Overview

The information in this chapter addresses some of the scenarios likely to be encountered by Customer Field Engineering (CFE) team members while performing BTS optimization and acceptance testing. This troubleshooting guide was created as an interim reference document for use in the field. It provides “what to do if” basic troubleshooting suggestions when the BTS equipment does not perform according to the procedures documented in the manual.

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

Table 11-1: Login Failure Troubleshooting Procedures

Step	Action
1	If the GLI LED is solid RED, it implies a hardware failure. Reset GLI by re-seating it. If this persists, install GLI card in GLI slot and retry. A Red LED may also indicate no termination on an external LAN connector (power entry compartment at rear of frame).
2	Verify that the span line is disconnected at the Span I/O card. If the span is still connected, verify the CBSC has disabled the BTS.
3	Try to *‘ping’* the GLI.
4	Verify the LMF is connected to the *primary* LAN (LAN A) at the LAN shelf below the CCP2 cage. If LAN A is not the active LAN, force a LAN switch to LAN A by following the procedure in Table 11-2.
5	Verify the LMF was configured properly.
6	If a Xircom parallel BNC LAN interface is being used, verify the BTS-LMF cable is RG-58 (flexible black cable less than 2.5 feet in length).
7	Verify the external LAN connectors are properly terminated (power entry compartment at rear of frame).
8	Verify a T-adapter is *not* used on LMF computer side connector when connected to the primary LAN at the LAN shelf.
9	Try connecting to the Ethernet Out port in the power entry compartment (rear of frame). Use a TRB–to–BNC (triax–to–coax) adapter at the LAN connector for this connection.
10	Re-boot the LMF and retry.
11	Re-seat the GLI and retry
12	Verify GLI IP addresses are configured properly by following the procedure in Table 11-3.

Table 11-2: Force Ethernet LAN A to Active State as Primary LAN	
Step	**Action**
1	If LAN A is not the active LAN, make certain all external LAN connectors are either terminated with 50Ω loads or cabled to another frame.
2	*If it has not already been done,* connect the LMF computer to the stand–alone or starter frame, as applicable (Table 6-6).
3	*If it has not already been done,* start a *GUI* LMF session and log into the BTS on the active LAN (Table 6-7).
4	Remove the 50Ω termination from the LAN B IN connector in the power entry compartment at the rear of the stand–alone or starter frame. The LMF session will become inactive.
5	Disconnect the LMF computer from the LAN shelf LAN B connector and connect it to the LAN A connector.
6	If the LAN was successfully forced to an active state (the cards in any cage can be selected and statused), proceed to step 13.
7	With the 50Ω termination still removed from the LAN B IN connector, remove the 50Ω termination from LAN B OUT connector. If more than one frame is connected to the LAN, remove the termination from the last frame in the chain.
8	If the LAN was successfully forced to an active state (the cards in any cage can be selected and statused), proceed to step 13.
9	With the 50Ω terminations still removed from LAN B, unseat each GLI card in each frame connected to the LAN, until all are disconnected from the shelf backplanes.
10	Reseat each GLI card until all are reconnected.
11	Allow the GLIs to power up, and attempt to select and status cards in the CCP shelves. If LAN A is active, proceed to step 13.
12	If LAN A is still not active, troubleshoot or continue troubleshooting following the procedures in 13.
13	Replace the 50Ω terminations removed from the LAN B IN and OUT connectors.

Table 11-3: GLI IP Address Setting	
Step	**Action**
1	If it has not previously been done, establish an MMI communication session with the GLI card as described in Table 6-11.

2	Enter the following command to display the IP address and subnet mask settings for the card:
	
	config lg0 current
	
	A response similar to the following will be displayed:
	
	`GLI3>config lg0 current`
	
	`lg0: IP address is set to`
	`DEFAULT (configured based on card location)`
	
	`lg0: netmask is set to`
	`DEFAULT (255.255.255.128)`

3	If the IP address setting response shows an IP address rather than "`Default (configured based on card location)`," enter the following:
	
	config lg0 ip default
	
	A response similar to the following will be displayed:
	
	`GLI3>config lg0 ip default`
	
	`_param_config_lg0_ip(): param_delete(): 0x00050001`
	`lg0: ip address set to DEFAULT`

4	If the GLI subnet mask setting does not display as "`DEFAULT (255.255.255.128)`," set it to default by entering the following command:
	
	config lg0 netmask default
	
	A response similar to the following will be displayed:
	
	`GLI3>config lg0 netmask default`
	
	`_param_config_lg0_netmask(): param_delete(): 0x00050001`
	`lg0: netmask set to DEFAULT`

table continued on next page

Table 11-3: GLI IP Address Setting	
Step	**Action**

5	Set the GLI route default to default by entering the following command:
	
	config route default default
	
	A response similar to the following will be displayed:
	
	`GLI3>config route default default`
	
	`_esh_config_route_default(): param_delete(): 0x00050001`
	`route: default gateway set to DEFAULT`

	NOTE Changes to the settings will not take effect unless the GLI is reset.
6	When changes are completed, close the MMI session, and reset the GLI card.

7	Once the GLI is reset, re–establish MMI communication with it and issue the following command to confirm its IP address and subnet mask settings:
	
	config lg0 current
	
	A response similar to the following will be displayed:
	
	`GLI3>config lg0 current`
	
	`lg0: IP address is set to`
	`DEFAULT (configured based on card location)`
	
	`lg0: netmask is set to`
	`DEFAULT (255.255.255.128)`

Cannot Communicate with Power Meter

Table 11-4: Troubleshooting a Power Meter Communication Failure

Step	Action
1	Verify power meter is connected to LMF with GPIB adapter.
2	Verify cable connections as specified in Chapter 4.
3	Verify the GPIB address of the power meter is set to the same value displayed in the applicable GPIB address box of the **LMF Options** window **Test Equipment** tab. Refer to Table 6-23 or Table 6-24 and the Setting GPIB Addresses section of Appendix B for details.
4	Verify the GPIB adapter DIP switch settings are correct. Refer to Test Equipment Preparation section of Appendix F for details.
5	Verify the GPIB adapter is not locked up. Under normal conditions, only 2 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 **Util** in the BTS menu bar and selecting **Test Equipment** > **Reset** from the pull–down lists.

Cannot Communicate with Communications System Analyzer

Table 11-5: Troubleshooting a Communications System Analyzer Communication Failure

Step	Action
1	Verify analyzer is connected to LMF with GPIB adapter.
2	Verify cable connections as specified in Chapter 4.
3	Verify the analyzer GPIB address is set to the same value displayed in the applicable GPIB address box of the **LMF Options** window **Test Equipment** tab. Refer to Table 6-23 or Table 6-24 and the Setting GPIB Addresses section of Appendix B for details.
4	Verify the GPIB adapter DIP switch settings are correct. Refer to Test Equipment Preparation section of Appendix F for details.
5	Verify the GPIB adapter is not locked up. Under normal conditions, only 2 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 **Util** in the BTS menu bar and selecting **Test Equipment** > **Reset** from the pull–down lists.

Cannot Communicate with Signal Generator

Step	Action
	Table 11-6: Troubleshooting a Signal Generator Communication Failure
1	Verify signal generator is connected to LMF with GPIB adapter.
2	Verify cable connections as specified in Chapter 4.
3	Verify the signal generator GPIB address is set to the same value displayed in the applicable GPIB address box of the **LMF Options** window **Test Equipment** tab. Refer to Table 6-23 or Table 6-24 and the Setting GPIB Addresses section of Appendix B for details.
4	Verify the GPIB adapter DIP switch settings are correct. Refer to Test Equipment Preparation section of Appendix F for details.
5	Verify the GPIB adapter is not locked up. Under normal conditions, only 2 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 **Util** in the BTS menu bar and selecting **Test Equipment** > **Reset** from the pull–down lists.

Cannot Download

Table 11-7: Troubleshooting Code Download Failure

Step	Action
1	Verify T1 or E1 span is disconnected from the BTS.
2	Verify LMF can communicate with the BTS devices using the LMF **Status** function.
3	Communication with GLI must first be established before trying to communicate with any other BTS device. GLI must be INS_ACT state (bright green).
4	Verify the target card is physically present in the cage and powered-up.
5	If the target card LED is solid RED, it implies hardware failure. Reset card by re-seating it. If LED alarm persists, replace with *same type of* card from another slot and retry.
6	Re-seat card and try again.
7	If a BBX reports a failure message and is OOS_RAM, the code load was OK. Use the LMF **Status** function to verify the load.
8	If the download portion completes and the reset portion fails, reset the device by selecting the device and **Reset**.

table continued on next page

Table 11-7: Troubleshooting Code Download Failure	
Step	**Action**
9	If a BBX or an MCC remains OOS_ROM (blue) after code download, use the LMF **Device > Status** function to verify that the code load was accepted.
10	If the code load was accepted, use LMF **Device** > **Download** > **Flash** to load RAM code into flash memory.

Cannot Download DATA to Any Device (Card)

Table 11-8: Troubleshooting Data Download Failure	
Step	**Action**
1	Re-seat card and repeat code and data load procedure.
2	Verify the ROM and RAM code loads are of the same release by statusing the card. Refer to Download the BTS section of Chapter 6 for more information.

Cannot ENABLE Device

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

The four device states that can be displayed by the LMF are:

- Enabled (bright green, INS_ACT)
- Stand–by (olive green, INS_SBY – redundant CSM and GLI only)
- Disabled (yellow, OOS_RAM)
- Reset (blue, OOS_ROM)

Table 11-9: Troubleshooting Device Enable (INS) Failure	
Step	**Action**
1	Re-seat card and repeat code and data load procedure.
2	If CSA cannot be enabled, verify the CDF has correct latitude and longitude data for cell site location and GPS sync.
3	Ensure primary CSM is in INS_ACT (bright green) state.
	NOTE MCCs will not enable without the CSA being INS.
4	Verify 19.6608 MHz CSA clock is present; MCCs will not enable without it.

table continued on next page

Table 11-9: Troubleshooting Device Enable (INS) Failure	
Step	**Action**
5	BBXs should not be enabled for ATP tests.
6	If MCCs give "invalid or no system time," verify the CSA is enabled.
7	Log out of the BTS, exit the LMF, restart the application, log into the BTS, and re–attempt device–enable actions.

cCLPA Errors

Table 11-10: cCLPA Errors	
Step	**Action**
1	If cCLPAs give continuous alarms, cycle power with the applicable DC PDA circuit breakers.
2	Establish an MMI session with the cCLPA (Table 6-11), connecting the cable to the applicable MMI port.
2a	– Type `alarms` at the HyperTerminal window prompt and press **Enter**. — The resulting display may provide an indication of the problem.
2b	– Call Field Support for further assistance.

Appendix A: MCC–Data Only

Appendix Content

MCC–DO Tests A-1

MCC–DO Testing A-1

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Notes

MCC–DO Tests

MCC–DO Testing

IMPORTANT

The tests in this appendix are provided for **information** only. The tests contained herein are not proven, and recommended equipment and equipment setup is not provided.

The following acceptance tests evaluate different performance aspects of the BTS with MCC–DO. This allows the CFE to select testing to meet the specific requirements for individual maintenance and performance verification situations.

The WinLMF must be version 2.16.4.0.04 or higher (with FR8000 – EV–DO manual ATP test support).

Prerequisites

Before attempting to run any *performance verification* ATP tests, all procedures outlined in previous *Optimization* chapters should have been successfully completed. At *a minimum*, successful completion of all BTS BLO calibration, and Bay Level Offset tests is recommended.

Test Equipment

Listed below are the recommended test equipment required to test MCC–DO.

Signal Generator:

- Agilent E4432B, with options UN8/(008 for upgrade) and 201/(251 for upgrade)
- E4430BK–404 – CDMA2000–1xEV–DO signal studio software

OR

- Agilent E4438C, with options UN8/(008 for upgrade) and 201/(251 for upgrade)
- E4438CK–404 – CDMA2000–1xEV–DO signal studio software

Spectrum Analyzer:

- Agilent E4406A), with option B78 and Firmware version A.04.21
- E4406AU–204 – 1xEV–DO measurement personality

MCC–DO Code Domain

The code domain power test verifies the noise floor of a carrier keyed up at a specific frequency per the CDF file.

Code domain power is the power in each code channel of a CDMA Channel. The CDMA time reference used in the code domain power test is derived from the Pilot Channel and is used as the reference for demodulation of all other code channels. This test verifies that orthogonality is maintained between the code channels. When transmit diversity is enabled, this test also verifies that time alignment is also maintained.

Follow the procedure in Table A-1 to test the MCC–DO Code Domain Power.

Table A-1: Procedure to Test MCC–DO Code Domain Power

Step	Action
1	Click the BBX(s) on DO carrier to be tested.
2	On the menu, click the **EvDO Tests > TX>Start Manual Tx ATP**.
3	Select the appropriate carrier from the **Sector/Carrier** list.
4	Click the **OK** button. A status report window is displayed.
5	Test tesults are displayed in the window.
6	Connect an MMI cable to the MCC–DO card.
7	Open a HyperTerminal application.
8	Open the COM to the MCC–DO MMI. Set parameters as follows: • Bits per second: 9600 • Data bits: 8 • Parity: None • Stop bits: 1 • Flow control: None
9	When the login prompt appears, enter login **mmi**.
10	When **MMI>** appears, type in the following command: **set_sc <*modem number*> <*sector number*> <*channel*> <*PN offset*>** where: • **<*modem number*>** is the modem on MCC–DO card to be tested • **<*sector number*>** is the sector number of the appropriate BBX (according to carrier selected in LMF) • **<*channel*>** is the appropriate channel (according to carrier selected in LMF) in the hexadecimal format 0xHHHH or NNNN format (normal decimal) • **<*PN offset*>** is set to 0 (zero)
11	Enable the modem on MCC–DO card by entering the following command: **enable <*modem number*>** where: • **<*modem number*>** is the modem selected in step 10.

table continued on next page

Table A-1: Procedure to Test MCC–DO Code Domain Power	
Step	**Action**
12	To generate a pattern, enter the following command: **fl_pattern 3**
13	On the Agilent E4406, set the Code Domain: • Press **Measure** button • Press **More** button until **Code Domain** option is displayed • Select **Code Domain** • Press **Meas Setup** button, then press **Meas Interval**, enter **3**. • Press **Meas Control** button, then press **Measure** to set it to **Cont** • Press **Meas Control** button • Set **Channel Type** to MAC • Press **More** button until **Trig Source** option is displayed • Press **Trig Source** key and select **Ext Rear** option • Press **More** button until **Advanced** option is displayed • Select **Advanced** option • If **Chip Rate** option is set to a value different than 1.228800, select **Chip Rate** and set it to 1.228800 • Select **Active Set Th** option to a value calculated using the following formula: – **xcvr_gain – cable_loss – 2dB** • Press **Display** button and set the **I/Q Combined Power Bar** to **On** • Press **Display** button, press Code Order button, select **Hadamard** option • To set appropriate frequency value, press **Frequency** and enter the value calculated according to the following formula: – **<tx_base_band_value> + 0.05*<chan_no> [MHz]**
14	Read the value of the power for each MAC channel.
15	Note the **Max Inactive Ch** value. The **Max Inactive Ch** value is –31dB or lower.

MCC–DO TX Mask

Follow the procedure in Table A-2 to test the MCC–DO TX Mask.

Table A-2: Procedure to Test the MCC–DO TX Mask

Step	Action
1	Click the BBX(s) on DO carrier to be tested.
2	On the menu, click the **EvDO Tests > TX>Start Manual Tx ATP**.
3	Select the appropriate carrier from the **Sector/Carrier** list.
4	Click the **OK** button. A status report window is displayed.
5	Connect test equipment as the instructions are displayed.
6	Connect an MMI cable to the MCC–DO card.
7	Open a HyperTerminal application.
8	Open the COM to the MCC–DO MMI. Set parameters as follows: • Bits per second: 9600 • Data bits: 8 • Parity: None • Stop bits: 1 • Flow control: None
9	When the login prompt appears, enter login **mmi**.
10	When **MMI>** appears, type in the following command: **set_sc <*modem number*> <*sector number*> <*channel*> <*PN offset*>** where: • **<*modem number*>** is the modem on MCC–DO card to be tested • **<*sector number*>** is the sector number of the appropriate BBX (according to carrier selected in LMF) • **<*channel*>** is the appropriate channel (according to carrier selected in LMF) in the hexadecimal format 0xHHHH or NNNN format (normal decimal). • **<*PN offset*>** is set to 0 (zero)
11	Enable the modem on MCC–DO card by entering the following command: **enable <*modem number*>** where: • **<*modem number*>** is the modem selected in step 10.

table continued on next page

Table A-2: Procedure to Test the MCC–DO TX Mask	
Step	**Action**
12	To generate a pattern, enter the following command: **fl_pattern 3**
13	On Agilent E4406, set **Spectrum** (Freq Domain) measurement as follows: • Press **Measure** button • Press **More** button until **Spectrum (Freq Domain)** option is displayed • Select **Spectrum** option • Press **SPAN** key to set its value to 4 [MHz] • To set the frequency value. press **Frequency** and enter the value calculated as follows: – **<tx_base_band_value> + 0.05*<chan_no> [MHz]**
14	Use the formula from step 13 to calculate the four frequencies to measure the Power. • check_point_1 = freq – 750 [kHz] • check_point_2 = freq + 750[kHz] • check_point_3 = freq – 1980 [kHz] • check_point_4 = freq + 1980 [kHz]
15	Press **MARKER** key: • Select 1, 2, 3, or 4 (frequency points) • Press **FUNCTION** key and select **Off** option • Press **TRACE** key and select **Spectrum** option • Press **NORMAL** key • Use the numeric keypad to enter the calculated frequency, assigning the proper unit. • Note the Power value of marker • Repeat step for all calculated frequency checkpoints The check point values are as follows: • Check_point_1 > –40 dBm • Check_point_2 > –40 dBm • Check_point_3 > –60 dBm • Check_ point_4 > –60 dBm

MCC–DO Pilot Time Offset

The pilot time offset test verifies the transmitted pilot channel element pilot time offset of a carrier keyed up at a specific frequency per the CDF file.

The calibrated communications test set measures the pilot time offset in microseconds, verifying that the result is within 3 microseconds (10 microseconds for JCDMA systems) of the target pilot time offset (zero microseconds).

Pilot time is defined as the estimate of CDMA System Time derived from observation of the pilot signal at the base station RF output port. Pilot time alignment error is the difference between the measured pilot time and the expected time, taking into account CDMA System Time and pilot offset.

Follow the procedure in Table A-3 to test the MCC–DO Pilot Time Offset.

Table A-3: Procedure to Test MCC–DO Pilot Time Offset

Step	Action
1	Click the BBX(s) on DO carrier to be tested.
2	On the menu, click the **EvDO Tests > TX>Start Manual Tx ATP**.
3	Select the appropriate carrier from the **Sector/Carrier** list.
4	Click the **OK** button. A status report window is displayed. Test results are displayed in the window.
5	Connect an MMI cable to the MCC–DO card.
6	Open a HyperTerminal application.
7	Open the COM to the MCC–DO MMI. Set parameters as follows: • Bits per second: 9600 • Data bits: 8 • Parity: None • Stop bits: 1 • Flow control: None
8	When the login prompt appears, enter login **mmi**.

table continued on next page

Table A-3: Procedure to Test MCC–DO Pilot Time Offset

Step	Action
9	When **MMI>** appears, type in the following command: **set_sc <*modem number*> <*sector number*> <*channel*> <*PN offset*>** where: • **<*modem number*>** is the modem on MCC–DO card to be tested • **<*sector number*>** is the sector number of the appropriate BBX (according to carrier selected in LMF) • **<*channel*>** is the appropriate channel (according to carrier selected in LMF) in the hexadecimal format 0xHHHH or NNNN format (normal decimal). • **<*PN offset*>** is set to 0 (zero)
10	Enable the modem on MCC–DO card by entering the following command: **enable <*modem number*>** where: • **<*modem number*>** is the modem selected in step 10.
11	To generate a pattern, enter the following command: **fl_pattern 3**
12	On the Agilent E4406, set the **Mod Accuracy (composite Rho)** measurement: • Press **Measure** button • Press **More** button until **Mod Accuracy (composite Rho)** option is displayed • Select **Mod Accuracy (composite Rho)** • Press **Meas Setup** button • Press **More** button until **Trig Source** option is displayed • Press **Trig Source** key and select **Ext Rear** option • Press **More** button until **Advanced** option is displayed • Select **Advanced** option • If **Chip Rate** option is set to a value different than 1.228800, select **Chip Rate** and set it to 1.228800 • Select Active Set Th option to a value calculated using the following formula: – **xcvr_gain – cable_loss – 2dB** • To set appropriate frequency value, press **Frequency** and enter the value calculated according to the following formula: – **<tx_base_band_value> + 0.05*<chan_no> [MHz]**
13	Read the value of the**Pilot Offset**. The **Pilot Offset** is less than 3 microseconds

MCC–DO Rho

The Rho test verifies the transmitted pilot channel element digital waveform quality of the carrier keyed up at a specific frequency per the CDF file.

Waveform quality is measured by determining the normalized correlated power between the actual waveform and the ideal waveform.

Follow the procedure in Table A-4 to test the MCC–DO Rho.

Table A-4: Procedure to Test MCC–DO Rho

Step	Action
1	Click the BBX(s) on DO carrier to be tested.
2	On the menu, click the **EvDO Tests > TX>Start Manual Tx ATP**.
3	Select the appropriate carrier from the **Sector/Carrier** list.
4	Click the **OK** button. A status report window is displayed. Test results are displayed in the window.
5	Connect an MMI cable to the MCC–DO card.
6	Open a HyperTerminal application.
7	Open the COM to the MCC–DO MMI. Set parameters as follows: • Bits per second: 9600 • Data bits: 8 • Parity: None • Stop bits: 1 • Flow control: None
8	When the login prompt appears, enter login **mmi**.
9	When **MMI>** appears, type in the following command: **set_sc <*modem number*> <*sector number*> <*channel*> <*PN offset*>** where: • **<*modem number*>** is the modem on MCC–DO card to be tested • **<*sector number*>** is the sector number of the appropriate BBX (according to carrier selected in LMF) • **<*channel*>** is the appropriate channel (according to carrier selected in LMF) in the hexadecimal format 0xHHHH or NNNN format (normal decimal). • **<*PN offset*>** is set to 0 (zero)

table continued on next page

Table A-4: Procedure to Test MCC–DO Rho	
Step	**Action**
10	Enable the modem on MCC–DO card by entering the following command: **enable <*modem number*>** where: • **<*modem number*>** is the modem selected in step 10.
11	To generate a pattern, enter the following command: **fl_pattern 3**
12	On the Agilent E4406, set the **Mod Accuracy (composite Rho)** measurement: • Press **Measure** button • Press **More** button until **Mod Accuracy (composite Rho)** option is displayed • Select **Mod Accuracy (composite Rho)** • Press **Meas Setup** button • Press **More** button until **Trig Source** option is displayed • Press **Trig Source** key and select **Ext Rear** option • Press **More** button until **Advanced** option is displayed • Select **Advanced** option • If **Chip Rate** option is set to a value different than 1.228800, select **Chip Rate** and set it to 1.228800 • Select **Active Set Th** option to a value calculated using the following formula: – **xcvr_gain – cable_loss – 2dB** • To set appropriate frequency value, press **Frequency** and enter the value calculated according to the following formula: – **<tx_base_band_value> + 0.05*<chan_no> [MHz]**
13	Read the value of the **Rho**. **Rho** normalized cross coefficient (ρ) is greater than 0.912

MCC–DO Packet Error Rate

The PER test verifies PER (Packet Error Rate) of traffic channels of an XCVR carrier keyed up at a specific frequency per the current CDF file. The XCVR is keyed to generate a CDMA carrier (with pilot channel element only) of the correct level.

The calibrated communications test set measures the all zero long code and verifies that the PER is not greater than 1 percent. A total number of packets to be received is dependent on Rate Set chosen.

PER Prerequisites

To perform the following test, the Agilent E4432B Signal Generator must have the following installed:

- Agilent Signal Studio – 1xEV Reverse Link” (requires installation of ”Agilent IO Libraries” application)
- Agilent E4432B Signal Generator with option 404

Follow the procedure in Table A-5 to test the MCC–DO Packet Error Rate.

Table A-5: Procedure to Test MCC–DO Packet Error Rate

Step	Action
1	Click the BBX(s) on DO carrier to be tested.
2	On the menu, click the **EvDO Tests > TX>Start Manual Tx ATP**.
3	Select the appropriate carrier from the **Sector/Carrier** list.
4	Click the **OK** button. A status report window is displayed. Test results are displayed in the window.
5	Connect the lap top computer to the Agilent E4432B Signal Generator and run the Agilent Signal Studio – 1x EV Reverse Link application.

table continued on next page

Table A-5: Procedure to Test MCC–DO Packet Error Rate	
Step	**Action**
6	Enter the following parameters for signal generation. Channel Configuration: • RRI Channel – checked RRI Bits – 1 • DRC Channel – checked Rel. gain (dB) – 3 • ACK Channel – checked Rel. gain (dB) – 0 • Data Channel – checked Rel. gain (dB) – 3.75 • Data Channel encoder active – checked • Data Channel Data rate – 9.6 kbps • Data Channel bit stream – PN15 • I Mask – 3FF80000000 • Q Mask – 3FF00000001 Signal Generation: • Oversampling ratio – 4 • Filter Type – IS 95 Std • Mirror Spectrum – unchecked ESG Configuration: • Frequency – calculated according to the formula: <rx_base_band_value> + 0,05 * <chan_no> [MHz] • Amplitude – depending on attenuation applied – overall signal value should be –122 [dBm] • Sampling rate 4.1952 [MHz] • Reconstruction filter 2.5 [MHz] • RF Blanking – unchecked • Internal Reference • + Mkrs
7	Press **Time Slot Setup** button and set the following parameters: ACK Channel • Active – All On • Data – 0s DRC Channel • Active – All On • Data – F (1111) • Cover – 1
8	Press **DOWNLOAD** button on the ”Agilent Signal Studio – 1xEV Reverse Link” application.

table continued on next page

Table A-5: Procedure to Test MCC–DO Packet Error Rate	
Step	**Action**
9	Connect an MMI cable to the MCC–DO card.
10	Open a HyperTerminal application.
11	Open the COM to the MCC–DO MMI. Set parameters as follows: • Bits per second: 9600 • Data bits: 8 • Parity: None • Stop bits: 1 • Flow control: None
12	When the login prompt appears, enter login **mmi**.
13	When **MMI>** appears, type in the following command: **set_sc <*modem number*> <*sector number*> <*channel*> <*PN offset*>** where: • **<*modem number*>** is the modem on MCC–DO card to be tested • **<*sector number*>** is the sector number of the appropriate BBX (according to carrier selected in LMF) • **<*channel*>** is the appropriate channel (according to carrier selected in LMF) in the hexadecimal format 0xHHHH or NNNN format (normal decimal). • **<*PN offset*>** is set to 0 (zero)

table continued on next page

Table A-5: Procedure to Test MCC–DO Packet Error Rate	
Step	**Action**
14	Enter the command to receive the PER measurements results: **rl_test 1 60 dflt dflt dflt dflt dflt dflt dflt dflt dflt dflt dflt dflt dflt dflt** this will set the MCC–DO to measure the PER with following parameters: • Perform PER Test at 9.6 KBPS • Duration 60 seconds • DataOffsetNominal dflt=0dB • DataOffset9k6 dflt=0dB • DataOffset19k2 dflt=0dB • DataOffset38k4 dflt=0dB • DataOffset76k8 dflt=0dB • DataOffset153k6 dflt=0dB • MacIndex dflt=5 • FrameOffset dflt=0 • DRCGating dflt=0 Continuous transmission • DRCLength dflt = 0 • DRCCover dflt = 1 • UATI dflt = 0x1234ABCD • AckChannelGain dflt=0dB • DRCChannelGain dflt=3dB
15	Read the results (after 1 minute) and calculate the PER value from the MCC–DO mmi result screen: Compute PER using the outcome of the rl_test PER = (expect–total+invalid) /expect Example output: Reverse Link Test has completed Reverse Link Test OK MODEM#1 pattern = 1 (9.6 kbps) expect = xxx total = xxx invalid = xxx
16	Receiver sensitivity is below –121.2 dBm at a signal rate of 9.6 kbps. Read the value of the **PER**. **PER** is less than 0.01 (1%)

Notes

Appendix B: Test Equipment Preparation

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B

Notes

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.

