

SC[™] 300 1X BTS Hardware Installation, ATP, and FRU Procedures

Software Release 2.16.0.x (1.9 GHz)

SC[™] 300

CDMA 2000 1X

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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:

MOTOROLA, INC.
Technical Education & Documentation
1 Nelson C. White Parkway
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
FAX: +1-847-435-5541

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.

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.

FCC Requirements

Content

This section presents Federal Communications Commission (FCC) Rules Parts 15 and 68 requirements and compliance information for the SC™ 300 Microcell Base Transceiver Subsystems (BTS).

Warning – Radio Frequency Radiation Hazard



WARNING

This equipment is designed to generate and radiate radio frequency (RF) energy. It should be installed and maintained only by trained technicians. Licensees of the Federal Communications Commission (FCC) using this equipment are responsible for insuring that its installation and operation comply with FCC regulations (47 C.F.R. & 1.1310) designed to limit human exposure to RF radiation.

Maximum Permissible Exposure (MPE) Limit Warning

In order to comply with the FCC guidelines on RF exposure, the antennas for this equipment must not exceed the maximum gain shown in the MPE Limits table. Antennas must be installed more than the minimum distance specified in the MPE Limits table away from persons. No antenna used with this equipment should be installed in a location in which any persons are likely to be within the maximum permissible distance from the antenna.



WARNING

Verify that transmitter output is turned off before performing antenna service within the restricted area.

MPE Limits		
Parameter	Frequency	
	800 MHz	1.9 GHz
Maximum Gain	5.2dBd	5.5dBi
Distance	1.0m (40 in.)	0.5m (20 in.)

RF Antenna Warning Labels

Your BTS is shipped with one of two different warning labels depending upon the frequency:

- 800 MHz – Motorola Part Number 5488229C09 (1 m label)
- 1.9 GHz – Motorola Part Number 5488229C10 (0.5 m label)

You must affix the label to a visible surface near the antenna for all indoor antenna mounting applications. The label(s) must be visible from

all directions. Order additional labels as required for your specific application.

FCC Part 15 Requirements

Part 15.19a(3) – Information to User

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Part 15.21 – Information to User

Changes or modifications not expressly approved by Motorola could void your authority to operate the equipment.

Part 15.105(b) – Information to User

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment OFF and ON, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Part 68 Requirements

This equipment complies with Part 68 of the Federal Communications Commission (FCC) Rules. A label located on the upper-right corner of the right side of the cooling fins contains, among other information, the FCC Registration Number and Ringer Equivalence Number (REN) for this equipment. If requested, this information must be provided to the telephone company.

The REN is useful to determine the quantity of the devices which may connect to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to incoming calls. In most, but not all areas, the sum of the RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to the line as determined by the total RENs, contact the telephone company to determine the maximum REN for the calling area.

If the dial-in site access modem causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice is not practical, the telephone company will notify you of the discontinuance as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of your dial-in site access modem. If this happens, the telephone company will provide advance notice so that you can modify your equipment as required to maintain uninterrupted service.

If you experience trouble with the dial-in site access modem, please contact:

Motorola Customer Network Resolution Center (CNRC)
3436 N. Kennicot Drive
Arlington Heights, Illinois 60004
Phone Number: 800-433-5202

for repair and/or warranty information. If the trouble is causing harm to the telephone network, the telephone company may request you to disconnect the equipment from the network until the problem is solved. You should not attempt to repair this equipment yourself. This equipment contains no customer or user-serviceable parts.

Changes or modifications not expressly approved by Motorola could void your authority to operate this equipment.

Revision History

Manual Number

68P09253A43

Manual Title

SC™ 300 1X BTS Hardware Installation, ATP, and FRU Procedures
Software Release 2.16.0.x (1.9 GHz)

Version Information

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

Version Level	Date of Issue	Remarks
1	JAN 2002	Draft/preliminary version for DE/CIE/DV&V 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

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	

Notes

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Chapter 1: Introduction

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

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 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 site that contains one or more SC™ 300 units will be referred to as the “Logical BTS” or “Multi-Unit 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 and Surge Suppressor mounting bracket on a wall, pole, or rack.

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

“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 1-6 show the MicroCell and optional Primary Surge Suppressor units mounted on a wall, rack, pole, and frame.

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

Configurations

The MicroCell supports single-carrier, omni configurations.

The cover configurations for the MicroCell and Primary Surge Suppressor are:

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

The battery configurations for the MicroCell unit is:

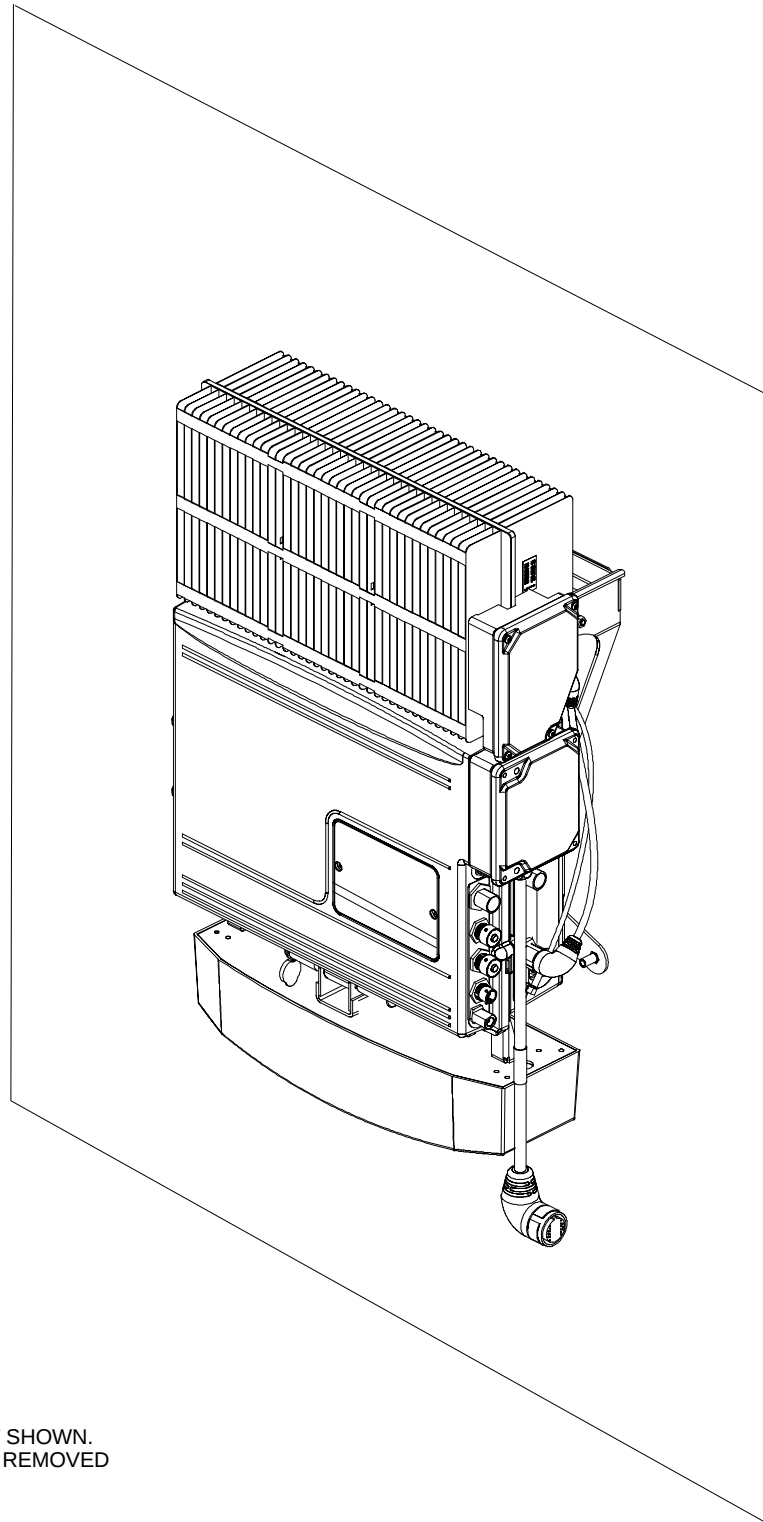
- Short duration battery

The power configurations for the MicroCell unit is:

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

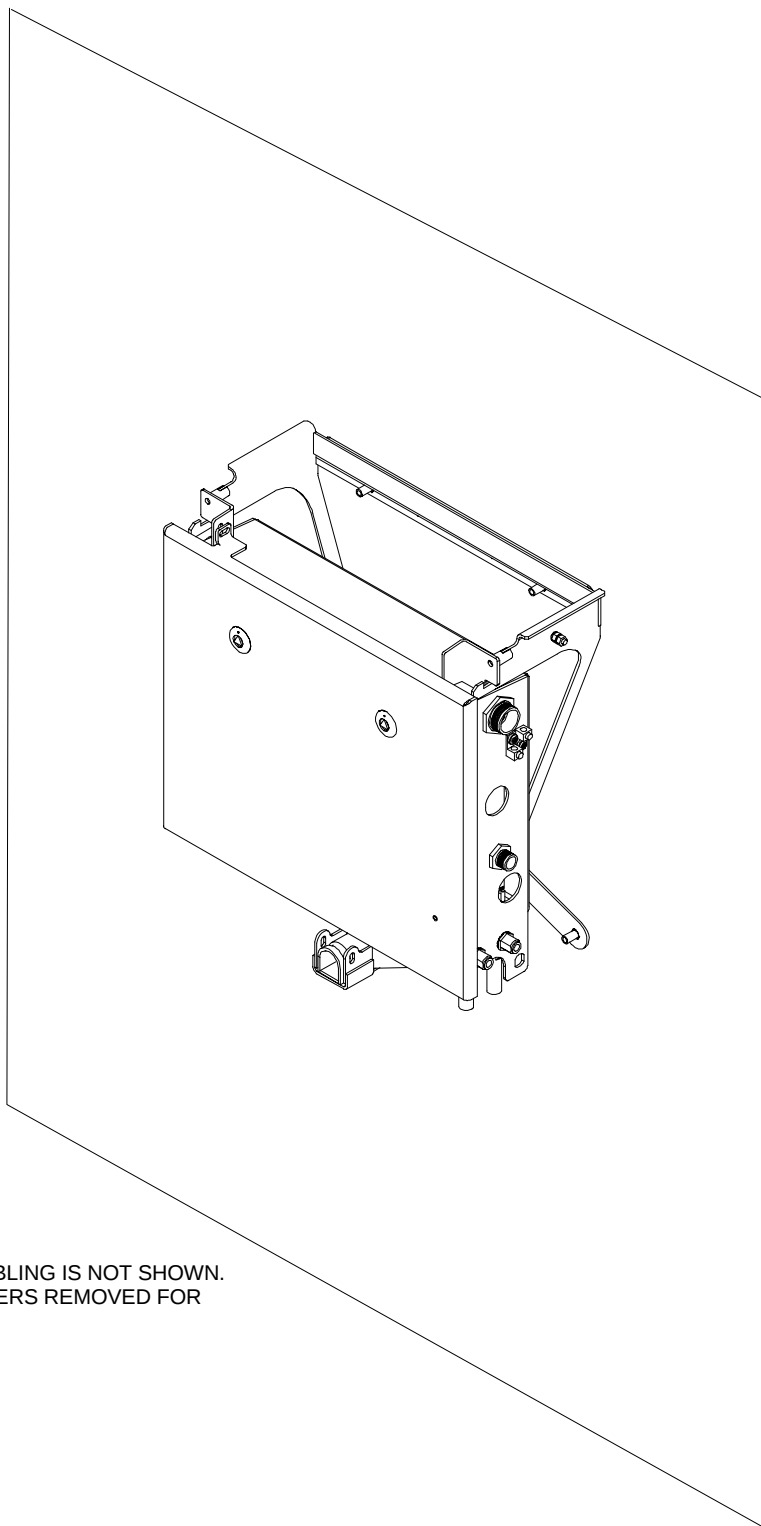
The synchronization configurations for the MicroCell unit is:

