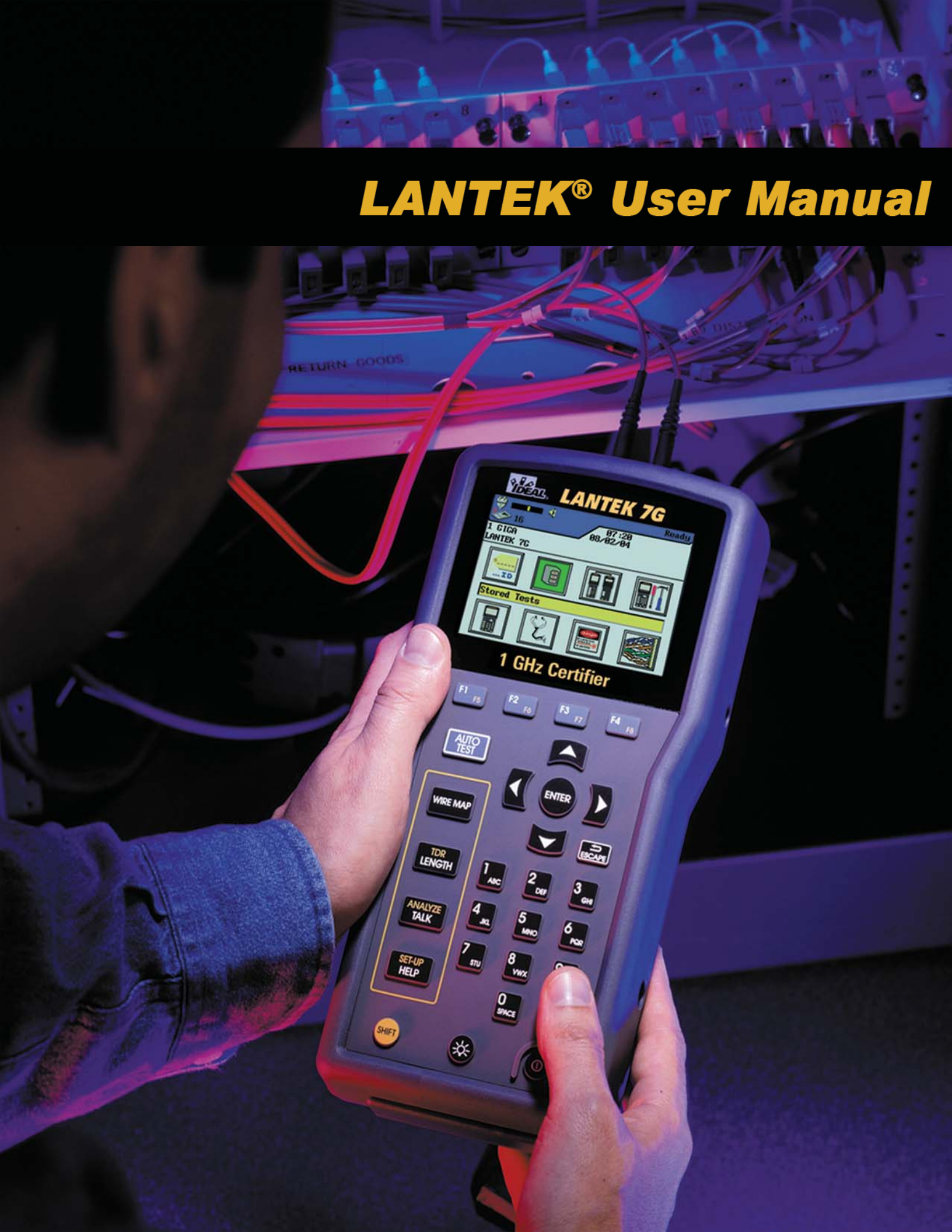
LANTEK® User Manual



LANTEK™ CABLE TESTER USER'S GUIDE

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IDEAL INDUSTRIES recommends that the user review all of the information in Appendix A, SAFETY PRECAUTIONS, prior to using the LANTEK tester.

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OPERATIONAL NOTES, CAUTIONS, AND WARNINGS

The following symbols are used in this manual to indicate that the user should use particular caution in order to prevent personal injury or damage to the tester or the system under test.

 Exercise caution when you see this symbol. It indicates actions that could be harmful to the user or to the equipment.

 Exercise extreme caution when you see this symbol. It indicates potentially lethal voltages.

TYPOGRAPHICAL CONVENTIONS

Boldface	Refers to the name of a button on the keypad or screen. For example, the Enter key will be referred to as **Enter**.
Italics	Refers to a section, heading, or title within this manual.
Quotation marks	Identifies a “Screen Message”.

CHAPTER 1
YOUR CABLE TESTER

PRODUCT FEATURES

Table 1-1: LANTEK Product Features

FEATURES	LANTEK 6 Basic	LANTEK 6A Premium	LANTEK 7G Premium
Frequency Range	350 MHz	500 MHz	1 GHz
Supports CAT 7 & ISO F	Upgradeable	Upgradeable	✓
Supports CAT 6a	Upgradeable	✓	✓
Supports CAT 6/5e/3 and ISO –E/D/C	✓	✓	✓
Accuracy Level III/IIIe (Draft)/IV (LANTEK 6/6A/7G)	ETL	ETL	ETL
Support DUALmode Testing to save time	✓	✓	✓
Test with Patchcords to save money	✓	✓	✓
CAT 6 Test Storage with graphs	500	500	500
Expansion Slots	2 PCMCIA	2 PCMCIA	2 PCMCIA
Standard External Compact Flash Memory	Option	64 MB	64 MB
USB/Serial Port	✓	✓	✓
Copper TDR Trace	✓	✓	✓
Fiber Loss Measurement (FIBERTEK)	Option	Option	Option
Fiber Distance to Event (TRACETEK)	Option	Option	Option
Talk over Fiber & Copper (Full Duplex)	✓	✓	✓
Display Screen on Remote	✓	✓	✓
Troubleshooting Tone Generator on Near End and Remote	✓	✓	✓
External Rapid Battery Charger & Extra Batteries	Option	✓	✓

PRODUCT AND PERFORMANCE SPECIFICATIONS

The LANTEK family of LAN cable certification testers is designed to test and measure twisted pair, coaxial and fiber-optic cable used for high-speed data communications networks. The following tables describes the LANTEK product specification as well as the LANTEK, FIBERTEK, and TRACETEK performance specifications

PRODUCT SPECIFICATIONS

Standard Test Compliance

ANSI/TIA/EIA 568B, CAT 6A(Draft)/6/5e/3, ISO-F/E/D/C, AS/NZS 3080, IEEE 802.3 Ethernet, EN50173 – F/E/D/C

Cable Types

UTP/ScTP/FTP CAT 3/5e/6/7; IBM STP Type 1, 2, 6 Coax, 110/66/210 Block

Dimensions (Display and Remote)

10.1” x 5.0” x 2.3”

256mm x 127mm x58mm

Weight

Display	2.3 lb (1050g)
Remote	2.0 lb (914g)
Battery	1.2 lb (548g)

Battery Packs

NiMH (Rechargeable)

Typical Operating Life (Battery)

8 hours

Maximum Operating Temperature

0°C to 50°C

Maximum Storage Temperature

-20°C to +70°C

Humidity

5 to 90% noncondensing

PERFORMANCE SPECIFICATIONS

Table 1-2: LANTEK Performance Specification

LANTEK™	Range	Resolution	Accuracy
Length (50-100μ cable)	0-2000 ft	1 ft/0.1 m	± (3% + 3 ft)
Delay	0-8000 ns	1 ns/0.1 m	± (3% + 1 ns)
Average Impedance	35-180 Ω	0.1 Ω	± (3% + 1 Ω)
Capacitance (Bulk)	0-100 nF	1 pF or 3 dig	± (2% + 20 pF)
Capacitance	0-100 pF/ft	0.1 pF	± (2% + 1 pF)
DC Loop Resistance	35-200 Ω	0.1 Ω	± (1% + 2 Ω)
Attenuation	1 MHz – 1 GHz	0.1 dB	Level III/IIIe(Draft)/IV
NEXT	1 MHz – 1 GHz	0.1 dB	Level III/IIIe(Draft)/IV
Return Loss	1 MHz – 1 GHz	0.1 dB	Level III/IIIe(Draft)/IV
ELFEXT	1 MHz – 1 GHz	0.1 dB	Level III/IIIe(Draft)/IV

Table 1-3: FIBERTEK Performance Specification

Specifications	FIBERTEK™	
Detector Receive Wavelength:	 MM: 850 nm, 1300 nm SM: 1310 nm, 1550 nm	
Transmitter Laser Type MM 850 nm: MM 1300 nm: SM 1310 nm: SM 1550 nm:	 VCSEL Fabry-Perot MCW (Grin Lens Focused) Fabry-Perot MCW (Grin Lens Focused) Fabry-Perot MCW (Grin Lens Focused)	
Measurement Accuracy Attenuation: Length:	 MM 850/1300 nm: SM 1310/1550 nm: (+/- 3%) + 1 meter	 0.25 dB 0.25 dB
Display Resolution Attenuation: Length:	 MM 850/1300 nm: SM 1310/1550 nm: MM 850/1300 nm: SM 1310/1550 nm:	 0.1 dB 0.1 dB 1.0 meter 1.0 meter
Linearity	0.2 dB	
Length Range	MM 850 nm: MM 1300 nm: SM 1310 nm: SM 1550 nm:	3,000 meters 6,000 meters 10,000 meters 10,000 meters

Table 1-3: FIBERTEK Performance Specification (Continued)

Specifications	FIBERTEK™	
Minimum Length	5 meters	
Physical Operating Temperature: Ambient Airflow:	 18 to 30°C at Specified Accuracy 0.3 Ms @ 20°C	
Network Specifications	1000BASE-SX/LX 1000BASE-F 10BASE-FL/FB	IEEE-802.3z ATM-155/622

Table 1-4: TRACETEK Performance Specification

Specifications	TRACETEK™
Detector	
Center Wavelength:	1300 nm, 1310 nm
Minimum Reflection for Event Detection:	-40 dB
Detector Type:	INGaAs
Distances	
High Resolution:	800 meters
Medium Resolution:	850 meters
Low Resolution:	4000 meters
Distance Accuracy:	(+/- 3%) + 1 meter
Event Spatial Resolution:	2 meters – High Resolution 8 meters – Medium and Low Resolution
Display Resolution:	0.01 meter
Transmitters	
MM Power Output:	40mW, (+16.0 dBm)
MM Source Type:	1300 nm Fabry-Perot Laser
SM Power Output:	20mW, (+13.0 dBm)
SM Source Type:	1310 nm Fabry-Perot Laser

THE DISPLAY HANDSET (DH)

The LANTEK Display Handset performs as the command unit to control preference and test functions during various cable test activities.

DISPLAY CONTROLS, INDICATORS AND INTERFACE

Figure 1-1: Display Handset (DH)

Table 1-5: Display Handset (DH) Keys, LCD, and Connectors

Item	DH Front Panel	Description
1	Graphical Display	Presents menus, test results, graphs, action choices, and option keys.
2	Option Keys	Select menu options displayed on screen.
3	Arrow/Enter Keys	Allow up, down, left, and right movement on the display. Enter key selects a highlighted option or saves changes.
4	AUTOTEST Key	Perform a fast suite of tests. Test results are presented as pass/fail. Suites for established standards are preprogrammed in the tester.
5	Wiremap Key	Find shorts, opens, and miswires such as split and reversed pairs.
6	Length/TDR Key	Initiate a Length or TDR.
7	Talk/Analyze Key	Activate/deactivate the Talkset function or Select option to perform individual cable tests (real time).
8	Help/Setup Key	Display Help info or open language setup screen
9	Escape Key	Abort and exit the current screen without making changes.

Item	DH Front Panel	Description
10	Alphanumeric Keys	Enter numbers, letters or special characters. Select numbered menu options.
11	Shift Key	Toggle key activities having dual functions.
12	Backlight Key	Toggle the screen backlight on/off.
13	On/Off Switch	Power the Display Handset on/off.
14	Low-Crosstalk Connector Port	Attach adapters for all types of cables.
15	Talkset Jack	Connect a Talkset headset and microphone.
16	DC Input Jack	Connect an external power supply.
17	PCMCIA Slots	Insert memory cards for data storage. See *Removable Mass Storage* below.
18	USB Port	Supports the following functions: Upload stored test results to a PC. Load firmware updates.
19	DB-9 Serial Port	Supports the following functions: Print test results on a serial printer. Upload stored test results to a PC. Load firmware updates.

Removable Mass Storage

⚠ Caution: When removing the Compact Flash card from its slot as sustained usage will cause the card to become hot to the touch. This condition does not affect the operation of the card.

The LANTEK tester provides two PCMCIA slots (Slot 1/Slot 2) for Compact Flash memory, which can be used for storing test results. Storage is organized in a standard Windows file structure with folder names corresponding to job names containing the test data files.

The storage system can accommodate Compact Flash memory up to 256 MB. The firmware will automatically present the option of moving test data from the internal memory to the Compact Flash, if the flash card is installed. The stored test data from the flash card can be transferred to a PC or laptop through the use of a flash card reader.

1/4 VGA FRONT PANEL

The Ready screen appears when the unit is powered up.

Note: A "Field Calibration is Required" screen will appear if the test being performed requires a field calibration prior to testing.

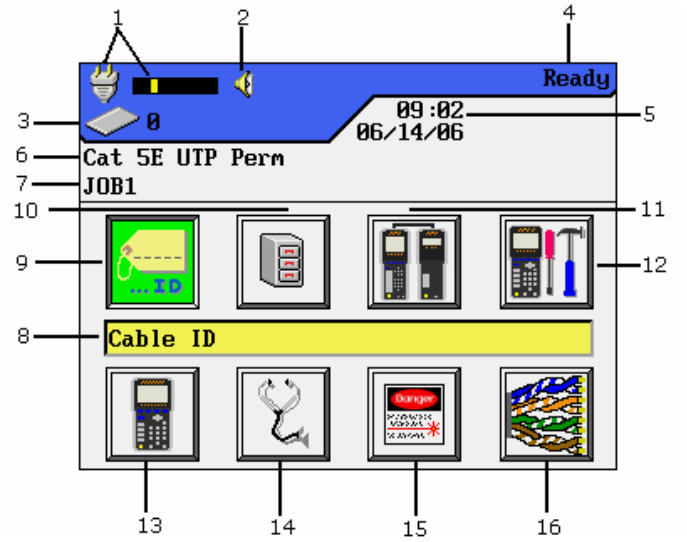


Figure 1-2: LCD Ready Screen

Table 1-6: Ready Screen Indicators

Item	Function	Description
1	Battery Meter, or AC Cable	Display remaining battery power level (from Empty to Full) or indicates when the unit is running off AC power.
2	Talk Set Indicator	Indicate when the Talk Set function is available.
3	Storage Device Indicator and Memory Usage	Display whether Compact Flash Memory or alternate device is used to store data. Also indicates the total number of records stored.
4	Screen Title	Display the screen title.
5	Time and Date	Display time and date information.
6	Setting	Display the cable type selected for testing.
7	Job Title	Display the current job name.
8	Function Title	Display the title of the highlighted function.
9	Cable ID Icon	Select the cable naming function.
10	Stored Test Icon	Select the stored test file manager function.
11	Field Calibration Icon	Select the field calibration function.
12	Preferences Icon	Select the instrument preferences function.
13	Instrument Information Icon	Select the instrument information function.
14	Analyze Icon	Select the option to perform individual cable tests (real time).
15	Fiber Optics Icon	Select the fiber optics function.
16	Cable Type Icon	Select or edit a cable type.

HARD AND SOFT KEYS

User options will often appear at the bottom of the tester display screen above the four function keys (**F1 to F4**) directly below the display. To select an action, press its corresponding function key. Pressing and hold down the **SHIFT** key while simultaneously pressing one of the **F1 to F4** keys will activate the **F5 to F8** keys. (Example **<SHIFT>F4** is the **F8** key.)

In the example below, press the Function keys below the screen to adjust the Timeout options: **F1** to increase or **F2** to decrease.

