RAIN DIAL®
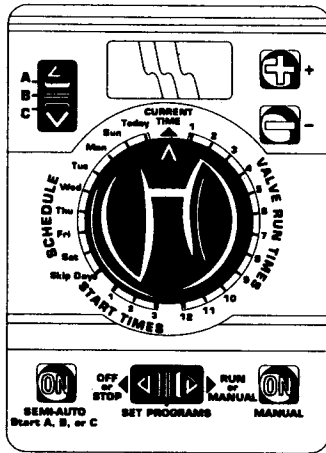
6, 9 & 12 Station
Indoor & Outdoor Controller

Installation and Programming Guide
For Models RD-600, RD-900, RD-1200 (EXT & INT)

Irritrol
SYSTEMS

Table of Contents

Contents & Specifications

Congratulations. You have purchased the easiest-to-use landscape control system available today. Although it is possible to install and program your Rain Dial® controller with little or no instructions, we strongly recommend that you read this guide first.

Your controller kit contains:

Outdoor models
•Controller
•2 keys
•3 mounting screws
•Instruction guide
•Mounting template

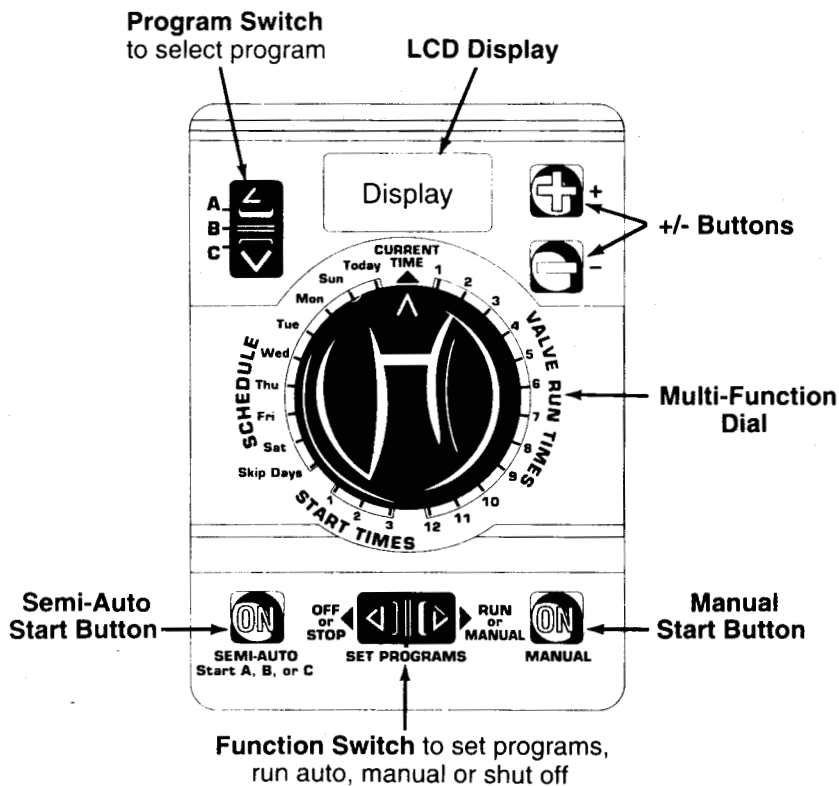### Indoor models
•Controller
•Plug-in transformer
•3 mounting screws
•Instruction guide
•Mounting template

Specifications
•Input: 120 VAC, 60 Hz, .5 amp. (NOTE: 220 or 240 VAC, 50 Hz available.)
•Output: 24 VAC at 1.25 amp total maximum output; .5 amp. / station max.
•Operating temperature range: 32°F to 140°F.
•Battery back-up: One 9 volt alkaline or NiCad (supplied by user)

