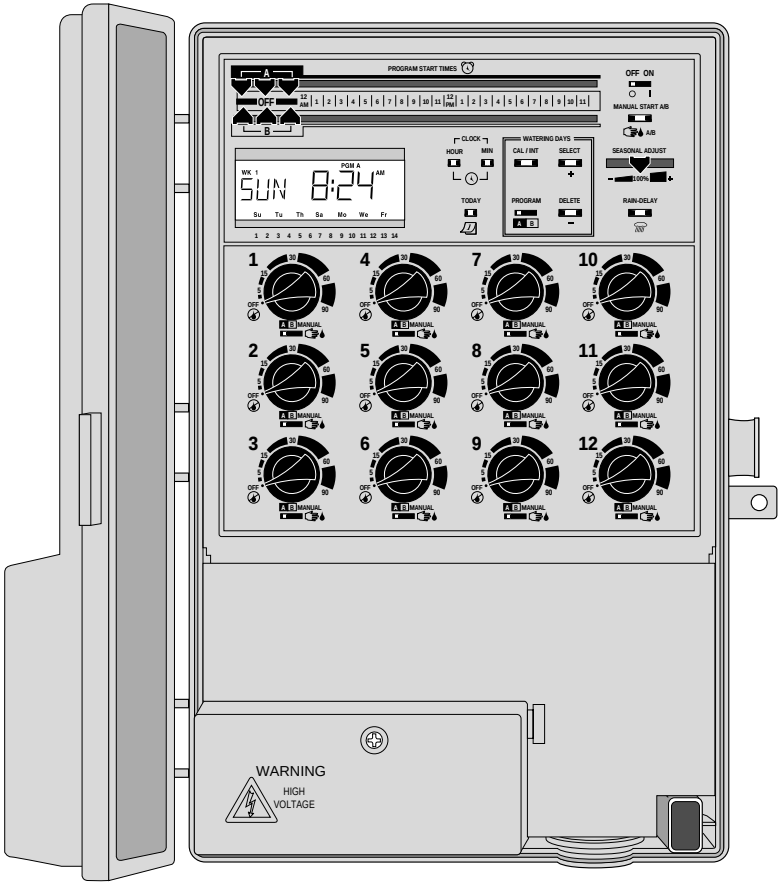
# TORO® Vision II™ *Plus*

SERIES CONTROLLER

**User's Guide**




## Vision II *Plus* Features

- **Dual Watering Programs With:**
  - **Three Start Times per Day**
  - **1 Minute to 9 Hours Station Run Time**
- **Rechargeable Ni-MH Battery Back-up**
- **Automatic Pump Start**
- **Seasonal Run Time Adjust**
- **Rain-Delay**
- **Rain Switch Ready**
- **ProgramLink™ Ready**
- **Large, Easy-To-Read Display**

## Warranty Information

### The Toro Promise – Limited Two-Year Warranty

The Toro Company warrants, to the owner, each new piece of equipment (featured in the current catalog at date of installation) against defects in material and workmanship provided they are used for irrigation purposes under manufacturer's recommended specifications for the period described below. Product failures due to acts of God (i.e., lightning, flooding, etc.) are not covered by this warranty.

Toro is not liable for failure of products not manufactured by Toro even though such products may be sold or used in conjunction with Toro products.

During such warranty period, Toro will repair or replace, at its option, any part found to be defective. Toro's liability is limited solely to the replacement or repair of defective parts. All other express and implied warranties are specifically disclaimed.

Return the defective part to your local Toro distributor, who may be listed in your telephone directory Yellow Pages under "Irrigation Supplies" or "Sprinkler Systems", or contact the Customer Service Department at The Toro Company, P.O. Box 489, Riverside, California, 92502. Phone 800-664-4740 for the location of your nearest Toro distributor (outside the U.S., call 909-688-9221).

This warranty does not apply where equipment is used, or installation is performed, in any manner contrary to Toro's specifications and instructions, nor where equipment is altered or modified.

**Toro is not liable for indirect, incidental or consequential damages in connection with the use of equipment, including but not limited to: vegetation loss, the cost of substitute equipment or services required during periods of malfunction or resulting non-use, property damage or personal injury resulting from installer's actions, whether negligent or otherwise.**

**All implied warranties, including those of merchantability and fitness for use, are limited to the duration of this express warranty.**

This warranty gives you specific legal rights and you may have other rights which vary from state to state.

# Table of Contents

## Introduction and Set Up



## Programming the Controller



## Installing the Controller



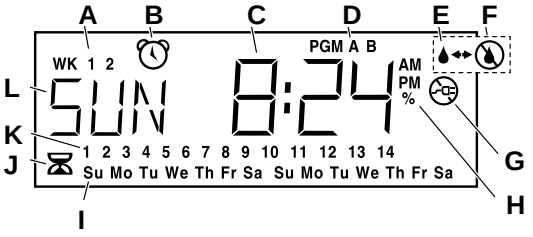
## Controller Operations

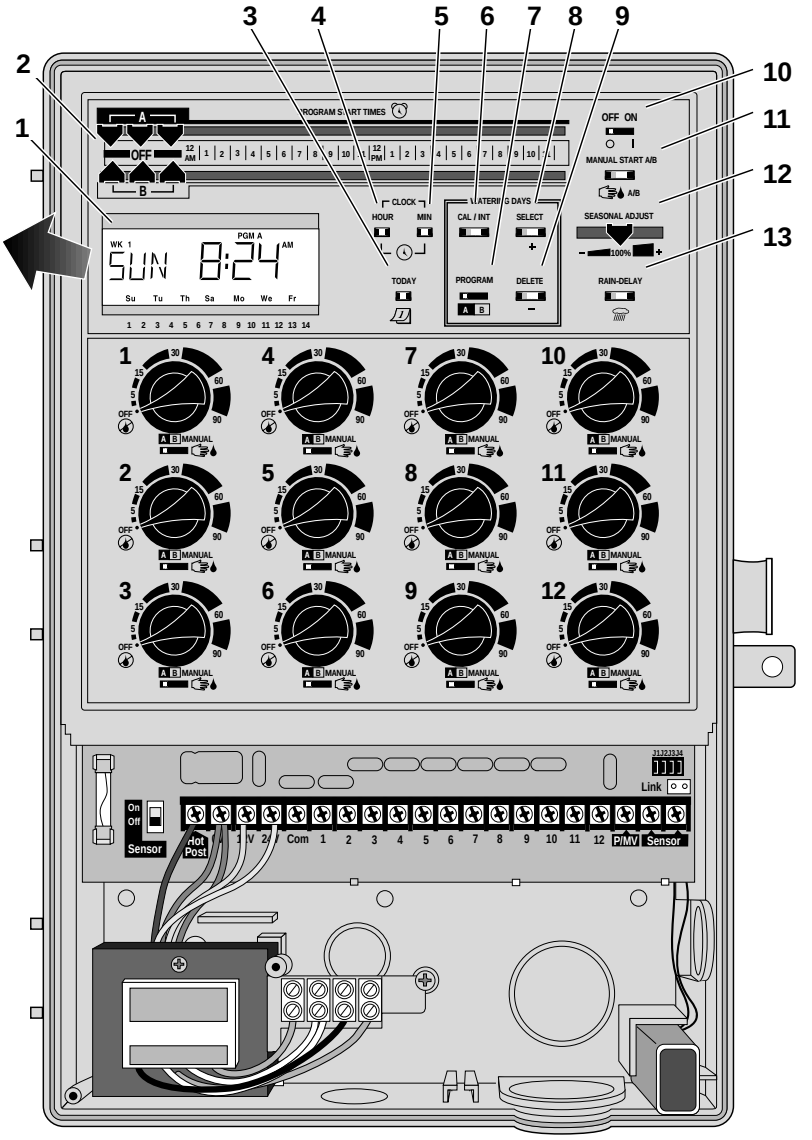


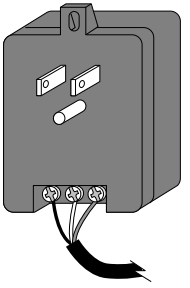
## Service and Specifications

# Introduction and Set-Up

## Controller Components



The following are brief descriptions of the Vision II Plus components and display elements. Each of these items will be explained in further detail within the appropriate programming, operating and installation sections of this guide.

