



Table of Contents

Introduction	3	Operation	16
Installation	3	Modes of Operation	16
Cabinet	3	General Editing	16
Earth Ground	4	Timing Mechanism Components	17
Power Source	5	Power-Up Diagnostics	18
Station Decoder	6	Home Button	18
Grounding the Communication Cable.....	8	Start Button	19
Pressure Sensor.....	9	Pause / Resume Button	19
Rain Sensor	9	Stop Button	19
Master Valve / Pump Relay	9	Gateway Settings	20
Gateway Synchronization	9	Station Settings	22
Communication Cable.....	10	Scheduled Watering	23
Communicating with the Remote Gateway.....	11	• Station Based Flow Management	
To Test Radio Communication Between the FIU and the Remote Gateway	13	Manual Watering	24
Changing the Frequency of the Radio	14	% (Percent) Adjust	24
		Diagnostics	25
		Motherboard Diagnostic Display	25
		Checking and Clearing Alarms	26
		Alarm Conditions	27
		Short Circuit Alarm	
		Thermal Alarm	
		High Current Alarm	
		Phase Current Imbalance Alarm	
		Clear Alarms	
		Specifications	28
		Toro Warranty and Support	28

Introduction

Congratulations on purchasing Toro's Remote Gateway. The Gateway combines modular flexibility, ease of use and increased programmability in a single controller.

The Remote Gateway user interface is easy to use and includes a backlight for improved visibility in low-light conditions, yet it is completely viewable in direct sunlight. The faceplate's combination of menu buttons, navigation arrows and input dial allows for easy and quick menu navigation.

The Remote Gateway comes in two flavors:

- DEC-RS-1000-DR (digital radio and modem)
- DEC-RS-1000-M (modem only)

Installation

Cabinet

Selecting the proper installation site for the Remote Gateway is essential to safe and reliable operation. The Remote Gateway features a weather resistant cabinet designed for indoor or outdoor installation.

Install the Remote Gateway:

- on a vertical wall or other sturdy structure
- so that the display is at or below eye level
- near a grounded power source
- so that it is in shade during the hottest hours of the day
- with as much protection from direct sunlight, rain, wind and snow as possible

⚠ IMPORTANT! Do not mount the controller where it is exposed to direct spray from the irrigation system.

Steps:

1. Drill two pilot holes 6" (15.25cm) apart for the top keyholes of the controller cabinet.
2. Install the top screws leaving approximately 1/4" (5–6mm) of exposed screw to accommodate the cabinet.



If mounting the cabinet on dry wall or masonry, install the appropriate type of screw anchors or fasteners to ensure secure installation.

3. Hang the cabinet using the top keyhole slots. See **Figure 1**.
4. Open the cabinet door and install the two bottom screws to secure the cabinet.

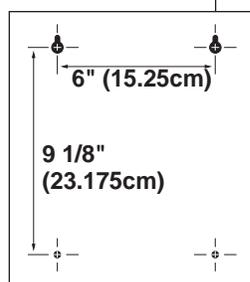
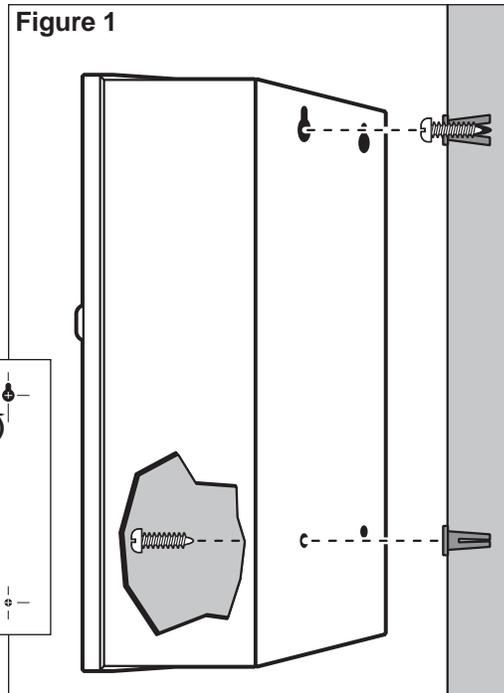


Figure 1



Earth Ground

⚠ IMPORTANT! The Remote Gateway surge protection components cannot properly function unless an efficient pathway to earth ground is provided. The ground path must be as direct as possible, without sharp bends and must not exceed 30 Ohm resistance (when measured with an earth ground resistance device). All electrical components throughout the irrigation system should be grounded similarly to provide the same ground potential.

The following instructions depict one of several acceptable earth grounding methods. Due to variables in soil composition and terrain, the method shown may not be suitable for your installation site. Contact your local Toro distributor for assistance and availability of the required earth ground resistance test instrument.

1. Drive a 5/8" x 8' (17mm x 2.5m) copper-clad steel rod into well moistened soil not less than 8' (2.5m) or not more than 12' (3.7m) from the controller cabinet. The top of the ground rod should be flush with or below ground level and protected from damage using a valve box. See **Figure 2**.

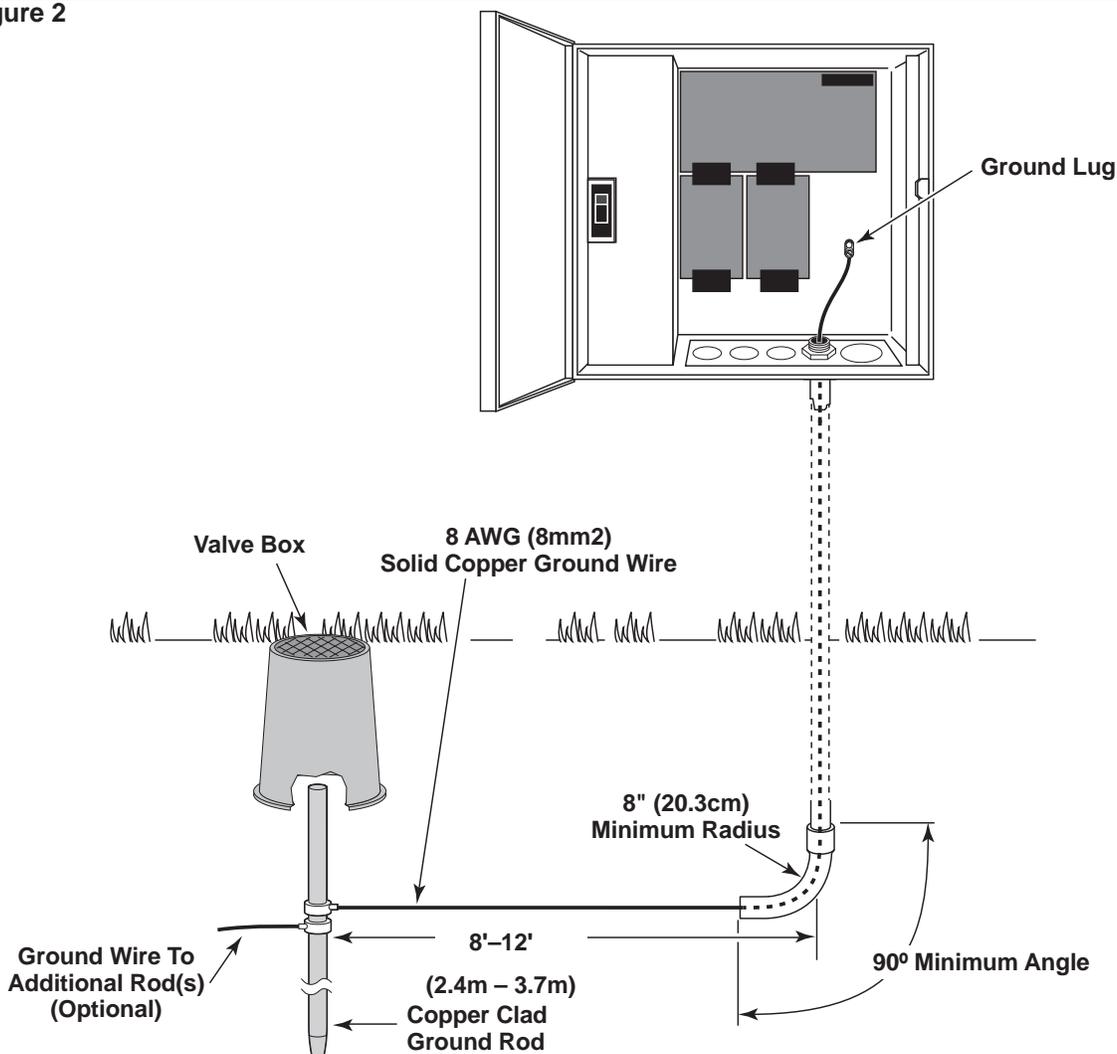
 Installing a round valve box over the ground rod enables the ground rod to be easily located as well as providing access to the ground wire connection(s).

2. Using a 5/8" (17mm) clamp or "Cad weld" fastener, attach an 8 AWG (8mm²) solid copper wire near the top of the ground rod. Avoiding wire bends of less than 8" (20.3cm) radius and more than 90°, route the wire through conduit and into the cabinet. Secure the wire to the copper ground lug.

 Make sure the soil surrounding the ground rod(s) remains well moistened at all times. The addition of some form of irrigation may be required if the cabinet is installed in a non-irrigated location.

3. Measure the ground resistance per the instructions provided with the ground test instrument. A reading of 0.0 Ohm is optimum, up to 10 Ohm is good and 11–30 Ohm is acceptable in most cases. If the resistance exceeds the acceptable limit, additional ground rod(s) can be installed at a distance equal to twice the buried depth of the first rod; i.e., 16' (4.9m). Interconnect the ground rods using 8 AWG (8mm²) solid copper wire and test again. If the measured ground resistance continues to read above the acceptable limit, contact your local Toro distributor for further assistance and recommendations.

Figure 2



Power Source



WARNING! AC POWER WIRING MUST BE INSTALLED AND CONNECTED BY QUALIFIED PERSONNEL ONLY. ALL ELECTRICAL COMPONENTS AND INSTALLATION PROCEDURES MUST COMPLY WITH ALL APPLICABLE LOCAL AND NATIONAL ELECTRICAL CODES. SOME CODES MAY REQUIRE A MEANS OF DISCONNECTION FROM THE AC POWER SOURCE, INSTALLED IN THE FIXED WIRING, HAVING A CONTACT SEPARATION OF AT LEAST 3mm IN THE LINE AND NEUTRAL POLES.

