

# ***FLOW METER***



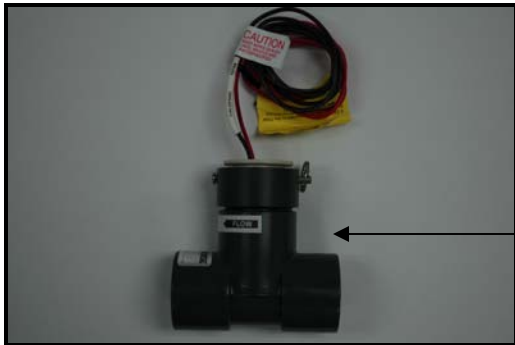
# ***TROUBLESHOOTING***



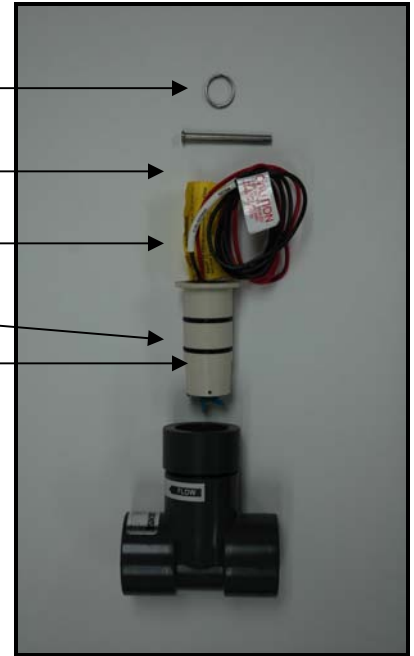
# FLOW METER PARTS IDENTIFICATION

FLOW METER PARTS

FLOW METER ASSEMBLY

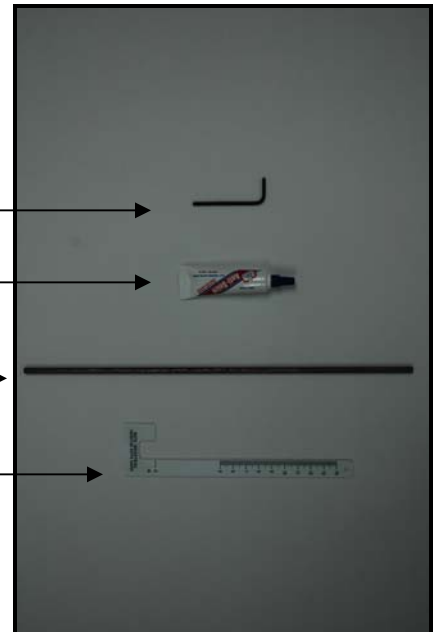


- RETAINING PIN RING
- RETAINING PIN
- FIELD WIRING
- FLOW METER INSERT
- IMPELLER PIN
- IMPELLER
- FLOW METER HOUSING



FMIX / FMBX INSERTS

- FMIX FLOW METER INSERT
- ALLEN WRENCH
- ANTI-SEIZE LUBRICATION
- ALIGNMENT TOOL
- INSTALLATION DEPTH GAUGE
- FMBX FLOW METER INSERT



FMIX / FMBX TOOLS

**FLOW METER TROUBLESHOOTING**

The *Calsense* Flow Meter enables all *Calsense* Irrigation Controllers to measure the flow rate of an irrigation system, making it an important management tool in detecting mainline breaks, broken risers, and closed or stuck valves and tracking water usage for management reports. It is installed in the main line, after the water meter or backflow preventer.

**REQUIRED TOOLS**

- Digital Multi-meter.
- Common Screwdriver
- Philips Screwdriver
- Wire Strippers
- 2 Dri-Splice Connectors (Hardening Type)
- 2 Yellow Wire Nuts
- Calsense FMI Insert
- 10" 14 AWG wire



**PROBLEM: NO FLOW**

EXAMPLE:

**NORMAL FLOW 9.0 GPM**

**MEASURED 0.0 GPM**

**Description:** This is an alert that appears on the display screen of the 2100, ET1, and ET2000 controllers when a **NO FLOW** condition occurs in the system. If a **NO FLOW** alert is detected on all stations or a group of stations on the controller, there could be a problem in a number of places in the irrigation system. The following areas that these problems could arise from are the water meter, back flow, master valve isolation valve, field wiring, flow meter or the controller. The following procedures will help in determining where a problem has occurred.



