

Operation Manual

HYDRO RAIN Solid State Controllers

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HYDRO RAIN **HR-6000 Series** Solid State Controllers



27671 La Paz Road, Laguna Niguel, CA 92677

FOR MODELS:

- HR-6000 without pump start
- HR-6000-1 with pump start

The HR-6000 is the finest 6 station Solid State controller available. It's easy to install and simple to program and operate.

The engineering objective in designing the HR-6000 was to create the ideal controller for homeowners, nurseries and all other light turf applications. It was also to be very straightforward and simple in its programming and use. The objective was met! Now anyone can own and operate an electronically accurate digital controller.

The heart of the HR-6000 is a solid state micro-computer. Because of its solid state construction, the controller has no moving parts to wear out or break down, thus it offers quiet, dependable performance.

We wish to thank you for purchasing this controller and we're confident that it will please you with its simplicity and impress you with its performance.

FEATURES

- Simple to install. Designed for use with any 24 VAC 2 watt automatic valves.
- Simple to program. With a logical layout and color coded panel, only 6 programming steps are required.
- Six stations which can be programmed to start up to three times a day.
- Each station can be programmed to water from 1 to 99 minutes. This allows almost 5 hours of watering per station per day (using all three start times). This capability makes the HR-6000 ideal for use in applications such as drip irrigation.
- A seven day weekly cycle plus a "Select Day" switch which allows watering day intervals from "every other day" up to "every seven days".
- Automatic, semi-automatic or manual operation.
- Constant real time read out and station activity display for ease of monitoring.
- A "Rain" switch which overrides any watering cycle without disturbing the program.
- Battery back-up allows the time to advance and retains your program through a power outage of up to 3 days duration.
- A built-in "Fail Safe Program" which will run all six stations for 10 minutes each in the event that you "lose" your program.
- A handsome, rugged case which allows the use of a lock (to discourage tampering) and the use of electrical conduit.
- Master valve and/or pump start use. (Available only in the HR-6000-1 model).

SPECIFICATIONS

- 110 VAC, 60 Hz (input)*
- 24 VAC, 7 VA max. (output)*
- Ambient operating temperature range: 32°F to 140°F.
- Battery back-up: One 9 volt, Eveready #522, Mallory #MN1604 or equal. (Supplied by the user).
- 1 amp fuse #312001/AGC
- *Foreign voltage applications may differ.

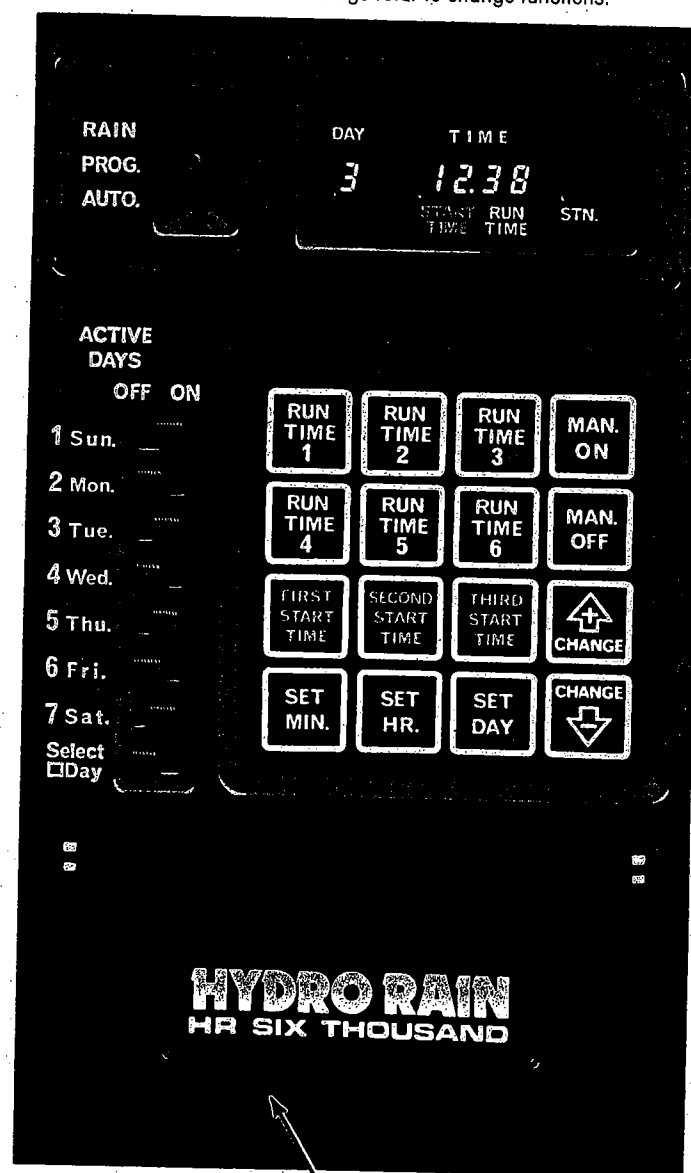
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THE CONTROLLER