Key Features

Program Switch to select program

LCD Display

A
B
C

Display

+/- Buttons

+

−

CURRENT TIME

Today

Sun

Mon

Tue

Wed

Thu

Fri

Sat

Skip Days

SCHEDULE

1 2 3 4 5 6 7 8 9 10 11 12

VALVE RUN TIMES

START TIMES

Multi-Function Dial

Semi-Auto Start Button

OFF or STOP

SET PROGRAMS

RUN or MANUAL

Manual Start Button

SEMI-AUTO
Start A, B, or C

SET PROGRAMS

MANUAL

**Function Switch** to set programs, run auto, manual or shut off

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Key Features

• **Modular design** allows...
    -Easy access to valve wiring terminals & battery
    -Simple snap-out removal of module for convenient "anywhere" program-
     ming or service without disturbing installation
    -Easy modular upgrade to as many as 12 stations
• **Short circuit detection** overrides an electrical malfunction of a valve, identi-
  fies it, and allows the other valves to water
• **Default "fail-safe" program** runs all valves for 10 minutes daily in case of
  program loss
• **Rugged, weather resistant, lockable case** comes with 2 keys
  (outdoor models only)
• **3 programs** for different watering requirements such as trees, lawn and flower
  garden.
• **3 start times** for each program, if desired
• **"Skip day" scheduling** for interval watering from 1 to every 15 days
• **Fully automatic or semi-automatic operation**
• **Manual operation** allows user to select valve(s) and watering duration
• **Display** shows current operation, including time of day
• **Live programming** allows program to be set or changed at any time, even
  during watering
• **Off (or *rain*) setting** stops all watering cycles without disturbing programs
• **Battery back-up** saves programs and keeps time during remote programming
  or power outage

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Installing the Battery (Indoor and Outdoor Models)

Open the door to your controller, then pop the control module up by flexing the inside tab to your right. The battery compartment is located at the top in the back of the module. Open it. Insert a standard 9 volt alkaline battery onto the clip. The battery will preserve your program and run the clock durring a **power outage**, *but it will not operate the valves.*
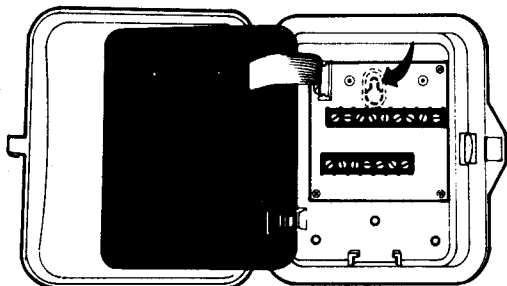
Installing the Indoor Model Controller

Using the mounting template, locate your Rain Dial indoor model in an area protected from weather—such as a garage—within 5 feet of a standard (120 volt U.S.) electrical outlet. *NOTE: Do not install on the same circuit as a high power user such as a refrigerator, garage door opener or air conditioner.* Insert a #10 screw into a wall stud, leaving about 1/4" exposed to slip into the keyhole slot (shown above) on the back of your controller. To secure the controller, drive other screws through the holes (shown above) in back. Use wall anchors or toggle bolts if wall is hollow. **CAUTION: Do not connect to electricity until after valves are connected, see pages 7 and 8.**

Installing the Outdoor Model Controller

Use the mounting template to locate the 3 mounting holes. Although you can locate your outdoor model almost anywhere, it is best to avoid direct exposure to sprinkler spray. Since this device is "hard wired," keep in mind that you must run electrical cable to it. *NOTE: Be sure that the ground wire is connected and that the controller is not sharing the same circuit as a large appliance.* Open the door to your controller, then pop the control module up by flexing the inside tab to your right. Locate your controller over the area you marked with the template, then drive 3 screws through the holes provided. Use wall anchors, toggle bolts or other appropriate fasteners when attaching to other than wall studs. Insert a battery, see page 6. **CAUTION: Do not connect to electricity until after valves are connected, see pages 7 and 8.**

Connecting the Valves

CAUTION: Before connecting the valves to the controller make sure that it is unplugged (indoor model) or disconnected from power (outdoor model).

