

# **Model 600DSL**

Telephone Network Analyzer  
Operator's Manual



**Riser Bond**

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## Section 1: Safety Information

**▲▲ WARNING ▲▲** If a procedure or process is not correctly followed, personal injury or death may result.

**▲▲ CAUTION ▲▲** If a procedure or process is not correctly followed, the equipment may be damaged or data lost.

**▲▲ HAZARDOUS VOLTAGE ▲▲** The hazardous voltage symbol indicates the high voltage source on the Model 6000DSL is active or there is a hazardous voltage present on the cable under test.

**▲▲ WARNING ▲▲**  
Before using, review all safety precautions. Note and **follow all safety information** on equipment and in documentation.

Keep this instrument away from flammable gases or fumes.

Do not modify any part or accessory of this instrument to help ensure proper operation and the safety of the operator.

Do not perform service or repair on this instrument. There are no user serviceable parts on or in this instrument. Return the instrument to Riser Bond Instruments or a designated representative for repairs or service. Failure to do so could result in electric shock and/or void your manufacturer's warranty.

When performing Insulation Resistance tests, start using the 50V source voltage setting. For any tests using a higher source voltage than 50V, make sure all network equipment is disconnected from the cable under test. Failure to do so could result in electric shock and/or damage to telephone network equipment.

Do not use the Model 6000DSL telephone network analyzer if it has been damaged, and secure the product from use by others. Return it to Riser Bond Instruments or a designated representative for repairs or service.

**▲▲ CAUTION ▲▲**  
Do not expose the Model 6000DSL to extremely hot or cold weather. Store your Model 6000DSL indoors during extreme hot or cold weather. Bring the Model 6000DSL to specified operating temperatures before using it to help ensure proper operation.

Only use Riser Bond test leads with the Model 6000DSL. Using other test leads may damage the Model 6000DSL and/or void the Manufacturer's Warranty.

Use a lint-free cloth or small soft brush to remove dust from the Model 6000DSL display screen and connectors. Use a damp cloth and mild soap and water to clean the case. Do not use harsh chemicals and abrasive cleaners; they may damage the Front panel and case.

Keep the instrument free from water to help ensure proper operation.

Inspect the Model 6000DSL, the Remote Device, and the Oscillator/Far End Unit after each use. Inspect cable accessories for damaged insulation, bent or broken clips. Replace damaged parts immediately or, if the unit needs repairs, return it to Riser Bond Instruments or a designated representative for repairs or service.

## Section 2: General Information

### 2.1 Introduction

The Model 6000DSL is a multi-function telephone test instrument. It combines diagnostic and fault location tools into a single instrument that includes a Multi-Meter, a full function Time Domain Reflectometer (TDR), Resistance Fault Locator (RFL), Open/Cap Meter, and Insulation Resistance (IR) Tester. The Model 6000DSL also tests POTS and Wideband Transmission, and measures Pair Balance and Noise. Telephone test technicians use the Model 6000DSL to troubleshoot voice pairs and to qualify pairs to support new high-speed digital circuits.

Use the Multi-Meter, IR, Transmission tests, and Pair Balance and Noise measurements to determine the type of fault locator to use: the TDR, RFL or Open/Cap Meter. Use the fault locator tools to find opens and partial opens, high and low resistance shorts, water, bridge taps, load coils, bad splices, faulty connectors, and cable damage.

### 2.2 General Features

- Compact, lightweight, portable
- Rugged carrying case
- RS-232 port
- Battery charger
- WAVE-VIEW computer software
- Auto Test functions
- Hazardous voltage test
- Model 6000DSL Remote Device for automated, single person testing
- Oscillator/Far End Unit
- Diagnostic and fault locator tools
  - Multi-Meter
  - Insulation Resistance Tester
  - Pair Balance and Noise Measurements
  - POTS and Wideband Transmission Tests
  - Open/Cap Meter
  - RFL
  - TDR

## Section 3: Operating Procedures

### 3.1 Theory of Operation

The Model 6000DSL is a multiple use instrument. Use any or all of the various diagnostic and fault locator tools or use the automated test function to step through typical pair diagnostic tests and fault location procedures.

The Model 6000DSL is easy to operate (Figure 1).

- A) Keys on the left side of the Front Panel control instrument operations.
- B) Keys on the bottom of the Front Panel control the menu items that are displayed on the screen.
- C) Keys on the right side of the Front Panel are used for fast access to common TDR controls, the telephone dialer, and cursor functions in test screens.
- D) The green light on the LED in the bottom right hand corner indicates the battery charger is plugged in.

The test lead jacks, serial port, and battery charger socket are on the back panel (Figure 4).

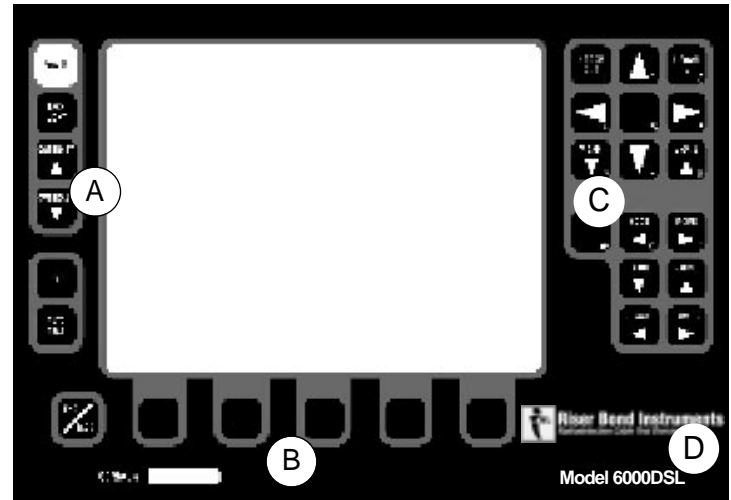


Figure 1. Front Panel

## 3.2 Front Panel Description

### 3.2.1 Keypad

The keys on the Front Panel control the functions displayed on the screen (Figure 2).

#### Instrument Operation Keys (A)



**Power.** On/Off.



**Backlight.** Turn the backlight On/Off. Use backlighting for low light situations.



**Contrast.** Increase or decrease LCD screen contrast.



**Help.** Press to access the Help Menu.



**Auto Test.** Press to start an automatic process for fault diagnosis and location.

#### Menu Control Softkeys (B)



**End/Back.** Use the End/Back key to stop a test or to return to previous screen.

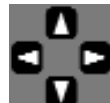


**Softkey menu.** The softkey menu is displayed on the screen. Press the softkey underneath the menu items to make your selection or move between selected items.

#### TDR Keys (C)



**Horizontal Zoom In, Zoom Out.** Use the two zoom keys to zoom in or out on an area in the waveform display.



**Waveform Position.** Use the four arrow keys to move the position of the waveform(s) left, right, up, and down.



**V Gain.** Use the two arrow keys to increase and decrease the vertical waveform amplitude or gain.



**Mode.** Use the two mode keys to change various live and stored waveform modes.



**Range.** Use the two range keys to increase and decrease the cable distance displayed on screen. Pulse width and vertical gain are automatically adjusted for each range.



**Cursors.** The cursor keys move the distance cursor along the waveform. Use these keys to move the distance cursor to the point of interest on the waveform. Cursors should be set on the leading edge of the reflection. When you change the cursor placement or adjust VOP, the distance between cursors automatically updates.

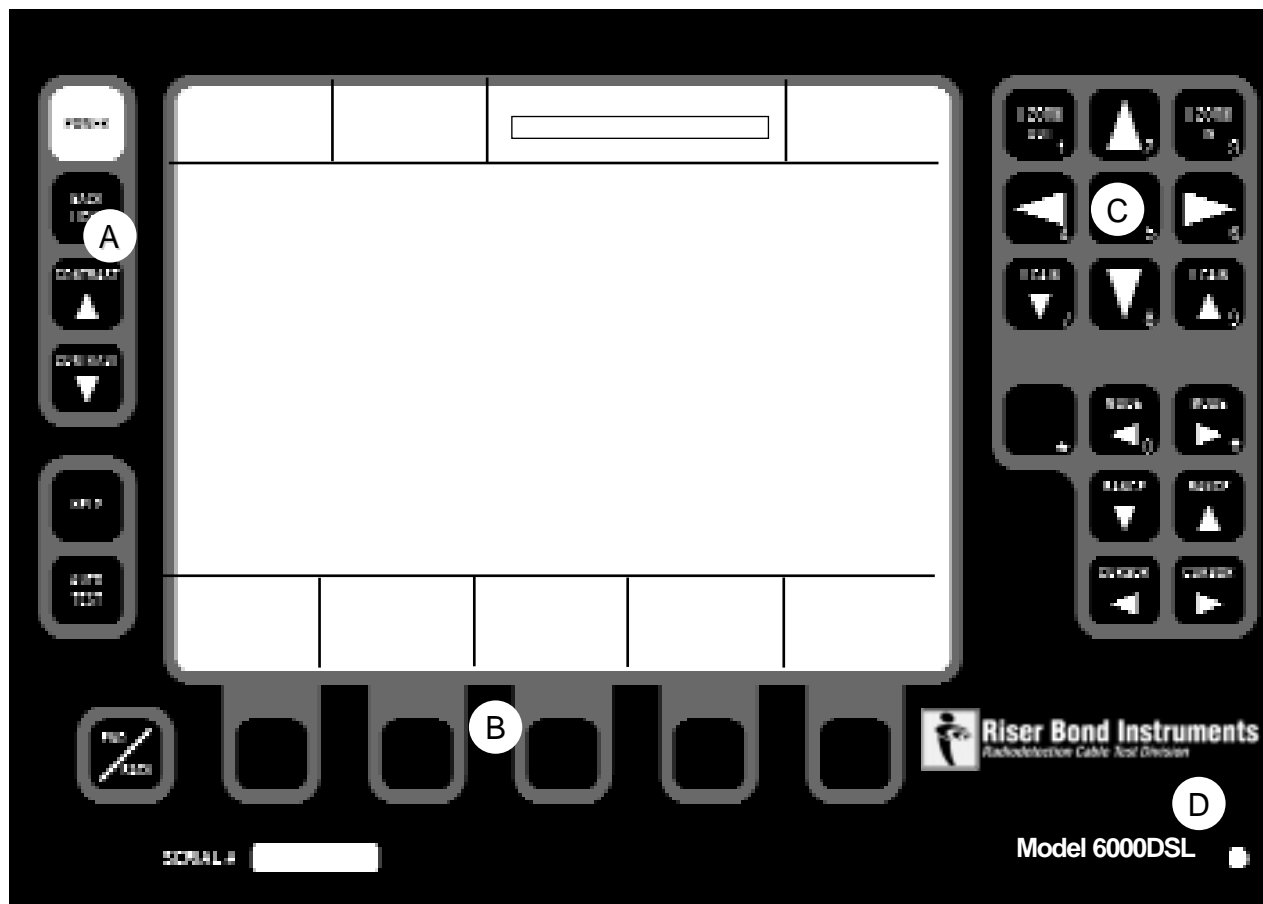


Figure 2. Front Panel

### 3.2.2 Display (Figure 3)

The display is a high contrast, SUPERTWIST Liquid Crystal Display. The center of the display is used to display test result information. A softkey menu, instrument settings, and status bar are displayed on the top and bottom of the display.

