

# SC™ 300 BTS Hardware Installation, ATP and FRU Procedures

Software Release 2.15.x.x

**SC™ 300**

CDMA

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PRELIMINARY



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## Foreword

### Scope of manual

This manual is intended for use by cellular telephone system craftspersons in the day-to-day operation of Motorola cellular system equipment and ancillary devices. It is assumed that the user of this information has a general understanding of telephony, as used in the operation of the Public Switched Telephone Network (PSTN), and is familiar with these concepts as they are applied in the cellular mobile/portable radiotelephone environment. The user, however, is not expected to have any detailed technical knowledge of the internal operation of the equipment.

This manual is not intended to replace the system and equipment training offered by Motorola, although it can be used to supplement or enhance the knowledge gained through such training.

### Text conventions

The following special paragraphs are used in this manual to point out information that must be read. This information may be set-off from the surrounding text, but is always preceded by a bold title in capital letters. The four categories of these special paragraphs are:

#### **NOTE**

Presents additional, helpful, non-critical information that you can use.



#### **IMPORTANT**

Presents information to help you avoid an undesirable situation or provides additional information to help you understand a topic or concept.



#### **CAUTION**

Presents information to identify a situation in which equipment damage could occur, thus avoiding damage to equipment.



#### **WARNING**

Presents information to warn you of a potentially hazardous situation in which there is a possibility of personal injury.

The following typographical conventions are used for the presentation of software information:

- In text, sans serif **BOLDFACE CAPITAL** characters (a type style without angular strokes: i.e., SERIF versus SANS SERIF) are used to name a command.
- In text, `typewriter` style characters represent prompts and the system output as displayed on an operator terminal or printer.
- In command definitions, sans serif **boldface** characters represent those parts of the command string that must be entered exactly as shown and `typewriter` style characters represent command output responses as displayed on an operator terminal or printer.
- In the command format of the command definition, `typewriter` style characters represent the command parameters.

## Changes to manual

Changes that occur after the printing date are incorporated into your manual by Cellular Manual Revisions (CMRs). The information in this manual is updated, as required, by a CMR when new options and procedures become available for general use or when engineering changes occur. The cover sheet(s) that accompany each CMR should be retained for future reference. Refer to the Revision History page for a list of all applicable CMRs contained in this manual.

## Receiving updates

Technical Education & Documentation (TED) maintains a customer database that reflects the type and number of manuals ordered or shipped since the original delivery of your *Motorola* equipment. Also identified in this database is a “key” individual (such as Documentation Coordinator or Facility Librarian) designated to receive manual updates from TED as they are released.

To ensure that your facility receives updates to your manuals, it is important that the information in our database is correct and up-to-date. Therefore, if you have corrections or wish to make changes to the information in our database (i.e., to assign a new “key” individual), please contact Technical Education & Documentation at:

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Technical Education & Documentation  
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Mundelein, Illinois 60060  
U.S.A.

Phone:  
Within U.S.A. and Canada . . . . . 800-872-8225  
Outside of U.S.A. and Canada . . +1-847-435-5700  
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**Reporting manual errors**

In the event that you locate an error or identify a deficiency in your manual, please take time to write to us at the address above. Be sure to include your name and address, the complete manual title and part number (located on the manual spine, cover, or title page), the page number (found at the bottom of each page) where the error is located, and any comments you may have regarding what you have found. We appreciate any comments from the users of our manuals.

**24-hour support service**

If you have any questions or concerns regarding the operation of your equipment, please contact the Customer Network Resolution Center for immediate assistance. The 24 hour telephone numbers are:

Arlington Heights, IL . . . . .	800-433-5202
Arlington Heights, International . .	+1-847-632-5390
Cork, Ireland . . . . .	44-1793-565444
Swindon, England . . . . .	44-1793-565444

---

## General Safety

**Remember! . . . Safety depends on you!!**

The following general safety precautions must be observed during all phases of operation, service, and repair of the equipment described in this manual. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment. Motorola, Inc. assumes no liability for the customer's failure to comply with these requirements. The safety precautions listed below represent warnings of certain dangers of which we are aware. You, as the user of this product, should follow these warnings and all other safety precautions necessary for the safe operation of the equipment in your operating environment.

### Ground the instrument

To minimize shock hazard, the equipment chassis and enclosure must be connected to an electrical ground. If the equipment is supplied with a three-conductor ac power cable, the power cable must be either plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter. The three-contact to two-contact adapter must have the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable must meet International Electrotechnical Commission (IEC) safety standards.

### Do not operate in an explosive atmosphere

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

### Keep away from live circuits

Operating personnel must:

- not remove equipment covers. Only Factory Authorized Service Personnel or other qualified maintenance personnel may remove equipment covers for internal subassembly, or component replacement, or any internal adjustment.
- not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed.
- always disconnect power and discharge circuits before touching them.

### Do not service or adjust alone

Do not attempt internal service or adjustment, unless another person, capable of rendering first aid and resuscitation, is present.

---

## General Safety – continued

### Do not substitute parts or modify equipment

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification of equipment. Contact Motorola Warranty and Repair for service and repair to ensure that safety features are maintained.

### Dangerous procedure warnings

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed. You should also employ all other safety precautions that you deem necessary for the operation of the equipment in your operating environment.



#### **WARNING**

Dangerous voltages, capable of causing death, are present in this equipment. Use extreme caution when handling, testing, and adjusting.

---

## Revision History

### Manual Number

68P09224A55

### Manual Title

SC™ 300 BTS Hardware Installation, ATP and FRU Procedures  
Software Release 2.15.x.x

### Version Information

The following table lists the manual version, date of version, and remarks on the version.

Version Level	Date of Issue	Remarks
1	SEP 2000	Draft version for Engineering review.

### Cellular Manual Revision Information

The following table lists Cellular Manual Revision (CMR) number, date of CMR, and remarks on the CMR.

Revision Level	Date of Issue	Remarks
CMR No.	N.A.	No CMRs apply to this manual



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## Patent Notification

### Patent numbers

This product is manufactured and/or operated under one or more of the following patents and other patents pending:

4128740	4661790	4860281	5036515	5119508	5204876	5247544	5301353
4193036	4667172	4866710	5036531	5121414	5204977	5251233	5301365
4237534	4672657	4870686	5038399	5123014	5207491	5255292	5303240
4268722	4694484	4872204	5040127	5127040	5210771	5257398	5303289
4282493	4696027	4873683	5041699	5127100	5212815	5259021	5303407
4301531	4704734	4876740	5047762	5128959	5212826	5261119	5305468
4302845	4709344	4881082	5048116	5130663	5214675	5263047	5307022
4312074	4710724	4885553	5055800	5133010	5214774	5263052	5307512
4350958	4726050	4887050	5055802	5140286	5216692	5263055	5309443
4354248	4729531	4887265	5058136	5142551	5218630	5265122	5309503
4367443	4737978	4893327	5060227	5142696	5220936	5268933	5311143
4369516	4742514	4896361	5060265	5144644	5222078	5271042	5311176
4369520	4751725	4910470	5065408	5146609	5222123	5274844	5311571
4369522	4754450	4914696	5067139	5146610	5222141	5274845	5313489
4375622	4764737	4918732	5068625	5152007	5222251	5276685	5319712
4485486	4764849	4941203	5070310	5155448	5224121	5276707	5321705
4491972	4775998	4945570	5073909	5157693	5224122	5276906	5321737
4517561	4775999	4956854	5073971	5159283	5226058	5276907	5323391
4519096	4797947	4970475	5075651	5159593	5228029	5276911	5325394
4549311	4799253	4972355	5077532	5159608	5230007	5276913	5327575
4550426	4802236	4972432	5077741	5170392	5233633	5276915	5329547
4564821	4803726	4979207	5077757	5170485	5235612	5278871	5329635
4573017	4811377	4984219	5081641	5170492	5235614	5280630	5339337
4581602	4811380	4984290	5083304	5182749	5239294	5285447	D337328
4590473	4811404	4992753	5090051	5184349	5239675	5287544	D342249
4591851	4817157	4998289	5093632	5185739	5241545	5287556	D342250
4616314	4827507	5020076	5095500	5187809	5241548	5289505	D347004
4636791	4829543	5021801	5105435	5187811	5241650	5291475	D349689
4644351	4833701	5022054	5111454	5193102	5241688	5295136	RE31814
4646038	4837800	5023900	5111478	5195108	5243653	5297161	
4649543	4843633	5028885	5113400	5200655	5245611	5299228	
4654655	4847869	5030793	5117441	5203010	5245629	5301056	
4654867	4852090	5031193	5119040	5204874	5245634	5301188	



# Chapter 1: Introduction

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## Scope of this document

This document provides information pertaining to the hardware installation, cabling installation, ATP and Field Replaceable Unit (FRU) procedures of the Motorola MicroCell and PicoCell SC™ 300 CDMA Base Transceiver Subsystem (BTS) equipment.

The FRU procedures do not cover the replacement of modules inside the unit.

An individual SC™ 300 BTS unit will be referred to as the “unit” for the remainder of this document. A BTS site that contains one or more SC™ 300 BTS units will be referred to as the “BTS” for the remainder of this document.

For detailed installation information of non-Motorola equipment, refer to the vendor manuals provided with such equipment.

## Manual order

The installation order is the order of the manual starting at Chapter 1 and continuing through Chapter 5. After hardware installation has been completed, run the ATP for the system by following the procedures defined in Chapter 6 of this manual.

### Chapter 1

“Introduction” — This is a brief outline of the manual. Also provided is a list of additional documents and tools necessary to complete the procedures.

### Chapter 2

“Site Preparation” — This chapter contains the necessary information to verify the condition of the site.

### Chapter 3

“Installing Mounting Bracket and Remote GPS” — This chapter contains the necessary information to install the MicroCell/Surge Suppressor or PicoCell mounting bracket on a wall, pole, rack or ceiling.

### Chapter 4

“Preparing Site Cabling for Sites Equipped with Customer–Supplied Site I/O Interface” — This chapter contains the procedures for installing the external cabling for sites equipped with the customer–supplied Site I/O interface.

### Chapter 5

“Preparing Site Cabling for Sites Equipped with optional Primary Surge Suppressor” — This chapter contains the procedures for installing the external cabling for sites equipped with the optional Primary Surge Suppressor.

### Chapter 6

“Installing the Unit and Installation Check Off List” — This chapter contains procedures for installing the unit, mounting the Solar Cover to the chassis and final Installation Check Off List.

**Chapter 7**

“Acceptance Test Procedures (Optional)” – This chapter outlines the ATP used for a field audit after a BTS initial installation, if necessary.

**Chapter 8**

“Acceptance Test Procedures for Frequency Hopping Pilot Beacon (Optional)” – This chapter outlines the ATP used for a field audit of units configured as a Frequency Hopping Pilot Beacon.

**Chapter 9**

“Field Replaceable Unit (FRU) Procedures” – This chapter provides the FRU procedures for the BTS system.

**Appendix A**

“Outdoor Grounding Guidelines Overview” — This chapter overviews the grounding information for external units. Use this chapter for general reference purposes only. It is not meant to replace local code specifications or site specific directions.

**Site cleanliness**

While performing the procedures provided in this document, be sure that:

- for an internal installation, the site is kept clean and free of tracked-in dirt
- all packing material has been removed from the equipment.
- all tools not currently in use are picked-up as the installation progresses.
- all trash is removed from the site at the end of each day and after the installation is complete.
- equipment is covered with a tarpaulin whenever possible.
- use a shop-vac whenever you perform an internal installation procedure that generates dust, such as drilling or cutting.

**Site manager**

The site manager is the person in charge of and responsible for the full site. The installer will be verifying a variety of conditions with the site manager.

**System diagrams**

Figure 1–1 through Figure 1-7 show the MicroCell, PicoCell and optional Primary Surge Suppressor units mounted on a wall, rack, pole, frame and ceiling (PicoCell only).

PicoCell units are the only units that can be mounted on the ceiling. The MicroCell and Primary Surge Suppressor units can not be mounted on the ceiling.

The MicroCell, PicoCell and Primary Surge Suppressor can be mounted indoors (internal) or can be mounted outdoors (external).

## **Configurations**

The MicroCell and PicoCell support single-carrier, omni configurations.

The cover configurations for the MicroCell and PicoCell units are:

- Use solar covers on the Microcell and optional Primary Surge Suppressor for all outside mounting applications.
- Use fin covers on the Microcell or PicoCell for indoor applications.
- The Primary Surge Suppressor uses solar covers only.

The battery configurations for the MicroCell and PicoCell units are:

- Short duration battery

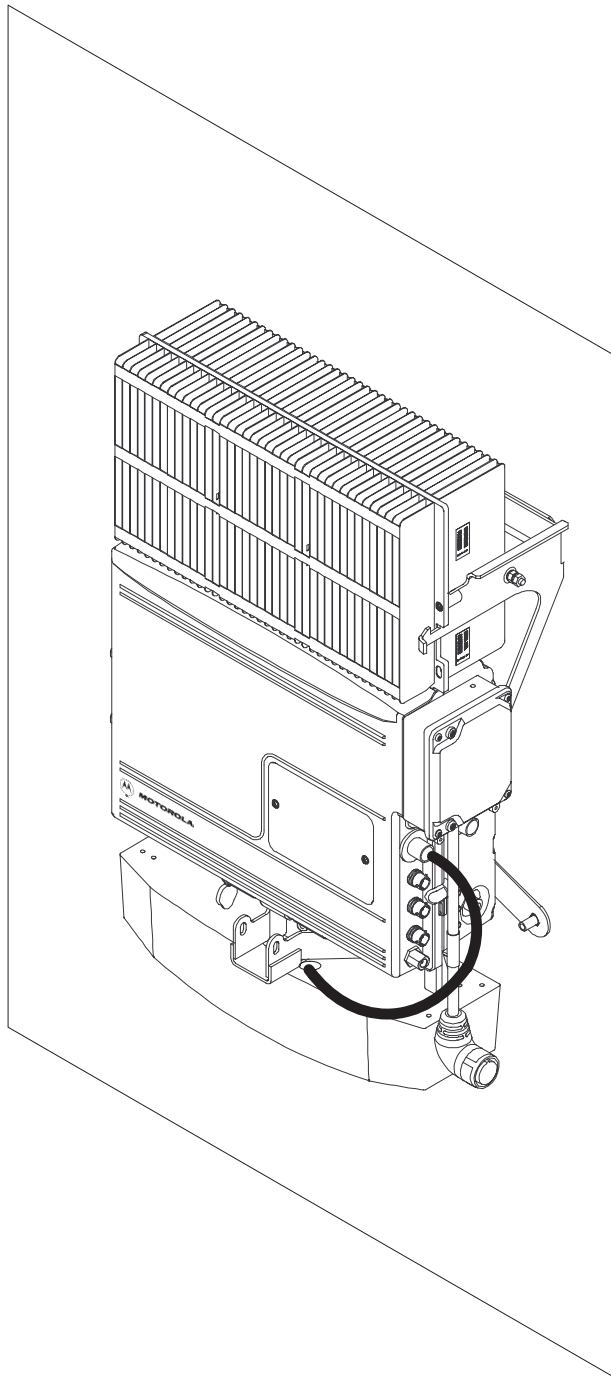
The power configurations for the MicroCell and PicoCell units are:

- AC power only
- DC power only
- AC power with short duration battery

The synchronization configurations for the MicroCell and PicoCell units are:

- Remote GPS Receiver – synchronous operation with High Stability Oscillator (HSO) backup.
- Internal High Stability Oscillator (HSO) only – non-synchronous operation.

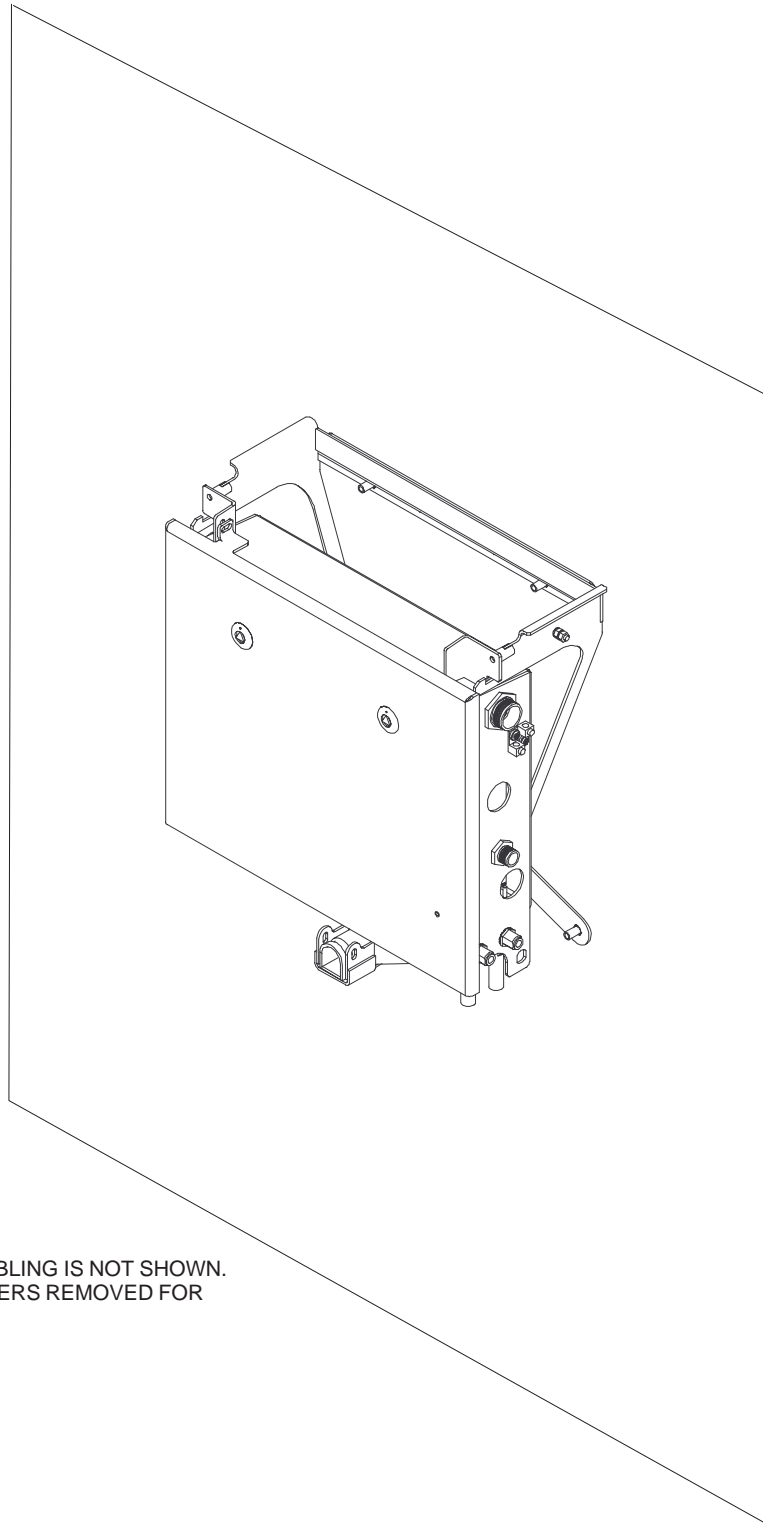
Figure 1-1: MicroCell Unit Mounted on a Wall



SYSTEM CABLING IS NOT SHOWN.  
FIN AND SOLAR COVERS REMOVED  
FOR CLARITY.



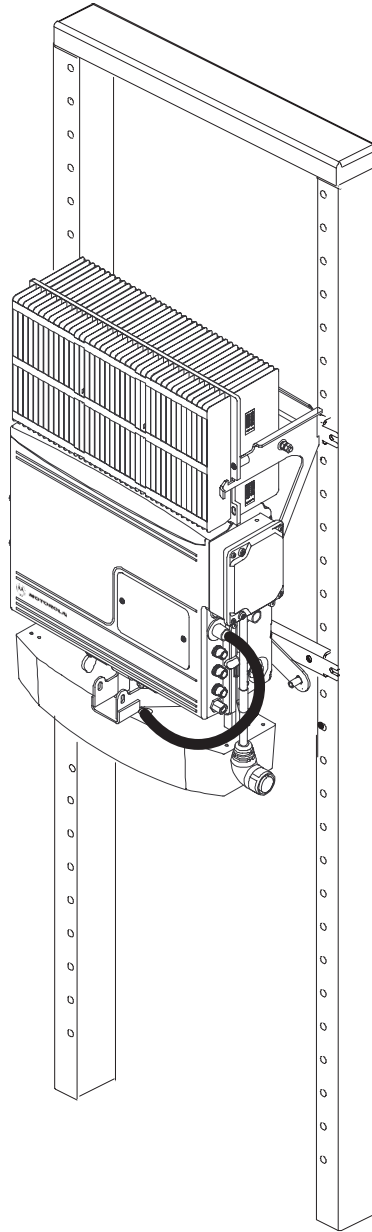
Figure 1-2: Primary Surge Suppressor Mounted on a Wall



SYSTEM CABLING IS NOT SHOWN.  
SOLAR COVERS REMOVED FOR  
CLARITY.

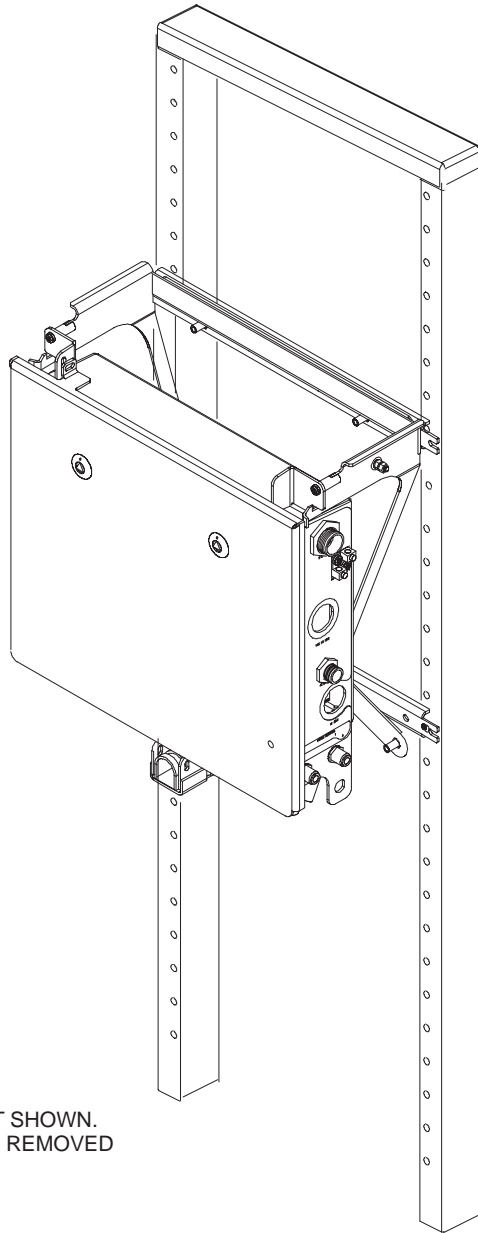
**Introduction** – continued

**Figure 1-3:** MicroCell Unit Mounted on a Rack



SYSTEM CABLING IS NOT SHOWN.  
FIN AND SOLAR COVERS REMOVED  
FOR CLARITY.

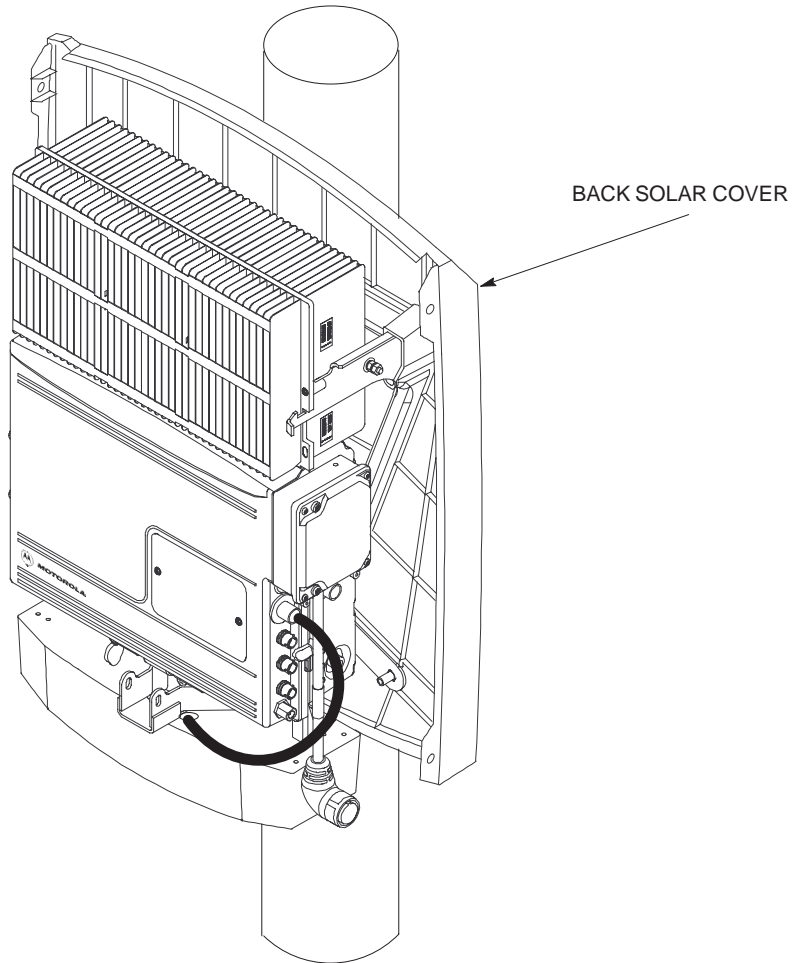
Figure 1-4: Primary Surge Suppressor Mounted on a Rack



SYSTEM CABLING IS NOT SHOWN.  
FIN AND SOLAR COVERS REMOVED  
FOR CLARITY.

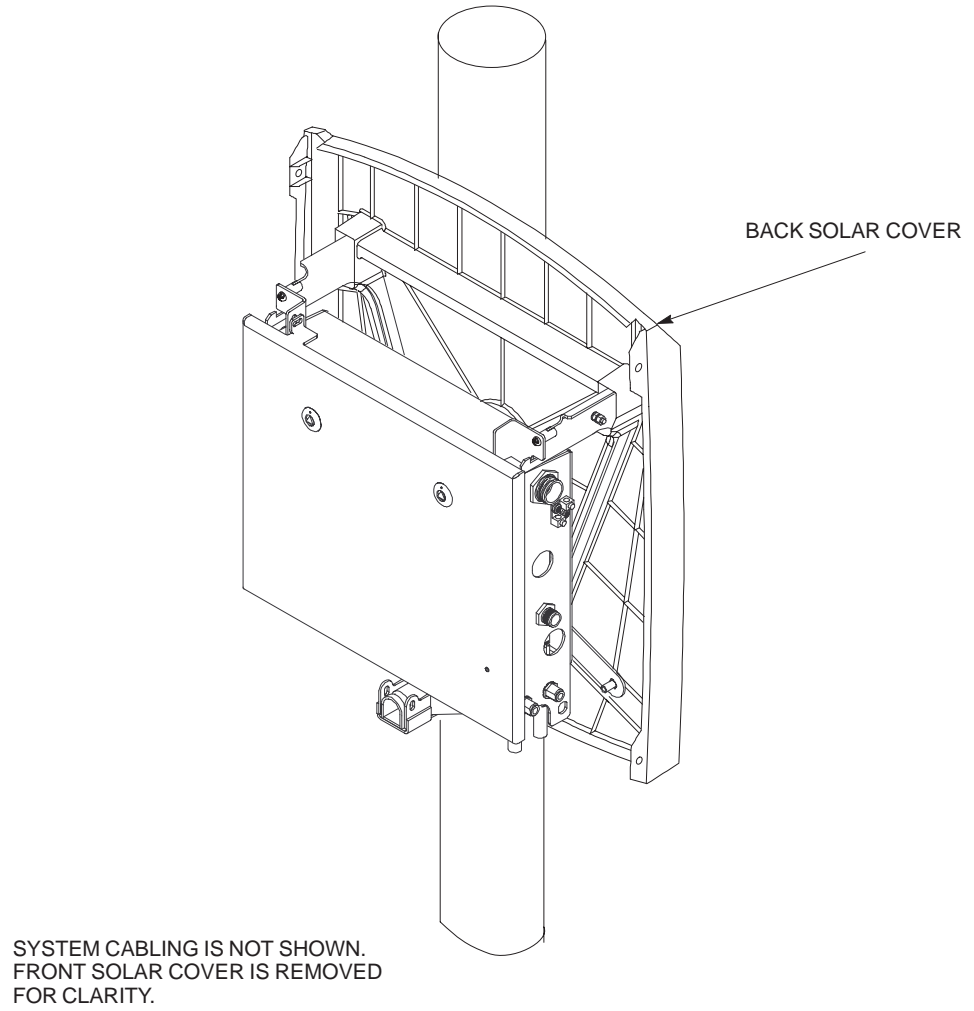
**Introduction** – continued

**Figure 1-5:** MicroCell Unit Mounted on a Pole



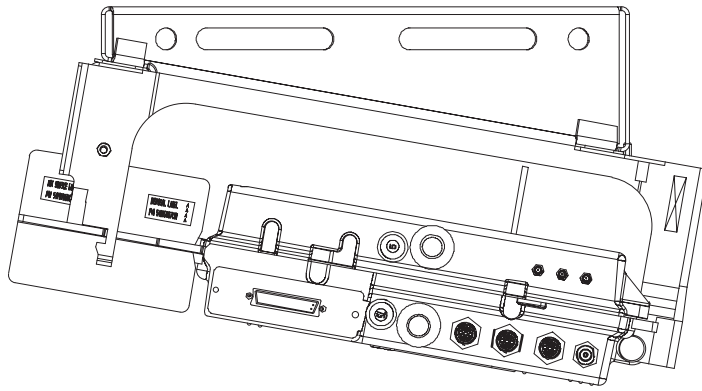
SYSTEM CABLING IS NOT SHOWN.  
FRONT SOLAR COVER IS REMOVED  
FOR CLARITY.

Figure 1-6: Primary Surge Suppressor Mounted on a Pole

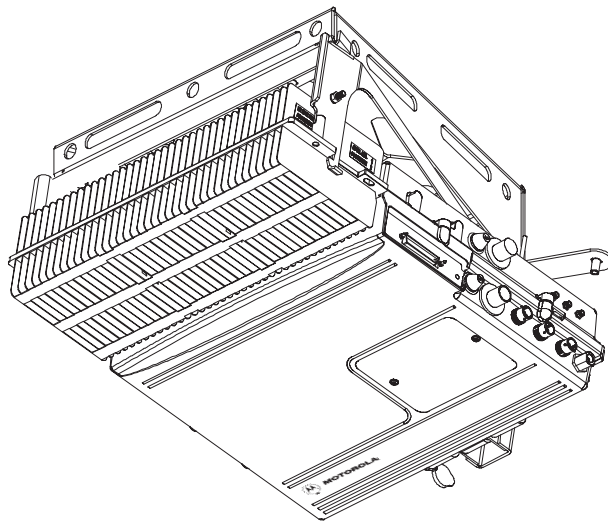


**Introduction** – continued

**Figure 1-7:** PicoCell Unit Mounted on a Ceiling



ONLY THE PICOCELL UNIT MAY BE MOUNTED ON THE CEILING



SYSTEM CABLING IS NOT SHOWN.  
FIN AND SOLAR COVERS REMOVED  
FOR CLARITY.

### Required Documents

The following documents are required to perform the installation, ATP and FRU procedures of the cell site equipment:

- *SC™ 300 BTS Hardware Installation, ATP and FRU – 68P09224A55* (This manual)
- Site Document (generated by Motorola Systems Engineering), which includes:
  - site specific documentation
  - channel allocation
  - contact list (customer)
  - ancillary/expendable equipment list
  - site wiring lists
  - contact list (Motorola support)
  - job box inventory
- Demarcation Document (Scope of Work agreement)
- *Grounding Guidelines for Cellular Radio Installations* (Motorola part number 68P81150E62)
- *CDMA LMF Operator's Guide; 68P64114A78.*
- Installation manuals for non-Motorola equipment (for reference purposes).

---

# Installation Tools and Materials

## Introduction

Many of the tools and materials depend on the style of the wall, pole, rack or ceiling that the mounting bracket is being installed on. The tools and materials required to install the BTS hardware are specified for each mounting style. Due to the variability of mounting styles, additional tools and materials may be required to meet specific site needs. This is outside of the scope of this document and must be evaluated on a site to site basis.

Also, for each procedure, a tools and materials list is provided within the procedure.

Motorola kit T393AA is available for most installation styles and methods. Motorola kit T393AA contains:

- 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
- Flathead bit
- Torque ratchet wrench 3/8-in. drive, 0–10 N–M (Utica part number TCI–150 R/A 3/8-in. or equivalent)
- 5/16 Breakaway 9-in. lb.
- 13/16 Breakaway 38-in. lb.
- Wire Crimping Tool
- Installation Handles, Motorola Part Numbers (Left Handle 0787668C01) and (Right Handle 0787668C02)
- Screws M6x19 (Motorola Part Number 0387541C03)
- Buckle Strap Tool



**Tools and Materials for  
Installing the Mounting Bracket  
on a Pole**

The following tools and materials are required to properly and safely install the the mounting bracket on a pole.

<b>Table 1-1: Tools and Materials for Pole Mounting</b>		
<b>Hand Tools</b>	<b>Materials</b>	<b>Power Tools</b>
Safety Glasses	MicroCell or PicoCell mounting kit	No Power Tools Required
Bucklestrap Cutting Tool (Motorola part number 6604809N01)	electrical tape (customer supplied)	
T30 TORX tamper bit, 1/4-in. hex		
Torque driver wrench, 1/4-in. hex female drive, 0–10 N–M		
Ball Peen (Metal Working) Hammer		
Heavy Gloves		
Tape Measure		

**Tools and Materials for  
Installing the Mounting Bracket  
on a Rack**

The following tools and materials are required to properly and safely install the mounting bracket on a rack.

<b>Table 1-2: Tools and Materials for Rack Mounting</b>		
<b>Hand Tools</b>	<b>Materials</b>	<b>Power Tools</b>
T30 Torx tamper bit, 1/4-in. hex	MicroCell or PicoCell Mounting Kit	No Power Tools Required
Torque driver wrench, 1/4-in. hex female drive, 0–10 N–M	Four machine screws 12–24 5/8-in. self tapping (customer supplied)	
	Chalk or marker to mark location on rack (customer supplied)	
	electrical tape (customer supplied)	

## Installation Tools and Materials – continued

### Tools and Materials for Installing the Mounting Bracket on a Concrete Wall

The following tools and materials are required to properly and safely install the mounting bracket on a concrete wall.

<b>Table 1-3: Mounting Bracket Tools and Materials for Concrete Wall Mounting</b>		
<b>Hand Tools</b>	<b>Materials</b>	<b>Power Tools</b>
T30 Torx tamper bit, 1/4-in hex	metal shim material	Hilti wall drilling rig
15/16-in. (23.8 mm) socket, a ratchet wrench, and an 18-in. (45.7 cm) breaker bar	Hilti anchors (for each bracket)	Hilti DCM 18–14 metric bit
safety glasses	MicroCell or PicoCell Mounting Kit	shop vacuum
chalk for marking outline on wall	electrical tape (customer supplied)	
tape measure		
4-ft (1.22 m) bubble level		
rubber mallet		
ear plugs		
dust mask		

**Tools and Materials for  
Installing the Mounting Bracket  
on a Concrete Ceiling**

The following tools and materials are required to properly and safely install the the ceiling adapter on a concrete ceiling.

**Table 1-4:** Tools and Materials for Concrete Ceiling

<b>Hand Tools</b>	<b>Materials</b>	<b>Power Tools</b>
T30 Torx tamper bit, 1/4-in. hex	metal shim material	Hilti wall drilling rig
Torque driver wrench, 1/4-in. hex female drive, 0–10 N–M	Hilti anchors (qty. of 4 for each bracket)	Hilti DCM 18–14 metric bit
15/16-in. (23.8 mm) socket, a ratchet wrench, and an 18-in. (45.7 cm) breaker bar	PicoCell Mounting Kit	shop vacuum
safety glasses	Ceiling Mounting Kit*	
chalk for marking outline on ceiling	electrical tape (customer supplied)	
tape measure		
4-ft (1.22 m) bubble level		
rubber mallet		
ear plugs		
dust mask		
*Optional. Not shipped with unit.		

# ATP Tools and Materials

## Policy

To ensure consistent, reliable and repeatable test results, test equipment meeting the following technical criteria should be used to perform the ATP on the BTS equipment.

### NOTE

During manual testing, you can substitute supported test equipment with other test equipment models not supported by the LMF. However, they must meet the same technical specifications.

*It is the responsibility of the customer to account for any measurement variances and /or additional losses / inaccuracies that can be introduced as a result of these substitutions. Before beginning the ATP or troubleshooting, make sure that the test equipment needed is on hand and operating properly.*

## Test equipment calibration

Optimum system performance and capacity depend on regular test equipment service, calibration, and characterization. Follow the original equipment manufacture (OEM) recommended maintenance and calibration schedules closely.

## Test cable calibration

Equipment test cables are very important in the ATP. It is recommended that the cable calibration be run at every BTS with the test cables attached. This method compensates for test cable insertion loss within the test equipment itself. No other allowance for test cable insertion loss needs to be made during the performance of tests.

Another method is to account for the loss by entering it into the Local Maintenance Facility (LMF) during the optimization procedure. This method requires accurate test cable characterization in a lab environment. The cable should be tagged with the characterization information prior to field optimization.

## Equipment Warm-up

After arriving at the a site, the test equipment should be plugged in and turned on to allow warm up and stabilization to occur for as long as possible. The following pieces of test equipment must be warmed-up for *a minimum of 60 minutes* prior to the ATP.

- Communications Test Set
- Power Meter

## Test Equipment List

The following pieces of test equipment are required during the ATP. Common assorted tools like screwdrivers and keys are not listed but are still required. Read the owners manual on all of the following major pieces of test equipment to understand their individual operation prior to use in optimization.

### NOTE

Always refer to specific OEM test equipment documentation for detailed operating instructions.

## CDMA LMF Hardware Requirements

A CDMA LMF computer platform that meets the following requirements (or better) is recommended:

- Notebook computer
- PCMCIA to Serial I/O Adapter
- 266 MHz (32 bit CPU) Pentium processor
- 4 Gbyte internal hard disk drive
- Color display with 1024 x 768 (recommended) or 800 x 600 pixel resolution
- 128 MB RAM
- CD ROM drive
- 3 1/2 inch floppy drive
- Serial port (COM 1)
- Parallel port (LPT 1)
- PCMCIA Ethernet interface card (for example, 3COM Etherlink III) with a 10Base-T-to-coax adapter
- Windows 98 or higher operating system

### NOTE

If 800 x 600 pixel resolution is used, the CDMA LMF window must be maximized after it is displayed.

## RS232 to GPIB Interface

One National Instruments GPIB-232-CT with Motorola CGDSEDN04X RS232 serial cable or equivalent; used to interface the LMF to the test equipment.

*A Standard RS-232 cable can be used with the following modifications:*

- Pin 8 (CTS) does not have to be jumpered/shorted to the others as it is a driver output. The DTR is already a driver output signal. The other pins are to receivers. Short pins 7, 1, 4, 6 on each cable end:



- Hewlett–Packard Model HP437B with HP8481A power sensor capable of measuring from –30 dBm to 20 dBm.

**RF attenuators**

30 dB, 10 Watt minimum RF attenuator to attenuate the transmitter output for Microcell tests.

**BTS serial cable**

One BTS serial cable to connect LMF to MMI/LMF connector.

**Male N to male N cables**

The following male N to male N cables are necessary to do this procedure:

- One male N to male N cable. The short RF test cable used for cable calibration.
- Two male N to male N cables. The transmit RF test cable and the receive RF test cable used for ATP.

**Male BNC to male N cable**

One male BNC to male N cable. This cable is used to allow self–calibration of the Communication Test Set.

**Male BNC to male cable**

One male BNC to male cable. This cable connects the 2 Second Reference to the external trigger of the Communication Test Set.

**Male BNC to Male SMA cable**

Two male BNC to male SMA cables. These cables are is used to connect the BTS 19.6608 MHz and 2 Second Reference to the Communication Test Set.

**Ohm load**

One male N 50 Ohm load to terminate the unused antenna port for Microcell receive testing.

**15 to 9–pin DSUB Adapter**

One 15 to 9–pin DSUB adapter. This allows connection between the MMI/LMF connector on the BTS and the DB9 cable.

**Female N to female N adapter**

One female N to female N adapter. This allows connection between the short RF test cable and the transmit RF test cable or the receive RF test cable.

**BNC–T connectors**

One female and one male port BNC–T connector. This connects the 2 Second Reference to the external trigger of the Communication Test Set.

**Optional Equipment****NOTE**

None of the optional equipment specified here is supported by the LMF in automated tests. It is meant to serve as a list of additional equipment that might be required during maintenance and troubleshooting operations.

**Digital multimeter**

Fluke Model 8062A with Y8134 test lead kit or equivalent; used for precision DC and AC measurements, requiring 4–1/2 digits.

**Frequency counter**

Stanford Research Systems SR620 or equivalent. If direct measurement of the 19.6608 MHz references is required.

**Spectrum analyzer**

Spectrum Analyzer (HP8594E with CDMA personality card) or equivalent. Required for manual tests other than standard tests performed by the LMF.

**Span line (JT1) verification equipment**

As required for local application

**RF test cable (if not provided with test equipment)**

Motorola model TKN8231A. Used to connect test equipment to the BTS during ATP or general troubleshooting procedures.

**Oscilloscope**

Tektronics model 2445 or equivalent. Used for waveform viewing, timing and measurements during general troubleshooting procedures.

**CDMA subscriber mobile or portable radiotelephone**

CDMA compatible with power supply and antenna. Used to provide test transmission and reception during BTS maintenance and troubleshooting. Two radios will be required for system and drive around testing *after* BTS installation and optimization.



## Introduction

The following is a list of the FRUs for the Microcell and Picocell units and a list of the tools and materials necessary to perform the FRU installation and removal procedures:

## 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

## Tools and Materials Required to Perform FRU Procedures

The following is a list of tools and materials required to perform the FRU installation procedures.

Table 1-5: Tools Required to Perform FRU Procedures		
Hand Tools	Materials	Power Tools
T30 Torx tamper bit, 1/4-in. hex	Applicable FRU Installation handles (optional)	None Required
T20 Torx tamper bit, 1/4-in. hex		
Torque driver wrench, 1/4-in hex female drive, 0–10 N–M		
13 mm torque wrench		
5/16 breakaway torque wrench		
13/16 breakaway torque wrench		

# Unit Identification

## Overview

Figure 1-9 and Figure 1-10 show the various components of the MicroCell and PicoCell systems.