Open the inside door the same way in which you installed the battery. Route each valve lead wire through the hole in the bottom (use the left-hand hole on the outdoor model) to the desired numbered terminal, see page 8. Attach the ground wire from each valve to a single common wire and attach that wire to the "COM/GRD" terminal. Use the chart on page 18 to note which valve is operated by which numbered terminal.

NOTE: This controller is designed to work with 24 VAC, 5VA solenoid operated valves. A maximum of 2 solenoids per terminal may be used, and no more than 5 solenoids should be on at any one time. This includes the master valve and/or pump start, if one is being used. Current requirements should not exceed .25 amp. (6VA) for any solenoid.

Connecting a Master Valve or Pump

To use a master valve which operates throughout the watering cycle, connect your lead to the "MV" terminal and the ground to "COM/GRD." *NOTE: The master valve must be equipped with a 24 VAC, .2 amp., 5VA solenoid. The controller should not be installed within 5 feet of a pump or pool equipment.*

To use a pump, connect to the "MV" and "COM/GRD" terminals as described above.
The pump relay should have a nominal coil voltage of 24VAC at .25 amp. maximum.
CAUTION: If you are using a pump start circuit, the fail-safe program will activate the pump for all valves for 10 minutes each on Prog. A only. If all valves are not being used, the pump will run against a "dead head" on each unused valve. This can damage the pump. To avoid this, simply connect a jumper wire from the unused valve terminal to a valve terminal that is in use.

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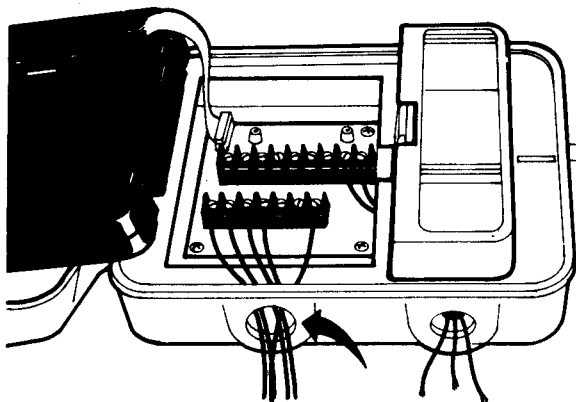
Connecting to Power

Indoor Model: *After* you have completed all valve connections and have a stable controller installation, route the two leads from your transformer through the bottom hole and connect to the 24 VAC INPUT terminals, then snap the control module closed. Plug the transformer into a standard 120 volt outlet. A flashing "12:00 PM" should show on the display.

Outdoor Model: Outdoor controllers have a built-in transformer which must be connected directly to a grounded, 3-wire, 120 VAC power source. This connection should be made by a licensed electrical contractor in accordance with all requirements of the National Electrical Code and applicable state and local codes. *NOTE: Local building and electrical codes usually require that approved electrical conduit and fittings be used to connect exterior, wall-mounted equipment to 120 VAC power.* **CAUTION: DO NOT connect the controller to one phase of a 3-phase power system used by a pump or other electrical equipment.**

To connect power to an outdoor model controller, complete the following:
1. Turn off installation site power at the associated circuit breaker.
2. Verify that power has been turned off at the installation site by using an appropriate AC voltage meter.
3. Install the conduit and associated fittings.
4. Connect power and ground wires per electrical codes.
5. Turn power on.
6. Check controller operation. If the controller is not operating, unplug the transformer and check for shorts.

Program Switch

… used to set up to 3 different programs for automatic operation, or to select a pre-set program (A, B or C) for semi-auto operation. After use in either mode, switch position does not affect daily automatic operation.

Function Switch

…Set to the left, it stops a programmed watering cycle and any valves that are on. In this mode, all programs are retained and the clock continues. Watering will not resume until the switch is returned to "RUN." Set to the left when it rains.

