



MOTOROLA

Networks

APPLICANT: MOTOROLA

FCC ID: IHET7GT1

Users Manual Exhibit

2.5GHz Diversity Access Point

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Contents

Access Point Hardware Installation

Revision History	2
Version Information	2
General information	2
Contacting Motorola	5
Errors	5
Questions and comments	5
24 hour support	5
Security Advice	6
Warnings and cautions	7
Failure to comply with warnings	7
Warnings.	7
Cautions	7
Notes	8
General Safety	9
Ground the equipment	9
Do not operate in an explosive atmosphere	9
Keep away from live circuits	9
Do not service or adjust alone	9
Use caution when exposing or handling the CRT.	10
Do not substitute parts or modify equipment	10
Potentially hazardous procedure warnings.	10
Devices sensitive to static	11
Special handling techniques	11
Caring for the environment	12
Disposal of Motorola Networks equipment in EU countries	12
Disposal of Motorola Networks equipment in non-EU countries	12
Third Party Computer Software and Trademarks	13
Computer Software	13
Trademarks	13
Motorola manual set	14
Ordering manuals and CD-ROMs	14
Manual banner definitions	14

Chapter 1: Introduction

Introduction	1-2
Overview.	1-2
Manual Order	1-2
Product Description	1-3
Recommended Documents	1-3
Abbreviations and Acronyms.	1-3
Tools and Materials	1-5

Introduction	1-5
Tools and Materials	1-5
Base Control Unit Hardware Identification	1-6
RF Head Hardware Identification	1-6
Access Point Equipment Identification	1-8
Introduction	1-8
BCU Hardware Identification	1-8
RF Head Hardware Identification	1-10

Chapter 2: Site Preparation

Site Preparation Overview	2-2
Overview	2-2
Installation	2-2
Site Manager	2-2
Verification and Procedures	2-2
Prepare Site for Equipment Arrival	2-3
Description	2-3
Equipment Arrival	2-3
Procedure to Prepare the Site for the Equipment	2-3
Shipping and Handling	2-4
Overview	2-4
How Equipment is Shipped	2-4
How Equipment Arrives	2-4
Unpacking	2-4
Recommended Tools	2-4
Unpacking Diagrams	2-5
Unpacking a Cardboard Container or Shrink Wrapped Shipment	2-7

Chapter 3: Cable Descriptions

Cable Descriptions	3-2
Overview	3-2
Configurations Supported	3-2
Cable Installation Order	3-2
Cable Labels	3-2
Cable Descriptions and Part Numbers	3-3
Cable Lengths	3-4
Earth Ground and Power Cables	3-5
Grounding Considerations	3-5
Power Considerations	3-5
DC Power (RF Head)	3-5
Antenna Cable	3-7
Objective	3-7
Cable Label	3-7
Antenna Cable Pin and Signal Information	3-7
Remote GPS Cable	3-8
Objective	3-8
Cable Label	3-8
RGPS Cables	3-8
Mounting Considerations	3-8
RF GPS Cable	3-10
Objective	3-10
Cable Label	3-10
Surge Protection	3-10
Mounting Considerations	3-10
Ethernet Cable	3-12
Objective	3-12

Cable Label 3-12
 Tools and Materials 3-12
 Fiber Optic Cable 3-13
 Objective. 3-13
 Cable Label 3-13
 Cable Description and Part Number 3-13
 Customer Defined Input/Output Cables 3-14
 Objective. 3-14
 Cable Label 3-14
 Cable Descriptions and Part Numbers 3-14
 Customer Defined Input and Output Connector Pinouts 3-15

