

*Logic Plus-42*  
*and*  
*Logic Plus-128*

***Two Wire Irrigation Controllers***



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**MADE IN THE USA**

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**Specifications and Installation Instructions Read Entire Booklet Before Installing**

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**Please read the entire operational manual before installing and programming the Logic Plus Controller.**

**NOTICE: Before installation, receivers must all be programmed. See page 16 for receiver programming instructions**

## SPECIFICATIONS

### FEATURES

	<u>LOGIC Plus 42</u>	<u>LOGIC Plus 128</u>
Stations Available	1-42	1-128
Programs Available	8	16
Run Time Per Station	0-10 hours, 59 min. Max. 0-27 hours-use 250% budget	0-10 hours, 59 min. Max. 0-27 hours-use 250% budget
Programs 5 & 6	0-59 min., 59 sec. 0-2 hours 30 min.-use 250% budget	0-59 min., 59 sec. 0-2 hours 30 min.-use 250% budget
Calendar	0-28 days Max.,ODD/EVEN	0-28 days Max.,ODD/EVEN
Water Budget	0-250%	0-250%
Rain OFF Days	0-31 days Max.	0-31 days Max.
Pause	0-59 sec.	0-59 sec.
Programs Running Simultaneously	4	4
Maximum Valves Running Simultaneously	4	4
Valves Per Receiver	1	1
Master Valve/ Pump Start Output	1	1
Rain Sensor Capable	Yes	Yes

Radio Remote Capable	Yes	Yes
Fertigation Output	1	1
Field Wire Outputs	4	4
Minimum Wire Size	14 gauge	14 gauge
Maximum Wire Run	12,000 Feet	12,000 Feet
Maximum Number of Receivers	80	128
Receivers Programmable and Re-Programmable	Yes	Yes
On Board Receiver Programming Capability	Yes	Yes
Remote Receiver Programming use LP-HHRP	Yes	Yes

**Enclosure:**

Box - Stainless steel, locking, wall or pedestal mount.

Pedestal – Stainless steel

**See diagram page D3** for box and pedestal dimensions.

**Input Power:**

110VAC 60Hz or

230VAC 50Hz

**Grounding:**

Enclosure grounded to utility ground. SPD/Output board grounds with 8 foot ground rod. **See diagram page D5**.

**Surge/Lightning Protection:**

Controller Surge Protection is provided by an assembly mounted below the controller panel. This board and its components are like a sophisticated fuse. It will blow in an attempt to save the main circuit board from destruction by line

surges mainly created by lightning. It is connected to the main board with a simple cable for easy removal for testing and replacement if necessary. **See diagram page D2.**

Field Surge Protection is provided by the use of L-SPD-F devices. Designed to be installed in valve boxes every 200-300 feet and attached to a ground rod. Rod is customer supplied. **See diagram page D8.**

### **Field Wiring:**

Wire type: Single strand direct burial, Jacketed two conductor, or Stranded

Wire Size: Minimum 14 gauge

Wire Runs: Maximum 12,000 feet for each two wire path (4 available)

Branching&Teeing: Allowed but should be well planned and minimized.

Wire Color: Use of different colored wires is recommended for ease of wire run identification. Use different colors for each run and every tee or branch.

Wiring Installation: Each individual output, including branches or tees, should be kept separate from the wiring of other outputs.  
**DO NOT connect** the wires of a field output with those of another **OR** any branch or tee.  
**DO NOT “Loop”** the field wires back to the controller **OR** back onto themselves.  
**DO NOT splice and direct bury** wire connections/splices.  
All wire connections/splices should be made in valve boxes.

### **Maximum Valve Operation:**

A maximum of 4 valves, any where on the system, may operate simultaneously, of either same number or combinations of different numbers. The 4 valve maximum does not include the Master valve or Pump Start Relay.

### **Wire Connectors:**

One of the most critical installation requirements of a Logic Plus two wire system is the quality of your wire connections. If you follow these directions you will have a reliable, dependable control system for many years. It is suggested to solder all receiver (red wire) connections to your main two-wire run. Next install the soldered two-wire connection in a waterproof underground connector housing. When soldering is impractical, a waterproof “dry-type” Hit Products DBC-BR wire connector is required. The above mentioned product will provide an uncontaminated, dry connection. **See diagram page D13.**

**Do not use pre-filled wire nut connectors as they will impede the transfer of the signal through the wire splice.**

### **Pump Start Relay**

When using a pump start relay, the relay shall be a 24 VAC coil with a maximum inrush of .35 amps and holding .25 amps. The relay will act as a slave to the

magnetic relay to control the pump motor. You can use up to a 5hp Hit Products pump start relay attached directly to the relay terminal.

