

## Test Equipment Set-up for RF Path Calibration

Follow the procedure in Table 3-35 to set up test equipment.

Table 3-35: Set Up Test Equipment for RF Path Calibration	
Step	Action
1	<i>If it has not already been done</i> , refer to the procedure in Table 3-5 (on page 3-17) to interface the LMF computer terminal to the frame LAN A connector.
2	<i>If it has not already been done</i> , refer to Table 3-6 (on page 3-26) to start a GUI LMF session.
3	If required, calibrate the test equipment per the procedure in Table 3-27 (on page 3-78).
	<b>NOTE</b> Verify the GPIB controller is properly connected and turned on.
	<b>! CAUTION</b> To prevent damage to the test equipment, all transmit (TX) test connections must be via the 30 dB directional coupler for 800 MHz with an additional 20 dB in-line attenuator for 1.7/1.9 GHz.
4	<i>For TX path calibration</i> , connect the test equipment as shown in Figure 3-16, Figure 3-17, or Figure 3-19, depending on the communications analyzer being used.

## 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 `ChannelList` CDF file parameter 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 <code>BTS-x.cdf</code> and <code>CBSC-x.cdf</code> 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.
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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 at sites WITHOUT the directional coupler option, is approximately 42.0 dB  $\pm 3.0$  dB.

- At sites WITHOUT RFDS option, BLO is approximately 42.0 dB  $\pm 4.0$  dB. A typical example would be TX output power measured at BTS (36.0 dBm) minus the BBX TX output level (approximately -6.0 dBm) would equate to 42 dB BLO.

The TX Bay Level Offset at sites WITH the directional coupler option, is approximately 41.4 dB  $\pm 3.0$  dB. TX BLO = Frame Power Output minus BBX output level.

- Example: TX output power measured at RFDS TX coupler (39.4 dBm) minus the BBX TX output level (approximately -2.0 dBm) and RFDS directional coupler/cable (approximately -0.6 dBm) would equate to 41.4 dB BLO.

## 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. When **Single-sided BLO** is selected, the result is only considered a success if it is in the lower half of the range. If it was normally a success from 37–47 (which is  $42 \pm 5$ ), **Single-sided BLO** would make it a success only if the result was from 37–42. 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

## Set-up for TX Calibration

The workaround in Table 3-36 allows the user to manually set the BLO limits to ensure that the redundant BBX BLO test does not fail due to the preset offset being incorrectly set for the frame under test. A future LMF release will correct this problem.

✓	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	To edit the nominal TX BLO, from the <b>Util</b> menu, select <b>Edit &gt; TX Nominal Offset</b> . In the TX Cal Parameter window, make any necessary changes to ensure the Tx BLO Nominal Offset (in dB) is correct: <ul style="list-style-type: none"> <li>– For 800 MHz, the value is 45.0 (dB), <b>OR</b></li> <li>– For 1900 MHz, the value is 43.0 (dB).</li> </ul>
	3	Download the data, which includes BLO values, to all the BBXs. From the <b>Device</b> menu, select <b>Download &gt; Data</b>

## 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.

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## All Cal/Audit and TX Calibration Procedure

The LMF All Cal/Audit and TX calibration procedures are essentially identical, except for the step that selects the type of procedure desired (Refer to Step 4 in Table 3-37).

### Prerequisites

Before running this procedure, be sure that the following have been done:

- The card in slot CSM 1, GLIs, MCCs, and BBXs have correct code and data loads.
- Primary CSM and MGLI are INS\_ACT (bright green).
- All BBXs are OOS\_RAM (yellow).
- If running calibration or audit using a test pattern *other than Pilot*, MCCs are INS\_ACT (bright green).
- Test equipment and test cables are calibrated and connected for TX calibration.
- LMF is logged into the BTS in the GUI environment.

**NOTE** Verify all BBX boards removed and repositioned have been returned to their assigned shelves/slots. Any BBX boards moved since they were downloaded will have to be downloaded again.

### All Cal Audit/TX Path Calibration procedure

Follow the procedure in Table 3-37 to perform the All Cal/Audit and TX path calibration test.

**Table 3-37: All Cal/Audit and TX Calibration Procedure**

✓	Step	Action
	1	If it has not already been done, configure test equipment for TX calibration by following the procedure in Table 3-35.
	2	Click on the BBX(s) to be calibrated.
	3	If the <b>Test Pattern</b> to be used is <b>Standard</b> , <b>CDFPilot</b> , or <b>CDF</b> , select at least one MCC (refer to “Test Pattern Drop-down Pick List” under “TX Calibration and the LMF” in this section).

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**Table 3-37:** All Cal/Audit and TX Calibration Procedure

✓	Step	Action
	4	<p><b>For All Cal Audit...</b></p> <ul style="list-style-type: none"> <li>– Click <b>Tests</b> in the BTS menu bar, and select <b>TX &gt; All Cal/Audit...</b> from the pull-down menus. A CDMA Test Parameters window will appear.</li> </ul> <p><b>For TX Calibration</b></p> <ul style="list-style-type: none"> <li>– Click <b>Tests</b> in the BTS menu bar, and select <b>TX &gt; TX Calibration</b> from the pull-down menus. A CDMA Test Parameters window will appear.</li> </ul>
	5	<p>Select the appropriate carrier(s) and sector(s) (carrier-bts#-sector#-carrier#) from those displayed in the <b>Channels/Carrier</b> pick list.</p> <p><b>NOTE</b> To select multiple items, hold down the <b>Shift</b> or <b>Ctrl</b> key while clicking on pick list items to select multiple carrier(s)–sector(s).</p>
	6	<p>Verify that the correct channel number for the selected carrier is shown in the <b>Carrier # Channels</b> box. If it is not, obtain the latest <b>bts-#.cdf</b> (or <b>bts-#.necf</b>) and <b>cbcs-#.cdf</b> files from the CBSC.</p> <p><b>NOTE</b> If necessary, the correct channel number may be manually entered into the <b>Carrier # Channels</b> box.</p>
	7	<p>If at least one MCC was selected in Step 3, select the appropriate transfer rate (<b>1</b> = 9600, <b>3</b> = 9600 1X) from the drop-down list in the <b>Rate Set</b> box.</p> <p><b>NOTE</b> The rate selection of <b>3</b> is only available if 1X cards are selected for the test.</p>
	8	<p>If <b>Verify BLO</b> is to be used during the calibration, leave the checkbox checked (default).</p>
	9	<p>If <b>Single-Sided BLO</b> is to be used during the calibration, click on the checkbox.</p> <p><b>* IMPORTANT</b> <b>Single-Sided BLO</b> should only be used for primary BBXs. Do not check the box when calibrating the <i>redundant</i> BBX.</p>
	10	<p>In the <b>Test Pattern</b> box, select the test pattern to use for the calibration from the drop-down list (refer to “Test Pattern Drop-down Pick List” under “TX Calibration and the LMF” in this section – see page 3-91).</p>
	11	<p>Click <b>OK</b> to display the status report window followed by a <b>Directions</b> pop-up window.</p>
	12	<p>Follow cable connection directions as they are displayed. When the calibration process is completed, results will be displayed in the status report window.</p>
	13	<p>Click on the <b>Save Results</b> or <b>Dismiss</b> button, as desired, to close the status report window.</p>

### Exception Handling

In the event of a failure, the calibration procedure displays a **FAIL** message in the status report window and provides information in the **Description** field.

Recheck the test setup and connection and re-run the test. If the tests fail again, note specifics about the failure, and refer to Chapter 6, *Troubleshooting*.

## Download BLO Procedure

After a successful TX path calibration, download the bay level offset (BLO) calibration file data to the BBXs. BLO data is extracted from the CAL file for the Base Transceiver Subsystem (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.

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

<b>Table 3-38: 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.  <b>NOTE</b> Selected device(s) do not change color when BLO is downloaded.
	3	Click on <b>OK</b> to close the status report window.

## Calibration Audit Introduction

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.

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



## TX Path Audit

Perform the calibration audit of the TX paths of all equipped BBX slots per the procedure in Table 3-39

**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.

**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**.

## TX Audit Test

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:

- 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.

### TX Path Audit procedure

After a TX calibration has been performed, or if verification of BLO data in the CAL file is required, follow the procedure in Table 3-39 to perform a BTS TX path audit.

**Table 3-39: BTS TX Path Audit**

✓ Step	Action
1	<i>If it has not already been done</i> , configure test equipment for TX path audit by following the procedure in Table 3-35 (TX audit uses the same configuration as TX calibration).
2	Select the BBX(s) to be audited.
3	If the <b>Test Pattern</b> to be used is <b>Standard</b> , <b>CDFPilot</b> or <b>CDF</b> , select at least one MCC (refer to “Test Pattern Drop-down Pick List” under “TX Calibration and the LMF” in this section).
4	Click <b>Tests</b> in the BTS menu bar, and select <b>TX&gt;TX Audit...</b> from the pull-down menus. A CDMA Test Parameters window will appear.
5	Select the appropriate carrier(s) (carrier-bts#-sector#-carrier#) from those displayed in the <b>Channels/Carrier</b> pick list.  <b>NOTE</b> To select multiple items, hold down the <b>Shift</b> or <b>Ctrl</b> key while clicking on pick list items to select multiple carrier(s)-sector(s).
6	Verify that the correct channel number for the selected carrier is shown in the <b>Carrier # Channels</b> box. If it is not, obtain the latest <b>bts-#.cdf</b> (or <b>bts-#.necf</b> ) and <b>cbsc-#.cdf</b> files from the CBSC.  <b>NOTE</b> The correct channel number may be manually entered into the <b>Carrier # Channels</b> box.
7	If at least one MCC was selected in Step 2, select the appropriate transfer rate ( <b>1</b> = 9600, <b>3</b> = 9600 1X) from the drop-down list in the <b>Rate Set</b> box.  <b>NOTE</b> The rate selection of <b>3</b> is only available if 1X cards are selected for the test.
8	Select <b>Verify BLO</b> (default) or <b>Single-sided BLO</b> .  <b>NOTE</b> <b>Single-sided BLO</b> is only used when checking non-redundant transceivers.
9	In the <b>Test Pattern</b> box, select the test pattern from the drop-down list (refer to “Test Pattern Drop-down Pick List” – see page 3-91).
10	Click <b>OK</b> to display the status report window followed by a <b>Directions</b> pop-up window.
11	Follow the cable connection directions as they are displayed. When the calibration process is completed, results will be displayed in the status report window.
12	Click on the <b>Save Results</b> or <b>Dismiss</b> button, as desired, to close the status report window.

### Exception Handling

In the event of a failure, the calibration procedure displays a **FAIL** message in the Status Report window and provides information in the **Description** field. Recheck the test setup and connection and re-run the test. If the tests fail again, note specifics about the failure, and refer to Chapter 6, *Troubleshooting*.



## All Cal/Audit Test

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

**NOTE** If the TX calibration portion of the test passes, the BLO data is automatically downloaded to the BBX(s) before the audit portion of the test is run.

### Prerequisites

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

- CSM-1, GLIs, BBXs have correct code and data loads.
- 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.

Follow the procedure in Table 3-40 to perform the All Cal/Audit test.

**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.

**Table 3-40: All Cal/Audit Test**

✔ Step	Action
1	Select the BBX(s) to be tested. <b>NOTE</b> If <b>STANDARD</b> , <b>CDFPilot</b> , or <b>CDF</b> is selected for the <b>TEST PATTERN</b> , then at least one MCC must be also selected.
2	From the <b>Tests</b> menu, select <b>All Cal/Audit</b> .
3	Select the appropriate carrier(s) displayed in the <b>Channels/Carrier</b> pick list. Press and hold the <b>&lt;Shift&gt;</b> or <b>&lt;Ctrl&gt;</b> key to select multiple items.
4	Type the appropriate channel number in the <b>Carrier n Channels</b> box.
5	If at least one MCC was selected in Step1 select the appropriate transfer rate ( <b>1</b> = 9600, <b>3</b> = 9600 1X) from the drop-down list in the <b>Rate Set</b> box. <b>NOTE</b> The rate selection of <b>3</b> is only available if 1X cards are selected for the test.
6	Select <b>Verify BLO</b> or <b>Single-sided BLO</b> . <b>NOTE</b> <b>Single-sided BLO</b> is only used when checking non-redundant transceivers.
7	In the <b>Test Pattern</b> box, select the test pattern from the drop-down list (refer to “Test Pattern Drop-down Pick List” – see page 3-91).
8	Click on <b>OK</b> .

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**Table 3-40: All Cal/Audit Test**

✔	Step	Action
	9	Follow the cable connection directions as they are displayed. A status report window displays the test results.
	10	Click on <b>Save Results</b> or <b>Dismiss</b> to close the status report window.

## Create CAL File

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The Create Cal File function gets the BLO data from BBXs and creates/updates the CAL file 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:

- The 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

**Table 3-41: Create CAL File**

✔	Step	Action
	1	Select the applicable BBXs. <b>NOTE</b> 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. A status report window displays the results of the action.
	4	Click <b>OK</b> to close the status report window.

## RFDS Set-up and Calibration

### RFDS Description

<b>NOTE</b>	The RFDS is not available for the -48 V BTS at the time of this publication.
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The optional RFDS performs RF tests of the site from the CBSC or from an LMF. The RFDS consists of the following elements:

- Antenna Select Unit (ASU)
- Fixed Wireless Terminal Interface Card (FWTIC)
- Subscriber Unit Assembly (SUA)

For complete information regarding the RFDS, refer to the CDMA *CDMA RFDS Hardware Installation; 68P64113A93*, *CDMA RFDS User's Guide; 68P64114A51*, and the *LMF Help function on-line documentation*.

### RFDS Parameter Settings

The **bts-#.cdf** file includes RFDS parameter settings that must match the installed RFDS equipment. The paragraphs below describe the editable parameters and their defaults. Table 3-42 explains how to edit the parameter settings.

- **RfdsEquip** – valid inputs are 0 through 2.  
0 = (default) RFDS is not equipped  
1 = Non-Cobra/Patzer box RFDS  
2 = Cobra RFDS
- **TsuEquip** – valid inputs are 0 or 1  
0 = (default) TSU not equipped  
1 = TSU is equipped in the system
- **MC1...4** – valid inputs are 0 or 1  
0 = (default) Not equipped  
1 = Multicouplers equipped in RFDS system  
(9600 system RFDS only)
- **Asu1/2Equip** – valid inputs are 0 or 1  
0 = (default) Not equipped  
1 = Equipped
- **TestOrigDN** – valid inputs are "" (default) or a numerical string up to 15 characters. (This is the phone number the RFDS dials when originating a call. A dummy number needs to be set up by the switch, and is to be used in this field.)

<b>NOTE</b>	Any text editor may be used to open the <b>bts-#.cdf</b> file to verify, view, or modify data. Because the <b>bts-#.cdf</b> file is generated on a Unix system, a more sophisticated editor, such as <i>MicroSoft WordPad</i> , will display file content in a more easily-read format than many simple text editors.
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## Checking and Setting RFDS Parameters

Follow the procedure in Table 3-42 to review and/or edit RFDS parameters.

**Table 3-42: RFDS Parameter Settings**

Step	Action
1	<b>Important!</b> Log out of the BTS prior to performing this procedure.
2	<p>Using a text editor, verify the following fields are set correctly in the <b>bts-#.cdf</b> file:</p> <p><b>EXAMPLE:</b></p> <pre> Asu1Equip = 1 Asu2Equip = 0 (1 if system is non-duplexed) Mc1Equip = 0 Mc2Equip = 0 Mc3Equip = 0 Mc4Equip = 0 RfdsEquip = 2 TestOrigDN = '123456789' TsuEquip = 1                     </pre> <p><b>NOTE</b></p> <p>The above is an example of entries extracted from the <b>bts-#.cdf</b> file that should have been generated by the OMC-R and copied to the LMF. These fields will have been set by the OMC-R if the RFDSPARM database is modified for the RFDS.</p>
3	Save changes and/or quit the editor.
4	Log into the BTS using an LMF <i>GUI</i> session (refer to Table 3-6).
5	If <i>no</i> changes were made to the <b>bts-#.cdf</b> file fields listed in Step 2, proceed to Step 6. If changes <i>were</i> made, continue with Step 8.
6	<p><b>NOTE</b></p> <p>To make certain the complete data download is accepted, the MGLI should be OOS_RAM (yellow) when RFDS parameter settings are downloaded.</p> <p>When changes are made to RFDS parameters in the <b>bts-#.cdf</b> file, data must be downloaded to the MGLI by performing the following:</p> <ul style="list-style-type: none"> <li>6a – To be sure it does not take control when the MGLI is disabled, <i>manually</i> disable the redundant GLI card by unseating it from the backplane connectors and sliding it partially out of the shelf slot.</li> <li>6b – Click on the MGLI.</li> <li>6c – Click on <b>Device</b> in the BTS menu bar, and select <b>Disable</b> from the pull-down menu. A status report window shows the status of the operation.</li> <li>6d – When the operation is complete, click <b>OK</b> to close the status report window.</li> <li>6e – Click on the MGLI (now OOS_RAM (yellow)).</li> <li>6f – Click on <b>Device</b> in the BTS menu bar, and select <b>Download &gt; Data</b> from the pull-down menus (<i>selected devices do not change color when data is downloaded</i>). A status report window shows the status of the download.</li> <li>6g – Click <b>OK</b> to close the status report window.</li> <li>6h – Click on the MGLI.</li> </ul>

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**Table 3-42:** RFDS Parameter Settings

Step	Action
6i	– Click on <b>Device</b> in the BTS menu bar, and select <b>Enable</b> from the pull-down menu. A status report window shows the status of the operation.
6j	– When the operation is complete, click <b>OK</b> to close the status report window.
6k 6l	<p><b>! CAUTION</b></p> <p>When the MGLI changes to INS_ACT, data will automatically be downloaded to the RFDS. During this process, the RFDS LED will slowly begin flashing red and green for approximately 2–3 minutes. <b>DO NOT</b> attempt to perform any functions with the RFDS until the LED remains steady green.</p>
	– Re-seat the redundant GLI card into the backplane connectors and lock it in place with the ejector tabs.
	– Once the redundant GLI initializes, download data to it by selecting the card and, in the BTS menu bar, clicking <b>Device</b> and selecting <b>Download &gt; Data</b> from the pull-down menus.
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7a	– Select the devices to be reset by clicking on them or using <b>Select</b> from the BTS menu bar and clicking on <b>MCCs</b> in the pull-down menu.
7b	– In the BTS menu bar, click on <b>Device</b> and select <b>Disable</b> from the pull-down menu. A status report window shows the status of the operation.
7c	– Click <b>OK</b> to close the status report window.
7d	– Repeat Step 7a to select the MCCs.
7e	<p>– Click on <b>Device</b> in the BTS menu bar and select <b>Download &gt; Data</b> from the pull-down menu. (Selected devices do not change color when data is downloaded.)</p> <p>– A status report window shows the status of the download.</p>
7f	– Click on <b>OK</b> to close the status report window.
7g	– When data download is complete, enable the MCCs by following the procedure in Table 3-17.
8	Click on the RFDS tab.
9	Status the RFDS TSU by performing the following:
9a	– Click on the SUA to select it.
9b	– Click on <b>TSU</b> in the BTS menu bar, and select <b>Status TSU</b> from the pull-down menu. A status report shows the software version number for the TSIC and SUA.
9c	– Click <b>OK</b> to close the status report window.
	<p><b>NOTE</b></p> <p>If the LMF displays an error message, check the following:</p> <ul style="list-style-type: none"> <li>• Ensure AMR cable is correctly connected from the BTS to the RFDS.</li> <li>• Verify RFDS has power.</li> <li>• Verify RFDS status LED is green.</li> <li>• Verify entries in RFDS fields of the <b>bts-#.cdf</b> file are correct (refer to Step 2).</li> <li>• Status the MGLI and ensure it is communicating (by Ethernet) with the LMF, and is in the proper state (INS_ACT (bright green)).</li> </ul>

## RFDS TSU NAM Programming

The Number Assignment Module (NAM) information needs to be programmed into the TSU before it can receive and process test calls, or be used for any type of RFDS test. The RFDS TSU NAM must be programmed with the appropriate system parameters and phone number during hardware installation. The TSU phone and TSU MSI must be recorded for each BTS used for OMC-R RFDS software configuration.

<b>NOTE</b>	The user will only need to program the NAM for the initial install of the RFDS.
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### Explanation of Parameters used when Programming the TSU NAM

Table 3-43 defines the parameters used when editing the tsu.nam file.

Access_Overload_Code Slot_Index System ID Network ID	These parameters are obtained from the switch.
Primary_Channel_A Primary_Channel_B Secondary_Channel_A Secondary_Channel B	These parameters are the channels used in operation of the system.
Lock_Code Security_Code Service_Level Station_Class_Mark	Do <i>not</i> change.
IMSI_11_12 IMSI_MCC	These fields are obtained at the OMC using the following command: <b>OMC000&gt;disp bts-# imsi</b> If the fields are blank, replace the IMSI fields in the NAM file to 0, otherwise use the values displayed by the OMC.
MIN Phone Number	This field is the phone number assigned to the mobile. The ESN and MIN should be entered into the switch as well.  <b>NOTE</b> This field is different from the TODN field in the <b>bts-#.cdf</b> file. The MIN is the phone number of the RFDS subscriber, and the TODN is the number the subscriber calls.

## Valid NAM Ranges

Table 3-44 provides the valid NAM field ranges. If any of the fields are missing or out of range, the RFDS errors out.

NAM Field Name	Valid Range	
	Minimum	Maximum
Access_Overload_Code	0	15
Slot_Index	0	7
System ID	0	32767
Network ID	0	32767
Primary_Channel_A	25	1175
Primary_Channel_B	25	1175
Secondary_Channel_A	25	1175
Secondary_Channel_B	25	1175
Lock_Code	0	999
Security_Code	0	999999
Service_Level	0	7
Station_Class_Mark	0	255
IMSI_11_12	0	99
IMSI_MCC	0	999
MIN Phone Number	N/A	N/A

## Set Antenna Map Data

The antenna map data must be entered manually if an RFDS is installed. Antenna map data does not need to be entered if an RFDS is not installed. The antenna map data is only used for RFDS tests and is required if an RFDS is installed.

### Prerequisite

- Logged into the BTS

Follow the procedure in Table 3-45 to set antenna map data for the RFDS.

**Table 3-45: Set Antenna Map Data**

Step	Action
1	Click on <b>Util</b> in the BTS menu bar, and select <b>Edit &gt; Antenna Map...</b> from the pull-down menus. A <i>tabbed</i> data entry pop-up window will appear.
2	In the data entry pop-up window, click on the <b>TX Antenna Map</b> or <b>RX Antenna Map</b> tab to select the antenna map to be edited.
3	Locate the carrier and sector number for which data is to be entered or edited, and click in the column where entry or editing is needed.
4	Enter/edit <b>Antenna #</b> and <b>Antenna Label</b> column data as needed for each carrier.  <b>NOTE</b> Refer to the <b>CDMA Help &gt; Utility Menu &gt; Edit-Antenna Map...</b> section of <i>LMF Help function on-line documentation</i> for antenna map examples.
5	<i>For each tab with changes</i> , click on the <b>Save</b> button to save displayed values.
6	Click on the <b>Dismiss</b> button to close the window.  <b>NOTE</b> <ul style="list-style-type: none"> <li>• Values entered or changed after the <b>Save</b> button was used will be lost when the window is dismissed.</li> <li>• Entered values will be used by the LMF as soon as they are saved. It is not necessary to log out and log back into the LMF for changes to take effect.</li> </ul>



## Set RFDS Configuration Data

If an RFDS is installed, the RFDS configuration data must be manually entered.

### Prerequisite

- LMF is logged into the BTS

**NOTE** The entered **antenna#** index numbers must correspond to the **antenna#** index numbers used in the antenna maps.

Follow the procedure in Table 3-46 to set the RFDS Configuration Data.

<b>Table 3-46: Set RFDS Configuration Data</b>	
<b>Step</b>	<b>Action</b>
1	Click on <b>Util</b> in the BTS menu bar, and select <b>Edit &gt; RFDS Configuration...</b> from the pull–down menus. A <i>tabbed</i> data entry pop–up window will appear.
2	In the data entry pop–up window, click on the <b>TX RFDS Configuration</b> or <b>RX RFDS Configuration</b> tab, as required.
3	To add a new antenna number, perform the following:
3a	– Click on the <b>Add Row</b> button.
3b	– Click in the <b>Antenna #</b> , <b>Cal Antenna</b> , <b>Scap Antenna</b> , or <b>Populate [Y/N]</b> columns, as required.
3c	– Enter the desired data.
4	To edit existing values, click in the data box to be changed and change the value.  <b>NOTE</b> Refer to the <b>CDMA Help &gt; Utility Menu &gt; Edit–RFDS Configuration...</b> section of <i>LMF Help function on–line documentation</i> for RFDS configuration data examples.
5	To delete a row, click on the row and then click on the <b>Delete Row</b> button.
6	<i>For each tab with changes</i> , click on the <b>Save</b> button to save displayed values.
7	Click on the <b>Dismiss</b> button to close the window.  <b>NOTE</b> <ul style="list-style-type: none"> <li>• Values entered or changed after the <b>Save</b> button was used will be lost when the window is dismissed.</li> <li>• Entered values will be used by the LMF as soon as they are saved. It is not necessary to log out and log back into the LMF for changes to take effect.</li> </ul>

## RFDS Calibration

The RFDS Calibration option is used to calibrate the RFDS TX and RX paths.

**TX Path Calibration** – For a TX antenna path calibration the BTS XCVR is keyed at a pre-determined power level and the BTS power output level is measured by the RFDS. The power level is then measured at the TX antenna directional coupler by the power measuring test equipment item being used (power meter or analyzer). The difference (offset) between the power level at the RFDS and the power level at the TX antenna directional coupler is used as the TX RFDS calibration offset value.

**RX Path Calibration** – For an RX antenna path calibration the RFDS is keyed at a pre-determined power level and the power input level is measured by the BTS BBX. A CDMA signal at the same power level measured by the BTS BBX is then injected at the RX antenna directional coupler by the communications system analyzer. The difference (offset) between the RFDS-keyed power level and power level measured at the BTS BBX is the RFDS RX calibration offset value.

**RFDS calibration and the CAL file** – The TX and RX RFDS calibration offset values are written to the CAL file in the slot[385] Block.

**TSIC channel frequency** – For each RFDS TSIC, the channel frequency is determined at the lower third and upper third of the appropriate band using the frequencies listed in Table 3-47.

<b>System</b>	<b>Channel Calibration Points</b>
800 MHz (A and B)	341 and 682
1.9 GHz	408 and 791

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

### Prerequisites

- Test equipment has been selected.
- Test equipment and test cables have been calibrated.
- TX calibration has been performed and BLO data has been downloaded to the BBXs.
- Test equipment and test cables are connected for TX calibration.
- Antenna map data has been entered for the site.
- BBXs are OOS-RAM.

## RFDS Calibration Procedure

Follow the procedure in Table 3-48 to perform RFDS calibration.

<b>Table 3-48: RFDS Calibration Procedure</b>	
<b>Step</b>	<b>Action</b>
1	In the LMF, select the <b>CDMA BTS-xxx</b> tab.
2	<i>If the BTS Control button is not selected (no black dot showing),</i> click on the <b>B</b> button in the BTS menu bar to select it.
3	Select the BBX(s) assigned to the carrier(s) and sector(s) which will be used in RFDS calibration (refer to Table 1-6 for BBX carrier and sector assignments).
4	Click on <b>RFDS</b> in the BTS menu bar, and select <b>RFDS Calibration...</b> from the pull-down menu. An <b>RFDS Calibration</b> set-up window will be displayed.
5	In the <b>Tests to Perform</b> box, select <b>TX Calibration</b> or <b>RX Calibration</b> , as required
6	Enter the appropriate channel number(s) (refer to Table 3-47) in the <b>Channel Field</b> box. To enter more than one channel number, use the following methods: <ul style="list-style-type: none"> <li>– Separate <i>non-sequential</i> channel numbers with a comma and <i>no spaces</i>; for example: 247,585,742.</li> <li>– Enter a range of sequential channels by typing the first and last channel numbers in the range separated by a dash and <i>no spaces</i>; for example: 385-395.</li> </ul>
7	If the frame is equipped with TX combiners, click in the <b>Has Combiners</b> checkbox.
8	Select the appropriate carrier(s) and sector(s) from the <b>Carriers</b> pick list (hold down the <b>Shift</b> or <b>Ctrl</b> key while clicking on pick list items to select multiple carrier(s)-sector(s)).
9	Select the appropriate Rx branch ( <b>Main</b> , <b>Diversity</b> or <b>Both</b> ) in the drop-down list if performing RX calibration.
10	Click on the <b>OK</b> button. A status report window is displayed, followed by a <b>Directions</b> pop-up window.
11	Follow the cable connection directions as they are displayed.
12	When the test is completed, test results are displayed in the status report window.
13	Click on the <b>OK</b> button to close the status report window.
14	Click on the <b>Frame</b> tab.
15	Select the MGLI by clicking on it.
16	Download updated RFDS offset data to the MGLI (see Step 6 in Table 3-42).

## Program TSU NAM

The NAM must be programmed before it can receive and process test calls, or be used for any type of RFDS test.

### Prerequisites

Ensure the following prerequisites have been met before proceeding:

- MGLI is INS.
- TSU is powered up and has a code load.

### Program NAM Procedure

Follow the procedure in Table 3-49 to program the TSU NAM.

<b>Table 3-49: Program the TSU NAM</b>	
<b>Step</b>	<b>Action</b>
1	Select the <b>RFDS</b> tab.
2	Select the <b>SUA</b> (Cobra RFDS) or <b>TSU</b> (GLI based RFDS).
3	Click on <b>TSU</b> in the BTS menu bar, and select <b>Program TSU NAM</b> from the pull-down menu. A NAM programming window will appear.
4	Enter the appropriate information in the boxes (see Table 3-43 and Table 3-44).
5	Click on the <b>OK</b> button to display the status report.
6	Click on the <b>OK</b> button 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 3-52. Miscellaneous Alarm Tests (BTS Frame)
- Table 3-53. BBX Redundancy Tests (BTS Frame)
- Table 3-54. CSM, GPS, & LFR/HSO Redundancy Alarm Tests
- Table 3-55. PA Redundancy Test
- Table 3-56. 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 3-50 to set up test equipment:

<b>NOTE</b>	All alarm tests are performed using TX antenna 1
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<b>Table 3-50: 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 3-17).
2	Login to the BTS.
3	Set up test equipment for TX Calibration at TXOUT1 (see Figure 3-16).  <b>NOTE</b> <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> .  <b>NOTE</b> 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 3-51 to verify redundancy of the power supply modules. Alarms reported by the master GLI (displayed via the alarm monitor) are also verified.