…Set in the middle, the switch enables the user to set new programs, or change existing ones.

…Set to the right for normal, daily automatic operation.

Semi-Auto Start Button

…Used with Program Switch. When depressed, immediately starts program selected (A, B or C) regardless of automatic program cycle.

Manual Start Button

…Used with Multi-Function Dial and +/- Buttons. When depressed, operates any selected single valve for an amount of time selected by user.

Multi-Function Dial

…Use with Manual Start Button for single valve operation.

…Use to set, check or change program information in conjunction with Number Advance Buttons. After using, always return dial to "Current Time."
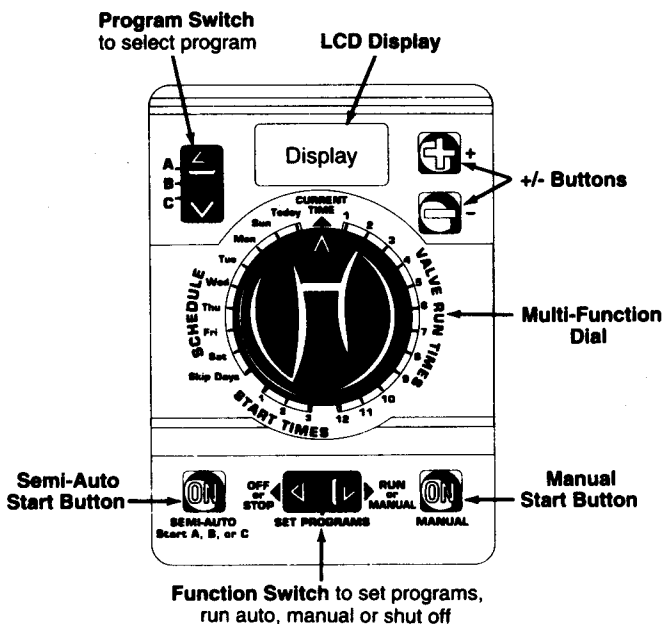
+/- Buttons

...Use with Multi-Function Dial or in Manual mode to set or change program information. Single finger taps to either button advance or reduce data one character at a time. Holding either button down advances data at a rate of 12 characters / sec.

LCD Display

...Shows current operation

Program Switch to select program **LCD Display**

Display

+/- Buttons

Multi-Function Dial

Semi-Auto Start Button

Manual Start Button

Function Switch to set programs, run auto, manual or shut off

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"Valve Run Time" Settings

These settings control how long each valve will water. The valve numbers correspond to the numbered terminals in back of the controller. The valves run sequentially; when one stops, another begins. You can set each valve to run from 1 minute to 5.9 hours.

"Start Times" Settings

Up to 3 different start times (time of day) can be selected for each program, up to 9 start times per day. These settings are especially useful for newly seeded lawns. NOTE: If a program from one day impinges on another program the next day, the controller will finish the first program.

"Schedule" Day Settings

Select which days watering is to occur by designating particular days of the week (for example, watering every Monday and Thursday), or setting *skip day* intervals (e.g. watering every 4 days). Days in either mode can be programmed "off."

"Today" Setting

This setting is used with the skip day schedule. For example, if you want to water every 8 days, and you watered 4 days ago, you would enter the number 4 in the Today setting so that in 4 more days, your newly programmed watering cycle will begin.