**See diagram on page D6.**

### **Fertigation**

The controller is fitted with a separate relay to operate a 24VAC system with a maximum inrush of .35 amps and holding .25 amps at 24VAC, for application of fertilizer or other material injection systems. A slave relay should be used to operate any auxiliary pumps or injection systems exceeding the above power requirements.

### **Rain Sensor**

The Rain Sensor terminal is located on the bottom right of the Controller board labeled “**RAIN OFF**.” These two terminal screws must be jumped with a wire to close the circuit and enable normal operation. This jumper wire is factory installed. It is to be removed if utilizing a “**RAIN OFF**” switch.

**Note:** Use only Rain Switches with “**Dry Contacts**.” (No Power) connect the “**Normally Closed**” contacts.

**See diagram page D7.**

### **Multiple Controller Installation**

Install a separate ground rod for each controller. **Do not** connect the field wires of one controller with those of another. Use slave or isolation relays if activating a common master valve. **See diagram page D11.**

### **Current Monitoring Feature**

This Feature can be accessed in three dial positions: “**Run**,” “**Semi/Manual/Program Clear**” and “**Test**.” The displayed number is a reference to current draw, not the number of valves running. The numbers range from 1-10 (10 being the highest). This is useful when troubleshooting “**Short Line**,” “**Valve Short**” or controller operation.

**Note:** When accessed in the “**Test**” position a reduced power level is sent to the field, which will result in a lower “**Current Monitoring Number**.”

### **Power ON**

A 15 second countdown / delay to “**Power ON**” the system on initial start up of any manual or automatic watering activity. This eliminates the need to have the system “**Hot**” with voltage at all times.

### **Controller Reset**

This reset button is to be used only when controller does not respond to any operator input and power has been removed, left off for a few minutes then re-applied. The push button switch is located just underneath the face plate.

**See diagram page D2.**

**Note:** Remove power before activating switch. Press and hold for 1-2 seconds. Restore power and do a “Master Clear”. All program information will be cleared.

**Accessory:**

Hand held programmer. For Programming  
Receivers away from the controller

**See diagram page D15.**

**Warranty:** Any Receiver returned for warranty must have the DBC-BR connection attached. If the DBC-BR is unattached, warranty is void.

## Logic Plus Installation “Do’s & Don’ts”

**For Warranty To Be Valid, Installation Must Comply To All Instructions Below**

1. Use only **LP-RP Receivers (Gray Molded Box)** with the **Logic Plus Controllers (LP-42, LP-128 and Uni-2 Plus)**.  
**Do not** use the L-RP (Black Molded Box) Receivers with the **Logic Plus** Controllers. Do not use the LP-RP (Gray Box) Receiver with the Logic 1, Logic 2, Logic 3 or Uni-2 Controller.
2. Branching and Teeing is permitted with Logic Plus. But should be well planned and minimized with care given using only waterproof DBC-BR splice kits. All wire connection/splices are to be made in a valve box. **DO NOT** bury connection/splices.
3. Logic Plus receivers must be directly attached to the 2 wire path; red wires to field wires, black wires to solenoid (See #4).
4. **Wire Connections**
  - A. All field wiring Connections of Logic Plus Receiver Red Wires (1 each to each of field wires) to field wires must use the enclosed DBC-BR splice kits. See instructions on back. **DO NOT USE PRE-FILLED GEL TYPE WIRE NUTS.**
  - B. All receiver to Valve Solenoid Connections must be waterproof, using “dry type” wire connectors (Hit Products DBC series or 3M™ DBY/DBR series™) and/or soldered and then installed in waterproof housings. **DO NOT USE PRE-FILLED GEL TYPE WIRE NUTS.**
5. **DO NOT** install the Logic Plus Controller, its Receivers or any Logic Plus Field Wire within 15 feet of any high voltage electrical panels, meters, pumps, equipment or controls.
6. Use with standard 24 VAC solenoids only. **DO NOT** use any with low power/diode bridge type solenoids.
7. Use different colored field wires for each wire in each two wire path.
8. Logic Plus provides 4 separate field outputs. Line 1, Line 2, Line 3 and Line 4. **DO NOT mix the wiring.**
9. On multiple controller Installations **DO NOT** connect any field wires of one controller with those of another. Each controller must have a separate ground rod.
10. **DO NOT** “loop” field wiring. At last valve on wire run, terminate line there. This is a computer, install it accordingly and it will serve you well. If you have any questions, please don’t hesitate to call the factory in California (800) 468-0071, ext. 331 for help. 8am-5pm, Mon-Fri.

