

ICC Decoder Module *Troubleshooting Guide*

This troubleshooting guide represents common field conditions and questions related to the ICC Decoder Module. Review the list of “Observed Field Conditions” in the table of contents below and then scroll to the corresponding page.

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Observed Field Condition

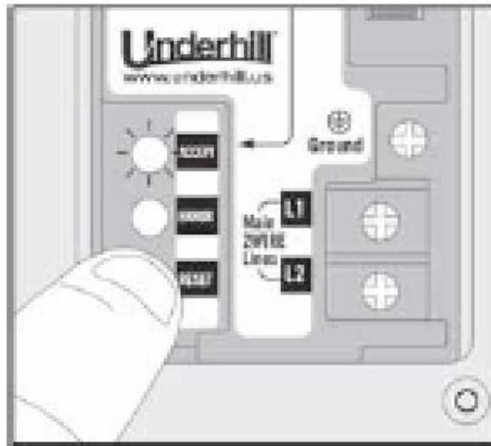
1) **"I cannot water any stations from the Underhill ICC Decoder module".**

Possible Causes

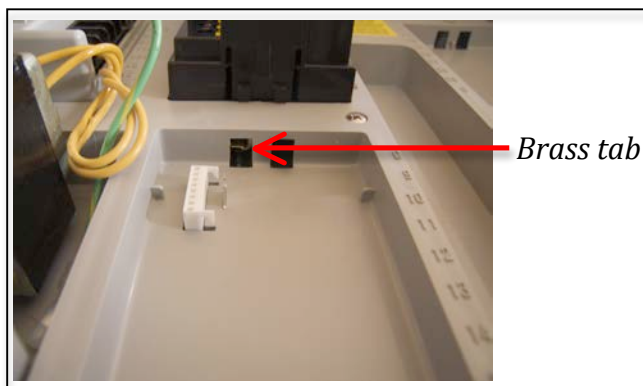
- a) The Underhill Decoder Module is not seated in the controller properly,
- b) The Decoder Module is not grounded,
- c) The 2Wire path is not connected or is not making good contact,
- d) None of the station decoders are programmed or do not correspond with the intended stations in the field.

How to Troubleshoot

- 1) Confirm the Underhill ICC Decoder Module is seated properly and operating.
 - a. Locate, press and hold the "Reset" button on the ICC Decoder Module as shown for approximately 10 seconds. The Green "Accept" LED should blink on and off for approximately 15-20 seconds before it extinguishes.

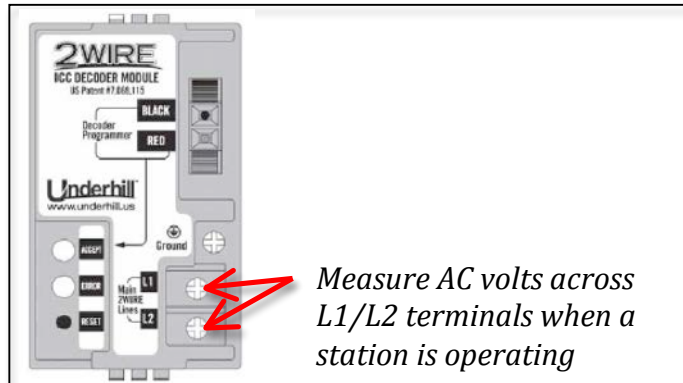


If the Green "Accept" LED does not blink on and off, **then remove AC power and the 9-volt battery** from the ICC controller. Remove the ICC Decoder Module and locate the brass metal tab as shown in photo below.

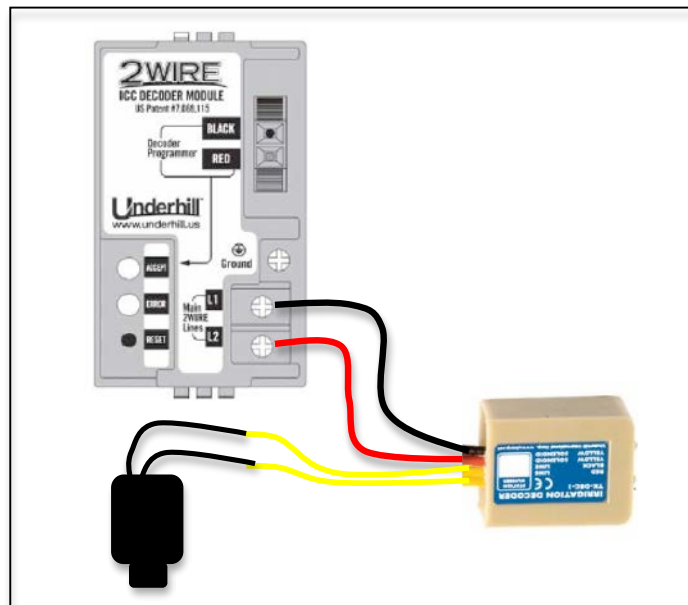


Using a pair of needle nose pliers, pry the tab slightly outwards. Then re-install the Decoder Module and re-apply power to the controller. Press and hold the "Reset" button for a 10-second count and confirm the Green "Accept" LED blinks on and off for 10-15 seconds before it extinguishes.