**1 - Display**

- **A -** Week 1 and 2 identifiers – Shows the current week of a 14-day Calendar watering schedule.
- **B -** "Start Time" symbol – This symbol is displayed when setting the program start times.
- **C -** Various time values and word prompts are displayed here.
- **D -** Program A and B identifiers.
- **E -** "Watering On" symbol – This symbol is displayed when a station is operating.
- **F -** "Watering Off" symbol – This symbol is displayed when watering activity has been suspended by the (optional) Rain Switch.
- **G -** "Power Off" symbol – This symbol is displayed when the main power source is disconnected or the controller's fuse is blown.
- **H -** "Percent" symbol – This symbol indicates the Seasonal Adjust feature is in use.
- **I -** Day abbreviations indicate the active watering day schedule.
- **J -** "Run Time" symbol – This symbol is displayed when selecting the station run time.
- **K -** Number display identifies which station is currently watering. The Interval watering schedule number (if used) is also displayed here.
- **L -** The current day of the week and various word prompts are displayed here.

**2 - Program Start Time Controls** – Sliding control indicators select start times for Program A and B.

**3 - Today Button** – Advances the current day of the week display.

**4 - Clock Hour Button** – Advances the clock display hours and a.m./p.m. Switches the station run time mode from Minutes to Hours.

**5 - Clock Minute Button** – Advances the clock display in minutes. Switches the station run time mode from Hours to Minutes.

**6 - Cal / Int Button** – Alternates the display between the Calendar and Interval watering schedules.

**7 - Program Select Switch** A B – Selects Program A or B when setting the watering day schedule.

**8 - Select (+) Button** – Selects the watering days in a Calendar day schedule and increases the Interval schedule number.

**9 - Delete (–) Button** – Removes watering days from a Calendar day schedule and decreases the Interval schedule number.

**10 - Off/On Switch** – Selects the controller operating mode. When switched On, the controller can be programmed and operated automatically or manually. When switched Off, all controller programming and operating features are disabled.

**11 - Manual Program A/B Button** A/B – Manually starts Program A and/or Program B watering cycle.

**12 - Seasonal Adjust Control –** 100% **+** – Sliding control automatically increases or decreases the run time of all stations by the same amount from 20 to 200%.

### Controller Components

**13 - Rain-Delay Button** – Delays automatic watering operation from 1 to 4 days.

**14 - Station Run Time Dial** – Rotates to select the station run time and to turn the station Off.

**15 - Station Control Switch** – Assigns the station to Program A or B. Operates the station manually when switched to the Manual position.

**16 - Control Option Jumpers** – Four removable jumpers enable various control options to be selected.

**17 - ProgramLink Receptacle** – Used when connecting two Vision II Plus controllers together for synchronous operation.

**18 - Rechargeable Ni-MH 9V Battery** – Battery backup maintains the controller memory when the main power source is disconnected.

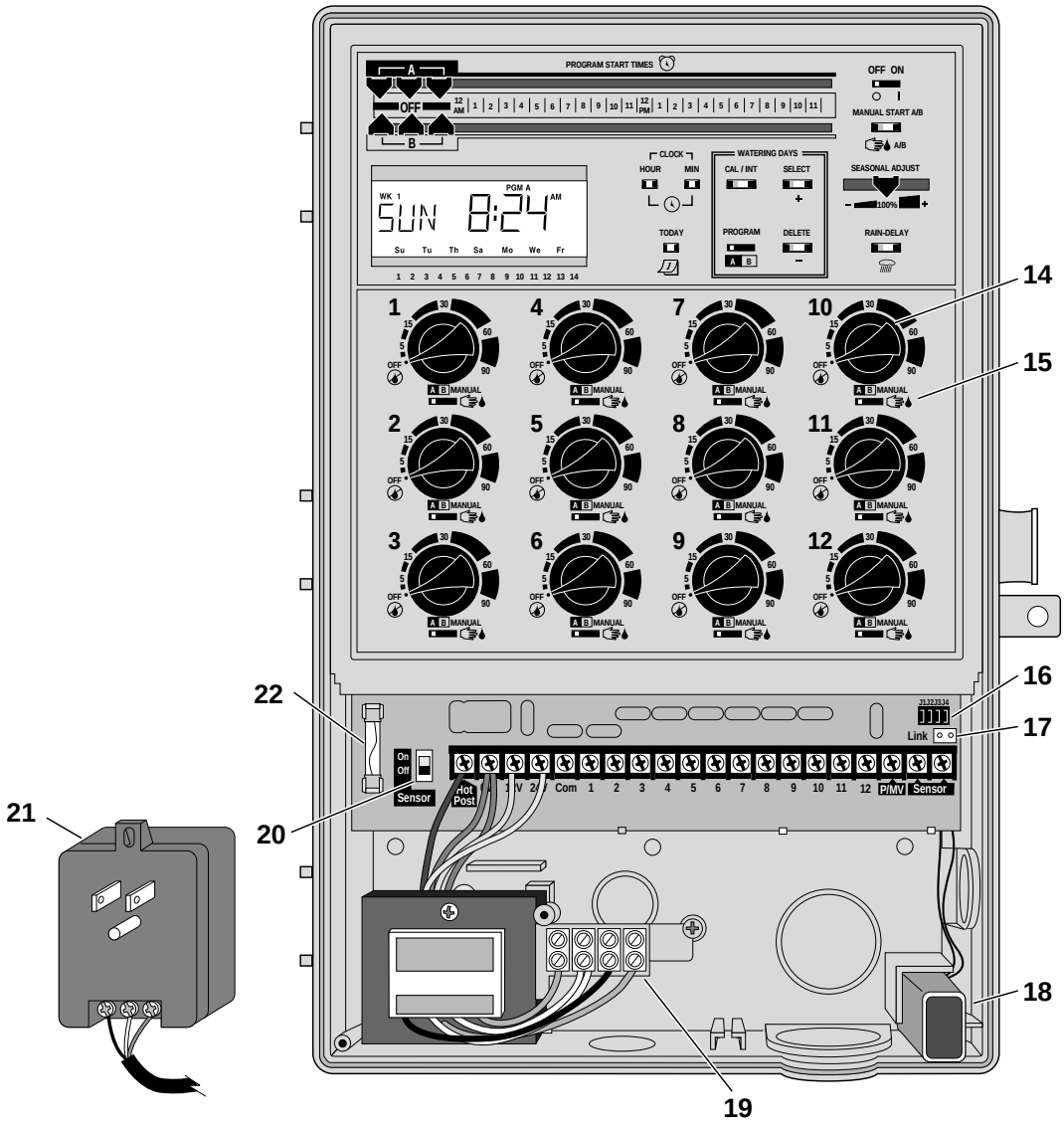
**19 - Main Power Connection Terminals** – Connection point for AC power and equipment ground wires. (Not provided on plug-in transformer models.)

**20- Sensor Switch** – Controls the input from the optional Toro Rain Switch.

**21-Plug-In Transformer** – Supplies 24 V a.c. power to the controller. Plugs into a grounded 120 V a.c. wall receptacle. (Not provided on internal transformer models.)

**22-1.5A Safety Fuse** – Protects the controller's electronic circuitry and the 24 V a.c. output.

## Controller Components



## Sprinkler System Basics

An automatic sprinkler system generally consists of the following five major components:

- Controller (also called a Timer)
- Valves (electrically actuated)
- Sprinklers
- Backflow Preventer
- Pipe

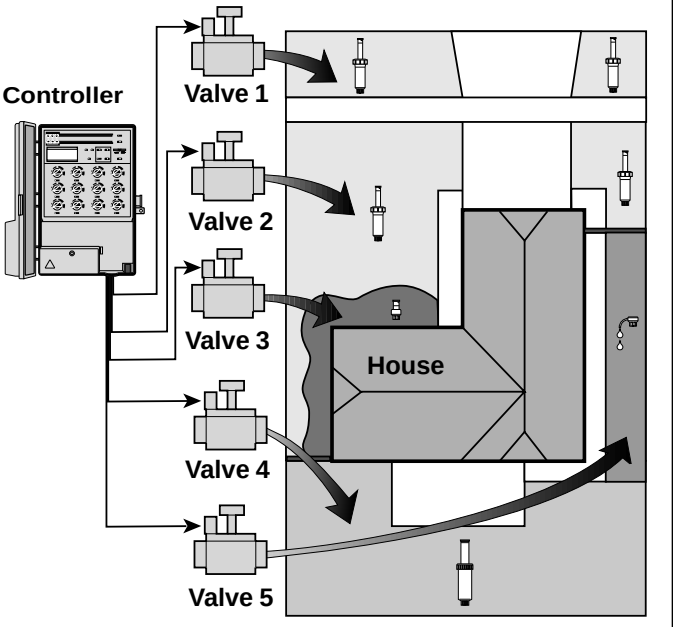
For now, we will focus on the basic operation of the sprinkler system which involves only the first three components: Controller, Valves and Sprinklers.