## TEST

Using the **TEST** key, test a station that you can see from the controller for two (2) minutes. Verify that the station you have turned on is running and has stabilized. If after verifying that the system is working properly and no flow readings appear on the display screen, proceed to **SECTION 2**.

If after testing and verifying that there is no water running from the system and no flow readings from the controller display, follow the steps in **SECTION 1** before proceeding to **SECTION 2**.



## SECTION 1 STEP 1

**Do not remove the controller or the flow insert. Check the following first.**

### Water meter:

Check that the Water Meter is not locked for non-payment, or turned OFF for repairs in the system.




## SECTION 1 STEP 2

### Back flow Preventer:

Check that the curb stop and ball / gate valves on the back flow device are in the OPEN position.

**SECTION 1**  
**STEP 3**

**Master Valve:**

Check the Master Valve setup in the controller for correct entry: Normally Open, Normally closed. Also check for the flow control turned down, wires not connected, or bad solenoid.



**SECTION 1**  
**STEP 4**

**Isolation Valves:**

Inspect the Mainline and RCV manifolds. Check that these valves have not been turned down.

**SECTION 1**  
**STEP 5**

**Isolation Valves:**

Check for isolation valves to make sure that they have not been turned OFF.





## SECTION 1 STEP 6

### RCV (Remote Control Valves):

Check for any RCV Valves that might have been recently worked on. It is possible that the flow control on the RCV Valve has been turned down.



## NOTE

After checking **Section 1** items 1 through 4 and finding everything okay. Proceed to **Section 2**.

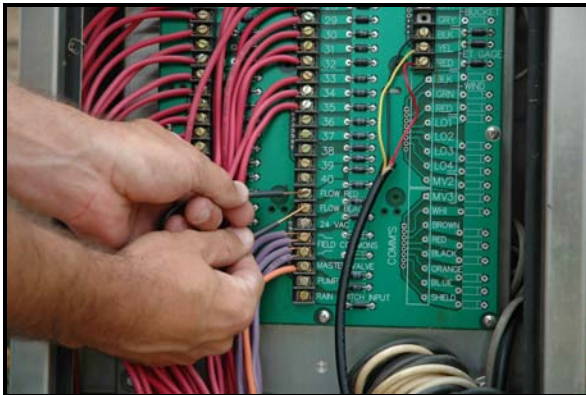
## SECTION 2 STEP 1

Disconnect the RED and BLACK wires in the black harness from the field wires going to the Flow Meter. If using a terminal block or TP-1 Board, disconnect the field wires from the terminal block or TP-1 Board.



**SECTION 2**  
**STEP 2**

With a Digital Multi-Meter measure the DC voltage on the terminal strip. You should read 9.5 to 12.0 volts DC.

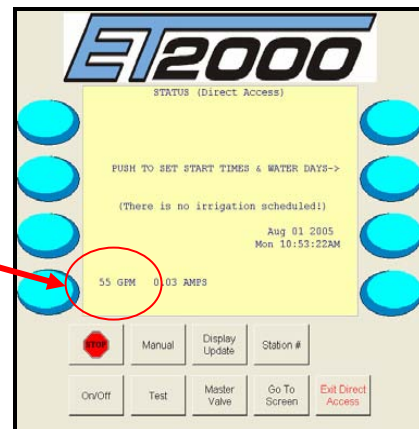


**SECTION 2**  
**STEP 3**

Tap the RED and BLACK wires together to see if you get flow readings on the controller display.

**SECTION 2**  
**STEP 4**

You should see a flow reading in the lower left corner of the controller display move from 0.0 GPM to a higher number.