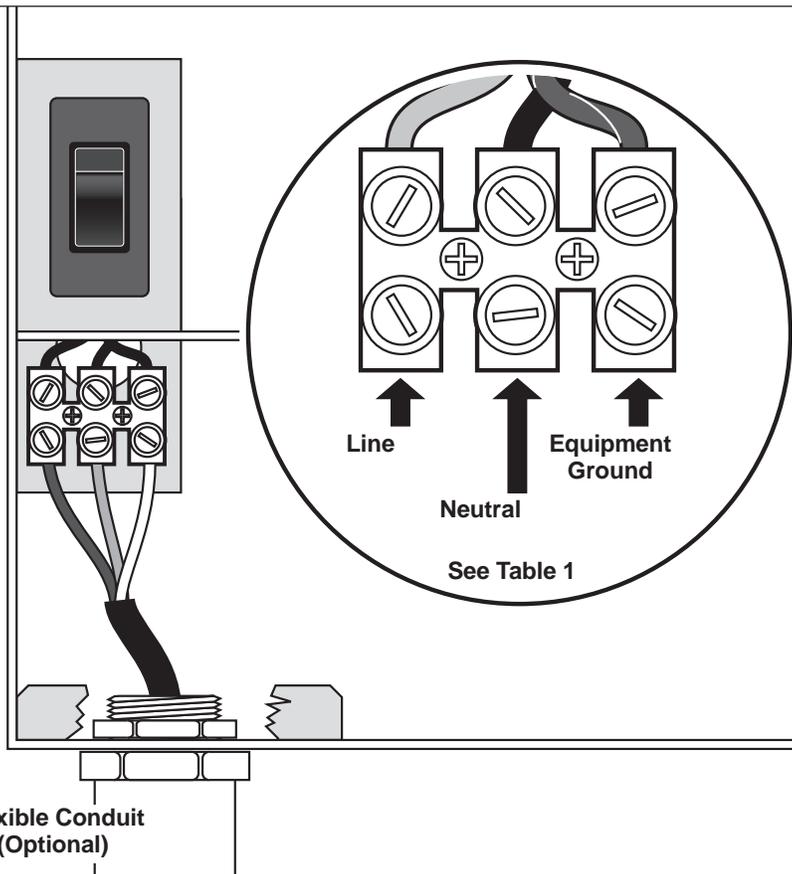
ENSURE THE AC POWER SOURCE IS OFF PRIOR TO SERVICING. FAILURE TO COMPLY MAY RESULT IN SERIOUS INJURY DUE TO ELECTRICAL SHOCK HAZARD.

1. Turn off the power at the power source location and place the controller's power switch to OFF. Connect and route the appropriate size 3-conductor cable (14 AWG [2.5mm²] maximum) from the power source to the controller cabinet. The provided power cable access hole can accommodate a 1" (25mm) conduit fitting. If conduit is required, install a section of flexible 1" (25mm) electrical conduit from the power source conduit box to the cabinet's access hole.
2. Open the cabinet door and remove the two retaining screws from the power supply cover.
3. Strip the power cables and secure them to the terminal block. Reference **Table 1** for the appropriate type of power connection.
4. Reinstall the power supply cover.
5. Apply power to the controller.

Table 1

AC Service Type	Line	Neutral	Equipment Ground
100 – 120 VAC (Domestic)	Hot (Black)	Neutral (White)	Green
220 – 240 VAC (International)	Hot (Brown)	Neutral (Blue)	Green / Yellow

Figure 3



Station Decoder

The station decoder module is available in 1-station, 2-station, or 4-station configurations.

The stand-alone Remote Gateway model can handle up to 100 stations per output board. These stations can be connected to the output board terminals in any configuration (25 stations connected to each of the four terminal pairs or 100 stations connected to one terminal pair, etc.). The decoder modules can be connected in parallel anywhere on the two-wire communication line connected to the station terminals. Each station can activate up to two solenoids.

 When a Tri-Comm Cellular modem is installed in the 2nd output board position, the maximum number of stations on the 1st output board is increased up to 200 stations.

It is recommended that the decoder modules are installed in an approved valve box to provide easy access to the wiring. Use 3M DBR/Y to waterproof all connectors.

Recommended Controller-to-Decoder cable: 14 AWG (2.5mm²), solid copper, jacketed 2-conductor, direct burial. The preferred wire make and model is the Paige Irrigation Wire, Spec P7350D.

Recommended Decoder-to-Solenoid cable: 14 AWG (2.5mm²), solid copper, 2-conductor, direct burial. The preferred wire make and model is the Paige Irrigation Wire, Spec P7351D.

Burial Depth

Toro recommends that the Controller-to-Decoder and Decoder-to-Solenoid cables should have a minimum cover of 6" (150mm). The irrigation plan may specify additional depth to be consistent with the depth of mainline or lateral pipe work and/or soil conditioning procedures such as aeration. Installation procedures must comply with all applicable local and national electrical codes.

- Use only wire approved for direct burial if installing the wires underground without conduit.
- All field wiring splices must be accessible to facilitate troubleshooting and/or service.

Steps:

1. Route communication cable from the controller to the station decoder module installation location.

 The maximum wire length between the controller and the decoder module is 15,000' (4500 m).

2. Secure the communication wires to terminal 1 of the Remote Gateway output board. White wire onto the 1st terminal and black wire onto the second terminal. See **Figure 4**.

3. Install the decoder module in a valve box. Record the decoder module's address number found on the side label. This address number identifies the station(s) that the decoder module control.

4. Secure the communication wires to the decoder module's black and white wires. Connect the black communication wire to the black decoder module wire. Connect the remaining communication wire (red or white) to the white decoder module wire. Use 3M DBR/Y to properly water-proof all wire connections.

5. Route output wires from the decoder module to the solenoid.

 The maximum wire length between the decoder module and the solenoid is 410' (125m).

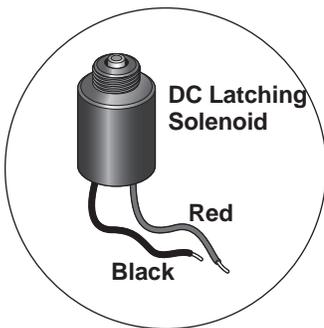
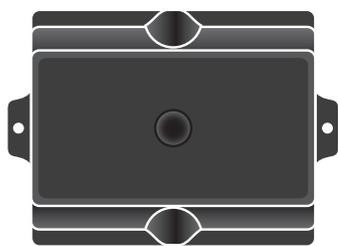
6. Connect the solenoid wires to the decoder module's station wires. The station wires are color coded for easy identification. Connect the solid colored (red, green, orange or blue) station wire to the red/white solenoid wire. Connect the similar color station wire with black stripe to the black solenoid wire. Use 3M DBR/Y to properly water-proof all wire connections.

7. Connect an additional solenoid to the station wire as necessary.

 Each station has a maximum load of two solenoids.

8. Repeat Steps 3–8 for additional decoder modules.

Figure 4



Station 1

Solid Red Station Wire - Connect to the Red/White solenoid wire
 Red with Black Stripe Station Wire - Connect to the Black solenoid wire

Station 2

Solid Green Station Wire - Connect to the Red/White solenoid wire
 Green with Black Stripe Station Wire - Connect to the Black solenoid wire

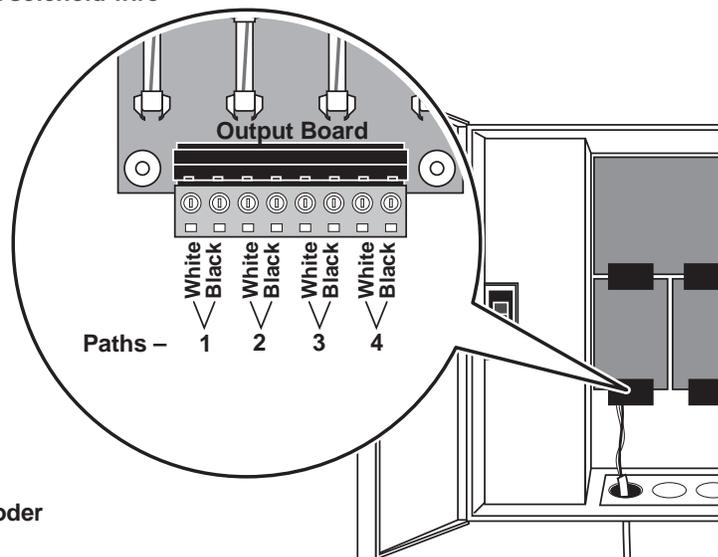
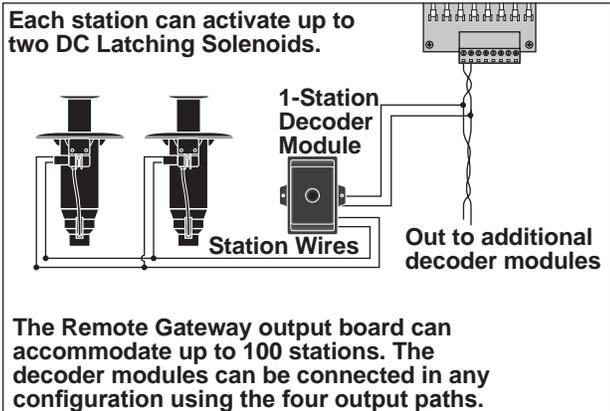
White Power/Communication Wire
 Black Power/Communication Wire

Station 3

Solid Orange Station Wire - Connect to the Red/White solenoid wire
 Orange with Black Stripe Station Wire - Connect to the Black solenoid wire

Station 4

Solid Blue Station Wire - Connect to the Red/White solenoid wire
 Blue with Black Stripe Station Wire - Connect to the Black solenoid wire

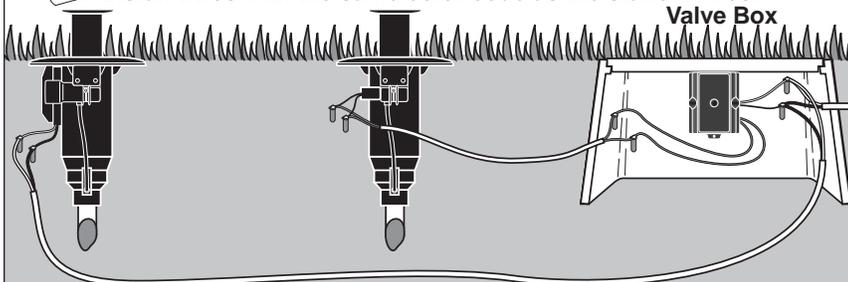


The maximum communication wire length between the decoder module and the solenoid is 410' (125m).

Recommended Cable for Decoder-to-Solenoid is the Paige® P7351D, 14 AWG, Solid Copper, 2-Conductor, Direct Burial cable.

To easily identify stations for troubleshooting, install wires with the same color code as the station wires.

Maximum communication wire length between the controller and the farthest decoder is 15,000' (4,500 m).



Recommended Cable for Controller-to-Decoder is the Paige® P7350D, 14 AWG, Solid Copper, Jacketed 2-Conductor, Direct Burial cable.

When possible, install the decoder module in a valve box for ease of service.

