

Chapter 6: Installing the Unit and Installation Check Off List

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Notes

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Unit Installation Overview

Overview

This chapter provides the procedures for unit installation and cabling.

The site cabling has been installed and routed to the location of the BTS. In this chapter, the cables will be attached to the unit(s). Cabling installation will be repeated as necessary for each unit at the BTS.

This chapter provides the information and procedures to:

- Attach the unit to the mounting bracket
- Attach cables to the unit
- Power on the unit
- Mount the solar covers
- Complete the installation completion checklist

Unit Installation Procedure Order

The process of installing the unit requires that the following procedures be completed in the order shown:

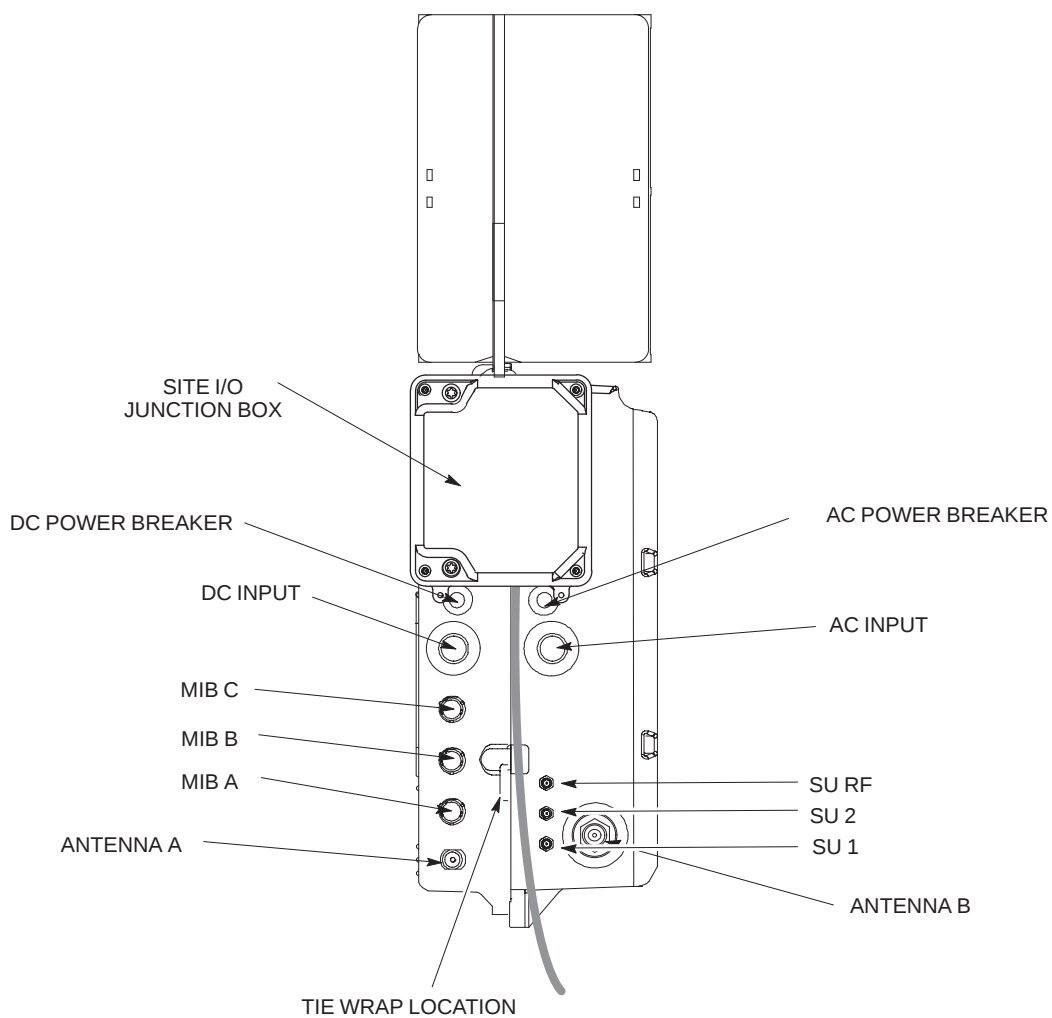
1. Attaching fin covers to the unit – optional
2. Attaching the installation handles to the unit
3. Attaching the unit to the mounting bracket and removing the installation handles
4. Attaching earth ground cable and optional master ground cable.
5. Attaching the Site I/O junction box to the unit
6. Attaching the short duration battery (optional)
7. Attaching the AC input power or DC input power cable
8. Attaching antenna cable(s)
9. Attaching the MIB cables (optional)
10. Attaching the SU cables (optional)
11. Terminating unused connectors
12. Powering on the unit
13. Mounting solar cover
14. Cleaning up site
15. Filling out the installation completion checklist

Connector Locations

Connector Locations

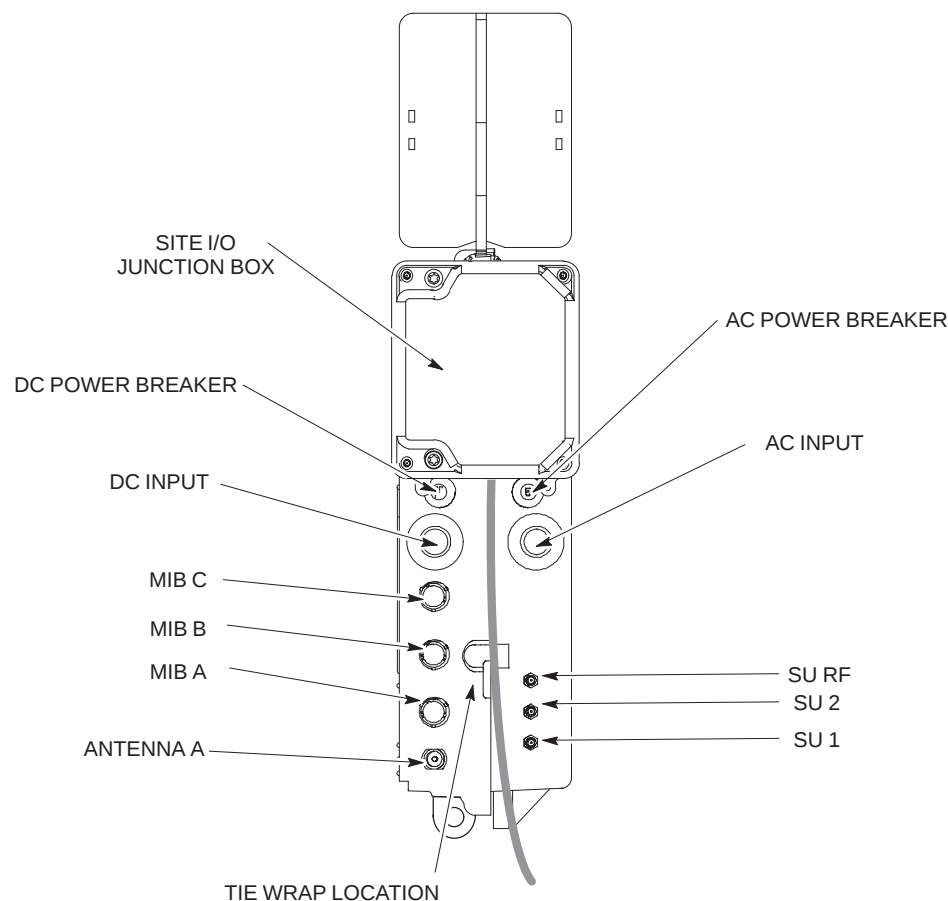
Figure 6-1, Figure 6-2, and Figure 6-3 show the location of the cable connectors on the Microcell, Picocell, and Primary Surge Suppressor. The system configuration determines which connectors are used.

Figure 6-1: Location of MicroCell Unit Connectors



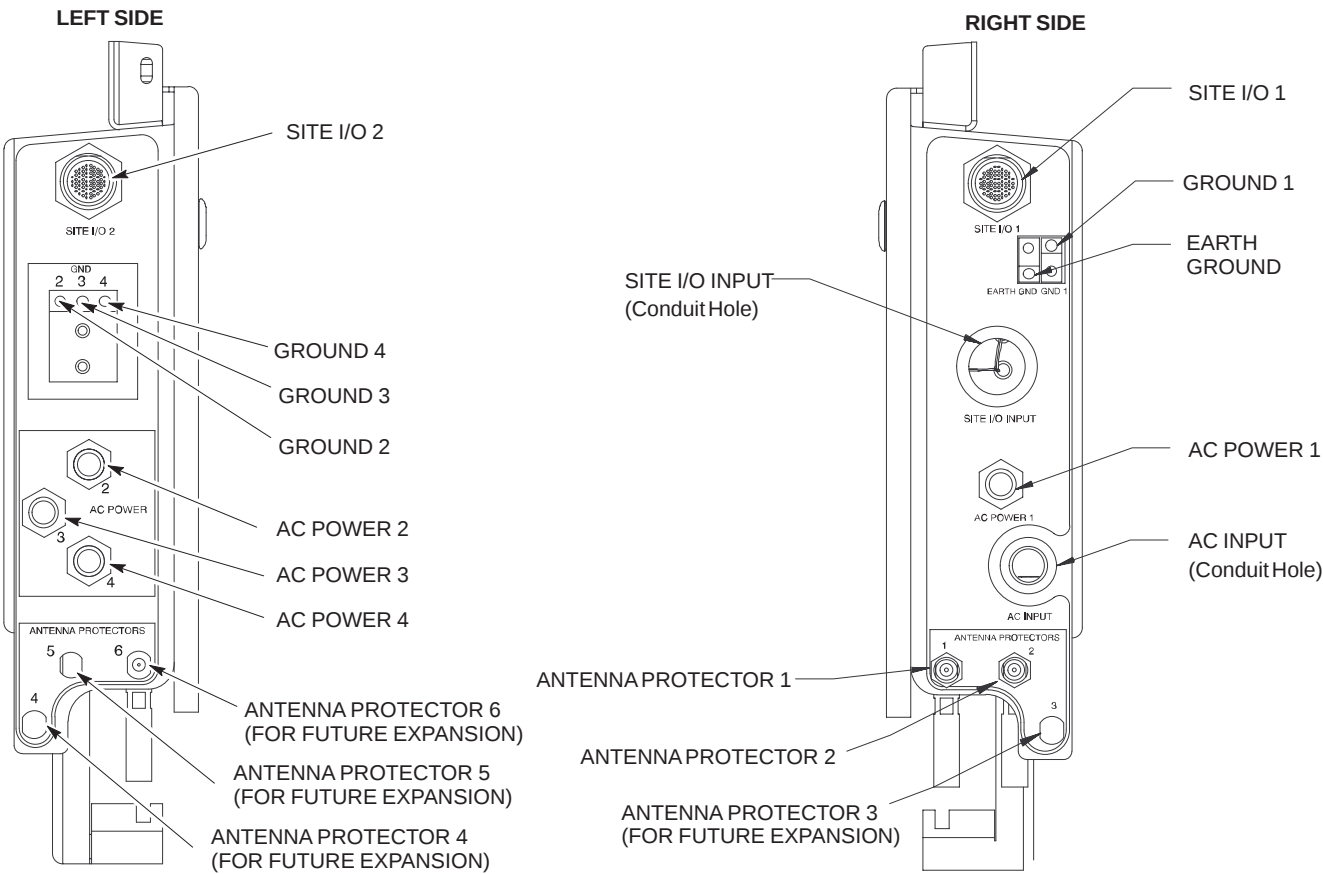
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Figure 6-2: Location of PicoCell Unit Connectors



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Figure 6-3: Location of Primary Surge Suppressor Connectors



Attaching Back Fin Cover to Unit

Objective

The objective of this procedure is to attach the back fin cover to the PicoCell and MicroCell units. The front fin cover is mounted to the unit after the unit is mounted to the mounting bracket.

When to Use the Fin Covers

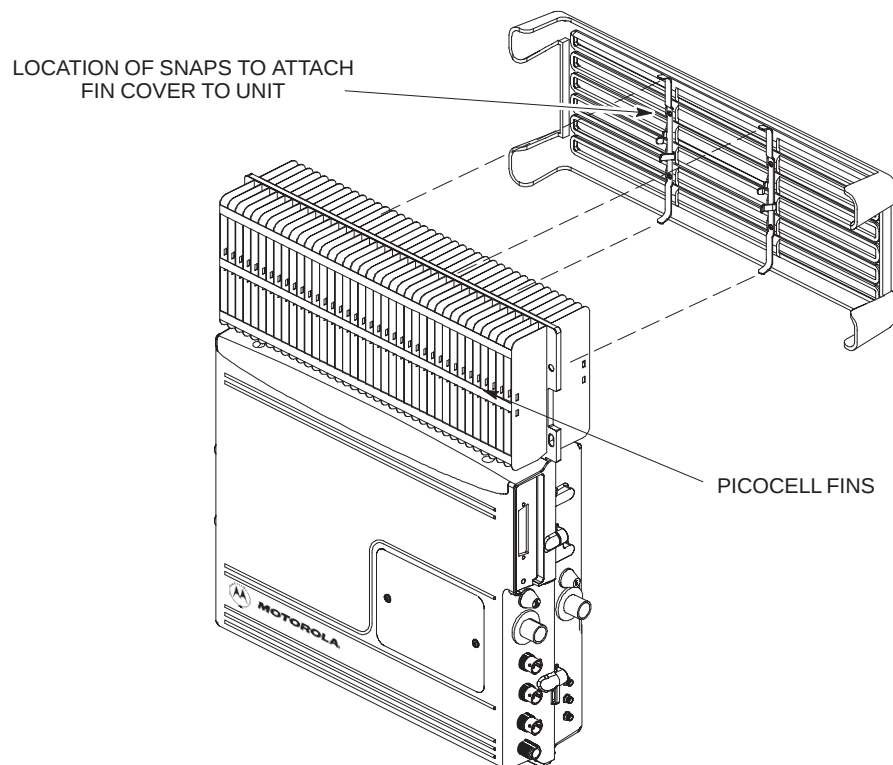
The fin covers should always be used in an indoor application.

Procedure

Attach the rear fin cover to the unit by following the procedures in Table 6-1 and the information in Figure 6-4.

Table 6-1: Procedure to Attach Rear Fin Cover to Units	
Step	Action
1	Install back fin cover prior to placing unit on the mounting bracket.
2	Center fin cover on the fins of the unit. See Figure 6-4 for snap locations.
3	Align snap with center tab on fins.
4	Push fin cover into place.

Figure 6-4: Attaching Back Fin Cover to Unit (Picocell Shown)



Attaching Optional Installation Handles to the Unit

Objective

The objective of this procedure is to attach the optional installation handles to the unit. The location for the handles is shown in Figure 6-5. The handles should be used when lifting or carrying the unit.

Required Tools and Materials

Tools

Attaching the installation handles to the unit requires:

- T30 Torx tamper bit
- Torque driver wrench, 1/4-in. hex female drive, 0–10 N–M

Motorola parts

Table 6-2 lists the parts necessary to do this procedure.

Table 6-2: Installation Handle Kit – SGLN5754		
Quantity	Part Number	Description
4	387541C03	Screws M6x190
1	0787668C01	Left Handle
1	0787668C02	Right Handle

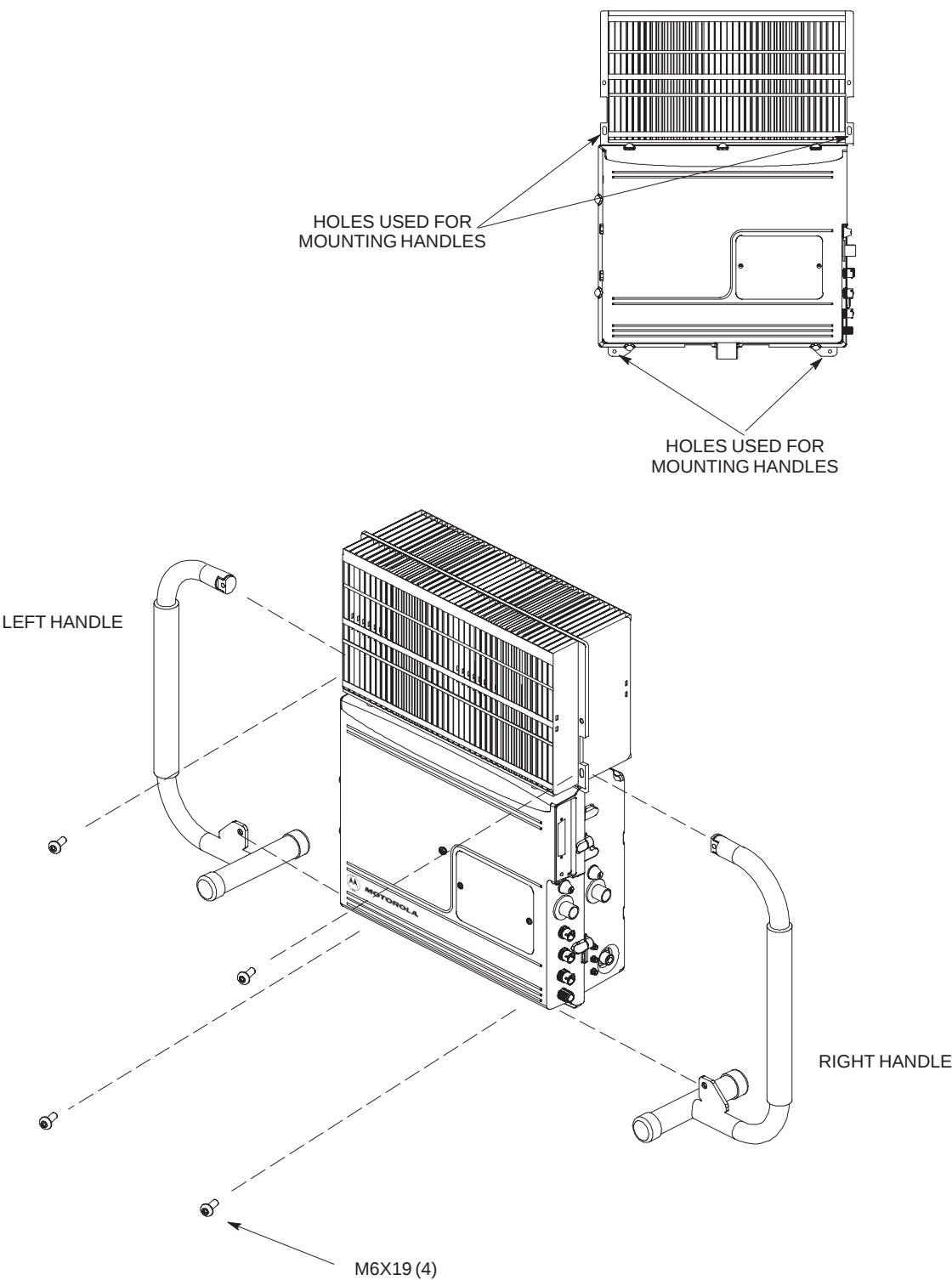
Procedure to Attach the Installation Handles to the Unit

Use the procedure in Table 6-3 to attach the installation handles to the unit. Refer to Figure 6-5.

Table 6-3: Procedure to Attach the Installation Handles to the Unit	
Step	Action
1	Hold the left handle in position and start the upper screw. The handles are marked left and right. Refer to Figure 6-5.
2	Position and start the lower screw.
3	Use a T30 Torx tamper bit to torque both screws to 5.0 N–m.
4	Repeat steps 1–3 for the right handle.

Attaching Installation Handles to the Unit – continued

Figure 6-5: Attaching the Installation Handles to the Unit (Picocell Shown)



Attaching Unit to Mounting Bracket

Objective

The objective of this procedure is to attach the unit to the mounting bracket. This procedure applies to mounting brackets that are attached to a rack, wall, ceiling or pole. This procedure also applies to both the MicroCell and PicoCell units.

Background

The unit attaches to the mounting bracket with two (2) M6 screws and the provided pin or a customer-supplied padlock.



WARNING

For ceiling mount applications, two people must do this procedure. One person must steady the unit while the second person installs the unit.

NOTE

The handles should be mounted to the unit before mounting the unit to the bracket. The handles should be used to lift the unit onto the bracket. If the solar cover is to be used, the back cover must be attached prior to mounting the unit. Remove the handles once the unit has been secured to the mounting bracket.

Tools and Materials

The following tools and materials are required to attach the unit to the mounting bracket:

- Torque driver wrench, 1/4-in. hex female drive, 0–10 N–M
- T30 Torx tamper bit
- Two M6X19 screws (Motorola Part Number 0387541C03)

Procedure to Attach the Unit to the Mounting Bracket

Follow the procedure in Table 6-4 to attach the unit to the mounting bracket. Refer to Figure 6-6.



WARNING

For ceiling mount applications, two people must do this procedure. One person must steady the unit while the second person installs the unit.



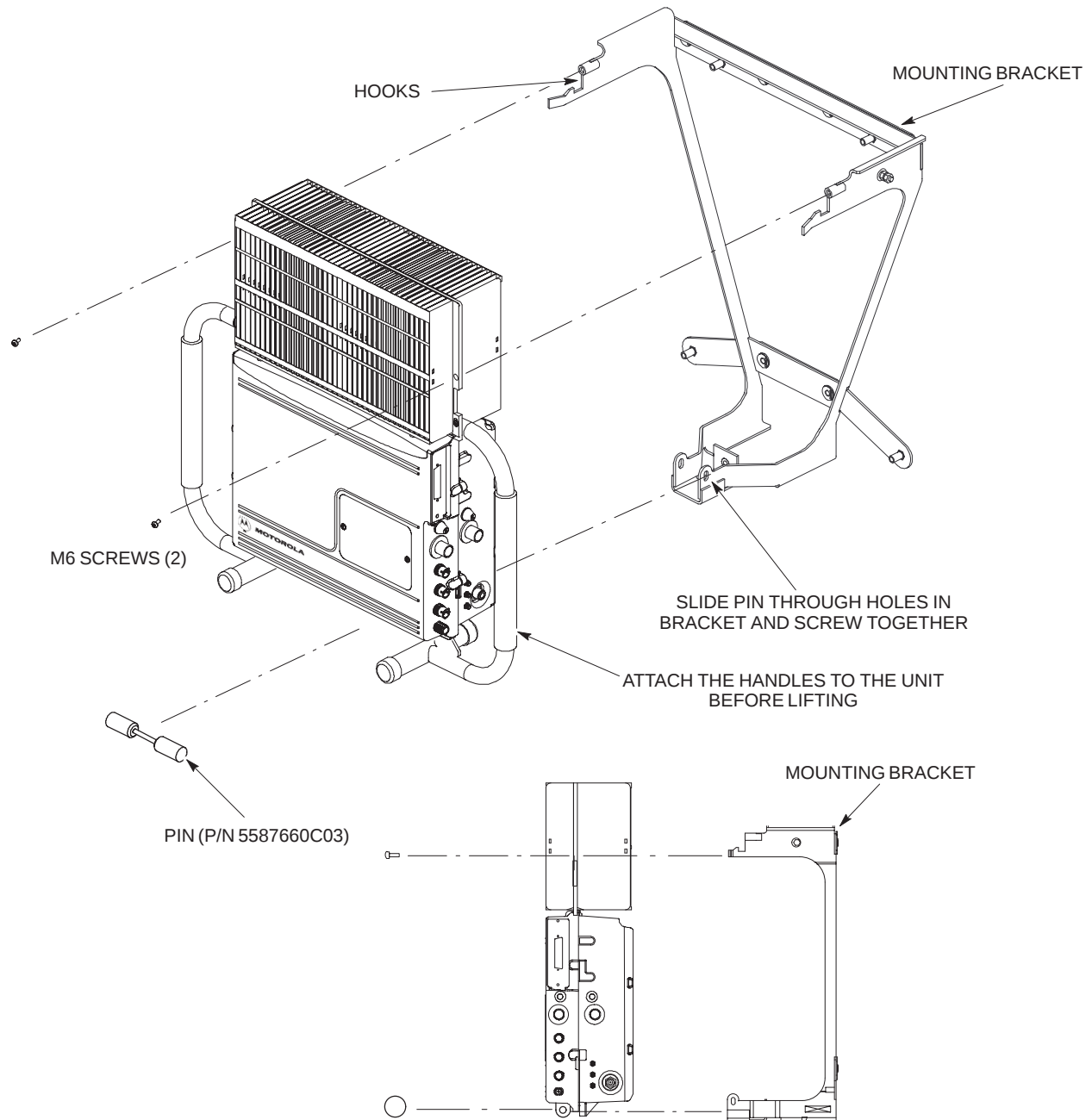
CAUTION

Use caution when resting the MicroCell or PicoCell unit on the hooks of the mounting bracket. Do not leave unit supported by hooks only.

Table 6-4: Procedure to Attach the Unit to the Mounting Bracket	
Step	Action
1	Lift the unit using the installation handles and place it on the mounting bracket by aligning the bracket’s upper arms into the rectangular cutouts in the heatsink. The unit will need to be raised up slightly so that the lower bracket flange does not contact the unit’s lower surface. For a ceiling application, use caution when resting the PicoCell on the hooks on the mounting bracket.
2	Use a T30 Torx tamper bit to start, but not tighten, both screws in the location shown in Figure 6-6.
3	At the bottom of the unit, align the hole in the mounting bracket with the hole in the unit. Place the pin or customer-supplied padlock through this hole. Screw pin together and tighten firmly.
4	Use a T30 Torx tamper bit to torque the two mounting screws to 5.0 N–M.
5	Use a T30 Torx tamper bit to remove the installation handles.

Attaching Unit to Mounting Bracket – continued

Figure 6-6: Attaching the Unit to the Mounting Bracket



Earth Ground Cabling

Objective

The objective of this procedure is to attach the earth ground cabling to one or more MicroCell or PicoCell units. This procedure covers just the grounding cables that attach to the MicroCell or PicoCell.

Other Grounding Considerations

Grounding considerations beyond the ground cables that attach to the MicroCell and PicoCell are summarized in Appendix A. Refer to Appendix A and the site documentation for other grounding considerations.

If your site is equipped with the optional Primary Surge Suppressor, refer to the “Power, Earth Ground, and Battery Cabling” Procedure in chapter 4 for information about installing the Master Ground cable.

Cable Description

The following cables in Table 6-5 are necessary to do this procedure.

Table 6-5: Ground Cable Description and Part Number			
Cable	Qty.	Part Number	Description
A	1–4	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector. Used for Primary Surge Suppressor Installation.
B	1–4	3087701C01	Ground cable, Site I/O Junction Box to Bracket.
Y	1	Customer Supplied	Master Ground Cable, 6 -AWG, insulated copper wire. Used for both Primary Surge Suppressor and non–Primary Surge Suppressor installations.

Tools and Materials

The following tools are required to attach ground cabling to the MicroCell and PicoCell units.

- 13 mm torque wrench set to 5.0 N–M
- Flathead screwdriver bit
- T30 TORX bit

Procedure

Use the following procedure to attach the ground cables. Refer to Table 6-6 and Figure 6-7.

Table 6-6: Procedure to Attach the Earth Ground Cables	
Step	Action
1	Remove the hex nuts and lock washers from the ground stud on the mounting bracket.
2	Attach ground cable (cable A or Y) to ground stud on mounting bracket.
... continued on next page	

Table 6-6: Procedure to Attach the Earth Ground Cables	
Step	Action
3	Replace one lock washer and nut on the ground stud and tighten to 5 N-m.
4	Attach the ground cable from the Site I/O junction box (cable B) to the ground stud on the mounting bracket.
5	Replace the second lockwasher and hex nut to the ground stud on mounting bracket. Use a torque wrench and a 13mm socket to tighten to 5.0 N-m.

Figure 6-7: Detail Location of Ground Stud

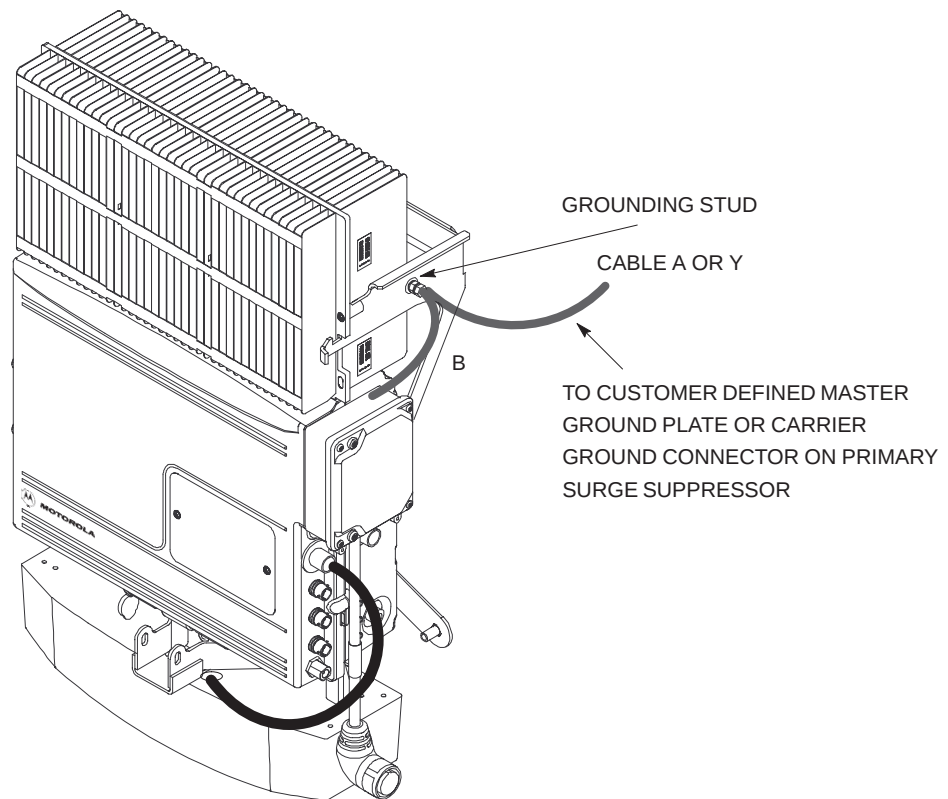
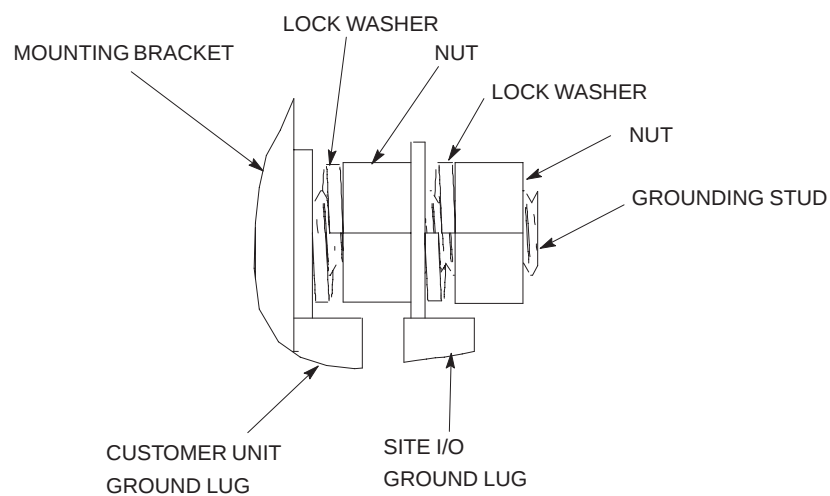


Figure 6-8: Grounding Stud on Mounting Bracket



Attaching Front Fin Cover to Unit

Objective

The objective of this procedure is to attach the front fin cover to the PicoCell and MicroCell units.

When to Use the Fin Covers

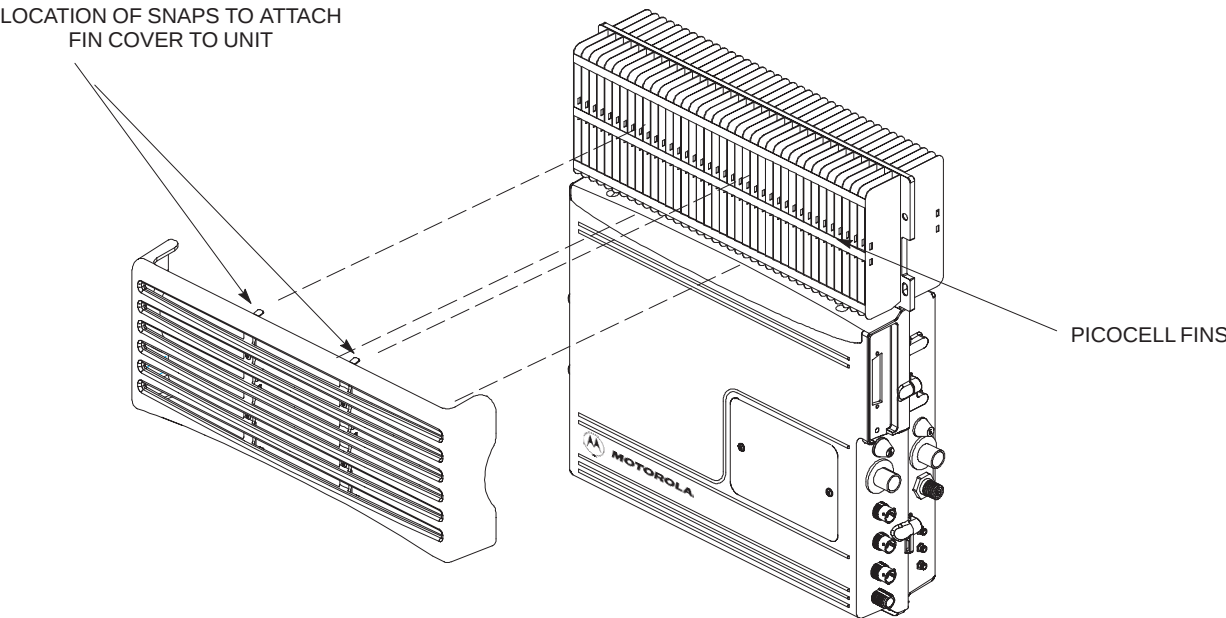
Always use fin covers for an indoor application.

Procedure

Follow the procedure in Table 6-7 to attach the front fin cover to the unit. Refer to Figure 6-9.

Table 6-7: Procedure to Attach Front Fin Cover to Unit	
Step	Action
1	Center fin cover on the fins of the unit. See Figure 6-9 for snap locations.
2	Align snap with center tab on fins.
3	Push fin cover into place.

Figure 6-9: Attaching Front Fin Cover to Unit (Picocell Shown)



Attaching the Site I/O Junction Box to the Unit

Objective

The objective of this procedure is to attach the Site I/O junction box to the unit. The location for the Site I/O junction box is shown in Figure 6-10.

If you do not mount a Site I/O Junction box to a unit, leave the installed Site I/O caps on the Site I/O Junction box connectors.

Required Tools and Materials

The following tools and materials are necessary to do this procedure:

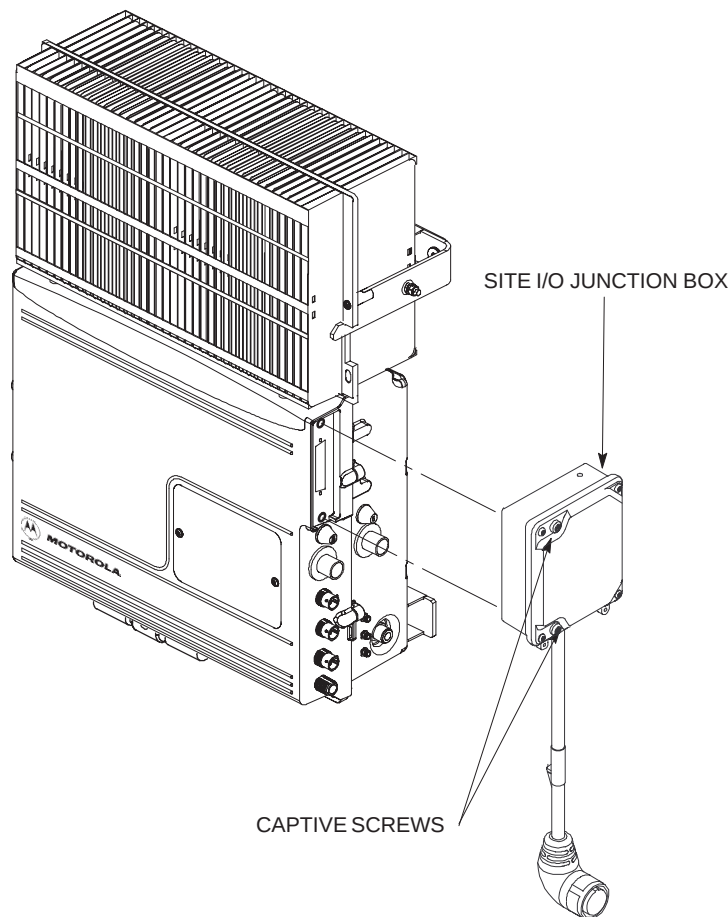
- Torque driver wrench, 1/4-in. hex female drive, 0–10 N–M
- T30 Torx tamper bit
- Site I/O Junction box

Procedure to Attach the Site I/O Junction Box to the Unit

Follow the procedure below to attach the site I/O junction box to the unit.

Table 6-8: Procedure to Attach the Site I/O Junction Box to the Unit	
Step	Action
1	Use a T30 TORX bit to remove Site I/O Cap from the Site I/O connector. NOTE Save Site I/O Cap for future use.
2	Remove the Site I/O Plate from the Site I/O Junction Box.
3	Attach one end of the Site I/O Ground cable to the Site I/O Junction Box. Use one M6x19 tamper-resistant screw. Torque to 5.0 N–m.
4	The free end of the Site I/O junction box cable should be connected to the customer-supplied Site I/O interface or to the Primary Surge Suppressor.
5	Position the Site I/O junction box as shown in NO TAG.
6	Insert the Site I/O junction box on to the housing, using the alignment feature on the housing.
7	Use a T30 Torx tamper bit to tighten (but do not torque) the upper tamper resistant screw.
8	Tighten but do not torque the lower tamper resistant screw.
9	Use a T30 Torx tamper bit to torque the upper and lower screw to 5 N–m.

Figure 6-10: Attaching the Site I/O Junction Box to the Unit



6

Procedure to Attach a Site I/O Cap to the Unit (optional)

Use the following procedure in Table 6-9 to attach a Site I/O Cap to the unit.

Table 6-9: Procedure to Attach a Site I/O Cap to the Unit (optional)	
Step	Action
1	Position the Site I/O cap, Motorola Part Number 3888121C01, over the Site I/O socket.
2	Use a T30 Torx tamper bit to tighten (but do not torque) the upper tamper resistant screw.
3	Tighten but do not torque the lower tamper resistant screw.
4	Use a T30 Torx tamper bit to torque the upper and lower screw to 5 N-m.

Attaching the Short Duration Battery to the Unit (optional)

Objective

The objective of this procedure is to attach the short duration battery to the unit.

Required Tools and Materials

Attaching the battery to the unit requires:

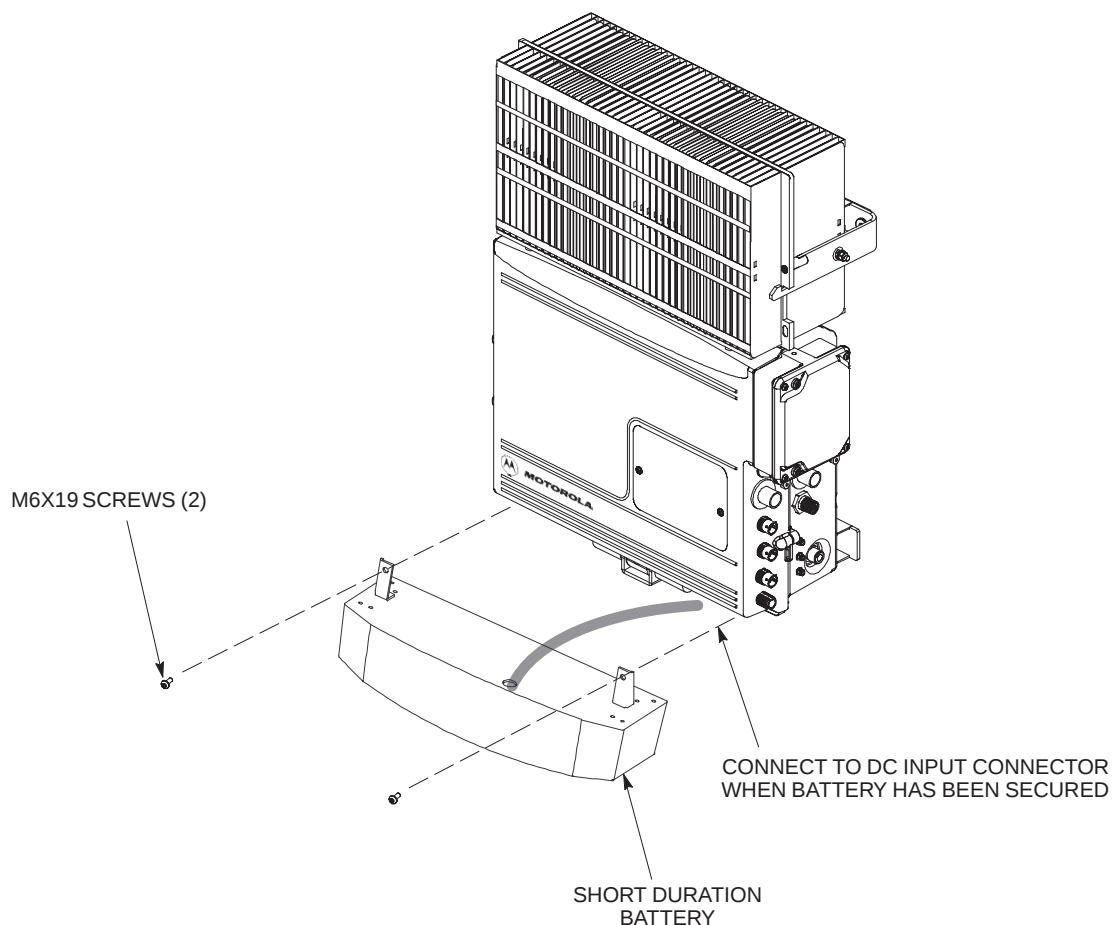
- T30 Torx tamper bit, 1/4-in. hex
- Torque driver wrench, 1/4-in. hex female drive, 0–10 N–M
- Two (2) Screws M6x19 (Motorola Part Number 0387541C03)

Procedure to Attach the Battery to the Unit

Follow the procedure in Table 6-10 to attach the short duration battery to the unit. Refer to Figure 6-11.

Table 6-10: Procedure to Attach the Short Duration Battery to the Unit	
Step	Action
1	Hold the battery in the position shown in Figure 6-11.
2	The two holes at the end of the battery should align with the mounting holes on the unit. See Figure 6-11.
3	Start but do not tighten the M6x19 screws.
4	Using a T30 Torx tamper bit wrench, 1/4-in. hex female drive, 0–10 N–M, torque the screws to 5 N–M.

Figure 6-11: Attaching the Short Duration Battery to the Unit



Short Duration Battery Cabling

Objective

The objective of this procedure is to attach the short duration battery cable.

Battery Cable

The battery cable is part of the battery assembly. The same type connector is used for the short duration battery and DC input cables.