**Table 3-51: Power Supply/Converter Redundancy (BTS Frame)**

Step	Action
1	Select the MGLI (highlight) and from the pulldown menu select: <b>Device&gt;BBX/MAWI&gt;Set Redundant Sector&gt;Carrier-#-1-1</b> <b>Device&gt;BBX/MAWI&gt;Set Pilot Only&gt;Carrier-#-1-1</b> <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 3-27). <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. Observe the alarm clears on the alarm monitor.
6	Repeat steps 4 and 5 for PS-2 and PS-3. <b>NOTE</b> For +27 V systems, skip to step 7 through step 10.
7	On -48 V systems, remove PS-4 (see Figure 3-28). <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>
8	Re-install PS-4. Observe the alarm clears on the alarm monitor.
9	Repeat steps 7 and 8 for PS-5 through PS-9.
10	Verify that all PWR/ALM LEDs are GREEN.
11	Select BBX-1 and <b>Device&gt;BBX/MAWI&gt;Dekey</b>

Figure 3-27: SC 4812T C-CCP Shelf

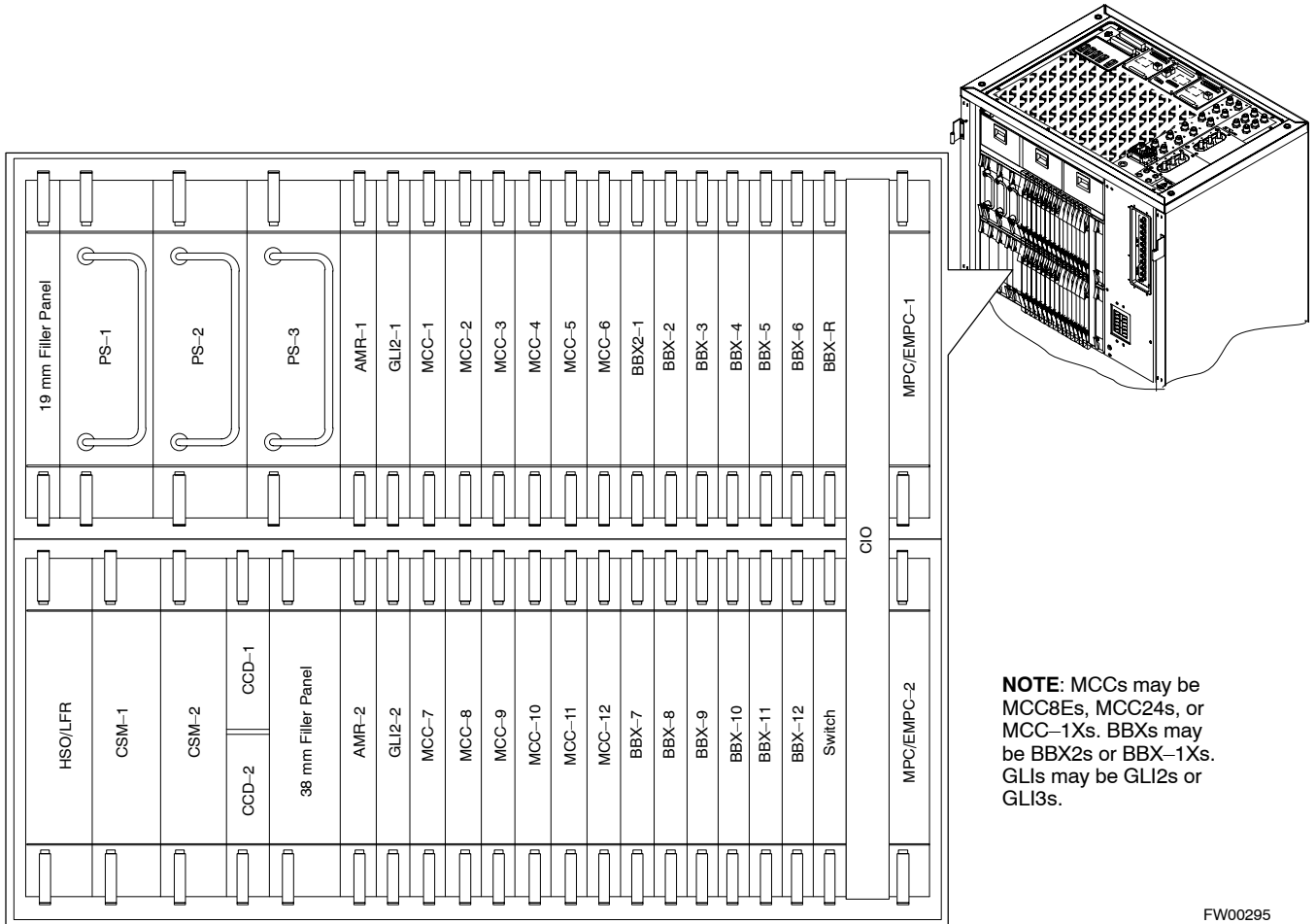
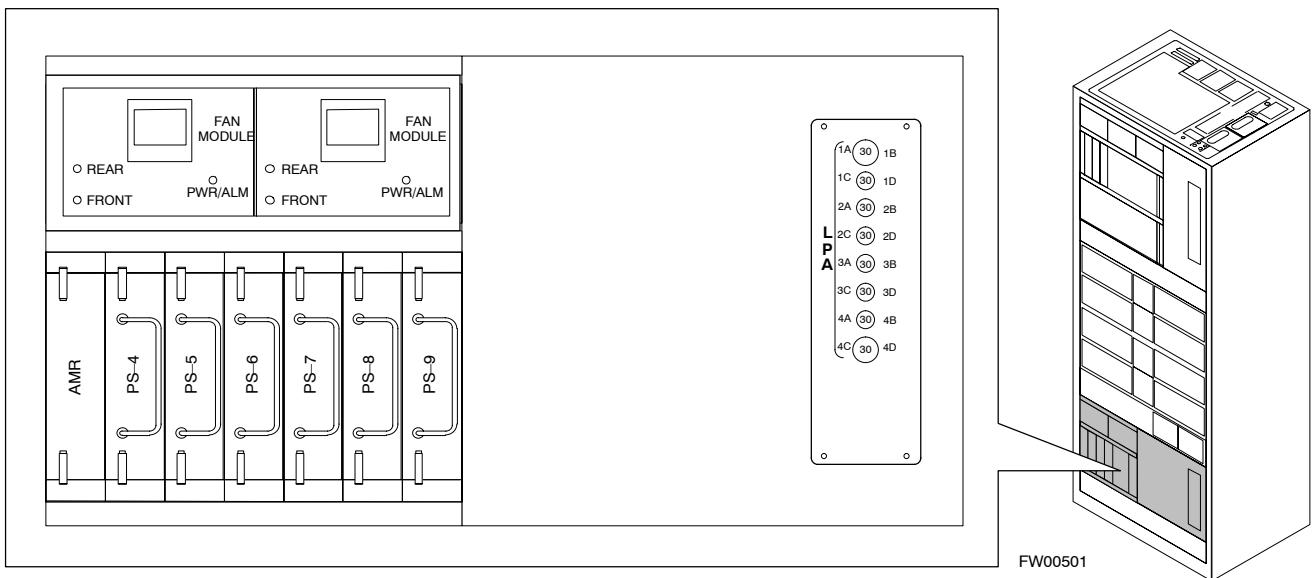


Figure 3-28: -48 V BTS Power Conversion Shelf





## Miscellaneous Alarm/Redundancy Tests

Follow the steps in Table 3-52 to verify alarms reported by the master GLI are displayed via the alarm monitor if a BTS frame module failure occurs.

<b>Table 3-52: 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 3-29 or Figure 3-30).</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> 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 3-27) 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 3-27) 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 3-27).</li> <li>• Observe that an alarm message is reported via the MGLI (as displayed on the alarm monitor).</li> <li>• Repeat Steps 1 through 3 and/or 4.</li> <li>• Replace the AMR module and verify the alarm monitor reports that the alarm clears.</li> <li>• Unseat AMR 1 and observe an alarm message was reported via the 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> All PWR/ALM LEDs should be GREEN at the completion of this test.

Figure 3-29: +27 V BTS C-CCP Fan Modules

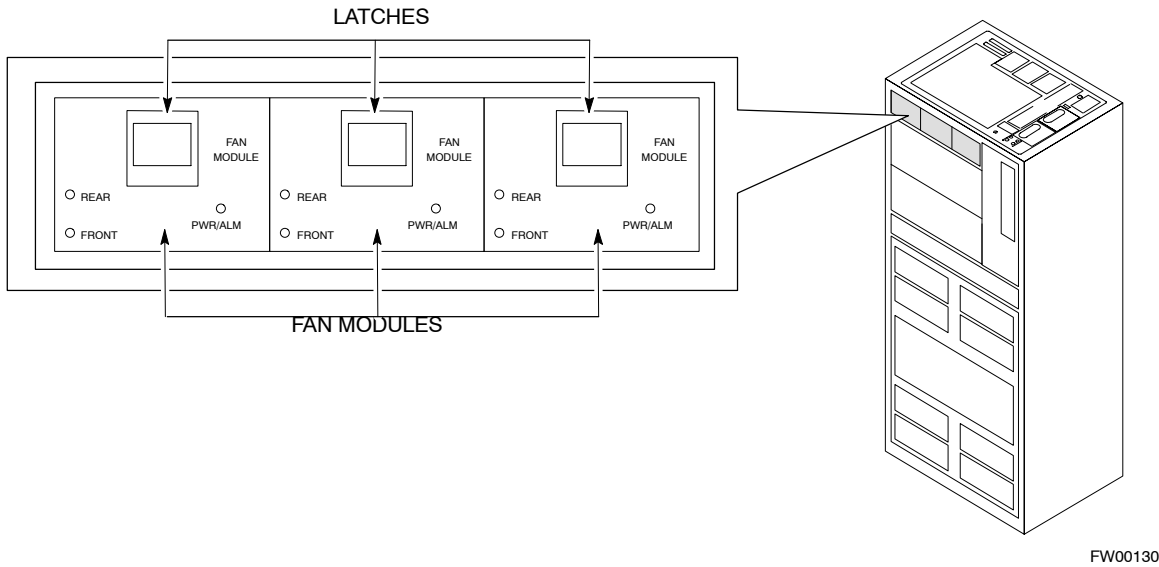
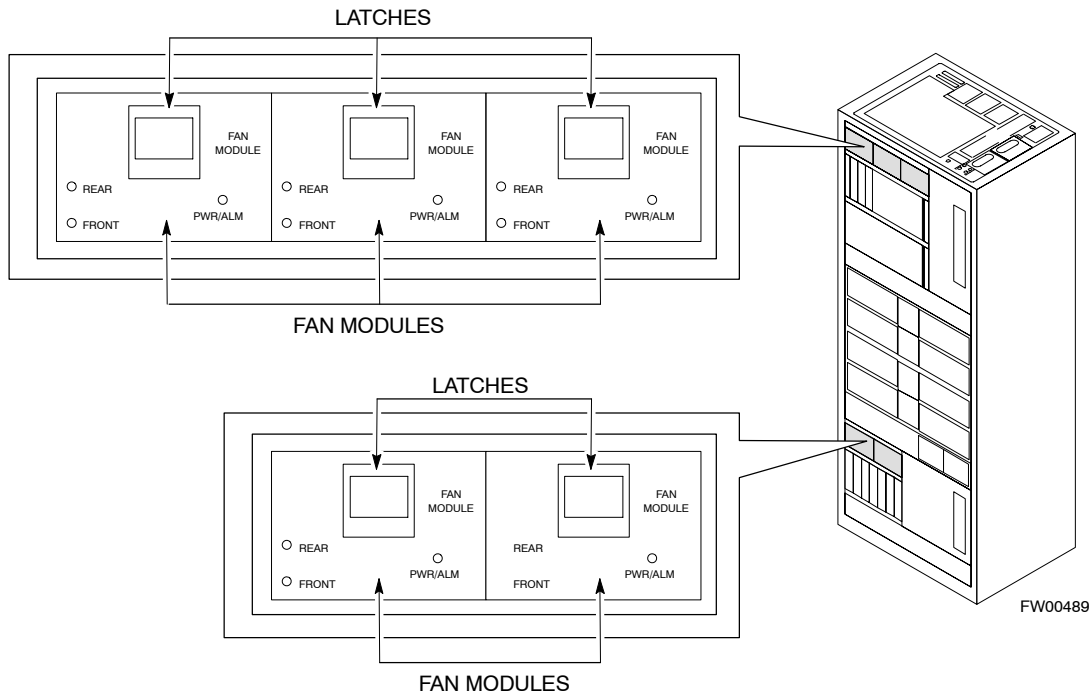


Figure 3-30: -48 V BTS C-CCP and Power Conversion Shelf Fan Modules



### BBX Redundancy

Follow the steps in Table 3-53 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 3-53: BBX Redundancy Alarms

Step	Action
	<p><b>Δ 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 Xcvt by selecting <b>Device&gt;BBX/MAWI&gt;Dekey</b> .
12	Repeat Steps 1 through 11 for additional BBXs/antennas, if equipped.

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

Follow the procedure in Table 3-54 to verify the *manual* redundancy of the CSM, GPS, and LFR/HSO boards. Verification of alarms reported is also covered.

**NOTE** DO NOT perform the procedure in Table 3-54, unless the site is configured with a LORAN-C or HSO timebase as a backup for the GPS.

**Table 3-54:** CSM, GPS, & LFR/HSO, Redundancy/Alarm Tests

Step	Action
	<p><b>△ WARNING</b> 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 LORAN-C LFR or 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 LFR/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>LFR/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> 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 3-54:** CSM, GPS, & LFR/HSO, Redundancy/Alarm Tests

Step	Action
11	<p><b>* IMPORTANT</b> DO NOT ENABLE the redundant CSM.</p> <p>Disable <b>CSM 2</b> and enable <b>CSM 1</b>.</p> <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	<p>Allow the <b>CSM 1</b> board to go <b>INS_ACT</b>.</p> <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.

## Power Amplifier (PA) Redundancy Test

Follow the procedure in Table 3-55 to verify redundancy of the Power Amplifiers (PA).

**WARNING** *First verify there are no BBX channels keyed BEFORE moving the antenna connection. Failure to do so can result in serious personal injury and/or equipment damage.*

**Table 3-55:** Power Amplifier Redundancy Test

Step	Action
1	From the pulldown menu select: <b>Device&gt;BBX/MAWI&gt;Set Redundant Sector&gt;Carrier-#-1-1</b> <b>Device&gt;BBX/MAWI&gt;Set Pilot Only&gt;Carrier-#-1-1</b> <b>Device&gt;BBX/MAWI&gt;Set Pilot Gain&gt; Carrier-#-1-1 and Pilot Gain = 262</b>
2	Key-up the BBX assigned to the PAs associated with the sector under test (gain = 40).
3	Adjust the communications test set spectrum analyzer, as required, to observe the overall carrier amplitude and IM Shelf and <b>note for reference</b> . These figures will be required later. <b>NOTE</b> See Figure 3-19 for test equipment setup, if required.
4	Push-in and release the breaker supplying the 1st PA of the pair. <b>NOTE</b> After power is removed, IM suppression takes a few seconds to settle out while compensating for the removal of the 1st PA. The overall gain decreases by approximately 6 dB. The process must be complete before proceeding.
5	Verify: <ul style="list-style-type: none"> <li>• The other PA module did not go OOS due to the loss of the PA.</li> <li>• The overall carrier amplitude is reduced by approximately 6 dB and IM suppression on the analyzer display remains basically unchanged.</li> <li>• PA fault message is reported via the MGLI and displayed on the alarm monitor.</li> </ul>
6	Re-apply power to the PA module and observe the alarm has cleared on the alarm monitor. <b>NOTE</b> All PWR/ALM LEDs should be GREEN at completion of test.
7	Repeat Steps 4 through 6 to verify the 2nd PA of the pair.
8	De-key the BBX.
9	<b>△ WARNING</b> <i>First verify there are no BBX channels keyed when moving the antenna connection. Failure to do so can result in serious personal injury and/or equipment damage.</i>  Repeat Steps 1 through 8 to verify PAs assigned to sectors 2 and 3 (if equipped). Move the test cable on top of the BTS to <b>TX OUT 2</b> and <b>TX OUT 3</b> antenna connectors as required.

## 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 3-56:** MGLI/GLI Redundancy Test (with MM Connection Established)

Step	Action
	<p><b>NOTE</b></p> <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 36 input signals coming into the BTS. These inputs are divided between 2 Alarm connectors marked ‘ALARM A’ and ‘ALARM B’ located at the top of the frame (see Figure 3-31). 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 through 36 (see Figure 3-32). 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.

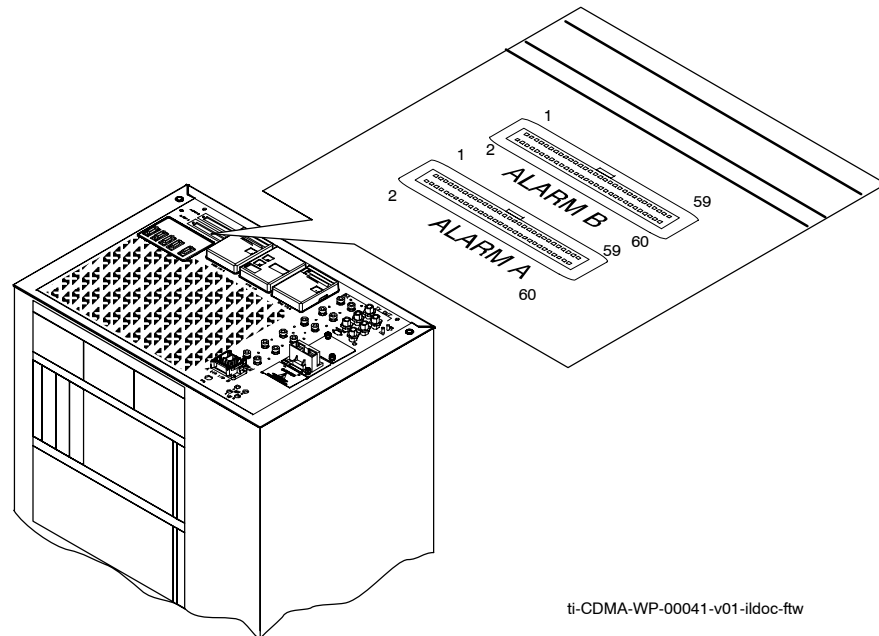
### Alarm Reporting Display

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 3-31:** 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 *SC 4812T Series BTS Installation Manual*.

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

The following test equipment is required to perform these tests:

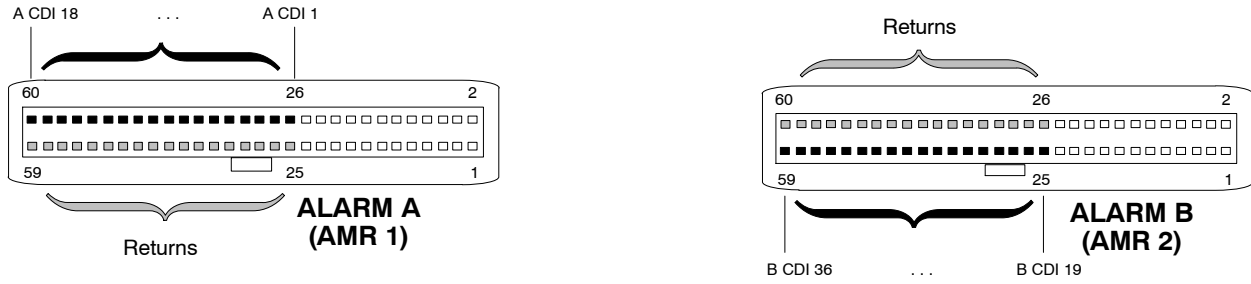
- LMF
- Alarms Test Box (CGDSCMIS00014) –optional

### NOTE

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

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

Figure 3-32: AMR Connector Pin Numbering



FW00302

**NOTE** The preferred method to verify alarms is to follow the Alarms Test Box Procedure, Table 3-57. If not using an Alarm Test Box, follow the procedure listed in Table 3-58.

### CDI Alarm Input Verification with Alarms Test Box

Table 3-57 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.

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> . 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 3-31).
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

**Table 3-57:** 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. 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. 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. An alarm should be reported for each switch setting.
24	Set all switches on the alarms test box to the <b>Closed</b> position. A clear alarm should be reported for each switch setting.
25	Disconnect the alarms test box from the <b>ALARM A</b> connector.
26	Connect the alarms test box to the <b>ALARM B</b> connector. A clear alarm should be reported for alarm inputs 19 through 36.
27	Set all switches on the alarms test box to the <b>Open</b> position. An alarm should be reported for each switch setting.
28	Set all switches on the alarms test box to the <b>Closed</b> position. 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> . 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.
36	Set all switches on the alarms test box to both the <b>Open</b> and the <b>Closed</b> position. No alarm should be reported for any switch settings.

. . . continued on next page

3

**Table 3-57:** CDI Alarm Input Verification Using the Alarms Test Box

Step	Action
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. 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 3-58 describes how to test the CDI alarm input verification without the use of the Alarms Test Box. Follow the steps as instructed and compare results with the LMF display.

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

**Table 3-58:** 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> . 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 3-32 and sequentially short the ALARM A connector CDI 1 through CDI 18 pins (25–26 through 59–60) together. An alarm should be reported for each pair of pins that are shorted. A clear alarm should be reported for each pair of pins when the short is removed.
8	Refer to Figure 3-32 and sequentially short the ALARM B connector CDI 19 through CDI 36 pins (25–26 through 59–60) together. An alarm should be reported for each pair of pins that are shorted. A clear alarm should be reported for each pair of pins when the short is removed.
9	Select the MGLI.
10	Click on the <b>Device</b> menu.
11	Click on the <b>Set Alarm Relays</b> menu item.

... continued on next page

**Table 3-58:** CDI Alarm Input Verification Without the Alarms Test Box

Step	Action
12	Click on <b>Normally Closed</b> . A status report window displays the results of the action.
13	Click on <b>OK</b> to close the status report window. Alarms should be reported for alarm inputs 1 through 36.
14	Refer to Figure 3-32 and sequentially short the ALARM A connector CDI 1 through CDI 18 pins (25–26 through 59–60) together. A clear alarm should be reported for each pair of pins that are shorted. An alarm should be reported for each pair of pins when the short is removed.
15	Refer to Figure 3-32 and sequentially short the ALARM B connector CDI 19 through CDI 36 pins (25–26 through 59–60) together. A clear alarm should be reported for each pair of pins that are shorted. An alarm should be reported for each pair of pins when the short is removed.
16	Select the MGLI.
17	Click on the <b>Device</b> menu.
18	Click on the <b>Set Alarm Relays</b> menu item.
19	Click on <b>Unequipped</b> . 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 3-32 and sequentially short the ALARM A connector CDI 1 through CDI 18 pins (25–26 through 59–60) together. No alarms should be displayed.
22	Refer to Figure 3-32 and sequentially short the ALARM B connector CDI 19 through CDI 36 pins (25–26 through 59–60) together. No alarms should be displayed.
23	Load data to the MGLI to reset the alarm relay conditions according to the CDF file.

## Pin and Signal Information for Alarm Connectors

Table 3-59 lists the pins and signal names for Alarms A and B.

Table 3-59: 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 <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 <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

## 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*.

**NOTE**

- 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.

Refer to Chapter 3 for detailed interconnection information needed for calibrating equipment, cables, and other test equipment set components.



## Reduced ATP

<b>NOTE</b>	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.
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After downloading the proper operational software to the BTS, the CFE must perform these procedures (minimal recommendation):

1. Verify the TX/RX paths by performing TX Calibration, TX Audit, and FER tests.
2. 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) 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.

<b>NOTE</b>	Refer to Chapter 3 for detailed information on test set connections for calibrating equipment, cables and other test set components, if required.
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Customer requirements determine which ATP tests are to be performed and the field engineer selects the appropriate ATP tests to run.

## ATP Test Options

There are three different ATP testing options that can be performed to completely test a BTS. Depending on your requirements, one of the following ATP testing options should be run. Table 4-1 provides the procedure to execute an ATP test. To completely test a BTS, run the ATP tests according to one of the following ATP testing options:

### ATP Testing Option 1

- **All TX/RX test** – Executes all the TX and RX tests as described in testing option 2.

### ATP Testing Option 2

- **All TX test** – TX tests verify the performance of the BTS transmit line up. These include the GLI, MCC, BBX, and CIO cards, the LPAs and passive components including splitters, combiners, bandpass filter, and RF cables.
- **All RX test** – RX tests verify the performance of the BTS receiver line up. These includes the MPC (for starter frames), EMPC (for expansion frames), CIO, BBX, MCC, and GLI cards and the passive components including RX filter (starter frame only), and RF cables.

### ATP Testing Option 3

These tests can be run individually:

- **TX Mask test**
- **Rho test**
- **Pilot Time Offset test**
- **Code Domain Power test**
- **FER test**

<b>NOTE</b>	The Full Optimization test can be run if you want the TX path calibrated, BLO downloaded, and TX audited before all the TX and RX tests are run.
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<b>NOTE</b>	If manual testing has been performed with the HP analyzer, remove the manual control/system memory card from the card slot and set the <b>IO CONFIG</b> to the <b>Talk &amp; Listen</b> mode before starting the automated testing.
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<b>NOTE</b>	The <b>STOP</b> button can be used to stop the testing process.
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## 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, MCCs, and TSU (if the RFDS is installed) 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 (yellow).
- Test cables are calibrated.
- Test equipment is connected for ATP tests (see Figure 3-19 through Figure 3-24 starting on page 3-68).
- 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.

<b>WARNING</b>	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.
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## TX OUT Connection

<b>NOTE</b>	Many of the acceptance test procedures require taking measurements at the <b>TX OUT</b> (BTS/RFDS) connector. At sites without RFDS installed, all measurements will be via the BTS <b>TX OUT</b> connector. At sites with RFDS installed, all measurements will be via the RFDS directional coupler <b>TX OUT</b> connector.
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## 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, <i>verify that there are no CDMA channels keyed.</i></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>
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<b>NOTE</b>	The test equipment must be re-calibrated before using it to perform the TX Acceptance Tests.
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## Individual Acceptance Tests

The following individual ATP tests can be used to evaluate specific aspects of BTS operation against individual performance requirements. All testing is performed using the LMF *GUI* environment.

### TX Testing

TX tests verify any given transmit antenna path and output power control. All tests are performed using the external, calibrated test equipment. All measurements are made at the appropriate BTS **TX OUT** connector(s).

TX tests verify TX operation of the entire CDMA forward link using selected BBXs assigned to respective sector antennas. Each BBX is keyed up to generate a CDMA carrier (using both `bbxlevel` and `BLO`) at the CDF file–specified carrier output power level.

### RX Testing

RX testing verifies receive antenna paths for BBXs selected for the test. All tests are performed using the external, calibrated test equipment to inject a CDMA RF carrier with all zero longcode at the specified RX frequency at the appropriate BTS **RX IN** connector(s).

RX tests verify RX operation of the entire CDMA reverse link using all equipped MCCs assigned to all respective sector/antennas.

## Individual Tests

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

### Spectral Purity TX Mask (Primary & Redundant BBX)

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

### Waveform Quality ( $\rho$ )

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

### Pilot Time Offset

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

### Code Domain Power (Primary & Redundant BBX)

This test verifies the code domain power levels, which have been set for all ODD numbered Walsh channels, using the OCNS command. This is done by verifying that the ratio of PILOT divided by OCNS is equal to  $10.2 \pm 2$  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.

<b>Table 4-1: ATP Test Procedure</b>	
<b>Step</b>	<b>Action</b>
1	Be sure that all prerequisites described on page 4-5 have been met.
	<p><b>NOTE</b></p> <p>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 new <b>Multi-Channel Preselector</b> setting. Using the wrong MPC setting can cause a false test failure.</p>
2	Select the device(s) to be tested.
3	<p>From the <b>Tests</b> menu, select the desired test from the pulldown menu:</p> <ul style="list-style-type: none"> <li>– <b>All TX/RX ATP...</b> / <b>All TX ATP...</b> / <b>All RX ATP...</b> or</li> <li>– <b>TX &gt; (TX Mask... / Rho... / Pilot Time Offset... / Code Domain Power...)</b> or</li> <li>– <b>RX &gt; FER...</b></li> </ul>
4	Select the appropriate carrier(s) (carrier-bts#-sector#-carrier#) displayed in the <b>Channels/Carrier</b> pick list. To select multiple items, hold down the <b>&lt;Shift&gt;</b> or <b>&lt;Ctrl&gt;</b> key while making the selections.
5	<p>Verify that the correct channel number for the selected carrier is shown in the <b>Carrier # Channels</b> box. If it is not, obtain the latest <b>bts-#.cdf</b> (or <b>bts-#.necf</b>) and <b>cbsc-#.cdf</b> files from the CBSC.</p> <p><b>NOTE</b></p> <p>If necessary, the correct channel number may be manually entered into the <b>Carrier # Channels</b> box.</p>
6	<p>If applicable, select <b>Verify BLO</b> (default) or <b>Single-sided BLO</b>.</p> <p><b>NOTE</b></p> <p><b>Single-sided BLO</b> is only used when checking non-redundant transceivers.</p>
7	For RX select the appropriate RX branch (Both, Main, or Diversity) in the drop-down list.
8	<p>In the <b>Rate Set</b> box, select the appropriate data rate (<b>1</b>=9600, <b>2</b>=14400, <b>3</b>=9600 1X) from the drop-down list.</p> <p><b>NOTE</b></p> <p>The <b>Rate Set</b> selection of <b>1</b> is only available if non-1X cards are selected for the test.</p> <p>The <b>Rate Set</b> selection of <b>2</b> is only available if non-1X cards are selected for the test.</p> <p>The <b>Rate Set</b> selection of <b>3</b> is only available if 1X cards are selected for the test.</p>
9	<p>Enter the channel elements to be tested for the RX ATP in the <b>Channel Element(s)</b> box. By default, all channel elements are specified.</p> <p>Use one of the following methods to enter more than one channel element:</p> <ul style="list-style-type: none"> <li>– Enter non-sequential channel elements separated by a comma and no spaces (for example; 0,5,15).</li> <li>– Enter a range of sequential channel elements by typing the first and last channel elements separated by two periods (for example; 0..15).</li> </ul> <p><b>NOTE</b></p> <p>The channel element numbers are 0 based; that is the first channel element is 0.</p>

. . . continued on next page

**Table 4-1:** ATP Test Procedure

Step	Action
10	<p>If applicable, select a test pattern from the <b>Test Pattern</b> pick list.</p> <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>
11	Click on the <b>OK</b> button. The status report window and a <b>Directions</b> pop-up are displayed.
12	Follow the cable connection directions as they are displayed, and click the <b>Continue</b> button to begin testing. The test results are displayed in the status report window.
13	Click on <b>Save Results</b> or <b>Dismiss</b> . If <b>Dismiss</b> is used, the test results <b>will not</b> be saved in the test report file.



## Individual ATP Test Background Information

### TX Spectral Purity Transmit Mask Acceptance Test (Tx Mask)

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** (BTS/RFDS) 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 either the BTS or RFDS directional coupler).

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

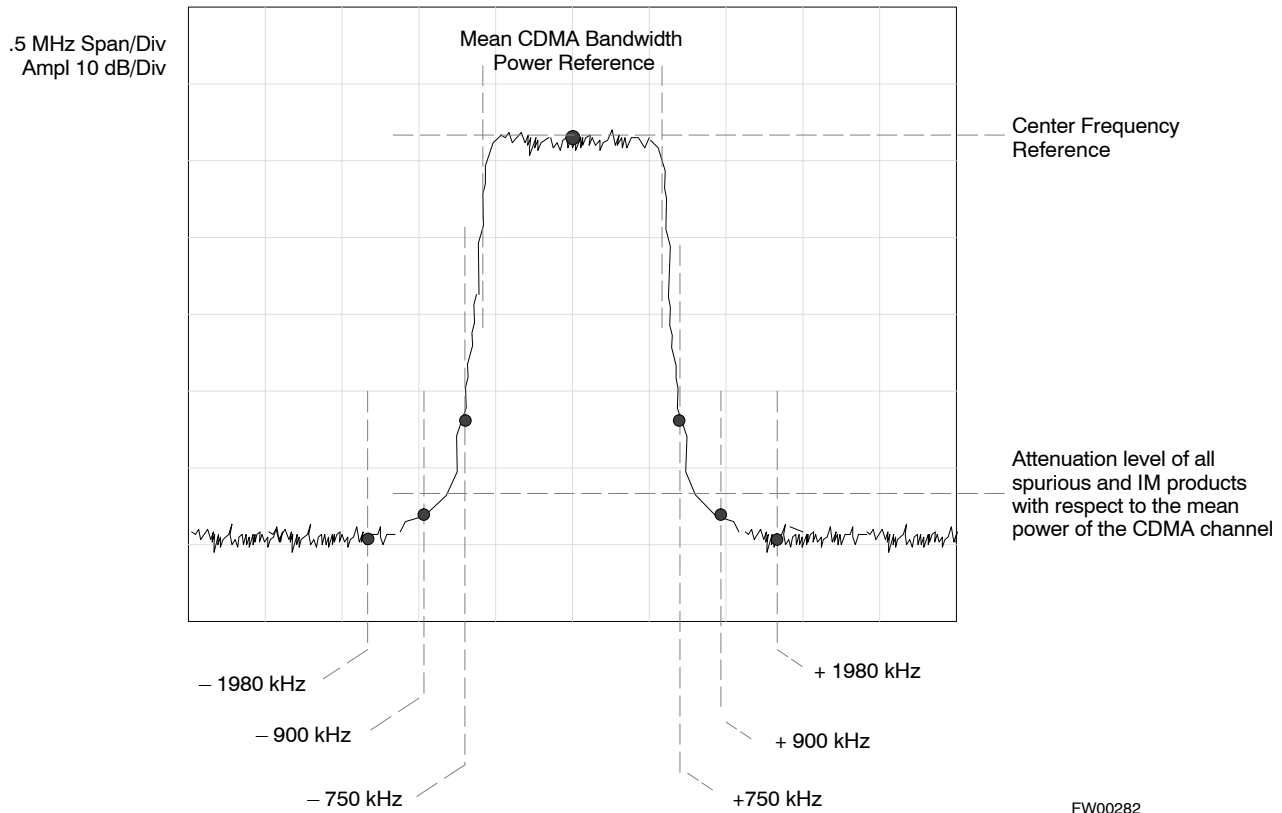
The calibrated communications test set measures and returns the attenuation level of all spurious and IM products in a 30 kHz resolution bandwidth. With respect to the mean power of the CDMA channel measured in a 1.23 MHz bandwidth in dB, verify that results meet system tolerances at the following test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

- 1.7/1.9 GHz:
  - at least **-45 dB @ + 900 kHz** from center frequency
  - at least **-45 dB @ - 900 kHz** from center frequency
- 800 MHz:
  - 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



## TX Waveform Quality (rho) Acceptance 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** (BTS/RFDS) connector.

The Pilot Gain is set to 262 for each antenna, and all channel elements from the MCCs are forward link disabled. The BBX is keyed up, using both `bbxlvl` and bay level offsets, to generate a CDMA carrier (with pilot channel element only, Walsh code 0). BBX power output is set to 40 dBm as measured at the **TX OUT** connector (on either the BTS or RFDS 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  $\geq 0.912$  (**-0.4dB**).

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 Pilot Time 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** (BTS/RFDS) connector.

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

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  $\leq 3 \mu\text{s}$  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

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** (BTS/RFDS) 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 (on either the BTS or RFDS directional coupler).

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  $\pm$  2 dB** and that the noise floor of all “OFF” Walsh channels measures  $\leq -27 \text{ dB}$  (with respect to total CDMA channel power).