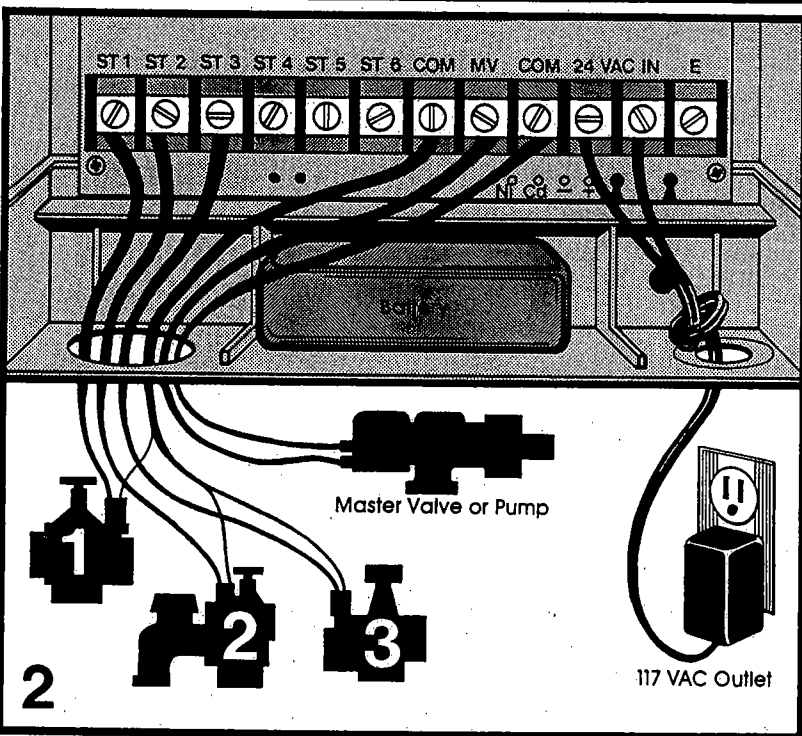
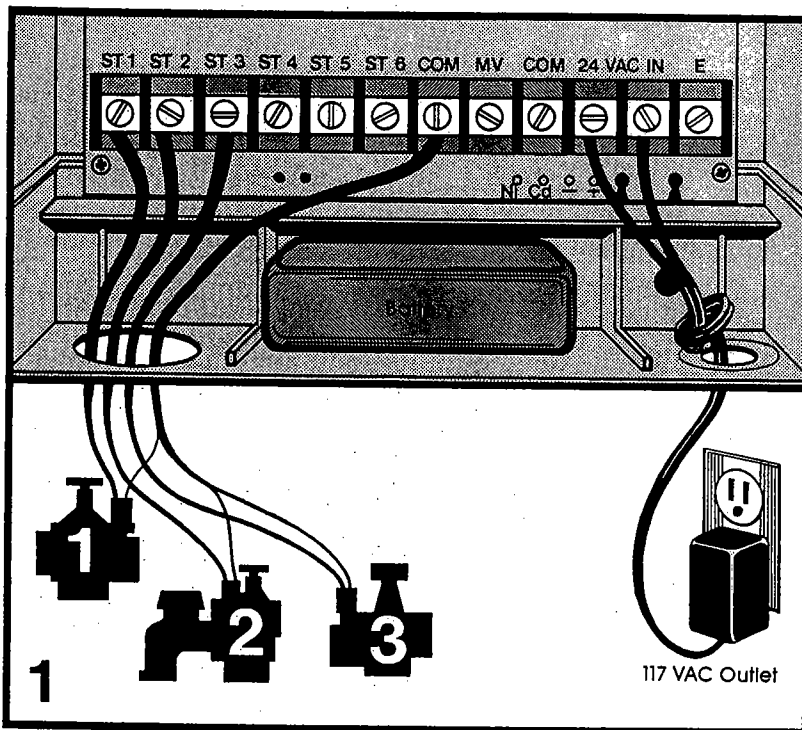
Both the control panel and the digital display of the HR-6000 are color coded to make the different function relationships easy to follow and use.

