

RFL>Separate-Pair, Single-Section Operation

6. The first parameter is the cable type and gauge. Use the Up and Down arrow keys to highlight the type of cable and the gauge of your cable.

The screenshot shows the 'Single Section' menu with the following options:

- AirCore: 19 AWG
- AirCore: 22 AWG (highlighted)
- AirCore: 24 AWG

Below the list, there are two input fields:

- DTS Length ft: Unknown
- Temperature °F: 0.0°F

At the bottom, there are four buttons: Select, Clear Temp, Unknown Temp, and OK.



7. Press **Select** to choose the cable length.

Special Requirement: Enter the cable temperature or the length, but not both. Only one parameter can be entered. There must be one unknown to solve the calculation.

For this example, we will use the cable temperature as the known value and the length will not be entered.

Press **Unknown Length** to enter an unknown length.

The screenshot shows the 'Single Section' menu with the following options:

- AirCore: 19 AWG
- AirCore: 22 AWG (highlighted)
- AirCore: 24 AWG

Below the list, there are two input fields:

- DTS Length ft: 0.00ft
- Temperature °F: Unknown

At the bottom, there are four buttons: Select, Clear Length, Unknown Length, and OK.





Measurement Functions

3M™ Dynatel™ Advanced Modular System 965AMS

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

8. Press **Select** to choose the cable temperature. Enter the temperature using the blue keys.

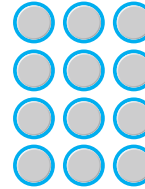
Press **OK** to return to the main RFL screen.

Single Section

AirCore: 19 AWG
AirCore: 22 AWG
AirCore: 24 AWG

DTS Length ft Temperature °F
Unknown 85.0°F
123abcABC

Select Clear Temp Unknown Temp OK



9. Press **Test** to review the settings.

RFL Navigation

Fault
T-G
R-G
Short

Pair
Separate

Section - gauge
Single

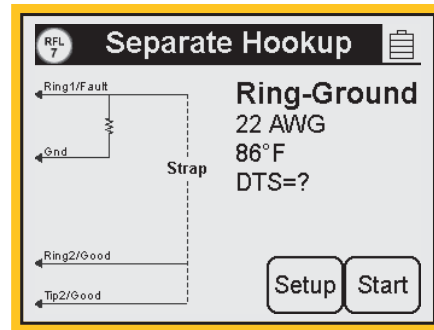
Select Setup Test



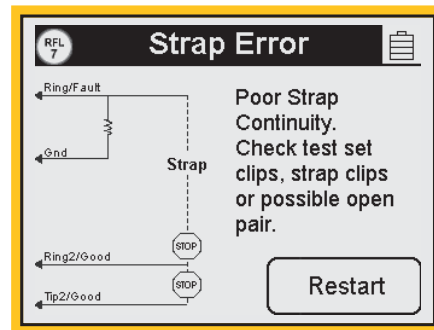


RFL>**Separate-Pair, Single-Section Operation**

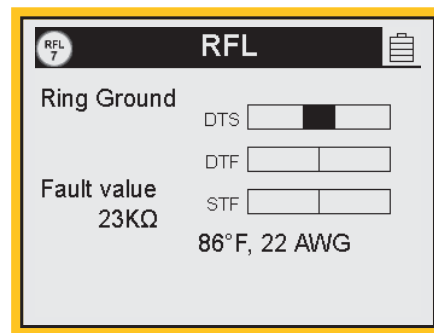
10. This screen shows the test lead hook-ups and the settings you have selected. Press **Start** to begin the test.



11. If the hook-up is not correct, you will see an error message on the wiring diagram at the point of the error.



12. During the measurement process, a bar graph of the null voltage for DTS and then for DTF will be visible on the screen.





Measurement Functions

3M™ Dynatel™ Advanced Modular System 965AMS

RFL>Separate-Pair, Single-Section Operation

13. The results of the measurements are displayed on the screen.

DTS is the distance to the strap.

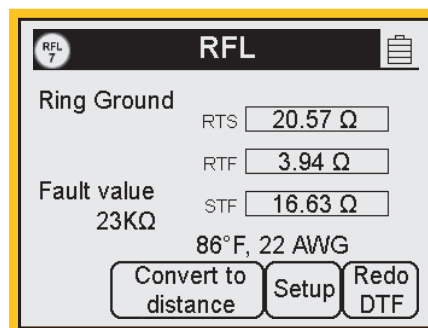
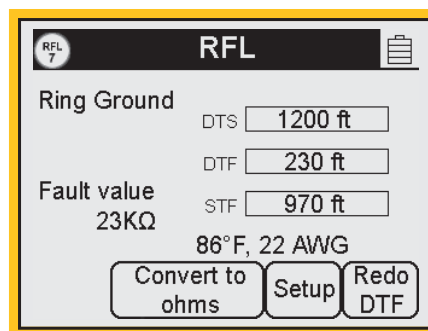
DTF is the distance to the Fault.

STF is the distance from the strap to the fault.

This screen also displays the value of the fault.

In some situations it may be more helpful to use the resistance values instead of the distance values. Press **Convert to ohms** to use the resistance values.

14. Press **Convert to distance** to convert the resistance back to distance.



RFL>Separate-Pair, Multi-Section Operation

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

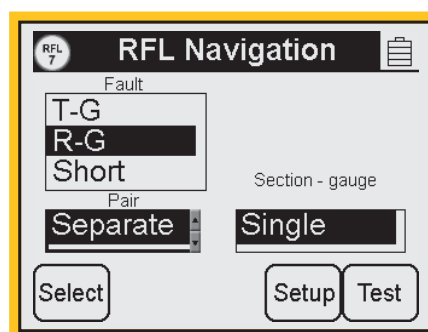
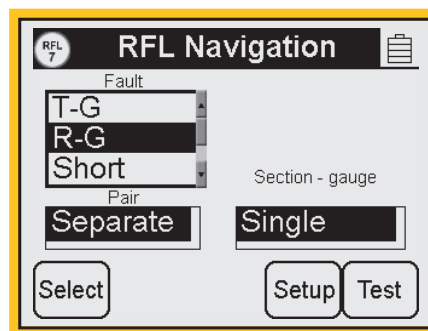
2. Press the blue  key to enter the RFL function.

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

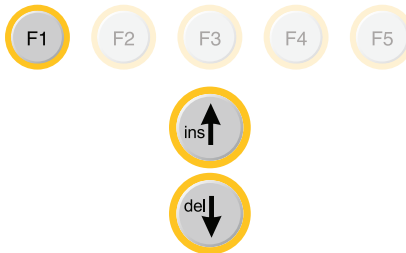
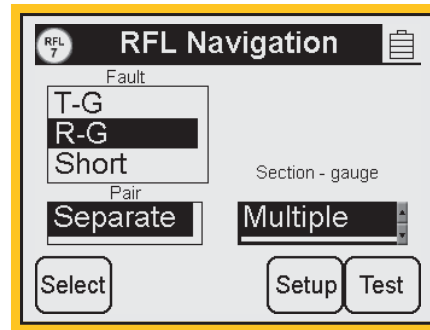
This example will show a Ring-Ground fault.

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

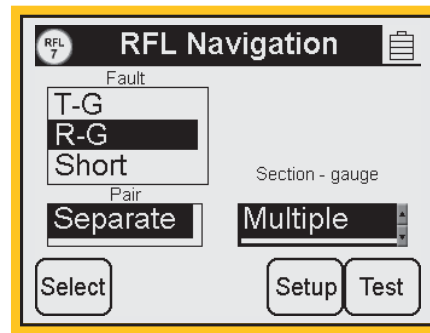


RFL>**Separate-Pair, Multi-Section Operation**

4. Press **Select** to move to the Multiple-Single section. Use the up and down arrow keys to select Multiple sections of cable that have more than one gauge.



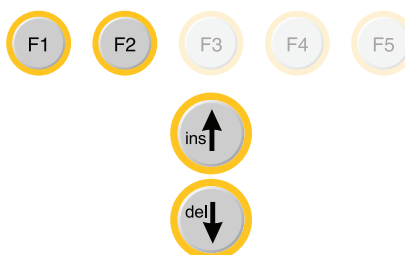
5. Press **Setup** to define each section.



RFL>Separate-Pair, Multi-Section Operation

6. Use the up and down arrow keys to select a section. Press **Edit Section** to choose the measurement parameters.

The screenshot shows the 'Multiple Gauge' screen. At the top left is a small icon with 'RFL 7'. The title is 'Multiple Gauge'. Below the title is a table with three columns: 'Section', 'Temp.', and 'Length'. The table has three rows, numbered 1, 2, and 3. Below the table, the word 'Total' is followed by a question mark '?'. At the bottom are three buttons: 'Edit Section', 'Delete Section', and 'OK'.



7. The first parameter is the cable type and gauge. Use the Up and Down arrow keys to highlight the type of cable and the gauge of your cable.

The screenshot shows the 'Edit Section #0' screen. At the top left is a small icon with 'RFL 7'. The title is 'Edit Section #0'. Below the title is a list of three options: 'AirCore: 19 AWG', 'AirCore: 22 AWG', and 'AirCore: 24 AWG'. Below the list are two input fields: 'Length' with the value 'Unknown' and 'Temp' with the value '0.0°F'. At the bottom are three buttons: 'Select', 'Load Coil', and 'OK'.





Measurement Functions

3M™ Dynatel™ Advanced Modular System 965AMS

RFL>Separate-Pair, Multi-Section Operation

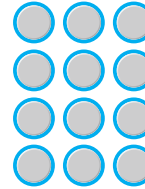
8. Press **Select** to enter the first section length. Use the blue keys to enter the length.

REF 7 Edit Section # 0

AirCore: 19 AWG
AirCore: 22 AWG
AirCore: 24 AWG

Length 500.00ft
Temp 0.0°F

Select Load Coil Unknown Length OK



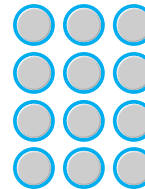
9. Press **Select** to move to the Temp section. Use the blue keys to enter the cable temperature. The temperature must be the same for all sections.

REF 7 Edit Section # 0

AirCore: 19 AWG
AirCore: 22 AWG
AirCore: 24 AWG

Length 500.00ft
Temp 85.0°F

Select Load Coil Unknown Temp OK



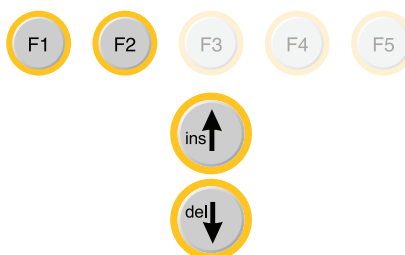
RFL>Separate-Pair, Multi-Section Operation

10. Use the up and down arrow keys to select the next section. Press **Edit Section** to choose the measurement parameters.