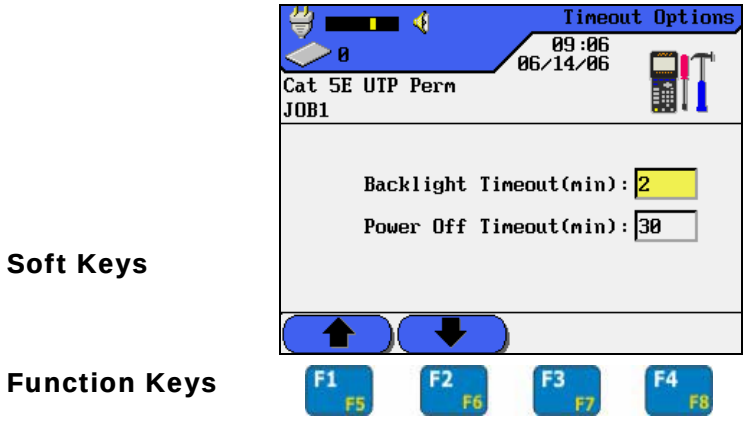
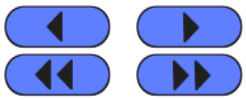


Table 1-7: Soft Key Descriptions

Soft Key	Description
Delete Backspace Insert	Delete alphanumeric character(s) at the cursor; delete left of the cursor; and insert alphanumeric character(s) at the cursor
From To	Automatic naming function on the near-end and far-end
Options	Show a list of options to select from
Start	Begin or Run the selected activity
YES NO	Accept the new changes upon exiting the activity; or exits without making changes
USB	Selection of USB mode
Save Save As	Save data to the current file or use the auto naming convention; and rename or overwrite on existing file
Print	Print data
MFGDB	Show a list of manufactured cables used to set the correct NVP value
Create	Create a Custom Cable
NVP	Display/Set Nominal Velocity of Propagation
↑ ↑	Page-up/down or increase/decrease values

Table 1-7: Soft Key Descriptions (Continued)

Soft Key	Description
	Increase/Decrease values by 1 and 10 units
12hr 24hr	Time format in 12 or 24 hours
ft m	Measurement in feet or meters
Manual Auto	Settings in Manual or Automatic
Meas NVP	Calculates a new NVP value with known length of cable
Zoom out Zoom in	Shrinks or Magnifies graph view
Overwrite	Overwrites the highlighted data entry
Select	Activates or deactivates the highlighted option
Edit	Edits existing data previous recorded
Run	Runs the selected activity
Refresh	Automatically scans and identifies storage media for use and refreshes info
Tref	Changes Reference Temperature
Color	Changes color wiremap display (568 A/B)
Fiber Std	Show list of Fiber Optic Cabling Standards & Applications
Budget	Manually enter value for Fiber Budget Loss Computation
Calc	Calculate for value of budget loss
Value Margin	Display the worst case values or margins

THE REMOTE HANDSET (RH)

The Remote Handset works with the DH (Display Handset) to perform Autotest or individual real time Analyze tests. The RH terminates the cable link and communicates with the DH. When performing measurements, the RH is automatically activated by the DH.

Note: The RH needs to have power available when performing a field calibration, otherwise, the DH will not find it.

DISPLAY, CONTROLS, INDICATORS AND INTERFACE

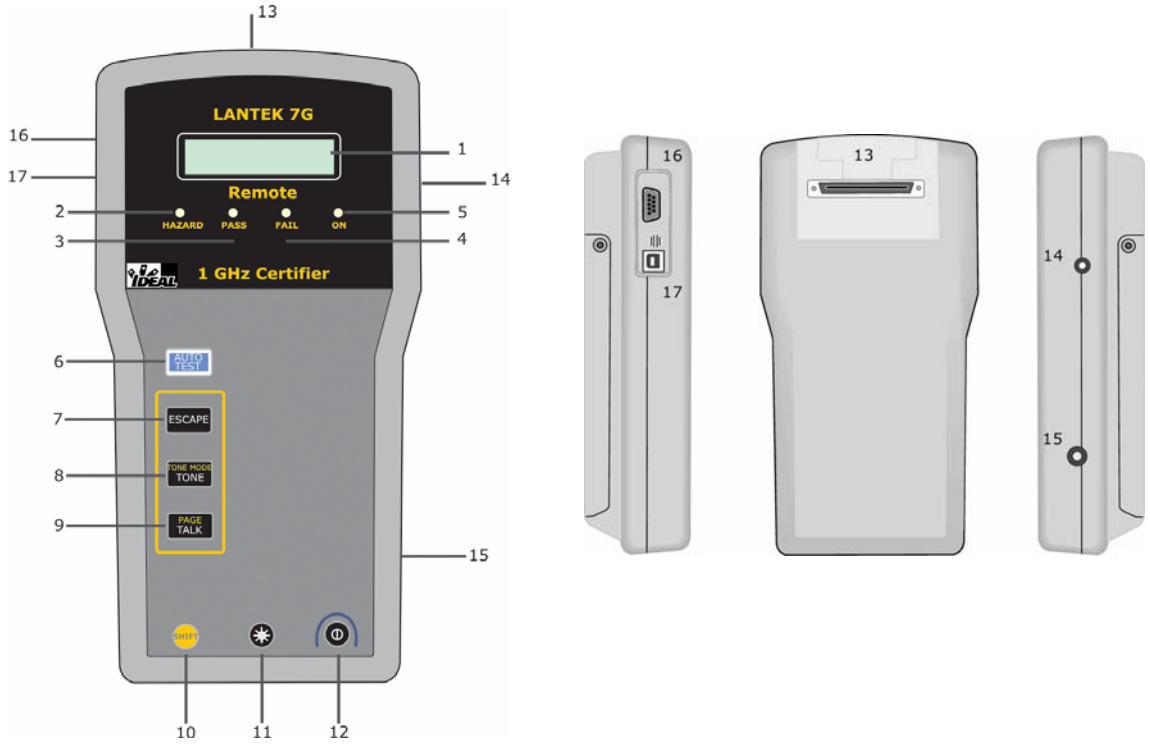


Figure 1-3: Remote Handset (RH)

Table 1-8: Remote Handset (RH) Keys, LED, and Connectors

Item	RH Front Panel	Description
1	B/W LCD	Two line alphanumeric display
2	Hazard LED	Excessive line voltage present (TELCO)
3	Pass LED	Successful test results
4	Fail LED	Unsuccessful test result(s)
5	On LED	RH unit on
6	Autotest Key	Press to activate Autotest
7	Escape Key	Abort and exit the current activity without making changes.
8	Tone Key	Press to activate/deactivate Tone
9	Talk Key	Press to activate/deactivate Talkset
10	Shift Key	Toggle key activities having dual functions
11	Backlight Key	Screen backlight, unused
12	On/Off Switch	Power the Remote Handset on/off
13	Low-Crosstalk Connector Port	Test access cable connector
14	Talkset Jack	Connect a Talkset headset and microphone
15	DC Input Jack	Connect an external power supply
16	DB-9 Serial Port	Interface to a PC or serial printer
17	USB Port	Interface to a PC

POWER MANAGEMENT

Both the Display (DH) and Remote (RH) Handsets use interchangeable rechargeable NiMH (Nickel Metal-Hydride) battery packs.

- The DH and RH can be run on battery power for approximately eight hours. Actual battery power times will vary based on factors such as operating time versus standby time, use of the display backlight, and ambient temperature.
- When the battery is almost empty, the tester displays a warning message. The tester will automatically shut down before testing results are affected.
- After a brief period of inactivity, the DH and RH automatically power down to save battery power.
- If the tester will not be used for several days, it is recommended that the yellow battery protection strips be inserted to conserve battery charge.

OPERATING THE DH AND RH FROM AC POWER

The DH and RH handsets can be operated from an external DC source (AC/DC Wall Cube).

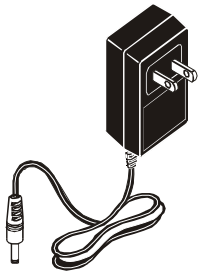


Figure 1-4: Tester AC/DC Wall Cube Adapter

When the AC/DC Wall Cube Adapter is used to power the handsets:

- Both handset batteries will receive a trickle charge.
- The DH handset will display the AC plug and cable indicator at the top left of the screen.

Only the Wall Cube provided with the instrument should be used. Other types of Wall Cubes may cause damage to the tester. Adapters are currently available for European, United Kingdom and North American AC power.

Note: Do not connect to AC power when testing shielded cables as a ground, loop may result and cause input protection warnings.

BATTERY CHARGING

The handset batteries are recharged using the AC/DC Wall Cube. The process can take up to approximately 8 hours to fully recharge batteries. The DH uses battery-powered flash ROM to store handset data and settings whenever the battery is removed from the tester. The internal flash ROM battery has a three-year life expectancy.

Note: Charge time will vary depending upon battery level at the time of charging.

OVERVIEW OF LINK TESTING AND REQUIREMENTS

The following sections describe typical setup for permanent link and channel link testing. Specific requirements for calibration of copper, coax, and fiber testing are discussed in Chapter 3: Structured Cable Field Calibration and Testing, Chapter 4: Coax Cable Field Calibration and Testing, and Chapter 5: Fiber Optics Cable Field Calibration and Testing (FIBERTEK™).

PERMANENT LINK TEST SETUP

ANSI, EIA, TIA, and ISO all provide two network communication circuit specifications: permanent link and channel link. A permanent link consists of up to 90 meters of horizontal network cabling (maximum length limit applies to TIA standards only). The permanent link (shown below) is used to certify the horizontal network cable installation before network connection and user hookup. It excludes adapters, patchcords, and jumpers.

CHANNEL LINK TEST SETUP

A channel link includes all aspects of the cabling system. It consists of up to 90 meters of horizontal network cabling, as well as user patchcords, jumpers, and channel adapters at each end. The channel link (shown below) is used to certify the network installation, including the horizontal link and user patchcords.

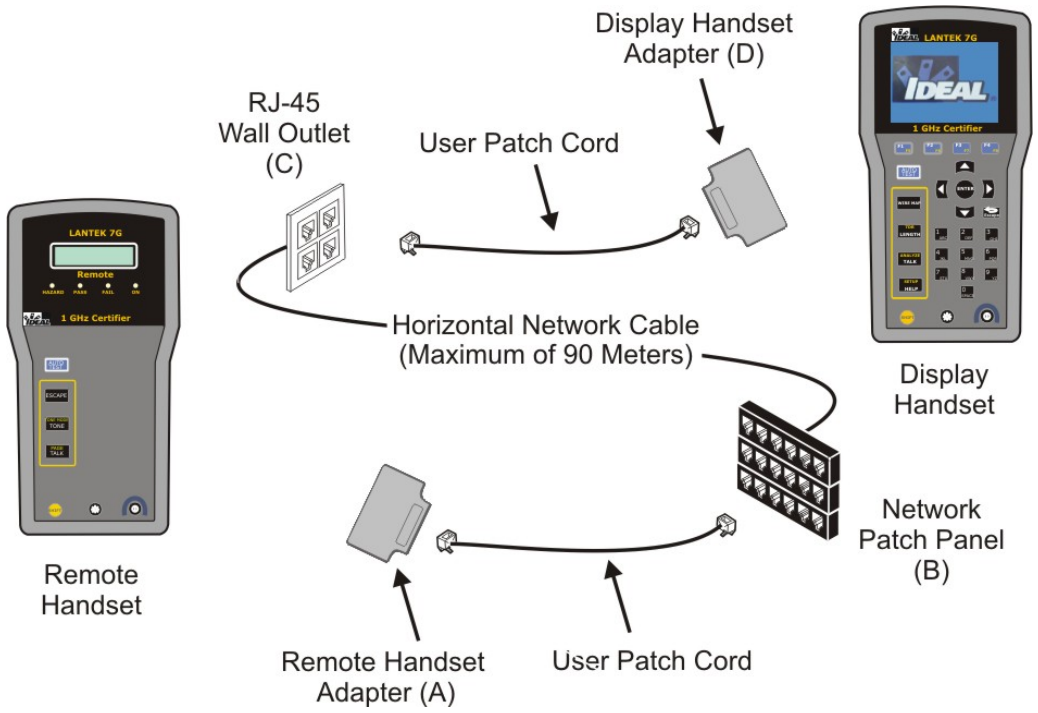


Figure 1-5: Permanent Link Test Connections

Note: Ensure that the Cable Type is set to the correct testing links. Twisted Pair Permanent Link or Twisted Pair Channel Link. If you exceed the tester length limits, the tester will fail the link.

CHAPTER 2
CABLE SETUP PROCEDURES

SETTING PREFERENCES

Most of the tester configuration parameters are set from the Preferences screen.

To open the Preferences screen:

1. Select Preferences on the Ready screen. The Preferences screen appears.

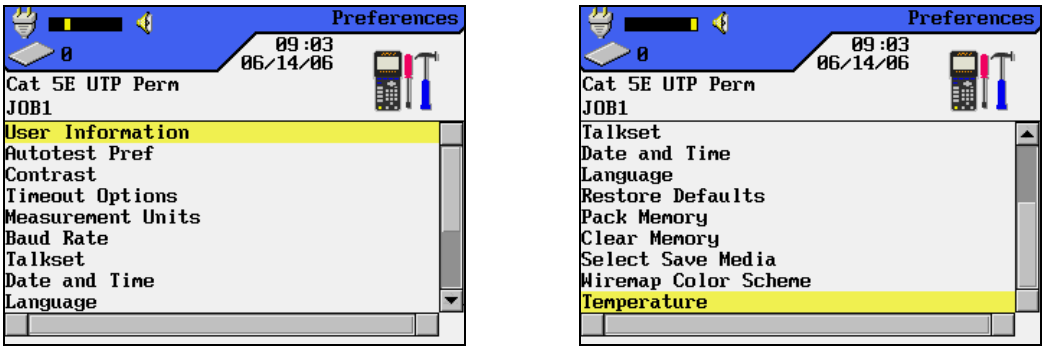


Figure 2-1: Preferences Screen

2. Use the **UP/DOWN ARROW** keys to select one or more options. These options are described in the sub-sections below.

USER INFORMATION

User information identifies the unit operator for test reports.

3. Select User Information on the Preferences screen. The User Information screen appears.

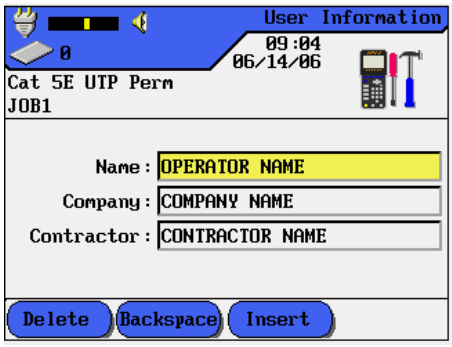


Figure 2-2: User Information Screen

4. Use the **ALPHA/NUMERIC** keys to enter your name. Press the **LEFT/RIGHT ARROW** keys to move the cursor from one character to the next.
5. Use the **UP/DOWN ARROW** keys to move between the fields.
6. Press **ENTER** to save or **ESCAPE** to exit.

Note: In most screens, press ESCAPE, the user will have the option to save or not save the changes selected during this procedure.

AUTOTEST PREFERENCES

Autotest can be set to automatically stop on the first failed test, as well as to save, and name test results at the completion of each test series.

1. Select Autotest Preferences on the Preferences screen. Press **ENTER**. The Autotest Preference screen appears.
2. Press the **UP/DOWN ARROW** keys to highlight the desired option.
3. Press Select to activate or deactivate the highlighted option.

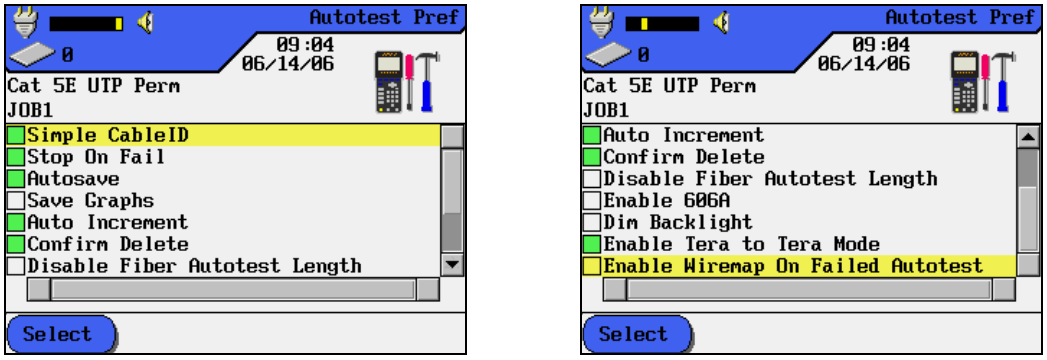


Figure 2-3: Autotest Preference Screen

4. Press **ENTER** to save or **ESCAPE** to exit.

Table 2-1: Autotest Preference Options

Option	Action
Simple Cable ID	Assign a fixed alpha value for the Cable ID.
Stop on Fail	Autotest aborts at the first failed test. Otherwise, Autotest continues until all tests are completed, regardless of results. **Note: If a wire map cannot be completed due to gross miss-wiring, the Autotest may abort regardless of the setting of this preference.**
AutoSave	Autotest automatically names and saves any passed AUTOTEST results. Failed tests are not automatically saved.
Save Graphs	Displaying graphs on the DH requires data to be transferred from the RH to the DH. To save time during testing, do not select this option. **Note: De-selecting this option will not allow graphs to be loaded to the PC software or printed on certification reports.**
Auto Increment	Autotest automatically increments Single and Double Cable ID test counters.
Confirm Delete	Activate request to confirm any Delete operation.
Disable Fiber Autotest Length	Disable or enable fiber Autotest length procedure.
Enable 606A	Enable 606-A Cable ID naming standard.
Dim Backlight	Toggle illumination of screen display backlighting during Autotest.

