



*Chapter 3*

# Optimization/Calibration

# Introduction to Optimization and 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.

|             |  |
|-------------|--|
| <b>NOTE</b> | 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.

|             |                              |
|-------------|------------------------------|
| <b>NOTE</b> | GLI's 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/NECF file. The CDF/NECF file 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.
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.

|             |  |
|-------------|--|
| <b>NOTE</b> | 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 3-36). |
|-------------|--|

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, please refer to the applicable *BTS/Modem Frame Hardware Installation and Functional Hardware Description* manuals.

3

## CDF/NECF

The CDF/NECF (Configuration Data File/Network Element Configuration File) contains information that defines the BTS and data used to download files to the devices. A CDF/NECF file must be placed in the applicable BTS folder before the LMF can be used to log into that BTS. CDF/NECF 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/NECF includes 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 *WinLMF On-Line Help SR2.16.x* for additional information on the layout of the LMF directory structure (including CDF/NECF 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** (or **bts-#.necf**) and **cbse-#.cdf** files for the BTS must be obtained from the CBSC and put in a **bts-#** folder in the LMF. Failure to use the correct CDF/NECF files can cause wrong results. **Failure to use the correct CDF/NECF files to log into a live (traffic carrying) site can shut down the site.**

The CDF/NECF is normally obtained from the CBSC on a DOS formatted diskette, or through a file transfer protocol (ftp) if the LMF computer has ftp capability. Refer to the *CDMA LMF Operator's Guide*, or the LMF Help screen, for the procedure.

## Site Equipage Verification

If you have not already done so, use an editor to view the CDF/NECF, and review the site documentation. Verify the site engineering equipage data in the CDF/NECF matches the actual site hardware using a CDF/NECF conversion table.

**CAUTION**

- Use extreme care not to make any changes to the CDF/NECF content while viewing the file. Changes to the CDF/NECF can cause the site to operate unreliably or render it incapable of operation.
- Always wear a conductive, high impedance 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 bag 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 1-9 for current supported version of LMF)
- CDF/NECF for each supported BTS (on diskette or available from the CBSC)
- CBSC File for each supported BTS (on diskette or available from the CBSC)

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

|             |   |
|-------------|---|
| <b>NOTE</b> | For the CDMA LMF graphics to display properly, the computer platform must be configured to display more than 256 colors. See the operating system software instructions for verifying and configuring the display settings. |
|-------------|---|

## Overview of Packet BTS files

R16.0 and earlier releases had the configuration file called CDF for each BTS and CBSC used by LMF. In 16.1 Packet BTS, BTS with GLI3 booting in packet binary, the CDF is replaced by two new configuration files called Network Element Configuration Base (NECB) and Network Element Change Journal (NECJ). The NECB contains the baseline configuration 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 gets to 80% of its maximum size, the NECB is re-generated and all the updates are rolled into it.

These files play much broader and vital role than previous CDF files. GLI3 booting in circuit binaries works similar to R16.0.

A few LMF related important facts about these files are listed below.

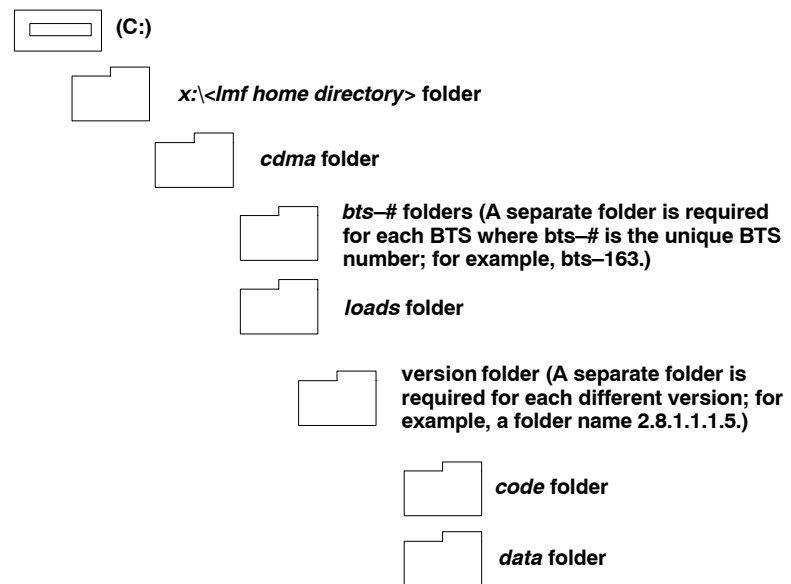
- Both files (NECB and NECJ) are in XML format.
- NECB contains all the up-to-date static configuration information and NECJ contains all the recent changes (including operations) which are not updated in the NECB.
- Both files can be viewed in any XML viewer (most easily available is Internet Explorer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

- These files will reside on both OMC-R and Packet-GLI3 (unlike CDF) and will be synchronized periodically between them.
- Both NECB and NECJ file 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 a `bts#.XML` file, which is a copy of the `NECB.XML` file.
- Packet-GLI3 will need these files for site initialization.
- The scope of NECB has grown much broader than CDF and has much more BTS centric information. The use of generic version of these files should be strictly avoided for the correct site initialization.

## 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 2.16.1.x. These folders may be present 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.



## NECF Filename Conventions and Directory Location

### NECF

The NECF actually consists of two files: the NECB and NECJ. The naming convention for the NECB and NECJ is:

**NECB\*bts#.xml**

**NECJ\*bts#.xml**

Where:

\* = any characters can be substituted there

# = the actual integer BTS number

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

The NECB and the NECJ must reside in the <LMF\_HOME>\cdma\bts-# directory corresponding to the BTS frame they are for.

### 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 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).

### 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.

|             |  |
|-------------|--|
| <b>NOTE</b> | <p><b>First Time Installation Sequence:</b></p> <ol style="list-style-type: none"> <li>1. Install Java Runtime Environment (JRE)</li> <li>2. Install U/WIN K-shell emulator</li> <li>3. Install LMF application programs</li> <li>4. Install/create BTS folders</li> </ol> |
|-------------|--|

|             |  |
|-------------|--|
| <b>NOTE</b> | <p>Any time you install U/WIN, you must install the LMF software because the installation of the LMF modifies some of the files that are installed during the U/Win installation. Installing U/Win over-writes these modifications.</p> <p>There are multiple binary image packages for installation on the CD-ROM. When prompted, choose the load that corresponds to the switch release that you currently have installed. Perform the Device Images install after the WinLMF installation.</p> <p>If applicable, a separate CD ROM of BTS Binaries may be available for binary updates.</p> |
|-------------|--|

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

| <b>Table 3-1: LMF Operating System Installation</b> |      |  |
|---|------|--|
| ✔   | 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.                            |
|   | 1b   | – If the Setup screen is not displayed, proceed to Step 2.   |
|   | 2    | Click on the <b>Start</b> button.  |
|   | 3    | Select <b>Run</b> .  |
|   | 4    | Enter <b>d:\autorun</b> In the Open box and click <b>OK</b> .  |
|   |      | <p><b>NOTE</b></p> <p>If applicable, replace the letter <b>d</b> with the correct CD ROM drive letter.</p> |

## Copy BTS and CBSC CDF/NECF Files to the LMF Computer

Before logging on to a BTS with the LMF computer to execute optimization/ATP procedures, the correct **bts-#.cdf** (or **bts-#.necf**) and **cbsc-#.cdf** 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/NECF 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 (e.g., `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 NECF files, comply with the following to prevent BTS login problems with the LMF:

- The numbers used in the **bts-#.cdf** (or **bts-#.necf** and **cbsc-#.cdf** 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 work with locally numbered BTS CDF files. Using this file *will not provide a valid optimization* unless the generic file is edited to replace default parameters (e.g., channel numbers) with the operational parameters used locally.

The procedure in Table 3-2 lists the steps required to transfer the CDF or NECF 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 NECF Files to the LMF**

| ✓ Step              | Action  |
|---------------------|---|
| <b>AT THE CBSC:</b> |   |
| 1                   | Login to the CBSC workstation.  |
| 2                   | Insert a DOS formatted diskette in the workstation drive.   |
| 3                   | Type <b>eject -q</b> and press the <b>&lt;Enter&gt;</b> key.  |
| 4                   | Type <b>mount</b> and press the <b>&lt;Enter&gt;</b> key.<br><b>NOTE</b> <ul style="list-style-type: none"> <li>• Look for the <i>“floppy/no_name”</i> message on the last line displayed.</li> <li>• If the <b>eject</b> command was previously entered, <i>floppy/no_name</i> will be appended with a number. Use the explicit <i>floppy/no_name</i> reference displayed when performing step 7.</li> </ul> |
| 5                   | Change to the directory containing the file by typing <b>cd &lt;directory name&gt;</b> (ex. <b>cd bts-248</b> ) and pressing <b>&lt;Enter&gt;</b> .   |
| 6                   | Type <b>ls &lt;Enter&gt;</b> to display the list of files in the directory.   |

. . . continued on next page

**Table 3-2:** Copying CBSC CDF or NECF Files to the LMF

| ✓                  | Step | Action   |
|--------------------|------|--|
|                    | 7    | <p>With <i>Solaris versions of Unix</i>, create <i>DOS-formatted versions</i> of the <b>bts-#.cdf</b> (or <b>bts-#.necf</b>) and <b>cbsc-#.cdf</b> files on the diskette by entering the following command:</p> <pre>unix2dos &lt;source filename&gt; /floppy/no_name/&lt;target filename&gt;</pre> <p>For example, <b>unix2dos bts-248.cdf/necf /floppy/no_name/bts-248.cdf</b>.</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• Other versions of Unix do not support the <code>unix2dos</code> and <code>dos2unix</code> commands. In these cases, use the Unix <code>cp</code> (copy) command. The <i>copied</i> 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/NECF files on the LMF computer is, therefore, not recommended.</li> <li>• Using <code>cp</code>, multiple files can be <i>copied</i> in one operation by separating each filename to be copied with a space and ensuring the destination directory (<i>floppy/no_name</i>) is listed at the end of the command string following a space (e.g., <b>cp bts-248.cdf cbsc-6.cdf /floppy/na_name</b>).</li> </ul> |
|                    | 8    | Repeat steps 5 through 7 for each <b>bts-#</b> that must be supported by the LMF.  |
|                    | 9    | When all required files have been copied to the diskette, type <b>eject</b> and press the <b>&lt;Enter&gt;</b> key.  |
|                    | 10   | Remove the diskette from the CBSC.   |
| <b>AT THE LMF:</b> |      |  |
|                    | 11   | Start the Windows operating system.  |
|                    | 12   | Insert the diskette into the LMF.  |
|                    | 13   | Using Windows Explorer (or equivalent program), create a corresponding <b>bts-#</b> folder in the <b>&lt;lmf home directory&gt;\cdma</b> directory for each <b>bts-#.cdf/necf/cbsc-#.cdf/necf</b> file pair copied from the CBSC.  |
|                    | 14   | Use Windows Explorer (or equivalent program) to transfer the <b>cbsc-#.cdf</b> (or <b>bts-#.necf</b> ) and <b>bts-#.cdf</b> files from the diskette to the corresponding <b>&lt;lmf home directory&gt;\cdma\bts-#</b> folders created in step 13.  |

## Creating a Named HyperTerminal Connection for MMI Connection

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 Hyperlink Connection for MMI Connection

| Step | Action  |
|------|---|
| 1    | From the Windows Start menu, select:<br><b>Programs&gt;Accessories</b>  |
| 2    | Select <b>Communications</b> , double click the <b>Hyperterminal</b> folder, and then double click on the <b>Hyperterm.exe</b> icon in the window that opens.<br><b>NOTE</b><br><ul style="list-style-type: none"> <li>• If a <b>Location Information Window</b> appears, enter the required information, then click <b>Close</b>. (This is required the first time, even if a modem is not to be used.)</li> <li>• If a <b>You need to install a modem.....</b> message appears, click <b>NO</b>.</li> </ul> |
| 3    | When the <b>Connection Description</b> box opens:<br><ul style="list-style-type: none"> <li>– Type a name for the connection being defined (e.g., MMI Session) in the <b>Name:</b> window.</li> <li>– Highlight any icon preferred for the named connection in the <b>Icon:</b> chooser window.</li> <li>– Click <b>OK</b>.</li> </ul>  |
| 4    | <b>NOTE</b><br>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.<br><br>From the <b>Connect using:</b> pick list in the <b>Connect To</b> box displayed, select the RS-232 port to be used for the connection (e.g., <b>COM1</b> or <b>COM2 (Win NT)</b> – or <b>Direct to Com 1</b> or <b>Direct to Com 2 (Win 98)</b> ), and click <b>OK</b> .   |
| 5    | In the <b>Port Settings</b> tab of the <b>COM# Properties</b> window displayed, configure the RS-232 port settings as follows:<br><ul style="list-style-type: none"> <li>• Bits per second: 9600</li> <li>• Data bits: 8</li> <li>• Parity: None</li> <li>• Stop bits: 1</li> <li>• Flow control: None</li> </ul>   |

... continued on next page

**Table 3-3:** Creating a Named Hyperlink Connection for MMI Connection

| Step | Action   |
|------|--|
| 6    | Click <b>OK</b> .  |
| 7    | Save the defined connection by selecting:<br><b>File&gt;Save</b>   |
| 8    | Close the HyperTerminal window by selecting:<br><b>File&gt;Exit</b>  |
| 9    | Click <b>Yes</b> to disconnect when prompted.  |
| 10   | Perform one of the following: <ul style="list-style-type: none"> <li>• If the <b>Hyperterminal</b> folder window is still open (<i>Win 98</i>) proceed to step 12</li> <li>• From the Windows Start menu, select <b>Programs &gt; Accessories</b></li> </ul>                         |
| 11   | Perform one of the following: <ul style="list-style-type: none"> <li>• For <i>Win NT</i>, select <b>Hyperterminal</b> and release any pressed mouse buttons.</li> <li>• For <i>Win 98</i>, select <b>Communications</b> and double click the <b>Hyperterminal</b> folder.</li> </ul> |
| 12   | Highlight the newly created connection icon by moving the cursor over it ( <i>Win NT</i> ) or clicking on it ( <i>Win 98</i> ).  |
| 13   | <i>Right click and drag</i> the highlighted connection icon to the Windows desktop and release the right mouse button.   |
| 14   | From the pop-up menu displayed, select <b>Create Shortcut(s) Here</b> .  |
| 15   | If desired, reposition the shortcut icon for the new connection by dragging it to another location on the Windows desktop.   |

## Span Lines – Interface and Isolation

### 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 of 25 pairs of wire. A GLI card can support up to six spans. In the SC 4812T configuration, the odd spans (1, 3, and 5) terminate on the Span “A” I/O; and the even spans (2, 4, and 6) terminate on the Span “B” I/O.

**NOTE** Span Lines will interface to the BTS through the Site I/O **ONLY** in circuit split mode.

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

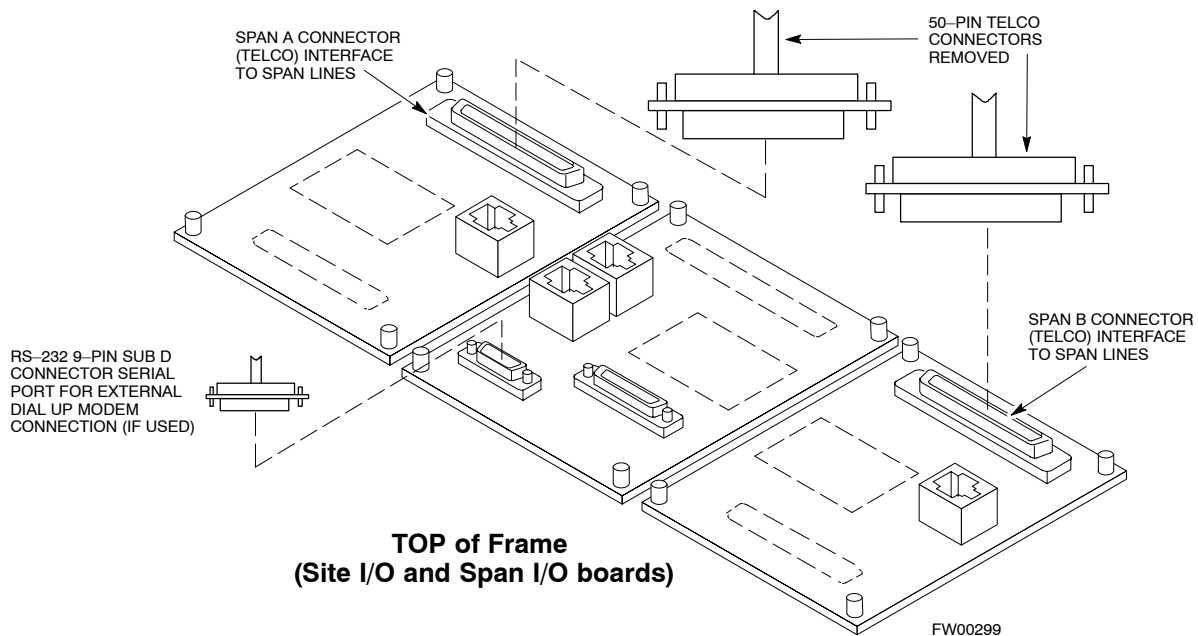
### Isolate BTS from T1/E1 Spans

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). |
| <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>– If a third party is used for span connectivity, the third party must be informed before disconnecting the span line.</li> <li>– Verify that you remove the SPAN cable, <i>not</i> the “MODEM/TELCO” connector.</li> </ul> |  |

3

Figure 3-2: Span I/O Board T1 Span Isolation





# LMF to BTS Connection

## Connect the LMF to the BTS

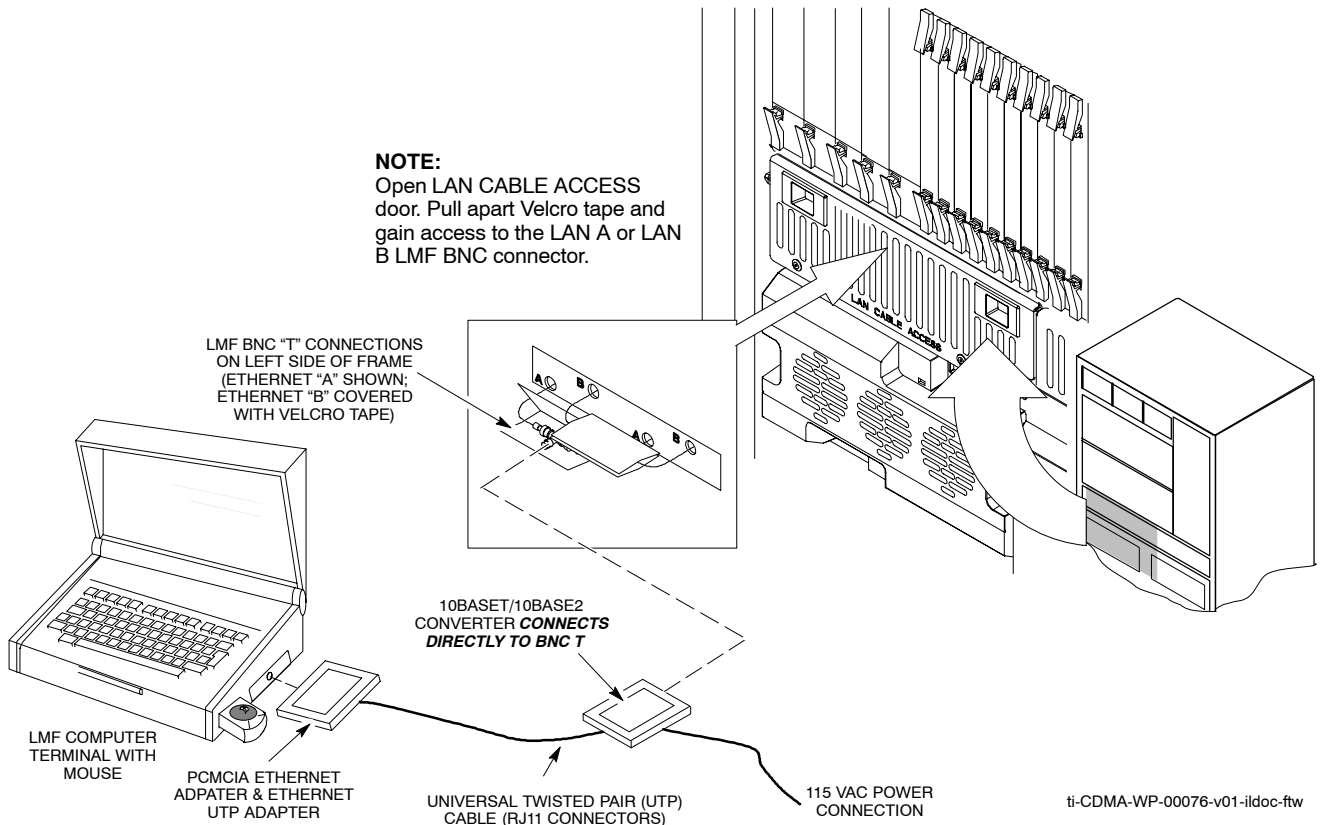
The LMF is connected to the LAN A or B connector located on the left side of the frame's lower air intake grill, behind the LAN Cable Access door (see Figure 3-3).

**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. <ul style="list-style-type: none"> <li>- If there is no login response, connect the LMF to the LAN B connector.</li> <li>- If there is still no login response, see Table 6-1, Login Failure Troubleshooting Procedures.</li> </ul> |
| <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>- 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, <i>the BNC cable must not exceed 91 cm (3 ft) in length.</i></li> <li>- The LAN shield is isolated from chassis ground. The LAN shield (exposed portion of BNC connector) <b>must not touch the chassis</b> during optimization.</li> </ul> |   |

3

**Figure 3-3: LMF Connection Detail**



# Using the LMF

## Basic LMF Operation

**LMF Coverage in This Publication** – The LMF application program supports maintenance of both CDMA and SAS BTSs. All references to the LMF in this publication are to the CDMA portion of the 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 *WinLMF On-Line Help SR2.16.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.

**CDF/NECF Requirements** – For the LMF to recognize the devices installed in the BTS, a BTS CDF/NECF file which includes 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 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/NECF file, 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 GUI, which works in the following way:

- Select the device or devices.
- Select the action to apply to the selected device(s).
- While action is in progress, a status report window displays the action taking place and other status information.
- The status report window indicates when the action is complete and displays other pertinent information.
- Clicking the **OK** button closes the status report window.

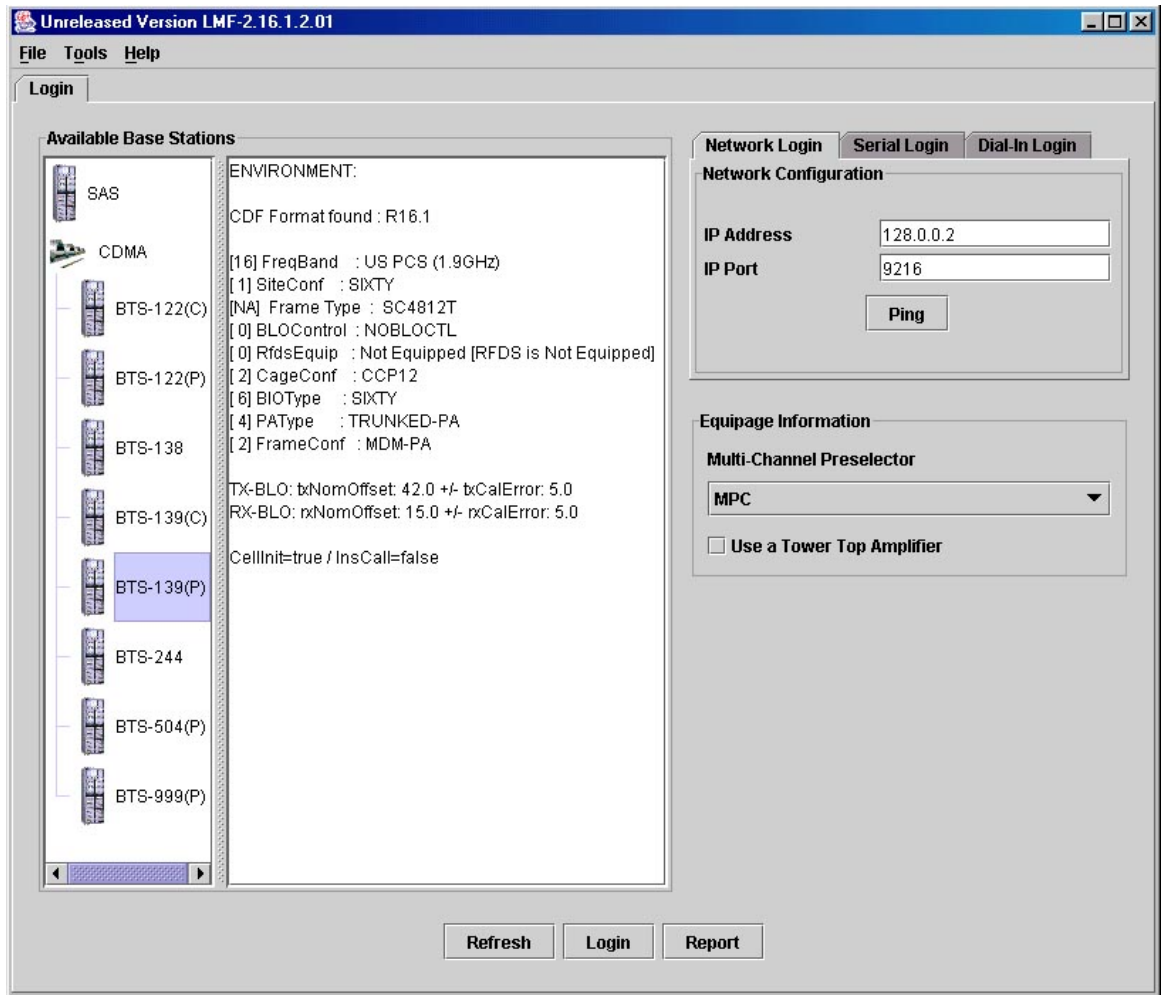
## Understanding GUI Operation

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

- Figure 3-4 depicts the differences between packet and circuit CDMA “cdf” file identification. Note that if there is a packet version “bts” file, the “(P)” is added as a suffix. There is a corresponding “(C)” for the circuit mode version.
- Figure 3-5 depicts the Self-Managed Network Elements (NEs) state of a packet mode SC4812T. Note that an “X” is on the front of each card that is under Self-Managed Network Elements (NEs) control by the GLI3 card.
- Figure 3-6 depicts three of the available packet mode commands. Normally the GLI3 has Self-Managed Network Elements (NEs) control of all cards as shown in Figure 3-5 by 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 Network Elements (NEs) control of the card by using the shown dropdown menu. It 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 site 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.

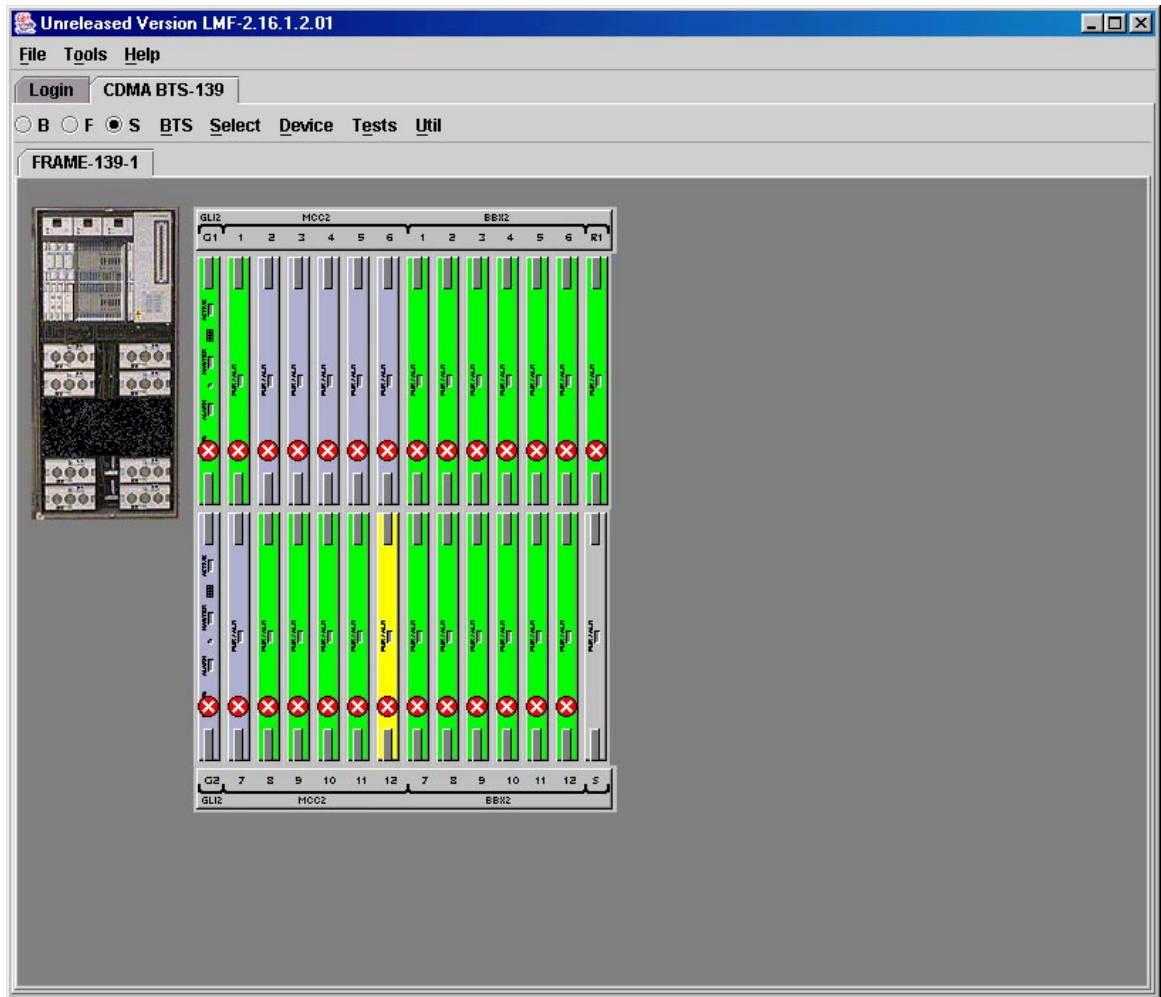
For detailed information on performing these and other LMF operations, refer to the *LMF Help function on–line documentation*.

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



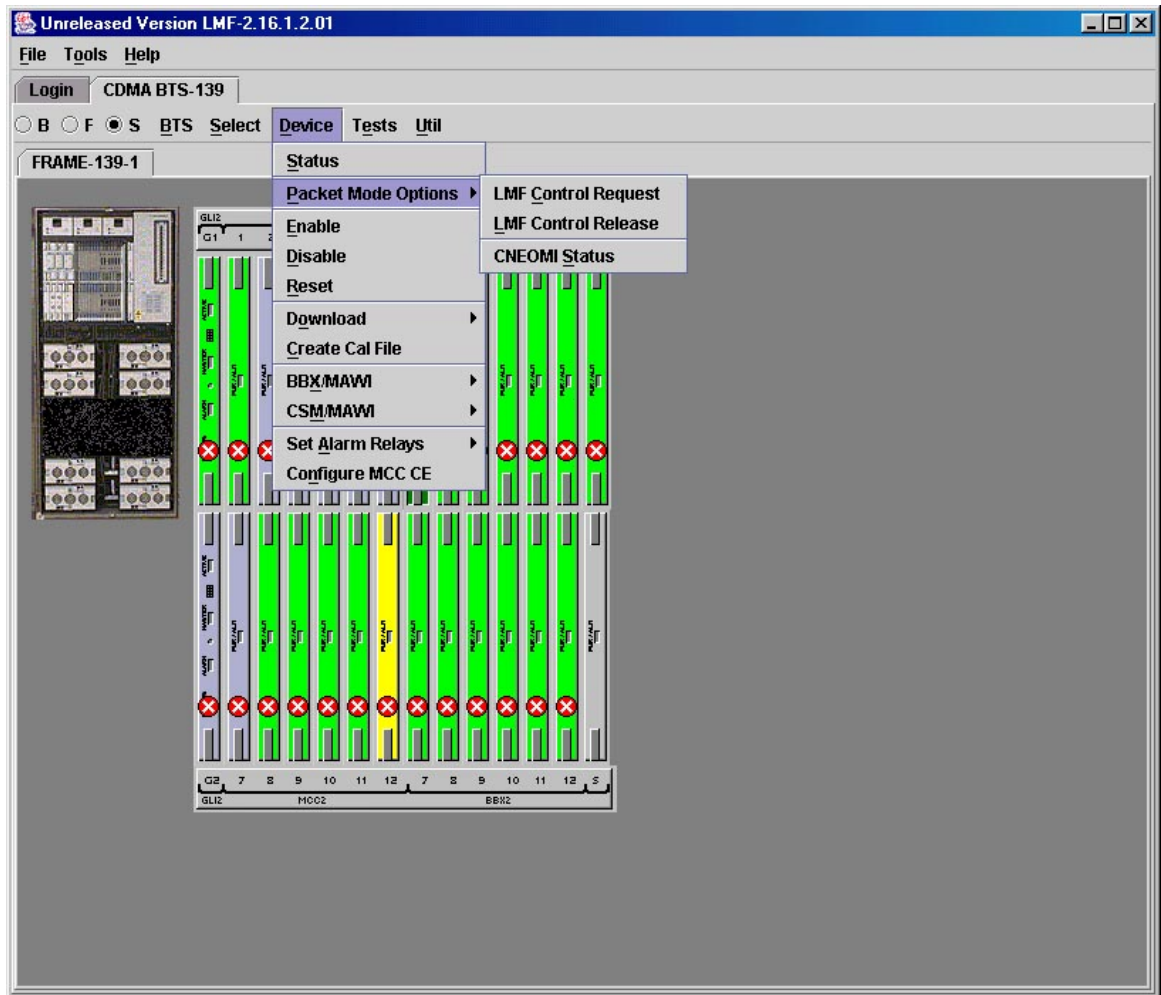
3

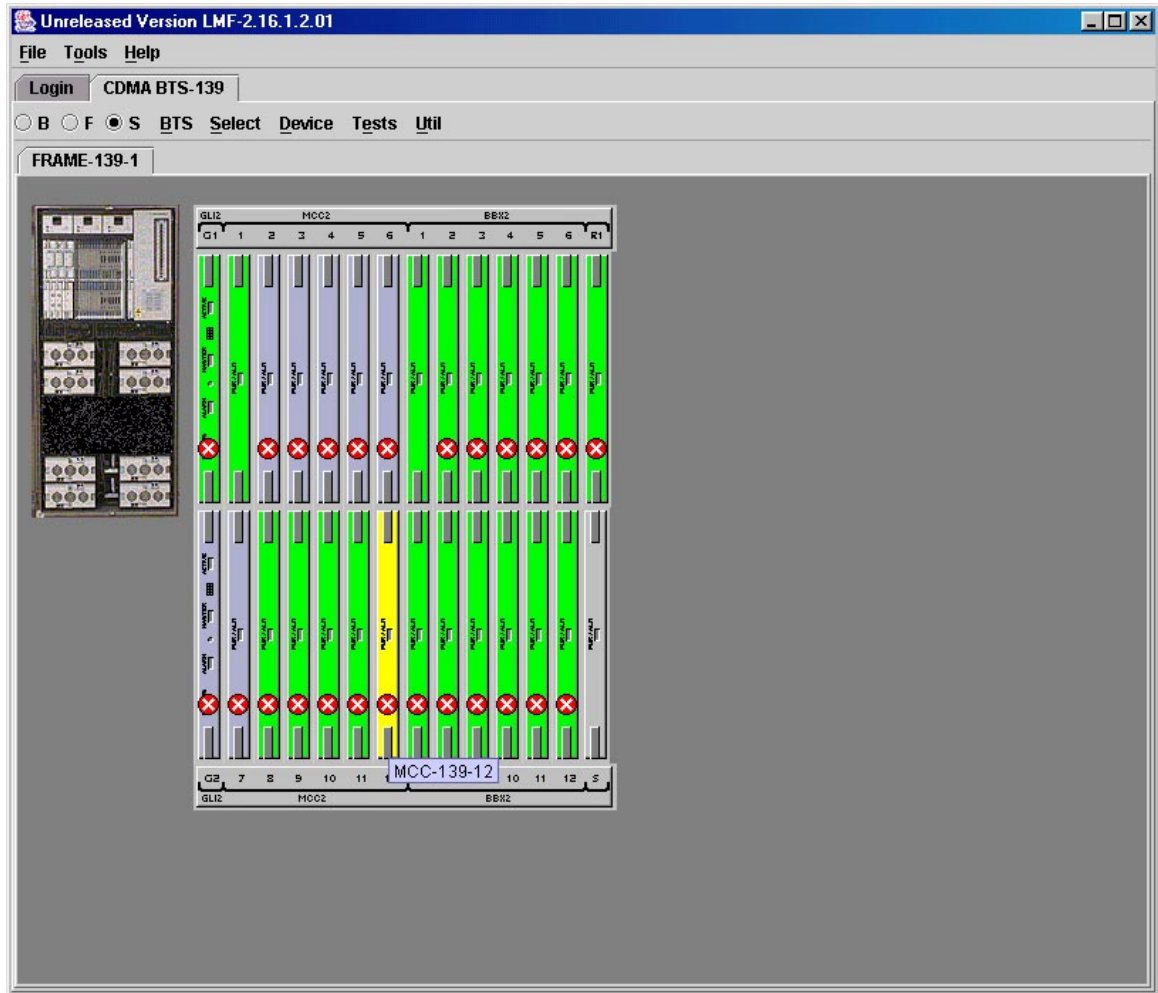
Figure 3-5: Self-Managed Network Elements (NEs) state of a packet mode SC4812T



3

Figure 3-6: Available packet mode commands



**Figure 3-7:** Packet mode site 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 you want 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> **rsi channel=6 sector=5**

Refer to the *LMF CDMA CLI Reference SR2.16.1.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/NECF and CBSC file 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.

|             |   |
|-------------|---|
| <b>NOTE</b> | Be sure that the correct <i>bts-#.cdf/necf</i> and <i>cbcs-#.cdf/necf</i> files are used for the BTS. These should be the CDF/NECF files that are provided for the BTS by the CBSC. Failure to use the correct CDF/NECF files can result in invalid optimization. <b>Failure to use the correct CDF/NECF files to log into a live (traffic carrying) site can shut down the site.</b> |
|-------------|---|

### BTS Login from the GUI Environment

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

| Step | Action   |
|------|--|
| 1    | Start the CDMA LMF GUI environment by double clicking on the WinLMF desktop icon (if the LMF is not running).<br><br><b>NOTE</b><br>If a warning similar to the following is displayed, select <b>No</b> , shut down other LMF sessions which may be running, and start the CDMA LMF GUI environment again:<br><br><pre> The CLI handler is already running. This may cause conflicts with the LMF Are you sure you want to start the application? Yes                               No </pre> |
| 2    | Click on the <b>Login</b> tab (if not displayed).  |
| 3    | If no base stations are displayed in the <b>Available Base Stations</b> pick list, double click on the <b>CDMA</b> icon.   |
| 4    | Click on the desired BTS number.   |

. . . continued on next page

**Table 3-6: BTS GUI Login Procedure**

| ✔ | Step | Action   |
|---|------|--|
|   | 5    | Click on the <b>Network Login</b> tab (if not already in the forefront).   |
|   | 6    | Enter the correct IP address (normally <b>128.0.0.2</b> for a field BTS) if not correctly displayed in the <b>IP Address</b> box.<br><b>NOTE</b><br>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 <b>9216</b> ) if not correctly displayed in the <b>IP Port</b> box.   |
|   | 8    | Click on <b>Ping</b> . <ul style="list-style-type: none"> <li>– If the connection is successful, the <b>Ping Display</b> window shows text similar to the following:<br/>                 Reply from 128 128.0.0.2: bytes=32 time=3ms TTL=255</li> <li>– If there is no response the following is displayed:<br/>                 128.0.0.2:9216:Timed out</li> </ul> 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 <b>Multi-Channel Preselector</b> (from the <b>Multi-Channel Preselector</b> pick list), normally <b>MPC</b> , corresponding to your BTS configuration, if required.<br><b>NOTE</b><br>When performing RX tests on expansion frames, do not choose EMPC if the test equipment is connected to the starter frame.   |
|   |      | <b>NOTE</b><br>“Use a Tower Top Amplifier” is not applicable to the SC4812T-MC.  |
|   | 10   | Click on <b>Login</b> .<br>A BTS tab with the BTS is displayed.<br><b>NOTE</b> <ul style="list-style-type: none"> <li>• If you attempt to login to a BTS that is already logged on, all devices will be gray.</li> <li>• There may be instances where the BTS initiates a log out due to a system error (i.e., a device failure).</li> <li>• If the MGLI is OOS_ROM (blue), it will have to be downloaded with code before other devices can be seen.</li> <li>• If the MGLI is OOS-RAM (yellow), it must be enabled before other installed devices can be seen.</li> </ul>  |

## BTS Login from the CLI Environment

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

|             |  |
|-------------|--|
| <b>NOTE</b> | If the CLI and GUI environments are to be used at the same time, the <i>GUI must be started first and BTS login must be performed from the GUI</i> . 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    | <p>Double click the WinLMF CLI desktop icon (if the LMF CLI environment is not already running).</p> <p><b>NOTE</b><br/>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.</p>  |
|   | 2    | <p>At the /wlmf prompt, enter the following command:<br/><b>login bts-<i>&lt;bts#&gt;</i> host=<i>&lt;host&gt;</i> port=<i>&lt;port&gt;</i></b></p> <p>where:<br/>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).<br/>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).</p> <p>A response similar to the following will be displayed:</p> <pre> LMF&gt; 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" </pre> |

3 |

## Logging Out

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

|             |   |
|-------------|---|
| <b>NOTE</b> | 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 log out of a BTS when using the GUI environment.

| ✓ | Step | Action  |
|---|------|---|
|   | 1    | Click on <b>BTS</b> on the BTS tab menu bar.  |
|   | 2    | Click the <b>Logout</b> item in the pull-down menu (a <b>Confirm Logout</b> pop-up message appears).  |
|   | 3    | Click on <b>Yes</b> or press the <b>&lt;Enter&gt;</b> key to confirm logout. You are returned to the <b>Login</b> tab.<br><br><b>NOTE</b><br>If a logout was previously performed on the BTS from a CLI window running at the same time as the GUI, a <b>Logout Error</b> 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 <b>Logout Error</b> 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: <ul style="list-style-type: none"> <li>– Click <b>OK</b>.</li> <li>– Select <b>File&gt;Exit</b> in the window menu bar.</li> <li>– Click <b>Yes</b> in the <b>Confirm Logout</b> pop-up.</li> <li>– Click <b>Yes</b> in the <b>Logout Error</b> pop-up which appears again.</li> </ul> |
|   | 5    | If further work is to be done in the GUI, restart it.<br><br><b>NOTE</b> <ul style="list-style-type: none"> <li>• The <b>Logout</b> item on the BTS menu bar will only log you out of the displayed BTS.</li> <li>• You can also log out of all BTS sessions and exit LMF by clicking on the <b>File</b> selection in the menu bar and selecting <b>Exit</b> from the <b>File</b> menu list. A <b>Confirm Logout</b> pop-up message will appear.</li> </ul>                 |

## 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  |
|                                     |      | <p><b>NOTE</b></p> <p>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.</p>   |
|                                     | 1    | <p>Logout of a BTS by entering the following command:</p> <p><b>logout bts-&lt;bts#&gt;</b></p> <p>A response similar to the following is displayed:</p> <pre> LMF&gt; 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" </pre> |
|                                     | 2    | <p>If desired, close the CLI interface by entering the following command:</p> <p><b>exit</b></p> <p>A response similar to the following is displayed before the window closes:</p> <pre> Killing background processes.... </pre>  |

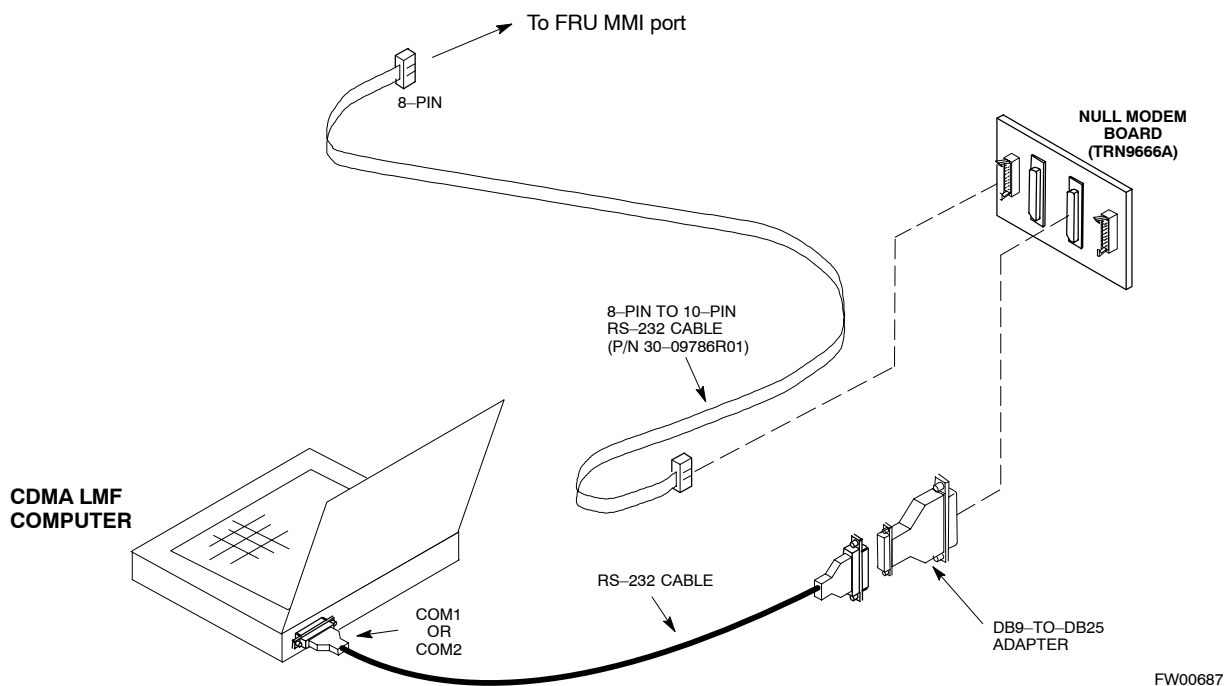
## Establishing an MMI Communication Session

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 Communications |  |  |
|---|--|--|
| Step  | Action   |  |
| 1   | Connect the LMF computer to the equipment as detailed in the applicable procedure that requires the MMI communication session.   |  |
| 2   | Start the named HyperTerminal connection for MMI sessions by double clicking on its desktop shortcut.<br><br><b>NOTE</b><br>If a desktop shortcut was not created for the MMI connection, access the connection from the Start menu by selecting:<br><b>Programs&gt;Accessories&gt;Hyperterminal&gt;HyperTerminal&gt;&lt;Named HyperTerminal Connection (e.g., MMI Session).</b> |  |
| 3   | Once the connection window opens, establish MMI communication with the BTS FRU by pressing the LMF computer <b>&lt;Enter&gt;</b> key until the prompt identified in the applicable procedure is obtained.  |  |

3

Figure 3-8: CDMA LMF Computer Common MMI Connections



## 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 Processors

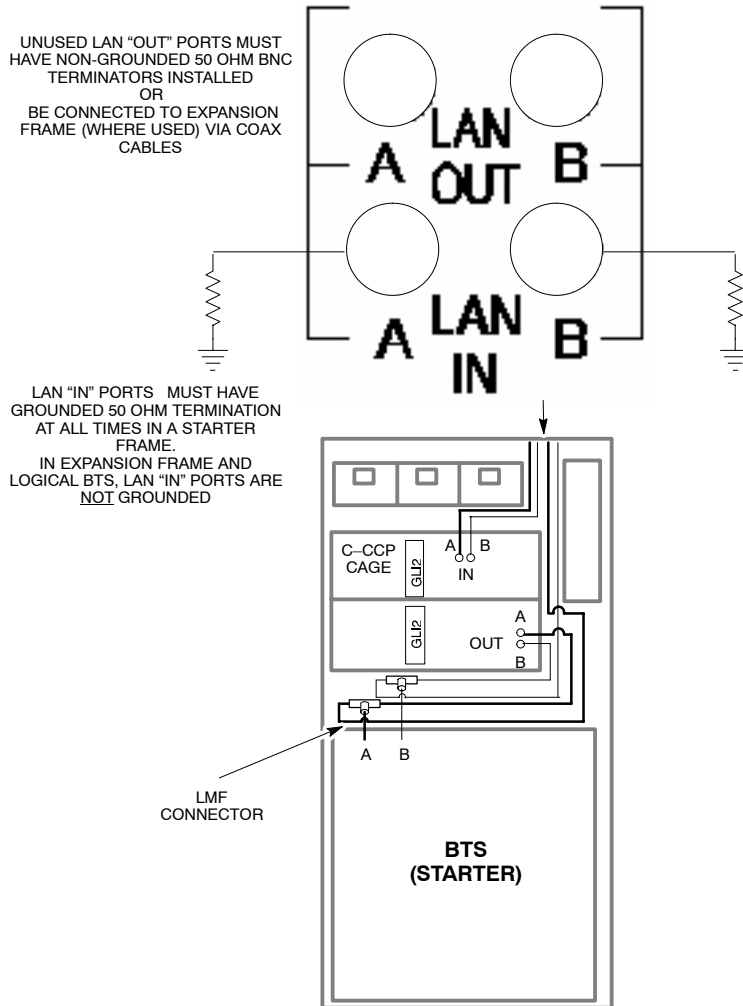
For proper operation, the integrity of the Ethernet LAN A and B links must be verified. Figure 3-9 represents a typical BTS Ethernet configuration. The drawing depicts one (of two identical) links, A and B.

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

**Figure 3-9:** BTS LAN Diagram



3



Follow the procedure in Table 3-11 and refer to Figure 3-9, as required, to ping each processor (on both LAN A and LAN B) and verify LAN redundancy is operating correctly.

**CAUTION** Always wear a conductive, high impedance 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 you have not already done so, connect the LMF to the BTS (see Table 3-5 on page 3-16).   |
|                                    | 2    | From the Windows desktop, click the <b>Start</b> button and select <b>Run</b> .   |
|                                    | 3    | In the <b>Open</b> box, type <b>ping</b> and the <i>&lt;MGLI IP address&gt;</i> (for example, <b>ping 128.0.0.2</b> ).<br><br><b>NOTE</b><br>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 <b>OK</b> button.  |
|                                    | 5    | If the connection is successful, text similar to the following is displayed:<br><br><pre>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</pre> 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 you must download ROM code, 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.

|             |   |
|-------------|---|
| <b>NOTE</b> | 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/NECF file). 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).

| <b>Table 3-12: Verify GLI ROM Code Loads</b> |   |
|--|---|
| <b>Step</b>                                  | <b>Action</b>   |
| 1  | <i>If it has not already been done</i> , start a <i>GUI</i> LMF session and log into the BTS ( refer to Table 3-6).   |
| 2  | Select all GLI devices by clicking on them, and select <b>Device &gt; Status</b> from the BTS menu bar.   |
| 3  | In the status report window which opens, note the number in the <b>ROM Ver</b> column for each GLI.   |
| 4  | If the ROM code loaded in the GLIs is <i>not</i> 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.   |
| 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 and GLI

### 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.

| ✓ | Step | Action   |
|---|------|--|
|   | 1    | Select <b>Tools&gt;Update Next Load&gt;CDMA</b> function to ensure the Next Load parameter is set to the correct code version level.   |
|   | 2    | Download code to the primary MGLI by clicking on the MGLI. <ul style="list-style-type: none"> <li>– From the <b>Device</b> pull down menu, select <b>Download&gt;Code/Data</b>. A status report confirms change in the device(s) status.</li> <li>– Click <b>OK</b> to close the status window. <i>(The MGLI should automatically be downloaded with data and enabled.)</i></li> </ul> |
|   | 3    | Download code and data to the redundant MGLI but do not enable at this time.   |

## 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.

|             |  |
|-------------|--|
| <b>NOTE</b> | <ul style="list-style-type: none"> <li>– 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.</li> <li>– CSM devices are RAM code-loaded at the factory. RAM code is downloaded to CSMs only if updating to a newer software version.</li> </ul> |
|-------------|--|

**Table 3-14:** Download Code and Data to Non-GLI Devices

| ↙ | Step | Action   |
|---|------|--|
|   | 1    | <b>Select</b> all devices to be downloaded.  |
|   | 2    | From the <b>Device</b> pull down menu, select <b>Download&gt;Code/Data</b> .<br>A status report displays the result of the download for each selected device.  |
|   | 3    | Click <b>OK</b> to close the status window when downloading is complete.   |
|   |      | <b>NOTE</b> <ul style="list-style-type: none"> <li>– 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).</li> <li>– 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.</li> <li>– 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.</li> </ul> |
|   | 4    | To download the firmware application data to each device, select the target device and select: <b>Device&gt;Download&gt;Data</b>   |

## 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.

| ✓ | Step | Action  |
|---|------|---|
|   | 1    | Select the applicable CSM(s).   |
|   | 2    | Click on <b>Device</b> in the BTS menu bar and select <b>CSM/MAWI &gt; Select Clock Source...</b> in the pull down menu – a clock source selection window is displayed.   |
|   | 3    | Select the applicable clock source in the <b>Clock Reference Source</b> pick lists. Uncheck the related check boxes for Clock Reference Sources 2 and 3 if you do not want the displayed pick list item to be used. |
|   | 4    | Click on the <b>OK</b> button – a status report window displays the results of the selection action.  |
|   | 5    | Click on the <b>OK</b> 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    | <p>Click on the target CSM.</p> <p>From the <b>Device</b> pull down, select <b>Enable</b>.</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>– If equipped with two CSMs, enable CSM-2 first and then CSM-1. A status report confirms change in the device(s) status. Click <b>OK</b> to close the status window.</li> <li>– 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 <b>one hour</b> to complete.</li> <li>– 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.</li> <li>– 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.</li> <li>– 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.)</li> <li>– 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).</li> </ul> |
| 3    | If more than an hour has passed, refer to Table 3-20 to determine the cause.   |

## Enable MCCs

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

|             |  |
|-------------|--|
| <b>NOTE</b> | 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 <b>Select</b> pulldown menu choose <b>MCCs</b> .                   |
|   | 3    | From the <b>Device</b> menu, select <b>Enable</b> – a status report confirms change in the device(s) status. |
|   | 4    | Click on <b>OK</b> 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 <b>Device</b> menu, select <b>Enable</b> – a status report window confirms the change in the device(s) status and the enabled GLI(s) is green. |
|   | 3    | Click on <b>OK</b> to close the status report window.   |

## CSM System Time/GPS and HSO Verification

### 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 1-10 on page 1-29 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.

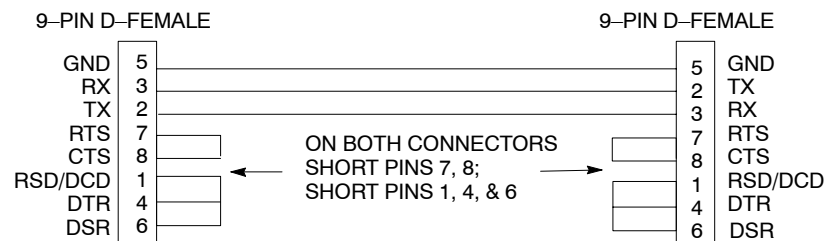
## CSM Frequency Verification

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 3-10 shows the wiring detail for the null modem cable.

**Figure 3-10:** Null Modem Cable Detail



FW00362

### 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

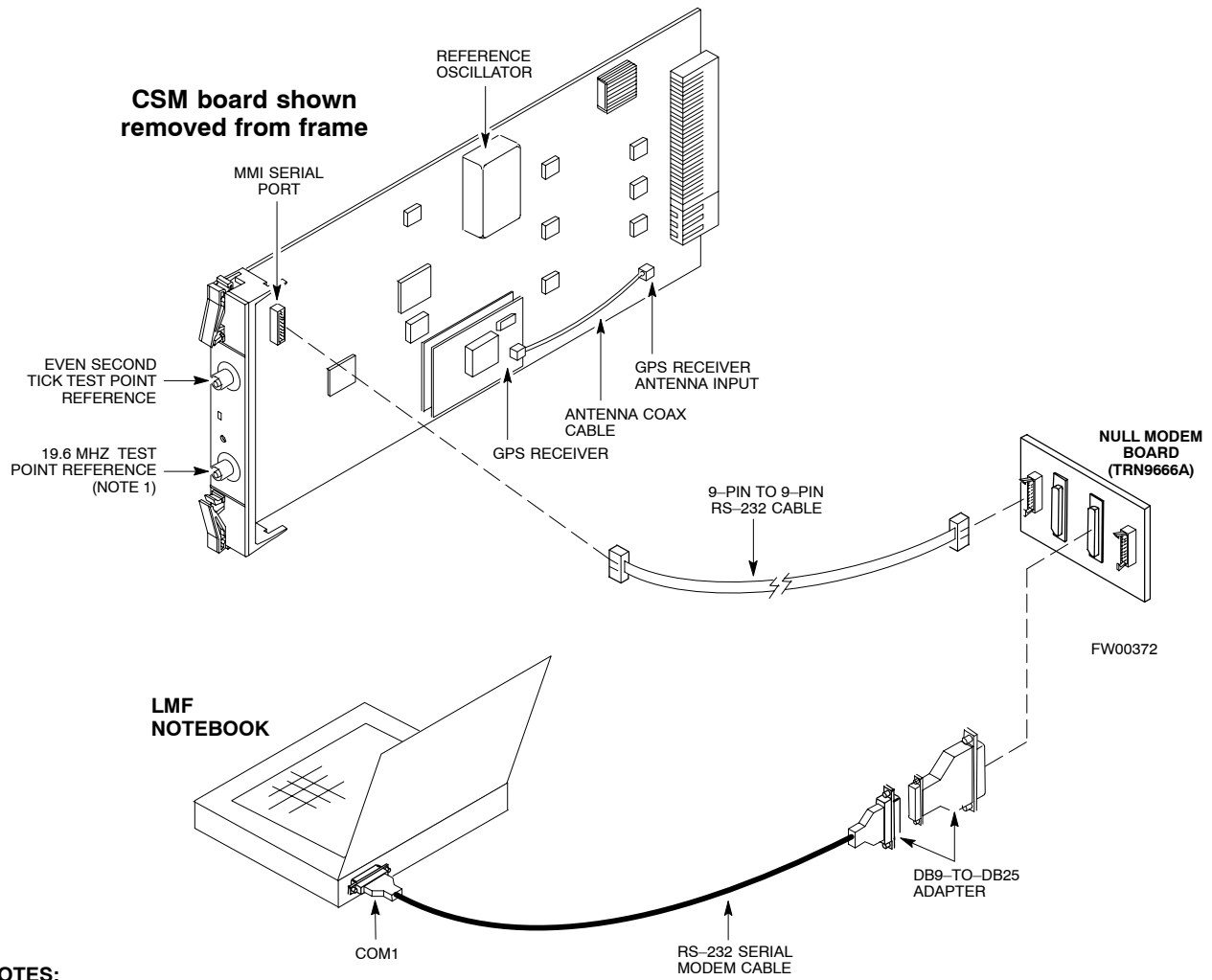
Follow the procedure in Table 3-19 to set up test equipment while referring to Figure 3-11 as required.