## **INSTALLING THE LOGIC PLUS**

Mounting the controller.....When selecting the controller installation location, **make sure controller and all related wiring is a minimum of 15 feet from any high voltage control boxes, pumps or any high voltage equipment. This irrigation controller is a computer and should be installed accordingly.**

When mounting the **LOGIC PLUS** indoors, notice the "keyhole" shaped mounting slot as well as 2 mounting holes on the back of the controller. Use the template provided to locate mounting screw locations. Remove the four face plate screws and two lower panel screws to access enclosure mounting screws. To attach to wall studs, use a #10 screw, leaving 1/4" of the shank exposed to slip into the "keyhole" slot. To additionally secure the controller, drive additional screws through the bottom mounting holes into the stud or cross bracing.

When mounting the **LOGIC PLUS** outdoors, use the same procedure as above. When attaching the controller to hollow walls, masonry, or cinder blocks, use appropriate toggle bolts, masonry shields or compression drive bolts. For additional weatherproofing, run a silicon bead around the case between the controller and the wall. It is also recommended to fill mounting holes with silicon as well, to prevent water or insects from entering the controller.

**The LOGIC PLUS should be hard wired to the transformer by a qualified electrical technician. Use an approved GFI device and utilize proper grounding techniques using the green wire from controller transformer. This will help assure safety as well as performance and reliability of the Logic Plus controller. The manufacturer's warranty becomes invalid without proper grounding as per local code. See enclosed "Installation Diagram for Primary Wiring". Warning! When connecting the field receivers, make sure there is no power to the printed circuit board, controller and/or the receivers; this will prevent the shorting of receivers and controller.**

Unscrew the LOGIC PLUS bottom terminal plate and route the field wires (one to four sets) through the hole at the bottom of the controller. Secure each 2-wire run under the appropriate terminal on the terminal strip labeled "Line 1", "Line 2", "Line 3", "Line 4". If using multiple outputs, keep each 2 wire set independent. **Do not mix** output "Line 1" with output "Line 2", "Line 3" with "Line 4" or any other combination. It is strongly suggested to use different colored wires for each wire used. **See diagram page \_\_\_\_\_**

## **TEST BEFORE BACK-FILLING TRENCH**

To easily test for communication and wire integrity, connect each receiver to the field wiring at each planned location. It is not necessary for receiver to be attached to solenoid/valve for test, but O.K. if already connected. Do not allow black receiver wires to touch each other (short or ground) when testing. Manually sequence controller through each station number for minimum of 30 seconds, checking each activated receiver in the field for a continuously activated bright LED light on each receiver. A continuously activated bright LED light on receiver during station activation confirms satisfactory communication.

**Please read the entire operational manual before installing and programming the Logic Plus Controller.**

## **PROGRAMMING THE LOGIC PLUS 42 and LOGIC PLUS 128 CONTROLLERS**

The LOGIC PLUS Controllers are so easy to program because the four sets of black up/down arrow buttons correspond to whatever is directly above them in the display. You can toggle between ON and OFF, set hours, minutes, and seconds, or even select program numbers, valve numbers, and start times simply by using these up/down buttons located directly under their functions. The square feature button located to the right of the arrow buttons will access the functions listed when the dial is turned to the numbered position stated by each function.

The controller programming consists of 8 buttons to control the display, a twelve position rotary switch and a special function key for more special options. The 8 buttons that control the display are located directly below the portion of the display they control. Each set (two buttons) of buttons operates the display up or down for ease of getting to the function, number, valve or time desired. For ease of explanation, the following terminology will be used throughout these instructions. The set of buttons to the far left will be button **set 1**, directly right of these will be **set 2**, directly right of set 2 will be **set 3** and the last set or far right set will be **set 4**, the special feature button in the upper right of the control panel, will be referred to as **set 5**.

The main rotary dial has 12 positions just like the numbered hour positions on a clock 1-12. The rotary switch consists of the following positions and functions:

### **NOTE:**

When you first install your LOGIC PLUS 42 or LOGIC PLUS 128 controller, use the Master Clear feature to clear all possible information stored in the unit. Put dial in position 10, Press top right Up/Down key under "CLR" OFF. Push Advanced Feature button. Controller will automatically clear ALL programmable data except current date and time.

**NOTE:** See diagram page \_\_\_\_\_

### **Position 1**

Current Date/Current Time
---------------------------

Current Date: Set today's Date, use set 2 to set month, use set 3 to set day of month, use set 4 to set year, i.e.: 5/30/01

Current Time: Set time of day, use set 1 to change display from date to time, use set 2 to set hour (this will set A.M. or P.M.), use set 3 to set minutes, use set 4 to "Zero out" seconds.