Procedure

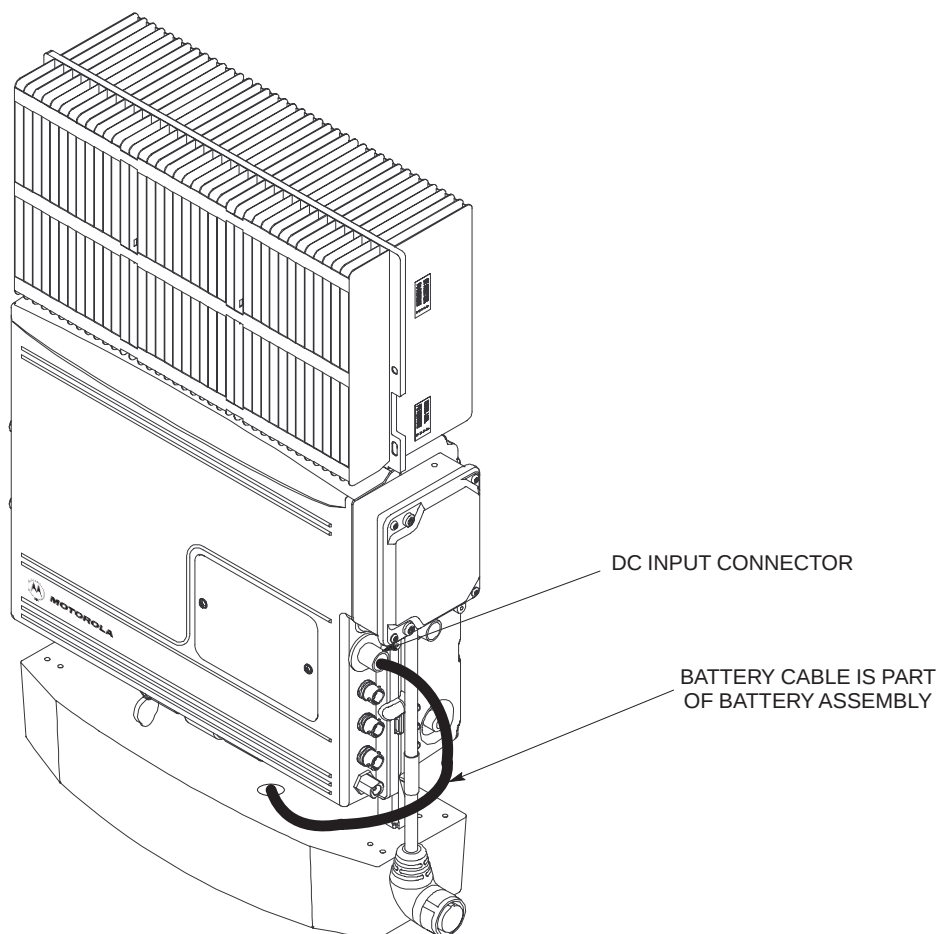
Use the following procedure in Table 6-11 to attach the short duration battery (DC input) cable to the DC input connector. Refer to Figure 6-12. The cable should be connected before the solar cover is attached.

The short duration battery should not be opened under any circumstances. No wire termination is required by the user except connection to the BTS, with the provided connector.

Table 6-11: Procedure to Connect the Short Duration Battery Cable to Unit

Step	Action
1	Ensure that the ground wire has a connection to unit and the Master Ground Bus (also called Master Ground Plate).
2	Verify that the DC power breaker is open. The white collar on the breaker is visible when it is open.
3	Place the round, black connector of the DC input cable onto the DC input connector on the BTS. Refer to Figure 6-12. Turn the cable connector to align its key.
4	Hand tighten the connector (a clicking sound is heard, this is normal). When the red line on the connector on the unit is covered, connection is complete.

Figure 6-12: Battery Cable Installation



AC Power Cabling

Objective

The objective of this procedure is to attach the AC input power cable to the unit. Use this procedure only when AC power is used to power the unit.

If the Primary Surge Suppressor is not used, the AC Installation Box is required for all outdoor mounting applications.



WARNING

This equipment uses dangerous voltages and is capable of causing death. Use extreme caution when handling and testing this equipment.

Cable Description

The following cables in Table 6-5 are necessary to do this procedure:

Table 6-12: AC Input Cable Description and Part Number			
Cable	Qty.	Part Number	Description
S	1–4	3087854C02	AC input cable, 18 AWG, 5 m, is designed for 120–240 VAC power input. Cable has Deutsch connector on both ends.

Power Cable and Connector Signal Information

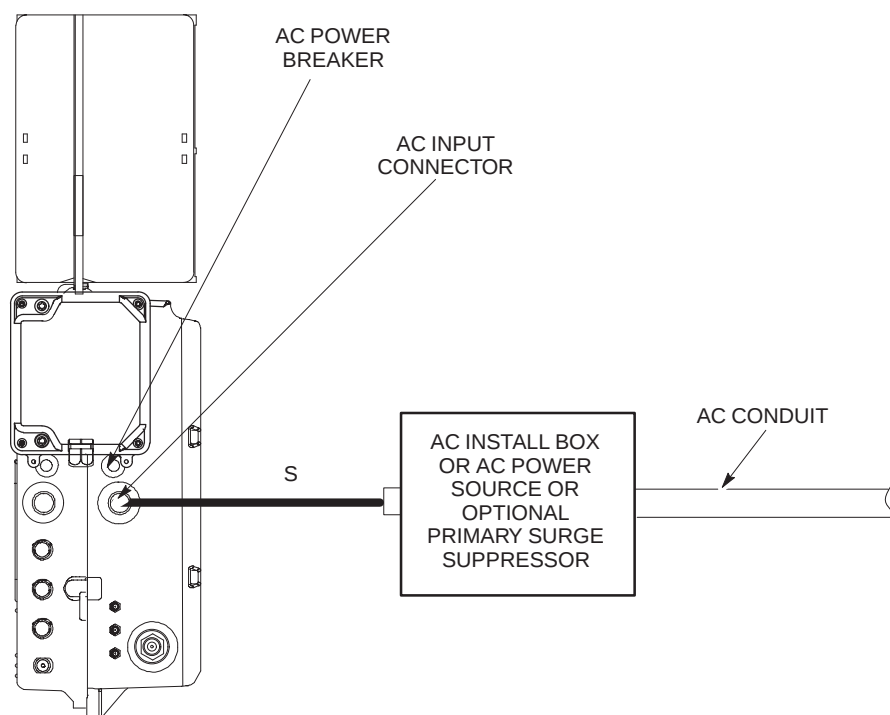
The AC input connector is located on the side of the unit as shown in Figure 6-13. The unit is designed for 88–260 VAC power input.

Procedure

Use the following procedure in Table 6-13 to connect the AC input cable to the unit. The AC input cable should be connected before the solar cover is attached.

Table 6-13: Procedure to Connect AC Power to the Unit	
Step	Action
1	Ensure that the ground wire has a connection to the Master Ground Bus (also called Master Ground Plate).
2	Verify that the AC power breaker is open. The white collar on the breaker is visible when it is open.
3	Place the round, black connector on the AC input cable (cable S) onto the AC input connector. See Figure 6-13. Turn the cable connector to align its key.
4	Hand tighten the connector (a clicking sound is heard, this is normal). When the red line on the connector on the unit is covered, connection is complete.

Figure 6-13: AC Power Cabling Details



DC Power Cabling

Objective

The objective of this procedure is to attach the DC input cable to the unit. Use this procedure only when DC power is used to power the unit.



WARNING

This equipment uses dangerous voltages and is capable of causing death. Use extreme caution when handling and testing this equipment.

Cable Description

The following cables in Table 6-14 are necessary to do this procedure.

Table 6-14: DC Input Cable Description and Part Number			
Cable	Qty.	Part Number	Description
U	1	3087854C04	DC input cable, 18 AWG, 5 m, is designed for 20 to 30 VDC power input.

Power Cable and Connector Signal Information

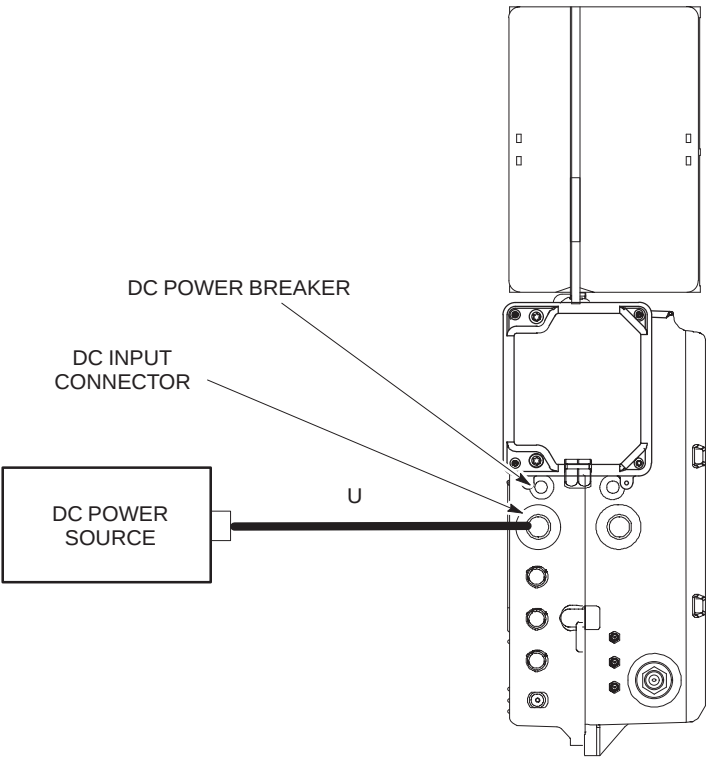
The DC input connector is located on the side of the unit. The unit is designed for 40 to 60 VDC.

Procedure

Use the following procedure in Table 6-15 to connect the DC input cable to the unit. Refer to Figure 6-14. The DC input cable should be connected before the solar cover is attached.

Table 6-15: Procedure to Connect DC Power to the Unit	
Step	Action
1	Ensure that the ground wire has a connection to the Master Ground Bus (also called Master Ground Plate).
2	Verify that the DC power breaker is open. The white collar on the breaker is visible when it is open.
3	Place the round, black connector of the DC input cable onto the DC input connector. See Figure 6-14. Turn the cable connector to align its key.
4	Hand tighten the connector (a clicking sound is heard, this is normal). When the red line on the connector on the unit is covered, connection is complete.

Figure 6-14: DC Power Cabling Details



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Antenna Cabling for Sites Equipped With Customer–Supplied Site I/O Interface

Objective

The objective of this procedure is to attach the antenna cabling for one or more units.

If your BTS is equipped with the optional Primary Surge Suppressor, then proceed to the “Antenna Cabling for Sites Equipped with the Optional Primary Surge Suppressor” procedure in Chapter 6.

Cable Labels

The cable designations are referenced to Table 6-16 in the “Cable Description” area of Chapter 4.

Cable Descriptions

The following cables in Table 6-16 are necessary to do this procedure.

Table 6-16: Cable Descriptions and Part Numbers			
Cable	Qty.	Part Number	Description
C	1–8	Customer Supplied	Antenna cable, 50–Ohm coaxial terminated with at least one male, N–type connector.

Procedure

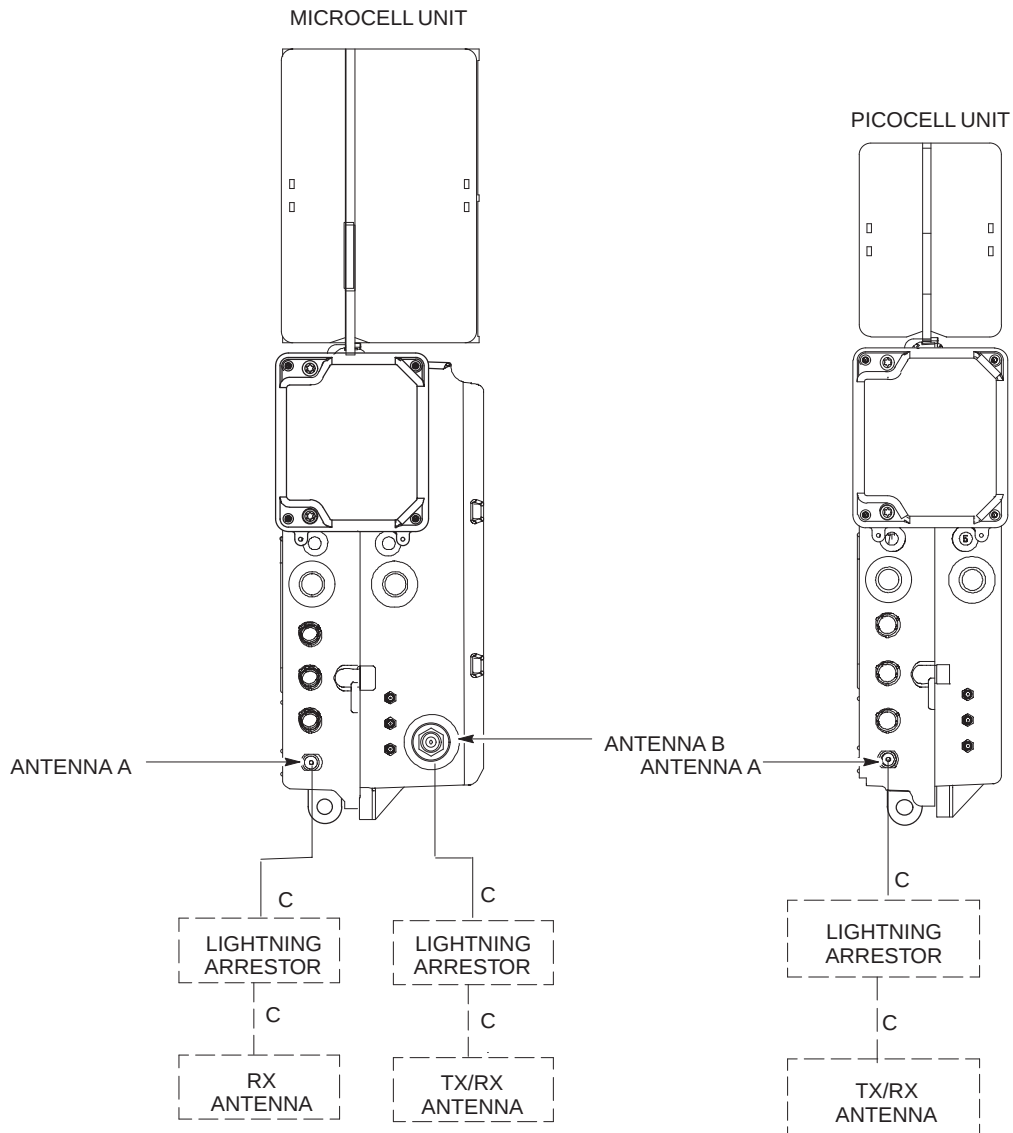
The cabling is installed between the unit(s) and the external lightning arrestors. If lightning arrestors are not present, it connects to the antenna.

If your BTS has one unit, cable the unit as shown in Figure 6-15. Torque the connectors to 4.3 N–M.

If your BTS has more than one unit, cable the unit as shown in Figure 6-18, Figure 6-17, Figure 6-16, Figure 6-21, Figure 6-20, or Figure 6-19.

Antenna Cabling for Sites Equipped With Customer–Supplied Site I/O Interface – continued

Figure 6-15: Antenna Cabling Details for MicroCell and PicoCell Unit



Antenna Cabling for Sites Equipped With Customer–Supplied Site I/O Interface – continued

Figure 6-16: Antenna Cabling for Two Microcells

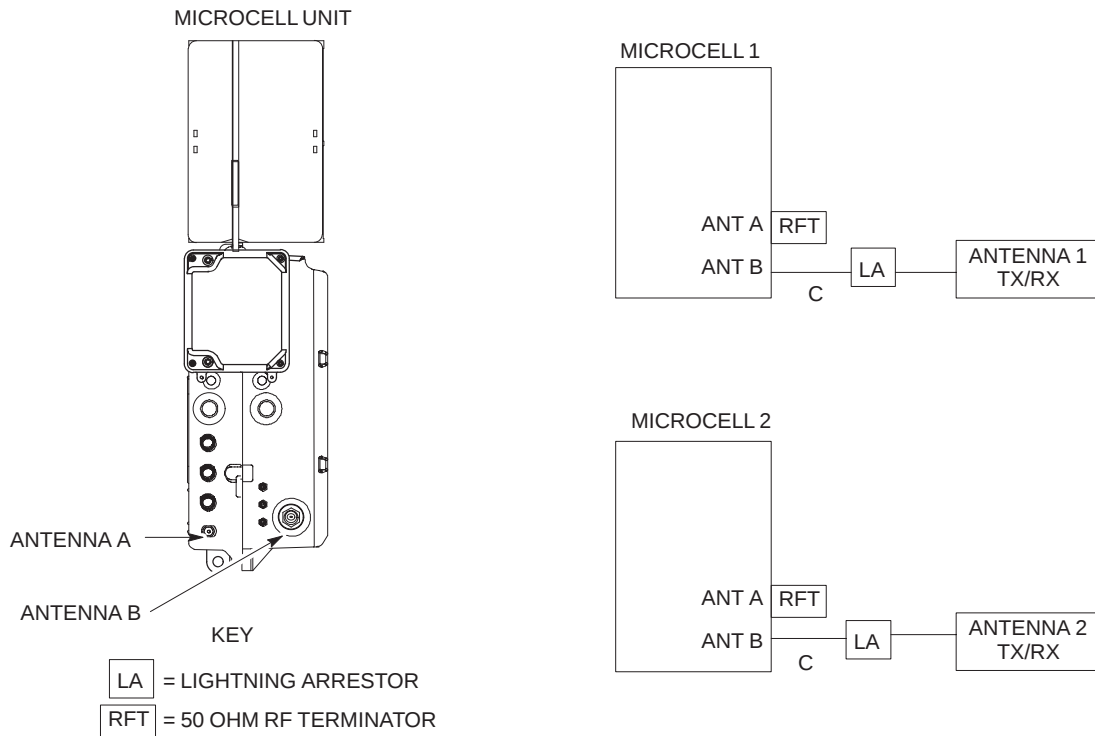
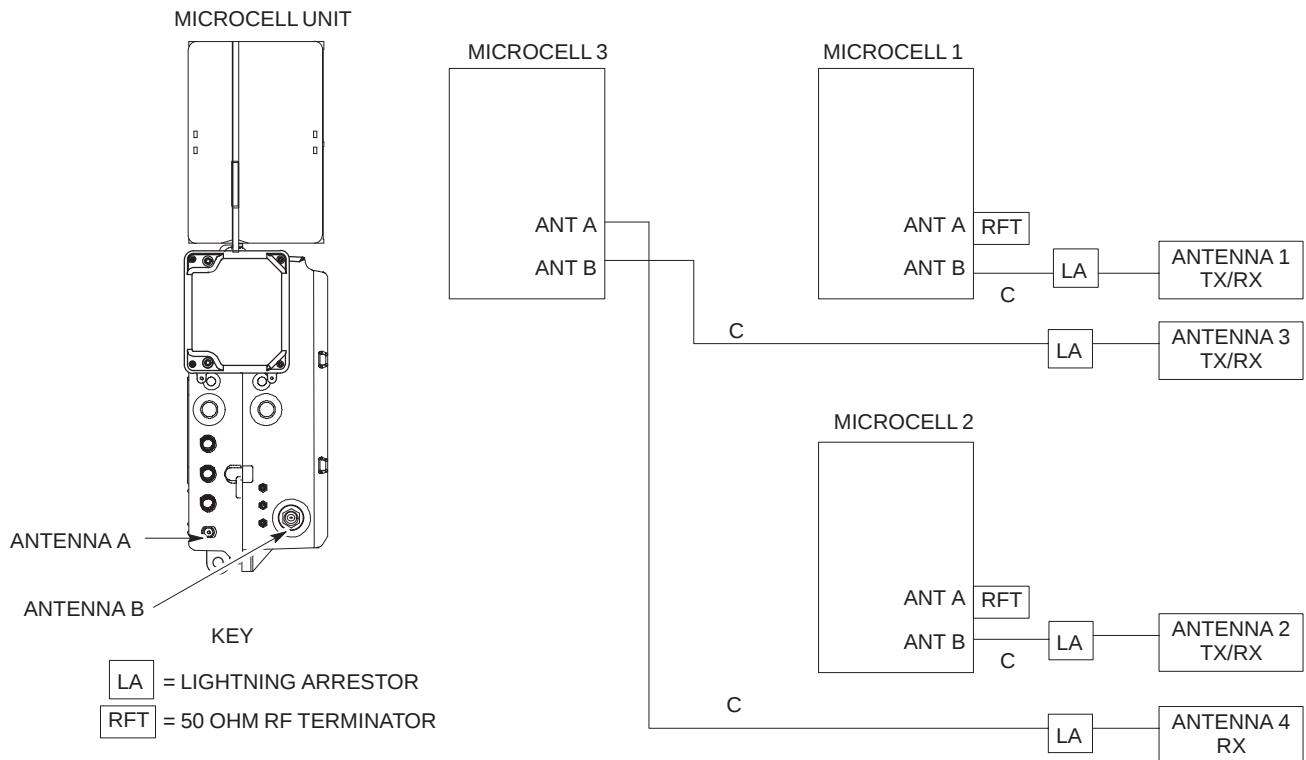


Figure 6-17: Antenna Cabling for Three Microcells



Antenna Cabling for Sites Equipped With Customer–Supplied Site I/O Interface – continued

Figure 6-18: Antenna Cabling for Four Microcells

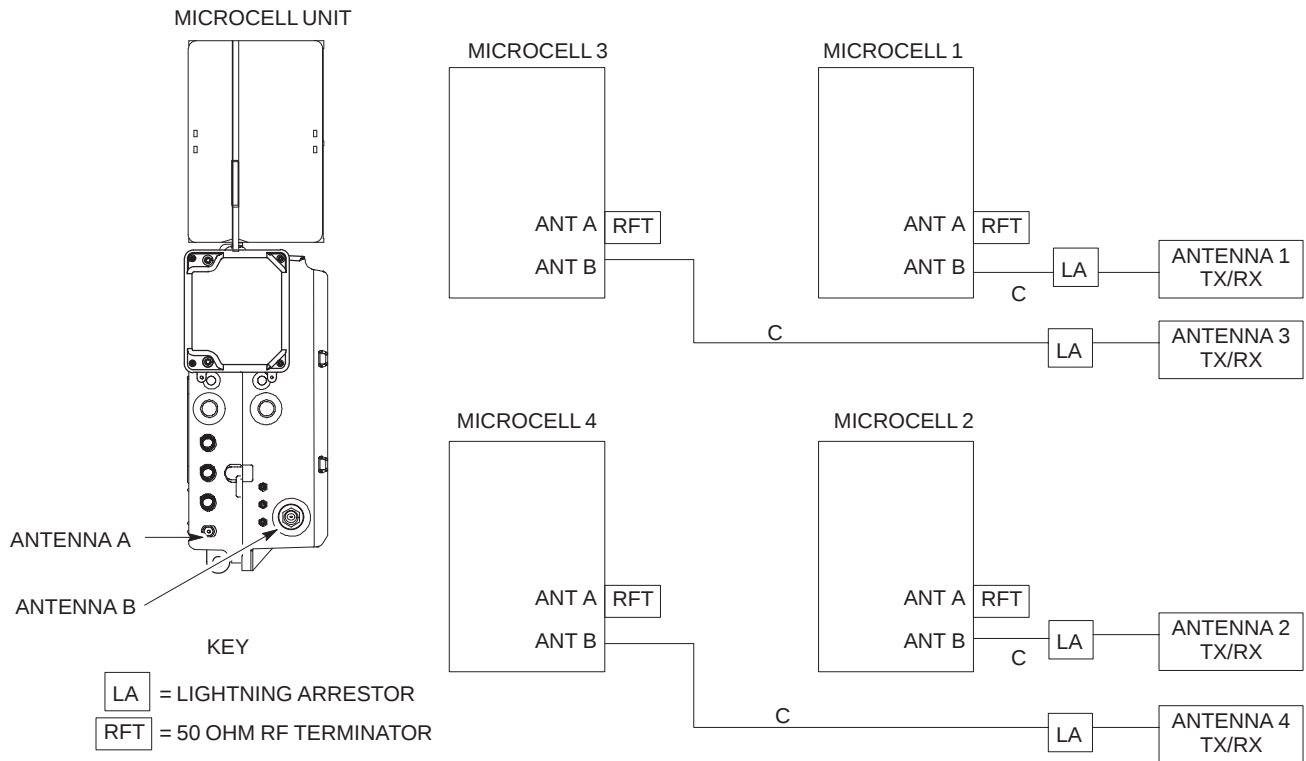
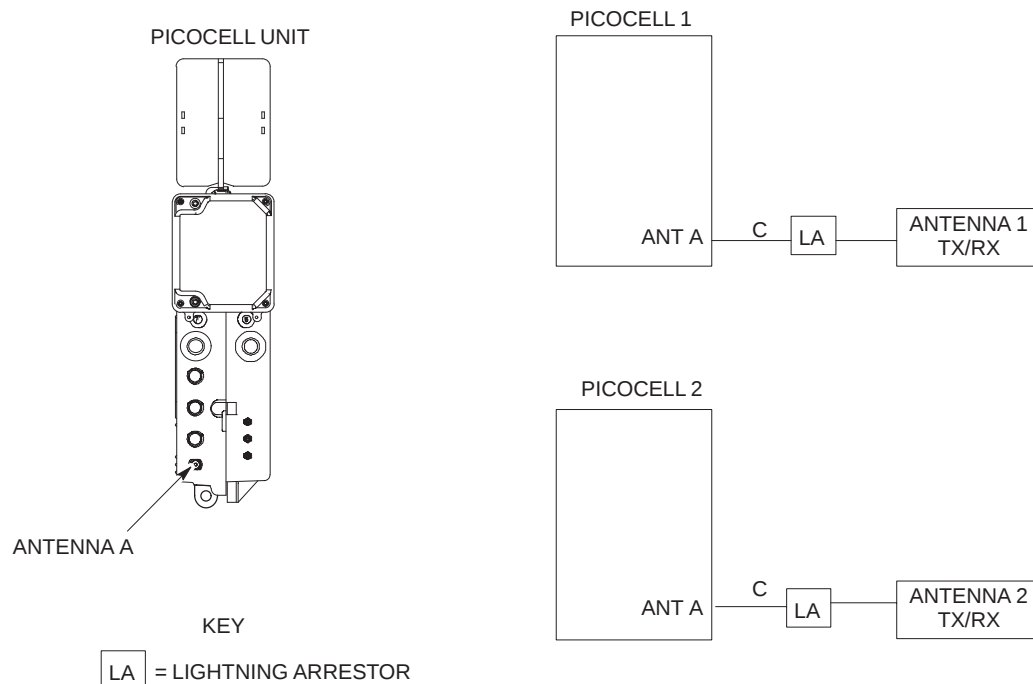


Figure 6-19: Antenna Cabling for Two Picocells



Antenna Cabling for Sites Equipped With Customer-Supplied Site I/O Interface – continued

Figure 6-20: Antenna Cabling for Three Picocells

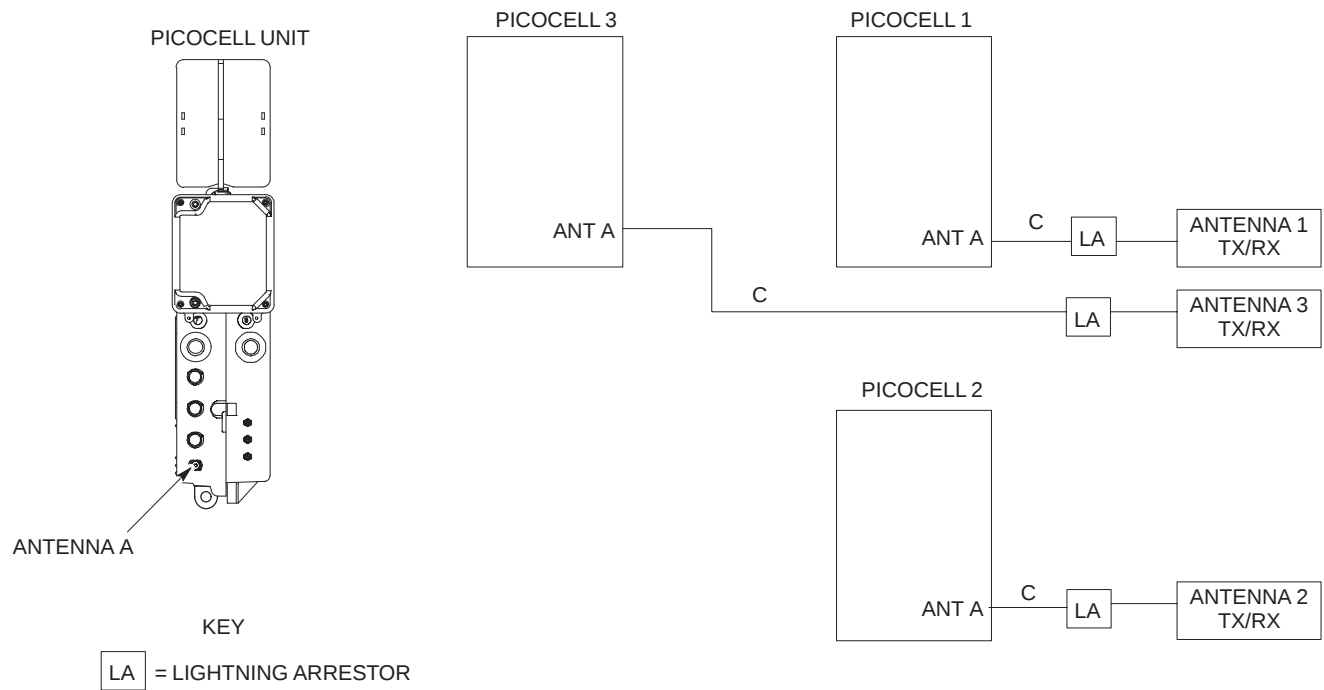
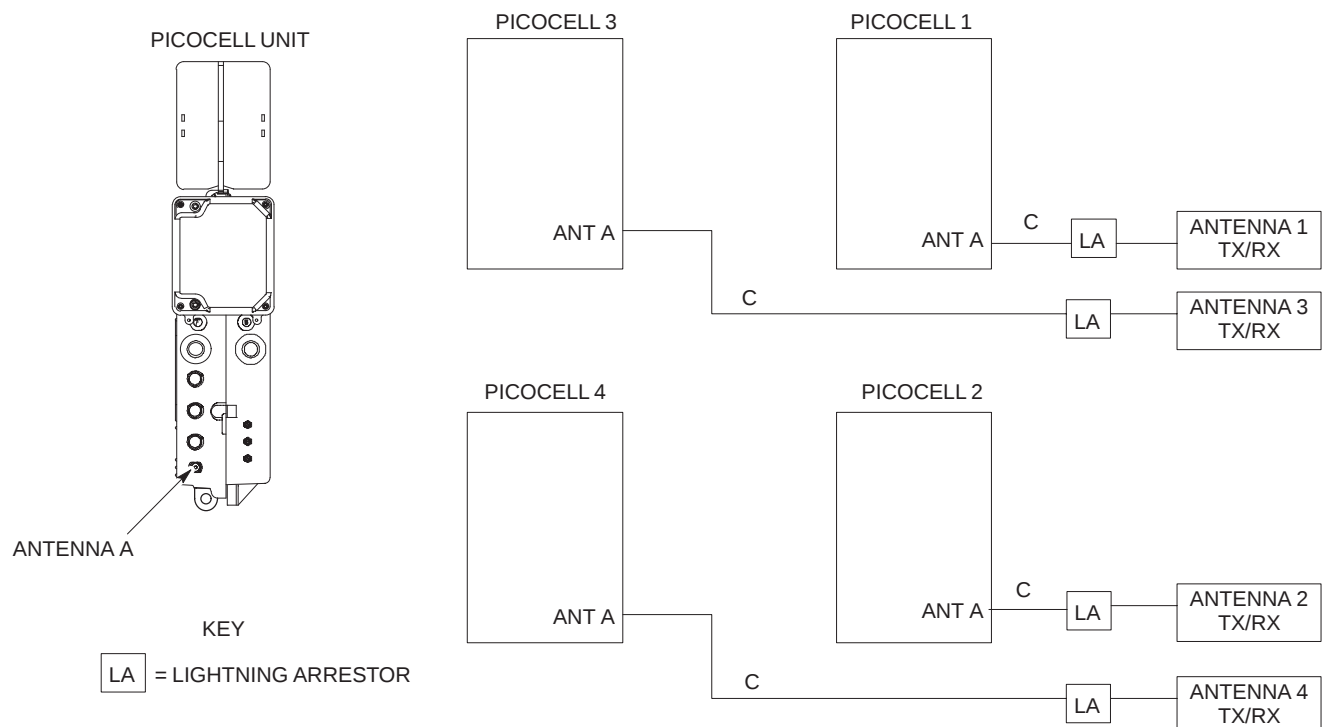


Figure 6-21: Antenna Cabling for Four Picocells



Antenna Cabling for Sites Equipped with Optional Primary Surge Suppressor

Objective

The objective of this procedure is to attach the antenna cabling for one or more units at a site equipped with the optional Primary Surge Suppressor.

Cable Labels

The cable designations are referenced to Table 6-17 in the “Cable Description” area of Chapter 4.

Cable Descriptions

The following cables in Table 6-17 are necessary to do this procedure.

Table 6-17: Cable Descriptions and Part Numbers			
Cable	Qty.	Part Number	Description
C	1–8	Customer Supplied	Antenna cable, 50–Ohm coaxial terminated with at least one male, N–type connector.
D	2–6	Customer Supplied	Antenna cable, terminated with 2 male N–type connectors

Procedure

Lightning arrestors are shipped/installed in the Primary Surge Suppressor for one or two unit configurations. If you are expanding from two to three or from three to four units, then you must install lightning arrestors for units three and four. Refer to the procedure in Table 6-18 to install antenna lightning arrestors.

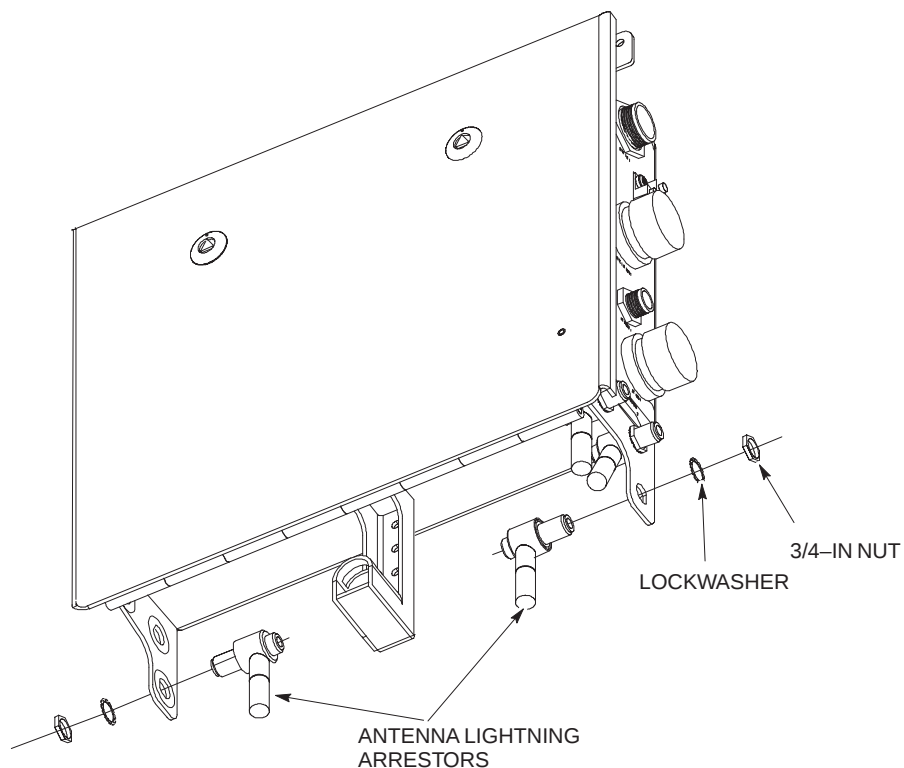
If your BTS has one unit and is equipped with the Primary Surge Suppressor, cable the unit as shown in Figure 6-23.

If your BTS has more than one unit and is equipped with the Primary Surge Suppressor, cable the units as shown in Figure 6-24 through Figure 6-29.

Table 6-18: Procedure to Install Antenna Lightning Arrestors	
Step	Action
1	Remove the 3/4–in. nut and lock washer from N–type connector on antenna lightning arrestor. Refer to Figure 6-22.
2	Insert the antenna lightning arrestor through hole in mounting flange. NOTE Antenna cable connectors may be connected to either side of the antenna protectors on the Primary Surge Suppressor.
3	Install the lockwasher and 3/4–in. nut on the N–type connector.
4	Use a 3/4–in. wrench to tighten to 20 N–m.

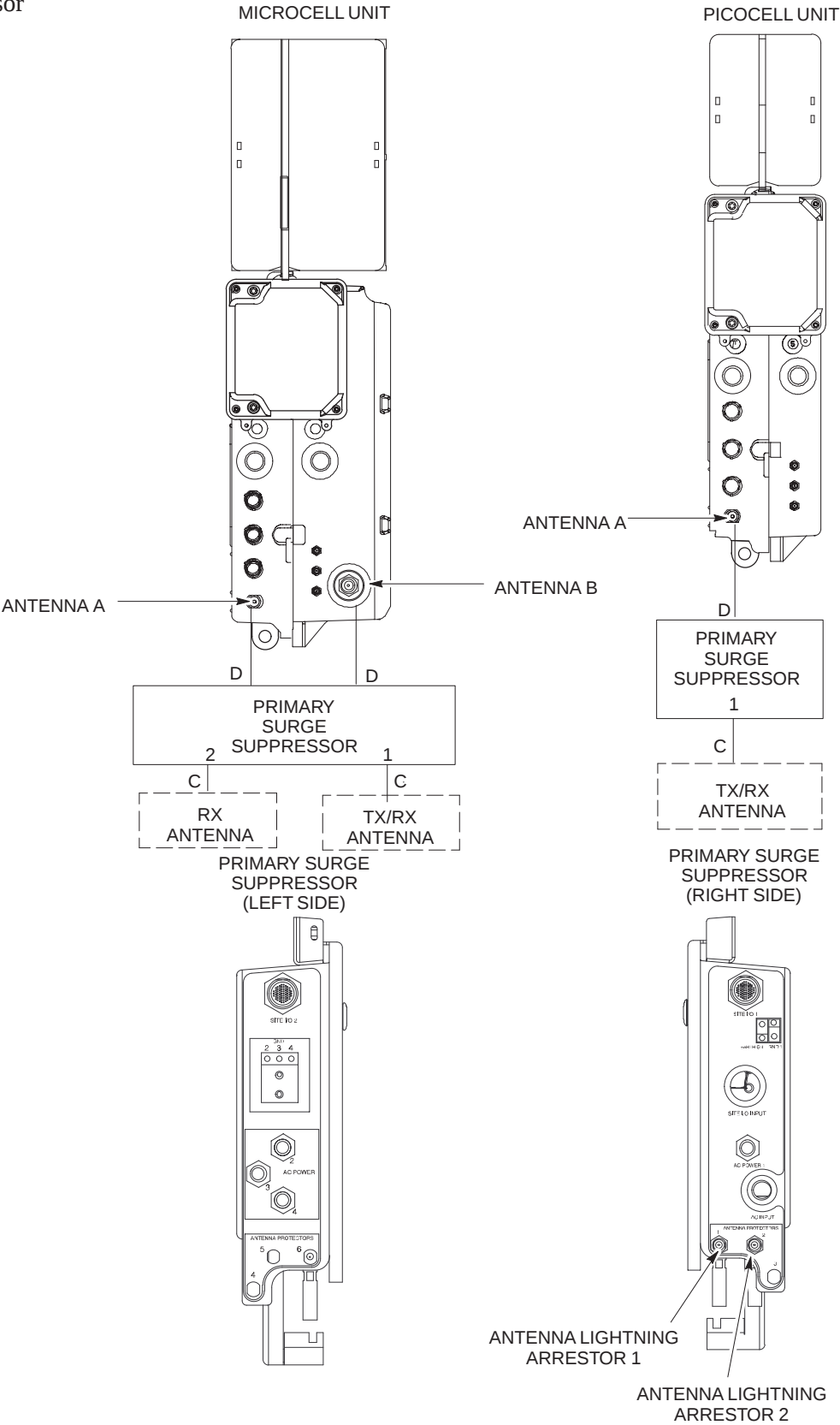
Antenna Cabling for Sites Equipped with Optional Primary Surge Suppressor – continued

Figure 6-22: Installation of Third and Fourth Antenna Lightning Arrestors



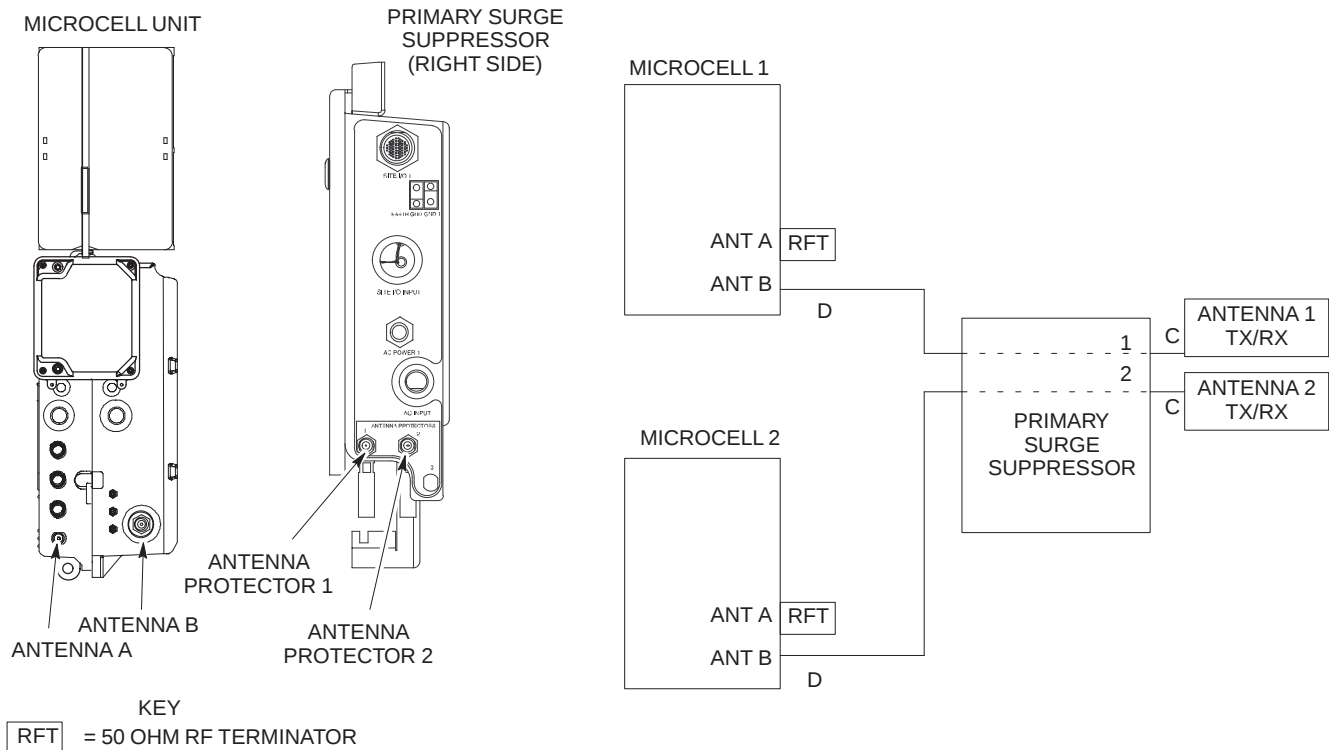
Antenna Cabling for Sites Equipped with Optional Primary Surge Suppressor – continued

Figure 6-23: Antenna Cabling Details for MicroCell and PicoCell Unit Equipped with Primary Surge Suppressor



Antenna Cabling for Sites Equipped with Optional Primary Surge Suppressor – continued