**(A) Status Bar.** Displays information about the configuration and condition of the Model 6000DSL:

- 1) Battery Level Indicator.  
Low battery message is activated when the battery level reaches 1/8 full.
- 2) Current Cable Type Indicator and RFL Cable Temperature.
- 3) Progress/Status Bar.
- 4) High Voltage Source Active Indicator.

#### **(B) Test Display Area.**

Test results and waveforms are displayed in this area.

**(C) Softkey Menu.** Press the softkey underneath the menu item to make your selection.

Press **End/Back** to end a test or return to a previous screen.

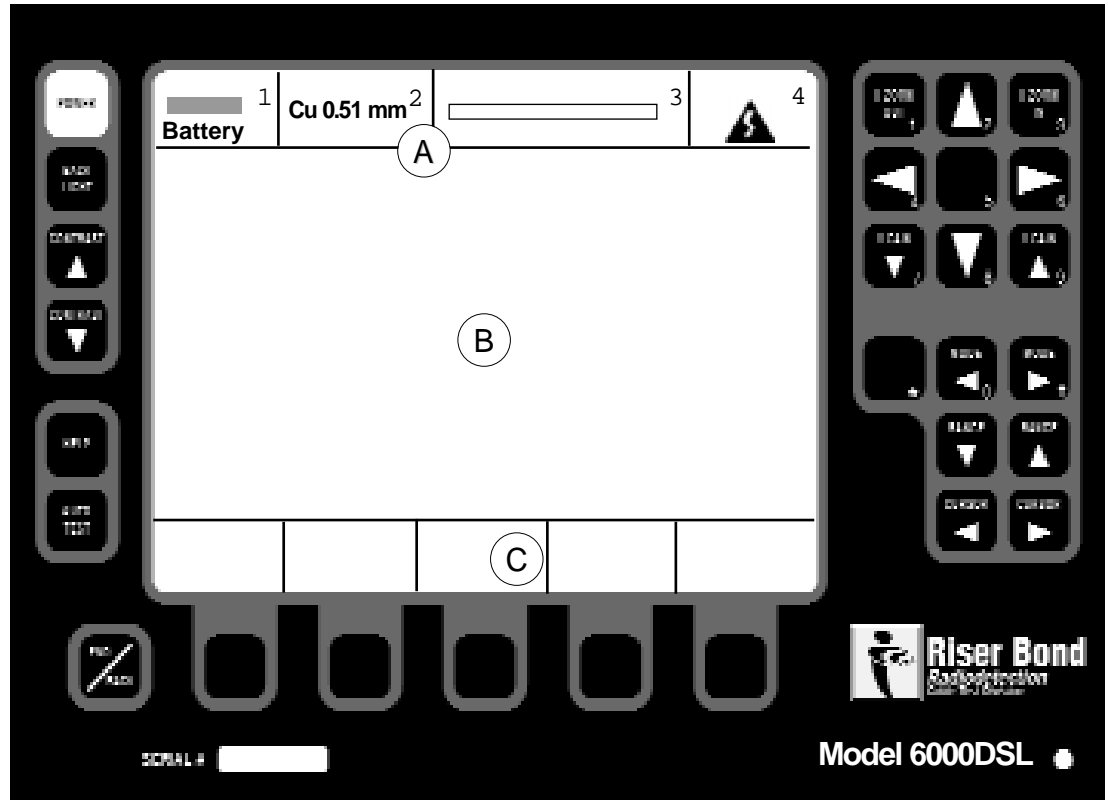


Figure 3. Display screen

### 3.3 Back Panel Description (Figure 4)

The Model 6000DSL has three connector areas on the back panel:

- 1) Serial port
- 2) Battery charger socket
- 3) Line 1, Line 2, and ground test lead banana jacks
- 4) Telephone headset connection

#### 3.3.1 Serial Port

Use the serial port to connect a printer to the Model 6000DSL. To print:

- 1) Press the softkey button **General Settings** to select the printer: Seiko DPU411; DPU414; or Citizen PN60.
- 2) Connect the printer cable to the serial port.
- 3) Press **Print** from the TDR or RFL softkey menu.

The serial port is also used to transfer TDR waveforms to WAVE-VIEW software for display, storage, or printing. See the WAVE-VIEW manual for instructions.

#### 3.3.2 Battery Charger Socket

Connect the external battery charger or the optional 12V cigarette lighter adapter to the Battery Charger Socket to recharge the Model 6000DSL internal 7.2V nickel metal hydride battery pack. See “Maintenance” for complete instructions on recharging the battery.

*NOTE:* You may operate the Model 6000DSL while the batteries are charging, but this will increase the charging time.

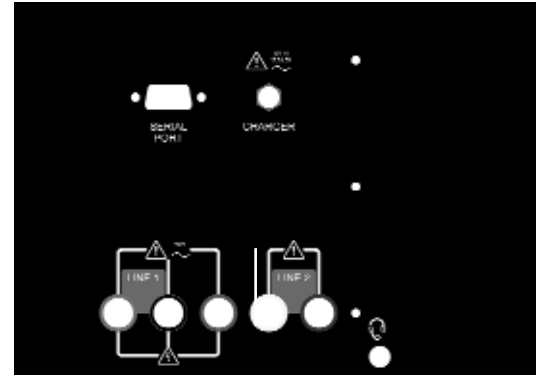


Figure 4. Back Panel

#### 3.3.3 Line 1 and Line 2 Test Lead Banana Jacks

**CAUTION** It is very important that the correct color test leads are connected to the banana jacks. Only use Riser Bond test leads; using other test leads may damage the Model 6000DSL and/or void the manufacturer's warranty.

Make pair connections to the Model 6000DSL with telephone test leads and color coded banana jacks.

- 1) Plug red and black leads into red and black banana jacks.
- 2) Plug blue and yellow leads into blue and yellow banana jacks.
- 3) Plug green test lead into green banana jack and connect to the network ground.
- 4) Connect the leads to the pair(s) under test.

Test lead color connection instructions for the pair(s) under test are displayed on the LCD screen.

## 3.4 Instrument Operation

### 3.4.1 Startup

**▲▲ WARNING ▲▲** The Model 6000DSL performs a Hazardous Voltage Test of the pair when the instrument is turned on or when a different test is selected. If an AC voltage greater than 30VAC is detected, the Hazardous Voltage Warning dialog box is displayed on the screen. When you see the warning, stop testing immediately and remove the voltage source.

To set up your Model 6000DSL for operation, or to change settings:

- 1) Press **Power**. A Startup screen with a softkey menu at the bottom is displayed on your instrument (Figure 5). The Startup screen lists the model number, firmware version, release date, system, options, and copyright message.
- 2) Press **General Settings**. The General Settings menu shows the various instrument settings: Measurement Units, Backlight at Startup, Serial Printer Type, Auto Off.
- 3) Press **Select** to highlight the desired option; press **Adjust** to change the selection.
- 4) Press **End/Back** to go back to the previous screen. Your Model 6000DSL is now ready for operation.



Figure 5. Startup screen

- 5) The General Settings menu includes a Cable Type menu, controls to load the defaults or “factory” settings, and an Instrument Calibration function. Use the Instrument Calibration function to verify that the Multi-Meter and Resistance Fault Locator are operating properly, and/or if the Model 6000DSL has been subjected to extreme temperatures since the last time the calibration function was performed.

### 3.4.2 Cable Menu Instructions

Press **General Settings**, **TDR**, or **RFL** to access the Cable Menu. Press **Cable Type** to select the type of cable under test. It is important to have the appropriate cable type set to get accurate test results. The closer a particular parameter is to its actual value, the more accurate the test results.

Current Cable Type. Shown in the second box from the left in the Status Bar at the top of the Model 6000DSL. An arrow on the left of the Cable Type selection screen points to the Current Cable Type.

<user>. Allows you to define the cable type. The Model 6000DSL automatically changes to <user> if a parameter of a pre-defined cable entry or a user defined cable entry (such as VOP) is changed from the original setting. Except for cable type name, all other parameters stay the same and can be edited.

#### How to Use the Cable Menu Softkeys

Press **Copy** to copy all of the parameters of the cable type, except name, into the first available user definable entry. Example: Cable Type entry 11 is the Current Cable Type. The first available user definable entry is 13. When you press **Copy**, Cable 11 parameters are copied into Entry 13 and the name of the cable type in 13 will be “Copy of 11”.

Press **Create/Edit** to change parameters of a user definable cable type.

Press **Erase** to clear a user-definable cable entry.

Use the **Select** arrow keys to highlight the desired cable type and press **Set** to make it the current cable type.

#### To Create and Edit User Definable cable types.

Press **Create/Edit**.

Press **Select** to highlight the parameter you wish to edit.

Press **Reset Selection** to clear the highlighted parameter of the cable.

Press **Adjust** to change the value of the parameter.

In fields that contain alphanumeric entries, such as the cable type name or diameter, press **Adjust** to enter a character selection menu. Move the cursor to the letter/number that you wish to edit. Use the softkeys below to edit the field.

Press **Cap Lock On/Off** to toggle the edit cursor between capital and lower case letters.

Press **Cursor** left or right to move the locations of the edit cursor to each character in the field and character left or right to scroll through characters and numbers.

Press **End/Back** to stop editing and return to the previous screen.

