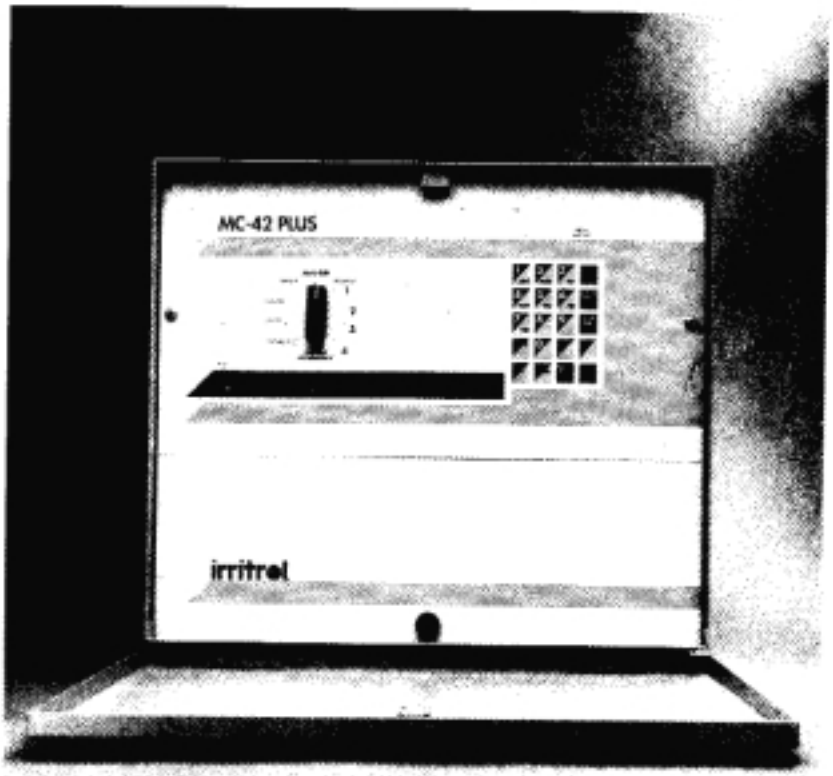
MCPLUS SERIES CONTROLLERS



OWNER'S MANUAL

4, 6, 8, 12, 18, 24, 30, 36 and 42 stations

Irritrol® SYSTEMS

TABLE OF CONTENTS

Table of Features iii
Location of Parts iv
Installing and Wiring the Controller 1
- Selecting the Site 1
- Mounting the Controller 1
- Connecting the Power 2
- Hooking Up the Valves 4
- How the Backup System Works 6
- Installing and Using Sensor Ports 6
- How the Electronic Circuit Breaker Works 7

How To Set the Current Time and Day 8
- Setting the Time 8
- Setting the Current Day 10

How To Program the Controller for Watering 11
- Developing a Watering Plan 11
- Erasing Any Prior Programs 13
- Selecting the Days to Water 14
- Setting the Watering Duration for Each Station 16
- Programming Cycle Start Times 17
- Running the Programmed Watering Plan 18

Operating the Controller Manually 19
- Manual On 19
- Manual Off 20
- Activating a Watering Cycle for a Selected Program 21
- Watering One Station for the Programmed Time 22
- Rain Off 23
- Testing All Stations 24

Displaying Existing Settings 25
- Displaying the Time and Day of the Week 25
- Watering Information 26

Using Advanced Features 31
- Changing the Length of the Watering Calendar 31
- Using Water Budgeting 32
- Programming a Delay Between Stations 34

Using Options 35
- Loop Watering 37
- Setting Watering Time for All Stations Using One Entry 41

Troubleshooting 42
Index 44

TABLE OF FEATURES

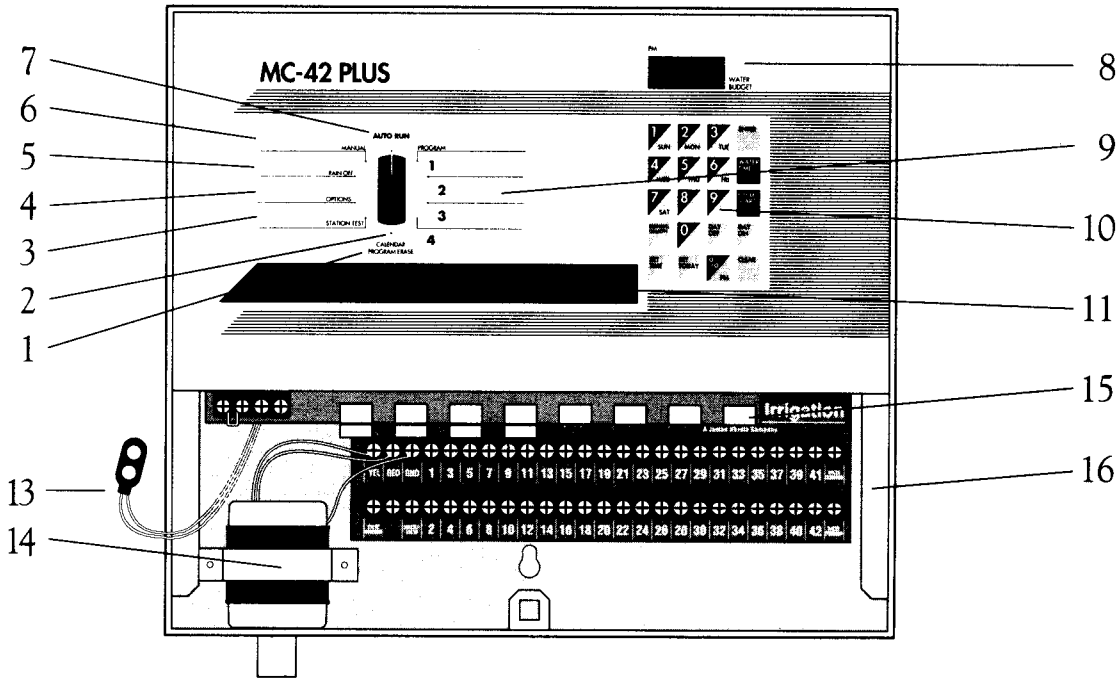
Thank you for purchasing the IrriTrol MC*plus* Series Controller. Listed below are some important features you should be aware of before you begin programming. Details on how to implement these features are described on the following pages.