- 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

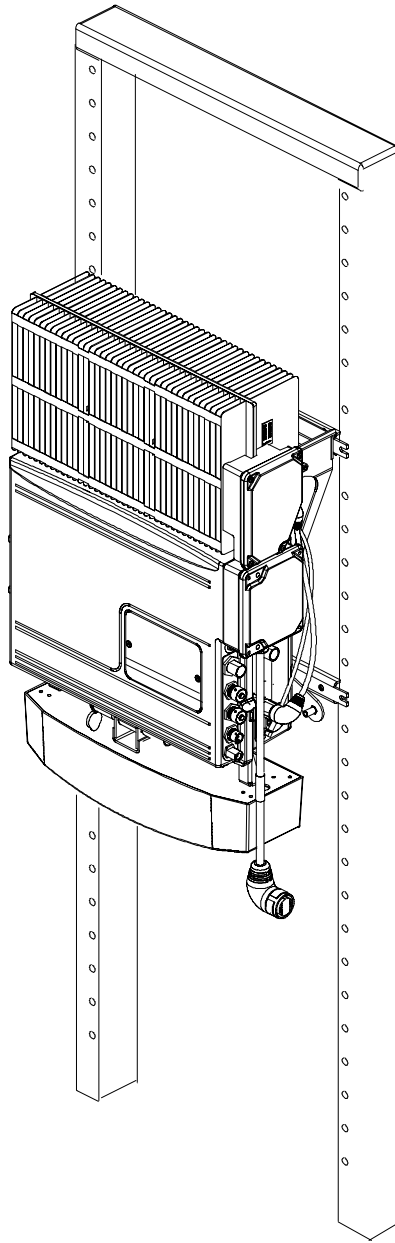
SYSTEM CABLING IS NOT SHOWN.
FIN AND SOLAR COVERS REMOVED
FOR CLARITY.

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



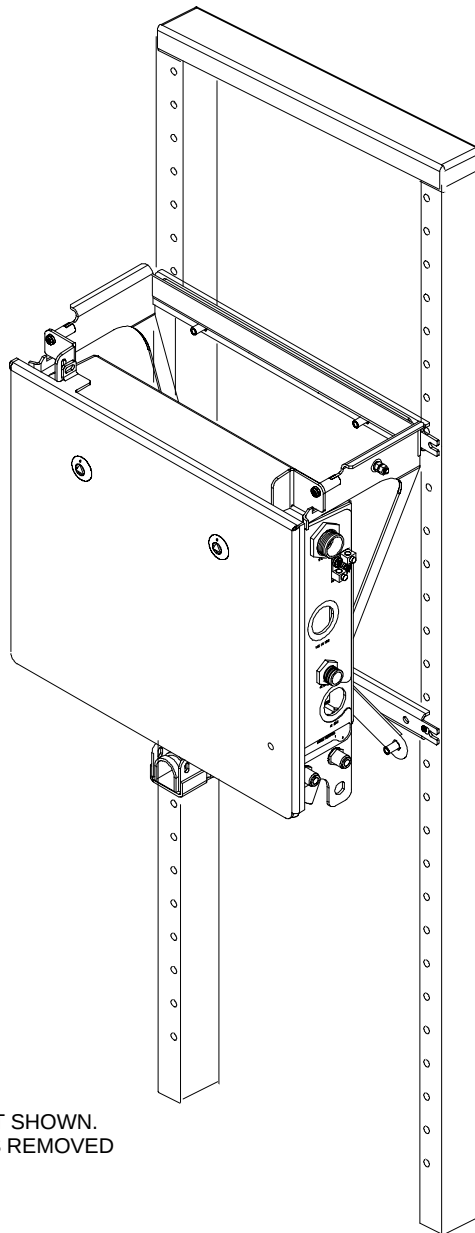
Introduction – continued

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

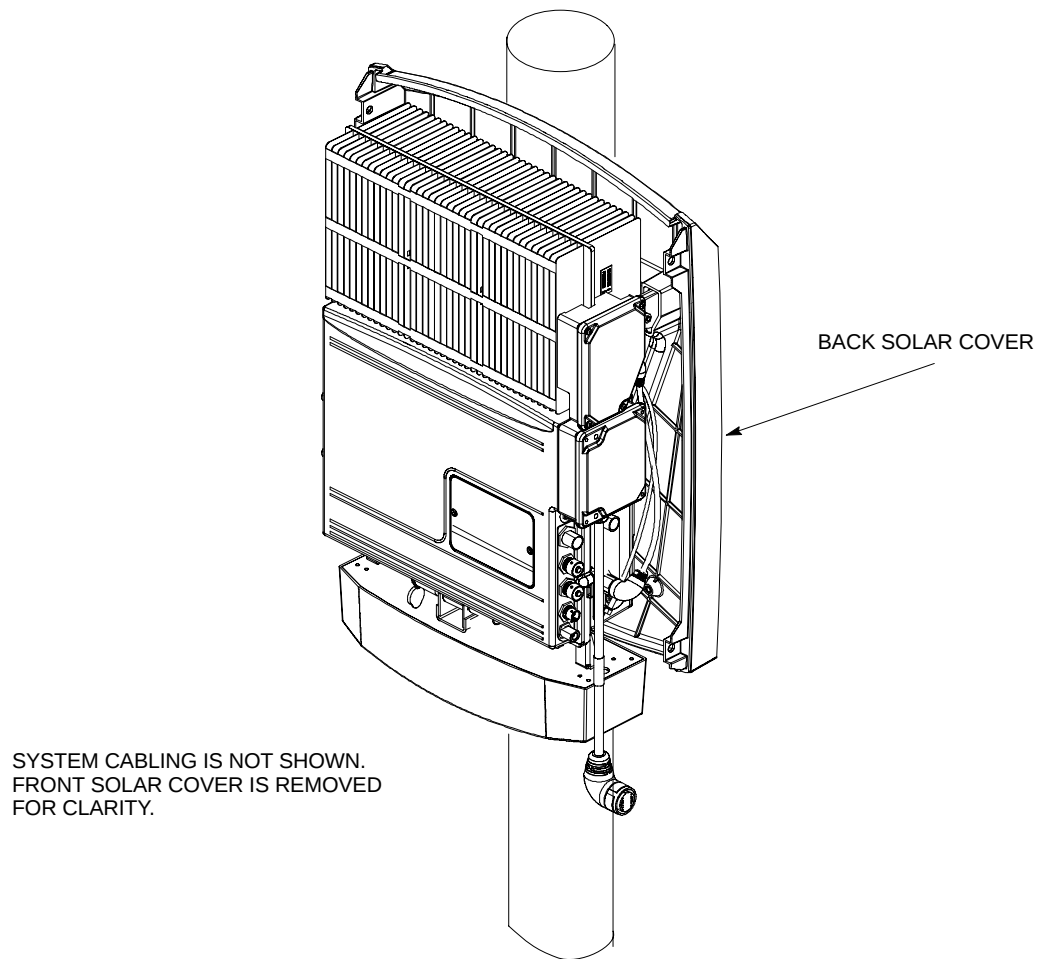
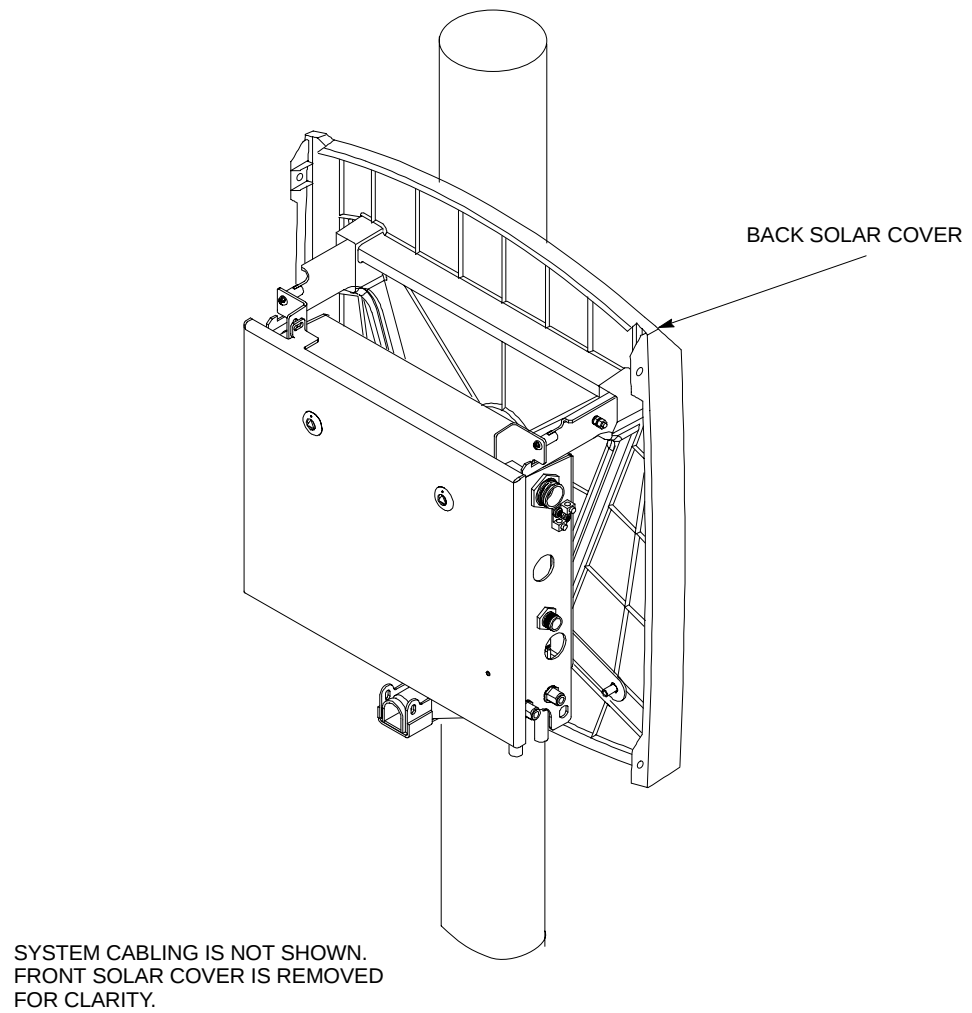


Figure 1-6: Primary Surge Suppressor Mounted on a Pole



Required Documents

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)
- *Grounding Guidelines for Cellular Radio Installations – 68P81150E62.*
- *CDMA LMF Operator's Guide – 68P64114A78.*
- 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)
- 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, or rack 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

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

The following tools and materials in Table 1-1 are required to properly and safely install the the mounting bracket on a pole.

Table 1-1: Required Tools and Materials for Pole Mounting		
Hand Tools	Materials	Power Tools
Safety Glasses	MicroCell 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		

Installation Tools and Materials – continued

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

The following tools and materials in Table 1-2 are required to properly and safely install the mounting bracket on a rack.

Table 1-2: Required Tools and Materials for Rack Mounting		
Hand Tools	Materials	Power Tools
T30 Torx tamper bit, 1/4-in. hex	MicroCell 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)	

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

The following tools and materials in Table 1-3 are required to properly and safely install the mounting bracket on a concrete wall.