The color coding is as follows:

- Yellow - All yellow buttons refer to stations and station times.
- Green - All green buttons refer to cycle start times.
- Orange - All orange buttons and codings refer to day and current time settings.
- White - All white buttons and codings refer to change functions.



Access Cover



INSTALLATION INSTRUCTIONS

1 Mounting the Controller

Install the controller near a 117 VAC "house current" outlet preferably located in a house, garage or other covered area. (Note: The supplied transformer leads are approx. 6 feet in length.) For ease of operation, eye level placement is recommended. Once the site is chosen, drive the provided #10 screw into the wall stud, leaving about 1/4" of the screw exposed. If necessary, use a toggle bolt or masonry shield.

Hang the controller from the keyhole slot located in the back of the case. Make sure the screw head is properly seated inside the controller case. If further security is desired, two additional screws may be inserted through the holes provided in the lower corners of the controller case.

2 Connecting the Transformer

Open the bottom access cover and loosen the two screws on the terminal strip directly above the label "24 VAC". Route the two transformer leads through the small hole in the bottom of the controller case. Allow a little slack and then tie a knot in the leads (see illustration). This will prevent the accidental pulling out of the leads from the controller. Insert one transformer lead beneath each screw then tighten both screws securely but using care not to over tighten. If desired, standard conduit may be used by removing the plug in the transformer inlet hole.

After plugging in the transformer, the display will indicate DAY 1 and the clock will begin running starting at 12:00 a.m.

CAUTION: Plug the transformer into the 117 VAC "house current" only after the transformer leads are connected.

3 Connecting The Battery

Using one 9 volt alkaline battery (Eveready #522, Mallory #MN 1604 or equal, supplied by the user), connect it to the loose battery terminal located below the terminal strip.

In case of a power outage, this battery will provide back-up power to retain the program and to advance the clock. (NOTE: The battery does not contain enough power to operate the valves). A typical alkaline battery contains enough power to continue the above functions for a cumulative total of between 48 and 72 hours of power loss. After this, it must be replaced.

THE "FAIL SAFE" FEATURES: In the event a battery is not used or has become "dead" and a power outage occurs, the controller will stop functioning and the program will become "lost". Once power is restored, a "fail safe" feature automatically returns the controller to Day 1 and the clock resumes running starting with 12:00 a.m. Then (unless the controller is reprogrammed) at 7:00 a.m. on the first ON day, a "fail safe" program comes on and each station waters for 10 minutes. The "fail safe" program will water again on the next scheduled ON day. This program is built in order to provide watering should the power outage occur while you are away for an extended period of time and are unable to reprogram watering times into the controller.

CAUTION: If you are using a pump start and pump start circuit, the "fail safe" program will activate the pump for each of the six stations for 10 minutes each. If less than six stations are being used, the pump will be running against a "dead head" on each unused station. This can cause a burn-out of the pump.

4 Connecting the Valves

NOTE: It is suggested that before connecting the valves that the user familiarize himself with the programming and operation of the controller. First by reading the Control Descriptions and Programming Instructions sections of this manual, and then by experimenting and practicing with the different programming controls and functions.

Route one lead wire from each valve through the large hole in the bottom

of the controller case. Insert the lead wire from valve #1 under the screw of the terminal strip screw labeled "ST 1" (station #1). In the same manner, connect the lead wire from each of the other valves to their respective terminals. The remaining "ground" wire from each valve must be attached to a single "common" wire. Route this common wire through the large hole and connect it to the terminal strip screw labeled "COM". Tighten all screws securely but do not over tighten.

NOTE: This controller is designed for use with 24 VAC, 2 Watt solenoid operated valves. A maximum of two valves per station may be used.

Due to the characteristics of this controller, there is a constant current which flows to all stations at a very low amperage. This current is not enough to affect the solenoid or valve operation and may only be detected with a quality voltmeter.

