



Applies to the Following FreeWave Products

This quick start guide applies to the following products in a wire replacement I/O system.

- FGRIO-M (running firmware 2.54 or later)
- FGRIO-S
- FGR2-IOS-C-U
- FGR2-IOS-CE-U
- FGR2-IO-IOE

Summary

This document describes how to quickly get the transceivers in a wire replacement I/O network setup and communicating with each other. It covers only the settings required for radio communication to and from the I/O Master and the I/O Slaves.

Additional information about transceiver settings, installing, and wiring information is provided in the *Wire Replacement I/O User Manual and Reference Guide*.

Installing Tool Suite

Tool Suite is the newest configuration software and is the recommended method for programming your transceivers. It provides a group of tools for configuring the devices in your network and for monitoring your network's performance. Using the Configuration application within Tool Suite, you can program changes to your transceiver settings. The Tool Suite installation is available on the *User Manual and System Tools CD* and is also available for download from www.freewave.com.

For more information about the general use of Tool Suite, see the *Tool Suite User Manual* on the *User Manual and System Tools CD* or by selecting **File > Help** in the Tool Suite software.

Note: You can also program FreeWave transceivers using a terminal emulator such as HyperTerminal, which offers the same configuration options that are available in the Configuration application in Tool Suite. If you run versions of the Windows operating system prior to Windows 7, HyperTerminal is included in the operating system installation. However, if you are running Windows 7 or newer, HyperTerminal is no longer available. If you prefer the HyperTerminal interface, the Setup Terminal application within Tool Suite provides the same interface that is available using HyperTerminal.

Configuring an I/O Master

This section describes how to quickly get the I/O Master in a wire replacement I/O network setup and communicating with the I/O Slaves. It covers only the settings required for radio communication to and from the I/O Master and the I/O Slaves. Parameter settings not included in the procedure below can be set at your discretion or remain at the factory default setting. For more information about the additional settings, see *Wire Replacement I/O User Manual and Reference Guide*.

1. Connect the transceiver to the serial port of a computer either through a serial cable or using the diagnostics cable. Make sure to connect the radio to a power source (+7.0 to +30.0 VDC).
2. Open Tool Suite and click **Configuration** in the Application pane.
3. Click **Read Radio** to read the transceiver's current settings.

The screenshot shows the 'Radio Information' configuration window. At the top, there are tabs for (0) Operation Mode, (1) Baud Rate, (2) Call Book, (3) Transmission Characteristics, (5) MultiPoint Parameters, and (9) IO Settings. The 'Radio Information' tab is active. It contains the following fields:

- Model: FGR 900 MHz IO Master
- Serial Number: 927-6792
- Firmware Version: 2.65
- Date Created: 6/30/2009 9:06 AM
- Date Modified: 6/30/2009 9:06 AM
- View Report... button

Below the radio information is the 'User Data' section, which includes:

- Site Name: 927-6792 - FGR 900 MHz IO Master
- Radio Notes: (empty text area)
- User created information pertaining to the radio.

The 'Diagnostics' section displays the following values:

- Master-Slave Distance (m): 62464
- Number of Disconnects: 0
- Radio Temperature (C): 24
- Antenna Reflected Power: 0
- Transmit Current (mA): 0
- Noise (dBm): -120
- Signal (dBm): -120
- Rate %: 0

A note at the bottom of the diagnostics section reads: 'These are the saved values the radio reported the last time it was read.'

4. Click the Operation Mode tab and select from one of the following options in the **Modem Mode** field:
 - **(E) FGRIO Master** - Select this mode when the I/O Master is a standalone I/O system and is connected to only I/O Slaves.
 - **(3) Point to MultiPoint Slave** - Select this option if the I/O Master is part of a larger network and serves as a MultiPoint Slave that is connected to the I/O Slaves. Configure the other, non-modbus radios in the network accordingly. Ensure that the **Repeaters** parameter is set to Enabled in the serial network Master.

The Ethernet options that display in this tab do not apply to an I/O Master and should be left at their factory default settings.

5. If you selected **(E) FGRIO** in step 4, continue with the next step as the Baud Rate tab settings do not apply. If you selected **(3) Point to MultiPoint Slave** in step 4, click the Baud Rate tab and set the following parameters to match the device that is connected to the transceiver's data port.
 - Baud Rate
 - Data Parity
 - Serial Interface
 - Flow Control