Section	Temp.	Length
1	24 AWG	86 F 500 ft
2		
3		

Total 500 ft

Edit Section Delete Section OK



11. You can add a load coil to the calculations. Press **Load Coil** to add the load coil to the section. You can add as many load coils as you need, but each one must be in a different section on the screen.

AirCore: 19 AWG
AirCore: 22 AWG
AirCore: 24 AWG

Length 500 Temp 86.0°F

Select Load Coil OK



12. Press **OK** to store the load coil and return to the Multiple Gauge screen.

Load Coil Selected

No Load Coil OK





Measurement Functions

3M™ Dynatel™ Advanced Modular System 965AMS

RFL>Separate-Pair, Multi-Section Operation

13. Use the up and down arrow keys to select the next section. Press **Edit Section** to choose the measurement parameters.

Section	Temp.	Length
1 24 AWG	86 F	500 ft
2 Load Coil		
3		

Total 500 ft

Edit Section Delete Section OK



14. Use the Up and Down arrow keys to highlight the type of cable and the gauge of your cable.

AirCore: 19 AWG
AirCore: 22 AWG
AirCore: 24 AWG

Length Unknown Temp 0.0°F

Select Load Coil OK



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

15. Press **Select** to enter the section length.

Special Requirement: Enter the cable temperature or the length, but not both. Only one parameter can be entered. There must be one unknown to solve the calculation.

For this example, we will use the cable temperature as the known value and the length will not be entered.

Press **Unknown Length** to enter an unknown length.

16. Press **Select** to move to the Temp section. Use the blue keys to enter the cable temperature. The temperature must be the same for all sections.

Press **OK** to return to the Multiple Gauge screen.

REF 7 Edit Section # 2

AirCore: 19 AWG
AirCore: 22 AWG
AirCore: 24 AWG

Length: Unknown
Temp: 86.0°F

Select Load Coil Unknown Length OK

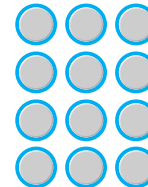


REF 7 Edit Section # 2

AirCore: 19 AWG
AirCore: 22 AWG
AirCore: 24 AWG

Length: Unknown
Temp: 86.0°F
Overwrite

Select Load Coil Unknown Temp OK



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

17. Press **OK** again to return to the main RFL screen.

Section	Temp.	Length
1 24 AWG	86 F	500 ft
2 Load Coil		
3 22 AWG	86 F	?

Total 500 ft

Edit Section Delete Section OK



17. Press **Test** to review the settings.

RFL 7 RFL Navigation

Fault
T-G
R-G
Short

Pair
Separate Multiple

Section - gauge
Multiple

Select Setup Test



18. This screen shows the test lead hook-ups and the settings you have selected. Press **Start** to begin the test.

RFL 7 Separate Hookup

Ring1/Fault
Gnd
Strap
Ring2/Good
Tip2/Good

Ring-Ground
22 AWG
86°F
DTS=?

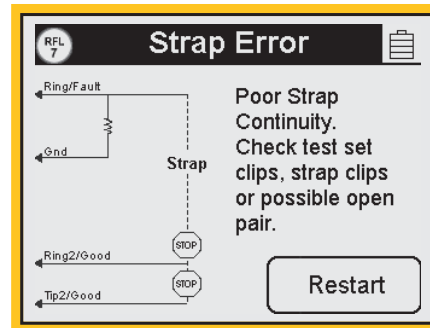
Setup Start



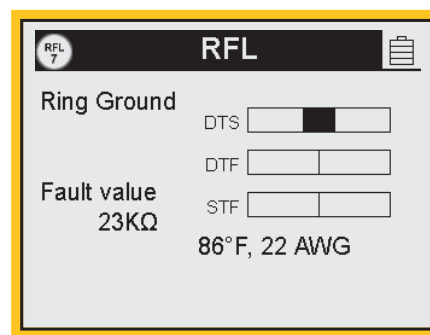


RFL>Separate-Pair, Multi-Section Operation

19. If the hook-up is not correct, you will see an error message on the wiring diagram at the point of the error.



20. During the measurement process, a bar graph of the null voltage for DTS and then for DTF will be visible on the screen.





Measurement Functions

3M™ Dynatel™ Advanced Modular System 965AMS

RFL>Separate-Pair, Multi-Section Operation

21. The results of the measurements are displayed on the screen.

DTS is the distance to the strap.

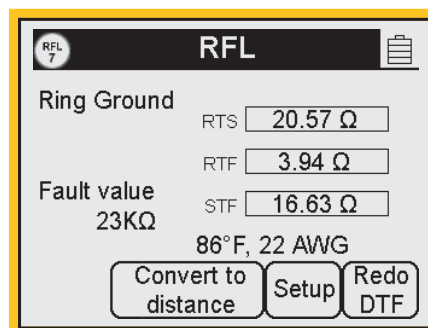
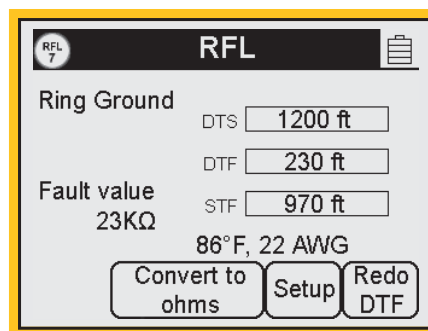
DTF is the distance to the Fault.

STF is the distance from the strap to the fault.

This screen also displays the value of the fault.

In some situations it may be more helpful to use the resistance values instead of the distance values. Press **Convert to ohms** to use the resistance values.

22. Press **Convert to distance** to convert the resistance back to distance.



RFL>Single-Pair, Single-Section Operation

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

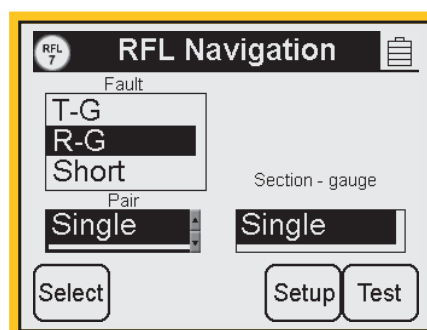
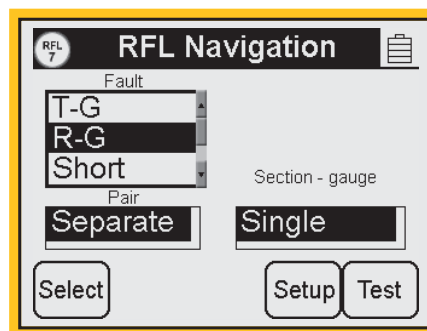
2. Press the blue  key to enter the RFL function.

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 Single Pair.



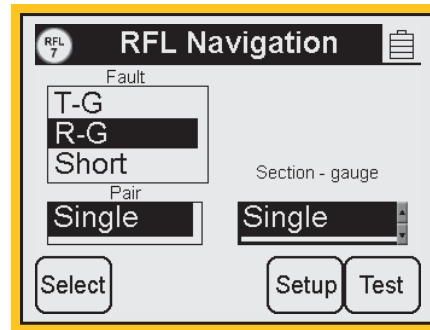


Measurement Functions

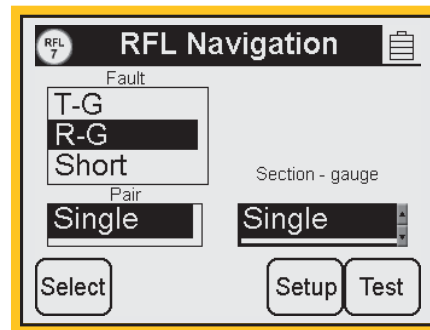
3M™ Dynatel™ Advanced Modular System 965AMS

RFL>Single-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.



RFL>Single-Pair, Single-Section Operation

6. The first parameter is the cable type and gauge. Use the Up and Down arrow keys to highlight the type of cable and the gauge of your cable.

The screenshot shows the 'Single Section' menu with the following options:

- AirCore: 19 AWG
- AirCore: 22 AWG (highlighted)
- AirCore: 24 AWG

Below the list, there are two input fields:

- DTS Length ft: Unknown
- Temperature °F: 0.0°F

At the bottom, there are four buttons: Select, Clear Temp, Unknown Temp, and OK.



7. Press **Select** to choose the cable length.

Special Requirement: Enter the cable temperature or the length, but not both. Only one parameter can be entered. There must be one unknown to solve the calculation.

For this example, we will use the cable temperature as the known value and the length will not be entered.

Press **Unknown Length** to enter an unknown length.

The screenshot shows the 'Single Section' menu with the following options:

- AirCore: 19 AWG
- AirCore: 22 AWG (highlighted)
- AirCore: 24 AWG

Below the list, there are two input fields:

- DTS Length ft: 0.00ft
- Temperature °F: Unknown

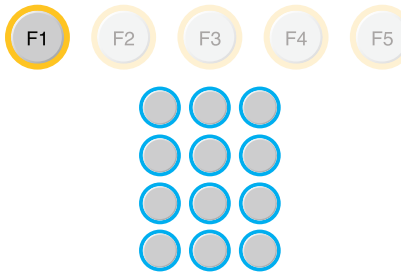
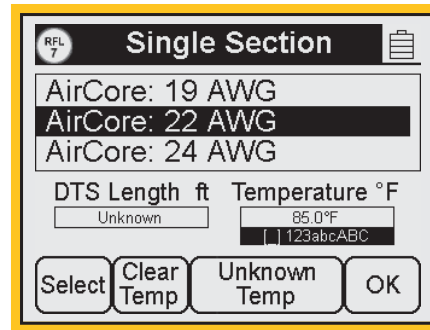
At the bottom, there are four buttons: Select, Clear Length, Unknown Length, and OK.



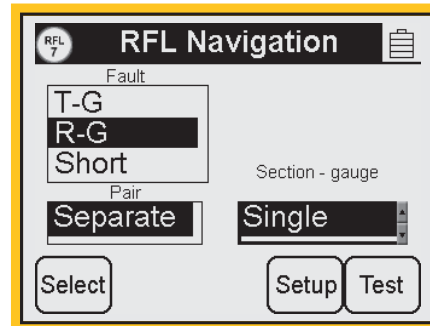
RFL>**Single-Pair, Single-Section Operation**

8. Press **Select** to choose the cable temperature. Enter the temperature using the blue keys.

Press **OK** to return to the main RFL screen.

