

Primex XR 72MHz Synchronized Time Solution

# 14000 Transmitter - External Antenna Troubleshooting 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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# 14000 Series Transmitter Troubleshooting

Learn about common troubleshooting procedures for a 14000 Series Transmitter. Before beginning any troubleshooting be sure to perform the Site and Transmitter Site Evaluation Procedure.

## Site and Transmitter evaluation procedure


Before completing any troubleshooting on a 14000 Series Transmitter, it's recommended to complete the procedure below. This allows you to observe and log the current state of the system clocks and Transmitter(s).

1. Record all issues reported from the system clocks.
    - Are all the clocks involved or just some clocks?
    - If just some clocks, where are they installed and how many? Smaller quantities could be clock issues and not Transmitter related.
  2. Once its determined to check a Transmitter, look it over and take notes of the information below.
    - Is the red LED flashing to the right of the screen?
    - Write down all information displayed on the Transmitter front display, including the time displayed. It's recommended to also take a photo of the front display.
    - Is the GPS communication symbol displayed in the upper right hand corner of the screen? When the symbol is displayed, this indicates the Transmitter and GPS Receiver are communicating. If the symbol is not displayed, Red LED flashing and Transmitter GPS communication symbol is not displayed on front display.
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# Red LED flashing and Transmitter GPS communication symbol is not displayed on front display

## Symptoms

All or some of the below symptoms may be present.

- Red LED is flashing on the Transmitter front display.
- Transmitter front display does NOT display its GPS communication symbol , this indicates it's not communicating with the GPS Receiver.
- Channel Number may be or may not be displayed on the Transmitter front display, located in the lower right hand corner of the screen.

Channel Number displayed: indicates the Transmitter is currently broadcasting.

Channel Number is NOT displayed: indicates the Transmitter is not currently broadcasting.

- Clocks may be displaying a visual signal loss indicator due to they have not received a time update for three days; Analog Clock second hand is stepping and a Digital Clock/Timer colon is flashing.
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## Problem

Transmitter is not receiving a time update.


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## Analyze

1. Reseat all GPS and cable connections, check to make sure they are not wet or corroded, and look for damage to the cable.
2. Is there is a extension cable in use? Identity if it's a factory supplied cable or is not factory supplied. If it's not factory supplied, is it longer than 200 ft. and/or is the pin out correct? Step 3 will identify if the extension cable is an issue.
3. If the GPS communication symbol is not displayed and extension cables are in use, take the GPS Receiver from its location and plug it directly into the back of the Transmitter.

If the GPS communication symbol appears, the extension cables are the cause of the issue and are required to be replaced. If the GPS communication symbol is not displayed, replace the GPS Receiver as the first step.

If after replacing the GPS Receiver and/or cable and the GPS communication symbol is NOT displayed, the import on the Transmitter may be bad, which will require the Transmitter to be replaced.

4. From the Transmitter front display screen, verify the GPS communication symbol is present, which indicate it's communicating with the GPS Receiver. If the symbol is present, watch for parentheses  coming towards the GPS communication symbol which indicates the GPS Receiver unit is receiving a time update from the GPS satellites. If the
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parentheses are not displayed, complete the troubleshooting topic - Red LED flashing and Transmitter GPS communication symbol displayed, but no parentheses

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## **Solution**

1. If GPS communication symbol is displayed when direct to the Transmitter, replace the GPS extension cables.
  2. If no GPS communication symbol is displayed when direct to the Transmitter, replace the GPS Receiver.
  3. After replacing all GPS components and the GPS communication symbol is not displayed, the Transmitter may need to be replaced. For further assistance, contact Primex Technical Support at 1-262-729-4860.
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# Red LED flashing and Transmitter GPS communication symbol displayed, but no parentheses



## Symptoms

All or some of the below symptoms may be present.

- Red LED is flashing on the Transmitter front display.
- Channel Number may be or may not be displayed on the Transmitter front display, located in the lower right hand corner of the screen.

Channel Number displayed: indicates the Transmitter is currently broadcasting.

Channel Number is NOT displayed: indicates the Transmitter is not currently broadcasting.