Chapter 4: Access Point Hardware Installation

Installation Overview 4-2
 Overview. 4-2
 Procedure Order 4-2
 Installation Kits 4-3
 GPS Kits 4-4
 Connector Locations 4-5
 Base Control Unit Connector Locations 4-5
 RF Head Connector Locations 4-5
 Base Control Unit Installation 4-6
 Overview. 4-6
 BCU Compartments 4-6
 Electrical 4-8
 Battery Backup 4-9
 Dimension and Weight 4-9
 Conduit Sizes 4-9
 Tools and Materials 4-9
 BCU Mounting Bracket Assembly Installation 4-10
 BCU Mounting Bracket Assembly Procedure 4-11
 Installing the BCU 4-12
 Diversity Access Point (DAP) RF Head Assembly Installation 4-14
 Overview. 4-14
 DAP RF Head 4-14
 Electrical Requirements 4-14
 Dimensions and Weight 4-14
 Conduit Sizes 4-14
 Tools and Materials 4-15
 U-Bolt Specifications. 4-15
 RF Head Assembly Installation Procedure 4-16
 Ground Cabling Installation 4-20
 Objective. 4-20
 General Grounding Guidelines 4-20
 BCU Grounding 4-20
 RF Head Grounding 4-20
 DC Power Grounding 4-20
 Antenna Grounding 4-20
 RGPS Grounding. 4-21
 AC Power Cabling Installation 4-23
 Objective. 4-23
 AC Cable Description 4-23
 Tools Required 4-23
 AC Power Connection Procedure. 4-23
 RF Head DC Power Cabling Installation 4-25
 Objective. 4-25
 DC Cable Description 4-25

Tools Required	4-25
DC Power Cable Installation	4-25
Antenna Cabling Installation	4-27
Objective	4-27
Installing Antenna Cables	4-27
RGPS Cabling Installation	4-28
Objective	4-28
Cable Description	4-28
Tools Required	4-28
Cable Pinout	4-28
RGPS Installation	4-29
Connecting the RGPS Cable to Lightning Arrestor	4-31
RF GPS Cabling Installation	4-34
Objective	4-34
Tools and Materials	4-34
Cable Description	4-34
Installing RF GPS Antenna and Cable	4-34
Ethernet Cabling Installation	4-37
Objective	4-37
Cable Description	4-37
Installing Ethernet Cables	4-37
Fiber Optic Cabling Installation	4-38
Objective	4-38
Cable Description	4-38
Customer Input/Output Cabling Installation	4-39
Objective	4-39
Cable Descriptions	4-39
Customer Input and Output Connector Pinouts	4-39
Customer Defined Input/Output Cable Installation	4-39

Chapter 5: Optional Equipment

Optional Band Pass Filters	5-2
Overview	5-2
Filter Requirements	5-2
Motorola Stability Oscillator (MSO)	5-3
Overview	5-3

Chapter 6: What’s Next and Cleanup

What’s Next	6-2
Introduction	6-2
Clean Up Site	6-2
Fill Out Checklist	6-2
Optimize the System	6-2
Site Cleanup	6-3
Tools	6-3
Materials	6-3
Remove Debris	6-3
Environment	6-3
Installation Completion Checklist	6-4
Installation Completion Checklist	6-4
Directions	6-4
Installation Checklist	6-4

Appendix A: Alternate Installation Procedures

Manual RF Head Installation Procedures	A-2
--	-----

Overview A-2
DAP RF Head A-2
Electrical Requirements A-2
Dimensions and Weight A-2
Conduit Sizes A-2
Tools and Materials A-3
U-Bolt Specifications. A-3
RF Head Mounting Bracket Assembly Installation A-3
RF Head Mounting Bracket Assembly Procedure A-4
Installing the RF Head. A-5

