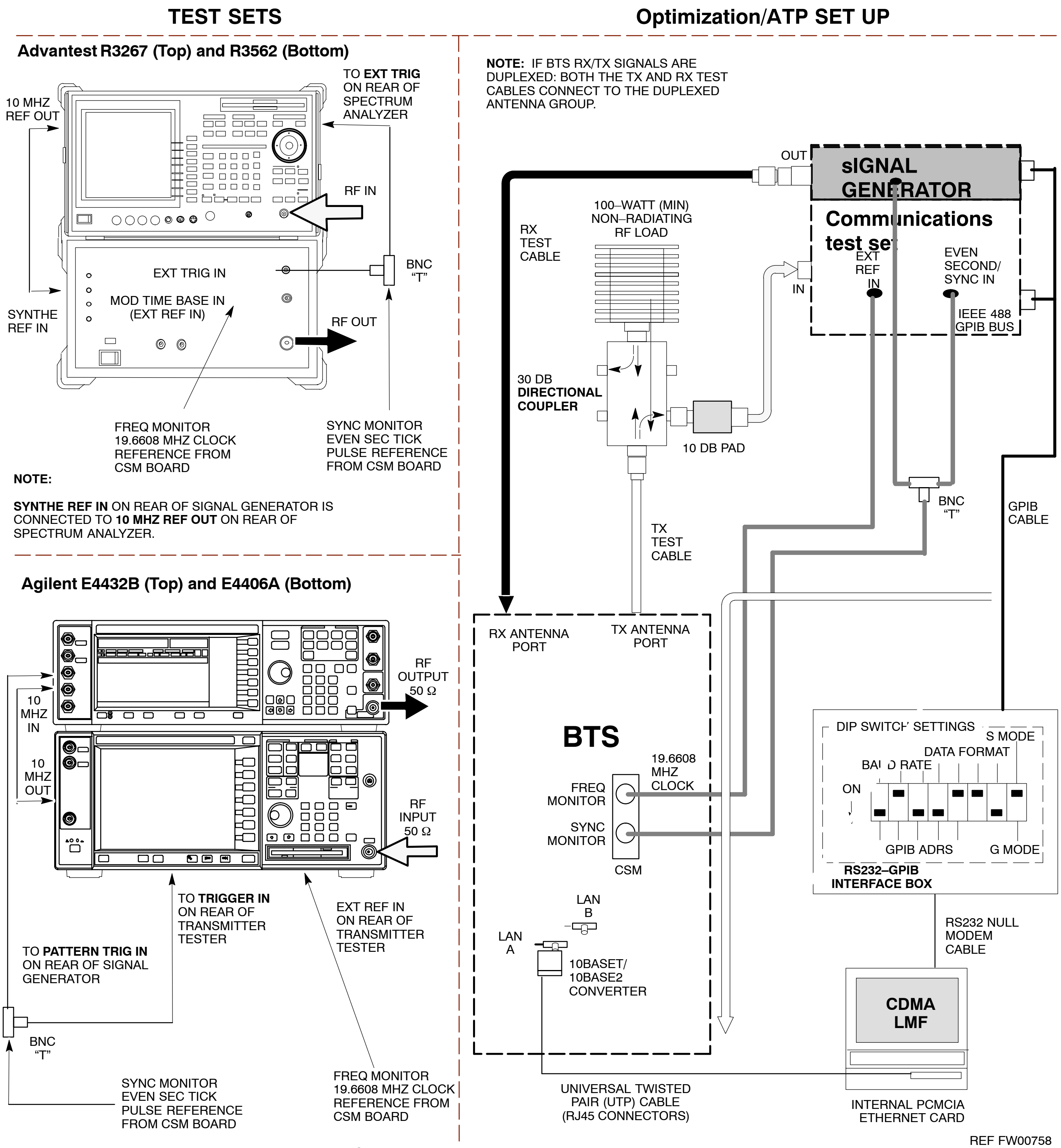


Figure 3-20: IS–95 A/B and CDMA 2000 Optimization/ATP Test Setup Using Directional Coupler



NOTE:

FOR MANUAL TESTING, GPIB MUST BE CONNECTED BETWEEN THE ANALYZER AND THE SIGNAL GENERATOR

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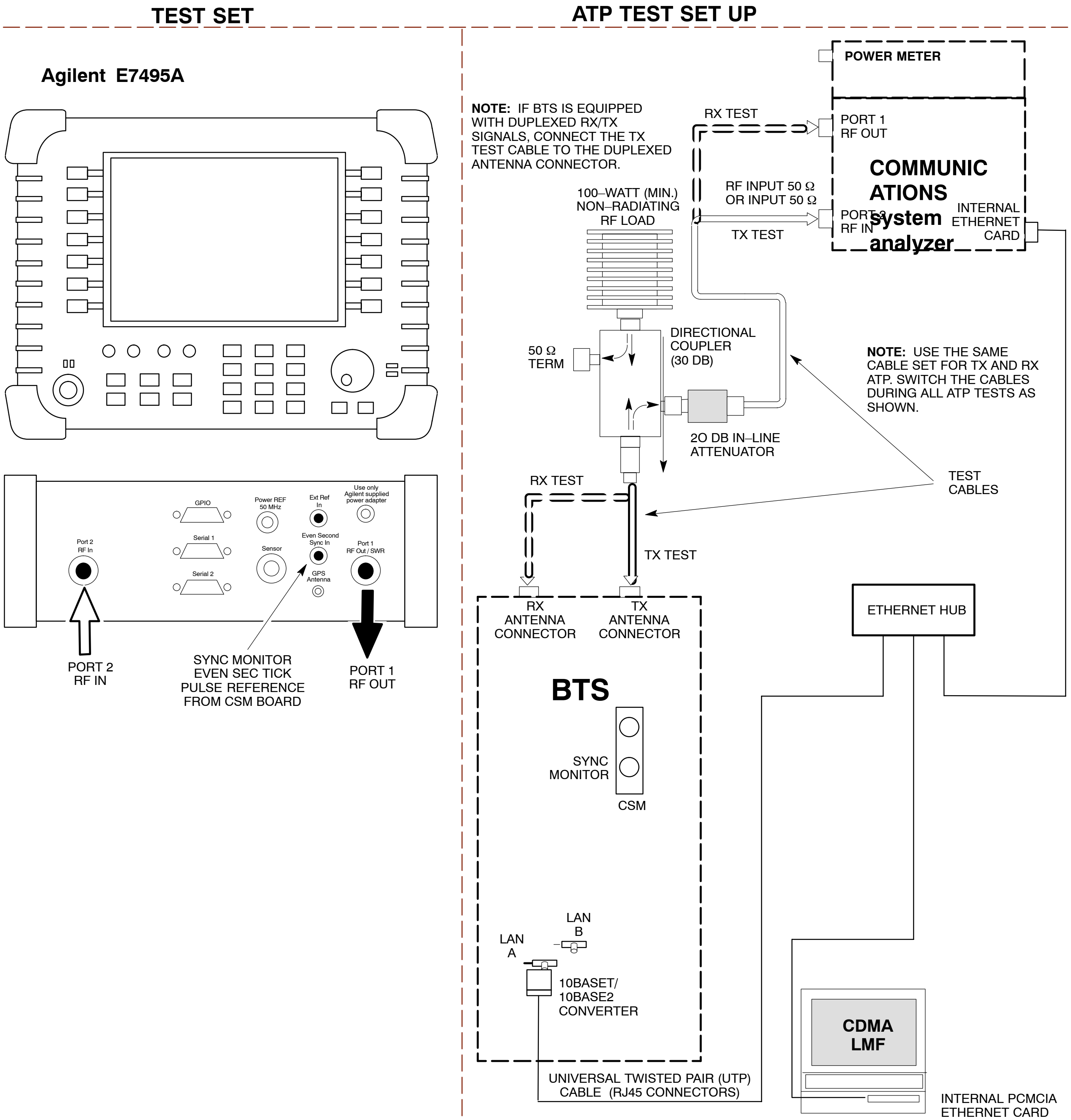
Figure 3-21: IS–95A/B and CDMA2000 1X Optimization/ATP Test Setup – Agilent E7495A



TX ATP Setup

Figure 3-22 shows a typical TX ATP setup and Figure 3-23 shows a typical RX ATP setup.

Figure 3-22: Typical TX ATP Setup with Directional Coupler (shown with and without RFDS)

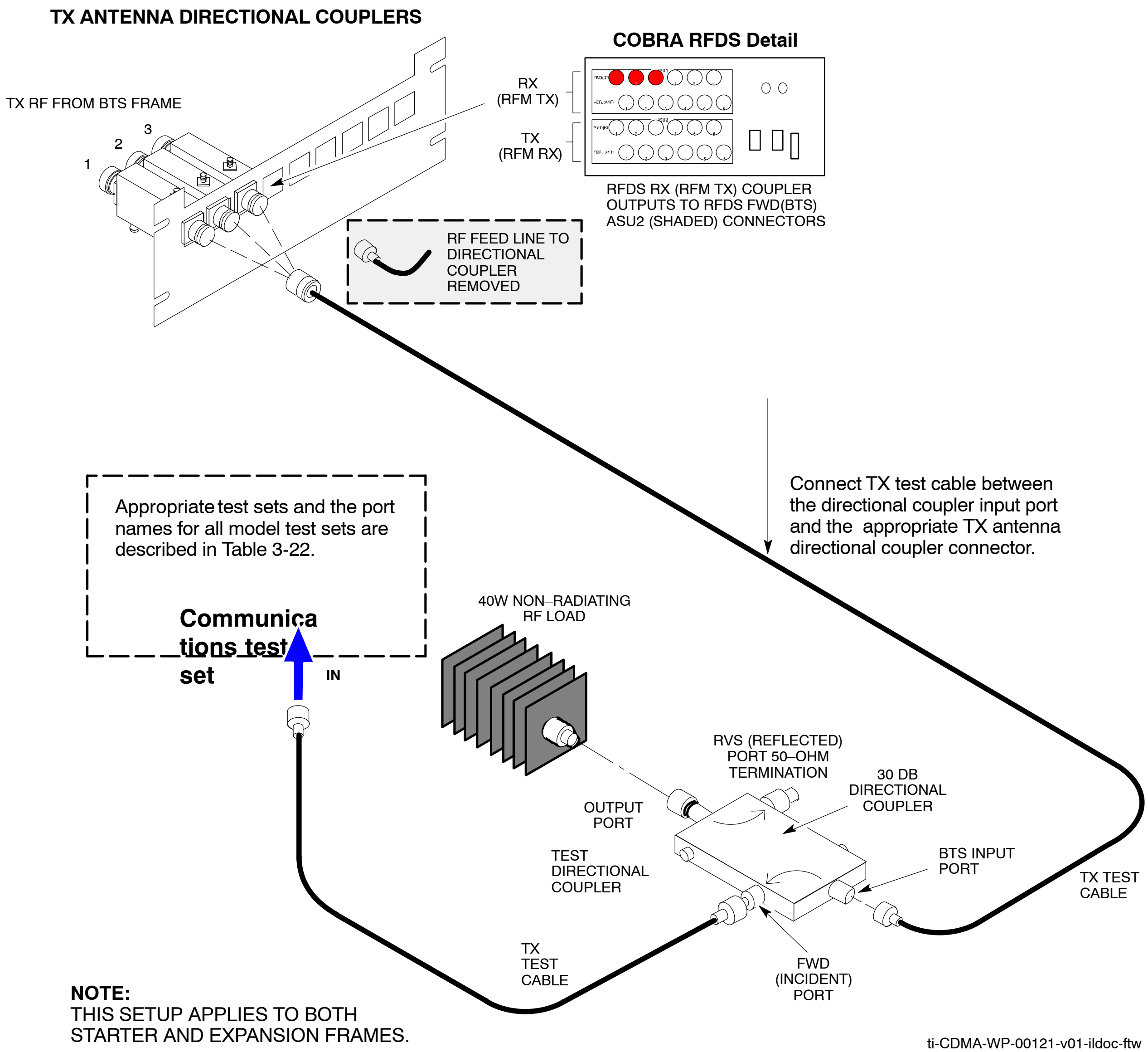


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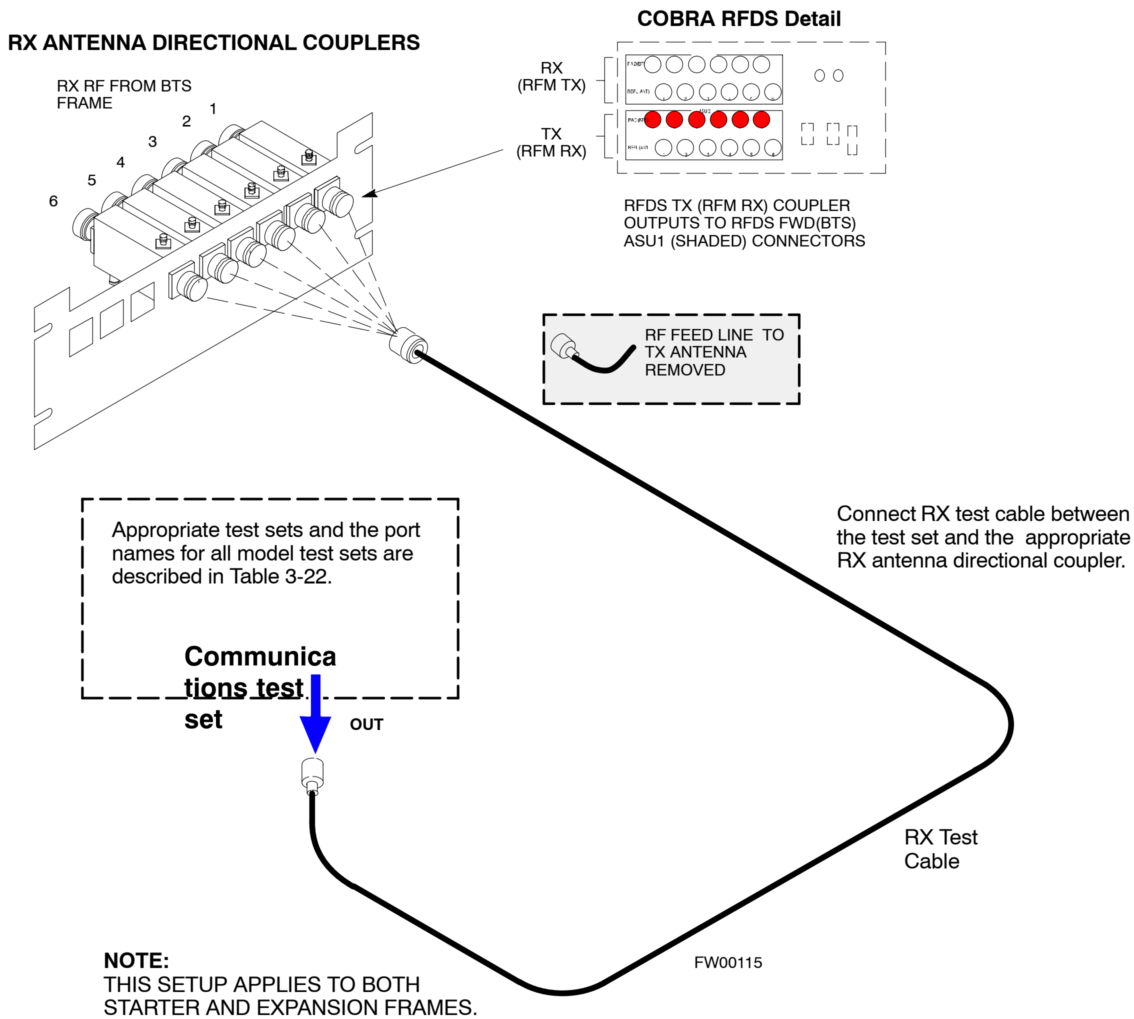
Figure 3-23: Typical RX ATP Setup with Directional Coupler (shown with or without RFDS)



Test Set Calibration Background

Proper test equipment calibration ensures that the test equipment and associated test cables do not introduce measurement errors, and that measurements are correct.

NOTE

If the test set being used to interface with the BTS has been calibrated and maintained as a set, this procedure does not need to be performed. (Test Set includes LMF terminal, communications test set, additional test equipment, associated test cables, and adapters.)

This procedure must be performed *prior* to beginning the optimization. Verify all test equipment (including all associated test cables and adapters actually used to interface all test equipment and the BTS) has been calibrated and maintained as a set.

CAUTION

If any piece of test equipment, test cable, or RF adapter, that makes up the calibrated test equipment set, has been replaced, re-calibration must be performed. Failure to do so can introduce measurement errors, resulting in incorrect measurements and degradation to system performance.

NOTE

Calibration of the communications test set (or equivalent test equipment) must be performed at the site before calibrating the overall test set. Calibrate the test equipment *after* it has been allowed to warm–up and stabilize for a *minimum of 60 minutes*.

Calibration Procedures Included

Automatic

Procedures included in this section use the LMF automated calibration routine to determine path losses of the supported communications analyzer, power meter, associated test cables, adapters, and (if used) antenna switch that make up the overall calibrated *test equipment set*. After calibration, the gain/loss offset values are stored in a test measurement offset file on the LMF computer.

Manual

Agilent E4406A Transmitter Tester – The E4406A does not support the power level zeroing calibration performed by the LMF. If this instrument is to be used for Bay Level Offset calibration and calibration is attempted with the LMF **Calibrate Test Equipment** function, the LMF will return a status window failure message stating that zeroing power is not supported by the E4406A. Refer to the Equipment Calibration section of Appendix F for instructions on using the instrument's self–alignment (calibration) function prior to performing Bay Level Offset calibration.

Power Meters – Manual power meter calibration procedures to be performed prior to automated calibration are included in the Equipment Calibration section of Appendix F**.**

Cable Calibration – Manual cable calibration procedures using the HP 8921A and Advantest R3465 communications system analyzers are provided in the Manual Cable Calibration section of Appendix F, if needed.

GPIB Addresses

GPIB addresses can range from 1 through 30. The LMF will accept any address in that range, but the numbers entered in the LMF Options window GPIB address box must match the addresses of the test equipment. Motorola recommends using 1 for a CDMA signal generator, 13 for a power meter, and 18 for a communications system analyzer. To verify and, if necessary, change the GPIB addresses of the test equipment, refer to the Setting GPIB Addresses section of Appendix F.

IP Addresses

The E7495A communications test set uses IP over Ethernet connections for communication rather than the GPIB. For the Agilent E7495A, set the IP address and complete initial setup as described in Appendix F, Table F-1.

Selecting Test Equipment Other Than Agilent E7495A

Open the **LMF Options** window from the **Tools > Options** menu list to select test equipment automatically (using the autodetect feature) or manually.

Serial Connection and **Network Connection** tabs are provided in the **LMF Options** window to specify the test equipment connection method. The **Serial Connection** tab is used when the test equipment items are connected directly to the LMF computer through a GPIB box (normal setup). The **Network Connection** tab is used when the test equipment is to be connected remotely through a network connection.

Prerequisites

Ensure the following prerequisites have been met before proceeding:

- Test equipment is correctly connected and turned on.
- GPIB addresses set in the test equipment have been verified as correct using the applicable procedures in Appendix F.
- CDMA LMF computer serial port and test equipment are connected to the GPIB box.

Selecting Test Equipment

Test equipment may be selected either manually with operator input or automatically using the LMF autodetect feature.

Manually Selecting Test Equipment in a Serial Connection Tab – Test equipment can be manually specified before, or after, the test equipment is connected. The LMF does not check to see if the test equipment is actually detected for manual specification. Follow the procedure in Table 3-24 to select test equipment manually.

Table 3-24: Selecting Test Equipment Manually in a Serial Connection Tab

✓	Step	Action
	1	From the **Tools** menu, select **Options**. The **LMF Options** window appears.
	2	Click on the **Serial Connection** tab (if not in the forefront).
	3	Select the correct serial port in the **COMM Port** pick list (normally **COM1**).
	4	Click on the **Manual Specification** button (if not enabled).
	5	Click on the check box corresponding to the test item(s) to be used.
	6	**NOTE** GPIB addresses can range from 1 through 30. The LMF will accept any address in that range, but the numbers in the **GPIB address** boxes must match the addresses of the test equipment. Motorola recommends using **1** for a CDMA signal generator, **13** for a power meter, and **18** for a CDMA analyzer. To verify and, if necessary, change the GPIB addresses of the test equipment, refer to Appendix F. Type the GPIB address in the corresponding **GPIB address** box. ***Recommended Addresses*** 1 = CDMA Signal generator 13 = Power Meter 18 = CDMA Analyzer
	7	Click on **Apply**. (The button darkens until the selection has been committed.) **NOTE** With manual selection, the LMF does not detect the test equipment to see if it is connected and communicating with the LMF. To verify and, if necessary, change the GPIB address of the test equipment, refer to Appendix NO TAG.

. . . continued on next page

Table 3-24: Selecting Test Equipment Manually in a Serial Connection Tab		
✓	Step	Action
	8	Click on **Dismiss** to close the test equipment window.

Automatically Selecting Test Equipment in Serial Connection Tab – When using the auto-detection feature to select test equipment, the LMF examines which test equipment items are actually communicating with the LMF. Follow the procedure in Table 3-25 to use the auto-detect feature.

Table 3-25: Selecting Test Equipment Using Auto-Detect		
✓	Step	Action
	1	From the **Tools** menu, select **Options**. The **LMF Options** window appears.
	2	Click on the **Serial Connection** tab (if not in the forefront).
	3	Select the correct serial port in the **COMM Port** pick list (normally **COM1**).
	4	Click on **Auto–Detection** (if not enabled).
	5	**NOTE** GPIB addresses can range from 1 through 30. The LMF will accept any address in that range, but the numbers in the **GPIB address to search** box must match the addresses of the test equipment. Motorola recommends using **1** for a CDMA signal generator, **13** for a power meter, and **18** for a CDMA analyzer. To verify and, if necessary, change the GPIB addresses of the test equipment, refer to Appendix NO TAG. Type the GPIB addresses in the box labeled **GPIB address to search** (if not already displayed). **NOTE** When both a power meter and an analyzer are selected, the LMF uses the first item that is capable of performing the test and is listed in the **GPIB addresses to search** box for RF power measurements (i.e., TX calibration). The address for a CDMA signal generator is normally **1**, the address for a power meter is normally **13,** and the address for a CDMA analyzer is normally **18**. If **1,13,18** is included in the **GPIB addresses to search** box, the power meter (**13**) is used for RF power measurements. When the test equipment items are manually selected, the CDMA analyzer is used only if a power meter is not selected.
	6	Click on **Apply.** **NOTE** The button darkens until the selection has been committed. A check mark appears in the **Manual Configuration** section for detected test equipment items.
	7	Click **Dismiss** to close the **LMF Options** window.

Detecting Test Equipment When Using Agilent E7495A

Be sure that no other equipment is connected to the LMF. The Agilent E7495A must be connected to the LAN to detect it. Then perform the procedures described in Appendix F, Table F-1, Table F-2, and Table F-3.

Calibrating Test Equipment

The calibrate test equipment function zeros the power measurement level of the test equipment item that is to be used for TX calibration and audit. If both a power meter and an analyzer are connected, only the power meter is zeroed.

NOTE

The Agilent E4406A transmitter tester does not support power measurement level zeroing. Refer to the Equipment Calibration section of Appendix F for E4406A calibration.

Prerequisites

- LMF computer serial port and test equipment are connected to the GPIB box.
- Test equipment to be calibrated has been connected correctly for tests that are to be run.
- Test equipment has been selected in the LMF (Table 3-24 or Table 3-25).

Calibrating test equipment

Follow the procedure in Table 3-26 to calibrate the test equipment.

Table 3-26: Test Equipment Calibration

✓	Step	Action
	1	From the **Util** menu, select **Calibrate Test Equipment** from the pull–down menu. A **Directions** window is displayed.
	2	Follow the directions provided.
	3	Click on **Continue** to close the **Directions** window and start the calibration process. A status report window is displayed.
	4	Click on **OK** to close the status report window.

Calibrating Cables Overview

The cable calibration function measures the loss (in dB) for the TX and RX cables that are to be used for testing. A CDMA analyzer is used to

3

measure the loss of each cable configuration (TX cable configuration and RX cable configuration). The cable calibration consists of the following:

- **Measuring the loss of a short cable –** This is required to compensate for any measurement error of the analyzer. The short cable (used only for the calibration process) is used in series with both the TX and RX cable configuration when measuring. The measured loss of the short cable is deducted from the measured loss of the TX and RX cable configuration to determine the actual loss of the TX and RX cable configurations. The result is then adjusted out of both the TX and RX measurements to compensate for the measured loss.
- **Measuring the short cable plus the RX cable configuration loss –** The RX cable configuration normally consists only of a coax cable with type-N connectors that is long enough to reach from the BTS RX port of the test equipment.
- **Measuring the short cable plus the TX cable configuration loss –** The TX cable configuration normally consists of two coax cables with type-N connectors and a directional coupler, a load, and an additional attenuator (if required by the specified BTS). The total loss of the path loss of the TX cable configuration must be as required for the BTS (normally 30 or 50 dB).

Calibrate Test Cabling using Communications System Analyzer

Cable Calibration is used to calibrate both TX and RX test cables. Appendix F covers the procedures for manual cable calibration.

Prerequisites

Ensure the following prerequisites have been met before proceeding:

- One of the following:
  - LMF computer serial port and test equipment are connected to the GPIB box
  - For E7495A, the LMF computer network card and the E7495 are connected to the Ethernet hub (Appendix NO TAG, Agilent E7495A Test Equipment Setup section, Connections subsection)
- Test equipment is turned on and has warmed up for at least 60 minutes.
- Test equipment has been selected in the LMF (Table 3-24, Table 3-25, or Table F-2)

Calibrating cables

Refer to Figure 3-13 or Figure 3-14 and follow the procedure in Table 3-27 to calibrate the test cable configurations.

Table 3-27: Cable Calibration

✓	Step	Action
	1	From the **Util** menu, select **Cable Calibration**. A **Cable Calibration** window is displayed.

Table 3-27: Cable Calibration		
✓	Step	Action
	2	Enter the channel number(s) in the **Channels** box. **NOTE** Multiple channel numbers must be separated with a comma and no space (i.e.; 200,800). When two or more channel numbers are entered, the cables are calibrated for each channel. Interpolation is accomplished for other channels as required for TX calibration.
	3	In the **Cable Calibration** pick list select one of the following: – **TX and RX Cable Cal** – **TX Cable Cal** – **RX Cable Cal**
	4	Click **OK** and follow the direction displayed for each step. A status report window displays the results of the cable calibration.

Calibrate Test Cabling Using Signal Generator & Spectrum Analyzer

Follow the procedure in Table 3-28 to calibrate the TX/Duplexed RX cables using a signal generator and spectrum analyzer. Refer to Figure 3-24, if required. Follow the procedure in Table 3-29 to calibrate the Non–Duplexed RX cables using the signal generator and spectrum analyzer. Refer to Figure 3-25, if required.

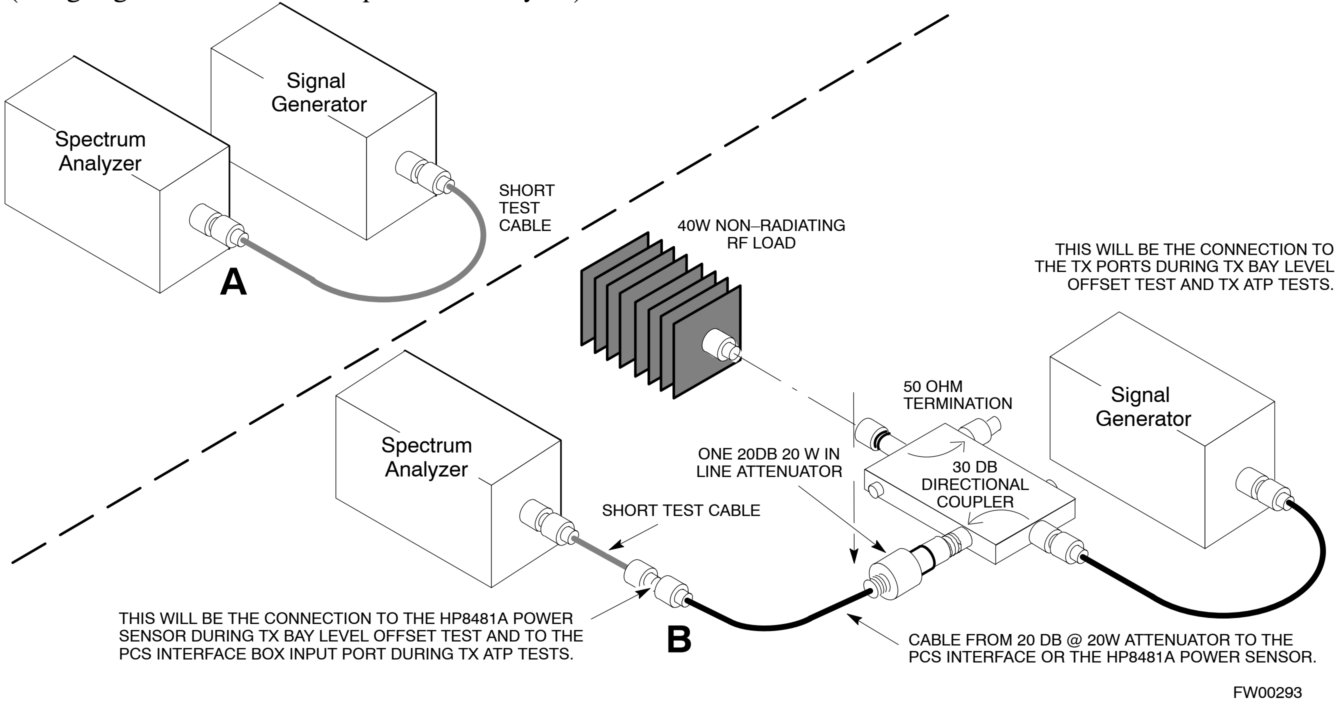
TX and Duplexed RX Cable Calibration

Table 3-28: Calibrating TX and Duplexed RX Cables Using Signal Generator and Spectrum Analyzer		
✓	Step	Action
	1	Connect a short test cable between the spectrum analyzer and the signal generator.
	2	Set signal generator to 0 dBm at the customer frequency of 869–894 MHz.
	3	Use a spectrum analyzer to measure signal generator output (see Figure 3-24, **A**) and record the value.
	4	Connect the spectrum analyzer's short cable to point **B**, (as shown in the lower right portion of the diagram) to measure cable output at customer frequency of 869–894 MHz. Record the value at point **B**.

. . . continued on next page

Table 3-28: Calibrating TX and Duplexed RX Cables Using Signal Generator and Spectrum Analyzer		
✓	Step	Action
	5	Calibration factor = A – B. *Example:* Cal = –1 dBm – (–53.5 dBm) = 52.5 dB **NOTE** The short cable is used for *calibration only*. It is *not* part of the final test setup. After calibration is completed, *do not* re-arrange any cables. Use the equipment setup, as is, to ensure test procedures use the correct calibration factor.

Figure 3-24: Calibrating Test Equipment Setup for TX BLO and TX ATP Tests (using Signal Generator and Spectrum Analyzer)



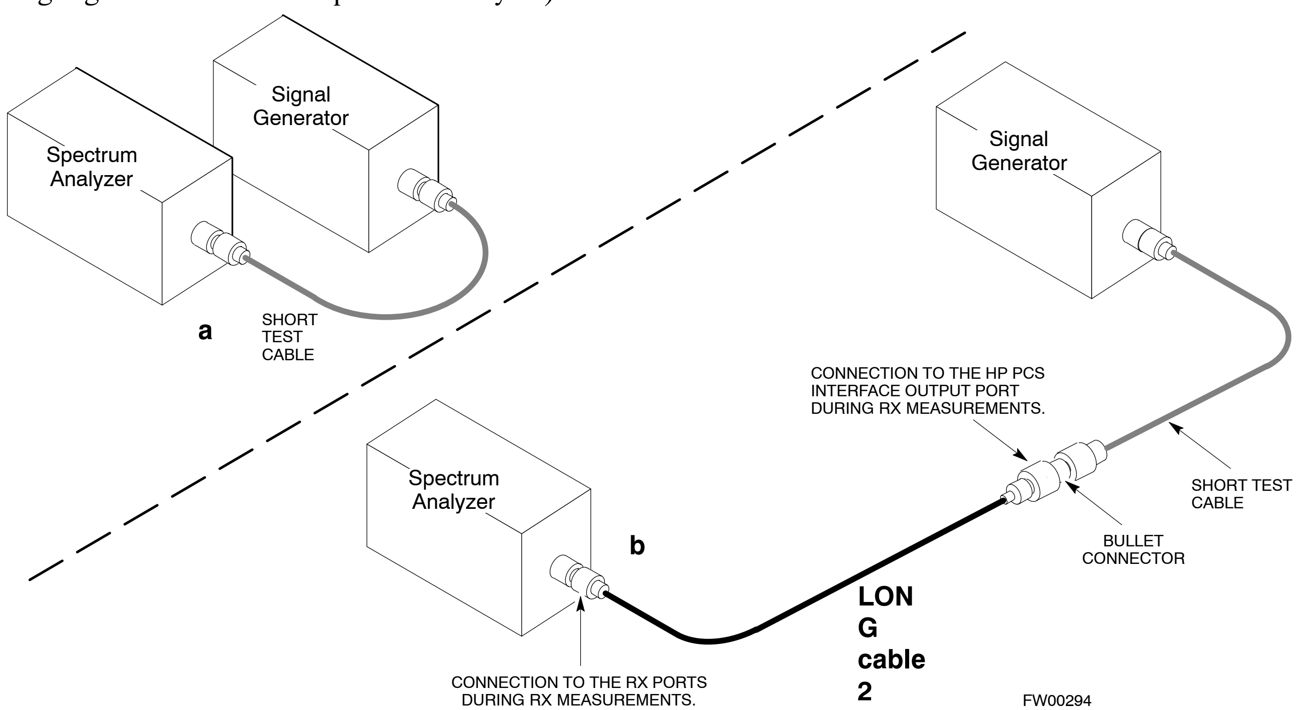
Non-Duplexed RX Cable Calibration

Table 3-29: Calibrating RX Cables Using a Signal Generator and Spectrum Analyzer		
✓	Step	Action
	1	Connect a short test cable to the spectrum analyzer and connect the other end to the Signal Generator.
	2	Set signal generator to –10 dBm at the customer's RX frequency of 824–849 MHz.
	3	Use spectrum analyzer to measure signal generator output (see Figure 3-25, **A**) and record the value for **A**.
	4	Connect the test setup, as shown in the lower portion of the diagram to measure the output at the customer's RX frequency of 824–849 MHz. Record the value at point **B**.

. . . continued on next page

Table 3-29: Calibrating RX Cables Using a Signal Generator and Spectrum Analyzer		
✓	Step	Action
	5	Calibration factor = A – B. *Example:* Cal = –12 dBm – (–14 dBm) = 2 dBm **NOTE** The short cable is used for *calibration only*. It is *not* part of the final test setup. After calibration is completed, *do not* re-arrange any cables. Use the equipment setup, as is, to ensure test procedures use the correct calibration factor.

Figure 3-25: Calibrating Test Equipment Setup for RX ATP Test (using Signal Generator and Spectrum Analyzer)



Setting Cable Loss Values

Cable loss values for the TX and RX test cable configurations are normally set by accomplishing cable calibration using the applicable test equipment. The resulting values are stored in the cable loss files. The cable loss values can also be set/changed manually. Follow the procedure in Table 3-30 to set cable loss values.

CAUTION

If cable calibration was performed without using the LMF, cable loss values *must* be manually entered in the LMF database. Failure to do this will result in inaccurate BTS calibration and reduced site performance.

Prerequisites

- Logged into the BTS

Table 3-30: Setting Cable Loss Values		
✓	Step	Action
	1	Click on the **Util** menu.
	2	Select **Edit > Cable Loss**.
	3	In the data entry pop–up window, select **TX Cable Loss** or **RX Cable Loss**.
	4	To add a new channel number, click on the **Add Row** button, then click in the **Channel #** and **Loss (dBm)** columns and enter the desired values.
	5	To edit existing values, click in the data box to be changed and change the value.
	6	To delete a row, click on the row and then click on the **Delete Row** button.
	7	To save displayed values, click on the **Save** button.
	8	To exit the window, click on the **Dismiss** button. Values entered/changed after the **Save** button was used are not saved. **NOTE** • If cable loss values exist for two different channels, the LMF will interpolate for all other channels. • Entered values are used by the LMF as soon as they are saved. Logging out and logging in again is not necessary.

Setting Coupler Loss Values

If an in–service coupler is installed, the coupler loss (e.g., 30 dB) must be manually entered so it will be included in the LMF TX calibration and audit calculations and RX FER Test. Follow the procedure in Table 3-31 to set coupler loss values.

Prerequisites

- Logged into the BTS.

Table 3-31: Setting Coupler Loss Value		
✓	Step	Action
	1	Click on the **Util** menu.
	2	Select **Edit > Coupler Loss**.
	3	In the data entry pop–up window, select one of the following: – **TX Coupler Loss** – **RX Coupler Loss**.
	4	Click in the **Loss (dBm)** column for each carrier that has a coupler and enter the appropriate value.

. . . continued on next page

Table 3-31: Setting Coupler Loss Value		
✓	**Step**	**Action**
	5	To edit existing values click in the data box to be changed and change the value.
	6	Click on the **Save** button to save displayed values.
	7	Click on the **Dismiss** button to exit the window. Values entered/changed after the **Save** button was used are not saved. **NOTE** • The **In–Service Calibration** check box in the **Tools > Options > BTS Options** tab must checked before entered coupler loss values are used by the TX calibration and audit functions or RX FER test. • Entered values are used by the LMF as soon as they are saved. Logging out and logging in again is not necessary.

Introduction

Bay Level Offset (BLO) calibration is the central activity of the optimization process. BLO calibration compensates for normal equipment variations within the BTS RF paths and assures the correct transmit power is available at the BTS antenna connectors to meet site performance requirements.

RF Path Bay Level Offset Calibration

Calibration identifies the accumulated gain in every transmit path (BBX slot) at the BTS site and stores that value in a BLO database calibration table in the LMF. The BLOs are subsequently downloaded to each BBX.

For starter frames, each receive path starts at a BTS RX antenna port and terminates at a backplane BBX slot. Each transmit path starts at a BBX backplane slot, travels through the Power Amplifier (PA), and terminates at a BTS TX antenna port.

For expansion frames each receive path starts at the BTS RX port of the cell site starter frame, travels through the frame-to-frame expansion cable, and terminates at a backplane BBX slot of the expansion frame. The transmit path starts at a BBX backplane slot of the expansion frame, travels though the PA, and terminates at a BTS TX antenna port of the same expansion frame.

Calibration identifies the accumulated gain in every transmit path (BBX slot) at the BTS site and stores that value in a BLO database. Each transmit path starts at a C–CCP shelf backplane BBX slot, travels through the PA, and ends at a BTS TX antenna port. When the TX path calibration is performed, the RX path BLO is automatically set to the default value.

At omni sites, BBX slots 1 and 13 (redundant) are tested. At sector sites, BBX slots 1 through 12, and 13 (redundant) are tested. Only those slots (sectors) *actually equipped* in the current CDF or NEC file are tested, regardless of physical BBX board installation in the slot.

When to Calibrate BLOs

Calibration of BLOs is required:

- After initial BTS installation
- Once each year
- After replacing any of the following components or associated interconnecting RF cabling:
  - BBX board
  - C–CCP shelf
  - MCIO card
  - MCIO to Power Amplifier backplane RF cable
  - Parallel Linear Amplifier Combiner

– Power Amplifier
– TX filter
– Enhanced Trunking Module (ETM)
– TX thru-port cable to the top of frame

TX Path Calibration

The TX Path Calibration assures correct site installation, cabling, and the first order functionality of all installed equipment. The proper function of each RF path is verified during calibration. The external test equipment is used to validate/calibrate the TX paths of the BTS.

WARNING

Before installing any test equipment directly to any **TX OUT** connector you must ***first verify that there are no CDMA channels keyed***. Have the OMC–R place the sector assigned to the PA under test OOS. Failure to do so can result in serious personal injury and/or equipment damage.

CAUTION

Always wear an approved anti–static wrist strap while handling any circuit card/module. If this is not done, there is a high probability that the card/module could be damaged by ESD.

NOTE

At new site installations, to facilitate the complete test of each CCP shelf (if the shelf is not already fully populated with BBX boards), move BBX boards from shelves currently not under test and install them into the empty BBX slots of the shelf currently being tested to insure that all BBX TX paths are tested.

This procedure can be bypassed on operational sites that are due for periodic optimization.

Prior to testing, view the CDF file to verify the correct BBX slots are equipped. Edit the file as required to include BBX slots not currently equipped (per Systems Engineering documentation).

BLO Calibration Data File

During the calibration process, the LMF creates a `bts–#.cal` calibration (BLO) offset data file (CAL file) in the **bts–#** folder. After calibration has been completed, this offset data must be downloaded to the BBXs using the LMF Download BLO function. An explanation of the file is shown below.

NOTE

Due to the size of the file, Motorola recommends printing a hard copy of a CAL file and refer to it for the following descriptions.

The CAL file is subdivided into sections organized on a per slot basis (a slot Block).

Slot 1 contains the calibration data for the 12 BBX slots. Slot 20 contains the calibration data for the redundant BBX. Each BBX slot header block contains:

- A creation Date and Time – broken down into separate parameters of createMonth, createDay, createYear, createHour, and createMin.
- The number of calibration entries – fixed at 720 entries corresponding to 360 calibration points of the CAL file including the slot header and actual calibration data.
- The calibration data for a BBX is organized as a large flat array. The array is organized by branch, sector, and calibration point.
  - The first breakdown of the array indicates which branch the contained calibration points are for. The array covers transmit, main receive and diversity receive offsets as follows:

Table 3-32: BLO BTS.cal File Array Assignments

Range	Assignment
C[1]–C[240]	Transmit
C[241]–C[480]	Main Receive
C[481]–C[720]	Diversity Receive

  - The second breakdown of the array is per sector. Configurations supported are Omni, 3–sector or 6–sector.

Table 3-33: BTS.cal File Array (Per Sector)					
BBX	**Sectorization**		**TX**	**RX**	**RX Diversity**
Slot[1] (Primary BBXs 1 through 12)					
1 (Omni)	6 Sector, 1st Carrier	3–Sector, 1st Carrier	C[1]–C[20]	C[241]–C[260]	C[481]–C[500]
2			C[21]–C[40]	C[261]–C[280]	C[501]–C[520]
3			C[41]–C[60]	C[281]–C[300]	C[521]–C[540]
4		3–Sector, 3rd Carrier	C[61]–C[80]	C[301]–C[320]	C[541]–C[560]
5			C[81]–C[100]	C[321]–C[340]	C[561]–C[580]
6			C[101]–C[120]	C[341]–C[360]	C[581]–C[600]
7	6 Sector, 2nd Carrier	3–Sector, 2nd Carrier	C[121]–C[140]	C[361]–C[380]	C[601]–C[620]
8			C[141]–C[160]	C[381]–C[400]	C[621]–C[640]
9			C[161]–C[180]	C[401]–C[420]	C[641]–C[660]
10		3–Sector, 4th Carrier	C[181]–C[200]	C[421]–C[440]	C[661]–C[680]
11			C[201]–C[220]	C[441]–C[460]	C[681]–C[700]
12			C[221]–C[240]	C[461]–C[480]	C[701]–C[720]

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Table 3-33: BTS.cal File Array (Per Sector)					
BBX	**Sectorization**		**TX**	**RX**	**RX Diversity**
Slot[20] (Redundant BBX–13)					
1 (Omni)	6 Sector, 1st Carrier	3–Sector, 1st Carrier	C[1]–C[20]	C[241]–C[260]	C[481]–C[500]
2			C[21]–C[40]	C[261]–C[280]	C[501]–C[520]
3			C[41]–C[60]	C[281]–C[300]	C[521]–C[540]
4		3–Sector, 3rd Carrier	C[61]–C[80]	C[301]–C[320]	C[541]–C[560]
5			C[81]–C[100]	C[321]–C[340]	C[561]–C[580]
6			C[101]–C[120]	C[341]–C[360]	C[581]–C[600]
7	6 Sector, 2nd Carrier	3–Sector, 2nd Carrier	C[121]–C[140]	C[361]–C[380]	C[601]–C[620]
8			C[141]–C[160]	C[381]–C[400]	C[621]–C[640]
9			C[161]–C[180]	C[401]–C[420]	C[641]–C[660]
10		3–Sector, 4th Carrier	C[181]–C[200]	C[421]–C[440]	C[661]–C[680]
11			C[201]–C[220]	C[441]–C[460]	C[681]–C[700]
12			C[221]–C[240]	C[461]–C[480]	C[701]–C[720]

- Ten calibration points per sector are supported for each branch. Two entries are required for each calibration point:
  1. The first value (all odd entries) identifies the CDMA channel (frequency) where the BLO is measured.
  2. The second value (all even entries) is the power set level (PwrLvlAdj). The valid range for PwrLvlAdj is from 2500 to 27500 (2500 corresponds to –125 dBm and 27500 corresponds to +125 dBm).
- The 20 calibration entries for each sector/branch combination must be stored in order of increasing frequency. If less than 10 points (frequencies) are calibrated, data for the highest frequency calibrated is repeated to fill out the remainder of the 10 points.

Example:

C[1]=384, *odd cal entry*

= *1 "calibration point"*

C[2]=19102, *even cal entry*

C[3]=777,

C[4]=19086,

.

.

C[19]=777,

C[20]=19086, (Since only two frequencies were calibrated, data for this one, the highest, is repeated for the last eight calibration points of the sector/branch)

- When the BBX is loaded with data, the CAL file data for the BBX is downloaded to the device in the order it is stored in the CAL file. TxCal data is sent first, C[1] – C[240]. Sector 1's ten calibration points are sent (C[1] – C[20]) followed by sector 2's ten calibration points (C[21] – C[40]), etc. The RxCal data is sent next (C[241] – C[480]), followed by the RxDCal data (C[481] – C[720]).

- Temperature compensation data is also stored in the cal file for each set.

Test Equipment Set-up for RF Path Calibration

Follow the procedure in Table 3-34 to set up test equipment.

Table 3-34: Test Equipment Setup (RF Path Calibration)

✓	Step	Action
	1	Verify the GPIB controller is properly connected and turned on (does not apply to the Agilent E7495A).
		! CAUTION To prevent damage to the test equipment, all transmit (TX) test connections must be via the 30 dB directional coupler.
	2	If it has not already been done, connect the LMF computer to the BTS LAN A connector on the BTS. Refer to the procedure in Table 3–2. • If required, calibrate the test equipment using the procedure in Table 3-26. • Connect the test equipment as shown in Figure 3-15 throug Figure 3-17.

Transmit (TX) Path Calibration Description

The assigned channel frequency and power level (as measured at the top of the frame) for transmit calibration are derived from the site CDF files. For each BBX, the channel frequency is specified in the `[CdmaChans]` in the `cbsc–#.cdf` file and the power is specified in the `SIFPilotPwr` CDF file parameter for the sector associated with the BBX (located under the `ParentSECTOR` field of the `ParentCARRIER` CDF file parameter).

NOTE

If both the `bts–#.cdf` and `cbsc–#.cdf` or `NECB*bts#.xml` and `NECJ*bts#.xml` files are current, all information will be correct on the LMF. If not, the carrier and channel will have to be set for each test.

The calibration procedure attempts to adjust the power to within ± 0.5 dB of the desired power. The calibration will pass if the error is less than the value set in the “TX Nominal offset” tolerance.

Transmit (TX) Bay Level Offset (BLO) Specifications – SC4812T–MC TX BLO specifications for different BTS sector configurations are as follows:

Table 3-35: Transmit (TX) Bay Level Offset (BLO) Specification

	Single Sided	Double Sided
800 MHz 3–Sector	> 35dB	40dB +/– 5dB
800 MHz 6–Sector	> 38dB	43dB +/– 5dB
1.9 GHz 3–Sector	> 30dB	35dB +/– 5dB
1.9 GHz 6–Sector	> 33dB	38dB +/– 5dB

To set the expected values see Table 3-36.

TX Calibration and the LMF

The LMF **Tests > TX > TX Calibration...** and **Tests > All Cal/Audit...** selections perform TX BLO calibration testing for installed BBX(s). The **All Cal/Audit...** selection initiates a series of actions to perform TX calibration, and, if calibration is successful, download BLO and perform TX audit. The **TX Calibration...** selection performs only TX calibration. When **TX Calibration...** is used, BLO download and TX audit *must be performed as separate activities*. The CDMA Test Parameters window which opens when **TX Calibration...** or **All Cal/Audit...** is selected contains several user–selectable features which are described in the following subsections.

Rate Set Drop–down Pick List

The Rate Set drop–down box is enabled if at least one MCC card is selected for the test. The available options for TX tests are **1** = 9600, and **3** = 9600 1X. Option **3** is only available if 1X cards are selected for the test. The available transfer rate options for RX tests are **1** = 9600 and **2** = 14400. Option 2 is only available if no 1X cards are selected.

Verify BLO

In both the **TX Calibration** and **All Cal/Audit** dialog boxes, a **Verify BLO** checkbox is provided and checked by default. After the actual TX calibration is completed during either the **TX Calibration** or **All Cal/Audit** process, the BLO derived from the calibration is compared to a standard, acceptable BLO tolerance for the BTS. In some installations, additional items may be installed in the transmit path. The additional change in gain from these items could cause BLO verification failure and, therefore, failure of the entire calibration. In these cases, either the **Verify BLO** checkbox should be unchecked or the additional path losses should be added into each applicable sector using the **Util > Edit > TX Coupler Loss...** function.

Single–sided BLO Checkbox

Another option that appears in the pull–down menu is **Single–sided BLO**. Normally valid BLO values are some value plus–or–minus some offset. The ranges currently used for calibration are wider than necessary to accommodate the redundant BBX. The lower half of the allowable range is where non–redundant BBXs should function. Single–sided BLO spec is ≥35dB. Double–sided BLO spec is 40±5dB. To get the more stringent conditions, the operator checks **Single–sided BLO** when calibrating non-redundant transceivers. **Single–sided BLO** carries the likelihood of more failures. This option should only be used by experienced CFEs.

The **Tests > TX > TX Calibration...** menu window has a **Test Pattern** pull–down menu. This menu has the following choices:

- **Pilot** (default) – performs tests using a pilot signal only. This pattern should be used when running in–service tests. It only requires a BBX to do the test.
- **Standard –** performs the tests using pilot, synch, paging and six traffic channels. This pattern should be used on all non–in–service tests. **Standard** requires a BBX and an MCC. **Standard** uses gain values specified by the IS97 standard.
- **CDFPilot** –performs the tests using the pilot signal, however, the gain is specified in the CDF file. Advanced users may use **CDFPilot** to generate a Pilot pattern using the value specified by the PilotGain parameter in the CDF file instead of a pre–determined value.
- **CDF** – performs the tests using pilot, synch, paging and six traffic channels, however, the gain for the channel elements is specified in the CDF file. Advanced users may use **CDF** to generate a standard pattern. Instead of using the values specified by IS97, the settings for the following CDF parameters are used:
  - PilotGain
  - PchGain
  - SchGain
  - NomGain1Way

TX Calibration

WARNING

Before installing any test equipment directly to any **TX OUT** connector, ***first verify there are no CDMA BBX channels keyed***. Failure to do so can result in serious personal injury and/or equipment damage.

CAUTION

Always wear an approved anti–static wrist strap while handling any circuit card or module. If this is not done, there is a high probability that the card or module could be damaged by ESD.

TX BLO Calibration for MC

Overview

LMF software release described on page NO TAG may be used to calibrate the Multicarrier trunked BTS running Software Release R2.16.4.1 *circuit* or *packet* software. These unique procedures are necessary due to the fact that the SC4812T–MC requires all equipped PAs to be enabled during TX testing.

TX BLO is obtained with BBXs-under-test having pilot gain set at 262 LSB, while BBXs-not-under–test are keyed at low transmit power (recommended pilot gain of 127 LSB and XCVR Power Gain set of –25 dBm).

The following procedure assumes that the SC4812T–MC frame is equipped with 4 carriers and all modules have appropriate software downloaded. The tasks required are:

- Set-up for TX Calibration
- TX Calibration
- Download TX BLO Data
- Copy TX BLO data for CBSC/OMCR

Set-up for TX Calibration

Table 3-36: Initial Set-up for Multicarrier TX Calibration

✓	Step	Action
	1	On the LMF computer, delete the existing calibration file (if any) from the BTS folder located at ***<x>:\<lmf home directory*\cdma\bts–#**, where # is the number of the BTS to be calibrated.
	2	Edit the nominal TX BLO – From the **Util** menu, select **Edit > TX Nominal Offset**. – **C**hange the value based on the BTS frequency band and configuration in Table 3-35
	3	Download the data, which includes BLO values, to all the BBXs. From the **Device** menu, select **Download > Data**
		NOTE Terminate all sector outputs on the frame, since more than one sector will be keyed during the calibration procedure.

TX Calibration

Follow the procedures in Table 3-37 to perform TX Calibration. Be sure to follow the primary **If performing TX Calibration** option in Step 2a.

Table 3-37: Procedure for TX Calibration and TX Audit		
✓	Step	Action
! CAUTION 1. This procedure will not work on an *SC*4812T–MC BTS operating with Software Release 2.16.4.0 and earlier. To calibrate an *SC*4812T–MC BTS operating on these earlier releases refer to the manual offset calibration procedure in *1X SC4812T–MC BTS Optimization/ATP; 68P09259A07*. 2. This procedure requires the use of LMF application software version 2.16.4.0.09 or later.		
	1	Select the BBXs for the carrier to be calibrated and the BBX–R by clicking on each card.
	2	Perform BLO calibration or TX audit by doing the following:
	2a	– Perform *one* of the following: — **If performing TX Calibration**: Click **Tests** in the BTS menu bar, and select **TX > TX Calibration** from the pull–down menus. — **If performing TX Audit**: Click **Tests** in the BTS menu bar, and select **TX > TX Audit** from the pull–down menus.
	2b	– Select the carrier's channel number from those displayed in the **Channels/Carrier** pick list.
	2c	– Select test to perform as **TX Cal**.
	2d	– Enter the selected carrier's XCVR gain value of 40 (dBm).
	2e	– In the **Test Pattern** box, select the test pattern to use as **Pilot**. — The LMF will automatically key the designated BBX and ask the operator to move the test equipment cable to appropriate TX path.
	3	Download BLO to all the calibrated BBXs. (See Table 3-38 for details). Save the carrier's TX BLO calibration results.

Download TX BLO Data

Select all BBXs including the BBXR. From the Device menu, select **BBX >Download >BLO**.

Copy TX BLO data for CBSC/OMCR

Follow the procedure described in Create Cal file (see Table 3-39).

Introduction

NOTE

RF path verification, BLO calibration, and BLO data download to BBXs must have been successfully completed prior to performing the calibration audit.

The BLO calibration audit procedure confirms the successful generation and storage of the BLO calibration offsets. The calibration audit procedure measures the path gain or loss of every BBX transmit path at the site. In this test, actual system tolerances are used to determine the success or failure of a test. The same external test equipment set up is used.

WARNING

Before installing any test equipment directly to any **TX OUT** connector, ***first verify there are no CDMA BBX channels keyed***. Failure to do so can result in serious personal injury and/or equipment damage.

The **Tests** menu item, **TX Audit**, performs the TX BLO Audit test for a BBX(s). All measurements are made through the appropriate TX output connector using the calibrated TX cable setup.

Prerequisites

Before running this test, ensure that the following have been done:

NOTE

All PAs must be INS during any TX testing.

- CSM–1, GLIs, and BBXs have correct code load and data load.
- Primary CSM and MGLI are INS.
- All BBXs are OOS_RAM.
- Test equipment and test cables are calibrated and connected for TX BLO calibration.
- LMF is logged into the BTS.

Test Procedure

Connect the test equipment as shown in Figure 3-15 or Figure 3-16. Follow the procedure in Table 3-37 using the **If performing TX Audit** alternate Step 1 to perform the BTS TX Path Audit test.

Download BLO Procedure

After a successful TX path calibration, download the BLO calibration file data to the BBXs. BLO data is extracted from the CAL file for the BTS and downloaded to the selected BBX devices.

NOTE

If a successful **All Cal/Audit** was completed, this procedure does not need to be performed, as BLO is downloaded as part of the **All Cal/Audit**.

Prerequisites

Ensure the following prerequisites have been met before proceeding:

- BBXs being downloaded are OOS–RAM (yellow).
- TX calibration is successfully completed.

Test Procedure

Follow the procedure in Table 3-38 to download the BLO data to the BBXs.

Table 3-38: Download BLO

✓	Step	Action
	1	Select the BBX(s) to be downloaded.
	2	Click **Device** in the BTS menu bar, and select **Download > BLO** from the pull–down menus. A status report window displays the result of the download. **NOTE** Selected device(s) do not change color when BLO is downloaded.
	3	Click on **OK** to close the status report window.