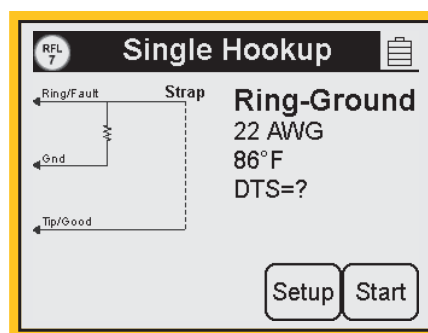


9. Press **Test** to review the settings.

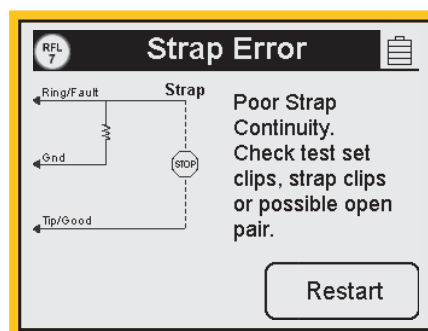


RFL>Single-Pair, Single-Section Operation

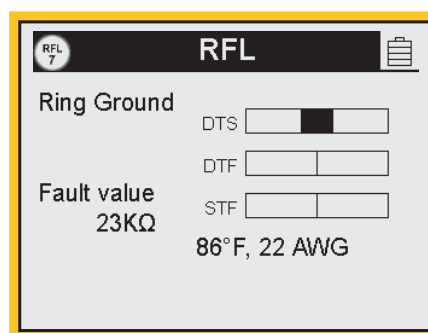
10. This screen shows the test lead hook-ups and the settings you have selected. Press **Start** to begin the test.



11. If the hook-up is not correct, you will see an error message on the wiring diagram at the point of the error.



12. During the measurement process, a bar graph of the null voltage for DTS and then for DTF will be visible on the screen.





Measurement Functions

3M™ Dynatel™ Advanced Modular System 965AMS

RFL>Single-Pair, Single-Section Operation

13. The results of the measurements are displayed on the screen.

DTS is the distance to the strap.

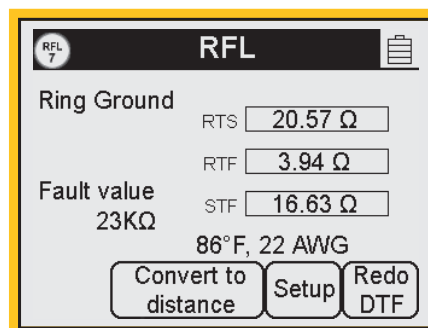
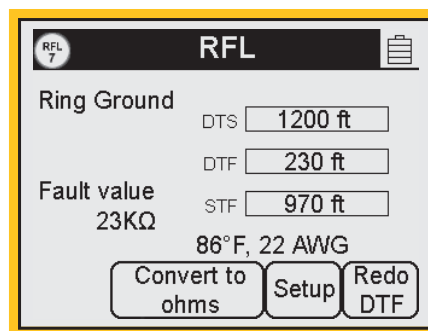
DTF is the distance to the Fault.

STF is the distance from the strap to the fault.

This screen also displays the value of the fault.

In some situations it may be more helpful to use the resistance values instead of the distance values. Press **Convert to ohms** to use the resistance values.

14. Press **Convert to distance** to convert the resistance back to distance.



RFL—Single Pair, Multi-Section>Operation

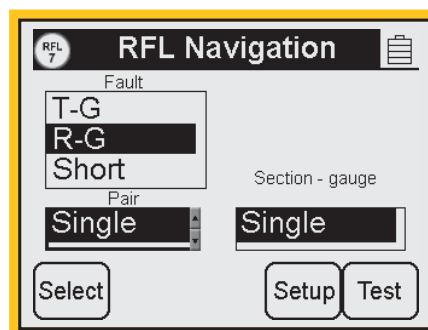
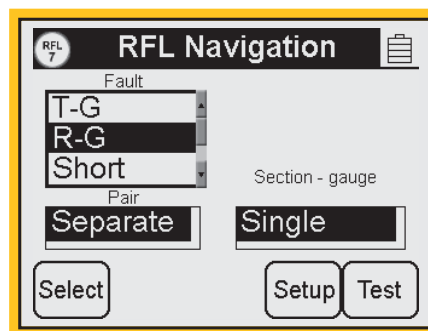
1. Use the Auto test , or the Ohmmeter , to determine the type of fault.
2. Press the blue  key to enter the RFL function.

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 Single Pair.



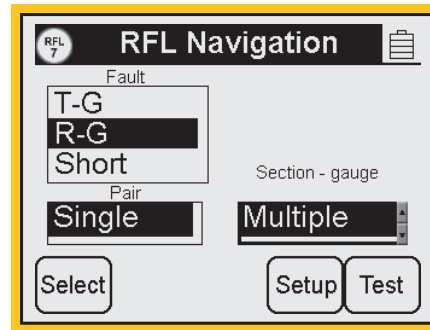


Measurement Functions

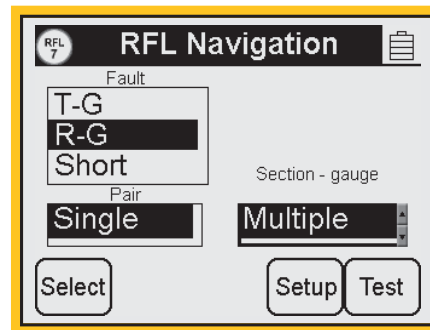
3M™ Dynatel™ Advanced Modular System 965AMS

RFL—Single Pair, Multi-Section>Operation

4. Press **Select** to move to the Multiple-Single section. Use the up and down arrow keys to select Multiple sections of cable that have more than one gauge.



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



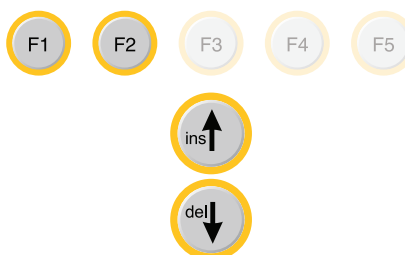
RFL—Single Pair, Multi-Section>Operation

6. Use the up and down arrow keys to select a section. Press **Edit Section** to choose the measurement parameters.

Section	Temp.	Length
1		
2		
3		

Total ?

Edit Section Delete Section OK



7. The first parameter is the cable type and gauge. Use the Up and Down arrow keys to highlight the type of cable and the gauge of your cable.

AirCore: 19 AWG
AirCore: 22 AWG
AirCore: 24 AWG

Length: Unknown Temp: 0.0°F

Select Load Coil OK





Measurement Functions

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RFL—Single Pair, Multi-Section>Operation

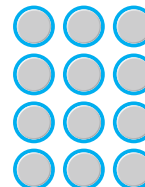
8. Press **Select** to enter the first section length. Use the blue keys to enter the length.

REF 7 Edit Section # 0

AirCore: 19 AWG
AirCore: 22 AWG
AirCore: 24 AWG

Length: 500.00ft
Temp: 0.0°F

Select Load Coil Unknown Length OK



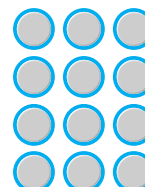
9. Press **Select** to move to the Temp section. Use the blue keys to enter the cable temperature. The temperature must be the same for all sections.

REF 7 Edit Section # 0

AirCore: 19 AWG
AirCore: 22 AWG
AirCore: 24 AWG

Length: 500.00ft
Temp: 85.0°F

Select Load Coil Unknown Temp OK



Press **OK** to return to the Multiple Gauge screen.

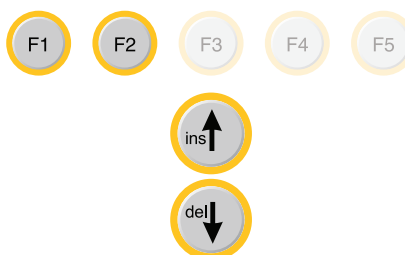
RFL—Single Pair, Multi-Section>Operation

10. Use the up and down arrow keys to select the next section. Press **Edit Section** to choose the measurement parameters.

Section	Temp.	Length
1	24 AWG	86 F
2		
3		

Total 500 ft

Edit Section Delete Section OK



11. You can add a load coil to the calculations. Press **Load Coil** to add the load coil to the section. You can add as many load coils as you need, but each one must be in a different section on the screen.

AirCore: 19 AWG
AirCore: 22 AWG
AirCore: 24 AWG

Length 500 Temp 86.0°F

Select Load Coil OK



12. Press **OK** to store the load coil and return to the Multiple Gauge screen.

Load Coil Selected

No Load Coil OK





Measurement Functions

3M™ Dynatel™ Advanced Modular System 965AMS

RFL—Single Pair, Multi-Section>Operation

13. Use the up and down arrow keys to select the next section. Press **Edit Section** to choose the measurement parameters.

Section	Temp.	Length
1 24 AWG	86 F	500 ft
2 Load Coil		
3		

Total 500 ft

Edit Section Delete Section OK



14. Use the Up and Down arrow keys to highlight the type of cable and the gauge of your cable.

AirCore: 19 AWG
AirCore: 22 AWG
AirCore: 24 AWG

Length: Unknown Temp: 0.0°F

Select Load Coil OK



RFL—Single Pair, Multi-Section>**Operation**

15. Press **Select** to enter the section length.

Special Requirement: Enter the cable temperature or the length, but not both. Only one parameter can be entered. There must be one unknown to solve the calculation.

For this example, we will use the cable temperature as the known value and the length will not be entered.

Press **Unknown Length** to enter an unknown length.

16. Press **Select** to move to the Temp section. Use the blue keys to enter the cable temperature. The temperature must be the same for all sections.

Press **OK** to return to the Multiple Gauge screen.