Multi-Function Dial

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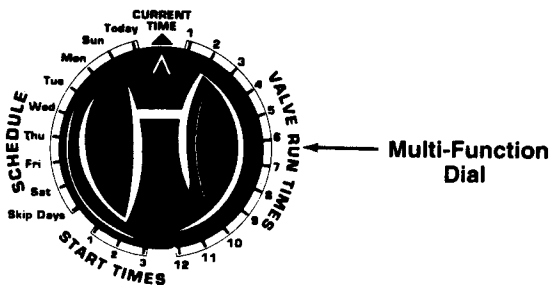
Anywhere Programming

The Rain Dial control module is designed to be easily removed for complete programming in a more convenient setting, or service. The module's battery power holds the program until the module is re-electrified. To remove the module, pop the module up as if you were going to replace the battery. Note the multi-pin plug on the upper left-hand face of the terminal board. Grasp the "wiring harness" closest to the plug and pull it out from the terminal. Then unsnap the module from the 2 hinge points. After programming or servicing, reinstall the module by reversing the steps above.
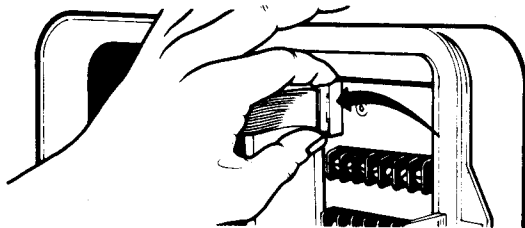
Fail-Safe Mode

If the battery fails during a power interruption, your program will be lost. When power is restored, the Rain Dial controller automatically defaults to its fail-safe mode. Upon restoration of power, the fail-safe mode returns to Sunday at 12:00 p.m. and the clock runs from that point. Unless the controller is reprogrammed, it will run each valve for 10 minutes, beginning at 7:00 a.m. These 10 minute waterings are repeated every 24 hours. This feature is designed to protect lawns and plants from drying out from outages that occur while you are away for a prolonged period of time. *NOTE: In freeze areas, disconnect the controller while you are away to prevent activation of the fail-safe program.*

Select Valve Watering Times

1. Set Program Switch to "A"
2. Move Function Switch to "Set Programs"
3. Turn dial to valve number 1. Use the +/- buttons to enter how long valve is to water.
4. Repeat step 3 for valve number 2, valve number 3 and so on. Use the +/- buttons to set unused valves to "Off."

Repeat the above steps if you wish to use Programs "B" and "C."

Dial in Start Time(s)

1. Turn dial to "1st Start Time." Use the +/- buttons to enter the time when you want Program "A" to start.
2. If you want Program "A" to water more than once a day, turn dial to 2nd Start Time. Repeat step 1 to enter a second start time, or press "-" for off.
Repeat for 3rd Start Time. <u>To shut off start time, press the "+" button until you reach 11:59 PM. Then press "+" button once more to display Off</u>.

Repeat the above steps if you wish to use Programs "B" and "C."

Dial in Daily Schedule

First, decide whether you want to use the controller's daily schedule (for example, water every Monday, Wednesday and Friday) or the interval "Skip Days" schedule (to water every third day, for example, set at 3) to activate your watering cycle.

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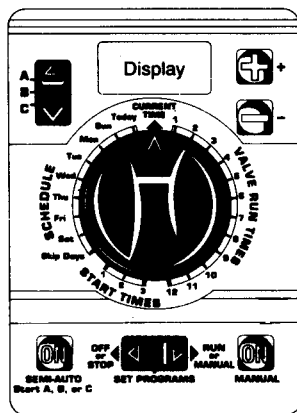
Daily Schedule

Dial in Sunday. Use the +/- buttons for "On" or "Off." Repeat this procedure for each succeeding day of the week. NOTE: When using this schedule, be sure to set the "Skip Days" setting to "Off."

"Skip Days" Schedule

1. Turn dial to "Skip Days." Use the +/- buttons to set the desired daily interval (for example, once every 8 days).
2. Turn the dial to "Today." Use the +/- buttons to set which day in the cycle "Today" should be, see page 12.

Repeat the above steps if you wish to use Programs "B" and "C."

Set the Clock

1. Turn dial to "Current Time." With the Function Switch still in the "Set Programs" position, use the +/- buttons to set the current time.
2. Turn the dial to "Today." Use the +/- buttons to select the current day.
3. Return the dial to "Current Time."