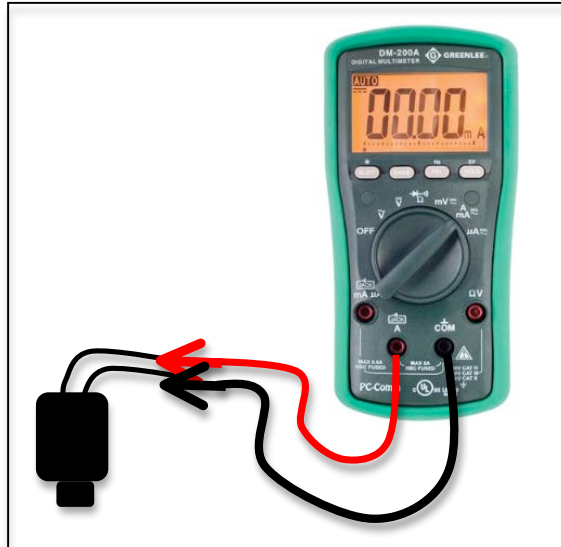
- b. Without the 2Wire communication wire connected to “L1/L2” terminals, turn on Station 01 in Manual mode. Use a multi-meter to confirm 26-28 volts AC across the “L1/L2” connectors. The RED “Error” LED should be illuminated during this test. To clear the RED LED, press the RESET button and hold for approximately 10 seconds.



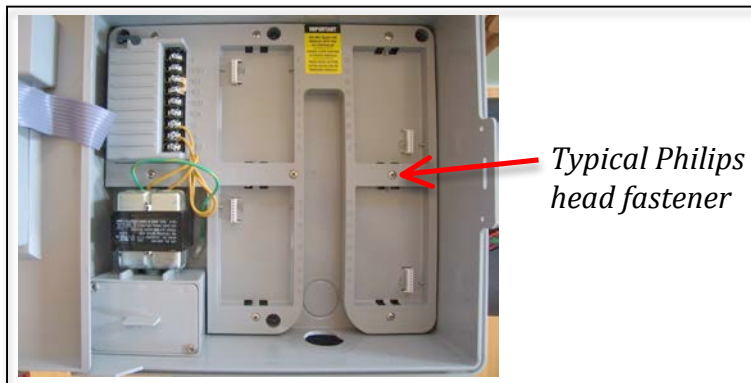
- c. Re-connect the 2Wire path and re-try operating a station in Manual mode from the ICC controller. If the station does not operate, remove a decoder from a valve box (assuming it has already been programmed) and connect the red and black decoder wires into the “L1 / L2” terminals on the ICC Decoder module. Temporarily disconnect the existing 2Wire pair from the L1/L2 terminal. Using a spare solenoid, connect the yellow wires to the solenoid per the diagram on the next page. Actuate the decoder and solenoid in Manual mode from the controller for the station number written on the decoder. If the solenoid operates, the ICC Decoder Module is operating ok. If it does not operate verify steps 2-4 below.

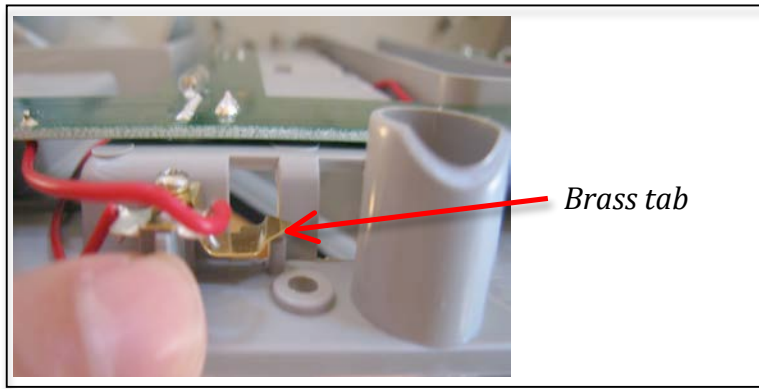


- d. Once the Decoder is removed from the valve box, conduct an ohms test on the existing valve solenoid to confirm it is functional. Using a multi-meter, select the "Ohms" test position. The Ohms symbol is shown here as " Ω ". Connect the black and red leads of the multi-meter to the open wires on the solenoid, (the order is not important). A typical solenoid will display a resistance value of 24 -65 Ohms. As a solenoid reaches end of life it will have more resistance that may be displayed as 100 Ohms or higher. Replace the solenoid if needed.