**Figure 1-9:** General Block Diagram Showing the Port Names

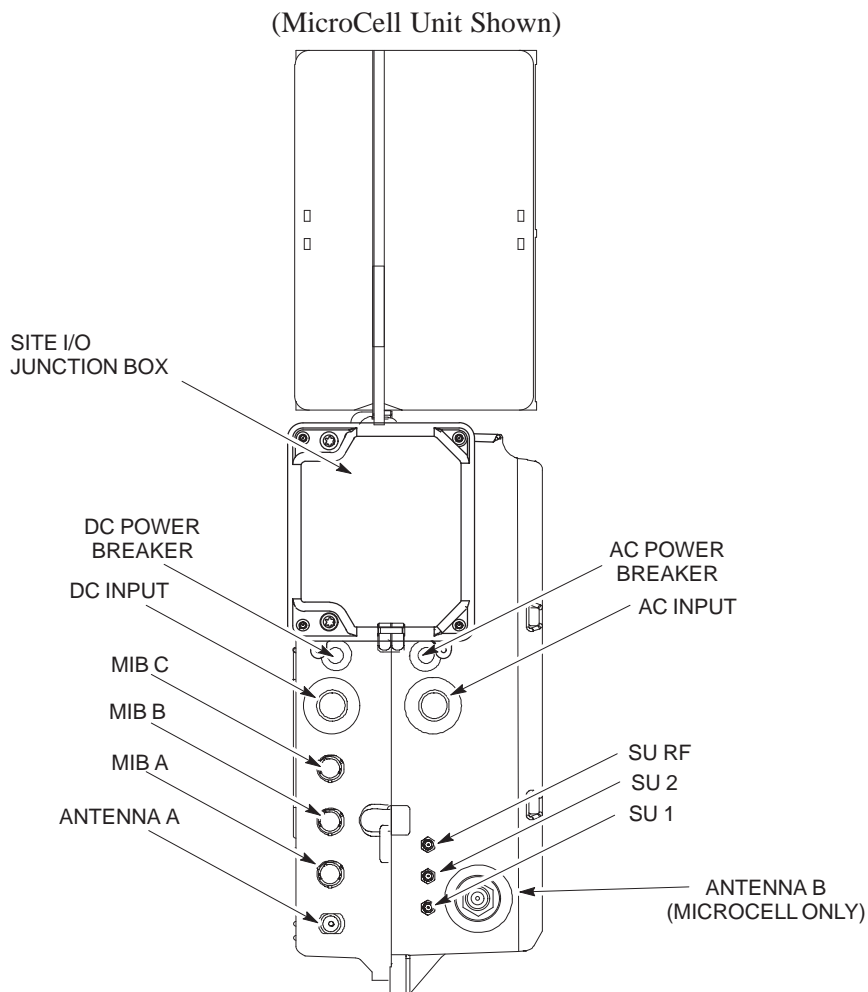
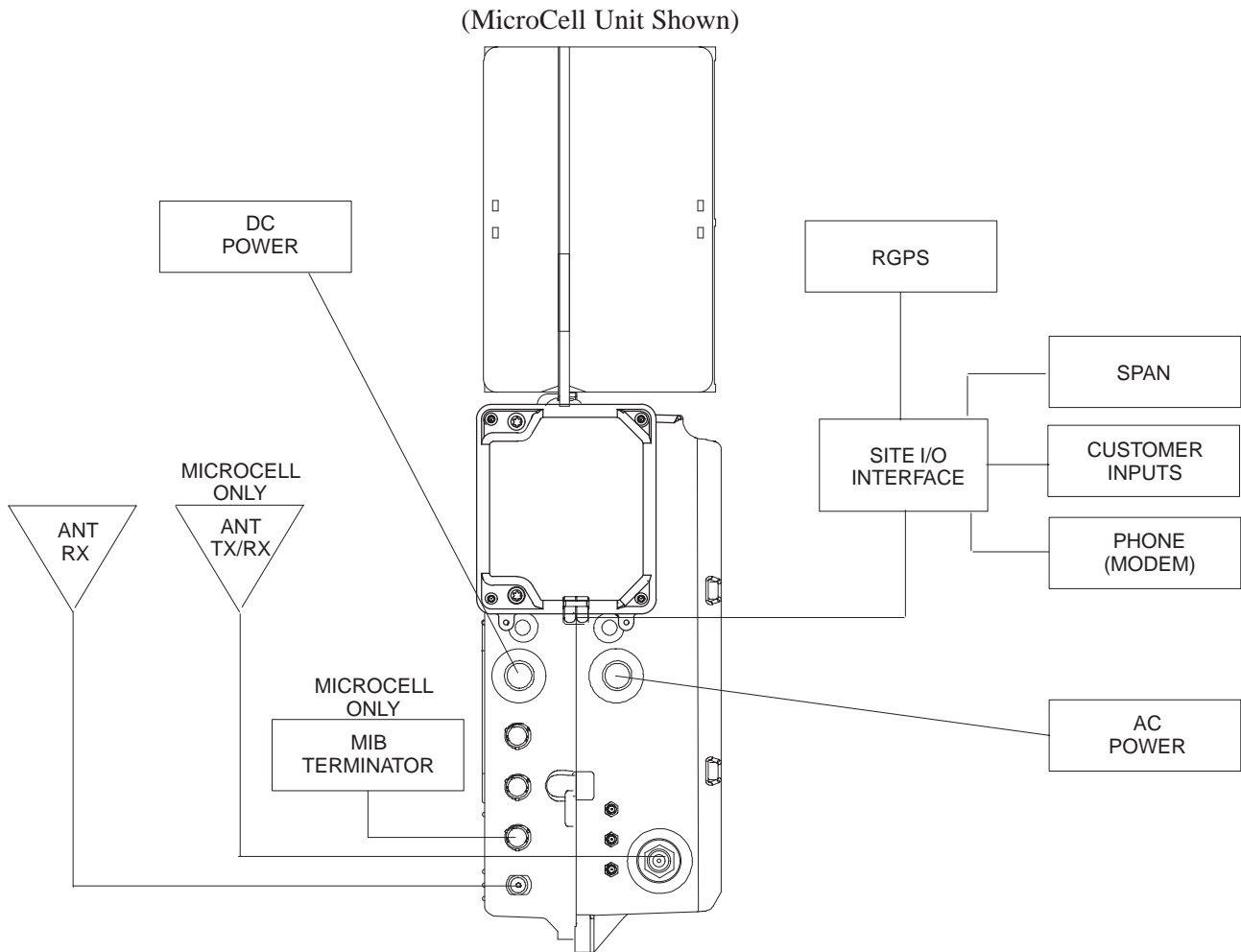


Figure 1-10: General Block Diagram Showing the Unit, Site I/O Interface, and External Items



# Unit Identification – continued

Figure 1-11: Microcell and Picocell Unit

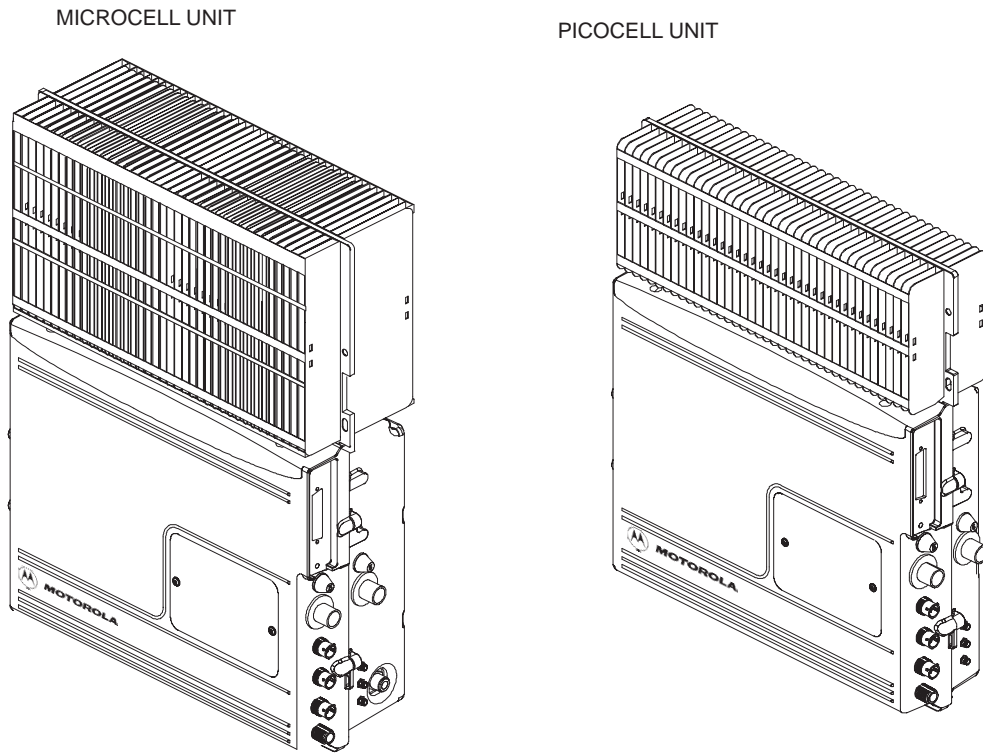


Figure 1-12: Site I/O Junction Box and Cable

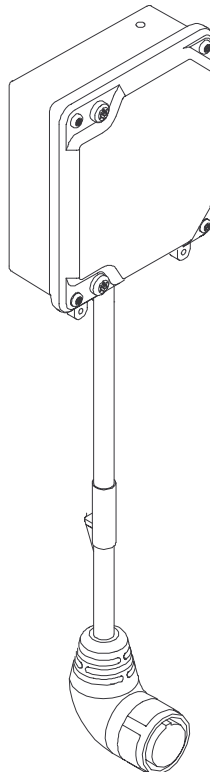


Figure 1-13: Primary Surge Suppressor (Optional)

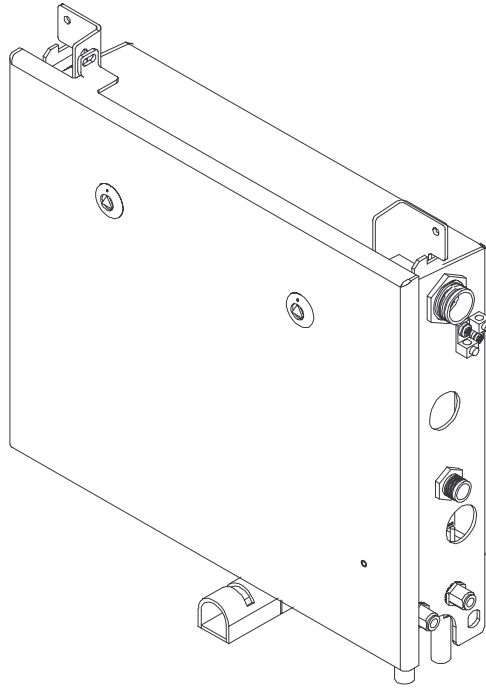
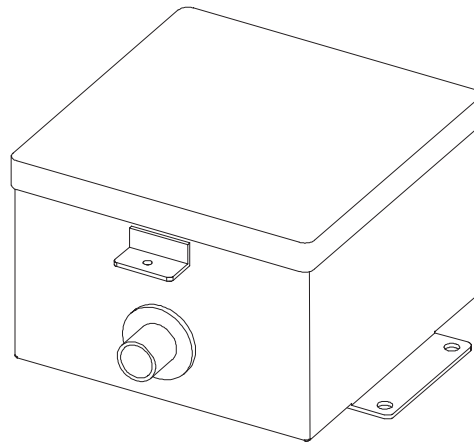
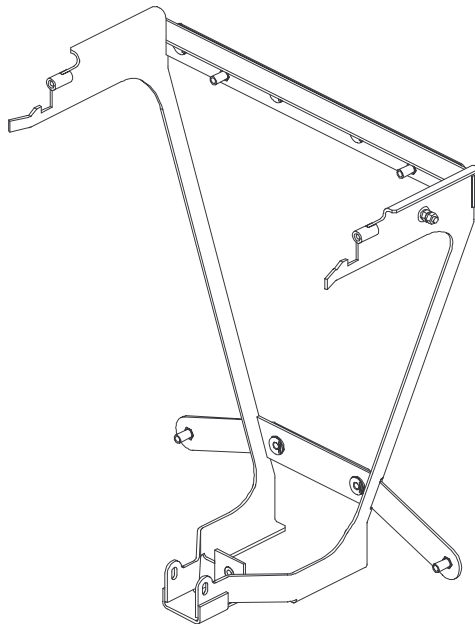


Figure 1-14: AC Installation Box (Optional)



## Unit Identification – continued

**Figure 1-15:** Mounting Bracket for both Microcell and Primary Surge Suppressor



**Figure 1-16:** Mounting Bracket for Picocell

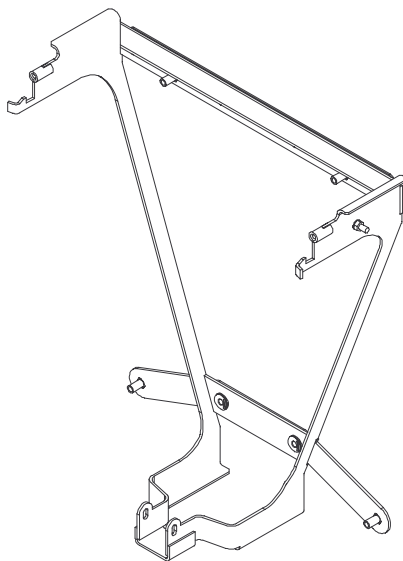
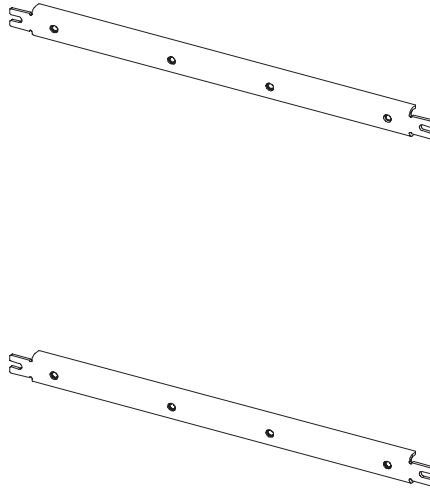


Figure 1-17: Adapters for Rack Mounting



# Unit Identification – continued

Figure 1-18: Adapters for Pole Mounting

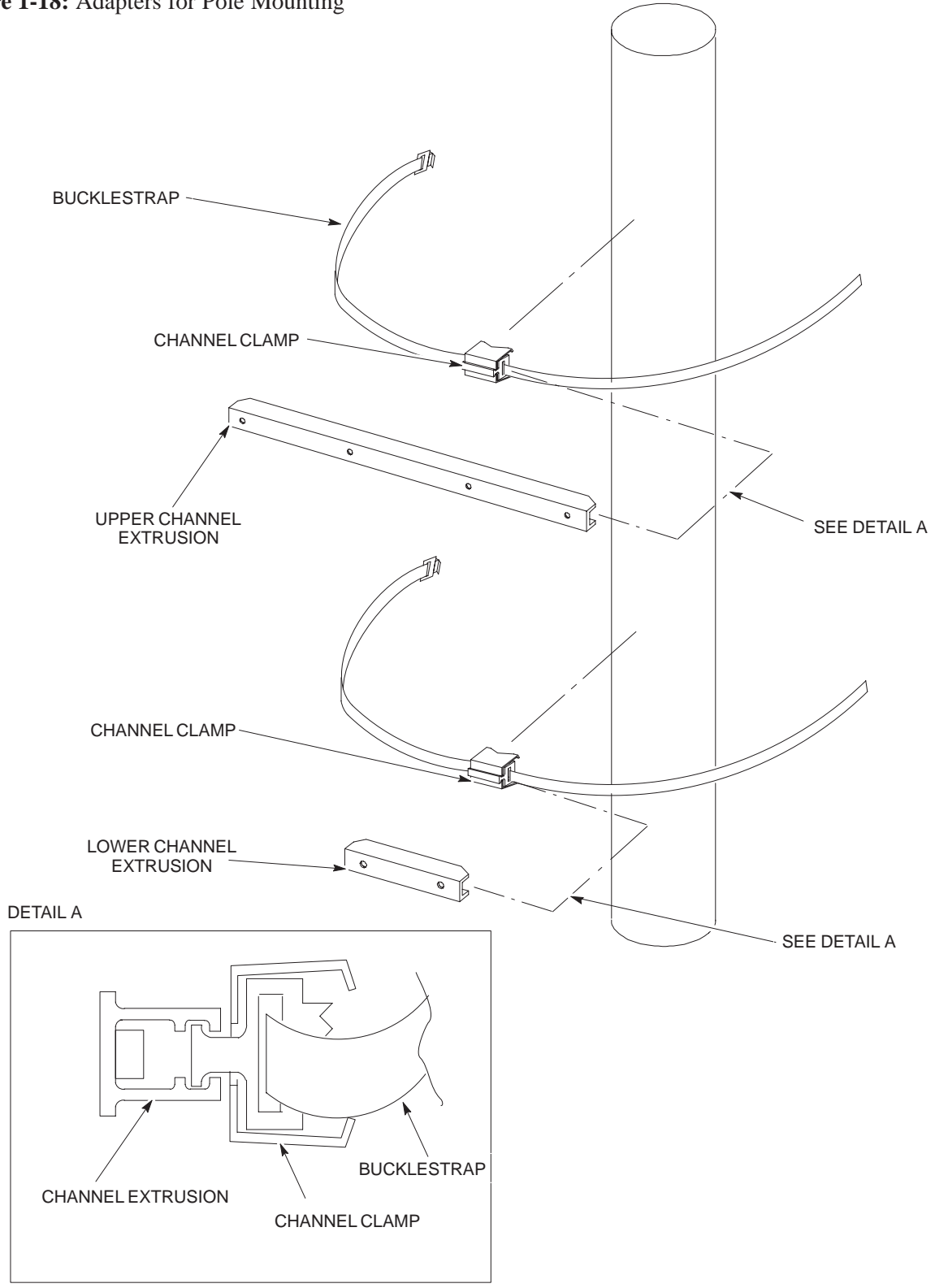




Figure 1-19: Adapter for Ceiling Mounting (Optional)

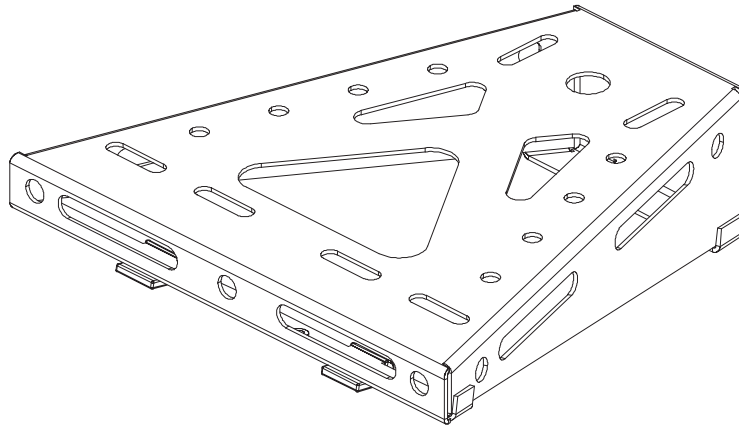


Figure 1-20: Installation Handles for Lifting Unit (Optional)

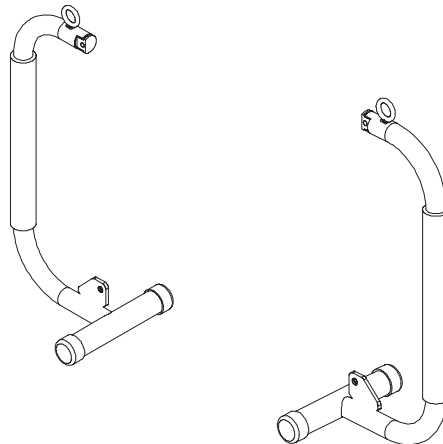
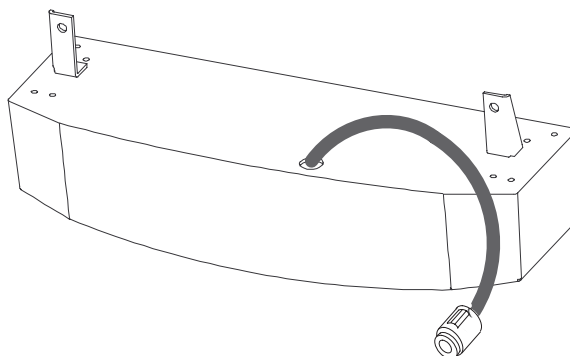


Figure 1-21: Short Duration Battery (Optional)



Unit Identification – continued

Figure 1-22: Front and Back Solar Covers for MicroCell

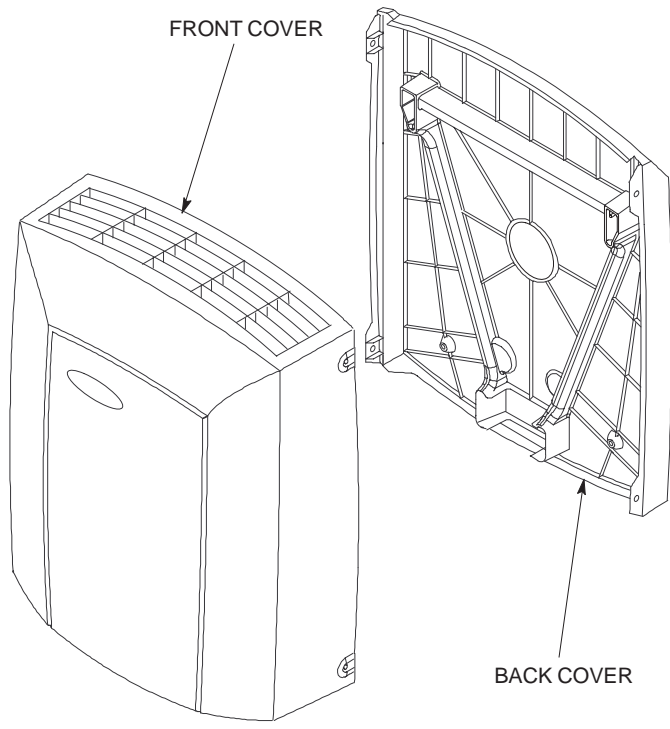


Figure 1-23: Front and Back Solar Covers for Surge Suppressor

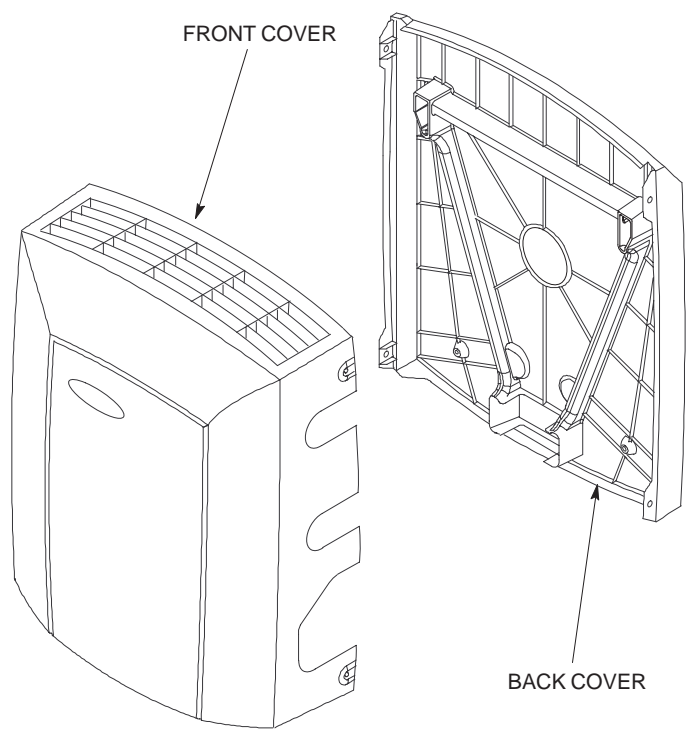
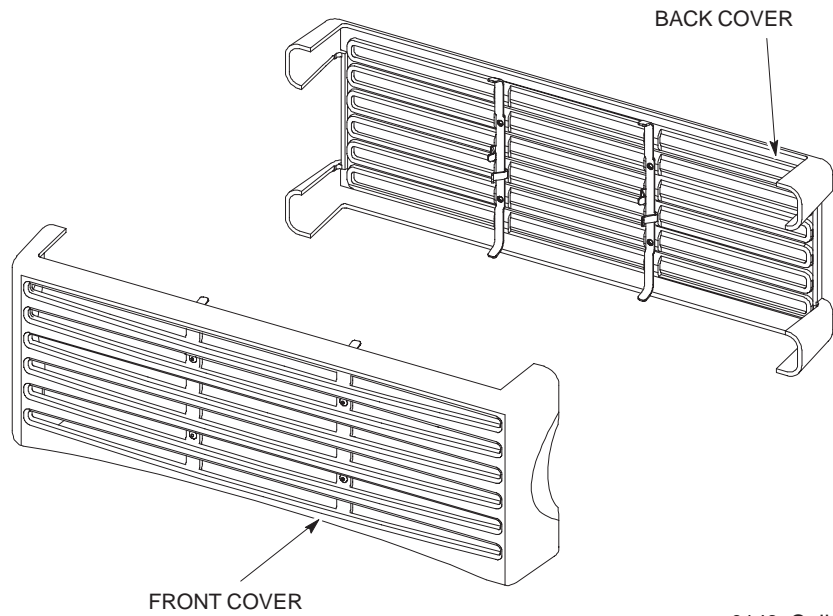


Figure 1-24: Front and Back Fin Covers for MicroCell and PicoCell (PicoCell shown)



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# Installation and ATP Order

## Installation Order

The pieces of the MicroCell, PicoCell and Primary Surge Suppressor units should be installed in the following order.

1. Unpack and inspect hardware.
2. Install mounting hardware and bracket(s).
3. Install back solar cover to mounting bracket (required for outdoor installations and optional for indoor applications).
4. Install back fin cover to unit (required for indoor installations).
5. Install RGPS.
6. Prepare site cabling.
7. Attach installation handles to unit (optional).
8. Attach and secure unit to mounting bracket.
9. Attach and secure Primary Surge Suppressor to mounting bracket (optional).
10. Remove installation handles (if used).
11. Remove Site I/O dust cover.
12. Attach Site I/O junction box to unit.
13. Attach all ground cabling to unit(s).
14. Attach all cables to unit(s).
15. Install short duration battery (if required).
16. Attach front solar cover (optional).
17. Attach front fin cover (optional).

## ATP Order

The ATP for the MicroCell and PicoCell units is performed in the following sequence:

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.
9. Update BTS-specific CDF file device load version.
10. Download and enable MAWI.
11. Test equipment setup (R3465 Calibration/GPIB address & clock setup).
12. Test equipment selection.
13. Power meter calibration.

14. Test cable calibration.
15. Create CAL file.
16. RF path audit.
17. TX and RX Acceptance tests.
18. Generate an ATP Report.
19. Copy LMF CAL file to CBSC.
20. Terminate LMF session/leave the site.

### Frequency Hopping Pilot Beacon ATP Order

The Frequency Hopping Pilot Beacon (FHPB) ATP for the MicroCell and PicoCell units is performed in the following sequence:

1. Create CAL file.
2. RF path audit.
3. TX Acceptance tests.
4. Generate an ATP Report.
5. Copy LMF CAL file to CBSC.
6. Terminate LMF session/leave the site.



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# Site Preparation Overview

## Overview

This chapter provides the procedures and information to verify that the site is ready to have the equipment installed. It also provides procedures to ensure the safety of the installation personnel, protect the equipment from damage, and verify the site layout parameters.

## External Installation Versus Internal Installation

The MicroCell and PicoCell systems can be installed outdoors (external) or indoors (internal). The site preparation depends on the type of installation and the site characteristics. Most preparations apply to both types (indoor and outdoor) of installations. It is stated when a preparation applies to only one type of installation.

All indoor installations must be in a restricted access location.

## Verifications and Procedures

The verifications and procedures provided in this chapter are:

- External site inspections
- Internal site inspections
- Preparing site for the arrival of equipment
- Site layout verification

## Site Manager

The site manager is the person in charge of and responsible for the full site.

## Verifications and Inspections

Verifications typically have the installer check with the site manager that a condition has been previously checked or procedure previously performed and meets a stated specification.

Inspections typically have the installer personally checking that a condition or item meets stated specifications.

---

# Site Inspections

## Inspection Overview

2

Inspect the site to verify that the necessary equipment has been properly installed. Also, as part of the inspection, verify that the equipment is adequate to support the Motorola equipment. Not all inspections may apply to every site. The site characteristics determine which inspections apply.

### NOTE

Installation of ancillary equipment (e.g., power supplies, terminal blocks, etc.) may be the responsibility of the installer. Refer questions to your Motorola Program Manager.

## Deficiencies

Notify responsible persons of any deficiencies as soon as possible, if the installer is not responsible for correcting the noted deficiencies. Deficiencies may need to be corrected before any installation can start.

## What to Inspect

The following external items should be inspected and compared against any related site-specific documentation.

- Towers
- Antennas
- External ground systems
- Clearances for units
- Mounting Structures

Additionally, for all sites the incoming power should be inspected and compared against any related site-specific documentation.

## Antenna and Tower Inspections

### Documentation

The vendor responsible for supplying the towers should leave the installation documentation at the site after the tower has been erected. Review this documentation and compare it with any related site-specific documents.

### Inspection

Inspect the following:

- Tower painting
- Tower lighting (beacons)
- Antenna and transmission line installation
- Grounding.

### Structural Inspections and Verifications

#### Wall loading capacity

Verify with the site manager that the wall loading capacity has been previously checked by a qualified Civil Engineer and meets the specifications stated in the site-specific documentation.

#### Pole loading capacity

Verify with the site manager that the pole loading capacity has been previously checked and meets the specifications stated in the site-specific documentation.

#### Ceiling loading capacity

Verify with the site manager that the ceiling loading capacity has been previously checked and meets the specifications stated in the site-specific documentation.

#### Site power

Verify with the site manager that site power has been previously checked and meets the specifications stated in the site-specific documentation.

#### Cabling rack

For indoor installations inspect the cable rack for proper installation. The cable racks should be at least 7 ft from the floor. The cable racks should be electrically tied together with 6 AWG wire, except cable racks that are in an isolated ground zone.

#### Fire protection

For indoor installations verify with the site manager that some type of fixed fire suppression equipment is installed. The possible types are:

- Halon gas system, recommended for cell sites because:
  - Halon extinguishes a fire without removing oxygen from a room.
  - Halon is clean, allowing for quick cleanup after a fire.
  - Halon will not damage the cell site equipment.
- CO<sup>2</sup> (carbon dioxide) system.
- Sprinkler system. “Dry pipe” sprinkler systems that remove all power to a room before filling the overhead sprinklers with water are recommended.



#### WARNING

In addition to the fixed fire suppression equipment, there should be at least two 5-lb ABC class portable fire extinguishers on the premises before equipment installation begins.

### Fire Fighting Procedures

Cellular infrastructure equipment contains various materials which can decompose into toxic compounds during intense heat. When fire fighting conditions are severe, wear full protective clothing, including helmet, self-contained, positive pressure or pressure demand breathing apparatus, bunker coat and pants, bands around arms, waist and legs, face mask, and protective covering for exposed areas of the head.

### Product Disposal



#### IMPORTANT

The cooling system of the SC™ 300 BTS product contains Fluorinert FC-84. The cooling system is sealed before shipment and should not be incinerated.

The Material Safety Data Sheet (MSDS) for Fluorinert FC-84 suggests reclaiming the fluid if feasible. Contact the following office for information:

3M Center – Performance Materials Division  
Building 223-6S-04  
St. Paul, MN 55144  
800-833-5045



#### IMPORTANT

The short duration battery is a lead acid battery. Do not incinerate.

The Material Safety Data Sheet (MSDS) for Lead Acid Batteries states the spent battery should be sent to a secondary lead smelter for recycling.

### Antenna cables and ports

Inspect the antenna cables and ports to verify that:

- All antenna cables have been properly labeled.
- Antenna ports have been properly weatherproofed.
- An adequate number of ports exist to handle all of the required antenna runs.
- Lightning arrestors have been installed at the site (sites equipped with optional Primary Surge Suppressor do not require this). Lightning arrestors are shipped with the optional Primary Surge Suppressor and Primary Surge Suppressor expansion kit.
- For some systems, special ports may be required (refer to the site-specific information for further details).

### Alarms

Verify with the site manager that any of the following alarms called out in the site-specific documentation have been installed and previously checked for meeting the site-specific documentation specifications.

- vandalism
- surface water
- intrusion
- fire
- building high/low temperatures
- any customer-specific options.

The interface of the alarms to the Motorola equipment will be part of the cell site equipment installation.

### Environmental Inspections (indoor only)

#### Temperature control

Verify with the site manager that the cell site building has been previously checked for the ability to maintain a temperature range as specified by Motorola. The life span of electronic equipment is shortened by environmental variations, even though it is designed to operate in extreme temperatures.

### Grounding Inspections

#### For external installations

For outside installations refer to the site specific documentation.

#### For internal installations

For indoor installations refer to the *Grounding Guideline for Cellular Radio Installations (68P81150E62)* for all grounding inspection procedures.

Verify the following:

- All ground cables have a bend radius of 20 cm (8 inches) or more.
- Metallic lines (span, phone[modem], RGPS, power and antenna) that enter or leave the site should be equipped with a 3-electrode gas tube protector. The ground side of the gas tubes should be tied to the Master Ground Bus (MGB). This is not necessary if your site is equipped with the Primary Surge Suppressor.
- All installed cable racks (in the same ground zone) are jumpered together.



#### WARNING

Cable racks in an Isolated Ground Zone (IGZ) are not to be connected to a cable rack in a non-IGZ. For more information on IGZ, see *Grounding Guideline for Cellular Radio Installations*, Motorola part number 68P81150E62.

## Prepare Site for the Arrival of the Equipment

### Description

2

This information covers various topics not all of which are needed at every site. Based on the site characteristics execute the steps that apply to your site. Before installing the equipment, do the following to ensure the safety of installation personnel and to protect the equipment.

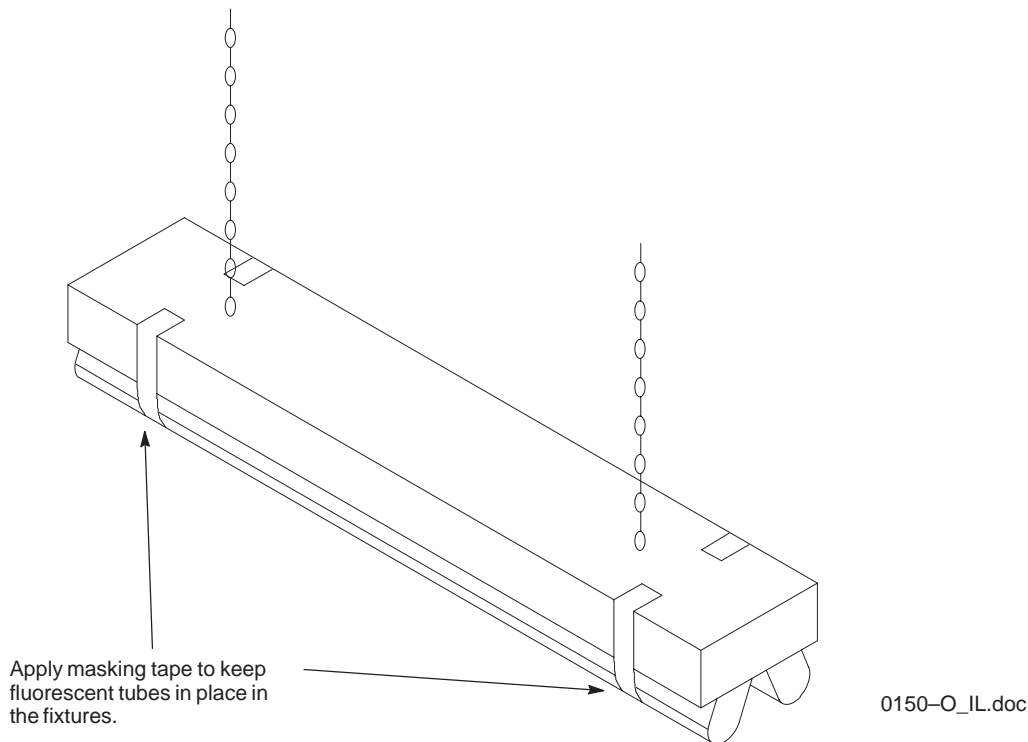
### Equipment Arrival

Before the equipment arrives, indicate to the transport company an area at the site where the equipment can be unloaded and, if necessary, unpacked. The equipment should be carefully delivered to the site, along with all equipment dollies and padding required to safely move the equipment from the unloading area to the cell site. The following should also be provided, outdoor weather protection, temporary lighting and power for lighting and power tools.

### Securing Fluorescent Lights

Figure 2-1 illustrates the use of tape to secure fluorescent tubes. Secure any fluorescent tubes that may be hit or damaged by any unit, cable, or personnel.

**Figure 2-1:** Securing Lights with Tape



## Prepare Site for the Arrival of the Equipment – continued

### Procedure to Prepare the Site for the Equipment

2

<b>Table 2-1: Procedure to Prepare the Site for the BTS</b>	
<b>Step</b>	<b>Action</b>
1	If some type of protective padding is available install it around any existing equipment at the site that could be damaged during installation of the units.
2	Hang plastic sheets around intended work areas to prevent dust and debris from damaging co-located equipment during installation.
3	Secure any fluorescent tubes in place using masking tape. (Refer to Figure 2-1.)  <b>NOTE</b> This will prevent the tubes from being inadvertently jarred from the fixtures during the installation of equipment or cables.
4	Locate the demarcation blocks for external utilities. Verify that they are shown on the Site Engineering documents, and determine the required cable routing back to the equipment frames.
5	Verify the following: <ul style="list-style-type: none"><li>• DC power is available and meets the site documentation specifications (if applicable).</li><li>• AC power is available and meets the site documentation specifications (if applicable).</li><li>• Cable rack is installed per site document specifications.</li><li>• Outdoor cable runs are installed and meet local building codes.</li><li>• Span line termination tie points are available.</li><li>• Customer input termination tie points are available.</li><li>• Phone tie-in points (modem) are available.</li><li>• Phone access is available (if applicable).</li><li>• There is clear access to move the equipment to the desired mounting area.</li><li>• There is sufficient space for installation and service access to the equipment.</li><li>• Customer supplied shelters are installed.</li></ul>

## Dimensions and Clearances

### MicroCell and PicoCell Overview

2

This information covers the dimensions and clearances associated with the MicroCell and PicoCell Units.

### Dimensions and Clearances

Table 2-2, Table 2-3, Figure 2-2 through Figure 2-7 show the installed dimensions and recommended clearances for each item.

<b>Table 2-2: Installation Dimensions for the MicroCell and PicoCell Units</b>				
<b>Item</b>	<b>Height</b>	<b>Width</b>	<b>Depth</b>	<b>Weight</b>
<b>MicroCell (fully installed)</b>	730 mm 28.76 in.	590 mm 23.25 in.	254 mm 10.01 in.	38.5 kg 84.7 lbs
<b>MicroCell (unit only)</b>	590 mm 23.22 in.	450 mm 17.71 in.	150 mm 5.90 in.	24 kg 52.8 lbs
<b>PicoCell (fully installed)</b>	525 mm 20.66 in.	500 mm 19.68 in.	144 mm 5.66 in.	30.5 kg 67.1 lbs
<b>PicoCell (unit only)</b>	510 mm 20.08 in.	450 mm 17.71 in.	110 mm 4.33 in.	15 kg 33 lbs
<b>Primary Surge Suppressor (fully installed)</b>	730 mm 28.76 in.	590 mm 23.25 in.	254 mm 10.01 in.	19.17 kg 42.26 lbs
<b>Primary Surge Suppressor (unit only)</b>	510 mm 20.08 in.	465 mm 18.32 in.	125 mm 4.93 in.	11 kg 24.26 lbs



## Dimensions and Clearances – continued

<b>Table 2-3</b> Minimum Clearances MicroCell and PicoCell Units						
Vertical Mounting						
Item	Front	Back	Left	Right	Top	Bottom
<b>Installation and Maintenance Requirements</b>	600 mm 23.62 in.	0	100 mm 3.93 in.	200 mm 7.87 in.	0	0
<b>Functional Requirements (with solar cover)</b>	0	0	100 mm 3.93 in.	200 mm	**50 mm 1.96 in.	**50 mm 1.96 in.
<b>Functional Requirements (without solar cover)</b>						
Ceiling Mounting (PicoCell Only)						
Item	Front	Back	Left	Right	Top	Bottom
<b>Installation and Maintenance Requirements</b>	200 mm 7.87 in.	100 mm 3.93 in.	0	0	0	600 mm 23.62 in.
<b>Functional Requirements (without solar cover)</b>	*1000 mm 39.37 in.	0	*1000 mm 39.37 in.	*1000 mm 39.37 in.	0	0

\* Within these boundaries, area must remain 75% unobstructed. This is the open surface area at any cross section.

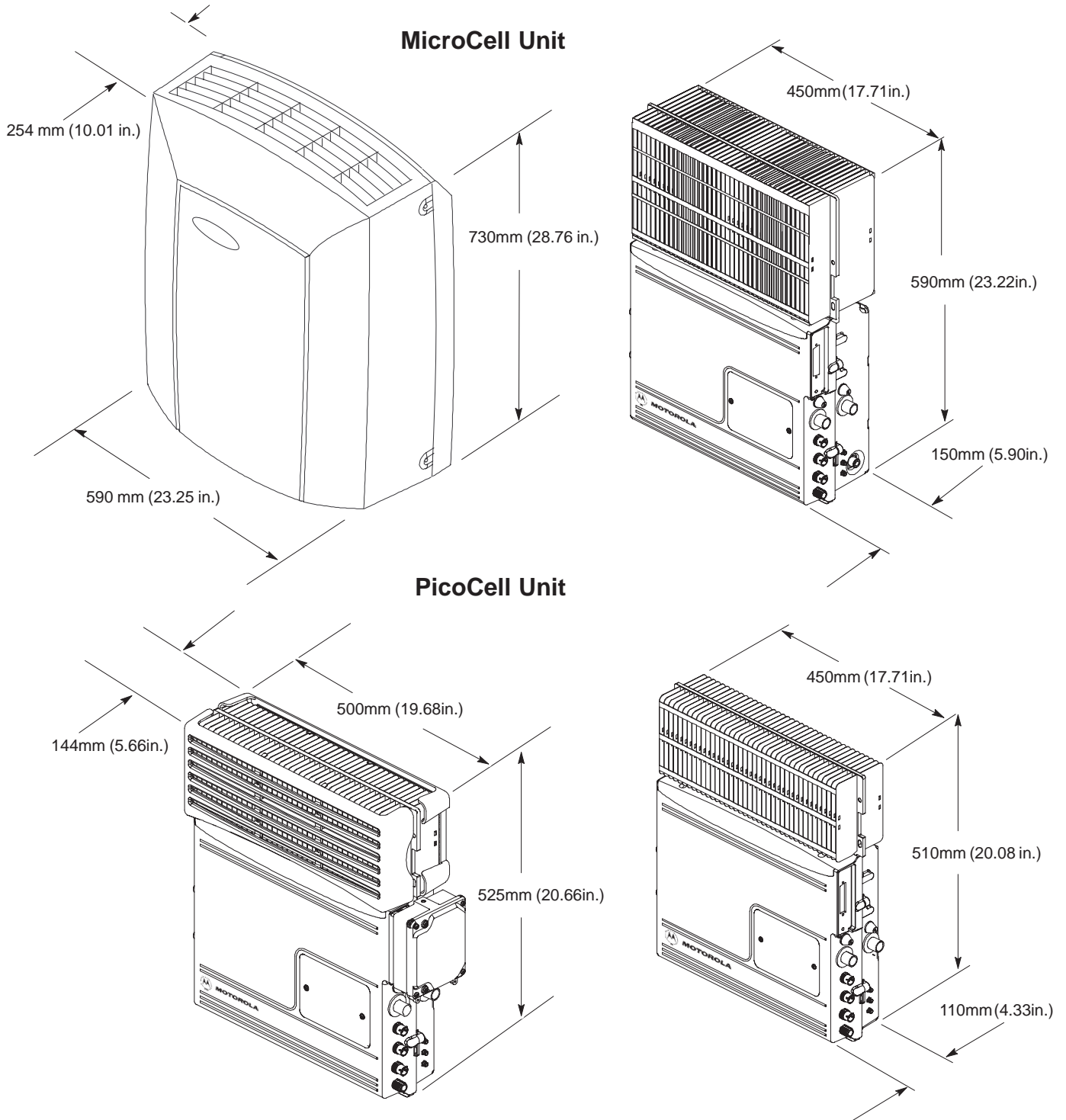
\*\* Within these boundaries, area must remain 25% unobstructed. This is the open surface area at any cross section. See Figure 2-10.

