

Perform the procedure in [Procedure 4-6](#) for all-inclusive RX test.

Procedure 4-6 All RX ATP Test

1	Set up the test equipment for abbreviated acceptance tests per Procedure 4-3
2	<p>On LMF, select devices to be tested.</p> <div style="display: flex; align-items: center; margin-top: 10px;"> <div style="background-color: #00FFFF; padding: 5px; border: 1px solid black; font-weight: bold; margin-right: 10px;">NOTE</div> </div> <p style="margin-top: 10px;">To select multiple items, hold down the Shift or Ctrl key while making the selections.</p>
3	Click on Tests in the UBS Menu bar, and select All RX Test... from pull-down menu.
4	Select the appropriate carrier from those displayed in the Channels/Carrier pick list.
5	Select the appropriate RX Branch (Both, Main, or Diversity) from the drop-down menu. In the Rate Set box, select the appropriate data rate (1=9600, 2= 14400, 3 = 9600 1X) from the drop-down list.
6	Click OK to display a status bar followed by a Directions pop-up window.
7	Follow the cable connection directions as they are displayed, and click the Continue button to begin testing. As the ATP process is completed, results will be displayed in a status report window.
8	<p>Click the Save Results or Dismiss button.</p> <div style="display: flex; align-items: center; margin-top: 10px;"> <div style="background-color: #00FFFF; padding: 5px; border: 1px solid black; font-weight: bold; margin-right: 10px;">NOTE</div> </div> <p style="margin-top: 10px;">If Dismiss is used, the test results will not be saved in the test report file.</p>

Individual Tests

TX and RX Testing

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

TX Testing

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

TX tests verify TX operation of the entire CDMA forward link using selected sector-carriers assigned to respective sector antennas. Each sector-carrier is keyed up to generate a CDMA carrier (using BLO) at the NEC file-specified carrier output power level.

RX Testing

RX testing verifies receive antenna paths for the sector-carriers selected for the test. All tests are performed using the external, calibrated test equipment to inject a CDMA RF carrier with all zero long code at the specified RX frequency at the appropriate UBS RX IN connector(s).

RX tests verify RX operation of the entire CDMA reverse link.

Individual Tests

Standard Pattern (per the 3GPP2 standard) - For UBS Macro, the standard pattern is the total digital gain of the signal (383) that includes the following channels (9 in all) and their individual digital gain:

- Pilot -171
- Page - 165
- Sync - 83
- 6xTCH - 117

In the UBS Macro, the pilot is set to 36dBm, which brings the total power of this pattern to 43dBm - 7dB higher.

Spectral Purity TX Mask

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

Waveform Quality (Rho)

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

Pilot Time Offset

The Pilot Time Offset is the difference between the CDMA analyzer measurement interval (based on the UBS system time reference) and the incoming block of transmitted data from the UBS.

Code Domain Power/Noise Floor

This test verifies the Code Domain Power/Noise of each sector-carrier is enabled at a specific frequency per the current NEC file assignment. All tests are performed using the external calibrated test set controlled by the same command. All measurements are via the appropriate TX OUT connector.

Frame Error Rate (FER)

The Frame Error Rate (FER) test verifies RX operation of the entire CDMA Reverse Link using all equipped DMIs assigned to all respective sectors/antennas. This test verifies the UBS sensitivity on all traffic channel elements currently configured on all equipped DMIs at an RF input level of -123.0 dBm.

TX Audit

The TX Audit is a power out test that will pass within +/-2dB of the expected power. The standard power per S-C is 43dBm and the Audit test will pass, if the output power is within the limits listed above.

Calibration

It is optional, but supported. The calibration in UBS is always a negative number representing the LOSS between the output of the XMI to the top of the frame. In this frame, it is typically -1dB to -2dB depending on RF elements in the frame.

Receive Signal Strength Indication (RSSI)

This test verifies the gain for UBS reverse (RX) paths for each carrier-sector selected is within requirements for correct operation for the operating band of the UBS as follows:

- 1900 MHz: -80 dBm (-86 dBm or greater)
- 800 MHz: -80 dBm (-86 dBm or greater)



NOTE

The LMF injects a -80 dBm signal (default) input to the UBS. The RSSI must be +/-6 dB.

TX Spectral Purity Transmit Mask Acceptance Test

TX Mask Test

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

The standard pattern is used (pilot 171 and 43dBm)

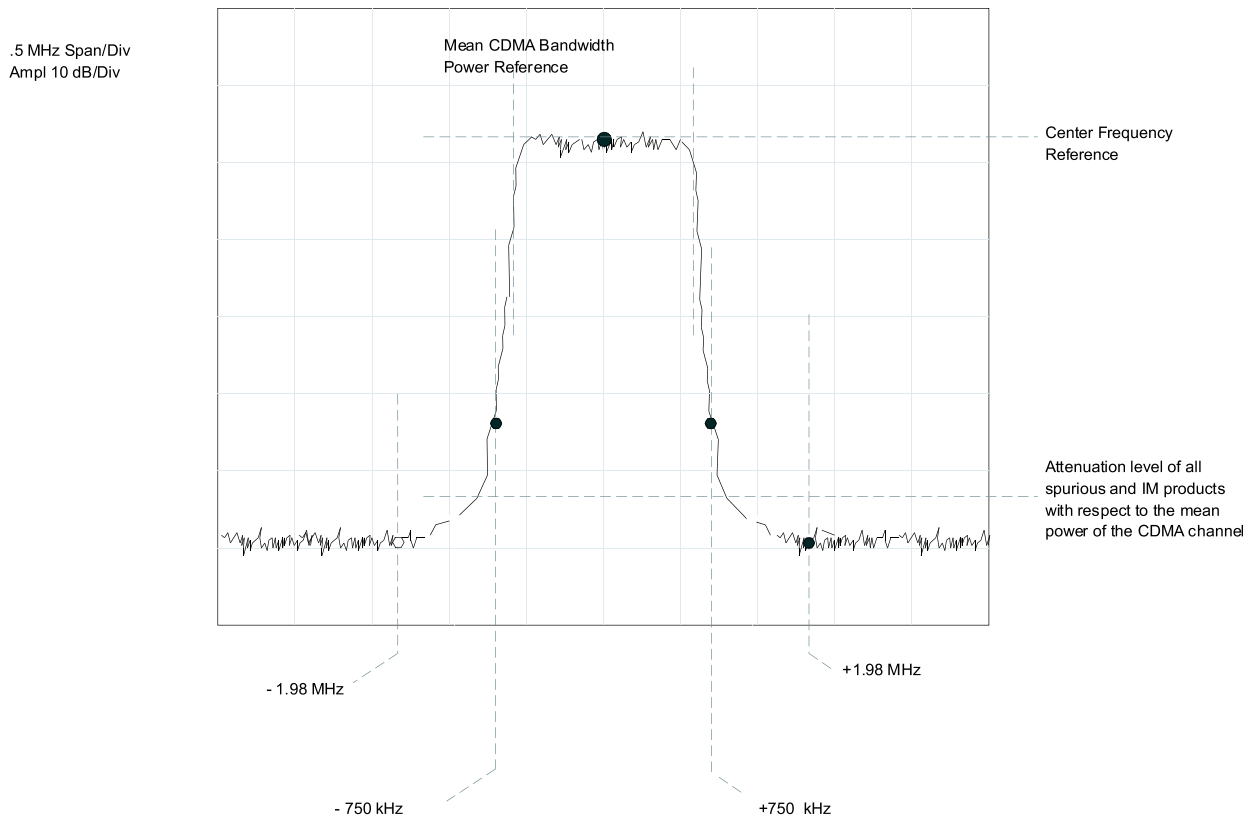
The parameters of the TX Mask are as follows:

> **-45.0 dBc / 30 kHz@>750 kHz offset**

> **-60.0 dBc / 30 kHz@ 1.98 MHz offset**

The sector-carrier is keyed or dekeyed during the test.

Figure 4-3 TX Mask Verification Spectrum Analyzer Display (1900 MHz)



TX Waveform Quality (Rho) Acceptance Test

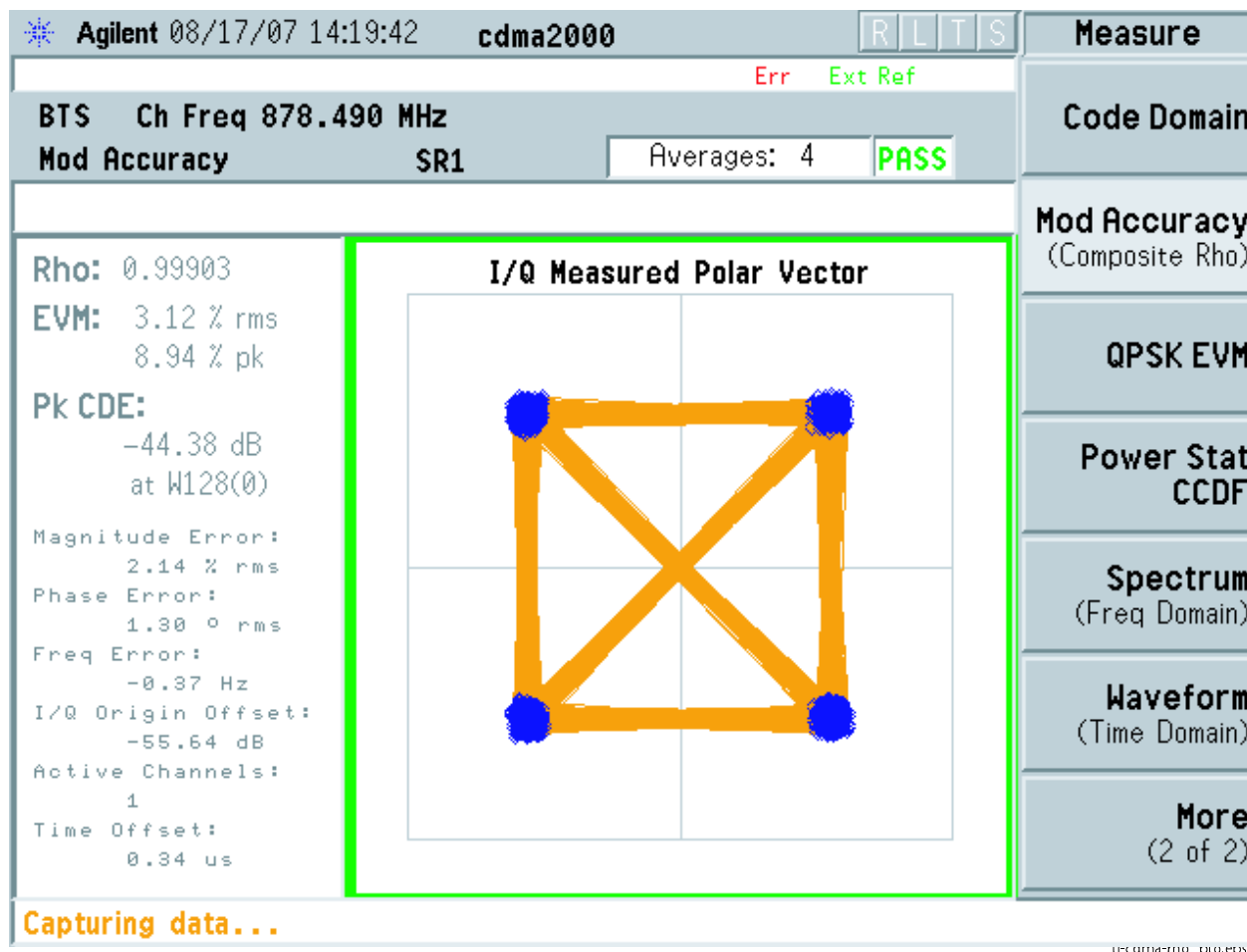
Rho Test

The Pilot Gain is set to 171 for each antenna. The sector-carrier is enabled using both rflvl and bay level offsets, to generate a CDMA carrier (with pilot channel element only, Walsh code 0). Sector-carrier power output is set to 36 dBm as measured at the TX OUT connector (on the UBS 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 greater than or equal to 0.97 (-0.4 dB).

Figure 4-4 Rho Signal



TX Pilot Time Offset Acceptance Test

PTO Acceptance Test

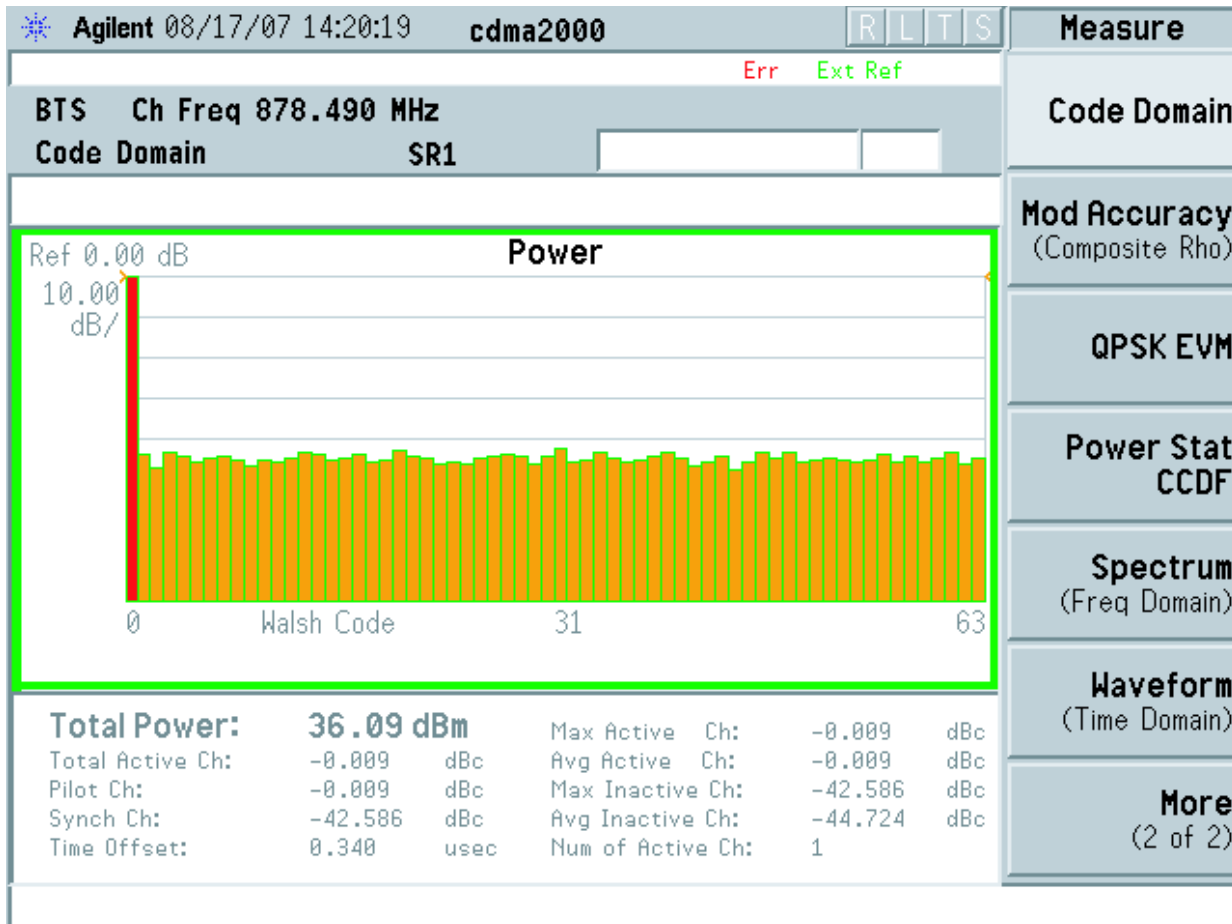
This test verifies the transmitted Pilot channel element Pilot Time Offset of each sector-carrier keyed up at a specific frequency *per the current NEC file assignment*. All tests are performed using the external calibrated test set controlled by the same command. All measurements are via the appropriate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

The Pilot Gain is set to 171 LSB for each antenna. The sector-carrier is enabled, using both rfLvl and bay level offsets, to generate a CDMA carrier (with pilot channel element only, Walsh code 0). Sector-carrier power output is set to 36 dBm as measured at the **TX OUT** connector (on the UBS directional coupler).