Create CAL File

After downloading BLO data to the BBXs, the BLO data must also be saved to a CAL file in the BTS folder on the LMF computer platform. The CAL file must be created or updated so it can be transferred to the OMC–R. If no CAL file is stored in the BTS folder (such as after the first–time calibration of a new BTS), the Create Cal File function gets the BLO data from the BBXs, creates the CAL file, and stores the BLO data in it. If the CAL file already exists in the BTS folder, this function will update it with the new BLO data. Note the following:

- Create Cal File function only applies to selected (highlighted) BBXs.

CAUTION

Motorola does not encourage the user to edit the CAL file as this action can cause interface problems between the BTS and the LMF. To manually edit the CAL file, the LMF must first be logged out of the BTS. If the CAL file is manually edited and then the Create Cal File function is run, the edited information is lost.

Prerequisites

Before running this procedure, the following should be done:

- LMF is logged into the BTS.
- BBXs are OOS_RAM with BLO downloaded.

Creating a CAL File

Table 3-39: Create CAL File

✓	Step	Action
	1	Select the applicable BBXs. **NOTE** The CAL file is only updated for the selected BBXs.
	2	Click on the **Device** menu.
	3	Click on the **Create Cal File** menu item. A status report window displays the results of the action.
	4	Click **OK** to close the status report window.

Objective

This section tests the redundancy options that could be included in the cell site. These tests verify, under a fault condition, that all modules equipped with redundancy switch operations to their redundant partner and resume operation. An example would be to pull the currently active CSM and verify the standby CSM takes over distribution of the CDMA reference signal.

Redundancy covers many BTS modules. Confirm the redundant options included in the BTS, and proceed as required. If the BTS has *only* basic power supply redundancy, the tests and procedures detailed in the following tables should be bypassed.

- Table 3-42. Miscellaneous Alarm Tests (BTS Frame)
- Table 3-43. BBX Redundancy Tests (BTS Frame)
- Table 3-44. CSM, GPS, and HSO Redundancy Alarm Tests
- Table 3-45. MGLI/GLI Redundancy Test

During redundancy verification of the test, alarms reported by the master GLI (displayed via the alarm monitor) will also be verified/noted.

Test Equipment

The following pieces of test equipment are required to perform this test:

- LMF
- Communications Test Set

Redundancy/Alarm Test

Perform each of the following tests to verify BTS redundancy and to confirm all alarms are received and reported by the BTS equipment. The procedures should be performed on the following modules/boards:

- Power supply/converter modules in all frames
- Distribution shelf modules in the BTS frame
- C–CCP shelf modules in the BTS frame (except MCCs)
- PA modules in the BTS frame
- AMR Customer defined input/output tests

Test Equipment Setup

Follow the procedure in Table 3-40 to set up test equipment:

NOTE

All alarm tests are preformed using TX antenna 1

Table 3-40: Test Equipment Setup for Redundancy/Alarm Tests

Step	Action
1	Interface the LMF computer to the BTS LAN A connector on the BTS frame (refer to Table 3-5, page 3-15).
2	Login to the BTS.

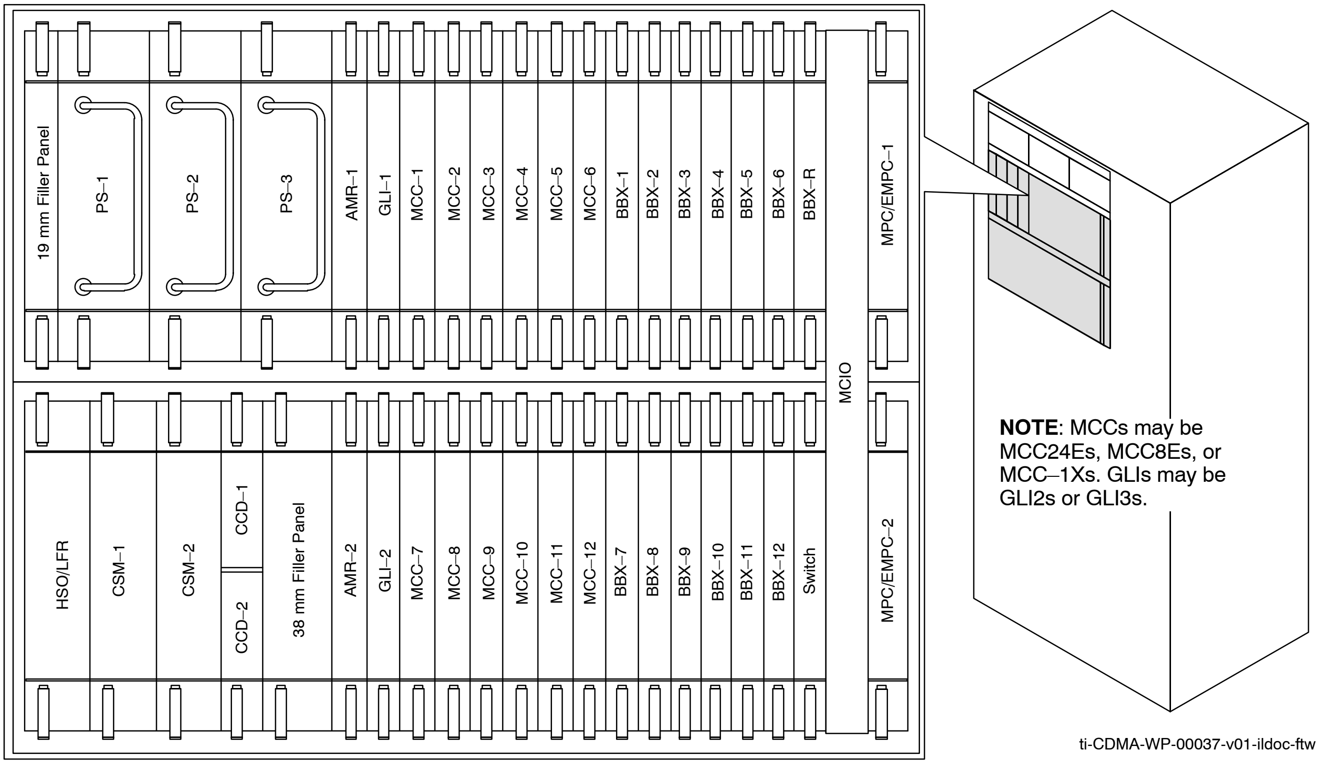
Table 3-40: Test Equipment Setup for Redundancy/Alarm Tests	
Step	**Action**
3	Set up test equipment for TX Calibration at TXOUT1 (see Table 3-5). **NOTE** ***If site is not equipped for redundancy***, remove all GLI and BBX boards installed in any redundant slot positions at this time.
4	Display the alarm monitor by selecting **Util>Alarm Monitor**.
5	Unequip all customer defined AMR alarms reported via the AMR Alarm connector (A & B) by clicking on **MGLI**, then selecting **Device>Set Alarm Relays>Unequipped**. **NOTE** During configuration of MGLI alarm reporting, spurious alarms may report. Allow the BTS to stabilize for 10 seconds. If any alarms are actively being reported after the BTS has stabilized, determine the cause before proceeding further.

Power Supply Redundancy

Follow the steps in Table 3-41 to verify redundancy of the power supply modules. Alarms reported by the master GLI (displayed via the alarm monitor) are also verified.

Table 3-41: Power Supply/Converter Redundancy (BTS Frame)	
Step	**Action**
1	Select the BBX–1 (highlight) and from the pulldown menu select: **Device>BBX/MAWI>Set Redundant Sector>Carrier–#–1–1** **Device>BBX/MAWI>Set Pilot Only>Carrier–#–1-1** **Device>BBX/MAWI>Set Pilot Gain>Carrier–#-1-1** and **Pilot Gain = 262**
2	Select (highlight) BBX–1 and from the pulldown menu select **Device>BBX/MAWI>Key**.
3	Set XCVR gain to 40 and enter the correct XCVR channel number.
4	Remove PS–1 from the power distribution shelf (see Figure 3-26). – Observe that an alarm message is reported via the MGLI as displayed on the alarm monitor. – Verify no other modules went OOS.
5	Re-install PS–1. Observe the alarm clears on the alarm monitor.
6	Repeat steps 4 and 5 for PS–2 and PS–3.
7	Verify that all PWR/ALM LEDs are GREEN.
8	Select BBX-1 and **Device>BBX/MAWI>Dekey**

Figure 3-26: C–CCP Shelf



Miscellaneous Alarm/Redundancy Tests

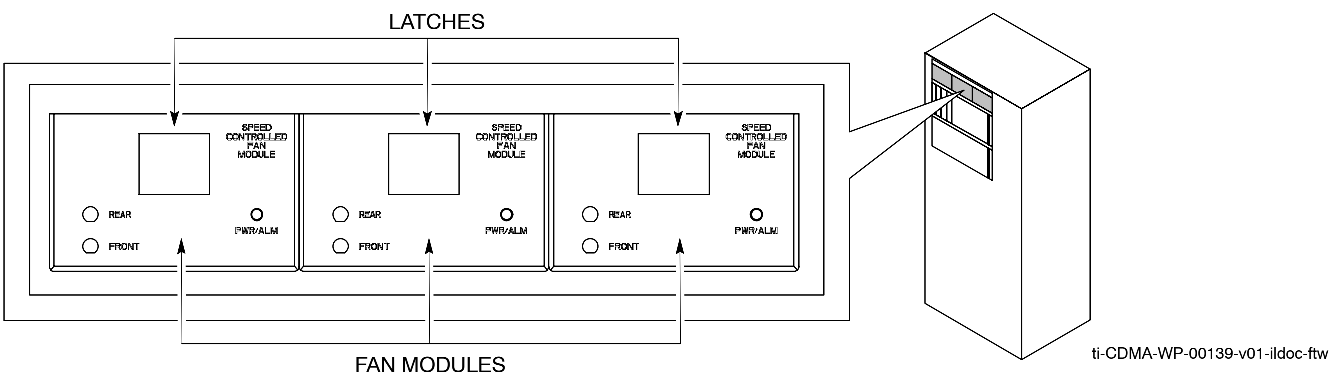
Follow steps in Table 3-42 to verify that alarms reported by the master GLI are displayed via the alarm monitor if a BTS frame module failure occurs.

Table 3-42: Miscellaneous Alarm Tests

Step	Action
1	Select **Util>Alarm Monitor** to display the alarm monitor window.
2	Perform the following to verify fan module alarms: • Unseat a fan module (see Figure 3-27). • Observe an alarm message was reported via the MGLI (as displayed on the alarm monitor). • Replace fan module and verify the alarm monitor reports that the alarm clears. • Repeat for all other fan modules in the BTS frame.
	NOTE Follow Step 3 for Starter Frames and Step 4 for Expansion Frames.
3	***Starter Frames Only:*** *Perform the following to verify MPC module alarms.* • Unseat MPC modules (see Figure 3-26) one at a time. • Observe that an alarm message was reported via the MGLI as displayed on the alarm monitor. • Replace the MPC modules and verify the alarm monitor reports the alarm clears.

Table 3-42: Miscellaneous Alarm Tests	
Step	**Action**
4	***Expansion Frames Only:*** *Perform the following to verify EMPC module alarms.* • Unseat EMPC modules (see Figure 3-26) one at a time • Observe that an alarm message was reported via the MGLI as displayed on the alarm monitor. • Replace the EMPC modules and verify the alarm monitor reports that the alarm clears.
5	If equipped with AMR redundancy, perform the following to verify AMR module redundancy/alarms. • Unseat AMR 2 (see Figure 3-26). • Observe that an alarm message is reported via the MGLI (as displayed on the alarm monitor). • Repeat Steps 1, 2 and 3 (starter frame) or Steps 1, 2 and 4 (expansion frame). • Replace the AMR module and verify the alarm monitor reports that the alarm clears. • Unseat AMR 1; observe alarm message was reported via MGLI (as displayed on the alarm monitor). • Replace the AMR module and verify the LMF reports the alarm has cleared.
	NOTE All PWR/ALM LEDs should be GREEN at the completion of this test.

Figure 3-27: Fan Modules



BBX Redundancy

Follow the steps in Table 3-43 to verify redundancy of the BBXs in the C–CCP shelf. Alarms reported by the master GLI (displayed via the alarm monitor) are also verified. *This test can be repeated for additional sectors at the customer's discretion.*

Table 3-43: BBX Redundancy Alarms	
Step	**Action**
	△ **WARNING** Any BBXs enabled will immediately key-up. Before enabling any BBX, *always verify* that the TX output assigned to the BBX is terminated into a 50 W non-radiating RF load! Failure to do so could result in serious personal injury and/or damage to the equipment.
1	Enable the **primary**, then the **redundant** BBX assigned to ANT 1 by selecting the BBX and **Device>BBX/MAWI>Key**.
2	Observe that primary BBXs key up, and a carrier is present at each respective frequency.
3	Remove the **primary** BBX.
4	Observe a carrier is still present. The **Redundant** BBX is now the active BBX for Antenna 1.
5	Replace the **primary** BBX and reload the BBX with code and data.
6	Re-enable the **primary** BBX assigned to ANT 1 and observe that a carrier is present at each respective frequency.
7	Remove the **redundant** BBX and observe a carrier is still present.
8	The **Primary** BBX is now the active BBX for ANT 1.
9	Replace the **redundant** BBX and reload the BBX with code and data.
10	Re-enable the **redundant** BBX assigned to ANT 1 and observe that a carrier is present at each respective frequency:
11	De-key the Xcvr by selecting **Device>BBX/MAWI>Dekey**.
12	Repeat Steps 1 through 11 for additional BBXs/antennas, if equipped.

CSM, GPS, & HSO Redundancy/Alarm Tests

Follow the procedure in Table 3-44 to verify the *manual* redundancy of the CSM, GPS, and HSO boards. Verification of alarms reported is also covered.

NOTE

DO NOT perform the procedure in Table 3-44, unless the site is configured with a HSO timebase as a backup for the GPS.

Table 3-44: CSM, GPS, & HSO, Redundancy/Alarm Tests	
Step	**Action**
	△ WARNING Any BBXs enabled will immediately key-up. Before enabling any BBX, *always verify* that the TX output assigned to the BBX is terminated into a 50 W non-radiating RF load! Failure to do so could result in serious personal injury and/or damage to the equipment.
1	Enable the **primary**, then the **redundant** BBXs assigned to ANT 1 by selecting the BBX and **Device>BBX/MAWI>Key**.
2	Disconnect the GPS antenna cable, located on top of the BTS frame. This forces the HSO board timebase to become the CDMA timing source.
3	Observe a CDMA timing reference alarm and source change is reported by the alarm monitor.
4	Allow the HSO to become the active timing source. • Verify the BBXs remain keyed and INS. • Verify no other modules went OOS due to the transfer to **HSO** reference. • Observe the PWR/ALM LEDs on the **CSM 1** front panel are steady GREEN.
5	Reconnect the GPS antenna cable.
6	Allow the GPS to become the active timing source. • Verify the BBXs remain keyed and INS. • Verify no other modules went OOS due to the transfer back to the **GPS** reference. • Observe the PWR/ALM LEDs on **CSM 1** are steady GREEN.
7	Disable **CSM 1** and enable **CSM 2**. • Various CSM source and clock alarms are now reported and the site comes down. • Alarms clear when the site comes back up.
8	Allow the **CSM 2** board to go **INS_ACT.** • Verify the BBXs are dekeyed and OOS, and the MCCs are OOS_RAM. • Verify no other modules went OOS due to the transfer to **CSM 2** reference. • Observe the PWR/ALM LEDs on **CSM 2** front panels are steady GREEN. **NOTE** It can take up to 20 minutes for the CSM to re-establish the GPS link and go INS. MCCs go OOS_RAM.
9	Key BBXs 1 and R and observe a carrier is present.
10	Repeat Steps 2 through 6 to verify CSM source redundancy with CSM 2.
	NOTE DO NOT ENABLE the redundant CSM.

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Table 3-44: CSM, GPS, & HSO, Redundancy/Alarm Tests	
Step	**Action**
11	Disable **CSM 2** and enable **CSM 1**. • Various CSM Source and Clock alarms are reported and the site comes down. • Alarms clear when the site comes back up.
12	De-key the Xcvr by selecting **Device>BBX/MAWI>Dekey**.
13	Allow the **CSM 1** board to go **INS_ACT.** • Verify the BBXs are de-keyed and OOS. • Verify no other modules went OOS due to the transfer to **CSM 1** reference. • Observe PWR/ALM LEDs on the **CSM 1** front panels are steady GREEN.
14	Disable the **primary** and **redundant** BBXs.

MGLI/GLI Redundancy Test

CAUTION

This test can *only* be performed when the MM path is established by the MM (not just with LAPD link connected). Attempting to force the GLIs to "hot swap" under alarm monitor control, when isolated from the MM, causes MGLIs to hang up.

Table 3-45: MGLI/GLI Redundancy Test (with MM Connection Established)	
Step	**Action**
	NOTE • This test assumes the alarm monitor is NOT connected to the BTS and the T1/E1 span is connected and communication is established with the MM. • BOTH GLIs must be **INS** before continuing.
1	Verify the BBXs are enabled and a CDMA carrier is present.
2	Identify the primary and redundant MGLI pairs.
3	Pull the MGLI that is *currently* **INS–ACT** and has cage control.
4	Observe the BBX remains GREEN, and the redundant MGLI is now **active.**
5	Verify no other modules go OOS due to the transfer of control to the redundant module.
6	Verify that the BBXs are enabled and a CDMA carrier is present.
7	Reinstall the MGLI and have the OMCR/CBSC place it back in-service.
8	Repeat Steps 1 through 7 to verify the other MGLI/GLI board.

Alarms Testing

Alarm Verification

ALARM connectors provide Customer Defined Alarm Inputs and Outputs. The customer can connect BTS site alarm input sensors and output devices to the BTS, thus providing alarm reporting of active sensors as well controlling output devices.

The SC 4812T is capable of concurrently monitoring 35 input signals. These inputs are divided between 2 Alarm connectors marked '**ALARM A**' and '**ALARM B**' located at the top of the frame (see Figure 3-28). The **ALARM A** connector is always functional; **ALARM B** is functional when an AMR module is equipped in the AMR 2 slot in the distribution shelf. **ALARM A** port monitors input numbers 1 through 18, while **ALARM B** port monitors input numbers 19, 20, and 22 through 36 (see Figure 3-29). Alarm 21 is reserved for system use. State transitions on these input lines are reported to the LMF and OMCR as MGLI Input Relay alarms.

ALARM A and **ALARM B** connectors each provide 18 inputs and 8 outputs. If both **A** and **B** are functional, 36 inputs and 16 outputs are available. They may be configured as redundant. The configuration is set by the CBSC.

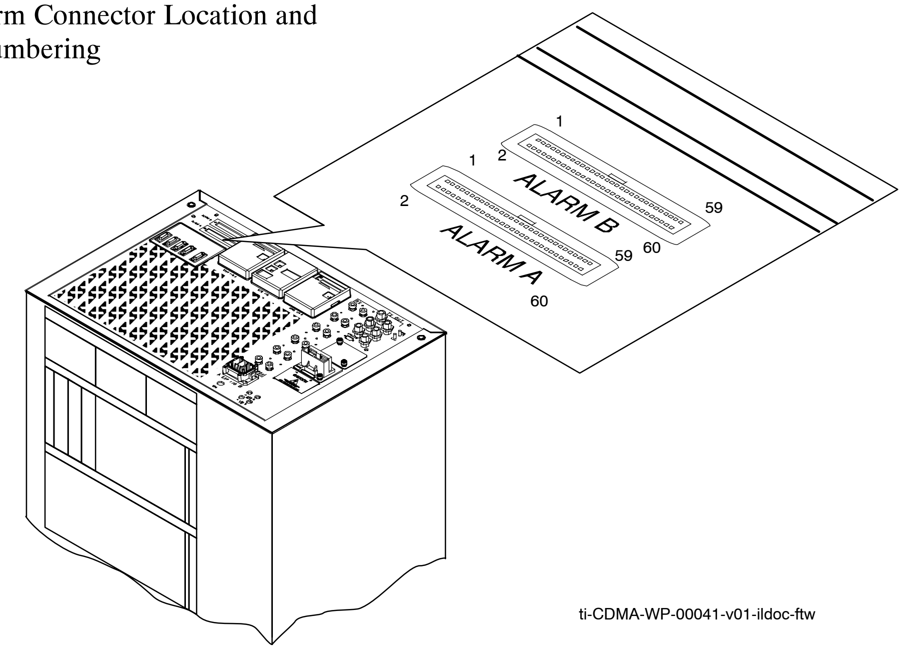
Alarm Reporting Display

The Alarm Monitor window can be displayed to list alarms that occur after the window is displayed. To access the Alarm Monitor window, select **Util>Alarm Monitor**.

The following buttons are included:

- The **Options** button allows for a severity level (**Warning, Minor**, and **Major**) selection. The default is all levels. To change the level of alarms reported click on the **Options** button and highlight the desired alarm level(s). To select multiple levels press the **<Ctrl>** key (for individual selections) or **<Shift>** key (for a range of selections) while clicking on the desired levels.
- The **Pause** button pauses/stops the display of alarms. When the **Pause** button is clicked the name of the button changes to **Continue**. When the **Continue** button is clicked, the display of alarms continues. Alarms that occur between the time the **Pause** button is clicked and the **Continue** button is clicked are not displayed.
- The **Clear** button clears the Alarm Monitor display. New alarms that occur after the **Clear** button is clicked are displayed.
- The **Dismiss** button dismisses/closes the Alarm Monitor display.

Figure 3-28: Alarm Connector Location and Connector Pin Numbering



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Purpose

The following procedures verify the customer defined alarms and relay contacts are functioning properly. These tests are performed on all AMR alarms/relays in a sequential manner until all have been verified. Perform these procedures periodically to ensure the external alarms are reported properly. Following these procedures ensures continued peak system performance.

Study the site engineering documents and perform the following tests only after **first** verifying that the AMR cabling configuration required to interconnect the BTS frame with external alarm sensors and/or relays meet requirements called out in the *1X SC 4812T-MC BTS Hardware Installation* .

NOTE

Motorola **highly** recommends that you read and understand this procedure in its entirety before starting this procedure.

Test Equipment

The following test equipment is required to perform these tests:

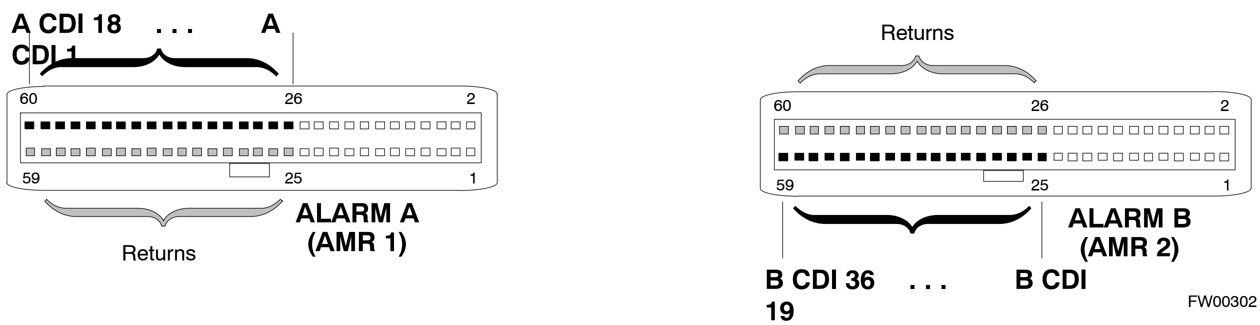
- LMF
- Alarms Test Box (CGDSCMIS00014) –optional

NOTE

Abbreviations used in the following figures and tables are defined as:

- NC = normally closed
- NO = normally open
- COM or C = common
- CDO = Customer Defined (Relay) Output
- CDI = Customer Defined (Alarm) Input

Figure 3-29: Figure Title Goes Here



NOTE

The preferred method to verify alarms is to follow the Alarms Test Box Procedure in Table 3-46. If not using an Alarm Test Box, follow the procedure in Table 3-47.

CDI Alarm Input Verification with Alarms Test Box

Table 3-46 describes how to test the CDI alarm input verification using the Alarm Test Box. Follow the steps as instructed and compare results with the LMF display.

NOTE

It may take a few seconds for alarms to be reported. The default delay is 5 seconds. Leave the alarms test box switches in the new position until the alarms have been reported.

Table 3-46: CDI Alarm Input Verification Using the Alarms Test Box	
Step	**Action**
1	Connect the LMF to the BTS and log into the BTS.
2	Select the MGLI.
3	Click on the **Device** menu.
4	Click on the **Set Alarm Relays** menu item.
5	Click on **Normally Open**. A status report window displays the results of the action.
6	Click on the **OK** button to close the status report window.
7	Set all switches on the alarms test box to the **Open** position.
8	Connect the alarms test box to the **ALARM A** connector (see Figure 3-28).
9	Set all of the switches on the alarms test box to the **Closed** position. An alarm should be reported for each switch setting.
10	Set all of the switches on the alarms test box to the **Open** position. A clear alarm should be reported for each switch setting.
11	Disconnect the alarms test box from the **ALARM A** connector.
12	Connect the alarms test box to the **ALARM B** connector.
13	Set all switches on the alarms test box to the **Closed** position. An alarm should be reported for each switch setting
14	Set all switches on the alarms test box to the **Open** position. A clear alarm should be reported for each switch setting.
15	Disconnect the alarms test box from the **ALARM B** connector.
16	Select the MGLI.
17	Click on the **Device** menu.
18	Click on the **Set Alarm Relays** menu item.
19	Click on **Normally Closed**. A status report window displays the results of the action.
20	Click **OK** to close the status report window. Alarms should be reported for alarm inputs 1 through 36.
21	Set all switches on the alarms test box to the **Closed** position.
22	Connect the alarms test box to the **ALARM A** connector. Alarms should be reported for alarm inputs 1 through 18.
23	Set all switches on the alarms test box to the **Open** position. An alarm should be reported for each switch setting.

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Table 3-46: CDI Alarm Input Verification Using the Alarms Test Box	
Step	**Action**
24	Set all switches on the alarms test box to the **Closed** position. A clear alarm should be reported for each switch setting.
25	Disconnect the alarms test box from the **ALARM A** connector.
26	**NOTE** Input 21 (pins 29 and 30) on the Alarm B connector is reserved for the Power Supply Modules alarm. Connect the alarms test box to the **ALARM B** connector. A clear alarm should be reported for alarm inputs 19 through 36.
27	Set all switches on the alarms test box to the **Open** position. An alarm should be reported for each switch setting.
28	Set all switches on the alarms test box to the **Closed** position. A clear alarm should be reported for each switch setting.
29	Disconnect the alarms test box from the **ALARM B** connector.
30	Select the MGLI.
31	Click on the **Device** menu.
32	Click on the **Set Alarm Relays** menu item.
33	Click on **Unequipped**. A status report window displays the results of the action.
34	Click on the **OK** button to close the status report window.
35	Connect the alarms test box to the **ALARM A** connector.
36	Set all switches on the alarms test box to both the **Open** and the **Closed** position. No alarm should be reported for any switch settings.
37	Disconnect the alarms test box from the **ALARM A** connector.
38	Connect the alarms test box to the **ALARM B** connector.
39	Set all switches on the alarms test box to both the **Open** and the **Closed** position. No alarm should be reported for any switch settings.
40	Disconnect the alarms test box from the **ALARM B** connector.
41	Load data to the MGLI to reset the alarm relay conditions according to the CDF file.

CDI Alarm Input Verification without Alarms Test Box

Table 3-47 describes how to test the CDI alarm input verification without the use of the Alarms Test Box. Follow the steps as instructed and compare results with the LMF display.

NOTE

It may take a few seconds for alarms to be reported. The default delay is 5 seconds. When shorting alarm pins wait for the alarm report before removing the short.

Table 3-47: CDI Alarm Input Verification Without the Alarms Test Box

Step	Action
1	Connect the LMF to the BTS and log into the BTS.
2	Select the MGLI.
3	Click on the **Device** menu.
4	Click on the **Set Alarm Relays** menu item.
5	Click on **Normally Open**. A status report window displays the results of the action.
6	Click on **OK** to close the status report window.
7	Refer to Figure 3-29 and sequentially short the ALARM A connector CDI 1 through CDI 18 pins (25–26 through 59–60) together. An alarm should be reported for each pair of pins that are shorted. A clear alarm should be reported for each pair of pins when the short is removed.
8	**NOTE** Input 21 (pins 29 and 30) on the Alarm B connector is reserved for the Power Supply Modules alarm. Refer to Figure 3-29 and sequentially short the ALARM B connector CDI 19 through CDI 36 pins (25–26 through 59–60) together. An alarm should be reported for each pair of pins that are shorted. A clear alarm should be reported for each pair of pins when the short is removed.
9	Select the MGLI.
10	Click on the **Device** menu.
11	Click on the **Set Alarm Relays** menu item.
12	Click on **Normally Closed**. A status report window displays the results of the action.
13	Click on **OK** to close the status report window. Alarms should be reported for alarm inputs 1 through 36.
14	Refer to Figure 3-29 and sequentially short the ALARM A connector CDI 1 through CDI 18 pins (25–26 through 59–60) together. A clear alarm should be reported for each pair of pins that are shorted. An alarm should be reported for each pair of pins when the short is removed.

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Table 3-47: CDI Alarm Input Verification Without the Alarms Test Box	
Step	Action
15	**NOTE** Input 21 (pins 29 and 30) on the Alarm B connector is reserved for the Power Supply Modules alarm. Refer to NO TAG and sequentially short the ALARM B connector CDI 19 through CDI 36 pins (25–26 through 59–60) together. A clear alarm should be reported for each pair of pins that are shorted. An alarm should be reported for each pair of pins when the short is removed.
16	Select the MGLI.
17	Click on the **Device** menu.
18	Click on the **Set Alarm Relays** menu item.
19	Click on **Unequipped**. A status report window displays the results of the action.
20	Click on **OK** to close the status report window.
21	Refer to NO TAG and sequentially short the ALARM A connector CDI 1 through CDI 18 pins (25–26 through 59–60) together. No alarms should be displayed.
22	**NOTE** Input 21 (pins 29 and 30) on the Alarm B connector is reserved for the Power Supply Modules alarm. Refer to NO TAG and sequentially short the ALARM B connector CDI 19 through CDI 36 pins (25–26 through 59–60) together. No alarms should be displayed.
23	Load data to the MGLI to reset the alarm relay conditions according to the CDF file.

Pin and Signal Information for Alarm Connectors

Table 3-48 lists the pins, wire color codes, and signal names for Alarms A and B.

Table 3-48: Pin and Signal Information for Alarm Connectors

Pin	Wire Color	Signal Name		Pin	Wire Color	Signal Name	
		Alarm A	Alarm B			Alarm A	Alarm B
1	Blu/Wht	A CDO1 NC	B CDO9 NC	**31**	Blu/Yel	Cust Retn 4	B CDI 22
2	Wht/Blu	A CDO1 Com	B CDO9 Com	**32**	Yel/Blu	A CDI 4	Cust Retn 22
3	Org/Wht	A CDO1 NO	B CDO9 NO	**33**	Org/Yel	Cust Retn 5	B CDI 23
4	Wht/Org	A CDO2 NC	B CDO10 NC	**34**	Yel/Org	A CDI 5	Cust Retn 23
5	Grn/Wht	A CDO2 Com	B CDO10 Com	**35**	Grn/Yel	Cust Retn 6	B CDI 24

3

Table 3-48: Pin and Signal Information for Alarm Connectors							
Pin	**Wire Color**	**Signal Name**		**Pin**	**Wire Color**	**Signal Name**	
		Alarm A	**Alarm B**			**Alarm A**	**Alarm B**
6	Wht/Grn	A CDO2 NO	B CDO10 NO	**36**	Yel/Grn	A CDI 6	Cust Retn 24
7	Brn/Wht	A CDO3 NC	B CDO11 NC	**37**	Brn/Yel	Cust Retn 7	B CDI 25
8	Wht/Brn	A CDO3 Com	B CDO11 Com	**38**	Yel/Brn	A CDI 7	Cust Retn 25
9	Slt/Wht	A CDO3 NO	B CDO11 NO	**39**	Slt/Yel	Cust Retn 8	B CDI 26
10	Wht/Slt	A CDO4 NC	B CDO12 NC	**40**	Yel/Slt	A CDI 8	Cust Retn 26
11	Blu/Red	A CDO4 Com	B CDO12 Com	**41**	Blu/Vio	Cust Retn 9	B CDI 27
12	Red/Blu	A CDO4 NO	B CDO12 NO	**42**	Vio/Blu	A CDI 9	Cust Retn 27
13	Org/Red	A CDO5 NC	B CDO13 NC	**43**	Org/Vio	Cust Retn 10	B CDI 28
14	Red/Org	A CDO5 Com	B CDO13 Com	**44**	Vio/Blu	A CDI 10	Cust Retn 28
15	Grn/Red	A CDO5 NO	B CDO13 NO	**45**	Grn/Vio	Cust Retn 11	B CDI 29
16	Red/Grn	A CDO6 NC	B CDO14 NC	**46**	Vio/Grn	A CDI 11	Cust Retn 29
17	Brn/Red	A CDO6 Com	B CDO14 Com	**47**	Brn/Vio	Cust Retn 12	B CDI 30
18	Red/Brn	A CDO6 NO	B CDO14 NO	**48**	Vio/Brn	A CDI 12	Cust Retn 30
19	Slt/Red	A CDO7 NC	B CDO15 NC	**49**	Slt/Vio	Cust Retn 13	B CDI 31
20	Red/Slt	A CDO7 Com	B CDO15 Com	**50**	Vio/Slt	A CDI 13	Cust Retn 31
21	Blu/Blk	A CDO7 NO	B CDO15 NO	**51**	Red/Wht	Cust Retn 14	B CDI 32
22	Blk/Blu	A CDO8 NC	B CDO16 NC	**52**	Wht/Red	A CDI 14	Cust Retn 32
23	Org/Blk	A CDO8 Com	B CDO16 Com	**53**	Blk/Wht	Cust Retn 15	B CDI 33
24	Blk/Org	A CDO8 NO	B CDO16 NO	**54**	Wht/Blk	A CDI 15	Cust Retn 33
25	Grn/Blk	Cust Retn 1	B CDI 19	**55**	Yel/Wht	Cust Retn 16	B CDI 34
26	Blk/Grn	A CDI 1	Cust Retn 19	**56**	Wht/Yel	A CDI 16	Cust Retn 34
27	Brn/Blk	Cust Retn 2	B CDI 20	**57**	Vio/Wht	Cust Retn 17	B CDI 35
28	Blk/Brn	A CDI 2	Cust Retn 20	**58**	Wht/Vio	A CDI 17	Cust Retn 35
29	Slt/Blk	Cust Retn 3	B CDI 21 +27V **Pwr Conv Alm –48V*	**59**	Blk/Red	Cust Retn 18	B CDI 36
30	Blk/Slt	A CDI 3	Cust Retn 21 +27V **Pwr Conv Retn –48V*	**60**	Red/Blk	A CDI 18	Cust Retn 36

NOTE

For –48V, reserved for Power Supply Module Alarm signal*. **NOT for use as CDOs or CDIs.

All Cust Rtrn **1–18** are electronically tied together at the RFMF.

All Cust Rtrn **19–36** are electronically tied together at the RFMF.

CDO = Customer Defined Output; **CDI** = Customer Defined Input;
NC – normally closed, **NO** – normally open, **Com** – common

The "A CDI" numbering is from the LMF/OMCR/CBSC perspective. LMF/OMCR/CBSC starts the numbering at 19 (giving 19 – 36). Actual cable hardware starts the numbering at 0 (giving 0–17)

Chapter 4: Automated Acceptance Test Procedure

Table of Contents

Notes

Introduction

The Automated Acceptance Test Procedure (ATP) allows Cellular Field Engineers (CFEs) to run automated acceptance tests on all equipped BTS subsystem devices using the Local Maintenance Facility (LMF) and supported test equipment per the current Cell Site Data File (CDF) assignment.

The results of these tests (at the option of the operator) are written to a file that can be printed. All tests are controlled from the LMF platform using the GPIB interface, therefore, only recommended test equipment supported by the LMF can be used.

This chapter describes the tests run from the GUI environment, which is the recommended method. The GUI provides the advantages of simplifying the LMF user interface, reducing the potential for miskeying commmands and associated parameters, and speeding up the execution of complex operations involving multiple command strings. If you feel the command line interface (CLI) will provide additional insight into the progress of ATPs and problems that could possibly be encountered, refer to *LMF CLI Commands.*

CAUTION

Before performing any tests, use an editor to view the "CAVEATS" section of the "readme.txt" file in the c:\wlmf folder for any applicable information.

The ATP test is to be performed on out-of-service (OOS) sectors *only.*

DO NOT substitute test equipment not supported by the LMF.

NOTE

Refer to Chapter 3 for detailed information on test set connections for calibrating equipment, cables and other test set components, if required.

Reduced ATP

NOTE

Equipment has been factory–tested for FCC compliance. If license–governing bodies require documentation supporting SITE compliance with regulations, a full ATP may be necessary. Perform the Reduced ATP only if reports for the specific BTS site are NOT required.

After downloading the proper operational software to the BTS, the CFE must perform these procedures (minimal recommendation):

- Verify the TX/RX paths by performing TX Calibration, TX Audit and FER tests.
- Retrieve Calibration Data required for normal site operation.

Should failures occur while performing the specified tests, refer to the Basic Troubleshooting section of this manual for help in determining the failure point. Once the point of failure has been identified and corrected, refer to the BTS Optimization and ATP Test Matrix (Table C-3, page C-4) section to determine the applicable test that must be performed.

In the unlikely event that the BTS passes these tests but has a forward link problem during normal operation, the CFE should then perform the additional TX tests for troubleshooting: TX spectral mask, TX rho, and TX code domain.

Required Test Equipment

The following test equipment is required:

- LMF
- Power meter (used with HP8921A/600 and Advantest R3465)
- Communications system analyzer
- Signal generator for FER testing (required for *all* communications system analyzers for 1X FER)

WARNING

- ***Before*** installing any test equipment directly to any BTS **TX OUT** connector, ***verify that there are no CDMA channels keyed***.
- At active sites, have the OMCR/CBSC place the carrier assigned to the PAs under test OOS. Failure to do so can result in serious personal injury and/or equipment damage.

NOTE

The test equipment must be re–calibrated before using it to perform the TX Acceptance Tests.

ATP Test Prerequisites

NOTE

All PAs must be INS during any TX testing.

Before attempting to run* any *ATP tests, ensure the following have been completed:

- BTS has been optimized and calibrated (see Chapter 3).
- LMF is logged into the BTS.
- CSMs, GLIs, BBXs, and MCCs have correct code load and data load.
- Primary CSM, GLI, and MCCs are INS_ACT (bright green).
- BBXs are calibrated and BLOs are downloaded.
- No BBXs are keyed (transmitting).
- BBXs are OOS_RAM (flashing green).
- Test cables are calibrated.
- Test equipment is connected for ATP tests (see Figure 3-18 through Figure 3-23).
- Test equipment has been warmed up 60 minutes and calibrated.
- GPIB is on.
- BTS transmit connectors are properly terminated for the test(s) to be performed.

WARNING

Before performing the FER, be sure that all PAs are turned OFF (circuit breakers pulled) or that all transmitter ports are properly terminated.

All transmit ports must be properly terminated for all ATP tests.

Failure to observe these warnings may result in bodily injury or equipment damage.

TX OUT Connection

NOTE

Many of the acceptance test procedures require taking measurements at the **TX OUT** connector. All measurements will be via the **BTS TX OUT** connector.

ATP Test Options

> **NOTE**
>
> All PAs must INS during any TX testing.

The tests can be run individually or as one of the following groups:

- **All TX/RX:** Executes all the TX and RX tests.
- **All TX:** TX tests verify the performance of the BTS transmit line up. These include the GLI, MCC, BBX, and MCIO cards, the PAs and passive components including ETMs, (S)PLCs, TX filters, and RF cables.
- **All RX:** RX tests verify the performance of the BTS receiver line up. These include the MPC (for starter frames), EMPC (for expansion frames), MCIO, BBX, MCC, and GLI cards and the passive components including RX filters (starter frame only), and RF cables.
- **Full Optimization:** Executes the TX calibration, downloads the BLO, and executes the TX audit before running all of the TX and RX tests.

> **NOTE**
>
> The Full Optimization test can be run if you want the TX path calibrated before all the TX and RX tests are run.
>
> If manual testing has been performed with the HP analyzer, remove the manual control/system memory card from the card slot and set the **I/O Config** to the **Talk & Lstn** mode before starting the automated testing.

> **NOTE**
>
> The **STOP** button can be used to stop the testing process.

Individual Acceptance Tests

The following individual tests can be used to verify the results of specific tests.

Spectral Purity TX Mask (Primary & Redundant BBX)

This test verifies that the transmitted CDMA carrier waveform generated on each sector meets the transmit spectral mask specification with respect to the assigned CDF file values.

Waveform Quality (rho)

This test verifies that the transmitted Pilot channel element digital waveform quality (rho) exceeds the minimum specified value in ANSI–J_STD–019. "*Rho*" represents the correlation between actual and perfect CDMA modulation spectrum. A rho value of 1.0000 represents 100% (or perfect correlation).

Pilot Time Offset

The Pilot Time Offset is the difference between the CDMA analyzer measurement interval (based on the BTS system time reference) and the incoming block of transmitted data from the BTS (Pilot only, Pilot Gain = 262, PN Offset = 0).

Code Domain Power (Primary & Redundant BBX)

This test verifies the code domain power levels, which have been set for all ODD numbered Walsh channels, using the OCNS command. This is done by verifying that the ratio of PILOT divided by OCNS is equal to **10.2 ± 2 dB**, and, that the noise floor of all EVEN numbered "OFF" Walsh channels measures **≤ –27 dB** (with respect to total CDMA channel power).

Frame Error Rate

The Frame Error Rate (FER) test verifies RX operation of the entire CDMA Reverse Link using all equipped MCCs assigned to all respective sectors/antennas. This test verifies the BTS sensitivity on all traffic channel elements currently configured on all equipped MCCs at an RF input level of –119 dBm (or –116 dBm if using TMPC).

ATP Test Procedure

Follow the procedure in Table 4-1 to perform any ATP test.

Table 4-1: ATP Test Procedure

✓	Step	Action
	1	Be sure that all prerequisites have been met.
	2	Select the device(s) to be tested. **IMPORTANT!** Only one carrier can be tested at a time. All PAs must be INS during testing.
		NOTE If the LMF has been logged into the BTS with a different **Multi–Channel Preselector** setting than the one to be used for this test, the LMF *must be logged out of the BTS and logged in again* with the *new* **Multi–Channel Preselector** setting. Using the wrong MPC setting can cause a false test failure.
	3	From the **Tests** menu, select the test you want to run.
	4	Select the appropriate carrier (carrier-bts#-sector#-carrier#) displayed in the **Channels/Carrier** pick list. **NOTE** To select multiple items, hold down the **<Shift>** or **<Ctrl>** key while making the selections.
	5	Enter the appropriate channel number in the **Carrier n Channels** box. The default channel number displayed is determined by the **CdmaChans[n]** number in the **cbsc–n.cdf** file for the BTS.
	6	If applicable, select **Verify BLO** (default) or **Single–sided BLO**.

. . . continued on next page

Table 4-1: ATP Test Procedure		
✓	**Step**	**Action**
		NOTE **Single–sided BLO** is only used when checking non–redundant transceivers.
	7	If applicable, select a test pattern from the **Test Pattern** pick list. **NOTE** • Selecting **Pilot** (default) performs tests using only a pilot signal. • Selecting **Standard** performs tests using pilot, synch, paging and 6 traffic channels. This requires an MCC to be selected. • Selecting **CDFPilot** performs tests using only a pilot signal, however, the gain for the channel elements is specified in the CDF file. • Selecting **CDF** performs tests using pilot, synch, paging and 6 traffic channels, however, the gain for the channel elements is specified in the CDF file.
	8	Click on the **OK** button. The status report window and a **Directions** pop-up are displayed.
	9	Follow the cable connection directions as they are displayed. The test results are displayed in the status report window.
	10	Click on **Save Results** or **Dismiss**. **NOTE** If **Dismiss** is used, the test results **will not** be saved in the test report file.
	11	Refer to Steps NO TAG through sub-step NO TAG of Table 3-37 to dekey.

Tx Mask Test

This test verifies the spectral purity of each BBX carrier keyed up at a specific frequency, *per the current CDF file assignment*. All tests are performed using the external calibrated test set, controlled by the same command. All measurements are via the appropriate **TX OUT** connector.

The Pilot Gain is set to 541 for each antenna, and all channel elements from the MCCs are forward-link disabled. The BBX is keyed up, using both bbxlvl and bay level offsets, to generate a CDMA carrier (with pilot channel element only). BBX power output is set to obtain +40 dBm as measured at the **TX OUT** connector (on the BTS directional coupler).

NOTE

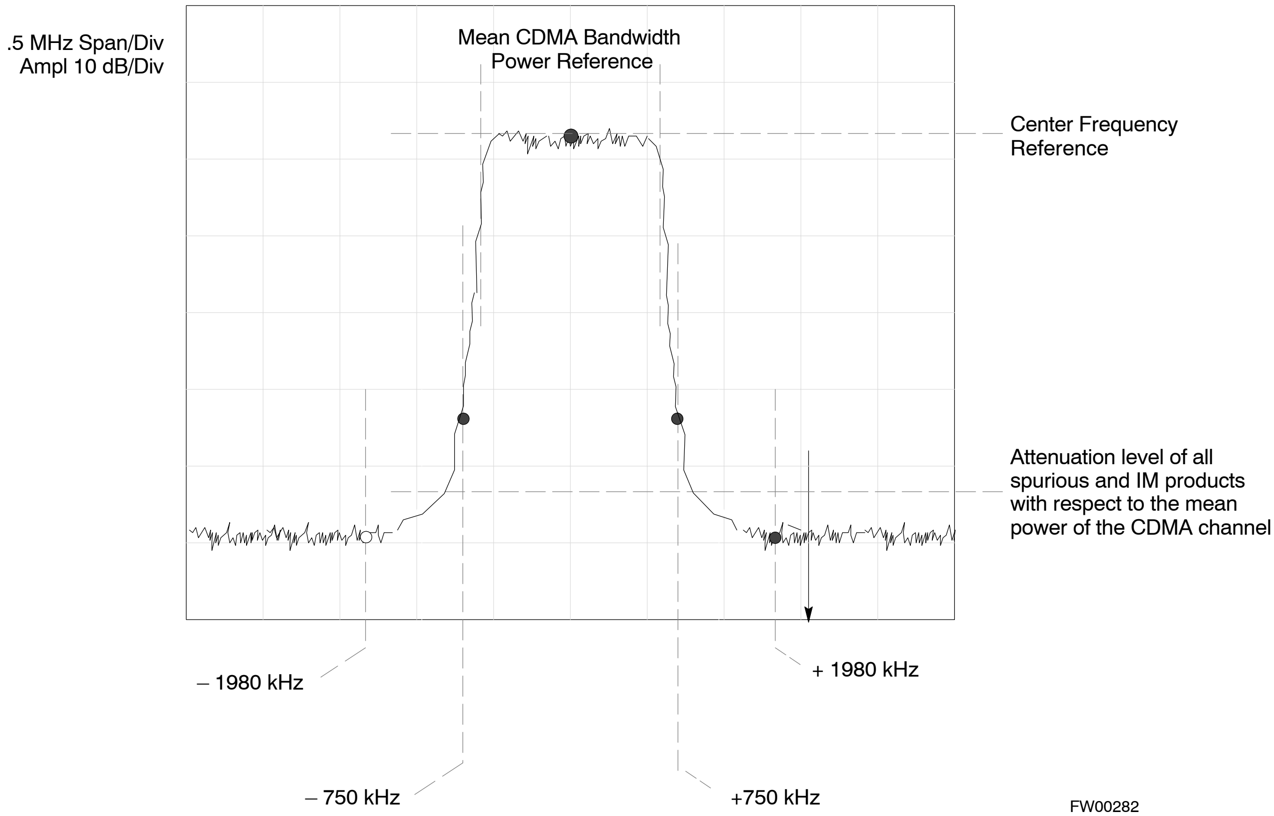
TX output power is set to +40 dBm by setting BTS power level to +33.5 dBm to compensate for 6.5 dB increase from pilot gain set to 541.

The calibrated communications test set measures and returns the attenuation level of all spurious and IM products in a 30 kHz resolution bandwidth. With respect to the mean power of the CDMA channel measured in a 1.23 MHz bandwidth in dB, verify that results meet system tolerances at the following test points:

– at least **–45 dB @ + 750 kHz** from center frequency
– at least **–45 dB @ – 750 kHz** from center frequency
– at least **–60 dB @ – 1980 kHz** from center frequency
– at least **–60 dB @ – 1980 kHz** from center frequency

The BBX then de-keys, and, if selected, the MCC is re-configured to assign the applicable redundant BBX to the current TX antenna path under test. The test is then repeated. See Table 4-1 to perform this test.

Figure 4-1: TX Mask Verification Spectrum Analyzer Display



Rho Test

This test verifies the transmitted Pilot channel element digital waveform quality of each BBX carrier keyed up at a specific frequency *per the current CDF file assignment*. All tests are performed using the external calibrated test set controlled by the same command. All measurements are via the appropriate **TX OUT** connector.

The Pilot Gain is set to 262 for each antenna, and all channel elements from the MCCs are forward link disabled. The BBX is keyed up using both bbxlvl and bay level offsets, to generate a CDMA carrier (with pilot channel element only, Walsh code 0). BBX power output is set to 40 dBm as measured at the **TX OUT** connector (on the BTS directional coupler).

The calibrated communications test set measures and returns the Pilot channel element digital waveform quality (rho) in dB, verifying that the result meets system tolerances:

- Waveform quality (rho) should be ≥ **0.912 (–0.4 dB)**.

The BBX then de-keys and, if selected, the MCC is re-configured to assign the applicable redundant BBX to the current TX antenna path under test. The test is then be repeated. See Table 4-1 to perform this test.

TX Pilot Time Offset Acceptance Test

Pilot Offset Acceptance Test

This test verifies the transmitted Pilot channel element Pilot Time Offset of each BBX carrier keyed up at a specific frequency *per the current CDF file assignment*. All tests are performed using the external calibrated test set controlled by the same command. All measurements are via the appropriate **TX OUT** connector.

The Pilot Gain is set to 262 for each antenna, and all TCH elements from the MCCs are forward link disabled. The BBX is keyed up, using both bbxlvl and bay level offsets, to generate a CDMA carrier (with pilot channel element only, Walsh code 0). BBX power output is set to 40 dBm as measured at the **TX OUT** connector (on either the BTS or RFDS directional coupler).

4

The calibrated communications test set measures and returns the Pilot Time Offset in μs, verifying results meet system tolerances:

- Pilot Time Offset should be within **± 3 μs** of the target PT Offset (0 μs).

The BBX then de-keys, and if selected, the MCC is re-configured to assign the applicable redundant BBX to the current TX antenna path under test. The test is then repeated. See Table 4-1 to perform this test.

TX Code Domain Power/Noise Floor Acceptance Test

Code Domain Power Test

This test verifies the Code Domain Power/Noise of each BBX carrier keyed up at a specific frequency *per the current CDF file assignment*. All tests are performed using the external calibrated test set controlled by the same command. All measurements are via the appropriate **TX OUT** connector.

For each sector/antenna under test, the Pilot Gain is set to 262. All MCC channel elements under test are configured to generate Orthogonal Channel Noise Source (OCNS) on different odd Walsh codes and to be assigned a full–rate gain of 81. The maximum number of MCC/CEs to be tested at any one time is 32 (32 odd Walsh codes). If more than 32 CEs exist, then multiple sets of measurements are made; so all channel elements are verified on all sectors.

4

BBX power output is set to 40 dBm as measured at the **TX OUT** connector.

You verify the code domain power levels, which have been set for all ODD numbered Walsh channels, using the OCNS command. This is done by verifying that Pilot Power (dBm) minus OCNS Power (dBm) is equal to **10.2 ± 2 dB** and that the noise floor of all "OFF" Walsh channels measures **≤ –27 dB** (with respect to total CDMA channel power).

NOTE

When performing this test using the LMF and the MCC is an MCC8E or MCC24E, the redundant BBX may fail or show marginal performance. This is due to a timing mismatch that the LMF does not address. Performing this test from the CBSC will not have this timing problem.

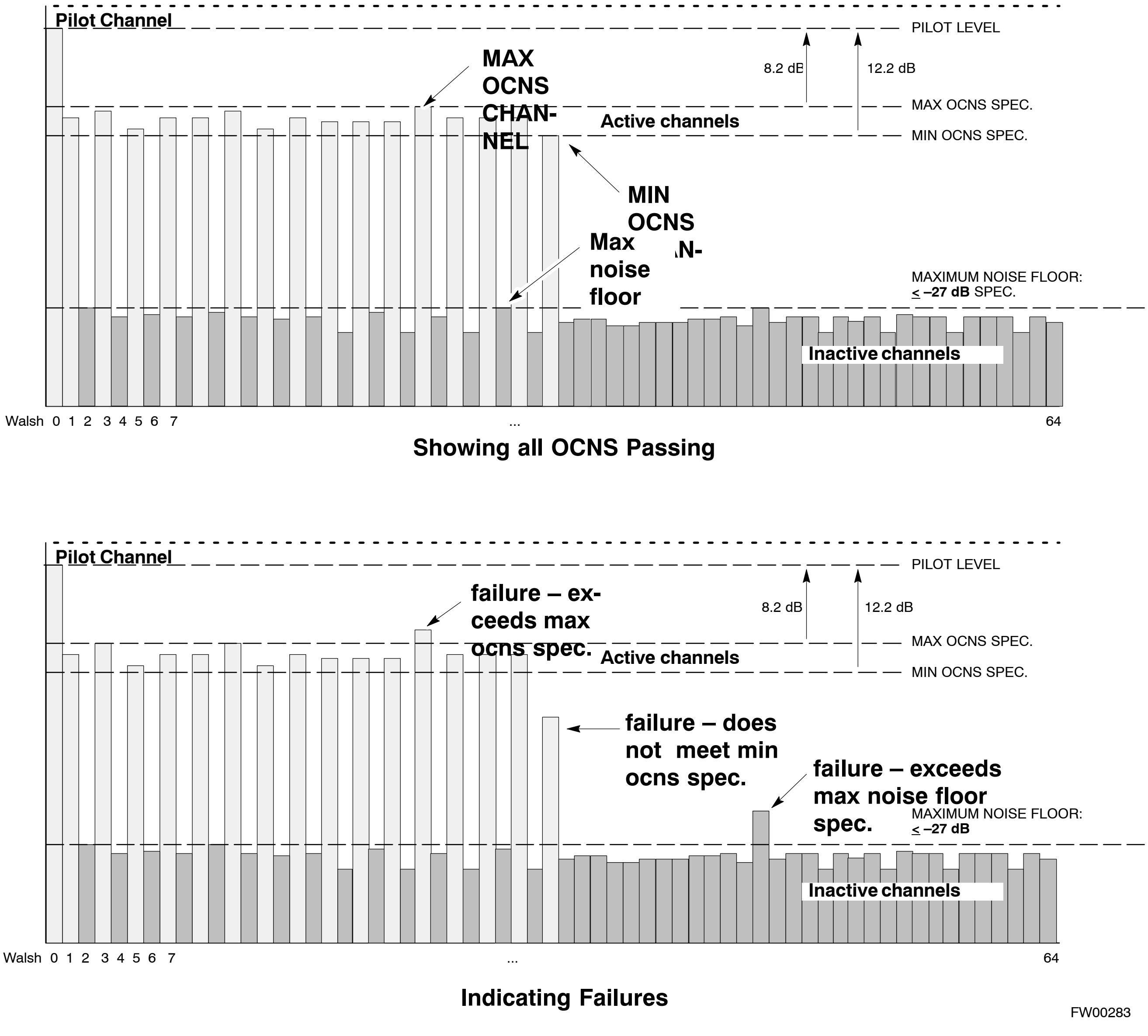
The BBX then de-keys and, if selected, the MCC is re-configured to assign the applicable redundant BBX to the current TX antenna path under test. The test is then repeated. Upon completion of the test, OCNS is disabled on the specified MCC/CE.

NOTE

If using Advantest test equipment, Code Domain Test MUST be configured in RC–1 mode.

See Table 4-1 to perform this test.

Figure 4-2: Code Domain Power and Noise Floor Levels



FER Test

This test verifies the BTS FER on *all* traffic channel elements currently configured on *all* equipped MCCs (full rate at 1% FER) at an RF input level of –119 dBm [or –116 dBm if using Tower Top Amplifier (TMPC)]. All tests are performed using the external calibrated test set as the signal source controlled by the same command. All measurements are via the LMF.

The Pilot Gain is set to 262 for each TX antenna, and all channel elements from the MCCs are forward-link disabled. The BBX is keyed up, using only bbxlvl level offsets, to generate a CDMA carrier (with pilot channel element only). BBX power output is set to –20 dBm as measured at the **TX OUT** connector. The BBX must be keyed to enable the RX receive circuitry.