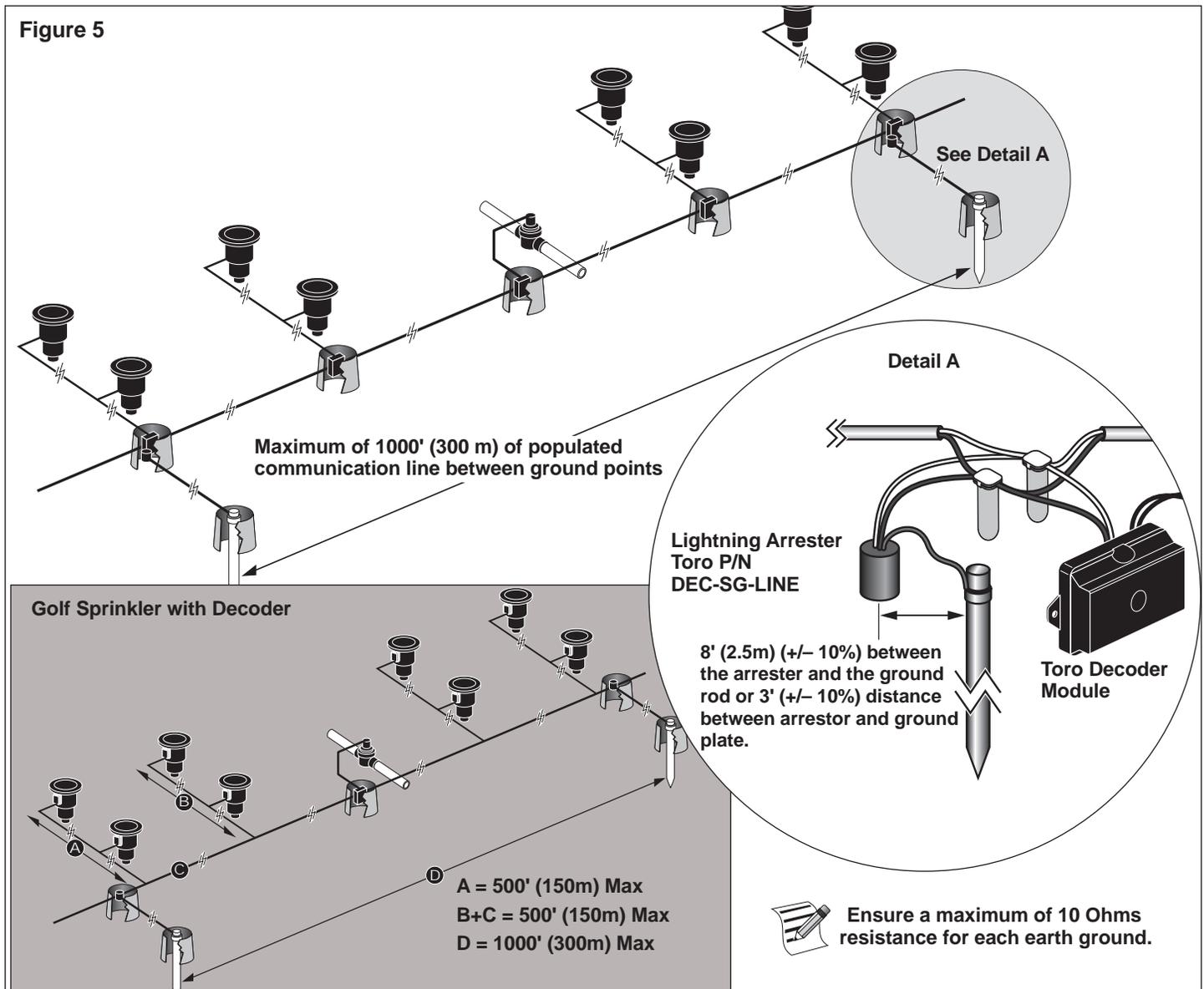
Grounding the Communication Cable

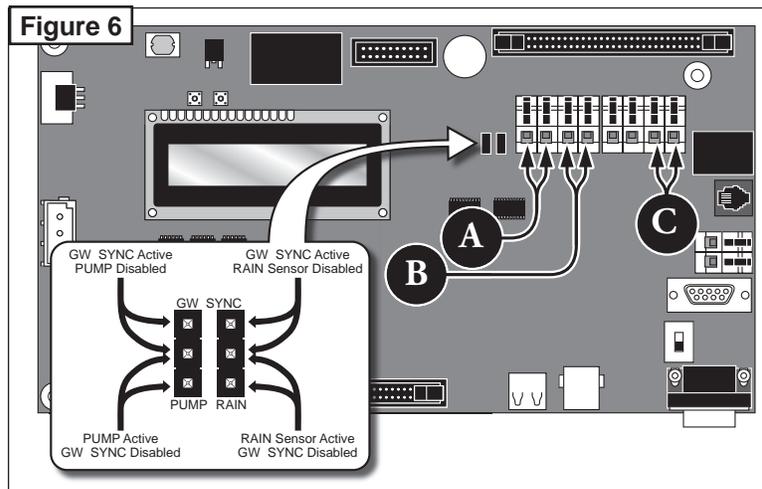
The lightning arrester (Toro P/N DEC-SG-LINE) is required to protect the decoder module from lightning. Without lightning arresters, decoders are vulnerable to lightning damage. In order for these arresters to discharge lightning energy efficiently, they must be properly grounded. To be effective, a resistance of 10 Ohms or less must be achieved at each earth ground point. **Figure 5** illustrates the proper grounding and wiring of the arrester.

1. Locate decoder's power/communication wires (black and white wires).
2. Strip the insulation from lightning arrester's white wire and connect it to the white wires from the decoder and controller-to-decoder cable. Use 3M DBR/Y to properly water-proof all wire connections. (See **Figure 5**.)
3. Strip the insulation from lightning arrester's black wire and connect it to the black wires from the decoder and controller-to-decoder cable. Use 3M DBR/Y to properly water-proof all wire connections. (See **Figure 5**.)
4. Connect the lightning arrester's ground wire to the ground rod or plate's wire. If the ground rod or plate is not pre-wired, use a 10 AWG bare copper wire. (See **Figure 5**.)

⚠ IMPORTANT! If using a ground rod, verify that the straight line distance between the lightning arrester/decoders and the ground rod is 8' (2.5m) +/- 10%. If using a 3' (1m) ground plate, the straight line distance should be 3' (1m) +/- 10%.

5. If necessary, use ground enhancement material (GEM) to attain a resistance of 10 Ohms or less.
6. Check the system for proper operation.

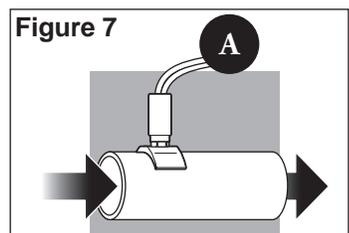




Pressure Sensor

The Remote Gateway controller is designed to accept both normally-open and normally-closed pressure sensor. Set the pressure sensor model in Remote Gateway controller preference menu.

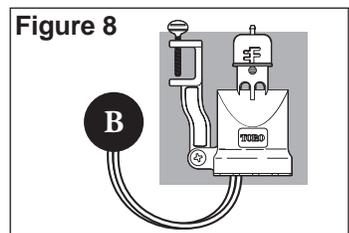
1. Place the controller's power switch to OFF.
2. Route the pressure sensor's cable into the controller.
3. Connect the cable wires to the Pressure Sensor Terminals labeled **A** in **Figure 6**.
4. Place the controller's switch to ON.



Rain Sensor

The Remote Gateway controller is designed to accept both normally-open and normally-closed rain switch. Set the rain switch model in Remote Gateway controller preference menu.

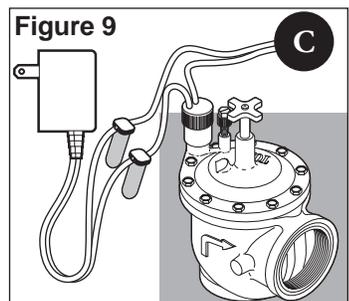
1. Place the controller's power switch to OFF.
2. Route the rain sensor's cable into the controller.
3. Connect the cable wires to the Rain Sensor Terminals labeled **B** in **Figure 6**.
4. Place the controller's switch to ON.



Master Valve / Pump Relay

Remote Gateway provide switch terminals to control a master valve or a pump relay if the system requires it.

1. Place the controller's power switch to OFF.
2. Connect the Positive/Hot wire of the power source that controls the master valve or the pump relay to the Master valve/Pump relay switch terminal. See **Figure 6, C**.
3. Route another wire from the Master Valve / Pump terminal and connect it to the master valve solenoid or pump relay.
4. Connect the Negative/Equipment ground wire of the power source to the master valve solenoid or pump relay.
5. Place the controller's switch to ON.



Gateway Synchronization

The Gateway controller must be synchronized with other Gateway controllers for proper communication. Gateway synchronization is achieved using a shared terminal with either the RAIN sensor or the PUMP PRESSURE sensor. To enable Gateway synchronization, the PUMP or RAIN sensor terminal jumper must be placed in the GW SYNC position (top two terminals).

1. Route a 2-wire cable (10' [3m] maximum length with a minimum diameter of 1.0mm2 [18 AWG]) from the first Gateway controller to the second Gateway controller.
2. Connect the 2-wire cable into the Synchronization terminals of both controllers. (Use either the PUMP or RAIN sensor terminals.) Make sure that the wire polarity is the same (the wire connected to the left terminal on the first controller is connected to the left terminal of the second controller).
3. Activate the sensor terminals being used for Synchronization (GW SYNC). See **Figure 6**.



Sensor function is disabled for the terminal with GW SYNC jumper position. If the Gateway is utilizing both PUMP and RAIN sensor terminals, disconnect one of the sensors and install in the other Gateway with an unused sensor terminals.

Communication Cable

Please note the following communication cable installation requirements and suggestions:

- The remote gateway is designed for use with shielded, twisted-pair, communication cable. Toro recommends Paige P7162D or equivalent.
- More than one cable run can be connected to the Surge Protection Unit (SPU, part #35-7353).
- A remote gateway communication cable can emanate from another remote gateway connection.
- If additional communication cable runs are installed for future system expansion, each cable wire pair must be terminated with a 600 ohm resistor (**Figure 11**).
- If the communication cable is routed in the same trench as main power wires, or the gateway to decoder module cables, a minimum of 12" (30.5cm) separation is recommended to prevent voltage induction on the communication cable. Check local codes for actual requirements.
- Refer to the installation instructions provided with the central control system for communication cable testing procedures.
- If in-ground cable splices or repairs are required, the connection must be properly insulated with a waterproof splicing device. Using an appropriate splicing kit, such as Scotchcast 82-A1 (or equivalent), is recommended. Placing the cable splice in a small valve box for protection and accessibility is a good installation practice.

Steps:

1. Starting at the Surge Protection Unit (SPU, part #35-7353), route the communication (comm) cable to each gateway leaving enough cable at each location to enable connection. See **Figure 10**.

 If additional communication cable is installed for future system expansion, connect a 600 ohm resistor across the wire pair at the end of the cable as shown in **Figure 11**.

