Controller Unit
MDC2
Safety Information

Warning!

Important safety information, including caution and warning messages, appear throughout this manual. To ensure correct operation and to avoid additional expense, read this manual thoroughly before you begin installing or operating the controller.

Operating this equipment in a residential area can cause interference to radio and television reception. The radio frequency energy emitted by this device complies with limits for a Class B computing device, described in FCC Rules Part 15, Subpart J.

Safety Information and Icons Used in This Manual:

To quickly help you find, identify and understand important information, this manual uses the following icons and notations:

This icon indicates critical information. This specific icon alerts you to an electrical CAUTION telling the installer or operator that he or she may be exposed to dangerous high voltages.

This icon indicates non-electrical but critical information. This specific icon alerts you to a general CAUTION that if you do not follow, may result in severe personal injury or death.

Warning! This designates a Warning indicating actions that may damage the equipment.

Note: This designates a Note, which helps clarify a specific instruction.
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Welcome to Rain Bird®

Thank you for purchasing your new, state-of-the-art Rain Bird® Controller. For more than six decades, Rain Bird® has led the irrigation industry in meeting all of your water management needs by providing the highest quality products and services available. Your new Rain Bird® Controller is designed to give you a lifetime of on-site watering control.

The MDC Controllers

The MDC line of controllers are systems that completely manage your landscape and turf needs by letting you control all your irrigation functions from one central location. MDC Controllers use Schedules to control the days, times and length of time each valve operates.

Once you program and store irrigation Schedules and other instructions, the MDC communicates this information, through a two-wire (MAXI cable) communication path, to numerous decoders located throughout the irrigation system. The decoders act on command from the controller, activating solenoids on various valves, master valves and pumps.

The MDC2 Controller uses a program module, which supports up to 50 (decoder) outputs. The controller also has slots to hold three expansion modules. Each expansion module supports an additional 50 outputs. This means you can configure your MDC2 Controller to support 50, 100, 150 and 200 outputs.
Introduction, continued

**Special Features**
The MDC2 Controller mounts to a wall and has the following special features:

- Anti-rust, corrosion-resistant design
- Weather-resistant cabinet allowing you to mount the controller inside or outside
- Stores up to 10 separate irrigation Programs and 1 auxiliary (non-irrigation) Program (which does not start pumps)
- Each Program supports up to 100 Steps (individual commands that complete a Program)
- Each Program can start up to 6 times a day
- Each Program runs on a 14-day Schedule
- Input terminal connections for rain or alarm sensor
- Output terminals for 3 communications cables
- Communications cables to support flow and auxiliary sensors
- Slots provided for 3 expansion modules supporting up to 200 single-output decoders (MDC2)
- Easy-to-use menu tree system
- Diagnostics to test decoders, schedules and short findings
- The option to choose between 5 languages (U.S. English, British English, Spanish, French and German)
- Backlighting that makes the liquid crystal display (LCD) easy to read
- A serial communication port and modem allowing you to program the controller from a PC
- Software to allow for remote programming and monitoring from a PC
Introduction, continued

Packing List
Please check to make sure that you have all the items on the list. If any item is missing or damaged, contact your Rain Bird® distributor.

1  Pre-assembled Controller in a Plastic Wall Cabinet
2  Keys
1  Installation and Operating Instructions Manual
1  Mounting Template
1  Three-year Warranty Card
1  MDC Software CD
This chapter of the manual explains how to mount your new MDC2 Controller on the wall, how to connect the wiring, install program and expansion modules and replace the battery.

Mounting the Controller

Before You Begin

Warning! Before installing your controller, make sure that the area around you is free from dirt and dust and that your hands and arms are clean. This will avoid contaminating the controller’s internal parts.

Warning! Do not let water or other liquids come in contact with any part inside the cabinet.

Choosing a location

When choosing the best location to install your wall-mounted controller, please consider the following:

- You must install this controller in compliance with local electrical codes.

CAUTION

- The MDC2 Controller cabinet is water-resistant, so you can mount it inside or outside.
- Select an area, protected from vandalism, where the user can easily reach the controller. Rain Bird® recommends placing the controller at eye level, in a utility room.

Warning! To minimize electromagnetic interference, select a location that is at least 15’ (4.6 m) away from high-draw motors, such as air conditioners, refrigerators or pool pumps.

- Select a location that has access to 120-Volt AC electrical power (or the proper electrical supply voltage outside the United States).
- Mount the controller on a flat, stable, vertical surface. Allow sufficient conduit clearance for the electrical connections at the bottom of the cabinet.
- Allow 9 1/2” (24.2 cm) minimum clearance for the hinged cabinet door to swing fully to the left.
- Allow at least 6 1/4” (17.2 cm) minimum clearance above the cabinet door so you can easily remove the hinge pin to service the controller.
Installation, continued

Typical Wall-mount Installation

- Field Wiring in Conduit
- 120-Volt AC Wiring in Conduit
- To Fuse Box
- Cabinet is 4-3/8" (11.1 cm) Deep
- 9-1/2" (24.2 cm) minimum
- 6-1/4" (17.2 cm) minimum
- 9-1/2" (24.1 cm)
- 10-1/4" (26 cm)
- Wall
- Floor

Locate for easy access and for comfortable viewing.

6-1/4" (17.2 cm) minimum

Typical Wall-mount Installation
Installation, continued

**What you will need**
Before you begin installation, you may need the following tools and materials:

✓ Slotted Head Screwdriver
✓ Phillips Head Screwdriver
✓ Thin Blade Screwdriver
✓ Lineman’s Pliers
✓ DBY Connectors
✓ Hammer
✓ Grounding Strap
✓ Two-wire MAXI Cable (#14 AWG wire)
✓ Two-wire MAXI Cable (#18 AWG wire)
✓ #8 AWG or #10 AWG Bare Ground Wire
✓ Tape Measure
✓ Wire Stripper
✓ Wire Nuts
✓ Marking Pencil
✓ Electric Drill (or Hammer Drill if installing in masonry or concrete wall)
Preparation of the Controller Cabinet for Power and Field Wires

Note: You can remove four knockouts from the controller cabinet making it easy to route the wires. You will find two of these knockouts on the back (for routing wires through a wall) and two on the underside (for feeding wires through the cabinet’s bottom).

To tap out a knockout, place the cabinet on a firm surface with the groove facing you. Work your way around the groove with a slotted screwdriver, firmly tapping out the knockout.

A hole on the underside of the cabinet fits a 1” (2.6 cm) PVC male adapter for installing PVC conduit. You can increase its size to 1 1/4” (3.2 cm) by tapping out the knockout around the hole. If you are using #14 AWG wire, or larger, you may need the larger hole. If you run the wires through the bottom holes, you will need to install conduits. Slip the conduit through the hole and secure it with a male adapter or other conduit fittings.
Installation, continued

Mounting the Controller on the Wall

Note: The MDC2 Controller has four mounting holes on the back on the cabinet—three keyhole slots near the top and one circular hole at the bottom.

Note: To install the controller on a flat wall surface, use the left and right keyhole slots at the top of the cabinet. To install the controller on a narrow stud, use the center keyhole slot.

1. Place the mounting template onto your mounting surface. Make sure it is level and mark the top drill holes. If mounting to a stud, mark the drill hole in the center of the stud.
2. Drill the holes and use the appropriate plugs or fasteners.
3. Screw in the appropriate mounting screws, leaving about 3/8” between the screw heads and wall.

Note: The mounting materials and specific screws you need will vary according to the mounting surface (i.e., wood, cement, masonry, drywall, etc.)

4. Slide the MDC cabinet over the top screws.
5. If mounting to a stud, swing open the cabinet door and faceplate. Mark the position of the bottom drill hole and then lift off the controller. Do not attempt to drill the bottom hole through the cabinet.
6. Drill the bottom hole and remount the cabinet.
7. Secure the bottom of the cabinet with a screw, tightening it all the way.
Connecting the Controller

There are three types of connections you must make to your MDC2 Controller. They include:

- Connecting to the Two-wire Communications Cable,
- Grounding the Controller, and
- Connecting to the Main Power Source.

**Note:** You may also connect an optional sensor, which prevents irrigation during rainfall or when the soil is moist.

This section of the manual contains instructions for all three types of basic connections, and the optional sensor connection.

**Note:** If you are installing a field or sensor decoder, please see the *MDC2 and Decoder Installation* poster for more information.

All wiring must be installed and connected in accordance with local electrical codes.

**Note:** You can run wires through the holes at the bottom of the cabinet or through the knockout holes at the back of the cabinet. If you use the knockout holes, make sure you seal the unused bottom holes. If you run the wires through the bottom holes, you will need to install conduits. Slip the conduit through the hole and secure it with a male adapter or other conduit fittings.

Connecting to the Two-wire Communications Cable

**Note:** You can connect up to three separate two-wire communications cables (paths). The communications cable you use must be approved for underground use. Rain Bird recommends you use MAXI Cable, #14 AWG as your two-wire communications cable.

**Warning! Do not install the communications cables in the same conduit as the wires to the Main power source.**

To connect the cable,

1. Feed the two-wire communications cable through the conduit and into the controller.
2. Remove about 6” of the cable’s outer sheathing and strip about 5/8” of the insulation from the ends of the two wires.
3. Using a thin blade screwdriver, connect the wire ends to a set of L1 and L2 terminals. Tug on the wires to make sure the connections are tight.
**Installation, continued**

**Grounding the Controller**
The MDC2 Controller is equipped with built-in electrical surge protection. For this system to function, you must properly ground the controller.

**Warning!** Connect the controller to the grounding grid using at least a #8 AWG (10 mm) or #10 AWG (6 mm) bare wire. The wire should be as short and as straight as possible. You will void the warranty if you do not ground the controller to a maximum reading of five ohms.

To connect the ground wire,

1. Loosen the screw on the copper earth ground terminal and slide the end of the ground wire into the terminal. Tighten the screw to secure the wire.

2. Feed the ground wire through the same conduit you used for the communications cable and connect it to ground.

**Connecting to the Main Power Source**
The three Main power input wires for a standard 120-Volt AC transformer are black, white and green. You will find these wires in the high voltage compartment in the lower left corner of the controller cabinet.

To prevent electrical shock, make sure all supply power is OFF before connecting these wires. Electrical shock can cause severe injury or death.

All electrical connections and wiring runs must be made according to local electrical building codes.

To feed the power wires,

1. Locate the high voltage compartment cover, remove the screw and swing open the cover.
Installation, continued

2. Feed the Mains 120-Volt AC power wires into the high voltage compartment through a separate conduit.

**Note:** You can also connect the Mains 120-Volt AC power and transformer wires inside a junction box located outside the controller cabinet.

**OR**

Feed the Mains 120-Volt AC power wires through the 1/4” knockout hole on the back of the cabinet. You also need to cut out the scored hole in the high voltage compartment’s fiberboard liner.

To connect to the Main power source,

1. Strip about 1/2” of the insulation off the ends of the power wires.

2. Using code-approved wire nuts, connect the black (HOT) wire to the black transformer wire, the white (neutral) wire to the white transformer wire and the green (ground) wire to the green transformer wire.

3. Tug on the connections to make sure they are tight, then close the high voltage compartment cover and replace the screw.
Connecting an Optional Sensor
The MDC2 Controller allows you to connect an optional sensor. The controller works with any open or closed switch sensor.

Warning! The wires you use to connect the controller to the sensor must be approved for underground use. Rain Bird® recommends using a two-wire #18 AWG (maximum gauge) cable long enough to easily reach the controller.

Warning! Install the sensor wire in the same conduit you use for the two-wire communications cable and ground wire. The conduit for the power wires should only contain the power wires.

To connect the sensor’s wires to the controller,

1. Remove about 6” of the cable’s outer sheathing and strip about 5/8” of the insulation from the ends of the two wires.

2. Using wire nuts, connect the two-wire cable to the sensor wires inside a valve box.

3. Protect all underground splices with DBY connections. Insert the wire nuts into the DBY connectors and close the gap tightly. Place the connectors inside the valve box.

4. Run the two-wire cable leading from the sensor wires through a conduit and into the controller cabinet. Use the same conduit you used for the communications cable.

5. Using a thin blade screwdriver, connect the sensor cable wires to SENSOR terminal 1 and SENSOR terminal 2 inside the controller. Tug on the wires to make sure the connections are secure.

You have now completed mounting and wiring your new MDC2 Controller.
Installing Program and Expansion Modules

The MDC2 Controller uses a program module that controls 50 (decoder) outputs. The controller also supports up to three expansion modules (MDC/M50D), each controlling an additional 50 outputs. So, by adding expansion modules, you can configure the MDC2 Controller to control 50, 100, 150, or 200 outputs. 200 is the maximum number of outputs the controller can manage in any combination over one, two or three separate two-wire communications lines.

**Warning!** When working with any program or expansion module, always use a grounding strap to avoid electrostatic discharge, which can damage the modules.

**Warning!** Always turn off the controller before you add or remove any module.

To add or replace a program or expansion module,

1. Use a Phillips head screwdriver to remove the two screws and lock washers holding the guide rail. Be careful not to lose the lock washers.

2. To remove a worn out module, grasp it by its tab and wiggle it back and forth while pulling up.

3. Hold the new module by its tab, so the back of the module faces the top of the cabinet.

4. Firmly plug a 10-pin expansion module into one of the three corresponding sockets on the circuit board. The program module is larger and fits only in one socket.

**Warning!** When plugging a program or expansion module into an MDC socket, please note its orientation. Make sure the back of the module’s mini circuit board is facing the top of the cabinet and not the display screen. Plugging the modules in backwards will not damage the controller, but the controller will not work properly.

5. Once you install the modules, replace the guide rail.
Installation, continued

**Replacing the Battery**

The MDC2 Controller has a built-in lithium battery to backup and store the program memory. During normal use, the battery should last for 10 years. Replace the battery when the MDC2 Controller no longer holds the programmed information.

_warning! The components inside the MDC2 Controller are sensitive to electrostatic discharge. By using a grounding strap, you can help avoid electrostatic discharge, which can damage the units._

To replace the battery,

1. Remove the controller cabinet door from its hinges by opening the door, then pushing the metal pin up and out of the hinge. Set the door and pin aside.

2. Unscrew and remove the faceplate. Set the faceplate aside. Set the faceplate aside.

   To prevent electrical shock, turn off the controller and shut **OFF** all supply power to the unit at the Main power before proceeding. Electrical shock can cause severe injury or death.

3. Using a Phillips head screwdriver, remove the five screws, lock washers and metal clip. Carefully lift the display and control module as far as the connecting wires allow.

4. Disconnect the two-wire harness from the board by grasping the connector and pulling straight up.
5. Open the locking tabs on the three ribbon cables by pushing the tabs away from the cables. Disconnect the ribbon cables by grasping the wide sides of the connectors and gently pulling the connector away from the board. Set the module aside.

6. Using a thin blade screwdriver, gently pry the lithium battery out of its compartment and replace it with a new battery, positive side facing up.

**Warning! Dispose of the depleted battery in accordance with local regulations.**

If you mistreat the battery, it may explode. Do not recharge, disassemble or dispose of in fire.

To reassemble the controller,

1. Reconnect the three ribbon cables by firmly pushing each connector into their slots on the board. A small tab on the side of the connector slides into a slot on the socket, so each connector fits only one way. Firmly push to engage the locking tabs.

2. Plug in the two-wire harness into its corresponding slot on the board. It fits only one way.

3. Reposition the display and control module and replace the screws, lock washers and clip.

4. Replace the controller’s faceplate.

5. Screw on the faceplate.

6. Turn on the Main power supply to the controller and turn on the controller.

**Note:** When you change the battery, you will need to reprogram the MDC2 Controller.
Using the buttons on the controller, you can set up the MDC2 Controller to operate automatically. You can also run the controller manually without changing the Programs you have set.

This chapter shows you how to use the controller’s buttons and gives you step-by-step instructions for setting up the controller to suit your needs.
Programming and Operation, continued

**Familiarizing Yourself with the MDC2 Controller**

Before beginning to program or operate your MDC2 Controller, take a moment to familiarize yourself with the controller. Note that the location of the ON/OFF switch is behind the removable panel. Once you turn the controller on, you can use the buttons to guide you through different display screens and functions on the (Liquid Crystal Display) LCD.

Most screens show a row of labels at the bottom. These labels indicate the specific function of the buttons under each label. As the labels change from one screen to the next, so does the function of the buttons. Labels with tabs contain submenus.

