Technical Note 098

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Nexus Wireless Troubleshooting & Maintenance Guide

Troubleshooting

Startup Problems

- **The radio will not wake up.** While in **storage mode**, the radio does not operate. All radios powered from an integrated battery ship from the factory in storage mode to conserve the battery. To wake the device, press and hold button 1 for 5 seconds. To place the radio in storage mode, press and hold button 1 for 5 seconds. The radio is in storage mode when the LEDs stop blinking, but in some models, the LCD remains on for an additional minute after the radio enters storage mode. After entering storage mode, you must wait 1 minute before waking it.
- **The sensors are not powered.** Many devices have several switch power outputs for powering sensors. Enable the power supplies using the I/O point parameters for sensor supply #, supply output voltage, and warm-up time.
- **The radio will not enter binding mode.** If you did not disconnect the power before changing the DIP switch positions, you must cycle power to the device. If you do not cycle power, the device does not register the DIP switch changes. For devices with an integrated battery, cycle the power by removing the battery for one minute.

Power/Battery Issues

- **The radio seems only partially powered.**
    - The radio has entered **Sleep Mode**. During normal operation, the radios enter sleep mode after 15 minutes of operation. The radio continues to function, but the LCD goes blank. To wake the device, press any button.
    - Verify the ribbon cable is correctly and fully plugged into all pins. It is possible to accidentally plug in the ribbon cable and miss the top row of pins. When the ribbon cable is plugged in incorrectly, the radio may partially power up, but it will not be able to communicate to any sensors nor will it communicate with the wireless network.
- **The radio will not power-on.**
    - If the device is supplied by 10-30 VDC, check the supply is operating correctly and that the maximum load ratings have not been exceeded.
    - If powered with an integrated battery, remove the radio cover and the battery, and test the voltage of the battery using a voltmeter. Any reading of 3.5 VDC or less is insufficient for full functionality of the radio and the battery must be replaced. Refer to the Maintenance section for instructions on properly replacing the battery and securing the radio cover.

Communication Issues

Refer to the Error Messages section for more information.

- **Communication is intermittent**
  - Run a site survey to determine the quality of the radio link.
  - Verify radio is powered. If battery-powered, test battery voltage. Refer to Power/Battery Issues for more information.
  - Verify all antenna connections.
  - Check for any recent environmental changes (trees, foliage, construction, etc.).
- **Communication has failed, system not responding**
  - After any additions (binding), changes, or performing a Site Survey, it may take up to 2 minutes for the Gateway and all Receiver radios in your system to synchronize.
  - Verify radio is powered. If battery-powered, test battery voltage. Refer to Power/Battery Issues for more information.
  - Verify all antenna connections.

If after a specified number of sequential polling cycles the Node does not acknowledge a message, the Gateway considers the link with that Node timed out (after approx. 4 minutes). The LCDs on both the Node and Gateway will display *ERROR. Press button 2 to view the Node experiencing the issue. Press button 1 to view error options.

- Clear – Clears the error message. The message will appear again if the error still exists.
- Disable – Disables error message from ever being reported again.
- Ignore – Ignores the error message for this instance only.

Base systems: Following a time-out, the Node de-energizes outputs and the Gateway sets all outputs linked to the Node in question to a de-energized state. Inputs from the Node mapped to outputs on the Gateway are suspended during a link time-out.

Link systems: Following a time-out, the Node will remain in its last state. The user is responsible for correcting the radio communications problem and regaining control of the external device.

After communication has failed, the Gateway must receive a specified number of good data packets (approx. 15 seconds worth) from the Node in question before the link is reinstated. Outputs are restored to current values after the link recovers.

Note: Signal quality with the Gateway or repeater radio significantly affects Node battery life.

Error Messages

LED Message Codes

Solid or flashing LEDs mean different things depending on the device.

LED 1	*LED 2*	*Definition*	*Solution*
Solid green		Gateway: Power is on	
Flashing green		Receiver: Good communication link	
	Flashing amber	Active communication	
Flashing red	Flashing red	Device error	If the LCD also reports BAD EE, contact Tucor for replacement.
		Gateway: Modbus communication error	Check connection and configuration of Modbus host/device.
	Flashing red	Receiver: No radio communication	• If the Gateway and Node are less than 6' apart, device communication may fail (radios may saturate). If the Gateway is less than 6' from another Gateway, send and receive transmissions between all devices the Gateways communicate with fails. • The Gateway and Node may be too far apart to achieve synchronization – consult Tucor for options. • Use a qualified antenna on both the Gateway and Node devices. • After any system parameter change, cycle the power to re-synchronize all devices. • When a Node loses synchronization, it is programmed to attempt resynchronization for 5 seconds, then sleep for fifteen seconds. Synchronizing may require up to 2 minutes. • Re-cycle power on the Gateway and Node devices.
No LED 1	No LED 2	All devices display "POWER" on the LCD for the first five to ten seconds after applying power. A Gateway always has a green LED 1 on when power is connected. Receivers flash a green LED 1 every second (or a red LED 2 every three seconds depending on the RF Link status.)	If no LEDs are lighting up: • Put battery powered devices into power-down mode by pressing and holding button 1 for three to five seconds. To return from power-down mode, press and hold button 1 for 3-5 seconds. • Recheck the power connections and power requirements. Battery-powered devices require 3.6–5.5VDC. Non-battery powered devices require 10–30VDC. • After replacing the battery, allow up to 60 seconds for the device to power up.