Activate the Controller

Activate the programming you have just entered by moving the Function Switch to the "Run" setting.

How to Check Your Program

Move the Function switch to "Off" and move the Program Switch to whichever program you wish to check, then turn the dial to the parameter you want to check. With the Function switch in the "Off" position, you can check, but you cannot change the programming.
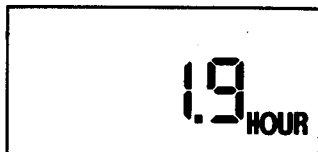
Information Displayed When *Programming*

The LCD will display these kinds of data with the Function switch in the "Set Programs" position, in conjunction with the following dial settings:
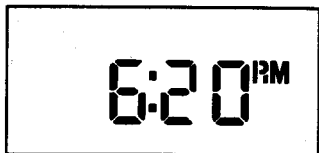
Valve Run Times

Shows minutes (e.g., 15 MIN) or hours (e.g., 1.5 HOUR). Also displays "OFF" for unused valves.

Start Times

Displays time in AM, PM or OFF for unused start times.
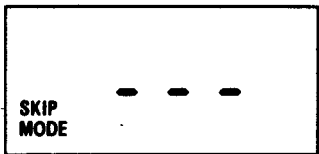
Skip Days

Shows days numbered 1-15, or OFF. The words, "'ONCE EVERY" appear to the left.
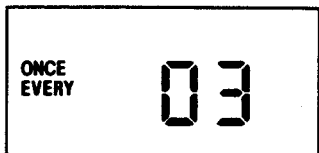
Schedule

Displays ON or OFF. If "Skip Days" has been set, 3 dashes (—) and the words, "SKIP MODE" will be displayed for each of the 7 daily settings.

Today

Displays 7 individual days for a weekly schedule, or displays day interval numbers (1-15) for a "Skip Days" schedule.

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Information Displayed When *Operating*

With the Function switch in the "Run" position, and the dial set to "Current Time," the number of any valve that is on will be displayed.

Automatic Mode With No Program On

| 10.58^{PM} |

With the Function switch in the "Run" position, the current time with a flashing colon (:) is displayed. If the entire display is flashing, the controller has just been plugged in or there has been a power outage. If the colon is not flashing, the controller is using battery power.

Automatic or Semi-Auto Mode With Program On

| 3 $A.34_{MIN}$ |

Shows the current time. Turn the dial to a valve that is on, and the display will show the valve number, the program (A, B or C) and the time remaining for the valve to run. If you turn the dial to a valve that is not currently on, the display shows "OFF" (even though that valve may have a programmed run time).

Manual Mode

| 7 $M.06_{MIN}$ |

With the dial pointing to the appropriate valve, the display shows the valve's number, an "M" (for manual mode), and the time remaining for the valve to run.

Short / Malfunction Detection

| OFF |

A flashing "OFF" indicates that the dial is pointing to a valve that has a short or other electrical malfunction.

NOTE: After a power outage or when the controller is energized, the display will flash 12:00 PM (or the current time if it was a short outage). Stop the flashing by pressing either of the +/- buttons.

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Documenting Your Auto Operation

Use the chart on page 19 to document your auto operation. Use the chart on this page to note your valve locations and their corresponding numbers.

VALVE LOCATIONS: ///////////////////////////////////

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10._____
11._____
12._____

Date installed _____

Date battery installed _____

Contractor Info:_____

_____

_____

_____

Watering Considerations

Plants, soils and climatological conditions vary from region to region. Consult your local nursery for the watering schedule best suited to your particular requirements. As a general rule, the best time to water is early morning because evaporation, wind drift and temperature are minimal. Evening watering may promote mildew and fungus growth.

PROGRAMMING WATERING SCHEDULE

WATERING TIMES

Valve Station	A Program	B Program	C Program	Valve/Station Description
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

	Start Times			Watering Days
	1st	2nd	3rd	

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Semi-Auto and Manual Operation

Use semi-auto or manual operation to supplement regularly programmed watering cycles on especially hot or dry days.