A backlight lights the display while you operate the buttons. Once you stop, the backlight remains on for about 70 seconds then turns off. The information is still on the display, but the display is not lit. Pressing any button turns the backlight on again.

**Note:** You must first turn on the backlight (press a button) before you can operate the controller.
Programming and Operation, continued

**Getting Started**

Remove the lower panel. Turn on the controller and replace the panel.

The display briefly shows the software version and controller type (MDC2).

A Power Returned message displays along with the current date and time (24 hour military time). Please see Appendix I: Conversion Chart from Standard to Military Time on page 91.

The message prompts you to Press OK (the button pointing to the OK label). This message also appears when power returns after a power failure.

**Note:** You need to press the button pointing to the OK label **twice**, to reach the **Main Operating Screen**.
Programming and Operation, continued

Main Operating Screen

1. **Program**
   - indicates the current Program being displayed. The MDC2 Controller can store up to 10 irrigation Programs (which start pumps) and 1 auxiliary or non-irrigation Program.

2. **Total**
   - indicates the total irrigation time, in hours and minutes, you scheduled for that Program.

3. **Current Time**
   - shows in 24-hour military time.

4. **Step Number**
   - each Program supports up to 100 Steps. Each Step contains specific programmed information for the decoders and the run time for each decoder and valve.

5. **MTWTFSSMTWTFSS**
   - shows a 14-day display Schedule of the programmed days, starting with the current day (this example assumes the current day is Monday).

6. **Start Time Indicator**
   - shows the time of day you want the Program to start. You can have up to six start times for each Program.

7. **Water Budget Indicator**
   - shows the water budget setting, which you can adjust from 0-250%. Water budget lets you adjust the water application or run times in a Schedule without reprogramming the Schedule.

---

![Diagram of Main Operating Screen](image-url)
Programming and Operation, continued

8. **Active/Passive**
   indicates whether a current Program is Active (A) or Passive (P).

9. **Run Every**
   shows the selected irrigation days, from 1-14.

10. **Repeat**
    shows how many times (up to 99 times) irrigation Programs Repeat.

11. **First**
    shows the year, month and day a Schedule begins.

12. **Pause**
    shows how many minutes you want a Program to Pause between Repeat Programs, before resuming with the next Program.

13. **Sprinkler Icon**
    “sprinkles” when an irrigation Schedule is running.

14. **(Search) Labels**
    use the buttons associated with the Sch labels to move up and down through the 11 stored Programs.

15. **(Schedule) Label**
    use the button associated with the Sched label to set up specific irrigation Schedules.

16. **Label**
    use the button associated with the Menu label to enter the Main Menu.

17. **Label**
    use the button associated with the Auto label to set the controller to the Auto mode. A menu displays allowing you to Pause the irrigation Schedule and manually start the decoders.

18. **Label**
    use the button associated with the Manual label to enter a menu where you can manually start irrigation programs or decoders and Pause a running Program.
Setting Up Your System

The first time you turn on the MDC2 Controller, you must program into your system specific set-up information (decoder and solenoid numbers, sensors, etc.) about your irrigation system.

Before you begin, you may need to Select a Country (indicating language and unit of measure) to read on the display screen.

**Note:** Pressing the button pointing to the minus (-) label returns you to the previous menu.

Selecting a Language

The default language is **English (US)**. However, you can choose between **English (UK)** (British spelling and m³/h—cubic meters per hour setting), **English (US)** (American spelling and GPM—gallons per minute setting), **German** (m³/h), **Spanish** (m³/h) or **French** (m³/h).

1. From the **Main Operating Screen**, press the button pointing to the **Menu** label to reach the **Main Menu**. An indicating arrow points to the menu category. You control the indicating arrow with the buttons pointing to the up and down arrow labels.

2. Move the indicating arrow to **1. Set-up Data** and press the button pointing to the **OK** label.

**Note:** Pressing the button pointing to either the up or down arrow labels changes the direction of the double arrow label. The double arrow label lets you quickly scroll through the categories.
3. Move the indicating arrow to 10. Select Language and press the button pointing to the OK label.

Note: It takes about five seconds for the controller to change the text to the new language before returning to the Set-up Data menu, displayed in the language you selected.

Note: Wait until the new country is updated before pressing any buttons. Otherwise, the country may not update.

5. Using the button pointing to the Up arrow label, scroll to 11. Return and press the button pointing to the OK label, or select minus(-) to return to the Main Menu.

4. Using the buttons pointing to the up or down arrow labels, scroll to the language you want to read on the display and press the button pointing to the OK label.

Note: It takes about five seconds for the controller to change the text to the new language before returning to the Set-up Data menu, displayed in the language you selected.

Note: Wait until the new country is updated before pressing any buttons. Otherwise, the country may not update.

Setting the Date/Time Formats

1. From the Main Menu, navigate to 2. Date/Time Formats and select OK.

You will be taken to the Date/Time Formats menu.

2. Select OK again. The first active field is the Time Hours, which is indicated by alternating blinking arrow markers.

3. Use the up and down arrows to change the Hours format to be either Standard (12) or Military Time (24) and select OK.

4. Use the down arrow to move to the Date Format. The active field is the Date Format, which is indicated by alternating blinking arrow markers.

5. Use the up and down arrows to change the Date Format and select OK.
Programming and Operation, continued

6. Use the **down arrow** to move to the **Year Delimited**.
7. Use the **up** and **down arrows** to change the **Year Delimited** format and select **OK**.
8. Press – to exit **Date/Time Formats** screen.

### Setting the Date and Time

1. From the **Main Menu**, move the indicating arrow to **2. Setting Date/Time** and select **OK**. The first active field is the **year**, which is indicated by alternating blinking arrow markers.

   ![MDC](image)

2. Use the **up** and **down arrows** to change the **year**.

   **Note:** The **double arrow** label lets you move through the **date** and **time** quickly. Pressing the button pointing to the **double arrow** label once increases or decreases the **date** and **time** by five digits. To switch the direction of the **double arrow** label, press the button pointing to the **up** and **down arrow** labels. Holding in the button pointing to the **double arrows** lets you scroll through the numbers quickly.

3. **OK** moves the blinking **markers** to the **month**. Scroll to the correct **month** and select **OK** to move the **markers** to the **day**.

4. Scroll **up** or **down** to the correct **day**. **OK** accepts the change and moves the **markers** to the **hour**, which reads in 24-hour military time. Please see **Appendix I: Conversion Chart from Standard to Military Time** on page 91.

   **Note:** The **year**, **month** and **day** you choose directly affects the **day** of the week *(Monday-Sunday)*. Changing any of those variables also changes the **day** of the week. The number next to the **day** of the week represents the specific **day** in the 14-day calendar.

5. Scroll **up** or **down** to the correct **hour**. **OK** moves the **markers** to the **minutes**. Change the **minutes** the same way then move to the **seconds**. **OK** locks in the new **date** and **time** and returns you to the **Main Menu**.
Programming and Operation, continued

Selecting Valve Types

Valve types refer to the electric requirements of magnetic solenoids. There are 10 Valve Types already programmed into the MDC2 Controller. The first five Valve Types are used by decoders controlling irrigation Programs and will start master valves and pumps. The last five control non-irrigation Programs (such as activating auxiliary alarms, etc.) and will not start pumps. Irrigation Valve Types use switch code 59F350. If setting up a normally open master valve that needs to close on an alarm, the switch code is 39F350. Non-irrigation Valve Types use a switch code of 3FFA20 when using a relay. These default switch codes are used for Rain Bird® 24 VAC solenoids.

Note: The number of solenoid (valve) outputs varies with the Rain Bird® Decoders in your system. For example, FD-102TURF and FD-202TURF can operate one or two solenoids on each output. Whereas FD-401TURF and FD-601TURF can only operate one solenoid on each output.

Note: If your system uses Standard Rain Bird® 24 VAC solenoids, do not change any of these settings. For the New Rain Bird® 24 VAC (White strip wires) solenoids the recommended settings are 59F370. Please move to the next section, Naming the Field Decoders.

Note: If your system operates solenoids that are not Rain Bird®, do not change the default switch codes before verifying if the solenoids open. If the solenoids do not open, you may need to change the Activation Time and/or Holding Voltage. Please see Appendix II: Selecting Electrical Codes for Solenoids on page 93.

Naming the Field Decoders

You must give each field decoder in your system a name (up to six characters) so that you can easily identify that decoder and pinpoint its location. For example, MAPLE1 (or the shorter M1) could represent the first decoder facing Maple Street and ELM5 (or E5) could identify the 5th decoder on Elm Street. It is easier if you make the name as short and descriptive as possible.

1. From the Main Menu, move the indicating arrow to 1. Set-up Data and select OK to reach the Set-up Data Menu.
2. Move the indicating arrow to 2. Decoders and select OK to reach the list of decoders.

Note: The indicating arrow points to the first available space. If you want to change information about a specific decoder already programmed, move the indicating arrow to the decoder you want to change.
3. Select OK to add or change a decoder. The screen now shows four columns or fields with the titles: Name; Type; Address; Booster and Flow. A pair of markers points to the Name field. Use the buttons pointing to the left and right arrow labels to move the markers from one field to the next and back again.

Note: The double arrow label lets you move through the alphanumeric characters quickly. Pressing the button pointing to the double arrow label one time increases or decreases the characters by five numbers or letters. To switch the direction of the double arrow, press the button pointing to the up and down arrows. Holding in the button pointing to the double arrows quickly scrolls through the characters.

4. Position the markers under Name and select OK to activate the Name field. The left and right arrow labels now switch to up and down arrows and the two markers alternate blinking, indicating the field is active.

5. Use the up and down arrows to change each character one at a time, from left to right. A blinking box shows the position of the first character you are changing. The box disappears when you begin scrolling through the characters. An arrow then, points to the character you are changing.

Note: The controller will not allow you to enter a duplicate name. If you do, the message Decoder already exists appears briefly and the controller returns you to the beginning of the field.

6. Change each character one at a time. OK accepts the change and moves to the next space. Continue to select OK until the markers stop blinking, deactivating the field. The up and down arrow labels will also switch to left and right arrow labels.

Note: Selecting minus (-) while you are still in an active field cancels the changes you made and returns the field to non-active.

7. Move the markers to the Type field. Here, you will select the type of valve (solenoid) connecting to the decoder.

Note: The decoder’s Type correlates directly to the valve type used to set the switch codes.
8. Select OK to activate the field, and then scroll through the choices to either an irrigation valve—values 1-5—or a non-irrigation valve—valves A-E. OK accepts the valve Type.

9. Select OK to deactivate the Type field and move the markers to the Address field. OK activates the Address field.

Note: The Address is the REC. No. (Record Number) for each decoder and solenoid connection in your system. You will find this number on the decoder, which should also be recorded on the irrigation drawings.

10. Scroll up or down to enter the complete 3-, 4- or 5-digit Address (REC. NO.). OK accepts the number.

Note: The controller will not allow you to enter a duplicate Address. If you try, the message Address already used appears briefly and the controller returns you to the beginning of the field.

11. Select OK to select the Address and move the markers to the Booster (Pump) field.

Note: If the solenoids connected to the decoder use Booster pumps to start irrigation, you must associate the Booster pump number to the decoder.

12. Select OK to scroll between Booster Numbers. Once the desired Booster is selected, move the markers to the Flow field.

13. Select OK to activate the Flow field and then scroll up or down. The feature lets you assign flow values that are used for SEUF (Seek and Eliminate Unexpected Flow) (see pg. 65).

14. Select OK once the flow has been set and then move the markers to the OK field to return to the decoder listing and continue naming decoders.
Programming and Operation, continued

**Note:** Rain Bird® decoders that have more than one output, (FD-202TURF, FD-401TURF and FD-601TURF) are considered multiple decoders. You must list the separate **Address (REC. NO.)** for each solenoid/master valve connection (i.e., brown 40216, red 40217, etc.) Treat each **Address (REC. NO.)** as a separate decoder and give each a separate name.

15. Once you identify each decoder in your irrigation system, move the markers to Finish and select OK to return to the Set-up Data menu.

### Decoders Failed

This is a list of valve decoders that have failed due to triggering SEUF (Seek and Eliminated Unexpected Flow) and have been blacklisted. A decoder on the list will not be activated during irrigation.

1. From the **Main Menu**, select 1. **Setup Data** and then select OK. The **Setup Data Menu** appears.
2. Select 3. **Decoders Failed** to conduct an audit of your valves.

Any valve decoders that have caused SEUF and are blacklisted shall be listed on the display window. If any of them have been found to be working properly or have been fixed, the user must take them off of the black list for the valves to run again.

### Entering the Pump/Master Valve Information

The MDC2 Controller supports master valves, master pumps and up to nine booster valves or pumps. Rain Bird® recommends you use one Relay-100 pump start relay for each pump in your system. However, in place of a pump start relay, your irrigation system may start pumps using a field decoder plus an external pressure switch, or use a master valve with a field decoder. For the controller to recognize and associate a field decoder to the master valve and pumps your system uses, you must program in the decoder’s **Address** and verify or change the switch code.

1. From the **Main Menu**, move the indicating arrow to 1. **Set-up Data** and select OK.
2. Move the indicating arrow to 4. **Pumps/Master Valves** and select OK to reach the **Pumps** screen. It lists one Master pump or valve and nine Booster pumps and their switch codes.

3. Move the indicating arrow to 1. **Master**, and select OK. The screen now shows 3 fields with the titles: **Pump; Switch; Address** and **On and Off**. A pair of markers points to the **Switch** field.
Note: If your system uses Rain Bird® Decoders and Relay-100, change the Switch Code to 49F390.

Note: If your system’s water supply feeds directly to a master valve, or if the system uses field decoders or pressure switches to start pumps, you may need to change the switch code. Please see Appendix III: Master Valve and Pump Set-up Tips on page 97.

4. Move the markers to the Address field and select OK. The left and right arrow labels now switch to up and down and the two markers alternate blinking, indicating an active field.

5. Use the up and down arrows to enter the field decoder Address marked on the irrigation drawings.

6. OK accepts the Address and the markers stop blinking. The up and down arrow labels also change to right and left arrows. The next set of options let you enter On and Off delays for a MV/Booster activation or deactivation. The On Delay means that the start will be delayed XX seconds after decoder activation. The Off Delay means the MV/Booster will remain activated XX seconds after deactivation of the decoder. This prevents the MV/Booster from stopping between two steps. To enter additional Booster pump Addresses, move the markers to the OK field and select OK to return to the Pumps screen.

7. Move the markers to Finish and select OK to return to the Set-up Data Menu.

Note: To deactivate a pump/master valve for repair or maintenance procedures, change the address to zero (0).

Activating Rain or Alarm Sensors

The Rain Bird® MDC2 Controller has one sensor input allowing you to install an optional rain or alarm sensor. Once you install the sensor, you must change the sensor status from Passive to Active.

Note: The MDC Controller supports only one Rain Sensor or one Alarm Sensor. Activate only one sensor leaving the other Passive. Setting both sensors as Active actually changes the status of both to Passive.

1. From the Main Menu, move the indicating arrow to 1. Set-up Data and select OK.

2. Move the indicating arrow to 5. Sensors and select OK to reach the Rain and Alarm Sensor screen.

3. If your system uses a Rain Sensor, press the buttons pointing to the arrow labels and change sensor status from Passive to Active.

Note: If your system does not use a Rain Sensor, keep the status Passive.
4. Select OK to move the markers to the Alarm Sensor field.

5. If your system uses an Alarm Sensor, change the status from Passive to Active.

6. Select OK to lock in your setting and return to the Set-up Data menu.

Setting Up a Sensor Decoder

The MDC2 Controller can control a variety of sensors (Flow, On/Off, Generic), which are powered by a Sensor Decoder through the two-wire communications cable.

Note: Please refer to Appendix IV for detailed information about the terms and units of measure mentioned in this section.

Programming a Sensor Decoder

1. From the Main Menu, select 1. Set-up Data and select OK.

   The Set-up Data Menu appears.


3. Move the indicating arrow to any desired sensor row and select OK.

   The Sensor Decoder Set-up screen appears.
4. Select **OK** and the blinking **markers** are positioned under **Name**.

5. Select **OK** to activate the **Name** field. Use the **up** and **down arrows** to change the default decoder name. Select **OK** to store the name.

You will notice that the **up** and **down arrows** switch to the **left** and **right arrows** to facilitate the navigation through the configuration parameters.

6. Move the markers to the **Type** field and activate. Use the **up** and **down arrows** to set the decoder type and select **OK** to save it.