REF 7 Edit Section # 2

AirCore: 19 AWG
AirCore: 22 AWG
AirCore: 24 AWG

Length: Unknown
Temp: 86.0°F

Select Load Coil Unknown Length OK

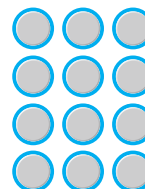


REF 7 Edit Section # 2

AirCore: 19 AWG
AirCore: 22 AWG
AirCore: 24 AWG

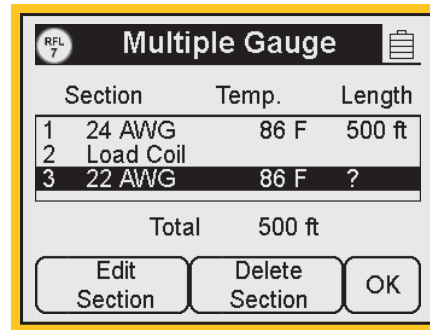
Length: Unknown
Temp: 86.0°F
Overwrite

Select Load Coil Unknown Temp OK

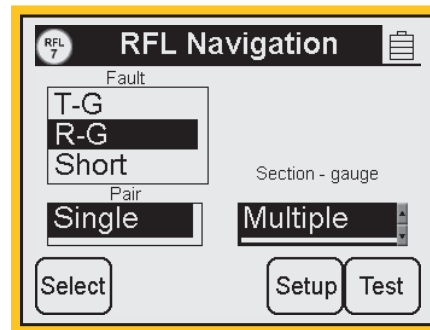


RFL—Single Pair, Multi-Section>**Operation**

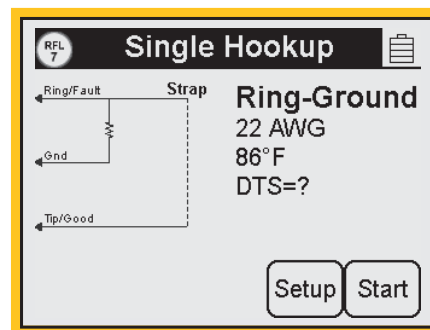
17. Press **OK** again to return to the main RFL screen.



17. Press **Test** to review the settings.



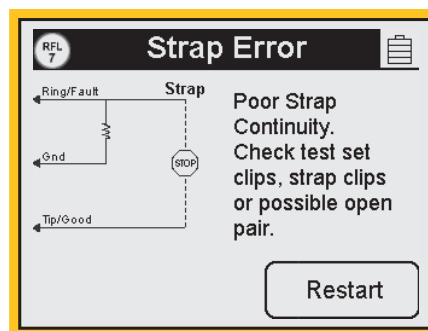
18. This screen shows the test lead hook-ups and the settings you have selected. Press **Start** to begin the test.



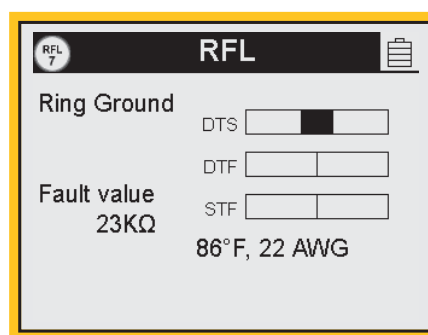


RFL—Single Pair, Multi-Section>Operation

19. If the hook-up is not correct, you will see an error message on the wiring diagram at the point of the error.



20. During the measurement process, a bar graph of the null voltage for DTS and then for DTF will be visible on the screen.





Measurement Functions

3M™ Dynatel™ Advanced Modular System 965AMS

RFL—Single Pair, Multi-Section>Operation

21. The results of the measurements are displayed on the screen.

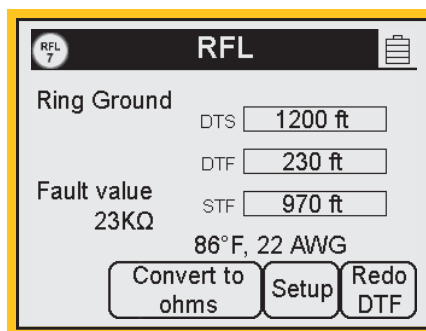
DTS is the distance to the strap.

DTF is the distance to the Fault.

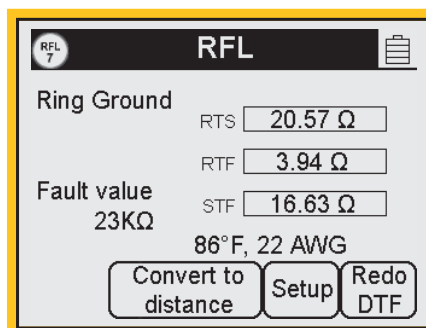
STF is the distance from the strap to the fault.

This screen also displays the value of the fault.

In some situations it may be more helpful to use the resistance values instead of the distance values. Press **Convert to ohms** to use the resistance values.



22. Press **Convert to distance** to convert the resistance back to distance.



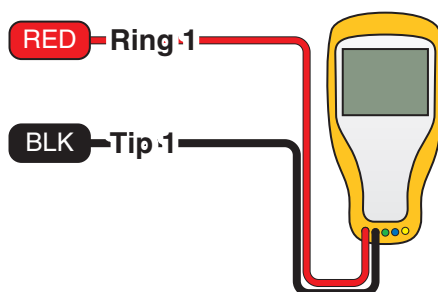
DSL (Digital Subscriber Line)

The **DSL**  functions include: DSL Loss, DSL Noise, DSL Spectrum Analyzer, Resistive Balance, and Impulse Noise.

DSL>DSL Loss

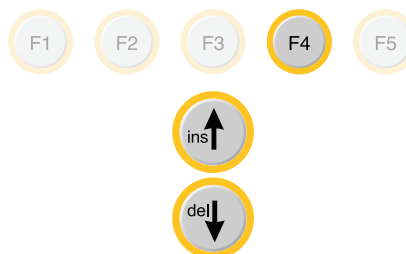
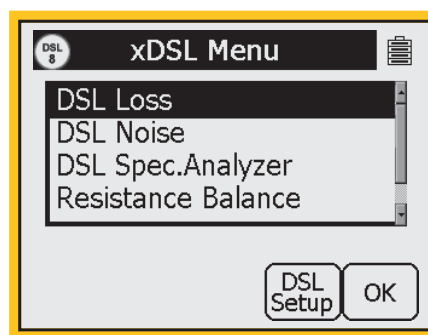
Use the **DSL Loss** function to measure the amount of loss in a circuit at a specific frequency.

DSL>DSL Loss>Hook-Up



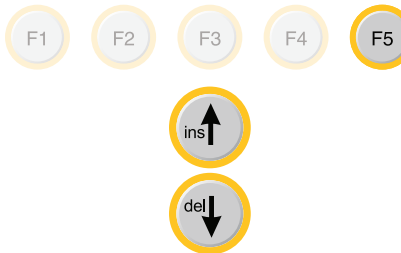
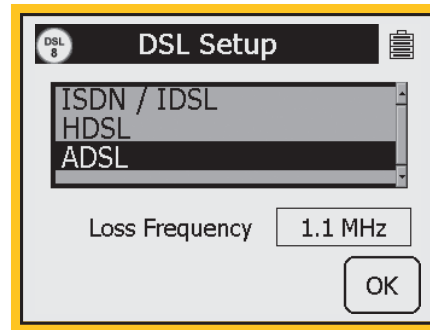
DSL>DSL Loss>Operation

- Press the blue  key to enter the DSL function.
Use the up and down arrow keys to select DSL Loss.
Use a tone source at the distant end that is capable sending a known output level such as a 965AMS tester or a 965DSP tester. Use 0dBm as the output level or follow your method of procedure.
- Press **DSL Setup** to select the type of service.

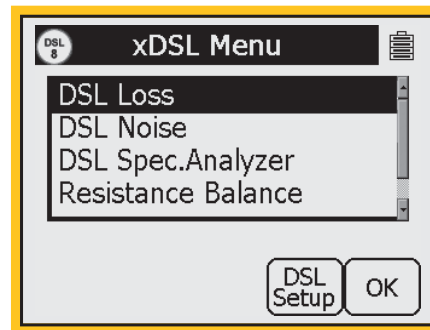


DSL>DSL Loss>Operation

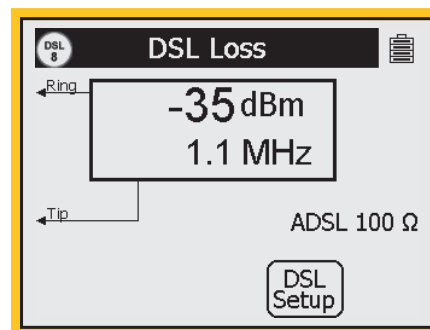
3. Use the up and down arrow keys to select the type of service that you are measuring.
4. Press **OK**.



4. Press **OK** to make the measurement.

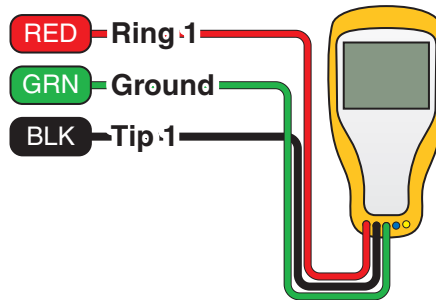


5. The results of the measurement will be displayed as a -dBm level at a specific frequency.

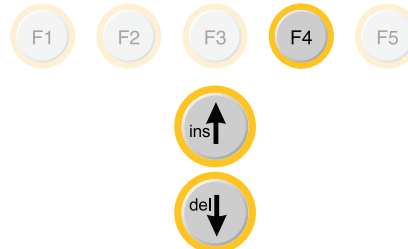
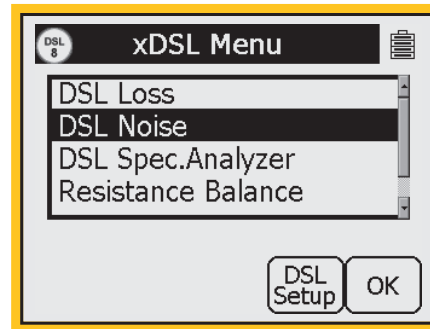


DSL>DSL Noise

Use **DSL Noise** to measure the Longitudinal or Metallic Noise on a DSL line.

DSL>DSL Noise>Hook-Up**DSL>DSL Noise>Operation**

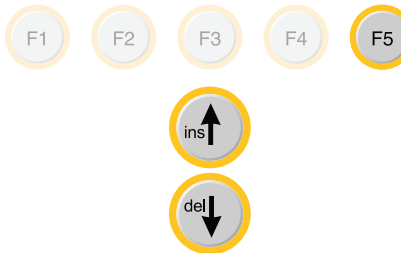
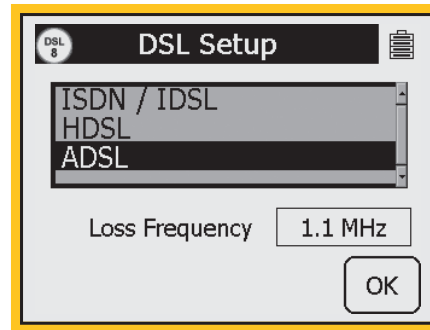
1. Press the blue  key to enter the DSL function.
Use the up and down arrow keys to select DSL Noise.
2. Press **DSL Setup** to select the type of service.



