

Primex XR 72MHz Synchronized Time Solution

# 14000 Series Transmitter- External Antenna Install & User Guide



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## Primex, Inc.

Primex is a leading provider of synchronized time and environmental monitoring solutions. Our solutions automate and maintain facility compliance, increase efficiencies, enhance safety and reduce risk for organizations in the healthcare, education, manufacturing and government vertical markets.

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# Regulatory Compliance

## Federal Communications Commission (FCC) / Industry Canada (IC)

### License Requirements

- Operation of the Transmitter requires a FCC/IC operating license, which must be obtained prior to operation.
- FCC licenses must be renewed every 10 years and the IC licenses must be renewed annually.
- As a service, Primex will file the license application if the end-user desires it. An end-user that does not want Primex to file for the original site license will be required to complete a waiver form, file the required application, and receive a valid license from the FCC/IC prior to use. If you have any questions or need any assistance, please contact Primex Technical Support.
- Primex requires a copy of the licenses in order to complete the factory presets.

### Product Compliance

- This device complies with Part 90 and Part 15 of the FCC rules and RSS-210 of Industry Canada.
- Operation of this device is subject to the following two conditions:
  1. This device may not cause harmful interference.
  2. This device must accept any interference, including interference that may cause undesired operation.

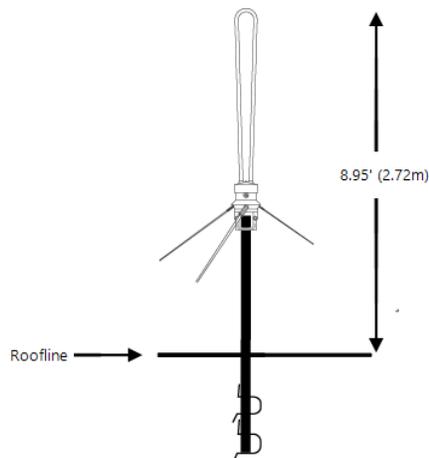
Changes or modifications to any part of the Primex System components not expressly approved by Primex could void the user's FCC/IC authority to operate the equipment.

### Radio Frequency (RF) Exposure

To comply with FCC/IC RF exposure requirements for mobile transmitting devices, the Transmitter is only to be used or installed in locations where there are at least 20 cm (approximately eight in.) separation distance between the antenna of the Transmitter and all persons.

To comply with FCC OET65 and Industry Canada RF exposure requirements, the antenna is only to be used or installed in locations where the following antenna separation guidelines exist when the Transmitter is in operation. Distance above roofline is for direct line of sight only. Distance Above Roofline: 8.95 ft. (2.72 m).

### Distance above roofline illustration



# Important Safety Instructions

READ ALL INSTRUCTIONS BEFORE INSTALLATION, OPERATION, OR MAINTENANCE OF PRODUCT.

Some of the following information may not apply to your particular product model; however, as with any electronic product, precautions should be observed during installation, operation, and maintenance.

- Never operate the Transmitter without the antenna being properly connected to the Transmitter. Operating the Transmitter without an antenna can lead to permanent damage of the Transmitter and poses a safety risk.
- Do not touch any of the antennas while broadcasting.
- Standard acceptance procedures must be followed prior to operating this equipment in the proximity of life support systems.
- Do not operate the Transmitter outdoors, in wet areas where there is standing water, or in areas where there is condensation or the risk of condensation. Use in any of these environments will damage the Transmitter and void the warranty.
- Do not open the Transmitter to alter the internal elements in any way. This will void the warranty and could lead to unsafe conditions, malfunction, and violations of FCC/IC regulations.
- Do not use a metal ladder during installation of the external antenna.
- During antenna installation, be sure to wear shoes with rubber soles and heels and wear protective clothing with long sleeves and rubber gloves.
- Do not install the antenna on a wet or windy day when lightning or thunder is in the area or near power lines. Power lines, telephone lines, and guy wires look the same. As a precaution please assume any wire can electrocute you.

The installation, maintenance, or removal of an antenna requires qualified, experienced personnel. The installation instructions are written for such installation personnel.

Antenna systems should be inspected once a year by qualified personnel to verify proper installation, maintenance, and condition of equipment.

Primex disclaims any liability or responsibility for the results of improper or unsafe installation practices.

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# GPS Managed Time Overview - 14000 Series Transmitter

## Architecture

The Primex GPS Managed Time solution consists of a single 14000 Series Transmitter, GPS Receiver, 14000 Series Repeater (Satellite) Transmitter (optional), and system clocks, bells and other devices in a single building, to a campus wide deployment.

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## Time Synchronization

Once a 14000 Series Transmitter has received its time from a GPS Receiver it sets its internal clock. It then transmits time information or schedules via a wireless radio signal to the wireless clocks, bells, and other devices in the system. As a result, the system devices are precisely synchronized to each other and all time, schedules, and events are kept current.

**Time Source:** Transmitter time is synchronized from a GPS Receiver and then broadcasts that time and event schedules to the system clocks and other devices.

**Broadcast (Transmit) Schedule Transmitter with Internal Antenna:** broadcasts its synchronized time continuously to the system clocks and devices.

**Broadcast (Transmit) Schedule Transmitter with External Antenna:** broadcasts its synchronized time to the system clocks and devices from the 39th to the 6th minute of the next hour and changes to a standby mode during the 7th to the 38th minute of the hour (standard broadcast schedule). During initial power-up, the Transmitter broadcasts for 8 consecutive hours. After the 8 hour power-up period, the Transmitter reverts to its timed broadcast schedule.

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## System components

**Transmitter:** operates on channels with 20kHz bandwidths and 72MHz frequency and is preset to one of the channels licensed by the FCC/IC to minimize interference on these frequencies and channels.

**GPS Receiver:** the Global Positioning System (GPS) Receiver has a sensitive antenna that receives the Coordinated Universal Time (UTC) from the GPS satellite transmission. The GPS Receiver then sends the time to the Transmitter. The GPS Receiver is required to have an unobstructed "view of the sky" to receive the signal.

**GPS/Transmitter Extension Cable (optional):** a specially designed low-resistance data cable can be used to extend the distance between the GPS Receiver and the Transmitter. The GPS Receiver continuously sends the precise time through the cable to the Transmitter.

**Repeater (Satellite) Transmitter (optional):** optional unit used to supplement and extend signal coverage.

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# 14000 Series Specifications - System Components

This section provides the specifications of the 14000 Series Transmitter and its components.

## 14000 Series Transmitter Specifications

Parameter	Specification
Operating Frequency Range	72MHz
Channels	16 channels available (pre-programmed prior to shipping)
Dimensions	16.0"L x 12.0"W x 1.9"D (40.6 cm x 30.5 cm x 4.8 cm)
Maximum Transmission	1 Watt (at Transmitter)
Radio Technology	Narrowband FM
Weight	9 lbs
Settings	Time Zone(External Antenna model factory preset), LAN/Local, 30 min offset, serial/USB/Ethernet connectivity
Daylight Saving Time	Bypass switch
LCD Display	Time, date, and signal verification
Power Supply	Input: 120 VAC, 50/60 Hz, 0.4 Amp Output: 9 VDC, 2.0 Amp 6 ft (1.82 m) cord
Operating Range	32° to 158° F (0°to 70° C), non-condensing environment

# GPS Receiver Specifications

A GPS Receiver draws time information from the U.S. Government Satellites, providing the system with Coordinated Universal Time (UTC).

- Mounted to rooftop, pole, or window (not a Low-E glass window).
- GPS Receiver sends UTC time to the Transmitter via the NMEA 0183 standard protocol.
- Optional GPS extension cable. A specially designed low-resistance cable to extend the distance between GPS Receiver and Transmitter. The maximum total length of the cable cannot exceed 200 ft. (60.96 m).

