

# Thank you for purchasing a Phytotronics®

## **Gemini™ 6A**

### Automatic Misting Controller with Sun-Sensor™ “5 Before, 5 After”

## **Instruction Manual**

*Revised 08/08*

**PLEASE READ ENTIRE INSTRUCTION MANUAL  
(INCLUDING LIMITED WARRANTY)  
BEFORE INSTALLATION**

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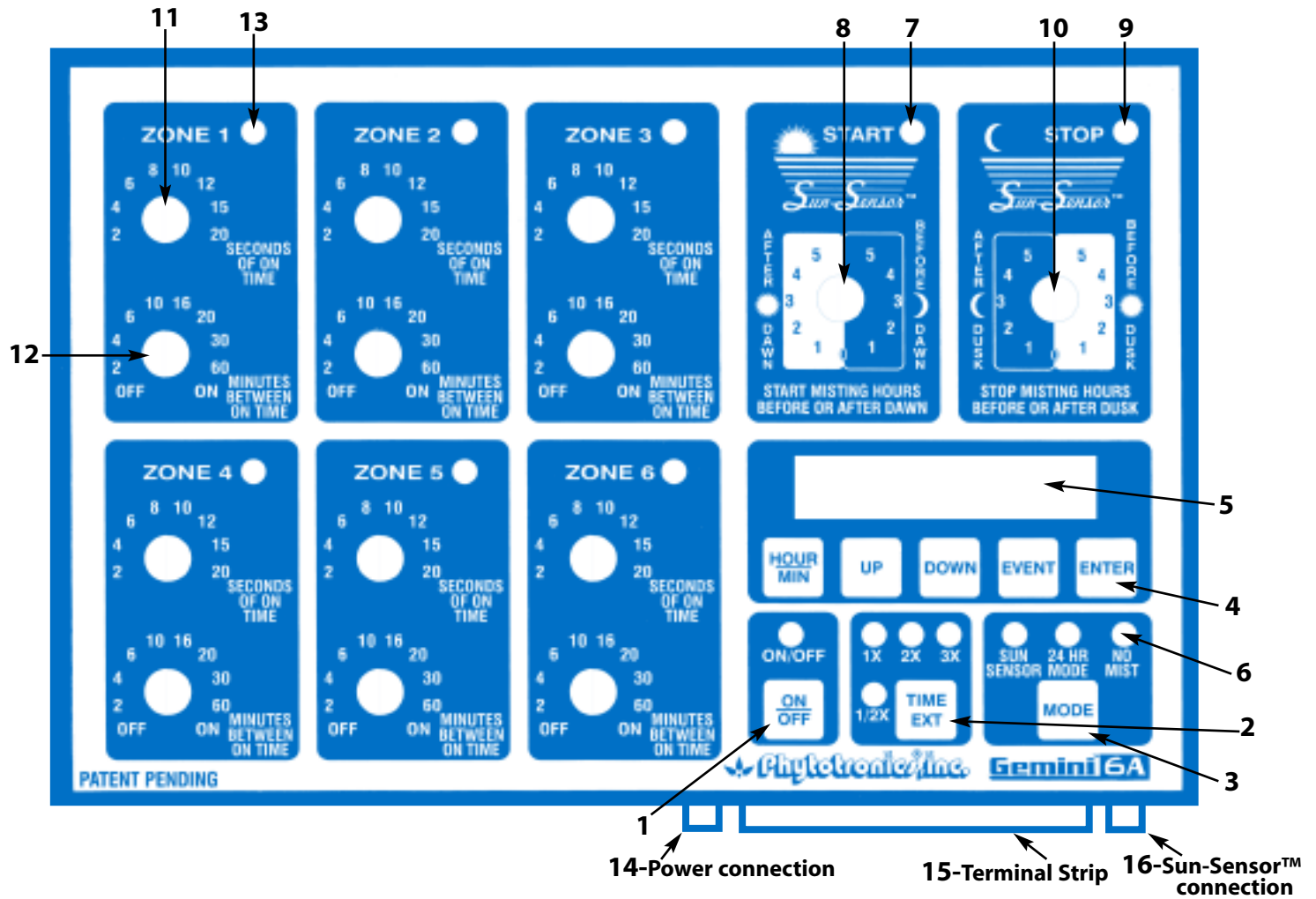
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# Gemini™ 6A

# “A” Series Diagram



Please refer to the next page for descriptions.

# Overview of the Control Panel and Its Functions

Please refer to the illustrations on page 2.

Numbers **1** through **6** collectively make up the “**Master Control Panel**”.

Numbers **7** through **10** collectively make up the “**Sun -Sensor™ Blocks**”.

Numbers **11, 12 & 13** describe a typical “**Zone Block**”.

Numbers **14, 15 & 16** represent the cable connection ports for power supply, terminal strip, and **Sun-Sensor™** for the **Gemini™ 6**.

1. **ON/OFF Membrane Switch** - Push once, to turn the controller on. To turn off the unit, push once, then press **ENTER** to verify that the controller is to be turned off.
2. **TIMER EXTENDER** - Used to cycle through **1/2X, 1X, 2X, 3X** to multiply all set times indicated on the rotary switches. (Example: **1/2X** changes a 20 second setting to 10 seconds and 2 minute setting to 1 minute.) Does not multiply **Sun -Sensor™** settings.
3. **MODE Selector** - Used to cycle through the 4 modes of operation.
4. **Programming Buttons left to right:**
  - **HR/MIN** - Used to set “HOURS/MINUTES”; to move program cursor from left to right on the LCD and to position cursor for data entry in other fields - Active only in the “NO MIST” mode.
  - ↑ **UP** - Used to cycle up through zones and other functions, and to advance time settings when in the **NO MIST MODE** - Active in all modes.
  - ↓ **DOWN** - Used to cycle down through zones and other functions and to decrease time settings when in the **NO MIST MODE** - Active in all modes.
  - EVENT** - Used to cycle down through display information in the display window - Active only in the “NO MIST” mode.
  - ENTER** - Used to enter set times or other information into the computer’s memory or erase previously entered data by pressing twice. It is also used to verify the controller is to be turned off. Active to verify off in any mode.
5. **Display Window** - Shows time, Sunrise, Sunset, Footcandle set points, various operating modes, programmed events, and time remaining until start of the misting event in a given zone.
6. LED’s (Light Emitting Diode) for showing the functions in use for membrane switches 1, 2, & 3.
7. LED for **Sun -Sensor™** ‘Start’ block.
8. Switch to ‘Start’ misting cycle up to 5 hours Before or 5 hours After Sunrise - Used in **Sun -Sensor™** & **Sun -Sensor™ /24 HOUR** Mode.
9. LED (Light Emitting Diode) - for **Sun -Sensor™** ‘Stop’ block.
10. Switch to ‘Stop’ misting cycle up to 5 hours Before or 5 hours After Sunset - Used in **Sun -Sensor™** & **Sun -Sensor™ /24 HOUR** Mode.
11. **Zone Switch (rotary type)** - Seconds of ON time. - Used to set the seconds of misting time.
12. **Zone Switch (rotary type)** - Minutes between ON time. - Used to set the minutes between misting. Also to operate continuously “ON” or “OFF”.
13. **LED for Zone Blocks** - Shows what zone is in operation.
14. **Power supply receptacle** - (3-prong) for 24 VAC power cord.
15. **Terminal Strip** - 14 terminals for 6-station unit; 6 terminals for 2-station unit. Wire solenoid valves and pump start relay here.
16. **Sun -Sensor™ receptacle** - (2-prong) for **Sun -Sensor™** plug.