List of Figures

Figure 1-1: BCU	1-6
Figure 1-2: RF Head	1-7
Figure 1-3: BCU Hardware	1-9
Figure 1-4: DAP RF Head Hardware	1-10
Figure 2-1: Shrink Wrapped Shipment.	2-5
Figure 2-2: Cardboard Shipping Container	2-6
Figure 3-1: Antenna Cable Detail	3-7
Figure 4-1: BCU Card Cage Compartment.	4-7
Figure 4-2: BCU Power and Customer Interface Compartment	4-8
Figure 4-3: BCU Pole Mounting Bracket Assembly.	4-10
Figure 4-4: U-Bolt Sizing.	4-16
Figure 4-5: RF Head Assembly.	4-17
Figure 4-6: Typical Outdoor Grounding Diagram	4-21
Figure 4-7: Typical Indoor Grounding Diagram	4-22
Figure 4-8: BCU AC Power Connection	4-24
Figure 4-9: Base Control Unit DC Power Connection	4-26
Figure 4-10: Connector Pins Numbering for Cables C and C1	4-28
Figure 4-11: RGPS Head.	4-30
Figure 4-12: Installing the Remote GPS Head	4-31
Figure 4-13: RGPS to Base Control Unit Connection Diagram	4-32
Figure 4-14: RGPS Lightning Arrestor Wiring	4-33
Figure 4-15: RF GPS Installation and Components Diagram	4-36
Figure 4-16: Ethernet Cable Connection.	4-37
Figure 4-17: Customer Defined Input and Output Connectors	4-39
Figure 5-1: Band Pass Filter	5-2
Figure 5-2: Filter Mounting	5-2
Figure A-1: U-Bolt Sizing	A-3
Figure A-2: RF Head Mounting Bracket Assembly	A-4
Figure A-3: RF Head Side Mounting Brackets and Solar Shield	A-8
Figure A-4: Antenna to Filter RF Cable Connection Diagram	A-9

List of Tables

Table 1: Manual version history	2
Table 1-1: Abbreviations and Acronyms	1-4
Table 1-2: Tools and Materials	1-5
Table 2-1: Recommended Unpacking Tools	2-5
Table 3-1: Cable Description and Part Numbers	3-3
Table 3-2: Cable Length Requirements	3-4
Table 3-3: RF Head DC Power Cable Description and Part Numbers	3-6
Table 3-4: Cable Description and Part Numbers	3-7
Table 3-5: Pin and Signal Information for Antenna Cable	3-7
Table 3-6: Cables Needed for RGPS Connections	3-8
Table 3-7: Local GPS Cable Description and Part Numbers	3-10
Table 3-8: Local GPS Antenna Mounting Considerations	3-11
Table 3-9: Fiber Optic Cable Description and Part Number	3-13
Table 3-10: Customer Defined I/O Cable Description and Part Numbers	3-14
Table 3-11: Customer Defined Input Connector Pins 1–4 and 5–8	3-15
Table 3-12: Customer Defined Input Connector Pins 9–12 and 13–16	3-15
Table 3-13: Customer Defined Output Connector Pins 1–2 and 3–4	3-16
Table 4-1: Conduit Types and Sizes	4-9
Table 4-2: Conduit Requirements	4-14
Table 4-3: DAP U-Bolt Sizing.	4-16
Table 4-4: Pinout for Cables C and C1	4-29
Table 6-1: Hardware Installation Checklist	6-5
Table A-1: Conduit Requirements	A-2
Table A-2: DAP U-Bolt Sizing.	A-3

List of Procedures

Procedure 2-1: Procedure to Prepare the Site for the BTS	2-3
Procedure 2-2: Unpacking Equipment from a Cardboard Container or Shrink Wrap	2-7
Procedure 2-3: Procedure to Remove Outdoor Equipment from Container.	2-7
Procedure 4-1: Procedure to Install Mounting Bracket Assembly on a Pole	4-11
Procedure 4-2: Procedure to Install the BCU	4-12
Procedure 4-3: Procedure to Install RF Head Assembly	4-17
Procedure 4-4: Procedure to Install AC Power Cable.	4-23
Procedure 4-5: Procedure to Install DC Power Cables	4-25
Procedure 4-6: Procedure for Installing the RGPS Head and Cabling	4-29
Procedure 4-7: Procedure for Installing RF GPS Antenna and Cabling.	4-34
Procedure 4-8: Procedure to Install Ethernet Cables	4-37
Procedure 4-9: Procedure to Install Fiber Optic Cables	4-38
Procedure 4-10: Procedure to Install the Customer Defined Input/Output Cables	4-39
Procedure A-1: Procedure to Install RF Head Main Support Bracket Assembly	A-4
Procedure A-2: Procedure to Install the RF Head	A-5
Procedure A-3: Procedure to Install Optional RF Filter	A-8