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

| Step | Action  |
|------|---|
| 1    | Perform one of the following operations: <ul style="list-style-type: none"> <li>– For <b>local GPS</b> (RF-GPS), verify a CSM board with a GPS receiver is installed in primary CSM slot 1 and that CSM-1 is INS.<br/>This is verified by checking the board ejectors for kit number <b>SGLN1145</b> on the board in slot 1.</li> <li>– For <b>Remote GPS</b> (RGPS), verify a CSM2 board is installed in primary slot 1 and that CSM-1 is INS.<br/>This is verified by checking the board ejectors for kit number <b>SGLN4132ED</b> (or later).</li> </ul> |
| 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)<br><br><b>NOTE</b><br>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 <b>&lt;Enter&gt;</b> key until the <b>CSM&gt;</b> prompt appears.   |

3

Figure 3-11: CSM MMI terminal connection



**NOTES:**

- One LED on each CSM:  
 Green = IN-SERVICE ACTIVE  
 Fast Flashing Green = OOS-RAM  
 Red = Fault Condition  
 Flashing Green & Red = Fault

## 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 3-11).
- The primary CSM and HSO (if equipped) have been warmed up for at least 15 minutes.

|                |   |
|----------------|---|
| <b>CAUTION</b> | Connect the GPS antenna to the GPS RF connector <b>ONLY</b> . Damage to the GPS <i>antenna</i> and/or <i>receiver</i> can result if the GPS antenna is inadvertently connected to any other RF connector. |
|----------------|---|

**Table 3-20: GPS Initialization/Verification**

| Step     | Action  |               |             |            |        |            |              |            |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |    |     |            |            |    |     |             |      |    |      |        |            |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |            |     |            |            |            |
|----------|---|---------------|-------------|------------|--------|------------|--------------|------------|--------------|-------|---|-----------|---------|---|-----|------|---|---|-----|----------|------------|---------------|---|----|-----|------------|------------|----|-----|-------------|------|----|------|--------|------------|--------------|-------|---|-----------|---------|---|-----|------|---|---|-----|----------|------------|---------------|---|------------|-----|------------|------------|------------|
| 1        | <p>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</p> <p><b>bstatus</b></p> <ul style="list-style-type: none"> <li>Observe the following typical response:</li> </ul> <pre>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</pre>  |               |             |            |        |            |              |            |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |    |     |            |            |    |     |             |      |    |      |        |            |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |            |     |            |            |            |
| 2        | <p>Enter the following command at the CSM&gt; prompt to display the current status of the Loran and the GPS receivers.</p> <p><b>sources</b></p> <ul style="list-style-type: none"> <li>Observe the following typical response for systems equipped with HSO:</li> </ul> <table border="1"> <thead> <tr> <th>Num</th> <th>Source Name</th> <th>Type</th> <th>TO</th> <th>Good</th> <th>Status</th> <th>Last Phase</th> <th>Target Phase</th> <th>Valid</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Local GPS</td> <td>Primary</td> <td>4</td> <td>Yes</td> <td>Good</td> <td>3</td> <td>0</td> <td>Yes</td> </tr> <tr> <td><u>1</u></td> <td><u>HSO</u></td> <td><u>Backup</u></td> <td>4</td> <td>No</td> <td>N/A</td> <td>timed-out*</td> <td>Timed-out*</td> <td>No</td> </tr> </tbody> </table> <p><b>*NOTE</b> “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&gt; prompt:</p> <pre>ss 1 12</pre> <p>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 <b>sources &lt;cr&gt;</b> at the CSM&gt; prompt. Verify that the HSO is now a valid source by confirming that the bold text below matches the response of the “sources” command.</p> <p>The HSO should be valid within one (1) minute, assuming the DPLL is locked and the HSO rubidium oscillator is fully warmed.</p> <table border="1"> <thead> <tr> <th>Num</th> <th>Source Name</th> <th>Type</th> <th>TO</th> <th>Good</th> <th>Status</th> <th>Last Phase</th> <th>Target Phase</th> <th>Valid</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Local GPS</td> <td>Primary</td> <td>4</td> <td>Yes</td> <td>Good</td> <td>3</td> <td>0</td> <td>Yes</td> </tr> <tr> <td><u>1</u></td> <td><u>HSO</u></td> <td><u>Backup</u></td> <td>4</td> <td><b>Yes</b></td> <td>N/A</td> <td>xxxxxxxxxx</td> <td>xxxxxxxxxx</td> <td><b>Yes</b></td> </tr> </tbody> </table> | Num           | Source Name | Type       | TO     | Good       | Status       | Last Phase | Target Phase | Valid | 0 | Local GPS | Primary | 4 | Yes | Good | 3 | 0 | Yes | <u>1</u> | <u>HSO</u> | <u>Backup</u> | 4 | No | N/A | timed-out* | Timed-out* | No | Num | Source Name | Type | TO | Good | Status | Last Phase | Target Phase | Valid | 0 | Local GPS | Primary | 4 | Yes | Good | 3 | 0 | Yes | <u>1</u> | <u>HSO</u> | <u>Backup</u> | 4 | <b>Yes</b> | N/A | xxxxxxxxxx | xxxxxxxxxx | <b>Yes</b> |
| Num      | Source Name   | Type          | TO          | Good       | Status | Last Phase | Target Phase | Valid      |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |    |     |            |            |    |     |             |      |    |      |        |            |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |            |     |            |            |            |
| 0        | Local GPS   | Primary       | 4           | Yes        | Good   | 3          | 0            | Yes        |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |    |     |            |            |    |     |             |      |    |      |        |            |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |            |     |            |            |            |
| <u>1</u> | <u>HSO</u>  | <u>Backup</u> | 4           | No         | N/A    | timed-out* | Timed-out*   | No         |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |    |     |            |            |    |     |             |      |    |      |        |            |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |            |     |            |            |            |
| Num      | Source Name   | Type          | TO          | Good       | Status | Last Phase | Target Phase | Valid      |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |    |     |            |            |    |     |             |      |    |      |        |            |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |            |     |            |            |            |
| 0        | Local GPS   | Primary       | 4           | Yes        | Good   | 3          | 0            | Yes        |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |    |     |            |            |    |     |             |      |    |      |        |            |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |            |     |            |            |            |
| <u>1</u> | <u>HSO</u>  | <u>Backup</u> | 4           | <b>Yes</b> | N/A    | xxxxxxxxxx | xxxxxxxxxx   | <b>Yes</b> |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |    |     |            |            |    |     |             |      |    |      |        |            |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |            |     |            |            |            |
| 3        | <p>HSO information (underlined text above, verified from left to right) is usually the #1 reference source. If this is not the case, have the <i>OMCR</i> determine the correct BTS timing source has been identified in the database by entering the <b>display bts csmgen</b> command and correct as required using the <b>edit csm csmgen refsrc</b> command.</p>  |               |             |            |        |            |              |            |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |    |     |            |            |    |     |             |      |    |      |        |            |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |            |     |            |            |            |
| 4        | <p><b>NOTE</b></p> <p>If any of the above mentioned areas fail, verify:</p> <ul style="list-style-type: none"> <li>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 <i>Wait for this to occur before continuing !</i></li> <li>If “timed out” is displayed in the Last Phase column, suspect the HSO output buffer or oscillator is defective</li> <li>Verify the HSO is FULLY SEATED and LOCKED to prevent any possible board warpage</li> </ul>   |               |             |            |        |            |              |            |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |    |     |            |            |    |     |             |      |    |      |        |            |              |       |   |           |         |   |     |      |   |   |     |          |            |               |   |            |     |            |            |            |

... continued on next page

**Table 3-20: GPS Initialization/Verification**

| Step | Action  |
|------|---|
| 5    | Verify the following GPS information (underlined text above): <ul style="list-style-type: none"> <li>- GPS information is usually the 0 reference source.</li> <li>- At least one Primary source must indicate “Status = good” and “Valid = yes” to bring site up.</li> </ul>   |
| 6    | Enter the following command at the CSM> prompt to verify that the GPS receiver is in tracking mode. <p><b>gstatus</b></p> <ul style="list-style-type: none"> <li>- Observe the following typical response:</li> </ul> <pre> 24:06:08 <u>GPS Receiver Control Task State: tracking satellites.</u> 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 <u>8 satellites tracked, receiving 8 satellites, 8 satellites visible.</u> 24:06:08 <u>Current Dilution of Precision (PDOP or HDOP): 0.</u> 24:06:08 Date &amp; 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> |
| 7    | Verify the following GPS information (shown above in <u>underlined</u> text): <ul style="list-style-type: none"> <li>- At least 4 satellites are tracked, and 4 satellites are visible.</li> <li>- GPS Receiver Control Task State is “tracking satellites”. <i>Do not continue until this occurs!</i></li> <li>- Dilution of Precision indication is not more that 30.</li> </ul> <p><b>Record</b> 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).</p>   |

... continued on next page

3

Table 3-20: GPS Initialization/Verification

| Step | Action   |
|------|--|
| 8    | <p><b>If steps 1 through 7 pass, the GPS is good.</b></p> <p><b>NOTE</b><br/>If any of the above mentioned areas fail, verify that:</p> <ul style="list-style-type: none"> <li>– If <i>Initial position accuracy</i> 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/NECF file).</li> <li>– If <i>Initial position accuracy</i> is “surveyed”, position data currently in the CDF/NECF file is assumed to be accurate. GPS will not automatically survey and update its position.</li> <li>– The GPS antenna is not obstructed or misaligned.</li> <li>– GPS antenna connector center conductor measures approximately +5 Vdc with respect to the shield.</li> <li>– There is no more than 4.5 dB of loss between the GPS antenna OSX connector and the BTS frame GPS input.</li> <li>– Any lightning protection installed between GPS antenna and BTS frame is installed correctly.</li> </ul> |
| 9    | <p>Enter the following commands at the CSM&gt; prompt to verify that the CSM is warmed up and that GPS acquisition has taken place.</p> <p><b>debug dpllp</b></p> <p>Observe the following typical response if the CSM is not warmed up (15 minutes from application of power) (<i>If warmed-up proceed to step 10</i>)</p> <pre>CSM&gt;DPLL Task Wait. 884 seconds left. DPLL Task Wait. 882 seconds left. DPLL Task Wait. 880 seconds left. ....etc.</pre> <p><b>NOTE</b><br/>The <b>warm</b> command can be issued at the MMI port used to force the CSM into warm-up, but the reference oscillator will be unstable.</p>   |
| 10   | <p>Observe the following typical response if the CSM is warmed up.</p> <pre>c:17486 off: <u>-11</u>, 3, <u>6</u> <u>TK SRC:0</u> S0: 3 S1:-2013175,-2013175 c:17486 off: <u>-11</u>, 3, <u>6</u> <u>TK SRC:0</u> S0: 3 S1:-2013175,-2013175 c:17470 off: <u>-11</u>, 1, <u>6</u> <u>TK SRC:0</u> S0: 1 S1:-2013175,-2013175 c:17486 off: <u>-11</u>, 3, <u>6</u> <u>TK SRC:0</u> S0: 3 S1:-2013175,-2013175 c:17470 off: <u>-11</u>, 1, <u>6</u> <u>TK SRC:0</u> S0: 1 S1:-2013175,-2013175 c:17470 off: <u>-11</u>, 1, <u>6</u> <u>TK SRC:0</u> S0: 1 S1:-2013175,-2013175</pre>  |
| 11   | <p>Verify the following GPS information (underlined text above, from left to right):</p> <ul style="list-style-type: none"> <li>– Lower limit offset from tracked source variable is not less than -60 (equates to 3µs limit).</li> <li>– Upper limit offset from tracked source variable is not more than +60 (equates to 3µs limit).</li> <li>– TK SRC: 0 is selected, where SRC 0 = GPS.</li> </ul>   |
| 12   | <p>Enter the following commands at the CSM&gt; prompt to exit the debug mode display.</p> <p><b>debug dpllp</b></p>  |



## 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 3-21: HSO Initialization/Verification**

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

## Test Equipment Set-up

### 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 3-10)
- 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 3-14 and Figure 3-15 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 3-21 and Figure 3-22 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

|                |   |
|----------------|---|
| <b>CAUTION</b> | 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

|             |                                   |
|-------------|-----------------------------------|
| <b>NOTE</b> | 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:

- 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
- Advantest R3267 Analyzer with Advantest R3562 Signal Generator

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.

### Test Equipment Reference Chart

Table 3-22 and Table 3-23 show the current test equipment available meeting Motorola standards.

To identify the connection ports, locate the test equipment presently being used in the **TEST SETS** columns, and read down the column. Where a ball appears in the column, connect one end of the test cable to that port. Follow the horizontal line to locate the end connection(s), reading up the column to identify the appropriate equipment/BTS port.

**Table 3-22: IS-95 A/B Test Equipment Setup**

| SIGNAL                      | COMMUNICATIONS SYSTEM ANALYZER |                   |                     |                     |                     | ADDITIONAL TEST EQUIPMENT |                |             |  | BTS                          |
|-----------------------------|--------------------------------|-------------------|---------------------|---------------------|---------------------|---------------------------|----------------|-------------|--|------------------------------|
|                             | Cyber-Test                     | Advant-est R3465  | HP 8935             | HP 8921A            | HP 8921 W/PCS       | Power Meter               | GPIB Interface | LMF         | 30 dB Directional Coupler & 20 dB Pad* |                              |
| EVEN SECOND SYNCHRONIZATION | EVEN SEC REF                   | EVEN SEC SYNC IN  | EVEN SECOND SYNC IN | EVEN SECOND SYNC IN | EVEN SECOND SYNC IN |                           |                |             |  | SYNC MONITOR                 |
| 19.6608 MHZ CLOCK           | TIME BASE IN                   | CDMA TIME BASE IN | EXT REF IN          | CDMA TIME BASE IN   | CDMA TIME BASE IN   |                           |                |             |  | FREQ MONITOR                 |
| CONTROL IEEE 488 BUS        | IEEE 488                       | GPIB              | HP-IB               | HP-IB               | HP-IB               | HP-IB                     | GPIB           | SERIAL PORT |  |                              |
| TX TEST CABLES              | RF IN/OUT                      | INPUT 50-OHM      | RF IN/OUT           | RF IN/OUT           | RF IN/OUT           |                           |                |             | 30 DB COUPLER AND 20 DB PAD            | TX1-n (SEE NOTE BELOW TABLE) |
| RX TEST CABLES              | RF GEN OUT                     | RF OUT 50-OHM     | RF IN/OUT           | DUPLEX OUT          | RF OUT ONLY         |                           |                |             |  | RX1-n (SEE NOTE BELOW TABLE) |

**NOTE**

- TX Test cables are setup 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.



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

| SIGNAL                              | TEST SETS                        |                          |                         |                                 | ADDITIONAL TEST EQUIPMENT |                |             |  | BTS                          |
|-------------------------------------|----------------------------------|--------------------------|-------------------------|---------------------------------|---------------------------|----------------|-------------|--|------------------------------|
|                                     | Advantest R3562 Signal Generator | Advantest R3267 Analyzer | Agilent E4406A Analyzer | Agilent E4432B Signal Generator | Power Meter               | GPIB Interface | LMF         | 30 dB Directional Coupler & 20 dB Pad* |                              |
| EVEN SECOND SYNCHRONIZATION         | EXT TRIG IN                      | EXT TRIG                 | TRIGGER IN              | PATTERN TRIG IN                 |                           |                |             |  | SYNC MONITOR                 |
| 19.6608 MHZ CLOCK                   | MOD TIME BASE IN                 |                          | EXT REF IN              |                                 |                           |                |             |  | FREQ MONITOR                 |
| SIGNAL SOURCE CONTROLLED SERIAL I/O | SERIAL I/O                       | SERIAL I/O               |                         |                                 |                           |                |             |  |                              |
| 10 MHZ                              | 10 MHZ IN                        | 10 MHZ OUT               | 10 MHZ OUT              | 10 MHZ IN                       |                           |                |             |  |                              |
| CONTROL IEEE 488 BUS                | IEEE 488                         | GPIB                     | HP-IB                   | GPIB                            | HP-IB                     | GPIB           | SERIAL PORT |  |                              |
| TX TEST CABLES                      | RF OUT                           | RF IN                    | RF INPUT 50 OHM         | RF OUTPUT 50 OHM                |                           |                |             | 30 DB COUPLER AND 20 DB PAD            | TX1-n (SEE NOTE BELOW TABLE) |
| RX TEST CABLES                      | RF GEN OUT                       | RF OUT 50-OHM            | RF OUT ONLY             | RF OUTPUT 50-OHM                |                           |                |             |  | RX1-n (SEE NOTE BELOW TABLE) |

**NOTE**

- TX Test cables are setup 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.

3

## 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 3-12 and Figure 3-13 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.

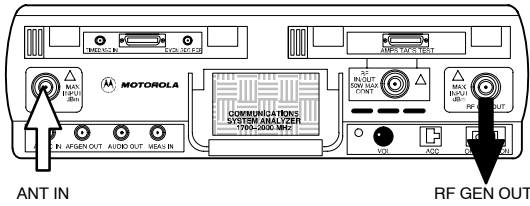
## Manual Cable Calibration

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

Figure 3-12: Cable Calibration Test Setup

SUPPORTED TEST SETS

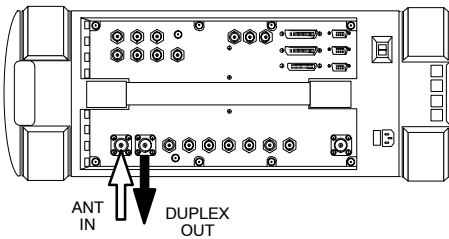
Motorola CyberTest



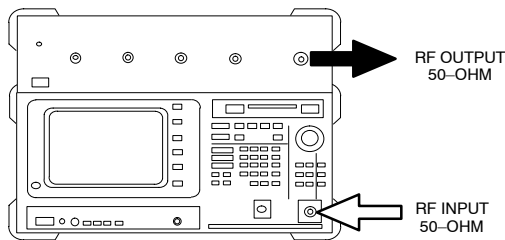
**Note:** The Directional Coupler is not used with the CyberTest Test Set. The TX cable is connected directly to the CyberTest Test Set.

A 10dB attenuator must be used with the short test cable for cable calibration with the CyberTest Test Set. The 10dB attenuator is used only for the cable calibration procedure, not with the test cables for TX calibration and ATP tests.

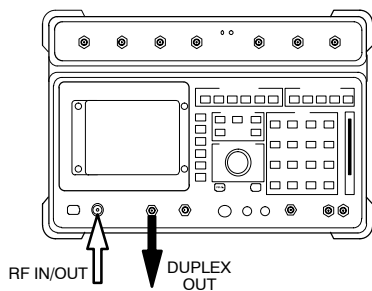
Hewlett-Packard Model HP 8935



Advantest Model R3465



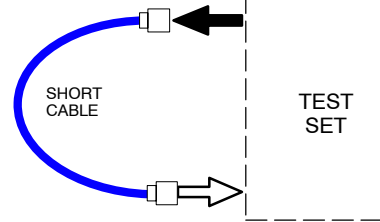
Hewlett-Packard Model HP 8921A



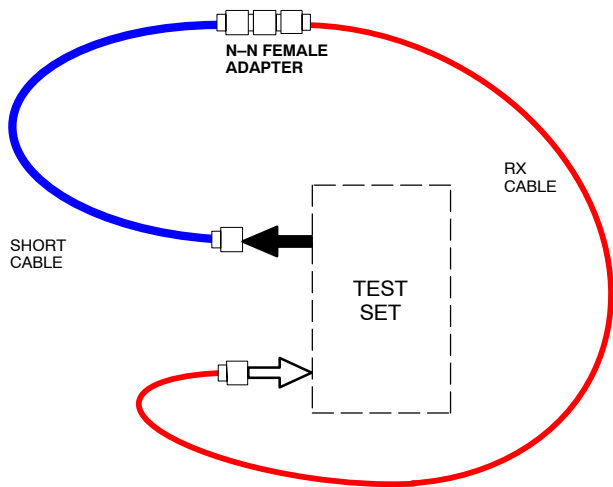
FW00089

CALIBRATION SET UP

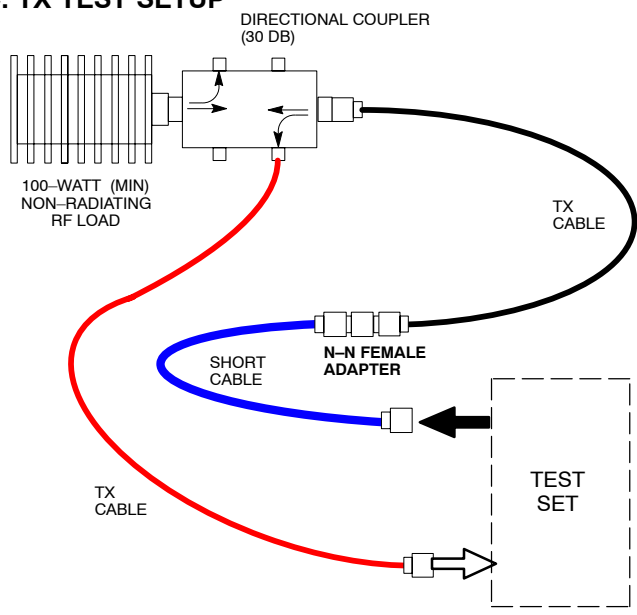
A. SHORT CABLE CAL



B. RX TEST SETUP



C. TX TEST SETUP

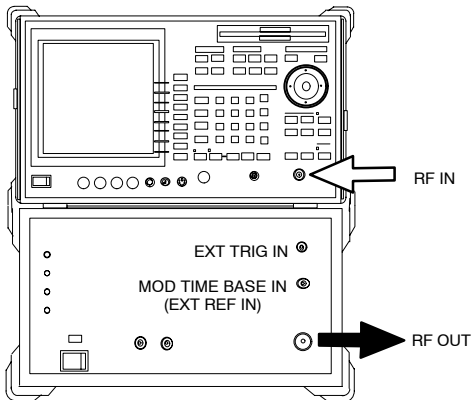


3

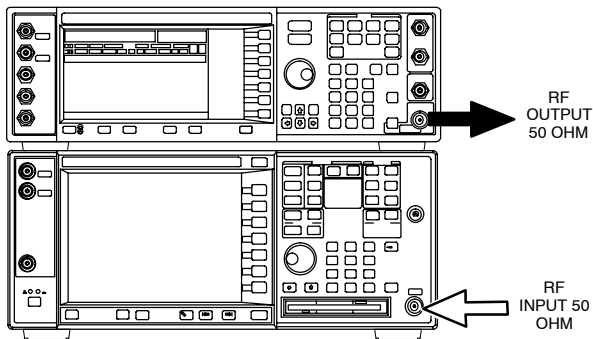
Figure 3-13: Cable Calibration Test Setup (Advantest R3267, Agilent E4406A)

**SUPPORTED TEST SETS**

Advantest R3267 (Top) and R3562 (Bottom)

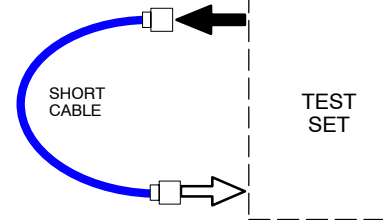


Agilent E4432B (Top) and E4406A (Bottom)

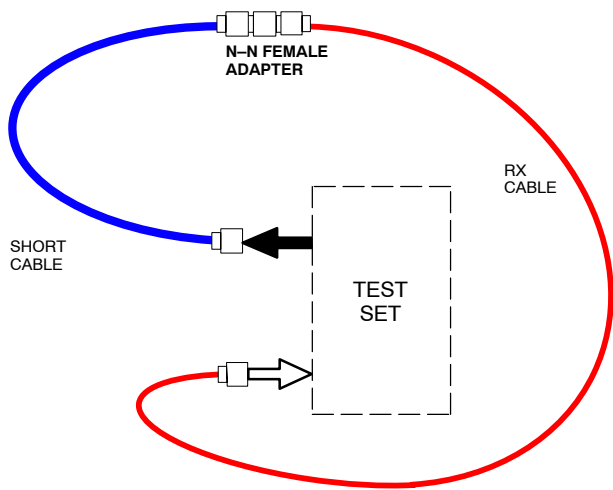


**CALIBRATION SET UP**

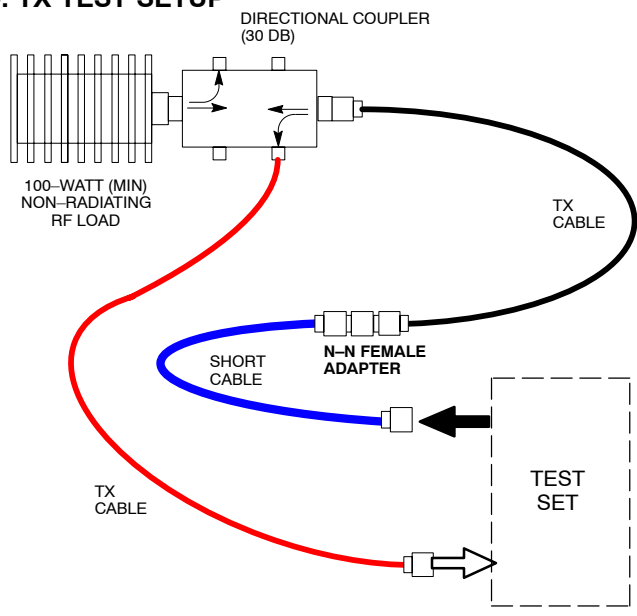
**A. SHORT CABLE CAL**



**B. RX TEST SETUP**



**C. TX TEST SETUP**



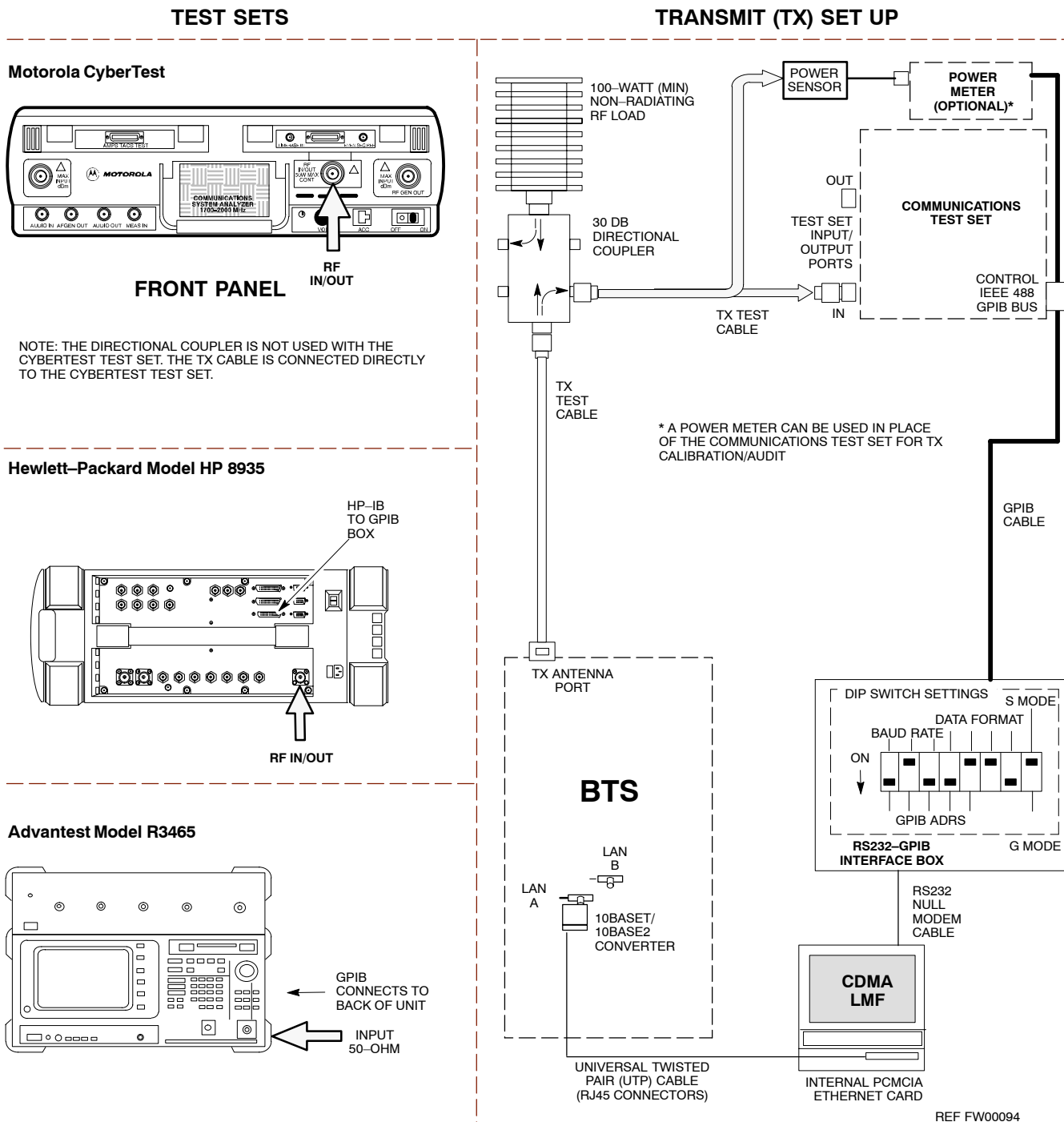
REF FW00089



### Set-up for TX Calibration

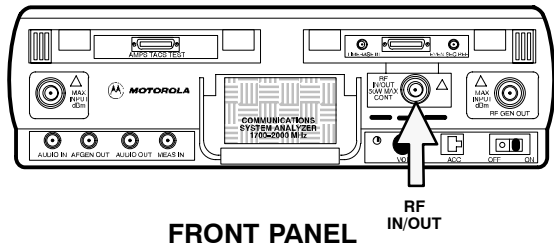
Figure 3-14 and Figure 3-15 show the test set connections for TX calibration.

Figure 3-14: TX Calibration Test Setup (CyberTest, HP 8935, and Advantest)



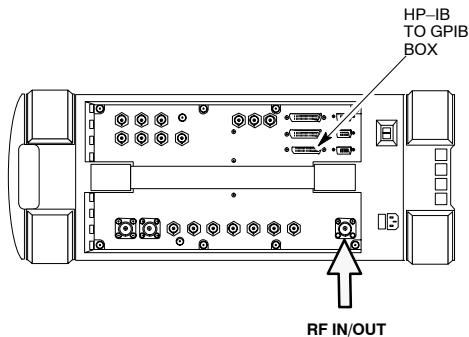
3

**TEST SETS**

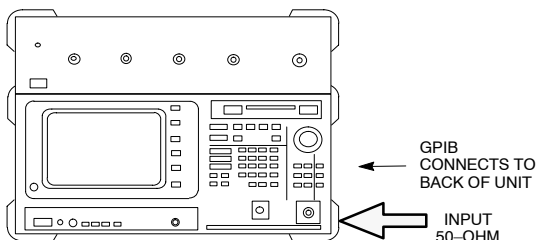


NOTE: THE DIRECTIONAL COUPLER IS NOT USED WITH THE CYBERTEST TEST SET. THE TX CABLE IS CONNECTED DIRECTLY TO THE CYBERTEST TEST SET.

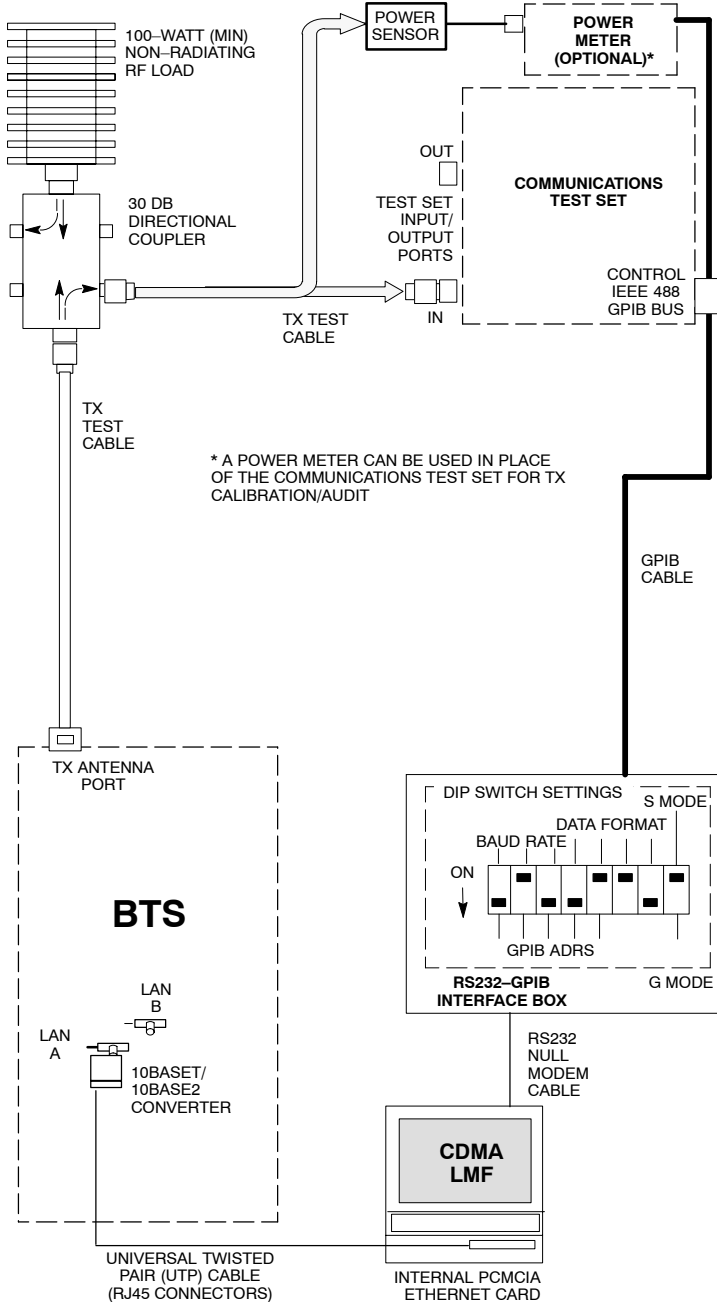
**Hewlett-Packard Model HP 8935**



**Advantest Model R3465**



**TRANSMIT (TX) SET UP**



REF FW00094

Figure 3-15: TX Calibration Test Setup (Advantest R3267 and Agilent E4406A)

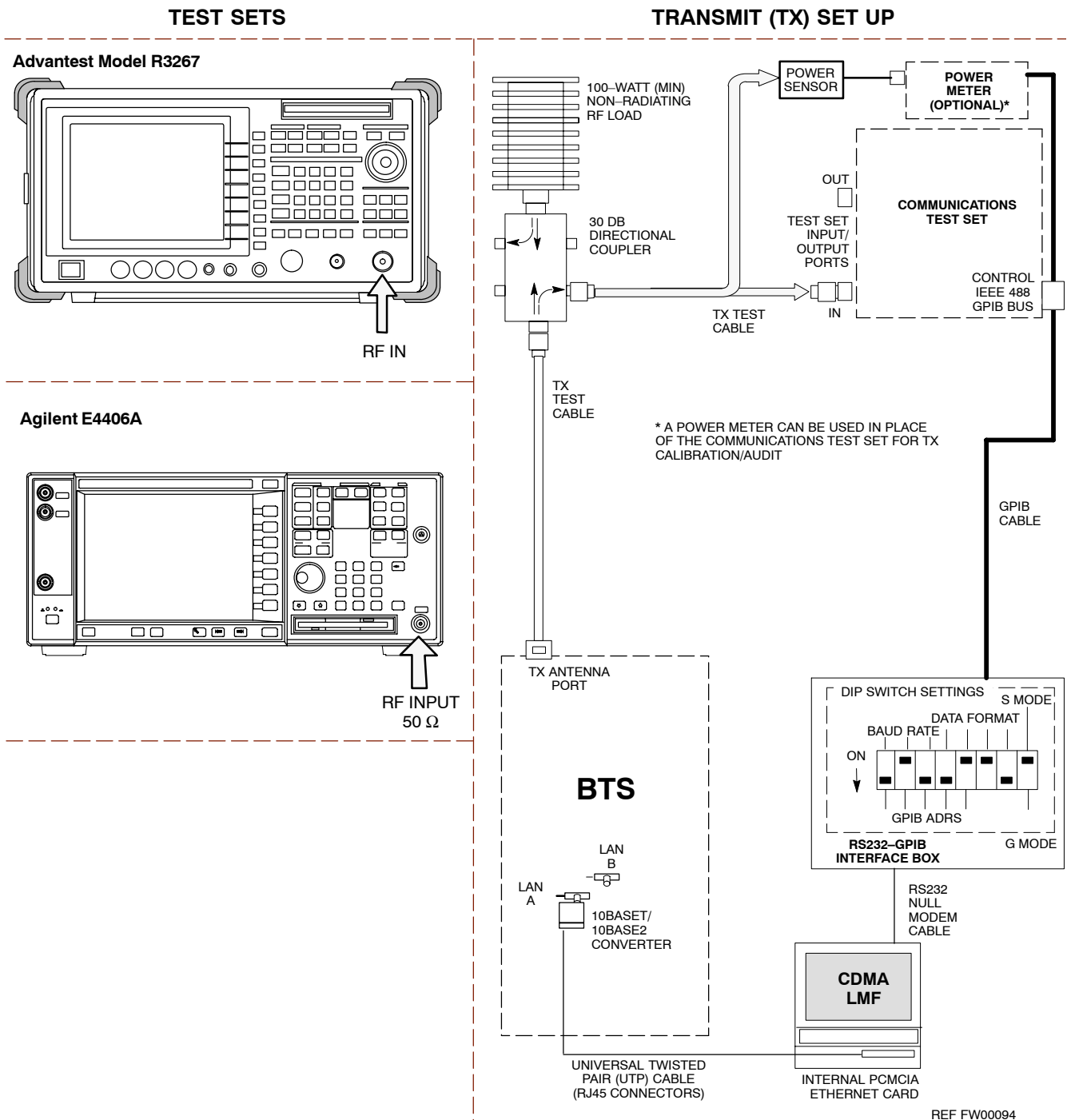
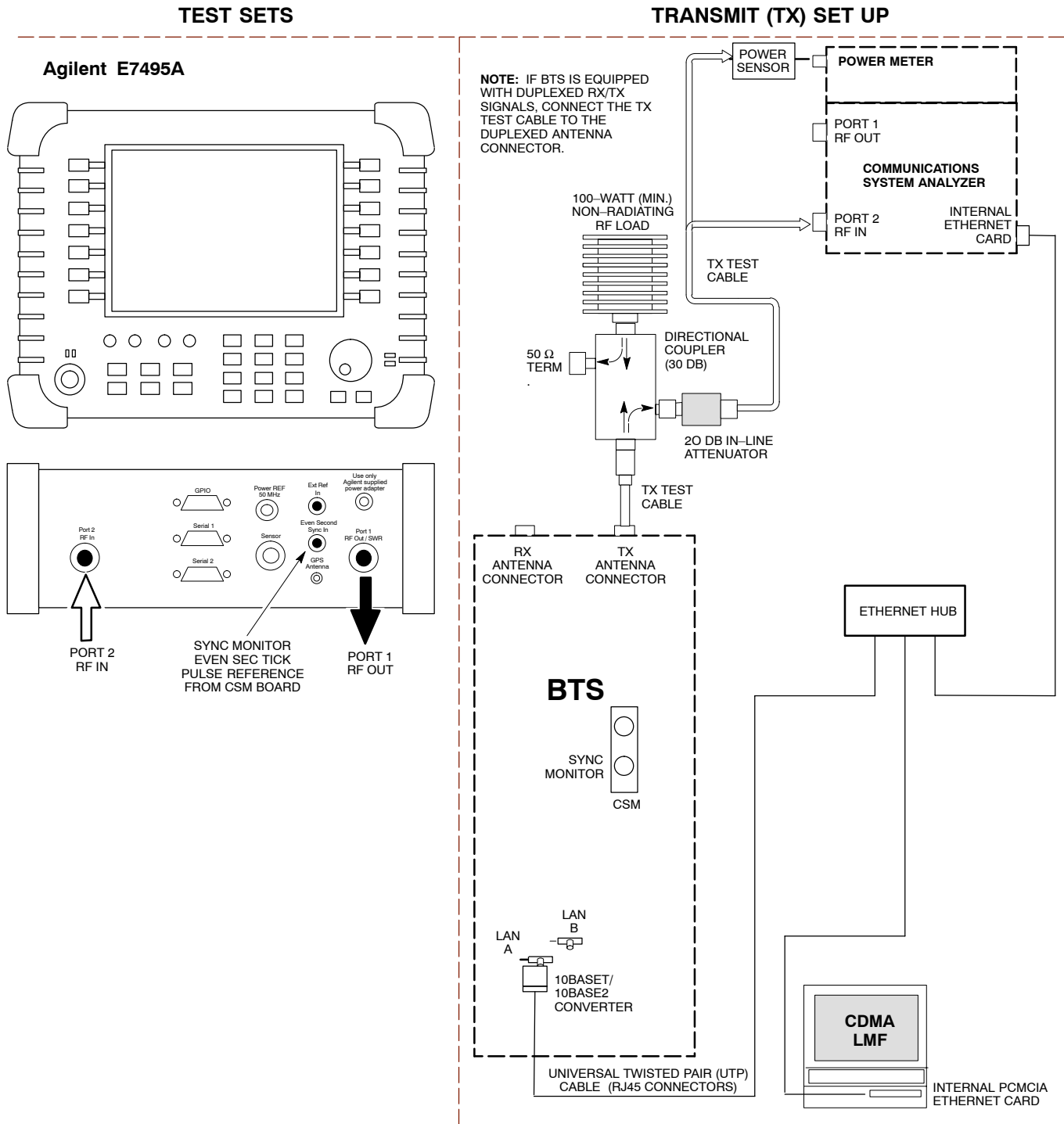
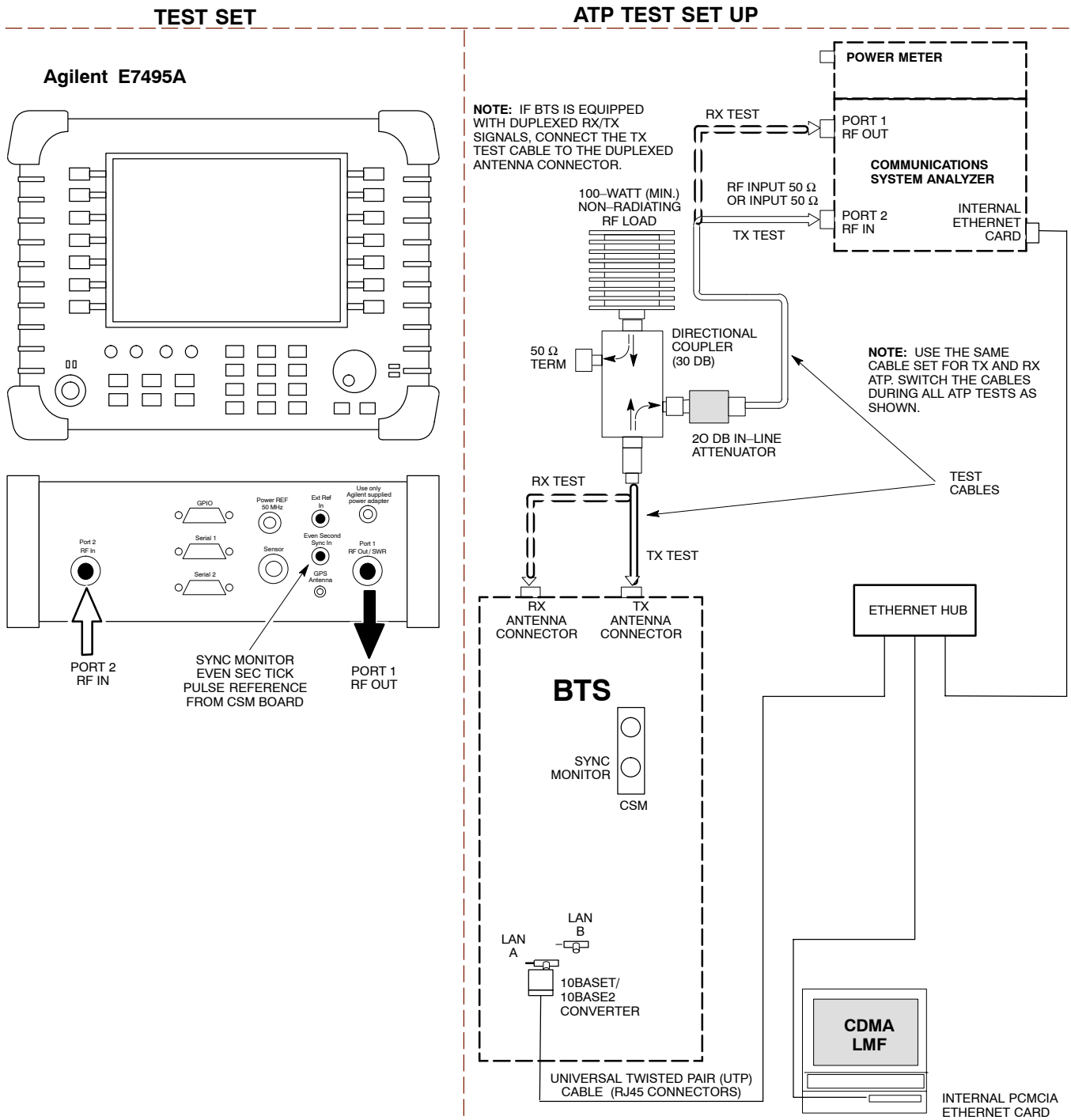


Figure 3-16: TX Calibration Test Setup – Agilent E7495A (IS-95A/B and CDMA2000 1X)

3



**Figure 3-17: IS-95A/B and CDMA2000 1X Optimization/ATP Test Setup – Agilent E7495A**

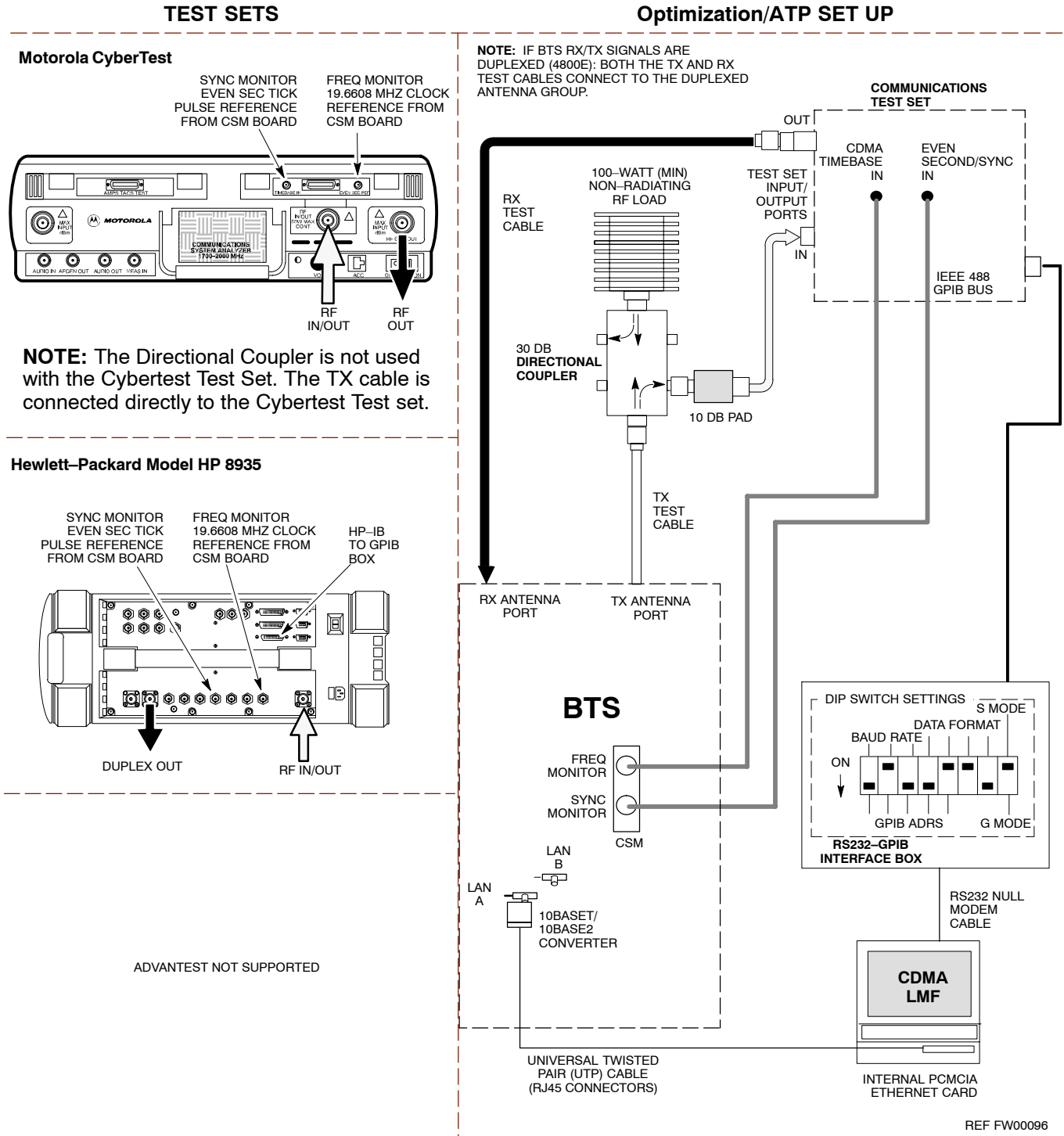


### Setup for Optimization/ATP

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)**

3



REF FW00096

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

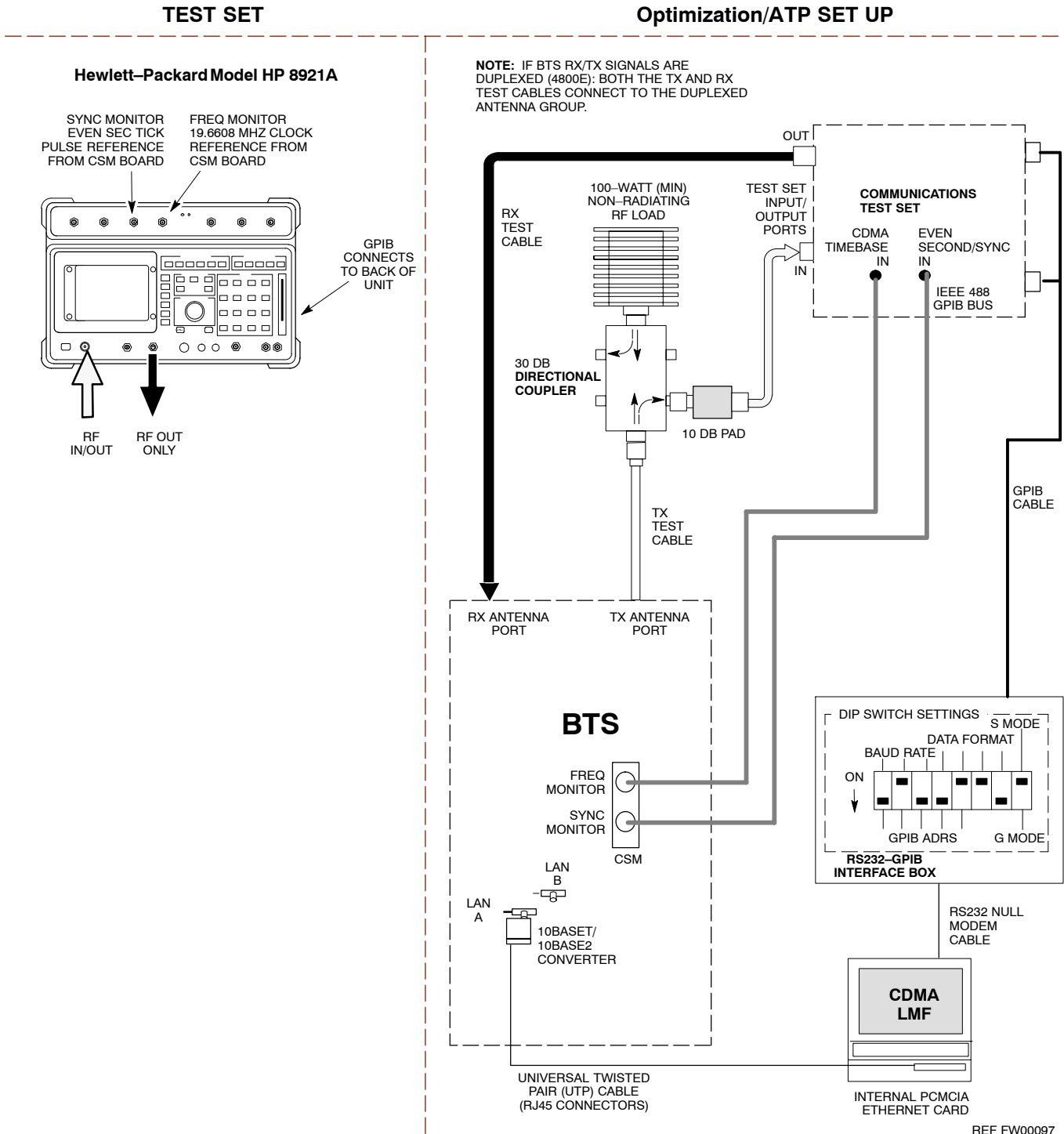
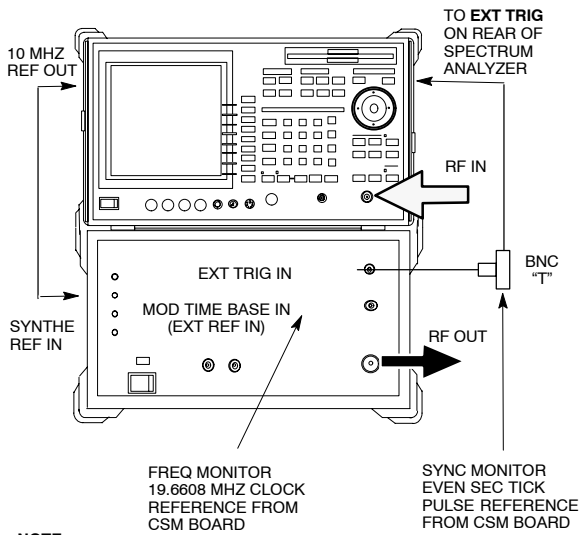


Figure 3-20: IS-95 A/B and CDMA 2000 Optimization/ATP Test Setup Using Directional Coupler

TEST SETS

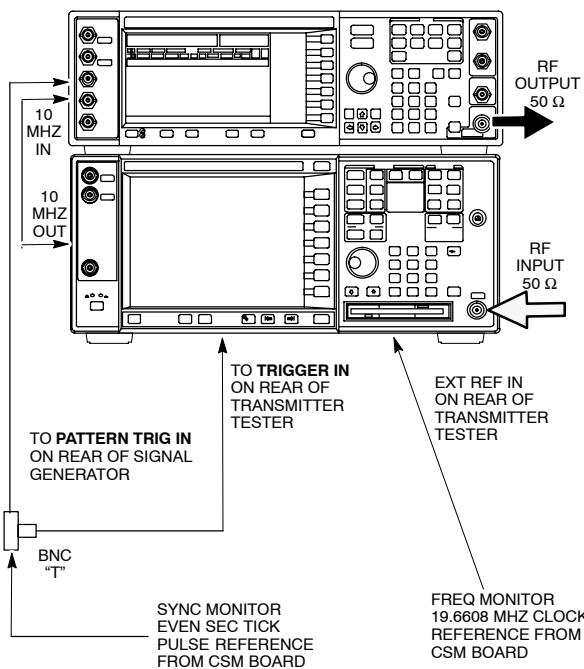
Advantest R3267 (Top) and R3562 (Bottom)



NOTE:

SYNTH REF IN ON REAR OF SIGNAL GENERATOR IS CONNECTED TO 10 MHZ REF OUT ON REAR OF SPECTRUM ANALYZER.

Agilent E4432B (Top) and E4406A (Bottom)

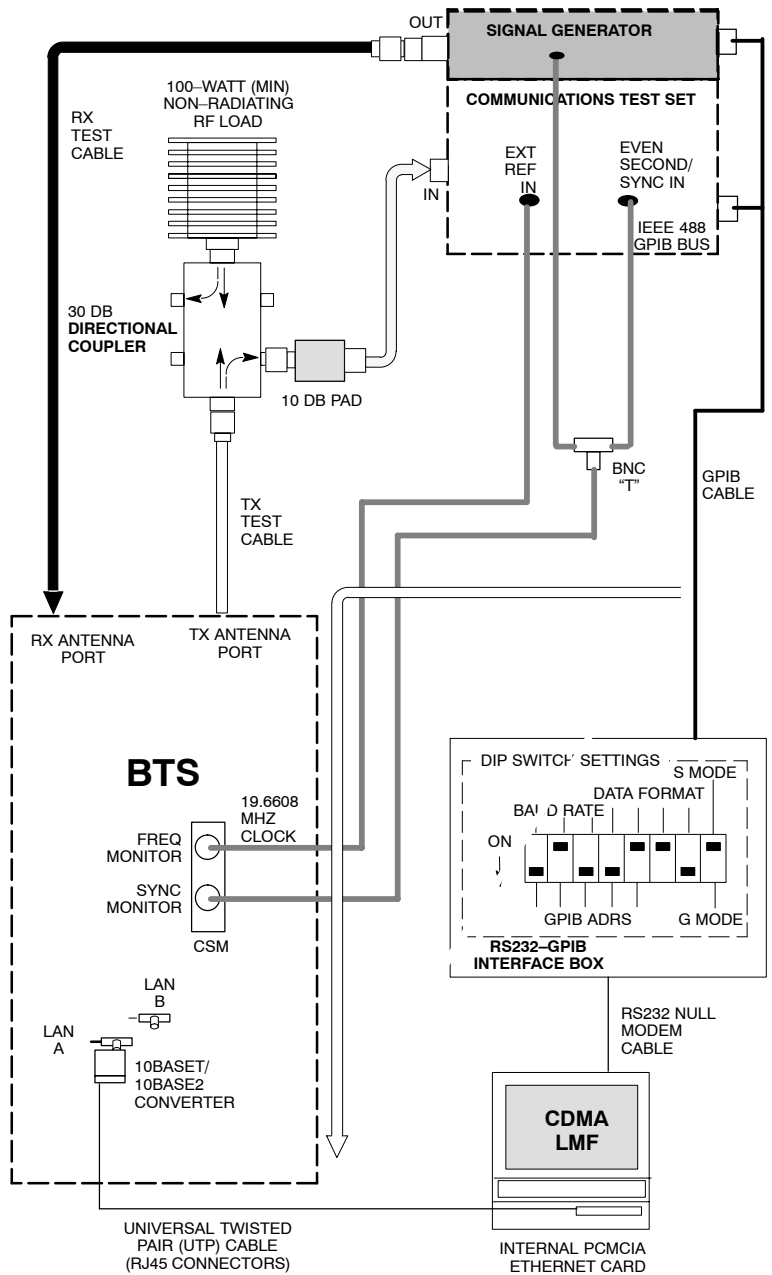


NOTE:

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

Optimization/ATP SET UP

NOTE: IF BTS RX/TX SIGNALS ARE DUPLEXED: BOTH THE TX AND RX TEST CABLES CONNECT TO THE DUPLEXED ANTENNA GROUP.



REF FW00758

3

# TX ATP Setup

Figure 3-21 shows a typical TX ATP setup and Figure 3-22 shows a typical RX ATP setup.

**Figure 3-21:** Typical TX ATP Setup with Directional Coupler (shown with and without RFDS)

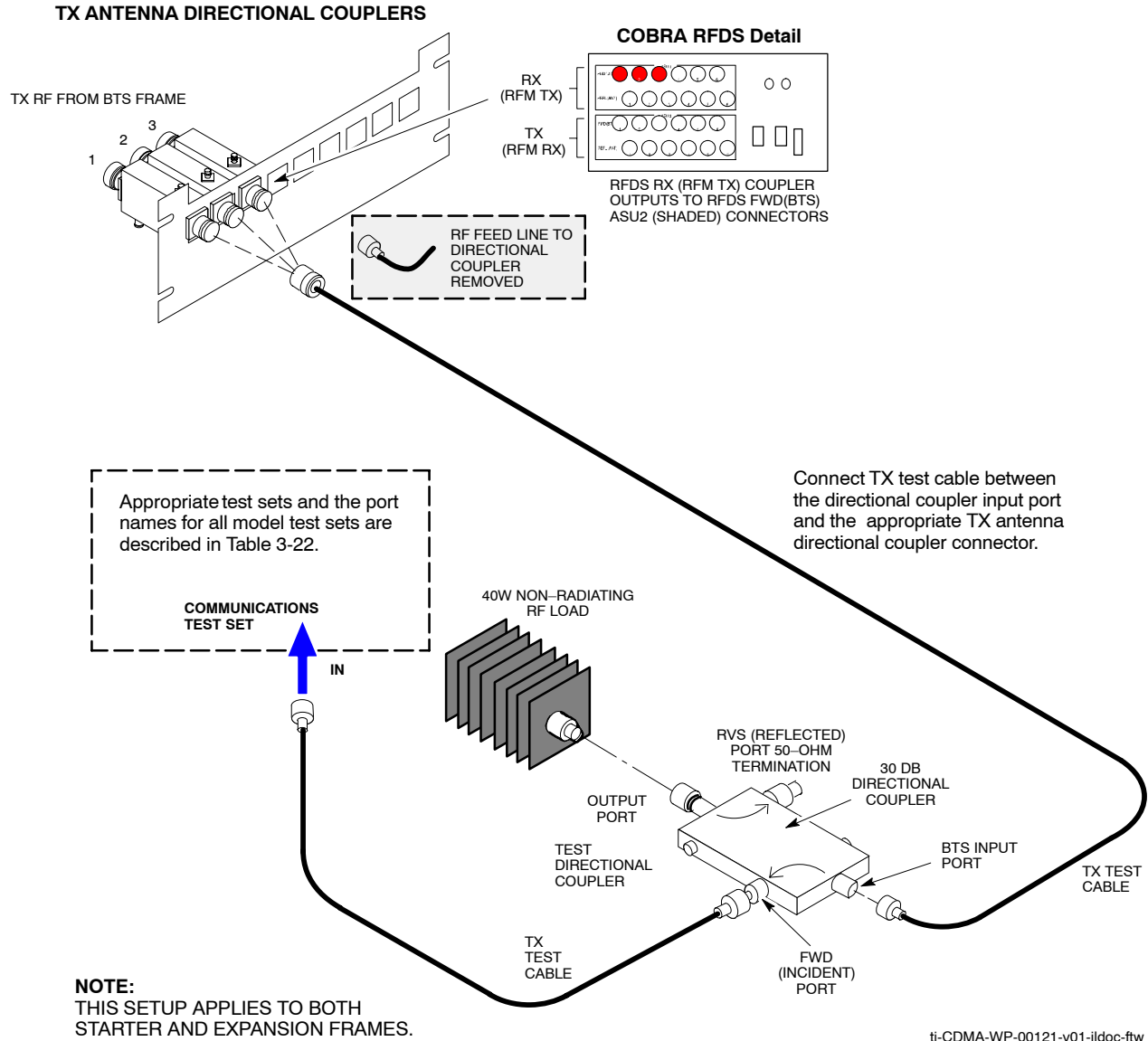
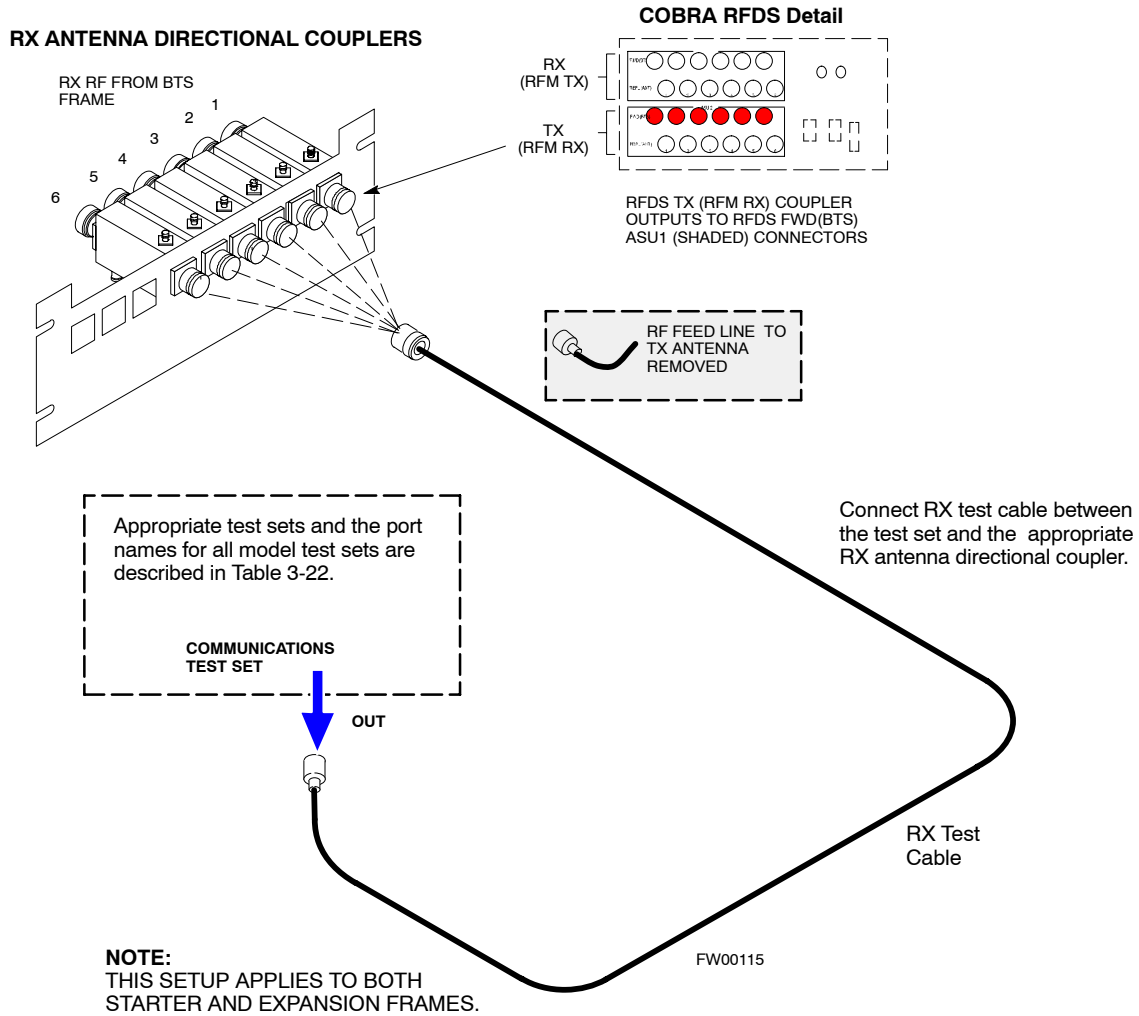




Figure 3-22: Typical RX ATP Setup with Directional Coupler (shown with or without RFDS)



## Test Set Calibration

### 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.

|             |   |
|-------------|---|
| <b>NOTE</b> | 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.

|                |  |
|----------------|--|
| <b>CAUTION</b> | 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. |
|----------------|--|

|             |  |
|-------------|--|
| <b>NOTE</b> | 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 <i>after</i> it has been allowed to warm-up and stabilize for a <i>minimum of 60 minutes</i> . |
|-------------|--|

### 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

For the Agilent E7495A Communications Test Set, set the IP address and complete initial setup as described in Appendix F (Specifically, see Table F-1 on page F-3).