**Please note:** Additional description of items 14-16 can be found on page 4.

**NOTE: Any attempt to bypass the 24 vac transformer to power this unit directly from a 120 volt power source will damage the controller’s circuitry and render it unfit for use. Such action will also void the Phytotronics® warranty.**

# Gemini™ Misting Controller Quick Start Procedure Using the “Sun-Sensor™ Mode”

1. The controller should be installed in a convenient location within 20’ of a 120 volt outlet and away from the output of any misting or watering nozzles and away from direct sunlight. Mount the controller at eye level using the stainless steel screws provided.
2. Plug 24 volt transformer into a grounded 120 volt outlet. The screw at the top of the transformer should be used to replace the screw in the receptacle plate. Run the transformer cable to the controller, but DO NOT connect to the controller at this time.
3. Connect solenoid valve wires to the terminal strip. A **Phytotronics®** screwdriver is provided to do this. When wiring the solenoids to the controller, make sure that each valve has its own “hot” and “common” wires. It usually does not matter which position (right or left) that they are attached. Some valves with diodes will cause LEDs to blink but still operate. Switch “hot” and “common” wires and restart unit. If solenoids share a common wire, make sure to wire “commons” to the odd numbered terminals. The following is a reference for wiring zone wires to the terminal strip:



24vac transformer

## Gemini™ 6 zone terminal strip

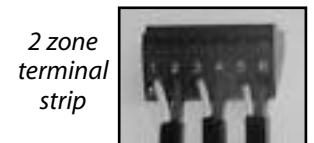
Positions	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Zone Wires	1	1	2	2	3	3	4	4	5	5	6	6	Pump	



6 zone terminal strip

If the Terminal Strip is unplugged when valve wires are attached, plug it into bottom of controller (#15) before proceeding to the next step.

See “The Terminal Strip and Valve Connection” on page 5 for additional information.



2 zone terminal strip

4. If you are using a Pump Start Relay, use the two far right terminals of the terminal strip on the unit. The maximum amps allowed to power the Pump Start Relay is .5 at 24 vac. The terminals; 13 & 14 of the **Gemini™ 6A**, will be active during the total time the controller is cycling. Use of a pump start relay reduces the number of valves that can be on at one time. Total inrush current should not exceed .5 amps.



pump terminal

5. Position the **Sun-Sensor™** within the greenhouse as near to the roof as possible, positioning the sensor toward sunrise. Additional instructions can be found on page 10 in this manual under **Sun -Sensor™**. Connect the **Sun -Sensor™** by plugging it next to the right side of the terminal strip - position #16.



Top: **Sun -Sensor™** cable & plug  
Bottom: **Sun -Sensor™**

6. Set zone knobs to the “Seconds of On Time” and “Minutes between On Time” as desired and then set the **Sun -Sensor™** “Start” and “Stop” rotary switches to the desired settings.
7. Connect the transformer cable to the bottom left side of the terminal strip (#14).
8. Press the **“ON/OFF”** button once to turn the controller “On”.



9. **Setting the clock.** Press the mode switch to select the “No Mist” mode. Press the **“HOUR/MIN”** switch once and the hour time will begin to blink. Press the **UP** or **Down** buttons to the correct hour (Note: an “A” will appear for “am” and a “P” will appear for “pm”. Be sure this setting is correct before setting minutes.) To set the minutes, press the **“HOUR/MIN”** button again. Press the **UP** or **DOWN** buttons again to change the minute settings. When the time showing is correct, press **ENTER** to store the time and move to the next setting. Sunrise and Sunset are set during manufacturing at 6:00 am and 6:00 pm. After 48 hours these settings will *automatically* be changed by the **Sun -Sensor™**. These settings can be changed by the grower if needed. See page 10 under “Setting the Clock”.



10. The Time Extender will be active and will multiply all zone time settings by the multiplier selected.
11. Press the **MODE** button until the LED light above **Sun -Sensor™** is lit. After a delay of 2 to 3 minutes, the controller will begin automatic operation. The controller will use times dialed in on the zone knobs, and will cycle only between sunrise and sunset.

