soma
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External Radio Unit Installation Guide

Release 2.0

Part 002739A revision 00d

Revision History

Revision	Date	Changes Made
00a	January 15, 2003	Document created based on the Release 1.0 version (revision 00e) of the Booster Antenna Installation Guide.
00b	February 10, 2003	■ Comments from technical review incorporated
00c	February 14, 2003	■ Comments from editorial review incorporated ■ Removed references to use of a water pipe as the central building ground
00d	February 25, 2003	■ Product name changed to External Radio Unit (ERU) ■ Added legal disclaimer to front matter

SOMA Networks, Inc.
185 Berry Street
Suite 2000
San Francisco, CA 94107
U.S.A.
Phone +1.415.882.6500
Fax +1.415.882.6501

Important Notice

An improperly installed ERU may cause serious damage to you and/or your property or may even cause fatal injuries. The External Radio Unit Installation Guide has been developed and is intended for those individuals with experience in performing various installation tasks involving outdoor telecommunication devices. It is strongly recommended that the ERU be installed by those individuals who have experience, at a minimum, with the following tasks:

- Familiarity and ability to use a power drill and associated tools and devices to safely drill holes into the exterior and interior structures of a house
- Familiarity and ability to determine with a high degree of accuracy and precision the location of support studs, water pipes, electrical wiring, or heating, air conditioning or gas lines or conduits in the structure near where holes are being drilled in the house
- Familiarity and ability to route coaxial cables through walls, under floors and/or interior walls, and if necessary, to safely cut coaxial cables and incorporate any necessary weatherproofing techniques
- Familiarity with the National Electrical Code (NEC) (published by the National Fire Protection Association), the Canadian Electrical Code (CEC), or the electrical code of your country, to have sufficient ability to ground the ERU in accordance with the national electrical code recommendations at the time of the publication of the External Radio Unit Installation Guide

By undertaking to install the ERU by yourself, you are assuming full responsibility that your building and roof are structurally sound to support the load (including weight, wind, water and ice, in addition to your weight) in the process of installation of the ERU, that you are capable of sealing the installation against all leaks, that you have consulted with the latest applicable version of the national electrical codes of your country (NEC, CEC, or other) and that you have read and understood the contents of the External Radio Unit Installation Guide, including all safety precautions and alerts as provided at the beginning of, and throughout, the External Radio Unit Installation Guide. Any failure on your part to follow the safety precautions and alerts may cause serious injury, fatal injuries, damage to property and/or void any warranty provided by your service provider.

Before installing the ERU, you are advised to check the zoning codes, covenants and community restrictions that may be applicable in your area. Certain areas may prohibit the installation of devices such as the ERU.

SOMA Networks, Inc. will not accept and is not responsible or liable for any damages or injuries that may result from the installation of the ERU by you. If you are not in agreement with this notice, or do not have the experience necessary to install the ERU, please contact your telecommunications service provider for further instructions with regard to the proper installation of the ERU.

Preface

This document describes how to install the External Radio Unit (ERU), ground it, and connect it to the SOMAport.

Related Documentation

The following table lists the SOMA Networks consumer documents that cover SOMAport installation

Document	Description	Audience
SOMAport Setup Guide	Installation and maintenance guide for the SOMAport	Subscribers
SOMAport Quick Setup Card	Quick installation card	Subscribers

Conventions

This section outlines the conventions used in this guide.

Measurement Conventions

Measurements in this guide are expressed according to the Systeme International d'Unites standards for metric units and abbreviation. Equivalent Imperial measurements (used in the United States) are provided in parentheses, except when Imperial is the international standard.

Bits and bytes are not abbreviated, though their prefixes are; for example, "kbits" for kilobits, "Gbytes" for gigabytes.

Trademark Identification

The SOMAport™ subscriber device, a trademark of SOMA Networks, Inc., is referred to without notation in the rest of this document.

Tell Us How We Are Doing

If you have any feedback about this document, e-mail Technical Communications at SOMA Networks: **docs@somanetworks.com**.

Alerts used in this guide

WARNING: Where you see this symbol and the WARNING heading, strictly follow the instructions to avoid personal injury or damage to the product.

WARNING: Where you see this symbol and the WARNING heading, strictly follow the instructions to avoid electric shock.

Important Safety Instructions

For your safety and protection, read this entire guide before you attempt to install the External Radio Unit (ERU). In particular, read this safety section carefully. Keep this safety information where you can refer to it if necessary.

WARNING: One milliampere of current flowing through your body can kill you. Voltage as low as 15 volts can kill under the right conditions. Treat energized equipment with respect.

Heed warnings – Adhere to all warnings on the product and in the operating instructions.

Follow instructions – Follow all operating instructions.

Attachments – Do not use attachments unless recommended by SOMA Networks as they may cause hazards.

Power lines – Locate the ERU more than 6 m (20 feet) from overhead power lines, electric lights, or power circuits. When installing the ERU, do not touch (or allow the ERU or any cabling or ladder to touch) power lines, electric lights, and power circuits, as contact with them may be fatal. If any part of the ERU comes into contact with a power line, call your local power company. Do not try to remove it yourself.

Weather conditions – Do not install the ERU while it is raining, if there is threat of lightning, or if winds are over 40 km/h (25 miles per hour).

Outdoor grounding – Ground the ERU to prevent voltage surges and buildup of static charges. Follow Section 810 of the National Electric Code (NEC), which provides guidelines regarding proper grounding of the ERU and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna discharge unit, connection to grounding electrodes, and requirements for the grounding electrode. In Canada, follow Section 10 of the Canadian Electrical Code (CEC). For other countries, be sure to meet the requirements of the electrical codes of that country.

Grounding electrode system – Protect yourself and the equipment from shock and fire hazard by grounding the ERU according to guidelines in the following NEC articles:

- Article 250-53 provides guidelines for the grounding path to the grounding electrode.
- Article 250-81 provides guidelines for a ground electrode system.
- Article 250-83 provides guidelines for other individual grounding electrodes.

In Canada, follow Section 10 of the Canadian Electrical Code (CEC). For other countries, be sure to meet the requirements of the electrical codes of that country.

Coaxial cable – Use fire-resistant coaxial cable and comply with the guidelines in NEC 820-49, NEC 820-50, and NEC fire requirements. Cable should not be marked with voltage markings. Installation of the coaxial cable should also comply with NEC requirements.

Contents

Introduction

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Overview

The SOMAport has an internal antenna that provides sufficient levels of performance in most situations. However, certain subscribers may be located too far away from the nearest basestation to receive a strong radio frequency (RF) signal. When an antenna, such as the internal SOMAport antenna, is located inside a building, the signal is weakened because it has to penetrate the walls. This phenomenon is known as building penetration loss. With the External Radio Unit (ERU), the radio signals do not have to penetrate the building to reach the antenna as they do with the internal SOMAport antenna because the ERU is located outside. It is because the ERU incurs no building penetration loss that it is able to enhance the operational performance of the SOMAport.

The ERU connects to the SOMAport using a single coaxial cable and is powered through this cable. No additional power supply is needed.

The ERU contains no moving parts. It has non-line-of-sight functionality, and the antenna direction is automatically chosen to increase performance. Manual steering or pointing of the ERU is not required.

The ERU cannot be used as an antenna for other devices. It will not radiate unless it is connected to a SOMAport.

WARNING: The long-term characteristics or the possible physiological effects of RF electromagnetic fields on humans have not been investigated by Underwriters Laboratories (UL).