**Position 2**

Pre Wet – Special Feature Button

Valve Run Times

Fertigation – Special Feature Button

**Set Valve Run Times:**

Use set 1 to choose the program, use set 2 to choose the valve number, use set 3 to set hours, use set 4 to set minutes. Input the total irrigation run time desired for each valve, including pre wet and fertigation time.

**Pre Wet and Fertigation option:**

Press set 5, the display will now be the same, except with the following changes, a “P” will show in front of Hours. Use set 3 or 4 to set amount of hours and minutes for the pre-wet time. Press set 5, again the display will stay the same except for a “F” that will show in front of hours, use sets 3 or 4 to set the amount of hours and minutes for fertigation.

**Definitions:**

Pre-wet will run concurrently at the start of the valve run time.

Fertigation will start at the conclusion of the programmed Pre-wet cycle and will automatically activate the fertigation relay (terminals located on the bottom of the controller board). If only fertigation time is programmed and no pre-wet time is programmed, fertigation will start at the commencement of the valve run time programmed. This relay will remain activated for as long as the fertigation is programmed. If the total valve run time is 15 minutes, pre wet for 3 minutes and fertigation for 5 minutes, then there will be 7 minutes remaining of valve run time after the fertigation cycle ends.

**NOTE:** At no time will the controller permit the total time of pre-wet and fertigation to exceed the total run time programmed. No pre-wet run times need to be programmed in order to run the fertigation mode.

**NOTE:** Programs 5 and 6 can only be set in minutes and seconds, as all other programs can be set in hours and minutes. The maximum run times can be set from 1 minute to 10 hours and 59 minutes on all programs except 5 and 6, which can be set for a minimum of 10 seconds to a maximum of 59 minutes and 59 seconds. With the water budget feature (position 8) these run times can be increased or decreased from 0% to 250% in 5% increments.

**NOTE:** A maximum of any 4 receivers/valves (any combination) may be operated simultaneously. Wire size must be designed for simultaneous multi-valve operation on same 2 wire run.

### **Position 3**

#### **Pause**

Pause: Use set 1 to choose the program, use set 2 or 3 to set desired time, use set 4 to turn master valve or pump start function ON or OFF during pause function.

#### **Definitions:**

Pause: Amount of time delay between sequential valve openings in a program

Master ON: Master ON will keep the master valve or pump relay ON during pause.

Master OFF: Will turn master valve or pump relay OFF during pause.

**Note: In order for the master valve to function, the master valve must be activated (see position 8 below) for that specific program.**

### **Position 4**

#### **Start Time**

To set start times, use set 1 to choose the desired program, use set 2 to choose the start number, (always use start 1 for the first start time after midnight and so on through start 8 (Logic Plus 42) start 16 (Logic Plus 128) use set 3 to set the hour of the start time, use set 4 to set the minutes of the start time.

**Note: The start time is part of the first leg of a preprogrammed function called “Diamond Settings” Refer to Diamond settings at the end of this programming guide for full details.**

### **Position 5**

#### **Total Run Time**

To review the total run time in a specific program, use set 1 to choose the program number. The total run time of that specific program is shown in the lower right hand position of the display. You can review the water budget setting along with the total run time in this position. If the water budget is changed from the default of 100%, the total run times will change in this position, but in position 2, the valve run times will stay as inputted. The actual running of the valve is determined by the input in position 2 multiplied by the water budget setting in position 8.

To review the numbered day of the calendar the controller is currently on, use set 1 to choose the program desired. The day of the calendar will be displayed directly right of the word “DAY” in the upper display. You can change the day of the calendar by using set 3 buttons. This will or can bring all days of all programs to the same day for calendar purposes.

**Note: By adjusting the budget up or down (0% to 250%) it will change the total run time. See position 8 for further discussion. The budget is the second leg of the Diamond Setting.**

## **Position 6**

### **Calendar**

The calendar is the third leg of the **Diamond Setting**. After programming the run times and the start times, the calendar will automatically establish the minimum calendar period. You can manually change the calendar to any desired period, longer than the minimum “Auto-calendar” period, but not shorter. By pressing set 1 to select the program, press set 2 to change the number of days desired in the calendar, (if the total run time exceeds one day, the calendar can not be set backwards. Press set 3 to review the days of the calendar. By pressing set 3 repetitively, the display above set 4 will show one of the following events: Strt (start), run or off for each day of the calendar. **Note:** The calendar automatically resets all programs to Day 1, today, for all programs when “Master Clear” is activated. The calendar automatically resets to Day 1, today, whenever a “Program Clear” function is activated for that specific program. The calendar automatically resets to today, Day 1, when any value in “Calendar” (Position 6) is changed. The calendar can be manually changed to any day including today in Position 5, “Total Run Time”. Day value has to be equal to or less than “calendar” number of days.