# Gemini™ Misting Controller Quick Start Procedure Using the “24 Hour Mode”

*This mode is designed to bypass the Sun-Sensor™ and utilize the events programmed in the 24 hour time clock to start and stop the misting cycle.*

1. Follow steps 1 through 4 on the preceding page.
2. Connect the transformer cable to the bottom left side of the terminal strip (#14). See diagram on page 2.
3. Press the **ON/OFF** button to turn the unit on.
4. **Setting the clock.** Press the mode switch to select the “No Mist” mode. Press the “**HOUR/MIN**” switch once and the hour time will begin to blink. Press the **UP** or **Down** buttons to the correct hour (Note: an “A” will appear for “am” and a “P” will appear for “pm”. Be sure this setting is correct before setting minutes.) To set the minutes, press the “**HOUR/MIN**” button again. Press the **UP** or **DOWN** buttons again to change the minute settings. After the time is entered, press **ENTER** to store the time.
5. Push the **DOWN** button 5 times to scan through the preset 1) sunrise, 2) sunset, 3) **Sun-Sensor™** setting, 4) the first part of Event 1 (E1) and 5) the time settings of Event 1 - “E1  $\overset{\text{Start}}{\text{time}}$   $\overset{\text{Stop}}{\text{time}}$ ”. To program the “start” and “stop” times, following the same procedure as described above in “**Setting the clock**”.
6. Setting Event 1 with “7:00A 6:00P” will automatically start the misting cycle every morning at 7:00am and stop the misting cycle at 6:00pm. Shorter or longer durations can be programmed into event 1 (E1) or more events can be programmed by using Event 2 (E-2) through Event 9 (E-9) for more control of mist cycles.
7. Push the **MODE** button to the **24 HOUR MODE** and set the rotary zone switches to the desired settings.
8. The Time Extender will be active and will multiply all zone time settings by the multiplier selected.
9. The **Sun -Sensor™** is not in use in this mode.
10. See page 7 for more information on the **24 HOUR MODE**.

## The Terminal Strip and Valve Connection

The terminal strip is located on the bottom of the lower right corner of the controller . The 6-zone unit has 14 terminals to accept 12 solenoid valve wires and 2 wires from a pump start relay. Terminals for the pump start relay on the **Gemini™ A** controllers are the last 2 terminals on the right end of the strip (see page 4); these terminals are not to be used for solenoid valves.

### Gemini™ 6 zone terminal strip

Positions	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Zone Wires	1	1	2	2	3	3	4	4	5	5	6	6	Pump	

For ease of connecting solenoid valves, the terminal strip may be unplugged from the controller. When connecting the solenoid valves, begin at the left hand side of the strip. The first 2 terminals on the left are for the Zone 1 solenoid valve. The next 2 terminals would be for the Zone 2 solenoid, and so on. Terminals will accept up to 14 gauge wire. When wiring of the valves is completed, plug the terminal strip back into the controller.

When wiring the solenoids to the controller, make sure that each valve has its own “hot” and “common” wires. It usually does not matter which position (right or left) that they are attached. Some valves with diodes will cause LEDs to blink but still operate. Switch “hot” and “common” wires and restart unit. If solenoids share a common wire, make sure to wire “commons” to the odd numbered terminals.

**NOTE: Connecting a solenoid valve to the terminals assigned to operate the pump start relay will result in a solenoid valve that will remain continuously open.**

## 24vac Transformer and 20' cable with connector

All solenoid valves operated by **Gemini™** controllers must be rated at 24vac and should have an inrush current that does not exceed .5 amps. Most valves fit these specifications. A maximum of 1.6 amps is supplied by the controller to operate solenoid valves and the pump start relay.

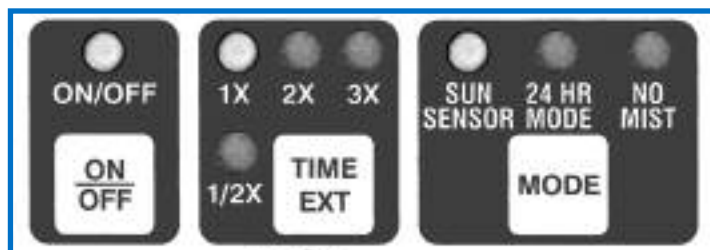
**Phytotronics®** offers a complete line of Solenoid Valves which are compatible with the **Gemini™** "A" misting controllers and the **Saturn™** watering controllers. Call your distributor or **Phytotronics®** for prices.



Each **Gemini™** "A" controller is supplied with a 120 vac to 24 vac plug-in transformer that has a 20 foot lead and is designed to operate on 60 Hz. The power cord is attached to the controller with a female, 3 prong connector inserted at the left hand side of the terminal strip. Initial plugging in of the 24 volt transformer supplies power to the controller. The built-in lithium battery supplies power to maintain all data should power be removed. If the unit was on when power is removed, (i.e., transformer unplugged or power failure) the controller will resume where it was before it lost power. If the unit was OFF when power is removed, it will start up in the OFF state. *If the power source is other than 120vac/60 Hz, a transformer rated for that source must be used.* **Phytotronics®** offers other transformers to be used with different power sources. Call your distributor or **Phytotronics®** for prices.



## Master Control Panel Switches and Their Functions - bottom row

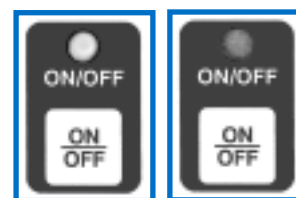


Master Control Panel - bottom row

### Turning on or off the Controller (ON/OFF)

When off, pressing the **ON/OFF** button turns the unit **ON**. The green LED at the top of the button lights, as do the LED's for **TIME EXTENDER** and **MODE** buttons.

When the unit is on and the **ON/OFF** button is pressed, the operator is prompted by the display to confirm the turn-off by the notation, "VERIFY OFF/ENTER". Press **ENTER** within 5 seconds to complete the turn-off procedure. If **ENTER** is not pressed within the 5 second delay, the unit resumes operation where it left off. All programs and clock time are retained when unit is turned off.

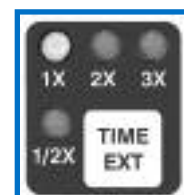


Unit "On" Unit "Off"

When the unit is off, the clock continues to get power from the 24 volt plug-in transformer. The LCD will continue to display the time that was entered. If no time was entered, the LCD will show "--:--". If the unit loses power, the lithium battery inside the controller will keep the time and programs intact, including time extender selection, operating mode, sunrise, sunset, footcandle set point, and the event list. The life expectancy of this battery is between 7 to 10 years.

### Using the Time Extender (TIME/EXT)

Press the **TIME/EXT** button to cycle through **1/2X, 1X, 2X, and 3X**. The appropriate LED light turns on for each selection. The **1/2X, 1X, 2X** and **3X** extensions, when chosen, will decrease (**1/2X**) or increase both seconds of on time *and* minutes between on time, by the multiplier chosen. EXAMPLE: The "Seconds of On Time" for zone 1 is set at 8 seconds,



and the “Minutes Between On Time” is set at 20 minutes. With the Time Extender set at 2X, the misting event is extended to 16 seconds and the interval between misting is extended to 40 minutes. Similarly, to decrease time, by setting the Time Extender at **1/2X**, the misting event is diminished to 4 seconds, and the interval between is diminished to 10 minutes. Switch settings for the **Sun -Sensor™** Start/Stop times are not affected by changes in the settings of the Time Extender function. The Time Extender Switch effects misting zone settings only.