The LMF prompts the MCC/CE under test to measure all zero longcode and provide the FER report on the selected active MCC on the reverse link for both the main and diversity RX antenna paths, verifying that results meet the following specification:

- FER returned less than **1%** and total frames measured is **1500**

All MCC/CEs selected are tested on the specified RX antenna path. The BBX then de-keys and, if selected, the MCC is re-configured to assign the applicable redundant BBX to the current RX antenna paths under test. The test is then repeated. See Table 4-1 to perform this test.

Generate an ATP Report

Background

Each time an ATP test is run, an ATP report is updated to include the results of the most recent ATP tests if the **Save Results** button is used to close the status report window. The ATP report *is not* updated if the status reports window is closed using the **Dismiss** button.

ATP Report

Each time an ATP test is run, a separate report is created for each BTS and includes the following for each test:

- Test name
- BBX number
- Channel number
- Carrier number
- Sector number
- Upper test limit
- Lower test limit
- Test result
- PASS or FAIL
- Description information (if applicable)
- Time stamp
- Details/Warning information (if applicable)

The report can be printed if the LMF computer is connected to a printer. Follow the procedure in the Table 4-2 to view and/or print the ATP report for a BTS.

Table 4-2: Generating an ATP Report

✓	Step	Action
	1	Click on the **Login** tab (if not in the forefront).
	2	Select the desired BTS from the available Base Station pick list.
	3	Click on the **Report** button.
	4	Click on a column heading to sort the report.
	5	– If not desiring a printable file copy, click on the **Dismiss** button. – If requiring a printable file copy, select the desired file type in the picklist and click on the **Save** button.

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Notes

Updating Calibration Data Files

Software Release caveats

Software Release R2.16.4.1 allows the user to load the calibration file from the LMF directly onto the MGLI. The MGLI will then ftp the new calibration file to the OMC–R, thereby eliminating the need for the user to place the calibration file at the OMC–R.

Copy and Load Cal File to to CBSC

Updated calibration (CAL) file information must be moved from the LMF Windows environment back to the CBSC, which resides in a Unix environment. The procedures that follow detail how to move files from one environment to the other.

Backup CAL Data to a Diskette

The BLO calibration files should be backed up to a diskette (per BTS). Follow the procedure in Table 5-1 to copy CAL files from a CDMA LMF computer to a diskette.

Table 5-1: Backup CAL Data to a Diskette

Step	Action
1	With *Windows* running on the LMF computer, insert a disk into Drive A:\.
2	Launch the ***Windows*** **Explorer** application program from the **Start > Programs** menu list.
3	Select the applicable **<*x*>:\<*lmf home directory*/cdma/bts–#** folder.
4	Drag the **bts–#.cal** file to Drive A.
5	Repeat Steps 3 and 4, as required, for other **bts–#** folders.

Copying CAL Files from Diskette to the CBSC

Follow the procedure in Table 5-2 to copy CAL files from a diskette to the CBSC.

Table 5-2: Procedures to Copy CAL Files from Diskette to the CBSC

Step	Action
1	Log into the CBSC on the OMC–R Unix workstation using your account name and password.
2	Place the diskette containing calibration files (cal files) in the workstation diskette drive.
3	Type **eject –q** and press the **Enter** key.
4	Type **mount** and press the **Enter** key. Verify that `floppy/no_name` is displayed.
	NOTE If the **eject** command has been previously entered, `floppy/no_name` will be appended with a number. Use the explicit `floppy/no_name` reference displayed.
5	Type in **cd /floppy/no_name** and press the **Enter** key.
6	Type in **ls –lia** and press the **Enter** key. Verify the **bts–#.cal** file filename appears in the displayed directory listing.
7	Type in **cd** and press the **Enter** key.
8	Type in **pwd** and press the **Enter** key. Verify the displayed response shows the correct home directory (/**home**/<*user's name*>).
9	With *Solaris versions of Unix,* create a Unix–formatted version of the **bts–#.cal** file in the home directory by performing the following:
9a	– Type in **dos2unix /floppy/no_name/bts–#.cal bts–#.cal** and press the **Enter** key. Where: **#** = BTS number for which the CAL file was created
	NOTE Other versions of Unix do not support the `dos2unix` command. In these cases, use the Unix **cp** (copy) command. The *copied* files will contain DOS line feed characters which must be edited out with a Unix text editor.
10	Type in **ls –l *.cal** and press the **Enter** key. Verify the CAL files have been copied. Verify all CAL files to be transferred appear in the displayed listing.

. . . continued on next page

Table 5-2: Procedures to Copy CAL Files from Diskette to the CBSC	
Step	**Action**
11	Type **eject** and press the **Enter** key.
12	Remove the diskette from the workstation.

5

External Test Equipment Removal

Perform the procedure in Table 5-3 to disconnect the test equipment and configure the BTS for active service.

Table 5-3: External Test Equipment Removal

Step	Action
1	Disconnect all external test equipment from all TX and RX connectors on the top of the frame.
2	Reconnect and visually inspect all TX and RX antenna feed lines at the top of the frame.

CAUTION

Verify that all sector antenna feed lines are connected to the correct ports on the frame. Crossed antenna cables will cause system degradation of call processing.

NOTE

Each module or device can be in any state prior to downloading. Each module or device will be in an OOS_RAM state after downloading has completed.

- For all LMF commands, information in *italics* represents valid ranges for that command field.
- Only those fields requiring an input will be specified. Default values for other fields will be assumed.
- For more complete command examples (including system response details), refer to the *CDMA LMF User Guide.*

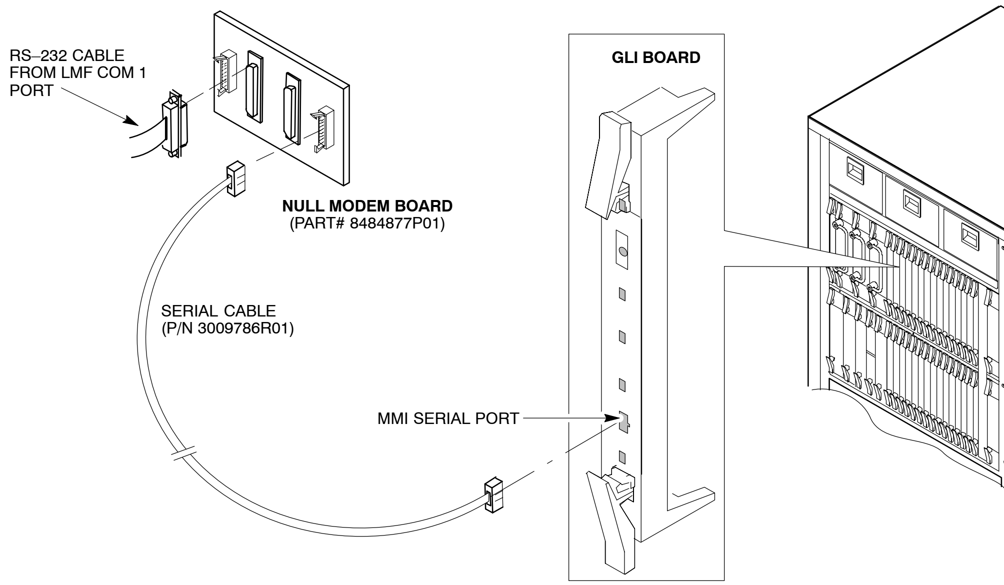
BTS Site Span Configuration Verification

Perform the procedure in Table 5-4 to verify the current Span Framing Format and Line Build Out (LBO) parameters. *ALL* MGLI/GLI boards in all C–CCP shelves that terminate a T1/E1 span should be verified.

Table 5-4: BTS Span Parameter Configuration	
Step	**Action**
1	Connect a serial cable from the LMF COM1 port (via null modem board) to the front panel of the MGLI MMI port (see Figure 5-1).
2	Start an MMI communication session with MGLI by using the Windows desktop shortcut icon (see Table 3-3 on page 3-11). **NOTE** The LMF program must not be running when a Hyperterminal session is started if COM1 is being used for the MMI session.
3	Verify the span parameter settings for frame format, equalization, and linkspeed for the span to be used by entering the following at the `GLI3>` prompt: **config ni current** The system will respond with a display similar to the following: `The frame format in flash is set to use T1_2.` `Equalization:` `  Span A – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `  Span B – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `  Span C – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `  Span D – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `  Span E – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `  Span F – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `Linkspeed: Default (56K for T1 D4 AMI, 64K otherwise)` `Currently, the link is running at the default rate` `The actual rate is 0` **NOTE** • Defaults for span equalization are 0–131 feet for T1/J1 spans and 120 Ohm for E1. • Default linkspeed is 56K for T1 D4 AMI spans and 64K for all other types. • There is no need to change from defaults unless the provisioned span configuration requires it.
4	The span parameter settings in the GLI must match those provisioned in the OMC–R database for the BTS. If they do not, proceed to Table 5-5 to change the span parameter settings.
5	Repeat steps 1 through 4 for all remaining GLIs.
6	Exit the GLI MMI session and HyperTerminal connection by selecting **File** from the connection window menu bar, and then **Exit** from the drop–down menu.

5

Figure 5-1: MGLI/GLI MMI Port Connection



5

Set BTS Site Span Configuration

Perform the procedure in Table 5-5 to configure the Span Framing Format and Line Build Out (LBO) parameters. *ALL* MGLI/GLI boards in all C–CCP shelves that terminate a T1/E1 span must be configured.

CAUTION

Perform the following procedure *ONLY* if span configurations loaded in the MGLI/GLIs do not match those in the OMC–R data base, *AND ONLY* when the exact configuration data is available. Loading incorrect span configuration data will render the site inoperable.

<table>
<tr><th colspan="2">Table 5-5: Set GLI3 Span Parameter Configuration</th></tr>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>If it has not been done, start a GLI3 MMI communication session on the LMF computer as described in Table 3-10.</td></tr>
<tr><td>2</td><td>At the GLI3> prompt, enter the following:

config ni format

The terminal will display a response similar to the following:<pre>
COMMAND SYNTAX: config ni format option
Next available options:
   LIST –   option : Span Option
                E1_1 : E1_1 – E1 HDB3 CRC4   no TS16
                E1_2 : E1_2 – E1 HDB3 no CRC4 no TS16
                E1_3 : E1_3 – E1 HDB3 CRC4   TS16
                E1_4 : E1_4 – E1 HDB3 no CRC4 TS16
                T1_1 : T1_1 – D4, AMI, No ZCS
                T1_2 : T1_2 – ESF, B8ZS
                J1_1 : J1_1 – ESF, B8ZS (Japan) – Default
                J1_2 : J1_2 – ESF, B8ZS
                T1_3 : T1_3 – D4, AMI, ZCS
>
</pre>NOTE
With this command, all active (in–use) spans will be set to the same format.</td></tr>
<tr><td>3</td><td>To set or change the span type, enter the correct option from the list at the entry prompt (>), as shown in the following example:

> T1_2

NOTE
The entry is case–sensitive and must be typed exactly as it appears in the list. If the entry is typed incorrectly, a response similar to the following will be displayed:<pre>
CP: Invalid command
01.061980 00:11’59 MGLI–000–2 INS–ACT BTS–CDMA 16.1.68.00

GLI3>
</pre></td></tr>
<tr><td>4</td><td>An acknowledgement similar to the following will be displayed:<pre>
The value has been programmed. It will take effect after the next reset.
GLI3>
</pre></td></tr>
</table>

. . . continued on next page

Table 5-5: Set GLI3 Span Parameter Configuration

Step	Action
5	If the current MGLI/GLI span rate must be changed, enter the following MMI command: **config ni linkspeed** A response similar to the following will be displayed : `Next available options:` `LIST – linkspeed : Span Linkspeed` `56K : 56K (default for T1_1 and T1_3 systems)` `64K : 64K (default for all other span configurations)` `>` **NOTE** With this command, all active (in–use) spans will be set to the same linkspeed.
6	To set or change the span linkspeed, enter the required option from the list at the entry prompt (>), as shown in the following example: > **64K** **NOTE** The entry is case–sensitive and must be typed *exactly* as it appears in the list. If the entry is typed incorrectly, a response similar to the following will be displayed: `CP: Invalid command` `01.061980 00:12'04 MGLI–000–2 INS–ACT BTS–CDMA 16.1.68.00` `GLI3>`
7	An acknowledgement similar to the following will be displayed: `The value has been programmed.  It will take effect after the next reset.` `GLI3>`

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Table 5-5: Set GLI3 Span Parameter Configuration	
Step	**Action**
8	If the span equalization must be changed, enter the following MMI command: **config ni equal** A response similar to the following will be displayed: `COMMAND SYNTAX: config ni equal span equal` `Next available options:` `LIST –       span : Span` `                     a : Span A` `                     b : Span B` `                     c : Span C` `                     d : Span D` `                     e : Span E` `                     f : Span F` `>`

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Table 5-5: Set GLI3 Span Parameter Configuration

Step	Action
9	At the entry prompt (>), enter the designator from the list for the span to be changed as shown in the following example: `> a` A response similar to the following will be displayed : `COMMAND SYNTAX: config ni equal a equal` `Next available options:` `LIST – equal : Span Equalization` `0 : 0–131 feet (default for T1/J1)` `1 : 132–262 feet` `2 : 263–393 feet` `3 : 394–524 feet` `4 : 525–655 feet` `5 : LONG HAUL` `6 : 75 OHM` `7 : 120 OHM (default for E1)` `8 : T1 Long Haul mode. No Attenuation` `9 : T1 Long Haul mode. 7.5 dB Attenuation` `10 : T1 Long Haul mode. 15.0 dB Attenuation` `11 : T1 Long Haul mode. 22.5 dB Attenuation` `12 : E1 Long Haul mode.` `>` **! CAUTION** When selecting span equalization settings, comply with the following or the BTS may operate erratically or unpredictably: • For *ALL* BTS types, *do not select any* of the following settings if they are displayed: – 5 LONG HAUL – 6 75 OHM – 11 T1 Long Haul mode. 22.5 dB Attenuation – 12 E1 Long Haul mode • For four–digit BTSs supported with Channel Service Units (CSU), *do not select any* of the following additional settings: – 8 T1 Long Haul mode. No Attenuation – 9 T1 Long Haul mode. 7.5 dB Attenuation – 10 T1 Long Haul mode. 15.0 dB Attenuation

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<table>
<tr><th colspan="2">Table 5-5: Set GLI3 Span Parameter Configuration</th></tr>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>10</td><td>At the entry prompt (>), enter the code for the required equalization from the list as shown in the following example (this should be the distance from the BTS Span I/O to the site demarcation equipment or CSU, as applicable):
> 0
A response similar to the following will be displayed :
<code>> 0</code>
<code>The value has been programmed. It will take effect after the next reset.</code>
<code>GLI2></code></td></tr>
<tr><td>11</td><td>Repeat steps 8 through 10 for each in–use span.</td></tr>
<tr><td>12</td><td>! CAUTION
Do not set the card for loopback as described in this step unless specifically required or requested for testing.

Enter the following MMI command to turn loopback on or off:
GLI#> config ni loopback <<i>on or off</i>>
Loopback commands and responses:
GLI#> config ni loopback on
<code>Loopback request SUCCESSFUL: All framers have been placed in loopback.</code>
<code>They will remain in loopback for 1 hour.</code>
GLI#> config ni loopback off
<code>Loopback request SUCCESSFUL: All framers have been removed from loopback.</code></td></tr>
<tr><td>13</td><td>NOTE
This step must be performed for GLI3 cards operating on a packet image to ensure the span parameter changes will replace the previous settings.

For a GLI3 card in packet mode, enter the following:
rmfile /nvram00/config/hlp_param.txt
A response similar to the following will be displayed :
<code>GLI3> rmfile /nvram00/config/hlp_param.txt</code>
<code>11.24.2003 23:14:57 MGLI–004–1 CC PRESENT BTS–CDMA 16.40.00.09</code>

<code>Removing file: /nvram00/config/hlp_param.txt</code>
<code>Successfully removed file: /nvram00/config/hlp_param.txt</code>

<code>GLI3></code></td></tr>
</table>

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Table 5-5: Set GLI3 Span Parameter Configuration	
Step	**Action**
14	*** IMPORTANT** • After executing the **config ni format**, **config ni linkspeed**, and/or **config ni equal** commands, the affected MGLI/GLI board *MUST* be reset and reloaded for changes to take effect. • Although defaults are shown in the software, *always* consult site–specific documentation for span type, equalization, and linkspeed used at the site where the cards are to be installed. Reset the card using the MMI **reset** command.
15	Once the card has completed resetting, execute the following command to verify span settings are as required: **config ni current** A response similar to the following will be displayed : `The frame format in flash is set to use T1_2.` `Equalization:` `  Span A – 0–131 feet` `  Span B – 0–131 feet` `  Span C – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `  Span D – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `  Span E – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `  Span F – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `Linkspeed: 64K` `Currently, the link is running at 64K` `The actual rate is 0`
16	If the span configuration is not correct, perform the applicable step from this table to change it and repeat steps 14 and 15 to verify required changes have been programmed.
17	Repeat steps 1 through 16 for each GLI card requiring changes in the span parameter settings.
18	If no other MMI actions are required for the card, terminate the MMI communication session and disconnect the LMF computer from the card.

LMF Removal

NOTE

DO NOT power down the LMF without performing the procedure below. Corrupted/lost data files may result, and in some cases, the LMF may lock up.

Follow the procedure in Table 5-6 to terminate the LMF session and remove the terminal.

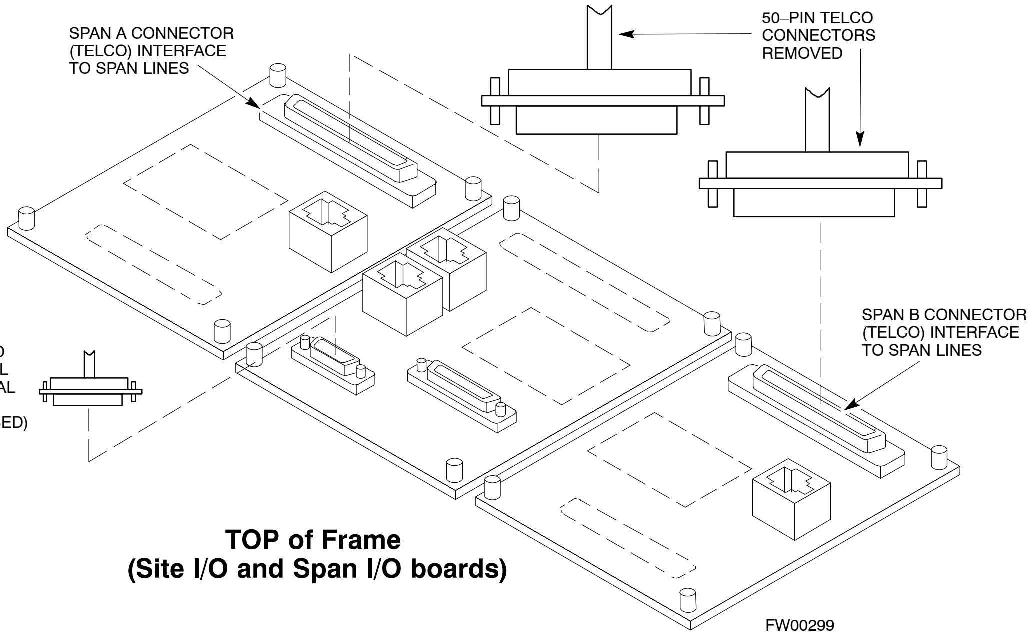
Table 5-6: LMF Termination and Removal		
✓	Step	Action
	1	From the CDMA window select **File>Exi**t. **NOTE** The "File > Exit" command will prompt you to confirm the logout proc and Exit" command will not prompt you and continues to shut down LM
	2	From the Windows Task Bar click **Start>Shutdown**. Click **Yes** when the Shut Down Windows message appears.
	3	Disconnect the LMF terminal Ethernet connector from the BTS cabinet.
	4	Disconnect the LMF serial port, the RS-232 to GPIB interface box, and required for equipment transport.

Re–connect BTS T1/E1 Spans and Integrated Frame Modem

Before leaving the site, connect any T1 span TELCO connectors that were removed to allow the LMF to control the BTS. Refer to Table 5-7 and Figure 5-2 as required.

Table 5-7: T1/E1 Span/IFM Connections	
Step	Action
1	Connect the 50–pin TELCO cables to the BTS span I/O board 50–pin TELCO connectors.
2	If used, connect the dial–up modem RS–232 serial cable to the Site I/O board RS–232 9–pin sub D connector. *** IMPORTANT** Verify that you connect both SPAN cables (if removed previously), and the Integrated Frame Modem (IFM) "TELCO" connector.

Figure 5-2: Site and Span I/O Boards T1 Span Connections



5

Reset All Devices and Initialize Site Remotely

Devices in the BTS should not be left with data and code loaded from the LMF. The configuration data and code loads used for normal operation could be different from those stored in the LMF files. Perform the procedure in Table 5-8 to reset all devices and initialize site remotely.

Table 5-8: Reset BTS Devices and Remote Site Initialization

Step	Action
1	Terminate the LMF session by following the procedures in Table 5-6.
2	Reconnect spans by following the procedure in Table 5-7.
3	– If BTS is configured for circuit operation, go to Step 4. – If BTS is configured for packet operation, go to Step 5.
4	**Circuit BTS Procedure:**
4a	From the BTS site, contact the OMC–R and request the operator to perform a BTS reset. *or* At the BTS site: – unseat one GLI card at a time and wait for 30 seconds; – reseat the GLI and wait for it to complete its initialization (this takes about one minute); – repeat for the second GLI.

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Table 5-8: Reset BTS Devices and Remote Site Initialization	
Step	**Action**
4b	Depending on the number of installed operational GLI cards, perform one of the following: – With fully redundant GLIs, contact the OMC–R and request the operator to run the ACTIVATE command for the BTS. – For a non–redundant GLI or a frame where the redundant GLI is not operational, contact the OMC–R and request the operator: • ACTIVATE the GLI to set the Nextload attribute for the GLI to the one for the current BSS software version; • Disable the GLI; • Enable the GLI to allow the MM to load the software version specified by the Nextload attribute; • Once the GLI is INS_ACT, contact the OMC–R and request the operator ACTIVATE the BTS. – Once the GLI cards are loaded with the specified code version, the active GLI will verify and update, as required, the RAM and, if it is necessary, ROM code loads for the installed CSM, MCC, and BBX cards using the DLM.
5	**Packet BTS procedure:**
5a	From the BTS site, contact the OMC–R and request the operator to PREACTIVATE the BTS to the required software version for the BSS. There are two types of PREACTIVATE load processes: – **Rolling Upgrade**: This load process is only available when the BTS cards are populated for full redundancy as applicable. – **Quick Reboot**: This process is used when there is not full redundancy for the BTS cards. The GLI3 will disable and reboot to the new load. This will cause all the other cards to go out of service. Once it is rebooted, the GLI3 determines which cards require a new load and then downloads the cards in the order which they establish communication with the GLI3 following their reboot. The GLI3 can reload up to 16 devices simultaneously.
6	Account for all tools used and parts removed from the frame during the operations, being sure none were left inside the frame.
7	Visually inspect the frame for any foreign objects left inside, and remove any discovered.
8	Visually inspect all cable connections, ensuring they are connected as required for normal BTS operation.
9	Be sure all internal frame cables are routed and secured to prevent damage to them when the frame doors are closed.
10	Close and secure the cabinet doors.
11	Verify no alarm conditions are being reported to the OMC–R with the frame doors closed.
12	After all activities at the site have been completed, contact the OMC–R and confirm that the BTS is under OMC–R control.

Notes

Chapter 6: Basic Troubleshooting

Table of Contents

Notes

Troubleshooting Overview

Overview

The information in this section addresses some of the scenarios likely to be encountered by Cellular Field Engineering (CFE) team members. This troubleshooting guide was created as an interim reference document for use in the field. It provides basic "what to do if" basic troubleshooting suggestions when the BTS equipment does not perform per the procedure documented in the manual.

Comments are consolidated from inputs provided by CFEs in the field and information gained form experience in Motorola labs and classrooms.

Cannot Log into Cell-Site

Follow the procedure in Table 6-1 to troubleshoot a login failure.

Table 6-1: Login Failure Troubleshooting Procedures

✓	Step	Action
	1	If MGLI LED is solid RED, it implies a hardware failure. Reset MGLI by re-seating it. If this persists, install a known good MGLI card in MGLI slot and retry. A Red LED may also indicate no Ethernet termination at top of frame.
	2	Verify that T1 is disconnected (see Table 3-4 on page 3-14). If T1 is still connected, verify the CBSC has disabled the BTS.
	3	Try *pinging* the MGLI (see Table 3-11 on page 3-32).
	4	Verify the LMF is connected to the **Primary** LMF port (LAN A) in the front of the BTS (see Table 3-5 on page 3-15).
	5	Verify the LMF was configured properly (see Preparing the LMF section starting on page 3–6).
	6	Verify the BTS-LMF cable is RG-58 [flexible black cable of less than 76 cm (2.5 feet) length].
	7	Verify the Ethernet ports are terminated properly (see Figure 3-10).
	8	Verify a T-adapter is <u>not</u> used on the LMF side port if connected to the BTS front LMF primary port.
	9	Try connecting to the I/O panel (top of frame). Use BNC T-adapters at the LMF port for this connection.
	10	Re-boot the LMF and retry.
	11	Re-seat the MGLI and retry.
	12	Verify IP addresses are configured properly.

6

Cannot Communicate to Power Meter

Follow the procedure in Table 6-2 to troubleshoot a power meter communication failure.

Table 6-2: Troubleshooting a Power Meter Communication Failure

✓	Step	Action
	1	Verify the Power Meter is connected to the LMF with a GPIB adapter.
	2	Verify the cable setup as specified in Chapter 3.
	3	Verify the GPIB address of the power meter is set to the same value displayed in the applicable GPIB address box of the **LMF Options** window **Test Equipment** tab. Refer to Table 3-24 or Table 3-25 and the GPIB Addresses section of Appendix F for details.
	4	Verify the GPIB adapter DIP switch settings are correct. Refer to the Test Equipment setup section for details.

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Table 6-2: Troubleshooting a Power Meter Communication Failure		
✓	Step	Action
	5	Verify the GPIB adapter is not locked up. Under normal conditions, only two green LEDs must be ‘ON’ (Power and Ready). If any other LED is continuously ‘ON’, then power-cycle the GPIB Box and retry.
	6	Verify the LMF computer COM1 port is not used by another application; for example, if a HyperTerminal window is open for MMI, close it.
	7	Reset all test equipment by clicking **Util** in the BTS menu bar and selecting **Test Equipment>Reset** from the pull–down lists.

Cannot Communicate to Communications Analyzer

Follow the procedure in Table 6-3 to troubleshoot a communications analyzer communication failure.

Table 6-3: Troubleshooting a Communications Analyzer Communication Failure		
✓	Step	Action
	1	Verify the analyzer is connected to the LMF with GPIB adapter.
	2	Verify the cable setup.
	3	Verify the signal generator GPIB address is set to the same value displayed in the applicable GPIB address box of the **LMF Options** window **Test Equipment** tab. Refer to Table 3-24 or Table 3-25 and the GPIB Address section of Appendix F for details.
	4	Verify the GPIB adapter DIP switch settings are correct. Refer to the CDMA 2000 Test Equipment Preparation section of Appendix NO TAG for details.
	5	Verify the GPIB adapter is not locked up. Under normal conditions, only two green LEDs must be ‘ON’ (Power and Ready). If any other LED is continuously ‘ON’, then cycle the GPIB box power and retry.
	6	Verify the LMF computer COM1 port is not used by another application; for example, if a HyperTerminal window is open for MMI, close it.
	7	Reset *all* test equipment by clicking **Util** in the BTS menu bar and selecting **Test Equipment>Reset** from the pull–down lists.

Cannot Download CODE to Any Device (card)

Follow the procedure in Table 6-4 to troubleshoot a code download failure.

Table 6-4: Troubleshooting Code Download Failure

✓	Step	Action
	1	Verify T1 is disconnected from the BTS.
	2	Verify the LMF can communicate with the BTS device using the Status function.
	3	Communication to the MGLI2 must first be established before trying to talk to any other BTS device. The MGLI2 must be INS_ACT state (green).
	4	Verify the card is physically present in the cage and powered-up.
	5	If the card LED is solid RED, it implies hardware failure. Reset the card by re-seating it. If the LED remains solid red, replace with a card from another slot & retry. **NOTE** The card can only be replaced by a card of the same type.
	6	Re-seat the card and try again.
	7	If BBX reports a failure message and is OOS_RAM, the code load was OK.
	8	If the download portion completes and the reset portion fails, reset the device by selecting the device and **Reset**.
	9	If a BBX or an MCC remains OOS_ROM (blue) after code download, use the LMF **Device > Status** function to verify that the code load was accepted.
	10	If the code load was accepted, use LMF **Device > Download > Flash** to load RAM code into flash memory.

Cannot Download DATA to Any Device (Card)

Perform the procedure in Table 6-5 to troubleshoot a data download failure.

Table 6-5: Troubleshooting Data Download Failure

✓	Step	Action
	1	Re-seat the card and repeat code and data load procedure.

Cannot ENABLE Device

Before a device can be enabled (placed in-service), it must be in the OOS_RAM state (yellow) with data downloaded to the device. The color of the device changes to green once it is enabled.

The three states that devices can be changed to are as follows:

- Enabled (green, INS)
- Disabled (yellow, OOS_RAM)
- Reset (blue, OOS_ROM)

Follow the procedure in Table 6-6 to troubleshoot a device enable failure.

Table 6-6: Troubleshooting Device Enable (INS) Failure

✓	Step	Action
	1	Re-seat the card and repeat the code and data load procedure.
	2	If the CSM cannot be enabled, verify the CDF file has correct latitude and longitude data for cell site location and GPS sync.
	3	Ensure the primary CSM is in INS_ACT state. **NOTE** MCCs will not go INS without the CSM being INS.
	4	Verify the 19.6608 MHz CSM clock; MCCs will not go INS otherwise.
	5	The BBX should not be enabled for ATP tests.
	6	If MCCs give "`invalid or no system time`", verify the CSM is operable.

Miscellaneous Errors

Perform the procedure in Table 6-7 to troubleshoot miscellaneous failures.

Table 6-7: Miscellaneous Failures

✓	Step	Action
	1	If PAs continue to give alarms, even after cycling power at the circuit breakers, then connect an MMI cable to the PA and set up a Hyperterminal connection (see Table 3-3 on page 3-11).
	2	Enter **ALARMS** in the Hyperterminal window. The resulting LMF display may provide an indication of the problem. (Call Field Support for further assistance.)

Bay Level Offset Calibration Failure

Perform the procedure in Table 6-8 to troubleshoot a BLO calibration failure.

NOTE

Only one carrier can be tested at a time. All PAs must be INS during testing. For the carriers not under test, key one BBX per carrier to a minimum power level. (Refer to Table 3-37).

Table 6-8: Troubleshooting BLO Calibration Failure

✓	Step	Action
	1	Verify the Power Meter is configured correctly (see the test equipment setup section in Chapter 3) and connection is made to the proper TX port.
	2	Verify the parameters in the bts–#.cdf file are set correctly for 800MHz: Bandclass=0; Freq_Band=8; SSType=8
	3	Verify that no PA is in alarm state (flashing red LED). Reset the PA by pulling the circuit breaker and, after 5 seconds, pushing back in.
	4	Re-calibrate the Power Meter and verify it is calibrated correctly with cal factors from the sensor head.
	5	Verify the GPIB adapter is not locked up. Under normal conditions, only two green LEDs must be 'ON' (Power and Ready). If any other LED is continuously 'ON', power-cycle (turn power off and on) the GPIB Box and retry.
	6	Verify the sensor head is functioning properly by checking it with the 1 mW (0 dBm) Power Ref signal.
	7	If communication between the LMF and Power Meter is operatonal, the Meter display will show "*RES*".

Cannot Load BLO

For Load BLO failures see Table 6-7.

Calibration Audit Failure

Follow the procedure in Table 6-9 to troubleshoot a calibration audit failure.

NOTE

Only one carrier can be tested at a time. All PAs must be INS during testing. For the carriers not under test, key one BBX per carrier to a minimum power level. (Refer to Table 3-37).

Table 6-9: Troubleshooting Calibration Audit Failure

✓	Step	Action
	1	Verify the Power Meter is configured correctly (refer to the test equipment setup section of Chapter 3).
	2	Re-calibrate the Power Meter and verify it is calibrated correctly with cal factors from the sensor head.
	3	Verify that no PA is in alarm state (rapidly flashing red LED). Reset the PA by pulling the circuit breaker and, after 5 seconds, pushing back in.
	4	Verify that no sensor head is functioning properly by checking it with the 1 mW (0 dBm) Power Ref signal.
	5	After calibration, the BLO data must be re-loaded to the BBXs before auditing. Click on the BBX(s) and select **Device>Download BLO**. Re-try the audit.
	6	Verify the GPIB adapter is not locked up. Under normal conditions, only two green LEDs must be “ON” (Power and Ready). If any other LED is continuously “ON”, power-cycle (turn power off and on) the GPIB Box and retry.

BTS passed Reduced ATP tests but has forward link problem during normal operation

Follow the procedure in Table 6-10 to troubleshoot a Forward Link problem during normal operation.

Table 6-10: Troubleshooting Forward Link Failure (BTS Passed Reduced ATP)

✓	Step	Action
	1	Perform these additional TX tests to troubleshoot a forward link problem: – TX mask – TX rho – TX code domain

Cannot Perform TX Mask Measurement

Follow the procedure in Table 6-11 to troubleshoot a TX mask measurement failure.

NOTE

Only one carrier can be tested at a time. All PAs must be INS during testing. For the carriers not under test, key one BBX per carrier to a minimum power level. (Refer to Table 3-37).

Table 6-11: Troubleshooting TX Mask Measurement Failure

✓	Step	Action
	1	Verify that TX audit passes for the BBX(s).
	2	If performing manual measurement, verify analyzer setup.
	3	Verify that no PA in the sector is in alarm state (flashing red LED). Re-set the PA by pulling the circuit breaker and, after 5 seconds, pushing it back in.

Cannot Perform Rho or Pilot Time Offset Measurement

Follow the procedure in Table 6-12 to troubleshoot a rho or pilot time offset measurement failure.

Table 6-12: Troubleshooting Rho and Pilot Time Offset Measurement Failure

✓	Step	Action
	1	Verify presence of RF signal by switching to spectrum analyzer screen.
	2	Verify PN offsets displayed on the analyzer is the same as the PN offset in the CDF file.

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Table 6-12: Troubleshooting Rho and Pilot Time Offset Measurement Failure

✓	Step	Action
	3	Re–load BBX data and repeat the test.
	4	If performing manual measurement, verify analyzer setup.
	5	Verify that no PA in the sector is in alarm state (flashing red LED). Reset the PA by pulling the circuit breaker and, after 5 seconds, pushing back in.
	6	If Rho value is unstable and varies considerably (e.g. .95,.92,.93), this may indicate that the GPS is still phasing (i.e., trying to reach and maintain 0 freq. error). Go to the freq. bar in the upper right corner of the Rho meter and select **Hz**. Press <Shift–avg> and enter **10**, to obtain an average Rho value. This is an indication the GPS has not stabilized before going *INS* and may need to be re-initialized.

Cannot Perform Code Domain Power and Noise Floor Measurement

Perform the procedure in Table 6-13 to troubleshoot a code domain and noise floor measurement failure.

Table 6-13: Troubleshooting Code Domain Power and Noise Floor Measurement Failure

✓	Step	Action
	1	Verify presence of RF signal by switching to spectrum analyzer screen.
	2	Verify PN offset displayed on analyzer is same as PN offset being used in the CDF file.
	3	Disable and re-enable MCC (one or more MCCs based on extent of failure).

Multi–FER Test Failure

Perform the procedure in Table 6-14 to troubleshoot a Multi–FER failure.

Table 6-14: Troubleshooting Multi-FER Failure

✓	Step	Action
	1	Verify the test equipment set up is correct for an FER test.
	2	Verify the test equipment is locked to 19.6608 and even second clocks. On the HP8921A test set, the yellow LED (REF UNLOCK) must be OFF.
	3	Verify the MCCs have been loaded with data and are INS–ACT.
	4	Disable and re-enable the MCC (one or more based on extent of failure).
	5	Disable, re-load code and data, and re-enable the MCC (one or more MCCs based on extent of failure).
	6	Verify the antenna connections to frame are correct based on the directions messages.

Problem Description

Many of the Clock Synchronization Manager (CSM) board failures may be resolved in the field before sending the boards to the factory for repair. This section describes known CSM problems identified in field returns, some of which are field-repairable. Check these problems before returning suspect CSM boards.

Intermittent 19.6608 MHz Reference Clock/GPS Receiver Operation

If having any problems with CSM board kit numbers, SGLN1145 or SGLN4132, check the suffix with the kit number. If the kit has version "AB", then replace with version "BC" or higher, and return model "AB" to the repair center.

No GPS Reference Source

Check the CSM boards for proper hardware configuration. CSM kit SGLN1145, in Slot l, has an on-board GPS receiver; while kit SGLN4132, in Slot 2, does not have a GPS receiver. Any incorrectly configured board *must* be returned to the repair center. *Do not attempt to change hardware configuration in the field.* Also, verify the GPS antenna is not damaged and is installed per recommended guidelines.

Checksum Failure

The CSM could have corrupted data in its firmware resulting in a non-executable code. The problem is usually caused by either electrical disturbance or interruption of data during a download. Attempt another download with no interruptions in the data transfer. Return the CSM board back to the repair center if the attempt to reload fails.

GPS Bad RX Message Type

This problem is believed to be caused by a later version of CSM software (3.5 or higher) being downloaded, via LMF, followed by an earlier version of CSM software (3.4 or lower), being downloaded from the CBSC. Download again with CSM software code 3.5 or higher. Return the CSM board back to the repair center if the attempt to reload fails.

CSM Reference Source Configuration Error

This problem is caused by incorrect reference source configuration performed in the field by software download. CSM kits SGLN1145 and SGLN4132 must have proper reference sources configured (as shown below) to function correctly.

CSM Kit No.	Hardware Configuration	CSM Slot No.	Reference Source Configuration	CDF Value
SGLN1145	With GPS Receiver	1	Primary = Local GPS Backup = HSO	0 2 or 18
SGLN4132	Without GPS Receiver	2	Primary = Remote GPS Backup = HSO	1 2 or 18

Takes Too Long for CSM to Come INS

This problem may be caused by a delay in GPS acquisition. Check the accuracy flag status and/or current position. Refer to the GSM system time/GPS and HSO verification section in Chapter 3. At least one satellite should be visible and tracked for the “surveyed” mode and four satellites should be visible and tracked for the “estimated” mode. Also, verify correct base site position data used in “surveyed” mode.

Introduction

The C–CCP backplane is a multi–layer board that interconnects all the C–CCP modules. The complexity of this board lends itself to possible improper diagnoses when problems occur.

Connector Functionality

The following connector overview describes the major types of backplane connectors along with the functionality of each. This information allows the CFE to:

- Determine which connector(s) is associated with a specific problem type.
- Isolate problems to a specific cable or connector.

Primary “A” and Redundant “B” Inter Shelf Bus Connectors

The 40 pin Inter Shelf Bus (ISB) connectors provide an interface bus from the master GLI to all other GLIs in the modem frame. Their basic function is to provide clock synchronization from the master GLI to all other GLIs in the frame.

The ISB also provides the following functions:

- Span line grooming when a single span is used for multiple cages.
- MMI connection to/from the master GLI to cell site modem.
- Interface between GLIs and the AMR (for reporting BTS alarms).

Span Line Connector

The 50–pin span line connector provides a primary and secondary (if used) span line interface to each GLI in the C–CCP shelf. The span line is used for MM/EMX switch control of the Master GLI and also all the BBX traffic.

Primary “A” and Redundant “B” Reference Distribution Module Input/Output

The Reference Distribution Module (RDM) connectors route the 3 MHz reference signals from the CSMs to the GLIs and all BBXs in the backplane. The signals are used to phase lock loop all clock circuits on the GLIs and BBX boards to produce precise clock and signal frequencies.

Power Input (Return A, B, and C connectors)

For –48 V configuration – Provides a –48 volt input for use by the power supply modules.

For +27 V configuration – Provides input for regulated +27 Volts.

Power Supply Interface

Each C–CCP power supply has a series of three different connectors to provide the needed inputs/outputs to the C–CCP backplane. These include a VCC/Ground input connector, a Harting style multiple pin interface, and a +15 V/Analog Ground output connector. The C–CCP Power Supplies convert +27 Volts to a regulated +15, +6.5, and +5.0 Volts to be used by the C–CCP shelf cards.

For –48V BTS only, the power supply modules convert –48 Volts to a regulated +27 Volts.

GLI Connector

This connector consists of a Harting 4SU digital connector and a 6–conductor coaxial connector for RDM distribution. The connectors provide inputs/outputs for the GLIs in the C–CCP backplane.

GLI 10Base–2 Ethernet “A” and “B” Connections

These BNC connectors are located on the C–CCP backplane and routed to the GLI board. This interface provides all the control and data communications between the master GLI and the other GLI, between gateways, and for the LMF on the LAN.

BBX Connector

Each BBX connector consists of a Harting 2SU/1SU digital connector and two 6–conductor coaxial connectors. These connectors provide DC, digital, and RF inputs/outputs for the BBXs in the C–CCP backplane.

MCIO Connectors

- RX RF antenna path signal inputs are routed through RX Tri–Filters (on the I/O plate), and via coaxial cables to the two MPC modules – the six “A” (main) signals go to one MPC; the six “B” (diversity) to the other. The MPC outputs the low–noise–amplified signals via the C–CCP backplane to the MCIO where the signals are split and sent to the appropriate BBX.
- A digital bus then routes the baseband signal through the BBX, to the backplane, then on to the MCC slots.
- Digital TX antenna path signals originate at the MCCs. Each output is routed from the MCC slot via the backplane appropriate BBX.
- TX RF path signal originates from the BBX, through the backplane to the MCIO, through the MCIO, and via multi-conductor coaxial cabling to the PAs in the PA shelf.

C–CCP Backplane Troubleshooting Procedure

Table 6-15 through Table 6-24 provide procedures for troubleshooting problems that appear to be related to a defective C–CCP backplane. The tables are broken down into possible problems and steps that should be taken in an attempt to find the root cause.

NOTE

IMPORTANT: Table 6-15 through Table 6-24 must be completed before replacing ANY C–CCP backplane.

Digital Control Problems

No GLI Control via LMF (all GLIs)

Follow the procedure in Table 6-15 to troubleshoot a GLI control via LMF failure.

Table 6-15: No GLI Control via LMF (all GLIs)

✓	Step	Action
	1	Check the 10Base–2 ethernet connector for proper connection, damage, shorts, or opens.
	2	Verify the C–CCP backplane Shelf ID DIP switch is set correctly.
	3	Visually check the master GLI connector (both board and backplane) for damage.
	4	Replace the master GLI with a known good GLI.

No GLI Control through Span Line Connection (All GLIs)

Follow the procedures in Table 6-16 and Table 6-17 to troubleshoot GLI control failures.

Table 6-16: No GLI Control through Span Line Connection (Both GLIs)

Step	Action
1	Verify the C–CCP backplane Shelf ID DIP switch is set correctly.
2	Verify that the BTS and GLIs are correctly configured in the OMCR/CBSC data base.
3	Visually check the master GLI connector (both board and backplane) for damage.
4	Replace the master GLI with a known good GLI.
5	Check the span line inputs from the top of the frame to the master GLI for proper connection and damage.
6	Check the span line configuration on the MGLI (see Table 5-4 on page 5-5).

Table 6-17: MGLI Control Good – No Control over Co–located GLI

Step	Action
1	Verify that the BTS and GLIs are correctly configured in the OMCR CBSC data base.
2	Check the 10Base–2 ethernet connector for proper connection, damage, shorts, or opens.
3	Visually check all GLI connectors (both board and backplane) for damage.
4	Replace the remaining GLI with a known good GLI.

6

No AMR Control (MGLI good)

Perform the procedure in Table 6-18 to troubleshoot an AMR control failure when the MGLI control is good.

Table 6-18: MGLI Control Good – No Control over AMR

Step	Action
1	Visually check the master GLI connector (both board and backplane) for damage.
2	Replace the master GLI with a known good GLI.
3	Replace the AMR with a known good AMR.

No BBX Control in the Shelf – (No Control over Co–located GLIs)

Perform the procedure in Table 6-19 to troubleshoot a BBX control in the shelf failure.

Table 6-19: No BBX Control in the Shelf – No Control over Co–located GLIs

Step	Action
1	Visually check all GLI connectors (both board and backplane) for damage.
2	Replace the remaining GLI with a known good GLI.
3	Visually check BBX connectors (both board and backplane) for damage.
4	Replace the BBX with a known good BBX.

No (or Missing) Span Line Traffic

Perform the procedure in Table 6-20 to troubleshoot a span line traffic failure.

Table 6-20: MGLI Control Good – No (or Missing) Span Line Traffic

Step	Action
1	Visually check all GLI connectors (both board and backplane) for damage.
2	Replace the remaining GLI with a known good GLI.
3	Visually check all span line distribution (both connectors and cables) for damage.
4	If the problem seems to be limited to one BBX, replace the MGLI with a known good MGLI.
5	Perform the BTS Span Parameter Configuration (see Table 5-4 on page 5-5).
6	Ensure that ISB cabling is correct.

No (or Missing) MCC Channel Elements

Perform the procedure in Table 6-21 to troubleshoot a channel elements failure.

Table 6-21: No MCC Channel Elements	
Step	**Action**
1	Verify CEs on a co–located MCC (MCC24 TYPE=2).
2	If the problem seems to be limited to one MCC, replace the MCC with a known good MCC. – Check connectors (both board and backplane) for damage.
3	If no CEs on any MCC: – Verify clock reference to MCIO.
4	Check the CDF for MCCTYPE=2 (MCC24E); MCCTYPE=0 (MCC8E) or MCCTYPE=3 (MCC–1X)

DC Power Problems

Perform the procedure in Table 6-22 to troubleshoot a DC input voltage to power supply module failure.

WARNING

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

6

No DC Input Voltage to Power Supply Module

Table 6-22: No DC Input Voltage to Power Supply Module

Step	Action
1	Verify DC power is applied to the BTS frame.
2	Verify there are no breakers tripped. *** IMPORTANT** If a breaker has tripped, remove all modules from the applicable shelf supplied by the breaker and attempt to reset it. – If the breaker trips again, there is probably a cable or breaker problem within the frame. – If the breaker does not trip, there is probably a defective module or sub–assembly within the shelf.
3	Verify that the C–CCP shelf breaker on the BTS frame breaker panel is functional.
4	Use a voltmeter to determine if the input voltage is being routed to the C–CCP backplane by measuring the DC voltage level on the PWR_IN cable. – If the voltage is not present, there is probably a cable or breaker problem within the frame. – If the voltage is present at the connector, reconnect and measure the level at the "VCC" power feed clip on the distribution backplane. – If the voltage is correct at the power clip, inspect the clip for damage.
5	*–48 V configuration only* – If everything appears to be correct, visually inspect the power supply module and verify LEDs are green.
6	*–48 V configuration only* – If LED is red, then replace the power suppy module with a known good module and verify LEDs are green.
7	If steps 1 through 5 fail to indicate a problem, a C–CCP backplane failure (possibly an open trace) has occurred.

6

No DC Voltage (+5, +6.5, or +15 Volts) to a Specific GLI, BBX, or Switchboard

Perform the procedure in Table 6-23 to troubleshoot a DC input voltage to GLI, BBX, or Switchboard failure.

Table 6-23: No DC Input Voltage to any C–CCP Shelf Module

Step	Action
1	Verify the steps in Table 6-22 have been performed.
2	Inspect the defective board/module (both board and backplane) connector for damage.
3	Replace suspect board/module with known good board/module.

TX and RX Signal Routing Problems

Perform the procedure in Table 6-24 to troubleshoot TX and RX signal routing problems.

Table 6-24: TX and RX Signal Routing Problems	
Step	**Action**
1	Inspect all Harting Cable connectors and back–plane connectors for damage in all the affected board slots.
2	Perform steps in the RF path troubleshooting flowchart in this manual.

Span Problems (No Control Link)

Perform the procedure in Table 6-25 to troubleshoot a control link failure.

Table 6-25: Troubleshoot Control Link Failure

✓	Step	Action
	1	Connect the CDMA LMF computer to the MMI port on the applicable MGLI/GLI as shown in Figure 6-1 or Figure 6-2.
	2	Start an MMI communication session with the applicable MGLI/GLI by using the Windows desktop shortcut icon.
	3	Once the connection window opens, press the CDMA LMF computer Enter key until the `GLI` prompt is obtained.
	4	At the `GLI` prompt, enter: **config ni current <cr>** (equivalent of `span view` command) The system will respond with a display similar to the following: `The frame format in flash is set to use T1_2.` `Equalization:` `Span A – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `Span B – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `Span C – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `Span D – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `Span E – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `Span F – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `Linkspeed: Default (56K for T1 D4 AMI, 64K otherwise)` `Currently, the link is running at the default rate` `The actual rate is 0` **NOTE** Defaults for span equalization are 0–131 feet for T1/J1 spans and 120 Ohm for E1. Default linkspeed is 56 kbps for T1 D4 AMI spans and 64 kbps for all other types. There is no need to change from defaults unless the OMC–R/CBSC span configuration requires it.
	5	The span configurations loaded in the GLI must match those in the OMCR/CBSC database for the BTS. If they do not, proceed to Table 6-26.
	6	Repeat steps 1 through 5 for all remaining GLIs.
	7	If the span settings are correct, verify the edlc parameters using the `show` command. Any alarm conditions indicate that the span is not operating correctly. • Try looping back the span line from the DSX panel back to the MM, and verify that the looped signal is good. • Listen for control tone on the appropriate timeslot from the Base Site and MM.

Table 6-25: Troubleshoot Control Link Failure		
✓	Step	Action
	8	Exit the GLI MMI session and HyperTerminal connection by selecting **File** from the connection window menu bar, and then **Exit** from the dropdown menu.
	9	If no TCHs in groomed MCCs (or in whole SCCP shelf) can process calls, verify that the ISB cabling is correct and that ISB A and ISB B cables are not swapped.

Figure 6-1: GLI2 Board MMI Connection Detail

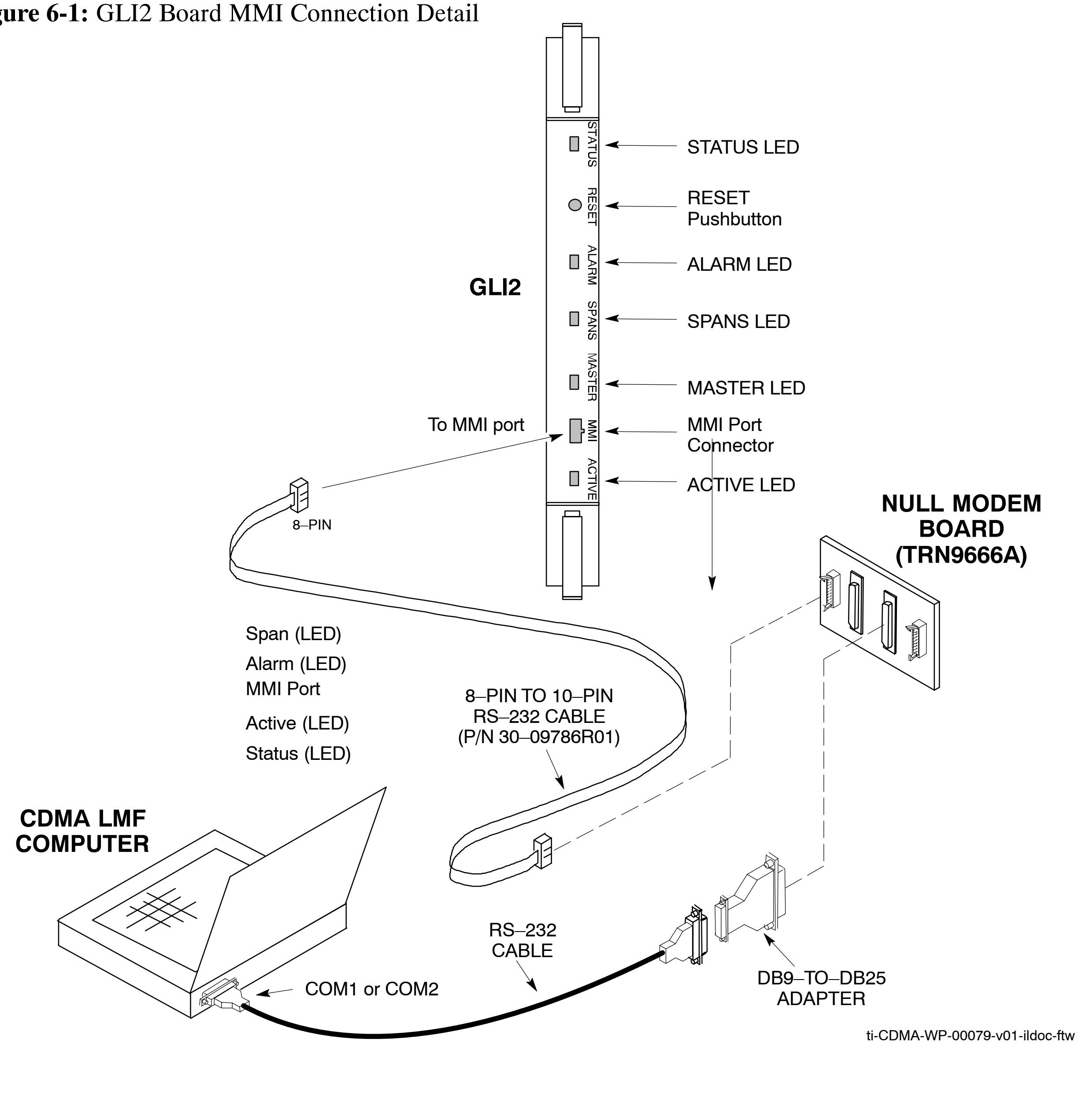

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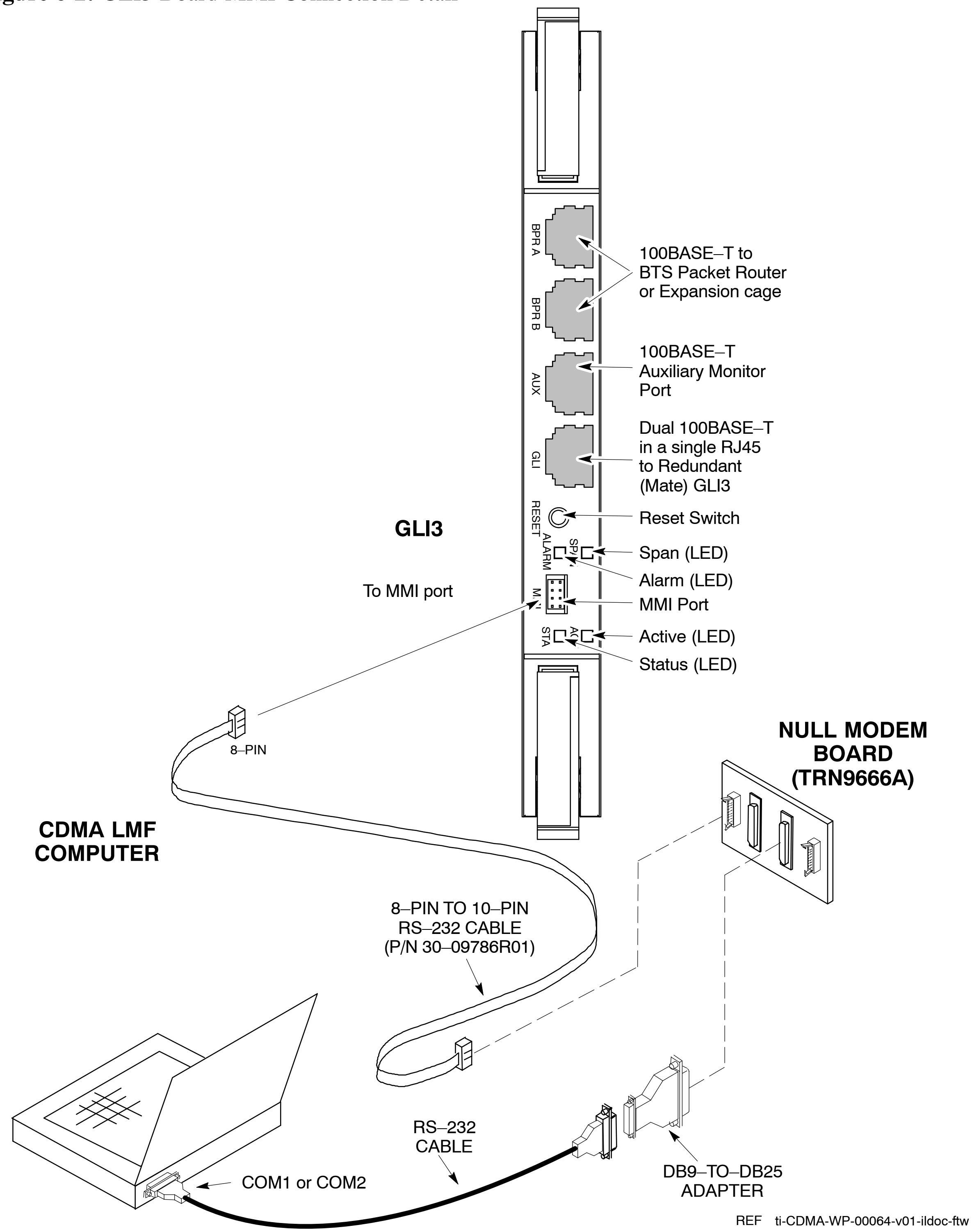
Figure 6-2: GLI3 Board MMI Connection Detail



Set BTS Site Span Configuration

Perform the procedure in Table 6-26 to set the span parameter configuration.

