POTS

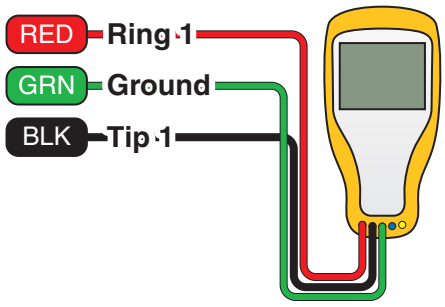
Tests available with the **POTS** key (POTS *) include Loss, Noise, Longitudinal Balance, Load Coil Counter, Caller ID, Ringers, and Level Trace.

POTS>**Loss**

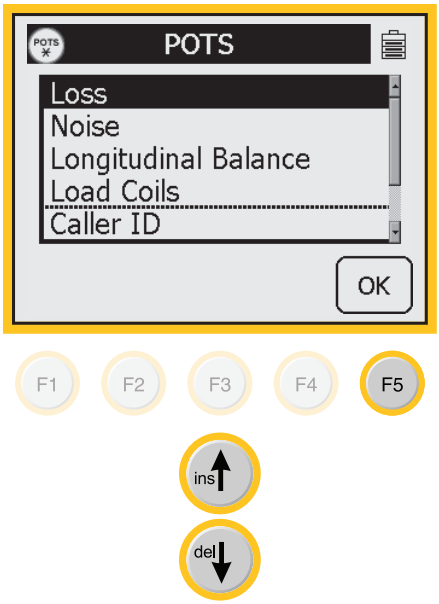
Use **Loss** to measure the loss from the far-end of a circuit to the near-end using a precision tone between 200 Hz and 20kHz.

Note: You must use a device at the far end to generate the tone. This could be the milliwatt number in the central office or an 965AMS set to the tone mode.

POTS>Loss>**Hook-Up**



1. Press the blue POTS key to enter POTS menu. Use the up and down arrow keys to select Loss.
2. Press OK to start the test.

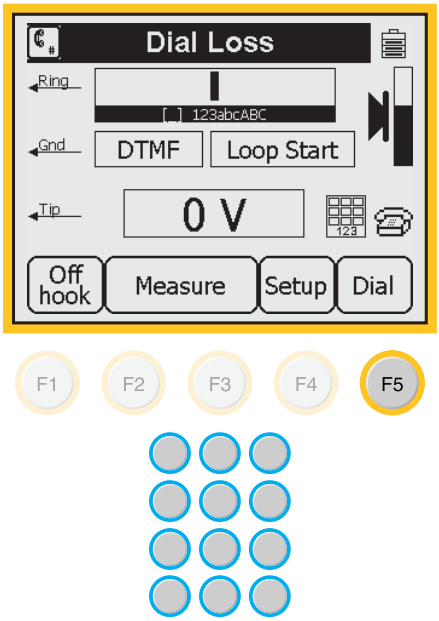


3. Dial a milliwatt number.

   There are 2 ways to enter the milliwatt numbers:

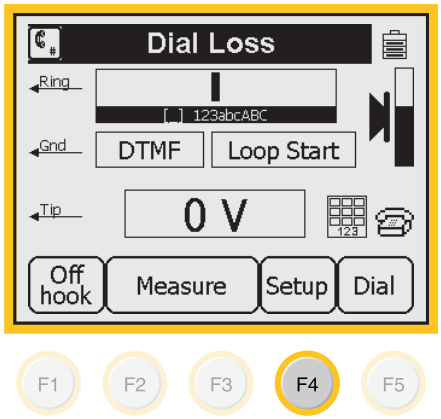
   1. **Use the blue keys to enter the number just like you were dialing a standard telephone.**

      Press Dial when you have entered all of the digits.



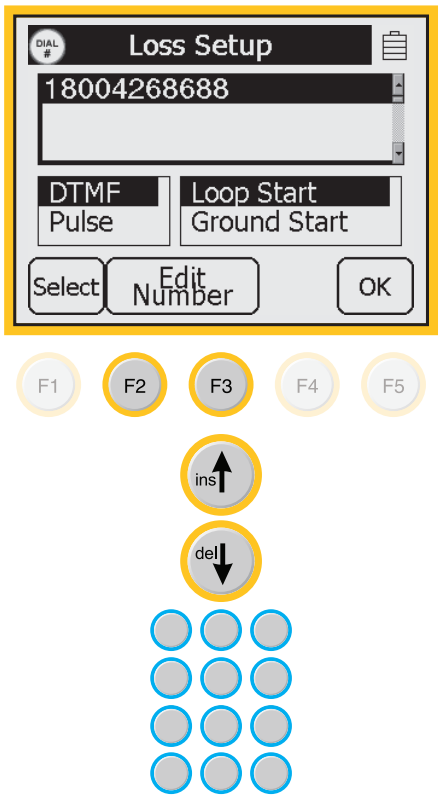
2. **Or, use the memory mode.** The 965AMS can store up to 10 numbers in the quiet line memory list.

   Press **Setup** to select or edit numbers from memory.

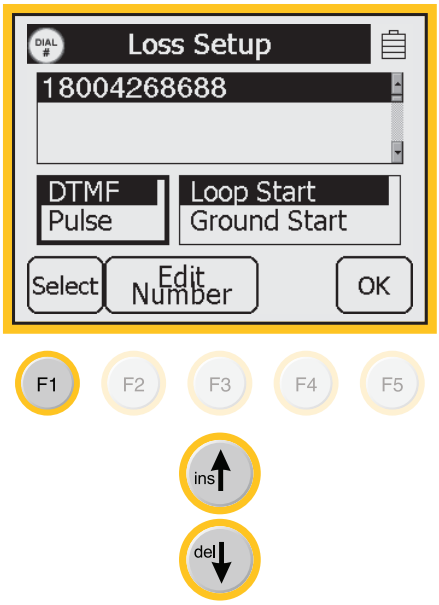


   a. Use the up and down arrow keys to find the quiet line number for the central office you want to measure.

   b. Use **Edit Number** to add new numbers or to edit existing numbers using the blue keys.

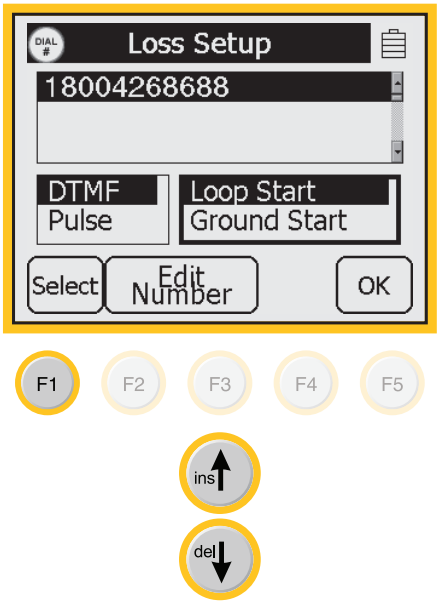


c. Press **Select** to move to the DTMF or Pulse dialing section. Use the Up and Down arrow keys to select a dialing method. DTMF pulsing is the default value.

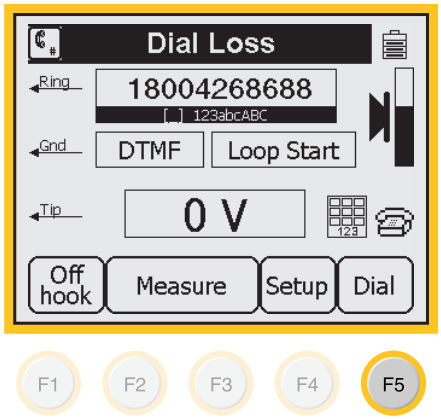


d. Press **Select** to move to the loop start-ground start section. Use the Up and Down arrow keys to select a method. The default is loop start.

Press **OK** to return to the main Dial Noise screen.

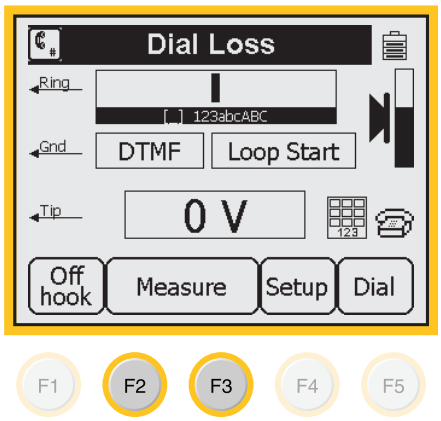


e. Press **Dial** to begin the test.

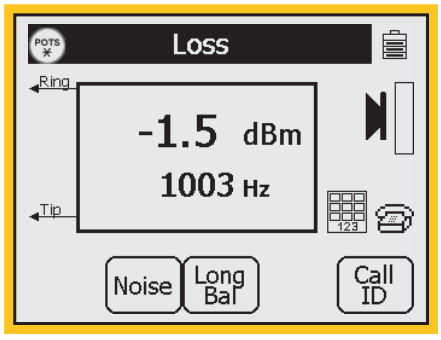


4. Point to Point Measurements

   1. Use a 965AMS tester or a 965DSP tester set to the tone mode.
   2. Verify that both ends of the circuit are on the same frequency.
   3. Press Send Tone at the sending end.
   4. Press **Measure** at the receiving end.



5. Results screen:



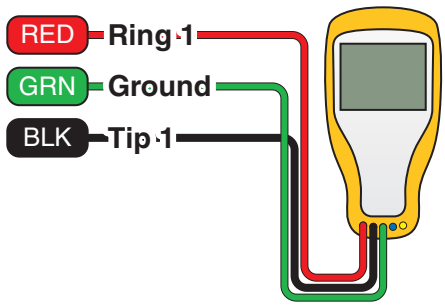
POTS Loss Measurement Normal Range

Parameter	OK	Marginal	Not OK
Balance	> 60 p	50-60	< 50 dBm
Loss	> 8.5	—	< 8.5 dBm
Noise	< 80	20-30	< 30 dBmC

POTS>**Noise**

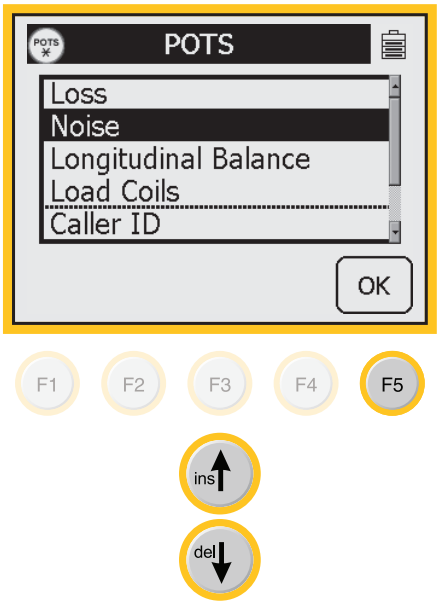
Use **Noise** to measure the Noise, Power Influence, and the calculated Balance of a pair.

POTS>Noise>**Hook-Up**



POTS>Noise>**Operation**

1. Press the blue POTS key to enter POTS menu. Use the up and down arrow keys to select Noise.
2. Press OK to start the test.



3. Enter the quiet line number for the central office you are calling.

   There are 2 ways to enter the quiet line numbers:

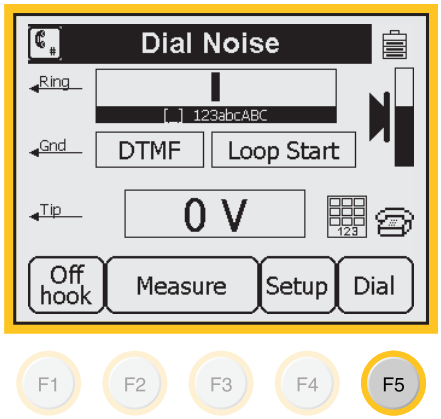
   1. **Use the blue keys to enter the number just like you were dialing a standard telephone.**

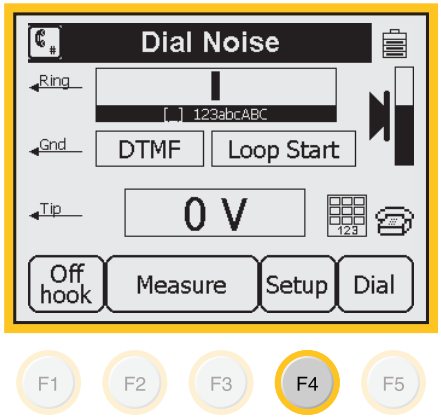
      If you have a combination milliwatt and quiet line, enter the number 3 as the telephone number. This will provide the proper termination for the noise measurement.

      Press **Dial** when you have entered all of the digits.

   2. **Or, use the memory mode.** Up to 10 numbers can be stored in the quiet line memory list.