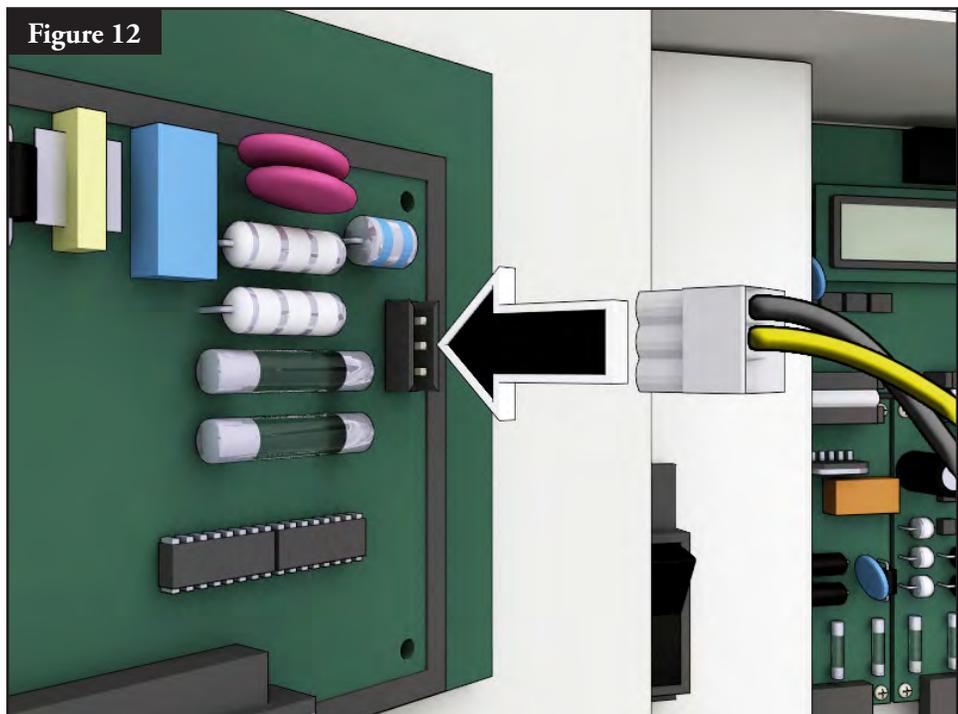
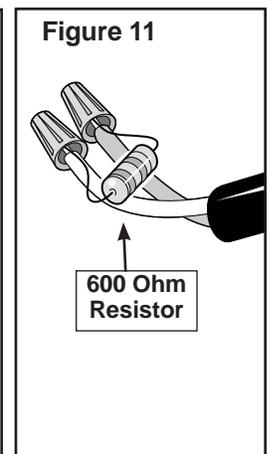
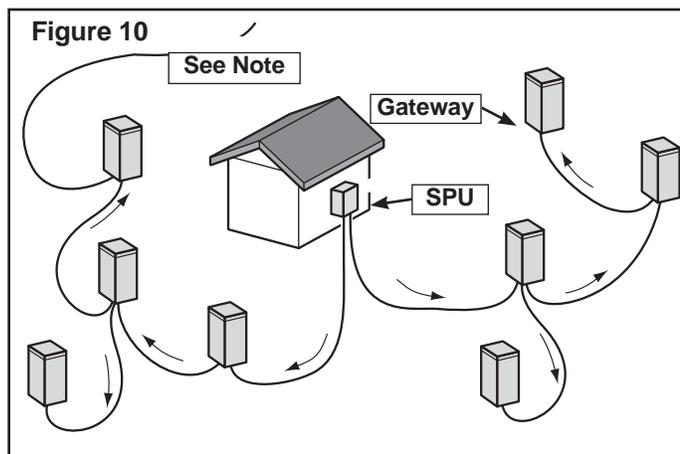
2. At the gateway, cut the cable and pull both ends into the gateway through the 3/4" (16mm) sweep conduit.

3. At the cable ends, strip the outer jacket and inner insulation to expose the comm wires.

- **Gateway connection:** Attach a Phoenix 3-hole connector.
- **SPU connection:** Attach a Phoenix 3-hole connector.
- **FIU connection:** Attach a RJ-11 connector.

4. For the Gateway, plug comm line into the modem port (**Figure 12**).

 Remove the modem wire connector(s) until the comm cable has been tested. Refer to the installation instructions provided with the Central controller for testing procedures.



Communicating with the Remote Gateway

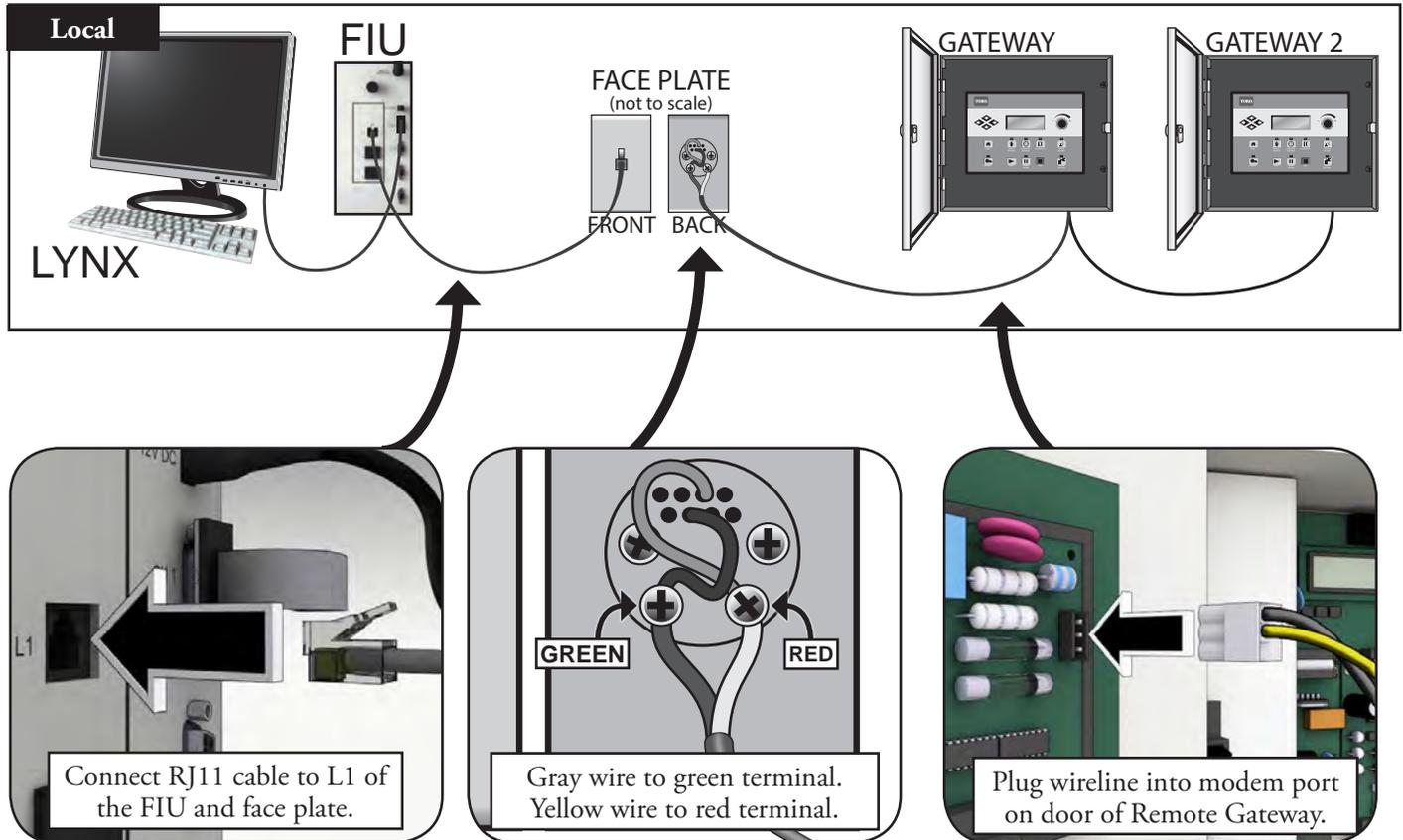
A personal computer running Toro's "Lynx" software is necessary to use the Remote Gateway. The Remote Gateway allows Lynx software to control over 9,000 sprinkler heads with individual precision.

The Lynx computer is attached to a Field Interface Unit (FIU) which sends commands to the Remote Gateways throughout the golf course.

There are two ways for the FIU to communicate with Remote Gateways: by Wireline or by radio. This document shows **three typical layouts** making use of one or both methods.

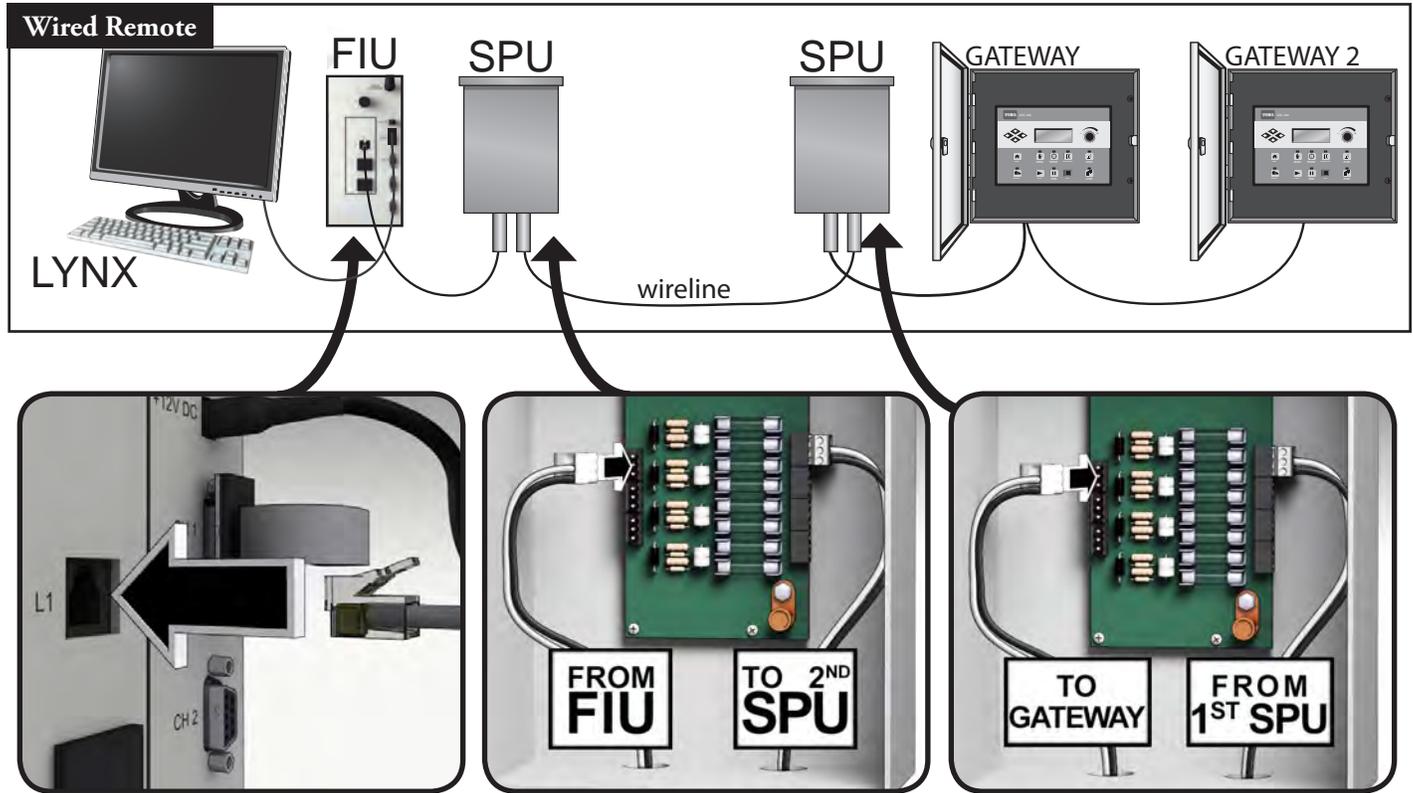
Layout 1 - Local

The Gateway is attached to the Field Interface Unit by a Wireline. The Gateway typically resides in the office with the Lynx computer and FIU.