**Note:** For **Flow Sensor Decoders**, **Flow Definition** allows you to program a Rain Bird® SD-210TURF Sensor Decoder to the type of flow sensor your system uses - either digital (pulse output) or analog (4-20 milliamps). To establish a conversion ratio, the controller uses to calculate the flow, you only need to program the flow output and sensor output. Rain Bird® recommends you enter the maximum flow, which determines the pulse type.

**Note:** Digital (pulse output) flow sensors are most common. Please see the manufacturers' specifications to determine the **sensor type**, **maximum flow** and **sensor output**.

7. Move the markers to the **Address** field and activate. Use the **up** and **down arrows** to set the decoder address and select **OK** to save it.

8. Move the markers to the @ field and activate. Use the **up** and **down arrows** to set the value and select **OK** to save it.

9. Move the markers to the **Value** field and activate. Use the **up** and **down arrows** to set the decoder type and select **OK** to save it.

10. Move the markers to the **Units** field and activate. Use the **up** and **down arrows** to choose the units and select **OK** to save it.

**Note:** Choose **Pulse/10s** if your **digital** flow sensor uses a higher pulse rate (30-200 pulses per second) and counts the number of pulses in 10-second intervals. Choose **mA** if you are using an analog flow sensor.

11. Move the markers to the **Sum** field and activate. Use the **up** and **down arrows** to choose either **Yes** or **No** and select **OK** to save it.

Now, it is time to define the **alarm conditions**. This feature allows you to set specific **alarm limits** when the controller is in the **Auto** mode. Once input from the sensor decoder goes beyond the set limit (which can occur if a valve opens to a broken pipe), the controller turns off all active decoders, displays and logs an alarm.

**Note:** For **Flow Control** set as below condition and alarms management the following should be considered:

1. When the flow has a transition from a value above the limit to below an alarm will trigger.

2. If no decoders are running for a period of time the MDC will be in non-irrigation mode and thus look for leak flow if set up to do so.
3. When decoders are started again it will then look again for a transition from above the limit to below and an alarm will trigger.

12. Move the markers to the Condition field and activate. Use the up and down arrows to choose a threshold and select OK to save it.

13. Move the markers to the Limit and activate. Use the up and down arrows to set the numeric limit value and select OK to save it.

14. Move the markers to the Action and activate. Use the up and down arrows to decide what shall happen when the alarm occurs and select OK to save it.

15. Move the markers to the Condition field for the second alarm definition and repeat steps 12 to 14, skipping the Obj. and Obj. Id fields (for now).

**Note:** Choosing a decoder that operates a Normally open Master Valve shuts off the complete water supply to the system.

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**Setting Up Sum Flow Alarms**

1. From the Main Menu, choose Set-up Data and select OK.

   You will be taken to the Set-up Data Menu.


3. Navigate to 11. **Setup sum flow alarms** and select OK.

   The Setup sum flow alarms screen appears.

4. Use the up and down arrows to enable Master Pump Flow (MPF) and select OK.

5. Use the right arrow to move to the Min flow when pump active field and select OK to activate it.

6. Use the up and down arrows to set the flow rate and select OK.

   Now, you are going to define alarms for your irrigation system.

7. Use the right arrow to move to the Alarm Type field and select OK to activate it.

8. Use the up and down arrows to choose the Alarm Type and select OK.
Programming and Operation, continued

9. Use the right arrow to move to the Limit field and select OK to activate it.
10. Use the up and down arrows to set the limit and select OK.
11. Use the right arrow to move to the second alarm field and select OK to activate it.
12. Use the up and down arrows to choose between the Leak and Disable and select OK.

**Note:** If you choose Disable, select OK and then select - to exit the screen.
13. If you choose Leak, select OK.
14. Use the right arrow to move to the Limit field and select OK to activate it.
15. Use the up and down arrows to set the limit and select OK.
16. Use the right arrow to move to the Action field and select OK to activate it.
17. Use the up and down arrows to decide what action you want to take place if the leak threshold is reached and select OK.
18. Use the right arrow to move to the Object field and select OK to activate it.
19. Use the up and down arrows to choose amongst Decoder, Schedule or Pump to be affected by the defined alarm condition and select OK.
20. Use the right arrow to move to the Object ID field and select OK to activate it.
21. Use the up and down arrows to choose the specific Decoder, Schedule or Pump to be affected by the defined alarm condition and select OK.
22. Select - to return to the Main Menu.

**Setting up an auxiliary sensor**
An auxiliary sensor works with rain or alarm sensors. If the rain sensor is installed far from the controller or if your system uses a pump alarm, you will also need an auxiliary sensor activated by a sensor decoder. Remember, auxiliary sensors can only tell if a switch is open or closed. Once an auxiliary sensor activates, irrigation stops.

1. From the Sensor Decoder menu, move the indicating arrow to 5. Aux. Sensor Decoder Address and select OK. The two alternating blinking markers indicate the Sensor Decoder Address field is ready for you to program in the Address.
2. Use the up and down arrows to match the Decoder your system is using for the Auxiliary Sensor.

**Note:** The Address should be recorded on the irrigation drawings.
3. Select OK to store the Address and move the markers to the Active field. A blinking black box indicates the field is ready for you to program. Not Install is the default setting.
4. Use the up and down arrows to select either Normally open or Normally closed.

**Note:** Select Normally open if the auxiliary sensor is open all the time. Select Normally closed if the auxiliary sensor opens only when it receives a signal.
5. Select OK to return to the Sensor Decoder menu.
6. Moving the indicating arrow to 6. Return, and selecting OK, or selecting minus (-) returns you to the Set-up Data menu.
Non-Water Window

It is possible to enter a “Non-Water Window” where irrigation is inhibited. This means the schedules will run but the decoders will not activate. To select a specific time frame that does not allow irrigation:

1. From the Main Menu, choose Set-up Data and select OK.
   You will be taken to the Set-up Data Menu.
3. Select OK to activate non-watering starting time.
   The active field is the **hour**, which is indicated by alternating blinking arrow markers.
4. Use the up and down arrows to change the hour and select OK. The alternating blinking arrow markers move to the minutes.
5. Use the up and down arrows to change the minutes and select OK.
   Now, you need to set the non-water window ending time.
6. Repeat steps 4 and 5 to set the ending time.
7. Select - to exit.
Setting the Switch Settings

Switch Settings lets you change from using the Full range of alphanumeric characters to using limited characters (to name field decoders.) The limited characters match the sixteen character keyboard on FT-210 Field Transmitters. You also use the Switch Setting to define the rain and alarm sensors.

Switching the alphabet

1. From the Main Menu, move the indicating arrow to 1. Set-up Data and select OK.

2. Move the indicating arrow to 8. Switch Settings and select OK to reach the Switch Settings menu.

3. With the indicating arrow at 1. Alphabet, select OK. The current setting appears between the two markers. A blinking black box in the first character position shows the field is active. The current controller Software Firmware Versions also appear on the display screen.

4. Use the up and down arrows to select either the Full or 1234567890CTFGV (the limited alphabet setting).

5. Select OK to return to the Switch Settings menu. Selecting minus (-) cancels the Alphabet change and returns to its previous setting.

Turning on an installed rain sensor

1. From the Switch Setting menu, move the indicating arrow to 2. Rain Sensor and select OK. The current setting appears between the two markers. A blinking black box in the first character position shows the field is active.

2. Use the up and down arrows to select between Normally open or Normally closed.
Programming and Operation, continued

**Note:** Select **Normally open** if the Rain Sensor is open all the time. Select **Normally closed** if the sensor opens only when it rains.

3. Select OK to return to the Switch Setting menu.

**Turning on an installed alarm sensor**

1. From the Switch Setting menu, move the indicating arrow to 3. Alarm Sensor and select OK. The current setting appears between the two markers. A blinking black box in the first character position shows the field is active.
2. Use the up and down arrows to select between Normally open or Normally closed.

**Note:** Use Normally open if the Alarm Sensor is open all the time. Select Normally closed if the Alarm Sensor opens only when it receives a specific signal.

3. Select OK to return to the Switch Setting menu.
4. Move the indicating arrow to 4. Return to return to the Set-up Data menu.

**Note:** If you press the button pointing to the minus (-) label after you change the Switch Settings, a screen appears asking if it is OK to Restart System? If not, Press ‘-’. Select OK to restart the system or ‘-’ to cancel.

**Erasing All the Data**

If you wish to delete all the data, such as testing or demo data, from the MDC Controller before you install the actual values, you can do so quickly and easily.

**Note:** Be careful when you erase data. Once erased, you cannot retrieve it again.

1. From the **Main Menu**, move the indicating arrow to 1. Set-up Data and select OK.
2. Move the indicating arrow to 9. Erase All and select OK. The display screen now reads, OK to Erase All Data? Use ‘-’ to cancel.

3. Select OK to Erase the Data and return to the Set-up Data menu. The minus (-) label cancels the action and returns to the Set-up Data menu without erasing any data.
Programming and Operation, continued

**Testing of Line Decoders**
Once you install and program the line (field) decoders into your system, you can then test to make sure they are working properly. The MDC2 Controllers have a built-in decoder test that tries each decoder in sequence.

**Testing the operation of the decoders**
1. From the **Main Menu**, move the indicating arrow to **4. Test** and select **OK**.
2. Move the indicating arrow to **1. Test of Line Decoders** and select **OK** to reach the **Decoder Test** screen.
3. Scroll up or down until you reach the decoder you want to start the test and select **OK** to setup the test. The controller will not test any decoder that is listed before the one you select to start the test.
4. Select **OK** to start the test. After a few seconds, the screen displays the test results in three current measurements (mA).

**Note:** The controller tests the decoders in the order you entered them into the system. The blinking **markers** and **box** show the field is active.

**Note:** The **Before** current refers to the standby current, **Inrush** is the current the solenoid needs to open and **Hold** is the holding current the solenoid needs to stay open. The **Before** value depends on the number and type of decoders your system uses, **Inrush** should fall between 290 to 700 and **Hold** should be 15 to 20 milliamps higher than the **Before** value. If the decoder is connected to two or more solenoids, the **Inrush** will be slightly higher and **Hold** currents will be double in proportion (30-40 mA).
Example: If your system uses 100 FD102TURF Field Decoders (each operating one solenoid output), then test results should show a Before reading of about 50 mA, Inrush of 525 mA (which is within the 290-700 range), and a Hold of 70 mA (which is 20 mA higher than the Before reading).

Note: If the Before, Inrush and Hold values are close, the decoder is not responding. Locate the decoder in the field and make sure that it is wired properly to the solenoid and communications cable. You should also make sure you programmed in the right Decoder Addresses (REC. NO.).

5. Press the button pointing to the OK label twice to activate and test the next decoder in line.

6. The minus (-) label cancels the test at any time, returning to the Test menu.

Note: To set up the MDC2 Controller to automatically activate and test each decoder in sequence, please see Setting Up an Automatic Test Program on page 48.

Testing the Sensor Decoders

Once you install and program the sensor decoders into your system, you can then test to make sure they are working properly. The MDC2 Controller has a built-in sensor decoder test that enables you to test each sensor decoder.

1. From the Main Menu, select 4. Test and select OK.

The Test Menu screen appears.

2. Select 2. Test of Sensor Decoders and select OK.

The Test of Sensor Decoders screen appears.

3. Use the up and down arrows to choose the sensor decoder to be tested and select OK.

The “Communicating with the SD, please wait” message appears.
Programming and Operation, continued

After a few seconds the screen displays the test result as seen below. This is a raw reading that verifies the sensor decoder is working.

3. Move the indicating arrow to 3. Short Finding and select OK to reach the Short Finding screen. In Short Finding Mode, the MDC changes the frequency of the line voltage from 1 to 50 Hertz (Hz).

Finding a short in the system
You can use the MDC2 Controller to help trace and locate shorts in the lines.

4. Check that the Clamp Amperemeter reads the current supplied by the controller. If the reading is higher than you expected, you have either a short or an overload in the system.

Note: If the short takes a high current, the MDC2 Controller automatically limits the current to a safe value of 200 mA. When this happens, the controller will go into the 50 Hz mode and a Short Circuit Warning shows on the display. Please see Sensing a Short Circuit on page 55.

5. To locate the short, “follow” the current from the controller to the decoders in the field.

6. Watch the reading on the Clamp Amperemeter closely. The reading disappears the moment you pass the short.

7. Once you locate the short, press any button on the controller to return to the Test menu.

4. Click OK to return to the Test of Sensor Decoders screen and use the up and down arrows to choose another sensor decoder to test and select OK.

5. Repeat Step 4, as necessary to test all the sensor decoders or select ‘- ‘ to return to the Main Menu.

Finding a short in the system
You can use the MDC2 Controller to help trace and locate shorts in the lines.

1. Attach a clamp from a Clamp Amperemeter to one of the communications wires connected to either L1 or L2 terminals in the controller.

2. Turn on the controller and navigate to the Test menu.
Line Survey

Line survey allows the user to perform an amperage draw and display those values on the main screen.

1. From Main Menu screen, navigate to 4. Test and press OK.
   You will be taken to the Test Menu.
2. Navigate to 4. Line Surv and press OK.
3. Press OK when you are asked Activate Line Survey?
   You will observe the VL and VG values on the display.

Note: VL indicates voltage on line and normally ranges between 34 - 37 V. VG indicates voltage to ground and should be slightly negative. I₁ and I₂ indicate currents in each of the lines in the two-wire path and should be nearly identical. If these measurements deviate much from each other this could indicate that one of the two wires has a ground leakage. There may be slight variations between values indicated on the Line Surv screen and those that appear on the Test Menu.

Viewing the Log Data

The Log Data shows you a complete list of the controller’s activity. The memory holds a 1500 line log. Adding a new line after you reach the maximum erases the first line in the log.

1. From the Main Menu, move the indicating arrow to 5. Log Data and select OK.
   Note: The display shows five lines at a time (a page). The page number is on the top of the page.
2. Use the up and down arrows to scroll from page to page.
3. Select OK or select minus (-) to return to the Main Menu.
Creating Irrigation Schedules

Once you customize the MCD2 Controller to the specific equipment and options in your system, the next step is to create irrigation **Schedules** to best suit your turf needs. A **Schedule** is a series of events you wish to have happen in the field at specific times. It is a watering plan that includes the **days** to water, **times** to begin and **end** watering, the various decoders you wish to operate and how long you want them to operate.

You can set up 10 standard irrigation **Programs**, which will start pumps, and one auxiliary **Program** (Program 11), which does not start pumps. **Programs** 1-9 only run one at a time. You cannot run them together. However, you can run **Programs** 10 and 11 simultaneously with any one of the other 9 **Programs**.
Creating Irrigation Schedules, continued

**Setting the Steps for Each Program**

You can set between 1 to 100 individual **Steps** for each **Program**. Each **Step** contains decoders (which operate valves) and **run times**. You can have up to 10 decoders running at the same time, as long as the hydraulics in your system can handle it. The controller prevents you from including more than 10 decoders for each **Step**.

Completed **Steps** could look like this:

<table>
<thead>
<tr>
<th>Step</th>
<th>Decoders</th>
<th>Run Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>T1, T2, T3</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>T4, T5, T6</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>T7, T8, T9</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>T10, T11, T12</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>T13, T14, T15</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>T16, T17, T18</td>
<td>10</td>
</tr>
</tbody>
</table>

In this example, the **Program** begins with **Step** 1, activating **Decoders** T1, T2 and T3 and running the valves (**run time**) for 10 minutes. After 10 minutes, **Decoders** T1, T2 and T3 switch off and **Step** 2 begins. It continues until all the **Steps** are done.

**Note:** You may include the same decoder in as many **Steps** as you want.

**Note:** If you want to stop irrigation between **Steps**, you can set up a **Step** without naming a decoder. To do this, simply program in a **Run Time**, or how long you wish to **Pause** the irrigation **Schedule**.

**Setting Up Steps**

1. From the **Main Operating Screen**, select **Sch** to reach the **Program** you want (1, 2, 3, etc.)

2. Select **Sched.**, then **Step** to activate the **Step** number. Alternating blinking **markers** show the field is active. If you have already programmed other **Steps**, you can use the **up** and **down arrows** to scroll through each programmed **Step**. The **Step** label is highlighted.

3. Select **OK** and **OK** again to activate the **Decoder** field.

4. Scroll **up** and **down** through the list of programmed decoders. Select **OK** to choose the first decoder you want to include in this **Step**.
Creating Irrigation Schedules, continued

5. Move to the next field and continue until you select all the Step 1 decoders. You can select up to 10 decoders for each Step.