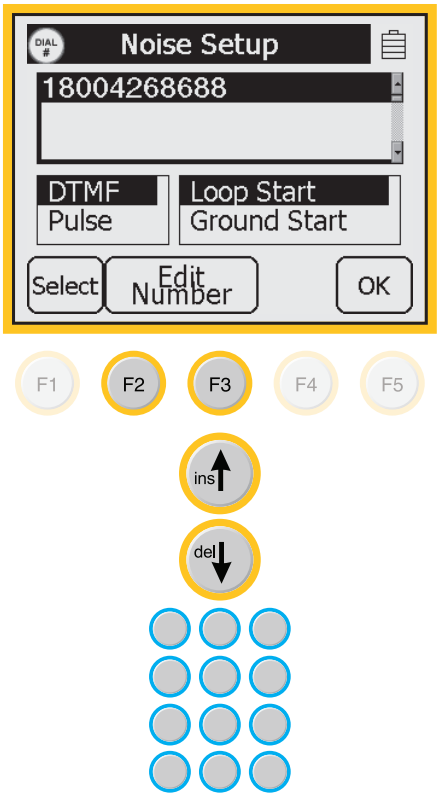
      Press **Setup** to select or edit numbers from memory.



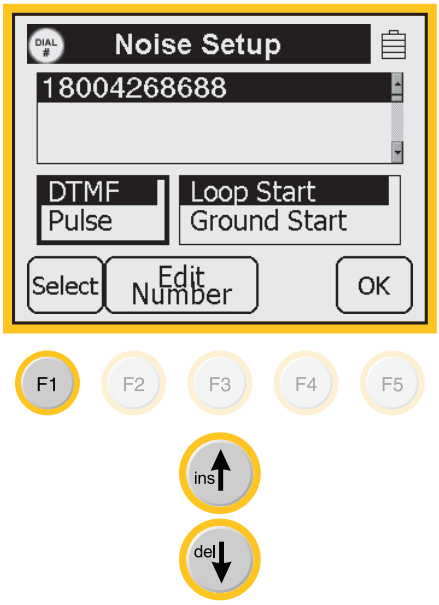


a. Use the up and down arrow keys to find the quiet line number for the central office you want to measure.

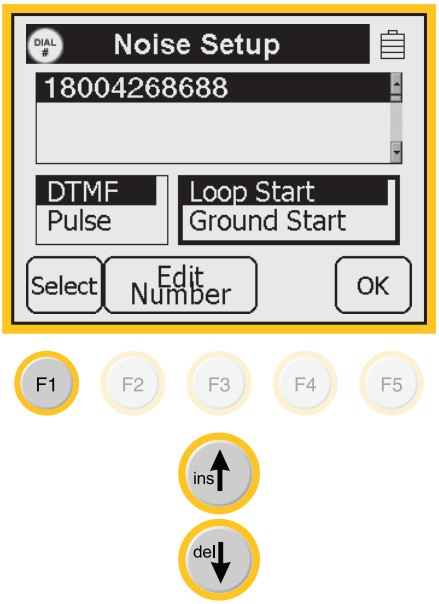
b. Use **Edit Number** to add new numbers or to edit existing numbers using the blue keys.



c. Press **Select** to move to the DTMF or Pulse dialing section. Use the Up and Down arrow keys to select a dialing method. DTMF pulsing is the default value.

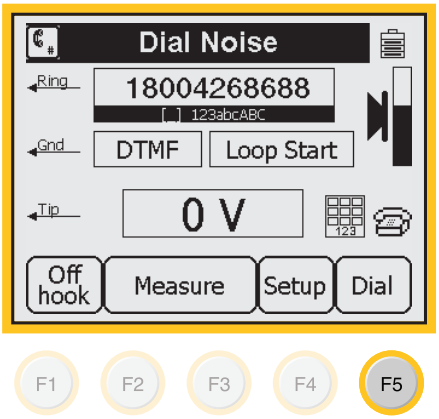


d. Press **Select** to move to the loop start-ground start section. Use the Up and Down arrow keys to select a method. The default is loop start.

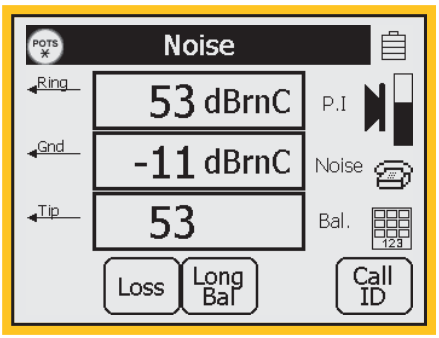


Press **OK** to return to the main Dial Noise screen.

e. Press **Dial** to begin the test.



4. Results screen:



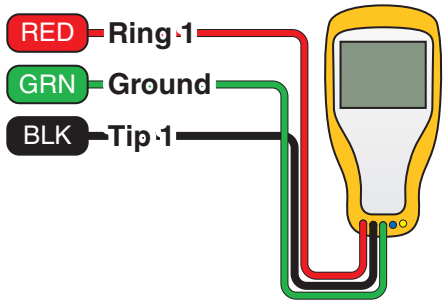
POTS Noise Normal Range

Parameter	OK	Marginal	Not OK
Balance	> 60	50–60	< 50dBm
Loss	> 8.5	—	< 8.5dBm
Noise	< 80	20–30	< 30dBmC

*POTS>**Longitudinal Balance***

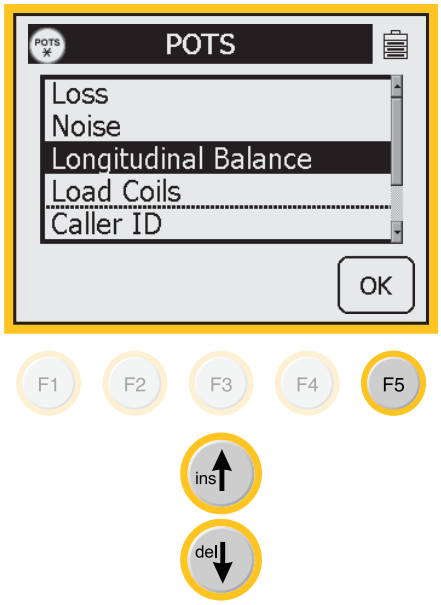
Use **Longitudinal Balance** to measure the active Longitudinal Balance on the pair. This test measures the ability of the Tip and Ring to reject noise and crosstalk.

*POTS>Longitudinal Balance>**Hook-Up***

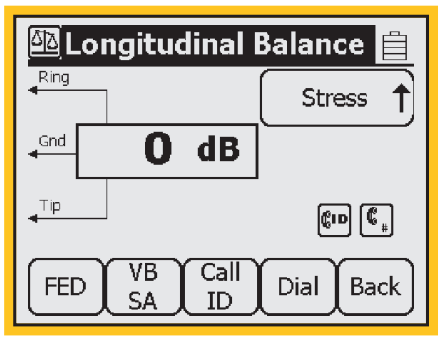


POTS>Longitudinal Balance>**Operation**

1. Press the blue POTS key to enter the POTS menu. Use the up and down arrow keys to select Longitudinal Balance.
2. Press OK to start the measurement.



3. The results are displayed on the screen.



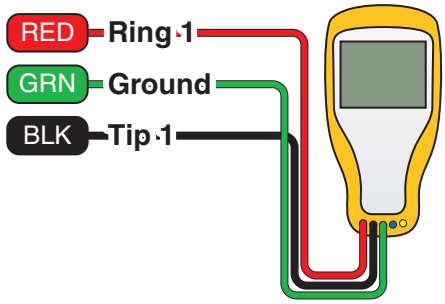
POTS Longitudinal Balance Normal Range

Parameter	OK	Marginal	Not OK
Balance	> 60	50–60	< 50dBm
Loss	> 8.5	—	< 8.5dBm
Noise	< 80	20–30	< 30dBmC

POTS>**Load Coils**

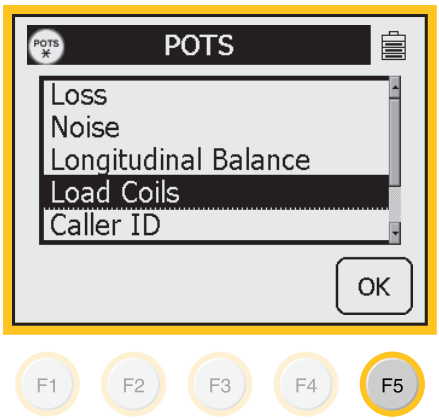
The **Load Coils** function counts up to five load coils on the pair and determines the distance to the first one. The distance measurement requires that you specify the wire gauge of the pair.

*POTS>Load Coils>**Hook-Up***

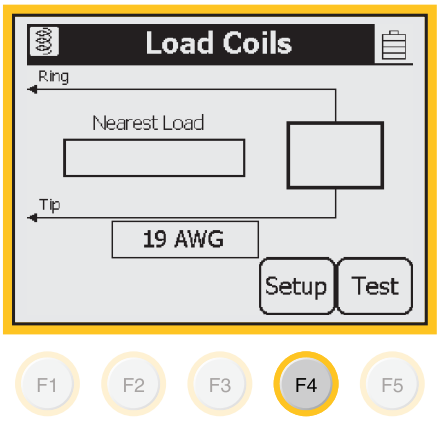


*POTS>Load Coils>**Operation***

1. Press the blue POTS key to enter POTS menu. Use the up and down arrow keys select Load Coils.
2. Press OK to see the Load Coil screen.

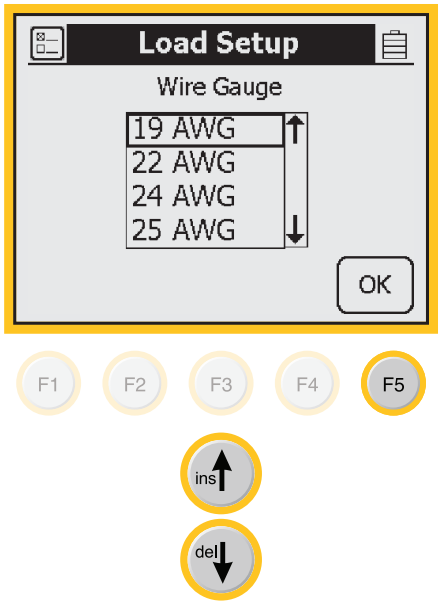


3. Press Setup to see the Load Setup Screen.

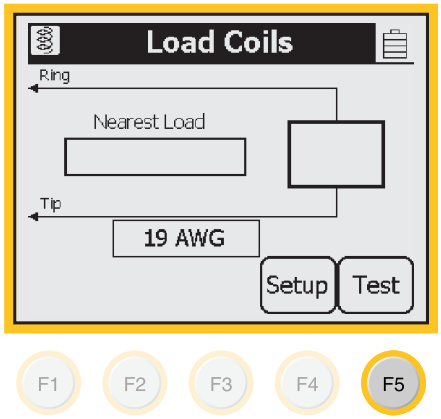


4. Use the up and down arrow keys to select the correct wire gauge.

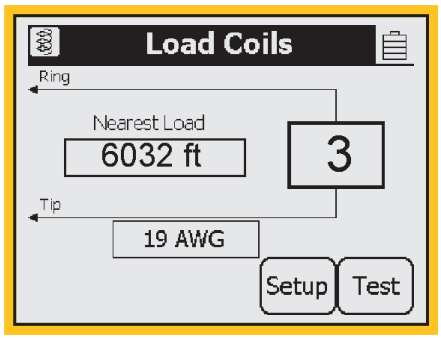
   Press OK to return to Load Coil screen.



5. Press Test to start the test.



6. The results show 3 load coils and the first load coil is at a distance of 6,032 feet.



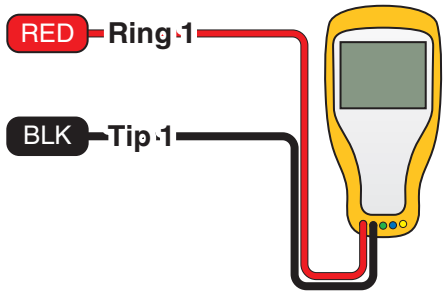
*POTS>Load Coils>**Operation***

7. It is not necessary to have any particular length of cable before the first load coil, but you must have at least 3,000 feet of cable after each load coil for the Load Coil function to count properly.

*POTS>**Caller ID***

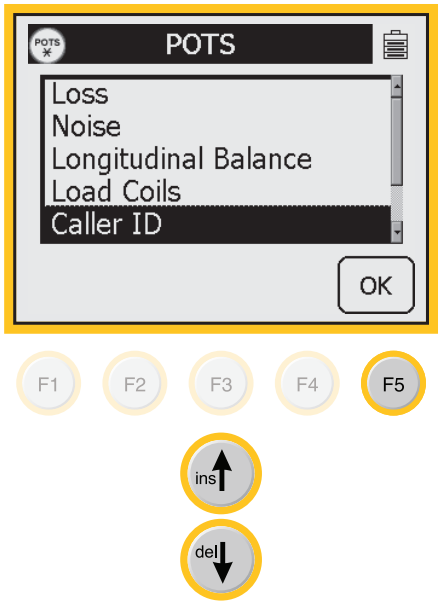
Caller ID detects the Caller ID signal sent on the pair and displays date, time, the calling number, the calling party name, the signal level, and the message status.