Table 1-3: Required 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
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 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		

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

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:

Communications Test Set

This procedure requires one of the following test sets:

- Motorola CyberTest
- Advantest R3465 and HP 437B or Gigatronics 8541C Power Meter
- Hewlett–Packard HP 8935
- Hewlett–Packard HP8921 (w/CDMA and PCS interface for 1.7/1.9 GHz) and HP 437B or Gigatronics Power Meter.

4–port 10 Base T ethernet hub (optional)

One 4–port, 10 base T, 10 Mbps, ethernet hub with BNC connector. This is used for LMF to BTS ethernet connections. This is used to connect the PCMCIA serial I/O port of the LMF to the RJ45 ethernet cable.

GPIO cables

Two Hewlett Packard 10833A or equivalent; 1 or 2 meters long used to interconnect test equipment and LMF terminal.

Power meter

This procedure requires one of the following power meters:

- Gigatronics Model 8541C with 80601A power sensor capable of measuring from –70 dBm to +23 dBm; *supported by the LMF* to perform BTS Total Power measurement.
- 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 used to connect the BTS 19.6608 MHz and 2 Second Reference to the Communication Test Set.

50 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 (T1/E1) 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.

FRU Tools and Materials

Introduction

The following is a list of the FRUs for the Microcell unit 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

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

Required Tools and Materials to Perform FRU Procedures

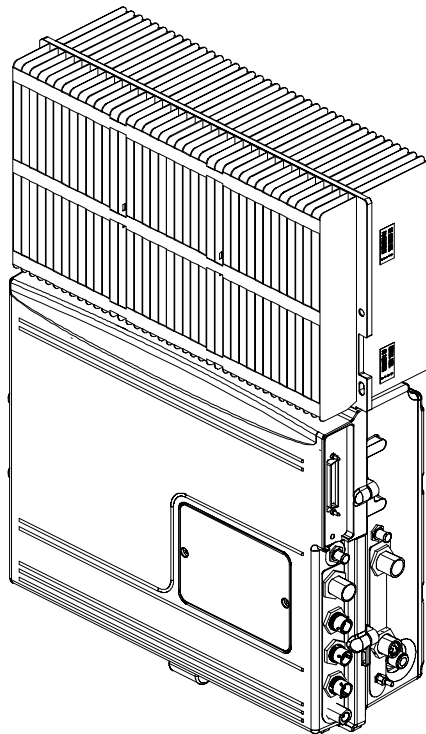
Table 1-4 lists the required tools and materials to perform the FRU installation procedures.

Table 1-4: Required Tools and Material to Perform FRU Procedures		
Hand Tools	Materials	Power Tools
T30 Torx tamper bit, 1/4-in. hex	Applicable FRU	None Required
T20 Torx tamper bit, 1/4-in. hex	Installation handles (optional)	
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		

Overview

Figure 1-7 through Figure 1-19 show the various components of the SC[™] 300 MicroCell system.

Figure 1-7: MicroCell Unit



Unit Identification – continued

Figure 1-8: Site I/O Junction Box and Cable

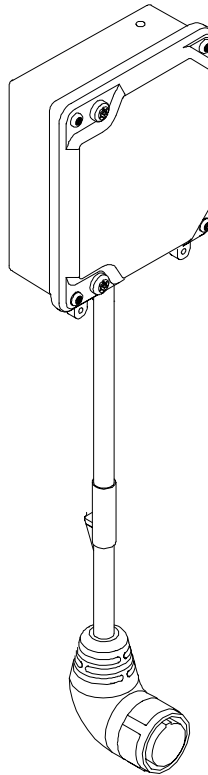


Figure 1-9: Subscriber Unit (SU) and Cable

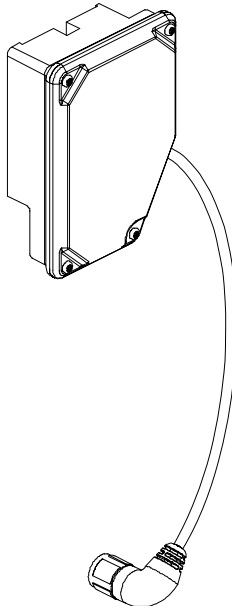


Figure 1-10: Primary Surge Suppressor (Optional)

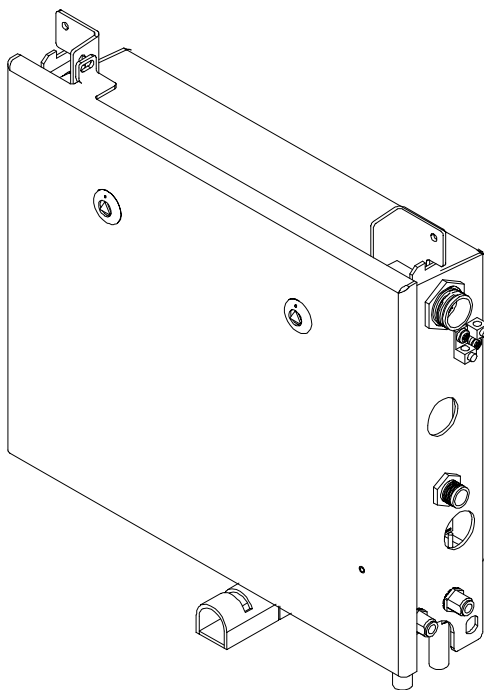
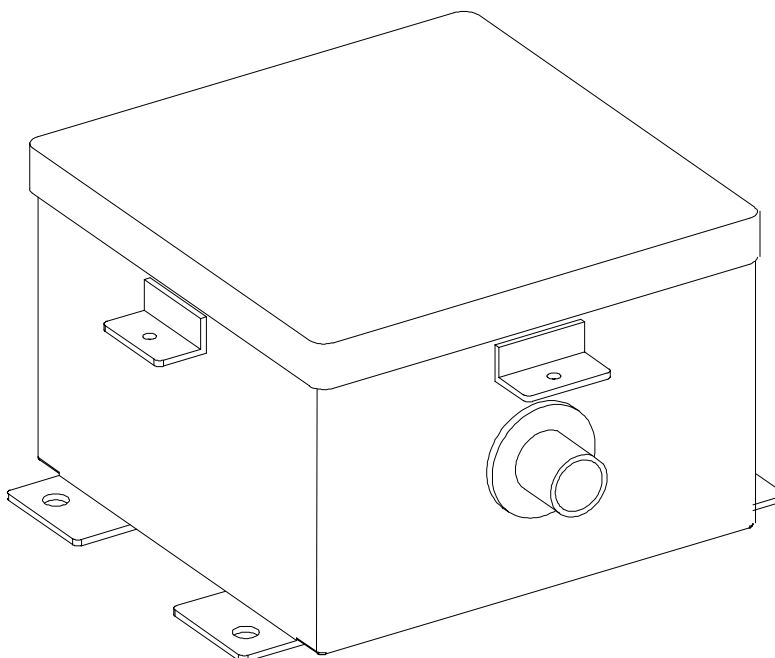


Figure 1-11: AC Installation Box (Optional)



Unit Identification – continued

Figure 1-12: Mounting Bracket for both MicroCell and Primary Surge Suppressor

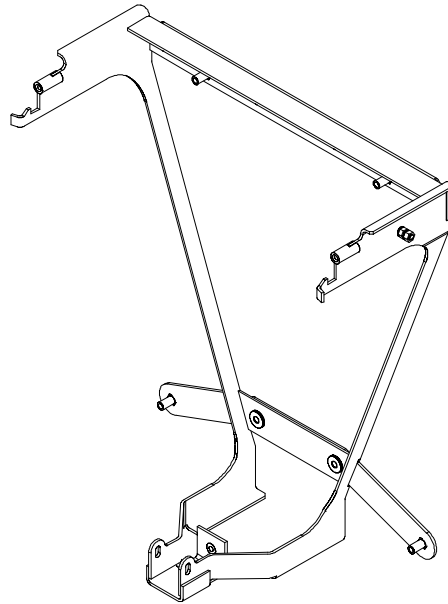
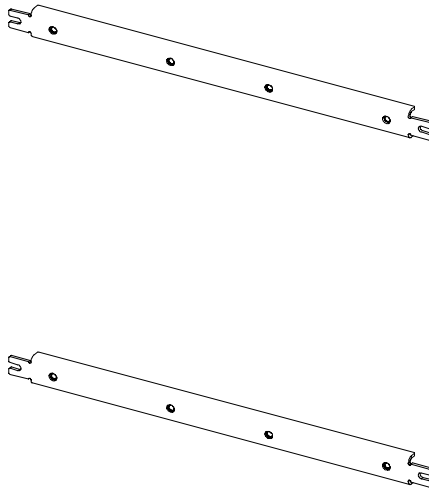
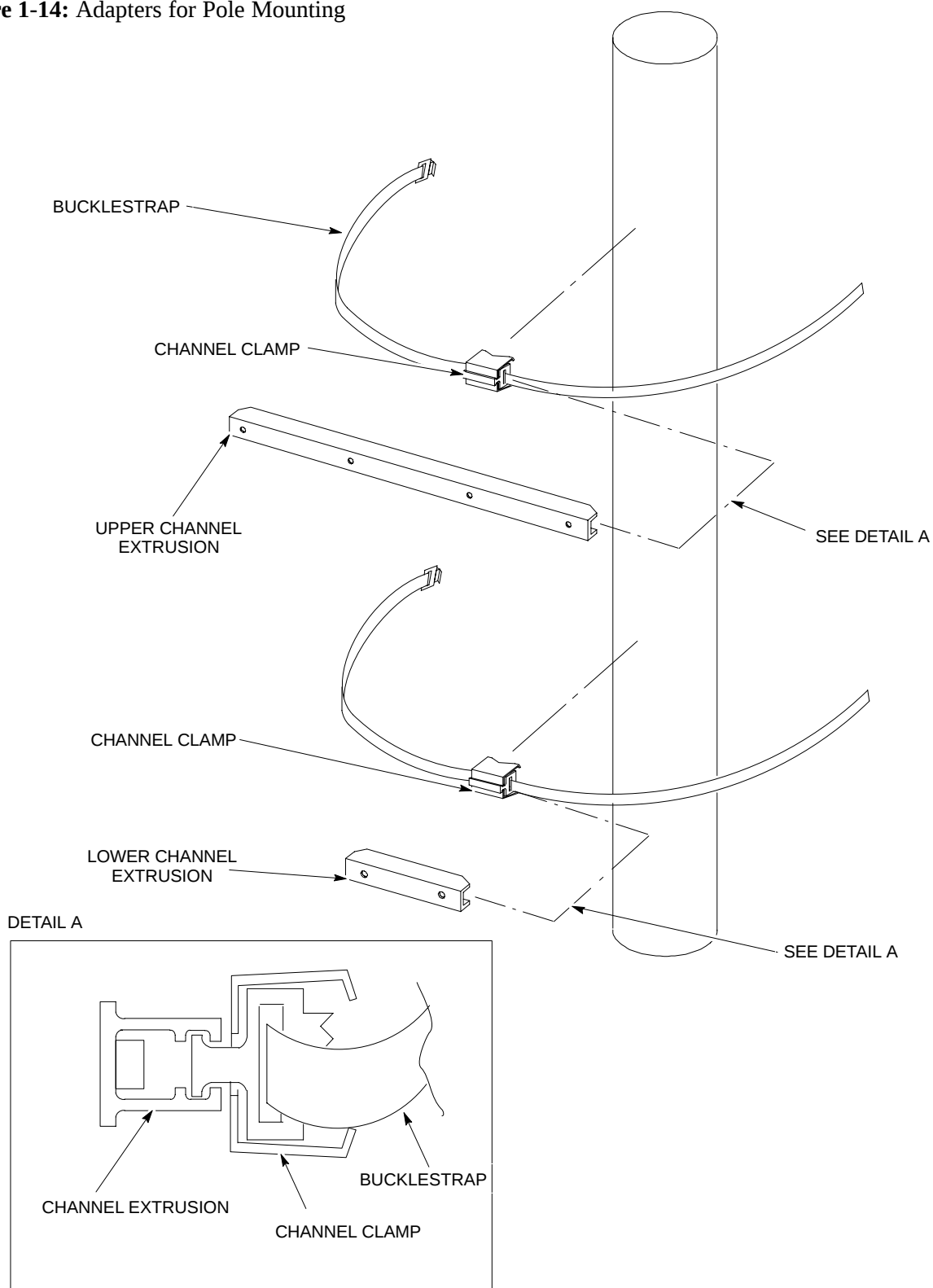