Table 2-1: Autotest Preference Options (continued)

Option	Action
Enable Tera to Tera Mode	LANTEK is set to default with Tera-to-Tera enable mode. In this mode, LANTEK firmware assumes that there is Tera-to-Tera patchcords connected and will treat an Autotest as a Cat 7 Autotest. If unselected, LANTEK firmware will assume that there is Tera-to-RJ45 patchcords attached and the Autotest will be treated as a Cat 6 Autotest.
Enable Wiremap on Failed Autotest	Mode dictates whether or not the LANTEK will automatically enter the advanced failure analysis when an Autotest fails.

CONTRAST

1. Select Contrast on the Preferences screen. Press **ENTER**. The Contrast screen appears.
2. Select ◀◀ / ◀ or ▶ / ▶▶ to adjust the screen contrast.

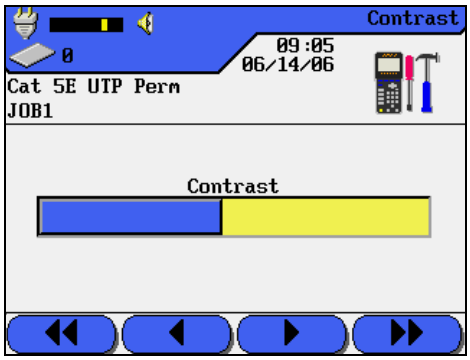


Figure 2-4: Contrast Screen

3. Press **ENTER** to save or **ESCAPE** to exit.

TIMEOUT OPTIONS

Set time-out options to help conserve battery power when the tester is not in use.

Default Timeout Settings:

Backlight	1 minute
Power	30 minutes

1. Select Timeout Options on the Preferences screen. Press **ENTER**. The Timeout Options screen appears with the cursor on the Backlight Timeout option.
   Note: The timers begin counting from the last key press.
2. Press the **ARROW** Keys to highlight the desired parameters.
3. Select  or  to adjust the desired setting.

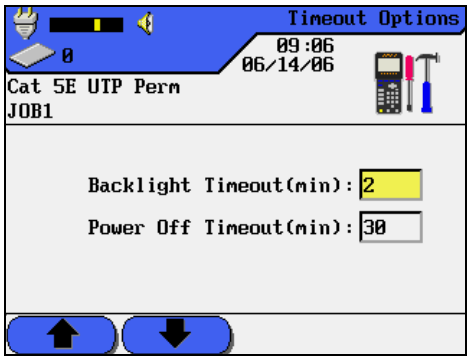


Figure 2-5: Timeout Options Screen

4. Press **ENTER** to save or **ESCAPE** to exit.

MEASUREMENT UNITS

Use this option to set the unit of measurement parameter for length measurements. The default setting is feet.

1. Select Measurement Units on the Preferences screen. Press **ENTER**. The Measurement Units screen appears.
2. Select either  or  to set the unit of measure to feet or meters.

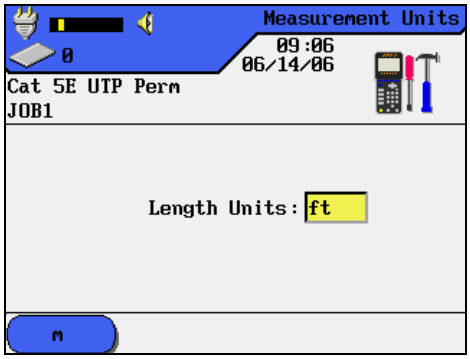


Figure 2-6: Measurement Units Screen

3. Press **ENTER** to save or **ESCAPE** to exit.

Note: Refer to the following conversion for differences in measurement units:
1 meter = 3.28084 ft
1 foot = 0.3048006 m

BAUD RATE

When using the RS-232 serial port, this option can configure the baud rate at which information will be transmitted.

1. Select Baud Rate on the Preferences screen. Press **ENTER**. The Baud Rate screen appears.

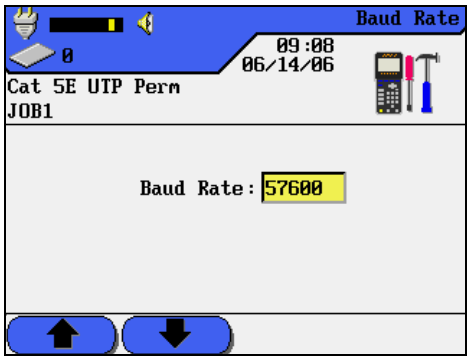


Figure 2-7: Baud Rate Screen

2. Select ↑ or ↓ to choose the desired setting.
3. Press **ENTER** to save or **ESCAPE** to exit.

TALKSET

LANTEK testers are "Talkset ready." Use this option to configure communications between the Display Handset and the Remote Handset through an externally attached microphone/headset.

To talk with someone using the talkset, both the Display Handset and the Remote Handset must be connected to a cable.

If the Talkset is set to "Auto," the Talkset feature is automatically enabled when Autotest is not running. If the Talkset is set to "Manual," the **TALK** button must be pressed momentarily to enable the Talkset feature.

The units will remain in "Talk" mode until the **ESCAPE** button on either unit is pressed, the **AUTOTEST** button is pressed, or after a period of no talk activity is detected by the Display Handset.

1. Select Talkset on the Preferences screen. Press **ENTER**. The Talkset screen appears.
2. Press the **ARROW** keys to highlight the desired setting.
3. The default setting for Talkset is "Manual". Select Manual or Auto to select the desired setting.

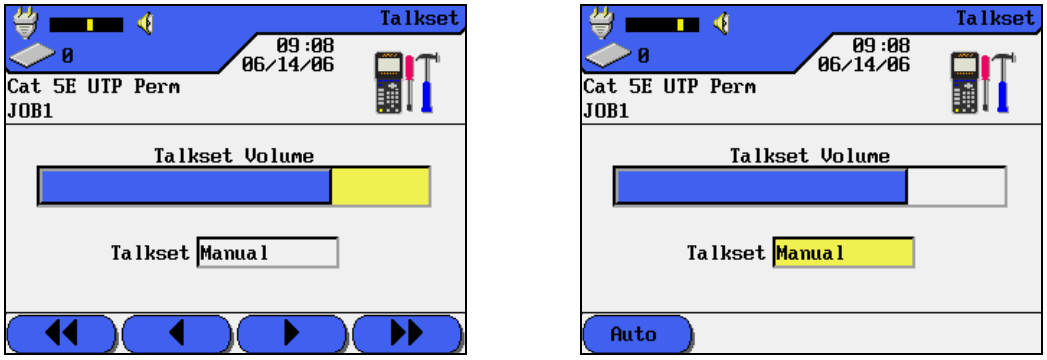


Figure 2-8: Talkset Screens

4. If the talkset is in Manual setting, select ◀◀ / ◀ or ▶ / ▶▶ to adjust the audible volume.
5. Press **ENTER** to save or **ESCAPE** to exit.

DATE AND TIME

Accurate date and time settings are necessary to create reliable record and report information.

1. Select Date and Time on the Preferences screen. Press **ENTER**. The Date and Time screen appears.
2. Select 12hr or 24hr to select the desired time format setting.
3. Use the **ARROW** keys to highlight the parameter to be changed.
4. Press or select the **ALPHA/NUMERIC** or **SOFT** keys to enter the desired setting.
5. Repeat steps 2 and 3 until all of the desired parameters have been set.
6. Press **ENTER** to save or **ESCAPE** to exit.

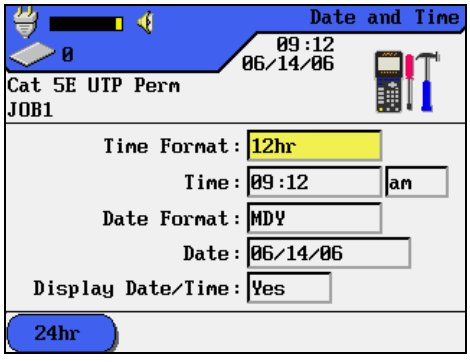


Figure 2-9: Date and Time Screen

LANGUAGE

The following languages are built into the LANTEK:

Chinese	Czech	Deutsch
Dutch	English	Espanol
French	Italian	Korean
Norwegian	Polish	Portuguese
Russian		

1. Select Language on the Preferences screen. Press **ENTER**. The Language screen appears.
2. Select ↑ or ↓ to select the desired language.
3. Press **ENTER** to save or **ESCAPE** to exit.

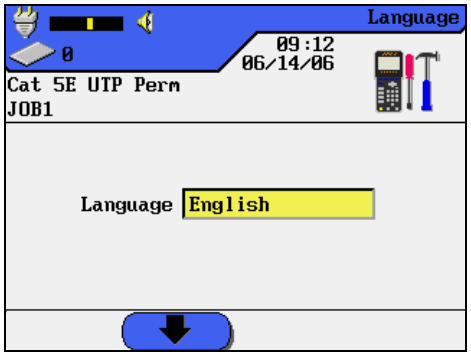


Figure 2-10: Language Screen

Note: Press <SHIFT>SET-UP keys to quickly access the Language menu.

RESTORE DEFAULTS

Use this option to reset all unit settings to their factory defaults.

1. From the Preferences screen, press the **ARROW** keys to highlight Restore Defaults.
2. Press **ENTER** to restore the unit to the factory default settings.
3. A Warning screen will appear. Select YES to accept the changes or select NO to exit this screen without making changes.

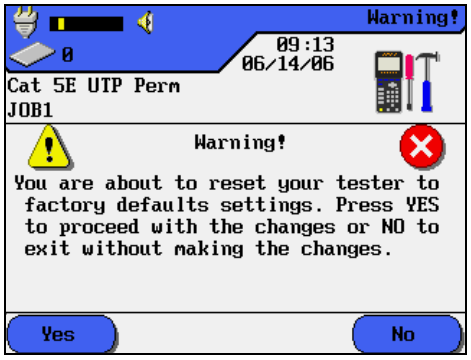


Figure 2-11: Restore Defaults Warning Screen

PACK MEMORY

Use this option to clear the tester memory of test(s) marked for deletion in the Stored Results screen.

Note: Using Pack Memory is similar to emptying the "Recycle Bin" on your computer. No active records will be deleted.

1. From the Preferences screen, press the **ARROW** keys to highlight Pack Memory.
2. Press **ENTER** to clear the tester memory of scheduled deletions.
3. A Warning screen will appear. Select YES to accept the changes or select NO to exit this screen without making changes.

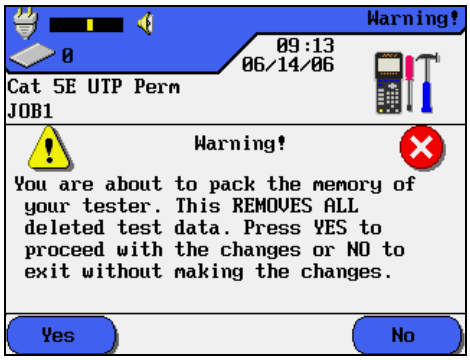


Figure 2-12: Pack Memory Warning Screen

CLEAR MEMORY

Use this option to clear the tester memory of all data.

1. From the Preferences screen, press the **ARROW** keys to highlight Clear Memory.
2. Press **ENTER** to clear the tester memory.
3. A Warning screen will appear. Select YES to accept the changes or select NO to exit this screen without making changes.

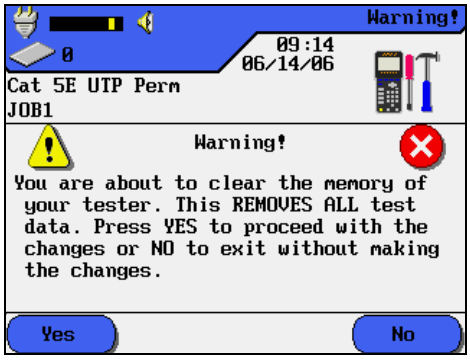


Figure 2-13: Clear Memory Warning Screen

Warning: There is NO UNDELETE option when Clear Memory is used. All stored tests will be permanently deleted.

SELECT SAVE MEDIA

Use this option to select the type of tester storage memory to use.

1. From the Preferences screen, press the **ARROW** keys to highlight Select Save Media.
2. Press **ENTER**, the Select Save Media screen appears.
3. Use Refresh to automatically scan and identify all storage media operating within the DH.

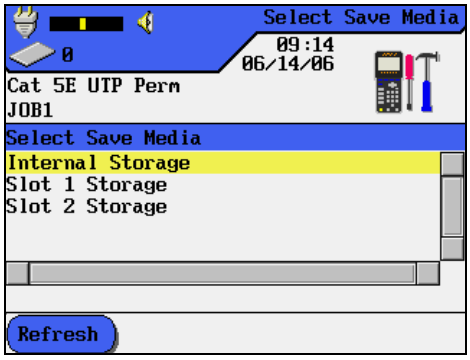


Figure 2-14: Select Save Media Screen

4. Highlight the desired saving option and press **ENTER** to save or **ESCAPE** to exit without saving changes.

WIREMAP COLOR SCHEME

Use this option to select the type of wiremap color scheme to use.

1. From the Preferences screen, press the **ARROW** keys to highlight Wiremap Color Scheme.
2. Press **ENTER**. The Wiremap Color Scheme screen appears.
3. Use the **F1**, **F2**, **F3,** or **<SHIFT>F2** Keys to select either STD, 568-A, 568-B, or Tera type cable.
4. Press **F4** to save selection.

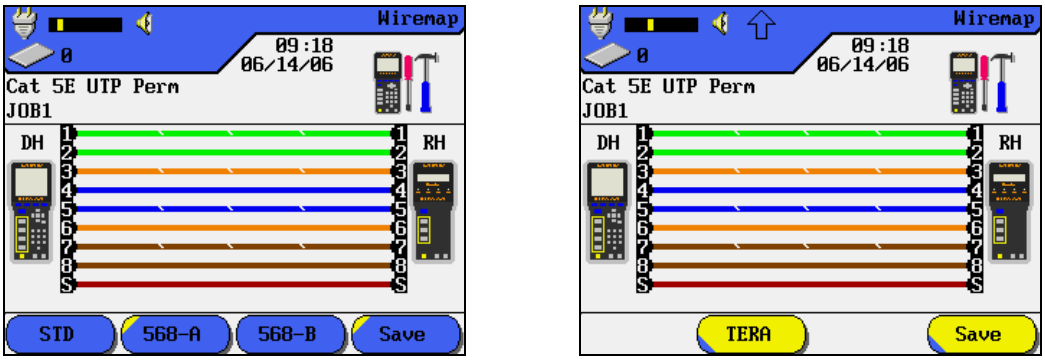


Figure 2-15: Wiremap Color Scheme Screen

5. Press **ENTER** to save or **ESCAPE** to exit without saving changes.

TEMPERATURE

Use this option to select the temperature to use.

Note: This feature is a legacy option for early Category 6 installations where the ambient temperature was considered during cable certification.

1. From the Preferences screen, press the **ARROW** keys to highlight Temperature.
2. Press **ENTER**. The Temperature screen appears.
3. Select ↑ or ↓ to choose either Fahrenheit or Celsius.
4. Press **ENTER** to save or **ESCAPE** to exit.

Note: Refer to the following equations for differences in temperature conversion:
Celsius = ($Temp^{Fahrenheit}$ – 32*5/9)
Fahrenheit = (9/5* $Temp^{Celsius}$) + 32.

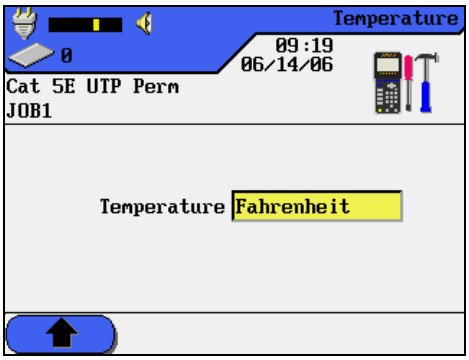


Figure 2-16: Temperature Screen

CABLE ID/AUTO AND 606 INCREMENT OPTIONS

There are two type of cable naming available:

- Simple Cable ID: Only the cable name and current value can be changed.
- Standard Cable ID: Additionally, the counting range may be defined and individual digits may be locked.