Antenna detection

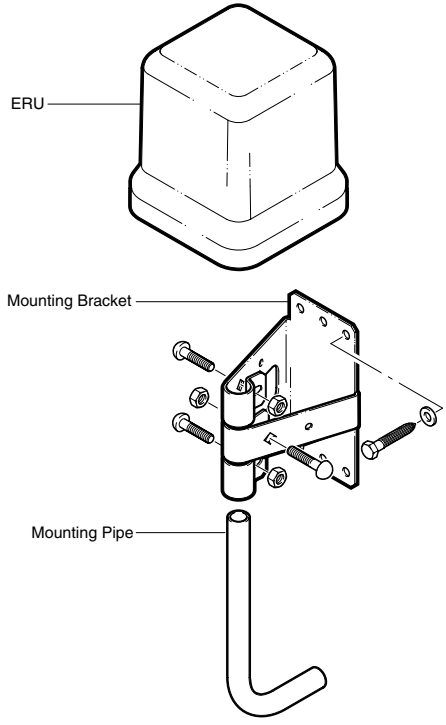
If, when the SOMAport is turned on, it detects that the ERU is connected, the SOMAport will use the ERU exclusively until the power to the SOMAport is turned off. If no ERU is detected, the SOMAport will use its own internal antenna until the SOMAport is turned off. The SOMAport decides whether to use its internal antenna or the ERU antenna each time the SOMAport is turned on, and does not change antennas until the SOMAport is turned off and back on again.

WARNING: Do not connect or disconnect the ERU cable while the SOMAport is on. +28V DC may be present, so attempting the connection or disconnection of the cable could result in personal injury. This will not damage the equipment, but may be dangerous. If the SOMAport (when first turned on) does not detect the ERU, the voltage through the ERU cable is turned off.

The ERU assembly

The following illustration shows the three main pieces that are shipped and that must be assembled as part of the installation.

- ERU
- Mounting bracket
- Mounting pipe



Do you have everything?

Before you begin, make sure you have everything you will need during the installation.

The basic ERU kit

Verify that the kit contains the following parts:

- ERU
- Mounting pipe
- Mounting bracket
- Four 5/16-inch x 2-inch lag screws
- Seven 5/16-inch flat washers
- Three 5/16-inch x 1-inch bolts

The installation kit

The installation kit is an optional set of mounting hardware provided for subscribers who want to install the antenna themselves. The kit contains the hardware you need to install the ERU on a variety of surfaces (wall, roof, and under the eaves). If you have this kit, verify that it contains the following parts:

- Ground block
- 22 m (75 feet) of hybrid RG-6/U coaxial cable with messengered #17 AWG copper-clad steel grounding wire
- 15 m (50 feet) of RG-6/U coaxial cable
- 7.6 m (25 feet) of #10 AWG copper grounding wire
- Oxide-inhibiting compound
- 10 cable clips
- One #10 washer-head screw

Materials and tools

In addition, you need the following materials and tools, which are not supplied with the basic ERU or installation kits:

- 13-mm (1/2-inch) socket wrench
- Pencil or chalk
- Carpenter's level
- Silicone sealant
- 11-mm (7/16-inch) open-end or box-end wrench or small adjustable wrench
- Electric drill with one of the following drill bits:
  - 3/16-inch wood drill bit (if installing on wood or a roof)
  - 1/2-inch masonry drill bit (if installing on concrete or brick)

Safety precautions

In addition to the safety instructions on page 7, follow these guidelines when installing the ERU:

- Carefully survey the job site before beginning the installation to locate secure handholds, dangerous conditions (such as power lines and weak roofs), and the safest and most convenient placements for ladders.
- Do not climb on a wet or icy roof.
- Do not attempt high installations on windy days.
- Use only the sturdiest commercial-grade ladders—those with wide, slip-preventive rungs and bases.
- Do not position ladders at an angle steeper than 70°. Steeper angles can cause a ladder to slip sideways.
- Dig the base of the ladder into the ground if possible.
- Do not place ladders on slate that is wet or hot.
- Wear rubber-soled, low-heeled shoes or boots.
- Wear a pair of durable but flexible protective gloves whenever they won't interfere with the installation process.
- Take care not to bump or bang the ERU against anything.
- Perform as many installation steps as possible on the ground.

WARNING: The ERU must not be used indoors. It must be mounted on a permanent outdoor structure.

WARNING: Do not connect any third-party devices to the ERU, ERU cable, or SOMAport F-connector. Damage may occur.

WARNING: The installer must keep a minimum distance of 25 cm from the antenna when it is active. The installation should be made to ensure a minimum of 25 cm separation from all persons who may come in close proximity to the antenna

INSTALLING THE ERU

This chapter describes how to install the ERU outdoors using a variety of mounting options. It also describes how to route and connect ground cables, ground the ERU, and connect it to the SOMAport. Be sure to read the important safety information in the front pages of this manual before beginning an installation.

Contents

Installation overview

Before you begin the installation, make sure you have the read the important notice on page 3 and the safety instructions on page 7.

Installation tasks

To install the ERU, you must carry out the following tasks in the specified order:

Step		See
1	Choose a site	page 21
2	Estimate cabling requirements	page 22
3	Assemble the mounting bracket and mounting pipe	page 24
4	Turn off the SOMAport	
5	Install the ERU on one of the following surfaces:	
	■ External wall with a wood or lap siding surface	page 30
	■ External wall with a brick or poured concrete surface	page 33
	■ External hollow or cinder block wall	page 36
	■ Under the eaves	page 38
	■ Rooftop	page 41
6	Attach the ERU to the mounting pipe	page 44
7	Route and ground the exterior cables	page 46
8	Route the cable into the building and connect it to the SOMAport	page 53

Installation guidelines and requirements

Guidelines

Follow these guidelines to optimize the received radio signal. The ERU works best when:

- Installed at the highest point possible
- Placed as far away as possible from obstructions, such as trees or tall buildings

Requirements

The installation must meet the following requirements:

- The ERU must not be used indoors. The ERU must be installed on an outdoor permanent structure such as a roof or an external wall.
- All four sides of the ERU must be unobstructed. Leave a clear zone of at least 6 cm (2.4 inches) around the ERU.
- The installed height of the ERU must be at least 3 m (10 feet) to ensure that it is safely out of reach. For example, if the ERU is installed on the side of a building, it should be at least 3 m (10 feet) off the ground. If installed on a rooftop that is accessible, the ERU must be at least 3 m (10 feet) above the rooftop.

WARNING: While this device is in operation, a separation distance of at least 25 cm must be maintained between the radiating antenna inside the ERU and the bodies of all persons exposed to the transmitter in order to meet the FCC RF exposure guidelines. Making changes to the antenna or the device is not permitted. Doing so may result in the installed system exceeding RF exposure requirements. This device must not be co-located or operated in conjunction with any other antenna or radio transmitter. Installers and end users must follow the installation instructions provided in this guide.

WARNING: Do not touch (or allow the ERU or any cabling or ladder to touch) power lines, electric lights, and power circuits, as contact with them may be fatal. Locate the ERU more than 6 m (20 feet) from overhead power lines. If any part of the ERU comes into contact with a power line, call your local power company. Do not try to remove it yourself.

Estimating cable requirements

Once you have selected the installation site, you must decide where you want the cable to enter the building and estimate how much cable you are going to need.

Cable restrictions

You must use RG-6/U coaxial cable to connect the ERU to the SOMAport. One coaxial cable runs from the ERU to a ground block. A second coaxial cable, which connects to the first at the ground block, runs to the SOMAport. The total length of the two coaxial cables must not exceed 45 m (150 feet). You cannot use a line amplifier.

To estimate how much cable is required

1. Identify where the SOMAport is located.
2. Locate the central building ground.

   The following ground points are acceptable:

   - Grounded metallic service raceway
   - Grounded electrical service panel enclosure
   - A 2.5-m (8-foot) grounding rod driven into the ground and bonded to the central building ground by #6 or heavier bonding wire
   - Grounded water pipe, if it complies with section 250.53[D] of the NEC, which requires new installations to verify the conductivity of the electrode and add a supplemental ground electrode
   - Other acceptable grounding electrodes that comply with sections 250 and 810 of the NEC, Section 10 of the CEC, or the electrical code of the country in which you are installing the ERU
3. Choose a location to mount the ground block.