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

- Pilot Time Offset should be within +/- 3 us of the target PT Offset (0 us).

Figure 4-5 Pilot Only Signal



ti-cdma-pilot_only.eps

TX Code Domain Power/Noise Floor Acceptance Test

Code Domain Power Test

For each sector/antenna under test, the Pilot Gain is set to 383 LSB. All channel elements under test are configured to generate Orthogonal Channel Noise Source (OCNS) on standard pattern - only 9 channels where the 6 Traffic channels (TCH) can be anywhere across the code domain. The maximum number of channel elements (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.

Sector-carrier power output is set to 43 dBm as measured at the **TX OUT** connector.

- CD_PILOT_RATIO: -6.5dB to -7.5dB
- CD_PAGING_RATIO:-6.8dB to -7.8dB
- CD_SYNC_RATIO: -12.8dB to -13.8dB
- CD_TRAFFIC_ON_MAX_RATIO: -9.8dB to -10.8dB
- CD_TRAFFIC_ON_MIN_RATIO: -9.8dB to -10.8dB
- CD_TRAFFIC_OFF_MAX_RATIO: -27dB (none)

Refer to [Figure 4-6](#).

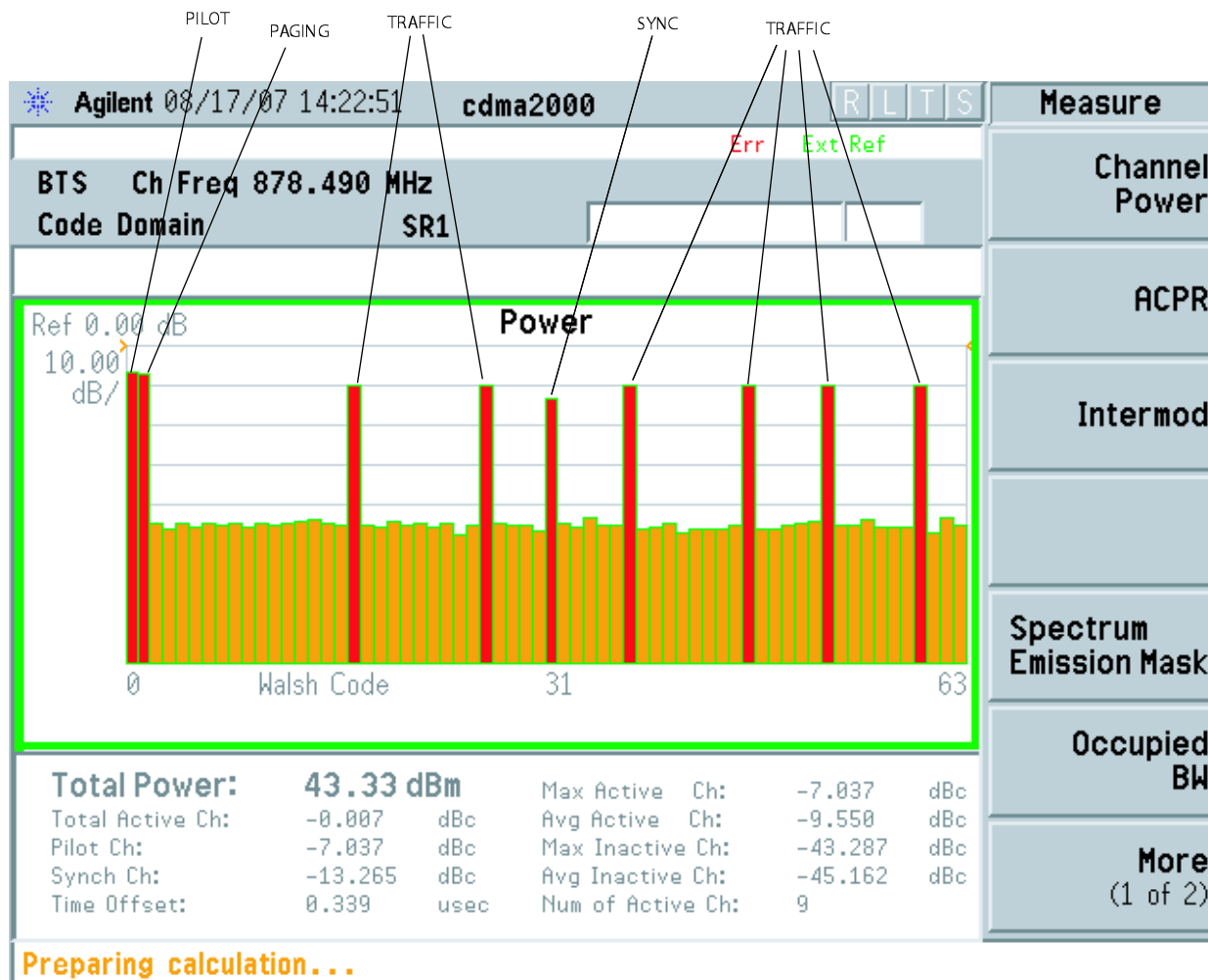


NOTE

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

See [Procedure 4-5](#) to perform this test.

Figure 4-6 Code Domain Power and Noise Floor Levels



ti-cdma-standard_pattern.eps

RX Frame Error Rate (FER) Acceptance Test

FER Test

This test verifies the UBS FER on all traffic channel elements is currently configured (full rate at 1% FER) at an RF input level of -123 dBm. 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 sector-carrier is enabled, using only rflvl level offsets, to generate a CDMA carrier (with pilot channel element only). Sector-carrier power output is set to +27.5 dBm as measured at the **TX OUT** connector. The UBS must be keyed to enable the RX receive circuitry.

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

- FER returned **<1% @ -123 dBm** and total frames measured is **1500**

All CEs selected are tested on the specified RX antenna path. See [Procedure 4-6](#) to perform this test.

Continuous Waveform Mode


Objective

This test verifies that the UBS frames can generate an unmodulated carrier tone on a single sector at any single channel number within the supported carrier frequency range of the frame.

Unlock Continuous Waveform Mode

WinLMF must be connected to the UBS frame to be tested and logged in.

Procedure 4-7 Procedure to Unlock Continuous Waveform Mode

1	On the menu, click on UBS -> Unlock Continuous Waveform Mode
2	Click the Yes button in the confirmation dialog box.
3	A status report window will appear that shows the result of the action request.  <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-left: 10px;">WARNING</div> WinLMF will fail to set up Continuous Waveform Mode for Modem devices provisioned in the configuration files on DMI, but not physically installed in the frame, and for Modem devices under reset.
4	Select tested Sector/Carrier and click Device->XCVR->Key menu item.
5	In Key window: Enter the desired power level [dBm] in the XCVR Gain box Enter the desired channel in the XCVR Channel box
6	Click the OK button in Key window. A status report window will appear that shows the result of the action request.
7	Perform the required testing on the selected Sector/Carrier.
8	Select Sector/Carrier keyed in step 4 and click Device->XCVR->Dekey menu item. A status report window will appear that shows the result of the action request.
9	To perform unmodulated carrier mode test on other Sector/Carrier repeat procedure from step 4 . If testing using unmodulated carrier mode is completed follow Lock Continuous Waveform Mode Procedure

Lock Continuous Waveform Mode

Procedure 4-8 Procedure to Lock Continuous Waveform Mode

- | | |
|---|---|
| 1 | On the menu, click on UBS -> Lock Continuous Waveform Mode |
| 2 | A status report window will appear that shows the result of the action request. |



WARNING

WinLMF will fail to disable Continuous Waveform Mode for Modem devices provisioned in the configuration files on DMI, but not physically installed in the frame and for Modem devices under reset.

Generate ATP Report

Background

Each time an Acceptance Test Procedure (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.



NOTE

The ATP report for a UBS will contain test results saved with Save Results button. Results will be saved for the last test performed on the same:

- Sector
- Carrier
- Channel

When an ATP report for a UBS is generated, *all* saved test results will be included in the report.

ATP Report

Each time an ATP test is run, a report may be created for the UBS being tested. If a previous report exists for the UBS, it is updated with the new test results as noted above. The report includes the following for each test:

- Test name
- Channel number
- Carrier number
- Sector number
- Test result
- PASS or FAIL
- Description information
- 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 [Procedure 4-9](#) to view and/or print the ATP report for a UBS.

Procedure 4-9 Generating an ATP Report

1	Click Util. Save Test Report from the LMF menu.
2	Click on a column heading to sort the report.
3	Do <i>one</i> of the following: <ul style="list-style-type: none"><li data-bbox="327 538 1204 570">• If a printable file copy <i>is not</i> desired, click on the Dismiss button.<li data-bbox="327 597 1246 651">• If a printable copy <i>is</i> required, select the desired file type in the pick list and click on the Save button.

Leave the Site

Configuring Backhaul

Before disconnecting the LMF and test equipment, the span backhaul must be configured to allow the UBS to communicate with the OMC-R.

Introduction

General

This section allows the Cellular Field Engineers (CFEs) to pre-configure the UBS backhaul parameters prior to cutting over the UBS. It also contains information on how to make adjustments to individual backhaul parameters.

Configuring the UBS Backhaul

Prior to BTS cutover, some span configuration and connection parameters must be set to match the type of backhaul chosen for the particular BTS. These parameters can be checked and changed if required using the LMF Configure Backhaul Basic Screen. With these values set correctly, the OMC-R should be able to establish communications with the BTS. In the event that communication between the OMC-R and the BTS is lost and cannot be re-established, the LMF Configure Backhaul Advanced Screen can be used to restore the backhaul configuration to default values. See [Figure 5-1](#).



NOTE

The default mode is Full Configuration Backhaul unless the Fractional Span box is checked.

Backhaul Configuration Procedure

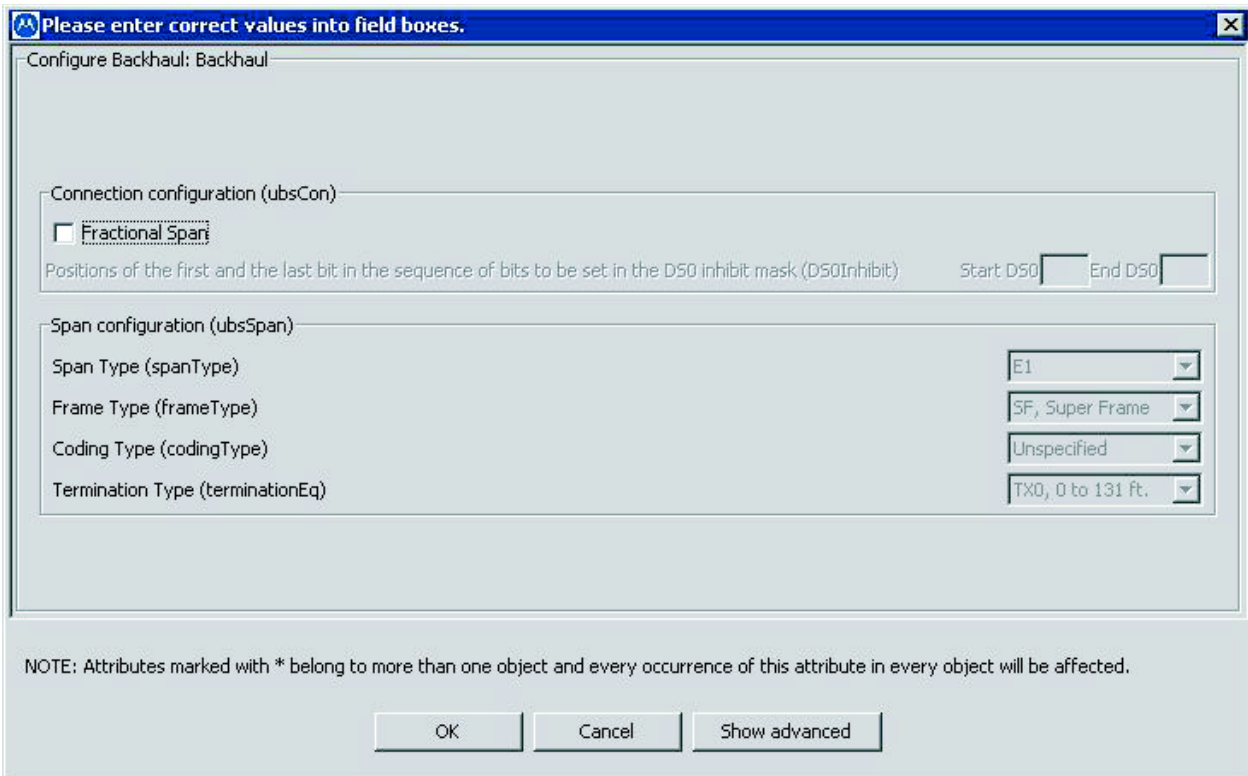
Prior to executing [Procedure 5-1](#), the information determined and gathered while working through the System Engineering Section of the UBS Set-up Procedure should be available. This information documents the intended backhaul configuration for the site and should match the configuration the OMC-R is expecting to use for the UBS.



CAUTION


Failure to configure the UBS backhaul correctly with the LMF using the same DS0 configuration may result in the OMC-R being unable to establish communication with the UBS at cutover.

Figure 5-1 Configure Backhaul Basic Screen



ti-cdma-06184.eps

Procedure 5-1 Fractional Span Backhaul Configuration Procedure

- 1 Go to the LMF Configure Backhaul Screen. See [Figure 5-1](#)
- 

NOTE

The default value for both the *LcpNcpNegRetryInt* and the *PPPKeepAliveMsg* parameters is 1000 ms. If the UBS will use satellite backhaul, the value for these parameters must be set to 2000 ms.
- 2 If the UBS will use Fractional Span backhaul, click on the **Fractional Span** box. The **Start DS0** and **End DS0** boxes will now accept operator - entered values.
 - 3 Enter the starting DS0 and ending DS0 intended for Span 1 into the appropriate boxes. The LMF will configure Span 1, which is sufficient to allow the cutover to succeed. Span 2 will be configured from the OMC-R after cutover.
 - 4 Select the correct span type, frame type, coding type and span equalization from the pull-down menus in the Span Configuration section.
 - 5 Click on the **OK** button.