 **NOTE**

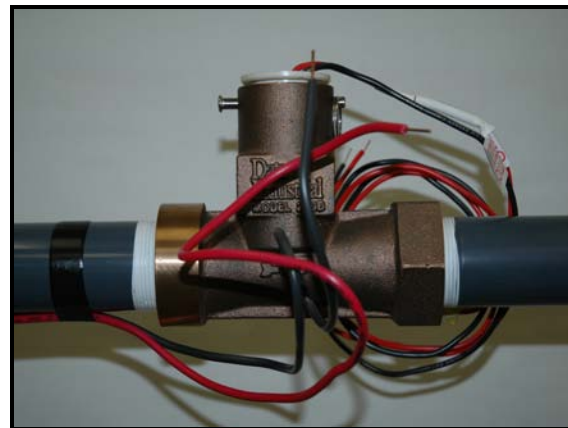
(The steps in **Section 2** verify that the controller is good).

If **Section 2** Steps 1 through 6 check out okay, reconnect your wires and proceed to

**“TESTING AT THE FLOW METER”.**

 **TESTING AT THE FLOW METER  
STEP 1**

At the Flow Meter location, cut out the wire connections. Strip the Flow meter and field wire ends. Check for discolored or corroded wire connections. This would be an indication of an improper connection.

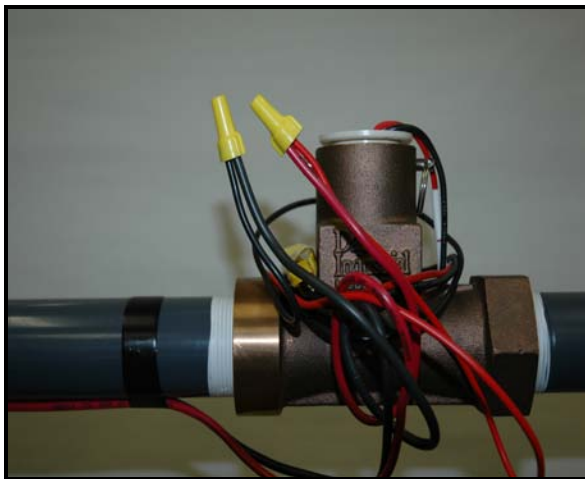
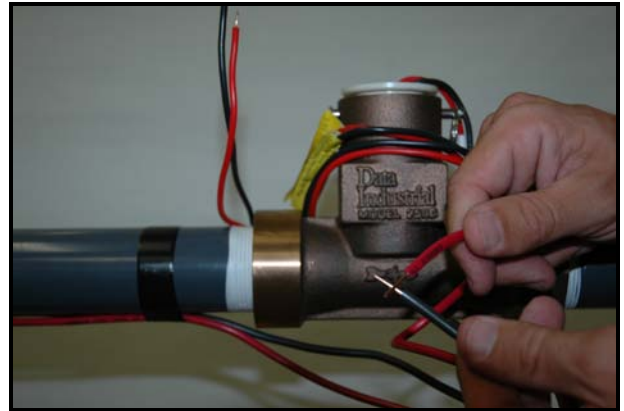
 **TESTING AT THE FLOW METER  
STEP 2**

With the field wires connected at the TP-1 Board, check the DC voltage on the field wires to the controller. You should read between 9.5 to 11.0 volts DC. This would be an indication of good field wires. If you do not read voltage the field wiring is faulty.



**TESTING AT THE FLOW METER  
STEP 3**

In the case where a digital Multi-meter is not available, have someone located at the controller to view the controller screen. Begin tapping together the two field wires going to the controller. You should see a flow reading in the lower left corner of the controller display move from 0.0 GPM to a higher number. No flow indicates bad wiring.



**TESTING AT THE FLOW METER  
STEP 4**

Reconnect the field wires to the Flow Meter using two (2) yellow wire nuts. At the controller test the same station as before to see if the controller reads flow.