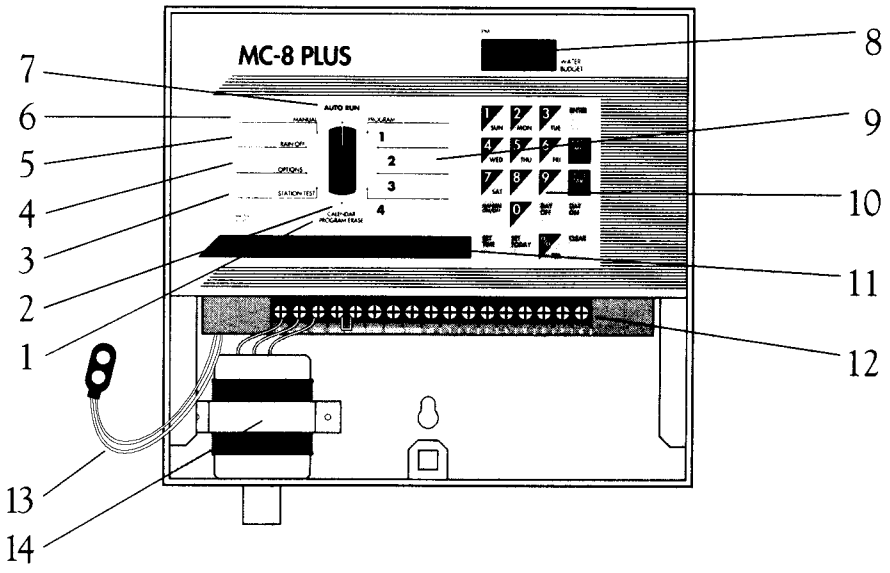
- Programmable watering calendar from 1 to 16 days for application versatility
- Rain off sensor hookup
- Sensor start hookup in program 4 for water conservation systems
- Non-volatile memory that retains programmed information indefinitely
- 9-volt alkaline battery to ensure accurate time during power failures
- Four independent programs that can run concurrently
- Capability of operating up to 4 valves per station
- Water budgeting for simple, single-entry increase or decrease of watering run time per program
- Total watering time display for quick review of scheduled watering time per program
- True manual, semi-automatic and single station timed manual for versatile operation
- Incomplete program alert to prevent errors in programming
- Station test for easy system testing of each station for 1 to 9 minutes each
- Remote ready for upgrading to an IrriTrol remote control system
- Program scrolling for information recall
- Selectable single program option for seasonal programming
- Selectable loop option for continuous cycling of program
- Electronic circuit breaker that identifies and overrides bad stations
- Single entry to program all stations with the same watering duration
- Rain off programmable to 7 days
- Start time stacking overlap protection within each program

These are just a few of the many features of the MC*plus* Series Controllers. Please review your manual before beginning programming.

LOCATION OF PARTS

1. **Function Dial**
   For selecting programming and operating functions.
2. **Calendar/Program Erase**
   Calendar for setting calendar length (1 to 16 days) and/or program erase for erasing all programmed information.
3. **Station Test**
   For running a valve test for all stations from 1 to 9 minutes.
4. **Options**
   For selecting options, single program option and seconds watering time option.
5. **Rain Off**
   For turning off output to all stations manually or programming up to 7 days off.
6. **Manual**
   For true manual on and off operation.
7. **Auto/Run**
   Programming off position for automatic operation.
8. **Digital Display**
   For viewing time and program information.
9. **Program Positions One Through Four**
   For selecting program.
10. **Twenty Position Keyboard**
    For programming data and operating controller.
11. **LED Station Indicator Lights**
    For viewing stations that are currently on.
12. **Terminal Strip MC-4, 6, 8 and 12 Plus**
    For hook-up of 24 volts, "GND", valve wires, common, pump start and sensors.
13. **Battery Snap**
    For hook-up of 9V alkaline battery to keep time during power failures.
14. **110V/24V Transformer**
15. **Main Bus Strip MC-18, 24, 30, 36 and 42 Plus**
    For hook-up to quick disconnect terminal strip.
16. **Quick Disconnect Terminal Strip MC-18, 24, 30, 36 and 42 Plus**
    For hook-up of 24 volts, "GND", valve wires, common, pump start and sensors.


MC-42 PLUS
AUTO RUN
MANUAL
RAIN OFF
OPTIONS
STATION TEST
PROGRAM
1
2
3
4
CALENDAR PROGRAM ERASE
WATER BUDGET
irrigation
1
2
3
4
5
6
7
8
9
10
11
13
14
15
16


MC-8 PLUS
AUTO RUN
MANUAL
RAIN OFF
OPTIONS
STATION TEST
PROGRAM
1
2
3
4
CALENDAR PROGRAM ERASE
WATER BUDGET
1
2
3
4
5
6
7
8
9
10
11
12
13
14

INSTALLING & WIRING THE CONTROLLER

This section includes instructions for installing the controller and hooking up the electricity. To ensure safe operation, it is important to follow the instructions carefully. The following topics are covered:

- Selecting the site
- Mounting the controller
- Connecting the power
- Hooking up the valves
  —Testing the valve hook-ups
  —If you have a pump
- How the backup system works
- Installing and using sensor ports
- How the electronic circuit breaker works

CAUTION: To avoid injury to you or damage to the controller, you ***MUST*** follow the sequence of installation steps outlined in this manual.

SELECTING THE SITE

The controller comes in an outdoor, rain-resistant, rust-resistant and dust-resistant box. The correct location is essential to ensure safe operation. Select a site for the controller that is:

1. Away from direct sprinkler spray.
2. Accessible to a 3-wire, grounded 120-volt AC, 60 Hz power supply.

CAUTION: ***DO NOT*** place controller where it is exposed to temperatures exceeding 130°F.

MOUNTING THE CONTROLLER

WALL MOUNT: For wall mounting, install the controller vertically on a flat, secure surface. Use the enclosed template to locate mounting screw holes. Follow complete mounting instructions on template.

PEDESTAL: For free-standing installation on a pedestal, follow the installation instructions in the pedestal box.

CONNECTING THE POWER

The controller is a solid-state microcomputer that may be affected by transient surges and electromagnetic interference. Wherever possible, the controller should be installed on its own dedicated circuit breaker.

CAUTION: Be sure to follow all applicable local electrical wiring codes.

CAUTION: ***DO NOT*** install the controller on the same line or within 5 feet of a heavy inductive load, such as a pump, motor, air conditioner, refrigerator, transformer, etc.

CAUTION: ***DO NOT*** turn on the power until all valves are wired (see "Hooking Up the Valves," page 4).

1. Remove the lower panel by unfastening the quarter-turn screw on the bottom center of the panel and pulling out and down slightly.
2. Verify that the yellow and red wires of the transformer are connected to the 24 VAC input on the terminals of the controller (see fig. 1). Connect the black and white wires of the 120 VAC, 60 Hz power supply to the black and white wires of the transformer (see fig. 1).

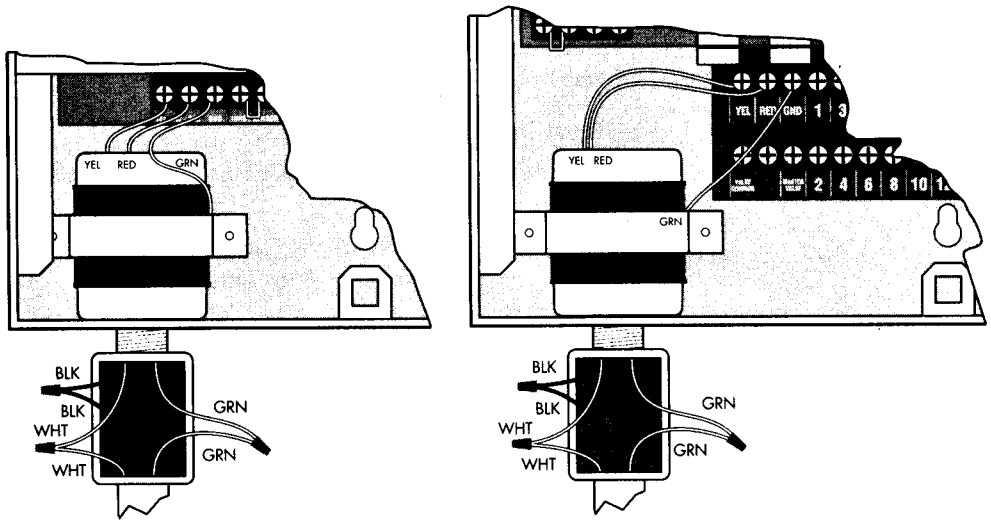


Figure 1. Electrical Hook-ups

CAUTION: ***DO NOT*** wire 120 volts directly to the PC board terminals; the transformer supplied with the controller ***MUST*** be used.