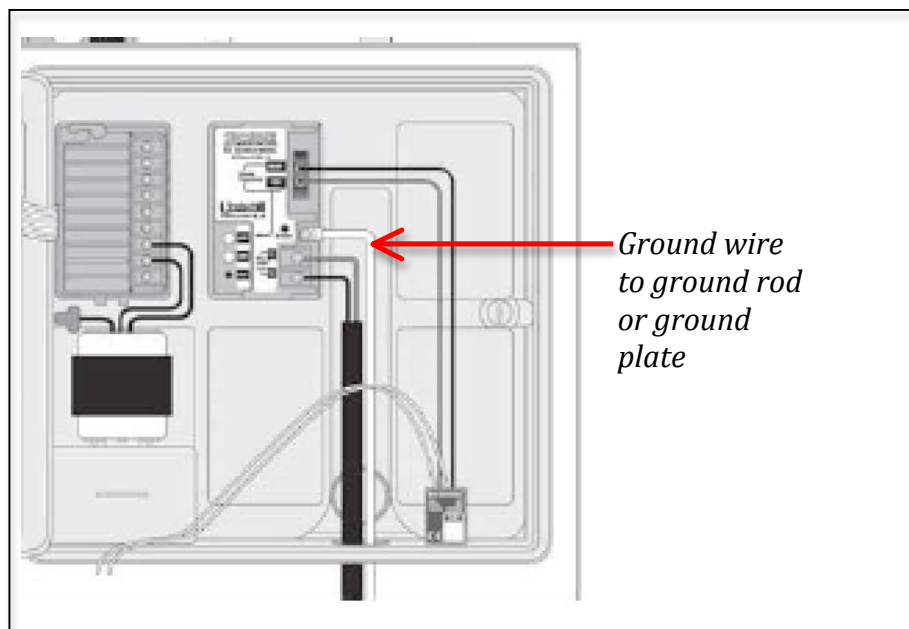
- e. If after attempting steps 3-4 without success, **remove AC power and the 9-volt back-up battery (if it exists)** from the ICC controller. Remove the ICC Decoder Module and locate the 7 (qty) Philips headed fasteners on the inside of the ICC controller as shown in the photo below. Remove the plastic-molded inner shell and locate the metal tab in the position where the Decoder Module is to be installed. Using a small pair of needle-nose pliers bend the tab upwards slightly then replace the plastic-molded cover. Re-install the 7 (qty) fasteners and press the Green "Accept" LED again following the steps outlined in (a) above.



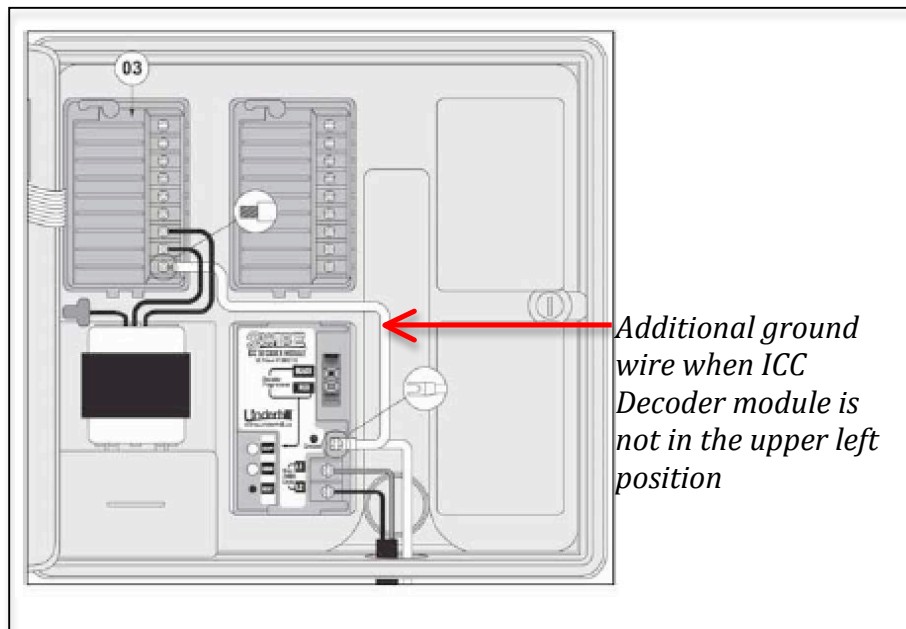


If the Decoder Module does not operate after attempting both steps (a) and (b), then the Decoder Module is damaged and should be replaced. The Underhill p/n is TW-IC-48 and can be ordered on-line or through your preferred local distributor.

- 2) *Is a #8 or #10 bare copper wire terminated in the "Ground" terminal to a ground rod or ground plate if only the ICC Decoder Module is installed?*



If the ICC controller is being used with both a Hunter station module(s) and an ICC Decoder module is a ground wire connected to both a ground rod or ground plate and to the "GND" connector on the Hunter module directly about the ICC controller transformer?