The **controller** is the brain of the system, telling the **valves** when and how long to supply water to the sprinklers. The **sprinklers** then apply the water in various spray patterns and amounts to specific areas of the landscape.

Each **valve** controls a specific area on the landscape called a watering **zone**. Each watering zone is designed and installed according to the type of plant to be watered, its location within the landscape and the maximum volume and pressure of water which can be supplied to the **sprinklers**. Each **valve** is wired to a numbered terminal within the controller. These terminals correspond to the controller **station numbers.**

The information stored in the controller memory which determines when and how long each station will operate is called a watering **program**. The Vision II Plus provides two separate watering programs called “Program A” and “Program B”.

The next section, “Watering Program Basics”, explains in greater detail how a watering program works and how you can use the dual program feature for optimum control of your sprinkler system.




Station 1 - Valve 1 - Zone 1 - Parkway Lawn - Fixed Spray

Station 2 - Valve 2 - Zone 2 - Front Lawn - Fixed Spray

Station 3 - Valve 3 - Zone 3 - Front Shrubs - Flood Bubbler

Station 4 - Valve 4 - Zone 4 - Back Lawn - Geared Rotor

Station 5 - Valve 5 - Zone 5 - Garden - Drip

## Watering Program Basics

A watering program requires three basic instructions to operate automatically:

- What days to water – called **watering days**
- What time to water – called a **start time**
- How long to water – called **run time**

As previously mentioned, the Vision II Plus provides two separate automatic programs. Using two watering programs enables various areas of the landscape to be watered on different watering day schedules.

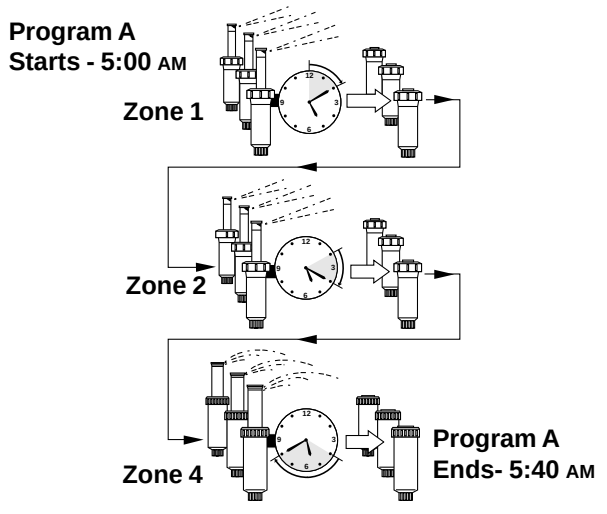
For example, all lawn zones, which generally require frequent watering, could be watered every other day on Program A, and the shrubs and garden could be watered every Tuesday and Friday on Program B.

It is important to remember that when a program starts, the stations assigned to the program operate **one at a time** in numerical order. In other words, one station operates its sprinklers completely before the next station starts. The station-by-station operation is referred to as a watering cycle. Each start time you select (up t three per program) starts a watering cycle, not an individual station.

The following example illustrates how a typical watering program could be set for the sprinkler system shown on the previous page.

Example: Zones 1, 2 and 4 are lawn areas and are assigned to Program A. The program start time is set for 5:00 a.m. Lawn Zones 1 and 2 each have a station run time of 10 minutes and lawn Zone 4 is set to run for 20 minutes. Note that Zones 3 and 5 water shrubs and flowers and their stations have been excluded from this program. (These stations will be set to operate on Program B.)

**Watering Program Diagram**




As shown in the Watering Program Diagram above, at 5:00 a.m. the controller starts Program A. Station 1 (Zone 1) sprinklers run for 10 minutes and shut off. Station 2 (Zone 2) sprinklers start, run for 10 minutes and shut off.

The controller skips Station 3 (a Program B station) and starts Station 4, which waters Zone 4 for 20 minutes and shuts off. Station 5 is skipped (also a Program B station) and the watering cycle ends at 5:40 a.m.

As you can see from this example, only one program start time was needed to water three different zones. Although the Vision II Plus offers the dual program feature, you may want to have all zones on Program A if it meets your needs. Program B can remain turned off (no start times) until you choose to use it.

## Watering Program Details

This section covers in detail each of the three parts of a watering program – watering days, program start times and station run times.

### Selecting the Watering Days

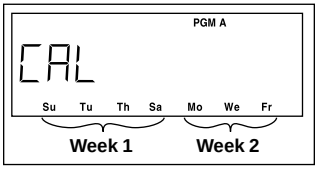
The Vision II Plus provides two methods of scheduling watering days: Calendar and Interval. Each program can use either one of the scheduling methods.

**The Calendar Schedule**

A Calendar schedule enables you to select specific days of the week to water within a 14-day (two-week) period.

This illustration shows how a Calendar schedule is displayed when it is being set.

In this example, Program A has a Calendar schedule with watering days set for Sunday, Tuesday, Thursday and Saturday of Week 1, and Monday, Wednesday and Friday of Week 2.




**The Interval Schedule**

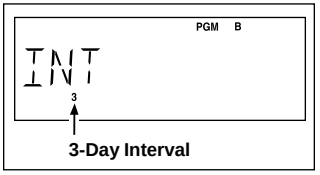
An Interval schedule enables you to set watering days without regard to actual days of the week. Interval schedules range from 1-day (water every day) to 14-day (water once every two weeks). For example, to water every other day, you would select a 2-day Interval. To water every third day, you would select a 3-day Interval and so on.

When setting an Interval schedule, the first day in the interval is the current day (today). Watering will occur today if a start time is later than the current time and it is set to start before midnight. If it is set to start after midnight, watering will not occur until the next active watering day.

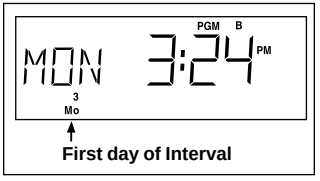
To help you track which days will water, the next active day is always displayed.

This illustration shows how an Interval schedule is displayed when it is being set.

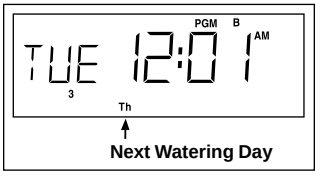
In this example, a 3-day interval is being set for Program B.




If today is Monday, the first day of the interval is Monday (Mo).




As the clock changes from Monday to Tuesday, the next scheduled watering day is displayed. In this example, Thursday (Th) is the next watering day.




### Selecting the Program Start Time

A program start time is the time of day you select to begin an automatic program watering cycle.

When a program starts, each station assigned to the program will water in numerical order, one at a time for its set run time.

Sometimes it is necessary to run a watering program more than one time per day, for example, when growing a new lawn. The Vision II Plus enables each program to have up to three separate start times per scheduled watering day.

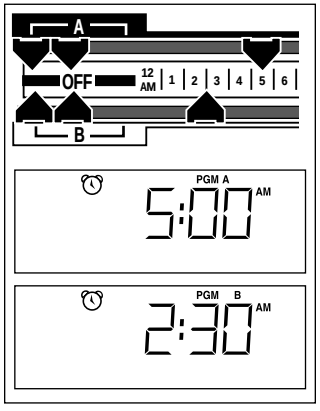
Program start times are selected by positioning the sliding indicators, located at the top of the controller faceplate, to the desired start time(s). The top set of indicators starts Program A and the lower set starts Program B.

## Selecting the Program Start Time (continued)

When selecting the program start time, please remember these important operational features:

- Only one start time is required to operate a program automatically. A start time initiates a complete program cycle, not an individual station.
- Start times can only be set to occur on the hour or half hour.
- If the same start time is selected for Programs A and B, Program A will run first to completion, followed by Program B.
- The earliest start time will always occur first regardless if it is set for Program A or B.
- A start time which occurs while a watering cycle is in progress will be delayed until the current watering cycle has been completed.

In this example, Program A has one start time set for 5:00 a.m. Program B is set to start at 2:30 a.m.