B

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 B-1.

Table B-1: Set IP Address on Agilent E7495A test set

✓	Step	Action
	1	Use the **System Button > Controls >IPAdmin** to set an IP address on the E7495A as **128.0.0.49**, and Netmask to **255.255.255.128**.

Connections

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 B-2.

Table B-2: Detecting Agilent E7495A Test Equipment

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

Power Sensor Calibration

Table B-3 describes the E7495A Power Sensor Calibration.

Table B-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 B-1. – Press the Zero softkey. – Press the Continue softkey.
	3	Calibrate the power meter: – Press Ref CF. – Enter the reference cal factor, reading it off the label on the power sensor head. – Press Calibrate. – Connect the power sensor (see Figure B-2). – Press Continue. – Press Cal Factor. – 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.

Test Equipment Preparation – continued

Figure B-1: Agilent E7495A Pre–Power Sensor Calibration Connection

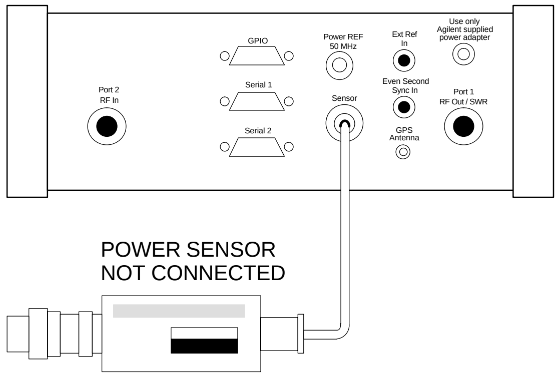
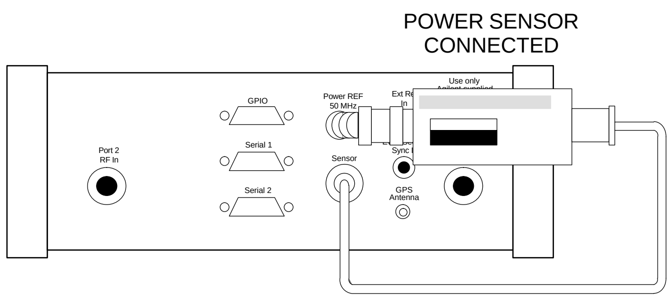


Figure B-2: Agilent E7495A Power Sensor Calibration Connection



Cable Calibration

Follow the directions in the WinLMF program to calibrate cables.

– Calibrate the short cable (see Figure 6-12 or Figure 6-13) 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 6-17 through Figure 6-20).

Verifying and Setting GPIB Addresses

Agilent E4406A Transmitter Tester GPIB Address

Refer to Figure B-3 and follow the procedure in Table B-4 to verify and, if necessary, change the Agilent E4406A GPIB address.

Figure B-3: Setting Agilent E4406A GPIB Address

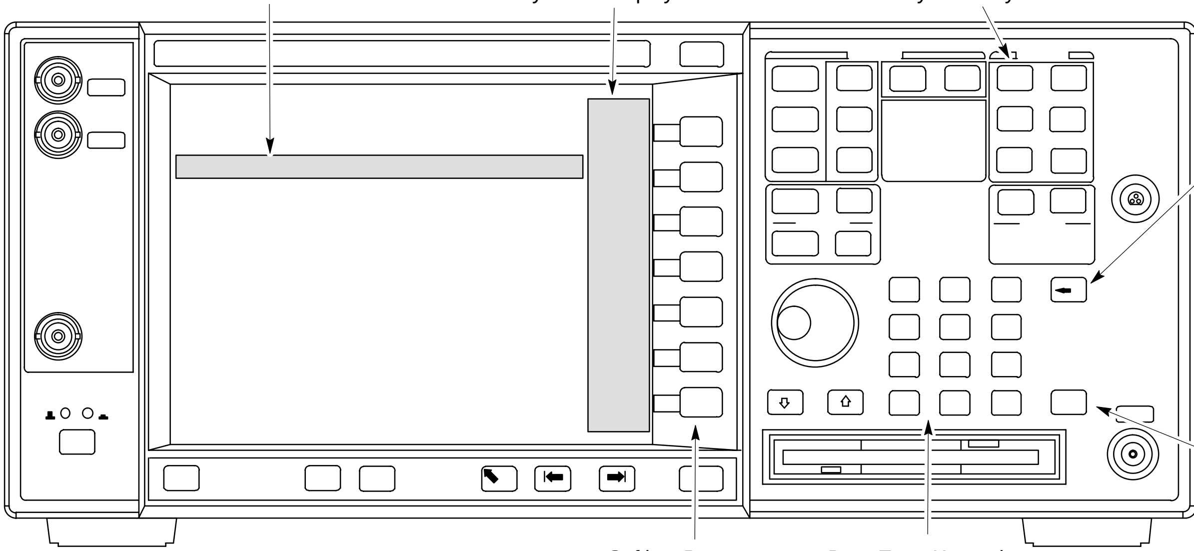


Table B-4: Verify and Change Agilent E4406A GPIB Address

Step	Action
1	In the **SYSTEM** section of the instrument front panel, press the **System** key. – The softkey labels displayed on the right side of the instrument screen will change.
2	Press the **Config I/O** softkey button to the right of the instrument screen. – The softkey labels will change. – The current instrument GPIB address will be displayed below the **GPIB Address** softkey label.
3	If the current GPIB address is not set to **18**, perform the following to change it:
3a	Press the GPIB Address softkey button. In the on–screen Active Function Area, **GPIB Address** will be displayed followed by the current GPIB address.

. . . continued on next page

B

Table B-4: Verify and Change Agilent E4406A GPIB Address	
Step	**Action**
3b	On front panel Data Entry keypad, enter the communications system analyzer GPIB address of **18**. – The **GPIB Address** label will change to **Enter**. – Characters typed with the keypad will replace the current GPIB address in the Active Function Area. **NOTE** To correct an entry, press **Bk Sp** key to delete one character at a time.
3c	Press the **Enter** softkey button or the keypad **Enter** key to set the new GPIB address. – The **Config I/O** softkey labels will reappear. – The new GPIB address will be displayed under the **GPIB Address** softkey label.

Agilent E4432B Signal Generator GPIB Address

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

Figure B-4: Setting Agilent E4432B GPIB Address

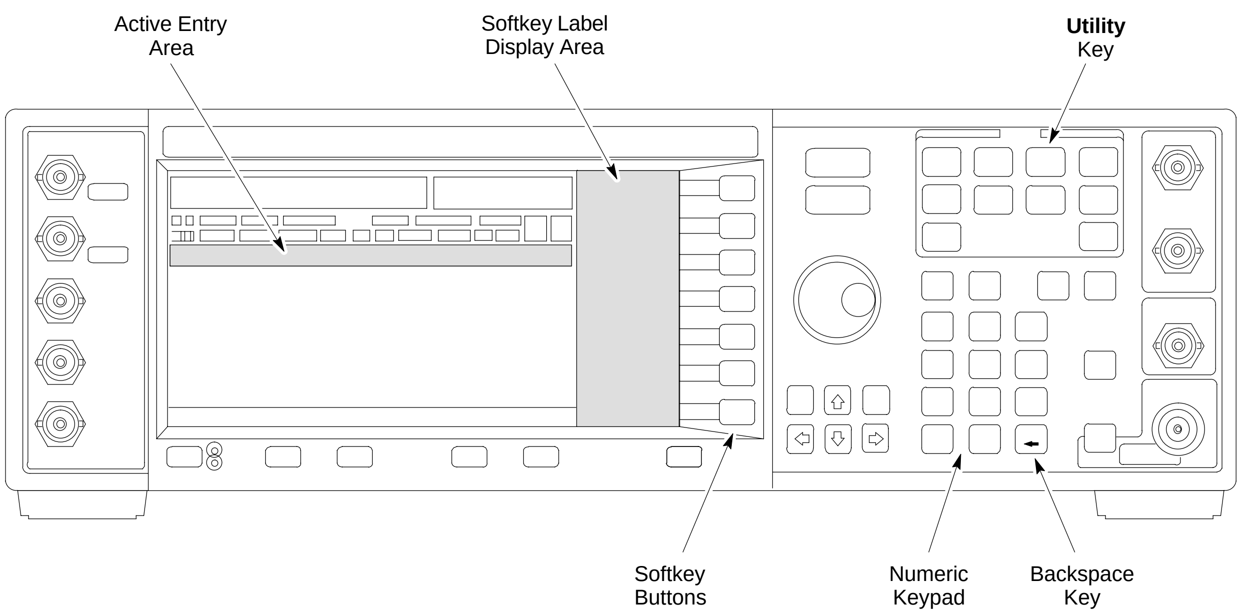


Table B-5: Verify and Change Agilent E4432B GPIB Address

Step	Action
1	In the **MENUS** section of the instrument front panel, press the **Utility** key. – The softkey labels displayed on the right side of the instrument screen will change.
2	Press the **GPIB/RS232** softkey button to the right of the instrument screen. – The softkey labels will change. – The current instrument GPIB address will be displayed below the **GPIB Address** softkey label.
3	If the current GPIB address is not set to **1**, perform the following to change it:
3a	Press the **GPIB Address** softkey button. – The **GPIB Address** label and current GPIB address will change to boldface. – In the on–screen Active Entry Area, **Address:** will be displayed followed by the current GPIB address.
3b	On the front panel Numeric keypad, enter the signal generator GPIB address of **1**. – The **GPIB Address** label will change to **Enter**. – Characters typed on the keypad will replace the current GPIB address in the Active Entry display. **NOTE** To correct an entry, press the backspace key at the lower right of the keypad to delete one character at a time.
3c	Press the **Enter** softkey button to set the new GPIB address. – The new GPIB address will be displayed under the **GPIB Address** softkey label.

Advantest R3267 Spectrum Analyzer GPIB Address

Refer to Figure B-5 and perform the procedure in Table B-6 to verify and, if necessary, change the Advantest R3267 spectrum analyzer GPIB address.

Figure B-5: Setting Advantest R3267 GPIB Address

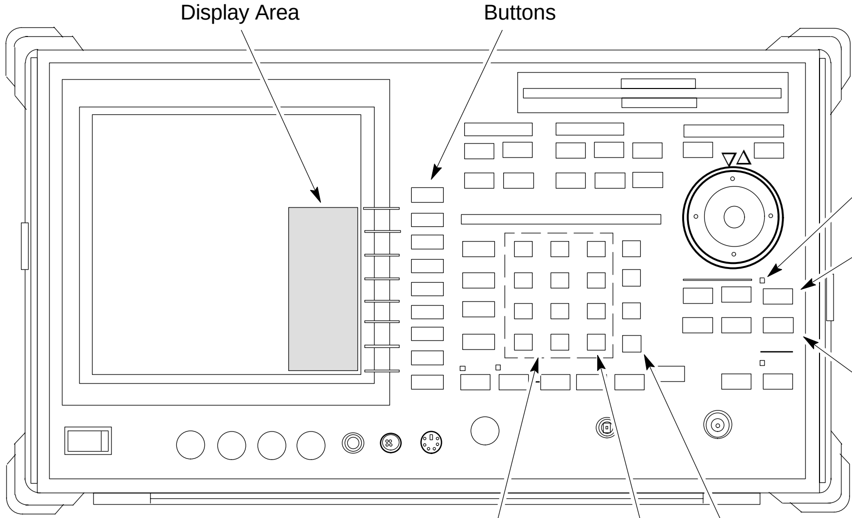
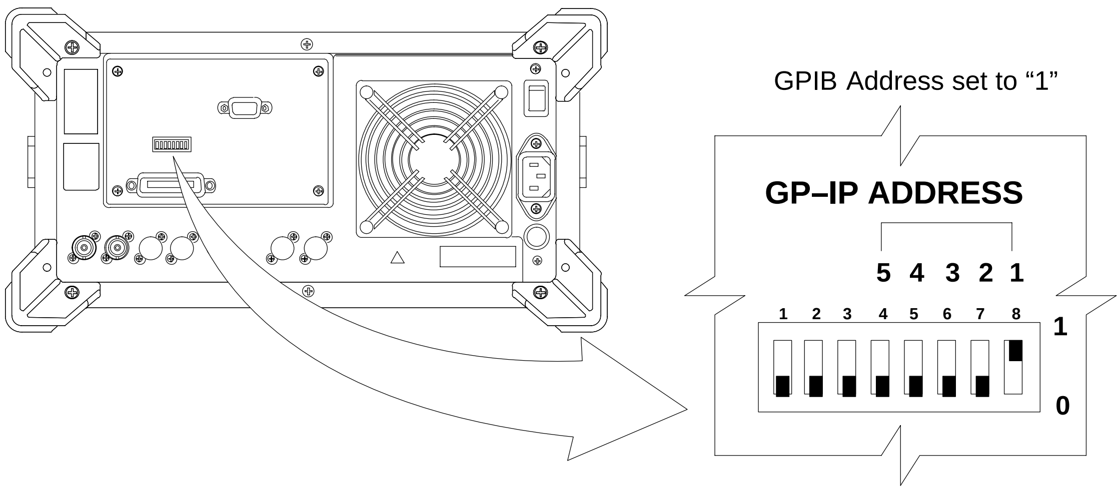


Table B-6: Verify and Change Advantest R3267 GPIB Address	
Step	**Action**
1	If the **REMOTE** LED is lighted, press the **LCL** key. – The LED extinguishes.
2	Press the **CONFIG** key. – **CONFIG** softkey labels will appear in the softkey label display area of the instrument display. – The current GPIB address will be displayed below the **GPIB Address** softkey label.
3	If the current GPIB address is not set to **18**, perform the following to change it:
3a	Press the **GPIB Address** softkey. A **GPIB Address** entry window will open in the instrument display showing the current GPIB address.
3b	Enter **18** on the keypad in the **ENTRY** section of the instrument front panel. – Characters typed on the keypad will replace the address displayed in the **GPIB Address** entry window. **NOTE** To correct an entry, press the **BS** (backspace) key at the lower right of the keypad to delete one character at a time.
3c	Press the **ENTR** key to the lower right of the keypad to set the new GPIB address. – The **GPIB Address** entry window closes. – The new address is displayed in the bottom portion of the **GPIB Address** softkey label.

Advantest R3562 Signal Generator GPIB Address

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

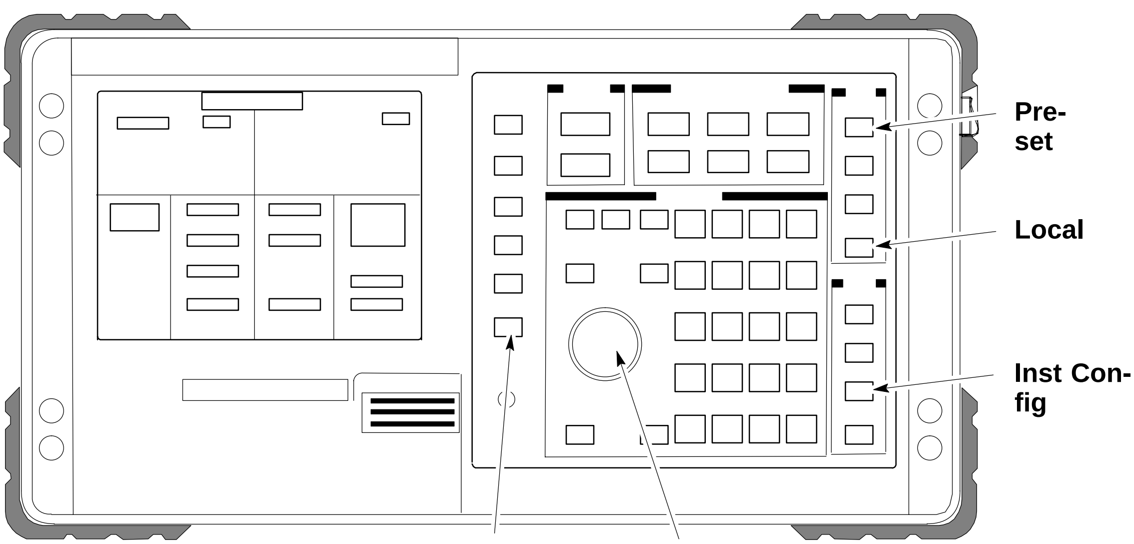
Figure B-6: Advantest R3562 GPIB Address Switch Setting



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

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

Figure B-7: Agilent 8935 Test Set



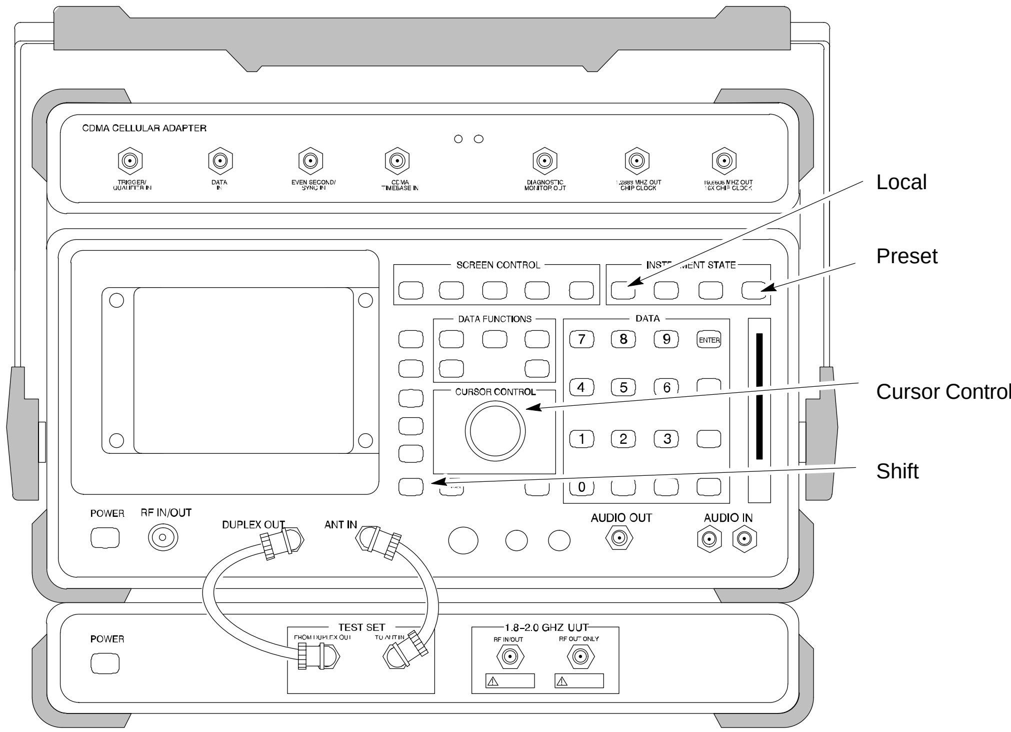
NOTE	This procedure assumes that the test equipment is set up and ready for testing.

Table B-7: Verify and/or Change Agilent 8935 (formerly HP 8935) GPIB Address	
Step	**Action**
1	**NOTE** The HP I/O configuration MUST be set to **Talk & Listen,** or *no* device on the GPIB will be accessible. (Consult test equipment OEM documentation for additional information as required.) To verify that the GPIB addresses are set correctly, press **Shift** and **LOCAL** on the Agilent 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:
2a	– Press **Shift** and **Inst Config**.
2b	– Turn the **Cursor Control** knob to move the cursor to the **HP–IB Adrs** field.
2c	– Press the **Cursor Control** knob to select the field.
2d	– Turn the **Cursor Control** knob as required to change the address to **18**.
2e	– Press the **Cursor Control** knob to set the address.
3	Press **Preset** to return to normal operation.

Hewlett Packard HP8921A and HP83236A/B GPIB Address

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

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



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

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

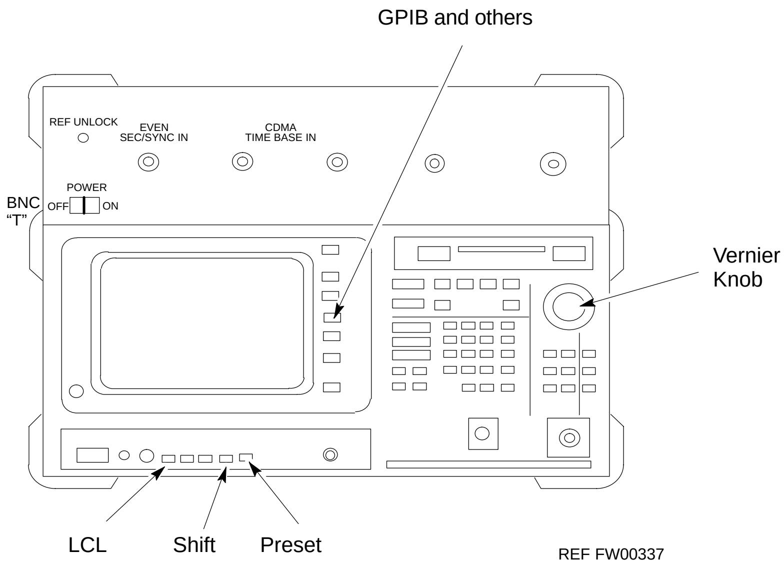
Step	Action
1	To verify that the GPIB addresses are set correctly, press **Shift** and **LOCAL** on the HP 8921A. – The current HP–IB address is displayed at the top of the screen. **NOTE** HP–IB is the same as GPIB.
2	If the current HP–IB address is not set to **18**, perform the following to change it:
2a	– Turn the **Cursor Control** knob to move the cursor to **More** and press the knob to select the field.
2b	– Turn the **Cursor Control** knob to move the cursor to **I/O Config** and press the knob to select the field.
2c	– Turn the **Cursor Control** knob to move the cursor to **Adrs** and press the knob to select the field.
2d	– Turn the **Cursor Control** knob to change the HP–IB address to **18** and press the knob to set the address.

Table B-8: Verify and/or Change HP 8921A and HP 83236A GPIB Addresses	
Step	**Action**
2e	– Press **Shift** and **Preset** to return to normal operation.
3	To set the HP 83236A (or B) PCS Interface GPIB address=**19**, set the DIP switches as follows: – A1=1, A2=1, A3=0, A4=0, A5=1, HP–IB/Ser = 1

Advantest R3465 Communications Test Set GPIB Address

Refer to Figure B-9 and follow the procedure in Table B-9 to verify and, if necessary, change the GPIB address for the Advantest R3465.

Figure B-9: R3465 Communications Test Set



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

Table B-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 **SHIFT** then **PRESET**.
1b	– Press **LCL**.
1c	– Press the **GPIB and Others** CRT menu key to view the current address.
2	If the current GPIB address is not set to **18**, perform the following to change it:
2a	– Turn the vernier knob as required to select **18**.

Table B-9: Verify and/or Change Advantest R3465 GPIB Address	
Step	**Action**
2b	– Press the vernier knob to set the address.
3	To return to normal operation, press **Shift** and **Preset**.

Motorola CyberTest GPIB Address

Follow the steps in Table B-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).

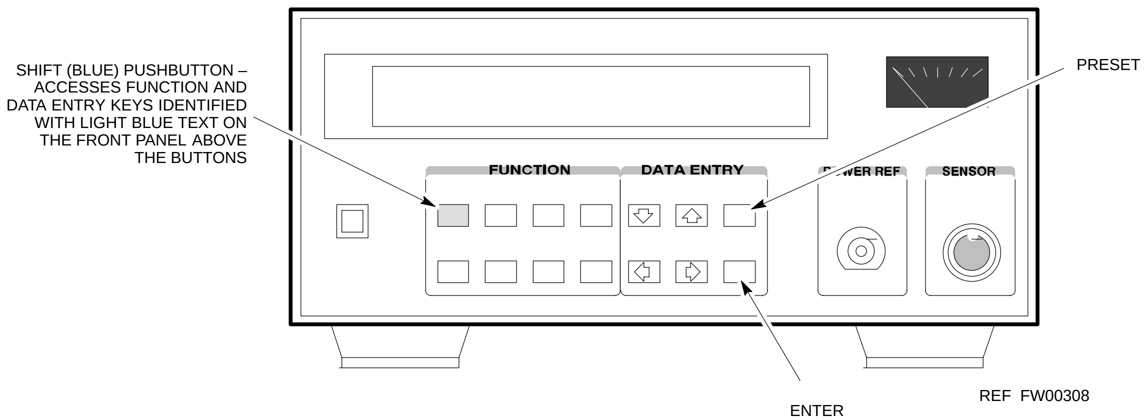
NOTE	This procedure assumes that the test equipment is set up and ready for testing.

Table B-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 **Special,** select **IEEE.488.2.**
3	CyberTAME software will query the CyberTest Analyzer for its current GPIB address. It then will open the IEEE 488.2 dialog box. If the current GPIB address is not **18**, perform the following procedure to change it:
3a	Use the up or down increment arrows or double–click in the field and type the number to set the address to **18**.
3b	Click on the **OK** 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 B-10 and follow the steps in Table B-11 to verify and, if necessary, change the HP 437 GPIB address.