NOTE

IMPORTANT: Perform the following procedure *ONLY* if span configurations loaded in the MGLI/GLIs do not match those in the OMCR/CBSC data base, *AND ONLY* when the exact configuration data is available. Loading incorrect span configuration data will render the site inoperable.

<table>
<tr><th colspan="3">Table 6-26: Set BTS Span Parameter Configuration</th></tr>
<tr><th>✓</th><th>Step</th><th>Action</th></tr>
<tr><td></td><td>1</td><td>If not previously done, connect the CDMA LMF computer to the MMI port on the applicable MGLI/GLI as shown in Figure 6-1.</td></tr>
<tr><td></td><td>2</td><td>If there is no MMI communication session in progress with the applicable MGLI/GLI, initiate one by using the Windows desktop shortcut icon.</td></tr>
<tr><td></td><td>3</td><td>At the GLI prompt, enter:
config ni format <<i>option</i>> <cr>
The terminal will display a response similar to the following:<pre>COMMAND SYNTAX: config ni format option
Next available options:
   LIST –   option : Span Option
                 E1_1 : E1_1 – E1 HDB3 CRC4   no TS16
                 E1_2 : E1_2 – E1 HDB3 no CRC4 no TS16
                 E1_3 : E1_3 – E1 HDB3 CRC4   TS16
                 E1_4 : E1_4 – E1 HDB3 no CRC4 TS16
                 T1_1 : T1_1 – D4, AMI, No ZCS
                 T1_2 : T1_2 – ESF, B8ZS
                 J1_1 : J1_1 – ESF, B8ZS (Japan) – Default
                 J1_2 : J1_2 – ESF, B8ZS
                 T1_3 : T1_3 – D4, AMI, ZCS
></pre>NOTE
With this command, all active (in–use) spans will be set to the same format.</td></tr>
<tr><td></td><td>4</td><td>To set or change the span type, enter the correct option from the list at the entry prompt (>), as shown in the following example:
> T1_2 <cr>
NOTE
The entry is case–sensitive and must be typed exactly as it appears in the list. If the entry is typed incorrectly, a response similar to the following will be displayed:<pre>CP: Invalid command
GLI></pre></td></tr>
</table>

. . . continued on next page

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Table 6-26: Set BTS Span Parameter Configuration		
✓	Step	Action
	5	An acknowledgement similar to the following will be displayed: `The value has been programmed. It will take effect after the next re-set.` `GLI>`
	6	If the current MGLI/GLI span rate must be changed, enter the following MMI command: **config ni linkspeed <cr>** The terminal will display a response similar to the following: `Next available options:` `LIST – linkspeed : Span Linkspeed` `56K : 56K (default for T1_1 and T1_3 systems)` `64K : 64K (default for all other span configurations)` `>` **NOTE** With this command, all active (in–use) spans will be set to the same linkspeed.
	7	To set or change the span linkspeed, enter the required option from the list at the entry prompt (>), as shown in the following example: > **64K <cr>** **NOTE** The entry is case–sensitive and must be typed *exactly* as it appears in the list. If the entry is typed incorrectly, a response similar to the following will be displayed: `CP: Invalid command` `GLI>`
	8	An acknowledgement similar to the following will be displayed: `The value has been programmed. It will take effect after the next re-set.` `GLI>`

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Table 6-26: Set BTS Span Parameter Configuration

✓	Step	Action
	9	If the span equalization must be changed, enter the following MMI command: **config ni equal <cr>** The terminal will display a response similar to the following: `COMMAND SYNTAX: config ni equal span equal` `Next available options:` `LIST – span : Span` `a : Span A` `b : Span B` `c : Span C` `d : Span D` `e : Span E` `f : Span F` `>`
	10	At the entry prompt (>), enter the designator from the list for the span to be changed as shown in the following example: > **a <cr>** The terminal will display a response similar to the following: `COMMAND SYNTAX: config ni equal a equal` `Next available options:` `LIST – equal : Span Equalization` `0 : 0–131 feet (default for T1/J1)` `1 : 132–262 feet` `2 : 263–393 feet` `3 : 394–524 feet` `4 : 525–655 feet` `5 : LONG HAUL` `6 : 75 OHM` `7 : 120 OHM (default for E1)` `>`
	11	At the entry prompt (>), enter the code for the required equalization from the list as shown in the following example: > **0 <cr>** The terminal will display a response similar to the following: `> 0` `The value has been programmed. It will take effect after the next re-set.` `GLI>`
	12	Repeat steps 9 through 11 for each in–use span.

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Table 6-26: Set BTS Span Parameter Configuration		
✓	Step	Action
	13	**NOTE** After executing the **config ni format**, **config ni linkspeed**, and/or **config ni equal** commands, the affected MGLI/GLI board *MUST* be reset and reloaded for changes to take effect. Although defaults are shown, *always* consult site specific documentation for span type and linkspeed used at the site. Press the RESET button on the MGLI/GLI for changes to take effect.
	14	Once the MGLI/GLI has reset, execute the following command to verify span settings are as required: **config ni current <cr>** (equivalent of `span view` command) The system will respond with a display similar to the following: `The frame format in flash is set to use T1_2.` `Equalization:` `Span A – 0–131 feet` `Span B – 0–131 feet` `Span C – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `Span D – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `Span E – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `Span F – Default (0–131 feet for T1/J1, 120 Ohm for E1)` `Linkspeed: 64K` `Currently, the link is running at 64K` `The actual rate is 0`
	15	If the span configuration is not correct, perform the applicable step from this table to change it and repeat steps 13 and 14 to verify required changes have been programmed.
	16	Return to step 6 of Table 6-25.

Module Status Indicators

Each of the non-passive plug-in modules has a bi-color (green & red) LED status indicator located on the module front panel. The indicator is labeled PWR/ALM. If both colors are turned on, the indicator is yellow.

Each plug-in module, except for the fan module, has its own alarm (fault) detection circuitry that controls the state of the PWR/ALM LED.

The fan TACH signal of each fan module is monitored by the AMR. Based on the status of this signal, the AMR controls the state of the PWR/ALM LED on the fan module.

LED Status Combinations for All Modules (except GLI, CSM, BBX, MCC)

PWR/ALM LED

The following list describes the states of the module status indicator.

- Solid GREEN – module operating in a normal (fault free) condition.
- Solid RED – module is operating in a fault (alarm) condition due to electrical hardware failure.

Note that a fault (alarm) indication may or may not be due to a complete module failure and normal service may or may not be reduced or interrupted.

DC/DC Converter LED Status Combinations

The PWR CNVTR has alarm (fault) detection circuitry that controls the state of the PWR/ALM LED. This is true for both the C–CCP and PA power converters.

PWR/ALM LED

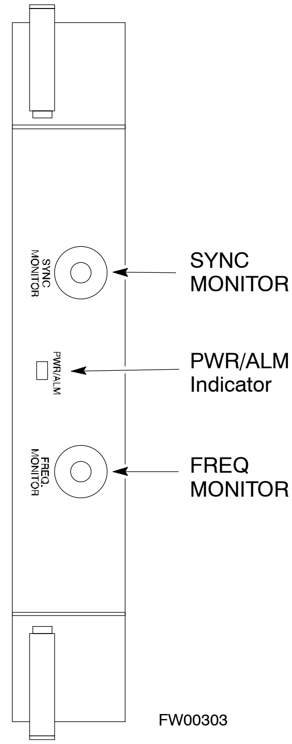
The following list describes the states of the bi-color LED.

- Solid GREEN – module operating in a normal (fault free) condition.
- Solid RED – module is operating in a fault (alarm) condition due to electrical hardware problem.

CSM LED Status Combinations

The CSMs include on-board alarm detection. Hardware and software/firmware alarms are indicated via the front panel indicators (see Figure 6-3).

Figure 6-3: CSM Front Panel Indicators & Monitor Ports



PWR/ALM LED

After the memory tests, the CSM loads OOS–RAM code from the Flash EPROM, if available. If not available, the OOS–ROM code is loaded from the Flash EPROM.

- Solid GREEN – module is INS_ACT or INS_STBY no alarm.
- Solid RED – Initial power up or module is operating in a fault (alarm) condition.
- Slowly Flashing GREEN – OOS_ROM no alarm.
- Long RED/Short GREEN – OOS_ROM alarm.
- Rapidly Flashing GREEN – OOS_RAM no alarm or INS_ACT in DUMB mode.
- Short RED/Short GREEN – OOS_RAM alarm.
- Long GREEN/Short RED – INS_ACT or INS_STBY alarm.
- Off – no DC power or on-board fuse is open.
- Solid YELLOW – After a reset, the CSMs begin to boot. During SRAM test and Flash EPROM code check, the LED is yellow. (If SRAM or Flash EPROM fail, the LED changes to a solid RED and the CSM attempts to reboot.)

FREQ Monitor Connector

A test port provided at the CSM front panel via a BNC receptacle allows monitoring of the 19.6608 MHz clock generated by the CSM. When both CSM 1 and CSM 2 are in an in-service (INS) condition, the CSM 2 clock signal frequency is the same as that output by CSM 1.

The clock is a sine wave signal with a minimum amplitude of +2 dBm (800 mVpp) into a 50 Ω load connected to this port.

SYNC Monitor Connector

A test port provided at the CSM front panel via a BNC receptacle allows monitoring of the "Even Second Tick" reference signal generated by the CSMs.

At this port, the reference signal is a TTL active high signal with a pulse width of 153 nanoseconds.

MMI Connector

Only accessible behind front panel. The RS–232 MMI port connector is intended to be used primarily in the development or factory environment, but may be used in the field for debug/maintenance purposes.

GLI LED Status Combinations

NOTE

GLIs may be GLI2 or GLI3. Either supports the 1X SC™4812T–MC BTS.

GLI

The GLI module has indicators, controls and connectors as described below and shown in Table 6-27 (GLI2) and Table 6-28 (GLI3).

The operating states of the LEDs are:

ACTIVE

Solid GREEN – GLI is active. This means that the GLI has shelf control and is providing control of the digital interfaces.

Off – GLI is not active (i.e., Standby). The mate GLI should be active.

MASTER (not on GLI3)

- Solid GREEN – GLI is Master (sometimes referred to as MGLI).
- Off – GLI is non-master (i.e., Slave).

ALARM

- Solid RED – GLI is in a fault condition or in reset.
- While in reset transition, STATUS LED is OFF while GLI is performing ROM boot (about 12 seconds for normal boot).
- While in reset transition, STATUS LED is ON while GLI is performing RAM boot (about 4 seconds for normal boot).
- Off – No Alarm.

STATUS

- Flashing GREEN– GLI is in service (INS), in a stable operating condition.
- On – GLI is in OOS RAM state operating downloaded code.
- Off – GLI is in OOS ROM state operating boot code.

SPANS

- Solid GREEN – Span line is connected and operating.
- Solid RED – Span line is disconnected or a fault condition exists.

GLI Pushbuttons and Connectors

RESET Pushbutton – Depressing the RESET pushbutton causes a partial reset of the CPU and a reset of all board devices. The GLI2 is placed in the OOS_ROM state

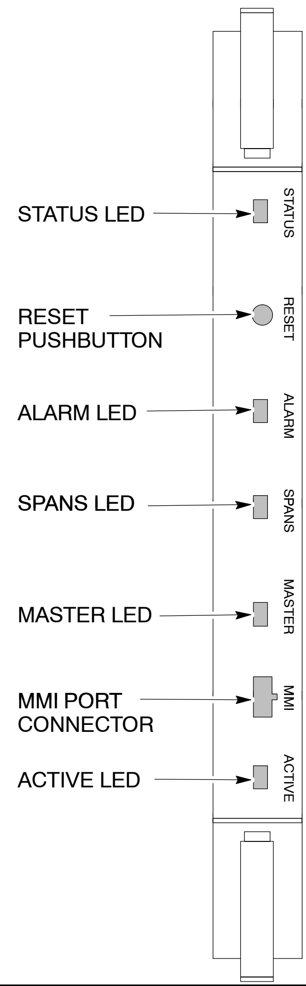
MMI Connector – The RS–232MMI port connector is intended to be used primarily in the development or factory environment but may be used in the field for debug/maintenance purposes.

LAN Connectors (A & B) – The two 10BASE2 Ethernet circuit board mounted BNC connectors are located on the bottom front edge of the GLI2; one for each LAN interface, A & B. Ethernet cabling is connected to tee connectors fastened to these BNC connectors.

GLI2 Front Panel

Table 6-27 shows the front panel of the GLI2 card and includes a description of the components.

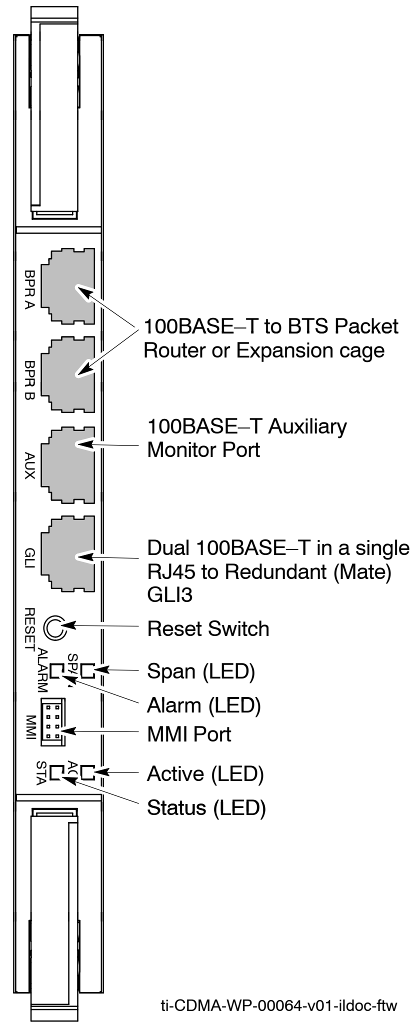
Table 6-27: GLI2 Front Panel

LED	Operating Status	Diagram
STATUS	OFF – operating normally ON – briefly during power-up when the Alarm LED turns OFF SLOW GREEN – when the GLI2 is INS (in-service)	
RESET	Pressing and releasing the switch resets all functions on the GLI2.	
ALARM	OFF – operating normally ON – briefly during power-up when the Alarm LED turns OFF SLOW GREEN – when the GLI2 is INS (in-service)	
SPANS	OFF – card is powered down, in initialization, or in standby GREEN – operating normally YELLOW – one or more of the equipped initialized spans is receiving a remote alarm indication signal from the far end RED – one or more of the equipped initialized spans is in an alarm state	
MASTER	The pair of GLI2 cards include a redundant status. The card in the top shelf is designated by hardware as the active card; the card in the bottom shelf is in the standby mode. ON – operating normally in active card OFF – operating normally in standby card	
MMI	An RS-232, serial, asynchronous communications link for use as an MMI port. This port supports 300 baud, up to a maximum of 115,200 baud communications.	
ACTIVE	Shows the operating status of the redundant cards. The redundant card toggles automatically if the active card is removed or fails ON – active card operating normally OFF – standby card operating normally	

GLI3 Front Panel

Table 6-28 shows the front panel of the GLI3 card and includes a description of the components.

Table 6-28: GLI3 Front Panel

LED	Operating Status	Diagram
BPR A	Connects to either a BPR or expansion cage and is wired as an ethernet client.	
BPR B	Connects to either a BPR or expansion cage and is wired as an ethernet client.	
AUX	Wired as an ethernet client for direct connection to a personal computer with a standard ethernet cable. It allows connection of ethernet "sniffer" when the ethernet switch is properly configured for port monitoring.	
GLI	Supports the cross–coupled ethernet circuits to the mate GLI using a double crossover cable.	
RESET	Pressing and releasing the switch resets all functions on the GLI3.	
ALARM	OFF – operating normally ON – briefly during power-up when the Alarm LED turns OFF SLOW GREEN – when the GLI3 is INS (in-service)	
SPAN	OFF – card is powered down, in initialization, or in standby GREEN – operating normally YELLOW – one or more of the equipped initialized spans is receiving a remote alarm indication signal from the far end RED – one or more of the equipped initialized spans is in an alarm state	
MMI	An RS-232, serial, asynchronous communications link for use as an MMI port. This port supports 300 baud, up to a maximum of 115,200 baud communications.	
STATUS	OFF – operating normally ON – briefly during power-up when the Alarm LED turns OFF SLOW GREEN – when the GLI3 is INS (in-service)	
ACTIVE	Shows the operating status of the redundant cards. The redundant card toggles automatically if the active card is removed or fails ON – active card operating normally OFF – standby card operating normally	

BBX LED Status Combinations

PWR/ALM LED

The BBX module has its own alarm (fault) detection circuitry that controls the state of the PWR/ALM LED.

The following list describes the states of the bi-color LED:

- Solid GREEN – INS_ACT no alarm
- Solid RED Red – initializing or power-up alarm
- Slowly Flashing GREEN – OOS_ROM no alarm
- Long RED/Short GREEN – OOS_ROM alarm
- Rapidly Flashing GREEN – OOS_RAM no alarm

- Short RED/Short GREEN – OOS_RAM alarm
- Long GREEN/Short RED – INS_ACT alarm

PA Shelf LED Status Combinations

PA Module LED

Each PA module contains a bi–color LED just above the MMI connector on the front panel of the module. Interpret this LED as follows:

- GREEN — PA module is active and is reporting no alarms (Normal condition).
- Flashing GREEN/RED — PA module is active but is reporting an low input power condition. If no BBX is keyed, this is normal and does not constitute a failure.

MCC LED Status Combinations

The MCC module has LED indicators and connectors as described below (see Figure 6-4). Note that the figure does not show the connectors as they are concealed by the removable lens.

The LED indicators and their states are as follows:

PWR/ALM LED

- RED – fault on module

ACTIVE LED

- Off – module is inactive, off-line, or not processing traffic.
- Slowly Flashing GREEN – OOS_ROM no alarm.
- Rapidly Flashing Green – OOS_RAM no alarm.
- Solid GREEN – module is INS_ACT, on-line, processing traffic.

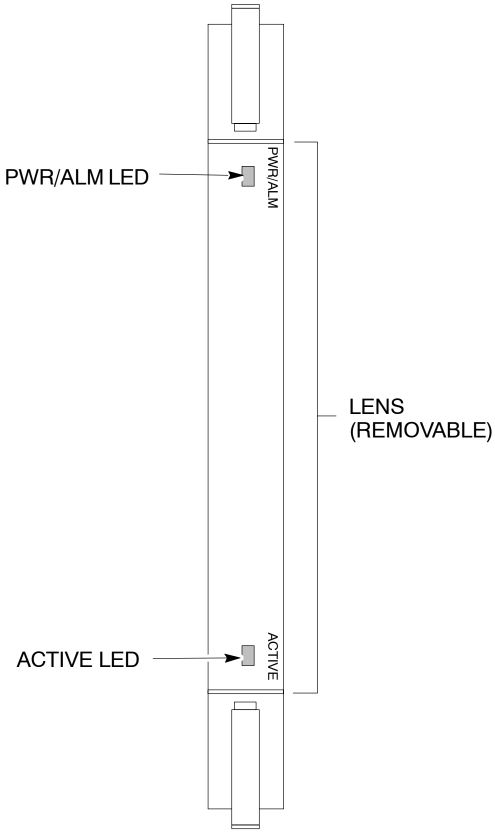
PWR/ALM and ACTIVE LEDs

- Solid RED – module is powered but is in reset or the BCP is inactive.

MMI Connectors

- The RS–232 MMI port connector (four-pin) is intended to be used primarily in the development or factory environment but may be used in the field for debugging purposes.
- The RJ–11 ethernet port connector (eight-pin) is intended to be used primarily in the development environment but may be used in the field for high data rate debugging purposes.

Figure 6-4: MCC Front Panel



LED	COLOR	OPERATING STATUS
PWR/ALM	RED	**OFF – operating normally** **ON – briefly during power-up and during failure conditions** ***An alarm is generated in the event of a failure***
ACTIVE	GREEN	**RAPIDLY BLINKING – Card is code-loaded but not enabled** **SLOW BLINKING – Card is not code-loaded** **ON – card is code-loaded and enabled (INS_ACTIVE)**
	RED	**ON – fault condition** **SLOW FLASHING (alternating with green) – CHI bus inactive on power-up**

6

Appendix A: Chapter Title Goes Here

Appendix Content

THIS IS A SPECIAL APPENDIX TOC.
THIS APPENDIX TOC MUST BE USED FOR APPENDIX A.
AUTONUMBER STREAMS ARE RESET HERE.

DO NOT USE THIS APPENDIX TOC FOR ANY OTHER APPENDIX.

Notes

Optimization (Pre–ATP) Data Sheets for Multi–Carrier

Verification of Test Equipment Used

Table A-1: Verification of Test Equipment Used

Manufacturer	Model	Serial Number

Comments: ______________________________

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Site Checklist

Table A-2: Site Checklist

OK	Parameter	Specification	Comments
❑	Deliveries	Per established procedures	
❑	Floor Plan	Verified	
	Inter Frame Cables:		
❑	Ethernet	Per procedure	
❑	Frame Ground	Per procedure	
❑	Power	Per procedure	
	Factory Data:		
❑	BBX	Per procedure	
❑	Test Panel	Per procedure	
❑	Site Temperature		
❑	Dress Covers/Brackets		

Comments: ____________________

Preliminary Operations

Table A-3: Preliminary Operations

OK	Parameter	Specification	Comments
❑	Shelf ID Dip Switches	Per site equipage	
❑	BBX Jumpers	Verified per procedure	
❑	Ethernet LAN verification	Verified per procedure	

Comments: ____________________

Pre–Power and Initial Power Tests

Table A-4: Pre–power Checklist

OK	Parameter	Specification	Comments
❑	Pre–power–up tests	Verify power supply output voltage at the top of each BTS frame is within specifications	
	Internal Cables:		
❑	ISB (all cages)	verified	
❑	CSM (all cages)	verified	
❑	Power (all cages)	verified	
	Ethernet Connectors		
❑	LAN A ohms	verified	
❑	LAN B ohms	verified	
❑	LAN A shield	isolated	
❑	LAN B shield	isolated	
❑	Ethernet Boots	installed	
❑	Air Impedance Cage (single cage)	installed	
❑	Initial power–up tests	Verify power supply output voltage at the top of each BTS frame is within specifications:	

Comments: ________________________________

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General Optimization Checklist

Table A-5: Pre–power Checklist

OK	Parameter	Specification	Comments
❑	LEDs	illuminated	
❑	Frame fans	operational	
	LMF to BTS Connection		
❑	Preparing the LMF	per procedure	
❑	Log into the LMF PC	per procedure	
❑	Create site specific BTS directory	per procedure	
❑	Create master–bts–cdma directory	per procedure	
❑	Download device loads	per procedure	
❑	Moving/Linking files	per procedure	
❑	Ping LAN A	per procedure	
❑	Ping LAN B	per procedure	
❑	Download/Enable MGLIs	per procedure	
❑	Download/Enable GLIs	per procedure	
❑	Set Site Span Configuration	per procedure	
❑	Download CSMs	per procedure	
❑	Download	per procedure	
❑	Enable CSMs	per procedure	
❑	Download/Enable MCCs	per procedure	
❑	Download BBXs	per procedure	
❑	Test Set Calibration	per procedure	

Comments: ______________________________________

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GPS Receiver Operation

Table A-6: GPS Receiver Operation

OK	Parameter	Specification	Comments
❑	GPS Receiver Control Task State: **tracking satellites**	Verify parameter	
❑	Initial Position Accuracy:	Verify Estimated or Surveyed	
❑	Current Position: **lat** **lon** **height**	RECORD in ms and cm also convert to deg min sec	
❑	Current Position: satellites tracked Estimated: **(>4) satellites tracked,(>4) satellites visible** Surveyed: **(≥1) satellite tracked,(>4) satellites visible**	Verify parameter as appropriate:	
❑	GPS Receiver Status:Current Dilution of Precision (PDOP or HDOP): **(<30)**	Verify parameter	
❑	Current reference source: **Number: 0; Status: Good; Valid: Yes**	Verify parameter	

Comments: ______________________________

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PA IM Reduction

Table A-7: PA IM Reduction – TX Filter

OK	PA #	Carrier		Specification	Comments
		3–Sector	6–Sector		
❑	1A	C1	C1	No Alarms	
❑	1B	C1	C1	No Alarms	
❑	1C	C1	C1	No Alarms	
❑	1D	C1	C1	No Alarms	
❑	2A	C2	C2	No Alarms	
❑	2B	C2	C2	No Alarms	
❑	2C	C2	C2	No Alarms	
❑	2D	C2	C2	No Alarms	
❑	3A	C3	C1	No Alarms	
❑	3B	C3	C1	No Alarms	
❑	3C	C3	C1	No Alarms	
❑	3D	C3	C1	No Alarms	
❑	4A	C4	C2	No Alarms	
❑	4B	C4	C2	No Alarms	
❑	4C	C4	C2	No Alarms	
❑	4D	C4	C2	No Alarms	

Comments: ____________________

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PA Convergence

Table A-8: PA Convergence (Multicarrier grouping)

OK	PA # Converged	Specification	Data
❑	1A	Verify per procedure & upload convergence data	
❑	2A		
❑	3A		
❑	4A		
❑	1B	Verify per procedure & upload convergence data	
❑	2B		
❑	3B		
❑	4B		
❑	1C	Verify per procedure & upload convergence data	
❑	2C		
❑	3C		
❑	4C		
❑	1D	Verify per procedure & upload convergence data	
❑	2D		
❑	3D		
❑	4D		

Comments: ____________________________________

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TX Bay Level Offset/Power Output Verification for 3–Sector Configurations
1–Carrier
2–Carrier Non–adjacent Channels
4–Carrier Non–adjacent Channels

Table A-9: TX BLO Calibration (3–Sector: 1; 2; and 4–Carrier Non–adjacent Channels)

OK	Parameter	Specification	Comments
❑	Calibrate carrier 1	TX Bay Level Offset = 40 dB +/– 5 for 800 MHz 35 dB +/–5 for 1.9 GHz prior to calibration	BBX–1, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–2, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–3, ANT–3 = ____dB BBX–r, ANT–3 = ____dB
❑	Calibrate carrier 2	TX Bay Level Offset = 40 dB +/– 5 for 800 MHz 35 dB +/–5 for 1.9 GHz prior to calibration	BBX–7, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–8, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–9, ANT–3 = ____dB BBX–r, ANT–3 = ____dB
❑	Calibrate carrier 3	TX Bay Level Offset = 40 dB +/– 5 for 800 MHz 35 dB +/–5 for 1.9 GHz prior to calibration	BBX–4, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–5, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–6, ANT–3 = ____dB BBX–r, ANT–3 = ____dB
❑	Calibrate carrier 4	TX Bay Level Offset = 40 dB +/– 5 for 800 MHz 35 dB +/–5 for 1.9 GHz prior to calibration	BBX–10, ANT–1 = ___dB BBX–r, ANT–1 = ____dB
❑			BBX–11, ANT–2 = ___dB BBX–r, ANT–2 = ____dB
❑			BBX–12, ANT–3 = ___dB BBX–r, ANT–3 = ____dB
❑	Calibration Audit carrier 1	TX Bay Level Offset = 40 dB +/– 5 for 800 MHz 35 dB +/–5 for 1.9 GHz prior to calibration	BBX–1, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–2, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–3, ANT–3 = ____dB BBX–r, ANT–3 = ____dB

. . . continued on next page

Table A-9: TX BLO Calibration (3–Sector: 1; 2; and 4–Carrier Non–adjacent Channels)			
OK	**Parameter**	**Specification**	**Comments**
❑	Calibration Audit carrier 2	0 dB (±1.5 dB) for gain set resolution post calibration	BBX–7, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–8, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–9, ANT–3 = ____dB BBX–r, ANT–3 = ____dB
❑	Calibration Audit carrier 3	0 dB (±1.5 dB) for gain set resolution post calibration	BBX–4, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–5, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–6, ANT–3 = ____dB BBX–r, ANT–3 = ____dB
❑	Calibration Audit carrier 4	0 dB (±1.5 dB) for gain set resolution post calibration	BBX–10, ANT–1 = ___dB BBX–r, ANT–1 = ____dB
❑			BBX–11, ANT–2 = ___dB BBX–r, ANT–2 = ____dB
❑			BBX–12, ANT–3 = ___dB BBX–r, ANT–3 = ____dB

Comments: ____

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2–Carrier Adjacent Channel

Table A-10: TX Bay Level Offset Calibration (3–Sector: 2–Carrier Adjacent Channels)

OK	Parameter	Specification	Comments
❑	Calibrate carrier 1	TX Bay Level Offset = 40 dB +/– 5 for 800 MHz 35 dB +/–5 for 1.9 GHz prior to calibration	BBX–1, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–2, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–3, ANT–3 = ____dB BBX–r, ANT–3 = ____dB
❑	Calibrate carrier 2	TX Bay Level Offset = 40 dB +/– 5 for 800 MHz 35 dB +/–5 for 1.9 GHz prior to calibration	BBX–7, ANT–4 = ____dB BBX–r, ANT–4 = ____dB
❑			BBX–8, ANT–5 = ____dB BBX–r, ANT–5 = ____dB
❑			BBX–9, ANT–6 = ____dB BBX–r, ANT–6 = ____dB
❑	Calibration Audit carrier 1	0 dB (±1.5 dB) for gain set resolution post calibration	BBX–1, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–2, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–3, ANT–3 = ____dB BBX–r, ANT–3 = ____dB
❑	Calibration Audit carrier 2	0 dB (±1.5 dB) for gain set resolution post calibration	BBX–7, ANT–4 = ____dB BBX–r, ANT–4 = ____dB
❑			BBX–8, ANT–5 = ____dB BBX–r, ANT–5 = ____dB
❑			BBX–9, ANT–6 = ____dB BBX–r, ANT–6 = ____dB

Comments: ________________________________

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3–Carrier Adjacent Channels
4–Carrier Adjacent Channels

Table A-11: TX Bay Level Offset Calibration (3–Sector: 3 or 4–Carrier Adjacent Channels)

OK	Parameter	Specification	Comments
❑	Calibrate carrier 1	TX Bay Level Offset = 40 dB +/– 5 for 800 MHz 35 dB +/–5 for 1.9 GHz prior to calibration	BBX–1, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–2, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–3, ANT–3 = ____dB BBX–r, ANT–3 = ____dB
❑	Calibrate carrier 2	TX Bay Level Offset = 40 dB +/– 5 for 800 MHz 35 dB +/–5 for 1.9 GHz prior to calibration	BBX–7, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–8, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–9, ANT–3 = ____dB BBX–r, ANT–3 = ____dB
❑	Calibrate carrier 3	TX Bay Level Offset = 40 dB +/– 5 for 800 MHz 35 dB +/–5 for 1.9 GHz prior to calibration	BBX–4, ANT–4 = ____dB BBX–r, ANT–4 = ____dB
❑			BBX–5, ANT–5 = ____dB BBX–r, ANT–5 = ____dB
❑			BBX–6, ANT–6 = ____dB BBX–r, ANT–6 = ____dB
❑	Calibrate carrier 4	TX Bay Level Offset = 40 dB +/– 5 for 800 MHz 35 dB +/–5 for 1.9 GHz prior to calibration	BBX–10, ANT–4 = ___dB BBX–3, ANT–4 = ____dB
❑			BBX–11, ANT–5 = ___dB BBX–r, ANT–5 = ____dB
❑			BBX–12, ANT–6 = ___dB BBX–r, ANT–6 = ____dB
❑	Calibration Audit carrier 1	0 dB (±1.5 dB) for gain set resolution post calibration	BBX–1, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–2, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–3, ANT–3 = ____dB BBX–r, ANT–3 = ____dB

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Optimization (Pre–ATP) Data Sheets for Multi–Carrier – continued

Table A-11: TX Bay Level Offset Calibration (3–Sector: 3 or 4–Carrier Adjacent Channels)			
OK	**Parameter**	**Specification**	**Comments**
❑	Calibration Audit carrier 2	0 dB (±1.5 dB) for gain set resolution post calibration	BBX–7, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–8, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–9, ANT–3 = ____dB BBX–r, ANT–3 = ____dB
❑	Calibration Audit carrier 3	0 dB (±1.5 dB) for gain set resolution post calibration	BBX–4, ANT–4 = ____dB BBX–r, ANT–4 = ____dB
❑			BBX–5, ANT–5 = ____dB BBX–r, ANT–5 = ____dB
❑			BBX–6, ANT–6 = ____dB BBX–r, ANT–6 = ____dB
❑	Calibration Audit carrier 4	0 dB (±1.5 dB) for gain set resolution post calibration	BBX–10, ANT–4 = ___dB BBX–r, ANT–4 = ____dB
❑			BBX–11, ANT–5 = ___dB BBX–r, ANT–5 = ____dB
❑			BBX–12, ANT–6 = ___dB BBX–r, ANT–6 = ____dB

Comments: ____

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TX Bay Level Offset/Power Output Verification for 6–Sector Configurations
1–Carrier
2–Carrier Non–adjacent Channels

Table A-12: TX BLO Calibration (6–Sector: 1–Carrier, 2–Carrier Non–adjacent Channels)

OK	Parameter	Specification	Comments
❑	Calibrate carrier 1	TX Bay Level Offset = 43 dB +/– 5 for 800 MHz 38 dB +/–5 for 1.9 GHz prior to calibration	BBX–1, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–2, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–3, ANT–3 = ____dB BBX–r, ANT–3 = ____dB
❑			BBX–4, ANT–4 = ____dB BBX–r, ANT–4 = ____dB
❑			BBX–5, ANT–5 = ____dB BBX–r, ANT–5 = ____dB
❑			BBX–6, ANT–6 = ____dB BBX–r, ANT–6 = ____dB
❑	Calibrate carrier 2	TX Bay Level Offset = 43 dB +/– 5 for 800 MHz 38 dB +/–5 for 1.9 GHz prior to calibration	BBX–7, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–8, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–9, ANT–3 = ____dB BBX–r, ANT–3 = ____dB
❑			BBX–10, ANT–4 = ___dB BBX–3, ANT–4 = ____dB
❑			BBX–11, ANT–5 = ___dB BBX–r, ANT–5 = ____dB
❑			BBX–12, ANT–6 = ___dB BBX–r, ANT–5 = ____dB

. . . continued on next page

Table A-12: TX BLO Calibration (6–Sector: 1–Carrier, 2–Carrier Non–adjacent Channels)			
OK	Parameter	Specification	Comments
❑	Calibration Audit carrier 1	0 dB (±1.5 dB) for gain set resolution post calibration	BBX–1, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–2, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–3, ANT–3 = ____dB BBX–r, ANT–3 = ____dB
❑			BBX–4, ANT–4 = ____dB BBX–r, ANT–4 = ____dB
❑			BBX–5, ANT–5 = ____dB BBX–r, ANT–5 = ____dB
❑			BBX–6, ANT–6 = ____dB BBX–r, ANT–6 = ____dB
❑	Calibration Audit carrier 2	0 dB (±1.5 dB) for gain set resolution post calibration	BBX–7, ANT–1 = ____dB BBX–r, ANT–1 = ____dB
❑			BBX–8, ANT–2 = ____dB BBX–r, ANT–2 = ____dB
❑			BBX–9, ANT–3 = ____dB BBX–r, ANT–3 = ____dB
❑			BBX–10, ANT–4 = ___dB BBX–r, ANT–4 = ____dB
❑			BBX–11, ANT–5 = ___dB BBX–r, ANT–5 = ____dB
❑			BBX–12, ANT–6 = ___dB BBX–r, ANT–6 = ____dB

Comments: ________________________________

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BTS Redundancy/Alarm Tests

Table A-13: BTS Redundancy/Alarm Tests

OK	Parameter	Specification	Data
❑	SIF: Misc. alarm tests	Verify per procedure	
❑	MGLI redundancy test	Verify per procedure	
❑	GLI redundancy test	Verify per procedure	
❑	Power supply/converter redundancy	Verify per procedure	
❑	Misc. alarm tests	Verify per procedure	
❑	CSM & GPS redundancy/alarm tests	Verify per procedure	
❑	PA redundancy test	Verify per procedure	

Comments: ____________________________________

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TX Antenna VSWR

Table A-14: TX Antenna VSWR

OK	Parameter	Specification	Data
❑	VSWR – Antenna 1	< (1.5 : 1)	
❑	VSWR – Antenna 2	< (1.5 : 1)	
❑	VSWR – Antenna 3	< (1.5 : 1)	
❑	VSWR – Antenna 4	< (1.5 : 1)	
❑	VSWR – Antenna 5	< (1.5 : 1)	
❑	VSWR – Antenna 6	< (1.5 : 1)	

Comments: ____________________________________

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RX Antenna VSWR

Table A-15: RX Antenna VSWR			
OK	**Parameter**	**Specification**	**Data**
❑	VSWR – Antenna 1	< (1.5 : 1)	
❑	VSWR – Antenna 2	< (1.5 : 1)	
❑	VSWR – Antenna 3	< (1.5 : 1)	
❑	VSWR – Antenna 4	< (1.5 : 1)	
❑	VSWR – Antenna 5	< (1.5 : 1)	
❑	VSWR – Antenna 6	< (1.5 : 1)	

Comments: ________________________________

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AMR Verification

Table A-16: AMR CDI Alarm Input Verification			
OK	**Parameter**	**Specification**	**Data**
❑	Verify CDI alarm input operation (“ALARM A” (numbers 1 –18)	BTS Relay #XX – Contact Alarm Sets/Clears	
❑	Verify CDI alarm input operation (“ALARM B” (numbers 19 –36)	BTS Relay #XX – Contact Alarm Sets/Clears	

Comments: ________________________________

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Site Serial Number Checklist

Date ____________________ Site ____________________

C–CCP Shelf

Site I/O A & B	______________________
C–CCP Shelf	______________________
CSM–1	______________________
CSM–2	______________________
HSO	______________________
CCD–1	______________________
CCD–2	______________________
AMR–1	______________________
AMR–2	______________________
MPC–1	______________________
MPC–2	______________________
Fans 1–3	______________________
GLI–1	______________________
GLI–2	______________________
BBX–1	______________________
BBX–2	______________________
BBX–3	______________________
BBX–4	______________________
BBX–5	______________________
BBX–6	______________________
BBX–7	______________________
BBX–8	______________________
BBX–9	______________________
BBX–10	______________________
BBX–11	______________________
BBX–12	______________________
BBX–r	______________________
MCC–1	______________________
MCC–2	______________________
MCC–3	______________________
MCC–4	______________________
MCC–5	______________________
MCC–6	______________________
MCC–7	______________________
MCC–8	______________________
MCC–9	______________________
MCC–10	______________________
MCC–11	______________________
MCC–12	______________________
MCIO	______________________
SWITCH	______________________
C–CCP PS–1	______________________
C–CCP PS–2	______________________
C–CCP PS–3	______________________

Site Serial Number Checklist – continued

Notes

Appendix B: PN Offset/I & Q Offset Register Programming Information

Appendix Content

THIS IS THE GENERAL APPENDIX TOC. USE THIS FOR ALL APPENDICES EXCEPT APPENDIX A.

B

Notes

PN Offset Programming Information

PN Offset Background

All channel elements transmitted from a BTS in a particular 1.25 MHz CDMA channel are orthonogonally spread by 1 of 128 possible Walsh code functions; additionally, they are also spread by a quadrature pair of PN sequences unique to each sector.

Overall, the mobile uses this to differentiate multiple signals transmitted from the same BTS (and surrounding BTS) sectors, and to synchronize to the next strongest sector.

The PN offset per sector is stored on the BBXs, where the corresponding I & Q registers reside.

The PN offset values are determined on a per BTS/per sector(antenna) basis as determined by the appropriate cdf file content. A breakdown of this information is found in Table B-1.

PN Offset Usage

Only the 14–chip delay is currently in use. It is important to determine the RF chip delay to be able to test the BTS functionality. This can be done by ascertaining if the CDF file `FineTxAdj` value was set to "on" when the MCC was downloaded with "image data". The `FineTxAdj` value is used to compensate for the processing delay (approximately 20 μS) in the BTS using any type of mobile meeting IS–97 specifications.

If the `FineTxAdj` value in the cdf file is 213 (D5 HEX), FineTxAdj has been set for the *14 chip table*.

NOTE

CDF file I and Q values can be represented in DECIMAL or HEX. If using HEX, add 0x before the HEX value. If necessary, convert HEX values in Table B-1 to decimal before comparing them to cdf file I & Q value assignments.

B

Table B-1: PnMask I and PnMask Q Values for PilotPn				
14–Chip Delay				
Pilot PN	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
0	17523	23459	4473	5BA3
1	32292	32589	7E24	7F4D
2	4700	17398	125C	43F6
3	14406	26333	3846	66DD
4	14899	4011	3A33	0FAB
5	17025	2256	4281	08D0
6	14745	18651	3999	48DB
7	2783	1094	0ADF	0446
8	5832	21202	16C8	52D2
9	12407	13841	3077	3611
10	31295	31767	7A3F	7C17
11	7581	18890	1D9D	49CA
12	18523	30999	485B	7917
13	29920	22420	74E0	5794
14	25184	20168	6260	4EC8
15	26282	12354	66AA	3042
16	30623	11187	779F	2BB3
17	15540	11834	3CB4	2E3A
18	23026	10395	59F2	289B
19	20019	28035	4E33	6D83
20	4050	27399	0FD2	6B07
21	1557	22087	0615	5647
22	30262	2077	7636	081D
23	18000	13758	4650	35BE
24	20056	11778	4E58	2E02
25	12143	3543	2F6F	0DD7
26	17437	7184	441D	1C10
27	17438	2362	441E	093A
28	5102	25840	13EE	64F0
29	9302	12177	2456	2F91
30	17154	10402	4302	28A2
31	5198	1917	144E	077D
32	4606	17708	11FE	452C
33	24804	10630	60E4	2986
34	17180	6812	431C	1A9C
35	10507	14350	290B	380E
36	10157	10999	27AD	2AF7
37	23850	25003	5D2A	61AB
38	31425	2652	7AC1	0A5C
39	4075	19898	0FEB	4DBA
40	10030	2010	272E	07DA
41	16984	25936	4258	6550
42	14225	28531	3791	6F73
43	26519	11952	6797	2EB0
44	27775	31947	6C7F	7CCB
45	30100	25589	7594	63F5
46	7922	11345	1EF2	2C51
47	14199	28198	3777	6E26
48	17637	13947	44E5	367B
49	23081	8462	5A29	210E
50	5099	9595	13EB	257B

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Table B-1: PnMask I and PnMask Q Values for PilotPn

Pilot PN	14–Chip Delay I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
51	32743	4670	7FE7	123E
52	7114	14672	1BCA	3950
53	7699	29415	1E13	72E7
54	19339	20610	4B8B	5082
55	28212	6479	6E34	194F
56	29587	10957	7393	2ACD
57	19715	18426	4D03	47FA
58	14901	22726	3A35	58C6
59	20160	5247	4EC0	147F
60	22249	29953	56E9	7501
61	26582	5796	67D6	16A4
62	7153	16829	1BF1	41BD
63	15127	4528	3B17	11B0
64	15274	5415	3BAA	1527
65	23149	10294	5A6D	2836
66	16340	17046	3FD4	4296
67	27052	7846	69AC	1EA6
68	13519	10762	34CF	2A0A
69	10620	13814	297C	35F6
70	15978	16854	3E6A	41D6
71	27966	795	6D3E	031B
72	12479	9774	30BF	262E
73	1536	24291	0600	5EE3
74	3199	3172	0C7F	0C64
75	4549	2229	11C5	08B5
76	17888	21283	45E0	5323
77	13117	16905	333D	4209
78	7506	7062	1D52	1B96
79	27626	7532	6BEA	1D6C
80	31109	25575	7985	63E7
81	29755	14244	743B	37A4
82	26711	28053	6857	6D95
83	20397	30408	4FAD	76C8
84	18608	5094	48B0	13E6
85	7391	16222	1CDF	3F5E
86	23168	7159	5A80	1BF7
87	23466	174	5BAA	00AE
88	15932	25530	3E3C	63BA
89	25798	2320	64C6	0910
90	28134	23113	6DE6	5A49
91	28024	23985	6D78	5DB1
92	6335	2604	18BF	0A2C
93	21508	1826	5404	0722
94	26338	30853	66E2	7885
95	17186	15699	4322	3D53
96	22462	2589	57BE	0A1D
97	3908	25000	0F44	61A8
98	25390	18163	632E	46F3
99	27891	12555	6CF3	310B
100	9620	8670	2594	21DE

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Table B-1: PnMask I and PnMask Q Values for PilotPn				
14–Chip Delay				
Pilot PN	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
101	6491	1290	195B	050A
102	16876	4407	41EC	1137
103	17034	1163	428A	048B
104	32405	12215	7E95	2FB7
105	27417	7253	6B19	1C55
106	8382	8978	20BE	2312
107	5624	25547	15F8	63CB
108	1424	3130	0590	0C3A
109	13034	31406	32EA	7AAE
110	15682	6222	3D42	184E
111	27101	20340	69DD	4F74
112	8521	25094	2149	6206
113	30232	23380	7618	5B54
114	6429	10926	191D	2AAE
115	27116	22821	69EC	5925
116	4238	31634	108E	7B92
117	5128	4403	1408	1133
118	14846	689	39FE	02B1
119	13024	27045	32E0	69A5
120	10625	27557	2981	6BA5
121	31724	16307	7BEC	3FB3
122	13811	22338	35F3	5742
123	24915	27550	6153	6B9E
124	1213	22096	04BD	5650
125	2290	23136	08F2	5A60
126	31551	12199	7B3F	2FA7
127	12088	1213	2F38	04BD
128	7722	936	1E2A	03A8
129	27312	6272	6AB0	1880
130	23130	32446	5A5A	7EBE
131	594	13555	0252	34F3
132	25804	8789	64CC	2255
133	31013	24821	7925	60F5
134	32585	21068	7F49	524C
135	3077	31891	0C05	7C93
136	17231	5321	434F	14C9
137	31554	551	7B42	0227
138	8764	12115	223C	2F53
139	15375	4902	3C0F	1326
140	13428	1991	3474	07C7
141	17658	14404	44FA	3844
142	13475	17982	34A3	463E
143	22095	19566	564F	4C6E
144	24805	2970	60E5	0B9A
145	4307	23055	10D3	5A0F
146	23292	15158	5AFC	3B36
147	1377	29094	0561	71A6
148	28654	653	6FEE	028D
149	6350	19155	18CE	4AD3
150	16770	23588	4182	5C24

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Table B-1: PnMask I and PnMask Q Values for PilotPn				
14–Chip Delay				
Pilot PN	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
151	14726	10878	3986	2A7E
152	25685	31060	6455	7954
153	21356	30875	536C	789B
154	12149	11496	2F75	2CE8
155	28966	24545	7126	5FE1
156	22898	9586	5972	2572
157	1713	20984	06B1	51F8
158	30010	30389	753A	76B5
159	2365	7298	093D	1C82
160	27179	18934	6A2B	49F6
161	29740	23137	742C	5A61
162	5665	24597	1621	6015
163	23671	23301	5C77	5B05
164	1680	7764	0690	1E54
165	25861	14518	6505	38B6
166	25712	21634	6470	5482
167	19245	11546	4B2D	2D1A
168	26887	26454	6907	6756
169	30897	15938	78B1	3E42
170	11496	9050	2CE8	235A
171	1278	3103	04FE	0C1F
172	31555	758	7B43	02F6
173	29171	16528	71F3	4090
174	20472	20375	4FF8	4F97
175	5816	10208	16B8	27E0
176	30270	17698	763E	4522
177	22188	8405	56AC	20D5
178	6182	28634	1826	6FDA
179	32333	1951	7E4D	079F
180	14046	20344	36DE	4F78
181	15873	26696	3E01	6848
182	19843	3355	4D83	0D1B
183	29367	11975	72B7	2EC7
184	13352	31942	3428	7CC6
185	22977	9737	59C1	2609
186	31691	9638	7BCB	25A6
187	10637	30643	298D	77B3
188	25454	13230	636E	33AE
189	18610	22185	48B2	56A9
190	6368	2055	18E0	0807
191	7887	8767	1ECF	223F
192	7730	15852	1E32	3DEC
193	23476	16125	5BB4	3EFD
194	889	6074	0379	17BA
195	21141	31245	5295	7A0D
196	20520	15880	5028	3E08
197	21669	20371	54A5	4F93
198	15967	8666	3E5F	21DA
199	21639	816	5487	0330
200	31120	22309	7990	5725

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Table B-1: PnMask I and PnMask Q Values for PilotPn				
14–Chip Delay				
Pilot PN	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
201	3698	29563	0E72	737B
202	16322	13078	3FC2	3316
203	17429	10460	4415	28DC
204	21730	17590	54E2	44B6
205	17808	20277	4590	4F35
206	30068	19988	7574	4E14
207	12737	6781	31C1	1A7D
208	28241	32501	6E51	7EF5
209	20371	6024	4F93	1788
210	13829	20520	3605	5028
211	13366	31951	3436	7CCF
212	25732	26063	6484	65CF
213	19864	27203	4D98	6A43
214	5187	6614	1443	19D6
215	23219	10970	5AB3	2ADA
216	28242	5511	6E52	1587
217	6243	17119	1863	42DF
218	445	16064	01BD	3EC0
219	21346	31614	5362	7B7E
220	13256	4660	33C8	1234
221	18472	13881	4828	3639
222	25945	16819	6559	41B3
223	31051	6371	794B	18E3
224	1093	24673	0445	6061
225	5829	6055	16C5	17A7
226	31546	10009	7B3A	2719
227	29833	5957	7489	1745
228	18146	11597	46E2	2D4D
229	24813	22155	60ED	568B
230	47	15050	002F	3ACA
231	3202	16450	0C82	4042
232	21571	27899	5443	6CFB
233	7469	2016	1D2D	07E0
234	25297	17153	62D1	4301
235	8175	15849	1FEF	3DE9
236	28519	30581	6F67	7775
237	4991	3600	137F	0E10
238	7907	4097	1EE3	1001
239	17728	671	4540	029F
240	14415	20774	384F	5126
241	30976	24471	7900	5F97
242	26376	27341	6708	6ACD
243	19063	19388	4A77	4BBC
244	19160	25278	4AD8	62BE
245	3800	9505	0ED8	2521
246	8307	26143	2073	661F
247	12918	13359	3276	342F
248	19642	2154	4CBA	086A
249	24873	13747	6129	35B3
250	22071	27646	5637	6BFE

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Table B-1: PnMask I and PnMask Q Values for PilotPn

Pilot PN	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
	14–Chip Delay			
251	13904	1056	3650	0420
252	27198	1413	6A3E	0585
253	3685	3311	0E65	0CEF
254	16820	4951	41B4	1357
255	22479	749	57CF	02ED
256	6850	6307	1AC2	18A3
257	15434	961	3C4A	03C1
258	19332	2358	4B84	0936
259	8518	28350	2146	6EBE
260	14698	31198	396A	79DE
261	21476	11467	53E4	2CCB
262	30475	8862	770B	229E
263	23984	6327	5DB0	18B7
264	1912	7443	0778	1D13
265	26735	28574	686F	6F9E
266	15705	25093	3D59	6205
267	3881	6139	0F29	17FB
268	20434	22047	4FD2	561F
269	16779	32545	418B	7F21
270	31413	7112	7AB5	1BC8
271	16860	28535	41DC	6F77
272	8322	10378	2082	288A
273	28530	15065	6F72	3AD9
274	26934	5125	6936	1405
275	18806	12528	4976	30F0
276	20216	23215	4EF8	5AAF
277	9245	20959	241D	51DF
278	8271	3568	204F	0DF0
279	18684	26453	48FC	6755
280	8220	29421	201C	72ED
281	6837	24555	1AB5	5FEB
282	9613	10779	258D	2A1B
283	31632	25260	7B90	62AC
284	27448	16084	6B38	3ED4
285	12417	26028	3081	65AC
286	30901	29852	78B5	749C
287	9366	14978	2496	3A82
288	12225	12182	2FC1	2F96
289	21458	25143	53D2	6237
290	6466	15838	1942	3DDE
291	8999	5336	2327	14D8
292	26718	21885	685E	557D
293	3230	20561	0C9E	5051
294	27961	30097	6D39	7591
295	28465	21877	6F31	5575
296	6791	23589	1A87	5C25
297	17338	26060	43BA	65CC
298	11832	9964	2E38	26EC
299	11407	25959	2C8F	6567
300	15553	3294	3CC1	0CDE

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Table B-1: PnMask I and PnMask Q Values for PilotPn

Pilot PN	14–Chip Delay I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
301	17418	30173	440A	75DD
302	14952	15515	3A68	3C9B
303	52	5371	0034	14FB
304	27254	10242	6A76	2802
305	15064	28052	3AD8	6D94
306	10942	14714	2ABE	397A
307	377	19550	0179	4C5E
308	14303	8866	37DF	22A2
309	24427	15297	5F6B	3BC1
310	26629	10898	6805	2A92
311	20011	31315	4E2B	7A53
312	16086	19475	3ED6	4C13
313	24374	1278	5F36	04FE
314	9969	11431	26F1	2CA7
315	29364	31392	72B4	7AA0
316	25560	4381	63D8	111D
317	28281	14898	6E79	3A32
318	7327	23959	1C9F	5D97
319	32449	16091	7EC1	3EDB
320	26334	9037	66DE	234D
321	14760	24162	39A8	5E62
322	15128	6383	3B18	18EF
323	29912	27183	74D8	6A2F
324	4244	16872	1094	41E8
325	8499	9072	2133	2370
326	9362	12966	2492	32A6
327	10175	28886	27BF	70D6
328	30957	25118	78ED	621E
329	12755	20424	31D3	4FC8
330	19350	6729	4B96	1A49
331	1153	20983	0481	51F7
332	29304	12372	7278	3054
333	6041	13948	1799	367C
334	21668	27547	54A4	6B9B
335	28048	8152	6D90	1FD8
336	10096	17354	2770	43CA
337	23388	17835	5B5C	45AB
338	15542	14378	3CB6	382A
339	24013	7453	5DCD	1D1D
340	2684	26317	0A7C	66CD
341	19018	5955	4A4A	1743
342	25501	10346	639D	286A
343	4489	13200	1189	3390
344	31011	30402	7923	76C2
345	29448	7311	7308	1C8F
346	25461	3082	6375	0C0A
347	11846	21398	2E46	5396
348	30331	31104	767B	7980
349	10588	24272	295C	5ED0
350	32154	27123	7D9A	69F3

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Table B-1: PnMask I and PnMask Q Values for PilotPn

Pilot PN	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
	14–Chip Delay			
351	29572	5578	7384	15CA
352	13173	25731	3375	6483
353	10735	10662	29EF	29A6
354	224	11084	00E0	2B4C
355	12083	31098	2F33	797A
356	22822	16408	5926	4018
357	2934	6362	0B76	18DA
358	27692	2719	6C2C	0A9F
359	10205	14732	27DD	398C
360	7011	22744	1B63	58D8
361	22098	1476	5652	05C4
362	2640	8445	0A50	20FD
363	4408	21118	1138	527E
364	102	22198	0066	56B6
365	27632	22030	6BF0	560E
366	19646	10363	4CBE	287B
367	26967	25802	6957	64CA
368	32008	2496	7D08	09C0
369	7873	31288	1EC1	7A38
370	655	24248	028F	5EB8
371	25274	14327	62BA	37F7
372	16210	23154	3F52	5A72
373	11631	13394	2D6F	3452
374	8535	1806	2157	070E
375	19293	17179	4B5D	431B
376	12110	10856	2F4E	2A68
377	21538	25755	5422	649B
378	10579	15674	2953	3D3A
379	13032	7083	32E8	1BAB
380	14717	29096	397D	71A8
381	11666	3038	2D92	0BDE
382	25809	16277	64D1	3F95
383	5008	25525	1390	63B5
384	32418	20465	7EA2	4FF1
385	22175	28855	569F	70B7
386	11742	32732	2DDE	7FDC
387	22546	20373	5812	4F95
388	21413	9469	53A5	24FD
389	133	26155	0085	662B
390	4915	6957	1333	1B2D
391	8736	12214	2220	2FB6
392	1397	21479	0575	53E7
393	18024	31914	4668	7CAA
394	15532	32311	3CAC	7E37
395	26870	11276	68F6	2C0C
396	5904	20626	1710	5092
397	24341	423	5F15	01A7
398	13041	2679	32F1	0A77
399	23478	15537	5BB6	3CB1
400	1862	10818	0746	2A42

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Table B-1: PnMask I and PnMask Q Values for PilotPn

Pilot PN	14–Chip Delay I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
401	5850	23074	16DA	5A22
402	5552	20250	15B0	4F1A
403	12589	14629	312D	3925
404	23008	29175	59E0	71F7
405	27636	13943	6BF4	3677
406	17600	11072	44C0	2B40
407	17000	29492	4268	7334
408	21913	5719	5599	1657
409	30320	7347	7670	1CB3
410	28240	12156	6E50	2F7C
411	7260	25623	1C5C	6417
412	17906	27725	45F2	6C4D
413	5882	28870	16FA	70C6
414	22080	31478	5640	7AF6
415	12183	28530	2F97	6F72
416	23082	24834	5A2A	6102
417	17435	9075	441B	2373
418	18527	32265	485F	7E09
419	31902	3175	7C9E	0C67
420	18783	17434	495F	441A
421	20027	12178	4E3B	2F92
422	7982	25613	1F2E	640D
423	20587	31692	506B	7BCC
424	10004	25384	2714	6328
425	13459	18908	3493	49DC
426	13383	25816	3447	64D8
427	28930	4661	7102	1235
428	4860	31115	12FC	798B
429	13108	7691	3334	1E0B
430	24161	1311	5E61	051F
431	20067	16471	4E63	4057
432	2667	15771	0A6B	3D9B
433	13372	16112	343C	3EF0
434	28743	21062	7047	5246
435	24489	29690	5FA9	73FA
436	249	10141	00F9	279D
437	19960	19014	4DF8	4A46
438	29682	22141	73F2	567D
439	31101	11852	797D	2E4C
440	27148	26404	6A0C	6724
441	26706	30663	6852	77C7
442	5148	32524	141C	7F0C
443	4216	28644	1078	6FE4
444	5762	10228	1682	27F4
445	245	23536	00F5	5BF0
446	21882	18045	557A	467D
447	3763	25441	0EB3	6361
448	206	27066	00CE	69BA
449	28798	13740	707E	35AC
450	32402	13815	7E92	35F7

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Table B-1: PnMask I and PnMask Q Values for PilotPn

Pilot PN	14–Chip Delay I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
451	13463	3684	3497	0E64
452	15417	23715	3C39	5CA3
453	23101	15314	5A3D	3BD2
454	14957	32469	3A6D	7ED5
455	23429	9816	5B85	2658
456	12990	4444	32BE	115C
457	12421	5664	3085	1620
458	28875	7358	70CB	1CBE
459	4009	27264	0FA9	6A80
460	1872	28128	0750	6DE0
461	15203	30168	3B63	75D8
462	30109	29971	759D	7513
463	24001	3409	5DC1	0D51
464	4862	16910	12FE	420E
465	14091	20739	370B	5103
466	6702	10191	1A2E	27CF
467	3067	12819	0BFB	3213
468	28643	19295	6FE3	4B5F
469	21379	10072	5383	2758
470	20276	15191	4F34	3B57
471	25337	27748	62F9	6C64
472	19683	720	4CE3	02D0
473	10147	29799	27A3	7467
474	16791	27640	4197	6BF8
475	17359	263	43CF	0107
476	13248	24734	33C0	609E
477	22740	16615	58D4	40E7
478	13095	20378	3327	4F9A
479	10345	25116	2869	621C
480	30342	19669	7686	4CD5
481	27866	14656	6CDA	3940
482	9559	27151	2557	6A0F
483	8808	28728	2268	7038
484	12744	25092	31C8	6204
485	11618	22601	2D62	5849
486	27162	2471	6A1A	09A7
487	17899	25309	45EB	62DD
488	29745	15358	7431	3BFE
489	31892	17739	7C94	454B
490	23964	12643	5D9C	3163
491	23562	32730	5C0A	7FDA
492	2964	19122	0B94	4AB2
493	18208	16870	4720	41E6
494	15028	10787	3AB4	2A23
495	21901	18400	558D	47E0
496	24566	20295	5FF6	4F47
497	18994	1937	4A32	0791
498	13608	17963	3528	462B
499	27492	7438	6B64	1D0E
500	11706	12938	2DBA	328A

. . . continued on next page

Table B-1: PnMask I and PnMask Q Values for PilotPn

Pilot PN	14–Chip Delay I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
501	14301	19272	37DD	4B48
502	23380	29989	5B54	7525
503	11338	8526	2C4A	214E
504	2995	18139	0BB3	46DB
505	23390	3247	5B5E	0CAF
506	14473	28919	3889	70F7
507	6530	7292	1982	1C7C
508	20452	20740	4FE4	5104
509	12226	27994	2FC2	6D5A
510	1058	2224	0422	08B0
511	12026	6827	2EFA	1AAB

Appendix C: FRU Optimization/ATP Test Matrix

Appendix Content

THIS IS THE GENERAL APPENDIX TOC. USE THIS FOR ALL APPENDICES EXCEPT APPENDIX A.