Note: Selecting the minus (-) label while in a non-active decoder field (indicated with right and left arrow labels) or an active Minute’s field (indicated with up and down arrow labels) deletes the information you programmed into that field.

6. Move to the Min field and select OK to activate it.

7. Scroll up and down to select a run time or how long (up to 999 minutes) you want the decoders to open each valve.

8. Select OK to accept the minutes.

9. Move the markers to the OK field and select OK to enter the Step into the Schedule. The Step label is highlighted and the blinking markers return to the beginning (Step 1) showing you the complete Step on the display screen.

10. Scroll to the next Step (Step 2) and program it the same way. You can program up to 100 Steps.

11. Once you finish setting each Step, press the button pointing to the highlighted Step label to return to the Schedule Set-up Screen.

Inserting a Step Between Two Steps

1. From the Main Operating Screen, select Sched then Step.

2. Scroll up or down to the point you wish to insert the Step. If you want to insert a Step between Steps 3 and 4, scroll to Step 4.

3. Move the marker to the Insert field and select OK.

4. Program the Step as you normally would and select OK to enter the new Step into the Schedule. The inserted Step moved Step 4, and all successive Steps, up one. So Step 4 is now 5, Step 5 is 6, and so on.

Note: Selecting the minus (-) label while in a non-active Decoder field (indicated with right and left arrow labels) or an active Minute’s field (indicated with up and down arrow labels) deletes the information you programmed into that field.

5. Select Step to return to the Schedule Set-up Screen.
Deleting Steps

1. From the Main Operating Screen, select Sched. then Step.
2. Scroll up or down to the Step(s) you want to delete.
3. Move the marker to the Delete field and select OK. The previous Step now shows on the display screen and all the successive Steps move back one.

Selecting the Days

Each Program runs on a 14-day cycle. You can set each individual Program (or Schedule) to run on any day in the cycle. The programming repeats itself after 14 days.

1. From the Main Operating Screen, scroll to the Program you want.
2. Select Sched. then Day to activate the 14-day Schedule. The blinking markers and box show the field is active. The Day label is highlighted.
3. Move the blinking box to each day you want to irrigate and select OK to schedule that day.

Example: If you want to irrigate every Monday, Wednesday, Friday and Sunday, move the box to those days in the 14-day Schedule and select the days you want or delete the days you do not want to include in the Schedule. Select the minus (-) labels to delete days (not water on those days) or use the right and left arrow labels to move to each day you want to water and select OK to program those days.

4. When you are finished, select Day to return to the Schedule Set-up Screen.
Creating Irrigation Schedules, continued

**Selecting a Start Time**

You must select at least one start time for each **Program**. You can have up to six start times for each **Program** for each day.

1. From the **Main Operating Screen**, scroll to the **Program** you want.
2. Select **Sched.** then **Time** to activate the **Start Time** indicator (1-6) field. The blinking **marker** shows the field is active. The **Time** label is highlighted.
3. Scroll **up** or **down** to the first **Start Time** indicator (1) and select **OK**.
4. Use the **up** and **down arrows** to set the first **Start Time**.
5. Select **OK** to enter the **Start Time** into the **Schedule**.
6. Scroll to the second **Start Time** indicator (2), select **OK** and enter a second **Start Time** into the **Schedule**. Continue until you are finished (up to six).
7. Select **Time** to return to the **Schedule Set-up Screen**.

**Note:** Start times must be separated by a minimum of two minutes.
Creating Irrigation Schedules, continued

Setting the Water Budget (WB)

Water budget lets you increase or decrease the operating time for each decoder in your Schedule from 0 to 250%. The water budget default setting is 100%. The total run time also changes when you change the water budget.

1. From the Main Operating Screen, scroll to the Program you want.
2. Select Sched, then WB to activate the water budget field. Alternating blinking markers show the field is active. The WB label is highlighted.
3. Use the up and down arrows to set the WB between 0 and 250%.
4. Select WB to return to the Schedule Set-up Screen.

Setting the Programs for Active or Passive (A/P)

You can set each Program to be active (A) or passive (P). Active means the Program (1-11) responds to all automatic starts and stops if the controller is in the Active Mode. Passive means it will not respond to any automatic settings. If you do not wish to use a Program at this time, (but may in the future) set it to Passive.

1. From the Main Operating Screen, scroll to the Program you want to set as Active or Passive and select Sched.
2. Press the button pointing to the A/P label to switch the Program between Passive and Active.
3. Select Next twice to return to the Main Operating Screen.
Creating Irrigation Schedules, continued

**Scheduling to Run on Specific Days and Dates**

You can program your controller to irrigate on a selected day(s) and date(s) in a 14-day period, instead of on the 14-day cycle (which begins on the day you initially program the controller). You can also set the first date you want to begin irrigating.

1. From the **Main Operating Screen**, scroll to the **Program** you want.
2. Select **Sched.** then **Next** to reach the **Run every** and **First** labels.

**Note:** **Run every** refers to which days you want a specific **Program** to run (**Run every 1st day; Run every 2nd day;** etc). **First** (which shows the year, month and day) refers to the date you want the sequence to begin.

3. To change the **Run every** day, press the button pointing to the **Every** label. Each time you press the button, the day increases by one, up to **Run every 14th day** (in the 14-day **Schedule**).

**Note:** You can see the 14-day **Schedule** change each time you press the button.

**Note:** An **arrow** label next to **Every** shows the direction you are scrolling. Pressing the button pointing to the **arrow** label changes the direction you are scrolling.

4. To change the date you want to start the sequence, press the button pointing to the **First** label. Continue to press the button to reach the start date you want.

**Repeating and Pausing Programs**

Once you set-up a **Program**, you can repeat it up to 99 times and set timed pauses (in minutes) between each repeated **Program**.

1. From the **Main Operating Screen**, scroll to the **Program** you want to repeat.
2. Select **Sched.** and **Next** to reach the **Repeat** label.
Creating Irrigation Schedules, continued

3. Press the button pointing to the **Repeat** label to set the number of times you want the **Program** to repeat. Holding down the button lets you scroll quickly up to 99 repeat times.

4. Select **Pause** to set a timed pause between each repeated **Program**.

**Note:** An **arrow** label next to **Every** shows the direction you are scrolling. Press the button pointing to the **arrow** label to change the direction you are scrolling.

5. Select **Next** to return to the **Main Operating Screen**.

---

**Setting Up an Automatic Test Program**

The MDC2 Controller allows you to set up a Test Program to automatically activate and test all decoders (from the first one you installed to the last), one by one. You can adjust the Decoder Activation Time between 10 and 240 seconds. 240 seconds is especially useful if you wish to walk through and visually inspect each decoder as they activate.

1. From the **Main Operating Screen**, press the button pointing to the **Sch down** label to reach the **Test Program**.

2. Select **Manual** to reach the **Select Program or Decoder** screen. The **Manual** label is highlighted.
Creating Irrigation Schedules, continued

3. Select **Prog.** to reach the test screen and select **OK. Valve Active Time 120 Seconds** appears on the display screen.

4. Use the **Sch up** and **Sch down** arrows to set the valve active time. Change the **Valve Active Time** anywhere between 10-240 seconds.

5. Select **OK.** The **Testing Display Screen** appears and the Program and Manual labels are highlighted.

**Note:** The controller is now testing all active decoders. The screen displays the three current measurements (Before, Inrush and Hold) for each decoder it tests.

6. You can cancel the test at anytime by selecting **Prog.**

---

**Operating the Irrigation Programs**

You can operate the MDC2 Controller completely automatically, completely manually or by a combination of both.

**Starting Automatic Irrigation Programs**

When you start **Automatic Irrigation**, all **Active Programs** will run according to the **Schedule** you set up. The controller only runs **Active Programs**, not **Passive**.

1. From the **Main Operating Screen**, scroll to the **Automatic Program** you want to start and select **Auto.**
Creating Irrigation Schedules, continued

The Auto Display Screen shows:

- the Program,
- the Total run time,
- the current time,
- the name of the Active Decoder(s) (during a Schedule),
- the number of minutes the decoder is active (during a Schedule),
- the day and time of the first Scheduled start time,
- the WB setting,
- the number of Active Dec. (during a Schedule),
- the number of times this Schedule Repeats,
- the length of Pauses between repeats,
- the Scheduled irrigation days in the 14-day cycle,
- a timeline, separated in six-hour increments, showing the Active time period of the Program (indicated by a black block),
- a sprinkler icon that “sprinkles” during irrigation and,
- the Auto label is highlighted.

**Note:** If none of the 11 Programs are Active, the message, **No Active Programs** appears on the display screen.

**Note:** If no irrigation Schedule is currently running while the controller is set in Automatic, 0 active Decoders shows, until the first Schedule starts. The Dec. and Auto labels are highlighted and the sprinkler icon “sprinkles” when a Schedule starts.

2. Selecting Pause temporarily stops the Automatic irrigation Schedule. Select Pause again to return to Automatic.

3. Pressing the button pointing to the Auto label stops the irrigation Program and returns you to the Main Operating Screen.

**Activating a Decoder in Auto Mode**

While the controller is set in Automatic, you can (manually) activate decoders before or in-between programmed irrigation Schedules.

1. Select Dec. and scroll through the list of installed decoders to find the one you want to activate and select OK.

2. Scroll up and down to select how many minutes you want the decoder to be active.

3. Select OK to lock the decoder in memory and return to the Automatic Display Screen. Both Dec. and Auto labels are highlighted and the sprinkler icon “sprinkles.”
Creating Irrigation Schedules, continued

4. Follow steps (1-3) to activate additional decoders.

5. You can now use the up and down arrow labels to scroll through all the Active Decoders.

Note: When the time you set for each Active Decoder runs out, the sprinkler icon stops and the controller returns to the Automatic mode with only the Auto label highlighted.

Activating an Irrigation Schedule in Auto Mode

Just like starting a schedule manually by switching the controller to the Manual mode, it is also possible to start an irrigation schedule manually when your controller is in Auto mode. When you manually start an irrigation schedule, the running programs are paused and the remaining parts are stacked to run after the manually started schedule(s) finish. It is possible to start up to three (3) schedules manually and they will all be stacked in the order that they are entered, but all prior to the stacked auto-schedules. Unlike in the Manual mode, you do not need to switch the controller’s operating mode.

To start a schedule manually when the controller is in Auto mode:

1. Select Program. You will see the following message:

2. Select OK.

3. Use the up and down arrows to choose the program that you wish to run manually and select OK.

The number of active decoders as well as the remaining run time will be displayed and the sprinkler icon will “sprinkle”.

Note: Your controller remains in Auto mode during the manually run irrigation schedule and resumes its normal course of the stacked irrigation schedules once the manually run schedule is over. Please note that it is not possible to pause a manually activated irrigation schedule.
Creating Irrigation Schedules, continued

Manually Starting an Irrigation Schedule

Operating the irrigation Programs Manually overrides all Automatic Programs. When you manually start an irrigation schedule, the running programs are paused and the remaining parts are stacked to run after the manually started schedule(s) finish. It is possible to start up to three (3) schedules manually and they will all be stacked in the order that they are entered, but all prior to the stacked auto-schedules.

1. From the Main Operating Screen, select Manual. The Manual label is highlighted and you are asked to Select Program or Decoder.

2. Use the up and down arrows to select an Active Program.

3. Select OK. The display will show the number of the steps in that program and will ask you which step you would like to start the irrigation with.

4. Use the up and down arrows to change the step number.

5. Select OK.

Note: The Manual Program starts at the first full minute. The Program starts by displaying the first decoder in the Step along with the Remaining run time for that Step. You will also see the Total Remaining Time for the complete Program. The sprinkler icon starts to “sprinkle.” Please note that it is not possible to pause a manually activated irrigation schedule.

6. Select Pause to pause the current Program Schedule. The display asks if it is OK to Pause Current Schedule. If you select Cancel to Abort, you will return to the Use Manual Display Screen.
Creating Irrigation Schedules, continued

7. Select **Pause**. **Pausing** appears on the display, showing the command registered. Irrigation continues until the next full minute. At the full minute mark, all activated sprinklers stop and the display reads **Paused**.

8. Select **Resume** to continue irrigating. The display asks if it is **OK to Resume Current Schedule**. **Cancel** returns the controller to the **Pause** state.

9. Select **Resume** to return to the **Manual Display Screen** and continue with the scheduled irrigation **Program**.

   Once the irrigation is over, the screen again asks you to **Select a Program or Decoder** for manual activation.

10. Press **Manual** to return to the **Main Operating Screen**.

11. Press **Auto** to put the controller back in the Auto mode.

   To resume the normal automatic mode after the manual irrigation is over:

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Manually Activating a Decoder

The MDC2 Controller allows you to activate programmed decoders manually.

1. From the **Main Operating Screen**, select **Manual**. The **Manual** label is highlighted and you are asked to **Select Program or Decoder**. The display also shows the number of **Active Decoders**.
2. Select **Dec**.
3. Scroll through the list of programmed decoders. Choose a decoder and select **OK**.
4. Use the **up** and **down arrows** to program how long you want the decoder to be active and select **OK**.

**Note:** The display now shows the number of **Active Dec.**, displaying only one at a time. The **sprinkler** icon starts to “sprinkle.”

5. Follow steps (2-4) to manually activate more decoders.
6. Use the **up** and **down arrows** to scroll through each **Active Decoder**.

Manually Stopping an Active Decoder

1. From the **Active Decoder Screen**, select **Dec**.
2. Scroll through the list of **Active Decoders** to reach the one you want to stop and select the **minus(-)** label. The **Active Decoder Screen** now shows one less decoder.
3. Select **Manual** to stop all the manually activated decoders and return to the **Main Operating Screen**.

**Note:** Please note that you do not need to perform **Step 3** if your controller is in **Auto** mode.
Understanding Sensor Warning Signs

If a rain or auxiliary sensor shows an alarm or warning condition, a message like this appears on the display.

- **Type of Sensor**
- **Date and time the Sensor activated (In:)**
- **Date and time the Sensor became deactive (Out:)** (If it is still active, there is no Out time)
- **Warning** sign—displays as long as Alarm condition exists

**Note:** If a rain sensor activates, irrigation stops, but the Program keeps running. If the rain sensor is the self-emptying type, irrigation continues as programmed once the sensor changes to Non-Active. Selecting OK removes the message. As long as the sensor is Active, the message will appear again every time you select an Automatic or Manual function.

Following are key warning indications that will appear on the screen and in logs:

AL# (where # is from 1 to 10) is alarm 1 (occurs while irrigation is in process) for flow sensors. This can also be set up to provide a flow alarm, or as a generic or on/off alarm.

al# (where # is from 1 to 10) is alarm 2 (occurs while not irrigating). This can be set up as a flow alarm, or as a generic or on/off alarm.

ALS indicates a flow SUM alarm that occurs while irrigation is in process.

alS indicates a flow SUM alarm that occurs while not irrigating.

SEF indicates SEUF (Seek and Eliminate Unexpected Flow) overflow.

seF indicates SEUF underflow.

MPF is master pump failure. If this is detected, currently running programs will be automatically stopped.
Creating Irrigation Schedules, continued

**Sensing a Short Circuit**

If the MDC2 Controller senses a short circuit on the lines, it will automatically limit the current to a safe value, change the line frequency from 1 to 50 Hz (making it easier to trace the short circuit) and display this message.

- **Type** of problem (**Short Circuit**)
- **Date** and **time** of problem (**In:**)
- **Date** and **time** problem was corrected (**Out:**) [If it still exists, there is no **Out** time]
- **Warning** sign—displays as long as problem exists

Select **OK** to remove the message. As long as the problem exists, the message will appear again every time you select an **Automatic** or **Manual** function.
Using the Controller with a PC

The MDC comes with its own programming and monitoring software. System set-up data and programs can be entered in the software. They can then be downloaded to the controller. The software can also be used to upload data and programs from the controller. Additionally, it can retrieve log data from the controller, and manually run stations and programs.

You can attach the MDC controller to a PC directly, using a nine-pin serial cable, or through a modem/telephone line. Both connections are easy to find under the faceplate.
Using the Controller with a PC, continued

**Linking your PC and Controller**

To link your PC using the serial communication port,

1. Open the MDC cabinet and remove the lower panel.

**Note:** For serial communications, you will need two nine-pin serial cables and an OLK-400 Optocoupler connection.

2. Attach one end of the first serial cable to the MDC serial communication port and attach the other end to the Optocoupler.
3. Attach one end of the second serial cable to the Optocoupler and the other end to your PC serial communication port.

