



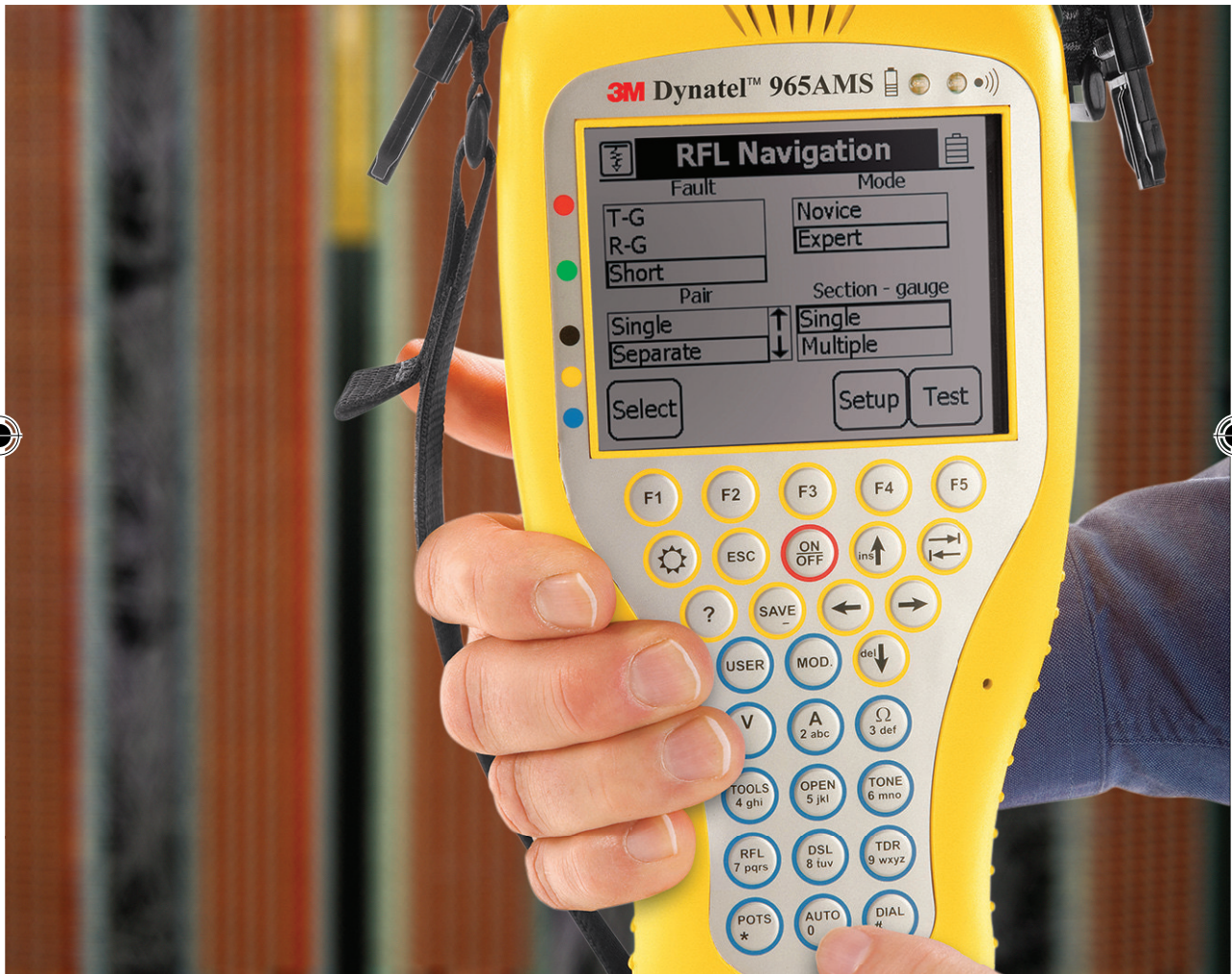
3M

Dynatel™

Advanced Modular System

965AMS-BT

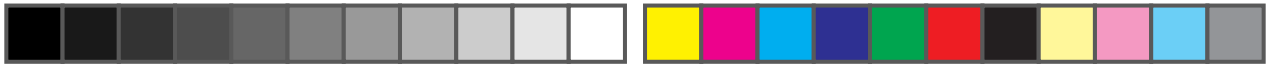
User's Guide

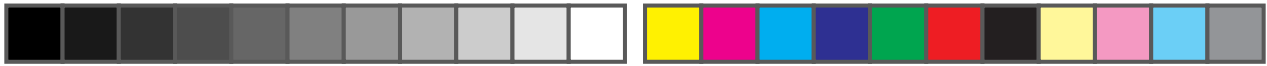


Future-Proof Testing Platform

June 2006







Contents

Introduction	5
Getting Started	5
Welcome Screen.....	7
Help.....	7
High Voltage.....	8
System Setup.....	9
Country	9
Language.....	10
Units.....	11
Clock Settings	13
Set Beep Volume	16
Power Down Timeout	17
Custom Cable.....	18
Voltage Termination.....	22
Measurement Functions.....	24
Volts-DC or AC.....	25
Loop Current.....	27
Ohms Measurements.....	30
Toolbox	36
Opens	45
Tone.....	50
RFL (Resistance Fault Locate)	55
DSL (Digital Subscriber Line).....	91
TDR.....	102
POTS.....	121
Auto Test.....	140
Talk Set	161





Care & Maintenance 168

Charging.....168

AC Charger168

DC Charger169

Level of Charge.....169

Battery Pack.....169

Battery Holder.....172

System Reset.....172

Test Leads173

Specifications 174

Electrical Specifications.....174

General Specifications177





Replacement Items..... 178

Troubleshooting 179



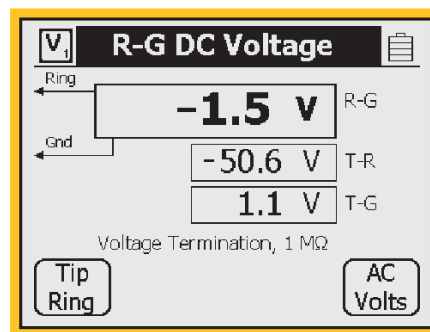
Introduction

Getting Started

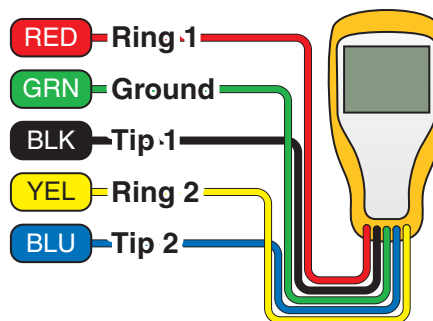
1. Press the red  key to power up the unit or to power down the unit.
2. Press the  key to change the contrast. Use the  or  keys to adjust the contrast on the screen.

3. F1 through F5 are the soft keys. Their function is displayed in the box above the key.

Example: To use the AC Volts, press F5.

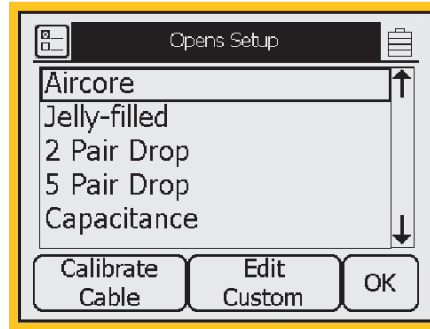


4. At the beginning of each chapter there will be a wiring diagram showing the test lead hook-up. The screen will also show the test lead hook-up.



Getting Started

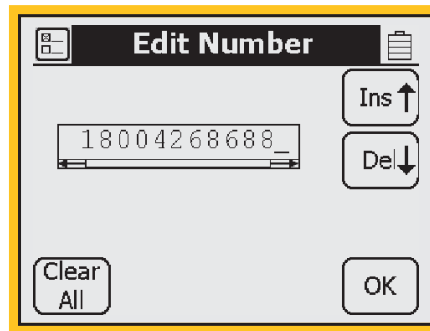
5. Some screens require you to choose from a list of possible choices.



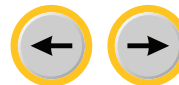
Use the up and down arrow keys to make your choice.



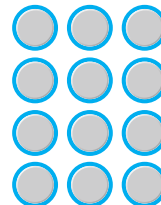
6. Other screens may allow you to enter information such as telephone numbers.




You can position the cursor by using the Left and Right arrow keys.



7. This symbol indicates you should use the blue keys to enter numeric values or numbers.

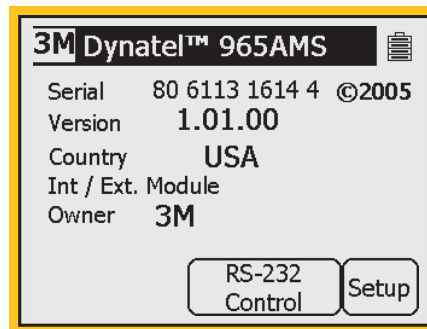


Getting Started




8. Use the  (escape) key to quit the current screen without making any changes. Use multiple escapes to return to the Welcome screen.
9. The **battery symbol** in the upper right-hand corner of the display gives an indication of the approximate battery capacity. Each bar represents one-quarter of the full capacity.
10. The unit is powered by a rechargeable NiMH battery pack. The unit will also work with the “AA” battery pack. Six “AA” batteries are required. Dispose of the batteries per your company procedures. See *Care & Maintenance* for more information on using the rechargeable battery pack.

Welcome Screen

This is the screen that you see when you first turn on the tester. It shows the model name, serial number, software version, selected country, installed module and the name of the owner.

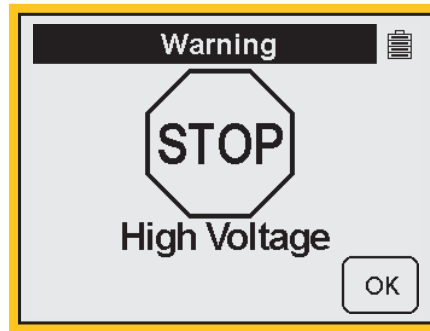


Help

Press the  key at any time in any screen to get help with the current function. Press  or  to return to the previous screen.

High Voltage

This screen indicates a high voltage (120 VAC/VDC or greater) has been detected between the test leads when not in the Voltage Mode. The tester has opened an internal relay to protect itself from damage. Use standard safety practices for disconnecting the test leads since high voltage may be present. Press **OK** to restart the 965AMS

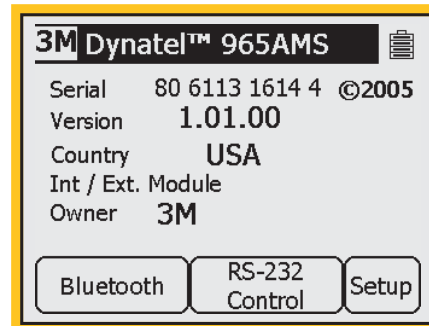


System Setup

Start with the Welcome Screen.

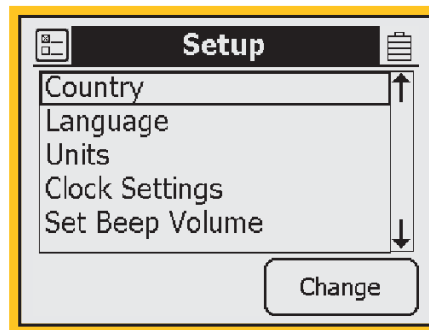
Press **Setup** to review the global settings or to make changes.