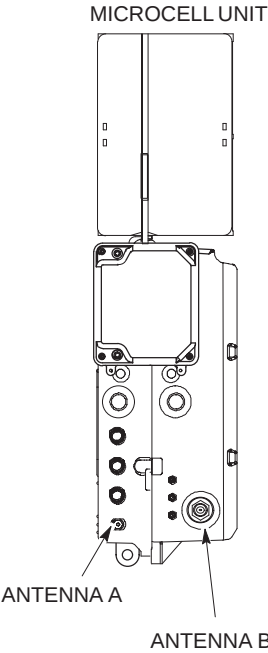
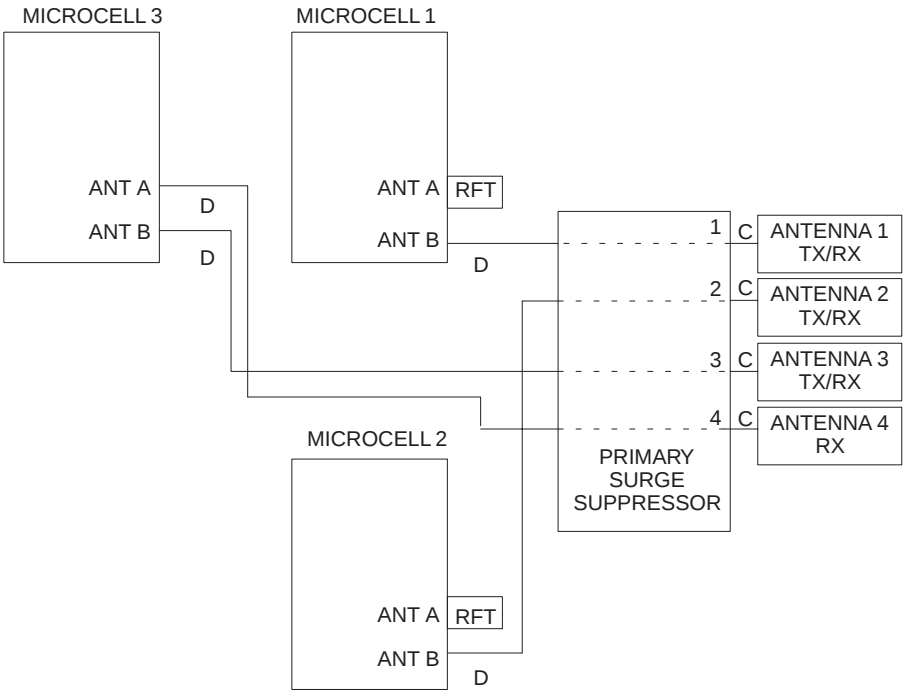
Figure 6-24: Antenna Cabling for Two Microcells Equipped with Primary Surge Suppressor



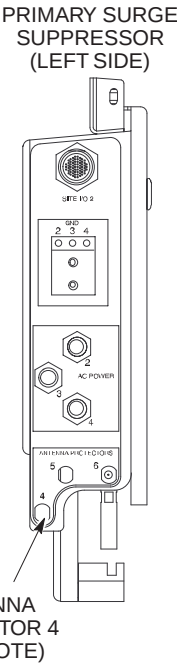
Antenna Cabling for Sites Equipped with Optional Primary Surge Suppressor

– continued

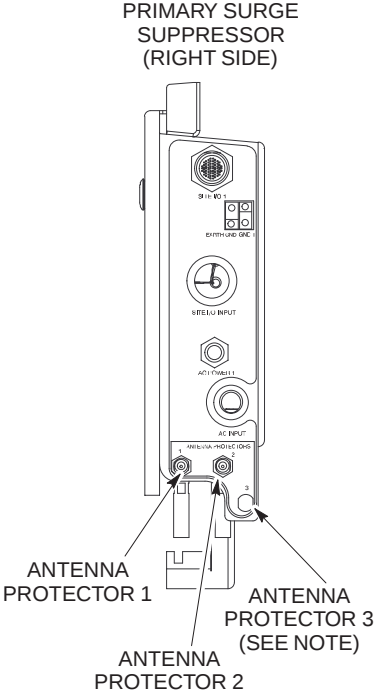
Figure 6-25: Antenna Cabling for Three Microcells Equipped with Primary Surge Suppressor



KEY
RFT = 50 OHM RF TERMINATOR



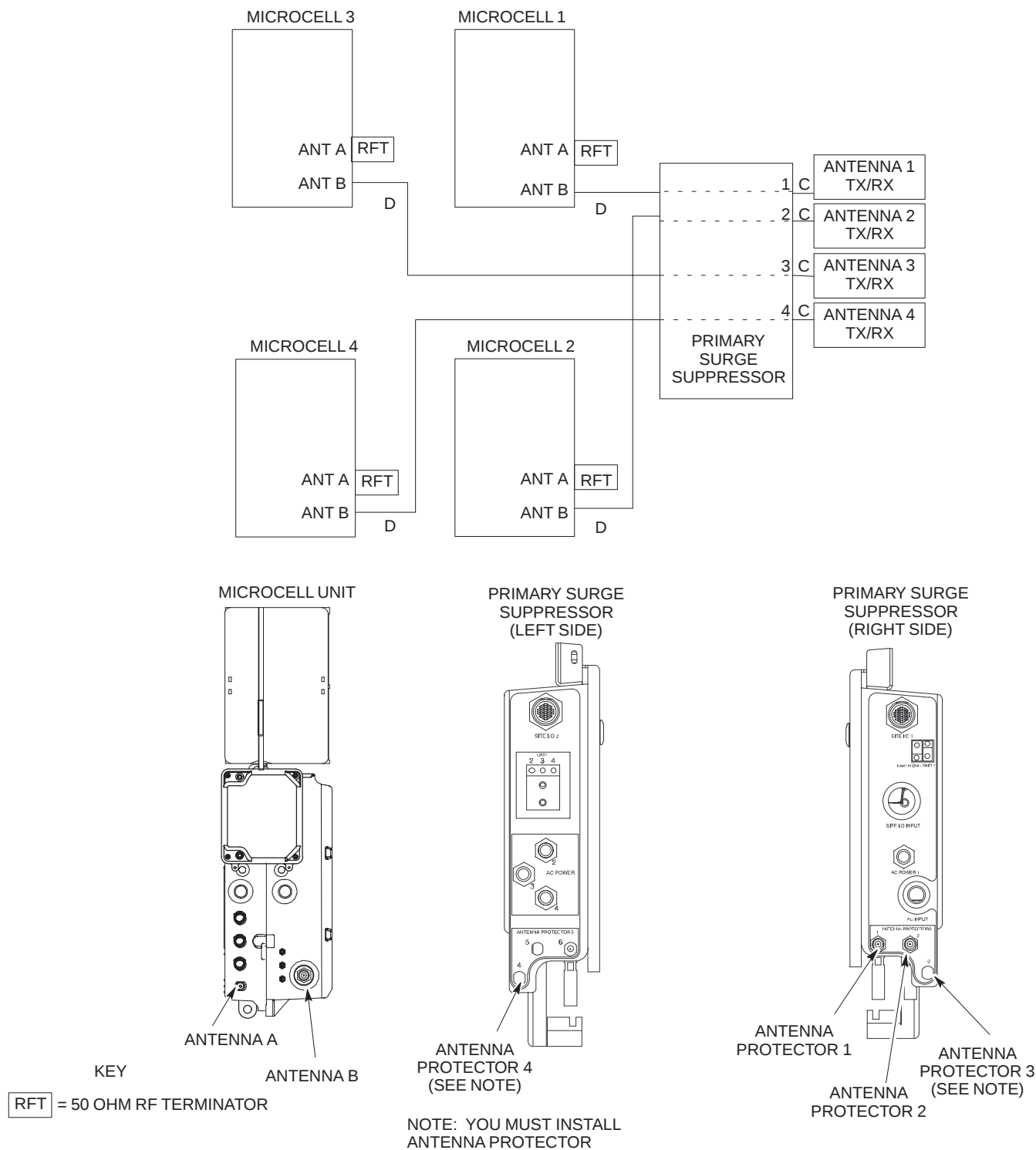
NOTE: YOU MUST INSTALL ANTENNA PROTECTOR



Antenna Cabling for Sites Equipped with Optional Primary Surge Suppressor

– continued

Figure 6-26: Antenna Cabling for Four Microcells Equipped with Primary Surge Suppressor



Antenna Cabling for Sites Equipped with Optional Primary Surge Suppressor – continued

Figure 6-27: Antenna Cabling for Two Picocells Equipped with Primary Surge Suppressor

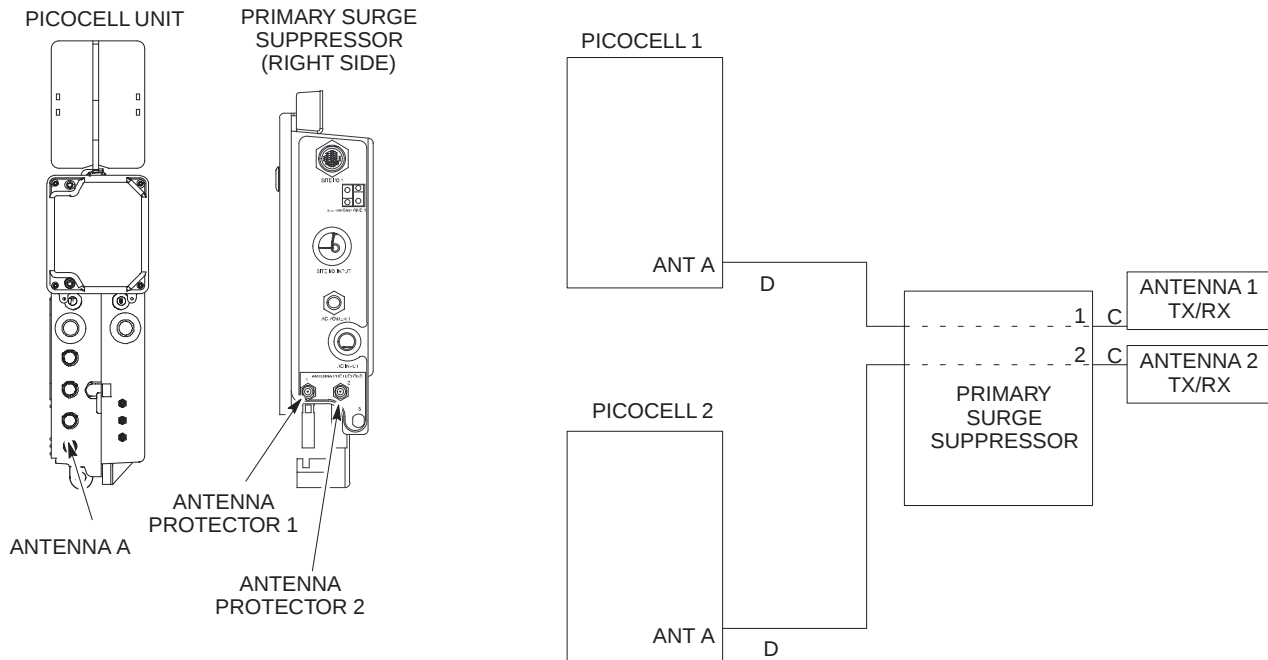
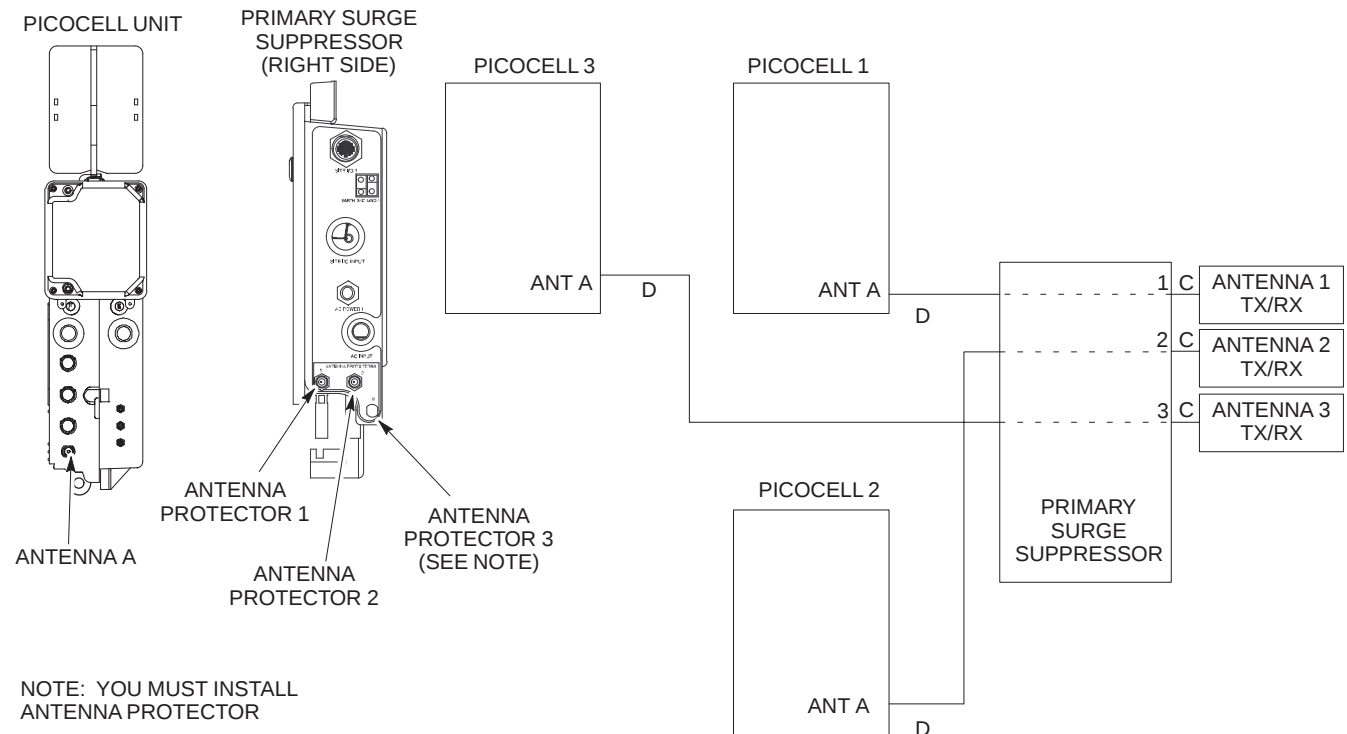
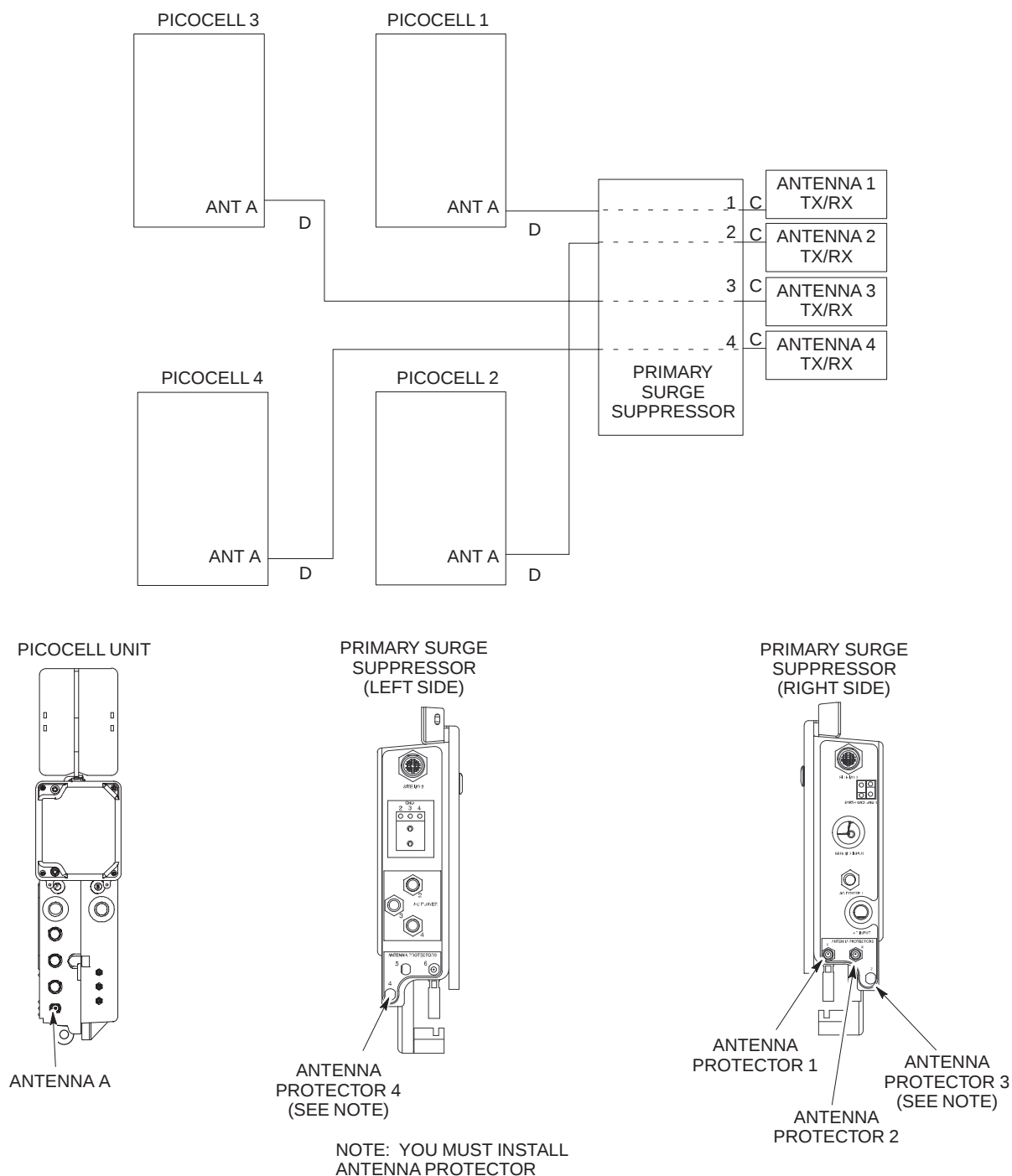


Figure 6-28: Antenna Cabling for Three Picocells Equipped with Primary Surge Suppressor



Antenna Cabling for Sites Equipped with Optional Primary Surge Suppressor – continued

Figure 6-29: Antenna Cabling for Four Picocells Equipped with Primary Surge Suppressor



MIB Cabling for Multi-Unit Configurations

Overview

The objective of this procedure is to attach the MIB cabling for a multi-BTS configuration.

Cable Labels

The cable designations are referenced in Table 4-1 in the “Cable Descriptions” procedure in Chapter 4.

Tools and Equipment

Motorola parts

The following terminators in Table 6-19 are necessary to do this procedure for a single-unit installation and are shipped with the unit:

Table 6-19: MIB Terminators		
Quantity	Part Number	Description
3	3009865S04	Terminator, MIB (Picocell)
1	3009865S02	Terminator, MIB (Microcell)
2	3009865S04	Terminator, MIB (Microcell)

Motorola kits for multi-unit installations

Table 6-20 through Table 6-29 give the Motorola kit numbers, cable descriptions and part numbers for the Motorola kits required to perform a multi-unit installation. Several kits are available depending upon the carrier installation.

Table 6-20: Microcell Expansion Kit for Units 1 to 2 Short MIB A (Cubicle) – T448AL			
Cable	Qty.	Motorola Part Number	Description
n/a	2	5882106P01	50 Ohm Antenna Terminator
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
K	1	3087707C09	MIB A cable (short, 1m; micro)
Q	1	3088120C01	Long SU Cable

MIB Cabling for Multi-Unit Configurations – continued

Table 6-21: Microcell Expansion Kit for Units 1 to 2 Long MIB A (Non-Cubicle) – T448AM

Cable	Qty.	Motorola Part Number	Description
n/a	2	5882106P01	50 Ohm Antenna Terminator
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
E	1	3087707C03	MIB A cable (current, 2m; micro)
Q	1	3088120C01	Long SU Cable

Table 6-22: Picocell Expansion Kit for Units 1 to 2 Short MIB A (Cubicle) – T448AN

Cable	Qty.	Motorola Part Number	Description
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
L	1	3087707C10	MIB A cable (short 1m; pico)
Q	1	3088120C01	Long SU Cable

Table 6-23: Picocell Expansion Kit for Units 1 to 2 Long MIB A (Non-Cubicle) – T448AP

Cable	Qty.	Motorola Part Number	Description
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
H	1	3087707C06	MIB A cable (long, 2m; pico)
Q	1	3088120C01	Long SU Cable

Table 6-24: Microcell/Picocell Expansion Kit for Units 2 to 3 Current 2m MIB B – T448AR

Cable	Qty.	Motorola Part Number	Description
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
F	1	3087707C04	MIB B cable (current, 2m)
Q	2	3088120C01	Long SU Cable
R	2	3088120C02	Short SU RF Cable
n/a	2	5688123C01	SU Splitter
n/a	2	8009573X06	Lightning arrestor

MIB Cabling for Multi-Unit Configurations – continued

Table 6-25: Microcell/Picocell Expansion Kit for Units 2 to 3 Long 5m MIB B – T448AS

Cable	Qty.	Motorola Part Number	Description
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
I	1	3087707C07	MIB B cable (long, 5m)
Q	2	3088120C01	Long SU RF Cable
R	2	3088120C02	Short SU RF Cable
n/a	2	5688123C01	SU Splitter
n/a	2	8009573X06	Lightning arrestor

Table 6-26: Microcell/Picocell Expansion Kit for Units 3 to 4 Current 2m MIBs B and C – T448AT

Cable	Qty.	Motorola Part Number	Description
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
n/a	2	5882106P01	50 Ohm Antenna Terminator
E	1	3087707C03	MIB A cable (current, 2m; micro)
F	1	3087707C04	MIB B cable (current, 2m)
G	2	3087707C05	MIB C cable (current, 2m)
Q	1	3088120C01	Long SU RF Cable

Table 6-27: Microcell/Picocell Expansion Kit for Units 3 to 4 Longer 5M MIBs B and C – T448AU

Cable	Qty.	Motorola Part Number	Description
n/a	2	5882106P01	50 Ohm Antenna Terminator
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
E	1	3087707C03	MIB A cable (current, 2m; micro)
I	1	3087707C07	MIB B cable (long, 5m)
J	2	3087707C08	MIB C cable (long, 5m)
Q	1	3088120C01	Long SU RF Cable

MIB Cabling for Multi-Unit Configurations – continued

Table 6-28: Picocell Expansion Kit for Units 3 to 4 Current 2M MIBs B and C – T448AV

Cable	Qty.	Motorola Part Number	Description
n/a	2	5882106P01	50 Ohm Antenna Terminator
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
E	1	3087707C03	MIB A cable (current, 2m; micro)
F	1	3087707C04	MIB B cable (long, 2m)
G	2	3087707C05	MIB C cable (long, 2m)
Q	1	3088120C01	Long SU RF Cable

Table 6-29: Picocell Expansion Kit for Units 3 to 4 Longer 5M MIBs B and C – T448AW

Cable	Qty.	Motorola Part Number	Description
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
H	1	3087707C06	MIB A cable (long, 2m; pico)
I	1	3087707C07	MIB B cable (long, 5m)
J	2	3087707C08	MIB C cable (long, 5m)
Q	1	3088120C01	Long SU RF Cable

Procedure

Cable the units as shown in Figure 6-32, Figure 6-31 or Figure 6-30. Make sure to terminate any unused connectors.

Figure 6-30: MIB Cabling for Two Units

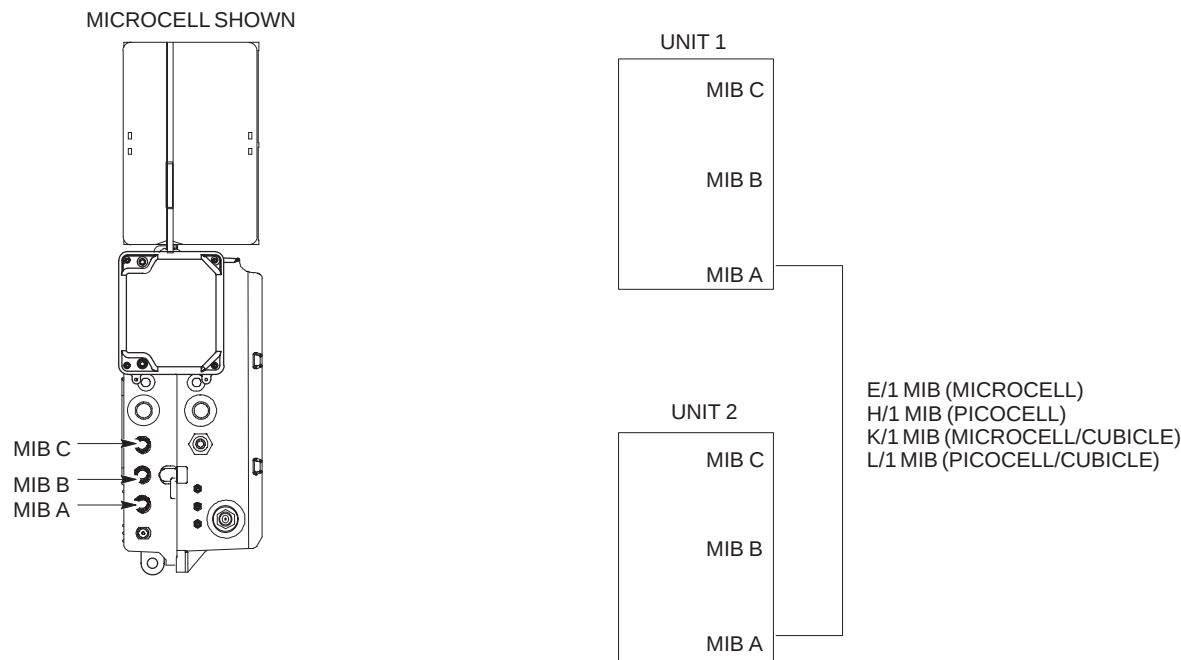


Figure 6-31: MIB Cabling for Three Units

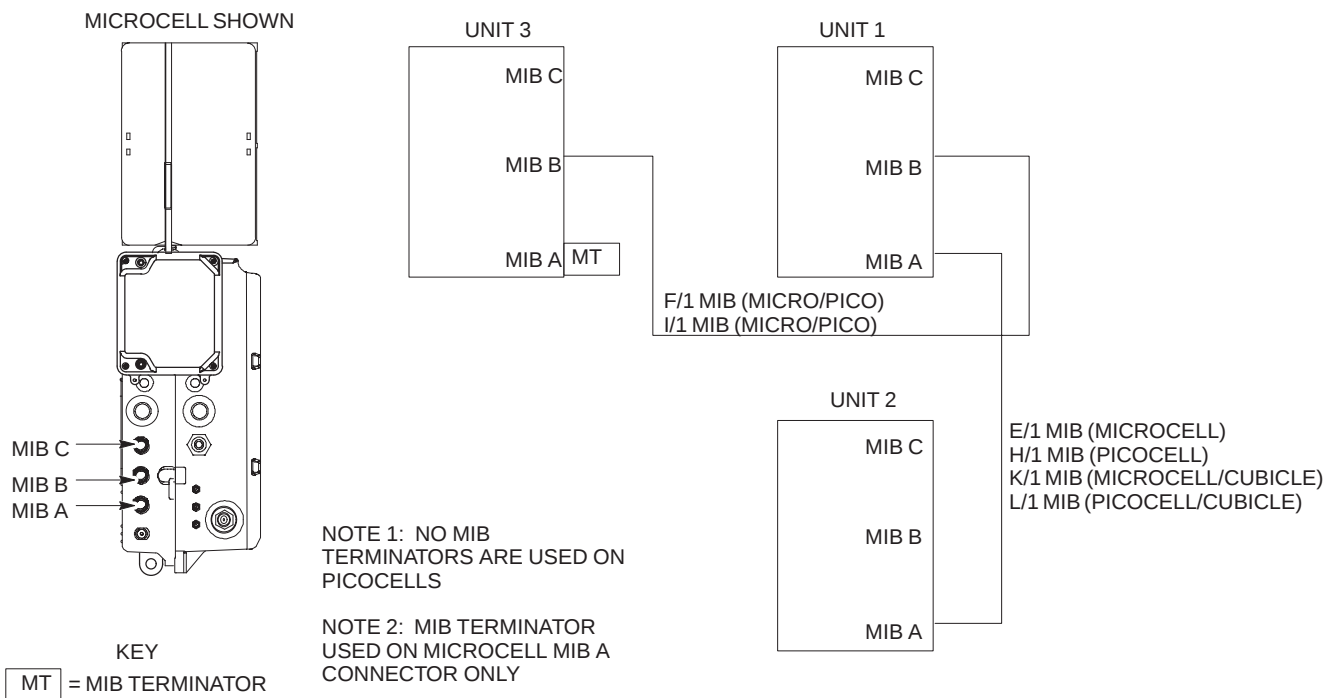
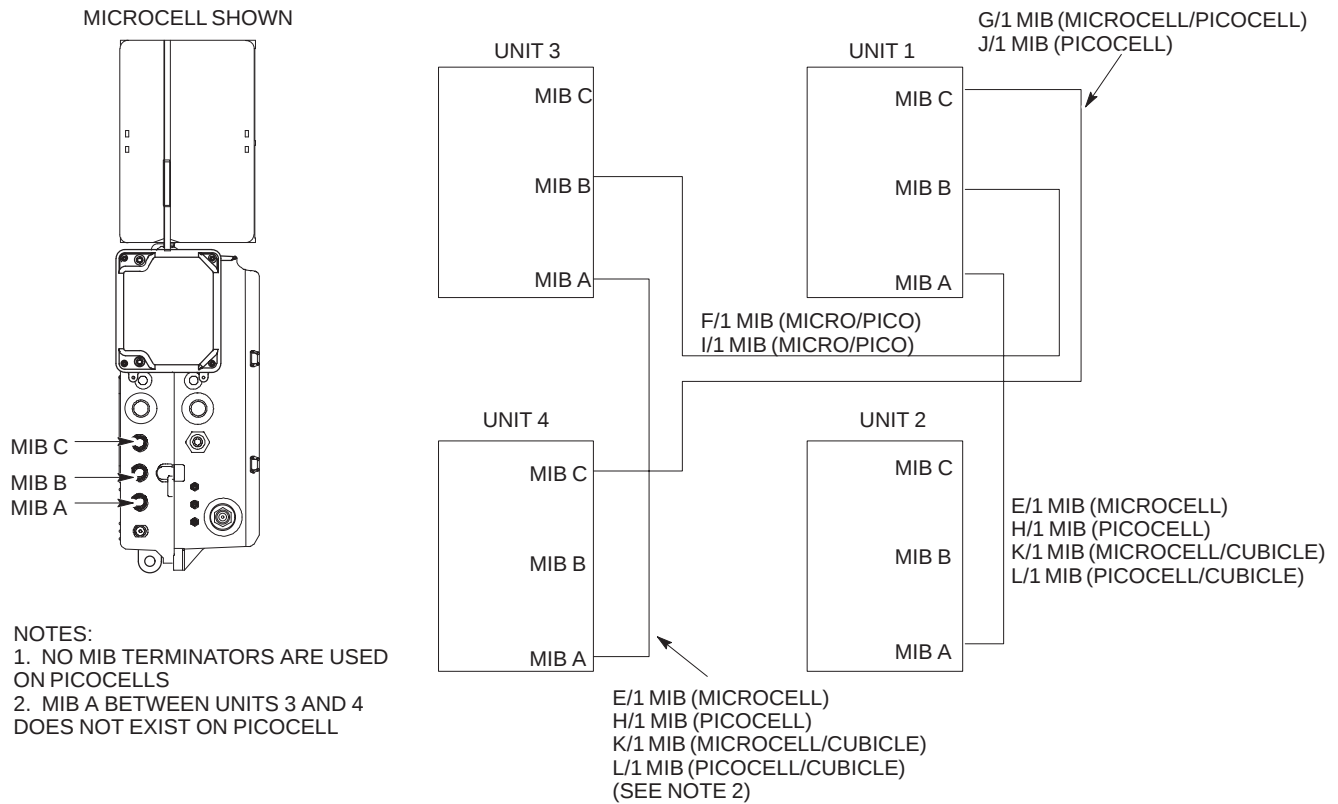


Figure 6-32: MIB Cabling for Four Units



SU Cabling

Objective

The objective of this procedure is to install the SU cable on one or more units.

Cable Labels

The cable designations are referenced to Table 6-5 in the “Cable Description” area of this chapter.

Tools and Equipment

Required tools

A 5/16-in. breakaway torque wrench is required to do this procedure.

Motorola parts

SU Distribution Terminators, SMA (Motorola Part Number 0187683C02) are required to do this procedure.

Table 6-30 provides the quantity and description of the SU cable used for a single-unit installation.

Table 6-30: Cables Needed for SU Connections

Cable	Qty.	Part Number	Description
P	1	3087416C19	SU cable, 105 mm
Q	N/A*	3088120C01	SU RF cable, long (part of kits SGEN4062A, SGEN4061A, SGEN4064A, SGEN4063A, SGEN4066A, SGEN4065A, SGEN4068A, SGEN4067A, SGEN4070A and SGEN4069A).
R	N/A*	3088120C02	SU RF cable, short (part of kits SGEN4066A and SGEN4065A)
*Quantity of cables depends upon system configuration. Refer to “Motorola Kits for Multi-Unit Installations” for more information.			

Motorola kits

Table 6-31 through Table 6-40 gives the Motorola Kit numbers, cable descriptions and part numbers for the Motorola kits required to perform the SU cabling on a multi-unit installation. Several kits are available depending upon the carrier installation.

Table 6-31: Microcell Expansion Kit for Units 1 to 2 Short MIB A (Cubicle) – T448AL

Cable	Qty.	Motorola Part Number	Description
n/a	2	5882106P01	50 Ohm Antenna Terminator
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
K	1	3087707C09	MIB A cable (short, 1m; micro)
Q	1	3088120C01	Long SU Cable

Table 6-32: Microcell Expansion Kit for Units 1 to 2 Long MIB A (Non-Cubicle) – T448AM

Cable	Qty.	Motorola Part Number	Description
n/a	2	5882106P01	50 Ohm Antenna Terminator
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
E	1	3087707C03	MIB A cable (current, 2m; micro)
Q	1	3088120C01	Long SU Cable

Table 6-33: Picocell Expansion Kit for Units 1 to 2 Short MIB A (Cubicle) – T448AN

Cable	Qty.	Motorola Part Number	Description
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
L	1	3087707C10	MIB A cable (short 1m; pico)
Q	1	3088120C01	Long SU Cable

Table 6-34: Picocell Expansion Kit for Units 1 to 2 Long MIB A (Non-Cubicle) – T448AP

Cable	Qty.	Motorola Part Number	Description
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
H	1	3087707C06	MIB A cable (long, 2m; pico)
Q	1	3088120C01	Long SU Cable

Table 6-35: Microcell/Picocell Expansion Kit for Units 2 to 3 Current 2m MIB B – T448AR

Cable	Qty.	Motorola Part Number	Description
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
F	1	3087707C04	MIB B cable (current, 2m)
Q	2	3088120C01	Long SU Cable
R	2	3088120C02	Short SU RF Cable
n/a	2	5688123C01	SU Splitter
n/a	2	8009573X06	Lightning arrestor

Table 6-36: Microcell/Picocell Expansion Kit for Units 2 to 3 Long 5m MIB B – T448AS

Cable	Qty.	Motorola Part Number	Description
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
I	1	3087707C07	MIB B cable (long, 5m)
Q	2	3088120C01	Long SU RF Cable
R	2	3088120C02	Short SU RF Cable
n/a	2	5688123C01	SU Splitter
n/a	2	8009573X06	Lightning arrestor

Table 6-37: Microcell/Picocell Expansion Kit for Units 3 to 4 Current 2m MIBs B and C – T448AT

Cable	Qty.	Motorola Part Number	Description
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
n/a	2	5882106P01	50 Ohm Antenna Terminator
E	1	3087707C03	MIB A cable (current, 2m; micro)
F	1	3087707C04	MIB B cable (current, 2m)
G	2	3087707C05	MIB C cable (current, 2m)
Q	1	3088120C01	Long SU RF Cable

Table 6-38: Microcell/Picocell Expansion Kit for Units 3 to 4 Longer 5M MIBs B and C – T448AU

Cable	Qty.	Motorola Part Number	Description
n/a	2	5882106P01	50 Ohm Antenna Terminator
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
E	1	3087707C03	MIB A cable (current, 2m; micro)
I	1	3087707C07	MIB B cable (long, 5m)
J	2	3087707C08	MIB C cable (long, 5m)
Q	1	3088120C01	Long SU RF Cable

Table 6-39: Picocell Expansion Kit for Units 3 to 4 Current 2M MIBs B and C – T448AV

Cable	Qty.	Motorola Part Number	Description
n/a	2	5882106P01	50 Ohm Antenna Terminator
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
E	1	3087707C03	MIB A cable (current, 2m; micro)
F	1	3087707C04	MIB B cable (long, 2m)
G	2	3087707C05	MIB C cable (long, 2m)
Q	1	3088120C01	Long SU RF Cable

Table 6-40: Picocell Expansion Kit for Units 3 to 4 Longer 5M MIBs B and C – T448AW

Cable	Qty.	Motorola Part Number	Description
A	1	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
H	1	3087707C06	MIB A cable (long, 2m; pico)
I	1	3087707C07	MIB B cable (long, 5m)
J	2	3087707C08	MIB C cable (long, 5m)
Q	1	3088120C01	Long SU RF Cable

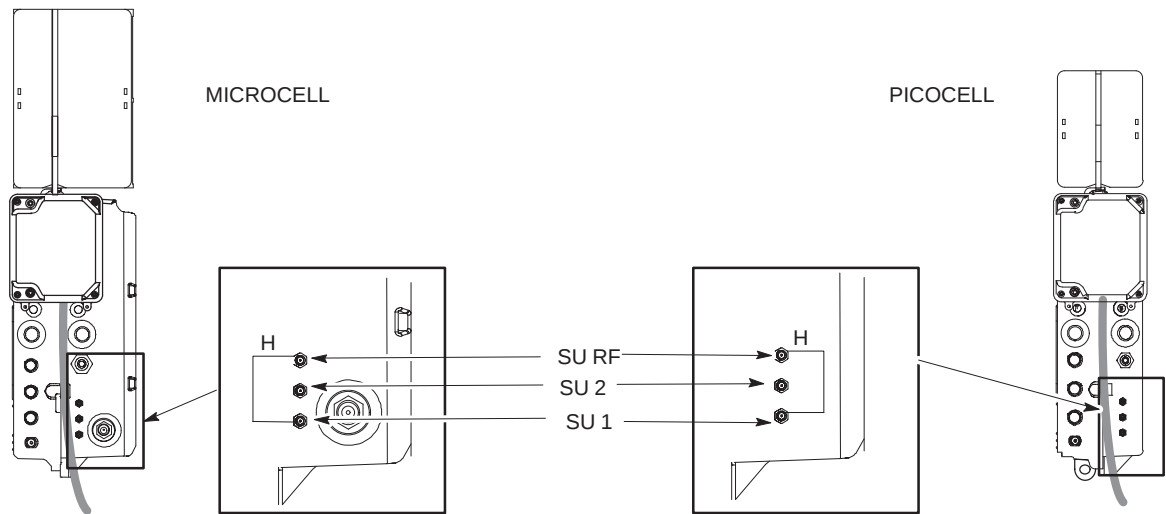
Procedure to Install SU Cabling for Single Unit

Table 6-41 gives the procedure to install the SU cable on one MicroCell or Picocell. Figure 6-33 shows the location of the cable connectors on the unit.

Table 6-41: Install the SU Cable on One MicroCell or PicoCell

Step	Action
1	Connect cable P to the SU RF and the SU1 connectors of the unit.
2	Torque the connectors at each end of the cable to 9 in-lb. Use a 5/16-in. breakaway torque wrench.

Figure 6-33: SU Cabling Details for Single MicroCell or Picocell



SU Cabling for Multi-Unit Configurations

Table 6-42 gives the procedure to install the SU cabling for Multi-unit configurations. Figure 6-34, Figure 6-35 and Figure 6-36 show the SU cabling for multi-unit configurations.

Table 6-42: Install SU Cabling for Multi-BTS Configurations	
Step	Action
1	Connect cable H to the appropriate SU connectors as shown in Figure 6-34, Figure 6-35 and Figure 6-36.
2	Torque the connectors at each end of the cable to 9 in-lb. Use a 5/16-in. breakaway torque wrench.
3	Terminate all unused SU connectors.

