

# Tantalus Utility Network®

**XR-3100**

**Crossband Repeater**



# Tantalus

Your Power. Your Data. One Wireless Network.



## LEGAL NOTICES

### Notice

The information contained in this document is subject to change without notice.

### Warranty

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## COMMUNICATIONS REGULATION INFORMATION

### RF Exposure

**Professional installation of this device is required.** The radio equipment described in this guide emits radio frequency energy. Although the power level is low, the concentrated energy from a directional antenna may pose a health hazard. The following minimum distances apply in both indoor and outdoor environments.

This device uses a 220 MHz (Part 90) internal antenna and the device must be mounted such that a Minimum Distance of 20 cm from the top of the device is maintained from the general public.

This internal antenna can be replaced with one of the external antennas shown in the table below. Only the antennas listed in this section are approved for use with this device.

**Table 1 Table of External Antenna Gain for Transceiver**

Part No.	dBi	Minimum Distance from the General Public.
AE-3010	5.2	23 cm
AE-3020	9.1	35 cm

More information on RF exposure is available at <http://www.fcc.gov/oet/info/documents/bulletins>.

### UL/CSA Notice

The transceiver has been recognized for use the Canadian Standards Association (CSA). The CSA Certification is in accordance with CSA CAN/CSA C22.2 No. 60950-1-03 & ANSI/UL 60950-1-2002.

#### **UL/CSA Conditions of Approval**

This device is approved for use in locations that are rated Overvoltage category I through III (IEC 60664-1). Equipment with an impulse withstand voltage corresponding to overvoltage category III is for use in the fixed installation downstream of, and including the main distribution board, (IEC 60364-4-443).

**The transceiver is not acceptable as a standalone unit.** It must be mounted within the following conditions of approval:

1. Installation, operation and maintenance of the transceiver should be in accordance with the transceiver's installation manual, and the National Electric Code.
2. When installed, this equipment must be protected with an external disconnect device and branch circuit current protection with a maximum rating of 15A. A circuit breaker rated at 15A satisfies both requirements.
3. When the unit cannot have the AC supply sourced from an Overvoltage category III installation, a transient voltage surge suppressor must be installed before the unit to reduce the peak transient surge rating.
4. Tampering or replacement with non-factory components may adversely affect the safe use of the transceiver and will void the approval.

5. Use of batteries that are not Tantalus-approved may adversely affect the safe use of the transceiver, and will void the approval.

#### FCC Part 15 Notice, USA

The transceiver described herein complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This device is specifically designed to be used under Section 15.247 of the FCC Rules and Regulations. Any unauthorized modification or changes to this device without the express approval of Tantalus Systems Corp. may void the user's authority to operate this device.

Furthermore, this device is intended to be used only when installed in accordance with the instructions outlined in this manual. Failure to comply with these instructions may also void the user's authority to operate this device.

#### **Radio and Television Interference**

The installation guidelines are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try and correct the interference by one of more of the following measures:

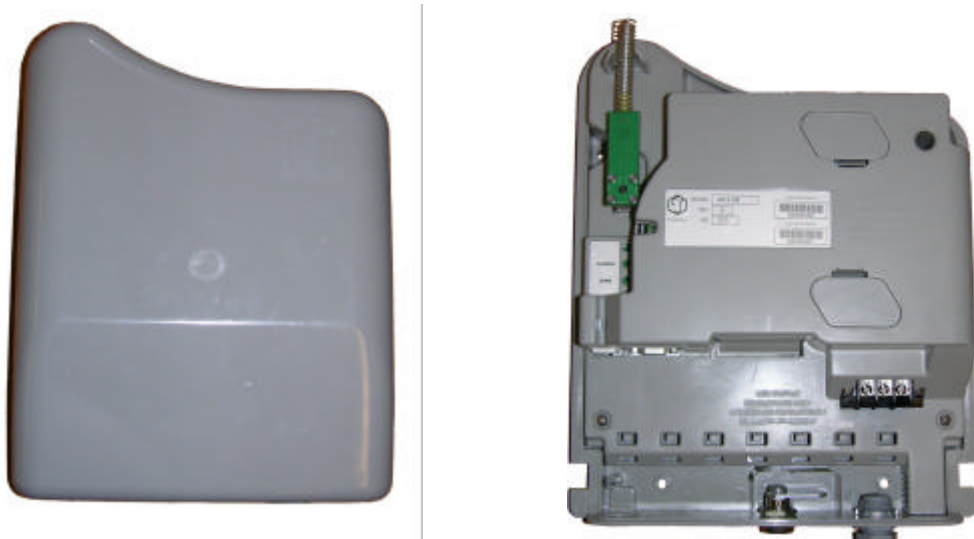
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