Using the LMF Configure Backhaul Advanced Screen

In the event that a backhaul configuration entered at the Operation and maintenance Center-Radio (OMC-R) results in the OMC-R being unable to communicate with the BTS, it may be necessary to reset backhaul parameters to their default values using the LMF. The LMF Configure Backhaul Advanced Screen is used to reset these values.

Prior to executing [Procedure 5-2](#), the information determined and gathered while working through the System Engineering Section of the BTS Set-up Procedure should be available. This information documents the intended backhaul configuration for the site and should match the configuration the OMC-R is expecting to use for the BTS. Default values for those parameters not covered above are listed below:

- Muxing: enabled
- Header Compression: enabled
- Max Transport Unit Size (bytes): 512
- Hello Interval Timer (seconds): 30
- Periodic Transmission intervals for join/prune messages (seconds): 60

Connection Configuration (ubsCon)

- Interval between LCP/IPCP retries during PPP link negotiation (milliseconds): 1000
For satellite backhaul: 2000
- Time between PPP keep-alive messages (milliseconds) 1000
For satellite backhaul: 2000
- Number of PPP keep-alive messages that can be lost before link is marked down: 5
- Number of retries for LCP/IPCP negotiations: 10
- Fractional Span backhaul: Per SE config

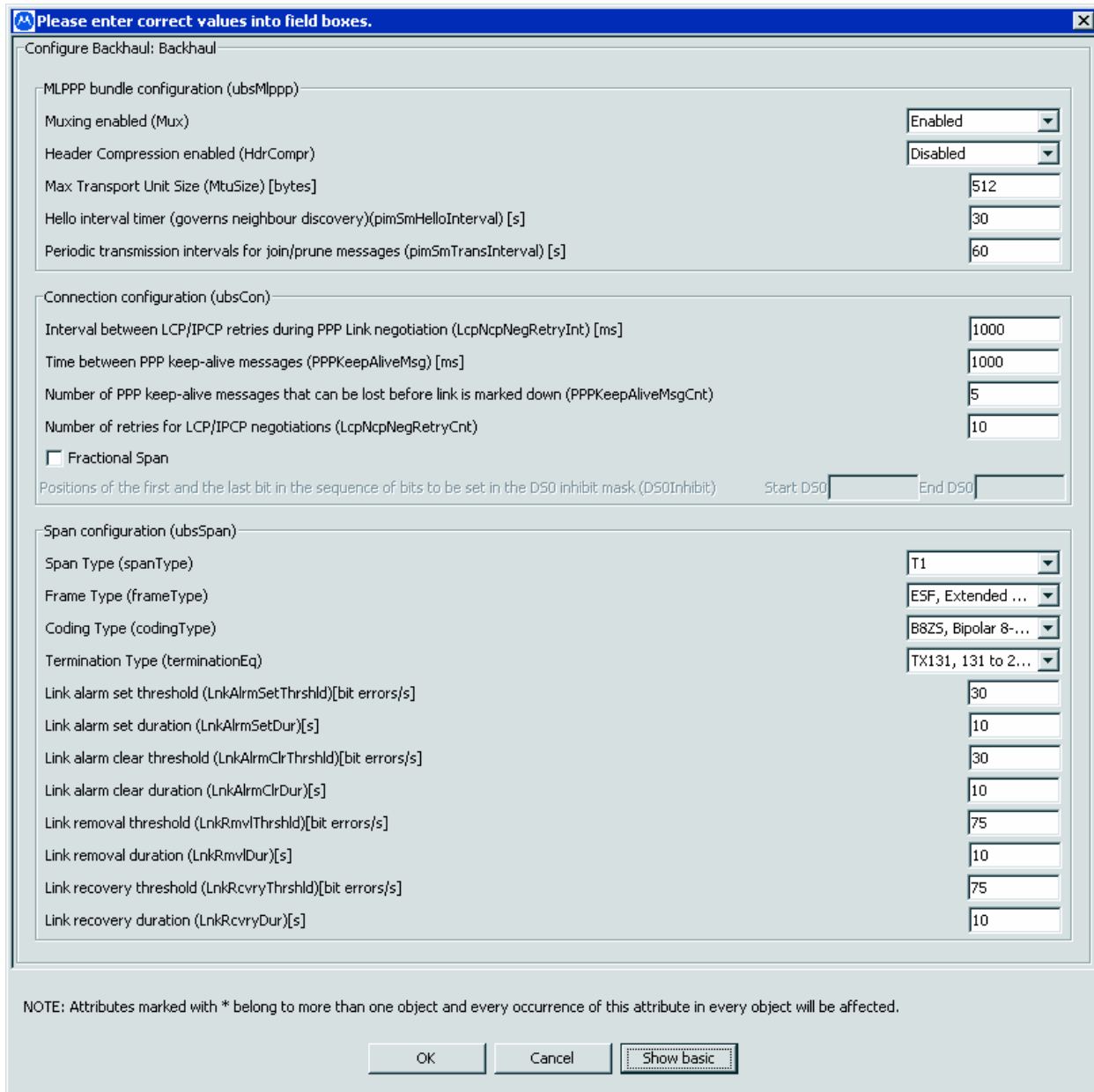
Span configuration (ubsSpan)

- Span type: T1
- Frame type: ESF, Extended ...
- Coding type: B8ZS, Bipolar 8-...
- Termination type: TX131, 131 to 2...
- Link alarm set threshold (bit errors / second): 30
- Link alarm set duration (seconds): 10
- Link alarm clear threshold (bit errors / second): 30
- Link alarm clear duration (seconds): 10
- Link removal threshold (bit errors / second): 75
- Link removal duration (seconds): 10
- Link recovery threshold (bit errors / second): 75
- Link recovery duration (seconds): 10

Procedure 5-2 Resetting Backhaul Parameters to their Default Values

1	Go to the LMF Configure Backhaul Screen.
2	Click on the Show Advanced box at the bottom of the screen. A full list of backhaul parameters will now be displayed. See Figure 5-2
3	Change the values in the entry boxes to align with the default values noted above.
4	Click on the OK button.

Figure 5-2 Configure Backhaul Advanced Screen



enter_filename_here_and_move_per_step_8

Prepare to Leave the Site

External Test Equipment Removal

Perform the procedure in [Procedure 5-3](#) to disconnect the test equipment and configure the UBS for active service.

Procedure 5-3 External Test Equipment Removal Procedure

1	Disconnect all external test equipment from all TX and RX connectors on the UBS.
2	Reconnect and visually inspect all TX and RX antenna feed lines on the UBS.



CAUTION

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

LMF Removal

Before removing the LMF, verify that the UBS code load is synched with the code load in the OMC-R.




NOTE

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

Follow the procedure in [Procedure 5-4](#) to terminate the LMF session and remove the terminal.

Continued

Procedure 5-4 LMF Termination and Removal Procedure

1	From the Local Terminal window select File > Exit .
	 <div style="background-color: #00b050; color: white; padding: 5px; display: inline-block; margin-left: 10px;">NOTE</div> <p>Anytime the LMF is exited from the UBS, the DMI controller(s) will automatically reboot within 1 minute in order to clear out any test configurations and boot up under the original configuration in the NECB and NECJ files.</p>
2	From the Windows Task Bar click Start > Shutdown . Click Yes when the Shut Down Windows message appears.
3	Disconnect the LMF terminal Ethernet connector from the UBS cabinet.
4	Disconnect the LMF serial port, the RS-232 to GPIB interface box, and the GPIB cables as required for equipment transport.

Reset All Devices and Initialize Site Remotely

Devices in the UBS 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 [Procedure 5-5](#) to reset all devices and initialize site remotely.

Procedure 5-5 Reset UBS Devices and Remote Site Initialization

1	Terminate the LMF session by following the procedure in Procedure 5-4
2	Verify that the OMC-R operator has re-activated the spans.
3	Verify at the OMC-R that the UBS has been integrated and has synchronized its code and data.
4	Account for all tools used and all parts removed.
5	Visually inspect the UBS for any foreign objects and remove them.
6	Visually inspect all cable connections, ensuring that they are connected as required for normal UBS operation.
7	Verify no alarm conditions are being reported to the OMC-R.
8	After all activities at the site have been completed, contact the OMC-R and confirm that the UBS is under OMC-R control.

Data Sheets

Checklist

Table A-2 Procedure Checklist

Parameter	Specification	Comments
Power Up Procedures		
Pre-Power Up Test	Per Procedure 2-1	
Initial Power Up Test	Per Procedure 2-2 and Procedure 2-3	
Optimization/ATP Procedures		
LMF-to-UBS Connection	Per Procedure 3-2	
UBS GUI Login	Per Procedure 3-3	
UBS GUI Logout	Per Procedure 3-4	
Generate ATP Report	Per Procedure 4-9	
Leave the Site		
Test Equipment Removal	Per Procedure 5-3 , Procedure 5-5	
Reset Devices and Initialize Site Remotely	Per Procedure 5-5	

FRU Optimization/ATP Matrix

FRU Optimization/ATP Test Matrix

Usage & Background

Re-optimization of specific portions of the site may be required. 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.

UBS Optimization Required

Table B-1 When Optimization is Required

Item Replaced	Optimize
XMI, IDRF, DMI, SSI, CRMS	All sector / carrier TX / RX paths

Detailed Reduced ATP

There Reduced ATP consists of the TX Audit and RSSI tests.

Detailed Optional Full ATP Test Matrix

Table B-2 outlines the optional ATP tests that would need to be performed if the user wants to fully test the UBS components or if the reduced ATP fails. It is also assumed that all modules are placed in a Locked State via the LMF.

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



NOTE

Not every procedure required to bring the site back on line is indicated in [Table B-2](#). It is meant to be used as a guideline *ONLY*. The table assumes that the user is familiar enough with the UBS Optimization/ATP procedure to understand which test equipment set ups, test set calibrations, and UBS site preparation will be required before performing the Table # procedures referenced.

Various passive UBS components (such as the TX and RX directional couplers, 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 unit is replaced, it is assumed that only power to the unit being replaced is turned off via the breaker supplying that unit.

Table B-2 Full ATP Test Matrix

Test	Procedure	Description	Reference
RX Cables	Run the appropriate LMF applications	RSSI Test FER Test	5 5
TX Cables	Run the appropriate LMF application	TX Audit	4
GPS	Run the appropriate LMF applications	GPS Initialization/Verification TX Audit RSSI Test Waveform Quality ATP Pilot Time Offset ATP Code Domain Power/Noise Floor FER Test	• * 6 * * 6 6 6

OPTIMIZATION AND TEST LEGEND

- Required
- * Perform if necessary for additional fault isolation, repair assurance, or site certification
- 1 Perform on all carrier and sector TX paths to the UBS.
- 2 Perform on all carrier and sector RX paths to the UBS.
- 3 Perform on all primary and redundant TX paths of the affected carrier.
- 4 Perform on the affected carrier and sector TX paths.
- 5 Perform on the affected carrier and sector RX paths.
- 6 Verify performance by performing on one sector of on carrier only.

CDMA Operating Frequency

800 MHz CDMA Operating Frequency Programming Information

Introduction

Programming of each of the BTS XMIs is performed by the BTS DMI modules over the Concentration Highway Interface (CHI) bus. This programming data determines the transmit and receive operating frequencies (channels) for each XMI.

800 MHz Channels

Figure C-1 shows the total channels for the 800 MHz frequency spectrum and the channels allocated to CDMA. There are 10 CDMA channels used in a CDMA system. The channels used are unique to each customer system.

Table C-1 shows the channel allocations and frequencies covered by the UBS Macro.

Table C-1 800 MHz Channel Allocations

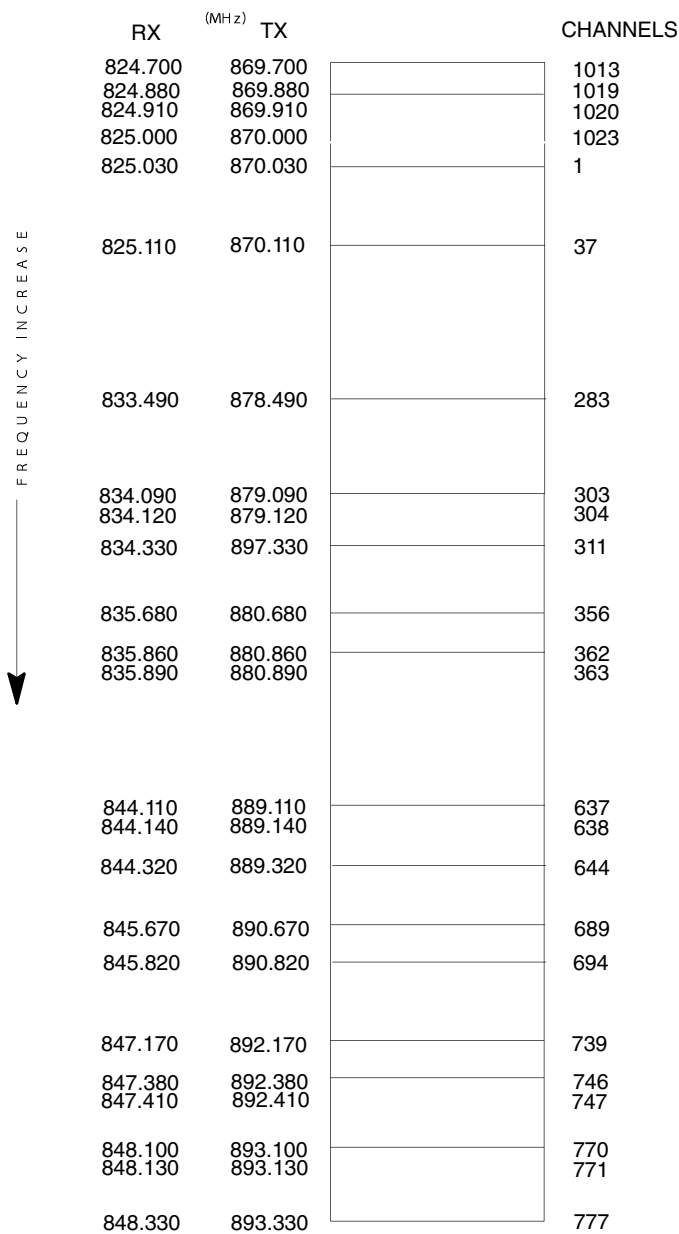
System Designator	CDMA Channel Validity	Channel No.	RX (MHz)	TX (MHz)
A (see NOTE below)	Not Valid	991-1012	824.04-824.67	869.04-869.67
	Conditionally Valid	1013-1020	824.70-824.91	869.70-869.91
	Valid	1021-1023	824.94-825.00	869.94-870.00
A	Valid	1-303	825.03-834.09	870.03-879.09
	Conditionally Valid	304-311	834.12-834.33	879.12-879.33
	Not Valid	312-333	834.36-834.99	879.36-879.99
B	Not Valid	334-355	835.02-835.65	880.02-880.65
	Conditionally Valid	356-363	835.68-835.89	880.68-880.89
	Valid	364-636	835.92-844.32	880.92-889.32
	Conditionally Valid	637-644	844.11-844.32	889.11-889.32
	Not Valid	645-666	844.35-844.98	889.35-889.98
A'	Not Valid	667-688	845.01-845.64	890.01-890.64
	Conditionally Valid	689-694	845.67-845.82	890.67-890.82
	Not Valid	695-716	845.85-846.48	890.85-891.48
B'	Not Valid	717-738	846.51-847.14	891.51-892.14
	Conditionally Valid	739-746	847.17-847.38	892.17-892.38
	Valid	747-769	847.41-848.07	892.41-893.07
	Conditionally Valid	770-777	848.10-848.31	893.10-893.31
	Not Valid	778-799	848.34-848.97	893.34-893.97
India	Conditionally Valid	1013-1020	824.70-824.91	869.70-869.91
	Valid	1021-594	824.94-842.82	869.94-887.82

Table C-1 800 MHz Channel Allocations (Continued)

System Designator	CDMA Channel Validity	Channel No.	RX (MHz)	TX (MHz)
China	Valid	37-283	826.11-833.49	871.11-878.49

The UBS supports all valid channels within the 800 MHz band and two Conditionally Valid channels: 1019 and 1020. On any other conditionally valid channels within the 800 MHz band, full TX Output power cannot be supported.