Figure 6-34: SU Cabling Details for Two Units

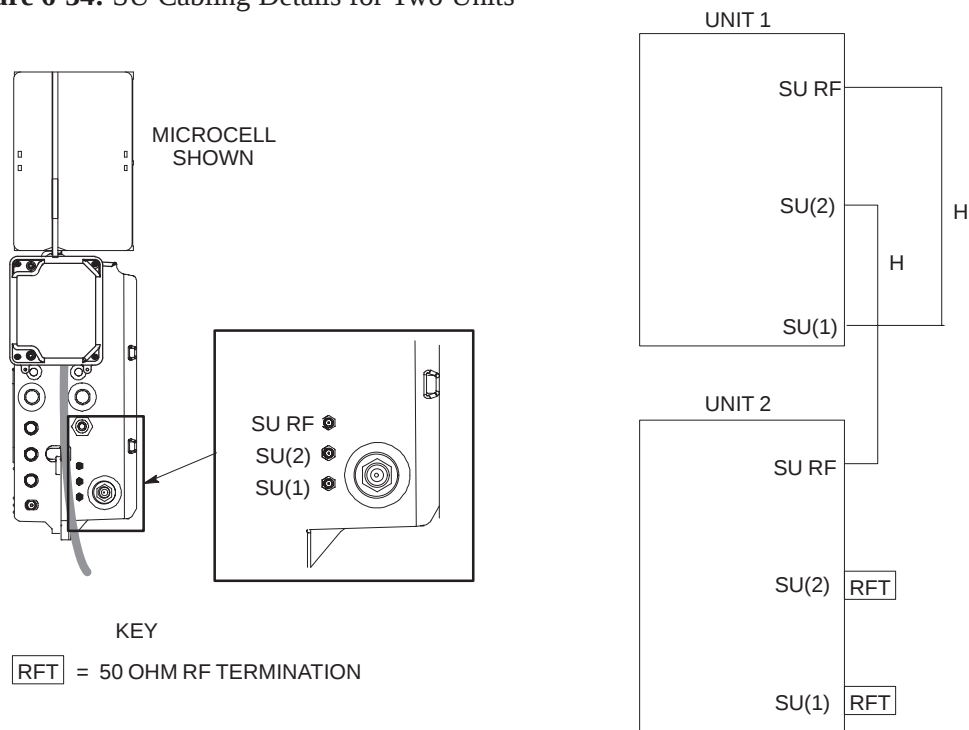


Figure 6-35: SU Cabling Details for Three Units

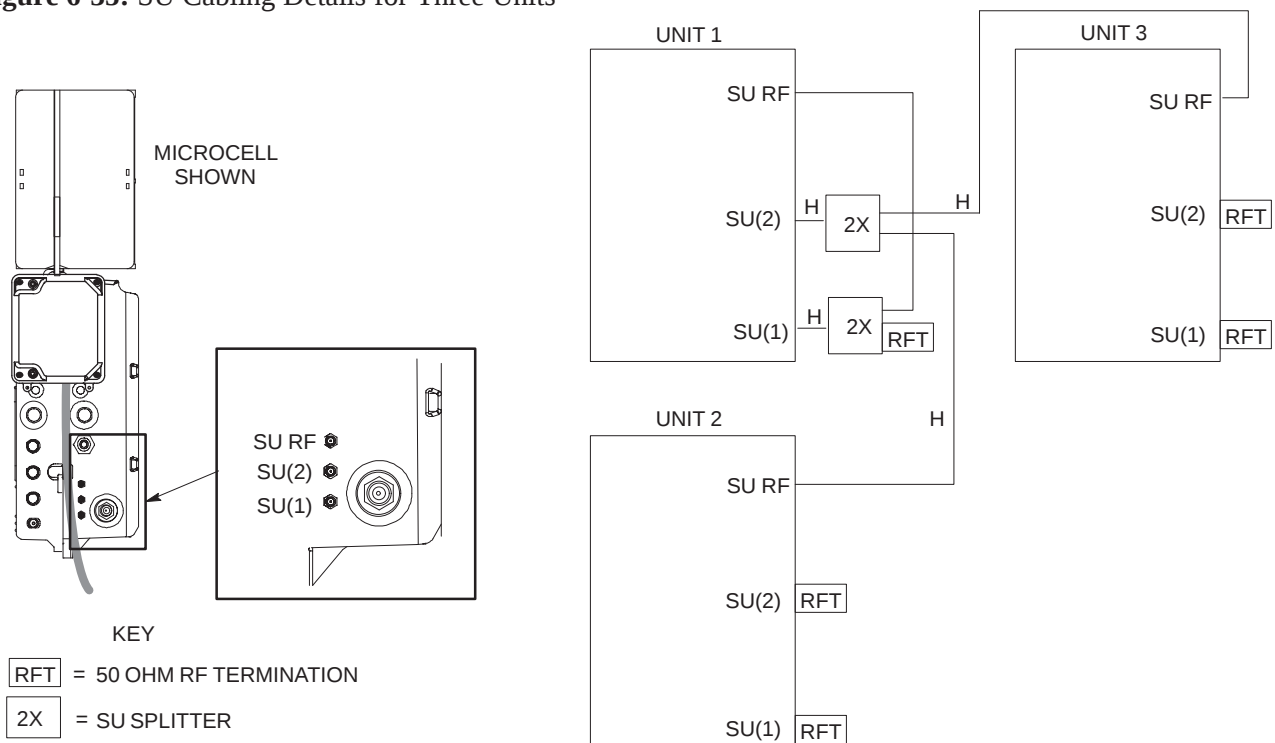
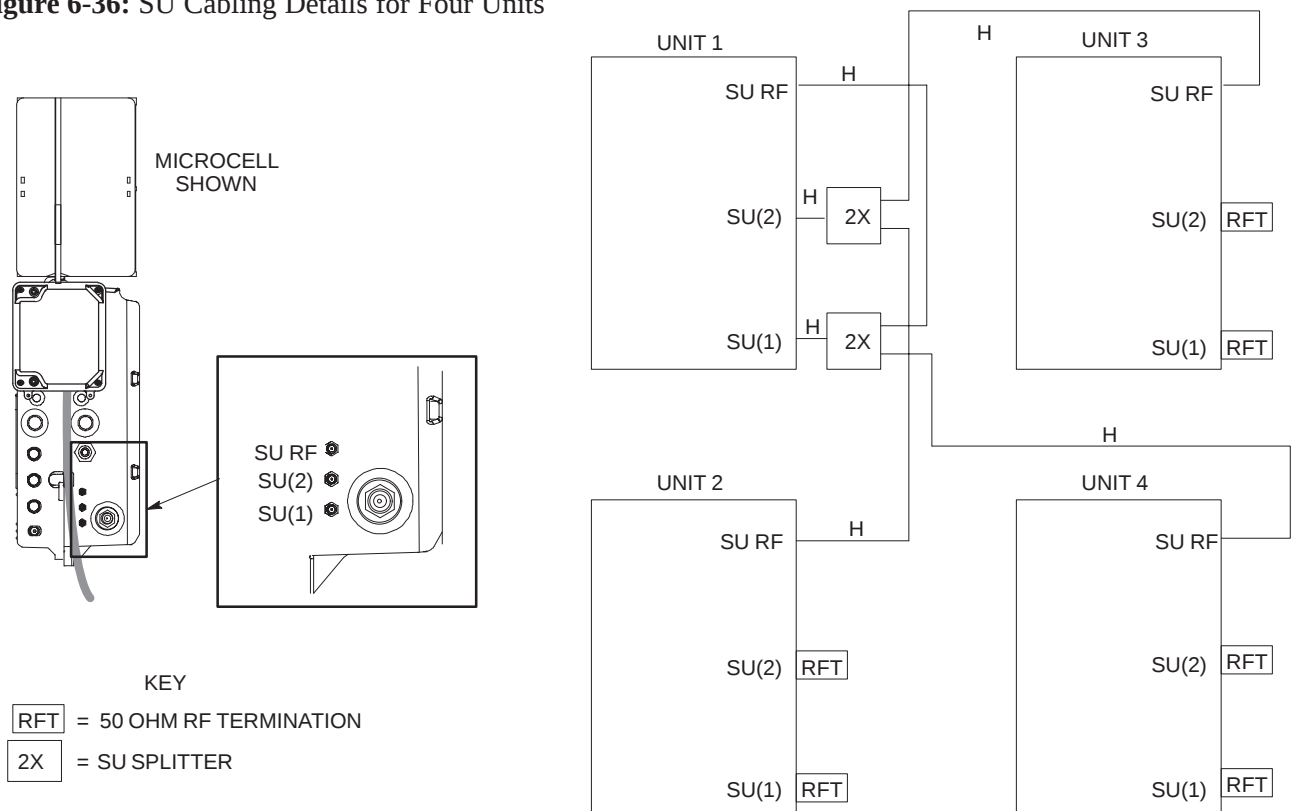


Figure 6-36: SU Cabling Details for Four Units



Terminating Unused Connections

Objective

The objective of this procedure is to terminate any unused connections.



IMPORTANT

Terminate all unused connections.

Termination List (MicroCell)

Table 6-43: Terminations of Unused Connectors		
Connector	Motorola Part #	Description
AC Input	5887659C02	Terminator, AC
DC Input	5887659C04	Terminator, DC
MIB A	3009865S02	Terminator, MIB
SU Distribution	0187683C02	Terminator, SMA
MIB B, C	3009865S04	Cap, MIB

Termination List (PicoCell)

Table 6-44: Terminations of Unused Connectors		
Connector	Motorola Part #	Description
AC Input	5887659C02	Terminator, AC
DC Input	5887659C04	Terminator, DC
MIB A, B, C	3009865S04	Cap, MIB
SU Distribution	0187683C01	Terminator, SMA

Procedure

The unit is shipped with the above terminators. Verify that a terminator is on each unused connector. Tighten the SMA terminators using a 5/16 Breakaway 9 in. lb. Hand tighten all other terminators.

Powering on Unit and Mounting the Solar Cover

Objective

The objective of this procedure is to power on the unit and mount the solar cover on the chassis.

You May Want to Wait

Do not mount the front solar cover on the unit if you wish to perform the Acceptance Test Procedures (ATP). Otherwise, mount the front solar cover until you perform the ATP.

Tools Required

The following tamper-resistant keys are required to do this procedure.

- Key for tamper-resistant stud (provided) for the solar cover.
- Key for tamper-resistant locks (provided) for the Primary Surge Suppressor.

Procedure to Power On Unit and Mount Solar Cover

Refer to the procedure in Table 6-45 to power on the unit and mount the solar cover.

Table 6-45: Procedure to Power on the Unit and Mount the Solar Cover	
Step	Action
1	⚠ WARNING Make sure the unit is properly grounded and that all connections are connected before powering on unit. If not applying AC power, go to step 2. If applying AC power, push down on the AC power breaker until it clicks and remains down. The white collar on the breaker is not visible when the breaker is closed.
2	If not applying DC power or providing for battery backup, go to step 3. If applying DC power or have short or long duration batteries present, push down on the DC power breaker until it clicks and remains down. The white collar on the breaker is not visible when the breaker is closed.
3	Position the solar cover so the cooling vents are at the top and place the solar cover on the unit. Use the key to tighten the four tamper-resistant studs (two on each side). Refer to Figure 6-37.

Procedure to Power On Surge Suppressor, Unit and Mount Solar Cover

If your BTS is equipped with the Primary Surge Suppressor, refer to the procedure in Table 6-46 to power on the unit and mount the solar cover.

Table 6-46: Procedure to Power on the Surge Suppressor, the Unit, and Mount the Solar Cover	
Step	Action
1	If closed, open the front cover of the Primary Surge Suppressor. Use the tamper-resistant key and turn both the locks counter-clockwise. Refer to Figure 6-37.
2	If not applying AC power, go to step 6. If applying AC power, push the main AC power breaker on the Surge Suppressor to the “On” position. Refer to Figure 6-38.
3	Push the AC power breakers for each individual carrier to the “On” position. All unused power breakers must be in the “Off” position.
4	Close the Primary Surge Suppressor door. Use the tamper-resistant key to turn the locks clockwise to the “Locked” position.
5	Push down on the AC power breaker on the unit until it clicks and remains down. The white collar on the breaker is not visible when the breaker is closed.
6	If not applying DC power or providing for battery backup, go to step 7. If applying DC power or have short or long duration batteries present, push down on the DC power breaker until it clicks and remains down. The white collar on the breaker is not visible when the breaker is closed.
7	Position the solar cover so the cooling vents are at the top and place the solar cover on the unit. Use the tamper-resistant key to tighten the four screws (two on each side) to 2.2 N-M. Refer to Figure 6-39.

Figure 6-37: Lock Positions on Primary Surge Suppressor

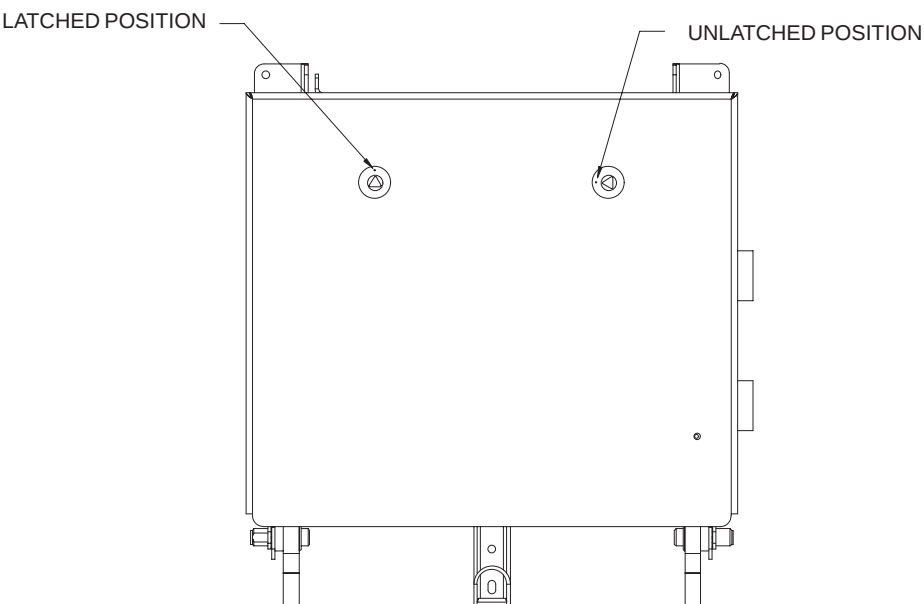


Figure 6-38: Location of AC Power Breakers on Primary Surge Suppressor

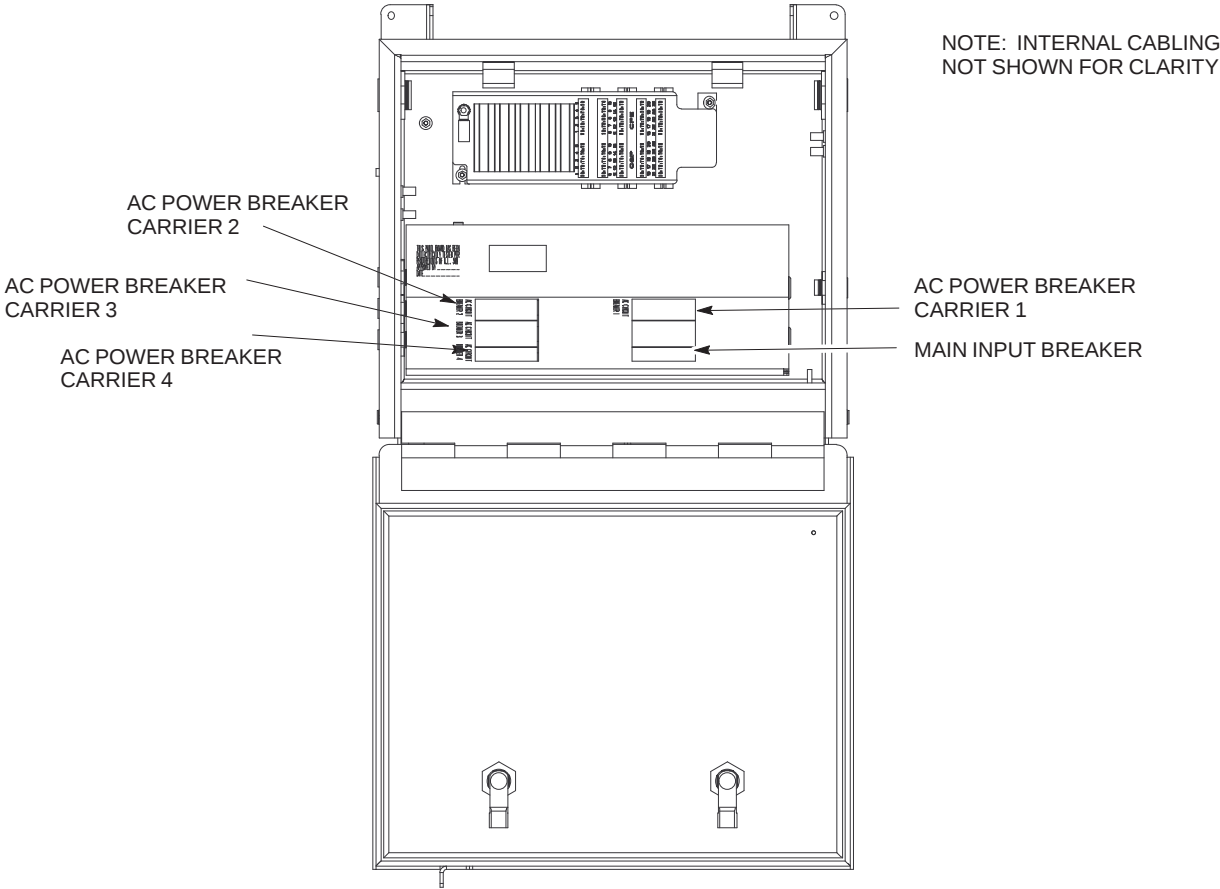
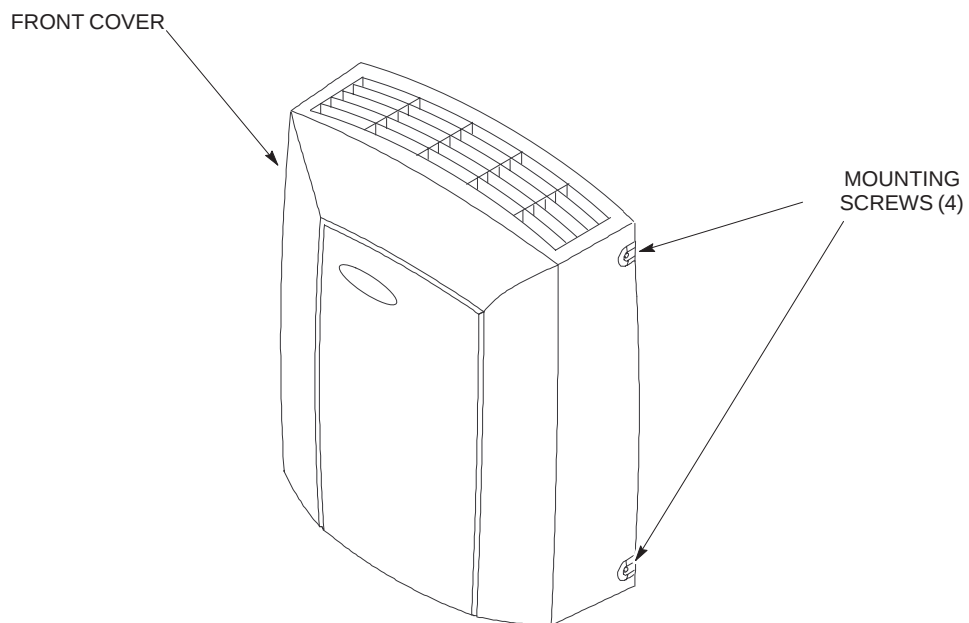


Figure 6-39: Front Solar Cover



Site Cleanup

Remove protective covering

Remove any antistatic plastic or cloth sheeting that was used to cover the equipment.

Lighting fixtures

Remove the masking tape from the fluorescent light fixtures.

Tools

Place all hand and power tools in the installation tool kit or other appropriate place. Note any tools that need replacement, cleaning, or adjustment.

Materials

Place any leftover materials in a location specified by the site manager.

Remove debris

Remove any packing material.

Ensure that all scrap materials have been removed from any tables or stands.

Clean/sweep the floor. Ensure that all alignment marks have been removed.

Environment

Remove any temporary weather protection used for installation.

Check that all covers are in place.

Check that the power connections are tight.

Organize any items (manuals, materials, etc.) left on site and place them in a location specified by the site manager.

Check that the unit lock is secure and key is removed.

Check that solar cover is secure.

Verify that cabling is properly secured between unit and enclosures.

Installation Completion Checklist

Directions

Fill out the installation completion checklist and make any necessary copies. You may copy this check sheet as needed.

Installation Completion Checklist – continued

Installation completion checklist

Date Hardware Installation Completed: _____

Site: _____

Serial Number(s): _____

Checklist Completed By: _____

Checklist Reviewed By: _____

Table 6-47: Installation Completion Checklist

Status	No.	Item	Notes
	1	Air flow clearance requirements are met.	
	2	Equipment is not damaged.	
	3	Mounting bracket is level and secure.	
	4	Back solar cover (if applicable) is securely attached to the mounting bracket.	
	5	RGPS head and mast are secure.	
	6	RGPS head has a clear view of the sky and is not in a location which accumulates debris. Make sure the RGPS is located away from the BTS transmit antenna.	
	7	Mounting bracket is connected to the Master ground.	
	8	The connection to the AC source is secure (if applicable).	
	9	The AC source is protected by a lightning arrestor (if applicable).	
	10	The connection to the DC source is secure (if applicable).	
	11	The connection to the battery is secure (if applicable).	
	12	The connection to the auxiliary device is secure (if applicable).	
	13	The antenna connections are secure.	
	14	The antenna cables are protected by lightning arrestors (if applicable).	
	15	Customer input alarm connections are complete between the Site I/O cable and the Site I/O interface(s).	
	16	RGPS connections are complete between the Site I/O cable and the Site I/O interface(s).	

Installation Completion Checklist – continued

Table 6-47: Installation Completion Checklist

Status	No.	Item	Notes
	17	Phone (modem) connections are complete between the Site I/O cable and the Site I/O interface(s).	
	18	Span connections are complete between the Site I/O cable and the Site I/O interface(s).	
	19	Span, phone, and RGPS connections are protected by lightning arrestors (if applicable).	
	20	The RGPS/HSO cabling for multi-BTS configurations is secure (if applicable).	
	21	The span line daisy chain cabling for multi-BTS configurations is secure.	
	22	The RGPS ground lead is connected to the BTS digital ground reference.	
	23	Fin covers are secure.	
	24	Installation hardware is removed.	
	25	The lock is in place and the key removed.	
	26	The site I/O junction box is secure.	
	27	The short-duration battery is secure (if applicable).	
	28	The short-duration battery cable (DC input cable) is secure (if applicable).	
	29	The earth ground connection is secure between the site I/O junction box and the mounting bracket.	
	30	The AC input cable is securely attached to the AC input connector (if applicable).	
	31	The DC input cable is securely attached to the DC input connector (if applicable).	
	32	The DC output cable is securely attached to the DC output connector (if applicable).	
	33	The unit-to-unit SU cabling is secure (if applicable).	
	34	The unit-to-unit MIB cabling is secure (if applicable)	
	35	The antenna N-type connectors are securely attached to the antenna A and B connectors (if applicable).	

Installation Completion Checklist – continued

Table 6-47: Installation Completion Checklist			
Status	No.	Item	Notes
	36	All unused ports are properly terminated.	
	37	All cables are dressed and tied.	
	38	The external power source (AC or DC) is active.	
	39	The AC and/or DC power breakers on the BTS are engaged (pushed in).	
	40	The front solar cover is secure (if applicable).	
	41	The auxiliary device is switched on (if applicable).	
	42	The site is cleaned, swept and trash removed.	
	43	The site specific documentation is present at the site.	

Chapter 7: Optimization and Optional Acceptance Test Procedures (ATP)

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Notes

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ATP Overview

Overview

The purpose of this procedure is to outline the optimization and ATP after a BTS installation. Calibration of the BTS is performed in the factory and is not required. The ATP is also performed in the factory and is optional.

All the procedures in this chapter are to be performed with the BTS out of service or under LMF control. If necessary, refer to the “Shut Down and Restoring BTS Signaling” procedure in Chapter 7.

For a complete listing of the required tools and equipment, refer to the “ATP Tools and Equipment” list in Chapter 1.

BTS Preparation

Overview

The purpose of this procedure is to prepare the BTS for the ATP. This procedure consists of:

1. Solar Cover Removal
2. BTS Power Up
3. Diagnostic Access Cover Removal

Tools Required

The following tools and materials are necessary to do this procedure:

- Torque driver wrench, 1/4-in. hex female drive, 0–10 N–M
- T20 Torx tamper bit

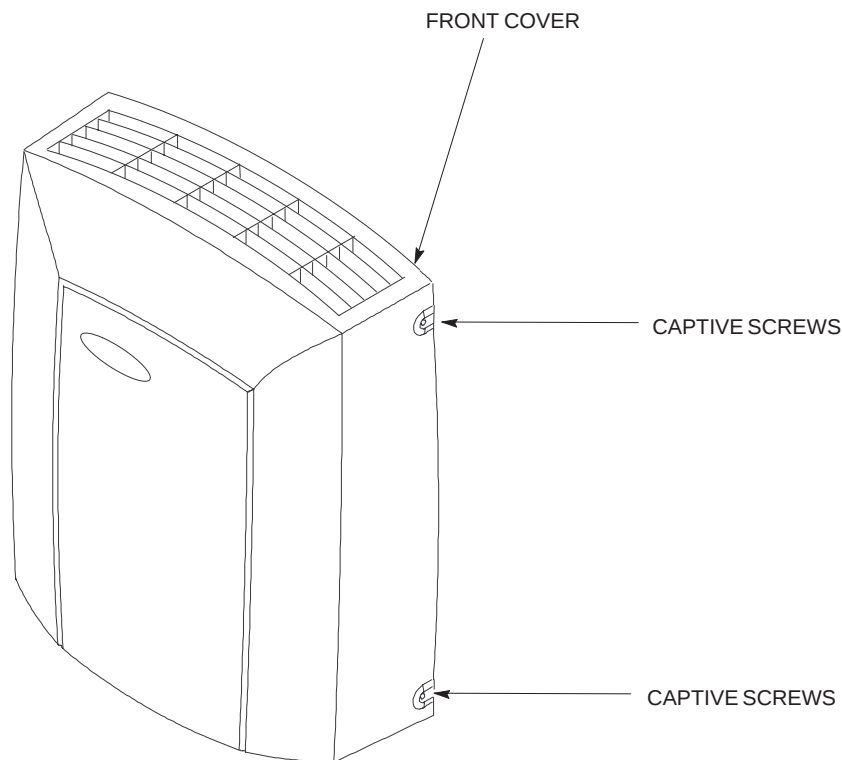
Remove Solar Cover

If you did not mount the solar cover during the unit installation, then this procedure is not necessary.

Procedure

Remove the four captive screws (two on each side) that hold the front solar cover. Refer to Figure 7-1.

Figure 7-1: Front Solar Cover (MicroCell Illustrated)

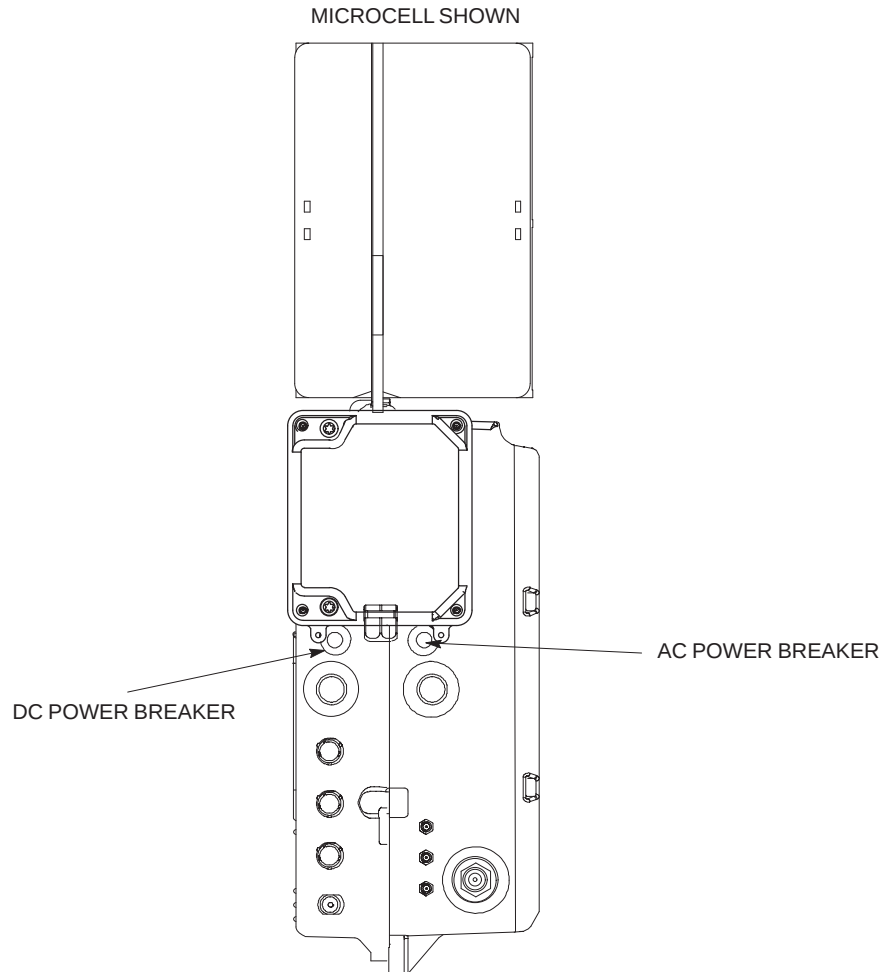


BTS Power Up

Figure 7-2 shows the location of the AC and DC Power breakers on the Microcell unit. Both the AC and DC breakers must be pushed in to power up the unit.

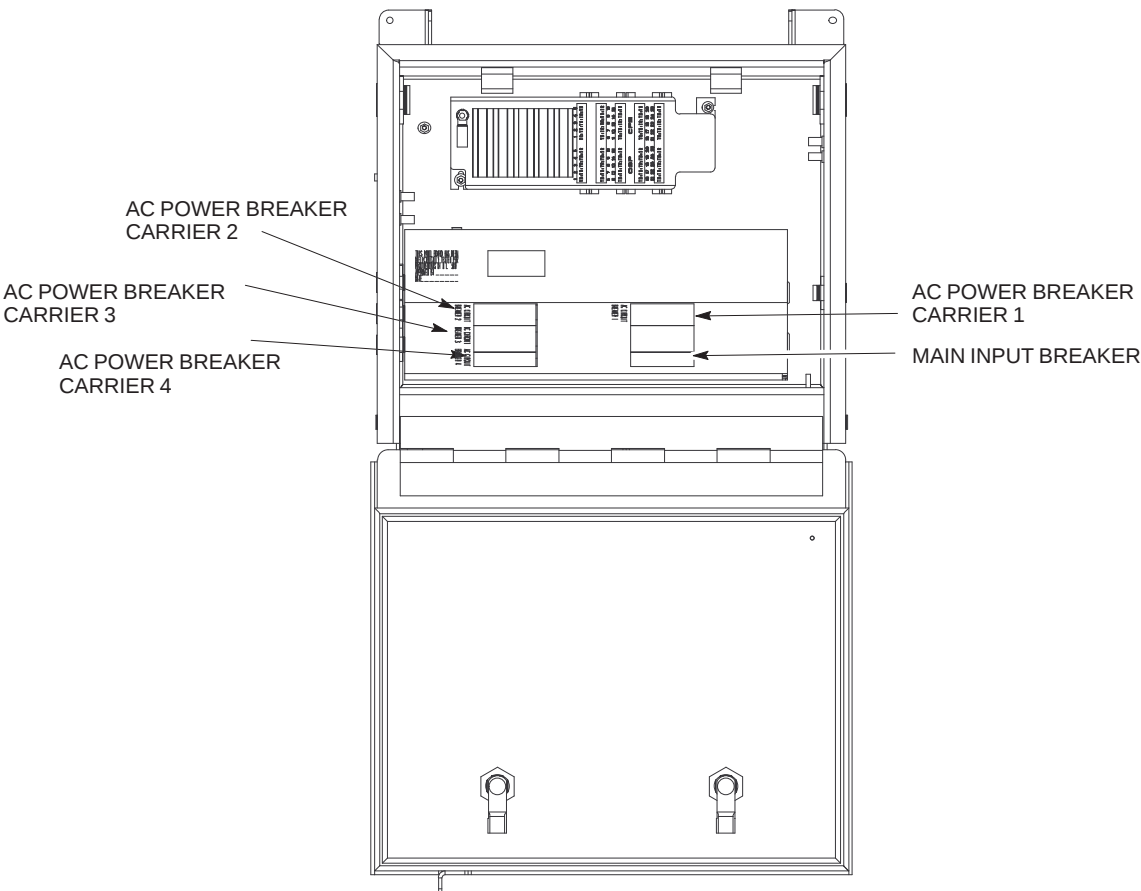
Figure 7-3 shows the location of the AC power breakers inside the optional Primary Surge Suppressor. The AC breakers must be closed before you power up the Microcell or Picocell unit.

Figure 7-2: Location of AC and DC Power Breakers



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Figure 7-3: Location of AC Power Breakers Inside Primary Surge Suppressor



Removing Diagnostic Access
Cover Procedure

NOTE

The screws are captivated. Do not attempt to remove them from the cover.

Table 7-1: Procedure for Removing Diagnostic Access Cover	
Step	Action
1	Using a T20 Torx tamper bit, loosen the two tamper resistant M4 screws holding the cover. See Figure 7-4.
2	Gently tap the cover to loosen if required.
3	Remove the cover and set inside a secure place.
	NOTE The 19 MHz and 2 SEC connectors should not be terminated with a 50 ohm terminator.

Figure 7-4: How To Remove The Diagnostic Access Cover (Microcell shown)

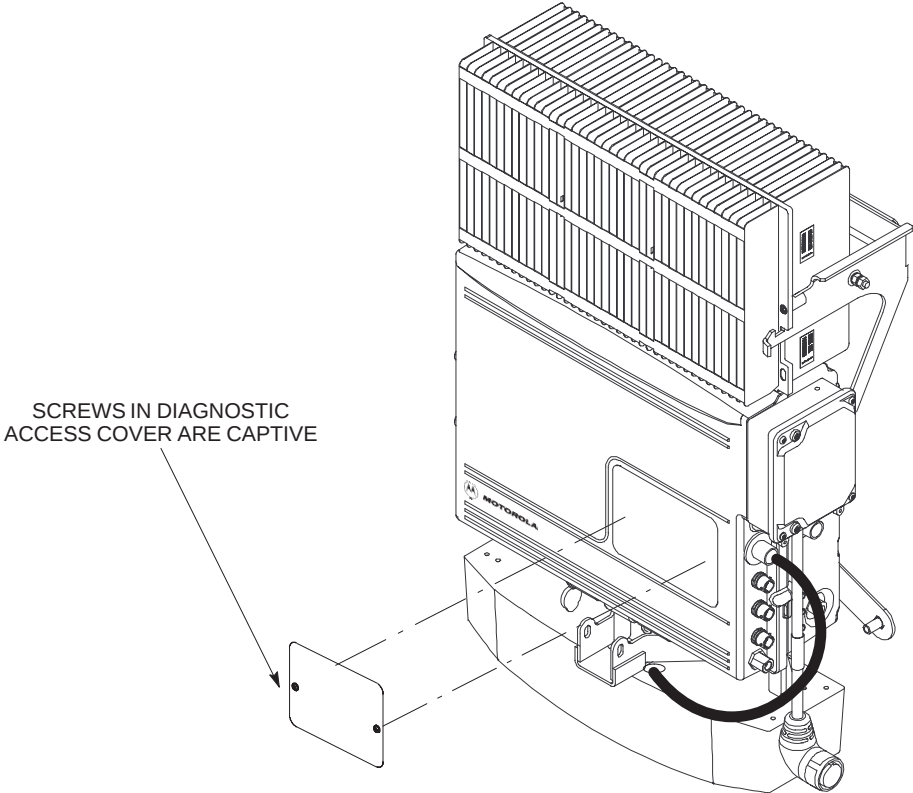
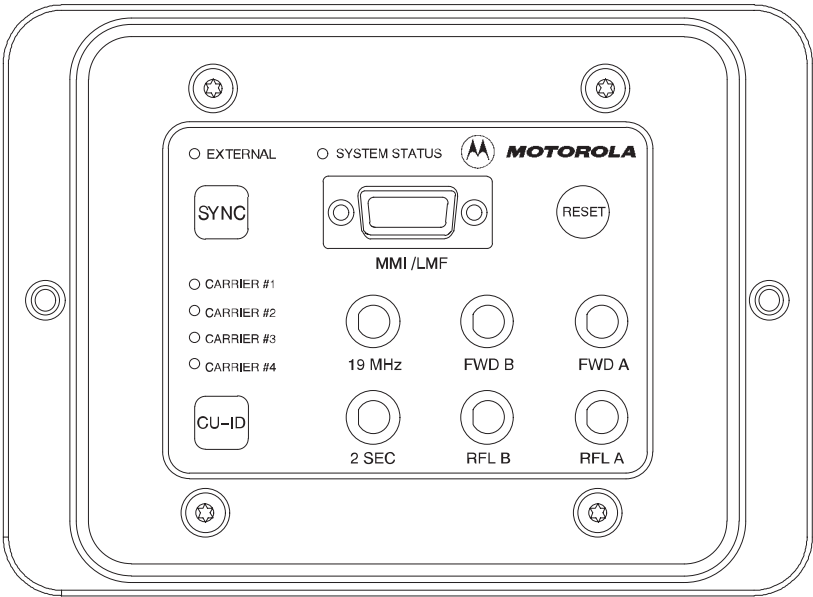
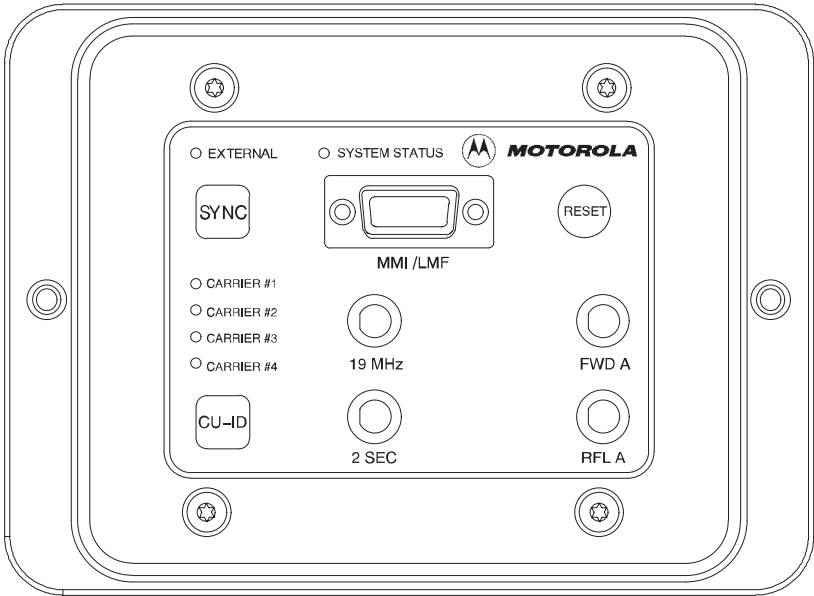


Figure 7-5: Detail Location of the Diagnostic Access Area for MicroCell



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Figure 7-6: Detail Location of the Diagnostic Access Area for PicoCell



Test Equipment and LMF Connection

Overview

This procedure gives instructions to connect the LMF to the BTS.

LMF to BTS Connection

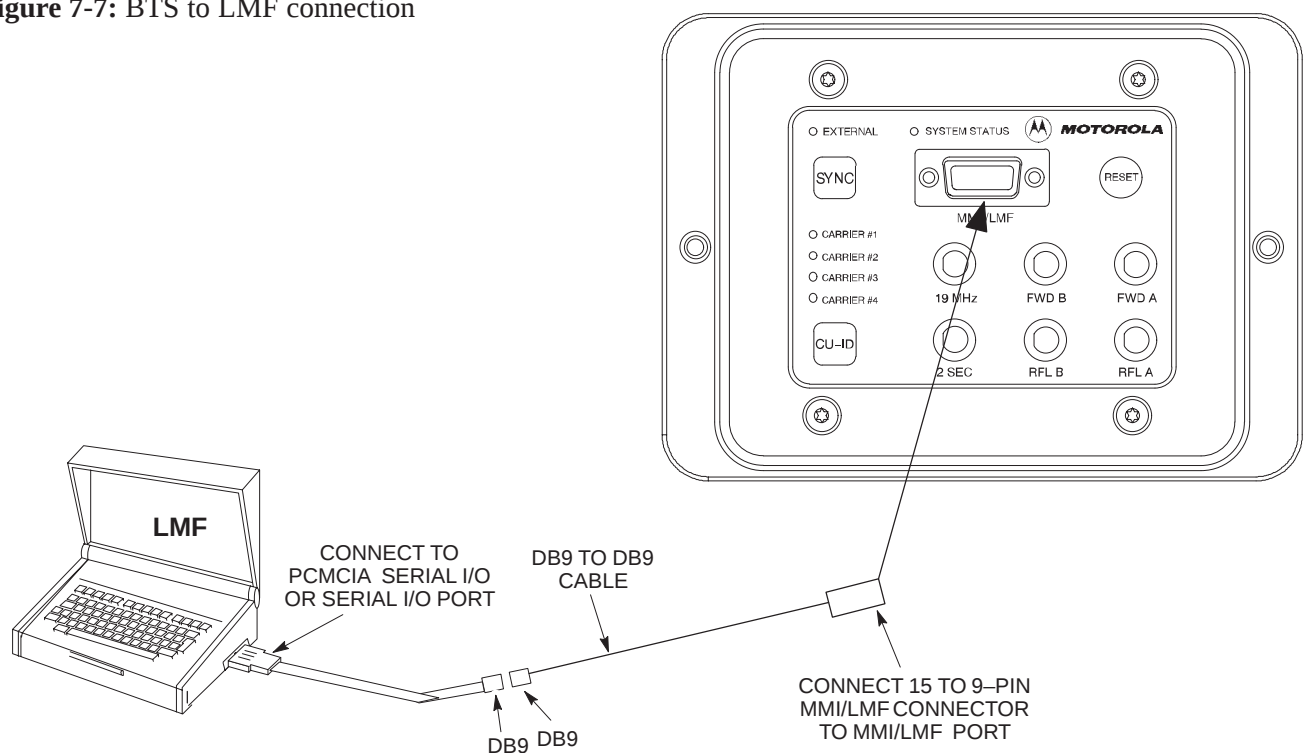
The LMF is connected to the MMI/LMF connector on the diagnostic access area. The illustration (Figure 7-7) shows the connections between the LMF and BTS.

The LMF serial port, or PCMCIA (Personal Computer Memory Card International Association) Serial Adapter provides the connection between the LMF and the MMI/LMF connector located on the diagnostic access area.

Procedure

Connect the LMF to the BTS. Refer to Figure 7-7, Figure 7-8, and Table 7-2.

Figure 7-7: BTS to LMF connection



MMI/LMF serial connector information

Refer to Figure 7-8 and Table 7-2 for information for the 15-pin MMI/LMF connector.

Figure 7-8: 15-Pin MMI/LMF Serial Connector

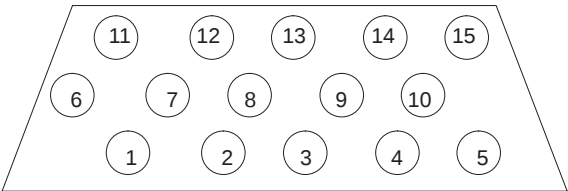


Table 7-2: 15-Pin MMI/LMF Serial Cable Information		
Pin#	Abbreviation	Description
1	RTS	Request to Send
2	TXD	Transmit Data
3	RXD	Receive Data
4	TX+	Ethernet Transmit +
5	TX–	Ethernet Transmit –
6	CTS	Clear to Send
7	CTS	Clear to Send
8	CTS	Clear to Send
9	–	Open
10	RI	Ring Indicator
11	RI	Ring Indicator
12	RX+	Ethernet Receive +
13	CTS	Clear to Send
14	GND	Ground
15	RX–	Ethernet Receive –

Test Equipment Connection

The following test equipment setup applies to the BTS Acceptance Test Procedure (ATP).

NOTE

If you are not going to perform the ATP, then proceed to the “Creating a Named HyperTerminal Connection for MMI Communication” procedure in this chapter.

Equipment warm-up



IMPORTANT

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



IMPORTANT

Warm-up **test equipment** for a minimum of 60 minutes prior to their use in the BTS ATP. This assures maximum equipment measurement accuracy and consistency during testing.

Connecting Test Equipment to the BTS and LMF

All test equipment is controlled by the LMF via a Serial Cable/GPIB bus. The LMF expects each piece of test equipment to have a factory-set GPIB address. If there is a communications problem between the LMF and any piece of test equipment, you should verify that the GPIB addresses have been set correctly.

NOTE

In the following procedure and illustrations, typical DIP switch positions and/or configurations are shown. If required, refer to the test equipment OEM user manuals for additional information.

Connecting Advantest R3465 to BTS

Follow the procedure in Table 7-3 to connect the Advantest R3465 to the BTS. Refer to Figure 7-9.

Table 7-3: Interfacing test equipment to the BTS

Step	Action
1	Connect an SMA/BNC coax cable between the following points: – BNC on the Advantest CDMA TIMEBASE IN port. – SMA on the 19 MHz port on the diagnostic access area of the BTS.
2	Connect an SMA/BNC cable between the following points: – BNC to one end of the BNC “T.” – SMA on the 2 Sec port on the diagnostic access area of the BTS.

Table 7-3: Interfacing test equipment to the BTS

Step	Action
3	Connect a BNC/BNC cable between the following points: – BNC to one end of the BNC “T.” – BNC to the EXT TRIG port on the rear panel of the Advantest R3465.
4	Connect the BNC “T” to the EVEN SEC/SYNC IN port of the Advantest R3561L.
5	Verify the R3561 and R3465 rear panel connections are in place (<i>These are common connections and should already be installed</i>): – Serial cable between 3465A rear panel SERIAL I/O port and R3561 SERIAL I/O port. – SMA cable between 3465A rear panel 1ST LO OUT port and R3561 LOCAL IN port.