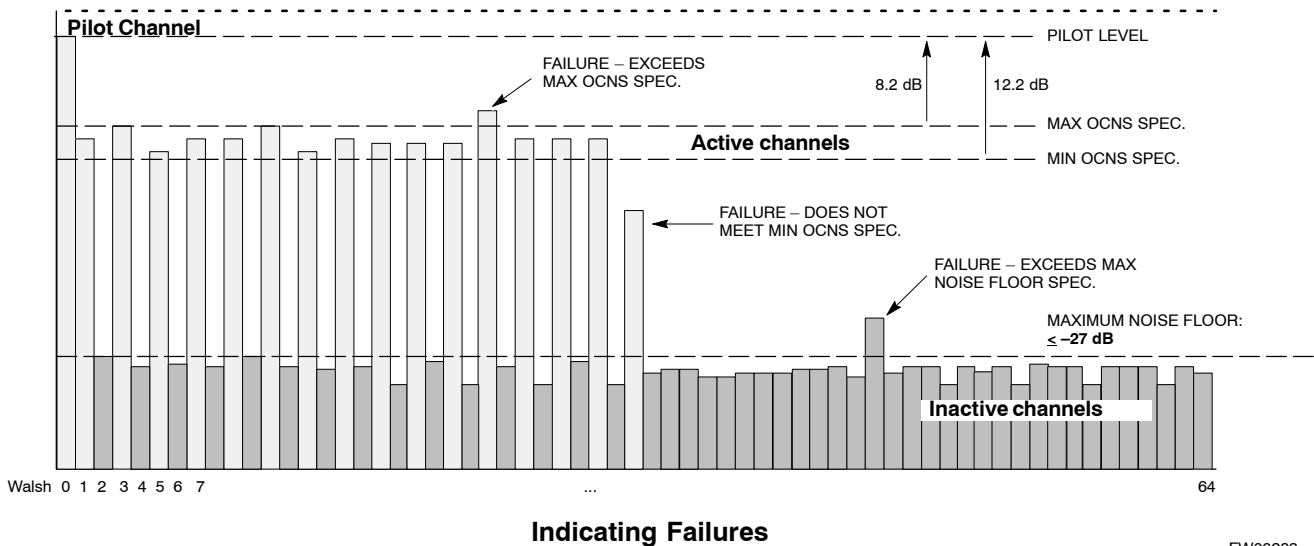
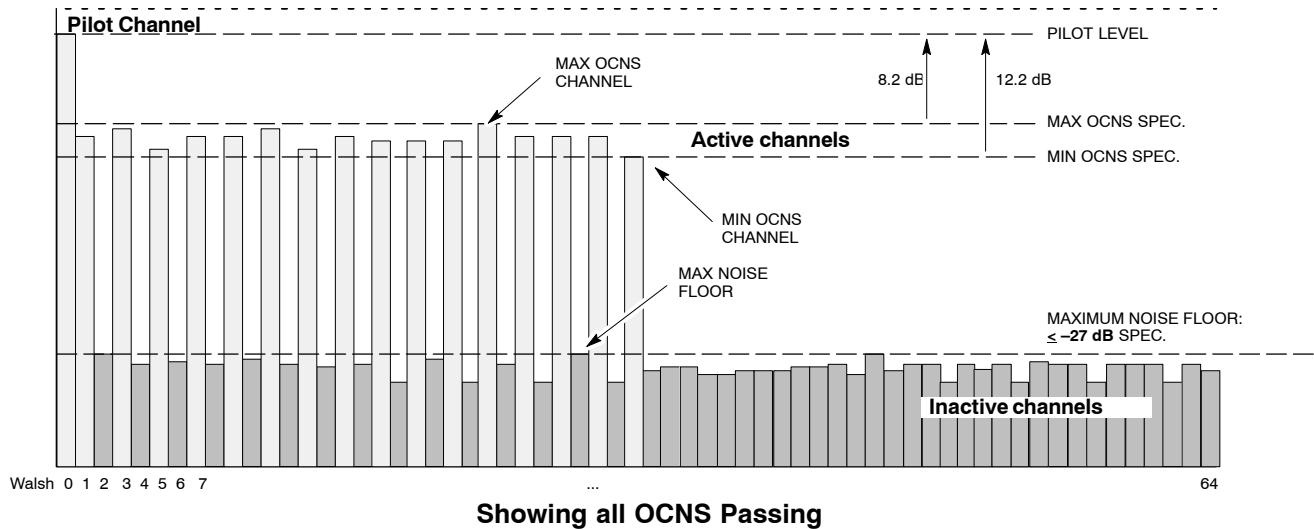
### NOTE

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, the OCNS is disabled on the specified MCC/CE.

See Table 4-1 to perform this test.

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



FW00283

### RX Frame Error Rate (FER) Acceptance 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 (on either the BTS or RFDS directional coupler). 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.

# Generating 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.

✓	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

After completing the TX calibration and audit, updated CAL file information must be moved from the LMF *Windows* environment back to the CBSC, a Unix environment. The following procedures detail moving files from one environment to the other.

#### Copying CAL files from LMF to a Diskette

Follow the procedures in Table 5-1 to copy the CAL files from an LMF computer to a 3.5 diskette.

**Table 5-1:** Copying CAL Files to a Diskette

Step	Action
1	With <i>Windows</i> running on the LMF computer, insert a disk into Drive A:\.
2	Launch the <i>Windows Explorer</i> 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.

<b>CAUTION</b>	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.
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<b>NOTE</b>	<p>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.</p> <ul style="list-style-type: none"> <li>- For all LMF commands, information in <i>italics</i> represents valid ranges for that command field.</li> <li>- Only those fields requiring an input will be specified. Default values for other fields will be assumed.</li> <li>- For more complete command examples (including system response details), refer to the <i>CDMA LMF User Guide</i>.</li> </ul>
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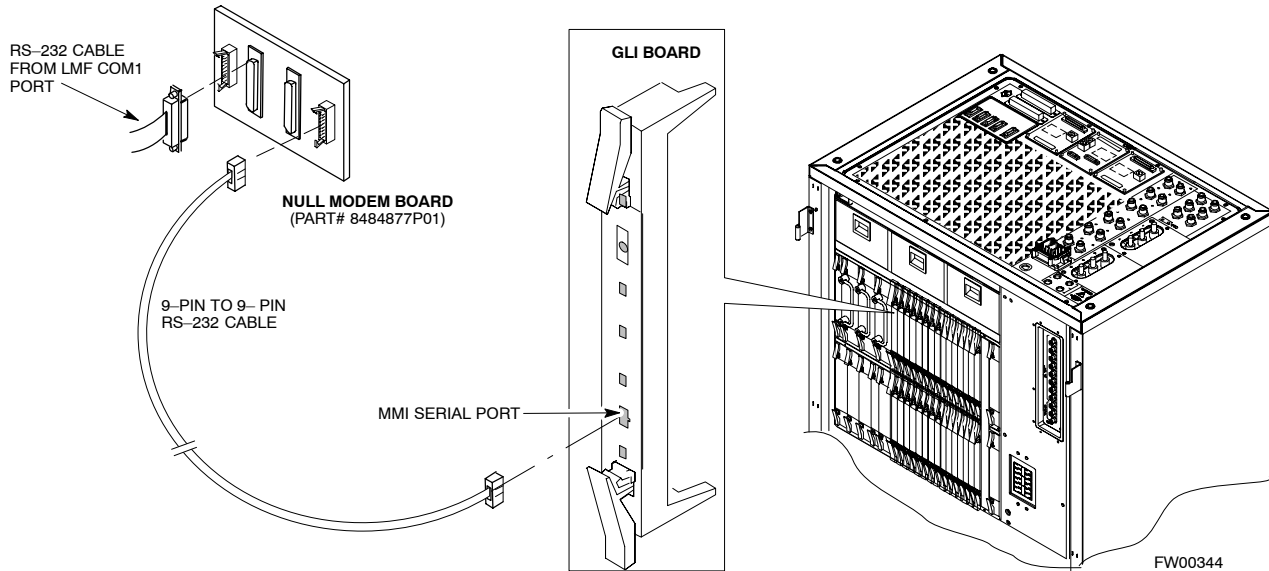
## BTS Site Span Configuration Verification

Table 5-4 describes how to verify the current Span Framing Format and Line Build Out (LBO) parameters. *ALL* MGLI2/GLI2 boards in all C-CCP shelves that terminate a T1/E1 span should be verified.

<b>Table 5-4: BTS Span Parameter Configuration</b>	
<b>Step</b>	<b>Action</b>
1	Connect a serial cable from the LMF COM1 port (via null modem board) to the front panel of the MGLI2 MMI port (see Figure 5-1).
2	<p>Start an MMI communication session with MGLI2 by using the Windows desktop shortcut icon (see Table 3-3 on page 3-13).</p> <p><b>NOTE</b> 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 MGLI2/GLI2 framing format and line code configuration (in bold type):</p> <p style="padding-left: 40px;"><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  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 ..... 3-40                     </pre>
	<p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>- Defaults for span equalization are 0-131 feet for T1/J1 spans and 120 Ohm for E1.</li> <li>- Default linkspeed is 56K for T1 D4 AMI spans and 64K for all other types.</li> <li>- There is no need to change from defaults unless the OMC-R/CBSC span configuration requires it.</li> <li>- If the current MGLI2/GLI2 framing format and line code configuration does not display the correct choice, proceed to Table 5-5.</li> </ul>
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: MGLI2/GLI2 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* MGLI2/GLI2 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 MGLI2/GLI2s 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 MGLI2 MMI port (see Figure 5-1).
2	Start an MMI communication session with CSM-1 by using the Windows desktop shortcut icon (see Table 3-3 on page 3-13).  <b>NOTE</b> The LMF program must not be running when a Hyperterminal session is started if COM1 is being used for the MMI session.

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

Step	Action
3	<p><i>If required only</i>, enter the following MMI command for each span line to set the BTS span parameters to match that of the physical spans <i>a – f</i> run to the site:</p> <p><b>span_config</b> &lt;option#1&gt; &lt;option#2&gt; &lt;option#3&gt; &lt;option#4&gt; &lt;option#5&gt;</p> <p><i>option#1</i> = the span to change (<b>a – f</b>)</p> <p><i>option#2</i> = the span type (<b>0 – 8</b>):</p> <ul style="list-style-type: none"> <li><b>0</b> – E1_1 (HDB3, CCS, CRC-4)</li> <li><b>1</b> – E1_2 (HDB3, CCS)</li> <li><b>2</b> – E1_3 (HDB3, CAS, CRC-4, TS16)</li> <li><b>3</b> – E1_4 (HDB3, CAS, TS16)</li> <li><b>4</b> – T1_1 (AMI, DS1 AT&amp;T D4, without ZCS, 3 to 1 packing, Group 0 unusable)</li> <li><b>5</b> – T1_2 (B8ZS, DS1 AT&amp;T ESF, 4 to 1 packing, 64K link)</li> <li><b>6</b> – J1_1 (B8ZS, J1 AT&amp;T ESF, Japan CRC6, 4 to 1 packing)</li> <li><b>7</b> – J1_2 (B8ZS, J1 AT&amp;T ESF, US CRC6, 4 to 1 packing)</li> <li><b>8</b> – T1_3 (AMI, DS1 AT&amp;T D4, with ZCS, 3 to 1 packing, Group 0 unusable)</li> </ul> <p><i>option#3</i> = the link speed (<b>56</b> or <b>64</b>) Kbps</p> <p><i>option#4</i> = the span equalization (<b>0 – 7</b>):</p> <ul style="list-style-type: none"> <li><b>0</b> – T1_6 (T1,J1:long haul)</li> <li><b>1</b> – T1_4 (T1,J1:393–524 feet)</li> <li><b>2</b> – T1_4 (T1,J1:131–262 feet)</li> <li><b>3</b> – E1_75 (E1:75 Ohm)</li> <li><b>4</b> – T1_4 (T1,J1:0–131 feet)</li> <li><b>5</b> – T1_4 (T1,J1:524–655 feet)</li> <li><b>6</b> – T1_4 (T1,J1:262–393 feet)</li> <li><b>7</b> – E1_120 (E1:120 Ohm)</li> </ul> <p><i>option#5</i> = the slot that has LAPD channel (<b>0 – 31</b>)</p> <p><i>Example for setting span configuration to E1_2, 64 Kbps, E1_120–Ohm, LAPD channel 1:</i></p> <pre>span_config a 1 64 7 1 . . span_config f 1 64 7 1</pre> <p><i>Example for setting span configuration to T1_2, 64 Kbps, T1_4 (0–131 feet), LAPD channel 0:</i></p> <pre>span_config a 5 64 4 0 . . span_config f 5 64 4 0</pre> <p><b>NOTE</b></p> <p>Make sure that spans <i>a – f</i> are set to the same span type and link speed. The equalization may be different for each individual span.</p> <p>After executing the <b>span_config</b> command, the affected MGLI2/GLI2 board <b>MUST</b> be reset and re-loaded for changes to take effect.</p> <p>Although defaults are shown, always consult site specific documentation for span type and rate used at the site.</p>
4	Press the RESET button on the GLI2 for changes to take effect.

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

Step	Action
5	This completes the site specific BTS Span setup for this GLI. Move the MMI cable to the next GLI2 and repeat steps 1 and 4 for <i>ALL</i> MGLI2/GLI2 boards.
6	Terminate the Hyperterm session and disconnect the LMF from the MGLI/SGLI.

## LMF Removal

Perform the procedure in Table 5-6 as required to terminate the LMF *GUI* session and remove the LMF computer.

**Table 5-6:** Terminate the LMF Session and Remove the LMF

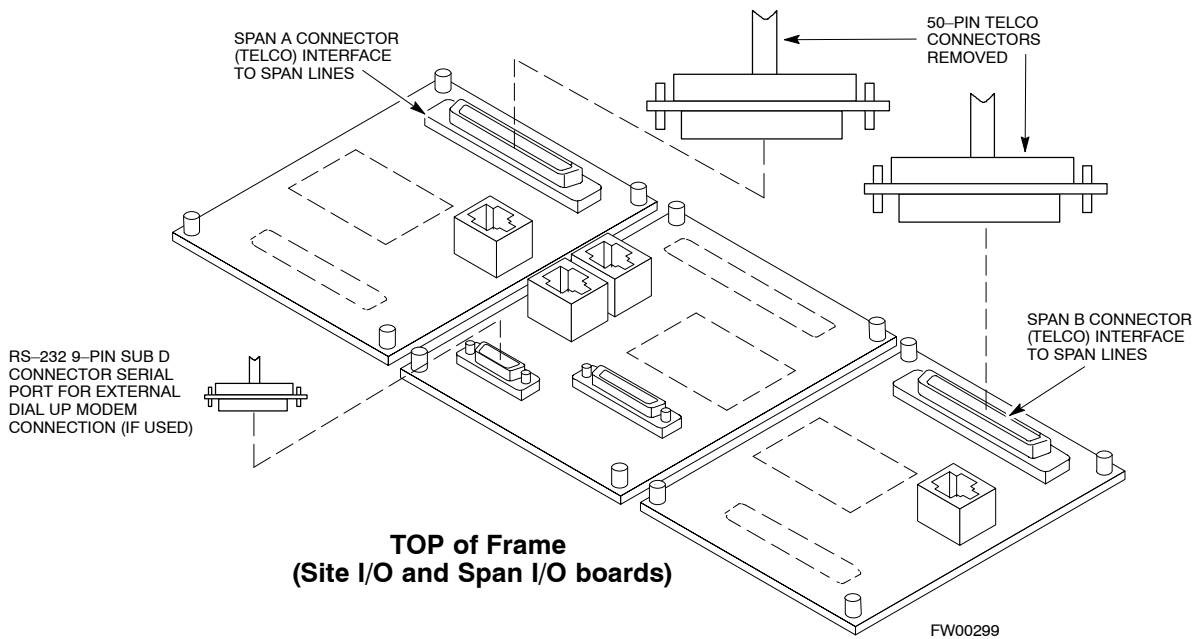
Step	Action
	<b>! CAUTION</b> <b>DO NOT</b> power down the CDMA LMF without performing the procedure indicated below. Corrupted/lost data files may result, and in some cases, the CDMA LMF may lock up.
1	Log out of all BTS sessions and exit LMF by clicking on <b>File</b> in the LMF window menu bar and selecting <b>Logout and Exit</b> from the pull-down list.
2	From the Windows Task Bar click <b>Start&gt;Shutdown</b> . Click <b>Yes</b> when the Shut Down Windows message appears.
3	Wait for the system to shut down and the screen to go blank.
4	Disconnect the LMF terminal Ethernet connector from the BTS cabinet.
5	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.
	<b>NOTE</b> 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 5a	<p><b>Packet BTS procedure:</b></p> <p>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 the MGLI LED is solid RED, it implies a hardware failure. Reset the MGLI by re-seating it. If this persists, install a known good MGLI card in the 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 3-16). 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 3-34).
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 3-17).
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 3-33).
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 3-25 or Table 3-26 and the GPIB Addresses 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.

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**Table 6-2:** Troubleshooting a Power Meter Communication Failure

✔	Step	Action
	5	Verify the GPIB adapter is not locked up. Under normal conditions, only two green LEDs must be 'ON' (Power and Ready). If any other LED is continuously 'ON', then cycle GPIB box power and retry.
	6	Verify the LMF computer COM1 port is not used by another application; for example, if a HyperTerminal window is open for MMI, close it.
	7	Reset all test equipment by clicking <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 signal generator is connected to LMF with GPIB adapter.
	2	Verify cable connections as specified in Chapter 3.
	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 3-25 or Table 3-26 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 MGLI must first be established before trying to talk to any other BTS device. The MGLI must be INS_ACT state (green).
	4	Verify the card is physically present in the cage and powered-up.
	5	If the card LED is solid RED, it implies hardware failure. Reset the card by re-seating it. If the LED remains solid red, replace with a card from another slot & retry.  <b>NOTE</b> The card can only be replaced by a card of the same type.
	6	Re-seat the card and try again.
	7	If a BBX reports a failure message and is OOS_RAM, the code load was OK. Use the LMF <b>Status</b> function to verify the load.
	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. <b>NOTE</b> 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 LPAs continue to give alarms, even after cycling power at the circuit breakers, then connect an MMI cable to the LPA and set up a Hyperterminal connection (see Table 3-3 on page 3-13).
	2	Enter <b>ALARMS</b> in the Hyperterminal window. The resulting LMF display may provide an indication of the problem. (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>Table 6-8: Troubleshooting BLO Calibration Failure</b>		
✓	<b>Step</b>	<b>Action</b>
	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 the following bands: For 1900 MHz: Bandclass=1; Freq_Band=16; SSType=16 For 800 MHz: Bandclass=0; Freq_Band=8; SSType=8 For 1700 MHz: Bandclass=4; Freq_Band=128; SSType=16
	3	Verify that no LPA in the sector is in alarm state (flashing red LED). Reset the LPA by pulling the circuit breaker and, after 5 seconds, pushing back in.
	4	Re-calibrate the Power Meter and verify it is calibrated correctly with cal factors from the sensor head.
	5	Verify the GPIB adapter is not locked up. Under normal conditions, only two green LEDs must be 'ON' (Power and Ready). If any other LED is continuously 'ON', power-cycle (turn power off and on) the GPIB Box and retry.
	6	Verify the sensor head is functioning properly by checking it with the 1 mW (0 dBm) Power Ref signal.
	7	If communication between the LMF and Power Meter is 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.

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 LPA is in alarm state (rapidly flashing red LED). Reset the LPA by pulling the circuit breaker and, after 5 seconds, pushing back in.
	4	Verify that no sensor head is functioning properly by checking it with the 1 mW (0 dBm) Power Ref signal.
	5	After calibration, the BLO data must be re-loaded to the BBXs before auditing. Click on the BBX(s) and select <b>Device&gt;Download BLO</b> . Re-try the audit.
	6	Verify the GPIB adapter is not locked up. Under normal conditions, only two green LEDs must be "ON" (Power and Ready). If any other LED is continuously "ON", power-cycle (turn power off and on) the GPIB Box and retry.

## 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.

Table 6-10: Troubleshooting Forward Link Failure (BTS Passed Reduced ATP)		
✓	Step	Action
	1	Perform these additional TX tests to troubleshoot a forward link problem: <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.

Table 6-11: Troubleshooting TX Mask Measurement Failure		
✓	Step	Action
	1	Verify that TX audit passes for the BBX(s).
	2	If performing manual measurement, verify analyzer setup.
	3	Verify that no LPA in the sector is in alarm state (flashing red LED). Re-set the LPA by pulling the circuit breaker and, after 5 seconds, pushing it back in.


### Cannot Perform Rho or Pilot Time Offset Measurement

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

Table 6-12: Troubleshooting Rho and Pilot Time Offset Measurement Failure		
✓	Step	Action
	1	Verify presence of RF signal by switching to spectrum analyzer screen.
	2	Verify PN offsets displayed on the analyzer is the same as the PN offset in the CDF file.
	3	Re-load BBX data and repeat the test.
	4	If performing manual measurement, verify analyzer setup.
	5	Verify that no LPA in the sector is in alarm state (flashing red LED). Reset the LPA by pulling the circuit breaker and, after 5 seconds, pushing back in.
	6	If Rho value is unstable and varies considerably (e.g. .95,.92,.93), this may indicate that the GPS is still phasing (i.e., trying to reach and maintain 0 freq. error). Go to the freq. bar in the upper right corner of the Rho meter and select <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.

<b>Table 6-13: Troubleshooting Code Domain Power and Noise Floor Measurement Failure</b>		
 Step	<b>Action</b>	
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. 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 Check-list

## 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 Backup = Either LFR or HSO	0 2 or 18
SGLN4132	Without GPS Receiver	2	Primary = Remote GPS Backup = Either LFR or HSO	1 2 or 18

## Takes Too Long for CSM to Come INS

This problem may be caused by a delay in GPS acquisition. Check the accuracy flag status and/or current position. Refer to the GSM system time/GPS and LFR/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.

# C-CCP Backplane Troubleshooting

## 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)

Provides a +27 volt or -48 volt input for use by the power supply modules.



## Power Supply Module Interface

Each power supply module 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 Modules convert +27 or –48 Volts to a regulated +15, +6.5, and +5.0 Volts to be used by the C–CCP shelf cards. In the –48 V BTS, the LPA power 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.

## CIO 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 CIO 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 CIO, through the CIO, and via multi–conductor coaxial cabling to the LPAs in the LPA 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>	Table 6-15 through Table 6-24 must be completed before replacing ANY C–CCP backplane.
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## 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 ethernet 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.

**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 MCC channel elements (CEs) are correct. MCCTYPE codes are: MCC8E=0, MCC24E=2, MCC-1X=3.
2	If the problem seems to be limited to one MCC, replace the MCC with a known good MCC. <ul style="list-style-type: none"><li>– Check connectors (both board and backplane) for damage.</li></ul>
3	If no CEs on any MCC: <ul style="list-style-type: none"><li>– Verify clock reference to CIO.</li></ul>

## 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. <b>* IMPORTANT</b> 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	If everything appears to be correct, visually inspect the power supply module connectors.
6	Replace the power supply module with a known good module.
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.

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

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

### TX and RX Signal Routing Problems

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

**Table 6-24:** TX and RX Signal Routing Problems

Step	Action
1	Inspect all Harting Cable connectors and back-plane connectors for damage in all the affected board slots.
2	Perform steps in the RF path troubleshooting flowchart in this manual.

## 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 LPA 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

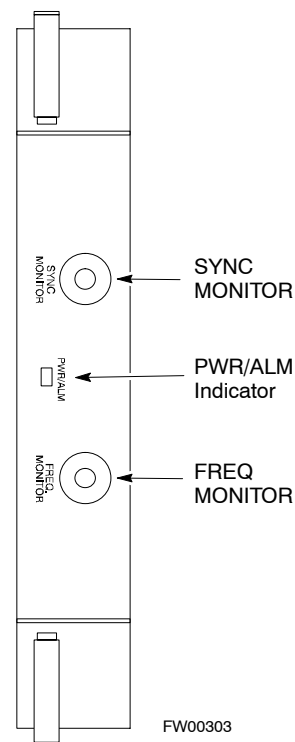
### PWR/ALM LED

The CSMs include on-board alarm detection. Hardware and software/firmware alarms are indicated via the front panel indicators.

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.)

**Figure 6-1:** CSM Front Panel Indicators & Monitor Ports



. . . continued on next page



### 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.

## GLI2 LED Status Combinations

The GLI2 module has indicators, controls and connectors as described below and shown in Figure 6-2.

The operating states of the 5 LEDs are:

### ACTIVE

Solid GREEN – GLI2 is active. This means that the GLI2 has shelf control and is providing control of the digital interfaces.

Off – GLI2 is not active (i.e., Standby). The mate GLI2 should be active.

### MASTER

- Solid GREEN – GLI2 is Master (sometimes referred to as MGLI2).
- Off – GLI2 is non-master (i.e., Slave).

### ALARM

- Solid RED – GLI2 is in a fault condition or in reset.
- While in reset transition, STATUS LED is OFF while GLI2 is performing ROM boot (about 12 seconds for normal boot).
- While in reset transition, STATUS LED is ON while GLI2 is performing RAM boot (about 4 seconds for normal boot).
- Off – No Alarm.

**STATUS**

- Flashing GREEN– GLI2 is in service (INS), in a stable operating condition.
- On – GLI2 is in OOS RAM state operating downloaded code.
- Off – GLI2 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.

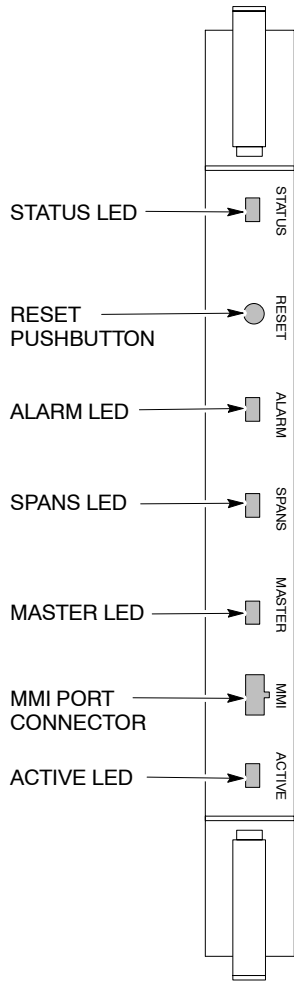
**GLI2 Pushbuttons and Connectors**

**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.

Figure 6-2: GLI2 Front Panel



LED	OPERATING STATUS
STATUS	OFF – operating normally ON – briefly during power-up when the Alarm LED turns OFF.
RESET	<del>SLOW GREEN – when the GLI2 is INS (in-service)</del> All functions on the GLI2 are reset when pressing and releasing the switch.
ALARM	OFF – operating normally ON – briefly during power-up when the Alarm LED turns OFF.
SPANS	<del>SLOW GREEN – when the GLI2 is INS (in-service)</del> OFF – card is powered down, in initialization, or in standby GREEN – operating normally YELLOW – one or more of the equipped initialized spans is receiving a remote alarm indication signal from the far end RED – one or more of the equipped initialized spans is in an alarm state
MASTER	The pair of GLI2 cards include a redundant status. The card in the top shelf is designated by hardware as the active card; the card in the bottom shelf is in the standby mode. ON – operating normally in active mode OFF – operating normally in standby mode
MMI PORT CONNECTOR	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 on or active fails. ON – active card operating normally OFF – standby card operating normally

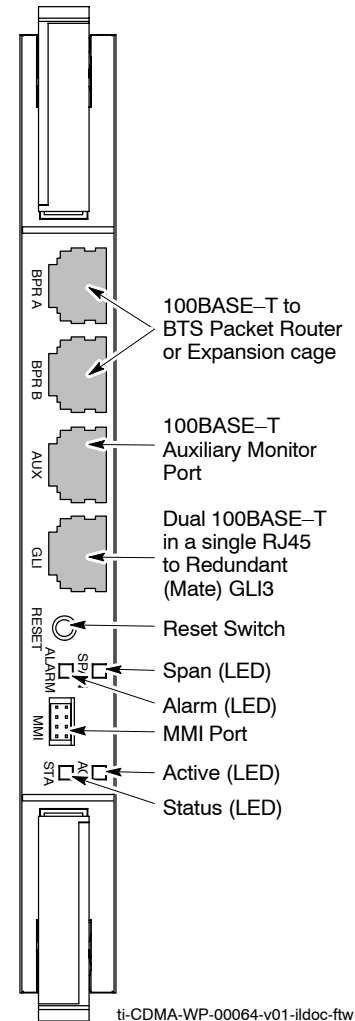
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### GLI3 Front Panel

Figure 6-3 shows the GLI3 front panel.

Figure 6-3: GLI3 Front Panel

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



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## 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

## 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.

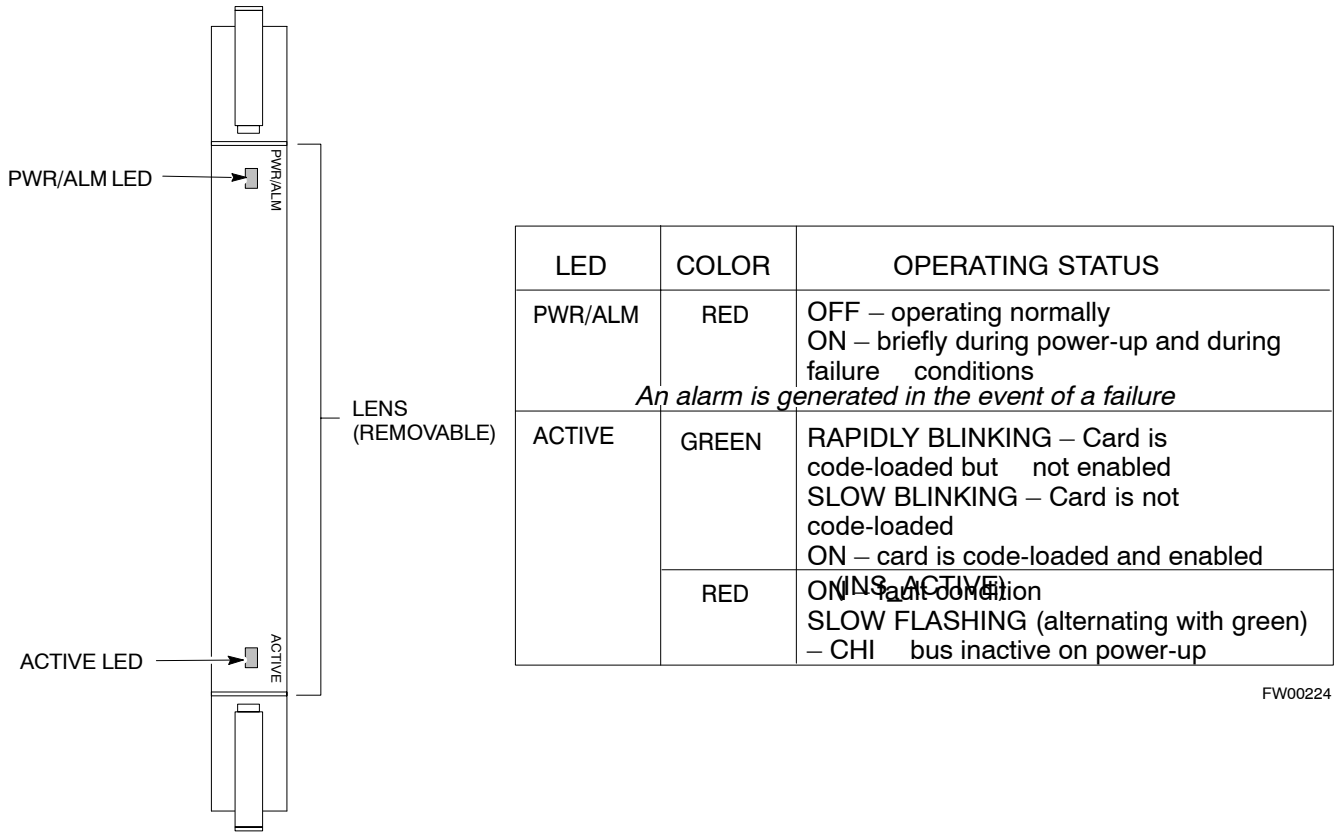
### PWR/ALM and ACTIVE LEDs

- 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



## LPA Shelf LED Status Combinations

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### LPA Module LED

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

- GREEN — LPA module is active and is reporting no alarms (Normal condition).
- Flashing GREEN/RED — LPA 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.