Figure 1-13: Adapters for Rack Mounting



Unit Identification – continued

Figure 1-14: Adapters for Pole Mounting



Unit Identification – continued

Figure 1-15: Installation Handles for Lifting Unit (Optional)

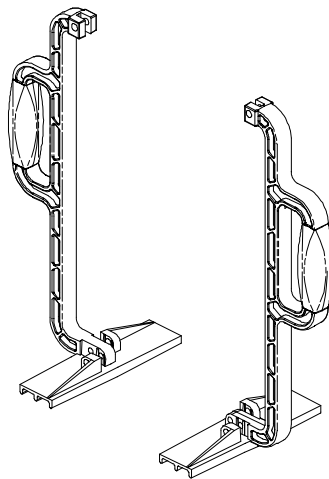


Figure 1-16: Short Duration Battery (Optional)

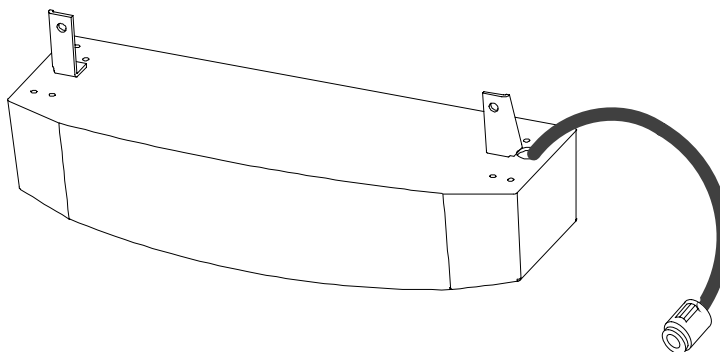


Figure 1-17: Front and Back Fin Covers

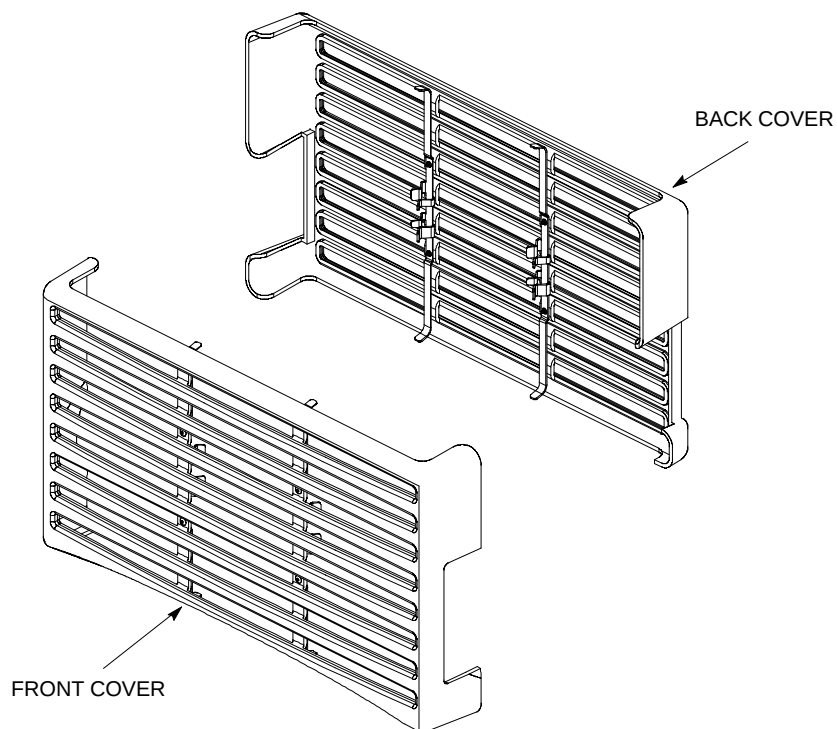
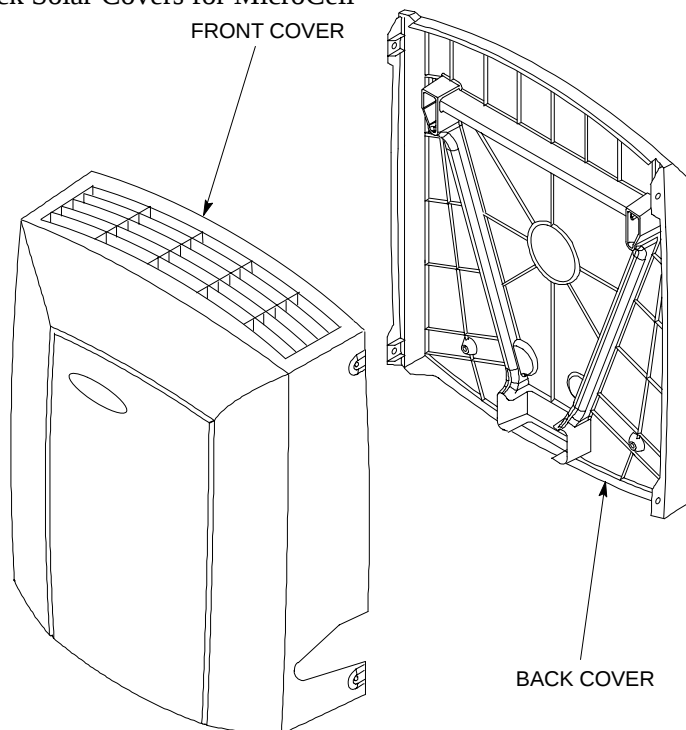
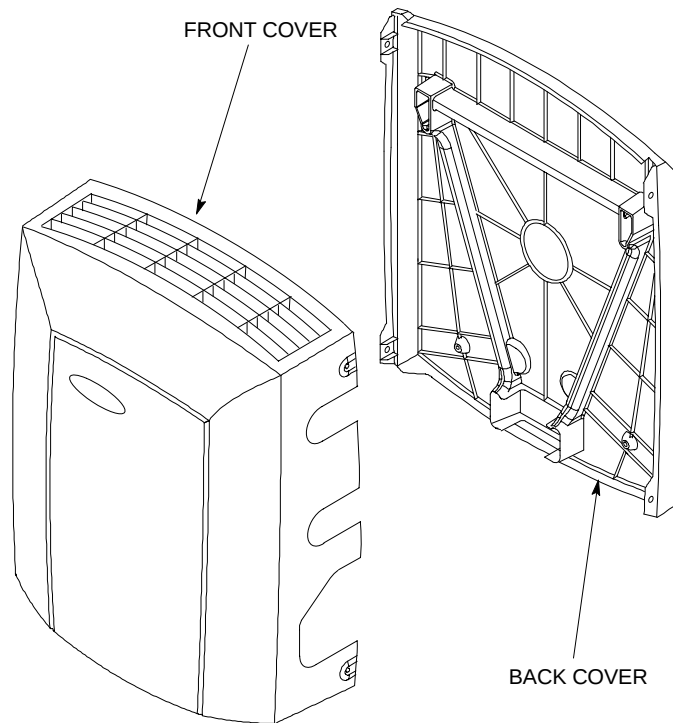


Figure 1-18: Front and Back Solar Covers for MicroCell



Unit Identification – continued

Figure 1-19: Front and Back Solar Covers for Surge Suppressor



Installation Order

The pieces of the MicroCell 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 if fin covers will not be used).
4. Install RGPS head.
5. Prepare site cabling.
6. Install back fin cover to unit (required for indoor applications if solar covers will not be used).
7. Attach installation handles to unit (optional).
8. Attach and secure unit to mounting bracket.
9. Remove installation handles (if used).
10. Attach and secure Primary Surge Suppressor to mounting bracket (optional).
11. Attach all ground cabling to unit(s).
12. Remove Site I/O dust cover.
13. Attach Site I/O junction box to unit.
14. Attach Subscriber Unit (SU) to unit.
15. Attach front fin cover (required for indoor applications if solar covers will not be used).
16. Install short duration battery (if required).
17. Attach all cables to unit(s).
18. Terminate all unused connections.
19. Attach front solar cover (required for outdoor installations and optional for indoor applications if fin covers will not be used).

ATP Order

The ATP for the MicroCell unit 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 (test set 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. Subscriber unit test and setup
19. Generate an ATP report
20. Copy LMF CAL file to CBSC
21. Terminate LMF session/leave the site

**Frequency Hopping Pilot
Beacon (FHPB) ATP Order**

The ATP for a MicroCell that is configured as a Frequency Hopping Pilot Beacon is performed in the following sequence:

1. Create CAL file
2. RF path audit
3. TX and RX 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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Notes

2

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 system 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.

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.
- CO² (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.

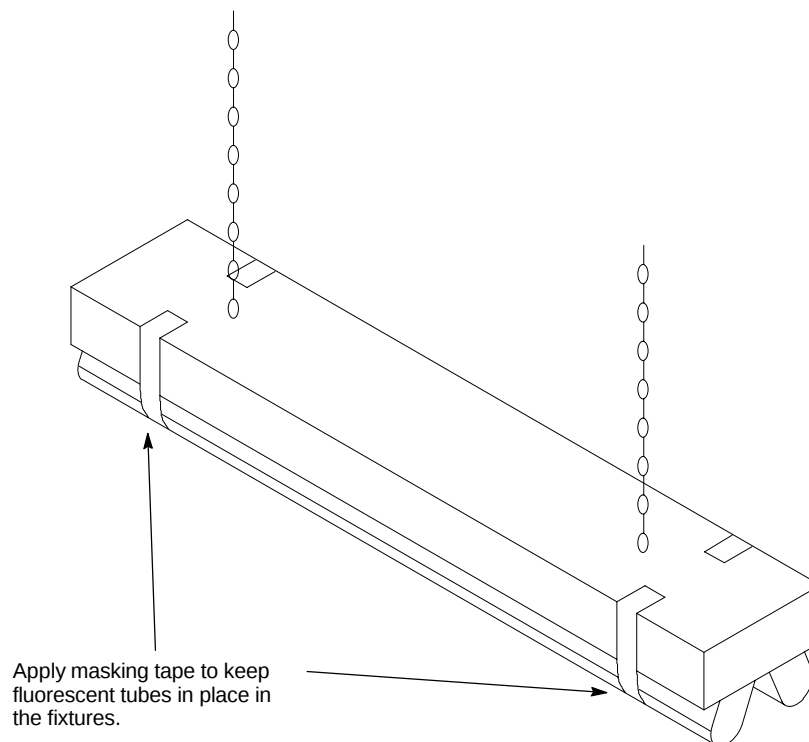
Equipment Arrival

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



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Prepare Site for the Arrival of the Equipment – continued

Procedure to Prepare the Site for the Equipment

Table 2-1: Procedure to Prepare the Site for the BTS

Step	Action
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.) NOTE 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: • DC power is available and meets the site documentation specifications (if applicable). • AC power is available and meets the site documentation specifications (if applicable). • Cable rack is installed per site document specifications. • Outdoor cable runs are installed and meet local building codes. • Span line termination tie points are available. • Customer input termination tie points are available. • Phone tie-in points (modem) are available. • Phone access is available (if applicable). • There is clear access to move the equipment to the desired mounting area. • There is sufficient space for installation and service access to the equipment. • Customer supplied shelters are installed.