Parameter	Specification
Cable	10 ft. (3.05 m) cable  50, 100 and 200 ft. (15.24 m, 30.48 m and 60.69 m) extensions available. The maximum total length of the cable cannot exceed 200 ft. (60.96 m).
Dimensions	2.5 inches W x .75 inches H (6.35 cm x 1.91 cm)
Mounting Bracket	3.5 inches W x 1.4 inches H x 4.5 inches D (8.89 cm x 3.56 cm x 11.43 cm)  Included for rooftop or window installation.
Weight	0.75 lb (.34 kg)
Operating Range	-32° to 158° F (-30° to 70° C)

## Ground Plane Omnidirectional Antenna Specifications

The external antenna is a heavy duty, light weight ground plane antenna designed to be mounted outdoors.

- Designed for mounting to a 1.25 inches (3.17 cm) rigged galvanized conduit.
- Best operation is obtained when the ground plane rods are above all objects.

Parameter	Specification
Frequency Range	68–80 MHz
Gain	0 dBd
Impedance	50 ohms
VSWR	<1.5:1
Polarization	Vertical
Maximum Input Power	75 watts (at 50° C)
H-plane Beamwidth	Omni
E-plane Beamwidth	78 degrees (half-power)
Connector	N-female
Weight	4.4 lb (2 kg)
Dimensions	Radiating element: 29.4 inches H (74.7 cm) Ground radials: 41.5 inches W (105.41 cm)
Lighting Protection	Direct Ground
Wind Survival Rating*	120 mph (200 kph)
Compliance	FCC Part 90 Accepted IC RSS-119 Accepted

NOTE

\* Mechanical design is based on environmental conditions as stipulated in EIA-222-F (June 1996) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity.

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# System Installation Considerations

When implementing a new system or adding new system devices, learn about what should be considered to ensure a seamless installation.

## WARNING

Do not install or attempt to set the system clocks or devices until the Transmitter and its components are installed and configured, the Transmitter is powered, its time source is configured and time has been received, and the Transmitter is fully operational.

## Clock signal search frequency - time update

A clock's search frequency is when its receiver turns to search for a Transmitter signal, starting with the previously stored channel, to receive a time update. When a clock is powered on, it automatically initializes its set up and searches for a signal to receive its time. The only model that requires a specific setup is a Manual Setting Analog Clock.

The scheduled search frequency varies by clock model as defined below.

Analog Clock signal search frequency: six pre-scheduled times a day at 10:01, 2:01 and 6:01 a.m. and p.m. lock time (not the actual time of the day), a clock's receiver turns on to search for a Transmitter signal to receive a time update, starting with the previously stored channel number.

Digital Clock/Timer signal search frequency: every 10 minutes on the 5's (5, 15, 25, 35, 45, 55 minutes) of the hour, a clock's receiver turns on to search for a Transmitter signal to receive a time update.

When a clock has not received a valid signal/time update for three consecutive days, it displays a visual signal loss indicator; an analog clock's second hand advances and pauses continuously (stepping) and a digital clock/timer's colons flash.

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## Transmitter broadcast schedule

The type of antenna determines a Transmitter's broadcast schedule, which should be taken into consideration when installing new system devices. System devices receive a time update during its scheduled signal search or when powered on from a broadcasting Transmitter.

Broadcast (Transmit) Schedule Transmitter with Internal Antenna: broadcasts its synchronized time continuously to the system clocks and devices.

Broadcast (Transmit) Schedule Transmitter with External Antenna: broadcasts its synchronized time to the system clocks and devices from the 39th to the 6th minute of the next hour and changes to a standby mode during the 7th to the 38th minute of the hour (standard broadcast schedule). During initial power-up, the Transmitter broadcasts for 8 consecutive hours. After the 8 hour power-up period, the Transmitter reverts to its timed broadcast schedule.

## NOTE

In the event of a facility wide power outage, a Transmitter with an External Antenna will broadcast for 8 hours upon the

restoration of power. This will synchronize all devices. In the event power to a Transmitter is shut off and turned back on (power cycle), the Transmitter will broadcast continuously for 8 hours. Power cycling the Transmitter can be used to set/reset system devices. Do not power cycle a Transmitter when it's in an error status - red LED is flashing; refer to the troubleshooting topics to resolve the error status.

## GPS Communication

The GPS Receiver needs to “see” three satellites in the sky above before it will send a time signal to the Transmitter. If the GPS Receiver has a 360° view of the sky, the process may take only 15 minutes or as many as several hours. The length of time is dependent on the location (if the unit does not have a full view of the sky, due to wall or window installations, building “shadows”, etc.) weather conditions (clear or overcast) time of day, and other similar environmental factors.

If the Transmitter is receiving its time source from the optional NTP configuration, it sends requests to the NTP server at defined intervals.

### NOTE

The Transmitter does not transmit time data until it has received valid time information from a time source. Once the Transmitter receives a time signal, the Transmitter sets its internal clock to the received time and displays the correct time and date. The Transmitter then begins transmission of its internal time once every second. The Transmitter continually monitors the time source and updates its internal clock with the time data it receives. The number to the right side of the display is the channel number to which the Transmitter will be transmitting the time signal.

## Clock installation considerations - Transmitter with External Antenna

If installing clocks after the initial Transmitter 8 hour power up transmission, there are three options.

1. Install clocks between 39 minutes past the hour and 6 minutes after the next hour. They will set right away.
2. Install the clocks at any time of the day. They will set their time at the next 39 minutes after the hour.
3. Power cycle the Transmitter. It will then broadcast for 8 consecutive hours and clocks will set immediately on power up.

## Repeater (Satellite) Transmitter - Main Transmitter with External Antenna

While using the timed broadcast schedule of a Transmitter with an External Antenna, the Receiver Switch updates between 40 and 56 minutes past the hour. The actual update time varies depending on the channel number it is receiving a signal on.

If installing a Receiver Switch after the initial Transmitter 8 hour power up transmission, there are three options.

1. Install the Receiver Switch between 39 minutes past the hour and 6 minutes after the next hour. It will set right away.

2. Install the Receiver Switch at any time of the day, it will disable the output of the Repeater (Satellite) Transmitter and the green LED will remain solid until 39 minutes after the hour. At that time, the LED will begin flashing and the Transmitter connected to it will begin broadcasting.
  3. Power cycle the Transmitter. It will then transmit for 8 hours and the Receiver Switch will update immediately on power up.
- 

### **Wireless Tone Generator installation considerations - Transmitter with External Antenna**

If installing a Wireless Tone Generator after the Transmitter initial 8 hour transmission, there are two options

1. Install the Wireless Tone Generator between 39 minutes past the hour and 6 minutes after the next hour. It will update its time right away and begin updating its schedule information.
  2. Power cycle the Transmitter. It will then broadcast continuously for 8 hours and the Wireless Tone Generator will update both its time and schedule information immediately on power up.
-

# Install 14000 Series Transmitter - External Antenna

Before you begin to install a 14000 Series Transmitter with an External Antenna, review the information below.

- Review the Installation Location Requirements and identify the installation location of the Transmitter and system components.
  - Inspect system components to verify packaging includes all supplied parts for each system component and verify no damage has occurred during shipping.
  - Do not install or attempt to set the system wireless clocks or devices until the Transmitter and its components are installed and configured, the Transmitter is powered, its time source is configured and time has been received, and the Transmitter is fully operational.
- 

## Installation overview

Listed below is a summary of the order in which the system components are to be installed and configured.