## Product Description

The XR-3100 is a cross band repeater that transports TUNet traffic between the 220 MHz WAN and the 900 MHz LAN. The XR-3100 provides additional flexibility when deploying a network:

- In hard to reach situations such as at range boundaries, where the device can be mounted high up to extend reach.
- In hard to penetrate situations, such as in metal enclosures or basements, where the device can be connected to an external antenna, allowing the TUNet signal to be directed towards the Network Controller.



## General Information

Tantalus provides two-way, real-time data communications networks to monitor and control electric utilities. Our long-range wireless networks unite a utility's applications, making meter reading, load management, and distribution automation cost-effective and practical throughout urban and rural service areas.

The Tantalus Utility Network uses long-range 220 MHz spectrum to deliver valued applications such as outage management, power quality monitoring, meter reading, load management, and distribution automation to utilities. The Network provides robust two-way communications throughout a utility's diverse service territory – including residential, commercial, and industrial.

## Product Specification: **XR-3100 Cross Band Repeater**

<b>Frequency Range</b>	902-928 MHz frequency hopping, license exempt 220-222 MHz frequency agile, very narrow-band GFSK
<b>Operating Temperature</b>	-22 to 140°F (-30 to +60°C)
<b>Operating Humidity</b>	5% to 95% non-condensing
<b>Modulation</b>	GFSK
<b>Power Supply</b>	100-240VAC from AC line mains, 2 A max
<b>Power Consumption</b>	Quiescent Power: 1.9 watts typical Standby Power: 2 watts Active Power: 12 watts (pulsed) Transmitted RF Power: 5 watts
<b>Outage Reporting</b>	Optional
<b>220-222 MHz Antenna (Part 90)</b>	Internal: Standard External: Optional For more information about the antennas that are approved for use with this device, see the table 1 on page ii.
<b>900 MHz Antenna (Part 15)</b>	Not accessible to installer/operator.
<b>Data rate</b>	1600/3200 bps
<b>Standards</b>	<ul style="list-style-type: none"> <li>• FCC CFR Title 47 Part 15c (Intentional Radiators)</li> <li>• ANSI C12.1:1995 Sections: 4.7.3.1 Insulation, 4.7.3.11 EFT/Burst, 4.7.3.3.1 Surge Immunity, 4.7.3.3.2 Ring Wave Immunity</li> <li>• CFR Title 47 Part 15b (Unintentional Radiators)</li> <li>• CFR Title 47 Part 90, Sub-Part I &amp; T (Private Land Mobile Radio Services)</li> <li>• CSA C22.2 60950-1 and ANSI/UL 60950-1-2002. (Product Safety)</li> </ul>



## Installing the XR-3100

Before the XR-3100 is ready for installation in the field, it must be programmed in the Meter Shop.



### Warning

Energized meters, meter sockets and distribution lines present the risk of electrical shock. All work on this equipment should be performed by qualified metering specialists or industrial electricians. Personnel working with this equipment should follow all utility company established operation and safety procedures.

### PROGRAMMING INSTRUCTIONS FOR THE METER SHOP

Ensure that you have the latest version of Tantalus DT-150 software installed on your PC and that you have your utility's Business Identifier as supplied by Tantalus.

1. Remove the XR-3100 from the packaging and place it on a flat, stable surface. Retain the packaging so you can re-package the device for the field once you have programmed it.
2. Unlock the XR-3100 and slide the front cover upwards until you can lift it free.



### Warning

Do NOT remove the inner plastic cover of the XR-3100. Tampering with the inner workings of this device may result in damage to the product or injury to the installer and void the product warranty.