Press **RS-232 Control** to upload results with a serial port, or press **Bluetooth** to upload results with a wireless connection.



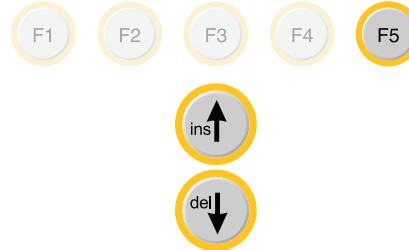
Country

1. Use the **Country** setup to configure the tester for a specific country. Selecting a new country will configure the tester with the setups for language, units, clock format, wire gauges, and cable types for that particular country. Press **Change** to make changes or to review the current settings.



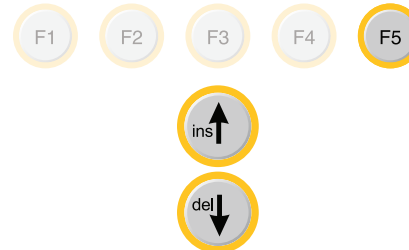
Country

- Use the up and down arrow keys to highlight a country. You will be warned about changing country-specific default values and asked to confirm or cancel your selection. Press **OK** to continue or press **ESC** to quit without making changes.



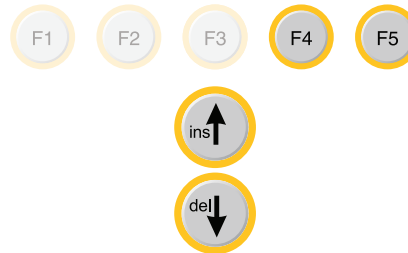
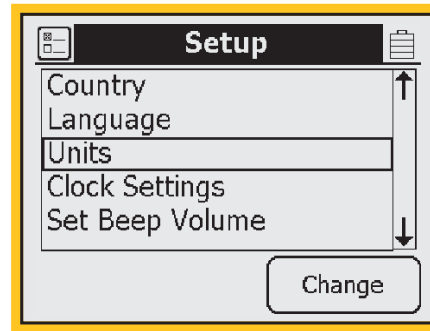
Language

- Use the **Language** setup to change only the language in the tester. Country-specific default values are not affected. Use the up and down arrow keys to highlight a new language. Press **OK** to continue or press **ESC** to quit without making changes.



Units

1. Use the **Units** menu to change the Units of Measure. Use the up and down arrow keys to highlight Units. Press **Change** to continue or press **ESC** to quit without making changes.



Units

2. Use the up and down arrow keys to select the units you want to change. Press **Change Selection** to change the units of measure. An “X” in a box indicates your choice.

Units			
Distance	ft <input checked="" type="checkbox"/>	m <input type="checkbox"/>	
Degrees	°F <input checked="" type="checkbox"/>	°C <input type="checkbox"/>	
Filter	c-msg <input checked="" type="checkbox"/>	ccitt <input type="checkbox"/>	
TDR	Vp <input checked="" type="checkbox"/>	m/μs <input type="checkbox"/>	

Change Selection OK

Distance: Feet or Meters: This affects all distances displayed in the 965AMS tester.

Degrees: Fahrenheit or Centigrade: This affects all temperatures used in the 965AMS.

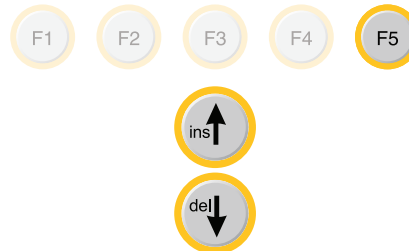
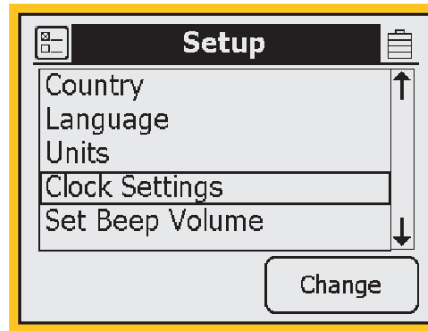
Filter: C-Message or CCITT: This affects the filter used in the POTS Noise function. Use the C-Message filter in the US and Canada. Use the CCITT (also called “Psophometric”) filter in all other countries.

The 965AMS tester features a dBrnP filter for noise tests in New Zealand. To set the default noise filter to dBrnP, set Filter option to CCITT. This filter is used only in units sold in New Zealand; for all other countries, the CCITT option uses a dBrnOp filter. Noise test results will be displayed as dBrnP.

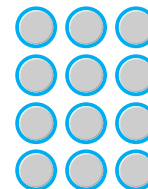
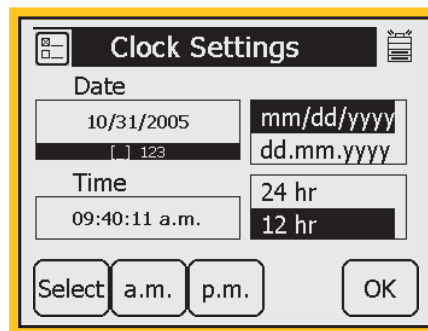
TDR: Vp (Velocity Propagation) or m/μS (meters per microsecond): This affects the TDR “velocity of propagation.” Use “Vp” in the US and Canada. Use “m/μS” in other countries. Press **OK** to accept any changes and return. Use the **ESC** key to return to the Welcome Screen without making changes.

Clock Settings

1. Use the **Clock Settings** menu to select the clock format and to set the correct time. Use the up and down arrow keys to highlight Units. Press **OK** to continue or press **ESC** to quit without making changes.

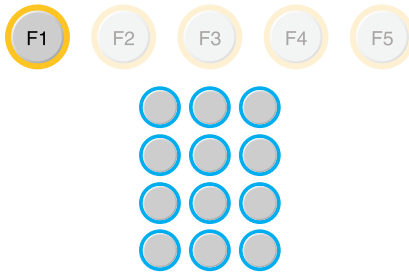
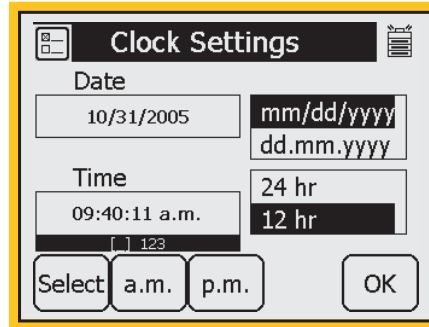


2. Use the blue keys to enter the correct date.

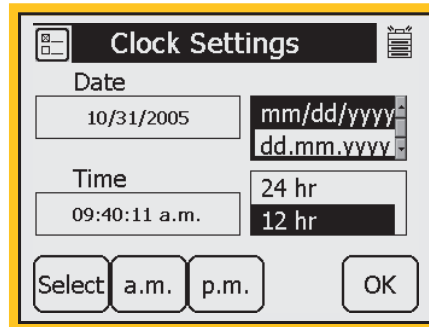


Clock Settings

3. Press **Select**, then enter the correct time using the blue keys.



4. Press **Select** to enter the date format. Choose month, day, year or day, month, year.



Clock Settings

5. Press **Select** to choose the 12 hour or 24 hour format. Use the up and down arrow keys to select the format.

If you choose the 12 hour format, press **a.m.** or **p.m.**.

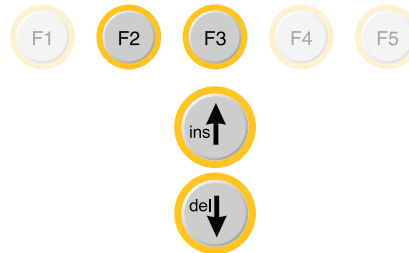
Note: Press **OK** at any time that you have completed your updates.

Clock Settings

Date
09/04/2005 mm/dd/yyyy
dd.mm.yyyy

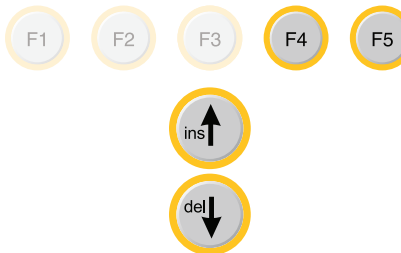
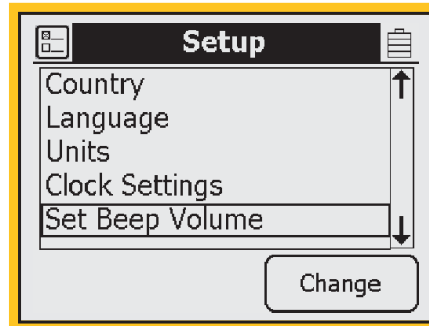
Time
02:40:04 p.m. 24 hr
12 hr

Select a.m. p.m. OK

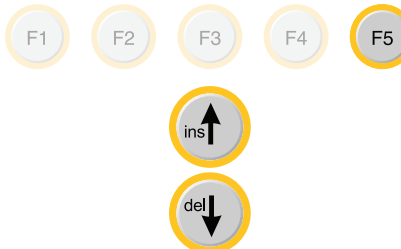


Set Beep Volume

1. Use this menu to change the **Set Beep Volume**. Use the up and down arrow keys to highlight Set Beep Volume. Press **Change** to continue or press **ESC** to quit without making changes.

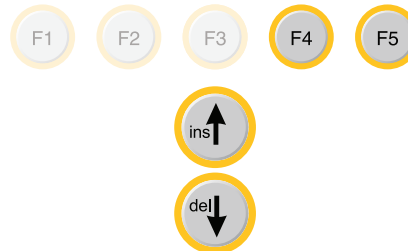
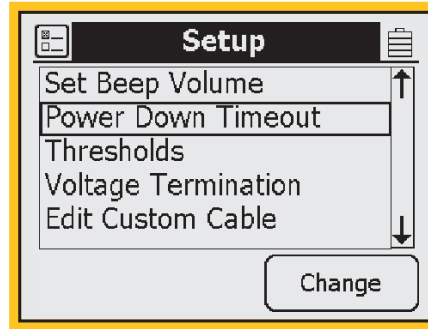


2. Use the up and down arrow keys to change the beep volume. Press **OK** to save this volume setting.

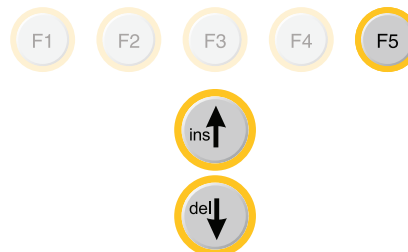
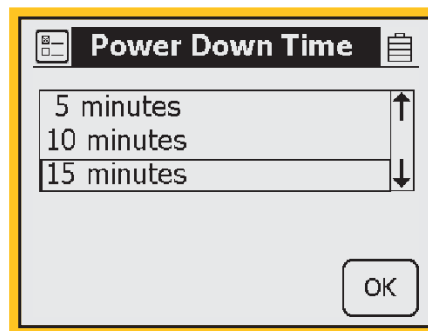


Power Down Timeout

1. Use this menu to change the **Power Down Timeout**. Use the up and down arrow keys to highlight Power Down Timeout. Press **Change** to continue or press **ESC** to quit without making changes.