Figure B-10: HP 437 Power Meter



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

Table B-11: Verify and/or Change HP 437 Power Meter GPIB Address

Step	Action
1	Press **Shift** and **PRESET**.
2	Use the ⏶ arrow key to navigate to HP–IB ADRS and press **ENTER**. The HP–IB address is displayed. **NOTE** HP–IB is the same as GPIB.
3	If the current GPIB address is not set to **13**, perform the following to change it: – Use the ⏶ ⏷ arrow keys to change the HP–IB ADRS to **13**. – Press **ENTER** to set the address.
4	Press **Shift** and **ENTER** to return to a standard configuration.

Gigatronics 8541C Power Meter GPIB Address

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

Figure B-11: Gigatronics 8541C Power Meter Detail

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

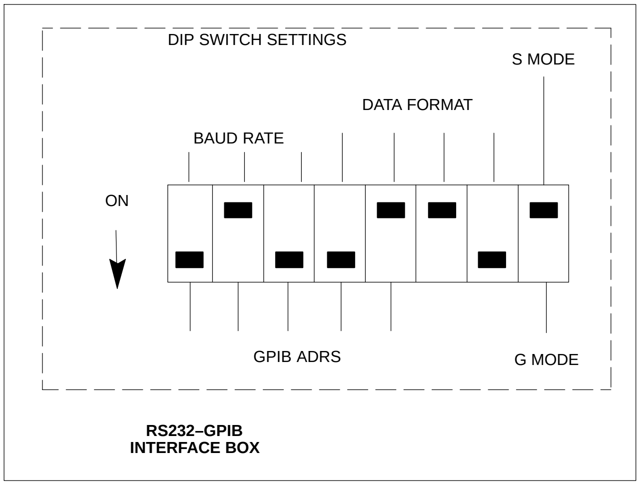
Table B-12: Verify and/or Change Gigatronics 8541C Power Meter GPIB Address

Step	Action
1	**! CAUTION** Do not connect/disconnect the power meter sensor cable with AC power applied to the meter. Disconnection could result in destruction of the sensing element or miscalibration. Press **MENU**.
2	Use the ▼ arrow key to select **CONFIG MENU** and press **ENTER**.
3	Use the ▼ arrow key to select **GPIB** and press **ENTER**. The current **Mode** and GPIB **Address** are displayed.
4	If the **Mode** is not set to **8541C**, perform the following to change it: Use the ◀ ▶ arrow keys as required to select **MODE**. Use the ▼▲ arrow keys as required to set **MODE** to **8541C**.
5	If the GPIB address is not set to **13**, perform the following to change it: Use the ▶ arrow key to select **ADDRESS**. Use the ▼▲ arrow keys as required to set the GPIB address to **13**.
6	Press **ENTER** to return to normal operation.

RS232 GPIB Interface Adapter

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

Figure B-12: RS232 GPIB Interface Adapter



Test Equipment Connection, Testing, and Control

Inter–unit Connection, Testing, and Control Settings

The following illustrations, tables, and procedures provide the information necessary to prepare various items of CDMA test equipment supported by the WinLMF for BTS calibration and/or acceptance testing.

HP 8921A with PCS Interface Test Equipment Connections

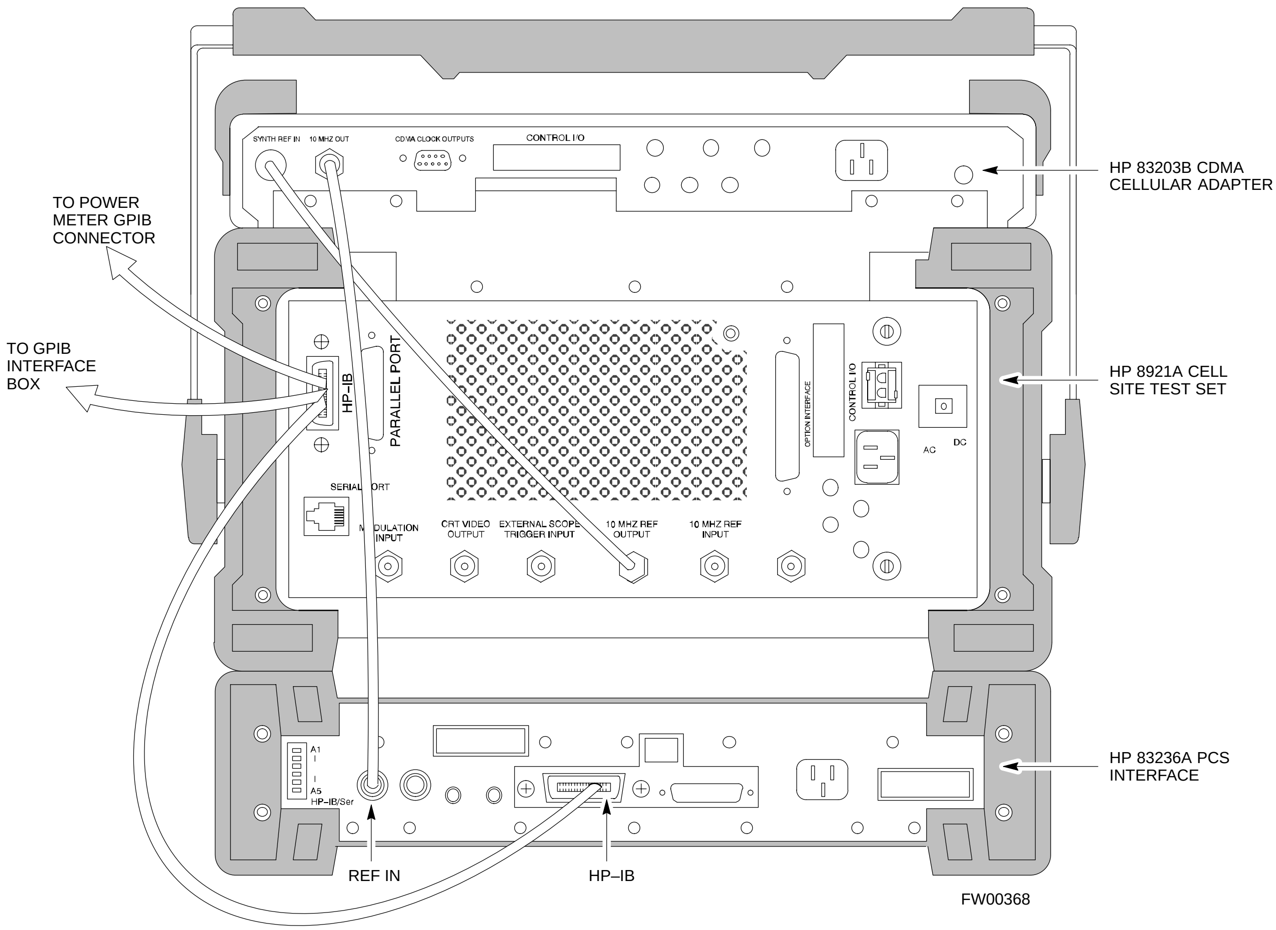
The following diagram depicts the rear panels of the HP 8921A test equipment as configured to perform automatic tests. All test equipment is controlled by the WinLMF via an IEEE–488/GPIB bus. The WinLMF expects each piece of test equipment to have a factory-set GPIB address (refer to Table B-8 and Figure B-8). If there is a communications problem between the WinLMF and any piece of test equipment, verify that the GPIB addresses have been set correctly and that the GPIB cables are firmly connected to the test equipment.

Table B-13 shows the connections when *not using* an external 10 MHz Rubidium reference.

Table B-13: HP 8921A/600 Communications Test Set Rear Panel Connections Without Rubidium Reference

From Test Set:	To Interface:		Connector Type
8921A	**83203B CDMA**	**83236A PCS**	
CW RF OUT	CW RF IN		SMC–female – SMC–female
114.3 MHZ IF OUT	114.3 MHZ IF IN		SMC–female – SMC–female
IQ RF IN	IQ RF OUT		SMC–female – SMC–female
DET OUT	AUX DSP IN		SMC–female – SMC–female
CONTROL I/O	CONTROL I/O		45–pin custom BUS
10 MHZ OUT	SYNTH REF IN		BNC–male – BNC–male
HPIB INTERFACE		HPIB INTERFACE	HPIB cable
	10 MHZ OUT	REF IN	BNC–male – BNC–male

Figure B-13: HP 8921A/600 Cable Connections for 10 MHz Signal and GPIB without Rubidium Reference



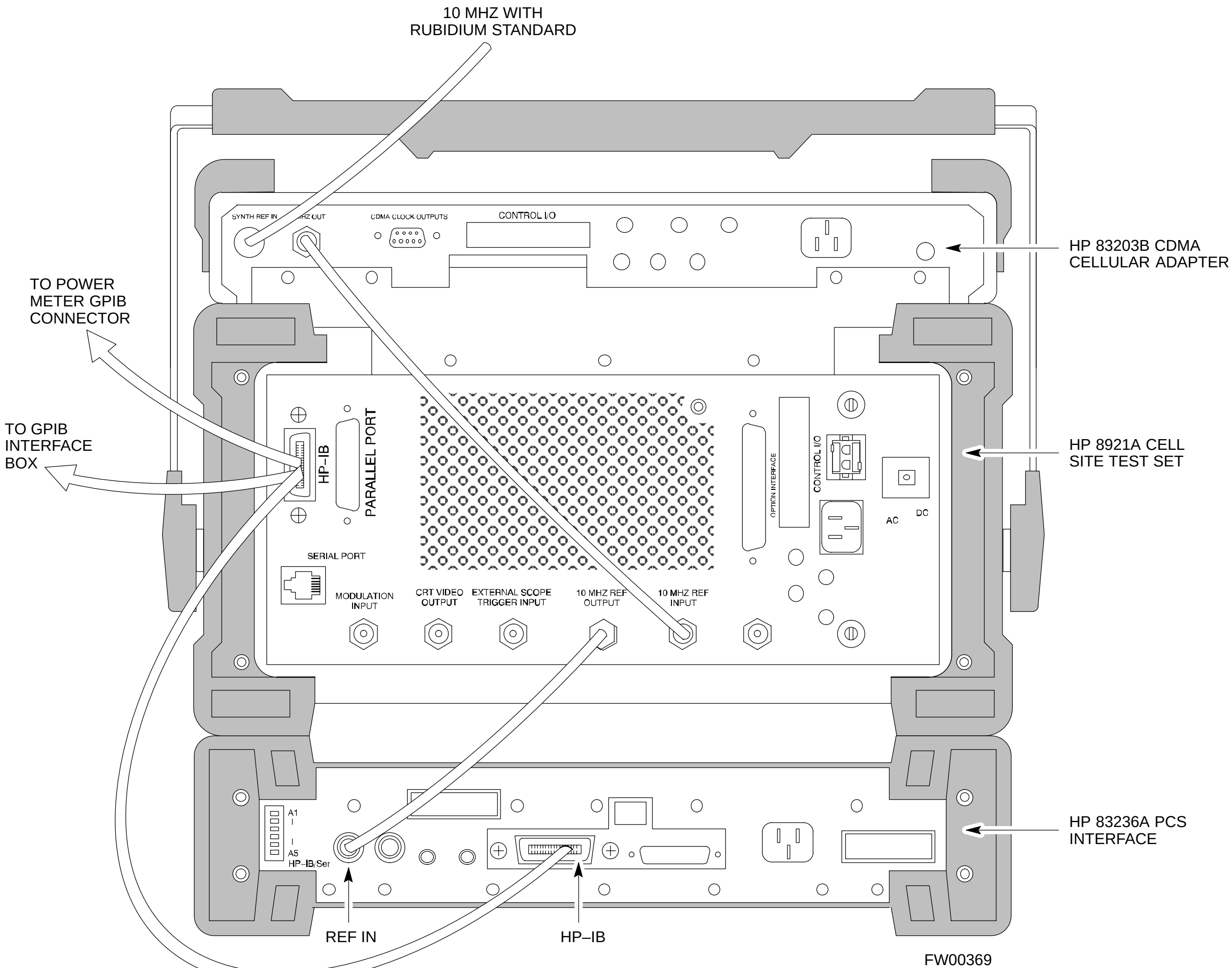
REAR PANEL
COMMUNICATIONS TEST SET

Figure B-14 shows the connections when *using* an external 10 MHz Rubidium reference.

Table B-14: HP 8921A/600 Communications Test Set Rear Panel Connections With Rubidium Reference

From Test Set:	To Interface:		Connector Type
8921A	**83203B CDMA**	**83236A PCS**	
CW RF OUT	CW RF IN		SMC–female – SMC–female
114.3 MHZ IF OUT	114.3 MHZ IF IN		SMC–female – SMC–female
IQ RF IN	IQ RF OUT		SMC–female – SMC–female
DET OUT	AUX DSP IN		SMC–female – SMC–female
CONTROL I/O	CONTROL I/O		45–pin custom BUS
10 MHZ OUT		REF IN	BNC–male – BNC–male
HPIB INTERFACE		HPIB INTERFACE	HPIB cable
10 MHZ INPUT	10 MHZ OUT		BNC–male – BNC–male

Figure B-14: HP 8921A Cable Connections for 10 MHz Signal and GPIB with Rubidium Reference



REAR PANEL
COMMUNICATIONS TEST SET

HP 8921A with PCS Interface System Connectivity Test

Follow the steps outlined in Table B-15 to verify that the connections between the PCS Interface and the HP 8921A 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 B-15: System Connectivity

Step	Action
	NOTE – Perform this procedure *after* test equipment has been allowed to warm–up and stabilize for a *minimum of 60 minutes*.
1	Insert HP 83236A Manual Control/System card into memory card slot.
2	Press the **[PRESET]** pushbutton**.**
3	Press the Screen Control **[TESTS]** pushbutton to display the “Tests” Main Menu screen.
4	Position the cursor at **Select Procedure Location** and select it by pressing the cursor control knob. In the Choices selection box, select **Card.**
5	Position the cursor at **Select Procedure Filename** and select it by pressing the cursor control knob. In the Choices selection box, select **SYS_CONN**.
6	Position the cursor at **RUN TEST** and select it. The software will provide operator prompts through completion of the connectivity setup.
7	Do the following when the test is complete, • position cursor on **STOP TEST** and select it • OR press the **[K5]** pushbutton.
8	To return to the main menu, press the **[K5]** pushbutton.
9	Press the **[PRESET]** pushbutton**.**

Pretest Setup for HP 8921A

Before the HP 8921A CDMA analyzer is used for WinLMF–controlled testing it must be set up correctly for automatic testing. Perform the procedure in Table B-16.

Table B-16: Pretest Setup for HP 8921A	
Step	**Action**
1	Unplug the memory card if it is plugged in.
2	Press the **CURSOR CONTROL** knob.
3	Position the cursor at **IO CONFIG** (under **To Screen** and **More**) and select it.
4	Select Mode and set for **Talk&Lstn**.

Pretest Setup for Agilent 8935

Before the Agilent 8935 analyzer is used for WinLMF controlled testing it must be set up correctly for automatic testing. Perform the procedure in Table B-17.

Table B-17: Pretest Setup for Agilent 8935	
Step	**Action**
1	Unplug the memory card if it is plugged in.
2	Press the **Shift** button and then press the **I/O Config** button.
3	Press the **Push to Select** knob.
4	Position the cursor at **IO CONFIG** and select it.
5	Select **Mode** and set for **Talk&Lstn**.

Advantest R3465 Connection

The following diagram depicts the rear panels of the Advantest R3465 test equipment as configured to perform automatic tests. All test equipment is controlled by the WinLMF via an IEEE–488/GPIB bus. The WinLMF expects each piece of test equipment to have a factory-set GPIB address (refer to Table B-9 and Figure B-9). If there is a communications problem between the WinLMF and any piece of test equipment, verify that the GPIB addresses have been set correctly and that the GPIB cables are firmly connected to the test equipment.

Figure B-15 shows the connections when *not using* an external 10 MHz Rubidium reference.

Figure B-15: Cable Connections for Test Set without 10 MHz Rubidium Reference

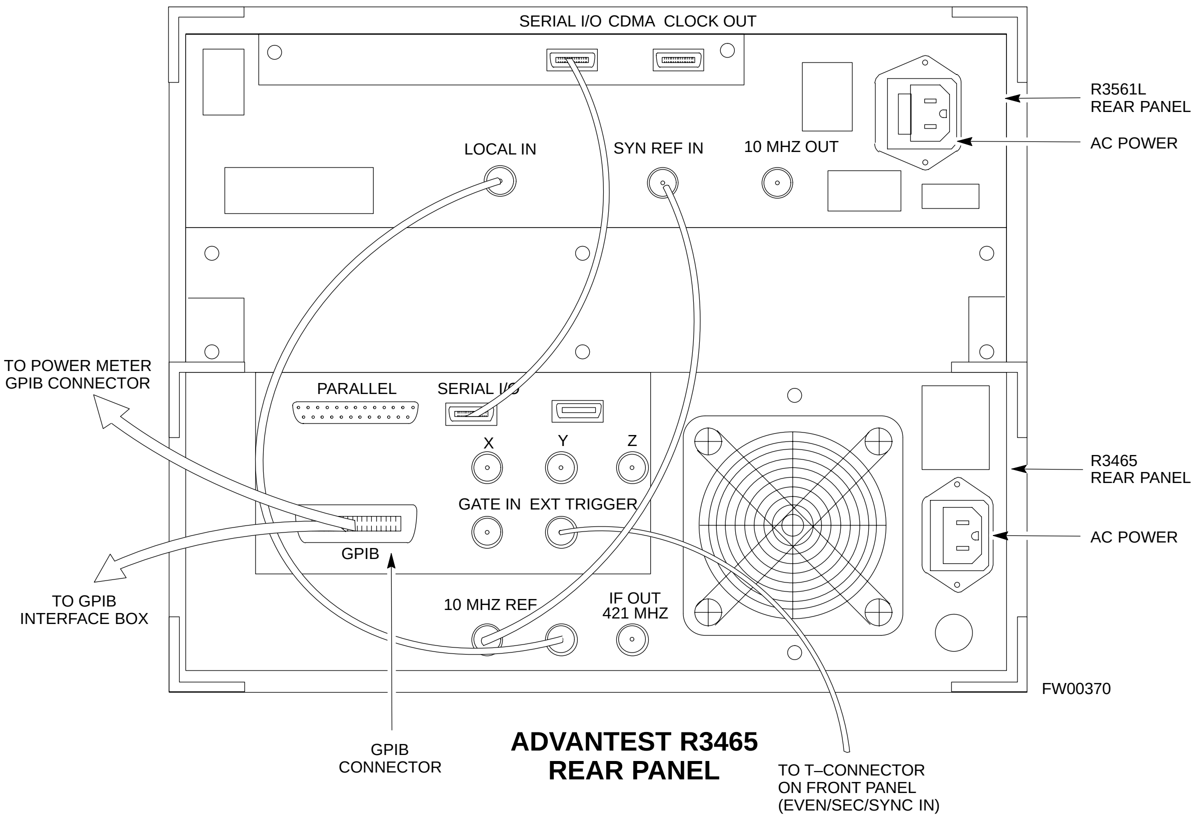
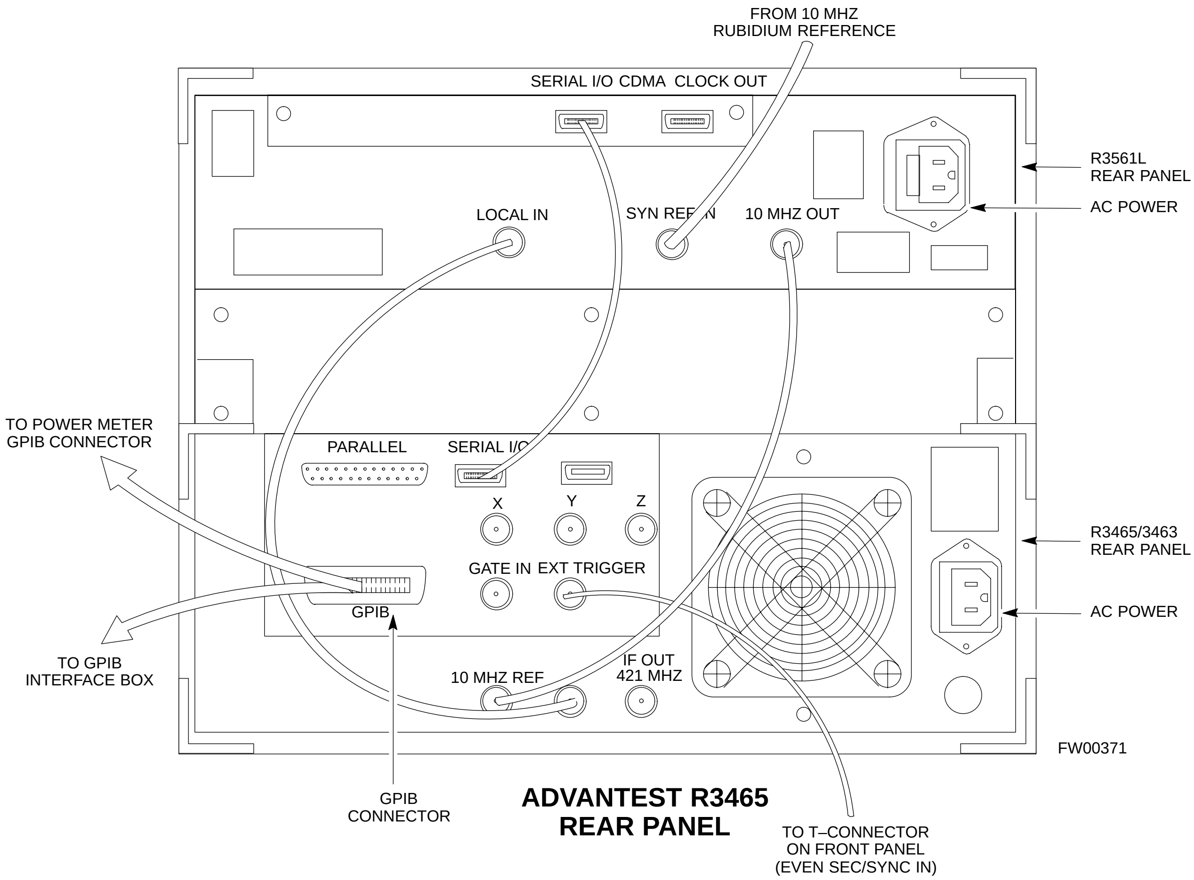


Figure B-16 shows the connections when *using* an external 10 MHz Rubidium reference.

Figure B-16: Cable Connections for Test Set with 10 MHz Rubidium Reference



R3465 GPIB Clock Set–up

Table B-18 describes the steps to set the clock for the **Advantest** R3465 equipment.

Table B-18: Advantest R3465 Clock Setup

Step	Action
1	Observe the current date and time displayed in upper right of the CRT display.
2	If the date and time are incorrect, perform the following to change them:
2a	– Push the **Date/Time CRT** menu key.
2b	– Rotate the vernier knob to select and set.
2c	– Push the vernier knob to enter.
2d	– Push the **SHIFT** then **PRESET** pushbutton (just below the CRT display).

Pretest Setup for Advantest R3465

Before the Advantest R3465 analyzer is used for WinLMF–controlled testing it must be set up correctly for automatic testing. Perform the procedure in Table B-19.

Table B-19: Pretest Setup for Advantest R3465

Step	Action
1	Press the **SHIFT** button so the LED next to it is illuminated.
2	Press the **RESET** button.

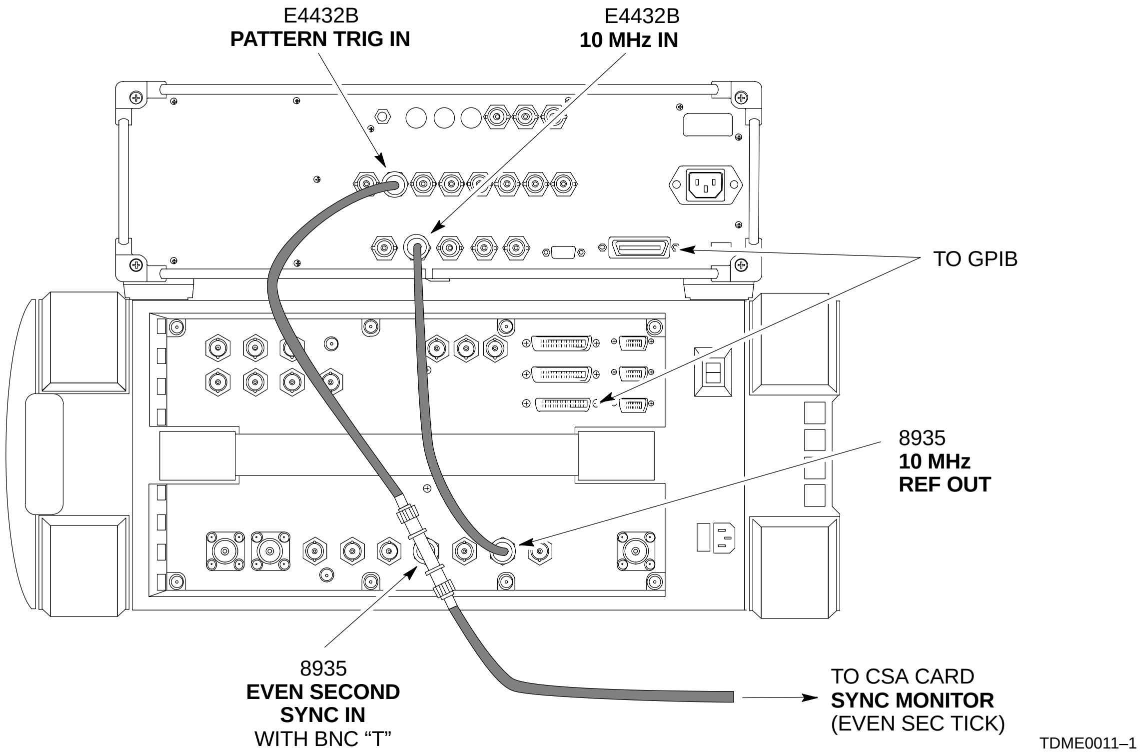
Agilent 8932/E4432B Test Equipment Interconnection

To perform FER testing on a 1X BTS with the Agilent 8935, a 1X–capable signal generator, such as the Agilent E4432B, must be used in conjunction with the CDMA base station test set. For proper operation, the test equipment items must be interconnected as follows:

10 MHz reference signal – Connect a BNC (M)–BNC (M) cable from the 8935 **10 MHz REF OUT** connector to the E4432B **10MHz IN** connector as shown in Figure B-17

Even second pulse reference – Refer to Figure B-17, and connect a BNC "T" connector to the 8935 **EVEN SEC SYNC IN** connector. Connect a BNC (M)–BNC (M) cable from one side of the BNC "T" to the E4432B **PATTERN TRIG IN** connector. Connect the other side of the BNC "T" to the CSA Card **SYNC MONITOR** connector using a BNC (M)–BNC (M) cable.