**REMOVING THE FLOW METER INSERT**

**CAUTION:**

This next step requires the removal of the Flow Meter insert. Extreme care must be taken when removing the Flow Meter insert. Turn **OFF** the water supply to the irrigation system. (This should include all Water Meters, Isolation Valves, Hose bibs, etc. to relieve the pressure off of the mainline).

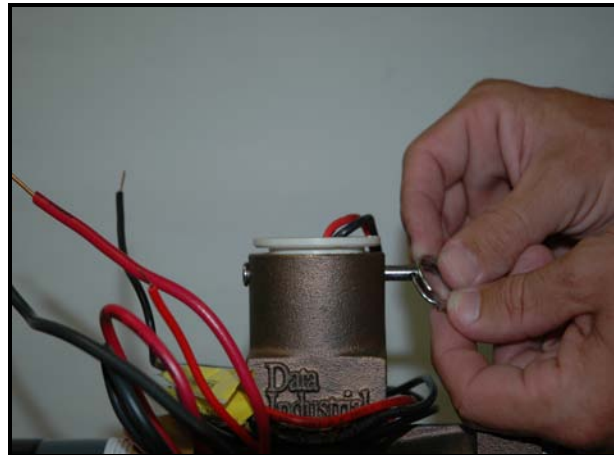


 **REMOVING THE FLOW  
METER INSERT STEP 1**

**CAUTION:**

**Do not position your head or  
body directly over the Flow  
Meter.**

Remove the ring from the  
stainless steel pin that holds the  
insert in the flow body.

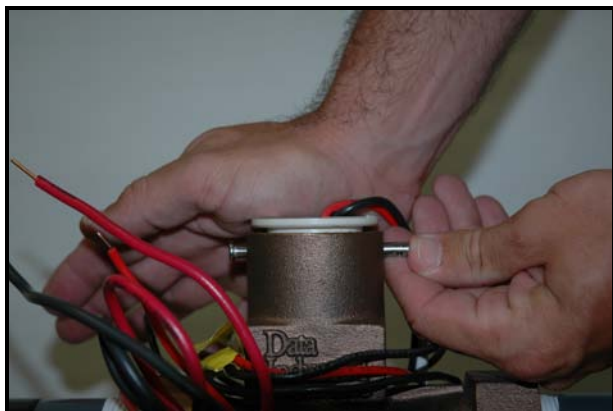


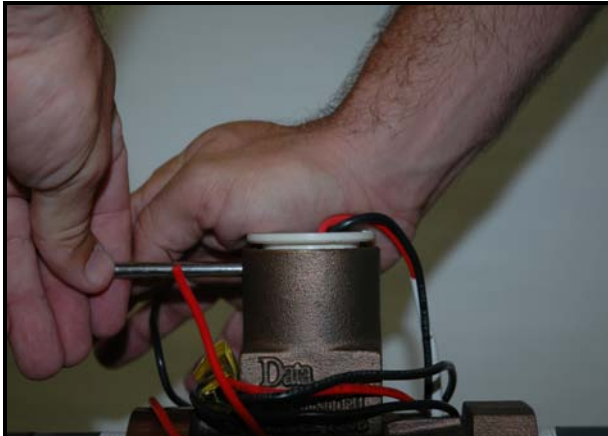
 **NOTE**

Note the direction of the arrow on the top of the insert in the flow body. Note the direction of the arrow on top of the insert. It is important that when reinstalling the insert into the body of the Flow Meter that the arrow be in the same direction as the flow.

 **REMOVING THE FLOW METER  
INSERT STEP 2**

With the palm of your hand firmly on top of the insert, push the ring end of the stainless steel pin toward the body of the Flow Meter insert with your other hand.