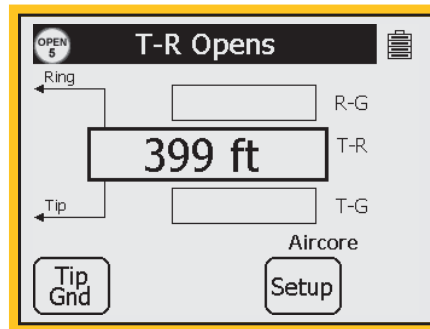
2. Use the up and down arrow keys to select the timeout you want to use. Press **OK** to save your choice.



Custom Cable

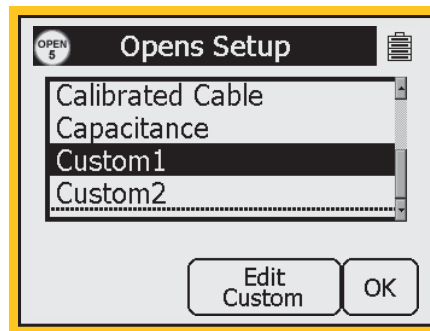
Use **Custom Cable 1** or **Custom Cable 2** to create a special cable you are using on a regular basis that has capacitance values that are different from existing cables.

1. Press the blue  key to enter the Opens measurement function.
2. Press **Setup** to enter the Setup menu.



3. Use the up and down arrow keys to select Custom 1 or Custom 2.

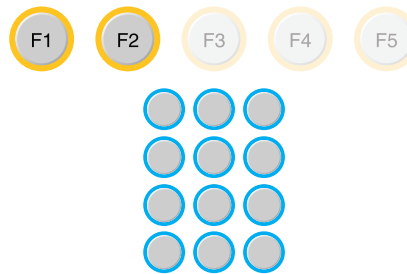
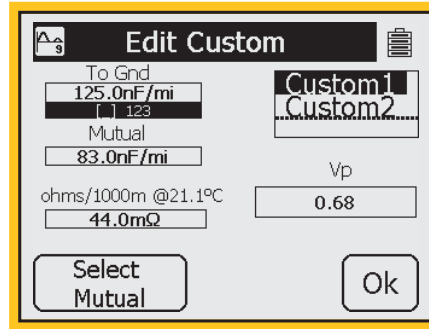
Press **Edit Custom**.



Custom Cable

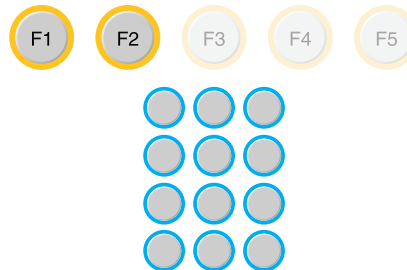
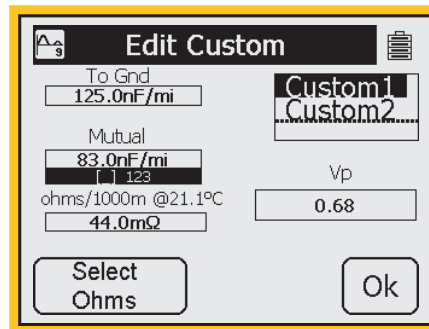
4. Use the blue keys to enter the capacitance to ground.

Press **Select Mutual**.



5. Use the blue keys to enter the mutual capacitance.

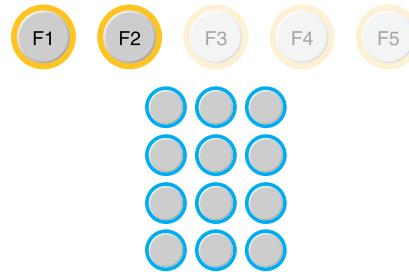
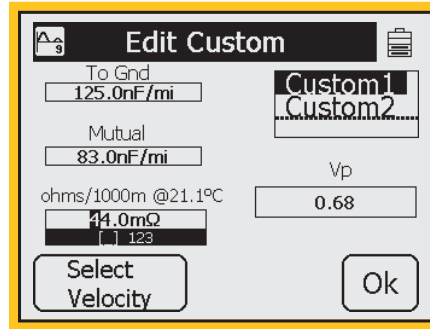
Press **Select Ohms**.



Custom Cable

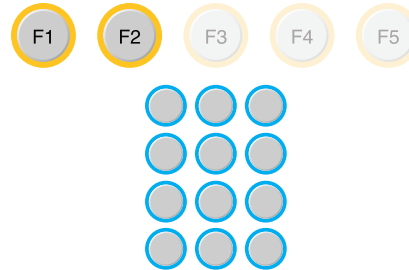
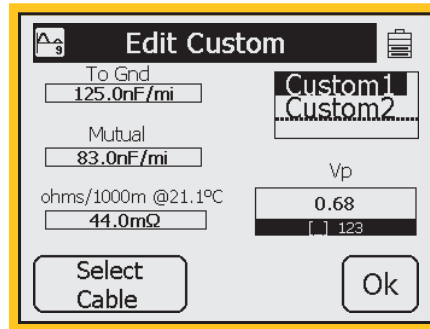
6. Use the blue keys to enter ohms per thousand feet.

Press **Select Velocity**.



7. Use the blue keys to enter the velocity propagation. If you do not know this value, use 0.68.

Press **Select Cable**.



Custom Cable

- Use the up and down arrow keys to select Custom 1 or Custom 2.

Press **OK** to save the custom cable.

Edit Custom

To Gnd
125.0nF/mi

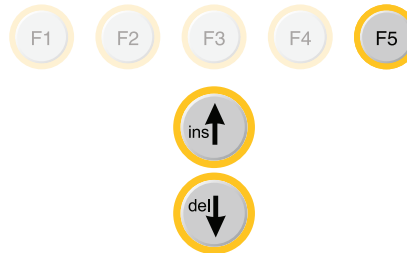
Mutual
83.0nF/mi

ohms/1000m @21.1°C
44.0mΩ

Vp
0.68

Custom1
Custom2

Select To Gnd Ok

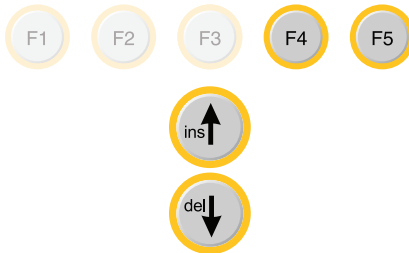
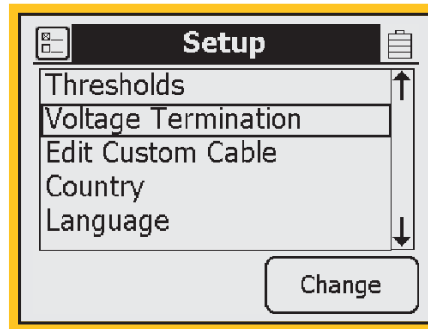


Voltage Termination

1. The **Voltage Termination** option allows you to select the input impedance of the 965AMS digital voltmeter (in supported countries only). The input impedance of the internal 965AMS voltmeter is normally 1Mohm. However, some legacy systems use voltage measurement systems with input impedances of 100Kohms. This option is provided to maintain measurement compatibility with those systems.

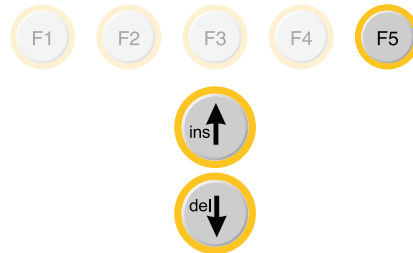
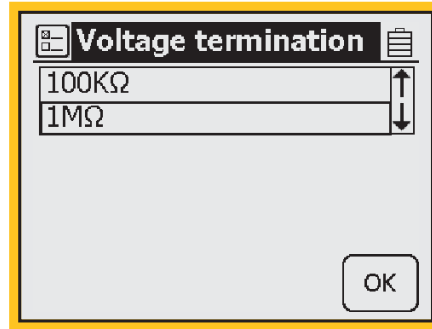
If 100Kohm termination is selected, the 965AMS tester will display '100K' on the voltage measurement.

Use this menu to change the Voltage Termination. Use the up and down arrow keys to highlight Voltage Termination. Press **Change** to continue or press **ESC** to quit without making changes.















Voltage Termination

- Use the up and down arrow keys to select the Voltage Termination you want to use. Press **OK** to save your choice.




Measurement Functions

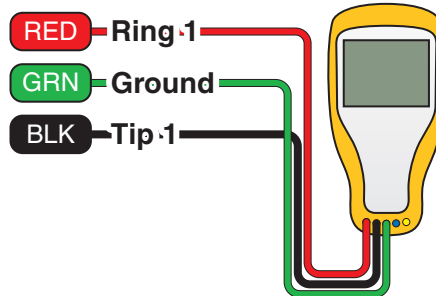
The 12 measurement functions include:

-  DC and AC voltage measurements
-  milliAmps and ground resistance measurements
-  Ohms measurement and Soak Test
-  Self-Calibrate, Stored Results and Ohms-to-Distance Calculator
-  Opens distance measurement
-  Send Tones
-  Resistance Fault Locate: Distance measurement to a resistive fault
-  DSL Loss and Noise plus the Spectrum Analyzer and Resistance Balance
-  Time Domain Reflectometer (TDR)
-  POTS Loss, Noise, Longitudinal Balance, Load Coil Counter and Caller ID
-  Automatic testing of circuits using “Expert Pair Tests”
-  Talk Set


Volts-DC or AC

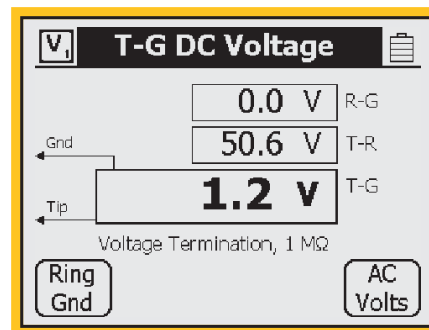
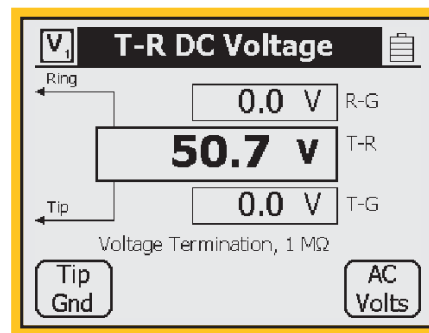
The Volts  function measures the DC voltage or AC voltage between Tip, Ring and Gnd.

Volts-DC or AC>Hook-Up



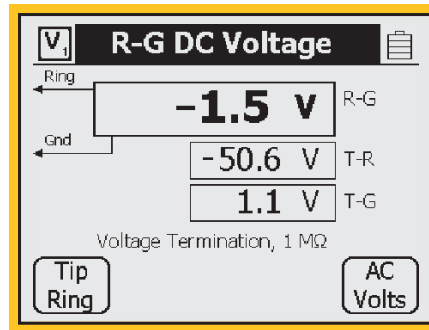
Volts-DC or AC>Operation

1. Press the blue  key to start the voltage measurement function.
2. This screen displays the T-R voltage in the larger active measurement box.
3. Press **Tip Gnd** to display the T-G voltage. The T-R measurement will be saved on the screen in a smaller box until a new measurement updates the screen.