   The ground block should be as close as possible to the point where the coaxial cable will enter the building.

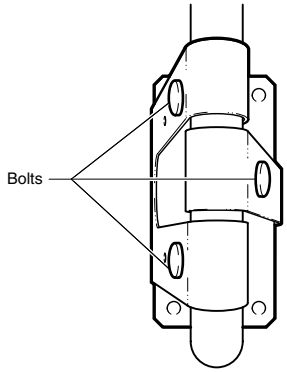
4 Estimate the amount of cable required for each of the following:

Cable run	Distance
One hybrid RG-6/U coaxial cable with messengered #17 AWG copper-clad steel grounding wire This cable, which has a grounding wire attached, runs from the ERU to the ground block.	_____
One RG-6/U coaxial cable This second piece of coaxial cable (no grounding wire attached) runs from the ground block to the SOMAport. The two pieces of coaxial cable connect at the ground block to create a continuous connection between the ERU and the SOMAport.	_____
One #10 AWG copper grounding wire This wire runs from the ground block to the central building ground.	_____

Assembling the mounting bracket and pipe

This section describes how to attach the mounting bracket to the mounting pipe. The recommended procedure is to attach the the bracket-and-pipe assembly to the mounting surface (wall, roof, or under the eaves) and then attach the ERU to the mounting pipe. This makes it easier to handle the assembly while attaching it to the mounting surface.

You will use three bolts to attach the mounting bracket to the mounting pipe. These bolts are inserted into the diamond-shaped holes on the mounting bracket as shown in the following illustration.



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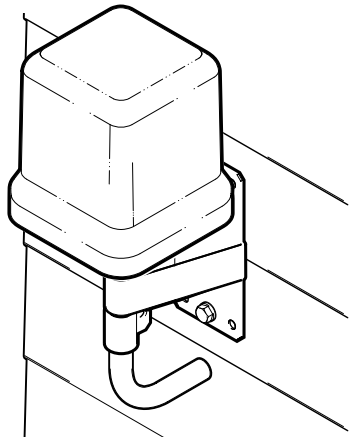
Tools and materials

Make sure you have the following items on hand before you begin.

Materials	Tools
Mounting bracket	11-mm (7/16-inch) open-end or box-end wrench or a small adjustable wrench
Mounting pipe	
3 bolts	
3 washers	
3 hex nuts	

Mounting options

The way in which you assemble the mounting bracket and mounting pipe depends on the mounting option you choose. The following table shows sample wall, rooftop, and under-the-eaves installations to illustrate how the parts must be assembled for each mounting option. The procedure on page 27 describes how to attach the mounting pipe to the mounting bracket for the various mounting options.

Option	Sample Installation
Wall	 00461

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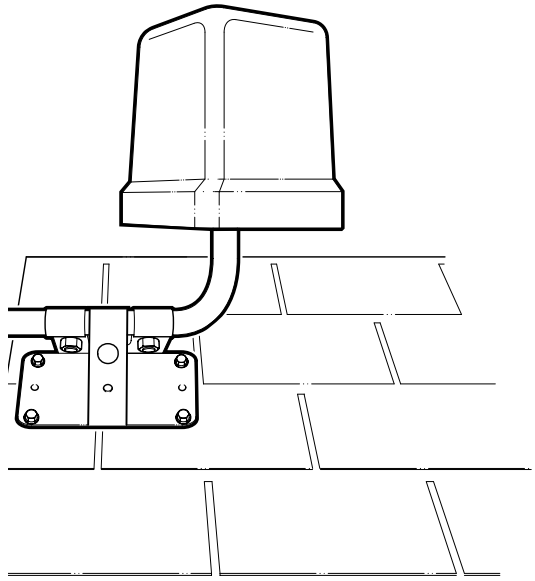
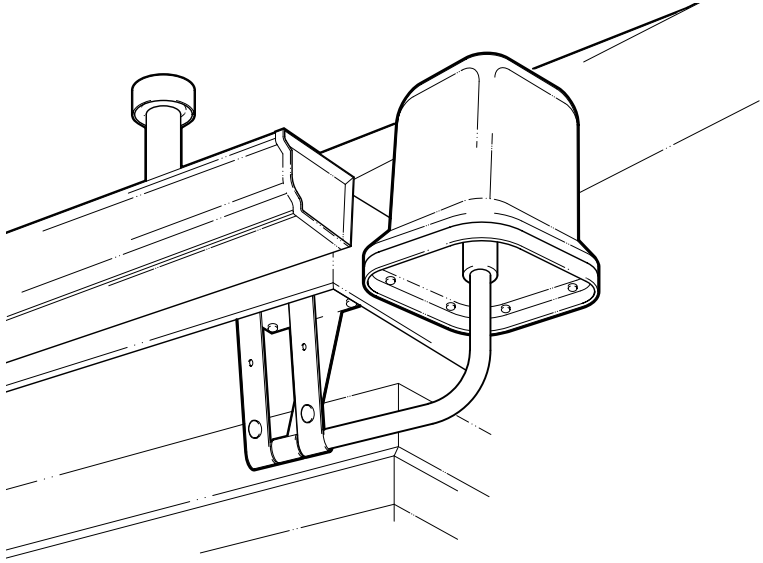
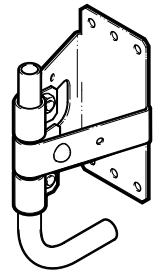
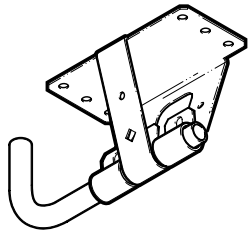
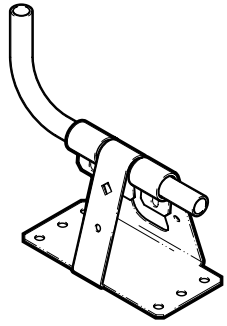
Option	Sample Installation
Rooftop	 00484
Under the eaves	 00476

To assemble the mounting bracket and pipe

1 Slide the mounting bracket over the long end of the mounting pipe and then assemble according to the mounting option you have chosen:

Option	Assembly
Wall	Position the bracket so that it is centered on the long end of the pipe. Make sure the bend in the pipe is oriented as shown below.  00464

Continued

Option	Assembly
Under the eaves	Position the bracket so that it is at the end of the pipe (as far from the bend in the pipe as possible). This will maximize the distance between the ERU and any obstructions, such as the eaves, wall, or roof. Make sure the bend in the pipe is oriented as shown below.  00482
Rooftop	Position the bracket so that it is centered on the long end of the pipe. Make sure the bend in the pipe is oriented as shown below.  00483

2 Insert a bolt into one of the three diamond-shaped holes in the mounting bracket and slide it through the hole on the other side.

3 Slide a washer over the bolt.

4 Twist a hex nut over the bolt and partially tighten it.

NOTE: Do not fully tighten the hex nut yet. You may need to adjust the orientation of the pipe.

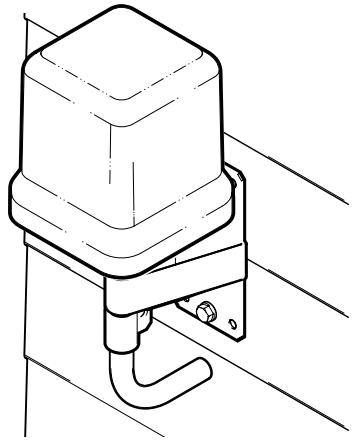
5 Repeat steps 2 to 4 for the other two holes.

6 Adjust the pipe orientation if necessary, and tighten all three hex nuts.

WARNING: Make sure the SOMAport is off before you install the ERU and connect any cables to it.