- Transmitter front display has a GPS communication symbol , but does not display the parentheses  to the right of the symbol.
  - Clocks may be displaying a visual signal loss indicator due to they have not received a time update for three days; Analog Clock second hand is stepping and a Digital Clock/Timer colon is flashing.
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## Problem

Transmitter is communicating with the GPS Receiver, but is not receiving a time update from the GPS satellites.

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## Analyze

1. Is the GPS Receiver inside? If it's mounted to a window or mounted where signal has to go through the roof, the GPS Receiver may need to be relocated outdoors. A GPS Receiver located indoors may not allow for an adequate signal. Low-E glass windows are coated with a transparent metal layer that reflects infrared heat rays; which can also reflect the GPS signal.
  2. Check the GPS Receiver mounting location. Verify its mounting did not slip or change and it has a clear view of the sky. Resolve any obstructions.
  3. There may be local interference affecting GPS signal reception. Try moving the location of the GPS Receiver to improve reception. Weather conditions, solar flares, time of day, and exact satellite position may also effect signal reception; however, these conditions are normally of a short duration.
  4. Poor connections of the GPS cables or a faulty GPS Receiver can cause the unit not to pick up a signal. If steps 1 and 2 do not resolve the issue, replace the GPS Receiver and its extension cables.
  5. If the Transmitter has low output power, it may not be able to pull the time update. Check voltage at the Transmitter.
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## Solution

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1. Move the GPS Receiver into a better location; outdoors with a clear view of the sky.
2. Replace the GPS Receiver and its extension cables.
3. After replacing all GPS components and still no parentheses, the Transmitter may need to be replaced.

If none of the above steps resolved the issue, the import on the Transmitter may be bad and need replacing. For further assistance, contact Primex Technical Support at 1-262-729-4860.

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# Transmitter front display does not light up or has black boxes across display

## Symptoms

All or some of the below symptoms may be present.

- Transmitter front display does not light up or has light black boxes across it.
  - Red LED is flashing on the Transmitter front display.
  - No information is displayed on the Transmitter front display.
  - Clocks may be displaying a visual signal loss indicator due to they have not received a time update for three days; Analog Clock second hand is stepping and a Digital Clock/Timer colon is flashing.
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## Problem

This may be due to a power issue or communication between the EPROM chip and the front screen.

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## Analyze

1. Using a multimeter, check for 9V at least 2.0A output from the power supply to the Transmitter.
  2. If the power to the Transmitter is not correct, Transmitter continues to power cycle and does not stay synced.
  3. If the power to the Transmitter is correct, its red LED is not flashing, and clocks are not indicating a loss of signal or a clock can be power cycled and resets its time, the Transmitter is more than likely broadcasting and the issue is the communication to the Transmitter's front display screen.
  4. If the power to the Transmitter is correct, its red LED light is flashing, and the clocks are indicating a loss of signal or power cycling a clock does not reset its time, the Transmitter may have more issues other than the screen.
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## Solution

Step 1 - power down Transmitter and disconnect connections.

1. Disconnect its power supply.
2. Disconnect its backside connections.

Internal Antenna: remove the Internal Antenna, disconnect GPS cable, and any other cable that may interfere when turning unit upside down.

External Antenna: disconnect the LMR 400 Coaxial Cable, grounding wire, and GPS cable.

Step 2 - verify EPROM chip and wiring ribbon/harness.

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1. Turn the Transmitter over.
2. From Transmitter's bottom panel, remove the four Phillips half-inch screws and remove the bottom panel.
3. Locate the EPROM chip (charcoal colored) - 1 1/8" square, connections on all 4 sides, in a 4 sided nest, in the center area of the green main circuit board.
4. Rub your index finger along all four sides of the EPROM chip to ensure it's flush with the board. Gently push (not too hard, which may crack the circuit board) the center of the chip to ensure it's secure. The light pushing is an attempt to re-establish any loose connections.
5. Slide ribbon cable up and down on its pins, on both the main board and display board, seat down completely. This again is an attempt to reestablish any loose connections; the wiring ribbon/harness from the circuit to the back of the display is secure. Be gentle at the back of the display - the wiring ribbon/harness is connected to pins that are floating on the back of the display.
6. Power on the Transmitter. From the Transmitter display, verify the correct time, day, date and channel number is displayed.