Access Point Hardware Installation

This manual contains general information and procedures for shipping and handling, site preparation, installation, and site clean up of the Access Point (AP) hardware.

Revision History

The following shows the issue status of this manual since it was first released.

Version Information

Table 1 Manual version history

Manual issue	Date of issue	Remarks
1	5/30/06	DRAFT
2	7/10/06	DRAFT Update 1
3	8/14/06	DRAFT Update 2
4	9/27/06	DRAFT Update 3
5	10/26/06	DRAFT Update 4

General information



NOTE

Motorola disclaims all liability whatsoever, implied or express, for any risk of damage, loss or reduction in system performance arising directly or indirectly out of the failure of the customer, or anyone acting on the customers behalf, to abide by the instructions, system parameters or recommendations made in this manual.

Purpose

Motorola cellular communications manuals are intended to instruct and assist personnel in the operation, installation and maintenance of the Motorola cellular infrastructure equipment and ancillary devices. It is recommended that all personnel engaged in such activities be properly trained by Motorola.



WARNING

Failure to comply with Motorola's operation, installation and maintenance instructions may, in exceptional circumstances, lead to serious injury or death.

These manuals are not intended to replace the system and equipment training offered by Motorola, although they can be used to supplement and enhance the knowledge gained through such training.

Cross references

Throughout this manual, references are made to external publications, chapter numbers and section names. The references to external publications are shown in italics. Chapter and section name cross references are emphasized in blue text in electronic versions. These are active links to the references.

This manual is divided into uniquely identified and numbered chapters that, in turn, are divided into sections. Sections are not numbered, but are individually named at the top of each page, and are listed in the table of contents.

Text conventions

The following conventions are used in the Motorola cellular infrastructure manuals to represent keyboard input text, screen output text and special key sequences.

Input

Characters typed in at the keyboard are shown like this.

Output

Messages, prompts, file listings, directories, utilities, and environmental variables that appear on the screen are shown like this.

Special key sequences

Special key sequences are represented as follows:

CTRL-c	Press the Control and c keys at the same time.
ALT-f	Press the Alt and f keys at the same time.
 	Press the pipe symbol key.
CR or RETURN	Press the Return key.

Contacting Motorola

Motorola appreciates feedback from the users of our manuals.

Errors

To report a documentation error, call the Customer Network Resolution Center (CNRC) and provide the following information to enable CNRC to open an Service Request (SR):

- the document type
- the manual title, part number, and revision character
- the page number(s) with the error
- a detailed description of the error and if possible the proposed solution

Questions and comments

Send questions and comments regarding user documentation to the email address below:
cdma.documentation@motorola.com

24 hour support

If you have problems regarding the operation of your equipment, please contact the Customer Network Resolution Center (CNRC) for immediate assistance. The 24 hour telephone numbers are listed at <https://mynetworksupport.motorola.com>. Select **Customer Network Resolution Center contact information**. For additional CNRC contact information, contact your Motorola account representative.

Security Advice

Motorola systems and equipment provide configurable security parameters to be set by the operator based on their particular operating environment. Motorola recommends setting and using these parameters following industry recognized security practices. Security aspects to be considered are protecting the confidentiality, integrity, and availability of information and assets. Assets include the ability to communicate, information about the nature of the communications, and information about the parties involved.

In certain instances Motorola makes specific recommendations regarding security practices, however the implementation of these recommendations and final responsibility for the security of the system lies with the operator of the system.