Notes

FRU Optimization/ATP Test Matrix

Usage & Background

Periodic maintenance of a site may also may mandate re–optimization of specific portions of the site. An outline of some basic guidelines is included in the following tables.

C

NOTE

Re–optimization steps listed for any assembly detailed in the tables below must be performed *anytime* an RF cable associated with it is replaced.

BTS Frame

Table C-1: When RF Optimization Is required on the BTS

Item Replaced	Optimize:
C–CCP Shelf	All sector TX and RX paths to all Combined CDMA Channel Processor (C–CCP) shelves.
Multicoupler/ Preselector Card	The three or six affected sector RX paths for the C–CCP shelf in the BTS frames.
BBX board	RX and TX paths of the affected C–CCP shelf / BBX board.
MCIO Card	All RX and TX paths of the affected CDMA carrier.
Any PA Module	All sector/carrier TX paths.
Parallel PA Combiner	All sector/carrier TX paths.
TX Filter	The affected sector TX path.
Enhanced Trunking Module	All sector/carrier TX paths.

Ancillary Frame

Item Replaced	Optimize:
Directional Coupler	All affected sector RX and TX paths to all BTS frame shelves.
Site filter	All affected RX sector paths in all shelves in all BTS frames.

Inter-frame Cabling

Optimization must be performed after the replacement of any RF cabling between BTS frames.

Table C-2: When to Optimize Inter–frame Cabling	
Item Replaced	**Optimize:**
Ancillary frame to BTS frame (RX) cables	The affected sector/antenna RX paths.
BTS frame to ancillary frame (TX) cables	The affected sector/antenna TX paths.

Detailed Optimization/ATP Test Matrix

Table C-3 outlines in more detail the tests that would need to be performed if one of the BTS components were to fail and be replaced. It is also assumed that all modules are placed OOS–ROM via the LMF until full redundancy of all applicable modules is implemented.

The following guidelines should also be noted when using this table.

IMPORTANT

Not every procedure required to bring the site back on line is indicated in Table C-3. It is meant to be used as a guideline ONLY. The table assumes that the user is familiar enough with the BTS Optimization/ATP procedure to understand which test equipment set ups, calibrations, and BTS site preparation will be required before performing the Table # procedures referenced.

Various passive BTS components (such as the TX and RX directional couplers, Preselector IO, MCIO, etc.) only call for a TX or RX calibration audit to be performed in lieu of a full path calibration. If the RX or TX path calibration audit fails, the entire RF path calibration will need to be repeated. If the RF path calibration fails, further troubleshooting is warranted.

Whenever any C–CCP BACKPLANE is replaced, it is assumed that only power to the C–CCP shelf being replaced is turned off via the breaker supplying that shelf.

Whenever any DISTRIBUTION BACKPLANE is replaced it is assumed that the power to the entire RFM frame is removed and the Preselector I/O is replaced. The modem frame should be brought up as if it were a new installation.

NOTE

If any significant change in signal level results from any component being replaced in the RX or TX signal flow paths, it would be identified by re–running the RX and TX calibration audit command.

When the MCIO is replaced, the C–CCP shelf remains powered up. The BBX boards may need to be removed, then re–installed into their original slots, and re–downloaded (code and BLO data). RX and TX calibration audits should then be performed.

C

Table C-3: SC 4812T–MC BTS Optimization and ATP Test Matrix																						
Doc Tbl #	**Page**	**Description**	**Directional Coupler (RX)**	**Directional Coupler (TX)**	**RX Filter**	**RX Cables**	**TX Cables**	**Multicoupler/Preselector**	**MCIO**	**C–CCP Backplane**	**BBX**	**MCC**	**CSM**	**LFR/HSO**	**GPS**	**GLI**	**Power Amplifier**	**Power Converters (See Note)**	**Switch Card**	**TX Filter**	**Enhanced Trunking Module**	**PLC**
Table 2-1	2-2	Initial Boards/ Modules Install, Preliminary Operations, CDF Site Equipage; etc.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Table 2-2 Table 2-4	2-1 2-6	DC Power Pre-Test Physical Inspect			•					•												
Table 2-5	2-7	Initial Power-up			•					•												
Table 3-11	3-32	Ping Processors								•	•	•	•			•			•			
Table 3-13	3-35	Download/Enable MGLIs								•						•						
Table 3-13	3-35	Download/Enable GLIs								•						•						
Table 3-14	3-36	Download CSMs								•			•		•							
Table 3-14	3-36	Download MCCs,								•			•		•							
Table 3-14	3-36	Download BBXs								•	•											
Table 3-16	3-39	Enable CSMs								•			•									
Table 3-17	3-39	Enable MCCs								•		•										
Table 3-20	3-45	GPS Initialization / Verification								•			•		•							
Table 3-21	3-49	HSO Initialization/ Verification								•				•								
Table 3-38	3-90	Download Offsets to BBX						•		•	•											
Table 4-1	4-5	Spectral Purity TX Mask ATP								•	•						•		•	•	•	•
Table 4-1	4-5	Waveform Quality (rho) ATP							•	•	•		•		•		•			•	•	•
Table 4-1	4-5	Pilot Time Offset ATP							•	•	•		•		•		•			•	•	•
Table 4-1	4-5	Code Domain Power/Noise Floor								•	•	•										
Table 4-1	4-5	FER Test						•	•	•	•	•										

NOTE

Replace power converters one card at a time so that power to the C–CCP or PA shelf is not lost. If power to the C–CCP shelf is lost, all cards in the shelf must be downloaded again.

Appendix D: BBX Gain Set Point vs. BTS Output

Appendix Content

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Notes

BBX Gain Set Point vs. BTS Output Considerations

Usage & Background

Table D-1 outlines the relationship between the *total* of all code domain channel element gain settings (digital root sum of the squares) and the BBX Gain Set Point between 33.0 dBm and 44.0 dBm. The resultant RF output (as measured at the top of the BTS in dBm) is shown in the table. The table assumes that the BBX Bay Level Offset (BLO) values have been calculated.

As an illustration, consider a BBX keyed up to produce a CDMA carrier with only the Pilot channel (no MCCs forward link enabled). Pilot gain is set to 262. In this case, the BBX Gain Set Point is shown to correlate exactly to the actual RF output anywhere in the 33 to 44 dBm output range. (This is the level used to calibrate the BTS).

D

Table D-1: BBX Gain Set Point vs. Actual BTS Output (in dBm)

dBm➧ Gain⬇	**44**	**43**	**42**	**41**	**40**	**39**	**38**	**37**	**36**	**35**	**34**	**33**
541	–	–	–	–	–	–	–	43.3	42.3	41.3	40.3	39.3
533	–	–	–	–	–	–	–	43.2	42.2	41.2	40.2	39.2
525	–	–	–	–	–	–	44	43	42	41	40	39
517	–	–	–	–	–	–	43.9	42.9	41.9	40.9	39.9	38.9
509	–	–	–	–	–	–	43.8	42.8	41.8	40.8	39.8	38.8
501	–	–	–	–	–	–	43.6	42.6	41.6	40.6	39.6	38.6
493	–	–	–	–	–	–	43.5	42.5	41.5	40.5	39.5	38.5
485	–	–	–	–	–	–	43.4	42.4	41.4	40.4	39.4	38.4
477	–	–	–	–	–	–	43.2	42.2	41.2	40.2	39.2	38.2
469	–	–	–	–	–	–	43.1	42.1	41.1	40.1	39.1	38.1
461	–	–	–	–	–	43.9	42.9	41.9	40.9	39.9	38.9	37.9
453	–	–	–	–	–	43.8	42.8	41.8	40.8	39.8	38.8	37.8
445	–	–	–	–	–	43.6	42.6	41.6	40.6	39.6	38.6	37.6
437	–	–	–	–	–	43.4	42.4	41.4	40.4	39.4	38.4	37.4
429	–	–	–	–	–	43.3	42.3	41.3	40.3	39.3	38.3	37.3
421	–	–	–	–	–	43.1	42.1	41.1	40.1	39.1	38.1	37.1
413	–	–	–	–	44	43	42	41	40	39	38	37
405	–	–	–	–	43.8	42.8	41.8	40.8	39.8	38.8	37.8	36.8
397	–	–	–	–	43.6	42.6	41.6	40.6	39.6	38.6	37.6	36.6
389	–	–	–	–	43.4	42.4	41.4	40.4	39.4	38.4	37.4	36.4

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Table D-1: BBX Gain Set Point vs. Actual BTS Output (in dBm)

dBm▶ Gain▼	44	43	42	41	40	39	38	37	36	35	34	33
381	–	–	–	–	43.3	42.3	41.3	40.3	39.3	38.3	37.3	36.3
374	–	–	–	–	43.1	42.1	41.1	40.1	39.1	38.1	37.1	36.1
366	–	–	–	43.9	42.9	41.9	40.9	39.9	38.9	37.9	36.9	35.9
358	–	–	–	43.7	42.7	41.7	40.7	39.7	38.7	37.7	36.7	35.7
350	–	–	–	43.5	42.5	41.5	40.5	39.5	38.5	37.5	36.5	35.5
342	–	–	–	43.3	42.3	41.3	40.3	39.3	38.3	37.3	36.3	35.3
334	–	–	–	43.1	42.1	41.1	40.1	39.1	38.1	37.1	36.1	35.1
326	–	–	43.9	42.9	41.9	40.9	39.9	38.9	37.9	36.9	35.9	34.9
318	–	–	43.7	42.7	41.7	40.7	39.7	38.7	37.7	36.7	35.7	34.7
310	–	–	43.5	42.5	41.5	40.5	39.5	38.5	37.5	36.5	35.5	34.5
302	–	–	43.2	42.2	41.2	40.2	39.2	38.2	37.2	36.2	35.2	34.2
294	–	44	43	42	41	40	39	38	37	36	35	34
286	–	43.8	42.8	41.8	40.8	39.8	38.8	37.8	36.8	35.8	34.8	33.8
278	–	43.5	42.5	41.5	40.5	39.5	38.5	37.5	36.5	35.5	34.5	33.5
270	–	43.3	42.3	41.3	40.3	39.3	38.3	37.3	36.3	35.3	34.3	33.3
262	44	43	42	41	40	39	38	37	36	35	34	33
254	43.7	42.7	41.7	40.7	39.7	38.7	37.7	36.7	35.7	34.7	33.7	–
246	43.4	42.4	41.4	40.4	39.4	38.4	37.4	36.4	35.4	34.4	33.4	–
238	43.2	42.2	41.2	40.2	39.2	38.2	37.2	36.2	35.2	34.2	33.2	–
230	42.9	41.9	40.9	39.9	38.9	37.9	36.9	35.9	34.9	33.9	–	–
222	42.6	41.6	40.6	39.6	38.6	37.6	36.6	35.6	34.6	33.6	–	–
214	42.2	41.2	40.2	39.2	38.2	37.2	36.2	35.2	34.2	33.2	–	–

Appendix E: Chapter Title Goes Here

Appendix Content

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Notes

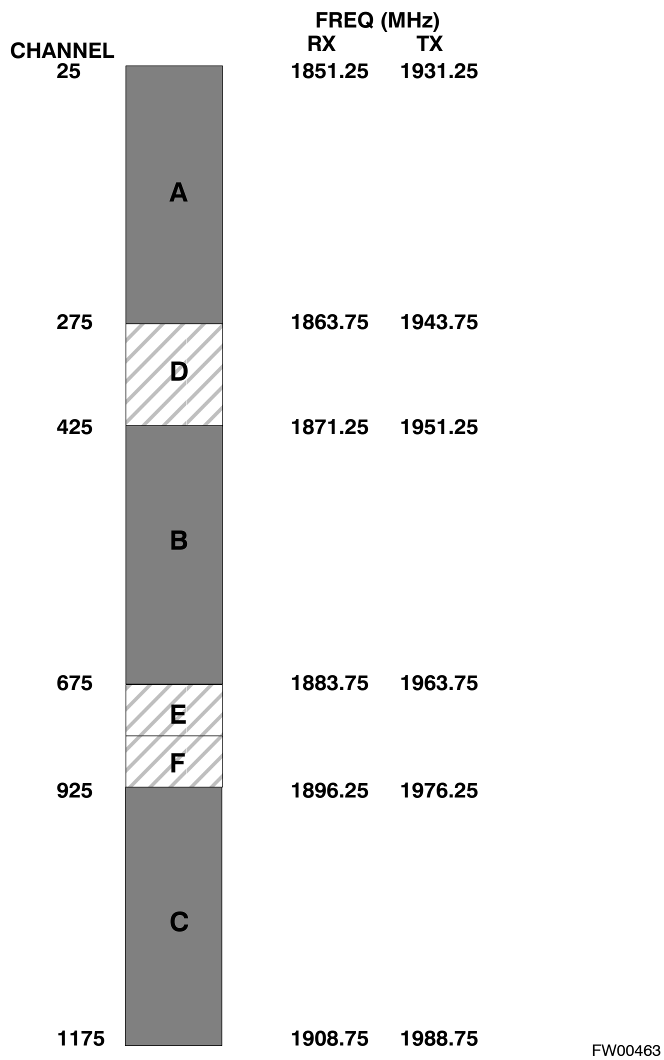
Introduction

Programming of each of the BTS BBX synthesizers is performed by the BTS GLI cards over the Concentration Highway Interface (CHI) bus. This programming data determines the transmit and receive operating frequencies (channels) for each BBX.

1900 MHz PCS Channels

Figure E-1 shows the valid channels for the North American PCS 1900 MHz frequency spectrum. There are 10 CDMA wireline or non–wireline band channels used in a CDMA system (unique per customer operating system).

Figure E-1: North America PCS Frequency Spectrum (CDMA Allocation)



Calculating 1900 MHz Center Frequencies

Table E-1 shows selected 1900 MHz CDMA candidate operating channels, listed in both decimal and hexadecimal, and the corresponding transmit, and receive frequencies. Center frequencies (in MHz) for channels not shown in the table may be calculated as follows:

- TX = 1930 + 0.05 * Channel#
  Example: Channel 262
  TX = 1930 + 0.05 * 262 = 1943.10 MHz
- RX = TX – 80
  Example: Channel 262
  RX = 1943.10 – 50 = 1863.10 MHz

Actual frequencies used depend on customer CDMA system frequency plan.

Each CDMA channel requires a 1.77 MHz frequency segment. The actual CDMA carrier is 1.23 MHz wide, with a 0.27 MHz guard band on both sides of the carrier.

Minimum frequency separation required between any CDMA carrier and the nearest NAMPS/AMPS carrier is 900 kHz (center-to-center).

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Table E-1: 1900 MHz TX and RX Frequency vs. Channel

Channel Number Decimal	Hex	Transmit Frequency (MHz) Center Frequency	Receive Frequency (MHz) Center Frequency
25	0019	1931.25	1851.25
50	0032	1932.50	1852.50
75	004B	1933.75	1853.75
100	0064	1935.00	1855.00
125	007D	1936.25	1856.25
150	0096	1937.50	1857.50
175	00AF	1938.75	1858.75
200	00C8	1940.00	1860.00
225	00E1	1941.25	1861.25
250	00FA	1942.50	1862.50
275	0113	1943.75	1863.75
300	012C	1945.00	1865.00
325	0145	1946.25	1866.25
350	015E	1947.50	1867.50
375	0177	1948.75	1868.75
400	0190	1950.00	1870.00
425	01A9	1951.25	1871.25
450	01C2	1952.50	1872.50
475	01DB	1953.75	1873.75
500	01F4	1955.00	1875.00
525	020D	1956.25	1876.25
550	0226	1957.50	1877.50

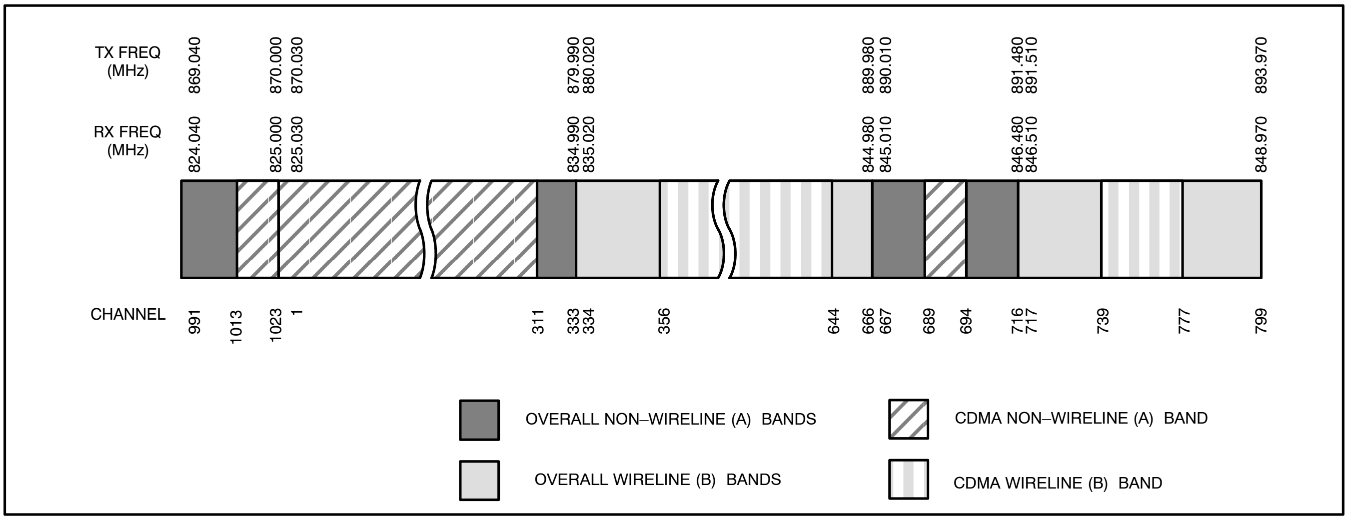
table continued next page

Table E-1: 1900 MHz TX and RX Frequency vs. Channel			
Channel Number Decimal	Hex	Transmit Frequency (MHz) Center Frequency	Receive Frequency (MHz) Center Frequency
575	023F	1958.75	1878.75
600	0258	1960.00	1880.00
625	0271	1961.25	1881.25
650	028A	1962.50	1882.50
675	02A3	1963.75	1883.75
700	02BC	1965.00	1885.00
725	02D5	1966.25	1886.25
750	02EE	1967.50	1887.50
775	0307	1968.75	1888.75
800	0320	1970.00	1890.00
825	0339	1971.25	1891.25
850	0352	1972.50	1892.50
875	036B	1973.75	1893.75
900	0384	1975.00	1895.00
925	039D	1976.25	1896.25
950	03B6	1977.50	1897.50
975	03CF	1978.75	1898.75
1000	03E8	1980.00	1900.00
1025	0401	1981.25	1901.25
1050	041A	1982.50	1902.50
1075	0433	1983.75	1903.75
1100	044C	1985.00	1905.00
1125	0465	1986.25	1906.25
1150	047E	1987.50	1807.50
1175	0497	1988.75	1908.75

800 MHz CDMA Channels

Figure E-2 shows the valid channels for the North American cellular telephone frequency spectrum. There are 10 CDMA wireline or non–wireline band channels used in a CDMA system (unique per customer operating system).

Figure E-2: North American Cellular Telephone System Frequency Spectrum (CDMA Allocation).



Calculating 800 MHz Center Frequencies

Table E-2 shows selected 800 MHz CDMA candidate operating channels, listed in both decimal and hexadecimal, and the corresponding transmit, and receive frequencies. Center frequencies (in MHz) for channels not shown in the table may be calculated as follows:

- Channels 1–777
  TX = 870 + 0.03 * Channel#
  Example: Channel 262
  TX = 870 + 0.03*262 = 877.86 MHz
- Channels 1013–1023
  TX = 870 + 0.03 * (Channel# – 1023)
  Example: Channel 1015
  TX = 870 +0.03 *(1015 – 1023) = 869.76 MHz
- RX = TX – 45 MHz
  Example: Channel 262
  RX = 877.86 –45 = 832.86 MHz

Table E-2: 800 MHz TX and RX Frequency vs. Channel

Channel Number Decimal	Hex	Transmit Frequency (MHz) Center Frequency	Receive Frequency (MHz) Center Frequency
1	0001	870.0300	825.0300
25	0019	870.7500	825.7500

table continued next page

Table E-2: 800 MHz TX and RX Frequency vs. Channel			
Channel Number Decimal	Hex	Transmit Frequency (MHz) Center Frequency	Receive Frequency (MHz) Center Frequency
50	0032	871.5000	826.5000
75	004B	872.2500	827.2500
100	0064	873.0000	828.0000
125	007D	873.7500	828.7500
150	0096	874.5000	829.5000
175	00AF	875.2500	830.2500
200	00C8	876.0000	831.0000
225	00E1	876.7500	831.7500
250	00FA	877.5000	832.5000
275	0113	878.2500	833.2500
300	012C	879.0000	834.0000
325	0145	879.7500	834.7500
350	015E	880.5000	835.5000
375	0177	881.2500	836.2500
400	0190	882.0000	837.0000
425	01A9	882.7500	837.7500
450	01C2	883.5000	838.5000
475	01DB	884.2500	839.2500
500	01F4	885.0000	840.0000
525	020D	885.7500	840.7500
550	0226	886.5000	841.5000
575	023F	887.2500	842.2500
600	0258	888.0000	843.0000
625	0271	888.7500	843.7500
650	028A	889.5000	844.5000
675	02A3	890.2500	845.2500
700	02BC	891.0000	846.0000
725	02D5	891.7500	846.7500
750	02EE	892.5000	847.5000
775	0307	893.2500	848.2500
NOTE Channel numbers 778 through 1012 are not used.			
1013	03F5	869.7000	824.7000
1023	03FF	870.0000	825.0000

E

Notes

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Appendix F: Test Equipment Preparation

Appendix Content

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Notes

Test Equipment Preparation

Purpose

Pre–testing set–up information covered includes verification and setting GPIB addresses, inter–unit cabling, connectivity testing, pre–test control settings, and equipment calibration for items which are not calibrated with the **Calibrate Test Equipment** function of the LMF.

The following procedures include verification and changing GPIB addresses for the various items of CDMA test equipment supported by the LMF.

Prepare test sets

This appendix provides information on pre–testing set–up for the following test equipment items (not required for the Cybertest test set):

- Agilent E7495A test equipment set–up
- Agilent E4406A transmitter test set
- Agilent E4432B signal generator
- Advantest R3267 spectrum analyzer
- Advantest R3562 signal generator
- Agilent 8935 analyzer (formerly HP 8935)
- HP 8921 with PCS interface analyzer
- Advantest R3465 analyzer
- Motorola CyberTest
- HP 437 power meter
- Gigatronics 8541C power meter
- GPIB adapter

Test Equipment Set-up

- HP8921A System Connectivity Test
- HP PCS Interface Test Equipment Setup for Manual Testing
- Calibrating Test Cable Set–up using Advantest R3465

Calibrating test sets

- Agilent E4406A Transmitter Tester Self-alignment (Calibration)
- HP 437 Power Meter (Calibration)
- Gigatronics 8542 power meter (Calibration)

Agilent E7495A Test Equipment Setup

This test equipment requires a warm-up period of at least 30 minutes before BTS testing or calibration begins.

Using the Agilent E7495A with the LMF

The Agilent E7495A does not require the use of the 19MHz frequency reference; if connected, it will be ignored. The Even Sec SYNC connection is required.

The Agilent E7495A signal generator is only calibrated down to –80db. In order to achieve accurate FER testing, be sure the RX setup includes at least 40db of attenuation. This will ensure the signal generator will output sufficient power to operate in the calibrated range.

Set the IP Address as described in Table F-1.

Table F-1: Set IP Address on Agilent E7495A test set

✓	Step	Action
	1	Use the **System Button > Controls >IPAdmin** to set an IP address on the E7495A as **128.0.0.49**, and Netmask to **255.255.255.128**.

Connections

Motorola recommends using a hub with BNC and RJ–45 connections. Suggested models: Netgear model EN104 (4 port) or EN108 (8 port). Do NOT use model numbers ending with "TP"; those have no BNC connectors.

The LMF will connect to the hub which in turn is connected to the BTS and to the Agilent E7495A.

Agilent E7495A to Hub – This is an Ethernet cable, RJ–45 to RJ–45.

LMF to Hub – Use one of the following cables to connect the LMF to the Hub:

- Ethernet cable, RJ–45–to–RJ–45. Be sure the LAN card is set for either AUTO or to use the RJ–45 only.
- Coax cable between LAN card and Hub. Use a BNC "T" connector on the hub. If the hub does not have BNC connectors, use a BNC–to–UTP adapter with the "T" connector. Connect a coaxial cable between the LAN card and one end of the BNC "T" crossbar.

Hub to BTS – With a BNC "T" connector on the hub, connect a coaxial cable between the open end of the "T" crossbar and the BTS LAN connection.

Detecting Test Equipment

Be sure no other equipment is connected to the LMF. The E7495A must be connected to the LAN, as described above, for the LMF to detect it. Perform the procedures described in Table F-2.

Table F-2: Detecting Agilent E7495A Test Equipment

✓	Step	Action
	1	Click the **Tools** Menu.
	2	Choose **Options**.

. . . continued on next page

Table F-2: Detecting Agilent E7495A Test Equipment		
✓	Step	Action
	3	Check **Agilent E7495A** option in non–GPIB Test Equipment and enter its IP number.
	4	Click **Apply** and wait a moment.
	5	Click **Dismiss**.

Power Sensor Calibration

Table F-3 describes the E7495A Power Sensor Calibration.

Table F-3: E7495A Power Sensor Calibration		
✓	Step	Action
	1	Display the power meter screen.
	2	Zero the power meter. Make sure equipment is connected as shown in Figure F-1. – Press the Zero softkey. – Press the Continue softkey.
	3	Calibrate the power meter: – Press Ref CF. – Enter the reference cal factor, reading it off the label on the power sensor head. – Press Calibrate. – Connect the power sensor (see Figure F-2). – Press Continue. – Press Cal Factor. – Enter the cal factor from the label on the power sensor head. Select a cal factor that is within the operating frequency of the BTS being calibrated.

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Figure F-1: Agilent E7495A Pre–Power Sensor Calibration connection

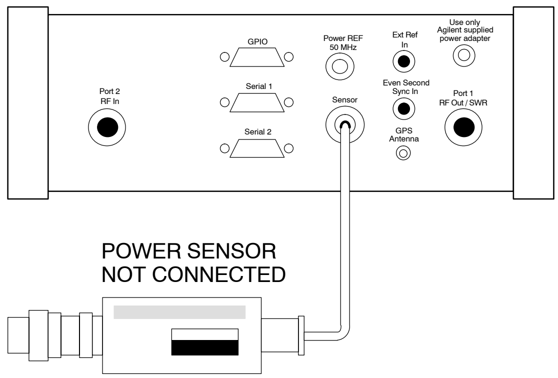
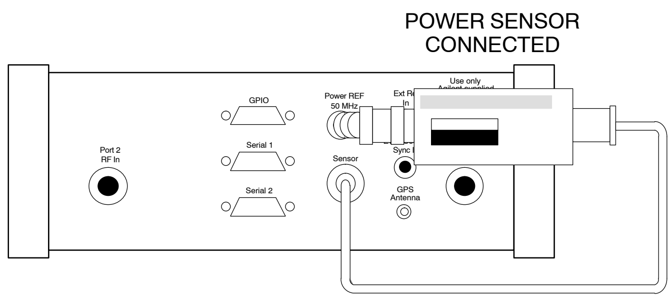


Figure F-2: Agilent E7495A Power Sensor Calibration connection



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Cable Calibration

Follow the directions in the LMF application program to calibrate cables.

- Calibrate the short cable (see Figure 3-13) and two 10 dB attenuators to establish a baseline and then calibrate the TX and RX set–ups. Because at least 40 dB of attenuation is needed when testing the FER, the set–up for RX is the same as for TX.

Agilent E4406A Transmitter Tester GPIB Address

Follow the procedure in Table F-4 and refer to Figure F-3 to verify and, if necessary, change the Agilent E4406A GPIB address.

Figure F-3: Setting Agilent E4406A GPIB Address

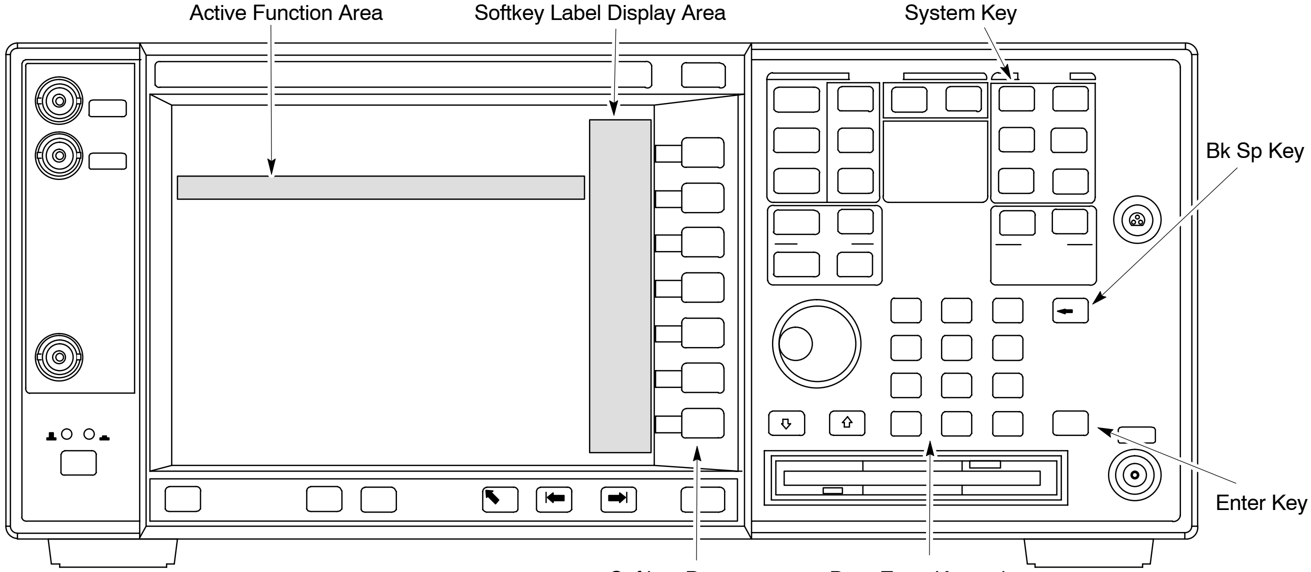

Table F-4: Verify and Change Agilent E4406A GPIB Address

Step	Action
1	In the **SYSTEM** section of the instrument front panel, press the **System** key. – The softkey labels displayed on the right side of the instrument screen will change.
2	Press the **Config I/O** softkey button to the right of the instrument screen. – The softkey labels will change. – The current instrument GPIB address will be displayed below the **GPIB Address** softkey label.
3	If the current GPIB address is not set to **18**, perform the following to change it:
3a	Press the GPIB Address softkey button. In the on–screen Active Function Area, **GPIB Address** will be displayed followed by the current GPIB address.

. . . continued on next page

Table F-4: Verify and Change Agilent E4406A GPIB Address	
Step	**Action**
3b	On the front panel Data Entry keypad, enter the communications system analyzer GPIB address of **18**. – The **GPIB Address** label will change to **Enter**. – Digits entered with the keypad will replace the current GPIB address in the display. **NOTE** To correct an entry, press the **Bk Sp** key at the upper right of the keypad to delete one character at a time.
3c	Press the **Enter** softkey button or the keypad **Enter** key to set the new GPIB address. – The **Config I/O** softkey labels will reappear. – The new GPIB address will be displayed under the **GPIB Address** softkey label.

Agilent E4432B Signal Generator GPIB Address

Follow the procedure in Table F-5 and refer to Figure F-4 to verify and, if necessary, change the Agilent E4432B GPIB address.

Figure F-4: Setting Agilent E4432B GPIB Address

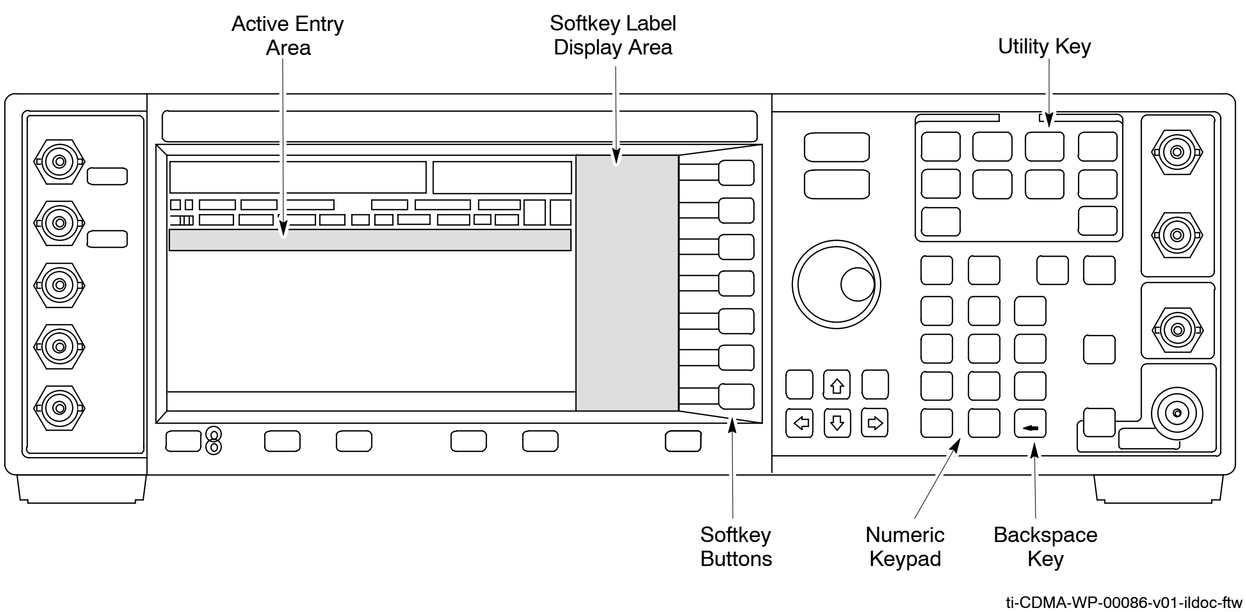

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Table F-5: Verify and Change Agilent E4432B GPIB Address	
Step	**Action**
1	In the **MENUS** section of the instrument front panel, press the **Utility** key. – The softkey labels displayed on the right side of the instrument screen will change.
2	Press the **GPIB/RS232** softkey button to the right of the instrument screen. – The softkey labels will change. – The current instrument GPIB address will be displayed below the **GPIB Address** softkey label.
3	If the current GPIB address is not set to **1**, perform the following to change it:
3a	Press the **GPIB Address** softkey button. – The **GPIB Address** label and current GPIB address will change to boldface. – In the on–screen Active Entry Area, **Address:** will be displayed followed by the current GPIB address.
3b	On the front panel Numeric keypad, enter the signal generator GPIB address of **1**. – The **GPIB Address** label will change to **Enter**. – Digits entered with the keypad will replace the current GPIB address in the Active Entry display. **NOTE** To correct an entry, press the backspace key at the lower right of the keypad to delete one character at a time.
3c	Press the **Enter** softkey button to set the new GPIB address. – The new GPIB address will be displayed under the **GPIB Address** softkey label.

Advantest R3267 Spectrum Analyzer GPIB Address

Perform the procedure in Table F-6 and refer to Figure F-5 to verify and, if necessary, change the Advantest R3267 spectrum analyzer GPIB address.

Figure F-5: Setting Advantest R3267 GPIB Address

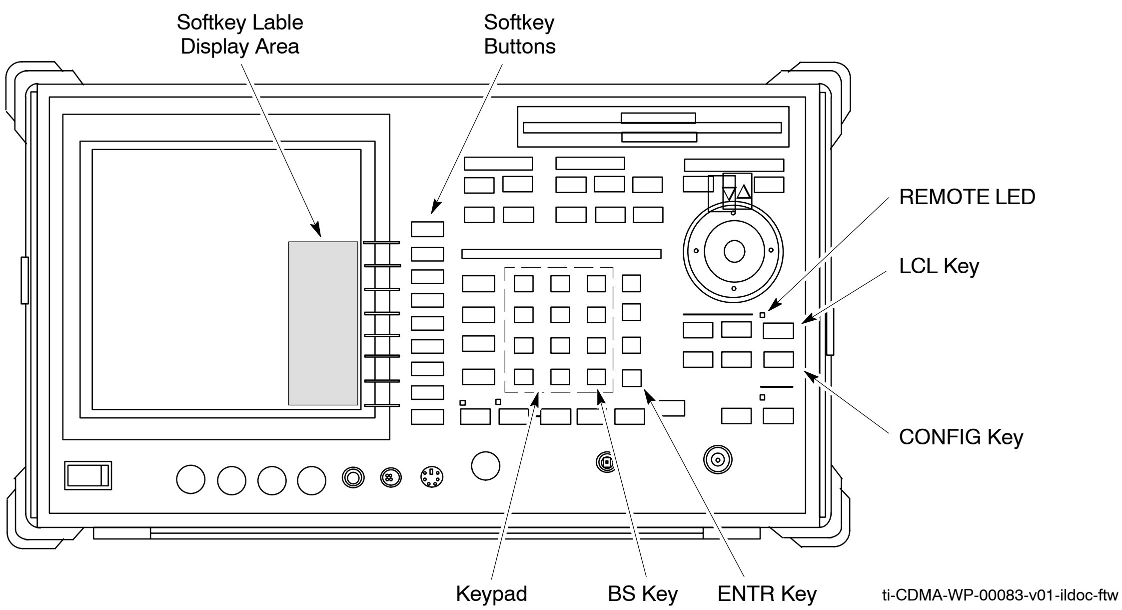

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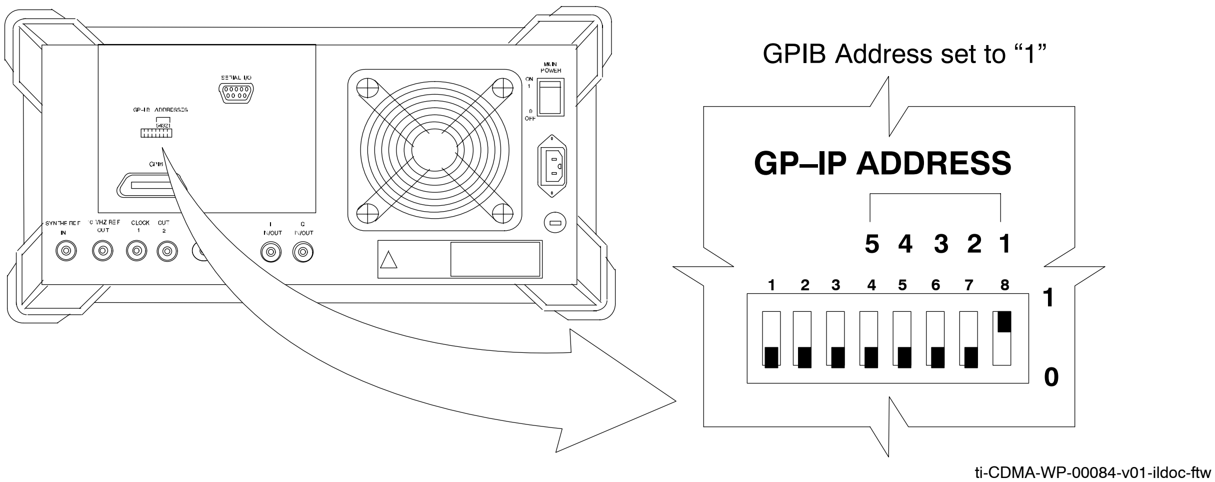
Table F-6: Verify and Change Advantest R3267 GPIB Address	
Step	**Action**
1	If the **REMOTE** LED is lighted, press the **LCL** key. – The LED extinguishes.
2	Press the **CONFIG** key. – The **CONFIG** softkey labels will appear in the softkey label display area of the instrument display. – The current GPIB address will be displayed below the **GPIB Address** softkey label.
3	If the current GPIB address is not set to **18**, perform the following to change it:
3a	Press the **GPIB Address** softkey. A **GPIB Address** entry window will open in the instrument display showing the current GPIB address.
3b	Enter **18** on the keypad in the **ENTRY** section of the instrument front panel. Characters typed on the keypad will replace the address displayed in the **GPIB Address** entry window. **NOTE** To correct an entry, press the **BS** (backspace) key at the lower right of the keypad to delete one character at a time.
3c	Press the **ENTR** key to the lower right of the keypad to enter the address. – The **GPIB Address** entry window closes. – The new address is displayed in the bottom portion of the **GPIB Address** softkey label.

Advantest R3562 Signal Generator GPIB Address

Set the GP–IB ADDRESS switch on the rear of the Advantest R3562 signal generator to address **1** as shown in Figure F-6.

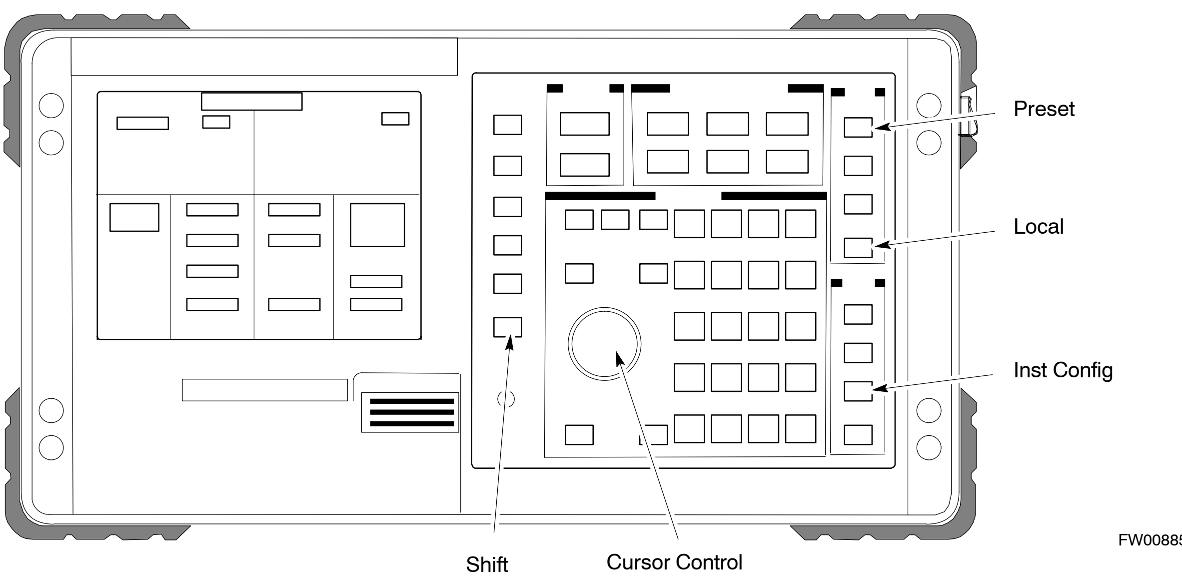
Figure F-6: Advantest R3562 GPIB Address Switch Setting



Agilent 8935 Series E6380 (formerly HP 8935) Test Set GPIB Address

Follow the procedure in Table F-7 and refer to Figure F-7 to verify and, if necessary, change the HP8935 GPIB address.

Figure F-7: HP8935 Test Set



NOTE

This procedure assumes that the test equipment is set up and ready for testing.

Table F-7: Verify and/or Change HP8935 GPIB Address

Step	Action
	NOTE The HP I/O configuration MUST be set to **Talk & Listen,** or NO device on the GPIB bus will be accessible. (Consult test equipment OEM documentation for additional information as required.)
1	To verify that the GPIB addresses are set correctly, press **Shift** and **LOCAL** on the HP8935. The current HP–IB address is displayed at the top of the screen. **NOTE** HP–IB is the same as GPIB.
2	If the current GPIB address is not set to **18**, perform the following to change it: – Press **Shift** and **Inst Config**. – Turn the **Cursor Control** knob to move the cursor to the **HP–IB Adrs** field. – Press the **Cursor Control** knob to select the field. – Turn the **Cursor Control** knob as required to change the address to 18. – Press the **Cursor Control** knob to set the address.
3	• Press **Preset** to return to normal operation.

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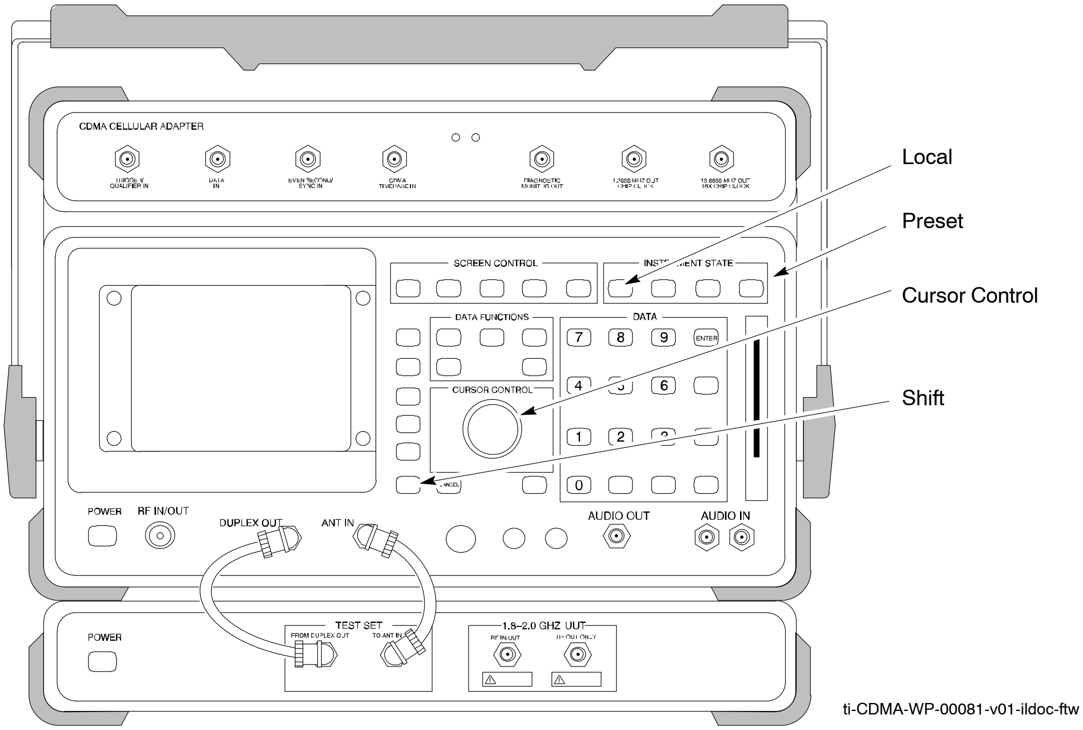
Hewlett Packard HP8921A and HP83236A/B GPIB Address

Follow the procedure in Table F-8 and refer to Figure F-8, to verify and, if necessary, change the HP8921A HP83236A GPIB addresses.

Figure F-8: HP8921A and HP3236A/B



NOTE

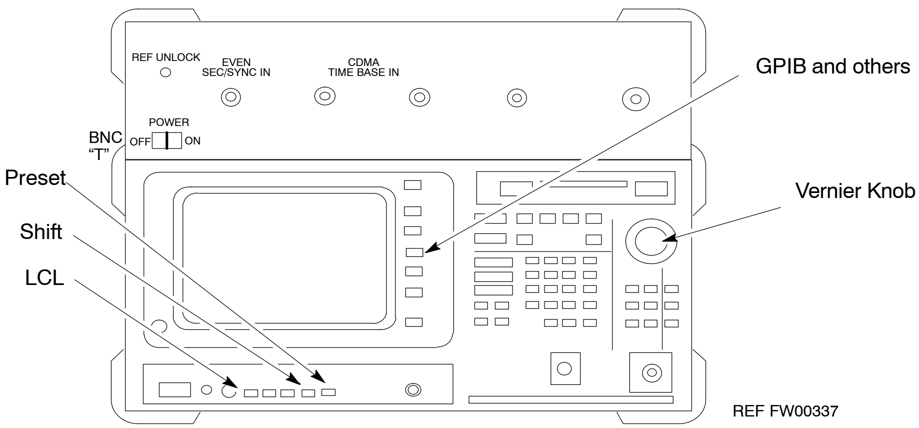
This procedure assumes that the test equipment is set up and ready for testing.

Table F-8: Verify and/or Change HP8921A and HP83236A GPIB Addresses	
Step	**Action**
1	To verify that the GPIB addresses are set correctly, press **Shift** and **LOCAL** on the HP8921A. The current HP–IB address is displayed at the top of the screen. **NOTE** HP–IB is the same as GPIB.
2	If the current HP–IB address is not set to **18**, perform the following to change it: – Turn the **Cursor Control** knob to move the cursor to **More** and press the knob to select the field. – Turn the **Cursor Control** knob to move the cursor to **I/O Config** and press the knob to select the field. – Turn the **Cursor Control** knob to move the cursor to **Adrs** and press the knob to select the field. – Turn the **Cursor Control** knob to change the HP–IB address to 18 and press the knob to set the address. – Press **Shift** and **Preset** to return to normal operation.
3	To set the HP83236A (or B) PCS Interface GPIB address=19, set the dip switches as follows: – A1=1, A2=1, A3=0, A4=0, A5=1, HP–IB/Ser = 1

Advantest R3465 Communications Test Set GPIB Address

Follow the steps in Table F-9 and refer to Figure F-9 to verify and, if necessary, change the GPIB address for the Advantest R3465.

Figure F-9: R3465 Communications Test Set



NOTE

This procedure assumes that the test equipment is set up and ready for testing.

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Table F-9: Verify and/or Change Advantest R3465 GPIB Address	
Step	**Action**
1	To verify that the GPIB address is set correctly, perform the following procedure: – Press **SHIFT** then **PRESET**. – Press **LCL**. – Press the **GPIB and Others** CRT menu key to view the current address.
2	If the current GPIB address is not set to **18**, perform the following to change it: – Turn the vernier knob as required to select **18**. – Press the vernier knob to set the address.
3	To return to normal operation, press **Shift** and **Preset**.

Motorola CyberTest GPIB Address

Follow the steps in Table F-10 to verify and, if necessary, change the GPIB address on the Motorola CyberTest. Changing the GPIB address requires the following items:

- Motorola CyberTest communications analyzer.
- Computer running Windows 3.1/Windows 95.

- Motorola CyberTAME software program “TAME”.
- Parallel printer port cable (shipped with CyberTest).

NOTE

This procedure assumes that the test equipment is set up and ready for testing.

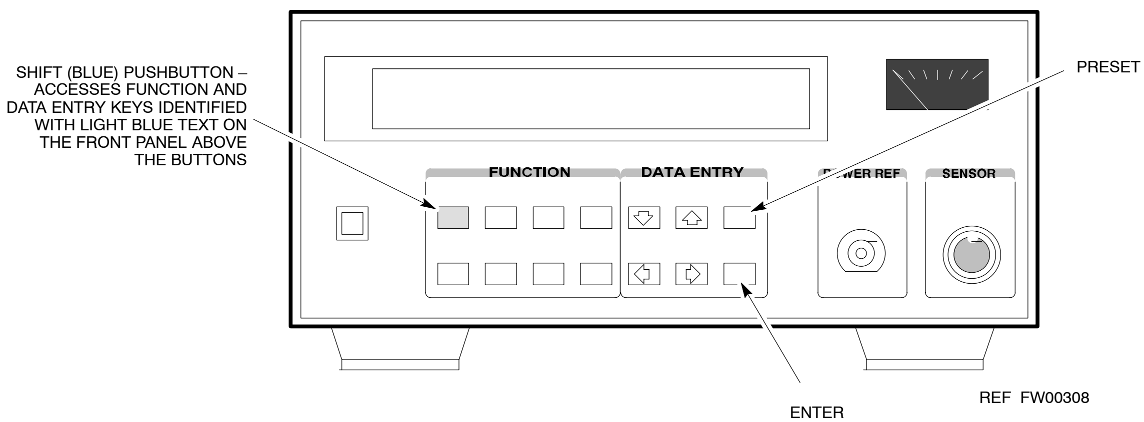
Table F-10: Verify and/or Change Motorola CyberTest GPIB A

Step	Action
1	On the LMF desktop, locate the CyberTAME icon. Double click on the icon application.
2	In the CyberTAME window taskbar, under **Special,** select **IEEE.488.2.**
3	CyberTAME software will query the CyberTest Analyzer for its current GPI open the IEEE 488.2 dialog box. If the current GPIB address is not 18, perfo procedure to change it: – Use the up or down increment arrows, or double–click in the field and t – Click on the **OK** button. The new address will be written to the CyberTest via the parallel port ar
	NOTE Verify that the address has been set by repeating steps 2 and 3. The ne dd the IEEE 488.2 dialog box Address field.