Figure C-1 800 MHz Frequency Spectrum (CDMA Allocation)



ti-cdma-05810.eps

800 MHz Channel Center Frequencies

Table C-2 shows the valid 800 MHz CDMA channels, listed in both decimal and hexadecimal, and the corresponding transmit and receive frequency for each.

Actual frequencies used depend on customer CDMA system frequency plan.

Other channels and frequencies can be calculated using the following formula:

For channels 1–799:

- TX Freq = $870.00 + (0.03 \times \text{Channel})$
- RX Freq = $(0.03 \times \text{Channel}) + 825.00$

For channels 991–1023:

- TX Freq = $870.00 + [0.03 \times (\text{Channel} - 1023)]$
- RX Freq = $[0.030 \times (\text{Channel} - 1023)] + 825.00$

For channels 1024–1323:

- TX Freq = $860.04 + [0.03 \times (\text{Channel} - 1024)]$
- RX Freq = $[0.030 \times (\text{Channel} - 1024)] + 815.04$

For channels 1324–1490:

- TX Freq = $860.04 + [0.03 \times (\text{Channel} - 1024)]$
- RX Freq = $[0.030 \times (\text{Channel} - 1024)] + 815.04$

Table C-2 800 MHz TX and RX Channel Center Frequencies

Decimal	Hex	Transmit Center Frequency (MHz)	Receive Center Frequency (MHz)
1021	03FD	869.94	824.94
1023	03FF	870.00	825.00
1	0001	870.03	825.03
303	012F	879.09	834.09
364	016C	880.92	835.92
636	027C	889.32	844.32
666	029A	889.99	844.35
716	02CC	891.49	844.98
747	02EB	893.10	847.71
769	0301	893.31	848.07

1900 MHz CDMA Operating Frequency Programming Information

Introduction

Programming of each of the BTS XMIs is performed by the BTS DMI modules over the Concentration Highway Interface (CHI) bus. This programming data determines the transmit and receive operating frequencies (channels) for each XMI.

1900 MHz Channels

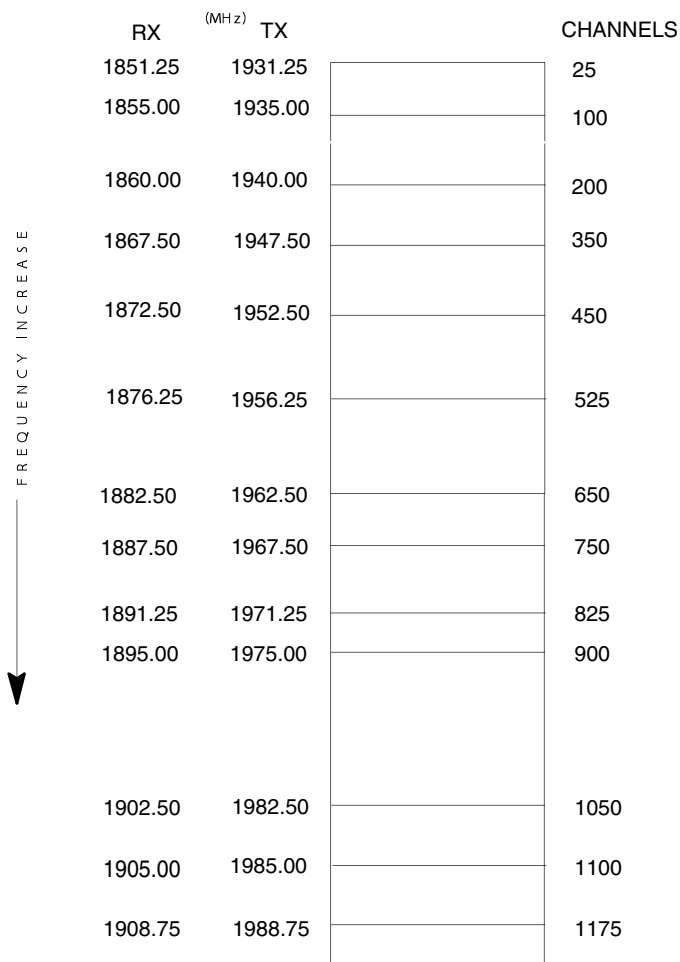
Figure C-2 shows the total channels for the 1900 MHz frequency spectrum and the channels allocated to CDMA. The channels used are unique to each customer system.

Table C-3 shows the channel allocations and frequencies covered by the UBS Macro.

Table C-3 1900 MHz Band Class 1 Channel Allocations

CDMA Channel Validity	Channel Number	TX (MHz)	RX (MHz)
Not Valid	0-24	1930.00-1931.20	1850.00-1851.20
Valid	25-1175	1931.25-1988.75	1851.25-1908.75
Not Valid	1176-1199	1988.80-1989.95	1908.80-1909.95

Figure C-2 1900 MHz Frequency Spectrum (CDMA Allocation)



ti-cdma-05810-B.eps

1900 MHz Channel Center Frequencies

Table C-4 shows some of the valid 1900 MHz CDMA channels, listed in both decimal and hexadecimal, and the corresponding transmit and receive frequency for each.

Actual frequencies used depend on customer CDMA system frequency plan.

Other channels and frequencies can be calculated using the following formula:

For channels 0–1199:

- TX Freq = 1930.00 + (0.05 x Channel)
- RX Freq = 1850.00 + (0.05 x Channel)

Table C-4 1900 MHz TX and RX Channel Center Frequencies

Decimal	Hex	Transmit Center Frequency (MHz)	Receive Center Frequency (MHz)
25	0019	1931.25	1851.25
100	0064	1935.00	1855.00
200	00C8	1940.00	1860.00
350	015E	1947.50	1867.50
450	01C2	1952.50	1872.50
525	020D	1956.25	1876.25
650	028A	1962.50	1882.50
750	02EE	1967.50	1887.50
825	0339	1971.25	1891.25
900	0384	1975.00	1895.00
1050	041A	1982.50	1902.50
1100	044C	1985.00	1905.00
1175	0497	1988.75	1908.75

CDMA Operating Frequency Programming Information

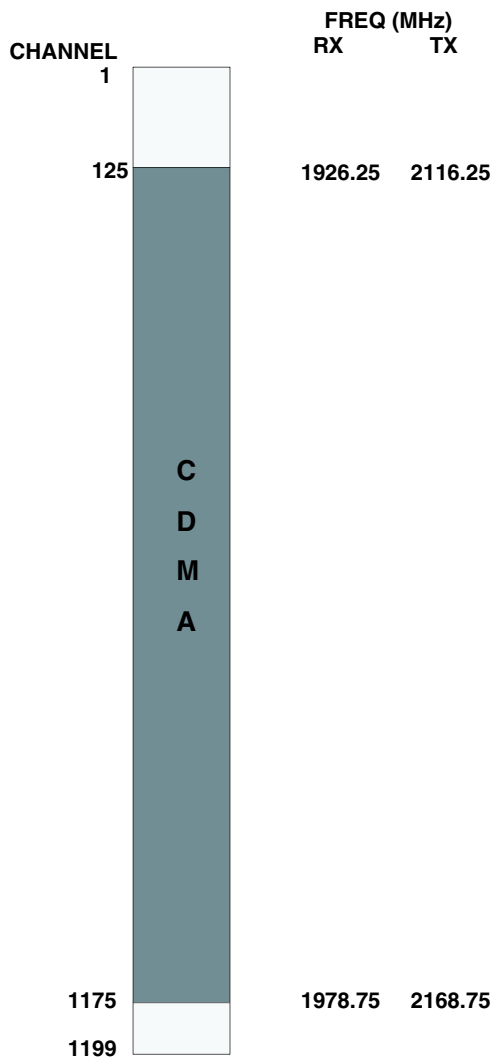
Introduction

Programming of each of the BTS XMIs is performed by the BTS GLI cards over the Concentration Highway Interface (CHI) bus. This programming data determines the transmit and receive operating frequencies (channels) for each XMI.

2100 MHz Channels

Figure C-1 [Figure C-3](#) shows the total channels for the 2100 MHz frequency spectrum and the channels allocated to CDMA. There are 10 CDMA channels used in a CDMA system. The channels used are unique to each customer system.

Figure C-3 2100 MHz Frequency Spectrum (CDMA Allocation)



CDMA2100MHZ-1

ti-cdma-00115.eps

Calculating 2100 MHz Channel Center Frequencies

Table C-5 shows the valid 2100 MHz CDMA channels, listed in both decimal and hexadecimal, and the corresponding transmit and receive frequencies for each. Center frequencies (in MHz) for channels not shown in the table may be calculated as follows:

- $\text{TX} = 2110 + 0.05 * \text{Channel\#}$ **Example:** Channel 262 TX = $2110 + 0.05 * 262 = 2123.10$ MHz
- $\text{RX} = 1920 + 0.05 * \text{Channel\#}$ **Example:** Channel 262 RX = $1920 + 0.05 * 262 = 1933.10$ MHz

Actual frequencies used depend on customer CDMA system frequency plan.

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

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

Table C-5 2100 MHz TX and RX Channel Center Frequencies

Channel Number		Transmit Center Frequency (MHz)	Receive Center Frequency (MHz)
Decimal	Hex		
125	007D	2116.25	1926.25
150	0096	2117.50	1927.50
175	00AF	2118.75	1928.75
200	00C8	2120.00	1930.00
225	00E1	2121.25	1931.25
250	00FA	2122.50	1932.50
275	0113	2123.75	1933.75
300	012C	2125.00	1935.00
325	0145	2126.25	1936.25
350	015E	2127.50	1937.50
375	0177	2128.75	1938.75
400	0190	2130.00	1940.00
425	01A9	2131.25	1941.25
450	01C2	2132.50	1942.50
475	01DB	2133.75	1943.75
500	01F4	2135.00	1945.00
525	020D	2136.25	1946.25
550	0226	2137.50	1947.50
575	023F	2138.75	1948.75
600	0258	2140.00	1950.00

Table C-5 2100 MHz TX and RX Channel Center Frequencies (Continued)

Channel Number		Transmit Center Frequency (MHz)	Receive Center Frequency (MHz)
Decimal	Hex		
625	0271	2141.25	1951.25
650	028A	2142.50	1952.50
675	02A3	2143.75	1953.75
700	02BC	2145.00	1955.00
725	02D5	2146.25	1956.25
750	02EE	2147.50	1957.50
775	0307	2148.75	1958.75
800	0320	2150.00	1960.00
825	0339	2151.25	1961.25
850	0352	2152.50	1962.50
875	036B	2153.75	1963.75
900	0384	2155.00	1965.00
925	039D	2156.25	1966.25
950	03B6	2157.50	1967.50
975	03CF	2158.75	1968.75
1000	03E8	2160.00	1970.00
1025	0401	2161.25	1971.25
1050	041A	2162.50	1972.50
1075	0433	2163.75	1973.75
1100	044C	2165.00	1975.00
1125	0465	2166.25	1976.25
1150	047E	2167.50	1977.50
1175	0497	2168.75	1978.75

Test Equipment Preparation

Test Equipment Preparation

This section provides pre-testing set-up information for test equipment supported by the LMF.

Purpose

Pretesting 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.

GPIB addresses

This appendix provides information on verification and changing GPIB addresses for the following test equipment items:

- Agilent E7495A/B test equipment set-up
- Agilent E4406A transmitter test set
- Agilent E4432B signal generator
- Advantest R3267 spectrum analyzer
- Advantest R3562 signal generator
- Agilent 8935 analyzer (formerly HP 8935)
- Advantest R3465 analyzer
- Gigatronics 8541C power meter
- Agilent E4418 power meter
- GPIB adapter

Calibration actions

The following calibration-related subjects are also covered for the test equipment items indicated:

Cable calibration set-up – Calibrating Test Cable Set-up using Advantest R3465

Calibrating test sets -

- Agilent E4406A Transmitter Tester Self-alignment (Calibration)
- Gigatronics 8541C power meter (Calibration)

Agilent E7495A/B Test Equipment Setup

Initial Requirement

This test equipment requires a warm-up period of at least 30 minutes before BTS testing or calibration begins.

Using the Agilent E7495A/B with the LMF

The Agilent E7495A/B 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/B 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 in the test set as described in .

Procedure D-1 Set IP Address on Agilent E7495A/B test set

1	Use the System Button > Controls > IPAdmin to set an IP address on the E7495A/B as 128.0.0.11 , and Netmask to 255.255.255.128 .
2	If the IP addressed was changed, reboot the E7495
3	For compatibility, change the LMF computer Network Interface Card (NIC) IP address to 128.0.0.48, subnetmask 255.255.255.128.

Connection

Connect the E7495A/B test set as described in the [Figure 3-29](#) Test Equipment Connection to the LMF.

Power Sensor Calibration

[Procedure D-2](#) describes the E7495A/B Power Sensor Calibration.

Procedure D-2 E7495A/B Power Sensor Calibration

1	Display the power meter screen.
2	Make sure equipment is connected as shown in Figure D-1 .

Procedure D-2 E7495A/B Power Sensor Calibration (Continued)

3	<p>Zero the power meter by doing the following:</p> <ol style="list-style-type: none"> 1. Press the Zero softkey. 2. Press the Continue softkey.
4	<p>Calibrate the power meter by doing the following:</p> <ol style="list-style-type: none"> 1. Press Ref CF. 2. Enter the reference cal factor, reading it off the label on the power sensor head. 3. Press Calibrate. 4. Connect the power sensor (see Figure D-2). 5. Press Continue. 6. Press Cal Factor. 7. Enter the cal factor from the label on the power sensor head. Select a cal factor that is within the operating frequency of the base station being calibrated.