Step 1: Assemble Ground Plane Omnidirectional Antenna

Step 2: Assemble Antenna Mast

Step 3: Secure Antenna to Mast

Step 4: Route Antenna LMR 400 Coaxial Cable

Step 5: Mount Antenna Mast

Step 6: Ground Antenna Mast

Step 7: Install GPS Receiver

Step 8: Complete Final Antenna Mounting Requirements

Step 9: Ground Transmitter

Step 10: Connect Cables to Transmitter

Step 11: Configure Switch Settings

Step 12: Verify System is Operational

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## Installation and Configuration Overview

- Review the Installation Guidelines and identify the installation location of the Transmitter and system components.
  - Inspect system components to verify packaging includes all supplied parts for each system component and verify no damage has occurred during shipping.
-

- Do not install or attempt to set the system wireless clocks or devices until the Transmitter and its components are installed and configured, the Transmitter is powered, its time source is configured, and the Transmitter is fully operational.
- 

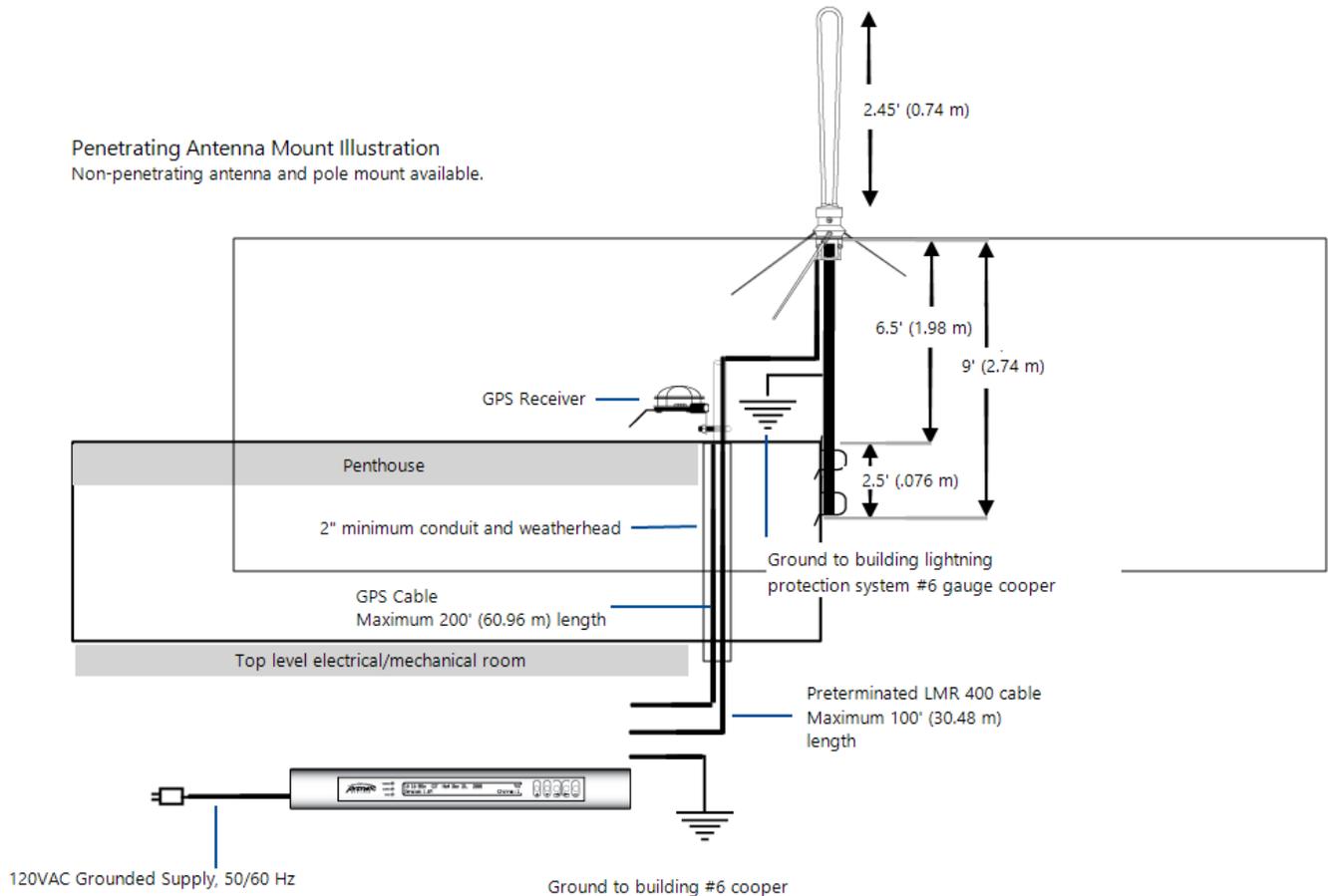
## **Installation overview**

Listed below is a summary of the order the Transmitter and its components are to be installed and configured.

1. Install GPS Receiver.
  2. Configure Switch Settings.
  3. Establish Connections.
  4. Verify System is Operational.
-

# Typical System Install Setup - 14000 Transmitter with External Antenna

The illustration below represents a typical installation system setup for a 14000 Transmitter with an external antenna.



## Installation Location Requirements

When planning the system installation of a Transmitter with an External Antenna, Primex recommends taking into consideration the below guidelines. Location is extremely important to ensure the best operation of your system.

### NOTE

Prior to installation and to assure optimum performance of the system, it's recommended a site survey is completed by Primex. The site survey includes an analysis and recommendation of the installation location of the system components and ground plan omnidirectional antenna.

- Transmitter should be located on the tallest building near center of area of coverage. In a multi-story building, locate Transmitter on the top floor; significantly improves coverage to the lower floors due to the "umbrella" pattern of transmission.

- Transmitter must be located within 100 feet (30.4 m) from the antenna. The maximum cable length allowed between the External Antenna and Transmitter is 100 feet (30.4 m). The system is attenuated to the 100 feet (30.4 m) of coaxial cable; typically figure between 80 to 85 feet of usable cable length.
- Transmitter must be located a minimum of 4 feet (1.2 m) above the floor.
- Transmitter must be located within 5 feet (1.5 m) from a 120 VAC electrical outlet. 10 AMP dedicated service recommended.
- Transmitter enclosure clearance. 5 or 30 Watt Transmitter enclosure dimension is 18" L x 22" W x 22" D (46 cm L x 56 cm W x 56 cm D), required wall space is 24" L x 30" H x 30" D, allowing for a minimum clearance of 4" (10 cm) rear, 12" (30.4 cm) front, and 10" (25.4 cm) side. 1 Watt Transmitter enclosure dimension 17" L x 12" W x 2" D (5.08 cm L x 43.18 cm W x 30.48 cm D), required area on the wall is 24" L x 18" W x 3" H.
- Transmitter must be located in a controlled environment that is 32 to 122° F (0 to 50° C) and non-condensing humidity environment.
- Transmitter shelf mounting: For 5 and 30 Watt Transmitter models, a shelf with enforcement must be provided that is 24" x 24" and support a weight of 60 lbs. A shelf for a 1 Watt Transmitter can be purchased from Primex.
- External Antenna must be located at a minimum of 15 feet (4.5 m) clear from the radius of other antennas.
- External Antenna must be located at least 10 feet (3 m) from normal traffic area.
- External Antenna must be located within 10 feet (3 m) from earth ground.
- External Antenna cannot be placed on or directly adjacent to walls or metal structures.
- External Antenna cannot be located near television receiving antennas.
- External Antenna cannot be mounted indoors or in enclosed areas.
- External Antenna cannot be mounted to pre-existing antenna towers. If this is desired, contact Primex prior to installation.
- 5 or 30 Watt Transmitter in healthcare facility: External Antenna must be located 30 feet (9 m) from any window or other glass openings. If Hospital Paging Link Receiver is located on roof, Primex is required to be supplied the frequency prior to installation.