Test Equipment and LMF Connection – continued

Figure 7-9: R3465 Communications Test Set Timing Signal Detail (Advantest R3465)

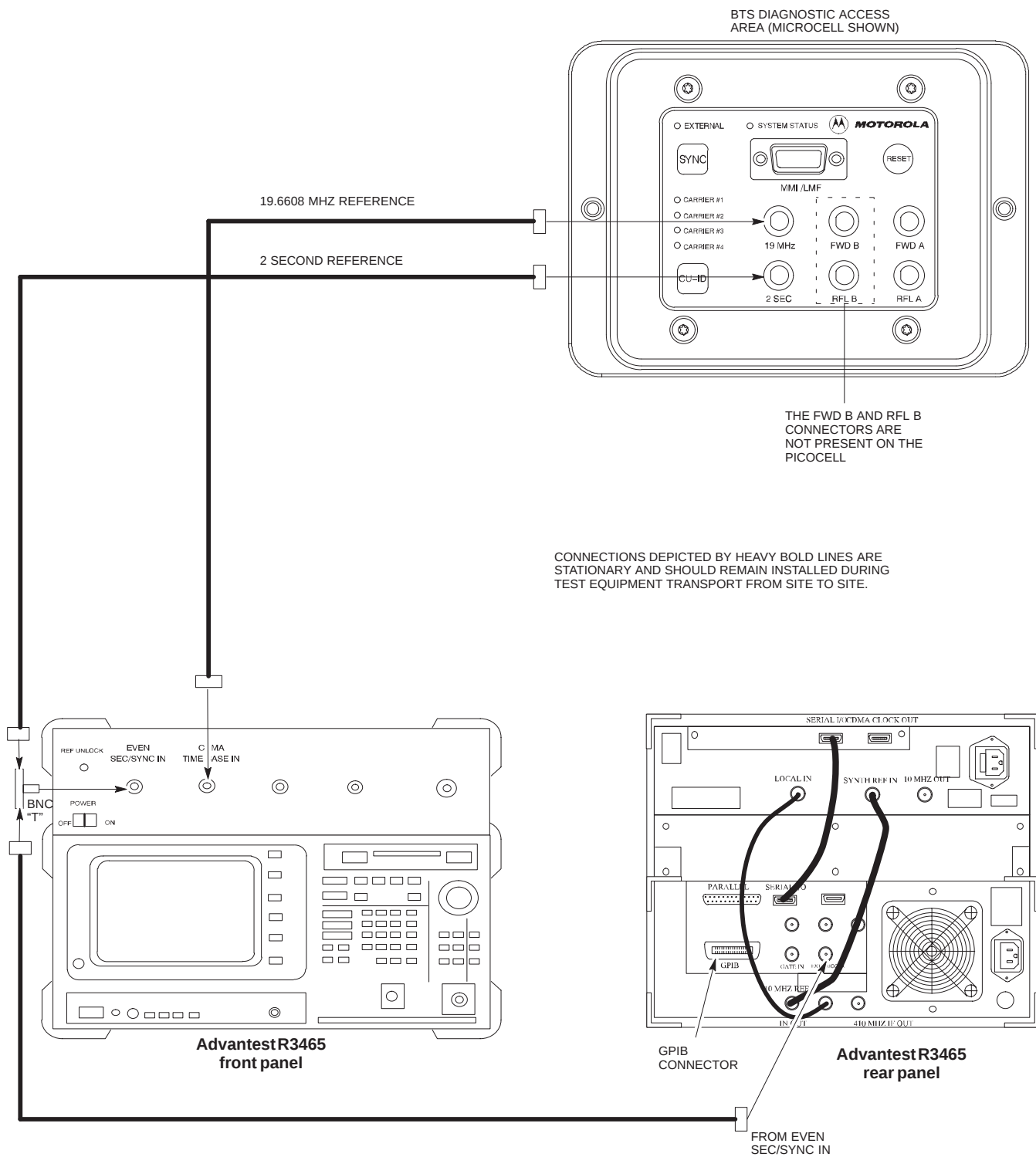
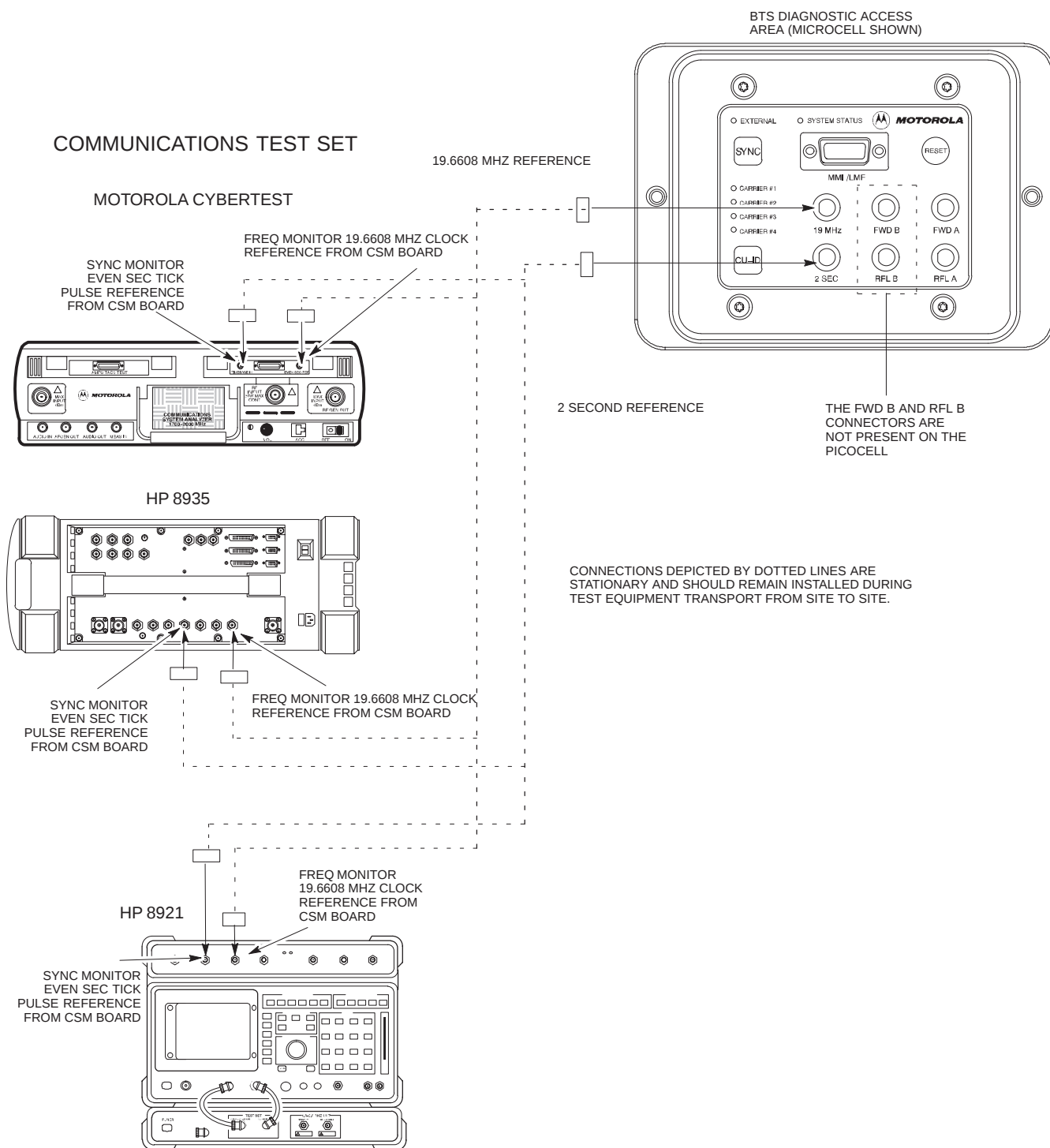


Figure 7-10: Communications Test Set Timing Signal Detail (CyberTest, HP 8935, HP 8921)



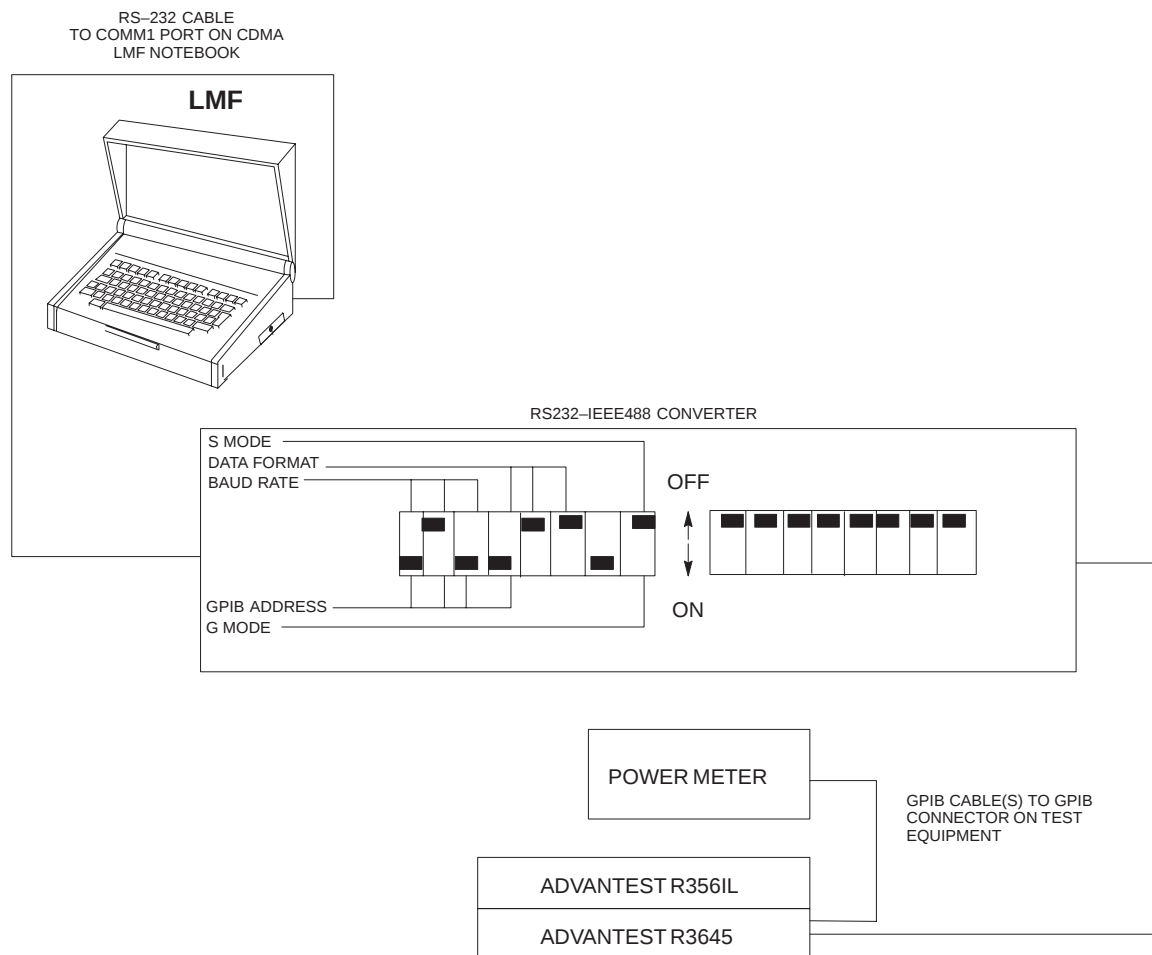
Test Equipment and LMF Connection – continued

Connecting the Communication Test Set and Power Meter to the LMF

Use the following procedure in Table 7-4 to connect the communication test set to the power meter and to the LMF. Refer to Figure 7-11.

Table 7-4: Connect the Communication Test Set and Power Meter to the LMF	
Step	Action
1	Connect the RS232–IEEE488 converter serial cable between the COM1 port of the LMF and the RS232 port of the RS232–IEEE488 converter.
2	Connect a GPIB cable between the RS232–IEEE488 converter and the GPIB port on the communication test set.
3	Connect a GPIB cable between the GPIB port on the communication test set and the GPIB port of the power meter.
4	Set the DIP switches on the RS232–IEEE488 converter as shown in Figure 7-11.
5	Power on the communication test set, power meter and RS232–IEEE488 converter.

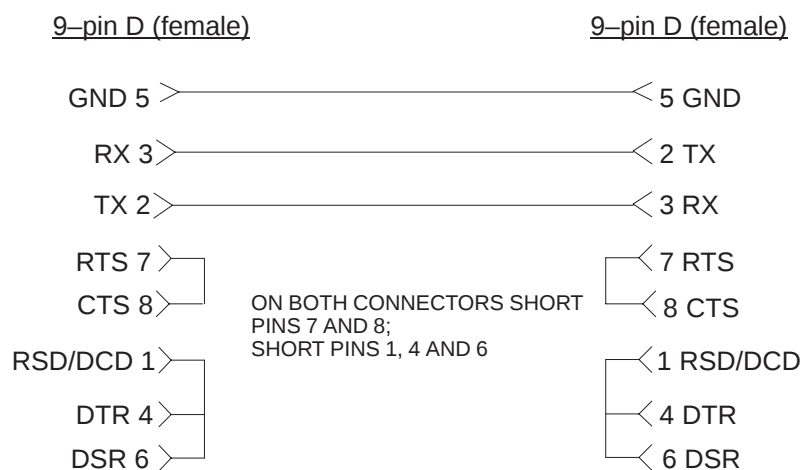
Figure 7-11: LMF to Test Equipment Connection



Cable Configuration

Figure 7-12 shows the cable configuration for the RS232–IEEE488 converter serial cable.

Figure 7-12: RS232–IEEE488 Converter Serial Cable Configuration



BTS Configuration

Objective

The objective of this procedure is to configure the BTS and establish communication sessions between the LMF and BTS. This procedure consists of:

1. Creating a named hyperterminal connection for MMI communication
2. Establishing an MMI communication session
3. Programming customer operating channel
4. Verifying BTS synchronization mode
5. Verifying DPLL tracking

Creating a Named HyperTerminal Connection for MMI Communication

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

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

Follow the procedures in Table 7-5 to establish a named HyperTerminal connection and create a Windows desktop shortcut for it.

Table 7-5: Create a HyperTerminal Connection

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

... continued on next page

Table 7-5: Create a HyperTerminal Connection

Step	Action
	NOTE For CDMA LMF computer configurations where COM1 is used by another interface such as test equipment and a physical port is available for COM2, select COM2 in the following step to prevent conflicts.
4	From the Connect using: pick list in the Connect To box displayed, select Direct to Com 1 or Direct to Com 2 for the RS-232 connection port, and click OK .
5	In the Port Settings tab of the COM# Properties window displayed, configure the RS-232 port settings as follows: • Bits per second: 9600 • Data bits: 8 • Parity: None • Stop bits: 1 • Flow control: None
6	Click OK .
7	Save the defined connection by selecting: File > Save
8	Close the HyperTerminal window by selecting: File > Exit
9	Click the Yes button to disconnect when prompted.
10	If the Hyperterminal folder window is still open, proceed to step 12.
11	Select Communications and double click the Hyperterminal folder.
12	Highlight the newly-created connection icon by clicking on it.
13	<i>Right click and drag</i> the highlighted connection icon to the Windows desktop and release the right mouse button.
14	From the popup menu which appears, select Create Shortcut(s) Here .
15	If desired, reposition the shortcut icon for the new connection by dragging it to another location on the Windows desktop.
16	Close the Hyperterminal folder window by selecting: File > Close

Establishing an MMI Communication Session

For those procedures which require MMI communication between the CDMA LMF and the BTS, follow the procedures in Table 7-6 to initiate the communication session.

NOTE

If an LMF session is in progress, logout of the LMF prior to establishing an MMI communication session. Refer to steps 1 and 2 of the “Remove LMF” procedure in Table 7-38.

Table 7-6: Establishing MMI Communication

Step	Action
1	Connect the CDMA LMF computer to the BTS. Refer to the “Connecting the LMF to the BTS” procedure in this chapter.
2	Start the named HyperTerminal connection for MMI sessions by double clicking on its Windows desktop shortcut.
3	NOTE If a Windows desktop shortcut was not created for the MMI connection, access the connection from the Windows Start menu by selecting: Programs > Accessories > Hyperterminal > HyperTerminal > <Named HyperTerminal Connection (e.g., MMI Session)> Once the connection window opens, establish MMI communication with the BTS FRU by pressing the CDMA LMF computer Enter key until the prompt identified in the applicable procedure is obtained. Every command is entered at the SC300> prompt unless otherwise specified.

Simulated LMF session

You must start a simulated LMF session when you enter MMI commands. Enter the following command at the MMI prompt to simulate an LMF link:

sndtype 0xa178

You should enter this command at the beginning of every MMI Communication Session.

Programming Customer Operating Channel

A non-volatile database containing the default channel and default power level of the site must be programmed. The default channel is the customer operating channel for this site. The default power level must be set to -50 dBm which will be overwritten by the MM/OMCR when the site comes on-line.

It is imperative that the customer frequency be programmed into this database. Failure to do so may result in the RF interference to other RF-emitting devices in the local area whenever the site is powered up.

Table 7-7: Updating Default Channel Setting to Customer Operating Channel

Step	Action
1	Connect the LMF computer terminal to the MMI/LMF connector. Refer to Figure 7-7.
2	If you have not already done so, logout of the BTS and exit the LMF. Wait 10 seconds before proceeding.
3	Establish an MMI connection session with the BTS. Refer to Table 7-6.
4	Simulate an LMF connection by issuing the sndtype 0xa178 command.
5	Verify that the BTS is in OOS_RAM status by issuing the status command.
6	Enter the op_param -w -50 chan# command. -w instructs the BTS to write the values into non-volatile memory. -50 defaults the power to -50dBm chan# the customer operating channel (76-724) If the command is successful, the following response will display: PASSED: TRX EEPROM updated for power level = -50 (dBm) and channel = chan#
7	If no additional MMI sessions are required at this time, exit the MMI session and HyperTerminal connection by selecting File>Exit. If you are continuing the MMI session, proceed to Table 7-8.

Synchronization Background

GPS

GPS is typically used as the primary timing reference for CDMA BTSs. In applications where RGPS is used, the BTS is said to be synchronous with CDMA system time. The RGPS provides a 1 Pulse Per Second timing reference and Time Of Day information to allow the BTS to synchronize to CDMA system time.

HSO

A High Stability Oscillator (HSO) within the BTS provides a backup timing reference in the event of a GPS outage. Using only the HSO, the BTS can maintain CDMA system time for up to 24 hours. The BTS can also use the HSO as the primary timing reference (non-synchronous operation). However, synchronization to CDMA system time is not possible. The HSO provides a 1 Pulse Per Second timing reference to allow the BTS to remain synchronized to CDMA system time in the event of a GPS outage (synchronous operation) or to provide a stable frequency reference (non-synchronous operation).

NOTE

The HSO must be installed with GPS tracking for at least 24 hours before the HSO can provide 24 hours of backup for CDMA system time synchronization.

BTS

The BTS uses a Digital Phase Locked Loop (DPLL) to track the RGPS and/or HSO and generate a 19.6608 MHz CDMA timing reference. This timing reference, in conjunction with Time Of Day information provided by the RGPS, allows the BTS to synchronize to CDMA system time. A 2 Second reference is also generated by the BTS to allow alignment of Pilot offsets for the BTS and external test equipment. Both the 19.6608 MHz (19 MHz) and 2 Second (2 Sec) references are available via SMA connectors located in the Diagnostic Access Area.

In order for the DPLL to begin the RGPS tracking process, the RGPS must be tracking GPS satellites. In order for the DPLL to begin the HSO tracking process, the BTS must be powered up (warmed) for at least 15 minutes.

The DPLL status is defined as being in one of five states: Init, Warm, A1, A2 and TK.

- The Init state is the starting state of the DPLL.
- The Warm state is the condition during the 15 minute BTS warm up time.
- The A1 and A2 states are acquisition states when the DPLL is adjusting the 19.6608 MHz frequency based on the available reference sources (RGPS or HSO). Under normal operating conditions, the acquisition states last about 5 minutes.
- The TK state is the DPLL tracking state and is entered at the end of the acquisition states. The TK state is required for performing ATP.

Synchronization Configuration

The Sync button in the Diagnostic Access Area is used to toggle the RGPS or HSO as the primary timing reference for the BTS. If the External indicator in the Diagnostic Access Area is illuminated, the BTS expects an RGPS to be present for use as the primary timing reference. If the External indicator is not illuminated, the BTS will use the internal HSO as the primary timing reference.

Use the procedure in Table 7-8 to verify and, if necessary change the BTS Sync mode.

Table 7-8: Verify BTS Sync Mode

Step	Action
1	If an MMI session was established, proceed to step 6. If no MMI session is running, proceed to step 2.
2	Connect the MMI/LMF.
3	Open an MMI Communication session.
4	Simulate an LMF connection by issuing the sndtype 0xa178 command.
5	Verify that the BTS is in OOS_RAM status by issuing the status command.
6	Observe the condition of the External indicator.
7	No further action is required if the BTS is in the desired Sync mode. Continue with Step 8 if the Sync mode needs to be altered.
8	Push the Sync button to change the BTS Sync mode.
9	Reset the BTS using the Reset button in the Diagnostic Access Area.
10	If no additional MMI sessions are required at this time, exit the MMI session and HyperTerminal connection by selecting File>Exit . If you are continuing the MMI session, proceed to Table 7-9.

Synchronization Verification

The DPLL within the BTS must be tracking either RGPS or HSO in order to perform ATP. Use the procedure in Table 7-9 to verify DPLL tracking.

Table 7-9: Verify DPLL Tracking

Step	Action
1	If an MMI session was established, proceed to step 6. If no MMI session is running, proceed to step 2.
2	Connect the MMI/LMF.
3	Open an MMI Communication session.
4	Simulate an LMF connection by issuing the sndtype 0xa178 command.
5	Verify that the BTS is in OOS_RAM status by issuing the status command.
6	If an RGPS is not present, go to Step 9.
. . . continued on next page	

Table 7-9: Verify DPLL Tracking

Step	Action
7	Enter the gps_status command to display the current state of the RGPS. Observe the following typical response: <pre>gps_status GPS Receiver Identification: Current GPS Time :8 03 1999 23:01:12 Current GPS Receiver Status :8 Number of Satellites Currently visible :11 Number of Satellites Currently received :5 Number of Satellites Currently tracked :5 GPS Receiver Type :UT Current GPS Task State :GPS_TRACK Current Dilution of Precision (HDOP (2D)/antenna ok [0x01]): 0 Chan: 0, SVID: 9, Mode: 8, RSSI: 44, Status: 0xaa Chan: 1, SVID: 4, Mode: 8, RSSI: 46, Status: 0xaa Chan: 2, SVID: 10, Mode: 8, RSSI: 44, Status: 0xaa Chan: 3, SVID: 6, Mode: 8, RSSI: 41, Status: 0xaa Chan: 4, SVID: 7, Mode: 8, RSSI: 43, Status: 0xaa Chan: 5, SVID: 24, Mode: 8, RSSI: 47, Status: 0xaa Chan: 6, SVID: 30, Mode: 8, RSSI: 45, Status: 0xaa Chan: 7, SVID: 5, Mode: 8, RSSI: 48, Status: 0xaa Current Longitude: -350250952 Current Latitude: 118244730 Current Height: 24019</pre>
8	The RGPS must have a Current GPS Task State of GPS_TRACK to proceed. NOTE GPS tracking times vary depending on location and installation.
9	Issue the dpll_status command to display the current state of the DPLL. Observe the following typical response: <pre>Current source set to: GPS reference DPLL control task state: DPLL track. DPLL status (not valid if using even sec src): c:0000 off: -8639450,6736579,7204904 TK (Note: This must say TK. A1 and A2 states will have preceded it) Mode cntr: 120 ip: 9, iq: 4 aip1: 9, aiq1: 4 aip2: 6, aiq2: -2 tip: 3, tiq: -9 integrator: 4096</pre>
... continued on next page	

Table 7-9: Verify DPLL Tracking

Step	Action
10	Verify that the DPLL is “tracking” either the RGPS or HSO. The DPLL must have a Current source set to of GPS reference or HSO reference . The DPLL must also have a DPLL control task state of DPLL track .
11	If no additional MMI sessions are required at this time, exit the MMI session and HyperTerminal connection by selecting File>Exit . If you are continuing the MMI session, proceed to Table 7-10.

Location Coordinates

The BTS supplies the RGPS with default startup coordinates (latitude and longitude) in order to assist the RGPS in tracking satellites. The default startup coordinates can be modified and saved into non-volatile memory to speed the tracking of satellites.

Use the procedure in Table 7-10 to verify and, if necessary, modify the default startup coordinates. The procedure in Table 7-10 is only applicable to sites equipped with an RGPS.

Table 7-10: Verify Default Startup Coordinates

Step	Action
1	If an MMI session was established, proceed to step 6. If no MMI session is running, proceed to step 2.
2	Connect the LMF/MMI.
3	Open an MMI Communication session.
4	Simulate an LMF connection by issuing the sndtype 0xa178 command.
5	Verify that the BTS is in OOS_RAM status by issuing the status command.
6	Issue the dpll_status command to display the current state of the DPLL. Verify that the DPLL has a “Current source set to” of GPS reference and a “DPLL control task state” of DPLL track . The DPLL must be tracking GPS in order to complete this procedure.
7	* IMPORTANT The values for longitude and latitude in response to the gps_status command are given in units of milli-arcseconds. Be careful to record the values accurately including any leading negative (–) signs. The value of Current Height is given in units of centimeters. Enter the gps_status command.
8	Record the values displayed for Current Longitude , Current Latitude and Current Height .
... continued on next page	

Table 7-10: Verify Default Startup Coordinates

Step	Action
9	* IMPORTANT The gps_config command displays the default startup coordinates for the BTS. Note that latitude is displayed first, followed by longitude. This is in reverse order compared to the response of the gps_status command. The values for latitude and longitude are given in units of milli-arcseconds. The value of Current Height is given in units of centimeters. Enter the gps_config command to display the default startup coordinates for the BTS. Observe the following typical response: <pre>GPS Configuration data: latitude: 151679715 msec longitude: -316791269 msec height: 19740 centi-meters height_type: 0 cable_delay: 0 nsec accuracy: 0</pre> If the default startup coordinates need to be modified, the gps_config command can be issued with additional parameters. Using the Current Longitude, Current Latitude and Current Height values recorded in step 8, issue the following command: <pre>gps_config <latitude> <longitude> <height> 0 0 0</pre> Be careful to input the latitude and longitude in the proper order along with any leading negative (–) signs. The GPS Height Type Configuration should be set to “0.”
10	Issue the gps_config to verify that the coordinates are set.
11	Reset the BTS to save the new coordinates.
12	Repeat the steps in Table 7-9 to verify the DPLL status prior to performing ATP.
13	If no additional MMI sessions are required at this time, exit the MMI session and HyperTerminal connection by selecting File>Exit .

Objective

This objective of this procedure is to:

1. Install the LMF program.
2. Create a site specific BTS directory.
3. Start the LMF.
4. Login to the BTS
5. Update the BTS-specific CDF file.
6. Download and enable the MAWI

Install the LMF Program and BTS Binaries

Install the LMF and BTS binaries on the PC to be used if they are not already installed. Refer to the *CDMA LMF Operator's Guide, 68P64114A78* for the installation procedure.

Create a Site-Specific BTS Directory

Follow the steps in Table 7-11 to create a `bts-bts#` directory, to which the `bts-bts#.cdf`, `cbsc-1.cdf`, `bts-bts#.cal`, and ATP report files will reside.

Table 7-11: Create Site-Specific BTS Directory	
Step	Action
1	Use MS Windows Explorer to create a <code>bts-#</code> folder under the <code>wlmf\cdma</code> folder (where # is the bts number).
2	Get the <code>bts-#.cdf</code> file and <code>cbsc-#.cdf</code> file from the CBSC and put a copy of the files in the <code>wlmf\cdma\bts-#</code> folder. Refer to the LMF help screens or the <i>CDMA LMF Operator's Guide, 68P64114A21</i> for the copy file procedure.

Start the LMF and Login to the BTS

Use the following procedure in Table 7-12 to start the LMF and login to the BTS.

Prerequisites

1. A `bts-#` folder with a correct CDF and CBSC file exists.
2. The LMF notebook is correctly set up and connected to the BTS.
Refer to Figure 7-7.

Procedure

NOTE

The **Refresh** button can be used to update the **Available Base Stations** pick list to include any new **bts-#** folders added/created after the LMF was started. To logout of the BTS, click on **Select>Logout**. A confirm logout pop-up message will appear.

Table 7-12: Start the LMF and Login to the BTS	
Step	Action
1	Click on the LMF desktop icon. The LMF window should appear.
2	Click on the Login tab if it is not already displayed.
3	Double-click on CDMA in the Available Base Stations pick list if the list of available BTSs is not displayed.
4	Click on the desired BTS.
5	Is all of the information in the Serial Login tab and Equipage Information box list correct? – If YES, go to step 8. – If NO, go to step 6.
6	Click on the Serial Login tab if it is not in the forefront. Select the correct Com Port (normally COM2) and select the desired Baud Rate (normally 9600 for tests and 38400 for downloads).
7	If applicable, change the Multi-Channel Preselector selection (normally MPC).
8	Click on the Login button. A BTS tab with the BTS should be displayed.
	NOTE A SC6XX BTS picture will appear instead of a SC300 picture.



Update BTS Specific CDF File
Device Load Version

Follow the steps in Table 7-13 to update the existing BTS specific CDF file *NextLoad* parameter to reflect the current device load version to be downloaded.

The **NextLoad** version parameter in the CDF file for a BTS can be updated to one of the existing version numbers in the **wlmf>cdma>loads** folder. When code is downloaded the code file used is determined by the **NextLoad** parameter in the CDF file. If a version number folder that has the same number as the **NextLoad** parameter is not found when the download code function is used the LMF will not automatically select the code and data files to be downloaded.

NOTE

Device load version in the CDF file does not have to match the current version loaded at the OMCR/CBSC.

Table 7-13: Update BTS Specific CDF File Device Load Version

Step	Action
1	Click on the Util menu.
2	Select the Tools menu item.
3	Click on the Update NextLoad device.
4	Select the desired version number (button next to desired version number must be darkened).
5	Click on the Save button. A pop-up message will appear indicating that the CDF file has been updated. NOTE At this point, a backup copy of the original CDF is created with a <code>_bak</code> extension, (e.g., <code>bts-812.cdf_bak</code>).
6	Click on the OK button to dismiss the pop-up message.

Download/Enable MAWI

The objective of this procedure is to download and enable the BTS.

The BTS software platform is based on the Motorola Advanced Wideband Interface (MAWI). The term MAWI is used to refer to the Microcell or Picocell from the LMF's point of view.

NOTE

The BTS is shipped from the factory with all the software downloaded. Use the load procedure only when new software is loaded.

Follow the steps outlined in Table 7-14 to download the code and data to enable the MAWI.

Before the download/enable process, use the **status** function and verify the MAWI responds with status information. Use this information to get the current code loaded in MAWI.

Table 7-14: Download/Enable MAWI

Step	Action
1	If the ATP is going to be run, the MAWI has to have the same code load as the LMF CDF or the site specific information cannot be loaded to MAWI (PN offset, etc.) for ATP to complete.
2	If downloading code, insure the LMF is logged into the BTS at 38400 Baud Rate for timely download (20 minutes vs 2+ hours).
3	Click on the MAWI and select Device>Download Code . A status report is displayed that confirms the change in device status. Click OK to close status window.
4	Click on the MAWI and select Device>Download Data . A status report is displayed that confirms the change in device status. Click OK to close status window.
5	Click on the MAWI and select Device>Enable to enable the MAWI. The MAWI changes to green (INS–ACT test mode).

Cell Site Data File (CDF)

The Configuration Data File (CDF) includes the CDMA channel element allocation plan. This plan indicates how each CDMA carrier is configured, and how the paging, sync, traffic, and access channel elements (and associated gain values) are assigned.

The CDF file also contains a table for the Effective Rated Power (ERP) for each transmit antenna. Motorola System Engineering specifies the ERP of a transmit antenna based on site geography, antenna placement, and government regulations. Working from this ERP requirement, the antenna gain, (dependent on the units of measurement specified) and antenna feed line loss can be combined to determine the required power at the BTS TX output.

NOTE

Refer to the *CDMA LMF Operators Guide; 68P64114A78* for additional information on the layout of the LMF directory structure (including cdf file locations and formats).

Site equipage verification

If you have not already done so, use an editor to view the CDF, and review the site documentation. Verify the site engineering equipage data in the CDF to the actual site hardware.

NOTE

If the current LMF or BTS binaries need to be installed on the LMF PC, or for more information on viewing CDF files, refer to the *CDMA LMF Operators Guide; 68P64114A78*.

System status LED states

Table 7-15 lists all of the possible system status LED states.

Table 7-15: System Status LED States	
System Status LED	Status Indication
Steady Green	INS_ACT ³ or INS_SBY ⁴ , no alarms
Slow Flashing Red/Green (0.2s Red, 1.4s Green)	INS_ACT or INS_SBY w/alarms(s)
Fast Flashing Green/Off (0.2s Green, 0.2s Off)	OOS_RAM ¹ with no alarms
Fast Flashing Red/Green (0.2s Red, 0.2s Green)	OOS_RAM with alarms(s)
Slow Flashing Green/Off (0.2s Green, 1.4s Off)	OOS_ROM ² with no alarms
Slow Flashing Green/Red (0.2s Green, 1.4s Red)	OOS_ROM with alarm(s)
Steady Red	Critical hardware failure
Fast Flashing Red/Off (0.25s Red/0.25s Off) ⁵ NOTE The MAWI has powered up in boot code because the ROM code is either corrupt or not present. This condition may indicate a MAWI hardware failure.	#1: RAM test failure #2: FLASH 1 (512K) manufacture/device ID mismatch #3: FLASH 2 (512K) manufacture/device ID mismatch #4: FLASH 3 (512K) manufacture/device ID mismatch #5: Modem present but untrained #6: Unknown interrupt event #7: Reset by hardware watchdog timeout #8: Reset by software watchdog timeout #9: Reset by double bus fault #10: Reset by loss of clock #11: Reset by RESET instruction #12: Reset by soft reset pin
Off	No DC Power applied to module
¹ OOS_RAM refers to a MAWI that is loaded but not enabled ² OOS_ROM refers to a MAWI that is not loaded. ³ INS_ACT refers to a MAWI that is in service and active. ⁴ INS_SBY refers to a MAWI that is in service but on standby. ⁵ The number of flashes equals the alarm #, with a three-second pause between flashes.	

Test Equipment Setup

Purpose

The following test equipment setup applies to the BTS Acceptance Test Procedure (ATP).

Required Test Equipment

The following pieces of test equipment will be required to perform these ATP tests:

- LMF
- Power Meter
- Communications Test Set



CAUTION

To prevent damage to the test equipment, all Microcell transmit (TX) tests must be made using the 30 dB attenuator.

Test Set Calibration Background

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

NOTE

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

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



CAUTION

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



IMPORTANT

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

Purpose of Test set Calibration

These procedures access the LMF automated calibration routine used to determine the path losses of the supported communications analyzer, power meter, associated test cables, and (if used) antenna switch that make up the overall calibrated test set. After calibration, the gain/loss offset values are stored in a test measurement offset file on the LMF.

Selecting Test Equipment

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

A **Serial Connection** and a **Network Connection** tab are provided for test equipment selection. The **Serial Connection** tab is used when the test equipment items are connected directly to the LMF computer via a GPIB box (normal setup). The **Network Connection** tab is used when the test equipment is to be connected remotely via a network connection.

Prerequisites

Ensure the following prerequisites have been met before proceeding:

- Test equipment is correctly connected and turned on.
- CDMA LMF computer serial port and test equipment are connected to the GPIB box.

Manually Selecting Test Equipment in a Serial Connection Tab

Test equipment can be manually specified before, or after, the test equipment is connected. The LMF does not check to see if the test equipment is actually detected for manual specification. Follow the procedure in Table 7-16 to select test equipment manually.

Table 7-16: Selecting Test Equipment Manually in a Serial Connection Tab

✓	Step	Action
	1	From the Options menu, select LMF Options . The LMF Options window appears.
	2	Click on the Serial Connection tab (if not in the forefront).

... continued on next page

Table 7-16: Selecting Test Equipment Manually in a Serial Connection Tab

✓	Step	Action
	3	Select the correct serial port in the COMM Port pick list (normally COM1).
	4	Click on the Manual Specification button (if not enabled).
	5	Click on the check box corresponding to the test item(s) to be used.
	6	Type the GPIB address in the corresponding GPIB address box. Recommended Addresses 13=Power Meter 18=CDMA Analyzer
	7	Click on Apply . (The button darkens until the selection has been committed.) NOTE With manual selection, the LMF does not detect the test equipment to see if it is connected and communicating with the LMF.
	8	Click on Dismiss to close the test equipment window.

Automatically Selecting Test Equipment in a Serial Connection Tab

When using the auto-detection feature to select test equipment, the LMF examines which test equipment items are actually communicating with the LMF. Follow the procedure in Table 7-17 to use the auto-detect feature.

Table 7-17: Selecting Test Equipment Using Auto-Detect

✓	Step	Action
	1	From the Options menu, select LMF Options . The LMF Options window appears.
	2	Click on the Serial Connection tab (if not in the forefront).
	3	Select the correct serial port in the COMM Port pick list (normally COM1).
	4	Click on Auto-Detection (if not enabled).
	5	Type in the GPIB addresses in the box labeled GPIB address to search (if not already displayed). NOTE When both a power meter and analyzer are selected, the first item listed in the GPIB addresses to search box is used for RF power measurements (i.e., TX calibration). The address for a power meter is normally 13 and the address for a CDMA analyzer is normally 18 . If 13,18 is included in the GPIB addresses to search box, the power meter (13) is used for RF power measurements. If the test equipment items are manually selected the CDMA analyzer is used only if a power meter is not selected.
		... continued on next page

Table 7-17: Selecting Test Equipment Using Auto-Detect

✓	Step	Action
	6	Click on Apply . NOTE The button darkens until the selection has been committed. A check mark appears in the Manual Configuration section for detected test equipment items.
	7	Click Dismiss to close the LMF Options window.

Calibrating Test Equipment

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

Use the **Calibrate Test Equipment** menu item from the **Util** menu to calibrate test equipment. The test equipment must be selected before calibration can begin. Follow the procedure in Table 7-18 to calibrate the test equipment.

Prerequisites

Ensure the following prerequisites have been met before proceeding:

- Test equipment to be calibrated has been connected correctly for tests that are to be run.
- Test equipment has been selected.

Table 7-18: Test Equipment Calibration

✓	Step	Action
	1	From the Util menu, select Calibrate Test Equipment . A Directions window is displayed.
	2	Follow the directions provided.
	3	Click on Continue to close the Directions window. A status report window is displayed.
	4	Click on OK to close the status report window.

Test Equipment Setup – continued

R3465 Calibration/GPIB Address & Clock Setup

Follow the steps in Table 7-20 to configure and calibrate the communication test set.

Table 7-19: R3465 Calibration Procedure	
Step	Action
	NOTE The calibration should be performed only after the analyzer has been allowed to warm-up and stabilize for a <i>minimum of 60 minutes</i> .
1	Perform the following to set the standard parameters on the test set: • Push the SHIFT and PRESET pushbutton (just below the CRT display) • Select TRANSIENT – Select Setup STD in CRT menu.
2	Verify and if required set the following parameters in the display (<i>rotate the vernier knob to navigate the screen, push the vernier knob to select</i>): • Set Type to Japan (800 MHz) • Set Link to FORWARD • Verify Rate to 9600/14400 (<i>set Link to REVERSE if Rate needs to be set</i>) • Set Offset Level to 0.0 dB • Set Freq Input to FREQUENCY • Set Cont. Auto Level Set to OFF – Select Return in CRT menu.
3	Verify that the Communications test set GPIB address and Date/Time are set correctly. • Communications test set GPIB address = 18 (<i>perform the following to view/set as required</i>). • Select CW • Push the LCL pushbutton (just below the CRT display) – Push the GPIB and Others CRT menu key to view the current address. – If required, change GPIB address to 18 (<i>rotate the vernier knob to set, push the vernier knob to enter</i>) • Verify the current Date and Time in upper/right of CRT display (<i>perform the following to set if required</i>). – Push the Date/Time CRT menu key – If required, change to correct Date/Time (<i>rotate the vernier knob to select and set, push the vernier knob to enter</i>) • Select CW

Table 7-19: R3465 Calibration Procedure

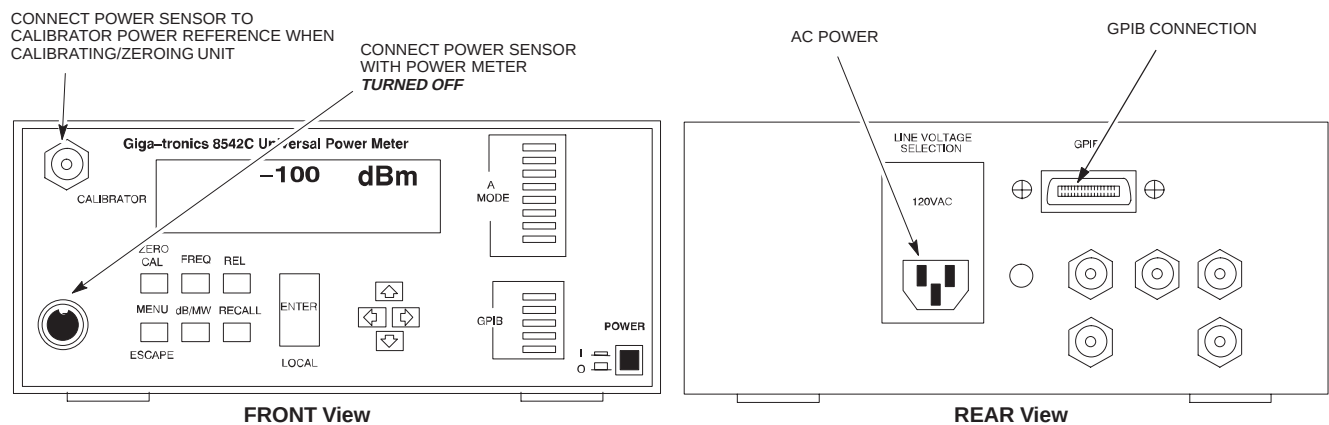
Step	Action
4	Verify that the CDMA Clock Source References are set correctly: • Push the ADVANCE key • Push the CDMA Sig. CRT menu key • Push the Setup CRT menu key • Push the Ref Clock CRT menu key – If required, change SynthRef (MHz) to 10 (rotate the vernier knob to set, push the vernier knob to enter) – If required, change CDMA–TB Source to 19.6608 (rotate the vernier knob to set, push the vernier knob to enter) • Verify that ON is active in the Output CRT menu key • Verify that OFF is active in the Mod CRT menu key • Push the return menu key • Push the return menu key again * IMPORTANT – Test equipment warm–up may vary depending on operating environment or initial temperature of unit upon turn–on. <i>Consult test equipment OEM documentation for additional information as required.</i>
5	Connect the male BNC to male N cable between the CAL OUT connector and the INPUT 50 Ω connector.
6	Perform the following to run the internal calibration on the test set: • Select CW • Push the SHIFT and CAL pushbuttons – Select Cal All in CRT menu. Internal calibration should complete in about 6 minutes.

Power Meter GPIB Setup

Precise transmit output power measurements are made using a broadband power meter with a sensitive power sensor. Follow the steps outlined in Table 7-20 to set the GPIB address of the power meter. Refer to Figure 7-13.