Installing the ERU on solid wood or lap siding

The following illustration shows an installation on an external wall with wood or lap siding.



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WARNING: Do not mount the ERU on any type of aluminum or vinyl siding or on any type of composite paneling, such as fiber board, particle board, or strand board. If the surface is made of wood, make sure it is structurally sound.

WARNING: Do not touch (or allow the ERU or any cabling or ladder to touch) power lines, electric lights, and power circuits, as contact with them may be fatal. Locate the ERU more than 6 m (20 feet) from overhead power lines. If any part of the ERU comes into contact with a power line, call your local power company. Do not try to remove it yourself.

Tools and materials

Make sure you have the following items on hand before you begin.

Materials	Tools
Two to four 5/16-inch x 2-inch lag screws	Electric drill with a 3/16-inch wood bit
Two to four 5/16-inch washers	Carpenter's level
	Screwdriver
	Hammer
	11-mm (7/16-inch) open-end or box-end wrench or a small adjustable wrench
	Pencil or chalk

To install the mounting assembly on a wall made of wood or lap siding

1. Locate the center of a stud if:
   - You are mounting the ERU on lap siding
   - You are mounting the ERU on wood siding that is less than 2.5 cm (1 inch) thick

   ATTENTION: Do not mount the ERU near the edge of a stud. Make sure you mount it on the center of a stud.
2. Hold the mounting bracket-and-pipe assembly in a position in which it's center line is centered on a stud or solid wood surface.
3. Use a level to verify that the center line of the mounting bracket is perfectly vertical.
4. Use a pencil or a piece of chalk to mark the position of the holes in the mounting bracket:
   - If you are installing the ERU on a stud, mark the locations of the two center holes, which are positioned over the stud.
   - If you are not installing the ERU on a stud, mark the positions of the four holes that are located in the four corners of the mounting bracket. Do not mark the center holes.
5. Remove the mounting bracket-and-pipe assembly.
6. Drill a 3/16-inch hole in each of the locations you marked.

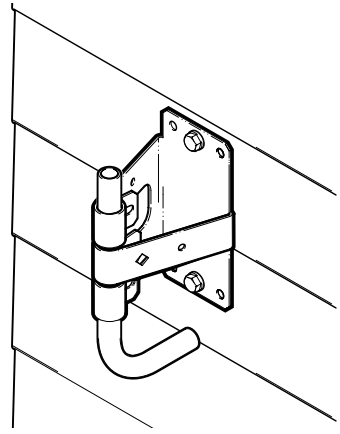
7 Hold the mounting bracket-and-pipe assembly over the holes so that the long end of the pipe points straight up.

8 If the mounting bracket spans two pieces of siding, use a spacer.

The mounting bracket should be positioned so that most of it is on the top board. A spacer should be installed to help hold the bottom of the mounting bracket in place. The spacer can be made of either solid wood or plastic.

9 Insert a 5/16-inch x 2-inch lag screw in each of the holes to attach the mounting bracket to the wall.

10 Tighten the screws to secure the mounting bracket-and-pipe assembly to the wall.



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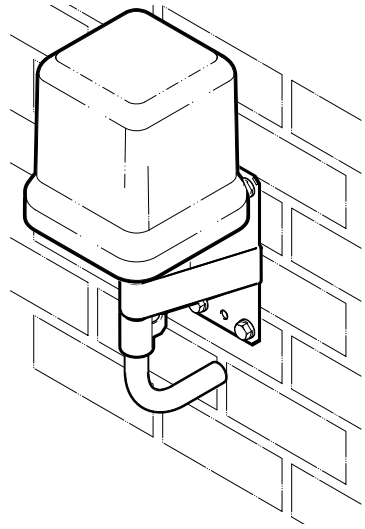
11 Attach the ERU to the mounting assembly as described in the section “Attaching the ERU to the mounting assembly” on page 44.

Installing the ERU on brick or poured concrete

The following illustration shows an installation on an external wall that is made of brick or poured concrete.



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This installation option requires the use of wall anchors, which must have a strength of at least 135 kgs (300 pounds) of pull-out pressure. B4015 or equivalent double-expansion anchors are recommended.

Tools and materials

Make sure you have the following items on hand before you begin.

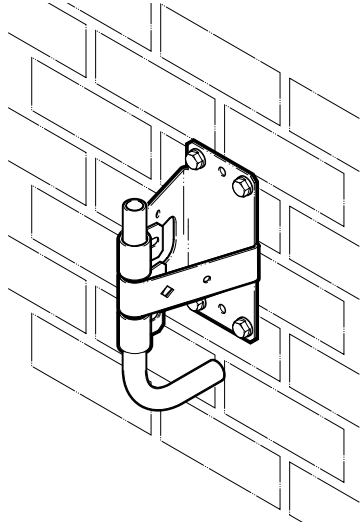
Materials	Tools
Four B4015 or equivalent double-expansion anchors	Electric drill with a 1/2-inch masonry bit
Four 1/4-inch -20 x 3-inch machine screws	Carpenter's level
	Screwdriver
	Hammer
	11-mm (7/16-inch) open-end or box-end wrench or a small adjustable wrench
	Pencil or chalk

To install the ERU on brick or poured concrete

1. Hold the mounting bracket-and-pipe assembly in position on the mounting surface.
2. Use a level to verify that the center line of the mounting bracket is perfectly vertical.
3. Use a pencil or a piece of chalk to mark the position of the four holes that are located in the four corners of the mounting bracket.
4. Remove the mounting bracket-and-pipe assembly.
5. Drill a 1/2-inch hole in each of the locations you marked.
6. Insert a double-expansion anchor in each hole.

7 Hold the mounting bracket-and-pipe assembly over the holes so that the long end of the mounting pipe points straight up.

8 Insert a 1/4-inch -20 x 3-inch machine screw in each of the holes to attach the mounting bracket to the wall.



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9 Tighten the screws to secure the mounting bracket-and-pipe assembly to the wall.

10 Attach the ERU to the mounting assembly as described in the section “Attaching the ERU to the mounting assembly” on page 44.

Installing the ERU on a cinder-block or hollow wall

Tools and materials

Make sure you have the following items on hand before you begin.

Materials	Tools
Four 1/4-inch -20 x 3-inch machine screws	Electric drill with a 1/2-inch masonry bit
Four BB (1/4-inch -20) or equivalent togglers	Carpenter's level
	Screwdriver
	Hammer
	11-mm (7/16-inch) open-end or box-end wrench or a small adjustable wrench
	Pencil or chalk

To install the ERU a hollow or cinder block wall

1. If you are installing the ERU on cinder block, you must install the togglers in the core of the block. To find the correct location on the block:
   i. Measure 19 cm (7.5 inches) from one side of the block.
   ii. Mark this location on the block.
2. Hold the mounting bracket-and-pipe assembly in position on the mounting surface (centered on the mark you made if installing the ERU on cinder block).
3. Use a level to verify that the center line of the mounting bracket is perfectly vertical.
4. Use a pencil or a piece of chalk to mark the positions of the four holes that are located in the four corners of the mounting bracket.
5. Remove the mounting bracket-and-pipe assembly.
6. Drill a 1/2-inch hole in each of the locations you marked.
7. Install the togglers:
   i. Fold one end of the metal channel along the plastic straps.
   ii. Hold the metal channel flat against the plastic straps and slide it through the hole.
   iii. Pull the ring so the metal channel rests flush behind the wall.

iv Hold the ring tight and slide the plastic cap along the straps until the cap is flush with the wall.

v Push the straps side to side to snap them off flush with the wall.

vi Repeat steps 7i to 7v for the other holes.

8 Hold the mounting bracket-and-pipe assembly over the holes so that the long end of the mounting pipe points straight up.