LCD Message Codes

If **ERROR* is displayed on the Gateway Radio's LCD screen (excludes Gateway Controller), press button 2 to view which node/receiver is experiencing the error. Press button 2 again to display the error message and refer to the table below.

Message	*Definition*	*Solution*
EC 53	Radio device (Node/Receiver) timed-out. • Gateway has lost communications with the Node/ Receiver indicated.	• Run a site survey to determine the quality of the radio link. If no communication exists between the Gateway and Node, verify the power at the Node and all antenna connections. Blocked radio communications may also be a result of recently changed environmental conditions. • Power-cycle the Gateway. • Replace the battery of a battery-powered Node. Although the LCD and device may appear functional, the battery may not have enough capacity to handle radio communication.
EC 54	Modbus time-out	Check connection and configuration of Modbus host/device.
Bad EE	System error – EEPROM failure	Replace Device
LCD Off	All radios display "POWER" on the LCD for the first 5 to 10 seconds after applying power. A Gateway's LED 1 is solid green when power is connected. Nodes flash a red LED 2 every 3 seconds or a green LED 1 every second depending on the radio link status.	• Battery-powered devices turn off the LCD after 15 minutes (factory default). Push any button to reactivate the LCD. Battery-powered devices may be in storage mode. To put battery powered devices into storage mode, hold button 1 for 5 seconds. To return from storage mode, hold button 1 for 5 seconds. • Recheck the power connections and power requirements. Battery-powered devices require 3.6 to 5.5 VDC. Non-battery powered devices require 10 to 30 VDC. • After replacing the battery, allow up to sixty seconds for the device to power up.

After viewing the error message, press button 1 to advance through the menu of:

- CLEAR: Clears this particular instance of the error from the system. Error will display again if the error condition remains.
- DISABL: Disables this particular error from ever appearing again from this specific node.
- IGNORE: Ignores the error. Error will not display again until condition has cleared and error occurs again.

Maintenance

Follow these instructions to perform basic maintenance tasks.

Replacing the Main Body Gasket

Check the main body gasket every time a wireless device is opened.

Replace the gasket when it is damaged, discolored, or showing signs of wear. The gasket must be:

- Fully seated within its channel along the full length of the perimeter, and
- Positioned straight within the channel with no twisting, stress, or stretching.

Replacing the Rotary Dial Access Cover

Check the rotary dial access cover o-ring every time the access cover is removed.

Replace the o-ring when it is damaged, discolored, or showing signs of wear. The O-ring must be:

- Seated firmly against the threads without stretching to fit or without bulging loosely, and
- Pushed against the flanged cover.

When removing or closing the rotary dial access cover, manually twist the cover into position. Do not allow cross-threading between the cover and the device's face. After the cover is in place and manually tightened, use a small screwdriver (no longer than five inches total length) as a lever to apply enough torque to bring the rotary dial access cover even with the cover surface.

Replacing the Battery

When installed outdoors or in a high humidity environment, applying dielectric grease to the battery terminals to prevent moisture and corrosion buildup is recommended. To replace the lithium "D" cell battery in battery-powered radio units, follow these steps:

1. Unplug the battery module from the device it powers.
2. Remove the four screws mounting the battery module face plate to the body and remove the face plate.
3. Remove the discharged battery by pressing the battery towards the negative terminal to compress the spring. Pry up on the battery’s positive end to remove from the battery holder.
4. Replace with a new battery. Only use a 3.6 V lithium battery from Xeno, model number XL-205F.

5. Verify the battery's positive and negative terminals align to the positive and negative terminals of the battery holder mounted within the case.
   After replacing the battery, allow up to 60 seconds for the device to power up.
6. Properly dispose of your used battery according to local regulations by taking it to a hazardous waste collection site, an e-waste disposal center, or any other facility qualified to accept lithium batteries.

As with all batteries, these are a fire, explosion, and severe burn hazard. Do not burn or expose them to high temperatures. Do not recharge, crush, disassemble, or expose the contents to water.

WARNING:

- There is a risk of explosion if the battery is replaced incorrectly.
- Potential electrostatic charging hazard
- When replacing the battery, the negative end of the battery holder is the side with the spring terminal. This side is marked with a minus (−) sign.
- Do not attempt to recharge the battery. These batteries are not rechargeable. Recharging may cause serious injury to personnel or damage the equipment. Replace only with factory recommended batteries.