3. Connect the green ground wire directly to the terminal labeled "GND"

In areas where lightning is prevalent or the condition of the third wire ground is questionable, a ground rod must be installed. Connect the grounding rod to the controller's case ground using a #10 gauge or heavier stranded copper wire.

The distance from the controller's case to the earth ground should be minimized.

HOOKING UP THE VALVES

A maximum load of 30VA (1.24 amps) may be connected to each station. A maximum total load of 43 VA (1.8 amps) may be programmed to operate simultaneously.

1. Strip the solenoid wires approximately 1/4 inch (do not bend exposed end).
2. Following the wiring diagram in figure 1, insert straight bare wire between the plates of the "sure grip" terminal. Connect one solenoid wire to the station terminal and the other to common. Tighten screw firmly.

CAUTION: Use a separate (dedicated) valve common wire for each controller. ***DO NOT*** daisy-chain controllers together using the same common wire.

3. Before turning on the power, recheck all leads connected to the terminal block for shorts.

TESTING THE VALVE HOOK-UPS

1. Make sure the valve common wire and all station wires are connected.
2. Turn on power to the controller.
3. Turn dial to Station Test position.
4. To enter test time, key in a number from 1 min. to 9 min. If no time is entered, 2 min. will be assumed.
5. Press the **Manual On/Off** key.

Each station in sequence will turn on for the number of minutes you entered. A Fused Circuit test will occur during the station test. If a Fused Circuit condition exists on any station, the controller will display "FUSE" alternately with the station number. "FUSE" indicates a short on that station. See "How the Electronic Circuit Breaker Works", page 7.

IF YOU HAVE A PUMP

In cases where a pump is to be controlled by the master valve output, ***DO NOT*** drive the pump directly from the controller. The master station must be connected to the coil of a 24 VAC relay, such as an Essex #184-20105-101Z (IrriTrol part number I 1001).

CAUTION: Connecting pump to controller without a 24 VAC relay will damage controller.

The pump latch relay should be set up by an electrician so that a switch closure will activate the latch relay coil, turning on the pump. The switch contacts of the relay should be connected to control the latch relay coil (see figure 2). The relay should be mounted at least 5 feet from the controller box, and the box ***MUST*** be grounded. Installation must follow all local electrical wiring codes.

CAUTION: ***DO NOT*** attempt to power the controller using power from one phase of pump power. This will damage the controller.

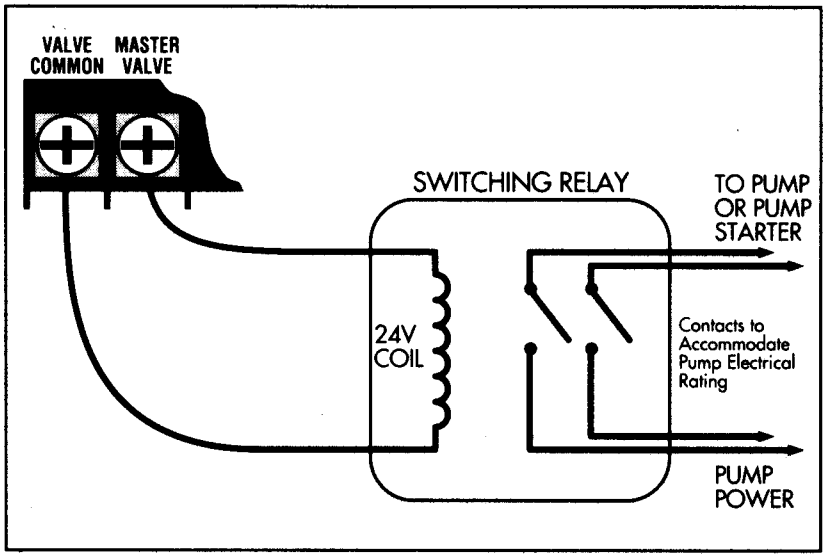


Figure 2. Installing a Relay for a Pump

HOW THE BACKUP SYSTEM WORKS

The controller is equipped with non-volatile memory for retention of programmed information. Once programming is complete, the controller will retain your program in the event of a power failure. There will be no need to reprogram following a power failure.

This controller is also equipped with a timekeeping circuit. The controller will keep accurate time during a power failure for a period of 30 days continuous via a 9-volt alkaline battery (not included).

INSTALLING & USING SENSOR PORTS

The controller is equipped with two types of sensor hookups.

1. **Rain Off Sensor Hook-up**: Terminals labeled **"Inhibit Sensor"** on the controller's terminal block. When the sensor contacts open, the controller will inhibit output to all stations (all programs are affected). If no sensor is used, the "short" wire must be installed.
2. **Start Sensor Hook-up**: Terminals labeled **"Start Sensor"** on the controller's terminal block. The sensor must be a "normally open" type of sensor. When the sensor contacts close, the controller will start a Program 4 watering cycle.

   This sensor hook-up enables you to activate watering using a sensor, such as a moisture sensor. Sensor contacts must remain closed for 30 seconds before the cycle will start.

   If the sensor remains closed after completion of the watering cycle, another cycle will be initiated. If the sensor opens before completion of the watering cycle, no new cycle will be initiated. The cycle in progress, however, will continue watering until completion.

To install a sensor:

1. Attach the sensor to the terminals of the controller's terminal block. Adjust the sensor according to manufacturer's instructions.

HOW THE ELECTRONIC CIRCUIT BREAKER WORKS

The controller is equipped with an electronic circuit breaker. If the controller detects a short circuit on a station, the shorted station (valve) will be turned off automatically. The display will then alternately flash "FUSE" and the shorted station number or "0" for the master valve. The controller will continue to automatically water the other stations and the following watering cycles until the short is repaired.

Common conditions of the electronic circuit breaker include:

CONDITION: "FUSE" and one or more station numbers alternately flash

Diagnosis: One or more stations are shorted.
Solution: Check station(s) for cause of shorted condition. Repair valve(s) and/or wiring on station(s) and press clear button.

Diagnosis: Too many valves are operating at the same time.
Solution: Check programs and stations including master valve for VA output. Maximum total output is 43VA (1.8 amps). Reduce amount of valves on at the same time to below maximum output allowance.

CONDITION: "FUSE" displays without any station numbers

Diagnosis: A transient surge has spiked the line.
Solution: Press CLEAR.