<b>Table 2-4</b> Minimum Clearances for Surge Suppressor						
Vertical Mounting						
Item	Front	Back	Left	Right	Top	Bottom
<b>Installation and Maintenance Requirements</b>	600 mm 23.62 in.	0	200 mm 7.87 in.	200 mm 7.87 in.	0	0
<b>Functional Requirements (without solar cover)</b>	0	0	100 mm 3.93 in.	100 mm 3.93 in.	0	0
<b>Functional Requirements (with solar cover)</b>	0	0	0	0	0	0

Unit Dimensions

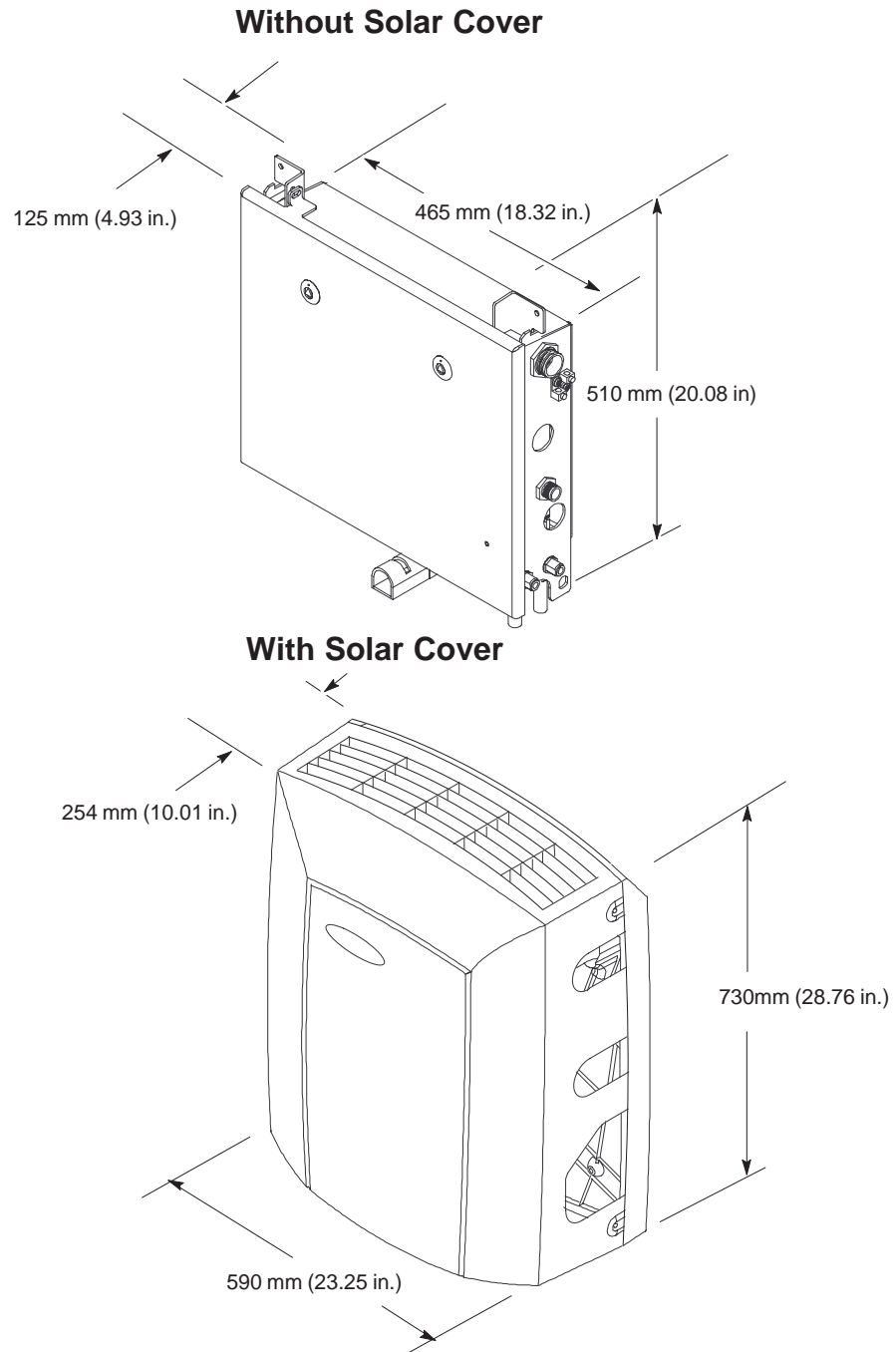
The unit dimensions are shown below.

Figure 2-2: Overall Dimensions of MicroCell and PicoCell Units



## Dimensions and Clearances – continued

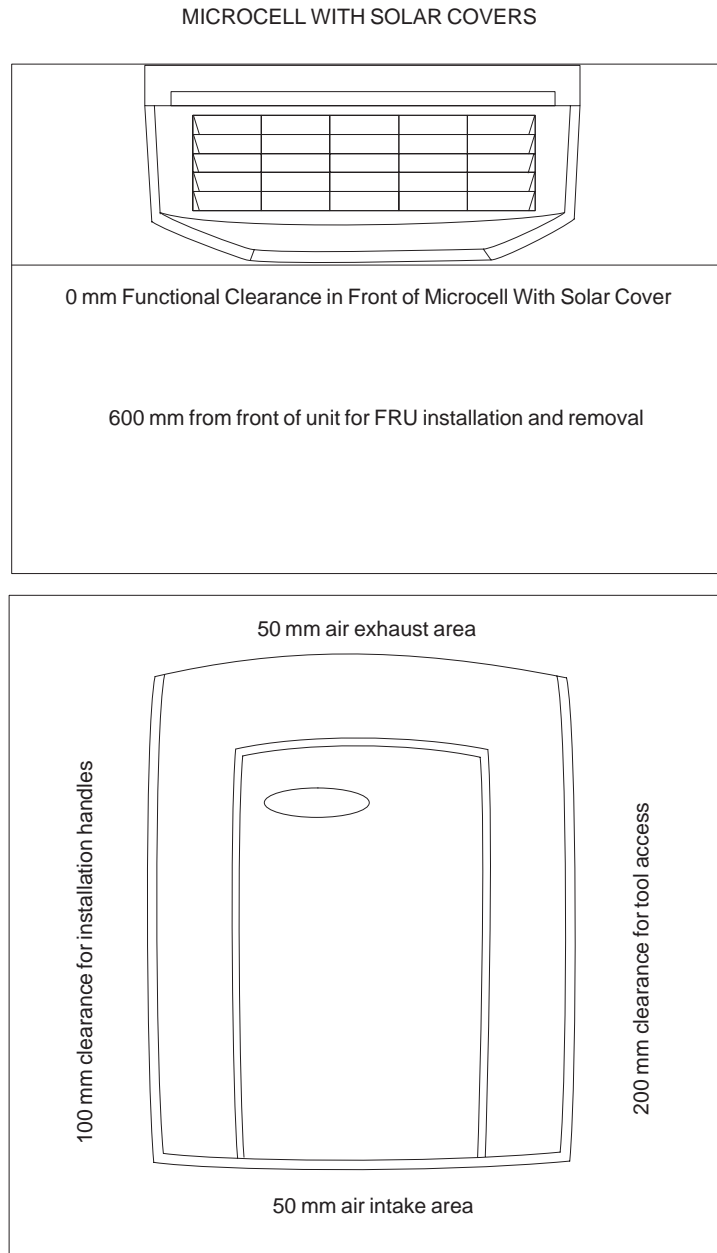
**Figure 2-3:** Overall Dimensions of Primary Surge Suppressor



Unit Clearances

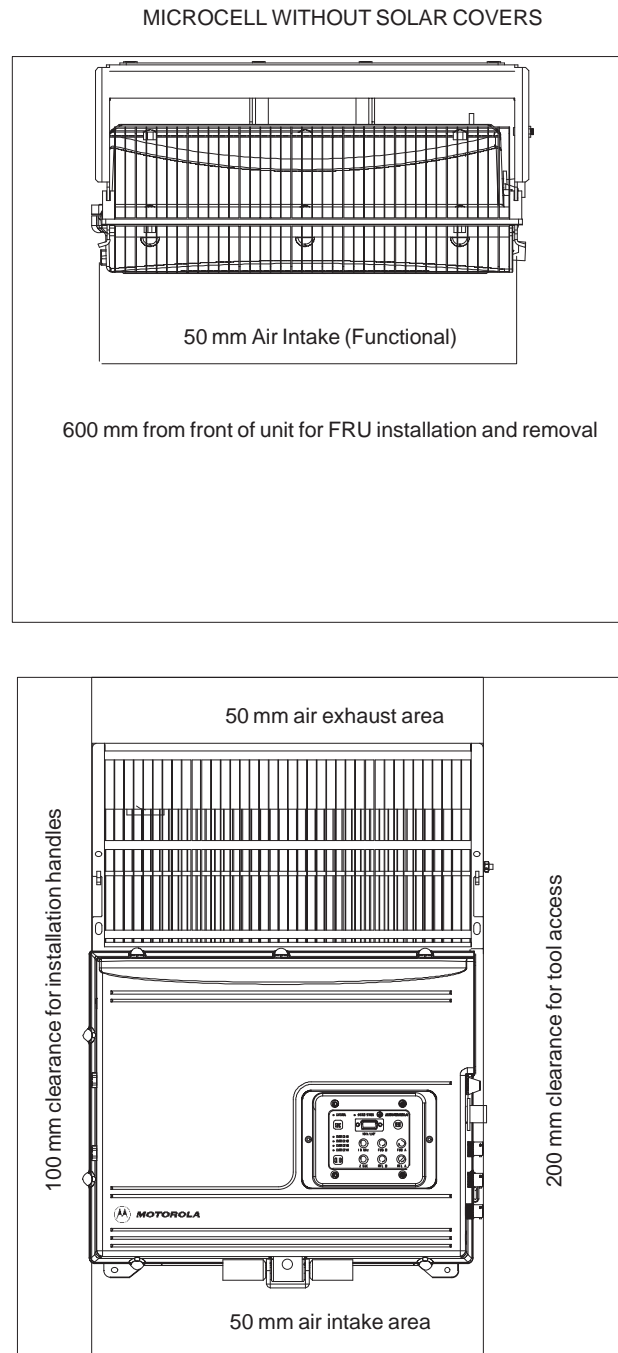
The unit clearances are shown below.

Figure 2-4: Installation and Functional Clearances for MicroCell Units (with Solar Covers)



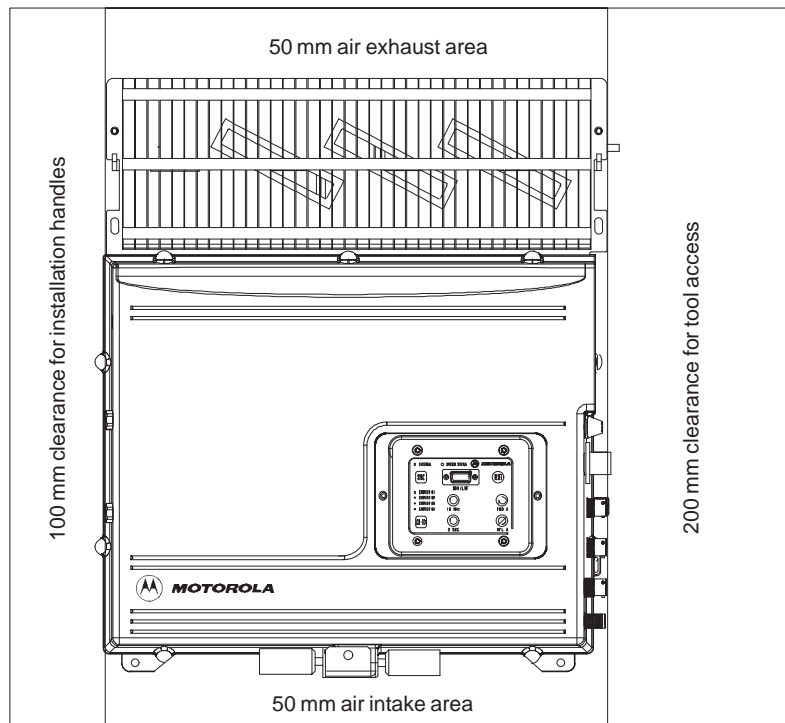
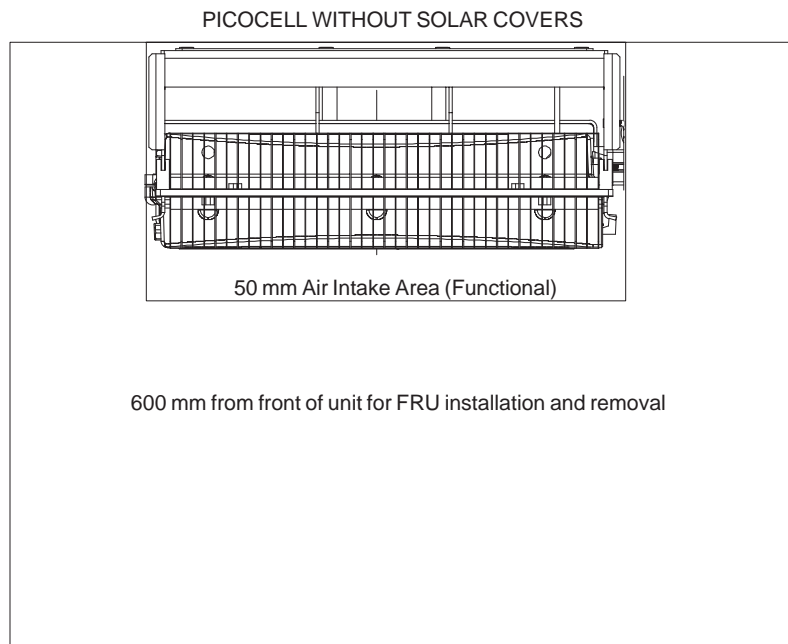
## Dimensions and Clearances – continued

Figure 2-5: Installation and Functional Clearances for MicroCell Units (without Solar Covers)



## Dimensions and Clearances – continued

**Figure 2-6:** Installation and Functional Clearances for PicoCell Units (without Solar Covers)



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## Dimensions and Clearances – continued

**Figure 2-7:** Installation and Functional Clearances for Primary Surge Suppressor (without Solar Covers)

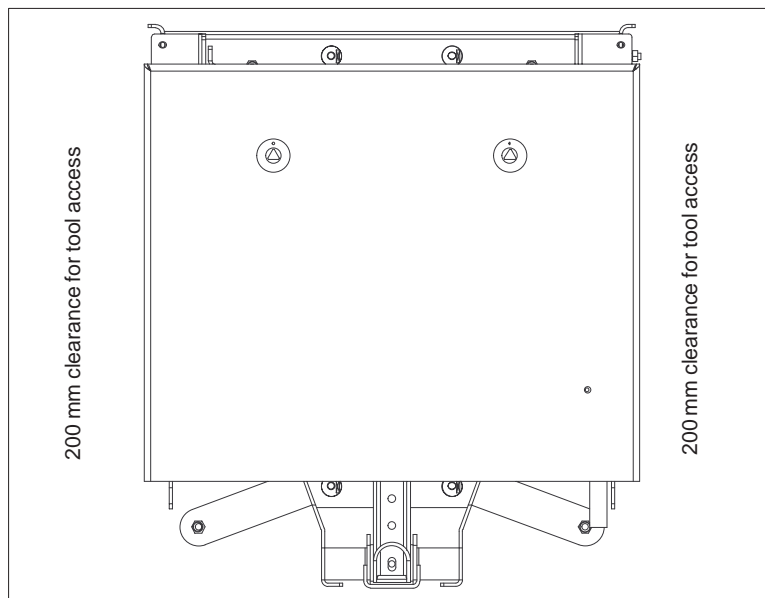
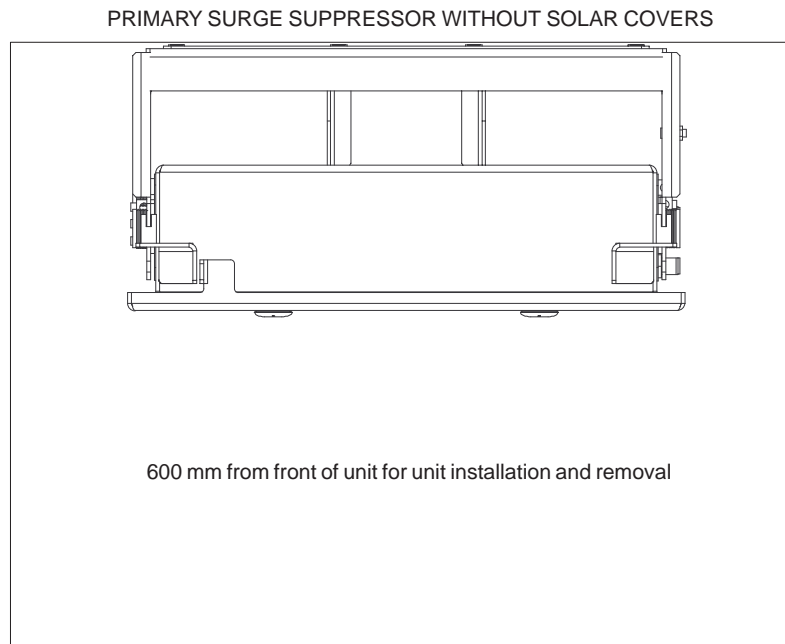
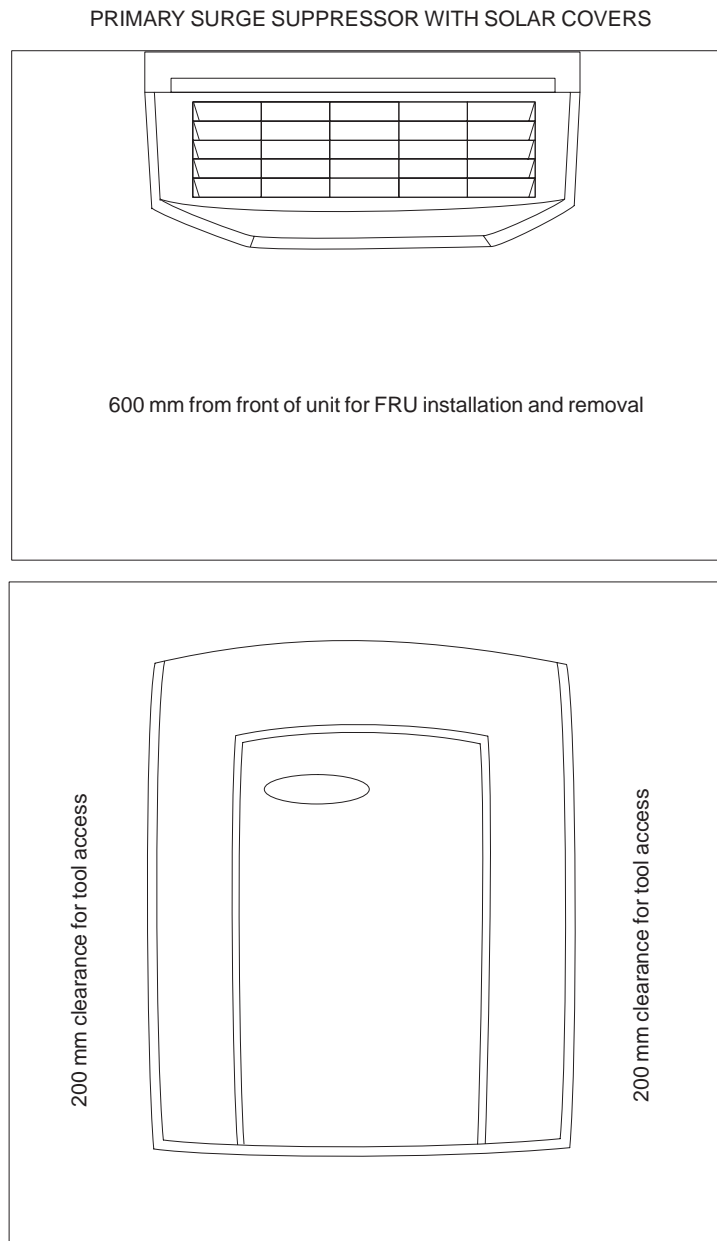


Figure 2-8: Installation and Functional Clearances for Primary Surge Suppressor (with Solar Covers)

2





## Dimensions and Clearances – continued

**Figure 2-9:** Installation and Functional Clearances for PicoCell Unit Mounted to Ceiling

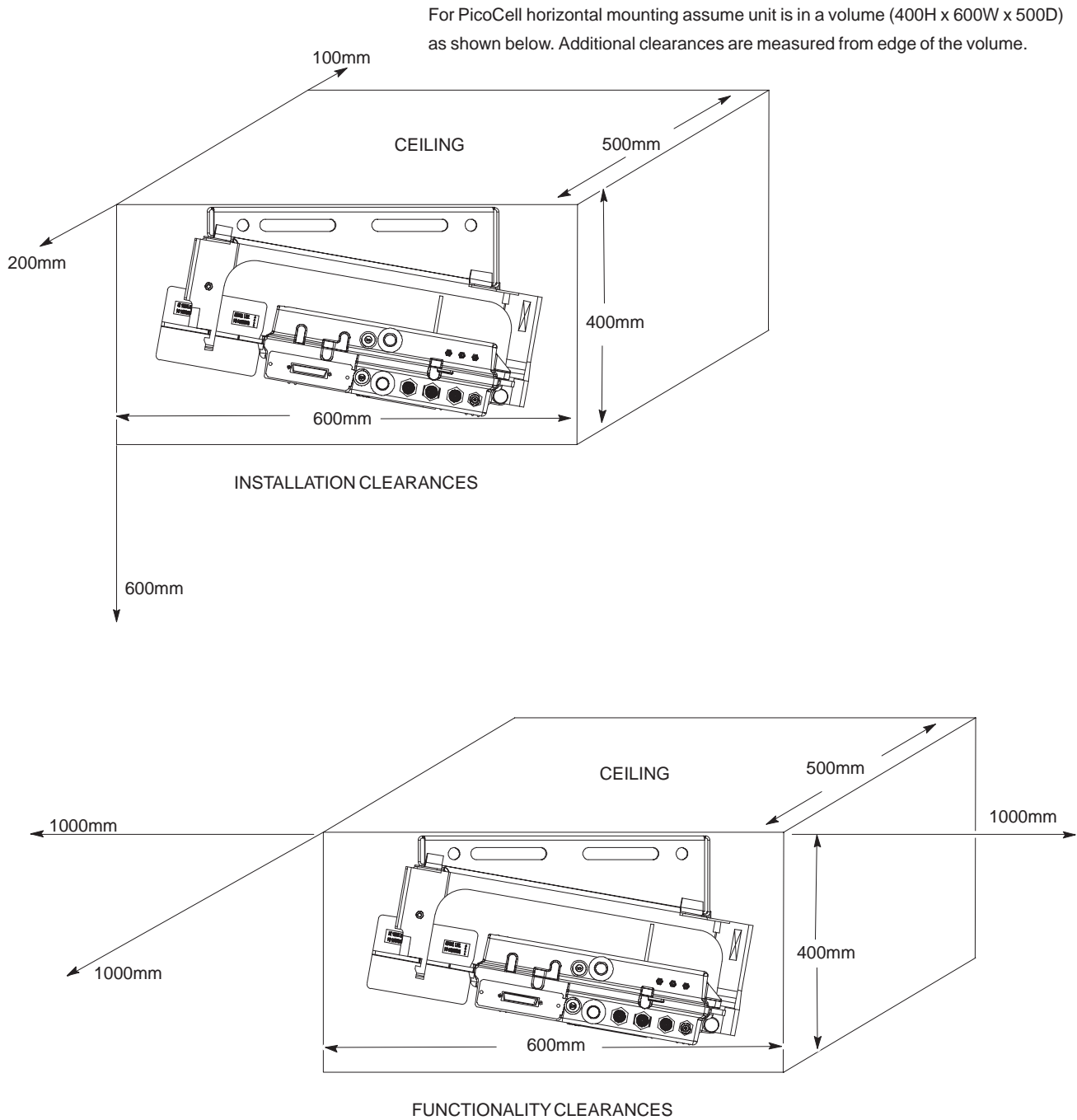
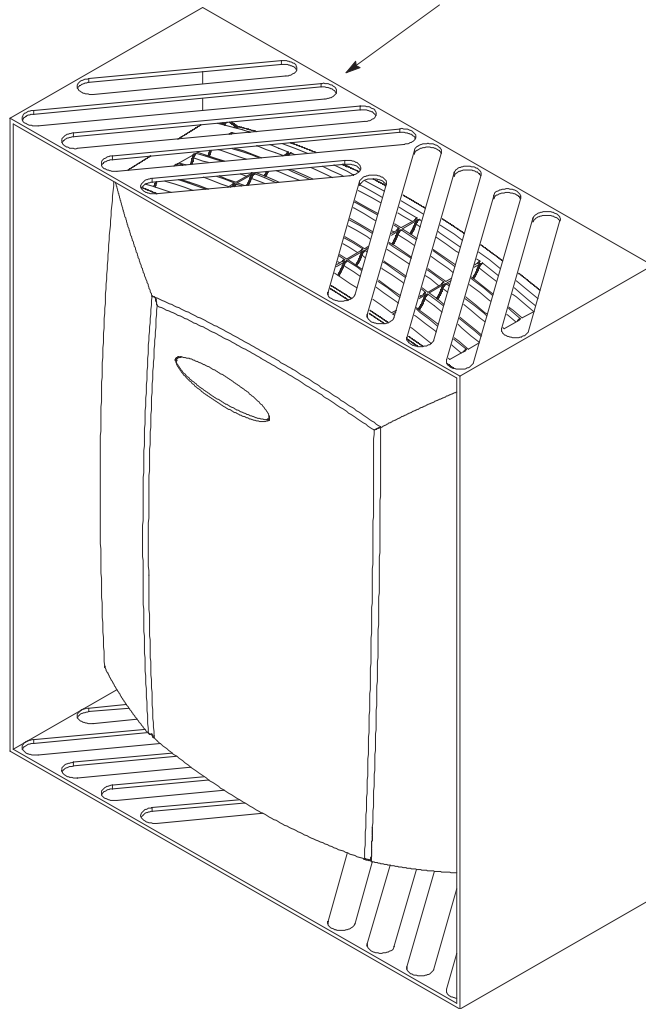


Figure 2-10: Concept of Functionality Clearances for MicroCell and PicoCell Units

2

THIS ILLUSTRATION SHOWS THE CONCEPT OF HOW THE AREA ABOVE AND BELOW THE SC™ 340 BTS SHOULD BE AT LEAST 25% UNOBSTRUCTED. THERE IS NO BOX AROUND THE UNIT. BOX IS USED FOR ILLUSTRATION PURPOSES ONLY



# Chapter 3: Installing Mounting Bracket and Remote GPS

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## Overview

### Overview

This chapter provides the information and procedures to:

- Unpack the equipment and inspect for damage.
- Install rack, pole or ceiling adapters.
- Install the mounting bracket on a wall, pole, rack or ceiling.
- Attach the unit and covers to the mounting bracket.

### Procedure order

The process of installing the mounting bracket and Remote GPS receiver requires that the following procedures be completed in the order shown.

1. Unpack the equipment and inspect for damage.
2. Install the mounting hardware on a wall, rack, pole or ceiling.
3. Attach the back solar cover.
4. Install the Remote GPS head.

---

# Unpacking the Equipment and Inspecting for Damage

## Objective

The objective of this procedure is to unpack the equipment and inspect it for damage.

## How System is Packed

A unit is shipped in two boxes. Box 1 contains site installation specific components and box 2 contains the unit itself. All of the following are shipped in box 1.

### Box 1

- Solar or fin covers
- Universal mounting bracket
- Rack mounting adapters and hardware
- Pole mounting adapters and hardware
- Ceiling mounting adapter (Optional Kit T391AA)
- External cables (AC input, DC input and SU)
- Lower pin
- Site I/O junction box and cable assembly
- Terminations
- AC Installation Box (required for outdoor applications)

### Box 2

- Microcell or Pico cell unit

### Box 3 (Optional)

- Primary Surge Suppressor
- Solar covers
- Mounting bracket
- Rack mounting adapters and hardware
- Pole mounting adapters and hardware
- Ground cables

The following are shipped separately:

- Short duration battery (optional) (Kit T392AA)
- Remote GPS receiver (optional)

## Inspecting for Damage

Before installing any equipment, inspect it for damage. Report any damage found to the Site Manager.

Only remove the equipment from the shipping containers when you are ready to install.

Inspect items for:

- dents
- scratches
- bent pins in connectors
- squareness of bracket
- damage to heatsink fins
- isolating pads, washers on mounting bracket
- frayed cabling or chafed connectors

# Attaching the Mounting Bracket to a Wall

## Objective

The objective of this procedure is to attach the mounting bracket on a concrete wall.



### CAUTION

For all applications always consult a licensed Civil Engineer to determine the exact (Zone 3 and/or Zone 4) compliance of your specific site.

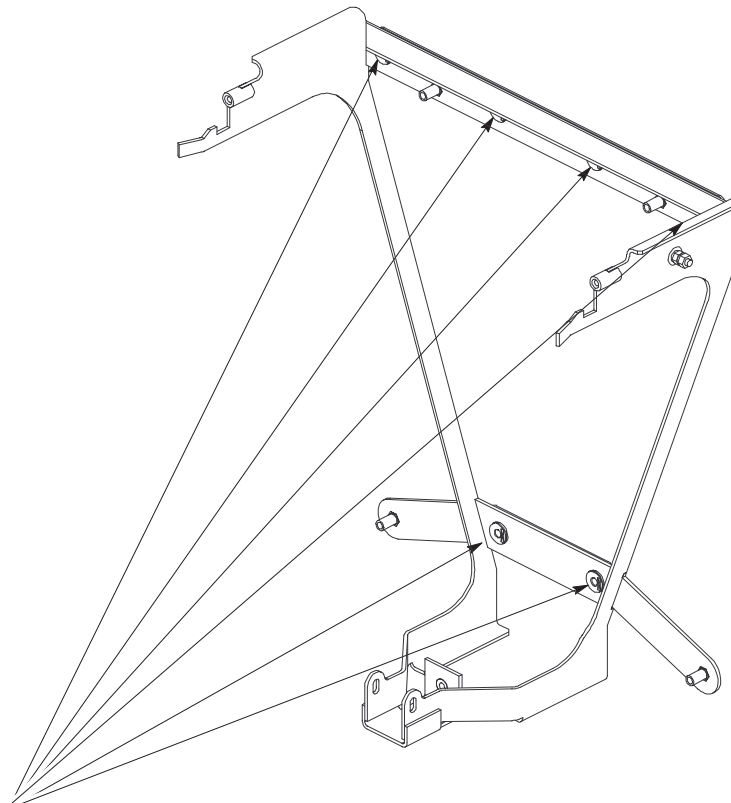
### NOTE

If your site requires the optional Primary Surge Suppressor, then you must install two mounting brackets.

## Mounting Bracket Hole Locations

Figure 3-1 shows the holes to use to attach the mounting bracket to a wall.

**Figure 3-1:** Holes to Use to Mount the Bracket to the Wall



HOLES TO BE USED TO MOUNT THE BRACKET



## Attaching the Mounting Bracket to a Wall – continued

### Required Tools and Materials for Concrete Wall Mounting



#### CAUTION

Do not use toggle bolts in sheet rock (dry wall). They will not hold the system and they will damage the wall.

Due to the many types of walls that the BTS could potentially be mounted to, it is impossible to detail all types in the context of this manual. For this reason, the installers must use good judgement and get recommendations from qualified personnel regarding the type of mounting bolts that are appropriate for the particular walls on which the BTS will be mounted.

#### Concrete wall

The following tools and materials are required to properly and safely install the the mounting bracket on a concrete wall.

**Table 3-1:** Mounting Bracket Tools and Materials for Concrete Wall Mounting

Hand Tools	Materials	Power Tools
T30 Torx tamper bit, 1/4-in hex	metal shim material	Hilti wall drilling rig
Torque driver wrench, 1/4-in hex female drive, 0–10 N–M	Hilti anchors (for each bracket)	Hilti DCM 18–14 metric bit
15/16-in. (23.8 mm) socket, a ratchet wrench, and an 18-in. (45.7 cm) breaker bar	MicroCell or PicoCell Mounting Kit	shop vacuum
safety glasses	electrical tape	
chalk for marking outline on wall		
tape measure		
4-ft (1.22 m) bubble level		
rubber mallet		
ear plugs		
dust mask		

## Attaching the Mounting Bracket to a Wall – continued

### Procedure to Drill Holes in the Wall



#### WARNING

Safety glasses, dust masks, and ear plugs must be worn by all installation personnel, including those in the immediate vicinity of the personnel operating the drilling equipment.

**Table 3-2:** Procedure to Drill Holes in the Wall for Mounting Bracket Installation

Step	Action
1	Verify with the site manager that the wall has been previously checked and is capable of supporting the weight of the system.
2	Hold the bracket in position and mark the mounting hole locations.
3	Prepare a standard 3/8” electric drill or the Hilti wall drilling rig.
4	Install the appropriate bit in the drill using the following information: <ul style="list-style-type: none"><li>• For concrete walls use the Hilti DCM 18–14 metric bit and Hilti anchors.</li></ul>
5	Begin to drill by using short bursts until the bit has a “bite” into the wall.
6	Run the drill at full speed to the appropriate depth. Check the depth of the hole by using the shop vacuum to collect the debris.  <b>* IMPORTANT</b> For concrete installation, the hole <b>MUST</b> be at least 5 in. (12.7 cm) deep. Anchors can not be removed once they are tapped into the hole.
7	Repeat steps 5 through 6 for each mounting hole.
8	Proceed to the “Procedure to Secure the Mounting Bracket to a Wall”, Table 3-3.

## Attaching the Mounting Bracket to a Wall – continued

### Securing Mounting Bracket to a Wall

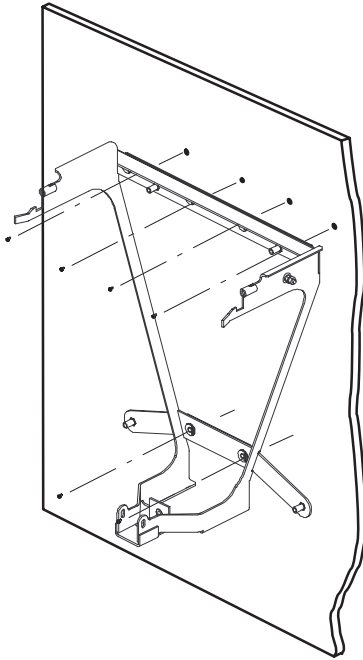
Refer to Figure 3-1 and Figure 3-2 and follow the procedure in Table 3-3 to secure the mounting bracket to a wall.

<b>Table 3-3: Procedure to Secure the Mounting Bracket to a Wall</b>	
<b>Step</b>	<b>Action</b>
	<b>* IMPORTANT</b> Use the shoulder washers attached to the mounting bracket in each mounting hole to electrically isolate the mounting bracket from the wall.
1	Insert a Hilti anchor into each mounting hole. Tap each anchor using a rubber mallet until each anchor is completely seated in a hole.
2	Position the mounting bracket on the wall over the mounting holes. Start, but do not tighten all bolts.
	<b>! CAUTION</b> Only put shims under the bracket where the isolation pad is present. Do not place shims so that they will contact the bare metal of the frame.
3	Place a 4-ft (1.22 m) level on the bracket from top-to-bottom. Then, using metal shim material, level the bracket.
4	Use a 15/16-in. (23.8 mm) socket, a ratchet wrench, and an 18-in. (45.7 cm) breaker bar, to tighten the red cap of each anchor bolt until the red cap shears off.  <b>NOTE</b> When the red cap shears off, the anchor bolt has been tightened to the correct torque.

# Attaching the Mounting Bracket to a Wall – continued

**Figure 3-2:** Securing Mounting Bracket to a Wall

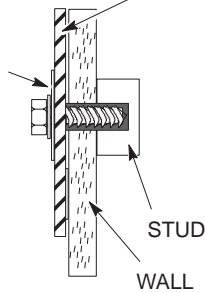
3



PLACE SCREW THROUGH HOLES

(FROM TOP TO BOTTOM)  
LAG SCREW, AND PLASTIC  
SHOULDER WASHER  
THREADED INTO PILOT  
HOLE THROUGH  
MOUNTING PLATE.

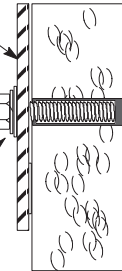
**LAG SCREW**



BRACKET  
(FOR CLARITY, THE  
REST OF THE  
BRACKET IS NOT  
SHOWN)

**CONCRETE ANCHOR**

(FROM TOP TO BOTTOM)  
BOLT AND PLASTIC  
SHOULDER WASHER  
THREADED INTO  
ANCHOR THROUGH  
MOUNTING BRACKET



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# Attaching the Mounting Bracket to a Ceiling

## Objective

The objective of this procedure is to attach the adapter and mounting bracket to a ceiling.



### IMPORTANT

You can only mount the Picocell to a ceiling.

Due to the many types of ceilings that the BTS may be mounted to, it is impossible to detail all types in the context of this manual. For this reason, the installers must use good judgement and get recommendations from qualified personnel regarding the type of mounting bolts that are appropriate for the particular ceiling mount for the BTS.



### CAUTION

For all applications always consult a licensed Civil Engineer to determine the exact (Zone 3 and/or Zone 4) compliance of your specific site.



### CAUTION

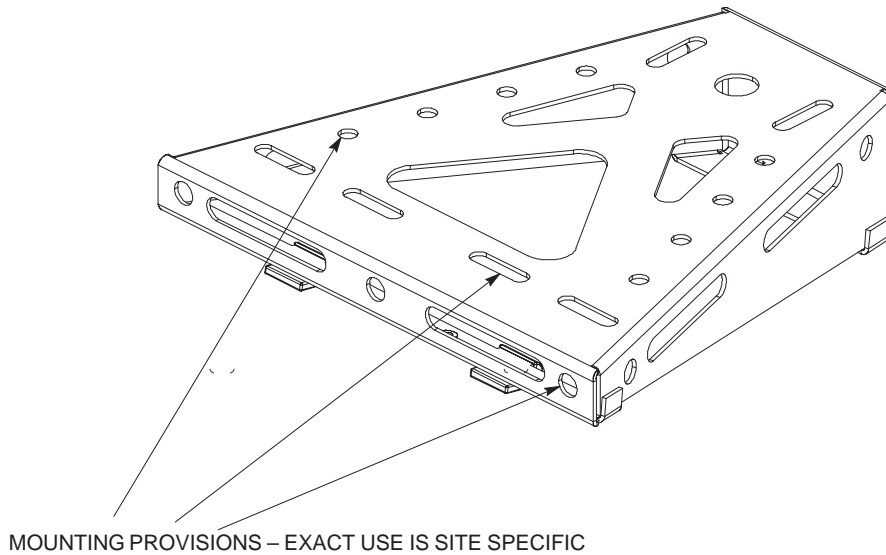
The top surface of the ceiling adapter must be mounted horizontally. The bubble level indicator in the center of the bracket must have the bubble in the center of the inner black circle after mounting the adapter. Failure to do so could cause damage to the unit and would void the warranty.

## Mounting Bracket Hole Locations

The ceiling adapter has been provided with multiple mounting options dependent on special site requirements. Specific holes to complete the installation are site specific. They are to be provided by site installation teams in accordance with a Civil Engineer to determine the exact compliance for your specific site. The ceiling mounting bracket is provided for correct installation angle only. Figure 3-1 shows some of the holes that can be used to attach the adapter to the ceiling.

## Attaching the Mounting Bracket to a Ceiling – continued

**Figure 3-3:** PicoCell Ceiling Mounting Bracket



### Tools and Materials for Installing the Mounting Bracket on a Ceiling

#### Concrete ceiling

The following tools and materials are required to properly and safely install the the ceiling adapter on a concrete ceiling.

