PRO-Two 2 Wire Controller



Two Wire Irrigation Controller Installation and Operating Instructions

Manufactured by Hit Products Lindsay, CA USA

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SPECIFICATIONS

FEATURES PRO-TWO

Stations Available	1-16
Programs Available	6
Run Time Per Station (In min and/or hrs.) Programs 1-5	0-10 hours, 59 min. Max. 0-27 hours-use 250% budget
Run Time Per Station (In sec and /or min.) Program 6	0-59 min., 59 sec. 0-2 hours 30 minuse 250% budget
Calendar	0-28 days Max., Weekly, Odd/Even
Irrigation Water Budget by Program	0-250%
Programmable Rain OFF Days	0-31 days Max.
Pause - Between Stations	0-59 sec.
Programs Running Simultaneously	2
Maximum Valves Running Simultaneously	2 Plus Master Valve or Pump Start
Valves Per Decoder	1
Master Valve Pump Start	Yes using Programmed PRO-TWO Decoder Yes using Programmed PRO-TWO Decoder
Rain Sensor Capable	Yes
Field Wire Outputs	1, wire path may be branched and teed as necessary.
Minimum Wire Size	18 gauge
Maximum Wire Run	2,000′
Maximum Number of Decoders on system	25
Decoders Programmable and Re-Programmable to desired valve number	Yes
On Board Decoder Programming Capability at Controller	Yes
Remote Decoder Programming use LP-HHRP	Yes

Input Power: 100-230VAC 50/60Hz

12 Volt Solar

Controller Surge Protection:

Surge protection is provided by circuit board components, and connection to a Grounding Rod. Rod is customer supplied.

Field Surge Protection:

Is provided by the use of LP-SPD-F devices. Designed to be installed in valve boxes every 200-300 feet or as needed and attached to a Grounding Rod. Grounding Rod is customer supplied.

Field Wiring:

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

Wire Size: Minimum 18 gauge

Wire Runs: Maximum 2000'

Branching & Teeing: Yes

<u>DO NOT "Loop"</u> the field wires back to the controller OR back onto themselves. **<u>DO NOT splice and direct bury</u>** wire connections/splices. All wire connections/splices should be made in valve boxes.

Maximum Valve Operation:

A maximum of 2 valves, any where on the system, may operate simultaneously, of either same number or combinations of different numbers. The 2 valve maximum does not include the Master valve or Pump Start Relay.

Wire Connectors:

One of the most critical installation requirements of a PRO-TWO 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 decoder (red wire) connections to your main two-wire run. 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, reliable dry connection.

A DBC-BR Kit (1 each) is included with each PRO-TWO Decoder.

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 current of .35 amps and a maximum holding current of .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 (24 VAC at .35 amp in rush and .25 amp holding) attached to a "M.V. / P.S. Decoder" connected to the field Two Wire path.

Rain Sensor

The Rain Sensor terminal is located on the bottom center of the Controller board labeled "RAIN OFF." Note: Use only Rain Switches with normally closed "Dry Contacts" (No Power).

See Rain Sensor on page 12 of Programming Instructions for more information.

Multiple Controller Installation

Install a separate Grounding 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 or pump start relay.

Power ON

There is a 5 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.

Accessory:

Hand held programmer. For remotely Programming Decoders in the field or office. Part Number LP-HHRP

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

Dimensions:

P2 11"x11"x3.5"

P2I Controller 7"x5"x3" P2I Power Supply 5.5"x2.25"1.5"

PRO-TWO Installation "Do's & Don'ts"

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

1. Use only PRO-TWO-D Decoders the (Black Molded PRO-TWO Box) with the PRO-TWO Controller.

2. Branching and Teeing of field Two Wire path is permitted with the PRO-TWO Controller System. Wire splices 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 any connection/splices.

3. PRO-TWO Decoders must be directly attached to the 2 wire path; red wires to field wires, black wires to solenoid.

4. Wire Connections

A. All field wiring Connections of PRO-TWO Decoder Red Wires (1 each to each of field wires) to the 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 Decoder 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 PRO-TWO Controller, its Decoder or any PRO-TWO 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. On multiple controller Installations DO NOT connect any field wires of one controller with those of another. Each controller must have a separate Grounding Rod.

8. DO NOT "loop" field wiring. Terminate the field wires at the last valve on that 2 wire path.

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. 115 for help. 8am-5pm, Mon-Fri.

PRO-TWO

INSTALLING THE PRO-TWO

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

<u>When mounting the PRO-TWO</u> 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 location. To attach to wall studs, use a #8 screw, leaving 1/4" of the shank exposed to slip into the "keyhole" slot.

When mounting the PRO-TWO 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.

Please read the entire operational manual before installing and programming the PRO-TWO Controller.

PROGRAMMING THE PRO-TWO Controller

The PRO-TWO Controllers are so easy to program because the four sets of blue 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.