Diagnosis: An overload or short has occurred while the controller is being remotely activated by a remote control device such as the RVC system.
Solution: Press CLEAR.

Diagnosis: A short has ocurred for too short of a time duration for the controller to determine the station number.
Solution: Check wiring for broken insulation or other conditions which may cause an intermittent short. Press CLEAR.

CONDITION: "FUSE" is alternately displayed with "0" and none of the stations are operating automatically

Diagnosis: The Master Valve is shorted. When this occurs all station outputs will be suspended until the short is repaired.
Solution: Repair Master Valve, pump start relay and/or wiring and press CLEAR.

HOW TO SET THE CURRENT TIME & DAY

Before you can program the controller for watering, you must set the current time and day of the week. This information is used to control the watering schedules. Once set, the time and day apply to all programs. To set the day and time, follow the steps below. To change the day or time, use the same steps.

IF YOU MAKE A MISTAKE

If you make a mistake while programming, the controller displays an error message. Press the **Clear** key; then try again.

SETTING THE TIME

1. Set the dial to any program (e.g., Program 1).
2. Using the number keys, key in the current time. You must enter both the hours and the minutes.
3. To indicate P.M., press the **PM** key. The controller will now display an apostrophe (') before the time. For A.M., skip this step.
4. Press the **Set Time** key.

NOTE: Midnight is 12:00 A.M.; noon is 12:00 P.M.

EXAMPLE A:

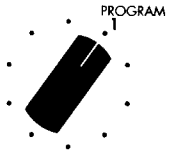
To set the time to 10:25 A.M. set the dial to Program 1:

Then press:

The controller displays:

EXAMPLE B:

To set the time to 3:23 P.M. set the dial to Program 1:



Then press:

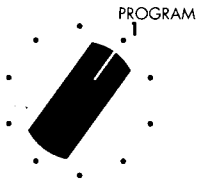
The controller displays:

SETTING THE CURRENT DAY

1. Make sure the dial is set to any program (e.g., Program 1).
2. Press the number key that corresponds to the current day of the week, such as **3** for Tuesday.
3. Press the **Set Today** key.

EXAMPLE:

To set the current day to Tuesday, set the dial to Program 1:



Then press:

The controller displays:

HOW TO PROGRAM THE CONTROLLER FOR WATERING

To set up a regular watering schedule, follow the steps below. This section covers the following topics:

- Developing a watering plan
- Erasing any prior programs
- Selecting the days to water
- Programming the cycle start
- Setting the watering duration for each station

DEVELOPING A WATERING PLAN

Four watering programs are available. Each program can be used for separate watering requirements. For example, you might use one program to water the lawn on Wednesdays and Saturdays, and another program to water trees and shrubs once a week.

The controller is pre-programmed with a 7-day calendar. The calendar can be changed to a different number of days, such as a 14-day calendar (see the section on advanced features, page 31). The examples in this section assume a 7-day calendar.

WHAT IS A WATERING CYCLE?

Each watering cycle waters all the stations in a program in sequence. For example, in the sample watering plan shown on page 12, program 1 has three watering cycles. Therefore, all six stations in the program are watered three times each day, first starting at 2 A.M., then at 6 A.M., and again at 5 P.M.

PLANNING THE WATERING CYCLES

Before you program a watering schedule, decide how to use each program. The chart on page 12 shows a sample watering plan. The sample watering plan illustrates the following important concepts:

- Number of watering cycles available
- Planning station placement
- Planning a delay between valve openings

SAMPLE WATERING PLAN

Program	Days	Cycle Start Times	Stations	Water Time Duration
1	Every	2 A.M.	1	10 min.
		6 A.M.	2	15 min.
		5 P.M.	3	35 min.
			4	5 min.
			11	50 min.
			12	2 min.
2	M,Th	7:06 A.M.	5	2 hrs.
3	T,W,F	7:00 A.M.	6	25 min.
		8:31 A.M.	7	5 min.
			8	15 min.
			9	45 min.
4	Every	11 A.M.	11	50 min.
			12	2 min.

Number of Watering Cycles Available

Programs 1, 2, and 3 can have up to 3 watering cycles each. Program 4 can have up to 2 cycles. For example, program 1 in the sample has three watering cycles. The first starts at 2 A.M., the second at 6 A.M., the third at 5 P.M. Therefore, each station in program 1 is activated three times each day.

Overlap Protection

The start time stacking feature on this controller will provide start time overlap protection in the event that an error in programming or an increased water budgeting percent creates an overlap between cycle start times. In the event that an overlap does occur, the controller will automatically suspend the start time until the current watering cycle finishes.

Planning Station Placement

Each station may be used in no more than 2 programs. For example, stations 11 and 12 are watered in programs 1 and 4, but could not be included in a third program.

Planning a Delay Between Valve Openings

If you plan to program a delay between valve openings, be sure to include that delay time in your watering plan. In all programs, the delay can be from 1 second to 4 minutes. (See the section on additional features, page 31, for programming instructions.)

Planning Summary

Max. Watering Cycles	=	3, (except 2 in program or loop operation in program 4)
Station Placement	=	Each station in up to 2 programs
Delay	=	1 second to 4 minutes

ERASING ANY PRIOR PROGRAMS

This process erases all previously programmed information. However, it does NOT erase the current time, current day of the week, the programmed watering calendar, or selected options (see page 31).

To clear prior watering programs:

1. Turn the dial to the **Calendar/Program Erase** position.
2. Press the following key sequence: **1, 3, 7, 9.**
3. Press the **Enter** key.
4. Return the program dial to desired program.

EXAMPLE:

To clear all programs, set the dial to Calendar/Program Erase:

Then press:

The controller displays the following flashing message:

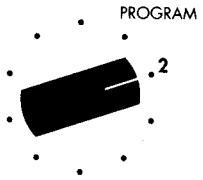
SELECTING THE DAYS TO WATER

Refer to your watering plan and follow the steps below to select watering days. The examples assume a 7-day calendar.

1. Turn the dial to the program number you wish to enter (e.g., Program 1).
2. Press the number corresponding to the day to water (e.g., **2** for Monday).
3. Press the **Day On** key.
4. Repeat for all watering days for the selected program.

EXAMPLE:

To set Program 2 to water on Mondays and Thursdays, turn the dial to Program 2:



Then press:

The controller displays "On" and then the watering day number, such as in the following example for Monday:

DELETING A PROGRAMMED DAY ON

If you make a mistake or want to delete a programmed day on, do the following:

1. Turn the dial to the program with the day to be deleted.
2. Press the number corresponding to the day to delete (e.g., **2** for Monday).
3. Press the **Day Off** key.
4. Repeat for all watering days to be deleted.

The controller displays "OF:" and the day number for the deleted watering day:

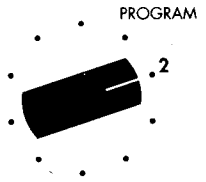
SETTING THE WATERING DURATION FOR EACH STATION

Refer to your watering plan and follow the steps below to set the watering duration for each station in a program. The watering durations may be set for 1 minute to 24 hours.