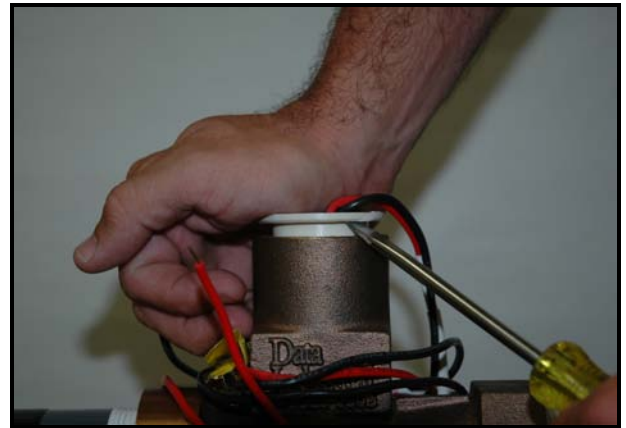


### REMOVING THE FLOW METER INSERT STEP 3

With the palm of your hand still firmly on top of the insert. Completely remove the stainless steel pin from the body of the flow meter insert.

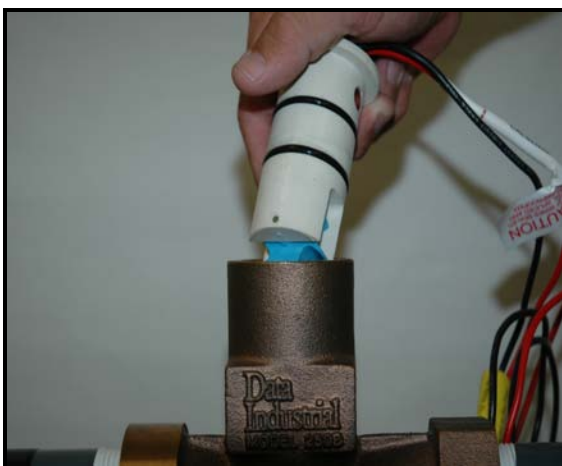
### REMOVING THE FLOW METER INSERT STEP 4

With the palm of your hand still firmly on top of the insert. Gently pry up the lip of the Flow Meter insert with a common screwdriver moving the insert about a ¼ inch past the first O-Ring.



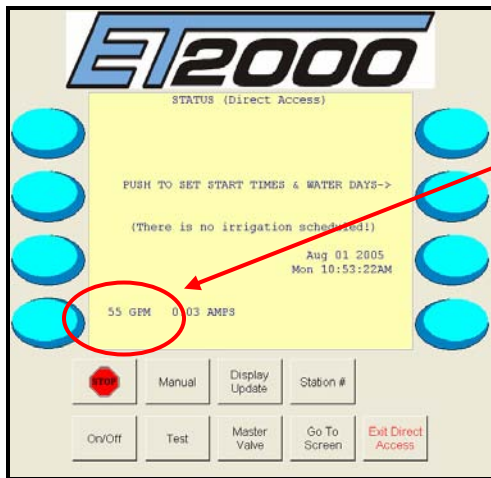
### REMOVING THE FLOW METER INSERT STEP 5

With your hand that you are using to hold down the top of the flow meter insert, firmly grab the Flow Meter insert. Slowly lift the Flow Meter insert out of the body of the Flow Meter being careful not to allow any debris to enter the body of the Flow Meter. Check the paddle wheel for any damage. Check the inside of the Flow Meter body for any debris.



**TESTING THE FLOW METER INSERT  
STEP 1**

Take the removed Flow meter insert to the controller. Connect the Flow Meter insert to the Flow RED and Flow BLACK terminals.



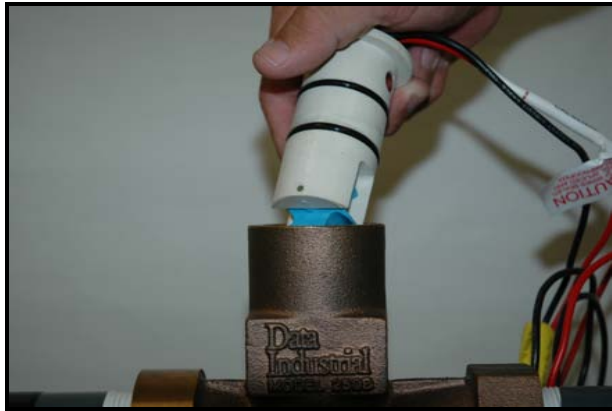
**TESTING THE FLOW METER INSERT  
STEP 2**

Spin the paddle wheel. You should observe a flow reading in the lower left hand corner of the display move from 0.0 GPM to a higher number. When the paddle wheel stops the number should return to 0.0 GPM. If no number appears or the numbers jump around without spinning the paddle wheel the Flow Meter insert is bad.