### **Definitions:**

**Start:** This is the day of the calendar that the program will start. This will be automatically set upon initial programming or set by the user. This is day 1 of the calendar, the day you set up the calendar or programmed the program or let the auto-calendar set up the calendar.

**Run:** The total run time of the program has carried over into the second or more days and the program will be running these days to complete.

**Off:** The user has programmed in additional days that the program will not be active.

**Odd/Even:** May be accessed by pressing Feature Key #6. Runtime must not go beyond 11:59p.m.

**Note:** **The number of days that the calendar automatically sets up is determined as follows: The number of hours from 12:00 midnight to the first start time plus the total run time, divided by 24 hours will equal the number of calendar days.**

For calculating the calendar for “Run” Times over 24 hours. This example is for 56 hours Run Time per Program.

**Example:** If a start time is 8:00 am, then the first calculation would be 8 hours plus a total run time of 56 hours for a grand total of 64 hours, divided by 24 hours would equal a 2.67 day calendar, the display would show a 3 day calendar, as follows, day 1 STRT, day 2 RUN and day 3 RUN. If you wanted to irrigate every 4<sup>th</sup> day, use set 2 to expand the calendar from 3 days to 4 days, day 4 would show OFF.

## Setting a 7 Day Calendar

1. Rotate the dial to the calendar position #6.
2. Select A Program A calendar will need to be set for each active program.
3. Set the number of days under “Cal” to 7
4. Set each day under “Day” to either “STRT” which indicated the program will start/run or “OFF,” which indicates the program will not run that day, i.e.

Sun	Day 1	Select Start or Off
Mon	Day 2	Select Start or Off
Tue	Day 3	Select Start or Off
Wed	Day 4	Select Start or Off
Thur	Day 5	Select Start or Off
Fri	Day 6	Select Start or Off
Sat	Day 7	Select Start or Off

5. **Turn the dial to position 5 “Total Run Time”.**
6. Select the program required.
7. Change Day 1 to correspond to current the day of the week, i.e. if today is Tuesday make it “Day 3”. If it is Thursday make it “Day 5”. This will align the day of the week with the calendar day.

**Note:** If at any time the information in the “Calendar” position is changed, the day in the “Total Run Time” position will reset to “Day 1”.

**Note:** To further understand the Diamond setting for calendar, read the Diamond setting on page 13.

## Position 7

Looping Program No. 6
--------------------------

Any valve run times and start times set in program 6 can be looped if desired. There must be individual run times for each desired valve and one start time in program 6 for looping to be activated. Use set 3 and set 4 to establish the total amount of loop time desired. Use set 2 to turn looping feature ON or OFF.

**Hints for using Looping:** Looping will run a program continuously for the amount of time set in position 7 looping. For example: If looping is set for 6 hours and the start time is 8:00 am, program 6 will start at 8:00 am and run for 6 hours. A new lawn can be irrigated for 5 minutes every hour by doing the following. Valves 1, 2 and 3 operate the new lawn, set run times for 5 minutes each on valves 1, 2 and 3, then go to a valve that is not being used and set run time for 45 minutes. You want to irrigate from 10 am until 5 pm. Set start time for program 6 at 10:00 am and go to position 7, set loop for 7 hours and turn looping ON. The program will start at 10 am and run valve 1 for 5 minutes, then valve 2 for 5 minutes and then valve 3 for 5 minutes and then the valve that is not being

used for 45 minutes and then back to valve 1 and so on until 7 hours runs out, which will be 5:00 PM.

**Caution! If operating with a pump, the 45 minutes will cause “Dead Heading” on the pump and may damage the pump or pipelines**

**Note:** Program 6 can be sensor activated, such as a temperature sensor. The terminals for remote operation are located on the terminal board and marked pr6trg (program 6 trigger). Program the amount of run times per valve in program 6, do not put in a start time, make sure the program is ON in position 8 and whether or not the master should run with program 6.

Program the amount of loop time in position 7. The contacts on the board are “Normally Open”, when the remote sensor activates and closes the contacts for more than 30 seconds, program 6 will operate for the looping time programmed.

If for any reason the remote sensor contact opens during the looping cycle, the looping cycle will continue until the programmed time is completed. The sensor must open and close the contacts to operate the looping cycle a second time. If, for any reason, the contacts open and close during the preprogrammed length of looping, the looping program will reset at that time and start over again.