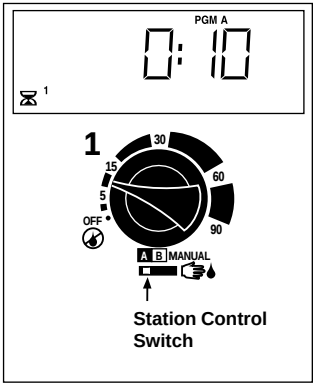

## Setting the Station Run Time

Station run time is the length of time a sprinkler zone will water during the program watering cycle or during manual operation. The run time for each station can be set in one of two modes: Minutes or Hours. Minutes mode provides a run time from 1 to 90 minutes. The Hours mode enables run time to be set from 10 minutes to 9 hours. Generally a run time under 90 minutes will be used for lawn and shrub zones. However, drip irrigation emitters may require an extended run time of several hours.

The run time for each station is set by turning the Station Run Time dial while viewing the display. The run time mode is changed by pressing the Hour or Min button while the run time is being displayed. Any station not being used should be turned to the Off position.

Each station is assigned to Program A or B by the position of the Station Control switch located directly below each Station Run Time dial.

In this example, Station 1 has been set to run for 10 minutes and is assigned to Program A.



## Planning Your Watering Schedule

It is always helpful to plan your watering schedule on paper before beginning the programming steps. You will have a record of your watering schedule and zone locations which can be kept with your Vision II Plus after it is installed. A watering schedule form is provided on page 12 for you to fill out.

- **Guidelines For Watering**

There are several factors to be considered when deciding when and how long to water. For example, the content of your soil, the part of the landscape being watered, climate conditions and the type of sprinklers being used. Because of these variables, we cannot give you an exact schedule to follow, but here are some general watering guidelines to help you get started.

- Water early in the morning, one to two hours before sunrise. You will have the best water pressure at this time and the water can soak into the plant root zone while evaporation is minimal. Watering during midday or in the evening may cause plant damage or mildew.
- Watch for signs of under- or over-watering and make program adjustments immediately.

### Filling Out the Watering Schedule Form

When filling out the Watering Schedule Form, we recommend using a pencil so changes can be easily made. Carefully remove the completed page from the booklet to use as a guide during programming.

Refer to the example form shown on the opposite page and fill out your form in a similar manner with the following information:

- **Location** - Identify the location of each watering zone and the type of plant being watered.

  **Note:** Enter the following information for each program. If the program is not needed, leave its information column blank.

- **Watering Day Schedule** - For a Calendar schedule, indicate which day(s) of the week watering is desired. For an Interval schedule indicate the desired Interval day number.
- **Station Run Time** - Indicate the amount of station run time for each zone in the Program A or B column.
- **Program Start Times** - Indicate the time of day to start the program. Each program can have three start times per watering day.

## Watering Schedule Example

| Watering Schedule Form | | Program A | | | | | | | Program B | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Watering Day Schedule | Calendar | Su | Mo | Tu | We | Th | Fr | Sa | Su | Mo | Tu | We | Th | Fr | Sa |
| | Week 1 | | | | | | | | | ✓ | | | | ✓ | |
| | | Su | Mo | Tu | We | Th | Fr | Sa | Su | Mo | Tu | We | Th | Fr | Sa |
| | Week 2 | | | | | | | | | ✓ | | | | ✓ | |
| | Interval | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | ✓ | | | | | | | | | | | | |
| | | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| | | | | | | | | | | | | | | | |

| Station | Watering Zone | Station Run Time | Station Run Time |
|---|---|---|---|
| 1 | Parkway Lawn | 10 minutes | |
| 2 | Front Lawn | 10 minutes | |
| 3 | Front Shrubs | | 5 minutes |
| 4 | Back Lawn | 25 minutes | |
| 5 | Garden | | 2 hours |
| 6 | | Off | Off |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |
| 11 | | | |
| 12 | | | |

| Program Start Times | | | |
|---|---|---|---|
| | 1 | 5:00 a.m. | 2:30 a.m. |
| | 2 | Off | Off |
| | 3 | Off | Off |

| Watering Schedule Form | | Program A | | | | | | | Program B | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Watering Day Schedule | Calendar Week 1 | Su | Mo | Tu | We | Th | Fr | Sa | Su | Mo | Tu | We | Th | Fr | Sa |
| | Week 2 | Su | Mo | Tu | We | Th | Fr | Sa | Su | Mo | Tu | We | Th | Fr | Sa |
| | Interval | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |

| Station | Watering Zone | Station Run Time | Station Run Time |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |
| 11 | | | |
| 12 | | | |

| Program Start Times | | | |
|---|---|---|---|
| | 1 | | |
| | 2 | | |
| | 3 | | |

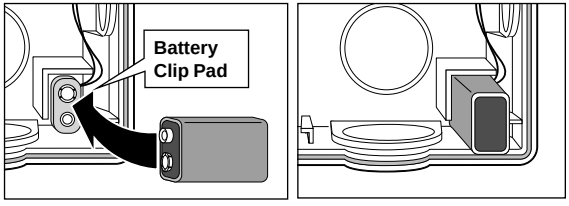
## Preprogramming the Controller

Installing the rechargeable 9V Ni-MH battery supplied enables you to program your new controller prior to installation.

## Installing and Removing the Battery

**WARNING**

**Use only a rechargeable 9V Ni-MH battery. Injury and/or equipment damage can result if an Alkaline battery is installed.**
**Always dispose of used batteries properly as recommended by the battery manufacturer.**




To install the battery:

1. Disconnect power to the controller (if installed).
2. Remove the protective cover from the battery terminals, attach it to the battery clip pad and store it in the compartment as shown above.
3. The display will begin flashing. Press the **Hour** or **Min** button to stabilize the display.

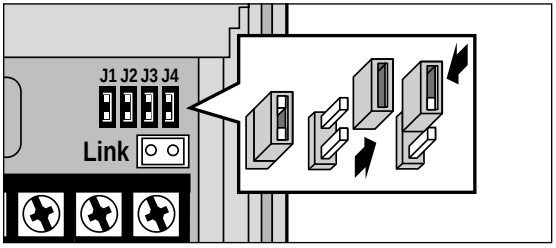
**Note:** The Ni-MH battery supplied may be not be fully charged when received. If the controller display does not respond when the battery is connected, either install another fully-charged battery, or install the controller at this time. The battery will be automatically charged in approximately 16 hours.

To remove the battery:

1. Disconnect power to the controller (if installed).
2. Carefully pull the battery from its compartment and disconnect the clip pad.

## Selecting Control Options

Four small jumper plugs, located on the printed circuit board as shown below, enable you to easily select alternate control features. When removing a jumper, place it back on one pin for future reuse. When a Jumper is removed, the resulting change is immediate.




The control options are as follows:

**J1** –Installed - The pump/master valve circuit is activated with any station operation.

**J1** –Removed - The pump/master valve circuit is not activated when a station has a run time in the "Hours" mode.

**J2** –Installed - The pump/master valve circuit is activated simultaneously with any sprinkler station.

**J2** –Removed - Provides a 15-second delay between the start of the pump/master valve and a station start. Also provides a 15-second delay between stations during a watering cycle.

**J3** –Installed - Designates the controller as a ProgramLink "Master" unit.

**J3** –Removed - Designates the controller as a ProgramLink "Slaved" unit.

**J4** –Installed - Selects the 12-hour (a.m./p.m.) clock mode.

**J4** –Removed - Selects the 24-hour clock mode.

# Programming the Controller

The following programming instructions are brief by design enabling you to move through the procedures as quickly as possible. Refer back to the "Watering Program Details" for additional information on any portion of the programming procedures.

## About the Vision II Plus Memory

The Vision II Plus has a preprogrammed watering day schedule within its memory. When power is first applied, the controller clock is set to 12:00 a.m. Sunday. Program A has a Calendar schedule set to water every other day and Program B has a 2-day Interval schedule.

You will see this information on the display as you begin programming the controller for the first time. Your watering day schedule information will replace the preprogrammed information as it is entered.

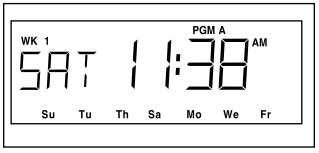
The battery keeps the clock synchronized with the current time. If a power failure occurs and lasts longer than the battery life, the clock will reset to 12:00 a.m., but your watering schedules will be retained.

## Setting the Current Time and Day

1. Ensure the **Off/On** switch is in the **On** ( I ) position.
2. Press and hold the **Clock** ◷ **Hour** button until the display advances to the current hour.