Please contact the Customer Network Resolution Center (CNRC) for assistance. The 24 hour telephone numbers are listed at <https://mynetworksupport.motorola.com/>. Select **Customer Network Resolution Center contact information**, from the menu located to the left of the Login box. Alternatively if you do not have access to CNRC or the internet, contact the Local Motorola Office.

Warnings and cautions

The following describes how warnings and cautions are used in this manual and in all manuals of this Motorola manual set.

Failure to comply with warnings

Observe all warnings during all phases of operation, installation and maintenance of the equipment described in the Motorola manuals. **Failure to comply with these warnings, or with specific warnings elsewhere in the Motorola manuals, or on the equipment itself, violates safety standards of design, manufacture and intended use of the equipment. Motorola assumes no liability for the customer's failure to comply with these requirements.**

Warnings

A definition and example follow below:

Definition of Warning

A warning is used to alert the reader to possible hazards that could cause loss of life, physical injury, or ill health. This includes hazards introduced during maintenance, for example, the use of adhesives and solvents, as well as those inherent in the equipment.

Example and format



WARNING

Do not look directly into fiber optic cables or data in/out connectors. Laser radiation can come from either the data in/out connectors or unterminated fiber optic cables connected to data in/out connectors.

Cautions

A definition and example follow below:

Definition of Caution

A caution means that there is a possibility of damage to systems, software or individual items of equipment within a system. However, this presents no danger to personnel.

Example and format



CAUTION

Do not use test equipment that is beyond its due calibration date; arrange for calibration to be carried out.

Notes

A definition and example follow below:

Definition of Note

A note means that there is a possibility of an undesirable situation or provides additional information to help the reader understand a topic or concept.

Example and format



NOTE

The UDR version number is configured at installation time by Motorola personnel and is not accessible by the customer.

General Safety

Ground the equipment

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.



NOTE

Refer to *Grounding Guideline for Cellular Radio Installations – 68P81150E62*.

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.

Use caution when exposing or handling the CRT

Breakage of the Cathode-Ray Tube (CRT) causes a high-velocity scattering of glass fragments (implosion). To prevent CRT implosion, avoid rough handling or jarring of the equipment. Only qualified maintenance personnel wearing approved safety mask and gloves should handle the CRT.

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.

Potentially hazardous procedure warnings

Warnings, such as the example below, precede potentially hazardous procedures throughout this manual. Instructions contained in the warnings must be followed. Employ all other safety precautions necessary for the operation of the equipment in the operating environment.



WARNING

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

Devices sensitive to static

Certain metal oxide semiconductor (MOS) devices embody in their design a thin layer of insulation that is susceptible to damage from electrostatic charge. Such a charge applied to the leads of the device could cause irreparable damage.

These charges can be built up on nylon overalls, by friction, by pushing the hands into high insulation packing material or by use of ungrounded soldering irons.

MOS devices are normally despatched from the manufacturers with the leads short circuited together, for example, by metal foil eyelets, wire strapping, or by inserting the leads into conductive plastic foam. Provided the leads are short circuited it is safe to handle the device.

Special handling techniques

In the event of one of these devices having to be replaced, observe the following precautions when handling the replacement:

- Always wear a ground strap which must be connected to the electrostatic point on the equipment.
- Leave the short circuit on the leads until the last moment. It may be necessary to replace the conductive foam by a piece of wire to enable the device to be fitted.
- Do not wear outer clothing made of nylon or similar man made material. A cotton overall is preferable.
- If possible work on an grounded metal surface or anti-static mat. Wipe insulated plastic work surfaces with an anti-static cloth before starting the operation.
- All metal tools should be used and when not in use they should be placed on an grounded surface.
- Take care when removing components connected to electrostatic sensitive devices. These components may be providing protection to the device.