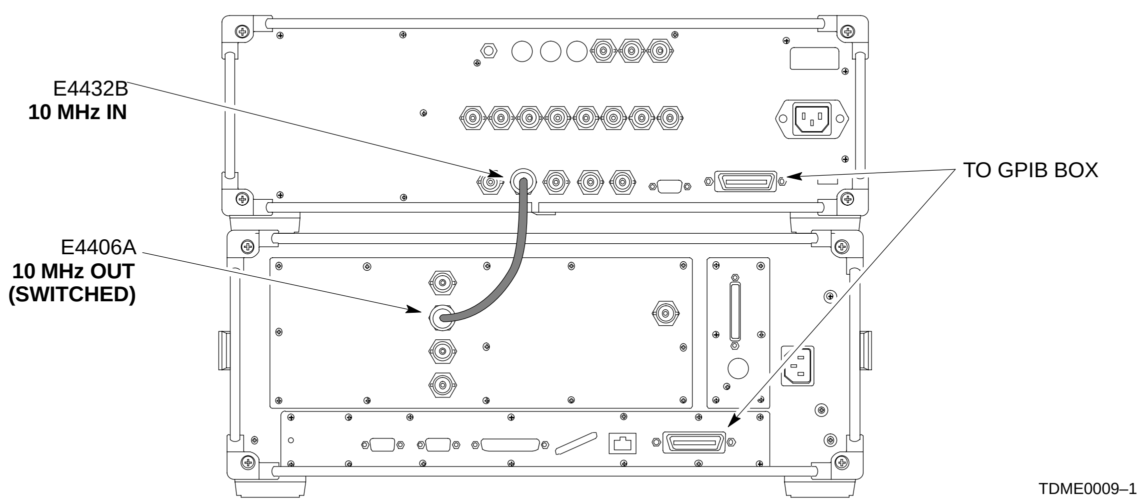
Figure B-17: Agilent 8935/E4432B 10MHz Reference and Even Second Tick Connections



Agilent E4406A/E4432B Test Equipment Interconnection

To provide proper operation during testing when both units are required, the 10 MHz reference signal from the E4406A transmitter test set must be provided to the E4432B signal generator. Connect a BNC (M)–BNC (M) cable from the E4406A **10 MHz OUT (SWITCHED)** connector to the E4432B **10MHz IN** connector as shown in Figure B-18.

Figure B-18: Agilent 10 MHz Reference Connections



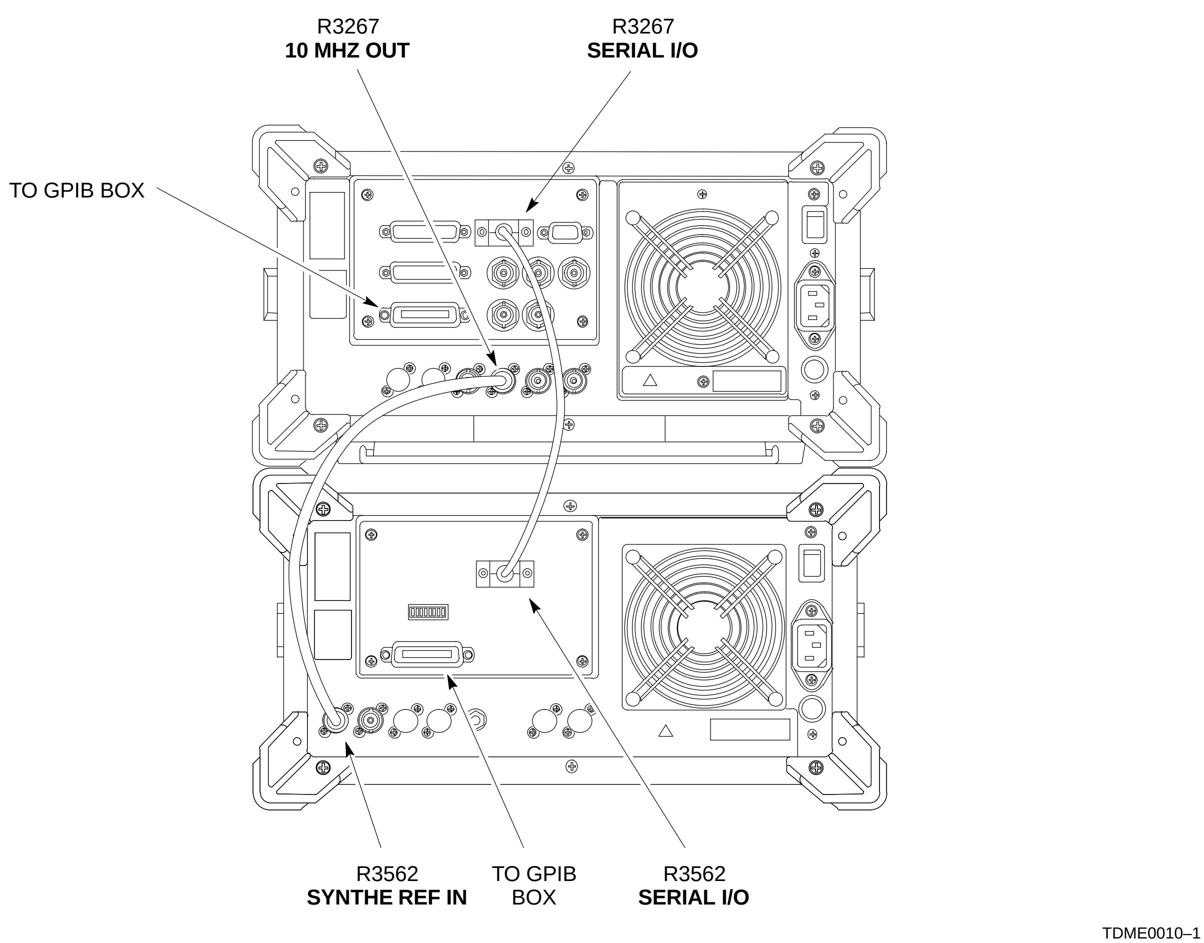
Advantest R3267/R3562 Test Equipment Interconnection

To provide proper operation during testing when both units are required, the R3257 spectrum analyzer must be interconnected with the R3562 signal generator as follows:

10 MHz reference signal – Connect a BNC (M)–BNC (M) cable between the R3562 **SYNTHE REF IN** connector and the R3267 **10 MHz OUT** connector as shown in Figure B-19.

Serial I/O – Using the Advantest cable provided, connect the R3267 **SERIAL I/O** connector to the R3562 **SERIAL I/O** connector as shown in Figure B-19.

Figure B-19: Advantest 10 MHz Reference and Serial I/O Connections



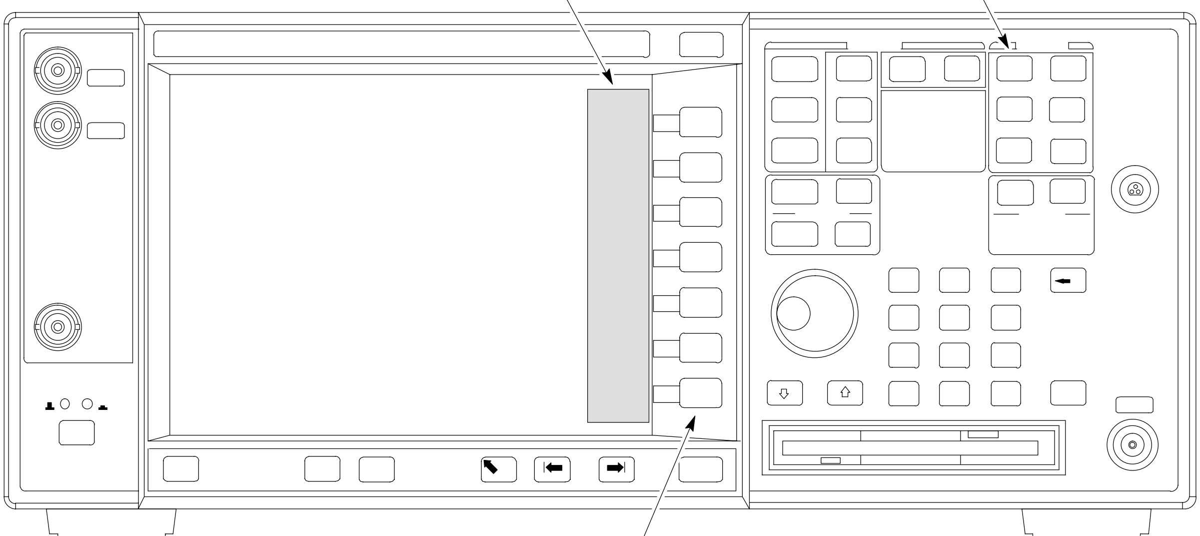
PRELIMINARY

Calibration Without the LMF

Several test equipment items used in the optimization process require pre–calibration actions or calibration verification which are not supported by the LMF. Procedures to perform these activities for the applicable test equipment items are covered in this section.

Agilent E4406A Transmitter Tester Self–alignment (Calibration)

Figure B-20: Performing Agilent E4406A Self–alignment (Calibration)



Refer to Figure B-20 and follow the procedure in Table B-20 to perform the Agilent E4406A self–alignment (calibration).

Table B-20: Perform Agilent E4406A Self–alignment (Calibration)

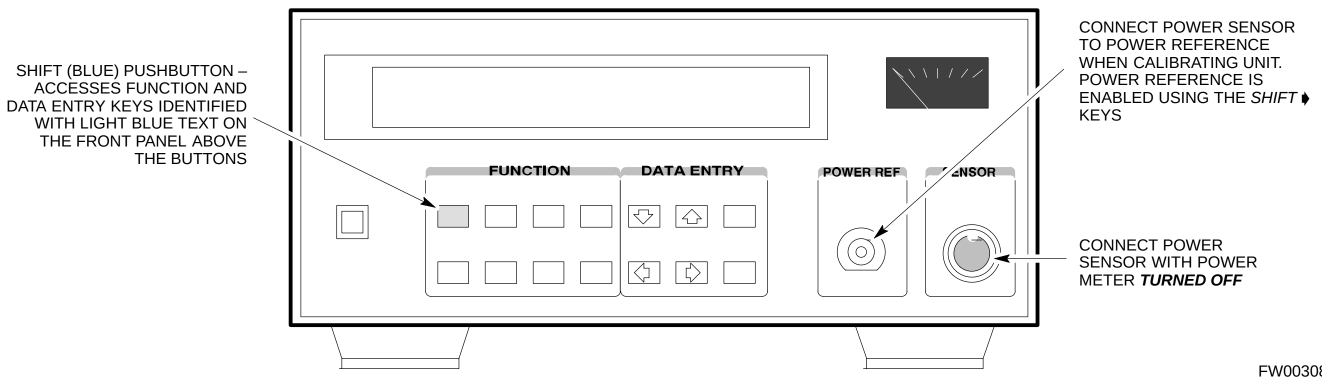
Step	Action
1	In the **SYSTEM** section of the instrument front panel, press the **System** key. – The softkey labels displayed on the right side of the instrument screen will change.
2	Press the **Alignments** softkey button to the right of the instrument screen. – The softkey labels will change.
3	Press the **Align All Now** softkey button. – All other instrument functions will be suspended during the alignment. – The display will change to show progress and results of the alignments performed. – The alignment will take less than one minute.

Calibrating HP 437 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 outlined in Table B-21 to enter information unique to the power sensor before calibrating the test setup. Refer to Figure B-21 as required.

NOTE	This procedure must be done *before* the automated calibration to enter power sensor specific calibration values.

Figure B-21: Power Meter Detail



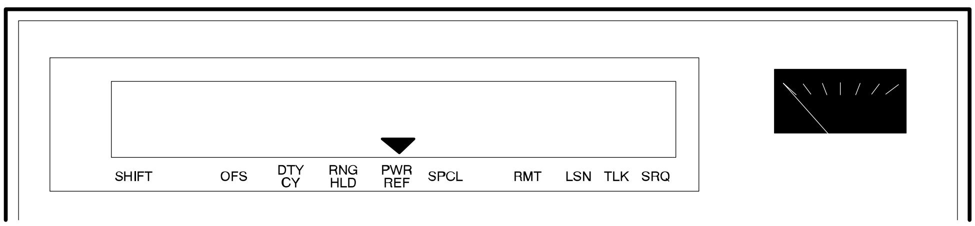
Step	Action
1	**! CAUTION** Do not connect/disconnect the power meter sensor cable with AC power applied to the meter. Disconnection could result in destruction of the sensing element or mis–calibration. Make sure the power meter **AC LINE** pushbutton is **OFF**.
2	Connect the power sensor cable to the **SENSOR** input.
3	Set the **AC LINE** pushbutton to **ON.** **NOTE** The calibration should be performed only after the power meter and sensor have been allowed to warm–up and stabilize for a *minimum of 60 minutes*.
4	Perform the following to set or verify the correct power sensor model:
4a	– Press **[SHIFT]** then **[⬍]** to select **SENSOR**.
4b	– Identify the power sensor model number from the sensor label.
4c	– Use the **[▲]** or **[▼]** button to select the appropriate model; then press **[ENTER]**.
5	Refer to the illustration for step 8, and perform the following to ensure the power reference output is OFF:

Table B-21: HP 437 Power Meter Calibration Procedure

. . . continued on next page

Equipment Calibration – continued

Table B-21: HP 437 Power Meter Calibration Procedure

Step	Action
5a	– Observe the instrument display and determine if the triangular indicator over **PWR REF** is displayed.
5b	– If the triangular indicator is displayed, press **[SHIFT]** then **[▶]** to turn it off.
6	Press **[ZERO]**. – Display will show "Zeroing ******." – Wait for process to complete.
7	Connect the power sensor to the **POWER REF** output.
8	Turn on the **PWR REF** by performing the following:
8a	– Press **[SHIFT]** then **[▶]**.
8b	– Verify that the triangular indicator (below) appears in the display above **PWR REF**. 
9	Perform the following to set the **REF CF%**:
9a	– Press (**[SHIFT]** then **[ZERO]**) for **CAL**.
9b	– Enter the sensor's **REF CF%** from the sensor's decal using the arrow keys and press **[ENTER]**. (The power meter will display "CAL *****" for a few seconds.) **NOTE** If the REF CAL FACTOR (REF CF) is not shown on the power sensor, assume it to be 100%.
10	Perform the following to set the **CAL FAC %**:
10a	– Press **[SHIFT]** then **[FREQ]** for **CAL FAC**.
10b	– On the sensor's decal, locate an approximate calibration percentage factor (**CF%**) at 2 GHz.
10c	– Enter the sensor's calibration % (**CF%**) using the arrow keys and press **[ENTER]**. — When complete, the power meter will typically display 0.05 dBm. (Any reading between 0.00 and 0.10 is normal.)
11	To turn off the **PWR REF**, perform the following:
11a	– Press **[SHIFT]** then **[▶]**.
11b	– Disconnect the power sensor from the **POWER REF** output.

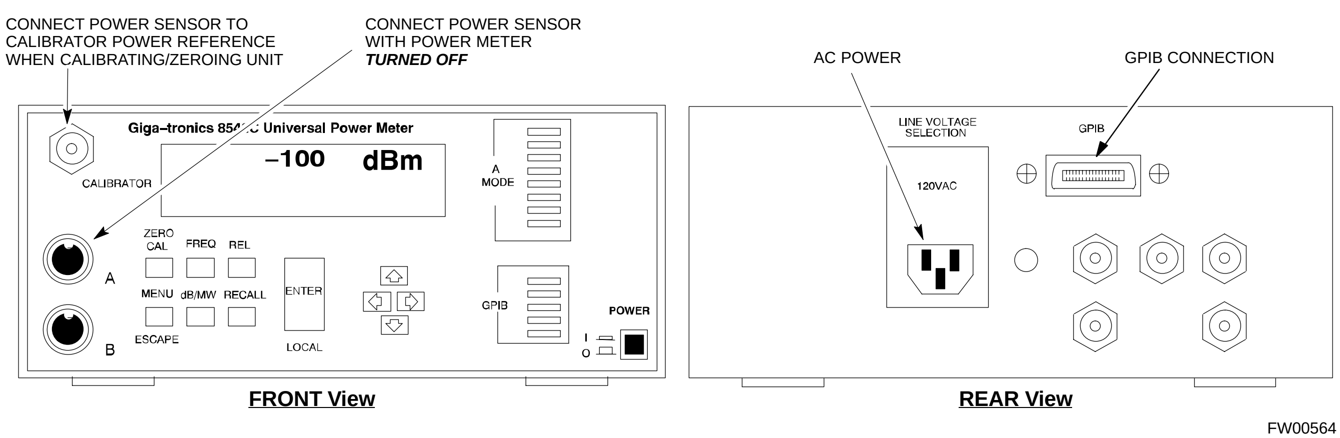
Calibrating Gigatronics 8541C Power Meter

Precise transmit output power calibration measurements are made using a bolometer–type broadband power meter with a sensitive power sensor. Follow the steps in Table B-22 to enter information unique to the power sensor.

Table B-22: Calibrate Gigatronics 8541C Power Meter

Step	Action
1	**! CAUTION** Do not connect/disconnect the power meter sensor cable with AC power applied to the meter. Disconnection could result in destruction of the sensing element or miscalibration. Make sure the power meter **POWER** pushbutton is **OFF**.
2	Connect the power sensor cable to the **SENSOR** input.
3	Set the **POWER** pushbutton to **ON.** **NOTE** Allow the power meter and sensor to warm up and stabilize for a *minimum of 60 minutes* before performing the calibration procedure.
4	Connect the power sensor to the **CALIBRATOR** output connector.
5	Press **ZERO**. – Wait for the process to complete. Sensor factory calibration data is read to power meter during this process.
6	When the zeroing process is complete, disconnect the power sensor from the **CALIBRATOR** output.

Figure B-22: Gigatronics 8541C Power Meter Detail



Calibrating Test Cable Setup Using HP PCS Interface (HP83236)

Table B-23 covers the procedure to calibrate the test equipment using the HP8921 Cellular Communications Analyzer equipped with the HP83236 PCS Interface.

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.

Table B-23: Calibrating Test Cable Setup (using the HP PCS Interface)

Step	Action
	NOTE Verify that GPIB controller is turned off.
1	Insert HP83236 Manual Control System card into memory card slot.
2	Press the **Preset** pushbutton.
3	Under **Screen Controls**, press the **TESTS** pushbutton to display the **TESTS** (Main Menu) screen.
4	Position the cursor at **Select Procedure Location** and select it. In the Choices selection box, select **CARD.**
5	Position the cursor at **Select Procedure Filename** and select it. In the Choices selection box, select **MANUAL**.
6	Position the cursor at **RUN TEST** and select it. HP must be in Control Mode **Select YES.**
7	If using **HP83236A:** Set channel number=<*chan#*>: – Position cursor at **Channel Number** and select it. – Enter the *chan#* using the numeric keypad; press **[Enter]** and the screen will go blank. – When the screen reappears, the *chan#* will be displayed on the channel number line. If using **HP83236B:** Set channel frequency: – Position cursor at **Frequency Band** and press **Enter**. – Select **User Defined Frequency**. – Go **Back to Previous Menu**. – Position the cursor to **83236** generator frequency and enter actual RX frequency. – Position the cursor to **83236** analyzer frequency and enter actual TX frequency.
8	Set RF Generator level: – Position the cursor at **RF Generator Level** and select it. – Enter **–10** using the numeric keypad; press [**Enter**] and the screen will go blank. – When the screen reappears, the value –10 dBm will be displayed on the RF Generator Level line.

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Table B-23: Calibrating Test Cable Setup (using the HP PCS Interface)

Step	Action
9	Set the user fixed Attenuation Setting to **0 dBm:** – Position cursor at **Analyzer Attenuation** and select it – Position cursor at **User Fixed Atten Settings** and select it. – Enter 0 (zero) using the numeric keypad and press [**Enter**].
10	Select **Back to Previous Menu**.
11	Record the HP83236 Generator Frequency Level: Record the HP83236**B** Generator Frequency Level: – Position cursor at **Show Frequency and Level Details** and select it. – Under HP83236 Frequencies and Levels, record the Generator Level. – Under HP83236**B** Frequencies and Levels, record the Generator Frequency Level (1850 – 1910 MHz). – Position cursor at **Prev Menu** and select it.
12	Click on **Pause for Manual Measurement**.
13	Connect the power sensor directly to the *RF OUT ONLY* port of the PCS Interface.
14	On the HP8921A, under **To Screen,** select **CDMA GEN**.
15	Move the cursor to the **Amplitude** field and click on the Amplitude value.
16	Increase the Amplitude value until the power meter reads **0 dBm ±0.2 dB**.
	NOTE The Amplitude value can be increased coarsely until 0 dBM is reached; then fine tune the amplitude by adjusting the **Increment Set** to 0.1 dBm and targeting in on 0 dBm.
17	Disconnect the power sensor from the *RF OUT ONLY* port of the PCS Interface.
	NOTE The Power Meter sensor's lower limit is –30 dBm. Thus, only components having losses ≤30 dB should be measured using this method. **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.**
18	Disconnect all components in the test setup and calibrate each one separately by connecting each component, one-at-a-time, between the *RF OUT ONLY PORT* and the power sensor. Record the calibrated loss value displayed on the power meter. • Example: (A) Test Cable(s) = –1.4 dB (B) 20 dB Attenuator = –20.1 dB (B) Directional Coupler = –29.8 dB
19	After all components are calibrated, reassemble all components together and calculate the total test setup loss by adding up all the individual losses: • Example: Total test setup loss = –1.4 –29.8 –20.1 = –51.3 dB. This calculated value will be used in the next series of tests.
20	Under **Screen Controls** press the **TESTS** button to display the **TESTS** (Main Menu) screen.

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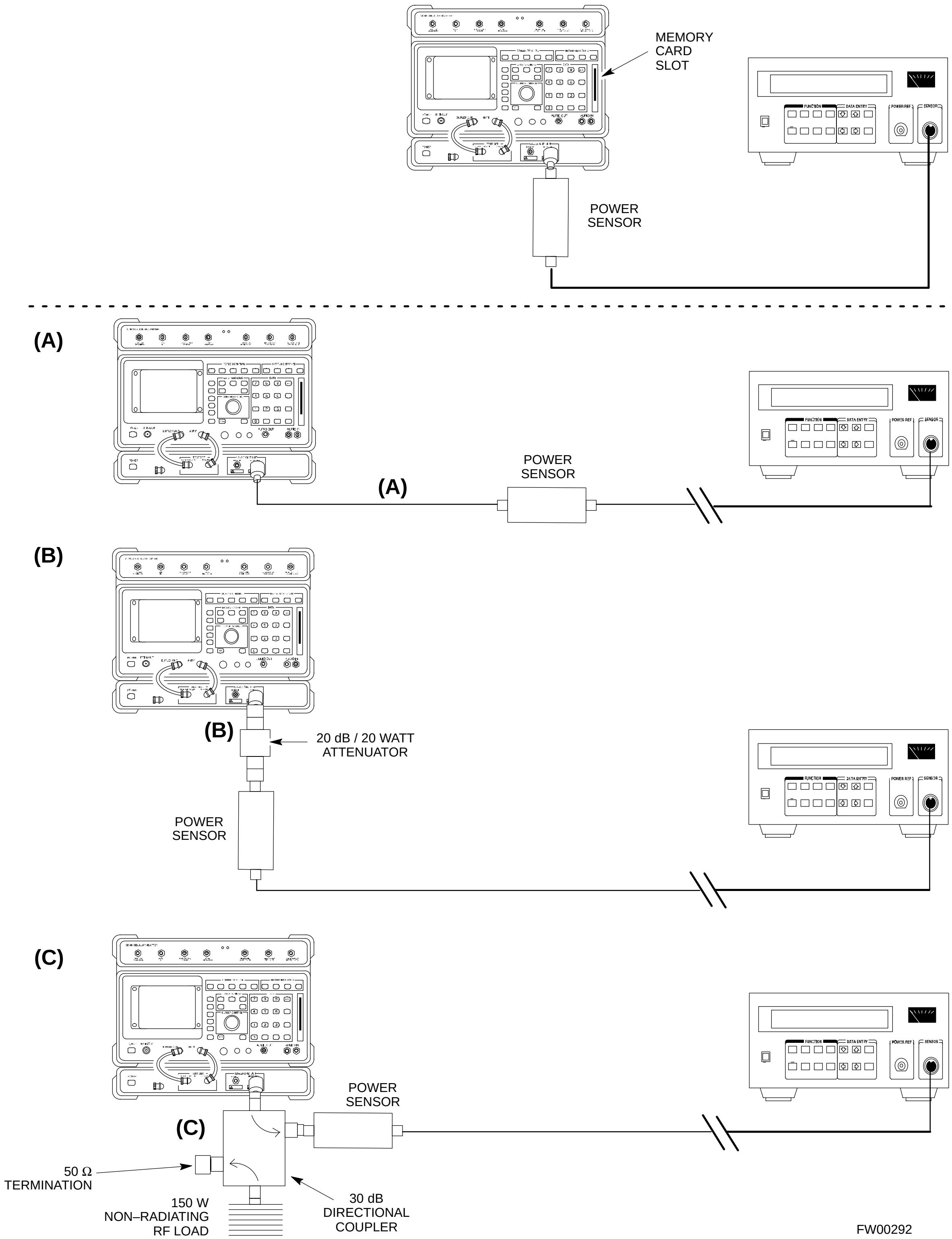
B

Table B-23: Calibrating Test Cable Setup (using the HP PCS Interface)	
Step	**Action**
21	Select **Continue** (K2).
22	Select **RF Generator Level** and set to –119 dBm.
23	Click on **Pause for Manual Measurement**.
24	Verify the HP8921A Communication Analyzer/83203A CDMA interface setup is as follows (fields not indicated remain at default): • Verify the GPIB (HP–IB) address: – under **To Screen,** select **More** – select **IO CONFIG** – Set HP–IB Adrs to **18** – set Mode to **Talk&Lstn** • Verify the HP8921A is displaying frequency (instead of RF channel) – Press the blue **[SHIFT]** button, then press the Screen Control **[DUPLEX]** button; this switches to the **CONFIG** (CONFIGURE) screen. – Use the cursor control to set RF Display to **<u>Freq</u>**
25	Refer toChapter 3 for assistance in setting the cable loss values into the LMF.

Figure B-23: Cable Calibration Using HP8921 with PCS Interface



Calibrating Test Cable Setup Using Advantest R3465

NOTE	Be sure the GPIB Interface is OFF for this procedure.