#### Helpful Hints

Look at the assigned parameters of a pre-defined Cable Type by copying it into a user definable entry. Then press **Create/Edit**.

The easiest way to create a Cable Type is to copy a pre-defined cable type that is almost equal to the type you would like to create. Then edit this entry.

### 3.4.3 Typical Connection

The Model 6000DSL uses a consistent connection scheme to the pair for most tests. Once this connection is made to the pair, use the Model 6000DSL to measure the DC and AC parameters of the pair and locate faults. A typical connection is:

- Red test lead connects to the A leg (Ring) of the second pair.
- Black test lead connects to the B leg (Tip) of the second pair.
- Green test lead connects to earth (Ground).

For a two-pair connection, to compare pairs using the TDR or four-wire RFL connections or Crosstalk measurements:

- 1) Connect the blue test lead to the A leg (Ring) of the pair.
- 2) Connect the yellow test lead to the B leg (Tip) of the pair.

## Section 4: Multi-Meter Functions

The Multi-Meter function measures DC Volts, AC Volts, Foreign Battery, Insulation Resistance, and Resistance (Figure 6). The operation of each test is similar; the user has the option to test the pair or exit the function.

Press **Multi-Meter** to start.

### 4.1 Measuring AC or DC volts (Figure 7)

- 1) Use the connection described in Section 3.4.3 to connect the pair to the Model 6000DSL.
- 2) Press the **AC Voltmeter** or **DC Voltmeter** softkey.
- 3) Press the softkey for the desired measurement, **A-B** (Ring-Tip), **A-E** (Ring to GND), **B-E** (Tip to GND)

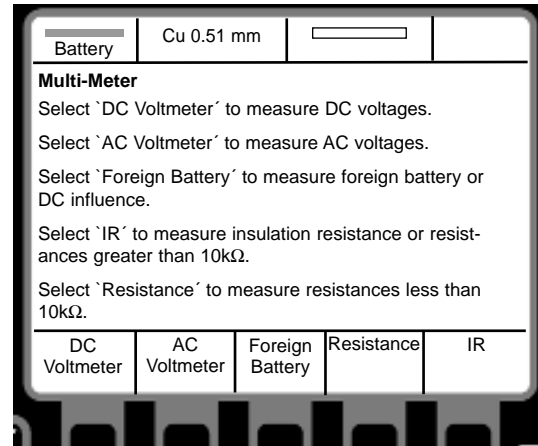


Figure 6. Multi-Meter screen

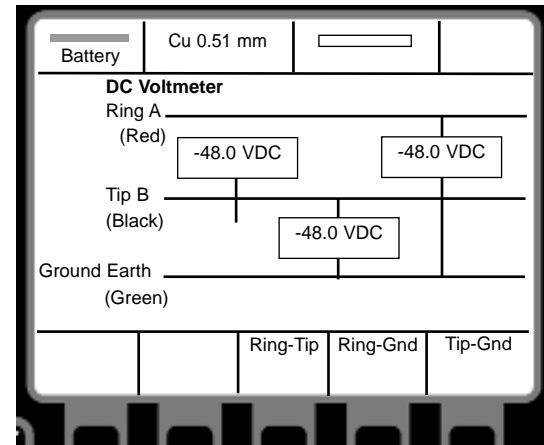


Figure 7. DC Voltmeter test screen

## 4.2 Measuring Foreign Battery

- 1) Use the connection described in Section 3.4.3 to connect the pair to the Model 6000DSL. Make sure the links in the exchange have been pulled and/or the pair is isolated with no exchange battery.
- 2) Press **Foreign Battery**.
- 3) Press the softkey for the desired measurement **A-E** (Ring to GND), **B-E** (Tip to GND).

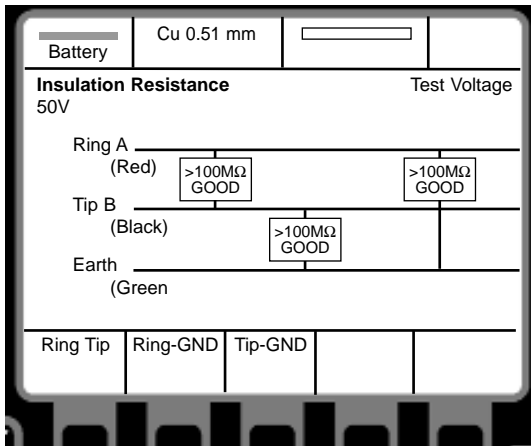


Figure 8. Insulation Resistance screen

## 4.3 Measuring Resistance

- 1) Use the connection described in Section 3.4.3 to connect the pair to the Model 6000DSL.
- 2) Press **Resistance**.
- 3) Press the softkey for desired measurement, **A-B** (Ring to Tip), **A-E** (Ring to GND), **B-E** (Tip to GND).

## 4.4 Measuring Insulation Resistance (Figure 8)

**▲ CAUTION ▲** For the initial test, use the 50V IR test setting only. Using a higher voltage may damage anything still connected to the network. If a full test is required, make sure that the pair is isolated and the exchange battery is disconnected and any other items are off the pair.

- 1) Use the connection described in Section 3.4.3 to connect the pair to the Model 6000DSL.
- 2) Press **IR**.
- 3) To adjust the IR test voltage, press **Test Voltage** to scroll through voltage options.
- 4) Press and hold the softkey for the desired measurement, **A-B** (Ring-Tip), **A-E** (Ring-GND), **B-E** (Tip-GND).  
*NOTE:* For accurate Insulation Resistance measurements or long cable, the Model 6000DSL may need 20 to 30 seconds to display a measurement.

## 4.5 Auto Test

### Auto Test

The Auto Test function allows you to press a single button and perform a diagnostic test of the pair, consisting of DC Volts, AC Volts, Foreign Battery, Resistance, Capacitance, Loop Current, Noise, Pair Balance tests and Insertion loss. The results of the tests are displayed on a comprehensive table on the screen. Auto Test also has a Quick Test function that limits the tests to DC Volts, AC Volts and Resistance to quickly determine if the pair is active or has a severe resistive fault.

To Auto Test:

- 1) Use the connection described in Section 3.4.3 to connect the pair to the Model 6000DSL.
- 2) Press **Auto Test** on the Front Panel.
- 3) Press **Start** or **Quick Test** to test.
- 4) Press **Storage** to view stored test results.
- 5) Press **Control** to switch between softkey selections.

At the end of the test, four softkeys are displayed.

- 1) Press **Storage** to store test results to a dedicated memory location.
- 2) Press **Print** to print test results.
- 3) Press **Analysis** to analyze test data. A fault location method is suggested.
- 4) Press **Start** or **Quick Test** to test again.

Battery	Cu 0.51 mm			
<b>Auto Test</b>				
	T-R	T-G	R-G	
DC Volts				
AC Volts				
Loop Current				
Foreign Battery				
Resistance				
Metallic Noise				
Power Influence				
Calculated Balance				
Long Balance				
Record:				
Line Status				
Storage			Quick Test	Start

Figure 9. Auto Test screen

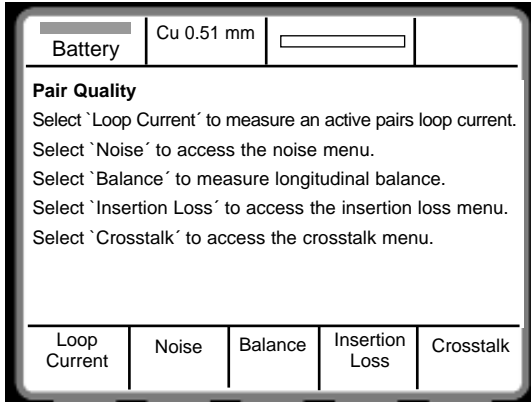


Figure 10. Pair Quality screen

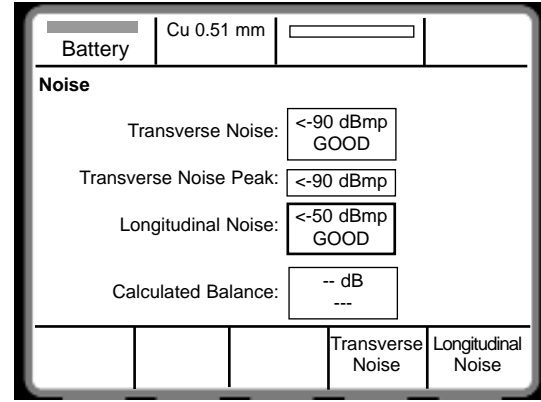


Figure 11. Noise Metallic screen

## Section 5: Pair Quality

Use the **Pair Quality** key to test Loop Current, Noise, Balance, Insertion Loss and Crosstalk.

### 5.1 Testing Loop Current:

- 1) Use the connection described in Section 3.4.3 to connect the pair to the Model 6000DSL.
- 2) Press **Loop Current**. Loop Current is drawn and the measurement is displayed in mA.

### 5.2 Noise

Use the **Noise** key in **Pair Quality** to measure Noise Metallic, Power Influence, and Power Spectral Density.

- 1) Use the connection described in Section 3.4.3 to connect the pair to the Model 6000DSL.

- 2) Press **Noise**. Screen displays Noise Metallic (NM) and Power Influence (PI). Calculated balance (PI - NM) is displayed.
- 3) Noise metallic is sometimes referred to as Transverse Noise and Power Influence is sometimes referred to as Longitudinal Noise.
- 4) Use the Noise key in Pair Quality to measure Noise Metallic, Power Influence and Power Spectral Density.

	Good	Fair	Bad
Noise Metallic (Transverse Noise)	<=20 dBmC <=-70 dBmp	21 to 30 dBmC -69 to -60 dBmp	>30 dBmC >-60 dBmp
Power Influence (Longitudinal Noise)	<=80 dBmC <=-10 dBmp	81 to 90 dBmC -9 to 0 dBmp	>90 dBmC >0 dBmp
Calculated Balance	>60 dB	50 to 60 dB	<50 dB

Table 1

### 5.3 PSD

Use the PSD test tools to monitor the power output versus frequency of a digital service or to check an inactive/faulty pair for signals that may be corrupting a digital service. The Model 6000DSL Remote can be used to terminate the far end or use the Start (Active) softkey to monitor an active line without disrupting data services.