**Note:** Rain Bird® recommends using the OLK-400 Optocoupler to protect your system against lightning surges. However, you may use a Null-modem cable as a temporary device.

To link your PC using the modem/telephone line connection,

1. Open the MDC cabinet and swing open the faceplate.
2. Feed a modem/telephone line through the two-wire communications conduit or through a separate access hole in the MDC cabinet.
3. Plug the phone clip into the corresponding jack.
Using the Controller with a PC, continued

**Installing the Rain Bird® MDC PC Software**

Your minimum PC requirements for the Rain Bird® MDC PC Software are:

- Windows 2000, XP/Pro required
- Pentium 3
- 900 MHz
- 256 MB RAM
- 25 MB hard disk space
- 1024 x 768 screen resolution
- CD-ROM
- External modem may be necessary if the internal modem in the PC is not set up to work at lower speeds (2400 bps)

Insert the MDC PC Software CD into your PC’s CD-ROM Drive. The CD-ROM software is set to install automatically. However, if your PC does not support this feature, you must then install it manually. Please see your PC Operations Manual to learn how to add new software to your PC. It is recommended to back up the database (rbt.1db) before upgrading from previous versions of the MDC software.

**Setting Up a Communications Link**

1. At the desktop, select Start, Programs, RainBird Turf, and Turf from the pull-up menus to open the Rain Bird Remote Access window.

2. From Rain Bird Remote Access, select File, then Connection wizard from the pull-down menu.

3. The first Connection wizard pop-up window gives you the option to name the installation. Direct (for direct connection) is the default name. Change the name, if you wish, and select Next to advance to the next window. Done exits you from Connection wizard while saving any changes you made to the default settings.
4. The **Connection wizard** now asks you to pick the type of connection your system uses, either a **Direct connection (Serial cable)** or a **Modem/telephone line**. Choose the connection and select **Next**. **Done** exits you from **Connection wizard** and **Back** returns you to the previous window.

5. If you selected **Direct connection (Serial cable)** you are then asked to select the **Com Port** (Communications Port) you used to connect the PC to the controller.

6. Select **Finish**. **Done** exits you from **Connection wizard** and **Back** returns you to the previous window.

7. If you selected **Modem/telephone line** as your PC/controller connection, you are then asked to supply the telephone number for the controller. At this point, you can also verify the modem settings by selecting **Modem Setup**.

8. Select **Finish**. Use **Modem Setup** to install and setup a new modem. **Done** exits you from **Connection wizard** and **Back** returns you to the previous window.
Using the Controller with a PC, continued

**Verifying the Time and Date**

Once you establish a communication link between the controller and PC, you then need to verify the controller’s time and date. Time and date directly affect irrigation Schedules. If either is incorrect, the irrigation Schedules are also incorrect.

1. From the Rain Bird Remote Access window, select Controller.
2. Select Get Set Time/Date from the pull-down menu to reach the Edit Controller Time pop-up window. This can be set up for either US or international (24-hour) time formats.

   ![Edit Controller Time](image)

   3. Select Get Controller Time and verify that the Controller Time matches Time is (PC time).
4. If necessary, adjust the date and time and select Send time to Controller.
5. Select OK once the two times match.

**Controller Status Observation**

You can get information about the current status of the controller, including the Start and Stop times of the Current and Next Schedule, Total Current Flow, Total Expected Flow, and Sensor Status.

1. From the Rain Bird Remote Access window, select Controller and then Controller Status. You will be presented with the status information retrieved from the controller as seen below.

   ![Status with info from controller](image)

   Note: While the PC is retrieving status data from the controller, the Communications Status pop-up window appears visually showing the progress. The window disappears once the status data is retrieved.

   Selecting Disconnect from the Controller pull-down menu disconnects the PC connection to the Controller.
Using the Controller with a PC, continued

**Using the MDC PC Software**

The MDC PC Software lets you retrieve installation and irrigation data—information about **decoders**, **valve types**, **pumps**, **sensors** and **irrigation programs**—from the controller. You can then edit the data and send it back to the controller.

**Retrieving the Data**

1. From the **Rain Bird Remote Access** window, select **Retrieve data**.
2. Select **Retrieve all data** from the pull-down menu. All data includes installation and irrigation data (schedules). **Retrieve irrigation data (schedules)** retrieves only the irrigation data from the controller. **Retrieve monitor information** retrieves the monitoring information, which is covered in detail on page 72.

**Note:** While the PC is retrieving data from the controller a **Communications Status** pop-up window appears visually showing the progress. The window disappears once the data is retrieved. If the PC is unable to establish communications with the controller, an Error message appears, asking to make sure the Connection Information is correct.

**Note:** When retrieving data from the controller, the following steps should be followed:
1. Back up data in the PC.
2. Clear all data in PC.
3. Retrieve data from the controller.

**Editing Set-Up Data**

You can edit the installation data you retrieved from the controller or set up all installation data using your MDC PC software and send it to the controller. Both editing or setting up brand new information are done on the **Edit Installation** screen. The **Edit Installation** screen acts as a wizard walking you through the installation steps and lets you set up data specific to each component. To edit installation data:

1. From **Rain Bird Remote Access** window, select **Edit Data**.
2. Select **Edit Set-up Data** and **Controller Type**.
3. Choose **Controller Type**.

**Note:** The controller type depends on the number of expansion modules installed inside the controller. If your MDC2 Controller is not using any expansion modules, then select RBT-50. Select RBT-100 if it is using one expansion module, RBT-150 for two modules and RBT-200 for three expansion modules.
Using the Controller with a PC, continued

4. If you wish for irrigation not to take place for a certain period of time on your site (Non-Water Window), specify this timeframe on the Time Window - Irrigation Prevented area. During the Non-Water Window, schedules will continue, but with no decoders being turned on.

5. Hit Next to reach Valves configuration information.

6. Confirm Valve Type, Valve Switch Code and No. of Valves and edit them as necessary (the software will allow you only to select 1 or 2 for the number of valves).

Note: Valve types refer to the electric requirements of magnetic solenoids. The default Switch Code settings are 59F350 for irrigation Valve types and 3FFA20 for non-irrigation Valve types. If your system uses Rain Bird® 24 VAC solenoids, do not change any of these settings. If your system operates solenoids that are not Rain Bird®, do not change the default Switch Codes before verifying if the solenoids open. If the solenoids do not open, you may need to change the Activation Time and/or Holding Voltage. Please see Appendix II: Selecting Electrical Codes for Solenoids.

7. Hit Next to reach Pumps/Master Valve configuration information.

8. Edit information specific to each Pump/Master Valve as necessary, including Address, On Delay, Off Delay, and Switch Code.

Note: On Delay means that the MV/Booster start will be delayed XX seconds after activation of the decoder. Off Delay means that the MV/Booster will remain activated XX seconds after deactivation of the decoder.

9. Hit Next to reach MDC Decoders configuration information.

Note: The MDC software does not allow deleting decoders. Alternatives are to either erase or change decoder data.
10. Edit information specific to each MDC decoder, including **Name**, **Address**, **Valve Type**, **Flow Value** and **Description**. **Value** lets you assign a **Flow Value** that is used for SEUF calculation.

11. Hit **Next** to reach **Alarms** configuration information.

![Image of Alarms configuration](image)

12. Choose to make rain or alarm sensors passive or active as necessary.

**Note:** The software will allow only one rain or alarm sensor to be active.

13. Hit **Next** to reach **Sensors** configuration information.

![Image of Sensors configuration](image)

14. Edit information specific to each **Sensor Decoder**, including **Name**, **Type**, **Address**, **Units**, **Value**, and **@ measure**.

**Note:** Digital (pulse output) flow sensors are most common. Please see the manufacturers’ specifications to determine the **sensor type**, **maximum flow** and **sensor output**. Choose **Pulse/10s** if your digital flow sensor uses a higher pulse rate (30-200 pulses per second) and counts the number of pulses in 10-second intervals. Choose **mA** if you are using an analog flow sensor.

To establish a conversion ratio the controller uses to calculate the flow, you only need to program the **(Value) flow output** and **sensor output**. Rain Bird® recommends you enter the maximum flow, which determines the pulse type.

15. Click **Done** when you complete your installation set-up process.

**Note:** Edit Installation Wizard is particularly important when you are setting up your MDC system for the first time. It helps you go through the installation data and guides you through the setup process making sure all the possibly applicable components of your MDC system are covered. However, anytime you need to change setup information for a particular component of your MDC system, you can directly jump into the setup screen for that specific component. For instance, **Edit Data> Edit Setup Data> Decoders**, as shown in the figure below, will take you to the Decoders Edit Installation Screen.
Using the Controller with a PC, continued

Configuring Sensor Decoder Settings

Sensor Decoders monitor dry contact switches (e.g., moisture sensor, pressure switch, and security systems) for open or closed conditions and inform the MDC system of switch status. Your MDC system supports up to 10 sensor decoders. Sensor decoders can be **Flow Sensors**, **On/Off Sensors** or **Generic Sensors** (Please note that the type of sensor decoders are set up on the Edit Installation > Sensor Decoders screen).

After you decide what type of sensors you have in your MDC system in the Edit Installation Wizard, you can now do the Sensor Decoder Type-specific settings through the Sensor Decoder Wizard.

1. From the Rain Bird Remote Access window, select Sensor Decoder Wizard. You are presented with a list of all the sensors in your MDC system. Please note that this first screen in the Sensor Decoder Wizard also asks you if you want to include any of the Flow Sensors in the Sum-Flow.

2. Click on the applicable button (either On/Off, Generic or Flow) to set up the alarm condition for each sensor decoder.

**Note:** Specific definitions for sensors, units of measure and alarm triggers (Actions) are contained in Appendix IV.

Configuring On/Off Sensor Decoders Alarm Condition

On/Off Sensor Decoders act as switches that indicate whether an on or off condition exists. These sensors are useful for indicating thresholds such as the opening and closure of devices such as valves and for alarms.

1. On Sensor Decoder Wizard, click on On/Off.

2. Set up the alarm information, including Action, Object Type, Object ID, Flow Limit, Conditions, Delay and Call Setup for outbound paging. Please note that you can define two (2) alarm conditions per On/Off Sensor Decoder.

3. Click Next to define alarms for another On/Off Sensor Decoder or Finish if you are done.

**Note:** When setting up an action to activate a decoder, please note the duration of this action will default to 999 minutes. Also, setting up an action to deactivate a pump or master valve will not deactivate decoders associated with it.

**Note:** When setting up “Irrigation Prevent” as an action, please note that this will be applied to schedules in Auto Mode but not those that are manually started.
Using the Controller with a PC, continued

**Configuring Generic Sensor Decoders**

Generic sensors refer to analog sensors other than flow sensors. The Sensor Wizard also gives you the option to have sensor data in the MDC’s log. To select this option, click on “Log to File” in the Monitor Data column.

1. On **Sensor Decoder Wizard**, click on **Generic**.

2. Set up the alarm information, including **Action**, **Object Type**, **Object ID**, **Absolute Limit**, **Conditions**, **Delay** and **Call Setup**. Please note that you can define two (2) alarm conditions per Generic Sensor Decoder.

3. Click **Next** to define alarms for another Generic Sensor Decoder or **Finish** if you are done.

**Configuring Flow Sensor Decoders**

The measurement of flow rate in the mainline is one of the most important measurements in an irrigation system. Flows that are out of range, either high or low, can be reported and acted upon. Flow sensors can be read remotely by your MDC system hardware designed with this feature.

Your MDC control system can continually check on the flow rate in the system and compare it to pre-defined acceptable levels. It can also be set up to make an outgoing page if the MDC is connected to a phone line. You can define the flow alarm thresholds as follows:

1. The **Sensor Decoder Wizard** provides an option to include individual sensor flow readings in a summed flow. To select this option, click on the box next to the sensor decoder number (SD) in the Include in Sum column. To have data from individual flow sensors recorded in the MDC log, click on “Log to file” in the Monitor Data column. Summed flow is always recorded.

2. On **Sensor Decoder Wizard**, click on **Flow**.

3. Set up the alarm information, including **Action**, **Object Type**, **Object ID**, **Flow Limit**, **Conditions**, **Delay** and **Call Setup**. Please note that you can define only one alarm condition per Flow Sensor Decoder. These options can also be set up for summed flow if that was previously selected in the **Sensor Decoder Wizard**.

4. On the **Sensor Decoder Wizard**, click on **Next**.
5. If desired, alarms can also be set up to operate when not irrigating to detect unexpected flow or leaks.

6. Set up the alarm information, including Action, Object Type, Object ID, Flow Limit, Conditions, Delay and Call Setup. Please note that you can define only one alarm condition per Flow Sensor Decoder. These options can also be set up for summed flow if that was previously selected in the Sensor Decoder Wizard.

Note: For Flow Control set as below condition and alarms management the following should be considered:

1. When the flow has a transition from a value above the limit to below an alarm will trigger.

2. If no decoders are running for a period of time the MDC will be in non-irrigation mode and thus look for leak flow if set up to do so.

3. When decoders are started again it will then look again for a transition from above the limit to below and an alarm will trigger.

7. Click Next to define alarms for Main Pump Failure.

Note: Flow limits can be set up to a maximum of ± 50%.

Note: See Appendix IV for information on sensor decoder alarm parameters and values.

Main Pump Failure Alarm
In case irrigation does not start, you can protect your pump by setting a minimum flow limit. The MPF alarm will stop currently running schedules, but not new schedules.

1. Specify this Limit (minimum flow) and (if desired) call setup information for outbound paging on the Main Pump Failure Alarm screen shown below.

2. Click Finish.

Erasing the set-up data
You can erase ALL SET-UP DATA and IRRIGATION SCHEDULE CONTENTS stored on the PC.

1. From the Rain Bird Remote Access window, select Edit Setup data.

2. Select Edit set-up data and Erase all from the pull-down menus to reach the Erase set-up Data pop-up window.
3. Select Yes to erase the information. Select No to cancel the action.

**Editing irrigation schedules**

1. From the Rain Bird Remote Access window, select Edit data.

2. Select Edit irrigation data and Irrigation schedules from the pull-down menus to reach the Irrigation Schedule Edit View pop-up window.

**Note:** The Irrigation Schedule Edit View window shows you an overview of each Program schedule. Use the numbered tabs on top (1-11) to reach the actual edit windows for each of the 11 Programs. The View window features three additional control buttons. The Zoom Out control button restores the full view of all schedules after zooming in on a particular schedule on the bar graph; Grid places grid lines over the Schedule; and Print prints the Schedule.

To view a detailed section (i.e., Schedule 5, Monday, between 6:10 am and 6:45 am) click on the graph. With the left mouse button pressed, drag the cursor across the section of the Schedule you want to view. Dragging the cursor forms a rectangle showing the area of the Schedule you want to detail. Release the mouse button to Zoom In. The Schedule now shows only the detailed area you selected. To return the screen back to normal, select the Zoom Out button again.

**Note:** When you move the cursor to a section on the View window, a Values @ pointer shows you the corresponding Schedule, day and time for the section where the cursor points.

3. Select the tab of the Schedule you want to change to reach the Irrigation Schedule Edit window.

**Note:** The Irrigation Schedule Edit windows let you add Schedules or change information in current Schedules. For example, use these windows to change Schedules from Active to Passive, change the days, adjust the water budget, start and repeat times, add pauses to Schedules and run times, add steps and select different decoders.
Using the Controller with a PC, continued

**Note:** Start times must be separated by a minimum of two minutes.

**Note:** A drop-down box appears when you select the **Decoder** columns. Use the drop-down boxes to make your selections from the **decoders** you already programmed into the controller.

4. Select **OK** to save the irrigation **Schedule** changes.

**Note:** Please see **Creating Irrigation Schedules** on page 41.

**Note:** To insert or delete a line in a schedule, click on the column immediately to the left of the step number. An arrow pointing to the right will appear. Then press the insert or delete key on the computer keyboard. Pressing the insert key will immediately insert a blank line above the step selected. Pressing the delete key will cause a warning box to appear. To confirm deletion of that line, click on “Yes”. Using this method will ensure that the database is properly updated.

**Deleting a Schedule**

When you delete a schedule, all irrigation programming information is erased from that schedule. You can return to the schedule at a later time and create a new program under the same irrigation schedule number. The **Irrigation Schedule Edit** screen employs color coding to indicate the status of irrigation schedules. The tab of each Schedule will be one of these colors:

- **Green** - indicates the Schedule is **Active**
- **Red** - indicates the Schedule is **Passive**
- **Gray** - indicates the schedule has no information in it.