6. Click the Call Book tab and enter the I/O Slaves' serial numbers in the **Number** column.
The **Repeater 1** and **Repeater 2** columns remain black as Repeaters are not used in a wire replacement network.
7. Click the Transmission Characteristic tab and set the following:
 - **Frequency Key** - If you selected **(E) FGRIO** in step 4, select a unique key. FreeWave recommends changing the key from the default setting of **5**.
If you selected **(3) Point to MultiPoint Slave** in step 4, the **Frequency Key** must match the network Master.
 - **Hop Table Version** - Leave at the factory default **902-928 MHz**.
 - **Hop Table Size** - Leave at the factory default **112**.
 - **Max Packet Size** - Set to **2** or higher.
 - **Min Packet Size** - Set to **2** or higher.
If you selected **(3) Point to MultiPoint Slave** in step 4, both the **Max** and **Min Packet Sizes** must match the network Master.
 - **RF Data Rate** - Set to **Normal**.
8. Click the MultiPoint Parameters tab and set the following:
 - **Master Packet Repeat** - Set to **3**.
 - **Network ID** - If you selected **(E) FGRIO**, enter a unique number between 1 and 4095 (except 255).
If you selected **(3) Point to MultiPoint Slave** in step 4, the **Network ID** must match the network Master.
 - **Repeaters** - Set to **On**.
 - **Subnet ID** - If you selected **(3) Point to MultiPoint Slave** in step 4, set the **Rx** portion of the subnet to **0** and the **Tx** portion to **F** if the I/O Master links directly to the network Master.
9. Click the I/O Settings tab and set the following:
 - **Enable FGRIO** - Set to **On**.
 - **Sensor Power** - A setting of **Always On** supplies continuous power to the VSNS (pin 7) of the I/O Slave. Use **Gated** when the RTU provides a switched power output to control the power of the analog sensor loop at the I/O Slave.
 - **Default Delay** - Enter the amount of time that the I/O Master waits before issuing a link alarm due to loss of communication to an I/O Slave. A setting of:
 - **1** = 1/6 second
 - **6** = 1 second
 - **42** = 7 seconds
 - **252** = 42 seconds
 - **Analog Out 1 through Digital Out 4** - Map the I/O Master outputs to the I/O Slave inputs. Select the appropriate I/O Slave input from the drop-down list next to the output.
The I/O Slaves are labeled by their position in the Master's Call Book. For example, Slave 0 refers to the serial number in entry to call **0**.

- Send the settings to the transceiver using the **All** or **Quick** options in the Network Title ribbon within Tool Suite.

Configuring an I/O Slave

This section describes how to quickly set an I/O Slave in a wire replacement I/O network. Parameter settings not included in the procedure below can be set at your discretion or remain at the factory default setting. For more information about the additional settings, see *Wire Replacement I/O User Manual and Reference Guide*.

Note: In an I/O Slave, the serial port is disabled. Therefore, the I/O Slaves do not use any settings in the Baud Rate tab.

- Connect the transceiver to the serial port of a computer either through a serial cable or using the diagnostics cable. Make sure to connect the radio to a power source (+6.0 to +30.0 VDC).
- Open Tool Suite and click **Configuration** in the Application pane.
- Click **Read Radio** to read the transceiver's current settings.

The screenshot displays the 'Radio Information' configuration window. At the top, there are tabs for (0) Operation Mode, (1) Baud Rate, (2) Call Book, (3) Transmission Characteristics, (5) MultiPoint Parameters, and (9) Wire Replacement. The main area is divided into three sections:

- Radio Information:** Contains fields for Model (FGR 900 MHz IO Slave), Serial Number (930-0853), and Firmware Version (2.65IO). It also shows Date Created and Date Modified (both 6/25/2009 9:00 AM) and a 'View Report...' button.
- User Data:** Includes a 'Site Name' field with the value '930-0853 - FGR 900 MHz IO Slave' and a 'Radio Notes' text area. A note below states 'User created information pertaining to the radio.'
- Diagnostics:** Displays various performance metrics: Master-Slave Distance (62464), Number of Disconnects (0), Radio Temperature (26), Antenna Reflected Power (0), Transmit Current (0), Noise (dBm) (-255), Signal (dBm) (-255), and Rate % (0). A note below states 'These are the saved values the radio reported the last time it was read.'

- Click the Operation Mode tab and select **(E) FGRIO Slave (Wire Replacement)** or **(E) FGRIO Slave (NOT IO-MODBUS)**, depending on your version of Tool Suite.
- Click the Call Book tab and enter the I/O Master's serial numbers in the Number column. The **Repeater 1** and **Repeater 2** columns remain black as Repeaters are not used in a wire replacement network.

6. Click the Transmission Characteristic tab and set the following parameters to the same settings as the I/O Master:
 - **Frequency Key**
 - **Hop Table Version**
 - **Hop Table Size**
 - **Max and Min Packet Sizes**
 - **RF Data Rate**
7. Click the MultiPoint Parameters tab and set the following parameters to match the I/O Master:
 - **Master Packet Repeat**
 - **Network ID**
 - **Repeaters**

Note: Subnet IDs are not used in I/O Slaves in a wire replacement network.
8. Click the Wire Replacement tab and set the following:
 - **Digital Out 1 and Digital Out 2** - Mapped to the Digital Inputs of the I/O Master.
For example, if you select Master DI#1 in the Digital Out 1 field, the I/O Master Digital Input 1 controls Digital Output 1 on the I/O Slave radio.
 - **A11 250 Ohms and A12 250 Ohms** - If you are configuring an FGR2-IOS-CE-U (an enclosed transceiver without an expansion port), set the power-up state of the internal resistor 250 Ω resistor when connecting the I/O Slave's Analog Inputs to an 4-20 mA sensor.
 - **D11 Pullup and D12 Pullup** - Sets the power-up state of the internal resistor (10 Kohms) connected to the Digital Inputs. They can pull up, such as when using a closed-contact-to-GND switch input, pull down so that unused inputs read 0 as DIs or ~0 as auxiliary analogs, or float to not load analog inputs.
 - **Digital Out 1 Default and Digital Out 2 Default** - Select the state to which the Digital Output returns to when you power up the device, or the device loses its link to the I/O Master in the network.
 - **Default Delay** - Enter the amount of time that the I/O Slave waits before entering the default state defined in **Digital Out 1 Default** and **Digital Out 2 Default**. A setting of:
 - **1** = 1/6 second
 - **6** = 1 second
 - **42** = 7 seconds
 - **252** = 42 seconds
9. Send the settings to the transceiver using the **All** or **Quick** options in the Network Title ribbon within Tool Suite.