#### 5.3.1 To Start PSD test

- 1) Use the connection described in Section 3.4.3 to connect the pair to the Model 6000DSL.
- 2) Press **Pair Quality, Noise, PSD, Telco Service**.
- 3) Press **Selection** and **Set** to set to the Service.
- 4) Press **Start** or **Start (Active)** to start PSD test.
- 5) Press **Stop** to return to test screen.

### 5.4 Testing Longitudinal Balance

- 1) Use the connection described in Section 3.4.3 to connect the pair to the Model 6000DSL.
- 2) Press **Balance**. Screen displays Longitudinal Balance.

	Good	Fair	Bad
Longitudinal Balance	<60 dB	50 to 60 dB	<50 dB

Table 2

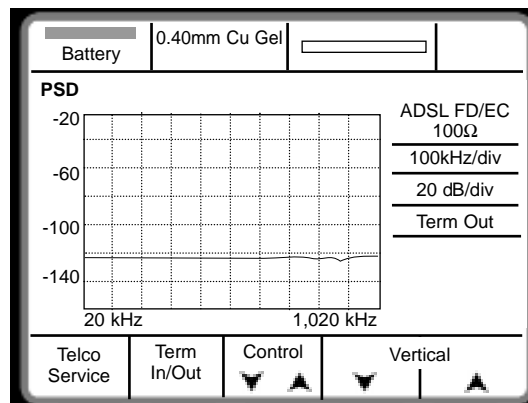


Figure 12. PSD test screen

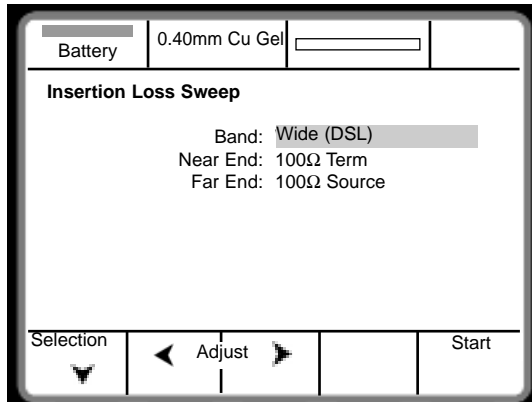


Figure 13. Insertion Loss setup screen

## 5.5 Insertion Loss

*NOTE:* An Oscillator/Far End Unit cannot be used for this test. Use the Insertion Loss test tools in the Pair Quality menu to measure the insertion loss of the pair at a specific frequency. The Model 6000DSL Remote Device is the signal source and termination so the Remote must be connected to the other end of the pair.

Insertion Loss requires a Remote Device to provide test tones. Reference Section 5.7 for Remote Device operation. Use the insertion loss test tools in the Pair Quality menu to test transmission characteristics of the pair. The Model 6000DSL Remote Device is the signal source and termination so the remote must be connected to the other end of the pair.

You can measure several different types of insertion loss:

- **POTS or Wideband Single Frequency Loss.** Select one frequency in the 50 Hz to 6 kHz range for POTS testing or 10 kHz to 2.2 MHz for wideband insertion loss.
- **POTS Slope Loss.** Measures loss at three frequencies based on three different standards: ITU-T (400 Hz, 1020 Hz and 2800 Hz), CCITT (300 Hz, 820 Hz and 3000 Hz), and USA (404 Hz, 1004 Hz and 2804 Hz).
- **POTS or Wideband Swept Frequency Loss:** Select POTS or Wideband sweep to automatically sweep the POTS (50 Hz to 6 kHz) or Wideband (10 kHz to 2.2 MHz) frequency ranges. The resolution of the frequency steps is displayed on screen. *NOTE:* For swept loss, processing and display may take up to 3 minutes.
- **Terminations.** Termination impedances can be selected for all insertion loss tests for both the Model 6000DSL and the Remote. POTS terminations available are 600Ω, 900Ω and TN12. Wideband terminations are 100Ω, 120Ω and 135Ω.

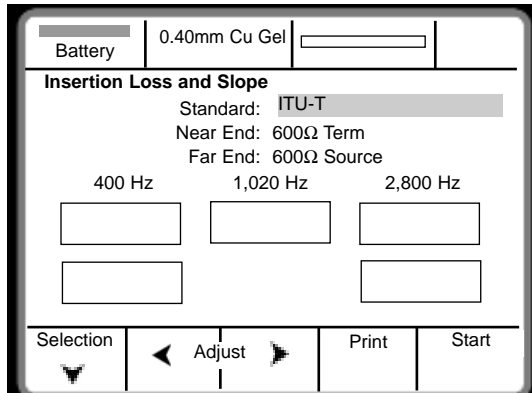


Figure 14. Insertion Loss and Slope screen

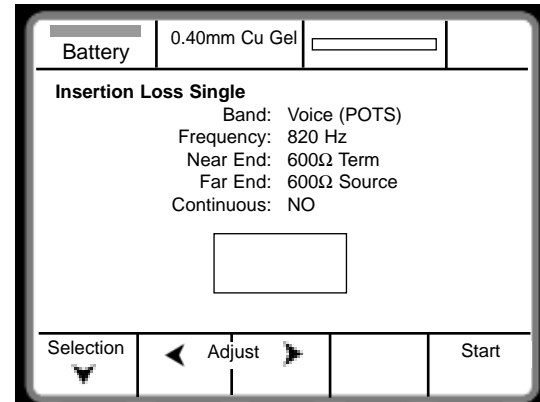


Figure 15. Insertion Loss setup screen

### 5.5.1 Measuring Insertion loss

- 1) Use the connection described in section 3.4.3 to connect the pair to the Model 6000DSL (Lines 1 and 2).
- 2) Press **Pair Quality**, then **Insertion Loss**.
- 3) Select **Sweep**, **Slope** or **Single**. Use the **Selection** and **Adjust** keys to set the desired test type, frequency, source/termination impedances and whether the test is a single or continuous update.
- 4) Press **Start** to start the test.

If the Model 6000DSL cannot locate a Remote Device or Oscillator/Far End Unit, an error message is displayed on the Model 6000DSL. It indicates the Model 6000DSL could not initiate connections with a Remote. Make sure a Remote Device is set up and connected to the pair under test.

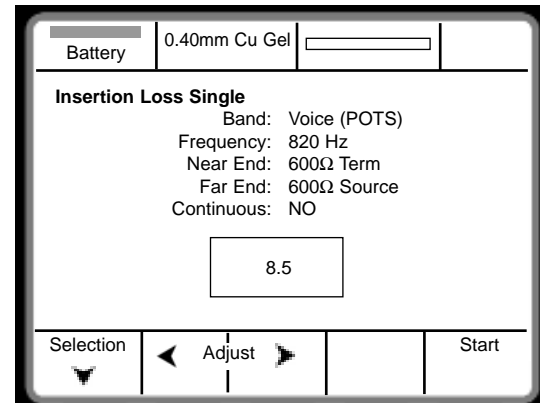


Figure 16. Insertion Loss results screen

## 5.6 Crosstalk, NEXT, and FEXT

*NOTE:* An Oscillator/Far End Unit cannot be used for this test. Use the crosstalk test tools in the Pair Quality menu to measure Near End Crosstalk (NEXT) and Far End Crosstalk (FEXT) characteristics of the pair. The Model 6000DSL Remote Device is the signal source and termination so the Remote must be connected to the other end of the pair.

Crosstalk requires a Remote Device to provide test tones. Reference Section 5.6.1 for Remote Device operation. You can measure several different types of crosstalk. Each range and type can test both Near End Cross Talk (NEXT) and Far End Cross Talk (FEXT).

- **POTS or Wideband Single Frequency Crosstalk.**  
Select one frequency in the 50 Hz to 6 kHz range for POTS testing or 10 kHz to 2.2 MHz for Wideband Crosstalk.
- **POTS or Wideband Swept Frequency Crosstalk.**  
Select POTS or Wideband sweep to automatically sweep the POTS (50 Hz to 6 kHz) or Wideband (10 kHz to 2.2 MHz) frequency ranges. The resolution of the frequency steps is displayed on screen.  
*NOTE:* For swept crosstalk, processing and display may take up to 3 minutes.

- **Termination.** Termination impedances can be selected for all crosstalk tests for both the Model 6000DSL and the Remote. POTS terminations available are 600 $\Omega$ , 900 $\Omega$  and TN12. Wideband terminations are 100 $\Omega$ , 125 $\Omega$  and 135 $\Omega$ .

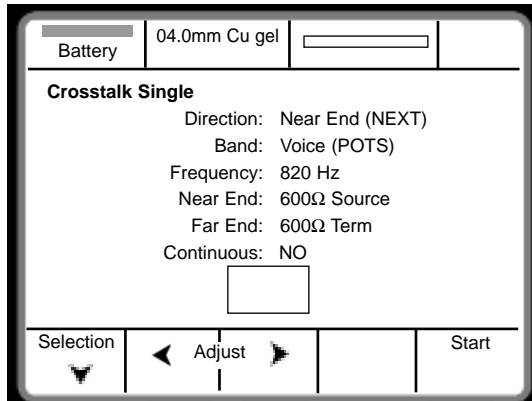


Figure 17. Crosstalk setup screen

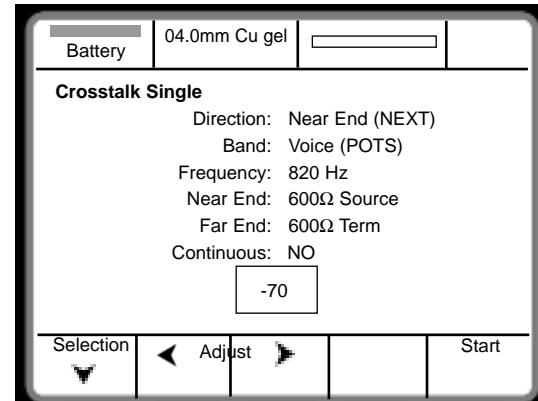


Figure 18. Crosstalk setup screen

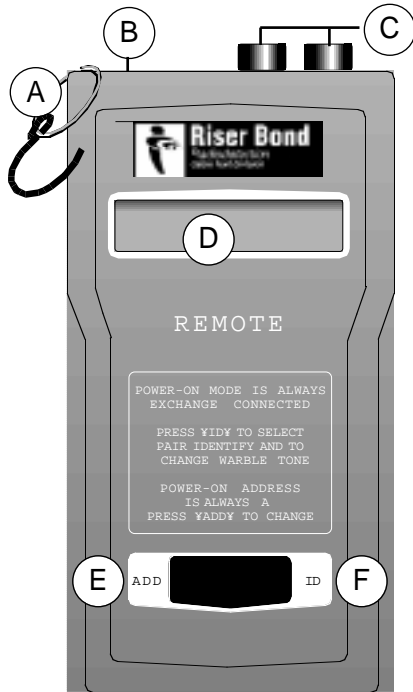
### 5.6.1 Measuring Near End and Far End Crosstalk

- 1) Use the connection described in Section 3.4.3 to connect the pair to the Model 6000DSL (Lines 1 and 2).
- 2) Press **Pair Quality**, then **Crosstalk**.
- 3) Press **Sweep** or **Single**.
- 4) Use **Selection** and **Adjust** keys to set the desired test type, frequency, and source/termination impedances, and whether the test is a single or continuous update.
- 5) Press **Start** to start the test or return to the test screen.