Layout 2 - Wired Remote

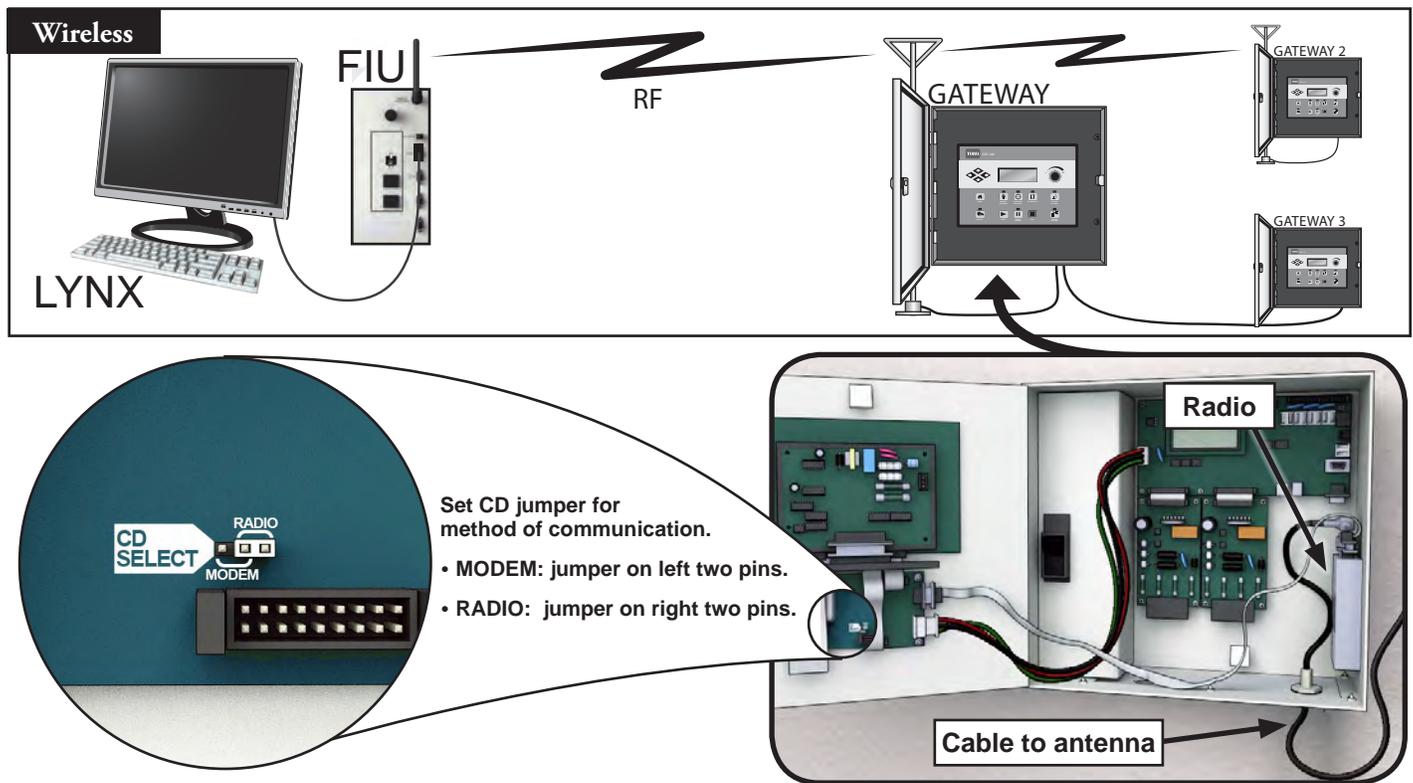
The Field Interface Unit is attached to the Gateway which is out in the field. Due to this distance (see note below), a Surge Protection Unit (SPU) is necessary on *both ends* of the cable run.



The Wireline connection is limited to about 9 miles.

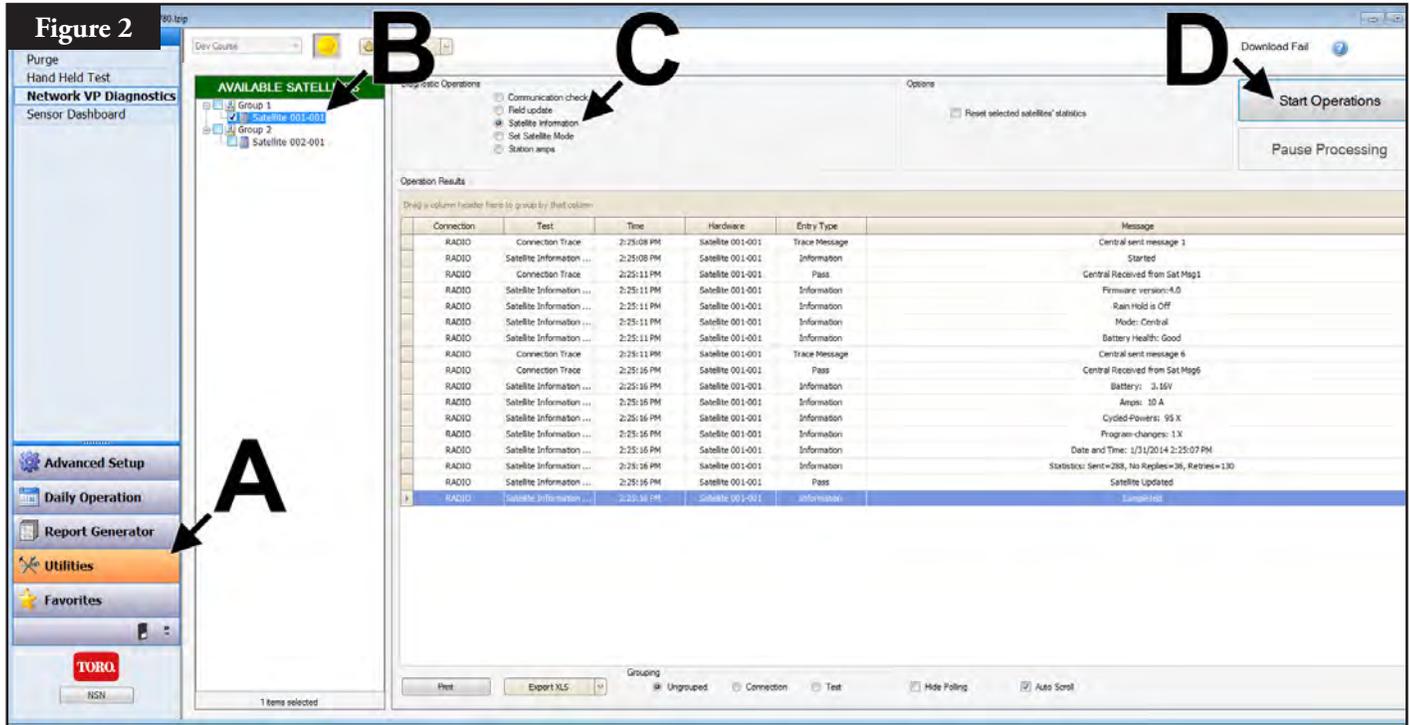
Layout 3 - Wireless

The Remote Gateway DEC-RS-1000-DR (digital radio and modem) communicates with the Lynx computer via radio. The system is preconfigured at our production facility.

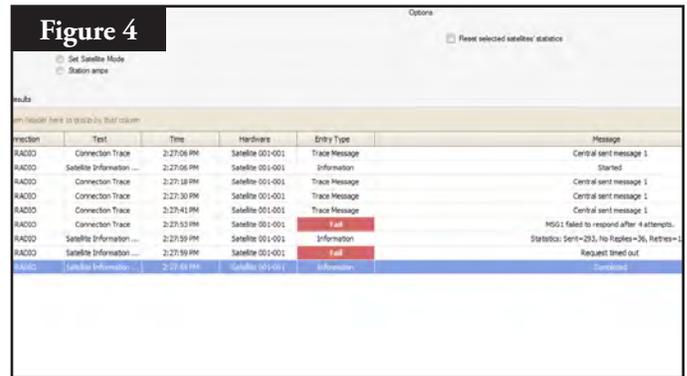
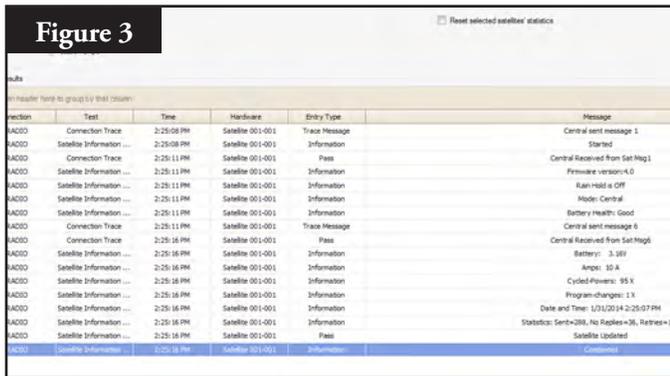


To Test Radio Communication Between the FIU and the Remote Gateway

1. Launch Lynx. See Figure 2.



1. Click the Utilities bar (Figure 2, A).
2. Select the desired satellite from the list (Figure 2, B).
3. Select **Gateway Information** radio button (Figure 2, C).
4. Click **Start Operations** button (Figure 2, D). Certain gateway information should be displayed on the screen (Figure 3). If communication fails, the software will display a “fail” message (Figure 4).



- ✍ Radio range can vary. Under normal conditions, a range of two miles should be feasible. To boost radio range, mount radio antennas on masts.
- ✍ If radio interference is a problem, please see the section below, “Changing the Frequency of the Radio”.