*POTS>Caller ID>**Hook-Up***

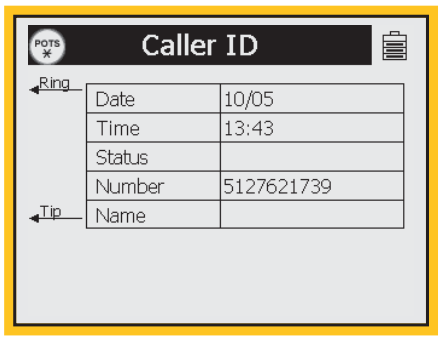


POTS>Caller ID>**Operation**

1. Press the blue POTS key to enter the POTS menu. Use the up and down arrow keys to select Caller ID.
2. Press OK to start the test.



3. The results of the test will be displayed on this screen.

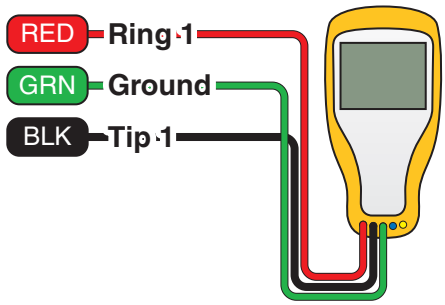


Certain result boxes may be blank if the information is not available.

*POTS>**Ringers***

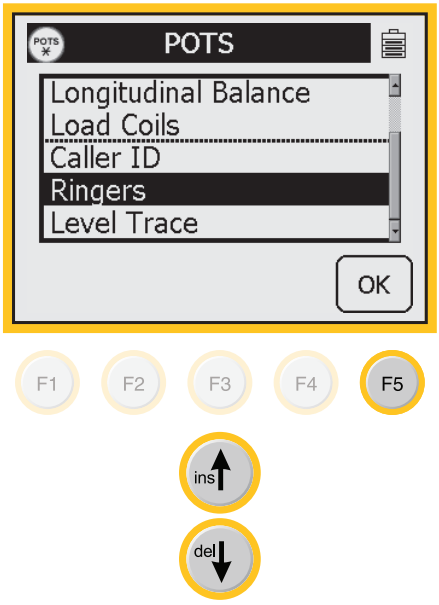
The **Ringers** function measures the capacitance associated with one or more ringer circuits on the line. One old style mechanical ringer has a capacitance of 0.47 µF. Newer phones have electronic ringers that have much lower capacitance than 0.47 µF

*POTS>Ringers>**Hook-Up***



*POTS>Ringers>**Operation***

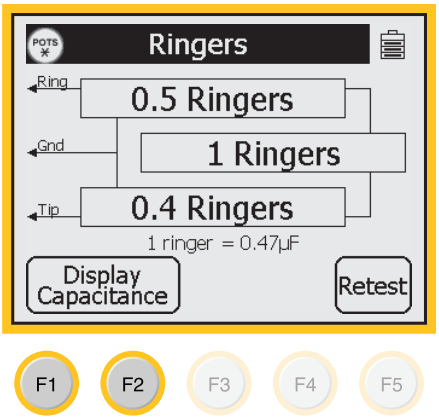
1. Press the blue POTS * key to enter the POTS menu. Use the up and down arrow keys to select Ringers.
2. Press OK to start the measurement.



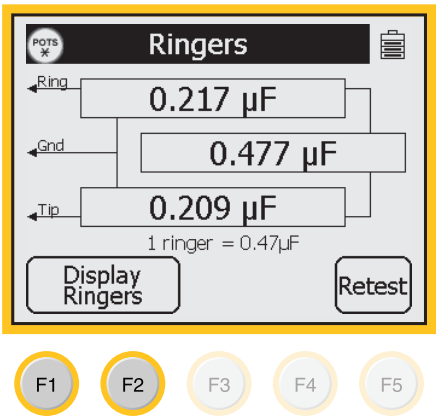
POTS>Ringers>**Operation**

3. During the measurement an hour glass will be visible at the bottom of the display. When the measurement is complete, the Ring-Ground, Tip-Ring and Tip-Ground capacitance will be displayed.

   To display the equivalent ringer count, press **Display Capacitance**.



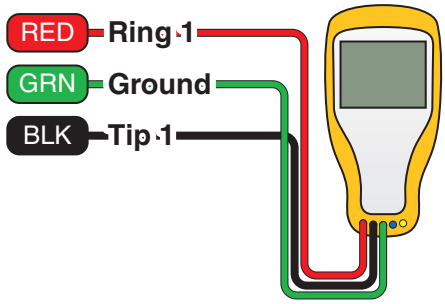
4. Press **Display Ringers** to return to the previous view.



POTS>**Level Trace**

Use **Level Trace** to measure and display the AC impedance of an inactive pair as a function of frequency. This test can be used to analyze a pair for loading and bridge tap problems. This is NOT a continuous test.

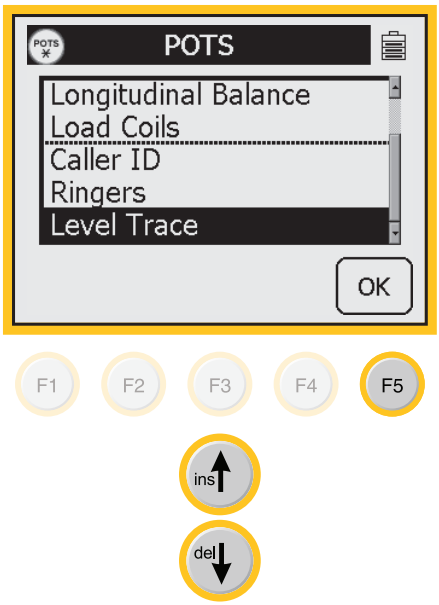
*POTS>Level Trace>**Hook-Up:***



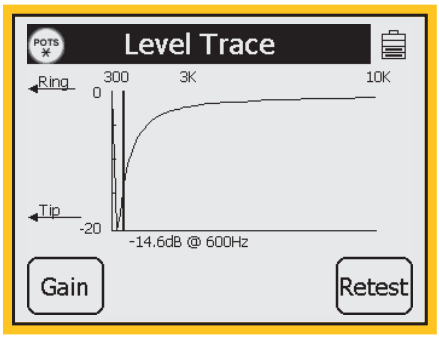
*POTS>Level Trace>**Operation***

1. Press the blue POTS key to enter POTS menu. Use the up and down arrow keys to select Level Trace.

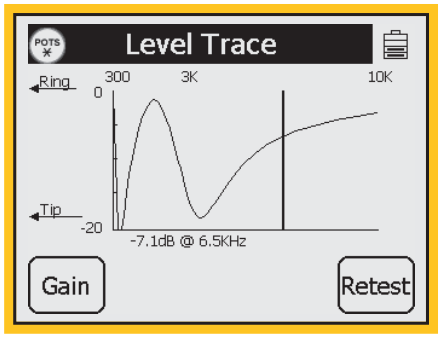
   Press OK to start the test.



2. The result is displayed on a graph with relative impedance level displayed on the y-axis (in dB) and the frequency on the x-axis. This trace shows a 12,000 foot line with no load coils.

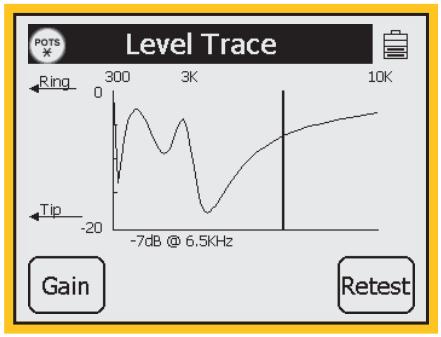


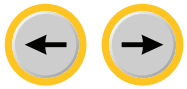
3. A dip in the graph indicates the presence of a load coil. This graph shows one load coil.



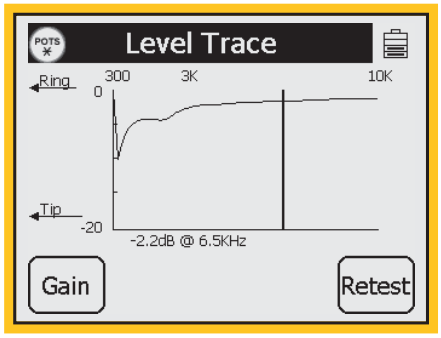
Note: Level trace cannot calculate the distance to the load coil.

4. Use the left and right soft keys to move the cursor across the graph. As the cursor is moved, a readout of the signal level and frequency will be displayed beneath the graph. This graph shows a circuit with two load coils.





5. This trace shows one load coil at 18,000 feet.



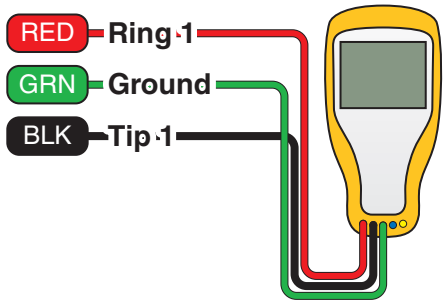
Auto Test

Use **Auto Test** AUTO 0 to automatically perform the following tests: Active POTS, Vacant POTS, Vacant WideBand and Smart Auto Test.

Auto Test>**Active POTS**

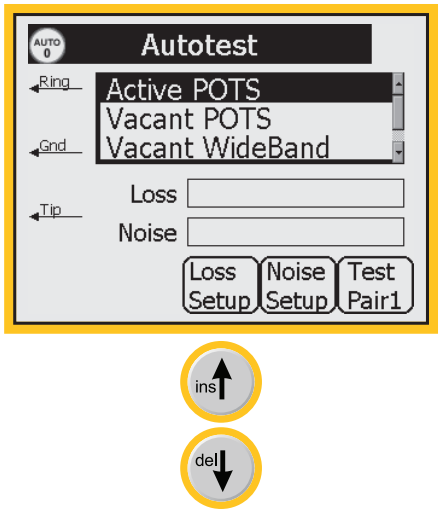
Use **Active POTS** to perform an automatic sequence of tests on Active POTS lines. The tests include: DC Voltage, AC Voltage, Loop Current, Ground Resistance, Single Tone Loss, Voiceband Noise (metallic), Voiceband Power Influence and Longitudinal Balance.

Auto Test>Active POTS>**Hook-Up**

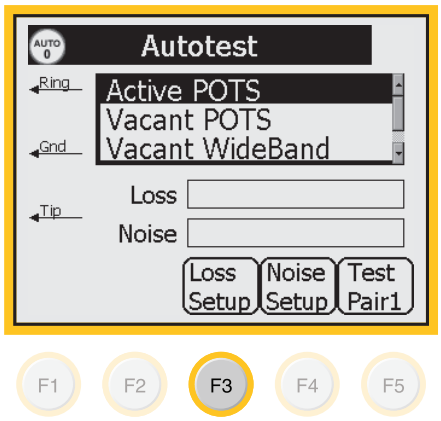


*Auto Test>Active POTS>**Operation***

1. Press the blue AUTO 0 key to enter the Auto Test function. Use the up and down arrow to select Active POTS.

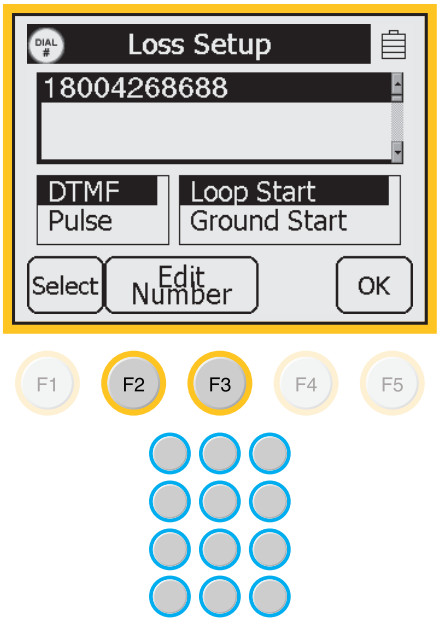


2. Press **Loss Setup** to set up the telephone numbers for the milliwatt line in the central office. You can store up to 10 different numbers for the central offices you work in.