## Selecting Test Equipment

Use **LMF Options** from the **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 via a network connection or the Agilent E7495A Communications Test Set is used.

### 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. (GPIB not applicable with Agilent E7495A)
- 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 <b>Tools</b> menu, select <b>Options</b> .<br>The <b>LMF Options</b> window appears.   |
|   | 2    | Click on the <b>Serial Connection</b> tab (if not in the forefront).  |
|   | 3    | Select the correct serial port in the <b>COMM Port</b> pick list (normally <b>COM1</b> ).   |
|   | 4    | Click on the <b>Manual Specification</b> button (if not enabled).   |
|   | 5    | Click on the check box corresponding to the test item(s) to be used.  |
|   | 6    | <p><b>NOTE</b></p> <p>GPIB addresses can range from 1 through 30. The LMF will accept any address in that range, but the numbers in the <b>GPIB address</b> boxes must match the addresses of the test equipment. Motorola recommends that you use <b>1</b> for a CDMA signal generator, <b>13</b> for a power meter, and <b>18</b> for a CDMA analyzer. To verify and, if necessary, change the GPIB addresses of the test equipment, refer to Appendix F.</p> <p>Type the GPIB address in the corresponding <b>GPIB address</b> box.</p> <p><i>Recommended Addresses</i></p> <p>1 = CDMA Signal generator<br/>13 = Power Meter<br/>18 = CDMA Analyzer</p> |
|   | 7    | Click on <b>Apply</b> . (The button darkens until the selection has been committed.)  |
|   |      | <p><b>NOTE</b></p> <p>With manual selection, the LMF does not detect the test equipment to see if it is connected and communicating with the LMF.</p> <p>To verify and, if necessary, change the GPIB address of the test equipment, refer to Appendix F.</p>   |
|   | 8    | Click on <b>Dismiss</b> 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 <b>Tools</b> menu, select <b>Options</b> .<br>The <b>LMF Options</b> window appears. |
|   | 2    | Click on the <b>Serial Connection</b> tab (if not in the forefront).                          |
|   | 3    | Select the correct serial port in the <b>COMM Port</b> pick list (normally <b>COM1</b> ).     |
|   | 4    | Click on <b>Auto-Detection</b> (if not enabled).  |

... continued on next page

**Table 3-25:** Selecting Test Equipment Using Auto-Detect

| ✔ | Step | Action   |
|---|------|--|
|   | 5    | <p><b>NOTE</b><br/>           GPIB addresses can range from 1 through 30. The LMF will accept any address in that range, but the numbers in the <b>GPIB address to search</b> box must match the addresses of the test equipment. Motorola recommends that you use <b>1</b> for a CDMA signal generator, <b>13</b> for a power meter, and <b>18</b> for a CDMA analyzer. To verify and, if necessary, change the GPIB addresses of the test equipment, refer to Appendix F.</p> <p>Type the GPIB addresses in the box labeled <b>GPIB address to search</b> (if not already displayed).</p> <p><b>NOTE</b><br/>           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 <b>GPIB addresses to search</b> box for RF power measurements (i.e., TX calibration). The address for a CDMA signal generator is normally <b>1</b>, the address for a power meter is normally <b>13</b>, and the address for a CDMA analyzer is normally <b>18</b>. If <b>1,13,18</b> is included in the <b>GPIB addresses to search</b> box, the power meter (<b>13</b>) 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.</p> |
|   | 6    | <p>Click on <b>Apply</b>.</p> <p><b>NOTE</b><br/>           The button darkens until the selection has been committed. A check mark appears in the <b>Manual Configuration</b> section for detected test equipment items.</p>  |
|   | 7    | <p>Click <b>Dismiss</b> to close the <b>LMF Options</b> window.</p>  |

## Detecting Test Equipment when using Agilent E7495A

Check that no other equipment is connected to the LMF. Agilent E7495A equipment must be connected to the LAN to detect it. Then perform the procedures described in Appendix F (Specifically, see Table F-1 on page F-3, Table F-2, and Table F-3 on page F-4).

## 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.

| <b>Table 3-26: Test Equipment Calibration</b> |      |  |
|---|------|--|
| ✔   | Step | Action   |
|   | 1    | From the <b>Util</b> menu, select <b>Calibrate Test Equipment</b> from the pull-down menu. A <b>Directions</b> window is displayed.    |
|   | 2    | Follow the directions provided.  |
|   | 3    | Click on <b>Continue</b> to close the <b>Directions</b> window and start the calibration process. A status report window is displayed. |
|   | 4    | Click on <b>OK</b> 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 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:

- LMF computer serial port and test equipment are connected to the GPIB box.
- 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 or Table 3-25)

### Calibrating cables

Refer to Figure 3-12 or Figure 3-13 and follow the procedure in Table 3-27 to calibrate the test cable configurations.

| ✓ | Step | Action  |
|---|------|---|
|   | 1    | From the <b>Util</b> menu, select <b>Cable Calibration</b> . A <b>Cable Calibration</b> window is displayed.  |
|   | 2    | Enter a channel number(s) in the <b>Channels</b> box.<br><b>NOTE</b><br>Multiple channels numbers must be separated with a comma, no space (i.e.; 200,800). When two or more channels numbers are entered, the cables are calibrated for each channel. Interpolation is accomplished for other channels as required for TX calibration. |
|   | 3    | Select <b>TX and RX Cable Cal</b> , <b>TX Cable Cal</b> , or <b>RX Cable Cal</b> in the <b>Cable Calibration</b> pick list.   |
|   | 4    | Click <b>OK</b> . 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 3-23, 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 3-24, if required.

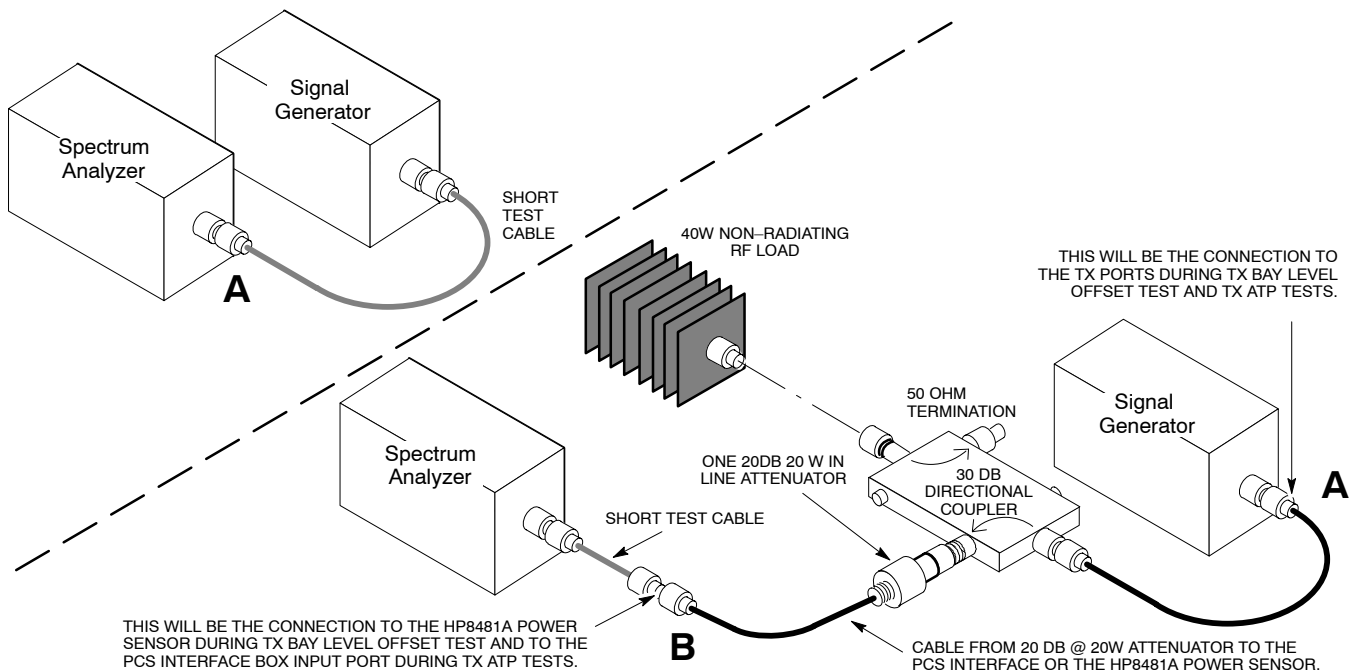
#### TX and Duplexed RX Cable Calibration

**Table 3-28:** Calibrating TX/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 3-23, <b>A</b> ) and record the value.   |
| 4    | Connect the spectrum analyzer's short cable to point <b>B</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>B</b> . |
| 5    | Calibration factor = A – B. <i>Example:</i> 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 3-23:** Calibrating Test Equipment Setup for TX BLO and TX ATP Tests (using Signal Generator and Spectrum Analyzer)



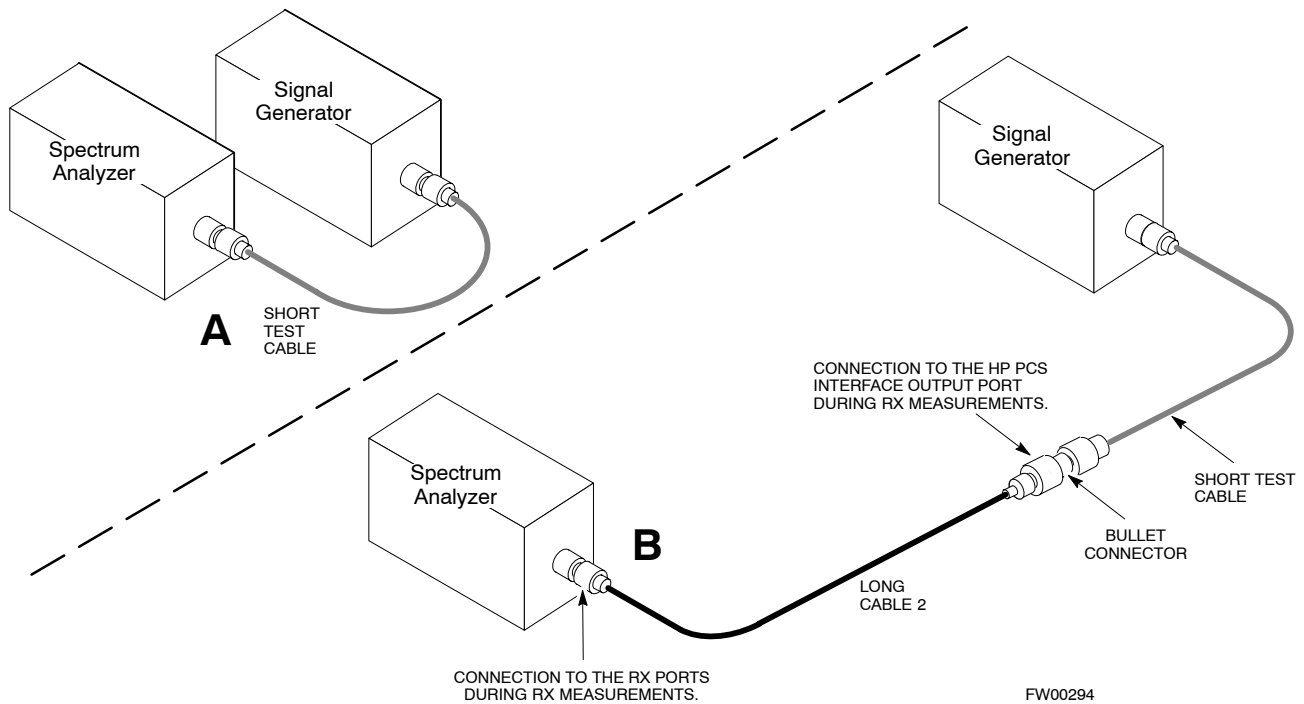
FW00293

### 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 3-24, <b>A</b> ) and record the value for <b>A</b> .  |  |
| 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>B</b> . |  |
| 5   | Calibration factor = A - B. <i>Example:</i> Cal = -12 dBm - (-14 dBm) = 2 dBm  |  |
| <p><b>NOTE</b><br/>The short cable is used for <i>calibration only</i>. It is <i>not</i> part of the final test setup. After calibration is completed, <i>do not</i> re-arrange any cables. Use the equipment setup, as is, to ensure test procedures use the correct calibration factor.</p> |  |  |

3

**Figure 3-24:** 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 <b>Util</b> menu.  |
|   | 2    | Select <b>Edit&gt;Cable Loss</b> .  |
|   | 3    | In the data entry pop-up window, select <b>TX Cable Loss</b> or <b>RX Cable Loss</b> .  |
|   | 4    | To add a new channel number, click on the <b>Add Row</b> button, then click in the <b>Channel #</b> and <b>Loss (dBm)</b> 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 <b>Delete Row</b> button.   |
|   | 7    | To save displayed values, click on the <b>Save</b> button.  |
|   | 8    | To exit the window, click on the <b>Dismiss</b> button.<br>Values entered/changed after the <b>Save</b> button was used are not saved.<br><b>NOTE</b> <ul style="list-style-type: none"> <li>• If cable loss values exist for two different channels, the LMF will interpolate for all other channels.</li> <li>• Entered values are used by the LMF as soon as they are saved. You do not have to logout and login.</li> </ul> |

## 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 <b>Util</b> menu.  |
|  | 2    | Select <b>Edit&gt;Coupler Loss</b> .  |
|  | 3    | In the data entry pop-up window, select <b>TX Coupler Loss</b> or <b>RX Coupler Loss</b> .  |
|  | 4    | Click in the <b>Loss (dBm)</b> column for each carrier that has a coupler and enter the appropriate value.  |
|  | 5    | To edit existing values click in the data box to be changed and change the value.   |
|  | 6    | Click on the <b>Save</b> button to save displayed values.   |
|  | 7    | Click on the <b>Dismiss</b> button to exit the window.<br>Values entered/changed after the <b>Save</b> button was used are not saved.<br><br><b>NOTE</b> <ul style="list-style-type: none"> <li>• The <b>In-Service Calibration</b> check box in the <b>Tools&gt;Options&gt;BTS Options</b> tab must checked before entered coupler loss values are used by the TX calibration and audit functions or RX FER test.</li> <li>• Entered values are used by the LMF as soon as they are saved. You do not have to logout and login.</li> </ul> |

# Bay Level Offset Calibration

## 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 through 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 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 a conductive, high impedance 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 in the **bts-#** folder. After calibration has been completed, this offset data must be downloaded to the BBXs using the Download BLO function. An explanation of the file is shown below.

**NOTE** Due to the size of the file, Motorola recommends that you print out a hard copy of a bts.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,<br>1st<br>Carrier | 3–Sector,<br>1st<br>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,<br>3rd<br>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,<br>2nd<br>Carrier | 3–Sector,<br>2nd<br>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,<br>4th<br>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] |

... continued on next page

3

**Table 3-33: BTS.cal File Array (Per Sector)**

| BBX                         | Sectorization               | TX                          | RX            | RX Diversity  |               |
|-----------------------------|-----------------------------|-----------------------------|---------------|---------------|---------------|
| Slot[20] (Redundant BBX-13) |                             |                             |               |               |               |
| 1 (Omni)                    | 6 Sector,<br>1st<br>Carrier | 3-Sector,<br>1st<br>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,<br>3rd<br>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,<br>2nd<br>Carrier | 3-Sector,<br>2nd<br>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,<br>4th<br>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.
- The first value (all odd entries) refer to the CDMA channel (frequency) where the BLO is measured. The second value (all even entries) is the power set level. 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, the largest frequency that is calibrated is repeated to fill out 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 cal points were calibrated this would be repeated for the next 8 points)

- 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.   |
|  |      | <p><b>! CAUTION</b></p> <p>To prevent damage to the test equipment, all transmit (TX) test connections must be via the 30 dB directional coupler.</p>   |
|  | 2    | <p>Connect the LMF computer terminal to the BTS LAN A connector on the BTS (if you have not already done so). Refer to the procedure in Table 3-2 on page 3-16.</p> <ul style="list-style-type: none"> <li>• If required, calibrate the test equipment per the procedure in Table 3-26 on page 3-69.</li> <li>• Connect the test equipment as shown in Figure 3-14 on page 3-56.</li> </ul> |

### 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).

|             |  |
|-------------|--|
| <b>NOTE</b> | If both the BTS-#.cdf and CBSC-#.cdf 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  $\pm 0.5$  dB of the desired power. The calibration will pass if the error is less than  $\pm 1.5$  dB.

The TX Bay Level Offset is approximately 40dB  $\pm 5$  dB for 3 Sector BTS and 43dB  $\pm 5$ dB for 6 Sector BTS.

3

## 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 that we currently use for calibration are wider than necessary to accommodate the redundant BBX. The lower half of that range is where non-redundant BBXs should be. Single-sided BLO spec is  $\geq 35\text{dB}$ . Double-sided BLO spec is  $40 \pm 5\text{dB}$ . 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.

## Test Pattern Drop-down Pick List

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 Multicarrier BTS

## Overview

LMF software release described on page 1-9 may be used to calibrate the Multicarrier trunked BTS running R2.16.0.x or R2.16.1.x *circuit* 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 3-35: Initial Set-up for Multicarrier TX Calibration |      |   |
|--|------|---|
| ✓  | Step | Action  |
|  | 1    | Delete the existing calibration file (if any) from the BTS folder on LMF laptop from the location <b>C:\wlmf\cdma\bts-#</b> , where # is the BTS number.  |
|  | 2    | Edit the nominal TX BLO <ul style="list-style-type: none"> <li>– From the <b>Util</b> menu, select <b>Edit &gt; TX Nominal Offset</b>.</li> <li>– <b>Change</b> the value from 45.0 to 40.0 (dB) for 3 sector</li> <li>– <b>Change</b> the value from 45.0 to 43.0 (dB) for 6 sector</li> </ul> |
|  | 3    | Download the data, which includes BLO values, to all the BBXs. From the <b>De-vice</b> menu, select <b>Download &gt; Data</b>   |
|  |      | <b>NOTE</b><br>Terminate all sector outputs on the frame, since more than one sectors will be keyed during the calibration procedure.   |

## TX Calibration

Follow the procedures in Table 3-36 to perform TX Calibration. Be sure to follow the primary **If performing TX Calibration** option in Step 2a.

Table 3-36: Procedure for TX Calibration and TX Audit

| ✓        | Step            | Action   |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|----------|-----------------|--|----------|--|--|---------|-----------------|-----------------------------------|---|-------|--------|---|-------|--------|---|-------|--------|---|----------|-------|----------|--|--|---|-------------|------|---|----------------|-----|
|          |                 | <p><b>NOTE</b><br/>The following commands will key selected BBXs to a power level that is low enough to not cause interference when calibrating using a power meter.</p>   |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          | 1               | Select the following GUI options to key the carriers which are not under test to a low pilot level.  |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          | 1a              | <ul style="list-style-type: none"> <li>– From the table, select a group of BBXs to key to a low level during test for the carrier and BBXs to be tested:</li> </ul> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th colspan="3" style="text-align: center;">3 Sector</th> </tr> <tr> <th style="text-align: center;">Carrier</th> <th style="text-align: center;">BBXs Under Test</th> <th style="text-align: center;">BBXs to low-level key during test</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1,2,3</td> <td style="text-align: center;">5,7,12</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">7,8,9</td> <td style="text-align: center;">1,5,12</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">4,5,6</td> <td style="text-align: center;">1,8,12</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">10,11,12</td> <td style="text-align: center;">1,6,8</td> </tr> <tr> <th colspan="3" style="text-align: center;">6 Sector</th> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1,2,3,4,5,6</td> <td style="text-align: center;">7,12</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">7,8,9,10,11,12</td> <td style="text-align: center;">1,6</td> </tr> </tbody> </table> | 3 Sector |  |  | Carrier | BBXs Under Test | BBXs to low-level key during test | 1 | 1,2,3 | 5,7,12 | 2 | 7,8,9 | 1,5,12 | 3 | 4,5,6 | 1,8,12 | 4 | 10,11,12 | 1,6,8 | 6 Sector |  |  | 1 | 1,2,3,4,5,6 | 7,12 | 2 | 7,8,9,10,11,12 | 1,6 |
| 3 Sector |                 |  |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
| Carrier  | BBXs Under Test | BBXs to low-level key during test  |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
| 1        | 1,2,3           | 5,7,12   |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
| 2        | 7,8,9           | 1,5,12   |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
| 3        | 4,5,6           | 1,8,12   |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
| 4        | 10,11,12        | 1,6,8  |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
| 6 Sector |                 |  |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
| 1        | 1,2,3,4,5,6     | 7,12   |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
| 2        | 7,8,9,10,11,12  | 1,6  |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          | 1b              | – From the <b>Device</b> menu, select <b>BBX &gt; Set Pilot Gain</b> .   |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          | 1c              | – Enter pilot gain value of 127 (LSB).   |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          | 1d              | – Select the carrier's BBXs.   |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          | 1e              | – From the <b>Device</b> menu, select <b>BBX &gt; Key</b> .  |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          | 1f              | – Enter XCVR gain value of –25 (dBm) with the <b>TX BLO</b> box unchecked.   |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          | 1g              | – Click on the carrier's BBXs and BBXR if equipped.  |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          |                 | <p><b>NOTE</b><br/>The 4th carrier (BBX10–12) is not supported in a converted SC 4812T MC BTS at this time. An upcoming feature release will address 4th carrier support.</p>  |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          | 2               | With BBXs still selected as described in Step 1g, proceed as follows:  |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          | 2a              | <ul style="list-style-type: none"> <li>– <b>If performing TX Calibration:</b> Click <b>Tests</b> in the BTS menu bar, and select <b>TX &gt; TX Calibration</b> from the pull-down menus.</li> <li>– <b>If performing TX Audit:</b> Click <b>Tests</b> in the BTS menu bar, and select <b>TX &gt; TX Audit</b> from the pull-down menus.</li> </ul>   |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          | 2b              | – Select the carrier's channel number from those displayed in the <b>Channels/Carrier</b> pick list.   |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          | 2c              | – Select test to perform as <b>TX Cal</b> .  |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          | 2d              | – Uncheck the <b>Verify TX BLO</b> box.  |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          | 2e              | – Enter the selected carrier's XCVR gain value of 40 (dBm).  |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          | 2f              | – In the <b>Test Pattern</b> box, select the test pattern to use as <b>Pilot</b> .   |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |
|          |                 | The LMF will automatically key the designated BBX and ask the operator to move the test equipment cable to appropriate TX path.  |          |  |  |         |                 |                                   |   |       |        |   |       |        |   |       |        |   |          |       |          |  |  |   |             |      |   |                |     |

... continued on next page

**Table 3-36:** Procedure for TX Calibration and TX Audit

| ✓ | Step | Action   |
|---|------|--|
|   | 3    | Download BLO to all the calibrated BBXs. (See Table 3-37 for details).<br>Save the carrier's TX BLO calibration results. |
|   | 4    | Reset the carrier pilot gain to 262 (from 127 LSB) by selecting the following GUI options:                               |
|   | 4a   | – Select same BBXs selected in Step 1a.  |
|   | 4b   | – From the <b>Device</b> menu, select <b>BBX &gt; Set Pilot Gain</b> .   |
|   | 4c   | – Enter pilot gain value of 262 (LSB).   |

## 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 3-38).

# TX Calibration Audit

## Introduction

|             |   |
|-------------|---|
| <b>NOTE</b> | 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.

|                |   |
|----------------|---|
| <b>WARNING</b> | <i>Before</i> installing any test equipment directly to any <b>TX OUT</b> connector, <i>first verify there are no CDMA BBX channels keyed</i> . 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:

|             |   |
|-------------|---|
| <b>NOTE</b> | 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 3-36). |
|-------------|---|

- 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 3-14 or Figure 3-15. Follow the procedure in Table 3-36 using the **If performing TX Audit** alternate Step 2a 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 3-37 to download the BLO data to the BBXs.

| <b>Table 3-37: Download BLO</b> |      |   |
|---------------------------------|------|---|
| ✓                               | Step | Action  |
|                                 | 1    | Select the BBX(s) to be downloaded.   |
|                                 | 2    | Click <b>Device</b> in the BTS menu bar, and select <b>Download &gt; BLO</b> from the pull-down menus. A status report window displays the result of the download.<br><br><b>NOTE</b><br>Selected device(s) do not change color when BLO is downloaded. |
|                                 | 3    | Click on <b>OK</b> to close the status report window.   |



## Create CAL File

The Create Cal File function gets the BLO data from BBXs and creates/updates the CAL file in the LMF for the BTS. If a CAL file does not exist, a new one is created. If a CAL file already exists, it is updated. After a BTS has been fully optimized, a copy of the CAL file must exist so it can be transferred to the CBSC. If TX calibration has been successfully performed for all BBXs and BLO data has been downloaded, a CAL file exists. Note the following:

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

**WARNING** The user is not encouraged to edit the CAL file as this action can cause interface problems between the BTS and the LMF. To manually edit the CAL file, you must first logout of the BTS. If you manually edit the CAL file and then use the Create Cal File function, the edited information is lost.

### Prerequisites

Before running this test, the following should be done:

- LMF is logged into the BTS.
- BBXs are OOS\_RAM with BLO downloaded.

### Creating a CAL File

| ✔ | Step | Action   |
|---|------|--|
|   | 1    | Select the applicable BBXs.<br><br><b>NOTE</b><br>The CAL file is only updated for the selected BBXs.        |
|   | 2    | Click on the <b>Device</b> menu.   |
|   | 3    | Click on the <b>Create Cal File</b> menu item.<br>A status report window displays the results of the action. |
|   | 4    | Click <b>OK</b> to close the status report window.   |

## BTS Redundancy/Alarm Testing

### 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 3-41. Miscellaneous Alarm Tests (BTS Frame)
- Table 3-42. BBX Redundancy Tests (BTS Frame)
- Table 3-43. CSM, GPS, and HSO Redundancy Alarm Tests
- Table 3-44. 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 3-39 to set up test equipment:

|             |  |
|-------------|--|
| <b>NOTE</b> | All alarm tests are performed using TX antenna 1 |
|-------------|--|

| <b>Table 3-39: Test Equipment Setup for Redundancy/Alarm Tests</b> |  |
|--|--|
| <b>Step</b>  | <b>Action</b>  |
| 1  | Interface the LMF computer to the BTS LAN A connector on the BTS frame (refer to Table 3-5, page 3-16).  |
| 2  | Login to the BTS.  |
| 3  | Set up test equipment for TX Calibration at TXOUT1 (see Figure 3-14).<br><br><b>NOTE</b><br><i>If site is not equipped for redundancy</i> , remove all GLI and BBX boards installed in any redundant slot positions at this time.  |
| 4  | Display the alarm monitor by selecting <b>Util&gt;Alarm Monitor</b> .  |
| 5  | Unequip all customer defined AMR alarms reported via the AMR Alarm connector (A & B) by clicking on <b>MGLI</b> , then selecting <b>Device&gt;Set Alarm Relays&gt;Unequipped</b> .<br><br><b>NOTE</b><br>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. |

3

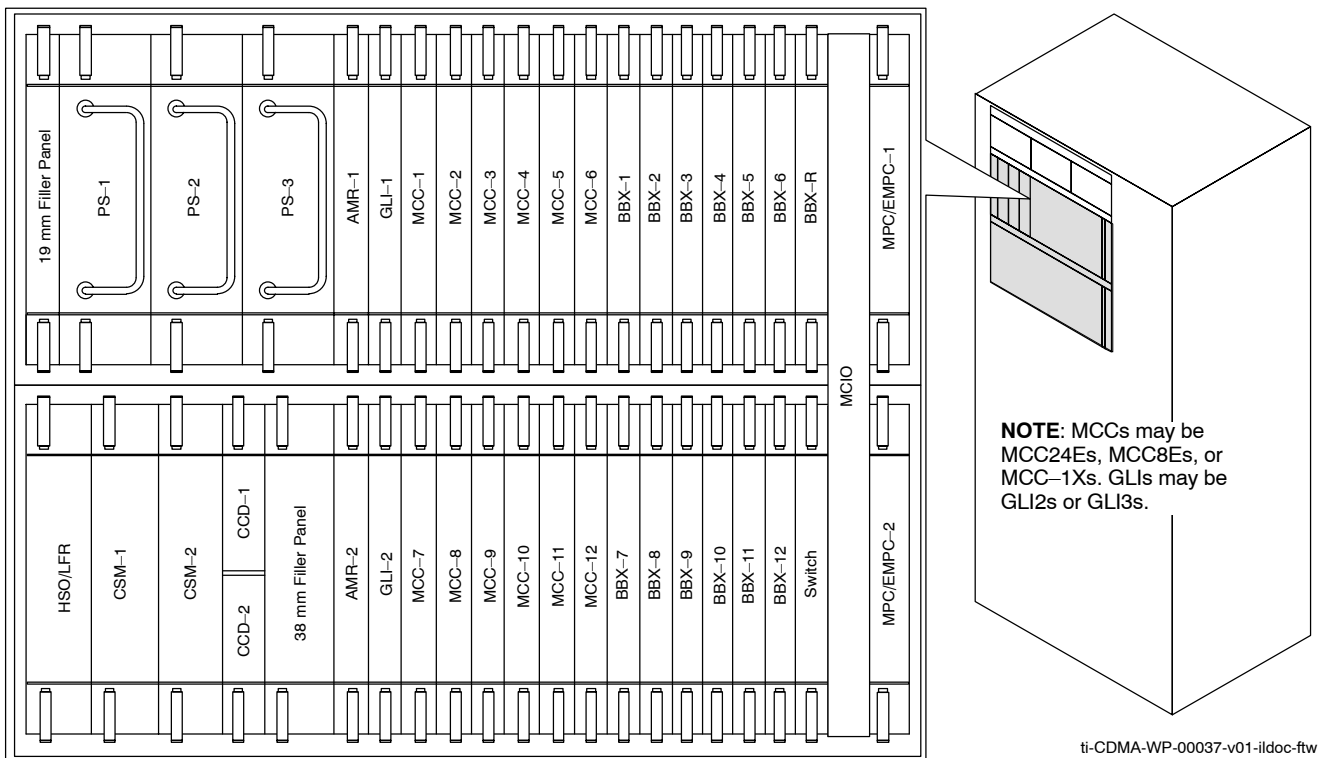
## Power Supply Redundancy

Follow the steps in Table 3-40 to verify redundancy of the power supply modules. Alarms reported by the master GLI (displayed via the alarm monitor) are also verified.

| Table 3-40: Power Supply/Converter Redundancy (BTS Frame) |  |
|---|--|
| Step  | Action   |
| 1   | Select the BBX-1 (highlight) and from the pulldown menu select:<br><b>Device&gt;BBX/MAWI&gt;Set Redundant Sector&gt;Carrier-#-1-1</b><br><b>Device&gt;BBX/MAWI&gt;Set Pilot Only&gt;Carrier-#-1-1</b><br><b>Device&gt;BBX/MAWI&gt;Set Pilot Gain&gt;Carrier-#-1-1 and Pilot Gain = 262</b> |
| 2   | Select (highlight) BBX-1 and from the pulldown menu select <b>Device&gt;BBX/MAWI&gt;Key</b> .  |
| 3   | Set XCVR gain to 40 and enter the correct XCVR channel number.   |
| 4   | Remove PS-1 from the power distribution shelf (see Figure 3-25).<br><ul style="list-style-type: none"> <li>- Observe that an alarm message is reported via the MGLI as displayed on the alarm monitor.</li> <li>- Verify no other modules went OOS.</li> </ul>                             |
| 5   | Re-install PS-1.<br>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 <b>Device&gt;BBX/MAWI&gt;Dekey</b>  |

3

Figure 3-25: C-CCP Shelf



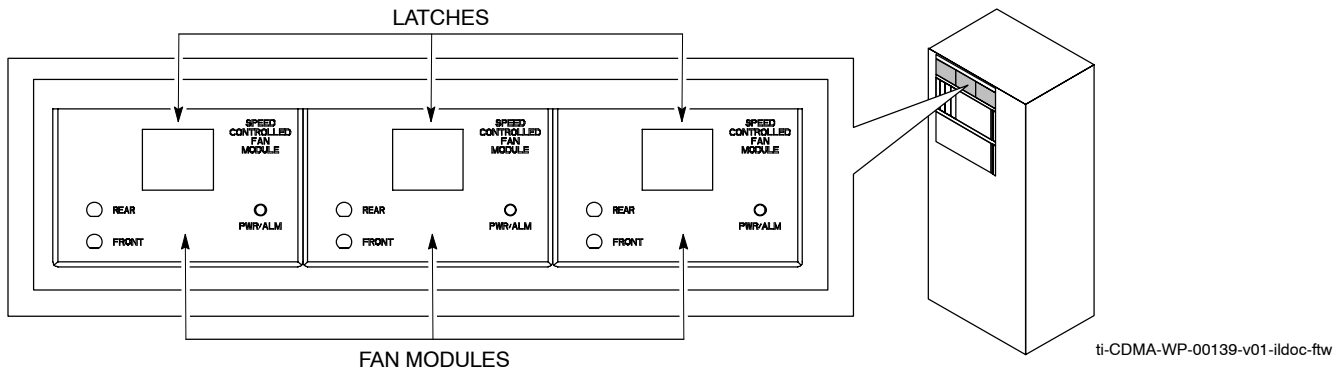
### Miscellaneous Alarm/Redundancy Tests

Follow steps in Table 3-41 to verify that alarms reported by the master GLI are displayed via the alarm monitor if a BTS frame module failure occurs.

| <b>Table 3-41: Miscellaneous Alarm Tests</b> |   |
|--|---|
| <b>Step</b>                                  | <b>Action</b>   |
| 1  | Select <b>Util&gt;Alarm Monitor</b> to display the alarm monitor window.  |
| 2  | Perform the following to verify fan module alarms: <ul style="list-style-type: none"> <li>• Unseat a fan module (see Figure 3-26).</li> <li>• Observe an alarm message was reported via the MGLI (as displayed on the alarm monitor).</li> <li>• Replace fan module and verify the alarm monitor reports that the alarm clears.</li> <li>• Repeat for all other fan modules in the BTS frame.</li> </ul>  |
|  | <b>NOTE</b><br>Follow Step 3 for Starter Frames and Step 4 for Expansion Frames.  |
| 3  | <i><b>Starter Frames Only:</b> Perform the following to verify MPC module alarms.</i> <ul style="list-style-type: none"> <li>• Unseat MPC modules (see Figure 3-25) one at a time.</li> <li>• Observe that an alarm message was reported via the MGLI as displayed on the alarm monitor.</li> <li>• Replace the MPC modules and verify the alarm monitor reports the alarm clears.</li> </ul>   |
| 4  | <i><b>Expansion Frames Only:</b> Perform the following to verify EMPC module alarms.</i> <ul style="list-style-type: none"> <li>• Unseat EMPC modules (see Figure 3-25) one at a time</li> <li>• Observe that an alarm message was reported via the MGLI as displayed on the alarm monitor.</li> <li>• Replace the EMPC modules and verify the alarm monitor reports that the alarm clears.</li> </ul>  |
| 5  | If equipped with AMR redundancy, perform the following to verify AMR module redundancy/alarms. <ul style="list-style-type: none"> <li>• Unseat AMR 2 (see Figure 3-25).</li> <li>• Observe that an alarm message is reported via the MGLI (as displayed on the alarm monitor).</li> <li>• Repeat Steps 1, 2 and 3 (starter frame) or Steps 1, 2 and 4 (expansion frame).</li> <li>• Replace the AMR module and verify the alarm monitor reports that the alarm clears.</li> <li>• Unseat AMR 1; observe alarm message was reported via MGLI (as displayed on the alarm monitor).</li> <li>• Replace the AMR module and verify the LMF reports the alarm has cleared.</li> </ul> |
|  | <b>NOTE</b><br>All PWR/ALM LEDs should be GREEN at the completion of this test.   |

**Figure 3-26: Fan Modules**

3



## BBX Redundancy

Follow the steps in Table 3-42 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 3-42: BBX Redundancy Alarms**

| Step | Action  |
|------|---|
|      | <p><b>△ WARNING</b></p> <p>Any BBXs enabled will immediately key-up. Before enabling any BBX, <i>always verify</i> 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.</p> |
| 1    | Enable the <b>primary</b> , then the <b>redundant</b> BBX assigned to ANT 1 by selecting the BBX and <b>Device&gt;BBX/MAWI&gt;Key</b> .   |
| 2    | Observe that primary BBXs key up, and a carrier is present at each respective frequency.  |
| 3    | Remove the <b>primary</b> BBX.  |
| 4    | Observe a carrier is still present. The <b>Redundant</b> BBX is now the active BBX for Antenna 1.   |
| 5    | Replace the <b>primary</b> BBX and reload the BBX with code and data.   |
| 6    | Re-enable the <b>primary</b> BBX assigned to ANT 1 and observe that a carrier is present at each respective frequency.  |
| 7    | Remove the <b>redundant</b> BBX and observe a carrier is still present.   |
| 8    | The <b>Primary</b> BBX is now the active BBX for ANT 1.   |
| 9    | Replace the <b>redundant</b> BBX and reload the BBX with code and data.   |
| 10   | Re-enable the <b>redundant</b> BBX assigned to ANT 1 and observe that a carrier is present at each respective frequency:  |
| 11   | De-key the Xcvr by selecting <b>Device&gt;BBX/MAWI&gt;Dekey</b> .   |
| 12   | Repeat Steps 1 through 11 for additional BBXs/antennas, if equipped.  |

### CSM, GPS, & HSO Redundancy/Alarm Tests

Follow the procedure in Table 3-43 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 3-43, unless the site is configured with a HSO timebase as a backup for the GPS.

**Table 3-43:** CSM, GPS, & HSO, Redundancy/Alarm Tests

| Step | Action   |
|------|--|
|      | <p><b>△ WARNING</b><br/>Any BBXs enabled will immediately key-up. Before enabling any BBX, <i>always verify</i> 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.</p>   |
| 1    | Enable the <b>primary</b> , then the <b>redundant</b> BBXs assigned to ANT 1 by selecting the BBX and <b>Device&gt;BBX/MAWI&gt;Key</b> .   |
| 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. <ul style="list-style-type: none"> <li>• Verify the BBXs remain keyed and INS.</li> <li>• Verify no other modules went OOS due to the transfer to <b>HSO</b> reference.</li> <li>• Observe the PWR/ALM LEDs on the <b>CSM 1</b> front panel are steady GREEN.</li> </ul>   |
| 5    | Reconnect the GPS antenna cable.   |
| 6    | Allow the GPS to become the active timing source. <ul style="list-style-type: none"> <li>• Verify the BBXs remain keyed and INS.</li> <li>• Verify no other modules went OOS due to the transfer back to the <b>GPS</b> reference.</li> <li>• Observe the PWR/ALM LEDs on <b>CSM 1</b> are steady GREEN.</li> </ul>  |
| 7    | Disable <b>CSM 1</b> and enable <b>CSM 2</b> . <ul style="list-style-type: none"> <li>• Various CSM source and clock alarms are now reported and the site comes down.</li> <li>• Alarms clear when the site comes back up.</li> </ul>  |
| 8    | Allow the <b>CSM 2</b> board to go <b>INS_ACT</b> . <ul style="list-style-type: none"> <li>• Verify the BBXs are dekeyed and OOS, and the MCCs are OOS_RAM.</li> <li>• Verify no other modules went OOS due to the transfer to <b>CSM 2</b> reference.</li> <li>• Observe the PWR/ALM LEDs on <b>CSM 2</b> front panels are steady GREEN.</li> </ul> <p><b>NOTE</b><br/>It can take up to 20 minutes for the CSM to re-establish the GPS link and go INS. MCCs go OOS_RAM.</p> |
| 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.   |

. . . continued on next page

**Table 3-43:** CSM, GPS, & HSO, Redundancy/Alarm Tests

| Step | Action  |
|------|---|
|      | <b>NOTE</b><br>DO NOT ENABLE the redundant CSM.   |
| 11   | Disable <b>CSM 2</b> and enable <b>CSM 1</b> . <ul style="list-style-type: none"> <li>• Various CSM Source and Clock alarms are reported and the site comes down.</li> <li>• Alarms clear when the site comes back up.</li> </ul>   |
| 12   | De-key the Xcvr by selecting <b>Device&gt;BBX/MAWI&gt;Dekey</b> .   |
| 13   | Allow the <b>CSM 1</b> board to go <b>INS_ACT</b> . <ul style="list-style-type: none"> <li>• Verify the BBXs are de-keyed and OOS.</li> <li>• Verify no other modules went OOS due to the transfer to <b>CSM 1</b> reference.</li> <li>• Observe PWR/ALM LEDs on the <b>CSM 1</b> front panels are steady GREEN.</li> </ul> |
| 14   | Disable the <b>primary</b> and <b>redundant</b> BBXs.   |

## MGLI/GLI Redundancy Test

|                |   |
|----------------|---|
| <b>CAUTION</b> | This test can <i>only</i> 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 3-44:** MGLI/GLI Redundancy Test (with MM Connection Established)

| Step | Action   |
|------|--|
|      | <b>NOTE</b> <ul style="list-style-type: none"> <li>• 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.</li> <li>• BOTH GLIs must be <b>INS</b> before continuing.</li> </ul> |
| 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 <i>currently</i> <b>INS-<del>ACT</del></b> and has cage control.   |
| 4    | Observe the BBX remains GREEN, and the redundant MGLI is now <b>active</b> .   |
| 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 3-27). 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 3-28). 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.

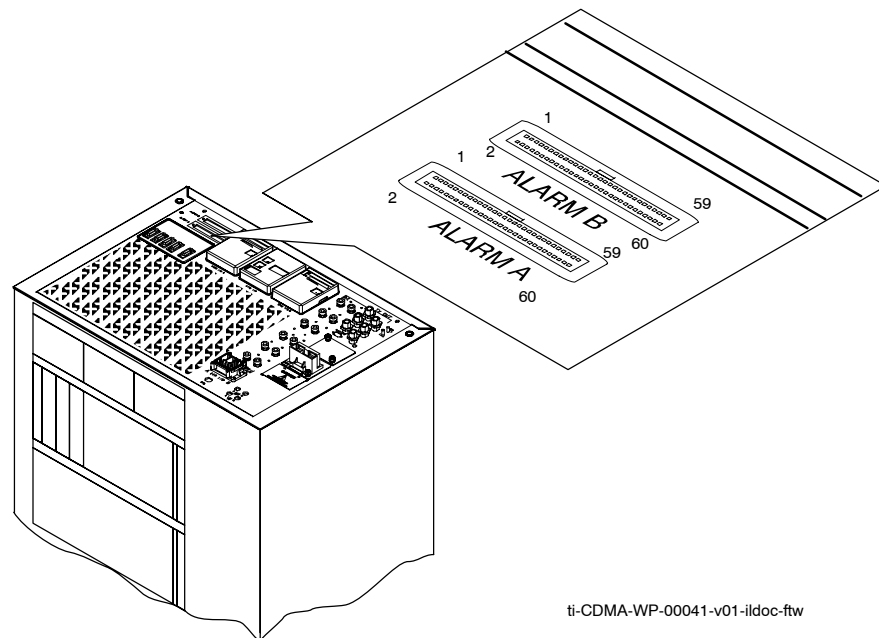
**ALARM A** and **ALARM B** connectors each provide 18 inputs and 8 outputs. If both **A** and **B** are functional, 36 inputs and 16 outputs are available. They may be configured as redundant. The configuration is set by the CBSC.

### 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 3-27:** Alarm Connector Location and Connector Pin Numbering

ti-CDMA-WP-00041-v01-ildoc-ftw

## 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* .

|             |   |
|-------------|---|
| <b>NOTE</b> | Motorola <b>highly</b> recommends that you read and understand this procedure in its entirety before starting this procedure. |
|-------------|---|

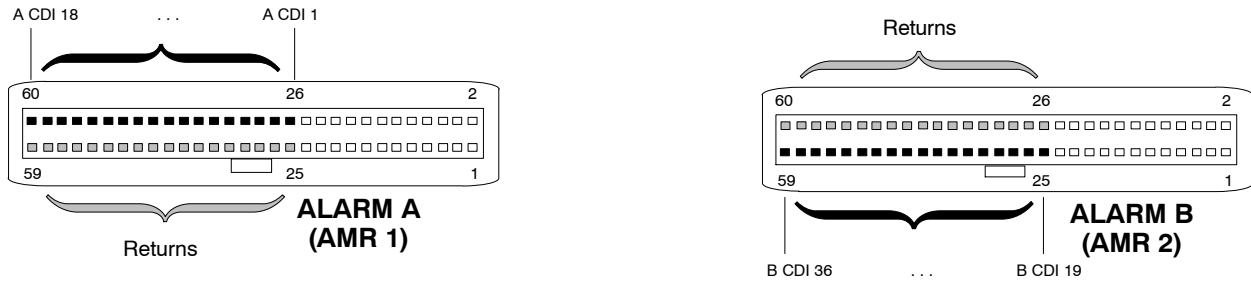
## Test Equipment

The following test equipment is required to perform these tests:

- LMF
- Alarms Test Box (CGDSCMIS00014) –optional

|             |  |
|-------------|--|
| <b>NOTE</b> | <p>Abbreviations used in the following figures and tables are defined as:</p> <ul style="list-style-type: none"> <li>• NC = normally closed</li> <li>• NO = normally open</li> <li>• COM or C = common</li> <li>• CDO = Customer Defined (Relay) Output</li> <li>• CDI = Customer Defined (Alarm) Input</li> </ul> |
|-------------|--|

Figure 3-28: AMR Connector Pin Numbering



FW00302

**NOTE** The preferred method to verify alarms is to follow the Alarms Test Box Procedure in Table 3-45. If not using an Alarm Test Box, follow the procedure in Table 3-46.

### CDI Alarm Input Verification with Alarms Test Box

Table 3-45 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 3-45: 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 <b>Device</b> menu.  |
| 4  | Click on the <b>Set Alarm Relays</b> menu item.   |
| 5  | Click on <b>Normally Open</b> .<br>A status report window displays the results of the action.   |
| 6  | Click on the <b>OK</b> button to close the status report window.  |
| 7  | Set all switches on the alarms test box to the <b>Open</b> position.  |
| 8  | Connect the alarms test box to the <b>ALARM A</b> connector (see Figure 3-27).  |
| 9  | Set all of the switches on the alarms test box to the <b>Closed</b> position. An alarm should be reported for each switch setting.    |
| 10   | Set all of the switches on the alarms test box to the <b>Open</b> position. A clear alarm should be reported for each switch setting. |
| 11   | Disconnect the alarms test box from the <b>ALARM A</b> connector.   |
| 12   | Connect the alarms test box to the <b>ALARM B</b> connector.  |
| 13   | Set all switches on the alarms test box to the <b>Closed</b> position. An alarm should be reported for each switch setting            |

... continued on next page

3

**Table 3-45:** CDI Alarm Input Verification Using the Alarms Test Box

| Step | Action  |
|------|---|
| 14   | Set all switches on the alarms test box to the <b>Open</b> position. A clear alarm should be reported for each switch setting.      |
| 15   | Disconnect the alarms test box from the <b>ALARM B</b> connector.   |
| 16   | Select the MGLI.  |
| 17   | Click on the <b>Device</b> menu.  |
| 18   | Click on the <b>Set Alarm Relays</b> menu item.   |
| 19   | Click on <b>Normally Closed</b> . A status report window displays the results of the action.  |
| 20   | Click <b>OK</b> to close the status report window.<br>Alarms should be reported for alarm inputs 1 through 36.                      |
| 21   | Set all switches on the alarms test box to the <b>Closed</b> position.  |
| 22   | Connect the alarms test box to the <b>ALARM A</b> connector.<br>Alarms should be reported for alarm inputs 1 through 18.            |
| 23   | Set all switches on the alarms test box to the <b>Open</b> position.<br>An alarm should be reported for each switch setting.        |
| 24   | Set all switches on the alarms test box to the <b>Closed</b> position.<br>A clear alarm should be reported for each switch setting. |
| 25   | Disconnect the alarms test box from the <b>ALARM A</b> connector.   |
|      | <b>NOTE</b><br>Input 21 (pins 29 and 30) on the Alarm B connector is reserved for the Power Supply Modules alarm.                   |
| 26   | Connect the alarms test box to the <b>ALARM B</b> connector.<br>A clear alarm should be reported for alarm inputs 19 through 36.    |
| 27   | Set all switches on the alarms test box to the <b>Open</b> position.<br>An alarm should be reported for each switch setting.        |
| 28   | Set all switches on the alarms test box to the <b>Closed</b> position.<br>A clear alarm should be reported for each switch setting. |
| 29   | Disconnect the alarms test box from the <b>ALARM B</b> connector.   |
| 30   | Select the MGLI.  |
| 31   | Click on the <b>Device</b> menu.  |
| 32   | Click on the <b>Set Alarm Relays</b> menu item.   |
| 33   | Click on <b>Unequipped</b> .<br>A status report window displays the results of the action.  |
| 34   | Click on the <b>OK</b> button to close the status report window.  |
| 35   | Connect the alarms test box to the <b>ALARM A</b> connector.  |

. . . continued on next page

**Table 3-45:** CDI Alarm Input Verification Using the Alarms Test Box

| Step | Action  |
|------|---|
| 36   | Set all switches on the alarms test box to both the <b>Open</b> and the <b>Closed</b> position.<br>No alarm should be reported for any switch settings. |
| 37   | Disconnect the alarms test box from the <b>ALARM A</b> connector.   |
| 38   | Connect the alarms test box to the <b>ALARM B</b> connector.  |
| 39   | Set all switches on the alarms test box to both the <b>Open</b> and the <b>Closed</b> position.<br>No alarm should be reported for any switch settings. |
| 40   | Disconnect the alarms test box from the <b>ALARM B</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 3-46 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.

|             |  |
|-------------|--|
| <b>NOTE</b> | 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 3-46:** 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 <b>Device</b> menu.  |
| 4    | Click on the <b>Set Alarm Relays</b> menu item.   |
| 5    | Click on <b>Normally Open</b> .<br>A status report window displays the results of the action.   |
| 6    | Click on <b>OK</b> to close the status report window.   |
| 7    | Refer to Figure 3-28 and sequentially short the ALARM A connector CDI 1 through CDI 18 pins (25–26 through 59–60) together.<br>An alarm should be reported for each pair of pins that are shorted.<br>A clear alarm should be reported for each pair of pins when the short is removed.   |
| 8    | <b>NOTE</b><br>Input 21 (pins 29 and 30) on the Alarm B connector is reserved for the Power Supply Modules alarm.<br>Refer to Figure 3-28 and sequentially short the ALARM B connector CDI 19 through CDI 36 pins (25–26 through 59–60) together.<br>An alarm should be reported for each pair of pins that are shorted.<br>A clear alarm should be reported for each pair of pins when the short is removed. |

... continued on next page

**Table 3-46:** CDI Alarm Input Verification Without the Alarms Test Box

| Step | Action  |
|------|---|
| 9    | Select the MGLI.  |
| 10   | Click on the <b>Device</b> menu.  |
| 11   | Click on the <b>Set Alarm Relays</b> menu item.   |
| 12   | Click on <b>Normally Closed</b> .<br>A status report window displays the results of the action.   |
| 13   | Click on <b>OK</b> to close the status report window.<br>Alarms should be reported for alarm inputs 1 through 36.   |
| 14   | Refer to Figure 3-28 and sequentially short the ALARM A connector CDI 1 through CDI 18 pins (25–26 through 59–60) together.<br>A clear alarm should be reported for each pair of pins that are shorted.<br>An alarm should be reported for each pair of pins when the short is removed.   |
| 15   | <b>NOTE</b><br>Input 21 (pins 29 and 30) on the Alarm B connector is reserved for the Power Supply Modules alarm.<br>Refer to Figure 3-28 and sequentially short the ALARM B connector CDI 19 through CDI 36 pins (25–26 through 59–60) together.<br>A clear alarm should be reported for each pair of pins that are shorted.<br>An alarm should be reported for each pair of pins when the short is removed. |
| 16   | Select the MGLI.  |
| 17   | Click on the <b>Device</b> menu.  |
| 18   | Click on the <b>Set Alarm Relays</b> menu item.   |
| 19   | Click on <b>Unequipped</b> .<br>A status report window displays the results of the action.  |
| 20   | Click on <b>OK</b> to close the status report window.   |
| 21   | Refer to Figure 3-28 and sequentially short the ALARM A connector CDI 1 through CDI 18 pins (25–26 through 59–60) together.<br>No alarms should be displayed.   |
| 22   | <b>NOTE</b><br>Input 21 (pins 29 and 30) on the Alarm B connector is reserved for the Power Supply Modules alarm.<br>Refer to Figure 3-28 and sequentially short the ALARM B connector CDI 19 through CDI 36 pins (25–26 through 59–60) together.<br>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 3-47 lists the pins, wire color codes, and signal names for Alarms A and B.

**Table 3-47: 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     |
| 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<br><i>*Pwr Conv Alm -48V</i>      | 59  | Blk/Red    | Cust Retn 18 | B CDI 36     |
| 30  | Blk/Slt    | A CDI 3     | Cust Retn 21 +27V<br><i>*Pwr Conv Retn -48V</i> | 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**

  
4  




# Automated Acceptance Test Procedures – All-inclusive TX & RX

## 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 commands 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)

|                |  |
|----------------|--|
| <b>WARNING</b> | <ul style="list-style-type: none"><li>– <i>Before</i> installing any test equipment directly to any BTS TX OUT connector, <b>verify that there are no CDMA channels keyed.</b></li><li>– 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.</li></ul> |
|----------------|--|

|             |  |
|-------------|--|
| <b>NOTE</b> | The test equipment must be re-calibrated before using it to perform the TX Acceptance Tests. |
|-------------|--|

## ATP Test Prerequisites

*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 3-22 starting on page 3-60).
- 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** 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 3-36).

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.

|             |   |
|-------------|---|
| <b>NOTE</b> | Prior to Spectral Mask Testing, key at least one BBX from each carrier to at least minimum level and adjust the frequency of the selected BBX by 200 AMP channels left or right of the frequency of the carrier under test. Repeat for other carriers under test. This is described in Table 4-1, Step 6. |
|-------------|---|

### 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  $10.2 \pm 2$  dB, and, that the noise floor of all EVEN numbered “OFF” Walsh channels measures  $\leq -27$  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.<br><b>IMPORTANT!</b> 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 Steps 1 through sub-step 1g of Table 3-36 for testing.   |
|                               |      | <b>NOTE</b><br>If the LMF has been logged into the BTS with a different <b>Multi-Channel Preselector</b> setting than the one to be used for this test, the LMF <i>must be logged out of the BTS and logged in again</i> with the <i>new Multi-Channel Preselector</i> setting. Using the wrong MPC setting can cause a false test failure.  |
|                               | 3    | From the <b>Tests</b> menu, select the test you want to run.   |
|                               | 4    | Select the appropriate carrier (carrier-bts#-sector#-carrier#) displayed in the <b>Channels/Carrier</b> pick list.<br><b>NOTE</b><br>To select multiple items, hold down the <b>&lt;Shift&gt;</b> or <b>&lt;Ctrl&gt;</b> key while making the selections.  |
|                               | 5    | Enter the appropriate channel number in the <b>Carrier n Channels</b> box.<br>The default channel number displayed is determined by the <b>CdmaChans[n]</b> number in the <b>cbse-n.cdf</b> file for the BTS.  |
|                               | 6    | <b>Spectral Mask Testing</b> requires channel adjustments made for other carriers (if equipped):<br><i>Where:</i> F = Actual Customer Channel <b><u>Channel Offset for other carriers (if equipped)</u></b><br>F1 = Channel for other carrier      F+200 AMPS channels<br>F2 = Channel for other carrier      F1+42 AMPS channels<br>F3 = Channel for other carrier      F2+42 AMPS channels<br><br><i>Example:</i> Carrier under test at Channel 283 and three other carriers installed in BTS:<br>F =                                      Channel 283<br>F1 = 283+200 = Channel 483 (new channel)<br>F2 = 483+42 = Channel 525 (new channel)<br>F3 = 525+42 = Channel 567 (new channel)<br><br>6a      – Key all other carriers to the new channels determined above.<br>6b      – Run Spectral Mask Test.<br>6c      – Dekey BBX(s) and repeats steps for Spectral Mask Testing for remaining carriers.<br><br><b>NOTE</b><br>Offset Channels can be shifted either left or right to the carrier under test, but not both and must remain between Channels 1013 and 777. |
|                               | 7    | If applicable, select <b>Verify BLO</b> (default) or <b>Single-sided BLO</b> .<br><b>NOTE</b><br><b>Single-sided BLO</b> is only used when checking non-redundant transceivers.  |
|                               | 8    | If applicable, select a test pattern from the <b>Test Pattern</b> pick list.   |

. . . continued on next page

Table 4-1: ATP Test Procedure

| ✔ | Step | Action   |
|---|------|--|
|   |      | <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• Selecting <b>Pilot</b> (default) performs tests using only a pilot signal.</li> <li>• Selecting <b>Standard</b> performs tests using pilot, synch, paging and 6 traffic channels. This requires an MCC to be selected.</li> <li>• Selecting <b>CDFPilot</b> performs tests using only a pilot signal, however, the gain for the channel elements is specified in the CDF file.</li> <li>• Selecting <b>CDF</b> performs tests using pilot, synch, paging and 6 traffic channels, however, the gain for the channel elements is specified in the CDF file.</li> </ul> |
|   | 9    | <p>Click on the <b>OK</b> button.</p> <p>The status report window and a <b>Directions</b> pop-up are displayed.</p>  |
|   | 10   | <p>Follow the cable connection directions as they are displayed.</p> <p>The test results are displayed in the status report window.</p>  |
|   | 11   | <p>Click on <b>Save Results</b> or <b>Dismiss</b>.</p> <p><b>NOTE</b></p> <p>If <b>Dismiss</b> is used, the test results <b>will not</b> be saved in the test report file.</p>   |
|   | 12   | <p>Refer to Steps 4 through sub-step 4c of Table 3-36 to dekey.</p>  |

# TX Spectral Purity Transmit Mask Acceptance Test

## 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).

|             |   |
|-------------|---|
| <b>NOTE</b> | 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. |
|-------------|---|

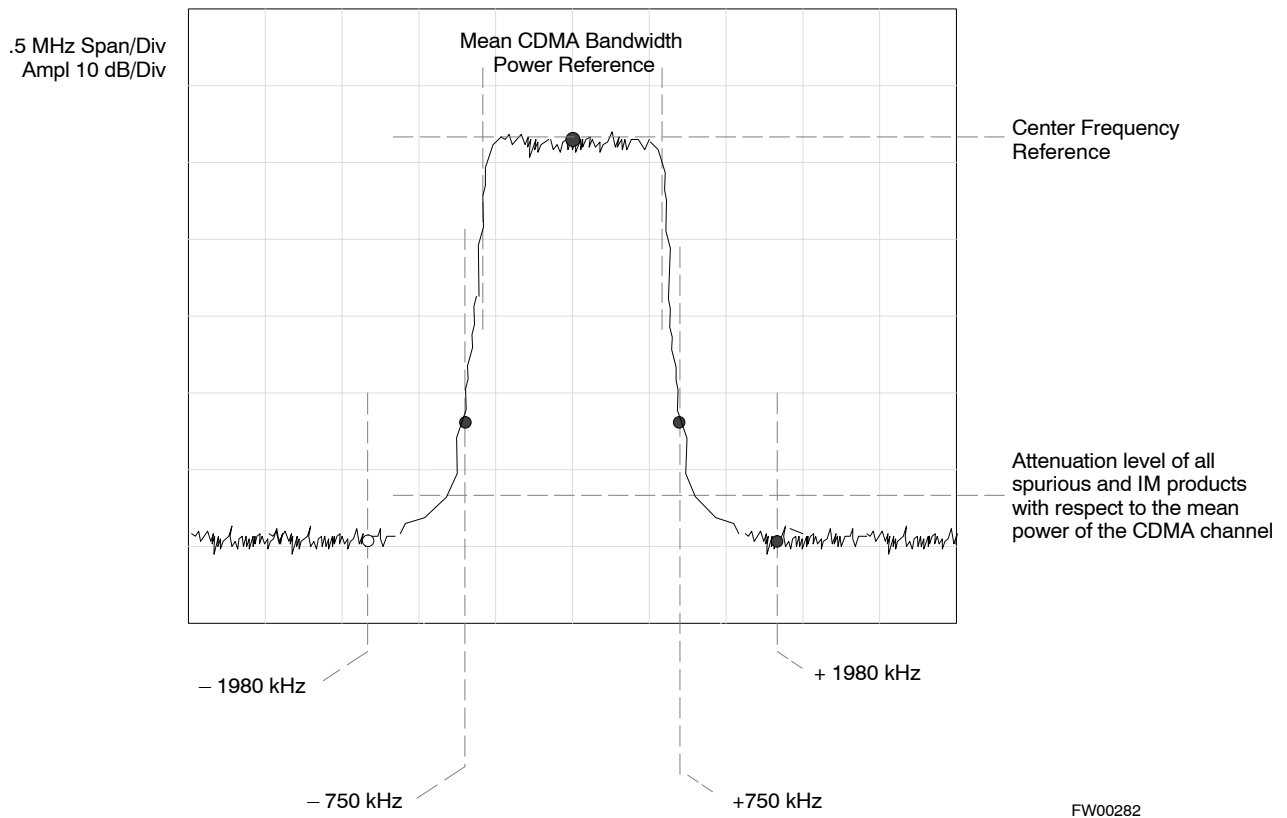
The calibrated communications test set measures and returns the attenuation level of all spurious and IM products in a 30 kHz resolution bandwidth. With respect to the mean power of the CDMA channel measured in a 1.23 MHz bandwidth in dB, verify that results meet system tolerances at the following test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



4

## TX Waveform Quality (rho) Acceptance Test

### 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 `bbxlv1` 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  $\geq 0.912$  (-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 `bbxlv1` 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).