## GPS Receiver Installation Location Guidelines

Determine a suitable location for the GPS Receiver unit. Location is extremely important to ensure the best operation of the system.

- GPS Receiver must be mounted where it has a "clear view of the sky" to receive a GPS signal 24 hours a day.
- Typical mounting locations of the GPS Receiver unit include the inside of a window (not a Low-E glass window), to an exterior pole, or on a rooftop.
- GPS Receiver unit should be kept away from large metal objects.
- GPS Receiver unit and cable must be mounted above any potential standing water, snow depth, leaves or other obstructions and is protected from the weather.
- Maximum total distance of the GPS cable to the Transmitter cannot exceed 200 feet (60.96 m).
- If the GPS cable is located outdoors, the use of a GelWrap splice enclosure is strongly recommended.

## Tools and Equipment Required

The following tools and equipment below are required to install a Transmitter with an External Antenna.

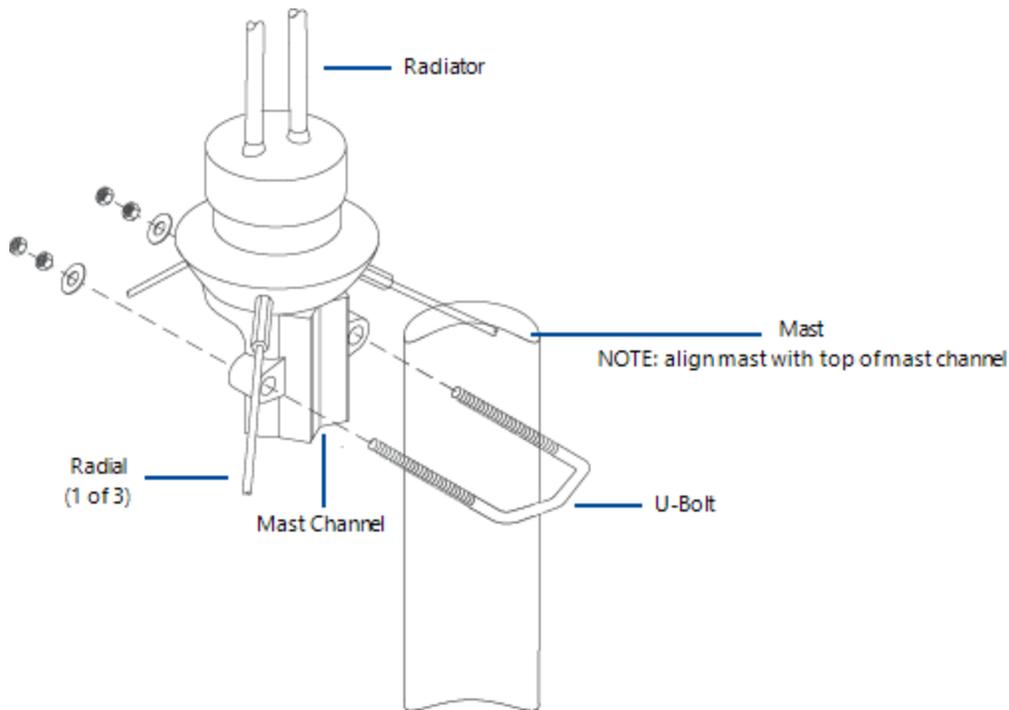
- Hammer drill
- Power drill
- 3/4 inch concrete drill bit, 18 in. (45.7 cm) long
- Penetrating mount only: 5/8 inch concrete drill bit, 18 inch (45.7 cm) long

- 1/2 inch wrench
- 3/4 ft. deep well socket with ratchet
- 10 inch (25.4 cm) adjustable wrench
- Phillips screwdriver
- Flat head screwdriver
- Lineman's pliers
- Shears/scissors
- Silicone caulk; required to seal cabling/ground penetration
- Transmitter rack (recommended)
- Building ground near Transmitter
- Ground near transmitting antenna

## Step 1: Assemble Ground Plane Omnidirectional Antenna

### How to assemble a Ground Plane Omnidirectional antenna

1. After removing the antenna from the shipping box, inspect all contents to ensure all parts are on hand and no damaged has occurred during shipping.
2. Screw the three radials into the base of the antenna.
3. Assemble the U-bolt on the base of the antenna. The Mast is to be aligned with the top of the mast channel.



## Step 2: Assemble Antenna Mast

The Antenna Mast has two sections secured by a hex bolt during shipment. The two sections include a 5 ft. x 1.25 inch (1.52 m x

2.54 cm) rigid galvanized conduit and a 5 ft. x 1 inch (1.52 m x 3.17 cm) rigid galvanized conduit.

#### NOTE

1 Watt Transmitter (External Antenna) model only - non-penetrating mounting kit only includes the 5 ft. x 1.25 inch rigid galvanized conduit section.

### How to assemble an antenna mast

1. Loosen and remove the hex bolt.
2. Remove the 5 ft. x 1 inch (1.52 m x 3.17 cm) rigid galvanized conduit section.
3. Insert the 5 ft. x 1 inch (1.52 m x 3.17 cm) rigid galvanized conduit section into the 5 ft. x 1.25 inch (1.52 m x 2.54 cm) rigid galvanized conduit section in reverse as shipped - to attain a combined antenna mast length of 9 ft. (2.74 m).
4. Align the sections fastening holes and secure sections together using the supplied hex bolt and nuts.

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## Step 3: Secure Antenna to Mast

Complete the steps below to secure the antenna to the mast.

1. Attach and fasten the antenna channel side base to the top of the 1 inch rigid galvanized conduit section.
2. Use a 1/2 inch wrench to tighten the nuts on both of the U-bolts, both evenly and securely. To ensure it's secure, tighten the second nut to the first nut.

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## Step 4: Route Antenna LMR 400 Coaxial Cable

### How to route the LMR 400 coaxial cable from the Transmitter to the antenna

1. Drill a 1 inch (2.54 cm) hole through an exterior wall of the building that is in close proximity to the antenna installation location.
2. Roll out the LMR 400 cable to prevent kinks from developing during routing.
3. Route the LMR 400 cable female connector from the Transmitter installation area to the outside installation location of the antenna, leaving enough cable for two 1 ft. (0.30 m) diameter coils at the base of the antenna mast.
4. Form and secure two 1 ft. diameter (305 mm) loops in the LMR 400 cable at the base of the mast for lightning protection.
5. Connect the LMR 400 cable to the antenna.

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## Step 5: Mount Antenna Mast

There are three available mounting methods. Installation is dependent upon the mounting kit supplied with the system.

NOTE

Mounting the antenna mast may require two people.

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# Assemble Non-Penetrating Roof Mount Kit Mount

The Non-Penetrating Antenna Kit is designed for mounting a ground plane omnidirectional antenna when mounting to the side of a structure is not practical. The overall footprint of the frame is 29 inches x 35 ½ inches (73.66 cm x 88.9 cm).

## Kit Contents

### NOTE

Installation requires six 8 inch x 8 inch x 16 inch concrete blocks (not supplied).

The kit is supplied with the following parts. If any of these items are missing, please contact Primex.