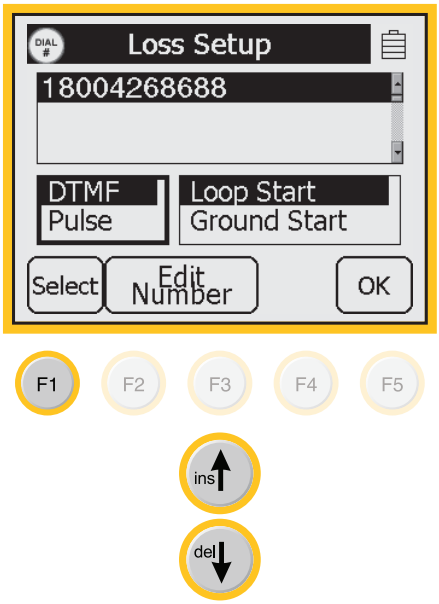


3. If you have entered telephone numbers in the Dial Loss function or the Talk Set function, they will be shown in the telephone number section.

   If you have not entered any telephone numbers in the Dial Loss function or the Talk Set function you can use **Edit Number** to enter the telephone number information with the blue keys.

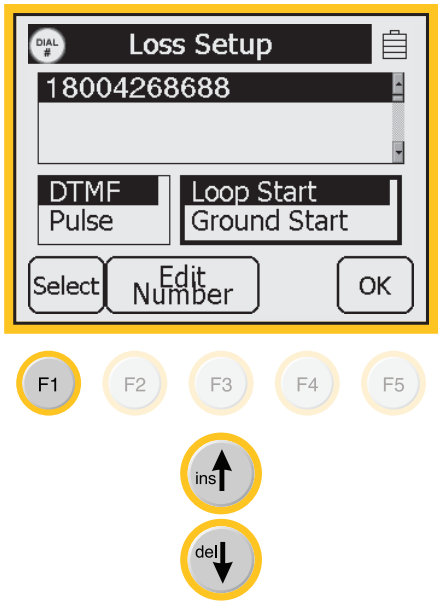


4. Press **Select** to move to the DTMF or Pulse dialing section. Use the Up and Down arrow keys to select a dialing method. DTMF is the default value.

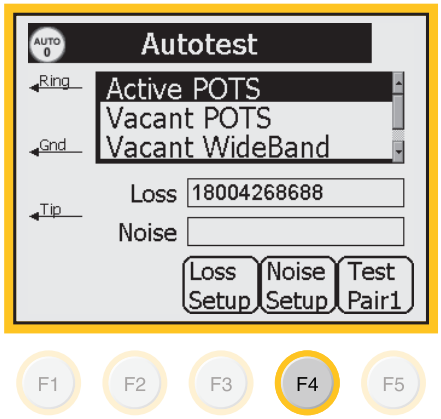


5. Press **Select** to move to the loop start-ground start section. Use the Up and Down arrow keys to select a method. The default is loop start.

   Press **OK** to return to the main Auto Test screen.

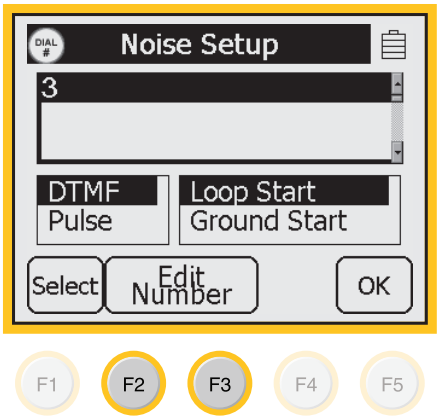


6. Press **Noise Setup** to setup the telephone numbers for the quiet line termination line in the central office.



7. ***Central Office with a combination milliwatt and quiet line termination:***

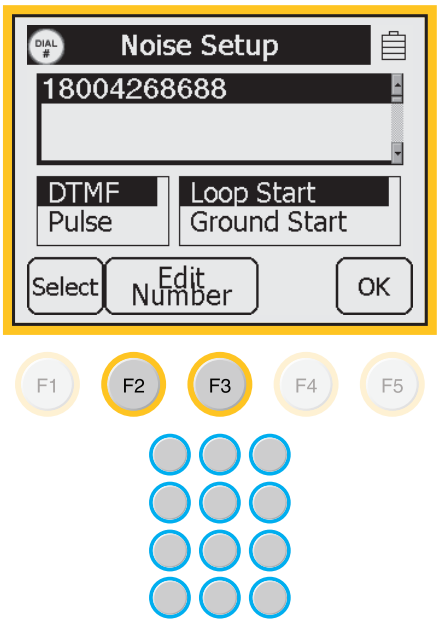
   Press **Edit Number** and enter a digit that is a valid first digit for the central office. This will break dialtone and the measurement will be taken as if it were a quite line termination.



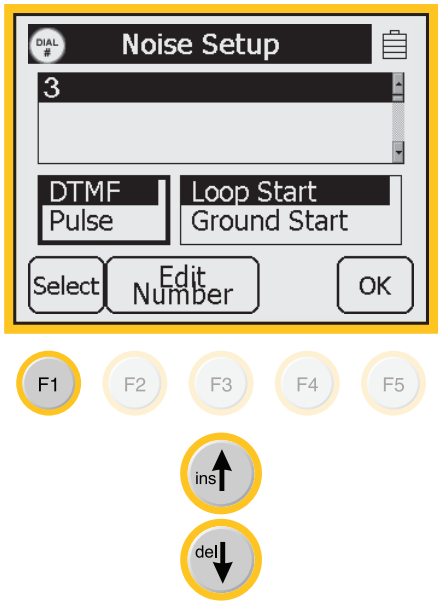
8. ***Central Office without a combination milliwatt and quiet line termination:***

   If you have entered telephone numbers in the Dial Loss function or the Talk Set function, they will be shown in the telephone number section.

   If you have not entered any telephone numbers in the Dial Loss function or the Talk Set function you can use **Edit Number** to enter the telephone number information with the blue keys.

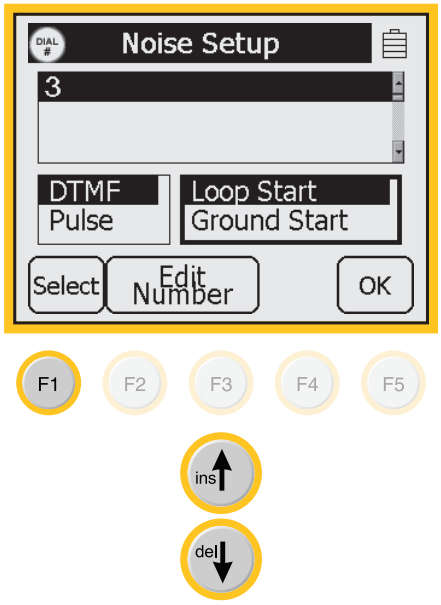


9. Press **Select** to move to the DTMF or Pulse dialing section. Use the Up and Down arrow keys to select a dialing method. DTMF is the default value.

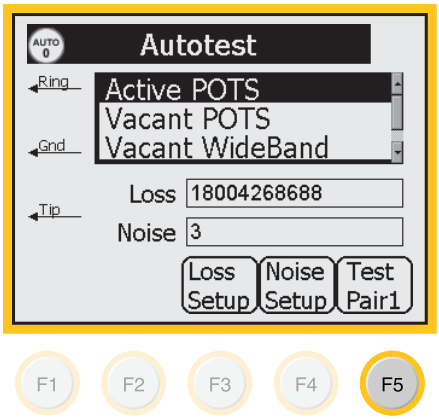


10. Press **Select** to move to the loop start-ground start section. Use the Up and Down arrow keys to select a method. The default is loop start.

    Press **OK** to return to the main Auto Test screen.

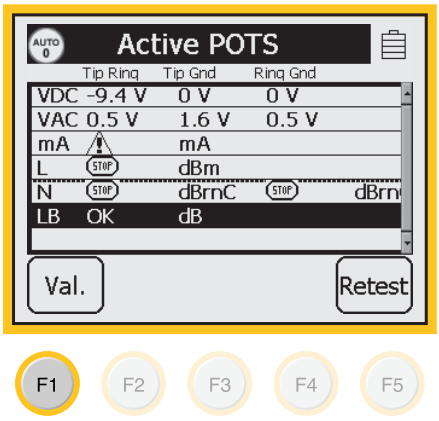


11. Press **Test Pair 1** to start the Active POTS tests.



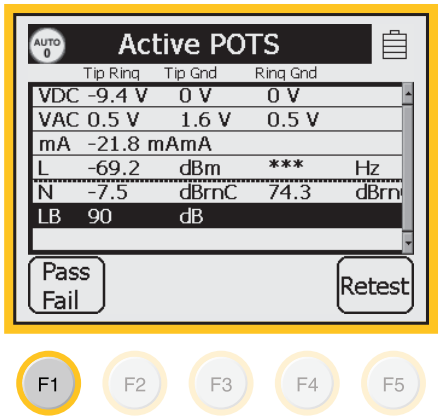
12. Certain auto test results are compared against pass/fail limits to provide a quick-look at the pair condition. The pass/fail status is indicated in the results box by an “OK” for pass, a “Yield” sign for marginal and a “Stop” sign for fail.

13. Press **Val.** to see the actual test results.



Auto Test>Active POTS>**Operation**

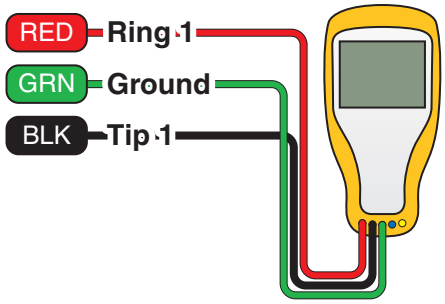
14. Press **Pass/Fail** to see only the OK, Yield, or Fail symbols.



Auto Test>**Vacant POTS**

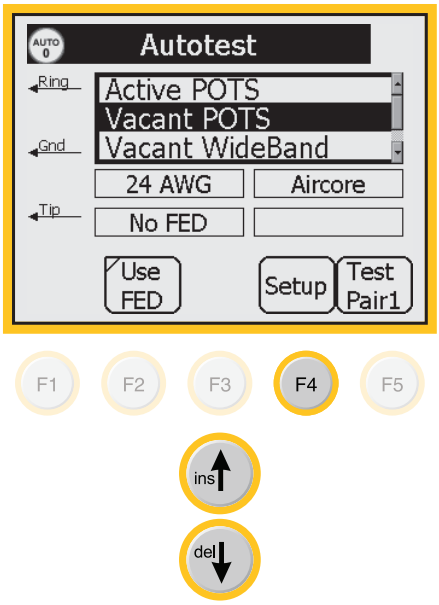
Use **Vacant POTS** to perform an automatic sequence of tests on Vacant POTS lines. When you use the 3M™ Dynatel™ 1342 or 1343 Far End Device II, the tests include: DC Voltage, AC Voltage, DC Resistance, Opens, % Capacitance Balance, Load Coil, Voice Band Loss, Voice Band Noise, Power Influence, Longitudinal Balance, Slope, Resistance Balance (loop) and Resistance Balance (% diff).

Auto Test>Vacant POTS>**Hook-Up**

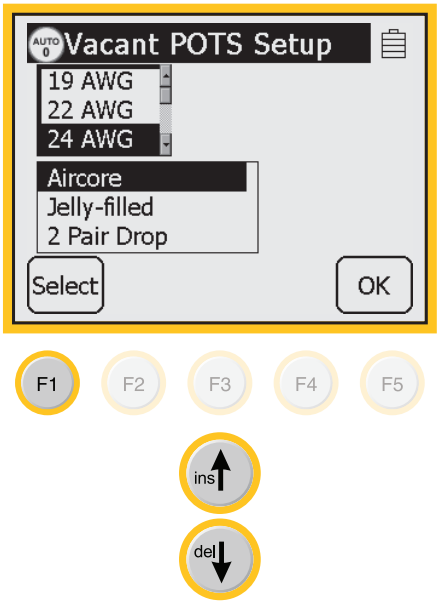


1. Press the blue AUTO 0 key to enter the Auto Test function. Use the up and down arrow keys to select Vacant Pots.

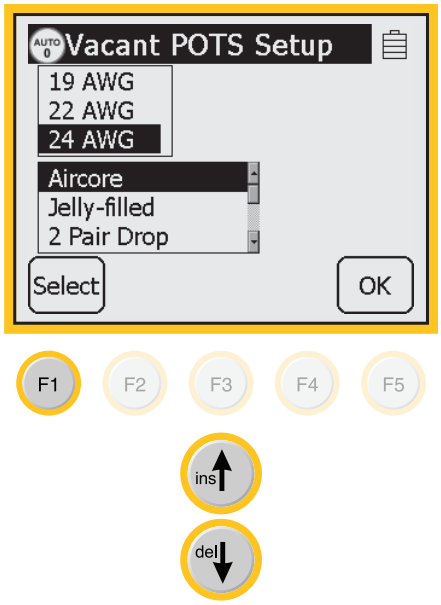
   Press **Setup** to choose the measurement parameters.