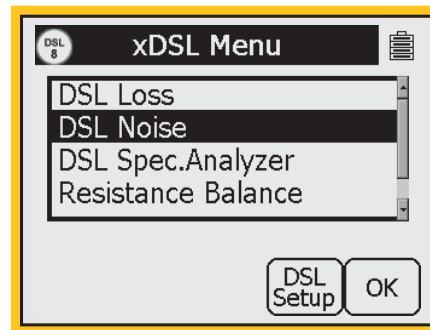
DSL>DSL Noise>**Operation**

- Use the up and down arrow keys to select the type of service.

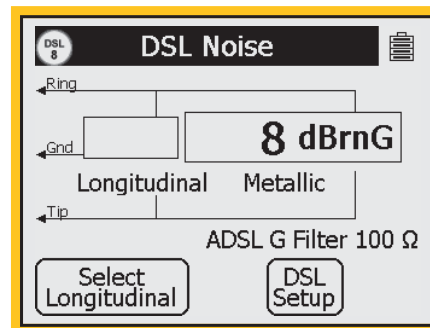
Press **OK**.



- Press **OK** to start the measurement for metallic noise.



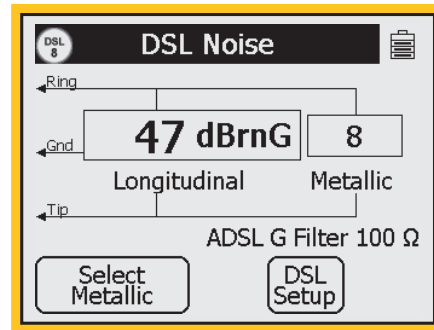
- Press **Select Longitudinal** to measure longitudinal noise.





DSL>DSL Noise>**Operation**

6. Press **Select Metallic** to measure metallic noise.

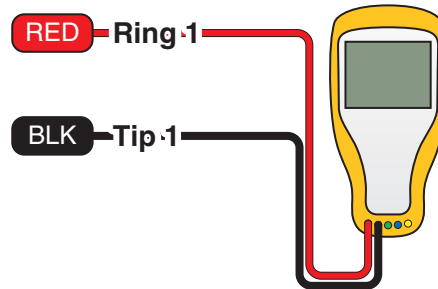


DSL>**DSL Spectrum Analyzer**

The **Spectrum Analyzer (SA)** shows a graph of useful signals and interference/noise at specific frequencies up to 2 MHz.

Use the SA to visually compare circuits to known good circuits.

DSL>DSL Spectrum Analyzer>**Hook-Up**

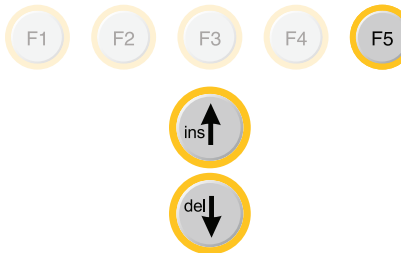
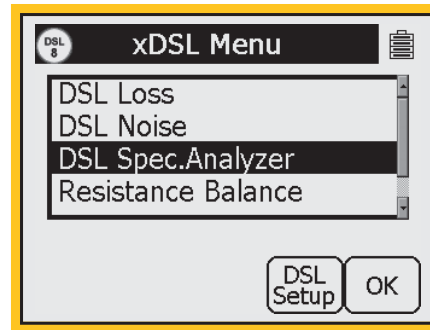


DSL>DSL Spectrum Analyzer>Operation

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

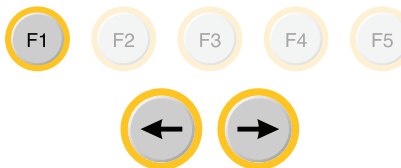
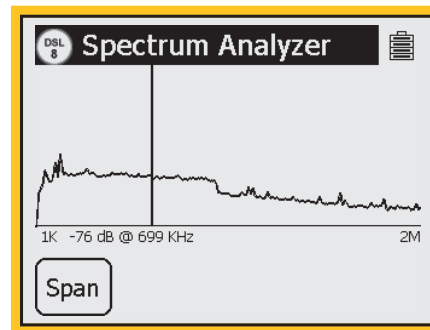
Use the up and down arrow keys to select DSL Spec.Analyzer.

2. Press **OK**.



3. Press **Span** to change the frequency range.

Use the left and right arrow keys to move the cursor. The cursor position will display the frequency and signal level.



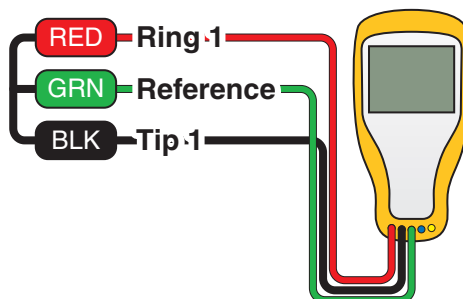
DSL>Resistance Balance

Use **Resistance Balance** to measure the:

- Loop Resistance between the Red and Green test leads.
- Resistance of each conductor connected to the Red and Green test lead.

- Resistance Difference between the two conductors. Connect the Red lead to one side of the pair.

DSL>Resistance Balance>Hook-Up



1. Connect the Red lead to one side of the pair.
2. Connect the Green lead to the other side of the pair.
3. Connect the Black lead to a reference wire.

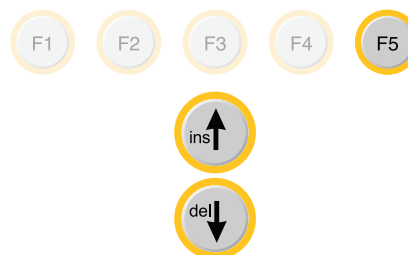
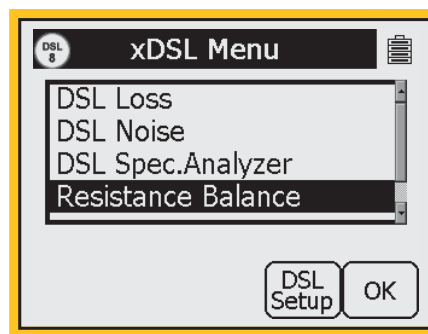
Note that the “reference wire” can be a separate wire or the shield of the cable.

DSL>Resistance Balance>Operation

1. Press the blue  key to enter the DSL function.
Use the up and down arrow keys to select Resistance Balance.

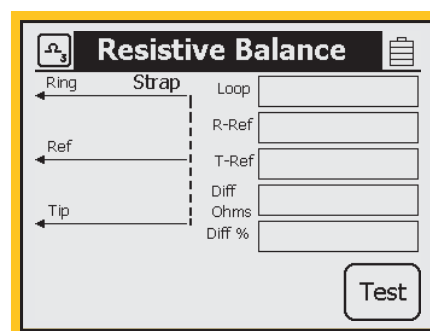
Connect the strap at a ‘far-end’ access point. The strap should be connected to all three of the conductors at the far end.

2. Press .



DSL>Resistance Balance>Operation

- Press **Test** to start the test.



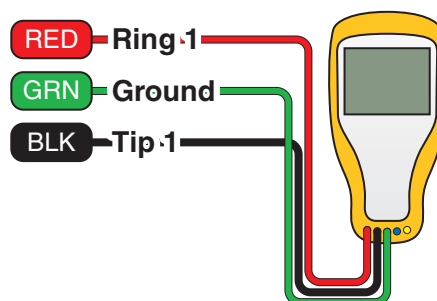
DSL Resistance Balance Normal Values

	% Ohms Difference
POTS	3%
Wideband	1%

DSL>DSL Impulse Noise

DSL Impulse Noise monitors random noise for a set period of time and returns a count of noise impulses.

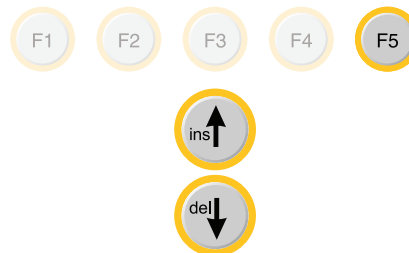
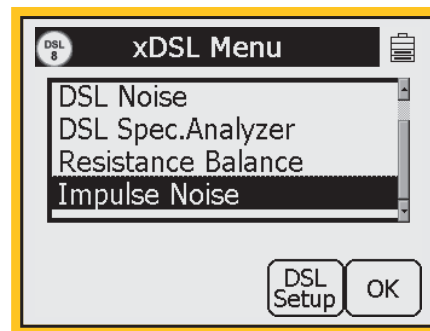
DSL>DSL Impulse Noise>Hook-Up



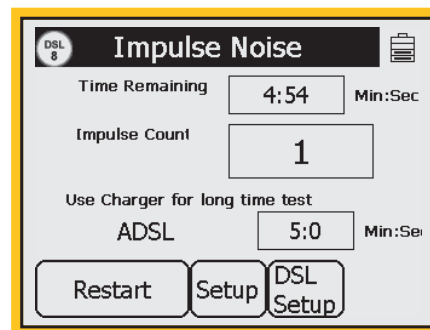
DSL>DSL Impulse Noise>Operation

1. Press the blue  key to enter the DSL function.
Use the up and down arrow keys to select Impulse Noise.

2. Press **OK**.



3. Press **DSL Setup** to select the type of service.





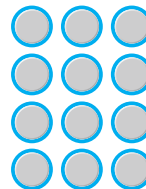
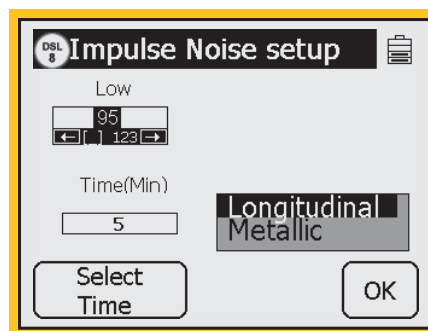
Measurement Functions

3M™ Dynatel™ Advanced Modular System 965AMS

DSL>DSL Impulse Noise>**Operation**

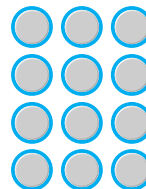
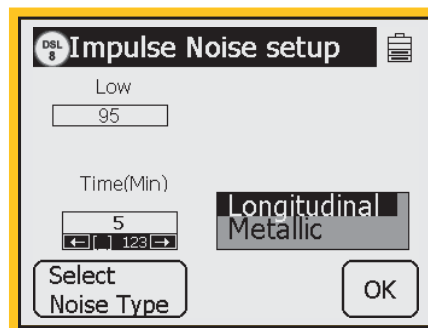
4. Use the blue keys to enter the lowest signal to be measured in units of dBnc.