The calibrated communications test set measures and returns the Pilot Time Offset in  $\mu\text{s}$ , verifying results meet system tolerances:

- Pilot Time Offset should be within  $\pm 3 \mu\text{s}$  of the target PT Offset (0  $\mu\text{s}$ ).

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.

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.

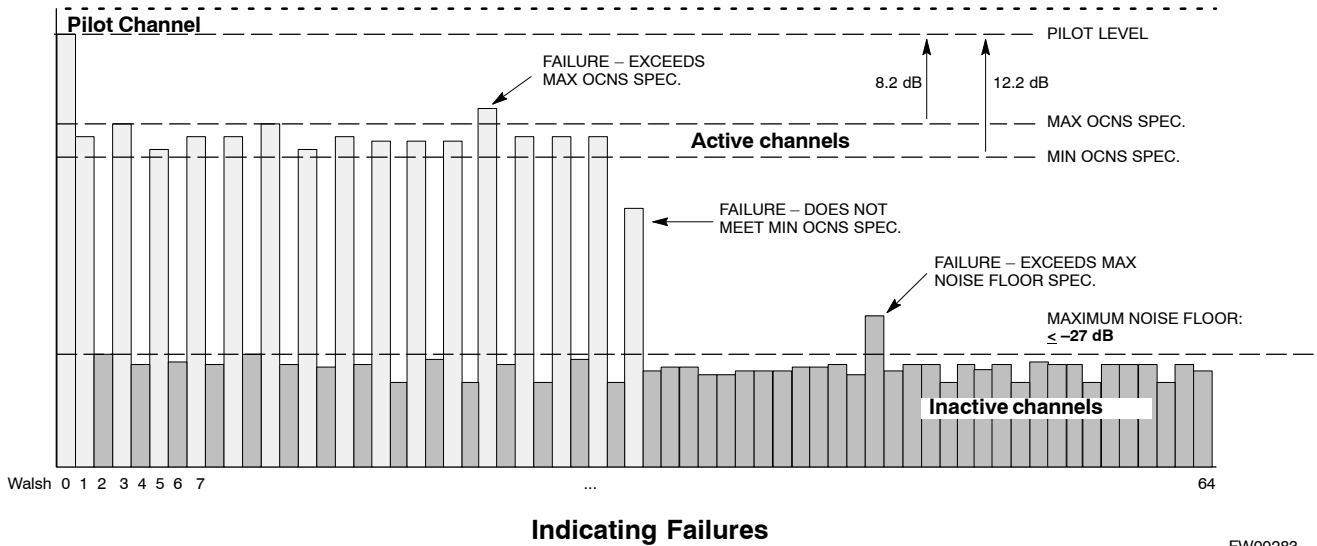
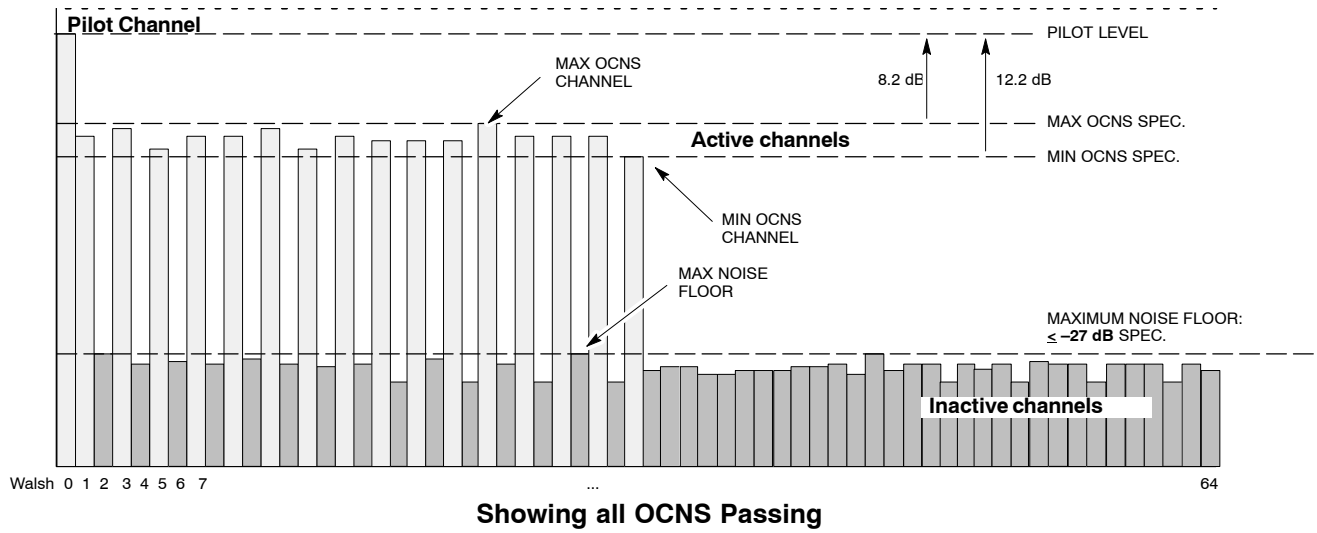
The BBX then de-keys and, if selected, the MCC is re-configured to assign the applicable redundant BBX to the current TX antenna path under test. The test is then repeated. Upon completion of the test, OCNS is disabled on the specified MCC/CE.

### 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



FW00283

4

## RX Frame Error Rate (FER) Acceptance Test

### 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 <b>Login</b> tab (if not in the forefront).  |
|   | 2    | Select the desired BTS from the available Base Station pick list.   |
|   | 3    | Click on the <b>Report</b> button.  |
|   | 4    | Click on a column heading to sort the report.   |
|   | 5    | <ul style="list-style-type: none"> <li>– If not desiring a printable file copy, click on the <b>Dismiss</b> button.</li> <li>– If requiring a printable file copy, select the desired file type in the picklist and click on the <b>Save</b> button.</li> </ul> |

## *Chapter 5*

# **Prepare to Leave the Site**



## Updating Calibration Data Files

### Software Release caveats

With Software Release 2.16.1.x, the packet BTS will NOT detect a new calibration file on the OMC-R. A manual workaround is available in bulletin `cdma_g_bts_059`. This will be corrected in Software Release 2.16.3.

Software Release 2.16.3 will allow 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 <i>Windows</i> running on the LMF computer, insert a disk into Drive A:\.                        |
| 2    | Launch the <b>Windows Explorer</b> application program from the <b>Start &gt; Programs</b> menu list. |
| 3    | Select the applicable <code>&lt;x&gt;:\&lt;lmf home directory&gt;/cdma/bts-#</code> folder.           |
| 4    | Drag the <code>bts-#.cal</code> file to Drive A.  |
| 5    | Repeat Steps 3 and 4, as required, for other <code>bts-#</code> 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.

| <b>Table 5-2:</b> Procedures to Copy CAL Files from Diskette to the CBSC |   |
|--|---|
| <b>Step</b>  | <b>Action</b>   |
| 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 <b>eject -q</b> and press the <b>Enter</b> key.  |
| 4  | Type <b>mount</b> and press the <b>Enter</b> key. Verify that <code>floppy/no_name</code> is displayed.   |
|  | <p><b>NOTE</b></p> <p>If the <b>eject</b> command has been previously entered, <code>floppy/no_name</code> will be appended with a <u>number</u>. Use the explicit <code>floppy/no_name</code> reference displayed.</p>   |
| 5  | Type in <b>cd /floppy/no_name</b> and press the <b>Enter</b> key.   |
| 6  | Type in <b>ls -lia</b> and press the <b>Enter</b> key. Verify the <b>bts-#.cal</b> file filename appears in the displayed directory listing.  |
| 7  | Type in <b>cd</b> and press the <b>Enter</b> key.   |
| 8  | Type in <b>pwd</b> and press the <b>Enter</b> key. Verify the displayed response shows the correct home directory ( <code>/home/&lt;user's name&gt;</code> ).   |
| 9  | With <i>Solaris versions of Unix</i> , create a Unix-formatted version of the <b>bts-#.cal</b> file in the home directory by performing the following:  |
| 9a   | <ul style="list-style-type: none"> <li>- Type in <b>dos2unix /floppy/no_name/bts-#.cal bts-#.cal</b> and press the <b>Enter</b> key.</li> </ul> <p style="padding-left: 40px;">Where: # = BTS number for which the CAL file was created</p> <p><b>NOTE</b></p> <p>Other versions of Unix do not support the <code>dos2unix</code> command. In these cases, use the Unix <b>cp</b> (copy) command. The <i>copied</i> files will contain DOS line feed characters which must be edited out with a Unix text editor.</p> |
| 10   | Type in <b>ls -l *.cal</b> and press the <b>Enter</b> key. Verify the CAL files have been copied. Verify all CAL files to be transferred appear in the displayed listing.   |
| 11   | Type <b>eject</b> and press the <b>Enter</b> key.   |
| 12   | Remove the diskette from the workstation.   |

# Prepare to Leave the Site

## External Test Equipment Removal

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

| <b>Table 5-3: External Test Equipment Removal</b> |   |
|---|---|
| <b>Step</b>                                       | <b>Action</b>   |
| 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*.

5

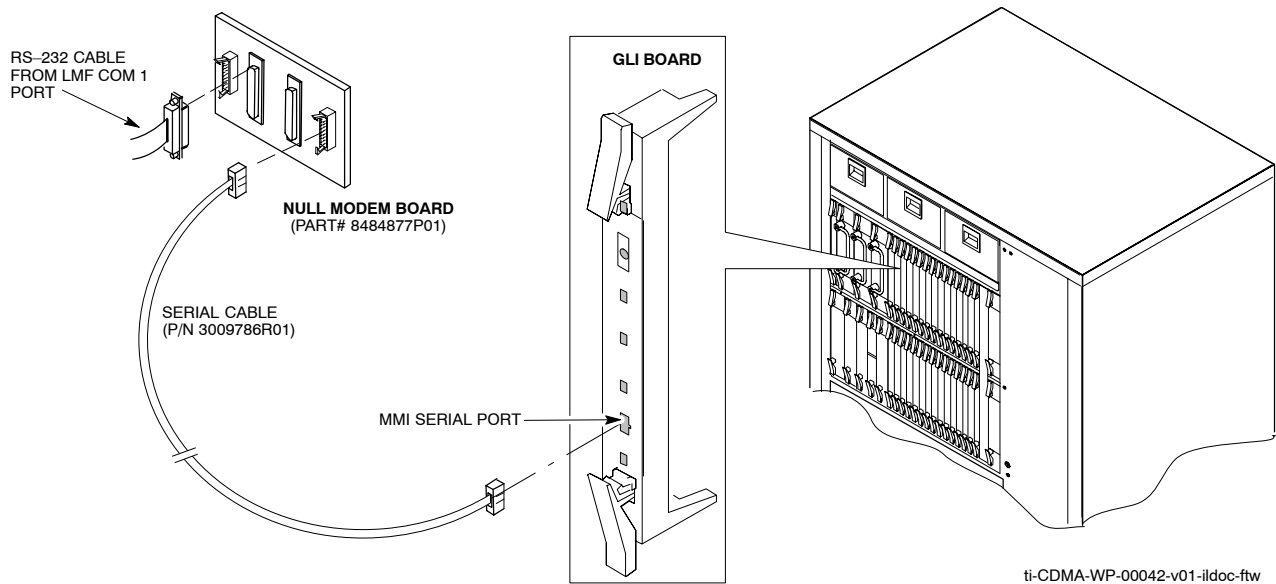
## BTS Site Span Configuration Verification

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    | <p>Start an MMI communication session with MGLI by using the Windows desktop shortcut icon (see Table 3-3 on page 3-12).</p> <p><b>NOTE</b><br/>The LMF program must not be running when a Hyperterminal session is started if COM1 is being used for the MMI session.</p>  |
| 3    | <p>Enter the following MMI command to display the current MGLI/GLI framing format and line code configuration (in bold type):</p> <p><b>span view &lt;cr&gt;</b></p> <p>Observe a display similar to the options shown below:</p> <pre>COMMAND ACCEPTED:      span view  The parameter in NVM is set to T1_2.  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</pre> <p><b>NOTE</b><br/>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. If the current MGLI/GLI framing format and line code configuration does not display the correct choice, proceed to Table 5-5.</p> |
| 4    | Repeat steps 1 through 3 for all remaining GLIs.  |
| 5    | Exit the GLI MMI session and HyperTerminal connection by selecting <b>File</b> from the connection window menu bar, and then <b>Exit</b> from the drop-down menu.   |

Figure 5-1: MGLI/GLI MMI Port Connection



## 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.

**NOTE** 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 5-5: Set BTS Span Parameter Configuration

| Step | Action  |
|------|---|
| 1    | If not already done, 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 MGLI1 by using the Windows desktop shortcut icon (see Table 3-3 on page 3-12).                              |
|      | <p><b>NOTE</b></p> <p>The LMF program must not be running when a Hyperterminal session is started if COM1 is being used for the MMI session.</p>    |

... continued on next page

**Table 5-5: Set BTS Span Parameter Configuration**

| Step | Action  |
|------|---|
| 3    | <p>Enter the following MMI command to determine the current BTS span parameters:</p> <pre>GLI#&gt; <b>config ni current</b></pre> <p>The frame format in flash is set to use T1_2.<br/>Equalization:<br/>Span A – 0–131 feet.<br/>Span B – Default (0–131 feet for T1/J1, 120 Ohm for E1)<br/>Span C – Default (0–131 feet for T1/J1, 120 Ohm for E1)<br/>Span D – Default (0–131 feet for T1/J1, 120 Ohm for E1)<br/>Span E – Default (0–131 feet for T1/J1, 120 Ohm for E1)<br/>Span F – 0–131 feet.<br/>Linkspeed: 64K<br/>Currently, the link is running at the default rate<br/>The actual rate is 0</p>   |
| 4    | <p>Enter the following MMI commands to configure the equalization for each span:</p> <pre>GLI#&gt; <b>config ni equal &lt;letter&gt; &lt;value&gt;</b></pre> <p>Where: letter = a : Span A      and value =    0 : 0–131 feet (default for T1/J1)<br/>              b : Span B                            1 : 132–262 feet<br/>              c : Span C                            2 : 263–393 feet<br/>              d : Span D                            3 : 394–524 feet<br/>              e : Span E                            4 : 525–655 feet<br/>              f : Span F                            5 : LONG HAUL<br/>    6 : 75 OHM<br/>    7 : 120 OHM (default for E1)</p> <p>An example of the command and response:</p> <pre>GLI#&gt; <b>config ni equal a 0</b></pre> <p>The value has been programmed. It will take effect after the next reset.</p> |
| 5    | <p>Enter the following MMI command to configure the span type:</p> <pre>GLI#&gt; <b>config ni format &lt;type&gt;</b></pre> <p>Where: type = E1_1 : E1_1 – E1 HDB3 CRC4 no TS16<br/>              E1_2 : E1_2 – E1 HDB3 no CRC4 no TS16<br/>              E1_3 : E1_3 – E1 HDB3 CRC4 TS16<br/>              E1_4 : E1_4 – E1 HDB3 no CRC4 TS16<br/>              T1_1 : T1_1 – D4, AMI, No ZCS<br/>              T1_2 : T1_2 – ESF, B8ZS<br/>              J1_1 : J1_1 – ESF, B8ZS (Japan) – Default<br/>              J1_2 : J1_2 – ESF, B8ZS<br/>              T1_3 : T1_3 – D4, AMI, ZCS</p> <p>An example of the command and response:</p> <pre>GLI#&gt; <b>config ni format T1_1</b></pre> <p>The value has been programmed. It will take effect after the next reset.</p>   |

... continued on next page

**Table 5-5: Set BTS Span Parameter Configuration**

| Step | Action  |
|------|---|
| 6    | <p>Enter the following MMI command to configure the link speed on the spans:</p> <p>GLI#&gt; <b>config ni linkspeed</b> &lt;speed&gt;</p> <p>Where speed = 56K : 56K(default for T1_1 and T1_3 systems)<br/>64K : 64K(default for all other span configurations)</p> <p>An example of the command and response:</p> <p>GLI#&gt; <b>config ni linkspeed 56K</b><br/>The value has been programmed. It will take effect after the next reset.</p>                     |
| 7    | <p>Enter the following MMI command to turn loopback on or off:</p> <p>GLI#&gt; <b>config ni loopback</b> &lt;on or off&gt;</p> <p>Loopback commands and responses:</p> <p>GLI#&gt; <b>config ni loopback on</b><br/>Loopback request SUCCESSFUL: All framers have been placed in loopback. They will remain in loopback for 1 hour.</p> <p>GLI#&gt; <b>config ni loopback off</b><br/>Loopback request SUCCESSFUL: All framers have been removed from loopback.</p> |
| 8    | Press the RESET button on the GLI for changes to take effect.   |
| 9    | This completes the site specific BTS Span setup for this GLI. Move the MMI cable to the next GLI and repeat steps 1 and 8 for ALL MGLI/GLI boards.  |
| 10   | Terminate the Hyperterm session and disconnect the LMF from the MGLI/SGLI.  |

5

## LMF Removal

**CAUTION**      **DO NOT** power down the LMF without performing the procedure indicated 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    | <p>From the CDMA window select <b>File&gt;Exit</b>.</p> <p><b>NOTE</b><br/>The “File &gt; Exit” command will prompt you to confirm the logout procedure. The “File &gt; Logout and Exit” command will not prompt you and continues to shut down LMF.</p> |
| 2    | <p>From the Windows Task Bar click <b>Start&gt;Shutdown</b>.<br/>Click <b>Yes</b> when the Shut Down Windows message appears.</p>  |
| 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 the GPIB cables as required for equipment transport.   |

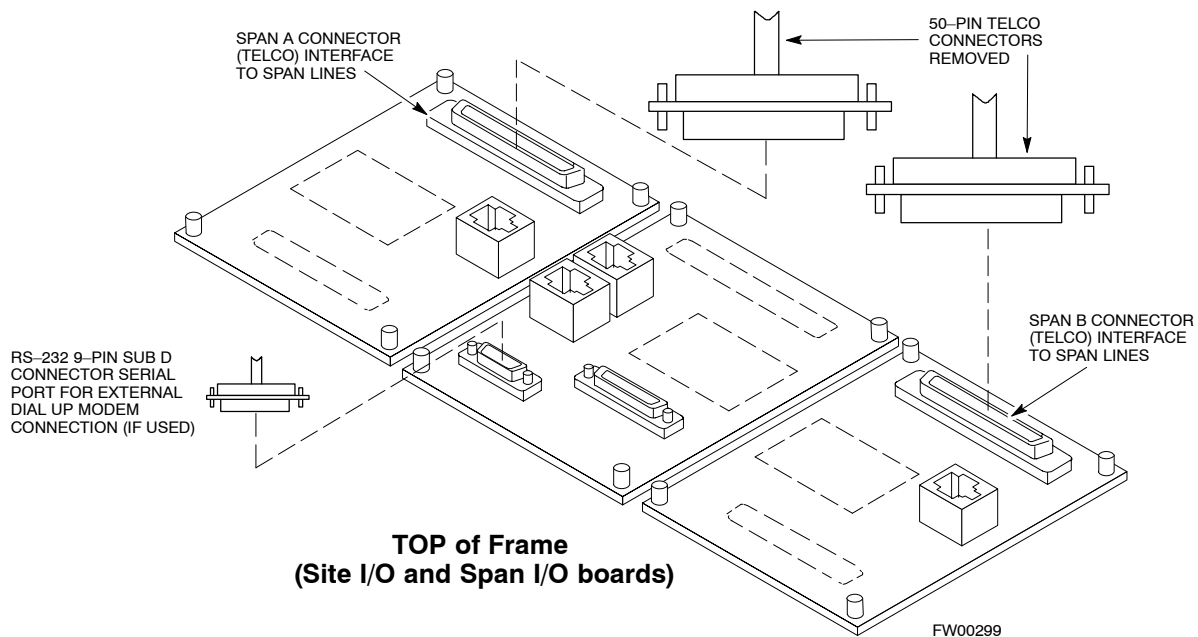
## Re-connect BTS T1/E1 Spans and Integrated Frame Modem

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.<br><br><b>* IMPORTANT</b><br>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**





## 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    | <ul style="list-style-type: none"> <li>- If BTS is configured for circuit operation, go to Step 4.</li> <li>- If BTS is configured for packet operation, go to Step 5.</li> </ul>  |
| 4    | <p><b>Circuit BTS Procedure:</b></p> <p>4a From the BTS site, contact the OMC-R and request the operator to perform a BTS reset.</p> <p style="text-align: center;"><i>or</i></p> <p>At the BTS site:</p> <ul style="list-style-type: none"> <li>- unseat one GLI card at a time and wait for 30 seconds;</li> <li>- reseat the GLI and wait for it to complete its initialization (this takes about one minute);</li> <li>- repeat for the second GLI.</li> </ul> <p>4b Depending on the number of installed operational GLI cards, perform one of the following:</p> <ul style="list-style-type: none"> <li>- With fully redundant GLIs, contact the OMC-R and request the operator to run the ACTIVATE command for the BTS.</li> <li>- For a non-redundant GLI or a frame where the redundant GLI is not operational, contact the OMC-R and request the operator:                             <ul style="list-style-type: none"> <li>• ACTIVATE the GLI to set the Nextload attribute for the GLI to the one for the current BSS software version;</li> <li>• Disable the GLI;</li> <li>• Enable the GLI to allow the MM to load the software version specified by the Nextload attribute;</li> <li>• Once the GLI is INS_ACT, contact the OMC-R and request the operator ACTIVATE the BTS.</li> </ul> </li> <li>- 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.</li> </ul> |

. . . continued on next page

5

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

| Step | Action  |
|------|---|
| 5    | <p><b>Packet BTS procedure:</b></p> <p>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:</p> <ul style="list-style-type: none"> <li>– <b>Rolling Upgrade:</b> This load process is only available when the BTS cards are populated for full redundancy as applicable.</li> <li>– <b>Quick Reboot:</b> 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.</li> </ul> |
| 6    | <p>After all activities at the site have been completed, contact the OMC-R and confirm that the BTS is under OMC-R control.</p>  |



*Chapter 6*

# Basic Troubleshooting

# Basic 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 from experience in Motorola labs and classrooms.

## Troubleshooting: Installation

### Cannot Log into Cell-Site

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

| ✓ | 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 3-15).<br>If T1 is still connected, verify the CBSC has disabled the BTS.   |
|   | 3    | Try <i>pinging</i> the MGLI (see Table 3-11 on page 3-31).  |
|   | 4    | Verify the LMF is connected to the <b>Primary</b> LMF port (LAN A) in the front of the BTS (see Table 3-5 on page 3-16).  |
|   | 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 3-9 on page 3-30).  |
|   | 8    | Verify a T-adaptor 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.  |

### Cannot Communicate to Power Meter

Follow the procedure in Table 6-2 to troubleshoot 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 <b>LMF Options</b> window <b>Test Equipment</b> 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.<br>Refer to the Test Equipment setup section for details.   |

. . . continued on next page

**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 <b>Util</b> in the BTS menu bar and selecting <b>Test Equipment&gt;Reset</b> 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 <b>LMF Options</b> window <b>Test Equipment</b> 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 F 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 <i>all</i> test equipment by clicking <b>Util</b> in the BTS menu bar and selecting <b>Test Equipment&gt;Reset</b> from the pull-down lists.   |

## Troubleshooting: Download

### 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.<br>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.<br>Reset the card by re-seating it.<br>If the LED remains solid red, replace with a card from another slot & retry.<br><br><b>NOTE</b><br>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 <b>Reset</b> .   |
|  | 9    | If a BBX or an MCC remains OOS_ROM (blue) after code download, use the LMF <b>Device &gt; Status</b> function to verify that the code load was accepted.   |
|  | 10   | If the code load was accepted, use LMF <b>Device &gt; Download &gt; Flash</b> 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.<br><b>NOTE</b><br>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 3-12). |
|                                   | 2    | Enter <b>ALARMS</b> in the Hyperterminal window.<br>The resulting LMF display may provide an indication of the problem.<br>(Call Field Support for further assistance.)                   |

## Troubleshooting: Calibration

### Bay Level Offset Calibration Failure

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

|             |   |
|-------------|---|
| <b>NOTE</b> | 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 3-36). |
|-------------|---|

**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:<br>Bandclass=0; Freq_Band=8; SStype=8   |
|   | 3    | Verify that no PA is in alarm state (flashing red LED).<br>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.<br>Under normal conditions, only two green LEDs must be 'ON' (Power and Ready).<br>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 operational, 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 3-36).

**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).<br>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.<br>Click on the BBX(s) and select <b>Device&gt;Download BLO</b> .<br>Re-try the audit.   |
|   | 6    | Verify the GPIB adapter is not locked up.<br>Under normal conditions, only two green LEDs must be “ON” (Power and Ready).<br>If any other LED is continuously “ON”, power-cycle (turn power off and on) the GPIB Box and retry. |

6

## Troubleshooting: Transmit ATP

### 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.

| <b>Table 6-10: Troubleshooting Forward Link Failure (BTS Passed Reduced ATP)</b> |      |   |
|--|------|---|
| ✓  | Step | Action  |
|  | 1    | Perform these additional TX tests to troubleshoot a forward link problem: <ul style="list-style-type: none"> <li>– TX mask</li> <li>– TX rho</li> <li>– TX code domain</li> </ul> |

### Cannot Perform TX Mask Measurement

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

|             |   |
|-------------|---|
| <b>NOTE</b> | 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 3-36). |
|-------------|---|

| <b>Table 6-11: Troubleshooting TX Mask Measurement Failure</b> |      |   |
|--|------|---|
| ✓  | 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).<br>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.

| <b>Table 6-12: Troubleshooting Rho and Pilot Time Offset Measurement Failure</b> |      |   |
|--|------|---|
| ✓  | 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. |
|  | 3    | Re-load BBX data and repeat the test.   |
|  | 4    | If performing manual measurement, verify analyzer setup.                                  |

. . . continued on next page

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

| ✔ | Step | Action  |
|---|------|---|
|   | 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).<br>Go to the freq. bar in the upper right corner of the Rho meter and select <b>Hz</b> . Press <Shift-avg> and enter <b>10</b> , to obtain an average Rho value. This is an indication the GPS has not stabilized before going <i>INS</i> 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).                |

## Troubleshooting: Receive ATP

### Multi-FER Test Failure

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

| <b>Table 6-14: Troubleshooting Multi-FER Failure</b> |             |   |
|--|-------------|---|
| ✓  | <b>Step</b> | <b>Action</b>   |
|  | 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.<br>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.   |

# Troubleshooting: CSM Checklist

## 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 1, 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<br>Backup = HSO  | 0<br>2 or 18 |
| SGLN4132    | Without GPS Receiver   | 2            | Primary = Remote GPS<br>Backup = HSO | 1<br>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.



# Troubleshooting: C-CCP Backplane

## 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.

|             |   |
|-------------|---|
| <b>NOTE</b> | <b>IMPORTANT:</b> 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.

| <b>Table 6-15: No GLI Control via LMF (all GLIs)</b> |      |  |
|--|------|--|
| ✓  | 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.

| <b>Table 6-16: No GLI Control through Span Line Connection (Both GLIs)</b> |  |
|--|--|
| 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).                               |

| <b>Table 6-17: MGLI Control Good – No Control over Co-located GLI</b> |  |
|---|--|
| 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.

| <b>Table 6-18: MGLI Control Good – No Control over AMR</b> |  |
|--|--|
| <b>Step</b>  | <b>Action</b>  |
| 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.

| <b>Table 6-19: No BBX Control in the Shelf – No Control over Co-located GLIs</b> |  |
|--|--|
| <b>Step</b>  | <b>Action</b>  |
| 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.

| <b>Table 6-20: MGLI Control Good – No (or Missing) Span Line Traffic</b> |   |
|--|---|
| <b>Step</b>  | <b>Action</b>   |
| 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.

| <b>Table 6-21: No MCC Channel Elements</b> |  |
|--|--|
| <b>Step</b>                                | <b>Action</b>  |
| 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.<br>– Check connectors (both board and backplane) for damage. |
| 3  | If no CEs on any MCC:<br>– 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.

### 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.<br><br><b>* IMPORTANT</b><br>If a breaker has tripped, remove all modules from the applicable shelf supplied by the breaker and attempt to reset it. <ul style="list-style-type: none"> <li>– If the breaker trips again, there is probably a cable or breaker problem within the frame.</li> <li>– If the breaker does not trip, there is probably a defective module or sub–assembly within the shelf.</li> </ul>   |
| 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. <ul style="list-style-type: none"> <li>– If the voltage is not present, there is probably a cable or breaker problem within the frame.</li> <li>– If the voltage is present at the connector, reconnect and measure the level at the “VCC” power feed clip on the distribution backplane.</li> <li>– If the voltage is correct at the power clip, inspect the clip for damage.</li> </ul> |
| 5    | <i>–48 V configuration only</i> – If everything appears to be correct, visually inspect the power supply module and verify LEDs are green.  |
| 6    | <i>–48 V configuration only</i> – If LED is red, then replace the power supply 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.   |

**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.

| <b>Table 6-23: No DC Input Voltage to any C-CCP Shelf Module</b> |   |
|--|---|
| <b>Step</b>  | <b>Action</b>   |
| 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.

| <b>Table 6-24: TX and RX Signal Routing Problems</b> |  |
|--|--|
| <b>Step</b>  | <b>Action</b>  |
| 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.                                     |



## Troubleshooting: Span Control Link

### Span Problems (No Control Link)

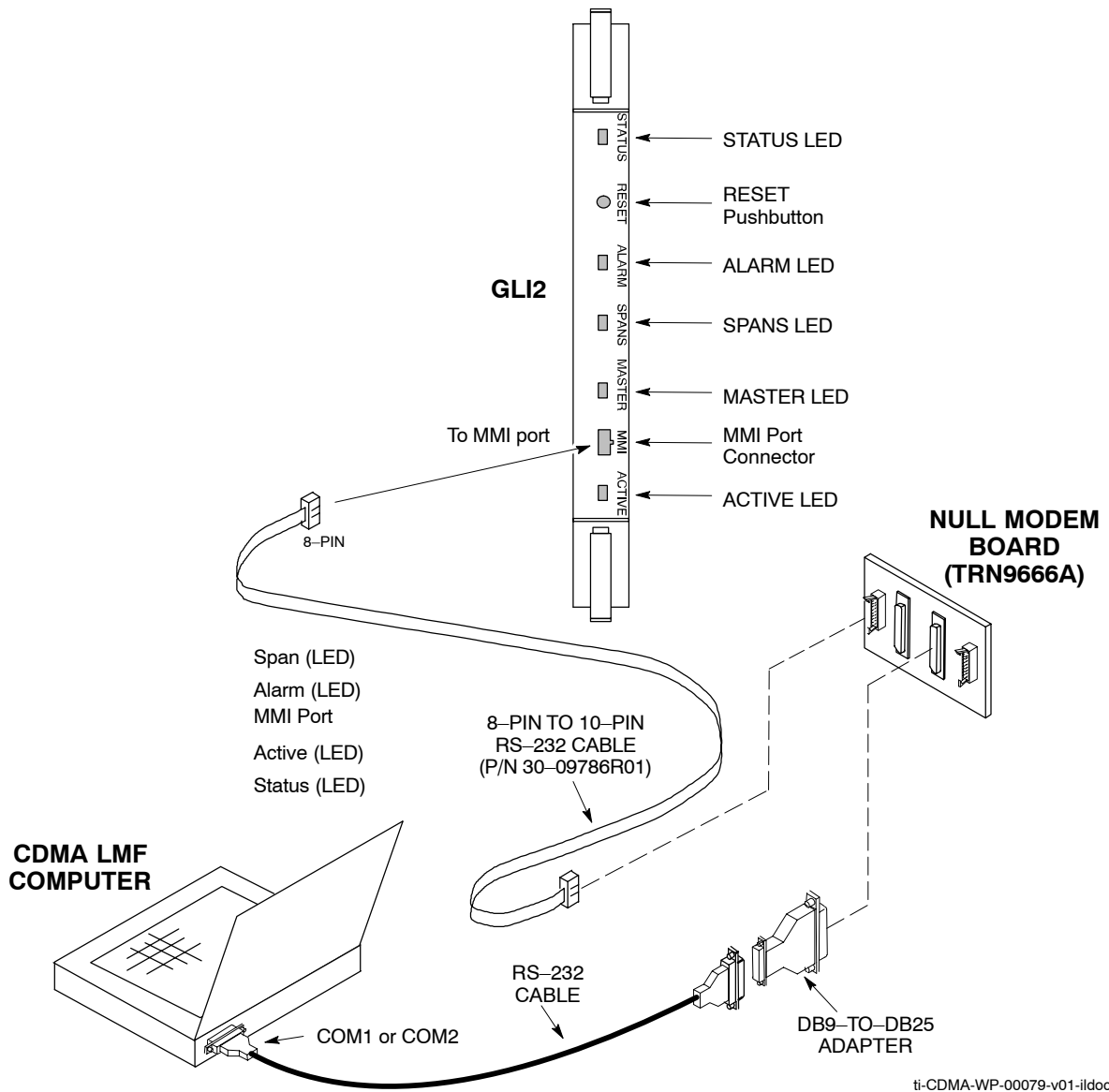
Perform the procedure in Table 6-25 to troubleshoot a control link failure.

**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    | <p>At the GLI prompt, enter:</p> <p><b>config ni current &lt;cr&gt;</b> (equivalent of span view command)</p> <p>The system will respond with a display similar to the following:</p> <pre>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</pre> <p><b>NOTE</b></p> <p>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.</p> |
|   | 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    | <p>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.</p> <ul style="list-style-type: none"> <li>• Try looping back the span line from the DSX panel back to the MM, and verify that the looped signal is good.</li> <li>• Listen for control tone on the appropriate timeslot from the Base Site and MM.</li> </ul>   |
|   | 8    | Exit the GLI MMI session and HyperTerminal connection by selecting <b>File</b> from the connection window menu bar, and then <b>Exit</b> 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.   |



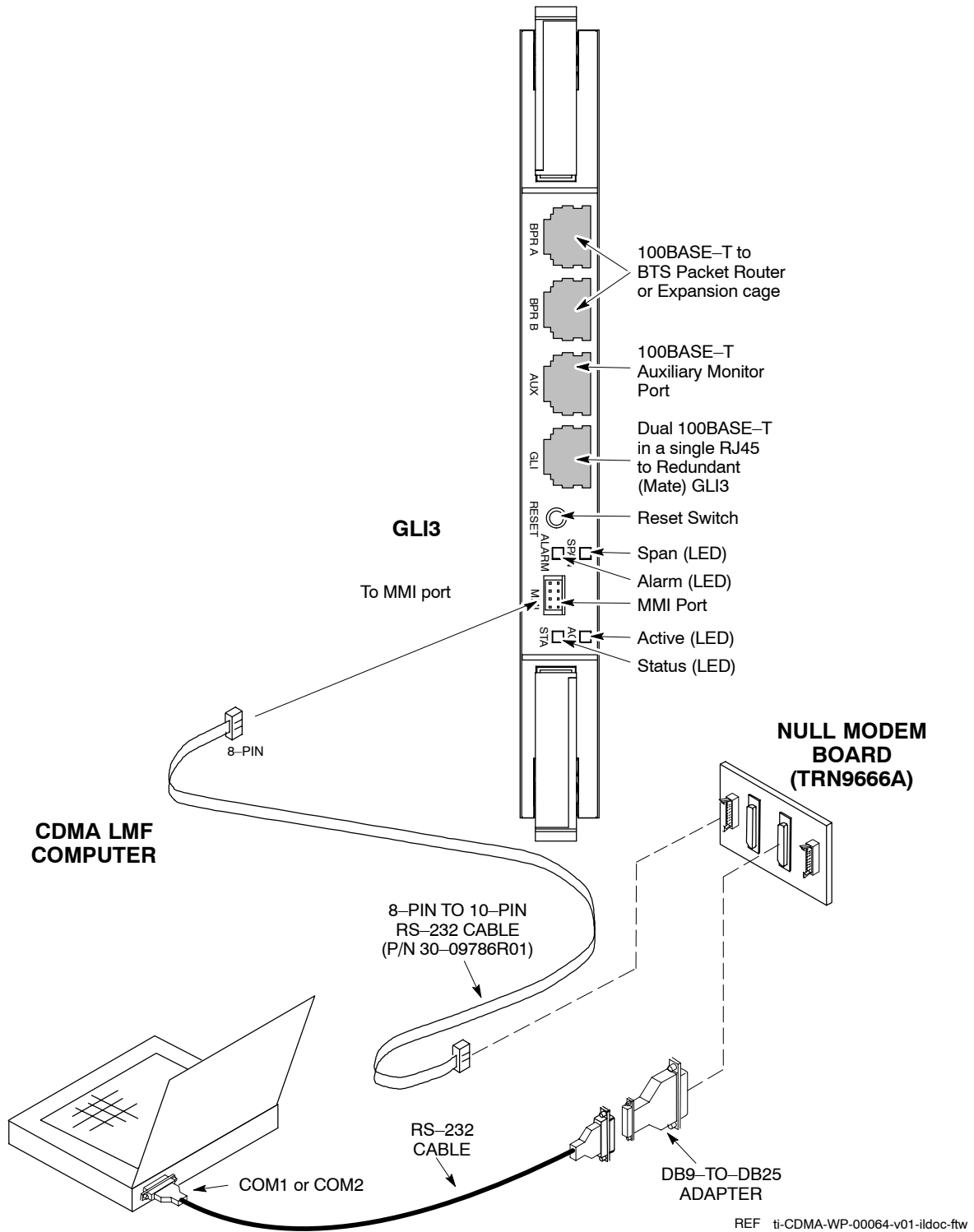
Figure 6-1: GLI2 Board MMI Connection Detail



ti-CDMA-WP-00079-v01-ildoc-ftw

6

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 6-26:** Set BTS Span Parameter Configuration

| ✔ | Step | Action  |
|---|------|---|
|   | 1    | If not previously done, connect the CDMA LMF computer to the MMI port on the applicable MGLI/GLI as shown in Figure 6-1.  |
|   | 2    | If there is no MMI communication session in progress with the applicable MGLI/GLI, initiate one by using the Windows desktop shortcut icon.   |
|   | 3    | <p>At the GLI prompt, enter:</p> <p style="padding-left: 20px;"><b>config ni format</b> &lt;option&gt; &lt;cr&gt;</p> <p>The terminal will display a response similar to the following:</p> <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           &gt;                 </pre> <p><b>NOTE</b><br/>With this command, all active (in-use) spans will be set to the same format.</p> |
|   | 4    | <p>To set or change the span type, enter the correct option from the list at the entry prompt (&gt;), as shown in the following example:</p> <p style="padding-left: 20px;">&gt; <b>T1_2</b> &lt;cr&gt;</p> <p><b>NOTE</b><br/>The entry is case-sensitive and must be typed <i>exactly</i> as it appears in the list. If the entry is typed incorrectly, a response similar to the following will be displayed:</p> <pre> CP: Invalid command GLI&gt;                 </pre>   |

... continued on next page

6

**Table 6-26: Set BTS Span Parameter Configuration**

| ✓ | Step | Action   |
|---|------|--|
|   | 5    | <p>An acknowledgement similar to the following will be displayed:</p> <pre>The value has been programmed. It will take effect after the next reset. GLI&gt;</pre>  |
|   | 6    | <p>If the current MGLI/GLI span rate must be changed, enter the following MMI command:</p> <p><b>config ni linkspeed &lt;cr&gt;</b></p> <p>The terminal will display a response similar to the following:</p> <pre>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) &gt;</pre> <p><b>NOTE</b><br/>With this command, all active (in-use) spans will be set to the same linkspeed.</p> |
|   | 7    | <p>To set or change the span linkspeed, enter the required option from the list at the entry prompt (&gt;), as shown in the following example:</p> <pre>&gt; 64K &lt;cr&gt;</pre> <p><b>NOTE</b><br/>The entry is case-sensitive and must be typed <i>exactly</i> as it appears in the list. If the entry is typed incorrectly, a response similar to the following will be displayed:</p> <pre>CP: Invalid command GLI&gt;</pre>  |
|   | 8    | <p>An acknowledgement similar to the following will be displayed:</p> <pre>The value has been programmed. It will take effect after the next reset. GLI&gt;</pre>  |
|   | 9    | <p>If the span equalization must be changed, enter the following MMI command:</p> <p><b>config ni equal &lt;cr&gt;</b></p> <p>The terminal will display a response similar to the following:</p> <pre>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 &gt;</pre>   |

... continued on next page

**Table 6-26: Set BTS Span Parameter Configuration**

| ✔ | Step | Action   |
|---|------|--|
|   | 10   | <p>At the entry prompt (&gt;), enter the designator from the list for the span to be changed as shown in the following example:</p> <pre>&gt; a &lt;cr&gt;</pre> <p>The terminal will display a response similar to the following:</p> <pre>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)  &gt;</pre> |
|   | 11   | <p>At the entry prompt (&gt;), enter the code for the required equalization from the list as shown in the following example:</p> <pre>&gt; 0 &lt;cr&gt;</pre> <p>The terminal will display a response similar to the following:</p> <pre>&gt; 0 The value has been programmed. It will take effect after the next reset. GLI&gt;</pre>   |
|   | 12   | Repeat steps 9 through 11 for each in-use span.  |
|   | 13   | <p><b>NOTE</b></p> <p>After executing the <i>config ni format</i>, <b>config ni linkspeed</b>, and/or <i>config ni equal</i> commands, the affected MGLI/GLI board <i>MUST</i> be reset and reloaded for changes to take effect.</p> <p>Although defaults are shown, <i>always</i> consult site specific documentation for span type and linkspeed used at the site.</p> <p>Press the RESET button on the MGLI/GLI for changes to take effect.</p>   |

... continued on next page

6

**Table 6-26:** Set BTS Span Parameter Configuration

| ✔ | Step | Action  |
|---|------|---|
|   | 14   | <p>Once the MGLI/GLI has reset, execute the following command to verify span settings are as required:</p> <p><b>config ni current &lt;cr&gt;</b> (equivalent of span view command)</p> <p>The system will respond with a display similar to the following:</p> <pre>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</pre> |
|   | 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 Front Panel LED Indicators and Connectors

## 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

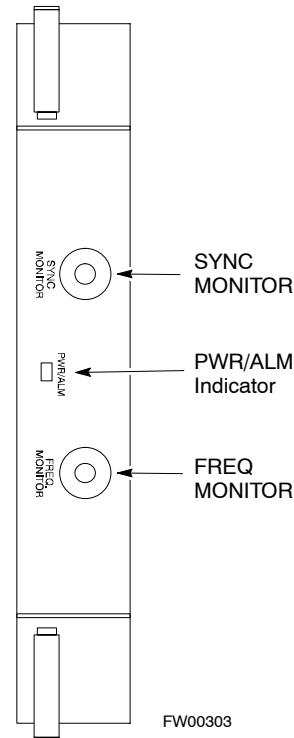
The following list describes the states of the bi-color LED.

- 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  $\Omega$  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<br>ON – briefly during power-up when the Alarm LED turns OFF<br>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<br>ON – briefly during power-up when the Alarm LED turns OFF<br>SLOW GREEN – when the GLI2 is INS (in-service)   |         |
| SPANS                        | OFF – card is powered down, in initialization, or in standby<br>GREEN – operating normally<br>YELLOW – one or more of the equipped initialized spans is receiving a remote alarm indication signal from the far end<br>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.<br>ON – operating normally in active card<br>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<br>ON – active card operating normally<br>OFF – standby card operating normally  |         |

6

**GLI3 Front Panel**

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

| <b>Table 6-28: GLI3 Front Panel</b> |   |  |
|-------------------------------------|---|--|
| <b>LED</b>                          | <b>Operating Status</b>   | <b>Diagram</b>   |
| BPR A                               | Connects to either a BPR or expansion cage and is wired as an ethernet client.  | <p style="text-align: right;">ti-CDMA-WP-00064-v01-ildoc-ftw</p> |
| 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<br>ON – briefly during power-up when the Alarm LED turns OFF<br>SLOW GREEN – when the GLI3 is INS (in-service)   |  |
| SPAN                                | OFF – card is powered down, in initialization, or in standby<br>GREEN – operating normally<br>YELLOW – one or more of the equipped initialized spans is receiving a remote alarm indication signal from the far end<br>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<br>ON – briefly during power-up when the Alarm LED turns OFF<br>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<br><br>ON – active card operating normally<br>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.

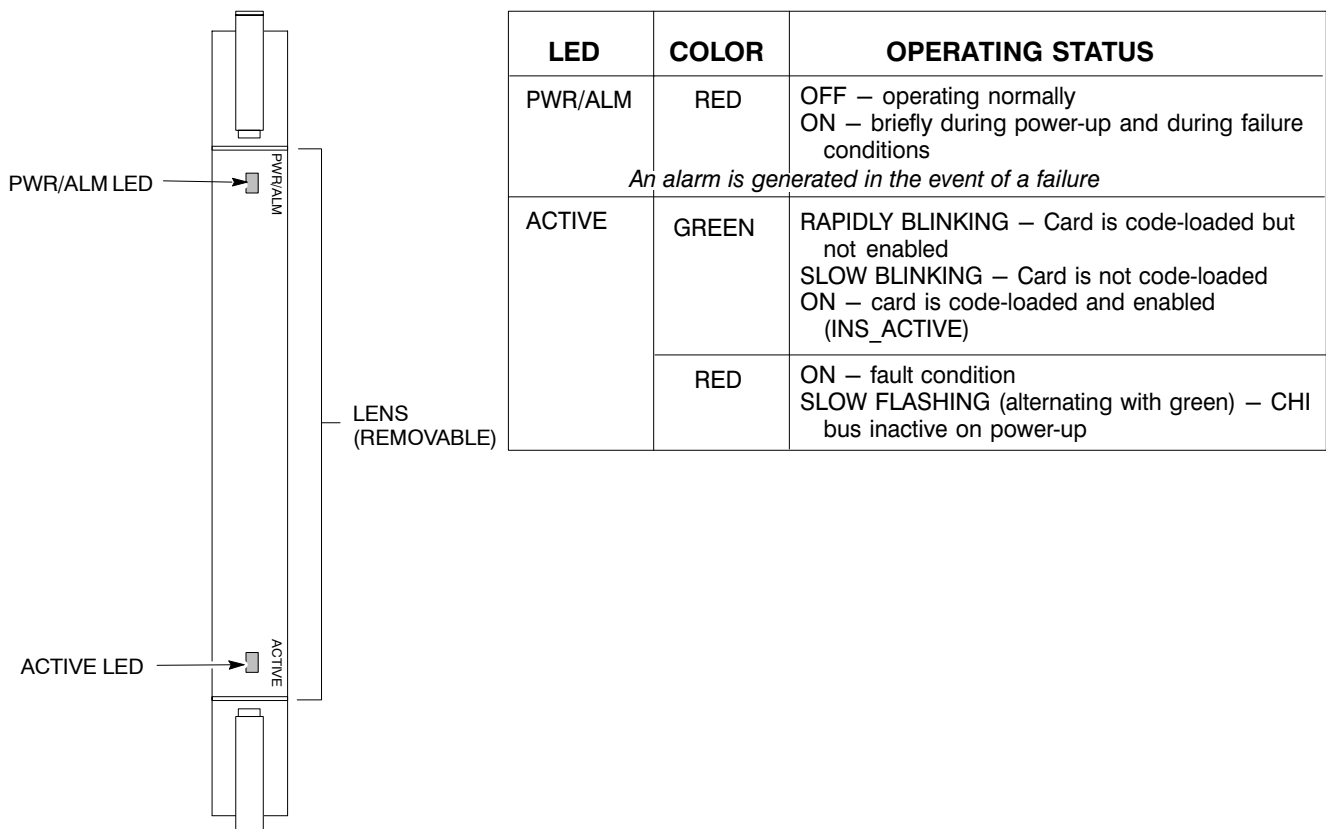
### PWR/ALM and ACTIVE LEDs

- 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







*Appendix A*

**Data Sheets**







## Site Checklist

| Table A-2: Site Checklist |                       |                            |          |
|---------------------------|-----------------------|----------------------------|----------|
| OK                        | Parameter             | Specification              | Comments |
| <input type="checkbox"/>  | Deliveries            | Per established procedures |          |
| <input type="checkbox"/>  | Floor Plan            | Verified                   |          |
| <input type="checkbox"/>  | Inter Frame Cables:   |                            |          |
| <input type="checkbox"/>  | Ethernet              | Per procedure              |          |
| <input type="checkbox"/>  | Frame Ground          | Per procedure              |          |
| <input type="checkbox"/>  | Power                 | Per procedure              |          |
| <input type="checkbox"/>  | Factory Data:         |                            |          |
| <input type="checkbox"/>  | BBX                   | Per procedure              |          |
| <input type="checkbox"/>  | Test Panel            | Per procedure              |          |
| <input type="checkbox"/>  | Site Temperature      |                            |          |
| <input type="checkbox"/>  | Dress Covers/Brackets |                            |          |

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Preliminary Operations

| Table A-3: Preliminary Operations |                           |                        |          |
|-----------------------------------|---------------------------|------------------------|----------|
| OK                                | Parameter                 | Specification          | Comments |
| <input type="checkbox"/>          | Shelf ID Dip Switches     | Per site equipage      |          |
| <input type="checkbox"/>          | BBX Jumpers               | Verified per procedure |          |
| <input type="checkbox"/>          | Ethernet LAN verification | Verified per procedure |          |

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

A

**Pre-Power and Initial Power Tests**

**Table A-4: Pre-power Checklist**

| OK   | Parameter  | Specification   | Comments |
|--|--|---|----------|
| <input type="checkbox"/>   | Pre-power-up tests   | Verify power supply output voltage at the top of each BTS frame is within specifications      |          |
| <input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/> | Internal Cables:<br>ISB (all cages)<br>CSM (all cages)<br>Power (all cages)<br>Ethernet Connectors<br>LAN A ohms<br>LAN B ohms<br>LAN A shield<br>LAN B shield<br>Ethernet Boots | verified<br>verified<br>verified<br>verified<br>verified<br>isolated<br>isolated<br>installed |          |
| <input type="checkbox"/>   | Air Impedance Cage (single cage)   | installed   |          |
| <input type="checkbox"/>   | Initial power-up tests   | Verify power supply output voltage at the top of each BTS frame is within specifications:     |          |

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



# General Optimization Checklist

| Table A-5: Pre-power Checklist |                                    |               |          |
|--------------------------------|------------------------------------|---------------|----------|
| OK                             | Parameter                          | Specification | Comments |
| <input type="checkbox"/>       | LEDs                               | illuminated   |          |
| <input type="checkbox"/>       | Frame fans                         | operational   |          |
|                                | LMF to BTS Connection              |               |          |
| <input type="checkbox"/>       | Preparing the LMF                  | per procedure |          |
| <input type="checkbox"/>       | Log into the LMF PC                | per procedure |          |
| <input type="checkbox"/>       | Create site specific BTS directory | per procedure |          |
| <input type="checkbox"/>       | Create master-bts-cdma directory   | per procedure |          |
| <input type="checkbox"/>       | Download device loads              | per procedure |          |
| <input type="checkbox"/>       | Moving/Linking files               | per procedure |          |
| <input type="checkbox"/>       | Ping LAN A                         | per procedure |          |
| <input type="checkbox"/>       | Ping LAN B                         | per procedure |          |
| <input type="checkbox"/>       | Download/Enable MGLIs              | per procedure |          |
| <input type="checkbox"/>       | Download/Enable GLIs               | per procedure |          |
| <input type="checkbox"/>       | Set Site Span Configuration        | per procedure |          |
| <input type="checkbox"/>       | Download CSMs                      | per procedure |          |
| <input type="checkbox"/>       | Download                           | per procedure |          |
| <input type="checkbox"/>       | Enable CSMs                        | per procedure |          |
| <input type="checkbox"/>       | Download/Enable MCCs               | per procedure |          |
| <input type="checkbox"/>       | Download BBXs                      | per procedure |          |
| <input type="checkbox"/>       | Test Set Calibration               | per procedure |          |

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

A

**GPS Receiver Operation**

**Table A-6: GPS Receiver Operation**

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

Comments:

---



---



---



---



---



**PA IM Reduction**

**Table A-7: PA IM Reduction – TX Filter**

| OK                       | PA # | Carrier  |          | Specification | Comments |
|--------------------------|------|----------|----------|---------------|----------|
|                          |      | 3-Sector | 6-Sector |               |          |
| <input type="checkbox"/> | 1A   | C1       | C1       | No Alarms     |          |
| <input type="checkbox"/> | 1B   | C1       | C1       | No Alarms     |          |
| <input type="checkbox"/> | 1C   | C1       | C1       | No Alarms     |          |
| <input type="checkbox"/> | 1D   | C1       | C1       | No Alarms     |          |
| <input type="checkbox"/> | 2A   | C2       | C2       | No Alarms     |          |
| <input type="checkbox"/> | 2B   | C2       | C2       | No Alarms     |          |
| <input type="checkbox"/> | 2C   | C2       | C2       | No Alarms     |          |
| <input type="checkbox"/> | 2D   | C2       | C2       | No Alarms     |          |
| <input type="checkbox"/> | 3A   | C3       | C1       | No Alarms     |          |
| <input type="checkbox"/> | 3B   | C3       | C1       | No Alarms     |          |
| <input type="checkbox"/> | 3C   | C3       | C1       | No Alarms     |          |
| <input type="checkbox"/> | 3D   | C3       | C1       | No Alarms     |          |
| <input type="checkbox"/> | 4A   | C4       | C2       | No Alarms     |          |
| <input type="checkbox"/> | 4B   | C4       | C2       | No Alarms     |          |
| <input type="checkbox"/> | 4C   | C4       | C2       | No Alarms     |          |
| <input type="checkbox"/> | 4D   | C4       | C2       | No Alarms     |          |

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

A

**PA Convergence**

**Table A-8: PA Convergence (Multicarrier grouping)**

| OK                       | PA # Converged | Specification                                  | Data |
|--------------------------|----------------|--|------|
| <input type="checkbox"/> | 1A             | Verify per procedure & upload convergence data |      |
| <input type="checkbox"/> | 2A             |  |      |
| <input type="checkbox"/> | 3A             |  |      |
| <input type="checkbox"/> | 4A             |  |      |
| <input type="checkbox"/> | 1B             | Verify per procedure & upload convergence data |      |
| <input type="checkbox"/> | 2B             |  |      |
| <input type="checkbox"/> | 3B             |  |      |
| <input type="checkbox"/> | 4B             |  |      |
| <input type="checkbox"/> | 1C             | Verify per procedure & upload convergence data |      |
| <input type="checkbox"/> | 2C             |  |      |
| <input type="checkbox"/> | 3C             |  |      |
| <input type="checkbox"/> | 4C             |  |      |
| <input type="checkbox"/> | 1D             | Verify per procedure & upload convergence data |      |
| <input type="checkbox"/> | 2D             |  |      |
| <input type="checkbox"/> | 3D             |  |      |
| <input type="checkbox"/> | 4D             |  |      |

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## 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  |
|--------------------------|-----------------------------|--|---|
| <input type="checkbox"/> | Calibrate carrier 1         | TX Bay Level Offset = 40 dB ( $\pm 5$ dB) prior to calibration | BBX-1, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB  |
| <input type="checkbox"/> |                             |  | BBX-2, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB  |
| <input type="checkbox"/> |                             |  | BBX-3, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB  |
| <input type="checkbox"/> | Calibrate carrier 2         | TX Bay Level Offset = 40 dB ( $\pm 5$ dB) prior to calibration | BBX-7, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB  |
| <input type="checkbox"/> |                             |  | BBX-8, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB  |
| <input type="checkbox"/> |                             |  | BBX-9, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB  |
| <input type="checkbox"/> | Calibrate carrier 3         | TX Bay Level Offset = 40 dB ( $\pm 5$ dB) prior to calibration | BBX-4, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB  |
| <input type="checkbox"/> |                             |  | BBX-5, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB  |
| <input type="checkbox"/> |                             |  | BBX-6, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB  |
| <input type="checkbox"/> | Calibrate carrier 4         | TX Bay Level Offset = 40 dB ( $\pm 5$ dB) prior to calibration | BBX-10, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB |
| <input type="checkbox"/> |                             |  | BBX-11, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB |
| <input type="checkbox"/> |                             |  | BBX-12, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB |
| <input type="checkbox"/> | Calibration Audit carrier 1 | 0 dB ( $\pm 0.5$ dB) for gain set resolution post calibration  | BBX-1, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB  |
| <input type="checkbox"/> |                             |  | BBX-2, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB  |
| <input type="checkbox"/> |                             |  | BBX-3, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB  |

... continued on next page



A

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

| OK                       | Parameter                   | Specification   | Comments  |
|--------------------------|-----------------------------|---|---|
| <input type="checkbox"/> | Calibration Audit carrier 2 | 0 dB ( $\pm 0.5$ dB) for gain set resolution post calibration | BBX-7, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-8, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-9, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB  |
| <input type="checkbox"/> | Calibration Audit carrier 3 | 0 dB ( $\pm 0.5$ dB) for gain set resolution post calibration | BBX-4, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-5, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-6, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB  |
| <input type="checkbox"/> | Calibration Audit carrier 4 | 0 dB ( $\pm 0.5$ dB) for gain set resolution post calibration | BBX-10, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB |
| <input type="checkbox"/> |                             |   | BBX-11, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB |
| <input type="checkbox"/> |                             |   | BBX-12, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB |

Comments:

