

Using the "Cable Fault Finder" (Floor Warming Mat Only)

v.6 4/27/05

These instructions help give an approximate distance to a short-circuit or open-circuit damage location in a Watts Radiant mat. Since the heating cable in the mat is laid in a serpentine pattern, the calculations below convert the pure distance of cable measured to a more useful, linear feet of mat. The accuracy of the instrument is very good, but occasionally it can get false readings. Results are never guaranteed.

What it is and how it works:

The **Cable Fault Finder** displays the number of feet to an "impedance change" in the circuit it is connected to. This impedance change could be an open-circuit or short-circuit or a junction between two different types of conductor. It will only display the first such problem that it comes to in the circuit. It works by sending a signal down the wire and, similar to sonar, the signal reflects back to the instrument where it decides what to do with what it has found.



Things to keep in mind:

1. Get all the information you can on the mat being tested: **MAT SIZE, EXACT LAYOUT OF MAT INCLUDING ANY PICTURES OF LAYOUT.**
2. The Cable Fault Finder is shipped from the factory with good "AA" batteries. However, if you have any difficulty getting a good reading, replace the batteries first.
3. This instrument has been tested with our product and has been found to be accurate within about 1 foot of mat length.
4. If you have difficulty, feel free to call the factory and ask for technical assistance. We will do the best we can to help you locate the problem.

Test Procedure:

1. Disconnect the power to the circuit that feeds the mat in question.
2. Remove the thermostat control and disconnect the power leads that feed the problem mat, including the green ground wire that feeds the mat.
3. Attach the test leads that come with the Cable Fault Finder to the connector on top of the instrument, twist to lock it in.
4. Turn on the Cable Fault Finder by holding down either the UP or DOWN button on the front of it while pressing the ON/STANDBY button. The display should alternate between "0" and a value called the VOP (Velocity of Propagation). If the VOP is 60, then you may continue. If not, press the UP or DOWN button to change it to 60.
5. Turn off the Cable Fault Finder, then turn it back on WITHOUT pressing the UP or DOWN buttons. The display should show a steady "0".
6. Temporarily touch the tips of the test leads together to get a tone from the instrument. The sound indicates "continuity" within a circuit. You are now ready to use the instrument.
7. Attach the black test lead to the green ground wire of the mat power leads.
8. Attach the red test lead to either one of the other two power leads feeding the mat.
9. If the display fluctuates or shows "ERR", try pulling the mat power leads apart further to get space between the test leads.
10. Write down the distance shown on the display and the color of the power lead you connected to.
DISTANCE: COLOR OF LEAD:
11. Move the red lead to the other power lead feeding the mat.
12. Write down the distance shown on the display and the color of the power lead you connected to.
DISTANCE: COLOR OF LEAD:

Calculations:

Note: The distance shown on the display is the number feet of cable to the problem, including the power leads and the heating cable in the mat.

1. Start with the shorter distance obtained from the Cable Fault Finder.
*- Is it less than the length of the power leads? If so, STOP.
 The problem may be in the power leads at the distance found.
 (The mat is shipped with 10 feet of power leads connected to the mat)*
- Is it within 1 foot of the length of the power leads? If so, there are two possibilities: (1) there is a problem near the splice between the power leads and the mat, or (2) the Cable Fault Finder is giving a false reading because there is a large difference in the conductors of the power leads and the heating cable in the mat.
2. Subtract the power lead length from the Fault Finder readout.
 (the mat is shipped with a minimum 10 feet of power leads, but sometimes the installer cuts the leads shorter). Example: readout 111, less 8 ft. power leads, 103 feet.
3. Divide the result by the "width factor".
 (This is the number of feet of heating cable in a linear foot of mat.)

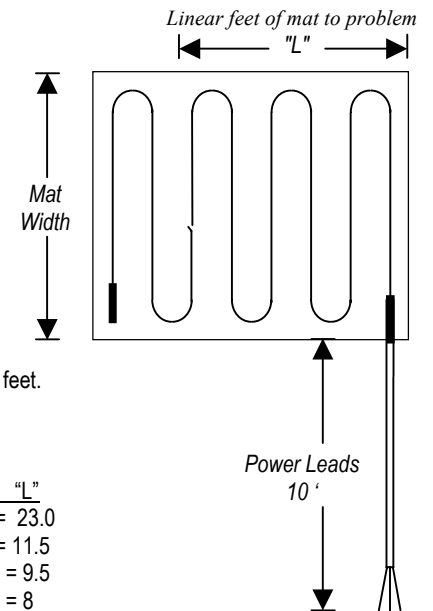
	"Width Factor"	Example	"L"
12" wide mat:	4.477	103 ft divided by 4.477 =	23.0
24" wide mat:	8.934	103 ft divided by 8.934 =	11.5
30" wide mat:	10.856	103 ft divided by 10.856 =	9.5
36" wide mat:	12.902	103 ft divided by 12.902 =	8

4. The result "L" is the number of linear feet of mat to the problem, starting at the **beginning** of the mat.

Using your knowledge of the layout of the mat, and the calculated linear feet of mat to the problem, you can trace where the mat goes and estimate the location of the problem in the floor.