**Table 3-4:** Tools and Materials for Concrete Ceiling

Hand Tools	Materials	Power Tools
15/16-in. (23.8 mm) socket, a ratchet wrench, and an 18-in. (45.7 cm) breaker bar	metal shim material	Hilti wall drilling rig
safety glasses	Hilti anchors (qty. of 4 for each bracket)	Hilti DCM 18–14 metric bit
T30 Torx tamper bit, 1/4-in. hex	Ceiling Mounting Kit	shop vacuum
Torque driver wrench, 1/4-in. hex female drive, 0–10 N–M	electrical tape	
ear plugs	chalk for marking outline on ceiling	
4-ft (1.22 m) bubble level	PicoCell Mounting Kit	
rubber mallet		
tape measure		
dust mask		

## Attaching the Mounting Bracket to a Ceiling – continued

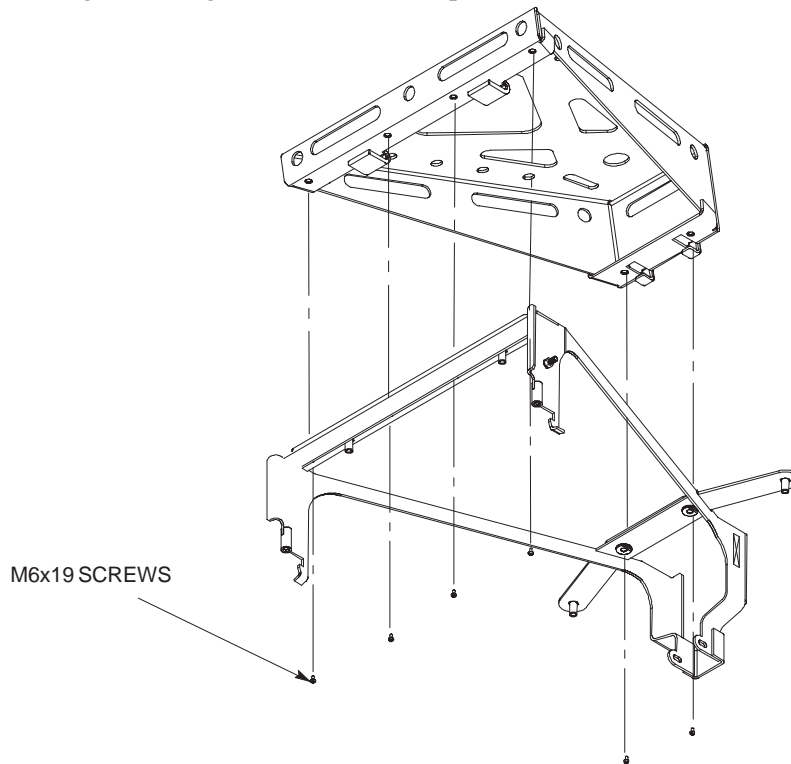
### Securing Mounting Bracket to Adapter

Once the adapter has been secured to the ceiling, the procedure in Table 3-5 must be followed to mount the bracket to the adapter.

Step	Action
1	Verify that isolating pads and bracket-mounted shoulder washers are installed on the bracket. If not, contact the site manager.
2	Position the mounting bracket on the ceiling adapter and align the mounting holes. See Figure 3-4.
3	Use a T30 Torx tamper bit to start but not tighten the M6x19 screws in each mounting hole. Begin with the outer holes and work toward the center.
4	Use a T30 Torx tamper bit to torque each M6x19 screw to 5 N-M.

3

**Figure 3-4:** Securing Mounting Bracket to the Adapter



# Attaching the Mounting Bracket to a Pole

## Objective

The objective of this procedure is to attach the mounting bracket to a pole.



### WARNING

The mounting pole structure must be reviewed for its ability to support the weight of the MicroCell [38.5 kg (84.7 lbs.)]; PicoCell [30.5 kg (67.1 lbs.)] and Primary Surge Suppressor [19.17 kg (42.26 lbs.)] under high winds, earthquakes, etc.

- Installing the BTS on an inadequate pole may result in serious personal injury even death or damage to the equipment.
- Placement of the BTS should not present a hazard to pedestrians by impeding passage, nor to field service personnel by being placed near high voltage or other hazardous conditions.
- All cabling must be constrained in or on the pole in accordance to local building codes.



### CAUTION

For all applications always consult a licensed Civil Engineer to determine the exact (Zone 3 and/or Zone 4) compliance of your specific site.

## Required Tools and Materials for Pole Mounting

The following tools and materials are required to properly and safely install the mounting bracket to a pole.

**Table 3-6:** Tools and Materials for Pole Mounting

Hand Tools	Materials	Power Tools
Safety Glasses	MicroCell or PicoCell Mounting Kit	No Power Tools Required
Bucklestrap Cutting Tool (Motorola part number 6604809N01)	electrical tape	
T30 Torx tamper bit, 1/4-in. hex		
Torque driver wrench, 1/4-in. hex female drive, 0–10 N–M		
Ball Peen (Metal Working) Hammer		
Heavy Gloves		
Tape Measure		



## Attaching the Mounting Bracket to a Pole – continued

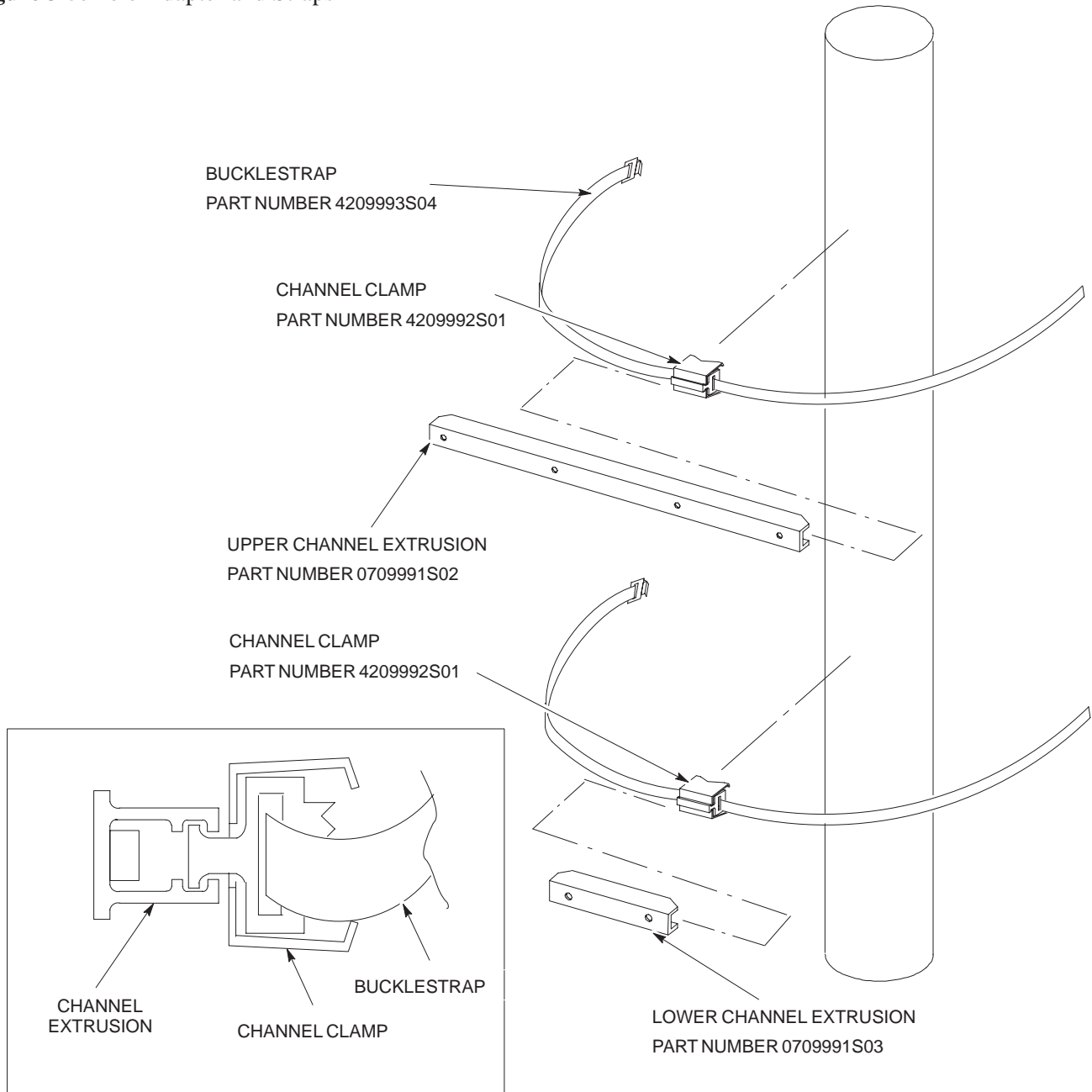
### Procedure to Attach the Mounting Bracket to a Pole

Follow the procedure in Table 3-7 to attach the mounting bracket to a pole.

<b>Table 3-7: Procedure for Attaching the Mounting Bracket to a Pole</b>	
<b>Step</b>	<b>Action</b>
1	Verify that the isolator pads are in place on the bracket.
2	Verify the safety of the installation location.
3	Place the bucklestrap through the channel clamp as shown in Figure 3-5.
4	Place the channel clamp and bucklestrap on the pole approximately where the upper portion of the BTS is to be located. See Figure 3-5.
5	Slide and center the upper channel extrusion on the channel clamp. See Figure 3-5.
6	Wrap the bucklestrap around the pole and through the fitting on the end of the band. Pull the band until it makes concentric contact with the pole.
7	Start but do not tighten the lower channel extrusion to the mounting bracket. Use 2 M6x19 tamper-resistant screws.
8	Before you tighten the lower strap, attach the mounting bracket to the top channel extrusion.
9	Slide the bucklestrap through the channel clamp and slide the channel clamp on the lower channel extrusion. Wrap the bucklestrap around the pole and through the fitting.
10	Secure the bucklestrap with the bucklestrap tool. Refer to the instructions included with the bucklestrap tool.
11	Use a T30 Torx tamper bit to tighten the six M6x19 screws to 5.0 N-m.
12	Center the channel clamp on to the lower extrusion.
13	Place the bucklestrap through the lower channel clamp.
14	Use the bucklestrap tool to secure the lower strap.

# Attaching the Mounting Bracket to a Pole – continued

**Figure 3-5:** Pole Adapter and Straps



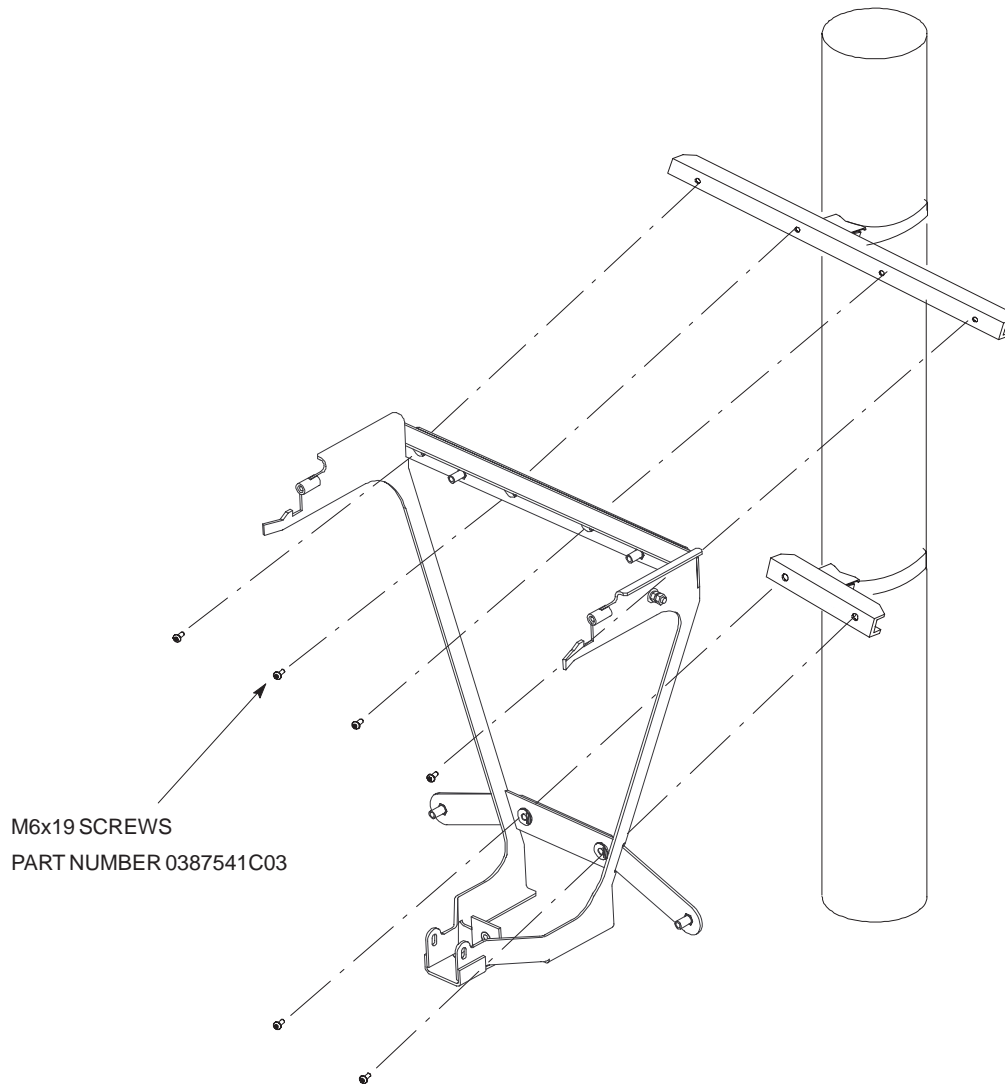
SIDE VIEW OF CHANNEL CLAMP AND BAND

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3

## Attaching the Mounting Bracket to a Pole – continued

**Figure 3-6:** Attaching Mounting Bracket to a Pole



# Attaching the Mounting Bracket to a Rack

## Objective

The objective of this procedure is to attach the mounting bracket to a 19-in. rack.

Rack must conform to EIA-RS-310-C or JIS-C-6010 standards.

## Tools and Materials for Installing the Mounting Bracket on a Rack

The following tools and materials are required to properly and safely install the mounting bracket on a rack.

**Table 3-8:** Tools and Materials for Rack Mounting

Hand Tools	Materials	Power Tools
Torque driver wrench, 1/4-in. hex female drive, 0–10 N–M	MicroCell or PicoCell Mounting Kit	No Power Tools Required
T30 Torx tamper bit, 1/4-in. hex	Four machine screws 12–24 5/8-in. self tapping (customer supplied)	
	Chalk or marker to mark location on rack	
	electrical tape (customer supplied)	

## Procedure to Attach the Mounting Bracket to a Rack

To attach the mounting bracket to a rack follow the procedure in Table 6-10.

**Table 3-9:** Procedure to Attach the Mounting Bracket to a Rack

Step	Action
1	Verify that isolating pads and washers are installed in the bracket. If not, contact the site manager.
2	Use the mounting bracket as a guide to mark the holes in the rack to be used to mount the upper adapter.
3	Use two self-tapping machine screws (customer supplied) to attach the upper rack adapter (Motorola part number 0709994S01) to the rack.
4	Use a T30 Torx tamper bit and two M6x19 screws to attach but do not tighten the lower rack adapter to the mounting bracket.
5	Use a T30 Torx tamper bit and four M6x19 screws to attach the mounting bracket to the upper rack adapter. Do not tighten.
. . . continued on next page	

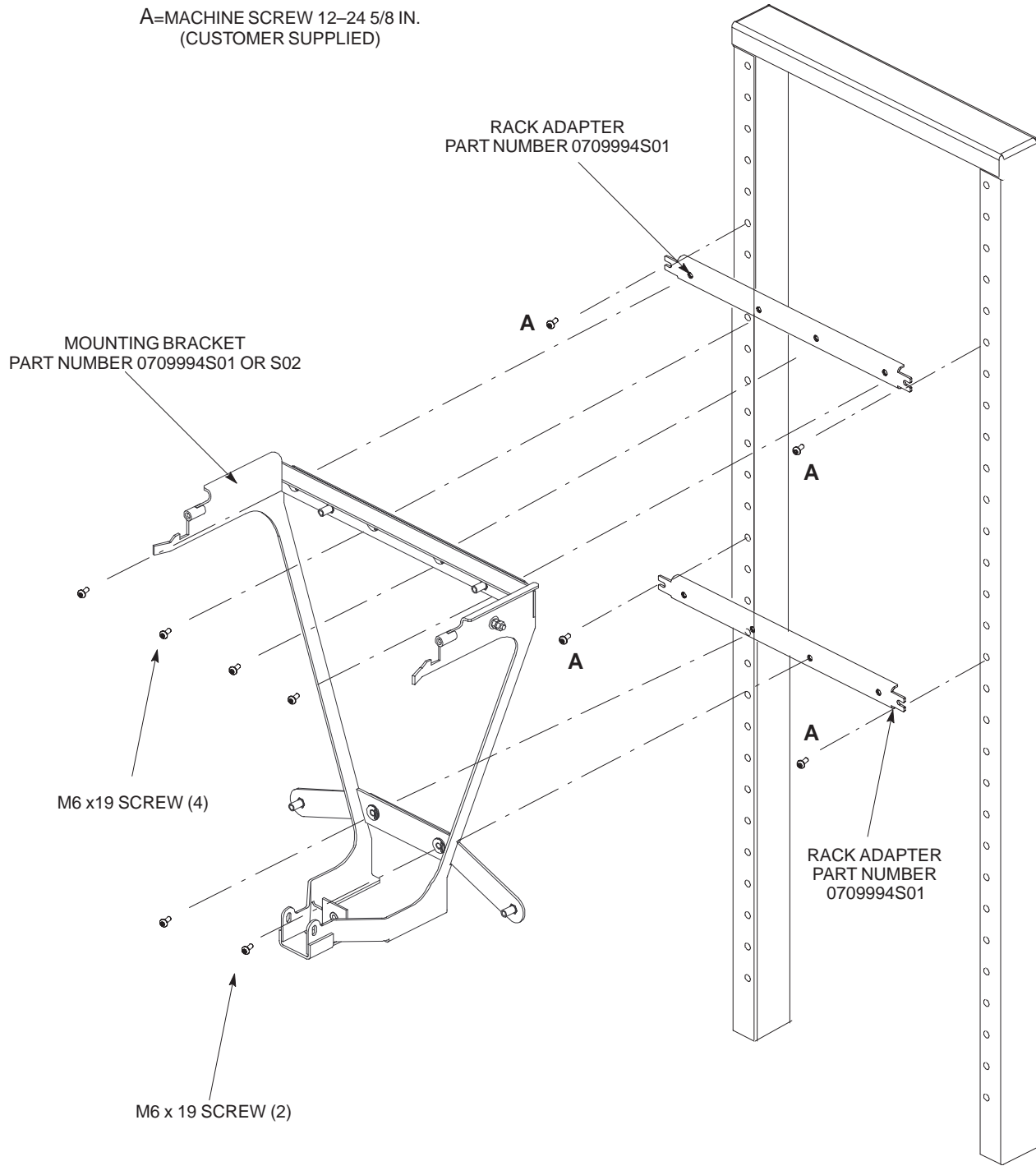
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## Attaching the Mounting Bracket to a Rack – continued

<b>Table 3-9: Procedure to Attach the Mounting Bracket to a Rack</b>	
<b>Step</b>	<b>Action</b>
6	Use two machine screws (customer supplied) to attach the lower rack adapter to the rack.
7	Use a T30 Torx tamper bit to torque the screws connecting the mounting bracket to the upper and lower adapters. Torque to 5.0 N-M.

# Attaching Mounting Bracket to a Rack – continued

**Figure 3-7:** Attaching the Mounting Bracket to a Rack



3

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# Attaching Back Solar Cover to Mounting Bracket

## Objective

The objective of this procedure is to attach the back solar cover to the mounting bracket.

## When to Use the Cover

Solar Covers are required in all outdoor applications

## Required tools

The following tools are required to attach the back solar cover to the mounting bracket.

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

## Procedure

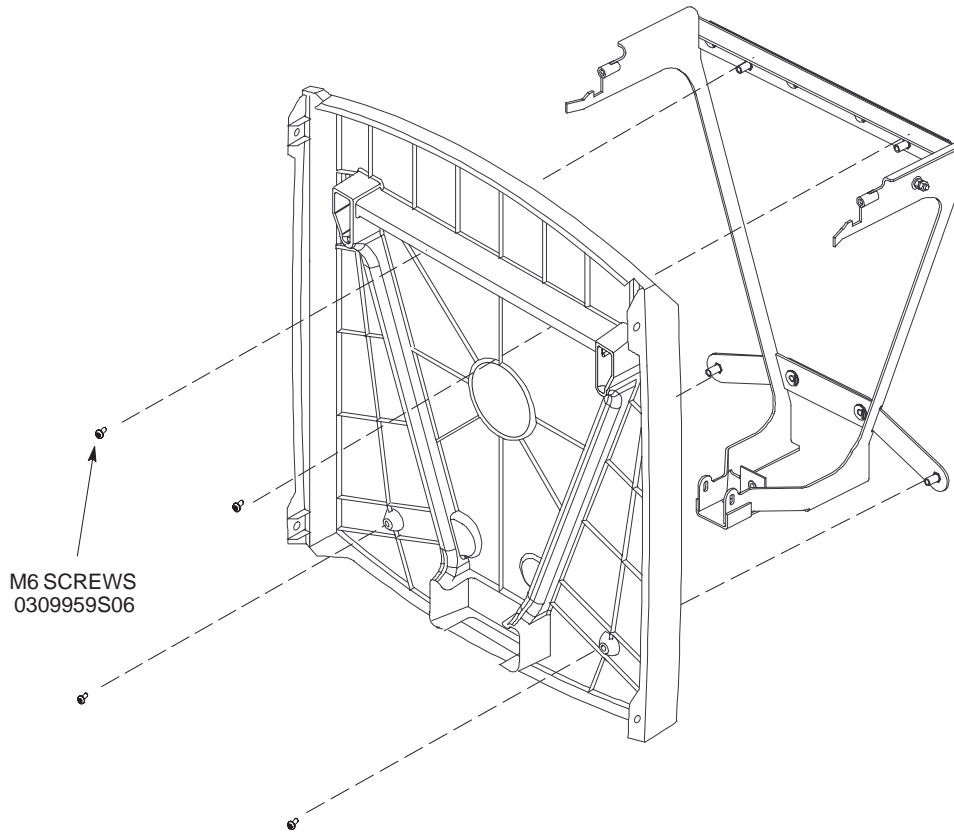
Attach the back solar cover to the mounting bracket by following the procedure in Table 3-10 and the information in Figure 3-8.

<b>Table 3-10:</b> Procedure to attach Back Solar Cover to Mounting Bracket	
<b>Step</b>	<b>Action</b>
1	Place the back solar cover on the mounting bracket so the cooling vents are at the top. Align the four M6 screws with the mounting holes.
2	Using a T30 Torx bit, start but do not tighten all four M6 screws.
3	Using the T30 Torx bit, tighten the four M6 screws to 5.0 N–m.

---

## Attaching Back Solar Cover to Mounting Bracket – continued

**Figure 3-8:** Attaching MicroCell Back Solar Cover to Mounting Bracket



3



# Remote GPS Head Installation

## Objective

The objective of this procedure is to show how to install the Remote Global Positioning System (RGPS) head.

## Tools and Materials

One RGPS Head (Motorola Part Number 0186012H03) is required to do this procedure.

## Installation Procedure



### CAUTION

The RGPS head must not make contact with any metal surface other than the provided hardware. Use only the equipment provided to mount the RGPS head. Failure to do so could damage the RGPS head.

Table 3-11 and Figure 3-9 show the procedure for installing the RGPS head.

**Table 3-11:** Installing the RGPS Head

Step	Action
1	<p>Determine the mounting location.</p> <p><b>NOTE</b></p> <p>The RGPS head mounting location is critical to the operation of the BTS. Position the RGPS head to have an unobstructed view of the sky and to minimize the chance of debris (leaves, dirt, etc.) accumulating on the radome of the RGPS head. Place the RGPS head as far away from the BTS transmit antenna as possible to avoid RF interference issues.</p> <p>Do not install the RGPS head close to a lightning rod. A lightning rod attracts lightning, which can damage or destroy the RGPS head. Also, since a lightning rod is connected to an earth ground, it can act as a shield and create a shadow that may block or reduce the signal from a satellite.</p>
2	<p><b>Δ WARNING</b></p> <p>The structure of the wall should be verified by a qualified structural engineer.</p> <p>Mounting the RGPS head and hardware to an inadequate wall structure and/or using inadequate installment methods can result in serious personal injury.</p> <p>Use the appropriate mounting bolts for the mounting surface and install the two wall mounting brackets (shown in Figure 3-9).</p>
3	<p>Insert the RGPS Interface cable through the pipe so that the connector end is at the RGPS head mounting location. (See Figure 3-9).</p>
4	<p>Connect the 12-pin connector on the RGPS head to the 12-pin connector on the RGPS interface cable. To secure the connection, tighten the spinning connector flange. Make sure to provide slack in the RGPS cable to allow future servicing. See Figure 3-9.</p>

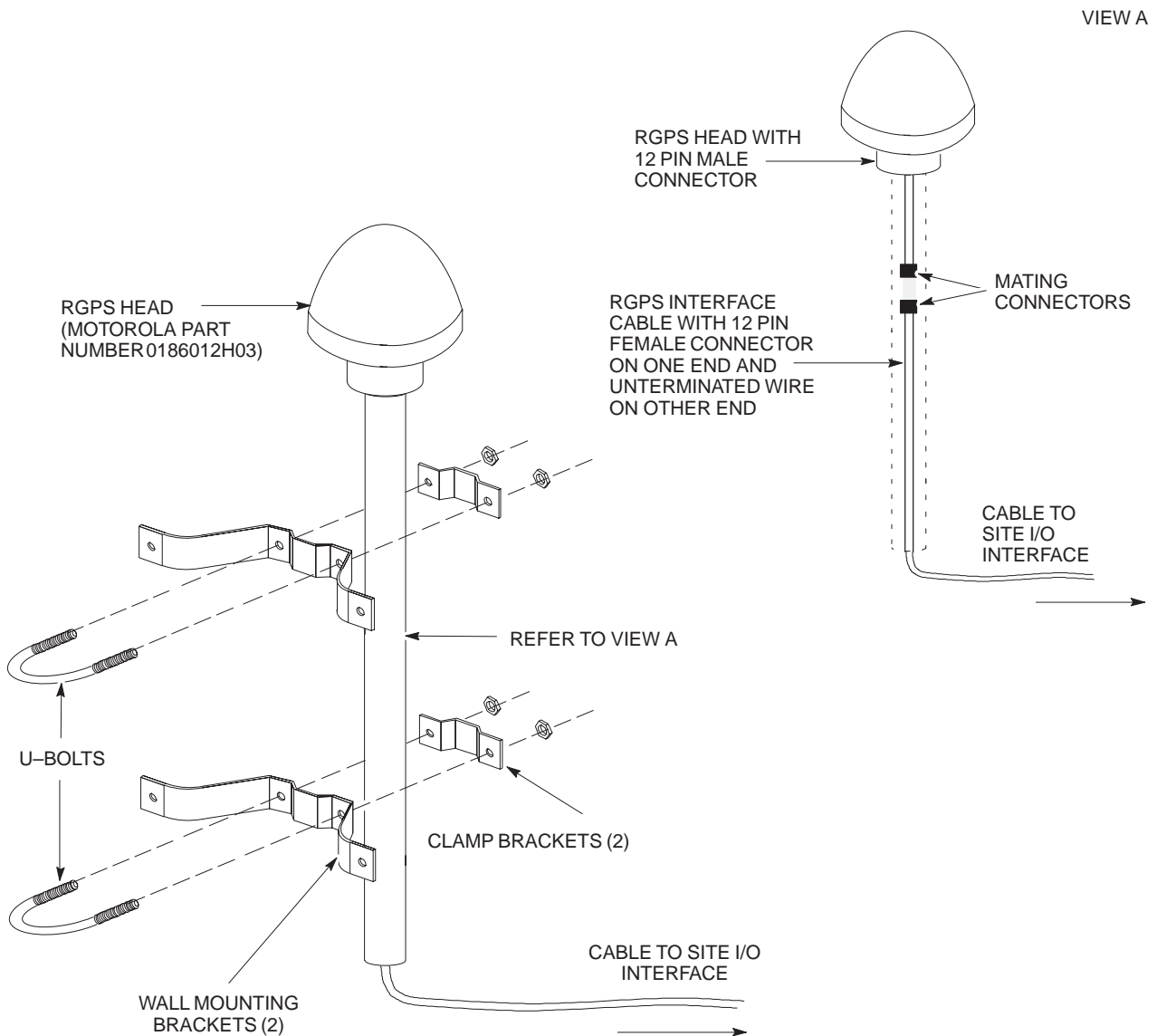
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## Remote GPS Head Installation – continued

**Table 3-11: Installing the RGPS Head**

Step	Action
5	<b>! CAUTION</b> To avoid binding the RGPS interface cable, turn the pipe, not the RGPS head, while tightening. Insert the pipe into the threaded neck on the RGPS head and hand tighten.
6	Place the assembly into the mounting brackets and secure with the two clamp brackets, U-bolts and nuts as shown in Figure 3-9.

**Figure 3-9: Installing the Remote GPS Head**



# Chapter 4: Preparing Site Cabling for Sites Equipped with Customer–Supplied Site I/O Interface

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# Cabling Overview

## Overview

This chapter provides the procedures to prepare the BTS site cabling, but not attach it to the unit. Chapter 6 shows the scope of work for unit cabling.

You will connect cables to the site and route them to the BTS location. You will attach the cables to the unit in Chapter 6.

Repeat cabling installation as necessary for each unit at the BTS.

### NOTE

Cabling is one of the most noticeable aspects of workmanship. Straight runs and proper turns are critical for a positive evaluation of the work.

## Configurations Supported

This chapter supports cable installation for single carrier omni configurations and multi-carrier omni configurations. This chapter also supports cable installations for sites equipped with the customer-supplied Site I/O Interface. Chapter 5 supports installations for sites equipped with the optional Primary Surge Suppressor.

  
**4**  


## Cabling Installation Order

To install the cables, Motorola recommends that the following procedures be completed in the order shown:

1. Earth ground cabling
2. AC power cabling
3. DC power cabling
4. Battery cabling (optional)
5. Antenna cabling
6. Site I/O interface cabling
7. RGPS/HSO cabling (optional)
8. Span line daisy chain cabling (optional)

## Cable Labels

The “Cable Descriptions and Part Numbers” in Table 4-1 provides cable descriptions and part numbers. The labels used to designate the cables (A, B, C, etc.) are used throughout this manual.

# Cable Descriptions

## Cable Descriptions and Part Numbers

Table 4-1 gives the cable descriptions and part numbers for the cables used to install the BTS. The following cables are necessary for sites equipped with the customer-supplied Site I/O Interface and the Primary Surge Suppressor.

**Table 4-1:** Cable Descriptions and Part Numbers

Cable	Qty.	Part Number	Description
A	1	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. Installed between Site I/O Junction Box and Mounting Bracket.
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
E	1*	3087707C03	MIB A cable (current, 2m; micro) (part of kit SGEN4068A, SGEN4067A and SGEN4061A)
F	1*	3087707C04	MIB B cable (current, 2m) (part of kit SGEN4066A, SGEN4070A and SGEN4068A)
G	2*	3087707C05	MIB C cable (current, 2m) (part of kit SGEN4070A and SGEN4068A)
H	1*	3087707C06	MIB A cable (long, 2m; pico) (part of kit SGEN4070A, SGEN4069A and SGEN4063A)
I	1*	3087707C07	MIB B cable (long, 5m) (part of kit SGEN4065A, SGEN4069A and SGEN4067A)
J	2*	3087707C08	MIB C cable (long, 5m) (part of kit SGEN4069A and SGEN4067A)
K	1*	3087707C09	MIB A cable (short, 1m; micro) (part of kit SGEN4062A)
L	1*	3087707C10	MIB A cable (short 1m; pico) (part of kit SGEN4064A)
M	1	3086039H11	RGPS cable, 125 ft.
		3086039H12	RGPS cable, 250 ft.
		3086039H13	RGPS cable, 500 ft.
		3086039H14	RGPS cable, 1000 ft.
		3086039H15	RGPS cable, 2000 ft.
N	1	Customer Supplied	Span cable. 22-24 AWG solid copper twisted pair.

. . . continued on next page

## Cable Descriptions – continued

<b>Table 4-1: Cable Descriptions and Part Numbers</b>			
<b>Cable</b>	<b>Qty.</b>	<b>Part Number</b>	<b>Description</b>
O	1	Customer Supplied	Customer Input cable. 22–24 AWG solid copper twisted pair.
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)
S	1–4	3087854C02	AC input power cable. 14 AWG. 5m. Designed for 120–240 VAC power input. Cable has Deutsch connector on both ends.
T	1	Customer Supplied	AC Input power cable. 10–14 AWG, 90°C wire. Designed for 120–240 VAC.
U	1	3087854C04	DC input cable, 14 and 22 AWG, 5 m, is designed for 20 to 30 VDC power input.
V	1	Customer Supplied	Phone (Modem) cable. 22–24 AWG solid copper twisted pair.
W	1–3	Customer Supplied	Span Line Daisy Chain cable.
X	1–11	3086039H18	RGPS Synchronization cable (part of kit SGKN4351A).
		3086039H19	RGPS Synchronization cable (part of kit SGKN4352A).
Y	1	Customer Supplied	Master Ground Cable, 6 -AWG, insulated copper wire. Used for both Primary Surge Suppressor and non-Primary Surge Suppressor installations.
Z	1	3088116C01	Site I/O Cable Extender. Required for use in a BTS not equipped with the Primary Surge Suppressor.
*Quantity of cables depends upon system configuration. Refer to “Motorola Kits for Multi-Unit Installations” for more information.			

## Cable Descriptions – continued

### Motorola Kits for Multi-Unit Installations

Table 4-2 through Table 4-11 gives 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 4-2:** 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 4-3:** 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 4-4:** 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 4-5:** 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



## Cable Descriptions – continued

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

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

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

## Cable Descriptions – continued

**Table 4-9:** 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 4-10:** 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 4-11:** 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

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## Cable Descriptions – continued

### Motorola Kits for RGPS Cabling

Table 4-12 and Table 4-13 show the contents of Motorola kits SGKN4351A and SGKN4352A. These kits are necessary for RGPS cabling between multiple BTS locations.

<b>Table 4-12: RGPS Synchronization Cable Kit – SGKN4351A</b>			
<b>Cable</b>	<b>Qty.</b>	<b>Motorola Part Number</b>	<b>Description</b>
X	1	3086039H18	RGPS Sync Cable, 2000 ft.
n/a	2	5864461A03	Fitting, liquid tight.
n/a	2	0264599A02	Nut, nylon locking

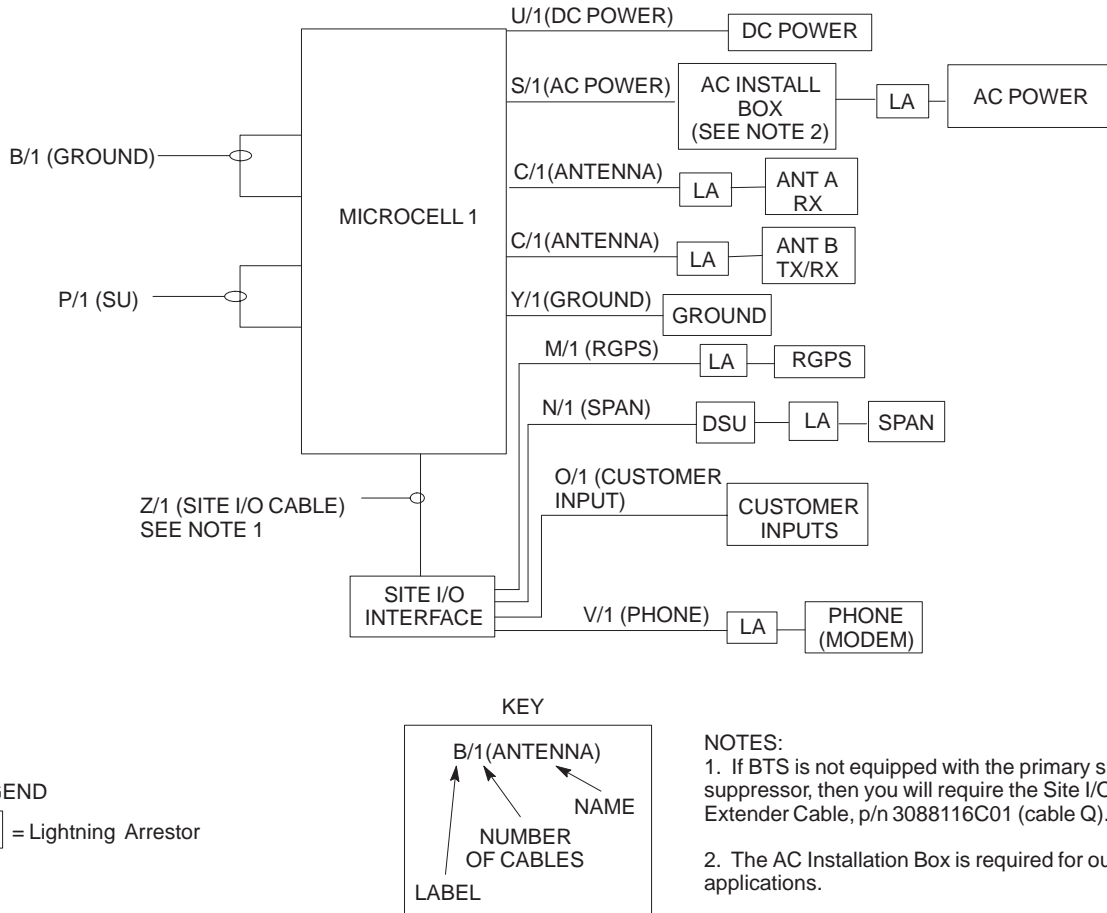
<b>Table 4-13: RGPS Synchronization Cable Kit – SGKN4352A</b>			
<b>Cable</b>	<b>Qty.</b>	<b>Motorola Part Number</b>	<b>Description</b>
X	1	3086039H19	RGPS Sync Cable, 3280 ft.
n/a	2	5864461A03	Fitting, liquid tight.
n/a	2	0264599A02	Nut, nylon locking

# Site Cabling for BTS With Customer–Supplied Site I/O Interface

## Preparing Site Cabling Scope of Work

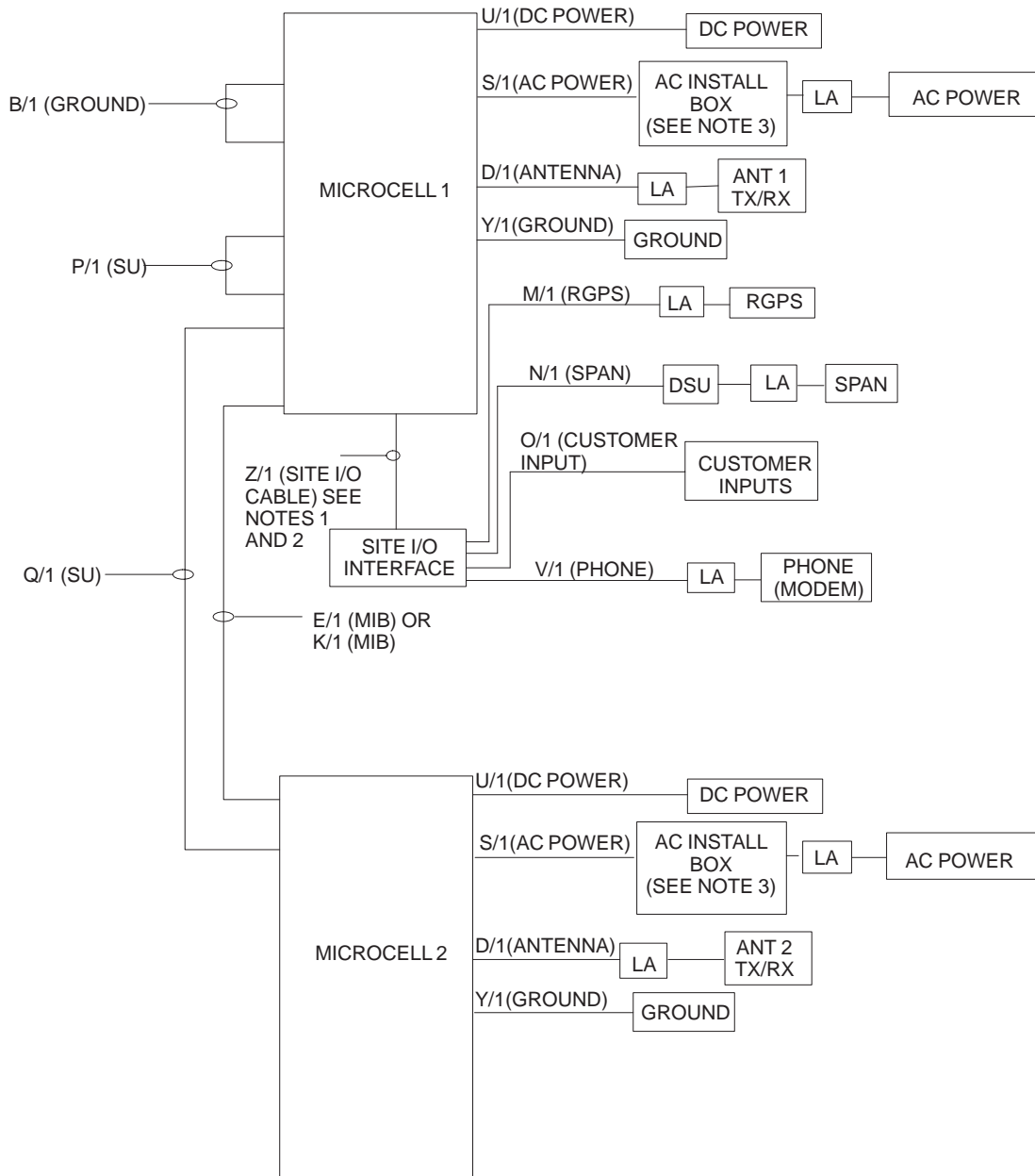
Figure 4-1 through Figure 4-8 shows the scope of work to be performed for preparing the site cabling with the customer–supplied Site I/O Interface. Chapter 6 shows the scope of work for unit cabling.