**Position 8**

Program/Master Valves ON/OFF
------------------------------

Pump Start
------------

Water Budget 0% - 250%
---------------------------

Use set 1 to choose the program desired, use set 2 to turn a program ON or OFF (a fully programmed program can be disabled by the this function) use set 3 to turn the master valve or pump start ON or OFF during the program running, use set 4 to increase or decrease the budget feature of the program 0%-250%. (The amount of time in position 2 will not change in the display but the actual run time will be increased or decreased by the amount of budget %). The new “water budgeted” run times can be viewed in position 5.

**Note:** The water budget is the fourth leg of the Diamond Settings (see page 13 for more on the Diamond Settings).

**Position 9**

Test Cycle

**Current Monitoring- Special Feature Button**

Use set 1 to set run time in minutes, use set 2 to set run time of seconds for test cycle, and use set 4 to turn ON or OFF test cycle. Use set 5, Special Feature, to access the Current Monitoring feature.

The controller will immediately run each valve in sequence for the predetermined run time for visual review of the systems operation.

The Master Valve will activate automatically.

**Note:** The pause setting in position 3 for Program 1 will determined the amount of pause between stations during the test cycle operation.

**Position 10**

Semi/ Manual/ Program  
Clear

**Master Clear Current Monitoring- Special  
Feature Button**

**Semi-** use set 1 to choose the program you want to activate for one cycle, use set 2 to activate that program ON. Leave the dial in number 10 position. **[Rotating the dial will cancel the program.]** Set 5 will activate the Current Monitoring feature. At the conclusion, the controller will revert to automatic after 30 minutes, without putting the rotary switch back to "Run".

**Note:** 30 minutes after the conclusion of the selected program the controller will automatically revert to the "RUN" condition.

**Manual** — Press set 3 to activate manual mode, use set 1 to choose the specific valve number to be operated manually for a predetermined time, use set 2 to set amount of hours to run, use set 3 to set amount of minutes, use set 4 to tell the controller whether or not you want the master valve or the pump start on during this manual operation. Valve will immediately be activated for that period of time. Use set 5 to activate the Current Monitoring feature. Leave the dial in number 10 position. **[Rotating the dial will cancel the program.]** At the conclusion, the controller will go back to "RUN" mode without turning the rotary switch back to the "RUN" position. You can activate up to 4 valves at the same time in manual mode.

**Note:** 30 minutes after the conclusion of the selected valves the controller will automatically revert to the "RUN" condition.

**Program Clear:** Use set 4 to choose program clear, use set 1 to choose the program that you desire to clear all the information from, use set 4 to answer yes.

**Note:** By clearing the program all information for that program is deleted.

**Master Clear** will clear all the information in the controller by way of the following: Turn rotary switch to position 10, press set 4, and then press the special function set 5, "Master Clear".

**Note:** All programming data in all programs will be deleted. Only the current time and date will remain.

**Note:** Semi/Manual mode can be operated when controller is in "OFF" mode.

### **Position 11**

Rain Delay Auto/On/Off

To set days of delay (controller will not run for the number of days set) press set 1 for the number of days of delay, remember the new day starts at midnight. To turn controller ON or OFF press set 4 to turn controller ON or OFF. In the OFF position, controller will keep time but no output will be made to activate valves on any program.

### **Position 12**

Run  
Program Receivers

### **Current Monitoring – Special Feature Button**

In the "Run" position the controller will execute all that it has been instructed it to do. Adding new or changing existing information can be done at anytime, even with a program running. As soon as dial is rotated and new instructions are input, the controller will interrupt any on going activity and accept the new instructions. When the dial is returned to the "Run" position scheduled activity will resume.

Use of the Feature button while a program is running will access current monitoring. Use of the feature button with no program running will access receiver programming. **See "Logic Plus Receiver Programming Instruction."**

**Note:** A 15 second "Power On Delay" will be displayed at the start of a program.

## **Logic Plus Receiver Programming Instructions**

When programming a receiver with a controller that is installed with the **field wires connected**:

1. Set the controller in the OFF position. Turn the rotary switch to position 11 (Rain Off/Auto On/Off) use the top right arrow key to turn the setting from ON to OFF. This will stop any program that is running and prevent any from starting while programming receivers.
- 2. Disconnect the field wires.**
3. Set the Rotary switch to the "Run" position. Position 12.
4. Press the "Feature" key to access the "Set Decoder ID" screen.
5. Connect the red wires of the receiver to the "Programming Port" at the bottom of the controller board; one red wire in each position.
- 6. Be sure black receiver wires are not touching.**
7. Using the arrow keys corresponding directly underneath the ID number in the display (set 3) select the desired number for that receiver.
8. Press the arrow key corresponding to "Enter" on the display (right up set 4).
9. The LED on the receiver will flash three (3) times.
10. Remove the red leads.
11. Install "Receiver Number Identification Tag" (see below listed instructions).  
**If programming more receivers repeat from step 5.** (see "Receiver Programming Leads" below.)
12. To end programming press "Feature" key to return to run. Controller will not resume "Run" automatically.
13. Re-connect field wires.
- 14. Set the Controller back to ON to resume Auto Programming.** Rotate the dial to position 11. Use the top right arrow key to turn the setting from OFF to ON.