Semi-Auto Operation...

Runs an entire program (A, B or C) whenever you want a supplemental watering.
1. Make sure the Function Switch is in the "Run" position and the dial points to "Current Time."
2. Use the Program Switch to select the program (A, B or C) you want to run.
3. Press the Semi-Auto Start button.
The display will show whichever valves are on in the program you have selected. When the semi-auto cycle is complete, the controller will resume its regular schedule.

Manual Operation...

Runs a single valve for the amount of time you select.
1. Make sure the Function Switch is in the "Run" position.
2. Dial in the valve number (1-12) you want to run.
3. Use the +/- buttons to select the amount of time you want to water.
4. Press the Manual button.
The display will show an "M" (for manual), the valve number, and the time remaining for that valve to run. When the manual cycle is complete, the controller will resume its regular schedule. Return the dial to Current Time.

Manual Shut-Off

To shut valves off, make sure dial points to Current Time, then move the Function Switch to "Off." Scheduled watering will resume when the Function Switch is returned to "Run."

Troubleshooting the System

How to Check for Valve "Shorts"

Rain Dial controllers are uniquely able to detect and identify valves malfunctioning due to electrical shorts in their wiring. Use your controller to check any or all valves with a twist of the dial:

1. Make sure the Function Switch is set to "Run."
2. Turn the dial to the valve you want to check.
3. Use +/- buttons to enter a run time.
4. Press the Manual button.

If the display flashes "OFF," that particular valve has an electrical short or other problem. The solenoid and field wiring should be inspected. **CAUTION: Do not test valves by touching wire ends to terminal screws. Serious damage may result.**

PROBLEM	POSSIBLE CAUSE	CORRECTION
Some valves don't operate	Solenoid defective	Test & replace as required
	Loose wire connection	Secure wire connections Check for continuity
No valves operate	Function Switch in "OFF" or "STOP" position	Set switch to "RUN" or "MANUAL" position
	Solenoid defective	Test & replace as required
	Loose wire connection	Secure wire connections Check for continuity
	Day set to "OFF"	Check current day in display. Set dial to correct day and check setting.
	"Skip Days" incorrectly set	Check and reprogram. See pages 14 and 15
	"Start Times" set to "OFF"	Reprogram "Start Times"

Troubleshooting the System

PROBLEM	POSSIBLE CAUSE	CORRECTION
Watering at wrong times	"Current Time" of day incorrectly set	Check and reset "Current Time"
	"Start Times" incorrectly set	Check and reset all "Start Times." See page 14.
Display blank	No power	Check circuit breaker panel Check wiring, connections Transformer plugged in?
Program won't display	Wrong function setting	Function Switch must be in "Run or Manual" setting
	Controller is in watering cycle	Check or change program with Function switch in "Set Programs"
Incorrect display (After a power outage or after being plugged in.)	Battery is weak or missing	Remove AC power and battery for 1 minute. Replace battery, restore power and reprogram
Waters on wrong days	Weekly or "Skip Days" schedule incorrectly set	Reprogram. See pages 14 and 15
"Current Time" is wrong and flashing	Power outage occurred with no battery or weak battery in controller	Replace battery and reprogram controller
Display is flashing	Excessive load	Check max. ratings, page 7
	Shorted solenoid or field wiring	Check solenoids and wiring, see page 21
Valve won't turn off (Function switch "Off")	Mechanical override. (Manual bleed is on)	Turn solenoid on top of valve fully clockwise

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FCC Notice

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

This equipment has been verified to comply with the limits for a class B computing device, pursuant to FCC Rules. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or shielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

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Irritrol Systems offers complete lines of professional irrigation products for commercial and residential applications:

Controllers and Controller Accessories

Valves and Valve Accessories

Sprinklers, Nozzles and Sprayheads

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