Connecting a Master Valve or Pump

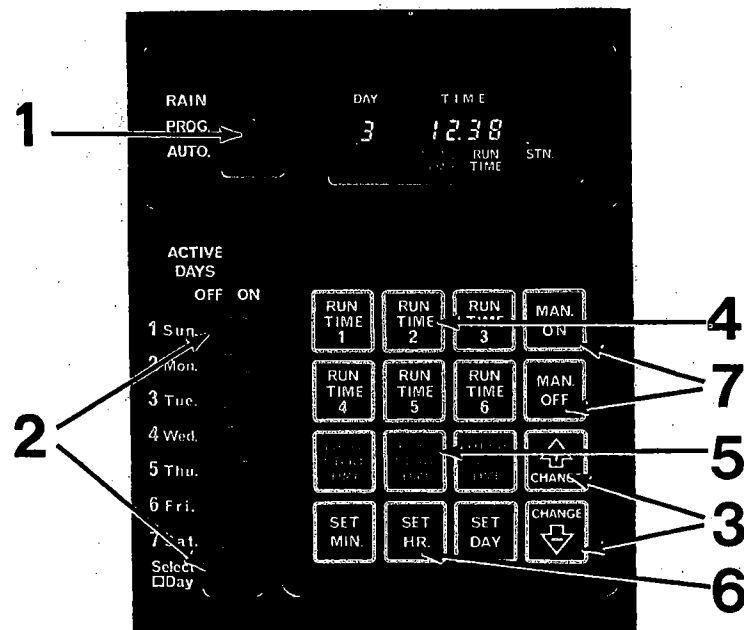
(See illustration #2)

NOTE: The circuitry required for a master valve or pump is optional and found only on the HR-6000-1 model.

To use a master valve which operates throughout the watering run times, simply connect one solenoid lead wire to the terminal strip screw labeled "M.V." and the remaining solenoid lead to the terminal strip screw labeled "COM". Use the "COM" terminal to the right of the "M.V." terminal and not the "COM" terminal located on the left. NOTE: The master valve must be equipped with a 24 VAC 2 watt solenoid. For any system with a master valve in use and wired to the controller, only one valve per station maximum may be used in order to avoid overloading the controller circuit.

If a pump is to be used and it has its own 24 VAC relay and independent low voltage power source, simply connect the relay leads to the same terminals that were used in the master valve connection.

CONTROL DESCRIPTIONS (and Basic Operating Instructions)



The Mode Switch

The mode switch is used whenever the program needs to be set, checked, changed or overridden. It has three settings: AUTO (automatic), PROG (program) and RAIN.

In the AUTO mode, the controller waters automatically according to the programmed schedule. The program may not be changed, but the programmed times for the various functions can be checked by simply pressing the appropriate button. Semi-automatic operation and true manual on/off can be conducted in this mode.

In the PROG mode, the controller may be checked or changed. Program changes may be made only in this mode and when the controller is not watering. Although all forms of operation (automatic, semi-automatic, and manual) can be conducted in this mode, it is recommended that this position be used only to change the program and then returned to the AUTO position.

In the RAIN mode, any programmed watering cycles are overridden and will not start. The current time keeps running and the program information is retained but may not be changed. When the rainfall stops, return the mode switch to AUTO and the program will continue with no loss of time.



The Day Switches

Each day of the week is assigned a numbered switch (color coded orange). When the switch for any chosen day is in the "OFF" position, the controller will not water during that 24 hour period. When the switch is in the "ON" position, the controller waters according to the programmed start times and run times.

At the bottom of the DAY switches is a SELECT DAY switch. This switch, when used in conjunction with a DAY switch, allows automatic watering every certain number of days. Example: With the SELECT DAY switch in the "ON" position and all DAY switches "OFF" except #4 Wed., the controller will water every 4th day. The number in front of the DAY switch corresponds to the number of the alternate day that watering will take place (3 = every 3rd day, 4 = every 4th day, 5 = every 5th day, etc.). When the SELECT DAY switch is "ON", only one DAY switch may be used. If more than one DAY switch is set to "ON", the SELECT DAY program will go by the smallest number day switch and disregard all others.