Press **Select Time**.



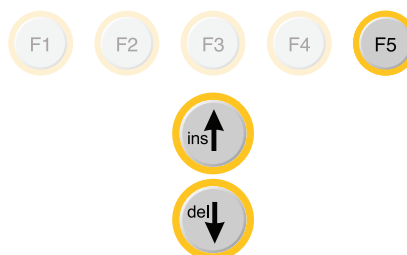
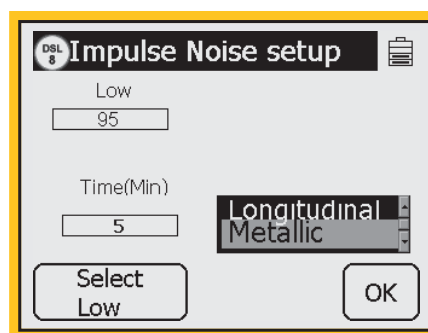
5. Use the blue keys to enter the amount of time for the test to run.

Press **Select Noise Type**.

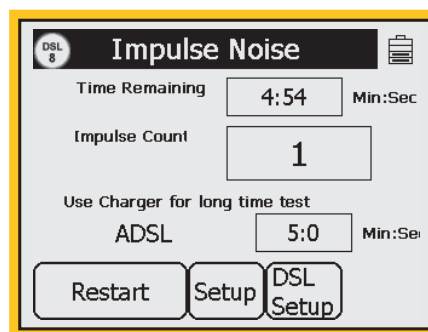


DSL>DSL Impulse Noise>**Operation**

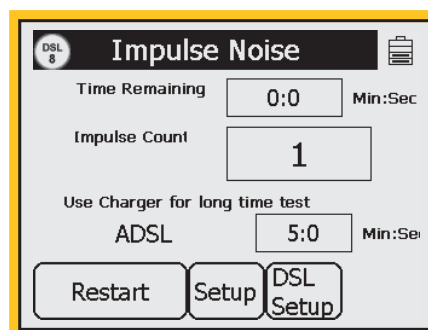
6. Use the Up and Down arrow keys to select Longitudinal or Metallic.
Press **OK**.



7. Press **Start** or **Restart** to start the measurement.



8. Results screen.



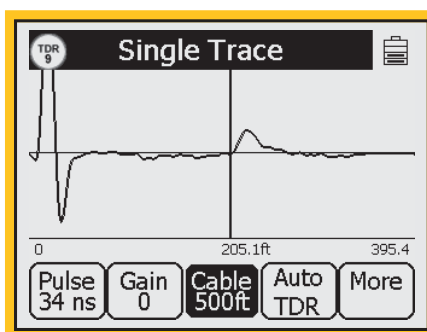


TDR

Use the **Time Domain Reflectometer (TDR)**  function to map the high-frequency impedance of the cable along its length. The display shows opens, load coils, splits, wet sections, splices, gauge changes, heavy shorts and any other physical deviation from a perfect cable. Each of these events have their own unique signature. A user-controlled vertical cursor is used to measure the distance to an event.

TDR>Event Recognition

“Events” are the “dips” and “peaks” seen on the screen caused by faults or changes in the pair.



“Peak” Events

1. **Launch Pulse:** The first peak on the screen is the “launch pulse” which occurs where the transition from the tester to the test leads occurs.
2. **Open:** A clean or partial open will show up as a peak on the screen. The “cleaner” the open, the taller the peak. A complete open will be the tallest peak (other than the launch pulse). You can not see events past a complete open.
3. **Load Coil:** A load coil looks very similar to an open. If you think there is a load coil on the pair, use the Load Coil function (in the Toolbox) to verify its presence. You can not see events past a load coil.

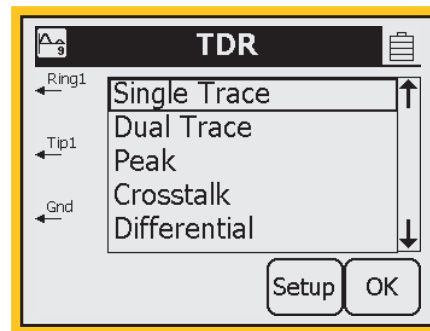


“Dip” Events

1. **Fault:** A resistance fault will show as a dip on screen. The lower the value of resistance, the lower the dip.
2. **Short:** A short (or zero-Ohm resistance fault) will show up as the lowest dip on the screen. You cannot see events past a short.
3. **BridgeTap:** A bridge tap will look like a small dip where the bridge tap begins. The end of the bridge tap looks like an upward event. The distance between the two events is the length of the bridge tap. The start of a bridge tap looks like a resistance fault. Use the ohms measurement function to measure the resistance on the pair. If there is no resistance, and you see a dip followed by a peak, you might suspect a bridge tap.

TDR>Setup

1. Press the blue  key to enter the TDR mode.
2. Press **Setup**.





Measurement Functions

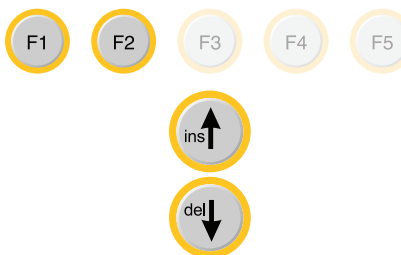
3M™ Dynatel™ Advanced Modular System 965AMS

TDR>Setup

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

Press **Select Gauge**.

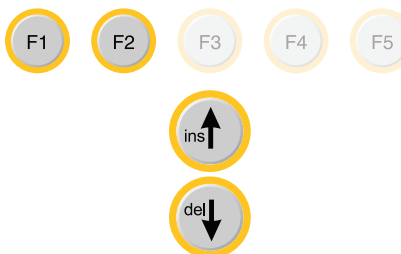
The screenshot shows the 'TDR Setup' screen. Under the 'Wire Type' section, a list of options is displayed: 'Aircore', 'Jelly-Filled', and '2 Pair Drop'. The 'Gauge' section shows '22 AWG' and '24 AWG'. The 'Length' section shows 'Last Used'. The 'Vp' value is '0.67'. At the bottom, there are two buttons: 'Select Gauge' and 'OK'.



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

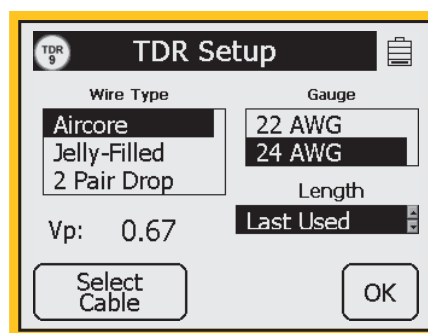
Press **Select Length**.

The screenshot shows the 'TDR Setup' screen. Under the 'Wire Type' section, a list of options is displayed: 'Aircore', 'Jelly-Filled', and '2 Pair Drop'. The 'Gauge' section shows '22 AWG' and '24 AWG'. The 'Length' section shows 'Last Used'. The 'Vp' value is '0.67'. At the bottom, there are two buttons: 'Select Length' and 'OK'.

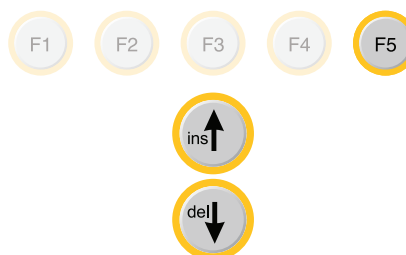


TDR>Setup

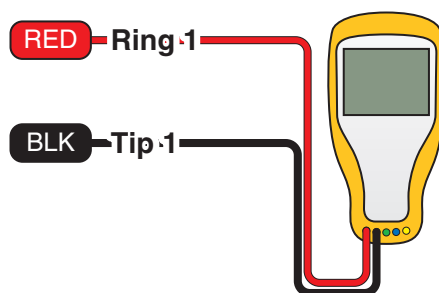
5. You can choose to start with the shortest range each time you enter the TDR or the last range that you used. Use the up and down arrow keys to select Minimum or Last Used range.



6. Press **OK** to return to the TDR menu screen.

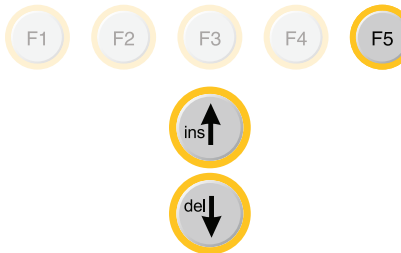
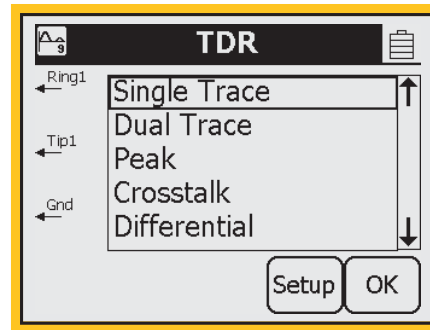
**TDR>Single Trace Mode**

Single Trace Mode is used for most TDR applications. You can use the single trace manual mode or you can use the Auto TDR mode.

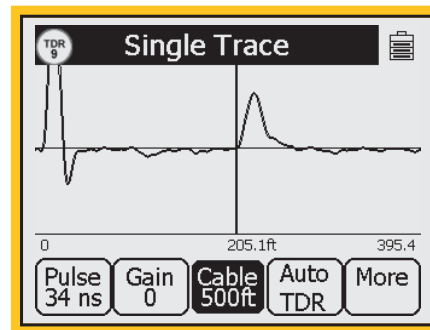
TDR>Single Trace Mode>Hook-Up

TDR>Single Trace Mode>Operation

1. Press the blue **TDR** key to enter the TDR mode. Use the up and down arrow keys to select Single Trace.
2. Press **OK** to display a trace.