## Four Modes of Operation - (MODE) - Explanation of each Mode

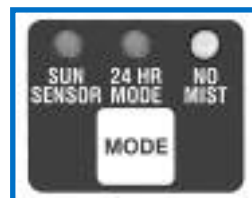
Press the **MODE** button to cycle through the four modes operation which are as follows:

### 1. NO-MIST mode - Suspension of misting and to be used for programming

This is a standby mode. When the controller is set to the **No Mist Mode** all misting cycles are suspended and the no mist LED will flash red. When the controller is plugged in for the first time and cycled to this mode, the clock may be set as well as the approximate times of sunrise and sunset. Once the controller has been in operation for more than 48 hours, the **Sun -Sensor™** will automatically set the actual times of sunrise and sunset.

All programming and program review is accomplished in this mode, as well as suspension of all misting. Pressing the **EVENT** switch or the **UP** or **DOWN** switch, allows a review or programming of the time, sunrise, sunset, footcandle setting and events 1-9.

This mode may act as an on-off switch to allow the grower to perform maintenance within the whole misting area. Any valve can manually be turned on in this mode. The misting cycle resumes where it was suspended upon exiting this mode.



### 2. Sun-Sensor™ mode

The **Gemini™'s Sun -Sensor™** light detector is cabled to the controller's internal computer and automatically senses the time at which dawn and dusk occurs. The unit is controlled by the **Sun-Sensor's™** Start/Stop settings. The times set on the rotary Zone Switches will control all misting times. All valves are off when the **Sun-Sensor™** detects night. Each day as the daylength changes, so do the internal settings. These settings, Sunrise and Sunset, can be reviewed on the display window to provide additional information to more accurately determine when misting should begin and when it should end.

When the controller is set to the **Sun -Sensor™ Mode**, the misting cycle begins and ends based on the hours selected before or after Dawn and before or after Dusk. Up to 5 hours before or after Dawn or Dusk may be selected. While in the **Sun -Sensor™ Mode**, start times and stop times are determined by the settings of “**On-At-Dawn**” and “**Off-At-Dusk**”. Any *programmed* event will not work in this mode. The green **Sun -Sensor™** LED is on when this mode is selected.



### 3. 24 Hour mode

This mode will allow up to 9 programmed events for independent user-defined settings of start and stop times of the misting cycles for **any zone** or **all zones**. An event may also be programmed to turn on a zone to operate continuously for any length of time.

When the controller is programmed to turn “on” at a certain time, it will begin misting on zone 1 and continue through all zones, as set by the rotary switches on the controller. The misting cycle will then stop cycling at the “off” time as programmed.

Events are programmed when the controller is in the NO MIST mode. When in the NO MIST mode, pressing the **DOWN** button several times will take you to the beginning of the event list. Each event consist of two parts, as shown on the next page.



### First Part

The figure at the right shows the first display of the event list. To move from one position to another, press the **HOUR/MIN** button. Position E1 stands for Event 1 and will stay constant.



The **UP** or **DOWN** button cycles through ALL, Z1, Z2, Z3, Z4, Z5, or Z6 on the **Gemini™ 6**. Position "ALL" stands for ALL ZONES.

Using the **UP** or **DOWN** button cycles through **CYCLE, ON, or OFF**. **CYCLE** programs the controller to activate the normal misting cycle with "seconds of on time" and "minutes between on time" as set by the rotary Zone switches. Selecting **ON**, will allow for continuous operation of the zone selected or all zones if selected. Selecting **OFF**, will allow for the stopping of the zone selected, or all zones if selected.

### Second Part

There are three parts to this display. Position E1 stands for Event 1 and will stay constant. The second position is the "STARTING OF THE EVENT" in hours and minutes. The third position is the "STOPPING OF THE EVENT" in hours and minutes. Pressing the **HOUR/MIN** button moves the "cursor" to the right.



Additionally, the controller can operate continuously if programmed to do so, over a 24 hour period with misting intervals set by each rotary Zone switch (i.e., turn "on" at 12:01 a.m. and "off" at 12:00 a.m.).

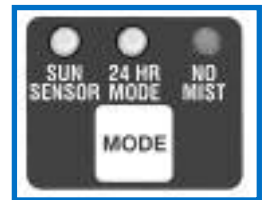
By programming a start time of 7:00 am and an off time of 5:00 pm, the controller will then start the misting cycle to automatically go on every morning at 7:00 am and turn off at 5:00 pm. This type of programming can be repeated up to 9 total events. See the section on setting the clock and programming misting events. When the controller is in this mode and no events are programmed, the display will indicate "NO EVENTS." This is a caution to the grower that means the controller is not programmed to begin misting at any time. This mode by-passes the **Sun-Sensor™ Mode** allowing the controller to start and stop the misting cycle at a set time as mentioned above. The green 24 HR Mode LED is on when the controller is set to this mode.

**See page 12 for programming an event**

**NOTE:** Should the mode be set to the "24 HOUR MODE" and there are no events programmed, the LCD display will show "NO EV", which means no misting will occur until an event is programmed.

## 4. Sun-Sensor™ + 24 Hour

While in this mode, the unit is controlled by the **Sun-Sensor™** and its settings, but the **24 HOUR MODE** overrides the **Sun-Sensor™** to permit the insertion of one or several misting intervals that would be desired *between* dusk and dawn. Such intervals are programmed into the controller. This also allows for a specific zone operation, (i.e., "Z2 OFF" while other zones are on). See section on setting the clock and programming misting events on page 12. If no events are programmed while in this mode, the display will show "NO EVENTS" to the right of the time. Both **Sun-Sensor™** and **24 HOUR MODE** LED's are on when the controller is set to these two modes.