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 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:

With a new installation be sure to do a "Master Clear" before programming. Rotate the Dial to position 10. Using the **set 4** arrow buttons press the up arrow button under "**CLR/OFF**" on the Display. The Display will change. Press the same arrow button, under the word "Yes" again. The display will prompt you to. "**Please Wait**". When the display changes. Rotate the Dial to start programming.

POWER CONNECTION



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FIELD WIRING



VALVE WIRING

The field wiring from the controller to the decoders consists of one, 2-wire run, which connects in series, to each valve location. The 2-wire run starts at the controller and ends at the last decoder/valve for that wire run. See Pg. 8

1) Do not loop the field wires back to the controller or any part of the field wiring. 2) Do not connect the field wires of one controller with those of another controller.

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 decoder (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.

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

Master Valve / Pump Start Decoder Wiring

A "Master Valve / Pump Start Decoder" (part # P2-D) is necessary for the Controller to operate a pump or master valve in conjunction with the PRO 2 Controller. This utilizes a standard PRO 2 Decoder that is programmed using the same method as programming the numbered decoders, at the Controller. The MV/PS programming code for programming the individual decoder is found in between valve # 16 and valve # 1 displayed as "MSTR" in the Decoder programming sequence. See section "Pro 2 Decoder Programming Instructions" for details in programming decoders, including the Master Valve / Pump Start decoder.

Once the decoder is programmed properly, the decoder needs to be connected to the Controller's 2 wire path. The field 2 wire path may be teed / branched to accommodate the location of the Master Valve or Pump Start Relay location. The MV / PS programmed decoder must be installed within 18" of the connection point to the Pump Start Relay or Master Valve Solenoid. (Do not install MV / PS decoder at a random location on the 2 wire path and then extend the black leads from the decoder to the Pump Relay or Master Valve Solenoid beyond a distance of 18") **See Page 23**





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RAIN SENSOR



PROGRAMMING THE PRO-TWO

Position 1

Current Date/Current Time

Current 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.

Current Date: 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

Valve Run Times

Input 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.

NOTE:

Program 6 valve run times can only be set in minutes and seconds. All other programs valve run times 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 6, which can be set for a minimum of 3 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 2 decoders/valves (any combination) may be operated simultaneously.

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:

<u>Pause:</u> Amount of time delay between sequential valve openings in a program <u>Master:</u> MSTR ON will keep the master valve or pump relay ON during pause. MSTR OFF will turn master valve or pump relay OFF during pause.

Note: In order for the master valve to function, and the "MSTR ON" Feature to be activated the master valve must be activated (see Position 8 below) for that specific program.

Position 4 *Start Time*

To establish program 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 #6 as desired use set 3 to set the hour (A.M. and P.M.) of the start time, use set 4 to set the minutes.

NOTE:

The **Start Time** is part of the first leg of a pre-programmed function called <u>"Diamond Set-tings"</u> 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. When a 7 day Calendar has been selected. The day of the week will be displayed.

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. To program for ODD/EVEN use the set 2 buttons to scroll to the ODD/EVEN display use set 3 or set 4 buttons to turn ODD/EVEN ON/OFF. Rotate the dial when selection is made.

Note: To exit "ODD/EVEN" and return to the daily calendar set both ODD and EVEN to off and rotate the dial out of position 6 and back.

Note: Setting a 7 Day Calendar using the **set 2** arrow buttons. Select "**Cal 7**". The actual days of the week will appear under Day in the third column. Use Set 3 to change days, use set 4 to select STRT or OFF

Definitions:

<u>Start</u>: 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.

<u>**Run:</u>** 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.</u>

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

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 4th day, use set 2 to expand the calendar from 3 days to 4 days, day 4 would show OFF.

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

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 for more on the Diamond Settings).

Position 9

Test Cycle

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.

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

Note: The Master Valve setting and the pause option value for program 1 will be used for the test cycle.

Position 10

Semi/ Manual/ Program Clear/Master Clear

<u>Semi</u>- 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.] At the conclusion, the controller will revert to automatic after 30 minutes, without putting the rotary switch back to "Run".

<u>Note</u>: Within 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. Leave the dial in number 10 position. **[Rotating the dial will cancel the program.]** At the conclusion, the controller will resume the Auto Function 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.

<u>Master Clear</u> will clear all the information in the controller by way of the following: Turn rotary switch to position 10, press set 4, two times.

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

Delay Rain ON/OFF Auto ON/OFF

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.

Rain Sensor To set the Controller to recognize a Rain Sensor use set 3 button to set to ON. When a Rain Sensor is not used leave setting OFF See Diagram.

<u>Auto Functions</u> Use Set 4 buttons. When OFF No Auto Functions will occur. The Manual and Semi Auto Functions can be used and the controller will keep day and time.

Position 12

Run Program Decoders

In the "Run" position the controller will execute all that it has been instructed 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.

To Program Decoders see PRO-TWO Decoder Programming Instruction pg13.

PRO-TWO Decoder Programming Instructions

1. Set the controller in the Off position, Turn the rotary switch to position #11 (Rain Off Auto On/Off) use the (SET 4) 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 decoders.