The type of cable naming is selected from the Preferences screen under Autotest Preferences.

SIMPLE ID

Selecting the Simple ID Option

1. Select Autotest Preferences on the Preference screen. The Autotest Preferences screen appears.
2. Press the **ARROW** keys to highlight Simple Cable ID.
3. Press Select to activate the Simple Cable ID.

STANDARD CABLE ID

If the Simple Cable ID option is not activated in the Preferences screen under Autotest Preference, you have further options available to set the required cable.

Setting a Cable ID

1. In the Cable ID screen, highlight Set 'Cable From'.

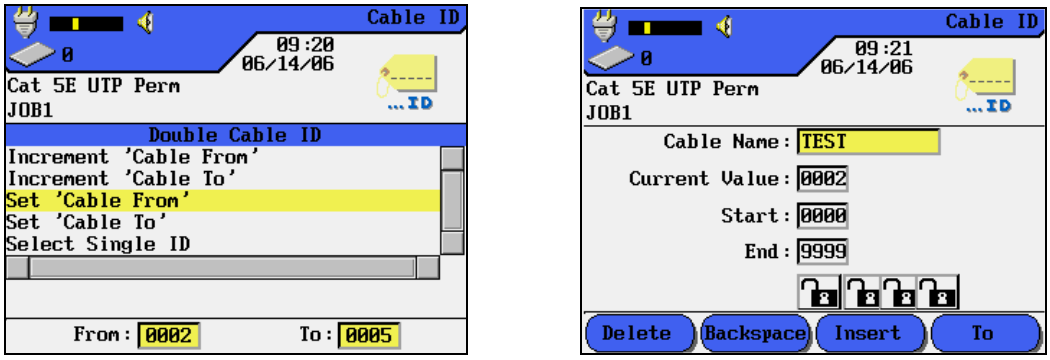


Figure 2-17: Cable ID Screens

2. Press **ENTER** to open the screen.

   Note: The screen that appears will reflect the most recently assigned Cable ID (either Single or Double). Double ID is used in this example.

3. Enter the following parameters as required:

   a. 'Cable From' name, twelve (12) characters maximum.

   b. Current, Start, and End point of the counter, four digits each. After reaching the End point the counter will be reset.

   c. Select the  icon to activate a lock and  to activate the Auto Increment feature for a character.

   ➢ Select  to go to the 'Cable To' screen. Repeat steps a, b and c.

4. After entering the desired 'Cable From' and 'Cable To' names and parameters, press **ENTER** to save and return to the Main Cable ID screen.

Test Counter

In addition to the cable name, you can assign up to four characters to identify individual tests.

➢ The icon  below a digit designates a non-incrementing field.

➢ The icon  indicates an automatically incrementing field.

The default numbering scheme is set to starts counting from 0000 and ends at 9999. Custom numbering schemes may be used. Table 2-2 and Table 2-3 contain some examples for counting Single and Double IDs.

Table 2-2: Single ID Counting Examples

Preset Parameters	**Custom Settings**	
Cable Name: TEST	Cable Name: PANEL	Cable Name: PANEL
Start: 0 0 0 0 End: 9 9 9 9 Lock:  Current: 0 0 0 0	Start: 0 0 0 0 End: 0 0 2 2 Lock:  Current: 0 0 0 0	Start: 0 0 0 A End: 0 9 9 D Lock:  Current: 0 1 8 A
0 0 0 0	0 0 0 0	0 1 8 A
0 0 0 1	0 0 0 1	0 1 8 B
0 0 0 2	0 0 0 2	0 1 8 C
0 0 0 3	0 0 1 0	0 1 8 D
0 0 0 4	0 0 1 1	0 1 9 A
0 0 0 5	0 0 1 2	0 1 9 B
0 0 0 6	0 0 2 0	0 1 9 C
0 0 0 7	0 0 2 1	0 1 9 D
0 0 0 8	0 0 2 2	0 2 0 A
0 0 0 9	0 0 0 0	0 2 0 B
0 0 1 0	0 0 0 1	0 2 0 C
0 0 1 1	0 0 0 2	0 2 0 D
0 0 1 2	0 0 1 0	0 2 1 A

Table 2-3: Double ID Counting Examples

"Cable To"
Cable name: OFFICE
Counter
Start: 0 0 0 A End: 0 0 9 D Lock:  Current: 0 0 0 A
0 0 0 A
0 0 0 B
0 0 0 C
0 0 0 D
0 0 1 A
0 0 1 B
0 0 1 C
0 0 1 D
0 0 2 A
0 0 2 B
0 0 2 C
0 0 2 D
0 0 3 A

"Cable From"
Cable name: DISTRIB
Counter
Start: 0 0 0 0 End: 9 9 9 9 Lock:  Current: 0 0 0 0
0 0 0 0
0 0 0 1
0 0 0 2
0 0 0 3
0 0 0 4
0 0 0 5
0 0 0 6
0 0 0 7
0 0 0 8
0 0 0 9
0 0 1 0
0 0 1 1
0 0 1 2

SETTING LANTEK TO TIA/EIA 606-A STANDARDS FORMAT

The TIA/EIA 606-A standards for telecommunications infrastructures include the following elements:

- Horizontal pathways and cabling,
- Backbone pathways and cabling,
- Telecommunications grounding/bonding,
- Spaces (e.g., entrance facility, telecommunications room, equipment room), and
- Firestopping.

These Standards address the administration of telecommunications infrastructure by:

- Assigning identifiers to components of the infrastructure,
- Specifying elements of information which make up the infrastructure,
- Specifying relationships between these records to access the information they contain,
- Specifying reports presenting information on groups of records, and
- Specifying graphical and symbolic requirements.

Selecting Autotest Preferences to perform TIA/EIA 606-A Standards

1. From the Preferences screen, use the **UP/DOWN ARROW** keys to select Autotest Preferences. Press **ENTER**. The Autotest Preferences screen appears.
2. From the Autotest Preferences screen, use the **UP/DOWN ARROW** keys to select Enable 606A.

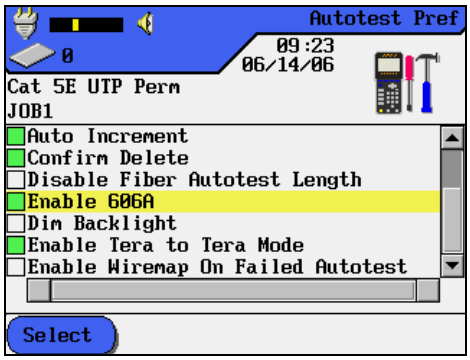


Figure 2-18: Autotest Pref Screen – Enable 606A Selected

3. Press Select to highlight the box green.
4. Press **ENTER** to save or **ESCAPE** to exit.

Saving in TIA/EIA 606A Format

1. Once the Enable 606A selection process has been completed, press **AUTOTEST** to begin.

   Note: LANTEK uses the Standards format to apply identification to the cables and their infrastructure relationship.

2. At completion of the Autotest activity, select one of three cable parameters (Drop, Backbone or Backbone Pair) to set the cable name for saving the results. Cable naming can be completed using the Auto Increment feature or manually.

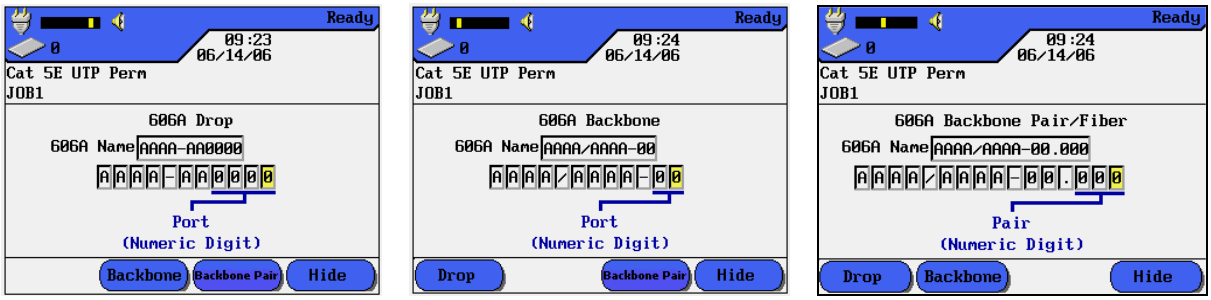


Figure 2-19: TIA 606A Cable Parameter Screens

3. Press **ENTER** to save the cable name and results or **ESCAPE** to exit.
4. If Enable 606A is selected in the Autotest Preference, then a 606A Standards Cable parameter can be edited by pressing **F1** or selecting the Cable ID on the DH Ready Screen.

DUALMODE

The DUALmode™ feature on the LANTEK is designed to provide both Permanent Link and Channel Link test results in about the same time that it would take to do each Autotest separately. For Category 6, that means both Channel and Permanent Link results are obtained and stored in about 20 seconds.

Based on the patent-pending technique that LANTEK uses to produce Permanent Link results, the dual mode adapters physically resemble Channel Adapters and patchcords that gather both phase and magnitude data for the full channel. The LANTEK Cable Certifier process removes the patchcords losses and signal reflections to produce Permanent Link results. The DUALmode function saves the results in two separate records.

Other significant tests can be performed under the DUALmode process. For example, consider the case where you, the installer, have a job to install a Category 6 class system in a government installation in a country that uses an ISO-based National Standard. You use cable and connectivity manufactured by a US-based company. The government may require the installer to certify the ISO-based CLASS E standard but the US Company may require certification to the TIA 568 Category 6 Standard in order to issue a warranty. Previously, this might have required running both ISO and TIA certifications and passing the increased costs to your client, the buyer. But with DUALmode, certifications to ISO CLASS E Permanent Link and TIA 568B Category 6 can be performed at the same time with no more effort than running only one test.

Another example of performing DUALmode would be the determination of headroom with regards to higher bandwidth for future applications. Previously, you could visually inspect Category 5e Permanent Link Certification records and assess whether there is enough headroom to run the higher bandwidth applications. But in order to access complete definitive data, a Category 6 certification tests would also be required. These actions would normally be ignored due to the increased testing costs.

With DUALmode, you could require that the system be certified to Category 5e Standards and that the system also be tested against the Category 6 limits. That way, in the future, your client would have definitive data about which of the links could support higher bandwidth applications. This information would be essential in any decision to re-terminate links using higher Category jacks or to pull higher category cable.

PERFORMING IN DUALMODE:

1. Move the cursor to select the Cable Type and press **ENTER**. The Cable Type screen appears.
2. Move the cursor to Twisted Pair DUALmode and press **ENTER**. The DUALmode tests menu appears.
3. Select the two (2) cable type combination to be tested in DUALmode and press **ENTER**.
4. Press **AUTOTEST**. The PASS/FAIL results will be displayed. (Figure 2-20) Worst-case margins and values for NEXT, RL, ACR and Attenuation are shown for each of the DUALmode tests.

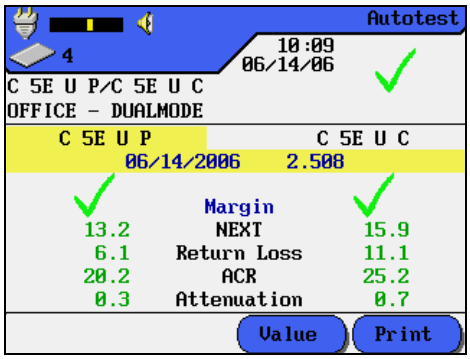


Figure 2-20: DUALmode Autotest

5. Press **ENTER** on the highlighted test to display its related graphic results.

OTHER OPERATIONS

CHANGING DEFAULT NVP VALUE OF A CABLE

1. From the Test Standard screen, select NVP to change the NVP. The NVP screen will appear.

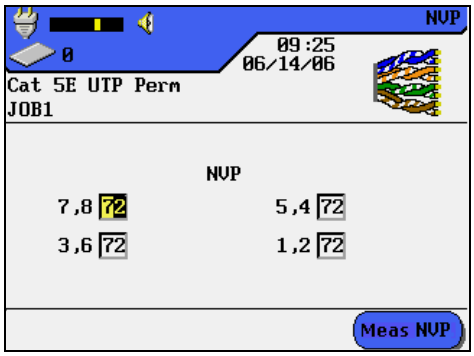


Figure 2-21: NVP Screen

2. Use the **ALPHA/NUMERIC** keys to manually enter one or more NVP value(s).
3. To automatically calculate a new NVP value, select Meas NVP. The Measure NVP screen appears.
4. Connect a test cable of known length.
5. Using the **ARROW** and **NUMERIC** keys, enter the known cable length.
6. Select Start to calculate a new NVP value. The display returns to the main NVP screen after the new NVP value has been calculated.

   Note: This is a channel measurement. Include the length of both patchcords when entering the cable length information.

CHANGING THE DEFAULT REFERENCE TEMPERATURE (T_{REF}) VALUE

This function is typically used in very warm environments where cable performance degrades as temperature rises. Input the maximum expected temperature that the cable will be exposed to and the attenuation limits will changes accordingly. This ensures that the network will operate properly even in extreme heat. Be aware that the longer links may fail the autotest since the attenuation limits are more strict as higher temperature values are entered into the T_{REF} function.

1. From the Test Standard screen, select Tref to change the Reference Temperature. The Reference Temperature screen will appear.
2. Use the **ALPHA/NUMERIC** keys to manually enter a new Reference Temperature Value.
3. Press **ENTER** to accept the new Reference Temperature.

CUSTOM CABLE SETTINGS AND PARAMETERS

All of the cable types pre-programmed into the LANTEK tester are associated with a predefined test standard. You cannot change these pre-programmed settings. If you want to run a different set of tests for a given cable you must create a Custom Cable.

For example, if you would like to run Return Loss in addition to the TIA 568B Category 5 tests (Return Loss is not a required TIA test), you must create a Custom Cable and select the tests you want to include in the test suite for this cable.

A maximum of ten (10) custom cable settings can be created, stored, removed, and retrieved when needed.

Creating a New Custom Cable Type

1. Press **<SHIFT>F4** or select the Cable Type on the DH Ready screen. The Cable Type screen appears.
2. Press the **ARROW** keys to highlight the desired cable type.
3. Press **ENTER**, the Test Standard screen appears with list of cable type names.
4. Position the cursor over the desired cable type and select Create. The Custom Cable screen appears.
5. Change the desired cable settings, and then proceed to the next step, naming the cable.
6. Position the cursor over Custom Name/NVP and press **ENTER**. The NVP Screen appears.
7. Change NVP parameters as required and then name your new custom cable.
8. Press **SAVE** to accept the changes and return to the Custom Cable screen. The new custom cable is now selected as the cable under test.

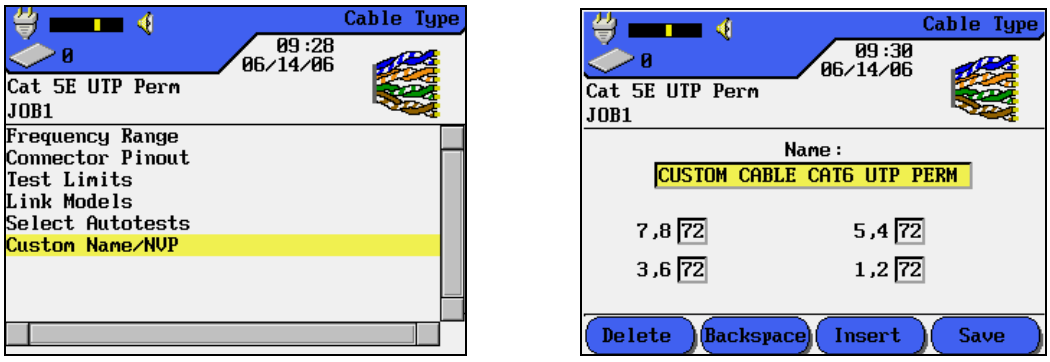


Figure 2-22: Custom Name/NVP Screen

Selecting or Deleting a Custom Cable Type

1. Press **<SHIFT>F4** or select the Cable Type on the DH Ready screen. The Cable Type screen appears.
2. Press the **ARROW** Key to highlight the Custom Cable type.
3. Press **ENTER** to open the Custom Cable screen.
4. Position the cursor over the desired custom cable type.
5. Press **ENTER** to make the custom cable you highlighted the new cable type or select Delete to delete the selected custom cable type.

Editing an Existing Custom Cable Type

1. Repeat Steps 1 to 3 from previous procedure.
2. Select the cable type to be customized.
3. Press the Edit soft key. The Custom Cable parameter screen appears.
4. Highlight the desired custom cable parameter and press **ENTER** to edit the settings.
5. After making the desired changes, select the Custom Name/NVP option. The NVP screen appears.
6. Press **ENTER** to save the cable under its current name or under a new name.