   **Note:** The display will begin to advance rapidly after ten consecutive seconds.
3. Press and hold the **Clock** ◷ **Min** (Minute) button until the display advances to the current minute.
4. Press and hold the **Today** button until the display advances to the current day.

**Note:** When setting the current day, Week 1 (**WK 1**) should be displayed. If Week 2 (**WK 2**) is displayed, continue pressing the Today button until the current day and Week 1 is shown.



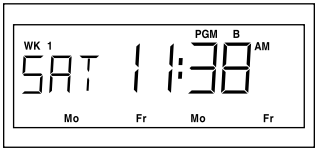

This example shows the the current day is Saturday, Week 1 and the current time is 11:38 a.m.

## Setting the Watering Day Schedule

### Setting a Calendar Schedule

1. Select Program A or B with the **Program** A B switch.
2. Press the **Cal/Int** button to select **CAL** (Calendar). The Sunday identifier (**Su**) will begin flashing.
3. To select Sunday as a watering day, press the **Select (+)** button. To delete Sunday from the schedule, press the **Delete (-)** button. The Monday identifier (**Mo**) will begin flashing.
4. Continue this procedure, selecting or deleting all of the remaining days of the 2-week watering schedule. The display will revert to the current time and day after 5 seconds of inactivity.

   **Note:** When the display reverts to the time and day, it will also indicate the current week of the 2-week calendar schedule.

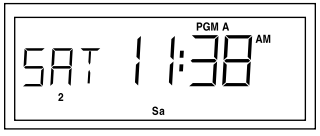



This example shows a Calendar schedule set for Program B to water every Monday and Friday. The current week of the 2-week watering schedule is Week 1 (**WK 1**).

### Setting an Interval Schedule

1. Select Program A or B with the **Program** A B switch.
2. Press the **Cal/Int** button to select **Int** (Interval). The interval number currently set will begin flashing.
3. To select the interval day number (1–14), press the **Select (+)** button to increase the number, or the **Delete (–)** button to decrease the number. The display will revert to the current time and day after 5 seconds of inactivity.

This example shows a 2-day Interval schedule (water every other day) set for Program A. The first watering day of the interval is today, Saturday.



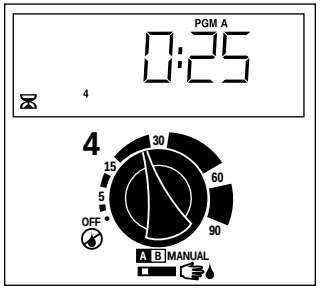

## Setting the Station Run Time

1. Turn the desired Station Run Time dial slowly to the right while viewing the display.

   **Note:** To change the run time mode from minutes to hours or hours to minutes, press the corresponding **Clock** (clock) **Hour** or **Min** button while the station run time is being displayed.
2. Adjust the dial until the desired amount of run time is shown, then leave the dial in this position.
3. Repeat this procedure for all active stations. Turn all unused stations to the **Off** position.

In this example, Station 4is set to run for 25 minutes.

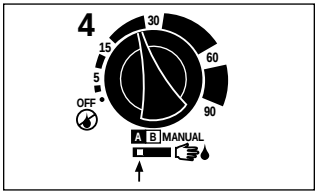
**Note:** If a pump is used in the system, it can be switched off automatically when station run time is set in hours by removing jumper J1.




## Assigning a Station to a Program

1. Assign each active station to a program by placing its Station Control switch in the A or B position.

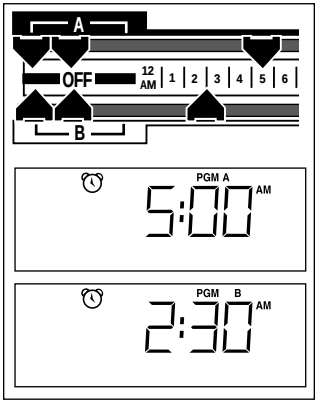
In this example, Station 4 is assigned to Program A.




## Setting the Program Start Time(s)

1. Begin with all Program Start Time indicators set to the left (Off) position.
2. Slide one indicator of either Program A or B to the right until the desired start time is displayed.
3. Repeat step 2 for each program start time required. The display will revert to the current time and day after 5 seconds of inactivity.

In this example, Program A has one start time set for 5:00 a.m. and Program B has one start time set for 2:30 a.m.




**Note:** This completes the programming steps required for automatic operation.

# Installing the Controller

## Selecting an Installation Location

Install the Vision II Plus controller in a location which provides the following conditions:

- Protection from direct exposure to irrigation spray, extreme heat and cold
- Access to a grounded 120 V a.c., 230 V a.c., 50/60 Hz or 240 V a.c. 50 Hz power source
- Access to the sprinkler control valve wiring and other field wiring
- Indoor location for plug-in transformer models

## Preparing the Controller for Installation

1. Remove the access cover by moving its tab to the right and pulling it outward, away from the cabinet. See **Figure 1**.

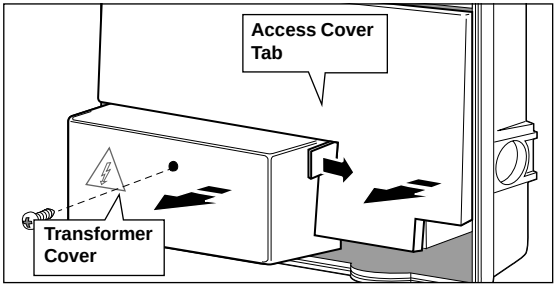



**Figure 1** - Removing the access covers.

2. Remove the phillips screw from the transformer cover and slide the cover out to remove.
3. **(Plastic cabinet models only)**
   Using a small screwdriver or punch, carefully remove lower mounting screw hole plug(s) (**A**) as needed. See **Figure 2**.
4. Remove the 1/2" (13mm) bottom or back power wiring access plug (**B**) and the 1" (25mm) bottom or back field wiring access plug (**C**). Remove the side access plug (**D**) if planning to install the Toro Rain Switch and/or ProgramLink™ cable options. See **Figure 2**.

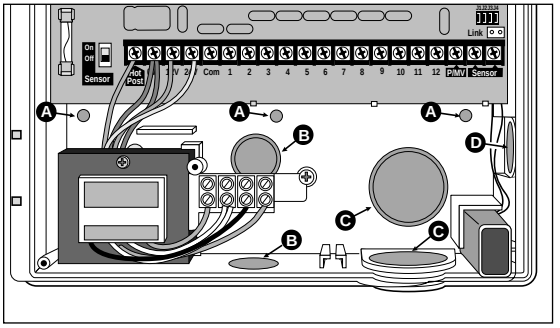



**Figure 2** - Removing screw hole and wiring plugs.

## Installing the Controller Cabinet

1. Install one wood screw (provided) into the wall at eye level. Leave the screw head extended 1/4" (6.5mm) from the wall if installing the plastic cabinet or 1/8" (3.3mm) for the metal cabinet.

   **Note:** Install screw anchors if attaching the controller to a masonry wall. For predrilling the mounting screw holes, use the dimensions provided in **Figure 3**.

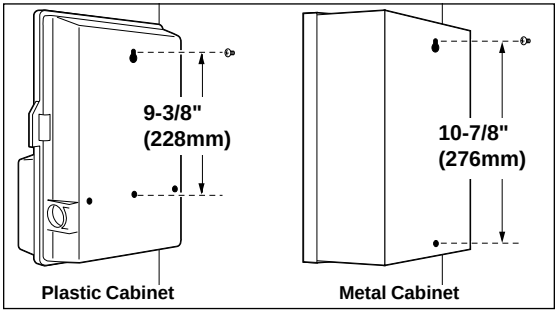



**Figure 3** - Positioning the controller on the wall.

## Installing the Controller Cabinet (cont.)

2. Hang the controller on the wood screw using the keyhole shaped opening on the back of the controller cabinet.
3. Install the lower mounting screw(s) and tighten securely.

## Installing Electrical Wiring Conduit

**Note:** Conduit and adapters are not supplied with the controller but may be required for installation in your area. Check local electrical codes and install conduit according to requirements.

1. Install a 1/2" (13mm) conduit adapter and conduit for the power/equipment ground wires. (Not required for plug-in transformer models.)
2. Install a 1" (25mm) conduit adapter and conduit for the field wiring.