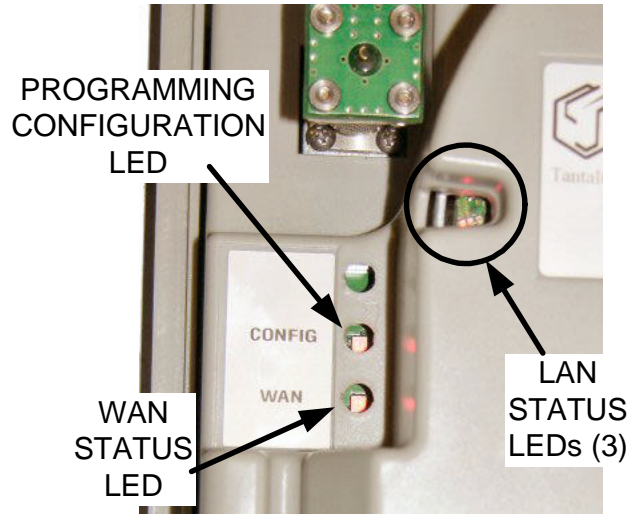
### Caution

Ensure that both battery compartments are empty.

3. Attach a power cord to the terminal blocks.
4. Attach the XR programming cable between your computer running the DT-150 software and the XR-3100 serial programming port, as shown in Figure 1. **Ensure that the toggle switch on the programming cable is set to LAN as shown in Figure 3.**



**Figure 1** The XR-3100 serial port with the DT-100 Cross band programming cable attached.



**Figure 2** Position of the XR-3100 programming and status LEDs




**Figure 3** Switch position to select the LAN Controller.



**Figure 4** The green programming CONFIG LED indicating communication to the LAN Controller.

5. Plug in the power cord. The CONFIG LED should now be green as shown in Figure 4. If it is red, immediately disconnect the power cord and check the toggle switch on the programming connector.

6. Start the DT-150 software. Click the read icon  once. A new window will appear. Should nothing come up then check all connections and settings.

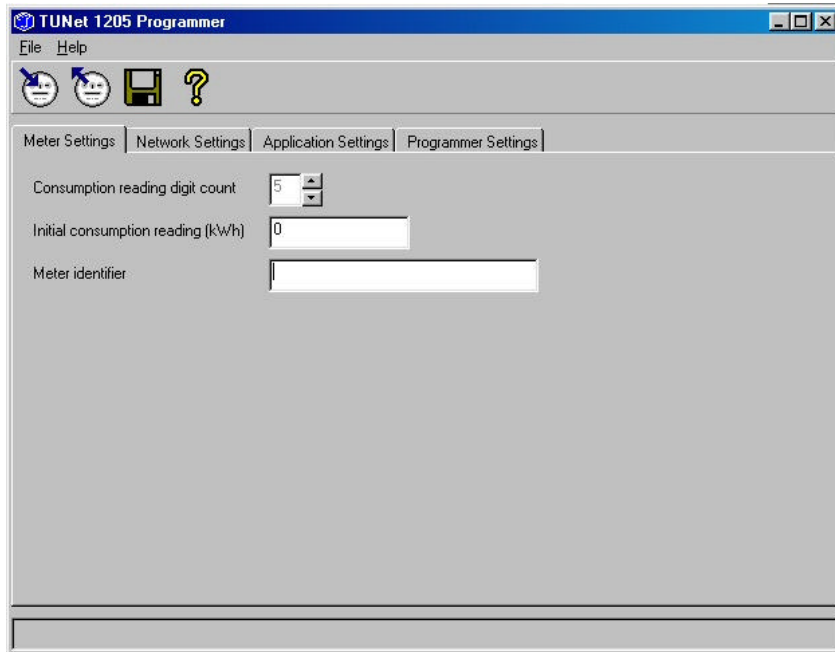
7. LAN Programming:

### Meter Settings Tab

Consumption reading digit count: default

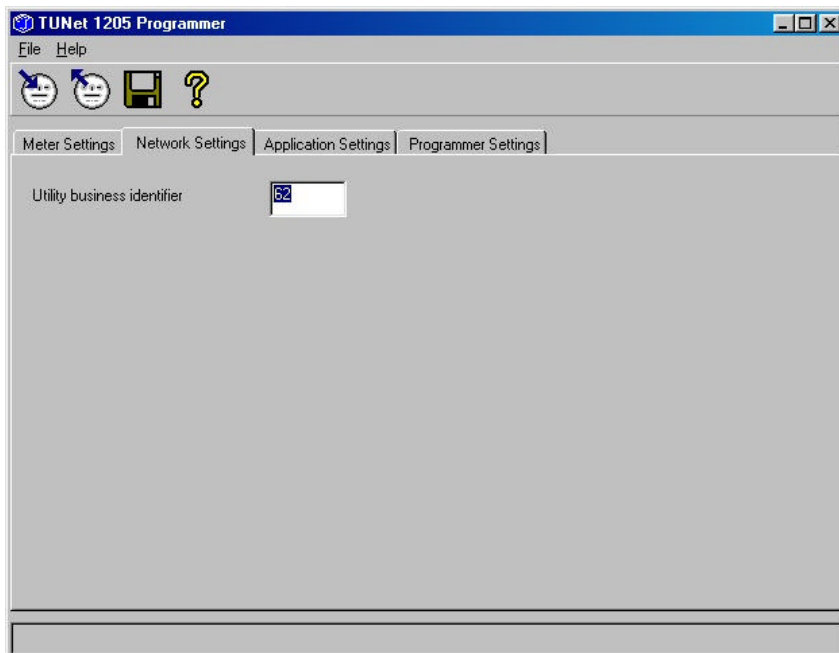
Initial Consumption reading: default

Meter Identifier: Enter a unique identifier for the unit, ie "Utility pole 12345", "1234 Broadway Street"



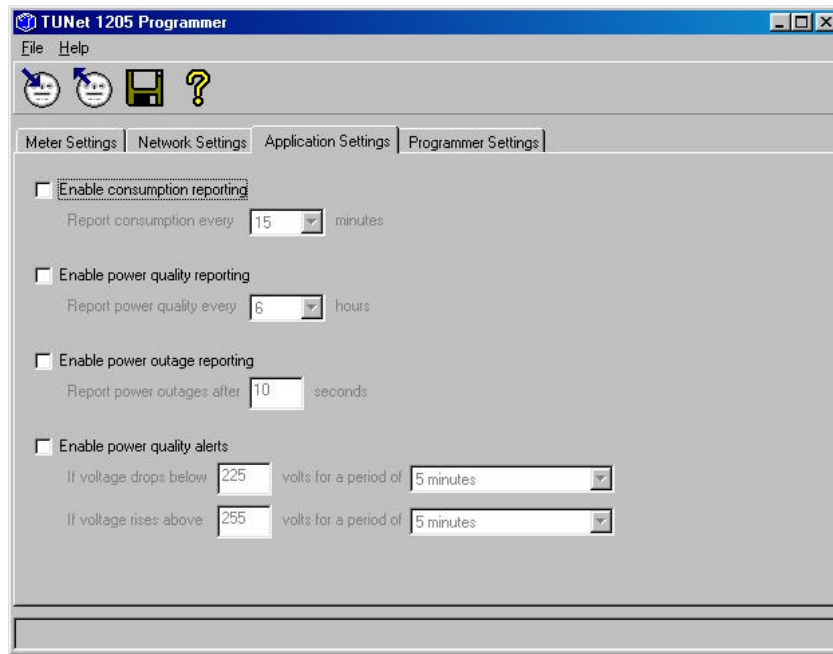
### Network Settings


Utility business identifier: Enter in the assigned business ID number for your utility provided by Tantalus.



## Application Settings

Uncheck all the boxes



8. Click the program icon  . Now close the DT-150 program.
9. Unplug the XR-3100. Switch the toggle on the programming cable to the WAN position.
10. Unplug the cord and disconnect it from the terminal block.
11. Return the XR-3100 to the original packaging. Ensure that you include at least one battery in the packaging with the device but do NOT install it in the XR-3100.

## INSTALLATION INSTRUCTIONS FOR THE FIELD



### Warning

This product should not be installed during heavy rain or snow as there may pose a risk of electric shock.

1. Remove the XR-3100 from the packaging. Ensure that you have a battery for the device, but do NOT install it until step 4.