1. Set the dial to the desired program.
2. Key in the station number.
3. Press the **Water Time** key.
4. Use the number keys to key in the watering duration for the station (e.g., **5** for 5 minutes).
5. Press **Enter**.
6. Repeat steps 2 through 5 for each station in this program.

EXAMPLE:

To set station 5 in Program 2 to water for 2 hours, set the dial to Program 2:



Then press:

The controller displays:

NOTE: A flashing "P1:P2" or "P3:P4" on the display indicates that this station is already programmed to water in two other programs. The numbers displayed are the programs that the station currently resides in. (See "Planning Station Placement," page 12.)

DELETING A PROGRAMMED STATION

To delete a programmed station, enter "0" for water time.

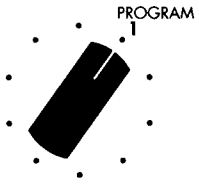
PROGRAMMING CYCLE START TIMES

Use this feature to set the time for a watering cycle to start. The watering cycle will water all the stations in a program starting at the time you set. Programs 1, 2, and 3 can be activated to water up to three times a day, and program 4 two times a day. For each cycle, set the cycle start as follows:

1. Turn dial to the desired program.
2. Press the number key corresponding to the cycle number you are programming (e.g. 1 for the first cycle).
3. Press the **Cycle Start** key.
4. Using the number keys, key in the start time for the cycle. You must enter both the hours and the minutes.
5. To indicate P.M., press the **PM** key. For A.M., skip this step.
6. Press the **Enter** key.
7. Repeat steps 2 through 6 for each additional cycle start in this program.

EXAMPLE:

To activate all valves in Program 1 twice each watering day at 2 A.M. and 5:15 P.M., turn the dial to Program 1:



To set the start time of 2:00 A.M. for the first cycle, press:

The controller displays the start time for the first cycle.

To set the start time of 5:15 P.M. for the second cycle,

Press:

The controller displays the start time for the second cycle

NOTE: The start time stacking feature on this controller will provide start time overlap protection in the event that an error in programming or an increased water budgeting percent creates an overlap between cycle start times. In the event that an overlap does occur, the controller will automatically suspend the start time until the current watering cycle finishes.

INCOMPLETE PROGRAM ALERT

To check that programming is complete, move the dial out of the current program position. If one long beep sounds, program is incomplete.

NOTE: This beep indicates that the program will **NOT** run automatically.

RUNNING THE PROGRAMMED WATERING PLAN

When you have finished programming, turn the dial to the Auto Run position. This locks the keyboard, thus eliminating unintentional program entries (watering program will also run if dial is in Program 1 position, but keyboard will not be locked).

With the dial in Auto Run position, all stations will water as programmed, and the controller displays the current time.

OPERATING THE CONTROLLER MANUALLY

Manual operation allows you to perform a one-time watering function without affecting the programmed watering plan. For example, you might want to turn off sprinklers on a rainy day but have watering resume normally after that. This section includes instructions for the following manual operations:

- Manual on
- Manual off
- Activating a watering cycle
- Watering one station for the programmed time
- Rain off
- Testing all stations

MANUAL ON

Use this option to water one station for any amount of time regardless of programming. The selected station will water until you turn it off.

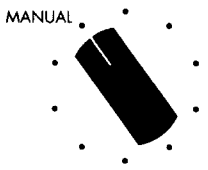
NOTE: For safety, a station turned on manually will shut off automatically at midnight.

NOTE: To alert the operator, the controller will sound two quick beeps every 30 seconds while the station is manually on.

1. Set the dial to the Manual position.
2. Key in the station number (e.g., **5** for station 5).
3. Press the **Manual On/Off** key.

EXAMPLE:

To water station 5 (until you later turn it off), set the dial to Manual position:



Then press:

The controller displays the station number:

Station indicator LED light will come on for station 5.

MANUAL OFF

Use this option to turn off any manual watering function.

To shut off a watering station:

1. Return the dial to the Auto Run position, or press the **Manual On/Off** key.

ACTIVATING A WATERING CYCLE FOR A SELECTED PROGRAM

Use this option to water all the stations in the program you select.

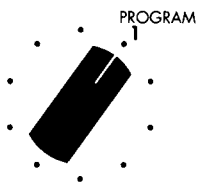
1. Turn the dial to the desired program.
2. Key in the first station you intend to turn on.
3. Press the **Manual On/Off** key.

All stations programmed after the selected starting station will turn on automatically in sequence.

NOTE: The selected starting station must have programmed water time to turn on. If it does not, the controller will select the next programmed station to start watering.

EXAMPLE:

To water all stations in Program 1, turn the dial to Program 1:



Press:

The controller will alternately display the first station number,

and the remaining water time for that station in minutes and seconds:

WATERING ONE STATION FOR THE PROGRAMMED TIME

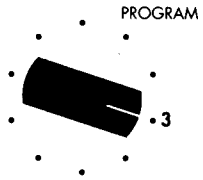
Use this feature to water one station for the programmed time. Only the selected station will be watered.

1. Turn dial to the program with the desired water station.
2. Key in the station number.
3. Press the **Water Time** key.
4. Press the **Manual On/Off** key.
5. Return the dial to the Auto Run position.

NOTE: A station without programmed water time will **NOT** turn on.

EXAMPLE:

To water station 6 in program 3 without activating the rest of the watering sequence in program 3, set the dial to Program 3:

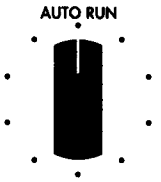


Then press:

The controller displays the station number,

then the remaining water time for that station in minutes and seconds:

Return dial to Auto Run position:



RAIN OFF

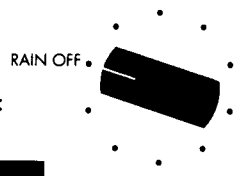
Use this feature to temporarily turn off watering, such as when it is raining. As long as this feature is on, watering cycles cannot be activated automatically.

1. Turn dial to Rain Off position.
   Stations currently watering will turn off after a 2-second delay.

To return controller to normal operation, turn dial to Auto Run position.

EXAMPLE:

To turn off all stations currently watering, turn dial to Rain Off position:



The controller displays:

PROGRAMMABLE RAIN OFF

Use this feature to turn off watering cycles for a specific length of time, from 1 to 7 days.

1. Turn dial to Rain Off position.
2. Press number of days to stop watering (1 to 7).
3. Press **Enter.**
4. Return dial to Auto Run position.

In the Auto Run position, the display will indicate "OFF" and the number of remaining days to be off.

To cancel programmable Rain Off

1. Turn dial to Rain Off position.
2. Press 0.
3. Press **Enter.**
4. Return dial to Auto Run position.

TESTING ALL STATIONS

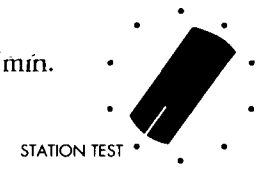
Use this feature to test all stations without affecting the program.

1. Turn dial to Station Test position.
2. To enter test time, key in a number from 1 minutes to 9 minutes. If no time is entered, 2 minutes will be assumed.
3. Press the **Manual On/Off** key.