Volts-DC or AC>**Operation**

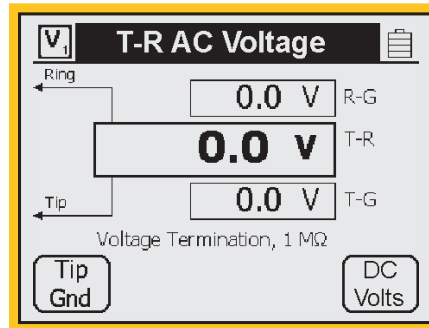
- Press **Ring Gnd** to display the R-G voltage. The T-G measurement will be saved on the screen in a smaller box until a new measurement updates the screen.



- All measurements are erased when you exit this function.

Volts-DC or AC>**AC Volts**

- Press **AC Volts** to measure AC volts.



AC Normal Range—Active Line:

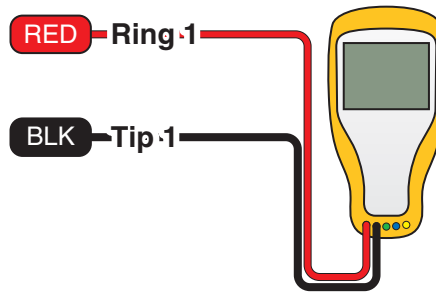
- R-G and T-G should have the same AC voltage. If they are not equal the pair will probably have noise.
- T-R should be 0 volts

Note: Maximum voltage = 300 volts DC, 250 volts AC


Loop Current

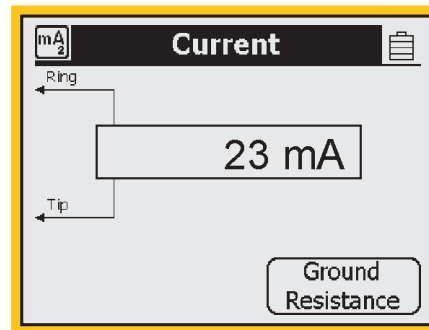
Loop Current  measures the loop current in an active line.

Loop Current > Hook-Up



Loop Current > Operation

1. Press the blue  key to start this test.
2. This is a continuous measurement until you disconnect the test leads or choose another function.



Normal Measurements

	OK	Marginal	Not OK
Current	>23mA	20-23mA	<20mA

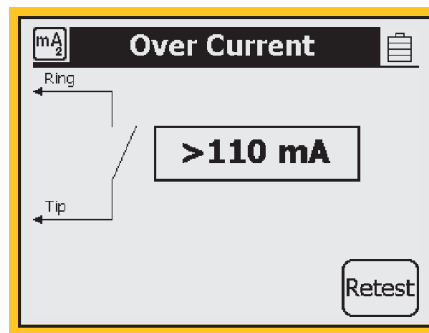
Loop Current>**Operation**

3. **Over Current Warning**

The tester has detected current higher than 110 mA.

High current can damage the test set. Use standard safety practices for disconnecting the test leads and eliminating the source of the high current.

Disconnect all test leads then press **Retest** to continue.

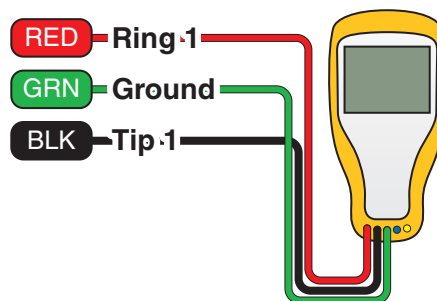


Loop Current>**Ground Resistance**

The Ground Resistance function compares the customer protector ground resistance to an active central office pair.

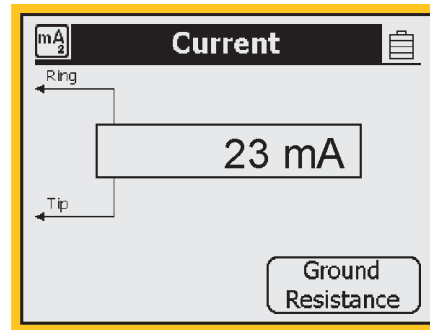
Note: The Ground Resistance function only works with central offices with the Tip connected to ground.

Loop Current>Ground Resistance>**Hook-Up**



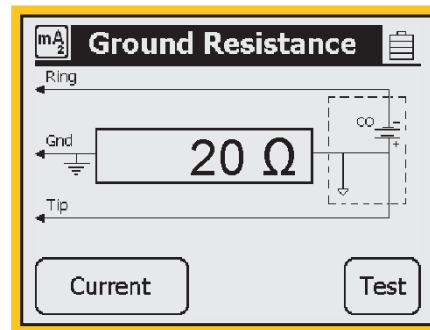
Loop Current>Ground Resistance>Operation

1. Press **Ground Resistance** to access the Ground Resistance function.



2. Press **Test** to start the test. The results will be displayed in the box in the center of the screen.


This is a continuous test.



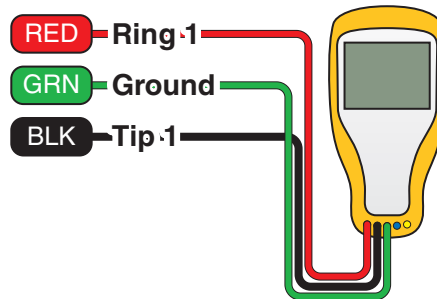
Normal Measurements

0 Ω to 25 Ω


Ohms Measurements

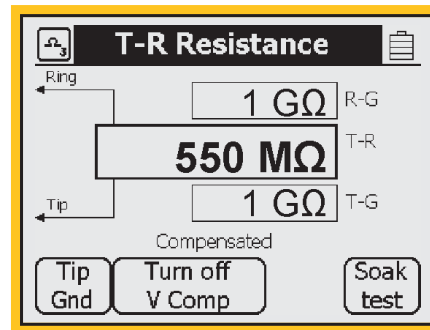
The **Ohms Measurement** function  measures the insulation resistance between the Tip, Ring and ground. This function can also measure the resistance of the Tip and Ring loop or individual wires.

Ohms Measurements>Hook-Up



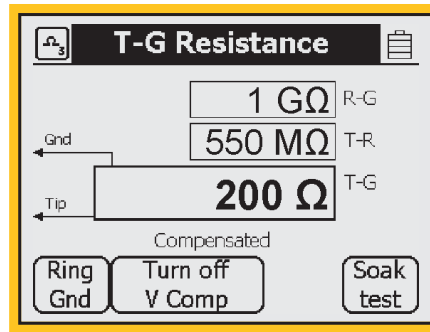
Ohms Measurements>Operation

1. Press the blue  key to start the ohms measurement function.
2. This screen displays the T-R resistance in the larger active measurement box.

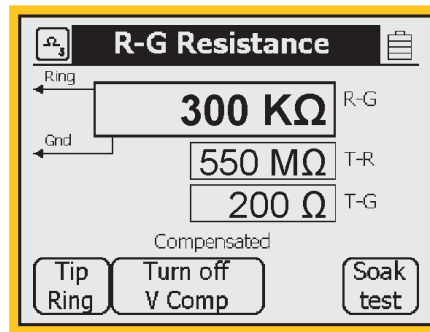


Ohms Measurements > **Operation**

- Press **Tip Gnd** to display the Tip-Ground resistance. The T-R measurement will be saved on the screen in a smaller box until a new measurement updates the screen.



- Press **Ring Gnd** to display the Ring-Ground resistance. The T-G measurement will be saved on the screen in a smaller box until a new measurement updates the screen.



- All measurements are erased when you exit this function.

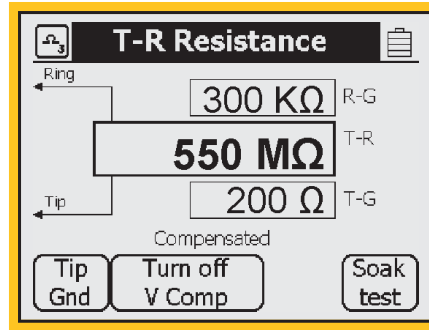
Normal Range: POTS Insulation Resistance

	OK	Marginal	Not OK
Insulation Resistance	<3 MΩ	3 kΩ to 3 MΩ	<3 kΩ

Ohms Measurements>**Voltage Compensation**

The Voltage Compensation feature compensates for crossed battery on the line. Use “compensated” for most measurements.

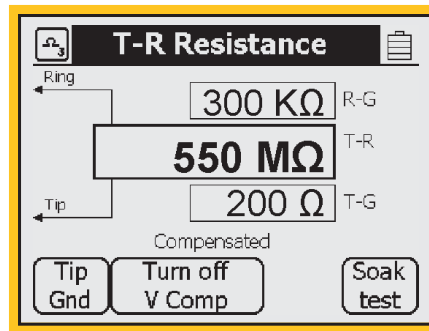
Press **Turn Off V Comp** to turn off voltage compensation.



Ohms Measurements>**Soak Test**

The Soak Test function can determine if the source of a resistive fault is caused by moisture, corrosion or pure resistance.

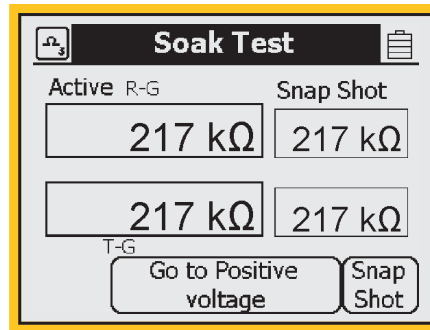
Press **Soak Test** to access the Soak Test menu.



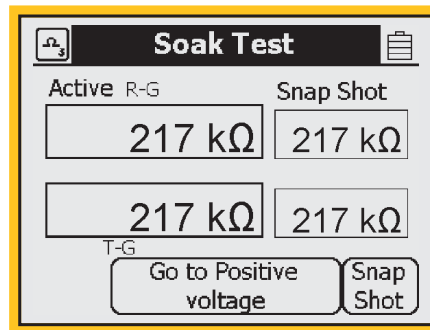
NOTE: The Soak Test function will not work properly if there is voltage on the line. Voltage Compensation does not apply to the Soak Test.

Ohms Measurements > **Soak Test**

1. Take an initial resistance measurement by pressing the **Snap Shot** key.
2. You will compare this to other active measurements to determine the source of the fault.



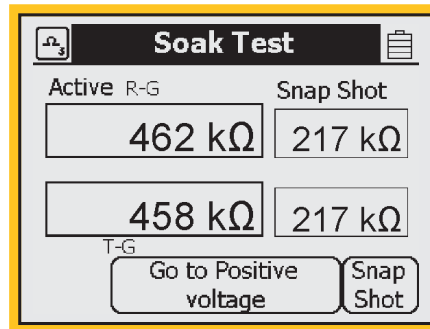
3. One of the properties of moisture in a circuit is the current from the ohmmeter can “dry out” the moisture. The ohmmeter will first show a lower resistance, then after one or two minutes, the resistance will increase to a higher reading.



Initial Reading

This indicates the fault is caused by moisture.