- 3) *Is the 2Wire Communication cable connected to “L1 / L2” terminals on the ICC Decoder module making good contact? Remove and remake these wire connections. If a station cannot be operated refer to #1 troubleshooting portion of this paragraph.*
- 4) *Program one or more of the decoders following the installation instructions on page 13 of the User Manual. Then install in the field with the corresponding station number. Once operation is confirmed, be sure and complete the wire connection using the included 3M DBRY connectors for a waterproof wire connection.*
- 5) *If after all of these tasks the “error” LED on the decoder module continues to remain “on”, then use a multi-meter and measure the AC voltages on the downstream side of the transformer where the wires terminate into Hunter ICC “power module” see Troubleshooting #18 for a diagram of how this can be accomplished. Verify if the same voltage can be measured on the L1/L2 terminals of the ICC module when a station is operated manually or from a program start. The there is a wide disparity in measured voltage, then the power module might require replacement.*

Observed Field Condition

2) "Some of the stations connected to the Underhill ICC Decoder module will not irrigate either manually or from a programmed start time".

Possible Causes

- a) There is a break in the 2Wire path between some stations,
- b) Some decoders are not programmed or are programmed incorrectly or do not match the corresponding valve they've been wired to.

How to Troubleshoot

- 1) In this example station 08 will operate but station 10, which is "downstream in terms of the 2Wire path" won't turn on. .
 - a. Is the ICC decoder module located in the upper right-hand position of the ICC or in another location?
 - b. If only the ICC decoder module exists, then go to "c". If a Hunter station module is in place, then know the ICC Decoder module station count begins with the next station number
 - c. If you remove decoder for station 10 and move it to station 08 can this station be operated in Manual mode? If yes, then there is most likely a break in the 2Wire path between the two stations.
 - d. If "No", then re-program the decoder and retry at station 08's location first. If it operates then move it to station 10's location and try again. If it does not operate, there is a break in the 2Wire com path and a you'll need a digital Clamp Meter Underhill p/n TW-DCM to determine where the break has occurred.

Observed Field Condition

3) "The Hunter ICC is only capable of managing 32 stations with Hunter station modules. How can it manage up to 48 stations with an Underhill ICC Decoder Module"?

The Hunter utilizes the same PCB to for both plastic wall mount enclosures managing 32 stations as it does for metal enclosures managing 48 stations. When the Underhill ICC Decoder Module is installed, it allows your plastic enclosure Hunter ICC to manage up to 48 stations.

Possible Reasons

Sometimes the Hunter ICC controller and the ICC decoder module don't synchronize the decoder module does not recognize more than 32 stations.

How to Troubleshoot

Turn the menu knob to "Manual Single Station". Press and hold the left arrow button. The display should show 48. If it doesn't, then remove the 9-volt battery, disconnect the Hunter ICC power module or unplug 120 volt power to the controller and remove the ICC Decoder module. Re-insert the Hunter power module, or reconnect to a 120-volt power source, then re-install the ICC Decoder module. Turn the menu knob to "Manual Single Station", press and hold the left arrow button to confirm 48 stations.

Observed Field Condition

4) "I have an 8-station Hunter ICC in which 7 stations are used. This installation also has an Underhill 2Wire module in the second station module space and I cannot operate station 08 from the 2Wire Decoder".

Possible Reasons

The Underhill Decoder module begins with station 09, 17 or 26 depending on how many existing Hunter station modules are present.

How to Troubleshoot

Remove the station decoder that will not operate and reprogram to another un-used station number above 08. Then re-install in the field and confirm operation from MANUAL mode.

Observed Field Condition

5) "The Hunter ICC is using 11 stations with two station modules and this installation also has an Underhill 2Wire module in the third space. I cannot operate stations 12-16".

Possible Cause

The Underhill Decoder module once installed begins with station 17 or 26 depending on where the Hunter station modules are installed.

How to Troubleshoot

Remove the station decoders that have been programed from 12-16 and re-program to stations higher than the last station using station decoders. Confirm their operation by operating in MANUAL mode once re-installed.

Observed Field Condition

6) "When operating a manual "test" sequence on the Hunter ICC, stations will turn "On" for about 15-25 seconds, but then turn off and move to the next station and repeat the same condition. The red LED "Error" light illuminates."

Possible Causes

Something has happened to the ICC Decoder, or a decoder is not programmed properly and/or there is a break in the 2Wire path downstream of the controller

How to Troubleshoot

Troubleshooting the observed field condition should start first with isolating if the issue is with the Hunter ICC controller or the ICC Decoder. There are two very quick troubleshooting methods to quickly make this determination:

- a) If there is a Hunter 8-station module available or in use, wire a solenoid to any station on the module and to the "C" or common terminal. Operate the corresponding station from the ICC controller. If the solenoid "buzzes", then ICC is most likely working.
- b) Disconnect any 2Wire communication cable connected to L1/L2 on the ICC decoder. Connect a pre-programmed decoder module's red and black wires

into the L1/L2 terminals. Connect the decoder's yellow wires to a known operable solenoid and manually operate this station. If the solenoid "buzzes" then the ICC decoder is most likely working.

If both the ICC controller and ICC decoder operate, then an issue may lie with the 2Wire communication cable. To isolate where the field issue lies, locate station 01 and disconnect the 2Wire path downstream of this valve. Operate station 01 manually from the controller. If the solenoid does not operate, then there is a break in the 2Wire path between the controller and the first valve. Look to see if you see signs of surface disturbance from gophers, a removed shrub or tree or signs of recent trenching that might be associated with the 2Wire path.