   Note: Refer to the section below for a description of custom cable parameter options.

Custom Cable Parameters

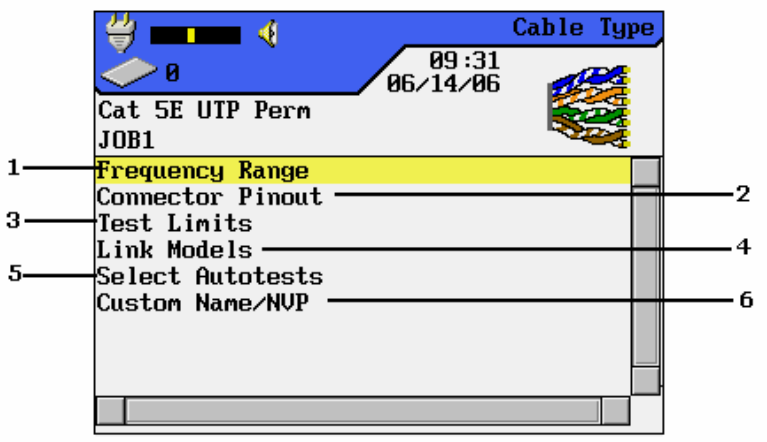


Figure 2-23: Custom Cable Parameter Screen

Table 2-4: Custom Cable Parameter Options

Item	Parameter	Description
1	Frequency Range	Use this menu to set minimum and maximum certification and cable performance frequencies.
2	Connector Pinout	This screen is used to define connector pinouts. **Note: If one wire pair is not selected, tests for NEXT, attenuation, capacitance, DC resistance, and impedance will not be performed on that pair.**
3	Test Limits	This screen is used to customize Autotest pass/fail limits.
4	Link Models	Custom NEXT and Attenuation limits are set by using a flat line limit or one of several different models. Frequency limits will vary depending on the LANTEK model and link type.
5	Select Autotests	Not all cables will require the full suite of Autotests. Use this menu to select the Autotests to be performed.
6	Custom Name/NVP	Use the **ALPHA/NUMERIC** keys to enter a custom name or change the NVP parameters. The LANTEK testers can store up to 10 custom cables.

TONE GENERATOR

Both the Display Handset and Remote Handset can generate a “low” tone, “high” tone, or “warble” tone (alternating “low” and “high” tone at 2 Hz rate) that is detectable by most standard wire tracing amplifiers.

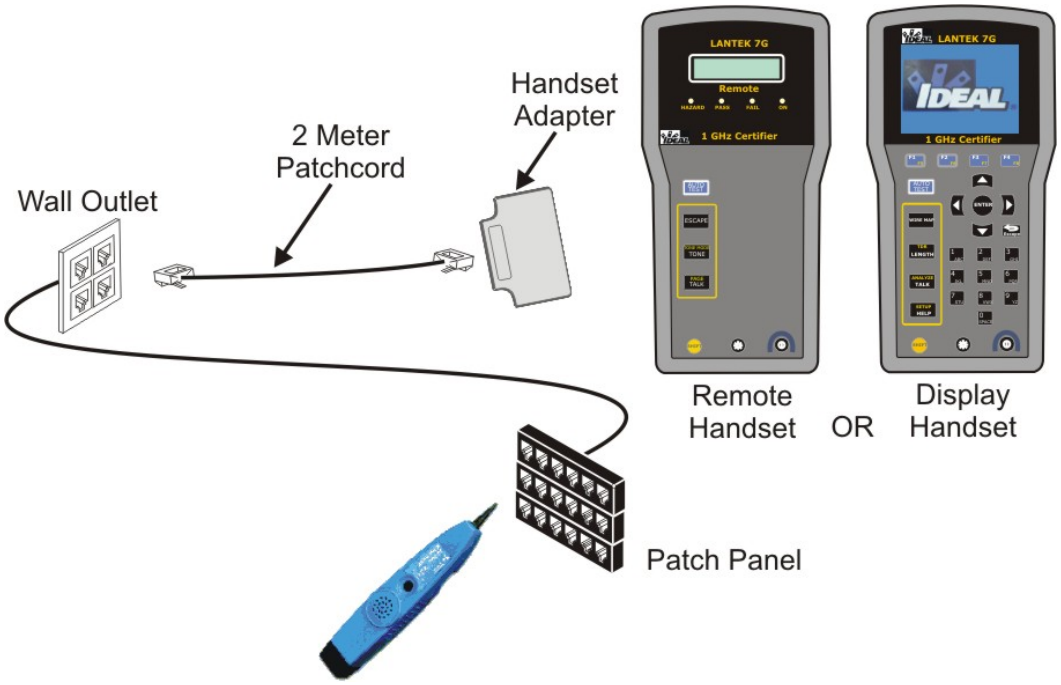


Figure 2-24: Typical Tone Generator Setup

Note: The WIREMAP, SHIFT, and TONE buttons are hard keys. Pair A, Pair B, Pair C, Pair D, Low, High, and Warble are soft keys that appear on the Display Handset.

ACTIVATING THE TONE GENERATOR USING THE DH

1. Connect the Display Handset to the cable under test.
2. Press **<SHIFT>WIRE MAP** to enter Tone mode.
   Note: The Tone mode will remain active until ESCAPE is pressed.
3. Using the soft keys, select the pair (Pair 78, Pair 36, Pair 54, or Pair 12) on which to place the tone.
4. Select the tone, press **SHIFT**, and select LOW, HIGH, or WARBLE using the soft keys.

ACTIVATING THE TONE GENERATOR USING THE RH

1. Connect the Remote Handset to the cable under test.
2. Press **TONE** on the Remote Handset to enter Tone mode. The Remote Handset two-line display shows the first line *TONE.* The second line shows the tone type and placement of tone in the *XY* form of characters.

X Character (Tone Type)	**Y Character (Placement of tone)**
L = Low	78 = Pair 78
H = High	36 = Pair 36
W = Warble	54 = Pair 54
	12 = Pair 12

Example: L78 = Low tone, Pair 78

Note: The Tone mode will remain active until ESCAPE is pressed.

3. Select the pair on which to place the tone by pressing the **TONE** key to cycle through the options.
4. Select the tone for the selected pair by pressing **<SHIFT>TONE** to cycle through the options.

CHAPTER 3
STRUCTURED CABLE FIELD CALIBRATION AND TESTING

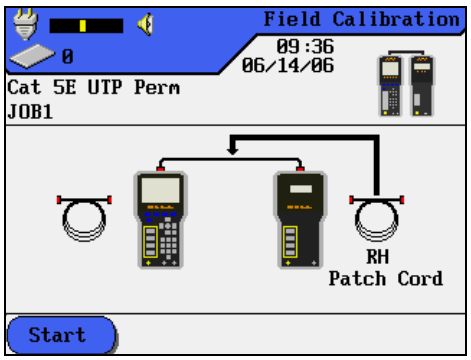
FIELD CALIBRATION – CAT3/5E/6/6A AND CLASS C/D/E/Ea/F/Fa (TERA AND EC 7)

This Field Calibration is a 4-step process. Steps 1 and 2 are performed with the patchcords connected to the Handsets. Steps 3 and 4 are performed with open-ended patchcords (Only one end connected to the Handsets).

To calibrate the tester, perform the following:

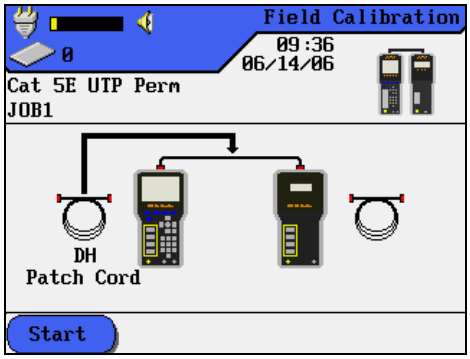
Step 1

- Connect the adapters to the Display Handset (DH) and Remote Handset (RH).
- Power both units on.
- Connect the patchcord that you plan to use as the RH patchcord to the adapters of the DH and RH units.
- From the DH Ready screen, select Field Calibration. The Calibration screen appears.
- From the DH Field Calibration screen, select **START** to begin the calibration process on the first (RH) patchcord. This first process takes about 10-20 seconds to complete.
- At the completion of the first calibration process, tag the RH end of the first patchcord. Disconnect the first patchcord from the DH and RH unit adapters. This tag will remind you which end to reinsert into the RH for Step 4.



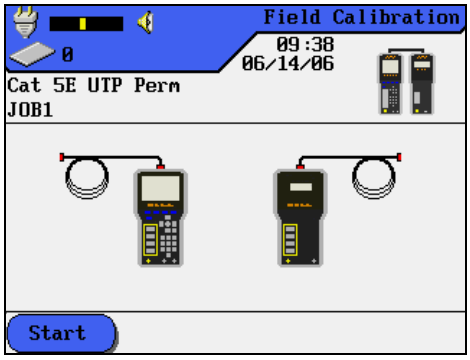
Step 2

- Insert the second (DH) matching patchcord into both the DH and RH adapters.
- From the DH Field Calibration screen, select **START** to begin the second calibration step.
- At the completion of the second patchcord step, disconnect one end of the second patchcord from the RH unit adapter (leaving the second end still attached to the DH unit).



Step 3

- Re-insert the tagged end of the first patchcord into the RH unit adapter.
- From the DH Field Calibration screen, select **START** or press **AUTOTEST** to begin the third calibration step.



Step 4

- From the RH, press **AUTOTEST** to begin the fourth calibration step.
- If calibration is successful, the DH will briefly Display “Calibration Complete” and the RH will briefly display the PASS light.
- If calibration is unsuccessful, the DH will briefly display either a Warning screen displaying “No Remote Handset” or a Calibration Failure screen.

FIELD CALIBRATION - GG45

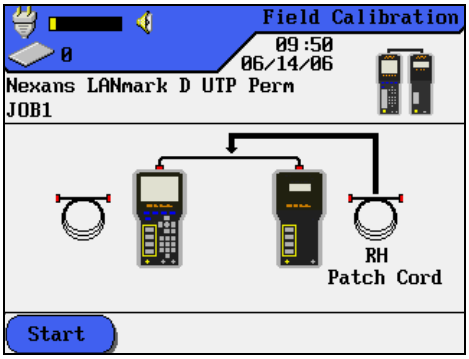
This field calibration is a 4-step process. Steps 1 and 2 are performed with the GG45 Calibration Adapters connected to the handsets. Steps 3 and 4 are performed with the GG45 Permanent Link Adapters open-ended patchcords and then the GG45 Calibration Load Terminator attached.

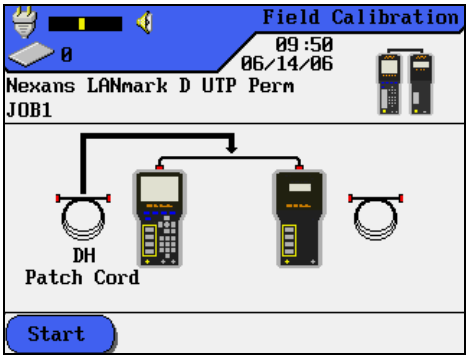
The GG45 test kit comprises a Category 6/7 connector product that is backward compatible with Category 6 - RJ45s.

To calibrate the tester, perform the following:

Steps 1 and 2

- Connect the GG45 Calibration Adapters to the Display Handset (DH) and Remote Handset (RH). Power both units on.
- From the DH Ready screen, select Field Calibration. The Calibration screen appears.
- From the DH Field Calibration screen, select **START** to begin the first calibration process. When this process ends, select **START** again to perform the second calibration process. Each process will take about 10-20 seconds to complete.

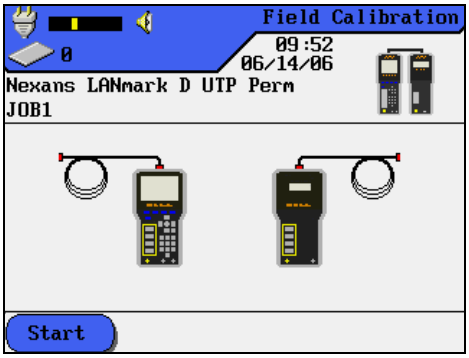


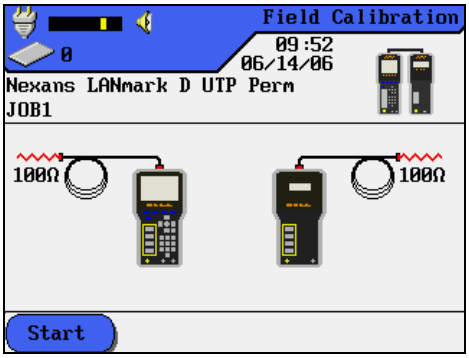


- At the completion of steps 1 and 2, disconnect the GG45 Calibration Adapters.

Step 3

- Insert the GG45 Permanent Link Adapters into both the Display and Remote Handsets.
- From the DH Field Calibration screen, select **START** to begin the third calibration step.
- Terminate the open end of the patchcord by connecting the GG45 Calibration Load Terminator and select **START** again.





Step 4

- From the RH, press **AUTOTEST** to begin the fourth calibration step.
- Terminate the open end of the patchcord by connecting the GG45 Calibration Load Terminator and press **AUTOTEST** again.
- When Step 4 is completed, the LANTEK is ready for testing Permanent Links.

GG45 – TROUBLESHOOTING

A field calibration should be performed prior to implementing a test of the GG45 cabling system. This process will ensure (1) synchronizing of the units, (2) qualifying (testing) of the patchcords and (3) gathering of loss data regarding the patchcords and mated connections.

The equipment required for a GG45 calibration procedure is:

- Display Handset
- Remote Handset
- GG45 Calibration Adapters
  (Two adapters joined by a short segment of Category 7 cable)
- GG45 Calibration Load Terminator (100Ω Jack)
- GG45 Permanent Link Adapters
  (A set of two adapters, each with a patchcord (approximately 2 meters) soldered to the adapter at one end and a GG45 Category 7 plug at the opposite end)

TESTING A GG45 CABLING SYSTEM

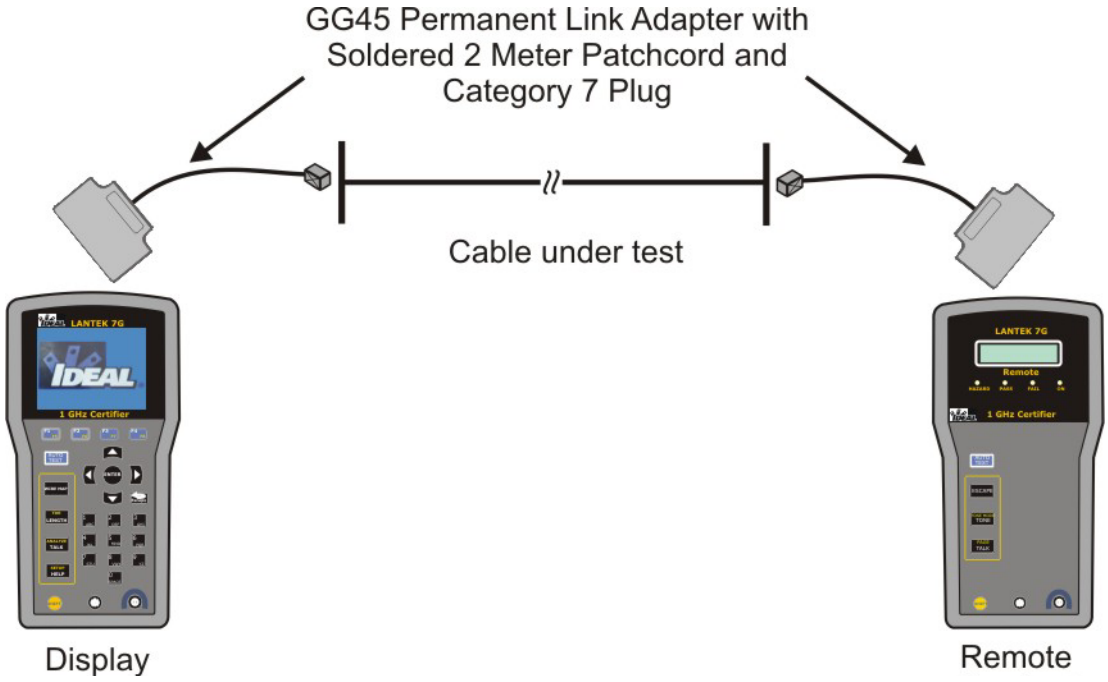


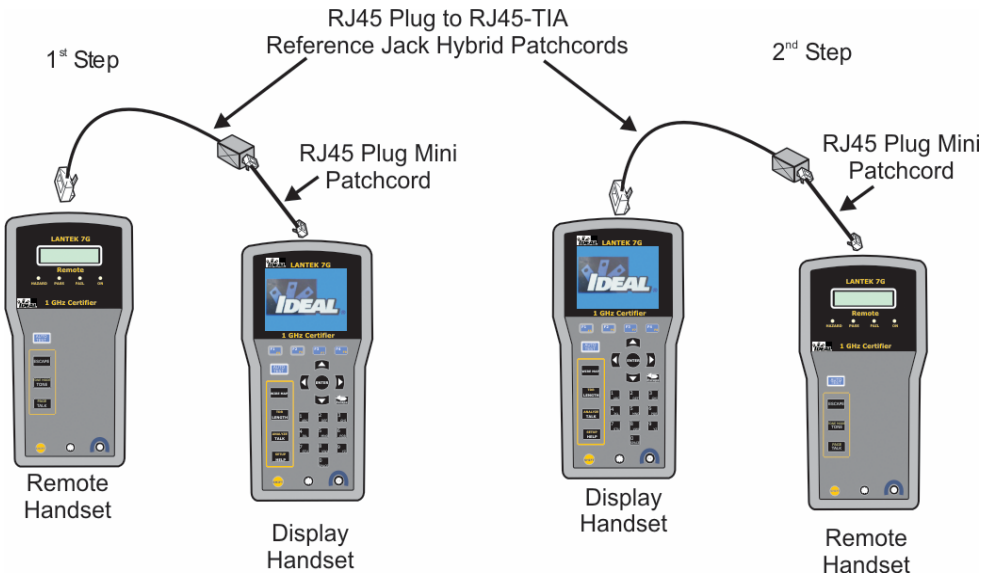
Figure 3-1: Typical Configuration for GG45 Cable Testing

Typical configuration for testing has the DH unit and RH unit connected to the GG45 Permanent Link Adapters. The cable under test is connected at the Category 7 plug end of both the DH and RH ends.