2. Press **Select** to select the gauge of your cable. Use the up and down arrow keys to select the gauge.



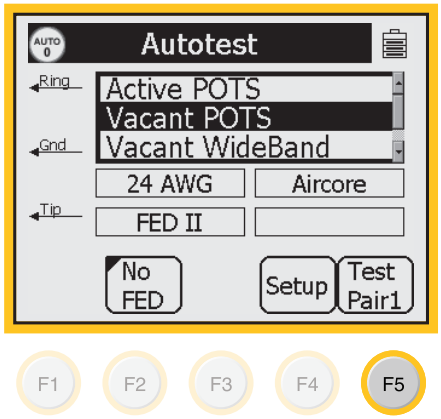
3. Press **Select** to move to the type of cable. Use the up and down arrow keys to select your type of cable.



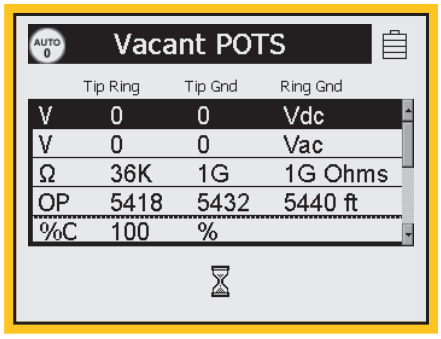
4. Press **OK** to return to the main Auto Test screen.

5. Using the FED II (far end device) can provide more information about your circuit. Press **FED** to use the far end device.

6. Press **Test Pair 1** to start the test.

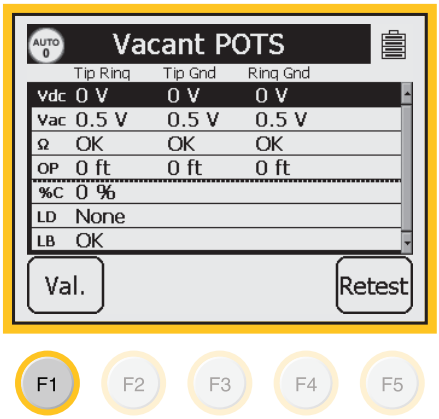


7. The screen will display the results of the measurements.

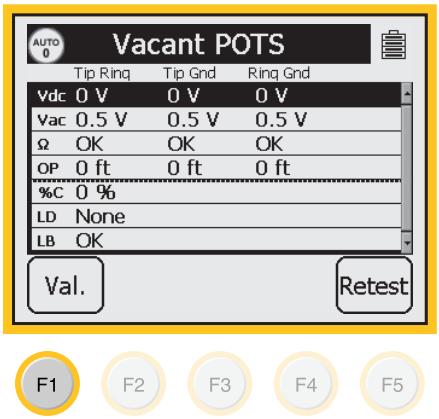


8. Certain auto test results are compared against pass/fail limits to provide a quick-look at the pair condition. The pass/fail status is indicated in the results box by an "OK" for pass, a "Yield" sign for marginal and a "Stop" sign for fail.

9. Press **Value** to see the actual test results.



10. Press **Pass/Fail** to see only the OK, Yield, or Fail symbols.



Auto Test>**Vacant Wideband**

Use **Vacant Wideband** to perform an automatic sequence of tests on Vacant Wideband circuits. The tests include: DC Voltage, AC Voltage, DC Resistance, Opens, % Capacitance Balance, Load Coil, Voice Band Loss, Voice Band Noise, Power Influence, Longitudinal Balance, Slope, Resistance Balance (loop) and Resistance Balance (% diff).

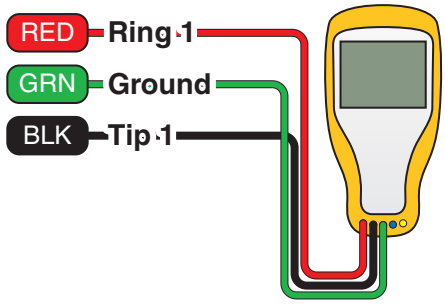
Note: You must use a 3M FED to use the Vacant WideBand function.

Insertion Loss Frequencies and Sweep Frequencies by Service Type

Insertion Loss Sweeps	*Single Frequency**	*Sweep Frequencies*
Pots	1004 Hz	404, 804, 1004, 1204, 1404, 1604, 1804, 2004, 2804, 3004 (Hz)
56k	28 kHz	20, 28, 32, 40, 48, 82 (kHz)
64k	32 kHz	20, 28, 32, 40, 48, 82 (kHz)
ISDN	40 kHz	20, 28, 32, 40, 48, 60, 70, 82 (kHz)
HDSL	196 kHz	20, 30, 50, 70, 90, 110, 130, 196, 400 (kHz)
T1	772 kHz	200, 400, 500, 700, 772, 1024 (kHz)
E1	1024 kHz	200, 400, 500, 700, 772, 1024 (kHz)
ADSL	138 kHz	20, 30, 50, 69, 90, 110, 138, 276, 400, 600, 800, 1000, 1100 (kHz)
H2/4ACC	196 kHz	50, 80, 130, 196, 250, 300, 350 (kHz)
H4RACC**	N/A	20, 30, 50, 70, 90, 110, 130, 196, 400 (kHz)
H4NACC***	N/A	20, 30, 50, 70, 90, 110, 130, 196, 400 (kHz)

** Pass/Fail provided for Single Frqeuency when measuring just Single Frequency or in Sweep Mode.*
*** Pass/Fail provided for 50 kHz, 90 kHz and 130 kHz*
**** Pass/Fail provided for 50 kHz, 90 kHz, 130 kHz and 196 kHz*

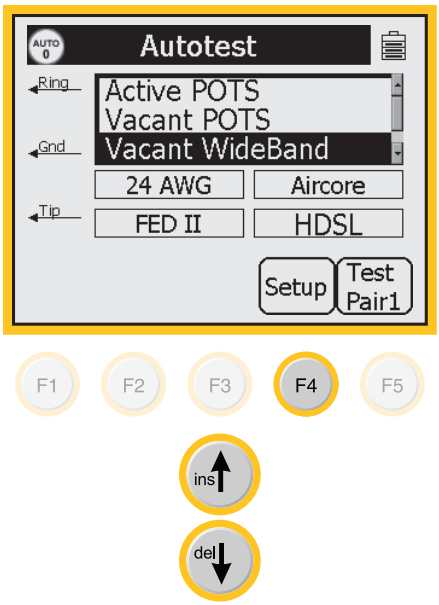
*Auto Test>Vacant Wideband>**Hook-Up***



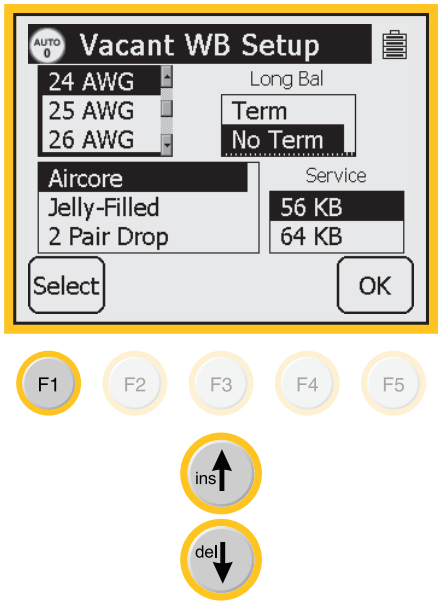
*Auto Test>Vacant Wideband>**Setup***

1. Press the blue AUTO 0 key to enter the Auto Test function. Use the up and down arrow keys to select Vacant Wideband.

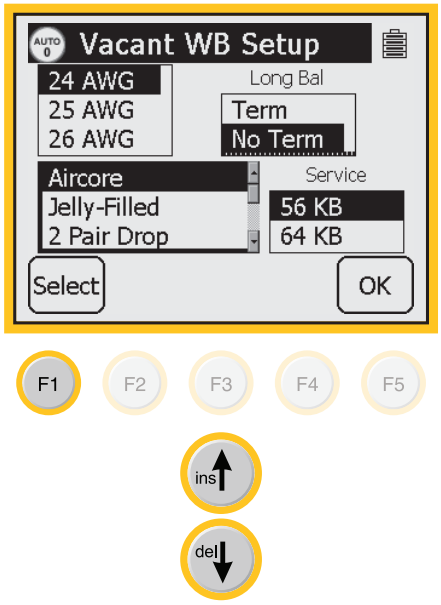
   Press **Setup** to choose the measurement parameters.



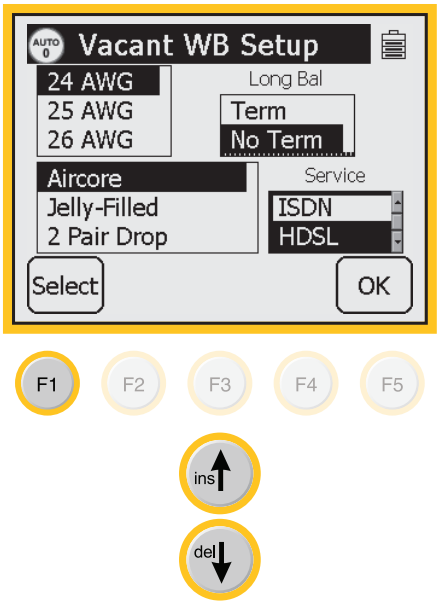
2. Press **Select** to select the gauge of your cable. Use the up and down arrow keys to select the gauge.



3. Press **Select** to move to the type of cable. Use the up and down arrow keys to select your type of cable.

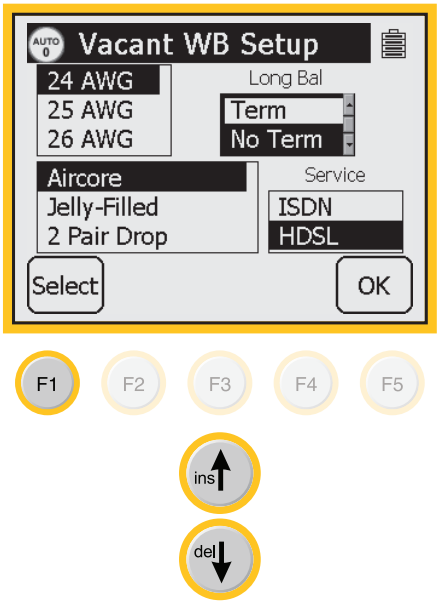


4. Press **Select** to move to the service type. Use the up and down arrow keys to choose the type of service.

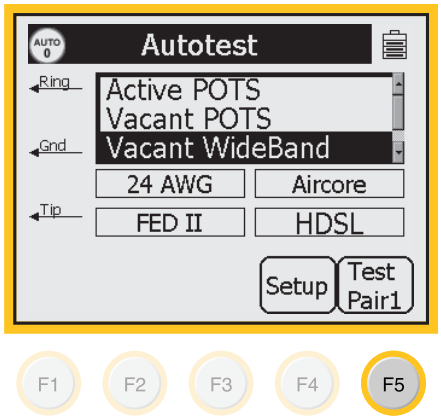


5. Press **Select** to move to the termination type. Use the up and down arrow keys to choose the termination.

   Press **OK** to return to the main Auto Test screen.

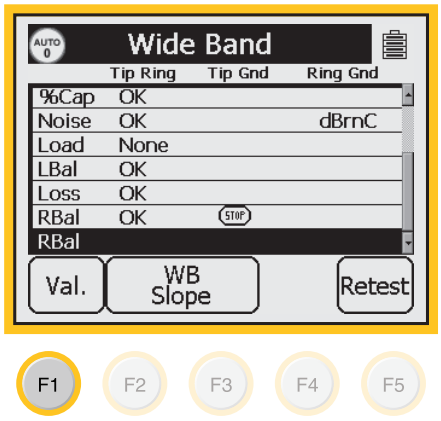


6. Press **Test Pair 1** to start the test.

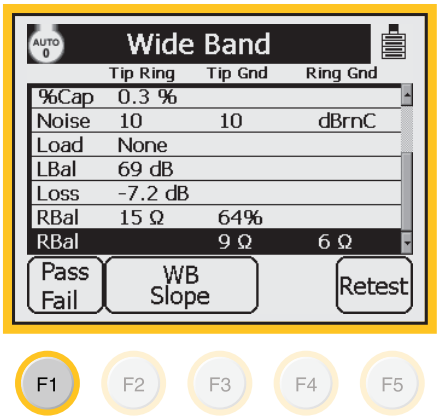


7. Certain auto test results are compared against pass/fail limits to provide a quick-look at the pair condition. The pass/fail status is indicated in the results box by an “OK” for pass, a “Yield” sign for marginal and a “Stop” sign for fail.

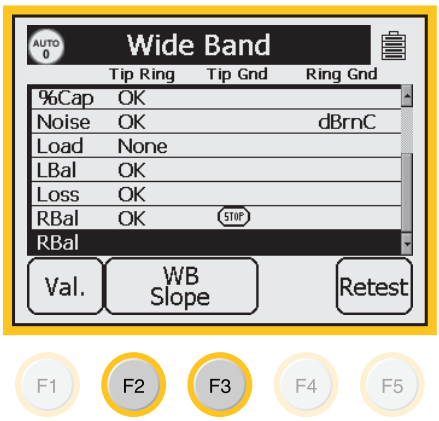
8. Press **Val.** to see the actual test results.