Table 7-20: Gigatronics Power Meter GPIB Address Procedure	
Step	Action
	! CAUTION Do not connect/disconnect the power meter sensor cable with ac power applied to the meter. Disconnection could result in destruction of the sensing element or mis-calibration.
1	Make sure the power meter POWER pushbutton is OFF . Connect the power sensor cable to the SENSOR input. Set the POWER 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 <i>minimum of 60 minutes</i> .
2	Verify that the Power Meter GPIB mode and address are set correctly: • Power Meter (currently used by LMF for calibration) GPIB address = 13 Consult test equipment OEM documentation for additional info as required). – Press MENU. Use the ▼ arrow key to select CONFIG MENU and press ENTER. – Use the ▼ arrow key to select GPIB and press ENTER. – Use the ▼▲ arrow keys as required to set MODE to 8541C or 8542C (as appropriate). – Press ▶ and use the ▼▲ arrow keys as required to set ADDRESS to 13. – Press ENTER.

Figure 7-13: Power Meter Detail



Acceptance Test (ATP)
Equipment Setup

Follow the steps outlined in Table 7-21 to set up test equipment prior to performing ATP tests.



IMPORTANT

LMF based measurements factor in cable and attenuator loss between the BTS and test equipment. No additional attenuation can be inserted as the additional losses would not be factored in.

Table 7-21: Test Equipment Setup

Step	Action
1	If you have not already done so, interface the CDMA LMF computer to the BTS and login to the BTS.
2	Refer to NO TAG to set up test equipment. Verify that the coaxial cable from the appropriate TX connector on the BTS is connected to the test equipment RF input port via the in line 30 dB high power attenuator for MicroCell BTSs.

Test Equipment Selection

Objective

The objective of this procedure is to select the test equipment used for BTS testing. The LMF must select the test equipment before it is used for BTS testing.

Prerequisites

The following are prerequisites for test equipment selection:

1. Test equipment to be used has been connected as shown in Figure 7-11.
2. Power for the test equipment and GPIB box has been turned on.
3. LMF has been started (do not have to be logged in to the BTS).

Procedure

Follow the steps in Table 7-22 for test equipment selection

NOTE

The test equipment can also be selected via a manual or automatic connection. Refer to the *CDMA LMF Operator's Guide, 68P64114A78* for the procedures.

Table 7-22: Test Equipment Selection

Step	Action
1	Click on Options from the menu.
2	Click on Options>LMF Options . A LMF Options window appears.
3	Select the correct COM port from the ComPort pick list (normally COM1).
4	Click on the Auto–Detection button if it is not enabled.
5	If the GPIB addresses are not displayed, enter the GPIB addresses in the box labeled GPIB address to search. NOTE When both a power meter and a communication test set are selected, the first item listed in the GPIB address to search box will be used for RF power measurements (e.g., TX calibration and audit). The address for a power meter is 13 and the address for a communications test set is 18. The numbers 13 and 18 must be included in the GPIB address to search box so the power meter (13) will be used for TX calibration and audit.
6	Click on the Apply button. The button will darken until the selection has been committed. A check mark will appear in the Manual Configuration section for detected test equipment items.
7	Click on the Dismiss button to close the LMF Options window.

Power Meter Calibration

Objective

This procedure calibrates the power meter that will be used for cable calibration and BTS testing.

Prerequisites

The following are prerequisites for power meter calibration:

1. The power meter is connected. Refer to Figure 7-11 in the “Test Equipment Selection” procedure.
2. Test equipment has been selected.

Procedure

Follow the steps in Table 7-23 to calibrate the power meter.

Table 7-23: Calibrate the Power Meter	
Step	Action
1	Click on Util>Calibrate Test Equipment . A cable connection direction pop-up is displayed.
2	Follow the directions provided.
3	Click on the OK button to close the status results window.

Test Cable Calibration

Background

Proper test equipment setup ensures that all measurements are correct, and that test equipment and associated test cables do not introduce measurement errors. Motorola recommends repeating cable calibration prior to testing at each BTS site.

If not already done so, this procedure needs to be performed prior to beginning the ATP. Verify that all test equipment (including all associated test cables and adapters actually used to interface all test equipment and the BTS together) has been calibrated.



CAUTION

In the event that any piece of test equipment, test cable, or RF adaptor is replaced that makes up the calibrated test equipment set, re-calibration should be performed. Failure to do so can introduce measurement errors, resulting in incorrect measurements or degradation to system performance.



IMPORTANT

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

Purpose

This procedure accesses the LMF automated calibration routine used to determine the path losses of the supported communications analyzer, power meter, associated test cables, and (if used) RF Network making up the overall calibrated test set. After calibration, the gain/loss offset values are stored in a test measurement offset file on the LMF.

If you have obtained the test cable insertion loss values previously, you can manually enter them using the **Util>Edit>CableLoss>TX** or **RX** menu.

Do not use the manual method if you plan to run/have already run the cable calibration procedure.

Automated Cable Calibration Procedure

This procedure calibrates the cables that will be used for BTS testing. Follow the steps in Table 7-24 to calibrate the test cables.

Prerequisites

1. Test equipment has been connected as shown in Figure 7-11.
2. Power for the test equipment and GPIB box has been turned on.
3. LMF has been started and BTS has been logged into.

Procedure

Follow the steps in Table 7-24 to calibrate the test cables. Refer to Figure 7-14.

NOTE

A 30 dB attenuator is used for Microcell (high power) BTSs. A 10 dB attenuator is used for Picocell BTSs.

Table 7-24: Automated Cable Calibration

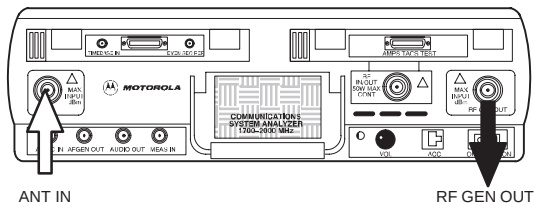
Step	Action
1	Click on the Util>Cable Calibration menu item.
2	Select one of the following options in the Cable Calibration menu: TX and RX CABLE CAL , TX CABLE CAL , or RX CABLE CAL . NOTE Normally the option TX and RX CABLE CAL is used so both the TX and RX cable configurations are calibrated. The TX CABLE CAL and RX CABLE CAL options are used only if one of the cable configurations needs to be calibrated.
3	Click the OK button. A Directions pop-up is displayed for each step of the cable calibration.
4	Follow the directions displayed for each step. A status report window is displayed with the results of the cable calibration.
5	Click on OK to close the status report window.

Test Cable Calibration – continued

Figure 7-14: Cable Calibration Test Setup

SUPPORTED TEST SETS

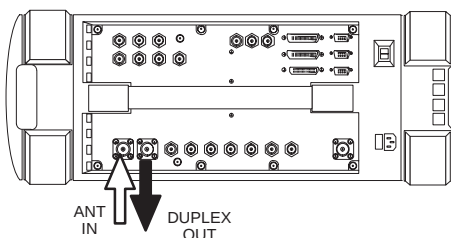
Motorola CyberTest



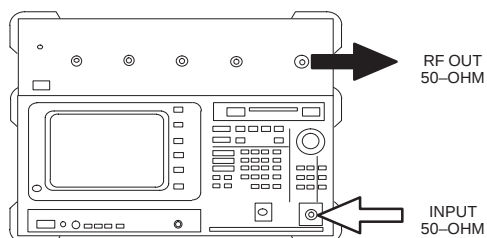
Note: The Directional Coupler is not used with the CyberTest Test Set. The TX cable is connected directly to the CyberTest Test Set.

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

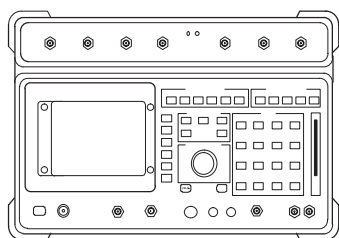
Hewlett-Packard Model HP 8935



Advantest Model R3465



Hewlett-Packard Model HP 8921A

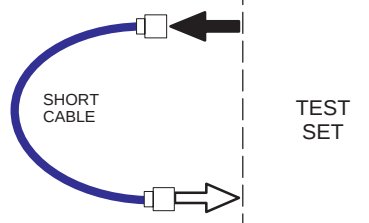


Note: For 800 MHz only. The HP8921A cannot be used to calibrate cables for PCS frequencies.

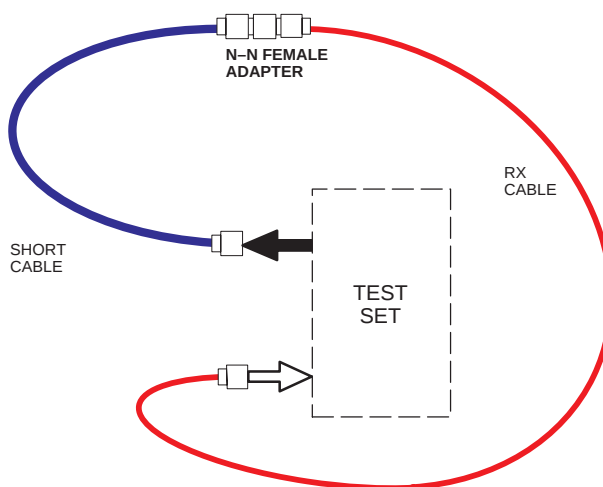
FW00089

CALIBRATION SET UP

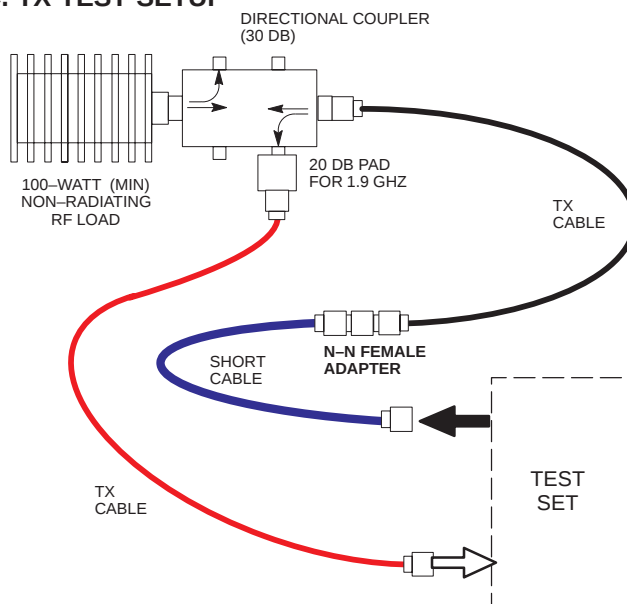
A. SHORT CABLE CAL



B. RX TEST SETUP



C. TX TEST SETUP



Create CAL File

Overview

Use this procedure to create a CAL file for the Calibration audit. You must do this procedure before the RF path audit.

Create CAL File

The Create CAL File function gets the BLO data from the MAWI and creates/updates the CAL file for the BTS. If a CAL file does not exist, a new one is created. If a CAL file already exists, it is updated. The BTS is calibrated at the factory and normally does not require calibration after installation, so you must use the Create CAL File function to create a CAL file since TX calibration is not performed.

NOTE

The Create CAL File function only applies to selected (highlighted) MAWIs.

NOTE

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

Prerequisites

The following must be done before you run this test:

- The MAWI has the correct code load and data load.
- The MAWI is INS.
- The LMF is logged on to the BTS.

Procedure

Use the following procedure in Table 7-25 to create a CAL file.

Table 7-25: Create CAL File	
Step	Action
1	Log on to the BTS if you have not already done so.
2	Select the MAWI.
3	Click on the Device menu.
4	Click on the Create Cal File menu item. The status report window displays the results of the action.
5	Click OK .

NOTE

The `bts-#.cal` is located in the `wlmf\cdma\bts-#` folder (where # is the number of the BTS).

RF Path Audit

Test Equipment Setup

The BTS RF path is calibrated in the factory. There is no need to calibrate during installation.



IMPORTANT

All tests are measured with respect to the Antenna output connector. Additional losses must be compensated for. RF calibration does not take the following into consideration:

- Antenna feedline losses.
- Antenna gain.

Transmit (TX) Audit

Prerequisites

The following steps must be completed before you do the TX RF path audit.

1. MAWI has correct code load and data load.
2. MAWI is INS.
3. Test equipment and test cables are calibrated and connected to the TX antenna outputs.
4. LMF is logged into the BTS.

Procedure

Follow the steps in Table 7-26 to audit the calibration.



CAUTION

To prevent damage to the test equipment all transmit (TX) test connections must be via the 30 dB in-line attenuator for the MicroCell BTS.

NOTE

The TX audit actions can be performed separately by using the applicable **Device** menu selections.

Table 7-26: RF Path Audit

Step	Action
1	Configure test equipment for TX path calibration according to NO TAG.
2	Select the MAWI. Select Tests>All Cal/Audit .
3	Type the appropriate channel number in the Carrier n Channels box.
4	Click OK .
5	Follow the cable connection directions as they are displayed. The test results will be displayed in the status report window.
6	Click OK to close the status report widow.

Acceptance Tests

TX Test Objective

The following tests will verify the TX antenna path. Output power control will also be verified. All tests will be performed using the power meter and communication test set. Measurements will be via the Antenna A (Picocell) and Antenna B (Microcell) connectors.

NOTE

You must remove the antenna cables before you perform the ATP.

The BTS is keyed up to generate a CDMA carrier at 31 dBm for MicroCell and 17 dBm for PicoCell.

TX Tests to be Performed

The following TX tests will be performed to verify the CDMA Forward Link.

Near band & in band spurious emissions and occupied bandwidth

You will verify that the transmitted CDMA carrier waveform generated meets the Spurious Emissions specification (transmit spectral mask and Occupied Bandwidth as defined in ARIB STD-T53) with respect to either a pre-determined test pattern or test pattern generated by using assigned cdf file values.

- +/- **750 kHz** from center frequency to +/- **1980 kHz** from center frequency – at least **-45 dBc**
- +/- **1980 kHz** from center frequency and out – at least **-60 dBc**
- all near band and out of band spurious emissions are verified to be less than or equal to **-60 dBc** relative to reference power (measured previously as total power).

Waveform quality (Rho) and pilot time tolerance (offset)

You will verify that the transmitted Pilot channel waveform quality (rho) exceeds the minimum specified value in ARIB STD T53. *Rho* represents the correlation between actual and perfect CDMA modulation spectrum. 1.0000 represents 100% (or perfect correlation).

- Waveform quality (Rho) should be > **0.912 (-0.4 dB)**.

The Pilot Time Tolerance (Offset) is the difference between the CDMA analyzer measurement interval (based on the BTS system time reference) and the incoming block of transmitted data from the BTS (Pilot only, Walsh code 0)

- Pilot Time Tolerance (Offset) should be < **10 uS**. (< **3 uS** typical)

CDMA carrier frequency verification

You will verify the frequency of the transmitted CDMA carrier signal to be within ± 0.05 ppm.

Code domain power noise, pilot power, and total power

You will verify that the code domain noise floor of all unused Walsh codes within the CDMA spectrum measures **< -27 dB** (with respect to total power). Pilot power will be verified to measure **-7.04 dB +/-0.5 dB** (with respect to standard test patterns). Total power will be verified to measure **+2/-4 dB** (with respect to CDF specific file parameters).

BTS frequency accuracy

BTS frequency accuracy can be verified manually during normal operation by monitoring the 19.6608 MHz reference (19 MHz) from the Diagnostic Access Area. A frequency counter with an accuracy of +/- 0.005 ppm can be used to check the BTS frequency accuracy.

RX Test Objective

The following test will verify the RX antenna path(s).

All tests will be performed using the communication test set. Measurements will be via the Antenna A (Microcell and Picocell) and Antenna B (Microcell) connectors.

RX Test to be Performed

The following RX test will be performed to verify the CDMA Reverse Link.

BTS RX sensitivity/frame erasure rate

The default test verifies the BTS sensitivity on all Traffic Channel elements (fullrate at 1% FER) at an RF input level of -117 dBm on the RX antenna path.

NOTE

There are no pass/fail criteria associated with FER readings taken at level below -117 dBm; other than to verify that the FER measurement reflects changes in RX input signal level.

CDMA Operating Frequency Programming Information – North American PCS Bands

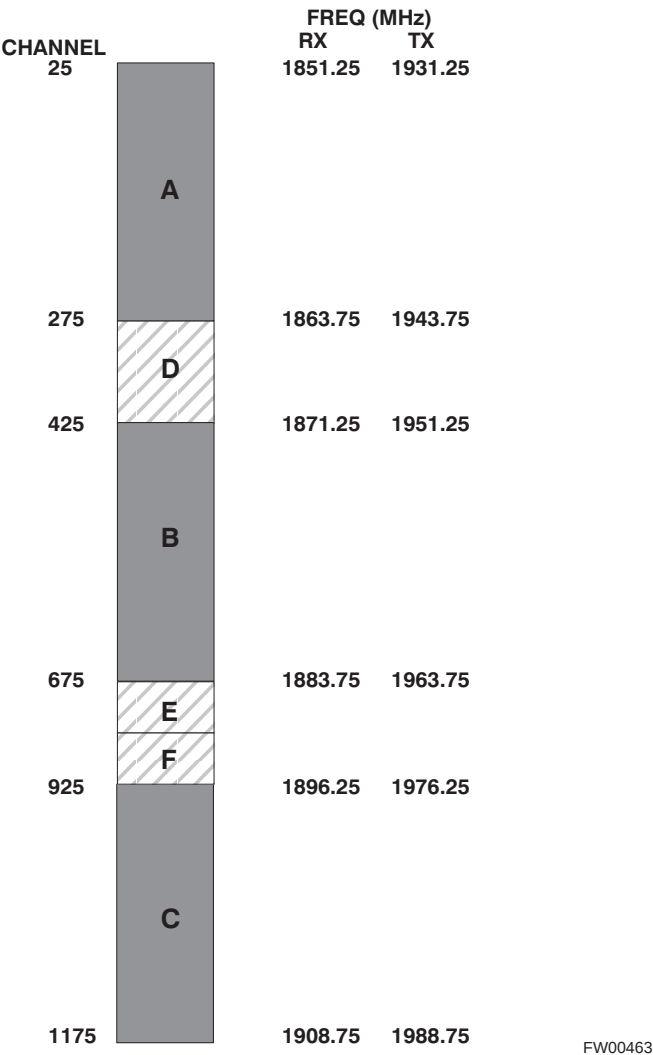
Introduction

The following tables show each of the valid operating channels for North American PCS Bands and their corresponding transmit and receive frequencies.

1900 MHz PCS Channels

Figure 7-15 shows the valid channels for the North American PCS 1900 MHz frequency spectrum. There are 10 CDMA wireline or non-wireline band channels used in a CDMA system (unique per customer operating system).

Figure 7-15: North America PCS Frequency Spectrum (CDMA Allocation)



CDMA Operating Frequency Programming Information – North American PCS Bands – continued

Calculating 1900 MHz Center Frequencies

Table 7-27 shows selected 1900 MHz CDMA candidate operating channels, listed in both decimal and hexadecimal, and the corresponding transmit, and receive frequencies. Center frequencies (in MHz) for channels not shown in the table may be calculated as follows:

- $TX = 1930 + 0.05 * \text{Channel\#}$
Example: Channel 262
 $TX = 1930 + 0.05 * 262 = 1943.10 \text{ MHz}$
- $RX = TX - 80$
Example: Channel 262
 $RX = 1943.10 - 80 = 1863.10 \text{ MHz}$

Actual frequencies used depend on customer CDMA system frequency plan.

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

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

Table 7-27: 1900 MHz TX and RX Frequency vs. Channel

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

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CDMA Operating Frequency Programming Information – North American PCS Bands – continued

Table 7-27: 1900 MHz TX and RX Frequency vs. Channel

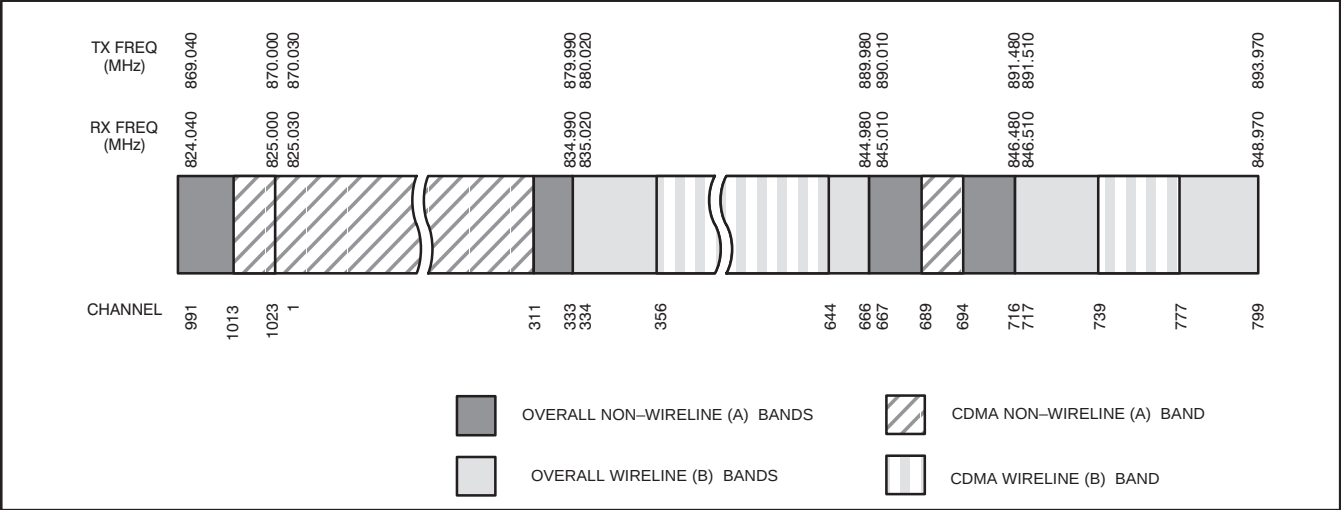
Channel Number		Transmit Frequency (MHz)	Receive Frequency (MHz)
Decimal	Hex	Center Frequency	Center Frequency
600	0258	1960.00	1880.00
625	0271	1961.25	1881.25
650	028A	1962.50	1882.50
675	02A3	1963.75	1883.75
700	02BC	1965.00	1885.00
725	02D5	1966.25	1886.25
750	02EE	1967.50	1887.50
775	0307	1968.75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

CDMA Operating Frequency Programming Information – North American PCS Bands – continued

800 MHz CDMA Channels

Figure 7-16 shows the valid channels for the North American cellular telephone frequency spectrum. There are 10 CDMA wireline or non-wireline band channels used in a CDMA system (unique per customer operating system).

Figure 7-16: North American Cellular Telephone System Frequency Spectrum (CDMA Allocation).



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Calculating 800 MHz Center Frequencies

Table 7-28 shows selected 800 MHz CDMA candidate operating channels, listed in both decimal and hexadecimal, and the corresponding transmit, and receive frequencies. Center frequencies (in MHz) for channels not shown in the table may be calculated as follows:

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

Table 7-28: 800 MHz TX and RX Frequency vs. Channel			
Channel Number		Transmit Frequency (MHz)	Receive Frequency (MHz)
Decimal	Hex	Center Frequency	Center Frequency
1	0001	870.0300	825.0300
25	0019	870.7500	825.7500

... continued on next page

CDMA Operating Frequency Programming Information – North American PCS Bands – continued

Table 7-28: 800 MHz TX and RX Frequency vs. Channel

Channel Number Decimal Hex		Transmit Frequency (MHz) Center Frequency	Receive Frequency (MHz) Center Frequency
50	0032	871.5000	826.5000
75	004B	872.2500	827.2500
100	0064	873.0000	828.0000
125	007D	873.7500	828.7500
150	0096	874.5000	829.5000
175	00AF	875.2500	830.2500
200	00C8	876.0000	831.0000
225	00E1	876.7500	831.7500
250	00FA	877.5000	832.5000
275	0113	878.2500	833.2500
300	012C	879.0000	834.0000
325	0145	879.7500	834.7500
350	015E	880.5000	835.5000
375	0177	881.2500	836.2500
400	0190	882.0000	837.0000
425	01A9	882.7500	837.7500
450	01C2	883.5000	838.5000
475	01DB	884.2500	839.2500
500	01F4	885.0000	840.0000
525	020D	885.7500	840.7500
550	0226	886.5000	841.5000
575	023F	887.2500	842.2500
600	0258	888.0000	843.0000
625	0271	888.7500	843.7500
650	028A	889.5000	844.5000
675	02A3	890.2500	845.2500
700	02BC	891.0000	846.0000
725	02D5	891.7500	846.7500
750	02EE	892.5000	847.5000
775	0307	893.2500	848.2500
NOTE Channel numbers 778 through 1012 are not used.			
1013	03F5	869.7000	824.7000
1023	03FF	870.0000	825.0000

TX & RX Acceptance Tests

TX ATP Test

Refer to Table 7-29 to perform a TX ATP test. This procedure assumes that the site specific CDF file is in the `wlmf\cdma\bts-#` folder.

The **ALL TX** list performs the following ATP tests:

1. TX Mask
2. Rho
3. Pilot Time Offset
4. Code Domain Power

Prerequisites

You must successfully complete all the procedures outlined in previous chapters before you attempt to run an ATP.

Table 7-29: TX Acceptance Test Outline

Step	Action
1	Set up test equipment for TX tests per Figure 7-17 or Figure 7-18.
2	Perform the following to run TX Acceptance Tests: – Select the MAWI. – Click on the Tests menu – Select ALL TX. * IMPORTANT The DPLL must be tracking either GPS or HSO.

TX Tests Using Backup Synchronization (Sites Equipped With GPS)

Follow the steps in Table 7-30 to perform the TX test using backup synchronization.

Table 7-30: TX Test Using Backup Synchronization

Step	Action
1	If logged into the BTS with the LMF, then logout.
2	Open an MMI Communication session.
3	Verify that the BTS is in OOS_RAM status by entering the status command.
4	Simulate an LMF connection by entering the sndtype 0xa178 command.
... continued on next page	

Table 7-30: TX Test Using Backup Synchronization

Step	Action
5	At the MMI prompt, enter dp1l_info and verify that GPS and HSO are good reference sources. Observe the following typical response: <pre>current dp1l task state info: dp1l task state: DPLL_LOCKED global cdma time: enabled local cdma time: disabled Reference Ref_Status Ref_select Even_select(DPLL's Ref source) GPS TRUE TRUE TRUE HSO TRUE FALSE FALSE FREERUN FALSE FALSE FALSE 2SEC FALSE FALSE FALSE</pre> The Ref_Status for the GPS and HSO must be TRUE. The Ref_select must be TRUE and FALSE for the GPS and HSO, respectively.
6	Verify that the HSO takes over for the GPS by simulating a failure of the GPS through software. Simulate the GPS losing all tracked satellites by entering the gps_rx_debug nosats on command at the MMI prompt. Observe the following typical response: <pre>FM: #2716 Ticks=00140aab pc=08137df4 nid=30003004 org=6 info=09e200270000 file=gps_misc.c line=3904 send gps no sats SET -seeing no tracked sats.</pre>
7	At the MMI prompt, enter dp1l_info and verify that the BTS is now using the HSO as the primary reference source. The Ref_select must be FALSE and TRUE for the GPS and HSO, respectively.
8	Enter the dp1l_status command to display the current state of the DPLL. Observe the following typical response. <pre>Current source set to: HSO reference DPLL control task state: DPLL track DPLL status (not valid if using even sec src): c:6CD6 off: -9697314,25154,8669797 TK Mode cntr: 60 ip: 3, iq: -9 aip1: 9, aiq1: 4 aip2: 6, aiq2: -2 tip: 3, tiq: -9 integrator: -2511864</pre>
9	Verify that the DPLL is “tracking” the HSO. The Current source set to field should read HSO reference. The DPLL control task state field should read DPLL track.
10	Exit the MMI communication session and login to the BTS with the LMF.
11	Under the JCdma menu, perform the JCdma Carrier and Jcdma PtOff tests to verify that the BTS passes using the HSO as the backup synchronization source.
12	Logout of the BTS.

... continued on next page

TX & RX Acceptance Tests – continued

Table 7-30: TX Test Using Backup Synchronization

Step	Action
13	If logged into the BTS with the LMF, then logout.
14	Open an MMI Communication session.
15	Verify that the BTS is in OOS_RAM status by entering the status command.
16	Simulate an LMF connection by entering the sndtype 0xa178 command.
17	Disable the simulation of the GPS losing tracked satellites by entering the gps_rx_debug nosats off command at the MMI prompt. NOTE The gps_rx_debug command simulates the “No Satellites Tracked” condition. In reality, the receiver is tracking satellites. However, the software is masking that information. Be sure to turn off the “No Satellites” condition after completing this test.
18	Follow the procedure in Table 7-9 (Synchronization Verification) to insure the BTS is tracking the RGPS.

RX ATP Test

Refer to Table 7-31 to perform an RX ATP test. This procedure assumes that the site specific CDF file is in the `wlmf\cdma\bts-#` folder.

Table 7-31: RX ATP Test

Step	Action
1	Set up test equipment per Figure 7-19 or Figure 7-20.
2	Terminate diversity RX antenna inputs on FRU.
3	Enter the following commands to run the RX Acceptance Tests. – Select the MAWI. – Click on the Tests menu. – Select ALL RX. NOTE The LMF refers to the antennas as Main and Diversity. On a Microcell, the Main is Antenna B and the Diversity is Antenna A. On a Picocell, the Main is Antenna A and there is no Diversity or Antenna B. NOTE Select Both in the RX Branch pick list if a diversity antenna is used.

TX & RX Acceptance Tests – continued

Figure 7-17: TX ATP Setup (CyberTest, HP 8935 and Advantest R3465)

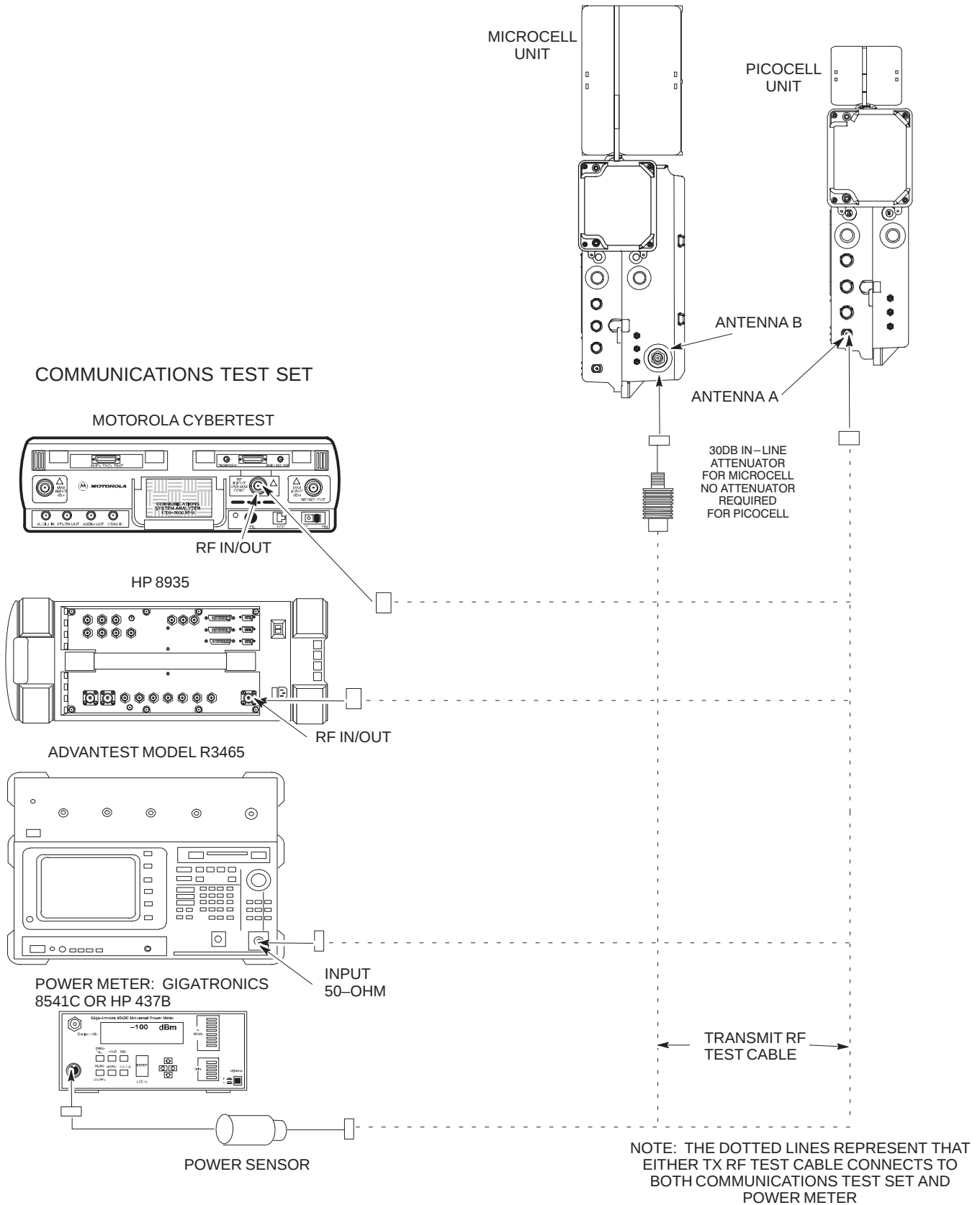


Figure 7-18: TX ATP Setup (HP 8921A)

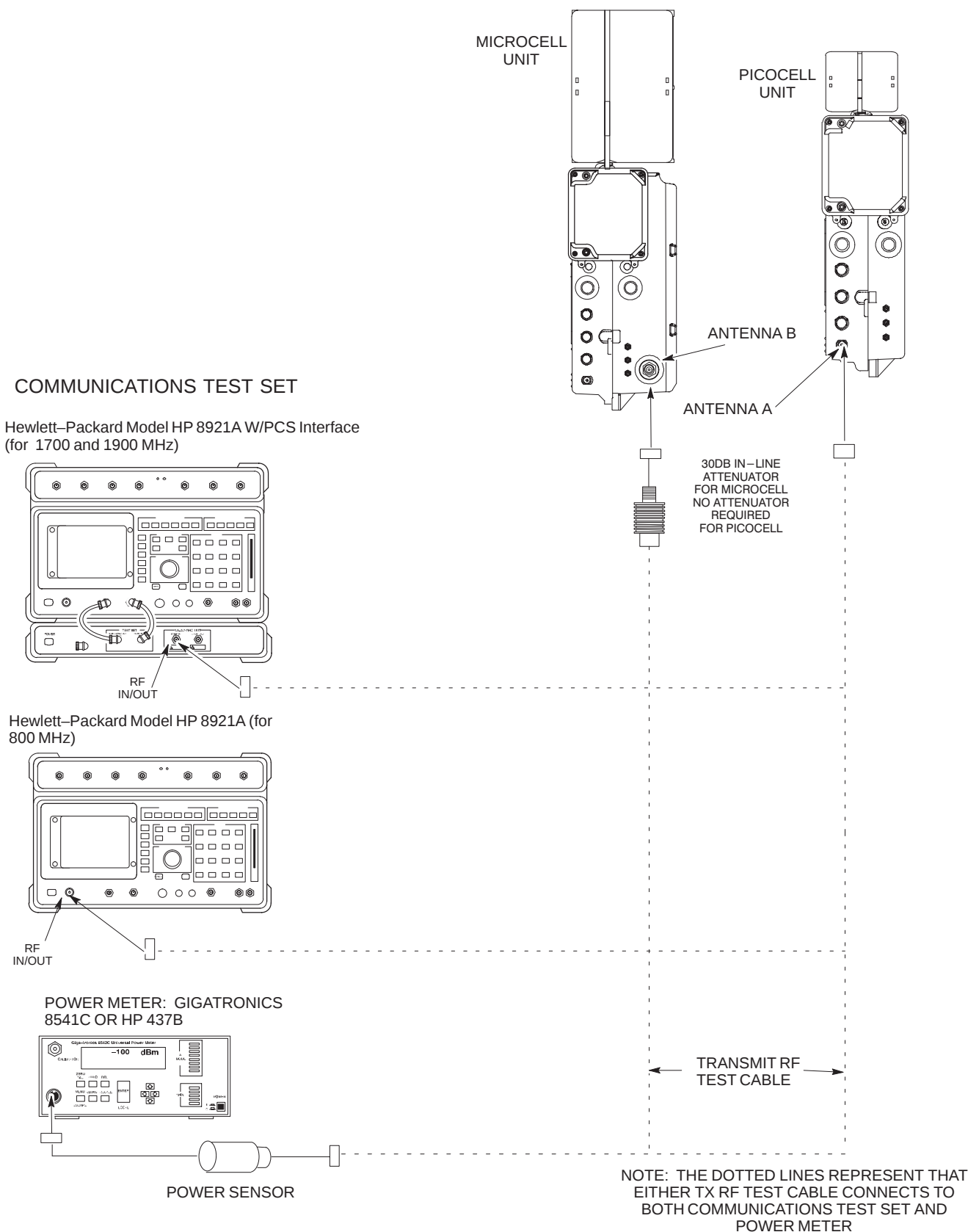


Figure 7-19: RX ATP Setup (CyberTest, HP 8935 and Advantest)

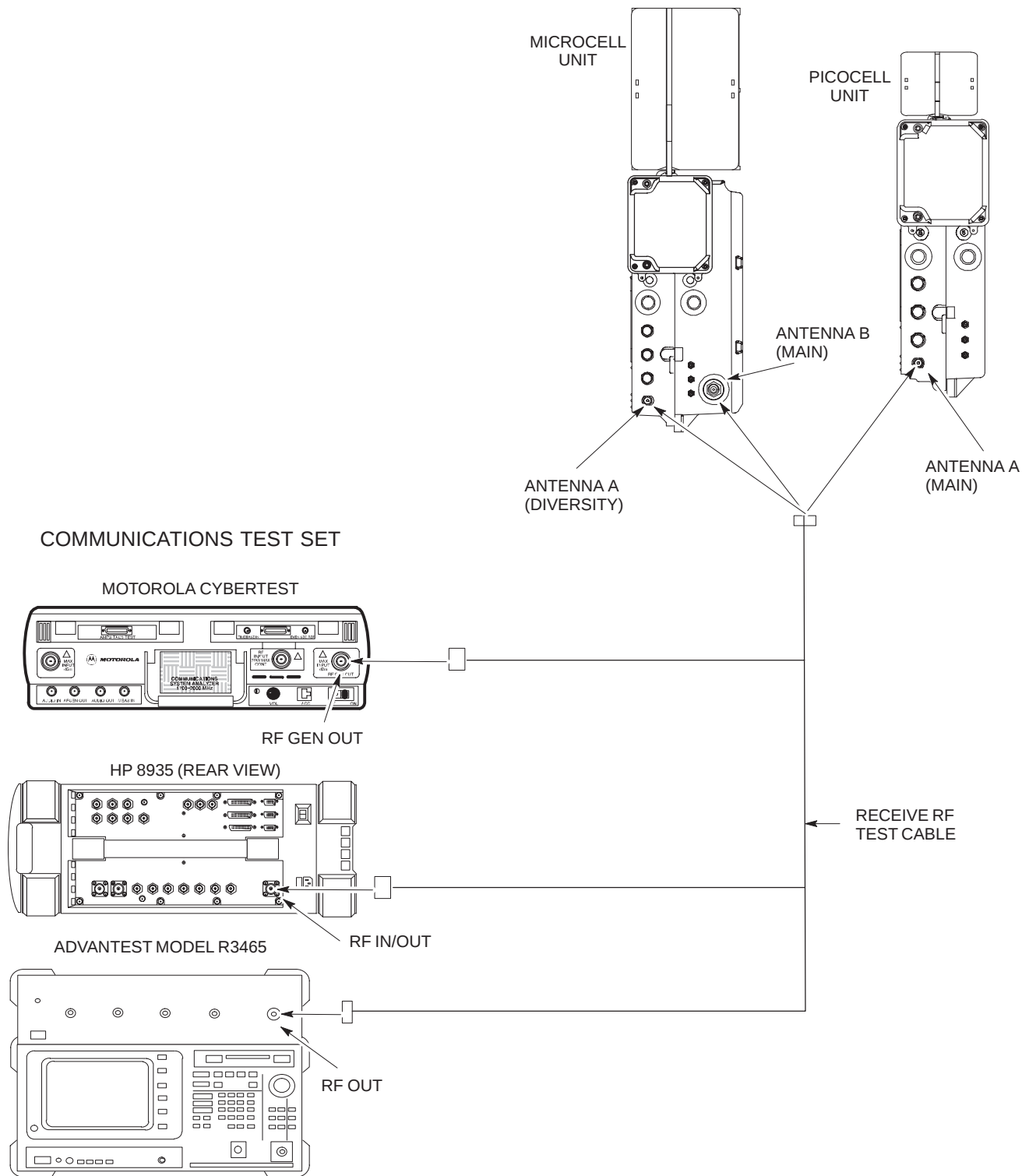
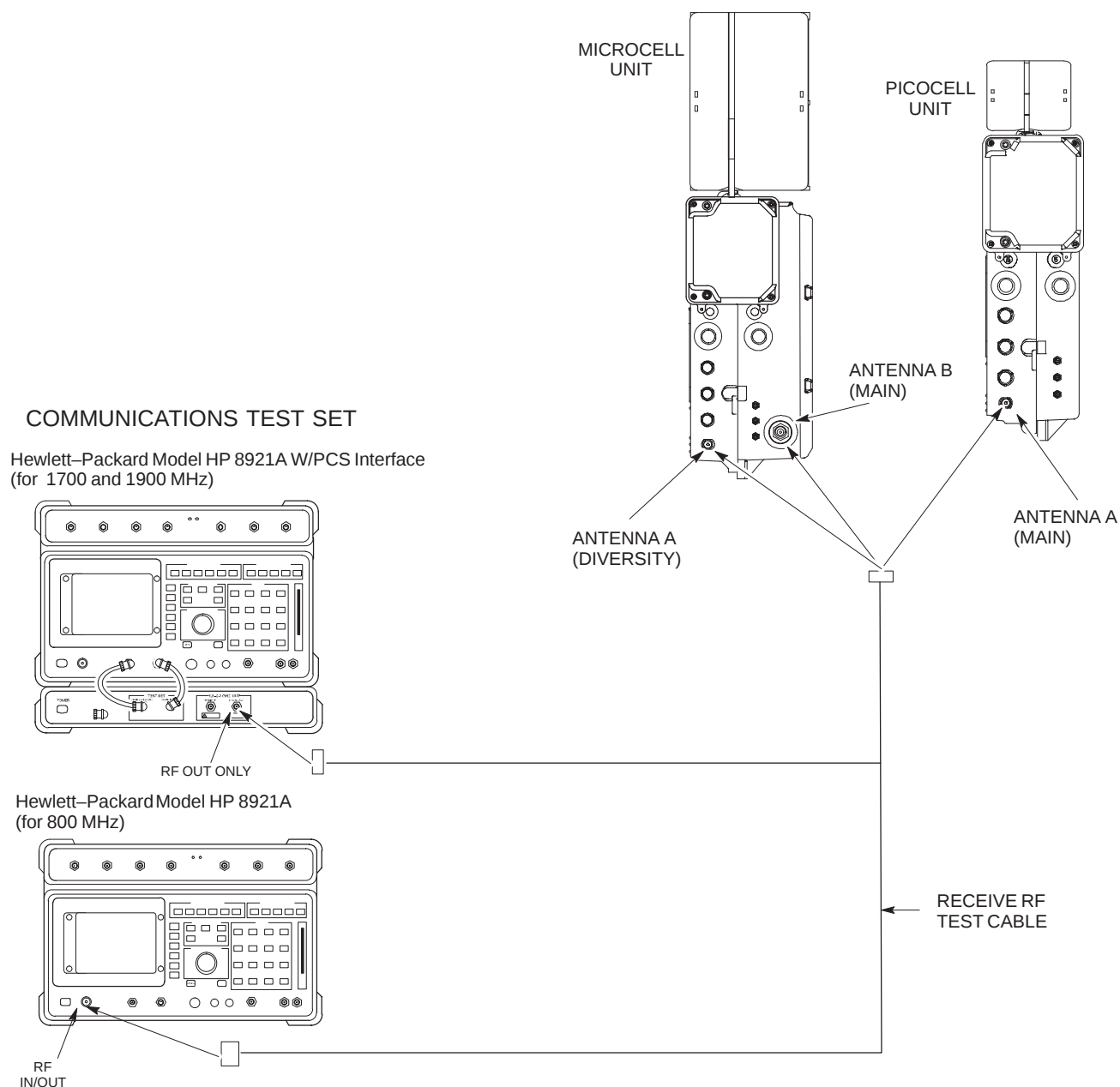


Figure 7-20: RX ATP Setup (HP 8921A)



Generate an ATP Report

Background

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

ATP Report

A separate report is created for each BTS and includes the following for each test:

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

Follow the procedures in Table 7-32 to view and create a printable file for the ATP report of a BTS.