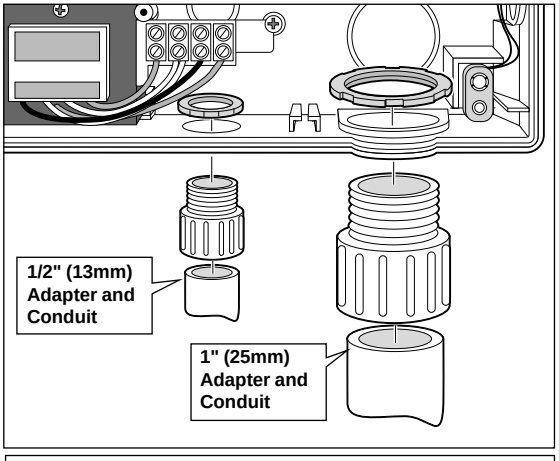



**Figure 4** - Installing electrical conduit.

## Connecting the Power Source

### Internal Transformer Models

**WARNING**

**AC power wiring must be installed and connected by qualified personnel only.**

**All electrical components and installation procedures must comply with all applicable local and national electrical codes. Some codes may require a means of disconnection from the AC power source, installed in the fixed wiring and having a contact separation of at least 0.120" (3mm) in the line and neutral poles.**

**Ensure the AC power source is OFF prior to connecting the controller.**

1. Route the power Line (s), Neutral (for 120V) and Equipment Ground wires from the power source into the controller cabinet.

**Note:** The controller terminal block accepts wire size up to and including #12 ($2mm^2$).

2. Select the appropriate wiring diagram for 120 V a.c. or 230 / 240 V a.c. installation as shown in **Figure 5**.

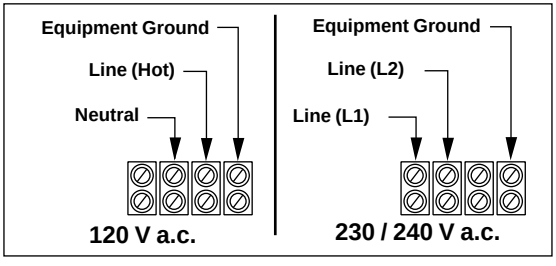



**Figure 5** - AC power wiring diagram.

## Connecting the Power Source (cont.)

3. Route the wires behind the terminal block assembly. Strip 3/8" (9.5mm) insulation from each wire end and insert the wires into the appropriate terminals as shown in **Figure 6**.

   **Note:** A wiring label (not shown) is applied to the top of the terminal block. Reference the label information when connecting the wires to the terminal block.

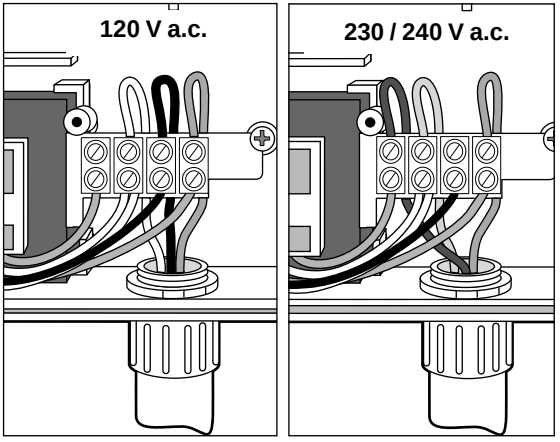



**Figure 6** - Connecting the power and equipment ground wires to the terminal block.

4. Using a small flat-blade screwdriver, secure the wires to the terminal block.

**CAUTION: If installing two controllers for ProgramLink operation, ensure that correct polarity is maintained when connecting power wires. If the controllers are not in phase, the 1.5A fuse will blow upon program start of linked controller.**

5. Install and secure the transformer cover.
6. Apply power to the controller.

### Plug-In Transformer Models

1. Route the transformer cable (supplied) into the controller cabinet through the 1/2" (13mm) conduit opening as shown in **Figure 7**.

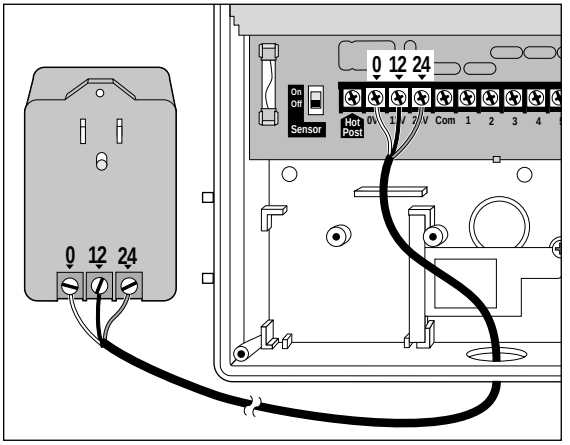



**Figure 7** - Connecting the transformer cable wires.

2. Secure the cable wires to the controller and transformer terminals as follows:
   - White wire to 0V
   - Black wire to 12V
   - Red wire to 24V
3. Install and secure the transformer cover.
4. Plug the transformer into a grounded 120 V a.c. wall receptacle.

## Connecting the Field Wiring

**Note:** Direct burial #18 (0.75mm$^2$) multi-wire cable is recommended for field wiring.

**Caution: All wiring splices must be waterproofed to prevent short circuits and corrosion.**

1. To provide a field common wire, attach the white cable wire to **either** wire of each sprinkler valve solenoid and either wire of the (optional) pump start relay or master valve. Refer to **Figure 8**.

   **Caution: Pump start relay current rating must not exceed 0.5 Amps.**

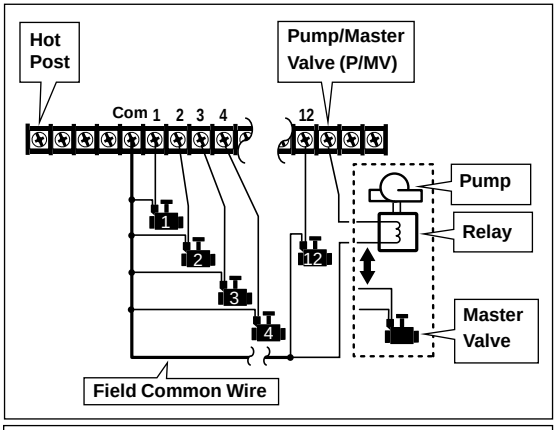



**Figure 8** - Field wiring diagram.

2. Attach a separate cable wire to each valve solenoid and optional pump start relay or master valve.

   **Note:** Connecting two Toro 1" plastic valves per station is permitted.

3. Route the cable into the controller cabinet. Attach the field common wire to the "Com" terminal.

   **Note:** The following optional procedure enables you to identify the various zone control valves by momentarily activating them (one at a time) with a 24 V a.c. source called the "Hot Post". If you have already identified the valve wires with their associated watering zones, attach the valve wires to the numbered station terminals in the desired order of operation, then continue at step 7.

4. Attach the optional pump start relay or master valve wire to the Hot Post terminal to activate the pump or master valve.

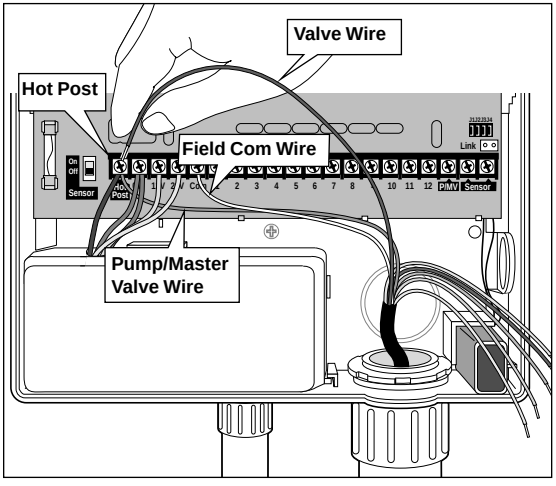



**Figure 9** - Using the Hot Post to activate and identify the sprinkler zones.

5. Touch one valve wire to the Hot Post terminal to activate and identify a sprinkler zone. Attach the wire to a numbered station terminal in the desired order of operation.
6. Repeat this procedure for each sprinkler zone. When all valve wires are connected, remove the optional pump/master valve wire from the Hot Post terminal.
7. Attach the optional pump/master valve wire to the terminal labeled P/MV.

## The Toro ProgramLink Feature

Installing The Toro ProgramLink feature enables two Vision II Plus controllers to be linked together electronically for the synchronous operation of watering programs.

An optional interface cable assembly (XF4-SCC) is required to connect the controllers as illustrated in **Figure 10**. When control option jumper J3 is removed, the Vision II Plus is designated as the "Slaved" controller and can only run automatically when signaled to start by the "Master" controller. (Manual operation is not affected by this installation.)