Advantest R3465 Manual Test setup and calibration must be performed at both the TX and RX frequencies.

Table B-24: Procedure for Calibrating Test Cable Setup Using Advantest R3465

Step	Action
	*** IMPORTANT** – This procedure can only be performed *after* test equipment has been allowed to warm–up and stabilize for a *minimum of 60 minutes*.
1	Press the **SHIFT** and the **PRESET** keys located below the display
2	Press the **ADVANCE** key in the MEASUREMENT area of the control panel**.**
3	Select the **CDMA Sig** CRT menu key
4	Select the **Setup** CRT menu key
5	Using the vernier knob and the cursor keys set the following parameters **NOTE** Fields not listed remain at default **Generator Mode:** SIGNAL **Link:** FORWARD **Level Unit:** dBm **CalCorrection:** ON **Level Offset:** OFF
6	Select the **return** CRT menu key
7	Press **FREQ** key in the ENTRY area
8	Set the frequency to the desired value using the keypad entry keys
9	Verify that the **Mod** CRT menu key is highlighting OFF; if not, press the **Mod** key to toggle it OFF.
10	Verify that the **Output** CRT menu key is highlighting OFF; if not, press the **Output** key to toggle it OFF.
11	Press the **LEVEL** key in the ENTRY area.
12	Set the LEVEL to **0 dBm** using the key pad entry keys.
13	Zero power meter. Next connect the power sensor directly to the “RF OUT” port on the R3561L CDMA Test Source Unit.
14	Press the **Output** CRT menu key to toggle Output to ON.
15	Record the power meter reading ________________________

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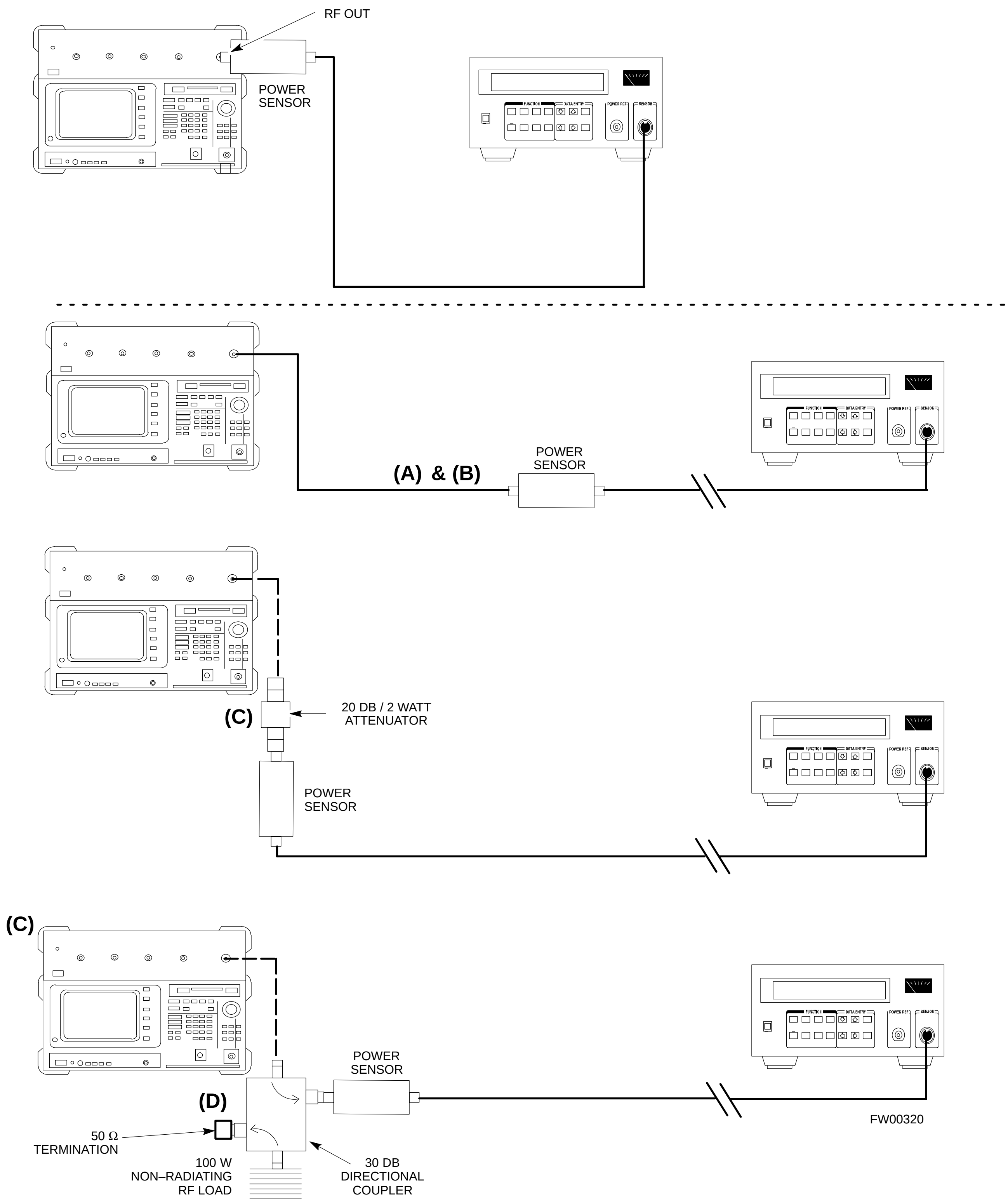
Table B-24: Procedure for Calibrating Test Cable Setup Using Advantest R3465	
Step	**Action**
16	Disconnect the power meter sensor from the R3561L RF OUT jack.
	*** IMPORTANT** The Power Meter sensor's lower limit is –30 dBm. Thus, only components having losses ≤ 30 dB should be measured using this method. **For best accuracy, always re–zero the power meter before connecting the power sensor to the component being calibrated. Then, after connecting the power sensor to the component, record the calibrated loss immediately.**
17	Disconnect all components in the the test setup and calibrate each one separately. Connect each component one–at–a–time between the "RF OUT" port and the power sensor (see Figure B-24, "Setups A, B, and C"). Record the calibrated loss value displayed on the power meter for each connection. Example: (A) 1st Test Cable = –0.5 dB (B) 2nd Test Cable = –1.4 dB (C) 20 dB Attenuator = –20.1 dB (D) 30 dB Directional Coupler = –29.8 dB
18	Press the **Output** CRT menu key to toggle Output OFF.
19	Calculate the total test setup loss by adding up all the individual losses: Example: Total test setup loss = 0.5 + 1.4 + 20.1 + 29.8 = 51.8 dB This calculated value will be used in the next series of tests.
20	Press the **FREQ** key in the ENTRY area
21	Using the keypad entry keys, set the test frequency to the RX frequency
22	Repeat steps 9 through 19 for the RX frequency.
23	Refer to Chapter 3 for assistance in setting the cable loss values into the LMF.

Figure B-24: Cable Calibration Using Advantest R3465



Appendix C: Download ROM Code

Appendix Content

C

Downloading ROM Code C-1
Exception Procedure – Downloading ROM Code C-1

Notes

Exception Procedure – Downloading ROM Code

This procedure is not part of a normal optimization.

Perform this procedure only on an exception basis when no alternative exists to load a BTS device with the correct version of ROM code.

NOTE

One GLI must be INS_ACT (bright green) before ROM code can be downloaded to non–GLI devices.

CAUTION

The correct ROM and RAM codes for the software release used on the BSS must be loaded into BTS devices. To identify the correct device ROM and RAM code loads for the software release being used on the BSS, refer to the Version Matrix section of the SC™ CDMA Release Notes (supplied on the tapes or CD–ROMs containing the BSS software).

All devices in a BTS must be loaded with the ROM and RAM code specified for the software release used on the BSS before any optimization or ATP procedures can be performed.

If a replacement device is loaded with ROM code which is not compatible with the BSS software release being used, the device ROM code can be changed using the LMF before performing the BTS optimization and ATPs. *A device loaded with later release ROM code can not be converted back to a previous release ROM code in the field without Motorola assistance*

If it is necessary to download ROM code to a device from the LMF, the procedure in Table C-1 includes steps *for both ROM and RAM code download using the LMF.*

Prerequisites

Prior to performing this procedure, ensure the correct ROM and RAM code files exist in the LMF computer's applicable **<*x*>:\<*lmf home directory*>\cdma\loads***<*codeload#*>**code** folder for each of the devices to be loaded.

CAUTION

The Release level of the ROM code to be downloaded must be the one specified for the software release installed in the BSS. The release level of the ROM code resident in the other devices in the BTS must also be correct for the BSS software release being used. ROM code must not be downloaded to a frame loaded with code for a BSS software release with which it is not compatible.

This procedure should only be used to upgrade replacement devices for a BTS. It should NOT be used to upgrade all devices in a BTS. If a BTS is to be upgraded from R15.x to R16.0, the upgrade should be done by the OMC–R using the DownLoad Manager.

Table C-1: Download ROM and RAM Code to Devices

Step	Action
1	Click on the device to be loaded. **NOTE** More than one device of the *same* type can be selected for download by either clicking on each one to be downloaded or from the BTS menu bar **Select** pull–down menu, select the *device* item that applies. Where: *device* = the type of device to be loaded (BBX, CSA, GLI, MCC)
2	From the BTS menu bar **Device** pull–down menu, select **Status**. – A status report window will appear.
3	Make a note of the number in the **HW Bin Type** column. **NOTE** "HW Bin Type" is the Hardware Binary Type for the device. This code is used as the last four digits in the filename of a device's binary ROM code file. Using this part of the filename, the ROM code file can be matched to the device in which it is to be loaded.
4	Click **OK** to close the status window.
5	Click on the device to be loaded.
6	**NOTE** ROM code is automatically selected for download from the `<x>:\<lmf home directory>\version folder>\<code folder>` specified by the NextLoad property in the `bts-#.cdf` file. To check the value of the NextLoad property, click on **Util > Examine > Display** Nextload. A pop–up message will show the value of the NextLoad. From the BTS menu bar **Device** pull–down menus, select **Download > ROM**. – 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 11. – If a file selection window appears, select the ROM code file manually.
7	Double–click on the version folder with the desired version number for the ROM code file (for example *2.16.0.x*).

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Table C-1: Download ROM and RAM Code to Devices	
Step	**Action**
8	Double–click the **Code** folder. – A list of ROM and RAM code files will be displayed.
9	**! CAUTION** A ROM code file with the correct HW Bin Type must be chosen. Using a file with the wrong HW Bin Type can result in unpredictable operation and damage to the device. Click on the ROM code file with the filename which matches the device type and HW Bin Type number noted in step 3 (for example, file **bbx_rom.bin.0604** is the ROM code file for a BBX with a HW Bin Type of 0604). – The file should be highlighted.
10	Click on the **Load** button. – A status report window is displayed showing the result of the download. **NOTE** If the ROM load failed for some devices, load them *individually* by clicking on one device, perform steps 6 through 10 for it, and repeat the process for each remaining device.
11	Click **OK** to close the status window.
12	From the LMF window menu bar **Tools** pull–down menus, select **Update NextLoad > CDMA**.
13	In the left–hand pane of the window which opens, click on the BTS number for the frame being loaded (for example, *BTS–14*).
14	On the list of versions displayed in the right–hand pane, click the button next to the version number of the folder that was used for the ROM code download (for example, *2.16.0.x*) and click **Save**. – A pop–up message will appear showing the CDF has been updated.
15	Click on the **OK** button to dismiss the pop–up message.
16	Click on the device that was loaded with ROM code.
17	**NOTE** RAM code is automatically selected for download. From the BTS menu bar **Device** pull–down menus, select **Download > Code/Data** to download RAM code and dds file data. – A status report is displayed showing the result of the download.
18	Click **OK** to close the status window.
19	Observe the downloaded non–GLI device to ensure it is OOS_RAM (yellow).
20	Click on the device which was loaded with code.
21	From the BTS menu bar **Device** pull–down menu, select **Status**. Verify that the correct ROM and RAM version numbers are displayed in the status report window.
22	Click **OK** to close the status window.

C

Notes

Appendix D: MMI Cable Fabrication

Appendix Content

MMI Cable Fabrication D-1
Purpose D-1
Required Parts D-1
Cable Details D-1
Wire Run List D-2

Notes

MMI Cable Fabrication

Purpose

When the Motorola SLN2006A MMI Interface Kit is not available, a cable can be fabricated by the user to interface a nine–pin serial connector on an LMF computer platform with an MMI connector on GLI cards and other Motorola BTS assemblies. This section provides information necessary for fabricating this cable.

Required Parts

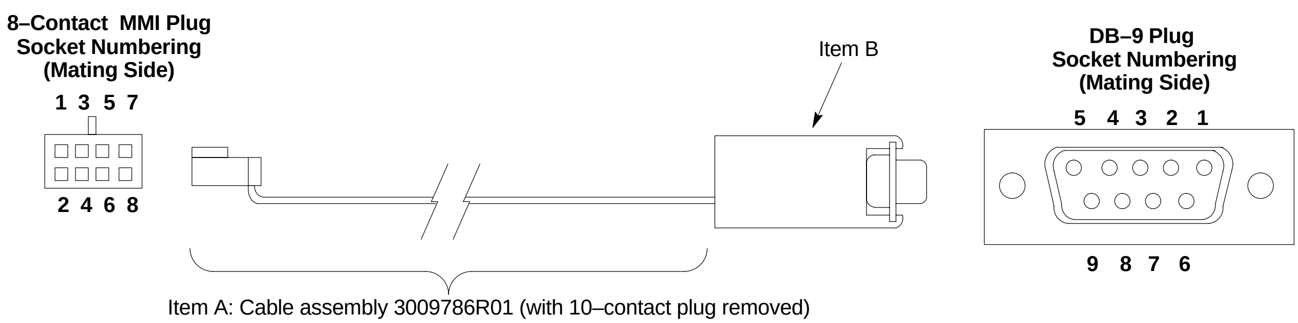
Table D-1: Parts Required to Fabricate MMI Cable

Item	Part Number	Qty	Description
A	Motorola 3009786R01	1	Ribbon cable assembly, 1.524 M, one 8–contact MMI connector, one 10–contact connector
B	AMP 749814–1, Belkin A4B202BGC, or equivalent	1	Receptacle kit, unassembled, 9–position, socket contacts, unshielded, metal or plastic shell, solder or crimp–type contacts

Cable Details

Figure D-1 illustrates the details of the fabricated MMI cable.

Figure D-1: Fabricated MMI Cable Details



FABRICATION NOTES:
1. Remove 10–contact connector from ribbon cable of cable assembly 3009786R01
2. Separate wires at unterminated end of ribbon cable as required to connect to DB–9 connector contacts
3. Dark wire on ribbon cable of cable assembly 3009786R01 connects to pin 1 of the 8–contact plug
4. Strip three ribbon cable wires with connections specified in Table D-2 and connect to DB–9 plug contacts as specified in Table D-2
5. Shorten un–connected ribbon cable wires enough to prevent contacting DB–9 contacts, leaving enough wire to egage any strain relief in the DB–9 connector shell

MMIFAB001–0

Wire Run List

Table D-2 provides the wire run/pin–out information for the fabricated MMI cable.

Table D-2: Fabricated MMI Cable Wire Run List

8–CONTACT MMI PLUG CONTACT		DB–9 PLUG CONTACT
1	———————	5
2	———————	2
3	———————	3
4		No Connection (NC)
5		NC
6		NC
7		NC
8		NC

Appendix E: Multiple BTS Configurations

Appendix Content

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PRELIMINARY

Notes

PRELIMINARY

Introduction

This appendix covers the indoor and outdoor version of the Compact BTS Expansion configuration. This configuration is set up for only using other Compact BTSes. Power and ground cabling is not shown. Figure E-1 through Figure E-3 show expansion BTSes using two cCLPAs.

Figure E-4 through Figure E-6 show expansion BTSes using one cCLPA.

Materials Needed

The following materials are required to configure expansion BTSes.

- Interconnect cabling of varying lengths
- Various sized conduit (if used)
- Data cable for cCLPA (if used)
- Customer I/O cabling

External Combiner and Directional Coupler

A combiner and directional coupler are required for some of the configurations. The following are the recommended specifications for the combiner and directional coupler.

Table E-1: Combiner and Directional Coupler Specifications

Item	Specifications
Combiner	
Connector:	N–Type
Frequency Range:	Up to 2 GHz
Insertion Loss:	3.5 dB maximum
Return Loss:	16 dB minimum
Average Input Power:	60 Watts minimum
Directional Coupler	
Connector:	N–Type
Frequency Range:	810 to 950 MHz
Coupling:	30 +/–1 dB
Directivity:	28 dB minimum
Return Loss:	18 dB minimum
Average Input Power:	10 Watts minimum

- Motorola recommended directional coupler is P/N 809643T03
- Recommended cable with combiner is Andrew LDF4–50 or equivalent

Frame ID Switch Settings

Refer to Chapter 5, Figure 5-1 or Figure 5-2 or Table 5-1 through Table 5-4 for the Frame DIP Switch settings.

Installation Procedure for Expansion Compact BTS with Dual cCLPAs

Follow the procedure in Table E-2 for installation of expansion Compact BTS with Dual cCLPAs.

Table E-2: Procedure for Installing Expansion Compact BTS with Dual cCLPA

Step	Action
1	Follow the procedure in Chapter 4 for installing a Compact BTS in a rack.
2	For a 3 BTS expansion configuration, follow Figure E-1. Proceed to step 3.
2a	For a 2 BTS expansion configuration, follow Figure E-2. Proceed to step 3.
2b	For a 1 BTS expansion configuration, follow Figure E-3. Proceed to step 3.
3	If not using conduit, dress cables as necessary.
4	Perform Optimization and ATP as described in Chapter 6. *LMF Help* provides further information.

Starter and Three Expansion BTSes Interconnect Cabling for Dual cCLPA

Table E-3 shows in tabular format the interconnect cabling of Figure E-1.

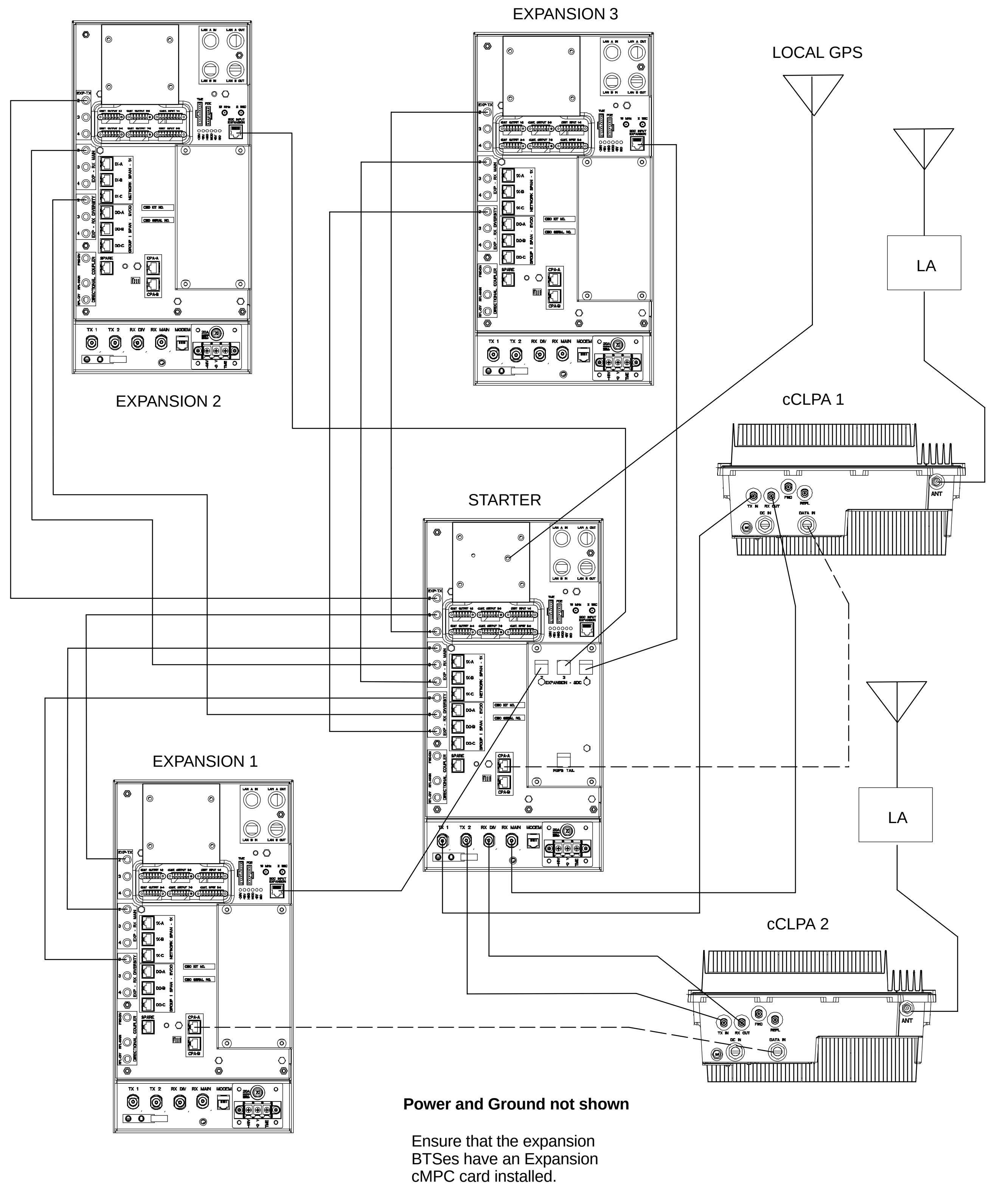
Table E-3: Starter and Three Expansion BTS Interconnect Cabling for Circuit or Packet Configuration with Dual cCLPA

BTS	Expansion 1	Expansion 2	Expansion 3	cCLPA
Starter TX–1	–	–	–	cCLPA–1 (TX IN)
Starter TX–2	–	–	–	cCLPA–2 (TX IN)
Starter EXP–TX 2	EXP TX–2	–	–	*cCLPA–2
Starter EXP–TX 3	–	EXP TX–2	–	*cCLPA–1
Starter EXP–TX 4	–	–	EXP TX–2	*cCLPA–2
Starter RX MAIN	–	–	–	cCLPA–1 (RX OUT)
Starter EXP–RX MAIN 2	–	EXP – RX MAIN 2	–	*cCLPA–1
Starter EXP–RX MAIN 3	EXP – RX MAIN 2	–	–	*cCLPA–2
Starter EXP–RX MAIN 4	–	–	EXP – RX MAIN 2	*cCLPA–2
Starter RX DIV	–	–	–	cCLPA–2 (RX OUT)
Starter EXP–RX DIV 2	EXP – RX DIV 2	–	–	*cCLPA–2
Starter EXP–RX DIV 3	–	EXP – RX DIV 2	–	*cCLPA–1
Starter EXP–RX DIV 4	–	–	EXP – RX DIV 2	*cCLPA–2
Starter SDCX 2	SDC INPUT EXPANSION	–	–	–
Starter SDCX 3	–	SDC INPUT EXPANSION	–	–
Starter SDCX 4	–	–	SDC INPUT EXPANSION	–

* Not actual physical connections to cCLPA, but software connections through the Starter BTS.

E

Figure E-1: Three Expansion BTSes Cabling Diagram with Two cCLPAs



Starter and Two Expansion BTSes Interconnect Cabling for Dual cCLPA

Table E-4 shows in tabular format the interconnect cabling of Figure E-2.

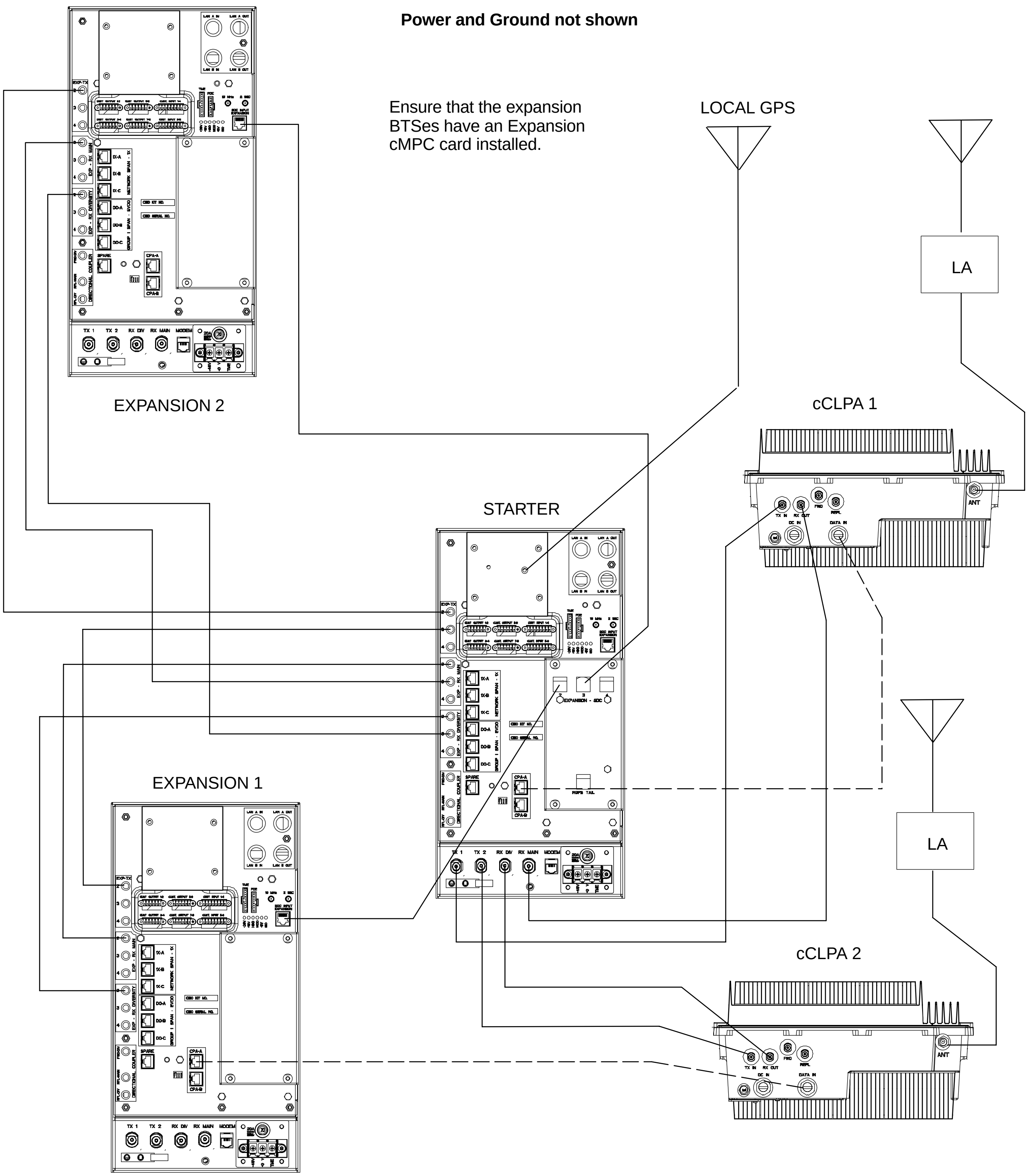
Table E-4: Starter and Two Expansion BTS Interconnect Cabling for Circuit or Packet Configuration with Dual cCLPA

BTS	Expansion 1	Expansion 2	Expansion 3	cCLPA
Starter TX–1	–	–	–	cCLPA–1 (TX IN)
Starter TX–2	–	–	–	cCLPA–2 (TX IN)
Starter EXP–TX 2	EXP TX–2	–	–	*cCLPA–2
Starter EXP–TX 3	–	EXP TX–2	–	*cCLPA–1
Starter EXP–TX 4	–	–	–	–
Starter RX MAIN	–	–	–	cCLPA–1 (RX OUT)
Starter EXP–RX MAIN 2		EXP – RX MAIN 2	–	*cCLPA–1
Starter EXP–RX MAIN 3	EXP – RX MAIN 2		–	*cCLPA–2
Starter EXP–RX MAIN 4	–	–	–	–
Starter RX DIV	–	–	–	cCLPA–2 (RX OUT)
Starter EXP–RX DIV 2	EXP – RX DIV 2	–	–	*cCLPA–2
Starter EXP–RX DIV 3	–	EXP – RX DIV 2	–	*cCLPA–1
Starter EXP–RX DIV 4	–	–	–	–
Starter SDCX 2	SDC INPUT EXPANSION	–	–	–
Starter SDCX 3	–	SDC INPUT EXPANSION	–	–
Starter SDCX 4	–	–	–	–

* Not actual physical connections to cCLPA, but software connections through the Starter BTS.