**When the controller is set to the Sun-Sensor™ mode, 24 Hour mode, or both, the display will appear as seen on the right.**



**SEE THE FOLLOWING PAGE FOR INFORMATION ON "TIME-TIL-MIST" COUNTDOWN DURING THE MISTING CYCLE**



# Master Control Panel Switches and Their Functions - Top row

There are 8 mem-



brane switches on the Master Control Panel in the lower right hand corner of the controller. The three on the bottom row include the **ON/OFF**, **TIME/EXT**, and **MODE**

switches. The functions of these switches are described above.

*The remaining 5 switches are described in order of occurrence, from left to right below.*

**HOUR/MINUTE** - Provides access to the controller's internal clock. It is used in the NO MIST mode when setting the clock and the times of misting events to move the program cursor left to right. It is also used in conjunction with the **"UP"** and **"DOWN"** switches.

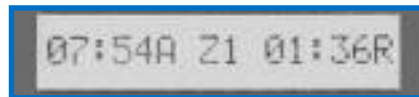
**UP & DOWN** - These 2 switches are used to select hours and minutes when setting the clock and times for misting events. They are also used to scroll to the "time-til-mist" of each zone. These switches are functional in all modes.

**EVENT** - Prepares the internal clock for the programming of misting events, sunrise and sunset. It is also used to scroll through each zone for the purpose of reviewing or editing these times. Operates in the NO MIST mode.

**ENTER** - This switch, when used in the NO MIST mode, allows programmed data to be accepted by the controller, when programming or editing misting events. Pressing **"ENTER"** two times in succession erases information shown on the LCD display. **"ENTER"** is also used in any mode to verify the shutting down of the controller when the **ON/OFF** switch is pressed.

## LCD Display

The LCD display serves many purposes to aid the grower with information and provide visual assistance in programming. The display is easy to read during daylight hours and emits a background glow that allows the display to be read in very low light and even at night.



## Time-til-Mist Countdown

During the misting cycle, the display window will show the current time at the left

side and a zone number (example - Z1) with the time remaining ("R") until that zone will begin misting again. Pressing the **UP** or **DOWN** membrane switch permits scrolling through each zone to review the next "time-til-mist" begins. This feature allows the grower to more accurately adjust the length of "on" time or "between on" time, based on the plant's condition and the moisture content of the media.



**PLEASE NOTE: When time remaining is in "hours & minutes", the hour & minutes displayed will NOT blink. When time remaining is in the "minutes & seconds", the seconds will blink indicating the times displayed are shown in minutes and seconds.**

# Zone Switch Operation and Description

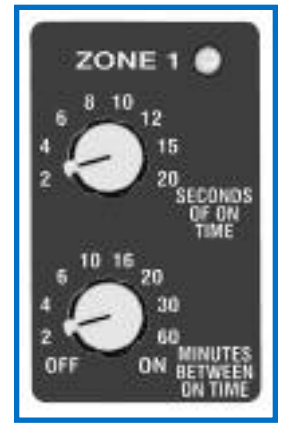
## Seconds of ON Time

The 6 zone G6A **Gemini™** controller has “Seconds of On Time” with 8 positions: 2, 4, 6, 8, 10, 12, 15 and 20.

## Minutes Between ON Time

Both controllers have “Minutes between On Time” switches with 10 positions: OFF, 2, 4, 6, 10, 16, 20, 30, 60 and ON.

The ON and OFF rotary dial positions turn valves “on” and “off” regardless of the operating mode. The principle of the complete misting cycle of the **Phytotronics®** controller is to have no more than 1 zone on at a time and to operate on a 2 minute cycle. The maximum “on” time of a zone of the G6A is 1 minute or 60 seconds per zone, (20 seconds at 3X time extender).



**Gemini™ 6A** -  
6-zone controller

The operational cycle of the 6-zone controller is divided into 6 time windows of 20 seconds. Each zone is assigned one of the windows. When activated, a given zone has its valve turned on at the start of a window and remains on for the number of “Seconds of On Time” set by the switch. Having completed its “Seconds of On Time”, the valve remains off for the number of cycles indicated by its “Minutes between on Time” switch.

**Gemini™** controllers are designed so that no more than one zone’s valve turns on at a time. Zones operate independently. It is possible, however, to manually turn valves on for simultaneous operation as long as no more than a current in-rush of 1.6 amps occurs at one time. The inrush current of each solenoid valve used in your system should not exceed .5 amps.

## Sun-Sensor™ Operation

The **Sun-Sensor™** is a phototransistor that senses light and detects sunrise and sunset based on footcandles of light sensed. It is attached to a 25 foot cable to permit proper location in the greenhouse. The **Sun-Sensor™** should be mounted to a truss, purlin, or other rigid mounting surface so that it cannot move. The recommended orientation of the sensor is slightly off vertical so that it can be pointed to the direction of sunrise and to the open sky at all times. A **Sun-Sensor™** clip is provided to hold the sensing unit securely in place. The clip may be secured into place with one of the cable ties provided.



Top: **Sun-Sensor™**  
cable & plug  
Bottom: **Sun-Sensor™**

### A. Placement and Care:

1. Mount the **Sun-Sensor™** securely to keep it from changing its orientation. Also be sure that it is not obscured by foliage, extrusions or other objects within or outside of the greenhouse.
2. Fasten the **Sun-Sensor™** cable with the cable ties along greenhouse structural members to prevent accidental snagging and pulling that could cause damage to either the **Sun-Sensor™** or the controller.
3. Be sure that the **Sun-Sensor™** placement will not expose it to chemical or fertilizer deposits.
4. Plug the **Sun-Sensor™** cable in on the right hand side of the terminal strip.
5. It is recommended to clean the top of the **Sun-Sensor™** once per year with a damp cloth, to maintain consistent performance.



## Sun-Sensor™ Operation

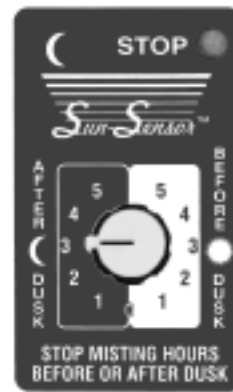
### Sun-Sensor™ Start

The **Sun-Sensor™ “Start”** block switch permits the starting of misting system up to 5 hours before dawn and up to 5 hours after dawn. When set at “0”, the **Sun-Sensor™** starts the unit at the normal occurrence of dawn.



### Sun-Sensor™ Stop

The **Sun-Sensor™ “Stop”** block switch permits the grower to end misting for the day up to 5 hours before sunset or up to 5 hours after sunset. When set at “0”, the **Sun-Sensor™** shuts the unit down at the normal occurrence of sunset.