**TESTING THE FLOW METER INSERT  
STEP 3**

At the controller, connect the new Flow Meter insert to the Flow RED and Flow BLACK terminals. Spin the paddle wheel. You should observe a flow reading in the lower left hand corner of the controllers display move from 0.0 GPM to a higher number. When the paddle wheel stops the number should return to 0.0 GPM.



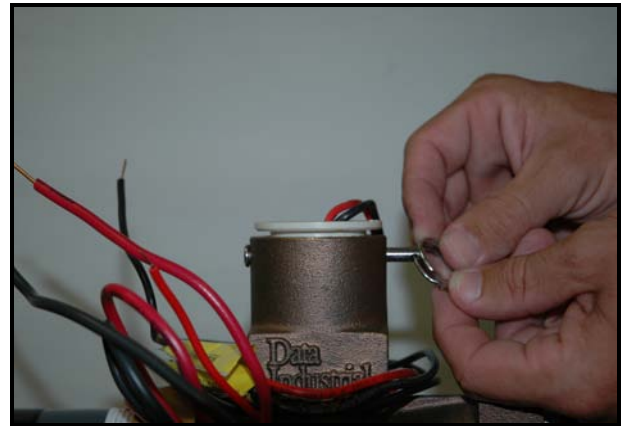


**INSTALLING THE FLOW METER  
INSERT STEP 1**

Insert the new Flow Meter insert into the body of the Flow Meter, making sure that the arrow on the top of the Flow Meter insert is pointing in the same direction as the direction of flow.

**INSTALLING THE FLOW METER  
INSERT STEP 2**

Re-insert the stainless steel pin and reconnect the ring to the end of the stainless steel pin.



**INSTALLING THE FLOW METER  
INSERT STEP 3**

Reconnect the field wires with recommended water proof connections.

**This concludes  
Flow Meter Troubleshooting**





 **NOTE**

If after checking steps 1 through 3 “Installing the Flow Meter” everything does not check okay.  
Follow the procedure for:

**“Wire verification test”**

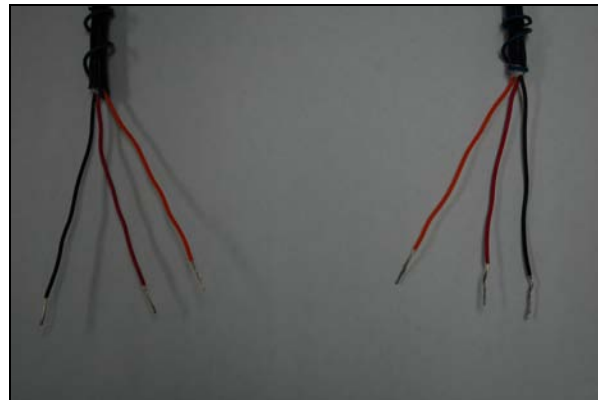
 **ISOLATION OHM TEST**

**Tests for nicks, bad splices and loose strands on terminal blocks.**

**Description:** In this test you will be making OHM measurements between the wires you are testing. The wires are not to be connected at either end to anything. They should not be touching the ground. When making OHM measurements between pieces of wire, you should see no difference in the meter reading than if meter leads aren’t touching anything. The meter should read infinite or “OL” as the Fluke meters show (OL stands for overload).