E

Figure E-2: Two Expansion BTSes Cabling Diagram with Two cCLPAs



Starter and One Expansion BTSes Interconnect Cabling for Dual cCLPA

Table E-5 shows in tabular format the interconnect cabling of Figure E-3.

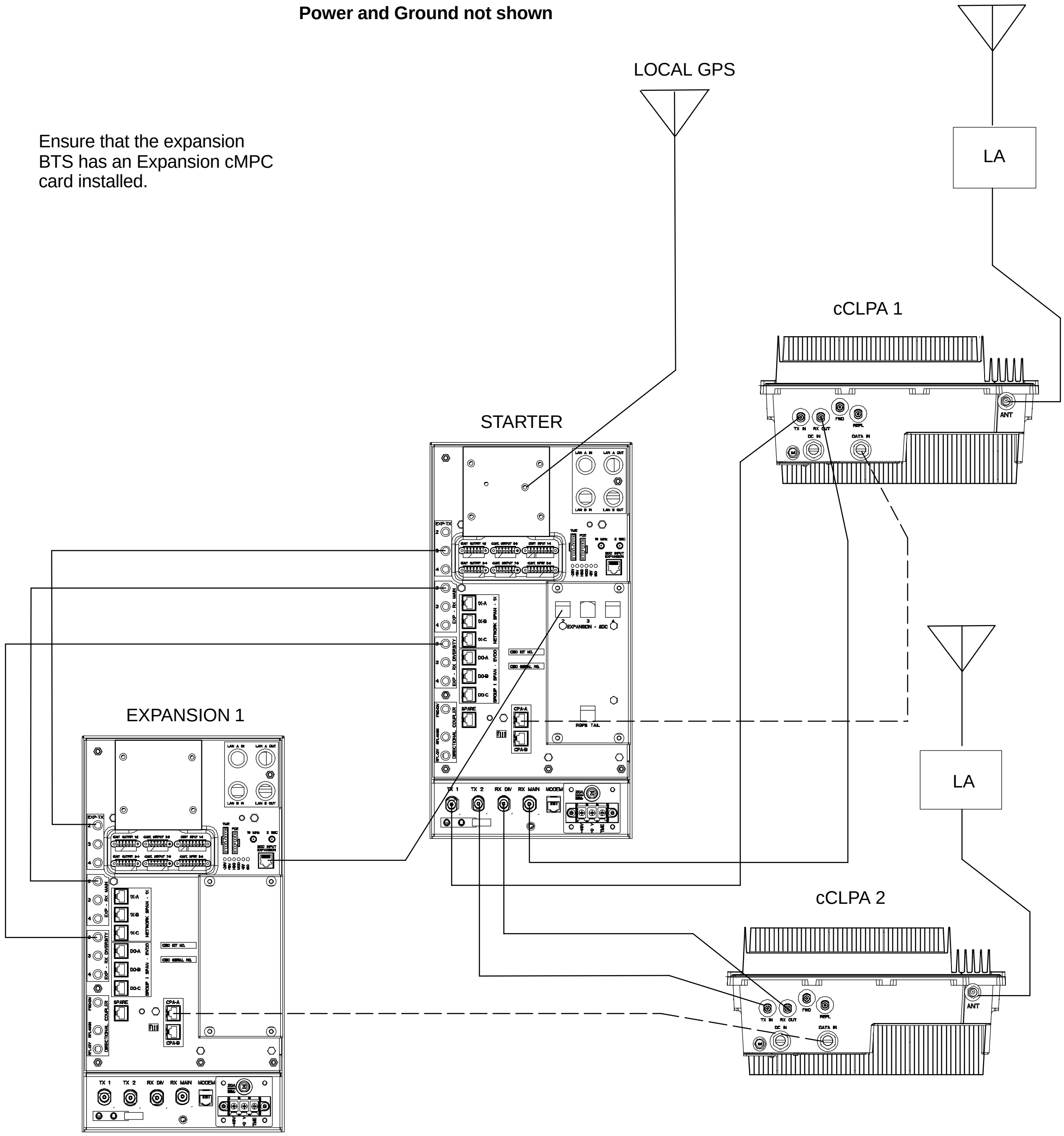
Table E-5: Starter and One Expansion BTS Interconnect Cabling for Circuit or Packet Configuration with Dual cCLPA

BTS	Expansion 1	Expansion 2	Expansion 3	cCLPA
Starter TX–1	–	–	–	cCLPA–1 (TX IN)
Starter TX–2	–	–	–	cCLPA–2 (TX IN)
Starter EXP–TX 2	EXP TX–2	–	–	–
Starter EXP–TX 3	–	–	–	–
Starter EXP–TX 4	–	–	–	–
Starter RX MAIN	–	–	–	cCLPA–1 (RX OUT)
Starter EXP–RX MAIN 2	–	–	–	–
Starter EXP–RX MAIN 3	EXP – RX MAIN 2	–	–	*cCLPA–2
Starter EXP–RX MAIN 4	–	–	–	–
Starter RX DIV	–	–	–	cCLPA–2 (RX OUT)
Starter EXP–RX DIV 2	EXP – RX DIV 2	–	–	*cCLPA–2
Starter EXP–RX DIV 3	–	–	–	–
Starter EXP–RX DIV 4	–	–	–	–
Starter SDCX 2	SDC INPUT EXPANSION	–	–	–
Starter SDCX 3	–	–	–	–
Starter SDCX 4	–	–	–	–

* Not actual physical connections to cCLPA, but software connections through the Starter BTS.

E

Figure E-3: One Expansion BTS Cabling Diagram with Two cCLPAs



Installation Procedure for Expansion Compact BTS with Single cCLPA

Follow the procedure in Table E-2 for installation of expansion Compact BTS with Dual cCLPAs.

Table E-6: Procedure for Installing Expansion Compact BTS with Single cCLPA

Step	Action
1	Follow the procedure in Chapter 4 for installing a Compact BTS in a rack.
2	For a 3 BTS expansion configuration, follow Figure E-4. Proceed to step 3.
2a	For a 2 BTS expansion configuration, follow Figure E-5. Proceed to step 3.
2b	For a 1 BTS expansion configuration, follow Figure E-6. Proceed to step 3.
3	If not using conduit, dress cables as necessary.
4	Perform Optimization and ATP as described in Chapter 6. *LMF Help* provides further information.

Starter and Three Expansion BTSes Interconnect Cabling for Single cCLPA

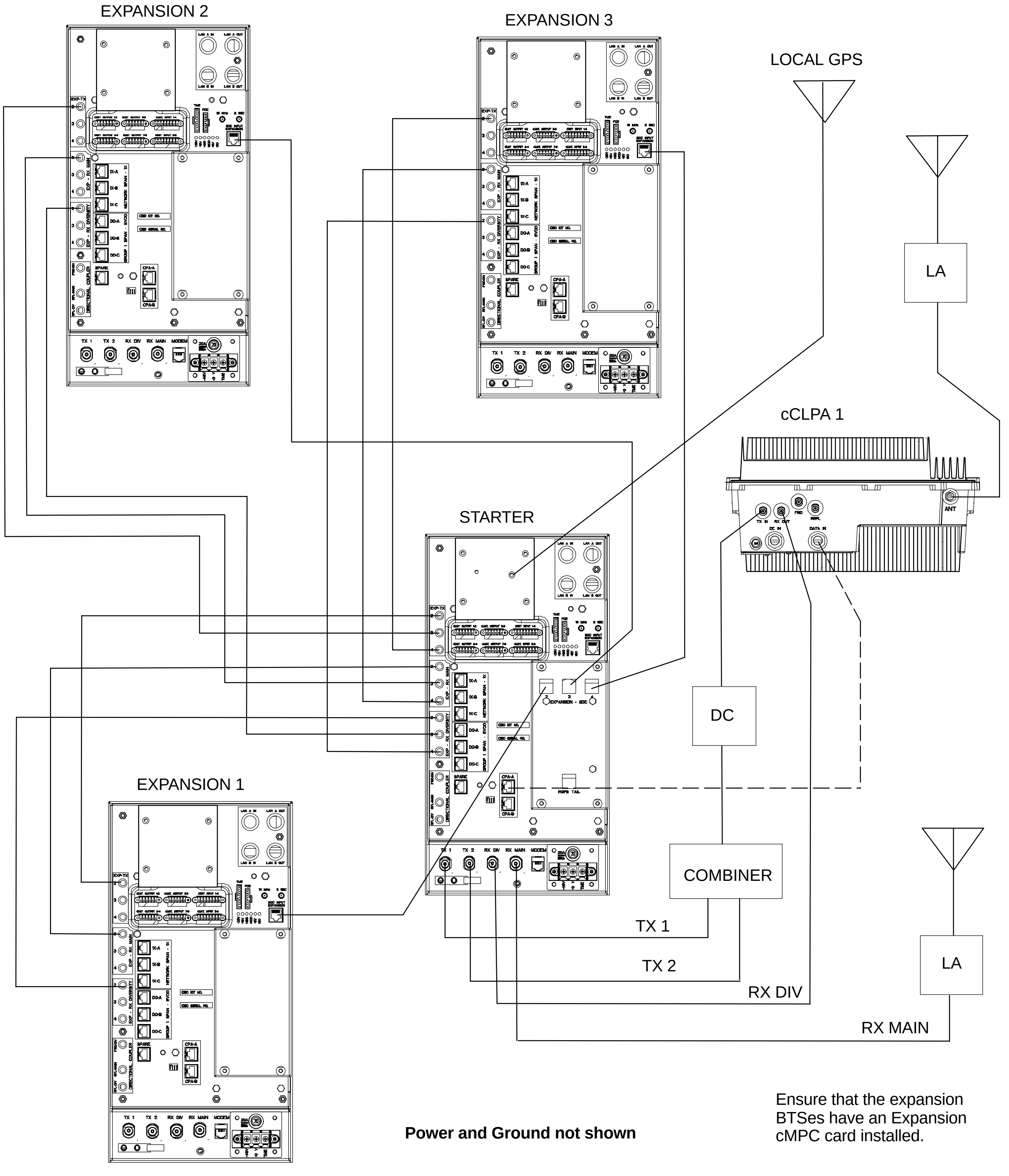
Table E-7 shows in tabular format the interconnect cabling of Figure E-4.

Table E-7: Starter and Three Expansion BTS Interconnect Cabling for Circuit or Packet Configuration with Single cCLPA

BTS	Expansion 1	Expansion 2	Expansion 3	cCLPA
Starter TX–1	Signals are sent thruogh an external combiner and directional coupler			cCLPA–1 (TX IN)
Starter TX–2				
Starter EXP–TX 2	EXP TX–2	–	–	*cCLPA–1
Starter EXP–TX 3	–	EXP TX–2	–	*cCLPA–1
Starter EXP–TX 4	–	–	EXP TX–2	*cCLPA–1
Starter RX MAIN	–	–	–	Antenna
Starter EXP–RX MAIN 2	EXP – RX MAIN 2	–	–	*cCLPA–1
Starter EXP–RX MAIN 3	–	EXP – RX MAIN 2	–	*cCLPA–1
Starter EXP–RX MAIN 4	–	–	EXP – RX MAIN 2	*cCLPA–1
Starter RX DIV	–	–	–	cCLPA–1 (RX OUT)
Starter EXP–RX DIV 2	EXP – RX DIV 2	–	–	*cCLPA–1
Starter EXP–RX DIV 3	–	EXP – RX DIV 2	–	*cCLPA–1
Starter EXP–RX DIV 4	–	–	EXP – RX DIV 2	*cCLPA–1
Starter SDCX 2	SDC INPUT EXPANSION	–	–	–
Starter SDCX 3	–	SDC INPUT EXPANSION	–	–
Starter SDCX 4	–	–	SDC INPUT EXPANSION	–

* Not actual physical connections to cCLPA, but software connections through the Starter BTS.

Figure E-4: Three Expansion BTSes Cabling Diagram with One cCLPA



Starter and Two Expansion BTSes Interconnect Cabling for Single cCLPA

Table E-8 shows in tabular format the interconnect cabling of Figure E-5.

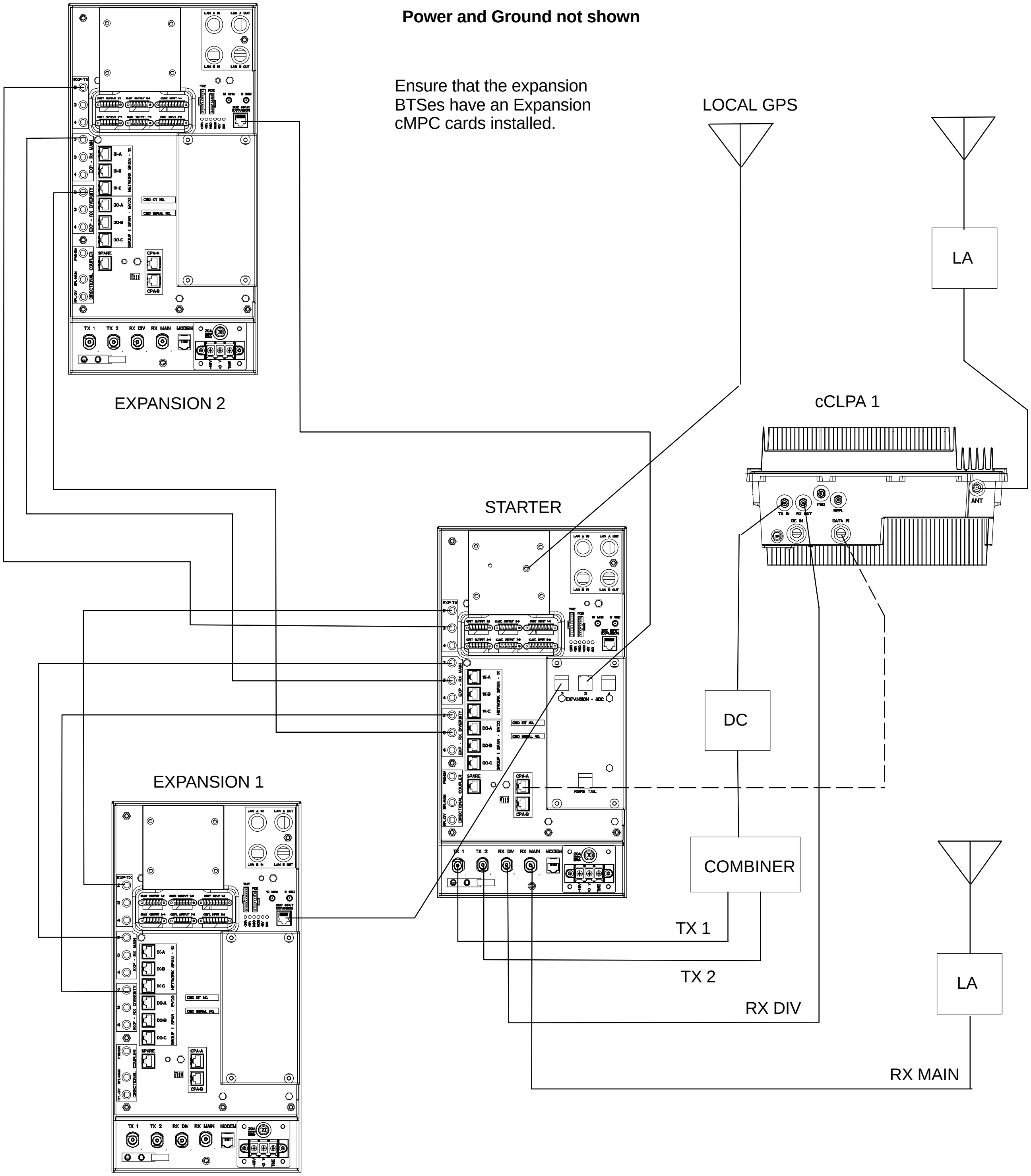
Table E-8: Starter and Two Expansion BTS Interconnect Cabling for Circuit or Packet Configuration with Single cCLPA

BTS	Expansion 1	Expansion 2	Expansion 3	cCLPA
Starter TX–1	Signals are sent thruogh an external combiner and directional coupler			cCLPA–1 (TX IN)
Starter TX–2				
Starter EXP–TX 2	EXP TX–2	–	–	*cCLPA–1
Starter EXP–TX 3	–	EXP TX–2	–	*cCLPA–1
Starter EXP–TX 4	–	–	–	–
Starter RX MAIN	–	–	–	Antenna
Starter EXP–RX MAIN 2	EXP – RX MAIN 2	–	–	*cCLPA–1
Starter EXP–RX MAIN 3	–	EXP – RX MAIN 2	–	*cCLPA–1
Starter EXP–RX MAIN 4	–	–	–	–
Starter RX DIV	–	–	–	cCLPA–1 (RX OUT)
Starter EXP–RX DIV 2	EXP – RX DIV 2	–	–	*cCLPA–1
Starter EXP–RX DIV 3	–	EXP – RX DIV 2	–	*cCLPA–1
Starter EXP–RX DIV 4	–	–	–	–
Starter SDCX 2	SDC INPUT EXPANSION	–	–	–
Starter SDCX 3	–	SDC INPUT EXPANSION	–	–
Starter SDCX 4	–	–	–	–

* Not actual physical connections to cCLPA, but software connections through the Starter BTS.

E

Figure E-5: Two Expansion BTSes Cabling Diagram with One cCLPA



Starter and One Expansion BTSes Interconnect Cabling for Single cCLPA

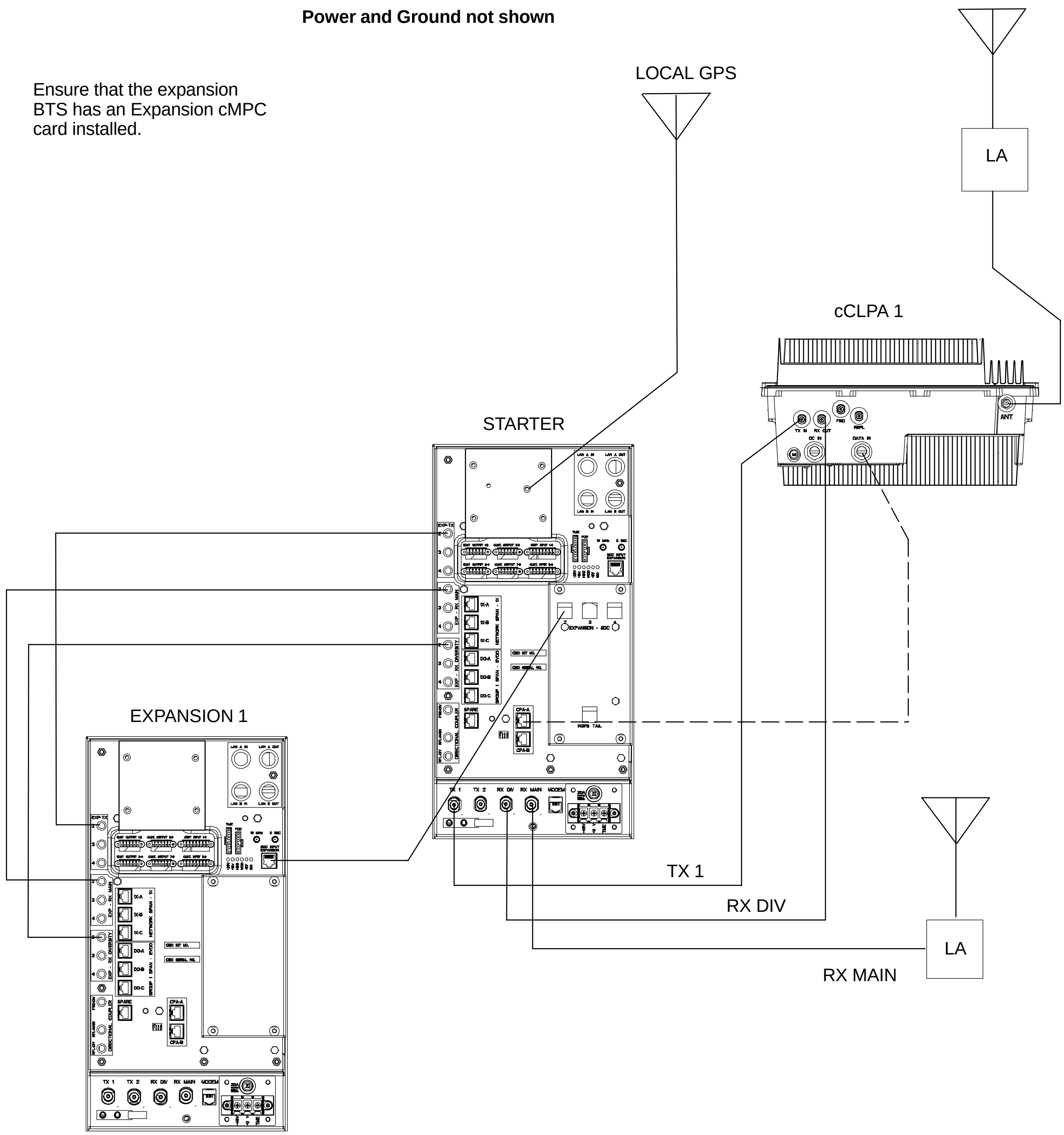
Table E-9 shows in tabular format the interconnect cabling of Figure E-6.

Table E-9: Starter and One Expansion BTS Interconnect Cabling for Circuit or Packet Configuration with Single cCLPA

BTS	Expansion 1	Expansion 2	Expansion 3	cCLPA
Starter TX–1	–	–	–	cCLPA–1 (TX IN)
Starter TX–2	–	–	–	–
Starter EXP–TX 2	EXP TX–2	–	–	–
Starter EXP–TX 3	–	–	–	–
Starter EXP–TX 4	–	–	–	–
Starter RX MAIN	–	–	–	Antenna
Starter EXP–RX MAIN 2	–	–	–	–
Starter EXP–RX MAIN 3	EXP – RX MAIN 2	–	–	*cCLPA–1
Starter EXP–RX MAIN 4	–	–	–	–
Starter RX DIV	–	–	–	cCLPA–1 (RX OUT)
Starter EXP–RX DIV 2	EXP – RX DIV 2	–	–	*cCLPA–1
Starter EXP–RX DIV 3	–	–	–	–
Starter EXP–RX DIV 4	–	–	–	–
Starter SDCX 2	SDC INPUT EXPANSION	–	–	–
Starter SDCX 3	–	–	–	–
Starter SDCX 4	–	–	–	–

* Not actual physical connections to cCLPA, but software connections through the Starter BTS.

Figure E-6: One Expansion BTS Cabling Diagram with One cCLPA



Installation Procedure for Expansion Compact BTS without cCLPA

Follow the procedure in Table E-2 for installation of expansion Compact BTS without cCLPAs. Table E-7 through Table E-9 (less the cCLPA) are virtually the same and are can be used for the diagrams without cCLPA, and so separate tables will not be included here.

Table E-10: Procedure for Installing Expansion Compact BTS without cCLPA

Step	Action
1	Follow the procedure in Chapter 4 for installing a Compact BTS in a rack.
2	For a 3 BTS expansion configuration, follow Figure E-7. Proceed to step 3.
2a	For a 2 BTS expansion configuration, follow Figure E-8. Proceed to step 3.
2b	For a 1 BTS expansion configuration, follow Figure E-9. Proceed to step 3.
3	If not using conduit, dress cables as necessary.
4	Perform Optimization and ATP as described in Chapter 6. *LMF Help* provides further information.

Starter and Expansion BTSes Interconnect Cabling without cCLPA

Table E-7 through Table E-9 are virtually the same and are can be used for the diagrams without cCLPA. Separate tables will not be included here.