Description	Qty
Rigid galvanized conduit mast   5 ft. x 1.25 inches (1.52 m x 3.17 cm)	1
Tripod leg   27 inches (2.54 cm) each in length	3
Frame rail (long)   34 ¾ inches (88.26 cm)	2
Frame rail (short)   28 ¼ inches (71.75 cm)	4
Grounding Clamp	1
Long carriage bolt	1
Short carriage bolt	11
Flat washers	12
Lock nuts	12

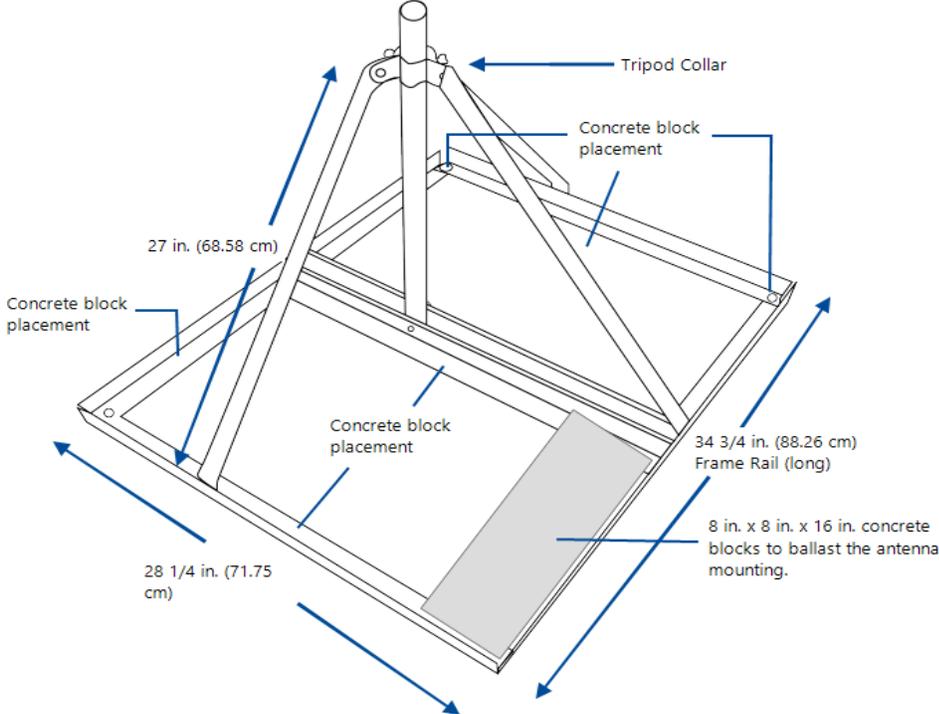
## How to assemble a Non-Penetrating Antenna Mount

1. Verify the kit contents.
2. Assemble the outer frame by laying the two long frame rails parallel to each - approximately 30 inches (76.2 cm) apart.
3. Insert a short carriage bolt from the bottom at each frame rail end, pointing skyward (4 total).
4. Connect the two long frames rails by placing the two short frame rails on top of the four protruding bolts to form a rectangle. Make sure the square holes in the short tail "sides" are directly opposite each other.

5. Place a washer and nut on each of the four bolts and finger tighten.
  6. Position the tripod within the four-sided frame.
  7. Secure the three tripod legs to the inside of the frame by inserting three short bolts, from the inside and placing the washer and nut on the outside of the frame.
  8. Drop the bottom of the mast (end with hole) through the top of the tripod collar.
  9. Place the remaining two short rails parallel to each other, separated by the bottom of the mast.
  10. Align the hole at the bottom of the mast, with the two square holes in the short frame rail sides.
  11. Insert the long bolt and connect the frame rails to the mast.
  12. From the underside of the frame, insert the four remaining short bolts upward and connect the inner short tails to the frame.
  13. Tighten all nuts to secure.
  14. Use six 8 inch x 8 inch x 16 inch concrete blocks to ballast the antenna mounting. Blocks are to be placed from rail to rail on each side of the mast; three blocks per side with a single block placed on each end and one in the middle.
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# Non-Penetrating Mount Illustration

Overall footprint: 29 in. x 35 1/2 in. (73.66 cm x 90.17 cm)



# Install Penetrating Antenna Kit

The Penetrating Antenna Kit contains the materials required to mount the antenna to a wooden pole or masonry wall. A 5/8 inch (1.58 cm) diameter mounting hole is required and the maximum diameter of the pole or wall thickness is 14 inches (35.56 cm).

## Kit contents

The kit is supplied with the following parts. If any of these items are missing, please contact Primex.

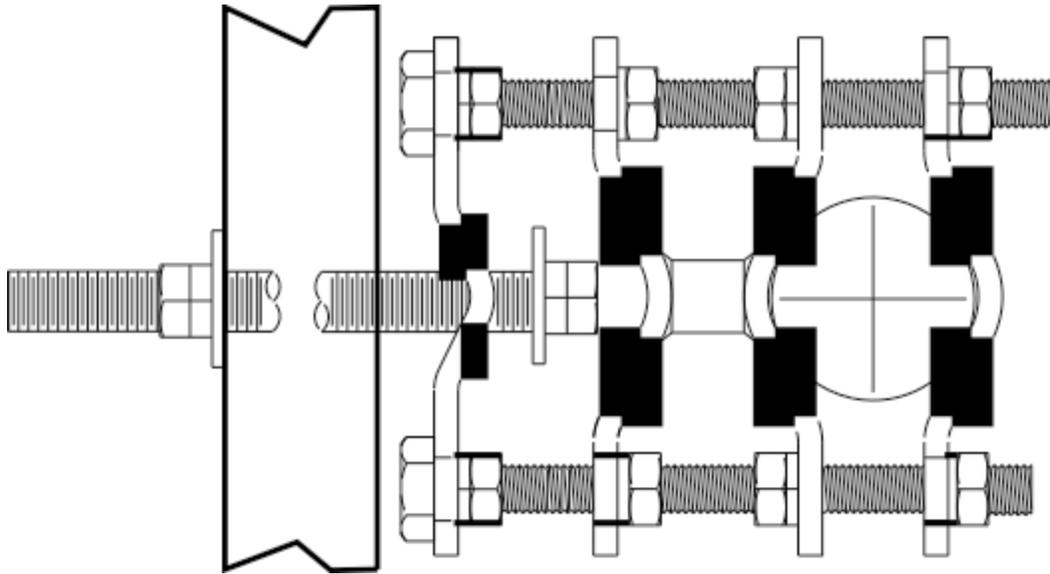
Description	Qty
Rigid galvanized conduit section   5 ft. x 1.25 inches	1
Rigid galvanized conduit insert   5 ft. x 1 inch	1
Antenna mounting clamp	2
Hex head bolt   1/2 inch	2
Bolt washer   1/2 inch	8
Lock washer   1/2 inch	8
Hex nut   1/2 inch	8

## How to mount an antenna using a Penetrating Antenna Kit

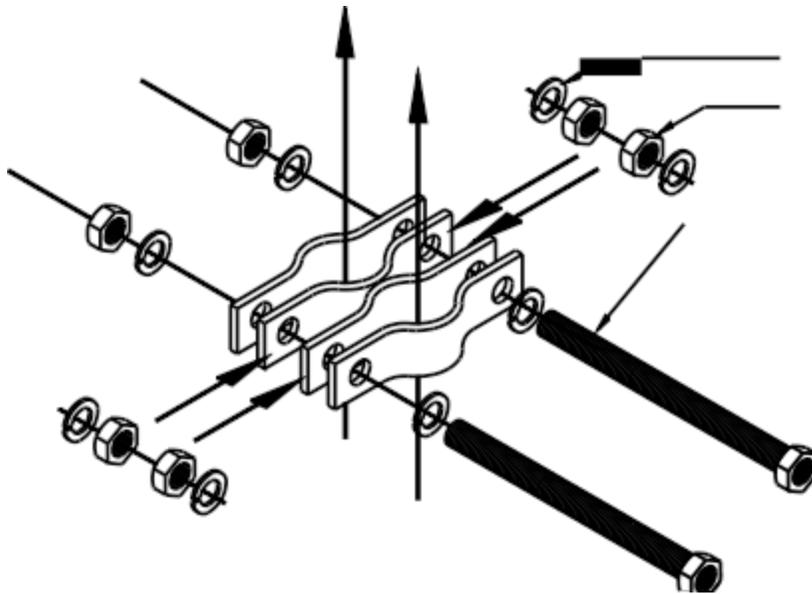
### NOTE

The recommended diameter of the pole or the wall thickness should not exceed 14 inches (35.56 cm).