Table 7-32: Generate an ATP Report

Step	Action
1	Click on the Login tab if it is not in the forefront.
2	Select the desired BTS from the Available Base Stations pick list.
3	Click on the Report button.
4	Start the report if desired by clicking on a column heading.
5	Click on the Dismiss button if you do not want to create a printable file copy.
6	To create a printable file, select the desired file type in the picklist and then click on the Save button.

NOTE

Refer to the LMF help screens, or the *CDMA LMF Operator's Guide*, 68P64114A21, for information on how to print an ATP report.

Copy LMF CAL File to CBSC

Overview

After you perform the ATP you must move a copy of the CAL file for the BTS from the LMF to the CBSC. This is normally done by putting a copy of the CAL file on a floppy disk and then using the floppy disk to move the CAL file to the CBSC.

Prerequisites

You must complete the following steps before you copy the LMF CAL file to the CBSC:

- A DOS formatted 1.44 MB 3 1/2-in. floppy disk is necessary to do this procedure.
- The ATP and Audit procedures have successfully been performed.
- The Create CAL File procedure was performed.
- You logged out of the BTS.

Copying CAL Files from LMF to a Diskette

Follow the procedure in Table 7-33 to copy CAL files from an LMF computer to a 3.5 diskette.

Table 7-33: Copy Files from LMF to a Diskette	
Step	Action
1	Insert a diskette into your Windows A: drive.
	NOTE If your diskette has not been formatted, format it using Windows. The diskette must be DOS formatted before copying any files. Consult your Windows/DOS documentation or online help on how to format diskettes.
2	Click on the bold Start button to launch the Windows Explorer program from your Programs menu list.
3	Click on your C: drive
4	Double click on the wlmf folder.
5	Double-click on the CDMA folder
6	Double click on the bt s-# folder for the file you want to copy.
7	Drag the file (for example, BTS-#.cal, BTS-#.txt, BTS-#.htm, BTS-#.xls) to the 3-1/2-in. floppy (A:) icon on the top left of the screen and release the mouse button.
8	Repeat step 6 and 7 until you have copied each file desired and close the Windows Explorer program by selecting Close from the File menu option.

Copy LMF CAL File to CBSC – continued

Copying CAL Files from Diskette to the CBSC

Follow the procedures in Table 7-34 to copy CAL file from a diskette to the CBSC.

Table 7-34: Copying CAL Files from Diskette to the CBSC

Step	Action
1	Log in to the CBSC on the OMC–R Unix workstation using your account name and password.
2	Place your diskette containing calibration file(s) in the workstation diskette drive.
3	Type in <code>eject -q</code> and press the Enter key.
4	Type in <code>mount</code> and press the Enter key. NOTE • Check to see that the message <code>floppy/no_name</code> is displayed on the last line. • If the eject command was previously entered, <code>floppy/no_name</code> will be appended with a number. Use the explicit <code>floppy/no_name</code> reference displayed.
5	Type in <code>cd /floppy/no_name</code> and press the Enter key.
6	Type in <code>ls -lia</code> and press the Enter key. Verify that the <code>bts-#.cal</code> file is on the diskette.
7	Type in <code>cd</code> and press the Enter key.
8	Type in <code>pwd</code> and press the Enter key. Verify you are in your home directory (<code>/home/<name></code>).
9	With <i>Solaris versions of Unix</i> , create a Unix-formatted version of the <code>bts-#.cal</code> file in your home directory by entering the following command: <code>dos2unix /floppy/no_name/bts-#.cal bts-#.cal</code> and press the Enter key (where <code>#</code> is BTS number). NOTE Other versions of Unix do not support the <code>dos2unix</code> command. In these cases, use the Unix <code>cp</code> (copy) command. The <i>copied</i> files will contain DOS line feed characters which must be edited out with a Unix text editor.
10	Type in <code>ls -l *.cal</code> and press the Enter key. Verify the cal files have been copied.
11	Type in <code>eject</code> and press the Enter key.
12	Remove the diskette from the workstation.

Prepare to Leave the Site

Removing External Test Equipment

Perform the procedure in Table 7-35 to disconnect the test equipment and prepare the BTS for active service.

Table 7-35: Remove External Test Equipment

Step	Action
1	Disconnect all test equipment from the antenna connectors on the BTS.
2	Reconnect and visually inspect all antenna feed lines on the BTS.
3	Disconnect all test equipment from the diagnostic access area.

Reset and Initialize Site Remotely

The BTS should not be left with data and code loaded from the CDMA LMF. The configuration data and code loads used for normal operation could be different from those stored in the CDMA LMF files. By resetting the BTS, the required data and code can be loaded from the CBSC when spans are again active.

To reset the BTS and have the OMCR/CBSC bring up the site remotely, perform the procedure in Table 7-36.

Table 7-36: Reset BTS and Remote Site Initialization

Step	Action
1	Terminate the CDMA LMF session by following the procedures in Table 7-38.
2	Use the AC and DC power breakers to cycle BTS power off and on.
3	Notify the OMCR/CBSC to take control of the site and download code and data to the BTS.
4	Verify the CBSC can communicate with the MAWI.

Bringing BTS into Service with the CDMA LMF



IMPORTANT

Whenever possible, have the OMCR/CBSC enable the BTS.

If code and/or data could not be loaded remotely from the OMCR/CBSC, follow the steps outlined in Table 7-37 *as required* to bring the BTS from the OOS to INS mode.

Table 7-37: Bring BTS into Service

Step	Action
1	On the CDMA LMF, select the MAWI.
2	Click on Device from the menu bar.
3	Click on Enable from the Device menu. A status report window is displayed.
4	Click Cancel to close the transceiver parameters window, if applicable.
5	Click OK to close the status report window. The selected devices that successfully change to INS change color to green.

Terminating LMF Session/Removing Terminal

Perform the procedure in Table 7-38 to terminate the LMF session and remove the CDMA LMF computer.

Table 7-38: Remove LMF

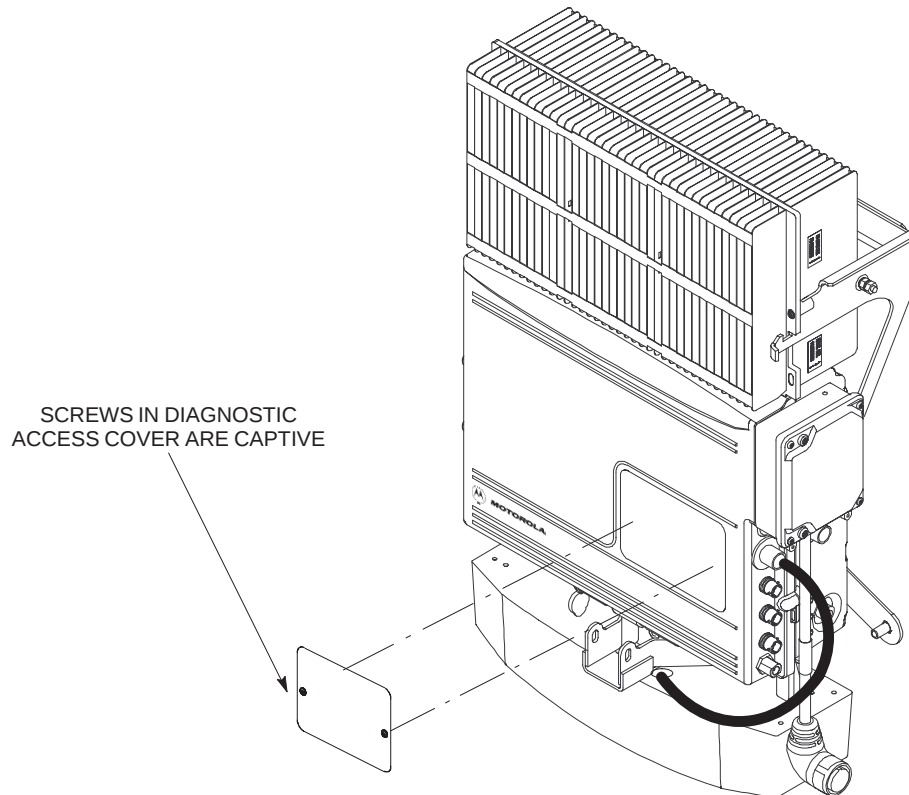
Step	Action
	! CAUTION Do not power down the CDMA LMF terminal without performing the procedure below. Corrupted/lost data files may result.
1	Log out of all BTS sessions and exit CDMA LMF by clicking on the File selection in the menu bar and selecting Exit from the File menu list.
2	Click Yes in the Confirm Logout pop-up message which appears.
3	In the Windows Task Bar, click Start and select Shutdown .
4	Click Yes when the Shut Down Windows message appears.
5	Wait for the system to shut down and the screen to go blank.
6	Disconnect the CDMA LMF terminal serial cable from the BTS.
7	Disconnect the CDMA LMF terminal serial port, the RS-232-IEEE488 converter and the GPIB cables as required for equipment transport.

Prepare to Leave the Site – continued

Replace Diagnostic Access Cover

Use a T20 Torx tamper bit to tighten the two tamper-resistant M4 screws holding the cover. Torque to 10 in-lb. Refer to Figure 7-21.

Figure 7-21: How To Replace The Diagnostic Access Cover (Microcell shown)



Replace Solar Cover

Replace the solar cover. Refer to the “Powering on Unit and Mounting the Solar Cover” procedure in Chapter 5.

Prepare to Leave the Site – continued

Notes

This image shows a single page of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting or typing. There are no margins, text, or other markings on the page.

Chapter 8: Optimization and Optional Acceptance Test Procedures (ATP) for Frequency Hopping Pilot Beacon (FHPB)

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Notes

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Overview

The purpose of this procedure is to outline the optimization and ATP procedure for a unit configured as a Frequency Hopping Pilot Beacon (FHPB).

This feature offers the ability to configure a standard SC300 MicroCell or PicoCell as a frequency hopping pilot beacon. The FHPB serves the same role in initiating mobile-assisted hard handoff as a conventional pilot beacon. However, the FHPB serves up to six carriers in a time division multiplexed fashion. This reduces the number of forward link transmitters required.

The SC300 FHPB serves as a Pilot Beacon only. It transmits a fixed list of overhead messages on the paging and synch channels. It does not carry traffic as a stand-alone entity.

The SC300 FHPB is configured, downloaded, initialized, maintained and diagnosed via the OMC-R. The FHPB cannot be configured by the LMF. The LMF can be used to download code and data, inspect FHPB parameters, and execute ATP test procedures.

The FHPB is connected to the OMC-R either via span line or by the multi-BTS configuration.

All the procedures in this chapter are to be performed with the BTS out of service or under LMF control. If necessary, refer to the “Shut Down and Restoring BTS Signaling” procedure in Chapter 7.

For a complete listing of the required tools and equipment, refer to the “ATP Tools and Equipment” list in Chapter 1.

FHPB ATP Prerequisites

You must complete the following ATP procedures before you do the FHPB ATP. Refer to the Optimization and Optional Acceptance Test Procedures (ATP) in Chapter 7 of this manual.

1. BTS preparation.
2. Connecting the LMF to the BTS.
3. Connecting test equipment to the BTS and LMF.
4. Establishing an MMI communications session.
5. Setting customer operating channel.
6. Synchronization verification.
7. Install LMF program and binaries.
8. Start LMF and log on to BTS.

Create CAL File

Overview

Use this procedure to create a CAL file for the Calibration audit. You must do this procedure before the RF path audit.

Create CAL File

The Create CAL File function gets the BLO data from the MAWI and creates/updates the CAL file for the BTS. If a CAL file does not exist, a new one is created. If a CAL file already exists, it is updated. The BTS is calibrated at the factory and normally does not require calibration after installation, so you must use the Create CAL File function to create a CAL file since TX calibration is not performed.

NOTE

The Create CAL File function only applies to selected (highlighted) MAWIs.

NOTE

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

Prerequisites

You must do the following steps before you run this test:

- The MAWI has the correct code load and data load.
- The MAWI is INS.
- The LMF is logged on to the BTS.

Procedure

Use the following procedure in Table 8-1 to create a CAL file.

Table 8-1: Create CAL File	
Step	Action
1	Log on to the BTS if you have not already done so.
2	Select the MAWI.
3	Click on the Device menu.
4	Click on the Create Cal File menu item. The status report window displays the results of the action.
5	Click OK .

NOTE

The `bts-#.cal` is located in the `wlmf\cdma\bts-#` folder (where # is the number of the BTS).

RF Path Audit

Test Equipment Setup

The BTS RF path is calibrated in the factory. There is no need to calibrate during installation.



IMPORTANT

All tests are measured with respect to the Antenna output connector. Additional losses must be compensated for. RF calibration does not take the following into consideration:

- Antenna feedline losses.
- Antenna gain.

Transmit (TX) Audit

Prerequisites

You must complete the following steps before you do the TX RF path audit:

1. MAWI has correct code load and data load.
2. MAWI is INS.
3. Test equipment and test cables are calibrated and connected to the TX antenna outputs.
4. LMF is logged into the BTS.

Procedure

Follow the steps in Table 8-2 to audit the calibration.



CAUTION

To prevent damage to the test equipment all transmit (TX) test connections must be via the 30 dB in-line attenuator for the MicroCell BTS.

NOTE

The TX audit actions can be performed separately by using the applicable **Device** menu selections.

Table 8-2: RF Path Audit	
Step	Action
1	Configure test equipment for TX path calibration according to NO TAG.
2	Select the MAWI. Select Tests>All Cal/Audit .
3	Type the appropriate channel number in the Carrier n Channels box.
4	Click OK .
5	Follow the cable connection directions as they are displayed. The test results will be displayed in the status report window.
6	Click OK to close the status report widow.

Acceptance Tests

TX Test Objective

The following tests will verify the TX antenna path. Output power control will also be verified. All tests will be performed using the power meter and communication test set. Measurements will be via the Antenna A (Picocell) and Antenna B (Microcell) connectors.

NOTE

You must remove the antenna cables before you perform the ATP.

The BTS is keyed up to generate a CDMA carrier at 31 dBm for MicroCell and 17 dBm for PicoCell.

TX Tests to be Performed

The following TX tests will be performed to verify the CDMA Forward Link.

Near band & in band spurious emissions and occupied bandwidth

You will verify that the transmitted CDMA carrier waveform generated meets the Spurious Emissions specification (transmit spectral mask and Occupied Bandwidth as defined in ARIB STD-T53) with respect to either a pre-determined test pattern or test pattern generated by using assigned cdf file values.

- +/- **750 kHz** from center frequency to +/- **1980 kHz** from center frequency – at least **-45 dBc**
- +/- **1980 kHz** from center frequency and out – at least **-60 dBc**
- all near band and out of band spurious emissions are verified to be less than or equal to **-60 dBc** relative to reference power (measured previously as total power).

Waveform quality (Rho) and pilot time tolerance (offset)

You will verify that the transmitted Pilot channel waveform quality (rho) exceeds the minimum specified value in ARIB STD T53. *Rho* represents the correlation between actual and perfect CDMA modulation spectrum. 1.0000 represents 100% (or perfect correlation).

- Waveform quality (Rho) should be > **0.912 (-0.4 dB)**.

The Pilot Time Tolerance (Offset) is the difference between the CDMA analyzer measurement interval (based on the BTS system time reference) and the incoming block of transmitted data from the BTS (Pilot only, Walsh code 0)

- Pilot Time Tolerance (Offset) should be < **10 uS**. (< **3 uS** typical)

CDMA carrier frequency verification

You will verify the frequency of the transmitted CDMA carrier signal to be within ± 0.05 ppm.

Code domain power noise, pilot power, and total power

You will verify that the code domain noise floor of all unused Walsh codes within the CDMA spectrum measures **< -27 dB** (with respect to total power). Pilot power will be verified to measure **-7.04 dB +/-0.5 dB** (with respect to standard test patterns). Total power will be verified to measure **+2/-4 dB** (with respect to CDF specific file parameters).

BTS frequency accuracy

BTS frequency accuracy can be verified manually during normal operation by monitoring the 19.6608 MHz reference (19 MHz) from the Diagnostic Access Area. A frequency counter with an accuracy of +/- 0.005 ppm can be used to check the BTS frequency accuracy.

TX Acceptance Tests

TX ATP Test

Refer to Table 8-3 to perform a TX ATP test. This procedure assumes that the site specific CDF file is in the `wlmf\cdma\bts-#` folder.

The **ALL TX** list performs the following ATP tests:

1. TX Mask
2. Rho
3. Pilot Time Offset
4. Code Domain Power

Prerequisites

Before attempting to run an ATP, all procedures outlined in previous chapters should have been successfully completed.

Table 8-3: TX Acceptance Test Outline

Step	Action
1	Set up test equipment for TX tests per NO TAG.
2	Perform the following to run TX Acceptance Tests: – Select the MAWI. – Click on the Tests menu – Select ALL TX. * IMPORTANT The DPLL must be tracking either GPS or HSO.

TX Tests Using Backup Synchronization (Sites Equipped With GPS)

Follow the steps in Table 8-4 to perform the TX test using backup synchronization.

Table 8-4: TX Test Using Backup Synchronization

Step	Action
1	If logged into the BTS with the LMF, then logout.
2	Open an MMI Communication session.
3	Verify that the BTS is in OOS_RAM status by entering the status command.
4	Simulate an LMF connection by entering the sndtype 0xa178 command.
... continued on next page	

Table 8-4: TX Test Using Backup Synchronization

Step	Action
5	At the MMI prompt, enter dp1l_info and verify that GPS and HSO are good reference sources. Observe the following typical response: <pre>current dp1l task state info: dp1l task state: DPLL_LOCKED global cdma time: enabled local cdma time: disabled Reference Ref_Status Ref_select Even_select(DPLL's Ref source) GPS TRUE TRUE TRUE HSO TRUE FALSE FALSE FREERUN FALSE FALSE FALSE 2SEC FALSE FALSE FALSE</pre> The Ref_Status for the GPS and HSO must be TRUE. The Ref_select must be TRUE and FALSE for the GPS and HSO, respectively.
6	Verify that the HSO takes over for the GPS by simulating a failure of the GPS through software. Simulate the GPS losing all tracked satellites by entering the gps_rx_debug nosats on command at the MMI prompt. Observe the following typical response: <pre>FM: #2716 Ticks=00140aab pc=08137df4 nid=30003004 org=6 info=09e200270000 file=gps_misc.c line=3904 send gps no sats SET -seeing no tracked sats.</pre>
7	At the MMI prompt, enter dp1l_info and verify that the BTS is now using the HSO as the primary reference source. The Ref_select must be FALSE and TRUE for the GPS and HSO, respectively.
8	Enter the dp1l_status command to display the current state of the DPLL. Observe the following typical response. <pre>Current source set to: HSO reference DPLL control task state: DPLL track DPLL status (not valid if using even sec src): c:6CD6 off: -9697314,25154,8669797 TK Mode cntr: 60 ip: 3, iq: -9 aip1: 9, aiq1: 4 aip2: 6, aiq2: -2 tip: 3, tiq: -9 integrator: -2511864</pre>
9	Verify that the DPLL is “tracking” the HSO. The Current source set to field should read HSO reference. The DPLL control task state field should read DPLL track.
10	Exit the MMI communication session and login to the BTS with the LMF.
11	Under the JCdma menu, perform the JCdma Carrier and Jcdma PtOff tests to verify that the BTS passes using the HSO as the backup synchronization source.
12	Logout of the BTS.
... continued on next page	

Table 8-4: TX Test Using Backup Synchronization

Step	Action
13	If logged into the BTS with the LMF, then logout.
14	Open an MMI Communication session.
15	Verify that the BTS is in OOS_RAM status by entering the status command.
16	Simulate an LMF connection by entering the sndtype 0xa178 command.
17	Disable the simulation of the GPS losing tracked satellites by entering the gps_rx_debug nosats off command at the MMI prompt. NOTE The gps_rx_debug command simulates the “No Satellites Tracked” condition. In reality, the receiver is tracking satellites. However, the software is masking that information. Be sure to turn off the “No Satellites” condition after completing this test.
18	Follow the procedure in Table 7-9 (Synchronization Verification) to insure the BTS is tracking the RGPS.

Generate an ATP Report

Background

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

ATP Report

A separate report is created for each BTS and includes the following for each test:

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

Follow the procedures in Table 8-5 to view and create a printable file for the ATP report of a BTS.

Table 8-5: Generate an ATP Report

Step	Action
1	Click on the Login tab if it is not in the forefront.
2	Select the desired BTS from the Available Base Stations pick list.
3	Click on the Report button.
4	Start the report if desired by clicking on a column heading.
5	Click on the Dismiss button if you do not want to create a printable file copy.
6	To create a printable file, select the desired file type in the picklist and then click on the Save button.

NOTE

Refer to the LMF help screens, or the *CDMA LMF Operator's Guide*, 68P64114A21, for information on how to print an ATP report.

Copy LMF CAL File to CBSC

Overview

After you perform the ATP you must move a copy of the CAL file for the BTS from the LMF to the CBSC. This is normally done by putting a copy of the CAL file on a floppy disk and then using the floppy disk to move the CAL file to the CBSC.

Prerequisites

You must do the following steps before you copy the LMF CAL file to the CBSC:

- A DOS formatted 1.44 MB 3 1/2-in. floppy disk is necessary to do this procedure.
- The ATP and Audit procedures have successfully been performed.
- The Create CAL File procedure was performed.
- You logged out of the BTS.

Copying CAL Files from LMF to a Diskette

Follow the procedure in Table 8-6 to copy CAL files from an LMF computer to a 3.5 diskette.

Table 8-6: Copy Files from LMF to a Diskette

Step	Action
1	Insert a diskette into your Windows A: drive.
	NOTE If your diskette has not been formatted, format it using Windows. The diskette must be DOS formatted before copying any files. Consult your Windows/DOS documentation or online help on how to format diskettes.
2	Click on the bold Start button to launch the Windows Explorer program from your Programs menu list.
3	Click on your C: drive
4	Double click on the wlmf folder.
5	Double-click on the CDMA folder
6	Double click on the bt s-# folder for the file you want to copy.
7	Drag the file (for example, BTS-#.cal, BTS-#.txt, BTS-#.htm, BTS-#.xls) to the 3-1/2-in. floppy (A:) icon on the top left of the screen and release the mouse button.
8	Repeat step 6 and 7 until you have copied each file desired and close the Windows Explorer program by selecting Close from the File menu option.

Copy LMF CAL File to CBSC – continued

Copying CAL Files from Diskette to the CBSC

Follow the procedures in Table 8-7 to copy CAL file from a diskette to the CBSC.

Table 8-7: Copying CAL Files from Diskette to the CBSC	
Step	Action
1	Log in to the CBSC on the OMC–R Unix workstation using your account name and password.
2	Place your diskette containing calibration file(s) in the workstation diskette drive.
3	Type in <code>eject -q</code> and press the Enter key.
4	Type in <code>mount</code> and press the Enter key. NOTE • Check to see that the message <code>floppy/no_name</code> is displayed on the last line. • If the eject command was previously entered, <code>floppy/no_name</code> will be appended with a number. Use the explicit <code>floppy/no_name</code> reference displayed.
5	Type in <code>cd /floppy/no_name</code> and press the Enter key.
6	Type in <code>ls -lia</code> and press the Enter key. Verify that the <code>bts-#.cal</code> file is on the diskette.
7	Type in <code>cd</code> and press the Enter key.
8	Type in <code>pwd</code> and press the Enter key. Verify you are in your home directory (<code>/home/<name></code>).
9	With <i>Solaris versions of Unix</i> , create a Unix-formatted version of the <code>bts-#.cal</code> file in your home directory by entering the following command: <code>dos2unix /floppy/no_name/bts-#.cal bts-#.cal</code> and press the Enter key (where <code>#</code> is BTS number). NOTE Other versions of Unix do not support the <code>dos2unix</code> command. In these cases, use the Unix <code>cp</code> (copy) command. The <i>copied</i> files will contain DOS line feed characters which must be edited out with a Unix text editor.
10	Type in <code>ls -l *.cal</code> and press the Enter key. Verify the cal files have been copied.
11	Type in <code>eject</code> and press the Enter key.
12	Remove the diskette from the workstation.

Notes

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Chapter 9: Field Replaceable Unit (FRU) Procedures

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Notes

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Field Replaceable Unit (FRU) Overview

Overview

The purpose of this chapter is to provide the Field Replaceable Unit (FRU) replacement procedures for the unit. Figure 9-1, Figure 9-2 and Figure 9-3 show the FRUs associated with the unit.

List of FRUs

The following is a list of FRUs for the unit:

1. Site I/O Junction Box with Primary Surge Suppressor – Kit T450AE
2. Site I/O Junction Box without Primary Surge Suppressor – Kit T450AA
3. RGPS Head – Kit T472AP
4. Short Duration Battery – Kit T348AE
5. Primary Surge Suppressor – Kit T449AA
6. AC Installation Box – Kit T449AB

PicoCell

1. A Band BTS with HSO – Kit SG1476AA
2. A Band BTS without HSO – Kit SG1477AA
3. B Band BTS with HSO – Kit SG1484AA
4. B Band BTS without HSO – Kit SG1485AA
5. Fin Cover – Kit T389AA

MicroCell

1. A Band BTS with HSO – Kit SG1478AA
2. A Band BTS without HSO – Kit SG1479AA
3. B Band BTS with HSO – Kit SG1486AA
4. B Band BTS without HSO – Kit SG1487AA
5. Solar Cover – Kit T451AA
6. Fin Cover – Kit T389AB

Figure 9-1: FRU Items

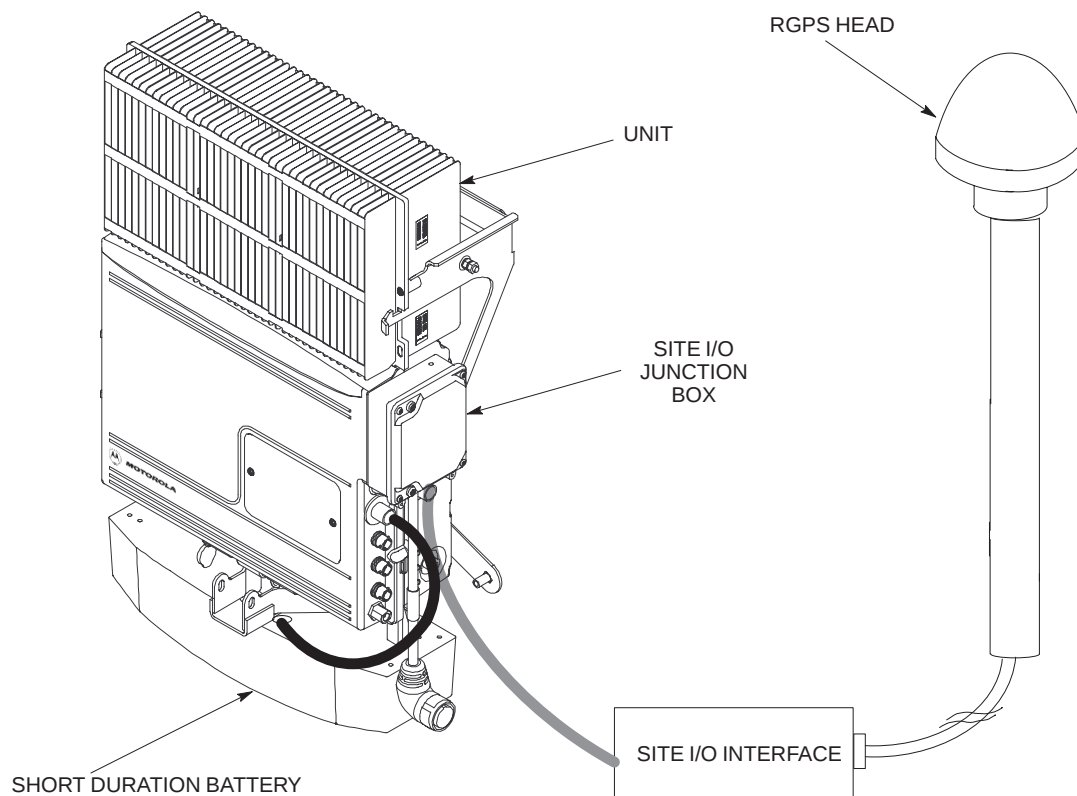


Figure 9-2: Front and Back Solar Covers for MicroCell

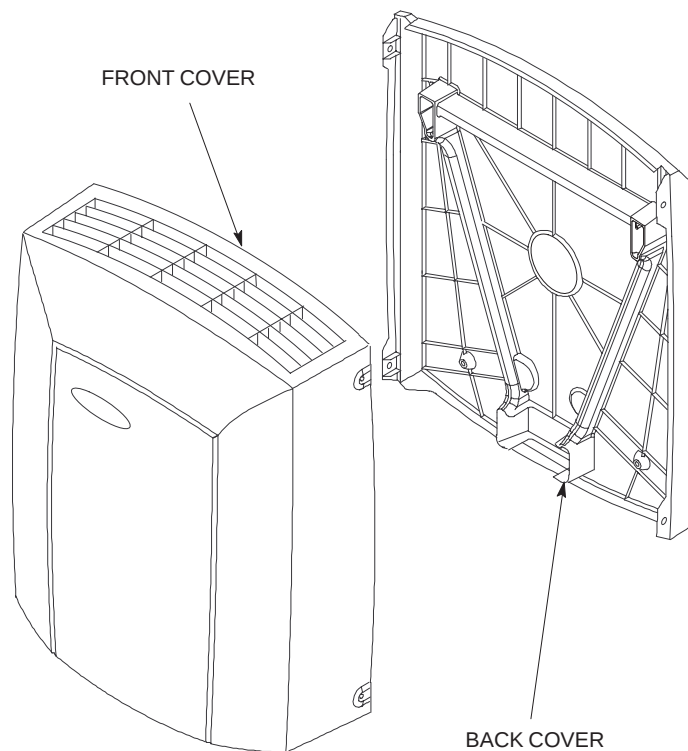
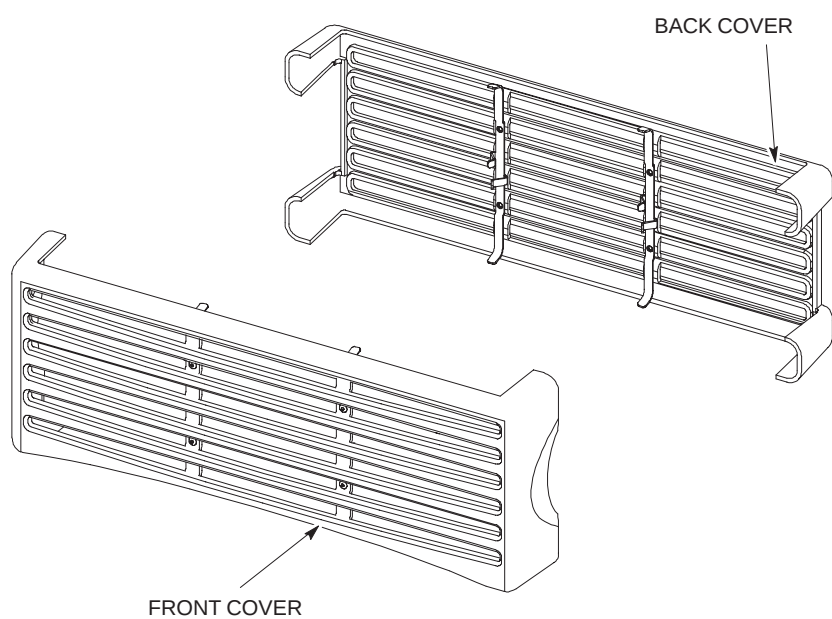


Figure 9-3: Front and Back Fin Covers for MicroCell and PicoCell (PicoCell shown)



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Shut Down & Restoring BTS Signaling

Overview

The FRU procedures require the shut down of BTS signalling functions.

Accessing the OMCR CLI window

The commands to manipulate the BTS in the following replacement procedure must be entered via UNO or OMCR (Operations and Maintenance Center – Radio).



IMPORTANT

Should there be any issues which affect CLI operations or the UNO/OMCR, this replacement procedure cannot be performed.

Accessing the OMCR CLI window

The commands used in the following replacement procedure in Table 9-1 are entered at the OMCR.

Table 9-1: Login and Access Alarm Window Procedure	
Step	Action
1	Login by entering the user name.
2	Enter the password at the system prompt.
3	Open an Alarm Manager window and an OMCR CLI window from the pull down menu using the mouse button.
4	Verify that the filter display is set to ALL. This is so that any alarms which may be encountered while installing the hardware can be observed and rectified.

Shut Down Signaling Functions

Table 9-2 contains steps for shutting down the signaling functions for the sector/site.

NOTE

The BTS acts like a single sector and all sector commands operate on the BTS carrier.



IMPORTANT

The **EDIT SECTOR REDIRECT** command does NOT affect calls in progress and will NOT move these calls to another sector/carrier. The command only prevents future calls from being originated on the targeted sector/carrier. If active call processing is still taking place in the target sector/carrier, it is advisable to wait for any active calls to terminate prior to disabling the sector.

Table 9-2: Shut Down Signaling Functions

Table 9-2: Shut Down Signaling Functions																																																																																																																			
Step	Action																																																																																																																		
1	Open a CLI window. Refer to Table 9-1.																																																																																																																		
2	Determine channel status of the MAWI prior to performing the following step by entering the following command: omc-000000>STATUS MAWI-<bts#>-<mawi#> ADD This command will display the busy overhead channels as well as any busy traffic channels.																																																																																																																		
3	* IMPORTANT Record the values shown in the following system display response. These values will be used to answer the prompts for the EDIT SECTOR REDIRECT command when restoring signaling operations at the end of the replacement procedure. View the status of the sector signaling redirect parameters for all carriers equipped for the sector by entering the following command at the prompt: omc-000000>DISPLAY SECTOR-<bts#>-<sector#> REDIRECT Observe the following <i>typical</i> system display response (this example shows initial standard values): <table><tr><td>CARRIER ID (bts-sector-carrier)</td><td>RETURN IF FAIL</td><td colspan="10">Access Overload Class Redirect Flags</td><td>ROTATE TIMER (SEC)</td><td>RECORD TYPE</td><td>EXP SID</td><td>IGNORE CDMA</td><td>SYS ORDERING</td></tr><tr><td>-----</td><td>-----</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>-----</td><td>-----</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>-----</td><td>-----</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td></tr><tr><td>CARRIER-1-1-1</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td></tr><tr><td>-----</td><td>-----</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td><td>N</td></tr></table>									CARRIER ID (bts-sector-carrier)	RETURN IF FAIL	Access Overload Class Redirect Flags										ROTATE TIMER (SEC)	RECORD TYPE	EXP SID	IGNORE CDMA	SYS ORDERING	-----	-----	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	-----	-----	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	-----	-----	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	CARRIER-1-1-1	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	-----	-----	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
CARRIER ID (bts-sector-carrier)	RETURN IF FAIL	Access Overload Class Redirect Flags										ROTATE TIMER (SEC)	RECORD TYPE	EXP SID	IGNORE CDMA	SYS ORDERING																																																																																																			
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Table 9-2: Shut Down Signaling Functions

Table 9-2: Shut Down Signaling Functions																																																																																																																																
Step	Action																																																																																																																															
4	NOTE This step edits the redirect parameters so that the Global Service Redirect Message broadcast on the paging channel redirects all subscribers away from the sector with the failed equipment and onto a different system. Enter the following command at the prompt: omc-0000000>EDIT SECTOR--<bts#>--<sector#> REDIRECT ! The system will prompt you to enter each command parameter value one at a time. Answer the prompts in the following order: <accolc0> enter Y, <accolc1> enter Y, ... <accolc15> enter Y (All Access Overload Classes <i>must</i> be set to yes to ensure that all subscribers are redirected.) <returniffail>, enter N (Must be set to no to ensure that subscribers do not return if redirect is unsuccessful.) <recordtype>, enter 4 (A value of four redirects subscribers to a JTACS analog site.) <expectedsid>, enter 13 (Use the Area ID the subscriber units should expect to find on the system they are being redirected to. This example uses 13.) <ignorecdma>, enter Y <sysordering>, enter CUSTOM (System ordering value does not matter because it is not used in JTACS systems.) <rotatetimer>, enter 4 (Call processing continuously rotates, circular right-shifts, the Y/N values of Access Overload Class Redirect Flags 0 to 9. Values are shifted one flag at the end of the timer period; then timer re-starts. Valid values are 0-255; 4 is default.) The system will display the command that will be sent. Verify the command syntax. omc-0000000>Accept [yes/no]? Enter Y to accept the command.																																																																																																																															
5	View the status of the sector signaling redirect parameters to verify that the sector is ready for maintenance. omc-0000000>DISPLAY SECTOR--<bts#>--<sector#> REDIRECT Ensure that the values in the system display response match the values input in step 4 (see example below). <table><tr><td>CARRIER ID (bts-sector-carrier)</td><td>RETURN IF FAIL</td><td colspan="10">Access Overload Class Redirect Flags</td><td>ROTATE TIMER (SEC)</td><td>RECORD TYPE</td><td>EXP SID</td><td>IGNORE CDMA</td><td>SYS ORDERING</td></tr><tr><td>-----</td><td>-----</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>-----</td><td>-----</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>-----</td><td>-----</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td></tr><tr><td>CARRIER-1-1-1</td><td>N</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td></tr><tr><td>-----</td><td>-----</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td></tr><tr><td>-----</td><td>-----</td><td>4</td><td colspan="10"></td><td>4</td><td>13</td><td>Y</td><td>CUSTOM</td></tr></table>									CARRIER ID (bts-sector-carrier)	RETURN IF FAIL	Access Overload Class Redirect Flags										ROTATE TIMER (SEC)	RECORD TYPE	EXP SID	IGNORE CDMA	SYS ORDERING	-----	-----	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	-----	-----	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	-----	-----	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	CARRIER-1-1-1	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-----	-----	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	-----	-----	4											4	13	Y	CUSTOM
CARRIER ID (bts-sector-carrier)	RETURN IF FAIL	Access Overload Class Redirect Flags										ROTATE TIMER (SEC)	RECORD TYPE	EXP SID	IGNORE CDMA	SYS ORDERING																																																																																																																
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CARRIER-1-1-1	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y																																																																																																																
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Table 9-2: Shut Down Signaling Functions

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Step	Action																																																														
6	View the existing congestion control parameters for all carriers equipped for the sector by entering the following command at the prompt: omc-000000>DISPLAY SECTOR-<bts#>-<sector#> CONGESTCONF Observe the following <i>typical</i> system display response: <table><tr><td>CARRIER (bts#-sector#-carrier#)</td><td>SET</td><td>NEWCALL ALARMFLAG</td><td>REG ALARMFLAG</td><td>AGG ALARMFLAG</td><td>ANALOGREDIRECT</td><td>GLOBALREDIRECT</td></tr><tr><td>----- 340-1-4</td><td>1</td><td>----- ENABLE</td><td>----- ENABLE</td><td>----- ENABLE</td><td>----- DISABLE</td><td>----- DISABLE</td></tr></table>							CARRIER (bts#-sector#-carrier#)	SET	NEWCALL ALARMFLAG	REG ALARMFLAG	AGG ALARMFLAG	ANALOGREDIRECT	GLOBALREDIRECT	----- 340-1-4	1	----- ENABLE	----- ENABLE	----- ENABLE	----- DISABLE	----- DISABLE																																										
CARRIER (bts#-sector#-carrier#)	SET	NEWCALL ALARMFLAG	REG ALARMFLAG	AGG ALARMFLAG	ANALOGREDIRECT	GLOBALREDIRECT																																																									
----- 340-1-4	1	----- ENABLE	----- ENABLE	----- ENABLE	----- DISABLE	----- DISABLE																																																									
7	NOTE In this step, you will change the value of the Global Service Redirection Flag (GLOBALREDIRECT) in the congestion control parameters so that the Global Service Redirect Message is broadcast on the sector paging channel. Enter the following command at the prompt: omc-000000>EDIT SECTOR-<bts#>-<sector#> CONGESTCONF ! The system will prompt you to enter each control parameter value one at a time. Skip through the prompts until you get to the following: <globalredirect>, enter ENABLE (This will force the Global Service Redirect Message to be broadcast on the sector paging channel.) The system will display the values of the control parameters. Verify that only the GLOBALREDIRECT value changed. omc-000000>Accept [yes/no]? Enter Y to accept the change. Now the Global Service Redirection Message is sent over the sector paging channels. All subscribers are redirected away from the sector and onto a different system. This effectively shuts down the sector.																																																														
8	Display the status of the MAWI at the BTS by entering the following command at the prompt: omc-000000>DISPLAY BTS-<bts#> STATUS Observe the following <i>typical</i> system response for the entry of: DISPLAY BTS – 340 STATUS <table><tr><td>DEVICE</td><td>CBSC</td><td>STATUS</td><td>Config Data</td><td>DEVSYNC Calibration Data</td><td>Calibration Sync</td><td>ISO RELATED STATE</td></tr><tr><td>-----</td><td>----</td><td>-----</td><td>-----</td><td>-----</td><td>-----</td><td>-----</td></tr><tr><td>BTS-340</td><td>1</td><td>INS</td><td>n/a</td><td>n/a</td><td>UNLOCKED</td><td>UNLOCKED</td></tr><tr><td>BTSSPAN-340-1</td><td>1</td><td>INS</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td></tr><tr><td>BTSLINK-340-1</td><td>1</td><td>INS</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td></tr><tr><td>LPA-340-1</td><td>1</td><td>OOS_PARENT</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td></tr><tr><td>MDM-340-1</td><td>1</td><td>PRECUT</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td></tr><tr><td>MAWI-340-1</td><td>1</td><td>INS</td><td>GOOD</td><td>GOOD</td><td>GOOD</td><td>KEYED</td></tr></table>							DEVICE	CBSC	STATUS	Config Data	DEVSYNC Calibration Data	Calibration Sync	ISO RELATED STATE	-----	----	-----	-----	-----	-----	-----	BTS-340	1	INS	n/a	n/a	UNLOCKED	UNLOCKED	BTSSPAN-340-1	1	INS	n/a	n/a	n/a	n/a	BTSLINK-340-1	1	INS	n/a	n/a	n/a	n/a	LPA-340-1	1	OOS_PARENT	n/a	n/a	n/a	n/a	MDM-340-1	1	PRECUT	n/a	n/a	n/a	n/a	MAWI-340-1	1	INS	GOOD	GOOD	GOOD	KEYED
DEVICE	CBSC	STATUS	Config Data	DEVSYNC Calibration Data	Calibration Sync	ISO RELATED STATE																																																									
-----	----	-----	-----	-----	-----	-----																																																									
BTS-340	1	INS	n/a	n/a	UNLOCKED	UNLOCKED																																																									
BTSSPAN-340-1	1	INS	n/a	n/a	n/a	n/a																																																									
BTSLINK-340-1	1	INS	n/a	n/a	n/a	n/a																																																									
LPA-340-1	1	OOS_PARENT	n/a	n/a	n/a	n/a																																																									
MDM-340-1	1	PRECUT	n/a	n/a	n/a	n/a																																																									
MAWI-340-1	1	INS	GOOD	GOOD	GOOD	KEYED																																																									
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Table 9-2: Shut Down Signaling Functions

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Step	Action																																																																																																																																																						
9	Display the status of the MAWI at the BTS to verify the status of the MAWI (which CEs are INS_IDLE or INS_BUSY) by entering the following command at the prompt: omc-000000>STATUS MAWI-<bts#>-<mawi#> ADD Observe the following <i>typical</i> system response: MAWI-340-1 00-05-24 15:10:31 omcr5 MM-5 M000109.00046 045519/479457 INFO:42 "Mawi Status Response" TELSTATE=INS_ACTIVE PROCEDURE=NONE PHYSTATE=INS_ACTIVE HDWR_TYPE=MAWI DEVICE_ASSUMED=NONE CLOCK_SRC=REMOTE_GPS LATITUDE="+032:50:41.502" LONGITUDE="-097:17:38.645" ALTITUDE="+0019865" NUM_SATELLITES="8" <table><tr><th>CF</th><th>MMCONF</th><th>MMSTATE</th><th>MMSECTOR</th><th>PHYCONF</th><th>PHYSTATE</th><th>PHYREASON</th><th>PHYSECTOR</th></tr><tr><td>--</td><td>-----</td><td>-----</td><td>-----</td><td>-----</td><td>-----</td><td>-----</td><td>-----</td></tr><tr><td>0</td><td>PCH_ACH</td><td>INS_BUSY</td><td>1</td><td>PCH_ACH</td><td>INS_BUSY</td><td>NONE</td><td>1</td></tr><tr><td>1</td><td>SCH</td><td>INS_BUSY</td><td>1</td><td>SCH</td><td>INS_BUSY</td><td>NONE</td><td>1</td></tr><tr><td>2</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>3</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>4</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>5</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>6</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>7</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>8</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>9</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>10</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>11</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>12</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>13</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>14</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>15</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr></table>							CF	MMCONF	MMSTATE	MMSECTOR	PHYCONF	PHYSTATE	PHYREASON	PHYSECTOR	--	-----	-----	-----	-----	-----	-----	-----	0	PCH_ACH	INS_BUSY	1	PCH_ACH	INS_BUSY	NONE	1	1	SCH	INS_BUSY	1	SCH	INS_BUSY	NONE	1	2	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	3	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	4	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	5	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	6	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	7	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	8	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	9	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	10	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	11	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	12	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	13	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	14	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	15	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT
CF	MMCONF	MMSTATE	MMSECTOR	PHYCONF	PHYSTATE	PHYREASON	PHYSECTOR																																																																																																																																																
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0	PCH_ACH	INS_BUSY	1	PCH_ACH	INS_BUSY	NONE	1																																																																																																																																																
1	SCH	INS_BUSY	1	SCH	INS_BUSY	NONE	1																																																																																																																																																
2	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT																																																																																																																																																
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4	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT																																																																																																																																																
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9	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT																																																																																																																																																
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14	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT																																																																																																																																																
15	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT																																																																																																																																																
10	Disable the MAWI in the INS-IDLE or the INS-BUSY state (predetermine number of active calls remaining to be terminated prematurely) by entering the following command at the prompt: omc-000000>DISABLE MAWI-<bts#>-<mawi#> UNC																																																																																																																																																						
11	Disable the BTS where the replacement procedure will be performed by entering the following command at the prompt: omc-000000>DISABLE BTS-<bts#> UNC																																																																																																																																																						

Restore Signaling Operations

Follow the steps in Table 9-3 to restore signaling operations to the site.