## Basic Troubleshooting – Span Control Link

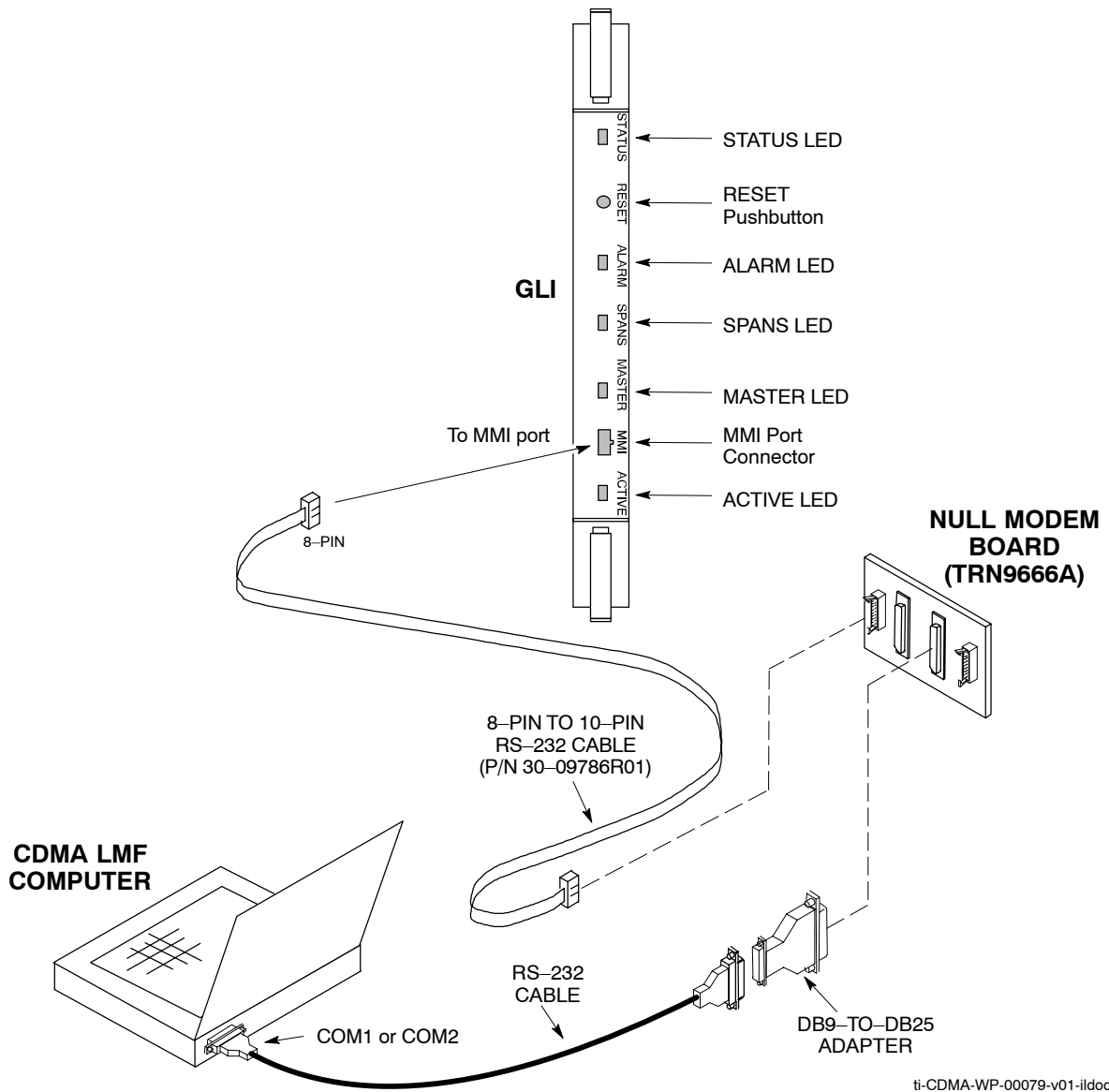
### Span Problems (No Control Link)

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 6-5 or Figure 6-6.
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&gt; prompt, enter:</p> <p style="text-align: center;"><b>config ni current &lt;cr&gt; (equivalent of span view command)</b></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 56K for T1 D4 AMI spans and 64K 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.</p> <p>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 drop–down menu.
9	If no TCHs in groomed MCCs (or in whole C–CCP shelf) can process calls, verify that the ISB cabling is correct and that ISB A and ISB B cables are not swapped.

Figure 6-5: MGLI/GLI Board MMI Connection Detail

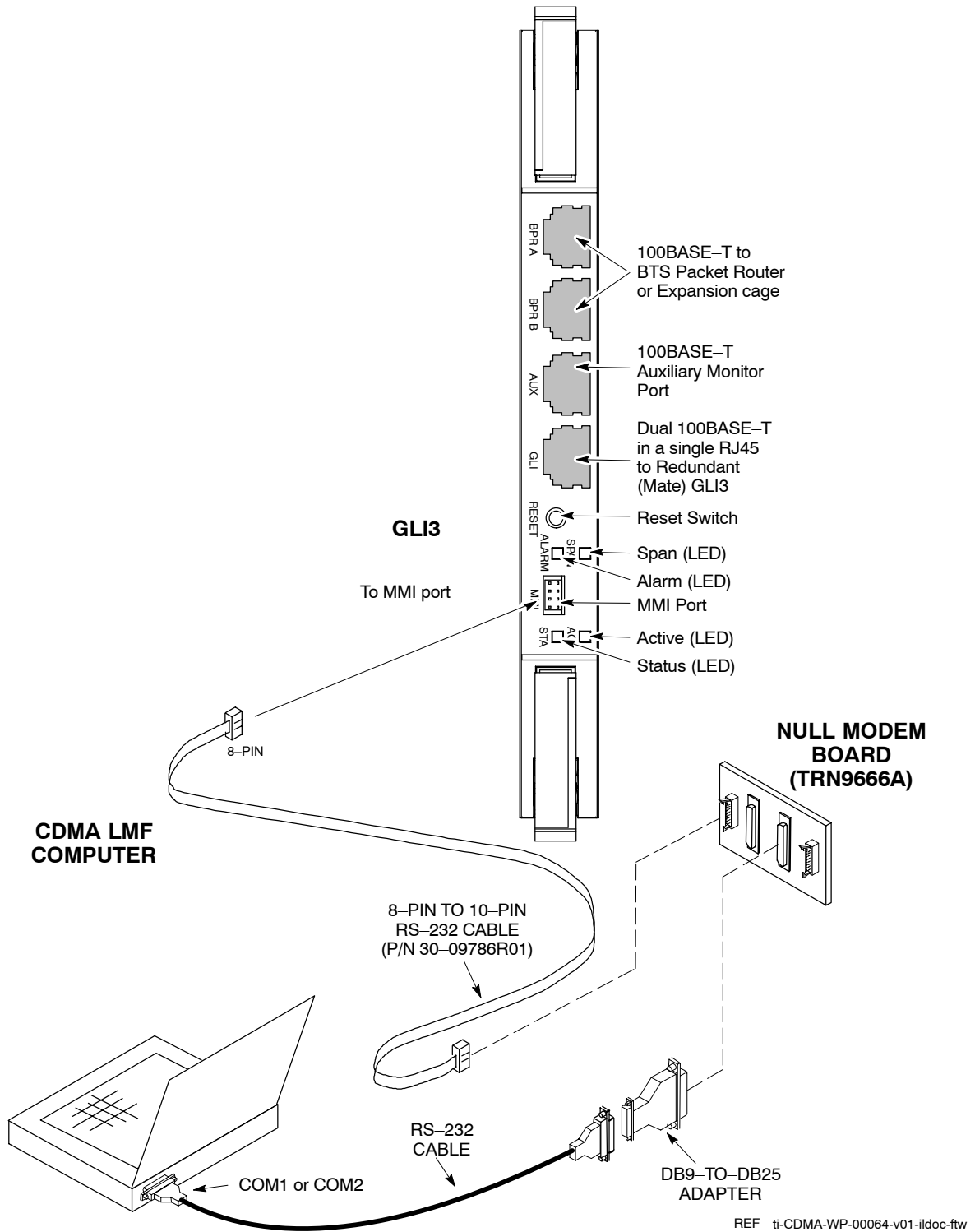


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Figure 6-6: GLI3 Board MMI Connection Detail



## Set BTS Site Span Configuration

Table 6-26 describes how to set the span parameter configuration.

**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 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 6-5.
	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&gt; 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> 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> 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 GLI2&gt;                 </pre>
	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. GLI2&gt;                 </pre>

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

✓	Step	Action
	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> 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> <p><b>&gt;64K &lt;cr&gt;</b></p> <p><b>NOTE</b> 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  GLI2&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. GLI2&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>

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**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> <p><b>&gt;a&lt;cr&gt;</b></p> <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> <p><b>&gt;0&lt;cr&gt;</b></p> <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. GLI2&gt;                     </pre>
	12	<p>Repeat Steps 9 through 11 for each in-use span.</p>
		<p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>- 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 <b>MUST</b> be reset and reloaded for changes to take effect.</li> <li>- Although defaults are shown, <i>always</i> consult site specific documentation for span type and linkspeed used at the site.</li> </ul>
	13	<p>Press the RESET button on the MGLI/GLI for changes to take effect.</p>
	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; (equivalent of span view command)</b></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>

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

✔	Step	Action
	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.



---

*Appendix A*

# Data Sheets





## Site Checklist

<b>Table A-2: Site Checklist</b>			
<b>OK</b>	<b>Parameter</b>	<b>Specification</b>	<b>Comments</b>
<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"/>	RFDS	Per procedure	
<input type="checkbox"/>	Site Temperature		
<input type="checkbox"/>	Dress Covers/Brackets		

## Preliminary Operations

<b>Table A-3: Preliminary Operations</b>			
<b>OK</b>	<b>Parameter</b>	<b>Specification</b>	<b>Comments</b>
<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"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Internal Cables: ISB (all cages) CSM (all cages) Power (all cages) Ethernet Connectors LAN A ohms LAN B ohms LAN A shield LAN B shield Ethernet Boots	verified verified verified verified verified isolated isolated 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"/>	Download TSU (in RFDS)	per procedure	
<input type="checkbox"/>	Program TSU NAM	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: <b>tracking satellites</b>	Verify parameter	
<input type="checkbox"/>	Initial Position Accuracy:	Verify Estimated or Surveyed	
<input type="checkbox"/>	Current Position: <b>lat</b> <b>lon</b> <b>height</b>	RECORD in ms and cm also convert to deg min sec	
<input type="checkbox"/>	Current Position: satellites tracked Estimated: <b>(&gt;4) satellites tracked,(&gt;4) satellites visible</b> Surveyed: <b>(≥1) satellite tracked,(&gt;4) satellites visible</b>	Verify parameter as appropriate:	
<input type="checkbox"/>	GPS Receiver Status:Current Dilution of Precision (PDOP or HDOP): <b>(&lt;30)</b>	Verify parameter	
<input type="checkbox"/>	Current reference source: <b>Number: 0; Status: Good; Valid: Yes</b>	Verify parameter	

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

## LFR Receiver Operation

**Table A-7: LFR Receiver Operation**

OK	Parameter	Specification	Comments
<input type="checkbox"/>	Station call letters M X Y Z assignment.	as specified in site documentation	
<input type="checkbox"/>	SN ratio is > 8 dB		
<input type="checkbox"/>	LFR Task State: lfr <b>locked to station xxxx</b>	Verify parameter	
<input type="checkbox"/>	Current reference source: <b>Number: 1; Status: Good; Valid: Yes</b>	Verify parameter	

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

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LPA IM Reduction

Table A-8: LPA IM Reduction

OK	Parameter					Specification	Comments
	LPA #	CARRIER					
		4:1 & 2:1 3-Sector	2:1 6-Sector	Dual BP 3-Sector	Dual BP 6-Sector		
<input type="checkbox"/>	1A	C1	C1	C1	C1	No Alarms	
<input type="checkbox"/>	1B	C1	C1	C1	C1	No Alarms	
<input type="checkbox"/>	1C	C1	C1	C1	C1	No Alarms	
<input type="checkbox"/>	1D	C1	C1	C1	C1	No Alarms	
<input type="checkbox"/>	2A	C2	C2	C2		No Alarms	
<input type="checkbox"/>	2B	C2	C2	C2		No Alarms	
<input type="checkbox"/>	2C	C2	C2	C2		No Alarms	
<input type="checkbox"/>	2D	C2	C2	C2		No Alarms	
<input type="checkbox"/>	3A	C3	C1		C1	No Alarms	
<input type="checkbox"/>	3B	C3	C1		C1	No Alarms	
<input type="checkbox"/>	3C	C3	C1		C1	No Alarms	
<input type="checkbox"/>	3D	C3	C1		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	



## LPA Convergence

Table A-9: LPA Convergence			
OK	Parameter	Specification	Data
	LPA # Converged		
<input type="checkbox"/>	1A	Verify per procedure & upload convergence data	
<input type="checkbox"/>	1B		
<input type="checkbox"/>	1C		
<input type="checkbox"/>	1D		
<input type="checkbox"/>	2A	Verify per procedure & upload convergence data	
<input type="checkbox"/>	2B		
<input type="checkbox"/>	2C		
<input type="checkbox"/>	2D		
<input type="checkbox"/>	3A	Verify per procedure & upload convergence data	
<input type="checkbox"/>	3B		
<input type="checkbox"/>	3C		
<input type="checkbox"/>	3D		
<input type="checkbox"/>	4A	Verify per procedure & upload convergence data	
<input type="checkbox"/>	4B		
<input type="checkbox"/>	4C		
<input type="checkbox"/>	4D		

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**TX BLO/Power Output Verification for 3-Sector Configurations**  
**1-Carrier**  
**2-Carrier Non-adjacent Channels**  
**4-Carrier Non-adjacent Channels**

**Table A-10: TX BLO Calibration (3-S: 1-C, and 2- and 4-C Non-adjacent Channels)**

OK	Parameter	Specification	Comments
<input type="checkbox"/>	Calibrate carrier 1	TX Bay Level Offset = 42 dB ( $\pm 4$ dB) prior to calibration	BBX-1, ANT-1 = ___ dB BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-2, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-3, ANT-3 = ___ dB BBX-r, ANT-3 = ___ dB
<input type="checkbox"/>	Calibrate carrier 2	TX Bay Level Offset = 42 dB ( $\pm 4$ dB) prior to calibration	BBX-7, ANT-1 = ___ dB BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-8, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-9, ANT-3 = ___ dB BBX-r, ANT-3 = ___ dB
<input type="checkbox"/>	Calibrate carrier 3	TX Bay Level Offset = 42 dB ( $\pm 4$ dB) prior to calibration	BBX-4, ANT-1 = ___ dB BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-5, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-6, ANT-3 = ___ dB BBX-r, ANT-3 = ___ dB
<input type="checkbox"/>	Calibrate carrier 4	TX Bay Level Offset = 42 dB ( $\pm 4$ dB) prior to calibration	BBX-10, ANT-1 = ___ dB BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-11, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-12, ANT-3 = ___ dB 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 BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-2, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-3, ANT-3 = ___ dB BBX-r, ANT-3 = ___ dB

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**Table A-10: TX BLO Calibration (3-S: 1-C, and 2- and 4-C 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 BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-8, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-9, ANT-3 = ___ dB 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 BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-5, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-6, ANT-3 = ___ dB 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 BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-11, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-12, ANT-3 = ___ dB BBX-r, ANT-3 = ___ dB

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

**2-Carrier Adjacent Channel**

**Table A-11: TX BLO Calibration (3-S: 2-C Adjacent Channels)**

OK	Parameter	Specification	Comments
<input type="checkbox"/>	Calibrate carrier 1	TX Bay Level Offset = 42 dB (typical), 38 dB (minimum) prior to calibration	BBX-1, ANT-1 = ___ dB BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-2, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-3, ANT-3 = ___ dB BBX-r, ANT-3 = ___ dB

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**Table A-11: TX BLO Calibration (3-S: 2-C Adjacent Channels)**

OK	Parameter	Specification	Comments
<input type="checkbox"/>	Calibrate carrier 2	TX Bay Level Offset = 42 dB (typical), 38 dB (minimum) prior to calibration	BBX-7, ANT-4 = ____ dB BBX-r, ANT-4 = ____ dB
<input type="checkbox"/>			BBX-8, ANT-5 = ____ dB BBX-r, ANT-5 = ____ dB
<input type="checkbox"/>			BBX-9, ANT-6 = ____ dB 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 BBX-r, ANT-1 = ____ dB
<input type="checkbox"/>			BBX-2, ANT-2 = ____ dB BBX-r, ANT-2 = ____ dB
<input type="checkbox"/>			BBX-3, ANT-3 = ____ dB 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 BBX-r, ANT-4 = ____ dB
<input type="checkbox"/>			BBX-8, ANT-5 = ____ dB BBX-r, ANT-5 = ____ dB
<input type="checkbox"/>			BBX-9, ANT-6 = ____ dB BBX-r, ANT-6 = ____ dB

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

**3-Carrier Adjacent Channels  
4-Carrier Adjacent Channels**

**Table A-12: TX BLO Calibration (3-S: 3- or 4-C Adjacent Channels)**

OK	Parameter	Specification	Comments
<input type="checkbox"/>	Calibrate carrier 1	TX Bay Level Offset = 42 dB ( $\pm 4$ dB) prior to calibration	BBX-1, ANT-1 = ____ dB BBX-r, ANT-1 = ____ dB
<input type="checkbox"/>			BBX-2, ANT-2 = ____ dB BBX-r, ANT-2 = ____ dB
<input type="checkbox"/>			BBX-3, ANT-3 = ____ dB BBX-r, ANT-3 = ____ dB

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**Table A-12: TX BLO Calibration (3-S: 3- or 4-C Adjacent Channels)**

OK	Parameter	Specification	Comments
<input type="checkbox"/>	Calibrate carrier 2	TX Bay Level Offset = 42 dB ( $\pm 4$ dB) prior to calibration	BBX-7, ANT-1 = ___ dB BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-8, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-9, ANT-3 = ___ dB BBX-r, ANT-3 = ___ dB
<input type="checkbox"/>	Calibrate carrier 3	TX Bay Level Offset = 42 dB ( $\pm 4$ dB) prior to calibration	BBX-4, ANT-4 = ___ dB BBX-r, ANT-4 = ___ dB
<input type="checkbox"/>			BBX-5, ANT-5 = ___ dB BBX-r, ANT-5 = ___ dB
<input type="checkbox"/>			BBX-6, ANT-6 = ___ dB BBX-r, ANT-6 = ___ dB
<input type="checkbox"/>	Calibrate carrier 4	TX Bay Level Offset = 42 dB ( $\pm 4$ dB) prior to calibration	BBX-10, ANT-4 = ___ dB BBX-3, ANT-4 = ___ dB
<input type="checkbox"/>			BBX-11, ANT-5 = ___ dB BBX-r, ANT-5 = ___ dB
<input type="checkbox"/>			BBX-12, ANT-6 = ___ dB 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 BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-2, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-3, ANT-3 = ___ dB 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-1 = ___ dB BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-8, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-9, ANT-3 = ___ dB BBX-r, ANT-3 = ___ dB

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**Table A-12: TX BLO Calibration (3-S: 3- or 4-C Adjacent Channels)**

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

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

\_\_\_\_\_



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

**Table A-13: TX BLO Calibration (6-S: 1-C, 2-C Non-adjacent Channels)**

OK	Parameter	Specification	Comments
<input type="checkbox"/>	Calibrate carrier 1	TX Bay Level Offset = 42 dB (typical), 38 dB (minimum) prior to calibration	BBX-1, ANT-1 = ___ dB BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-2, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-3, ANT-3 = ___ dB BBX-r, ANT-3 = ___ dB
<input type="checkbox"/>			BBX-4, ANT-4 = ___ dB BBX-r, ANT-4 = ___ dB
<input type="checkbox"/>			BBX-5, ANT-5 = ___ dB BBX-r, ANT-5 = ___ dB
<input type="checkbox"/>			BBX-6, ANT-6 = ___ dB BBX-r, ANT-6 = ___ dB
<input type="checkbox"/>	Calibrate carrier 2	TX Bay Level Offset = 42 dB (typical), 38 dB (minimum) prior to calibration	BBX-7, ANT-1 = ___ dB BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-8, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-9, ANT-3 = ___ dB BBX-r, ANT-3 = ___ dB
<input type="checkbox"/>			BBX-10, ANT-4 = ___ dB BBX-3, ANT-4 = ___ dB
<input type="checkbox"/>			BBX-11, ANT-5 = ___ dB BBX-r, ANT-5 = ___ dB
<input type="checkbox"/>			BBX-12, ANT-6 = ___ dB BBX-r, ANT-5 = ___ dB

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**Table A-13: TX BLO Calibration (6-S: 1-C, 2-C 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 BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-2, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-3, ANT-3 = ___ dB BBX-r, ANT-3 = ___ dB
<input type="checkbox"/>			BBX-4, ANT-4 = ___ dB BBX-r, ANT-4 = ___ dB
<input type="checkbox"/>			BBX-5, ANT-5 = ___ dB BBX-r, ANT-5 = ___ dB
<input type="checkbox"/>			BBX-6, ANT-6 = ___ dB 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 BBX-r, ANT-1 = ___ dB
<input type="checkbox"/>			BBX-8, ANT-2 = ___ dB BBX-r, ANT-2 = ___ dB
<input type="checkbox"/>			BBX-9, ANT-3 = ___ dB BBX-r, ANT-3 = ___ dB
<input type="checkbox"/>			BBX-10, ANT-4 = ___ dB BBX-r, ANT-4 = ___ dB
<input type="checkbox"/>			BBX-11, ANT-5 = ___ dB BBX-r, ANT-5 = ___ dB
<input type="checkbox"/>			BBX-12, ANT-6 = ___ dB BBX-r, ANT-6 = ___ dB

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

\_\_\_\_\_

**BTS Redundancy/Alarm Tests****Table A-14: 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, & LFR redundancy/alarm tests	Verify per procedure	
<input type="checkbox"/>	LPA redundancy test	Verify per procedure	

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

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**TX Antenna VSWR****Table A-15: 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: \_\_\_\_\_

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## RX Antenna VSWR

Table A-16: 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-17: 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: \_\_\_\_\_





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- MCC-10 \_\_\_\_\_
- MCC-11 \_\_\_\_\_
- MCC-12 \_\_\_\_\_
- CIO \_\_\_\_\_
- SWITCH \_\_\_\_\_
- PS-1 \_\_\_\_\_
- PS-2 \_\_\_\_\_
- PS-3 \_\_\_\_\_

**LPAs**

- LPA 1A \_\_\_\_\_
- LPA 1B \_\_\_\_\_
- LPA 1C \_\_\_\_\_
- LPA 1D \_\_\_\_\_
- LPA 2A \_\_\_\_\_
- LPA 2B \_\_\_\_\_
- LPA 2C \_\_\_\_\_
- LPA 2D \_\_\_\_\_
- LPA 3A \_\_\_\_\_
- LPA 3B \_\_\_\_\_
- LPA 3C \_\_\_\_\_
- LPA 3D \_\_\_\_\_
- LPA 4A \_\_\_\_\_
- LPA 4B \_\_\_\_\_
- LPA 4C \_\_\_\_\_
- LPA 4D \_\_\_\_\_

**Power Conversion Shelf (-48 V BTS Only)**

- AMR \_\_\_\_\_
- PS 4 \_\_\_\_\_
- PS 5 \_\_\_\_\_
- PS 6 \_\_\_\_\_
- PS 7 \_\_\_\_\_
- PS 8 \_\_\_\_\_
- PS 9 \_\_\_\_\_

*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*.

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

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**B**

<b>Table B-1: PnMask I and PnMask Q Values for PilotPn</b>				
<b>14-Chip Delay</b>				
<b>Pilot PN</b>	<b>I (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

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

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<b>Table B-1: PnMask I and PnMask Q Values for PilotPn</b>				
<b>14-Chip Delay</b>				
<b>Pilot PN</b>	<b>I (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

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

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

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

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

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

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

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<b>Table B-1: PnMask I and PnMask Q Values for PilotPn</b>				
<b>14-Chip Delay</b>				
<b>Pilot PN</b>	<b>I (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

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

14-Chip Delay				
Pilot PN	I (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

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

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

### BTS Frame

<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/ 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.
CIO Card	All RX and TX paths of the affected CDMA carrier.
Any LPA Module	The affected sector TX path.
LPA Backplane	The affected sector TX path.
LPA Filter	The affected sector TX path.

### 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.
Any RFDS component or TSU.	The RFDS calibration RX & TX paths (MONFWD/GENFWD).



## 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 assumes 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>	Not every procedure required to bring the site back on line is indicated in Table C-3. It is meant to be used as a guideline ONLY. The table assumes that the user is familiar enough with the BTS Optimization/ATP procedure to understand which test equipment set ups, calibrations, and BTS site preparation will be required before performing the Table # procedures referenced.
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Various passive BTS components (such as the TX and RX directional couplers, Preselector IO, CIO; 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.
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When the CIO 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 BTS Optimization and ATP Test Matrix**

Doc Tbl #	page	Description	Directional Coupler (RX)	Directional Coupler (TX)	RX Filter	RX Cables	TX Cables	MPC/EMPC	CIO	C-CCP Backplane	BBX	MCC	CSM	LFR/HSO	GPS	GLI	LPA Trunking Backplane	LPA	LPA Bandpass Filter	Power Supply Modules	Switch Card	RFDS
Table 2-1	2-3	Initial Boards/Modules Install, Preliminary Operations, CDF Site Equipage; etc.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	**	•	•
Table 2-2 Table 2-5	2-6 2-14	DC Power Pre-Test Physical Inspect			•					•												
Table 2-7	2-15	Initial Power-up								•							•	•		**		•
Table 3-11	3-34	Ping the Processors								•	•	•	•			•					•	
Table 3-13	3-38	Download/Enable MGLIs								•						•						•
Table 3-13	3-38	Download/Enable GLIs								•						•						•
Table 3-14	3-39	Download CSMs								•			•	•								•
Table 3-14	3-39	Download MCCs								•			•	•								•
Table 3-14	3-39	Download BBXs								•	•											•
Table 3-16	3-41	Enable CSMs								•			•									
Table 3-17	3-42	Enable MCCs								•		•										
Table 3-20	3-49	GPS Initialization / Verification								•			•	•								
Table 3-21	3-53	LFR Initialization / Verification								•				•								
Table 3-22	3-55	HSO Initialization/Verification								•				•								
<p>• Required</p> <p>** Replace power converters one card at a time so that power to the C-CCP or LPA shelf is not lost. If power to the C-CCP shelf is lost, all cards in the shelf must be downloaded again.</p>																						

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**Table C-3: SC 4812T BTS Optimization and ATP Test Matrix**

Doc Tbl #	page	Description	Directional Coupler (RX)	Directional Coupler (TX)	RX Filter	RX Cables	TX Cables	MPC/EMPC	CIO	C-CCP Backplane	BBX	MCC	CSM	LFR/HSO	GPS	GLI	LPA Trunking Backplane	LPA	LPA Bandpass Filter	Power Supply Modules	Switch Card	RFDS
Table 3-37	3-92	TX Path Calibration	4	4			4		1	1	4					*	3	3	4		7	
Table 3-38	3-94	Download Offsets to BBX	4	4						1	4					*						
Table 3-39	3-96	TX Path Calibration Audit	4	4			4		1	1	4					*	3	3	4		7	
Table 3-48	3-107	RFDS Path Calibration Procedure (see Note †)	6	6		5	4		1	1	6					*	3	3	4			6
†	RFDS Path Calibration should be performed at initial BTS installation AND after replacement of the RFDS FRU. RFDS Path Calibration is NOT required for other FRU replacement but may be used as an additional fault isolation tool.																					
Table 4-1	4-9	Spectral Purity TX Mask ATP	4	4						1	4					*	*	*	*			*
Table 4-1	4-9	Waveform Quality (rho) ATP	4	4					*	1	4		*		*	*	*	*	*			
Table 4-1	4-9	Pilot Time Offset ATP	4	4					*	1	4		*		*	*	*	*	*			
Table 4-1	4-9	Code Domain Power / Noise Floor	4	4						1	4	8	8	8	8	*	*	*	*			
Table 4-1	4-9	FER Test	5	5		5		5	2	2	5	8	8	8	8	*						7
<p>* Perform if necessary for additional fault isolation, repair assurance, or site certification.</p> <p>1 Perform on all carrier and sector TX paths to the C-CCP cage.</p> <p>2 Perform on all carrier and sector RX paths to the C-CCP cage.</p> <p>3 Perform on all primary and redundant TX paths of the affected carrier.</p> <p>4 Perform on the affected carrier and sector TX paths. (BBXR replacement affects all carrier and sector TX paths.)</p> <p>5 Perform on the affected carrier and sector RX paths. (BBXR replacement affects all carrier and sector RX paths.)</p> <p>6 Perform on all RF paths of the affected carrier and sector (RFDS replacement affects all carriers.)</p> <p>7 Perform with redundant BBX for all sectors on all carriers.</p> <p>8 Verify performance by performing on one sector of one carrier only.</p>																						





*Appendix D*

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# **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↗ Gain↘	44	43	42	41	40	39	38	37	36	35	34	33
541	—	—	—	—	—	—	—	43.3	42.3	41.3	40.3	39.3
533	—	—	—	—	—	—	—	43.2	42.2	41.2	40.2	39.2
525	—	—	—	—	—	—	44	43	42	41	40	39
517	—	—	—	—	—	—	43.9	42.9	41.9	40.9	39.9	38.9
509	—	—	—	—	—	—	43.8	42.8	41.8	40.8	39.8	38.8
501	—	—	—	—	—	—	43.6	42.6	41.6	40.6	39.6	38.6
493	—	—	—	—	—	—	43.5	42.5	41.5	40.5	39.5	38.5
485	—	—	—	—	—	—	43.4	42.4	41.4	40.4	39.4	38.4
477	—	—	—	—	—	—	43.2	42.2	41.2	40.2	39.2	38.2
469	—	—	—	—	—	—	43.1	42.1	41.1	40.1	39.1	38.1
461	—	—	—	—	—	43.9	42.9	41.9	40.9	39.9	38.9	37.9
453	—	—	—	—	—	43.8	42.8	41.8	40.8	39.8	38.8	37.8
445	—	—	—	—	—	43.6	42.6	41.6	40.6	39.6	38.6	37.6
437	—	—	—	—	—	43.4	42.4	41.4	40.4	39.4	38.4	37.4
429	—	—	—	—	—	43.3	42.3	41.3	40.3	39.3	38.3	37.3
421	—	—	—	—	—	43.1	42.1	41.1	40.1	39.1	38.1	37.1
413	—	—	—	—	44	43	42	41	40	39	38	37
405	—	—	—	—	43.8	42.8	41.8	40.8	39.8	38.8	37.8	36.8
397	—	—	—	—	43.6	42.6	41.6	40.6	39.6	38.6	37.6	36.6
389	—	—	—	—	43.4	42.4	41.4	40.4	39.4	38.4	37.4	36.4

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<b>dBm↗ 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	–	–



*Appendix E*

# CDMA Operating Frequency



# Operating Frequency – North American PCS Bands

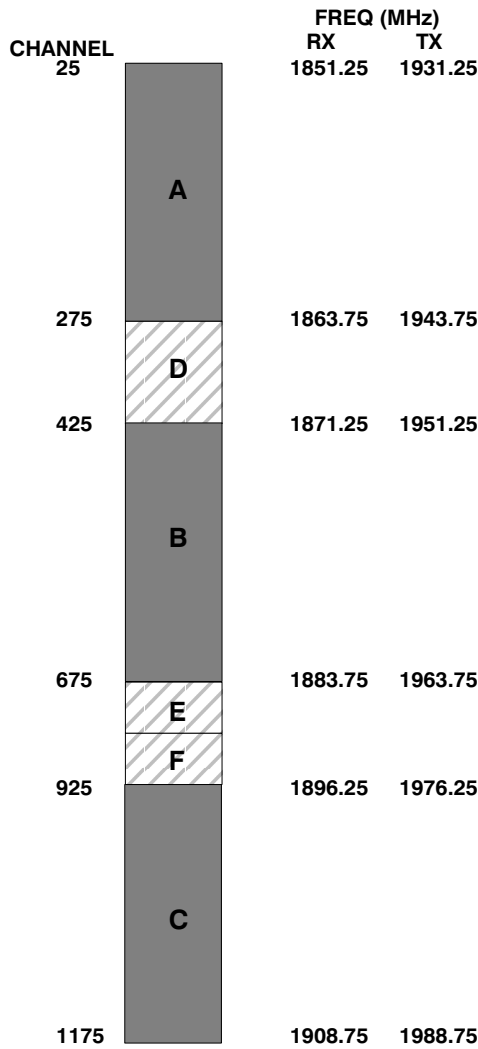
## Introduction

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.

## 1900 MHz PCS Channels

Figure E-1 shows the valid channels for the North American PCS 1900 MHz frequency spectrum. There are 10 CDMA wireline or non-wireline band channels used in a CDMA system (unique per customer operating system).

**Figure E-1:** North American PCS 1900 MHz Frequency Spectrum



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## Calculating 1900 MHz Center Frequencies

Table E-1 shows selected 1900 MHz CDMA candidate operating channels, listed in both decimal and hexadecimal, and the corresponding transmit, and receive frequencies. Center frequencies (in MHz) for channels not shown in the table may be calculated as follows:

- $TX = 1930 + 0.05 * \text{Channel\#}$

**Example:** Channel 262

$$TX = 1930 + 0.05 * 262 = 1943.10 \text{ MHz}$$

- $RX = TX - 80$

**Example:** Channel 262

$$RX = 1943.10 - 80 = 1863.10 \text{ MHz}$$

Actual frequencies used depend on customer CDMA system frequency plan.

Each CDMA channel requires a 1.77 MHz frequency segment. The actual CDMA carrier is 1.23 MHz wide, with a 0.27 MHz guard band on both sides of the carrier.

Minimum frequency separation required between any CDMA carrier and the nearest NAMPS/AMPS carrier is 900 kHz (center-to-center).