1. Verify the kit contents.
2. Assemble both clamps, as shown below, tightening the hex nuts to a torque of approximately 45 ft-lbs.



3. Remove the nut and washer from the 14 inch threaded rod.
4. Drill a 5/8 inch hole through the top of an exterior wall.
5. Insert the 14 inch threaded rod through the hole in the wall. If the thickness of the wall is greater than 10 inches, a longer rod may be required. Different lengths of rod are available at hardware stores. If a longer threaded rod is needed, use a 5/8"-11 threads per inch rod.
6. Place the nut and metal plate over the rod.
7. Tighten the square nuts to an approximate torque of approximately 55 ft-lbs.
8. Drill a second 5/8 inch (1.59 cm) hole 2.5 ft. (0.76 m) directly below the first hole.
9. Ensure both clamps are vertically aligned, as shown below



10. Repeat Steps 4 through 6.
  11. Connect the LMR 400 cable to the antenna. Be sure the connection is tight.
  12. Insert the mast into the clamps.
  13. Tighten both clamps evenly and securely.
  14. Install gelwrap splice enclosure over the connection between the LMR400 cable and antenna. Secure gelwrap to mast using common electrical tape or cable ties.
  15. Next, route the antenna cable. For additional information, see [Route Antenna LMR 400 Coaxial Cable](#).
-

# Install Antenna Pole Mount Kit

The Antenna Pole Mount kit is designed for the purpose of mounting the antenna to round or angled tower legs.

- The clamps can be used on round tower legs that measure from 1.25 inches to 3.25 inches (3.17 cm to 8.25 cm) OD or on angled tower legs that measure up to 3 in. (7.62 cm) on a side.
- The center section of each clamp is welded to provide mechanical stability and all parts are hot-depped galvanized steel.

## Kit contents

The kit is supplied with the following parts. If any of these items are missing, please contact Primex.

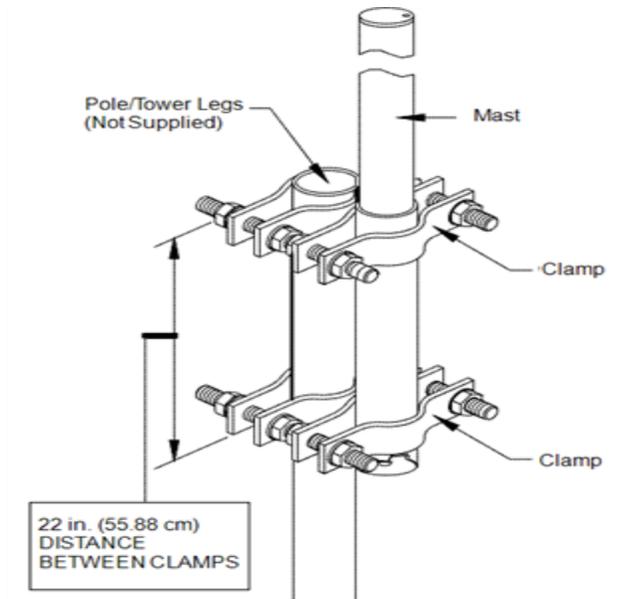
Description	Qty
Rigid galvanized conduit section   5 ft. by 1.25 inches	1
Rigid galvanized conduit section   5 ft. by 1 inches	1
X style clamp	2
U-clamp	4
1/2 inch all thread bolt	4
1/2 inch lock washer	16
1/2 inch hex nut	16

## How to mount an antenna using a Pole Mount Antenna Kit

1. Verify the kit contents.
2. Assemble both clamps, tightening the hex nuts to an approximate torque of approximately 45 ft-lbs.
3. Tighten half of one clamp two feet below the top of the pole. Use a 3/4 inch wrench to do this and be sure to tighten the clamps both evenly and securely.
4. Using a 3/4 inch wrench, tighten half of the other clamp a few in. below the top of the pole. Be sure to tighten the clamps both evenly and securely.
5. Connect the LMR 400 cable to the antenna. Be sure the connection is tight.
6. Insert the mast into the clamps. The bottom of the mast should be a minimum of 2 inches below the bottom clamp.

7. Using a 3/4 inch wrench, tighten all nuts on both clamps.
  8. Next, route the antenna cable. For additional information, see [Route Antenna LMR 400 Coaxial Cable](#).
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### Pole Mount Assembly Illustration



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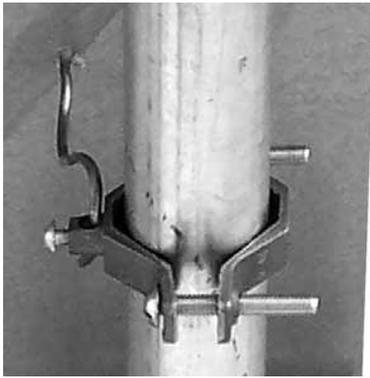
### Step 6: Ground Antenna Mast

#### NOTE

The National Electrical Code (NEC) requires that every antenna installation be grounded. Also many areas have local antenna grounding codes. Be sure that you are familiar with local grounding and other antenna regulations and codes.

#### How to ground the antenna mast

1. Secure the ground clamp (supplied) around the antenna mast.
  2. Insert and tighten the #6 gauge wire (supplied) in the ground clamp.
-



**NOTE**

Cut the wire off at the necessary length. The remainder of the wire will be used to ground the Transmitter.

3. Connect the other end of the #6 gauge wire to a verified building/earth ground.

## Step 7: Install GPS Receiver

A GPS Receiver is required when a Transmitter is set to use GPS as its time source.

### Installation location guidelines

Determine a suitable location for the GPS Receiver unit. Location is extremely important to ensure the best operation of the system.

- GPS Receiver must be mounted where it has a "clear view of the sky" to receive a GPS signal 24 hours a day.
- Typical mounting locations of the GPS Receiver unit include the inside of a window (not a Low-E glass window), to an exterior pole, or on a rooftop.
- GPS Receiver unit should be kept away from large metal objects.
- GPS Receiver unit and cable must be mounted above any potential standing water, snow depth, leaves or other obstructions and is protected from the weather.
- Maximum total distance of the GPS cable to the Transmitter cannot exceed 200 feet (60.96 m).
- If the GPS cable is located outdoors, the use of a GelWrap splice enclosure is strongly recommended.

### GPS Receiver mounting kit contents

Part	Quantity
Mounting bracket	1
GPS 18 LVC and connector	1

Part	Quantity
M3 x 0.5 x 6 mm pan head screws	2
#6 x 3/8 sheet metal screw	3
Suction cups	3
U-bolt with nuts for mounting on 1 inch (2.54 cm) pole	1

### How to mount a GPS Receiver

1. Verify the kit contents and the installation location meets the installation guidelines.
2. From the outside of the building, route the GPS cable.