Figure E-7: Three Expansion BTSes Cabling Diagram

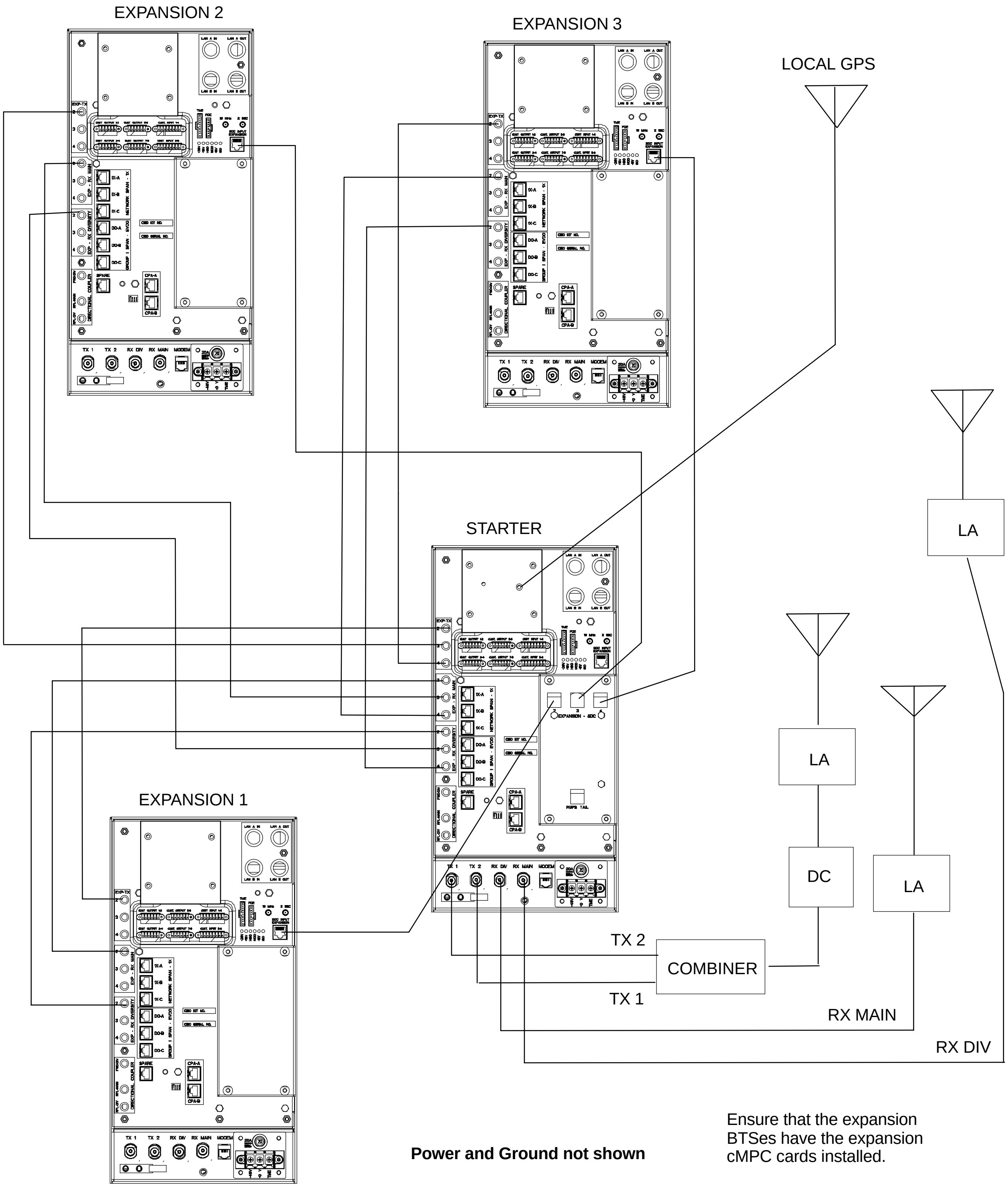
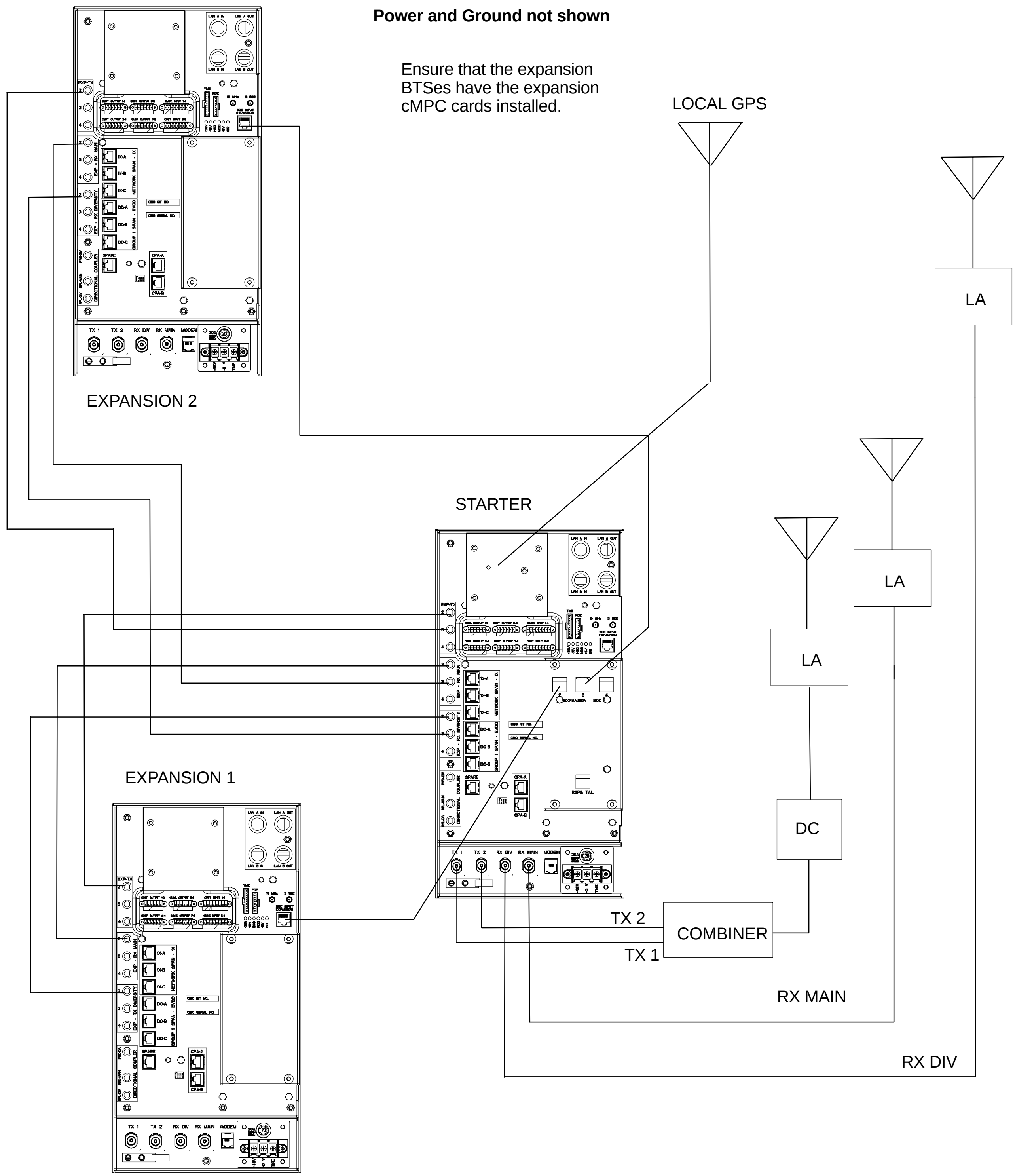


Figure E-8: Two Expansion BTSes Cabling Diagram



E

Figure E-9: One Expansion BTS Cabling Diagram

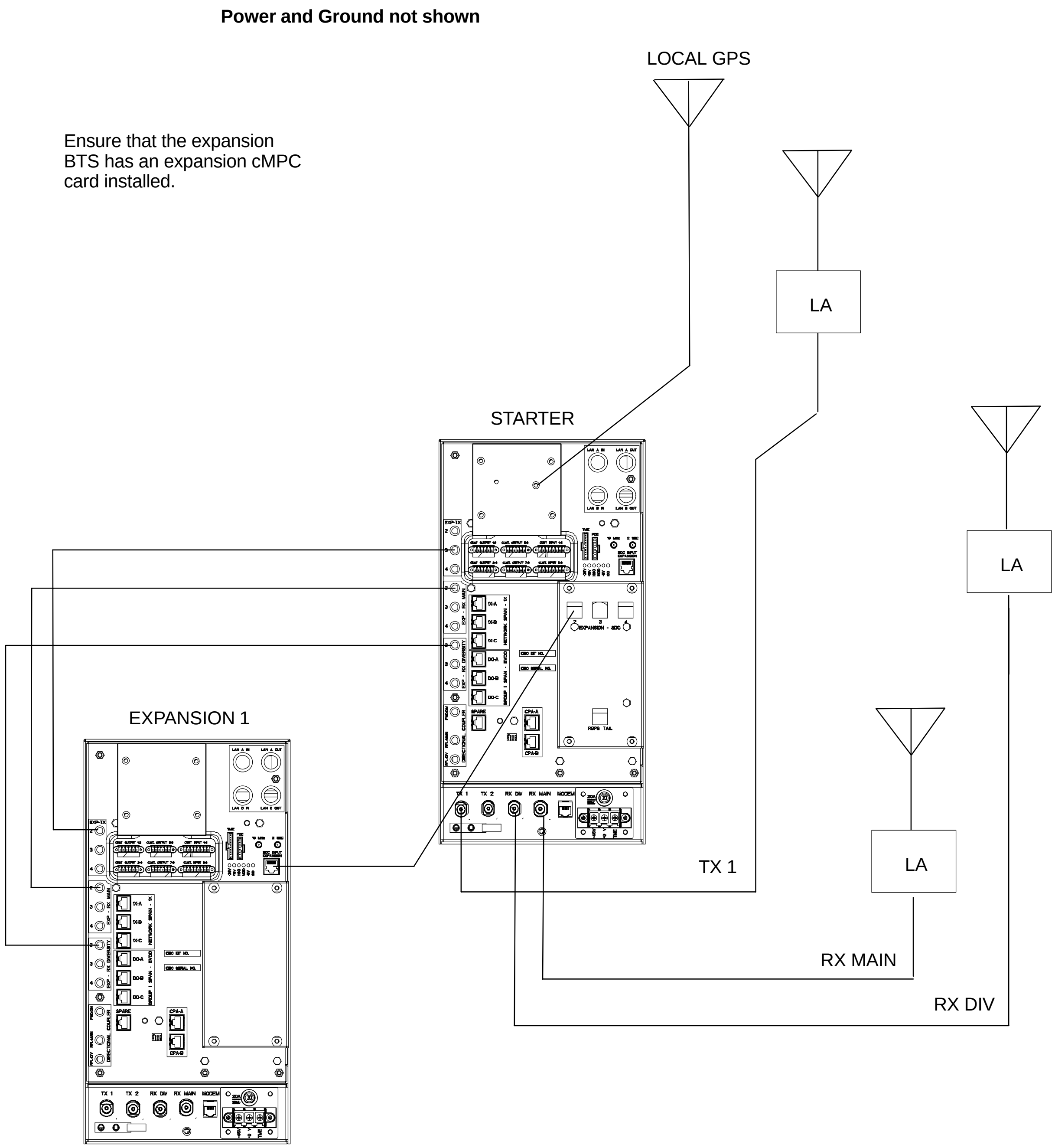


Table E-11: BBX (Carrier) to cCLPA Via RS485	
BTS	**cCLPA**
Starter – BBX1	cCLPA–1
Starter – BBX4	cCLPA–1
Expansion 1 – BBX1	cCLPA–2
Expansion 1 – BBX4	cCLPA–2
Expansion 2 – BBX1	cCLPA–1
Expansion 2 – BBX4	cCLPA–1
Expansion 3 – BBX1	cCLPA–2
Expansion 3 – BBX4	cCLPA–2

Table E-12 shows in tabular format the BTS–to–cCLPA cabling of Figure E-1.

Table E-12: Starter and Three Expansion BTS Cabling for Circuit or Packet to Dual cCLPAs	
BTS	**cCLPA**
Starter – BBX1	CPA–A (CPA–1)
Starter – BBX4	CPA–A (CPA–1)
Expansion 1 – BBX1	CPA–B (CPB–2)
Expansion 1 – BBX4	CPA–B (CPB–2)
Expansion 2 – BBX1	CPA–A (CPA–1)
Expansion 2 – BBX4	CPA–A (CPA–1)
Expansion 3 – BBX1	CPA–B (CPA–2)
Expansion 3 – BBX4	CPA–B (CPA–2)

Starter and Two Expansion BTSes to cCLPA Cabling

Table E-13 shows in tabular format the BTS–to–cCLPA cabling of Figure E-2.

Table E-13: Starter and Two Expansion BTS Cabling for Circuit or Packet to Dual cCLPAs

BTS	cCLPA
Starter – BBX1	CPA–A (CPA–1)
Starter – BBX4	CPA–A (CPA–1)
Expansion 1 – BBX1	CPA–B (CPB–2)
Expansion 1 – BBX4	CPA–B (CPB–2)
Expansion 2 – BBX1	CPA–A (CPA–1)
Expansion 2 – BBX4	CPA–A (CPA–1)

Starter and One Expansion BTS to cCLPA Cabling

Table E-14 shows in tabular format the BTS–to–cCLPA cabling of Figure E-3.

Table E-14: Starter and One Expansion BTS Cabling for Circuit or Packet to Dual cCLPAs

BTS	cCLPA
Starter – BBX1	CPA–A (CPA–1)
Starter – BBX4	CPA–A (CPA–1)
Expansion 1 – BBX1	CPA–B (CPB–2)
Expansion 1 – BBX4	CPA–B (CPB–2)

Introduction

This section covers only the outdoor version of the multiple Compact BTS configuration.

Materials Needed

The following materials are required to configure expansion BTSes.

- Varied length cables with RJ45 connectors
- Varied length cables with RF connectors
- Conduit (customer supplied)
- DC Power source (custoemr supplied)
- Battery Backup (customer supplied)

External Combiner and Directional Coupler

A combiner and directional coupler are required for some of the configurations. The following are the recommended specifications for the combiner and directional coupler.

Table E-15: Combiner and Directional Coupler Specifications

Item	Specifications
Combiner	
Connector:	N–Type
Frequency Range:	Up to 2 GHz
Insertion Loss:	3.5 dB maximum
Return Loss:	16 dB minimum
Average Input Power:	60 Watts minimum
Directional Coupler	
Connector:	N–Type
Frequency Range:	810 to 950 MHz
Coupling:	30 +/–1 dB
Directivity:	28 dB minimum
Return Loss:	18 dB minimum
Average Input Power:	10 Watts minimum

- Motorola recommended directional coupler is P/N 809643T03
- Recommended cable with combiner is Andrew LDF4–50 or equivalent

- Directional coupler and combiner are not environmentally protected , and so must be placed within the TME.

ExpansionCompact BTS Installation Procedure

Follow the procedure in Table E-16for installation of multiple Compact BTSes.

Table E-16: Procedure for Installing Expansion Compact BTSes

Step	Action
1	Follow the procedure in Chapter 4 for installing a Compact BTS in a rack.
2	For a 3 BTS expansion configuration, follow Figure E-1. Proceed to step 3.
2a	For a 2 BTS expansion configuration, follow Figure E-2. Proceed to step 3.
2b	For a 1 BTS expansion configuration, follow Figure E-3. Proceed to step 3.
3	If conduit is not used, dress cables as necessary.
4	Perform Optimization and ATP as described in Chapter 6. *LMF Help* provides further information.

Frame ID Switch Settings

Refer to Chapter 5, Figure 5-1 or Figure 5-2 or Table 5-1 through Table 5-4 for the Frame DIP Switch settings.

Figure E-10: Three Expansion BTSes Cabling Diagram

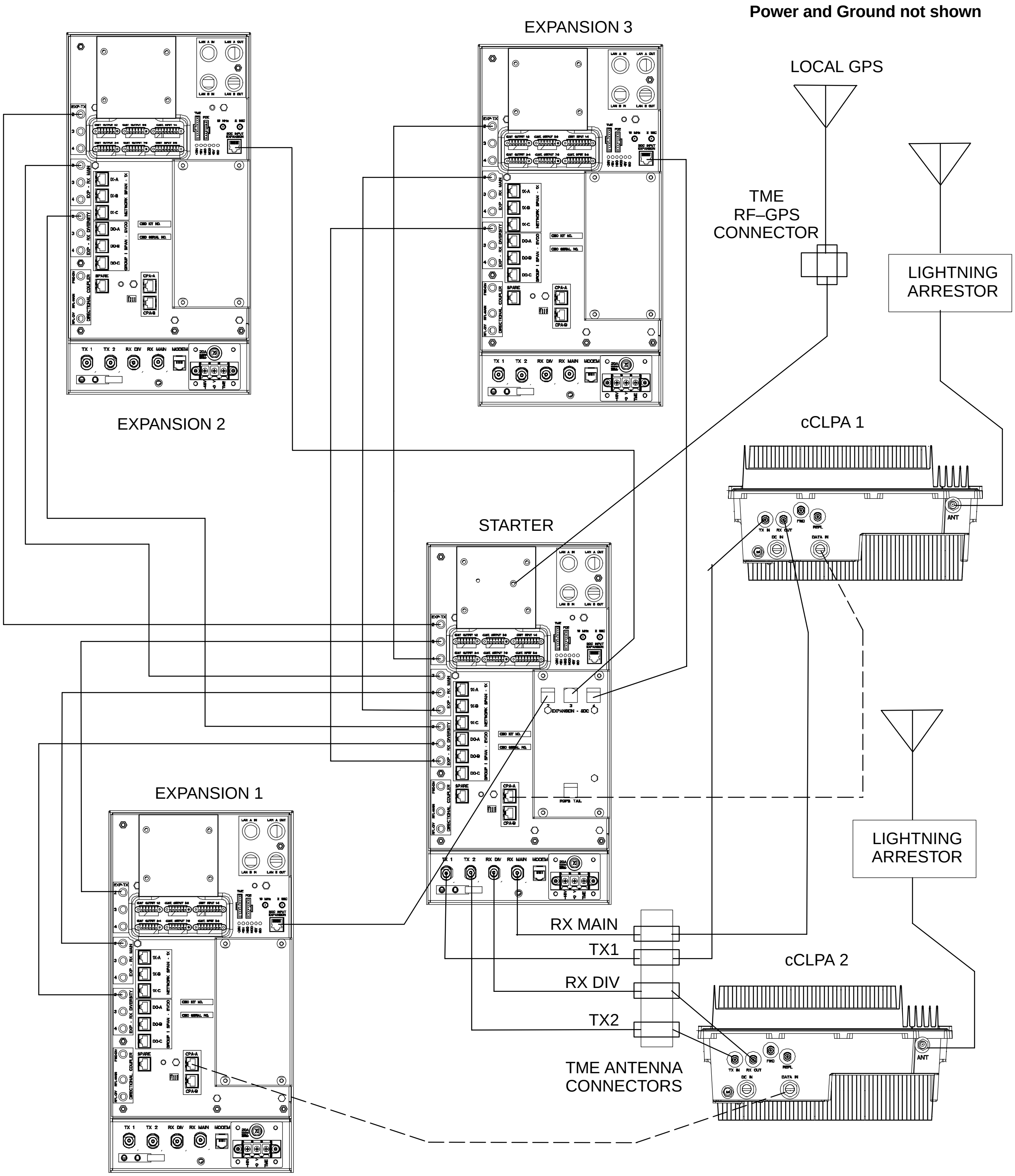


Figure E-11: Outdoor Two Expansion BTSes Cabling Diagram

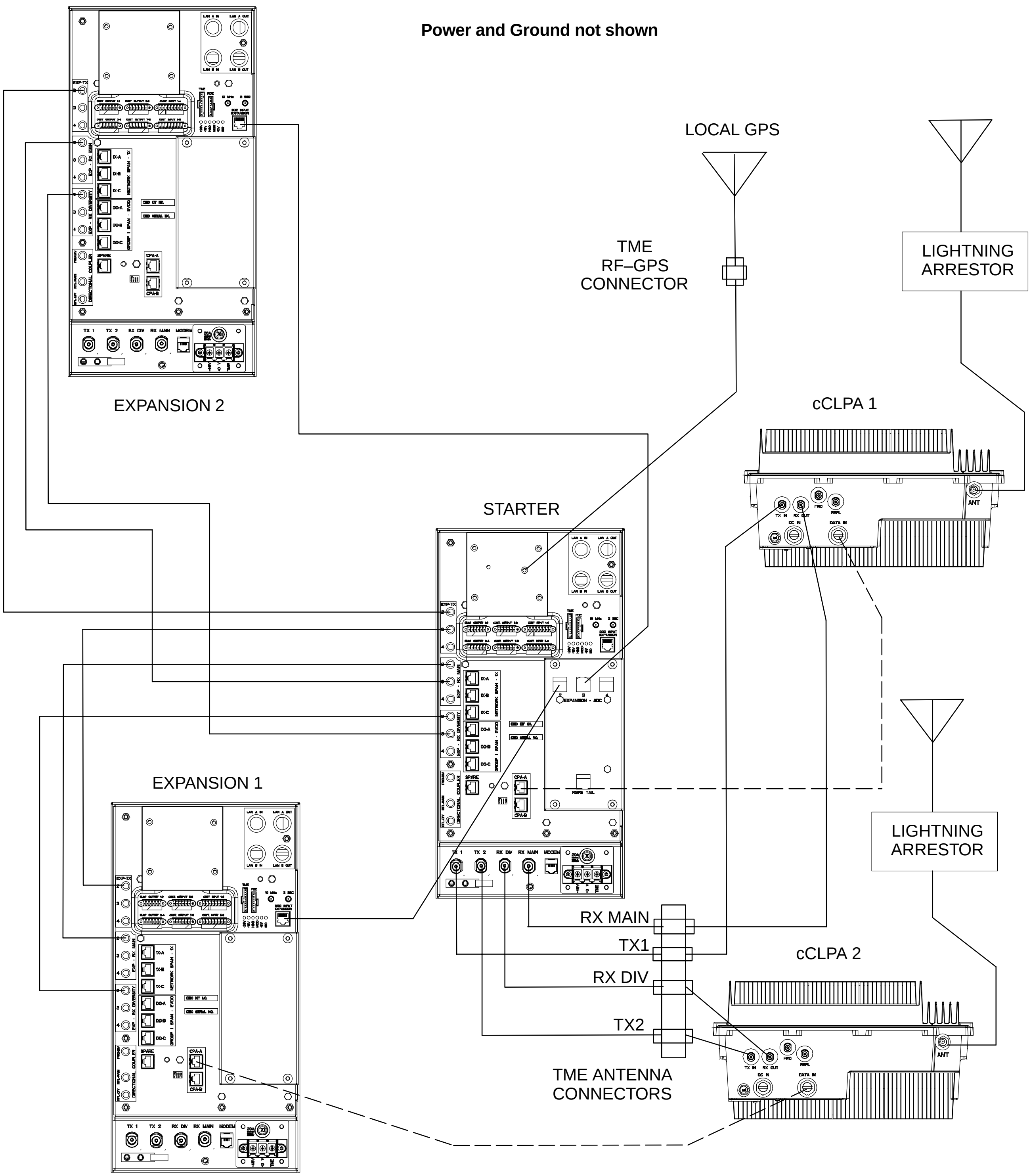
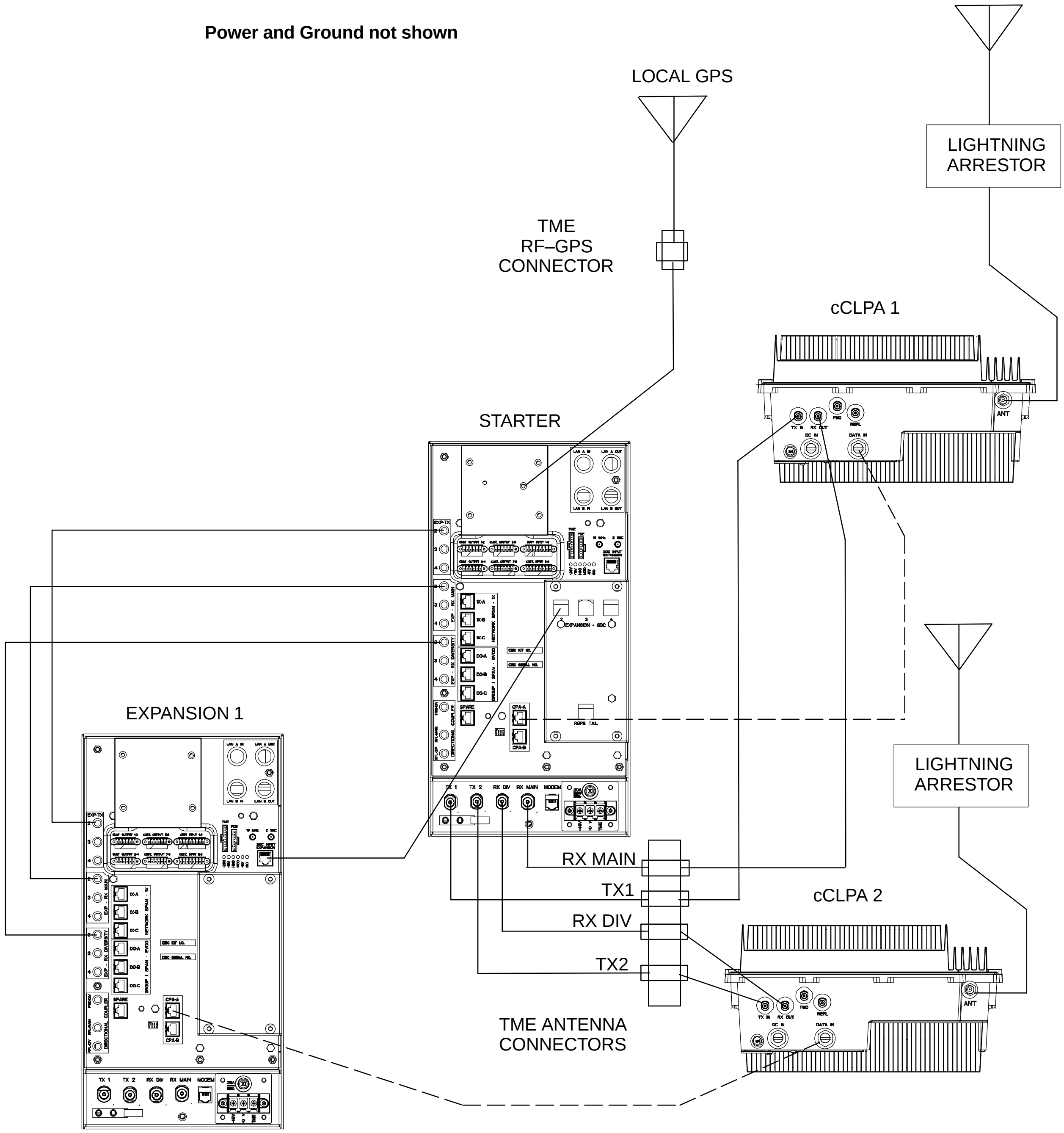


Figure E-12: Outdoor One Expansion BTS Cabling Diagram



Other Diagrams

For single cCLPA and no cCLPA, refer to the diagrams for indoor and allow for the TME connectors as shown in the diagrams presented in this appendix.

Appendix F: Logical BTS Configuration

Appendix Content

Logical BTS LAN Configuration for Compact BTS (Indoor) F-1
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Logical BTS LAN Cabling Installation Procedure F-3

PRELIMINARY

Notes

PRELIMINARY

Logical BTS LAN Configuration for Compact BTS (Indoor)

Introduction

This appendix covers only the Logical BTS configuration for cicruit Compact BTS. The diagrams cover only the LAN connections. This configuration is set up to be used only with other Compact BTSes. Power and ground cabling are not shown.