During operation, the master controller sends a start command to the slaved controller at the end of each watering program cycle. The slaved controller automatically starts the watering cycle of the matching program (A or B).

**CAUTION: Ensure the transformer wire connections of both controllers are the same. If the controllers are not in phase, the 1.5A fuse will blow.**

**Note:** The Rain Delay feature and Rain Switch device electronically prevent program start times from occurring. Since program start times are disabled on the Slave controller, these features apply only to the Master controller.

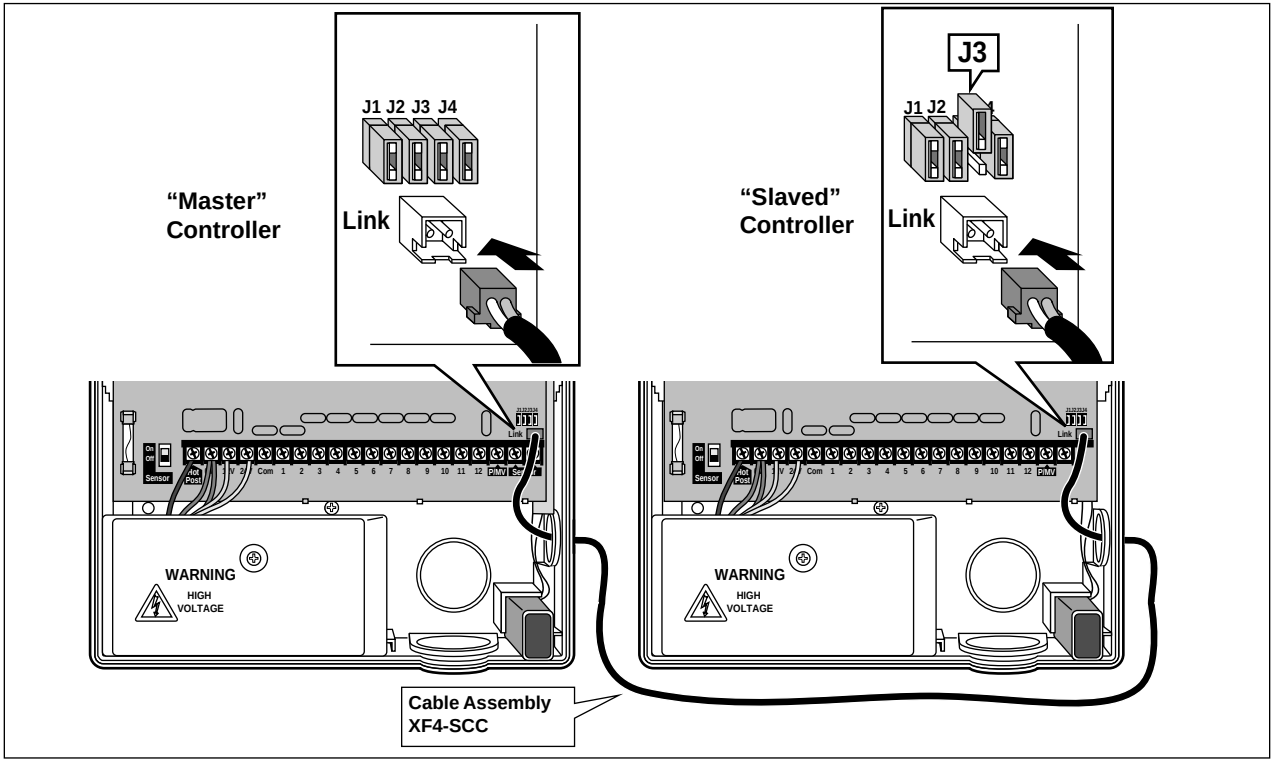



**Figure 10** - Setting up two Vision II Plus controllers for Toro ProgramLink operation.

## The Toro Rain Switch

The optional Toro Rain Switch (850-74) is an externally mounted rain sensing device which can be wired to the controller to automatically cancel watering during rain.

The Rain Switch is generally mounted on the edge of the roof where it is directly exposed to rain and sunshine. When the Rain Switch is contacted by water, it electronically signals the controller to stop all watering in progress. The "No Watering" symbol is displayed and all automatic watering activity is suspended while the Rain Switch is active. When the Rain Switch drys out, the No Watering symbol is turned off and the controller resumes operation as programmed.

A Sensor Switch is provided enabling the Rain Switch function to be turned On and Off as desired.

**Note:** The Sensor feature is designed for the connection of a normally open switch device. To install a normally closed switch device, consult the manufacturer's instructions and install accordingly.

1. Route the wire cable from the Toro Rain Switch into the controller housing through the side access opening (plastic cabinet only) or through the bottom field wiring access opening.

**Note:** The Rain Switch cable has four wires: two thick wires and two thin wires. Only the **thick copper** colored wire and the **thin silver** colored wires are used in this application

2. Trim off the thin copper wire and the thick silver wire flush with the end of the cable insulation.
3. Attach the remaining two wires (in either order) to the Sensor terminals as shown in **Figure 11**.

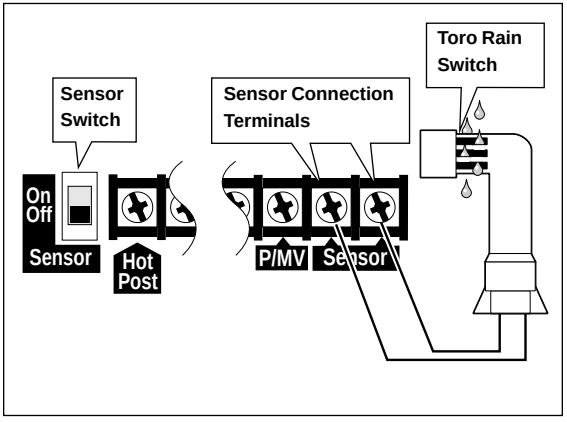



**Figure 11** - Toro Rain Switch wiring diagram.

4. To enable the Rain Switch to operate, place the **Sensor** Switch in the **On** position. Place the **Sensor** switch in the **Off** position to prevent or bypass the operation of the Rain Switch.

**Note:** The Rain Switch affects only the automatic operation of the controller. All manual operations can be performed at any time regardless of Rain Switch activity.

# Controller Operations

The Vision II Plus controller has three modes of operation: Automatic, Manual and Off. In the Automatic mode, the controller tracks the time and day and starts the automatic watering programs. The Manual mode enables the watering programs to be started and controlled manually at any time. The Off mode shuts off all watering activity and prevents any stations from operating automatically or manually.

The Rain-Delay and Seasonal Adjust control features are provided to enable quick, temporary changes in operation to help compensate for variables in weather and season.

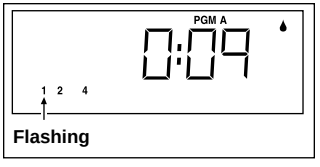
Each of the operating modes and control features are explained in this section of the guide.

## Automatic Operation

In the Automatic mode, the Vision II Plus tracks the current time, day and week. Automatic operation occurs whenever a program start time and set watering day match the current time and day.

When watering starts (automatically or manually), the display changes to show the status of the program in progress. When watering is finished, the display reverts to the current time and day.

This watering status example shows that Program A is currently operating. Station 1 is on (number flashing) and has 9 minutes of run time remaining. Stations 2 and 4 will also run during this watering cycle.




## Manual Operations

Manual operation allows you to start the automatic watering programs or run individual stations at any time.

**To manually start the automatic program(s):** Press the **Manual Start A/B** A/B button one time. Program A will start first, running each of its assigned stations in sequence. At the end of Program A, Program B will start. To start only Program B, skip Program A stations using the following procedure.

**To skip stations:** Press the **Manual Start A/B** A/B button during operation. Each time the button is pressed, the station currently watering will shut off and the next station in sequence will start.

**To manually start an individual station:** Place its **Station Control** switch in the **Manual** position. Once the station starts, return the switch to the A or B position (as previously set). You can continue selecting up to 5 additional stations (to operate in sequence) by repeating this procedure. As you select additional stations, their station numbers will be displayed.

**To cancel watering activity:** Place the **Off/On** switch in the **Off** (○) position, wait 5 seconds, then return the switch to the **On** (I) position.