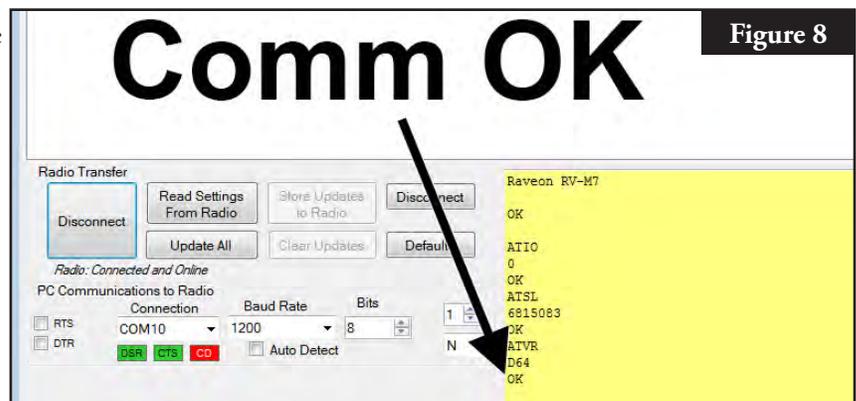
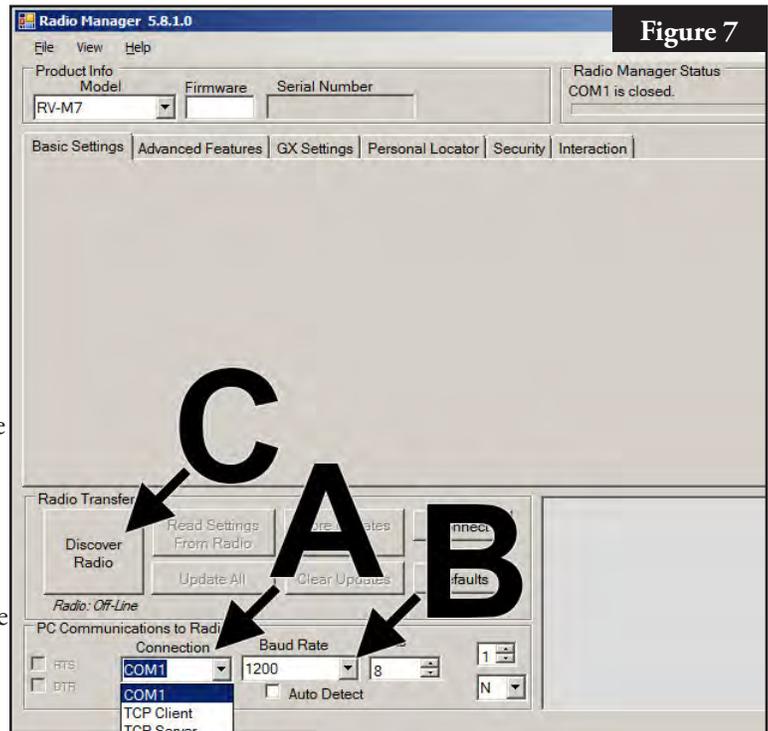
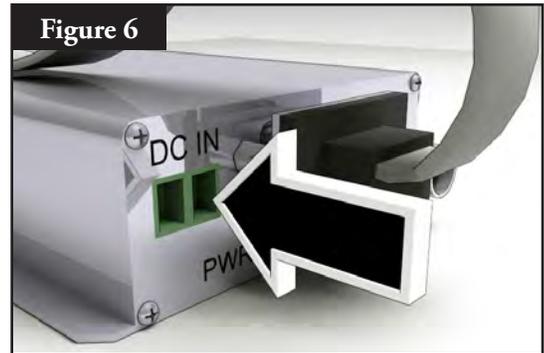
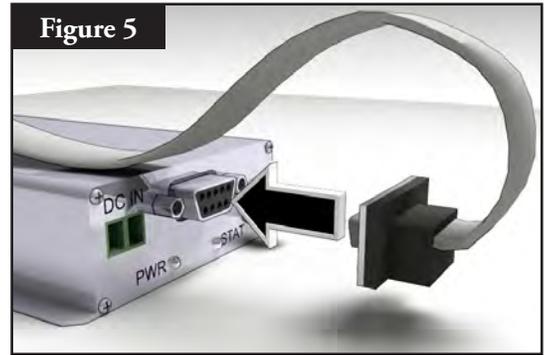
Changing the Frequency of the Radio

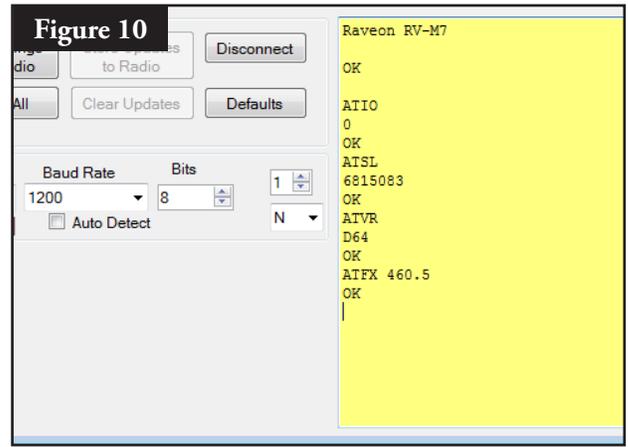
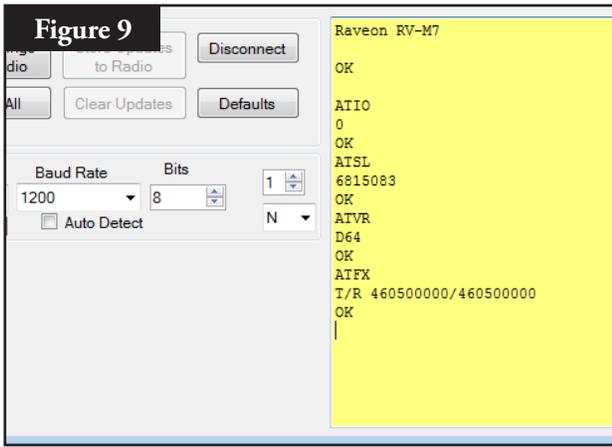
At the time of installation, your authorized Toro installer should configure the radio to work properly. In the future, if it becomes necessary to change the radio frequency, you will need:

- Radio Manager software from Raveon
- USB to Serial (DB9) cable with included drivers
- 12V Phoenix power connector (from authorized Toro distributor)
- 12V power supply for radio (from authorized Toro distributor)

1. Disconnect all power to the FIU. Remove the radio. Place it next to the Lynx computer on a static-free surface.
 2. At the computer running Lynx, install the drivers for the USB to Serial (DB9) cable. Reboot computer.
 3. Plug USB cable into a USB port and Serial port on radio (**Figure 5**).
 4. Connect Phoenix power cable into 12V power supply. Plug other end into DC IN port on radio (**Figure 6**).
 5. Plug in 12V power supply.
 6. Launch Radio Manager. See **Figure 7**.
 7. Select appropriate COM port (**Figure 7, A**).
 8. Change the baud rate to 1200 (**Figure 7, B**).
 9. Press 'Discover Radio' button (**Figure 7, C**). The computer should discover the radio (**Figure 8**).
 10. To see current radio frequency, enter **ATFX** into the command line (**Figure 9**).
 11. To change the frequency, simply add an appropriate frequency number to that command. Example:
ATFX 460.5
-  UHF frequency range is from 450 to 470 MHz. Frequency number specified must be between those numbers.
12. Software will confirm the change (**Figure 10**). It is possible to manually confirm the change by simply typing in **ATFX** again.
 13. Power down power supply and disconnect power line and serial cable.
 14. Install radio back into FIU.

15. The UHF frequencies of the two radios involved (one in the FIU, one in the Remote Gateway) must match. Follow the above procedure with the radio from the Remote Gateway to specify a matching frequency.





An FCC license is required to operate on any given UHF frequency. Frequency coordination (selection) is handled through the Personal Communications Industry Association (PCIA) (800-759-0300) and an application must be submitted to the FCC. There is a PCIA fee and FCC license fee that must be paid as well.

Operation

Modes of Operation

The Remote Gateway can be placed in three operating modes: Central mode, Local mode and Off mode. In all three modes, the gateway will accept communications from Lynx[®]. Select the mode of operation by pressing **Satellite Settings**  and selecting **Comm Mode**. Select from the three modes using the Input Dial .

Central Mode - When placed in Central Mode, the gateway will allow Lynx to download irrigation programs, edit time and date and modify the gateway's operation mode. If communication between central and gateway is interrupted for more than one hour, the Central Mode LED indicator will start flashing until communication is reestablished.

Local Mode - When placed in Local mode, the gateway will execute previously downloaded or locally configured irrigation programs. In this mode, the gateway will allow the central to edit time, date and operation mode but will not allow modification of settings affecting irrigation programs.

Off Mode - When placed in Off mode, the gateway will not execute any watering operation whether it is program or manually initiated. Any watering operation will terminate once the gateway is placed in Off mode. Watering operations will resume once the gateway is placed back to Central or Local mode. In this mode, the gateway will allow the central to edit time, date and operation mode but will not allow modification of settings affecting irrigation programs.

General Editing

Pressing a menu key on the Remote Gateway will display menu items. Items with fields containing values that can be edited are called Entry Fields. Use the Arrow Keys  to navigate through the menus and entry fields. Modify any selected value by scrolling through the selection using the Input Dial . Values will be saved automatically when you exit an entry field or press another menu key. Pressing the HOME  button will also save any modification and revert back to Home display.

Additionally, if no keypad activity is detected within five minutes, the gateway will automatically save any modifications and revert back to Home display.

Timing Mechanism Components

1.  **Left and Right Arrows** allow you to select the next entry field within the same menu line. Any changes will be saved after you exit that entry field.

2.  **Up and Down Arrows** allow you to scroll up and down through the menu items.

3. **Operation Mode LED Display** will indicate the current gateway operation mode.

4. **LCD Panel** is the display screen.

5.  **Input Dial** allows you to scroll through the value selection within the selected entry field.

6.  **Home** button allows you to exit from any function menu and return the gateway to normal operation. After pressing the Home Key, all modifications to the settings will be saved.

7.  **Manual Watering** button allows you to activate station(s) or program(s) manually.

8.  **Scheduled Watering** button allows you to view the Station Based Flow (SBF) list, which is the automatic watering schedule.

9.  **Diagnostics** button allows you to view the gateway's firmware version as well as other diagnostic information.

10.  **Station Settings** button allows you to modify station parameters. Within this setting, you can disable the station from any activity, hold station watering for a specific number of days, set the station type to a switch and create or edit the station description/name.

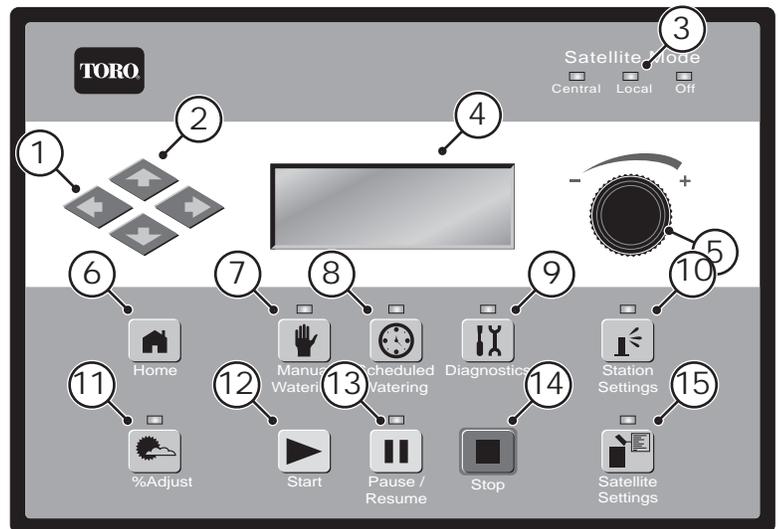
11.  **Percent Adjust** is not used at this time.

12.  **Start** button will execute selected manual operation.

13.  **Pause** will cancel a currently running station.

14.  **Stop** button will cancel currently running program(s) or station(s).