2. Disconnect the 2 field wires if connected at the Terminal marked Line Out.

3. Set the Rotary switch to the "Run" position. Position 12.

4. Press (SET 1) arrow key up to access the Set Decoder ID screen.

5. Connect the two red wires of the decoder to the programming port at the bottom of the controller board marked "**PROG**". One Red wire in each of the Terminals marked Red.

Connect the decoders' 2 black wires to the position marked "check". One black wire each in the Terminals marked Black. See below.

6. Using the arrow key corresponding directly underneath the ID number in the Display (Set 2) arrow key select the desired number for that decoder.

7. Press the arrow key corresponding to "ENTER" on the display (right up SET 4).

8. The LED on the controller marked "PROGRAMMING LED" will flash 3 times.

9. Remove the red and black leads.

10. Install "decoder number identification tag"

11. If programming more than one decoder repeat from step 5.

12. To end programming press (SET 1) down arrow key. Controller will

not resume "RUN" automatically.

13. Re-connect the field wires.

14. Set the controller back to ON to resume Auto programming. Rotate the dial to position #11. Press (SET 4) arrow key to turn the setting from OFF to ON.15. Rotate Dial to Run position #12.

Note:

DO NOT PROGRAM DECODERS WITH SOLENOIDS CONNECTED. SEE FOLLOWING PAGE

DECODER PROGRAMMING



PROGRAMMING ALLIGATOR CLIPS

- Connect the red wires of the programming alligator clips to the programming port at the bottom of the controller board marked "**prog**" one red wire in each of the terminals marked red.
 Connect the programming alligator clips` black wires to the position marked "**check**" one black wire in each of the terminals marked black.
- Connect the decoders` red and black wires to each of the corresponding programming alligator clips` red and black wires.



Programmable Decoder Number Identification Tags

Hit Products has developed a user friendly, flexible means to identify the number of the field-programmed decoders during the decoder programming process. Inside every box of programmable decoders, you will find one set of identification tags numbered 1-16. You will use these decoder identification tags as follows:

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

2. To attach identification tag to decoder, insert one red decoder 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 decoder.

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

4. Should decoder 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!

Pump Start / Master Valve Wiring



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 PRO-TWO, 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 and an encoded signal is supplied to the Line Out Terminals.

Decoder Operations

The Decoder operates as an electronically controlled switch. When the decoder recognizes the encoded signal that matches its programmed data, it then allows or "switches" power to the solenoid on the valve.

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 pre-set level.

Note: No Output is sent to the field during the following conditions:

- If excessive current draw is sensed at a programs initial start a "<u>Line Short</u>" will be displayed.
- If excessive current draw is sensed during a specific valve run time then "<u>Short Valve</u>" 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 that specific valve's run time. The controller will monitor the program status and standard 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 for that specific valve until the short is repaired. No irrigation will occur for that specific valve's run time but all valves that do <u>not</u> have a "short" condition will continue to irrigate as programmed.

Note: These high current draw codes are designed to protect the controller and transformer. In extremely long wire runs the current level may not be reached to activate "Line Short" or "Short Valve " due to line loss.

TROUBLESHOOTING HINTS FOR PRO-TWO TWO WIRE SYSTEMS

PROBLEM		SOLUTION
Display Blank	No Power	 Check: 110v or 220v supply and connections. Correct as needed Check: 12 V Power at the controller board terminals.
Controller Operates in "Manual" or "Test" but not in "Auto"	Incorrect Programming Controller is OFF Program is OFF No start times Calendar not set correctly Water budget set at zero	Correct Programming See the Programming section of this Manual
Controller Displaying "Short Line" or Turn- ing ON/OFF and "Clicking"	 High Current Draw 1) More than 4 valves activating 2) Short field wires 3) Field wires of one controller connected to field wires of a second controller 	 Possible failed Decoder Field wires shorted
No Valves Activating	 Controller not activating Field Wire Connection 	 See "Controller Operates in Manual and Test but not Auto" Line Check the "Out" wire connections at the Controller. Failed Controller Replace Panel
Single Valve not Activating	 Bad wire connection Failed Decoder 	1) Check Decoder Wire Connection 2) See Decoder Operation
Multiple Valves not Activating	1) Field wiring or connections	1) Check wiring and connections between the last valve working and the first valve not working.
Display reads "Rain Off"	Controller is in Rain Off condition	1) Rain Switch has activated a bad connec- tion from Controller to Rain Switch
PROBLEMS		SOLUTIONS
Display is flashing "Rain Off"	Power is being supplied to Rain Off con- nector	Incorrect Rain Switch
Controller displaying reads "Valve Short" with a valve number	High current draw during valve run time	 Possible bad solenoid Shorted wires between decoder and solenoid
Display frozen, does not respond to rotat- ing valve	Micro is locked	1) Turn power off for a minute, then back on
Valves Turning ON/OFF during run time	Possible EMF interference	Check: Controller, Decoder and Field Wir- ing location in respect to any high voltage.

NOTES



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