**Note:** During manual operation, the controller will temporarily suspend all automatic watering activity.

## Turning Off the Controller

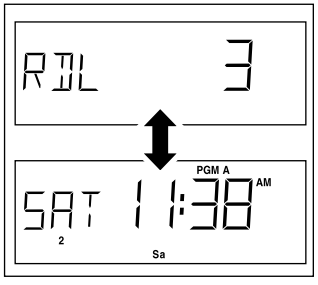
When the **Off/On** switch is placed in the **Off** (○) position, the controller immediately shuts off any watering operation currently in progress and "Off" is displayed. While in the Off mode, the controller continues to update the current time and day, but suspends all watering activity. For extended shutdown periods, leave the **Off/On** switch in the **Off** (○) position. To resume operation, place the switch in the **On** (I) position.

## Using the Rain-Delay Feature

This feature enables automatic watering operation to be delayed from 1 to 4 days. For example, if rain is forecast in your area for the next two days, instead of turning off the controller and possibly forgetting to turn it back on, a delay of three days can be easily entered. At the end of the third day, the controller will resume automatic operation as scheduled.

**To activate the delay feature:** Press the **Rain-Delay** button 1 to 4 times to display the number of days you wish to delay automatic operation. After 5 seconds, the display will begin alternating between the number of delay days remaining and the current time and day. The delay number will automatically decrease as each day passes. When the delay number is 0 (zero), automatic operation will resume as scheduled.

In this example, a 3-day delay is set.




**To cancel the delay feature:** Press the **Rain-Delay** button repeatedly until 0 (zero) is displayed.

## Using the Seasonal Adjust Feature

The Seasonal Adjust feature automatically adjusts the station run time of <u>all</u> active stations up or down by the same amount. The run time can be decreased to 20% or increased to 200% of the value set on the Station Run Time dial.

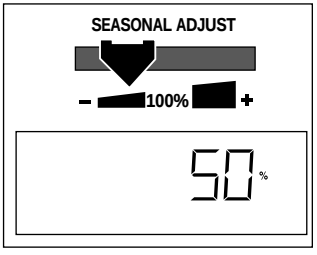
For example, a 50% setting will decrease a 10-minute run time to 5 minutes. Increases however, work differently. With any adjustment over 100%, the run time of each station is first increased by the value selected then divided in half. The program will then run consecutively two times to deliver the increased amount of water. This is called "Split Cycle" watering and is done to prevent pooling, run-off and soil erosion.

For example, adjusting to 150% would first increase a station with a 20-minute run time to 30 minutes, then split the time in half (15 minutes). The program would then run through its watering cycle twice consecutively with a 15-minute station run time in each cycle. During operation, a percent symbol (%) will be displayed indicating Split-Cycle operation.

**To change the Seasonal Adjust setting from 100%:**

Slide the **Seasonal Adjust** – 100% + control toward (–) to decrease or (+) to increase while viewing the display. When the desired value is displayed, release the control. After 5 seconds of inactivity, the display will return to the current time and day.

In this example a 50% adjustment value has been selected.




**Note:** The station run time will be displayed at the 100% value regardless of the Seasonal Adjust setting. The adjusted run time will be displayed only while a station is running.

# Service and Specifications

## Replacing the Safety Fuse

A 1.5A safety fuse protects the controller's electronic circuitry and the 24 V a.c. output. A blown fuse is usually caused by a valve control wire shorted to ground or a faulty control valve solenoid. Before replacing the fuse, always check the wiring connections at the controller as well as the control valve locations. If replacing the fuse does not solve the problem, contact your sprinkler system installer or local Toro distributor for assistance.

If the fuse blows, the controller will continue to maintain the current time, day and watering day schedule for the duration of available battery power. The "Power Off" symbol ⊗ will be displayed if the fuse is blown or power is disconnected.

**WARNING**

**This controller requires a 1.5A Fast-blow fuse. Bypassing the fuse or replacing it with a fuse type and/or rating other than specified can cause an electrical hazard to occur resulting in severe injury and/or equipment damage.**

**Replace the fuse as follows:**

1. Disconnect power to the controller by switching off the circuit breaker at the main power panel or by removing the plug-in transformer from the wall receptacle.
2. Remove the access cover and locate the fuse on the lower left side of the circuit board.
3. Carefully remove the fuse from the retaining clips.

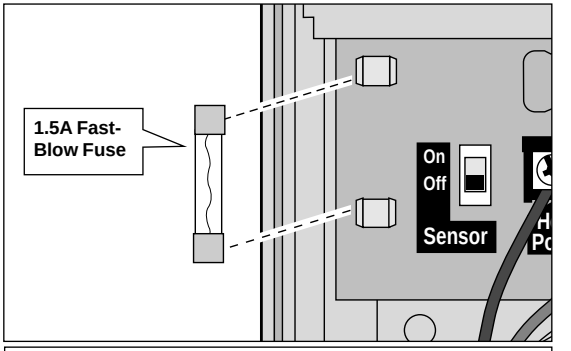



**Figure 12** - Removing and replacing the fuse.

4. Install the new fuse into the retaining clips.
5. Install the access cover.
6. Apply power to the controller.
7. Manually operate each station one at a time to check for proper operation.

## Troubleshooting

If you are experiencing a problem with the controller, check the following list of symptoms, possible causes and remedies. If the problem can not be corrected or is not listed, contact your local Toro distributor for further assistance.

| Symptom | Possible Cause | Remedy |
|---|---|---|
| **The display is blank and the controller does not operate.** | The battery is dead or not installed and one or more of the following causes: | Replace the battery and or one or more of the following: |
| | Controller safety fuse is blown. | Replace the 1.5A fuse. |
| | Power disconnected at source. | Reset the AC power service circuit breaker. Ensure the plug-in transformer is fully inserted in the wall receptacle. |
| **Watering programs start at unscheduled times.** | Watering programs have overlapping schedules. | Shorten the station run times and/or space the program start times farther apart. |
| **Watering zone does not turn on.** | Faulty control valve wire connections. | Check the wire connections at the control valve and the controller. |
| **Watering zone does not turn off.** | A control valve problem. | Inspect, clean and/or replace the control valve solenoid. |
| **Each program runs two times consecutively during an automatic watering cycle.** | Seasonal Adjust control setting is greater than 100%. | Reset the Seasonal Adjust control to 100%. |
| **The stations do not turn on immediately.** | Control option jumper J2 is removed. | This option provides a 15-second delay between stations during a watering cycle. Reinstall jumper. |

## Specifications

- Internal Transformer Models:
  - Input Power: 120/230 V a.c., 50/60 Hz, 30VA
  - Output Power: 24 V a.c., 50/60 Hz, 22VA
  - Input Power: (Australia / New Zealand) 240 V a.c., 50 Hz, 26VA
  - Output Power: (Australia / New Zealand) 24 V a.c., 50 Hz, 15VA
- External Transformer Models:
  - Input Power – 120 V a.c., 60 Hz, 30VA
  - Output Power – 24 V a.c., 60 Hz, 30VA
- Maximum Station Output: 0.5A @ 24 V a.c.
- Maximum Number of Plastic Valves Allowed Per Station: Two Toro 1" Electric
- Maximum Pump Relay/Master Valve Output: 0.5A @ 24 V a.c.
- Maximum Output (Station and Pump/Master Valve): 0.9A @ 24 V a.c.
  Maximum Output (Australia / New Zealand) (Station and Pump/Master Valve): 0.7A @ 24 V a.c.
- Fuse – 1.5A, 250V, Fast-Blow
- Plastic Cabinet Dimensions:
  - 14" H x 10" W x 3" D
  - (35.6cm H x 25.4cm W x 7.6cm D)
- Metal Cabinet Dimensions:
  - 13-1/8" H x 8-3/4" W x 3-3/4" D
  - (33.3cm H x 22.2cm W x 9.5cm D)
- Conduit Access:
  - 1/2" (13mm) Power Wiring
  - 1" (25mm) Field Wiring
- Battery Back-Up: 9V Rechargeable Ni-MH

## Electromagnetic Compatibility

**Domestic:** This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a FCC Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause 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 the receiving antenna.
- Relocate the irrigation controller with respect to the receiver.
- Move the irrigation controller away from the receiver.
- Plug the irrigation controller into a different outlet so that the irrigation controller and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems". This booklet is available from the U.S. Government Printing Office, Washington, DC 20402. Stock No. 004-000-00345-4.

**International:** This is a CSPR 22 Class B product.


Irrigation Division
An ISO 9001-Certified Facility
P.O. 489 Riverside, CA 92502

Form Number
371-0028 Rev. B

*(311-21321C)*