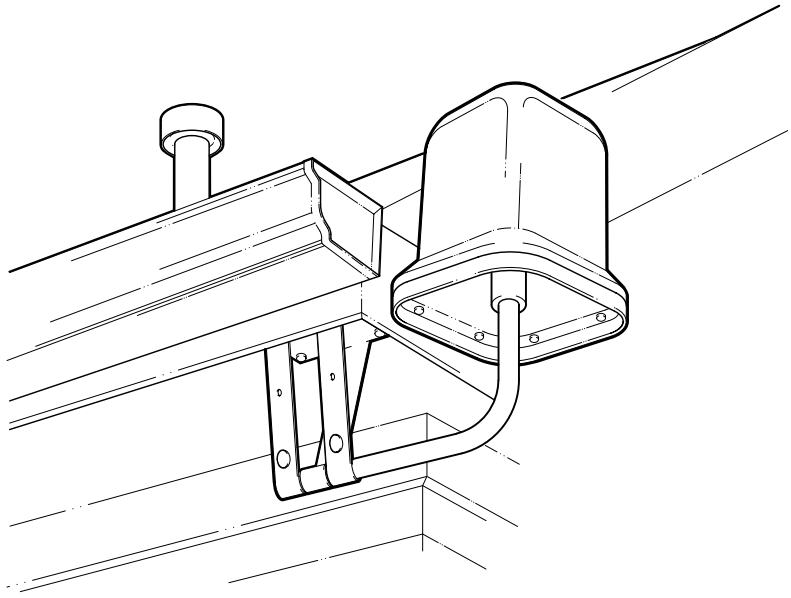
9 Insert a 1/4-inch -20 x 3-inch machine screw in each of the holes to attach the mounting bracket to the wall.

10 Tighten the screws to secure the mounting bracket-and-pipe assembly to the wall.

11 Attach the ERU to the mounting assembly as described in the section “Attaching the ERU to the mounting assembly” on page 44.

Installing the ERU under the eaves

The following illustration shows an under-the-eaves installation.



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Follow these guidelines when installing the ERU under the eaves:

- Make sure the wooden surface is structurally sound.
- Do not mount the ERU on any type of aluminum or vinyl.
- Do not mount the ERU on any type of composite material, such as fiber board, particle board, or strand board.
- Choose an alignment and pipe orientation that maximizes the distance between the ERU and any partial obstruction including walls, eaves, or roof. The clearance between the ERU body and any partial obstruction should be at least 6 cm (2.4 inches).

WARNING: Do not touch (or allow the ERU or any cabling or ladder to touch) power lines, electric lights, and power circuits, as contact with them may be fatal. Locate the ERU more than 6 m (20 feet) from overhead power lines. If any part of the ERU comes into contact with a power line, call your local power company. Do not try to remove it yourself.

Tools and materials

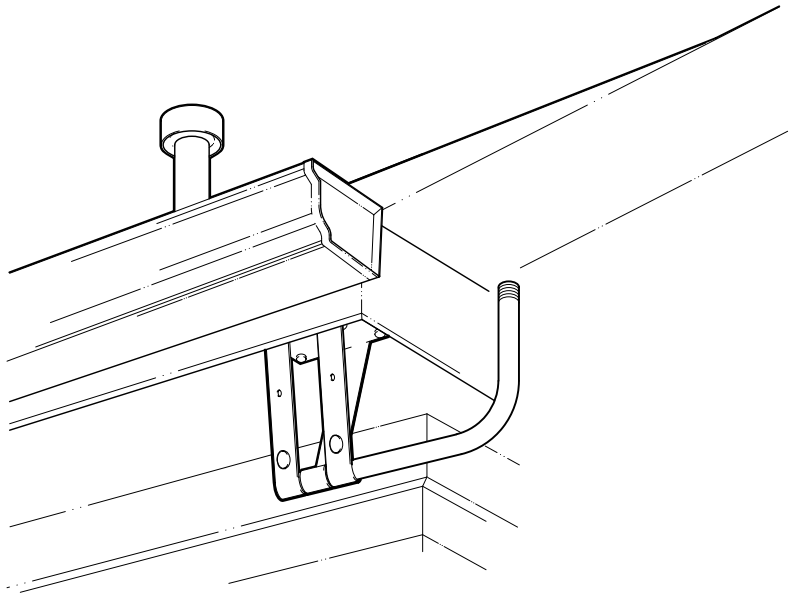
Make sure you have the following items on hand before you begin.

Materials	Tools
Four 5/16-inch x 2-inch lag screws	Electric drill with a 3/16-inch wood bit
Four 5/16-inch x 2-inch washers	Carpenter's level
	Screwdriver
	Hammer
	11-mm (7/16-inch) open-end or box-end wrench or a small adjustable wrench
	Pencil or chalk

To install the mounting assembly under wooden eaves

1. Hold the mounting bracket-and-pipe assembly in position.
2. Use a pencil or a piece of chalk to mark the positions of the four holes that are located in the four corners of the mounting bracket.
3. Remove the mounting bracket-and-pipe assembly.
4. Drill a 3/16-inch hole in each of the locations you marked.

5 Hold the mounting bracket-and-pipe assembly over the holes so that the short end of the mounting pipe points straight up.



00486

6 Insert a 5/16-inch x 2-inch lag screw in each of the holes to attach the mounting bracket.

7 Tighten the screws to secure the mounting bracket-and-pipe assembly under the eaves.

8 Use a level to see if the mounting pipe is pointing straight up.

If the pipe is not perfectly vertical:

i Use a wrench to loosen the three bolts that secure the mounting bracket to the pipe.

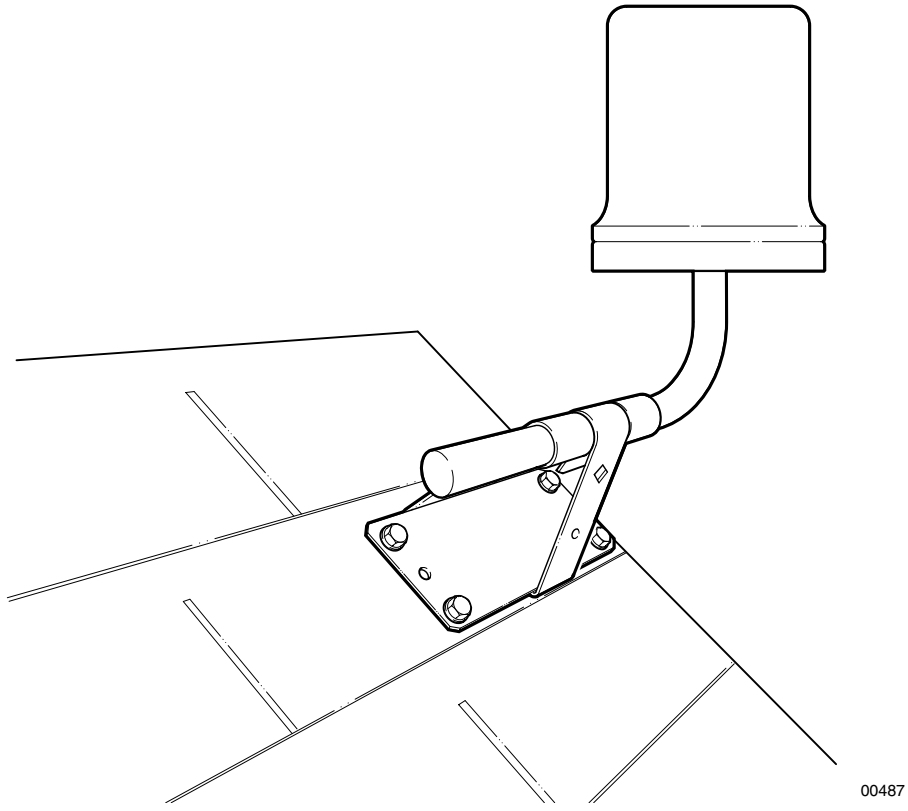
ii Grasp the mounting pipe and rotate it until the short end of the pipe is pointing up and is perfectly vertical.

iii Tighten the three bolts to hold the mounting pipe securely in a vertical position.