If the Model 6000DSL could not initiate connections with the Remote, an error message is displayed on the screen. Verify the Remote Device is set up and connected to the pair under test.

### 5.7 Model 6000DSL Remote Device (Figure 19)

The Model 6000DSL Remote Device has several signal sources and line terminations for POTS and Wideband insertion loss testing and crosstalk evaluation. The Remote Device also has a switching network to open, short, or connect the pair under test through to the exchange or central office. The Remote can also be used to generate a warble tone for pair identification.



- A. Hook for suspending the Remote.
- B. Socket for power lead.
- C. Sockets for Line 1 and Line 2 test leads.
- D. LCD Display.
- E. ADD Key.
- F. ID Key.

Figure 19. Model 6000DSL Remote Device

### 5.7.1 Using the Model 6000DSL Remote Device (Figure 19)

#### Power On

To turn on the Remote, plug the test lead into (C). The display switches off after 5 seconds to conserve battery life, but the Remote remains on until the test lead is removed.

#### Test leads (Figure 20)

The standard one meter test lead has two red and two blue leads with alligator clips. Remove the jumpers between the central office and the customer. The red leads are connected toward the Central Office side of the pair and the blue leads are connected to the subscriber or customer side of the pair. The Model 6000DSL Remote is connected in series with the pair and polarity is not critical.

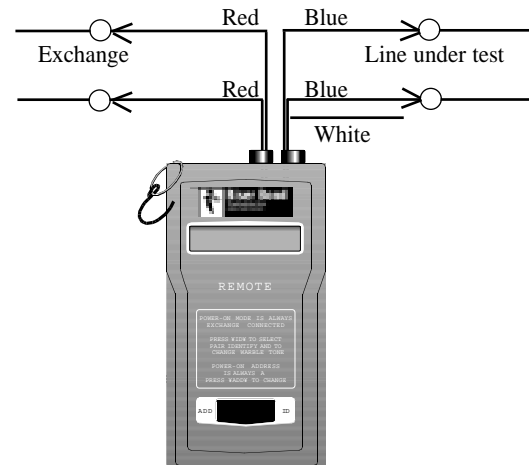


Figure 20. Remote Device Test Loader

### Power Lead

Use the Power Lead accessory to power the Model 6000DSL Remote Device when operating from within a Central Office or Exchange.

### Selecting the operating mode

The Model 6000DSL Remote is in the Exchange Connect mode when you turn it on. The pair is connected through to the exchange.

Press **ADD** to change the address of the Remote (Figure 19). Up to three Model 6000DSL Remote Devices can be connected to the pair under test and each can be individually controlled.

Press **ID** to activate the identify tone (Figure 19).

All other remote operating modes are affected by control signals sent from the Model 6000DSL.

### Battery Status

*NOTE:* To help proper operation, when "low" is displayed on the Remote LCD, replace battery immediately with one 9V battery.

### 5.8 Oscillator/Far End Unit (Figure 21) (Optional)

The Oscillator/Far End Unit has a switching network to open, short, or connect the pair under test through to the exchange or central office. The Oscillator/Far End Unit can also be used to generate a warble tone for pair identification.

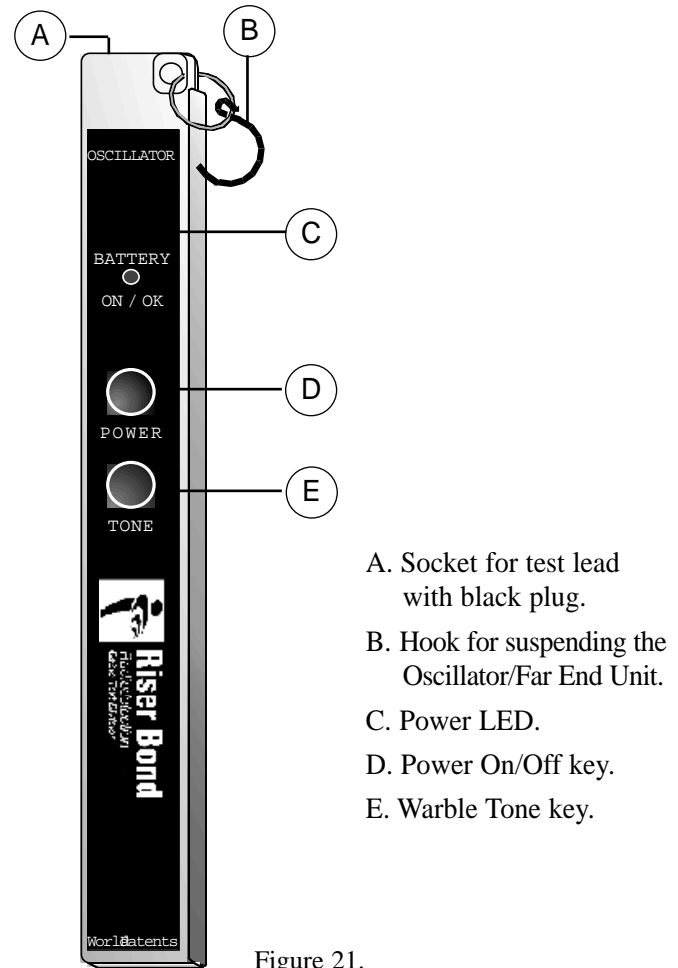


Figure 21.

## Section 6: Fault Location

The **Fault Location** softkey allows you to select a RFL or full function TDR. Use the RFL function to locate a resistance fault on a pair or single conductor. Use the TDR to locate other faults such as opens, shorts, water, bad splices, and cable damage.

### 6.1 Selecting a Fault Location Tool

Use the following table to determine which tool is best suited to locating specific types of faults.

Type of Fault	Excellent	Good	Fair
Open Circuit	TDR	Open/Cap Meter	
Short Circuit	TDR RFL		
High Resistance Joint	TDR		
Split Pairs	TDR		
Crosstalk		TDR	
Low Insulation Resistance	RFL		TDR
Low Insulation Resistance to Ground	RFL		TDR
Contact Fault	RFL	TDR	
Earth Fault	RFL	TDR	
Water In Cable		TDR	Open/Cap Meter
Locate Load Coil	TDR		

Table 3

### 6.2 Resistance Fault Locator (RFL)

There are three possible RFL test modes:

- 3-wire mode is used when only one leg of the pair is faulty
- 4-wire mode is used when both legs of the faulty pair are affected. In this case, you need two good wires. Attach the yellow and black leads to the good wires. None of the three wires has to be the same gauge.
- The Kupfmuller mode is used when a good wire cannot be found. To help ensure accurate results:

- 1) The fault ratio between the two conductors **must be** at least 2 to 1. For example, if the “good” wire has a fault of  $2M\Omega$ , the fault on the “bad” wire **must be** less than  $1M\Omega$ .
- 2) The loop resistance **must be** 100 times smaller than the two faults added together. For example, if one fault is  $10k\Omega$  and the other is  $90k\Omega$  ( $10k\Omega + 90k\Omega = 100k\Omega$ ), then the loop has to be  $1000\Omega$  or less.

Follow the on-screen diagram for correct connection and test procedures.

In all three modes, the opposite ends of the pair must be sorted together (strapped) at a point past the fault, normally at the end of the cable span. A yellow clip is supplied for strapping. If a Remote Device is used at the far end, the Model 6000DSL will automatically control the device to provide strapping functions in RFL tests.

### 6.2.1 Setting up the Resistance Fault Locator

- 1) On Main Menu press **Fault Location**.
- 2) Press **RFL**.
- 3) Press **Settings**. The RFL must be configured properly for accurate fault location.
- 4) Press **Select** to enter cable temperature, RFL test type, and measurement units. Press **Adjust** to move between options. **Enter the actual cable temperature, not the ambient temperature.**
- 5) Press **Cable Type**. Use **Select** and **Set** to select cable type.
- 6) Press **End/Back** to return to the test screen.

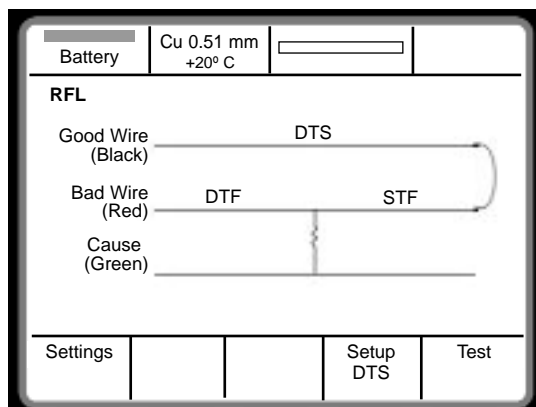


Figure 22. RFL screen

### 6.2.2 Using the RFL

Use the connection described in Section 3.4.3 to connect the pair to the Model 6000DSL.

If the distance to the strap point is known:

- 1) Press **Setup DTS**.
- 2) Use **Select** and **Adjust** to enter distance and cable type for each section of cable before the strap point.

If you don't know the distance to the strap point:

- 1) Press **Settings**.
- 2) Press **Cable Type**. Use **Select** and **Set** to select cable type.
- 3) Press **End/Back** to return to the test screen.

- To test:
- For 3- or 4-wire modes, connect the strap at the far end of the cable. Press **Test**.
  - For the Kupfmuller mode, leave the strap disconnected and press **Test**; the instrument will tell you when the strap should be connected.
  - If using the Remote accessory, the Remote will automatically short and open the cable pair for 3-wire, 4-wire, and Kupfmuller RFL test.