**Receiver Programming Leads Using Alligator Clips (these may be used when programming multiple receivers.)**

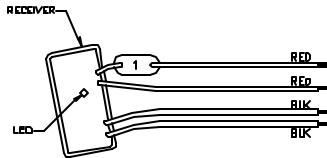
1. Disconnect the field wires.
2. Insert the wire end into the screw terminal of the "Programming Port". One wire per screw terminal.
3. Attach one alligator clip to one receiver red wire.

**DO NOT ALLOW THE ALIGATOR CLIPS OR RECEIVER BLACK WIRES TO TOUCH (SHORT) WHILE PROGRAMMING.**

## Programmable Receiver Number Identification Tags

Hit Products has developed a user friendly, flexible means to identify the number of the field-programmed receivers during the receiver programming process. Inside every box of programmable receivers, you will find one set of identification tags numbered 1-128. You will use these receiver identification tags as follows:

1. Every time a receiver is programmed, find the corresponding numbered identification tag and immediately attach to receiver.



2. To attach identification tag to receiver, insert one red receiver wire into the hole (from front to back) to the left of the appropriate numbered tag as you are looking at the number. Pull red wire all the way through the hole until identification tag is approximately one inch from body of receiver.

**Note:** This will leave the engraved number unobstructed by the wire.

3. Insert same end of same red wire back through hole (from back of tag towards front) and continue to pull wire through until tight. The number on the tag should now be readily visible and the black wire positioned on back (blank side of tag). See above.
4. Should receiver ever be reprogrammed to a different number, make sure to replace the identification tag with the appropriately numbered identification tag. Failure to do so can create extreme confusion!

## **DIAMOND SETTINGS**

The DS, as we call it, is an automatic calendar setting after run times and start times are entered. The DS will set the minimum days of the irrigation calendar. This is to protect against overlapping within a program. After initial programming of the Logic Plus, run times and start times, the DS will not allow you to enter additional run times or increase the budget so that it will exceed the current calendar days set.

If you are unable to increase run times, check your “total run time” in position 5. If the “total run time” for that program is close to the number of current calendar days for that program you may have to increase the number of calendar days to get the controller to accept increased run times, increased water budget or adding more valves with run times to that program. The same is true of increasing the water budget; the calendar may have to be extended to accommodate the extended run times to allow the program to complete its cycle.

The DS sets the calendar automatically as follows. The start time entered is calculated as to how many hours past 12 midnight it is, for example an 8AM start time would be 8 hours from midnight or the start of that day, then the DS looks at total run times including pause time and adds the time from midnight to the start time together. **If the total time exceeds 24 hours the calendar is set for two days**, if the total time exceeds 48 hours the calendar is set to a three-day calendar and so on. The first day will be set as a STRT day (Start) the following day will be “run” days. The day you programmed this program, automatically becomes day 1 of the calendar, for example a three-day calendar programmed on Monday would look like the following:

Day 1 STRT would be Monday  
Day 2 RUN would be Tuesday  
Day 3 RUN would be Wednesday  
Day 1 STRT would be Thursday  
Day 2 RUN would be Friday

And so on; please note that any calendar not divisible by 7 will run on different days of the week as the year progresses. If the above example were changed to a five-day calendar the days 4 and 5 would show OFF.

**Note:** It is important to remember if the total run time of a program is under 23 hours and 59 minutes; the DS automatically sets the calendar to one day. Even if the start time is set to allow the program to run past midnight into the next day. The same is true if multiple start times are used in the same program and the total runtime of the program multiplied by the number of start times is under 23 hours and 59 minutes. The DS will not allow multiple start times that total more than 23 hours and 59 minutes.

## Two Wire Operation

### Controller Operation

When the controller is activated by either “Auto” programming or a “Manual” Input, the power plus an encoded signal is supplied to the four field Outputs.

### Receiver Operations

The Receiver operates as an electronically controlled switch. When the receiver recognizes the encoded signal that matches its programmed data, it then allows or “switches” power to the solenoid at the valve.

Each receiver has a Red LED that will light when the receiver is “switched” or activated. When testing or troubleshooting, this LED is a convenient indicator of the Receiver Status. Lit condition indicates that the signal and power are present and the Power is being sent to the solenoid.