Step 3- Reconnect back panel and connections.

1. Reconnect the back panel with the four Philips half-inch screws.
2. Reconnect the Transmitter's power supply and all connections.
3. From the Transmitter front display, verify the correct time, day, date, and channel number is displayed.

If these steps do not resolve the problem, the Transmitter may be required to be replaced. For further assistance, contact Primex Technical Support at 1-262-729-4860.

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# Transmitter time and date are not correct on the front display


## Symptoms

All or some of the below symptoms may be present.

- Time and date is not correct on the Transmitter front display.
- Red LED is flashing on the Transmitter front display.
- Channel Number may be or may not be displayed on the Transmitter front display, located in the lower right hand corner of the screen.

Channel Number displayed: indicates the Transmitter is currently broadcasting.

Channel Number is NOT displayed: indicates the Transmitter is not currently broadcasting.

- GPS communication symbol may not be displayed on the Transmitter front display.
- GPS communication parentheses symbol  may not be displayed on the Transmitter front display.

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## Problem

This may be due to the Transmitter switch position(s), bad or lacking information from the GPS Receiver.

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## Analyze

1. Verify the GPS communication symbol and parentheses are present.
2. Check dip switch #1, #2, #3, or #4 to verify they are in the correct position.

Switch #1 sets the Daylight Saving Time Calendar. UP position: set to the new Daylight Saving Time calendar of 2007. DOWN position: set the old schedule before 2007.

Switch #2 sets the direction of UTC offset. UP position for U.S. and Canada, DOWN position for Europe.

Switch #3 sets the automatic Daylight Saving Time adjustment. UP position for automatic Daylight Saving Time changes. DOWN position to bypass Daylight Saving Time adjustments.

Switch #4 sets the clock display on the Transmitter. UP position for 12-hour display. DOWN position for 24-hour display.

3. Verify the time zone selector is set to the correct position. Use a small slotted screwdriver to adjust the rotary switch.

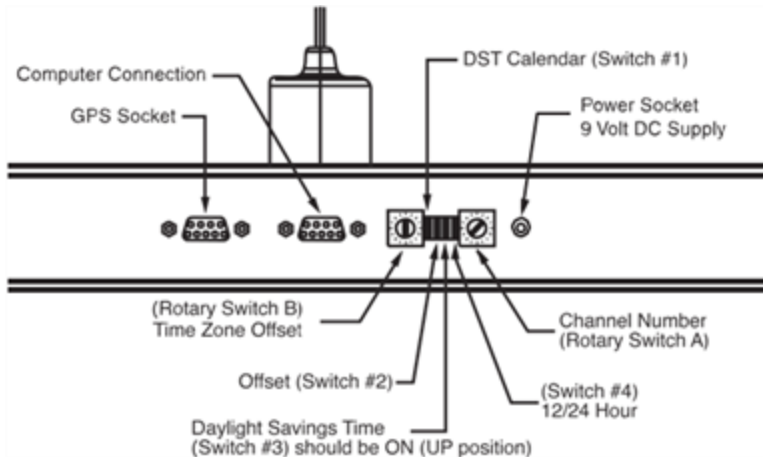
"4" for Atlantic Time Zone, "5" for Eastern Time Zone, "6" for Central Time Zone, "7" for Mountain Time Zone, "8" for Pacific Time Zone, "9" for Alaska Time Zone, "A" for Hawaii Time Zone

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### WARNING

Do NOT adjust Rotary Switch A which is the Channel Switch. It's set to the frequency specified on the FCC/IC application

and is factory preset to the FM frequency on which the Transmitter will broadcast. A 14000 series Transmitter has 16 available channels.



4. If dip switch #1 is in the correct position and ST or DT is displayed behind the time and not ST+ or DT+, the Transmitter may have the wrong EPROM chip in it.
5. If everything looks normal on the front display, but the Channel Number is not displayed, power cycle the Transmitter. As the screen comes back up, watch the upper left hand corner of the screen for either "No call sign", or "4 letters and 3 numbers" which is the Transmitter's call sign. If "No call sign" is displayed, the Transmitter cannot broadcast and requires configuration.
6. If all switch settings are correct, the GPS symbol and parentheses are both displayed, and the time and/or date are still not correct, it may be due to a bad GPS cable connection or a bad GPS Receiver.