If station 01 does operate, then move to station 03 and repeat the process. If station 03 operates move a few more stations downstream. If station 03 doesn't operate then move to station 02 and try again. Underhill recommends using a "Digital Clamp Meter" p/n TW-DCM along with a "Faulting Transformer" p/n TRANSFRMR-115 as diagnostic tools for field wire issues.

Observed Field Condition

7) "I'm having difficulty in programming a decoder beyond 32 stations."

Possible Causes

The Hunter ICC controller and the Underhill ICC decoder module are not synchronized or something has occurred to the programming function in the ICC decoder module.

How to Troubleshoot

- 1) *Turn the Hunter main menu knob to "Manual-Single Station." Press and hold the "left" arrow button and view the display. If it says 32, then disconnect the 120-volt power to the ICC controller. This may involve unplugging the power cord, or removing the power module – whichever is easiest. Then remove the 9-volt back-up battery and the ICC decoder module. Re-insert the ICC decoder module, then re-apply 120-volt power to the controller and recheck the number of stations in the "Manual-Single Station" menu. Now program the decoder(s) as needed.*
- 2) *Once a decoder is programmed, verify it's operating by removing the two red and black wire leads from the "speaker-wire" programming connections and re-connect them to the L1/L2 terminals. Then connect a working solenoid to the two yellow wires. Operate this station manually and verify the solenoid buzzes. If it doesn't, then try to operate the station manually as station 01. If the solenoid buzzes, then the decoder was not programmed properly to initially. Re-program and re-test. Periodically, you may find the decoder will simply not program. If a second ICC decoder module on another controller is close by, repeat the programming steps or use an Underhill Portable Programmer p/n DEC-PROG-115 as an alternative solution.*

Observed Field Condition

8) "The Hunter ICC continuously displays an "ERR" message when irrigating any station manually or from a scheduled start. All of the stations are operating without any issues. Why does this occur?"

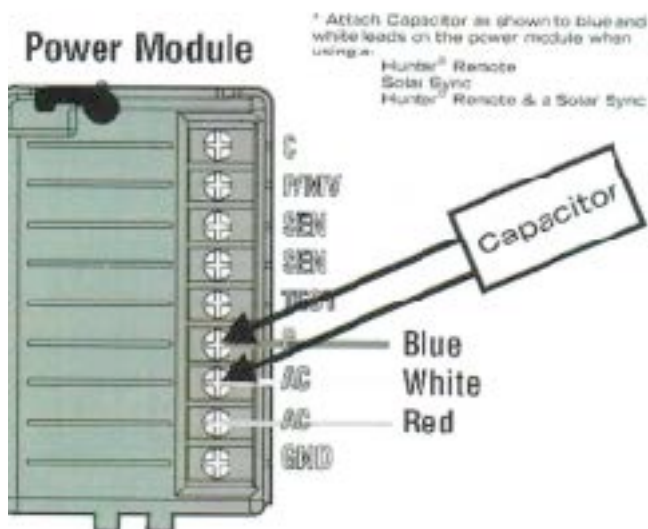
Possible Causes

This message is typically displayed when the Hunter ICC controller is connected to a Roam or Roam XL hand-held receiver or Solar Sync.

How to Troubleshoot

Verify if a blue-colored capacitor has been installed on the Hunter ICC's power module. Generally if this capacitor is missing, the "ERR" message will appear. Call Underhill International and request the quantity of capacitors needed. There is a no-cost fee for these that come complete with installation instructions.

If a capacitor exists and the "ERR" message is still observed, verify the capacitor is making contact with the terminal blocks and/or is installed properly. See diagram below:



Observed Field Condition

9) "There are two solenoids sharing a single decoder. All other stations operate, but neither one of these valves will operate in a Manual or scheduled irrigation mode."

Possible Causes

One of several issues may have occurred:

- 1) The decoder has failed or is not programmed to the corresponding station number on the controller's station output.*
- 2) One or both of the solenoids has failed*
- 3) There is a field wiring issue in the 2Wire communication cable between the controller and this station. There could be a splice in the 2Wire path off of the main 2Wire com path run to this station specifically.*

How to Troubleshoot

Each of the three possible causes can be diagnosed in the following order;

- 1) Removed the corresponding decoder from the two valve solenoids and bring back to the controller. Temporarily disconnect the 2Wire com cable wires from L1/L2 and connect the black and red wires of the decoder into either one of these connections. Attach the two yellow wires of the decoder to a known working solenoid. Attempt to operate the corresponding station number manually from the Hunter ICC controller. If the solenoid does not "buzz", then try a working decoder. You might also re-program the decoder to the corresponding station number and retry step #1.*
- 2) If the solenoid buzzes, then isolate the mainline and remove both solenoids from the field where the decoder was originally installed. Connect one of the solenoids to the decoder still attached to the L1/L2 terminals. Attempt to operate this station manually. If the solenoid "buzzes", then retry with the second solenoid. If it too "buzzes" then wire them both. If both "buzz" then go to #3. If one solenoid "buzzes" and the other does not, replace the solenoid that did not originally "buzz".*
- 3) If both solenoid "buzzed" in #2 but won't once re-installed in the valve box, then a problem exists in the two-wire path somewhere between the controller and this set of valves. Purchase a digital clamp meter Underhill p/n TW-DCM and portable power supply Underhill p/n TRANSFRMR-115 to locate the field issue.*

Observed Field Condition

10) "I have one or more stations that won't operate. How can I troubleshoot this field issue?"