First, the Model 6000DSL measures the fault value. Then it checks that the pair is shorted (strapped) at the end. Next, the Model 6000DSL calculates distance to strap and distance to fault. If a fault is not detected, or the strap is not connected properly, a warning is displayed (Figure 24). Re-test or exit the screen.

### 6.2.3 Multiple Gauge (Diameter) Sections

If DTS is known or if a cable has multiple sections of different wire gauge (diameter) cables, then use the DTS Setup to define each cable section and type of cable. See Figure 25.

- 1) Press **Setup DTS**.
- 2) Use the **Adjust** arrows to enter the number of cable sections in the Number of Sections field.
- 3) Edit the section data using the **Selection** arrows to scroll to each section and the **Adjust** arrows to select the proper cable type.
- 4) Press **End/Back** to return to the Resistance Fault Locator screen once the cable sections are defined.

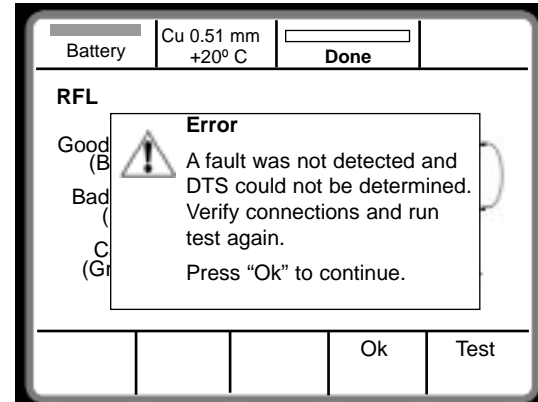


Figure 24. Strap not connected warning

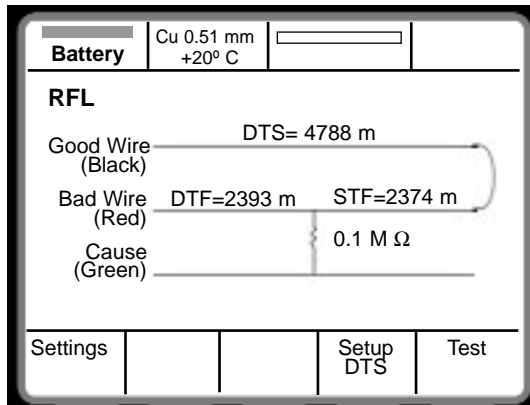


Figure 23. RFL test with results

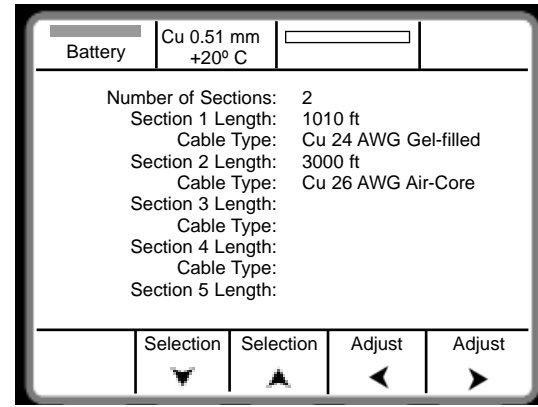


Figure 25. Multiple gauge (diameter) sections

## 6.2.4 After the RFL Test

When a result has been obtained from the RFL test, the softkeys have the following options:

- 1) **Print.** Print to a serial printer.
- 2) **Transfer to TDR.** The results of the RFL test can be transferred to the TDR. The cursor marked “F” indicates the fault and the cursor marked “S” indicates the strap.
- 3) **Relocate.** Run the same test again.
- 4) **New Pair.** Select a new test.
- 5) **Short/Open Remote Device.** Shorts or opens a Remote Device (if available) to determine the end of the cable.

## 6.3 TDR Operation

Press the softkeys underneath the menu items to control TDR operations. The more commonly used controls are on the keys on the Front Panel. See Section 3.2.1.

### 6.3.1 How to Use Softkey TDR Controls

**VOP.** Press **Control** until the **VOP** keys appear. Press the keys to increase and decrease the VOP.

**Pulse Width.** Press **Control** until the **Pulse** keys appear. Press the keys to increase and decrease Pulse Width.

**Balance Control.** Press **Control** until the **Balance Left** and **Balance Right** keys appear. Press the keys to adjust the output balance circuit.

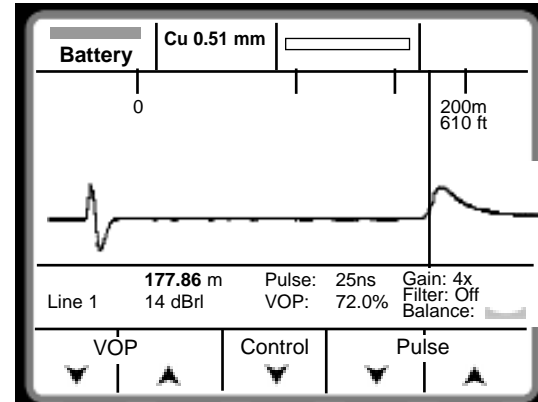


Figure 26. TDR screen

**Filter.** Press **Control** until the **Filter** keys appear. Use the keys to cycle through available software filters. Filters are not available in intermittent fault mode.

**Search.** Press **Control** until the **Search** key appears. Press the key to automatically search the cable for major faults or the end of the cable.

**Storage.** Press **Control** until the **Storage** key appears. Press **Storage** to select a memory location, store a waveform, recall a waveform, or erase a waveform.

**Serial Printing.** Press **Control** until the **Print** key appears. Press the key to print the screen on a connected serial printer.

**Cursor 1.** Set TDR Cursors to “Dual.” Press **Control** until **Cursor 1** appears. Press left or right keys to move Cursor 1.

**Overlay.** Available when two waveforms are displayed on screen. Press **Control** until **Overlay** keys appear. Press the keys to adjust waveform separation.

**Unloaded Samples/Loaded Samples.** Press **Control** until the **Unloaded Samples** and **Loaded Samples** keys appear. Press either key to access sample waveforms of typical cable faults. Press **Selection** to scroll through the waveforms. As each is highlighted, a description is displayed at the bottom of the screen. Select a waveform and press **Recall** to view it. The waveform is displayed along with the current live waveform.

**Hold to Stress.** If the Stress TDR is enabled in the TDR settings, the **Hold to Stress** key will apply voltage to the line to locate high-resistive faults.

**Short Remote.** Controls the Remote Device to short/open the cable pair for a visual reference of the Remote location.

### 6.3.2 Adjusting TDR settings

To adjust TDR settings:

- 1) Press **Settings**.
- 2) Press **Cable Type**. Highlight the gauge, size or type of cable under test.
- 3) Press **Select** to highlight menu items. Press **Adjust** to scroll through and set options:
  - Horizontal Reference. Select **On** to display a Horizontal Reference Line on the screen.

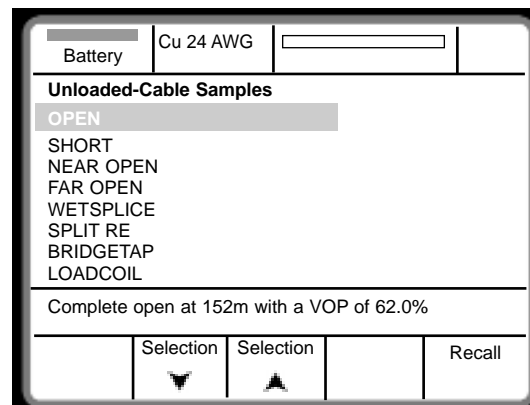


Figure 27. Unloaded Sample screen

- VOP. Display velocity of propagation as a percentage of the speed of light (VOP), or as meters or feet per microsecond velocity divided by 2 (V/2).
- Cursors. Select **Single** or **Dual**. If dual is selected, press the softkey cursor buttons in the TDR menu to operate the second cursor.
- Cancel Test Leads. Select **Yes** to subtract the length of the test lead from the distance between cursors display.
- TDR Start. Select whether the TDR will start in the shortest possible distance range and pulse width or will start by running an Autosearch to scan the cable for major faults.

### 6.3.3 Using the TDR (Figure 28)

- 1) Use the connection described in Section 3.4.2 to connect the pair to the Model 6000DSL for a single pair or two pair operation.
- 2) Start in the shortest distance range to examine the cable close to the instrument.
- 3) Press **Range** up to increase distance to test more cable.
- 4) Check for events (reflections) on the cable signature. Scan all the way to the end of the section you are testing.

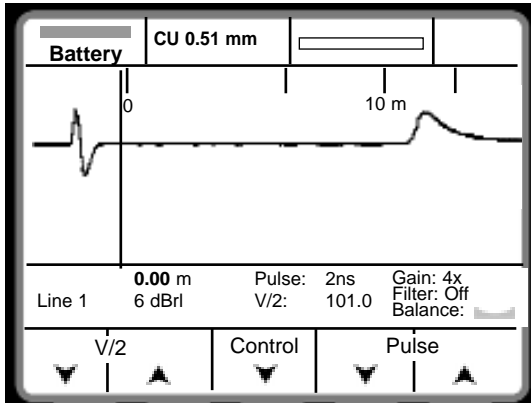


Figure 28. TDR screen

### 6.4 Capacitive Fault Locator (Open/Cap Meter)

The Capacitive Fault Locator is used to measure capacitance of the pair to the end of the cable or the distance of an open circuit in the span of the cable.

### 6.4.1 Setting up and using the Open/Cap Meter (Figure 29)

- 1) Use the connection described in section 3.4.2 to connect the pair to the Model 6000DSL.
- 2) Press **Fault location**.
- 3) Press **Open/Cap Meter**.
- 4) Press **Cable Type** and use the **Select** and **Set** controls to select the cable type. This step is not necessary if the cable type has been selected for previous tests.
- 5) Press **End/Back** to return to the test screen.
- 6) Press the softkey for the desired measurement, **A-B** (Ring-Tip), **A-E** (Ring to Earth), **B-E** (Tip to Earth).