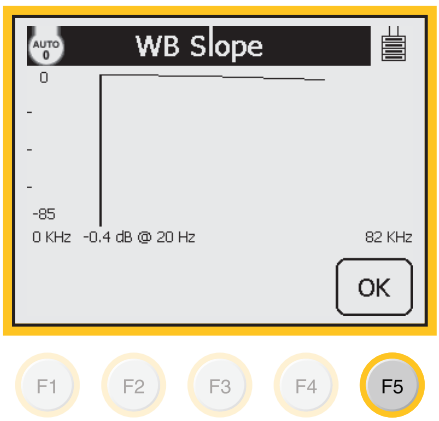
9. Press **Pass/Fail** to see only the OK, Yield, or Fail symbols.



10. Press **WB Slope** to see the graph of the slope.



11. Press **OK** to return to the main Test Results screen.



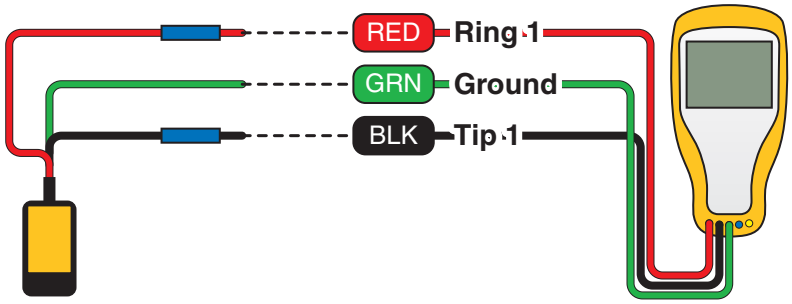
Auto Test>**Expert Pair Test**

Use the **Expert Pair Test** to detect, identify and locate the most common pair faults without having to change test leads. In most situations, the 3M Dynatel™ Far End Device II 1342 or 1343 is required to provide the most complete information.

Auto Test>Expert Pair Test>**Features**

	Identification with FED	Location with FED	Identification w/o FED	Location w/o FED
Working Pair	Yes	NA	Yes	NA
Good Pair	Yes	Length	Yes	Length
T/R Reversal	Yes	No	No	No
Light T/R Short	Yes	NA	Yes	No
Solid T/R Short	Yes	Yes	Yes	Yes
Solid T-Ground	Yes	Yes	Yes	No
Solid R-Gound	Yes	Yes	Yes	No
High T-Ground	Yes	Yes	Yes	No
High R-Ground	Yes	Yes	Yes	No
T-Battery Cross	Yes	Yes	Yes	No
R-Battery Cross	Yes	Yes	Yes	No
T-Complete Open	Yes	Yes	Yes	Yes
R-Complete Open	Yes	Yes	Yes	Yes
T&R-Complete Open	Yes	Yes	Yes	Yes
T-Partial Open	Yes	Yes	Yes	Yes
R-Partial Open	Yes	Yes	Yes	Yes
T&R Partial Open	Yes	Yes	Yes	Yes

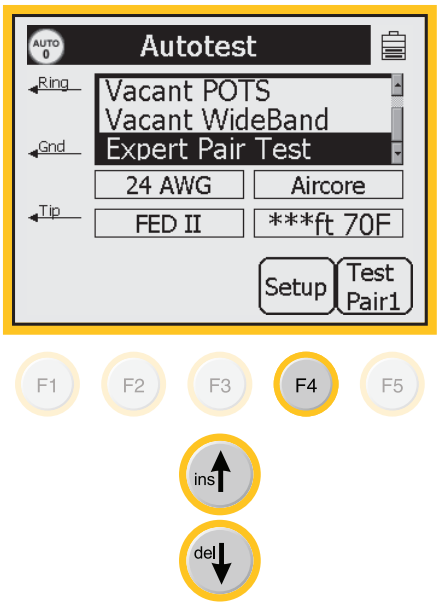
*Auto Test>Expert Pair Test>**Hook-Up***



*Auto Test>Expert Pair Test>**Operation***

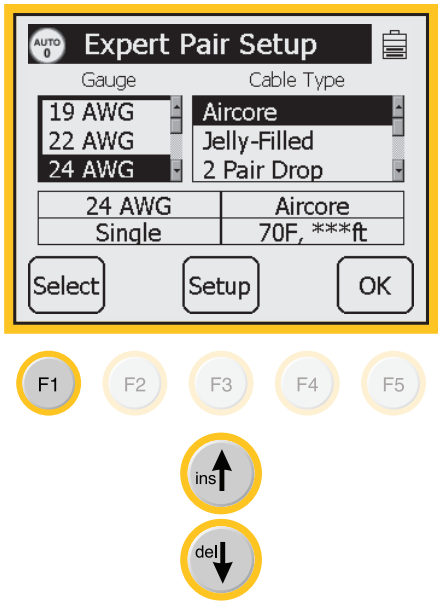
1. Press the blue AUTO 0 key to enter the Auto Test function. Use the up and down arrow keys to select Expert Pair Test.

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



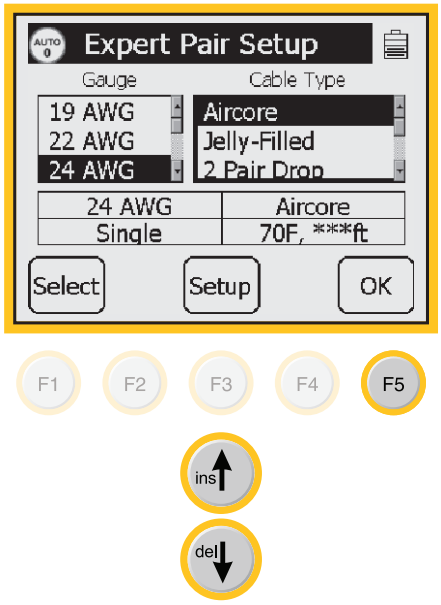
2. Use the up and down keys to select the wire gauge.

   Press Select.

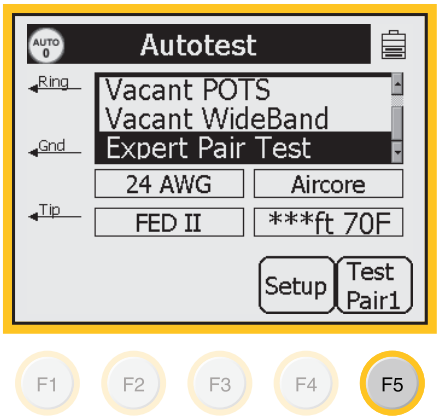


3. Use the up and down keys to select the type of cable.

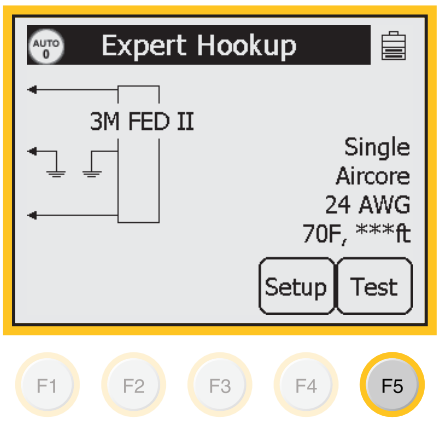
   Press OK.



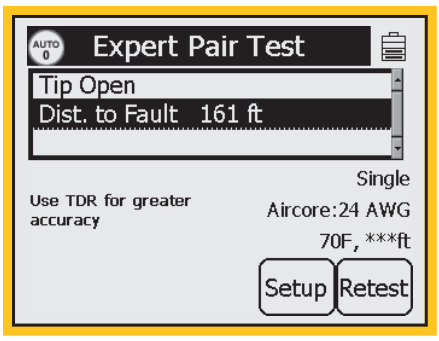
4. Press **Test Pair 1**.



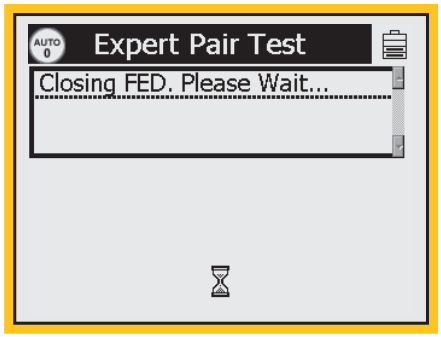
5. Review the screen for the correct setup information. Press **Test** to start the test.



6. Test results.



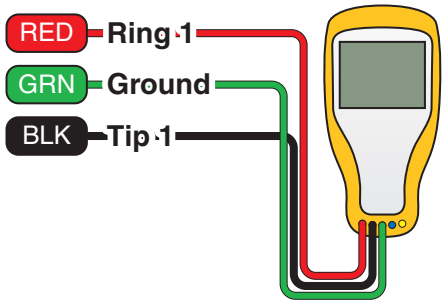
7. Use ESC to exit this screen. Wait for the FED to reset before you choose another screen.



Talk Set

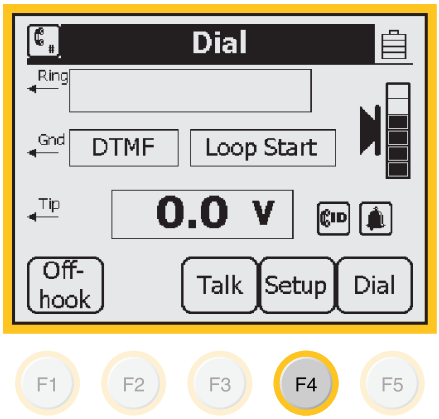
The **Talk Set** DIAL # function allows you to use the 965AMS tester as a talk set on an active line to send DTMF or pulse dialing.

*Talk Set>**Hook-Up***

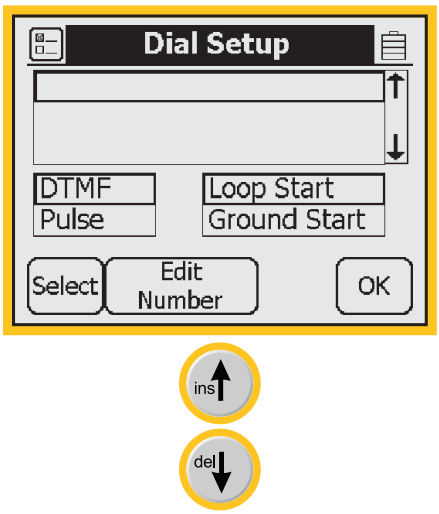


*Talk Set>**Setup***

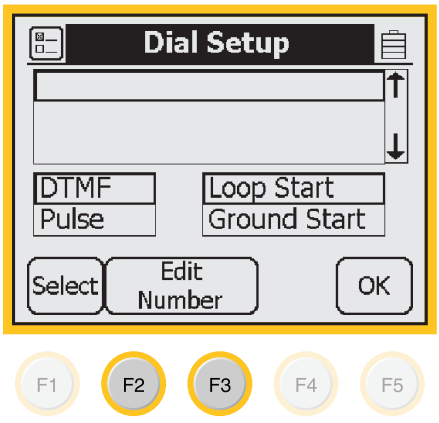
1. Press the blue DIAL # key to start this function.
2. Press **Setup**.



3. Use the up and down arrow keys to choose one of the 10 memory locations. These locations are not numbered.



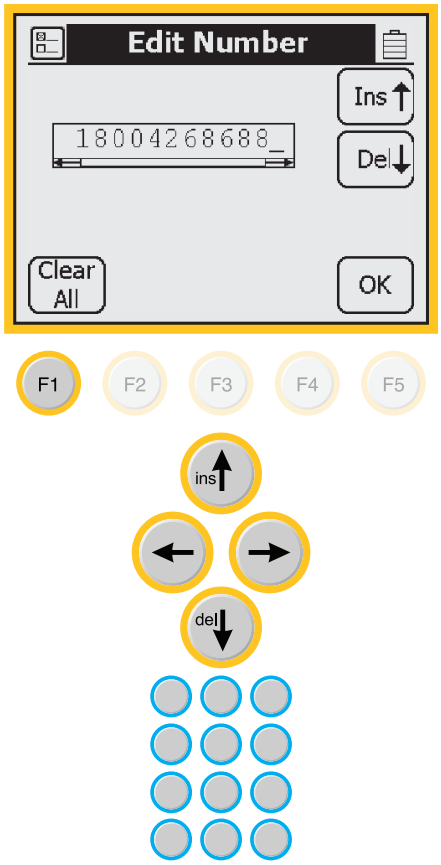
4. Press **Edit Number**.