Figure D-1 Agilent E7495A/B Pre-Power Sensor Calibration Connection

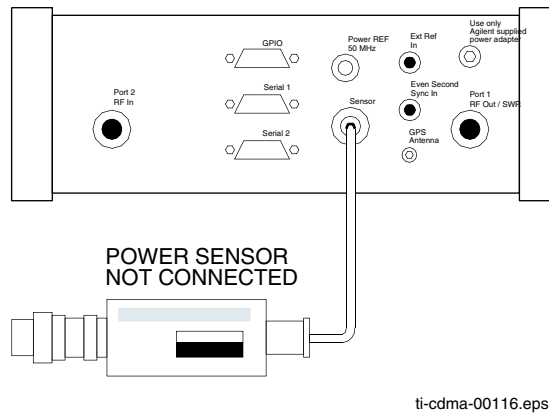
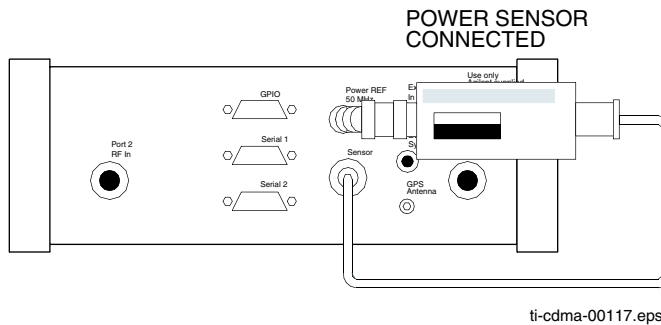


Figure D-2 Agilent E7495A/B Power Sensor Calibration Connection



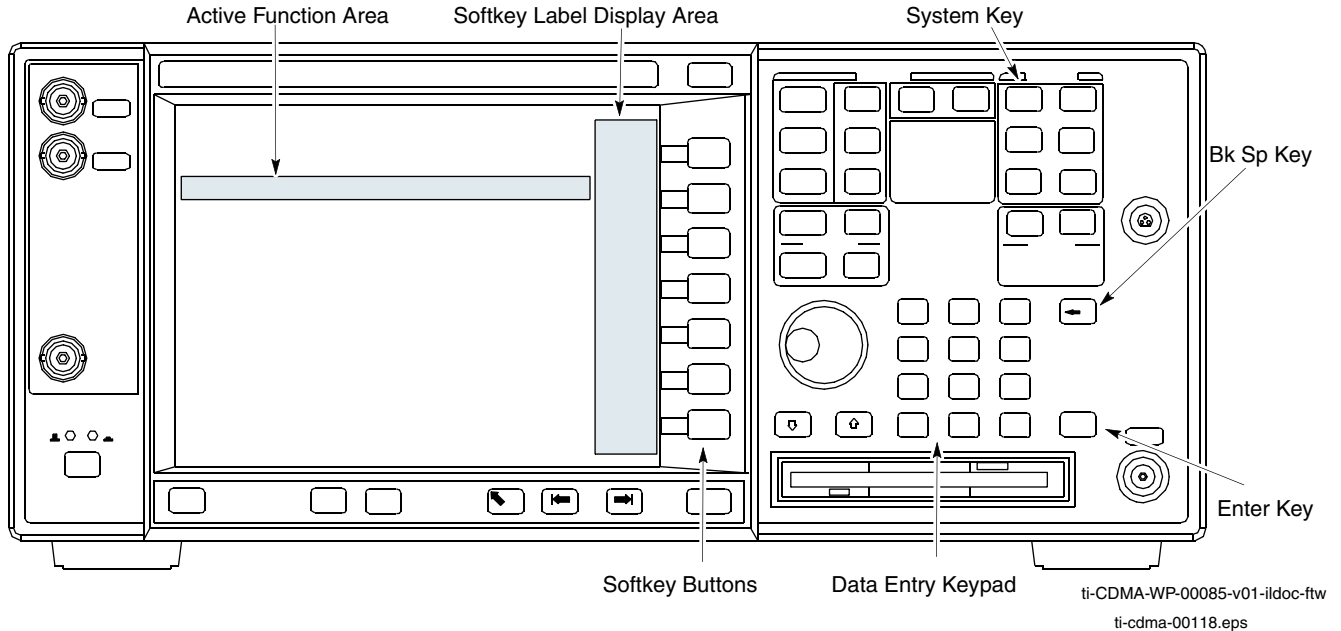
Cable Calibration

Follow the directions in the LMF application program to calibrate cables.

Additional cable calibration details - Calibrate the short cable (see [Figure 3-25](#)) and two 10 dB attenuators to establish a baseline and then calibrate the TX and RX set-ups. Because at least 40 dB of attenuation is needed when testing the FER, the set-up for RX is the same as for TX.

Verifying and Setting GPIB Addresses – Agilent E4406A Transmitter Tester

Figure D-3 Setting Agilent E4406A GPIB Address



Refer to [Figure D-3](#) when performing the following:

Procedure D-3 Verify and Set/Change Agilent E4406A Transmitter Tester GPIB Address

1	<p>In the SYSTEM section of the instrument front panel, press the System key.</p> <p>Result: The softkey labels displayed on the right side of the instrument screen will change.</p>
2	<p>Press the Config I/O softkey button to the right of the instrument screen.</p> <p>Result:</p> <ul style="list-style-type: none"> • The softkey labels will change. • The current instrument GPIB address will be displayed below the GPIB Address softkey label.
3	<p>If the current GPIB address is not set to 18, perform the following to change it:</p> <ol style="list-style-type: none"> 1. Press the GPIB Address softkey button. <p>Result: In the on-screen Active Function Area, GPIB Address will be displayed followed by the current GPIB address.</p>

Procedure D-3 Verify and Set/Change Agilent E4406A Transmitter Tester GPIB Address (Continued)

2. On the front panel Data Entry keypad, enter the communications system analyzer GPIB address of **18**

Result:

- The **GPIB Address** label will change to **Enter**.
- Digits entered with the keypad will replace the current GPIB address in the display.

**NOTE**

To correct an entry, press the **Bk Sp** key at the upper right of the keypad to delete one character at a time.

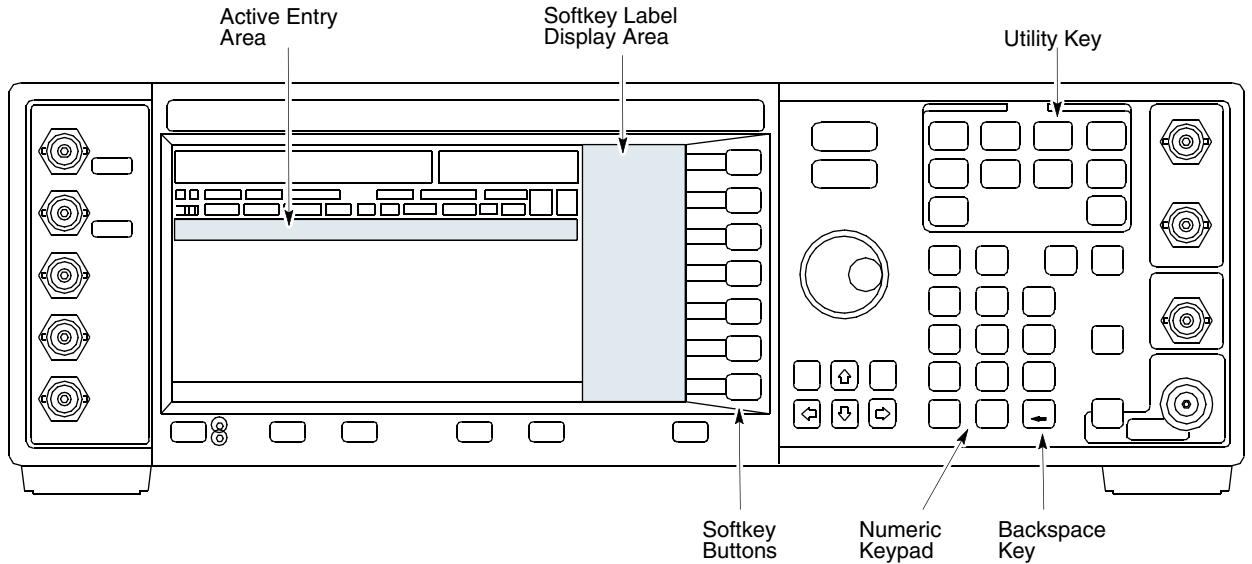
3. Press the **Enter** softkey button or the keypad **Enter** key to set the new GPIB address.

Result:

- The **Config I/O** softkey labels will reappear.
 - The new GPIB address will be displayed under the **GPIB Address** softkey label.
-

Verifying and Setting GPIB Addresses – Agilent E4432B Signal Generator

Figure D-4 Setting Agilent E4432B GPIB Address



ti-CDMA-WP-00086-v01-ildoc-ftw

ti-cdma-00119.eps

Refer to [Figure D-4](#) when performing the following:

Procedure D-4 Verify and Change Agilent E4432B Signal Generator GPIB Address

1	<p>In the MENUS section of the instrument front panel, press the Utility key.</p> <p>Result:</p> <ul style="list-style-type: none"> The softkey labels displayed on the right side of the instrument screen will change.
2	<p>Press the GPIB/RS232 softkey button to the right of the instrument screen.</p> <p>Result:</p> <ul style="list-style-type: none"> The softkey labels will change. The current instrument GPIB address will be displayed below the GPIB Address softkey label.
3	<p>If the current GPIB address is not set to 1, perform the following to change it:</p> <ol style="list-style-type: none"> Press the GPIB Address softkey button. <p>Result:</p>

Procedure D-4 Verify and Change Agilent E4432B Signal Generator GPIB Address (Continued)

- The **GPIB Address** label and current GPIB address will change to boldface.
- In the on-screen Active Entry Area, **Address:** will be displayed followed by the current GPIB address.

2. On the front panel Numeric keypad, enter the signal generator GPIB address of **1**.

Result:

- The **GPIB Address** label will change to **Enter**.
- Digits entered with the keypad will replace the current GPIB address in the Active Entry display.

**NOTE**

To correct an entry, press the backspace key at the lower right of the keypad to delete one character at a time.

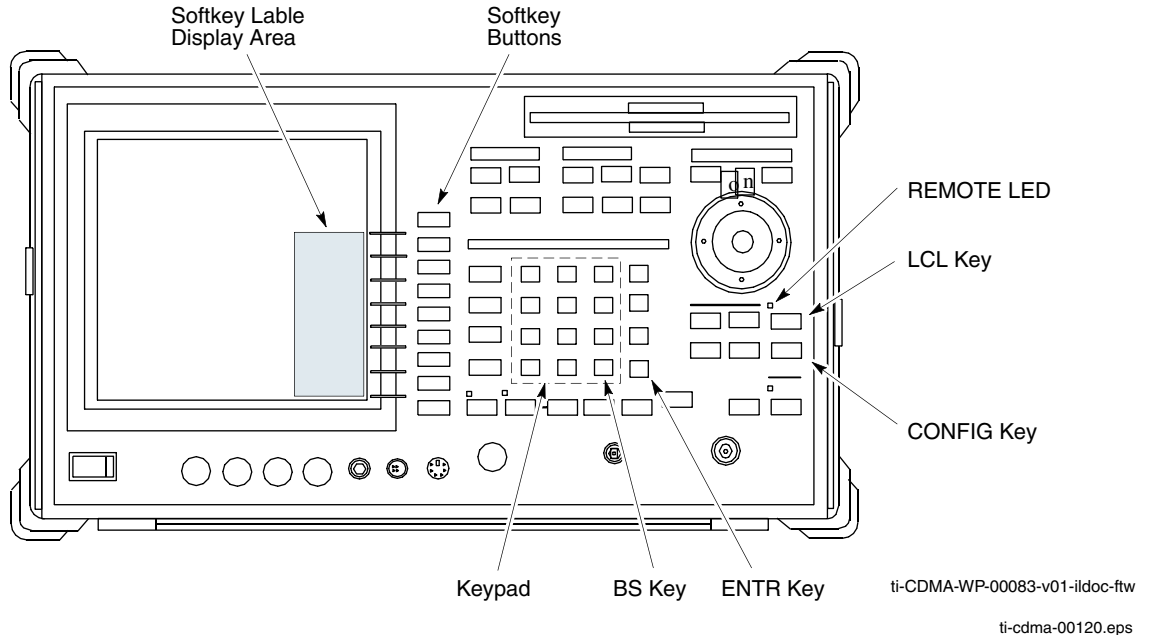
3. Press the **Enter** softkey button to set the new GPIB address.

Result:

- The new GPIB address will be displayed under the **GPIB Address** softkey label.

Verifying and Setting GPIB Addresses – Advantest R3267 Spectrum Analyzer

Figure D-5 Setting Advantest R3267 GPIB Address



Refer to [Figure D-5](#) when performing the following.

Procedure D-5 Verify and Set/Change Advantest R3267 GPIB Address

1	<p>If the REMOTE LED is lighted, press the LCL key.</p> <p>Result:</p> <ul style="list-style-type: none"> The LED extinguishes.
2	<p>Press the CONFIG key.</p> <p>Result:</p> <ul style="list-style-type: none"> The CONFIG softkey labels will appear in the softkey label display area of the instrument display. The current GPIB address will be displayed below the GPIB Address softkey label.
3	<p>If the current GPIB address is not set to 18, perform the following to change it:</p> <ol style="list-style-type: none"> Press the GPIB Address softkey. <p>Result: A GPIB Address entry window will open in the instrument display showing the current GPIB address.</p>

Procedure D-5 Verify and Set/Change Advantest R3267 GPIB Address (Continued)

2. Enter **18** on the keypad in the **ENTRY** section of the instrument front panel.

**NOTE**

To correct an entry, press the **BS** (backspace) key at the lower right of the keypad to delete one character at a time.

Result: Characters typed on the keypad will replace the address displayed in the **GPIB Address** entry window.

3. Press the **ENTR** key to the lower right of the keypad to enter the address.

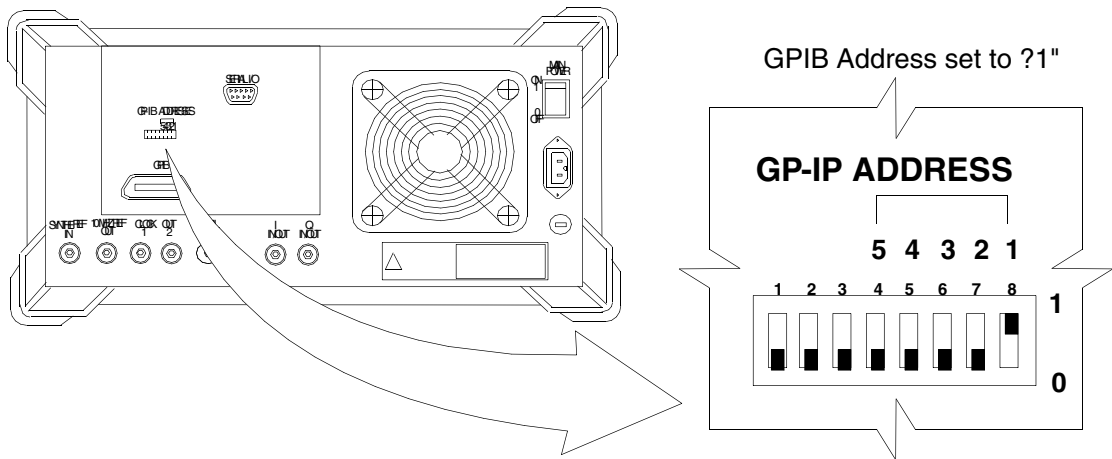
Result:

- o The **GPIB Address** entry window closes.
 - o The new address is displayed in the bottom portion of the **GPIB Address** softkey label.
-

Verifying and Setting GPIB Addresses – Advantest R3562 Signal Generator

Set the GP-IB ADDRESS switch on the rear of the Advantest R3562 signal generator to address **1** as shown in [Figure D-6](#).