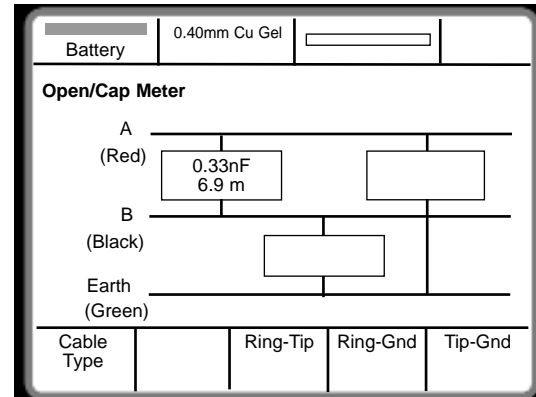


Figure 29. Open/Cap Meter Results screen

## Section 7: Utilities

### 7.1 Model 6000DSL Remote Device

The Remote Device is the signal source for Insertion Loss and Crosstalk tests. It can also be used to remotely control the far end of the cable under test for true single man operation. The Remote Device can open, short (strap), and connect the pair through to the Central Office. It also has a pair identify warble tone to identify the pair.

### 7.2 Oscillator/Far End Unit

The Oscillator/Far End Unit is used to remotely control the far end of the cable pair under test. The Oscillator/Far End Unit is used to open, short (strap), and connect the pair through to the Central Office. It also has a pair identify warble tone to identify the pair.

### 7.3 Controlling the Model 6000DSL Remote Device and the Oscillator/Far End Unit

- 1) Press **Utilities** and **Seek Remotes** to enter the remote menu.
- 2) The Model 6000DSL tests the pair for any remotes. An error message stating no remotes were found is displayed if no remote device is detected.
- 3) Make sure a Model 6000DSL Remote Device or an Oscillator/Far End Unit is connected to the pair.
- 4) Press **Seek Remotes** again.

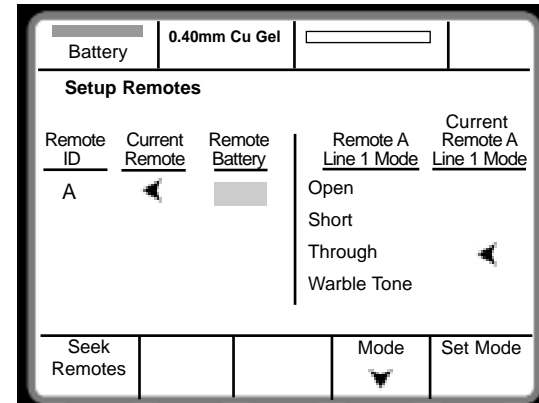


Figure 30. Remote Setup screen

A Control Menu is displayed when communications are established with the Remote Device. Use the Control Menu to change the configuration of the remote. The left side of the menu screen displays the remote on the line, the remote currently active (if multiple remotes are used), and the battery level of the remote.

### 7.3.1 Multiple Remotes

Up to three remotes may be used on a single pair to save time and traveling when testing a very long cable. For example, a remote could be installed at a cross connection point to test the pair between the cross connect and the customer. Another remote with a different ID setting could be placed at the Central Office so the complete length of the pair may be tested also.

- 1) If multiple remotes are detected, the Setup Remotes menu displays each remote.
- 2) Press **Remote** to scroll the highlight cursor to each remote detected on the pair and press **Set** to select the highlighted remote as active.
- 3) Once set as active, the specific remote device can be controlled with the remote **Mode** key.

*NOTE:* When using remotes in series, make sure the first remote in the series is set to Through mode to be able to access the remotes farther down the cable.

### 7.3.2 To Change the Remote Configuration (Figure 30)

- 1) Press **Mode** to scroll through the mode options of the Model 6000DSL Remote Device:
  - Open. Circuits the pair at the Model 6000DSL Remote Device.
  - Short. Short circuits the pair at the Remote Device.

- Through. Connects the pair through the Remote Device to the pair connected to the second (red) set of leads of the remote test lead assembly. When the Model 6000DSL Remote is powered, set up, and communications have been established with the Model 6000DSL, 'Through' is the default mode. Also use 'Through' to reconnect the pair to the Central Office for testing.
  - Warble tone. To identify the pair.
- 2) Press **Set** to set the highlighted remote mode. An arrow on the screen indicates the active mode.

The Model 6000DSL Remote Device and Oscillator/Far End Unit can also be controlled from fault location tools, such as the RFL, to provide an automatic strap to the end of the cable. See the specific fault location sections of the manual for operation.

### Section 7.4 Telephone

The Model 6000DSL has a basic talk set telephone for use on active cable pairs. The telephone functions require a cell phone style telephone headset with a 2.5mm plug connected to the telephone headset port on the back of the instrument.

Press **Utilities** to enter the utilities menu. Then press **Telephone**.

### 7.4.1 Using the Telephone

- 1) Enter the number to be dialed via the numeric keypad on the front panel. Once the number is entered press **Dial/Answer** to dial the number. The telephone number may also be dialed after the Dial Answer key is pressed and dial tone is present.
- 2) Press **Clear** to clear the numeric entry.
- 3) Press **Mute/Talk** to mute or un-mute the microphone.
- 4) Press **Louder** or **Softer** to increase or decrease the headset volume.
- 5) Press **Memory** to enter a telephone number memory menu to store or recall phone numbers. To enter a number in memory, enter the number in the main telephone menu and press **Memory**. Select the memory location using the **Arrow** keys and press **Store**. The number may also be directly entered to a memory location using the numeric keypad on the front panel.
- 6) To recall a number from memory to dial, use the **Arrow** keys to select the desired memory locations and press **Recall**.

### Section 8: Helpful Hints

- Read the Operator's Manual thoroughly.
- Know your equipment. If you have questions, call Riser Bond Instruments at (800) 688-8377 or (402) 466-0933. Radiodetection at (800) 524-1739 or (201) 848-1739.
- Get as close to the fault as possible.
- Make a quality connection to the cable under test.
- Enter the correct cable type or VOP.
- Start in the shortest range/pulse width.
- Test from both ends of the cable.
- When locating a fault, determine cable path and depth accurately to improve accuracy.
- Retest the cable after fixing the fault.
- Use common sense when troubleshooting.
- Use multiple tests to locate a fault and to verify the distance before digging.

## Section 9: Maintenance

### 9.1 Charging the Batteries

Use the Battery charger socket and the external battery charger or optional 12V cigarette lighter adapter to recharge the Model 6000DSL internal 7.2V nickel metal hydride battery pack. The Model 6000DSL is shipped with a full charge and operates approximately 6 hours between charges.

*NOTE:* You may operate the Model 6000DSL while the batteries are charging but this will increase charging time. The Model 6000DSL has a built-in circuit which limits battery charge current. As the batteries approach maximum charge, the charging rate will decrease. **Do not leave the batteries charging for long periods of time; their useful life will be shortened.**

When the battery supply is depleted:

- 1) Plug the external battery charger (or adapter) jack into the charger socket.
- 2) Plug the charger into an AC or DC power source with correct voltage and current specifications.
- 3) Allow 16 hours charging time. The green LED on the Front Panel will light to indicate the charger is plugged in and the batteries are being charged.

### 9.2 Cleaning

Use a lint-free cloth or small, soft brush to remove dust from the Model 6000DSL display screen and connectors.

Use a *damp* cloth with mild soap and water to clean the case, front panel and outside of the instrument. Do not get water in the instrument to help ensure proper operation. Do not use harsh chemicals and abrasive cleaners: they may damage the Front Panel and case.

### 9.3 Periodic Inspection

Inspect the Model 6000DSL and accessories regularly for damaged, worn or missing parts or deformations in the enclosure. If the unit is operated in harsh, dusty or wet environments, inspect after every use. If repairs are necessary, return the units immediately to Riser Bond Instruments or a designated representative.

Clean the Model 6000DSL regularly following the manufacturer's cleaning instructions. Inspect the back panel connectors for dirt, broken or deformed insulation and contacts, and clean and repair as needed.

Inspect cable accessories for damaged insulation, bent or broken clips. Replace damaged parts immediately.

## 9.4 Service

### **WARNING**

Do not perform service or repair on this instrument. There are no user serviceable parts on or in this instrument. Return the instrument to Riser Bond Instruments or a designated representative for repairs or service. Failure to do so could result in electric shock and/or void your manufacturer's warranty.

### **Instrument Disposal**

This instrument is equipped with non-user serviceable nickel metal hydride batteries. If you need to dispose of this instrument, consult your local regulations for standard disposal procedures.

## Section 10: Specifications

### General Specifications

#### Physical

##### **Model 6000DSL**

##### **Without carrying case & accessories:**

Height: 6.30 inches (160 mm)

Width: 9.45 inches (240 mm)

Depth: 2.36 inches (60 mm)

Weight: 3 pounds (1.3 kg)

##### **Model 6000DSL**

##### **With carrying case and accessories:**

Height: 7.80 inches (198 mm)

Width: 11.0 inches (279 mm)

Depth: 6.50 inches (165 mm)

Weight: 6 pounds (2.7 kg)

##### **Model 6000DSL**

##### **Remote Device**

Height: 8.50 inches (216 mm)

Width: 3.94 inches (100 mm)

Depth: 1.58 inches (40 mm)

Weight: 1 pound (0.4 kg)

## Model 6000DSL

### Oscillator/Far End Unit

Height: 9.06 inches (230 mm)  
Width: 1.38 inches (35 mm)  
Depth: 0.98 inches (25 mm)  
Weight: 7.41 ounces (210 g)

### Environmental

Operating Temperature: 0°C to 50°C  
(32°F to 122°F)  
Storage Temperature: -20°C to 60°C  
(-4°F to 140°F)  
Humidity: 95% maximum relative,  
non-condensing IEC 68-2-3  
Vibration: IEC 68-2-6  
Shock (Bump): IEC 68-2-29, 40g, 6ms,  
1000 shocks in each axis  
Drop: IEC 68-2-27, 1m free fall,  
packaged in carrying case  
Moisture rating: IP 54

### Power

Internal: Rechargeable, 7.2V nickel metal  
hydride battery pack  
External: 12VAC or VDC, 1250mA  
power supply  
Operating Time: Greater than 5 hours  
without backlight