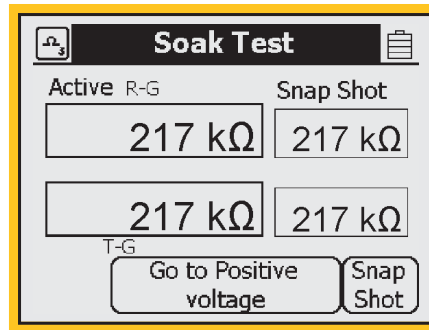
Note: This is not an acceptable procedure to “dry” a fault.



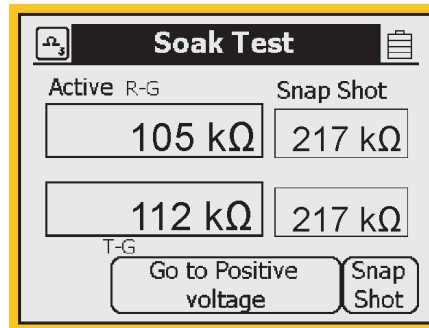
Reading After 1 or 2 Minutes

Ohms Measurements > **Soak Test**

4. A property of corrosion is that a current flowing through the corrosion will cause the corrosion to become a better conductor. The ohmmeter will show a lower resistance reading if corrosion is the cause.

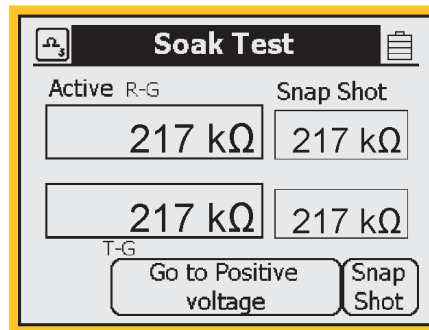


Initial Reading



Reading After 1 or 2 Minutes

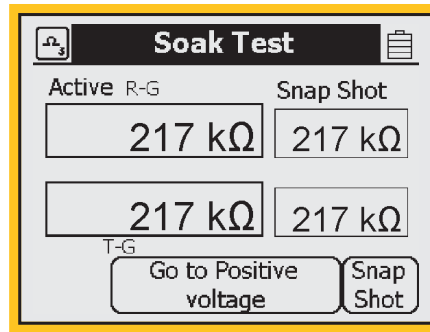
5. If the resistance value does not change, the fault is a pure resistive fault.






Ohms Measurements > **Soak Test**

- Use **Go To Positive Voltage** and **Go To Negative Voltage** to reverse the voltage polarity. Use the lowest resistance reading of the two numbers for your measurements.



Toolbox


Use the Toolbox  to: (1) view saved test results, (2) perform a self calibrate, (3) use the Ohms to Distance calculator, and (4) Upload results to PC Link.

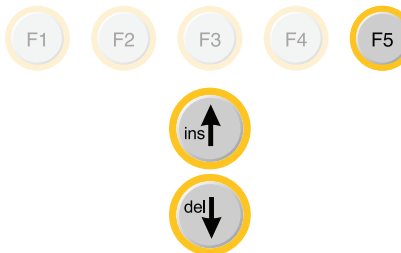
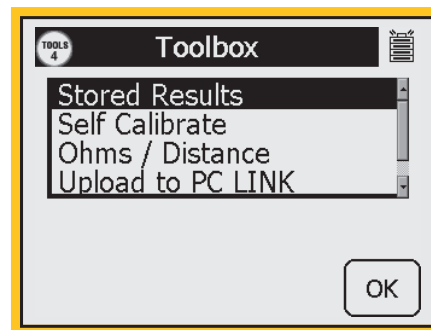
Toolbox>Stored Results

The **Stored Results** function allows you to review the results of previously saved tests.

Toolbox>Stored Results>Operation

1. Press the blue  key to enter the Toolbox function.

Use the up and down arrow keys to select the Stored Results function. Press  to save your choice.



Toolbox>Stored Results>Operation

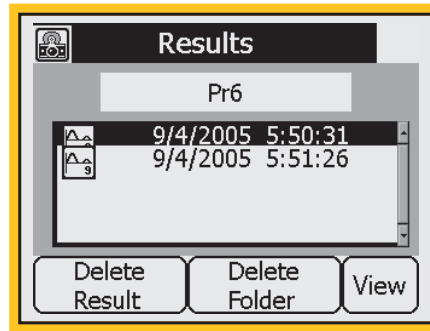
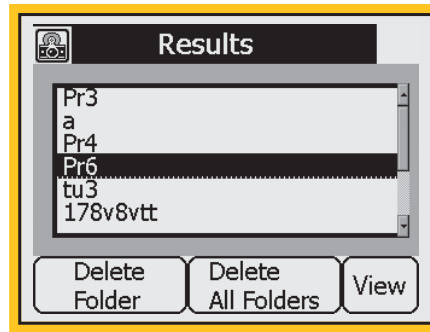
- If one or more test results have been stored, the ID number for each will be displayed.

The ID number is like a file folder and each test result is like a file. The name of the file is the time and date stamp that is generated by the tester.

Press **View** to see the list of files.

- This screen shows the contents of the file.

Press **Delete Result** to delete one file or press **Delete Folder** to delete all files in the folder.

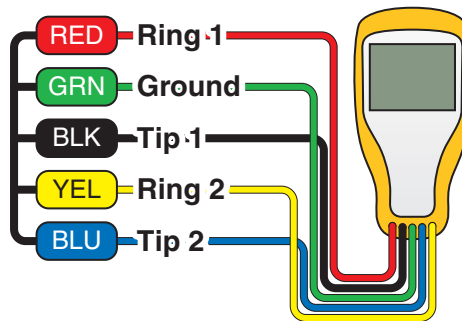


Toolbox>**Self-Calibrate**


The **Self-Calibrate** function will verify that all of the internal circuits and test leads are operating properly. Use self-calibrate:

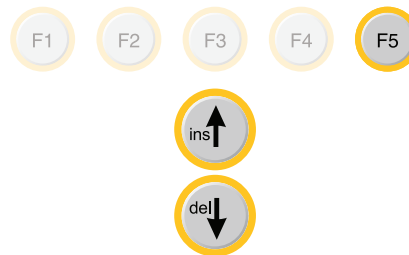
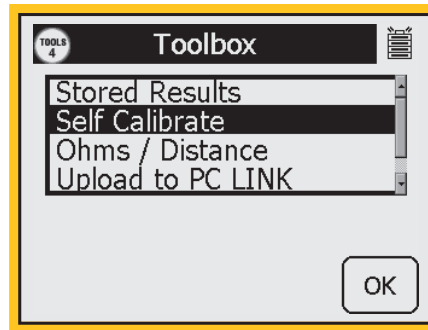
- After the first full battery charge before you put the tester in service for the first time.
- Anytime the working temperature changes by more than 35°F (20°C). Calibrate the 965AMS tester at the same temperature at which it will be used.
- After changing the batteries, or anytime the battery pack completely discharges.

Toolbox>*Self-Calibrate*>**Hook-Up**

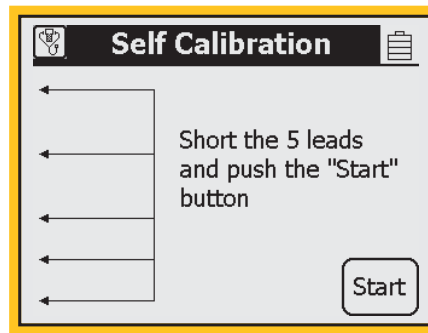


Toolbox>Self-Calibrate>Operation

1. Press the blue  key to enter the Toolbox function.
2. Use the up and down arrow keys to select the Self-Calibrate function. Press **OK** to save your choice.





3. The calibration may take up to 1 minute to complete.

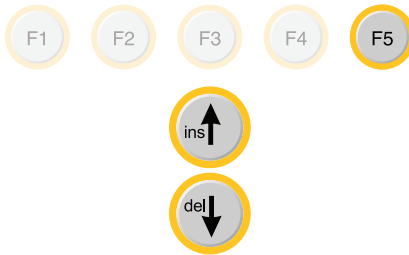
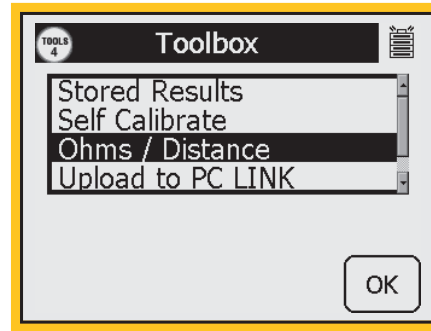



Toolbox>**Ohms-to-Distance Calculator**

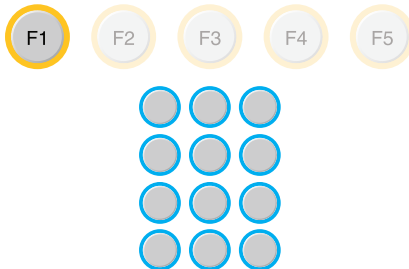
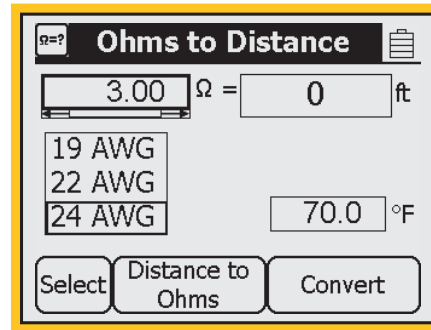
Use this function to convert from Ohms to Distance or Distance to Ohms based on temperature and wire gauge.

Toolbox>Ohms-to-Distance Calculator>**Operation**

1. Press the blue  key to enter the Toolbox function.
2. Use the up and down arrow keys to select the Ohms-to-Distance Calculator. Press  to save your choice.

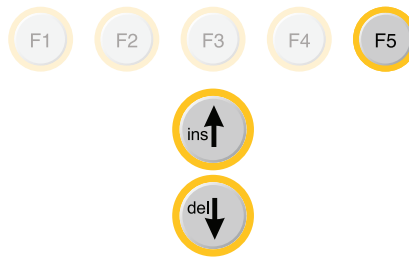
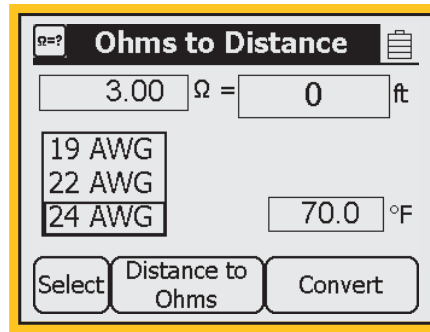


3. Use the blue keys to enter the Ohms value. Press  to save and highlight the wire gauge selection.

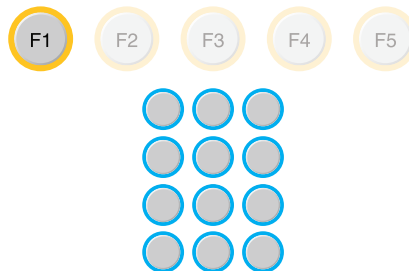
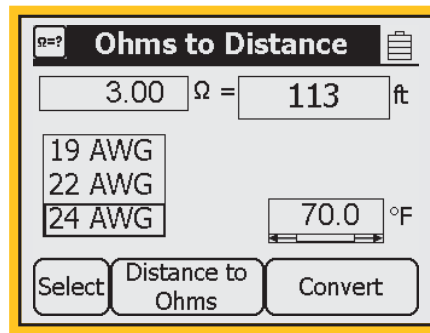


Toolbox>Ohms-to-Distance Calculator>Operation

- Use the up and down arrow keys to select the wire gauge. Press **Select** to save and highlight the temperature field.