To erase all data for a particular schedule:

1. On the **Irrigation Schedule Edit** window, click on the tab of the Schedule you want to view.
2. Click **Delete Schedule**. You will be asked to confirm the deletion of the schedule (MDC Notice).
3. Click **OK**. Note that the color of the tab of the deleted schedule changes to gray.

**Erasing all irrigation schedules**

You can erase **ALL IRRIGATION SCHEDULES** and **IRRIGATION SCHEDULE CONTENTS** stored on the PC.

1. From the **Rain Bird Remote Access** window, select **Edit data**.
2. Select **Edit irrigation data** and **Erase all** from the pull-down menus to reach the **Erase Irrigation Schedules** window.
3. Select **Yes** to erase the information. Select **No** to cancel the action.

**Editing the global water budget**

Editing global water budget lets you adjust all the Schedules quickly and easily. If you design individual Schedules with a nominal run time for each decoder and valve, and set the water budget at 100%, you can easily adjust to changes in weather conditions.

1. From the **Rain Bird Remote Access** window, select **Edit data**.
Using the Controller with a PC, continued

2. Select **Edit Global Water Budget** and an **Adjust Global Water Budget** pop-up window appears.

![Adjust Global Water Budget](image)

3. Change the **Water budget percentage** and select **OK**.

**Note:** You must send the **water budget** changes to the controller before updates to the **Global Water Budget** can take affect.

### Sending Data to the Controller

Once you edit the controller information, you must then transmit or send the new information to the controller. From the **Send data** pull-down menu, you can **Send all data** (which includes set-up and irrigation data), **Send irrigation data** only, or **Send water budget** data. The sending procedures are identical.

1. From the **Rain Bird Remote Access** window, select **Send data**.

2. Select **Send all data** from the pull-down menu.

3. If you have changed the **Global Water Budget**, **Send the water budget** data to the controller.

**Note:** While the PC is sending data from the PC to the controller a **Communications Status** pop-up window appears visually showing the progress. The window disappears once the data is sent.

**Note:** If the PC loses communications with the controller, an Error message appears, asking to make sure the Connection Information is correct.

**Note:** If an irrigation **Schedule** is running or the controller is set in the **Automatic** mode when you send data, you will be asked if you want to: **Take the controller out of manual or auto mode to send set-up data?** Select **Yes** to send the data or **No** to continue the irrigation **Schedule**. If you select **No**, no data will be sent.

### Manual Operations

You can start any schedule or activate any decoder manually when your MDC2 controller is in **Auto** mode.

From the **Rain Bird Remote Access** window, select **Controller** and then **Manual Operations**. The Manual Operations screen appears.

![Manual Operations](image)
Starting a Decoder Manually


2. Select a decoder that you want to start manually from the pull-down menu.

3. Set Run Time. Please note that a station can be set up to run from 1 minute to 999 minutes.

4. Hit Execute.

5. Repeat for other decoders as necessary.

Starting a Schedule Manually

When you manually start a schedule, running schedules will be paused and the remaining steps of the schedule will be stacked to run after the manually started schedule(s) finish. Your MDC2 PC Software allows you to start up to three schedules manually and they will be stacked in the order that they are entered, but all will take place prior to the stacked auto-schedules. To start a schedule manually:


2. Select the schedule that you want to start manually.

3. Click Execute. Communication status will be displayed.

4. Click Another to manually start another schedule or Close to exit the Manual Operations window.
**Retrieving Monitoring Information**

The controller stores information about every irrigation event that occurs. These events include every time a valve or pump starts or stops, flow measurements, etc. You can retrieve and store this information on your PC.

1. From the Rain Bird Remote Access window, select **Retrieve data**.
2. Select **Retrieve monitor information** from the pull-down menu.

**Note:** While the PC is retrieving data from the controller a **Communications Status** pop-up window appears visually showing the progress. The window disappears once the data is retrieved.

**Note:** If the PC has lost or is unable to establish communications with the controller, an Error message appears, asking to make sure the Connection Information is correct.

**Note:** The data stored on your PC is in a binary format. To set up a monitoring information data file (stored in an ASCII file format) you need to **Create a Log File**.

---

**Failed Decoder List**

This is a list of valve decoders that have failed due to triggering SEUF (Seek and Eliminate Unexpected Flow) and have been blacklisted.

1. From the Rain Bird Remote Access window, select **Controller** and then **Identify Failed Valves.** **Edit Valve Status** screen appears.

![Edit Valve Status](image)

2. Click on **Get Valve Status** to conduct an audit of your valves. Any valves that have malfunctioned and blacklisted shall be listed on this window. If any of them have been found to be working properly or have been fixed, the user must take them off of the black list for the valves to run again. This is done by checking the **Clear Valve From the List** box. If you do that and then click OK, all checked decoders will be sent to the MDC and cleared from the list.

3. Click **OK**.

4. From the Rain Bird Remote Access screen, select **Send Data** and **Send All Data** to send the updated information back to the controller.
Operating the Controller, continued

Creating a Log File

1. From the Rain Bird Remote Access window, select File.
2. Select Create Log File from the pull-down menu to reach the Create Log File pop-up window.
3. Enter the From and To dates you want to use.
4. Select the type of Data you want to include.
5. Select the location of the file and whether you want this data to Append (add to) or Replace a current file. To save the file in spreadsheet format, change the file extension from “.mon” to “.csv”.
6. Select OK to create the file.

Example: Below is an example of how the information appears in the Log File. Each line represents an event. We selected the event information to include the Date (YYYYMMDD), Time, Device, Device Type and Action.

20010919, 085000, 1, I,,Started
20010919, 085000, T1, D,,Started
20010919, 085000, 1, P,,Started

Line 1 tells us that I (Irrigation Schedule) #1 started on Sept. 19th, 2001 at 8:50 AM
Line 2 tells us that D (Decoder) T1 started on Sept. 19th, 2001 at 8:50 AM
Line 3 tells us that P (Pump) #1 started on Sept. 19th, 2001 at 8:50 AM

Note: You can import the file into a spreadsheet or to a database program. To import the file into a spreadsheet, save it using the file extension “.csv”.

Note: Specific device abbreviations include:
P = Pump
B = Power
I = Schedule
D = Decoder
S = Sensor
Operating the Controller, continued

**Backing Up MDC Database**

1. From the **Rain Bird Remote Access** window, select **Setup** and then **Backup database**. The **Select File for the Database Backup** window appears for you to name the backup database file and decide on its location in your system.

2. Give file a name.

3. Choose a location to save it.

4. Click on **Open**.

   You will be presented with the message below confirming your successful saving of the backup file.

5. Click **OK**.

**Restoring Database**

1. From the **Rain Bird Remote Access** window, select **Setup** and then **Restore database**. The **Select File for Database Restore** window appears for you to locate the backup database file to be restored into your MDC system.

2. Choose the file and click **Open**. Database restore pop-up shall appear confirming the successful restoration of your backup file.

3. Click **OK**.
Operating the Controller, continued

**Printing Set-Up and Irrigation Data**

1. From the **Rain Bird Remote Access** window, select **File**.
2. Select **Print** from the pull-down menu.
3. Select either **Print set-up data** or **Print irrigation schedules**.
4. Select **OK** at the **Print** pop-up window for your PC.

**Exiting the Remote Access Window**

1. From the **Rain Bird Remote Access** window, select **File**.
2. Select **Exit** from the pull-down menu or select **X** in the top corner of the window.
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Troubleshooting

**Understanding Faults**

Faults are error conditions that can occur in any electronic system or equipment, no matter how well designed and built. Many factors can contribute to faults, such as the system’s age, natural occurrences (i.e., lightning, floods, frost or heat), or human errors.

When installing the MDC2 Controller and irrigation system, human errors can and do occur. They happen by overloading cables and sockets, adding excessive pressure to decoders, solenoids, or cables with heavy equipment (tractors or cultivators), or not taking the necessary care when connecting the systems cables and decoders. Fortunately, the MDC2 Controller and irrigation system features built-in test diagnostics to help pinpoint specific faults and to aid in troubleshooting.

**Finding the Cause**

This chapter of the manual is written for you, the Service Technician in the field. It is your responsibility to localize problems with the Rain Bird® MDC2 Controller and Rain Bird® Decoder Irrigation System and determine their cause. You should always find the fault and correct it in the field at the “box” level. In other words, if you find the fault in a field decoder, replace the field decoder. If you find a fault inside the controller, replace the controller. Only highly qualified Rain Bird® Service Technician Specialists should find and correct problems inside a “box” (replace worn out or defective components inside a controller, decoder, solenoid, etc.).

The purpose of this chapter is to teach you basic troubleshooting techniques that you can easily do in the field. This chapter does not cover faults that were caused by using the wrong size cable (wires that are too thin or cable lengths that are too long) or faults caused by entering incorrect data into the controller.
Understanding Basic Troubleshooting Techniques

Using a systematic approach is perhaps the best way to troubleshoot any MDC Controller system. In other words, start at one end, test and replace components one at a time until you find and fix the problem. Understand too, that a set of troubleshooting procedures cannot cover every conceivable situation. It is you, the technician, responsible for finding and repairing the faults, who must mold these procedures to the situation. Also, when a fault occurs, try to learn the circumstances that led to the fault. This can often times lead you to a good starting point.

Before you attempt to troubleshoot a system, it is important for you to have a good understanding of:

• how the complete MDC Controller system works,
• electrical terms, such as current, voltage and resistance,
• how to use the right tools, and
• the actual installation.

First, familiarize yourself with the installation of the complete system. Review and study the as-built irrigation drawings of the system. These drawings should show you the locations of each field decoder, solenoid, master valve and pump. You should be able to use these drawings to trace the exact course of the two-wire cables, their connections and termination points.

Next, gather your tools and equipment. Specific tools you may need to troubleshoot and repair an MDC Controller system may include:

• an instrument, such as a Fluke 10 (digital) Multimeter, that measures minimum AC/DC voltages from 0 – 50 V (Volts), with a 0 – 1M (meter) ohm resistance,
• a Clamp Amperemeter, such as a Kyoritsu 8112 Clamp Meter, that measures 0 – 2A (amps), with a minimum resolution of 5mA (milliamps),
• a cable finder (if you do not know the exact location of the two-wire cable),
• an extra MDC2 Controller, and
• standard tools, such as screwdrivers, lineman’s pliers, wire stripper, wire nuts and DBY connectors.
Troubleshooting, continued

**Troubleshooting the System**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>A fault occurs the first time the system was started.</td>
<td>You will probably find the fault in the cabling between the different units (i.e., two-wire cable and field decoder, field decoder and solenoid, pump decoder and pump, etc.) Check that the hook up from unit to unit is done properly.</td>
</tr>
<tr>
<td>A fault occurs after the system is serviced.</td>
<td>You will probably find the fault around the serviced area. It is rare for two faults to occur at the same time.</td>
</tr>
<tr>
<td>A strong smell, heat buildup or smoke develops in the controller during a fault.</td>
<td>Switch the controller off immediately and replace the unit. The fault is probably in the controller.</td>
</tr>
<tr>
<td>Nothing works when you turn on the controller; the system is dead.</td>
<td>The controller is either defective or there is no power reaching the controller.</td>
</tr>
</tbody>
</table>

**CAUTION**

Check the Mains 120-Volt AC power line leading into the controller. Make sure the Mains power is turned on.

Check the Mains cabling. Make sure it isn’t severed, kinked or showing a short.

Check for burned out fuses or tripped circuit breakers in the Mains cabling line (if applicable). There are no fuses inside the MDC Controller, except for a non field-replaceable thermal fuse, which automatically resets once a short circuit is cleared.

If the system uses a power disconnect switch, make sure it is not engaged.

Measure the supply voltage (in the AC range) in the wire nuts. The voltage should be around 120 V. (The controller should work, with no problems, at a nominal voltage of 80% of the Mains.) If the voltage you read is lower, the fault is in the controller and you should replace the controller.
Troubleshooting, continued

**Problem**  
Diagnostics indicate there is a fault with the field decoders.

**Solution**  
There is a break in the two-wire communications cable, the connections are loose, the decoders are supplying too much or too little voltage, or the controller is defective. To check the line voltage and decoders, you will need a voltmeter and Clamp Ampmeter.

Navigate the MDC Controller to the Short Finding Screen (this switches the controller to the 50 Hz mode). Please see Finding a short in the system on page 40. This enables you to measure line voltage (in the AC mode) and currents with the Clamp Ampmeter.

Start by measuring the line voltage between L1 and L2 on the terminal strip. Nominal voltage is 34 V, but because the voltage form is non-standard (standard=sine), your reading will probably be higher. Acceptable values are from 33 – 40 V.

If the value is too low, disconnect the line wires (L1 and L2) and measure again. If the voltage is still too low, the controller is defective and you will need to replace it.

If the voltage is within the acceptable range, there is a problem with the field installation. Please see the problem, The field decoders are not responding on page 81.

With the lines (L1 and L2) connected, use the Clamp Ampmeter to measure the line current. Standby current for the FD-102TURF and FD-202TURF Decoder is 0.5 mA.

Standby current for the FD-401TURF and FD-601TURF Decoder is 1 mA. Based on these values, compute the expected line current for your system. If the actual current differs more than 20 mA from the value you computed, the problem is in the field.

Voltages or current readings that are too high indicate that something is overloading the two-wire communications cable. Please see the problem, Overloading the two-wire communications cable caused a short circuit on page 84.

Current reading too low may indicate that there is a break in the two-wire communications cable. Please see the problem, Finding a break in the two-wire communications cable on page 83.
## Troubleshooting, continued

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Finding a fault by measuring line voltages in the field.</strong></td>
<td>When searching for a fault, you may need to measure the voltage on the two-wire communications cable in the field. Set the voltmeter in the DC range and measure the voltage at the L1 and L2 terminal strip. If the DC readings are erratic (changing every half second) navigate the MDC Controller to the 50 Hz mode and switch the voltmeter to AC. Please see <strong>Finding a short in the system</strong> on page 40. In the AC range, the voltmeter typically reads on the high side, from 33 – 40 V. This is acceptable. With the voltmeter set, go into the field and measure the two-wire communications cable (line) at easy access points, either at a branch or inside a valve box where decoders connect. Remove the DBY connectors and measure the cable. If you need to measure in the middle of a cable, use a sharp knife to cut the insulation off the cable and measure between the bare wires. Use DBY connectors to repair any cuts in the cable.</td>
</tr>
<tr>
<td><strong>The field decoders are not responding.</strong></td>
<td>If several field decoders are not responding, and they are located on the same branch, the fault is probably with the cable. Please see the problem, <strong>Finding a break in the two-wire communications cable</strong> on page 83. If a single field decoder (or field decoders on separate branches) is not responding, you should first test the field decoder to determine if the fault is in the decoder or the valve. Please see <strong>Testing the operation of the decoders</strong> on page 37. If the test results show the field decoder is not responding, (all three current readings are the same, or very close), check the following reasons. There is a fault in the cable leading to the unresponsive field decoder. Measure the voltage on the decoder’s input wires. If the voltage is in the acceptable range (33 – 40 VAC), then check the input connection to the decoder. There is a fault in the field decoder. Check that the decoder address was entered correctly. Please see <strong>Naming the Field Decoders</strong> on page 25. There is a break in the solenoid. Measure the resistance in the solenoid. Standard Rain Bird® solenoids measure about 28 Ohms. If the resistance is low, replace the solenoid. If the field decoder still does not respond, replace the field decoder.</td>
</tr>
</tbody>
</table>
Problem One or more field decoders does not always activate the valve.

Solution To open a valve, a field decoder supplies the valve with energy (electricity) for a short time. If the valve’s hydraulic pressure is high, then it needs more energy to open. There are many factors contributing to the amount of energy available to open a valve. These factors include the length of the two-wire communications cable to the field decoder and the number of field decoders operating at one time. The switch code setting controls these factors.

The field decoder’s valve type defines the solenoid’s switch code. The switch code tells the field decoder how to operate the solenoid. The switch code must be specified correctly for the field decoder to operate the solenoid. If the solenoids you are using are not made by Rain Bird®, you may need to change the switch code settings. Please see Appendix II: Selecting Electrical Codes for Solenoids on page 93.

If the two-wire communications cable was installed as a ring cable, a break in the ring can cause a fault. Because the controller sends the voltage in both directions on the ring, field decoders can still operate, one at a time, even with a break. However, a break in the ring increases the cable’s resistance and there may not be enough available energy to open more valves. To eliminate the fault, you must connect both ends of the ring cable to the L1 and L2 terminals inside the controller.