#### NOTE

Other than the switch settings or the loss of GPS signal, the Transmitter should never display the wrong time or date. The Transmitter's time is set by the time signal received from the GPS Receiver.

#### Solution

1. If the GPS communication symbol and/or parentheses is not displayed, Red LED flashing and Transmitter GPS communication symbol is not displayed on front display
2. If the switch settings are wrong, correct them, and then power cycle the Transmitter.
3. If the GPS communication symbol and parentheses are showing and all switch settings are correct, and the time and/or date are still wrong, replace the GPS Receiver and cable.

4. If ST or DT is displayed instead of the ST+ or DT+, the Transmitter needs a new EPROM chip with the new Daylight saving Calendar. You can temporarily fix the time by changing the time zone. For further assistance, contact Primex Technical Support at 1-262-729-4860.
  5. If you have determined the Transmitter has lost the Call Sign, contact Primex Technical Support.
  6. If the switch settings are correct, the GPS Receiver and cabling have been replaced, and the time and/or date is still not correct, the Transmitter is required to be replaced. For further assistance, contact Primex Technical Support at 1-262-729-4860.
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# Transmitter continues to power cycle and does not stay synced

## Symptoms

All or some of the below symptoms may be present.

- Transmitter front display screen is dim.
  - Transmitter syncs its time, cycles back to counting up, syncs its time, and then cycles again.
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## Cause

This may be due to a power issue.

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## Analyze

1. Verify power is present at the 120 VAC outlet.
  2. Verify the power supply connection to the Transmitter and to the 120 VAC outlet is secure.
  3. Using a multimeter, check for 9V at least 2.0A output from the power supply to the Transmitter.
  4. If there is a UPS (surge protector/battery backup) in use, check the voltage carefully or bypass the UPS it to determine if it has become defective.
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## Solution

1. If power to the Transmitter power supply is bad, get the issue corrected.
2. If it's determine the UPS (surge protector/battery backup) is defective, bypass it until is can be replaced.
3. If power to the Transmitter power supply is good, replace the power supply as your first step.

If these steps do not resolve the problem, the Transmitter may be required to be replaced. For further assistance, contact Primex Technical Support at 1-262-729-4860.

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# Extremely weak or no signal

## Symptoms

All or some of the below symptoms may be present.

- The signal from the Transmitter will only set a clock or show up on a signal meter up to 100 feet or less.
  - Red LED is flashing on the Transmitter front display.
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## Problem

This may be due to a power issue, a defective Transmitter, or antenna issues.

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## Analyze

1. If the red LED is flashing on the Transmitter, first complete all troubleshooting steps in Red LED flashing and Transmitter GPS communication symbol is not displayed on front display and work through all troubleshooting topics. Resolve any issues found.
2. If the red LED is not flashing, complete steps in Transmitter continues to power cycle and does not stay synced
3. Look for the letter "L" (Loop Lock Failure) behind the time on the Transmitter front display.
4. Verify antenna connections and placement.

Internal Antenna: verify antenna connection is not cross threaded and the base of the antenna is flat and secured to the top of the Transmitter case. Verify the antenna is straight up vertically and is not touching anything or extremely close to any metal.

External Antenna: verify connections and inspect external antenna. Verify the antenna and cables running to it are in good shape, cables aren't bent or kinked, and antenna is not mounted with the head of the antenna near other objects on the roof. Detailed inspection steps provided below.