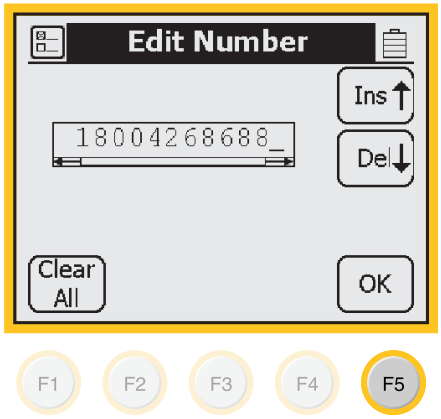
5. Use the blue keys to enter the phone numbers. Use the left and right arrow keys to position the number as needed.

6. Use the up and down arrows to insert or delete numbers.

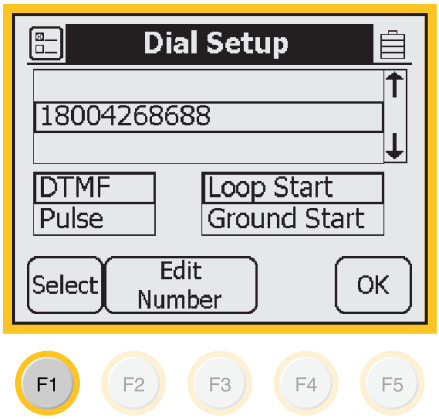
7. Press **Clear All** to remove all numbers from this entry.



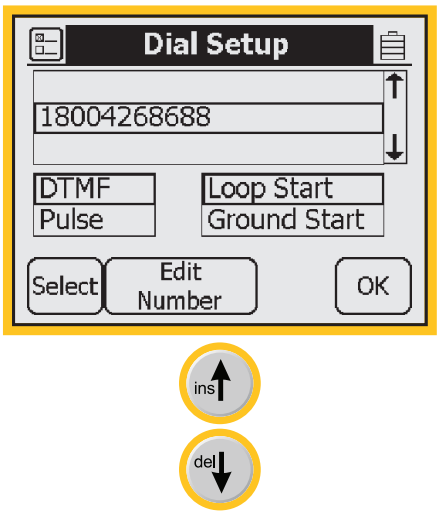
8. Press **OK** to save this phone number.



9. Press **Select** to choose the type of pulsing.

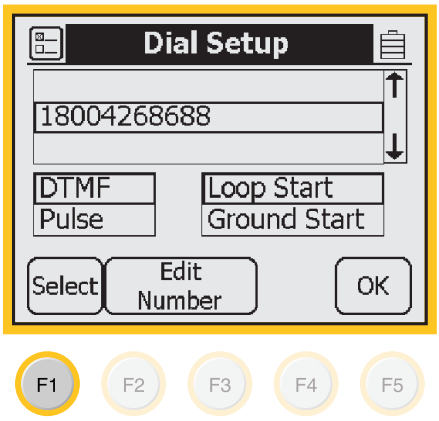


10. Use the up and down arrow keys to choose DTMF or Dial Pulse. DTMF is the most common.



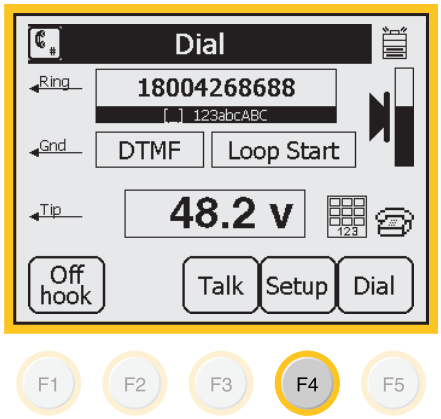
11. Press **Select** again to choose the type of dial tone start mode. Loop start is the most common.

Note: Ground start requires the green test lead to be connected to a grounded shield.

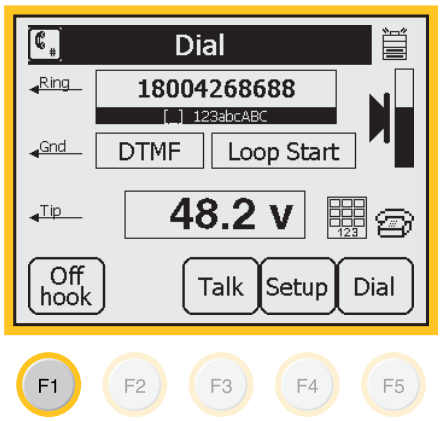


Talk Set>**Operation**

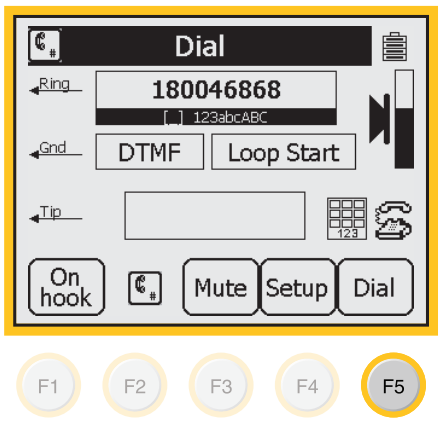
1. This screen shows the last number dialed, the DC voltage on the line and the signal format for dialing. You can use the previously dialed number, enter a new number using the blue keys, or press **Setup** to use the stored number list.



2. Press **Off Hook** to draw dial tone.



3. Press **Dial** to dial the number.

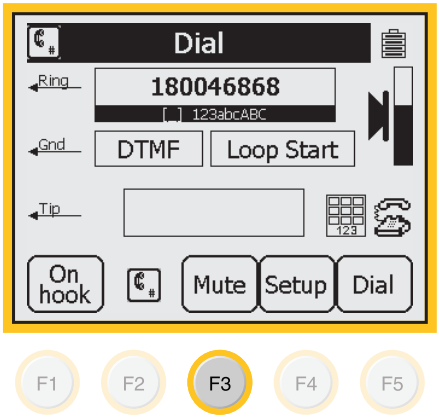


4. The speaker and microphone are located on the front of the unit.

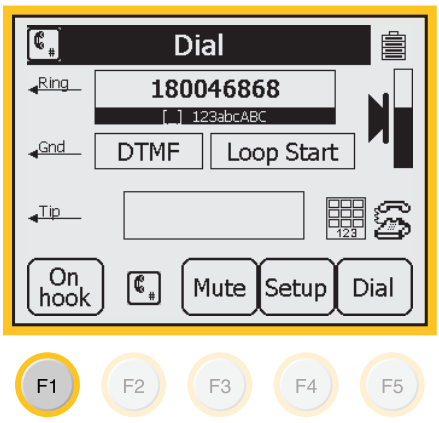
5. The up and down arrow keys adjust the receiver volume.

6. Press **Mute** to mute the microphone.

   Press **Talk** to un-mute.



8. Press **On Hook** to end the call.



Talk Set>**Applications**

1. This function can be used as a butt set to dial out or to receive incoming ringing tone.

2. You can also use this function as a talk circuit on an inactive pair. Multiple 965AMS units can be bridged together on the pair. Each tester supplies it's own talk battery. You cannot use the talk function and any other function at the same time.

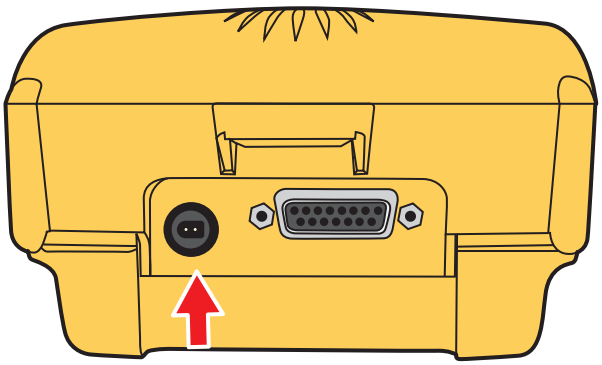
Care & Maintenance

Charging

1. The battery pack must be charged on a regular basis. You can typically use the 965AMS tester for up to 12 hours between charges.
2. The time between charges may be reduced if you use the backlight frequently, use the optional /SA or /ADSL features heavily, or if you work in very cold weather.
3. Charging time is 4 hours **minimum**. Recommended charging time is overnight (12 hours). When the battery is charging, a charging indicator appears when you turn on the unit. If the battery does not appear to charge fully after an overnight charge, simply disconnect the charger, wait a few seconds until the charging indicator disappears, and reconnect the charger.

AC Charger

Use the AC charger to charge the NiMH Battery pack. Plug the AC cord into the AC charger and into a power outlet. Plug the DC cord into 965AMS tester. Make sure that the key on the plug fits properly into the slot in the connector. The AC charger is meant for charging the NiMH battery pack only.



DC Charger

Use the Cigarette Lighter Adapter to charge the NiMH battery pack from a vehicle's battery. This adapter is meant for charging the NiHM battery pack only and should not be used to power the 965AMS tester during normal operations.

Level of Charge

The battery icon in the upper right of all screens indicates the battery charge. Four black bars in the icon indicate full charge. Zero black bars indicate the battery pack is very low and should be charged immediately. A warning screen appears when there are only five minutes charge left.

Charging efficiency is best with a temperature between 50°F (10°C) and 86° F (30°C).

Note: Do not charge the batteries at temperatures below 32°F (0°C) or above 104° F (40°C).

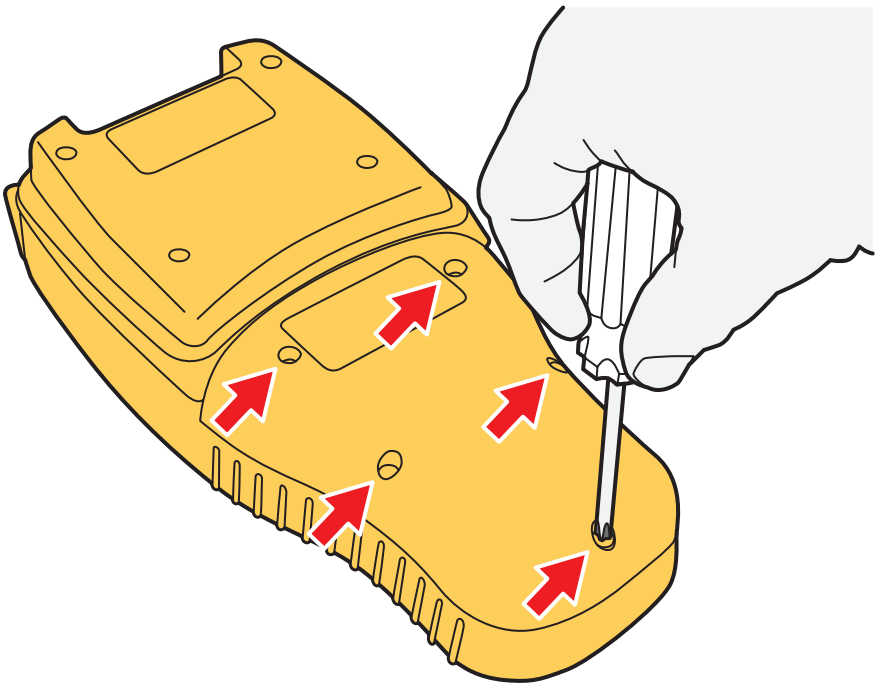
Battery Pack

The 965AMS tester uses a Nickel Metal Hydride (NiMH) battery pack. Typical life of battery pack is two years. To change the battery pack:

1. Power down the unit.

Battery Pack

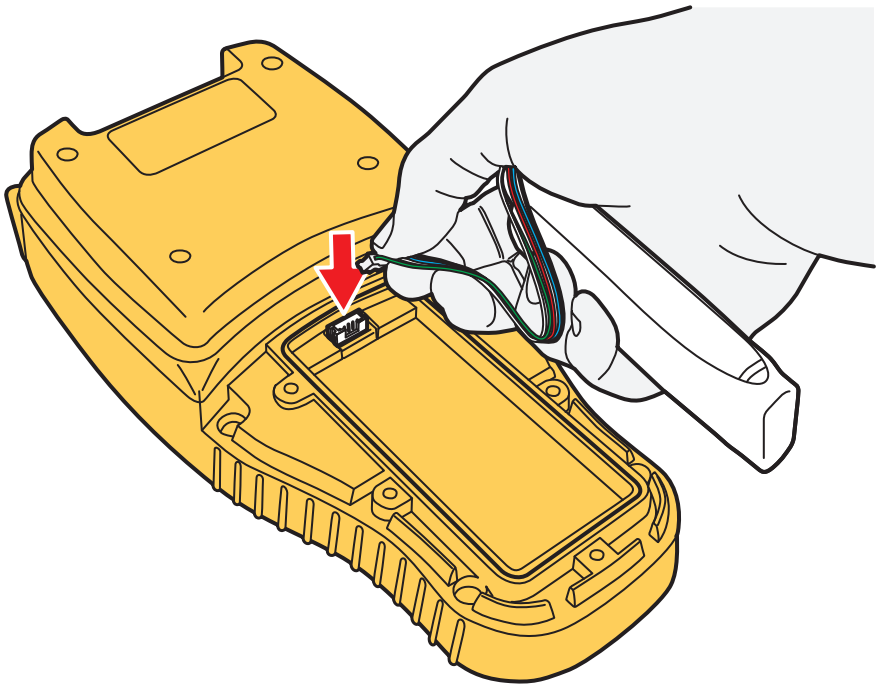
2. Place the unit upside down on a soft surface. Loosen the 5 screws.