When mounted onto printed circuit boards (PCBs), MOS devices are normally less susceptible to electrostatic damage. However PCBs should be handled with care, preferably by their edges and not by their tracks and pins, they should be transferred directly from their packing to the equipment (or the other way around) and never left exposed on the workbench.

Caring for the environment

The following information is provided to enable regulatory compliance with the European Union (EU) Directive *2002/96/EC Waste Electrical and Electronic Equipment (WEEE)* when using Motorola Networks equipment in EU countries.

Disposal of Motorola Networks equipment in EU countries

Please do not dispose of Motorola Networks equipment in landfill sites.

In the EU, Motorola Networks in conjunction with a recycling partner will ensure that equipment is collected and recycled according to the requirements of EU environmental law.

Please contact the Customer Network Resolution Center (CNRC) for assistance. The 24 hour telephone numbers are listed at <https://mynetworksupport.motorola.com/>. Select **Customer Network Resolution Center contact information**. Alternatively if you do not have access to CNRC or the internet, contact the Local Motorola Office.

Disposal of Motorola Networks equipment in non-EU countries

In non-EU countries, dispose of Motorola Networks equipment in accordance with national and regional regulations.

Table 1

Parameter	MPE Limits
	Frequency 2500 MHz
Maximum Gain	16 dBi
Distance	0.85 cm (33.5 in)

FCC Part 15 Requirements

Part 15.19a(3) - INFORMATION TO USER



NOTE

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



CAUTION

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

15.105(b) - INFORMATION TO USER

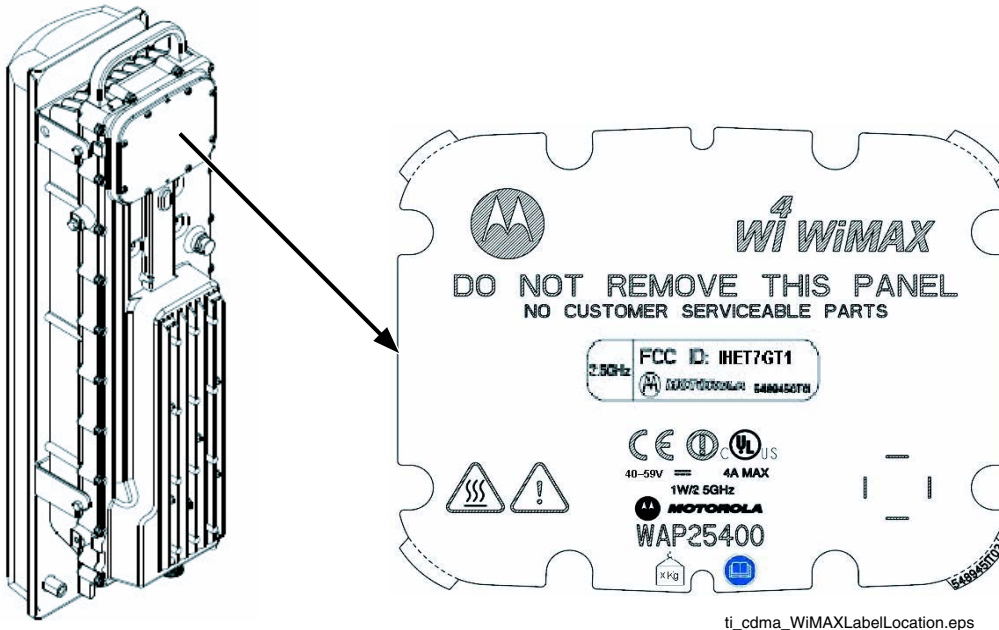


NOTE

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.
- 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.

Label and Location



ti_cdma_WiMAXLabelLocation.eps

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Motorola manual set

The Motorola manual sets provide the information needed to install, operate, and maintain the Motorola equipment.

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With internet access available, to view, download, or order manuals (original or revised), visit the Motorola Lifecycles Customer web page at <https://mynetworksupport.motorola.com/>, or contact your Motorola account representative.