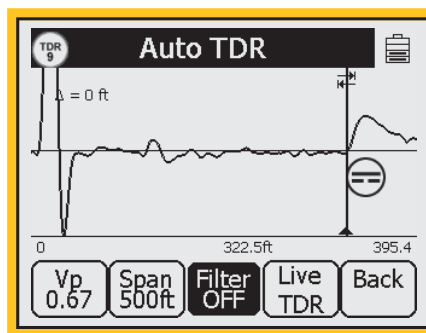
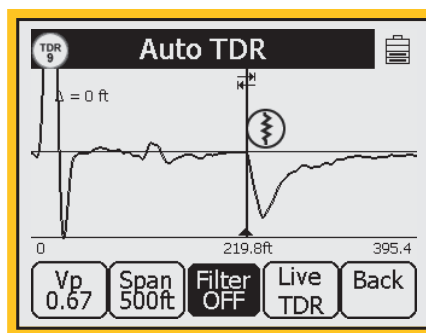
3. This screen shows the end of a pair at 205 feet.
4. Use the TDR Controls section in this chapter to see all of the parameters that you can adjust.
5. The Auto TDR mode automatically finds potential faults and displays an icon that represents the type of fault. Press **Auto TDR** to use this function.





TDR>Single Trace Mode>**Operation**

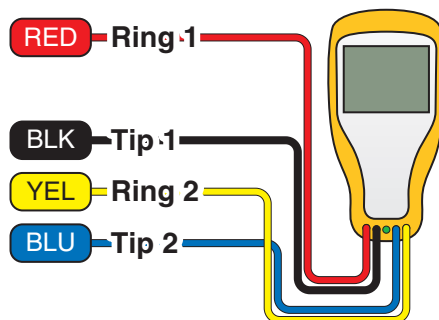
6. This trace shows a resistive fault at 219 feet.
7. The Auto TDR is not a live trace, but you can use the Gain, Cable length, Span and Filter functions.
8. If you change the circuit you must capture a new trace. Press **Live TDR** then press **Auto TDR**.
9. This trace shows an open at 395 feet.



TDR>**Dual Trace Mode**

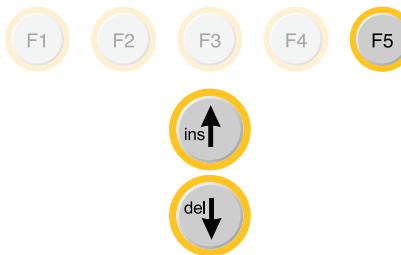
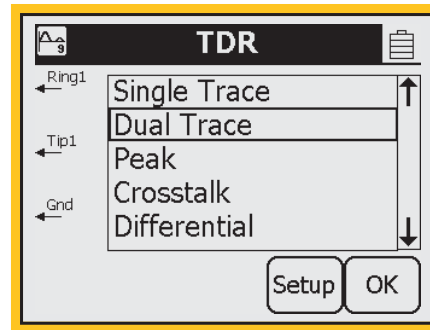
Dual Trace Mode is used to compare two pairs at the same time, usually a faulted and a good pair.

TDR>Dual Trace Mode>**Hook-Up**

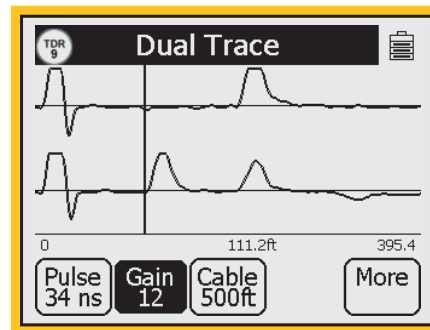


TDR>Dual Trace Mode>Operation

1. Press the blue **TDR** key to enter the TDR mode. Use the up and down arrow keys to select Dual Trace.
2. Press **OK** to display a trace.

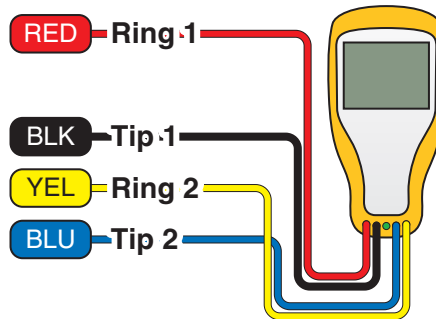


3. The pair under test (red/black) is displayed at the top of the screen. The reference pair (yellow/blue) is displayed at the bottom of the screen.
4. Any changes in the control parameters affect both traces. It is not possible to control each trace independently.



TDR>Differential

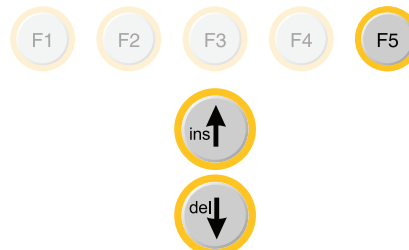
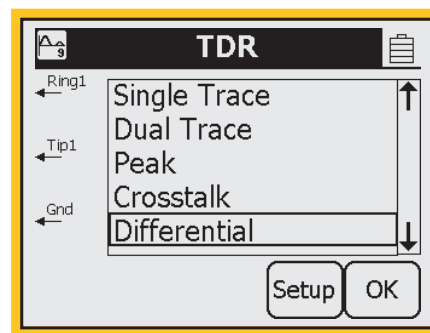
Use the **Differential** mode to display only the differences between two pairs, usually a 'good' pair and a pair under test.

TDR>Differential>Hook-Up

1. Connect the red and black test leads to the pair under test.
2. Connect the blue and yellow test leads to a known good pair in the same cable. This is called the reference pair.

TDR>Differential>Operation

1. Press the blue  key to enter the TDR mode. Use the up and down arrow keys to select Differential.
2. Press **OK** to display a trace.



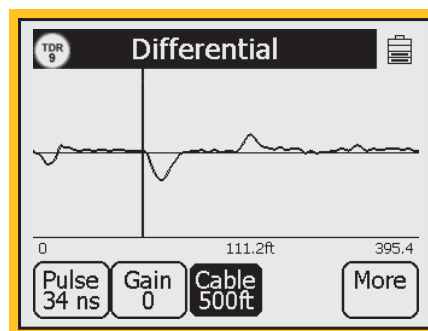


Measurement Functions

3M™ Dynatel™ Advanced Modular System 965AMS

TDR>Differential>Operation

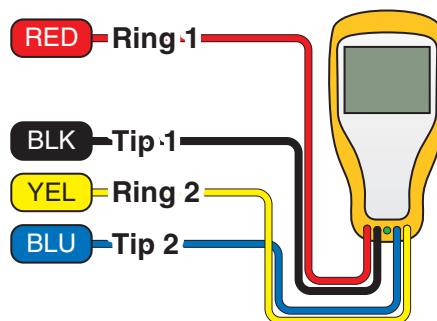
- A trace with a straight line would indicate a perfect match between both pairs. This trace shows differences between the reference pair (Blue/Yellow) and the pair under test (Red/Black).



TDR>Crosstalk

Use **Crosstalk** to display the amplitude and location of signals that “cross” from one pair to the other, as could be caused by a split.

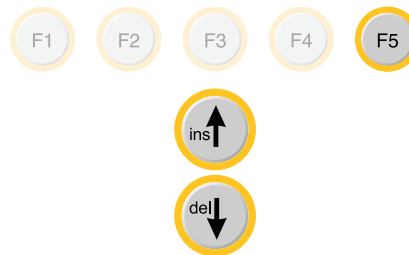
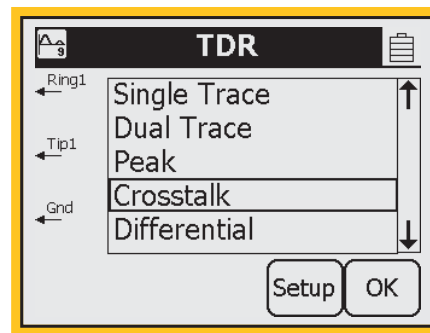
TDR>Crosstalk>Hook-Up



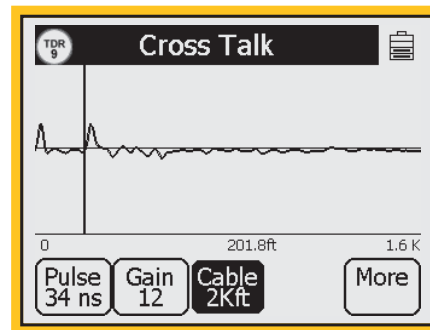
- Connect the red and black test leads to the pair under test.
- Connect the blue and yellow test leads to a pair that is suspected of having a crosstalk problem.

TDR>Crosstalk>Operation

1. Press the blue  key to enter the TDR mode. Use the up and down arrow keys to select Crosstalk.
2. Press **OK** to display a trace.



3. The location of the crosstalk will be shown as an upward or downward event.

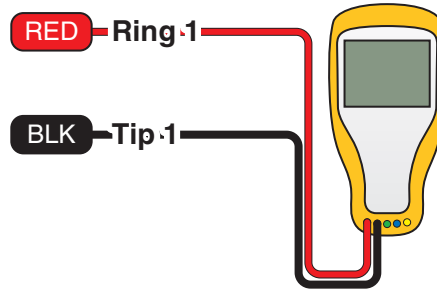
**TDR>Memory Mode**

Memory Mode is used to compare a pair under test to a stored trace in memory.