FIELD CALIBRATION - PATCHCORD TESTING

This Field Calibration is a 4-step process. Steps 1 and 2 are performed with the hybrid (RJ45 Plug to RJ45-TIA-Reference-Jack) patchcords connected to the Handsets using the kit's mini patchcord. Steps 3 and 4 are performed with open-ended hybrid patchcords (Only one end connected to the Handsets).

To calibrate the tester, perform the following:



Step 1

- Connect the Category 5e/6 – RJ45 adapters to the Display Handset (DH) and Remote Handset (RH). Power both units on.
- Connect the RJ45 plug of the first hybrid patchcord to the Remote Handset (RH). Using the RJ45 mini patchcord attach the DH RJ45-TIA Reference Jack end of the hybrid patchcord to one end of the mini patchcord and then connect the other end of the mini patchcord to the Display Handset (DH).

Note: Patchcords can vary in length. The most common length used is the 2-meter length patchcords.

- From the DH Ready Screen, select Field Calibration. The Calibration screen appears.
- From the RH, press **AUTOTEST** to perform the first step of the calibration process. At the completion of step 1, disconnect the mini patchcord and hybrid patchcord from the RH and DH.

Step 2

- Connect the RJ45 plug of the second hybrid patchcord to the Display Handset (DH). Using the RJ45 mini patchcord attach the DH RJ45-TIA Reference Jack end of the hybrid patchcord to one end of the mini patchcord and then connect the other end of the mini patchcord to the Remote Handset (RH).
- From the DH Field Calibration screen, select **START** or press **AUTOTEST** from the RH to perform the second step of the calibration process.
- At the completion of step 2, disconnect the mini patchcord.

Step 3

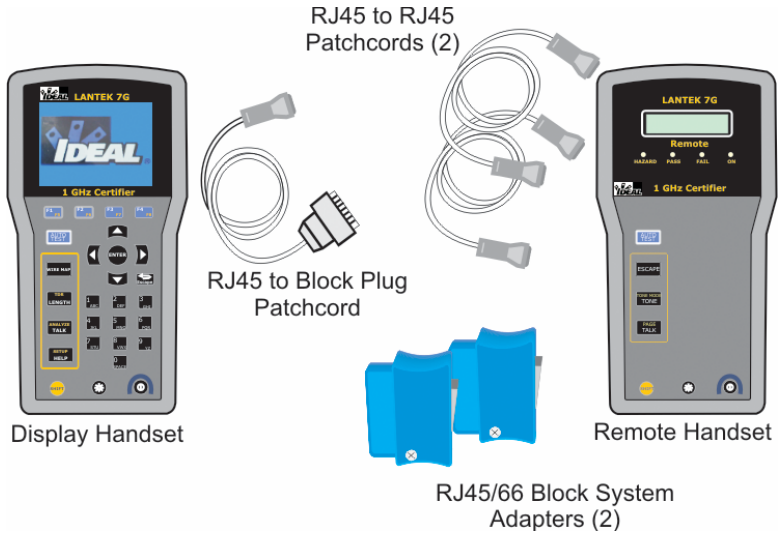
- Remove the RJ45 mini patchcord from the RH and the hybrid patchcord.
- With the DH hybrid patchcord open-ended, select **START** from the DH Field Calibration screen to perform the third calibration process.

Step 4

- Re-connect the RJ45 plug of the first hybrid patchcords to the Remote Handset (RH).
- With the RH hybrid patchcord open-ended, press **AUTOTEST** from the RH to perform the fourth calibration process. Upon completion of the calibration process, the LANTEK handsets and the hybrid patchcords are ready for use in testing cables.

FIELD CALIBRATION - BLOCK TESTING 66/110/BIX

This Field Calibration is a 4-step process. Steps 1 and 2 are performed with a patchcord connected to the Handsets. Steps 3 and 4 are performed with open-ended patchcords (only one end connected to each Handset).



For Block 66 Systems

The RJ45 block calibration adapters connected to the block during calibration is either the T568A or 568B RJ45/66 Block adapter. The T568A adapter is used with patchcords connected in a TIA-568A configuration. The T568B adapter is used with patchcords connected in a TIA-568B configuration. Both block adapters have the standard RJ45 plug at the opposite end.

Calibrating the tester for the 110/BIX Block System:

Step 1 and 2

- Connect the adapters to the Display Handset (DH) and Remote Handset (RH). Power both units on.
- Connect the RJ45-to-RJ45 patchcord that you plan to use as the RH patchcord to the adapters of the DH and RH units.
- From the DH Ready screen, select Field Calibration. The Calibration screen appears. Select **START** to begin the calibration.
- Select **START** again to perform the second calibration process. Each step will take about 10-20 seconds to complete.
- At the completion of this calibration process disconnect the RJ45 patchcord from the DH unit, leaving the RJ45-to-RJ45 patchcord attached to the RH unit.

Step 3

- Insert the second (DH) RJ45 to Block Plug patchcord into the DH unit where the RJ45 end is connected into the DH unit adapter and the block plug is left open-ended.
- From the DH Field Calibration screen, select **START** or press **AUTOTEST** to begin the third calibration process.

Step 4

- From the RH, press **AUTOTEST** to begin the fourth calibration step.
- If calibration is successful, the DH will briefly Display “Calibration Complete” and the RH will briefly display the PASS light. The handsets and the patchcords are now ready for testing procedures.
- If calibration is unsuccessful, the DH will briefly display either a Warning screen displaying “No Remote Handset” or a Calibration Failure screen.

Calibrating the tester for the 66 Block System:

Steps 1 and 2

- Connect the RJ45 adapters to the Display Handset (DH) and Remote Handset (RH). Power both units on.
- Connect the RJ45-to-RJ45 Patchcord that you plan to use as the RH Patchcord to the adapters of the DH and RH units.
- From the DH Ready screen, select Field Calibration. The Calibration screen appears. Select **START** to begin the calibration process on the (RH) Patchcord.
- Then select **START** again to perform the calibration process. This will take about 10-20 seconds to complete.
- At the completion of this calibration process disconnect the RJ45 patchcord from the DH unit leaving the RJ45-to-RJ45 patchcord attached to the RH unit.

Step 3

- Connect the RJ45/66 Block adapter to one end of the DH RJ45 patchcord.

Note: If field testing a TIA-568A connection system, use a T568A calibration adapter. If field testing a TIA-568B connection system, use a T568B calibration adapter.

- Insert the other end of the DH patchcord into the DH unit, leaving the block adapter connection open-ended.
- From the DH Field Calibration screen, select **START**, or press **AUTOTEST** to perform the third calibration process.

Step 4

- Press **AUTOTEST** on the RH to perform the fourth calibration process.
- If calibration is successful, the DH will briefly Display “Calibration Complete” and the RH will briefly display the PASS light. The handsets and the patchcords are now ready for testing procedures.
- If calibration is unsuccessful, the DH will briefly display either a Warning screen displaying “No Remote Handset” or a Calibration Failure screen.

AUTOTEST AND SINGLE TEST FOR STRUCTURED CABLE

AUTOTEST SUITE OVERVIEW

Autotest is the easiest and quickest way to measure and verify your cable installation. When the **AUTOTEST** key is pressed, the LANTEK tester automatically performs a series of pre-programmed tests. These test suites are pre-determined based on either adopted or proposed standards as well as specific parameters. After all tests have been completed, the tester displays a single overall pass/fail result and individual test pass/fail results.

Autotests are performed with the Display Handset (DH) and Remote Handset (RH) connected at opposite ends of the cable under test.

Test Suites

Tests run during an Autotest depend on the cable type selected.

Autotest can be preset to automatically save test results immediately following each suite of tests, or results can be saved and printed manually. To preset these functions, see *Autotest Preferences*.

Individual sub-tests can be selected and viewed with more detailed data following completion of the Autotest using the Autotest Results screen.

Table 3-1: Preset Autotest Suites Available for Specific Cable Types

CABLE TYPES	Wiremap	Resistance	Length	Capacitance	NEXT	Attenuation	ACR	Return Loss	Impedance	Delay and Skew	Power Sum NEXT	Power Sum ACR	Headroom	ELFEXT	Power Sum ELFEXT
TWISTED PAIR PERMANENT															
Cat 5E, UTP/STP Perm	*		*		*	*	*	*		*	*	*	*	*	*
Cat 6-250 UTP/STP Perm	*	*	*		*	*	*	*		*	*	*	*	*	*
Cat 6 Midspan POE Perm		*	*		*	*	*	*		*	*	*	*	*	*
Cat 6 10GbE TSB155D 3.0 UTP/STP Perm	*	*	*		*	*	*	*		*	*	*	*	*	*
Cat 6a 500 Draft 3.0 UTP/STP Perm	*	*	*		*	*	*	*		*	*	*	*	*	*
ISO C UTP/STP 2nd Perm	*	*	*		*	*		*		*					
ISO D UTP/STP 2nd Perm	*	*	*		*	*	*	*		*	*	*		*	*
ISO E UTP/STP Perm	*	*	*		*	*	*	*		*	*	*		*	*
ISO Ea 500 Draft 753 UTP/STP Perm	*	*	*		*	*	*	*		*	*	*		*	*
ISO F 600 STP Perm	*	*	*		*	*	*	*		*	*	*		*	*
ISO F 350 STP Perm	*	*	*		*	*	*	*		*	*	*		*	*
EN50173-1 D UTP/STP Perm	*	*	*		*	*	*	*		*	*	*		*	*
EN50173-1 E UTP/STP Perm	*	*	*		*	*	*	*		*	*	*		*	*
EN50173-1 F 600 STP Perm	*	*	*		*	*	*	*		*	*	*		*	*
EN50173-1 F 350 STP Perm	*	*	*		*	*	*	*		*	*	*		*	*
EN50173.A1 D UTP/STP Perm	*	*	*		*	*	*	*		*	*	*		*	*
AS/NZS 3080 UTP/STP Perm	*	*	*		*	*	*	*	*	*	*	*	*	*	*
Graybar VIP 1000 UTP/STP Perm	*		*		*	*	*	*		*	*	*	*	*	*
Graybar VIP 2000 UTP/STP Perm	*	*	*		*	*	*	*		*	*	*	*	*	*
Nexans LANmark D UTP/STP Perm	*		*		*	*	*	*	*	*	*	*		*	*
Nexans LANmark E UTP/STP Perm	*	*	*		*	*	*	*		*	*	*	*	*	*
Nexans Epsilon E UTP/STP Perm	*	*	*		*	*	*	*		*	*	*	*	*	*
Nexans Class D UTP/STP Perm	*		*		*	*	*	*	*	*	*	*		*	*
Korean Govt Residential Perm	*				*	*									
Korean Govt Commercial Perm	*				*	*									
TWISTED PAIR BASIC															
Cat 3 UTP Link	*		*		*	*									
Cat 5 UTP/STP Link	*		*		*	*									
Cat 5 Gbit UTP/STP Link	*		*		*	*		*		*				*	
Cat 5E UTP/STP Link	*		*		*	*	*	*		*	*	*	*	*	*
ISO C UTP/STP 1st Link	*	*	*		*	*	*	*		*					
ISO D UTP/STP 1.2 Link	*	*	*		*	*	*	*		*					
TPPMD UTP Link	*	*	*	*	*	*	*	*	*						
TPDDI STP Link	*	*	*	*	*	*	*	*	*						
AS/NZS C UTP/STP Link	*	*	*	*	*	*	*	*	*	*					
AS/NZS D UTP/STP Link	*	*	*	*	*	*	*	*	*	*					
BOSCH STP Link	*	*	*	*	*	*	*	*	*	*					
BOSCH 120S Link	*	*	*	*	*	*	*		*	*					
TWISTED PAIR CHANNEL															
Cat 3 UTP Chan	*		*		*	*									
Cat 5 UTP/STP Chan	*		*		*	*									
Cat 5 Gbit UTP/STP Chan	*		*		*	*		*		*				*	
Cat 5E UTP/STP Chan	*		*		*	*	*	*		*	*	*	*	*	*
Cat 6-250 UTP/STP Chan	*	*	*		*	*	*	*		*	*	*	*	*	*
Cat 6 Midspan POE Chan		*	*		*	*	*	*		*	*	*	*	*	*
Cat 6 10GbE TSB155D 1.3.2 UTP/STP Chan	*	*	*		*	*	*	*		*	*	*	*	*	*
Cat 6a 500 Draft 3.0 UTP/STP Chan	*	*	*		*	*	*	*		*	*	*	*	*	*

CABLE TYPES	Wiremap	Resistance	Length	Capacitance	NEXT	Attenuation	ACR	Return Loss	Impedance	Delay and Skew	Power Sum NEXT	Power Sum ACR	Headroom	ELFEXT	Power Sum ELFEXT
TWISTED PAIR CHANNEL															
ISO C UTP/STP 2nd Chan	*	*	*		*	*		*		*					
ISO D UTP/STP 1.2 Chan	*	*	*		*	*	*	*		*					
ISO D UTP/STP 2nd Chan	*	*	*		*	*	*	*		*	*	*		*	*
ISO E UTP/STP Chan	*	*	*		*	*	*	*		*	*	*		*	*
ISO Ea 500 Draft 753 UTP/STP Chan	*	*	*		*	*	*	*		*	*	*		*	*
ISO E 10GbE Draft 762 UTP/STP Chan	*	*	*		*	*	*	*		*	*	*		*	*
ISO TR24750 Draft 762 UTP/STP Chan	*	*	*		*	*	*	*		*	*	*		*	*
ISO F 600 STP Chan	*	*	*		*	*	*	*		*	*	*		*	*
ISO F 350 STP Chan	*	*	*		*	*	*	*		*	*	*		*	*
EN50173-1 D UTP/STP Chan	*	*	*		*	*	*	*		*	*	*		*	*
EN50173-1 E UTP/STP Chan	*	*	*		*	*	*	*		*	*	*		*	*
EN50173-1 F 600 STP Chan	*	*	*		*	*	*	*		*	*	*		*	*
EN50173-1 F 350 STP Chan	*	*	*		*	*	*	*		*	*	*		*	*
EN50173.A1 C UTP Chan	*	*	*		*	*		*		*					
EN50173.A1 D UTP/STP Chan	*	*	*		*	*	*	*		*	*	*		*	*
AS/NZS C UTP/STP Chan	*	*	*	*	*	*	*	*	*	*					
AS/NZS D UTP/STP Chan	*	*	*		*	*	*	*	*	*					
BOSCH STP Chan	*	*	*		*	*	*	*	*	*					
BOSCH 120S Chan	*	*	*		*	*	*		*	*					
Graybar VIP 1000 UTP/STP Chan	*		*		*	*	*	*		*	*	*	*	*	*
Graybar VIP 2000 UTP/STP Chan	*	*	*		*	*	*	*		*	*	*	*	*	*
Korean Govt Residential Chan	*				*	*									
Korean Govt Commercial Chan	*				*	*		*							
SiemonUltra 6 UTP/STP Chan	*	*	*		*	*	*	*		*	*	*	*	*	*
MISC. TYPES															
LOCAL TALK	*	*	*	*		*									
ISDN	*	*	*	*	*	*	*								
DIN 44312-1	*	*	*	*	*	*	*	*	*	*					
Bavaria STP Link	*	*	*	*	*	*	*	*	*	*					
AUTOMATCH	*	*	*	*	*	*	*		*	*					
ECOMATCH	*	*	*	*	*	*	*		*	*					
FOILTEK	*	*	*	*	*	*	*	*	*	*					
PAIRTEK	*	*	*	*	*	*	*	*	*	*					
SINGLE PAIR	*	*	*	*		*									
USOC	*	*	*	*	*	*	*								
IBM COAX		*	*			*									
TWINAXIAL		*	*			*									
ARCNET		*	*			*									
CATV		*	*			*									
VW STP Link	*	*	*	*	*	*	*	*	*	*					
Cat 6-200 UTP/STP Chan	*	*	*		*	*	*	*		*	*	*	*	*	*
Cat 6-200 UTP/STP Link	*	*	*		*	*	*	*		*	*	*	*	*	*
ALLIANZ 900 Chan	*	*	*		*	*	*	*		*	*	*		*	*
Korean Emblem Grade 3 Chan	*		*		*	*									
Korean Emblem Grade 2 Chan	*		*		*	*	*	*		*	*	*	*	*	*
Korean Emblem Grade 1 Chan	*		*		*	*	*	*		*	*	*	*	*	*
Korean Emblem Premier Chan	*		*		*	*	*	*		*	*	*	*	*	*
TPPMD UTP Chan	*	*	*	*	*	*	*								
TPDDI STP Chan	*	*	*	*	*	*	*	*	*	*					