External antenna Transmitter: route through a 3/4 inch drilled hole into the building.

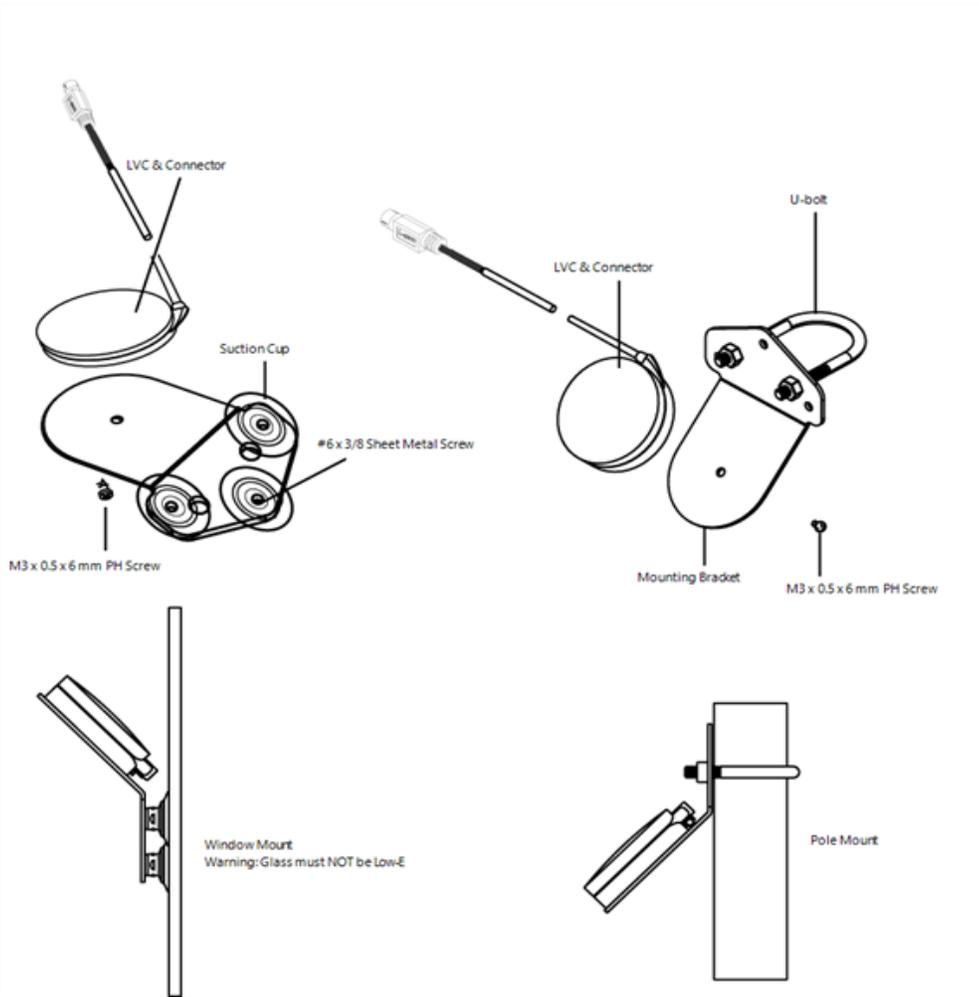
3. Assemble and mount the GPS Receiver unit to either the inside of a window (not Low-E glass) or to an outside pole or rooftop. The mounting location is required to have a clear view of the sky.

#### NOTE

Be sure to follow local building code requirements when attaching the GPS unit to the inside of a window. Clean the windowpane before using the suction cups for attachment.

4. Route GPS cable and connect to Transmitter GPS connection.

## GPS Receiver installation components and illustration



### Step 8: Complete Final Antenna Mounting Requirements

During this step, you will weatherproof and secure the cabling, verify all connections are secure, and caulk any exterior holes.

1. Weatherproof the antenna connection using GelWrap kit supplied.
2. Secure the GPS cable and LMR 400 cable to the building and mast.
3. Leave a drip loop where both cables enter the building to prevent water from entering the building.
4. Use UV resistant zip ties to secure the cables to the mast and building.

#### WARNING

Do not zip tie the GPS cable to the LMR 400 cable. These two cables must be 2 inches (5.08 cm) apart at all times, with the exception of the point where they enter into the building.

5. Verify all nuts and bolts in the mounting hardware are secure.
6. Caulk all exterior holes.
7. Secure and tie wrap all indoor cables.

## Step 9: Ground Transmitter

Complete the steps below to ground the Transmitter.

1. Connect and tighten the terminal ground lug (supplied) on the Transmitter.
2. Insert and tighten #6 gauge wire (supplied) into the Transmitter terminal ground lug.
3. Connect other end of wire to a verified building/earth ground source.

## Step 10: Connect Cables to Transmitter

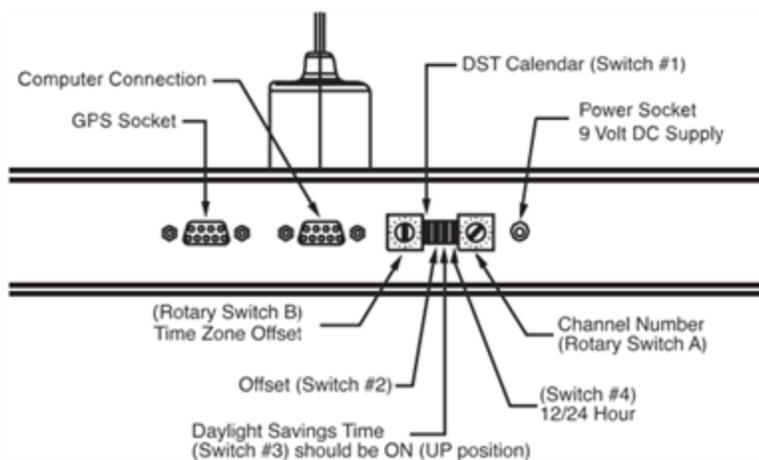
Complete the steps below to connect the GPS and LMR 400 cable to the Transmitter.

1. Connect the GPS cable to Transmitter "GPS IN" port, located on the back side of the Transmitter.
2. Connect the LMR 400 cable to the Transmitter "External Antenna" port, located on the back side of the Transmitter.

## Step 11: Configure Switch Settings

The switch preferences are located on the back side of the 14000 Series Transmitter. The switches set the Time Zone, channel number, 12- or 24-hour display, and the observance of Daylight Saving Time. The Transmitter continually checks the position of the switches.

### 14000 Transmitter - connections and switch settings



## Switch

Rotary Switch A (channel selection)

**WARNING**

Do NOT adjust the channel switch. It is only to be set to the frequency specified on the FCC/IC application.

Factory preset to the FM frequency on which the Transmitter will broadcast.

There are 16 available channels. The chart below explains which switch positions correspond to which channel numbers.

Switch No.	Channel No.	Switch No.	Channel No.
0	16	8	8
1	1	9	9
2	2	A	10
3	3	B	11
4	4	C	12
5	5	D	13
6	6	E	14
7	7	F	15

## Switch

### Rotary Switch B

Sets the Time Zone. Use a small slotted screwdriver to adjust the rotary switch.

"4" for Atlantic Time Zone

"5" for Eastern Time Zone

"6" for Central Time Zone

"7" for Mountain Time Zone

"8" for Pacific Time Zone

"9" for Alaska Time Zone

"A" for Hawaii Time Zone

### Switch #1

Sets the Daylight Saving Time Calendar.

Up to automatically change to the new Daylight Saving Time calendar in 2007.

Down to abide by the old schedule in 2007.