HP437 Power Meter GPIB Address

Follow the steps in Table F-11 and refer to Figure F-10 to verify and, if necessary, change the HP437 GPIB address.

Figure F-10: HP437 Power Meter



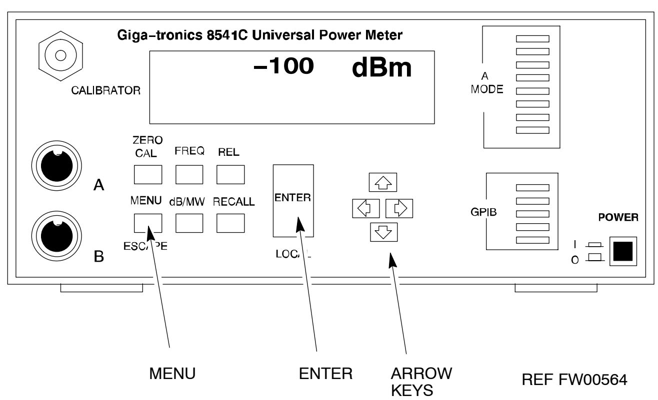
NOTE	This procedure assumes that the test equipment is set up and ready for testing.

Table F-11: Verify and/or Change HP437 Power Meter GPIB Address	
Step	**Action**
1	Press **Shift** and **PRESET**.
2	Use the ⏶ arrow key to navigate to HP–IB ADRS and press **ENTER**. The HP–IB address is displayed. **NOTE** HP–IB is the same as GPIB.
3	If the current GPIB address is not set to **13**, perform the following to change it: – Use the ⏶ ⏷ arrow keys to change the HP–IB ADRS to **13**. – Press **ENTER** to set the address.
4	Press **Shift** and **ENTER** to return to a standard configuration.

Gigatronics 8541C Power Meter GPIB Address

Follow the steps in Table F-12 and refer to Figure F-11 to verify and, if necessary, change the Gigatronics 8541C power meter GPIB address.

Figure F-11: Gigatronics 8541C Power Meter Detail



NOTE

This procedure assumes that the test equipment is set up and ready for testing.

Table F-12: Verify and/or Change Gigatronics 8541C Power Meter GPIB Address	
Step	**Action**
	! CAUTION Do not connect/disconnect the power meter sensor cable with AC power applied to the meter. Disconnection could result in destruction of the sensing element or miscalibration.
1	Press **MENU**.

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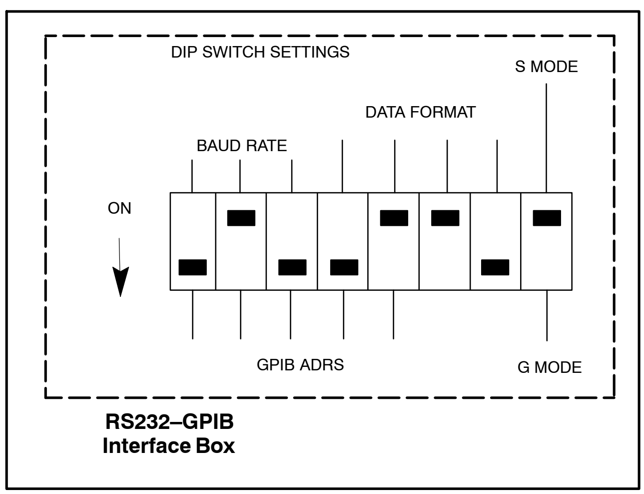
Table F-12: Verify and/or Change Gigatronics 8541C Power Meter GPIB Address	
Step	**Action**
2	Use the ↓ arrow key to select **CONFIG MENU** and press **ENTER**.
3	Use the ↓ arrow key to select **GPIB** and press **ENTER**. The current **Mode** and GPIB **Address** are displayed.
4	If the **Mode** is not set to **8541C**, perform the following to change it: Use the ◄ ► arrow keys as required to select **MODE**. Use the ↓↑ arrow keys as required to set **MODE** to **8541C**.
5	If the GPIB address is not set to **13**, perform the following to change it: Use the ► arrow key to select **ADDRESS**. Use the ↓↑ arrow keys as required to set the GPIB address to **13**.
6	Press **ENTER** to return to normal operation.

RS232 GPIB Interface Box

Ensure that the RS232 GPIB interface box dip switches are set as shown in Figure F-12.

Figure F-12: RS232 GPIB Interface Box



ti-CDMA-WP-00082-v01-ildoc-ftw

Test Equipment Set-up

Purpose

This section covers other test equipment and peripherals not covered in Chapter 3. Procedures for the manual testing are covered here, along with procedures to calibrate the TX and RX cables using the signal generator and spectrum analyzer.

Equipment Warm up

NOTE

Warm-up BTS equipment for a minimum of *60 minutes* prior to performing the BTS optimization procedure. This assures BTS site stability and contributes to optimization accuracy. (Time spent running initial power-up, hardware/firmware audit, and BTS download counts as warm-up time.)

CAUTION

If any piece of test equipment (i.e., test cable, RF adapter) has been replaced, re-calibration must be performed. Failure to do so could introduce measurement errors, resulting in incorrect measurements and degradation to system performance..

NOTE

Calibration of the communications test set (or equivalent test equipment) ***must be*** performed at the site before calibrating the overall test set. Calibrate the test equipment *after* it has been allowed to warm-up and stabilize for a *minimum of 60 minutes*.

Prerequisites

Prior to performing any of these procedures, all preparations for preparing the LMF, updating LMF files, and any other pre-calibration procedures, as stated in Chapter 3, must have been completed.

HP8921A System Connectivity Test

Follow the steps in Table F-13 to verify that the connections between the PCS Interface and the HP8921A are correct, and cables are intact. The software also performs basic functionality checks of each instrument.

NOTE

Disconnect other GPIB devices, especially system controllers, from the system before running the connectivity software.

Table F-13: System Connectivity	
Step	**Action**
	NOTE – Perform this procedure *after* test equipment has been allowed to warm–up and stabilize for a *minimum of 60 minutes*.
1	Insert HP 83236A Manual Control/System card into memory card slot.
2	Press the **[PRESET]** pushbutton**.**
3	Press the Screen Control **[TESTS]** pushbutton to display the "Tests" Main Menu screen.
4	Position the cursor at **Select Procedure Location** and select by pressing the cursor control knob. In the Choices selection box, select **Card.**
5	Position the cursor at **Select Procedure Filename** and select by pressing the cursor control knob. In the Choices selection box, select **SYS_CONN**.
6	Position the cursor at **RUN TEST** and select it. The software will prompt you through the connectivity setup.
7	When the test is complete, position the cursor on **STOP TEST** and select it; *OR* press the **[K5]** pushbutton.
8	To return to the main menu, press the **[K5]** pushbutton.

HP PCS Interface Test Equipment Setup for Manual Testing

Follow the procedure in Table F-14 to setup the HP PCS Interface Box for manual testing.

Table F-14: Manual Cable Calibration Test Equipment Setup (using the HP PCS Interface)		
✓	**Step**	**Action**
		NOTE Verify GPIB controller is turned off.
	1	Insert HP83236B Manual Control/System card into the memory card slot.
	2	Under **Screen Controls**, press the **[TESTS]** push-button to display the **TESTS** (Main Menu) screen.
	3	Position the cursor at **Select Procedure Location** and select. In the Choices selection box, select **CARD.**
	4	Position the cursor at **Select Procedure Filename** and select. In the Choices selection box, select **MANUAL**.

Table F-14: Manual Cable Calibration Test Equipment Setup (using the HP PCS Interface)		
✓	**Step**	**Action**
	5	Position the cursor at **RUN TEST** and select OR press the **K1** push-button.
	6	Set channel number=<*chan#*>: – Position cursor at **Channel Number** and select. – Enter the *chan#* using the numeric keypad and then press **[Enter]** (the screen will blank). – When the screen reappears, the *chan#* will be displayed on the channel number line.
		NOTE – If using a TMPC with Tower Top Amplifier (TTA) skip **Step 7**.
	7	Set RF Generator level= –119 dBm + Cal factor *Example:* –119 dBm + 2 dB = –117 dBm – Continue with **Step 9** (skip Step 8).
	8	Set RF Generator level= –116 dBm + Cal factor. *Example:* –116 dBm + 2 dB = –114 dBm
	9	Set the user fixed Attenuation Setting to **0 dB**: – Position cursor at **RF Generator Level** and select. – Position cursor at **User Fixed Atten Settings** and select. – Enter 0 (zero) using the numeric keypad and press **[Enter].**
	10	Select **Back to Previous Menu.**
	11	Select **Quit,** then select **Yes.**

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Calibrating Test Cable Setup using Advantest R3465

NOTE

Be sure the GPIB Interface is OFF for this procedure.

Perform the procedure in Table F-15 to calibrate the test cable setup using the Advantest R3465. Advantest R3465 Manual Test setup and calibration must be performed at both the TX and RX frequencies.

Table F-15: Procedure for Calibrating Test Cable Setup Using Advantest R3465	
Step	**Action**
	NOTE – This procedure can only be performed *after* test equipment has been allowed to warm–up and stabilize for a *minimum of 60 minutes*.
1	Press the **SHIFT** and the **PRESET** keys located below the display.
2	Press the **ADVANCE** key in the MEASUREMENT area of the control panel**.**
3	Select the **CDMA Sig** CRT menu key.
4	Select the **Setup** CRT menu key.

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Table F-15: Procedure for Calibrating Test Cable Setup Using Advantest R3465	
Step	**Action**
5	Using the vernier knob and the cursor keys set the following parameters: **NOTE** Fields not listed remain at default. **Generator Mode:** SIGNAL **Link:** FORWARD **Level Unit:** dBm **CalCorrection:** ON **Level Offset:** OFF
6	Select the **return** CRT menu key.
7	Press **FREQ** key in the ENTRY area.
8	Set the frequency to the desired value using the keypad entry keys.
9	Verify that the **Mod** CRT menu key is highlighting OFF; if not, press the **Mod** key to toggle it OFF.
10	Verify that the **Output** CRT menu key is highlighting OFF; if not, press the **Output** key to toggle it OFF.
11	Press the **LEVEL** key in the ENTRY area.
12	Set the LEVEL to **0 dBm** using the key pad entry keys.
13	Zero power meter. Next connect the power sensor directly to the "RF OUT" port on the R3561L CDMA Test Source Unit.
14	Press the **Output** CRT menu key to toggle Output to ON.
15	Record the power meter reading ________________________
16	Disconnect the power meter sensor from the R3561L RF OUT jack. **NOTE** The Power Meter sensor lower limit is –30 dBm. Thus, only components having losses ≤ 30 dB should be measured using this method. **For best accuracy, always re–zero the power meter before connecting the power sensor to the component being calibrated. Then, after connecting the power sensor to the component, record the calibrated loss immediately.**
17	Disconnect all components in the the test setup and calibrate each one separately. Connect each component one–at–a–time between the "RF OUT" port and the power sensor (see Figure F-13, "Setups A, B, and C"). Record the calibrated loss value displayed on the power meter for each connection. Example: (A) 1st Test Cable = –0.5 dB (B) 2nd Test Cable = –1.4 dB (C) 20 dB Attenuator = –20.1 dB (D) 30 dB Directional Coupler = –29.8 dB
18	Press the **Output** CRT menu key to toggle Output OFF.

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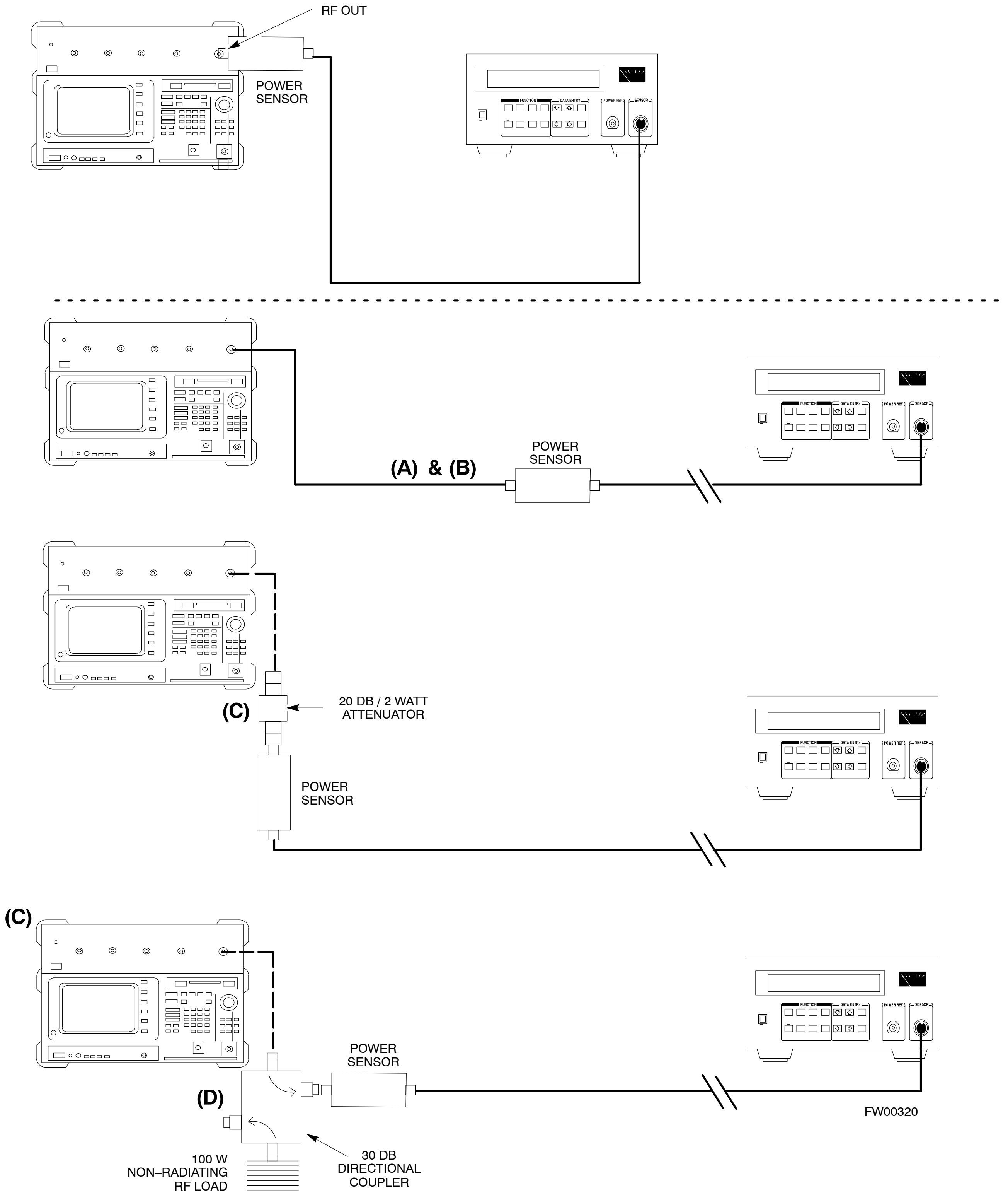
Table F-15: Procedure for Calibrating Test Cable Setup Using Advantest R3465	
Step	**Action**
19	Calculate the total test setup loss by adding up all the individual losses: Example: Total test setup loss = 0.5 + 1.4 + 20.1 + 29.8 = 51.8 dB This calculated value will be used in the next series of tests.
20	Press the **FREQ** key in the ENTRY area.
21	Using the keypad entry keys, set the test frequency to the RX frequency.
22	Repeat steps 9 through 19 for the RX frequency.
23	Refer to Table 3-30 for assistance in manually setting the cable loss values into the LMF.

Figure F-13: Cable Calibration using Advantest R3465



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Agilent E4406A Transmitter Tester Self-alignment (Calibration)

Refer to Figure F-14 and follow the procedure in Table F-16 to perform the Agilent E4406A self–alignment (calibration).

Figure F-14: Agilent E4406A

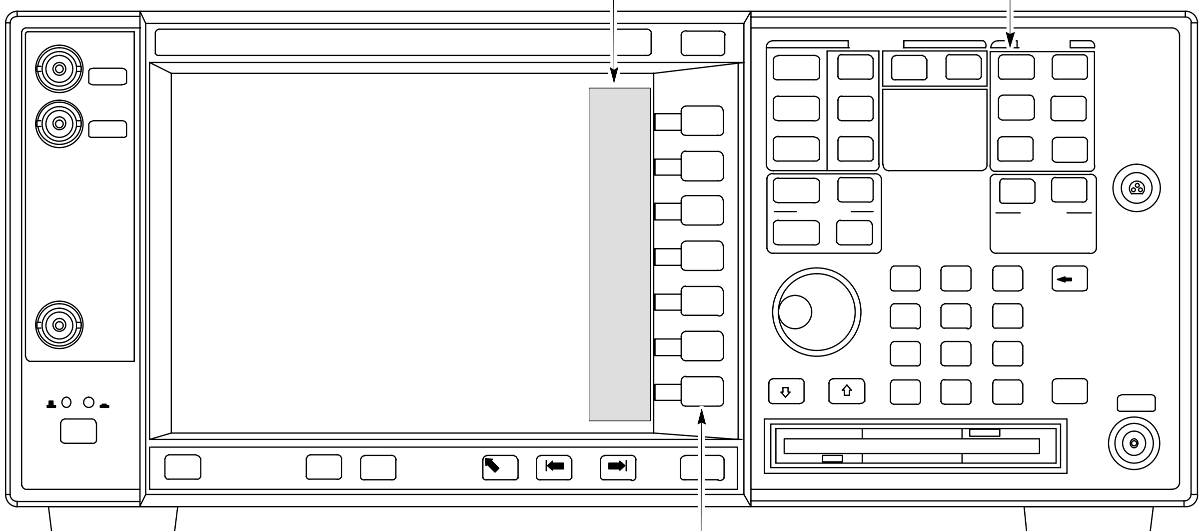

Table F-16: Perform Agilent E4406A Self–alignment (Calibration)

Step	Action
1	In the **SYSTEM** section of the instrument front panel, press the **System** key. – The softkey labels displayed on the right side of the instrument screen will change.
2	Press the **Alignments** softkey button to the right of the instrument screen. – The softkey labels will change.
3	Press the **Align All Now** softkey button. – All other instrument functions will be suspended during the alignment. – The display will change to show progress and results of the alignments performed. – The alignment will take less than one minute.

HP 437 Power Meter (Calibration)

Precise transmit output power calibration measurements are made using a bolometer–type broadband power meter with a sensitive power sensor. Follow the steps in Table F-17 to enter information unique to the power sensor before calibrating the test setup. Refer to Figure F-15 as required.

> **NOTE**
>
> This procedure must be done *before* the automated calibration to enter power sensor specific calibration values.

Figure F-15: Power Meter Detail

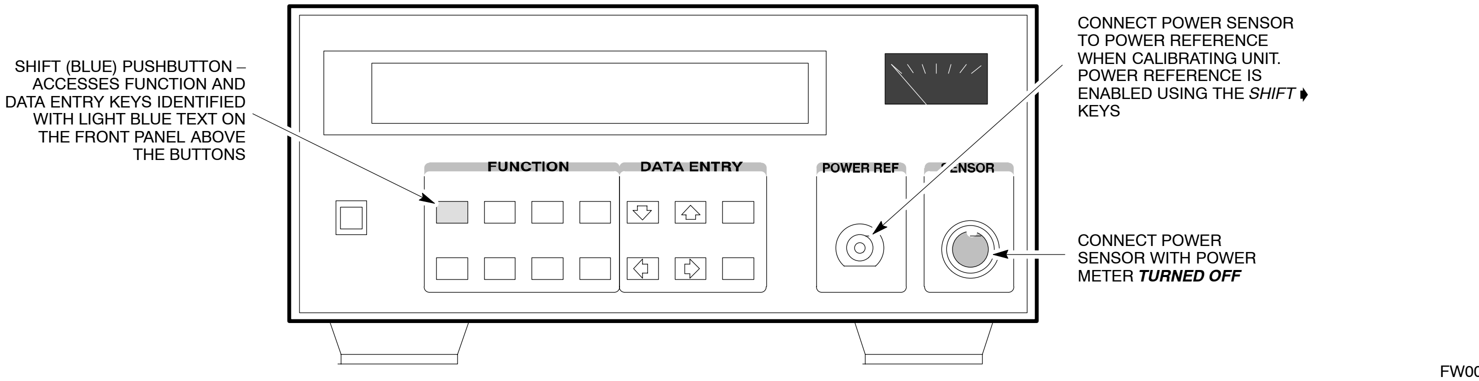

Table F-17: HP 437 Power Meter Calibration Procedure	
Step	**Action**
1	**! CAUTION** Do not connect/disconnect the power meter sensor cable with AC power applied to the meter. Disconnection could result in destruction of the sensing element or mis–calibration. Make sure the power meter **AC LINE** pushbutton is **OFF**.
2	Connect the power sensor cable to the **SENSOR** input.
3	Set the **AC LINE** pushbutton to **ON.** **NOTE** The calibration should be performed only after the power meter and sensor have been allowed to warm–up and stabilize for a *minimum of 60 minutes*.
4	Perform the following to set or verify the correct power sensor model:
4a	– Press **[SHIFT]** then **[⇦]** to select **SENSOR**.
4b	– Identify the power sensor model number from the sensor label.
4c	– Use the **[▲]** or **[▼]** button to select the appropriate model; then press **[ENTER]**.
5	Refer to the illustration for step 8, and perform the following to ensure the power reference output is OFF:
5a	– Observe the instrument display and determine if the triangular indicator over **PWR REF** is displayed.
5b	– If the triangular indicator is displayed, press **[SHIFT]** then **[⇨]** to turn it off.

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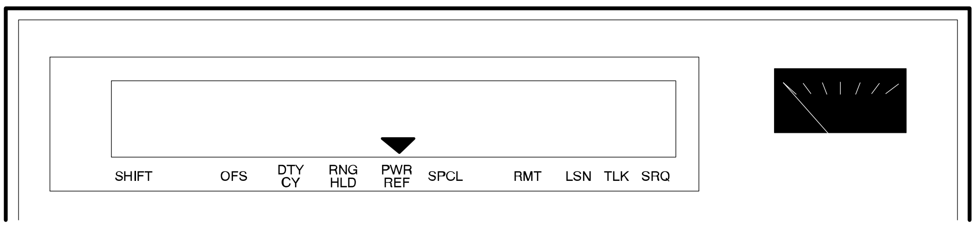
Table F-17: HP 437 Power Meter Calibration Procedure	
Step	**Action**
6	Press **[ZERO]**. – Display will show “Zeroing ******.” – Wait for process to complete.
7	Connect the power sensor to the **POWER REF** output.
8	Turn on the **PWR REF** by performing the following:
8a	– Press **[SHIFT]** then **[▶]**.
8b	– Verify that the triangular indicator (▼) appears in the display above **PWR REF** as shown below. 
9	Perform the following to set the **REF CF%**:
9a	– Press (**[SHIFT]** then **[ZERO]**) for **CAL**.
9b	– Enter the sensor’s **REF CF%** from the sensor’s decal using the arrow keys and press **[ENTER]**. (The power meter will display `"CAL *****"` for a few seconds.) **NOTE** If the REF CAL FACTOR (REF CF) is not shown on the power sensor, assume it to be 100%.
10	Perform the following to set the **CAL FAC %**:
10a	– Press **[SHIFT]** then **[FREQ]** for **CAL FAC**.
10b	– On the sensor’s decal, locate an approximate calibration percentage factor (**CF%**) at the test frequency.
10c	– Enter the sensor’s calibration % (**CF%**) using the arrow keys and press **[ENTER]**. — When complete, the power meter will typically display 0.05 dBm. (Any reading between 0.00 and 0.10 is normal.)
11	To turn off the **PWR REF**, perform the following:
11a	– Press **[SHIFT]** then **[▶]**.
11b	– Disconnect the power sensor from the **POWER REF** output.

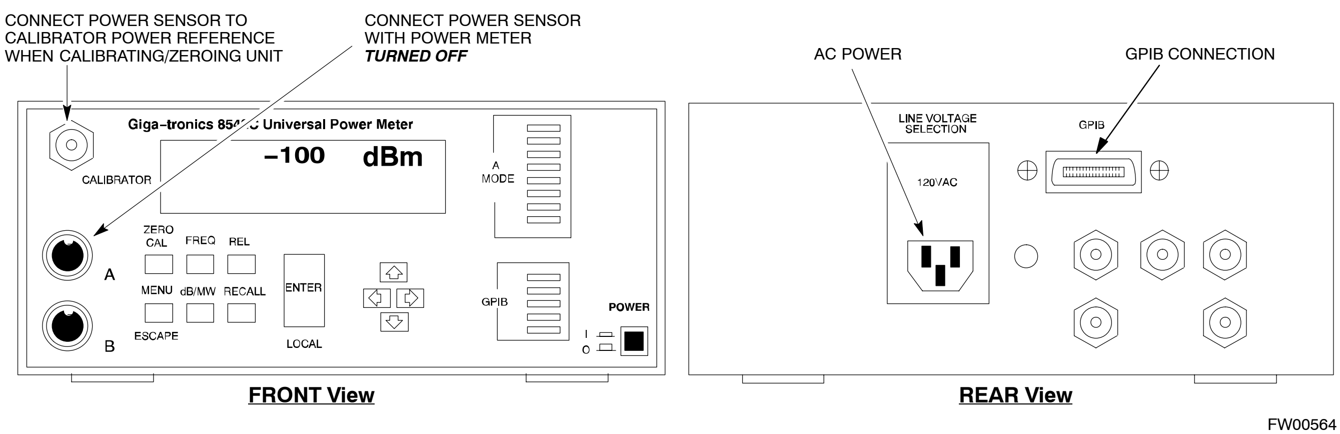
F

Gigatronics 8542 power meter (Calibration)

Precise transmit output power calibration measurements are made using a bolometer–type broadband power meter with a sensitive power sensor. Follow the steps in Table F-18 to enter information unique to the power sensor. Refer to Figure F-16 as necessary.

Table F-18: Calibrate Gigatronics 8542 Power Meter	
Step	**Action**
1	**! CAUTION** Do not connect/disconnect the power meter sensor cable with AC power applied to the meter. Disconnection could result in destruction of the sensing element or miscalibration. Make sure the power meter **POWER** pushbutton is **OFF**.
2	Connect the power sensor cable to the **SENSOR** input.
3	Set the **POWER** pushbutton to **ON.** **NOTE** Allow the power meter and sensor to warm up and stabilize for a *minimum of 60 minutes* before performing the calibration procedure.
4	Connect the power sensor to the **CALIBRATOR** output connector.
5	Press **ZERO**. – Wait for the process to complete. Sensor factory calibration data is read to power meter during this process.
6	When the zeroing process is complete, disconnect the power sensor from the **CALIBRATOR** output.

Figure F-16: Gigatronics 8541C Power Meter



F

Notes

Appendix G: VSWR

Appendix Content

THIS IS THE GENERAL APPENDIX TOC. USE THIS FOR ALL APPENDICES EXCEPT APPENDIX A.

Notes

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Transmit & Receive Antenna VSWR

Purpose

The following procedures will verify that the Voltage Standing Wave Ratio (VSWR) of all antennas and associated feed lines fall within acceptable limits. The tests will be performed on all antennas in a sequential manner (i.e., ANT 1, then ANT 2) until all antennas/feedlines have been verified.

These procedures should be performed periodically by measuring each respective antenna's VSWR (reflected power) to verify that the antenna system is within acceptable limits. This will ensure continued peak system performance.

The antenna VSWR will be calculated at the CDMA carrier frequency assigned to each antenna. Record and verify that they meet the test specification of less than or equal to 1.5:1.

NOTE

Motorola recommends that the installer be familiar with the following procedure in its entirety before beginning the actual procedure. Ensure that the entire site is currently not in service.

This test is used to test RX antennas by substituting RX frequencies for TX frequencies.

Study the site engineering documents and perform the following tests only after **first** verifying that the RF cabling configuration required to interconnect the BTS frames and antennas meet requirements called out in the *BTS Installation Manual.*

Test equipment

The following pieces of test equipment will be required to perform this test:

- LMF
- Directional coupler
- Communications test set

WARNING

Prior to performing antenna tests, insure that no CDMA BBX channels are keyed. Failure to do so could result in personal injury or serious equipment damage.

Equipment Setup – HP Test Set

Follow the procedure in Table G-1 to set up test equipment required to measure and calculate the VSWR for each antenna.

Table G-1: VSWR Measurement Procedure – HP Test Set		
Step	**Action**	**HP TEST SET**
1	***For manual VSWR testing,*** using external directional coupler, refer to Figure G-1. – Connect the communications test set RF IN/OUT port to the INPUT port of the directional coupler. – Connect the ANT IN port of the communication test set to the reverse (RVS) port on the directional coupler. ***Terminate the forward port with a 50 ohm load.*** – Install the antenna feed line to the output port on the directional coupler.	
	NOTE Manual Communications Analyzer test setup (fields not indicated remain at default): • Set screen to **RF GEN**. – Set the **RF Gen Freq** to center frequency of actual CDMA carrier between 869–894 MHz for TX and 824–849 MHz for RX. – Set Amplitude to **–30 dBm**. – Set Output Port to **RF OUT**. – Set AFGen1 & AFGen2 to **OFF**.	
2	Remove the antenna feed line and install an "RF short" onto the directional coupler output port.	
	NOTE Set–up communication test set as follows (fields not indicated remain at default): • Set screen to **SPEC ANL**. – Under Controls, set input port to **ANT**. – Set Ref Level to **–40 dBm**. – Under Controls, select **Main**, select **Auxiliary**. – Under Controls, select **AVG**. Set Avg = **20**.	
3	– Record the reference level on the communications analyzer and ***Note as P_S for reference.*** – Replace the short with the antenna feedline. Record the reference level on the communications analyzer and ***Note for as P_A reference.*** – Record the difference of the two readings in dB.	
4	Calculate the VSWR per the equation shown to the right. *Where:* $R_{L(dB)} = P_{A(dBm)} - P_{S(dBm)}$ P_A = Power reflected from antenna P_S = Power reflected from short A calculated value of –13.98 dB equates to VSWR of better than **1.5:1**. $VSWR = \left[\frac{1 + 10^{\frac{RL}{20}}}{1 - 10^{\frac{RL}{20}}}\right]$	
5	If the readings indicate a potential problem, verify the physical integrity of all cables (including any in–line components, pads, etc.) and associated connections up to the antenna. If problem still persists, consult antenna OEM documentation for additional performance verification tests or replacement information.	

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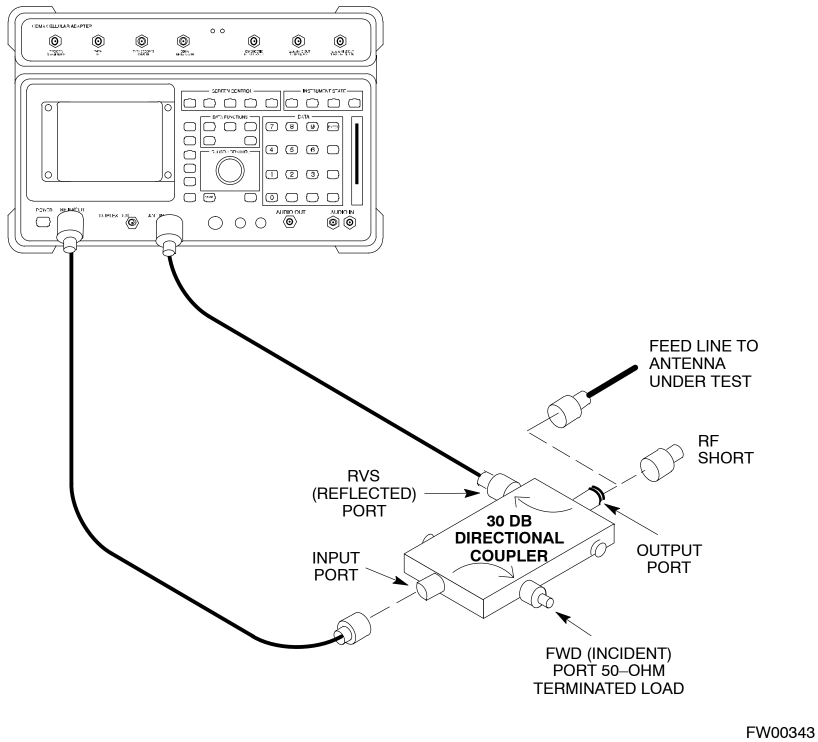
Table G-1: VSWR Measurement Procedure – HP Test Set		
Step	**Action**	**HP TEST SET**
6	Repeat steps 1 through 5 for all remaining TX sectors/antennas.	
7	Repeat steps 1 through 5 for all remaining RX sectors/antennas.	

Figure G-1: Manual VSWR Test Setup Using HP8921 Test Set



Equipment Setup – Advantest Test Set

Follow the procedure in Table G-2 to set up test equipment required to measure and calculate the VSWR for each antenna.

Table G-2: VSWR Measurement Procedure – Advantest Test Set		
Step	**Action**	**ADVANTEST**
1	***If you have not already done so,*** refer to the procedure in Table 3-5 on page 3-15 to set up test equipment and interface the LMF computer to the BTS.	
2	***For manual VSWR testing*** using external directional coupler, refer to Figure G-2. – Connect the communications test set RF OUT port to the input port of the directional coupler. – Connect the INPUT port of the communication test set to the forward port on the directional coupler. ***Terminate the forward port with a 50 Ohm load.*** – Connect the RF short to the directional coupler output port.	

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Table G-2: VSWR Measurement Procedure – Advantest Test Set	
Step	**Action** **ADVANTEST**
3	Preform the following to instruct the calibrated test set to generate a CDMA RF carrier (RVL call) with all zero longcode at the assigned RX frequency at –10 dBm: • Push the **ADVANCE** Measurement key. • Push the **CDMA Sig** CRT menu key. • Push the **FREQ** Entry key: – Set **RF Gen Freq** to center frequency of actual CDMA carrier between 869–894 MHz for TX and 824–849 MHz for RX. • Push the **LEVEL** Entry key; set to **0 dBm** (by entering **0** and pushing the **–dBm** key). • Verify that **ON** is active in the **Output** CRT menu key. • Verify that **OFF** is active in the **Mod** CRT menu key. • Push the **CW** Measurement key. • Push the **FREQ** Entry key. – Push the **more 1/2** CRT menu key. – Set **Preselect** CRT menu key to **3.0G.** • Push the **Transient** Measurement key. – Push the **Tx Power** CRT menu key. – Push the LEVEL entry key (set to 7 dBm by entering 7 and pushing the the dBm key). – Set **Avg Times** CRT menu key to **ON**. Set to **20** (by entering **20** and pushing the **Hz** ENTER key). • Push the **REPEAT** Start key to take the measurement.
4	Record the Burst Power display on the communications analyzer and ***Note as*** $\mathbf{P_S}$ ***for reference.***
5	Install the antenna feedline to the output port of the directional coupler.
6	• Push the **Auto Level Set** CRT menu key. • Push the **REPEAT** Start key to take the measurement.
7	Record the Burst Power on the communications analyzer and ***Note as*** $\mathbf{P_A}$ ***level for reference***. Record the difference of the two readings in dBm.
8	Calculate the VSWR per the equation shown to the right. *Where:* $R_{L(dB)}$ = $P_{A(dBm)} - P_{S(dBm)}$ P_A = Power reflected from antenna P_S = Power reflected from short $$VSWR = \left(\frac{1 + 10^{\frac{RL}{20}}}{1 - 10^{\frac{RL}{20}}} \right)$$ A calculated value of –13.98 dB equates to VSWR of better than **1.5:1**.
9	If the readings indicate a potential problem, verify the physical integrity of all cables (including any in–line components, pads, etc.) and associated connections up to the antenna. If problem still persists, consult antenna OEM documentation for additional performance verification tests or replacement information.

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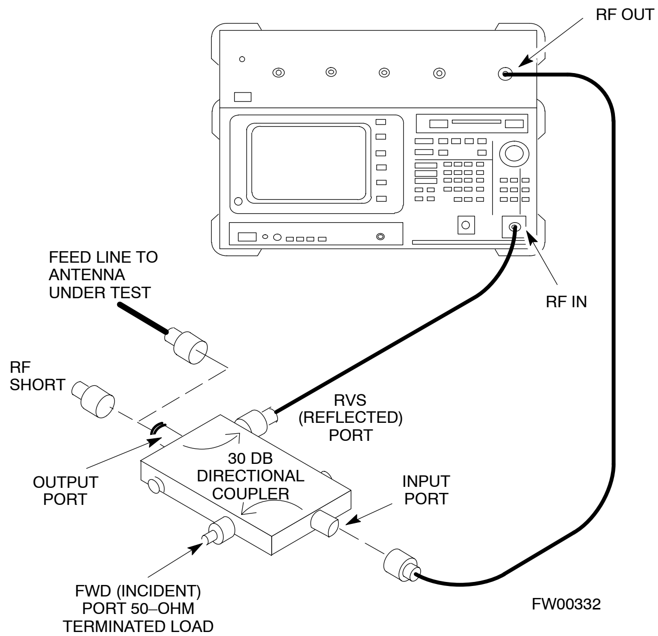
Table G-2: VSWR Measurement Procedure – Advantest Test Set	
Step	**Action** ADVANTEST
10	Repeat steps 2 through 9 for all remaining TX sectors/antennas.
11	Repeat steps 2 through 9 for all remaining RX sectors/antennas.

Figure G-2: Manual VSWR Test Setup Using Advantest R3465



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Notes

Appendix H: Download ROM Code

Appendix Content

THIS IS THE GENERAL APPENDIX TOC. USE THIS FOR ALL APPENDICES EXCEPT APPENDIX A.

Notes

Download ROM Code

ROM code can be downloaded to a device that is in any state. After the download is started, the device being downloaded changes to OOS_ROM (blue) and remains OOS_ROM (blue). The same R–level RAM code must then be downloaded to the device. This procedure includes steps for both the ROM code download and the RAM code download.

ROM code files cannot be selected automatically. The ROM code file must be selected manually. Follow the procedure in Table H-1 to download ROM code.

Prerequisite

- ROM and RAM code files exist for the device to be downloaded.

CAUTION

The R–level of the ROM code to be downloaded must be the same as the R–level of the ROM code for other devices in the BTS. Code must not be mixed in a BTS. This procedure should only be used to upgrade replacement devices for a BTS and it should not be used to upgrade all devices in a BTS. If a BTS is to be upgraded from one R–level to another, the optimization and ATP procedures must first be performed with the BTS in the original configuration. The upgrade should then be done by the CBSC.

Table H-1: Download ROM Code

Step	Action
1	Click on the device to be downloaded. **NOTE** More than one device of the *same* type can be selected for download by either clicking on each one to be downloaded or from the BTS menu bar **Select** pull–down menu, select the *device* item that applies. Where: *device* = the type of device to be loaded (BBX, CSM, GLI, MCC)
2	Click on the **Device** menu.
3	Click on the **Status** menu item. A status report window appears.
4	Make a note of the number in the **HW Bin Type** column. **NOTE** “HW Bin Type” is the Hardware Binary Type for the device. This code is used as the last four digits in the filename of a device’s binary ROM code file. Using this part of the filename, the ROM code file can be matched to the device in which it is to be loaded.

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Table H-1: Download ROM Code	
Step	**Action**
5	Click on the **OK** button to dismiss the status report window.
	NOTE ROM code is automatically selected for download from the `<x>:\<lmf home directory>\version folder>\<code folder>` specified by the NextLoad property in the `bts–#.cdf` file. To check the value of the NextLoad property, click on **Util>Examine>Display Nextload**. A pop–up message will show the value of the NextLoad.
6	Click on the **Download Code Manual** menu item. A file selection window appears.
7	Double–click on the version folder that contains the desired ROM code file.
8	Double–click on the **Code** folder. A list of ROM and RAM code files is displayed.
	! CAUTION A ROM code file having the correct hardware binary type (HW Bin Type) needs to be chosen. The hardware binary type (last four digits in the file name) was determined in step 4. Unpredictable results can happen and the device may be damaged (may have to be replaced) if a ROM code file with wrong binary type is downloaded.
9	Choose a ROM code file having the correct hardware binary type (HW Bin Type). The hardware binary type (last four digits in the file name) was determined in step 4.
10	Click on the ROM code file that matches the device type and HW Bin Type (e.g., bbx_rom.bin.0604 for a BBX having a HW Bin Type of 0604). The file should be highlighted.
11	Click on the **Load** button. A status report window displays the result of the download.
	NOTE If the ROM load failed for some devices, load them *individually* by clicking on one device, perform steps 6 through 11 for it, and repeat the process for each remaining device.
12	Click on the **Ok** button to close the status report window.
13	Click on the **Util** menu.
14	Select the **Tools** menu item.
15	Click on the **Update NextLoad>CDMA** menu item.
16	Select the version number of the folder that was used for the ROM code download.
17	Click on the **Save** button. A pop–up message indicates that the CDF file has been updated.
18	Click on the **OK** button to dismiss the pop–up message.
19	Click on the device that was downloaded with ROM code.
20	Click on the **Device** menu.

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H

Table H-1: Download ROM Code	
Step	**Action**
21	Click on the **Download Code** menu item to download RAM code. A status report window displays the result of the download. **NOTE** Data is automatically downloaded to GLI devices when the RAM code is downloaded. Use the Download Data procedure to download data to other device types after they have been upgraded.
22	Click on the **Ok** button to close the status report window. The downloaded device should be OOS_RAM (yellow) unless it is a GLI in which case it should be INS (green).
23	Click on the device that was downloaded.
24	Click on the **Device** menu.
25	Click on the **Status** menu item. Verify that the status report window displays the correct ROM and RAM version numbers.
26	Click on the **Ok** button to close the status report window.

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Appendix Content

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Notes

BTS Router Initial Configuration

Overview

This appendix contains information and operations related to loading an MWR 1900 or MWR 1941 BTS router with the minimum standard (*canned*) configuration necessary for network communications. Once the router is communicating on the network, the full, site–specific, operational configuration can be downloaded to the router over the network. This appendix includes sections on:

- Setting up communications with a router using a Microsoft® Windows®–based computer
- Downloading BTS router canned configuration files from the OMC–R
- Transferring the canned configuration files from the *Windows*–based computer to the BTS router
- Verifying and replacing/upgrading the IOS version loaded on the CF memory card
- Verifying and, if necessary, replacing/upgrading the ROM monitor low–level operating system version loaded in the BTS router
- Recovery from BTS router initialization with the ROM monitor low–level operating system and troubleshooting to locate and correct the cause
- Changing the router FE interface IP addresses
- Sample listings of the BTS router canned configuration files

Creating a Terminal Session

General – This section provides the procedures to configure and save a terminal session for communicating with the MWR 1900 BTS router. Terminal settings are the same as those used for BTS card and module Man–Machine Interface (MMI) communication sessions. The procedures are for a Pentium® processor–based computer operating with either *Windows* 98 Second Edition (SE) or *Windows* 2000.

Using the LMF computer – LMF computer platforms can be used for communicating with the routers, and the MMI terminal connection created for BTS card/module optimization actions will operate with the BTS routers. See the "Establishing a BTS Router Communication Session" section of this appendix for additional interface hardware required for BTS router communication.

Terminal Settings

Follow the procedure in Table I-1 to create a named HyperTerminal connection for BTS router interface and generate a *Windows* desktop shortcut for it.

NOTE

There are differences between *Windows* 2000 and *Windows* 98 in the menus and screens used for creating a HyperTerminal connection. In the following procedure, items applicable to:

- *Windows* 2000 will be identified with *Win2000*
- *Windows* 98 will be identified with *Win98*

Table I-1: Establish HyperTerminal Connection

Step	Action
1	From the *Windows* Start menu, select: **Programs > Accessories**
2	Perform one of the following: • For *Win2000*, select **Hyperterminal** and then click on **HyperTerminal** • For *Win98*, select **Communications**, double click the **Hyperterminal** folder, and then double click on the **Hypertrm.exe** icon in the window which opens. **NOTE** • If a **Location Information Window** appears, enter the required information, then click on the **Close** button. (This is required the first time a HyperTerminal connection is configured, even if a modem is not to be used.) • If a **You need to install a modem.....** message appears, click on **NO**.

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Table I-1: Establish HyperTerminal Connection	
Step	**Action**
3	When the **Connection Description** box opens: – Type a name for the connection being defined (for example, BTSRTR Session, MMI) in the **Name:** window, – Highlight any icon preferred for the named connection in the **Icon:** chooser window, and – Click **OK**.
4	From the **Connect using:** pick list in the **Connect To** box displayed, select the RS–232 port to be used for the connection (e.g., **COM1** or **COM2 –** *Win2000* or **Direct to Com 1** or **Direct to Com 2 –** *Win98*), and click **OK**.
5	In the **Port Settings** tab of the **COM# Properties** window displayed, configure the RS–232 port settings as follows: • Bits per second: 9600 • Data bits: 8 • Parity: None • Stop bits: 1 • Flow control: None
6	Click **OK**.
7	With the HyperTerminal window still open and the connection running, select: **File > Properties**
8	Click the **Settings** tab, click the arrow in the **Emulation** window, and select **VT100** from the dropdown list.
9	Click the **ASCII Setup** button, uncheck all boxes in the ASCII Setup window which appears, and click **OK**.
10	Click **OK** for the connection Properties box.
11	Save the defined connection by selecting: **File > Save**
12	Close the HyperTerminal window by selecting: **File > Exit**
13	Click the **Yes** button to disconnect when prompted.
14	Perform one of the following: • If the **Hyperterminal** folder window is still open (*Win98*), proceed to step 16, or • From the Windows Start menu, select **Programs > Accessories**
15	Perform one of the following: • For *Win2000*, select **Hyperterminal** and release any pressed mouse buttons. • For *Win98*, select **Communications** and double click the **Hyperterminal** folder.

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Table I-1: Establish HyperTerminal Connection	
Step	**Action**
16	Highlight the newly–created connection icon by moving the cursor over it (*Win2000*) or clicking on it (*Win98*).
17	*Right click and drag* the highlighted connection icon to the *Windows* desktop and release the right mouse button.
18	From the popup menu displayed, select **Create Shortcut(s) Here**.
19	If desired, reposition the shortcut icon for the new connection by dragging it to another location on the *Windows* desktop. **NOTE** The shortcut icon can now be double–clicked to open a BTS router or BTS card/module MMI HyperTerminal session without the need to negotiate multiple menu levels.

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BTS Router Serial Communication

For those procedures which require serial communication with BTS routers, follow the procedures in Table I-2 to initiate the communication session. This procedure calls out the LMF computer platform, but any VT100–equivalent terminal or computer equipped with terminal emulation software and a hardware serial connector may be used.

Required Items

The following items are required to perform the verification:

- LMF computer platform or equivalent (see *1X SC4812T BTS Optimization/ATP; 68P09260A62* for requirements)
- Eight–conductor (four–pair, *un*shielded twisted pair is acceptable) *rollover* cable, two 8–contact modular plugs (see Figure I-1 for cable wiring requirements)
- Adapter, DB–9 plug–to–8–contact modular plug, Global Computer Supplies C4717 or equivalent (see Figure I-2 for adapter wiring requirements)

Figure I-1: Wiring Diagram, BTS Router Communication Rollover Cable

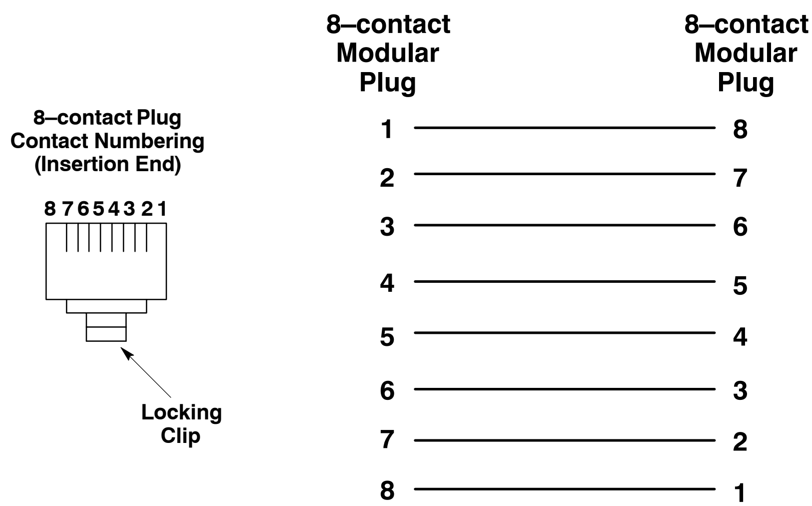

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Figure I-2: Wiring Diagram, DB–9 Plug–to–8–contact Modular Plug Adapter

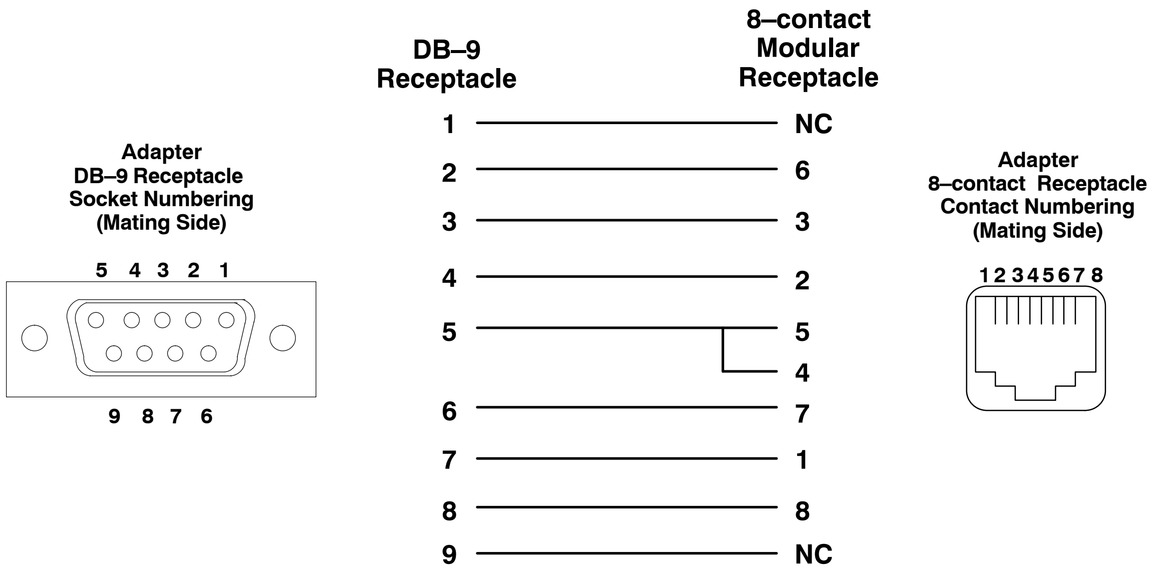
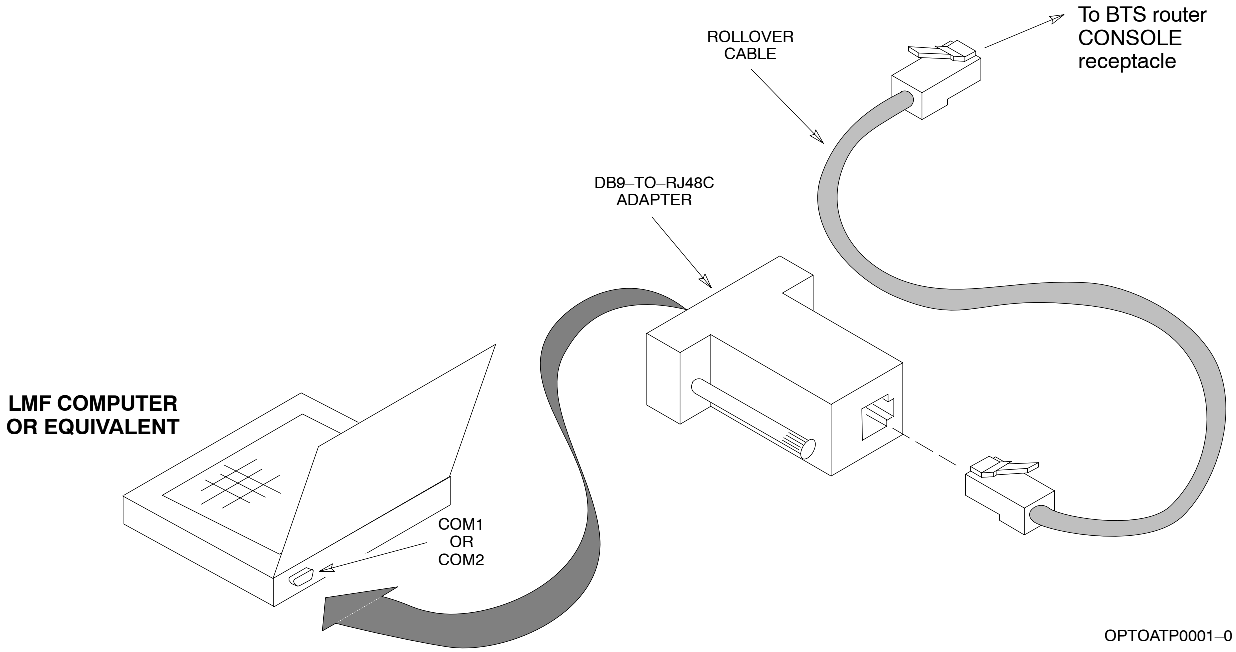


Table I-2: Establishing BTS Router Serial Communication	
Step	**Action**
1	If it has not been done, start the computer and allow it to complete boot–up.
2	If a named HyperTerminal connection for BTS router serial communication or BTS card/module MMI communication has not been created on the LMF computer, create one as described in Table I-1 in the “Terminal Set–up” section of this appendix.
3	Connect the computer to the BTS router as shown in Figure I-3.
4	Start the named HyperTerminal connection for BTS router communication sessions by double clicking on its *Windows* desktop shortcut. **NOTE** If a *Windows* desktop shortcut was not created for the communication session, access the connection from the *Windows* Start menu by selecting: **Programs > Accessories > Hyperterminal > HyperTerminal > <*Named HyperTerminal Connection* *(for example,* *BTSRTR)*>**
5	Once the connection window opens, establish communication with the BTS router by pressing the computer **Enter** key until the prompt identified in the applicable procedure is obtained.

Figure I-3: LMF Computer Connections to BTS Router



Download Canned Configuration Files from the OMC–R

Obtaining BTS Router Minimum (Canned) Configuration Files

After they are generated on the OMC–R, the BTS router canned configuration files must be transfered to another computer platform from which they can be installed into the BTS routers. A number of procedures may be used to move the canned configuration files from the OMC–R to a platform from which they can be loaded into the routers. Some alternatives are:

1. If a floppy diskette drive is available at the OMC–R, such as the one for UNO workstations, the configuration files can be transferred to an LMF computer or similar machine using the CDF file transfer procedure in the Preparing the LMF section of *1X SC4812T BTS Optimization/ATP; 68P09260A62*. Directories identified in Table I-3 must be used rather than those in the CDF file transfer procedure.
2. If a *Windows*–based server connection is available in the operator's network and it can provide an FTP or telnet connection to the OMC–R, files may be transferred by either the FTP or telnet methods.
3. If a dial–up connection is available for accessing the OMC–R, an FTP or telnet session may be possible to transfer files to the computer used to load the CF memory cards.

The procedure provided in this section covers FTP transfer using a *Windows*–based server in the operator's network. Coordinate with the local network administrator to determine the method and procedure to use on a specific network.

Prerequisites

The following must be obtained from the local network administrator before performing the canned configuration file FTP procedure in Table I-3:

- User ID and password to log onto the OMC–R
- Name of the sub–directory where the specific BTS router group canned configuration files to be downloaded were created

FTP File Transfer from the OMC–R

This procedure uses the *Windows*–based LMF computer platform to download BTS router canned configuration files from the OMC–R. Follow the procedure in Table I-3.

<table>
<tr><th colspan="2">Table I-3: BTS Router Canned Configuration File FTP Transfer from the OMC–R</th></tr>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>If it has not been done, create a directory on the LMF computer where the BTS router canned configuration files will be stored.</td></tr>
<tr><td>2</td><td>If it has not been done, obtain the OMC–R logon user ID and password from the local network administrator.</td></tr>
<tr><td>3</td><td>Connect the LMF computer to the local network and log on.</td></tr>
<tr><td>4</td><td>NOTE
This procedure uses the command line FTP client supplied with Windows 98, Second Edition (Win98 SE) and Windows 2000 (Win2K); however, any commercially available FTP client application can be used. Follow the manufacturer’s instructions for operation of an alternative application.