CABLE TYPES	Wiremap	Resistance	Length	Capacitance	NEXT	Attenuation	ACR	Return Loss	Impedance	Delay and Skew	Power Sum NEXT	Power Sum ACR	Headroom	ELFEXT	Power Sum ELFEXT
MISC. TYPES															
RG59 100ft/31m MAX		*	*			*		*	*						
RG59 Tri-Shield 100ft/31m MAX		*	*			*		*	*						
RG59 Quad-Shield 100ft/31m MAX		*	*			*		*	*						
RG59 300ft/92m MAX		*	*			*		*	*						
RG59 Tri-Shield 300ft/92m MAX		*	*			*		*	*						
RG59 Quad-Shield 300ft/92m MAX		*	*			*		*	*						
RG6 100ft/31m MAX		*	*			*		*	*						
RG6 Tri-Shield 100ft/31m MAX		*	*			*		*	*						
RG6 Quad-Shield 100ft/31m MAX		*	*			*		*	*						
RG6 300ft/92m MAX		*	*			*		*	*						
RG6 Tri-Shield 300ft/92m MAX		*	*			*		*	*						
RG6 Quad-Shield 300ft/92m MAX		*	*			*		*	*						
TIA 568-B.2 UTP/STP Patchcord	*		*		*			*							
CAT6 Patchcord Quality Test	*		*		*			*							
TERA Patchcord Quality Test															
CAT5E Patchord Quality Test	*		*		*			*							
ISO F 1000 Draft STP Chan	*	*	*		*	*	*	*		*	*	*		*	*
ISO F 1000 Draft STP Perm	*	*	*		*	*	*	*		*	*	*		*	*
ETHERNET															
10Base T	*	*	*	*	*	*	*								
10Base 2		*	*			*									
10Base 5		*	*			*									
100Base T Basic	*		*		*	*									
100Base T Channel	*		*		*	*									
Cat6 10GbE TSB155D 3.0 UTP/STP Chan	*	*	*		*	*	*	*		*	*	*	*	*	*
Cat 6a 10GbE Draft 3.0 UTP/STP Chan	*	*	*		*	*	*	*		*	*	*	*	*	*
ISO E 10GbE Draft 762 UTP/STP Chan	*	*	*		*	*	*	*		*	*	*		*	*

Note: ISO F 600 is available only on the LANTEK 7/7G.

TEST SETUP

1. If the LANTEK tester has not been calibrated in the past 7 days, it is recommended that you perform a field calibration.
2. Configure the tester as required. See *Setting Preferences*.
3. Select the Cable Type.
4. Disconnect the cable to be tested from all network equipment.
5. Connect the Adapters to both handsets.
6. With the appropriate patchcords, connect the Display Handset patchcord to one end of the link and the Remote Handset patchcord to the opposite end.
7. Press **ON / OFF** key to power up the Display Handset.

   Note: The Remote Handset will be powered up automatically by the Display Handset when the AUTOTEST begins. LANTEK Channel Adapters and patchcords are used for both Permanent Link and Channel Link testing. The LANTEK unit will set the Reference Plane and Test Limits according to the type of test selected. For Fiber testing, the RH must be powered on manually.

TEST SEQUENCE

When the **AUTOTEST** button is pressed, the following actions occur:

1. The DH firsts attempt to communicate with the RH (Remote Handset) using one correctly wired pair. If it is unable to establish communication, the DH will display a message that it is looking for the RH and continue trying until the Autotest is manually canceled or the RH is found.
2. Once communication with the RH is established, its serial number is checked to see if current field calibration data exists. If a field calibration has not been performed in the last 7 days with the RH unit, the Autotest will be aborted and a "Calibration Required" message will display.
3. If the serial number is valid, the DH will proceed with the specified Autotest. The first test performed in most Autotests is the Wire Map for twisted pair cable types.
4. After running the Wire Map test, Autotest runs the remaining tests specified for the currently selected cable type. You have the option of specifying (in Autotest Preferences) that testing halt after any failed test or proceed through the entire Autotest series regardless of test failures.
5. Once an Autotest has been completed, all of the test data can be reviewed, saved, and printed.
   - The test results for the last Autotest are held in non-volatile memory and available for review or storage, even after power is cycled off and back on.
   - The last Autotest results remain in non-volatile memory until they are either replaced by new test results, the memory is cleared, or any Analyze test is performed.

SETTING AUTOTEST PREFERENCES

1. Select the Preferences on the Ready screen. The Preferences screen appears.
2. Select Autotest Preferences. The Autotest Preference screen appears.
3. Press the **ARROW** keys to highlight the desired option.
4. Press Select to activate or deactivate an option.
5. Press **ENTER** to accept the selected Autotest Preferences or press **ESCAPE** to exit this screen without making changes.

RUNNING AUTOTEST AND UNDERSTANDING RESULTS

Autotest performs comprehensive tests using programmed testing limits. An overall pass or fail is displayed along with individual test results.

Before beginning Autotesting, connect the Display and Remote handsets to the cable or link to be tested.

1. Press **AUTOTEST**. During the Autotest, the handset unit will display a progress screen.
2. If the RH unit is not found, a "Searching for Remote Handset" warning message is displayed on the DH. Press **ESCAPE** to cancel the test and return to the Ready screen.
3. If the RH is found, Autotest compares the cable test readings to standards for the cable type selected and issues pass/fail statements for each test.
4. When the Autotest is completed, an overall result of pass or fail is displayed at the top right of the test information columns. Results for individual tests are displayed opposite each test name.

5. To begin another Autotest, press **AUTOTEST**. If results from the current test have not been saved, you will be prompted to discard or save the current test results before the next Autotest will run.

   Note: The tester also performs real time Analyze testing that enables you to troubleshoot problem areas. If Autotest results indicate a failure, refer to the Analyze Testing section for further details.

INTERPRETING AUTOTEST RESULTS

Pass/Fail Reporting

The overall Autotest result is displayed at the top right of the Autotest display screen. Individual Autotest results are displayed to the right of each test.

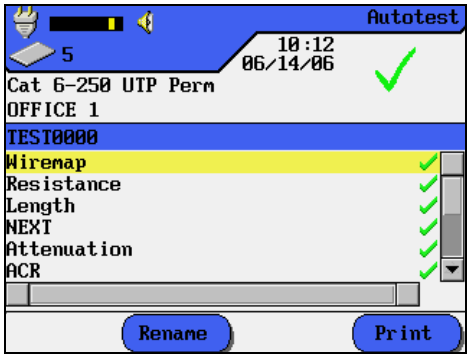


Figure 3-2: Typical Overall Autotest Results Screen

Table 3-2: Test Result Symbols

Symbol	Overall Autotest Result
✓	Overall test result is a pass if each individual test is a pass or a pass*.
✗	Overall test result is a fail if one or more individual test is either a fail or a fail*.

Viewing Current Autotest Results

Results can be viewed at completion of the test sequence or saved for later viewing.

1. Press the **ARROW** keys to highlight the desired test.
2. Press **ENTER** to view test results.

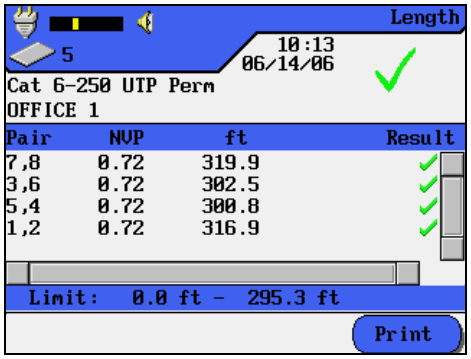


Figure 3-3: Typical Individual Autotest Results Screen

3. When finished, press **ESCAPE** to return to the Autotest screen.

Understanding Test Failures

A failure result for Autotest indicates that one or more tests did not meet minimum cable parameter levels for the cable type selected.

Note: Be sure that you have selected the correct cable type and are using appropriate connectors and links.

Identifying which tests failed and the characteristics of the failure will determine the type of fault. If the Autotest shows a failure on a particular sub-test, perform Analyze testing for the failing test in order to troubleshoot the cable.

When more than one test fails on Autotest, the test order used for troubleshooting is an important element in eliminating the source of the problem.

If any tests fail, Analyze tests should be performed in the following order:

1. Wire Map
2. DC Resistance
3. Length
4. Delay and Skew
5. Impedance
6. Attenuation
7. NEXT
8. Dual Return Loss

Refer to the *Analyze Testing* section to run these tests.

WARNING SCREENS

In response to a change in parameter(s), failure, harmful condition, or operational limitation, the tester will display a warning screen advising you of the activity or request you are engaged in. The screen will prompt you to YES (continue) or NO (exit).

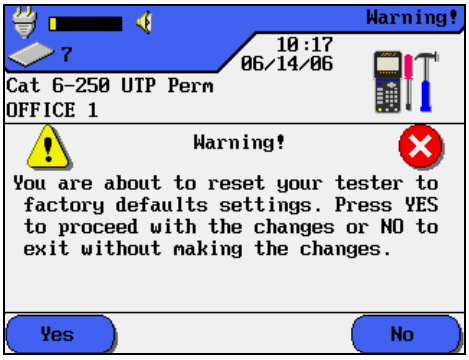


Figure 3-4: Sample Warning Screen

USING JOBS TO STORE TEST RESULTS

The LANTEK tester can store cable test results under separate Job names. You can create Jobs, assign any name to them, and store test results on a Job-by-Job basis. By using Jobs, you can logically group and store test results in a descriptive manner

You can set up a separate Job for each floor in a building, each building on a campus, each customer, or for any other user-defined classification.

To create a New Job:

1. Select Stored Results on the Ready screen. Press **ENTER**. At this point, you will see a list of all the jobs which are currently available. If you have never created a Job, the list will be empty.
2. To create a new Job select Options. The Job Options screen appears.
3. Press the **ARROW** keys to select New Job. Press **ENTER**. The New Job screen appears.
4. Type a name into the text field on the New Job screen using the alphanumeric keyboard. Press a key a second or third time to select the second or third character on the key. Press the **RIGHT ARROW** key or wait a few seconds to advance to the next character position.
5. After entering the name, press **ENTER**, returning to the Job Options screen where you can Access Job information, Delete Jobs, Rename Jobs, make a Job the current Job, or create more Jobs. The new active job name is displayed at the top left corner of the display.

SAVING CURRENT AUTOTEST RESULTS

The maximum individual Autotest results of 500 TIA CAT 6 with graphs or 30,000 plus without graphs can be stored in the LANTEK internal tester memory and accessed later using the Test Results menu. Autotest results can be saved immediately following the test.

- Only overall passed Autotests can be automatically saved.
- The entire set of test results is saved as one file.
- Test results are automatically saved if the AutoSave preference is enabled. Refer to Setting Preferences.
- Test names are automatically assigned to completed tests. If a different name is desired, a test can be named manually using the 'Rename' selection.

To manually save Autotest results (AutoSave Disabled):

1. Press **SAVE**. The Test Saved screen will be displayed for a brief period, showing the name the test is saved under.
2. If the current name already exists, a warning screen appears asking you to overwrite the currently existing file or rename the results to another file or new file name.
3. Press **NO** to exit and return to the previous screen without performing a save operation. Press **YES** to overwrite the existing file.
4. Select Save As to rename the current test. The Save Test screen will appear with a new name option.
5. Press **ENTER** to accept the change and return to the Test Results screen.

VIEWING OR DELETING STORED AUTOTEST RESULTS

You can view, print, delete or rename the Stored Results files.

When an Autotest or TDR is saved, the data is stored with a unique name. Test results can be viewed, printed, or deleted from the Stored Results screen.

1. Select Stored Results on the Ready screen to open the Job List screen.
2. Highlight the desired Job.
3. Select Select to choose the desired Job.
4. Select Options to open the Options screen.
5. Press the **ARROW** keys to highlight the desired selection.
6. Press **ENTER** to perform the desired option.
7. Press **ESCAPE** at any time to return to the previous screen.

Job and Test Options

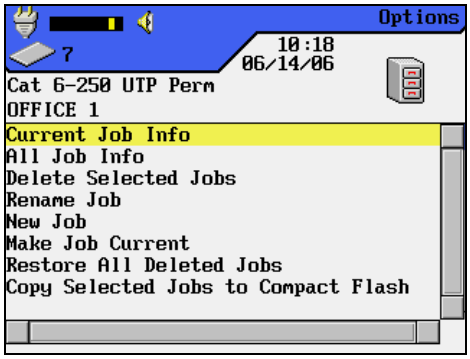


Figure 3-5: Job Options Screen

Table 3-3: Job Options

Option	Description
Current Job Info	Total number of tests passed/failed, cable length, and memory used for current job.
All Job Info	Total number of tests passed/failed, cable length, and memory used for all jobs.
Delete Selected Jobs	Selected jobs are deleted and sent to the internal wastebasket.
Rename Job	Change name of currently highlighted job.
New Job	Add new job to the job list.
Make Job Current	Activate the highlighted job. Saved tests (Autotests) will be stored in this job.
Restore All Deleted Jobs	Restore all deleted jobs currently in the internal wastebasket.
Copy Selected Jobs to Compact Flash	Copy all tests of the selected job from internal memory to Compact Flash.

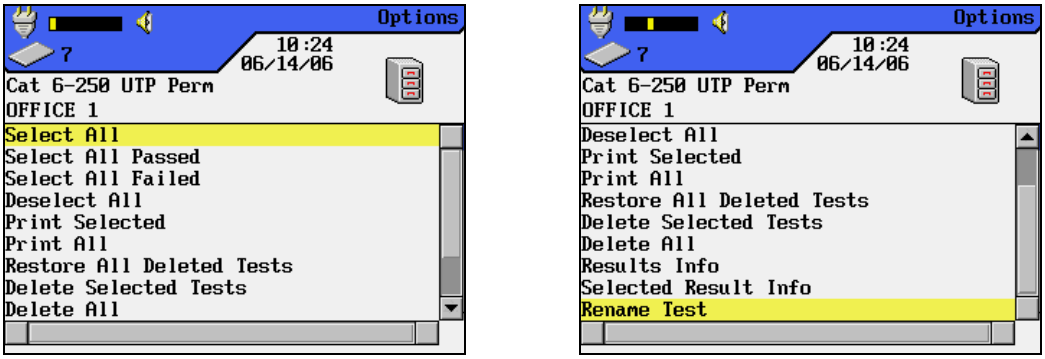


Figure 3-6: Test Options Screen

Table 3-4: Test Options

Option	Description
Select All	Select all stored test results.
Select All Passed	Select only passed tests for processing.
Select All Failed	Select only failed tests for processing.
De-select All	Unmark all stored test results.
Print Selected	Print selected test results.
Print All	Print a summary of stored test results.
Restore All Deleted Tests	Restore all deleted test.
Delete Selected Test	Delete marked test results.
Delete All	Delete all stored test results.
Result Info	Display test result information such as number of tests, number passed and failed, length tested, and memory used.
Selected Result Info	Display the results of selected tests.
Rename Test	Rename selected test result.