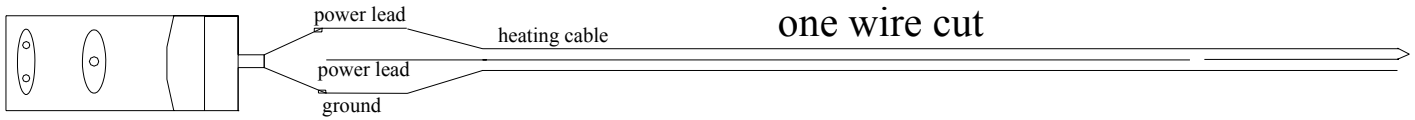
5. Take the other distance obtained from the Cable Fault Finder and go through the same calculations shown above. If the other distance given by the Fault Finder is only a few feet longer than the first, it would be within the margin of error of the Fault Finder, and is typically an indication of a single area of damage.

For additional pictures and examples of calculations and interpretations, please see other side of this sheet.

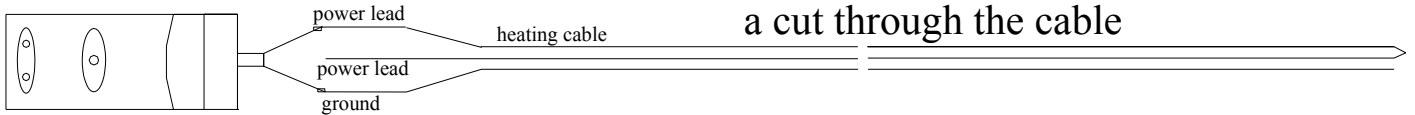


Additional Examples of Calculations and Interpretations:

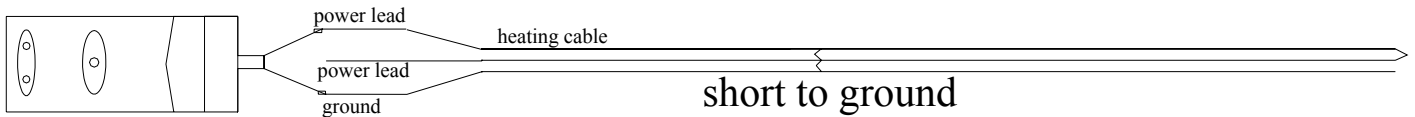
Example: “L” calculated to be 60 feet, but the mat is only 50 feet long. $60-50=10$ feet, the meter detects some type of damage about 10 linear feet from the far end of the mat. If the “L” calculated from the other power lead is substantially less than 40 feet from the start of the mat, there may be two areas of damage within the heating cable. Diagram below is of a heating cable with a cut through a single heating element wire.



Example: “L” calculated to be 30.2 feet for one conductor, and from the other conductor “L” calculated to be 31.1 feet. This is within the margin of error of the Fault Finder, and often an indication of a cut through the whole cable, as shown in the diagram below.



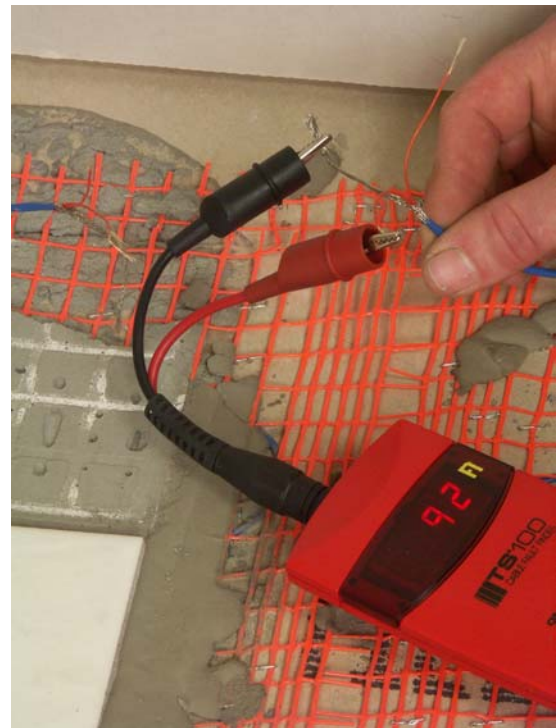
Example: Your ohm meter shows continuity between both power leads and the ground wire. “L” calculated to be about 27 feet for each conductor. The damage is causing a short to ground, as shown in the diagram below.



Pictures of the Fault Finder in use



This picture shows the Fault Finder connected to the power leads at the work box on the wall. Black test lead is connected to the mat's green ground lead, red test lead is connected to the black power lead.



This picture shows the Fault Finder connected at the floor where a wire has been cut and prepped for a splice repair. This is recommended before the splice is installed to verify there is no other damage to the heating cable. Use of a digital ohm meter from this location is also advised. Test the heating cable in both directions from the cut.