**Table E-1:** 1900 MHz TX and RX Frequency vs. Channel

Channel Number		Transmit Frequency (MHz) Center Frequency	Receive Frequency (MHz) Center Frequency
Decimal	Hex		
25	0019	1931.25	1851.25
50	0032	1932.50	1852.50
75	004B	1933.75	1853.75
100	0064	1935.00	1855.00
125	007D	1936.25	1856.25
150	0096	1937.50	1857.50
175	00AF	1938.75	1858.75
200	00C8	1940.00	1860.00
225	00E1	1941.25	1861.25
250	00FA	1942.50	1862.50
275	0113	1943.75	1863.75
300	012C	1945.00	1865.00
325	0145	1946.25	1866.25
350	015E	1947.50	1867.50
375	0177	1948.75	1868.75
400	0190	1950.00	1870.00
425	01A9	1951.25	1871.25
450	01C2	1952.50	1872.50
475	01DB	1953.75	1873.75
500	01F4	1955.00	1875.00
525	020D	1956.25	1876.25
550	0226	1957.50	1877.50
575	023F	1958.75	1878.75

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**Table E-1: 1900 MHz TX and RX Frequency vs. Channel**

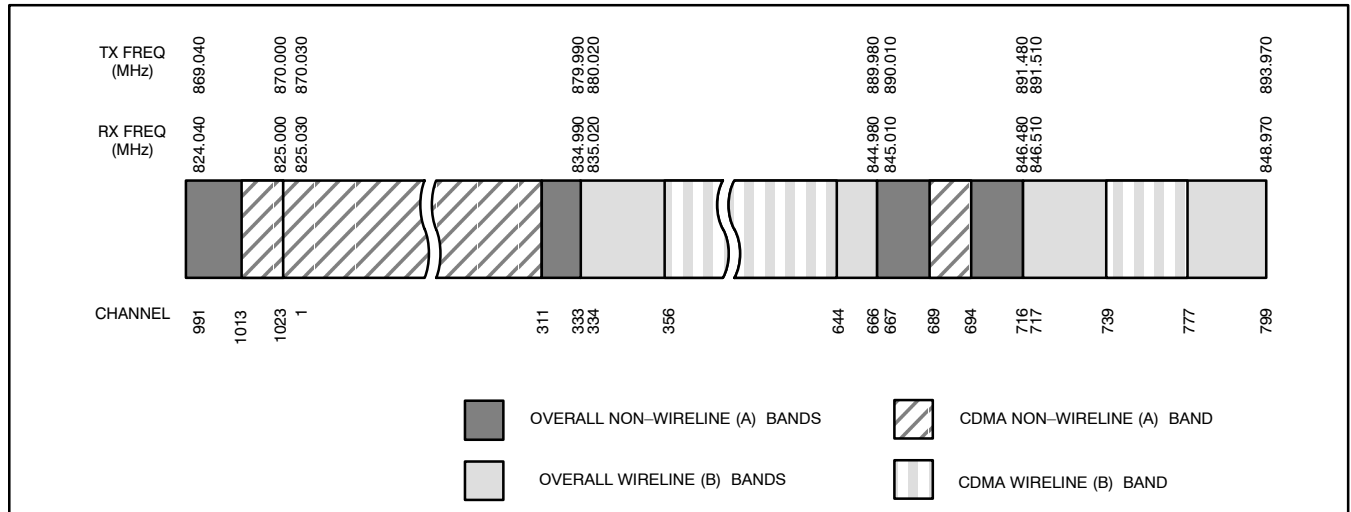
Channel Number		Transmit Frequency (MHz)	Receive Frequency (MHz)
Decimal	Hex	Center Frequency	Center Frequency
600	0258	1960.00	1880.00
625	0271	1961.25	1881.25
650	028A	1962.50	1882.50
675	02A3	1963.75	1883.75
700	02BC	1965.00	1885.00
725	02D5	1966.25	1886.25
750	02EE	1967.50	1887.50
775	0307	1968.75	1888.75
800	0320	1970.00	1890.00
825	0339	1971.25	1891.25
850	0352	1972.50	1892.50
875	036B	1973.75	1893.75
900	0384	1975.00	1895.00
925	039D	1976.25	1896.25
950	03B6	1977.50	1897.50
975	03CF	1978.75	1898.75
1000	03E8	1980.00	1900.00
1025	0401	1981.25	1901.25
1050	041A	1982.50	1902.50
1075	0433	1983.75	1903.75
1100	044C	1985.00	1905.00
1125	0465	1986.25	1906.25
1150	047E	1987.50	1807.50
1175	0497	1988.75	1908.75

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### 800 MHz CDMA Channels

Figure E-2 shows the valid channels for the North American cellular telephone frequency spectrum. There are 10 CDMA wireline or non-wireline band channels used in a CDMA system (unique per customer operating system).

**Figure E-2:** North American Cellular Telephone System Frequency Spectrum



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### Calculating 800 MHz Center Frequencies

Table E-2 shows selected 800 MHz CDMA candidate operating channels, listed in both decimal and hexadecimal, and the corresponding transmit, and receive frequencies. Center frequencies (in MHz) for channels not shown in the table may be calculated as follows:

- Channels 1–777  
 $TX = 870 + 0.03 * Channel\#$   
**Example:** Channel 262  
 $TX = 870 + 0.03 * 262 = 877.86 \text{ MHz}$
- Channels 1013–1023  
 $TX = 870 + 0.03 * (Channel\# - 1023)$   
**Example:** Channel 1015  
 $TX = 870 + 0.03 * (1015 - 1023) = 869.76 \text{ MHz}$
- $RX = TX - 45 \text{ MHz}$   
**Example:** Channel 262  
 $RX = 877.86 - 45 = 832.86 \text{ MHz}$

Channel Number		Transmit Frequency (MHz)	Receive Frequency (MHz)
Decimal	Hex	Center Frequency	Center Frequency
1	0001	870.0300	825.0300
25	0019	870.7500	825.7500
50	0032	871.5000	826.5000

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**Table E-2:** 800 MHz TX and RX Frequency vs. Channel

Channel Number		Transmit Frequency (MHz) Center Frequency	Receive Frequency (MHz) Center Frequency
Decimal	Hex		
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

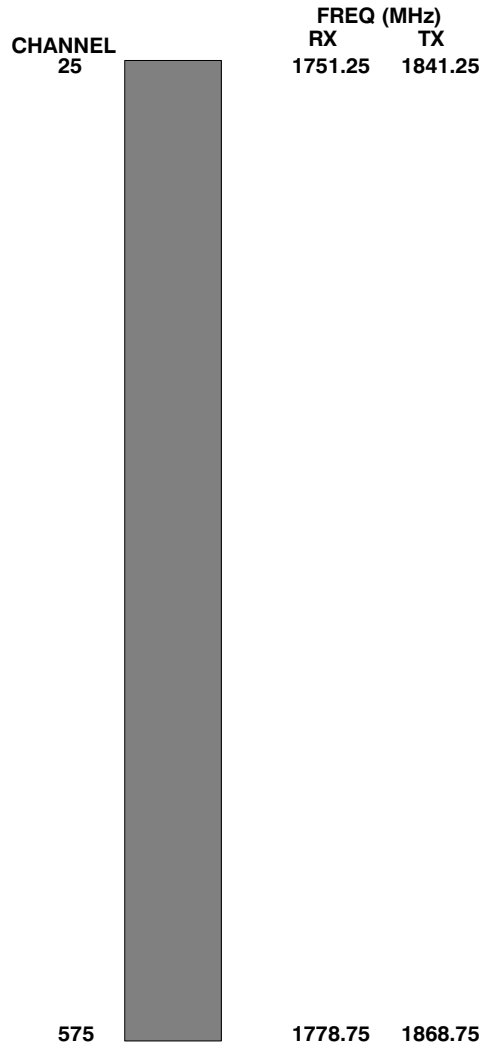


## Operating Frequency – Korean Bands

### 1700 MHz PCS Channels

Figure E-3 shows the valid channels for the 1700 MHz PCS frequency spectrum. The CDMA channels are spaced in increments of 25 (25, 50, 75, . . . 575) across the CDMA band.

**Figure E-3:** 1700 MHz PCS Frequency Spectrum



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## Calculating 1700 MHz Center Frequencies

Center frequency for channels may be calculated as follows:

Direction	Formula	Example
TX	$1840 + (0.05 * \text{Channel\#})$	Channel: $1840 + (0.05 * 25) = 1841.25$
RX	$1750 + (0.05 * \text{Channel\#})$	Channel: $1750 + (0.05 * 25) = 1751.25$

- Actual frequencies used depend on customer CDMA system frequency plan.
- Each CDMA channel requires a 1.77 MHz frequency segment. The actual CDMA carrier is 1.23 MHz wide, with a 0.27 MHz guard band on both sides of the carrier
- Minimum frequency separation required between any CDMA carrier and the nearest NAMPS/AMPS carrier is 900 kHz (center to center).

**Table E-3: 1700 MHz TX and RX Frequency vs. Channel (Korean Bands)**

Channel Number		Transmit Frequency (MHz) Center Frequency	Receive Frequency (MHz) Center Frequency
Decimal	Hex		
25	0019	1841.25	1751.25
50	0032	1842.50	1752.50
75	004B	1843.75	1753.75
100	0064	1845.00	1755.00
125	007D	1846.25	1756.25
150	0096	1847.50	1757.50
175	00AF	1848.75	1758.75
200	00C8	1850.00	1760.00
225	00E1	1851.25	1761.25
250	00FA	1852.50	1762.50
275	0113	1853.75	1763.75
300	012C	1855.00	1765.00
325	0145	1856.25	1766.25
350	015E	1857.50	1767.50
375	0177	1858.75	1768.75
400	0190	1860.00	1770.00
425	01A9	1861.25	1771.25
450	01C2	1862.50	1772.50
475	01DB	1863.75	1773.75
500	01F4	1865.00	1775.00
525	020D	1866.25	1776.25
550	0226	1867.50	1777.50
575	023F	1868.75	1778.75

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*Appendix F*

# Test Equipment Preparation

# Test Equipment Preparation

## Purpose

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

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 cover verification and changing GPIB addresses for the various items of CDMA test equipment supported by the LMF.

## Agilent R7495A 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.

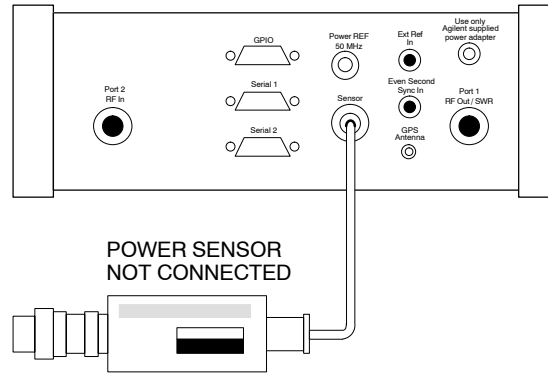
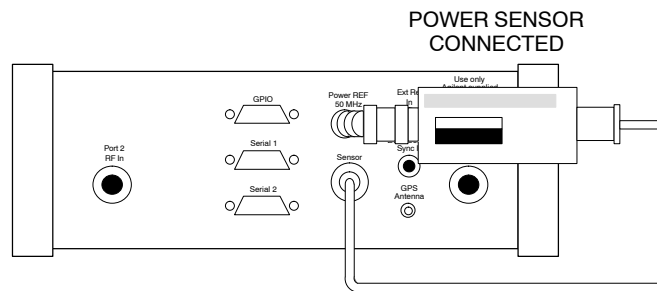
Table F-2: Detecting Agilent E7495A Test Equipment		
✓	Step	Action
	1	Click the <b>Tools</b> Menu.
	2	Choose <b>Options</b> .
	3	Check <b>Agilent E7495A</b> option in non-GPIB Test Equipment and enter its IP number.
	4	Click <b>Apply</b> and wait a moment.
	5	Click <b>Dismiss</b> .

## 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>

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**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 3-15 on page 3-64) 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.

## ATP Setup

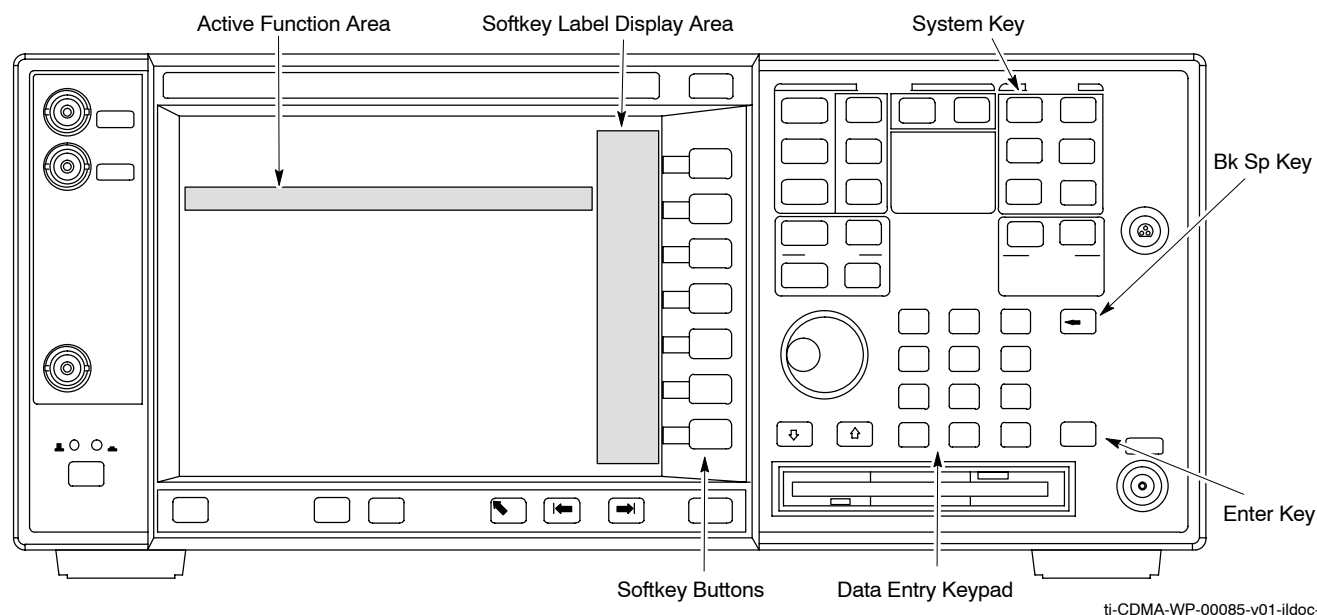
TX Path Calibration setup is shown in Test Equipment Setup (see Figure 3-18 on page 3-67).

## Verifying and Setting GPIB Address

### Agilent E4406A Transmitter Tester GPIB Address

Refer to Figure F-3 and follow the procedure in Table F-4 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

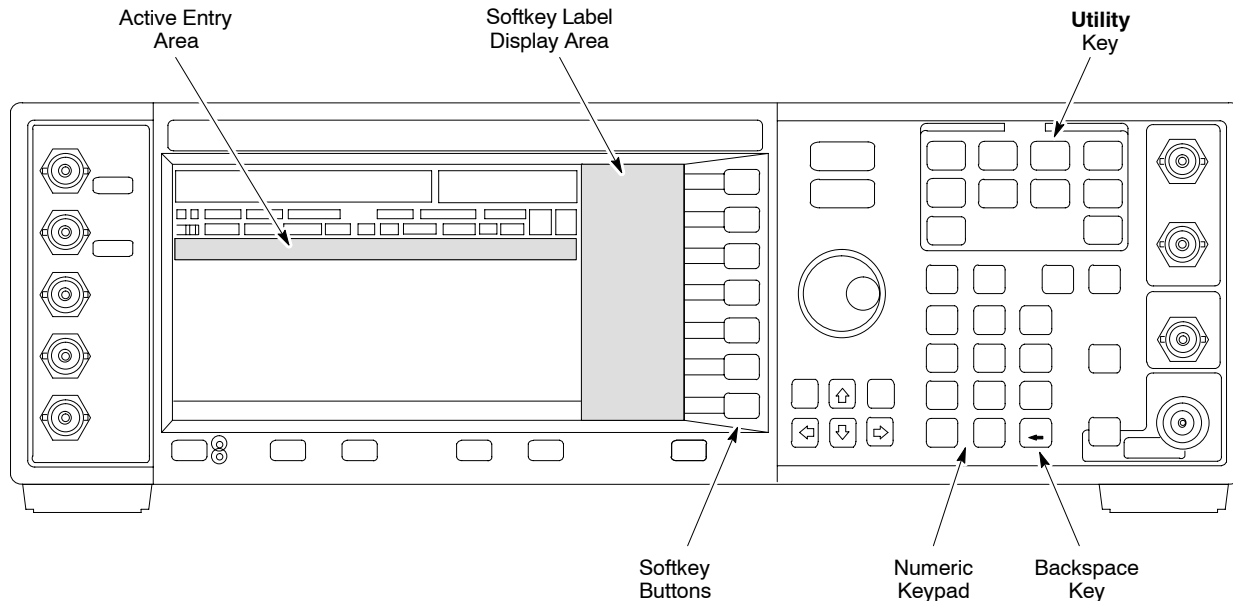
Step	Action
1	In the <b>SYSTEM</b> section of the instrument front panel, press the <b>System</b> key. <ul style="list-style-type: none"> <li>– The softkey labels displayed on the right side of the instrument screen will change.</li> </ul>
2	Press the <b>Config I/O</b> softkey button to the right of 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 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>– Characters typed with the keypad will replace the current GPIB address in the Active Function Area.</li> </ul> <p><b>NOTE</b> To correct an entry, press <b>Bk Sp</b> key 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

Refer to Figure F-4 and follow the procedure in Table F-5 to verify and, if necessary, change the Agilent E4432B GPIB address.

**Figure F-4:** Setting Agilent E4432B GPIB Address



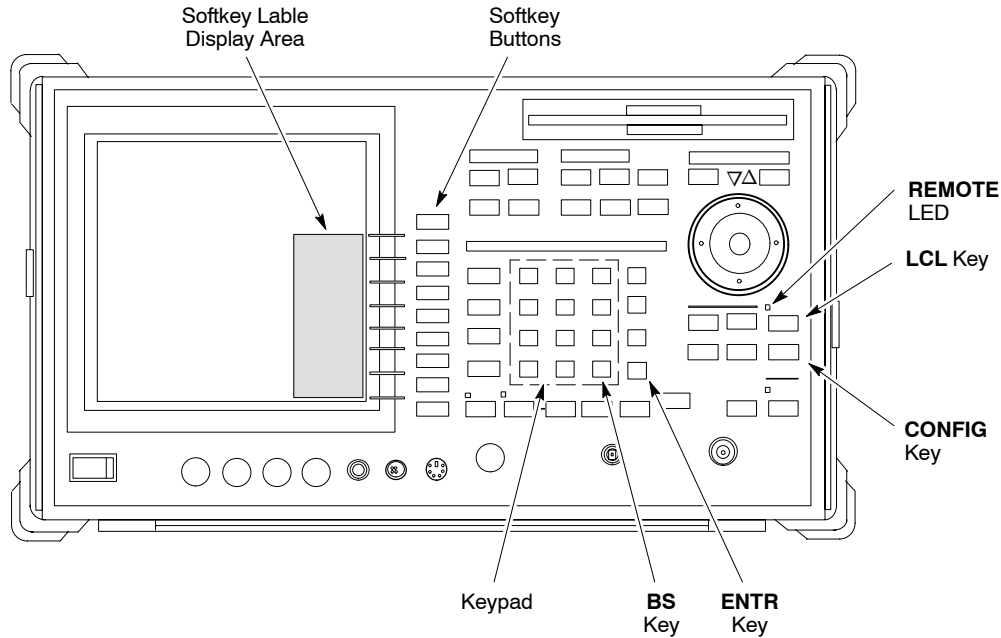
**Table F-5:** Verify and Change Agilent E4432B GPIB Address

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>– Characters typed on the keypad will replace the current GPIB address in the Active Entry display.</li> </ul> <p><b>NOTE</b> 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

Refer to Figure F-5 and perform the procedure in Table F-6 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

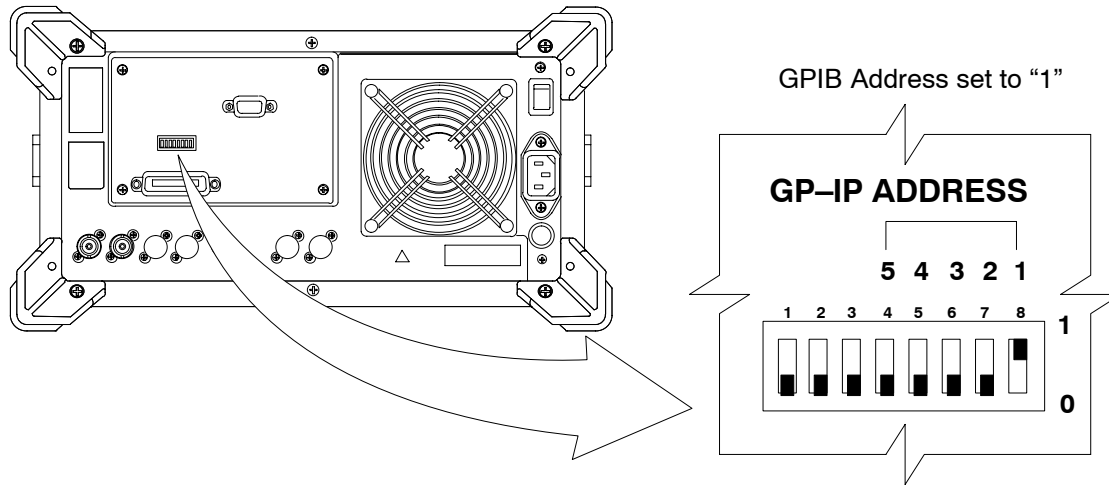
Step	Action
1	If the <b>REMOTE LED</b> is lighted, press the <b>LCL</b> key. <ul style="list-style-type: none"> <li>- The LED extinguishes.</li> </ul>
2	Press the <b>CONFIG</b> key. <ul style="list-style-type: none"> <li>- <b>CONFIG</b> softkey labels will appear in the softkey label display area of 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: <p>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.</p> <p>3b Enter <b>18</b> on the keypad in the <b>ENTRY</b> section of the instrument front panel.                     <ul style="list-style-type: none"> <li>- Characters typed on the keypad will replace the address displayed in the <b>GPIB Address</b> entry window.</li> </ul> <p><b>NOTE</b> 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> <p>3c Press the <b>ENTR</b> key to the lower right of the keypad to set the new GPIB 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> </p></p>

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### Advantest R3562 Signal Generator GPIB Address

Set the **GP-IB ADDRESS** switch on the rear of the Advantest R3562 signal generator to address **1** as shown in Figure F-6.

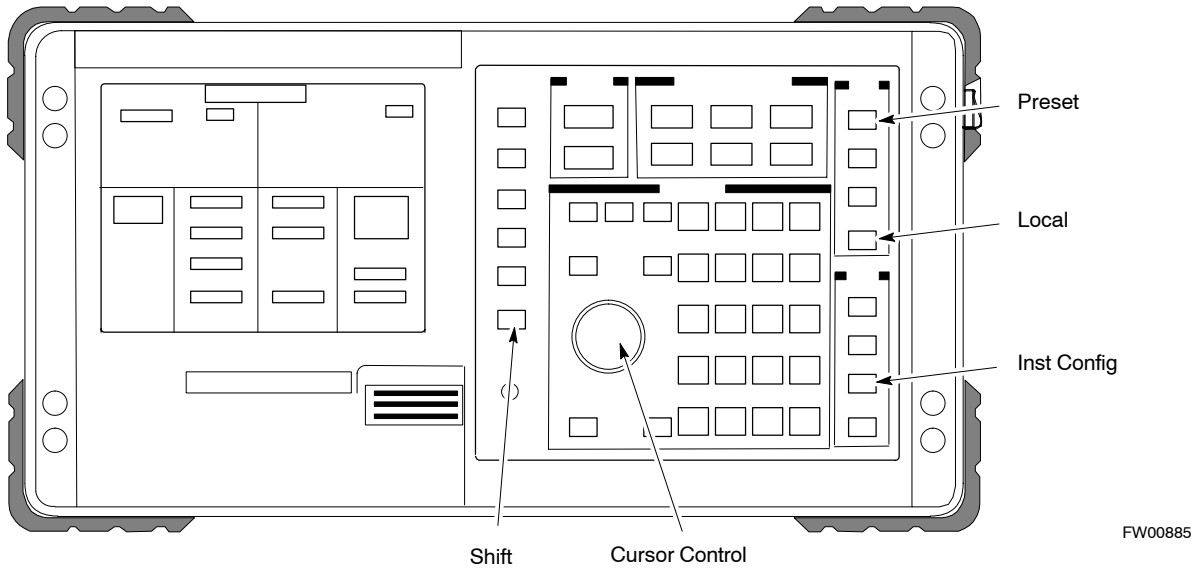
**Figure F-6:** Advantest R3562 GPIB Address Switch Setting



## Agilent 8935 Series E6380 (formerly HP 8935) Test Set GPIB Address

Refer to Figure F-7 and follow the procedure in Table F-7 to verify and, if necessary, change the Agilent 8935 GPIB address.

**Figure F-7:** Agilent 8935 Test Set



**NOTE** This procedure assumes that the test equipment is set up and ready for testing.

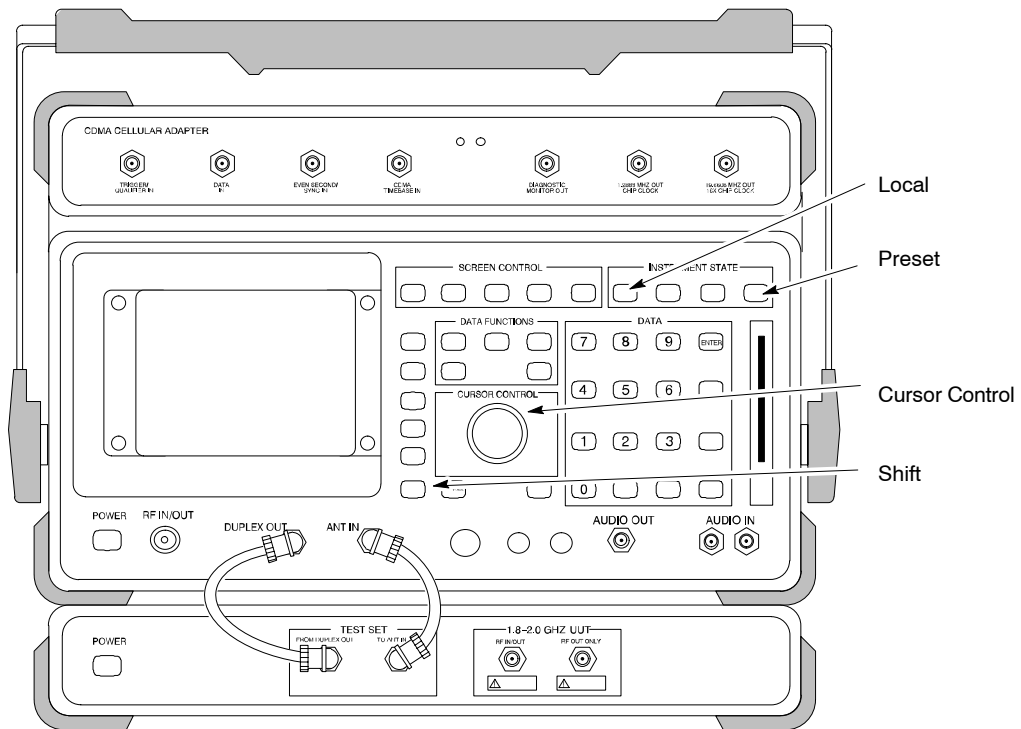
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Table F-7: Verify and/or Change Agilent 8935 (formerly HP 8935) GPIB Address	
Step	Action
1	<p><b>NOTE</b> The HP I/O configuration <b>MUST</b> be set to <b>Talk &amp; Listen</b>, or <i>no</i> device on the GPIB will be accessible. (Consult test equipment OEM documentation for additional information as required.)</p> <p>To verify that the GPIB addresses are set correctly, press <b>Shift</b> and <b>LOCAL</b> on the Agilent 8935.</p> <ul style="list-style-type: none"> <li>– The current HP-IB address is displayed at the top of the screen.</li> </ul> <p><b>NOTE</b> HP-IB is the same as GPIB.</p>
2	If the current GPIB address is not set to <b>18</b> , perform the following to change it:
2a	– Press <b>Shift</b> and <b>Inst Config</b> .
2b	– Turn the <b>Cursor Control</b> knob to move the cursor to the <b>HP-IB Adrs</b> field.
2c	– Press the <b>Cursor Control</b> knob to select the field.
2d	– Turn the <b>Cursor Control</b> knob as required to change the address to <b>18</b> .
2e	– Press the <b>Cursor Control</b> knob to set the address.
3	Press <b>Preset</b> to return to normal operation.

## Hewlett Packard HP8921A and HP83236A/B GPIB Address

Refer to Figure F-8 and follow the procedure in Table F-8 to verify and, if necessary, change the HP 8921A HP 83236A GPIB addresses.

**Figure F-8:** HP 8921A and HP 83236A/B



**NOTE** This procedure assumes that the test equipment is set up and ready for testing.

**Table F-8:** Verify and/or Change HP 8921A and HP 83236A GPIB Addresses

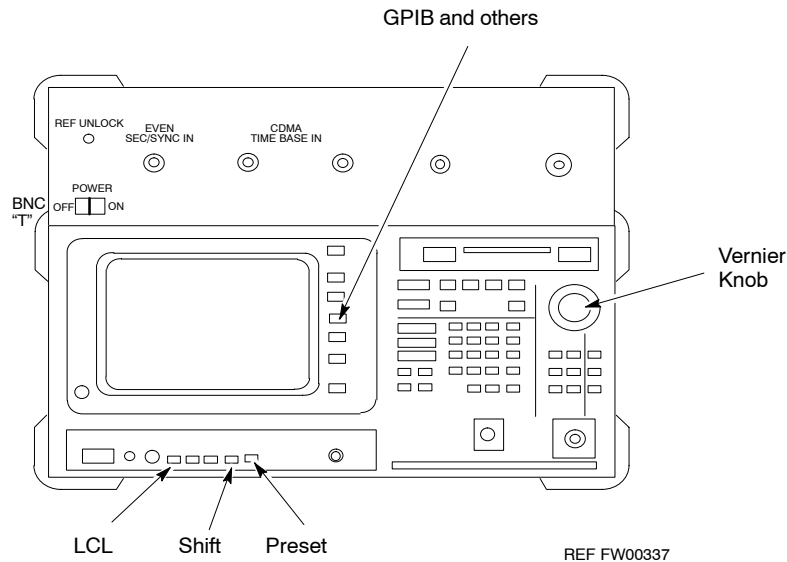
Step	Action
1	To verify that the GPIB addresses are set correctly, press <b>Shift</b> and <b>LOCAL</b> on the HP 8921A. <ul style="list-style-type: none"> <li>– The current HP-IB address is displayed at the top of the screen.</li> </ul> <p><b>NOTE</b> HP-IB is the same as GPIB.</p>
2	If the current HP-IB address is not set to <b>18</b> , perform the following to change it:
2a	– Turn the <b>Cursor Control</b> knob to move the cursor to <b>More</b> and press the knob to select the field.
2b	– 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.
2c	– Turn the <b>Cursor Control</b> knob to move the cursor to <b>Adrs</b> and press the knob to select the field.
2d	– Turn the <b>Cursor Control</b> knob to change the HP-IB address to <b>18</b> and press the knob to set the address.
2e	– Press <b>Shift</b> and <b>Preset</b> to return to normal operation.
3	To set the HP 83236A (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

Refer to Figure F-9 and follow the procedure in Table 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:
1a	– Press <b>SHIFT</b> then <b>PRESET</b> .
1b	– Press <b>LCL</b> .
1c	– Press the <b>GPIB and Others</b> CRT menu key to view the current address.
2	If the current GPIB address is not set to <b>18</b> , perform the following to change it:
2a	– Turn the vernier knob as required to select <b>18</b> .
2b	– Press the vernier knob to set the address.
3	To return to normal operation, press <b>Shift</b> and <b>Preset</b> .

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## 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.

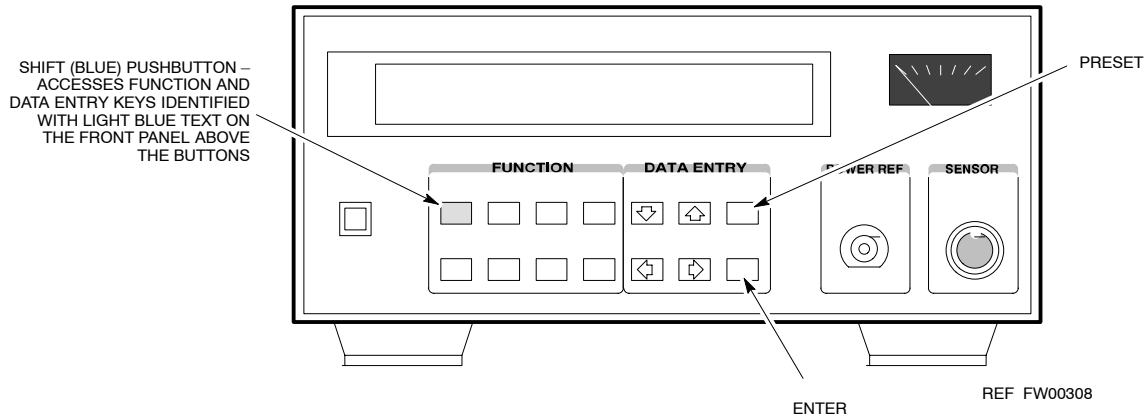
**Table F-10:** Verify and/or Change Motorola CyberTest GPIB Address

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 <b>18</b> , perform the following procedure to change it:
3a	– Use the up or down increment arrows or double-click in the field and type the number to set the address to <b>18</b> .
3b	– Click on the <b>OK</b> button. — The new address will be written to the CyberTest through the parallel port and saved.
4	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.

## HP 437 Power Meter GPIB Address

Refer to Figure F-10 and follow the steps in Table F-11 to verify and, if necessary, change the HP 437 GPIB address.