Possible Causes

The solenoid has reached the end of its service life

The decoder has reached the end of its service life

There is a break in the 2Wire path to this valve due to how the wire path is installed.

How to Troubleshoot

- 1) *Determine if the inoperable stations are in numerical order. For example stations 07-11 don't operate. If this condition exists, then a broken 2Wire com path may exist. If the inoperable stations are random than follow steps 2-4.*
- 2) *Disconnect the decoder from the valve solenoid. Using a multi-meter, conduct an ohm resistance test on the valve solenoid. The reading should be 24-30 ohms indicating an acceptable and working solenoid. If the ohm reading is higher, then the solenoid may require replacement. Compare this reading against a known working solenoid before moving to the next troubleshooting task.*
- 3) *Disconnect the decoder and use a known working solenoid (typically a spare service part). Temporarily disconnect the 2Wire path from the ICC decoder module labeled L1/ L2. Connect the red and black wires of the decoder and then connect the known working solenoid to either yellow wire. Turn this corresponding station on via the "Manual – Single Station" function. If the solenoid does not "buzz" then verify the decoder is programmed correctly. If the decoder "buzzes" then you may have a broken 2Wire com wire.*
- 4) *Look around to determine if any ground disturbance can be located that might indicate a break in the 2Wire path. Use a digital clamp meter and portable power supply to locate the break and repair as needed. Stringing a temporary pair of wires from the nearest valve box to confirm the valve and decoder operation is another alternative isolating method.*

Observed Field Condition

11) "I just replaced the Underhill ICC decoder module, do I need to reprogram all of the decoders?"

Solution

No, the station number is retained in the decoder once programmed. The default station number of any "new" decoder is 01.

Observed Field Condition

12) “I cannot remember how to program a decoder.”

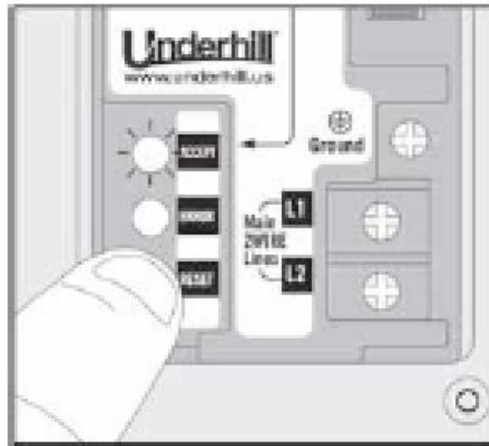
Solution

Insert the new decoder’s red and black wires into the red and black terminals labeled “Decoder Programmer”. These terminals look like a speaker wire terminal.

Turn the main menu dial on the Hunter ICC controller to “Manual – Single Station”.

Press the right arrow button to select the station number. Locate and press the “+” button to add some time to the corresponding station.

Press and hold the “Reset” button on the Underhill ICC decoder until you see the green LED flash, see figure below. Then turn the main menu knob on the Hunter ICC to the “RUN” position and observe the green LED flashing again.



Press and hold the “Reset” Button on the ICC Decoder Module

The decoder is now programmed.

To confirm the decoder is programmed properly, remove it from the red and black speaker wire connections and connect to the L1/L2 terminals below. Make sure to temporarily disconnect the existing 2Wire path out to the valves in the field. With a working solenoid, connect to the two yellow wires on the decoder.

Operate the corresponding station manually and the solenoid should “buzz”. If it doesn’t buzz, then select station 01 and operate manually. If the decoder “buzzes”, then it wasn’t programmed initially. Repeat the steps above.

Observed Field Condition

13) “The Hunter ICC controller runs every station for about 3 seconds, then moves onto the next station until all stations have operated. This occurs in both manual operation of a single station or during a scheduled start time”.

Possible Causes

This is commonly a sign that the Hunter ICC motherboard is failing and it requires replacement.

How to Troubleshoot

If you have access to another Hunter ICC controller, swap the faceplate with the controller exhibiting this condition. If condition does not occur, then replace the Hunter ICC faceplate. Underhill also offers the Sapien 2Wire controller as a suitable replacement. In either case the decoders attached to valve zones **do not** require reprogramming.

Observed Field Condition

14) “I’m new to this site and there are no “As-built” drawings denoting the valve locations. I can’t locate or irrigate some stations. Will a cable detector I use to locate wire for a multi-wire controller work to locate the 2Wire path?”