Each station in sequence will turn on for the number of minutes you entered. A Fused Circuit test will occur during the station test. If a Fused Circuit condition exists on any station, the controller will display "Fuse" alternately with the station number. "Fuse" indicates a short on that station.

EXAMPLE:

To test all stations for 5 min. each, turn dial to **Station Test** position:



To turn on, press:

The controller alternately flashes the station number:

and the remaining test time in minutes and seconds:

NOTE: Any currently active automatic watering cycles will be suspended while the Station Test is in operation. Upon completion or termination of the Station Test, automatic operation will resume.

DISPLAYING EXISTING SETTINGS

Use the features in this section to display current settings without affecting the program. For example, you can check the current time or check the watering time for a station. The following topics are covered:

- Displaying the time and day of the week
- Displaying watering information
  - — Watering days for a program
  - — Total water time for a program
  - — Water time duration for a station
  - — Cycle start and end
  - — Current water budget percent

DISPLAYING THE TIME AND DAY OF THE WEEK

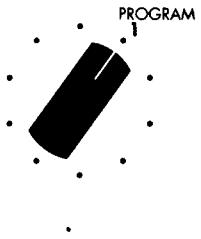
To display the time and day of week without affecting settings:

1. Turn the dial to any program (e.g., Program 1).
2. Press the **Set Time** key to display the current time. (The current time is also displayed when the dial is in the Auto Run position.)
3. Press the **Set Today** key to display the day of the week. The controller displays the number corresponding to the current day of the week, e.g., 2 for Monday.

NOTE: To change the time or day of week, see "How To Set the Current Time and Day," pages 8-10.

EXAMPLE:

To check if the current day is correctly entered as Monday, set the dial to any program, such as Program 1:



Press:

For Monday, the controller displays:

WATERING INFORMATION

This section describes how to display watering information. Current settings are not affected by displaying them.

DISPLAYING WATERING DAYS FOR A PROGRAM

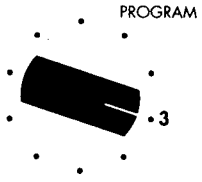
To display watering days for a program without affecting the program:

1. Turn the dial to the desired program.
2. Press the **Day On** key.

   The controller displays, in turn, "On:" and the number corresponding to each day programmed for watering. Likewise, pressing the **Day Off** key will display the days that are not programmed to water.

EXAMPLE:

To check watering days for program 3, assuming Tuesday, Wednesday, and Friday were programmed, turn the dial to Program 3:



Press:

The controller displays:

Then:

Then:

DISPLAYING ALL STATIONS PROGRAMMED TO WATER AND THEIR WATER TIMES

Press: CLEAR WATER TIME WATER TIME

The controller will display each programmed station in sequence with its watering time.

DISPLAYING TOTAL WATER TIME FOR A PROGRAM

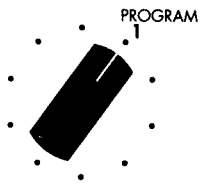
To display total watering time for a program without affecting the program:

1. Turn the dial to the desired program.
2. Press the **Clear** key.
3. Press the **Water Time** key.

NOTE: If the controller displays a flashing number, the Total Watering Time is greater than 100 hours.

EXAMPLE:

To display the total water time (for Program 1 in the sample watering plan, page 12), turn the dial to Program 1:



NOTE: Total water time takes into account the water budget and station delays.

Press: CLEAR WATER TIME

The controller displays: 1:57

DISPLAYING WATER TIME DURATION FOR A STATION

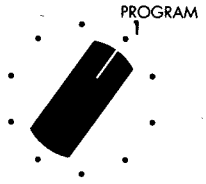
To display watering time for a station without affecting the program:

1. Turn the dial to the desired program.
2. Key in the station number (e.g., **2** for station 2).
3. Press the **Water Time** key.

NOTE: Time displayed will be programmed time and will not be recalculated by water budget percentage.

EXAMPLE:

To display the watering time for station 2 in Program 1 (programmed to water for 15 minutes with water budgeting 50%), turn the dial to Program 1:



Press:

The controller displays the programmed watering time:

DISPLAYING CYCLE START & END

To display the cycle start and end for a program without affecting the program:

1. Turn the dial to the desired program.
2. Key in the number of the desired cycle start.
3. Press the **Cycle Start** key.
4. To display the cycle end time, press the **Cycle Start** key again.

NOTE: If cycle end time is more than 24 hours after the cycle start, the end time display will flash.

NOTE: Cycle end time will take into account the water budget percentage and any programmed delays.

EXAMPLE:

To display the cycle start and end for the second cycle in Program 1, turn the dial to Program 1:

Press:

The controller displays the cycle start time:

Press:

The controller displays the cycle end time:

If loop watering is activated (Program 4 only, see page 37), the controller displays:

DISPLAYING CURRENT WATER BUDGETING PERCENT

To display the current water budgeting percent without affecting the program:

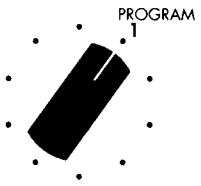
1. Turn dial to desired program.
2. Press the **%/PM** key.

Display will show water budgeting's current value.

NOTE: 100% is normal when water budgeting is not in use.

EXAMPLE:

Assume that water budgeting had previously been set at 50% (see "Water Budgeting," page 32). To display this setting without affecting the program, turn the dial to Program 1:



Press:

The controller displays:

NOTE: For percentages other than 100, in the respective program position, a period will be displayed in the lower right side of the display.

USING ADVANCED FEATURES

The MC*plus* controller offers several advanced features for sophisticated watering applications. These include:

- Changing the length of the watering calendar
- Using water budgeting
- Programming a delay between stations
- Options
  - — Running a single program
  - — Changing watering time to seconds and minutes in Program 4
- Loop watering
- Setting watering time for all stations using one entry

CHANGING THE LENGTH OF THE WATERING CALENDAR

To give you greater flexibility, the watering calendar may be changed from its factory setting of 7 days. The calendar may be from 1 to 16 days. This change affects **all programs.** This feature can be used to aid in meeting watering restrictions or for ease in programming.

For simplicity of programming, you may want to shorten the watering calendar. A watering calendar of 2 days, for instance, would water each program every other day. Keep in mind that a 2-day watering calendar uses only two days, i.e., day 1 and day 2.

A longer watering calendar may also be programmed. For example, to water every 2 weeks, use a 14-day calendar.

To change the watering calendar:

1. Turn the dial to the Calendar/Program Erase position. The current calendar length is displayed. For example, **PE:7** indicates a 7-day weekly calendar.
2. Key in the desired calendar length (from 1 to 16).
3. Press the **Enter** key.

NOTE: The number entered for Set Today, Days On, and Days Off cannot be greater than the programmed calendar length.

EXAMPLE:

To change the watering calendar from 7 days to 14 days, turn the dial to the Calendar/Program Erase position:

The controller displays the current number of days in the calendar:

Press:

The controller flashes the number of days in the new calendar

USING WATER BUDGETING

A special water budgeting feature allows you to quickly increase or decrease the watering time per **program.** The currently programmed times can be adjusted by a percentage ranging from 0% through 255%. For example, in the winter you might want to water only 50% of the programmed time.