The LAN operates at 10Mbps which is an ethernet standard. It provides an interface for each GLI in the confiiguration.

Refer to Figure 6-1 for location of the LAN connectors. In circuit mode, the LAN connections are used by the LMF to download data, and for use in calibration, acceptance testing, and optimization.

Use these diagrams in conjunction with the diagrams for expansion BTSes in Appendix E.

Materials Needed

The following materials are required to configure LAN connections BTSes.

- 7 – RG–58 U cables (Length depends on spacing)
- 14 – BNC, Terminaton Resistor Plugs (IEC 169–8 spec)
- 2 – BNC, 50 Ohm terminations

BTS ID Switch Settings

Refer to Chapter 5, Figure 5-1 or Figure 5-2 or Table 5-1 through Table 5-4 for the BTS DIP Switch settings.

Figure F-1: Three Expansion BTSes LAN Cabling Diagram

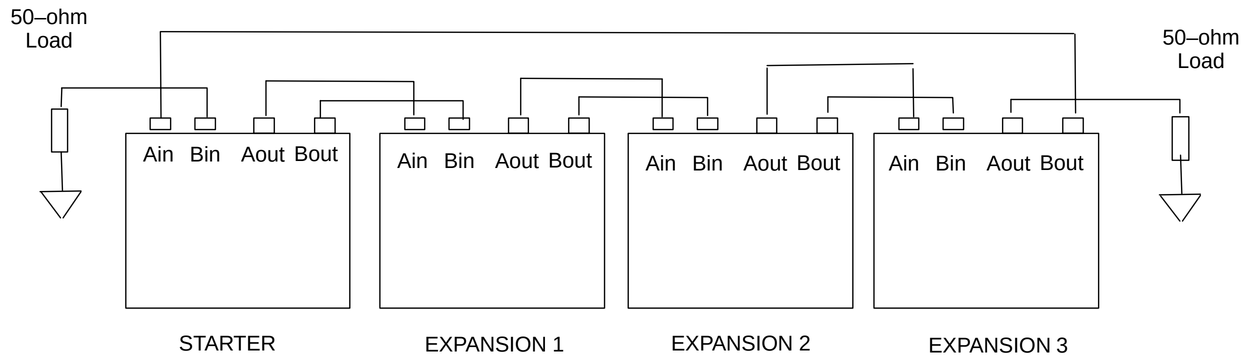

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Figure F-2: Two Expansion BTSes LAN Cabling Diagram

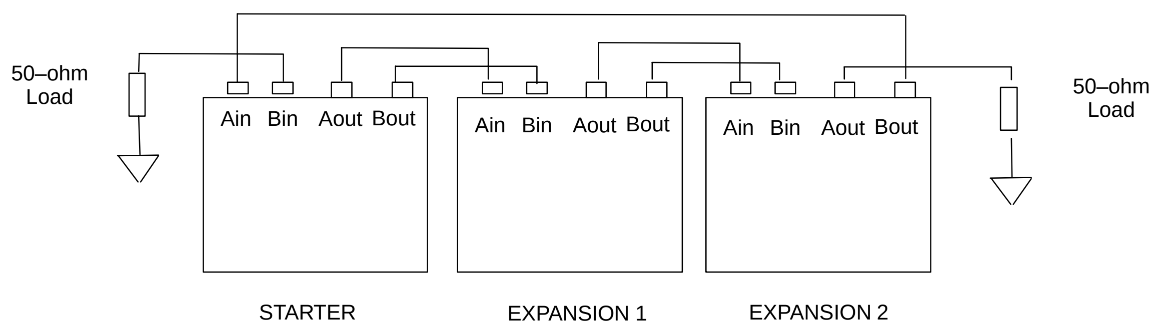
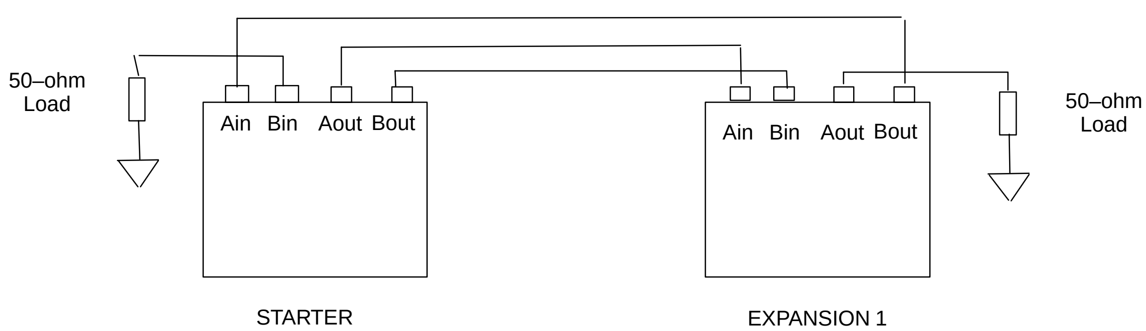


Figure F-3: One Expansion BTSes LAN Cabling Diagram



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Logical BTS LAN Cabling Installation Procedure

Follow the procedure in Table F-1 for installation of LAN cables for Logical BTS.

Table F-1: Procedure for Installing LAN Cabling for Logical BTS

Step	Action
1	Follow the procedure in Chapter 4 for installing a Compact BTS in a rack.
2	For a 3 BTS expansion configuration, follow Figure F-1. Proceed to step 3.
2a	For a 2 BTS expansion configuration, follow Figure F-2. Proceed to step 3.
2b	For a 1 BTS expansion configuration, follow Figure F-3. Proceed to step 3.
3	Route LAN cables through conduit from Starter to Expansion BTS 1.
4	Route LAN cables through conduit from Starter to Expansion BTS 2 or 3 (depending on configuration).
5	If in use, route LAN cables from Expansion BTS 1 to Expansion BTS 2.
6	If in use, route LAN cables from Expansion BTS 2 to Expansion BTS 3.
7	Ensure that unused LAN connections are terminated in 50 ohms.
8	If not already performed, proceed to Appendix E for expansion cabling diagrams.
9	Perform Optimization and ATP as described in Chapter 6. *LMF Help* provides further information.

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Appendix G: Integrated BTS Router Preliminary Operations

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PRELIMINARY

Introduction

The information and procedures provided are performed in cases where the GLI3 load and span parameters need to be verified.

Preliminary Operations

Implementing the Integrated BTS Router (IBR) function requires some preliminary checks of the GLI3 cards which will be used. This appendix provides the procedures to accomplish these checks. The checks are:

- Verification that IBR–capable software is installed on GLI3 cards which will be used for IBR
- Verification that span parameter settings on GLI3 cards match the requirement for the spans at the BTS where the cards will be installed.

When to Perform the Verifications

All preliminary verifications provided in this chapter can be performed at either the BTS site or in a central facility equipped to power–up the GLI3 cards. Depending on the circumstances of the cards' use, however, it may be advantageous in reducing the on–site upgrade time and logistics to perform some of the verifications prior to installation at the BTS site. Table G-1 lists card conditions of use and the corresponding suggested verification locations for the software version and span parameter settings.

Table G-1: Suggested Preliminary Verification Locations

GLI3 Card Condition	Installation Location	Software Version Verification Location	Span Parameter Settings Verification Location
Installed and operating (circuit or packet)	Site where installed	At site	Not required unless span type will change
	Different operating site from where currently installed	At site where currently installed	Before or after installation at different site

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Verify GLI3 Software Version and Span Parameter Settings

Software Version Verification – Before upgrading a BTS to packet backhaul with an IBR, the software version installed in the GLI3 card or cards must be verified. If the installed software version does not support IBR functionality, it must be upgraded to a version which does. For BTS sites which are already in operation, the upgrade can be done through a network download to the GLI3 once it is installed. For cards to be installed in new BTS sites not previously in operation, the upgrade requires special procedures, and must be done with Motorola Field Operations or Account Team assistance.

Span Parameter Settings – Prior to initializing a GLI3 card for the first time in a live circuit BTS or IBR packet BTS site, the span parameter settings in the card must be verified as matching those provisioned in the OMC–R database. If the settings are not correct, the card will be unable to communicate with the RAN network elements and the site will not go into service. Procedures are included in this section to change the GLI3 card span parameter settings if this is necessary to match those required for the BTS.

Required Items

The following items are required to perform the verification:

- Local Maintenance Facility (LMF) computer with the LMF application program version installed which is compatible with the software release installed on the BSS refer to Chapter 6 Optimization/ATP in this manual.
- *One* of the following
  - Motorola cable part number CGDSMMICABLE219112
  - Fabricated DB–9 receptacle–to–8–contact MMI connector cable (see the MMI Cable Fabrication Section of Appendix D for fabrication instructions and Figure 6-9 for connection)
  - SLN2006A MMI Interface Kit (this kit is no longer available to order), consisting of the following:
    - Motorola Model TRN9666A null modem board
    - Motorola 3009786R01 MMI cable or equivalent
- (For use with SLN2006A only) Straight–through RS–232 cable, DB–9 to DB–9, and DB–9 to DB–25 connector adapter (see Figure D-1)

Verifying GLI3 Software Version and Span Parameter Settings

Follow the procedure in Table G-2 to verify GLI3 card software version and span parameter settings.

Table G-2: Verify GLI3 Software Version and Span Parameter Settings

Step	Action
1	If it has not been done, start a GLI3 MMI communication session on the LMF computer as described in Table 6-11.
2	Verify the installed software version by entering the following at the GLI3 prompt: **display version**
3	Response to the command will depend on the operating mode of the card. Responses similar to the following will be displayed for:

3a	– Cards in *circuit* mode:
	
	`GLI3>  display version`
	`01.09.1980 20:01:59 MGLI-002-2  OOS-SBY   BTS-CDMA 16.41.200.14`
	
	`RAM version: 16.41.200.14`
	`ROM version: 16.41.200.14`
	`Built: Tue Oct 21 09:52:28 2003 il27-2112`
	
	`Bootrom version: 16.41.200.12`
	`Bootrom Built: Thu Oct  2 03:11:34 2003 IL27-0775`
	
	`Bootblock version: 16.1.59.00`
	`Bootblock Built: Wed Apr 10 07:08:06 2002 RIPCORD004`
	
	`This GLI board is in RAM`
	`Booted from /nvram00/loads/gli3_ckt_rom_upgrade.elf`
	`Next boot from /nvram00/loads/gli3_ckt_rom_upgrade.elf`
	`GLI3>`

. . . continued on next page

Table G-2: Verify GLI3 Software Version and Span Parameter Settings

Step	Action

3b	– For cards in *packet* mode:
	`GLI3>  display version`
	`03.23.2004 18:16:07 MGLI-250-1  CC PRESENT BTS-CDMA 16.41.00.11`
	
	`INTERNAL RAM VERSION: 16.41.0.11`
	`RAM Built: Tue Mar  2 04:59:33 2004 il27-2112`
	
	`BOOTROM VERSION: 16.41.00.08`
	`BOOTROM Built: Tue Feb 17 10:52:27 2004 il27-0507`
	
	`BOOTBLOCK VERSION: 16.1.59.00`
	`BOOTBLOCK Built: Wed Apr 10 07:08:06 2002 RIPCORD004`
	
	`SYSTEM VERSION: 2.16.4.50.15`
	`COMMITTED VERSION: 2.16.4.50.15`
	`NEXT VERSION: 2.16.4.50.15`
	`BACK UP VERSION 2.16.4.50.10`
	`CURRENT RELEASE PATH: /nvram00/screl/2.16.4.50.15/`
	`CURRENT LIF: /nvram00/screl/2.16.4.50.15/NE_LIF.xml`
	`CURRENT IMAGE: /nvram00/screl/2.16.4.50.15/gli_ram.bin.0108`
	`CODE SERVER: 128.0.0.1`
	
	`GLI3>`

4	Note the bootROM or System version numbers displayed and determine if the GLI3 is loaded with IBR–capable code as follows: • If the booROM version number is 2.16.41.00.08 or later, the GLI3 is IBR–capable • If the System version number is `2.16.4.50`.7 or later (for example, 2.16.4.50.25), the GLI3 is IBR–capable **NOTE** If the card is to be installed in a new BTS site which has not previously been in operation, contact the local Motorola Account Team for assistance in upgrading the card with IBR–capable software version.

. . . continued on next page

Table G-2: Verify GLI3 Software Version and Span Parameter Settings

Step	Action

5	Verify the span parameter settings for frame format, equalization, and linkspeed by entering the following at the `GLI3>` prompt:
	
	config ni current
	
	The system will respond with a display similar to the following:
	
	`The frame format in flash is set to use T1_2.`
	`Equalization:`
	`  Span A – Default (0–131 feet for T1/J1, 120 Ohm for E1)`
	`  Span B – Default (0–131 feet for T1/J1, 120 Ohm for E1)`
	`  Span C – Default (0–131 feet for T1/J1, 120 Ohm for E1)`
	`  Span D – Default (0–131 feet for T1/J1, 120 Ohm for E1)`
	`  Span E – Default (0–131 feet for T1/J1, 120 Ohm for E1)`
	`  Span F – Default (0–131 feet for T1/J1, 120 Ohm for E1)`
	
	`Linkspeed: Default (56K for T1 D4 AMI, 64K otherwise)`
	`Currently, the link is running at the default rate`
	`The actual rate is 0`
	
	NOTE
	• Defaults for span equalization are 0–131 feet for T1/J1 spans and 120 Ohm for E1.
	• Default linkspeed is 56K for T1 D4 AMI spans and 64K for all other types.
	• There is no need to change from defaults unless the provisioned span configuration requires it.

6	The span parameter settings in the GLI must match those provisioned in the OMC–R database for the BTS. If they do not, proceed to Table G-3 in the Change GLI3 Span Parameter Settings section.
7	If no other MMI actions are required for the card, terminate the MMI communication session and disconnect the LMF computer from the card.

Change GLI3 Span Parameter Configuration

If span parameter settings in the GLI3 card do not match the OMC–R database span parameters for the BTS where they are to be installed, follow the procedure in Table G-3 to change them.

Table G-3: Set GLI3 Span Parameter Configuration

Step	Action
1	If it has not been done, start a GLI3 MMI communication session on the LMF computer as described in Table 6-11.

2	At the `GLI3>` prompt, enter the following:
	
	config ni format
	
	The terminal will display a response similar to the following:
	
	`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`
	`>`
	
	NOTE
	With this command, all active (in–use) spans will be set to the same format.

3	To set or change the span type, enter the correct option from the list at the entry prompt (>), as shown in the following example:
	
	`>` **T1_2**
	
	NOTE
	The entry is case–sensitive and must be typed *exactly* as it appears in the list. If the entry is typed incorrectly, a response similar to the following will be displayed:
	
	`CP: Invalid command`
	`01.061980 00:11’59 MGLI-000-2 INS-ACT BTS-CDMA 16.1.68.00`
	
	`GLI3>`

. . . continued on next page

Table G-3: Set GLI3 Span Parameter Configuration

Step	Action

4	An acknowledgement similar to the following will be displayed:
	`The value has been programmed. It will take effect after the next reset.`
	`GLI3>`

5	If the current GLI span rate must be changed, enter the following MMI command:
	config ni linkspeed
	A response similar to the following will be displayed :
	`Next available options:`
	` LIST -  linkspeed : Span Linkspeed`
	`                   56K : 56K (default for T1_1 and T1_3 systems)`
	`                   64K : 64K (default for all other span configurations)`
	`>`
	NOTE
	With this command, all active (in–use) spans will be set to the same linkspeed.

6	To set or change the span linkspeed, enter the required option from the list at the entry prompt (>), as shown in the following example: `>` **64K**

	NOTE
	The entry is case–sensitive and must be typed *exactly* as it appears in the list. If the entry is typed incorrectly, a response similar to the following will be displayed:
	`CP: Invalid command`
	`01.061980 00:12’04 MGLI-000-2 INS-ACT BTS-CDMA 16.1.68.00`
	`GLI3>`

7	An acknowledgement similar to the following will be displayed:
	`The value has been programmed.  It will take effect after the next reset.`
	`GLI3>`

. . . continued on next page

Table G-3: Set GLI3 Span Parameter Configuration

Step	Action

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

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Table G-3: Set GLI3 Span Parameter Configuration

Step	Action

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

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Table G-3: Set GLI3 Span Parameter Configuration	
Step	**Action**

10	At the entry prompt (>), enter the code for the required equalization from the list as shown in the following example:
	`>` **0**
	A response similar to the following will be displayed :
	`> 0`
	`The value has been programmed. It will take effect after the next reset.`
	`GLI2>`

11	Repeat steps 8 through 10 for each in–use span.

12	**NOTE**
	This step *must* be performed for GLI3 cards operating on a *packet* image to ensure the span parameter changes will replace the previous settings.
	
	For a GLI3 card in *packet* mode, enter the following:
	rmfile /nvram00/config/hlp_param.txt
	A response similar to the following will be displayed :
	`GLI3>  rmfile /nvram00/config/hlp_param.txt`
	`11.24.2003 23:14:57 MGLI-004-1  CC PRESENT BTS-CDMA 16.40.00.09`
	
	`Removing file: /nvram00/config/hlp_param.txt`
	`Successfully removed file: /nvram00/config/hlp_param.txt`
	
	`GLI3>`

13	*** IMPORTANT** • After executing the **config ni format**, **config ni linkspeed**, and/or **config ni equal** commands, the affected MGLI/GLI board *MUST* be reset and reloaded for changes to take effect. • Although defaults are shown in the software, *always* consult site–specific documentation for span type, equalization, and linkspeed used at the site where the cards are to be installed. Reset the card using the MMI **reset** command.

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Table G-3: Set GLI3 Span Parameter Configuration	
Step	**Action**

14	Once the card has completed resetting, execute the following command to verify span settings are as required:
	
	config ni current
	
	A response similar to the following will be displayed :
	
	`The frame format in flash is set to use T1_2.`
	`Equalization:`
	`Span A – 0–131 feet`
	`Span B – 0–131 feet`
	`Span C – Default (0–131 feet for T1/J1, 120 Ohm for E1)`
	`Span D – Default (0–131 feet for T1/J1, 120 Ohm for E1)`
	`Span E – Default (0–131 feet for T1/J1, 120 Ohm for E1)`
	`Span F – Default (0–131 feet for T1/J1, 120 Ohm for E1)`
	
	`Linkspeed: 64K`
	`Currently, the link is running at 64K`
	`The actual rate is 0`

15	If the span configuration is not correct, perform the applicable step from this table to change it and repeat steps 12, 13, and 14 to verify required changes have been programmed.
16	If no other MMI actions are required for the card, terminate the MMI communication session and disconnect the LMF computer from the card.

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Appendix H: Integrated BTS Router Installation

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PRELIMINARY

Integrated BTS Router Installation – Introduction

Background

The IBR capability was developed to provide a low–cost solution for providing CDMA packet backhaul benefits at cell sites with lower traffic volumes. The IBR function is implemented by using the GLI3 card Concentration Highway Interface (CHI) bus 2 processor to perform the router function. This is accomplished through changes in the GLI3 card software. A card with the IBR–capable software can perform as a circuit GLI3 card, as a GLI3 with IBR, and as a GLI3 used with external BTS router groups. The card has the capability to recognize the environment in which it is installed and autoselect the appropriate operating mode (circuit, IBR packet, external BTS router packet).

Span line channel capability for an IBR–equipped *SC*480 BTS is limited to those available on a single T1 or E1 span.

New Packet BTS Installation

This section covers the actions necessary for implementing IBR packet capability in the installation of a new BTS. Procedures unique to this implementation are contained in this section. When procedures required in this implementation are contained in other parts of this publication or in other publications, the user will be specifically directed to them at the appropriate places in this section.

Prerequisites

The following must be accomplished prior to traveling to the BTS site for IBR implementation:

- The BTS has been installed as described in Chapter 4 of this manual.
- *One* of the following:
  - GLI3 card(s) for the site have been verified as having IBR–capable software image installed
  - Motorola Field Operations or Account Team member is identified to travel to the BTS site to perform GLI3 IBR–capable software installation, if required
- GLI3 card(s) for the BTS are on hand for transport to the BTS site or are verified to be at the BTS site
- Required publications to support IBR implementation activities are on hand for transportation to the BTS site

Implementing IBR Functionality

Follow the procedure in Table H-1 to implement IBR functionality for the BTS.

Table H-1: Implement IBR Functionality in New BTS

Step	Action
1	Upon arrival at the site, contact the OMC–R and notify the operator that site operations are starting.
2	If the BTS has not been initially powered up, apply power to the BTS in accordance with the Power Pre–Power–up Tests and Initial Power–up Tests and Procedures described in Chapter 5 of this manual.
3	Once the BTS is fully powered up with these procedures, the GLI3 card should have been seated in the correct slot. If it is not, seat the card at this time and allow each to complete its initialization.
4	*If it was not previously done*, follow the procedure in Table G-2 to: • Verify the software version in the GLI3 card(s) • Verify the span parameter settings in each GLI3 card match those established for the site in the OMC–R database
5	If the GLI3software requires upgrading for IBR capability, request Motorola Field Operations or Account Team assistance in upgrading the software.
6	If GLI3 card span parameter settings do not match those required, change them as necessary by following the procedure in Table G-3.

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Step	Action
7	Refer to the site documentation for IBR spans and inspect the BTS span cabling connections to be sure they match Figure H-1.
8	Correct any cabling discrepancies between the BTS span cabling and site documentation, referring to Figure H-1 and the Install Span and Alarm Cables and Span Line Cable Pin Numbering Chapter 4 of this manual as required.
9	If the BTS requires optimization and/or ATP, perform them at this time by following the applicable procedures in Chapter 6 of this manual.
10	When all preparations for BTS operation are completed, contact the OMC–R and notify the operator that the BTS is ready for operation and request notification when the operator no longer requires support on–site.
11	When advised that there is no further requirement for on–site support of BTS and IBR initialization, proceed to Chapter 8 and follow the procedures to prepare to leave the site.

Table H-1: Implement IBR Functionality in New BTS

BTS Span Connections

The illustration in this section provides the detail of span connection for a non–redundant BTS to support IBR packet operation. The required configuration for IBR in redundant BTS is a single span.

BTS Span Cable

All connections in the BTS span connection diagram for IBR are based on the use of the following Motorola–standard BTS span cable:

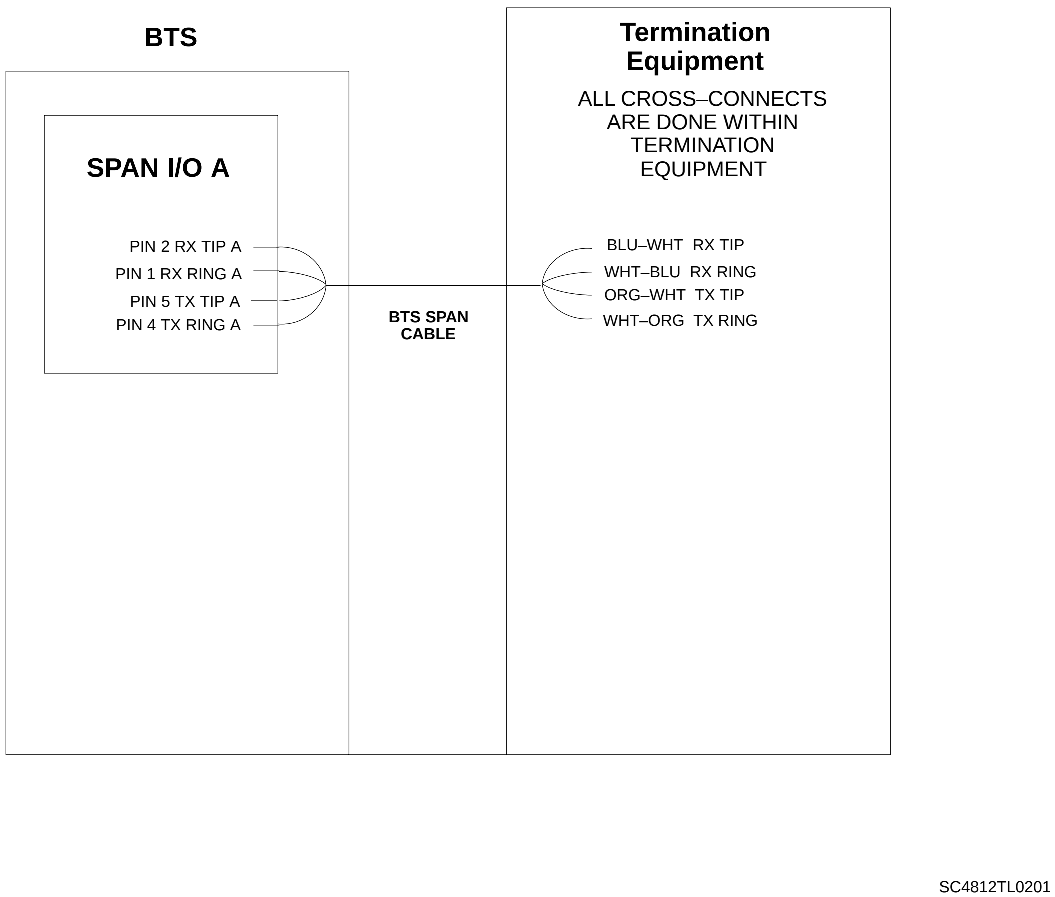
Table H-2: BTS Span Cables

Item	Part Number	Qty	Description
BTS span cable	CGDS1583461 or CGDS1583462	1	Cable, 50–wire, shielded twisted 25 pair, 100 ohm, 24–AWG, 7.6 m (25 ft – CGDS1583461) or 15.2 m (50 ft – CGDS1583462), one male 50–contact TELCO connector attached. One end of cable is un–terminated to allow connection to site termination equipment.

One Span Frame

Figure H-1 illustrates the connection details for one span to support packet operation with IBR for non–redundant BTS.

Figure H-1: Cabling Compact BTS Packet Operation Integrated BTS Router Spans – One Span



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Appendix I: Packet Backhaul Configuration

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Packet Backhaul BTS

Introduction

For Packet Backhaul, the *LMF Help* should be accessed for the appropriate procedures.

Packet Backhaul BTS Procedures

Optimization Procedures

- Click on *LMF Help*
- Select *Optimization/ATP Process*
- Select *Optimization procedure for SC48X*
  - Important CDF Parameters
  - CSA
  - Optimization of SC48X High Power Configuration
  - Optimization of SC48X Low Power Configuration
  - Optimization of SC48X High Power in Logical Configuration
  - Optimization of SC48X Low Power in Logical Configuration
  - Calibrating Procedures for SC48X Expansion Frame Configurations

Follow the appropriate procedure identified in the *LMF Help.*

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