An unlit condition indicates the receiver is not activated. This is an indication that the power and/or signal is not present.

### Line Short/Valve Short Codes

The controller, through its current monitoring ability, can display two fault conditions: One being “Short Line” the second being “Valve Short.” These faults are triggered when current draw has exceeded a present level.

**Note: No Output is sent to the field during these conditions.**

- If this current draw is sensed at a programs initial start a line short will be displayed.
- If the current draw is sensed during a valve run time then short valve with a valve number will be displayed.

Short line will retry after 20 minutes. Turning the dial out of “Run” and back will clear the display. The controller will then try to continue any scheduled program. If the short has not been corrected the controller will go back into “Line Short.”

“Short Valve” will stay displayed during the valve run time. The controller will monitor the program status and operation will resume when the next valve is activated. If the problem has not been corrected by the time the controller is scheduled to Run again the “Short Valve” will repeat.

**Note: These codes are designed to protect the controller and transformer. In extremely long wire runs the current level may not be reached to activate “Short” due to line loss.**

## **VALVE WIRING**

The field wiring from the controller to the receivers consists of either one, two, three or four, 2-wire runs, which connect, in series, to each valve location. Each 2-wire run is totally independent of the other relative to wire size requirements and the number of valves operating simultaneously. All four 2-wire runs receive and output the exact same information. The purpose of four independent 2 wire runs are for reducing the potential amount of “back tracking” when valves are located in more than one general direction from the controller. Theoretically, with the Logic controller located in the center of an irrigation project, one 2-wire run would go one direction and the second, third and fourth could go in other directions. Each 2-wire run starts at the controller and ends at the last receiver/valve for that wire run.

**1) Do not loop the field wires back to the controller.**

**2) Do not connect field wires of one 2-wire run with those of another. Each run is independent.**

**3) Do not connect the field wires of one controller with those of another controller.**

For the main 2-wire runs, it is very important to size the wire properly. Consideration for designing the proper wire size includes the total wire distance from controller to the farthest receiver and how many valves will be operating simultaneously. Wire size must be designed using Ohm’s law for any application.

The field wiring should consist of one to four continuous main 2 wire runs starting at the controller terminal labeled “Line 1,” “Line 2,” “Line 3,” “Line 4” and continuing to the last receiver/valve of that wire run. If using the multiple output feature, use one continuous length of wire independently for each output. Every receiver is to be connected directly anywhere on one of your main two-wire continuous runs. **The last receiver installed is the end of the main two wire run.** You may operate a maximum of four of the same numbered receivers or four valves maximum of any random numbered receivers at any one time. This will affect the wire size, as more power draw will be needed. (See wire-sizing guide.)

Use the following formula when designing your wire size for each Logic Plus 42 wire run. Consult attached wire charts to insure proper wire gage. Minimum wire size and type is 14 Ga. Always use direct bury, heavy jacket, solid core copper wire.

**WIRE CONNECTIONS:**

One of the most critical installation requirements of a Two Wire system is the quality of your wire connections. If you follow these directions you will have a reliable, dependable control system for many years. It is suggested to solder all receiver (red wire) connections to your main two-wire run. Next install the soldered two-wire connection in a waterproof underground connector housing. When soldering is impractical, a waterproof "dry-type" connection such as the Hit Products DBC-BR wire connector is required. The above mentioned products will provide an uncontaminated, dry connection. **See diagram page D13.**

**Do not use pre-filled wire nut connectors as they will impede the transfer of the signal through the wire splice.**



Display is flashing "Rain Off"	Power is being supplied to Rain Off connector	Incorrect Rain Switch
Controller displaying reads "Valve Short" with a valve number	High current draw during valve run time	<ol style="list-style-type: none"> <li>1) Possible bad solenoid</li> <li>2) Shorted wires between receiver and solenoid</li> <li>3) Possible bad receiver</li> </ol>
Display frozen, does not respond to rotating valve	Micro is locked	<ol style="list-style-type: none"> <li>1) Turn power off for a minute, then back on</li> <li>2) Press Reset Button (DO NOT press and hold). Button is located on the P.C. board just under the face plate. See pg <a href="#">D2</a></li> </ol> <p><b>Note: All information will be lost. Be sure to do master clear before programming.</b></p>
Display reads 'SPD Board Not Attached'	Controller does not sense SPD BA	<ol style="list-style-type: none"> <li>1) Interface cable not connected</li> <li>2) Bad Connector/Cable, reseal connectors</li> </ol>
Valves Turning ON/OFF during run time	Possible EMF interference	Check: Controller, Receivers and Field Wiring location in respect to any high voltage.