---



---



---



---



2-Carrier Adjacent Channel

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

| OK                       | Parameter                   | Specification   | Comments                                       |
|--------------------------|-----------------------------|---|--|
| <input type="checkbox"/> | Calibrate carrier 1         | TX Bay Level Offset = 40 dB (typical), 35 dB (minimum) prior to calibration | BBX-1, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB |
| <input type="checkbox"/> |                             |   | BBX-2, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB |
| <input type="checkbox"/> |                             |   | BBX-3, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB |
| <input type="checkbox"/> | Calibrate carrier 2         | TX Bay Level Offset = 40 dB (typical), 35 dB (minimum) prior to calibration | BBX-7, ANT-4 = ___ dB<br>BBX-r, ANT-4 = ___ dB |
| <input type="checkbox"/> |                             |   | BBX-8, ANT-5 = ___ dB<br>BBX-r, ANT-5 = ___ dB |
| <input type="checkbox"/> |                             |   | BBX-9, ANT-6 = ___ dB<br>BBX-r, ANT-6 = ___ dB |
| <input type="checkbox"/> | Calibration Audit carrier 1 | 0 dB ( $\pm 0.5$ dB) for gain set resolution post calibration               | BBX-1, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB |
| <input type="checkbox"/> |                             |   | BBX-2, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB |
| <input type="checkbox"/> |                             |   | BBX-3, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB |
| <input type="checkbox"/> | Calibration Audit carrier 2 | 0 dB ( $\pm 0.5$ dB) for gain set resolution post calibration               | BBX-7, ANT-4 = ___ dB<br>BBX-r, ANT-4 = ___ dB |
| <input type="checkbox"/> |                             |   | BBX-8, ANT-5 = ___ dB<br>BBX-r, ANT-5 = ___ dB |
| <input type="checkbox"/> |                             |   | BBX-9, ANT-6 = ___ dB<br>BBX-r, ANT-6 = ___ dB |

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**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  |
|--------------------------|-----------------------------|--|---|
| <input type="checkbox"/> | Calibrate carrier 1         | TX Bay Level Offset = 40 dB ( $\pm 5$ dB) prior to calibration | BBX-1, ANT-1 = ___ dB                           |
| <input type="checkbox"/> |                             |  | BBX-r, ANT-1 = ___ dB                           |
| <input type="checkbox"/> |                             |  | BBX-2, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB  |
| <input type="checkbox"/> | Calibrate carrier 2         | TX Bay Level Offset = 40 dB ( $\pm 5$ dB) prior to calibration | BBX-3, ANT-3 = ___ dB                           |
| <input type="checkbox"/> |                             |  | BBX-r, ANT-3 = ___ dB                           |
| <input type="checkbox"/> |                             |  | BBX-7, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB  |
| <input type="checkbox"/> | Calibrate carrier 3         | TX Bay Level Offset = 40 dB ( $\pm 5$ dB) prior to calibration | BBX-8, ANT-2 = ___ dB                           |
| <input type="checkbox"/> |                             |  | BBX-r, ANT-2 = ___ dB                           |
| <input type="checkbox"/> |                             |  | BBX-9, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB  |
| <input type="checkbox"/> | Calibrate carrier 4         | TX Bay Level Offset = 40 dB ( $\pm 5$ dB) prior to calibration | BBX-4, ANT-4 = ___ dB                           |
| <input type="checkbox"/> |                             |  | BBX-r, ANT-4 = ___ dB                           |
| <input type="checkbox"/> |                             |  | BBX-5, ANT-5 = ___ dB<br>BBX-r, ANT-5 = ___ dB  |
| <input type="checkbox"/> | Calibration Audit carrier 1 | 0 dB ( $\pm 0.5$ dB) for gain set resolution post calibration  | BBX-6, ANT-6 = ___ dB                           |
| <input type="checkbox"/> |                             |  | BBX-r, ANT-6 = ___ dB                           |
| <input type="checkbox"/> |                             |  | BBX-10, ANT-4 = ___ dB<br>BBX-3, ANT-4 = ___ dB |
| <input type="checkbox"/> | Calibration Audit carrier 1 | 0 dB ( $\pm 0.5$ dB) for gain set resolution post calibration  | BBX-11, ANT-5 = ___ dB                          |
| <input type="checkbox"/> |                             |  | BBX-r, ANT-5 = ___ dB                           |
| <input type="checkbox"/> |                             |  | BBX-12, ANT-6 = ___ dB<br>BBX-r, ANT-6 = ___ dB |
| <input type="checkbox"/> | Calibration Audit carrier 1 | 0 dB ( $\pm 0.5$ dB) for gain set resolution post calibration  | BBX-1, ANT-1 = ___ dB                           |
| <input type="checkbox"/> |                             |  | BBX-r, ANT-1 = ___ dB                           |
| <input type="checkbox"/> |                             |  | BBX-2, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB  |
| <input type="checkbox"/> | Calibration Audit carrier 1 | 0 dB ( $\pm 0.5$ dB) for gain set resolution post calibration  | BBX-3, ANT-3 = ___ dB                           |
| <input type="checkbox"/> |                             |  | BBX-r, ANT-3 = ___ dB                           |
| <input type="checkbox"/> |                             |  | BBX-3, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB  |

... continued on next page



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

| OK                       | Parameter                   | Specification   | Comments  |
|--------------------------|-----------------------------|---|---|
| <input type="checkbox"/> | Calibration Audit carrier 2 | 0 dB ( $\pm 0.5$ dB) for gain set resolution post calibration | BBX-7, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-8, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-9, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB  |
| <input type="checkbox"/> | Calibration Audit carrier 3 | 0 dB ( $\pm 0.5$ dB) for gain set resolution post calibration | BBX-4, ANT-4 = ___ dB<br>BBX-r, ANT-4 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-5, ANT-5 = ___ dB<br>BBX-r, ANT-5 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-6, ANT-6 = ___ dB<br>BBX-r, ANT-6 = ___ dB  |
| <input type="checkbox"/> | Calibration Audit carrier 4 | 0 dB ( $\pm 0.5$ dB) for gain set resolution post calibration | BBX-10, ANT-4 = ___ dB<br>BBX-r, ANT-4 = ___ dB |
| <input type="checkbox"/> |                             |   | BBX-11, ANT-5 = ___ dB<br>BBX-r, ANT-5 = ___ dB |
| <input type="checkbox"/> |                             |   | BBX-12, ANT-6 = ___ dB<br>BBX-r, ANT-6 = ___ dB |

Comments:

---



---



---



---

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

| <b>Table A-12: TX BLO Calibration (6-Sector: 1-Carrier, 2-Carrier Non-adjacent Channels)</b> |                     |  |   |
|--|---------------------|--|---|
| <b>OK</b>  | <b>Parameter</b>    | <b>Specification</b>   | <b>Comments</b>                                 |
| <input type="checkbox"/>   | Calibrate carrier 1 | TX Bay Level Offset = 42 dB (typical),<br>38 dB (minimum) prior to calibration | BBX-1, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB  |
| <input type="checkbox"/>   |                     |  | BBX-2, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB  |
| <input type="checkbox"/>   |                     |  | BBX-3, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB  |
| <input type="checkbox"/>   |                     |  | BBX-4, ANT-4 = ___ dB<br>BBX-r, ANT-4 = ___ dB  |
| <input type="checkbox"/>   |                     |  | BBX-5, ANT-5 = ___ dB<br>BBX-r, ANT-5 = ___ dB  |
| <input type="checkbox"/>   |                     |  | BBX-6, ANT-6 = ___ dB<br>BBX-r, ANT-6 = ___ dB  |
| <input type="checkbox"/>   | Calibrate carrier 2 | TX Bay Level Offset = 42 dB (typical),<br>38 dB (minimum) prior to calibration | BBX-7, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB  |
| <input type="checkbox"/>   |                     |  | BBX-8, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB  |
| <input type="checkbox"/>   |                     |  | BBX-9, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB  |
| <input type="checkbox"/>   |                     |  | BBX-10, ANT-4 = ___ dB<br>BBX-3, ANT-4 = ___ dB |
| <input type="checkbox"/>   |                     |  | BBX-11, ANT-5 = ___ dB<br>BBX-r, ANT-5 = ___ dB |
| <input type="checkbox"/>   |                     |  | BBX-12, ANT-6 = ___ dB<br>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  |
|--------------------------|-----------------------------|---|---|
| <input type="checkbox"/> | Calibration Audit carrier 1 | 0 dB ( $\pm 0.5$ dB) for gain set resolution post calibration | BBX-1, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-2, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-3, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-4, ANT-4 = ___ dB<br>BBX-r, ANT-4 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-5, ANT-5 = ___ dB<br>BBX-r, ANT-5 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-6, ANT-6 = ___ dB<br>BBX-r, ANT-6 = ___ dB  |
| <input type="checkbox"/> | Calibration Audit carrier 2 | 0 dB ( $\pm 0.5$ dB) for gain set resolution post calibration | BBX-7, ANT-1 = ___ dB<br>BBX-r, ANT-1 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-8, ANT-2 = ___ dB<br>BBX-r, ANT-2 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-9, ANT-3 = ___ dB<br>BBX-r, ANT-3 = ___ dB  |
| <input type="checkbox"/> |                             |   | BBX-10, ANT-4 = ___ dB<br>BBX-r, ANT-4 = ___ dB |
| <input type="checkbox"/> |                             |   | BBX-11, ANT-5 = ___ dB<br>BBX-r, ANT-5 = ___ dB |
| <input type="checkbox"/> |                             |   | BBX-12, ANT-6 = ___ dB<br>BBX-r, ANT-6 = ___ dB |

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

A

### BTS Redundancy/Alarm Tests

| Table A-13: BTS Redundancy/Alarm Tests |                                   |                      |      |
|--|-----------------------------------|----------------------|------|
| OK                                     | Parameter                         | Specification        | Data |
| <input type="checkbox"/>               | SIF: Misc. alarm tests            | Verify per procedure |      |
| <input type="checkbox"/>               | MGLI redundancy test              | Verify per procedure |      |
| <input type="checkbox"/>               | GLI redundancy test               | Verify per procedure |      |
| <input type="checkbox"/>               | Power supply/converter redundancy | Verify per procedure |      |
| <input type="checkbox"/>               | Misc. alarm tests                 | Verify per procedure |      |
| <input type="checkbox"/>               | CSM & GPS redundancy/alarm tests  | Verify per procedure |      |
| <input type="checkbox"/>               | PA redundancy test                | Verify per procedure |      |

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

### TX Antenna VSWR

| Table A-14: TX Antenna VSWR |                  |               |      |
|-----------------------------|------------------|---------------|------|
| OK                          | Parameter        | Specification | Data |
| <input type="checkbox"/>    | VSWR – Antenna 1 | < (1.5 : 1)   |      |
| <input type="checkbox"/>    | VSWR – Antenna 2 | < (1.5 : 1)   |      |
| <input type="checkbox"/>    | VSWR – Antenna 3 | < (1.5 : 1)   |      |
| <input type="checkbox"/>    | VSWR – Antenna 4 | < (1.5 : 1)   |      |
| <input type="checkbox"/>    | VSWR – Antenna 5 | < (1.5 : 1)   |      |
| <input type="checkbox"/>    | VSWR – Antenna 6 | < (1.5 : 1)   |      |

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## RX Antenna VSWR

| Table A-15: RX Antenna VSWR |                  |               |      |
|-----------------------------|------------------|---------------|------|
| OK                          | Parameter        | Specification | Data |
| <input type="checkbox"/>    | VSWR – Antenna 1 | < (1.5 : 1)   |      |
| <input type="checkbox"/>    | VSWR – Antenna 2 | < (1.5 : 1)   |      |
| <input type="checkbox"/>    | VSWR – Antenna 3 | < (1.5 : 1)   |      |
| <input type="checkbox"/>    | VSWR – Antenna 4 | < (1.5 : 1)   |      |
| <input type="checkbox"/>    | VSWR – Antenna 5 | < (1.5 : 1)   |      |
| <input type="checkbox"/>    | VSWR – Antenna 6 | < (1.5 : 1)   |      |

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## AMR Verification

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

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_





# Site Serial Number Check List

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          |  |

... continued on next page



|            |       |
|------------|-------|
| MCC-10     | _____ |
| MCC-11     | _____ |
| MCC-12     | _____ |
| MCIO       | _____ |
| SWITCH     | _____ |
| C-CCP PS-1 | _____ |
| C-CCP PS-2 | _____ |
| C-CCP PS-3 | _____ |

**Power Amplifiers**

Multicarrier Grouping

|       |       |
|-------|-------|
| PA 1A | _____ |
| PA 2A | _____ |
| PA 3A | _____ |
| PA 4A | _____ |

|       |       |
|-------|-------|
| PA 1B | _____ |
| PA 2B | _____ |
| PA 3B | _____ |
| PA 4B | _____ |

|       |       |
|-------|-------|
| PA 1C | _____ |
| PA 2C | _____ |
| PA 3C | _____ |
| PA 4C | _____ |

|       |       |
|-------|-------|
| PA 1D | _____ |
| PA 2D | _____ |
| PA 3D | _____ |
| PA 4D | _____ |

|           |       |
|-----------|-------|
| PLC/SPLC1 | _____ |
| PLC/SPLC2 | _____ |
| PLC/SPLC3 | _____ |
| PLC/SPLC4 | _____ |

|      |       |
|------|-------|
| ETM1 | _____ |
| ETM2 | _____ |

|             |       |
|-------------|-------|
| TX Filter 1 | _____ |
| TX Filter 2 | _____ |
| TX Filter 3 | _____ |

|              |       |
|--------------|-------|
| Terminator 1 | _____ |
| Terminator 2 | _____ |

A

### Power Supply Modules (-48 V Only)

Multicarrier Grouping \_\_\_\_\_

PSM#1 \_\_\_\_\_

PSM#2 \_\_\_\_\_

PSM#3 \_\_\_\_\_

PSM#4 \_\_\_\_\_

PSM#5 \_\_\_\_\_

*Appendix B*

# **PN Offset/I & Q Offset Register Programming Information**

## 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  $\mu$ S) 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</b> |                     |          |                     |          |
|--|---------------------|----------|---------------------|----------|
| <b>14-Chip Delay</b>                                       |                     |          |                     |          |
| <b>Pilot<br/>PN</b>  | <b>I<br/>(Dec.)</b> | <b>Q</b> | <b>I<br/>(Hex.)</b> | <b>Q</b> |
| 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     |

... continued on next page

**B**

| <b>Table B-1: PnMask I and PnMask Q Values for PilotPn</b> |                     |          |               |          |
|--|---------------------|----------|---------------|----------|
| <b>14-Chip Delay</b>                                       |                     |          |               |          |
| <b>Pilot<br/>PN</b>  | <b>I<br/>(Dec.)</b> | <b>Q</b> | <b>I</b>      | <b>Q</b> |
|  |                     |          | <b>(Hex.)</b> |          |
| 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     |

... continued on next page

| <b>Table B-1: PnMask I and PnMask Q Values for PilotPn</b> |                     |          |                     |          |
|--|---------------------|----------|---------------------|----------|
| <b>14-Chip Delay</b>                                       |                     |          |                     |          |
| <b>Pilot<br/>PN</b>  | <b>I<br/>(Dec.)</b> | <b>Q</b> | <b>I<br/>(Hex.)</b> | <b>Q</b> |
| 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     |

... continued on next page

**B**



**B**

| <b>Table B-1: PnMask I and PnMask Q Values for PilotPn</b> |                     |          |               |          |
|--|---------------------|----------|---------------|----------|
| <b>14-Chip Delay</b>                                       |                     |          |               |          |
| <b>Pilot<br/>PN</b>  | <b>I<br/>(Dec.)</b> | <b>Q</b> | <b>I</b>      | <b>Q</b> |
|  |                     |          | <b>(Hex.)</b> |          |
| 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     |

... continued on next page

| <b>Table B-1: PnMask I and PnMask Q Values for PilotPn</b> |                     |                     |                     |                     |
|--|---------------------|---------------------|---------------------|---------------------|
| <b>14-Chip Delay</b>                                       |                     |                     |                     |                     |
| <b>Pilot<br/>PN</b>  | <b>I<br/>(Dec.)</b> | <b>Q<br/>(Dec.)</b> | <b>I<br/>(Hex.)</b> | <b>Q<br/>(Hex.)</b> |
| 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                |

... continued on next page

**B**

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

| 14-Chip Delay |             |             |             |             |
|---------------|-------------|-------------|-------------|-------------|
| Pilot<br>PN   | I<br>(Dec.) | Q<br>(Dec.) | I<br>(Hex.) | Q<br>(Hex.) |
| 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        |

... continued on next page

| <b>Table B-1: PnMask I and PnMask Q Values for PilotPn</b> |                     |                     |                     |                     |
|--|---------------------|---------------------|---------------------|---------------------|
| <b>14-Chip Delay</b>                                       |                     |                     |                     |                     |
| <b>Pilot<br/>PN</b>  | <b>I<br/>(Dec.)</b> | <b>Q<br/>(Dec.)</b> | <b>I<br/>(Hex.)</b> | <b>Q<br/>(Hex.)</b> |
| 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                |

... continued on next page

**B**

| <b>Table B-1: PnMask I and PnMask Q Values for PilotPn</b> |                     |          |               |          |
|--|---------------------|----------|---------------|----------|
| <b>14-Chip Delay</b>                                       |                     |          |               |          |
| <b>Pilot<br/>PN</b>  | <b>I<br/>(Dec.)</b> | <b>Q</b> | <b>I</b>      | <b>Q</b> |
|  |                     |          | <b>(Hex.)</b> |          |
| 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     |

... continued on next page

| <b>Table B-1: PnMask I and PnMask Q Values for PilotPn</b> |                     |          |               |          |
|--|---------------------|----------|---------------|----------|
| <b>14-Chip Delay</b>                                       |                     |          |               |          |
| <b>Pilot<br/>PN</b>  | <b>I<br/>(Dec.)</b> | <b>Q</b> | <b>I</b>      | <b>Q</b> |
|  |                     |          | <b>(Hex.)</b> |          |
| 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     |

... continued on next page

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

| 14-Chip Delay |             |       |        |      |
|---------------|-------------|-------|--------|------|
| Pilot<br>PN   | I<br>(Dec.) | Q     | I      | 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

| <b>Table B-1: PnMask I and PnMask Q Values for PilotPn</b> |                     |                     |                     |                     |
|--|---------------------|---------------------|---------------------|---------------------|
| <b>14-Chip Delay</b>                                       |                     |                     |                     |                     |
| <b>Pilot<br/>PN</b>  | <b>I<br/>(Dec.)</b> | <b>Q<br/>(Dec.)</b> | <b>I<br/>(Hex.)</b> | <b>Q<br/>(Hex.)</b> |
| 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                |


  
**B**
  






*Appendix C*

# FRU Optimization/ATP Test Matrix

# 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.

|             |   |
|-------------|---|
| <b>NOTE</b> | Re-optimization steps listed for any assembly detailed in the tables below must be performed <i>anytime</i> an RF cable associated with it is replaced. |
|-------------|---|

### BTS Frame

| <b>Table C-1: When RF Optimization Is required on the BTS</b> |  |
|---|--|
| <b>Item Replaced</b>  | <b>Optimize:</b>   |
| C-CCP Shelf   | All sector TX and RX paths to all Combined CDMA Channel Processor (C-CCP) shelves. |
| Multicoupler/<br>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<br>Module                                   | All sector/carrier TX paths.   |

### Ancillary Frame

| <b>Item Replaced</b> | <b>Optimize:</b>   |
|----------------------|--|
| 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.

| <b>Item Replaced</b>                     | <b>Optimize:</b>                      |
|--|---------------------------------------|
| 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.

|             |  |
|-------------|--|
| <b>NOTE</b> | <b>IMPORTANT:</b> 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 <b>ONLY</b> . 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.

|             |  |
|-------------|--|
| <b>NOTE</b> | 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.

**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/SPLC |
|------------------------|-------------|--|--------------------------|--------------------------|-----------|-----------|-----------|--------------------------|------|-----------------|-----|-----|-----|---------|-----|-----|-----------------|-----------------------------|-------------|-----------|--------------------------|----------|
| Table 2-1              | 2-3         | Initial Boards/ Modules Install, Preliminary Operations, CDF Site Equipage; etc. | •                        | •                        | •         | •         | •         | •                        | •    | •               | •   | •   | •   | •       | •   | •   | •               | •                           | •           | •         | •                        | •        |
| Table 2-2<br>Table 2-4 | 2-6<br>2-10 | DC Power Pre-Test Physical Inspect   |                          |                          | •         |           |           |                          |      | •               |     |     |     |         |     |     |                 |                             |             |           |                          |          |
| Table 2-5              | 2-11        | Initial Power-up   |                          |                          | •         |           |           |                          |      | •               |     |     |     |         |     |     |                 |                             |             |           |                          |          |
| Table 3-11             | 3-31        | Ping Processors  |                          |                          |           |           |           |                          |      | •               | •   | •   | •   |         |     |     | •               |                             | •           |           |                          |          |
| Table 3-13             | 3-34        | Download/Enable MGLIs  |                          |                          |           |           |           |                          |      | •               |     |     |     |         |     |     | •               |                             |             |           |                          |          |
| Table 3-13             | 3-34        | Download/Enable GLIs   |                          |                          |           |           |           |                          |      | •               |     |     |     |         |     |     | •               |                             |             |           |                          |          |
| Table 3-14             | 3-35        | Download CSMs  |                          |                          |           |           |           |                          |      | •               |     |     | •   |         | •   |     |                 |                             |             |           |                          |          |
| Table 3-14             | 3-35        | Download MCCs,   |                          |                          |           |           |           |                          |      | •               |     |     | •   |         | •   |     |                 |                             |             |           |                          |          |
| Table 3-14             | 3-35        | Download BBXs  |                          |                          |           |           |           |                          |      | •               | •   |     |     |         |     |     |                 |                             |             |           |                          |          |
| Table 3-16             | 3-37        | Enable CSMs  |                          |                          |           |           |           |                          |      | •               |     |     | •   |         |     |     |                 |                             |             |           |                          |          |
| Table 3-17             | 3-38        | Enable MCCs  |                          |                          |           |           |           |                          |      | •               |     | •   |     |         |     |     |                 |                             |             |           |                          |          |
| Table 3-20             | 3-45        | GPS Initialization / Verification  |                          |                          |           |           |           |                          |      | •               |     |     | •   |         | •   |     |                 |                             |             |           |                          |          |
| Table 3-21             | 3-48        | HSO Initialization/ Verification   |                          |                          |           |           |           |                          |      | •               |     |     |     | •       |     |     |                 |                             |             |           |                          |          |
| Table 3-37             | 3-87        | Download Offsets to BBX  |                          |                          |           |           |           | •                        |      | •               | •   |     |     |         |     |     |                 |                             |             |           |                          |          |
| Table 4-1              | 4-7         | Spectral Purity TX Mask ATP  |                          |                          |           |           |           |                          |      | •               | •   |     |     |         |     |     | •               |                             | •           | •         | •                        | •        |
| Table 4-1              | 4-7         | Waveform Quality (rho) ATP   |                          |                          |           |           |           |                          | •    | •               | •   |     | •   |         | •   |     | •               |                             |             | •         | •                        | •        |
| Table 4-1              | 4-7         | Pilot Time Offset ATP  |                          |                          |           |           |           |                          | •    | •               | •   |     | •   |         | •   |     | •               |                             |             | •         | •                        | •        |
| Table 4-1              | 4-7         | Code Domain Power/Noise Floor  |                          |                          |           |           |           |                          |      | •               | •   | •   |     |         |     |     |                 |                             |             |           |                          |          |
| Table 4-1              | 4-7         | 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.

C

*Appendix D*

■  
D  
■

# **BBX Gain Set Point vs BTS Output**

# 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).

**Table D-1: BBX Gain Set Point vs. Actual BTS Output (in dBm)**

| dBm↗<br>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 |

... continued on next page

| <b>dBm↗<br/>Gain↘</b> | <b>44</b> | <b>43</b> | <b>42</b> | <b>41</b> | <b>40</b> | <b>39</b> | <b>38</b> | <b>37</b> | <b>36</b> | <b>35</b> | <b>34</b> | <b>33</b> |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>381</b>            | –         | –         | –         | –         | 43.3      | 42.3      | 41.3      | 40.3      | 39.3      | 38.3      | 37.3      | 36.3      |
| <b>374</b>            | –         | –         | –         | –         | 43.1      | 42.1      | 41.1      | 40.1      | 39.1      | 38.1      | 37.1      | 36.1      |
| <b>366</b>            | –         | –         | –         | 43.9      | 42.9      | 41.9      | 40.9      | 39.9      | 38.9      | 37.9      | 36.9      | 35.9      |
| <b>358</b>            | –         | –         | –         | 43.7      | 42.7      | 41.7      | 40.7      | 39.7      | 38.7      | 37.7      | 36.7      | 35.7      |
| <b>350</b>            | –         | –         | –         | 43.5      | 42.5      | 41.5      | 40.5      | 39.5      | 38.5      | 37.5      | 36.5      | 35.5      |
| <b>342</b>            | –         | –         | –         | 43.3      | 42.3      | 41.3      | 40.3      | 39.3      | 38.3      | 37.3      | 36.3      | 35.3      |
| <b>334</b>            | –         | –         | –         | 43.1      | 42.1      | 41.1      | 40.1      | 39.1      | 38.1      | 37.1      | 36.1      | 35.1      |
| <b>326</b>            | –         | –         | 43.9      | 42.9      | 41.9      | 40.9      | 39.9      | 38.9      | 37.9      | 36.9      | 35.9      | 34.9      |
| <b>318</b>            | –         | –         | 43.7      | 42.7      | 41.7      | 40.7      | 39.7      | 38.7      | 37.7      | 36.7      | 35.7      | 34.7      |
| <b>310</b>            | –         | –         | 43.5      | 42.5      | 41.5      | 40.5      | 39.5      | 38.5      | 37.5      | 36.5      | 35.5      | 34.5      |
| <b>302</b>            | –         | –         | 43.2      | 42.2      | 41.2      | 40.2      | 39.2      | 38.2      | 37.2      | 36.2      | 35.2      | 34.2      |
| <b>294</b>            | –         | 44        | 43        | 42        | 41        | 40        | 39        | 38        | 37        | 36        | 35        | 34        |
| <b>286</b>            | –         | 43.8      | 42.8      | 41.8      | 40.8      | 39.8      | 38.8      | 37.8      | 36.8      | 35.8      | 34.8      | 33.8      |
| <b>278</b>            | –         | 43.5      | 42.5      | 41.5      | 40.5      | 39.5      | 38.5      | 37.5      | 36.5      | 35.5      | 34.5      | 33.5      |
| <b>270</b>            | –         | 43.3      | 42.3      | 41.3      | 40.3      | 39.3      | 38.3      | 37.3      | 36.3      | 35.3      | 34.3      | 33.3      |
| <b>262</b>            | 44        | 43        | 42        | 41        | 40        | 39        | 38        | 37        | 36        | 35        | 34        | 33        |
| <b>254</b>            | 43.7      | 42.7      | 41.7      | 40.7      | 39.7      | 38.7      | 37.7      | 36.7      | 35.7      | 34.7      | 33.7      | –         |
| <b>246</b>            | 43.4      | 42.4      | 41.4      | 40.4      | 39.4      | 38.4      | 37.4      | 36.4      | 35.4      | 34.4      | 33.4      | –         |
| <b>238</b>            | 43.2      | 42.2      | 41.2      | 40.2      | 39.2      | 38.2      | 37.2      | 36.2      | 35.2      | 34.2      | 33.2      | –         |
| <b>230</b>            | 42.9      | 41.9      | 40.9      | 39.9      | 38.9      | 37.9      | 36.9      | 35.9      | 34.9      | 33.9      | –         | –         |
| <b>222</b>            | 42.6      | 41.6      | 40.6      | 39.6      | 38.6      | 37.6      | 36.6      | 35.6      | 34.6      | 33.6      | –         | –         |
| <b>214</b>            | 42.2      | 41.2      | 40.2      | 39.2      | 38.2      | 37.2      | 36.2      | 35.2      | 34.2      | 33.2      | –         | –         |

D





*Appendix E*

# CDMA Operating Frequency



# CDMA Operating Frequency Programming Information

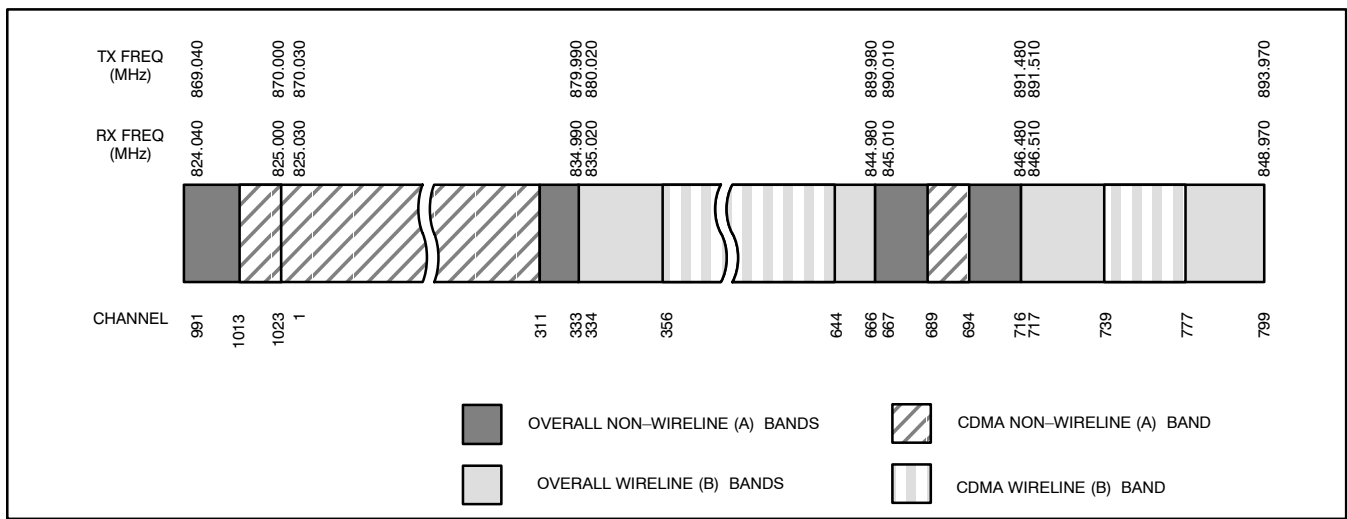
## Introduction

Programming of each of the BTS BBX synthesizers is performed by the BTS GLIs via the CHI bus. This programming data determines the transmit and receive transceiver operating frequencies (channels) for each BBX.

## 800 MHz CDMA Channels

Figure E-1 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-1:** North American Cellular Telephone System Frequency Spectrum (CDMA Allocation)



FW00402

## Calculating 800 MHz Center Frequencies

Table E-1 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  
 $TX = 870 + 0.03 * \text{Channel\#}$   
**Example:** Channel 262  
 $TX = 870 + 0.03 * 262 = 877.86 \text{ MHz}$
- Channels 1013–1023  
 $TX = 870 + 0.03 * (\text{Channel\#} - 1023)$   
**Example:** Channel 1015  
 $TX = 870 + 0.03 * (1015 - 1023) = 869.76 \text{ MHz}$
- $RX = TX - 45 \text{ MHz}$   
**Example:** Channel 262  
 $RX = 877.86 - 45 = 832.86 \text{ MHz}$

**Table E-1:** 800 MHz TX and RX Frequency vs. Channel

| Channel Number                                 |      | Transmit Frequency (MHz)<br>Center Frequency | Receive Frequency (MHz)<br>Center Frequency |
|--|------|--|---|
| Decimal  | Hex  |  |   |
| 1  | 0001 | 870.0300                                     | 825.0300                                    |
| 25   | 0019 | 870.7500                                     | 825.7500                                    |
| 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                                    |
| <b>NOTE</b>                                    |      |  |   |
| Channel numbers 778 through 1012 are not used. |      |  |   |
| 1013   | 03F5 | 869.7000                                     | 824.7000                                    |
| 1023   | 03FF | 870.0000                                     | 825.0000                                    |



*Appendix F*

# Test Equipment Preparation

# 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 setup
- 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 Setup 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.

| ✓ | Step | Action  |
|---|------|---|
|   | 1    | Use the <b>System Button &gt; Controls &gt; IPAdmin</b> to set an IP address on the E7495A as <b>128.0.0.49</b> , and Netmask to <b>255.255.255.128</b> . |

### Connections

It is recommended that you use 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 that the LAN card is set for either AUTO or to use the RJ-45 only).
- Coax cable between LAN card and Hub. (Use a “T” on the hub and connect a cable between the other end of the “T” and the BTS LAN connection).

**Hub to BTS** – Use BNC “T” connector on the hub. [If your hub doesn’t have BNC ports, use a BNC to UTP adapter.]



## Detecting Test Equipment

Check that no other equipment is connected to the LMF. Agilent equipment must be connected to the LAN to detect it. Then perform the procedures described in Table F-2.

**Table F-2:** Detecting Agilent E7495A Test Equipment

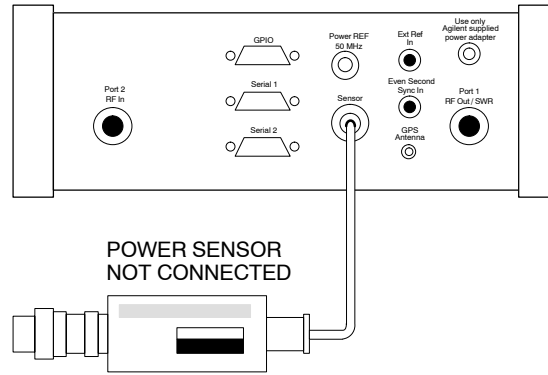
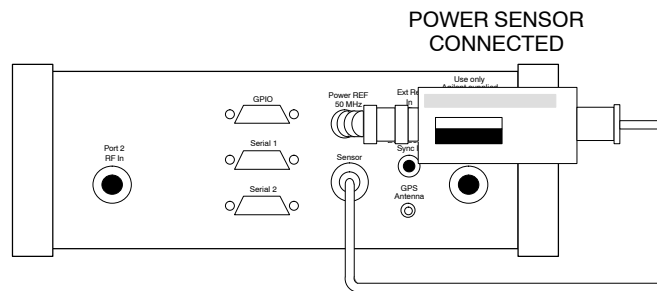
| ✓ | Step | Action   |
|---|------|--|
|   | 1    | Click the <b>Tools</b> Menu.   |
|   | 2    | Choose <b>Options</b> .  |
|   | 3    | Check <b>Agilent E7495A</b> option in non-GPIB Test Equipment and enter its IP number. |
|   | 4    | Click <b>Apply</b> and wait a moment.  |
|   | 5    | Click <b>Dismiss</b> .   |

## 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 you are connected as shown in Figure F-1. <ul style="list-style-type: none"> <li>– Press the Zero softkey.</li> <li>– Press the Continue softkey.</li> </ul>   |
|   | 3    | Calibrate the power meter: <ul style="list-style-type: none"> <li>– Press Ref CF.</li> <li>– Enter the reference cal factor, reading it off the label on the power sensor head.</li> <li>– Press Calibrate.</li> <li>– Connect the power sensor (see Figure F-2).</li> <li>– Press Continue.</li> <li>– Press Cal Factor.</li> <li>– Enter the cal factor from the label on the power sensor head. Select a cal factor that's within the operating frequency of the base station.</li> </ul> |

**Figure F-1:** Agilent E7495A Pre-Power Sensor Calibration connection**Figure F-2:** Agilent E7495A Power Sensor Calibration connection

### Cable Calibration

Follow the directions in the WinLMF program to calibrate cables.

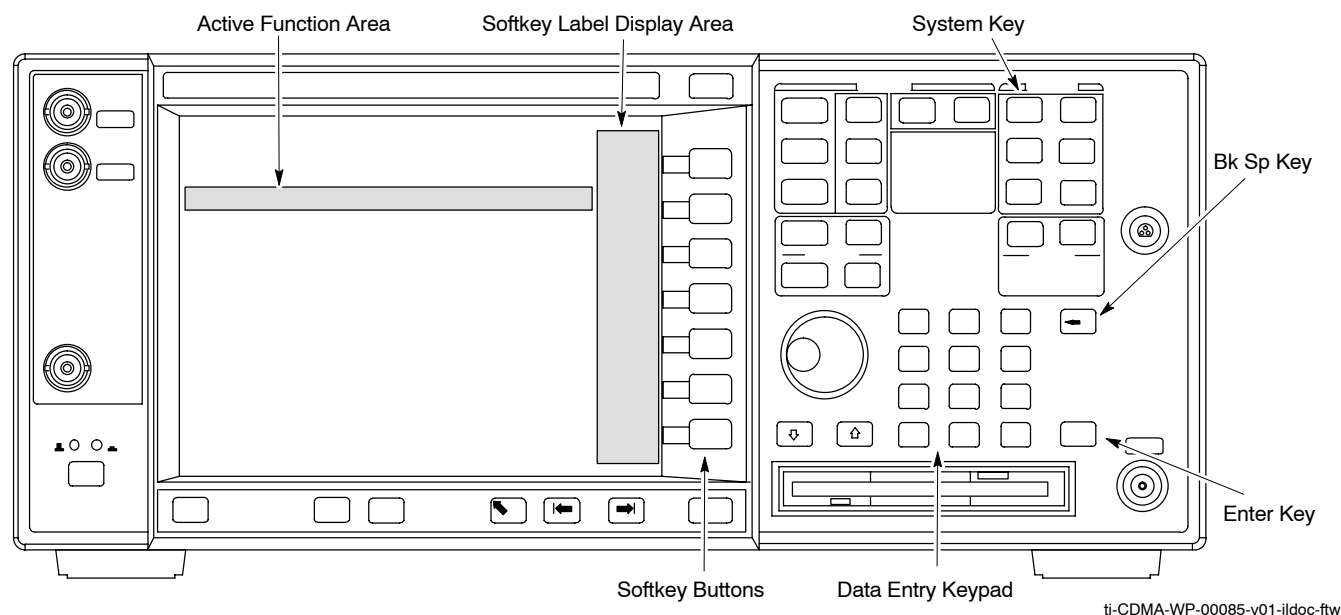
- Calibrate the short cable (see Figure 3-12 on page 3-54) and two 10 dB pads to get a base line and then calibrate the TX and RX setup. Since you need at least 40 dB of loss when doing the FER test, the setup for RX is the same as TX.

## Verifying and Setting GPIB Addresses

### 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



ti-CDMA-WP-00085-v01-ildoc-ftw

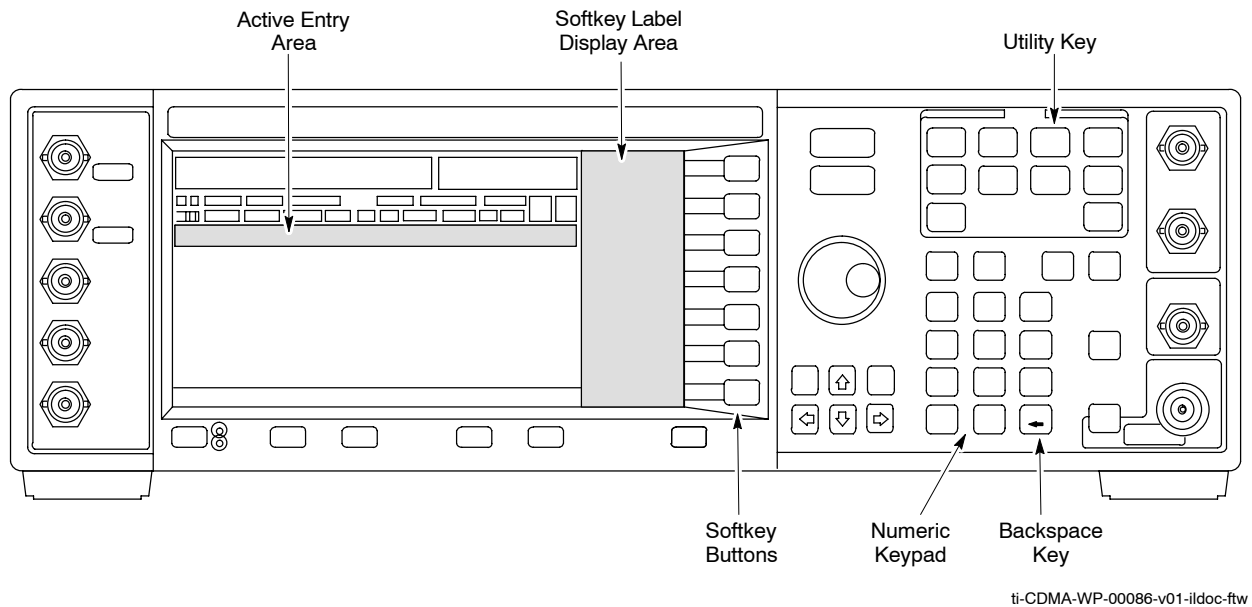
**Table F-4:** Verify and Change Agilent E4406A GPIB Address

| Step | Action   |
|------|--|
| 1    | In the <b>SYSTEM</b> section of the instrument front panel, press the <b>System</b> key. <ul style="list-style-type: none"> <li>The softkey labels displayed on the right side of the instrument screen will change.</li> </ul>  |
| 2    | Press the <b>Config I/O</b> softkey button to the right of the instrument screen. <ul style="list-style-type: none"> <li>The softkey labels will change.</li> <li>The current instrument GPIB address will be displayed below the <b>GPIB Address</b> softkey label.</li> </ul>  |
| 3    | If the current GPIB address is not set to <b>18</b> , perform the following to change it:  |
| 3a   | Press the GPIB Address softkey button. In the on-screen Active Function Area, <b>GPIB Address</b> will be displayed followed by the current GPIB address.  |
| 3b   | On the front panel Data Entry keypad, enter the communications system analyzer GPIB address of <b>18</b> . <ul style="list-style-type: none"> <li>The <b>GPIB Address</b> label will change to <b>Enter</b>.</li> <li>Digits entered with the keypad will replace the current GPIB address in the display.</li> </ul> <p><b>NOTE</b><br/>To correct an entry, press the <b>Bk Sp</b> key at the upper right of the keypad to delete one character at a time.</p> |
| 3c   | Press the <b>Enter</b> softkey button or the keypad <b>Enter</b> key to set the new GPIB address. <ul style="list-style-type: none"> <li>The <b>Config I/O</b> softkey labels will reappear.</li> <li>The new GPIB address will be displayed under the <b>GPIB Address</b> softkey label.</li> </ul>   |

## 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



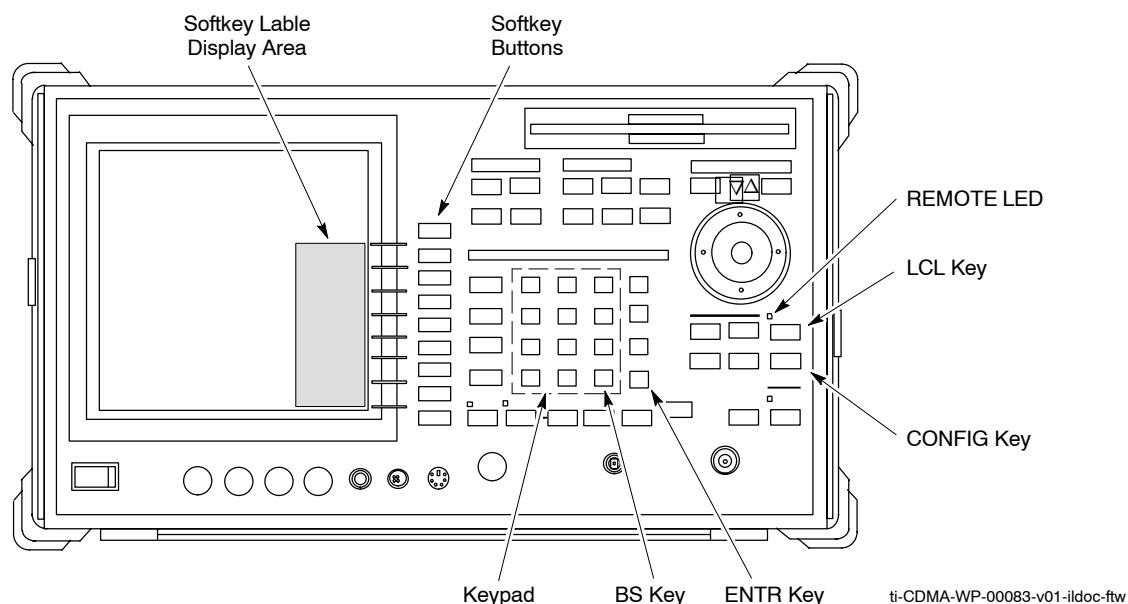
**Table F-5:** Verify and Change Agilent E4432B GPIB Address

| Step | Action   |
|------|--|
| 1    | In the <b>MENUS</b> section of the instrument front panel, press the <b>Utility</b> key. <ul style="list-style-type: none"> <li>The softkey labels displayed on the right side of the instrument screen will change.</li> </ul>  |
| 2    | Press the <b>GPIB/RS232</b> softkey button to the right of the instrument screen. <ul style="list-style-type: none"> <li>The softkey labels will change.</li> <li>The current instrument GPIB address will be displayed below the <b>GPIB Address</b> softkey label.</li> </ul>  |
| 3    | If the current GPIB address is not set to <b>1</b> , perform the following to change it:   |
| 3a   | Press the <b>GPIB Address</b> softkey button. <ul style="list-style-type: none"> <li>The <b>GPIB Address</b> label and current GPIB address will change to boldface.</li> <li>In the on-screen Active Entry Area, <b>Address:</b> will be displayed followed by the current GPIB address.</li> </ul>   |
| 3b   | On the front panel Numeric keypad, enter the signal generator GPIB address of <b>1</b> . <ul style="list-style-type: none"> <li>The <b>GPIB Address</b> label will change to <b>Enter</b>.</li> <li>Digits entered with the keypad will replace the current GPIB address in the Active Entry display.</li> </ul> <p><b>NOTE</b><br/>To correct an entry, press the backspace key at the lower right of the keypad to delete one character at a time.</p> |
| 3c   | Press the <b>Enter</b> softkey button to set the new GPIB address. <ul style="list-style-type: none"> <li>The new GPIB address will be displayed under the <b>GPIB Address</b> softkey label.</li> </ul>   |

## 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



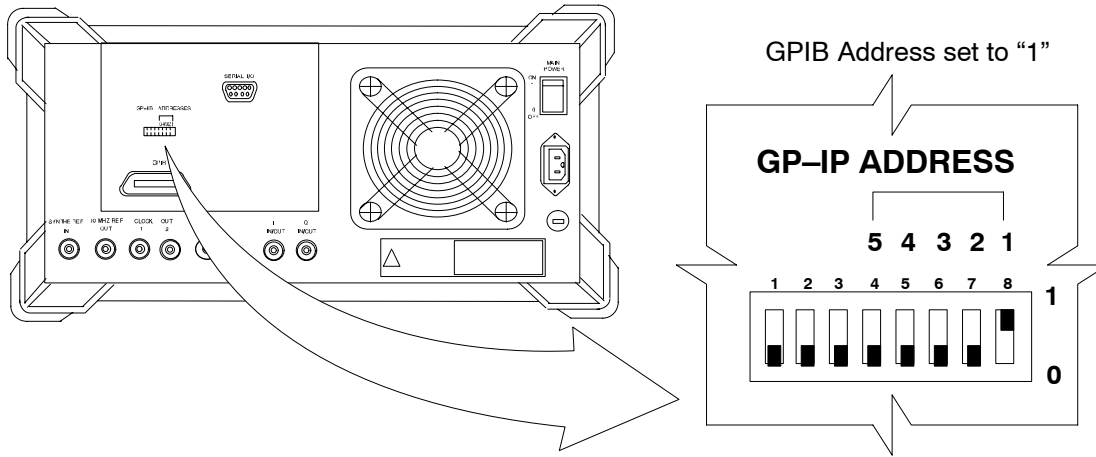
**Table F-6:** Verify and Change Advantest R3267 GPIB Address

| Step | Action   |
|------|--|
| 1    | If the <b>REMOTE LED</b> is lighted, press the <b>LCL</b> key. <ul style="list-style-type: none"> <li>– The LED extinguishes.</li> </ul>   |
| 2    | Press the <b>CONFIG</b> key. <ul style="list-style-type: none"> <li>– The <b>CONFIG</b> softkey labels will appear in the softkey label display area of the instrument display.</li> <li>– The current GPIB address will be displayed below the <b>GPIB Address</b> softkey label.</li> </ul>  |
| 3    | If the current GPIB address is not set to <b>18</b> , perform the following to change it:  |
| 3a   | Press the <b>GPIB Address</b> softkey. A <b>GPIB Address</b> entry window will open in the instrument display showing the current GPIB address.  |
| 3b   | Enter <b>18</b> on the keypad in the <b>ENTRY</b> section of the instrument front panel. Characters typed on the keypad will replace the address displayed in the <b>GPIB Address</b> entry window. <p><b>NOTE</b></p> <p>To correct an entry, press the <b>BS</b> (backspace) key at the lower right of the keypad to delete one character at a time.</p> |
| 3c   | Press the <b>ENTR</b> key to the lower right of the keypad to enter the address. <ul style="list-style-type: none"> <li>– The <b>GPIB Address</b> entry window closes.</li> <li>– The new address is displayed in the bottom portion of the <b>GPIB Address</b> softkey label.</li> </ul>  |

### 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

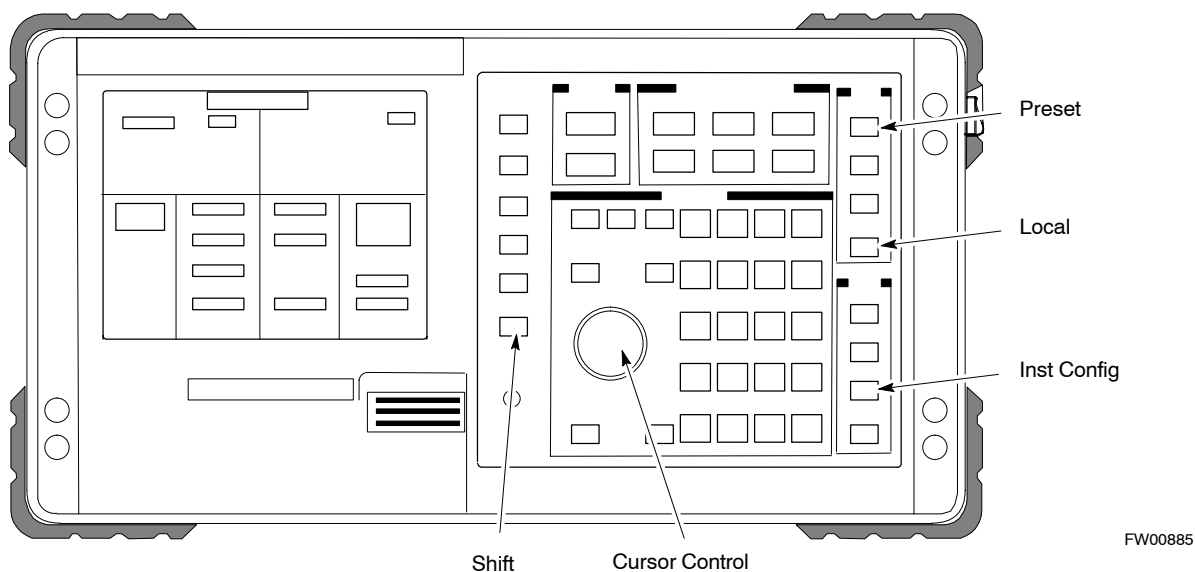


ti-CDMA-WP-00084-v01-ildoc-ftw

## 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

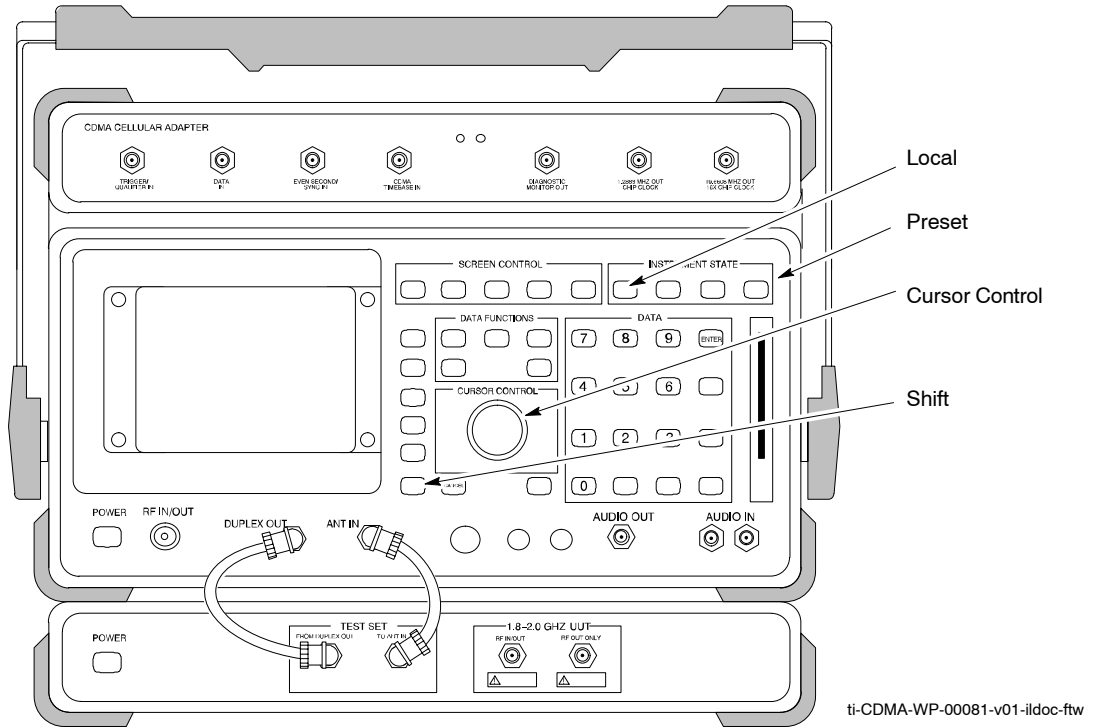
| Step | Action  |
|------|---|
|      | <p><b>NOTE</b><br/>The HP I/O configuration <b>MUST</b> be set to <b>Talk &amp; Listen</b>, or NO device on the GPIB bus will be accessible. (Consult test equipment OEM documentation for additional information as required.)</p>   |
| 1    | <p>To verify that the GPIB addresses are set correctly, press <b>Shift</b> and <b>LOCAL</b> on the HP8935. The current HP-IB address is displayed at the top of the screen.</p> <p><b>NOTE</b><br/>HP-IB is the same as GPIB.</p>   |
| 2    | <p>If the current GPIB address is not set to <b>18</b>, perform the following to change it:</p> <ul style="list-style-type: none"> <li>- Press <b>Shift</b> and <b>Inst Config</b>.</li> <li>- Turn the <b>Cursor Control</b> knob to move the cursor to the <b>HP-IB Adrs</b> field.</li> <li>- Press the <b>Cursor Control</b> knob to select the field.</li> <li>- Turn the <b>Cursor Control</b> knob as required to change the address to 18.</li> <li>- Press the <b>Cursor Control</b> knob to set the address.</li> </ul> |
| 3    | <ul style="list-style-type: none"> <li>• Press <b>Preset</b> to return to normal operation.</li> </ul>  |

F

### 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 HP83236A/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 <b>Shift</b> and <b>LOCAL</b> on the HP8921A. The current HP-IB address is displayed at the top of the screen.<br><br><b>NOTE</b><br>HP-IB is the same as GPIB.  |
| 2   | If the current HP-IB address is not set to <b>18</b> , perform the following to change it: <ul style="list-style-type: none"> <li>– Turn the <b>Cursor Control</b> knob to move the cursor to <b>More</b> and press the knob to select the field.</li> <li>– Turn the <b>Cursor Control</b> knob to move the cursor to <b>I/O Config</b> and press the knob to select the field.</li> <li>– Turn the <b>Cursor Control</b> knob to move the cursor to <b>Adrs</b> and press the knob to select the field.</li> <li>– Turn the <b>Cursor Control</b> knob to change the HP-IB address to 18 and press the knob to set the address.</li> <li>– Press <b>Shift</b> and <b>Preset</b> to return to normal operation.</li> </ul> |
| 3   | To set the HP83236A (or B) PCS Interface GPIB address= <b>19</b> , set the dip switches as follows: <ul style="list-style-type: none"> <li>– A1=1, A2=1, A3=0, A4=0, A5=1, HP-IB/Ser = 1</li> </ul>   |

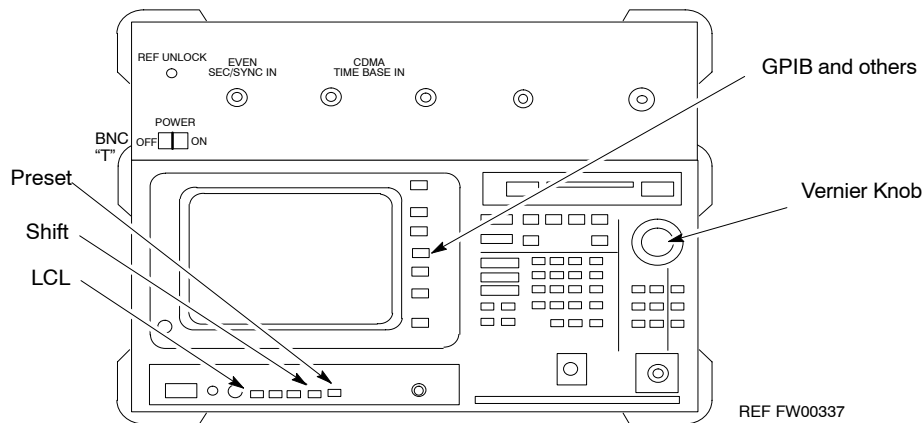




## Advantest R3465 Communications Test Set GPIB Address

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.