**Figure 4-1:** Site Cabling for One Microcell

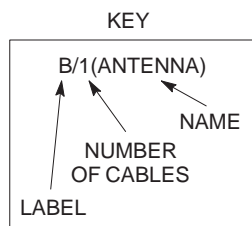


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Figure 4-2: Site Cabling for Two Microcells



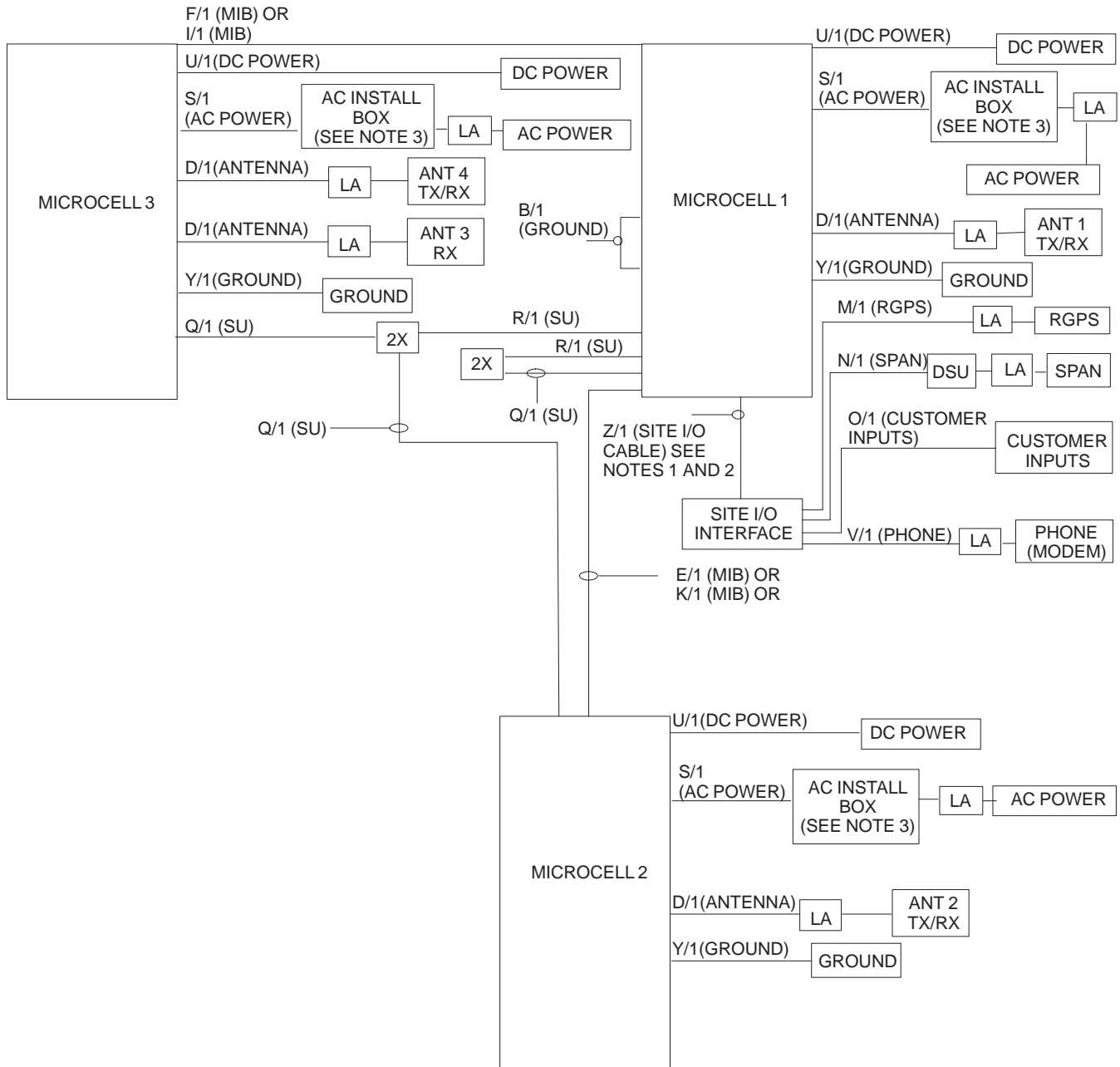
LEGEND  
 LA = Lightning Arrestor



NOTES

- 1: Site I/O junction box and associated cable are present on Microcell 1 only.
- 2: If BTS is not equipped with the primary surge suppressor, then you will require the Site I/O Cable Extender Cable, p/n 3088116C01 (cable Z).
- 3: The AC Installation Box is required for outdoor applications.

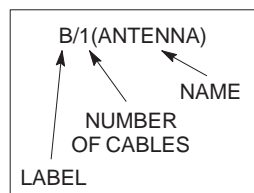
Figure 4-3: Site Cabling for Three Microcells



LEGEND

- LA = Lightning Arrestor
- 2X = SU Splitter/Combiner

KEY

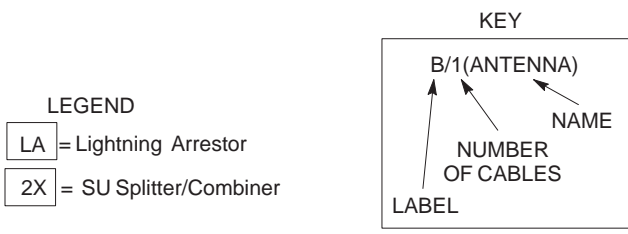
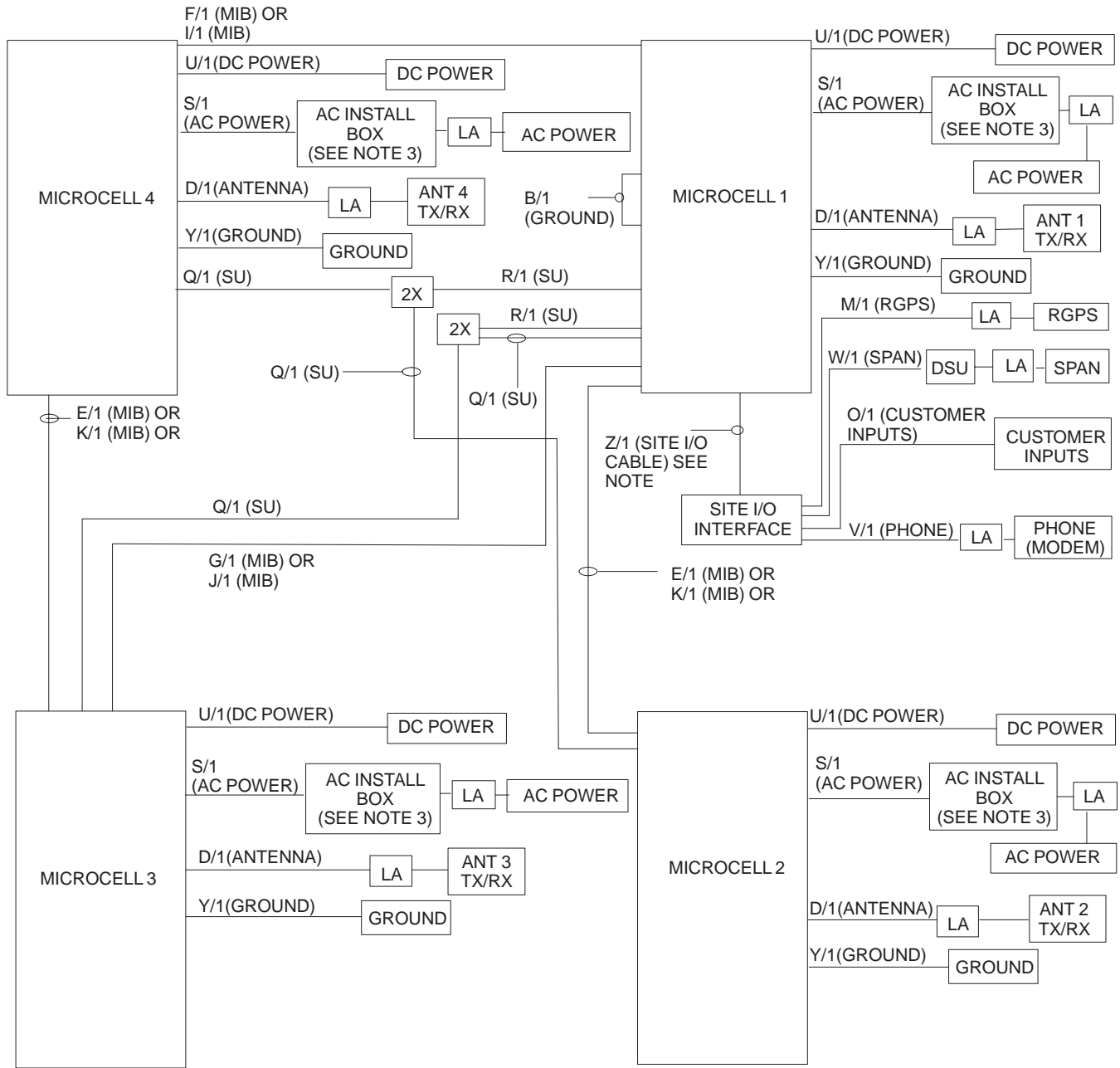


NOTES

1. Site I/O junction box and associated cable are present on Microcell 1 only.
2. If BTS is not equipped with the primary surge suppressor, then you will require the Site I/O Cable Extender Cable, p/n 3088116C01 (cable Z).
3. The AC Installation Box is required for outdoor applications.

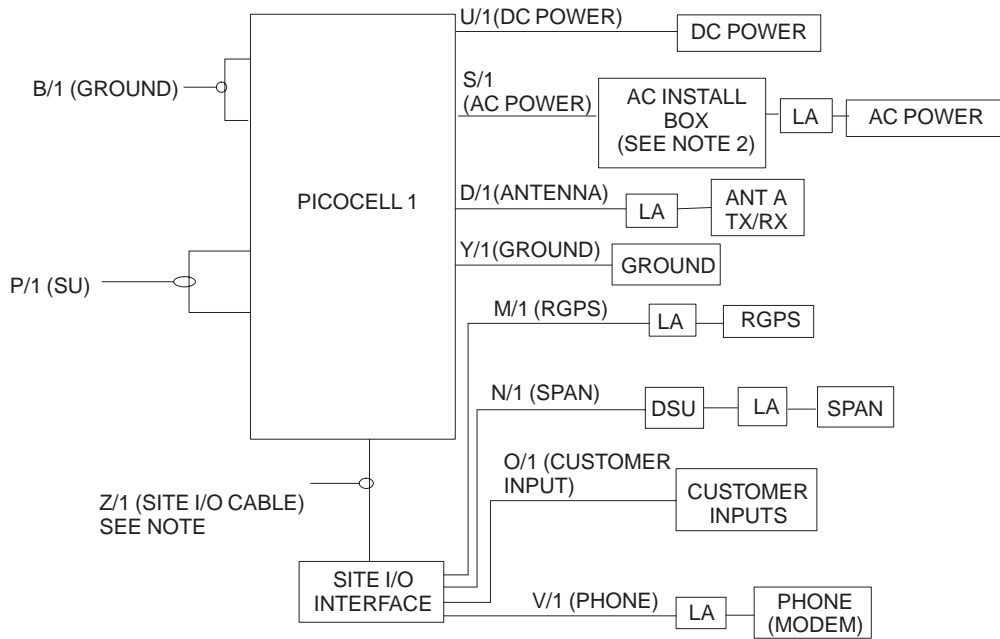


Figure 4-4: Site Cabling for Four Microcells



- NOTES**
- 1: Site I/O junction box and associated cable are present on Microcell 1 only.
  - 2: If BTS is not equipped with the primary surge suppressor, then you will require the Site I/O Cable Extender Cable, p/n 3088116C01 (cable Z).
  - 3: The AC Installation Box is required for outdoor applications.

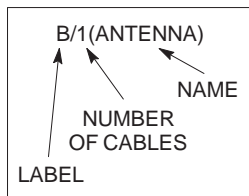
Figure 4-5: Site Cabling for One Picocell



LEGEND

LA = Lightning Arrestor

KEY



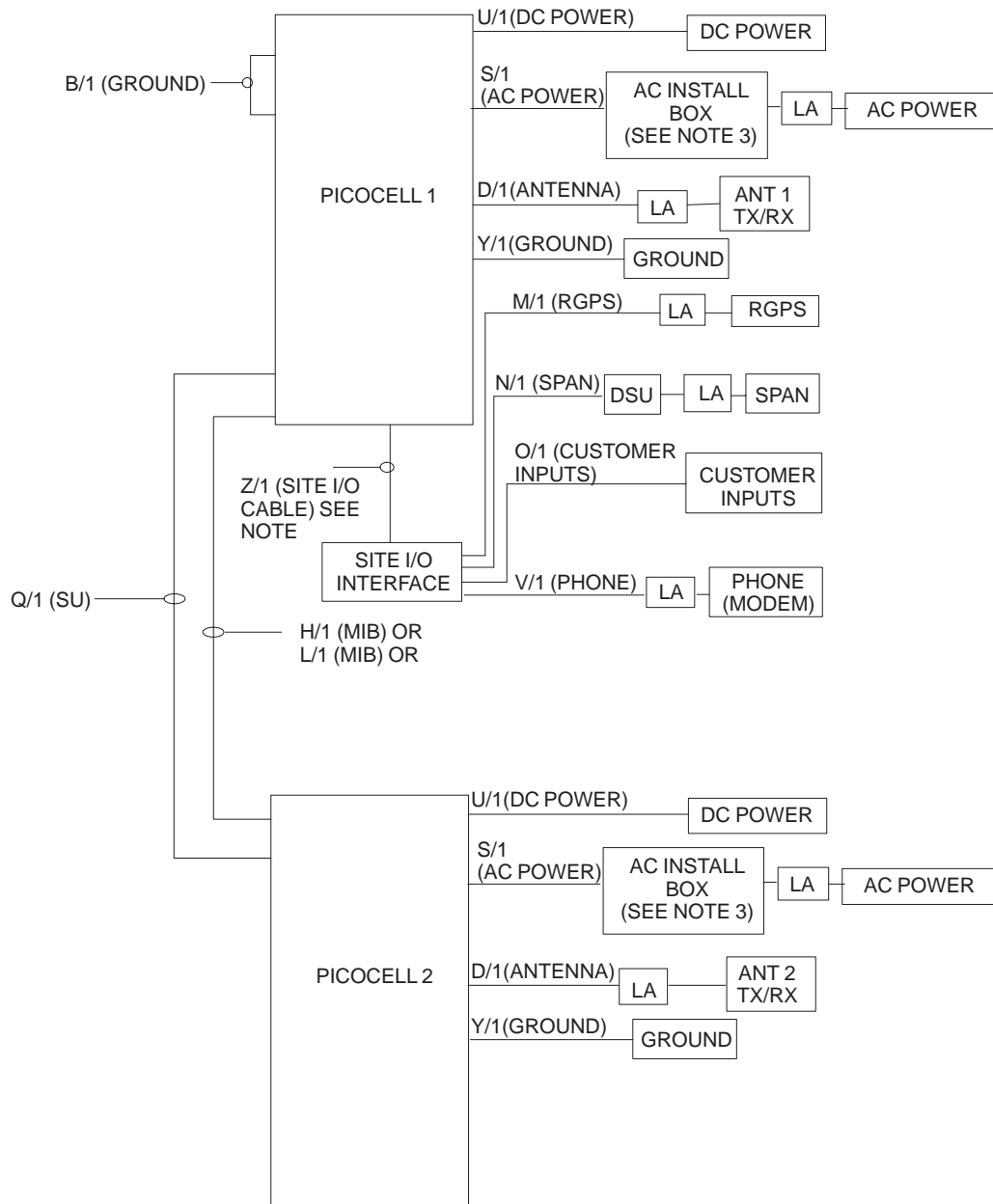
NOTES:

1. If BTS is not equipped with the primary surge suppressor, then you will require the Site I/O Cable Extender, p/n 3088116C01 (cable Z).
2. The AC Installation Box is required for outdoor applications.

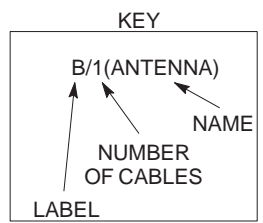




Figure 4-6: Site Cabling for Two Picocells

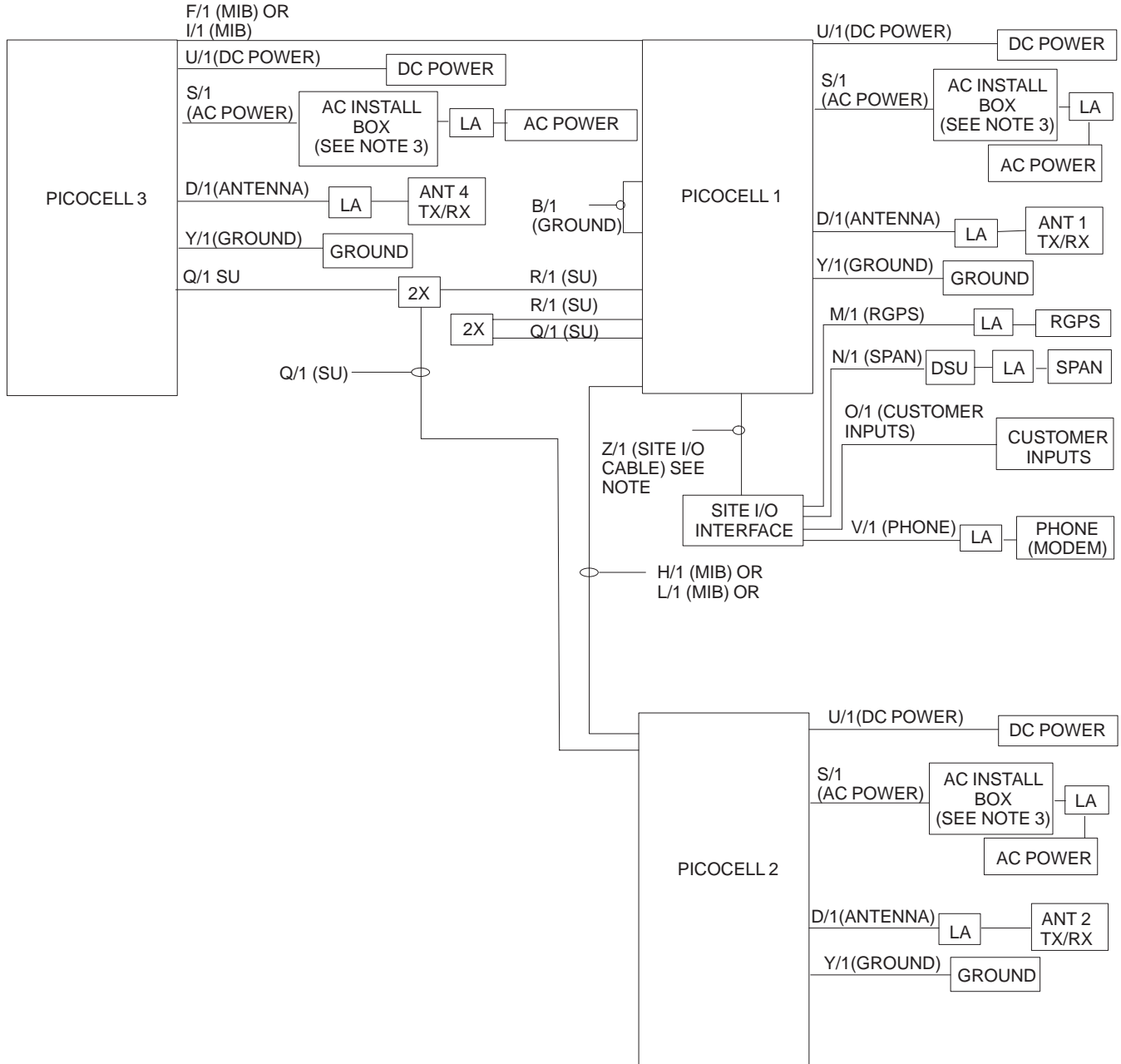


**LEGEND**  
 LA = Lightning Arrestor  
 2X = SU Splitter/Combiner



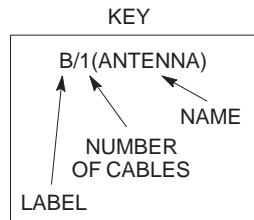
- NOTES**
- 1: Site I/O junction box and associated cable are present on Microcell 1 only.
  - 2: If BTS is not equipped with the primary surge suppressor, then you will require the Site I/O Cable Extender Cable, p/n 3088116C01 (cable Z).
  - 3: The AC Installation Box is required for outdoor applications.

**Figure 4-7:** Site Cabling for Three Picocells



4

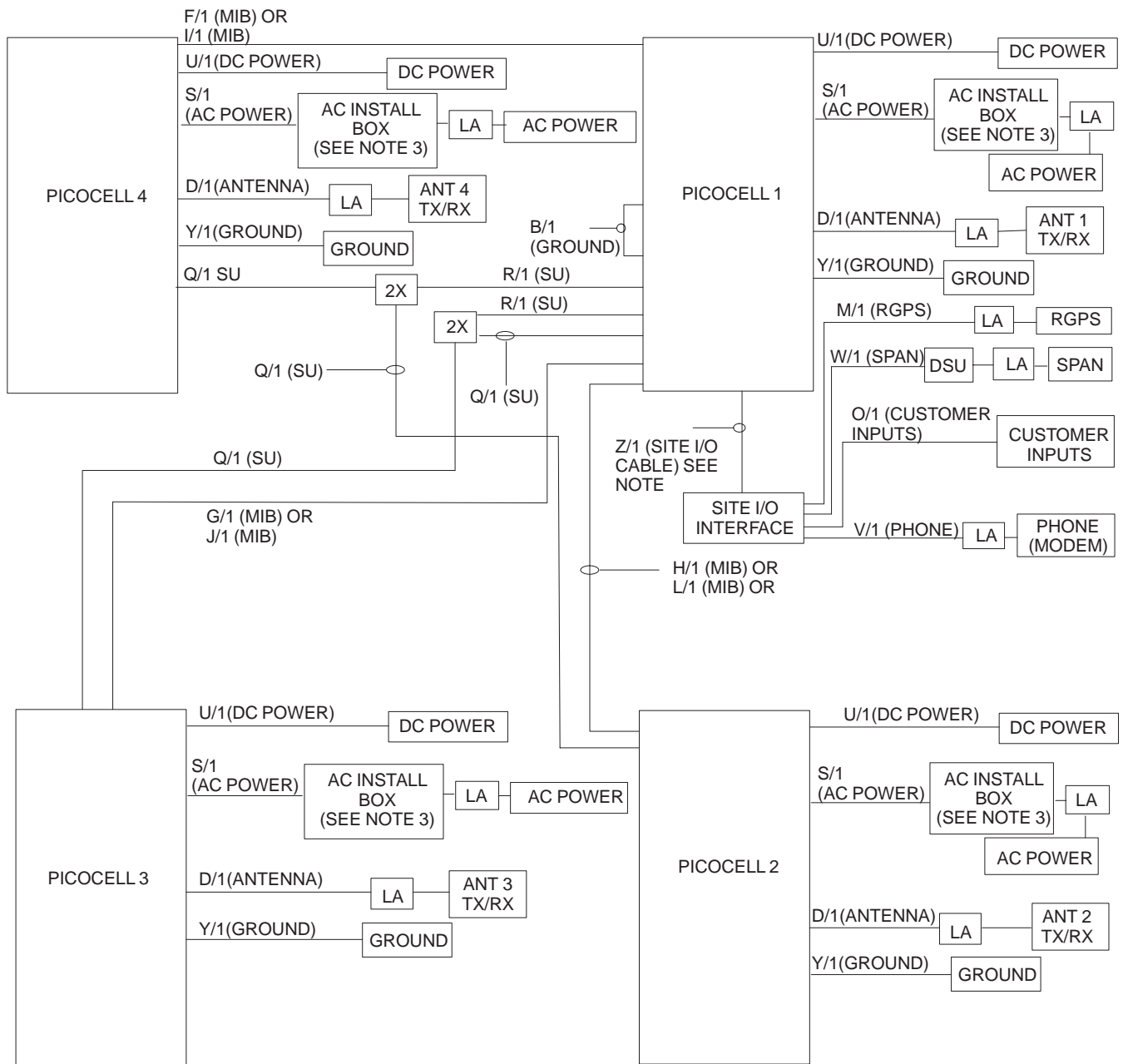
**LEGEND**  
 LA = Lightning Arrestor  
 2X =SU Splitter/Combiner



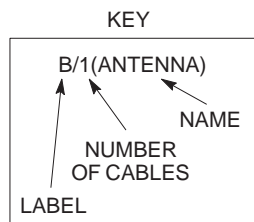
**NOTES**

- 1: Site I/O junction box and associated cable are present on Microcell 1 only.
- 2: If BTS is not equipped with the primary surge suppressor, then you will require the Site I/O Cable Extender Cable, p/n 3088116C01 (cable Z).
3. The AC Installation Box is required for outdoor applications.

Figure 4-8: Site Cabling for Four Picocells



**LEGEND**  
 LA = Lightning Arrester  
 2X = SU Splitter/Combiner



**NOTES**

- 1: Site I/O junction box and associated cable are present on Microcell 1 only.
- 2: If BTS is not equipped with the primary surge suppressor, then you will require the Site I/O Cable Extender Cable, p/n 3088116C01 (cable Z).
- 3: The AC Installation Box is required for outdoor applications.

# Power, Ground, and Battery Cabling for Sites Equipped With Customer–Supplied Site I/O Interface

## Objective

The objective of this procedure is to install the power, earth ground, and battery cabling for one or more Microcell or PicoCell units at a site equipped with customer–supplied Site I/O Interface.



### WARNING

Dangerous voltages, capable of causing death, are present in this equipment. Use extreme caution when handling and testing this equipment.

### NOTE

If you are installing the unit outdoors and are not using the Primary Surge Suppressor, then you must connect AC power with the AC Installation Box. The AC Installation Box is included with the non–surge option.

## 4

## Other Grounding Considerations

This procedure covers only the grounding information for the cables that attach to one or more MicroCell or PicoCell units. Grounding considerations beyond the ground cables that attach to the MicroCell are summarized in Appendix A. Refer to Appendix A and the site documentation for other grounding considerations.

## Power Requirements and Configurations

The power requirements for the unit are: 120–240 VAC or 20–30 VDC power input.

The AC Installation Box is required for all outdoor installations which use the customer–supplied Site I/O interface.

The power and battery configurations for the MicroCell and PicoCell units are:

- AC power only (no battery)
- AC power with short duration battery
- DC power

### NOTE

Neither the "+" or "-" terminal of the DC Input is connected to the BTS ground. If a negative supply input is provided, the "+" terminal of the DC input must be connected to the Master Ground Plate (MGP). By connecting the "+" terminal of the DC input to the MGP, a negative supply system is created.

# Power, Ground, and Battery Cabling for Sites Equipped With Customer–Supplied Site I/O Interface – continued

## Cables Needed

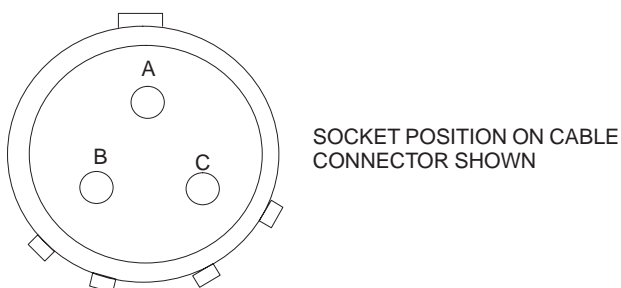
Table 4-14 provides the quantity and description of the cables needed.

Cable	Qty.	Part Number	Description
S	1–4	3087854C02	AC input cable, 14 AWG, 5 m, is designed for 88–260 VAC power input.
U	1–4	3087854C04	DC input cable, 14 and 22 AWG, 5 m, is designed for 20 to 40 VDC power input.
Y	1–4	Customer Supplied	Ground cable, 6 -AWG, insulated copper wire. Requires one ring lug connectors.

## AC Input Cable Information

The pinout information for the AC input cable(s) (Cable S) is given in Figure 4-9 and Table 4-15.

**Figure 4-9:** AC Input Cable Connector Information



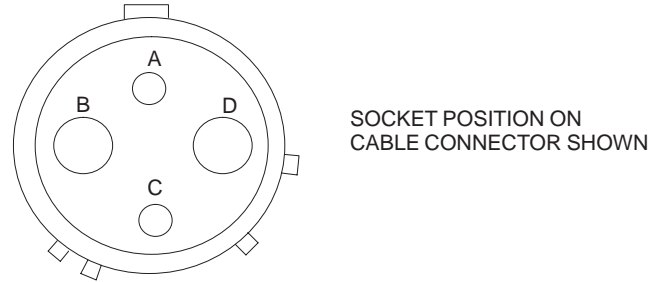
Connector	Wire Color	Description
A	Black	Line
B	Green	Ground
C	White	Neutral

# Power, Ground, and Battery Cabling for Sites Equipped With Customer–Supplied Site I/O Interface – continued

## DC Input Cable Information

The information for the DC input cable(s) (Cable U) is given in Figure 4-10.

**Figure 4-10:** DC Input Cable Connector Information



**Table 4-16:** DC Input Cable Information

Connector	Wire Color	Description	Comments
A	Yellow	Switch A	No connection
B	Red	Positive	Connect to positive terminal of supply.
C	Blue	Switch B	Connect to negative terminal of supply.
D	Black	Negative	Connect to negative terminal of supply.

## Procedure

The system configuration determines which power cables are installed. The ground cable is always installed. Based on the system configuration perform the appropriate procedures from the following tables.

**Table 4-17:** Procedure to Install Earth Ground Cable

Step	Action
1	Route cable Y (ground cable) from the ground on the mounting bracket to the customer defined grounding location.
2	Connect cable Y to the customer defined master ground plate.

## Power, Ground, and Battery Cabling for Sites Equipped With Customer–Supplied Site I/O Interface – continued

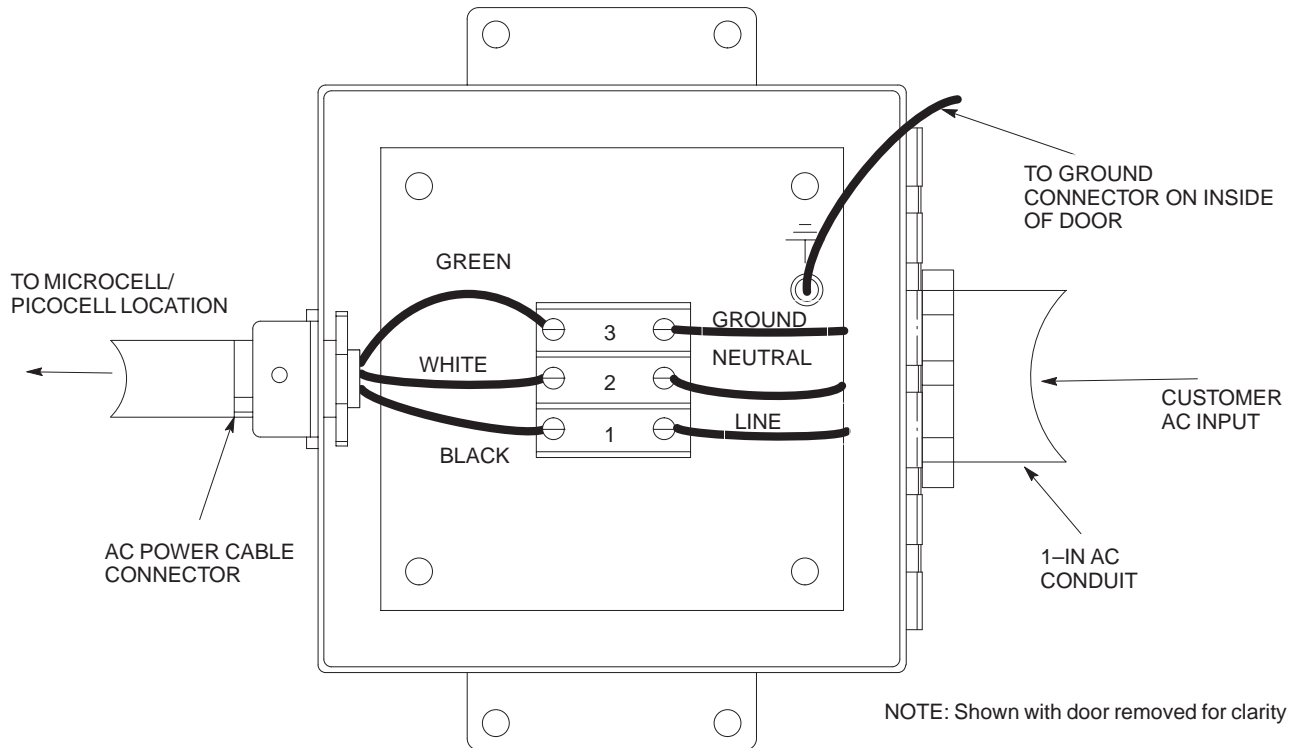
<b>Table 4-18: Procedure to Install AC Input Cable(s) (Indoor Applications)</b>	
<b>Step</b>	<b>Action</b>
1	If you will not use the AC Installation box, remove the male connector (with pins) from the AC input power cable (cable S).
2	Connect the loose wires of cable S (AC input cable) to the customer defined AC power source. Refer to Table 4-15 for wiring information.
3	Verify all connections of cable S with an ohmmeter prior to routing the cable.
4	Route cable S from the AC power supply to the unit location.

<b>Table 4-19: Procedure to Install AC Installation Box (Optional – Required for Outdoor Installations)</b>	
<b>Step</b>	<b>Action</b>
1	Route the AC Power Cable (cable T) through 1–in. conduit from the customer–defined AC power source to the AC Installation box. Refer to Figure 4-11 and Table 4-20.
2	Attach cable T to the connector on the AC Installation Box and route cable T to unit location.

<b>Table 4-20: AC Installation Box Cabling</b>		
<b>Punchdown Block Connector</b>	<b>AC Power Cable Wire Color</b>	<b>Description</b>
1	Black	Line*
2	White	Neutral*
3	Green	Ground**
<p>*The line and neutral connections can accept 10–14 AWG cable.            **The Ground connection can accept 14–6 AWG cable.            Refer to the “Cable Descriptions and Part Numbers” table in Chapter 4 for more information.</p>		

# Power, Ground, and Battery Cabling for Sites Equipped With Customer-Supplied Site I/O Interface – continued

**Figure 4-11:** AC Installation Box



4

**Table 4-21:** Procedure to Install DC Input Cable(s)

Step	Action
1	Connect the loose wires of cable U (DC input cable) to the customer defined DC power source. Refer to NO TAG for wiring information.
2	Verify all connections of cable U with an multimeter prior to routing the cable.
3	Route cable U from the DC power supply to the unit location.



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

## Objective

The objective of this procedure is to install the cabling for the antenna(s). This cabling is installed between one or more units and the customer–supplied lightning arrestor(s).

## Cable Labels

The cable designations are referenced to Table 4-1 in the “Cable Description” area of this chapter.

## Equipment Needed

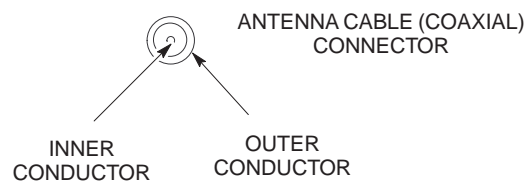
Table 4-22 provides the quantities and descriptions of the cables.

Cable	Qty.	Part Number	Description
C	1 to 8	Customer Supplied	Antenna cable, 50–Ohm coaxial terminated with at least one male, N–type connector.

## Antenna Cable Pin and Signal Information

The antenna cabling uses a 50–Ohm coaxial cable. The inner conductor provides signaling and the outer conductor provides shielding and ground.

**Figure 4-12: Antenna Cabling Details**



Antenna	Inner Conductor	Outer Conductor
B (Microcell only)	TX/RX	Ground
A	RX (Microcell) TX/RX (Picocell)	Ground

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

## Procedure to Install Antenna Cabling for One Antenna



### IMPORTANT

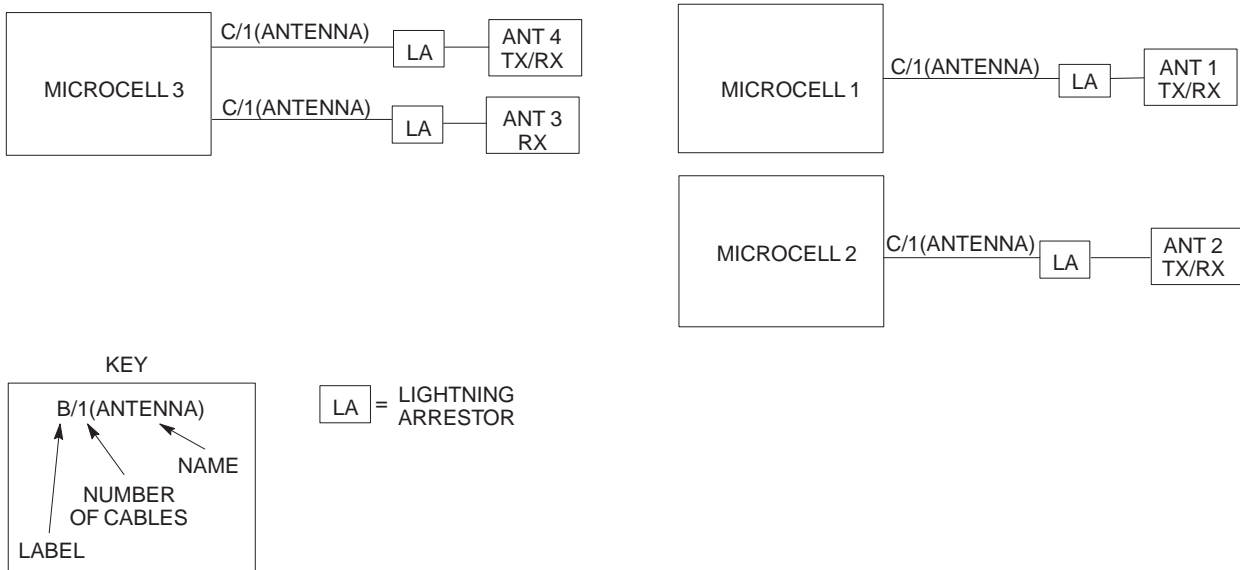
You must install lightning arrestors for all outdoor installations.

Route the antenna cable between the unit and the customer–supplied lightning arrestor. If a lightning arrestor is not required, route the cabling directly to the antenna. Refer to Figure 4-12 and Table 4-23.

## Procedure to Install Antenna Cabling for Multi–Unit Configurations

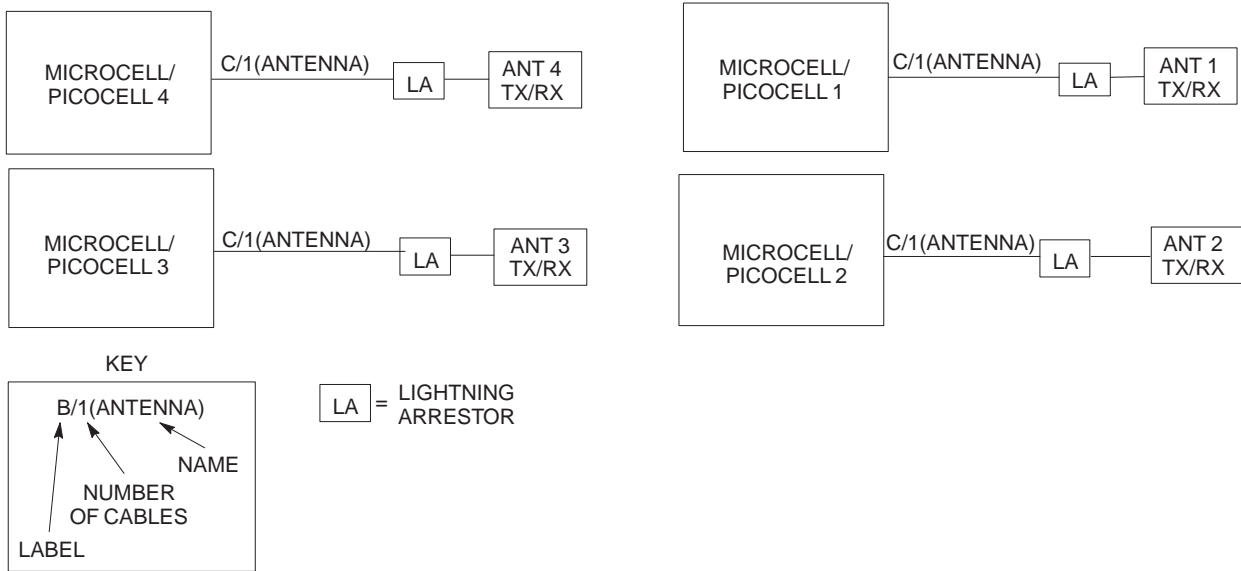
If your site has more than one Microcell or Picocell unit, refer to Figure 4-13 or Figure 4-14 for site cabling information. Route the antenna cables between the units and the customer–supplied lightning arrestors. If lightning arrestors are not required, route the cabling directly to the antennas.

**Figure 4-13:** Antenna Cabling for Three Microcells



# Antenna Cabling for Sites Equipped With Customer–Supplied Site I/O Junction Box – continued

**Figure 4-14:** Antenna Cabling for Maximum of Four Microcells or Picocells



# Site I/O , Span Line, RGPS and Modem Cabling for Sites Equipped With Customer–Supplied Site I/O Interface

## Objective

The objective of this procedure is to install the Site I/O cable between the Site I/O junction box and the customer–supplied Site I/O interface. This procedure also covers the installation of the site cabling of the span line, RGPS and modem cabling to the site I/O interface.

If your multi–unit BTS is equipped with the optional Primary Surge Suppressor, refer to the “Primary Surge Suppressor Cabling” procedures in chapter 5.

## Cable Labels

The cable designations are referenced to Table 4-1 in the “Cable Description” area of this chapter.

## Tools and Equipment

Table 4-24 provides the quantities and descriptions of the cables.

Cable	Qty.	Part Number	Description
M	1	3086039H11	RGPS cable, 125 ft.
		3086039H12	RGPS cable, 250 ft.
		3086039H13	RGPS cable, 500 ft.
		3086039H14	RGPS cable, 1000 ft.
		3086039H15	RGPS cable, 2000 ft.
N	1	Customer Supplied	Span Cable. 22–24 AWG solid copper twisted pair.
O	1	Customer Supplied	Customer Input Cable. 22–24 AWG solid copper twisted pair.
V	1	Customer Supplied	Phone (Modem) Cable. 22–24 AWG solid copper twisted pair.
Z	1	3088116C01	Site I/O Extender Cable. Required for use in a BTS not equipped with the Primary Surge Suppressor.

## Site I/O Cabling

The Site I/O interface and cabling are customer–supplied. The cable between the Site I/O junction box and the Site I/O interface is part of the Site I/O junction box and is supplied by Motorola. If your BTS uses the customer–supplied Site I/O Interface instead of the Primary Surge Suppressor, then you will need to use the Site I/O Extender Cable (Cable Z). The Site I/O Extender cable is included with this option.

The customer determines the Site I/O interface configuration. The end result is the correct signals getting to the correct pins on the Site I/O cable.

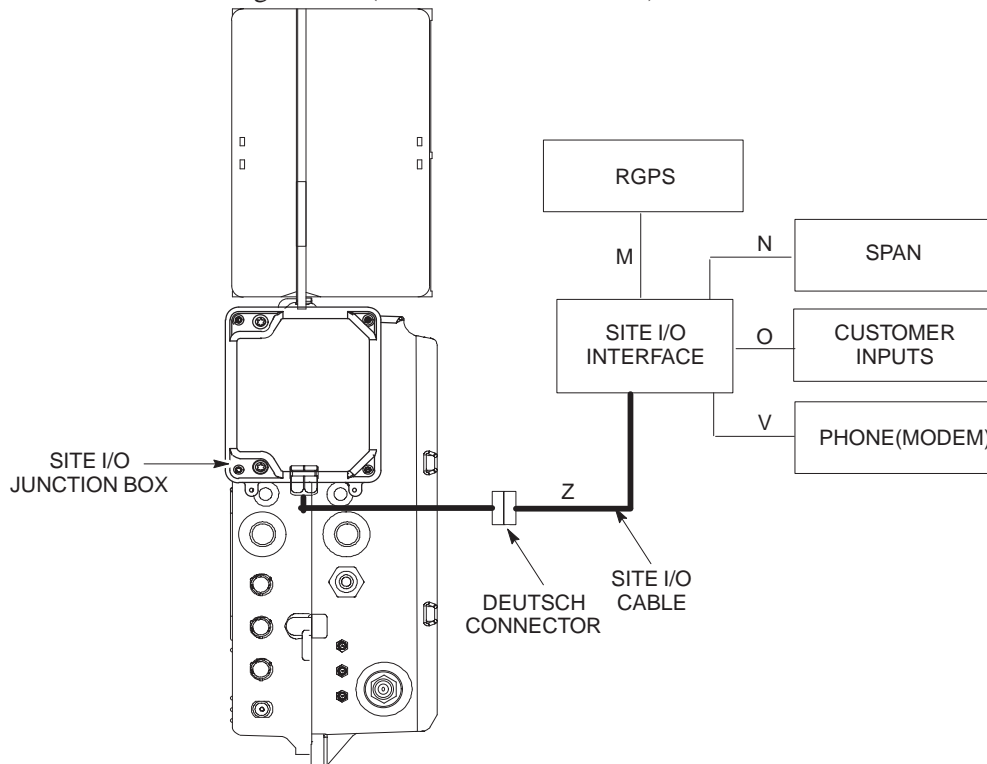
# Site I/O , Span Line, RGPS and Modem Cabling for Sites Equipped With Customer–Supplied Site I/O Interface – continued

## Procedure to Install Site I/O Cable Between Site I/O Junction Box and Site I/O Interface

Route the Site I/O junction box cable from the unit location(s) to the Site I/O Extender Cable (cable Z). Route cable Z to the Site I/O interface. Connect the appropriate connectors within the Site I/O interface. Refer to Figure 4-15 and Table 4-25.