### Switch #2

Sets the direction of UTC offset.

Up for U.S. and Canada

Down for Europe

### Switch #3

Sets the automatic Daylight Saving Time adjustment.

Up for automatic Daylight Saving Time changes

Down to bypass Daylight Saving Time adjustments

## Switch

Switch #4

Sets the clock display on the Transmitter.

Up for 12-hour display

Down for 24-hour display

## Step 12: Verify System is Operational

The final step is to verify the 14000 Series Transmitter is operating and functional.

1. Verify a GPS signal has been received.
2. Verify the Time and Date are correct.
3. Verify the Channel Number is set correctly.

# Transmitter Operation

Learn about the operation of a 14000 Series Transmitter.

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## Transmitter Operation

### Power-on sequence

1. Initially display its time as 12:00:00 and software version.
2. Transmitter checks the position of the switches on the rear of the Transmitter and stores the settings in its memory.
3. Transmitter sends information to the GPS Receiver and waits for time information from the GPS Receiver. The red LED light flashes until the Transmitter receives a valid time signal from the GPS Receiver.
4. The time on its front display increments once each second until the GPS Receiver sends the Transmitter a valid time.

The GPS Receiver needs to see three satellites in the sky above before it will send a time signal to the Transmitter. This may take up to 15 minutes for a GPS Receiver that has a 360° view of the sky. The length of time is dependent on the location, weather conditions, time of day. In areas where the unit does not have a full view of the sky, it may take up to several hours for the Transmitter to receive a valid time signal.

5. The GPS Communication indicator appears when the Transmitter is receiving a signal from the satellite through the GPS Receiver. If the symbol is not displayed, see Troubleshooting.
6. Once the Transmitter receives a valid time signal from the GPS Receiver, sets its internal clock to the time received and displays the correct time and date on its front display. The Transmitter then begins to broadcast its internal time once every second.

#### NOTE

The Transmitter does not broadcast time to system devices until it has received valid time information from the GPS Receiver.

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### GPS time source

The Transmitter continually monitors the GPS Receiver and updates its internal clock with the time data it receives. If the Transmitter does not receive valid time data from the GPS Receiver for 48 hours, its red LED on the right side of its front display will flash.

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### Transmitting Channel Number (FCC/IC license)

The number located on right side of its front display is the channel number to which the Transmitter will be transmitting the time signal.

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The channel number must be the same as the channel number specified on the site FCC/IC license. If not, you must immediately adjust the channel to the number that corresponds to the FCC/IC license.

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## Daylight Saving Time

The Transmitter is pre-programmed to automatically make adjustments for Daylight Saving Time.

- The letters "DT" (Daylight Saving Time) or "ST" (Standard Time) is displayed when adjustment for Daylight Saving Time is active (switch #3 in the up position).
- If neither "DT" nor "ST" is displayed, then switch #3 is in the down position and the Transmitter does not adjust for Daylight Saving Time.
- The adjustment to Daylight Saving Time and back to Standard Time take place 2:01 AM on the day of change.

### NOTE

The GPS signal does not encode information about Daylight Saving Time. In the spring when the Transmitter changes to Daylight Saving Time, the system clocks adjust by advancing faster than their normal speed to make the adjustment and then return to normal operation. In the fall when the Transmitter returns to Standard Time, the system clocks make the time adjustment and then return to normal operation.

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## Time Zone

The Time Zone of your location is not shown on the display. However, when the Transmitter has received a valid time from the GPS Receiver, the correct Time Zone can be checked by verifying the correct hour is displayed. The Transmitter can be set for all 24 time zones around the world and 1/2-hour time zones.

## 12-Hour or 24-Hour Time

The 12/24-Hour option only affects the Transmitter LCD display. If AM or PM is on the display, then the 12-hour option is selected with switch #4. If neither AM nor PM is on the display, then the 24-hour option is selected.

- Analog System Clocks are 12-hour clocks.
  - Digital Clocks have a selectable jumper option to display either 12-hour or 24-hour time regardless of the Transmitter 12/24 option setting.
- 

## GPS Receiver Communication

The status of the GPS Receiver is indicated by the GPS Communication indicator.

- When the "Y"-like symbol  is displayed, the GPS Receiver is connected to the Transmitter and there is proper communication between the GPS Receiver and the Transmitter.
  - When the Transmitter is receiving valid time data from the GPS Receiver, the three parentheses  sequence in a motion pattern. If these symbols are not displayed, see Troubleshooting.
-

## Power Failure

The system has a fail-safe design. If the failure of a system component or power loss to a component occurs, all downstream components continue normal operations using their own internal time base. If after a specified period, communication has not been restored, a visual that indicates a loss of communication appears and remains until communication is restored.

Red flashing LED on the Transmitter; flashing colons on LED digital clocks; double stepping of second hand on analog clocks.

# Support

To obtain additional technical documentation for Primex products, visit the Support area on our website at [www.primexinc.com](http://www.primexinc.com)

You may require Technical Support when you have questions about product features, system configuration, or troubleshooting. Support services are delivered in accordance with your organization's support agreement, end user licenses agreements, and warranties, either with a Primex Certified Sales and Service Partner or directly with Primex.

## **Support through Primex Certified Sales and Service Partners**

Ensuring our customers experience excellent service is of utmost importance to Primex. Our network of Certified Sales and Service Partners offer technical support services for Primex products.

If you have purchased Primex products or have a service agreement with a Primex Partner, they are your primary contact for all Technical Support inquiries.

## **When contacting Primex Technical Support**

Make sure you have satisfied the system requirements listed in your product documentation. Also, you should be at the computer or device on which the problem occurred, in case it's necessary to replicate the problem.

When you contact Primex Technical Support, please have the following information available:

- Customer ID/Account Name
- Problem description/error messages
- Device hardware information
- Troubleshooting performed before contacting Primex

## **Primex Technical Support**

Hours: 8:00 a.m. to 5:00 p.m CST | Monday through Friday

Phone: 1-262-729-4860

Email: [techservices@primexinc.com](mailto:techservices@primexinc.com) | Web: [www.primexinc.com/support](http://www.primexinc.com/support)

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## Five Year Limited Warranty

Primex, Inc. warrants this product to be free from defects in materials and workmanship for a standard of five (5) years from the date of purchase\* from an authorized reseller or directly from Primex. Primex, Inc. will at its sole option, repair or replace any components that fail in normal use. Such repairs or replacements will be made at no charge to the customer for replacement parts. The customer will be responsible for any transportation costs. This warranty does not cover failures due to misuse, abuse, accidental or unauthorized alterations or repairs.

The warranties and remedies contained herein are exclusive and in lieu of all other warranties express or implied or statutory, including any liability arising under any warranty or merchantability or fitness for a particular purpose, implied, statutory or otherwise. In no event shall Primex, Inc. be liable for any incidental, special, indirect or consequential damages, whether resulting from the use, misuse or inability to use this product or from defects in the product. Some states do not allow this exclusion or limitation of incidental or consequential damages so the above limitations or exclusion may not apply to you.

To obtain warranty service: If after following the instructions in the product guide, you are certain the product is defective, contact Primex Technical Support to assist with troubleshooting the issue. If the issue cannot successfully be resolved and the product is under warranty, a RMA (Return Material Authorization) will be generated. The RMA form will be provided via email with detailed instructions for the return. All merchandise returned must be shipped to Primex, Inc. Attn: Returns Dept., N3211 County Road H, Lake Geneva, WI 53147.

Primex, Inc. retains the exclusive right to repair or replace the unit at its sole discretion. Such shall be your sole exclusive remedy for any breach of warranty.

\* applies to products sold on or after June 1, 2018.