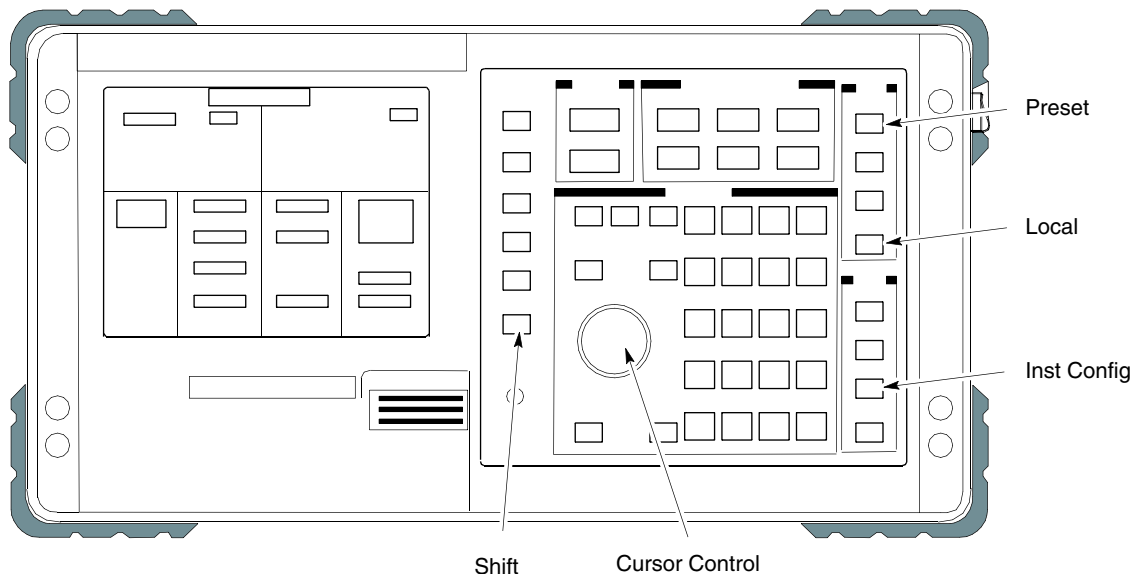
Figure D-6 Advantest R3562 GPIB Address Switch Setting



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Verifying and Setting GPIB Addresses – Agilent 8935 Series E6380 Test Set

Figure D-7 Setting Agilent 8935 Test Set GPIB Address



FW00885

ti-cdma-00122.eps



NOTE

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

Refer to [Figure D-7](#) when performing the following.

Procedure D-6 Verify and Set/Change Agilent 8935 Series E6380 Test Set GPIB Address

1



NOTE

The HP I/O configuration **MUST** be set to **Talk & Listen**, or NO device on the GPIB bus will be accessible. (Consult test equipment manufacturer’s documentation for additional information as required.)

Procedure D-6 Verify and Set/Change Agilent 8935 Series E6380 Test Set GPIB Address (Continued)

To verify that the GPIB addresses are set correctly, press **Shift** and **LOCAL** on the 8935. The current HP-IB address is displayed at the top of the screen.

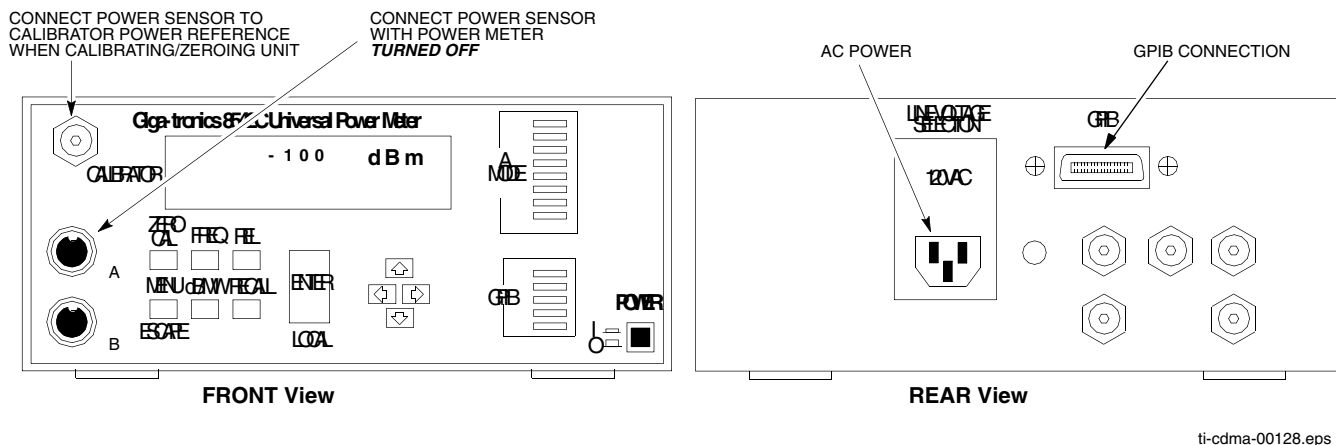
**NOTE**

HP-IB is the same as GPIB.

-
- | | |
|---|--|
| 2 | If the current GPIB address is not set to 18 , perform the following to change it: <ol style="list-style-type: none">1. Press Shift and Inst Config.2. Turn the Cursor Control knob to move the cursor to the HP-IB Adrs field.3. Press the Cursor Control knob to select the field.4. Turn the Cursor Control knob as required to change the address to 18.5. Press the Cursor Control knob to set the address. |
| 3 | Press Preset to return to normal operation. |
-

Verifying and Setting GPIB Addresses – Gigatronics 8541C Power Meter

Figure D-8 Gigatronics 8541C Power Meter Detail



ti-cdma-00128.eps


Refer to [Figure D-8](#) when performing the following:



NOTE

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

Procedure D-7 Verify and Set/Change Gigatronics 8541C Power Meter GPIB Address

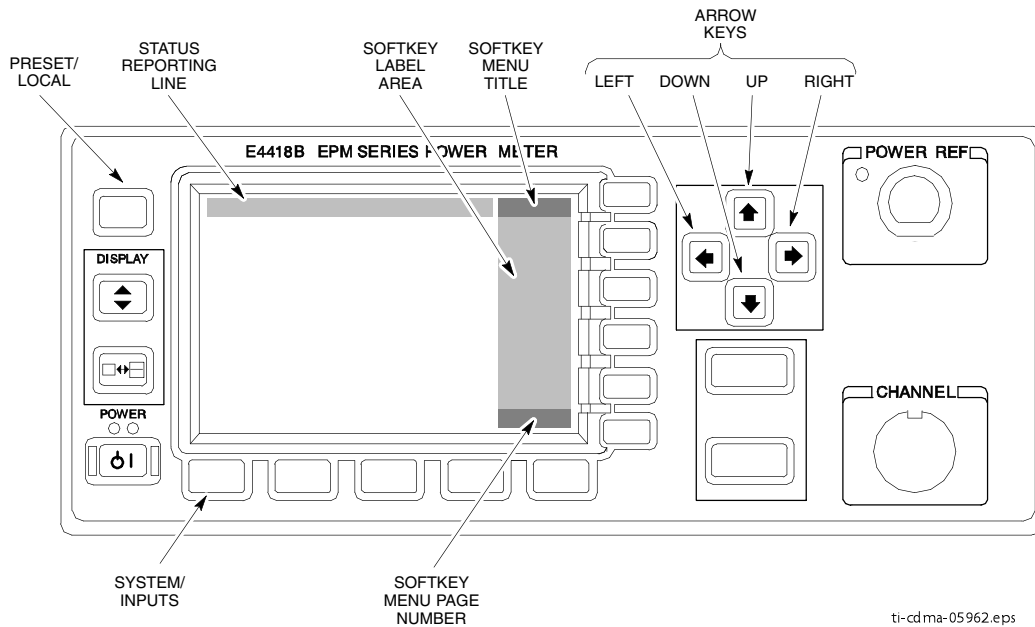
1	 <div style="border: 1px solid black; background-color: yellow; padding: 2px; display: inline-block;">CAUTION</div> <p>Do not connect/disconnect the power meter sensor cable with AC power applied to the meter. Disconnection could result in destruction of the sensing element or miscalibration.</p> <p>Press MENU.</p>
2	Use the [Symbol_arrowblackdown] arrow key to select CONFIG MENU and press ENTER .
3	Use the [Symbol_arrowblackdown] arrow key to select GPIB and press ENTER .
Result: The current Mode and GPIB Address are displayed.	

Procedure D-7 Verify and Set/Change Gigatronics 8541C Power Meter GPIB Address
(Continued)

4	If the Mode is not set to 8541C , perform the following to change it: <ol style="list-style-type: none">1. Use the ◀ ▶ arrow keys as required to select MODE.2. Use the ▼ ▲ arrow keys as required to set MODE to 8541C.
5	If the GPIB address is not set to 13 , perform the following to change it: <ol style="list-style-type: none">1. Use the ▶-arrow key to select ADDRESS.2. Use the ▼ ▲ arrow keys as required to set the GPIB address to 13.
6	Press ENTER to return to normal operation.

Verifying and Setting GPIB Addresses – Agilent E4418 Power Meter

Figure D-9 Agilent E4418B Power Meter Verify and Set/Change GPIB Address



Refer to [Figure D-9](#) when performing the following:

Procedure D-8 Verify and Set/Change Agilent E4418 Power Meter GPIB Address

1	<p>If RMT (remote operation) is displayed on the left end of the instrument screen status reporting line, press the Preset/Local front panel button.</p> <p>Result: The status line entry will change to LCL (local or front panel operation).</p>
2	<p>On the instrument front panel, press the System/Inputs key.</p> <p>Result: The softkey labels displayed on the right side of the instrument screen will change.</p>
3	<p>Press the Remote Interface > Configure Interface > GPIB softkeys to the right of the instrument screen.</p> <p>Result:</p> <ul style="list-style-type: none"> • The softkey labels will change. • The current instrument GPIB address will be displayed below the GP-IB Addr softkey label.

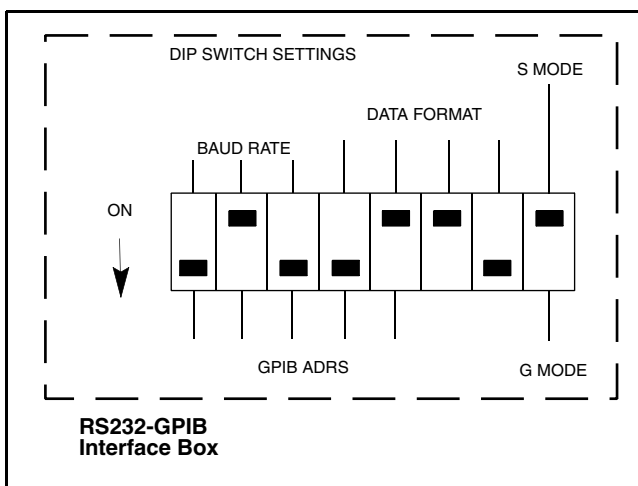
Procedure D-8 Verify and Set/Change Agilent E4418 Power Meter GPIB Address
(Continued)

4	If the current GPIB address is set to 13 , skip to step step 8 .
5	If the current GPIB address is <i>not</i> set to 13 , press the GP-IB Addr softkey. Result: A pop-up window will appear and display the current GPIB address.
6	Modify the GPIB address in the pop-up as necessary using the following front panel keys to perform the indicated functions: <ul style="list-style-type: none">• Up and down arrow keys to change the digit on which the cursor is currently located• Left and right arrow keys to move the cursor to other digits
7	When the GPIB address is correct, press the Enter softkey.
8	Return the instrument to the required setup configuration for testing.

Verifying and Setting GPIB Addresses – RS232 GPIB Interface Box

Be sure that the RS232 GPIB interface box DIP switches are set as shown in [Figure D-10](#).

Figure D-10 RS232 GPIB Interface Box

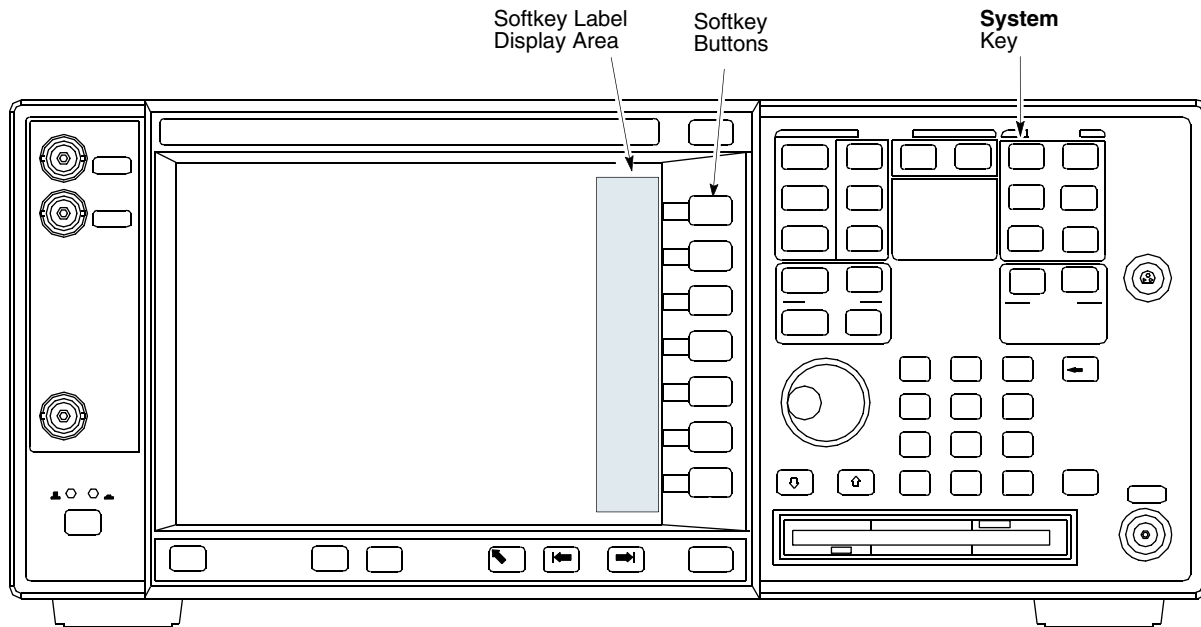


ti-cdma-00125.eps

Test Equipment Calibration – Agilent 4406 Self-alignment

Refer to [Figure D-11](#) when performing the following.