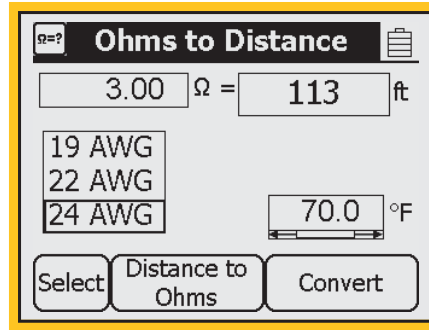


- Use the blue keys to enter the temperature.

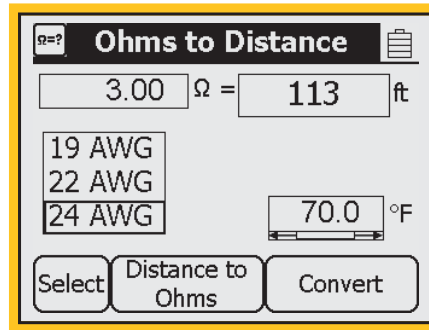


Toolbox>Ohms-to-Distance Calculator>Operation

- Press **Convert** to find the distance.



- Select **Distance to Ohms** if you want to convert a distance to an Ohms value.



Toolbox>PC Link

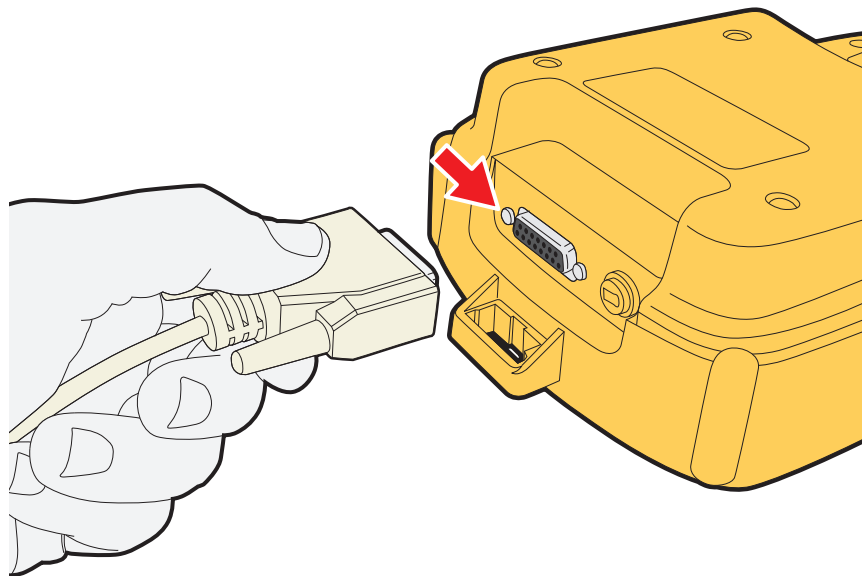
The PC Link function allows you to upload stored test results from the 965AMS tester to your PC or laptop. PC Link can be used either with the 3M™ Dynatel™ Advanced Modular System 965AMS Serial Cable 1190 or via a Bluetooth® connection.

Download the PC Link software from www.3m.com/dynatel.

Toolbox>PC Link>Serial Cable Hookup

Note: You must have a COM port on your laptop or PC to use PC Link with a serial cable.

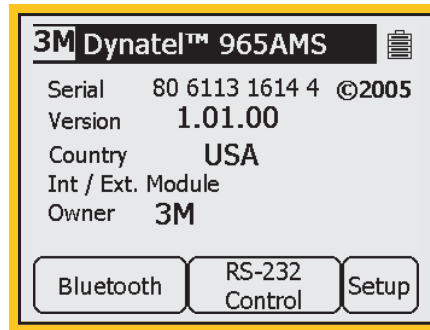
Connect the 3M™ Dynatel™ Advanced Modular System 965AMS Serial Cable 1190 to the 965AMS tester and the PC or laptop if you will be uploading stored test results.

**Toolbox>PC Link>Bluetooth® Hookup**

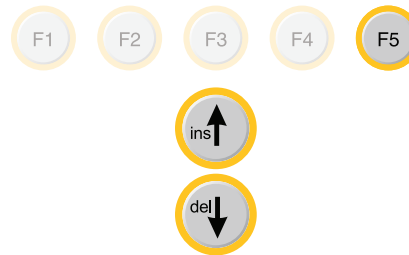
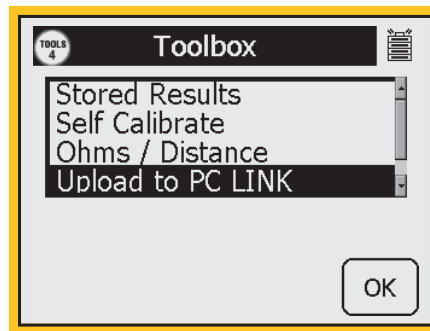
1. The receiving PC or laptop must be equipped with Bluetooth® wireless technology and software.
2. Use the Bluetooth manager in the receiving PC or laptop to establish a connection to the 965AMS tester using the Serial Port Profile (SSP). In the process, the Bluetooth manager will assign a serial port number to the wireless connection.
3. Start PC Link. Set up the serial port number for the connection.

Toolbox>PC Link>Operation

1. Start with the Welcome Screen. Press **RS-232 Control** to upload results with a serial port, or press **Bluetooth** to upload results with a wireless connection.

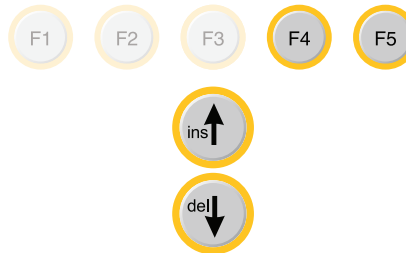
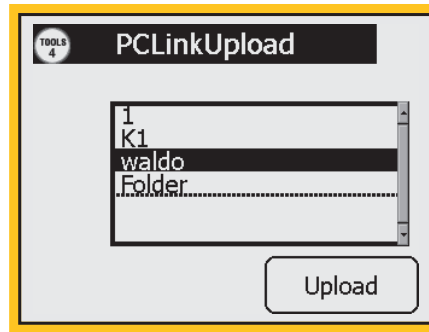



2. Press the blue **TOOLS** key to enter the Toolbox function.
3. Use the up and down arrow keys to select Upload to PC Link. Press **OK** to save your choice.



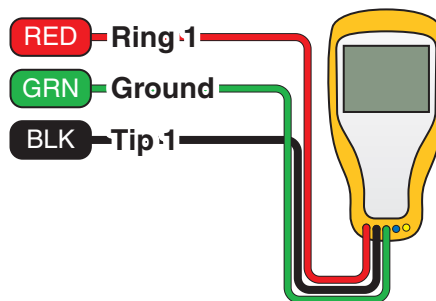
Toolbox>PC Link>Operation

- Use the up and down arrow keys to select the file to upload. Press **Upload** to transfer the file.


**Opens**

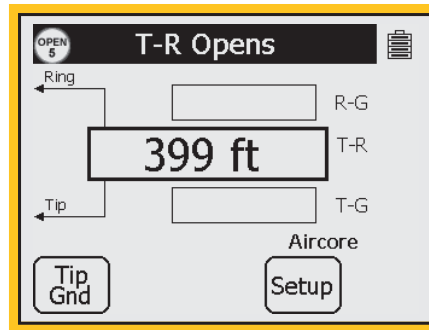
Opens  measures the distance to an “open” circuit. This could be a broken wire, a cut pair or the end of the circuit.

Opens>Hook Up

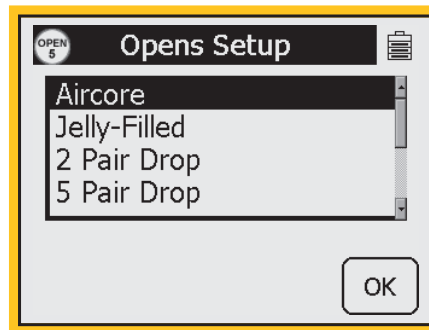


Opens>Operation

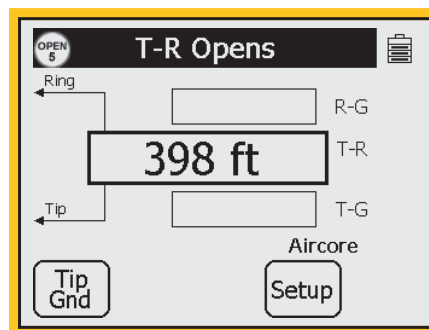
1. Press the blue  key to enter the Opens measurement function.
2. Press **Setup** to enter the Setup menu.



3. Use the up and down arrow keys to choose the type of cable that best describes your cable. Press **OK** to save your choice.



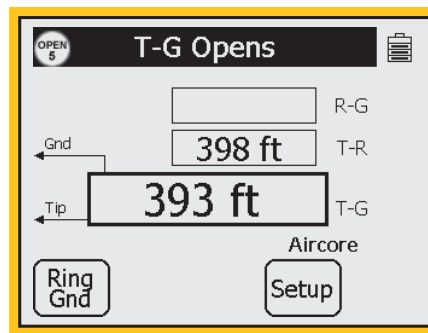
4. This screen displays the T-R distance in the larger active measurement box. Press **Tip Gnd** to display the T-G distance.



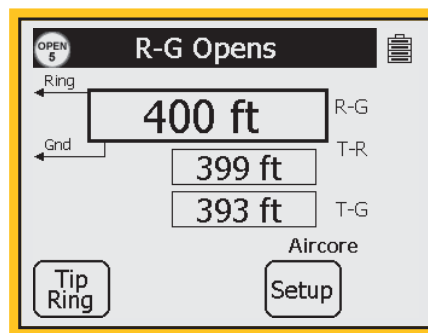
Opens> **Operation**

5. The T-R measurement will be saved on the screen in a smaller box until a new measurement updates the screen.

Press **Ring Gnd** to display the R-G distance.



6. The T-G measurement will be saved on the screen in a smaller box until a new measurement updates the screen.



7. All measurements are erased when you exit this function.

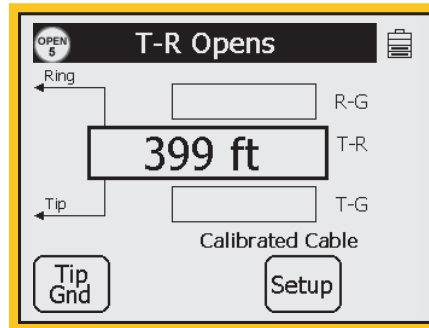
Normal Range: A good pair should have the T-G, R-G and T-R within about 5% of each other. If they are not within 2%, the shortest distance will be the location of the fault and the other distances will not provide accurate distances. Typically this will be an open ground bond or a broken Tip or Ring.

Note: “Opens” is more accurate if other cable pairs are active. If other pairs are not active, short at least 30% of the inactive pairs to the cable shield.