**Figure F-10:** HP 437 Power Meter



**NOTE** This procedure assumes that the test equipment is set up and ready for testing.

**Table F-11:** Verify and/or Change HP 437 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> . The HP-IB address is displayed. <b>NOTE</b> 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.

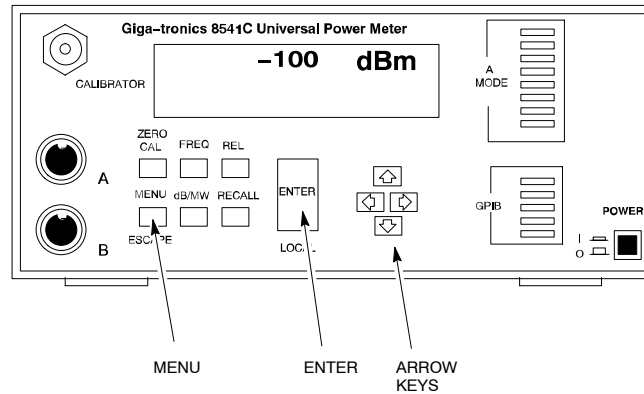
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## Gigatronics 8541C Power Meter GPIB Address

Refer to Figure F-11 and follow the steps in Table F-12 to verify and, if necessary, change the Gigatronics 8541C power meter GPIB address.

**Figure F-11:** Gigatronics 8541C Power Meter Detail



REF FW00564

<b>NOTE</b>	This procedure assumes that the test equipment is set up and ready for testing.
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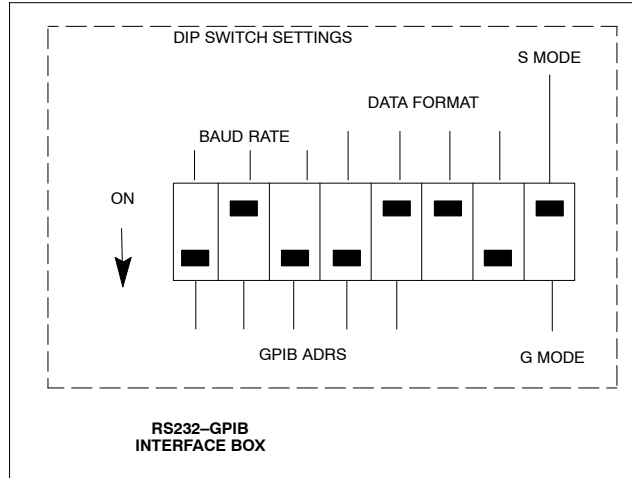
**Table F-12:** Verify and/or Change Gigatronics 8541C Power Meter GPIB Address

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>Press <b>MENU</b>.</p>
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> . 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: Use the <b>↔</b> arrow keys as required to select <b>MODE</b> . Use the <b>↕</b> arrow keys as required to set <b>MODE</b> to <b>8541C</b> .
5	If the <b>GPIB address</b> is not set to <b>13</b> , perform the following to change it: Use the <b>↩</b> arrow key to select <b>ADDRESS</b> . Use the <b>↕</b> arrow keys as required to set the <b>GPIB address</b> to <b>13</b> .
6	Press <b>ENTER</b> to return to normal operation.

## RS232 GPIB Interface Adapter

Be sure that the RS-232 GPIB interface adapter DIP switches are set as shown in Figure F-12.

Figure F-12: RS232 GPIB Interface Adapter



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## 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.)
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<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.
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<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> .
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### Prerequisites

Prior to performing any of these procedures, all preparations for preparing the LMF, updating LMF files, and any other pre-calibration procedures, as stated in Chapter 3, must have been completed.

## HP8921A System Connectivity Test

Follow the steps in Table F-13 to verify that the connections between the PCS Interface and the HP8921A are correct, and cables are intact. The software also performs basic functionality checks of each instrument.

**NOTE** Disconnect other GPIB devices, especially system controllers, from the system before running the connectivity software.

**Table F-13: System Connectivity**

Step	Action
	<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. 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.

## Manual Cable Calibration using HP8921 with HP PCS Interface (HP83236)

### NOTE

This calibration method *must be executed with great care*. Some losses are measured close to the minimum limit of the power meter sensor (–30 dBm).

### Prerequisites

Ensure the following prerequisites have been met before proceeding:

- Test equipment to be calibrated has been connected correctly for cable calibration.
- Test equipment has been selected and calibrated.

Refer to Figure F-13 for location of the components on the PCS Interface and Communications Test Set.

### Test Equipment Set-up

Perform the procedure in Table F-14 to calibrate the test equipment using the HP8921 Cellular Communications Analyzer equipped with the HP83236 PCS Interface.

Table F-14: Manual Cable Calibration Test Equipment Setup (using the HP PCS Interface)			
Step	Action		
	<b>NOTE</b> Verify that GPIB controller is turned off.		
1	Insert HP 83236A Manual Control System card into memory card slot (see Figure F-13).		
2	Press the <b>Preset</b> pushbutton.		
3	Under <b>Screen Controls</b> , press the <b>TESTS</b> pushbutton to display the <b>TESTS (Main Menu)</b> screen.		
4	Position the cursor at <b>Select Procedure Location</b> and select it. In the Choices selection box, select <b>CARD</b> .		
5	Position the cursor at <b>Select Procedure Filename</b> and select it. In the Choices selection box, select <b>MANUAL</b> .		
6	Position the cursor at <b>RUN TEST</b> and select it. HP must be in Control Mode <b>Select YES</b> .		
7	<table border="0"> <tr> <td style="vertical-align: top;"> <p>If using <b>HP 83236A</b>:</p> <p>Set channel number=&lt;chan#&gt;:</p> <ul style="list-style-type: none"> <li>– Position cursor at <b>Channel Number</b> and select it.</li> <li>– Enter the <i>chan#</i> using the numeric keypad; press <b>[Enter]</b> and the screen will go blank.</li> <li>– When the screen reappears, the <i>chan#</i> will be displayed on the channel number line.</li> </ul> </td> <td style="vertical-align: top;"> <p>If using <b>HP 83236B</b>:</p> <p>Set channel frequency:</p> <ul style="list-style-type: none"> <li>– Position cursor at <b>Frequency Band</b> and press <b>Enter</b>.</li> <li>– Select <b>User Defined Frequency</b>.</li> <li>– Go <b>Back to Previous Menu</b>.</li> <li>– Position the cursor to <b>83236</b> generator frequency and enter actual RX frequency.</li> <li>– Position the cursor to <b>83236</b> analyzer frequency and enter actual TX frequency.</li> </ul> </td> </tr> </table>	<p>If using <b>HP 83236A</b>:</p> <p>Set channel number=&lt;chan#&gt;:</p> <ul style="list-style-type: none"> <li>– Position cursor at <b>Channel Number</b> and select it.</li> <li>– Enter the <i>chan#</i> using the numeric keypad; press <b>[Enter]</b> and the screen will go blank.</li> <li>– When the screen reappears, the <i>chan#</i> will be displayed on the channel number line.</li> </ul>	<p>If using <b>HP 83236B</b>:</p> <p>Set channel frequency:</p> <ul style="list-style-type: none"> <li>– Position cursor at <b>Frequency Band</b> and press <b>Enter</b>.</li> <li>– Select <b>User Defined Frequency</b>.</li> <li>– Go <b>Back to Previous Menu</b>.</li> <li>– Position the cursor to <b>83236</b> generator frequency and enter actual RX frequency.</li> <li>– Position the cursor to <b>83236</b> analyzer frequency and enter actual TX frequency.</li> </ul>
<p>If using <b>HP 83236A</b>:</p> <p>Set channel number=&lt;chan#&gt;:</p> <ul style="list-style-type: none"> <li>– Position cursor at <b>Channel Number</b> and select it.</li> <li>– Enter the <i>chan#</i> using the numeric keypad; press <b>[Enter]</b> and the screen will go blank.</li> <li>– When the screen reappears, the <i>chan#</i> will be displayed on the channel number line.</li> </ul>	<p>If using <b>HP 83236B</b>:</p> <p>Set channel frequency:</p> <ul style="list-style-type: none"> <li>– Position cursor at <b>Frequency Band</b> and press <b>Enter</b>.</li> <li>– Select <b>User Defined Frequency</b>.</li> <li>– Go <b>Back to Previous Menu</b>.</li> <li>– Position the cursor to <b>83236</b> generator frequency and enter actual RX frequency.</li> <li>– Position the cursor to <b>83236</b> analyzer frequency and enter actual TX frequency.</li> </ul>		
8	<p>Set RF Generator level:</p> <ul style="list-style-type: none"> <li>– Position the cursor at <b>RF Generator Level</b> and select it.</li> <li>– Enter <b>–10</b> using the numeric keypad; press <b>[Enter]</b> and the screen will go blank.</li> <li>– When the screen reappears, the value –10 dBm will be displayed on the RF Generator Level line.</li> </ul>		

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**Table F-14:** Manual Cable Calibration Test Equipment Setup (using the HP PCS Interface)

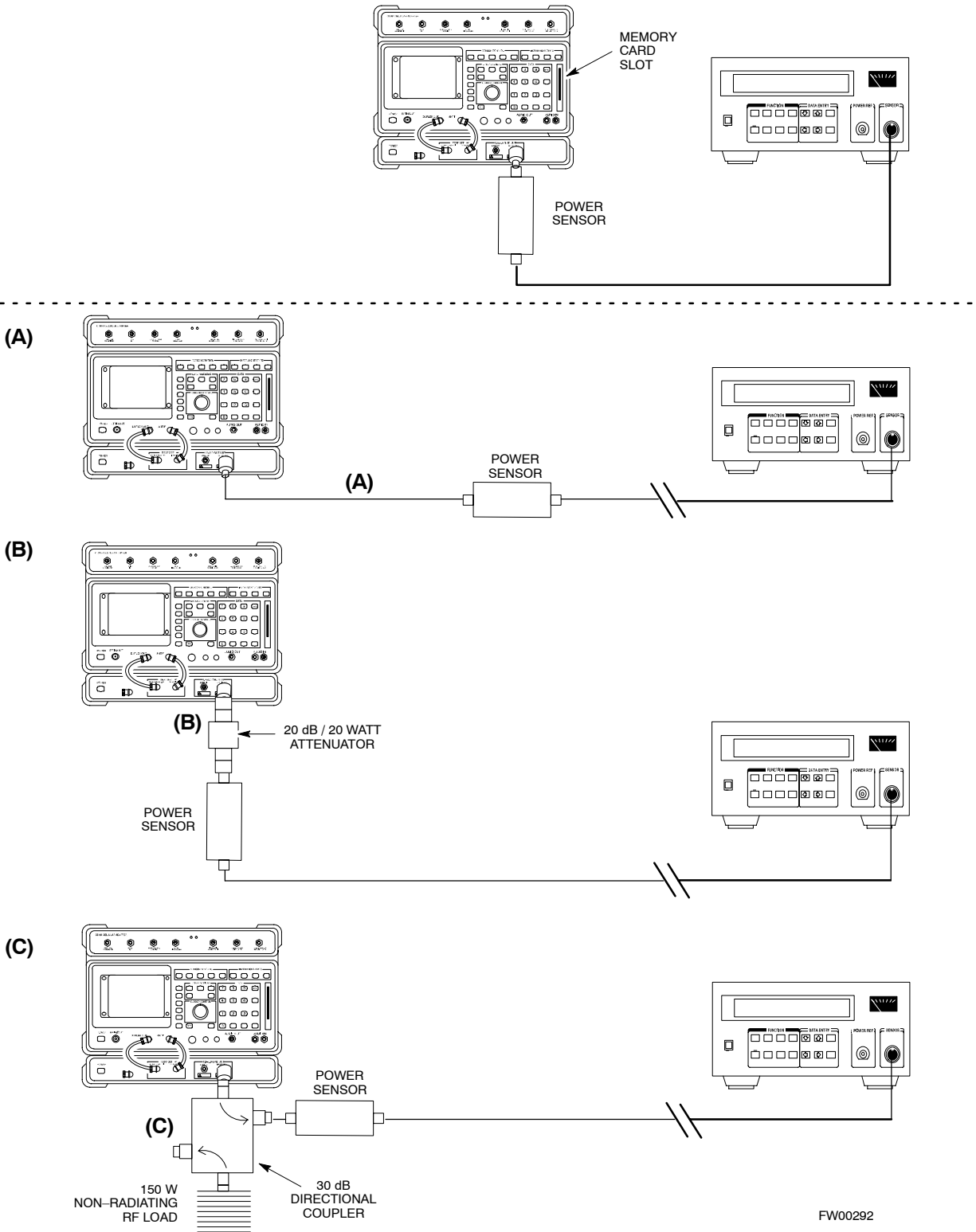
Step	Action
9	Set the user fixed Attenuation Setting to <b>0 dBm</b> : <ul style="list-style-type: none"> <li>– Position cursor at <b>Analyzer Attenuation</b> and select it</li> <li>– Position cursor at <b>User Fixed Atten Settings</b> and select it.</li> <li>– Enter 0 (zero) using the numeric keypad and press <b>[Enter]</b>.</li> </ul>
10	Select <b>Back to Previous Menu</b> .
11	Record the HP83236 Generator Frequency Level: Record the HP83236 <b>B</b> Generator Frequency Level: <ul style="list-style-type: none"> <li>– Position cursor at <b>Show Frequency and Level Details</b> and select it.</li> <li>– Under HP83236 Frequencies and Levels, record the Generator Level.</li> <li>– Under HP83236<b>B</b> Frequencies and Levels, record the Generator Frequency Level (1850 – 1910 MHz for 1.9 GHz or 1750 – 1780 for 1.7 GHz).</li> <li>– Position cursor at <b>Prev Menu</b> and select it.</li> </ul>
12	Click on <b>Pause for Manual Measurement</b> .
13	Connect the power sensor directly to the <i>RF OUT ONLY</i> port of the PCS Interface.
14	On the HP8921A, under <b>To Screen</b> , select <b>CDMA GEN</b> .
15	Move the cursor to the <b>Amplitude</b> field and click on the Amplitude value.
16	Increase the Amplitude value until the power meter reads <b>0 dBm ±0.2 dB</b> .  <b>NOTE</b> The Amplitude value can be increased coarsely until 0 dBm is reached; then fine tune the amplitude by adjusting the <b>Increment Set</b> to 0.1 dBm and targeting in on 0 dBm.
17	Disconnect the power sensor from the <i>RF OUT ONLY</i> port of the PCS Interface.  <b>NOTE</b> The Power Meter sensor's lower limit is –30 dBm. Thus, only components having losses ≤30 dB should be measured using this method. <b>For further accuracy, always re-zero the power meter before connecting the power sensor to the component being calibrated. After connecting the power sensor to the component, record the calibrated loss immediately.</b>
18	Disconnect all components in the test setup and calibrate each one separately by connecting each component, one-at-a-time, between the <i>RF OUT ONLY PORT</i> and the power sensor (see Figure F-13, Setups A, B, or C). Record the calibrated loss value displayed on the power meter. <ul style="list-style-type: none"> <li>• Example: (A) Test Cable(s) = –1.4 dB</li> <li>(B) 20 dB Attenuator = –20.1 dB</li> <li>(B) Directional Coupler = –29.8 dB</li> </ul>
19	After all components are calibrated, reassemble all components together and calculate the total test setup loss by adding up all the individual losses: <ul style="list-style-type: none"> <li>• Example: Total test setup loss = –1.4 –29.8 –20.1 = –51.3 dB.</li> </ul> This calculated value will be used in the next series of tests.
20	Under <b>Screen Controls</b> press the <b>TESTS</b> button to display the <b>TESTS (Main Menu)</b> screen.
21	Select <b>Continue (K2)</b> .
22	Select <b>RF Generator Level</b> and set to –119 dBm.

. . . continued on next page

**Table F-14:** Manual Cable Calibration Test Equipment Setup (using the HP PCS Interface)

Step	Action
23	Click on <b>Pause for Manual Measurement</b> .
24	<p>Verify the HP8921A Communication Analyzer/83203A CDMA interface setup is as follows (fields not indicated remain at default):</p> <ul style="list-style-type: none"> <li>• Verify the GPIB (HP-IB) address: <ul style="list-style-type: none"> <li>– under <b>To Screen</b>, select <b>More</b></li> <li>– select <b>IO CONFIG</b></li> <li>– Set HP-IB Adrs to <b>18</b></li> <li>– set Mode to <b>Talk&amp;Lstn</b></li> </ul> </li> <li>• Verify the HP8921A is displaying frequency (instead of RF channel) <ul style="list-style-type: none"> <li>– Press the blue <b>[SHIFT]</b> button, then press the Screen Control <b>[DUPLEX]</b> button; this switches to the <b>CONFIG</b> (CONFIGURE) screen.</li> <li>– Use the cursor control to set RF Display to <b>Freq</b></li> </ul> </li> </ul>
25	Refer to Table 3-31 for assistance in manually setting the cable loss values into the LMF.

Figure F-13: Calibrating Test Setup Components



F



## HP PCS Interface Test Equipment Setup for Manual Testing

Follow the procedure in Table F-15 to setup the HP PCS Interface Box for manual testing.

Table F-15: HP PCS Interface Test Equipment Setup for Manual Testing		
✓	Step	Action
		<b>NOTE</b> 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#>: <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>
	7	<b>NOTE</b> If using a TMPC with Tower Top Amplifier (TTA) skip Step 7. <ul style="list-style-type: none"> <li>• Set RF Generator level= <math>-119 \text{ dBm} + \text{Cal factor}</math>  Example: <math>-119 \text{ dBm} + 2 \text{ dB} = -117 \text{ dBm}</math></li> <li>• Continue with Step 9 (skip Step 8).</li> </ul>
	8	Set RF Generator level= $-116 \text{ dBm} + \text{Cal factor}$ . Example: $-116 \text{ dBm} + 2 \text{ dB} = -114 \text{ dBm}$
	9	Set the user fixed Attenuation Setting to <b>0 dB</b> : <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.
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Perform the procedure in Table F-16 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-16:** Procedure for Calibrating Test Cable Setup Using Advantest R3465

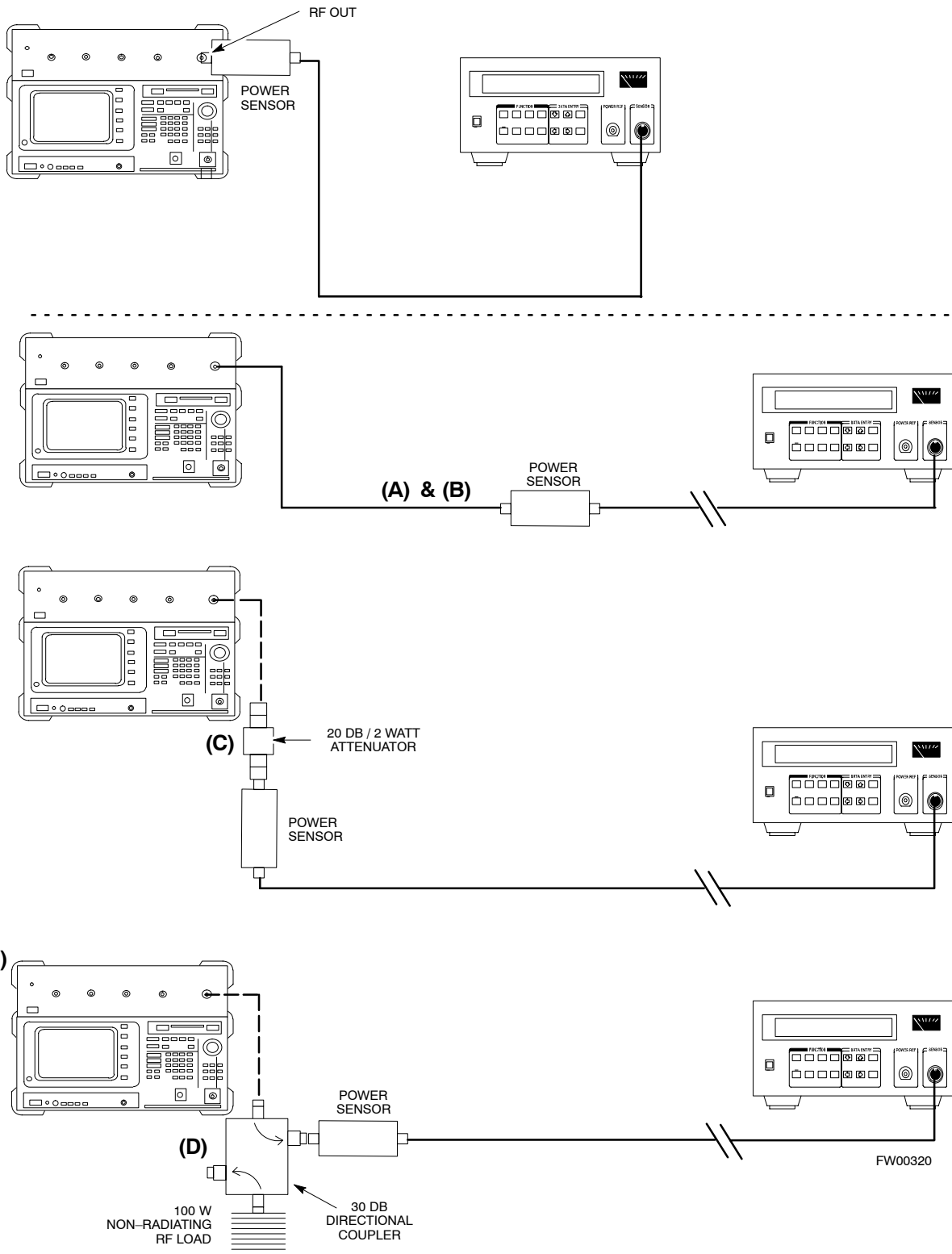
Step	Action
	<p><b>NOTE</b></p> <p>– This procedure can only be performed <i>after</i> test equipment has been allowed to warm-up and stabilize for a <i>minimum of 60 minutes</i>.</p>
1	Press the <b>SHIFT</b> and the <b>PRESET</b> keys located below the display.
2	Press the <b>ADVANCE</b> key in the 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.

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**Table F-16:** Procedure for Calibrating Test Cable Setup Using Advantest R3465

Step	Action								
17	<p><b>NOTE</b> 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> <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-14, “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 3-31 for assistance in manually setting the cable loss values into the LMF.								

Figure F-14: Cable Calibration using Advantest R3465



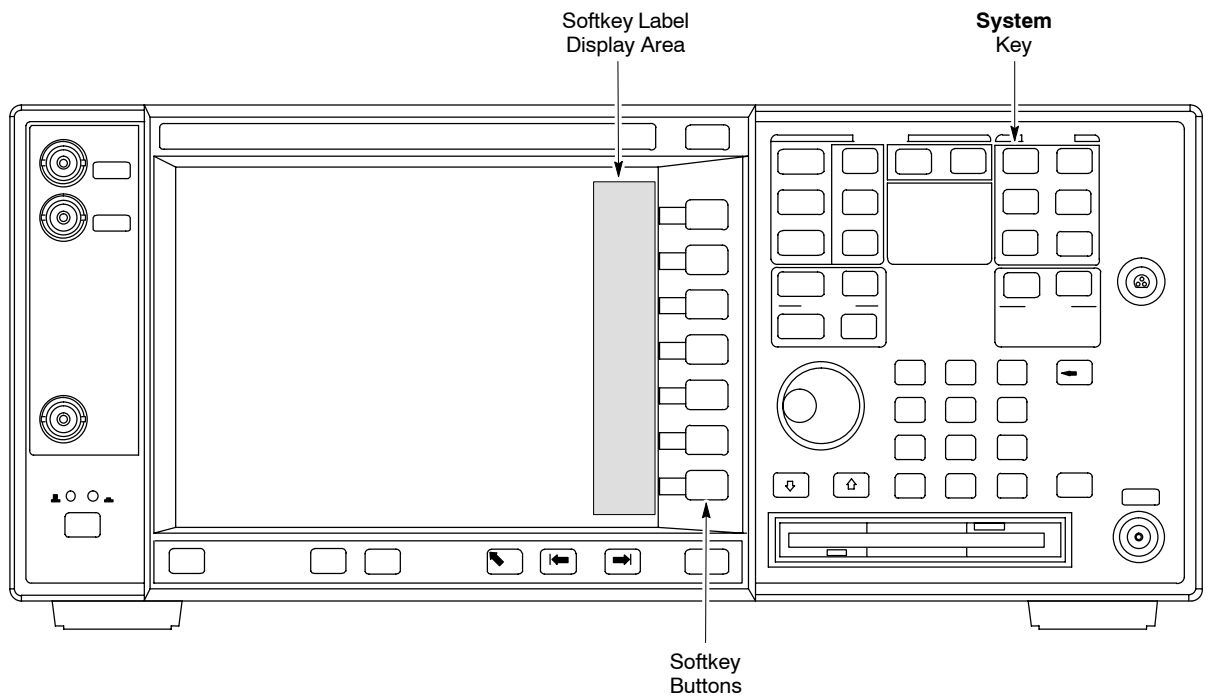
F

## Agilent E4406A Transmitter Tester Self-alignment (Calibration)

The Agilent E4406A requires pre-calibration actions or calibration verification that are not supported by the LMF. Follow the procedure in Table F-17 and refer to Figure F-15 to perform the Agilent E4406A self-alignment (calibration).

Table F-17: 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. – 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. – The softkey labels will change.
3	Press the <b>Align All Now</b> softkey button. – All other instrument functions will be suspended during the alignment. – The display will change to show progress and results of the alignments performed. – The alignment will take less than one minute.

**Figure F-15:** Agilent E4406A Self-alignment



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

F



*Appendix G*

# 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 G-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.
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**Table G-1:** Download ROM Code

Step	Action
1	Click on the device to be downloaded.  <b>NOTE</b> 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. A status report window appears.
4	Make a note of the number in the <b>HW Bin Type</b> column.  <b>NOTE</b> “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> 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.

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Table G-1: Download ROM Code

Step	Action
6	From the BTS menu bar <b>Device</b> pull-down menus, select <b>Download &gt; ROM</b> . <ul style="list-style-type: none"> <li>– If the file matching the Hardware Binary Type of the device is found in the code folder, a status report shows the result of the download. Proceed to Step 12.</li> <li>– If a file selection window appears, select the ROM code file manually.</li> </ul>
7	Double-click on the version folder that contains the desired ROM code file.
8	Double-click on the <b>Code</b> folder. A list of ROM and RAM code files is displayed.
	<b>! CAUTION</b> A ROM code file having the correct hardware binary type (HW Bin Type) needs to be chosen. The hardware binary type (last four digits in the file name) was determined in step 4. Unpredictable results can happen and the device may be damaged (may have to be replaced) if a ROM code file with wrong binary type is downloaded.
9	Choose a ROM code file having the correct hardware binary type (HW Bin Type). The hardware binary type (last four digits in the file name) was determined in step 4.
10	Click on the ROM code file that matches the device type and HW Bin Type (e.g., bbx_rom.bin.0604 for a BBX having a HW Bin Type of 0604). The file should be highlighted.
11	Click on the <b>Load</b> button. A status report window displays the result of the download.
	<b>NOTE</b> 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. 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. A status report window displays the result of the download. <b>NOTE</b> 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. The downloaded device should be OOS_RAM (yellow) unless it is a GLI in which case it should be INS (green).

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

<b>Step</b>	<b>Action</b>
23	Click on the device that was downloaded.
24	Click on the <b>Device</b> menu.
25	Click on the <b>Status</b> menu item. 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.

*Appendix H*

# **In-Service Calibration**

# Introduction

## Purpose

This procedure is a guide to expanding your system with multiple carriers while the system remains in service. This procedure also allows you to perform on site maintenance (replace defective boards and recalibrate) while the remainder of the site stays in service.

Motorola recommends that you perform this procedure during a maintenance window.

This procedure cannot be performed on BTSs with 4-to-1 combiners. The procedure can only be performed on one side of the BTS at one time. That is, LPAs 1, 2, 3, 7, 8, 9 (feed antennas 1, 2, 3) can be calibrated while LPAs 6, 7, 8, 10, 11, 12 (feed antennas 4, 5, 6) remain in service and vice versa.

## Equipment Warm up

**NOTE**

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

**CAUTION**

If any piece of test equipment (i.e., test cable, RF adapter) has been replaced, re-calibration must be performed. Failure to do so could introduce measurement errors, causing incorrect measurements and degradation to system performance.



# Power Delta Calibration

## Power Delta Calibration Introduction

The In–service calibration procedure has several differences from a normal calibration procedure. One of these is the use of a spectrum analyzer instead of a power meter to measure power. Power meters are broadband measurement devices and cannot be used to measure power during In–service Calibration since other carriers are operating. A spectrum analyzer can be used because it measures power at a given frequency. However, measuring power using a spectrum analyzer is less accurate than using a power meter. Therefore, you must compensate for the difference (delta) between the power meter and the spectrum analyzer.

## HP8921A Power Delta Calibration

Use the HP8921A Spectrum Analyzer to measure power during In–Service Calibration for 800 MHz systems. After the offset value has been calculated, add it to the TX cable loss value.

Follow the procedure in Table H-1 to perform the HP8921A Power Delta Calibration procedure.

<b>NOTE</b>	This procedure requires two HP8921As.
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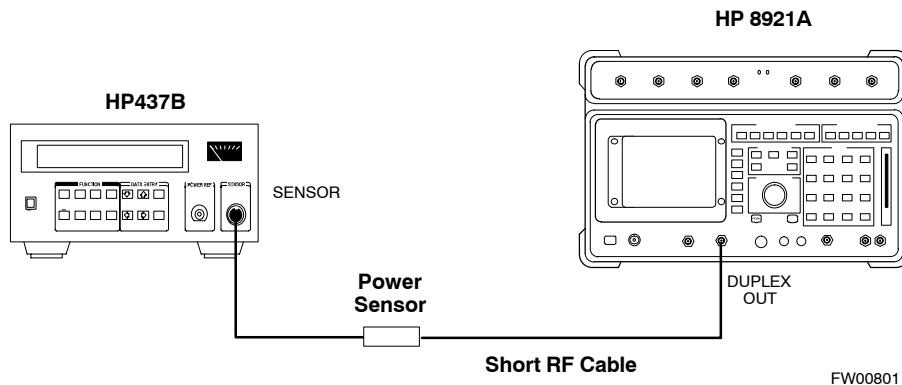
**Table H-1:** HP8921A Power Delta Calibration Procedure

Step	Action
	<b>NOTE</b> Perform this procedure <i>after</i> test equipment has been allowed to warm–up and stabilize for a <i>minimum of 60 minutes</i> .
1	Connect a short RF cable between the HP8921A <b>Duplex Out</b> port and the HP437B power sensor (see Figure H-1).
2	Set the HP8921A signal source as follows: <ul style="list-style-type: none"> <li>– Measure mode to <b>CDMA Generator</b></li> <li>– Frequency to the CDMA Calibration target frequency</li> <li>– CW RF Path to <b>IQ</b></li> <li>– Output Port to <b>Dupl</b></li> <li>– Data Source to <b>Random</b></li> <li>– Amplitude to <b>0 dBm</b></li> </ul>
3	Measure and record the power value reading on the HP437B Power Meter.
4	Record the Power Meter reading as result <b>A</b> _____.
5	Turn off the source HP8921A signal output, and disconnect the HP437B. <b>NOTE</b> Leave the settings on the source HP8921A for convenience in the following steps.
6	Connect the short RF cable between the source HP8921A <b>Duplex Out</b> port and the measuring HP8921A <b>RF–IN</b> port (see Figure H-2).

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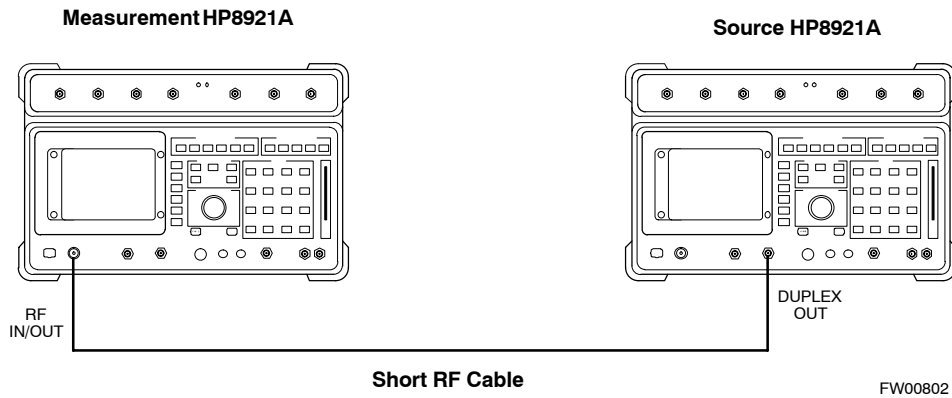
<b>Table H-1: HP8921A Power Delta Calibration Procedure</b>	
<b>Step</b>	<b>Action</b>
7	Ensure that the source HP8921A settings are the same as in Step 2.
8	Set the measuring HP8921A as follows: <ul style="list-style-type: none"> <li>- Measure mode to <b>CDMA AnI</b></li> <li>- Frequency to the CDMA calibration target frequency</li> <li>- Input Attenuation to <b>0 dB</b></li> <li>- Input port to <b>RF-IN</b></li> <li>- Gain to <b>Auto</b></li> <li>- Analyzer Direction to <b>Fwd</b></li> </ul>
9	Turn on the source HP8921A signal output.
10	Measure and record the channel power reading on the measuring HP8921A as result <b>B</b> _____.
11	Turn off the source HP8921A signal output and disconnect the equipment.
12	Compute the delta between HP437B and HP8921A using the following formula: $\text{Delta} = A - B$ Example: Delta = -0.70 dBm - (-1.25 dBm) = 0.55 dBm Example: Delta = 0.26 dBm - 0.55 dBm = -0.29 dBm These examples are included to show the mathematics and do not represent actual readings. <b>NOTE</b> Add this delta value to the <b>TX Cable Loss</b> value during In-Service Calibration (see Step 4 in Table H-5).