Figure D-11 Agilent E4406A Self-alignment



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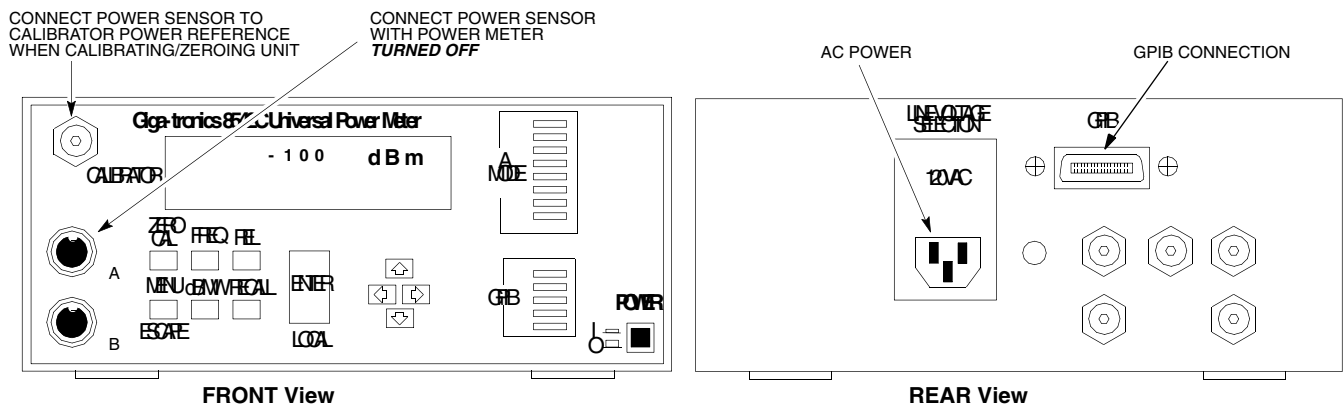
Procedure D-9 Agilent E4406A Self-alignment (Calibration)

1	<p>In the SYSTEM section of the instrument front panel, press the System key.</p> <p>Result: The softkey labels displayed on the right side of the instrument screen will change.</p>
2	<p>Press the Alignments softkey button to the right of the instrument screen.</p> <p>Result: The softkey labels will change.</p>
3	<p>Press the Align All Now softkey button.</p> <p>Result:</p> <ul style="list-style-type: none"> • 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.

Test Equipment Calibration – Gigatronics 8542 Power Meter



Precise transmit output power calibration measurements are made using a bolometer-type broadband power meter with a sensitive power sensor. Follow the steps in [Procedure D-10](#) to enter information unique to the power sensor. Refer to [Figure D-12](#) as necessary.

Figure D-12 Gigatronics 8541C Power Meter Calibration



ti-cdma-00128.eps

Procedure D-10 Calibrate Gigatronics 8542 Power Meter

1	 <div style="background-color: yellow; border: 1px solid black; padding: 2px; display: inline-block;">CAUTION</div> <p>Do not connect/disconnect the power meter sensor cable with AC power applied to the meter. Disconnection could result in destruction of the sensing element or miscalibration.</p> <p>Make sure the power meter POWER pushbutton is OFF.</p>
2	Connect the power sensor cable to the SENSOR input.
3	Set the POWER pushbutton to ON.
	<div style="background-color: cyan; border: 1px solid black; padding: 2px; display: inline-block;">NOTE</div> <p>Allow the power meter and sensor to warm up and stabilize for a minimum of 60 minutes before performing the calibration procedure.</p>

Procedure D-10 Calibrate Gigatronics 8542 Power Meter (Continued)

4	Connect the power sensor to the CALIBRATOR output connector.
5	Press ZERO , and wait for the process to complete. Result: Sensor factory calibration data is read to power meter during this process.
6	When the zeroing process is complete, disconnect the power sensor from the CALIBRATOR output.

Optimization and Calibration Procedures

Introduction to Calibration

Overview

This appendix is not normally applicable to the UBS, but is provided for reference.

This section describes procedures for isolating the UBS from the span lines, preparing and using the LMF, downloading system operating software, set up and calibration of the supported test equipment, and transmit/receive path verification.



NOTE

Before using the LMF, use a browser to view the *CAVEATS* section in the *readme.html* file in the LMF home directory (e.g., c:\wlmf) for any applicable information.

Optimization Process Summary

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

- 1.** Use the status function and verify that all of the installed devices of the following types respond with status information: HDModem and DMI.
- 2.** Verify the code load of all the devices.
- 3.** Verify the operation of the GPS and QHSO or MSO signals.
- 4.** Unlock the following devices:
 - o UBS
- 5.** Connect the required test equipment for a full optimization.
- 6.** Select the test equipment.
- 7.** Perform the TX Audit.
- 8.** If the TX Audit fails, there is a hardware problem, correct the problem that caused the failure and repeat the optimization for the failed path.
- 9.** If the TX Audit portion of the optimization passes for the RF path, but some of the TX or RX tests fail, correct the problem that caused the failure and run the individual tests as required until all TX and RX tests have passed for all the paths.

Take Control of UBS Resources

UBS Control

In a UBS, the DMI controls all UBS resources, such as the Modem and QHSO , which were previously managed by the Central Base Station Controller (CBSC) and Mobility Manager (MM) in BTSes. As a result, the LMF cannot perform any of the normal code/data download, optimization, or test functions with the UBS until the DMI gives up control of these items.

Taking Control of UBS Resources

After logging into a UBS for optimization or acceptance testing, the first action which must be performed is transferring control of the UBS from the Controller to the LMF

Prerequisites

LMF must be logged into the UBS.

after logging into the UBS, the LMF will be operating in monitoring mode. (It allows the user to view status/monitor all UBS cards and Site Controller (SC))

To take control of all devices from the UBS, perform UBS-> Enter *Invasive Mode* (DMI comes under the control of the LMF and disconnects it from the UBS span lines).

Code Syncing to the UBS

General Information

Before a UBS can operate, each equipped device must contain device application (RAM) code and must be code sync'd to each equipped device by the user before the UBS can be made fully functional for the site where it is installed

Bay Level Offset Calibration



NOTE

To avoid over-driving the XMIs, the BLO for UBS must be -2 dB or greater.

Introduction

Bay Level Offset (BLO) calibration is used to optimize non-standard UBS installations. Factory calibration of the UBS components assures proper TX performance of the UBS system in all installations that use Motorola supplied hardware in the TX path. In the event of a non-standard installation, BLO calibration can be used to compensate for TX path loss variations due to non-standard equipment.

RF Path Bay Level Offset Calibration

Calibration identifies the accumulated gain in every transmit path (sector-carrier) at the UBS site and stores that value in a BLO data base calibration table in the LMF.

For single frames, each receive path starts at an RX antenna port and terminates at the UBS.

Calibration identifies the accumulated gain in every transmit path at the UBS site and stores that value in a BLO database. Only those slots (sectors) actually equipped in the current NEC file are tested.

When to TX Audit

TX Audit will be performed:

- After initial UBS installation
- After UBS replacement

TX Path Calibration

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



WARNING

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



CAUTION

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


BLO Calibration Data File

During the calibration process, the LMF creates a UBS-#.cal calibration (BLO) offset data file (CAL file) in the UBS-# folder. After calibration has been completed, Cal file has to be downloaded to the UBS using UBS->Upload CAL File function. An explanation of the file is shown below.

Test Equipment Set-up for RF Path Calibration

Follow the procedure in [Procedure E-1](#) to set up test equipment.

Procedure E-1 Test Equipment Setup (RF Path Calibration)

1	Verify the GPIB controller is properly connected and turned on (does not apply to the Agilent E7495A/B).
	 <p>CAUTION</p> <p>To prevent damage to the test equipment, all transmit (TX) test connections must be via the 30 dB directional coupler. Total cable loss should be no less than 30 dB.</p>
2	If it has not already been done, connect the LMF computer to the UBS LMT connector on the UBS.

Transmit (TX) Path Calibration Description

The Line Maintenance Facility (LMF) will automatically use the channel numbers and power levels assigned to the UBS if the UBS has been connected to an Operation Maintenance Center — Radio (OMC-R) and brought into service. If the OMC-R connection has not yet been established, the LMF operator will have to manually select each calibration point using a specific channel number and power level for that channel. Bay Level Offset (BLO) calibration is only applied to the specific channel numbers, thus calibration must be done on the exact channel number to be used when the site is operational.

TX Calibration and the LMF

The LMF **Tests > TX > TX Calibration...** and **Tests > All Cal/Audit...** selections perform TX BLO calibration testing for the installed RDF. 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.

Pilot Generation

Channels / Carrier pick-list containing the list of carriers available for the selected Sector/Carriers. The list is derived from NECB file. DMI pick-list containing the list of DMIs being able to generate Pilot signal of selected Sector/Carrier. The list is derived from NECB file. The list is derived from NECB file. PN non-modifiable text box(es). The value is the PilotPn derived from NECB files Carrier # Channels: text box(es). Carrier numbers and default channels are derived from NECB file. Frequency Band non-modifiable text box(es). The value is the frequency band derived from NECB files.

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 UBS. 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. **Single-sided BLO** spec is >-3.5 dB. Double-sided BLO spec is -1.5 ± 2.0 dB. To get the more stringent conditions, the operator checks Single-sided BLO when calibrating non-redundant transceivers. **Single-sided BLO** carries the likelihood of more failures. This option should only be used by experienced CFEs.

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 requires the DMIs to do the test.
- Standard – performs the tests using pilot, synch, paging and six traffic channels.
- CDFPilot – performs the tests using the pilot signal, however, the gain is specified in the NEC file. Advanced users may use CDFPilot to generate a Pilot pattern using the value specified by the Pilot Gain parameter in the NEC file instead of a predetermined value.
- CDF – performs the tests using pilot, synch, paging and six traffic channels, however, the gain for the channel elements is specified in the NEC file. Advanced users may use NEC to generate a standard pattern. Instead of using the values specified by IS-97, the settings for the following NEC parameters are used:
 - PilotGain
 - PchGain
 - SchGain
 - NomGain1Way

UBS Redundancy/Alarm Testing

Test Equipment Setup

Follow the procedure in [Procedure E-2](#) to set up test equipment:




NOTE

All alarm tests are performed using the sector 1 IDRf.

Procedure E-2 Test Equipment Setup for Redundancy/Alarm Tests

1	Connect the LMF computer to the CRMS/LMT CUSTOMER ENET connector on the SSI.
2	Login to the UBS.
3	Set up test equipment for TX Audit at the sector 1 IDRf TX/RX M connector (see Figure 3-23 , Figure 3-24 , Figure 3-25 , or Figure 3-26).
4	Display the alarm monitor by selecting Util > Alarm Monitor .
5	Unequip all customer-defined alarms reported through the SSI Customer I/O connectors (IN 1-12 OUT 1-4 and IN 13-24 OUT 5-8) then selecting Device > Set Alarm Relays > Unequipped .



NOTE

During alarm reporting, spurious alarms may report. Allow the UBS to stabilize for 10 seconds. If any alarms are actively being reported after the UBS has stabilized, determine the cause before proceeding further.

GPS and QHSO Redundancy/Alarm Tests


Follow the procedure in [Procedure E-3](#) to verify the manual redundancy of the GPS and QHSO boards. Verification of alarms reported is also covered.



NOTE

DO NOT perform [Procedure E-3](#), unless the site is configured with an QHSO or MSO time base as a backup for the GPS.

Procedure E-3 GPS and QHSO/MSO Redundancy/Alarm Tests

1	 <div style="border: 1px solid black; background-color: #f4a460; padding: 2px; display: inline-block; margin-left: 10px;">WARNING</div> <p>Before enabling any XMI, always verify that the TX output is terminated into a 200 W non-radiating RF load! Failure to do so could result in serious personal injury and/or damage to the equipment.</p> <p>If the XMI is not INS (green), enable it by selecting it and then selecting Device > Unlock.</p>
2	Click OK to close the status report window.
3	Key the XMI by selecting it and then selecting Device > XCVR > Key .
4	Disconnect the cable from the SSI RGPS connector. This forces the QHSO board time base to become the CDMA timing source.
5	Observe that a CDMA timing reference alarm and source change are reported in the Alarm Monitor.
6	Allow the QHSO/MSO to become the active timing source, and verify the following: <ul style="list-style-type: none"> • The XMI remains keyed and INS. • No other modules went OOS due to the transfer to QHSO/MSO reference.
7	Reconnect the cable to the SSI RGPS connector.
8	Allow the GPS to become the active timing source, and verify the following: <ul style="list-style-type: none"> • The XMI remains keyed and INS. • No other modules went OOS due to the transfer to GPS reference.
9	De-key the UBS by selecting Device > XCVR > Dekey .
10	Disable the XMI by selecting it and then selecting Device > Lock . Result: The XMI color changes to yellow (OOS).

Alarms Testing

Alarm Verification

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

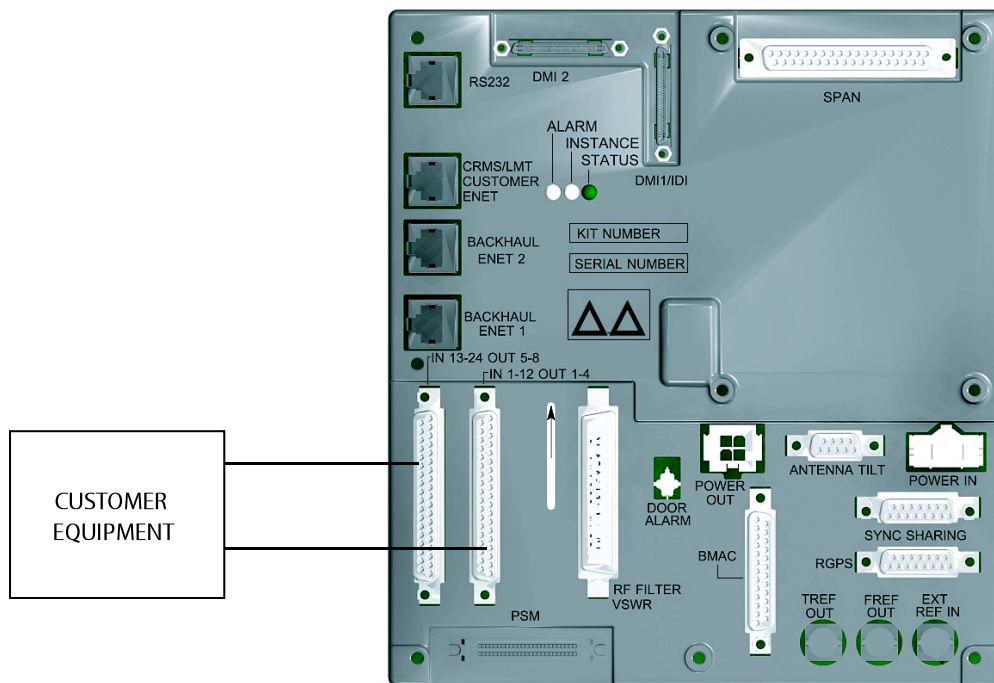
Alarm Reporting Display

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 E-1 Alarm Connector Location



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Purpose

The following procedures verify the customer defined alarms and relay contacts are functioning properly. These tests are performed on all 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 alarm cabling configuration required to interconnect the UBS frame with external alarm sensors and/or relays meet requirements called out in the 1X UBS Macro BTS Hardware Installation .



NOTE

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

Alarm input and output information

Alarm connectors

There are two ALARM connectors on the UBS Macro SSI:

- CUSTOMER IP 1-12 OP 1-4 connector
- CUSTOMER IP 13-24 OP 5-8 connector

Each ALARM connector provides 12 inputs and 4 outputs. A total of 24 inputs and 8 outputs are available.

Function

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

The SSI detects signals from customer input sensors and reports the detected signals to the DMI controller, which in turn reports the detected alarm to the OMC-R, where it is displayed as defined by the customer.