To use water budgeting:

1. Turn the dial to the desired program.
2. Press the **%/PM** key. The controller displays the current water budgeting percent (e.g., **100** for 100%).
3. Key in the new percent value (e.g. **50** for 50%).
4. Press the **Enter** key. The controller flashes the new percent value and a period is displayed in the lower right corner to indicate a budget percentage other than 100.

EXAMPLE:

Assume that Program 1 waters two stations, station 1 for 30 min. and station 2 for 45 min. To adjust the watering time for all stations in Program 1 to 50% of their current watering times, turn the dial to Program 1:

Press: %

The controller displays 100%: 100

Press: % 5 0 ENTER

The controller flashes the entered percent value: 50.

After changing to 50%, station 1 will water for 15 min. and station 2 for 23 min. (fractions are rounded upward).

NOTE: Watering run times may be returned to their original values by entering 100%.

NOTE: Watering times will be displayed and remain as originally programmed.

NOTE: For percentages, other than 100, in the respective program position, a period will appear in the lower right side of the display. This is to alert the user of a water budget status in that program.

NOTE: The start time stacking feature on this controller will provide start time overlap protection in the event that an error in programming or an increased water budgeting percent creates an overlap between cycle start times. In the event that an overlap does occur, the controller will automatically suspend the start time until the current watering cycle finishes.

PROGRAMMING A DELAY BETWEEN STATIONS

Use this feature any time you need a delay between stations. The delay can be from 1 sec. to 4 min. in **all programs.**

The master valve will stay on during the delay. The controller automatically enters the delay in seconds and minutes. For example, if you key in 4, the controller enters 4 seconds.

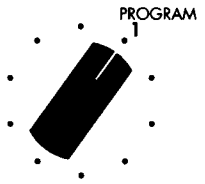
To program a delay between stations:

1. Turn the dial to any program (e.g., Program 1).
2. Press the zero (0) key.
3. Press the **Water Time** key.
4. Key in the desired delay time (e.g., 400 for 4 min).
5. Press the **Enter** key.

NOTE: The delay applies to all stations in **all programs.**

EXAMPLE:

To program a delay of 1 min. in all programs, turn the dial to any program, such as Program 1:



Press:

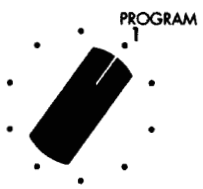
The controller displays the delay time:

REMOVING DELAY TIME

To cancel a programmed delay time, program a delay time of zero (0).

EXAMPLE:

To remove any previously programmed delay time, turn the dial to any program (e.g., Program 1):



Press:

The controller displays zero:

USING OPTIONS

Several special options are available, including:

- Running a single program
- Changing watering time to seconds and minutes

OPTION 1—RUNNING A SINGLE PROGRAM

This feature allows you to run a single program automatically according to the position of the dial. The single program option 1 reads "On" in the Option position.

NOTE: With option 1 on, if the dial is not in a program positionall programs will operate concurrently.

You can use this feature for seasonal preprogramming. For example, you might use Program 1 for spring watering, Program 2 for summer watering, and Program 3 for fall and winter watering by programming different watering times for each season. This allows you to change your watering times by simply changing the dial without further programming.

To run a single program automatically:

1. Turn dial to the Options position.
2. Press the **Enter** key. The display will show each option in turn and "On" or "Off" status (i.e., OF:1, ON:2).
3. Press the **1** key.
4. Press the **Manual On/Off** key. Display will indicate "ON:1."

OPTION 2—CHANGING WATERING TIME TO SECONDS AND MINUTES

This feature changes all stations in Program 4 to seconds and minutes, with a maximum water time of 24 minutes instead of 24 hours.

1. Turn dial to the Options position.
2. Press the **Enter** key. The display will show each option in turn and "On" or "Off" status (i.e., OF:1, OF:2).
3. Press the **2** key.
4. Press the **Manual On/Off** key. Display will indicate "ON:2."

LOOP WATERING

This feature, sometimes called "looping," allows you to repeat the Program 4 watering cycle for a period you specify. You can use this feature to water a steep bank to prevent run-off or keep an area wet all day for plant or grass propagation. This feature can also be used for many nursery applications, such as watering orchids for ten seconds each hour.

To program repeat watering, enter the start time and the stop time. The controller will water continuously, looping through the watering cycle between the start and stop time.

To program the watering start time:

1. Turn the dial to the Program 4 position.
2. Press the **2** key.
3. Press the **Cycle Start** key.

NOTE: Loop start ***MUST*** be cycle start #2.

4. Key in the desired start time using the number keys.
5. Press the **Enter** key.

To program the watering end time (dial points to Program 4):

1. Press the **0** key.
2. Press the **Cycle Start** key.
3. Key in the desired end time using the number keys.
4. Press the **Enter** key.

The watering cycle will end at the programmed time whether or not the last cycle has been completed.

PROGRAMMING A LOOP DELAY

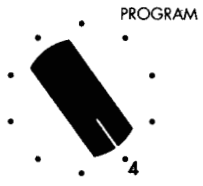
Use station 88 to program a delay during loop watering. This special station causes watering to pause between loops with the master valve off for the amount of time you program.

1. Make sure the dial is in the Program 4 position.
2. Press **88**.
3. Press the **Water Time** key.
4. Use the number keys to key in the delay duration (e.g., **20** for 20 minutes).
5. Press **Enter**.

NOTE: The loop delay is always 1 min. to 24 hrs. in one-minute increments.

EXAMPLE A:

To keep a new lawn wet while seed is germinating, you can water each station for 2 min., pause for 20 min., and repeat this watering cycle from 6:00 A.M. to 5:00 P.M. Make sure the controller is programmed to water every day. Program each station to water for 2 min.; program station 88 for 20 min. Turn the dial to the Program 4 position:



Key in the **start** time by pressing:

Key in the **end** time by pressing:

To program **loop delay** time, press:

NOTE: End time ***MUST*** be programmed for this loop feature to work correctly. Otherwise, the controller will interpret cycle start #2 as a regular cycle start (see page 17).

EXAMPLE B:

For plant propagation, you might want to water each station for 8 seconds, pause for 10 minutes, and repeat this watering cycle from 8:00 A.M. to 8:00 P.M. daily.

Make sure the watering time has been changed to seconds and minutes using Option #2 (see page 35) and the controller is programmed to water every day. Turn the dial to the Program 4 position. Program each station to water for 8 seconds; program the cycle loop delay (station 88) for 10 minutes.

Key in the **start** time by pressing: 2 MON, CYCLE START, 8, 0, 0, ENTER

Key in the **end** time by pressing: 0, CYCLE START, 8, 0, 0, %, ENTER

To program **loop delay** time, press: 8, 8, WATER TIME, 1 SUN, 0, ENTER

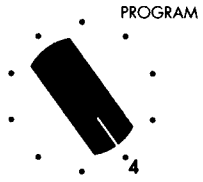
DISPLAYING WHETHER LOOP WATERING IS ACTIVATED

To verify that loop watering is activated:

1. Turn the dial to Program 4.
2. Press the **2** key.
3. Press the **Cycle Start** key twice. The controller displays "LOOP."