9 Attach the ERU to the mounting assembly as described in the section “Attaching the ERU to the mounting assembly” on page 44.

Installing the ERU on a roof

The following illustration shows a rooftop installation.



When installing the ERU on a roof, install it in the highest possible location to maximize the signal you receive.

ATTENTION: Under some conditions, walking on the roof can cause damage, and improperly sealed mounting holes can cause leaks. Use caution when installing the ERU on the roof.

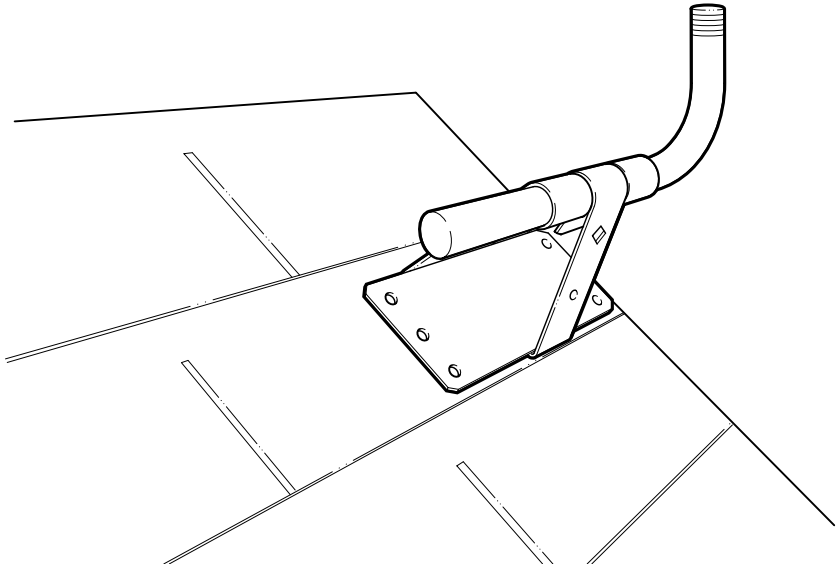
Tools and materials

Make sure you have the following items on hand before you begin.

Materials	Tools
Four 5/16-inch x 2-inch lag screws	Electric drill with a 3/16-inch bit
Four 5/16-inch flat washers	Carpenter's level
Silicone sealant	Screwdriver
	Hammer
	11-mm (7/16-inch) open-end or box-end wrench or a small adjustable wrench
	Pencil or chalk

To install the mounting assembly on a roof

1. Locate the center of a rafter where you want to place the mounting bracket-and-pipe assembly.
2. Hold the long end of the bracket base across a rafter so that it is perpendicular to, rather than parallel to, the centerline of the rafter.



3. Use a carpenter's level to make sure the center line of the bracket is perfectly horizontal.
4. Use a pencil or a piece of chalk to mark the positions of the four holes that are located in the four corners of the mounting bracket.
5. Remove the mounting bracket-and-pipe assembly.
6. Drill a 3/16-inch hole in each of the locations you marked.
7. Fill the holes you drilled with silicone sealant.
8. Hold the mounting bracket-and-pipe assembly over the holes.
9. Insert a 5/16-inch x 2-inch lag screw in each of the holes to attach the mounting bracket to the roof.
10. Tighten the screws to secure the mounting bracket-and-pipe assembly in place.
11. Use a level to see if the short end of the mounting pipe is pointing straight up.

    If it is not perfectly vertical:

    i. Use a wrench to loosen the three bolts that secure the mounting bracket to the pipe.

    ii. Grasp the mounting pipe and rotate it until the short end of the pipe is pointing up and is perfectly vertical.

    iii. Tighten the three bolts to hold the mounting pipe securely in a vertical position.

12. Seal the mounting bracket with roof sealant.
13. Attach the ERU to the mounting assembly as described in the section "Attaching the ERU to the mounting assembly" on page 44.

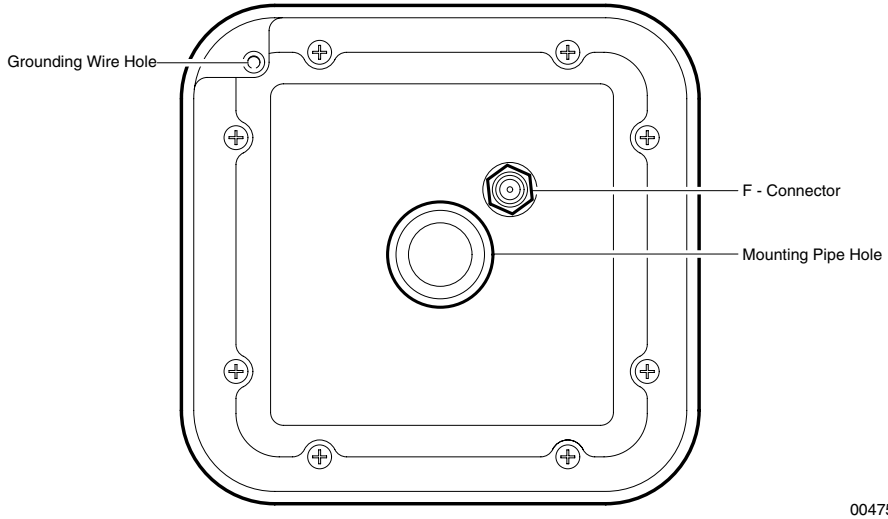
Attaching the ERU to the mounting assembly

Once the mounting bracket-and-pipe assembly is securely attached to the mounting surface and the mounting pipe is pointing straight up, you can attach the ERU to the mounting assembly.

At this point you should also attach the coaxial cable and grounding wire to the base of the ERU in preparation for the grounding procedure that follows.

The ERU base

The mounting pipe, coaxial cable, and grounding wire are attached to the base of the ERU, as described in this section.



Tools and materials

Make sure you have the following items on hand before you begin.

Materials	Tools
ERU	Screwdriver
Hybrid RG-6/U coaxial cable with messengered #17 AWG grounding wire	
Oxide-inhibiting compound	
One #10 washer-head screw	

To attach the ERU to the mounting pipe

1. Attach the ERU to the mounting pipe by sliding the hole on its base over the mounting pipe.
2. Turn the ERU in a clockwise direction to tighten it.

To attach the coaxial cable and grounding wire to the ERU

1. Insert one end of the hybrid RG-6/U coaxial cable into the F-connector on the base of the ERU and secure it.
2. Form the end of the attached grounding wire into a loop (creating a “P” shape) and hold it over the grounding wire hole in one of the corners of the ERU base.
3. Put some oxide-inhibiting compound on the P-shaped end of the grounding wire and in the grounding wire hole.
4. Insert a #10 washer-head screw through the loop and slide it into the grounding wire hole.
5. Tighten the screw until the grounding wire is securely fastened.

Routing and grounding the exterior cables

Grounding the ERU to the central building ground helps protect it and the SOMAport from lightning damage.

> **ATTENTION:** You may be able to ground the ERU yourself. However, if you are not completely sure of what is required, contact a qualified electrician. Grounding is important and must be completed correctly.