**Figure H-1: Delta Calibration Setup – HP8921A to HP437B**



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**Figure H-2:** Delta Calibration Setup – HP8921A to HP8921A



### Advantest R3465 Power Delta Calibration

Follow the procedure in Table H-2 to perform the Advantest R3465 Power Delta Calibration procedure.

<b>Table H-2:</b> Advantest Power Delta Calibration Procedure	
Step	Action
	<b>NOTE</b> Perform this procedure <i>after</i> test equipment has been allowed to warm-up and stabilize for a <i>minimum of 60 minutes</i> .
<b>On the Advantest R3465:</b>	
1	Press the <b>SHIFT</b> and the <b>PRESET</b> keys located below the CRT display.
2	Press the <b>ADVANCE</b> key in the Measurement area of the control panel.
3	Press the <b>CDMA Sig</b> CRT menu key.
4	Press the <b>FREQ</b> key in the Entry area of the control panel.
5	Set the frequency to the desired value using the keypad entry keys.
6	Press the <b>LEVEL</b> key in the Entry area of the control panel.
7	Set the <b>LEVEL</b> to <b>0 dBm</b> using the keypad entry keys.
8	Verify the <b>Mod</b> CRT menu key is highlighting <b>OFF</b> , if not press the <b>Mod</b> key to toggle it <b>OFF</b> .
9	Verify the <b>Output</b> CRT menu key is highlighting <b>OFF</b> . If not, press the <b>Output</b> key to toggle it <b>OFF</b> .
<b>On the HP 437 Power Meter:</b>	
10	Zero the Power Meter prior to connecting the power sensor to the RF cable from the signal generator.
	<b>NOTE</b> For best accuracy, always re-zero the power meter before connecting the power sensor to the component being calibrated.
11	Connect the RF cable from the R3561L CDMA Test Source Unit <b>RF OUT</b> port to the power sensor (see Figure H-3).
12	Press the <b>Output</b> CRT menu key to toggle the Output to <b>ON</b> .

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**Table H-2:** Advantest Power Delta Calibration Procedure

<b>Step</b>	<b>Action</b>
13	Record the Power Meter reading as result <b>A</b> _____.
14	Press the Output <b>CRT</b> menu key to toggle the Output to <b>OFF</b> .
15	Connect the RF cable from the R3561L CDMA Test Source Unit <b>RF OUT</b> port to the Spectrum Analyzer <b>INPUT</b> Port (see Figure H-4).
16	Press the <b>Output</b> CRT menu key to change the Output to <b>ON</b> .
17	Press the <b>CW</b> key in the Measurement area of the control panel.
18	Press the <b>LEVEL</b> key in the Entry area of the control panel.
19	Set the REF LEVEL to <b>10 dBm</b> using the keypad entry keys.
20	Press the <b>dB/div</b> CRT menu key.
21	Press the <b>10 dB/div</b> CRT menu key.
22	Press the <b>FREQ</b> key in Entry area of the control panel.
23	Set the frequency to the desired value using the keypad entry keys.
24	Press the <b>more 1/2</b> CRT menu key.
25	Press the <b>Preselector</b> CRT menu key to highlight <b>3.0G</b> .
26	Press the <b>FORMAT</b> key in the Display Control area of the control panel.
27	Press the <b>TRACE</b> CRT menu key.
28	Press the <b>AVG A</b> CRT menu key.
29	Set AVG to <b>20</b> using keypad entry keys.
30	Press the <b>return</b> CRT menu key.
31	Press the <b>SPAN</b> key in the Entry area of the control panel.
32	Press the <b>Zero Span</b> CRT menu key.
33	Press the <b>BW</b> key in the Entry area of the control panel.
34	Press the <b>RBW</b> CRT menu key to highlight <b>MNL</b> .
35	Set <b>RBW</b> to <b>30 kHz</b> using keypad entry keys.
36	Press the <b>VBW</b> CRT menu key to highlight <b>MNL</b> .
37	Set <b>VBW</b> to <b>1 MHz</b> using keypad entry keys.
38	Press the Marker <b>ON</b> key in the Display Control area of the control panel.
39	Record the Marker Level reading as result <b>B</b> _____.

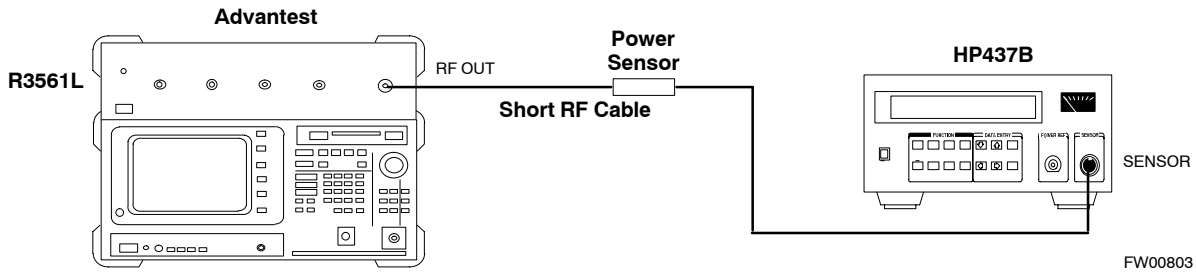
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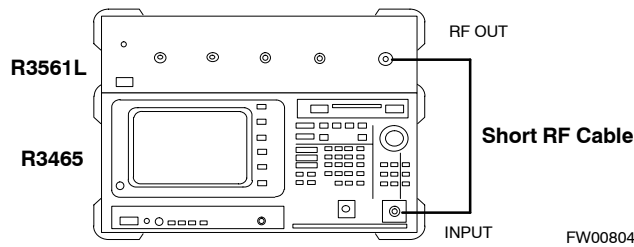



<b>Table H-2: Advantest Power Delta Calibration Procedure</b>	
<b>Step</b>	<b>Action</b>
40	<p>Calculate the <b>Power Calibration Delta</b> value. The delta value is the power meter measurement minus the Advantest measurement.</p> <p style="padding-left: 40px;">Delta = A – B</p> <p style="padding-left: 40px;">Example: Delta = –0.70 dBm – (–1.25 dBm) = 0.55 dBm</p> <p style="padding-left: 40px;">Example: Delta = 0.26 dBm – 0.55 dBm = –0.29 dBm</p> <p>These examples are included to show the mathematics and do not represent actual readings.</p> <p><b>NOTE</b></p> <p>Add this delta value to the <b>TX Cable Loss</b> value during In–Service Calibration (see Step 4 in Table H-5).</p>

**Figure H-3: Delta Calibration Setup – R3561L to HP437B**



**Figure H-4: Delta Calibration Setup – R3561L to R3465**



## HP8935 Power Delta Calibration

Follow the procedure in Table H-3 to perform the HP8935 Power Delta Calibration procedure.

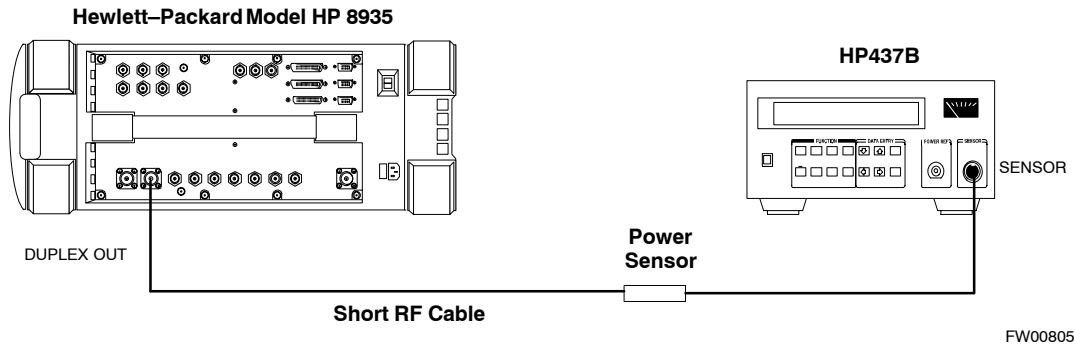
<b>Table H-3: HP8935 Power Delta Calibration Procedure</b>	
<b>Step</b>	<b>Action</b>
	<p><b>NOTE</b> Perform this procedure <i>after</i> test equipment has been allowed to warm-up and stabilize for a <i>minimum of 60 minutes</i>.</p>
1	Connect a short RF cable between the HP8935 <b>Duplex Out</b> port and the HP437B power sensor (see Figure H-5).
2	Set the HP8935 signal source as follows: <ul style="list-style-type: none"> <li>– Measure mode to <b>CDMA Gen</b></li> <li>– Frequency to the CDMA Calibration target frequency</li> <li>– CW RF Path to <b>IQ</b></li> <li>– Output Port to <b>Dupl</b></li> <li>– Data Source to <b>Random</b></li> <li>– Amplitude to <b>0 dBm</b></li> </ul>
3	Measure and record the power value reading on the HP437B Power Meter.
4	Record the Power Meter reading as result <b>A</b> _____.
5	Turn off the source HP8935 signal output, and disconnect the HP437B. <p><b>NOTE</b> Leave the settings on the source HP8935 for convenience in the following steps.</p>
6	Connect the short RF cable between the source HP8935 <b>Duplex Out</b> port and the <b>RF-IN/OUT</b> port (see Figure H-6).
7	Ensure that the source HP8935 settings are the same as in Step 2.
8	Set the measuring HP8935 as follows: <ul style="list-style-type: none"> <li>– Measure mode to <b>CDMA Anl</b></li> <li>– Frequency to the CDMA calibration target frequency</li> <li>– Input Attenuation to <b>0 dB</b></li> <li>– Input port to <b>RF-IN</b></li> <li>– Gain to <b>Auto</b></li> <li>– Anl Dir to <b>Fwd</b></li> </ul>
9	Turn on the source HP8935 signal output.
10	Set the Chn Pwr Cal to <b>Calibrate</b> and select to calibrate.
11	Measure and record the channel power reading on the measuring HP8935 as result <b>B</b> _____.
12	Turn off the source HP8935 signal output and disconnect the equipment.

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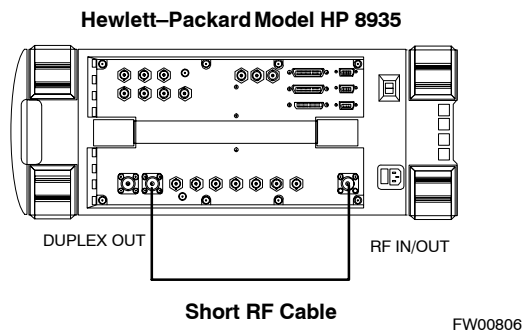
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<b>Table H-3: HP8935 Power Delta Calibration Procedure</b>	
<b>Step</b>	<b>Action</b>
13	<p>Calculate the <b>Power Calibration Delta</b> value. The delta value is the power meter measurement minus the Advantest measurement.</p> <p style="padding-left: 40px;">Delta = A – B</p> <p style="padding-left: 40px;">Example: Delta = –0.70 dBm – (–1.25 dBm) = 0.55 dBm</p> <p style="padding-left: 40px;">Example: Delta = 0.26 dBm – 0.55 dBm = –0.29 dBm</p> <p>These examples are included to show the mathematics and do not represent actual readings.</p> <p><b>NOTE</b></p> <p>Add this delta value to the <b>TX Cable Loss</b> value during In-Service Calibration (see Step 4 in Table H-5).</p>

**Figure H-5: Delta Calibration Setup – HP8935 to HP437B**



**Figure H-6: Delta Calibration Setup – HP8935 to HP8935**



## Agilent E4406A Power Delta Calibration

The Agilent E4406A transmitter tester and E4432B signal generator test equipment combination can be used for ISC of IS–2000 CDMA 1X as well as IS–95A/B operation modes. The power delta calibration is performed on the E4406A, but the E4432B is required to generate the reference signal used to calculate the power delta offset. After the offset value has been calculated, add it to the TX cable loss value in the LMF.

Follow the procedure in Table H-4 to perform the Agilent E4406A Power Delta Calibration procedure.

**Table H-4:** Agilent E4406A Power Delta Calibration Procedure

Step	Action
	<p><b>NOTE</b> Perform this procedure <i>after</i> test equipment has been allowed to warm–up and stabilize for a <i>minimum of 60 minutes</i>. After it is warmed up and stabilized, calibrate the test equipment as described in the “Test Set Calibration” section of the Optimization/Calibration chapter in the <i>SC 4812T Optimization/ATP manual</i>.</p>
1	Zero the Power Meter prior to connecting the power sensor to the RF cable from the signal generator.
2	<p><b>NOTE</b> For best accuracy, always re–zero the power meter before connecting the power sensor to the component being calibrated.</p> <p>Connect a short RF cable from the E4432B <b>RF OUTPUT</b> connector the HP437 power meter power sensor (see Figure H-7).</p>
3	<p>Set the E4432B signal generator as follows:</p> <ul style="list-style-type: none"> <li>– Press <b>Preset</b> to exit any modes for which the signal generator is configured.</li> <li>– Press <b>Frequency</b> and enter the <i>frequency</i> of the channel to be calibrated using the numeric keypad.</li> <li>– Using the soft keys to the right of the screen, select the frequency range to be measured (for example, <b>MHz</b>).</li> <li>– Press <b>Amplitude</b> and, using the numeric keypad, set signal amplitude to <b>0</b> (zero).</li> <li>– Using the soft keys, set the measurement type to <b>dBm</b>.</li> </ul>
4	<p>On the E4432B, press <b>RF On/Off</b> to toggle the RF output to <b>RF ON</b>.</p> <ul style="list-style-type: none"> <li>– Note that the RF On/Off status in the screen display changes.</li> </ul>
5	Measure and record the value reading on the HP437 power meter as result <b>A</b> _____.
6	<p>On the E4432B, press <b>RF On/Off</b> to toggle the RF output to <b>RF OFF</b>.</p> <ul style="list-style-type: none"> <li>– Note that the RF On/Off status in the screen display changes.</li> </ul>
7	Disconnect the short RF cable from the HP437 power meter power sensor, and connect it to the <b>RF INPUT</b> connector on the E4406A transmitter tester (see Figure H-8).

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**Table H-4:** Agilent E4406A Power Delta Calibration Procedure

Step	Action
8	<p><b>NOTE</b> Do not change the frequency and amplitude settings on the E4432B when performing the following steps.</p> <p>Set the E4406A as follows:</p> <ul style="list-style-type: none"> <li>– Press <b>Preset</b> to exit any modes for which the transmitter tester is configured.</li> <li>– Press <b>MODE</b> and, using the soft keys to the right of the screen, select <b>cdmaOne</b>.</li> <li>– Press <b>MEASURE</b> and, using the soft keys, select <b>spectrum</b>.</li> <li>– Press <b>Frequency</b> and, using the soft keys, select <b>Center Frequency</b>.</li> <li>– Using the numeric keypad, enter the <i>frequency</i> of the channel to be calibrated.</li> <li>– Using the soft keys, select the frequency range to be measured (for example, <b>MHz</b>).</li> <li>– Press Input/Output and, using the soft keys, select <b>Input Atten</b>.</li> <li>– Using the numeric keypad, set <b>Input Atten</b> to <b>0</b> (zero) and, using the soft keys, select <b>dB</b>.</li> <li>– Using the soft keys, select <b>External Atten</b> and then select <b>Mobile</b>.</li> <li>– Using the numeric keypad, set <b>Mobile</b> to <b>0</b> (zero) and, using the soft keys, select <b>dB</b>.</li> <li>– Using the soft keys, select <b>Base</b>.</li> <li>– Using the numeric keypad, set <b>Base</b> to <b>0</b> (zero) and, using the soft keys, select <b>dB</b>.</li> <li>– Press <b>MEASURE</b> and, using the soft keys, select <b>Channel Power</b>.</li> </ul>
9	<p>On the E4432B signal generator, press <b>RF On/Off</b> to toggle the RF output to <b>RF ON</b>.</p> <ul style="list-style-type: none"> <li>– Note that the RF On/Off status in the screen display changes.</li> </ul>
10	<p>Read the measured Channel Power from the E4406A screen display and record it as result <b>B</b> _____.</p>
11	<p>On the E4432B, press <b>RF On/Off</b> to toggle the RF output to <b>RF OFF</b>.</p> <ul style="list-style-type: none"> <li>– Note that the RF On/Off status in the screen display changes.</li> </ul>
12	<p>Calculate the <b>Power Calibration Delta</b> value. The delta value is the power meter measurement minus the Agilent measurement.</p> <p style="text-align: center;"><b>Delta = A – B</b></p> <p style="text-align: center;">Example: Delta = –0.70 dBm – (–1.25 dBm) = 0.55 dBm</p> <p style="text-align: center;">Example: Delta = 0.26 dBm – 0.55 dBm = –0.29 dBm</p> <p>These examples are included to show the mathematics and do not represent actual readings.</p> <p><b>NOTE</b> Add this delta value to the <b>TX Cable Loss</b> value during In–Service Calibration (see step 4 in Table H-5).</p>

Figure H-7: Delta Calibration Setup – Agilent E4432B to HP437

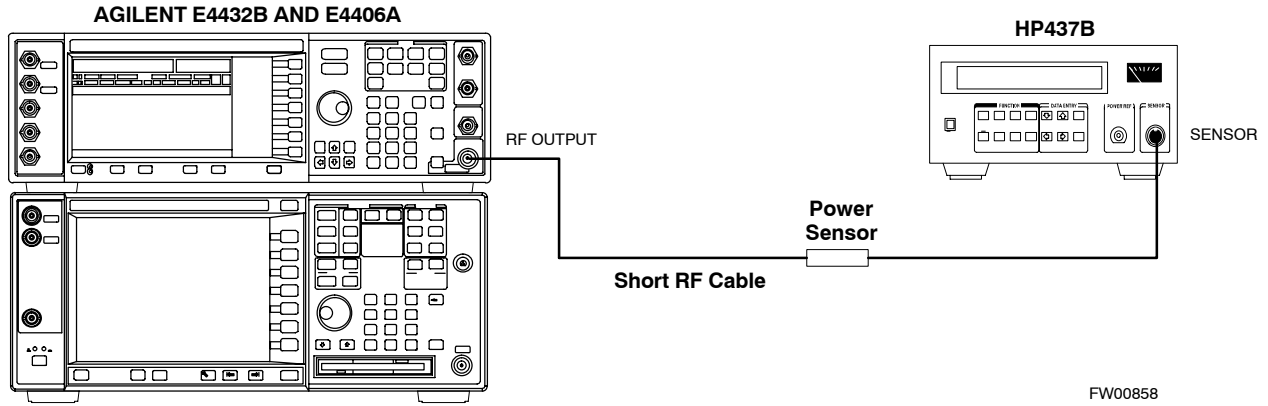
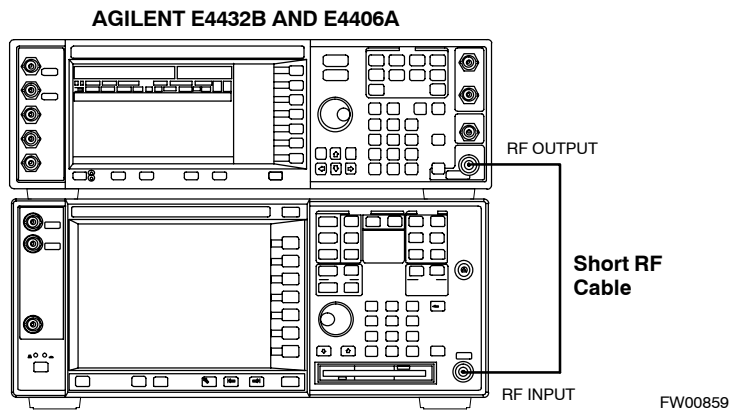


Figure H-8: Delta Calibration Setup – Agilent E4432B to Agilent E4406A



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## In-Service Calibration

**CAUTION** This feature does NOT have fault tolerance at this time. The system has no safe-guards to stop you from doing something that will take the BTS out of service. If possible, perform this procedure during a maintenance window.

Follow the procedures in this section precisely, otherwise the entire BTS will most likely go OUT OF SERVICE.

At the CBSC, only perform operations on expansion hardware when it is in the OOS\_MANUAL state.

The operator must be trained in the LMF operation prior to performing this procedure.

### Prerequisites

- Expansion hardware has been added in the CBSC database, and the CDF file has been generated.
- The expansion devices have been inserted into the C-CCP cage and are in the OOS\_MANUAL state at the CBSC.
- The site specific cdf (with the expansion hardware) and cal files have been loaded onto the LMF.
- The LMF has the same code and dds files as the CBSC to download.

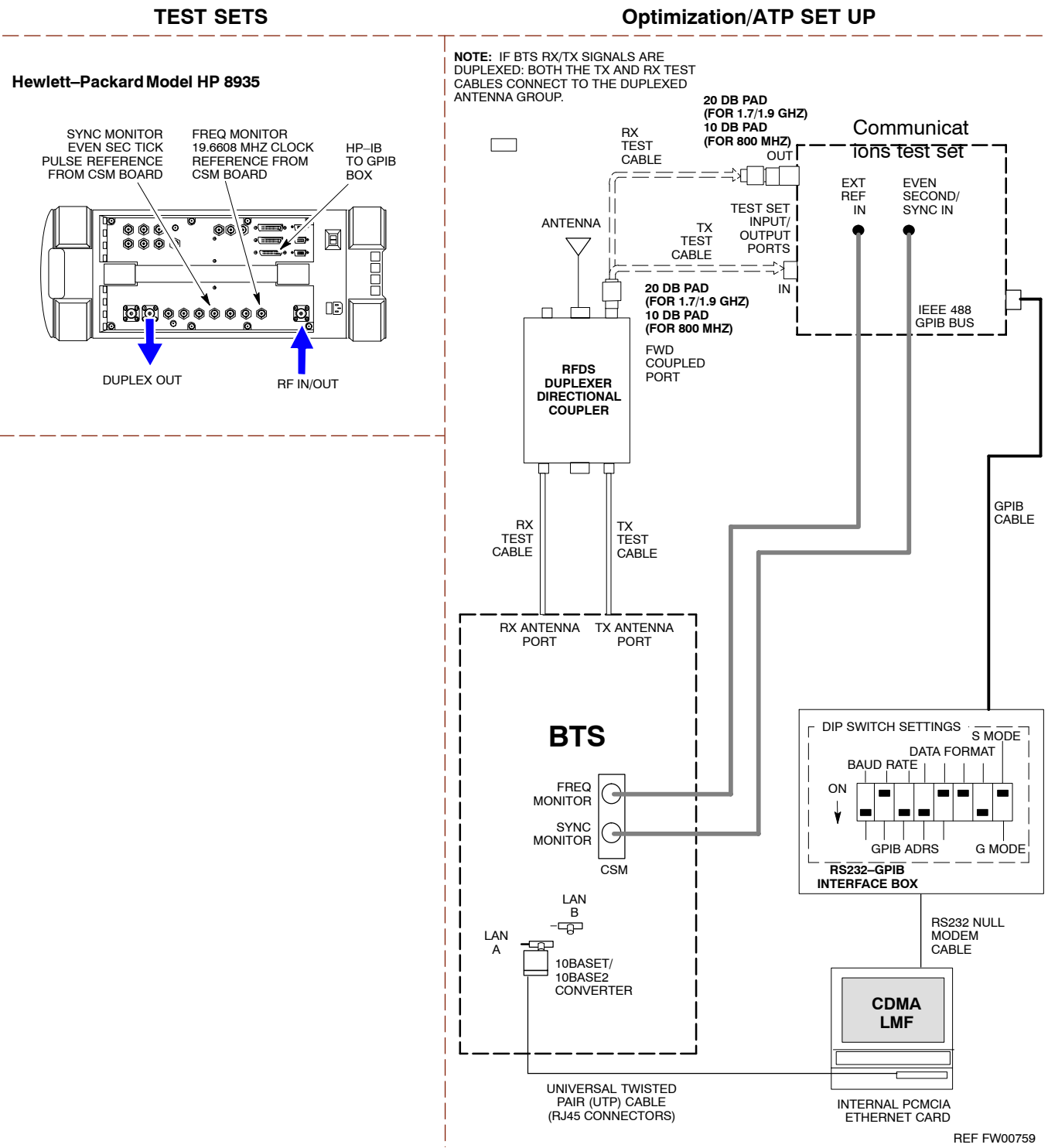
**CAUTION** Do not download code or data to any cards other than those you are working on. Downloading code or data to other cards will take the site OUT OF SERVICE.

The code file version numbers must match the version numbers on the other cards in the frame. If the numbers do not match, the site may go OUT OF SERVICE.

The BTS-#.cdf, CBSC-#.cdf, and CAL files for this BTS must have come from the CBSC.

- Test equipment has been configured per Figure H-9 and Figure H-10.
- An RFDS (or at a minimum a directional coupler), whose loss is already known, must be in line to perform the in-service calibration.
- Test equipment has been calibrated after 1 hour warm up.
- A short RF cable and two BNC-N adapters are available to perform Cable Calibration.
- The Power Delta Calibration has been performed (see Table H-1, Table H-2, or Table H-3).

Figure H-9: Optimization/ATP Test Setup Using RFDS

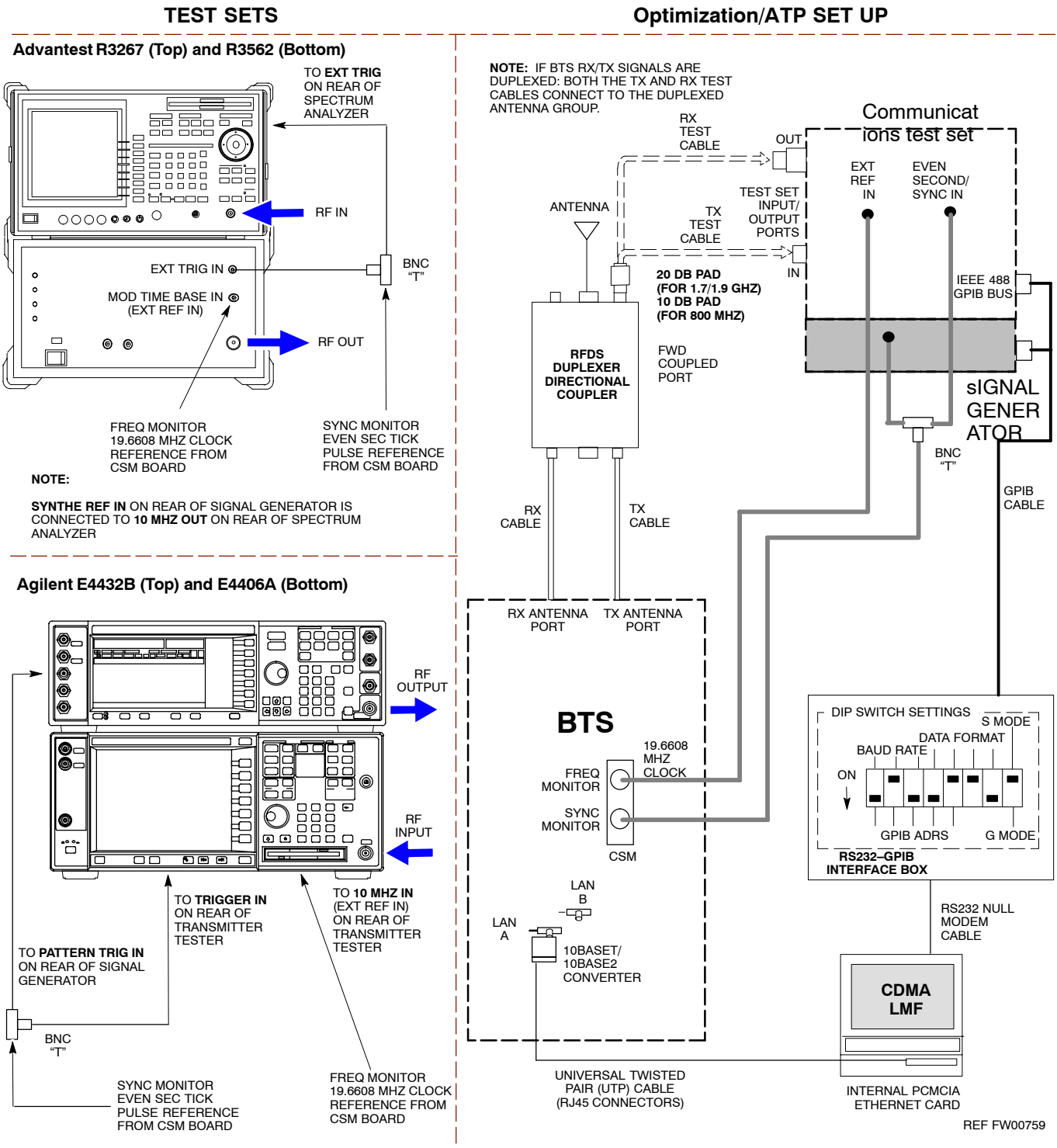


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Figure H-10: IS-95 A/B/C Optimization/ATP Test Setup Using RFDS



Follow the procedure in Table H-5 to perform the In-Service Calibration.