The SSI also provides switched relay contacts to customer output devices. The SSI controls relay contacts according to output control signals from the DMI controller, in response to customer defined commands entered at the OMC-R.

Input connectors

Each input consists of a wire/pin pair (that is, input/Gnd). To ensure proper operation, each pair to be used must be connected to an external sensor that provides a dry-contact closure. The customer sensor output connects between an optically isolated 5 VDC signal and an isolated return.

For an OPEN circuit (logic **0**) between pins:

- There is 10 K Ohms or greater across the input pair.
- The signal to ground voltage is +5 VDC.

For a CLOSED circuit (logic **1**) between pins:

- There is 1 K Ohms or less across the input pair.
- The signal to ground current is a maximum of 9 mA.

Either of the above states can be defined by the customer in system software as an alarm condition.

Output connectors

Each output consists of 3-wires/pins:

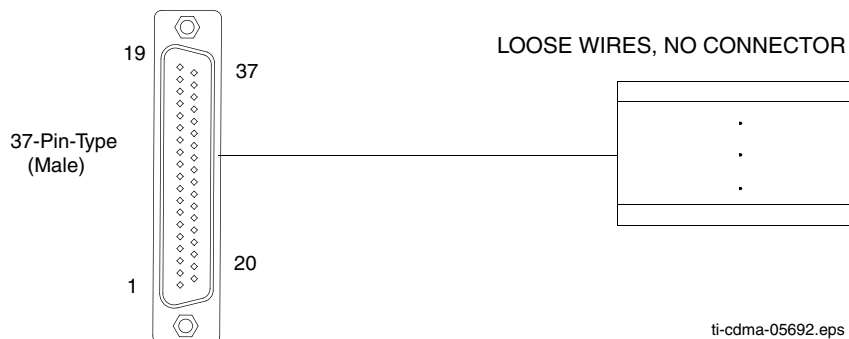
- COM
- NC
- NO

The customer output device control inputs connect between the common (COM) and either the normally closed (NC) or normally open (NO) contacts of a relay. The NC and NO state for relay contacts occurs when the relay coil is not energized.

Relay contacts are load rated for a maximum of 1 A at 24 VDC and 0.5 A at 50 VDC.

The toggling of relay contacts to the opposite state is controlled by system software.

Figure E-2 Alarm Connector Pin Numbering



Customer Alarm Input Verification

Procedure E-4 describes how to test the Customer alarm input verification. 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.

Procedure E-4 Customer Alarm Input Verification

1	Connect the LMF to the UBS and log into the UBS.
2	Select the Controller.
3	Click on the Device menu.
4	Click on the Set Alarm Relays menu item.
5	Click on Normally Open . A status report window displays the results of the action.
6	Click on OK to close the status report window.
7	Refer to Figure E-2 and sequentially short the ALARM A connector CA IN 1 through CA IN 12 pins together. Sequentially short the ALARM B connector CA IN 13 through CA IN 24 pins 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	Select the Controller.
9	Click on the Device menu.
10	Click on the Set Alarm Relays menu item.
11	Click on Normally Closed . A status report window displays the results of the action.
12	Click on OK to close the status report window. Alarms should be reported for alarm inputs 1 through 24.
13	Sequentially short the ALARM B connector CA IN 13 through CA IN 24 pins 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.
14	Select the Controller.
15	Click on the Device menu.

Procedure E-4 Customer Alarm Input Verification (Continued)

16	Click on the Set Alarm Relays menu item.
17	Click on Unequipped . A status report window displays the results of the action.
18	Click on OK to close the status report window.
19	Refer to Figure E-2 and sequentially short the ALARM A connector CA IN 1 through CA IN 12 pins together. Sequentially short the ALARM B connector CA IN 13 through CA IN 24 pins together. No alarms should be displayed.
20	Load data to the Controller to reset the alarm relay conditions according to the NEC file.

Pin and Signal Information for Alarm Connectors

[Table E-1](#) and [Table E-2](#) lists the pins, wire color codes, and signal names.

Table E-1 Connector Pinout for Cable T IP 1-12 OP 1-4

Pin	Name	Recommended Wire Color for Cable
1	CA IN 1	White/Blue
2	CA IN 2	White/Orange
3	CA IN 3	White/Green
4	CA IN 4	White/Brown
5	CA IN 5	White/Gray
6	CA IN 6	Red/Blue
7	CA IN 7	Red/Orange
8	CA IN 8	Red/Green
9	CA IN 9	Red/Brown
10	NC	NA
11	CA NO 1	Black/Blue
12	CA NO 2	Black/Orange
13	CA NC 2	Black/Green
14	CA NO 3	Black/Brown
15	CA NO 4	Black/Gray
16	CA NC 4	Yellow/Blue
17	CA IN 10	Yellow/Orange
18	CA IN 11	Yellow/Green
19	CA IN 12	Yellow/Brown

Table E-1 Connector Pinout for Cable T IP 1–12 OP 1–4 (Continued)

Pin	Name	Recommended Wire Color for Cable
20	GND 1	Blue/White
21	GND 2	Orange/White
22	GND 3	Green/White
23	GND 4	Brown/White
24	GND 5	Gray/White
25	GND 6	Blue/Red
26	GND 7	Orange/Red
27	GND 8	Green/Red
28	GND 9	Brown/Red
29	CA NC 1	Blue/Black
30	CA COM 1	Orange/Black
31	CA COM 2	Green/Black
32	CA NC 3	Brown/Black
33	CA COM 3	Gray/Black
34	CA COM 4	Blue/Yellow
35	GND 10	Orange/Yellow
36	GND 11	Green/Yellow
37	GND 12	Brown/Yellow

CA IN— Customer Alarm signal into the M810 BTS, NO — Normally Open, NC — Normally Closed, COM — Common

Table E-2 Connector Pinout for Cable T IP13–24 OP5–8

Pin	Name	Recommended Wire Color for Cable
1	CA IN 13	White/Blue
2	CA IN 14	White/Orange
3	CA IN 15	White/Green
4	CA IN 16	White/Brown
5	CA IN 17	White/Gray
6	CA IN 18	Red/Blue
7	CA IN 19	Red/Orange
8	CA IN 20	Red/Green
9	CA IN 21	Red/Brown
10	NC	NA

Table E-2 Connector Pinout for Cable T IP13-24 OP5-8 (Continued)

Pin	Name	Recommended Wire Color for Cable
11	CA NO 5	Black/Blue
12	CA NO 6	Black/Orange
13	CA NC 6	Black/Green
14	CA NO 7	Black/Brown
15	CA NO 8	Black/Gray
16	CA NC 8	Yellow/Blue
17	CA IN 22	Yellow/Orange
18	CA IN 23	Yellow/Green
19	CA IN 24	Yellow/Brown
20	GND 13	Blue/White
21	GND 14	Orange/White
22	GND 15	Green/White
23	GND 16	Brown/White
24	GND 17	Gray/White
25	GND 18	Blue/Red
26	GND 19	Orange/Red
27	GND 28	Green/Red
28	GND 21	Brown/Red
29	CA NC 5	Blue/Black
30	CA COM 5	Orange/Black
31	CA COM 6	Green/Black
32	CA NC 7	Brown/Black
33	CA COM 7	Gray/Black
34	CA COM 8	Blue/Yellow
35	GND 22	Orange/Yellow
36	GND 23	Green/Yellow
37	GND 24	Brown/Yellow

CA IN— Customer Alarm signal into the M810 BTS, NO — Normally Open, NC — Normally Closed, COM — Common

MSO Calibration

MSO Calibration

MSO Calibration Status

The check the status of the Motorola Standard (Medium Stability) Oscillator (MSO) perform the following:

- Log into the UBS with the LMF.
- Click on **BTS > MSO Calibration Status** menu item
- MSO status is displayed.

MSO Calibration Procedure

Perform the following procedure only if the BTS is in *Island Mode* configuration, the system has no configured references, and HSO, GPS, or external reference is connected.

Procedure F-1 Procedure to Calibrate the MSO

1	Log into the UBS.
2	Click on BTS Menu . Select Enter Invasive Mode (Figure F-1). Wait for Message window to appear (Figure F-2).
3	From BTS Menu, select MSO Calibration Status (Figure F-3). MSO status is displayed (Figure F-4)
4	From BTS Menu, select MSO Calibration Figure F-5)
5	Select Clock reference HSO-1 to start MSO calibration (Figure F-6). Wait for start (Figure F-7)
6	The calibration takes about 15 minutes to complete (it can take up to an 60 minutes). Read the calibration status (Figure F-8)
7	Logout of UBS. Click on File->Exit (Figure F-9).
8	Login to UBS (do not enter invasive mode).
9	From BTS Menu, select MSO Calibration Status (Figure F-10).

Figure F-1 BTS Menu - Enter Invasive Mode

Figure F-2 Message Window

Figure F-3 BTS Menu - MSO CAL Status

Figure F-4 Read MSO Cal Status

Figure F-5 Select MSO Calibration

Figure F-6 Select Clock Reference

Figure F-7 MSO Calibration (Invasive Mode)

Figure F-8 Read MSO Status

Figure F-9 Exit Local Terminal

Figure F-10 MSO Status (Non-Invasive Mode)

SSI Loopback Connector Information

SSI Loopback Connector

There are two loopback connectors required, one for the Span and one for the Customer Input / Output. This appendix section provides the information necessary for making a 37 pin D-sub for the span and customer input / output connectors.

Purpose

The purpose of the SSI loopback connector is to enable the user to determine if the receive and transmit lines of the span cable circuitry are operating correctly.

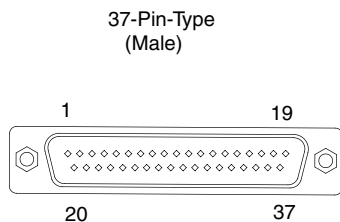
Required Parts

Should a 37 pin D-sub loopback connector not be available, one can be made by the user to interface with the 37 pin D-sub on the SSI board.

Table G-1 Parts Required to Fabricate Loopback Connector

Item	Part Number	Qty	Description
	Customer Supplied	2	37 pin, D-sub plug

Figure G-1 Loopback Connector



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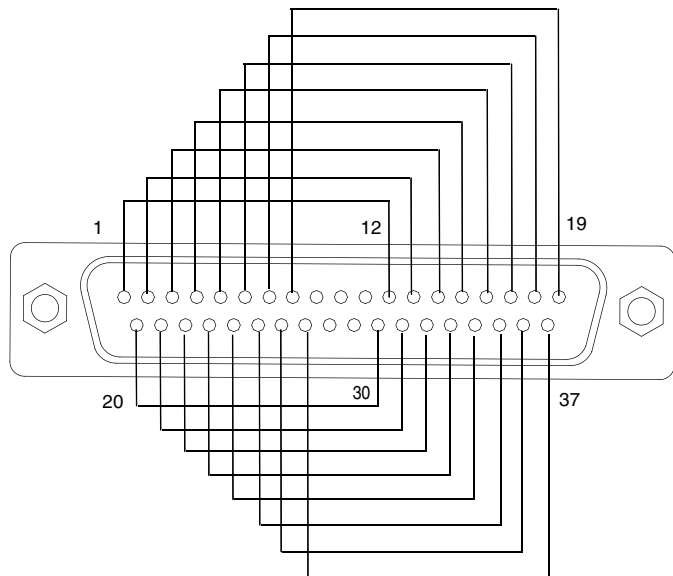
SSI Span Loopback Connector

The pinouts for the SSI Span Loopback Connector are listed in [Table G-2](#). Recommended wire is 22 AWG, solid or 24 AWG, stranded.

Table G-2 SSI Span Loopback Connector Pinouts

Pin #	Signal Description	Loopback Connection Pin	Pin #	Signal Description	Loopback Connection Pin
1	TX1 TIP	12	20	TX1 RING	30
2	TX2 TIP	13	21	TX2 RING	31
3	TX3 TIP	14	22	TX3 RING	32
4	TX4 TIP	15	23	TX4 RING	33
5	TX5 TIP	16	24	TX5 RING	34
6	TX6 TIP	17	25	TX6 RING	35
7	TX7 TIP	18	26	TX7 RING	36
8	TX8 TIP	19	27	TX8 RING	37
9	GND		28	GND	
10	GND		29	GND	
11	GND		30	RX1 RING	20
12	RX1 TIP	1	31	RX2 RING	21
13	RX2 TIP	2	32	RX3 RING	22
14	RX3 TIP	3	33	RX4 RING	23
15	RX4 TIP	4	34	RX5 RING	24
16	RX5 TIP	5	35	RX6 RING	25
17	RX6 TIP	6	36	RX7 RING	26
18	RX7 TIP	7	37	RX8 RING	27
19	RX8 TIP	8			

Figure G-2 SSI Span Loopback Connector Wiring Diagram



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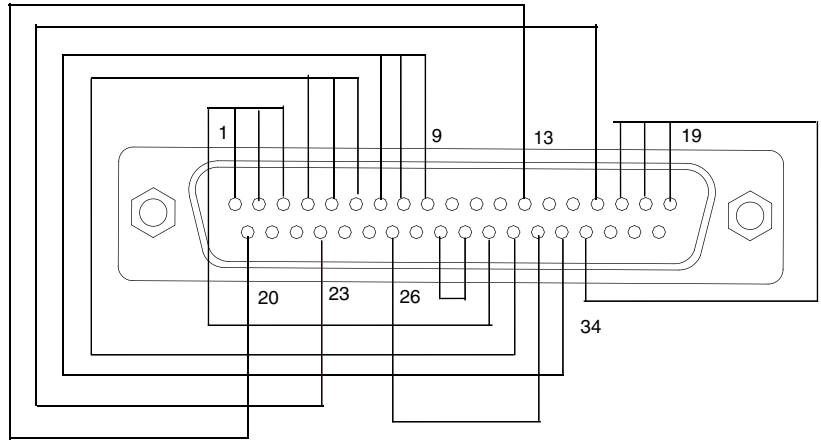
SSI Customer Input / Output Loopback Connector

The pinouts for the SSI CIO Loopback Connector are listed in [Table G-3](#). Recommended wire is 22 AWG, solid or 24 AWG, stranded.

Table G-3 SSI CIO Loopback Connector Pinouts

Pin #	Signal Description	Loopback Connection Pin	Pin #	Signal Description	Loopback Connection Pin
1	CA IN 1	30	20	GND	13
2	CA IN 2	30	21	GND	
3	CA IN 3	30	22	GND	
4	CA IN 4	31	23	GND	16
5	CA IN 5	31	24	GND	
6	CA IN 6	31	25	GND	
7	CA IN 7	33	26	GND	32
8	CA IN 8	33	27	GND	
9	CA IN 9	33	28	GND	29
10	NC		29	Relay NC 1	28
11	Relay NO 1	NC	30	Relay COM 1	1,2,3
12	Relay NO 2	NC	31	Relay COM 2	4,5,6
13	Relay NC 2	20	32	Relay NC 3	26
14	Relay NO 3	NC	33	Relay COM 3	7,8,9
15	Relay NO 4	NC	34	Relay COM 4	17,18,19
16	Relay NC 4	23	35	GND	
17	CA IN 10	34	36	GND	
18	CA IN 11	34	37	GND	
19	CA IN 12	34			

Figure G-3 SSI CIO Loopback Connector Wiring Diagram



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