If lightning arrestors are required, they must be customer–supplied. Lightning arrestors are not necessary for sites equipped with optional Primary Surge Suppressor.

**Figure 4-15:** Site I/O Cabling Details (MicroCell Unit Shown)



# Site I/O , Span Line, RGPS and Modem Cabling for Sites Equipped With Customer–Supplied Site I/O Interface – continued

## Pin and Signal Information for Site I/O Cabling

Table 4-25 gives the pin and signal information for the Site I/O cable.

<b>Table 4-25: Pin/Signal Information for Site I/O Cable</b>		
<b>BTS Interface</b>	<b>Wire/Stripe Color</b>	<b>Description</b>
Customer Input	Black	Customer Input 1 Signal
	Brown	Customer Input 1 Ground
	Red	Customer Input 2 Signal
	Orange	Customer Input 2 Ground
	Yellow	Customer Input 3 Signal
	Green	Customer Input 3 Ground
	Blue	Customer Input 4 Signal
	Purple	Customer Input 4 Ground
	Grey	Customer Input 5 Signal
	White	Customer Input 5 Ground
	Black/Brown	Customer Input 6 Signal
	Black/Red	Customer Input 6 Ground
	Black/Orange	Customer Input 7 Signal
	Black/Yellow	Customer Input 7 Ground
	Black/Green	Customer Input 8 Signal
Black/Blue	Customer Input 8 Ground	
Sync Reverse	Black/Purple	Data to Tail –
	Black/Grey	Data to Tail +
	Black/White	Data from Tail –
	Brown/Black	Data from Tail +
	Brown/Red	1 PPS to Tail –
	Brown/Orange	1 PPS to Tail +
	Brown/Yellow	1 PPS from Tail –
	Brown/Green	1 PPS from Tail +
	Brown/Blue	Downstream BTS Detect +
	Brown/Purple	Downstream BTS Detect –
. . . continued on next page		



# Site I/O , Span Line, RGPS and Modem Cabling for Sites Equipped With Customer–Supplied Site I/O Interface – continued

**Table 4-25: Pin/Signal Information for Site I/O Cable**

BTS Interface	Wire/Stripe Color	Description
Sync Forward	Brown/Grey	Data from Head –
	Brown/White	Data from Head +
	Red/Black	Data to Head –
	Red/Brown	Data to Head +
	Red/Orange	1 PPS from Head –
	Red/Yellow	1 PPS from Head +
	Red/Green	1 PPS to Head –
	Red/Blue	1 PPS to Head +
	Red/Purple	RGPS 28V
	Red/Grey	RGPS Ground
	Red/White	RGPS 28V
	Orange/Black	RGPS Ground
	Orange/Brown	RGPS 28V
	Orange/Red	RGPS Ground
	Orange/Yellow	NO CONNECTION
Orange/Green	NO CONNECTION	
Span (Network)	Orange/Blue	RX TIP Primary (Network)
	Orange/Purple	RX RING Primary (Network)
	Orange/Grey	TX TIP Primary (Network)
	Orange/White	TX RING Primary (Network)
	Yellow/Black	RX TIP Secondary (Network)
	Yellow/Brown	RX RING Secondary (Network)
	Yellow/Red	TX TIP Secondary (Network)
	Yellow/Orange	TX RING Secondary (Network)
. . . continued on next page		



## Site I/O , Span Line, RGPS and Modem Cabling for Sites Equipped With Customer–Supplied Site I/O Interface – continued

**Table 4-25: Pin/Signal Information for Site I/O Cable**

BTS Interface	Wire/Stripe Color	Description
Span (Redundant)	Yellow/Green	RX TIP Primary (Redundant)
	Yellow/Blue	RX RING Primary (Redundant)
	Yellow/Purple	TX TIP Primary (Redundant)
	Yellow/Grey	TX RING Primary (Redundant)
	Yellow/White	RX TIP Secondary (Redundant)
	Green/Black	RX RING Secondary (Redundant)
	Green/Brown	TX TIP Secondary (Redundant)
	Green/Red	TX RING Secondary (Redundant)
Phone (Modem)	Green/Orange	MODEM TIP
	Green/Yellow	MODEM TIP
	Green/Blue	No connection
	Green/Purple	No connection
	Green/Grey	MODEM RING
	Green/White	MODEM RING

### Connecting Customer–Defined Inputs to the Site I/O Interface

The unit provides eight customer–defined inputs for connection to external contacts. Each input (a signal/ground pair) is monitored for an “OPEN” (>50 k Ohms) or “CLOSED” (<3 Ohms) condition.



# Site I/O , Span Line, RGPS and Modem Cabling for Sites Equipped With Customer–Supplied Site I/O Interface – continued

## Connecting the RGPS Cable to the Site I/O Interface

The RGPS (cable M) is connected to the Site I/O interface (Sync Forward) of the BTS. Table 4-26 provides the Sync Forward to RGPS connections.

**Table 4-26: Connecting the RGPS to the Site I/O Cable**

Site I/O Cable		RGPS (Cable M)	
Sync Forward Descriptions	Sync Forward Color Code (wire/stripe)	RGPS Description	RGPS Color Code (wire/stripe)
Data from Head –	Brown/Grey	Transmit Port –	Green/Black
Data from Head +	Brown/White	Transmit Port +	Green
Data to Head –	Red/Black	Receive Port –	White/Black
Data to Head +	Red/Brown	Receive Port +	White
1 pps from Head –	Red/Orange	1 PPS Timing –	Brown/Black
1 pps from Head +	Red/Yellow	1 PPS Timing +	Brown
RGPS 28 V	Red/Purple	Power 1	Blue
	Red/White		
	Orange/Brown	Power 2	Yellow
	Orange/Yellow		
RGPS Ground	Red/Grey	DC Ground 1	Blue/Black
	Orange/Black		
	Orange/Red	DC Ground 2	Yellow/Black
	Orange/Green		
<b>NOTE</b>			
The RGPS must also be ground referenced to the BTS “digital” ground. This is done by connecting the Red/Grey lead (RGPS Ground) from the Sync Forward Interface to the Black/Blue lead (Customer Input 8 Ground) from the Customer Input interface.			

## Connecting the Span Line Cable to the Site I/O Interface

The unit provides two, four–wire JT1 interfaces for backhaul support. Each interface is made up of Transmit Tip/Ring and Receive Tip/Ring connections.

The Transmit and Receive data flow is given from the perspective of the unit. Only a single span line (Primary) is required for BTS operation.

---

## Site I/O , Span Line, RGPS and Modem Cabling for Sites Equipped With Customer–Supplied Site I/O Interface – continued

### Connecting a Phone Line to the Site I/O Interface (Modem Support)

The unit provides a two–wire analog phone line interface for modem support. The unit Tip and Ring signals are connected to the external phone line Tip and Ring.

# RGPS Cabling for Multi-BTS Configurations

## Overview

This procedure gives information to connect multiple units for both RGPS (synchronous) and HSO (non-synchronous) configurations.

## Background

The RGPS only connects to the first unit of a multi-unit system. This first unit sends timing signals to all other units in a multi-unit system. You only need to connect the first units of each BTS to each other. This allows “sharing” of a single RGPS antenna between several single or multi-unit BTSs.

This also applies to systems using HSO instead of RGPS. The HSO timing is “shared” in the same way.

## Required Equipment

### Cables

The RGPS Synchronization Cable is contained in the Motorola kits listed in Table 4-27:

<b>Table 4-27: Cable Descriptions and Part Numbers</b>			
<b>Cable</b>	<b>Qty.</b>	<b>Part Number</b>	<b>Description</b>
X	1-11	3086039H18	RGPS Synchronization cable (part of kit SGKN4351A).
		3086039H19	RGPS Synchronization cable (part of kit SGKN4352A).

### Motorola kits

Table 4-28 and Table 4-29 show the contents of Motorola kits SGKN4351A and SGKN4352A. These kits are necessary for RGPS cabling between multiple BTS locations.

<b>Table 4-28: RGPS Synchronization Cable Kit – SGKN4351A</b>			
<b>Cable</b>	<b>Qty.</b>	<b>Motorola Part Number</b>	<b>Description</b>
X	1	3086039H18	RGPS Sync Cable, 2000 ft.
n/a	2	5864461A03	Fitting, liquid tight.
n/a	2	0264599A02	Nut, nylon locking

<b>Table 4-29: RGPS Synchronization Cable Kit – SGKN4352A</b>			
<b>Cable</b>	<b>Qty.</b>	<b>Motorola Part Number</b>	<b>Description</b>
X	1	3086039H19	RGPS Sync Cable, 3280 ft.
n/a	2	5864461A03	Fitting, liquid tight.
n/a	2	0264599A02	Nut, nylon locking

### Cable Diagram

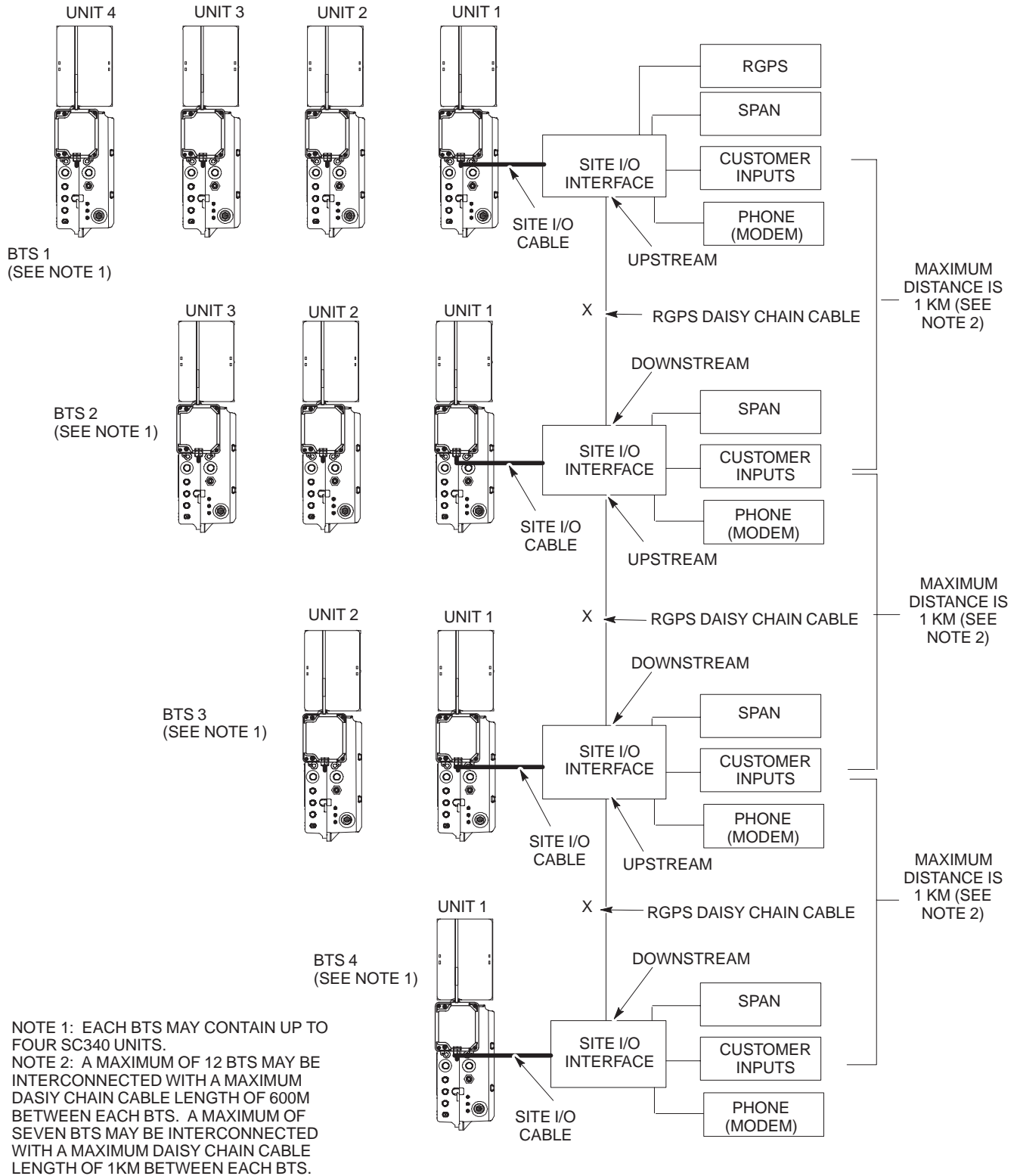
Figure 4-16 and Figure 4-17 both show the cabling for multi-unit configurations for both RGPS (synchronous) and HSO (non-synchronous).

### Procedure

Connect the cables (Cable O) between the RGPS head (if used) and the site I/O junction box of each BTS. Refer to the cable run list in Table 4-30, Figure 4-16 and Figure 4-17.

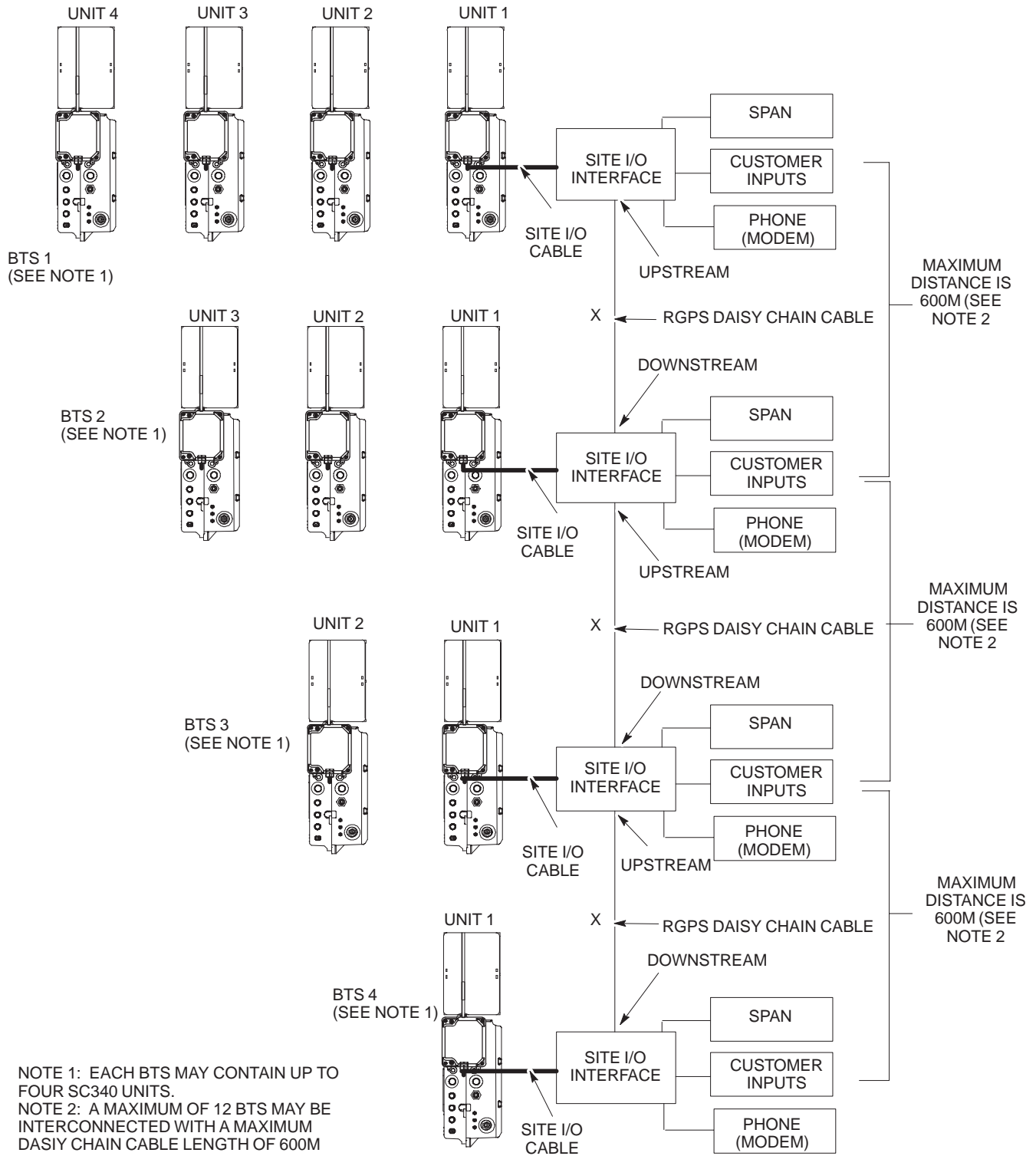
# RGPS Cabling for Multi-BTS Configurations – continued

**Figure 4-16:** Site I/O Interface Cabling for RGPS (Synchronous) Configurations



# RGPS Cabling for Multi-BTS Configurations – continued

**Figure 4-17: Site I/O Interface Cabling for HSO (Non-Synchronous) Configurations**



4

# RGPS Cabling for Multi-BTS Configurations – continued

## Cable Connections

For a full signal description of the Site I/O cable, refer to NO TAG in the “Site I/O, Span Line, RGPS and Modem Cabling” procedure.

**NOTE**

The pin number and wire color are based on the Site I/O cable. The pin number corresponds to pins on the Site I/O junction box connectors.

**Table 4-30: Multi-BTS Cable Run List**

Sync Reverse – From BTS N		Interconnecting Cable	Sync Forward – To BTS N+1	
Color	Signal	RGPS Cable Color	Color	Signal
Black/Purple	Data to Tail–	Green/Black	Brown/Grey	Data from Head–
Black/Grey	Data to Tail+	Green	Brown/White	Data from Head+
Black/White	Data from Tail–	White/Black	Red/Black	Data to Head–
Brown/Black	Data from Tail+	White	Red/Brown	Data to Head+
Brown/Red	1 PPS to Tail–	Brown/Black	Red/Orange	1 PPS from Head–
Brown/Orange	1 PPS to Tail+	Brown	Red/Yellow	1 PPS from Head+
Brown/Yellow	1 PPS from Tail–	Red/Black	Red/Green	1 PPS to Head–
Brown/Green	1 PPS from Tail+	Red	Red/Blue	1 PPS to Head+
Black/Blue	Ground*	Blue/Black	Black/Blue	Ground*

\*The Multi-BTS Synchronization interface must also be referenced to the BTS digital ground through a 7.5K ohm, 1W resistor. This resistor should be physically located at the punch block or terminal strip at each Sync Reverse connection in series with the Black/Blue Ground wire.



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# Span Line Daisy Chain Cabling

## Objective

The objective of this procedure is to install span line cabling between multiple BTSs in an open daisy chain configuration.

## Background

This feature allows BTSs to be linked together in an open daisy chain loop using a single T1/JT1/E1 span. This will reduce the number of spans necessary to support a JCDMA system and minimize unused channels.

Each BTS may contain up to four units. A maximum of 12 BTSs may be combined in a single daisy chain.

## Cable Description

The following cables are necessary to do this procedure.

**Table 4-31: Cable Descriptions and Part Numbers**

Cable	Qty.	Part Number	Description
N	1-3	Customer Supplied	Span Line Daisy Chain Cable

## Procedure

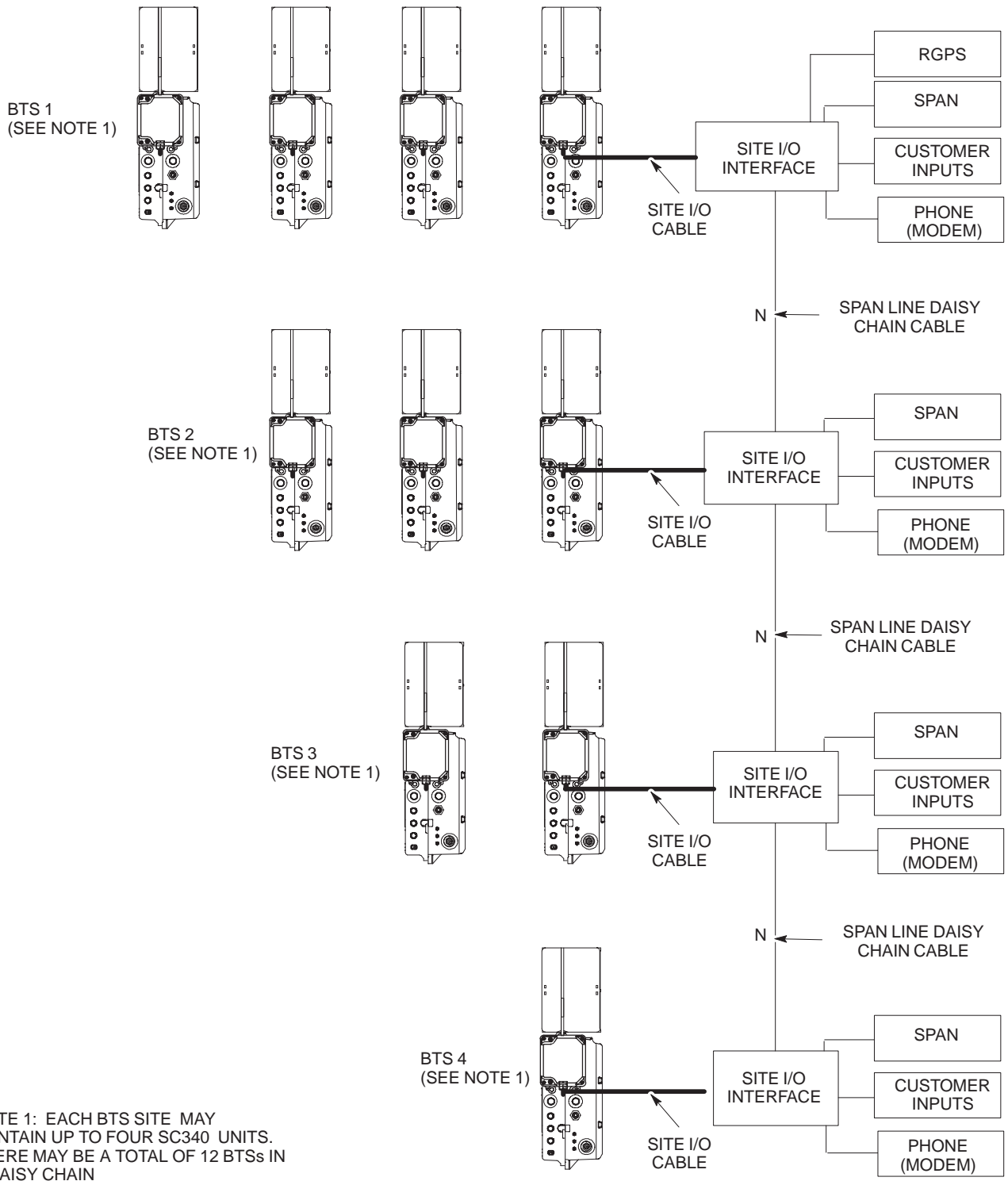
Attach the span line daisy chain cable (Cable N) to the site I/O interfaces of each BTS. Refer to Figure 4-18 and Table 4-32.

4



# Span Line Daisy Chain Cabling – continued

**Figure 4-18:** Site I/O Interface Cabling for Span Line Daisy Chain Cabling



## Span Line Daisy Chain Cabling – continued

### Cable Connections

Table 4-32 shows the cable run information for span line daisy chain cabling.

For a full signal description of the Site I/O cable refer to NO TAG in the “Site I/O, Span Line, RGPS and Modem Cabling” procedure.

#### NOTE

The pin number and wire color are based on the Site I/O cable. The pin number corresponds to pins on the Site I/O junction box connectors.

<b>BTS 1 (Secondary Backhaul)</b>		<b>BTS 2 (Primary Backhaul)</b>	
<b>Color</b>	<b>Description</b>	<b>Color</b>	<b>Description</b>
Yellow/Black	RX TIP	Orange/Grey	TX TIP
Yellow/Brown	RX RING	Orange/White	TX RING
Yellow/Red	TX TIP	Orange/Blue	RX TIP
Yellow/Orange	TX RING	Orange/Purple	RX RING

# Chapter 5: Preparing Site Cabling for Sites Equipped with Optional Primary Surge Suppressor

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# Cabling Overview

## Overview

This chapter provides the procedures to prepare the BTS site cabling for sites equipped with the optional Primary Surge Suppressor. Chapter 6 shows the scope of work for unit cabling.

You will connect the cables to the site and route them to the location of the BTS. You will attach the cables to the unit during the unit cabling procedures in Chapter 6.

Repeat cabling installation as necessary for each unit at the BTS.

### NOTE

Cabling is one of the most noticeable aspects of workmanship. Straight runs and proper turns are critical for a positive evaluation of the work.

## Configurations Supported

This chapter supports cable installation for single carrier omni configurations and multi-carrier omni configurations. This chapter supports cable installations for sites equipped with the optional Primary Surge Suppressor.

  
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## Cabling Installation Order

To install the cables, Motorola recommends that the following procedures be completed in the order shown:

1. Earth ground cabling
2. AC power cabling
3. DC power cabling
4. Battery cabling (optional)
5. Antenna cabling
6. Site I/O interface cabling
7. RGPS/HSO cabling (optional)
8. Span line daisy chain cabling (optional)

## Cable Labels

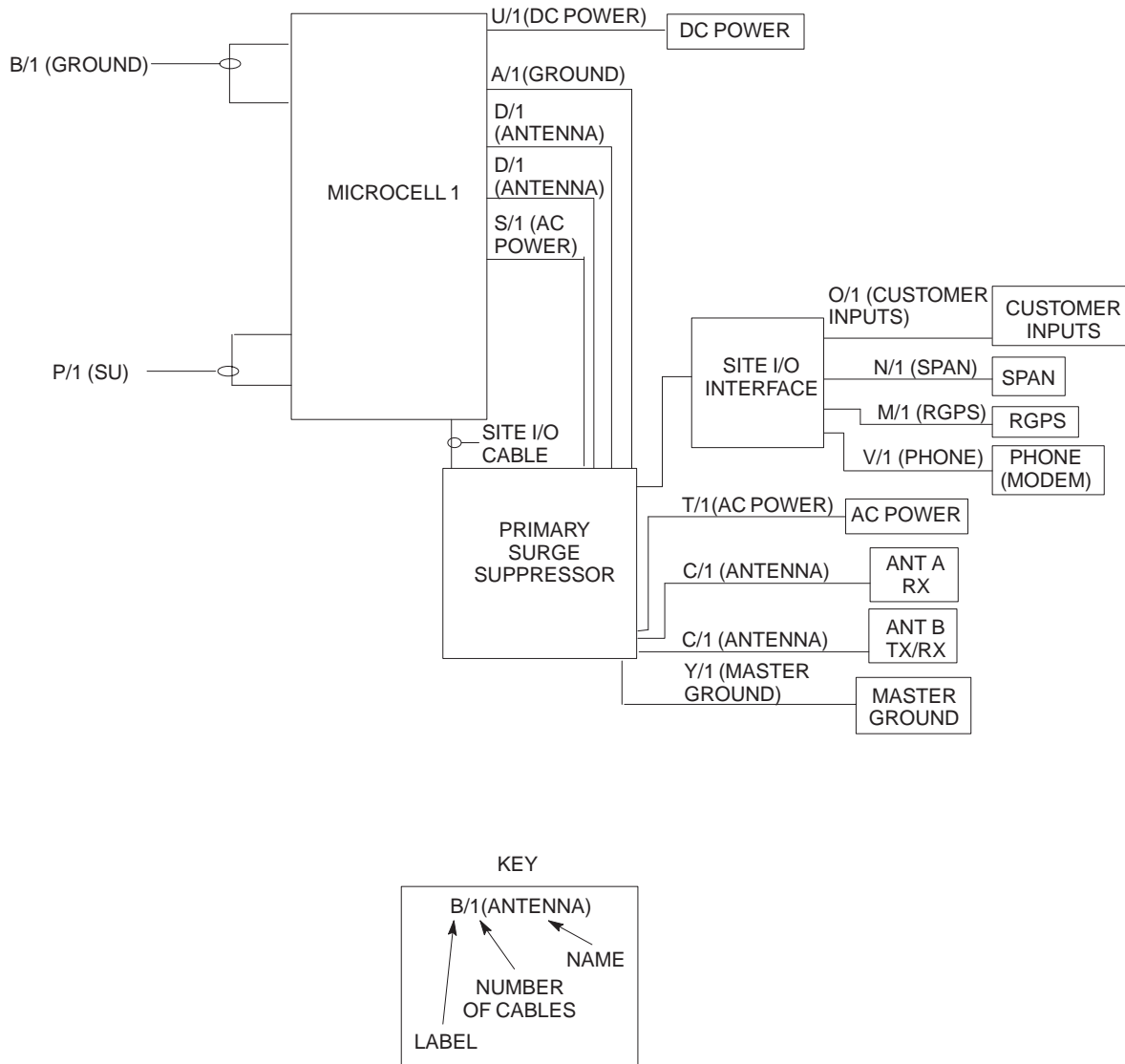
The “Cable Descriptions and Part Numbers” in Table 4-1 provides cable descriptions and part numbers. The labels used to designate the cables (A, B, C, etc.) are used throughout this manual.

# Site Cabling for BTS With Optional Primary Surge Suppressor

## Preparing Site Cabling Scope of Work

Figure 5-1 through Figure 5-8 shows the scope of work to be performed for preparing the site cabling with the optional Primary Surge Suppressor. Chapter 6 shows the scope of work for unit cabling.

**Figure 5-1:** Site Cabling for One Microcell with Primary Surge Suppressor



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Figure 5-2: Site Cabling for Two Microcells with Primary Surge Suppressor

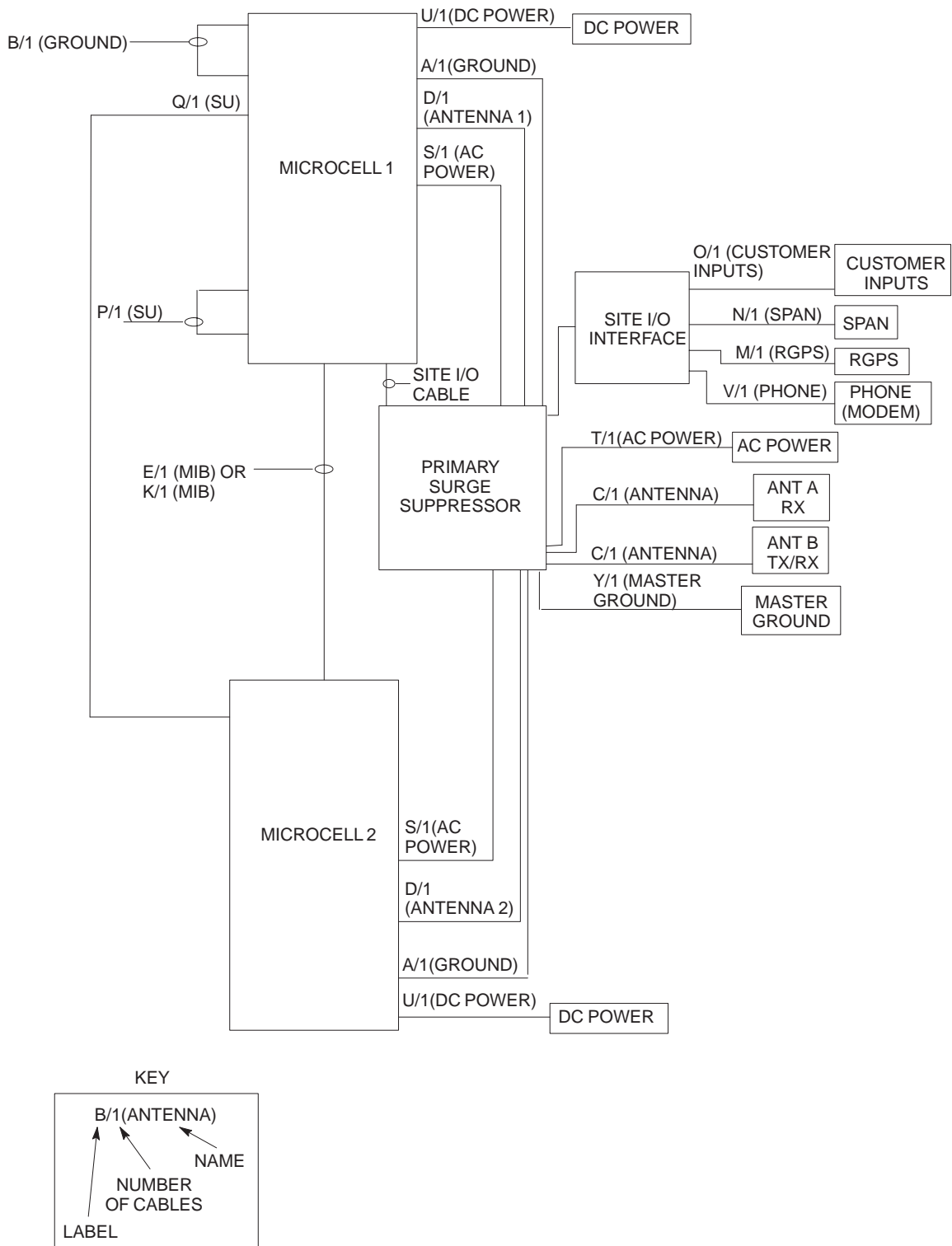
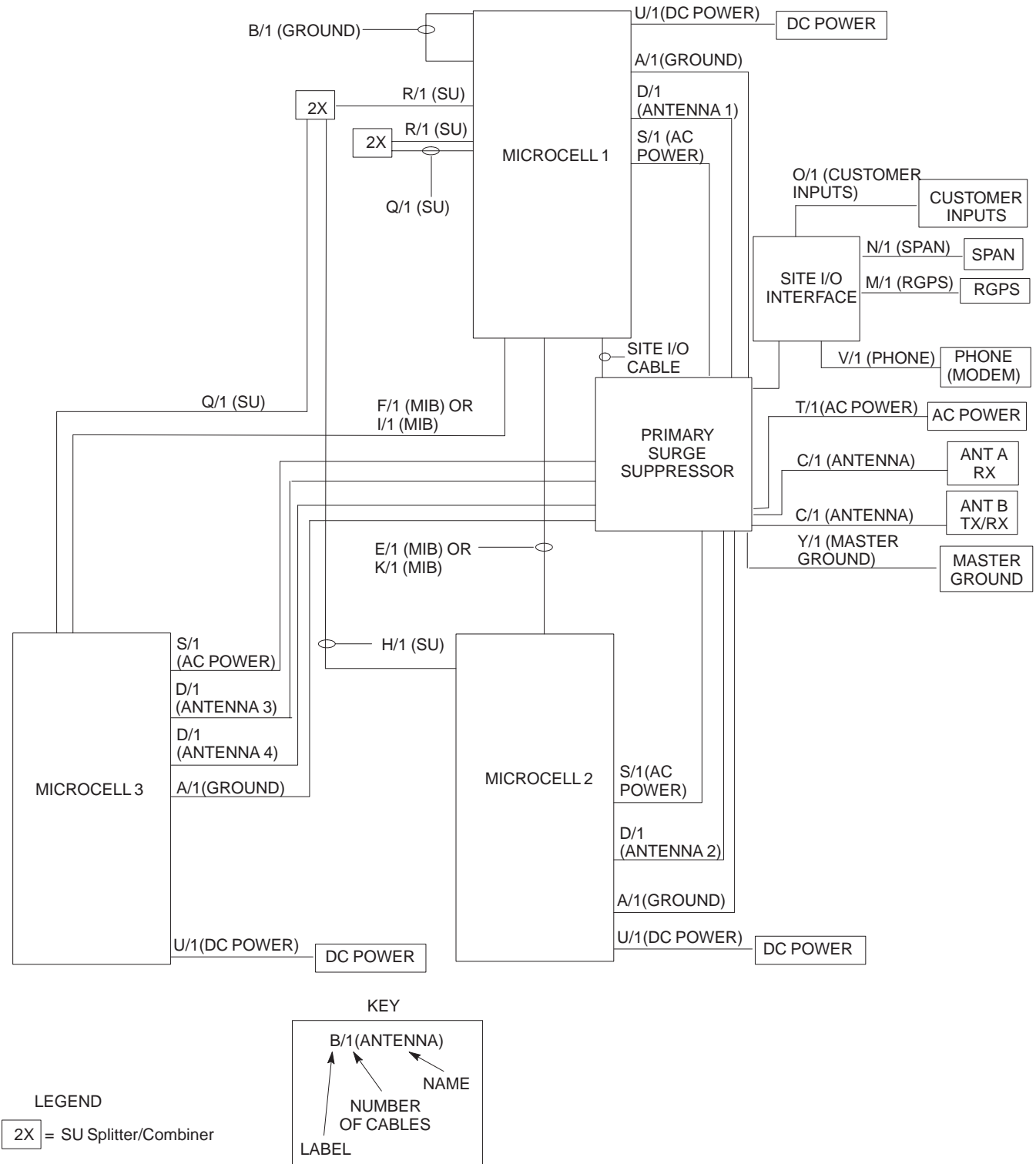


Figure 5-3: Site Cabling for Three Microcells with Primary Surge Suppressor



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# Site Cabling for BTS With Optional Primary Surge Suppressor – continued