- a. Verify the LMR 400 Coaxial Cable connections are secure both at the Transmitter and at the Omni Directional Antenna.
  - b. Visually inspect the LMR 400 Coaxial Cable from the back of the Transmitter out to the Omni Directional Antenna - look for any damage (cuts, kinks compressions). If cable is damaged, replace the cable.
  - c. Visually inspect the Omni Directional Antenna for a bent radiator (top of the antenna that looks like a trombone slide that wider at the top and tapers at the antenna base). There should be three radials attached to the antenna base at 30 degree angles. Make sure all three radials are attached and securely fastened. Replace any damaged or missing components.
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- d. Verify a GelWrap splice closure is in use to protect connection from outdoor elements. Open and inspect the connection to ensure it's secure and has not been not compromised by moisture or corrosion. Dry connection if it's wet.
  - e. Verify the LMR 400 Coaxial Cable is routed and secured with a UV Resistant cable tied to the outside of the antenna mast. Be sure it is NOT routed to the inside of the mast, which may cause the connection to become wet due to condensation from ongoing seasonal climate changes.
  - f. Inspect the area where the antenna is installed, make sure the antenna head is well above the roof line and not near obstacles on the roof that could cause the signal to return on the line.
  - g. Verify the antenna has 15 ft. of clearance from other antennas and any metal.
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## **Solution**

1. If power to the Transmitter power supply is bad, resolve the issue.
2. If the UPS (surge protector/battery backup) is defective, bypass it until the UPS can be replaced.
3. If power to the Transmitter power supply is good, replace the power supply as your first step.
4. If there is an "L" behind the time, power cycle the Transmitter, watch it for at least 5 minutes to see if the "L" returns to the screen. If the "L" returns, the Transmitter will need to be replaced. If the "L" does not return, advise facility staff to check on it periodically, watching for the "L". Check the signal and determine how far it reaches.
5. Internal antenna: relocate Transmitter if antenna issues.
6. External antenna: replace damaged antennas or antenna cables. Relocate the antenna if there might be antenna issues.

If you have checked all the previous steps and there is still no signal or it only reaches out less than 100 feet, the Transmitter, antenna or antenna cable may be required to be replaced. For further assistance, contact Primex Technical Support at 1-262-729-4860.

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## Weak signal and limited coverage area

This is the toughest issue to diagnose due to there are many variables that can cause a weak signal or symptoms that may lead to indicate there is a weak signal when it's not a signal issue.

The coverage area is determined by many factors. One of the primary factors is the transmitted signal compared to the background interference. For clocks to receive a clear signal from a Transmitter, the signal must be several times stronger than the background interference. Therefore, Transmitters located in areas with generally higher background interference will have reduced signal coverage.

### NOTE

When certain types of electronic light ballasts become defective they may radiate broadband noise, which can interfere with wireless devices. While interference issues are unlikely with the Primex system, high levels of noise present in the 72-76MHz range could potentially cause clocks which are located far from the Transmitter and also within the close proximity of these ballasts to not receive a signal. Very limited instances have occurred in the past, which has only been found to happen when ballasts become defective.

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## Symptoms

All or some of the below symptoms may be present.

- Clocks may be displaying a visual signal loss indicator due to they have not received a time update for three days; Analog Clock second hand is stepping and a Digital Clock/Timer colon is flashing.
- Clocks may not set to the correct time.
- Clock issues may increase based on their distance from the Transmitter.
- Clock issues may not have a consistent, identifiable pattern.

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## Cause

This may be due to a power issue, a defective Transmitter, interference, wrong size Transmitter for facility, construction of the building, contents of the building, or poor clock maintenance.

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## Analyze

1. Complete all troubleshooting steps, first Red LED flashing and Transmitter GPS communication symbol is not displayed on front display and work through all troubleshooting topics. Resolve any issues found.
2. After resolving all issues and the signal coverage is not improved, it's recommended to test the signal coverage. To test use a meter at the Transmitter to check output and/or a meter to test the antenna and cable, or walk the facility with a clock to test signal coverage.

3. Check clocks to determine if the issue is a maintenance issue, such as weak batteries, or if the issue seems to be only present in a specific clock version or model.
  4. Make a site map. On the map, mark the clocks that have an issue to determine if there is a pattern to the issue.
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#### Solution

1. Correct all issues found while completing all troubleshooting steps.
  2. Correct all issues found with the clocks.
  3. Re-evaluate the situation with a site map and test results of the Transmitter.
  4. Contact Primex Technical Support for additional assistance when:
    - It's determined it may be a weak Transmitter.
    - The Transmitter is operating as expected, but may be too small to cover the facility.
    - There may be other circumstances causing the issue.
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# 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

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