## B. Sun-Sensor™ Start / Stop Rotary Switches

The **Sun-Sensor™** mode governs the daytime operation of the controller between sunrise and sunset, but can be modified by setting the **Sun-Sensor™** Start/Stop switches.

Misting cycles can be set to start up to 5 hours before sunrise or as late as 5 hours after sunrise using the “start” switch. Similarly, misting can be ended up to 5 hours before sunset or up 5 hours after sunset using the stop switch. There are 11 switch positions - 5 before, 5 after and “0” for each **Sun-Sensor™** block. This gives the grower considerable latitude in governing misting times.

## Footcandle Set Point

Light sensitivity of the **Sun-Sensor™** is set initially at 0 footcandles by the manufacturer. While the stated footcandle levels are specific, they represent a range of footcandle sensitivities. Five levels can be set at 10, 75, 125, 175 or 225 footcandles, (see the table below). These values are set at the factory and cannot be erased. Changes to the **Sun-Sensor™** threshold can be made in the “NO-MIST” mode. The higher settings will allow the controller to suspend operation on dark, overcast days, if necessary. When the dark cloud conditions pass, the **Sun-Sensor™** will reactivate the controller to resume misting where it left off. Remember this will cause the controller to turn on later in the day because of the **Sun-Sensor™** having to sense a higher footcandle level to turn on. If this is not a needed function, retain the factory preset level of 0 footcandles. The footcandle levels are necessary to activate the **Sun-Sensor™** to keep the daytime misting cycle operating.

<u>Stated level</u>	<u>Footcandle Range</u>
<b>SR-SS</b>	<b>Sunrise-Sunset</b>
<b>10</b>	<b>5 - 49 footcandles</b>
<b>75</b>	<b>50 - 99 footcandles</b>
<b>125</b>	<b>100 - 149 footcandles</b>
<b>175</b>	<b>150 - 199 footcandles</b>
<b>225</b>	<b>200 - 250 footcandles</b>

## C. Start-up operation with the Sun-Sensor™

When power is supplied to the controller, the **Sun-Sensor™** makes its determination of day or night. Since the controller’s clock has not yet detected sunrise or sunset, it will use pre-set times. These times are initially factory-set at 6:00 a.m. and 6:00 p.m., respectively. The **Sun-Sensor™** will automatically override the artificial times with actual times within 48 hours of being turned on. **In order for the Sun-Sensor™ to work properly, the controller’s clock must be set as described in the following section.** By setting the clock to your local time, the programming of events in the 24 Hour mode, (**Sun-Sensor™** +24 hour mode as well), can be accurately achieved. It is not necessary to set the actual sunrise and sunset times, since the **Sun-Sensor™** will recognize the actual times within 48 hours. The actual times for sunrise and sunset can be programmed, but must be done with the times selected lying within 1/2 hour before or after actual sunrise and sunset times. Either way, the **Sun-Sensor™ will override this programming with the actual time of sunrise and sunset within 48 hours of being turned on.**

## Programming the Clock

Press the mode switch to select the "No Mist" mode. Press the "HOUR/MIN" switch once and the hour time will begin to blink. Press the UP or DOWN buttons to the correct hour (Note: an "A" will appear for "am" and a "P" will appear for "pm". Be sure this setting is correct before setting minutes.) To set the minutes, press the "HOUR/MIN" button again. Press the UP or DOWN buttons again to change the minute settings. After the time is entered, press ENTER to store the time and move to the next function.

## Event Operation and Programming

Once the time on the clock is set, 9 additional misting or no misting events can be programmed for use in the 24 HOUR or Sun-Sensor™ + 24 HOUR MODE. It is important to understand that each misting event has an "ON" time and an "OFF" time and that each event must be separately programmed. If you use your Gemini™ 6A in the Sun-Sensor™ mode, it is not necessary to program events.

An event has the following parameters: Zone Selection, Their Functions of "On", "Off" or "cycle", Start Time & Stop Time. See example on the right.

### FIRST DISPLAY OF AN EVENT A - E

The following settings will be shown during the programming of an event as seen in the examples to the right

**A** - "E1" stands for Event 1 and will remain constant, "ALL" for all zones and "CYCLE" for misting cycle as set on the rotary zone switches in seconds of on time and minutes between on time.

**B** - Pressing the HOUR/MIN button cycles to the ALL field which will begin to blink, meaning it is ready for a program change. Pressing the DOWN button cycles the settings for all zones or any 1 of 6 zones.

**C** - Pressing the HOUR/MIN button again cycles to the CYCLE field which will begin to blink, meaning it is ready for a program change. Pressing the DOWN button allows for a change of CYCLE, ON or OFF.

**CYCLE** - This program setting programs the controller to cycle the controller based on the settings as indicated on the rotary zone switches as described in A above.

**D** - ON - This setting programs ALL zones or ANY ZONE to be ON continuously as if the rotary switch was set to ON.

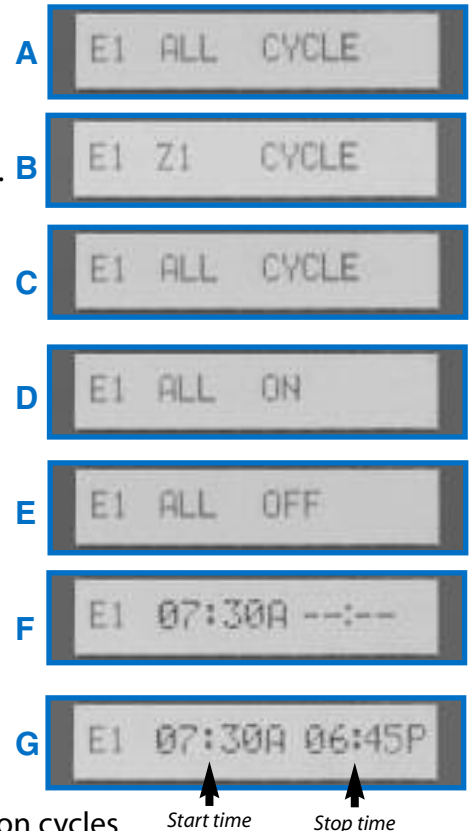
**E** - OFF - This setting programs ALL zones or ANY ZONE to be OFF continuously, as if the rotary switch was set to OFF.