Table 9-3: Restore Signaling Operations																																																																							
Step	Action																																																																						
1	Open a CLI window. Refer to Table 9-1.																																																																						
2	Enable the BTS by entering the following command at the prompt: omc-0000000>ENABLE BTS-<bts#> UNC																																																																						
3	Enable the MAWI by entering the following command at the prompt: omc-0000000>ENABLE MAWI-<bts#> UNC																																																																						
4	View the status of the sector signaling redirect parameters for all carriers equipped for the sector by entering the following command at the prompt: omc-0000000>DISPLAY SECTOR-<bts#>-<sector#> REDIRECT Observe that the values in the system display response should match the values input in step 4 of the shut down signaling functions table.																																																																						
<table><tr><th>CARRIER ID (bts-sector-carrier)</th><th>RETURN IF FAIL</th><th>Access</th><th>Overload</th><th>Class</th><th>Redirect</th><th>Flags</th><th>ROTATE TIMER (SEC)</th><th>RECORD TYPE</th><th>EXP SID</th><th>IGNORE CDMA</th><th>SYS ORDERING</th></tr><tr><td>-----</td><td>-----</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td></tr><tr><td>-----</td><td>-----</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr><tr><td>-----</td><td>-----</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr><tr><td>CARRIER-1-1-1</td><td>N</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td></tr></table>												CARRIER ID (bts-sector-carrier)	RETURN IF FAIL	Access	Overload	Class	Redirect	Flags	ROTATE TIMER (SEC)	RECORD TYPE	EXP SID	IGNORE CDMA	SYS ORDERING	-----	-----	0	0	0	0	0	0	0	1	1	1	-----	-----	0	1	2	3	4	5	6	7	8	9	-----	-----	0	1	2	3	4	5	6	7	8	9	CARRIER-1-1-1	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CARRIER ID (bts-sector-carrier)	RETURN IF FAIL	Access	Overload	Class	Redirect	Flags	ROTATE TIMER (SEC)	RECORD TYPE	EXP SID	IGNORE CDMA	SYS ORDERING																																																												
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CARRIER-1-1-1	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y																																																												
. . . continued on next page																																																																							

Table 9-3: Restore Signaling Operations

Step	Action																
5	* IMPORTANT In this step, use the values recorded in step 3 of the shut down signaling functions table to answer the prompts for the EDIT SECTOR REDIRECT command; except for record type enter 2. NOTE This step shows the entry of initial standard values which is consistent with the original example; except record type must be 2. Your entries may be different. Restore the values of all redirect parameters by entering the following command at the prompt: omc-000000>EDIT SECTOR–<bts#>–<sector#> REDIRECT ! The system will prompt you to enter each command parameter one at a time. Answer the prompts in the following order (Note that the following specified values are consistent with the original example. Yours may be different): <accolc0> Enter N, <accolc1> Enter N, ... <accolc15> enter N <returniffail>, enter N <recordtype>, enter 2 <expectedsid>, enter 0 <ignorecdma>, enter N <sysordering>, enter CUSTOM <rotatetimer>, enter 4 The system will display the command that will be sent. Verify the command syntax. omc-000000>Accept [yes/no]? Enter Y to accept the command.																
6	View the status of the sector signaling redirect parameters to verify that the sector is ready for maintenance. omc-000000>DISPLAY SECTOR–<bts#>–<sector#> REDIRECT Ensure that the values in the system display response match the values input by the operator in step 5 (see example below). <table><tr><td>CARRIER ID (bts-sector-carrier)</td><td>RETURN IF FAIL</td><td>Access Overload Class Redirect Flags</td><td>ROTATE TIMER (SEC)</td><td>RECORD TYPE</td><td>EXP SID</td><td>IGNORE CDMA</td><td>SYS ORDERING</td></tr><tr><td>----- CARRIER-1-1-1</td><td>----- N</td><td>0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 ----- N N N N N N N N N N N N N N N</td><td>----- 4</td><td>----- 2</td><td>----- 0</td><td>----- N</td><td>----- CUSTOM</td></tr></table>	CARRIER ID (bts-sector-carrier)	RETURN IF FAIL	Access Overload Class Redirect Flags	ROTATE TIMER (SEC)	RECORD TYPE	EXP SID	IGNORE CDMA	SYS ORDERING	----- CARRIER-1-1-1	----- N	0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 ----- N N N N N N N N N N N N N N N	----- 4	----- 2	----- 0	----- N	----- CUSTOM
CARRIER ID (bts-sector-carrier)	RETURN IF FAIL	Access Overload Class Redirect Flags	ROTATE TIMER (SEC)	RECORD TYPE	EXP SID	IGNORE CDMA	SYS ORDERING										
----- CARRIER-1-1-1	----- N	0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 ----- N N N N N N N N N N N N N N N	----- 4	----- 2	----- 0	----- N	----- CUSTOM										
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Shut Down & Restore BTS Signaling – continued

Table 9-3: Restore Signaling Operations

Table 9-3: Restore Signaling Operations																																																														
Step	Action																																																													
7	View the congestion control parameters for all carriers equipped for the sector by entering the following command at the prompt: omc-000000>DISPLAY SECTOR-<bts#>-<sector#> CONGESTCONF Observe the following <i>typical</i> system display response: <table><tr><td>CARRIER (bts#-sector#-carrier#)</td><td>SET</td><td>NEWCALL ALARMFLAG</td><td>REG ALARMFLAG</td><td>AGG ALARMFLAG</td><td>ANALOGREDIRECT</td><td>GLOBALREDIRECT</td></tr><tr><td>----- 340-1-4</td><td>1</td><td>----- ENABLE</td><td>----- ENABLE</td><td>----- ENABLE</td><td>----- DISABLE</td><td>----- ENABLE</td></tr></table>						CARRIER (bts#-sector#-carrier#)	SET	NEWCALL ALARMFLAG	REG ALARMFLAG	AGG ALARMFLAG	ANALOGREDIRECT	GLOBALREDIRECT	----- 340-1-4	1	----- ENABLE	----- ENABLE	----- ENABLE	----- DISABLE	----- ENABLE																																										
CARRIER (bts#-sector#-carrier#)	SET	NEWCALL ALARMFLAG	REG ALARMFLAG	AGG ALARMFLAG	ANALOGREDIRECT	GLOBALREDIRECT																																																								
----- 340-1-4	1	----- ENABLE	----- ENABLE	----- ENABLE	----- DISABLE	----- ENABLE																																																								
8	NOTE In this step, you will change the value of the Global Service Redirection Flag (GLOBALREDIRECT) in the congestion control parameters so that the Global Service Redirect Message is only broadcast on the sector paging channel when there is traffic congestion in the sector. Enter the following command at the prompt: omc-000000>EDIT SECTOR-<bts#>-<sector#> CONGESTCONF ! The system will prompt you to enter each control parameter value one at a time. Skip through the prompts until you get to the following: <globalredirect>, enter DISABLE (This will revert the Global Service Redirect Message to congestion control.) The system will display the values of the control parameters. Verify that only the GLOBALREDIRECT value changed. omc-000000>Accept [yes/no]? Enter Y to accept the change. Now the Global Service Redirection Message will only be sent over the sector paging channels when there is traffic congestion in the sector.																																																													
9	Display the status of the MAWI at the BTS by entering the following command at the prompt: omc-000000>DISPLAY BTS-<bts#> STATUS Observe the following <i>typical</i> system response: <table><tr><td>DEVICE</td><td>CBSC</td><td>STATUS</td><td>Config Data</td><td>DEVSYNC Calibration Data</td><td>Calibration Sync</td><td>ISO RELATED STATE</td></tr><tr><td>-----</td><td>-----</td><td>-----</td><td>-----</td><td>-----</td><td>-----</td><td>-----</td></tr><tr><td>BTS-340</td><td>1</td><td>INS</td><td>n/a</td><td>n/a</td><td>UNLOCKED</td><td>UNLOCKED</td></tr><tr><td>BTSSPAN-340-1</td><td>1</td><td>INS</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td></tr><tr><td>BTSLINK-340-1</td><td>1</td><td>INS</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td></tr><tr><td>LPA-340-1</td><td>1</td><td>OOS_PARENT</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td></tr><tr><td>MDM-340-1</td><td>1</td><td>PRECUT</td><td>n/a</td><td>n/a</td><td>n/a</td><td>n/a</td></tr><tr><td>MAWI-340-1</td><td>1</td><td>INS</td><td>GOOD</td><td>GOOD</td><td>GOOD</td><td>KEYED</td></tr></table>						DEVICE	CBSC	STATUS	Config Data	DEVSYNC Calibration Data	Calibration Sync	ISO RELATED STATE	-----	-----	-----	-----	-----	-----	-----	BTS-340	1	INS	n/a	n/a	UNLOCKED	UNLOCKED	BTSSPAN-340-1	1	INS	n/a	n/a	n/a	n/a	BTSLINK-340-1	1	INS	n/a	n/a	n/a	n/a	LPA-340-1	1	OOS_PARENT	n/a	n/a	n/a	n/a	MDM-340-1	1	PRECUT	n/a	n/a	n/a	n/a	MAWI-340-1	1	INS	GOOD	GOOD	GOOD	KEYED
DEVICE	CBSC	STATUS	Config Data	DEVSYNC Calibration Data	Calibration Sync	ISO RELATED STATE																																																								
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BTS-340	1	INS	n/a	n/a	UNLOCKED	UNLOCKED																																																								
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BTSLINK-340-1	1	INS	n/a	n/a	n/a	n/a																																																								
LPA-340-1	1	OOS_PARENT	n/a	n/a	n/a	n/a																																																								
MDM-340-1	1	PRECUT	n/a	n/a	n/a	n/a																																																								
MAWI-340-1	1	INS	GOOD	GOOD	GOOD	KEYED																																																								
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Table 9-3: Restore Signaling Operations

Table 9-3: Restore Signaling Operations																																																																																																																																																							
Step	Action																																																																																																																																																						
10	Display the status of the MAWI in the BTS by entering the following command at the prompt: omc-0000000> STATUS MAWI-<bts#>-<mawi#> ADD Observe the following <i>typical</i> system response for entry of: STATUS MAWI – 340 –1 ADD MAWI-340-1 00-05-24 15:10:31 omcr5 MM-5 M000109.00046 045519/479457 INFO:42 "Mawi Status Response" TELSTATE=INS_ACTIVE PROCEDURE=NONE PHYSTATE=INS_ACTIVE HDWR_TYPE=MAWI DEVICE_ASSUMED=NONE CLOCK_SRC=REMOTE_GPS LATITUDE="+032:50:41.502" LONGITUDE="-097:17:38.645" ALTITUDE="+0019865" NUM_SATELLITES="8" <table><tr><th>CF</th><th>MMCONF</th><th>MMSTATE</th><th>MMSECTOR</th><th>PHYCONF</th><th>PHYSTATE</th><th>PHYREASON</th><th>PHYSECTOR</th></tr><tr><td>--</td><td>-----</td><td>-----</td><td>-----</td><td>-----</td><td>-----</td><td>-----</td><td>-----</td></tr><tr><td>0</td><td>PCH_ACH</td><td>INS_BUSY</td><td>1</td><td>PCH_ACH</td><td>INS_BUSY</td><td>NONE</td><td>1</td></tr><tr><td>1</td><td>SCH</td><td>INS_BUSY</td><td>1</td><td>SCH</td><td>INS_BUSY</td><td>NONE</td><td>1</td></tr><tr><td>2</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>3</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>4</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>5</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>6</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>7</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>8</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>9</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>10</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>11</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>12</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>13</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>14</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr><tr><td>15</td><td>TCH</td><td>INS_IDLE</td><td>FLOAT</td><td>TCH</td><td>INS_IDLE</td><td>NONE</td><td>FLOAT</td></tr></table>							CF	MMCONF	MMSTATE	MMSECTOR	PHYCONF	PHYSTATE	PHYREASON	PHYSECTOR	--	-----	-----	-----	-----	-----	-----	-----	0	PCH_ACH	INS_BUSY	1	PCH_ACH	INS_BUSY	NONE	1	1	SCH	INS_BUSY	1	SCH	INS_BUSY	NONE	1	2	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	3	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	4	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	5	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	6	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	7	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	8	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	9	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	10	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	11	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	12	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	13	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	14	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT	15	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT
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15	TCH	INS_IDLE	FLOAT	TCH	INS_IDLE	NONE	FLOAT																																																																																																																																																

Site I/O Junction Box Replacement Procedure

Objective

The objective of this procedure is to replace the Site I/O junction box.

System Impact/Considerations

The removal of the failed Site I/O junction box will require system downtime. The BTS cannot report alarms without the Site I/O junction box. The other system level alarms are too numerous and outside the scope of this document.

Required Tools and Materials

The following tools are required to remove the solar cover and install the new Site I/O junction box.

Tools

- Torque driver wrench, 1/4-in. hex female drive, 0–10 N–M
- T20 Torx tamper bit
- T30 Torx tamper bit

Replacement units

One Site I/O junction box is required – Kit T396AA

Replacement Procedure

Before you begin

Before you begin, enter the following information into the following replacement list table.

Table 9-4: Item Number Replacement List	
Item	Number
BTS number	
Failed Site I/O Junction Box number	

Site I/O Junction Box Replacement Procedure – continued

Remove the failed site I/O junction box

Follow the steps in Table 9-5 to remove the failed Site I/O junction box.

Table 9-5: Remove the Failed Site I/O Junction Box	
Step	Action
1	Place the BTS out of service using the “Shut Down Signaling Functions” procedure shown in Table 9-2.
2	Using a T20 Torx tamper bit, remove the Solar Cover if one is present and locate the failed Site I/O junction box.
3	If DC power is being supplied to the unit or if the battery backup is present, open (pull) the DC power breaker. The white collar on the breaker is visible when the breaker is opened.
4	If AC power is being supplied to the unit, open (pull) the AC power breaker. The white collar on the breaker is visible when the breaker is open.
5	Disconnect the unit ground cable from the Site I/O junction box.
6	Using a T30 Torx tamper bit, remove the two tamper resistant captive screws to disconnect the Site I/O junction box from the unit. See Figure 9-4.
7	If your BTS is equipped with the customer-supplied Site I/O interface, then proceed to step 8. If your BTS is equipped with the optional Primary Surge Suppressor, then proceed to step 9.
8	Disconnect the Site I/O cable from the Deutsch connector on the Site I/O cable. Location of Site I/O interface is site-dependent.
9	Disconnect the Site I/O cable from the Primary Surge Suppressor.

Install the replacement Site I/O junction box

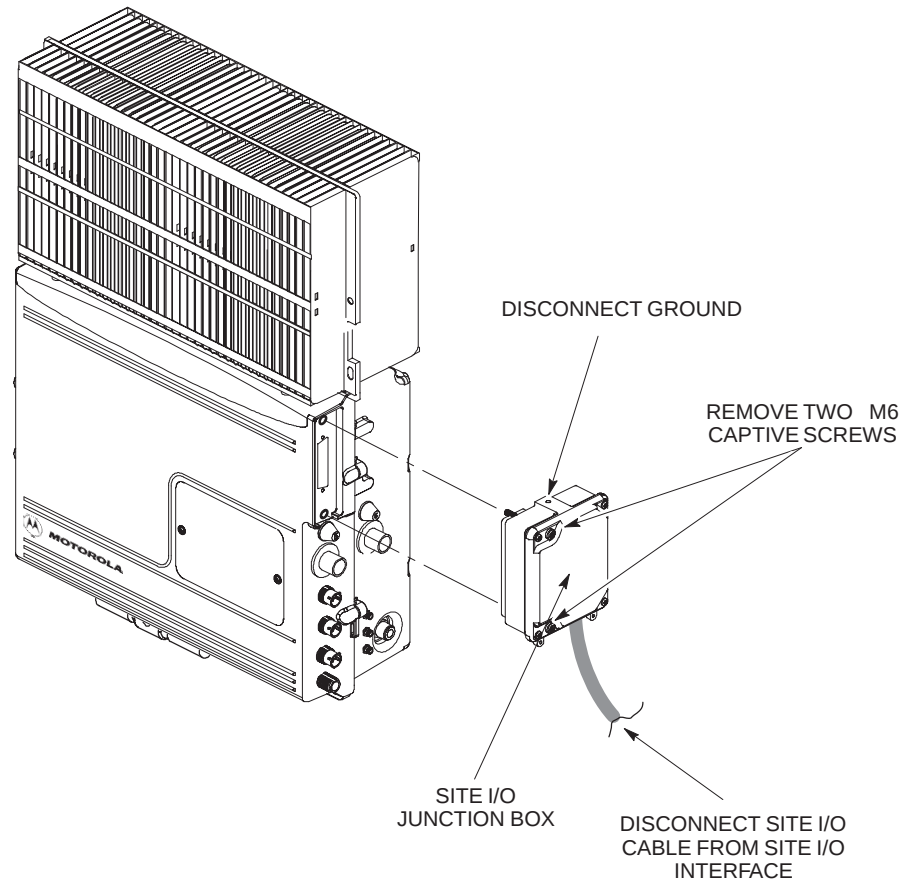
Follow the steps in Table 9-6 to install the replacement Site I/O junction box.

Table 9-6: Install the Replacement Site I/O Junction Box	
Step	Action
1	Reconnect the Site I/O cable according to the “Site I/O, Span Line, RGPS and Modem Cabling” procedure in Chapter 4.
2	Install the replacement Site I/O junction box according to the “Mounting the Site I/O Junction Box to the Unit” procedure in Chapter 5.
3	Attach the ground cable from the mounting bracket to the Site I/O junction box.
4	If AC power is being supplied to the unit, close (push) the AC power breaker. The white collar on the breaker is not visible when the breaker is closed.
5	If DC power is being supplied to the unit or if battery backup is present, close (push) the DC power breaker. The white collar on the breaker is not visible when the breaker is closed.
6	Install the Solar Cover if one is present according to the “Mounting Solar Cover and Powering on Unit” procedure in Chapter 5.
7	Place the BTS back in service using the “Restore Signaling Operations” procedure in Table 9-3.

Site I/O Junction Box Replacement Procedure – continued

Site I/O Junction Box Location Diagram

Figure 9-4: Site I/O Junction Box Replacement



Short Duration Battery Replacement Procedures

Objective

The objective of this procedure is to replace the short duration battery.

Required Tools and Materials

The following tools are required to remove the solar cover and install the new battery.

Tools

Attaching the battery to the unit requires:

- T20 Torx tamper bit, 1/4-in. hex
- T30 Torx tamper bit, 1/4-in. hex
- Torque driver wrench, 1/4-in. hex female drive, 0–10 N–M
- Two (2) Screws M6x19 (Motorola Part Number 0387541C03)

Replacement units

One Battery – Kit T392AA is necessary for this procedure.

Replacement Procedure

Before you begin

Before you begin, enter the following information into the following replacement list table.

Table 9-7: Item Number Replacement List	
Item	Number
BTS number	
Failed Battery number	

Short Duration Battery Replacement Procedure – continued

Remove the failed battery

Follow the steps in Table 9-8 to remove the failed battery. Refer to Figure 9-5.

NOTE

The short duration battery is designed to be replaced with the DC breaker closed (pushed). If the DC breaker is opened (pulled) during this procedure, the BTS must be taken off-line and restarted to ensure proper battery fault management.

Table 9-8: Remove the Failed Short Duration Battery

Step	Action
1	Turn the DC Power Breaker off.
2	Use a T20 Torx tamper bit to remove the Solar Cover (if one is present) and locate the battery.
3	Turn the connector on the short duration battery cable counterclockwise to disconnect the cable from the unit. See Figure 9-5. An alarm will be generated.
4	Using a T30 Torx tamper bit remove the two screws that are holding the battery to the unit. See Figure 9-5.

Install the replacement battery

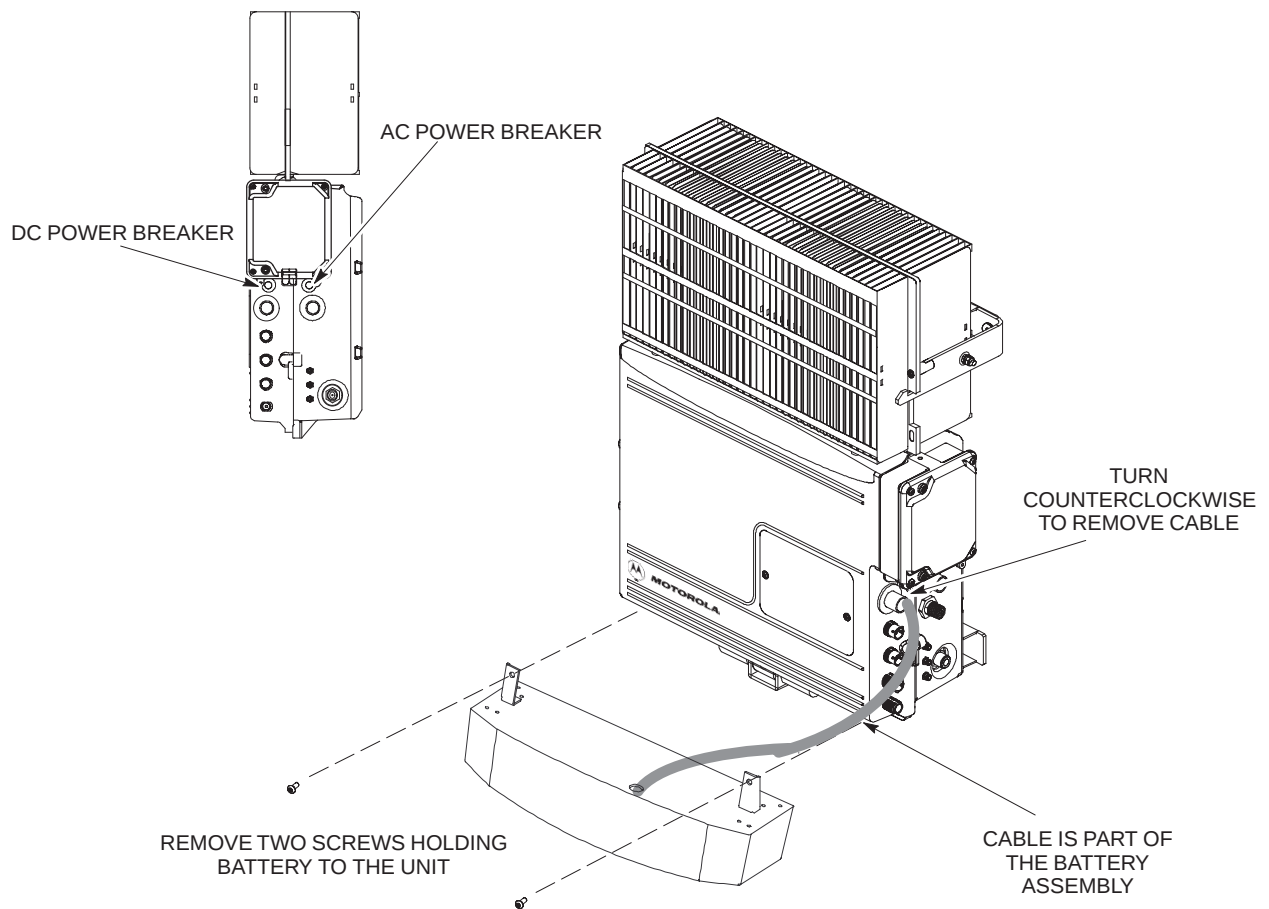
Follow the steps in Table 9-8 to install the replacement short duration battery. Refer to Figure 9-5.

Table 9-9: Install the Replacement Short Duration Battery

Step	Action
1	Install the replacement battery according to the “Attaching the Battery to the Unit” installation procedure in Chapter 5.
2	Re-connect the short-duration battery cable to DC input connector. See Figure 9-5. The alarm will clear.
3	Re-install the Solar Cover if one is present.

Short Duration Battery Replacement Procedure – continued

Figure 9-5: Battery Replacement



Remote GPS Replacement Procedures

Objective

The objective of this procedure is to replace the RGPS head.

Required Tools and Materials

Replacement units

One RGPS head with cable attached (Motorola Kit T472AP) is required to do this procedure.

Replacement Procedure

Before you begin

Before you begin, enter the following information into the following replacement list table.

Table 9-10: Item Number Replacement List	
Item	Number
BTS number	
Failed RGPS head number	

Remove the failed RGPS head

Follow the steps in Table 9-11 to remove the failed RGPS head. Refer to Figure 9-6.

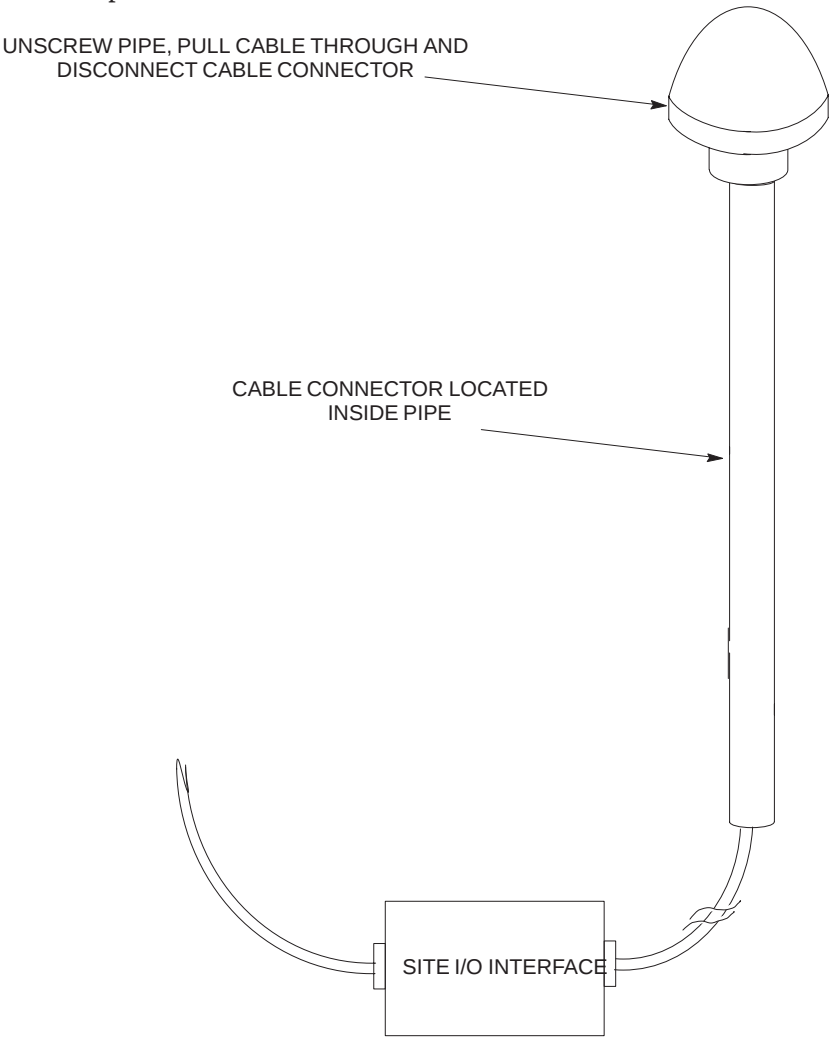
Table 9-11: Remove the Failed RGPS Head	
Step	Action
	NOTE To prevent twisting of cables, do not unscrew or screw the RGPS head while holding the pipe/conduit.
1	Loosen the pipe/conduit mounting hardware until the pipe/conduit is free to be unscrewed from the RGPS head.
2	Grasp the RGPS head with one hand and the pipe/conduit with the other hand. Unscrew the pipe/conduit from the head and separate the head from the pipe/conduit. Grasp the cable just below the head and pull about 16 inches of cable out of the pipe/conduit until the mating cable connectors are exposed.
3	Separate the mating cable connectors to disconnect the RGPS head from the RGPS cable.

Install the replacement RGPS head

Follow the steps in Table 9-12 to install the replacement RGPS head.
Refer to Figure 9-6.

Table 9-12: Install the Replacement RGPS Head	
Step	Action
1	Connect the cable connector of the replacement RGPS head to the RGPS cable connector. Secure the connection by tightening the spinning connector flange.
2	Feed the cable slack into the RGPS head end of the mounting pipe/conduit.
3	Grasp the RGPS head with one hand and the pipe/conduit with the other hand. Be careful not to cross-thread the fitting on the RGPS head, screw the pipe/conduit into the head. Hand tighten only!
4	Tighten the pipe/conduit mounting hardware until the pipe/conduit is securely mounted.

Figure 9-6: RGPS Head Replacement



Full Unit Replacement Procedures

Objective

The objective of this procedure is to replace a Microcell or Picocell unit. See Figure 9-7.

System Impact/Considerations

The removal of the failed unit will require system downtime.

Required Tools and Materials

The following tools and materials are required to do this procedure:

Tools

The following tools are required to do this procedure:

- Torque driver wrench, 1/4-in. hex female drive, 0–10 N–M
- T20 TORX Tamper Bit, 1/4-in. hex
- T30 TORX Tamper Bit, 1/4-in. hex
- 13 mm torque wrench set to 5.0 N–M
- 5/16 breakaway torque wrench 9-in. lb.
- 13/16 breakaway torque wrench 38-in. lb.
- Key for lock
- Handles for unit (optional)

Replacement units

One Microcell or Picocell unit is required to do this procedure.

Replacement Procedure

Before you begin

Before you begin, enter the following information into the following replacement list table.

Table 9-13: Item Number Replacement List	
Item	Description
BTS Number	
Failed Unit Number	

Remove the failed unit

Follow the steps in Table 9-14 to remove the failed unit.

Table 9-14: Remove the Failed Unit	
Step	Action
1	Place the BTS out of service. Refer to the “Shut Down Signaling Functions” procedure in Table 9-2.
2	If necessary, use a T20 TORX Tamper bit to remove the Solar Cover.
. . . continued on next page	

Table 9-14: Remove the Failed Unit

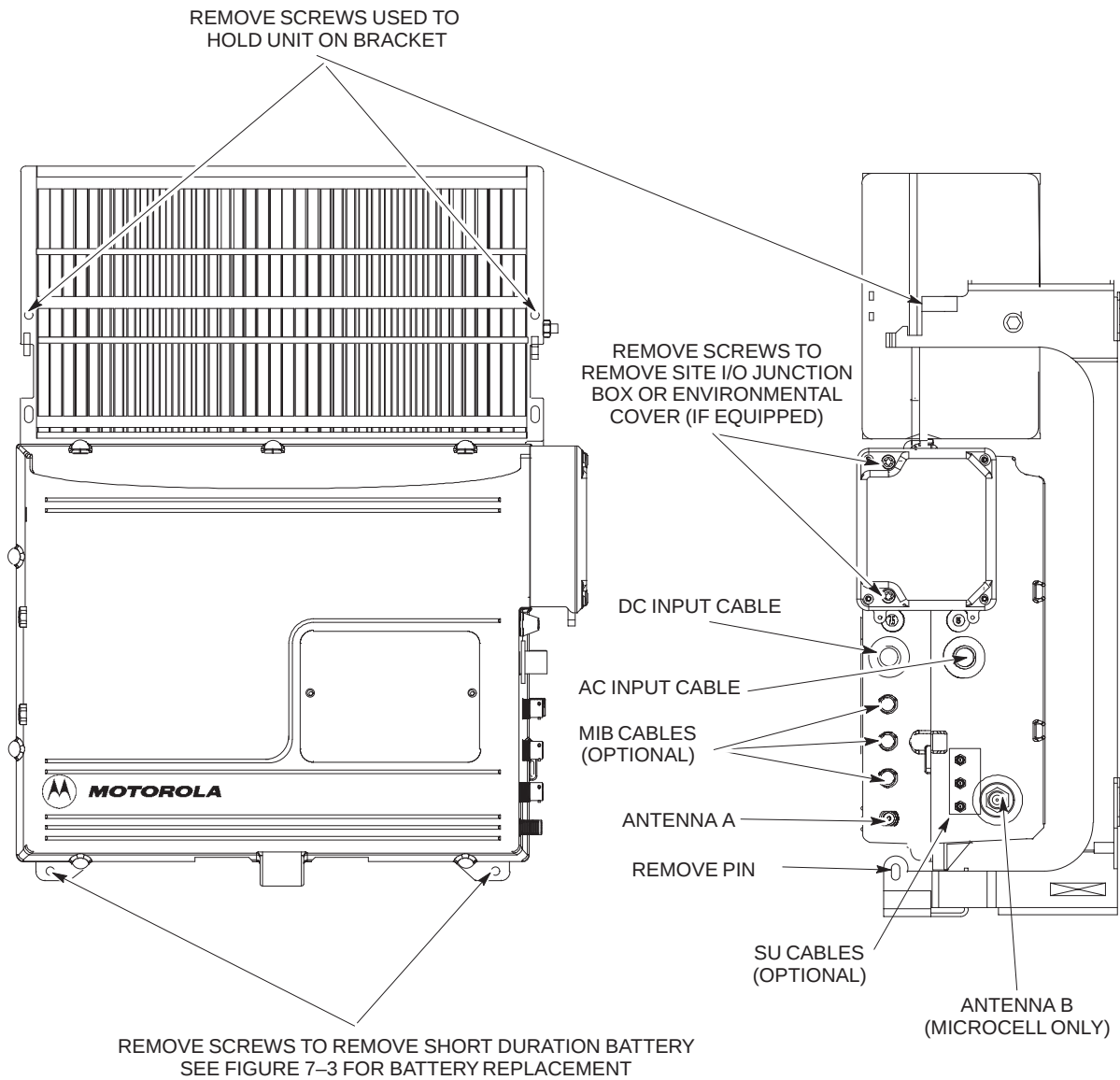
Step	Action
3	If DC power is being supplied to the unit or if battery backup is present, open (pull) the DC power breaker. The white collar on the breaker is visible when the breaker is opened.
4	If AC power is being supplied to the unit, open (pull) the AC power breaker. The white collar on the breaker is visible when the breaker is opened.
5	Turn the power off at the main power source (AC and/or DC).
6	Use a T30 TORX tamper bit to remove the two tamper-resistant screws that hold the Site I/O junction box (or environmental cover) to the BTS. Refer to Figure 9-4 in the “Site I/O Junction Box Replacement” procedure.
7	Disconnect the AC input cable from the unit. Refer to Figure 9-7.
8	Disconnect the DC input cable from the unit. Refer to Figure 9-7.
9	Disconnect the antenna cable(s) from the unit. Refer to Figure 9-7.
10	Disconnect the MIB cables from the unit (if equipped). Refer to Figure 9-7.
11	Disconnect the SU cables from the unit (if equipped). Refer to Figure 9-7.
12	Remove the two mounting screws that hold the short duration battery (if present) to the unit. Refer to NO TAG in the “Short Duration Battery Replacement Procedures” procedure and Figure 9-7.
13	Attach the installation handles to the unit. Refer to the “Attaching Installation Handles to the Unit” procedure in Chapter 6.
14	Use a T30 Tamper bit to remove the two screws that hold the unit to the mounting bracket.
15	Remove the pin or lock (if equipped) from the unit.
16	Remove the unit from the mounting bracket.

Install the replacement unit

Follow the steps in Table 9-15 to install the replacement unit.

Table 9-15: Install the New Unit	
Step	Action
1	Attach the installation handles to the replacement unit. Refer to the “Attaching Installation Handles to Unit” procedure in Chapter 6.
2	Mount the replacement unit to the bracket. Refer to the “Attaching Unit to the Mounting Bracket” procedure in Chapter 6.
3	Once the replacement unit has been secured to the mounting bracket, remove the installation handles (reverse the installation order of the “Attaching Installation Handles to the Unit” procedure in Chapter 6).
4	Attach the Site I/O junction box or environmental cover to the unit. Refer to the “Attaching the Site I/O Junction Box to the Unit” procedure in Chapter 6 and Figure 9-4.
5	Attach the short duration battery (if present) to the unit. Refer to NO TAG in the “Short Duration Battery Replacement Procedure” and Figure 9-7.
6	Connect the AC input cable. Refer to the “AC Power Cabling” procedure in Chapter 6.
7	Connect the DC input cable. Refer to the “DC Power Cabling” procedure in Chapter 6.
8	Connect the antenna cable(s). Refer to the “Antenna Cabling” procedure in Chapter 6.
9	Connect the MIB cables (if equipped). Refer to the “MIB Cabling” procedure in Chapter 6.
10	Connect the SU cables (if equipped). Refer to the “SU Cabling” procedure in Chapter 6.
11	Turn power on at the main power source (AC and/or DC).
12	If AC power is being supplied to the unit, close (push) the AC power breaker. The white collar on the breaker is not visible when the breaker is closed.
13	If DC power is being supplied to the unit or if battery backup is present, close (push) the DC power breaker. The white collar is not visible when the breaker is closed.
14	Perform the ATP, if necessary. Refer to the ATP procedures in Chapter 7.
15	Install the Solar Covers (if necessary).
16	Place the BTS back in service using the “Restore Signaling Operations” procedure in Table 9-3.

Figure 9-7: Unit Replacement (MicroCell shown)



NOTE: REMOVE THE SITE I/O JUNCTION BOX (OR ENVIRONMENTAL COVER) AND BATTERY FROM THE FAILED UNIT AND RE-MOUNT THEM ON THE REPLACEMENT UNIT

Full Unit Replacement Procedures – continued

Notes

This image shows a full page of blank, lined paper. It features approximately 20 evenly spaced horizontal grey lines across its entire width, providing a template for writing or drawing. The margins are consistent on all sides.

Appendix A: Outdoor Grounding Guidelines Overview

Appendix Content

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Notes

General

This is a summary of the outdoor grounding guidelines. Outdoor installations should be based on this summary and site specific documentation. Motorola publication 68P81150E62 should also be followed to ground an antenna tower.

This guideline assumes that auxiliary equipment is co-located at the installation site. All of the equipment referenced may not be present at every site.

Because outdoor MicroCell/PicoCell installations will involve a variety of methods, this information is not meant to represent actual physical layout. It is meant to act as an aid to understanding an effective ground system.

Chassis Isolation

Regardless of the type of installation (wall, frame, pole), the grounding plan must have a single point ground to prevent surge/transient currents from passing through the BTS and auxiliary equipment. The BTS includes insulation hardware to insure that the chassis will be grounded by the intended ground path and not through the mounting structure (frame, pole, or wall).

Master Ground Plate

The Master Ground Plate (MGP) is the key to the outdoor grounding scheme. The MGP is the single grounding point for all BTS input and output and provides a uniform ground potential through out the site.

Although the MGP may be implemented differently at each installation, it must be a plate that is big enough to attach to all the lightning arrestors and have a ground stud.

The MGP ground stud is the only connection to earth ground for the BTS hardware.

Main AC Power

The AC power input is single-phase and connects to the BTS by a three conductor cable. The cable is insulated and connects to the BTS on one end and the AC source on the other end. The AC power source should be ground referenced to the MGP at a point closest to the access point. The line and neutral conductors must be protected by lightning arrestors. The lightning arrestors connect to the MGP at the same point as the AC ground reference.

If an external circuit breaker or an uninterruptible power supply are used, install them between the AC power lightning arrestor and the BTS.

Antenna

Coaxial cables are used to connect to the antenna(s). The ground conductor (shield) of the coaxial cable must be ground referenced to the

Outdoor Grounding Guidelines Summary – continued

MGP at the antenna access point. The signal (center) conductor must be protected by a lightning arrestor. The lightning arrestor connects to the MGP at the same point as the ground conductor (shield) of the antenna cable.

Chassis

The ground stud of the BTS chassis connects to the MGP.

T1 Span Lines

The BTS can connect to two T1 span lines. For many applications the T1 cable is derived from an optical fiber interconnect. For cases where the optical interconnect is non-metallic, no special grounding is needed. If the optical fiber is encased in a metallic sheath, the sheath must be grounded to the MGP. If the span lines are metallic, the conductors must be protected by lightning arrestors which connect to the MGP at a point closest to the demarcation point.

Modem

A single tip and ring pair is used for a dial-up modem connection. The tip and ring pair must be protected by a lightning arrestor which connects to the MGP at a point closest to the demarcation point.

Customer I/O

The BTS provides eight customer defined inputs. These connections are internal to the cell site and do not require special grounding unless they originate from an area not protected by the MGP.

Example: Signal light in tower configuration