15.  **Satellite Settings** button allows the user to modify the gateway parameters. Users can specify the gateway communication mode, hold duration for gateway's activity, the language, clock settings, date, day change, CSG address, gateway address, station delay, maximum number of stations to run simultaneously, units and display contrast. Within this menu, the user can also reset all programs, reset the station parameters and reset all disables.



Power-Up Diagnostics

Upon power-up, the gateway will display:

Gateway TM Booting

The Gateway TM will initiate a diagnostic test automatically during power-up. This function will take approximately ten seconds and it can not be bypassed. If a problem is detected during the diagnostic test, it will be indicated on the display. These status information cannot be edited. The information is as follows:

Line 1: Gateway Firmware Version and Revision Date

Line 2: Last Power Downtime Date and Time

Example:

```
Rev: 4.00 09/15/10
```

```
FD - 09/16/10
```

The default Home display will follow after the diagnostic display has timed-out.

Home display example:

```
Sun 04/02/06 02:31 pm
```

```
GW# 001-001 Sec: 57
```

```
Day Change: 12:00am
```

Home Button

 Pressing the Home button will revert to the default display. When editing irrigation programs, Station or Gateway settings, pressing the Home button will save any setting modifications and return the user to the Home display.

Home display examples:

```
Sun 04/02/06 02:31 pm
```

```
GW# 001-001 Sec: 57
```

```
Next start: 03:00am
```

(typical Home display
with no active scheduled program)

```
Sun 04/02/06 02:31 pm
```

```
GW# 001-001 Sec: 57
```

```
Running 02 programs
```

```
P01 Sta01 00:09:46
```

```
P05 Sta25 00:19:51
```

(Home display with two active
scheduled programs)

The Day Change line will display the next program start time (Next Start: HH:MM) if the current day is an active watering day. If the gateway is running a program, the Day Change line will display `Running XX programs` to indicate the number of active programs.

Currently, the Gateway only displays the next automatic start for gateway A only. Gateway B's next automatic start is *not* displayed.

If the gateway has an active running program, the display will read:

```
Sun 04/02/06      02:31 pm  
GW# 001-001      Sec: 57  
Running 04  prg+ Man (Running Multi-Manual)
```

P01	Sta01	%00:05:00	(The “%” symbol before the runtime indicates that station 01 is percent adjusted.)
P01	Sta02	00:05:00	(P01 indicates Program 01 is currently active)
P01	Sta03D	00:05:00	(The “D” symbol after the station number indicates that station 03 is disabled.)
P02	Sta10P	00:05:00	(The “P” symbol after the station number indicates that program 02 is paused.)
Man	Sta21	00:10:00	(“Man” indicates Manual Watering is currently active)
Man	Sta22S	00:10:00	(The “S” symbol after the station number indicates that program 02 is stacked.)

Start Button

 Use the Start button to execute a manual function.

 Pressing the Start button while the controller is idle will prompt the Manual Watering menu.

Multi-Manual Start Display

```
Multi-Manual  
Starting  
  03  
STOP to cancel
```

Press the Stop  button to cancel.

Pause Button

 The Pause button can be used to cancel a currently running station. Those stations will not be resumed.

Stop Button

 Use the Stop function to cancel program or manual irrigation. If the Remote Gateway has no current activity, pressing the Stop button will have no effect. The Stop function causes a system cancel including power-down / power-up sequence for BOTH daughter boards regardless of station activity.

Gateway Settings

 Satellite Settings allows you to set gateway parameters such as Time, Date and Language.

- Use the Up or Down Arrows   to navigate through the menus.
- Use the Left and Right Arrow   to advance to the next entry field on the same menu line.
- Use the Input Dial  to select values when editing.

Command	Function
Comm Mode:	Use this menu item to select the gateway mode of operation between Central, Local or Off mode.
Hold All:	Use this menu item to suspend satellite operation and choose the suspension duration from Today, 02-30 days, Permanent or None . This does not affect manual starts from the front panel.
Hold Rain:	Use this option to suspend satellite operation and choose the suspension duration from Today, 02-30 days, Permanent or None . When activated, Hold Rain will cancel any current watering, along with suspending operation. This does not affect manual starts from the front panel.
Reset Sta's:	Use this menu item to reset all station settings by selecting Yes. After selecting Yes, press the Up or Down Arrows   to activate. There is countdown before the command executes. The following will display: <div data-bbox="727 751 1063 867" data-label="Code-Block" style="border: 1px solid black; padding: 5px; text-align: center;"> <pre>Reset All Stations to defaults 05 STOP to escape</pre> </div>
Reset Unit:	Use this menu item to reset the gateway settings by selecting Yes. Select Yes using the Input Dial  and press the Up or Down Arrows   to activate. There is countdown before the gateway reboots. The following will display: <div data-bbox="727 1060 1063 1176" data-label="Code-Block" style="border: 1px solid black; padding: 5px; text-align: center;"> <pre>Reset All Defaults 10 STOP to escape</pre> </div> <div data-bbox="308 1186 397 1270" data-label="Image"> </div> <p>Resetting the unit will erase all user-defined program data and configuration values in the gateway's memory.</p>
Power Mode:	Use this menu item to change the power mode from switched to continuous. The default mode is switched. Continuous mode is helpful for troubleshooting.
Enable Sta's:	Use this menu item to reset all disabled stations with one execution. Select Yes All using the Input Dial  and press the Up or Down Arrows   to activate. Select No to cancel. Individual stations can be enabled/disabled by using the Disable function within the Station Settings menu.
Language:	Default language is English. Future option: Spanish.
Clock Set:	Use this menu item to set the current time. Use the Left and Right Arrow Keys   to select the Hours and Minutes parameters then use the Input Dial  to modify the values.
Clock Mode:	Use this menu item to select the clock mode between Am/Pm (12-Hour) and 24-Hour mode.
Date Mode:	Use this menu item to select the date mode: MMDDYY or DDMMYY.
Date:	Use this menu item to set the current date. Use the Left and Right Arrow Keys   to select the Month, Date and Year parameters then use the Input Dial  to modify the values.

- Day Change:** Use this menu item to set the “day change” time. The “day change” is the specified time that the gateway will advance the date. The default day change is 12:00 am. Adjusting the day change time will allow programs to start throughout the night on the same active day schedule. Programs with runtimes beyond the day change time are allowed to finish.
- GW Address:** Use this menu item to set the CSG (Central Gateway Group) address. Lynx uses this address to identify different gateway groups.
- Identify all gateways that can be grouped together and assign them with the same CSG address. When Lynx sends out a command to that CSG address, all the gateways within that group will receive and execute the command.
- DB Address:** Use this menu item to set the gateway address. Each gateway must be given a unique gateway address. Lynx uses this address to identify individual gateways when sending gateway specific commands.
- Max Sim Sta:** Use this menu item to set the maximum number of simultaneously operating stations. This threshold will be applied to all programs and manual irrigation functions. Each program can then be set with a lower limitation if necessary. This setting is set in Lynx and downloaded to the gateway.
- Meas Units:** Use this menu item to set the gateway’s unit system between English (U.S. Standard) and Metric units.
- Display Adj:** Use this menu item to adjust the contrast of the LCD screen. Use the Input Dial  to darken or lighten the text display.

Station Settings

 Station Settings allows you to set parameters specific to each station.

- Use the Up or Down Arrows   to navigate through the menus.
- Use the Left and Right Arrow Keys   to advance to the next entry field on the same menu line.
- Use the Input Dial  to select values when editing.

Command	Function
DB1 or 2	Select the daughterboard.
S01	Select the station you want to edit in this field. Choose from Station 01 through the gateway maximum station count of 500 (per daughterboard).
Sched Today:	Total scheduled station runtime for the current irrigation day.
Water Today:	Total station runtime that has occurred for the current irrigation day.  Runtime resulting from a station that is manually activated via the output hardware switch will <i>not</i> be captured.
Water Yestr:	Total station runtime that occurred for the previous irrigation day.  Runtime resulting from a station that is manually activated via the output hardware switch will <i>not</i> be captured.
Disable:	Disable station operation by selecting Yes . Resume station operation by selecting No .
Hold:	Use this menu item to delay operation for this station. Select the hold duration from 01–30 days , Permanent or None . This option is useful when a specific station needs to be deactivated without affecting any of the programs. This does not affect manual starts from the front panel.
Capacitor Voltage	Must be set to 15V only.
Dec Addrss:	Shows the 5-character address of the decoder module, is downloaded from Lynx.
Dec Offset:	Shows the ouput number (1,2,3, or 4), is downloaded from Lynx.

```
S016 100% 1STSTLAWN
Decoder Addr: 38684
Dec Sta: 4 Board: 1
Disable: No
```

Scheduled Watering

 The Remote Gateway shows the Station Based Flow Management list, the automatic program downloaded from the Central computer Lynx software.

Station Based Flow Management:

The SBF (Station Based Flow) screen can be accessed from the Scheduled Watering menu. Follow the steps to access.

1. Press the Scheduled Watering Key . The cursor is initially located at the program selection field. Use the Input Dial  to select **SBF List** which is located between GMM and P01.

 The SBF List is only available after a successful download from the Central computer.

2. Use the Right arrow  to navigate to the event number.
3. Use the Input Dial  to select the event number you want to review.

SBF (Station Based Flow) Sample Screen:

```
SBF List Event  001    (1st line will indicate the Event Number)
Start  12:00am  S22    (2nd line will indicate the Start Time followed by the Station Number)
Run    00:10:00  P26    (3rd line will indicate the Runtime [Hrs:Min:Sec] followed by the Program
                          Number)
Program Start  (80)    (4th line indicate Miscellaneous Functional Code)
```

 Editing the SBF List is not allowed at the Gateway level. SBF modifications must be made at the Central computer and downloaded to the gateway to implement changes.

Manual Watering

 The Manual Watering functions are used for additional watering if the irrigation program is not sufficient. They can also be used to troubleshoot each station for proper operation. Pressing the Manual Watering Key accesses the Multi-Manual function.

M-Manual - Select M-Manual to activate a station or group of stations with a specified runtime.

Multi-Manual Station Activation Directions

Manual station activation example: Activate stations 1–12 with a runtime of 5 minutes each and limit watering to 3 stations simultaneously.

 The Multi-Manual function is limited to the maximum simultaneous station settings of the gateway. In cases where a program is running and a multi-manual activated, the gateway will activate all stations specified in the multi-manual in addition to the currently activated stations. Thus, the multi-manual will allow the gateway to exceed the maximum simultaneous station settings.

1. Press the Manual Watering Key .
2. The cursor should be located in the Manual field, use the Input Dial  to select M-Manual.
3. Press the Down Arrow  to advance the cursor to the Sta#: field. Use the Input Dial  to select the correct value of the first station being irrigated. For this example, select station 01.
4. Press the Right Arrow  to advance the cursor to the next value. This value will indicate the last station of the range. If irrigating only one station, this value should be the same as the first value. For this example, select station 12.
5. Press the Right Arrow  to advance the cursor to the next entry field. This entry field will indicate the runtime in hours, minutes and seconds (HH:MM:SS). Use the Input Dial  and the Right Arrow Key  to select the appropriate runtime value. For this example, set the value to 00:05:00.
6. Press the Down Arrow  to advance the cursor to the next entry field. Notice that a new Station: line was created. Fill this line only if irrigating multiple ranges of stations, otherwise, leave this line blank.
7. Press the Down Arrow  to advance the cursor to the Simult: field. Use the Input Dial  to select the maximum simultaneous irrigating stations. For this example, set the value to 03.
8. Once finished, press the Start Key  to activate or press the Home Key  to cancel and revert back to the default display.