Solution

Generally speaking no, multi-wire cable detectors typically generate 500V pulses. As almost all lighting protection modules start to conduct at 90V, these will prove to be ineffective and are not recommended.

Another type cable locator that generates 20-50V at a higher frequency are better suited for locating the 2Wire path. The following two web links meet these requirements as suitable alternatives. One of them might be available for rental depending on the size of the metropolitan area where you live or conduct business.

http://www.radiodetection.com/products_det.asp?art_id=6988&sec_id=2690

Another alternative is to contact a local cable locating service to determine if they have similar equipment that could be applied.

Observed Field Condition

15) "I have a master valve that has its own separate wire path from the Hunter ICC controller. I need to add a new station, which I connected to the wire path for the master valve with a decoder but the station does not operate. I can hear the solenoids buzzing, but neither valve will open."

Possible Causes

The wire path used for the master valve cannot be used for the additional station because it driven from the multi-wire side of the Hunter ICC controller.

Solution

Locate the nearest valve box with an existing station decoder. Run a temporary 2Wire path on-grade to this location and attempt to operate this station manually. It should operate. If it doesn't verify the decoder has been programmed to the appropriate station number and retry. If the valve operates as well as the master valve, then trench and bury the temporary 2Wire path.

Observed Field Condition

16) "Stations will come on randomly, out of numerical sequence and may not be associated with a scheduled start time. Others times a station will start on a scheduled start time and another station will operate at the same in a random order."

Possible Cause

You may have one or more decoders that are starting to fail. Replacement of the defective decoders will resolve this observed field condition.

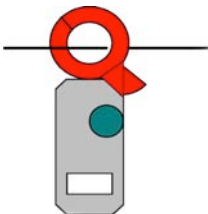
How To Troubleshoot

Damaged decoders typically take a lower or higher current than the 2.9 to 3.1 mA values.

You will need a digital clamp meter, Underhill p/n TW-DCM to measure current along the 2Wire path. See photo below.



Place the digital clamp meter anywhere along the 2Wire comp path but around one of the 2Wire cables only as shown below.



Program the controller to turn on the pump/master valve output along with several stations from a programmed start time. As stations are operating, measure the current draw along the 2Wire path.

This may require disconnecting half the stations or a branch in the 2Wire path to isolate a decoder(s). Remove and replace the located decoders as needed. Remember to program them with the corresponding station number first.

Observed Field Condition

17) “I replaced the ICC module recently and came back to the controller only to determine the ICC module is no longer operating. Why do I keep “blowing-up” ICC modules?”

Possible Causes

- 1) The ICC module is not grounded to a separate ground rod, (not electrical ground but “earth-ground”).
- 2) You may have several decoders with the same address and one of more has a defective decoder and/or solenoid. (Remember as a solenoid reaches end-of-life, it has more resistance drawing excessive current).

How To Troubleshoot

Damaged decoders typically take a lower or higher current than the 2.9 to 3.1 mA values.

- 1) Confirm the ICC module has a #12 solid copper ground wire to a ground rod or ground plate. The ground rod should be a copper-clad 8” long x 5/8” diameter ground rod driven full-depth. Connect the ground wire without any sharp bends or angles. If local soil conditions prevent installation of a ground rod, consider using a ground plate. Both should be installed a minimum of 10’ away from the controller. Sometimes site conditions prevent this distance so shorter distances are acceptable as exception not the rule.
- 2) To troubleshoot the 2Wire path you will need the following troubleshooting equipment:

*Fault-finding transformer
Underhill p/n TRANSFRMR-115V*



*Digital Clamp Leak Detector
Underhill p/n TW-DCM*



- Temporarily disconnect the 2Wire path connected to L1/L2 on the decoder module.

- *Connect the 2Wire path to the fault-finding transformer (yellow box above). Clamp the red lead wire from the fault-finding transformer at least one foot away from the transformer.*
- *Measure the current with the clamp meter along the 2Wire path at the valve closest to the controller and at the valve furthest away. The value you measure is the number of decoders x 3mA. For example, if the controller is managing 30 stations, then a value of around 90 mA should be observed. If the value is initially 95 mA at the station closest to the controller but 0mA at the valve furthest away, then there is a break in the 2Wire path. Measuring at intervals along the 2Wire path will indicate where the short lies. If the value measured at the valve furthest away is generally the same, then there is no short on the 2Wire path.*
- *Disconnect the fault-finding transformer from the 2Wire path and reconnect the 2Wire path to the L1/L2 terminals on the decoder module.*
- *Using the clamp meter and clamp around one of the conductors on the 2Wire path, then operate station 01 manually from the ICC controller. Write down the mA value displayed on the clamp meter and repeat the process for every station on the 2Wire path. If the red "Error" LED comes on, reset it and continue this task. Mark the station(s) with the "Error" message. The corresponding decoder may need to be removed and verified its working by taking it back to the ICC module and operating it in Manual – Single Station mode with a known working solenoid. If it does not operate, then replace. While the decoder is removed, conduct an ohms check on the valve solenoid to verify it's functioning. Generally a "good" solenoid will have a value between 25-35. If the value is much higher, replace the solenoid.*
- *You may encounter more than one station being managed by a single decoder or several decoders with the same address.*
- *Temporarily disconnect one of the solenoids from the decoder and operate the station manually again. Write down this value. Using the clamp meter, conduct an ohms test on the disconnected solenoid.*
- *Repeat the process on the other solenoid sharing the same decoder. Replace if necessary.*