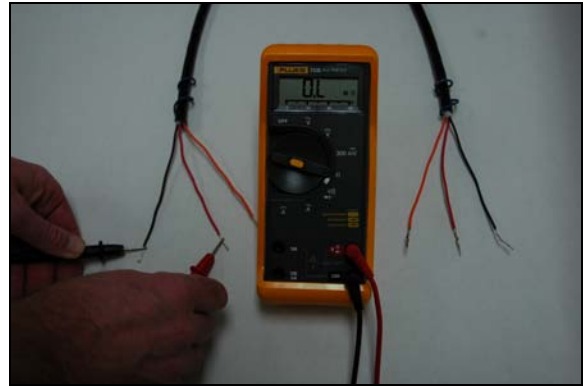
 **ISOLATION OHM TEST  
STEP 1**

Isolate all wires involved. This means disconnect at both ends.



### **ISOLATION OHM TEST STEP 2**

Make OHM measurement between the various pieces of wire and each other. Test all combinations. You should see a reading of OL . (OL stands for overload).

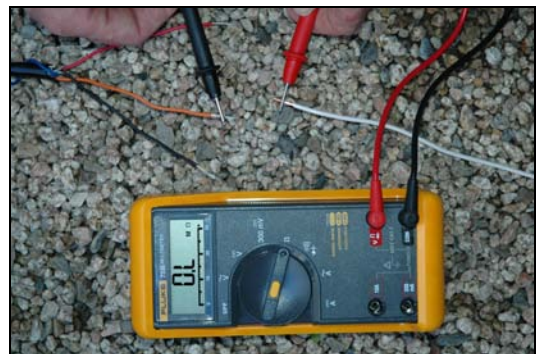


### **ISOLATION OHM TEST STEP 3**

Make OHM measurements between the various pieces of wire and the ground rod. If no ground rod is available, jab your meter probe straight into the ground. You should read OL on the meter.

### **ISOLATION OHM TEST STEP 4**

Make OHM measurements between the various pieces of wire and the field common. You should read OL on the meter.



 **LOOP OHM TEST**

Tests for bad splices, bad connections, broken wires and crossed pairs.

**Description:** In this test you will be making OHM measurements between the wires with them twisted together at the other end of the cable. The wires are not to be connected to anything. They should not be touching the ground. When making OHM measurements between the pieces of wire you should have readings similar to the reading you get when you touch your two-meter leads together. As the wire lengths increase, you will start to see OHM numbers. Numbers like 1 or 2 OHMs may be common. You should not expect to see 20 OHMs however.

 **LOOP OHM TEST  
STEP 1**

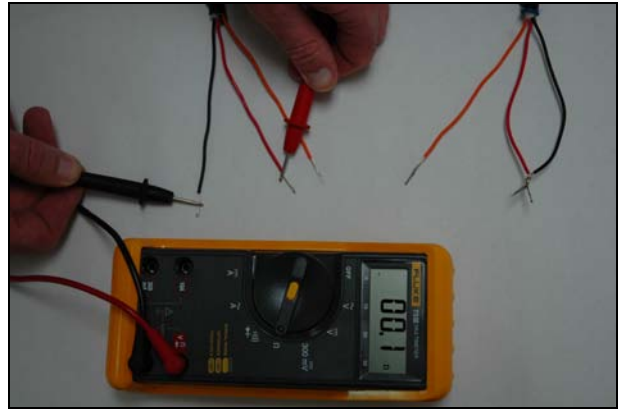
Isolate all wires involved. This means disconnect at both ends. (Recommend you perform the ISOLATION OHM TEST at this point, if you have not done it already).

 **LOOP OHM TEST  
STEP 2**

At one end of the cable, take two wires and twist them together. If there are more than two wires, you may repeat ending up with more than one twist. Each twist involves only two wires.

**LOOP OHM TEST  
STEP 3**

Make OHM measurements between the pieces of wire that are twisted together. You should see low readings.



**LOOP OHM TEST  
STEP 4**

Repeat the tests changing the groups of wires. For example, if your first pairs were RED / BLUE and BLACK / ORANGE repeat the test using RED / ORANGE and BLUE / BLACK pairs. (You repeat the test to find crossed pairs. No matter how many wires involved, you only need to change your pairs once).

**NOTE**

**THIS WILL CONCLUDE THE WIRE VERIFICATION TESTS**





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