Dimensions and Clearances

Overview

This information covers the dimensions and clearances associated with the MicroCell and Primary Surge Suppressor 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.

Table 2-2: Installation Dimensions for the MicroCell and Primary Surge Suppressor Units				
Item	Height	Width	Depth	Weight
MicroCell (fully installed)	730 mm 28.76 in.	590 mm 23.25 in.	254 mm 10.01 in.	38.5 kg 84.7 lbs
MicroCell (unit only)	590 mm 23.22 in.	450 mm 17.71 in.	150 mm 5.90 in.	24 kg 52.8 lbs
Primary Surge Suppressor (fully installed)	730 mm 28.76 in.	590 mm 23.25 in.	254 mm 10.01 in.	19.17 kg 42.26 lbs
Primary Surge Suppressor (unit only)	510 mm 20.08 in.	465 mm 18.32 in.	125 mm 4.93 in.	11 kg 24.26 lbs

Table 2-3 Minimum Clearances for MicroCell						
Item	Front	Back	Left	Right	Top	Bottom
Installation and Maintenance Requirements	600 mm 23.62 in.	0	100 mm 3.93 in.	200 mm 7.87 in.	0	0
Functional Requirements (with solar cover)	0	0	100 mm 3.93 in.	200 mm	50 mm 1.96 in.*	50 mm 1.96 in.*
Functional Requirements (without solar cover)	50 mm 1.96 in.	0	200 mm 7.87 in.	200 mm 7.87 in.	50 mm 1.96 in.	50 mm 1.96 in.
* Within these boundaries, area must remain 25% unobstructed. This is the open surface area at any cross section. See Figure 2-7.						

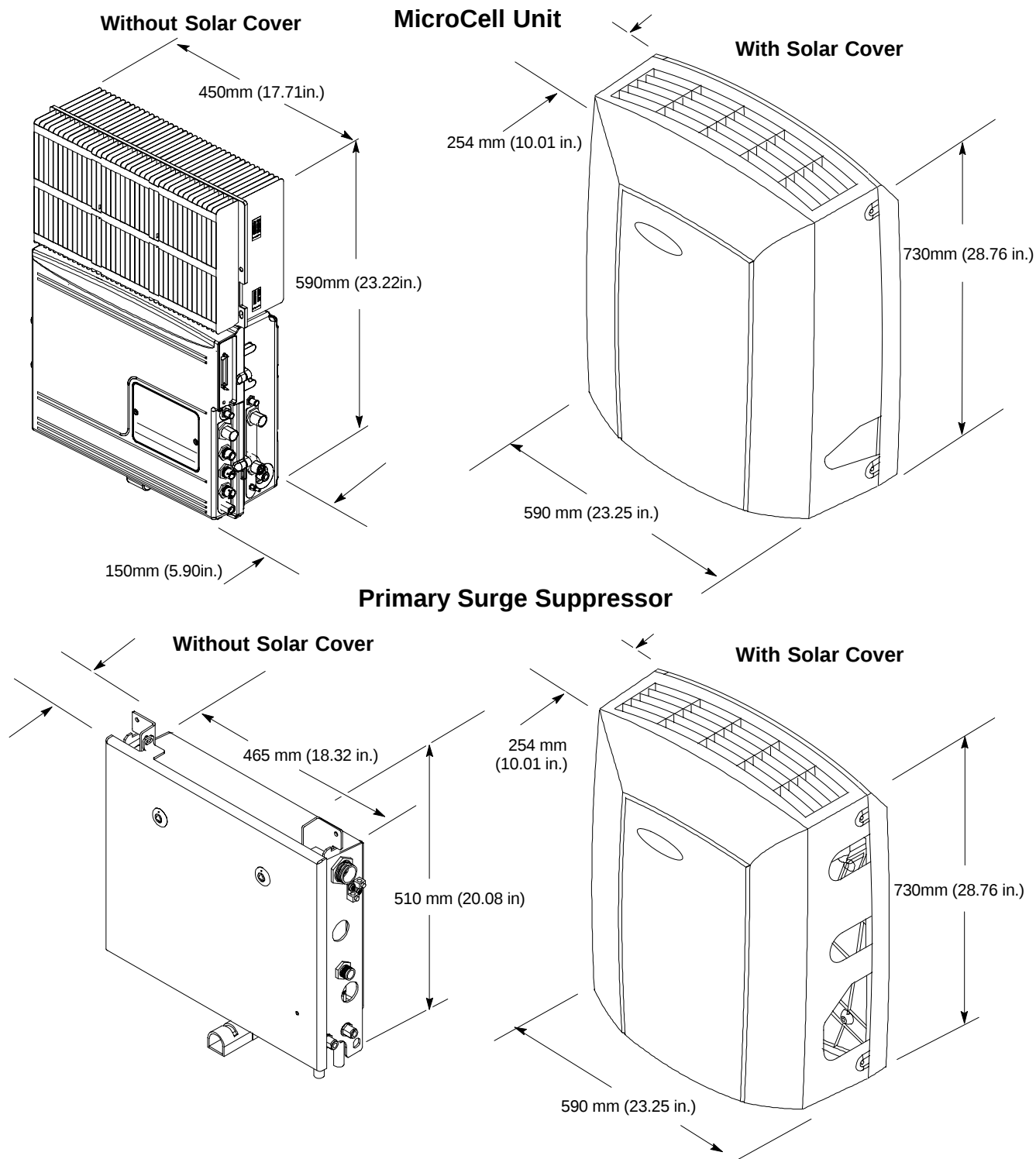
Dimensions and Clearances – continued

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

Unit Dimensions

The unit dimensions are shown below in Figure 2-2.

Figure 2-2: Overall Dimensions of MicroCell Unit and Primary Surge Suppressor



Unit Clearances

The unit clearances are shown below in Figure 2-3 through Figure 2-7.

Figure 2-3: Installation and Functional Clearances for MicroCell Units (Without Solar Covers)

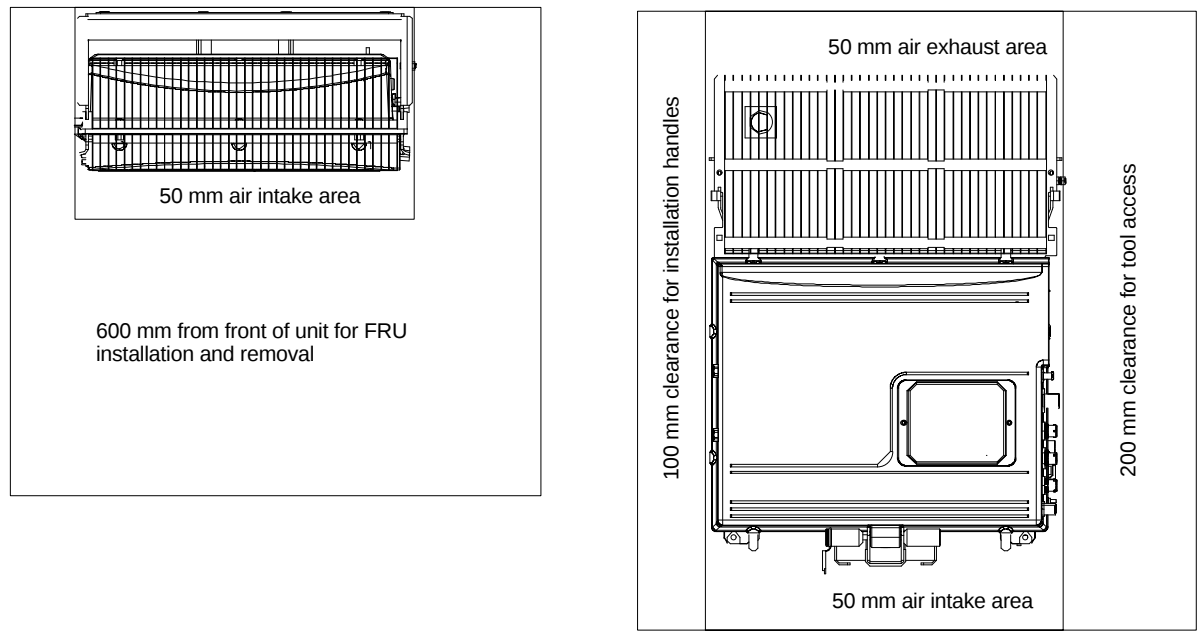


Figure 2-4: Installation and Functional Clearances for MicroCell Units (With Solar Covers)

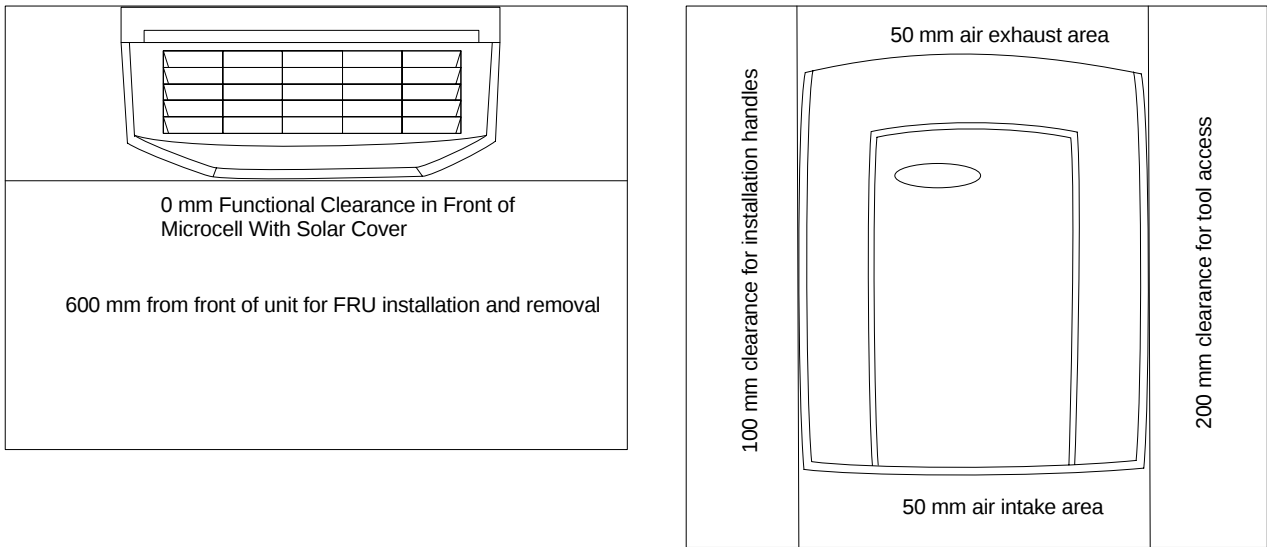


Figure 2-5: Installation and Functional Clearances for Primary Surge Suppressor (without Solar Covers)