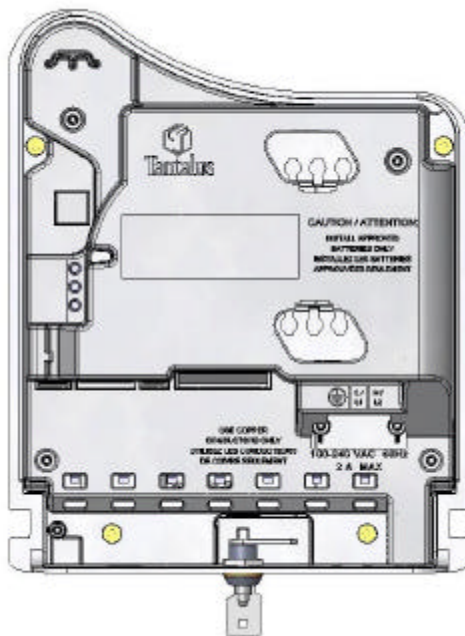
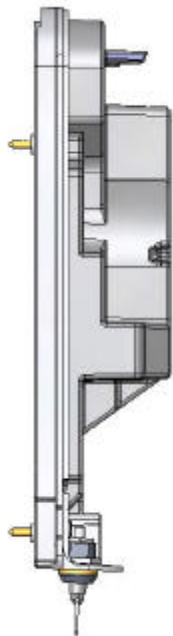
### Warning

1. Ensure that there is no power source connected to the XR-3100.
2. Ensure that both battery compartments are empty.

2. Remove the cover and mount the XR-3100 by one of the following methods:

### Flat wall:

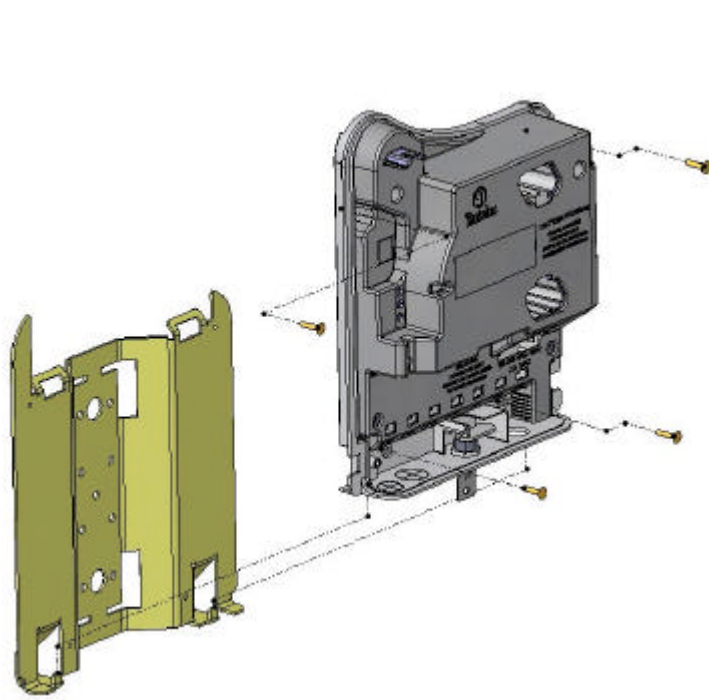
The XR must be mounted to a flat surface that will engage all four mounting screws. This is important to ensure adequate environmental sealing. The XR-3100 comes with 4 mounting screws for mounting to wood or sheet metal.



Mounting bracket:

The mounting bracket can be fixed to a utility pole by metal strapping or by threaded rod. The bracket has also been designed to mount to horizontal poles and hand rails.

It is recommended to first mount the bracket first then mount the XR-3100 to the bracket using the 4 thread cutting screws that come with the bracket.



**Caution**

All 4 screws must be securely installed for protection against the environment. Failure to do so will void warranty.

3. If you are using the supplied internal antenna, go to Step 4.

– or –

If you are installing the Tantalus-approved external antenna:

- a. Remove the internal antenna by unscrewing the TNC plug from the TNC jack.
- b. Remove the ½" trade knockout on the bottom left of the device. It is recommended to use a utility knife, flat head screw driver and hammer to facilitate removal.
- c. Run the coaxial cable from the outside of the box and up through the knockout. Connect the cable to the TNC jack.
- d. Ensure that there are several inches of strain relief available in the coax cable. Secure a tie wrap to the slots in the inner cover.
- e. Install the provided split cord grip fitting around the coax cable and insert into the knockout. This fitting can accommodate multiple coax thickness. If the cable is too loose, wrap electrical tape around the coax cable to provide a tighter fit in the cord grip fitting.