Open a command line (MS DOS) window by clicking on Start > Programs > Command Prompt.</td></tr>
<tr><td>5</td><td>When the command line window opens, change to the directory where the canned configuration files will be stored on the LMF computer by entering:

cd pathname

Where pathname = the path to the required directory

A response similar to the following will be displayed:<pre>
C:\> cd Can_Cfg
C:\Can_Cfg>
</pre></td></tr>
<tr><td>6</td><td>Check the contents of the directory by entering the following:

dir

A response similar to the following will be displayed:<pre>
C:\Can_Cfg>dir
 Volume in drive C is MAIN
 Volume Serial Number is F2AA–1721

 Directory of C:\Can_Cfg>

08/22/2002 03:46p   <DIR>   .
08/22/2002 03:46p   <DIR>   ..
08/22/2002 03:46p   2,223 btsrtr_canned.blue
08/22/2002 03:47p   2,223 btsrtr_canned.red
               2 File(s)   4,644 bytes
               2 Dir(s)   2,556,045,312 bytes free

C:\Can_Cfg>
</pre></td></tr>
</table>

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Table I-3: BTS Router Canned Configuration File FTP Transfer from the OMC–R

Step	Action
7	If either or both of the following files are found in the directory, delete them or move them to another directory: • `btsrtr_config.blue` • `btsrtr_config.red`
8	Begin the FTP session by entering the following: **ftp** *hostname* Where *hostname* = the OMC–R hostname or IP address A response similar to the following will be displayed: `C:\Can_Cfg> ftp OMCR–1` `C:\Can_Cfg>` `Connected to OMCR–1.` `220 OMCR–1 FTP server (SunOS 5.6) ready.` `User (OMCR–1:(none)):`
9	Enter the User ID and password when prompted, pressing the **Enter** key after each. A response similar to the following will be displayed: `User (OMCR–1:(none)): scadm` `331 Password required for scadm.` `Password:` `230 User scadm logged in.` `ftp>`
10	Change to the directory where the BTS router canned configuration file sub–directories are created and verify the present working directory by entering the following, pressing the **Enter** key after each: **cd /home/scadm/btsrtr_canned_configs** **pwd** A response similar to the following will be displayed: `ftp> cd /home/scadm/btsrtr_canned_configs` `240 CWD command successful.` `ftp> pwd` `245 "/home/scadm/btsrtr_canned_configs" is current directory.`

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Table I-3: BTS Router Canned Configuration File FTP Transfer from the OMC–R	
Step	**Action**
11	Enter the following to list the contents of the directory and be sure the specific canned configuration directory name provided by the administrator exists: **ls** A response similar to the following will be displayed: `ftp> ls` `200 PORT command successful.` `150 ASCII data connection for /bin/ls (10.182.29.117,80) (0 bytes).` `Mon_Jul_2_01:55:07_CDT_2002` `Wed_Jul_24_09:35:41_CDT_2002` `Tue_Aug_04_10:35:22_CDT_2002` `226 ASCII Transfer complete.` `ftp: 30 bytes received in 0.02Seconds 1.50Kbytes/sec.` `ftp>` **NOTE** Directory names where canned configuration files are located will consist of the *weekday_month_day_time_year* when the canned configuration files were created on the OMC–R.
12	Change to the directory specified for the BTS router group to be configured and list the directory contents by entering the following, pressing the **Enter** key after each command: **cd** *weekday_month_day_time_year* **ls** A response similar to the following will be displayed: `ftp> cd Wed_Jul_24_09:35:41_CDT_2002` `250 CWD command successful.` `ftp> ls` `200 PORT command successful.` `150 ASCII data connection for /bin/ls (10.182.29.117,80) (0 bytes).` `btsrtr_canned.blue` `btsrtr_canned.red` `226 ASCII Transfer complete.` `ftp: 39 bytes received in 0.05Seconds 0.78Kbytes/sec.` `ftp>`

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Table I-3: BTS Router Canned Configuration File FTP Transfer from the OMC–R	
Step	**Action**
13	Change to the binary transfer mode and, if desired, turn on hash mark printing for transfer progress by entering the following, pressing the **Enter** key after each command: **bin** **hash** A response similar to the following will be displayed: `ftp> bin` `200 Type set to I.` `ftp> hash` `Hash mark printing On  ftp: (2048 bytes/hash mark) .` `ftp>` **NOTE** With *Win98 SE*, turning on hash mark printing can slow down file transfer in certain circumstances, but the canned configuration files are quite small (approximately 2.5 KB) so there should be little noticeable effect.
14	Download the BTS router canned configuration files to the LMF computer by performing the following:
14a	– Enter the following to download the first canned configuration file: **get btsrtr_canned.blue** A response similar to the following will be displayed: `ftp> get btsrtr_canned.blue` `200 PORT command successful.` `150 Binary data connection for btsrtr_canned.blue (10.182.29.117,80)` `(2223 bytes).` `#` `226 Binary Transfer complete.` `ftp: 2223 bytes received in 0.59Seconds 3.76Kbytes/sec.` `ftp>`

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Table I-3: BTS Router Canned Configuration File FTP Transfer from the OMC–R	
Step	**Action**
14b	– Enter the following to download the second BTS router canned configuration file: **get btsrtr_canned.red** A response similar to the following will be displayed: `ftp> get btsrtr_canned.red` `200 PORT command successful.` `150 Binary data connection for btsrtr_canned.red (10.182.29.117,80) (2223 bytes).` `#` `226 Binary Transfer complete.` `ftp: 2223 bytes received in 0.59Seconds 3.76Kbytes/sec.` `ftp>`
15	Before terminating the FTP session, open *Windows* Explorer and view the contents of the directory where the canned configuration files are to be stored to be sure the files are present. Perform the following:
15a	– Click **Start > Programs > Windows Explorer**.
15b	– In the left–hand pane of *Windows* Explorer, perform one of the following depending on the LMF computer operating system: — *Win98 SE*: If necessary, expand the directory display for the drive where the canned configuration file storage directory is located by clicking on the **+** next to the drive icon. — *Win2K*: Expand the user profile and directory display for the drive where the canned configuration file storage directory is located by clicking on the **+** next to each icon, respectively.
15c	– Expand any sub–directories as required to display the directory folder where the canned configuration files are to be stored.
15d	– Click on the directory folder icon where the canned configuration files are to be stored.
15e	– In the *right*–hand pane, verify that the files `btsrtr_canned.blue` and `btsrtr_canned.red` appear.
15f	– If the files appear, proceed to step 16.
15g	– If the files do not appear, repeat step 14, its sub–steps, step 15 and its sub–steps.
16	Close *Windows* Explorer, and, in the command line window, enter the following to terminate the FTP session: **bye** A response similar to the following will be displayed: `ftp> bye` `221 Goodbye.` `C:\Can_Cfg>`

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Table I-3: BTS Router Canned Configuration File FTP Transfer from the OMC–R	
Step	**Action**
17	Close the command line window by entering the following: **exit**
18	BTS router canned configuration files are now ready for transfer to a BTS router.

Verify IOS Version and Install Canned Configuration

Introduction

Overview

This section covers the procedures and commands required to verify the IOS version loaded on BTS router CF memory cards and copy standard canned configuration files to the routers. Because of the set–up required and the length of some of the procedures, Motorola recommends performing the actions covered in this section at a central location to prepare the BTS routers for installation prior to the site visit.

IOS Version Verification and File Sequence Position

Version verification – The IOS version loaded on the BTS router CF memory card should be verified as the version required for operation on the network where the routers will be installed. If the loaded IOS version is not correct, it can be replaced with a different version. There are several methods available to accomplish version verification. These depend on the equipment and software applications the user selects to use in installing the canned configuration files in the BTS routers. Appropriate verification procedures are included in each of the two canned configuration installation methods covered in this section. Methods to change or upgrade the loaded IOS version are provided in the Change or Upgrade BTS Router IOS Version section of this appendix and are referenced at the appropriate places in the canned configuration installation methods.

File sequence position – During initialization, the MWR 1900 or MWR 1941 router will first search the `startup–config` file for a boot system command line telling it in what directory and file to find the boot loader. If this line is not found, the router will default to attempting to boot from the first file in its flash memory. Flash memory for the MWR 1900 or MWR 1941 is the CF memory card (software identifier **slot0:**). The canned configuration files used for BTS router installation do not contain a boot system command line because of the need to maintain flexibility for IOS version changes. Because of this, it is critical that *the IOS file is the first file listed on the CF memory card*. The canned configuration installation procedures contain steps to assure that this is the case, and, if it is not, provide guidance to correct the condition. It is important to remember that, if the router boots and displays a `rommon 1 >` prompt, the IOS file is missing, out of sequence, has a corrupted flash memory image or the `startup–config` file contains a boot system line which specifies a missing or incorrect IOS pathname/filename.

Canned Configuration File Installation

Filename and installation location requirements – The canned configuration files for the BTS routers must be copied to the CF memory card. The filename of the file on the CF memory card *must* be `canned–config`. Canned configuration file location and filename requirements are a result of Mobile Wireless Center (MWC) actions during the process of switching a BTS from packet to circuit mode or during BTS re–parenting to another OMC–R. In this process, the MWC will query the BTS routers' slot0: directory for a file named `canned–config`. A missing or mis–named file will cause problems with execution of the mode–switching process.

Installation Method – The `startup–config` configuration file used by the BTS router during initialization is stored in NVRAM. This is a memory device internal to the router and is separate from the CF memory card. To install the canned configuration file so the router will use it during boot–up, the file must be copied into the `startup–config` file in NVRAM. This requires copying the canned configuration file from the *Windows*–based LMF computer to the CF memory card installed in a router, and then copying it to the `startup–config` file in the router's NVRAM. *The only Motorola–supported method to copy files to the BTS router CF memory card is through tftp file transfer.*

CAUTION

Motorola does not support using a CF memory card reader to copy files to the BTS router CF memory card. *Do not* use a CF memory card reader for either of the following actions:

- Formatting a BTS router CF memory card
- Copying files to a BTS router CF memory card

CAUTION

Do not format BTS router CF memory cards using a CF memory card reader. Only format CF memory cards in a BTS router. Using a card reader to format the CF memory card will result in improper BTS router initialization which requires special recovery procedures.

Using a TFTP Server to Copy Files to CF Memory Card

Required Equipment and Software

The following items are required to perform this procedure:

- A *Windows*–based computer which meets the requirements of the LMF computer platform as specified in *1X SC4812T BTS Optimization/ATP; 68P09260A62* original design frame, or *1X SC4812T–CLPA BTS Optimization/ATP; 68P64115A06* for updated design frames.
- One of the following operating systems for the *Windows*–based computer:

– *Windows* 2000
– *Windows* 98 Second Edition (SE) using the *FAT32* file system

CAUTION

BTS router CF memory cards loaded using computers equipped with *Windows* 98 versions earlier than *Windows* 98 SE and using the FAT16 file system will not operate properly, resulting in a complete site outage.

- One of the following for the *Windows*–based computer:
  – Internal 10/100baseT Network Interface Card (NIC)
  – PCMCIA 10/100baseT NIC
- Cable, *rollover*, as described in the Establishing a BTS Router Communication Session section of this Appendix
- DB–9 plug–to–8–contact modular plug adapter as described in the Establishing a BTS Router Communication Session section of this Appendix
- Cable, Ethernet *crossover*, Category 5E or better, unshielded twisted pair, two 8–contact modular plugs, in one of the following lengths, as determined necessary:
  – 0.3 m (11.8 in) (Motorola pn 3088643C07)
  – 0.6 m (23.6 in)(Motorola pn 3088643C13)
  – 1.0 m (39.4 in) (Motorola pn 3088643C15)
  – 2.1 m (84 in) (Motorola pn 3088643C08)
  – 3.0 m (120 in) (Motorola pn 3088643C09)
- A +27 Vdc power supply to power the BTS router during configuration file operations
- A tftp server software application (refer to the Setting Up the TFTP Server – Procedure in *Cellular System Administration – CDMA OnLine Documentation, 68P09259A20*) such as:
  – Cisco tftp server
  – PumpKIN tftp server
  – Any other equivalent tftp server application
- A copy of the MWR 1900 or MWR 1941 router IOS version required for the network where the routers are to be installed (contact the network administrator or the Motorola account team for information on obtaining the required MWR 1900 or MWR 1941 IOS version)

Required Materials

The following material is required to perform this method:

- Marking material to identify the BTS router and CF memory card with the installed configuration (blue or red)

Required Publications

The following publications are required to perform procedures in this section:

- *1X SC4812T BTS Optimization/ATP; 68P09260A62* original frame design or *1X SC4812T–CLPA BTS Optimization/ATP; 68P64115A06* for updated design frames
- *Cellular System Administration – CDMA OnLine Documentation, 68P09259A20*
- *MWR1900 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*

Preparation for Canned Configuration File TFTP Transfer to CF Memory Card

Preparation for a canned configuration file tftp transfer consists of the following activities:

1. Determining the speed of the LMF computer NIC (10 or 100 MHz)
2. Setting the LMF computer NIC IP address
3. Creating a directory (folder) on the LMF computer to be used for all tftp file transfers
4. Installing the tftp server application on the LMF computer, and setting the tftp server application root directory to the directory created in 2, above
5. Connecting the LMF computer to the BTS router for both HyperTerminal (serial) and Ethernet communication
6. BTS router power–up and initial configuration for Ethernet communication

The following procedures are used to accomplish all of these preparatory actions.

Set LMF computer NIC TCP/IP address and create the default TFTP directory – Follow the procedure in Table I-4 to set the NIC IP address.

IMPORTANT

If the IP address for the LAN connection on an LMF computer is being changed to support tftp downloads to a BTS router, the BTS 10base–2 LAN IP address and subnet mask for the NIC must be restored before the LMF can log into a BTS to perform an optimization or ATP.

NOTE

There are differences between *Windows* 2000 and *Windows* 98 in the menus and screens used for setting or changing a NIC connection. In the following procedure, items applicable to:

- *Windows* 2000 will be identified with *Win2000*
- *Windows* 98 will be identified with *Win98*

Table I-4: Determine LMF Computer NIC Speed, Set NIC IP Address, and Create a Default TFTP Directory

Step	Action
1	If it is not known, determine and record the speed of the LMF computer NIC (10 or 100 MHz) for use in step 7 of Table I-6.
2	Start the computer.
3	Login and allow the computer to boot to the desktop.
4	Depending on the installed operating system, from the *Windows* Start menu, select one of the following: • *Win2000*: **Settings > Network and Dial–up Connections** • *Win98*: **Settings > Control Panel** and double–click **Network**.
5	Perform one of the following as applicable for the installed operating system: • For *Win2000*, in the list of displayed connections, locate the Local Area Network connection for the NIC to be used for BTS router Ethernet communication. • For *Win98*, in the **Configuration** tab of the **Network** dialog box, locate the TCP/IP connection for the installed NIC. – If **TCP/IP** does not appear in the displayed list of installed network components, refer to the operating system documentation and install TCP/IP.
6	Perform one of the following as applicable for the installed operating system: • For *Win2000*, highlight the connection for the NIC and right click the highlighted connection, and select **Properties** from the pop–up menu. • For *Win98*: – Highlight the TCP/IP NIC connection in the displayed list of installed network components. – Click the **Properties** button. – Skip to step 9.
7	For *Win2000* , in the **Local Area Connection Properties** dialog box which appears, if Internet Protocol (TCP/IP) is not showing in the *Components checked are used by this connection:* listbox, refer to the operating system documentation and install TCP/IP.
8	For *Win2000*, if the checkbox next to the Internet Protocol (TCP/IP) entry is not checked, click in the box to check it.
9	Perform one of the following: • *Win2000*: Highlight the Internet Protocol (TCP/IP) entry, and click on the **Properties** button below the *Components checked are used by this connection:* listbox. • *Win98*: From the tabs displayed in the **TCP/IP Properties** dialog box which opens, select the **IP Address** tab if it is not at the front.
10	In the **Internet Protocol (TCP/IP) Properties** dialog box which appears (*Win2000*) or the **IP Address** tab of the **TCP/IP Properties** dialog box (*Win98*), perform the following:
10a	– If a black dot is not showing in the the radio button circle next to **Use the following IP address:** (*Win2000*) or **Specify an IP address** (*Win98*), click on the radio button. — A black dot will appear in the circle.

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Table I-4: Determine LMF Computer NIC Speed, Set NIC IP Address, and Create a Default TFTP Directory	
Step	**Action**
10b	– If using an LMF computer, record the IP address and subnet mask used for LMF–BTS communication so they can be re–entered when tftp transfer activities for the BTS router are completed.
10c	– Enter **100.100.100.1** in the **IP address:** box.
10d	– Enter **255.255.255.252** in the **Subnet mask:** box.
11	Click the **OK** button for the **Internet Protocol (TCP/IP) Properties** dialog box (*Win2000*) or the **TCP/IP Properties** box (*Win98*).
12	Click the **OK** button for the **Local Area Connection Properties** box (*Win2000*) or the **Network** box (*Win98*).
13	In *Win98*, click **File > Close** to close the **Control Panel** window.
14	Click **Start > Programs > Windows Explorer** to open *Windows* Explorer.
15	If the default tftp directory will be the same directory in which the files downloaded from the OMC–R are stored, proceed to step 23.
16	In the *left*–hand pane of *Windows* Explorer, locate the icon for the drive where the default tftp directory is to be created.
17	Highlight the drive icon and click **Files > New > Folder**.
18	While observing the new folder icon in the *right*–hand pane, type the name for the folder (for example, *tftp_files*), and press the **Enter** key.
19	In *Windows* Explorer, locate the directory where the canned configuration files downloaded from the OMC–R are stored.
20	In the *left*–hand pane, highlight the directory where the files are stored.
21	Scroll the *left*–hand pane until the newly–created default tftp directory is visible.
22	In the *right*–hand pane, highlight the canned configuration files and drag them to the default tftp directory.
23	In the *left*–hand pane, click on the default tftp directory, and verify that the canned configuration files appear in the *right*–hand pane.
24	Load a copy of the required BTS router IOS version into the default tftp directory using FTP, internet download, or media such as a Zip disk (file size is over 7 MB).
25	Click **Files > Close** to close *Windows* Explorer.

Install and configure tftp server application – To obtain, install, and configure the Cisco or PumpKIN tftp software applications, refer to the Setting Up the TFTP Server – Procedure in *Cellular System Administration – CDMA OnLine Documentation, 68P09259A20* For other tftp server applications, install and configure the application according to the manufacturer’s instructions.

IMPORTANT

When entering the name of the tftp server root directory while configuring the tftp server application, be sure to use the name of the directory identified in Table I-4, step 15, or created in Table I-4, step 18, above.

Connect the LMF computer to the BTS router – Connect the LMF computer to the BTS router by following the procedure in Table I-5 and referring to Figure I-4.

Figure I-4: LMF Computer TFTP Connections to BTS Router

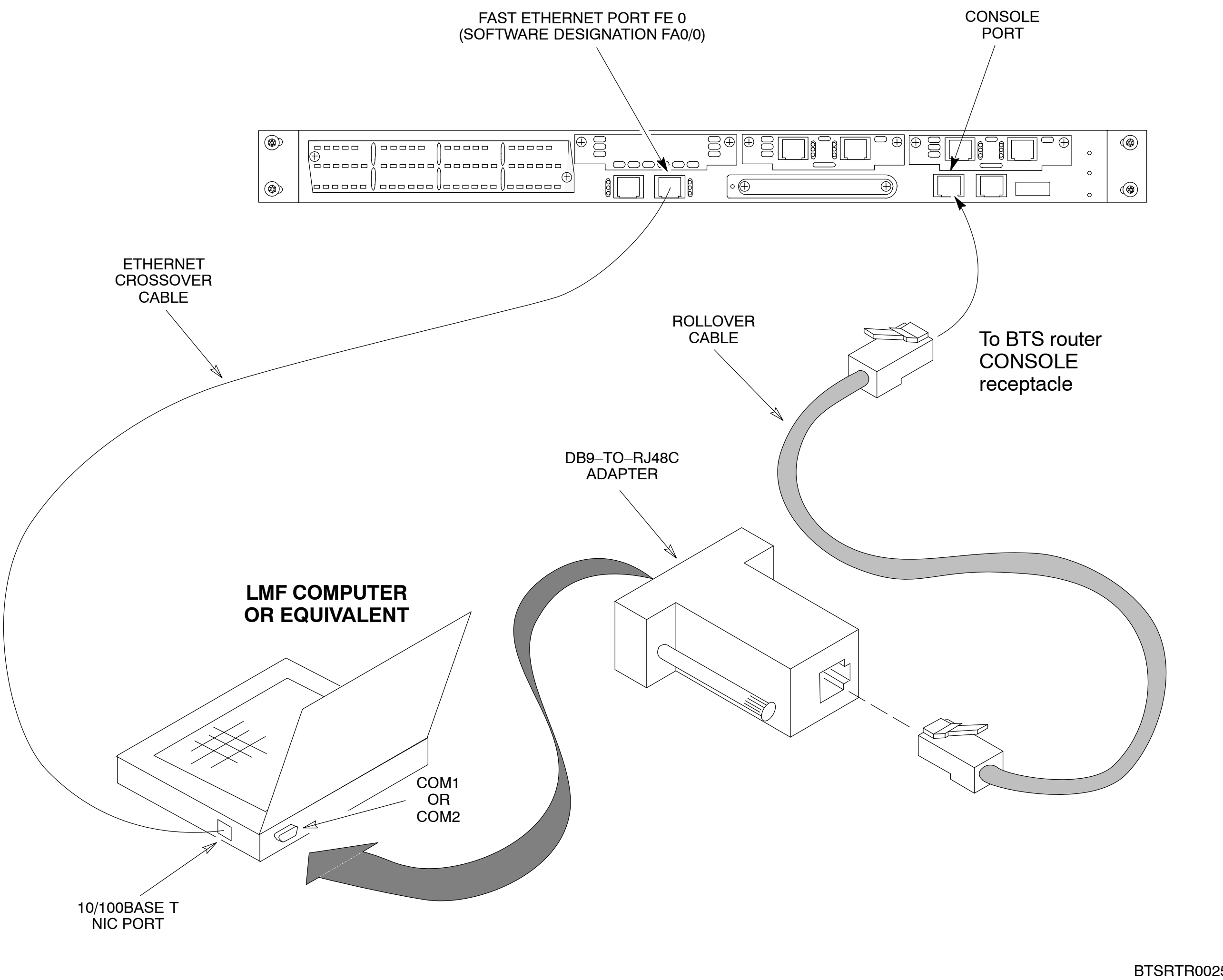

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Table I-5: Connecting the LMF Computer to the BTS Router for TFTP File Transfer	
Step	**Action**
1	If the BTS router has not been connected to a power source, be sure the +27 Vdc power source is not on, and connect it to the router.
2	Connect the LMF computer to the BTS router as shown in Figure I-4, referring to the list of required equipment in this section as required.
3	If the LMF computer has not been started, turn it on, login, and allow it to boot to the desktop.
4	Refer to the procedure in Table I-2 of this appendix, and start a HyperTerminal communication session for the BTS router.
5	Start the tftp server application as specified for the software (refer to the Setting Up the TFTP Server – Procedure in *Cellular System Administration – CDMA OnLine Documentation, 68P09259A20* or the manufacturer's instructions).

BTS router power–up and initial configuration for Ethernet communication – Follow the procedure in Table I-6 to apply power to the router and set an initial configuration for Ethernet communication.

- The required version of the IOS is loaded on the CF memory card
- The CF memory card is installed in the BTS router

Table I-6: BTS Router Power–up and Initial Ethernet Configuration	
Step	**Action**
*** IMPORTANT** This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in *MWR1900 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*. Have this publication available for reference while performing this procedure.	
1	Be sure a CF memory card loaded with the Cisco IOS is installed in the BTS router (refer to the BTS Router CF Memory Card Removal and Replacement section of this Appendix for instructions to access the CF memory card slot).
2	*** IMPORTANT** In this step *do not touch the computer keyboard until the router completes the boot process*. The router will buffer any keystrokes made during the boot process and interpret them as commands to be executed immediately following boot completion. Apply power to the router and allow it to complete boot–up.
3	If a message similar to the following, is displayed, press the **Enter** key and proceed to step 5: `Press RETURN to get started!`

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<table>
<tr><th colspan="2">Table I-6: BTS Router Power–up and Initial Ethernet Configuration</th></tr>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>4</td><td>If a message similar to the following, is displayed type no and press the Enter key:

<code>Basic management setup configures only enough connectivity</code>
<code>for management of the system, extended setup will ask you</code>
<code>to configure each interface on the system</code>

<code>Would you like to enter basic management setup? [yes/no]:</code>

A response similar to the following will be displayed:

<code>Would you like to enter basic management setup? [yes/no]: no</code>

<code>Cisco Internetwork Operating System Software</code>
<code>IOS (tm) 1900 Software (MWR1900–I–M), Version 12.2(20020127:101239</code>
<code>Copyright (c) 1986–2002 by cisco Systems, Inc.</code>
<code>Compiled Sun 27–Jan–02 06:08 by walrobin</code>

<code>Router></code></td></tr>
<tr><td>5</td><td>At the <code>Router></code> user EXEC mode prompt, enter the following to access the privileged EXEC mode:

enable

A response similar to the following will be displayed:

<code>Router>enable</code>
<code>Router#</code></td></tr>
<tr><td>6</td><td>At the <code>Router#</code> privileged EXEC mode prompt, enter the following to access the configure submode:

configure terminal

A response similar to the following will be displayed:

<code>Router#conf t</code>
<code>Enter configuration commands, one per line. End with CNTL/Z.</code>
<code>Router(config)#</code>

The router is now in the global configuration mode and ready to accept configuration changes entered from the keyboard.</td></tr>
</table>

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Table I-6: BTS Router Power–up and Initial Ethernet Configuration

Step	Action
7	At the global configuration mode prompt, type each of the following commands, pressing the **Enter** key after each command: **hostname btsrtr1** **int**erface **fa0/0** **ip address 100.100.100.2 255.255.255.252** **speed 100** or **10** depending on the speed of the LMF computer NIC **duplex full** **no shutdown** **line con 0** **exec–timeout 0 0** **no login** **line vty 0 4** **no login** Responses similar to the following will be displayed: `Router(config)#hostname BTSRTR1` `BTSRTR1(config)#interface fa0/0` `BTSRTR1(config–if)#ip address 100.100.100.2 255.255.255.252` `BTSRTR1(config–if)#speed 100` `BTSRTR1(config–if)#duplex full` `BTSRTR1(config–if)#no shutdown` `BTSRTR1(config–if)#line con 0` `BTSRTR1(config–line)#exec–timeout 0 0` `BTSRTR1(config–line)#no login` `BTSRTR1(config–line)#line vty 0 4` `BTSRTR1(config–line)#no login` `BTSRTR1(config–line)#`
8	Once the correct parameters have been set, return to the privileged EXEC mode prompt by holding down the **Ctrl** key and pressing **z** (**Ctrl+z**). A response similar to the following will be displayed: `BTSRTR1(config–line)#  ^z` `01:11:27: %SYS–5–CONFIG_I: Configured from console by console` `BTSRTR1#` **NOTE** Entering **exit** twice, pressing the **Enter** key after each entry, will also complete the configuration process and return the router to the privileged EXEC mode.

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Table I-6: BTS Router Power–up and Initial Ethernet Configuration

Step	Action
9	Verify port FE 0 (fa0/0) is configured with the correct IP address by entering the following: **sh**ow **ip** **int**erface **br**ief A response similar to the following will be displayed: `BTSRTR1#sh ip int br` `Interface        IP Address      OK?  Method  Status                 Protocol` `FastEthernet0/0  100.100.100.2   YES  manual  up                       up` `Serial0:0        unassigned      YES  unset   administratively down  down` `FastEthernet0/1  unassigned      YES  unset   administratively down  down` `Serial1:0        unassigned      YES  unset   administratively down  down` `BTSRTR1#`
10	The router is now configured for Ethernet communication on FE 0, and the canned configuration file can be transferred by tftp. Proceed to Table I-7.

Verifying IOS Version and Canned Configuration File TFTP Transfer to the BTS Router

Prerequisites – The following is required prior to performing this procedure:

- A copy of the required MWR 1900 or MWR 1941 router IOS version file is installed in the default tftp directory (transfer the file to the LMF computer using FTP, internet download, or media such as a Zip disk; file size is approximately 7–8 MB)

IMPORTANT

MWR 1941 routers must be loaded with IOS version mwr1900–i–mz.122–8.MC2d.bin or later. This router model will not function properly with earlier IOS versions.

IOS verification and canned configuration file transfer – Follow the procedure in Table I-7 to verify the loaded IOS version and transfer the canned configuration files from the LMF computer to the BTS router CF memory card.

IMPORTANT

This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in *MWR1900 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*. Have this publication available for reference while performing this procedure.

Table I-7: Transfer Canned Configuration Files to the BTS Router Using a TFTP Server

Step	Action
	! CAUTION If personal firewall and/or intrusion detection software such as Black ICE is running on the LMF computer, shut it down before performing this procedure. If this is not done, the tftp transfer process will not operate.
1	On the LMF computer, if it has not been done, start the tftp server according to the manufacturer's directions (refer to the Setting Up the TFTP Server – Procedure in the *Cellular System Administration – CDMA OnLine Documentation, 68P09259A20*).
2	If a HyperTerminal communication session with the BTS router is not running, start one following the procedure in Table I-2.
3	In the HyperTerminal window, the router must be in the *privileged* EXEC mode, as indicated by a number sign at the end of the prompt: `BTSRTR1#`
4	Be sure the Ethernet crossover cable is connected between the LMF computer NIC port and the BTS router FE 0 port (Figure I-4).

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Table I-7: Transfer Canned Configuration Files to the BTS Router Using a TFTP Server	
Step	**Action**
5	Begin verification that the CF memory card contains the correct version of the Cisco IOS by entering the following: **dir** slot0: A response similar to the following will be displayed: `BTSRTR1#dir slot0:` `Directory of slot0:/` `  1  –rw–  7051976   Mar 01 1993 00:11:34  mwr1900–i–mz.122–8.MC2a.bin` `31932416 bytes total (24879104 bytes free)` `BTSRTR1#` **NOTE** 1. The IOS defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the **cd** command. Determine the present working directory by entering **pwd**. If the present working directory has been changed, enter the command **cd slot0:** to return to the default setting. 2. If slot0: is included in the command, be sure to include the colon (**:**) after **slot0** when typing the command. 3. The IOS filename will be similar to the following: **mwr1900–i–mz.122–8.MC2a.bin**

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Table I-7: Transfer Canned Configuration Files to the BTS Router Using a TFTP Server	
Step	**Action**
6	Direct the router to show the version information by entering the following: **sh**ow **ver**sion A response similar to the following will be displayed: `BTSRTR1#sh ver` `Cisco Internetwork Operating System Software` `IOS (tm) 1900 Software (MWR1900–I–M), Version 12.2(8)MC2a, EARLY DEPLOY-MENT RELEASE SOFTWARE (fc1)` `TAC Support: http://www.cisco.com/tac` `Copyright (c) 1986–2002 by cisco Systems, Inc.` `Compiled Mon 05–Aug–02 11:07 by nmasa` `Image text–base: 0x60008940, data–base: 0x60B54000` `ROM: System Bootstrap, Version 12.2(20020113:235343) [sbose–wilma 109], DEVELOPMENT SOFTWARE` `ROM: 1900 Software (MWR1900–I–M), Version 12.2(8)MC2a, EARLY DEPLOYMENT RELEASE SOFTWARE (fc1)` `Router uptime is 1 minute` `System returned to ROM by power–on` `System image file is ”slot0:mwr1900–i–mz.122–8.MC2a.bin”` `cisco mwr1900 (R7000) processor (revision 0.1) with 121856K/18432K bytes of memory.` `Processor board ID JMX0611K5TS` `R7000 CPU at 240Mhz, Implementation 39, Rev 3.3, 256KB L2 Cache` `Bridging software.` `X.25 software, Version 3.0.0.` `Primary Rate ISDN software, Version 1.1.` `Toaster processor tmc is running.` `2 FastEthernet/IEEE 802.3 interface(s)` `2 Serial network interface(s)` `2 Channelized T1/PRI port(s)` `DRAM configuration is 64 bits wide with parity disabled.` `55K bytes of non–volatile configuration memory.` `31360K bytes of ATA Slot0 CompactFlash (Read/Write)` `Configuration register is 0x101` `BTSRTR1#`
7	Compare the IOS filename returned in step 5 and the second line of the version information in step 6. Note the correspondence between the filename and IOS version information. *** IMPORTANT** MWR 1941 routers must be loaded with IOS version mwr1900–i–mz.122–8.MC2d.bin or later. This router model will not function properly with earlier IOS versions.

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Table I-7: Transfer Canned Configuration Files to the BTS Router Using a TFTP Server	
Step	**Action**
8	If the IOS filename from the CF memory card returned in step 5 is different than the filename of the required IOS version loaded in the LMF computer default tftp directory, perform the procedure in Table I-8 to load the required version, and then return to step 9, below.
9	**! CAUTION** The file sequence on the CF memory card can not be verified with application programs which place the listed file names in alphabetical order (for example, certain Unix telnet applications, Unix directory listing commands, and *Windows* file managers such as *Windows* Explorer). This portion of the procedure is intended for use only with applications, such as HyperTerminal, which do not list directory contents alphabetically. If the IOS version is correct and there is more than one file loaded on the CF memory card, be sure the *IOS file is the first file listed* in the directory content display. If it is not, perform the following:
9a	– Backup all files on the CF memory card to the LMF computer default tftp directory by performing steps 3 through 10 of Table I-8.
9b	– Perform steps 25 through 29 of Table I-8, as applicable.
9c	– Type the following to delete a possible boot system line in the startup–config file, pressing the **Enter** key after the command and at each prompt to confirm the filename and deletion operation: **del nvram:startup–config** A response similar to the following will be displayed: `BTSRTR1#del nvram:startup–config` `Delete filename [startup–config]?` `Delete nvram:startup–config? [confirm]` `[OK]` `BTSRTR1#` **NOTE** Be sure to include the colon (**:**) after **nvram** when typing the command.

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Table I-7: Transfer Canned Configuration Files to the BTS Router Using a TFTP Server

Step	Action
9d	– Verify the startup–config file size has been reduced to a minimum by entering the following: **dir nvram:** A response similar to the following will be displayed: `Router#dir nvram:` `Directory of nvram:/` `53  –rw–      5      <no date>  startup–config` `54  ––––      5      <no date>  private–config` `57336 bytes total (57274 bytes free)` `BTSRTR1#`
10	At the *privileged* EXEC mode prompt, enter the following: **copy tftp:btsrtr_canned.***color* **slot0:canned–config** Where *color* = **blue** or **red**, as applicable. A response similar to the following will be displayed: `BTSRTR1#copy tftp:btsrtr_canned.blue slot0:canned–config` `Address or name of remote host []?`
11	At the prompt for the remote host address or name, enter the IP address of the LMF computer NIC: **100.100.100.1** A response similar to the following will be displayed: `BTSRTR1#copy tftp:btsrtr_canned.blue slot0:canned–config` `Address or name of remote host []? 100.100.100.1` `Destination filename [canned–config]?`
12	At the prompt for the destination filename, press the **Enter** key. A response similar to the following will be displayed: `BTSRTR1#copy tftp:btsrtr_canned.blue slot0:canned–config` `Address or name of remote host []? 100.100.100.1` `Destination filename [canned–config]?` `Loading btsrtr_canned.blue from 100.100.100.1 (via Ethernet0/0): !` `[OK – 2457/4096 bytes]` `2457 bytes copied in 84.724 secs (29 bytes/sec)` `BTSRTR1#`

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Table I-7: Transfer Canned Configuration Files to the BTS Router Using a TFTP Server

Step	Action
13	Verify that the canned configuration file is saved on the CF memory card by entering the following: **dir** A response similar to the following will be displayed: `Directory of slot0:/` `  1  –rw–  7051976   Mar 01 1993 00:11:34  mwr1900–i–mz.122–8.MC2a.bin` `  2  –rw–     2457   Mar 01 1993 00:14:48  canned–config` `31932416 bytes total (24877983 bytes free)` `BTSRTR1#`
14	To allow the BTS router to boot using the canned configuration, enter the following: **copy canned–config start**up–config A response similar to the following will be displayed: `BTSRTR1#copy canned–config start` `Destination filename [startup–config]?`
15	When prompted for the destination file name, press the **Enter** key. A response similar to the following will be displayed: `BTSRTR1#copy canned–config start` `Destination filename [startup–config]?` `2457 bytes copied in 3.52 secs` `BTSRTR1#`
16	Display and note the file size of startup–config by entering the following: **dir nvram:** A response similar to the following will be displayed: `Directory of nvram:/` `  26  –rw–       2457              <no date>  startup–config` `  27  ––––          5              <no date>  private–config` `29688 bytes total (24774 bytes free)` `BTSRTR1#`

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Table I-7: Transfer Canned Configuration Files to the BTS Router Using a TFTP Server	
Step	**Action**
17	Scroll the HyperTerminal window back to the slot0: directory display obtained in step 13, above.
18	Compare the file size of startup–config to the canned configuration file to verify the copy operation. File sizes should be the same.
19	If desired, the contents of the startup–config file may be verified against the file listings at the end of this appendix for the blue or red canned configuration, as applicable, by entering the following: **sh**ow **start**up–config **NOTE** Pressing the space bar at the `MORE` prompt will scroll another screen–full of data. Pressing the Enter key will scroll the screen one line at a time.
20	Verify the router will boot properly on the IOS and revised startup–config files by entering the following: **reload** A response similar to the following will be displayed: `BTSRTR1#reload` `System configuration has been modified. Save? [yes/no]: n` `Proceed with reload? [confirm]`
21	If prompted to save a modified configuration, enter **n** for "no," and press the **Enter** key.
22	When prompted to proceed with reload, press the **Enter** key to continue the reload operation.
23	**NOTE** Reloading the router with the revised startup–config file will change router FE port speed to 100. If the router FE port speed was changed to 10 to communicate with the LMF computer NIC, the computer may indicate that the FE LAN connection has been lost at this point. Verify the router reboots without displaying the `rommon 1 >` prompt or error messages related to port configurations. If the router boots to the rommon prompt, proceed to the Recovery from BTS Router Boot to rommon section of this appendix.
24	Using the tagging materials, tag the router to clearly identify the installed configuration (blue (BTSRTR1) or red (BTSRTR2)).
25	Remove the CF memory from the router following the procedure in Table I-13, mark the installed configuration (blue or red) on the card label, and install the card in the router following the procedure in Table I-14.
26	If an additional router must have the canned configuration installed, perform the following:

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Table I-7: Transfer Canned Configuration Files to the BTS Router Using a TFTP Server	
Step	**Action**
26a	– Disconnect the cabling from the BTS router.
26b	– Remove power from the router and disconnect it from the power supply.
26c	– Repeat the procedures in Table I-5, Table I-6, and this table (Table I-7) using the additional router.
27	If no additional routers must be configured, perform steps 26a and 26b.
28	On the LMF computer, shut down the tftp server application and exit the HyperTerminal session.
29	If no additional tftp transfer activities will be performed, change the NIC IP address and subnet mask back to those for LMF–BTS communication recorded in Table I-4, step 10b. **! CAUTION** If the BTS 10base–2 LAN IP address and subnet mask for the LMF computer's NIC are not restored, the LMF can not log into a BTS when attempting to perform a BTS optimization or ATP.

Change or Upgrade BTS Router IOS Version

Background

BTS routers are supplied with CF memory cards pre–loaded with a version of the IOS. Prior to installing the routers in a BTS, the loaded IOS version should be verified as being the one required for the network. It is critical to also verify that the IOS file is the *first file on the CF memory card*. If another file precedes the IOS file, the BTS router will not boot properly and will not function in the network.

Equipment and Software Required

The following items are required to perform this procedure:

- A *Windows*–based computer which meets the requirements of the LMF computer platform as specified in *1X SC4812T BTS Optimization/ATP; 68P09260A62* for original design frames or *1X SC4812T–CLPA BTS Optimization/ATP; 68P64115A06* for updated design frames.
- One of the following operating systems for the *Windows*–based computer:
  – *Windows* 2000
  – *Windows* 98 Second Edition (SE) using the *FAT32* file system

CAUTION

BTS router CF memory cards loaded using computers equipped with *Windows* 98 versions earlier than *Windows* 98 SE and using the FAT16 file system will not operate properly, resulting in a complete site outage.

- Cable, *rollover*, as described in the Establishing a BTS Router Communication Session section of this Appendix
- DB–9 plug–to–8–contact modular plug adapter as described in the Establishing a BTS Router Communication Session section of this Appendix
- Cable, Ethernet *crossover*, Category 5E or better, unshielded twisted pair, two 8–contact modular plugs, in one of the following lengths, as determined necessary:
  – 0.3 m (11.8 in) (Motorola pn 3088643C07)
  – 0.6 m (23.6 in)(Motorola pn 3088643C13)
  – 1.0 m (39.4 in) (Motorola pn 3088643C15)
  – 2.1 m (84 in) (Motorola pn 3088643C08)
  – 3.0 m (120 in) (Motorola pn 3088643C09)
- A +27 Vdc power supply to power the BTS router during configuration file operations
- A tftp server software application (refer to the Setting Up the TFTP Server – Procedure in *Cellular System Administration – CDMA OnLine Documentation, 68P09259A20*) such as:

– Cisco tftp server
– PumpKIN tftp server
– Any other equivalent tftp server application

- A copy of the MWR 1900 or MWR 1941 router IOS version required for the network where the routers are to be installed

NOTE

Contact the network administrator or the Motorola Account Team for assistance in determining and obtaining a copy of the required IOS version.

IMPORTANT

MWR 1941 routers must be loaded with IOS version mwr1900–i–mz.122–8.MC2d.bin or later. This router model will not function properly with earlier IOS versions.

Required Publications

The following publication is required to perform procedures in this section:

- *MWR1900 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*

Upgrade/Replace Installed IOS Version and Verify File Sequence Position

Description – This procedure covers using an LMF computer equipped with a tftp server application to perform the following activities:

1. Verify the IOS version loaded on a CF memory card and running on a BTS router
2. Upgrade or replace the IOS version installed in a BTS router
3. Ensure the IOS file *is the first file on the CF memory card*

Prerequisites – The following are required prior to performing this procedure:

- The LMF computer and BTS router have been prepared for tftp file transfer and are operating as they would be after performing the procedures in Table I-4, Table I-5, Table I-6, and steps 1 through 8 of Table I-7
- A copy of the required IOS version is loaded into the tftp default directory of the LMF computer

Upgrading/replacing installed IOS version and verifying file sequence position – Follow the procedure in Table I-8 to replace or upgrade the installed IOS version using the tftp server application, and ensure the IOS file is first in the stored file sequence on the CF memory card.

Table I-8: Using a TFTP Server Application for Upgrading/Replacing Loaded IOS Version and Verifying File Sequence Position

Step	Action
*** IMPORTANT**	This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in *MWR1900 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*. Have this publication available for reference while performing this procedure.
1	This procedure assumes the LMF computer and BTS router are configured, connected, and operating as they would be after performing the procedures in Table I-4, Table I-5, Table I-6, and steps 1 through 8 of Table I-7. If necessary, perform these procedures now.
2	**NOTE** The IOS present working directory defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the **cd** command. Determine the present working directory by entering **pwd**. If the present working directory has been changed, enter the command **cd slot0:** to return to the default setting. Identify the filename of the currently loaded IOS which must be replaced by entering the following: **dir** A response similar to the following will be displayed: `BTSRTR1#dir` `Directory of slot0:/` `1  –rw–     7051844   Sep 23 2002 07:15:08  mwr1900–i–mz.07022002.bin` `2  –rw–        2212   Mar 01 1993 00:11:00  canned–config` `31932416 bytes total (24878360 bytes free)` `BTSRTR1#`
3	Begin to backup the currently installed version of the router's IOS to the LMF computer's default tftp directory by entering the following: **copy** *old_IOS_filename* **tftp:** Where *old_IOS_filename* = the filename of the IOS currently loaded on the BTS router CF memory card. A response similar to the following will be displayed: `BTSRTR1#copy mwr1900–i–mz.07022002.bin tftp:` `Address or name of remote host []?`

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Table I-8: Using a TFTP Server Application for Upgrading/Replacing Loaded IOS Version and Verifying File Sequence Position

Step	Action
4	At the remote host prompt, enter the following: **100.100.100.1** A response similar to the following will be displayed: `Address or name of remote host []? 100.100.100.1` `Destination filename [mwr1900–i–mz.07022002.bin]?`
5	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected: `Address or name of remote host []? 100.100.100.1` `Destination filename [mwr1900–i–mz.07022002.bin]?` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `7051844 bytes copied in 109.92 secs (64697 bytes/sec)` `BTSRTR1#`

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Table I-8: Using a TFTP Server Application for Upgrading/Replacing Loaded IOS Version and Verifying File Sequence Position	
Step	**Action**
6	If additional files are stored on the CF memory card, begin backing them up to the LMF computer's default tftp directory by entering the following: **copy** *additional_filename* **tftp:** Where *additional_filename* = the filename of an additional file loaded on the BTS router CF memory card. A response similar to the following will be displayed: `BTSRTR1#copy canned–config tftp:` `Address or name of remote host [100.100.100.1]?`
7	If the default IP address displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct IP address for the LMF computer. A response similar to the following will be displayed if the default filename is selected: `Address or name of remote host [100.100.100.1]?` `Source filename [canned–config]?`
8	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected: `Source filename [canned–config]?` `Destination filename [canned–config]?`
9	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed: `Destination filename [canned–config]?` `!` `[OK – 2212/4096 bytes]` `2212 bytes copied in 0.152 secs` `BTSRTR1#`
10	If more files are stored on the CF memory card, repeat steps 6 through 9 until all files have been backed up to the LMF computer.

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Table I-8: Using a TFTP Server Application for Upgrading/Replacing Loaded IOS Version and Verifying File Sequence Position

Step	Action
11	Delete *all* files from the CF memory card by entering the following command: **format slot0:** A response similar to the following will be displayed: `BTSRTR1#format slot0:` `Format operation may take a while. Continue? [confirm]`
12	Press the **Enter** key to continue the format operation. A response similar to the following will be displayed: `Format operation may take a while. Continue? [confirm]` `Format operation will destroy all data in ”slot0:”.  Continue? [confirm]`
13	Press the **Enter** key to continue the format operation. A response similar to the following will be displayed: `Format operation will destroy all data in ”slot0:”.  Continue? [confirm]` `Format: Drive communication & 1st Sector Write OK...` `Writing Monlib` `sec-` `tors.........................................................................` `................` `Monlib write complete` `.` `Format: All system sectors written. OK...` `Format: Total sectors in formatted partition: 62560` `Format: Total bytes in formatted partition: 32030720` `Format: Operation completed successfully.` `Format of slot0 complete` `BTSRTR1#`

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<table>
<tr><th colspan="2">Table I-8: Using a TFTP Server Application for Upgrading/Replacing Loaded IOS Version and Verifying File Sequence Position</th></tr>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>14</td><td>Verify all files have been deleted from the CF memory card by entering the following:

dir

A response similar to the following will be displayed:

<code>Directory of slot0:/</code>

<code>No files in directory</code>

<code>31932416 bytes total (31932416 bytes free)</code>
<code>BTSRTR1#</code></td></tr>
<tr><td>15</td><td>Begin to copy the required version of the IOS from the LMF computer to the BTS router by entering the following:

copy tftp:new_IOS_filename slot0:

Where new_IOS_filename = the filename of the required IOS for the BTS router.

A response similar to the following will be displayed:

<code>BTSRTR1#copy tftp:mwr1900–i–mz.122–8.MC2a.bin slot0:</code>
<code>Address or name of remote host [100.100.100.1]?</code></td></tr>
<tr><td>16</td><td>If the default IP address displayed in the prompt is correct, press the Enter key to accept it. If it is missing or not correct, enter the correct IP address for the LMF computer.
A response similar to the following will be displayed if the default filename is selected:

<code>Address or name of remote host [100.100.100.1]?</code>
<code>Source filename [mwr1900–i–mz.122–8.MC2a.bin]?</code></td></tr>
<tr><td>17</td><td>If the default filename displayed in the prompt is correct, press the Enter key to accept it. If it is missing or not correct, enter the correct filename.

A response similar to the following will be displayed if the default filename is selected:

<code>Source filename [mwr1900–i–mz.122–8.MC2a.bin]?</code>
<code>Destination filename [mwr1900–i–mz.122–8.MC2a.bin]?</code></td></tr>
</table>

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<table>
<tr><th colspan="2">Table I-8: Using a TFTP Server Application for Upgrading/Replacing Loaded IOS Version and Verifying File Sequence Position</th></tr>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>18</td><td>If the default filename displayed in the prompt is correct, press the Enter key to accept it. If it is not correct, enter the correct filename.

A response similar to the following will be displayed if the default filename is selected:
<pre>
Destination filename [mwr1900–i–mz.122–8.MC2a.bin]?
Accessing tftp://100.100.100.1/mwr1900–i–mz.122–8.MC2a.bin...
Loading mwr1900–i–mz.122–8.MC2a.bin from 100.100.100.1 (via FastEther-
net0/0): !!!!
Loading mwr1900–i–mz.122–8.MC2a.bin from 100.100.100.1 (via FastEther-
net0/0):
!!!
!!!
!!!
!!!
!!!
!!!
!!!
!!!
!!!
!!!
!!!
!!!
!!!
!!!
!!!
!!!
!!!
!!!
!!
[OK – 7051976/14103552 bytes]

7051976 bytes copied in 145.108 secs (48634 bytes/sec)
BTSRTR1#
</pre></td></tr>
</table>

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<table>
<tr><th colspan="2">Table I-8: Using a TFTP Server Application for Upgrading/Replacing Loaded IOS Version and Verifying File Sequence Position</th></tr>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>19</td><td>Display the CF memory card directory to verify that the new IOS file is there by entering the following:

dir

A response similar to the following will be displayed:
<pre>BTSRTR1#dir
Directory of slot0:/

    1 –rw–   7051976   Sep 23 2002 07:25:36
mwr1900–i–mz.122–8.MC2a.bin

31932416 bytes total (24880440 bytes free)
BTSRTR1#</pre></td></tr>
<tr><td>20</td><td>If any additional files previously stored on the CF memory card are to be copied to the card, perform the following:
copy tftp:filename slot0:

Where filename = the filename of the file to be copied to the CF memory card

A response similar to the following will be displayed:
<pre>BTSRTR1#copy tftp:canned–config slot0:
Address or name of remote host [100.100.100.1]?</pre></td></tr>
<tr><td>21</td><td>If the default IP address displayed in the prompt is correct, press the Enter key to accept it. If it is missing or not correct, enter the correct IP address for the LMF computer.
A response similar to the following will be displayed if the default IP address is selected:
<pre>Address or name of remote host [100.100.100.1]?
Destination filename [canned–config]?</pre></td></tr>
<tr><td>22</td><td>If the default filename displayed in the prompt is correct, press the Enter key to accept it. If it is missing or not correct, enter the correct filename.

A response similar to the following will be displayed if the default filename is selected:
<pre>Destination filename [canned–config]?
Accessing tftp://100.100.100.1/canned–config...
Loading basic_config from 100.100.100.1 (via FastEthernet0/0): !
[OK – 2212/4096 bytes]

2212 bytes copied in 0.152 secs
BTSRTR1#</pre></td></tr>
</table>

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Table I-8: Using a TFTP Server Application for Upgrading/Replacing Loaded IOS Version and Verifying File Sequence Position	
Step	**Action**
23	After the additional file is copied to the CF memory card, display the CF memory card directory by entering the following: **dir** A response similar to the following will be displayed: `BTSRTR1#dir` `Directory of slot0:/` `    1  –rw–      7051976   Sep 23 2002 07:24:18` `mwr1900–i–mz.122–8.MC2a.bin` `    2  –rw–         2212   Mar 01 1993 00:09:06  canned–config`
24	The IOS file *must be the first file listed* for the BTS router to boot properly. If it is, proceed to step 29.
25	**! CAUTION** The file sequence on the CF memory card can not be verified with application programs which place the listed file names in alphabetical order (for example, certain Unix telnet applications, Unix directory listing commands, and *Windows* file managers such as *Windows* Explorer). This portion of the procedure is intended for use only with applications, such as HyperTerminal, which do not list directory contents alphabetically. If another file is listed before the IOS file, delete the file by performing steps 11 through 13 and display the directory of the CF memory card as described in step 23 to be sure the file is deleted.
26	Copy the file from the LMF computer to the CF memory card again by performing steps 20 through 23.
27	If the file is again listed before the IOS file in the CF memory card directory display, format the CF memory card by performing steps 11 through 14 of this table.
28	Copy the IOS file and any other required file to the formatted CF memory card by performing steps 15 through 24.
29	If additional files are to be transferred to the CF memory card, perform steps 20 through 24 for each one.

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Table I-8: Using a TFTP Server Application for Upgrading/Replacing Loaded IOS Version and Verifying File Sequence Position	
Step	**Action**
30	After making sure the IOS file *is the first file on the CF memory card*, restart the BTS router with the new IOS version by entering the following: **reload** A response similar to the following will be displayed: `BTSRTR1#reload` `System configuration has been modified. Save? [yes/no]: n` `Proceed with reload? [confirm]`
31	If prompted to save a modified configuration, enter **n** for “no,” and press the **Enter** key.
32	When prompted to proceed with reload, press the **Enter** key to continue the reload operation.
33	Once the router has completed rebooting, change to the privileged EXEC mode and confirm the booted IOS version is correct by entering the following: **sh**ow **ver**sion A response similar to the following partial example will be displayed: `BTSRTR1#sh ver` `Cisco Internetwork Operating System Software` `IOS (tm) 1900 Software (MWR1900–I–M), Version 12.2(8)MC2a, EARLY DEPLOY-` `MENT RELEASE SOFTWARE (fc1)` `.` `.` `.` `BTSRTR1#`
34	Verify the version number displayed in the second line of the version information is the correct IOS version.
35	If this procedure was entered from step 8 of Table I-7, return to Table I-7, step 9.
36	If no other BTS router file operations or configuration actions are required, perform the following:
36a	– Remove power from the router and disconnect it from the power supply.
36b	– Disconnect all other cabling from the BTS router.
36c	– On the LMF computer, exit the HyperTerminal communications session.

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Table I-8: Using a TFTP Server Application for Upgrading/Replacing Loaded IOS Version and Verifying File Sequence Position

Step	Action
37	If no additional tftp transfer activities will be performed, change the NIC IP address and subnet mask back to those for LMF–BTS communication recorded in Table I-4, step 10b. **! CAUTION** If the BTS 10base–2 LAN IP address and subnet mask for the LMF computer's NIC are not restored, the LMF can not log into a BTS when attempting to perform a BTS optimization or ATP.

I

Verify and Upgrade ROMmon Version

Introduction

BTS routers are supplied pre–loaded with a version of the ROM monitor (ROMmon) low–level operating system. Along with the IOS version, the loaded ROMmon version should be verified as being the one required for the network. Procedures in this section are used to verify the loaded ROMmon version, and, if necessary, upgrade or change it to the required version. Methods are provided for using either a tftp server or CF memory card reader to transfer the required ROMmon version to a BTS router's CF memory card.

Required Equipment and Software

The following items are required to perform ROMmon version verification and upgrade for both verification/upgrade methods:

- A *Windows*–based computer which meets the requirements of the LMF computer platform as specified in *1X SC4812T BTS Optimization/ATP; 68P09260A62* original design frames or *1X SC4812T–CLPA BTS Optimization/ATP; 68P64115A06* for updated design frames.
- One of the following operating systems for the *Windows*–based computer:
  – *Windows* 2000
  – *Windows* 98 Second Edition (SE) using the *FAT32* file system

CAUTION

BTS router CF memory cards loaded using computers equipped with *Windows* 98 versions earlier than *Windows* 98 SE and using the FAT16 file system will not operate properly, resulting in a complete site outage.

- Cable, *rollover*, as described in the Establishing a BTS Router Communication Session section of this Appendix
- DB–9 plug–to–8–contact modular plug adapter as described in the Establishing a BTS Router Communication Session section of this Appendix
- Cable, Ethernet *crossover*, Category 5E or better, unshielded twisted pair, two 8–contact modular plugs, in one of the following lengths, as determined necessary:
  – 0.3 m (11.8 in) (Motorola pn 3088643C07)
  – 0.6 m (23.6 in)(Motorola pn 3088643C13)
  – 1.0 m (39.4 in) (Motorola pn 3088643C15)
  – 2.1 m (84 in) (Motorola pn 3088643C08)
  – 3.0 m (120 in) (Motorola pn 3088643C09)
- A +27 Vdc power supply to power the BTS router during configuration file operations

- A tftp server software application (refer to the Setting Up the TFTP Server – Procedure in *Cellular System Administration – CDMA OnLine Documentation, 68P09259A20*) such as:
  - Cisco tftp server
  - PumpKIN tftp server
  - Any other equivalent tftp server application
- A copy of the MWR 1900 or MWR 1941 router ROMmon version required for the network where the routers are to be installed

NOTE

Contact the network administrator or the Motorola Account Team for assistance in determining and obtaining a copy of the required ROMmon version.