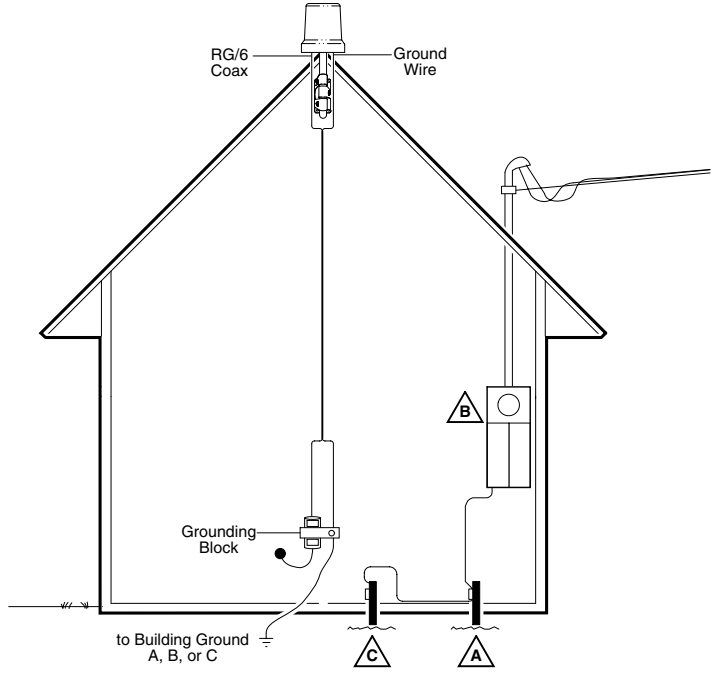
Proper grounding involves:

- Attaching the ground block to the wall and grounding it
- Connecting the coaxial cable and grounding wire that are attached to the ERU (as performed in the previous procedure) to the ground block
- Routing the coaxial cable from the outside to the inside of the building
- Connecting the coaxial cable to the SOMAport

WARNING: The coaxial cable carries a variety of radio signals, supply voltages, and control signals specific to the SOMAport. Do not connect the coaxial cable to any other equipment such as cable or satellite television equipment, or duplex or splitter boxes.

Electrical code compliance

The ERU must be grounded in accordance with Section 810 of the National Electrical Code (NEC), Section 10 of the Canadian Electrical Code (CEC), or the electrical code of the country in which you are installing the ERU. The following illustration, which is not to scale, depicts the grounding requirements. Grounding options A to C are described on page 48.



CAUTION: It is extremely important to ground the ERU and the coaxial cable to a single point in the central building ground. A nearby lightning strike can easily damage the ERU, the SOMAport, and any attached equipment. Connecting both wires to the same point in the central building ground meets code requirements and provides the best protection for your equipment.

Choosing a location for the ground block

The coaxial cable from the ERU attaches to your building at the ground block. The ground block must be located as close as is practical to the point where the cable enters the building, preferably outside the building.

WARNING: Do not mount the ground block directly on flammable material, such as lap, wood, or vinyl siding. Install a heat-resistant barrier, such as a piece of metal, between a flammable mounting surface and the ground block. Alternatively, install the ground block on the foundation wall, below any siding.

WARNING: Do not mount the ground block on material that is not solid, such as aluminum siding.

Choosing a building ground

The building ground wire must be terminated at one of the building grounds described below. The three options (A through C) are illustrated on page 47.

NOTE: You can use option A or B if the grounding point is within 6 m (20 feet) of the ground block. Otherwise, use option C.

Option	Termination Point	Description
A	Electrical service grounding rod or raceway	Any point on the existing electrical service raceway or grounding rod, which is typically located below the service panel
B	Electrical service panel enclosure	A predrilled hole on the service panel enclosure can be used to attach the grounding wire using a suitable listed ground lug
C	Grounding rod	A grounding rod that is UL-listed, copper-clad or made of non-corrosive material. The rod must be at least 2.5-m (8-feet) tall and 1.25 cm (0.5 inches) in diameter. The grounding rod should be driven into the ground within 6 m (20 feet) of the ground block and must be attached to the block with #10 AWG copper grounding wire. This rod must also be attached (bonded) to one of the building grounds (A or B) with a #6 AWG bond wire. A suitable, listed pressure lug must be used. Damp soil is preferable to dry soil and clay soil is preferable to sandy soil. If you live in an extremely dry or desert climate, refer to local electrical codes, which may be stricter than national codes.

A water pipe by itself is not an acceptable building ground. It is acceptable only if supplemented with a grounding rod and bonded to the central building ground with a #6 AWG bond wire.

Mobile homes

For mobile homes, the electrical service panel or, if the service panel is inside the trailer, the main electrical disconnect (the emergency disconnect switch outside the trailer), must be within sight of and within 9 m (30 feet) of one of the mobile home's walls. If none of the above-mentioned grounds are available, or if the distance is greater than 9 m (30 feet), a 2.5-m (8-foot) grounding rod must be driven into the ground as close as possible to the ground block. The grounding rod must be bonded to the metal frame of the mobile home, or to a ground terminal with a #12 AWG copper bond wire.

Burying the cable

Depending on the location of the ERU and the ground block, you may choose to route the coaxial cable underground.

If you choose to bury the coaxial cable, pay special attention to the cable type. When normal coaxial cable is buried, its outer cover decays in the soil, and the cable's life is shortened. Cables that are suitable for burial have a special outer cover that resists breakdown. Some of these cables also have a special coating on their ground shields. This coating resists corrosion if water gets into the cable.

Protecting the cable from damage

If you are routing the cable above the ground, use cable clips to secure it to a wall or surface. Make sure you route the cable in an area where people or animals are not likely to come in contact with the cable.

Prevent moisture penetration by using weatherproof connectors or by sealing any connection that is exposed to the elements. Drip loops provide additional protection by preventing moisture from traveling down the cable and entering the connection.

Tools and materials

Make sure you have the following items on hand before you begin.

Materials	Tools
Ground block and necessary hardware	Screwdriver
#10 AWG copper grounding wire	Hammer
Hybrid RG-6/U coaxial cable with messengered #17 AWG grounding wire	
Oxide-inhibiting compound	

ATTENTION: The #10 AWG copper grounding wire must be a single, whole piece of wire. Never splice two wires for the grounding wire. If you cut the grounding wire too short, break it, or destroy its integrity, it becomes unusable and you must replace it with a single length of wire.

To install the coaxial cable and grounding wire between the ERU and the ground block

1. Attach the ground block to the side of the building close to the point you have chosen as the entry point for the RG-6/U coaxial cable.

   ATTENTION: The United States National Electrical Code (NEC) and the Canadian Electrical Code (CEC) specify that coaxial cable that is exposed to lightning must be connected to the grounding system of the building as close to the point of cable entry as possible.

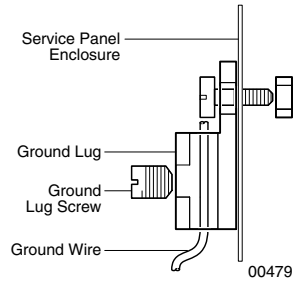
   You may have to use anchors, togglers, or wood screws, depending on the surface on which you are mounting the ground block.

2. Route the RG-6/U coaxial cable and messengered grounding wire that you connected to the ERU to the ground block.
3. Make a drip loop of 8–13 cm (3–5 inches) using cable clips at the ground block as shown below.

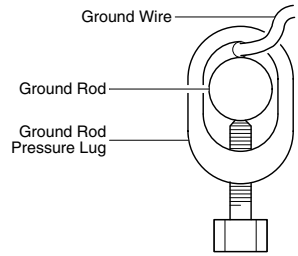
   This will prevent water from running into the connection at the ground block and keep water from running into the wall.

4. Attach the two grounding wires (the #17 AWG wire that is attached to the coaxial cable that runs from the ERU and the #10 AWG wire that you will run to the building ground in the next step) to the ground block by running them through the wire hole in the ground block and tightening the screw.

5 Route the #10 AWG wire and connect it to the central building ground point you selected by following the appropriate procedure in the following table.