Pressing the ENTER button stores all data and the second part of the event is displayed.

### SECOND DISPLAY OF AN EVENT F - G

**F** - "E1" stands for Event 1 ("E1 <sup>Start time</sup> \_\_\_:\_\_\_ <sup>Stop time</sup> \_\_\_:\_\_\_") and will remain constant. Pressing the HOUR/MIN button causes the hour in the "start time" to blink meaning it is ready for programming. Press the UP or DOWN button to set hour; press the HOUR/MIN button again causes the minute field to blink. Repeat the preceding steps to change the minutes.

Note: an "A" will appear for "am" and a "P" will appear for "pm". Be sure this setting is correct before setting minutes.



**G -** Press the HOUR/MIN button again causes the hour in the “stop time” to blink. Proceed in programming as described above under F. Pressing ENTER stores the time and proceeds to the next event. An event whose end time is earlier than its start time, will span midnight. (Example: If end time is 10 am and its start time 11 am, the event will run from 11:00am on one day and end at 10:00 am the next day. Always be sure your a.m. and p.m. settings are correct.) An event whose end time is the same as its start time is ignored.

**NOTE: PRESSING “ENTER” WHILE IN ANY TIME SETTING FIELDS OR MODE, CAUSES THE LCD TO DISPLAY “ENTER TO ERASE”. PRESSING ENTER TWICE, ERASES THE EVENT YOU ARE IN OR FIELD YOU ARE IN AND REVERTS TO THE FACTORY SETTINGS AND IS READY TO BE REPROGRAMMED AGAIN. TO MOVE TO THE NEXT FUNCTION WITHOUT ERASING ANY DATA, PRESS “EVENT”, “UP” OR “DOWN” BUTTON.**

## Programming in the *Sun-Sensor*<sup>™</sup> Mode

1. Press the **MODE** button until the *Sun-Sensor*<sup>™</sup> LED is on.
2. The *Sun-Sensor*<sup>™</sup> is connected to one end of a 25 foot long cable and must be placed where daylight will not be obstructed. A plastic clip is provided for holding the *Sun-Sensor*<sup>™</sup> element in place. The *Sun-Sensor*<sup>™</sup> cable is attached to the controller by a female, 2-prong connector inserted in the right hand side of the Zone Terminal Strip.
3. Select hours to start misting by setting the “START BEFORE/AFTER DAWN” rotary switch to the specific hours before or after dawn that you want the controller to begin its cycle. By setting the dial at 5 hours before dawn, the controller will remember the daylight/night length of the previous day and turn the controller on 5 hours before dawn. The light in the *Sun-Sensor*<sup>™</sup> block will come on 5 hours before dawn and count down the hours till dawn when it will go out. If set for 2 hours after dawn, the light in the *Sun-Sensor*<sup>™</sup> block will come on at dawn and count down the 2 hours till misting begins.
4. The “STOP BEFORE/AFTER DUSK” rotary switch works the same way, just relating to dusk.

**ADDITIONAL INFORMATION PERTAINING TO THE SUN-SENSOR<sup>™</sup>  
OPERATION AND PROGRAMMING CAN BE FOUND ON PAGES 10 AND 11.**

## Programming for the *Sun-Sensor*<sup>™</sup> + 24 Hour Mode

This combination mode permits the insertion of one or several misting events that would take place *between* dusk and before dawn the next day. A suggested use for this mode would be to apply several misting periods of mist over a propagation bed in a region with hot nights and low humidity for the purpose of cooling and supplying adequate moisture. Use the following steps to utilize this mode:

1. Press the **MODE** button until the NO-MIST mode LED (red) flashes.
2. Program an “E1 ON” and “E1 OFF” event as described earlier to occur during the period between “AFTER DUSK” and before “BEFORE DAWN”. A total of 9 events may be programmed during this night period. Press **“ENTER”** to accept misting time(s).
3. For initiating the events programmed, press mode button until both the *Sun-Sensor*<sup>™</sup> and the 24 Hour mode LED’s are lit up.

This mode will allow the *Sun-Sensor*<sup>™</sup> to operate the controller through the daylight hours but will override the night mode and allow the programmed events for night misting as necessary.

# Troubleshooting and Additional Information

## Blinking LEDs (Light Emitting Diodes)

Blinking of the LEDs occurs at a rate of 1Hz or 1/10 of a second. The following gives an illustration of the length of time the LEDs are on in a second to signify the existing problem:

1. 1/10 - open circuit - verify the solenoid is wired correctly.
2. 5/10 - bad switch or switch position is between numbers.
3. 9/10 - overload of current. Turn off the controller. Verify the solenoid is wired correctly and there is not a short caused by wires touching. Some valves with diodes will cause the LEDs to blink but still operate. Switch "hot" and "common" wires. After checking the wiring, turning the unit off and on again will reset LEDs. If overload signal still persists, call **Phytotronics®** for assistance.

## No MIST mode - There is no countdown in this mode.

In all modes other than mist, the following notations have priority:

- "OFF SW" indicates that a zone switch is turned to "off".
- "ON SW" Indicates that a zone switch is turned to "on".
- "BAD SW" shows if a rotary switch is not working correctly or is in between numbers.

## Sun-Sensor™ mode at night - Shows the time remaining ("R") until the start of daytime operation.

**24 Hour mode** - If an OFF event is in progress for the zone, the display says "OFF EV". If there are no such events, "NO EVENTS" is displayed. If a CYCLE event is in progress, the "time-til-mist" ("R" = time remaining) is displayed for that zone. Using the **UP/DOWN** buttons moves through the different zone displays.

**Sun-Sensor™ + 24 Hour mode** - If an OFF or ON event is in progress, time remaining is displayed. If a CYCLE event is in progress, the time until the zone's "time-til-mist" is displayed.

**Sun-Sensor™ + 24 Hour mode at night** - If an ON or CYCLE event exists for a zone, the time of the next event, or the time until the the start of daytime operation is displayed. If no such event exists, the time until daytime operation is displayed.

**Sun-Sensor™ +24 Hour and Sun-Sensor™ only modes** - If watering has stopped due to a false night detection, (i.e., heavy clouds) "LOW FOOTCANDLES" is displayed.