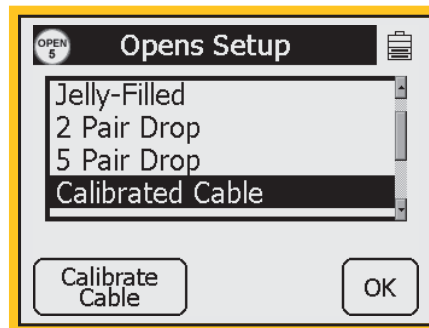
Opens>**Calibrate Cable**

Use this function to measure the capacitance of a known good pair within a cable of known length. This value can be used as a ‘Calibrated Cable’(or ‘reference’) to find the distance to an ‘open’ on the same or similar cable.

1. Press **Setup**.



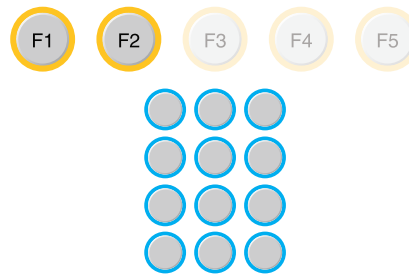
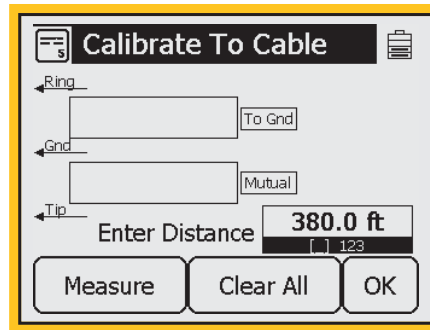
2. Press **Calibrate Cable**.



Opens>**Calibrate Cable**

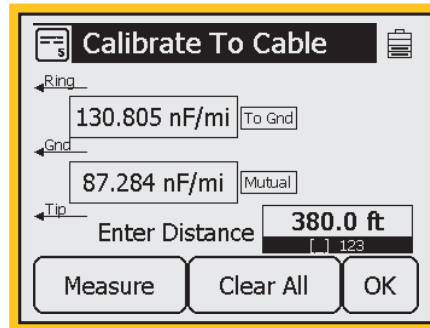
- Use the blue keys to enter the known distance.

Press **Measure**.



- The screen will display the measured capacitance per distance for the reference pair.

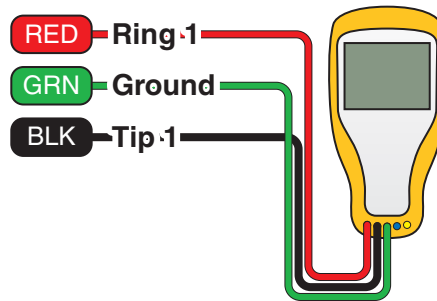
Note: A Yield sign indicates that the Ring to ground and Tip to ground differ by more than 5%.




Tone

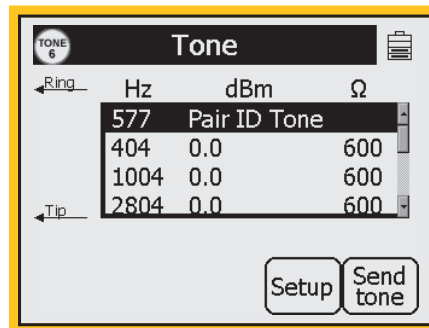
Use **Tone**  to send a tone on a pair.

Tone>Set-Up



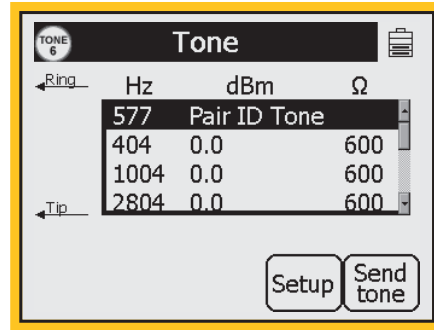
Tone>Operation

1. Press the blue  key to enter the Tone function.
2. Use the up and down arrow keys to highlight the frequency that you want to use.

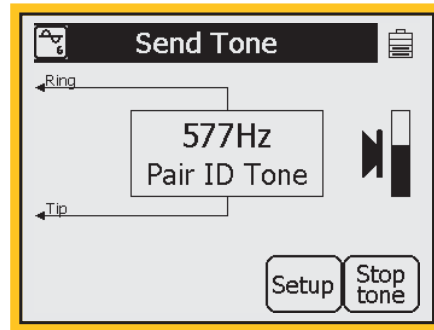


Tone>Operation

- Press **Send Tone** to send the tone.



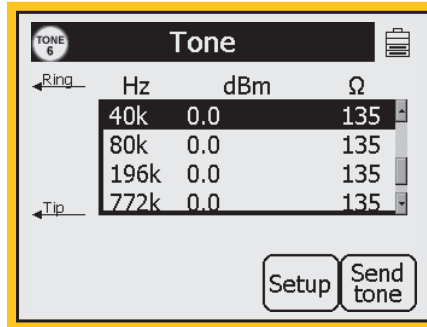
- Press **Stop Tone** to stop the tone.



Tone>**Edit The Frequency Of A Tone**

There are 10 frequencies that can be stored in memory. If you need a different frequency you can edit any of the 10 frequencies and change to a new frequency.

1. Use the up and down arrow keys to select one of the frequencies to change.



2. Frequency Range:

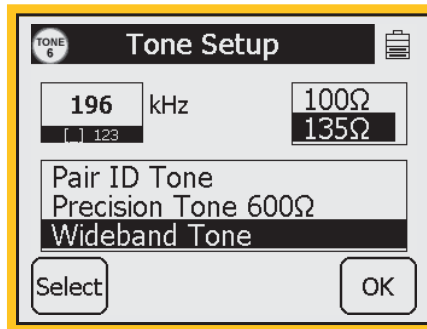
ID - 200 Hz and 1,000 Hz

Precision - 200 Hz and 19,999 Hz

Wideband - 20 kHz and 2200 kHz.

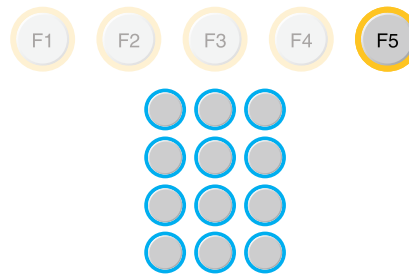
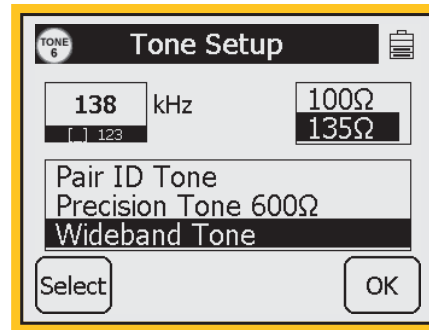


3. For this example we will replace 196 kHz with 138 kHz. Use the up and down arrow keys to select Wideband Tone.



Tone>Edit The Frequency Of A Tone

4. Use the blue keys to enter the frequency in kHz.
5. Press **OK**.


**Tone>Applications**

The Tone function can be used for three applications: **ID Tone**, **Precision Tone** and **Wideband Tone**.

Tone>Applications>ID Tone


1. Use the **ID Tone** for pair identification and tone coiling.
2. The ID tone is always an interrupted tone.
3. The frequency is adjustable between 200 Hz and 1,000 Hz.
4. The 965AMS tester automatically goes off-hook when an ID tone is sent.
5. The volume control on the 965AMS controls the volume you hear, but the output to the far end is set at a fixed level.

*Tone>Applications>***Precision Tone**

1. Use the **Precision Tone** to send a tone.
2. Use another 965AMS tester to receive the tone. Press the blue  key, then select **Loss**.
3. The output frequency of the Precision tone is adjustable between 200Hz and 19,999Hz.
4. The output level range is -20dBm to +1dBm.
5. The most common frequencies for POTS lines are 404Hz, 1004Hz and 2804Hz.
6. The impedance is fixed at 600Ω.
7. Press **Send Tone** to send the ID tone.
8. Press **Stop Tone** to stop the Precision tone.



*Tone>Application>***Wideband Tone**



1. Use the **Wideband Tone** to send a tone to the other end of a wideband circuit to measure the signal loss.
2. Use another 965AMS tester to receive the tone.
3. Press the blue  key, then select **DSL Loss**.
2. The output frequency of the Wideband tone is adjustable between 20kHz and 2200kHz.
3. The output level is fixed at 0dBm.
4. The impedance can be set to 600Ω or 135Ω.
5. Press **Send Tone** to send the wideband tone.
6. Press **Stop Tone** to stop the wideband tone.

RFL (Resistance Fault Locate)

Use **RFL**  to find the distance to a short or ground.

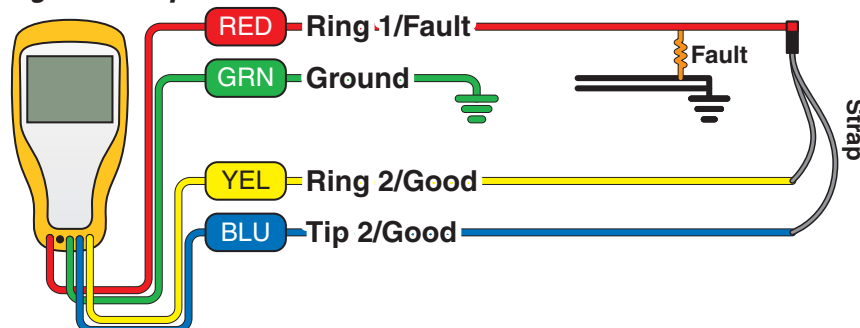
Important Note: You must first use the Auto test , or the Ohmmeter , to determine the type of fault.

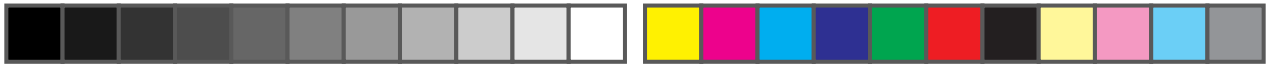
1. There are two types of hook-ups, **Separate Pair** and **Single Pair**. Separate Pair is more accurate, but it requires more wires to hook-up. The “Good” wires can be any gauge and any length. As an example, the Good wires can be jumper wire. Separate Pair is recommended for applications where you have a short or ground in an aerial cable or a direct buried cable.
2. Single Pair requires that the “Good” wire is the same gauge and length as the faulted wire. Single Pair is appropriate for situations where you are looking for the fault to be in the nearest pedestal.
3. RFL has the ability to find the distance to a short or ground using a single section of cable or a section with multiple gauges. Select Single- or Multi-section for your situation.