Building Ground	Procedure
Electrical service grounding rod or raceway	TBD - need an illustration and procedure
Electrical service panel enclosure	**NOTE:** If there is no pre-drilled hole in the service panel enclosure use a different building ground.  **ATTENTION:** Both sides of the metal through which the fastening screw passes should be visible and well away from any energized parts, bus bars, or wires. **1** Turn off the power: ■ If there is a main switch at the service panel, use it to cut off all power. ■ If there is no main switch, turn off all the circuit breakers. **2** Secure the ground lug to the service panel enclosure using a screw that is appropriate for your ground lug. **3** Insert the #10 AWG grounding wire through the wire hole in the ground lug. **4** Insert the ground lug screw into the ground lug hole and tighten it to secure the grounding wire in place.

Continued

Building Ground	Procedure
Grounding rod	**1** Drive the grounding rod into the earth within 6 m (20 feet) of the ground block. **NOTE:** No more than 15 cm (6 inches) of the rod should be above the earth. **2** Slide the pressure lug over the top of the grounding rod.  00478 **3** Insert the #10 AWG grounding wire that runs from the ground block between the grounding rod and the pressure lug. **4** Insert a #6 AWG bond wire between the grounding rod and the pressure lug. **5** Insert the lug screw through the hole in the pressure lug. **6** Tighten the screw to hold the wires securely in place. **7** Attach the other end of the #6 AWG bond wire to one of the other building grounds (A or B) with the appropriate connector.

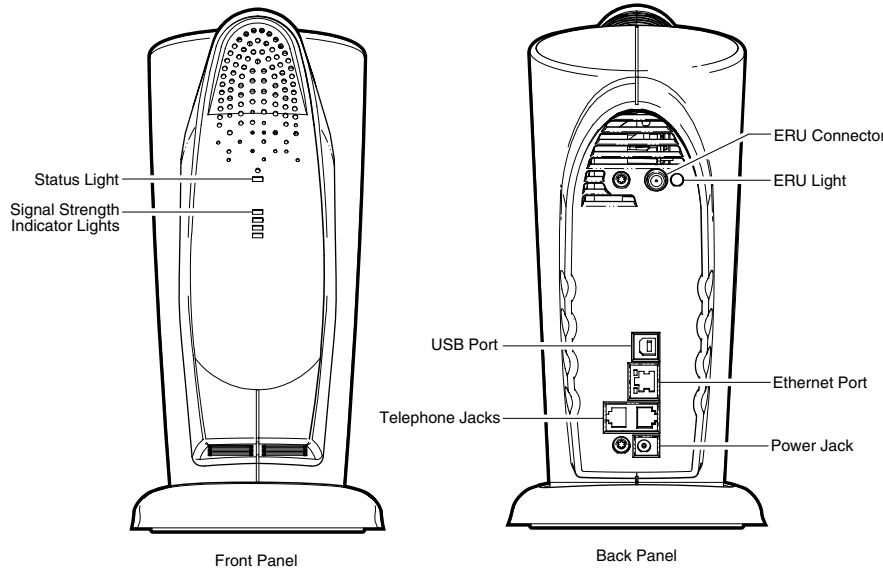
Routing cable to the SOMAport

When routing cable to the SOMAport, you should select the shortest possible path and always protect the cable from physical damage. Depending on the installation site, you could run the cable through a floor or wall, or directly to the SOMAport. If the cable goes straight through a wall, you can use a wall plate at the access point.

The SOMAport

The following diagram shows the location of the ERU connector and ERU light on the back panel of the SOMAport. When the light is green, the SOMAport is using the ERU. When the light is not illuminated, the SOMAport is using its internal antenna.

The lights on the front panel indicate the signal strength. The more lights that are lit, the stronger the signal. However, even if no lights are lit, the SOMAport may be able to function normally.



Tools and materials

Make sure you have the following items on hand before you begin.

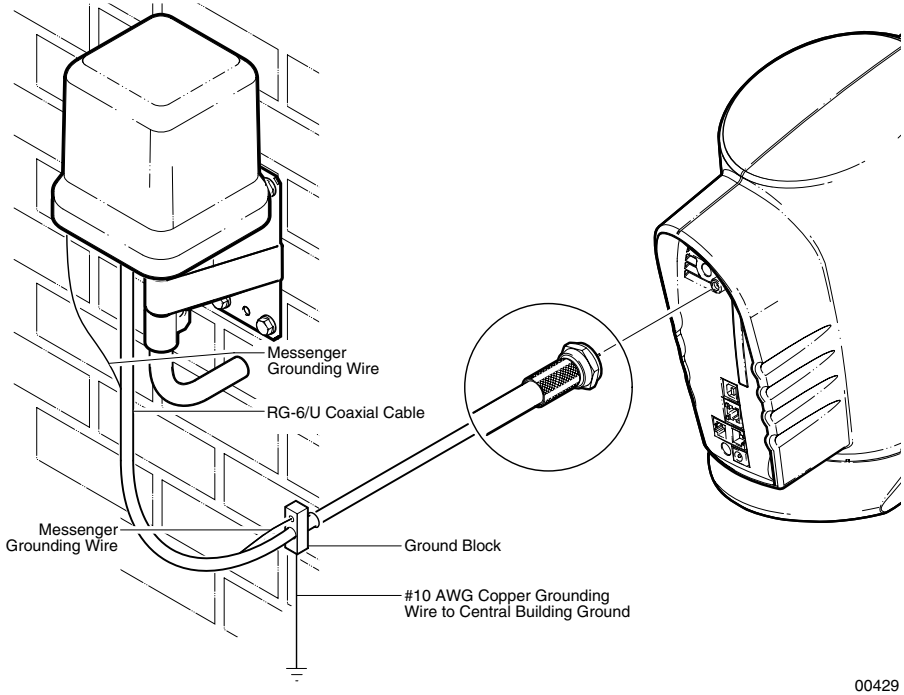
Materials	Tools
RG-6/U coaxial cable (no messengered grounding wire attached)	Drill with a 7-mm (5/16-inch) drill bit appropriate for the type of material (such as wood or masonry)
Cable clips	
Silicone sealant	

To route the coaxial cable from the ground block to the SOMAport

1. Verify that there are no wires or pipes blocking the location where you will be feeding the RG-6/U coaxial cable into the building.
2. Drill a hole in the wall where you want the coaxial cable to enter the building.
3. Connect the second piece of RG-6/U coaxial cable (that does not have a messengered grounding wire attached to it) to the terminal on the ground block.
4. Make a drip loop of 8–13 cm (3–5 inches) using cable clips.
5. Secure the drip loop and cable to the wall using cable clips.
6. Make sure the SOMAport is off.

   ATTENTION: The SOMAport must be off before you connect the coaxial cable to it.

7 Route the RG-6/U coaxial cable through the building and insert it into the F-connector on the back of the SOMAport.



8 Seal the access point into the building with silicone sealant.

9 Turn on the SOMAport.

The SOMAport takes a few minutes to start and connect to the network.

Make sure the SOMAport is operational. When the Status light turns solid green, the SOMAport has acquired a radio channel and is operational.

10 Look at the light next to the F-connector on the back of the SOMAport to make sure it is using the ERU.

- If the light is green, the ERU is being used.
- If the light is off, the internal SOMAport antenna is being used.

11 Test the equipment that is attached to the SOMAport.

Troubleshooting

If you experience any of the following problems, follow the suggested actions.

Problem	Corrective Actions
The cable connections are poor.	■ Secure the cable connections.
The ERU was not detected.	■ Check the cable connections to make sure they are secure. ■ Check to see if the cable is shorted. If it is, connect another cable and check again. ■ Turn off the SOMAport and then turn it back on. ERU detection is performed only when the SOMAport powers on. **ATTENTION:** To disconnect or reconnect the ERU, make sure the SOMAport is off.
The signal is weak.	■ Reposition the ERU following the guidelines on page 21. ■ Try another ERU.
The total length of the coaxial cable from the ERU to the SOMAport is more than 45 m (150 feet).	■ Check the connections and make sure they are secure. Poor connections may be reported as excessive cable length. ■ Reposition the ERU or the SOMAport to reduce the amount of cable required.