**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: <ul style="list-style-type: none"> <li>– Press <b>SHIFT</b> then <b>PRESET</b>.</li> <li>– Press <b>LCL</b>.</li> <li>– Press the <b>GPIB and Others</b> CRT menu key to view the current address.</li> </ul> |
| 2    | If the current GPIB address is not set to <b>18</b> , perform the following to change it: <ul style="list-style-type: none"> <li>– Turn the vernier knob as required to select <b>18</b>.</li> <li>– Press the vernier knob to set the address.</li> </ul>                                       |
| 3    | To return to normal operation, press <b>Shift</b> and <b>Preset</b> .  |

F

## 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.

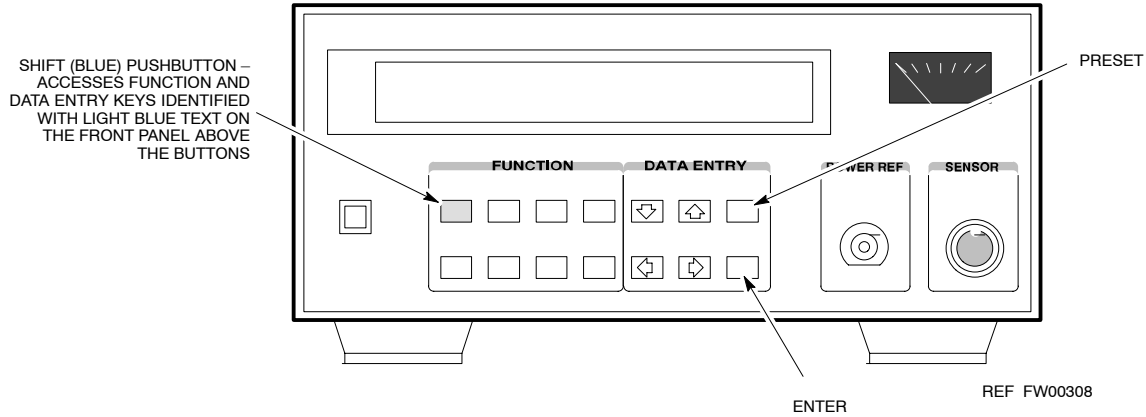
**Table F-10:** Verify and/or Change Motorola CyberTest GPIB Address

| Step | Action  |
|------|---|
| 1    | On the LMF desktop, locate the CyberTAME icon. Double click on the icon to run the CyberTAME application.   |
| 2    | In the CyberTAME window taskbar, under <b>Special</b> , select <b>IEEE.488.2</b> .  |
| 3    | CyberTAME software will query the CyberTest Analyzer for its current GPIB address. It then will open the IEEE 488.2 dialog box. If the current GPIB address is not 18, perform the following procedure to change it: <ul style="list-style-type: none"> <li>– Use the up or down increment arrows, or double-click in the field and type the number.</li> <li>– Click on the <b>OK</b> button.</li> </ul> The new address will be written to the CyberTest via the parallel port and saved. |
|      | <p><b>NOTE</b></p> <p>Verify that the address has been set by repeating steps 2 and 3. The new address should now appear in the IEEE 488.2 dialog box Address field.</p>  |

## 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

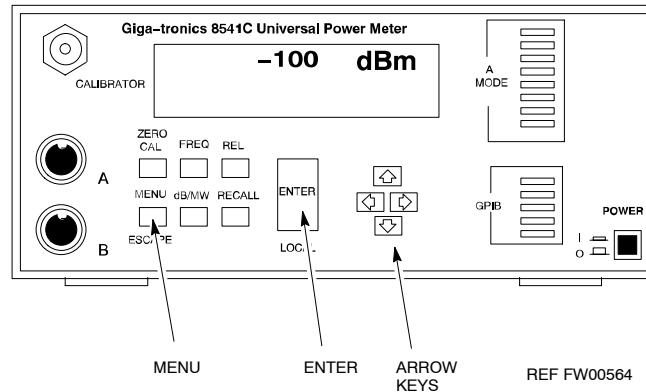
| Step | Action   |
|------|--|
| 1    | Press <b>Shift</b> and <b>PRESET</b> .   |
| 2    | Use the <b>▲</b> arrow key to navigate to HP-IB ADRS and press <b>ENTER</b> .<br>The HP-IB address is displayed.<br><b>NOTE</b><br>HP-IB is the same as GPIB.  |
| 3    | If the current GPIB address is not set to <b>13</b> , perform the following to change it: <ul style="list-style-type: none"> <li>- Use the <b>▲ ▼</b> arrow keys to change the HP-IB ADRS to <b>13</b>.</li> <li>- Press <b>ENTER</b> to set the address.</li> </ul> |
| 4    | Press <b>Shift</b> and <b>ENTER</b> to return to a standard configuration.   |

F

## 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.

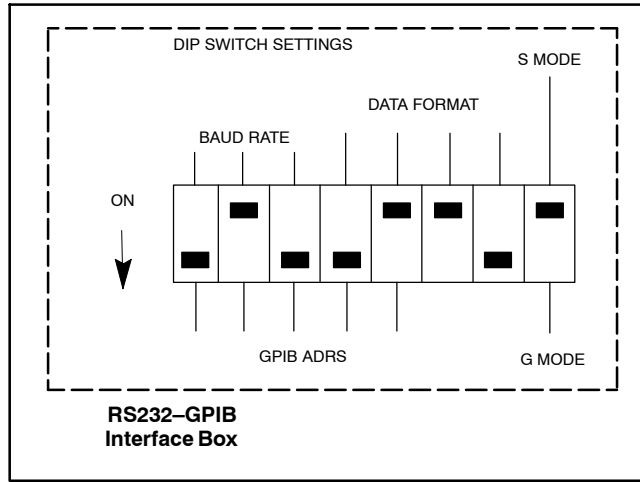
**Table F-12:** Verify and/or Change Gigatronics 8541C Power Meter GPIB Address

| Step | Action   |
|------|--|
|      | <p><b>! CAUTION</b></p> <p>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.</p>                          |
| 1    | Press <b>MENU</b> .  |
| 2    | Use the <b>↵</b> arrow key to select <b>CONFIG MENU</b> and press <b>ENTER</b> .   |
| 3    | Use the <b>↵</b> arrow key to select <b>GPIB</b> and press <b>ENTER</b> .<br>The current <b>Mode</b> and <b>GPIB Address</b> are displayed.  |
| 4    | If the <b>Mode</b> is not set to <b>8541C</b> , perform the following to change it:<br>Use the <b>↔</b> arrow keys as required to select <b>MODE</b> .<br>Use the <b>↕</b> arrow keys as required to set <b>MODE</b> to <b>8541C</b> . |
| 5    | If the GPIB address is not set to <b>13</b> , perform the following to change it:<br>Use the <b>↘</b> arrow key to select <b>ADDRESS</b> .<br>Use the <b>↕</b> arrow keys as required to set the GPIB address to <b>13</b> .           |
| 6    | Press <b>ENTER</b> 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

■  
F  
■

## 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

|             |   |
|-------------|---|
| <b>NOTE</b> | Warm-up BTS equipment for a minimum of <i>60 minutes</i> 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.) |
|-------------|---|

|                |  |
|----------------|--|
| <b>CAUTION</b> | 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. |
|----------------|--|

|             |   |
|-------------|---|
| <b>NOTE</b> | Calibration of the communications test set (or equivalent test equipment) <b>must be</b> performed at the site before calibrating the overall test set. Calibrate the test equipment <i>after</i> it has been allowed to warm-up and stabilize for a <i>minimum of 60 minutes</i> . |
|-------------|---|

### 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.

|             |   |
|-------------|---|
| <b>NOTE</b> | Disconnect other GPIB devices, especially system controllers, from the system before running the connectivity software. |
|-------------|---|

**Table F-13: System Connectivity**

| Step | Action  |
|------|---|
|      | <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>– Perform this procedure <i>after</i> test equipment has been allowed to warm-up and stabilize for a <i>minimum of 60 minutes</i>.</li> </ul> |
| 1    | Insert HP 83236A Manual Control/System card into memory card slot.  |
| 2    | Press the <b>[PRESET]</b> pushbutton.   |
| 3    | Press the Screen Control <b>[TESTS]</b> pushbutton to display the “Tests” Main Menu screen.   |
| 4    | Position the cursor at <b>Select Procedure Location</b> and select by pressing the cursor control knob. In the Choices selection box, select <b>Card</b> .  |
| 5    | Position the cursor at <b>Select Procedure Filename</b> and select by pressing the cursor control knob. In the Choices selection box, select <b>SYS_CONN</b> .  |
| 6    | Position the cursor at <b>RUN TEST</b> and select it.<br>The software will prompt you through the connectivity setup.   |
| 7    | When the test is complete, position the cursor on <b>STOP TEST</b> and select it; <i>OR</i> press the <b>[K5]</b> pushbutton.   |
| 8    | To return to the main menu, press the <b>[K5]</b> 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   |
|  |      | <b>NOTE</b><br>Verify GPIB controller is turned off.   |
|  | 1    | Insert HP83236B Manual Control/System card into the memory card slot.  |
|  | 2    | Under <b>Screen Controls</b> , press the [TESTS] push-button to display the <b>TESTS (Main Menu)</b> screen.   |
|  | 3    | Position the cursor at <b>Select Procedure Location</b> and select. In the Choices selection box, select <b>CARD</b> .   |
|  | 4    | Position the cursor at <b>Select Procedure Filename</b> and select. In the Choices selection box, select <b>MANUAL</b> .   |
|  | 5    | Position the cursor at <b>RUN TEST</b> and select OR press the <b>K1</b> push-button.  |
|  | 6    | Set channel number=<chan#>:<br><ul style="list-style-type: none"> <li>– Position cursor at <b>Channel Number</b> and select.</li> <li>– Enter the <i>chan#</i> using the numeric keypad and then press <b>[Enter]</b> (the screen will blank).</li> <li>– When the screen reappears, the <i>chan#</i> will be displayed on the channel number line.</li> </ul> |
|  |      | <b>NOTE</b><br><ul style="list-style-type: none"> <li>– If using a TMPC with Tower Top Amplifier (TTA) skip <b>Step 7</b>.</li> </ul>  |
|  | 7    | Set RF Generator level= $-119 \text{ dBm} + \text{Cal factor}$ <i>Example: <math>-119 \text{ dBm} + 2 \text{ dB} = -117 \text{ dBm}</math></i><br><ul style="list-style-type: none"> <li>– Continue with <b>Step 9</b> (skip Step 8).</li> </ul>   |
|  | 8    | Set RF Generator level= $-116 \text{ dBm} + \text{Cal factor}$ . <i>Example: <math>-116 \text{ dBm} + 2 \text{ dB} = -114 \text{ dBm}</math></i>   |
|  | 9    | Set the user fixed Attenuation Setting to <b>0 dB</b> :<br><ul style="list-style-type: none"> <li>– Position cursor at <b>RF Generator Level</b> and select.</li> <li>– Position cursor at <b>User Fixed Atten Settings</b> and select.</li> <li>– Enter 0 (zero) using the numeric keypad and press <b>[Enter]</b>.</li> </ul>                                |
|  | 10   | Select <b>Back to Previous Menu</b> .  |
|  | 11   | Select <b>Quit</b> , then select <b>Yes</b> .  |



## Calibrating Test Cable Setup using Advantest R3465

|             |   |
|-------------|---|
| <b>NOTE</b> | 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

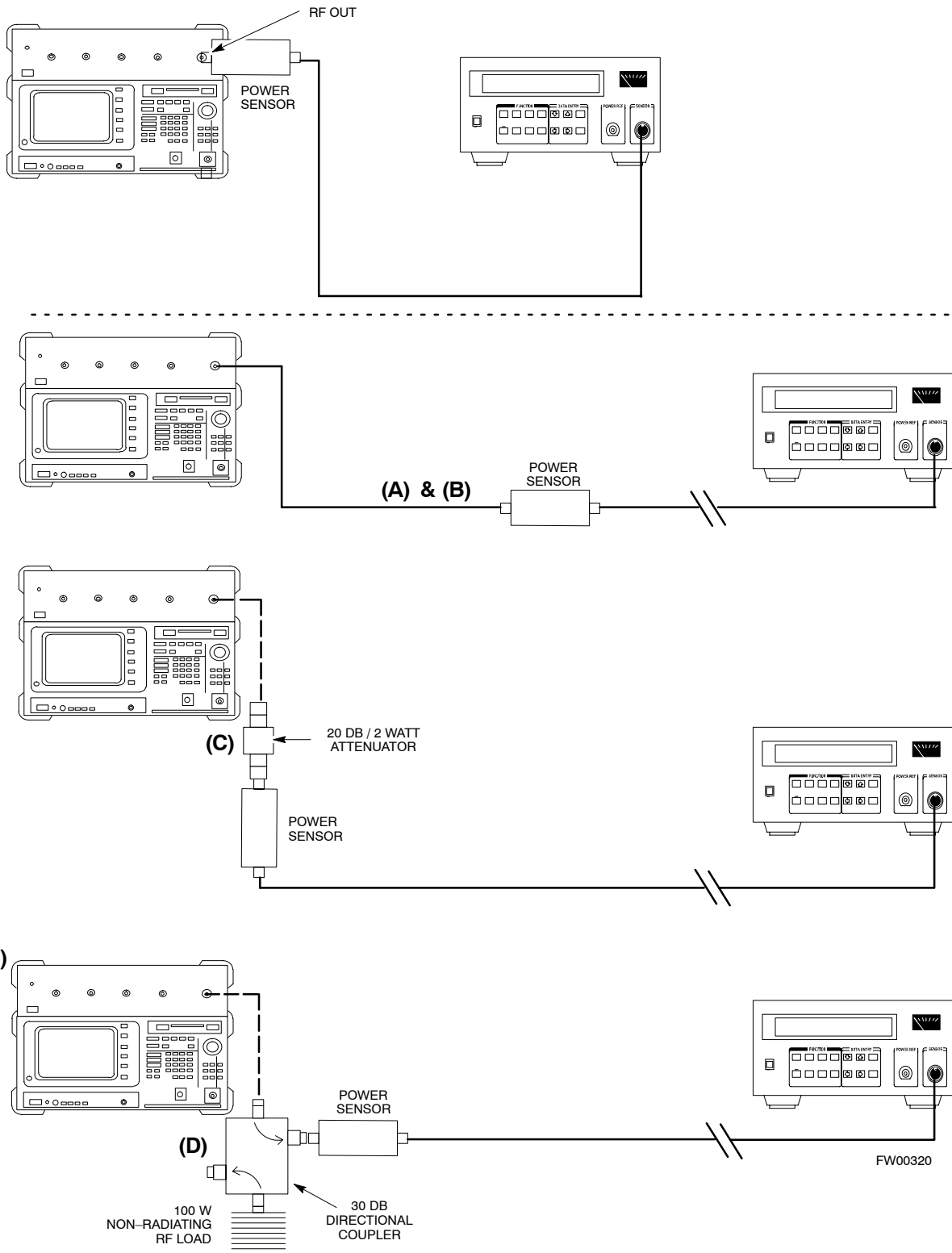
| Step | Action  |
|------|---|
|      | <p><b>NOTE</b></p> <p>– This procedure can only be performed <i>after</i> test equipment has been allowed to warm-up and stabilize for a <i>minimum of 60 minutes</i>.</p>  |
| 1    | Press the <b>SHIFT</b> and the <b>PRESET</b> keys located below the display.  |
| 2    | Press the <b>ADVANCE</b> key in the MEASUREMENT area of the control panel.  |
| 3    | Select the <b>CDMA Sig</b> CRT menu key.  |
| 4    | Select the <b>Setup</b> CRT menu key.   |
| 5    | Using the vernier knob and the cursor keys set the following parameters:  |
|      | <p><b>NOTE</b></p> <p>Fields not listed remain at default.</p> <p><b>Generator Mode:</b> SIGNAL</p> <p><b>Link:</b> FORWARD</p> <p><b>Level Unit:</b> dBm</p> <p><b>CalCorrection:</b> ON</p> <p><b>Level Offset:</b> OFF</p> |
| 6    | Select the <b>return</b> CRT menu key.  |
| 7    | Press <b>FREQ</b> key in the ENTRY area.  |
| 8    | Set the frequency to the desired value using the keypad entry keys.   |
| 9    | Verify that the <b>Mod</b> CRT menu key is highlighting OFF; if not, press the <b>Mod</b> key to toggle it OFF.   |
| 10   | Verify that the <b>Output</b> CRT menu key is highlighting OFF; if not, press the <b>Output</b> key to toggle it OFF.   |
| 11   | Press the <b>LEVEL</b> key in the ENTRY area.   |
| 12   | Set the LEVEL to <b>0 dBm</b> 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 <b>Output</b> 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.  |

... continued on next page

**Table F-15:** Procedure for Calibrating Test Cable Setup Using Advantest R3465

| Step                          | Action  |                    |           |                    |           |                      |            |                               |            |
|-------------------------------|---|--------------------|-----------|--------------------|-----------|----------------------|------------|-------------------------------|------------|
|                               | <p><b>NOTE</b></p> <p>The Power Meter sensor lower limit is -30 dBm. Thus, only components having losses <math>\leq 30</math> dB should be measured using this method. <b>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.</b></p>   |                    |           |                    |           |                      |            |                               |            |
| 17                            | <p>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.</p> <p>Example:</p> <table> <tr> <td>(A) 1st Test Cable</td> <td>= -0.5 dB</td> </tr> <tr> <td>(B) 2nd Test Cable</td> <td>= -1.4 dB</td> </tr> <tr> <td>(C) 20 dB Attenuator</td> <td>= -20.1 dB</td> </tr> <tr> <td>(D) 30 dB Directional Coupler</td> <td>= -29.8 dB</td> </tr> </table> | (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 |
| (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 <b>Output</b> CRT menu key to toggle Output OFF.  |                    |           |                    |           |                      |            |                               |            |
| 19                            | <p>Calculate the total test setup loss by adding up all the individual losses:</p> <p>Example:      Total test setup loss = 0.5 + 1.4 + 20.1 + 29.8 = 51.8 dB</p> <p>This calculated value will be used in the next series of tests.</p>  |                    |           |                    |           |                      |            |                               |            |
| 20                            | Press the <b>FREQ</b> 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



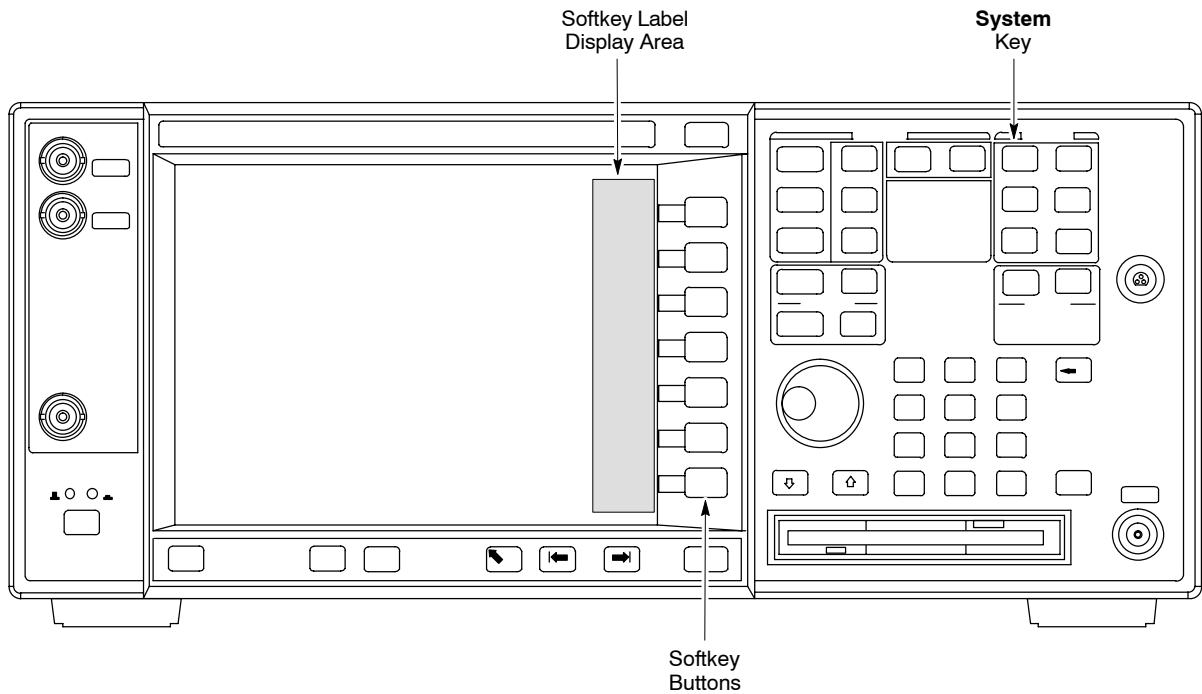
F

## Test Equipment Calibration

### 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



ti-CDMA-WP-00080-v01-ildoc-ftw

**Table F-16:** Perform Agilent E4406A Self-alignment (Calibration)

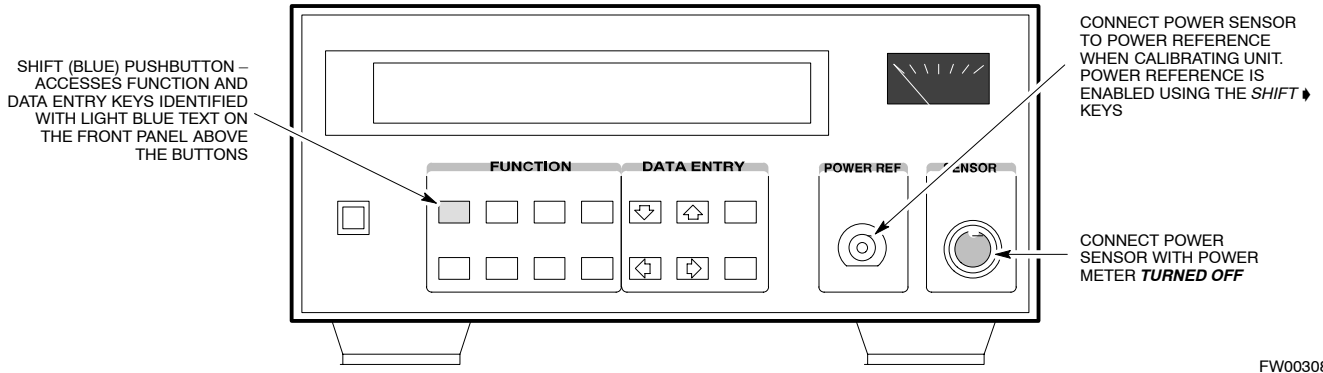
| Step | Action   |
|------|--|
| 1    | In the <b>SYSTEM</b> section of the instrument front panel, press the <b>System</b> key.<br>– The softkey labels displayed on the right side of the instrument screen will change.   |
| 2    | Press the <b>Alignments</b> softkey button to the right of the instrument screen.<br>– The softkey labels will change.   |
| 3    | Press the <b>Align All Now</b> softkey button.<br>– All other instrument functions will be suspended during the alignment.<br>– The display will change to show progress and results of the alignments performed.<br>– 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



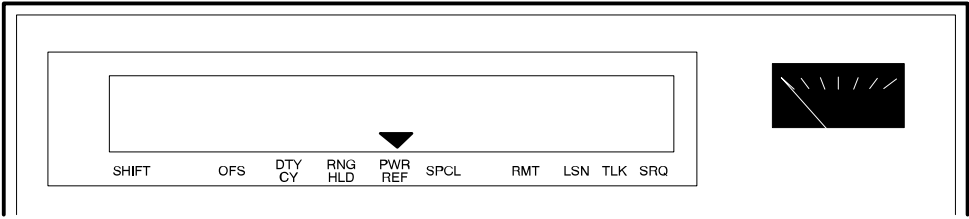
FW00308

**Table F-17:** HP 437 Power Meter Calibration Procedure

| Step | Action   |
|------|--|
| 1    | <p><b>! CAUTION</b></p> <p>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.</p> <p>Make sure the power meter <b>AC LINE</b> pushbutton is <b>OFF</b>.</p> |
| 2    | Connect the power sensor cable to the <b>SENSOR</b> input.   |
| 3    | Set the <b>AC LINE</b> pushbutton to <b>ON</b> .   |
|      | <p><b>NOTE</b></p> <p>The calibration should be performed only after the power meter and sensor have been allowed to warm-up and stabilize for a <i>minimum of 60 minutes</i>.</p>   |
| 4    | Perform the following to set or verify the correct power sensor model:   |
| 4a   | – Press [ <b>SHIFT</b> ] then [ <b>RIGHT ARROW</b> ] to select <b>SENSOR</b> .   |
| 4b   | – Identify the power sensor model number from the sensor label.  |
| 4c   | – Use the [ <b>UP</b> ] or [ <b>DOWN</b> ] button to select the appropriate model; then press [ <b>ENTER</b> ].  |
| 5    | Refer to the illustration for step 8, and perform the following to ensure the power reference output is <b>OFF</b> :   |
| 5a   | – Observe the instrument display and determine if the triangular indicator over <b>PWR REF</b> is displayed.   |
| 5b   | – If the triangular indicator is displayed, press [ <b>SHIFT</b> ] then [ <b>RIGHT ARROW</b> ] to turn it off.   |

... continued on next page

Table F-17: HP 437 Power Meter Calibration Procedure

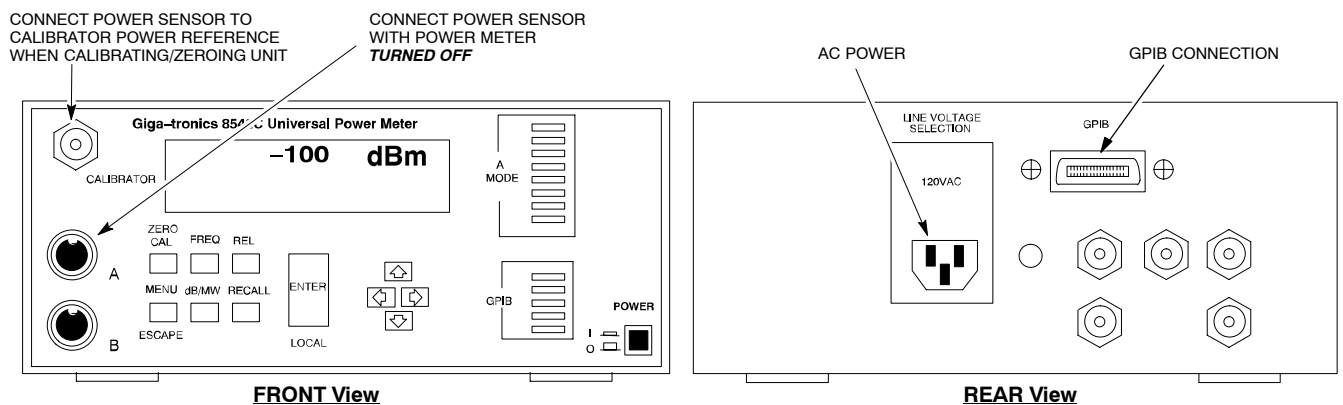
| Step | Action   |
|------|--|
| 6    | Press <b>[ZERO]</b> . <ul style="list-style-type: none"> <li>- Display will show “Zeroing *****.”</li> <li>- Wait for process to complete.</li> </ul>  |
| 7    | Connect the power sensor to the <b>POWER REF</b> output.   |
| 8    | Turn on the <b>PWR REF</b> by performing the following:  |
| 8a   | - Press <b>[SHIFT]</b> then <b>[▶]</b> .   |
| 8b   | - Verify that the triangular indicator (▼) appears in the display above <b>PWR REF</b> as shown below. <div style="text-align: center; margin-top: 10px;">  </div>                                       |
| 9    | Perform the following to set the <b>REF CF%</b> :  |
| 9a   | - Press ( <b>[SHIFT]</b> then <b>[ZERO]</b> ) for <b>CAL</b> .   |
| 9b   | - Enter the sensor's <b>REF CF%</b> from the sensor's decal using the arrow keys and press <b>[ENTER]</b> .<br>(The power meter will display “CAL *****” for a few seconds.) <p><b>NOTE</b><br/>If the REF CAL FACTOR (REF CF) is not shown on the power sensor, assume it to be 100%.</p> |
| 10   | Perform the following to set the <b>CAL FAC %</b> :  |
| 10a  | - Press <b>[SHIFT]</b> then <b>[FREQ]</b> for <b>CAL FAC</b> .   |
| 10b  | - On the sensor's decal, locate an approximate calibration percentage factor ( <b>CF%</b> ) at 2 GHz.  |
| 10c  | - Enter the sensor's calibration <b>% (CF%)</b> using the arrow keys and press <b>[ENTER]</b> . <ul style="list-style-type: none"> <li>— When complete, the power meter will typically display 0.05 dBm. (Any reading between 0.00 and 0.10 is normal.)</li> </ul>                         |
| 11   | To turn off the <b>PWR REF</b> , perform the following:  |
| 11a  | - Press <b>[SHIFT]</b> then <b>[▶]</b> .   |
| 11b  | - Disconnect the power sensor from the <b>POWER REF</b> output.  |

## 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  | <p><b>! CAUTION</b></p> <p>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.</p> <p>Make sure the power meter <b>POWER</b> pushbutton is <b>OFF</b>.</p> |
| 2  | Connect the power sensor cable to the <b>SENSOR</b> input.  |
| 3  | <p>Set the <b>POWER</b> pushbutton to <b>ON</b>.</p> <p><b>NOTE</b></p> <p>Allow the power meter and sensor to warm up and stabilize for a <i>minimum of 60 minutes</i> before performing the calibration procedure.</p>  |
| 4  | Connect the power sensor to the <b>CALIBRATOR</b> output connector.   |
| 5  | <p>Press <b>ZERO</b>.</p> <ul style="list-style-type: none"> <li>– Wait for the process to complete. Sensor factory calibration data is read to power meter during this process.</li> </ul>   |
| 6  | When the zeroing process is complete, disconnect the power sensor from the <b>CALIBRATOR</b> output.  |

Figure F-16: Gigatronics 8541C Power Meter



FW00564

## *Appendix G*

# **VSWR**



# 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

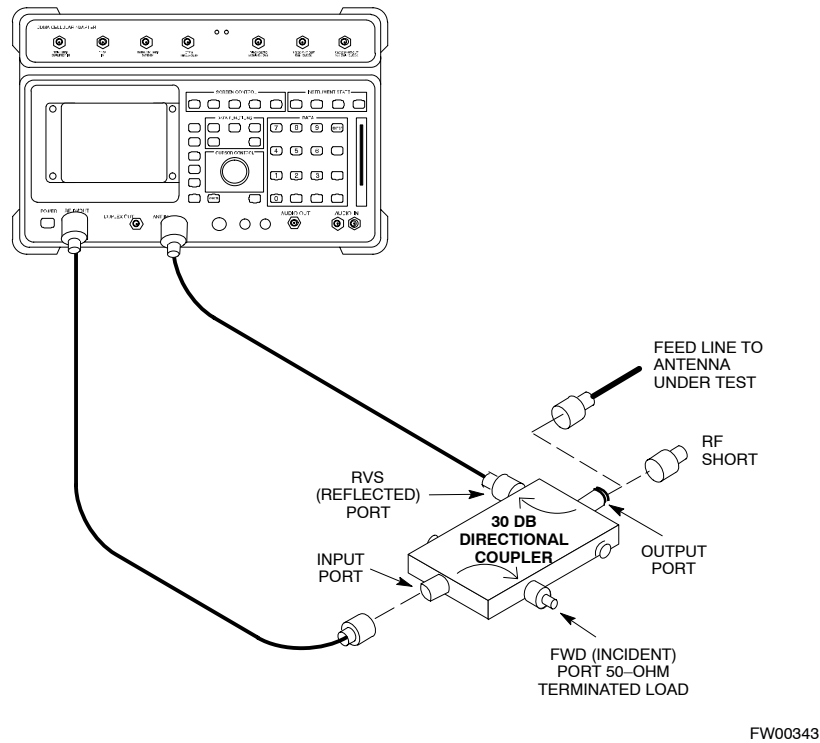
Follow the procedure in Table G-1 to set up test equipment required to measure and calculate the VSWR for each antenna.

| Table G-1: VSWR Measurement Procedure – HP Test Set |  |   |
|---|--|---|
| Step  | Action   | HP TEST SET   |
| 1   | <p><i>For manual VSWR testing</i>, using external directional coupler, refer to Figure G-1.</p> <ul style="list-style-type: none"> <li>– Connect the communications test set RF IN/OUT port to the INPUT port of the directional coupler.</li> <li>– Connect the ANT IN port of the communication test set to the reverse (RVS) port on the directional coupler. <i>Terminate the forward port with a 50 ohm load.</i></li> <li>– Install the antenna feed line to the output port on the directional coupler.</li> </ul>          |   |
|   | <p><b>NOTE</b><br/>Manual Communications Analyzer test setup (fields not indicated remain at default):</p> <ul style="list-style-type: none"> <li>• Set screen to <b>RF GEN</b>.               <ul style="list-style-type: none"> <li>– Set the <b>RF Gen Freq</b> to center frequency of actual CDMA carrier between 869–894 MHz for TX and 824–849 MHz for RX.</li> <li>– Set Amplitude to <b>–30 dBm</b>.</li> <li>– Set Output Port to <b>RF OUT</b>.</li> <li>– Set AFGen1 &amp; AFGen2 to <b>OFF</b>.</li> </ul> </li> </ul> |   |
| 2   | Remove the antenna feed line and install an “RF short” onto the directional coupler output port.   |   |
|   | <p><b>NOTE</b><br/>Set-up communication test set as follows (fields not indicated remain at default):</p> <ul style="list-style-type: none"> <li>• Set screen to <b>SPEC ANL</b>.               <ul style="list-style-type: none"> <li>– Under Controls, set input port to <b>ANT</b>.</li> <li>– Set Ref Level to <b>–40 dBm</b>.</li> <li>– Under Controls, select <b>Main</b>, select <b>Auxiliary</b>.</li> <li>– Under Controls, select <b>AVG</b>. Set Avg = <b>20</b>.</li> </ul> </li> </ul>                               |   |
| 3   | <ul style="list-style-type: none"> <li>– Record the reference level on the communications analyzer and <i>Note as <math>P_S</math> for reference</i>.</li> <li>– Replace the short with the antenna feedline. Record the reference level on the communications analyzer and <i>Note for as <math>P_A</math> reference</i>.</li> <li>– Record the difference of the two readings in dB.</li> </ul>  |   |
| 4   | <p>Calculate the VSWR per the equation shown to the right.</p> <p>Where:</p> $R_L(\text{dB}) = P_A(\text{dBm}) - P_S(\text{dBm})$ <p><math>P_A</math> = Power reflected from antenna<br/> <math>P_S</math> = Power reflected from short</p> <p>A calculated value of –13.98 dB equates to VSWR of better than <b>1.5:1</b>.</p>  | $VSWR = \left[ \frac{1 + 10^{\frac{RL}{20}}}{1 - 10^{\frac{RL}{20}}} \right]$ |
| 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.  |   |

. . . continued on next page

| 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



G

## Equipment Setup – Advantest Test Set

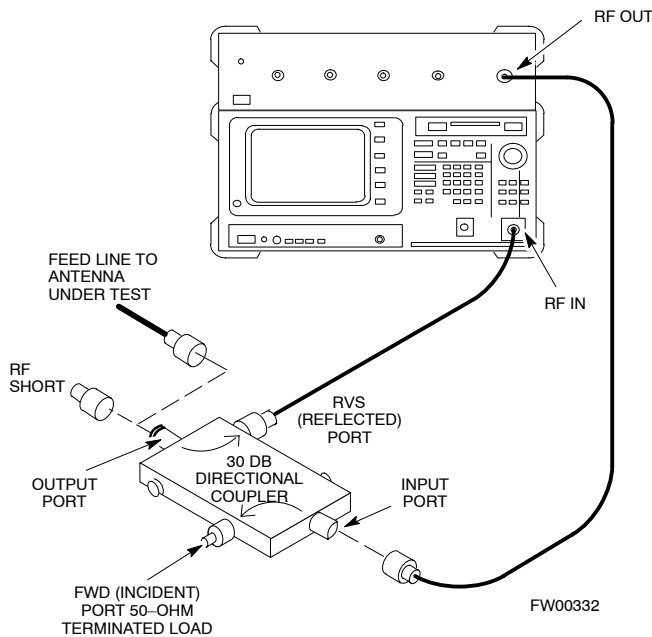
Follow the procedure in Table G-2 to set up test equipment required to measure and calculate the VSWR for each antenna.

| Table G-2: VSWR Measurement Procedure – Advantest Test Set |   |           |
|--|---|-----------|
| Step   | Action  | ADVANTEST |
| 1  | <i>If you have not already done so</i> , refer to the procedure in Table 3-5 on page 3-16 to set up test equipment and interface the LMF computer to the BTS.   |           |
| 2  | <p><i>For manual VSWR testing</i> using external directional coupler, refer to Figure G-2.</p> <ul style="list-style-type: none"> <li>– Connect the communications test set RF OUT port to the input port of the directional coupler.</li> <li>– Connect the INPUT port of the communication test set to the forward port on the directional coupler. <i>Terminate the forward port with a 50 Ohm load.</i></li> <li>– Connect the RF short to the directional coupler output port.</li> </ul>  |           |
| 3  | <p>Perform 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:</p> <ul style="list-style-type: none"> <li>• Push the <b>ADVANCE</b> Measurement key.</li> <li>• Push the <b>CDMA Sig</b> CRT menu key.</li> <li>• Push the <b>FREQ</b> Entry key: <ul style="list-style-type: none"> <li>– Set <b>RF Gen Freq</b> to center frequency of actual CDMA carrier between 869–894 MHz for TX and 824–849 MHz for RX.</li> </ul> </li> <li>• Push the <b>LEVEL</b> Entry key; set to <b>0 dBm</b> (by entering <b>0</b> and pushing the <b>–dBm</b> key).</li> <li>• Verify that <b>ON</b> is active in the <b>Output</b> CRT menu key.</li> <li>• Verify that <b>OFF</b> is active in the <b>Mod</b> CRT menu key.</li> <li>• Push the <b>CW</b> Measurement key.</li> <li>• Push the <b>FREQ</b> Entry key. <ul style="list-style-type: none"> <li>– Push the <b>more 1/2</b> CRT menu key.</li> <li>– Set <b>Preselect</b> CRT menu key to <b>3.0G</b>.</li> </ul> </li> <li>• Push the <b>Transient</b> Measurement key. <ul style="list-style-type: none"> <li>– Push the <b>Tx Power</b> CRT menu key.</li> <li>– Push the <b>LEVEL</b> entry key (set to 7 dBm by entering 7 and pushing the the dBm key).</li> <li>– Set <b>Avg Times</b> CRT menu key to <b>ON</b>. Set to <b>20</b> (by entering <b>20</b> and pushing the <b>HZ ENTER</b> key).</li> </ul> </li> <li>• Push the <b>REPEAT</b> Start key to take the measurement.</li> </ul> |           |
| 4  | Record the Burst Power display on the communications analyzer and <i>Note as P<sub>S</sub> for reference.</i>   |           |
| 5  | Install the antenna feedline to the output port of the directional coupler.   |           |
| 6  | <ul style="list-style-type: none"> <li>• Push the <b>Auto Level Set</b> CRT menu key.</li> <li>• Push the <b>REPEAT</b> Start key to take the measurement.</li> </ul>   |           |
| 7  | Record the Burst Power on the communications analyzer and <i>Note as P<sub>A</sub> level for reference.</i><br>Record the difference of the two readings in dBm.  |           |

... continued on next page

| Table G-2: VSWR Measurement Procedure – Advantest Test Set |  |   |
|--|--|---|
| Step   | Action   | ADVANTEST   |
| 8  | <p>Calculate the VSWR per the equation shown to the right.</p> <p>Where:</p> $R_L(\text{dB}) = P_A(\text{dBm}) - P_S(\text{dBm})$ <p><math>P_A</math> = Power reflected from antenna<br/> <math>P_S</math> = Power reflected from short</p> <p>A calculated value of <math>-13.98</math> dB equates to VSWR of better than <b>1.5:1</b>.</p> | $VSWR = \left( \frac{1 + 10^{\frac{R_L}{20}}}{1 - 10^{\frac{R_L}{20}}} \right)$ |
| 9  | <p>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.</p>         |   |
| 10   | <p>Repeat steps 2 through 9 for all remaining TX sectors/antennas.</p>   |   |
| 11   | <p>Repeat steps 2 through 9 for all remaining RX sectors/antennas.</p>   |   |

Figure G-2: Manual VSWR Test Setup Using Advantest R3465



G

*Appendix H*

# Download ROM Code

## Download ROM Code

### 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.

|                |   |
|----------------|---|
| <b>CAUTION</b> | 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.<br><br><b>NOTE</b><br>More than one device of the <i>same</i> type can be selected for download by either clicking on each one to be downloaded or from the BTS menu bar <b>Select</b> pull-down menu, select the <i>device</i> item that applies. Where: <i>device</i> = the type of device to be loaded (BBX, CSM, GLI, MCC) |
| 2    | Click on the <b>Device</b> menu.   |
| 3    | Click on the <b>Status</b> menu item.<br>A status report window appears.   |
| 4    | Make a note of the number in the <b>HW Bin Type</b> column.<br><br><b>NOTE</b><br>“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.               |
| 5    | Click on the <b>OK</b> button to dismiss the status report window.   |
|      | <b>NOTE</b><br>ROM code is automatically selected for download from the <x>:\<lmf home directory>\<version folder>\<code folder> specified by the NextLoad property in the <i>bts-#.cdf</i> file. To check the value of the NextLoad property, click on <b>Util&gt;Examine&gt;Display Nextload</b> . A pop-up message will show the value of the NextLoad.           |

. . . continued on next page

Table H-1: Download ROM Code

| Step | Action   |
|------|--|
| 6    | Click on the <b>Download Code Manual</b> menu item.<br>A file selection window appears.  |
| 7    | Double-click on the version folder that contains the desired ROM code file.  |
| 8    | Double-click on the <b>Code</b> folder.<br>A list of ROM and RAM code files is displayed.  |
|      | <b>! CAUTION</b><br>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).<br>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).<br>The file should be highlighted.  |
| 11   | Click on the <b>Load</b> button.<br>A status report window displays the result of the download.  |
|      | <b>NOTE</b><br>If the ROM load failed for some devices, load them <i>individually</i> by clicking on one device, perform steps 6 through 11 for it, and repeat the process for each remaining device.  |
| 12   | Click on the <b>Ok</b> button to close the status report window.   |
| 13   | Click on the <b>Util</b> menu.   |
| 14   | Select the <b>Tools</b> menu item.   |
| 15   | Click on the <b>Update NextLoad&gt;CDMA</b> menu item.   |
| 16   | Select the version number of the folder that was used for the ROM code download.   |
| 17   | Click on the <b>Save</b> button.<br>A pop-up message indicates that the CDF file has been updated.   |
| 18   | Click on the <b>OK</b> button to dismiss the pop-up message.   |
| 19   | Click on the device that was downloaded with ROM code.   |
| 20   | Click on the <b>Device</b> menu.   |
| 21   | Click on the <b>Download Code</b> menu item to download RAM code.<br>A status report window displays the result of the download.<br><b>NOTE</b><br>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 <b>Ok</b> button to close the status report window.<br>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.   |

. . . continued on next page



**Table H-1:** Download ROM Code

| <b>Step</b> | <b>Action</b>   |
|-------------|---|
| 24          | Click on the <b>Device</b> menu.  |
| 25          | Click on the <b>Status</b> menu item.<br>Verify that the status report window displays the correct ROM and RAM version numbers. |
| 26          | Click on the <b>Ok</b> button to close the status report window.  |

  
H  


*Appendix I*

# Packet Backhaul Configuration



# BTS Router Initial Configuration

## Overview

This appendix contains information and operations related to loading an 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:

- Terminal Setup
- Downloading canned BTS router configuration files
- Verifying IOS canned version of CF memory card
- Replacing installed BTS router CF memory card IOS version
- Verify and upgrade rommon version
- Recovery from BTS router boot to rommon
- Entering or changing router FE interface IP address
- Preparation for site turn-over

# Terminal Setup

## General

This section provides the procedures to configure and save a terminal session for communicating with the MWR 1941 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.

|             |   |
|-------------|---|
| <b>NOTE</b> | <p>There are differences between <i>Windows 2000</i> and <i>Windows 98</i> in the menus and screens used for creating a HyperTerminal connection. In the following procedure, items applicable to:</p> <ul style="list-style-type: none"> <li>• <i>Windows 2000</i> will be identified with <i>Win2000</i></li> <li>• <i>Windows 98</i> will be identified with <i>Win98</i></li> </ul> |
|-------------|---|

**Table I-1:** Establish HyperTerminal Connection

| Step | Action   |
|------|--|
| 1    | From the <i>Windows</i> Start menu, select <b>Programs &gt; Accessories</b>  |
| 2    | <p>Perform one of the following:</p> <ul style="list-style-type: none"> <li>• For <i>Win2000</i>, select <b>Hyperterminal</b> and then click on <b>HyperTerminal</b></li> <li>• For <i>Win98</i>, select <b>Communications</b>, double click the <b>Hyperterminal</b> folder, and then double click on the <b>Hypertrm.exe</b> icon in the window which opens.</li> </ul> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• If a <b>Location Information Window</b> appears, enter the required information, then click on the <b>Close</b> button. (This is required the first time a HyperTerminal connection is configured, even if a modem is not to be used.)</li> <li>• If a <b>You need to install a modem.....</b> message appears, click on <b>NO</b>.</li> </ul> |
| 3    | <p>When the <b>Connection Description</b> box opens:</p> <ul style="list-style-type: none"> <li>– Type a name for the connection being defined (for example, <b>BTSRTR Session, MMI</b>) in the <b>Name:</b> window,</li> <li>– Highlight any icon preferred for the named connection in the <b>Icon:</b> chooser window, and</li> <li>– Click <b>OK</b>.</li> </ul>   |

. . . continued on next page

**Table I-1:** Establish HyperTerminal Connection

| Step | Action   |
|------|--|
| 4    | From the <b>Connect using:</b> pick list in the <b>Connect To</b> box displayed, select the RS-232 port to be used for the connection (e.g., <b>COM1</b> or <b>COM2 – Win2000</b> or <b>Direct to Com 1</b> or <b>Direct to Com 2 – Win98</b> ), and click <b>OK</b> .   |
| 5    | In the <b>Port Settings</b> tab of the <b>COM# Properties</b> window displayed, configure the RS-232 port settings as follows: <ul style="list-style-type: none"> <li>• Bits per second: 9600</li> <li>• Data bits: 8</li> <li>• Parity: None</li> <li>• Stop bits: 1</li> <li>• Flow control: None</li> </ul> |
| 6    | Click <b>OK</b> .  |
| 7    | With the HyperTerminal window still open and the connection running, select:<br><b>File &gt; Properties</b>  |
| 8    | Click the <b>Settings</b> tab, click the arrow in the <b>Emulation</b> window, and select <b>VT100</b> from the dropdown list.   |
| 9    | Click the <b>ASCII Setup</b> button, uncheck all boxes in the ASCII Setup window which appears, and click <b>OK</b> .  |
| 10   | Click <b>OK</b> for the connection Properties box.   |
| 11   | Save the defined connection by selecting:<br><b>File &gt; Save</b>   |
| 12   | Close the HyperTerminal window by selecting:<br><b>File &gt; Exit</b>  |
| 13   | Click the <b>Yes</b> button to disconnect when prompted.   |
| 14   | Perform one of the following: <ul style="list-style-type: none"> <li>• If the <b>Hyperterminal</b> folder window is still open (<i>Win98</i>), proceed to step 16, or</li> <li>• From the Windows Start menu, select <b>Programs &gt; Accessories</b></li> </ul>   |
| 15   | Perform one of the following: <ul style="list-style-type: none"> <li>• For <i>Win2000</i>, select <b>Hyperterminal</b> and release any pressed mouse buttons.</li> <li>• For <i>Win98</i>, select <b>Communications</b> and double click the <b>Hyperterminal</b> folder.</li> </ul>                           |
| 16   | Highlight the newly-created connection icon by moving the cursor over it ( <i>Win2000</i> ) or clicking on it ( <i>Win98</i> ).  |
| 17   | <i>Right click and drag</i> the highlighted connection icon to the <i>Windows</i> desktop and release the right mouse button.  |
| 18   | From the popup menu displayed, select <b>Create Shortcut(s) Here</b> .   |

. . . continued on next page

**Table I-1:** Establish HyperTerminal Connection

| Step | Action  |
|------|---|
| 19   | If desired, reposition the shortcut icon for the new connection by dragging it to another location on the <i>Windows</i> desktop.<br><br><b>NOTE</b><br>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. |

## 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 *this manual* for requirements)
- Eight-conductor (four-pair, *unshielded* 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

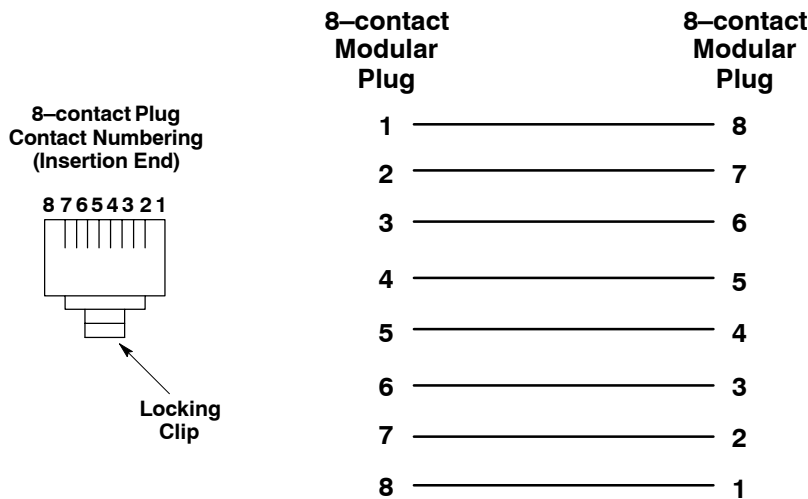


Figure I-2: Wiring Diagram, DB-9 Plug-to-8-contact Modular Plug Adapter

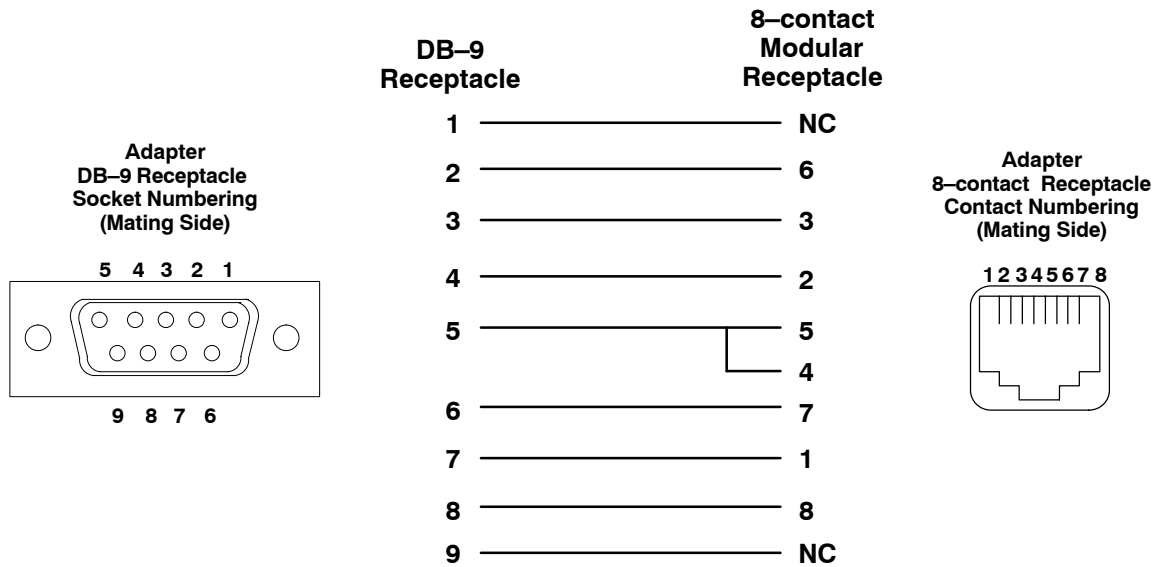
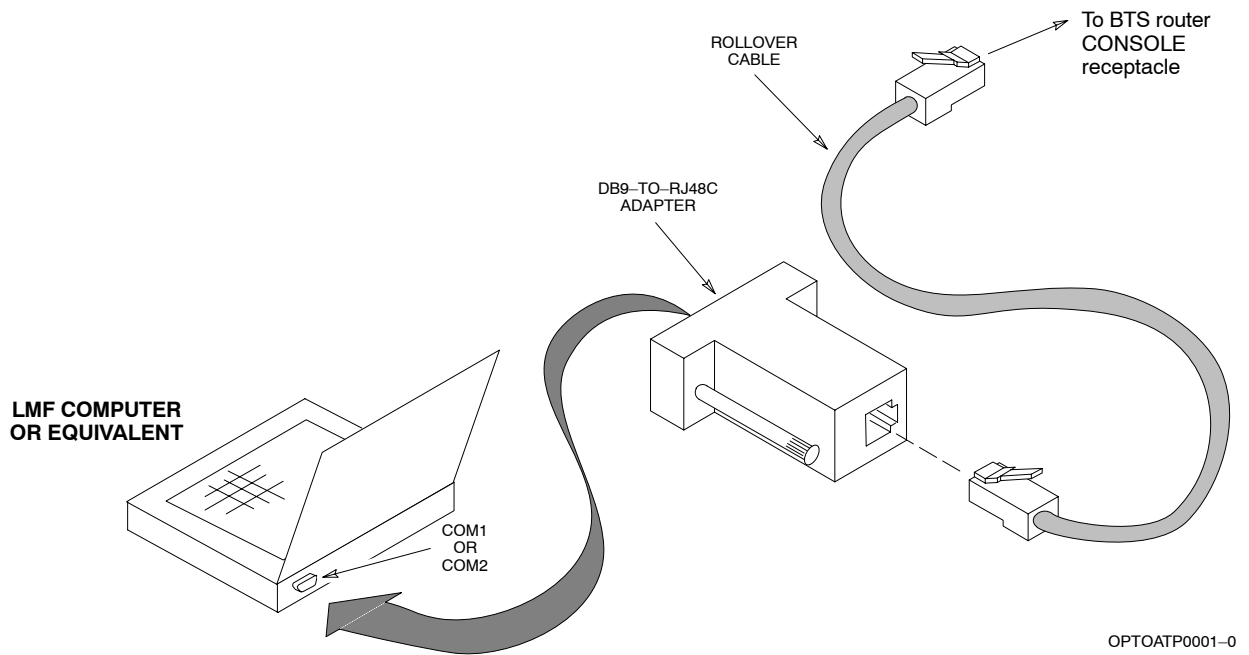


Table I-2: Establishing BTS Router Serial Communication

| 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    | <p>Start the named HyperTerminal connection for BTS router communication sessions by double clicking on its <i>Windows</i> desktop shortcut.</p> <p><b>NOTE</b><br/>If a <i>Windows</i> desktop shortcut was not created for the communication session, access the connection from the <i>Windows</i> Start menu by selecting:<br/><b>Programs &gt; Accessories &gt; Hyperterminal &gt; HyperTerminal &gt; &lt;Named HyperTerminal Connection (for example, BTRSRTTR)&gt;</b></p> |
| 5    | Once the connection window opens, establish communication with the BTS router by pressing the computer <b>Enter</b> key until the prompt identified in the applicable procedure is obtained.  |



**Figure I-3:** LMF Computer Connections to BTS Router





# Downloading Minimum Canned BTS Router Configuration Files

## Downloading Overview

After they are generated on the OMC-R, the BTS router canned configuration files must be transferred 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 *this manual*. 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 I-3:** BTS Router Canned Configuration File FTP Transfer from the OMC-R

| Step | Action  |
|------|---|
| 1    | If it has not been done, create a directory on the LMF computer where the BTS router canned configuration files will be stored. |
| 2    | If it has not been done, obtain the OMC-R logon user ID and password from the local network administrator.                      |

. . . continued on next page

**Table I-3:** BTS Router Canned Configuration File FTP Transfer from the OMC-R

| Step | Action   |
|------|--|
| 3    | Connect the LMF computer to the local network and log on.  |
|      | <p><b>NOTE</b></p> <p>This procedure uses the command line FTP client supplied with <i>Windows 98, Second Edition (Win98 SE)</i> and <i>Windows 2000 (Win2K)</i>; however, any commercially available FTP client application can be used. Follow the manufacturer's instructions for operation of an alternative application.</p>  |
| 4    | Open a command line (MS DOS) window by clicking on <b>Start &gt; Programs &gt; Command Prompt</b> .  |
| 5    | <p>When the command line window opens, change to the directory where the canned configuration files will be stored on the LMF computer by entering:</p> <p style="padding-left: 40px;"><b>cd</b> <i>pathname</i></p> <p>Where <i>pathname</i> = the path to the required directory.</p> <p>A response similar to the following will be displayed:</p> <pre>C:\&gt; cd Can_Cfg C:\Can_Cfg&gt;</pre>   |
| 6    | <p>Check the contents of the directory by entering the following:</p> <p style="padding-left: 40px;"><b>dir</b></p> <p>A response similar to the following will be displayed:</p> <pre>C:\Can_Cfg&gt;dir Volume in drive C is MAIN Volume Serial Number is F2AA-1721  Directory of C:\Can_Cfg&gt;  08/22/2002  03:46p      &lt;DIR&gt;      . 08/22/2002  03:46p      &lt;DIR&gt;      .. 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&gt;</pre> |
| 7    | <p>If either or both of the following files are found in the directory, delete them or move them to another directory:</p> <ul style="list-style-type: none"> <li>• btsrtr_config.blue</li> <li>• btsrtr_config.red</li> </ul>   |
| 8    | <p>Begin the FTP session by entering the following:</p> <p style="padding-left: 40px;"><b>ftp</b> <i>hostname</i></p> <p>Where <i>hostname</i> = the OMC-R hostname or IP address.</p> <p>A response similar to the following will be displayed:</p> <pre>C:\Can_Cfg&gt; ftp OMCR-1 C:\Can_Cfg&gt; Connected to OMCR-1. 220 OMCR-1 FTP server (SunOS 5.6) ready. User (OMCR-1:(none)):</pre>   |

. . . continued on next page

**Table I-3: BTS Router Canned Configuration File FTP Transfer from the OMC-R**

| Step | Action  |
|------|---|
| 9    | <p>Enter the User ID and password when prompted, pressing the <b>Enter</b> key after each. A response similar to the following will be displayed:</p> <pre>User (OMCR-1:(none)): scadm 331 Password required for scadm. Password: 230 User scadm logged in. ftp&gt;</pre>   |
| 10   | <p>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 <b>Enter</b> key after each:</p> <pre><b>cd /home/scadm/btsrtr_canned_configs</b> <b>pwd</b></pre> <p>A response similar to the following will be displayed:</p> <pre>ftp&gt; cd /home/scadm/btsrtr_canned_configs 240 CWD command successful. ftp&gt; pwd 245 "/home/scadm/btsrtr_canned_configs" is current directory.</pre>   |
| 11   | <p>Enter the <b>ls</b> command to list the contents of the directory and be sure the specific canned configuration directory name provided by the administrator exists. A response similar to the following will be displayed:</p> <pre>ftp&gt; 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&gt;</pre> <p><b>NOTE</b></p> <p>Directory names where canned configuration files are located will consist of the <i>weekday_month_day_time_year</i> when the canned configuration files were created on the OMC-R.</p> |
| 12   | <p>Change to the directory specified for the BTS router group to be configured and list the directory contents by entering the following, pressing the <b>Enter</b> key after each command:</p> <pre><b>cd weekday_month_day_time_year</b> <b>ls</b></pre> <p>A response similar to the following will be displayed:</p> <pre>ftp&gt; cd Wed_Jul_24_09:35:41_CDT_2002 250 CWD command successful. ftp&gt; 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&gt;</pre>   |

... continued on next page

**Table I-3:** BTS Router Canned Configuration File FTP Transfer from the OMC-R

| Step | Action  |
|------|---|
| 13   | <p>Change to the binary transfer mode and, if desired, turn on hash mark printing for transfer progress by entering the following, pressing the <b>Enter</b> key after each command:</p> <p><b>bin</b><br/><b>hash</b></p> <p>A response similar to the following will be displayed:</p> <pre>ftp&gt; bin 200 Type set to I. ftp&gt; hash Hash mark printing On  ftp: (2048 bytes/hash mark) . ftp&gt;</pre> <p><b>NOTE</b></p> <p>With <i>Win98 SE</i>, 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.</p>   |
| 14   | <p>Download the BTS router canned configuration files to the LMF computer by performing the following:</p> <p>14a – Enter the following to download the first canned configuration file:</p> <p><b>get btsrtr_canned.blue</b></p> <p>A response similar to the following will be displayed:</p> <pre>ftp&gt; 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&gt;</pre> <p>14b – Enter the following to download the second BTS router canned configuration file:</p> <p><b>get btsrtr_canned.red</b></p> <p>A response similar to the following will be displayed:</p> <pre>ftp&gt; 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&gt;</pre> |

. . . continued on next page

**Table I-3:** BTS Router Canned Configuration File FTP Transfer from the OMC-R

| Step | Action   |
|------|--|
| 15   | Before terminating the FTP session, open <i>Windows Explorer</i> 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 <b>Start &gt; Programs &gt; Windows Explorer</b> .   |
| 15b  | – In the left-hand pane of <i>Windows Explorer</i> , perform one of the following depending on the LMF computer operating system:<br>— <i>Win98 SE</i> : 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.<br>— <i>Win2K</i> : 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 <i>right</i> -hand pane, verify that the files <code>btsrtr_canned.blue</code> and <code>btsrtr_canned.red</code> 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 <i>Windows Explorer</i> , and, in the command line window, enter the <b>bye</b> command to terminate the FTP session. A response similar to the following will be displayed:<br><br><pre>ftp&gt; bye 221 Goodbye. C:\Can_Cfg&gt;</pre>   |
| 17   | Close the command line window by entering the <b>exit</b> command.   |
| 18   | BTS router canned configuration files are now ready for transfer to a BTS router.  |



## Verifying IOS Canned Version of the CF Memory Card

### 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 the loaded IOS version are provided in the Change 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 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 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. 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 Methods** – 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. There are two methods available to accomplish this:

1. Using a tftp server application to copy 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
2. Using a CF memory card reader to copy the canned configuration file to a CF memory card, and then, once the CF memory card is installed in the router, using a HyperTerminal communication session to copy the file from the CF memory card to the `startup-config` file in the router's NVRAM

**Comparison of methods** – Preparation for using the tftp server application method is extensive and requires setting up simultaneous serial and FE communication sessions with the router. This method offers the advantage of being able to verify IOS file sequence position immediately and supporting direct file transfers between the router and LMF computer without removing the CF memory card. As an alternative, using a CF memory card reader to copy the canned configuration file to a CF memory card, and from there to the `startup-config` file requires very little set-up. With this method, the IOS file sequence position can only be verified once the CF memory card is installed in the router, and any file transfers between the router and LMF computer require physically moving the CF memory card between the router and card reader.

**Procedures to use each method** – Using the tftp server application to copy the canned configuration file to a CF memory card is covered in the Method 1 subsection. Performing the transfer process with a card reader is covered in the Method 2 subsection. The applicable procedures for verifying the loaded IOS version and file sequence position are included in each method.