The Change + / Change - Buttons

The change plus and change minus buttons (color code white) are used in conjunction with the three sets of function buttons to set the station run times, the cycle start times, and the current time. Each button has two "speed of change" stages. For the first couple of seconds that either button is pressed, the function time displayed changes at a rate of 2 digits per second. As pressure on the button is continued, the function time displayed changes at an increased rate of speed (6 digits per sec.) and will continue to change at this rate for as long as the button is pressed. With either button, tapping it lightly changes the function time displayed by 1 digit.



The Run Time Buttons

The HR-6000 has the capacity to operate up to six stations and a maximum of 2 valves per station. Each station has its own RUN TIME button (color coded yellow) which is used to program the length of time that that station will run (water). Each station may be set to run from 00 to 99 minutes in one minute increments.



The Start Time Buttons

Up to three daily watering cycles are possible. The three START TIME buttons (color coded green) are used to program the cycle start times in hourly increments. NOTE: The controller operates on a 24 hour clock. See section 6 for further information.) During each cycle each valve will operate for its programmed run (or watering) time.



NOTE: If a watering cycle is set to start at a late evening hour, the controller will finish out that cycle even if it runs into the next day and even if the next day is an "OFF" day (i.e. a 4 hour watering cycle is set to start at 2200 (10 p.m.); it will start and continue until 200 (2 a.m.) the next day even though it may be an "OFF" day).

The Current Time/Day Buttons

There are three buttons (color coded orange) used to set the current time and day. The SET MIN (minute), SET HR (hour) and SET DAY buttons.



The current day is always represented numerically with Sunday being "1" through to Saturday which is "7". For help in setting, refer to the number to the left of each day switch.

In setting the current time, please note that the controller operates on a 24 hour "military style" clock. Rather than repeating the hours 1 through 12 in the afternoon and evening, the clock counts to 24 hours before starting over at midnight. For example:

5:15 a.m. is displayed as 05.15

Noon is displayed as 12.00

3:45 p.m. is displayed as 15.45

Midnight is displayed as 24.00

In monitoring the controller, the current day and time is always shown unless a watering cycle is taking place. Then the current station that is watering is shown as well as the amount of time still left for that particular stations run time. The current day and current hour are not shown during the watering cycle. When the cycle is completed, the current day, hour and minute are shown again and no station number is displayed.

The Manual Buttons

The MAN ON and MAN OFF buttons (color coded white) are used in the SEMI AUTOMATIC and MANUAL operation of the controller. They may be used with the mode switch in either the PROG or AUTO position.



Semi Automatic Operation

This mode of operation is used if an extra watering cycle is desired, say on an especially dry day. To start a complete watering cycle, simply depress MAN ON and the controller regardless of the programmed schedule, ON or OFF days, or current time, will start

and run through a complete cycle from Station 1 through to Station 6. Upon completion of the cycle, the controller will return to the programmed automatic schedule. NOTE: If the controller is in the middle of a watering cycle and you wish to start it over, depress MAN OFF which will interrupt the cycle and return the controller to actual time. Then depress MAN ON and the controller will restart a complete watering cycle.

To stop a watering cycle while it is in progress, whether it is a programmed cycle or a semi automatic cycle, simply depress the MAN OFF button. The controller will immediately stop the cycle, return to actual time and begin watering again at the next start time and on the next ON day.

Manual Operation

If the running of a specific station is desired at a time other than what is programmed or for a time longer than that which is programmed, simply depress the desired station RUN TIME button and the MAN ON button, then regardless of any scheduled program, ON or OFF day or current time, that station will come on and run indefinitely until the user returns and depresses MAN OFF. The controller will then return to the programmed schedule and begin watering again at the next scheduled start time and on the next ON day.

NOTE: If the controller is in the middle of a watering cycle, and a specific stations operation is desired, depress MAN OFF which will interrupt the cycle and return the controller to actual time. Then depress the desired station RUN TIME and MAN ON and that station will come on and run until turned off by depressing MAN OFF.



PROGRAMMING INSTRUCTIONS

(Please read Control Descriptions section first)

Set the Mode Switch

To set or change the program, the mode switch must be set in the PROG position. To use the manual feature or to check or override the program, refer to the following chart for the appropriate MODE switch setting.

MODE	SET/ CHANGE	CHECK	SEMI AUTO	MAN
RAIN	NO	NO	NO	NO
PROG.	YES	YES	YES	YES
AUTO	NO	YES	YES	YES



Set the Day Switches

The HR-6000 allows either a 7 day weekly cycle or a "select day" cycle which allows watering day intervals from every other day to every 7 days. (See section 2 of the Control Descriptions for a more detailed explanation.)