EXAMPLE:

To verify that loop watering is activated, turn the dial to Program 4:



Press:

The controller displays:

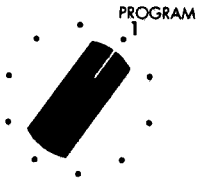
SETTING WATERING TIME FOR ALL STATIONS USING ONE ENTRY

This quick start feature enables you to program all stations with the same watering duration.

1. Turn the dial to any program, such as Program 1.
2. Key in **99**.
3. Press the **Water Time** key.
4. Key in the watering duration using the number keys.
5. Press the **Enter** key.

EXAMPLE:

To program all stations to water for 15 minutes, turn the dial to any program, such as Program 1:



Press:

The controller will flash:

TROUBLESHOOTING

❖ Error	Solution...
❖ **All Valves Will Not Turn on Automatically**	1. Make sure you have programmed cycle start times. 2. Verify program: water time, start time, days on, current time, current day, and water budgeting percent. 3. Check valve common wire for proper hook-up. 4. Check sensor inhibit hook-up for jumper wire. 5. Check Rain Off. 6. Check sensors (if any).
❖ **Unable to Program**	1. Move dial to a program position. 2. Remove batteries (check voltage). Disconnect power to controller for 5 min. Reconnect power and reprogram. Reconnect good 9-volt alkaline battery.
❖ **Controller Displays Error Message**	1. Press **Clear** key. 2. Check for proper cycle start times. Make sure you did not attempt to enter a start time for each valve. 3. Try programming operation again. Be sure you follow the correct programming sequence.
❖ **No Display**	1. Check incoming power and valve wiring. 2. Remove batteries (check voltage). Disconnect power to controller for 5 min. Reconnect power and reprogram. Reconnect good 9-volt alkaline battery.

❖ Error	Solution...
❖ **Controller Skips a Cycle**	1. Verify start times and current time.
❖ **Valve Stays On**	1. Check duration of programmed water times. 2. Check solenoids for obstructions or wiring shorts. 3. Check valve for rocks or other obstructions or torn diaphragm. 4. Disconnect valve wire to valve. If still on, valve is suspect. 5. Check for manual mode; place controller in automatic mode. 6. Check manual bleed.
❖ **Valve Will Not Turn On**	1. Make sure dial is not in **Rain Off** position. 2. Verify program: water time, start time, days on, current time, current day, and water budgeting percent. 3. Make sure common wire and valve wire are correctly connected. 4. Check solenoid. 5. Check valve bleed tube. 6. Check water main.
❖ **Controller Display 'Fuse'**	1. See "How the Electronic Circuit Breaker Works", page 7.
❖ **Controller Displays 'Err 1' or 'Err 2'**	1. Indicates hardware failure; disconnect power for 5 minutes. If "Err" is still displayed, return for repair.

INDEX

88 (Loop Watering) 38
99 (Quick Start Watering) 41
Advanced Features 31
Alert, Incomplete Program 18
Auto Run 18
Automatic Shutoff of Manual Operation 19
Backup System 6
Battery Backup 6
Beep(s)
    One Long (See Incomplete Program Alert)
    Two Quick (See Manual On)
Budgeting, Water 32
Calendar, Watering 31
Calendar/Program Erase 13, 31
Circuit Breaker 7
Clearing Programming Errors 8
Conservation, Water (See Water Budgeting)
Controller Installation 1
Cycle Start Times
    Displaying 29
    Programming 17
Day
    Changing the Current 8
    Displaying the Current 25
    On 14
    Setting the Current 10
Decrease Watering Run Time (See Water Budgeting)
Delay Between Stations 12, 34
    Removing 35
Deleting
    Day On 15
    Delay Time 35
    Programmed Station Water Time 16
Displaying
    Cycle Start and End Times 29
    Day of Week 25
    Loop Watering (Whether Activated) 37
    Time 25
    Water Budgeting Percent 32
    Water Time, For a Station 28
Displaying (continued)
    Water Time, Total 27
    Watering Days for a Program (Days On) 26
Earth Ground 3
Electronic Circuit Breaker 7
Erasing Prior Programs 13
Error, Programming 8
Errors 42, 43

Features, Table of iii
Fused Circuit 4, 7
Ground, Earth 3
Incomplete Program Alert 18
Installation, Controller 1
Installation, Sensor Ports 6
Keyboard, Locking the 18
Lightning 3
Loop Watering 37
    Delay 38
    Displaying (Whether Activated) 40
Manual Off 20
Manual On 19
Manual Operation 19
Memory, Non-Volatile 6
Mistake, Programming 8
Moisture Sensor 6
Mounting, Controller 1
Old Programs, Erasing 13
Options 35
Parts, Location of iv
PE: (See Watering Calendar)
Pedestal Mount of Controller 1
Percent, Watering (see Water Budgeting)
Power
    Connecting the 2
    Failure 6
    Requirements 1
Programmable Rain Off 23
Programming
    Cycle Start Times 17
    Days to Water 14
    Delay Between Stations 34
    Erasing 13
    Loop Watering 37
    Loop Watering Delay 38
    Rain Off 23
Pump
    Controlling a 5
    Installing a Latch Relay for 5
Quick Start Watering 41
Rain Off 23
Removing
    Day On 15
    Delay Time 35
    Programmed Station Water Time 16
Repeat Watering in Program 4 (See Loop Watering)
Seasonal Watering 36
Sensor Ports 6
Set Time 8

Set Today 10
Short Circuit (Fuse) 7
Shutoff of Manual Operation (Automatic) 19
Single Program, Running a 35
Site Selection 1
Station
  88 (Loop Watering) 38
  Deleting a Programmed 16
  Placement 12
Testing All Stations 24
Time
  Displaying 25
  Setting 8
Troubleshooting 42
Turn Off Watering 23
Valves
  Hook-up 4
  Number That May Run Simultaneously 4
  Per Station 4
  Testing 4, 24
Verify Program Information (See Displaying)
Wall Mount of Controller 1
Water Budgeting 32
Water Conservation (See Water Budgeting)
Water Cycle
  Activating for a Selected Program 21
  Programming 17
  What is a 11
Water Time
  All Stations 41
  Changing to Seconds and Minutes 36
  Decrease or Increase 34
  Deleting Programmed 16
  Programming 16
  Returning to Originally Programmed 32
Watering
  Calendar 31
  Cycles 12
  Duration 16
  How to Program 11
  Loop 37
  One Station 22
  Plan, Developing 11
  Plan, Running 18
  Quick Start 41
  Repeating Program 4 (See Loop Watering)
  Seasonal 36
  Turning Off 23
Wiring, Controller 1

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 interface 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 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.

Irritrol Systems offers an entire family of products for commercial and residential applications:

Controllers and Controler Accessories
Valves and Valve Accessories
Sprinklers, Nozzles and Sprayheads

Irritrol® SYSTEMS

PRODUCT INQUIRIES
P.O. BOX 489
RIVERSIDE, CA 92502
1-800-634-8873

© 1997 IRRITROL SYSTEMS

1050101 REV B.