RHT4 Thermostat



Cap Mat™



DGT Misting Nozzle



Professional Light Meter



Bamboo Stakes

## Other Fine Products from Phytotronics®, Inc.



Pestick™



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Complete Misting & Watering Supplies



Pestrap™

# Limited Warranty

**Phytotronics® , Incorporated** (“we”) warrant to the original purchaser (“you”) that the product or system accompanying this warranty (the “product”) will be free from defects in material and workmanship existing at the time of manufacture and appearing within one (1) year from the date of original purchase. This warranty applies only so long as the product is stored, installed, operated and maintained in accordance with our recommendations, and when used under proper and normal use.

THIS WARRANTY SHALL BE EXCLUSIVE AND, TO THE EXTENT PERMITTED BY LAW, SHALL BE IN LIEU OF ANY OTHER WARRANTIES, WRITTEN OR ORAL, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

TO THE EXTENT IMPLIED WARRANTIES MAY NOT BE DISCLAIMED, THE DURATION OF SUCH WARRANTIES, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, IS EXPRESSLY LIMITED TO THE ONE YEAR PERIOD OF DURATION OF THIS LIMITED WARRANTY. In certain circumstances, some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

## When this Limited Warranty does not apply

This warranty does not cover claims resulting from failure to follow instructions on installation and use, neglect, misuse, accident, modifications, alterations, acts of God, vandalism, misapplication or repairs made by you or others, use of unauthorized attachments, use on a current or voltage other than specified, or overloading.

## Your remedies

If a covered defect appears during the warranty period, we will, (at our sole option), repair or replace the defective product at no charge for service or parts, provided that the product is delivered at your expense to our authorized service center. Parts and/or replacement product supplied under this warranty may be new or rebuilt at our option. Any product which is repaired or any replacement product will be covered under this warranty for the remainder of the one year period or for 90 days after repair or replacement, whichever is longer. THIS IS YOUR EXCLUSIVE REMEDY FOR BREACH OF THIS WARRANTY OR OF ANY IMPLIED WARRANTY OR OF ANY OTHER OBLIGATION ARISING BY OPERATION OF LAW OR OTHERWISE.

## What is not covered by the Limited Warranty

The warranty does not include reimbursement for the expenses of labor, transportation, installation, removal or any other expenses which may be incurred by you. For instructions on how to obtain warranty service, call 314-770-0717 or write to **Phytotronics®** Customer Service, 13688 Rider Trail North, Earth City, Missouri 63045 and see the accompanying Repair Policy.

IN NO EVENT SHALL WE BE LIABLE OR RESPONSIBLE FOR PUNITIVE, EXEMPLARY, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOST PROFITS, LOSS OF CROP, REVENUES OR SAVINGS ARISING OUT OF THE BREACH OR PERFORMANCE OF ANY WARRANTY OR THE USE OR INABILITY TO USE THIS PRODUCT FOR ANY PURPOSE WHATSOEVER.

YOUR EXCLUSIVE COMPENSATION FOR LOSS OR DAMAGE ARISING FROM PURCHASE, USE, REPAIR OR REPLACEMENT OF ANY PRODUCT SHALL BE LIMITED TO AN AMOUNT EQUAL TO THE PURCHASE PRICE OF THE PRODUCT. THIS LIMITATION OF LIABILITY SHALL BE APPLICABLE TO ANY CLAIMS PRESENTED TO US REGARDLESS OF THE LEGAL THEORY FORMING THE BASIS OF SUCH CLAIM, AND WHETHER SUCH THEORY INVOLVES NEGLIGENCE, CONTRACTUAL LIABILITY, FAILURE OF REMEDY OR OTHERWISE.

In certain circumstances, some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

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

## Repair Policy

Authorization to return products for service (whether or not under warranty) must first be obtained by calling 314-770-0717 or writing to **Phytotronics**® Customer Service, 13688 Rider Trail North, Earth City, MO 63045. Any product returned without proper authorization will not be accepted, and will be returned to the sender.

Product under warranty which is in need of repair is to be returned, postage prepaid, with a copy of the sale receipt or invoice and an explanation of the malfunction or defect. Product determined by us to be covered by the limited warranty will be, at our sole option, repaired or replaced and returned by standard UPS delivery service at no charge.

Product which requires service beyond the warranty period is to be returned, postage prepaid, with a check or money order made payable to **Phytotronics, Inc.**, for \$95.00. The standard charge for service and repair is \$95.00 and includes a 90 day original purchase limited warranty and return by standard UPS delivery service.

If the product requires service or repair in excess of the standard \$95.00 service charge, you will be contacted by **Phytotronics**® Customer Service to determine appropriate action. **Phytotronics**® Customer Service will provide an estimate of repair costs to you which will include a 90 day original purchase limited warranty and return by standard UPS delivery service.

Product which is inspected but not repaired or which is beyond repair will be subject to a minimum \$50.00 service charge to cover inspection and return by standard UPS delivery service. The remaining \$45.00 will be refunded to you.

If you request return by express or overnight delivery services, or postal services other than UPS, you will be billed for the additional charges incurred.

Emergency field testing can be done by calling **Phytotronics**® technicians.

We will make every reasonable effort to repair and ship your controller within 5 working days upon receipt. Our standard repair policy and practice require that every unit, whether new or repaired, be fully tested and inspected for proper operation, and exercised under full load for 24 hours prior to return.

THE LIMITATIONS DESCRIBED UNDER THE LIMITED WARRANTY APPLY TO ANY REPAIRED OR REPLACED PRODUCT, WHETHER OR NOT UNDER WARRANTY.

## Loaner Policy

Customers in need of a loaner controller may contact **Phytotronics, Inc.** at 314-770-0717. Loaners are available for the length of time it takes to repair your unit. The handling charge for loaners is \$45.00 and includes UPS freight charges for delivery of a loaner to customers in the continental United States. Loaners are shipped regular UPS unless the customer requests and agrees to pay for second day air or next day air UPS service. **Phytotronics, Inc.** reserves the right to require a \$45.00 prepayment and a deposit of 1/2 the commercial value of the controller prior to sending a loaner to customers who have been delinquent in the past, are currently past due, or do not have a previously established charge account with **Phytotronics, Inc.**

**NOTE: All fees for repairs and services described above are in U.S. dollars.**



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