**Table H-5: In-Service Calibration**

Step	Action
	<p><b>NOTE</b> Perform this procedure <i>after</i> test equipment has been allowed to warm-up and stabilize for a <i>minimum of 60 minutes</i>.</p>
1	<p>Set up the LMF for In-Service Calibration:</p> <ul style="list-style-type: none"> <li>– Start the LMF by double-clicking the LMF icon on the Windows desktop.</li> <li>– Click <b>Tools&gt;Options</b> from the menu bar at the login screen.</li> <li>– Check the applicable spectrum analyzer check box and the signal generator check box on the <b>Test Equipment</b> tab. Ensure that the GPIB address is <b>18</b> for the CDMA analyzer and <b>1</b> for the signal generator.</li> <li>– Uncheck any other other equipment that is selected.</li> <li>– Click the <b>Apply</b> button.</li> <li>– Select the <b>BTS Options</b> tab in the LMF Option window.</li> <li>– Check the <b>In-Service Calibration</b> check box.</li> <li>– Click the <b>Apply</b> button.</li> <li>– Click the <b>Dismiss</b> button to close the LMF Option window.</li> </ul>
2	<p>Login to the target BTS:</p> <ul style="list-style-type: none"> <li>– Select the target BTS icon.</li> <li>– Click the <b>Login</b> button at the login screen.</li> </ul>
3	<p>Measure the Cable Loss using the Cable Calibration function:</p> <ul style="list-style-type: none"> <li>– Click <b>Util&gt;Cable Calibration</b> from the menu bar at the main window.</li> <li>– Set the desired channel(s) and select <b>TX and RX CABLE CAL</b> at the cable calibration pop up window.</li> <li>– Click the <b>OK</b> button to perform cable calibration.</li> <li>– Follow the on-screen instructions to complete the cable loss measurement.</li> </ul> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>– The measured value is input automatically to the cable loss file.</li> <li>– To view the cable loss file, click <b>Util&gt;Examine&gt;Cable Loss&gt;TX</b> or <b>RX</b>.</li> </ul>
4	<p>Add the spectrum analyzer power delta to the <b>Cable Loss</b>.</p> <ul style="list-style-type: none"> <li>– To view the cable loss file, click <b>Util&gt;Examine&gt;Cable Loss&gt;TX</b> or <b>RX</b>.</li> <li>– Add the value computed in Table H-1, Table H-2, or Table H-3 to the TX Cable Loss.</li> </ul> <p><b>NOTE</b></p> <p>Be sure to include the sign of the value. The following examples are included to show the mathematics and do not represent actual readings:</p> <ul style="list-style-type: none"> <li>– Example: 5.65 dBm + 0.55 dBm = 6.20 dBm</li> <li>– Example: 5.65 dBm + (–0.29 dBm) = 5.36 dBm</li> <li>– Example: –5.65 dBm + 0.55 dBm = –5.10 dBm</li> <li>– Example: –5.65 dBm + (–0.29 dBm) = –5.94 dBm</li> </ul>

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**Table H-5:** In–Service Calibration

<b>Step</b>	<b>Action</b>
5	Input the Coupler Loss for the TX and RX tests: <ul style="list-style-type: none"> <li>– Click <b>Util&gt;Edit&gt;Coupler Loss&gt;TX</b> or <b>RX</b> from the menu bar at the main window.</li> <li>– Input the appropriate coupler loss for the target carrier(s) by referring to the information taken at the time of BTS installation.</li> <li>– Click the <b>Save</b> button.</li> <li>– Click the <b>Dismiss</b> button to close the window.</li> <li>– To view the coupler loss file, click <b>Util&gt;Examine&gt;Coupler Loss&gt;TX</b> or <b>RX</b>.</li> </ul>
6	Have the CBSC operator put the redundant BBX OOS_MANUAL.
7	<p><b>! CAUTION</b></p> <p>Be sure to download OOS devices only. Loading in–service devices takes them OUT OF SERVICE and can result in dropped calls.</p> <p>The code file version numbers must match the version numbers on the other cards in the frame. If the numbers do not match, the site may go OUT OF SERVICE.</p> <p><b>NOTE</b></p> <p>Be sure to include the redundant BBX in steps 7, 8, and 9.</p> <p>Download code and data to the target devices:</p> <ul style="list-style-type: none"> <li>– Click <b>Tools&gt;Update NextLoad&gt;CDMA</b> to set the code version that will be downloaded.</li> <li>– Select the BTS(s) you need, check the appropriate code version in the pop up window, and click the <b>Save</b> button to close.</li> <li>– Select the target BBX(s) on the C–CCP cage picture.</li> <li>– Click <b>Device&gt;Download&gt;Code/Data</b> to start downloading code.</li> <li>– Select the target BBX(s) on the C–CCP cage picture.</li> <li>– Click <b>Device&gt;Download&gt;Data</b> to start downloading data.</li> </ul>

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Table H-5: In-Service Calibration

Step	Action
8	<p><b>! CAUTION</b> Perform the In-service Calibration procedure on OOS devices only.</p> <p>Select the desired test:</p> <ul style="list-style-type: none"> <li>– Select the target BBX(s) on the C-CCP cage picture.</li> <li>– Click <b>Tests&gt;</b>[desired test] from the menu bar at the main window.</li> <li>– Select the target carrier and confirm the channel number in the pop up window.</li> <li>– Leave the <b>Verify BLO</b> check box checked.</li> <li>– From the <b>Test Pattern</b> pick list, select a test pattern.</li> <li>– Click the <b>OK</b> button to start calibration.</li> <li>– Follow the on-screen instructions, except, do not connect to the BTS antenna port, connect to the directional coupler (fwd) port associated with the on screen prompt antenna port.</li> </ul> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• Selecting <b>Pilot</b> (default) performs tests using a pilot signal only.</li> <li>• Selecting <b>Standard</b> performs tests using pilot, synch, paging and six traffic channels. This requires an MCC to be selected.</li> <li>• Selecting <b>CDFPilot</b> performs tests using 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 six traffic channels, however, the gain for the channel elements is specified in the CDF file.</li> </ul>
9	<p>Save the result and download the BLO data to the target BBX(s):</p> <ul style="list-style-type: none"> <li>– Click the <b>Save Result</b> button on the result screen. The window closes automatically.</li> </ul>
10	<p>Logout from the BTS and close the LMF session:</p> <ul style="list-style-type: none"> <li>– Click <b>BTS&gt;Logout</b> to close the BTS connection.</li> <li>– Close the LMF window.</li> </ul>
11	<p>Restore the new “bts-*.cal” file to the CBSC.</p>
12	<p>Enable the target device(s) from the CBSC.</p>

*Appendix I*

**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.

<b>NOTE</b>	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.
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*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

<b>WARNING</b>	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.
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## Equipment Setup – HP Test Set

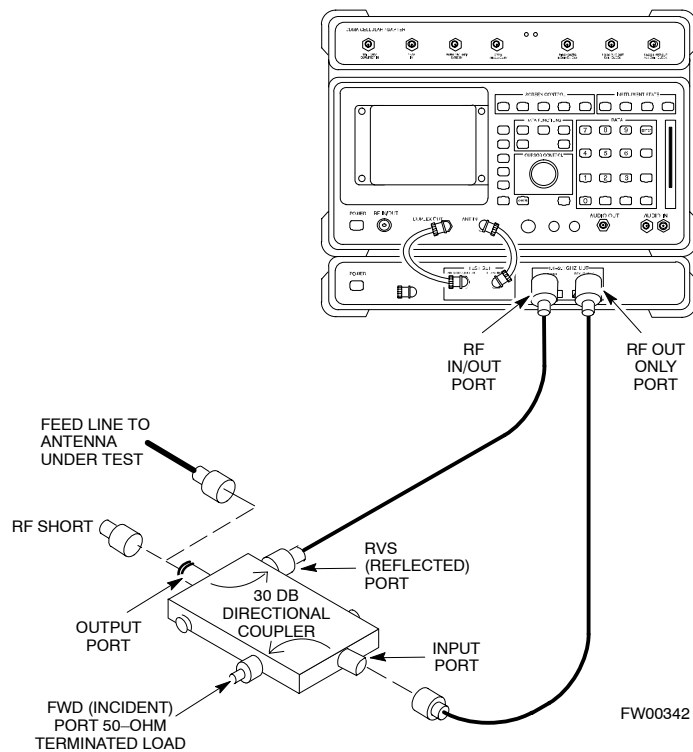
Follow the procedure in Table I-1 to set up test equipment required to measure and calculate the VSWR for each antenna.

Table I-1: VSWR Measurement Procedure – HP Test Set		
Step	Action	HP TEST SET
1	<i>If you have not already done so</i> , refer to the procedure in Table 3-5 on page 3-17 to set up test equipment & interface the LMF computer to the BTS.	
2	<p><i>For manual VSWR testing</i>, using external directional coupler, refer to Figure I-1 (1700/1900 MHz) or Figure I-2 (800 MHz).</p> <ul style="list-style-type: none"> <li>– Connect the communications test set RF OUT ONLY port to the INPUT port of the directional coupler.</li> <li>– Connect the RF IN/OUT 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> 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>– For 1900 MHz systems, set the <b>RF Gen Freq</b> to center frequency of actual CDMA carrier between 1930–1990 MHz for TX and 1850–1910 MHz for RX. For 800 MHz systems, 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. For 1700 MHz systems, set the <b>RF Gen Freq</b> to center frequency of actual CDMA carrier between 1840–1870 MHz for TX and 1750–1780 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>	
3	Remove the antenna feed line and install an “RF short” onto the directional coupler output port.	
	<p><b>NOTE</b> 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>	
4	<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>	

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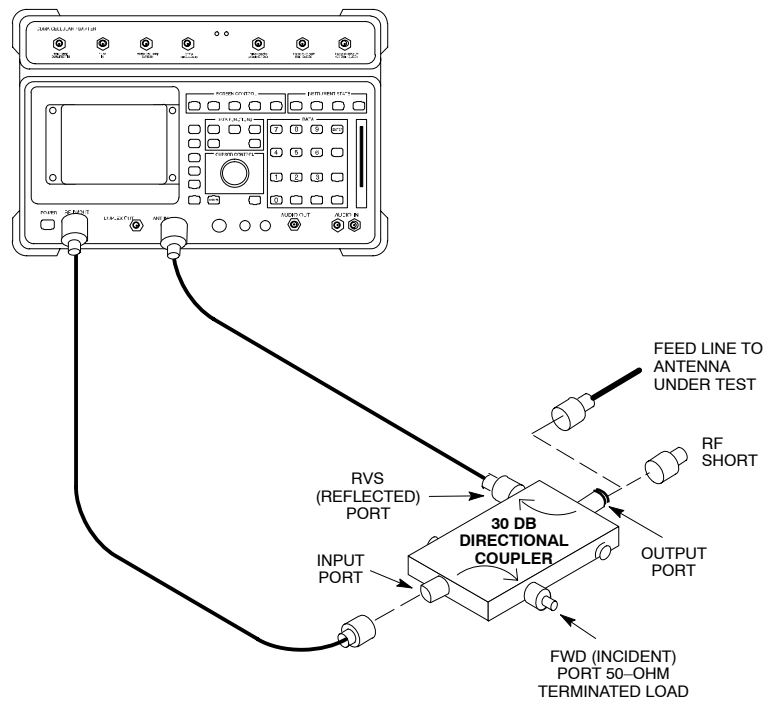
Table I-1: VSWR Measurement Procedure – HP Test Set		
Step	Action	HP TEST SET
5	<p>Calculate the VSWR per the equation shown to the right.</p> <p>Where:</p> $R_L(\text{dB}) = P_A(\text{dBm}) - P_S(\text{dBm})$ <p><math>P_A</math> = Power reflected from antenna</p> <p><math>P_S</math> = Power reflected 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>	$VSWR = \left[ \frac{1 + 10^{\frac{R_L}{20}}}{1 - 10^{\frac{R_L}{20}}} \right]$
6	<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>	
7	<p>Repeat steps 2 through 6 for all remaining TX sectors/antennas.</p>	
8	<p>Repeat steps 2 through 6 for all remaining RX sectors/antennas.</p>	

Figure I-1: Manual VSWR Test Setup Using HP8921 Test Set (1700/1900 MHz)





**Figure I-2:** Manual VSWR Test Setup Using HP8921 Test Set (800 MHz)



FW00343

### Equipment Setup – Advantest Test Set

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

Table I-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 3-17 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 I-3.</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. <b>Terminate the forward port with a 50 Ohm load.</b></li> <li>– Connect the RF short to the directional coupler output port.</li> </ul>	

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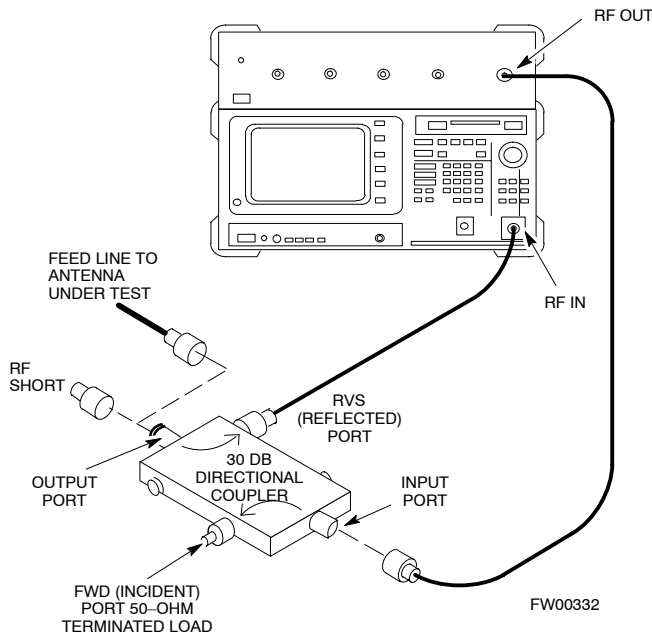
**Table I-2: VSWR Measurement Procedure – Advantest Test Set**

Step	Action	ADVANTEST
3	<p>Preform the following to instruct the calibrated test set to generate a CDMA RF carrier (RVL call) with all zero longcode at the assigned RX frequency at -10 dBm:</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>– For 1900 MHz systems, set <b>RF Gen Freq</b> to center frequency of actual CDMA carrier between 1930–1990 MHz for TX and 1850–1910 MHz for RX.</li> <li>– For 800 MHz systems, 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> <li>– For 1700 MHz systems, set <b>RF Gen Freq</b> to center frequency of actual CDMA carrier between 1840–1870 MHz for TX and 1750–1780 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</b> ENTER 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> Record the difference of the two readings in dBm.	
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><b>P<sub>A</sub></b> = Power reflected from antenna  <b>P<sub>S</sub></b> = Power reflected from short</p> $VSWR = \left[ \frac{1 + 10^{\frac{R_L}{20}}}{1 - 10^{\frac{R_L}{20}}} \right]$ <p>A calculated value of -13.98 dB equates to VSWR of better than <b>1.5:1</b>.</p>	

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Table I-2: VSWR Measurement Procedure – Advantest Test Set		
Step	Action	ADVANTEST
9	If the readings indicate a potential problem, verify the physical integrity of all cables (including any in-line components, pads, etc.) and associated connections up to the antenna. If problem still persists, consult antenna OEM documentation for additional performance verification tests or replacement information.	
10	Repeat steps 2 through 9 for all remaining TX sectors/antennas.	
11	Repeat steps 2 through 9 for all remaining RX sectors/antennas.	

Figure I-3: Manual VSWR Test Setup Using Advantest R3465





*Appendix J*

# 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 J-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>
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**Table J-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>

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**Table J-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: <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: <b>File &gt; Save</b>
12	Close the HyperTerminal window by selecting: <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> .

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**Table J-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.  <b>NOTE</b> 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 J-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 J-1 for cable wiring requirements)
- Adapter, DB-9 plug-to-8-contact modular plug, Global Computer Supplies C4717 or equivalent (see Figure J-2 for adapter wiring requirements)

**Figure J-1:** Wiring Diagram, BTS Router Communication Rollover Cable

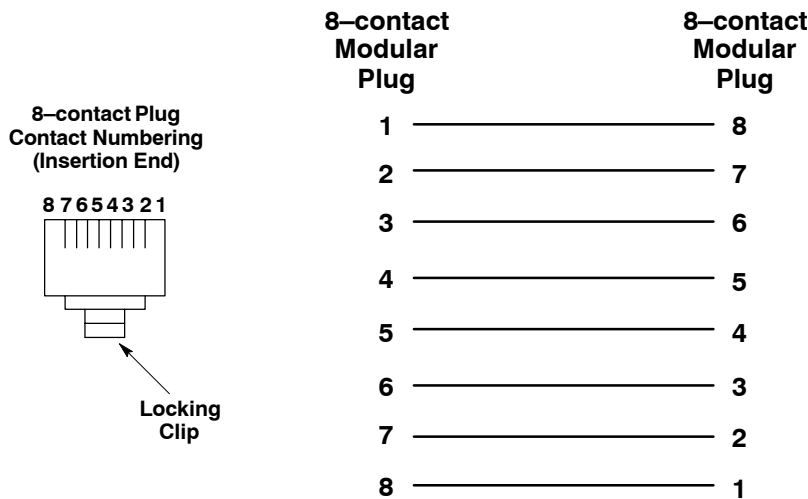


Figure J-2: Wiring Diagram, DB-9 Plug-to-8-contact Modular Plug Adapter

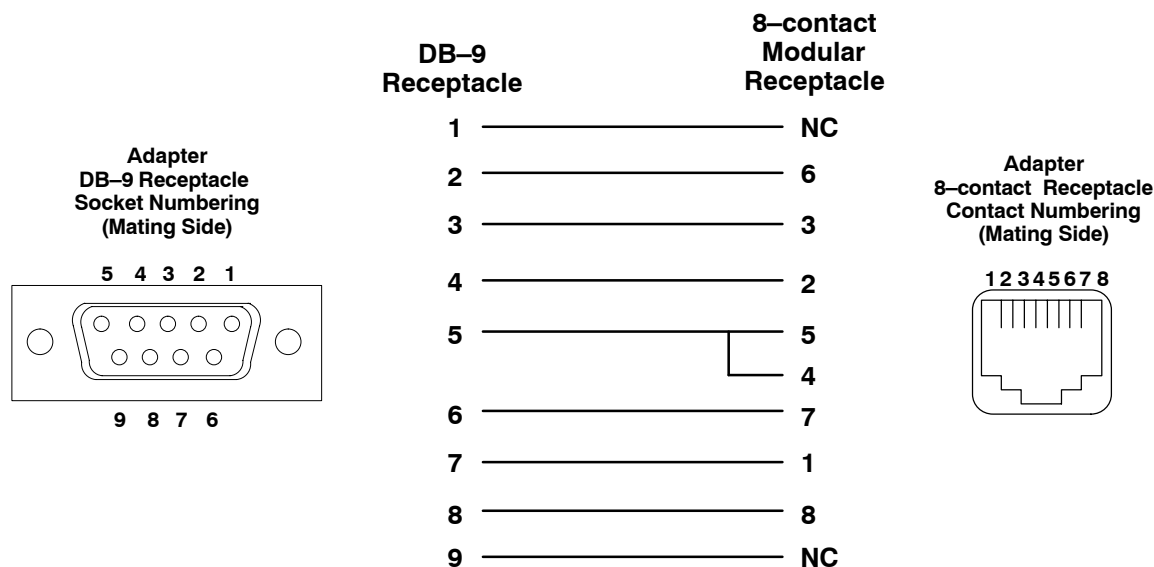
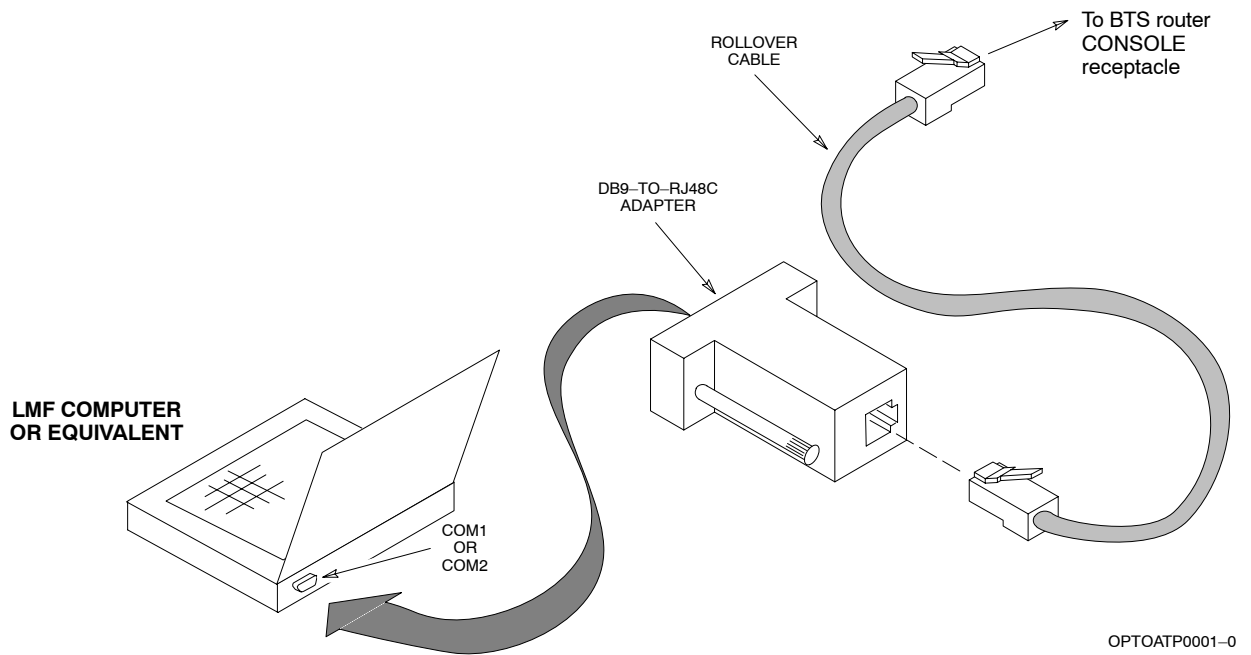


Table J-2: Establishing BTS Router Serial Communication

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 J-1 in the "Terminal Set-up" section of this appendix.
3	Connect the computer to the BTS router as shown in Figure J-3.
4	Start the named HyperTerminal connection for BTS router communication sessions by double clicking on its <i>Windows</i> desktop shortcut.  <b>NOTE</b> 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: <b>Programs &gt; Accessories &gt; Hyperterminal &gt; HyperTerminal &gt; &lt;Named HyperTerminal Connection (for example, BTRSRTTR)&gt;</b>
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 J-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 J-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 J-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 J-3.

<b>Table J-3: BTS Router Canned Configuration File FTP Transfer from the OMC-R</b>	
<b>Step</b>	<b>Action</b>
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.

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**Table J-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> <pre>cd pathname</pre> <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> <pre>dir</pre> <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> <pre>ftp hostname</pre> <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>

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**Table J-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>

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**Table J-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> <pre> bin hash </pre> <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> <pre> get btsrtr_canned.blue </pre> <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> <pre> get btsrtr_canned.red </pre> <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>

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**Table J-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: — <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. — <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:  <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.
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## 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*) 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*
- *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 J-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.
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<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>
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<b>Table J-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>

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**Table J-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*. For other tftp server applications, install and configure the application according to the manufacturer's instructions.

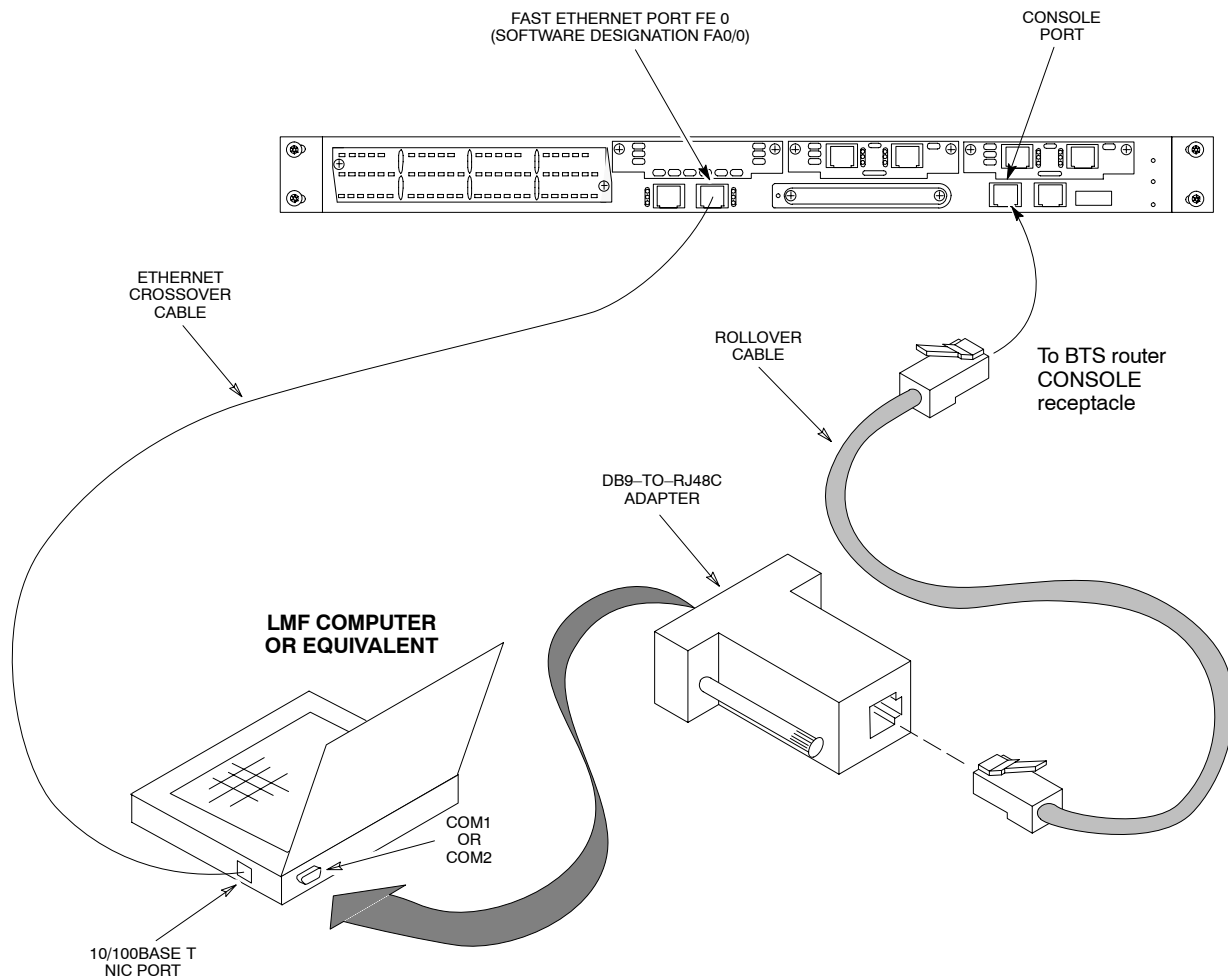
### NOTE

**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 J-4, step 14, or created in Table J-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 J-5 and referring to Figure J-4..

**Figure J-4:** LMF Computer TFTP Connections to BTS Router



BTSRTR0025

**Table J-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 J-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 J-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</i> or the manufacturer's instructions).

### BTS router power-up and initial configuration for Ethernet communication

Follow the procedure in Table J-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 J-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 BTS FRU Guide</i> 68P09258A64 for instructions to access the CF memory card slot).
2	<b>* IMPORTANT</b> 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.  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:  Press RETURN to get started!

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**Table J-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>

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

Step	Action
<b>CAUTION</b>	
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</i> ).  <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.
2	If a HyperTerminal communication session with the BTS router is not running, start one following the procedure in Table J-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:  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 J-4).

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**Table J-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> <pre>dir slot0:</pre> <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: <b>mwr1941-i-mz.122-8.MC2a.bin</b></li> </ol>

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**Table J-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 J-13 to load the required version, and then return to step 9, below.</p>

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**Table J-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 J-13.</p> <p>9b – Perform steps 25 through 29 of Table J-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>

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**Table J-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: <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: <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: <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>

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**Table J-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> 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 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 J-5, Table J-6, and this table (Table J-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 J-4, step 9b.</p> <p><b>CAUTION</b> 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*
- *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 J-8.

**Table J-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 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>

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<b>Table J-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 J-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 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> .

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

Step	Action
12	<p><b>NOTE</b></p> <p>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></p> <p>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 J-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></p> <p>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. — The filename will be highlighted.</p> <p>20b – Wait approximately two seconds, and then click on the canned configuration file filename again. — A hair-line rectangle will appear around the highlighted filename.</p> <p>20c – After the rectangle appears around the highlighted filename, type the following: <b>canned-config</b></p> <p>20d – Press the <b>Enter</b> key or click on the canned configuration file <i>icon</i>. — 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>

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

Step	Action
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 BTS FRU Guide</i> .
24	Proceed to Table J-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 J-9 to accomplish this.

**Table J-9:** Copy Canned Configuration File to BTS Router Startup Configuration and Verify IOS File 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	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 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 J-8.
3	At the <code>Router&gt;</code> <i>user</i> EXEC mode prompt, enter the following to access the <i>privileged</i> EXEC mode: <b>enable</b> A response similar to the following will be displayed:  Router>enable Router#

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**Table J-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 J-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>

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

Step	Action
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> 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 style="padding-left: 40px;">Router#reload System configuration has been modified. Save? [yes/no]: n Proceed with reload? [confirm]</pre>
11	<p>If prompted to save a modified configuration, enter <b>n</b> for “no,” and press the <b>Enter</b> key.</p>
12	<p>When prompted to proceed with reload, press the <b>Enter</b> key to continue the reload operation.</p>
13	<p>Verify the router reboots without displaying the rommon 1 &gt; 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.</p>
14	<p>Using the tagging materials, tag the router to clearly identify the installed configuration (blue (BTSRTR1) or red (BTSRTR2)).</p>
15	<p>If an additional router must have the canned configuration installed, perform the following:</p>
15a	<ul style="list-style-type: none"> <li>– Disconnect the cabling for the HyperTerminal communications session from the BTS router, and minimize the HyperTerminal window on the LMF computer.</li> </ul>
15b	<ul style="list-style-type: none"> <li>– Remove power from the router and disconnect it from the power supply.</li> </ul>
15c	<ul style="list-style-type: none"> <li>– Repeat the procedures in Table J-8 and this table (Table J-9) using the additional router.</li> </ul>
16	<p>If no additional routers must be configured, perform steps 15a and 15b.</p>
17	<p>On the LMF computer, exit the HyperTerminal session.</p>

# 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.
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- 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.
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- 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*) 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 J-4, Table J-5, Table J-6, and steps 1 through 8 of Table J-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 J-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 J-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 J-4, Table J-5, Table J-6, and steps 1 through 8 of Table J-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>

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**Table J-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>

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**Table J-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>

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**Table J-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 J-7, return to Table J-7, step 9.

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

Step	Action
36 36a 36b 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 J-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 J-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 J-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 J-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 J-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> 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.  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.

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**Table J-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 J-8, return to Table J-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 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 J-8.
18	At the Router> <i>user</i> EXEC mode prompt, enter the following to access the <i>privileged</i> EXEC mode: <b>enable</b> A response similar to the following will be displayed:  Router>enable Router#

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**Table J-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 J-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	If prompted to save a modified configuration, enter <b>n</b> for “no,” and press the <b>Enter</b> key.
23	When prompted to proceed with reload, press the <b>Enter</b> key to continue the reload operation.
24	Verify the router reboots without displaying the <code>rommon 1 &gt;</code> prompt or error messages related to port configurations.
25	If no other BTS router file operations or configuration actions are required, perform the following:
25a	– Remove power from the router and disconnect it from the power supply.
25b	– Disconnect all cabling from the BTS router.
25c	– On the LMF computer, exit the HyperTerminal communications session.

## 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 J-8 and steps 1 through 5 of Table J-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*) 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 J-12 to place the installed IOS version file first in the stored file sequence on the CF memory card.

**Table J-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 J-8 and steps 1 through 5 of Table J-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 J-4.</p>
6	<p>If it has not been done, configure the LMF computer NIC as directed in Table J-4.</p>

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**Table J-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: <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: <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: <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></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>

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**Table J-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: <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 J-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.

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**Table J-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>

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**Table J-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 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 J-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 J-9, return to Table J-9, step 6.</p>

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**Table J-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 J-11, return to Table J-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 J-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.
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- 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.
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- 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*) 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 J-4, Table J-5, Table J-6, and steps 1 through 8 of Table J-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 J-13 to verify and, if necessary, replace the installed rommon version using the tftp server application.

**Table J-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 J-4, Table J-5, Table J-6, and steps 1 through 4 of Table J-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 <code>ROM: System Bootstrap</code> line in the response.</p>

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**Table J-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: <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>

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**Table J-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 J-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>

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**Table J-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 J-4, step 9b.</p> <p><b>CAUTION</b> 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

<b>CAUTION</b>	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.
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### 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 J-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.

<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.
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**Verifying and replacing installed rommon version**

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

**Table J-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 J-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><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>

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<b>Table J-14: Verify and Replace Installed rommon Version Using a CF Memory Card Reader</b>	
<b>Step</b>	<b>Action</b>
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: <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 BTS FRU Guide</i> .

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**Table J-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> 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> 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> 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 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 J-15 to attempt a simple recovery from a BTS router rommon initialization.

**Table J-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 J-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>

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**Table J-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> <p><b>boot slot0:IOS_filename</b></p> <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	<p>If the router successfully reboots with the IOS, proceed to step 7.</p>
5	<p>If the router does not reboot with the IOS, perform the following:</p> <p>5a – Scroll the HyperTerminal display down until the directory display from step 2, above, is visible.</p> <p>5b – Compare the IOS filename from the directory display with the filename entered in performing step 3, above.</p> <p>5c – If the filename was typed incorrectly, repeat step 3, using care to type the filename correctly.</p>
6	<p>If the router does not reboot with the IOS after typing the filename correctly, proceed to Table J-16 and perform the extended recovery procedure.</p>

... continued on next page



**Table J-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	<p>After a successful reboot with IOS, perform the following to correct the cause of the boot to rommon:</p>
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 J-10, steps 25 through 32, or Table J-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:  <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:  <b>boot system slot0:IOS_filename</b></li> </ul>
	<p>Where <i>IOS_filename</i> = the filename of the IOS noted in step 2, above.</p>
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:  <b>copy runing-config startup-config</b></li> </ul>

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**Table J-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:  <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:  <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 J-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 J-15 to perform an extended recovery from a BTS router rommon initialization.

**Table J-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 J-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 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: <b>dir slot0:</b> A response similar to the following will be displayed: <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.

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**Table J-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> <pre><b>boot slot0:IOS_filename</b></pre> <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> <pre><b>enable</b></pre> <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 BTS FRU Guide</i> .
11	Install the <i>original</i> CF memory card in the router following the procedure in the BTS FRU Guide.

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

Step	Action
12	Format the <i>original</i> CF memory card by entering the following: <b>format slot0:</b> A response similar to the following will be displayed: <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: <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: <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 J-10</li> <li>• Use the LMF computer and a CF memory card reader following the procedure in Table J-11</li> </ul>
16	If applicable, perform IOS initialization troubleshooting as described in Table J-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 J-17.

Table J-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 J-1 of this appendix.
3	Connect the LMF computer to the BTS router, and start a communication session as described in Table J-2 in this appendix.

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**Table J-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 FastEthernet0/1      unassigned     YES unset          administratively down Serial1:0         unassigned     YES      unset administratively down</pre> <pre>BTSRTR-bts#-1-1#</pre>
7	<p>For a FastEthernet0/0 (fa0/0) or FastEthernet0/1(fa0/1) interface which does not have a correct or an assigned IP address, enter the following at the router prompt to access the global configuration mode:</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>

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**Table J-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. 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: <i>IP_addr</i> = the required IP address for the interface; for example, 192.168.147.1 <i>subnet_mask</i> = the required subnet mask for the interface; for example, 255.255.255.0 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> 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>

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## 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 J-18 and Table J-19.

<b>Table J-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 J-19 to return the site to OMC-R control.

<b>Table J-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.





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***Technical  
Information***

1X SC™ 4812T BTS Optimization/ATP

***Software Release R2.16.3.x***

***800 and 1900 Mhz***

***CDMA***

***ENGLISH***

***Oct 2003***

***68P09258A31-A***



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**SOFTWARE RELEASE X.X.X**

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**ENGLISH**

Oct 2003

**68P09258A31-A**





# STANDARD MANUAL PRINTING INSTRUCTIONS

Part Number: **68P09258A31-A**      Filename: \_\_\_\_\_      APC: \_\_\_\_\_

Title: 1X SC™ 4812T BTS Optimization/ATP

Volume \_\_\_\_ of \_\_\_\_      Print Vendor: \_\_\_\_\_      Date \_\_\_\_\_

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## 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 (5/16–in. dia.)
Binder Cover: Standard TED cover – 10 pt. Carolina	Pantone 2706–C Black Ink	White Black Ink	Shrink Wrap Body

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

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## TAB and SHEET SIZE/QUANTITY

7X9 \_\_\_\_\_      8.5x11 \_\_\_\_\_      11x17 \_\_\_\_\_      Sheets = (Total Pages) / 2

1st Level Tabs \_\_\_\_\_      2nd Level Tabs \_\_\_\_\_

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## NON–STANDARD SPECIFICATIONS

Tape Bound       Corner Stitch

Other: Meet with manager to determine the deliverable.

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## SPECIAL INSTRUCTIONS

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