**File operations using a CF memory card reader** – Only file transfers should be performed using the CF memory card reader. CF memory card *formatting should be performed in a BTS router* using a HyperTerminal connection. Attempting to format a CF memory card from a *Windows*-based computer using a card reader could result in unpredictable BTS router operation.

|                |   |
|----------------|---|
| <b>CAUTION</b> | Do not format BTS router CF memory cards using a <i>Windows</i> -based computer. Only format CF memory cards in a BTS router. |
|----------------|---|

## Method 1: Using a TFTP Server to Load 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 *this manual*.
- 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, 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)
- 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
- A tftp server software application (refer to the Setting Up the TFTP Server – Procedure in *Cellular System Administration – CDMA OnLine Documentation, Release 2.16.1*) such as:
  - Cisco tftp server
  - PumpKIN tftp server
  - Any other equivalent tftp server application
- A copy of the 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 1941 IOS version)
- A +27 Vdc power supply to power the BTS router during configuration file operations

### 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:

- *this manual*
- *Cellular System Administration – CDMA OnLine Documentation, Release 2.16.1*
- *MWR1941 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. Setting the LMF computer NIC IP address
2. Creating a directory (folder) on the LMF computer to be used for all tftp file transfers
3. Installing the tftp server application on the LMF computer, and setting the tftp server application root directory to the directory created in 2, above
4. Connecting the LMF computer to the BTS router for both HyperTerminal (serial) and Ethernet communication
5. 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.

|             |   |
|-------------|---|
| <b>NOTE</b> | <b>IMPORTANT!</b> 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. |
|-------------|---|

|             |  |
|-------------|--|
| <b>NOTE</b> | There are differences between <i>Windows 2000</i> and <i>Windows 98</i> in the menus and screens used for setting or changing a NIC connection. In the following procedure, items applicable to: <i>Windows 2000</i> will be identified with <i>Win2000</i> <i>Windows 98</i> will be identified with <i>Win98</i> |
|-------------|--|

| <b>Table I-4: Set LMF Computer NIC IP Address and Create a Default TFTP Directory</b> |   |
|---|---|
| <b>Step</b>   | <b>Action</b>   |
| 1   | Start the computer.   |
| 2   | Login and allow the computer to boot to the desktop.  |
| 3   | Depending on the installed operating system, from the <i>Windows</i> Start menu, select one of the following: <ul style="list-style-type: none"> <li>• <i>Win2000</i>: <b>Settings &gt; Network and Dial-up Connections</b></li> <li>• <i>Win98</i>: <b>Settings &gt; Control Panel</b> and double-click <b>Network</b>.</li> </ul>   |
| 4   | Perform one of the following as applicable for the installed operating system: <ul style="list-style-type: none"> <li>• For <i>Win2000</i>, in the list of displayed connections, locate the Local Area Network connection for the NIC to be used for BTS router Ethernet communication.</li> <li>• For <i>Win98</i>, in the <b>Configuration</b> tab of the <b>Network</b> dialog box, locate the TCP/IP connection for the installed NIC. <ul style="list-style-type: none"> <li>– If <b>TCP/IP</b> does not appear in the displayed list of installed network components, refer to the operating system documentation and install TCP/IP.</li> </ul> </li> </ul> |
| 5   | Perform one of the following as applicable for the installed operating system: <ul style="list-style-type: none"> <li>• For <i>Win2000</i>, highlight the connection for the NIC and right click the highlighted connection, and select <b>Properties</b> from the pop-up menu.</li> <li>• For <i>Win98</i>: <ul style="list-style-type: none"> <li>– Highlight the TCP/IP NIC connection in the displayed list of installed network components.</li> <li>– Click the <b>Properties</b> button.</li> <li>– Skip to step 8.</li> </ul> </li> </ul>   |
| 6   | For <i>Win2000</i> , in the <b>Local Area Connection Properties</b> dialog box which appears, if Internet Protocol (TCP/IP) is not showing in the <i>Components checked are used by this connection:</i> listbox, refer to the operating system documentation and install TCP/IP.   |
| 7   | For <i>Win2000</i> , if the checkbox next to the Internet Protocol (TCP/IP) entry is not checked, click in the box to check it.   |
| 8   | Perform one of the following: <ul style="list-style-type: none"> <li>• <i>Win2000</i>: Highlight the Internet Protocol (TCP/IP) entry, and click on the <b>Properties</b> button below the <i>Components checked are used by this connection:</i> listbox.</li> <li>• <i>Win98</i>: From the tabs displayed in the <b>TCP/IP Properties</b> dialog box which opens, select the <b>IP Address</b> tab if it is not at the front.</li> </ul>  |

. . . continued on next page



**Table I-4:** Set LMF Computer NIC IP Address and Create a Default TFTP Directory

| Step | Action  |
|------|---|
| 9    | In the <b>Internet Protocol (TCP/IP) Properties</b> dialog box which appears ( <i>Win2000</i> ) or the <b>IP Address</b> tab of the <b>TCP/IP Properties</b> dialog box ( <i>Win98</i> ), perform the following:  |
| 9a   | <ul style="list-style-type: none"> <li>– If a black dot is not showing in the the radio button circle next to <b>Use the following IP address:</b> (<i>Win2000</i>) or <b>Specify an IP address</b> (<i>Win98</i>), click on the radio button. <ul style="list-style-type: none"> <li>— A black dot will appear in the circle.</li> </ul> </li> </ul> |
| 9b   | <ul style="list-style-type: none"> <li>– 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.</li> </ul>  |
| 9c   | <ul style="list-style-type: none"> <li>– Enter <b>100.100.100.1</b> in the <b>IP address:</b> box.</li> </ul>   |
| 9d   | <ul style="list-style-type: none"> <li>– Enter <b>255.255.255.252</b> in the <b>Subnet mask:</b> box.</li> </ul>  |
| 10   | Click the <b>OK</b> button for the <b>Internet Protocol (TCP/IP) Properties</b> dialog box ( <i>Win2000</i> ) or the <b>TCP/IP Properties</b> box ( <i>Win98</i> ).   |
| 11   | Click the <b>OK</b> button for the <b>Local Area Connection Properties</b> box ( <i>Win2000</i> ) or the <b>Network</b> box ( <i>Win98</i> ).   |
| 12   | In <i>Win98</i> , click <b>File &gt; Close</b> to close the <b>Control Panel</b> window.  |
| 13   | Click <b>Start &gt; Programs &gt; Windows Explorer</b> to open <i>Windows Explorer</i> .  |
| 14   | If the default tftp directory will be the same directory in which the files downloaded from the OMC–R are stored, proceed to step 22.   |
| 15   | In the <i>left</i> –hand pane of <i>Windows Explorer</i> , locate the icon for the drive where the default tftp directory is to be created.   |
| 16   | Highlight the drive icon and click <b>Files &gt; New &gt; Folder</b> .  |
| 17   | While observing the new folder icon in the <i>right</i> –hand pane, type the name for the folder (for example, <i>tftp_files</i> ), and press the <b>Enter</b> key.   |
| 18   | In <i>Windows Explorer</i> , locate the directory where the canned configuration files downloaded from the OMC–R are stored.  |
| 19   | In the <i>left</i> –hand pane, highlight the directory where the files are stored.  |
| 20   | Scroll the <i>left</i> –hand pane until the newly–created default tftp directory is visible.  |
| 21   | In the <i>right</i> –hand pane, highlight the canned configuration files and drag them to the default tftp directory.   |
| 22   | In the <i>left</i> –hand pane, click on the default tftp directory, and verify that the canned configuration files appear in the <i>right</i> –hand pane.   |
| 23   | 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).  |
| 24   | Click <b>Files &gt; Close</b> to close <i>Windows Explorer</i> .  |

## 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, Release 2.16.1* For other tftp server applications, install and configure the application according to the manufacturer's instructions.

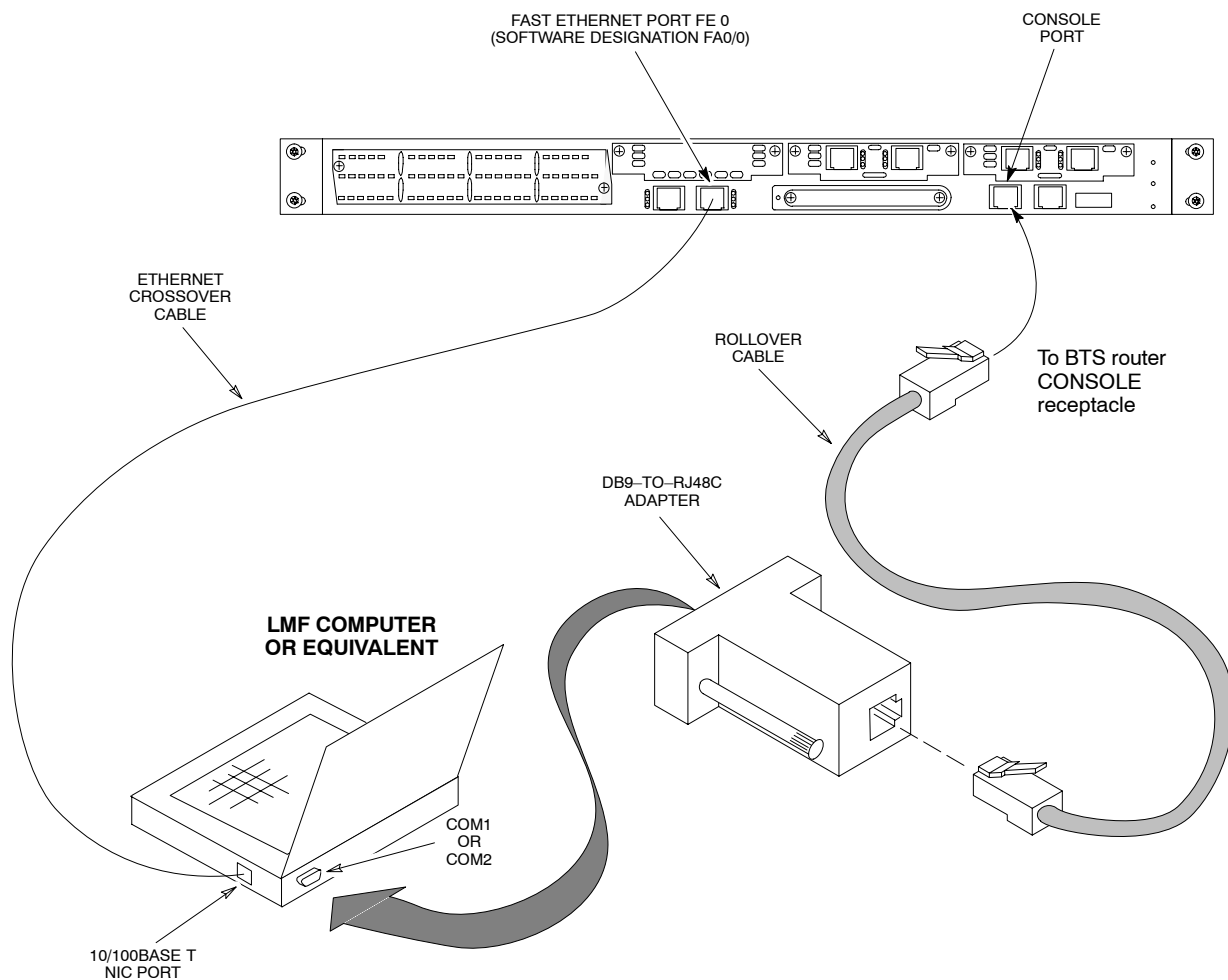
### NOTE

**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 14, or created in Table I-4, step 17, 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



BTSRTR0025

**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 <i>Cellular System Administration – CDMA OnLine Documentation, Release 2.16.1</i> 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  |
|---|---|
| <b>* IMPORTANT</b>  |   |
| 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 <i>MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78-13983-01</i> . 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 Card and Module Replacement section of the <i>1X SC 4812T-MC BTS FRU Guide</i> 68P64115A20 for instructions to access the CF memory card slot).  |
| 2   | <b>* IMPORTANT</b><br>In this step <i>do not touch the computer keyboard until the router completes the boot process</i> . The router will buffer any keystrokes made during the boot process and interpret them as commands to be executed immediately following boot completion.<br><br>Apply power to the router and allow it to complete boot-up. |
| 3   | If a message similar to the following, is displayed, press the <b>Enter</b> key and proceed to step 5:<br><br>Press RETURN to get started!  |

. . . continued on next page

**Table I-6:** BTS Router Power-up and Initial Ethernet Configuration

| Step | Action   |
|------|--|
| 4    | <p>If a message similar to the following, is displayed type <b>no</b> and press the <b>Enter</b> key:</p> <pre>Basic management setup configures only enough connectivity for management of the system, extended setup will ask you to configure each interface on the system  Would you like to enter basic management setup? [yes/no]: A response similar to the following will be displayed:  Would you like to enter basic management setup? [yes/no]: no  Cisco Internetwork Operating System Software IOS (tm) 1941 Software (MWR1941-I-M), Version 12.2(20020127:101239 Copyright (c) 1986-2002 by cisco Systems, Inc. Compiled Sun 27-Jan-02 06:08 by walrobin  Router&gt;</pre> |
| 5    | <p>At the Router&gt; <i>user</i> EXEC mode prompt, enter the following to access the <i>privileged</i> EXEC mode:</p> <p><b>enable</b></p> <p>A response similar to the following will be displayed:</p> <pre>Router&gt;enable Router#</pre>   |
| 6    | <p>At the Router# <i>privileged</i> EXEC mode prompt, enter the following to access the <i>configure submode</i>:</p> <p><b>configure terminal</b></p> <p>A response similar to the following will be displayed:</p> <pre>Router#conf t Enter configuration commands, one per line. End with CNTL/Z. Router(config)#</pre> <p>The router is now in the <i>global configuration</i> mode and ready to accept configuration changes entered from the keyboard.</p>   |

. . . continued on next page



**Table I-6:** BTS Router Power-up and Initial Ethernet Configuration

| Step | Action   |
|------|--|
| 7    | <p>At the global configuration mode prompt, type each of the following commands, pressing the <b>Enter</b> key after each command:</p> <pre> <b>hostname btsrtr1</b> <b>interface fa0/0</b> <b>ip address 100.100.100.2 255.255.255.252</b> <b>speed 100</b> <b>duplex full</b> <b>no shutdown</b> <b>line con 0</b> <b>exec-timeout 0 0</b> <b>no login</b> <b>line vty 0 4</b> <b>no login</b> </pre> <p>Responses similar to the following will be displayed:</p> <pre> 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)# </pre> |
| 8    | <p>Once the correct parameters have been set, return to the privileged EXEC mode prompt by holding down the <b>Ctrl</b> key and pressing <b>z (Ctrl+z)</b>. A response similar to the following will be displayed:</p> <pre> BTSRTR1(config-line)# ^z 01:11:27: %SYS-5-CONFIG_I: Configured from console by console BTSRTR1# </pre> <p><b>NOTE</b></p> <p>Entering <b>exit</b> twice, pressing the <b>Enter</b> key after each entry, will also complete the configuration process and return the router to the privileged EXEC mode.</p>  |
| 9    | <p>Verify port FE 0 (fa0/0) is configured with the correct IP address by entering the following:</p> <pre> <b>show ip interface brief</b> </pre> <p>A response similar to the following will be displayed:</p> <pre> 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 </pre> <p>BTSRTR1#</p>   |
| 10   | <p>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.</p>  |

## 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 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)

**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.

|             |  |
|-------------|--|
| <b>NOTE</b> | <b>IMPORTANT:</b> 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. |
|-------------|--|

|             |   |
|-------------|---|
| <b>NOTE</b> | 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 <i>MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78–13983–01</i> . 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  |
|--|---|
| <b>CAUTION</b><br>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 <i>Cellular System Administration – CDMA OnLine Documentation, Release 2.16.1</i> ).<br><br><b>* IMPORTANT</b><br>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. |
| 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 <i>privileged EXEC</i> mode, as indicated by a number sign at the end of the prompt:<br><br>BTSRTR1#   |
| 4  | Be sure the Ethernet crossover cable is connected between the LMF computer NIC port and the BTS router FE 0 port (see Figure I-4).  |

. . . continued on next page



**Table I-7:** Transfer Canned Configuration Files to the BTS Router Using a TFTP Server

| Step | Action   |
|------|--|
| 5    | <p>Begin verification that the CF memory card contains the correct version of the Cisco IOS by entering the following:</p> <p><b>dir slot0:</b></p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#dir slot0: Directory of slot0:/   1  -rw-  7051976   Mar 01 1993 00:11:34  mwr1941-i-mz.122-8.MC2a.bin  31932416 bytes total (24879104 bytes free) BTSRTR1#</pre> <p><b>NOTE</b></p> <ol style="list-style-type: none"> <li>1. The IOS defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the <b>cd</b> command. Determine the present working directory by entering <b>pwd</b>. If the present working directory has been changed, enter the command <b>cd slot0:</b> to return to the default setting.</li> <li>2. If slot0: is included in the command, be sure to include the colon (:) after <b>slot0</b> when typing the command.</li> <li>3. The IOS filename will be similar to the following:<br/><b>mwr1941-i-mz.122-8.MC2a.bin</b></li> </ol> |

. . . continued on next page

**Table I-7:** Transfer Canned Configuration Files to the BTS Router Using a TFTP Server

| Step | Action  |
|------|---|
| 6    | <p>Direct the router to show the version information by entering the following:</p> <pre>show version</pre> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#sh ver Cisco Internetwork Operating System Software IOS (tm) 1941 Software (MWR1941-I-M), Version 12.2(8)MC2a, EARLY DEPLOYMENT 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: 1941 Software (MWR1941-I-M), Version 12.2(8)MC2a, EARLY DEPLOYMENT RELEASE SOFT- WARE (fc1)  Router uptime is 1 minute System returned to ROM by power-on System image file is "slot0:mwr1941-i-mz.122-8.MC2a.bin"  cisco mwr1941 (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> |
| 7    | <p>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.</p>  |
| 8    | <p>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-13 to load the required version, and then return to step 9, below.</p>   |

. . . continued on next page

**Table I-7:** Transfer Canned Configuration Files to the BTS Router Using a TFTP Server

| Step | Action   |
|------|--|
|      | <p><b>CAUTION</b></p> <p>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 <i>Windows</i> file managers such as <i>Windows Explorer</i>). This portion of the procedure is intended for use only with applications, such as HyperTerminal, which do not list directory contents alphabetically.</p> <p>9 If the IOS version is correct and there is more than one file loaded on the CF memory card, be sure the <i>IOS file is the first file listed</i> in the directory content display. If it is not, perform the following:</p> <p>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-13.</p> <p>9b – Perform steps 25 through 29 of Table I-13, as applicable.</p> <p>9c – Type the following to delete a possible boot system line in the startup-config file, pressing the <b>Enter</b> key after the command and at each prompt to confirm the filename and deletion operation:</p> <p><b>del nvram:startup-config</b></p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#del nvram:startup-config Delete filename [startup-config]? Delete nvram:startup-config? [confirm] [OK] BTSRTR1#</pre> <p><b>NOTE</b></p> <p>Be sure to include the colon (:) after <b>nvram</b> when typing the command.</p> <p>9d – Verify the startup-config file size has been reduced to a minimum by entering the following:</p> <p><b>dir nvram:</b></p> <p>A response similar to the following will be displayed:</p> <pre>Router#dir nvram: Directory of nvram:/     53  -rw-           5          &lt;no date&gt;  startup-config    54  ——           5          &lt;no date&gt;  private-config  57336 bytes total (57274 bytes free) BTSRTR1#</pre> |
| 10   | <p>At the <i>privileged EXEC</i> mode prompt, enter the following:</p> <p><b>copy tftp:btsrtr_canned.color slot0:canned-config</b></p> <p>Where <i>color</i> = <b>blue</b> or <b>red</b>, as applicable.</p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#copy tftp:btsrtr_canned.blue slot0:canned-config Address or name of remote host []?</pre>  |

... continued on next page

**Table I-7:** Transfer Canned Configuration Files to the BTS Router Using a TFTP Server

| Step | Action   |
|------|--|
| 11   | <p>At the prompt for the remote host address or name, enter the IP address of the LMF computer NIC:<br/><b>100.100.100.1</b></p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#copy tftp:btsrtr_canned.blue slot0:canned-config Address or name of remote host []? 100.100.100.1 Destination filename [canned-config]?</pre>  |
| 12   | <p>At the prompt for the destination filename, press the <b>Enter</b> key. A response similar to the following will be displayed:</p> <pre>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#</pre> |
| 13   | <p>Verify that the canned configuration file is saved on the CF memory card by entering <b>dir</b> command. A response similar to the following will be displayed:</p> <pre>Directory of slot0:/   1  -rw-  7051976   Mar 01 1993 00:11:34  mwr1941-i-mz.122-8.MC2a.bin  2  -rw-    2457    Mar 01 1993 00:14:48  canned-config  31932416 bytes total (24877983 bytes free) BTSRTR1#</pre>   |
| 14   | <p>To allow the BTS router to boot using the canned configuration, enter the following:<br/><b>copy canned-config startup-config</b></p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#copy canned-config start Destination filename [startup-config]?</pre>  |
| 15   | <p>When prompted for the destination file name, press the <b>Enter</b> key. A response similar to the following will be displayed:</p> <pre>BTSRTR1#copy canned-config start Destination filename [startup-config]? 2457 bytes copied in 3.52 secs BTSRTR1#</pre>  |
| 16   | <p>Display and note the file size of startup-config by entering the following:<br/><b>dir nvram:</b></p> <p>A response similar to the following will be displayed:</p> <pre>Directory of nvram:/   26  -rw-    2457                &lt;no date&gt;  startup-config  27  ——    5                &lt;no date&gt;  private-config  29688 bytes total (24774 bytes free) BTSRTR1#</pre>  |

. . . continued on next page

**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   | <p>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:</p> <pre>show startup-config</pre> <p><b>NOTE</b><br/>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.</p> |
| 20   | <p>Verify the router will boot properly on the IOS and revised startup-config files by entering the following:</p> <pre>reload</pre> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#reload  System configuration has been modified. Save? [yes/no]: n Proceed with reload? [confirm]</pre>  |
| 21   | If prompted to save a modified configuration, enter <b>n</b> for “no,” and press the <b>Enter</b> key.  |
| 22   | When prompted to proceed with reload, press the <b>Enter</b> key to continue the reload operation.  |
| 23   | 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 the <i>1X SC 4812T-MC BTS FRU Guide</i> , mark the installed configuration (blue or red) on the card label, and install the card in the router following the procedure in the FRU Guide.  |
| 26   | If an additional router must have the canned configuration installed, perform the following:  |
| 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   | <p>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 9b.</p> <p><b>CAUTION</b><br/>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.</p>                            |

## Method 2: Using a CF Memory Card Reader to Load 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 *this manual*.
- 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.

- Compact Flash memory card *reader* device and software driver for the operating system installed on the LMF computer

**CAUTION** Card readers for other non-volatile, solid-state memory devices such as Smart Media cards will not work with the CF memory cards used in the MWR 1941 routers. Do not attempt to use a card reader intended for another type of memory device.

- 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
- A copy of the MWR 1941 router IOS version required for the network where the routers are to be installed (contact the network administrator and the Motorola account team for information on obtaining the required MWR 1941 IOS version)
- A +27 Vdc power supply to power the BTS router during configuration file operations

### Required Materials

The following material is required to perform this method:

- Tagging and 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:

- *Cellular System Administration – CDMA OnLine Documentation, Release 2.16.1*
- *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78-13983-01*

### File Operations Using a CF Memory Card Reader

Only file transfers should be performed using the CF memory card reader. CF memory card *formatting should be performed in a BTS router*

using a HyperTerminal connection. Attempting to format a CF memory card from a *Windows*-based computer using a card reader could result in unpredictable BTS router operation.

**CAUTION** Do not format BTS router CF memory cards using a *Windows*-based computer. Only format CF memory cards in a BTS router.

### Verifying IOS Version and Loading BTS Router Canned Configuration File to CF Memory Card Using a CF Memory Card Reader

The process of transferring a canned configuration file to a BTS router using a CF memory card reader consists of the following activities:

1. Transfer the canned configuration file to the router's CF memory card using a CF memory card reader
2. Copy the file from the CF memory card to the router's `startup-config` file

The following procedures are used to accomplish these actions.

#### Prerequisites

The following is required prior to performing this procedure:

- A copy of the required 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)

#### Verifying IOS version and transferring canned configuration file to the router's CF memory card

**NOTE** **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.

Transfer canned configuration files from the LMF computer to a BTS router CF memory card by following the procedure in Table I-8.

**Table I-8:** Transfer Canned Configuration File to CF Memory Card with CF Memory Card Reader

| Step  | Action   |
|---|--|
| <p><b>* IMPORTANT</b></p> <p>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 <i>MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78-13983-01</i>. Have this publication available for reference while performing this procedure.</p> |  |
| 1   | <p>If it has not been done, install a CF memory card loaded with the IOS in the BTS router by following the procedure in the <i>1X SC 4812T-MC BTS FRU Guide</i>.</p> <p><b>* IMPORTANT</b></p> <p>MWR 1941 routers must be loaded with IOS version <code>mwr1900-i-mz.122-8.MC2d.bin</code> or later. This router model will not function properly with earlier IOS versions.</p> |

... continued on next page

| <b>Table I-8: Transfer Canned Configuration File to CF Memory Card with CF Memory Card Reader</b> |  |
|---|--|
| <b>Step</b>   | <b>Action</b>  |
| 2   | Connect the LMF computer to the BTS router and start a HyperTerminal communication session with the router by following the procedure in Table I-2.  |
| 3   | If it has not been done, be sure the +27 Vdc power supply output is <b>OFF</b> , and connect the BTS router to the +27 Vdc power supply.   |
| 4   | <p><b>* IMPORTANT</b></p> <p>In this step <i>do not touch the computer keyboard until the router completes the boot process</i>. The router will buffer any keystrokes made during the boot process and interpret them as commands to be executed immediately following boot completion.</p> <p>Apply power to the router and allow it to complete boot-up.</p>  |
| 5   | <p>If a message similar to the following, is displayed, press the <b>Enter</b> key and proceed to step 7:</p> <pre>Press RETURN to get started!</pre>  |
| 6   | <p>If a message similar to the following, is displayed type <b>no</b> and press the <b>Enter</b> key:</p> <pre>Basic management setup configures only enough connectivity for management of the system, extended setup will ask you to configure each interface on the system  Would you like to enter basic management setup? [yes/no]: A response similar to the following will be displayed:  Would you like to enter basic management setup? [yes/no]: no  Cisco Internetwork Operating System Software IOS (tm) 1941 Software (MWR1941-I-M), Version 12.2(20020127:101239 Copyright (c) 1986-2002 by cisco Systems, Inc. Compiled Sun 27-Jan-02 06:08 by walrobin  Router&gt;</pre> |
| 7   | <p><b>CAUTION</b></p> <p>Use only a card reader specifically designed for CF memory cards to perform this procedure. Card readers for other non-volatile, solid-state memory devices such as Smart Media cards will not work with the CF memory cards used in the MWR 1941 routers.</p> <p>If it has not been done, follow the CF memory card reader manufacturer's instructions to load the CF memory card driver application for the operating system being used onto the LMF computer.</p>  |
| 8   | Connect the CF memory card reader to the LMF computer following the card reader manufacturer's instructions.   |
| 9   | Remove the CF memory card from the BTS router by following the procedure in the <i>1X SC 4812T-MC BTS FRU Guide</i>  |
| 10  | Insert the CF memory card into the card reader as specified by the card reader manufacturer's instructions.  |
| 11  | On the LMF computer, click <b>Start &gt; Programs &gt; Windows Explorer</b> to open <i>Windows Explorer</i> .  |

... continued on next page



**Table I-8:** Transfer Canned Configuration File to CF Memory Card with CF Memory Card Reader

| Step | Action   |
|------|--|
| 12   | <p><b>NOTE</b><br/>The CF memory card reader will appear as a disk drive in <i>Windows Explorer</i> with a disk drive letter and icon.</p> <p>Scroll the <i>left</i>-hand pane of <i>Windows Explorer</i> to locate the icon for the CF memory card.</p>   |
| 13   | <p>Verify that the CF memory card contains the required version of the IOS by performing the following:</p> <p>13a – In the <i>left</i>-hand pane of <i>Windows Explorer</i>, highlight the CF memory card icon.</p> <p>13b – In the <i>right</i>-hand pane, note the IOS filename loaded on the card, and record it.</p> <p><b>NOTE</b><br/>The IOS filename will be similar to <b>mwr1941-i-mz.122-8.MC2a.bin</b>.</p>   |
| 14   | <p>Scroll the <i>left</i>-hand pane of <i>Windows Explorer</i> to locate the icon for the directory where the canned configuration files downloaded from the OMC-R and required IOS version are stored.</p>  |
| 15   | <p>In the <i>left</i>-hand pane, highlight the directory where the files are stored.</p>   |
| 16   | <p>In the the <i>right</i>-hand pane, locate the filename of the required IOS version and compare it to the filename recorded in step 13b, above.</p>  |
| 17   | <p>If filenames are different, proceed to Table I-11 to replace the IOS on the CF memory card and return to step 18, below.</p>  |
| 18   | <p>In the <i>right</i>-hand pane, highlight the canned configuration file to be transferred to the CF memory card and drag it to the CF memory card disk drive icon.</p>   |
| 19   | <p>Verify the canned configuration file has been copied to the CF memory card by clicking on the CF memory card disk drive icon in the <i>left</i>-hand pane, and verifying that the canned configuration file appears in the in the <i>right</i>-hand pane.</p> <p><b>NOTE</b><br/>Do not be concerned if the canned configuration file appears before the IOS file in the file sequence displayed by <i>Windows Explorer</i>. The position of the IOS file in the sequence of files on the CF memory card can not be verified until the CF memory card is installed in the BTS router.</p>   |
| 20   | <p>With the CF memory card disk drive icon still selected, change the name of the canned configuration file on the card to <b>canned-config</b> by doing the following:</p> <p>20a – In the <i>right</i>-hand pane of <i>Windows Explorer</i>, click on the canned configuration filename.<br/>— The filename will be highlighted.</p> <p>20b – Wait approximately two seconds, and then click on the canned configuration file filename again.<br/>— A hair-line rectangle will appear around the highlighted filename.</p> <p>20c – After the rectangle appears around the highlighted filename, type the following:<br/><b>canned-config</b></p> <p>20d – Press the <b>Enter</b> key or click on the canned configuration file <i>icon</i>.<br/>— The rectangle around the canned configuration filename will disappear and the filename will remain highlighted.</p> |
| 21   | <p>Click <b>Files &gt; Close</b> to close <i>Windows Explorer</i>.</p>   |

. . . continued on next page

| <b>Table I-8: Transfer Canned Configuration File to CF Memory Card with CF Memory Card Reader</b> |  |
|---|--|
| <b>Step</b>   | <b>Action</b>  |
| 22  | Remove the CF memory card with the IOS version and canned configuration file from the card reader, and mark the card label with the canned configuration (blue or red) copied to it. |
| 23  | Install the CF memory card in the BTS router by following the procedure in the <i>1X SC 4812T-MC BTS FRU Guide</i> .   |
| 24  | Proceed to Table I-9 to copy the canned configuration from the CF memory card to the BTS router's <code>startup-config</code> file.  |

### Copy Canned Configuration File from the CF Memory Card to the BTS Router's Startup Configuration and verify IOS file sequence

To allow the BTS router to automatically boot using the canned configuration, the configuration must be copied to the the router's `startup-config` file in NVRAM. Follow the procedure in Table I-9 to accomplish this.

| <b>Table I-9: Copy Canned Configuration File to BTS Router Startup Configuration and Verify IOS File Position</b>   |   |
|---|---|
| <b>Step</b>   | <b>Action</b>   |
| <b>* IMPORTANT</b>  |   |
| 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 <i>MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78-13983-01</i> . Have this publication available for reference while performing this procedure. |   |
| 1   | If it has not been done, install the CF memory card with the canned configuration and required IOS version in the BTS router by following the procedure in the <i>1X SC 4812T-MC BTS FRU Guide</i> .  |
| 2   | At this point, the router should be powered up and displaying the <code>Router&gt;</code> prompt in the HyperTerminal window of the LMF computer communication session. If it is not, perform steps 1 through 6 of Table I-8.                                       |
| 3   | At the <code>Router&gt;</code> <i>user EXEC</i> mode prompt, enter the following to access the <i>privileged EXEC</i> mode:<br><b>enable</b><br>A response similar to the following will be displayed:<br><br><code>Router&gt;enable</code><br><code>Router#</code> |

... continued on next page

**Table I-9: Copy Canned Configuration File to BTS Router Startup Configuration and Verify IOS File Position**

| Step | Action  |
|------|---|
| 4    | <p><b>NOTE</b></p> <p>The IOS defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the <b>cd</b> command. Determine the present working directory by entering <b>pwd</b>. If the present working directory has been changed, enter the command <b>cd slot0:</b> to return to the default setting.</p> <p>Display the directory listing of the CF memory card by entering the following:</p> <p><b>dir</b></p> <p>A response similar to the following will be displayed:</p> <pre>Router#dir slot0: Directory of slot0:/   1  -rw-      7051976   Sep 23 2002 07:24:18  mwr1941-i-mz.122-8.MC2a.bin  2  -rw-         2212   Mar 01 1993 00:14:48  canned-config  31932416 bytes total (24885606 bytes free) Router#</pre> |
| 5    | <p>Be sure the <i>IOS file is the first file listed</i> in the directory content display. If it is not, perform the procedure in Table I-12, and then return to step 6, below.</p>  |
| 6    | <p>Copy the canned configuration to the BTS router's startup configuration file by entering the following:</p> <p><b>copy slot0:canned-config startup-config</b></p> <p>A response similar to the following will be displayed:</p> <pre>Router#copy slot0:canned-config start Destination filename [startup-config]?</pre>  |
| 7    | <p>When prompted for the destination file name, press the <b>Enter</b> key. A response similar to the following will be displayed:</p> <pre>Router#copy slot0:canned-config start Destination filename [startup-config]? 2218 bytes copied in 3.52 secs Router1#</pre>  |
| 8    | <p>Check the file size of the startup-config to verify the copy operation by entering the following:</p> <p><b>dir nvram:</b></p> <p>A response similar to the following will be displayed:</p> <pre>Directory of nvram:/   26  -rw-         2218           &lt;no date&gt;  startup-config  27  -rw-          5           &lt;no date&gt;  private-config  29688 bytes total (25247 bytes free) Router#</pre> <p><b>NOTE</b></p> <p>Be sure to include the colon (: ) after <b>nvram</b> when typing the command.</p>  |

. . . continued on next page

| <b>Table I-9: Copy Canned Configuration File to BTS Router Startup Configuration and Verify IOS File Position</b> |  |
|---|--|
| <b>Step</b>   | <b>Action</b>  |
| 9   | <p>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:</p> <p style="padding-left: 40px;"><b>show startup-config</b></p> <p><b>NOTE</b><br/>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.</p> |
| 10  | <p>Verify the router will boot properly on the IOS and revised startup-config files by entering the following:</p> <p style="padding-left: 40px;"><b>reload</b></p> <p>A response similar to the following will be displayed:</p> <pre>Router#reload  System configuration has been modified. Save? [yes/no]: n Proceed with reload? [confirm]</pre>   |
| 11  | If prompted to save a modified configuration, enter <b>n</b> for “no,” and press the <b>Enter</b> key.   |
| 12  | When prompted to proceed with reload, press the <b>Enter</b> key to continue the reload operation.   |
| 13  | 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.  |
| 14  | Using the tagging materials, tag the router to clearly identify the installed configuration (blue (BTSRTR1) or red (BTSRTR2)).   |
| 15  | If an additional router must have the canned configuration installed, perform the following:   |
| 15a   | – Disconnect the cabling for the HyperTerminal communications session from the BTS router, and minimize the HyperTerminal window on the LMF computer.  |
| 15b   | – Remove power from the router and disconnect it from the power supply.  |
| 15c   | – Repeat the procedures in Table I-8 and this table (Table I-9) using the additional router.   |
| 16  | If no additional routers must be configured, perform steps 15a and 15b.  |
| 17  | On the LMF computer, exit the HyperTerminal session.   |



# Replacing Installed BTS Router CF Memory Card 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 for Verification Methods

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 Chapter 3 of this manual:
- One of the following operating systems for the *Windows*-based computer:
  - *Windows* 2000
  - *Windows* 98 Second Edition (SE) using the *FAT32* file system

|                |   |
|----------------|---|
| <b>CAUTION</b> | BTS router CF memory cards loaded using computers equipped with <i>Windows</i> 98 versions earlier than <i>Windows</i> 98 SE and using the <i>FAT16</i> 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
- A copy of the MWR 1941 router IOS version required for the network where the routers are to be installed

|             |  |
|-------------|--|
| <b>NOTE</b> | Contact the network administrator or the Motorola Account Team for assistance in determining and obtaining a copy of the required IOS version. |
|-------------|--|

- The MWR 1941 will accept a voltage from -60 Vdc to + 60 Vdc during configuration and file operations

## Required Publications

The following publication is required to perform procedures in this section:

- *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78-13983-01*

## Method 1: Replacement of Installed Router CF Card IOS Data

### 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. Replace the IOS version installed in a BTS router
3. Ensure the IOS file *is the first file on the CF memory card*

### Additional required equipment/software

For this method, the following software application is required in addition to the common items required for both methods:

- 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 tftp server software application (refer to the Setting Up the TFTP Server – Procedure in *Cellular System Administration – CDMA OnLine Documentation, Release 2.16.1*) such as:
  - Cisco tftp server
  - PumpKIN tftp server
  - Any other equivalent tftp server application

### 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

### Replacing installed IOS version and verifying file sequence position

Follow the procedure in Table I-10 to replace 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-10:** Using a TFTP Server Application for Replacing Loaded IOS Version and Verifying File Sequence Position

| Step  | Action  |
|---|---|
| <p><b>* IMPORTANT</b></p> <p>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 <i>MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78-13983-01</i>. Have this publication available for reference while performing this procedure.</p> |   |
| 1   | <p>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.</p>   |
| 2   | <p><b>NOTE</b></p> <p>The IOS present working directory defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the <b>cd</b> command. Determine the present working directory by entering <b>pwd</b>. If the present working directory has been changed, enter the command <b>cd slot0:</b> to return to the default setting.</p> <p>Identify the filename of the currently loaded IOS which must be replaced by entering <b>dir</b> command. A response similar to the following will be displayed:</p> <pre>BTSRTR1#dir Directory of slot0:/   1  -rw-      7051844   Sep 23 2002 07:15:08  mwr1941-i-mz.07022002.bin  2  -rw-         2212   Mar 01 1993 00:11:00  canned-config  31932416 bytes total (24878360 bytes free) BTSRTR1#</pre> |
| 3   | <p>Begin to backup the currently installed version of the router's IOS to the LMF computer's default tftp directory by entering the following:</p> <p><b>copy old_IOS_filename tftp:</b></p> <p>Where <i>old_IOS_filename</i> = the filename of the IOS currently loaded on the BTS router CF memory card.</p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#copy mwr1941-i-mz.07022002.bin tftp: Address or name of remote host []?</pre>   |
| 4   | <p>At the remote host prompt, enter the following:</p> <p><b>100.100.100.1</b></p> <p>A response similar to the following will be displayed:</p> <pre>Address or name of remote host []? 100.100.100.1 Destination filename [mwr1941-i-mz.07022002.bin]?</pre>  |

... continued on next page





**Table I-10:** Using a TFTP Server Application for Replacing Loaded IOS Version and Verifying File Sequence Position

| Step | Action  |
|------|---|
| 9    | <p>If the default filename displayed in the prompt is correct, press the <b>Enter</b> key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed:</p> <pre> Destination filename [canned-config]? ! [OK - 2212/4096 bytes]  2212 bytes copied in 0.152 secs BTSRTR1#                     </pre>   |
| 10   | <p>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.</p>  |
| 11   | <p>Delete <i>all</i> files from the CF memory card by entering the following command:</p> <p><b>format slot0:</b></p> <p>A response similar to the following will be displayed:</p> <pre> BTSRTR1#format slot0: Format operation may take a while. Continue? [confirm]                     </pre>   |
| 12   | <p>Press the <b>Enter</b> key to continue the format operation. A response similar to the following will be displayed:</p> <pre> Format operation may take a while. Continue? [confirm] Format operation will destroy all data in "slot0:". Continue? [confirm]                     </pre>  |
| 13   | <p>Press the <b>Enter</b> key to continue the format operation. A response similar to the following will be displayed:</p> <pre> Format operation will destroy all data in "slot0:". Continue? [confirm] Format: Drive communication &amp; 1st Sector Write OK... Writing Monlib sectors..... ..... 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#                     </pre> |
| 14   | <p>Verify all files have been deleted from the CF memory card by entering the <b>dir</b> command. A response similar to the following will be displayed:</p> <pre> Directory of slot0:/  No files in directory  31932416 bytes total (31932416 bytes free) BTSRTR1#                     </pre>  |

... continued on next page



**Table I-10:** Using a TFTP Server Application for Replacing Loaded IOS Version and Verifying File Sequence Position

| Step | Action  |
|------|---|
| 19   | <p>Display the CF memory card directory to verify that the new IOS file is there by entering the <b>dir</b> command. A response similar to the following will be displayed:</p> <pre>BTSRTR1#dir Directory of slot0:/   1  -rw-      7051976   Sep 23 2002 07:25:36  mwr1941-i-mz.122-8.MC2a.bin  31932416 bytes total (24880440 bytes free) BTSRTR1#</pre>   |
| 20   | <p>If any additional files previously stored on the CF memory card are to be copied to the card, perform the following:</p> <p><b>copy tftp:filename slot0:</b></p> <p>Where <i>filename</i> = the filename of the file to be copied to the CF memory card</p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#copy tftp:canned-config slot0: Address or name of remote host [100.100.100.1]?</pre>  |
| 21   | <p>If the default IP address displayed in the prompt is correct, press the <b>Enter</b> 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:</p> <pre>Address or name of remote host [100.100.100.1] Destination filename [canned-config]?</pre>  |
| 22   | <p>If the default filename displayed in the prompt is correct, press the <b>Enter</b> 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:</p> <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> |
| 23   | <p>After the additional file is copied to the CF memory card, display the CF memory card directory by entering the <b>dir</b> command. A response similar to the following will be displayed:</p> <pre>BTSRTR1#dir Directory of slot0:/   1  -rw-      7051976   Sep 23 2002 07:24:18  mwr1941-i-mz.122-8.MC2a.bin  2  -rw-         2212   Mar 01 1993 00:09:06  canned-config</pre>  |
| 24   | <p>The IOS file <i>must be the first file listed</i> for the BTS router to boot properly. If it is, proceed to step 29.</p>   |

... continued on next page

**Table I-10:** Using a TFTP Server Application for Replacing Loaded IOS Version and Verifying File Sequence Position

| Step | Action   |
|------|--|
|      | <p><b>CAUTION</b></p> <p>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 <i>Windows</i> file managers such as <i>Windows Explorer</i>). This portion of the procedure is intended for use only with applications, such as HyperTerminal, which do not list directory contents alphabetically.</p> |
| 25   | 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.   |
| 30   | <p>After making sure the IOS file <i>is the first file on the CF memory card</i>, restart the BTS router with the new IOS version by entering the following:</p> <p><b>reload</b></p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#reload  System configuration has been modified. Save? [yes/no]: n Proceed with reload? [confirm]</pre>  |
| 31   | If prompted to save a modified configuration, enter <b>n</b> for “no,” and press the <b>Enter</b> key.   |
| 32   | When prompted to proceed with reload, press the <b>Enter</b> key to continue the reload operation.   |
| 33   | <p>Once the router has completed rebooting, change to the privileged EXEC mode and confirm the booted IOS version is correct by entering the following:</p> <p><b>show version</b></p> <p>A response similar to the following partial example will be displayed:</p> <pre>BTSRTR1#sh ver Cisco Internetwork Operating System Software IOS (tm) 1941 Software (MWR1941-I-M), Version 12.2(8)MC2a, EARLY DEPLOYMENT RELEASE SOFTWARE (fc1) . . .  BTSRTR1#</pre>                       |
| 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.   |

. . . continued on next page

**Table I-10:** Using a TFTP Server Application for Replacing Loaded IOS Version and Verifying File Sequence Position

| Step                    | Action  |
|-------------------------|---|
| 36<br>36a<br>36b<br>36c | If no other BTS router file operations or configuration actions are required, perform the following: <ul style="list-style-type: none"> <li>– Remove power from the router and disconnect it from the power supply.</li> <li>– Disconnect all other cabling from the BTS router.</li> <li>– On the LMF computer, exit the HyperTerminal communications session.</li> </ul>                |
| 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 9b. <p><b>CAUTION</b></p> 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. |

## Method 2: Using a CF Memory Card Reader for Replacement of Installed IOS Version and Changing File Sequence Position

This subsection contains the file replacement and file sequence manipulation procedures to use when transferring files with a CF memory card reader.

### Replace IOS Version Installed on the CF Memory Card

**Description** – This procedure covers using an LMF computer equipped with a CF memory card reader to perform the following activities:

1. Verify the IOS version loaded on a CF memory card and running on a BTS router
2. Replace the IOS version installed in a BTS router
3. Ensure the IOS file *is the first file on the CF memory card*

**Additional required equipment/software** – For this method, the following equipment item and associated software is required in addition to the common items required for both methods:

- Compact Flash memory card *reader* device and software driver for the operating system installed on the LMF computer

**CAUTION** Card readers for other non-volatile, solid-state memory devices such as Smart Media cards will not work with the CF memory cards used in the MWR 1941 routers. Do not attempt to use a card reader intended for another type of memory device.

**Prerequisites** – The following are required prior to performing this procedure:

- The LMF computer and BTS router have been prepared for CF memory card reader file transfer and are operating as they would be after performing the procedures in steps 1 through 8 of Table I-8
- A copy of the required IOS version is loaded into the desired directory of the LMF computer

**File operations using a CF memory card reader** – Only file transfers should be performed using the CF memory card reader. CF memory card *formatting should be performed in a BTS router* using a HyperTerminal connection. Attempting to format a CF memory card from a *Windows*-based computer using a card reader could result in unpredictable BTS router operation.

**CAUTION** Do not format BTS router CF memory cards using a *Windows*-based computer. Only format CF memory cards in a BTS router.

**Replacing installed IOS version** – Follow the procedure in Table I-11 to replace the installed IOS version using a CF memory card reader and to ensure the IOS file is first in the stored file sequence on the CF memory card.

**Table I-11:** Using a CF Memory Card Reader for Replacing Loaded IOS Version and Verifying File Sequence Position

| Step  | Action  |
|---|---|
| <b>* IMPORTANT</b>  |   |
| 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 <i>MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78-13983-01</i> . 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 steps 1 through 17 of Table I-8. If necessary, perform these procedures now.  |
| 2   | With the CF memory card in the CF memory card reader and the card reader icon highlighted in the left-hand pane of <i>Windows Explorer</i> , perform the following to delete the IOS file from the card:  |
| 2a  | – In the right-hand pane of <i>Windows Explorer</i> , highlight the IOS file to be removed.   |
| 2b  | – Right-click and select <b>Delete</b> from the popup menu.   |
| 3   | <b>CAUTION</b><br>When performing the following step and its associated substeps, files should be moved to and from the CF memory card one by one to reduce the potential for disrupting the the CF memory card file sequence. Do not attempt to move multiple files by highlighting and dragging and dropping all of them at one time.<br><br>If there are more files on the CF memory card which must be retained, perform the following: |
| 3a  | – Scroll the left-hand pane of <i>Windows Explorer</i> to locate the LMF computer directory where the required IOS version and canned configuration files are stored.   |
| 3b  | – In the right-hand pane, highlight the additional file on the CF memory card which is to be retained.  |
| 3c  | – While holding down the <b>Ctrl</b> key on the LMF computer, drag and drop the highlighted file into the directory in the left-hand pane where the required IOS and canned config files are stored.  |
| 3d  | – If additional files loaded on the CF memory card must be retained, repeat steps 3b and 3c for each file until all files have been moved from the CF memory card to the directory on the LMF computer.   |

... continued on next page

**Table I-11:** Using a CF Memory Card Reader for Replacing Loaded IOS Version and Verifying File Sequence Position

| Step | Action   |
|------|--|
| 4    | When all files on the CF memory card have been deleted or moved, as applicable, highlight the directory in the left-hand pane where the required IOS version and canned configuration files are stored.                                      |
| 5    | Verify that all files from the CF memory card which must be retained were moved to the directory by checking the filenames in the right-hand pane.   |
| 6    | Scroll the left-hand pane of <i>Windows Explorer</i> to locate the CF memory card reader icon.   |
| 7    | In the right-hand pane, highlight the icon for the required version of the IOS.  |
| 8    | Drag and drop the IOS icon to the CF memory card reader icon to copy it to the CF memory card.   |
| 9    | If an additional file in the LMF computer directory must be <i>moved</i> to the CF memory card, perform the following:   |
| 9a   | – In the right-hand pane, highlight <i>one</i> additional file which is to be <i>moved</i> to the CF memory card.  |
| 9b   | – While holding down the <b>Ctrl</b> key on the LMF computer, drag and drop the highlighted file into the CF memory card reader directory in the left-hand pane.   |
| 9c   | – If additional files in the directory must be placed on the CF memory card, repeat steps 9a and 9b for each file until all files have been moved <i>one at a time</i> from the LMF computer to the CF memory card.                          |
| 10   | In the left-hand pane, highlight the CF memory card reader icon.   |
| 11   | Verify that all required files were moved to the CF memory card by checking the filenames in the right-hand pane.  |
| 12   | Scroll the left-hand pane of <i>Windows Explorer</i> to locate the LMF computer directory where the required IOS version and canned configuration files are stored.  |
| 13   | Highlight the directory in the left-hand pane.   |
| 14   | If this procedure was entered from step 17 of Table I-8, return to Table I-8, step 18.   |
| 15   | If no other file transfer activities between the LMF computer and CF memory card are required at this time, click <b>Files &gt; Close</b> to close <i>Windows Explorer</i> .   |
| 16   | Remove the CF memory card from the card reader and install it in the BTS router by following the procedure in the <i>1X SC 4812T-MC BTS FRU Guide</i> .  |
| 17   | At this point, the router should be powered up and displaying the user EXEC prompt in the HyperTerminal window of the LMF computer communication session. If it is not, perform steps 1 through 6 of Table I-8.                              |
| 18   | <p>At the Router&gt; <i>user</i> EXEC mode prompt, enter the following to access the <i>privileged</i> EXEC mode:</p> <p><b>enable</b></p> <p>A response similar to the following will be displayed:</p> <pre>Router&gt;enable Router#</pre> |

. . . continued on next page

**Table I-11:** Using a CF Memory Card Reader for Replacing Loaded IOS Version and Verifying File Sequence Position

| Step | Action  |
|------|---|
| 19   | <p><b>NOTE</b></p> <p>The IOS present working directory defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the <b>cd</b> command. Determine the present working directory by entering <b>pwd</b>. If the present working directory has been changed, enter the command <b>cd slot0:</b> to return to the default setting.</p> <p>Display the directory listing of the CF memory card by entering the following:</p> <p><b>dir</b></p> <p>A response similar to the following will be displayed:</p> <pre>Router#dir slot0: Directory of slot0:/   1  -rw-      7051976   Sep 23 2002 07:24:18  mwr1941-i-mz.122-8.MC2a.bin  2  -rw-         2212   Mar 01 1993 00:14:48  canned-config  31932416 bytes total (24885606 bytes free) Router#</pre> |
| 20   | <p><b>CAUTION</b></p> <p>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 <i>Windows</i> file managers such as <i>Windows Explorer</i>). This portion of the procedure is intended for use only with applications, such as HyperTerminal, which do not list directory contents alphabetically.</p> <p>Be sure the <i>IOS file is the first file listed</i> in the directory content display. If it is not, perform the procedure in Table I-12, and then return to step 21, below.</p>  |
| 21   | <p>Verify the router will boot properly on the IOS and revised startup-config files by entering the following:</p> <p><b>reload</b></p> <p>A response similar to the following will be displayed:</p> <pre>Router#reload  System configuration has been modified. Save? [yes/no]: n Proceed with reload? [confirm]</pre>  |
| 22   | <p>If prompted to save a modified configuration, enter <b>n</b> for “no,” and press the <b>Enter</b> key.</p>   |
| 23   | <p>When prompted to proceed with reload, press the <b>Enter</b> key to continue the reload operation.</p>   |
| 24   | <p>Verify the router reboots without displaying the <code>rommon 1 &gt;</code> prompt or error messages related to port configurations.</p>   |
| 25   | <p>If no other BTS router file operations or configuration actions are required, perform the following:</p> <p>25a – Remove power from the router and disconnect it from the power supply.</p> <p>25b – Disconnect all cabling from the BTS router.</p> <p>25c – On the LMF computer, exit the HyperTerminal communications session.</p>  |



## Change CF Memory Card File Sequence to Place IOS File First on the Card

This procedure covers using an LMF computer equipped with a CF memory card reader to perform the following activities:

1. Change the sequence of files on a CF memory card to place the IOS version file first
2. Formatting the CF memory card, if necessary, to achieve the required file sequence positioning of the IOS version file

### Prerequisites

The following are required prior to performing this procedure:

- The LMF computer and BTS router have been prepared for CF memory card reader file transfer and are operating as they would be after performing the procedures in Table I-8 and steps 1 through 5 of Table I-9
- Copies of the required IOS version and canned configuration files are loaded into the desired directory of the LMF computer

### Optional equipment/software

If they are available, the following items may be used to change the CF memory card file sequence once the card is installed in the BTS router:

- 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 tftp server software application (refer to the Setting Up the TFTP Server – Procedure in *Cellular System Administration – CDMA OnLine Documentation, Release 2.16.1*) such as:
  - Cisco tftp server
  - PumpKIN tftp server
  - Any other equivalent tftp server application

### Changing CF memory card file sequence

Follow the procedure in Table I-12 to place the installed IOS version file first in the stored file sequence on the CF memory card.

**Table I-12:** Use CF Memory Card Reader to Place IOS File  
First in CF Memory Card File Sequence

| Step  | Action  |
|---|---|
| <p><b>CAUTION</b></p> <p>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 <i>Windows</i> file managers such as <i>Windows Explorer</i>). This procedure is intended for use only with applications, such as HyperTerminal, which do not list directory contents alphabetically.</p> |   |
| 1   | <p>This procedure assumes that the LMF computer and BTS router have been prepared for CF memory card reader file transfer and are operating as they would be after performing the procedures in Table I-8 and steps 1 through 5 of Table I-9. If necessary, perform these procedures now.</p>   |
| 2   | <p><b>NOTE</b></p> <p>The IOS present working directory defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the <b>cd</b> command. Determine the present working directory by entering <b>pwd</b>. If the present working directory has been changed, enter the command <b>cd slot0:</b> to return to the default setting.</p> <p>With the CF memory card still installed in the router, display a CF memory card directory listing if one is not showing by entering the <b>dir</b> command. A response similar to the following will be displayed:</p> <pre> Router#dir slot0: Directory of slot0:/     2  -rw-          2212   Mar 01 1993 00:14:48  canned-config    1  -rw-       7051976   Sep 23 2002 07:24:18  mwr1941-i-mz.122-8.MC2a.bin  31932416 bytes total (24878228 bytes free) Router# </pre> |
| 3   | <p>Verify that the IOS file is <i>not</i> the first file on the CF memory card.</p>   |
| 4   | <p>If a tftp server application is <i>not</i> available on the LMF computer, skip to step 23.</p>   |
| 5   | <p>If a tftp server <i>is</i> available on the LMF computer, connect the Ethernet <i>crossover</i> cable as shown in Figure I-4.</p>  |
| 6   | <p>If it has not been done, configure the LMF computer NIC as directed in Table I-4.</p>  |

. . . continued on next page

**Table I-12:** Use CF Memory Card Reader to Place IOS File  
First in CF Memory Card File Sequence

| Step | Action   |
|------|--|
| 7    | Configure FE port FE 0 (fa0/0) by performing the following:  |
| 7a   | <ul style="list-style-type: none"> <li>– At the Router&gt; <i>user</i> EXEC mode prompt, enter the following to access the <i>privileged</i> EXEC mode:<br/><b>enable</b></li> </ul> <p>A response similar to the following will be displayed:</p> <pre>Router&gt;enable Router#</pre>   |
| 7b   | <ul style="list-style-type: none"> <li>– At the Router# <i>privileged</i> EXEC mode prompt, enter the following to access the <i>configure</i> submode:<br/><b>configure terminal</b></li> </ul> <p>A response similar to the following will be displayed:</p> <pre>Router#conf t Enter configuration commands, one per line. End with CNTL/Z. Router(config)#</pre>   |
| 7c   | <ul style="list-style-type: none"> <li>– At the global configuration mode prompt, type each of the following commands, pressing the <b>Enter</b> key after each command:<br/><b>hostname btsrtr1</b><br/><b>interface fa0/0</b><br/><b>ip address 100.100.100.2 255.255.255.252</b><br/><b>speed 100</b><br/><b>duplex full</b><br/><b>no shutdown</b><br/><b>line con 0</b><br/><b>exec-timeout 0 0</b><br/><b>no login</b><br/><b>line vty 0 4</b><br/><b>no login</b></li> </ul> <p>Responses similar to the following will be displayed:</p> <pre>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)#</pre> |
| 7d   | <ul style="list-style-type: none"> <li>– Once the correct parameters have been set, return to the privileged EXEC mode prompt by holding down the <b>Ctrl</b> key and pressing <b>z</b> (<b>Ctrl+z</b>). A response similar to the following will be displayed:</li> </ul> <pre>BTSRTR1(config-line)# ^z 01:11:27: %SYS-5-CONFIG_I: Configured from console by console BTSRTR1#</pre>  |

... continued on next page

**Table I-12:** Use CF Memory Card Reader to Place IOS File  
First in CF Memory Card File Sequence

| Step | Action  |
|------|---|
| 7e   | <p>– Verify port FE 0 (fa0/0) is configured with the correct IP address by entering the following:<br/><b>show ip interface brief</b></p> <p>A response similar to the following will be displayed:</p> <pre>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#</pre> |
| 8    | Be sure the required IOS file and canned configuration file for the BTS router are located in the tftp server root directory (refer to Table I-4, step 14 or step 17, as applicable)  |
| 9    | <p>Delete files from the CF memory card by entering the <b>del filename</b> command. A response similar to the following will be displayed:</p> <pre>Router#del canned-config Delete filename [canned-config]?</pre>  |
| 10   | <p>If the default filename displayed in the prompt is correct, press the <b>Enter</b> 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:</p> <pre>Delete filename [canned-config]? Delete slot0:canned-config? [confirm]</pre>   |
| 11   | <p>Press the <b>Enter</b> key to confirm the deletion.</p> <p>A response similar to the following will be displayed if the default filename is selected:</p> <pre>Delete filename [canned-config]? Delete slot0:canned-config? [confirm] Router#</pre>  |
| 12   | <p>Confirm the file deletion by entering the <b>dir</b> command. A response similar to the following will be displayed:</p> <pre>Router#dir Directory of slot0:/   1  -rw-      7051976   Sep 23 2002 07:24:18  mwr1941-i-mz.122-8.MC2a.bin  31932416 bytes total (24887818 bytes free) Router#</pre>   |
| 13   | Repeat steps 9 through 12 for each file until <i>all</i> files have been deleted from the CF memory card.   |

... continued on next page



**Table I-12:** Use CF Memory Card Reader to Place IOS File  
First in CF Memory Card File Sequence

| Step | Action   |
|------|--|
| 17   | <p>Display the directory of the CF memory card to confirm the IOS file transfer by entering the <b>dir</b> command. A response similar to the following will be displayed:</p> <pre>Router#dir Directory of slot0:/   1  -rw-      7051976   Sep 23 2002 07:24:18  mwr1941-i-mz.122-8.MC2a.bin  31932416 bytes total (248880440 bytes free) Router#</pre>  |
| 18   | <p>Copy the canned configuration file to the CF memory card by entering the following:</p> <p><b>copy tftp:btsrtr_canned.color slot0:canned-config</b></p> <p>Where <i>color</i> = <b>blue</b> or <b>red</b>, as applicable.</p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#copy tftp:btsrtr_canned.blue slot0:canned-config Address or name of remote host [100.100.100.1]?</pre>                                   |
| 19   | <p>If the default IP address for the LMF computer displayed in the prompt is correct, press the <b>Enter</b> key to accept it. If it is missing or not correct, enter the correct IP address.</p> <p>A response similar to the following will be displayed if the default filename is accepted:</p> <pre>Destination filename [canned-config]? 2212 bytes copied in 0.208 secs Router#</pre>   |
| 20   | <p>At the prompt for the destination filename, press the <b>Enter</b> key. A response similar to the following will be displayed:</p> <pre>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#</pre> |
| 21   | <p>Determine if the IOS file is now the first file displayed in the directory listing by entering the <b>dir</b> command. A response similar to the following will be displayed:</p> <pre>Router#dir Directory of slot0:/   1  -rw-      7051976   Mar 01 1993 00:14:48  mwr1941-i-mz.122-8.MC2a.bin  2  -rw-         2212   Sep 23 2002 07:24:18  canned-config  31932416 bytes total (24878228 bytes free) Router#</pre>                           |
| 22   | <p>If the IOS file is the first file displayed, as shown in step 21, above, proceed to step 30.</p>  |

... continued on next page

**Table I-12:** Use CF Memory Card Reader to Place IOS File  
First in CF Memory Card File Sequence

| Step | Action  |
|------|---|
| 23   | <p>If the IOS <i>is not</i> the first file displayed, as shown in step 2, above, format the CF memory card by entering the following:</p> <p><b>format slot0:</b></p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#format slot0: Format operation may take a while. Continue? [confirm]</pre>   |
| 24   | <p>Press the <b>Enter</b> key to continue the format operation. A response similar to the following will be displayed:</p> <pre>Format operation may take a while. Continue? [confirm] Format operation will destroy all data in "slot0:". Continue? [confirm]</pre>  |
| 25   | <p>Press the <b>Enter</b> key to continue the format operation. A response similar to the following will be displayed:</p> <pre>Format operation will destroy all data in "slot0:". Continue? [confirm] Format: Drive communication &amp; 1st Sector Write OK... Writing Monlib sectors..... ..... 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#</pre> |
| 26   | <p>If a tftp server <i>is</i> available on the LMF computer, repeat steps 14 through 22 to transfer the IOS and canned configuration files to the CF memory card.</p>   |
| 27   | <p>Once the format operation is completed, remove the CF memory card from the router following the procedure in the <i>1X SC 4812T-MC BTS FRU Guide</i>, insert it in the card reader connected to the LMF computer, and copy the IOS file to the card by performing step 4 and steps 6 through 11 of Table I-11, as required.</p>  |
| 28   | <p>Remove the CF memory card from the card reader and install it in the router following the procedure in the <i>BTS FRU Guide</i>.</p>   |
| 29   | <p>Be sure that the IOS file is now the first file displayed in the directory listing by entering the <b>dir</b> command. A response similar to the following will be displayed:</p> <pre>Router#dir Directory of slot0:/   1  -rw-      7051976   Sep 23 2002 07:24:18  mwr1941-i-mz.122-8.MC2a.bin  2  -rw-         2212   Mar 01 1993 00:14:48  canned-config  31932416 bytes total (24885606 bytes free) Router#</pre>  |
| 30   | <p>If this procedure was entered from step 5 of Table I-9, return to Table I-9, step 6.</p>   |

... continued on next page

**Table I-12:** Use CF Memory Card Reader to Place IOS File  
First in CF Memory Card File Sequence

| Step | Action   |
|------|--|
| 31   | If this procedure was entered from step 20 of Table I-11, return to Table I-11, step 21.   |
| 32   | If no other BTS router file operations or configuration actions are required, perform the following:   |
| 32a  | – Remove power from the router and disconnect it from the power supply.  |
| 32b  | – Disconnect all cabling from the BTS router.  |
| 32c  | – On the LMF computer, exit the HyperTerminal communications session.  |
| 33   | <p>If a tftp server was used in this procedure and 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 9b.</p> <p><b>CAUTION</b></p> <p>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.</p> |





# 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, 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.

## Equipment and Software Required for Verification

The following items are required to perform rommon verification:

- A *Windows*-based computer which meets the requirements of the LMF computer platform as specified in *this manual*.
- One of the following operating systems for the *Windows*-based computer:
  - *Windows* 2000
  - *Windows* 98 Second Edition (SE) using the *FAT32* file system

|                |   |
|----------------|---|
| <b>CAUTION</b> | BTS router CF memory cards loaded using computers equipped with <i>Windows</i> 98 versions earlier than <i>Windows</i> 98 SE and using the <i>FAT16</i> 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
- A copy of the MWR 1941 router rommon version required for the network where the routers are to be installed

|             |   |
|-------------|---|
| <b>NOTE</b> | Contact the network administrator or the Motorola Account Team for assistance in determining and obtaining a copy of the required rommon version. |
|-------------|---|

- A +27 Vdc power supply to power the BTS router during configuration file operations

## Required Publications

The following publication is required to perform procedures in this section:

- *MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78-13983-01*

## Method 1: In-Router Verification and 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. Replace the rommon version installed in a BTS router

### Additional required equipment/software

For this method, the following equipment and software application is required in addition to the common items required for both methods:

- 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 tftp server software application (refer to the Setting Up the TFTP Server – Procedure in *Cellular System Administration – CDMA OnLine Documentation, Release 2.16.1*) such as:
  - Cisco tftp server
  - PumpKIN tftp server
  - Any other equivalent tftp server application

### 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 replacing installed rommon version

Follow the procedure in Table I-13 to verify and, if necessary, replace the installed rommon version using the tftp server application.