Measurement Functions

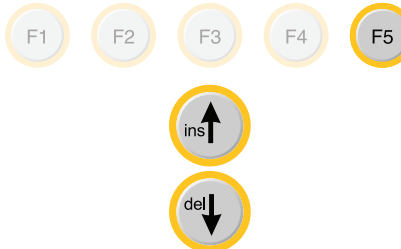
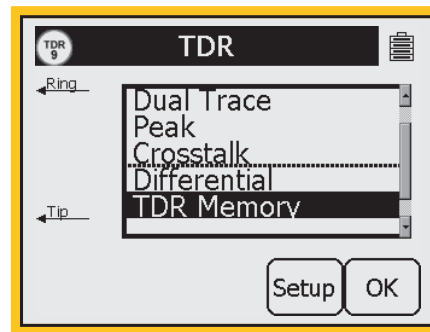
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TDR>Memory Mode>**Hook-Up**



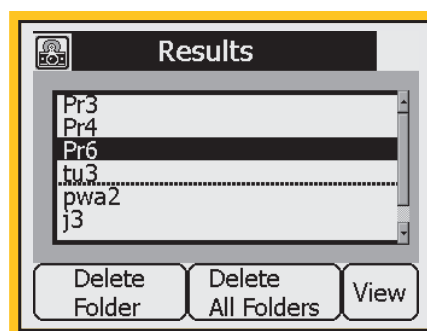
TDR>Memory Mode>**Operation**

1. Press the blue  key to enter the TDR mode. Use the up and down arrow keys to select Memory.
2. Press **OK**.

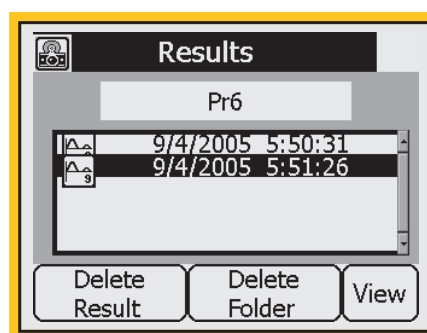


TDR>Memory Mode>**Operation**

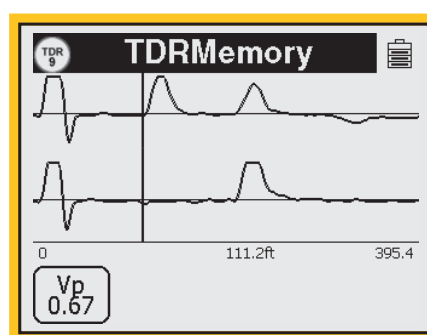
- The first screen in memory mode will show a list of the ID numbers for all stored Single Trace TDR traces. Use the up and down arrows keys to highlight the desired stored result.



- Press the **View** key to select the highlighted result and display the stored results list for that ID number by type (TDR), date, and time.



- The stored trace is displayed on the bottom of the TDR Memory screen and the “live” trace on the top. Move the cursor using the left and right arrow keys.





Measurement Functions

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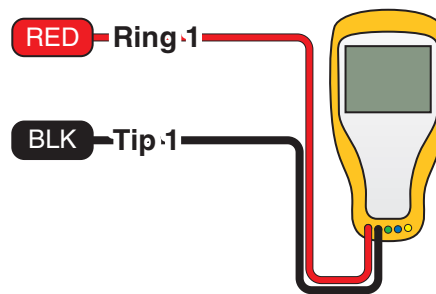
TDR>Memory Mode>Operation

5. The TDR Memory screen defaults to the control settings that were active when the stored trace was saved using the “TDR Save” function.

TDR>Peak Mode

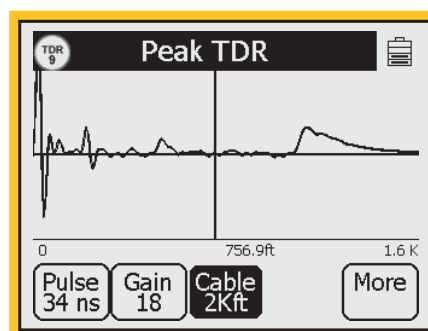
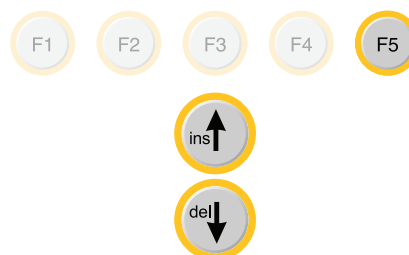
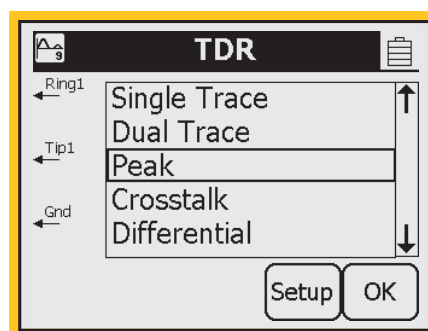
Use **Peak Mode** to capture events that may be intermittent.

TDR>Peak Mode>Hook-Up



TDR>Peak Mode>Operation

1. Press the blue  key to enter the TDR mode. Use the up and down arrow keys to select Peak.
2. Press **OK** to display a trace.
3. The 'live' trace is displayed continuously as a normal line. As a new maximum or minimum trace is detected, it will be displayed as a thin line along with the live trace.
4. If the pair being tested is stable (no intermittent faults), then the minimum, maximum and 'live' traces should appear as a single line.
5. If any of the control values are changed, the peak histories will be erased and new values will begin to display.



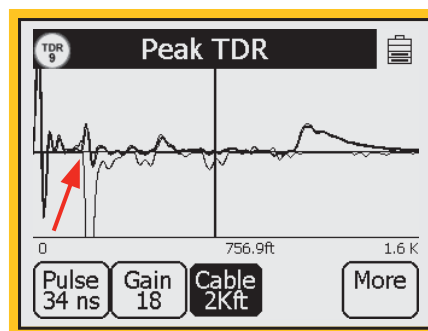


Measurement Functions

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TDR>Peak Mode>Operation

- The trace with the thin line (red arrow) shows where the intermittent starts. The end of the thin line does not provide any useful information.



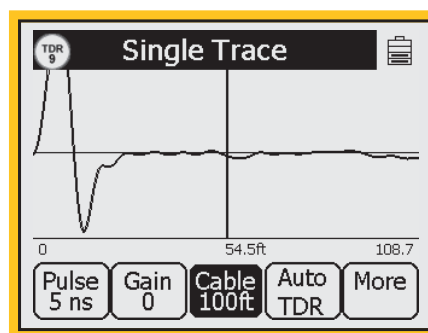
TDR>Controls

Cable Length

- The Cable Length allows you to set the distance from the left side of the screen to the right side.

The lengths that you may use are:

100 ft
200 ft
500 ft
1,000 ft
2,000 ft
5,000 ft
10,000 ft
20,000 ft
30,000 ft



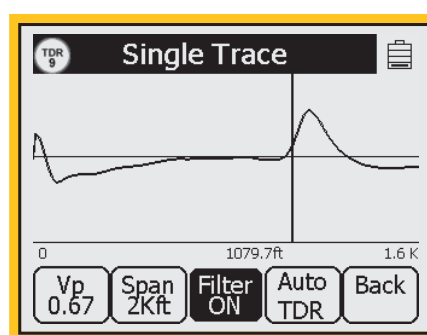
- The left side of the screen is usually at the test set and the right side is the furthest distance that can be displayed with the length selected.

TDR>Controls**Screen Pan**

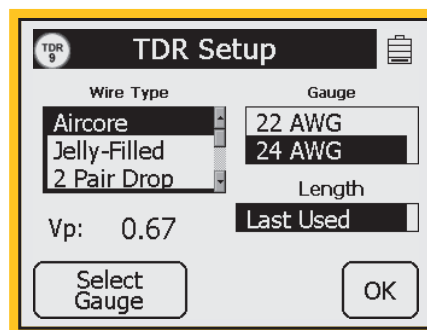
1. The start and stop numbers shown in the distance bar are the distances represented at the left and right side of the screen
2. If you move the cursor to the right side of the screen, the screen will “pan” to the right.
3. If you move the cursor to the left side of the screen the screen will “pan” to the left until it reaches Zero.

Filter

1. The Filter is used to reduce external noise from the trace on circuits that are 10,000 feet or longer.

**Velocity of Propagation**

1. The velocity of propagation is a measure of how fast a pulse travels in a circuit.
2. To get the most accurate distance measurement the VP should be set to the value for the cable type and gauge you are testing.
3. If you do not know the VP, we recommend you use the TDR Setup menu. In this menu, you will select the type of wire you are testing and the tester will choose the VP.





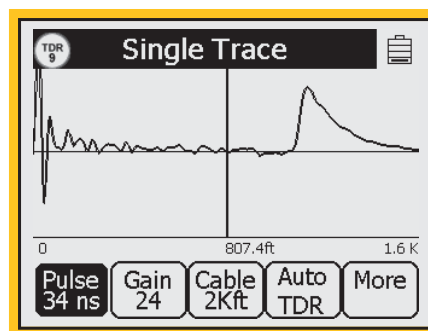
Measurement Functions

3M™ Dynatel™ Advanced Modular System 965AMS

TDR>Controls

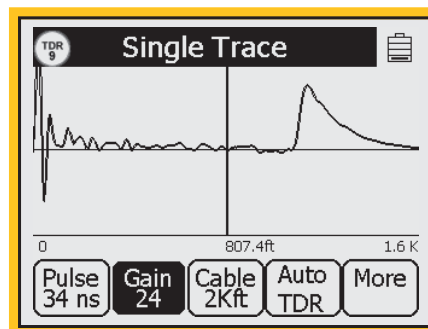
Pulse Width

1. Pulse Width allows you to select the width of the TDR pulse. A longer pulse width is required for longer range settings.
2. The tester automatically chooses the best pulse width for each length selected.
3. You can change the pulse width independent of the length, but we recommend you let the tester select the pulse width.



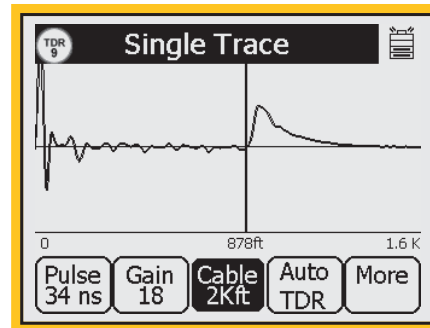
Gain

1. The Gain control allows you to increase the height and depth of events.
2. Higher gain will make events look taller and deeper on the screen which may be helpful in finding small events.



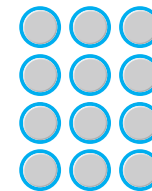
TDR>**Controls****TDR Save**

1. Traces can be stored in the single trace mode. None of the other TDR modes can be saved. Up to two-hundred traces can be stored.



2. Press the  key to enter the Save mode.

Use the blue keys to enter an alphanumeric ID. Enter the numbers and letters like you would with your cell phone memory. This could be a single number such as “8” or a label such as “cable-23-pr-12”. You may have up to 12 characters in the label. Upper and lower case letters are supported.



3. Press  to save the file.





Measurement Functions

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TDR>Controls

4. If User Info is enabled, you will see another edit screen. Edit the Tech ID and Job Number if needed.
5. The data entered into each field will remain present for every saved result until explicitly changed or cleared. In this way information that is infrequently changed such as the Tech ID does not need to be re-keyed every time. These two fields are appended to the TDR trace results when they are printed or stored in the PC Link software.