**Figure 5-4:** Site Cabling for Four Microcells with Primary Surge Suppressor

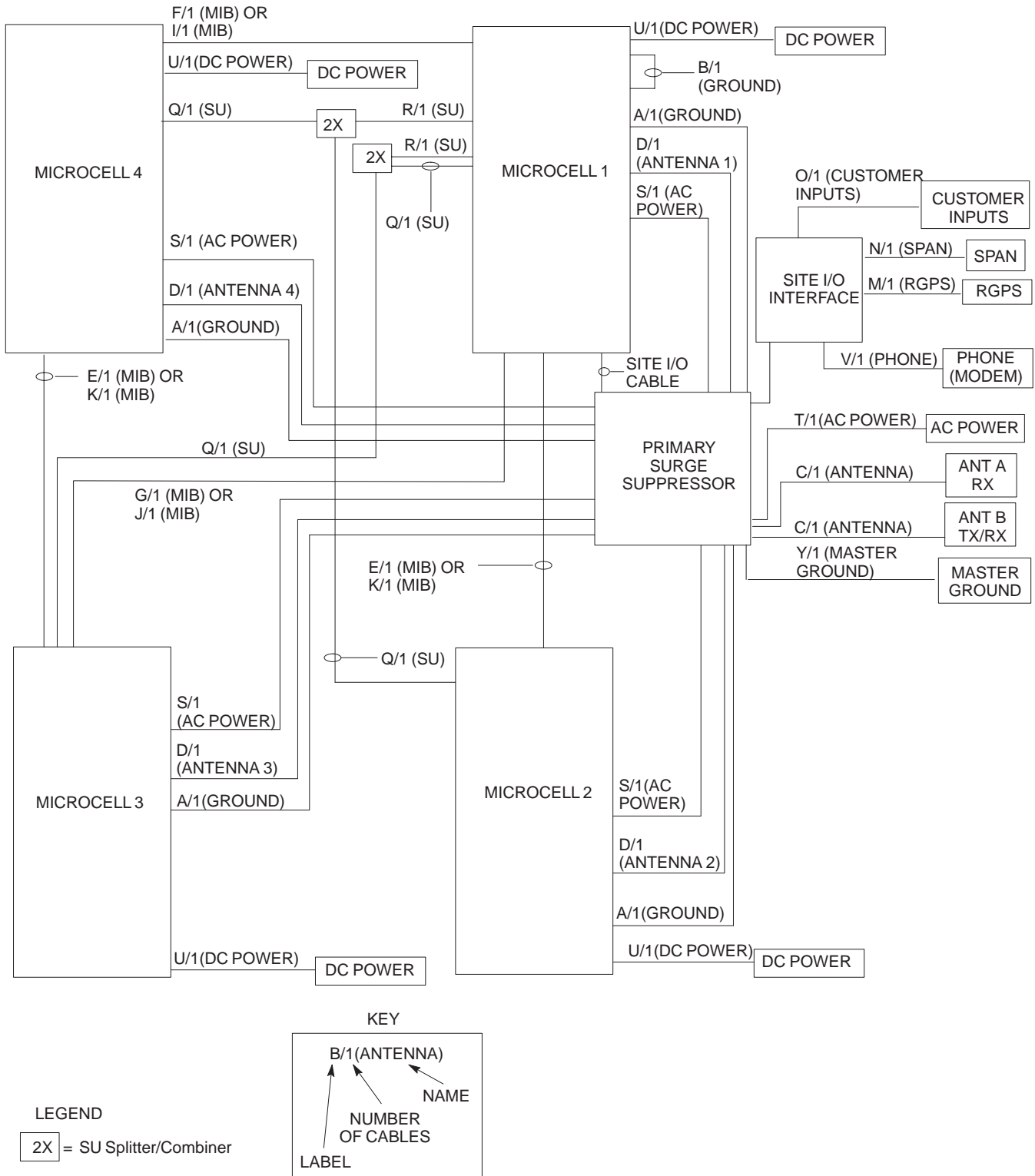
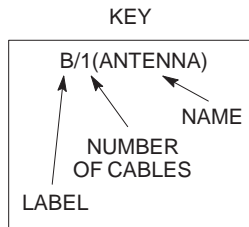
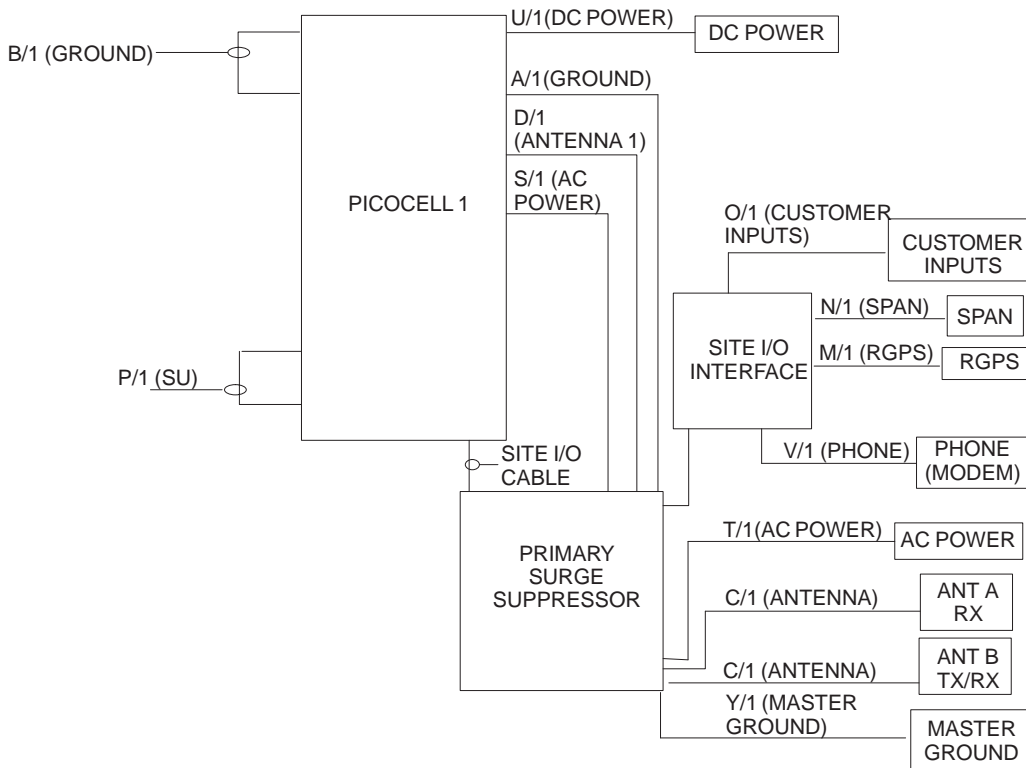
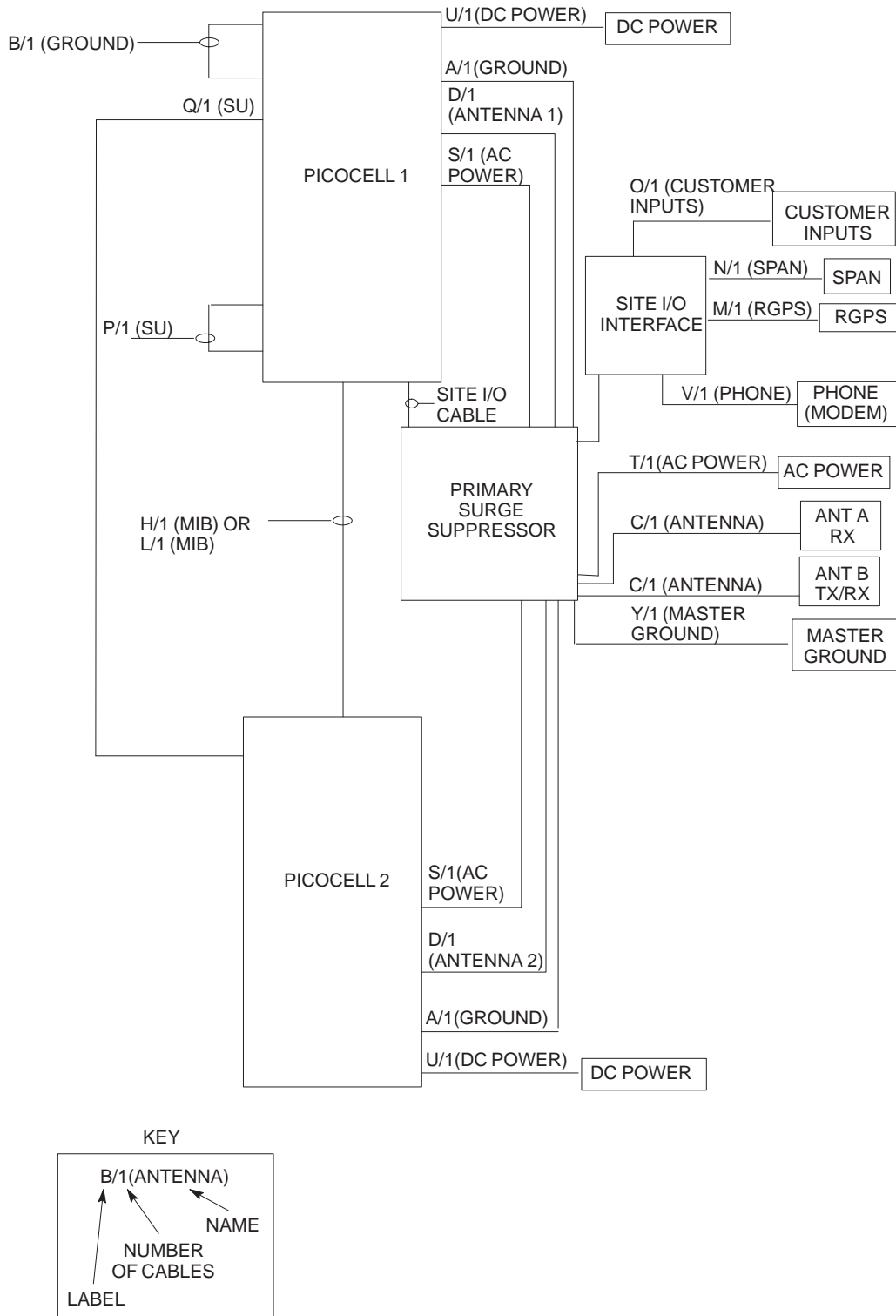


Figure 5-5: Site Cabling for One Picocell with Primary Surge Suppressor

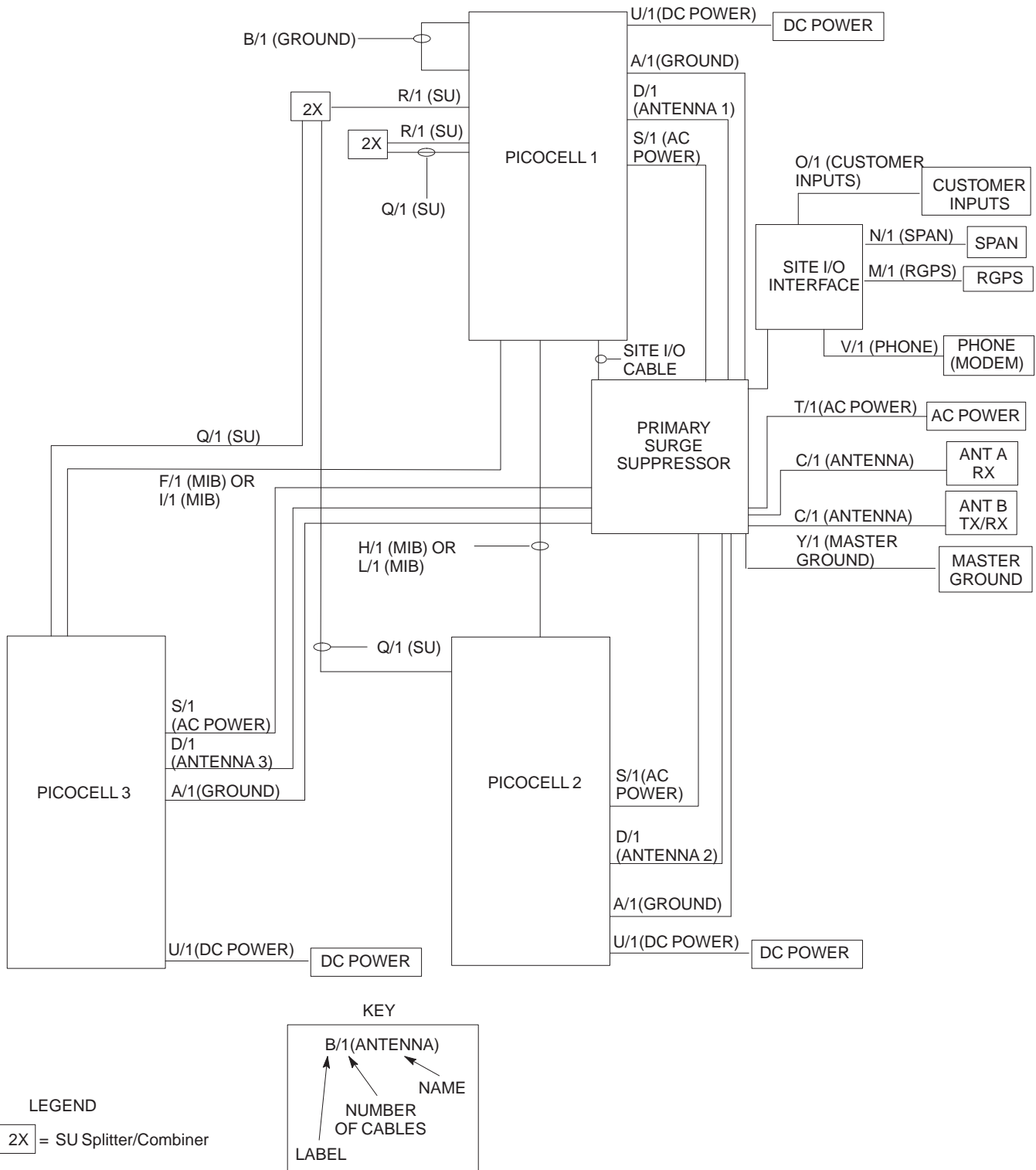


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Figure 5-6: Site Cabling for Two Picocells with Primary Surge Suppressor

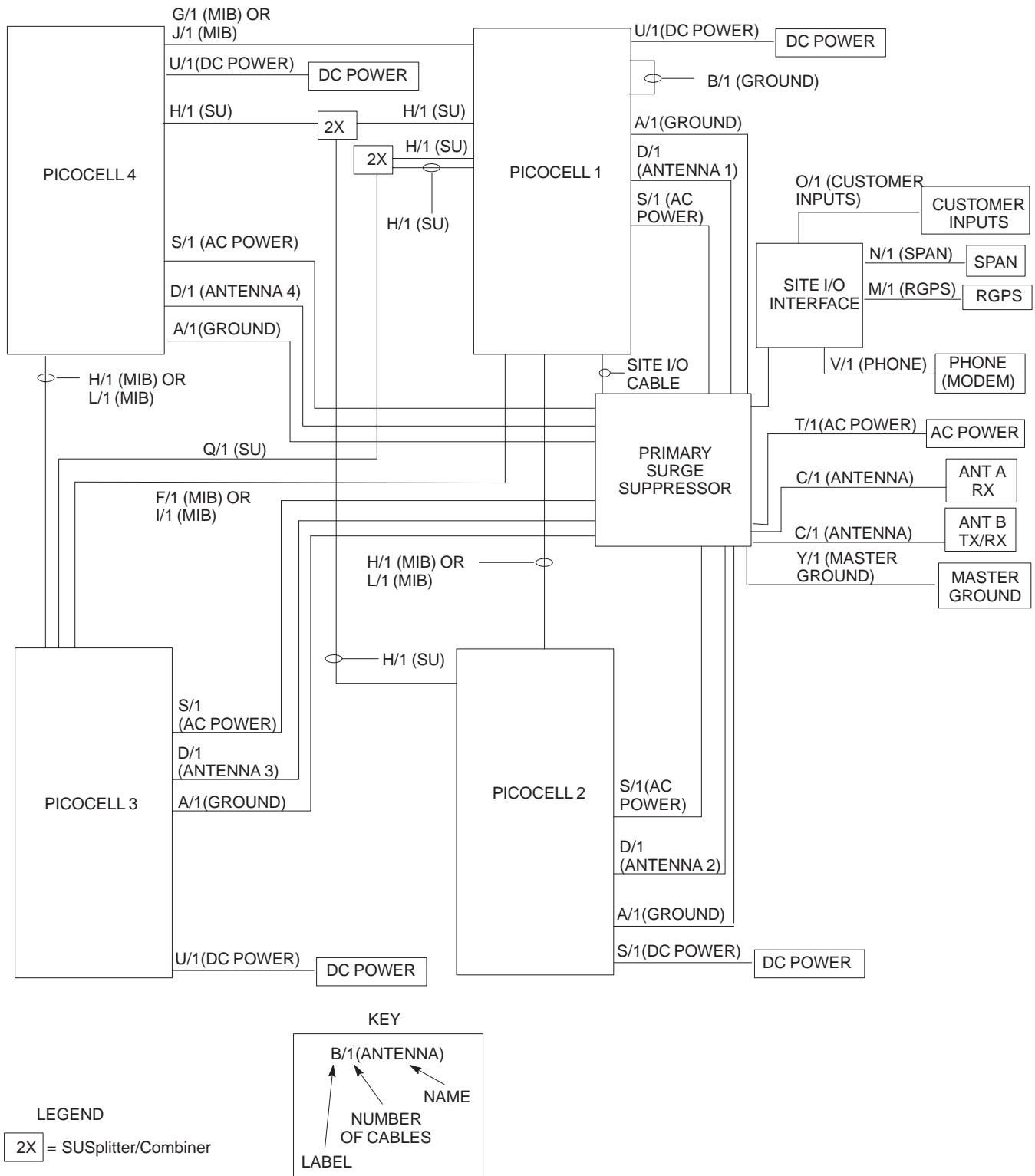


**Figure 5-7:** Site Cabling for Three Picocells with Primary Surge Suppressor



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Figure 5-8: Site Cabling for Four Picocells with Primary Surge Suppressor



# Attaching Surge Suppressor to Mounting Bracket

## Objective

The objective of this procedure is to attach the optional Primary Surge Suppressor to the mounting bracket. This procedure applies to mounting brackets that are attached to a rack, wall or pole.



### IMPORTANT

You must attach the Primary Surge Suppressor to the mounting bracket before you install the unit cabling.

## Background

The following procedures should be followed in order to mount the surge suppressor to the mounting bracket. The unit attaches to the mounting bracket with three (3) M6 screws.

## 5

## Tools

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
- Three M6X19 screws (Motorola Part Number 0387541C03)

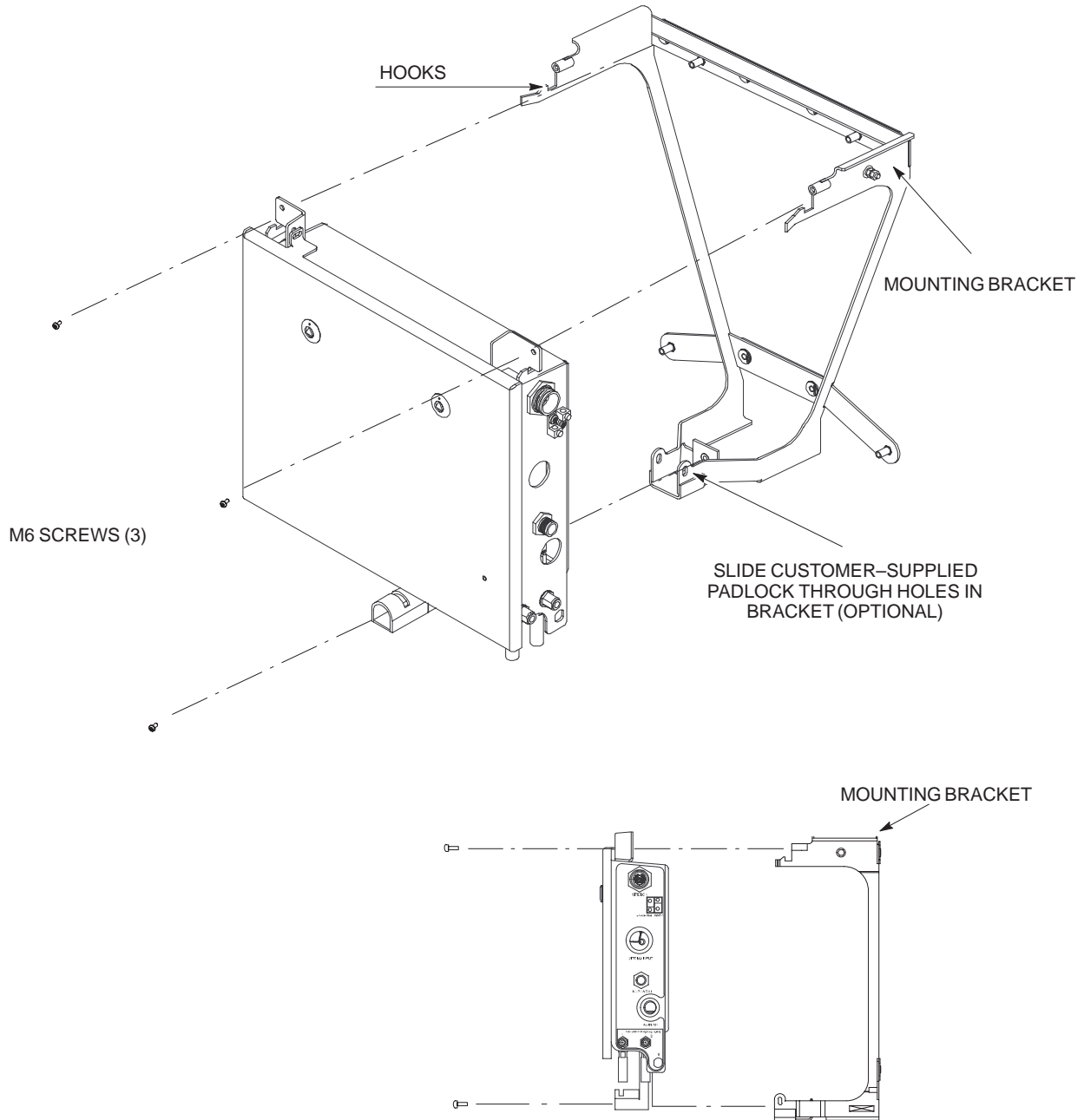
## Procedure to Attach the Surge Suppressor to the Mounting Bracket

Use the procedure in Table 5-1 to attach the surge suppressor to the mounting bracket. Refer to Figure 5-9.

Step	Action
1	Lift the unit and place it on the mounting bracket by aligning the bracket's upper arms into the rectangular cutouts in the mounting tabs. The unit may need to be raised up slightly so that the lower bracket flange does not contact the unit's lower surface.
2	Use a T30 Torx tamper bit to start, but not tighten, all three screws in the location shown in Figure 5-9.
3	Use a T30 Torx tamper bit to torque the three mounting screws to 5.0 N–M.

# Attaching Surge Suppressor to Mounting Bracket – continued

Figure 5-9: Attaching the Surge Suppressor to the Mounting Bracket



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# Power, Ground and Battery Cabling for Sites Equipped With Optional Primary Surge Suppressor

## Objective

The objective of this procedure is to install the power, earth ground, and battery cabling for one or more Microcell or Picocell units at a site equipped with optional Primary Surge Suppressor.



### WARNING

Dangerous voltages, capable of causing death, are present in this equipment. Use extreme caution when handling and testing this equipment.

## Other Grounding Considerations

This procedure covers only the grounding information for the ground cables that attach to one or more Microcell or Picocell units. Grounding considerations beyond the ground cables that attach to the Microcell or Picocell are summarized in Appendix A. Refer to Appendix A and the site documentation for other grounding considerations.

## Power Considerations and Configurations

The Primary Surge Suppressor is designed for 120/240 VAC 3-wire plus ground single phase.

The power and battery configurations for the MicroCell and PicoCell units are:

- AC power only (no battery)
- AC power with short duration battery
- DC power

### NOTE

Neither the "+" or "-" terminal of the DC Input is connected to the BTS ground. If a negative supply input is provided, the "+" terminal of the DC input must be connected to the Master Ground Plate (MGP). By connecting the "+" terminal of the DC input to the MGP, a negative supply system is created.



# Power, Ground and Battery Cabling for Sites Equipped With Optional Primary Surge Suppressor – continued

## Cables Needed

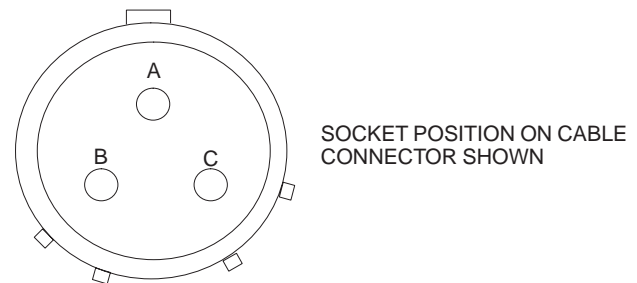
Table 5-2 provides the quantity and description of the cables needed.

<b>Table 5-2: Cables Needed for Power, Earth Ground, and Battery Connections</b>			
<b>Cable</b>	<b>Qty.</b>	<b>Part Number</b>	<b>Description</b>
A	1–4	3087701C02	Ground cable, 8 -AWG, insulated copper wire. Requires one ring lug connector.
S	1–4	3087854C02	AC input cable, 14 AWG, 5 m, is designed for 88–260 VAC power input. Cable has Deutsch connector on both ends.
T	1	Customer Supplied	AC Input power cable. 10–14 AWG, 90°C wire. Designed for 120–240 VAC.
U	1–4	3087854C04	DC input cable, 14 and 22 AWG, 5 m, is designed for 20 to 30 VDC power input.
Y	1	Customer Supplied	Master Ground Cable, 6 -AWG, insulated copper wire.

## AC Input Cable Information

The information for the AC input cable(s) (Cable S) is given in Figure 5-10 and Table 5-3.

**Figure 5-10: AC Input Cable Connector Information**



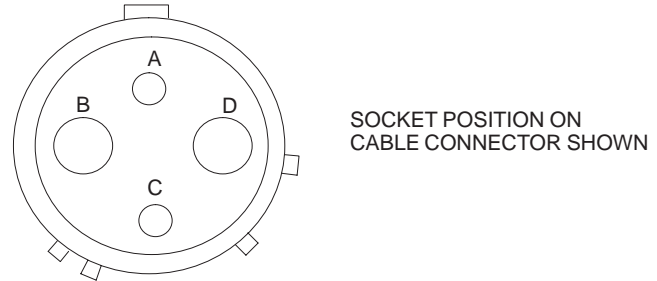
<b>Table 5-3: AC Input Cable Information</b>		
<b>Connector</b>	<b>Wire Color</b>	<b>Description</b>
A	Black	Line
B	Green	Ground
C	White	Neutral

# Power, Ground and Battery Cabling for Sites Equipped With Optional Primary Surge Suppressor – continued

## DC Input Cable Information

The information for the DC input cable(s) (Cable U) is given in Figure 5-11 and Table 5-4.

**Figure 5-11:** DC Input Cable Connector Information



**Table 5-4:** DC Input Cable Information

Connector	Wire Color	Description	Comments
A	Yellow	Switch A	No connection
B	Red	Positive	Connect to positive terminal of supply.
C	Blue	Switch B	Connect to negative terminal of supply.
D	Black	Negative	Connect to negative terminal of supply.

## Procedure

The system configuration determines which power cables are installed. The ground cable is always installed. Based on the system configuration perform the appropriate procedures from the following tables.

**Table 5-5:** Procedure to Install the Master Ground Cable on a BTS Equipped with Optional Primary Surge Suppressor

Step	Action
1	Connect the Master Ground cable (cable Y) to the EARTH GND connector on the Primary Surge Suppressor.
2	Connect the other end of cable Y to the customer-defined master ground plate.

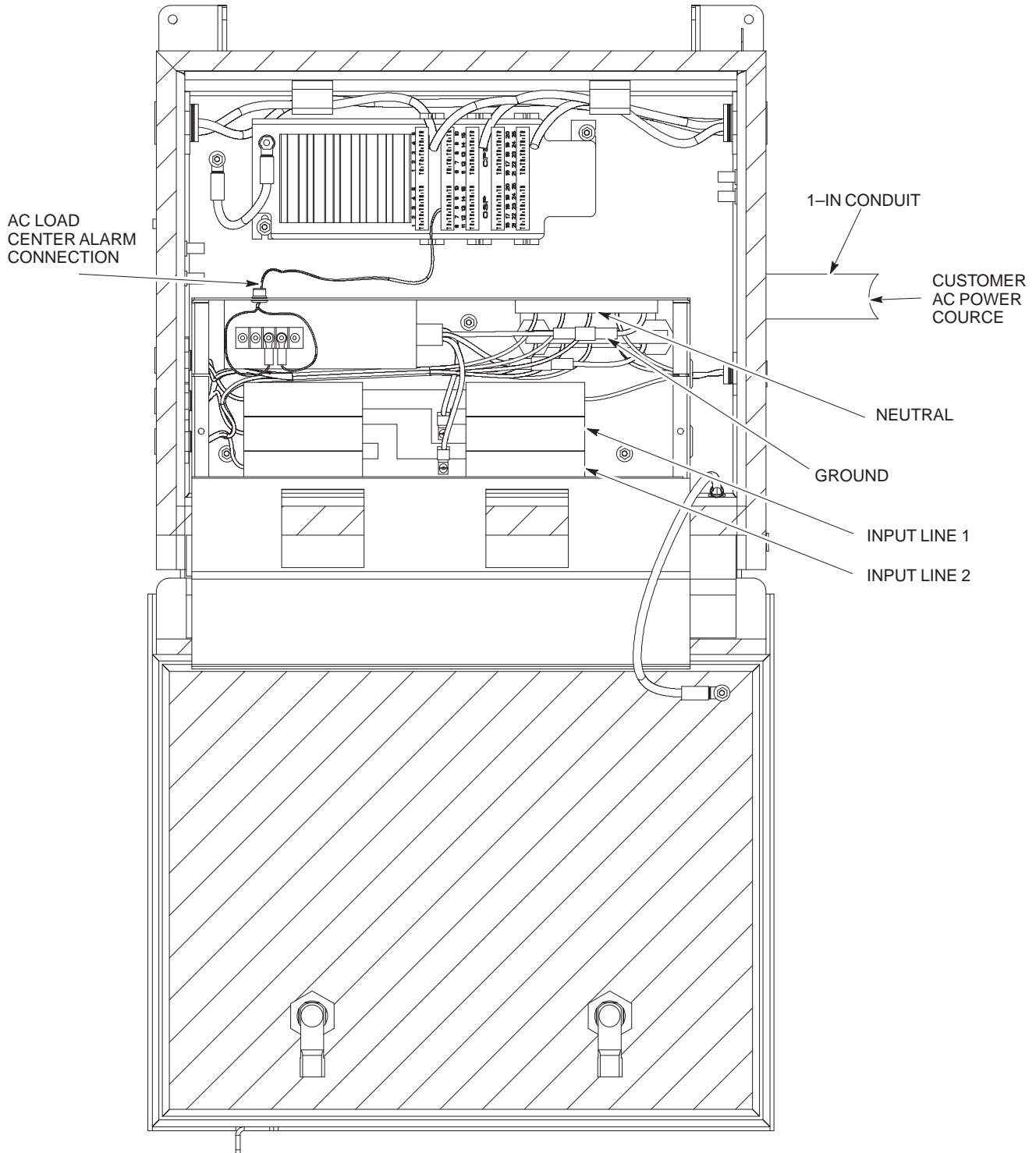
## Power, Ground and Battery Cabling for Sites Equipped With Optional Primary Surge Suppressor – continued

<b>Table 5-6:</b> Procedure to Install Earth Ground Cable on a BTS Equipped with Optional Primary Surge Suppressor	
<b>Step</b>	<b>Action</b>
1	Route cable A (ground cable) from the ground lug on the mounting bracket to the Primary Surge Suppressor.
2	Connect cable A to the GND connector 1–4 on the Primary Surge Suppressor.

<b>Table 5-7:</b> Procedure to Install AC Input Cable(s) on a BTS Equipped with Optional Primary Surge Suppressor	
<b>Step</b>	<b>Action</b>
1	Connect the customer-supplied AC input cable (cable T) to the customer defined AC power source. Refer to Table 5-3 for wiring information.
2	Verify all connections of cable T with an ohmmeter prior to routing the cable.
3	Route cable T via 1-in. conduit from the customer defined AC power source to the breaker terminals inside the Primary Surge Suppressor. Refer to Figure 5-12.
4	Route the AC Input Power Cable (cable S – Motorola part number 3087854C02) from the Carrier 1–4 AC Output connector on the Primary Surge Suppressor to the unit location(s).

# Power, Ground and Battery Cabling for Sites Equipped With Optional Primary Surge Suppressor – continued

Figure 5-12: Primary Surge Suppressor AC Input Power Connection Locations



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## Power, Ground and Battery Cabling for Sites Equipped With Optional Primary Surge Suppressor – continued

<b>Table 5-8:</b> Procedure to Install DC Input Cable(s)	
<b>Step</b>	<b>Action</b>
1	Connect the loose wires of the DC Input Cable (cable U) to the customer defined DC power source. Refer to Table 5-4 for wiring information.
2	Verify all connections of cable U with an ohmmeter prior to routing the cable.
3	Route cable U from the DC power supply to the unit location.

# Antenna Cabling for Sites Equipped With Optional Primary Surge Suppressor

## Objective

The objective of this procedure is to install the cabling for the antenna(s).

The antenna cabling is installed between one or more units and the Primary Surge Suppressor. No lightning arrestors are used.

## Cable Labels

The cable designations are referenced to Table 4-1 in the “Cable Description” area of this chapter.

## Equipment Needed

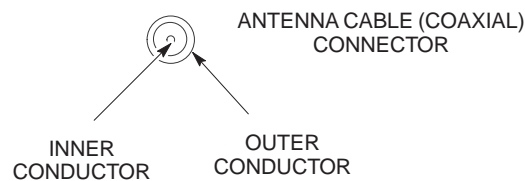
Table 5-9 provides the quantities and descriptions of the cables.

Cable	Qty.	Part Number	Description
C	1 to 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 N-type connectors

## Antenna Cable Pin and Signal Information

The antenna cabling uses a 50-Ohm coaxial cable. The inner conductor provides signaling and the outer conductor provides shielding and ground.

**Figure 5-13: Antenna Cabling Details**



Antenna	Inner Conductor	Outer Conductor
B (Microcell only)	TX/RX	Ground
A	RX (Microcell) TX/RX (Picocell)	Ground

# Antenna Cabling for Sites Equipped With Optional Primary Surge Suppressor – continued

## Procedure to Install Antenna Cabling for Sites Equipped with Primary Surge Suppressor

Do the procedure in Table 5-11 to install the antenna cabling.

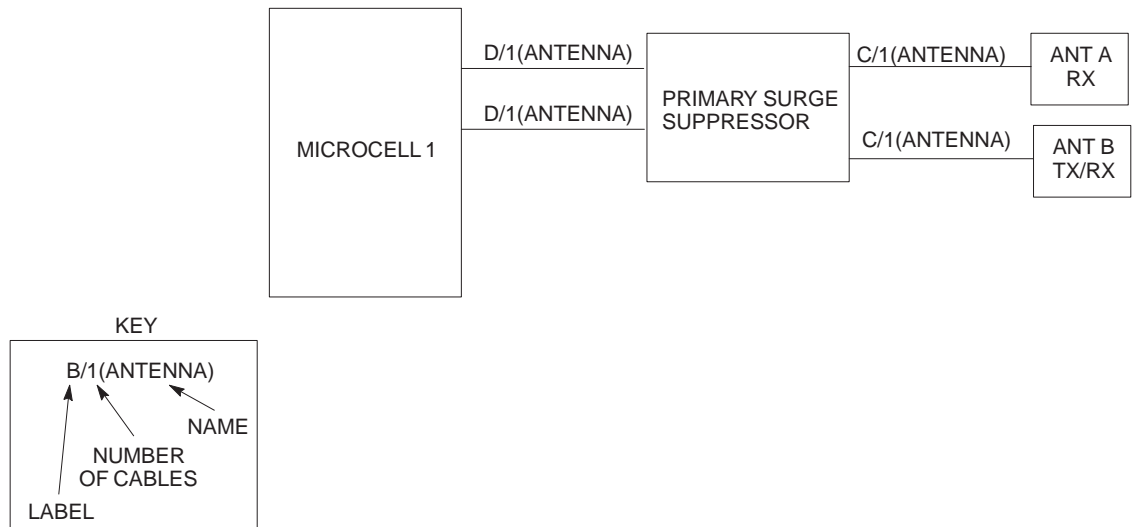


### IMPORTANT

Lightning arrestors are installed on the Primary Surge Suppressor for two units. You must add additional lightning arrestors when you expand from one to two units; two to three units and from three to four units.

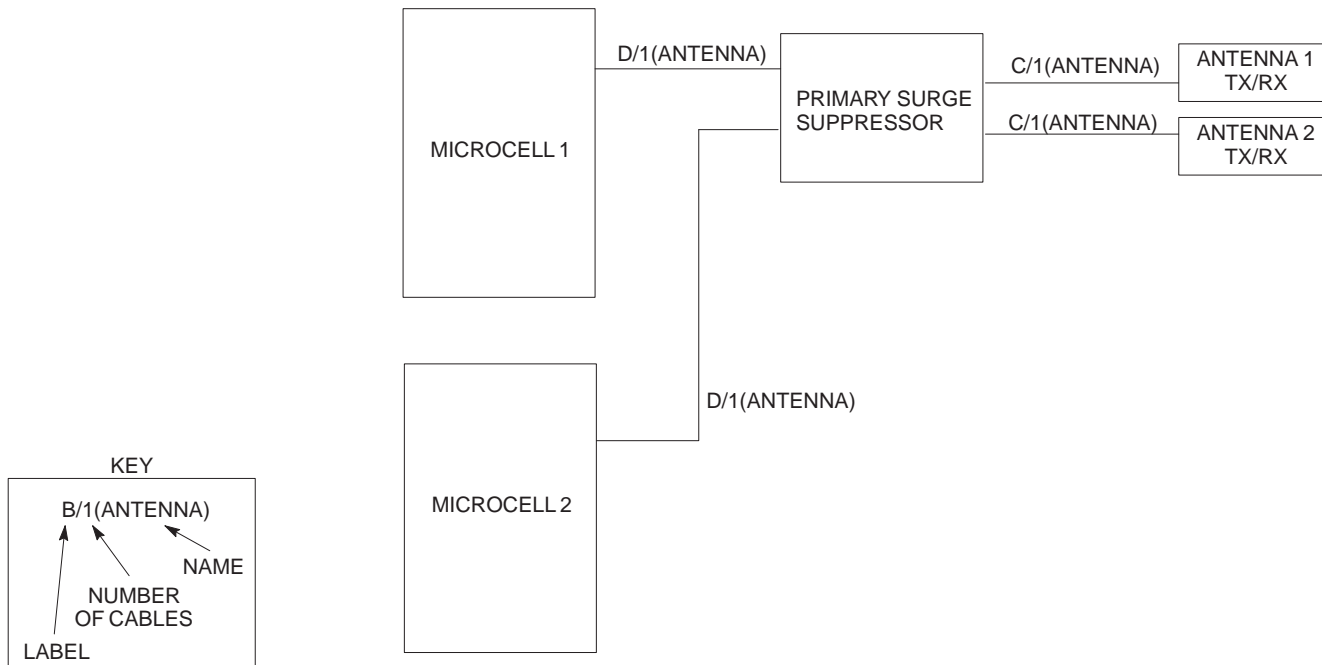
Step	Action
1	Route cable D (antenna cable) between the unit(s) and the Primary Surge Suppressor.
2	Route cable C (antenna cable) from the Primary Surge Suppressor directly to the antenna(s).
3	Torque connectors to 4.3 N–m.

**Figure 5-14:** Antenna Cabling for one Microcell with Primary Surge Suppressor

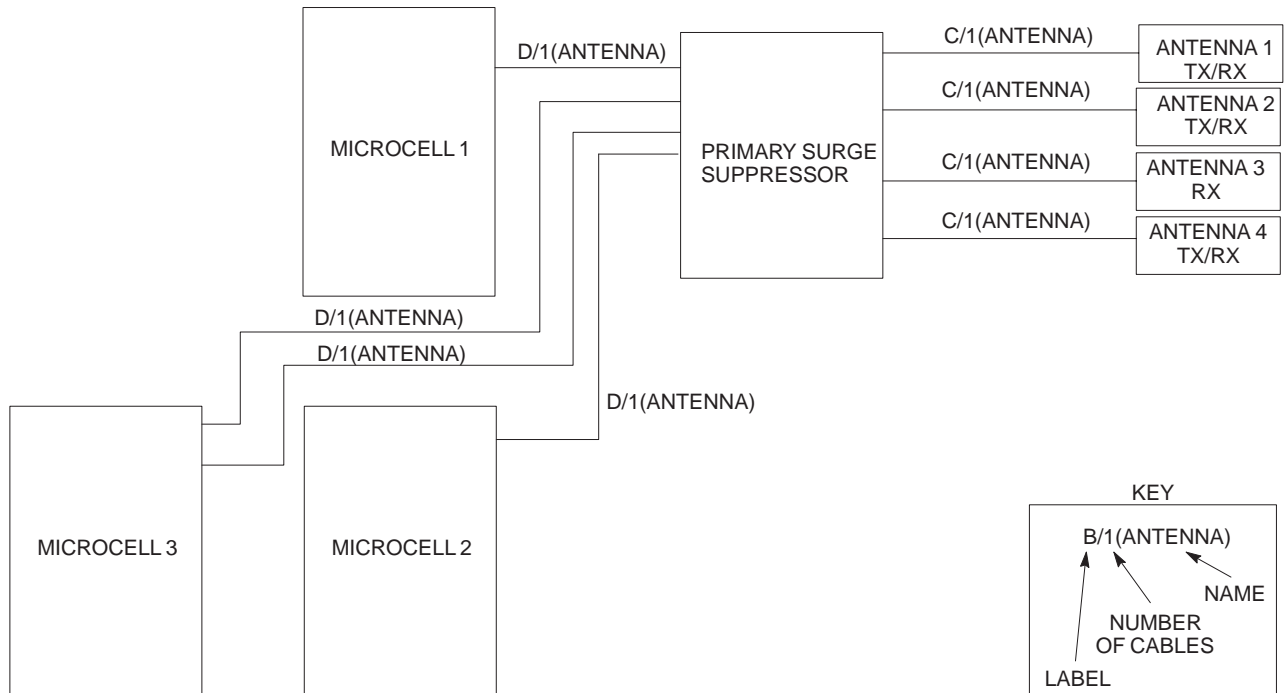


# Antenna Cabling for Sites Equipped With Optional Primary Surge Suppressor – continued

**Figure 5-15:** Antenna Cabling for Two Microcells with Primary Surge Suppressor



**Figure 5-16:** Antenna Cabling for Three Microcells with Primary Surge Suppressor

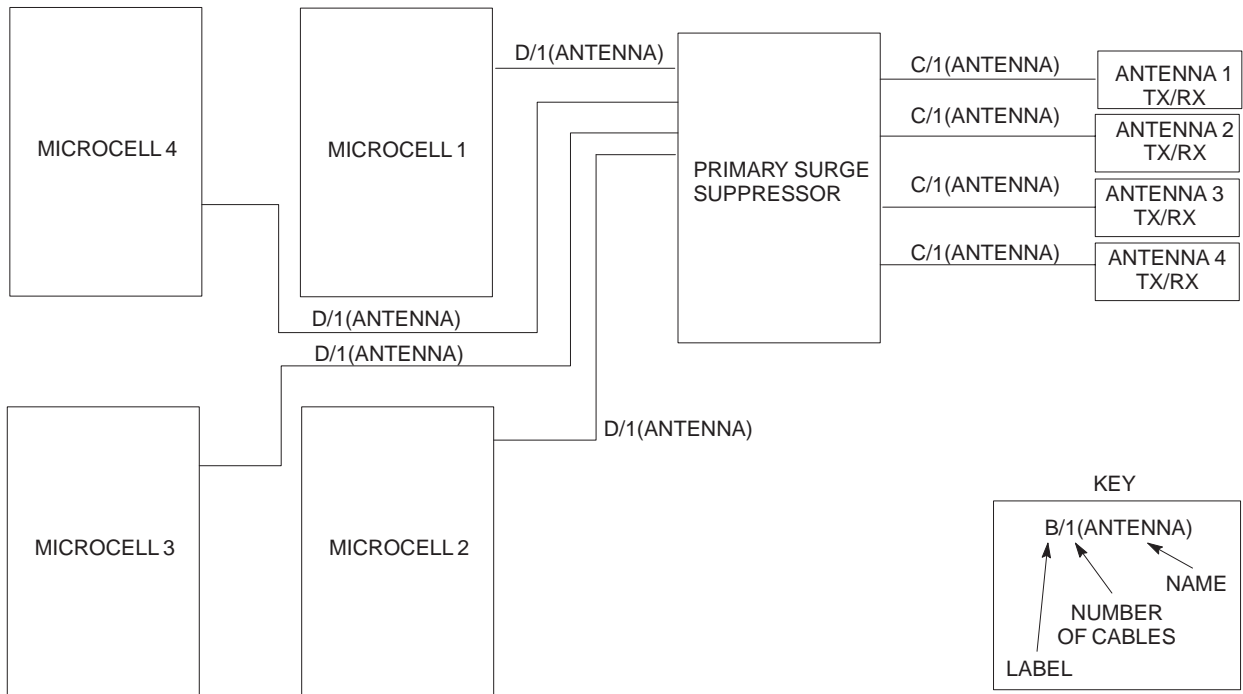


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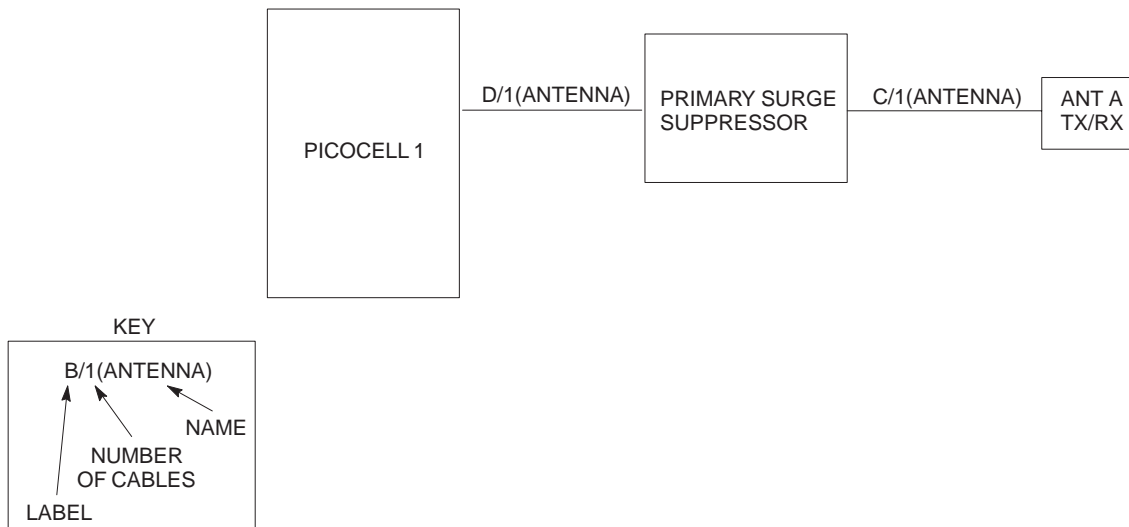