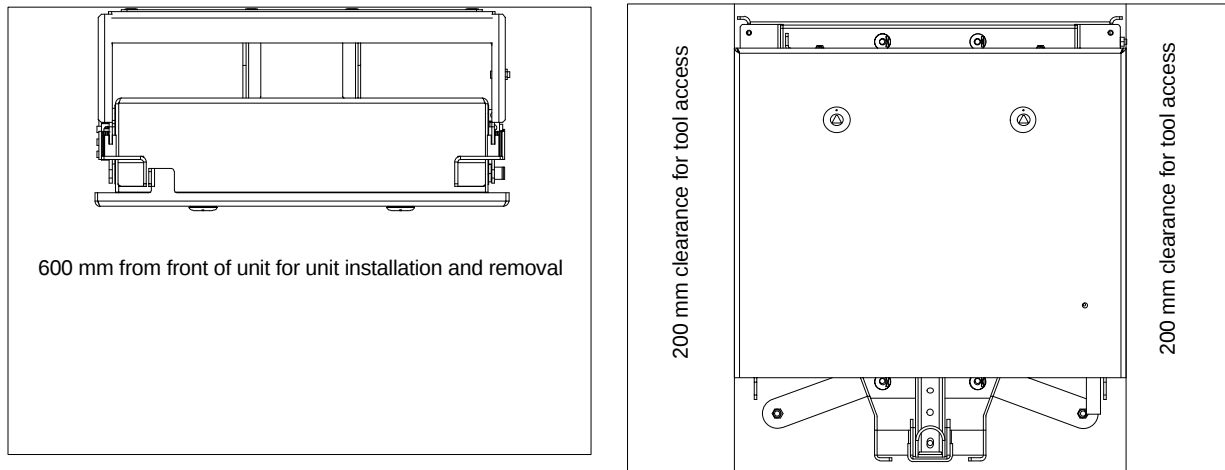


Figure 2-6: Installation and Functional Clearances for Primary Surge Suppressor (with Solar Covers)

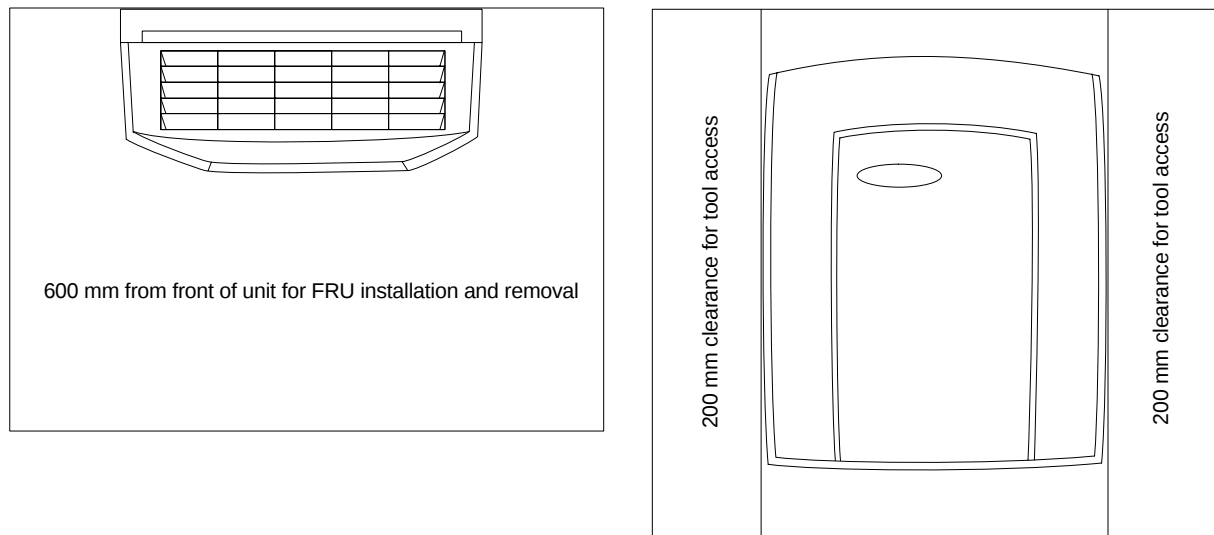
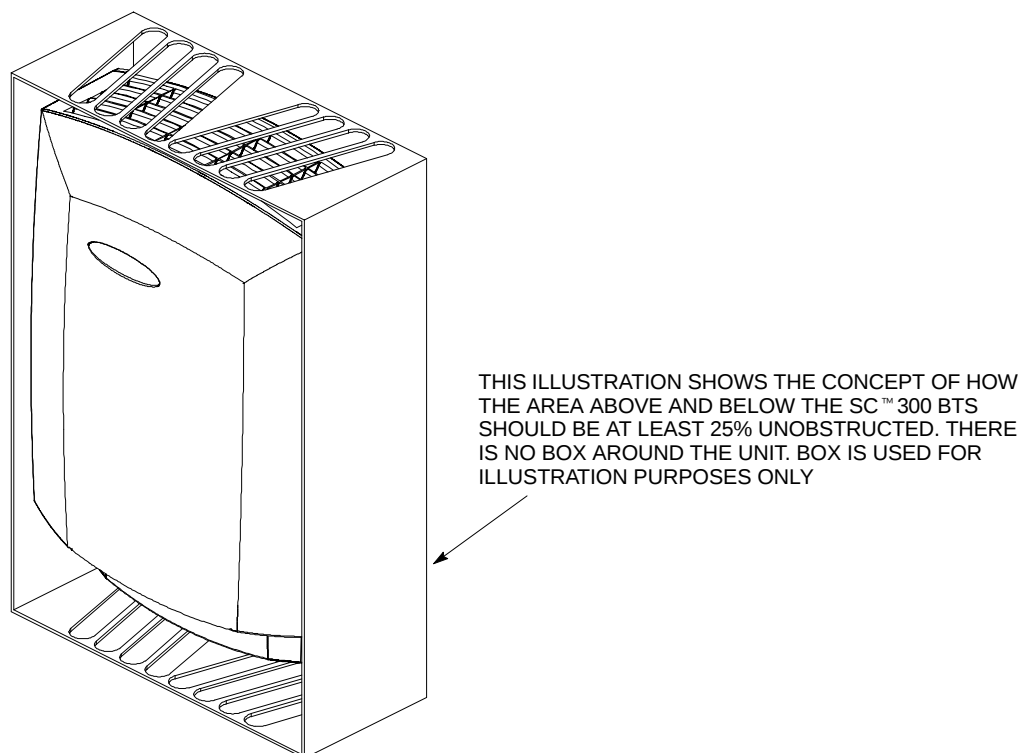


Figure 2-7: Concept of Functionality Clearances for MicroCell Units (V-Style Solar Cover)



Dimensions and Clearances – continued

Notes

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Chapter 3: Installing Mounting Bracket and Remote GPS

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Mounting Bracket Installation Overview

Overview

This chapter provides the information and procedures to:

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

Required Tools and Materials



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 in Table 3-1 are required to properly and safely install the the mounting bracket on a concrete wall.

Attaching the Mounting Bracket to a Wall – continued

Table 3-1: Required 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 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		

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: For concrete walls use the Hilti DCM 18–14 metric bit and Hilti anchors.
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. * IMPORTANT For concrete installation, the hole MUST be at least 5 in. (12.7 cm) deep. Anchors can not be removed once they are tapped into the hole.

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Attaching the Mounting Bracket to a Wall – continued

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

Step	Action
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.

Procedure to Secure the 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.

Table 3-3: Procedure to Secure the Mounting Bracket to a Wall

Step	Action
	* IMPORTANT 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.
	! CAUTION 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. NOTE When the red cap shears off, the anchor bolt has been tightened to the correct torque.

Mounting Bracket Hole Locations

Figure 3-1 and Figure 3-2 show 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

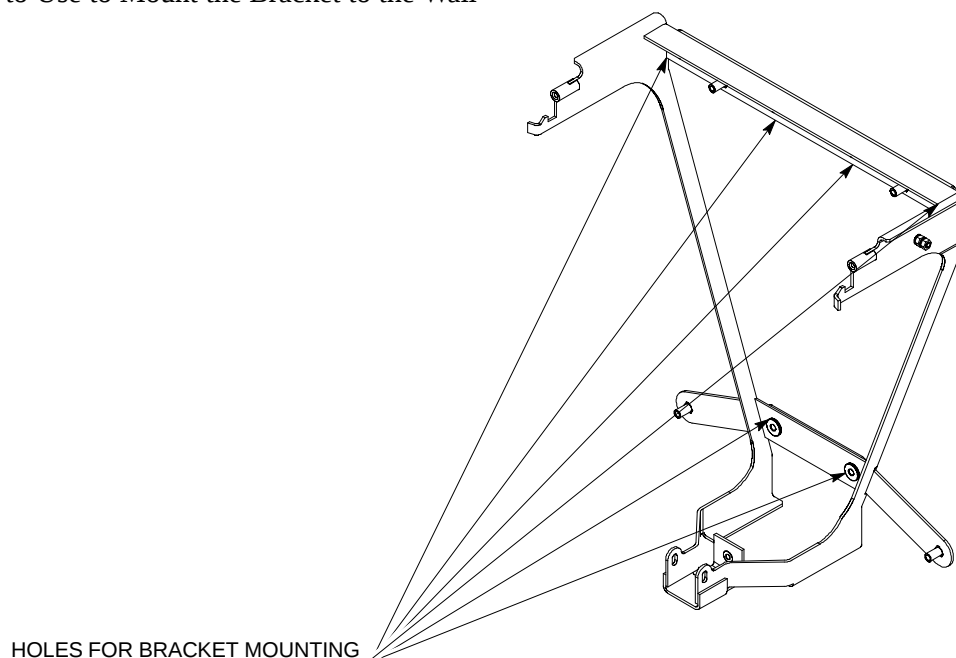
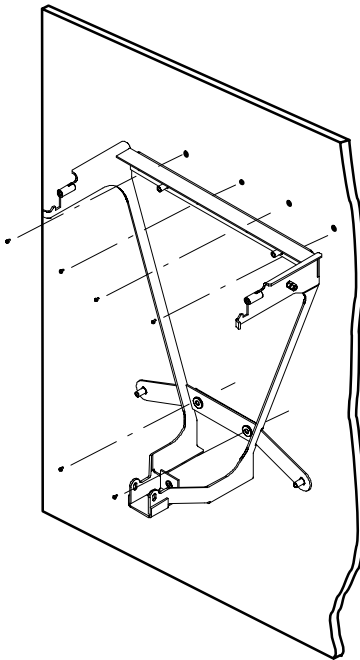


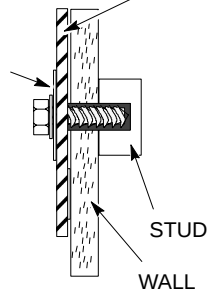
Figure 3-2: Securing Mounting Bracket to a Wall



PLACE SCREW THROUGH HOLES

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

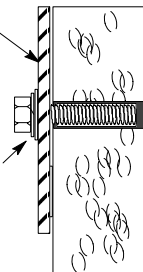
LAG SCREW



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



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.)] 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

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

Table 3-4: Required Tools and Materials for Pole Mounting

Table 3-4: Required Tools and Materials for Pole Mounting		
Hand Tools	Materials	Power Tools
Safety Glasses	MicroCell 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		