The device should now look like the one in Figure 5.



**Figure 5 The XR-3100 with the strain relief correctly installed**

- f. Install the external antenna, lighting arrestor and mounting hardware according to the supplied instructions and also taking note of the minimum safe operating distances for the general public in Table 1 of the RF Exposure section on page ii.

4. Install the battery in the XR-3100. Depress the battery cover tab, lift the cover, and install the batteries (orientation not critical) with the exposed contacts inward.



**Caution**

Ensure that you are using a Tantalus-approved battery only.  
Do NOT apply power to the XR-3100 until the battery has been installed.

5. Attach power to the XR-3100:
  - a. Connect the white power/neutral wire, black power wire, and green chassis ground wire to the terminal block per the markings on the inner cover.
  - b. Ensure that there are several inches of strain relief available in the wires. Secure a tie wrap to the slots in the inner cover.
6. Turn on the power.
7. Observe the LEDs on the left side of the XR-3100 to verify that two-way communication is established.
  - A green WAN LED indicates that the XR-3100 is operational.

For a description of the LEDs, turn to *Troubleshooting the XR-3100* on page 11.

8. Attach the top cover by sliding the faceplate down over the device. The cover will snap into place if correctly installed.
9. Engage the barrel lock.

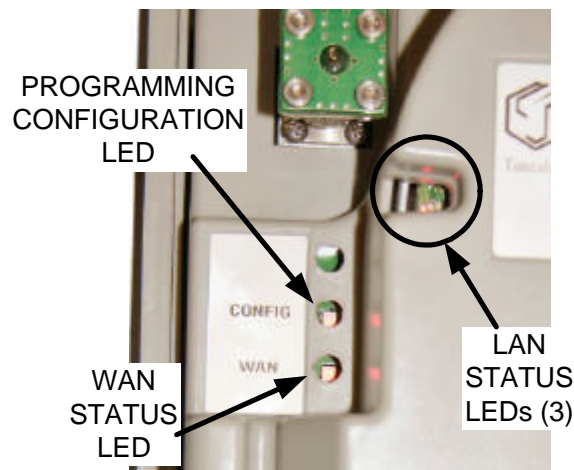


## Troubleshooting the XR-3100



**Warning**

Energized meters, meter sockets and distribution lines present the risk of electrical shock. All work on this equipment should be performed by qualified metering specialists or industrial electricians. Personnel working with this equipment should follow all utility company established operation and safety procedures.



**Figure 6** Position of the XR-3100 programming and status LEDs

### WAN LED STATUS INDICATORS

Start-up/Power up	Solid RED
Scanning	Flashing RED
Found Tantalus Channel	Flashing ORG
Received message from Network Controller (one-way)	Solid ORG
Received ACK to response to Network Controller (two-way)	Solid GRN
Failed to receive ACK to subsequent response to Network Controller (return to one-way)	Solid ORG

LAN NETWORK STATUS LED (RED)

Start-up/Power up	Solid RED
Module is not programmed	Fast flashing RED
Unassociated/Re-associating	Solid RED
Valid association candidate found	Flashing RED
Full network association confirmed	OFF

LAN APPLICATION MESSAGE TRANSACTION LED (GREEN)

Start-up/Power-up	OFF
Message queued for transmission	Long flash GRN
Valid message received (addressed to this device)	Short flash GRN

LAN RF PACKET LED (AMBER)

Start-up/Power-up	OFF
RF packet transmitted	Long flash Amber
RF packet received (LAN activity)	Short flash Amber

Check the WAN LED on the mid cover to ensure full two-way communication with the NC-2200.

If	Then
The XR-3100 does not power up.	Remove the unit and replace it with another one.
The XR-3100 powers up but does not appear to find a Tantalus channel.	Remove the unit and replace it with another one. When back in the Meter shop, ensure that the Tantalus channel has been programmed in the scan list.
The XR-3100 finds the Tantalus channel but does not appear to be addressed by the controller.	Contact the NC-2200 Administrator to verify that the unit is being installed and the WAN Network ID has been registered in the database. If it has not been registered, ask that it be registered now.

If you still can't get a signal and you are only using the internal antenna, try installing an external antenna to the device to boost the signal strength.

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