RFL > Hook-Up

There are ten possible scenarios for connecting a 965AMS to use the RFL function:

Ring-Cross Separate Pair



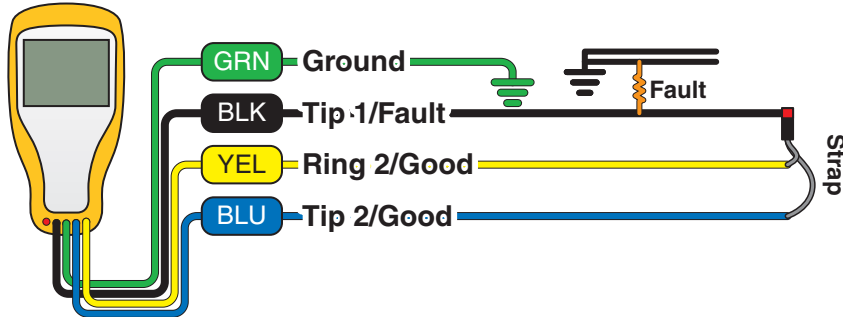


Measurement Functions

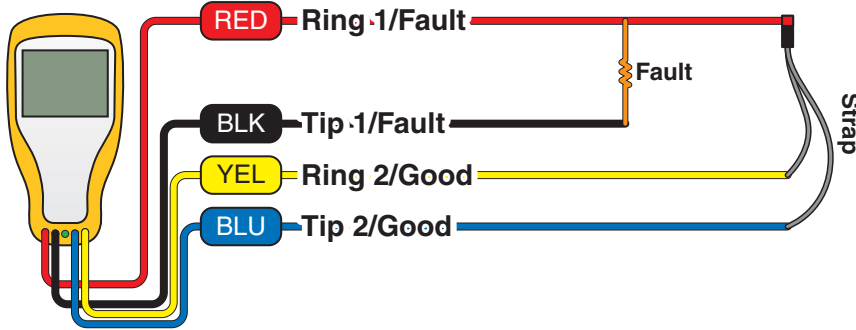
3M™ Dynatel™ Advanced Modular System 965AMS

RFL>Hook-Up

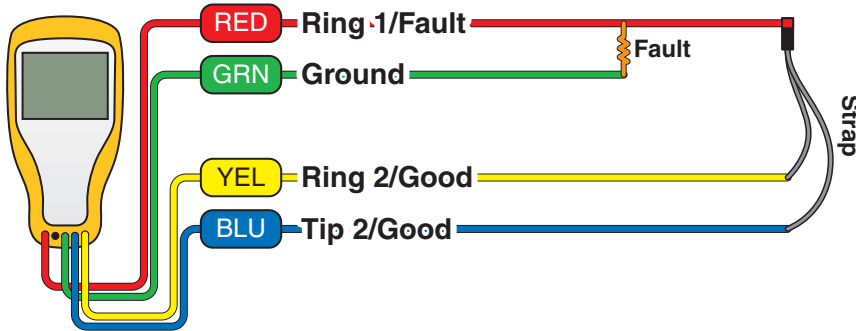
Tip-Cross Separate Pair



Short Separate Pair

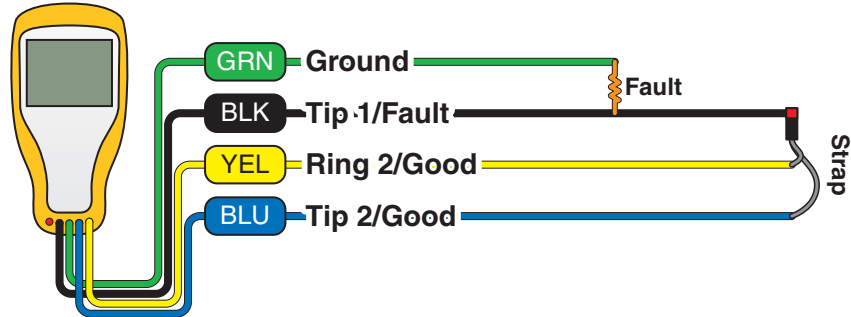


Ring-Ground Separate Pair

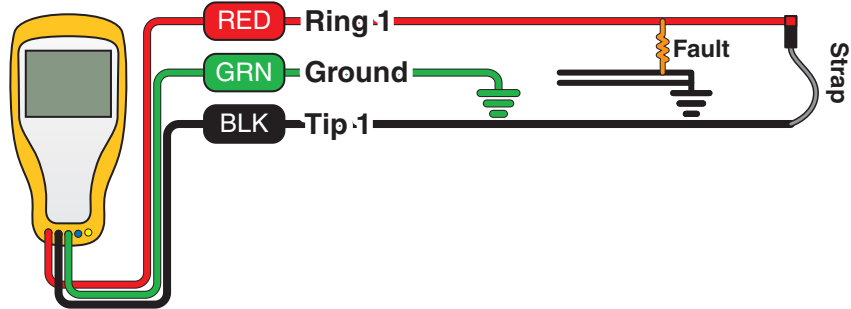


RFL>Hook-Up

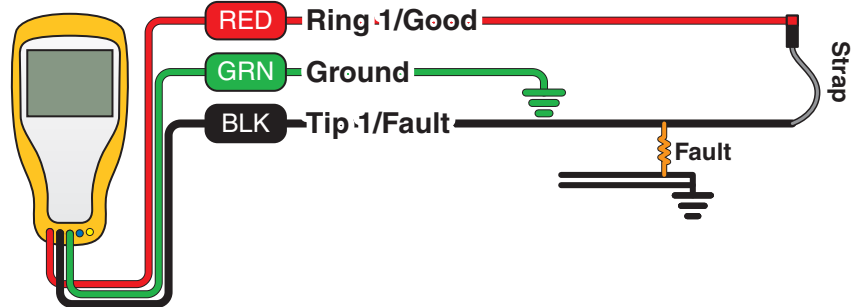
Tip-Ground Separate Pair



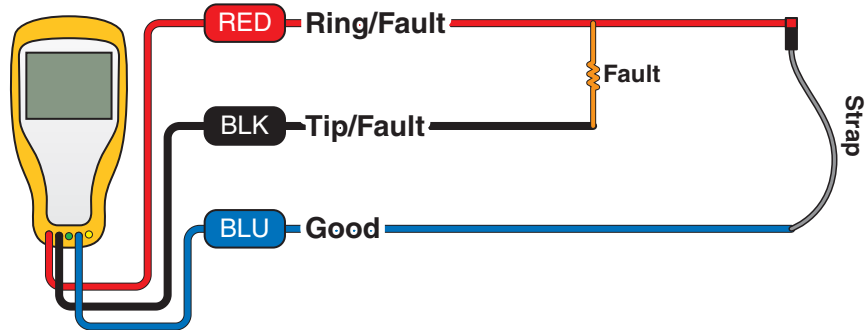
Ring-Cross Single Pair



Tip-Cross Single Pair

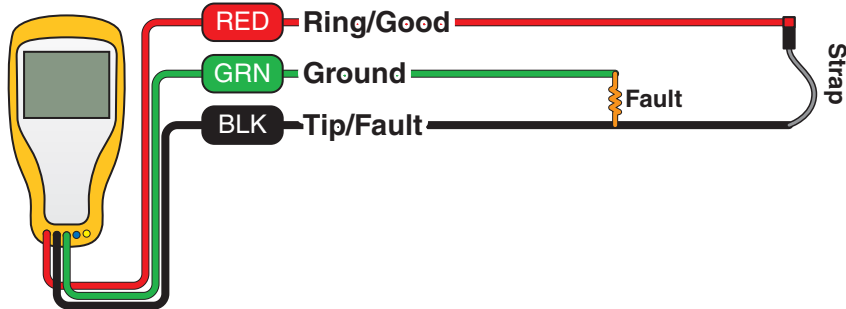


Short Single Pair

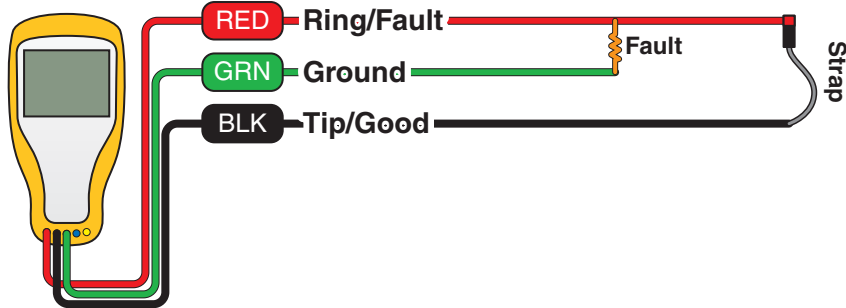


RFL>Hook-Up



Tip-Ground Single Pair



Ring-Ground Single Pair



RFL>Separate-Pair, Single-Section Operation

1. Use the Auto test , or the Ohmmeter , to determine the type of fault.



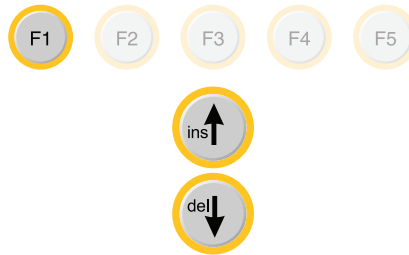
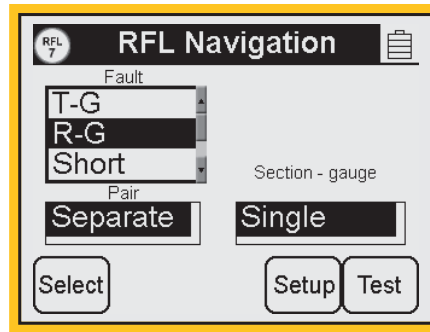
RFL> **Separate-Pair, Single-Section Operation**

2. Press the blue  key to enter the RFL function.

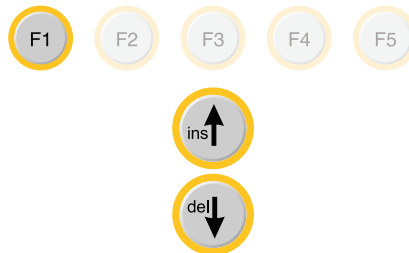
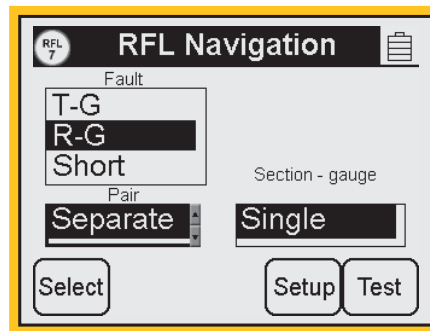
Press **Select** until the up and down arrow keys are in the Fault section. Use the up and down arrow keys to select the type of fault that you have. The options include:

Tip Cross, Ring Cross, Wet Pulp, T-G, R-G, Short

This example will show a Ring-Ground fault.

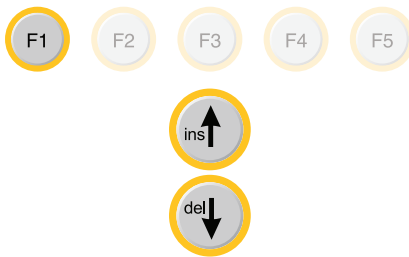
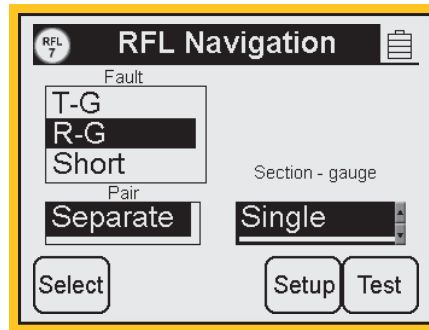


3. Press **Select** to move to the Pair section. Use the up and down arrow keys to select Separate Pair.



RFL>**Separate-Pair, Single-Section Operation**

- 4. Press **Select** to move to the Multiple-Single section. Use the up and down arrow keys to select Single Section.



- 5. Press **Setup** to choose the measurement parameters.