Attaching the Mounting Bracket to a Pole – continued

Procedure to Attach the Mounting Bracket to a Pole

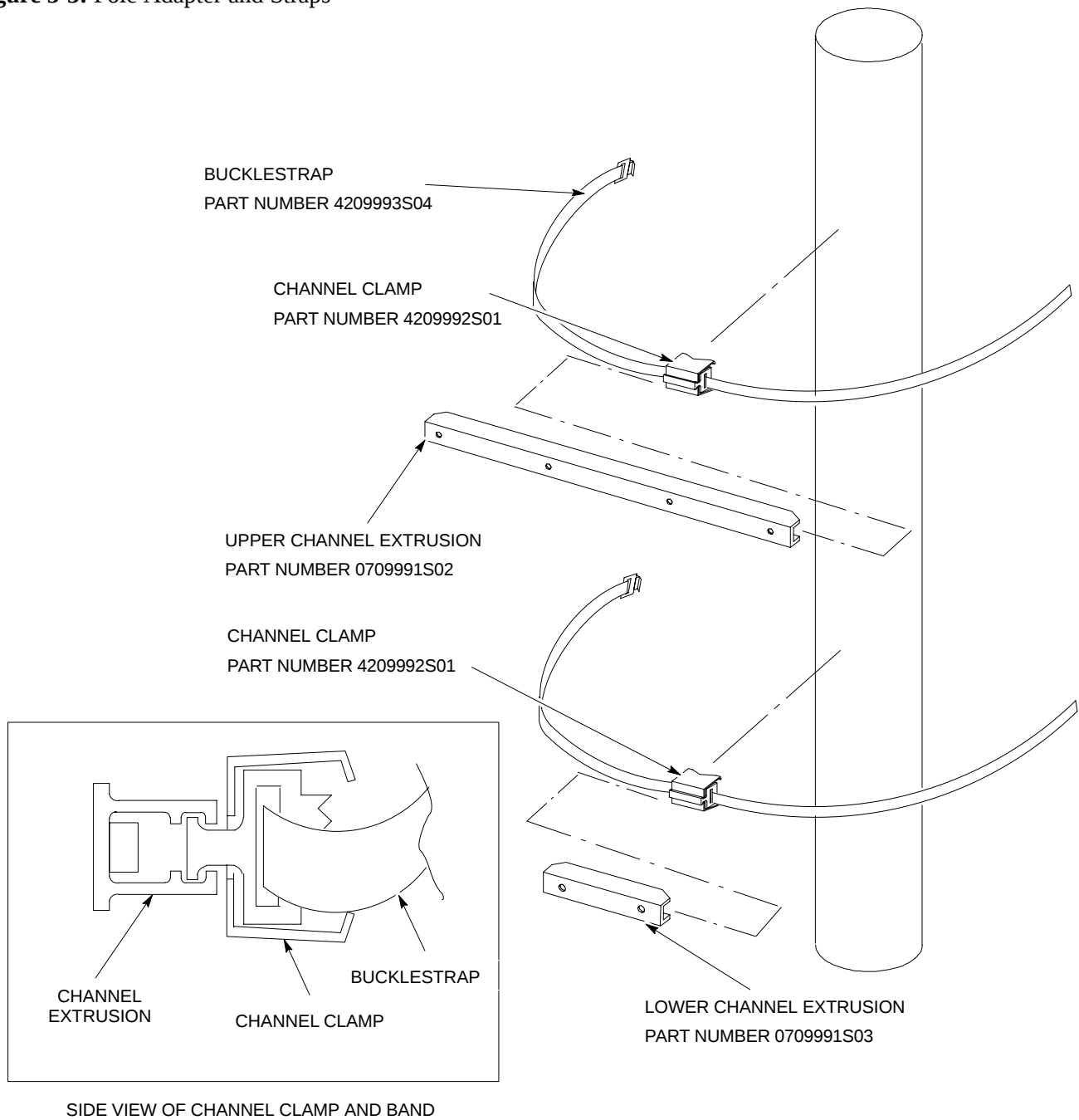
Follow the procedure in Table 3-5 to attach the mounting bracket to a pole.

Table 3-5: Procedure to Attach the Mounting Bracket to a Pole

Step	Action
1	Verify that the isolator pads are in place on the bracket.
5	Verify the safety of the installation location.
6	Place the bucklestrap through the channel clamp as shown in Figure 3-3.
7	Place the channel clamp and bucklestrap on the pole approximately where the upper portion of the BTS is to be located. See Figure 3-3.
8	Slide and center the upper channel extrusion on the channel clamp. See Figure 3-3.
9	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.
10	Start but do not tighten the lower channel extrusion to the mounting bracket. Use 2 M6x19 tamper-resistant screws.
11	Before you tighten the lower strap, attach the mounting bracket to the top channel extrusion.
12	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.
13	Secure the bucklestrap with the bucklestrap tool. Refer to the instructions included with the bucklestrap tool.
14	Use a T30 Torx tamper bit to tighten the six M6x19 screws to 5.0 N-m.
15	Center the channel clamp on to the lower extrusion.
16	Place the bucklestrap through the lower channel clamp.
17	Use the bucklestrap tool to secure the lower strap.

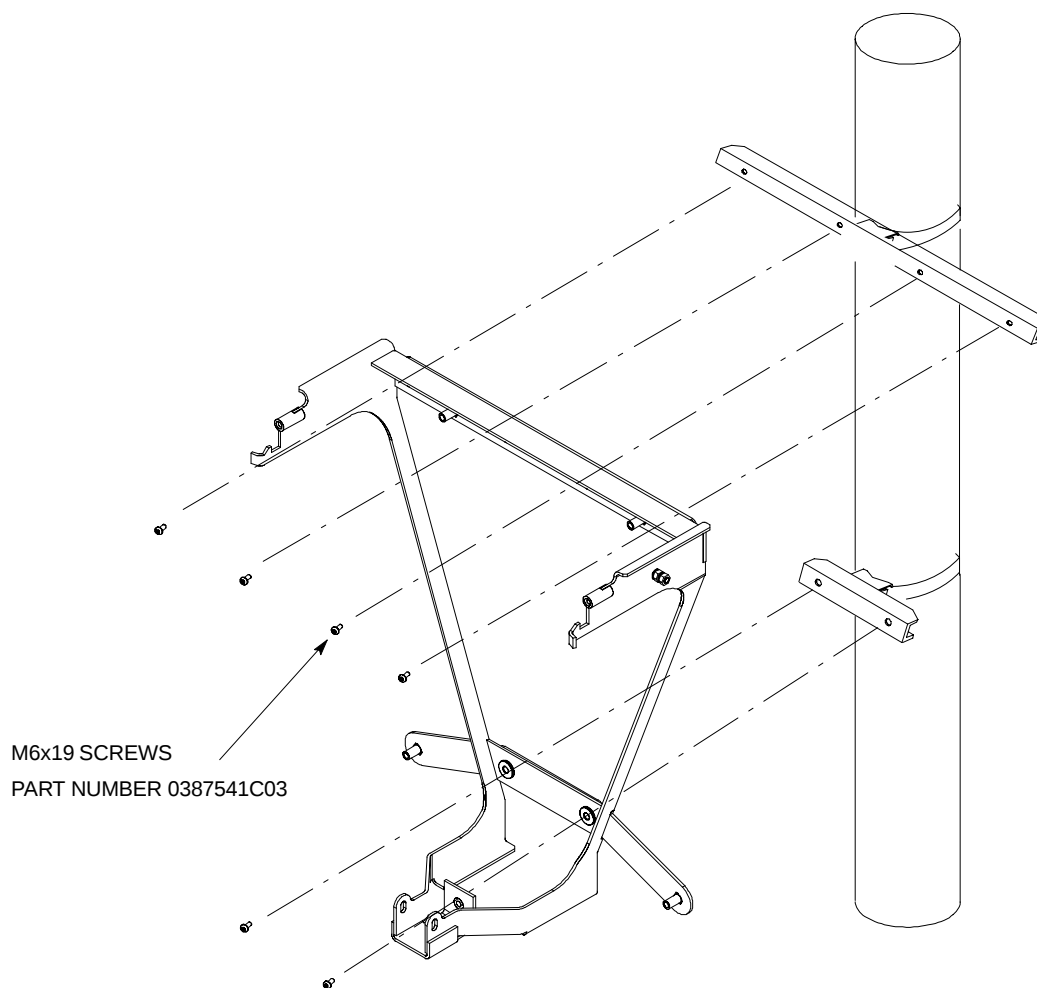
Attaching the Mounting Bracket to a Pole – continued

Figure 3-3: Pole Adapter and Straps



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Figure 3-4: 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.

Required Tools and Materials

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

Table 3-6: Required 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 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

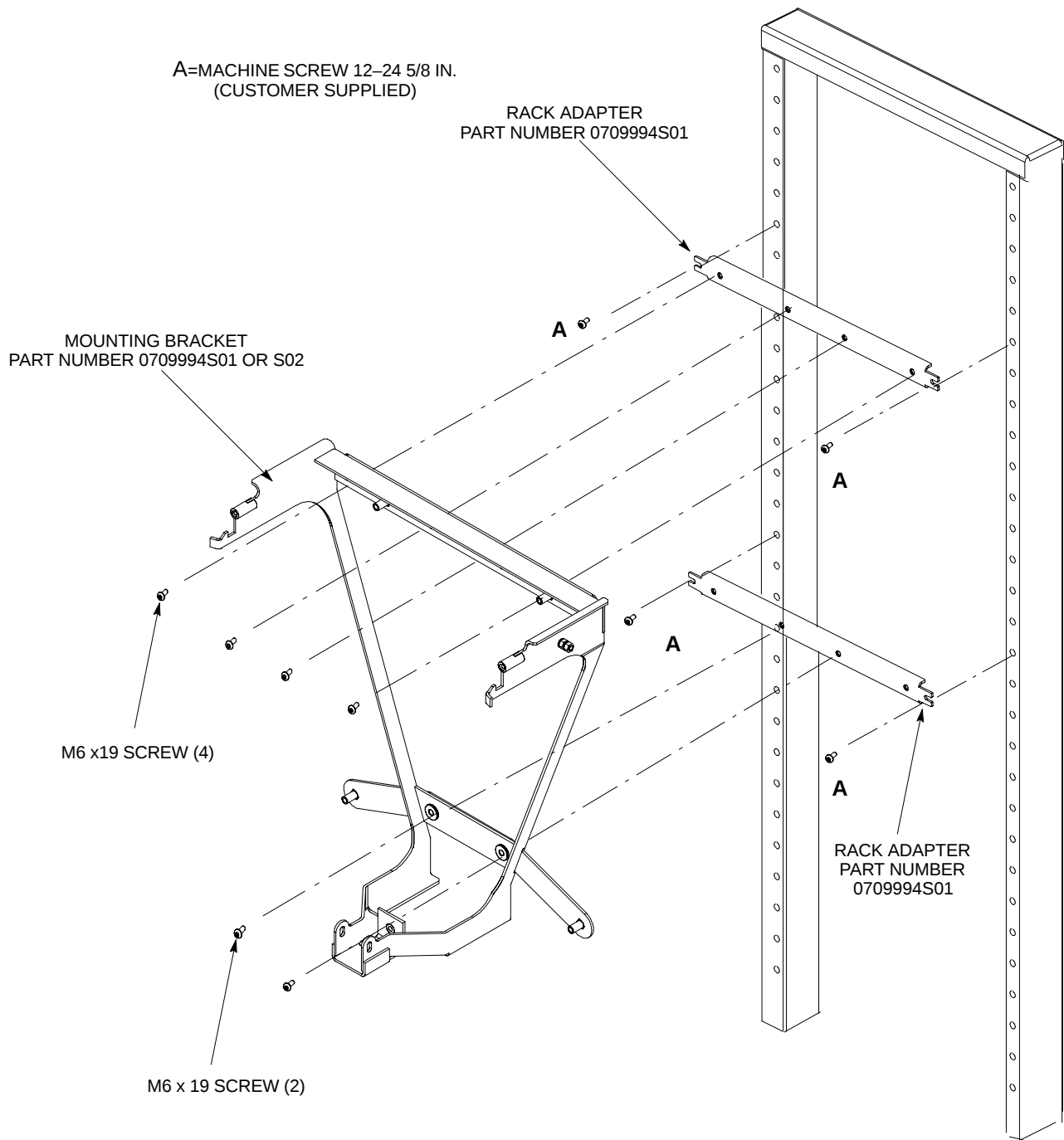
To attach the mounting bracket to a rack follow the procedure in Table 3-7.