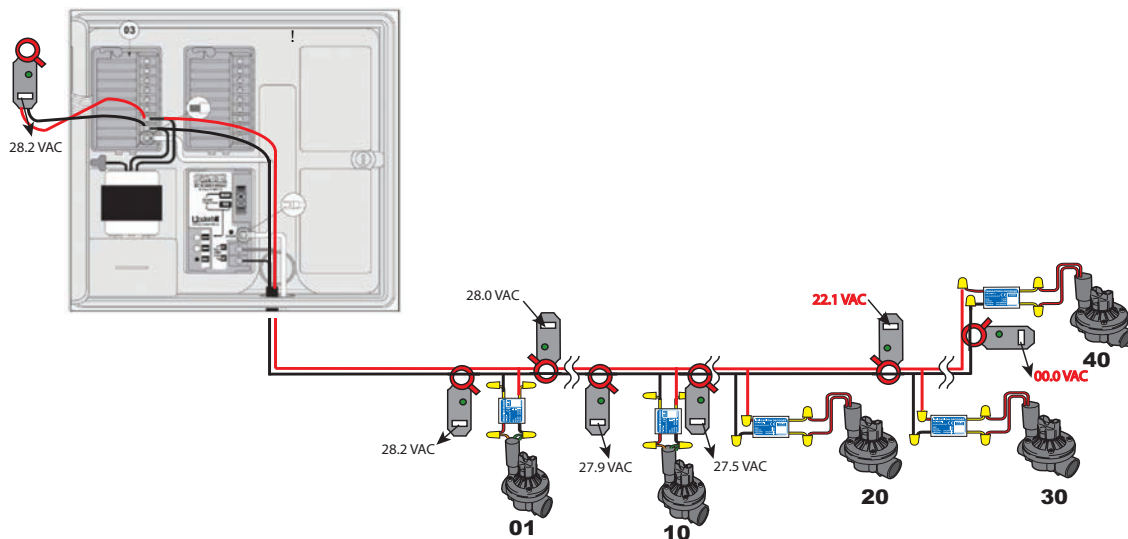
Observed Field Condition

18) "Is there a method to troubleshoot a break in the 2Wire path?"

How to Troubleshoot

The following techniques can be used with a digital clamp meter that can measure AC volts. A multi-meter is also suitable but requires each one of the 2Wire connections to be opened to obtain a consistent reading which can be time consuming.

The diagram below shows how a digital clamp meter can be used to take measurements along the 2Wire path as it enters and exists a valve box. Note that only one of the wires is clamped inside of the digital clamp meter. In this example, the 2Wire path is temporarily disconnected from the L1/L2 terminals and connected directly to the 24-volt terminal block of the Hunter ICC power module. **This is done with the 120-volt power to the ICC controller "Off"**. Stations will not operate because they are not receiving a "decoded" message specific to a station number. Using the "halving method" take measurements along the 2Wire path at regular intervals.



Note the two measurements in "red" text showing a drop in AC voltage or none at all. The drop in voltage indicates a nick or path to ground. Check field wire connections to isolate the problem. The 0 volts AC, indicates a break in the 2Wire path. Locate and repair the break as needed.

This is a simple diagram but your field wire layout could have branches or a "loop" to a quick opening of valve boxes to confirm wire color and 2Wire path connections should be conducted as part of this discovery phase.

Once all issues are resolved, disconnect the 2Wire path from the 24 VAC source and reconnect to the L1/L2 terminals.

Observed Field Condition

19) "Stations 1-6 operate ok, but when station 07 is operated manually, other stations higher than 07 will operate at the same time."

Possible Causes

Station 07 decoder has failed and is sending errant messages down the 2Wire path when operated.

Another decoder higher than station 07 has also failed and this portion of the 2Wire path might be "looped".

How to Troubleshoot

- 1) *Locate station 07 in the field. Temporarily disconnect station 07 decoder and re-attach the 2Wire path essentially bypassing station 07.*
- 2) *Operate station 08 and others and confirm they operate individually. If they do, then replace station 07 decoder.*
- 3) *While station 07 decoder is disconnected conduct an ohms test on the solenoid corresponding to station 07. A value of 24-65 is considered normal, but if you observe a value 95 and above, replace the valve solenoid at the same time.*
- 4) *Confirm if possible, the 2Wire path is a single leg and does not reconnect or loop back onto it self. If a loop is found, temporarily disconnect and bypass other station decoders until the field issue is isolated.*