Without internet access available, order hard copy manuals or CD-ROMs with your Motorola Local Office or Representative.

If Motorola changes the content of a manual after the original printing date, Motorola publishes a new version with the same part number but a different revision character.

Manual banner definitions

A banner (oversized text on the bottom of the page, for example, **PRELIMINARY**) indicates that some information contained in the manual is not yet approved for general customer use.

Introduction

Introduction

Overview

This document provides information pertaining to the hardware and cabling installation for the outdoor version of the Motorola Access Point (AP) Hardware.

Manual Order

The manual order outlines the content make up starting with Chapter 1 and continuing through Chapter X. After hardware installation has been completed, run the ATP for the system by following the procedures defined in Chapter Y of this manual.

Chapter 1 Overview - This is a brief outline of the manual. It also provides a list of additional documents and tools necessary to complete the procedures.

Chapter 2 Site Preparation - This chapter contains the information for site verification and shipping and handling of the hardware.

Chapter 3 Cable Descriptions — This chapter contains general information on the cabling available for the BCU and RF Head.

Chapter 4 Access Point Hardware Installation — This chapter contains general information and procedures for installing the Base Control Unit (BCU) and RF Head.

Chapter 5 Optional Equipment — This chapter contains general information and procedures for installing optional equipment.

Chapter 6 Access Point Hardware Operational check — This chapter contains general information and operational checkout procedures for pre and post installation of the BCU and RF Head.

Chapter 7 What's Next - This chapter contains general information and procedures for site clean up and installation checklist.

Product Description

The Access Point (AP) hardware is made up of two component assemblies: the BCU and the RF Head. The BCU contains the signal processing and interface hardware, and the RF Head contains the TX and RX components and BCU interface hardware.

Recommended Documents

The following documents may be required to assist in the installation of the AP Hardware.

- Grounding Guidelines for Cellular Radio Installations (Motorola part number 68P81150E62) or
 - Appendix C of Standards and Guidelines for Communication Sites
- Standards and Guidelines for Communication Sites
 - Hard copy (Motorola Part Number 6881089E50)
 - CD-ROM (Motorola Part Number 9882904Y01)
- 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).

Abbreviations and Acronyms

[Table 1-1](#) lists the uncommon abbreviations and acronyms that appear within the manual.

Table 1-1 Abbreviations and Acronyms

Term	Definition
AP	Access Point
BCU	Base Control Unit
CBC	Circuit Breaker Card
DAC	Direct Air Cooling
DAP	Diversity Access Point
PSU	Power Supply Unit
RFCU	RF Carrier Unit
TRX	Transmit/Receive RF Module

Tools and Materials

Introduction

Many of the tools and materials depend on the style of the wall or pole on which the mounting bracket is being installed. 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.

Tools and Materials

The tools and materials listed in [Table 1-2](#) are recommended to properly and safely perform the various installation procedures. Not all the tools will be used in all the procedures.