Table 3-7: 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.
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 the Mounting Bracket to a Rack – continued

Figure 3-5: Attaching the Mounting Bracket to a Rack



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 and Materials

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

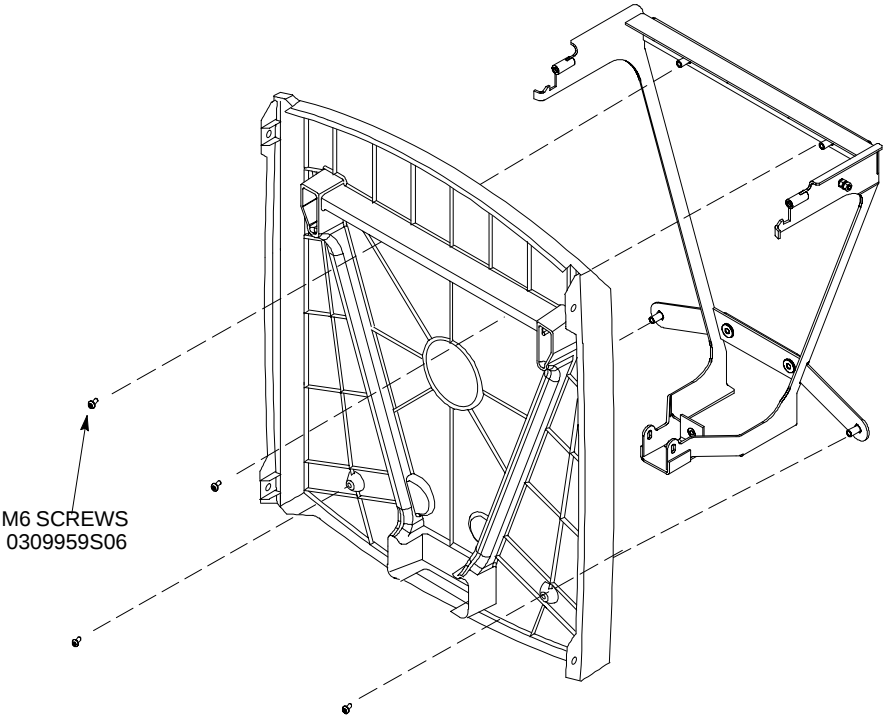
- Torque driver wrench, 1/4-in. hex female drive, 0–10 N–M
- T30 Torx bit

Procedure

Attach the back solar cover to the mounting bracket by following the procedure in Table 3-8 and the information in Figure 3-6.

Table 3-8: Procedure to Attach Back Solar Cover to Mounting Bracket	
Step	Action
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.

Figure 3-6: Attaching MicroCell Back Solar Cover to Mounting Bracket



Remote GPS Head Installation

Objective

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

Required Tools and Materials

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

RGPS Mounting Considerations

The RGPS Head requires specific mounting considerations in order to properly observe the GPS satellites.

- The mounting pipe for the RGPS head should be mounted vertically with less than five degrees (5°) of tilt.
- The RGPS head mounting hardware which comes with the RGPS head should be used in all installations. This mounting hardware properly isolates the painted metal base of the RGPS head from other conductive surfaces. If the metal base comes in contact with another conductive surface, the electrical surge resistance of the RGPS head can be significantly reduced leading to RGPS head failure.
 - If the supplier of the RGPS mounting hardware cannot be used, the installer **MUST** make certain that the metal base of the RGPS head does not make contact with any conductive surface.
- 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.
- The RGPS head must have a clear view of the sky, preferably to within ten degrees (10°) of the horizon in all directions. The total blockage of the sky (due to buildings, mountains, etc.) should be less than 50%.
- Place the RGPS head as far away from the BTS transmit antenna as possible to avoid RF interference issues.
- Place the RGPS head at least 15 m away from lightning rods, towers, or structures that attract lightning. RGPS head damage is usually not the result of a direct lightning strike, but of a lightning strike on a nearby structure. 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.
- After you power on the BTS, you can check the RGPS signal strengths with the **GPS_STATUS** command on the MMI port.
 - An optimal installation will have at least one satellite (SV) with an RSSI value ≥ 50 , and at least four (4) satellites with RSSI values ≥ 45 .
 - A minimal installation should have at least four (4) satellites with RSSI values ≥ 40 .

- The RGPS head is rated for ambient air temperatures from –40°C (–40°F) to 80°C (176°F), and has ratings for humidity, shock, waterproof, UV light resistance, vibrations, salt fog, ESD, EMI, and altitude.
- If you are designing a system to support a maximum of 12 daisy–chained BTS sites, the maximum cable length between the RGPS head and the first BTS is 600m (1968 ft.). The maximum cable length between each subsequent BTS in the chain is also 600m (1968 ft.). If a long cable run needs to be broken into pieces, minimize the number of breaks in the cable.
- If you are designing a system to support a maximum of 7 daisy–chained BTS sites, the maximum cable length between the RGPS head and the first BTS is 1km (3280 ft.). The maximum cable length between each subsequent BTS in the chain is also 1km (3280 ft.). If a long cable run needs to be broken into pieces, minimize the number of breaks in the cable.

Procedure to Install the RGPS Head

Table 3-9, Figure 3-7, and Figure 3-8 show the procedure for installing the RGPS head.



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 3-9: Procedure to Install the RGPS Head

Step	Action
1	Determine the mounting location.
2	△ WARNING The structure of the wall should be verified by a qualified structural engineer. Mounting the RGPS head and hardware to an inadequate wall structure and/or using inadequate installment methods can result in serious personal injury. Use the appropriate mounting bolts for the mounting surface and install the two wall mounting brackets. Refer to Figure 3-7.
3	Insert the RGPS cable (cable M) into the pipe.
4	Connect the 12 pin Deutsch connector of the RGPS unit cable to cable M. Refer to Figure 3-8. Tighten the spinning flange on the connector a quarter turn to secure the connection.
5	Insert the pipe into the threaded mount in the RGPS unit and carefully hand–tighten.
6	Place the assembly into the mounting brackets. Refer to Figure 3-7. Tighten the U–bolt clamps to secure the assembly.

Figure 3-7: Installing the Remote GPS Head

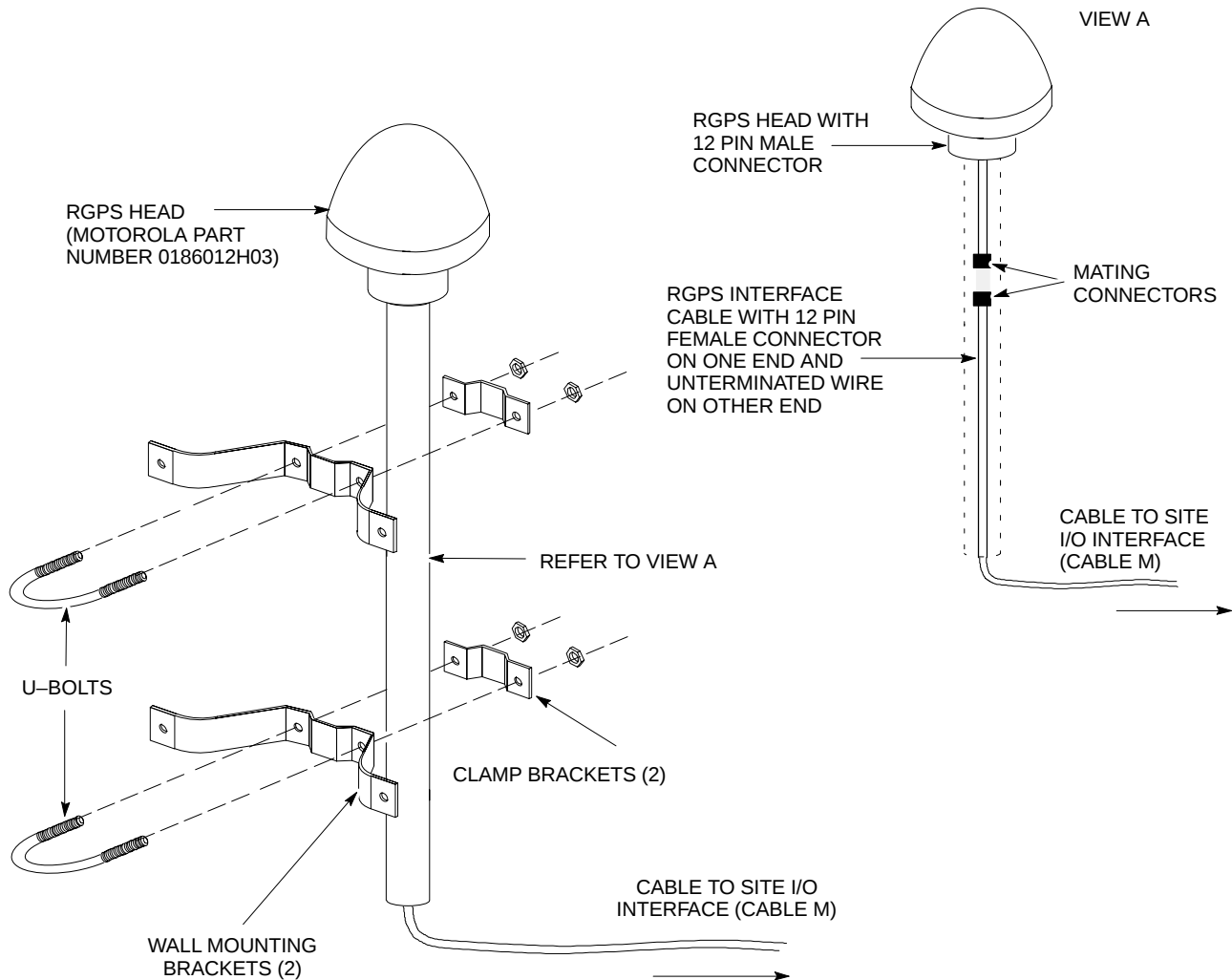
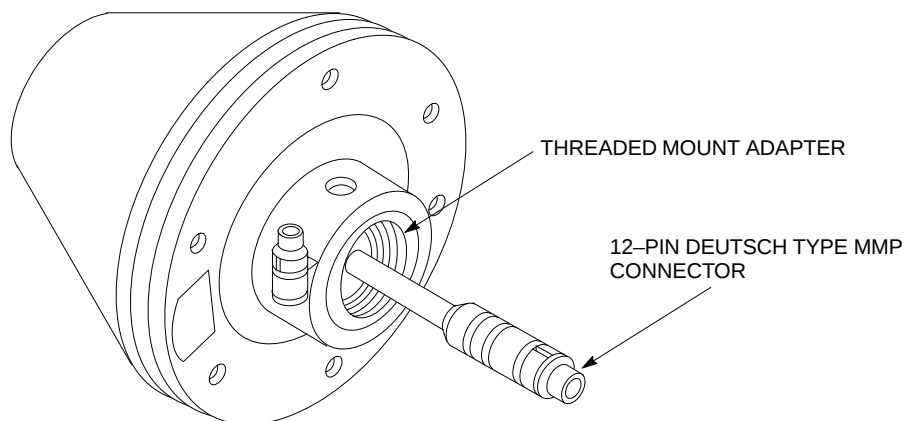


Figure 3-8: RGPS Head



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

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