Disconnect the ring cable at one end and measure the resistance of both wires from one end of the cable to the other. If the cable measures 2.5 square millimeters, the resistance should be about 7.0 Ohms per kilometer of cable.

In other words, if your ring cable measures 6 kilometers, you should be able to measure about 42 Ohms for each wire in the cable. The resistance is inversely proportional to the square. A cable measuring 3.1 square millimeters will have a resistance of:

\[ 7 \times \frac{2.5}{3.1} = 5.6 \text{ Ohms per kilometer}. \]

If the resistance you measure is too high, then the cable is defective. Please see the problem Finding a break in the two-wire communications cable on page 83.
Troubleshooting, continued

<table>
<thead>
<tr>
<th>Problem</th>
<th>Finding a break in the two-wire communications cable.</th>
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</thead>
</table>
| Solution| Measure the line voltage on the L1 and L2 terminals inside the controller. If the voltage is correct, then the fault is a result of a break in the two-wire communications cable. To locate the break, you will need an as-built irrigation drawing showing the complete installation and tracking of the two-wire communications cable, including each field decoder connection point. If the break is in a ring cable, disconnect one end of the cable from the controller. You can now find the approximate location of the break by testing each field decoder to determine which decoders are not responding. Please see Testing the operation of the decoders on page 37. If, during the test, a field decoder activates, you will know the break in the cable must be beyond that decoder. Field decoders will not respond if there is a break in the cable. Before testing, you may want to depressurize any pressure-controlled pumps and deactivate any pump decoders in your system. Please see Entering the Pump/Master Valve Information on page 28. This will stop the pumps from activating during the test, conserving water. Once you localize a break between two decoders, you then need to find the exact location of the break manually by measuring its voltage. A cable’s voltage after a break is not always zero (0). In fact, it may only be 10 V lower than the reading before the break. First, check connections at the two decoders and between the two decoders. Measure the voltage on the cable from the last decoder that is working. Then measure the voltage on the cable at the non-working decoder connection. If you cannot find the fault in any of the field decoder connections and there is no specific hint at to where the fault may be, you can try using a cable tracer to locate any irregularities along the cable. If you do not have access to a cable tracer, you can either replace the complete length of the questionable cable or follow the systematic approach we will outline next.
Troubleshooting, continued

**Problem**  Using a systematic method to find a break in the two-wire communications cable.

**Solution**  There is a systematic method to find a cable break, but it can be time-consuming. Measure the voltage midway between the field decoder that is working and the one that is not.

If the voltage is out of the acceptable range (33 – 40 VAC), you can locate the break between the field decoder that works and the point where you measured the line voltage. Measure the line voltage again at the middle of this section of cable. If the voltage is still out of the acceptable range, you have narrowed the area of the break even further. Continue to narrow the sections this way until you find the break.

**Problem**  Overloading the two-wire communications cable caused a short circuit.

**Solution**  If the two-wire cable is damaged or a field decoder develops a defect, a short circuit can occur on the cable. A short circuit can mean that nothing in the system works or only parts of the system work.

If the MDC Controller senses a short circuit on the lines, it will automatically limit the current to a safe value by changing the line frequency from 1 to 50 Hz. and display a **Short Circuit** message. Please see **Sensing a Short Circuit** on page 55. When this happens, you must check the line voltage.

If the line voltage reading is between 24 and 34 V, a field decoder, using too much power, is probably causing the fault. If the system is still operational, you should test all the decoders. If all the decoders pass the test, please see the problem, **A two-wire communications cable shows signs of corrosion** on page 85.

If the line voltage reading is less than 24 V, you will not be able to use the field decoders to locate the fault. This type of short circuit affects all parts of the cable by dropping the voltage below the controller’s minimum operating voltage. Here, you will need to use a **Clamp Ampmeter** to locate the short circuit.

A Clamp Ampmeter allows you to measure the current running in a cable without cutting the cable. Attach the clamp to one of the two communications wires and measure the resistance. If you clamp both wires, the reading will be zero (0).
Clamp Ampmeters normally measure only rapidly alternating currents. Navigate the MDC Controller to the 50 Hz mode, causing the Controller to send 50 Hz voltage and current through the two-wire cable. Please see Finding a short in the system on page 40. You can measure this current directly on the Clamp Ampmeter.

If the two-wire communications cable is installed as a ring, you must disconnect one end of the ring from the controller before measuring the current.

If the controller is using more than one two-wire communications cable, you can use the Clamp Ampmeter to find the two-wire cable that is using too much current. When measuring the cables, pay close attention to the magnitude of the current. If you learn that none of the communications wires are using too much current, then the short circuit may be in the controllers lighting protection. To check this, disconnect all the communications cables and test the terminals. If the condition remains after you disconnect the lines, the short is in the lighting protection and you will need to replace the controller.

To locate the short, use the Clamp Ampmeter to “follow” the current from the controller to the decoders in the field. The large current will run out from the controller on one wire to the short circuit and back again to the controller on the other. The current running beyond the short circuit in the cable will read zero (0) or have a very low reading.

If the cable splits into two or more branches, the current will only continue in the branch where you will locate the short circuit.

If the fault is in a field decoder, you can measure the current in the decoder’s connecting (blue) input wires.

<table>
<thead>
<tr>
<th>Problem</th>
<th>A two-wire communications cable shows signs of corrosion.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solution</td>
<td>To safeguard the two-wire cables against corrosion, their mean voltage relative to the surrounding ground must be slightly negative. The controller initially determines this voltage. A ground fault means that a current is running from the system’s two-wires through the ground and back to the ground rod. If the mean cable-to-ground voltage were positive, a defect in the cable’s insulation would result in a very destructive corrosion of the cable. This ground current will not affect the mean voltage of the two-wires but it may overload the controller if it gets too high.</td>
</tr>
</tbody>
</table>
Troubleshooting, continued

You can measure the ground current with a Clamp Ampmeter (set in the 50 Hz mode) on the wire to the ground rod. If the current is 20 mA or less there is no reason to worry. But, if the current is above 20 mA, you can locate the ground fault with a Clamp Ampmeter.

Turn off any running Programs or Schedules. Please see Operating the Irrigation Programs on page 49. Connect both communications wires to the L1 terminal inside the controller. Attach the clamp from a Clamp Ampmeter to the L1 terminal. With no decoders using power, the line voltage should read zero (0). Any reading other than zero (0) is ground current. If the reading is above 20 mA, track it along the cable until the current disappears. Once the current disappears, you have passed the leakage point. This procedure only works for one or two shorts. If there are several minor shorts you will not be able to see the sudden drop in the leakage current when you pass the fault.

<table>
<thead>
<tr>
<th>Problem</th>
<th>The clock shows an incorrect time after a power outage.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solution</td>
<td>When the power goes out, a back-up battery powers the controller’s clock. The battery is in a battery holder on the main board. The clock and the memory use the battery only when the controller is turned off or without power. The battery life is normally around 10 years. If the time is incorrect, replace the battery. Please see Replacing the Battery on page 15.</td>
</tr>
</tbody>
</table>

If the fault is not in the battery, either the main board or the power supply is defective. Replace the controller.

<table>
<thead>
<tr>
<th>Problem</th>
<th>The controller is loosing installation data and irrigation schedules.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solution</td>
<td>The controller’s installation data and irrigation schedules are stored in S-RAM, which needs power to hold data. When the Mains power is off, the battery supplies the power for the memory. If it can no longer do this, replace the battery. Please see Replacing the Battery on page 15.</td>
</tr>
</tbody>
</table>

If you replace the controller, you will need to retrieve the installation and irrigation data from the old board. Please see Replacing the Controller on page 89.
Troubleshooting, continued

**Problem**  The optional (rain or alarm) sensor is not responding.

**Solution**  Disconnect the two-wire sensor connection from the terminals inside the controller. After a few seconds, a message should appear on the controller’s display screen reading, Rain (or Alarm) Sensor In:<time>. Next, connect a piece of wire between the terminals. The message should change to Out:<time>. This sequence is based on a correct set up and a rain (alarm) sensor that is Normally closed (NC). (ON, open = NC; ON, closed = NO—Normally open). If this sequence does not occur, check to make sure the rain (alarm) sensor is properly installed. Please see Connecting an Optional Sensor on page 13.

**Troubleshooting a Field Transmitter (Optional)**

The Field Transmitter is a separate, small, handheld computer, which uses special connectors to connect to the two-wire communications cable in the field. You use Field Transmitters to manually operate field decoders. In the following, it is assumed that the MDC Controller and field decoder system is working properly.

**Problem**  The Field Transmitter's display is dead.

**Solution**  Check that there is line voltage on the connection sockets inside the Field Transmitter Connection Box. Various connection boxes may be located in the field at specific points along the two-wire communications line. Use the irrigation drawings to find the location of each box.

Open the Connection Box and measure the line voltage between terminals 1 and 2. Make sure the wires leading into the rear terminals are not corroded. If they are, cut away the corroded wires and reconnect the wires.

Check the connection points. If the pins of the socket are corroded (which can happen if the protective cap is missing) replace the socket.

**Problem**  The Field Transmitter reads No Contact.

**Solution**  A No Contact message indicates the Field Transmitter cannot contact the controller. Heavy leakage currents may cause this in the system. Check the line voltage. If the line voltage is acceptable, there is probably a fault in the Field Transmitter, or in rare cases, the controller. Check the Field Transmitter’s installation data. Make sure PULSE TIME is set to 0 and INT. DELAY is set to 40. Please see the Field Transmitter User Manual on page 43. If these settings are correct, replace the Field Transmitter.
Troubleshooting, continued

If the No Contact message appears only when a specific field decoder or pump decoder is active, the fault is in this decoder.

Problem  The Field Transmitter reads Try Again.
Solution   This message can appear if the controller is very busy, for example, if an irrigation Schedule is running or about to start. If the message appears frequently, please see The Field Transmitter reads No Contact on page 87.

Problem  The Field Transmitter reads Unknown Decoder to an existing field decoder.
Solution   The fault is probably in the character string installed in the Field Transmitter. If this is not identical with the character string installed in the controller, the field decoder’s letters will be switched around. Check and correct the Field Transmitter’s installation. Please see the Field Transmitter User Manual on page 43.

Problem  The Field Transmitter uses the wrong language.
Solution   Select the correct language in the Field Transmitter’s installation menu. Please see the Field Transmitter User Manual on page 43.

Troubleshooting the Controller’s Internal Parts

The MDC2 Controller does have a thermal fuse that resets itself after a Short Circuit message disappears. You should not try to replace the thermal fuse. In general it is better to substitute the controller as a whole than try to replace various internal parts that may be interconnected with cables and plugs. However, there are a few procedures you may try to troubleshoot the controller.

Problem  The display will not come on when the controller receives power.
Solution   Check that the cable connector from the transformer to the main board is correctly inserted in the connector on the board. Check also the cable/connector from the ON/OFF switch.

Problem  The contrast on the display screen is too high/low.
Solution   If the contrast is too high/low, try adjusting the potentiometer in the uppermost left corner of the main board. To get access, remove the display and control module. Please see Replacing the Battery on page 15.
Problem  The controller is functioning but acting oddly.
Solution  If the controller is acting oddly, try downloading the Firmware to the program module in the controller. Please see the Firmware Upgrade Instructions included with the Firmware Upgrade package.

Replacing The Controller

The MDC2 Controller contains set-up and irrigation data that is stored in a chip soldered to the main board. When you need to replace the controller, the data will stay in the defective controller. However, you can use the PC program to transfer data from the controller to the PC. If the controller is still able to communicate, you can retrieve and transfer the data to the replacement unit. Please see Retrieving the Data on page 62. If the controller cannot communicate you must rely on the current PC data or backup disk you made the last time you updated the data.
Troubleshooting Guide for the Decoder System

Controller display ON?

Start 50 Hz mode. Check line voltage.
Is reading 33-40 VAC?

YES NO

Problem is in field. Does the line current (50 Hz) match decoders?

YES NO

Check valve activation. Is Inrush OK?

YES NO

Next valve

Is decoder address OK?

YES NO

Defective solenoid

Correct address. Next decoder

Bad splice

Defective decoder

Connect both wires to the same terminal and trace leak.

Is current >20 mA?

YES NO

Not possible to trace.

Use Clamp Ampmeter to trace short.

Use Clamp Ampmeter to trace short.

Connect one cable at a time. Is current OK?

YES NO

Take next cable.

Disconnect lines and measure again. Is reading OK?

YES NO

Controller is defective.

Check next cable.

Use Clamp Ampmeter to trace short.

Is supply voltage OK?

YES NO

Turn on switch.

Is switch ON?

YES NO

Defective decoder

Defective solenoid

Correct address. Next decoder

Use Clamp Ampmeter to locate problem.

Is current in GND?

YES NO

Connect one cable at a time. Is current OK?

YES NO

Controller is defective.

Check fuses and Mains switch.

Does the line current (50 Hz) match decoders?

YES NO

YES NO

YES NO

YES NO

YES NO

YES NO

YES NO

YES NO

YES NO

YES NO

YES NO
### Conversion Chart from Standard to Military Time

<table>
<thead>
<tr>
<th>Standard Time</th>
<th>Military Time</th>
<th>Standard Time</th>
<th>Military Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:00 am</td>
<td>01:00</td>
<td>1:00 pm</td>
<td>13:00</td>
</tr>
<tr>
<td>2:00 am</td>
<td>02:00</td>
<td>2:00 pm</td>
<td>14:00</td>
</tr>
<tr>
<td>3:00 am</td>
<td>03:00</td>
<td>3:00 pm</td>
<td>15:00</td>
</tr>
<tr>
<td>4:00 am</td>
<td>04:00</td>
<td>4:00 pm</td>
<td>16:00</td>
</tr>
<tr>
<td>5:00 am</td>
<td>05:00</td>
<td>5:00 pm</td>
<td>17:00</td>
</tr>
<tr>
<td>6:00 am</td>
<td>06:00</td>
<td>6:00 pm</td>
<td>18:00</td>
</tr>
<tr>
<td>7:00 am</td>
<td>07:00</td>
<td>7:00 pm</td>
<td>19:00</td>
</tr>
<tr>
<td>8:00 am</td>
<td>08:00</td>
<td>8:00 pm</td>
<td>20:00</td>
</tr>
<tr>
<td>9:00 am</td>
<td>09:00</td>
<td>9:00 pm</td>
<td>21:00</td>
</tr>
<tr>
<td>10:00 am</td>
<td>10:00</td>
<td>10:00 pm</td>
<td>22:00</td>
</tr>
<tr>
<td>11:00 am</td>
<td>11:00</td>
<td>11:00 pm</td>
<td>23:00</td>
</tr>
<tr>
<td>12:00 pm</td>
<td>12:00</td>
<td>12:00 am</td>
<td>00:00</td>
</tr>
</tbody>
</table>
Selecting Electrical Codes for Solenoids

If your system uses solenoids (valves) that do not open, you may need to extend the switch code activation time. To do this, change the 4th digit of the code according to the following chart.
Appendix II, continued

Electrical Requirement Code of Magnetic Solenoid

**SWITCH CODE DEFINITION 59F, X, Y, 0**

<table>
<thead>
<tr>
<th>Activation Time [ms]</th>
<th>X</th>
<th>Y</th>
<th>Holding Voltage [Volts]</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>3</td>
<td>3</td>
<td>1.2</td>
</tr>
<tr>
<td><strong>40</strong></td>
<td><strong>4</strong></td>
<td><strong>4</strong></td>
<td>1.7</td>
</tr>
<tr>
<td>50</td>
<td>5</td>
<td>5</td>
<td><strong>2.3</strong></td>
</tr>
<tr>
<td>60</td>
<td>6</td>
<td>6</td>
<td>2.9</td>
</tr>
<tr>
<td>70</td>
<td>7</td>
<td>7</td>
<td>3.5</td>
</tr>
<tr>
<td>80</td>
<td>8</td>
<td>8</td>
<td>4.0</td>
</tr>
<tr>
<td>90</td>
<td>9</td>
<td>9</td>
<td>4.6</td>
</tr>
<tr>
<td>100</td>
<td>A</td>
<td>A</td>
<td>5.2</td>
</tr>
<tr>
<td>110</td>
<td>B</td>
<td>B</td>
<td>5.8</td>
</tr>
<tr>
<td>120</td>
<td>C</td>
<td>C</td>
<td>6.3</td>
</tr>
<tr>
<td>130</td>
<td>D</td>
<td>D</td>
<td>6.9</td>
</tr>
<tr>
<td>140</td>
<td>E</td>
<td>E</td>
<td>7.5</td>
</tr>
<tr>
<td>150</td>
<td>F</td>
<td>F</td>
<td>8.1</td>
</tr>
</tbody>
</table>

Use the chart above to select a suitable electrical code for special solenoid (valve) types.