To set a 7 day cycle, slide the appropriate switches for the days to be watered to the ON position.

If watering "every so many days" (select day cycle) is desired, set the SELECT DAY switch to ON and the



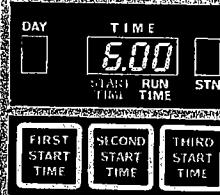
appropriate numbered day switch to ON. All other day switches should be set to OFF. Use the number preceding the day designation as a guide. The day designation does not apply when using the SELECT DAY switch (i.e. with the SELECT DAY switch ON and 4 WED switch ON, watering will occur every 4th day, not every Wed).

5 Thu.
6 Fri.
7 Sat.
Select Day

3 Set the Start Times

Up to three watering cycle start times are possible for each day. To set the cycle start times, depress the FIRST START TIME button and hold it down. Simultaneously depress the appropriate CHANGE button to reach the desired hour. Remember, the controller is based on a 24 hour clock and the start times are in hourly increments. (See section 6 of Control Descriptions.) If SECOND and THIRD START TIMES are desired, repeat the above procedure. If no additional start times are desired, set each to read "00" in which case they are inactive.

If it is essential that a cycle start on a time other than an hourly increment, this can be accomplished by simply setting the current time to read earlier by that amount of time off the hour. Example: With the controller current time set 15 minutes slow and a cycle start time set at 6:00 a.m., when the cycle starts, it would really be 6:15 a.m.



4 Set the Run Times

Up to 99 minutes of run (or watering) time may be programmed for each of six stations per cycle. To set the station run times, depress RUN TIME 1. Simultaneously depress the appropriate CHANGE button to reach the desired amount of time. Repeat this same procedure for RUN TIMES 2 through 6. If a station is not needed, set the run time at "00" in which case during a watering cycle the controller would bypass that station and immediately advance to the next programmed station.

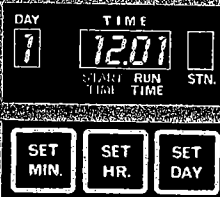


5 Set the Current Time and Day

To set the current day, depress the SET DAY and the appropriate CHANGE buttons. Remember the days are shown numerically (i.e. 1 = Sunday; 2 = Monday, etc.).

To set the current hour, depress the SET HR and the appropriate CHANGE buttons. Remember the controller is based on a 24 hour clock. (See section 6 of Control Descriptions.)

To set the current minute, depress the SET MIN and the appropriate CHANGE buttons.



6 Reset the Mode Switch

After steps 2 thru 5 have been completed, set the mode switch from the PROG position back to the AUTO position.

RAIN
PROG.
AUTO.

Checking the Program

Although the program may be checked with the mode switch in the PROG position, we recommend that you only check the functions with the mode switch set in the AUTO position as this position prevents accidental program changes.

To check the complete program repeat the above steps 2 thru 5 using only the function buttons and not the CHANGE buttons. The display will indicate what is in the programmed memory.

To check a specific function, merely press that button.

TROUBLE SHOOTING

Problem	Possible Cause	Correction
Valves don't operate	Position switch on "RAIN" Solenoid defective Loose Wire Connection Proper Day Switch Off	Position mode switch to "AUTO" Test & replace if necessary Secure wire connections. Check for continuity Check current day in display with number and the switch position Make sure day switch on
Valves open at strange times	Current time of day out of synchronization First, second or third start time needs checking	Check and reset current time Check and reset first, second, and third start times
Program won't display	No power at wall plug Transformer partially pulled out of wall receptacle In wrong mode Controller is in watering cycle	Check house current, fuse, or circuit breaker If transformer loose in plug, spread blades slightly, push transformer into receptacle firmly Position switch must be in either "PROG" mode or "AUTO" mode Check or change program when controller is out of watering cycle
Program won't start when depressing "MAN ON"	Already in programmed watering cycle	Push "MAN OFF" to discontinue present watering cycle and then depress "MAN ON" to initiate a new program
Waters on a day when not scheduled	Individual day or select day switch in ON position	Either use select day or individual days of week switches. See Control Description for more details
Current time of day is wrong time	Power outage occurred with no batteries or dead batteries used in the controller	Reset current time of day. If upon checking watering times and they are different than previously programmed, reprogram controller. Check and replace batteries