Required Publications

The following publication is required to perform procedures in this section:

- *MWR1900 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*

Verification and Upgrade/Replacement of Installed ROMmon Version

Description – This procedure covers using an LMF computer equipped with a tftp server application to perform the following activities:

1. Verify the ROMmon version loaded and running on a BTS router
2. Upgrade or replace the ROMmon version installed in a BTS router

Prerequisites – The following are required prior to performing this procedure:

- The LMF computer and BTS router have been prepared for tftp file transfer and are operating as they would be after performing the procedures in Table I-4, Table I-5, Table I-6, and steps 1 through 8 of Table I-7
- A copy of the required ROMmon version is loaded into the tftp default directory of the LMF computer

Verifying and Upgrading/replacing installed ROMmon version – Follow the procedure in Table I-8 to verify and, if necessary, replace or upgrade the installed ROMmon version using the tftp server application.

Table I-9: Verify and Upgrade/Replace Installed ROMmon Version Using a tftp Server	
Step	**Action**
*** IMPORTANT** This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in *MWR1900 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*. Have this publication available for reference while performing this procedure.	
1	This procedure assumes the LMF computer and BTS router are configured, connected, and operating as they would be after performing the procedures in Table I-4, Table I-5, Table I-6, and steps 1 through 4 of Table I-7. If necessary, perform these procedures now.

. . . continued on next page

Table I-9: Verify and Upgrade/Replace Installed ROMmon Version Using a tftp Server	
Step	**Action**
2	Determine the currently installed ROMmon version by entering the following at the router *privileged* EXEC mode prompt: **sh**ow **ver**sion A response similar to the following will be displayed: `BTSRTR1#sh ver` `Cisco Internetwork Operating System Software` `IOS (tm) 1900 Software (MWR1900–I–M), Version 12.2(8)MC2b, EARLY DEPLOY-MENT RELEASE SOFTWARE (fc3)` `TAC Support: http://www.cisco.com/tac` `Copyright (c) 1986–2002 by cisco Systems, Inc.` `Compiled Mon 05–Aug–02 11:07 by nmasa` `Image text–base: 0x60008940, data–base: 0x60B54000` `ROM: System Bootstrap, Version 12.2(20020113:235343) [sbose–wilma 109], DEVELOPMENT SOFTWARE` `ROM: 1900 Software (MWR1900–I–M), Version 12.2(8)MC2b, EARLY DEPLOYMENT RELEASE SOFTWARE (fc3)` `Router uptime is 1 minute` `System returned to ROM by power–on` `System image file is ”slot0:mwr1900–i–mz.122–8.MC2b.bin”` `cisco mwr1900 (R7000) processor (revision 0.1) with 121856K/18432K bytes of memory.` `Processor board ID JMX0611K5TS` `R7000 CPU at 240Mhz, Implementation 39, Rev 3.3, 256KB L2 Cache` `Bridging software.` `X.25 software, Version 3.0.0.` `Primary Rate ISDN software, Version 1.1.` `Toaster processor tmc is running.` `2 FastEthernet/IEEE 802.3 interface(s)` `2 Serial network interface(s)` `2 Channelized T1/PRI port(s)` `DRAM configuration is 64 bits wide with parity disabled.` `55K bytes of non–volatile configuration memory.` `31360K bytes of ATA Slot0 CompactFlash (Read/Write)` `Configuration register is 0x101` `BTSRTR1#`
3	To determine the currently installed ROMmon version, examine the `ROM: System Bootstrap` line in the response.

. . . continued on next page

Table I-9: Verify and Upgrade/Replace Installed ROMmon Version Using a tftp Server	
Step	**Action**
4	Compare the installed ROMmon version information with the filename of the ROMmon version required for the network. **NOTE** 1. Rommon filename format is similar to the following: **MWR1900_RM2.srec.122–8r.MC3.bin** 2. The ROMmon filename reflects the version number of the software (122–8r.MC3).
5	If the installed version is the one required for the network skip to step 26.
6	If the installed ROMmon version is not the one required for the network, backup the current BTS router configuration to the LMF computer by entering the following: **copy nvram:start**up–config **tftp** A response similar to the following will be displayed: `BTSRTR1#copy nvram:start tftp` `Address or name of remote host []?` **NOTE** Be sure to include the colon (**:**) after **nvram** when typing the command.
7	At the prompt for the remote host address or name, enter the IP address of the LMF computer NIC: **100.100.100.1** A response similar to the following will be displayed: `BTSRTR1#copy copy nvram:start tftp` `Address or name of remote host []? 100.100.100.1` `Source filename [startup–config]?`
8	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected: `Source filename [startup–config]?` `Destination filename [startup–config]?`

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Table I-9: Verify and Upgrade/Replace Installed ROMmon Version Using a tftp Server

Step	Action
9	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed: `Destination filename [startup–config]?` `!` `[OK – 2212/4096 bytes]` `2212 bytes copied in 0.152 secs` `BTSRTR1#`
10	**NOTE** The IOS defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the **cd** command. Determine the present working directory by entering **pwd**. If the present working directory has been changed, enter the command **cd slot0:** to return to the default setting. Determine the amount of memory available (bytes free) on the CF memory card by entering the following: **dir** A response similar to the following will be displayed: `BTSRTR1#dir` `Directory of slot0:/` `    1  –rw–     7051976   Sep 23 2002 07:24:18` `mwr1900–i–mz.122–8.MC2b.bin` `    2  –rw–        2212   Mar 01 1993 00:14:48  canned–config` `31932416 bytes total (24885606 bytes free)` `Router#`
11	Be sure there is at least 1 MB (1048580) of free memory. **NOTE** A ROMmon version file requires approximately 0.7 MB.

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Table I-9: Verify and Upgrade/Replace Installed ROMmon Version Using a tftp Server	
Step	**Action**
12	Begin to copy the required version of the ROMmon file from the LMF computer to the BTS router by entering the following: **copy tftp:***new_rommon_filename* **slot0:** Where *new_rommon_filename* = the filename of the required ROMmon version for the BTS router. A response similar to the following will be displayed: `BTSRTR1#copy tftp:MWR1900_RM2.srec.122–8r.MC3.bin slot0:` `Address or name of remote host [100.100.100.1]?`
13	If the default IP address displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct IP address for the LMF computer. A response similar to the following will be displayed if the default filename is selected: `Address or name of remote host [100.100.100.1]?` `Source filename [MWR1900_RM2.srec.122–8r.MC3.bin]?`
14	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected: `Source filename [MWR1900_RM2.srec.122–8r.MC3.bin]?` `Destination filename [MWR1900_RM2.srec.122–8r.MC3.bin]?`
15	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected: `Destination filename [MWR1900_RM2.srec.122–8r.MC3.bin]?` `Accessing tftp://100.100.100.1/MWR1900_RM2.srec.122–8r.MC3.bin...` `Loading MWR1900_RM2.srec.122–8r.MC3.bin from 100.100.100.1 (via FastE-` `thernet0/0): !!!!` `Loading MWR1900_RM2.srec.122–8r.MC3.bin from 100.100.100.1 (via FastE-` `thernet0/0):` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `[OK – 614306/14103552 bytes]` `614306 bytes copied in 13.059 secs (48634 bytes/sec)` `BTSRTR1#`

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Table I-9: Verify and Upgrade/Replace Installed ROMmon Version Using a tftp Server	
Step	**Action**
16	Display the CF memory card directory to verify that the new ROMmon version file is there by entering the following: **dir** A response similar to the following will be displayed: `BTSRTR1#dir` `Directory of slot0:/` `  1  -rw-    7051976   Sep 23 2002 07:25:36  mwr1900-i-mz.122-8.MC2b.bin` `  2  -rw-       2212   Mar 01 1993 00:09:06  canned-config` `  3  -rw-     614306   Dec 13 2002 14:59:36` `MWR1900_RM2.srec.122-8r.MC3.bin` `31932416 bytes total (24263922 bytes free)` `BTSRTR1#`
17	Replace the existing ROMmon version with the new one copied to the CF memory card by entering the following: **upgrade rom–monitor file slot0:MWR1900_RM2.srec.122–8r.MC3** A response similar to the following will be displayed: `BTSRTR1#This command will reload the router. Continue?[yes/no]`
18	When prompted to continue, enter **yes** and press the **Enter** key. A response similar to the following will be displayed: `BTSRTR1#This command will reload the router. Continue?[yes/no] yes` `ROMMON image upgrade in progress` `Erasing boot flash` `eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee` `Programming boot flash pppp` `Now reloading`
19	When the router has completed initialization, change to the router *privileged* EXEC mode by entering the following: **enable** A response similar to the following will be displayed: `BTSRTR1>enable` `BTSRTR1#`

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Table I-9: Verify and Upgrade/Replace Installed ROMmon Version Using a tftp Server	
Step	**Action**
20	Verify the router has initialized with the new ROMmon version by entering the following: **sh**ow **ver**sion A response similar to the following partial response will be displayed: `BTSRTR1#sh ver` `Cisco Internetwork Operating System Software` `IOS (tm) 1900 Software (MWR1900–I–M), Version 12.2(8)MC2b, EARLY DEPLOY-MENT RELEASE SOFTWARE (fc3)` `TAC Support: http://www.cisco.com/tac` `Copyright (c) 1986–2002 by cisco Systems, Inc.` `Compiled Mon 05–Aug–02 11:07 by nmasa` `Image text–base: 0x60008940, data–base: 0x60B54000` `ROM: System Bootstrap, Version 12.2(8r)MC3 RELEASE SOFTWARE (fc1)`
21	Compare the version displayed in the response `ROM: System Bootstrap` line to the filename of the new ROMmon version file copied to the CF memory card.
22	If the router successfully rebooted with the new ROMmon version, the ROMmon file can be deleted from the CF memory card by entering the following: **del**ete **slot0:***new_rommon_filename* Where *new_rommon_filename* = the filename of the required ROMmon version copied to the CF memory card in steps 12 through 15, above. A response similar to the following will be displayed: `BTSRTR1#del slot0:MWR1900_RM2.srec.122–8r.MC3.bin` `Delete filename [MWR1900_RM2.srec.122–8r.MC3.bin]?`
23	If the default filename displayed in the prompt is correct, press the **Enter** key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed if the default filename is selected: `Delete filename [MWR1900_RM2.srec.122–8r.MC3.bin]?` `Delete slot0:MWR1900_RM2.srec.122–8r.MC3.bin? [confirm]`

. . . continued on next page

Table I-9: Verify and Upgrade/Replace Installed ROMmon Version Using a tftp Server	
Step	**Action**
24	Press the **Enter** key to confirm the deletion. A response similar to the following will be displayed if the default filename is selected: `Delete filename [MWR1900_RM2.srec.122–8r.MC3.bin]?` `Delete slot0:MWR1900_RM2.srec.122–8r.MC3.bin? [confirm]` `BTSRTR1#`
25	**! CAUTION** In this step, *do not delete the IOS and* `canned–config` *files* from the CF memory card. The BTS router must have these files on the card to properly boot or switch between packet and circuit mode. If additional unnecessary files, such as a backup of the `startup–config` file, are also on the CF memory card, delete them by repeating steps 22 through 24 for each file.
26	If no other BTS router file operations or configuration actions are required, perform the following:
26a	– Remove power from the router and disconnect it from the power supply.
26b	– Disconnect all cabling from the BTS router.
26c	– On the LMF computer, exit the HyperTerminal communications session.
27	If no additional tftp transfer activities will be performed, change the NIC IP address and subnet mask back to those for LMF–BTS communication recorded in Table I-4, step 10b. **! CAUTION** If the BTS 10base–2 LAN IP address and subnet mask for the LMF computer's NIC are not restored, the LMF can not log into a BTS when attempting to perform a BTS optimization or ATP.

ROM monitor boot conditions – Under certain circumstances the BTS router will initialize with the ROM monitor (ROMmon) operating system rather than the IOS. These circumstances include:

- The hexadecimal value in the router's configuration register has been changed from the factory default (can change the location from where the router attempts to load code for boot–up).
- IOS file is missing from the CF memory card
- IOS file is not the first file on the CF memory card
- Startup–config file contains an outdated boot system line specifying an IOS file which has been replaced with an updated version
- Startup–config file contains boot system line with typographical error(s) in the IOS filename
- IOS file image on the CF memory card is corrupted

Description – Router operation on ROMmon is signalled by the display of the `rommon # >` prompt, where # is a number which increments each time a command is issued. ROMmon is a low–level operating system which provides limited capabilities for router testing and troubleshooting operations, including viewing directory contents and booting from a specified file.

Recovery methods – Two recovery methods are included in this section. The first is the simplest and requires that a valid, uncorrupted IOS version is installed on the CF memory card. The second method requires additional equipment and must be used in instances such as when an IOS file is not installed on the CF memory card or the installed IOS image is corrupted.

Simple Recovery from Boot to ROMmon

Requirements – Unless it is certain that the IOS image on the CF memory card is corrupted, this method should always be the first tried for router recovery from ROMmon initialization. This method does not require any additional equipment beyond the items necessary to load canned configuration files into the BTS router. To be effective, this method does require that a valid, uncorrupted IOS image file is installed on the router's CF memory card.

Recovery – Follow the procedure in Table I-10 to attempt a simple recovery from a BTS router ROMmon initialization.

<table>
<tr><th colspan="2">Table I-10: Simple Recovery from BTS Router ROMmon Boot</th></tr>
<tr><th>Step</th><th>Action</th></tr>
<tr><td colspan="2">* IMPORTANT
This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in MWR1900 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01. Have this publication available for reference while performing this procedure.</td></tr>
<tr><td>1</td><td>This procedure assumes the LMF computer is set up and connected to the BTS router with an active HyperTerminal communication session. If it is not, follow the procedure in Table I-2 to establish a HyperTerminal communication session.</td></tr>
<tr><td>2</td><td>With the <code>rommon 1 ></code> prompt displayed in the HyperTerminal window, enter the following to determine if the router’s configuration register is set to the factory default value:
confreg

A response similar to the following will be displayed:
<pre>
rommon 4 > confreg

           Configuration Summary

   (Virtual Configuration Register: 0x100)

enabled are:

load rom after netboot fails

console baud: 9600

boot: image specified by the boot system commands

      or default to: cisco2–mwr1900

do you wish to change the configuration? y/n [n]:
</pre>
NOTE

The configuration register setting is shown in the (Virtual Configuration Register: 0x____) line
0x in the Virtual Configuration Register line indicates the numbers following are hexadecimal
</td></tr>
<tr><td>3</td><td>If the value shown for the configuration register is 2102, skip to step 6.</td></tr>
<tr><td>4</td><td>If the value shown for the configuration register is not 2102, perform the following:</td></tr>
<tr><td>4a</td><td>Press the Return key to accept the default of n (for no).</td></tr>
</table>

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Table I-10: Simple Recovery from BTS Router ROMmon Boot

Step	Action
4b	Enter the following at the `rommon` prompt: **confreg 0x2102** A response similar to the following will be displayed: `rommon 3 > confreg 0x2102` `You must reset or power cycle for new config to take effect` `rommon 4 >`
4c	Enter the following at the `rommon` prompt: **reset** A response which begins and ends similar to the following will be displayed: `rommon 4 > reset` `System Bootstrap, Version 12.2(20020113:235343) [sbose–wilma 109], DE-` `VELOPMENT SOFTWARE` `Copyright (c) 1994–2002 by cisco Systems, Inc.` `mwr1900 processor with 131072 Kbytes of main memory` `Main memory is configured to 64 bit mode with parity disabled` `Readonly ROMMON initialized` . ...<*output omitted*>... . `Press RETURN to get started!`
5	If the router reboots with the IOS, skip to step 21.

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Table I-10: Simple Recovery from BTS Router ROMmon Boot	
Step	**Action**
6	If the configuration register is set properly and/or the router does *not* reboot with the IOS, enter the following at the `rommon # >` prompt to identify the IOS file on the CF memory card: **dir slot0:** A response similar to the following will be displayed: `rommon 1 > dir slot0:` `program load complete, entry point: 0x80008000, size: 0xb2a0` `Directory of slot0:` `2 2212 –rw– canned–config` `3 7051976 –rw– mwr1900–i–mz.122–8.MC2b.bin` `4 614306 –rw– MWR1900_RM2.srec.122–8r.MC3.bin` `rommon 2 >` **NOTE** The IOS filename will be similar to the following: **mwr1900–i–mz.122–8.MC2b.bin**
7	If there is no IOS file on the CF memory card, proceed to Table I-11 and perform the extended recovery procedure.

. . . continued on next page

Table I-10: Simple Recovery from BTS Router ROMmon Boot

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>8</td><td>If an IOS file is found, note the IOS filename, and enter the following to begin recovery to an IOS boot:

boot slot0:*IOS_filename*

Where *IOS_filename* = the filename of the IOS noted in step 6, above.

A successful IOS re–boot operation will result in display of a response which begins and ends similar to the following:

<code>rommon 2 > boot slot0:mwr1900–i–mz.122–8.MC2b.bin</code>

<code>program load complete, entry point: 0x80008000, size: 0xb2a0</code>

<code>program load complete, entry point: 0x80008000, size: 0x6b99ac</code>

<code>Self decompressing the image :</code>
<code>### [OK]</code>

<code>Smart Init is enabled</code>

<code>smart init is sizing iomem</code>

<code> ID   MEMORY_REQ   TYPE</code>

<code>00031A   0X005F3C00 MWR1900 Mainboard</code>

<code>   0X000F3BB0 public buffer pools</code>

<code>   0X00211000 public particle pools</code>

<code>TOTAL: 0X008F87B0</code>
<code>.</code>
<code>...</code><*output omitted*><code>...</code>
<code>.</code>
<code>Press RETURN to get started!</code></td></tr>
<tr><td>9</td><td>If the router successfully reboots with the IOS, skip to step 12.</td></tr>
<tr><td>10</td><td>If the router does not reboot with the IOS, perform the following:</td></tr>
<tr><td>10a</td><td>– Scroll the HyperTerminal display down until the directory display from step 6, above, is visible.</td></tr>
<tr><td>10b</td><td>– Compare the IOS filename from the directory display with the filename entered when performing step 8, above.</td></tr>
<tr><td>10c</td><td>– If the filename was typed incorrectly, repeat step 8, using care to type the filename correctly.</td></tr>
</table>

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Table I-10: Simple Recovery from BTS Router ROMmon Boot	
Step	**Action**
11	If the router still does not reboot with the IOS after typing the filename correctly, proceed to Table I-11 and perform the extended recovery procedure.
12	**! CAUTION** The file sequence on the CF memory card can not be verified with application programs which place the listed file names in alphabetical order (for example, certain Unix telnet applications, Unix directory listing commands, and *Windows* file managers such as *Windows* Explorer). This portion of the procedure is intended for use only with applications, such as HyperTerminal, which do not list directory contents alphabetically. After a successful reboot with IOS, perform the following to correct the cause of the boot to ROMmon:
12a	– At the `BTSRTR1>` *user* EXEC mode prompt, enter the following to access the *privileged* EXEC mode: **enable** A response similar to the following will be displayed: `BTSRTR1>enable` `BTSRTR1#`
12b	– Enter the **dir slot0:** command to display the CF memory card directory, and, if the IOS file *is not* the first file listed, perform the procedure in Table I-8, steps 25 through 32, to correct the situation.

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Table I-10: Simple Recovery from BTS Router ROMmon Boot	
Step	**Action**
12c	– If the IOS file *is* the first file, enter the following command to display the contents of the startup–config file: **sh**ow **start**up–config A response which begins similar to the following will be displayed: `BTSRTR1#sh start` `Using 1589 out of 57336 bytes` `!` `version 12.2` `service timestamps debug uptime` `service timestamps log uptime` `no service password–encryption` `!` `hostname BTSRTR1` `!` `boot system slot0:mwr1900–i–mz.07132002.bin` `no logging console` `!` `username cisco password 0 cisco` `!` `redundancy` `  mode y–cable` `   standalone` `!`
13	Review the startup–config file listing for a "boot system" line and perform the following:
13a	– If the startup–config file does *not* contain a boot system line, skip to step 14.
13b	– If the file listing contains a "boot system" line, examine it for the correct IOS filename.
13c	– If the boot system slot0: filename is incorrect, enter the following, using care to type the filename correctly: **boot system slot0:***IOS_filename* Where *IOS_filename* = the filename of the IOS noted in step 6, above.
13d	– Replace the boot system line in the startup–config file with the line entered in step 13c, above, by entering the following: **copy run**ing–config **start**up–config

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<table>
<tr><th colspan="2">Table I-10: Simple Recovery from BTS Router ROMmon Boot</th></tr>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>13e</td><td>– Verify the correct IOS filename is now included in the listing by entering the following:

show startup–config

A response which begins similar to the following will be displayed:
<pre>
BTSRTR1#sh start
Using 1589 out of 57336 bytes
!
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password–encryption
!
hostname BTSRTR1
!
boot system slot0:mwr1900–i–mz.122–8.MC2b.bin
no logging console
!
username cisco password 0 cisco
!
redundancy
  mode y–cable
   standalone
!
</pre></td></tr>
</table>

. . . continued on next page

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<table>
<tr><th colspan="2">Table I-10: Simple Recovery from BTS Router ROMmon Boot</th></tr>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>14</td><td>Re–verify the router's configuration register setting by entering the following:

show version

A response similar to the following will be displayed:
<pre>
BTSRTR1#sh ver
Cisco Internetwork Operating System Software
IOS (tm) 1900 Software (MWR1900–I–M), Version 12.2(8)MC2b, EARLY DEPLOY-
MENT RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 1986–2002 by cisco Systems, Inc.
Compiled Mon 05–Aug–02 11:07 by nmasa
Image text–base: 0x60008940, data–base: 0x60B54000

ROM: System Bootstrap, Version 12.2(20020113:235343) [sbose–wilma 109],
DEVELOPMENT SOFTWARE
ROM: 1900 Software (MWR1900–I–M), Version 12.2(8)MC2b, EARLY DEPLOYMENT
RELEASE SOFTWARE (fc1)

Router uptime is 1 minute
System returned to ROM by power–on
System image file is ”slot0:mwr1900–i–mz.122–8.MC2b.bin”

cisco mwr1900 (R7000) processor (revision 0.1) with 121856K/18432K bytes
of memory.
Processor board ID JMX0611K5TS
R7000 CPU at 240Mhz, Implementation 39, Rev 3.3, 256KB L2 Cache
Bridging software.
X.25 software, Version 3.0.0.
Primary Rate ISDN software, Version 1.1.
Toaster processor tmc is running.
2 FastEthernet/IEEE 802.3 interface(s)
2 Serial network interface(s)
2 Channelized T1/PRI port(s)
DRAM configuration is 64 bits wide with parity disabled.
55K bytes of non–volatile configuration memory.
31360K bytes of ATA Slot0 CompactFlash (Read/Write)

Configuration register is 0x101

BTSRTR1#
</pre>
NOTE
The configuration register value is shown in the last line of the show version response.</td></tr>
<tr><td>15</td><td>If the value shown for the configuration register is 0x2102, skip to step 18.</td></tr>
</table>

. . . continued on next page

Table I-10: Simple Recovery from BTS Router ROMmon Boot	
Step	**Action**
16	If the value shown for the configuration register is *not* 0x2102, enter the following command in the order shown to change it: **conf**igure **t**erminal **config–register 0x2102** A response similar to the following will be displayed: `BTSRTR1#conf t` `Enter configuration commands, one per line.  End with CNTL/Z.` `BTSRTR1(config)#config–register 0x2102` `BTSRTR1(config)#`
17	Verify the change was entered properly by entering the following commands in the order shown: **exit** **sh**ow **ver**sion A response which begins and ends similar to the following will be displayed: `BTSRTR1(config)#exit` `BTSRTR1#sh ver` `Cisco Internetwork Operating System Software` `IOS (tm) 1900 Software (MWR1900–I–M), Version 12.2(8)MC2b, EARLY DEPLOY-` `MENT RELEASE SOFTWARE (fc1)` `TAC Support: http://www.cisco.com/tac` `Copyright (c) 1986–2002 by cisco Systems, Inc.` `.` `...`<*output omitted*>`...` `.` `Configuration register is 0x101 (will be 0x2102 at next reload)` `BTSRTR1#`
18	If the filename is correctly written in the boot system line (step 13e) and the configuration register is properly set to the factory default of 0x2102, enter the following to determine if the router will reboot to IOS: **reload** A response similar to the following will be displayed: `BTSRTR1#reload` `System configuration has been modified. Save? [yes/no]: n` `Proceed with reload? [confirm]`

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Table I-10: Simple Recovery from BTS Router ROMmon Boot	
Step	**Action**
19	If prompted to save a modified configuration, enter **n** for "no," and press the **Enter** key.
20	When prompted to proceed with reload, press the **Enter** key to continue the reload operation.
21	After a successful reboot with IOS, proceed with other BTS router activities or remove power from the router and disconnect it
22	If the router still will not successfully boot with IOS, proceed to Table I-11 and perform the extended recovery procedure.

Extended Recovery from Boot to ROMmon

Requirements – If ROMmon boot recovery attempts fail using the simple recovery method, this method must be used to reboot a BTS router which has initialized with ROMmon. This method requires additional equipment beyond the items necessary to load canned configuration files into the BTS router. Extended recovery requires formatting the CF memory card from the ROMmon–initialized router and reloading the reformatted CF memory card with the required IOS version.

Additional equipment required – An additional, formatted, 32 MB CF memory card with the required version of the IOS installed is required in addition to the equipment and software required for BTS router canned configuration installation. This card may be:

- A *spare* CF memory card which is loaded with the required IOS version
- A CF memory card from an additional BTS router which is loaded with the required IOS version

Recovery – Follow the procedure in Table I-10 to perform an extended recovery from a BTS router ROMmon initialization.

Table I-11: Extended Recovery from BTS Router ROMmon Boot	
Step	**Action**
1	This procedure assumes the BTS router is powered and operating on ROMmon with the LMF computer set up and connected to the router with an active HyperTerminal communication session. If it is not, follow the procedure in Table I-2 to establish a HyperTerminal communication session.
2	Remove the CF memory card from the BTS router following the procedure in Table I-13.
3	Install the additional CF memory card in the router following the procedure in Table I-14.

. . . continued on next page

Table I-11: Extended Recovery from BTS Router ROMmon Boot	
Step	**Action**
4	Enter the following to obtain the filename of the IOS version loaded on the CF memory card: **dir slot0:** A response similar to the following will be displayed: `rommon 1 > dir slot0:` `program load complete, entry point: 0x80008000, size: 0xb2a0` `Directory of slot0:` `1      7051976   –rw–     mwr1900–i–mz.122–8.MC2b.bin` `rommon 2 >`
5	Note the exact filename displayed for the IOS version.

. . . continued on next page

Table I-11: Extended Recovery from BTS Router ROMmon Boot	
Step	**Action**
6	Enter the following to initialize the router with the IOS on the additional CF memory card: **boot slot0:***IOS_filename* Where *IOS_filename* = the filename of the IOS noted in step 5, above. A successful IOS re–boot operation will result in display of a response which begins and ends similar to the following: `rommon 2 > boot slot0:mwr1900–i–mz.122–8.MC2b.bin` `program load complete, entry point: 0x80008000, size: 0xb2a0` `program load complete, entry point: 0x80008000, size: 0x6b99ac` `Self decompressing the image :` `###################################################################### [OK]` `Smart Init is enabled` `smart init is sizing iomem` `ID            MEMORY_REQ                TYPE` `00031A        0X005F3C00 MWR1900 Mainboard` `              0X000F3BB0 public buffer pools` `              0X00211000 public particle pools` `TOTAL:        0X008F87B0` `.` `.` `.` `––– System Configuration Dialog –––` `Would you like to enter the initial configuration dialog? [yes/no]: n`
7	If the router prompts with a question to enter the initial dialog as shown in step 6, above, type **no** and press the **Enter** key to obtain the user EXEC mode prompt.
8	If the router prompts with `Press RETURN to get started!`, press the **Enter** key to obtain the user EXEC mode prompt.

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Table I-11: Extended Recovery from BTS Router ROMmon Boot	
Step	**Action**
9	At the user EXEC mode prompt, enter the following to access the privileged EXEC mode: **enable** A response similar to the following will be displayed: `Router> enable` `Router#`
10	Remove the additional CF memory card from the BTS router following the procedure in Table I-13.
11	Install the *original* CF memory card in the router following the procedure in Table I-14.
12	Format the *original* CF memory card by entering the following: **format slot0:** A response similar to the following will be displayed: `Router#format slot0:` `Format operation may take a while. Continue? [confirm]`
13	Press the **Enter** key to continue the format operation. A response similar to the following will be displayed: `Format operation may take a while. Continue? [confirm]` `Format operation will destroy all data in ”slot0:”.  Continue? [confirm]`

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Table I-11: Extended Recovery from BTS Router ROMmon Boot	
Step	**Action**
14	Press the **Enter** key to continue the format operation. A response similar to the following will be displayed: `Format operation will destroy all data in ”slot0:”.  Continue? [confirm]` `Format: Drive communication & 1st Sector Write OK...` `Writing Monlib` `sec-` `tors.............................................................` `................` `Monlib write complete` `.` `Format: All system sectors written. OK...` `Format: Total sectors in formatted partition: 62560` `Format: Total bytes in formatted partition: 32030720` `Format: Operation completed successfully.` `Format of slot0 complete` `Router#`
15	Copy the required IOS version to the formatted original CF memory card using the LMF computer and a tftp server following the procedure in Table I-8.
16	If applicable, perform IOS initialization troubleshooting as described in Table I-10, steps 12 through 21.

Entering or Changing BTS Router FE Interface IP Addresses

FE Interface IP Addresses and Operating Parameters

It may be necessary to enter or change the IP addresses and/or operating parameters for BTS router FE interfaces FE 0 and FE1 without making other changes in the router configuration files. Procedures in this section cover these operations.

Prerequisites

The following must be accomplished before entering or changing BTS router FE port IP addresses and/or operating parameters:

- The user has read and understands the content of *MWR1900 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*
- BTS routers must have the required version of the IOS saved on their installed CF memory card
- BTS routers must have power applied, be operating without alarms other than span alarms, and have completed boot–up to the user EXEC mode prompt (`BTSRTR–`*bts#*`–1–1>`)
- The BTS router privileged EXEC mode password has been obtained from the network administrator

Entering or Changing FE Interface IP Addresses

To enter or change FE interface IP addresses, follow the procedure in Table I-12.

Table I-12: Entering or Changing BTS Router FE Interface IP Addresses and Operating Parameters

Step	Action
	*** IMPORTANT** This procedure does not cover all aspects of BTS router operation and programming. Before performing this procedure, review BTS router initialization, operation, and programming information and procedures in *MWR1900 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01*. Have this publication available for reference while performing this procedure.
1	Obtain the correct IP addresses and subnet masks for the BTS router FE interfaces from the network administrator.
2	If a HyperTerminal connection for BTS card/module MMI or BTS router (BTSRTR) communication has not been created, create one as described in Table I-1 of this appendix.
3	Connect the LMF computer to the BTS router, and start a communication session as described in Table I-2 in this appendix.

. . . continued on next page

Table I-12: Entering or Changing BTS Router FE Interface IP Addresses and Operating Parameters

Step	Action
4	**NOTE** Examples in this procedure show prompts for BTSRTR–*bts#*–1–1 and BTSRTR–*bts#*–1–2, but the procedure can be used for any router in any BTS router group or a router running the canned configuration file (BTSRTR1 or BTSRTR2). At the `BTSRTR–`*bts#*`–1–1>` user EXEC mode prompt, enter the following to access the privileged EXEC mode: **enable** A response similar to the following will be displayed: `BTSRTR–`*bts#*`–1–1> enable` `Password:`
5	Enter the privileged EXEC mode password. A response similar to the following will be displayed: `BTSRTR–`*bts#*`–1–1> enable` `Password:` `BTSRTR–`*bts#*`–1–1#`
6	At the `BTSRTR–`*bts#*`–1–1#` privileged EXEC mode prompt, display the FE interface IP addresses by typing: **sh**ow **ip int**erface **brief** A response similar to the following will be displayed: `BTSRTR–`*bts#*`–1–1#  show ip interface brief` `Interface        IP Address     OK?  Method  Status                  Protocol` `FastEthernet0/0  192.168.146.1  YES  NVRAM   up                         up` `Serial0:0        unassigned     YES  unset   administratively down  down` `FastEthernet0/1  unassigned     YES  unset   administratively down  down` `Serial1:0        unassigned     YES  unset   administratively down  down` `BTSRTR–`*bts#*`–1–1#`

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Step	Action
	Table I-12: Entering or Changing BTS Router FE Interface IP Addresses and Operating Parameters
7	For a FastEthernet0/0 (fa0/0) or FastEthernet0/1(fa0/1) interface which does not have a correct or an assigned IP address, enter the following at the router prompt to access the global configuration mode: **conf**igure **t**erminal A response similar to the following will be displayed: `BTSRTR–`*bts#*`–1–1# conf t` `Enter configuration commands, one per line. End with CNTL/Z.` `BTSRTR–`*bts#*`–1–1(config)#`
8	At the global configure mode prompt, enter the following to access the configure interface submode for the interface requiring IP address assignment/change: **int**erface **fa**stethernet*interface#* Where *interface#* = 0/0 or 0/1, as applicable. A response similar to the following will be displayed: `BTSRTR–`*bts#*`–1–1(config)# int fa0/1` `BTSRTR–`*bts#*`–1–1(config–if)#`
9	At the configure interface submode prompt, assign or change the interface IP address by entering: **ip address** *IP_addr subnet_mask* Where: *IP_addr* = the required IP address for the interface; for example, 192.168.147.1 *subnet_mask* = the required subnet mask for the interface; for example, 255.255.255.0 A response similar to the following will be displayed: `BTSRTR–`*bts#*`–1–1(config–if)# ip address 192.168.147.1 255.255.255.0` `BTSRTR–`*bts#*`–1–1(config–if)#`
10	To complete configuration of the interface, enter the following parameter settings, one at a time, pressing **Enter** after each: **duplex full** **speed 100** **keepalive 1** **no shutdown**

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Table I-12: Entering or Changing BTS Router FE Interface IP Addresses and Operating Parameters

Step	Action
11	Return to the global configuration mode by entering the following: **exit** A response similar to the following will be displayed: `BTSRTR–`*bts#*`–1–1(config–if)#  exit` `BTSRTR–`*bts#*`–1–1(config)#`
12	If the IP address and/or parameters for the *other* FE interface on the router must be assigned or changed at this time, repeat steps 8 through 11 for the other FE interface.
13	Once the correct parameters have been set for all FE interfaces, return to the privileged EXEC mode prompt by holding down the **Ctrl** key and pressing **z** (**Ctrl +z**). A response similar to the following will be displayed: `BTSRTR–`*bts#*`–1–1(config–if)#  ^z` `01:11:27: %SYS–5–CONFIG_I: Configured from console by console` `BTSRTR–`*bts#*`–1–1#` **NOTE** Entering **exit** twice, pressing the **Enter** key after each entry, will also complete the interface configuration and return the router to the privileged EXEC mode.
14	Save the interface configuration changes to the startup configuration file on the CF memory card by entering the following: **copy run**ning–config **start**up–config A response similar to the following will be displayed: `BTSRTR–`*bts#*`–1–1#  copy run start` `BTSRTR–`*bts#*`–1–1#  Destination filename [startup–config]?`
15	Press **Enter** A response similar to the following will be displayed: `BTSRTR–`*bts#*`–1–1#  copy run start` `BTSRTR–`*bts#*`–1–1#  Destination filename [startup–config]?` `Building configuration...` `!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!` `!!!!!!!!![OK]` `BTSRTR–`*bts#*`–1–1#`

. . . continued on next page

Step	Action
	Table I-12: Entering or Changing BTS Router FE Interface IP Addresses and Operating Parameters
16	If all FE IP address entries/changes for the router are complete, enter the following to return the router to user EXEC mode: **disable** A response similar to the following will be displayed: `BTSRTR–`*bts#*`–1–1#  disable` `BTSRTR–`*bts#*`–1–1>`
17	If no other router requires the FE interfaces to be assigned/changed, proceed to step 20.
18	If FE interfaces on another router must be assigned/changed, disconnect the 8–contact modular plug from the current router CONSOLE port and connect it to the CONSOLE port of the other router.
19	Press the **Enter** key, and when the router user EXEC mode prompt appears repeat steps 3 through 16 for the other router.
20	When the router is in user EXEC mode, close the HyperTerminal session and disconnect the LMF computer and additional components from the BTS router.

Example BTS Router Canned Configuration Files

BTS Router Canned Configuration File

This section presents listings of the *blue* and *red* router canned configuration file contents for the MWR 1900 BTS routers. The *blue* router is the primary router on the BTS LAN subnet 192.168.146.0, and the *red* router is the primary on BTS LAN subnet 192.168.147.0. The canned configuration files allow communication with the BTS routers for both on–site FE cabling connectivity verification and for downloading the routers from the network with the full, site–specific operational configuration.

Obtaining the Latest Configuration File Content

The files included here are *for example only*. The correct canned configuration file content for each BTS router should be generated at the OMC–R using the */screl/active/bin/gen_btsrtr_canned_config.ksh* script.

Configuration File Examples

Examples of both configuration files are provided in the following subsections.

I

"Blue" BTS Router Canned Configuration

```
! Canned Config file for BTSRTR1

version 12.2


service timestamps debug uptime
service timestamps log uptime
no service password–encryption
!
hostname BTSRTR1
!
no logging console
!
!
ip subnet–zero
ip classless
ip pim bidir–enable
!
disable–eadi
memory–size iomem 25
!
redundancy
  mode y–cable
    standby use–interface Loopback101 health
    standby use–interface Loopback102 revertive
    standby use–interface Multilink1 backhaul

interface loopback 101
  description  BTSRTR health loopback
  no ip address

interface loopback 102
  description  BTSRTR revertive loopback
  no ip address
!
! configure 1 DS0 for BTSRTRLINK
!
controller T1 0/0
  description  1st span on BTSRTR
  framing esf
  linecode b8zs
  cablelength short 133
  clock source line
  channel–group 0 timeslots 1–24 speed 64

! MLPPP bundle with BTSRTRLINK.
! This performs IPCP with RPM when BTSRTR is rebooted
interface Multilink 1
  ip address negotiated
  no ip route–cache
  no cdp enable
  ppp multilink
```


I

```
  multilink–group 1
  no shutdown
!
! Setup Serial Interface for PPP and IPCP, no MLPPP at this time
!
interface Serial0/0:0
  no ip address
  encapsulation ppp
  keepalive 1
  ppp multilink
  multilink–group 1
  no shutdown

!
! Setup Ethernet Interfaces and HSRP between them
!
interface FastEthernet0/0
  ip address 192.168.146.1 255.255.255.0
  keepalive 1
  speed 100
  full–duplex
  standby 1 timers 1 3
  standby 1 preempt
  standby 1 priority 100
  standby 1 ip 192.168.146.3
  standby 1 name one
  standby 1 track Fa0/1 10
  standby 1 track Multilink1 10
  ! Track the router health interface
  standby 1 track Loopback101 10
  ! Track the router revertive (compensation) interface
  standby 1 track Loopback102 5
  no shutdown
!
interface FastEthernet0/1
  ip address 192.168.147.1 255.255.255.0
  keepalive 1
  speed 100
  full–duplex
  standby 2 timers 1 3
  standby 2 preempt
  standby 2 priority 100
  standby 2 ip 192.168.147.3
  standby 2 name two
  standby 2 track Fa0/0 10
  standby 2 track Multilink1 10
  ! Track the router health interface
  standby 2 track Loopback101 10
  ! Track the router revertive (compensation) interface
  standby 2 track Loopback102 5
  no shutdown

!
! Set a default route to RPM thru BTSRTRLINK
!
ip route 0.0.0.0 0.0.0.0 Multilink 1
```

I

```
!

line con 0
 exec–timeout 15 0
 password cisco
line aux 0
 login
 password cisco
line vty 0 4
 login
 password cisco

end
```

"Red" BTS Router Canned Configuration

```
! Canned Config file for BTSRTR2

version 12.2


service timestamps debug uptime
service timestamps log uptime
no service password–encryption
!
hostname BTSRTR2
!
no logging console
!
!
ip subnet–zero
ip classless
ip pim bidir–enable
!
disable–eadi
memory–size iomem 25
!
redundancy
  mode y–cable
    standby use–interface Loopback101 health
    standby use–interface Loopback102 revertive
    standby use–interface Multilink1 backhaul

interface loopback 101
  description  BTSRTR health loopback
  no ip address

interface loopback 102
  description  BTSRTR revertive loopback
  no ip address
!
! configure 1 DS0 for BTSRTRLINK
!
controller T1 0/0
  description  1st span on BTSRTR
  framing esf
  linecode b8zs
  cablelength short 133
  clock source line
  channel–group 0 timeslots 1–24 speed 64

! MLPPP bundle with BTSRTRLINK.
! This performs IPCP with RPM when BTSRTR is rebooted
interface Multilink 1
  ip address negotiated
  no ip route–cache
  no cdp enable
```

```
    ppp multilink
    multilink–group 1
    no shutdown
  !
  ! Setup Serial Interface for PPP and IPCP, no MLPPP at this time
  !
  interface Serial0/0:0
    no ip address
    encapsulation ppp
    keepalive 1
    ppp multilink
    multilink–group 1
    no shutdown

  !
  ! Setup Ethernet Interfaces and HSRP between them
  !
  interface FastEthernet0/0
    ip address 192.168.146.2 255.255.255.0
    keepalive 1
    speed 100
    full–duplex
    standby 1 timers 1 3
    standby 1 preempt
    standby 1 priority 100
    standby 1 ip 192.168.146.3
    standby 1 name one
    standby 1 track Fa0/1 10
    standby 1 track Multilink1 10
    ! Track the router health interface
    standby 1 track Loopback101 10
    ! Track the router revertive (compensation) interface
    standby 1 track Loopback102 5
    no shutdown
  !
  interface FastEthernet0/1
    ip address 192.168.147.2 255.255.255.0
    keepalive 1
    speed 100
    full–duplex
    standby 2 timers 1 3
    standby 2 preempt
    standby 2 priority 100
    standby 2 ip 192.168.147.3
    standby 2 name two
    standby 2 track Fa0/0 10
    standby 2 track Multilink1 10
    ! Track the router health interface
    standby 2 track Loopback101 10
    ! Track the router revertive (compensation) interface
    standby 2 track Loopback102 5
    no shutdown

  !
  ! Set a default route to RPM thru BTSRTRLINK
  !
```

I

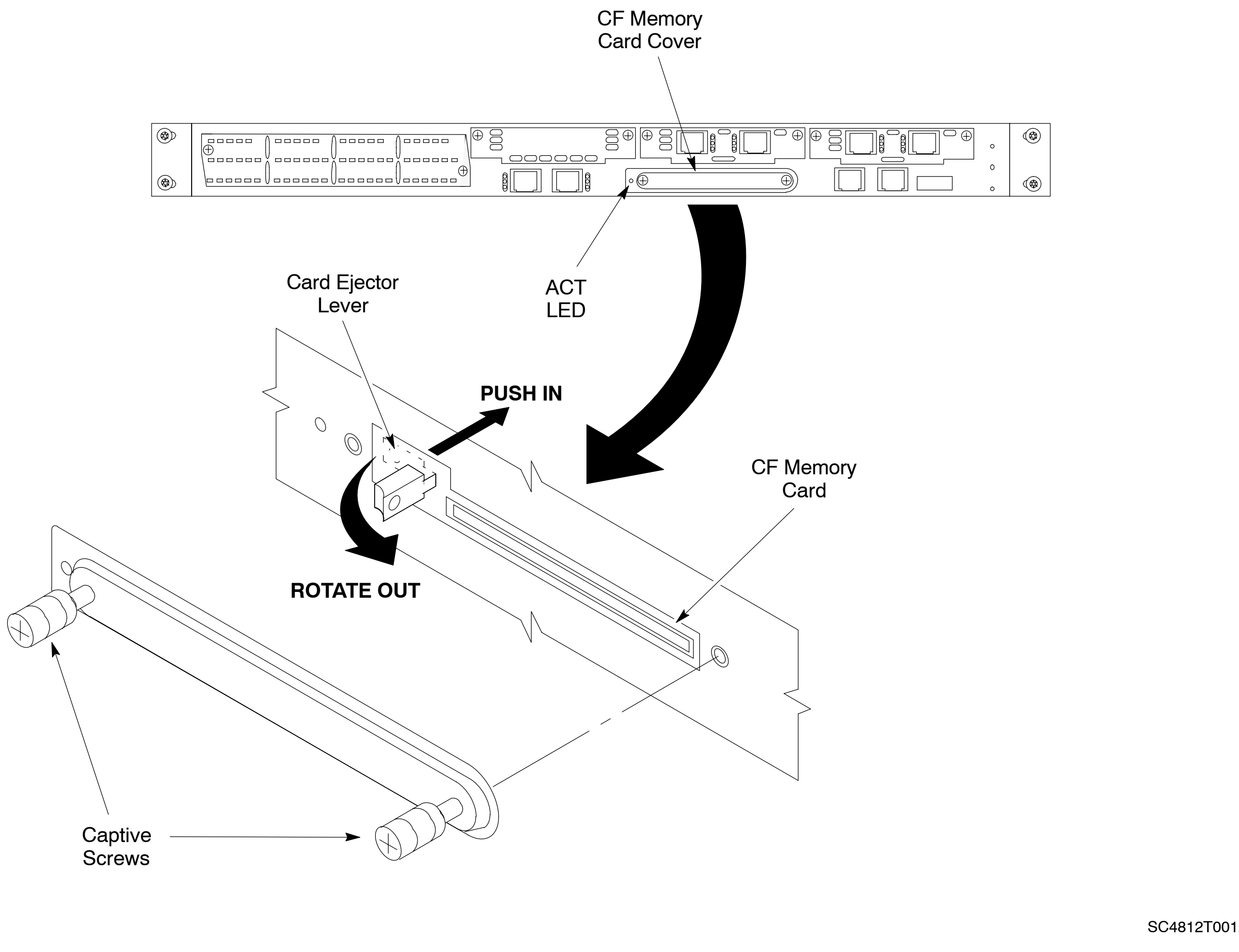
```
ip route 0.0.0.0 0.0.0.0 Multilink 1
!


line con 0
 exec–timeout 15 0
 password cisco
line aux 0
 login
 password cisco
line vty 0 4
 login
 password cisco

end
```

I

BTS Router CF Memory Card Removal and Installation

The following procedures cover removal and installation of the CF memory card used to store the IOS and configuration data for the BTS router.

Figure I-5: Router CF Memory Card Removal



Tools Required

The following tool is required to perform procedures included in this section:

- Number 2 cross–recess screwdriver

Removing a CF memory card – Refer to Figure I-5 and follow the procedures in Table I-13 to remove the CF memory card from the BTS router.

NOTE

The CF memory card may be removed and installed while power is applied to the router.

Table I-13: Router Flash Memory Card Removal

Step	Action
1	Refer to *MWR1900 Wireless Mobile Edge Router Hardware Installation Guide; part number 78–13982–01* for the latest information, cautions, and notes on BTS router CF memory card removal and installation prior to proceeding with the following steps.
2	**! CAUTION** Do not remove the CF memory card while there are read or write operations occurring on the card. Removing the card during these operations will cause the router to shut down and damage the file system. If power is applied to the router, be sure there are no read or write operations in progress for the card by verifying the ACT indicator LED is not lighted or lighting intermittently.
3	Using a cross–recess screwdriver, fully loosen the captive screws securing the flash memory card slot cover to the router, and remove the cover.
4	Remove the CF memory card by performing the following:
4a	– Rotate the end of the card ejector lever until it is pointing out 90° to the router front panel (see Figure I-5).
4b	– Push the card ejector lever straight into the router to unseat the CF memory card.
4c	– Carefully pull the card out of the slot.
5	Place the CF memory card on an anti–static surface or in an anti–static container.

Installing a Flash Memory Card – Refer to Figure I-5 and follow the procedures in Table I-13 to install the CF memory card in a BTS router

Table I-14: Router Flash Memory Card Installation

Step	Action
1	Refer to *MWR1900 Wireless Mobile Edge Router Hardware Installation Guide; part number 78–13982–01* for the latest information, cautions, and notes on BTS router CF memory card removal and installation prior to proceeding with the following steps.
2	If the flash memory slot cover is installed, use a cross–recess screwdriver to fully loosen the captive screws securing the cover to the router, and remove the cover (see NO TAG).
3	Install the CF memory card by performing the following:
3a	– Hold the CF memory card with the label facing up and the connector end pointing toward the router.
3b	– Carefully insert the *connector end* into the flash memory card slot.

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Table I-14: Router Flash Memory Card Installation	
Step	**Action**
3c	– Push the CF memory card into the slot to seat it in the slot connector. — The card ejector lever will extend out of the router as the card is seated.
3d	– Pull on the card ejector lever to fully extend it from the router, and rotate it to the left to its stowed position to latch the card in the slot (see Figure I-5).

Notes

Appendix J: Chapter Title Goes Here

Appendix Content

THIS IS THE GENERAL APPENDIX TOC. USE THIS FOR ALL APPENDICES EXCEPT APPENDIX A.

Notes

MMI Cable Fabrication

Purpose

When the Motorola SLN2006A MMI Interface Kit is not available, a cable can be fabricated by the user to interface a nine–pin serial connector on an LMF computer platform with an MMI connector on GLI cards and other Motorola BTS assemblies. This section provides information necessary for fabricating this cable.

Required Parts

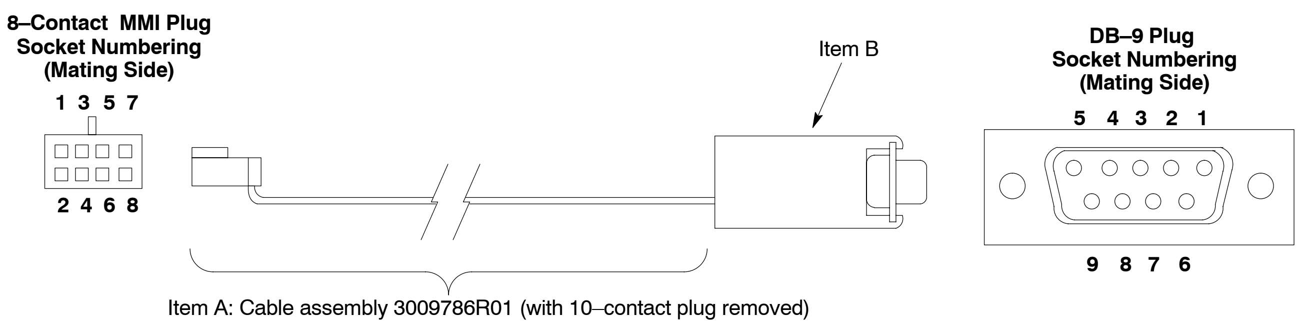
Table J-1: Parts Required to Fabricate MMI Cable

Item	Part Number	Qty	Description
A	Motorola 3009786R01	1	Ribbon cable assembly, 1.524 M, one 8–contact MMI connector, one 10–contact connector
B	AMP 749814–1, Belkin A4B202BGC, or equivalent	1	Receptacle kit, unassembled, 9–position, socket contacts, unshielded, metal or plastic shell, solder or crimp–type contacts

Cable Details

Figure J-1 illustrates the details of the fabricated MMI cable.

Figure J-1: Fabricated MMI Cable Details



FABRICATION NOTES:

1. Remove 10–contact connector from ribbon cable of cable assembly 3009786R01
2. Separate wires at unterminated end of ribbon cable as required to connect to DB–9 connector contacts
3. Dark wire on ribbon cable of cable assembly 3009786R01 connects to pin 1 of the 8–contact plug
4. Strip three ribbon cable wires with connections specified in Table J-2 and connect to DB–9 plug contacts as specified in Table J-2
5. Shorten un–connected ribbon cable wires enough to prevent contacting DB–9 contacts, leaving enough wire to egage any strain relief in the DB–9 connector shell

MMIFAB001–0

Wire Run List

Table J-2 provides the wire run/pin–out information for the fabricated MMI cable.

Table J-2: Fabricated MMI Cable Wire Run List

8–CONTACT MMI PLUG CONTACT		DB–9 PLUG CONTACT
1	————————	5
2	————————	2
3	————————	3
4		No Connection (NC)
5		NC
6		NC
7		NC
8		NC

This index supports 4 levels– Level 1 through Level 4 in a 2–column format.

B

68P09260A64–B

Technical Information

1X SC4812T–MC BTS OPTIMIZATION/ATP

SOFTWARE RELEASE 2.16.4.X

800 MHZ & 1.9 GHZ

CDMA2000 1X

DRAFT

ENGLISH
5/21/04
68P09260A64–B

1X SC4812T–MC BTS OPTIMIZATION/ATP

SOFTWARE RELEASE 2.16.4.X

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CDMA2000 1X

DRAFT

ENGLISH

5/21/04

68P09260A64–B

MOTOROLA

Technical Information Products and Services

STANDARD MANUAL PRINTING INSTRUCTIONS

Part Number: 68P09260A64–B   Filename: ____________   APC: _______

Title: 1X SC4812T–MC BTS Optimization/ATP

Volume 1 of 1   Print Vendor: eDOC   Date 5/21/04

STANDARD SPECIFICATIONS – FOR REFERENCE–DO NOT MODIFY

PAPER:	1st. LEVEL TABS:	2nd. LEVEL TABS:	FINISHING:
Body: 70 lb.	Single Sided	Single Sided	3–Ring Binder Slant–D
Inside Cover: 65 lb. Cougar	5 Cuts	7 Cuts	3–Hole Punched (5/16–in. dia.)
Tabs: 110 lb. Index	Clear Mylar	Clear Mylar	Shrink Wrap Body
Binder Cover: Standard TED cover – 10 pt. Carolina	Pantone 2706–C	White	
	Black Ink	Black Ink	

Black ink for body, inside cover, and binder cover.

TAB and SHEET SIZE/QUANTITY

7X9 _______   8.5x11 _______   11x17 _______   Sheets = (Total Pages) / 2

1st Level Tabs _______   2nd Level Tabs _______

NON–STANDARD SPECIFICATIONS

☐ Tape Bound   ☐ Corner Stitch

Other: Meet with manager to determine the deliverable.

SPECIAL INSTRUCTIONS

B

Using The Tabs

To use these tabs, simply cut or copy the tab catalog and paste in the chapter book in the first postion (in front of the chaptoc document).

You will note that these are good for ten chapters. To build tabs for 11–20 or for appendix A–J, open the catalogs for the proper tab position and edit the microdocument for the proper number/letter. Number 11 or alpha A start in the top tab_1 position.

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MANUAL TITLE SC 9640 BTS Install/Opto/ATP/FRU xxxxxxxx

PART NUMBER 68P09248A54–D

For 8.5x11, use all tabs.
For 7x9, use just cuts 1–4

***** DO NOT HAVE 3 OR MORE LINES OF TEXT ON A TAB *****

CUT 1 – IN FRONT OF CHAPTER ___
OR
BETWEEN PAGES ___ AND ___

CLEAR MYLAR, COLOR–PANTONE 2706–C, INK–BLACK

CUT 2 – IN FRONT OF CHAPTER ___
OR
BETWEEN PAGES ___ AND ___

CUT 3 – IN FRONT OF CHAPTER ___
OR
BETWEEN PAGES ___ AND ___

CUT 4 – IN FRONT OF CHAPTER ___
OR
BETWEEN PAGES ___ AND ___

CUT 5 – IN FRONT OF CHAPTER ___
OR
BETWEEN PAGES ___ AND ___

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MANUAL TITLE SC 9640 BTS Install/Opto/ATP/FRU xxxxxxxx

PART NUMBER 68P09248A54–D

***** DO NOT HAVE 3 OR MORE LINES OF TEXT ON A TAB *****

For 8.5x11, use all tabs.
For 7x9, use just cuts 1–5

CUT 1 – IN FRONT OF CHAPTER ____
OR
BETWEEN PAGES ____ AND ____

CUT 2 – IN FRONT OF CHAPTER ____
OR
BETWEEN PAGES ____ AND ____

CUT 3 – IN FRONT OF CHAPTER ____
OR
BETWEEN PAGES ____ AND ____

CUT 4 – IN FRONT OF CHAPTER ____
OR
BETWEEN PAGES ____ AND ____

CUT 5 – IN FRONT OF CHAPTER ____
OR
BETWEEN PAGES ____ AND ____

CUT 6 – IN FRONT OF CHAPTER ____
OR
BETWEEN PAGES ____ AND ____

CUT 7 – IN FRONT OF CHAPTER ____
OR
BETWEEN PAGES ____ AND ____

CLEAR MYLAR, COLOR–WHITE, INK–BLACK

Product Information

Model Chart

Model Complement For Product A – Models X, Y, Z		
Model	**Description**	**Quantity**

Options

Option Complement For Product A		
Model	**Description**	**Quantity**

Specifications

General Specifications for Product A	
Specification	**Description**

Receiver Specifications for Product A	
Specification	**Description**

Transmitter Specifications for Product A	
Specification	**Description**

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Trademarks

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