### Display

320 X 240 dot-matrix liquid crystal  
display (LCD) with CCFL backlighting.

### Multi-Meter

DC Voltage: 0.0 to 400.0V  
Resolution: 0.1V  
Accuracy: 1%±0.1V  
  
AC Voltage: 0.0 to 400.0V  
Resolution: 0.1V  
Accuracy: 2%±0.1V  
  
Foreign Battery: 2.0 to 400.0V  
Resolution: 0.1V  
Accuracy: 1%±0.1V  
  
Resistance: 0.0 to 1999.9Ω  
Resolution: 0.1Ω  
Accuracy: 0.2%±0.2Ω  
  
Resistance: 2kΩ to 10kΩ  
Resolution: 1Ω  
Accuracy: 0.2%±1Ω  
  
Insulation Resistance  
Voltages: 50V/100V/250V/500V  
0.00MΩ to 99.9MΩ

Resolution: 0.01MΩ  
Accuracy: 2%±0.01MΩ

10.0MΩ to 99.9MΩ  
Resolution: 0.1MΩ  
Accuracy: 4%

100MΩ to 999MΩ  
Resolution: 1MΩ  
Accuracy: 10%

Capacitance/Open Meter  
0 to 1000 ft (0 to 100 m)  
Resolution: 1 ft (0.1 m)  
Accuracy: 2% +/-3 ft (1 m)  
  
1000 ft to 10,000 ft (100 m to 1,000 m)  
Resolution: 10 ft (1 m)  
Accuracy: 3%

10,000 ft to 100,000 ft (1000 m to  
10,000 m)  
Resolution: 100 ft (10 m)  
Accuracy: 5%

100,000 ft to 150,000 ft (10,000 m to  
50,000 m)  
Resolution: 1000 ft (100 m)  
Accuracy: 8%

### **Pair Quality**

Loop Current: 0.0 to 120mA  
Resolution: 0.1mA  
Accuracy: 5%  $\pm$ 0.2mA

Noise Metallic (POTS): 0 to 50 dBrnC  
Resolution: 1 dB  
Accuracy:  $\pm$ 2 dB

Power Influence (POTS): 40 to 100dBrnC  
Resolution: 1 dB  
Accuracy:  $\pm$ 2 dB

Longitudinal Balance (POTS): 40 to 62dB  
Resolution: 1 dB  
Accuracy:  $\pm$ 2 dB

Insertion Loss: 0 to 60 dB  
Frequency  
Range: 50 Hz to 2 MHz  
Resolution: 1 dB  
Output Level: 0 and -10 dBm

Crosstalk (NEXT and FEXT):  
-20 dB to -70 dB  
Frequency  
Range: 50 Hz to 2 MHz  
Resolution: 1 dB  
Output Level: 0 and -10 dBm  
Impedance: 100, 120, 135, 600, 900 ohm and TN12

### **Power Spectral Density**

Wideband  
Range: -20 dB to -140 dB/Hz  
Frequency  
Range: 20 kHz to 2 MHz  
Resolution  
Bandwidth: 10 kHz  
Impedance: 100, 120 and 135 ohm

### **Time Domain Reflectometer loaded and non-loaded cable**

Horizontal Resolution:  
*For distances less than 2,000 ft:*  
<0.25 ft at 99.0% VOP, <0.07 ft at 30.0%  
<0.07 m at 99.0% VOP, <0.02 m at 30.0%

*For distances over 2,000 ft:*  
1 foot at any VOP  
0.1 meter at any VOP

Vertical Resolution: 14 bits with 137 dots displayed  
Vertical Sensitivity: >65dB

Output signal: Pulse widths of 2ns, 25ns, 100ns, 500ns, 1.5 $\mu$ , 4.4 $\mu$  and 330 $\mu$ .

Output balance: Variable from 80 $\Omega$  to 120 $\Omega$

Distance Accuracy:  
 $\pm$ 0.5 ft plus  $\pm$ 0.01% of reading  
 $\pm$ 0.15 m plus  $\pm$ 0.01% of reading

## Maximum Range

Live waveform:

63,700 ft (19,400 m) at 99.0% VOP

38,600 ft (11,700 m) at 60.0% VOP

Stored waveform:

11,900 ft (3,600.0 m) at 99.0% VOP

7,200 ft (2,200.0 m) at 60.0% VOP

Range varies with VOP. Maximum testable cable length varies with pulse width and cable type.

## Input Protection

400 VDC or VAC up to 60 Hertz

## Velocity of Propagation

Two user-selectable display formats:

- VOP (%) ranging from 30.0% to 99.0%  
Loaded cable: VOP (%) ranging from 0.8% to 20.0%
- V/2 ranging from 45.0 to 148.4 m/ms or 147.5 to 486.9 ft/ms  
Loaded cable: V/2 ranging from 1.2 to 30.0 m/ms or 3.9 to 98.4 ft/ms

## Storage

### (Standard)

- 8 Auto Test records
- 8 Power Spectral Density records
- 8 SUPER-STORE TDR waveforms at 6144 samples each

### (Optional)

- 32 Auto Test records
- 32 Power Spectral Density records
- 32 SUPER-STORE waveforms at 6144 samples each

## TDR Noise Filters

### (Standard)

8x, 50/60 Hz

### (Optional)

4x, 8x, 16x, 32x, 64x, 128x, 50/60 Hz

## Resistance Fault Locator (RFL)

Location Range: 0 to 150 kft  
(0 to 45 km)

Resistance fault range: 0 to 50M $\Omega$   
Accuracy:

- 3-Wire Test:  $\pm 0.25\%$  of DTS plus  $\pm 0.4$  ohms
- 4-Wire Test:  $\pm 0.25\%$  of DTS plus  $\pm 0.25$  ohms
- Kupfmuller Test:  $\pm 1.0\%$  of DTS plus  $\pm 1$  ohm

## Model 6000DSL Remote Device

Communications for:

- Short pair
- Open pair
- Exchange connect, disconnect
- Send Loss/Crosstalk signals
- Set Terminations
- Pair identification tone

## Oscillator/Far End Unit

Communications for:

- Short pair
- Open pair
- Exchange connect, disconnect
- Pair identification tone

## Standard Accessories

Operator's Manual, 12VDC charger, nylon carry/accessory bag, shoulder strap, 2 sets telco connection leads plus ground lead, pair shorting strap, VOP card, "hands-free" telephone ear piece/microphone.

## Optional Accessories

Extended waveform storage  
32 waveforms \$295.  
Extended TDR noise filters \$195

## Appendix A

### Serial I/O Printer Port Connection

#### The Citizen PN 60 Pocket Printer

Riser Bond Model 6000DSL interfaces to the Citizen PN60 Pocket Printer.

Printer setup parameters:

Language:	English
Font:	Roman
Font Lock:	Off
Line Spacing:	6LPI
Character Set:	Italics
Code Page:	USA
Space Skip:	Enable
Stylewriter:	Auto
Protocol:	DTR
Emulation:	Epson
Pitch:	10CPI
Compress:	Off
Form Length:	11 letters
Slash Zero:	On
Internal Char Set:	USA
Auto LF:	Off
Power Off:	3 minutes
Baud Rate:	9,600

#### Seiko DPU-411/414 Printer

The Model 6000DSL can be used in conjunction with the Seiko DPU-411 Thermal Printer. It uses the Seiko DPU-411 command set. Serial communication parameters are: no parity, two-stop bit, and 9,600 baud.

The printer setup parameters are as follows:

Input Method:	Serial
CR Function:	Carriage return
Print Mode:	Normal printing
Character Set:	Ordinary char.
Zero Font:	Slash zero
Intern Char Set:	USA
Data Bit Len:	Eight bits
Parity Permission:	Without
Parity Condition:	Odd
Baud Rate:	9,600

## Appendix B - VOP Table

Telephone				
Cable	AWG	MM		VOP
PIC	19	.912		.72
	22	.643		.67
	24	.511		.66
	26	.404		.64
JELLY/	19	.912		.68
FILLED	22	.643		.62
	24	.511		.60
	26	.404		.58
PULP	22	.643		.67
	24	.511		.68
	26	.404		.66

## **WARRANTY**

The Riser Bond Model 6000DSL is warranted to be free from defects in material and workmanship that develop under normal use in accordance with Riser Bond operating instructions for a period of one year from the date of shipment from Riser Bond factory or its designated distributor.

Items returned for repair or replacement shall be shipped with a copy of the dated invoice, freight charges prepaid, to:

RADIODETECTION  
RR#2 BOX 756  
BRIDGTON COMMERCE CENTER  
BRIDGTON  
MAINE 04009  
USA.  
TEL: (207) 647 9495  
TOLL FREE: 877 247 3797  
FAX (207) 647 9496  
email: [bridgton@radiodetection.spx.com](mailto:bridgton@radiodetection.spx.com)

Radiodetection Ltd.  
Western Drive  
Bristol BS14 OAZ U.K.  
Telephone +44 (0) 117 976 7776  
Fax +44 (0) 117 976 7775  
[sales.uk@radiodetection.com](mailto:sales.uk@radiodetection.com)

This warranty will be void if products are modified by the purchaser during the period of warranty without the manufacturer's written consent. This warranty is expressly made in lieu of all other warranties expressed or implied, including merchantability, whether arising by law, custom or conduct. The rights or remedies provided herein are exclusive and in lieu of any other rights or remedies unless specifically stated in the purchase order for this equipment. This warranty covers repair or replacement of the purchased item only and does not cover any subsidiary damages to associated customer equipment. If the extended warranty is purchased, it does not apply to the battery pack.

Thank you for purchasing the Riser Bond Model 6000DSL Telephone Network Analyzer. Our goal is to provide a high-quality troubleshooting tool that is both powerful and easy to use. Please read the Manual thoroughly to help ensure the best results from your Telephone Network Analyzer. Record your serial number on the line below. If you have questions, comments or suggestions, please contact:

RADIODETECTION  
RR#2 BOX 756  
BRIDGTON COMMERCE CENTER  
BRIDGTON  
MAINE 04009  
USA.  
TEL: (207) 647 9495  
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email: [bridgton@radiodetection.spx.com](mailto:bridgton@radiodetection.spx.com)

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Bristol BS14 OAZ U.K.  
Telephone +44 (0) 117 976 7776  
Fax +44 (0) 117 976 7775  
[sales.uk@radiodetection.com](mailto:sales.uk@radiodetection.com)

Model 6000DSL Serial Number \_\_\_\_\_



**Riser Bond Instruments™**  
*Radiodetection Cable Test Division*

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