 Pressing the Home Key will save the entered values.

 The gateway containing the desired station to be started can be selected by highlighting 'x' in the "BDx" field.

When finished, the display should read:

```
Manual: M-Manual
Sta#: 01-12 00:05
Sta#: -----:--
Simult: 03
```

```
Press START to water
```

When reviewing the Multi-Manual program by pressing the Manual Watering button, the display will deduct the stations that watered or currently watering to the list.

Modifying the Multi-manual will append the added stations to the currently running manual. Currently running stations will not be affected. The Gateway will run the stations in sequential order disregarding the order it was entered.

% (Percent) Adjust

 The Percent Adjust feature is not used at this time.

Diagnostics

 The Diagnostics function of the remote gateway allows for easy system troubleshooting. Within this function, the user can monitor the gateway's internal voltages as well as check the firmware version.

Use the Input Dial  to navigate through the menus while in the **Menu:** field.

Menu: Link Monitor	This menu item allows you to monitor communication network traffic.
Menu: System Monitor	This menu item allows you to monitor all the gateways in the system.
Menu: Revision	This menu item will display the gateway firmware version and creation date.
Menu: Power-Up Detect	This menu item will display the number of detected stations, number of detected sensors. It will also display the date and time of the last power-down (PD) and last power-up (PU). Press the Down arrow  to scroll down the informations.
Menu: VA Monitor	This menu item allows you to monitor the gateway's amperage, voltages and temperature in real-time. This allows you to troubleshoot the gateway's internal circuit voltages.
Menu: Event Codes	This menu item will display the gateway's Event Code log. You can clear the log from this option. Navigate to the Clear field using the Down arrow  , select Yes using the Input Dial  and press the Down arrow  to activate.
Menu: Link Settings	Use this menu item to view the gateway's communication settings. Parameters can not be edited here.

Motherboard Diagnostic Display

The Gateway motherboard features a 2-line, 16 character LCD display for quickly viewing for system diagnostic information (see **Figure 6, page 9**). Use the left button below the LCD to scroll through the display lines and if needed, use the right button the scroll through the available options.

```
Rev 2.02
03/28/2011
```

After power up, the screen will display board's firmware version.

```
D1 A=1.500
D2 = OFF
```

After the initial Revision screen, the display will show the real time current for both daughter boards.

```
D1L1=0.123 A
D1L2=0.121 A
```

```
D2L1=0.224 A
D2L2=0.223 A
```

The display will also show the load currents by individual wires of a two-wire communication line.

```
Rain sw =open
Pump pres=closed
```

The display will show the Rain and Pump Pressure sensor state and will be updated in real time.

```
D1 DEC 32396
10 min Send...
```

The display will show the information contained in the message during transmission execution. The information will only be displayed while the transmission is being executed. The display will refresh if a different command is transmitted.

```
Display Contrast
Psh Opt to Adj
```

Scroll to this menu to adjust the display contrast. Press the right button below the LCD to adjust.

```
No Alarms
```

Use the Alarms display to view fault information such as daughter board thermal alarms, shorts, high current and wire load imbalances. You can clear the alarms by pressing and holding the scroll (left) button for four seconds.

```
00:00:06:23:05
```

This is the time counter in Month:Days:Hours:Minutes:Seconds which starts upon power up.

```
Flow=0.00 Hz
```

The display will show the real time pulse frequency of the flow sensor input.

Checking and Clearing Alarms

Press the down arrow key  to advance the cursor to the **S001:** field. Use the input dial  to scroll through all the stations with alarms. To clear the alarm, press the right arrow key  to the Alarm: field, use the Input Dial  to display Clear Alarm. Press the down arrow key  to execute.

```
Menu: RunDiagnostics
Perform: Comm Check
Press START to start
```

Use this menu perform a Comm (Communication) Check or a Solenoid Chk (check).

```
Menu: VA Monitor
Battery Volt: 3.3
LCD Voltage: 2.7
Board temp: 28c
```

Use this menu to monitor the system's voltages.

```
Menu: Event Codes
Clear log: No
Last code: 93
06/30/11 10:21:46
```

This menu will display the last logged event that may help diagnose problems. The event code, date and time the event occurred will be displayed. Clear the log by navigating to "Clear log: No" using the Right or Left arrows  .

Use the input dial to toggle No to Yes. Press the Up or Down arrow to accept.

```
Menu: Revision
Revision: 02.08
Rev. Date 01/04/11
```

Use this menu to verify firmware version.

```
Menu: PowerUp Detect
Capacity: 200 sta's
PD 06/28/11 13:53:51
PU 06/29/11 11:15:32
```

This menu will display the detected station capacity from the last Power Down (PD). PU will display the date and time of the last Power Up.

```
Menu: Link Monitor
Sent: GetPumpPress
Resp: 2nd
Total Bad Resp: 001
```

Use this menu to display when and what messages are sent.

```
Total Timeouts: 001
Total Failed: 002
Clear Total: No
```

- 1st Line: Name of the sent message
 - 2nd Line: Response status
 - 3rd Line: Number of messages that were sent out with bad responses
 - 4th Line: Number of messages that did not get a response
 - 5th Line: Number of messages that failed to communicate after
- Use the arrow keys to navigate to Clear Total and toggle No to Yes to clear all Link Monitor's values.

Alarm Conditions

All of the Alarm Conditions, when active, toggle back and forth between the two message states below.

Short Circuit Alarm

```
D1 Short  
D2 A=0.500
```

```
Hold Opt to Clr  
D2 A=0.500
```

- 2.0 Amp Trigger
- Shuts off and disables daughter board indefinitely.
- Motherboard LCD toggles alarm and instruction on how to re-enable the daughter board.
- Affected daughter board's alarm LED blinks on and off.

Thermal Alarm

```
D1 Thermal  
D2 A=0.500
```

```
Hold Opt to Clr  
D2 A=0.500
```

- Shuts off and disables daughter board indefinitely.
- Motherboard LCD toggles alarm and instruction on how to re-enable the daughter board.
- Affected daughter board's alarm LED blinks on and off.

High Current Alarm

```
D1 High Amp  
D2 A=0.500
```

```
D1 A=1.100  
D2 A=0.500
```

- Triggered when individual daughter board's load current is above 1.0 Amps for a minimum 10 seconds.
- 10 second timer is reset when below 1.0Amps.
- Does NOT shut off or disable daughter board.
- Motherboard LCD toggles alarm message and load current.
- Affected daughter board's alarm LED blinks on and off.

Phase Current Imbalance Alarm

```
D1L1 High Amp  
D2 A=0.500
```

```
D1L1 A=0.750  
D2 A=0.500
```

- Triggered when load current of one wire is 2x higher than the opposite wire for a minimum 20 seconds.
- 20 second timer is reset when load current of one wire is no longer 2x higher.
- Does NOT shut off or disable daughter board.
- Motherboard LCD toggles alarm message and load current.
- Affected daughter board's alarm LED blinks on and off.



The display difference between the **High Current Alarm** and **Phase Current Imbalance Alarm** is subtle: Notice the two-character difference in the display on the first line:

“D1” (High Current Alarm) vs. “D1L1” (Phase Imbalance).

Clear Alarms

To clear an alarm condition, simply hold down the Option button on the motherboard for three seconds.

Specifications

Radio

Equipment Type – Data radio, Raveon RV-M7-UC
Frequency Band – UHF
RF Output Power – 2.0 watt
Current Consumption:
Standby (Muted) – < 65 mA
Transmit 2 watts RF power – < 1.0A
FCC License: FCC ID# SRS-RV-M7-UC

Fuse and Circuit Breaker

Power Supply:

1.5A On/Off Switch/Circuit Breaker – Main Power Input
3.2A Fuse (Slow-Blow) – Field Output

Output Board: 3.2A Fuse

Remote Gateway

Cabinet Type: Non-corrosive, lockable wall mount, indoor/outdoor installation
Six 1" (25.4mm) conduit openings and one 1 1/2" (38mm) conduit opening
Controls up to 1000 stations
Line Voltage: 100-240 VAC 50/60 Hz, 75 VA
Current Draw (no load): 0.12A @ 115-120 VAC, 60 Hz or 0.07A @ 230-240 VAC, 50 Hz
Current Draw (maximum load): 0.24A @ 115-120 VAC, 60 Hz or 0.14A @ 230-240 VAC, 50 Hz
Operating Temperature: 0°C to +60°C (32°F to 140°F)
Storage Temperature: -30°C to +60°C (-22°F to 140°F)
Remote Gateway output voltage: 40 AC max.
Remote Gateway output power: 75W max.

Automatic Action: Type 1.C product
Impulse Voltage: 2500V
Ball Pressure Test Temperature: 257°F (125°C)
Glow Wire Test Temperature: 1,562°F (850°C)

Toro Support

Toro Commitment to Quality

Toro is committed to developing and producing the highest quality, best performing, most dependable products on the market. Because your satisfaction is our first priority, we have provided the Toro Helpline to assist you with any questions or problems that may arise. If for some reason you are not satisfied with your purchase or have questions, please contact us toll free at 1-877-345-8676.

Warranty

The Toro Company and its affiliate, Toro Warranty Company, pursuant to an agreement between them, jointly warrants, to the owner, against defects in material and workmanship for a period of five years from the date of purchase. Neither The Toro Company nor Toro Warranty Company is liable for failure of products not manufactured by them, even though such products may be sold or used in conjunction with Toro products. During such warranty period, we will repair or replace, at our option, any part found to be defective. Return the defective part to the place of purchase. Our liability is limited solely to the replacement or repair of defective parts. There are no other express warranties. This warranty does not apply where equipment is used, or installation is performed, in any manner contrary to Toro's specifications and instructions, nor where equipment is altered or modified. Neither The Toro Company nor Toro Warranty Company is liable for indirect, incidental or consequential damages in connection with the use of equipment, including but not limited to: vegetation loss, the cost of substitute equipment or services required during periods of malfunction or resulting non-use, property damage or personal injury resulting from installer's negligence.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. All implied warranties, including those of merchantability and fitness for use, are limited to the duration of this express warranty. Some states do not allow limitations of how long an implied warranty lasts, so the above limitation may not apply to you. This warranty gives you specific legal rights and you may have other rights which vary from state to state.

Radio complies with FCC Part 22 and Part 90 of the FCC Rules

Domestic: This equipment has been tested and found to comply with the limits for a FCC Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. The equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to the radio communications. Operation in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

International: This is a CISPR 22 Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures. Each stations can activate up to two solenoids.

This product, utilizing a Class 2 transformer tested to UL1585, satisfies the requirements of a Class 2 Power Source as defined in the NFPA 70 (NEC), Article 725.121(A)(3).



Count on it.

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