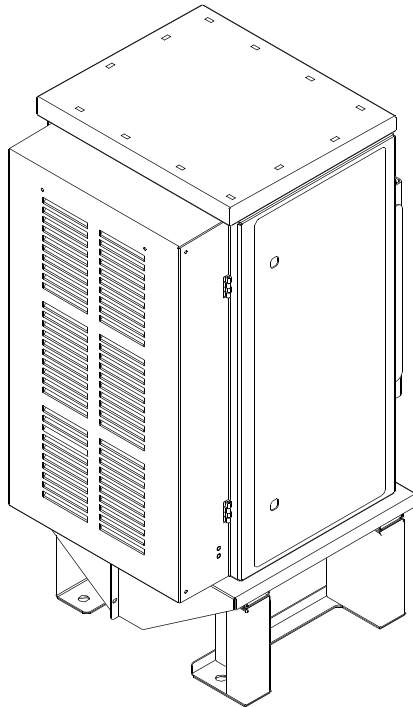
Table 1-2 Tools and Materials

Hand Tool	Materials	Purpose
Adjustable Torque ratchet and metric/standard socket set	Customer Supplied	For general torquing of bolts and nuts.
Cordless Power Drill, 1/4-in or 3/8-in drive	Appropriate wood and masonry drill bits (Standard set may be adequate) Customer Supplied	Drill holes in wood and light concrete
Bucklestrap Cutting Tool	(Motorola P/N 6604809N01)	For the pole mounting brackets
Tape Measure	Customer Supplied	General purpose measurement
Tin Snips	Customer Supplied	General purpose metal cutting
Safety Glasses	Customer Supplied	Eye Safety
Knife or Box Cutter	Customer Supplied	General purpose cutting
13/16 Breakaway Torque Wrench 38-in. lb	Customer Supplied	N Connectors
Block and Tackle	Customer Supplied	Raising the RF Head
No. 2 Blade Screw Driver	Customer Supplied	General Purpose
Electrical Tape	Customer Supplied	General Purpose
Adjustable Crescent Wrench	Customer Supplied	General Purpose
T30 Torx Screw Driver	Customer Supplied	General Purpose
Tie-Wraps	Customer Supplied	General Purpose, varying lengths.
Crimp Tool	Customer Supplied	Ground wires

Base Control Unit Hardware Identification

Figure 1-1 shows the BCU in an outdoor configuration.

Figure 1-1 BCU

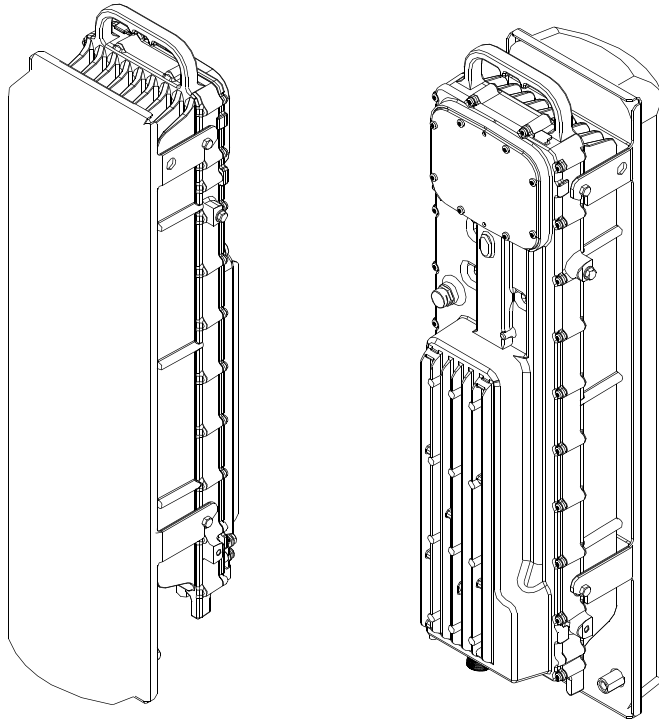


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RF Head Hardware Identification

Figure 1-2 shows the DAP RF Head hardware.

Figure 1-2 RF Head



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Access Point Equipment Identification

Introduction

The Base Control Unit (BCU) consists of one shelf of cards and modules within a metal enclosure. The BCU is powered by AC or DC voltage.

BCU Hardware Identification

Figure 1-3 displays the contents of the Base Control Unit (BCU). Except for the Mounting Bracket Assembly all the items shown are already installed in the BCU. The number of cards installed in the BCU card cage depends on the configuration that was ordered. Maximum number of cards in the BCU card cage is listed below:

- 1 — Alarms Card
- 1 — Circuit Breaker Card
- 4 — Modem Cards
- 2 — Controller Cards
- 3 — Power Supply Units

The I/O Panel is always installed and is located in the Customer Interface compartment.

Heater is usually necessary if unit is used in a cold climate.