**Note:** To find a switch code that works with your valve, you may need to use the trial and error method.

Example:  
**Activation Time** = 40 ms. (milliseconds)  
**Arrows in chart show:**  
**Holding Voltage** = **2.3** volts  
**Switch Code** = **59F450**

If the solenoid opens but will not stay open, the holding voltage may be too low. Here, you would change the fifth digit of the code.

Example:  
**Activation Time** = 50 ms.  
**Holding Voltage** = **5.2** Volts  
**Switch Code** = **59F5A0**

If the solenoids are still not operating properly after repeated attempts, contact your Rain Bird® Distributor to guide you in adjusting this number for proper operation.
Appendix II, continued

**Changing the Switching Codes**

1. From the **Main Menu**, move the indicating arrow to **1. Set-up** and select **OK**.
2. Move the indicating arrow to **1. Valve Types** and select **OK**.
3. Scroll to the **Valve type** you need to change.
4. Select **OK** and **OK** again to activate the **Switch** field. A blinking box shows the position of the first character you are changing.
5. Select **OK** to move to the next character. The box is replaced with an arrow pointing to the character you can change.

   ![MDC](image)

   **Note:** Change only the numbers and letters you need to change.

   **Note:** You need to continue selecting **OK** until the up and down arrow labels switch to left and right arrows. Only then is the Switch field no longer active.

6. Use the right arrow to select **OK**, to return to the **Set-up** menu. Selecting **minus** (-) cancels the change and returns to its previous setting.
Default Switch Codes

Standard Rain Bird 24 VAC solenoids.
• Switch Code 59F350

New Rain Bird 24 VAC solenoids
• Switch Code 59F370

Normally open Master Valve (Close on alarm)
• Switch Code 39F350

Municipal Water Supply: Master Valve Normally Open or Closed
• Switch Code 49F350

Non-Irrigation Valve Types
• Switch Code 3FFA20

Relay 100: Master Valves and Pumps
• Switch Code 4FFA20

Note: Recommended default switch codes are provided for general guidance purposes under normal operating parameters only. Due to the potential uniqueness of your MDC2 installation, functional operation of the MDC2 switch code settings must be verified by the end-user to ensure the system is functioning as desired.
Master Valve and Pump Set-up Tips

To supply water to the various valves located throughout an irrigation area, systems use either a master valve or master pump. By recognizing a specific Address and switch code, the controller sends a signal telling the decoder when to activate the valve or pump. The switch code can vary depending on how your system was installed. Below, we will cover some of the more common installations.

Using a Field Decoder With a Pump
In this installation, a field decoder attaches to a pump using a relay. Rain Bird recommends you use Relay-100. Please see the illustration below. When setting up the controller, enter the field decoder Address in the pump Address field. The switch code for the above Relay-100 is 4FFA20.

With the above setup, the flow sensor monitors the flow rate, sending the information to the controller. Once the flow exceeds the maximum rate during irrigation, and an alarm flow or leakage schedule is set, the controller will automatically shut off the pump and all the decoders and valves.
Using a Decoder With aNormally Closed (NC) Master Valve

In this installation, a decoder controls a Normally closed master valve with a pressure switch controlling the operation of the pump. Please see the illustration below. When setting up the controller, enter the decoder Address. If the master valve is Normally open, please see Using the Municipal Water Supply With a Master Valve (NC or NO) on page 100.

With the above setup, both the master valve and flow sensor monitor the flow rate. Once the flow exceeds the maximum rate, the controller sends a signal to the pump decoder shutting off the master valve and all other decoders and valves in the system. When the water pressure builds up inside the pump, due to the pressure switch, the pump also stops. There cannot be a leak in the system because when no Programs or decoders are active, the Normally closed master valve is closed.
Using a Decoder and Relay-100 With a Pressure Switch

In this installation, the pressure switch attaches directly to the decoder and Relay-100, and the decoder and Relay-100 to the pump. Please see the illustration below.

Please see Naming the Field Decoders on page 25. You will also need to define a separate valve type with the switch code of 4FFA20. The controller circuit from the pressure switch runs through the contacts on the Relay-100.

With the above setup, the pressure switch will provide power to the pump, or if the flow exceeds the maximum rate, the controller sends a signal to the field decoder stopping the pump and shutting off the valves in the system. If the pressure is too high, the pressure switch will cut off power to the pump and shut it off. With the valves closed, any flow in the system is considered a leak.
Using the Municipal Water Supply With a Master Valve (NC or NO)

In this installation, a field decoder attaches to a Normally closed or Normally open master valve installed as a pump. Please see the illustration below. When setting up the controller, enter the decoder address in the pump **Address** field and change the switch code to **49F350**, which is the setting for a standard 24 VAC/2-3 W irrigation valve.

With the above setup, the flow sensor monitors the flow rate. If, during irrigation, the flow exceeds its maximum rate, the controller sends a signal shutting off a Normally closed master valve. A Normally closed master valve is open when a Program is running.

If the master valve is Normally open, exceeding the maximum flow will shut off all valves. Because none of the valves are open, any additional flow detected is considered a leak in the system. Once the flow surpasses the alarm leakage schedule, the field decoder activates, closing the Normally open master valve.
**Sensors and Alarms**

Your MDC2 Controller can work with the following type of sensors:

**Flow Sensor:** Defines an analog sensor on the logical level. The input can be analog or digital. Flow can be summed.

**Generic Sensor:** Defines an analog sensor on the logical level. The input can be analog or digital.

**On/Off Sensor:** Defines a sensor on the logical level. The input can only be digital.

**Sensor Unit of Measures**

Depending on the type of sensors listed above, your sensor will be using one of the following unit of measures:

- **Pulse/10sec:** A digital input in terms of pulses counted per 10 seconds.
- **mA:** An analog current measurement (4-20 mA)

**Alarm Triggers**

Alarm triggers define what will happen when a pre-defined alarm condition is realized. These are independent of the sensor type. Your MDC system shall take one of the following actions in an alarm situation:

- **Pause:** Pauses the schedule specified by alarm action ID or all schedules. The pause shall take effect immediately. This feature works only if a schedule(s) is running.
- **Resume:** Resumes the schedule specified by alarm action ID or all schedules. The resume will take effect immediately. This feature works only if a schedule(s) is running.
- **Irr. Prevent:** Prevents all irrigation. The schedules will continue within the controller, but no decoders will be activated. Currently active decoders will be stopped.
- **Irr. Allow:** Allows previously prevented irrigation. The decoders will be activated on the next schedule/step start. Decoders that were active on the time of “cancel inhibited irrigation” will not be reactivated.
- **Irrigation Off (IrrOff):** Sets the controller out of auto mode. Any running schedules will stop. Once the “irrigation of period” is over, the controller needs to be manually put back to auto mode.
- **System Off:** Turns the system off by taking the MDC out of Auto.
Appendix IV, continued

Activate (Activ): Turns on a decoder, pump or schedule, depending on the specified alarm action type and ID. The schedule will start on next full minute if possible or else it will be stacked.

Deactivate (Deact): Turns off a decoder, pump or schedule, depending on the specified Alarm Action Type and Alarm ID. Deactivation can apply to all decoders, pumps and schedules. The schedule shall stop immediately and its active decoders will be deactivated.

Object ID
Defines the ID of what to activate/deactivate depending on the alarm action and alarm action type.
Freedom System Interface

Your MDC2 Controller can work with the FREEDOM™ System - a member of Rain Bird’s family of irrigation products. The FREEDOM System uses the available COM port on your MDC Controller to access command-based functions like:

- Turn On
- Turn Off
- Advance
- Pause
- Resume
- Customized schedule-based functions

The tables below list the commands and their actions that are understood by the MDC2 Freedom driver.

System Mode Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Outcome</th>
<th>Beep Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Stops All Decoders</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Command</th>
<th>Action</th>
<th>Outcome</th>
<th>Beep Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>0</td>
<td>Auto or Manual OFF</td>
<td>2</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>Auto ON</td>
<td>2</td>
</tr>
<tr>
<td>21</td>
<td>0</td>
<td>Manual or Auto OFF</td>
<td>2</td>
</tr>
<tr>
<td>21</td>
<td>1</td>
<td>Manual ON</td>
<td>2</td>
</tr>
</tbody>
</table>
Appendix V, continued

##Command#Action##

###Decoder Commands#

<table>
<thead>
<tr>
<th>Command</th>
<th>Decoder</th>
<th>Time</th>
<th>Outcome</th>
<th>Beep Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>OK</td>
</tr>
<tr>
<td>1</td>
<td>1-200</td>
<td>1-999</td>
<td>Activate Decoder</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>1-200</td>
<td>0</td>
<td>Deactivate Decoder</td>
<td>2</td>
</tr>
</tbody>
</table>

###Schedule Commands#

<table>
<thead>
<tr>
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<th>Schedule</th>
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<td>73</td>
<td>1-10, 0</td>
<td>Pause schedule, or all if 0</td>
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<td>74</td>
<td>1-10, 0</td>
<td>Resume schedule, or all if 0</td>
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###Notes:###
- Entering any command other than those listed in tables above result in an audible error message (in the form of a long beep).
- Pause and Resume are not immediate actions. Both Pause and Resume commands take effect with the next full minute.
- Entering #* anytime during a session will, for both FREEDOM interface types will result in reset of the received command string, and for the US FREEDOM will also hang-up the line.
Appendix VI

Legacy Field Transmitter Interface

Your MDC system can accommodate the use of a field transmitter to start valves regardless which state the MDC controller is in. If the MDC is in Standby state, usage of the Field Transmitter will make it change to Manual state.

When the Field Transmitter is plugged in, it first shows the version of the built-in software. After that, it enters the menu system shown below:
Field Transmitter Installation
The following figure illustrates the Field Transmitter installation process:

* Reset will set all values to factory default.
** If more than one Field Transmitter is used, each must be set to its own number. Up to 10 Field Transmitters may be used simultaneously.
*** After a delay, the menu on the previous page is active.

Please refer to your Field Transmitter User Manual for more information on the use of the field transmitter.
Appendix VII

Instructions for Upgrading Existing MDC’s to Version 2.0

1. Prior to installing the new software, ensure that the existing data and schedules in the existing software are up to date and have been synchronized with the controller.

2. As a backup, print out existing set up data and schedules via the “Print” functions in the “File.” Ensure this includes Sensor Decoder data as well as all data on Pumps/MVs and boosters.

3. Install software, per the following:
   i. Install the 2.0 SW in a new directory
   ii. Copy the rbt.ldb and monitor.ldb files from the old directory to the new directory
   iii. Run the upgradedatabase.bat and this will do the update.
   iv. Delete the old directory once the update is complete.

4. Verify that all set-up data and schedules are correct. Make any changes if needed.

5. On the controller, change out the existing memory card with the new Version 2.0 card.

6. Connect to the controller via serial cable or phone line

7. Under the “Send data” menu on the top tool bar, select “Send all set up and irrigation data. This will send all configuration data and schedules from the PC software to the controller.

8. At the controller verify that all setup and schedule information has been correctly received.

Note: For running more than one version of the MDC software after installing Version 2.0, ensure that the versions remain in separate directories. You may have a conflict using the un-installer to remove MDC software when the MDC software is installed more than one time. This is just because of the shared DLL. Just remove the directory instead of using the remove software function under Windows. Finally, you can only run one the MDC software at the time. Make sure all programs are closed before you start another. Watch the two icons in the task bar.
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Appendix VIII

MDC Controller Information Sheet Descriptions

Below you will find helpful information about the MDC Controller, decoders, and programming information sheets to follow. Please refer to the programming sheet when reading the descriptions below.

1. **Column 1 – “Order”**
   This column is for inputting the order you would like the valves to turn on. When programming the MDC Controller, this will help determine the order of stations to be assigned to the steps of various programs.

2. **Column 2 – “Decoder Number”**
   This is for inputting the decoder addresses printed on the side of the decoders installed in the valve boxes. Decoders are essential in two wire systems since they allow the controller to “talk” to individual valves even though there is not a dedicated wire path to each valve. The decoder number is a five digit address that should not repeat on the same controller. The purpose of writing these numbers down is to make programming quick and easy and to save decoder information in case of loss of data.

3. **Column 3 – “Valve ID”**
   This is for inputting the valve number from the plans so that they are easy to find in the field from the plan or as built after the system has been installed.

4. **Column 4 – “Station Location / Description”**
   As valves are wired to the decoders the column should be used to write a short description of what and where the valve irrigates. This needs to be done in order to make the walk through of the system quick and simple. It also provides a great reference to the irrigation system when the system is turned over.

5. **Column 5 – “Plant Type”**
   This is used to distinguish turf zones from plant zones or any other specialty needs zones. This helps when programming the controller so that proper run times can be assigned to various irrigation zones.

6. **Column 6 – “Irrigation Types”**
   This column helps further refine the input of proper run times by describing the type of irrigation equipment on each valve. Since each type has significantly differently precipitation rates, it is important to develop specific run times to maximize efficiency.

7. **Column 7 – “MDC Valve Name”**
   This is the user generated name for each valve. A good valve name would be a name that describes the irrigation zone. Each valve must have its own valve name. When operating and programming the controller you will be prompted to enter commands for the valves based on these valve names. This is also why this sheet is important as a whole, so you do not have to rack you brain trying to remember what irrigates what when operating and programming the controller.

8. **Column 8 – “Run Time”**
   This is used to enter the run times for each irrigation zone per watering day.

9. **Column 9 – “P#”**
   This is the program number that each valve will operate in as programmed into the controller. Each valve can be on several programs. There are 10 programs per controller, six start times per program, and several repeats per start time. Repeats should be used to eliminate runoff with shorter run times and more repetition of each zone.
### Appendix VIII, continued

#### MDC Controller - Edit Set-Up Data

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Appendix VIII, continued
booster pump
activates when the demand for water pressure exceeds the capabilities of the master pump.

circuit board
one of the etched, copper clad sheets of insulating material onto which electronic components and terminals are assembled. Controllers contain circuit boards.

ccontroller
a device that sends a 24 VAC power signal to the field solenoid valves controlling when they open and close.

CPU board
the central processing unit circuit board inside the controller.

default setting
the start-up settings for the controller.

GPH (used in USA)
gallons per hour.

hardwire
communications cable used to transmit data between devices.

irrigation schedule
the watering Schedule for one of the Programs controlled by the controller.

liquid crystal display (LCD)
the illuminated display used on most controllers.

manual
requires user input, rather than being automatically performed.

master pump
main irrigation pump, controlled electronically, that supplies water pressure to the system. Not all systems require a master pump.

master valve (MV)
an electrically operated valve located on the system’s main line that controls the flow of water to all other electric and manual valves downstream of it.
Glossary, continued

**M3/h (used outside USA)**
cubic meters per hour.

**monitor**
to observe conditions in and around the irrigation system and send the information to the different components in the system for appropriate action.

**sensor**
an optional addition to the controller that can disable watering.

**solenoid**
a coil of copper wire that receives a 24 VAC electrical current from the controller, causing a plunger to open a control port in a valve allowing the valve to open and operate the sprinklers.

**valve**
a manual or electrically operated device used to control flow of water in an irrigation system.

**water budget**
allows the adjustment of water application times without reprogramming each irrigation Schedule.

**watering cycle**
the complete cycle of watering for all Programs controlled by the controller.
Service Information

In the unlikely event this equipment should malfunction, all repairs should be performed by an Authorized Rain Bird® MDC2 Controller Service Center.

For information on Authorized Rain Bird® MDC2 Controller Service Centers, contact Rain Bird® at:

Rain Bird® Corporation
Contractor Division
970 W. Sierra Madre Avenue
Azusa, CA 91702
Phone: (626) 812-3400

Rain Bird® Corporation
Commercial Division
6991 E. Southpoint Rd. Bldg. #1
Tucson, AZ 85706
Phone: (520) 741-6100

Rain Bird® International, Inc.
145 N. Grand Ave.
Glendora, CA 91741-2469
Phone: (626) 852-7313

Rain Bird® Technical Services
1-866-GSP-XPRT (1-866-477-9778)

Specifications Hotline
1-800-458-3005

www.rainbird.com
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This product is covered by Rain Bird’s Three-year Trade Warranty. For details, see the Rain Bird Landscape Irrigation Products Catalog.