**Table I-13:** Verify and Replace Installed rommon Version Using a tftp Server

| Step | Action   |
|------|--|
|      | <p><b>* IMPORTANT</b></p> <p>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 <i>MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78-13983-01</i>. Have this publication available for reference while performing this procedure.</p>  |
| 1    | <p>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.</p>  |
| 2    | <p>Determine the currently installed rommon version by entering the following at the router <i>privileged EXEC</i> mode prompt:</p> <p><b>show version</b></p> <p>A response similar to the following will be displayed:</p> <pre> BTSRTR1#sh ver Cisco Internetwork Operating System Software IOS (tm) 1941 Software (MWR1941-I-M), Version 12.2(8)MC2b, EARLY DEPLOYMENT 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: 1941 Software (MWR1941-I-M), Version 12.2(8)MC2b, EARLY DEPLOYMENT RELEASE SOFT- WARE (fc3)  Router uptime is 1 minute System returned to ROM by power-on System image file is "slot0:mwr1941-i-mz.122-8.MC2b.bin"  cisco mwr1941 (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> |
| 3    | <p>To determine the currently installed rommon version, examine the ROM: System Bootstrap line in the response.</p>  |

... continued on next page

**Table I-13:** Verify and Replace Installed rommon Version Using a tftp Server

| Step | Action   |
|------|--|
| 4    | <p>Compare the installed rommon version information with the filename of the rommon version required for the network.</p> <p><b>NOTE</b></p> <ol style="list-style-type: none"> <li>Rommon filename format is similar to the following:<br/><b>MWR1941_RM2.srec.122-8r.MC3.bin</b></li> <li>The rommon filename reflects the version number of the software (122-8r.MC3).</li> </ol>   |
| 5    | <p>If the installed version is the one required for the network skip to step 26.</p>   |
| 6    | <p>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:</p> <p><b>copy nvram:startup-config tftp</b></p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#copy nvram:start tftp Address or name of remote host []?</pre> <p><b>NOTE</b></p> <p>Be sure to include the colon (:) after <b>nvram</b> when typing the command.</p> |
| 7    | <p>At the prompt for the remote host address or name, enter the IP address of the LMF computer NIC:</p> <p><b>100.100.100.1</b></p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#copy copy nvram:start tftp Address or name of remote host []? 100.100.100.1 Source filename [startup-config]?</pre>   |
| 8    | <p>If the default filename displayed in the prompt is correct, press the <b>Enter</b> key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed:</p> <pre>Source filename [startup-config]? Destination filename [startup-config]?</pre>  |
| 9    | <p>If the default filename displayed in the prompt is correct, press the <b>Enter</b> key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed:</p> <pre>Destination filename [startup-config]? ! [OK - 2212/4096 bytes]  2212 bytes copied in 0.152 secs BTSRTR1#</pre>   |

... continued on next page

**Table I-13:** Verify and Replace Installed rommon Version Using a tftp Server

| Step | Action  |
|------|---|
| 10   | <p><b>NOTE</b></p> <p>The IOS defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the <b>cd</b> command. Determine the present working directory by entering <b>pwd</b>. If the present working directory has been changed, enter the command <b>cd slot0:</b> to return to the default setting.</p> <p>Determine the amount of memory available (bytes free) on the CF memory card by entering the <b>dir</b> command. A response similar to the following will be displayed:</p> <pre>BTSRTR1#dir Directory of slot0:/   1  -rw-      7051976   Sep 23 2002 07:24:18  mwr1941-i-mz.122-8.MC2b.bin  2  -rw-         2212   Mar 01 1993 00:14:48  canned-config  31932416 bytes total (24885606 bytes free) Router#</pre> |
| 11   | <p>Be sure there is at least 1 MB (1048580) of free memory.</p> <p><b>NOTE</b></p> <p>A rommon version file requires approximately 0.7 MB.</p>  |
| 12   | <p>Begin to copy the required version of the rommon file from the LMF computer to the BTS router by entering the following:</p> <p><b>copy tftp:new_rommon_filename slot0:</b></p> <p>Where <i>new_rommon_filename</i> = the filename of the required rommon version for the BTS router.</p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#copy tftp:MWR1941_RM2.srec.122-8r.MC3.bin slot0: Address or name of remote host [100.100.100.1]?</pre>  |
| 13   | <p>If the default IP address displayed in the prompt is correct, press the <b>Enter</b> 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:</p> <pre>Address or name of remote host [100.100.100.1]? Source filename [MWR1941_RM2.srec.122-8r.MC3.bin]?</pre>  |
| 14   | <p>If the default filename displayed in the prompt is correct, press the <b>Enter</b> 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:</p> <pre>Source filename [MWR1941_RM2.srec.122-8r.MC3.bin]? Destination filename [MWR1941_RM2.srec.122-8r.MC3.bin]?</pre>   |

. . . continued on next page



**Table I-13:** Verify and Replace Installed rommon Version Using a tftp Server

| Step | Action   |
|------|--|
| 20   | <p>Verify the router has initialized with the new rommon version by entering the following:</p> <p><b>show version</b></p> <p>A response similar to the following partial response will be displayed:</p> <pre>BTSRTR1#sh ver Cisco Internetwork Operating System Software IOS (tm) 1941 Software (MWR1941-I-M), Version 12.2(8)MC2b, EARLY DEPLOYMENT 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)</pre> |
| 21   | <p>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.</p>   |
| 22   | <p>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:</p> <p><b>delete slot0:new_rommon_filename</b></p> <p>Where <i>new_rommon_filename</i> = the filename of the required rommon version copied to the CF memory card in steps 12 through 15, above.</p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#del slot0:MWR1941_RM2.srec.122-8r.MC3.bin Delete filename [MWR1941_RM2.srec.122-8r.MC3.bin]?</pre>   |
| 23   | <p>If the default filename displayed in the prompt is correct, press the <b>Enter</b> 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:</p> <pre>Delete filename [MWR1941_RM2.srec.122-8r.MC3.bin]? Delete slot0:MWR1941_RM2.srec.122-8r.MC3.bin? [confirm]</pre>  |
| 24   | <p>Press the <b>Enter</b> key to confirm the deletion. A response similar to the following will be displayed if the default filename is selected:</p> <pre>Delete filename [MWR1941_RM2.srec.122-8r.MC3.bin]? Delete slot0:MWR1941_RM2.srec.122-8r.MC3.bin? [confirm] BTSRTR1#</pre>   |
|      | <p><b>CAUTION</b></p> <p>In this step, <i>do not delete the IOS and canned-config files</i> 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.</p>  |
| 25   | <p>If additional unnecessary files, such as a backup of the <i>startup-config</i> file, are also on the CF memory card, delete them by repeating steps 22 through 24 for each file.</p>  |
| 26   | <p>If no other BTS router file operations or configuration actions are required, perform the following:</p>  |
| 26a  | <ul style="list-style-type: none"> <li>– Remove power from the router and disconnect it from the power supply.</li> </ul>  |
| 26b  | <ul style="list-style-type: none"> <li>– Disconnect all cabling from the BTS router.</li> </ul>  |
| 26c  | <ul style="list-style-type: none"> <li>– On the LMF computer, exit the HyperTerminal communications session.</li> </ul>  |

. . . continued on next page

**Table I-13:** Verify and Replace Installed rommon Version Using a tftp Server

| Step | Action   |
|------|--|
| 27   | <p>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 9b.</p> <p><b>CAUTION</b><br/>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.</p> |

## Method 2: Verification and Replacement of Installed rommon Version Using a CF Memory Card Reader

### Description

This procedure covers using an LMF computer equipped with a CF memory card reader to perform the following activities:

1. Verify the rommon version loaded and running on a BTS router
2. Replace the rommon version installed in a BTS router

### Additional required equipment/software

For this method, the following equipment item and associated software is required in addition to the common items required for both methods:

- CF memory card *reader* device and software driver for the operating system installed on the LMF computer

**CAUTION** Card readers for other non-volatile, solid-state memory devices such as Smart Media cards will not work with the CF memory cards used in the MWR 1941 routers. Do not attempt to use a card reader intended for another type of memory device.

### Prerequisites

The following are required prior to performing this procedure:

- The LMF computer and BTS router have been prepared for CF memory card reader file transfer and are operating as they would be after performing the procedures in steps 1 through 8 of Table I-8
- A copy of the required rommon version is loaded into the desired directory of the LMF computer

### File operations using a CF memory card reader

Only file transfers should be performed using the CF memory card reader. CF memory card *formatting should be performed in a BTS router* using a HyperTerminal connection. Attempting to format a CF memory card from a *Windows*-based computer using a card reader could result in unpredictable BTS router operation.

**CAUTION** Do not format BTS router CF memory cards using a *Windows*-based computer. Only format CF memory cards in a BTS router.



**Verifying and replacing installed rommon version**

Follow the procedure in Table I-14 to verify and, if necessary replace the installed rommon version using a CF memory card reader.

**Table I-14:** Verify and Replace Installed rommon Version Using a CF Memory Card Reader

| Step               | Action   |
|--------------------|--|
| <b>* IMPORTANT</b> | <p>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 <i>MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78-13983-01</i>. Have this publication available for reference while performing this procedure.</p>  |
| 1                  | <p>This procedure assumes the LMF computer and BTS router are configured, connected, and operating as they would be after performing the procedures in steps 1 through 8 of Table I-8. If necessary, perform these procedures now.</p>   |
| 2                  | <p>Determine the currently installed rommon version by entering the following at the router <i>privileged EXEC</i> mode prompt:</p> <p style="padding-left: 40px;"><b>show version</b></p> <p>A response similar to the following will be displayed:</p> <pre> BTSRTR1#sh ver Cisco Internetwork Operating System Software IOS (tm) 1941 Software (MWR1941-I-M), Version 12.2(8)MC2b, EARLY DEPLOYMENT 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: 1941 Software (MWR1941-I-M), Version 12.2(8)MC2b, EARLY DEPLOYMENT RELEASE SOFT- WARE (fc3)  Router uptime is 1 minute System returned to ROM by power-on System image file is "slot0:mwr1941-i-mz.122-8.MC2b.bin"  cisco mwr1941 (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> |
| 3                  | <p>To determine the currently installed rommon version, examine the ROM: System Bootstrap line in the response.</p>  |

... continued on next page

**Table I-14:** Verify and Replace Installed rommon Version Using a CF Memory Card Reader

| Step | Action   |
|------|--|
| 4    | <p>Compare the installed rommon version information with the filename of the rommon version required for the network.</p> <p><b>NOTE</b></p> <ol style="list-style-type: none"> <li>Rommon filename format is similar to the following:<br/><b>MWR1941_RM2.srec.122-8r.MC3.bin</b></li> <li>The rommon filename reflects the version number of the software (122-8r.MC3).</li> </ol>   |
| 5    | If the installed version is the one required for the network skip to step 25.  |
| 6    | <p><b>NOTE</b></p> <p>The IOS defaults to the CF memory card (slot0:) directory unless the present working directory has been changed using the <b>cd</b> command. Determine the present working directory by entering <b>pwd</b>. If the present working directory has been changed, enter the command <b>cd slot0:</b> to return to the default setting.</p> <p>If the installed rommon version is not the one required for the network, determine the amount of memory available (bytes free) on the CF memory card by entering the following:</p> <p><b>dir</b></p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#dir Directory of slot0:/   1  -rw-      7051976   Sep 23 2002 07:24:18  mwr1941-i-mz.122-8.MC2b.bin  2  -rw-         2212   Mar 01 1993 00:14:48  canned-config  31932416 bytes total (24885606 bytes free) Router#</pre> |
| 7    | <p>Be sure there is at least 1 MB (1048580) of free memory.</p> <p><b>NOTE</b></p> <p>A rommon version file requires approximately 0.7 MB, and space must also be available for a backup of the router's startup-config file.</p>  |
| 8    | <p>Create a backup of the current BTS router configuration on the CF memory card by entering the following:</p> <p><b>copy nvram:startup-config slot:0</b></p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#copy nvram:startup-config slot0: Destination filename [startup-config]?</pre>  |
| 9    | <p>If the default filename displayed in the prompt is correct, press the <b>Enter</b> key to accept it. If it is missing or not correct, enter the correct filename. A response similar to the following will be displayed:</p> <pre>Destination filename [startup-config]? 2212 bytes copied in 4.96 secs (553 bytes/sec) BTSRTR1#</pre>  |
| 10   | Remove the CF memory card from the router by following the procedure in the <i>1X SC 4812T-MC BTS FRU Guide</i> .  |

... continued on next page

**Table I-14:** Verify and Replace Installed rommon Version Using a CF Memory Card Reader

| Step | Action   |
|------|--|
| 11   | Insert the CF memory card into the card reader as specified by the card reader manufacturer's instructions.  |
| 12   | On the LMF computer, click <b>Start &gt; Programs &gt; Windows Explorer</b> to open <i>Windows Explorer</i> .  |
| 13   | <p><b>NOTE</b><br/>The CF memory card reader will appear as a disk drive in <i>Windows Explorer</i> with a disk drive letter and icon.</p> <p>Scroll the <i>left</i>-hand pane of <i>Windows Explorer</i> to locate the icon for the CF memory card.</p>   |
| 14   | In the <i>left</i> -hand pane of <i>Windows Explorer</i> , highlight the CF memory card icon.  |
| 15   | In the <i>right</i> -hand pane, verify the files displayed in step 6, above, appear.   |
| 16   | Scroll the <i>left</i> -hand pane of <i>Windows Explorer</i> to locate the icon for the directory where the required rommon version file is stored.  |
| 17   | <p>In the <i>right</i>-hand pane, highlight the <code>startup-config</code> file on the CF memory card, note its file size, and drag it to the icon for the directory where the required rommon version file is stored.</p> <p><b>NOTE</b><br/>After highlighting the <code>startup-config</code> file in the <i>right</i>-hand pane, it may be necessary to scroll the <i>left</i>-hand pane to see the directory icon where the required rommon version file is stored before dragging the file.</p> |
| 18   | In the <i>left</i> -hand pane, highlight the directory where the required rommon version file is stored.   |
| 19   | In the <i>right</i> -hand pane, verify the <code>startup-config</code> file is in the directory and the file size is the same as the original on the CF memory card.   |
| 20   | <p>In the <i>right</i>-hand pane, highlight the required rommon version file to be transferred to the CF memory card and drag it to the CF memory card disk drive icon.</p> <p><b>NOTE</b><br/>After highlighting the rommon version file in the <i>right</i>-hand pane, it may be necessary to scroll the <i>left</i>-hand pane to see the CF memory card disk drive icon before dragging the file.</p>   |
| 21   | Verify the rommon version file has been copied to the CF memory card by clicking on the CF memory card disk drive icon in the <i>left</i> -hand pane, and being sure that the rommon version file appears in the <i>right</i> -hand pane.  |
| 22   | Click <b>Files &gt; Close</b> to close <i>Windows Explorer</i> .   |
| 23   | Remove the CF memory card with the rommon version file from the card reader.   |
| 24   | Install the CF memory card in the BTS router by following the procedure in the <i>1X SC 4812T-MC BTS FRU Guide</i> .   |
| 25   | Proceed to <b>Replace installed rommon version</b> , below.  |

# Recovery From BTS Router Boot to rommon

## Introduction

### 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:

- IOS file is missing from the CF memory card
- IOS file is not the first file on the CF memory card
- IOS file image on the CF memory card is corrupted
- 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

### 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, but does not support any operations on files beyond viewing directory contents or booting from a specified file. As a result, files can not be copied or deleted when the router is operating on rommon.

### 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 attempted to recover the router from a 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-15 to attempt a simple recovery from a BTS router rommon initialization.

**Table I-15:** Simple Recovery from BTS Router rommon Boot

| Step  | Action   |
|---|--|
| <p><b>* IMPORTANT</b></p> <p>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 <i>MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78-13983-01</i>. Have this publication available for reference while performing this procedure.</p> |  |
| 1   | <p>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.</p>   |
| 2   | <p>With the <code>rommon 1 &gt;</code> prompt displayed in the HyperTerminal window, enter the following to identify the IOS file on the CF memory card:</p> <p><b>dir slot0:</b></p> <p>A response similar to the following will be displayed:</p> <pre>rommon 1 &gt; dir slot0: program load complete, entry point: 0x80008000, size: 0xb2a0 Directory of slot0: 2      2212      -rw-      canned-config 3      7051976   -rw-      mwr1941-i-mz.122-8.MC2a.bin rommon 2 &gt;</pre> |

. . . continued on next page



**Table I-15:** Simple Recovery from BTS Router rommon Boot

| Step | Action  |
|------|---|
| 3    | <p>Note the IOS filename, and enter the following to begin recovery to an IOS boot:</p> <pre><b>boot slot0:IOS_filename</b></pre> <p>Where <i>IOS_filename</i> = the filename of the IOS noted in step 2, above.</p> <p>A successful IOS re-boot operation will result in display of a response which begins and ends similar to the following:</p> <pre>rommon 2 &gt; boot slot0:mwr1941-i-mz.122-8.MC2a.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 MWR1941 Mainboard                 0X000F3BB0 public buffer pools                 0X00211000 public particle pools  TOTAL:          0X008F87B0 . . . Press RETURN to get started!</pre> |
| 4    | If the router successfully reboots with the IOS, proceed to step 7.   |
| 5    | If the router does not reboot with the IOS, perform the following:  |
| 5a   | – Scroll the HyperTerminal display down until the directory display from step 2, above, is visible.   |
| 5b   | – Compare the IOS filename from the directory display with the filename entered in performing step 3, above.  |
| 5c   | – If the filename was typed incorrectly, repeat step 3, using care to type the filename correctly.  |
| 6    | If the router does not reboot with the IOS after typing the filename correctly, proceed to Table I-16 and perform the extended recovery procedure.  |

. . . continued on next page

**Table I-15:** Simple Recovery from BTS Router rommon Boot

| Step | Action   |
|------|--|
|      | <p><b>CAUTION</b></p> <p>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 <i>Windows</i> file managers such as <i>Windows Explorer</i>). This portion of the procedure is intended for use only with applications, such as HyperTerminal, which do not list directory contents alphabetically.</p> |
| 7    | After a successful reboot with IOS, perform the following to correct the cause of the boot to rommon:  |
| 7a   | <ul style="list-style-type: none"> <li>– Enter the <b>dir slot0:</b> command to display the CF memory card directory, and, if the IOS file <i>is not</i> the first file listed, perform the procedure in Table I-10, steps 25 through 32, or Table I-12, as applicable, to correct the situation.</li> </ul>   |
| 7b   | <ul style="list-style-type: none"> <li>– If the IOS file <i>is</i> the first file, enter the following command to display the contents of the startup-config file:<br/> <b>show startup-config</b></li> </ul>  |
|      | <p>A response which begins similar to the following will be displayed:</p> <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:mwr1941-i-mz.07132002.bin no logging console ! username cisco password 0 cisco ! redundancy   mode y-cable   standalone ! </pre>  |
| 7c   | <ul style="list-style-type: none"> <li>– If the file listing contains a “boot system” line, examine it for the correct IOS filename.</li> </ul>  |
| 7d   | <ul style="list-style-type: none"> <li>– If the boot system slot0: filename is incorrect, enter the following, using care to type the filename correctly:<br/> <b>boot system slot0:<i>IOS_filename</i></b></li> </ul>   |
|      | Where <i>IOS_filename</i> = the filename of the IOS noted in step 2, above.  |
| 7e   | <ul style="list-style-type: none"> <li>– Replace the boot system line in the startup-config file with the line entered in step 7d, above, by entering the following:<br/> <b>copy runing-config startup-config</b></li> </ul>  |

. . . continued on next page

**Table I-15:** Simple Recovery from BTS Router rommon Boot

| Step | Action   |
|------|--|
| 7f   | <p>– Verify the correct IOS filename is now included in the listing by entering the following:<br/> <b>show startup-config</b></p> <p>A response which begins similar to the following will be displayed:</p> <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:mwr1941-i-mz.122-8.MC2a.bin no logging console ! username cisco password 0 cisco ! redundancy  mode y-cable  standalone !</pre> |
| 7g   | <p>– If the filename is correctly written, enter the following to determine if the router will reboot to IOS:<br/> <b>reload</b></p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR1#reload  System configuration has been modified. Save? [yes/no]: n Proceed with reload? [confirm]</pre>   |
| 8    | If prompted to save a modified configuration, enter <b>n</b> for “no,” and press the <b>Enter</b> key.   |
| 9    | When prompted to proceed with reload, press the <b>Enter</b> key to continue the reload operation.   |
| 10   | After a successful reboot with IOS, proceed with other BTS router activities or remove power from the router and disconnect it   |
| 11   | If the router still will not successfully boot with IOS, proceed to Table I-16 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-15 to perform an extended recovery from a BTS router rommon initialization.

**Table I-16:** 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 the <i>1X SC 4812T-MC BTS FRU Guide</i> .   |
| 3    | Install the additional CF memory card in the router following the procedure in the <i>BTS FRU Guide</i> .  |
| 4    | Enter the following to obtain the filename of the IOS version loaded on the CF memory card:<br><b>dir slot0:</b><br>A response similar to the following will be displayed:<br><pre>rommon 1 &gt; dir slot0: program load complete, entry point: 0x80008000, size: 0xb2a0  Directory of slot0:  1      7051976  -rw-   mwr1941-i-mz.122-8.MC2a.bin  rommon 2 &gt;</pre> |
| 5    | Note the exact filename displayed for the IOS version.   |

... continued on next page

**Table I-16:** Extended Recovery from BTS Router rommon Boot

| Step | Action  |
|------|---|
| 6    | <p>Enter the following to initialize the router with the IOS on the additional CF memory card:</p> <p><b>boot slot0:IOS_filename</b></p> <p>Where <i>IOS_filename</i> = the filename of the IOS noted in step 5, above.</p> <p>A successful IOS re-boot operation will result in display of a response which begins and ends similar to the following:</p> <pre>rommon 2 &gt; boot slot0:mwr1941-i-mz.122-8.MC2a.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 MWR1941 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</pre> |
| 7    | If the router prompts with a question to enter the initial dialog as shown in step 6, above, type <b>no</b> and press the <b>Enter</b> key to obtain the user EXEC mode prompt.   |
| 8    | If the router prompts with <code>Press RETURN to get started!</code> , press the <b>Enter</b> key to obtain the user EXEC mode prompt.  |
| 9    | <p>At the user EXEC mode prompt, enter the following to access the privileged EXEC mode:</p> <p><b>enable</b></p> <p>A response similar to the following will be displayed:</p> <pre>Router&gt; enable Router#</pre>  |
| 10   | Remove the additional CF memory card from the BTS router following the procedure in the <i>1X SC 4812T-MC BTS FRU Guide</i> .   |
| 11   | Install the <i>original</i> CF memory card in the router following the procedure in the BTS FRU Guide.  |

. . . continued on next page

**Table I-16:** Extended Recovery from BTS Router rommon Boot

| Step | Action   |
|------|--|
| 12   | Format the <i>original</i> CF memory card by entering the following:<br><b>format slot0:</b><br>A response similar to the following will be displayed:<br><pre>Router#format slot0: Format operation may take a while. Continue? [confirm]</pre>   |
| 13   | Press the <b>Enter</b> key to continue the format operation. A response similar to the following will be displayed:<br><pre>Format operation may take a while. Continue? [confirm] Format operation will destroy all data in "slot0:". Continue? [confirm]</pre>   |
| 14   | Press the <b>Enter</b> key to continue the format operation. A response similar to the following will be displayed:<br><pre>Format operation will destroy all data in "slot0:". Continue? [confirm] Format: Drive communication &amp; 1st Sector Write OK... Writing Monlib sectors..... ..... 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#</pre> |
| 15   | Copy the required IOS version to the formatted original CF memory card by performing <i>one</i> of the following: <ul style="list-style-type: none"> <li>• Use the LMF computer and a tftp server following the procedure in Table I-10</li> <li>• Use the LMF computer and a CF memory card reader following the procedure in Table I-11</li> </ul>   |
| 16   | If applicable, perform IOS initialization troubleshooting as described in Table I-15, steps 7 through 10.  |



## Entering or Changing Router FE Interface IP Address

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 *MWR1941 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-17.

| Table I-17: Enter/Change BTS Router FE Interface IP Addresses & Operating Parameters  |   |
|---|---|
| Step  | Action  |
| <b>* IMPORTANT</b>  |   |
| 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 <i>MWR1941 Wireless Mobile Edge Router Software Configuration Guide; part number 78-13983-01</i> . 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-17: Enter/Change BTS Router FE Interface IP Addresses & Operating Parameters**

| Step | Action  |
|------|---|
| 4    | <p><b>NOTE</b></p> <p>Examples in this procedure show prompts for <code>BTSRTR-bts#-1-1</code> and <code>BTSRTR-bts#-1-2</code>, but the procedure can be used for any router in any BTS router group or a router running the canned configuration file (<code>BTSRTR1</code> or <code>BTSRTR2</code>).</p> <p>At the <code>BTSRTR-bts#-1-1&gt;</code> user EXEC mode prompt, enter the following to access the privileged EXEC mode:</p> <p><b>enable</b></p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR-bts#-1-1&gt; enable Password:</pre>  |
| 5    | <p>Enter the privileged EXEC mode password. A response similar to the following will be displayed:</p> <pre>BTSRTR-bts#-1-1&gt; enable Password: BTSRTR-bts#-1-1#</pre>   |
| 6    | <p>At the <code>BTSRTR-bts#-1-1#</code> privileged EXEC mode prompt, display the FE interface IP addresses by typing:</p> <p><b>show ip interface brief</b></p> <p>A response similar to the following will be displayed:</p> <pre>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#</pre> |
| 7    | <p>For a <code>FastEthernet0/0</code> (<code>fa0/0</code>) or <code>FastEthernet0/1</code> (<code>fa0/1</code>) 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:</p> <p><b>configure terminal</b></p> <p>A response similar to the following will be displayed:</p> <pre>BTSRTR-bts#-1-1# conf t Enter configuration commands, one per line. End with CNTL/Z. BTSRTR-bts#-1-1(config)#</pre>  |

... continued on next page

**Table I-17: Enter/Change BTS Router FE Interface IP Addresses & Operating Parameters**

| Step | Action  |
|------|---|
| 8    | <p>At the global configure mode prompt, enter the following to access the configure interface submode for the interface requiring IP address assignment/change:</p> <pre><b>interface fastethernetinterface#</b></pre> <p>Where <i>interface#</i> = 0/0 or 0/1, as applicable.<br/>A response similar to the following will be displayed:</p> <pre>BTSRTR-bts#-1-1(config)# int fa0/1</pre> <pre>BTSRTR-bts#-1-1(config-if)#</pre>  |
| 9    | <p>At the configure interface submode prompt, assign or change the interface IP address by entering:</p> <pre><b>ip address IP_addr subnet_mask</b></pre> <p>Where:<br/><i>IP_addr</i> = the required IP address for the interface; for example, 192.168.147.1<br/><i>subnet_mask</i> = the required subnet mask for the interface; for example, 255.255.255.0<br/>A response similar to the following will be displayed:</p> <pre>BTSRTR-bts#-1-1(config-if)# ip address 192.168.147.1 255.255.255.0</pre> <pre>BTSRTR-bts#-1-1(config-if)#</pre>  |
| 10   | <p>To complete configuration of the interface, enter the following parameter settings, one at a time, pressing <b>Enter</b> after each:</p> <pre><b>duplex full</b></pre> <pre><b>speed 100</b></pre> <pre><b>keepalive 1</b></pre> <pre><b>no shutdown</b></pre>   |
| 11   | <p>Return to the global configuration mode by entering the <b>exit</b> command. A response similar to the following will be displayed:</p> <pre>BTSRTR-bts#-1-1(config-if)# exit</pre> <pre>BTSRTR-bts#-1-1(config)#</pre>  |
| 12   | <p>If the IP address and/or parameters for the <i>other</i> FE interface on the router must be assigned or changed at this time, repeat steps 8 through 11 for the other FE interface.</p>  |
| 13   | <p>Once the correct parameters have been set for all FE interfaces, return to the privileged EXEC mode prompt by holding down the <b>Ctrl</b> key and pressing <b>z (Ctrl +z)</b>. A response similar to the following will be displayed:</p> <pre>BTSRTR-bts#-1-1(config-if)# ^z</pre> <pre>01:11:27: %SYS-5-CONFIG_I: Configured from console by console</pre> <pre>BTSRTR-bts#-1-1#</pre> <p><b>NOTE</b><br/>Entering <b>exit</b> twice, pressing the <b>Enter</b> key after each entry, will also complete the interface configuration and return the router to the privileged EXEC mode.</p> |

. . . continued on next page



## BTS Router Canned Configuration File

This section presents listings of the *blue* and *red* router canned configuration file contents for the MWR 1941 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.





**“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

!
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 192.168.146.1 255.255.255.0
 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 MWR 1941 health interface
 standby 1 track Loopback101 10
 ! Track the MWR 1941 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 MWR 1941 health interface
 standby 2 track Loopback101 10
 ! Track the MWR 1941 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
!

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

!
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 MWR 1941 health interface
 standby 1 track Loopback101 10
 ! Track the MWR 1941 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 MWR 1941 health interface
 standby 2 track Loopback101 10
 ! Track the MWR 1941 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
!

line con 0
 exec-timeout 15 0
 password cisco
line aux 0
 login
 password cisco
line vty 0 4
 login
 password cisco

end
```

## Preparation for Site Turn-over

Prepare the BTS site for turn-over to the control of the OMC-R by performing the procedures in Table I-18 and Table I-19.

| <b>Table I-18: Prepare for Site Turn-over</b> |  |
|---|--|
| <b>Step</b>                                   | <b>Action</b>  |
| 1   | After disconnecting it from the BTS router, shut down the LMF computer.  |
| 2   | If any additional external support equipment was used during the installation process, shut it down, disconnect it from the frame.                                 |
| 3   | Account for all tools used and parts removed from the frame during the installation, being sure none were left inside the frame.                                   |
| 4   | Visually inspect the frame for any foreign objects left inside, and remove any discovered.   |
| 5   | Visually inspect all cable connections, ensuring they are connected as required for normal BTS operation.  |
| 6   | Be sure all internal frame cables are routed and secured to prevent damage to them when the frame doors are closed.  |
| 7   | Be sure all external frame and BTS router cables are routed and secured so they will not interfere with normal maintenance and operational activities at the site. |
| 8   | Be sure the BTS routers are powered up and not reporting alarms other than span alarms.  |

## Returning the Site to OMC-R Control

Follow the procedure in Table I-19 to return the site to OMC-R control.

| <b>Table I-19: Returning the Site to Operational Control</b> |  |
|--|--|
| <b>Step</b>  | <b>Action</b>  |
| 1  | Contact the OMC-R, and notify the operator the installation is complete. Request notification from the operator when the routers have been downloaded with the full site-specific configurations and are verified as functioning normally. |
| 2  | When notified router operation has been verified and the OMC-R can assume control of the site, perform the following:  |
| 2a   | – On any frames which were opened, close and secure the cabinet doors.   |
| 2b   | – Verify no alarm conditions are being reported to the OMC-R with the frame doors closed.  |
| 2c   | – Prepare all equipment, tools, and parts removed from the frame for transport from the site.  |

## What to Do Next

The installation of the Packet Backhaul option is complete. When the site is secured, there are no further actions to perform at the BTS site.



---

# *Index*

## Numbers

- 10BaseT/10Base2 Converter, [1-9](#)
  - LMF to BTS connection, [3-16](#)
- 2-way Splitter, [1-12](#)
- 3C-PC-COMBO CBL, [1-9](#)
- 800 MHz CDMA Channels, [E-2](#)
- 800 MHz Center Frequencies, Calculating, [E-2](#)

## A

- ACTIVE LED
  - GLI, [6-31](#)
  - MCC, [6-35](#)
- Advantest R3267, GPIB Address, [F-8](#)
- Advantest R3465, [3-50](#)
  - Calibrating Test Cable, [F-2](#), [F-20](#)
- Advantest R3465 Communications Test Set GPIB Address, [F-12](#)
- Advantest R3562, GPIB Address, [F-9](#)
- Agilent 8935 Series E6380 (formerly HP 8935) Test Set GPIB Address, [F-10](#)
- Agilent E4406A
  - calibration, [F-2](#), [F-23](#)
  - GPIB Address, [F-6](#)
- Agilent E4432B Signal Generator, GPIB Address, [F-7](#)
- Alarm Connector Location/Pin, [3-97](#)
- ALARM LED, GLI, [6-31](#)
- Alarm Monitor window, [3-96](#)
- alarm redundancy tests, BBX, [3-93](#)
- Alarm Reporting Display, [3-96](#)
- Alarm tests, redundancy, [3-89](#)
- Alarm/Redundancy Tests, Distribution Shelf, [3-92](#)
- All RX, [4-5](#)
- All TX, [4-5](#)
- All TX/RX, [4-5](#)
- AMR, No control, [6-17](#)
- AMR CDI Alarm Input Verification, test data sheets, [A-17](#)
- Ancillary frame, when to optimize, [C-2](#)

- ATP, [4-2](#)
  - Code Domain Power, [4-13](#)
  - Frame Error Rate (FER), [4-15](#)
  - generate report, [4-16](#)
  - Pilot Time Offset, [4-12](#)
  - Report, [4-16](#)
  - Spectral Purity Transmit Mask, [4-9](#)
  - test matrix/detailed optimization, [C-3](#)
  - Test Prerequisites, [4-4](#)
  - Test Procedure, [4-7](#)
  - Waveform Quality (rho), [4-11](#)

ATP Setup, TX, [3-63](#)

Automated Acceptance Test Procedure, [4-2](#)

## B

- Backplane DIP switch settings, [2-4](#)
  - Bay Level Offset calibration failure, [6-7](#)
  - BBX
    - alarm redundancy tests, [3-93](#)
    - Connector, [6-15](#)
    - gain set point vs BTS output considerations, [D-2](#)
    - No control in the shelf, [6-17](#)
  - BBX Configurations, [1-31](#)
  - BLO
    - Calibration, [3-76](#)
    - Calibration Audit, [3-86](#)
    - calibration data file, [3-77](#)
    - Calibration Failure, [6-7](#)
    - Download, [3-87](#)
  - Breaker Panel, [2-8](#)
  - BTS
    - Ethernet LAN interconnect diagram, [3-30](#)
    - LMF connection, [3-16](#)
    - system software download, [3-4](#)
    - test data sheets, redundancy/alarm tests, [A-16](#)
    - when to optimize, [C-2](#)
  - BTS frame, initial power-up, [2-11](#)
  - BTS router communication session, establishing, [I-6](#)
  - BTS router connections
    - FE verification, [I-7](#)
    - programming, [I-7](#)
  - Create CAL File, [3-88](#)
  - BTS Site Span Configuration Verification, [5-5](#)
- ## C
- C-CCP Backplane, Troubleshooting, [6-14](#), [6-15](#)

- C–CCP Shelf, [1-29](#)
  - Site Serial Number Check List, [A-18](#)
- Cable
  - GPIB, [1-11](#)
  - LAN Cable, [1-11](#)
  - Calibrating, [3-70](#)
  - Null Modem, [3-41](#)
  - Setting Loss Values, [3-74](#)
  - Timing Reference, [1-11](#)
- Cable Calibration, Manual, [3-53](#)
- Cable Calibration Set–up, Automatic, [3-53](#)
- CAL File, [3-88](#)
- Calculating Center Frequencies, 800 MHz, [E-2](#)
- Calibrate Test Cabling, Communications System Analyzer, [3-71](#)
- Calibrating
  - Cables, [3-70](#)
  - Test Equipment, [3-69](#)
- Calibrating Test Cable, Advantest R3465, [F-2](#), [F-20](#)
- Calibrating Test Cabling, Signal Generator & Spectrum Analyzer, [3-72](#)
- Calibration
  - BLO, [3-76](#)
  - Cable, [1-7](#)
  - data file, BLO, [3-77](#)
  - RF Path, Test Equipment Setup, [3-80](#)
  - Test Equipment, [1-7](#)
  - TX Path, [3-77](#), [3-80](#)
- Test Cable Calibration, [1-7](#)
- Test Equipment Calibration, [1-7](#)
- calibration, Gigatronics 8542B, [F-2](#), [F-26](#)
- Calibration Audit Failure, Troubleshooting, [6-8](#)
- Calibration Procedures Included, Automatic, [3-65](#)
- Cannot communicate to Communications Analyzer, [6-4](#)
- Cannot communicate to Power Meter, [6-3](#)
- Cannot download CODE to any device card, [6-5](#)
- Cannot Download DATA to any device card, [6-5](#)
- Cannot ENABLE device, [6-6](#)
- Cannot load BLO, [6-8](#)
- Cannot Log into cell–site, [6-3](#)
- Cannot perform Code Domain Noise Power measurement, [6-10](#)
- Cannot perform Rho or pilot time offset measurement, [6-9](#)
- Cannot perform Txmask measurement, [6-9](#)
- CDF, [3-3](#)
  - site equipage verification, [3-4](#)
  - site type and equipage data information, [2-2](#)
- CDF Files, Copy from CBSC, [3-10](#)
- CDI Alarm
  - with Alarms Test Box, [3-98](#)
  - without Alarms Test Box, [3-100](#)
- CDMA LMF, Product Description, [1-8](#)
- Cell Site
  - equipage verification, [2-2](#)
  - preliminary operations, [2-2](#)
  - types, [3-3](#)
- Cell Site Data File. *See* CDF
- Channel elements, No or missing, [6-18](#)
- Channels, 800 MHz, [E-2](#)
- Checksum Failure, [6-12](#)
- CLI, [3-22](#)
  - Command Line Interface, [3-17](#)
  - Format Conventions, [3-23](#)
  - Logging Out, [3-28](#)
- CLPA, [1-15](#)
- Code Domain Power, [4-6](#)
  - ATP, [4-13](#)
- Code Domain Power and Noise Floor Measurement Failure, Troubleshooting, [6-10](#)
- Code Domain Power Test, [4-13](#)
- Code Download Failure, Troubleshooting, [6-5](#)
- Command Line Interface, [3-22](#)
- command terminal, settings, [I-3](#)
- Common power supply verification, [2-10](#)
- Communications Analyzer Communication Failure, Troubleshooting, [6-4](#)
- Communications System Analyzer, [1-10](#)
- communications test set, TX acceptance tests, [4-4](#)
- Connector Functionality, Backplane, Troubleshooting, [6-14](#)
- Copy and Load Cal File to to CBSC, [5-2](#)
- Copy CAL files from CDMA LMF to the CBSC, [5-2](#)
- Copy CAL Files From Diskette to the CBSC, [5-3](#)
- Copy CDF Files from CBSC, [3-10](#)
- Copy Files to a Diskette, [5-2](#)



Copy CAL files to the CBSC, [5-3](#)

## CSM

- Clock Source, [3-36](#)
- Enable, [3-37](#)
- frequency verification, [3-41](#)
- functions, [3-39](#)
- LEDs, [3-39](#)
- MMI terminal connection, illustration, [3-43](#)
- redundancy/alarm tests, [3-94](#)
- Reference Source Configuration Error, [6-12](#)
- Troubleshooting, [6-12](#), [6-13](#)

CyberTest, [3-50](#)

## D

- Data Download Failure, Troubleshooting, [6-5](#)
- DC Power Pre–test, BTS Frame, [2-6](#)
- DC Power Problems, [6-19](#)
- DC/DC Converter, LED Status Combinations, [6-28](#)
- Device Enable (INS) Failure, Troubleshooting, [6-6](#)
- Digital Control Problems, C–CCP Backplane Troubleshooting, [6-16](#)
- Digital Multimeter, [1-11](#)
- Directional Coupler, [1-11](#)
- Distribution shelf, alarm/redundancy tests, [3-92](#)
- Download
  - BLO, [3-87](#)
  - BTS, [3-32](#)
  - BTS system software, [3-4](#)
  - Non–GLI2 Devices, [3-35](#)
  - ROM Code, [H-2](#)

## E

- E4406A, calibration, [F-2](#), [F-23](#)
- Enable
  - CSMs, [3-37](#)
  - MCCs, [3-38](#)
  - Redundant GLIs, [3-38](#)
- enhanced trunking modules, [1-30](#)
- Equipment setup, VSWR, HP Test Set, [G-3](#)

- Ethernet LAN
  - interconnect diagram, [3-30](#)
  - Transceiver, [1-9](#)
- Ethernet maintenance connector interface, illustration, [3-16](#)
- ETM, [1-30](#)
- External Test Equipment Removal, [5-4](#)

## F

- FER test, [4-15](#)
- Folder Structure Overview, [3-7](#)
- Foreword, [xviii](#)
- Frame Error Rate, [4-6](#)
  - ATP, [4-15](#)
- FREQ Monitor Connector, CSM, [6-30](#)
- Frequency counter, optional test equipment, [1-12](#)
- Frequency Spectrum, North American Cellular Telephone System (800 MHz), [E-2](#)
- Full Optimization, [4-5](#)

## G

- Gain set point, BBX, [D-2](#)
- General Safety, [xx](#)
- Generating an ATP Report, [4-16](#)
- General optimization checklist, test data sheets, [A-5](#)
- Gigatronics 8542 power meter, calibration, [F-2](#), [F-26](#)
- Gigatronics 8542B power meter, illustration, [F-15](#)
- Gigatronics Power Meter, [3-50](#)
- GLI
  - See also* Master (MGLI2) and Slave (SGLI2) Group Line Interface
  - LED Status, [6-31](#)
  - No Control through span line connection, [6-16](#)
  - No Control via LMF, [6-16](#)
- GLI2
  - Connector, [6-15](#)
  - Ethernet Connections, [6-15](#)
- GLI3 Front Panel, [6-32](#), [6-33](#)
- GPIB
  - power meter
    - Gigatronics 8542B, [F-15](#)

- HP437B, [F-14](#)
- set address, Motorola CyberTest, [F-13](#)
- GPIB Cable, [1-11](#)
- GPIB Address
  - Advantest R3267, [F-8](#)
  - Advantest R3465, [F-12](#)
  - Advantest R3562, [F-9](#)
  - Agilent (formerly HP) 8935, [F-10](#)
  - Agilent E4406A, [F-6](#)
  - Agilent E4432B, [F-7](#)
  - Hewlett Packard HP8921a & HP83236A/B, [F-11](#)
- GPS
  - Initialization/Verification, [3-44](#)
  - receiver operation, test data sheets, [A-6](#)
  - redundancy alarm tests, [3-94](#)
  - satellite system, [3-37](#)
  - Test Equipment Setup, [3-42](#)
- GPS Bad RX Message Type, [6-12](#)
- Graphical User Interface, [3-18](#)
- GUI, [3-18](#)
  - Graphical User Interface, [3-17](#)
  - Logging Out, [3-27](#)
- H**
- LMF Hardware Requirements, [1-8](#)
- Hewlett Packard HP8921A and HP83236A/B GPIB Address, [F-11](#)
- High Stability 10 MHz Rubidium Standard, [1-12](#)
- High-impedance Conductive Wrist Strap, [1-11](#)
- HP 437, Pre-calibration, [F-2](#), [F-24](#)
- HP 437B, [3-50](#)
- HP 83236A, [F-18](#)
- HP 8921, [3-50](#)
- HP 8921A, System Connectivity Test, [F-2](#), [F-18](#)
- HP 8935, [3-50](#)
- HP PCS Interface Test Equipment Setup for Manual Testing, [F-2](#), [F-19](#)
- HP Test Set, VSWR, [G-3](#)
- HSO
  - Initialization/Verification, [3-48](#)
  - redundancy/alarm tests, [3-94](#)
- HyperTerminal Connection, Creating, [3-12](#)
- I**
- I and Q values, [B-2](#)
- Initial Installation of Boards/Modules, preliminary operations, [2-3](#)
- Initial power tests, test data sheets, [A-4](#)
- Initial power-up, BTS frame, [2-11](#)
- Initialization/Verification
  - GPS, [3-44](#)
  - HSO, [3-48](#)
- Intended reader profile, [1-13](#)
- Inter-frame cabling, when to optimize, [C-3](#)
- IP Addresses, Agilent E7495A, [3-66](#)
- IS-97 specification, [B-2](#)
- ISB connectors, [6-14](#)
- Isolate BTS from T1/E1 Spans, [3-15](#)
- Itasca Alarms Test Box, [1-12](#)
- L**
- 1 TX ATP Setup, [3-63](#)
- LAN
  - BTS frame interconnect, illustration, [3-30](#)
  - Tester, [1-12](#)
- LAN Connectors, GLI, [6-32](#)
- LED, CSM, [3-39](#)
- LED Status, [6-28](#)
  - BBX, [6-34](#)
  - CSM, [6-29](#)
  - DC/DC Converter, [6-28](#)
  - GLI, [6-31](#)
  - MCC, [6-35](#)
  - PA, [6-34](#)
- LFR, redundancy/alarm tests, [3-94](#)
- LFR/HSO, Test Equipment Setup, [3-42](#)
- LIF, Load Information File, [3-8](#)
- Line Build Out parameters
  - configure, [5-6](#)
  - verify, [5-5](#)
- LMF, [3-5](#)
  - 1X FER acceptance test, [4-4](#)
  - Ethernet maintenance connector interface detail, illustration, [3-16](#)
  - Installation and Update Procedures, [3-9](#)
  - Termination and Removal, [5-8](#)
    - to BTS connection, [3-16](#)
    - TX acceptance tests, [4-4](#)
- LMF BTS displays, [3-17](#)
- LMF Home Directory, [3-7](#)

LMF Operation, [3-17](#)  
 LMF Removal, [5-8](#)  
 Load Information File, [3-8](#)  
 Loading Code, [3-32](#)  
 Logging In to a BTS, [3-24](#)  
 Logging Out, [3-27](#)  
   CLI, [3-28](#)  
   GUI, [3-27](#)  
 Logical BTS, [1-18](#)  
   Numbering, [1-18](#)  
 Login  
   CLI, [3-26](#)  
   GUI, [3-24](#)  
 Login Failure, Troubleshooting, [6-3](#)

**M**

Manual  
   layout, [1-2](#)  
   overview, [1-3](#)  
 MASTER LED, GLI, [6-31](#)  
 MCC, Enable, [3-38](#)  
 MCIO, Connectors, [6-15](#)  
 MCM, [1-30](#)  
 MGLI, redundancy test RFM frame, [3-95](#)  
 MGLI2, board detail, MMI port connections, [5-6](#)  
 Miscellaneous errors, Troubleshooting, [6-6](#)  
 MMI Connection, [3-29](#)  
 MMI Connector  
   CSM, [6-30](#)  
   GLI, [6-32](#)  
   MCC, [6-35](#)  
 MMI equipment setup, [3-29](#)  
 Module status indicators, [6-28](#)  
 Multi-FER test Failure, Troubleshooting, [6-11](#)  
 multicarrier module, [1-30](#)

**N**

NECF, [3-3](#)  
 No DC input voltage to Power Supply Module, [6-19](#)  
 No DC voltage +5 +65 or +15 Volts to a specific GLI, BBX, or Switch board, [6-20](#)  
 No GPS Reference Source, [6-12](#)

Non-GLI2, Download, [3-35](#)

Null Modem Cable, [3-41](#)

## O

Online Help, [3-17](#), [3-29](#)

Optimization  
   Process, [3-2](#)  
   purpose, [1-4](#)  
   When, [1-6](#)

Optimization/ATP Setup, [3-60](#)

Optional Test Equipment, [1-12](#)  
   frequency counter, [1-12](#)

Oscilloscope, [1-12](#)

## P

PA, test data sheets  
   convergence, [A-8](#)  
   IM Reduction, [A-7](#)

PA Configurations, 32 W, [1-31](#)

PA Module LED, [6-34](#)

PA Shelves, [1-30](#)

Parallel Linear amplifier Combiners, [1-30](#)

PAs, Site Serial Number Check List, [A-19](#)

path  
   RX, [1-4](#)  
   TX, [1-4](#)

PCMCIA, Ethernet adapter, LMF to BTS connection, [3-16](#)

Pilot Gain, [4-11](#), [4-12](#), [4-13](#), [4-15](#)

Pilot Offset Acceptance test, [4-12](#)

Pilot Time Offset, [4-6](#), [4-12](#)

Pin/Signal Information for ARM A Cable, [3-102](#)

Ping, [3-30](#)

PLC, [1-30](#)

PN Offset  
   programming information, [B-2](#)  
   usage, [B-2](#)

PnMask, I and PnMask Q Values, [B-3](#)

Power Input, [6-14](#)

Power Meter, illustration, [F-14](#)

Power meter  
   GPIB  
     Gigatronics 8542B, [F-15](#)  
     HP437B, [F-14](#)

- illustration, Gigatronics 8542B, [F-15](#)
- TX acceptance tests, [4-4](#)
- Power Meter Communication Failure, Troubleshooting, [6-3](#)
- Power supply, converter redundancy, [3-91](#)
- Power Supply Interface, [6-15](#)
- power supply/converter redundancy, [3-91](#)
- Pre-calibration, HP 437, [F-2](#), [F-24](#)
- Pre-power tests, test data sheets, [A-4](#)
- Preliminary operations
  - cell Site types, [2-2](#)
  - test data sheets, [A-3](#)
- Prepare to Leave the Site
  - BTS Site Span Configuration Verification, [5-5](#)
  - External Test Equipment Removal, [5-4](#)
  - LMF Removal, [5-8](#)
  - Re-connect BTS T1/E1 Spans and Integrated Frame Modem, [5-9](#)
  - Reset All Devices and Initialize Site Remotely, [5-10](#)
  - Set BTS Site Span Configuration, [5-6](#)
- Pushbuttons and Connectors, GLI, [6-32](#)
- PWR/ALM LED
  - BBX, [6-34](#)
  - CSM, [6-29](#)
  - DC/DC Converter, [6-28](#)
  - generic, [6-28](#)
  - MCC, [6-35](#)
- R**
- RDM, [6-14](#)
- Re-connect BTS T1/E1 Spans, [5-9](#)
- Re-connect Integrated Frame Modem, [5-9](#)
- Reduced ATP, [4-3](#), [6-9](#)
- redundancy/alarm tests, [3-89](#)
- Redundant GLIs, Enable, [3-38](#)
- Reference Distribution Module, [6-14](#)
- Required documents, [1-13](#)
- Required test equipment, communications system analyzer, [1-10](#)
- Reset All Devices and Initialize Site Remotely, [5-10](#)
- RESET Pushbutton, GLI, [6-32](#)
- Revision History, [xxii](#)
- RF
  - Adapters, [1-11](#)
  - Load, [1-11](#)
- RF Path Calibration, [3-80](#)
- rho, [4-6](#)
- rho test, [4-11](#)
- ROM Code, Download, [H-2](#)
- RS-232 to GPIB Interface, [1-9](#)
- RS232 GPIB Interface Box, [F-16](#)
- RX, antenna VSWR, test data sheets, [A-17](#)
- RX Acceptance Tests, Frame Error Rate, [4-6](#)
- RX ATP Setup, [3-64](#)
- RX path, [1-4](#)
- S**
- Selecting Test Equipment, [3-66](#)
- Set BTS Site Span Configuration, [5-6](#)
- Setting Cable Loss Values, [3-74](#)
- Setting TX Coupler Loss Value, [3-75](#)
- Setup for Optimization/ATP, [3-60](#)
- SGLI2, board detail, MMI port connections, [5-6](#)
- Shelf Configuration Switch, [2-4](#)
- Signal Generator, [3-73](#)
- signal generator, 1X FER acceptance test, [4-4](#)
- Site, equipage verification, [3-4](#)
- Site checklist, data sheets, [A-3](#)
- Site equipage, CDF/NECF, [3-3](#)
- Site I/O board, T1 span cable connection, [5-9](#)
- Site Serial Number Check List, [A-18](#)
- Software Release caveats, [5-2](#)
- Span Framing Format
  - configure, [5-6](#)
  - verify, [5-5](#)
- Span I/O board
  - E1 span isolation, illustration, [3-15](#)
  - T1 span isolation, illustration, [3-15](#)
- Span Interface, [3-14](#)
- Span Line
  - connector , [6-14](#)
  - T1/E1 Verification Equipment, [1-12](#)
- Span line, troubleshooting, [6-21](#)
- Span line configuration, troubleshooting, [6-24](#)

- Span line traffic, No or missing, [6-17](#)
  - SPANS LED, GLI, [6-31](#)
  - Spectral Purity Transmit Mask ATP, [4-9](#)
  - Spectral Purity TX Mask, [4-6](#)
  - Spectrum Analyzer, [1-12](#), [3-73](#)
  - Spectrum Analyzer , HP8594E, [3-50](#)
  - SPLC, [1-30](#)
  - STATUS LED, GLI, [6-31](#)
  - Switched Parallel Linear amplifier Combiners , [1-30](#)
  - SYNC Monitor Connector, CSM, [6-30](#)
  - System Connectivity Test, HP8921A, [F-2](#), [F-18](#)
- ## T
- T1, span connection, [5-9](#)
  - T1/E1 Span Interface, [3-14](#)
  - T1/E1 Span Isolation, [3-15](#)
  - terminal communication settings, [I-3](#)
  - Test data sheets
    - AMR CDI Alarm Input Verification, [A-17](#)
    - BTS redundancy/alarm tests, [A-16](#)
    - general optimization checklist, [A-5](#)
    - GPS receiver operation, [A-6](#)
    - initial power tests, [A-4](#)
  - PA
    - convergence, [A-8](#)
    - IM Reduction, [A-7](#)
  - pre-power tests, [A-4](#)
  - preliminary operations, [A-3](#)
  - RX antenna VSWR, [A-17](#)
  - site checklist, [A-3](#)
  - TX antenna VSWR, [A-16](#)
  - TX BLO
    - Offset/Power Output Verification, [A-9](#)
    - Power Output Verification, [A-14](#)
  - Test Equipment
    - Automatically Selecting, [3-67](#)
    - Calibrating, [3-69](#)
    - Connecting test equipment to the BTS, [3-49](#)
    - Manually Selecting, [3-66](#)
    - Reference Chart, [3-51](#)
    - Selecting, [3-66](#)
    - verification data sheets, [A-2](#)
    - VSWR, [G-2](#)
  - Test equipment
    - system analyzer, [1-10](#)
    - TX acceptance tests, [4-4](#)
  - Test Equipment Setup, [3-49](#)
    - GPS & LFR/HSO, [3-42](#)
    - RF path calibration, [3-80](#)
  - Test Matrix, [C-4](#)
    - ATP optimization, [C-3](#)
  - Test Set Calibration, [3-65](#)
  - Test Set Calibration , Background, [3-65](#)
  - Timing Reference Cables, [1-11](#)
  - Top Interconnect Plate, [1-26](#)

## Troubleshooting

- BBX Control Good – No (or Missing) Span Line Traffic, [6-17](#)
  - BLO Calibration Failure, [6-7](#)
  - C–CCP Backplane, [6-14](#), [6-15](#)
  - Calibration Audit Failure, [6-8](#)
  - Code Domain Power and Noise Floor Measurement Failure, [6-10](#)
  - Code Download Failure, [6-5](#)
  - Communications Analyzer Communication Failure, [6-4](#)
  - CSM Checklist, [6-12](#)
  - Data Download Failure, [6-5](#)
  - DC Power Problems, [6-19](#)
  - Device Enable (INS) Failure, [6-6](#)
  - Login Failure, [6-3](#)
  - MGLI Control Good – No Control over AMR, [6-17](#)
  - MGLI Control Good – No Control over Co-located GLI2, [6-16](#)
  - Miscellaneous Failures, [6-6](#)
  - Multi-FER Failure, [6-11](#)
  - No BBX Control in the Shelf – No Control over Co-located GLIs, [6-17](#)
  - No DC Input Voltage to any C–CCP Shelf Module, [6-20](#)
  - No DC Input Voltage to Power Supply Module, [6-19](#)
  - No GLI Control through Span Line Connection, [6-16](#)
  - No GLI Control via LMF, [6-16](#)
  - No MCC Channel Elements, [6-18](#)
  - Power Meter Communication Failure, [6-3](#)
  - Rho and Pilot Time Offset Measurement Failure, [6-9](#)
  - Set span configuration, [6-24](#)
  - span problems, [6-21](#)
  - TX and RX Signal Routing, [6-20](#)
  - TX Mask Measurement Failure, [6-9](#)
- TX
- acceptance tests, equipment setup, [4-4](#)
  - antenna VSWR, test data sheets, [A-16](#)
- TX & RX Path Calibration, [3-76](#)
- TX and RX Frequency vs Channel , 800 MHz, [E-3](#)
- TX and RX Signal Routing, C–CCP Backplane Troubleshooting, [6-20](#)
- TX ATP Setup, [3-63](#)

- TX BLO, test data sheets
  - Offset/Power Output Verification, [A-9](#)
  - Power Output Verification, [A-14](#)
- TX calibration, [3-82](#)
- TX Mask test, [4-9](#)
- TX Mask Verification, spectrum analyzer display, illustration, [4-10](#)
- TX OUT connection, [4-5](#)
- TX Output Acceptance Tests
  - Code domain power, [4-6](#), [4-13](#)
  - Pilot Time Offset, [4-6](#), [4-12](#)
  - Spectral purity TX mask, [4-6](#)
  - Waveform quality (rho), [4-6](#), [4-11](#)
- TX Path, calibration, [3-77](#)
- TX path, [1-4](#)
  - calibration, [3-80](#)
- TX path calibration, [3-82](#)

## U

- Updating Calibration Data Files, [5-2](#)
  - Copy and Load Cal File to to CBSC, [5-2](#)
  - Software Release caveats, [5-2](#)
- UTP, LMF to BTS connection, [3-16](#)

## V

- Verification of Test Equipment, data sheets, [A-2](#)
- Verify GLI ROM code load, [3-33](#)
- Voltage Standing Wave Ratio. *See* VSWR

## VSWR

- Advantest Test Set, [G-5](#)
- Calculation, [G-3](#), [G-6](#)
- Equation, [G-3](#), [G-6](#)
- manual test setup detail
  - Advantest illustration, [G-6](#)
  - HP illustration, [G-4](#)
- required test equipment, [G-2](#)
- transmit and receive antenna, [G-2](#)

## W

- Walsh channels, [4-13](#)
- Warm-up, [1-8](#)
- \*\*Empty\*\*, [3-53](#)
- Waveform Quality (rho), [4-6](#)

Waveform Quality (rho) ATP, [4-11](#)

When to optimize

Ancillary – table, [C-2](#)

BTS, [C-2](#)

inter-frame cabling, [C-3](#)

## **X**

Xircom Model PE3-10B2, LMF to BTS connection,  
[3-16](#)







**68P64115A21-B**

***Technical  
Information***

1X SC 4812T-MC Multicarrier BTS  
Optimization/ATP

***Software Release R2.16.1.x***

***800 Mhz***

***CDMA***



1X SC 4812T-MC Multicarrier BTS Optimization/ATP

**SOFTWARE RELEASE X.X.X**

**800 Mhz**

**CDMA**

**ENGLISH**

Sept 2003

**68P64115A21-B**



# STANDARD MANUAL PRINTING INSTRUCTIONS

Part Number: **68P64115A21-B**      Filename: 115a21-11.pdf      APC: t89  
Title: 1X SC 4812T-MC Multicarrier BTS Optimization/ATP  
Volume      of           Print Vendor: Copy Concept      Date Jun 2003

---

## 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                     |
| Inside Cover: 65 lb. Cougar                           | 5 Cuts                      | 7 Cuts             | Slant-D                           |
| Tabs: 110 lb. Index                                   | Clear Mylar                 | Clear Mylar        | 3-Hole Punched<br>(5/16-in. dia.) |
| Binder Cover: Standard TED<br>cover – 10 pt. Carolina | Pantone 2706-C<br>Black Ink | White<br>Black Ink | Shrink Wrap Body                  |

Black ink for body, inside cover, and binder cover.

---

## TAB and SHEET SIZE/QUANTITY

7X9           8.5x11 322      11x17           Sheets = 322 / 2  
1st Level Tabs 16      2nd Level Tabs     

---

## NON-STANDARD SPECIFICATIONS

Tape Bound       Corner Stitch

Other: Meet with manager to determine the deliverable.

---

## SPECIAL INSTRUCTIONS

---