3. Remove the battery cover.
4. Unplug the battery connector.

Battery Pack

5. Plug in the new battery connector.



6. Place the battery in the compartment.
7. Replace the cover.
8. Tighten the screws.

Caution: Battery may explode, leak or catch fire if exposed to high temperatures or fire. Recycle or dispose of properly. To prevent injuries or burns, do not allow metal objects to contact or short circuit the battery terminals.

Note: NiMH batteries may be recycled.

Battery Holder

The plastic battery holder that comes with the unit uses six “AA” alkaline batteries (alkaline batteries are not included).

Use alkaline batteries only when the NiMH battery pack is discharged and the AC adapter is not available. Typical lifetime of the alkaline battery pack is twenty hours of normal use (less if you use the backlight frequently, use the optional /SA or /ADSL features heavily, or work in very cold weather). The alkaline battery pack is installed the same way as the NiMH battery pack.

Note: The battery holder has protection against accidental charging of alkaline batteries.

System Reset

There could be situations were the batteries run down and the unit will not power up. Use this procedure to reset the unit:

1. Charge the internal battery pack or use the “AA” battery pack with new batteries.
2. Press and hold the ON OFF key for 10 seconds.
3. Release the ON OFF key, and press again for 1 second.
4. Files will appear loading on the screen after about 20 seconds.
5. When the main screen appears, the unit is ready to use.

Test Leads

The 965AMS tester comes with a Red/Black test lead pair, a Blue/Yellow test lead pair, and a separate Green test lead. The Red/Black and Green test leads are used for most measurements. The Blue/Yellow lead pair is used with some TDR modes (not in the 965AMS-B) and RFL. The shorting “strap” that comes with the unit is used with RFL. Keep the test leads clean and dry at all times to insure best accuracy of the measurements. Use soap and water to clean them if necessary.

Specifications

Electrical Specifications

Functions	Range	Resolution	Accuracy
Voltage (DC)	0 to 99.9 V 100 to 300 V	0.1 V 1 V	1% ± 0.5 V 3%
Voltage (AC) Meter resistance 100 k or 1 m	0 to 99.9 V 100 to 250 V	0.1 V 1 V	1% ± 0.5 V 3%
Current Shunt resistance	0 to 59.9 mA 60 to 110 mA 430 Ω	0.1 mA 0.1 mA	1% ± 0.3 mA 2%
Resistance With CO voltage	0 to 9999 Ω 0 to 9999 Ω 10 k to 99.9 kΩ 100 k to 999 kΩ 1 M to 9.9 MΩ 10 M to 99 MΩ 100 M to 990 MΩ	1 Ω 1 Ω 0.1 kΩ 1 kΩ 10 kΩ 0.1 MΩ 1 MΩ	1% ± 5 Ω 1% ± 50 Ω 1% 3% 3% 5% 10%
Opens (no noise)	0 to 3,000 ft (0 to 1,000 m) 3,000 to 10,000 ft (1 km to 3 km) 10,000 to 50,000 ft (3 km to 15 km) 50,000 to 100,000 ft (15 km to 30 km)	1 ft (1 m) 1 ft (1 m) 10 ft (10 m) 100 ft (100 m)	1% ± 3 ft (1 m) 3% 5% 10%
RFL Fault range Resistance to Fault (no noise)	 0 to 20 MΩ 0 to 99.99 Ω 100 to 999.9 Ω 1 k to 3 kΩ	 — RTS 0.01 Ω RTS 0.1 Ω RTS 1.0 Ω	 — 0.1% of RTS ± 0.01 Ω[1] 0.2% of RTS ± 0.01 Ω[1] 1.0% of RTS ± 0.01 Ω[1]
Wet section test Loop resistance Resistive balance	 0 to 7 kΩ 0 to 3.5 kΩ	 — —	 — 5%
Loop resistance	0 to 99.9 Ω 100 to 999.9 Ω 1000 to 7000 Ω	0.01 Ω 0.1 Ω 1 Ω	0.1% ± 0.01 Ω 0.2% ± 0.01 Ω 1.0% ± 0.01 Ω
Resistance difference	0 to 99.99 Ω	0.01 Ω	1% of loop resistance ± 0.01 Ω

Note: *[1]All resistance to fault measurement accuracies have an added factor of $(2x10^{-8})$ R_f ohms (R_f=fault resistance in ohms)*

Electrical Specifications

Functions	Range	Resolution	Accuracy
Tone output			
ID tone	200 to 1000 Hz, fixed level	8 volt peak to peak	+1 Hz
Precision tone-600 Ω Zout	200 to 9999 Hz, -20 to +1 dBm	1 Hz, 0.1 dB	1% Hz, 0.2 dB
	10 k to 19.99 kHz, -20 to +1 dBm	1 Hz, 0.1 dB	2% Hz, 1 dB
Ringers	0.0 to 4.0 ringer 0 to 2000 nF	0.1 ringer 10 nF	
Load coil count	0 to 5	1	±1 load coil
Ground resistance	5 to 500 Ω	1 Ω	1% ± 1 Ω
Ohms/distance calculator	0-9999 Ω 0-99999 ft (0-30 km)	0.01 1 ft (0.1 m)	— —
TDR			*
Ranges	100 ft, 200 ft, 500 ft, 1,000 ft, 2,000 ft, 5,000 ft, 10,000 ft, 20,000 ft, 30,000 ft (30 m, 60 m, 150 m, 300 m, 600 m, 1.5 km, 3km, 6 km, 10 km)	1 ft (1 m)	0.3% range
		5 nS, 34 nS, 135 nS, 1660 nS, 600 nS	Fixed values
Velocity input	0.50 to 0.99 (150 to 299 m/µs)	—	—
Modes	Single trace, dual trace, differential, memory, crosstalk, peak, memory diff.	—	—
Loss (and frequency)	-40 to +10 dBm, 200 to 3000 Hz,	0.1 dB, 1 Hz,	±0.5 dB, 2 Hz
With 600 Ω Zin	-40 to +10 dBm, 3000 to 9995 Hz,	0.1 dB, 10 Hz	±0.5 dB, 10 Hz
	-40 to +10 dBm, 10 k to 19.9 kHz	1 dB, 10 Hz	±1 dB, 20 Hz

Electrical Specifications

Functions	Range	Resolution	Accuracy
Noise metallic 600 ΩZin C and psophometric	0 to 50 dBrnc (-90 to –40 dBm0p)	1 dB	±2 dB
Noise to ground 600 ΩZin	40 to 100 dBrnc (-50 to 10 dBm0p)	1 dB	±2 dB
Longitudinal balance	0 to 85 dB	1 dB	±2 dB
Dial mode	DTMF, pulse	Standard	Standard
Caller ID (U.S. and Canada only) Carrier level	Date, time, number, name -4 to –32 dBm	— 1 dBm	 ±2 dBm
Short range wideband specifications (without SA option)			
Wideband loss 100, 135 Ω Zin Wideband tone output–100,135 Ω Zout	-50 to +2 dBm, 20 kHz to 1.2 MHz 0 dBm, 20 k to 2.2 MHz	0.1 dB, 100 Hz 1 kHz	±2 dB, 1% Hz ±+1 dB
SA wideband specifications (with SA option)			
Wideband loss 100, 135 Ω Zin	-85 to +5 dBm, 20 kHz to 2.2 MHz	0.1 dB, 100 Hz	±1 dB, 1% Hz
Wideband noise metallic			
100, 135 Ω Zin E, F, G & G2 filters	E filter 10-90 dBm F filter 20-90 dBm G filter 30-90 dBm	1 dB 1 dB 1 dB	±2 dB ±2 dB ±2 dB
Wideband spectral analysis			
100, 135 Ω Zin Dynamic range Wideband tone output –100,135 Ω Zout	10 kHz to 2.2 MHz –90 dBm to +10 dBm 0 dBm, 20 kHz to 2.2 MHz	0.5% of span 1 dB 1 kHz	1% ±1 dB ±0.1% frequency ±0.5 kHz
Impulse noise counting E, F, G & G2 filters			
Counting interval	1-60 minutes	1 minute	±5%
Threshold	Lower limits: 30 dBrnC & E 40 dBrnF 50 dBrnG 100 dBrn upper limit All 30 dB higher for N to Ground	1 dB	±1 dB (typical)
Count capacity	9999	1	—

Electrical Specifications

Functions	Range	Resolution	Accuracy
Filters: C, E, F, G, G2 and Psophometric for OUS	 E filter F filter G filter G2 filter	300 Hz – 3400 Hz 1 kHz – 50 kHz 4.9 kHz – 245 kHz 20 kHz – 1.1 MHz – 3 dB points 20 kHz – 2.2 MHz	
Stored results (All Results)	100 results total of all types maximum		

General Specifications

Drop test	Survives 3 ft (1 m) drop onto concrete, (survives 5 ft drop onto concrete with soft case) using ASTM D4169 assurance level I method 5276
Vibration	Meets Mil 810F method 514.5
Water, dust and chemical proof	Meets IP65 per IEC 529(1989) for rain and dust Immersion test IP67 0.15 m deep
Emissions USA FCC ID: T52965AMSBT	Standards meet FCC part 15, class A: Digital Devices for the US, and EN55022 (radiated emissions). This device complies with Part 15 of the FCC Rules. Operation is subject to the following two Conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Warning: Modification of this device without the permission of the manufacturer could void the user's right to operate it under the rules and regulations of the FCC.
Canada IC:458D-965AMSBT	This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numériqué de la class B est conformé à la norme NMB-003 du Canada
Built to ISO9001/2000 certification for manufacturing facilities and TL 9000 compliant Built to ANSI/IPC A610-C manufacturing standards	
Battery	Rechargeable battery pack or alkaline, 9 hours typical use (50% on/off measures voltage)
Display	4.1" x 3.1"(104 x 79 mm), 320 x 240 pixel resolution, high visibility in bright sunlight

Note: Routine lab calibration is not recommended or required

Replacement Items

You may order replacement items from 3M. Contact 3M Communication Markets Division customer service at 1-800-426-8688 for more information.

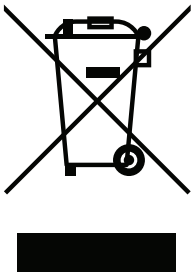
Accessory	3M Part Number
NiMH Battery Pack	80-6108-6473-0
Red/Black Test Lead*	80-6108-6435-9
Blue/Yellow Test Lead*	80-6108-6436-7
Green Test Lead *	80-6108-6437-5
Red/Black Test Lead**	80-6108-6395-5
Blue/Yellow Test Lead**	80-6108-6397-1
Green Test Lead**	80-6108-6399-7
Ground Strap, alligator	80-6109-3830-2
Ground Strap, banana	80-6109-3833-6
AC Adapter, 110/220 V	80-6113-1617-7
Cig Lighter Adapter	80-6109-3281-8
FED - No Pin	80-6111-3261-6
FED Bed of Nails	80-6111-3262-4
Adapter, Alkaline Battery	80-6108-6472-2
Serial-to-USB Cable	80-6113-1621-9

Troubleshooting

Many apparent failures with the 965AMS tester can be corrected by simple procedures.

Symptom	Cause	Solution
Unit does not turn on	Discharged battery pack.	Charge battery pack.
	NiMH battery pack old.	Replace battery pack.
Screen goes blank	Battery voltage low.	Charge battery pack.
Dark lines across screen	Battery voltage low.	Charge battery pack.
Error Messages	Battery voltage low.	Charge battery pack.
Inaccurate results	Battery voltage low.	Charge battery pack.
	Test lead broken.	Replace test lead.
	Improper connections.	Check connections.
No results	Test lead broken.	Replace test lead.
	Improper connections.	See on-screen hookups.
Resistance <999 MΩ when test leads open.	Test leads dirty.	Clean test leads.
Error messages during Self-Calibration.	Test Leads not shorted properly when prompted.	Check connections.
	Test leads broken.	Check test leads.

If the above solutions do not fix the problem, the 965AMS tester may need repair. Please make a note of the conditions when any failure occurred and record any error messages that may have appeared on the screen, then call 3M Telecom Repair Service at 1-800-426-8688 and select option 2 (in the US or Canada), or call your local 3M representative in other countries for further details on repair service.



This is the EU symbol for equipment that is covered under the Waste from Electrical and Electronic Equipment (WEEE) directive per CENELEC Specification 5041. It indicates that certain products should not be discarded in the trash, but rather should be recycled. This applies to all electronic pluggable and battery powered products.

Important Notice

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