# Antenna Cabling for Sites Equipped With Optional Primary Surge Suppressor – continued

**Figure 5-17:** Antenna Cabling for Four Microcells with Primary Surge Suppressor



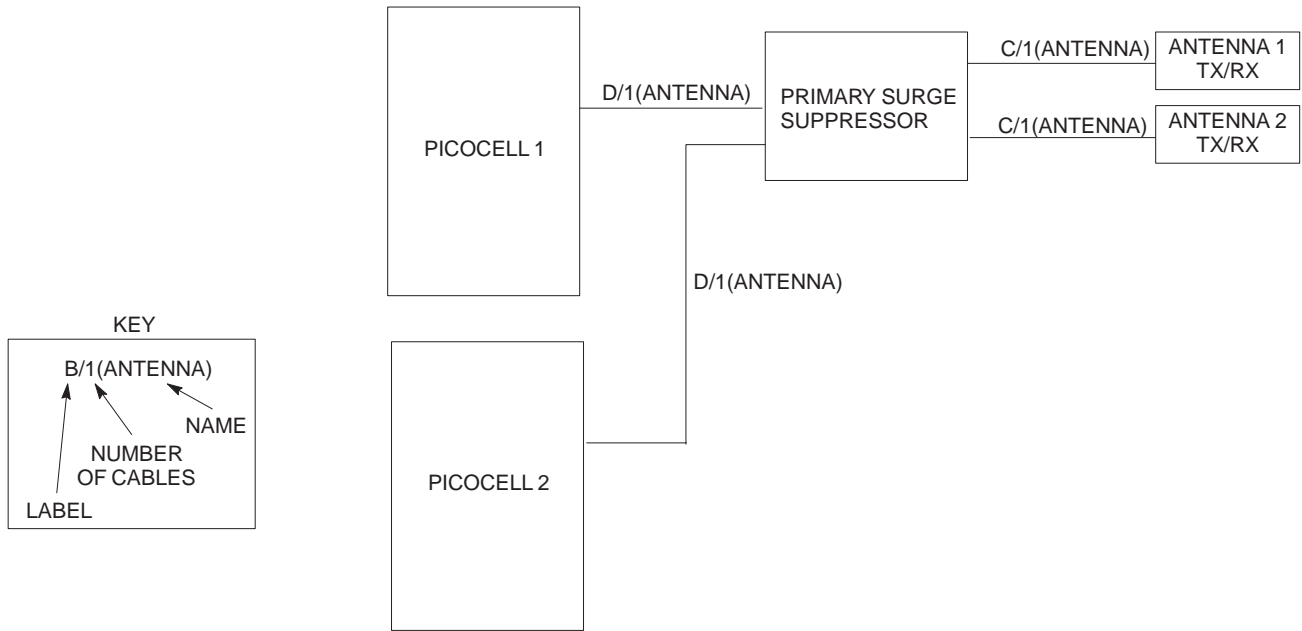
**Figure 5-18:** Antenna Cabling for one Picocell with Primary Surge Suppressor



# Antenna Cabling for Sites Equipped With Optional Primary Surge Suppressor

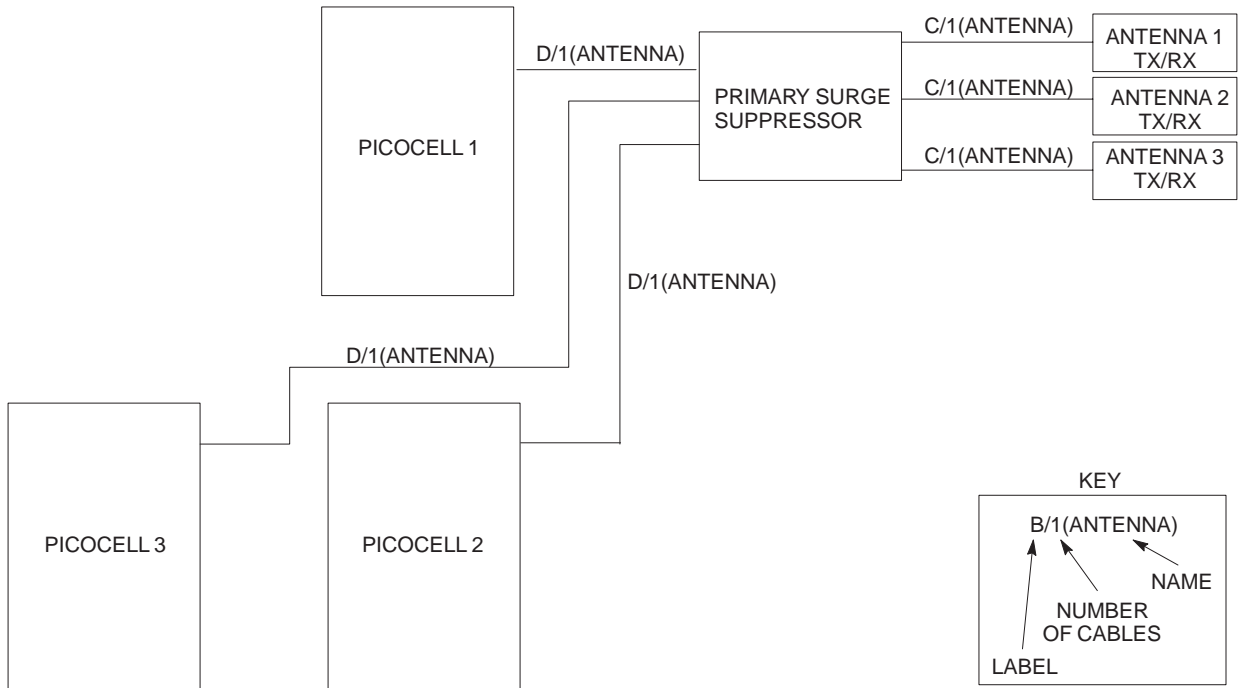
– continued

**Figure 5-19:** Antenna Cabling for Two Picocells with Primary Surge Suppressor



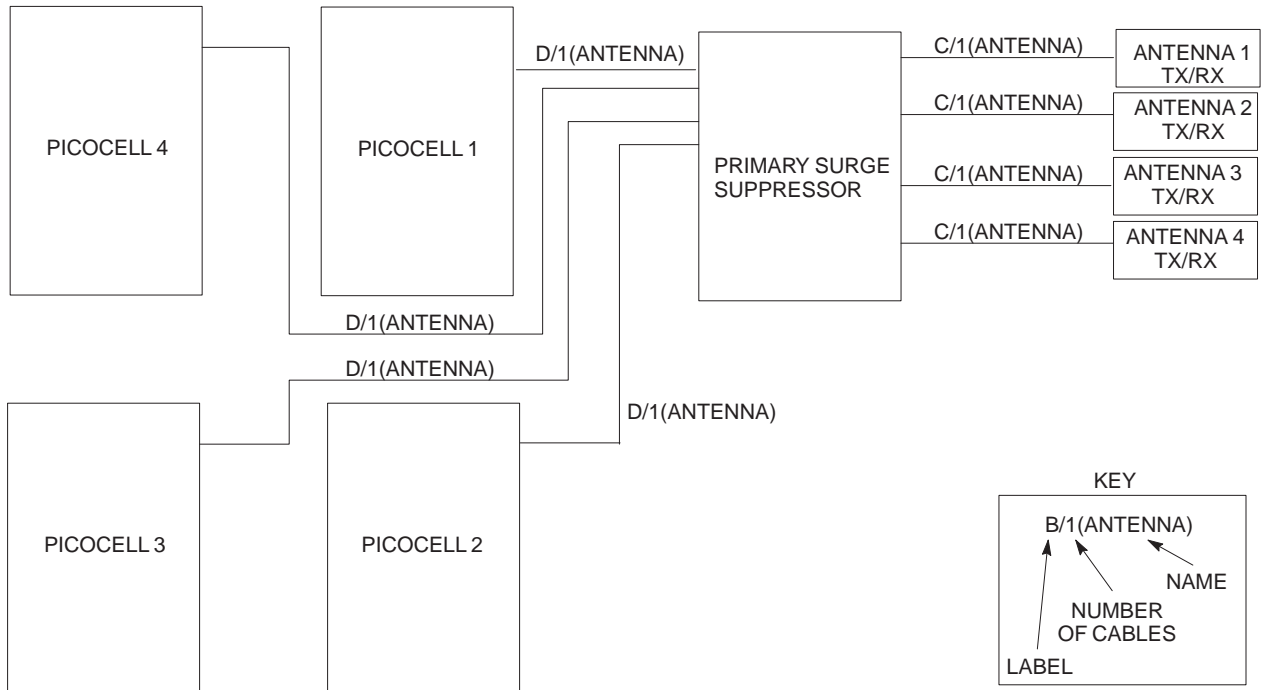
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**Figure 5-20:** Antenna Cabling for Three Picocells with Primary Surge Suppressor



# Antenna Cabling for Sites Equipped With Optional Primary Surge Suppressor – continued

**Figure 5-21:** Antenna Cabling for Four Picocells with Primary Surge Suppressor



# Site I/O, Span Line, RGPS and Modem Cabling for Sites Equipped With Primary Surge Suppressor

## Objective

The objective of this procedure is to install the cabling between the Site I/O junction box to the Primary Surge Suppressor. This procedure also shows the punchblock cabling for the Site I/O cable.

## Cable Labels

The cable designations are referenced to Table 4-1 in the “Cable Description” area of this chapter.

## Tools and Equipment

Table 5-12 provides the quantities and descriptions of the cables.

<b>Table 5-12: Cables Needed for Antenna Connections</b>			
<b>Cable</b>	<b>Qty.</b>	<b>Part Number</b>	<b>Description</b>
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 N–type connectors
M	1	3086039H11	RGPS cable, 125 ft.
		3086039H12	RGPS cable, 250 ft.
		3086039H13	RGPS cable, 500 ft.
		3086039H14	RGPS cable, 1000 ft.
		3086039H15	RGPS cable, 2000 ft.
N	1	Customer Supplied	Span Cable. 22–24 AWG solid copper twisted pair.
O	1	Customer Supplied	Customer Input Cable. 22–24 AWG solid copper twisted pair.
T	1	Customer Supplied	AC Input Power Cable. 14 AWG. Designed for 120–240 VAC. Terminated by at least 1 Deutsch connector.
V	1	Customer Supplied	Phone (Modem) Cable. 22–24 AWG solid copper twisted pair.

## Site I/O Cabling

The Primary Surge Suppressor is optional and is supplied by Motorola. The Site I/O cable between the Primary Surge Suppressor and units 1 and 2 is part of the Site I/O Junction box and is supplied by Motorola.

The customer determines the Primary Surge Suppressor configuration. The end result is the correct signals getting to the correct punchblock location on the punchdown block.

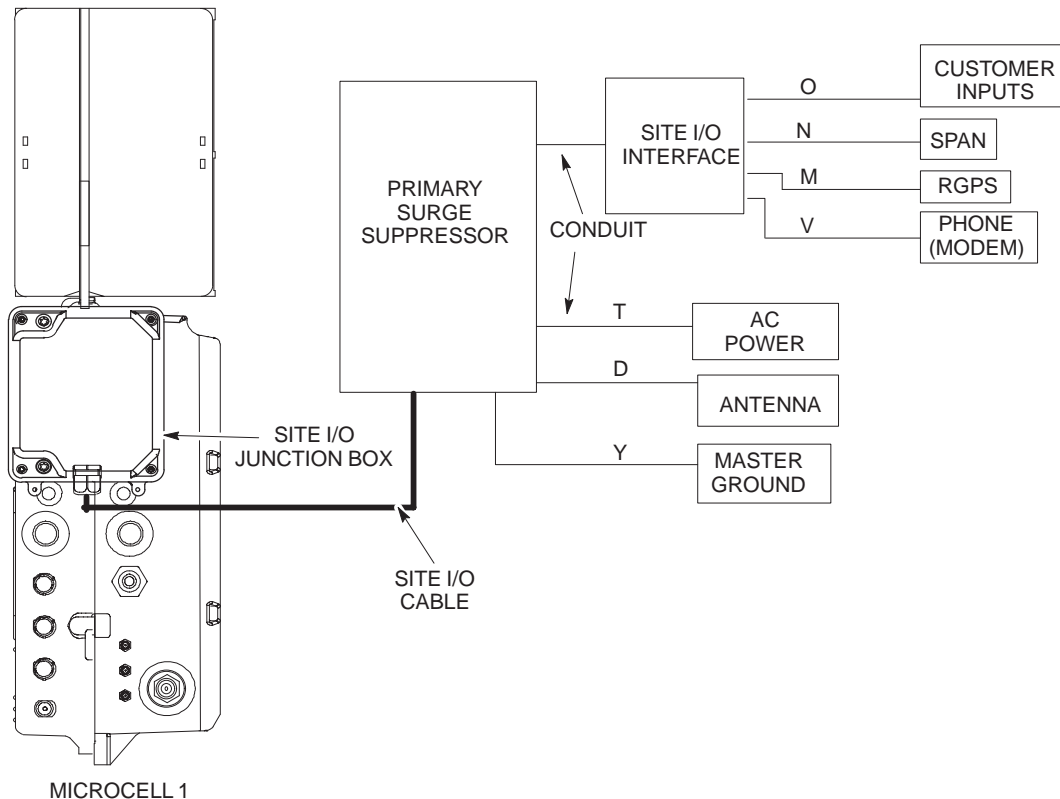
# Site I/O, Span Line, RGPS and Modem Cabling for Sites Equipped With Primary Surge Suppressor – continued

## Procedure to Install Site I/O Cable Between Site I/O Junction Box and Optional Primary Surge Suppressor

Do the procedure in Table 5-13 to connect the Site I/O cable. Refer to Figure 5-22, Figure 5-23 and Figure 5-24.

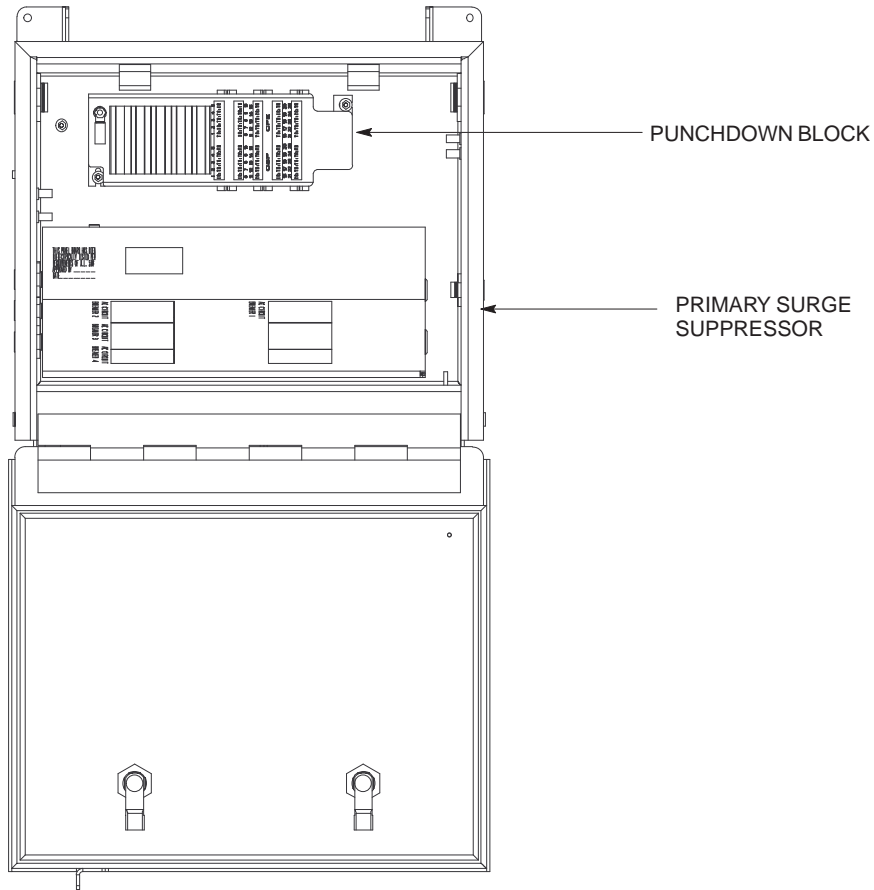
Table 5-13: Procedure to Install Site I/O Cable Between Site I/O Junction Box and Optional Primary Surge Suppressor	
Step	Action
1	Route the Site I/O cable(s) from the unit location to the Primary Surge Suppressor.
2	Connect the Site I/O cable from unit 1 to the connector labeled SITE I/O 1 on the right side of the Surge Suppressor.
3	Connect the appropriate conductors or wires to the Primary Surge Suppressor Punchdown block.

Figure 5-22: Site I/O Cabling Details with Optional Primary Surge Suppressor (MicroCell Unit Shown)



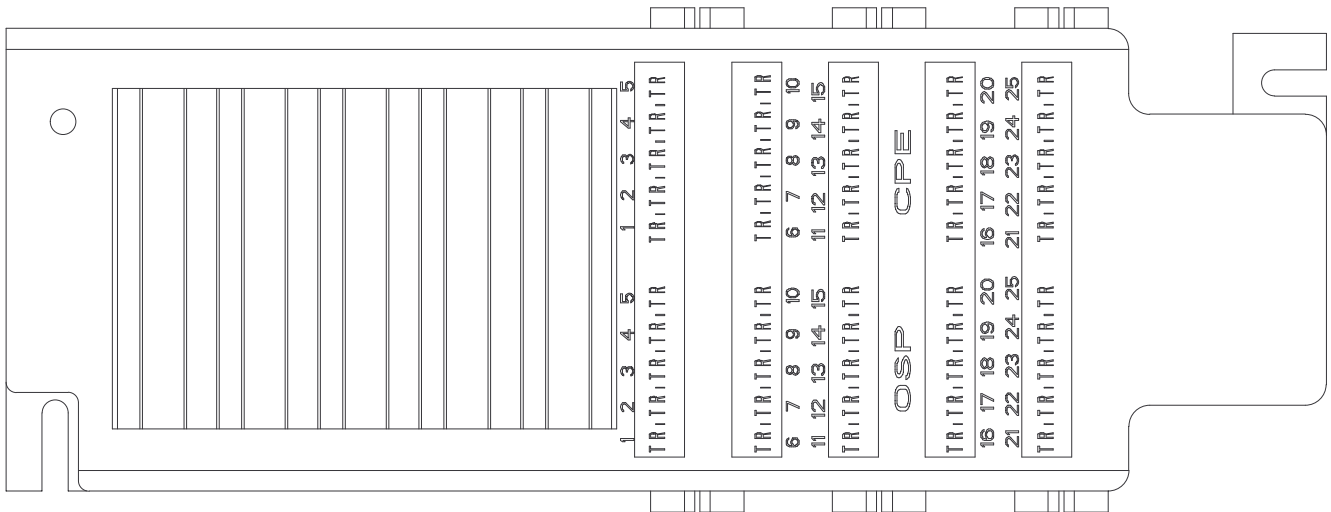
# Site I/O, Span Line, RGPS and Modem Cabling for Sites Equipped With Primary Surge Suppressor – continued

Figure 5-23: Punchdown Block Location



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Figure 5-24: Punchdown Block



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## Site I/O, Span Line, RGPS and Modem Cabling for Sites Equipped With Primary Surge Suppressor – continued

### Pin and Signal Information for Surge Suppressor Punchdown Block Cabling

Table 5-14 gives the pin and signal information for connecting the loose wires to the customer locations on the Punchdown Block.

# Site I/O, Span Line, RGPS and Modem Cabling for Sites Equipped With Primary Surge Suppressor – continued

**Table 5-14:** Pin/Signal Information for Site I/O Cable and Punchdown Block

BTS Interface	Punchblock Location	Description
Customer Input	OSP 1T	Customer Input 1 Signal
	OSP 1R	Customer Input 1 Ground
	OSP 2T	Customer Input 2 Signal
	OSP 2R	Customer Input 2 Ground
	OSP 3T	Customer Input 3 Signal
	OSP 3R	Customer Input 3 Ground
	OSP 4T	Customer Input 4 Signal
	OSP 4R	Customer Input 4 Ground
	OSP 5T	Customer Input 5 Signal
	OSP 5R	Customer Input 5 Ground
	OSP 6T	Customer Input 6 Signal
	OSP 6R	Customer Input 6 Ground
	OSP 7T	Customer Input 7 Signal
	OSP 7R	Customer Input 7 Ground
	OSP 8T	Customer Input 8 Signal*
	OSP 8R	Customer Input 8 Ground*
Sync Reverse	OSP 9T	Data to Tail –
	OSP 9R	Data to Tail +
	OSP 10T	Data from Tail –
	OSP 10R	Data from Tail +
	OSP 11T	1 PPS to Tail –
	OSP 11R	1 PPS to Tail +
	OSP 12T	1 PPS from Tail –
	OSP 12R	1 PPS from Tail +
	OSP 13T	Downstream BTS Detect +
	OSP 13R	Downstream BTS Detect –
. . . continued on next page		

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# Site I/O, Span Line, RGPS and Modem Cabling for Sites Equipped With Primary Surge Suppressor – continued

**Table 5-14: Pin/Signal Information for Site I/O Cable and Punchdown Block**

BTS Interface	Punchblock Location	Description
Sync Forward	OSP 14T	Data from Head –
	OSP 14R	Data from Head +
	OSP 15T	Data to Head –
	OSP 15R	Data to Head +
	OSP 16T	1 PPS from Head –
	OSP 16R	1 PPS from Head +
	OSP 17T	1 PPS to Head –
	OSP 17R	1 PPS to Head +
	OSP 18T	RGPS 28V
	OSP 18R	RGPS Ground
	OSP 18T	RGPS 28V
	OSP 18R	RGPS Ground
	OSP 19T	RGPS 28V
	OSP 19R	RGPS Ground
Unused	OSP20T	Unused
	OSP20R	Unused
Span (Network)	OSP 21T	RX TIP Primary (Network)
	OSP 21R	RX RING Primary (Network)
	OSP 22T	TX TIP Primary (Network)
	OSP 22R	TX RING Primary (Network)
	OSP 23T	RX TIP Secondary (Network)
	OSP 23R	RX RING Secondary (Network)
	OSP 24T	TX TIP Secondary (Network)
	OSP 24R	TX RING Secondary (Network)
Phone (Modem)	OSP 25T	MODEM TIP
	OSP 25R	MODEM RING

\*Motorola recommends that you use the Customer Input 8 Signal and Ground for load center alarms.

# Site I/O, Span Line, RGPS and Modem Cabling for Sites Equipped With Primary Surge Suppressor – continued

## Connecting Customer-Defined Inputs to the Primary Surge Suppressor

The unit provides eight customer-defined inputs for connection to external contacts. Each input (a signal/ground pair) is monitored for an “OPEN” (>50 k Ohms) or “CLOSED” (<3 Ohms) condition.

Motorola recommends using Customer Input 8 Signal and Ground for load center alarms. The Primary Surge Suppressor is shipped with the AC load center alarms already connected. Refer to Figure 5-12.

## Connecting the RGPS Cable to the Primary Surge Suppressor

The RGPS cable (cable M) is connected to the Primary Surge Suppressor punchdown block (Sync Forward) of the BTS. Table 5-15 provides the punchdown block to RGPS connections.

**Table 5-15: Connecting the RGPS to the Site I/O Cable**

Punchdown Block		RGPS (Cable M)	
Sync Forward Descriptions	Punchdown Block Location	RGPS Description	RGPS Color Code (wire/stripe)
Data from Head –	OSP14T	Transmit Port –	Green/Black
Data from Head +	OSP14R	Transmit Port +	Green
Data to Head –	OSP15T	Receive Port –	White/Black
Data to Head +	OSP15R	Receive Port +	White
1 pps from Head –	OSP16T	1 PPS Timing –	Brown/Black
1 pps from Head +	OSP16R	1 PPS Timing +	Brown
RGPS 28V	OSP18T	Power 1	Blue
	OSP19T	Power 2	Yellow
RGPS Ground	OSP18R	DC Ground 1	Blue/Black
	OSP19R	DC Ground 2	Yellow/Black
<p><b>NOTE</b> The RGPS must also be ground referenced to the BTS “digital” ground. This is done by connecting the Red/Grey lead (RGPS Ground) from the Sync Forward Interface to the Black/Blue lead (Customer Input 8 Ground) from the Customer Input interface.</p>			

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## Site I/O, Span Line, RGPS and Modem Cabling for Sites Equipped With Primary Surge Suppressor – continued

### Connecting the Span Line Cable to the Primary Surge Suppressor

The unit provides two, four-wire JT1 interfaces for backhaul support. Each interface is made up of Transmit Tip/Ring and Receive Tip/Ring connections.

The Transmit and Receive data flow is given from the perspective of the unit. Only a single span line (Primary) is required for BTS operation.

### Connecting a Phone Line to the Primary Surge Suppressor (Modem Support)

The unit provides a two-wire analog phone line interface for modem support. The unit Tip and Ring signals are connected to the external phone line Tip and Ring.

# RGPS Cabling for Multi-BTS Configurations Equipped with Optional Primary Surge Suppressor

## Overview

This procedure gives information to connect multiple units for both RGPS (synchronous) and HSO (non-synchronous) configurations.

## Background

The RGPS only connects to the first unit of a multi-unit BTS. This first unit sends timing signals to all other units in a multi-unit BTS. You only need to connect the first units of each BTS to each other. This allows “sharing” of a single RGPS antenna between several single or multi-unit BTSs.

This also applies to systems using HSO instead of RGPS. The HSO timing is “shared” in the same way.

## Required Equipment

### Cables

The RGPS Synchronization Cable is contained in the Motorola kits listed in Table 5-16:

Table 5-16: Cable Descriptions and Part Numbers			
Cable	Qty.	Part Number	Description
X	1-11	3086039H18	RGPS Synchronization cable (part of kit SGKN4351A).
		3086039H19	RGPS Synchronization cable (part of kit SGKN4352A).

### Motorola kits

Table 5-17 and Table 5-18 show the contents of Motorola kits SGKN4351A and SGKN4352A. These kits are necessary for RGPS cabling between multiple BTS locations.

Table 5-17: RGPS Synchronization Cable Kit – SGKN4351A			
Cable	Qty.	Motorola Part Number	Description
X	1	3086039H18	RGPS Sync Cable, 2000 ft.
n/a	2	5864461A03	Fitting, liquid tight.
n/a	2	0264599A02	Nut, nylon locking

Table 5-18: RGPS Synchronization Cable Kit – SGKN4352A			
Cable	Qty.	Motorola Part Number	Description
X	1	3086039H19	RGPS Sync Cable, 3280 ft.
n/a	2	5864461A03	Fitting, liquid tight.
n/a	2	0264599A02	Nut, nylon locking

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## RGPS Cabling for Multi-BTS Configurations Equipped with Optional Primary Surge Suppressor – continued

### Cable Diagram

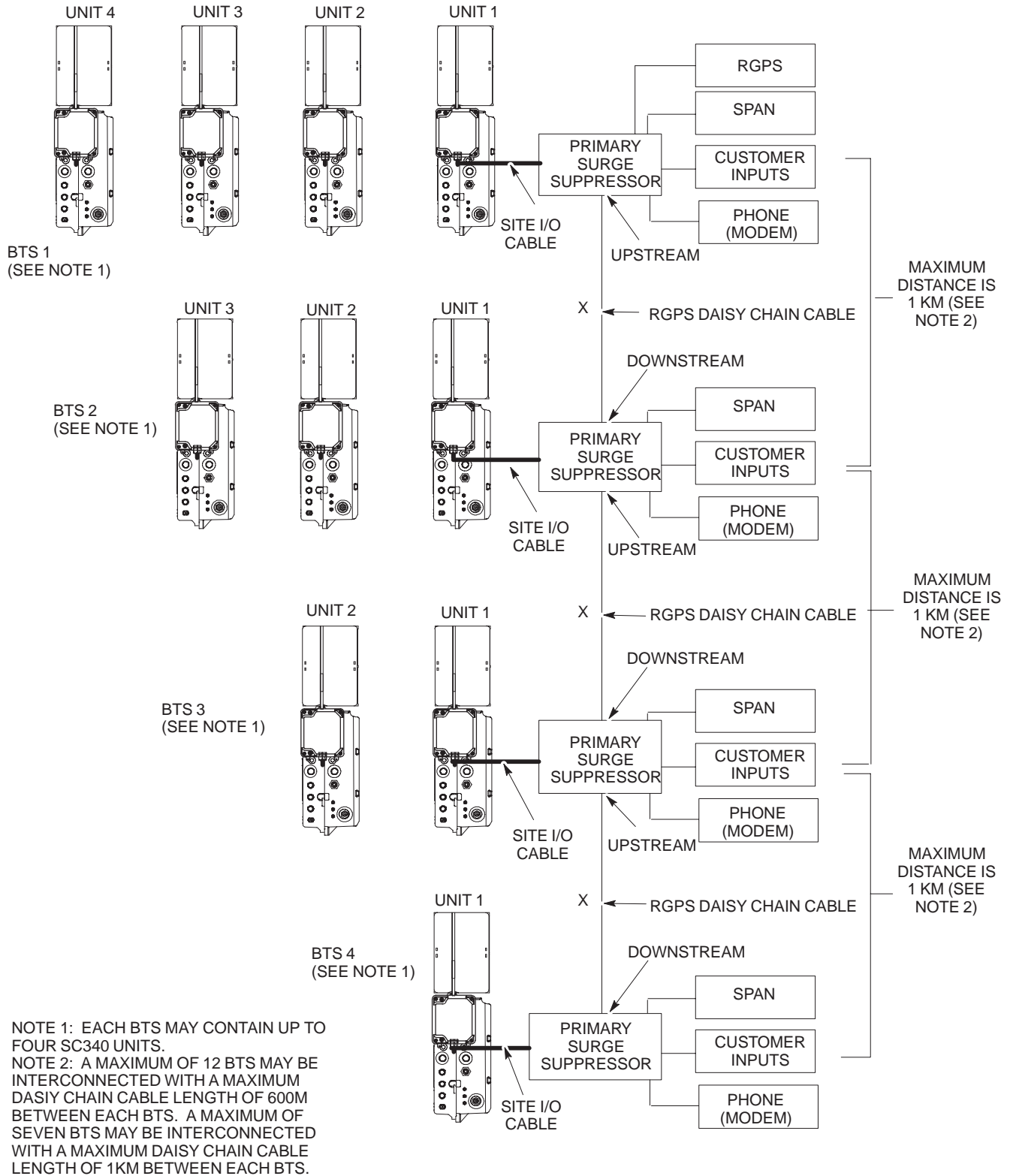
Figure 5-25 and Figure 5-26 both show the cabling for multi-unit configurations for both RGPS (synchronous) and HSO (non-synchronous).

### Procedure

Connect the cables (Cable X) between the Primary Surge Suppressors of each BTS. Refer to the cable run list in Table 5-19, Figure 5-25, and Figure 5-26.

# RGPS Cabling for Multi-BTS Configurations Equipped with Optional Primary Surge Suppressor – continued

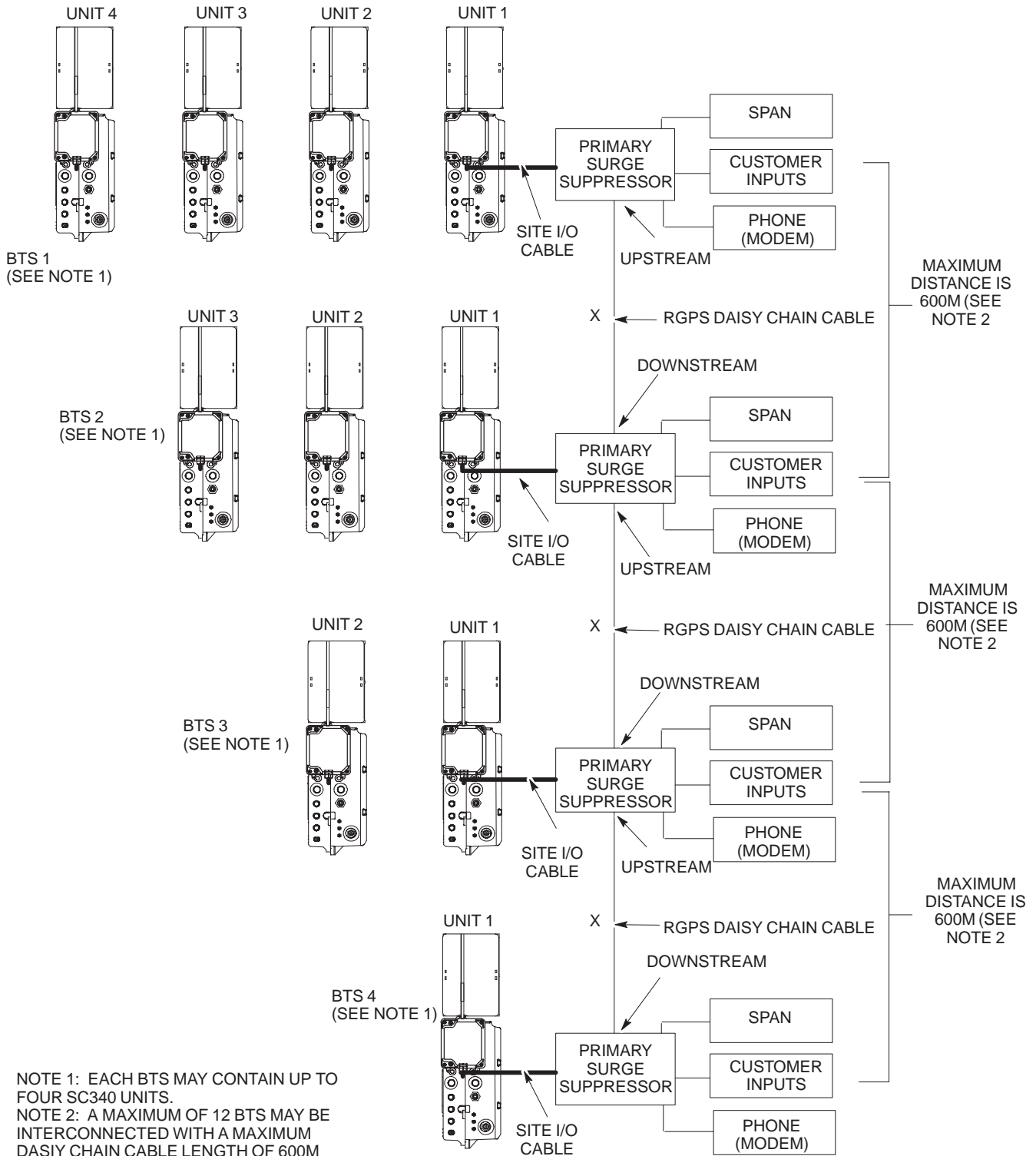
**Figure 5-25:** Site I/O Interface Cabling for RGPS (Synchronous) Configurations



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# RGPS Cabling for Multi-BTS Configurations Equipped with Optional Primary Surge Suppressor – continued

**Figure 5-26:** Site I/O Interface Cabling for HSO (Non-Synchronous) Configurations



NOTE 1: EACH BTS MAY CONTAIN UP TO FOUR SC340 UNITS.  
 NOTE 2: A MAXIMUM OF 12 BTS MAY BE INTERCONNECTED WITH A MAXIMUM DASIY CHAIN CABLE LENGTH OF 600M BETWEEN EACH BTS. A MAXIMUM OF SEVEN BTS MAY BE INTERCONNECTED WITH A MAXIMUM DASIY CHAIN CABLE LENGTH OF 1KM BETWEEN EACH BTS.

# RGPS Cabling for Multi-BTS Configurations Equipped with Optional Primary Surge Suppressor – continued

## Cable Connections

For a full signal description of the Site I/O cable, refer to Table 5-14 in the “Site I/O, Span Line, RGPS and Modem Cabling For Sites Equipped With Primary Surge Suppressor” procedure.

### NOTE

The pin number and wire color are based on the Site I/O cable. The pin number corresponds to pins on the Site I/O junction box connectors.

**Table 5-19: Multi-BTS RGPS Cable Run List for Primary Surge Suppressor**

Sync Reverse – From BTS N		Interconnecting RGPS Cable (Cable X)	Sync Forward – To BTS N+1	
Punchblock Location	Signal		Punchblock Location	Signal
OSP 9T	Data to Tail–	Green/Black	OSP 14T	Data from Head–
OSP 9R	Data to Tail+	Green	OSP 14R	Data from Head+
OSP 10T	Data from Tail–	White/Black	OSP 15T	Data to Head–
OSP 10R	Data from Tail+	White	OSP 15R	Data to Head+
OSP 11T	1 PPS to Tail–	Brown/Black	OSP 16T	1 PPS from Head–
OSP 11R	1 PPS to Tail+	Brown	OSP 16R	1 PPS from Head+
OSP 12T	1 PPS from Tail–	Red/Black	OSP 17T	1 PPS to Head–
OSP 12R	1 PPS from Tail+	Red	OSP 17R	1 PPS to Head+
OSP 8R	Ground	Blue/Black	OSP 8R	Ground

\*The Multi-BTS Synchronization interface must also be referenced to the BTS digital ground through a 7.5K ohm, 1W resistor. This resistor should be physically located at the punch block or terminal strip at each Sync Reverse connection in series with the Black/Blue Ground wire.

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# Span Line Daisy Chain Cabling for Sites Equipped with Optional Primary Surge Suppressor

## Objective

The objective of this procedure is to install span line cabling between multiple BTSs equipped with Primary Surge Suppressor in an open daisy chain configuration.

## Background

This feature allows BTSs to be linked together in an open daisy chain loop using a single T1/JT1/E1 span. This will reduce the number of spans necessary to support a JCDMA system and minimize unused channels.

Each BTS may contain up to four units. A maximum of 12 BTSs may be combined in a single daisy chain.

## Cable Description

The following cables are necessary to do this procedure.

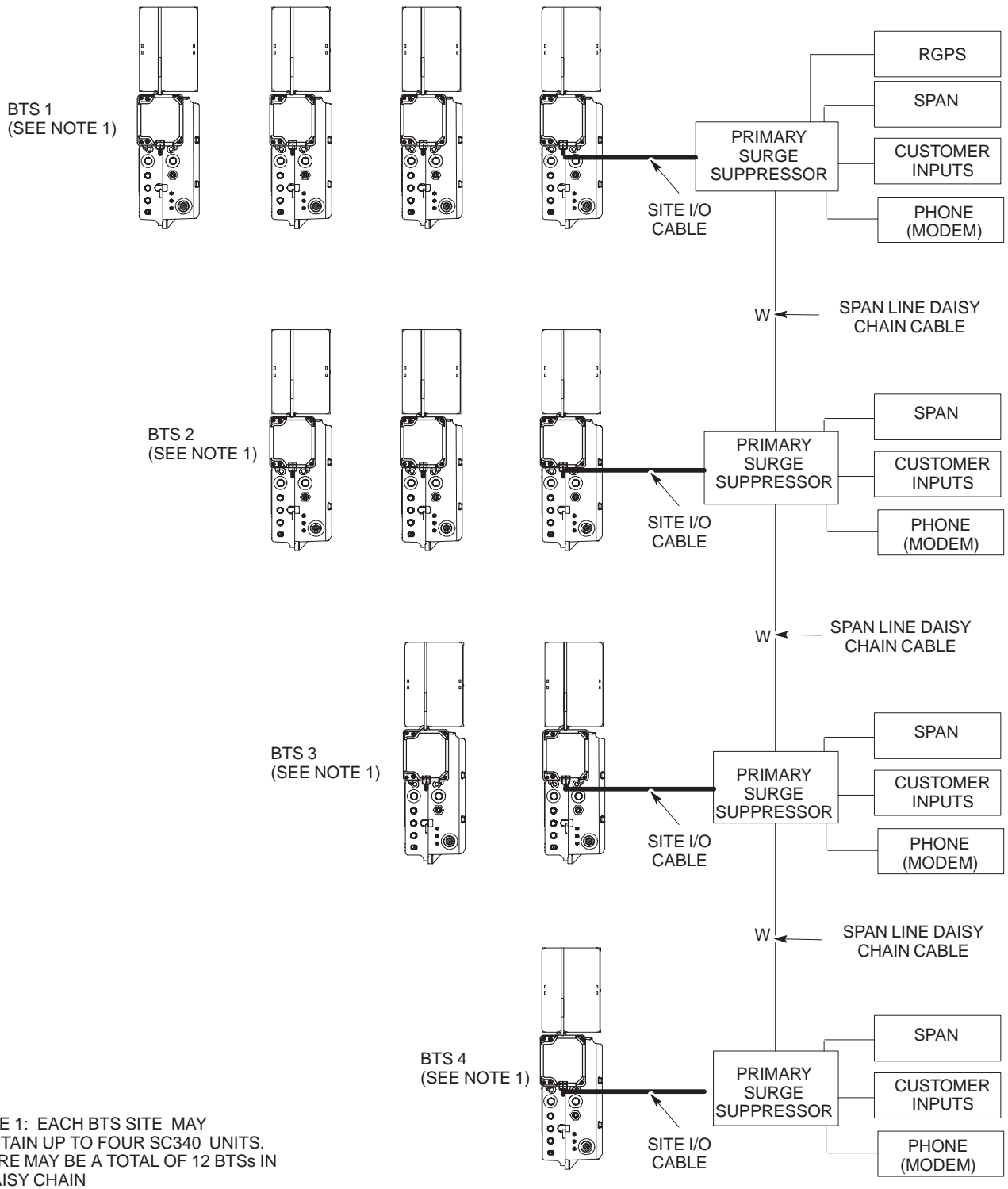
<b>Table 5-20: Cable Descriptions and Part Numbers</b>			
<b>Cable</b>	<b>Qty.</b>	<b>Part Number</b>	<b>Description</b>
W	1-3	Customer Supplied	Span Line Daisy Chain Cable

## Procedure

Attach the span line daisy chain cable (Cable W) to the Primary Surge Suppressor of each BTS. Refer to Figure 5-27 and Table 5-21.

# Span Line Daisy Chain Cabling for Sites Equipped with Optional Primary Surge Suppressor – continued

**Figure 5-27:** Site I/O Interface Cabling for Span Line Daisy Chain Cabling



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# Span Line Daisy Chain Cabling for Sites Equipped with Optional Primary Surge Suppressor – continued

## Cable Connections

Table 5-21 shows the cable run information for span line daisy chain cabling for BTSs equipped with the Primary Surge Suppressor.

For a full signal description of the Site I/O cable refer to Table 5-14 in the “Site I/O, Span Line, RGPS and Modem Cabling for Sites Equipped with Optional Primary Surge Suppressor” procedure.

### NOTE

The pin number and wire color are based on the Site I/O cable. The pin number corresponds to pins on the Site I/O junction box connectors.

<b>BTS 1 (Secondary Backhaul)</b>		<b>BTS 2 (Primary Backhaul)</b>	
<b>Punchdown Block Location</b>	<b>Desc.</b>	<b>Punchdown Block Location</b>	<b>Desc.</b>
OSP 23T	RX TIP	OSP 22T	TX TIP
OSP 23R	RX RING	OSP 22R	TX RING
OSP 24T	TX TIP	OSP 21T	RX TIP
OSP 24R	TX RING	OSP 21R	RX RING