AUTOTEST GRAPHS

Autotest results can be viewed at the completion of the test sequence in either a tabular or graphical format.

Graphing Facts

Graphs can be very useful for viewing test results. There are a few things you need to know before you start using them:

- In Autotest Preferences, you can set your tester to include and save graphs with test results.
- The limit and worst case margin parameters are displayed at the bottom of the tabular test screen.
- When you go to graph view, the vertical cursor is placed at the worst case margin location.

To view an Autotest graph:

1. Configure the Autotest Preferences.
2. In Autotest Preferences, make sure the Save Graphs checkbox is selected.
3. Press **AUTOTEST**. Upon completion of the test suite for the cable type selected, the Overall Autotest results screen displays.
4. To display tabular data, highlight the desired test result (the NEXT test) and press **ENTER**.
5. To display a graph of the tabular data, highlight the tabular data of interest (pairs 7, 8 and 3, 6) and press **ENTER**.
6. The graph will always open with the cursor positioned on the worst case margin. In this example, the cursor is positioned on the horizontal axis at 215.00 MHz.
7. Press **ESCAPE** to return to the previous screen.

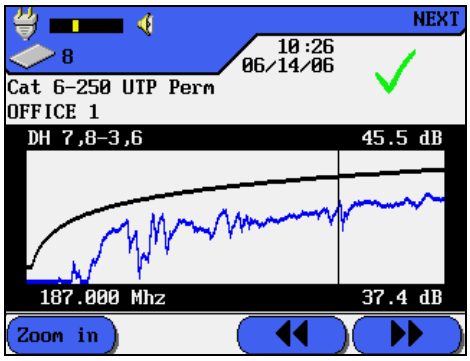


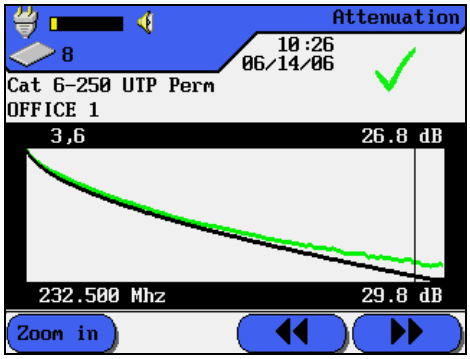
Figure 3-7: Typical Autotest Graphic Display

Graph Formats, Layouts, and Controls

Graphs are useful for observing the relationship between two network cable parameters, actual measured parameters and predefined worst case margins.

There are two different graph formats: single and dual plot.

Single Plot



Dual Plot

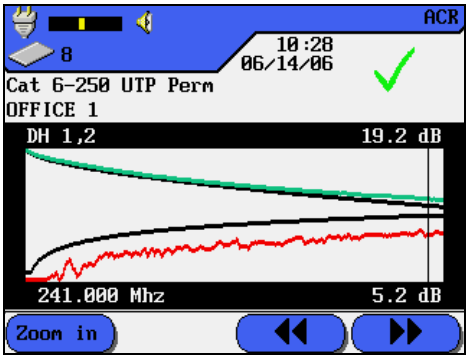
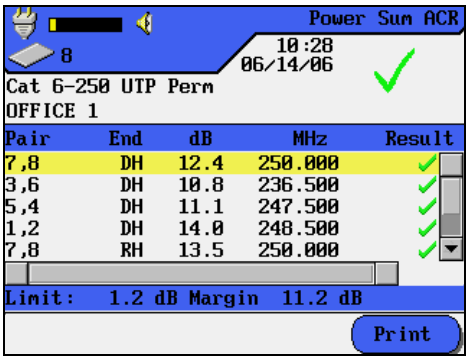


Figure 3-8: Single and Dual Plot Graphic Display

Layout and Controls

The horizontal axis represents frequency data and the vertical axis represents the measured values in dB, with limits indicated as a solid line trace.

Tabular View



Graphic View

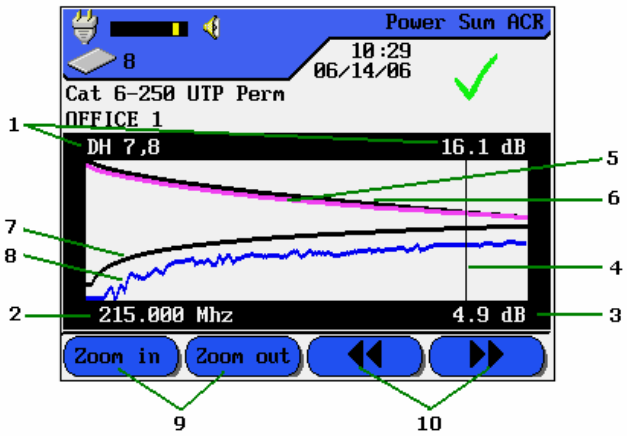


Figure 3-9: Autotest Tabular Data and Graphic View Layout

Note: The margin data at the bottom right of the Tabular screen represents the worst case difference between the actual measured data and the predefined limit threshold as shown by the cursor position in the graph on the right.

Table 3-5: Autotest Graph View Layout and Controls

Item	Function
1	Wire pair plotted from tabular data.
2	The horizontal axis represents frequency data.
3	The vertical axis represents measurements in dB.
4	When a wire pair graph is first displayed, the cursor is automatically positioned at the worst case limit and frequency point.
5	Actual data plot for a wire pair. Attenuation is plotted in this example.
6	Predefined worst case limit plot for attenuation.
7	Predefined worst case limit plot for NEXT.
8	Actual data plot for a wire pair. NEXT is plotted in this example.
9	Expands or compresses the horizontal axis of the graph. At full magnification, these keys become inactive.
10	Arrow keys are used to move the cursor horizontally. As the cursor moves, screen readouts will change to reflect cursor position. - Use the soft keys to move the cursor in large steps. - Use the key pad keys to move the cursor in small steps. - Hold the **SHIFT** key while using the **ARROW** keys to make large cursor steps.

ANALYZE TESTING FOR STRUCTURED CABLE

ANALYZE SINGLE TEST MODE OVERVIEW

Analyze mode allows you to troubleshoot by running individual tests, making adjustments, and observing changed test results. For example, a failed capacitance measurement can indicate crimped or stretched cable. With Analyze testing, you can walk the cable and check for damage and stretching. Freeing the cable at suspected problem areas should improve the measured reading.

Depending on the cable type and defined test standard, any or all of the following individual tests are available:

Wire Map	Resistance	Length
Capacitance	NEXT	Attenuation/Insertion Loss
ACR	Return Loss	Impedance
Delay and Skew	Power Sum NEXT	Power Sum ACR
Headroom	ELFEXT	Power Sum ELFEXT
TDR		

Note: The RH is required to perform all tests with the exception of: TDR, Resistance, Length, Capacitance, Impedance, and Delay & Skew.

Wire Map Test

Wire Map testing is used to locate shorts, opens, and miswires. Test results are displayed graphically for easy visual indication of any problems.

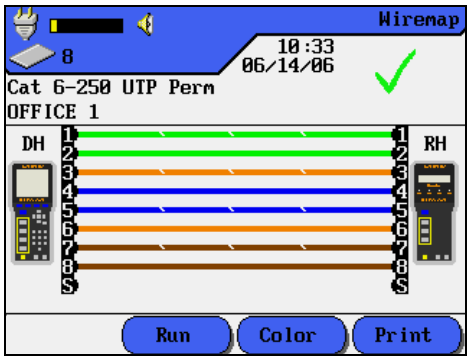


Figure 3-10: Wire Map Test Screen

Wire Map Errors

A failure in a Wire Map should always be the first problem corrected, since it causes faults in other tests. One open pin can cause DC loop resistance and attenuation tests to fail. An open may also cause a zero capacitance reading, and will cause false readings in NEXT tests.

A wire map test will always look for and map all nine possible wires (four pairs + shield) but will only consider wires defined as present in the selected cable type for pass/fail criteria. For example, a wire that is not specified in the cable type will show on the map but will not cause a test failure.

The Wire Map test guarantees the following minimum level of error detection (based on four pairs of conductors, shield optional):

- Any wiring error or combination of wiring errors will indicate a wire map failure.
- Any combination of up to three opens, shorts, or cross-connections will be correctly identified.
- Opens and shorts will provide an indication of the cable end that the error occurred on (provided by Length screen results in Autotest).
- Split pairs will be identified based on specific patterns of inconsistent NEXT (Near-End Crosstalk).

Troubleshooting Wire Map Problems

Problem: One or more open pins

Probable Causes	Connector-to-wire punch down not mated Defective jack or plug. Broken wire(s).	
Other Tests Affected	**Test**	**Possible Result**
	DC Resistance	Fail.
	Attenuation	Fail.
	NEXT	Some false measurements.
	Mutual Capacitance	0 reading possible.
	Length	May be low if the open is near the DH.

Problem: Shorted pins

Probable Causes	Conductors making contact at a connector. Jack or plug has pin or circuit defect. Cable damaged.	
Other Tests Affected	**Test**	**Possible Result**
	DC Resistance	Low or zero.
	Attenuation	Fail.
	NEXT	Some false measurements.
	Capacitance	Over limit.
	Length	Reduced or shorted pairs.

Problem: Miswired pins

Probable Causes	Conductors reversed at a connector.	
Other Tests Affected	**Test**	**Possible Result**
	Usually none	Infrequently, one or more tests may fail.

Wire Length Test

This test measures the length of each wire pair to make sure that the recommended limits for the particular cable type are not exceeded. The Wire Length Test is mainly used for informational purpose only. Depending on the units selected in the Setup menu, length is reported in either feet or meters.

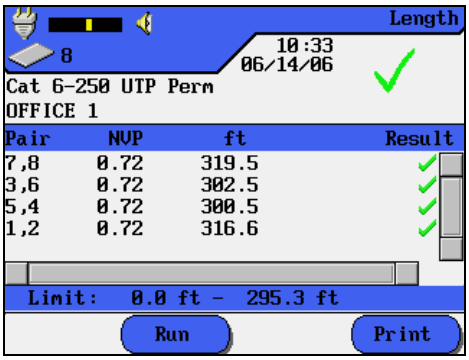


Figure 3-11: Wire Length Test Screen

Length and NVP

Measuring the length of the cable requires that you know the Nominal Velocity of Propagation (NVP) of the cable. Refer to the specification or the manufacturer of the cable you are testing for the cable NVP. If the wire specification is not available, use a known length of good cable (100 - 200 feet) and use the calculate NVP function to enter the total length of the cable and calculate the correct NVP.

Wire Length Errors

Lengths may differ slightly between pairs in the same cable, due to minor NVP differences between the pairs and physical length differences due to twisting patterns. When electrically measured cable length varies too much from actual length, a problem exists.

Troubleshooting Wire Length Problems

Problem: Length between a pair of the same cables varies by more than 10%.

Probable Causes	Incorrect NVP. Excessive cable length. Installed matched terminator not functioning correctly. Cable insulation damage to longer pairs. Break or short in a pair. Elevated capacitance on a pair.	
Other Tests Affected	**Test**	**Possible Result**
	DC Loop Resistance	May be slightly high or fail.
	Attenuation	May be slightly high or fail.

Resistance Test

This test measures the loop resistance of each pair of wires. The test is performed to ensure total loop resistance does not exceed recommended limits. Results are displayed with resistance in ohms for each pair and a comparison limit for the cable type.

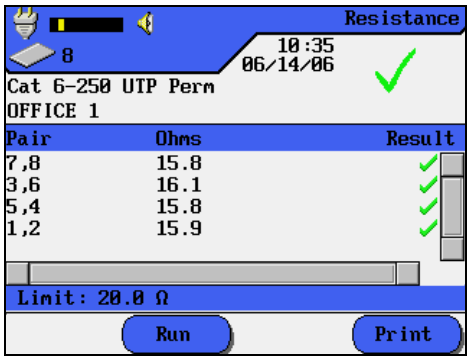


Figure 3-12: Resistance Test Screen

Resistance Errors

All four pairs of a network link should have approximately the same resistance. Pair resistance that exceeds the limit is indicated as a failure. The maximum limits in the default tables are based on the maximum length limit of the link or cable segment.

Troubleshooting Resistance Problems

Problem: Excessive Resistance

Probable Causes	Mismatched cable types. Poor punch block connection. Poor RJ-45 termination connections. Wire pair has a tap (never done). Cable damage. Shorted cable.	
Other Tests Affected	**Test**	**Possible Result**
	Wire Map	May fail.
	Attenuation	May fail.
	NEXT	May have false readings.
	Capacitance	May fail.

Problem: One wire pair has a very high DC loop resistance, others are normal.

Probable Causes	Poor connection points. Cable damage. Connector blades not fully piercing wire insulation. Worn Connector	
Other Tests Affected	**Test**	**Possible Result**
	Wire Map	May fail.
	Attenuation	May fail.
	NEXT	May have false readings.
	Capacitance	May fail.

NEXT, ELFEXT, and Power Sum Tests

The NEXT (Near End Crosstalk) and ELFEXT (Equal Level Far-End Crosstalk) tests measure crosstalk at the near and far ends of the cable in one Autotest. High levels of crosstalk can cause excessive retransmissions, data corruption, and other problems that slow the network system.

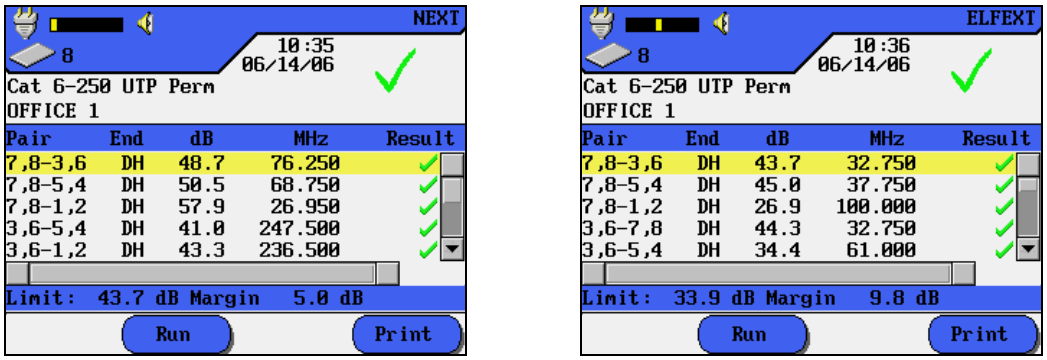
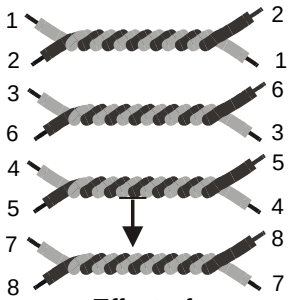


Figure 3-13: NEXT and ELFEXT Test Screens

NEXT, FEXT, and ELFEXT

The NEXT test measures cross-talk from a transmitting pair to an adjacent pair in the same cable sheath. NEXT is measured at the DH and RH.

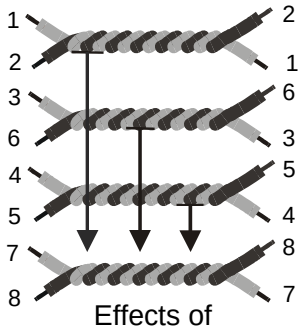


Effect of
Adjacent Pair

- The FEXT test is similar to the NEXT test except that the traffic is generated at the RH and crosstalk is measured at the DH.
- NEXT measurements are made at each end of the cable for all pair combinations (pair 1-2 vs. 3-6, etc.), yielding a total of twelve measurements.
- ELFEXT measurements are made with the DH and RH for all possible pair combinations (1-2 vs. 3-6, 3-6 vs. 1-2, 1-2 etc.) at both ends yielding a total of twenty-four measurements.

Power Sum NEXT and Power Sum ELFEXT

Power Sum tests measure the crosstalk effects of three transmitting pairs on the fourth pair in the same cable sheath.



Effects of
3 Pairs on 1 Pair

During the Power Sum NEXT test, six measurements are made at each end of the cable and combined (pairs 1-2, 3-6, and 4-5 vs. pair 7-8, etc.) for a total of eight measurements.

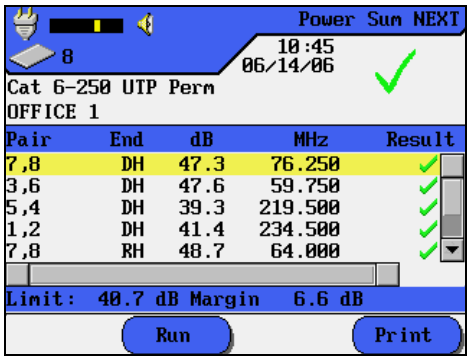


Figure 3-14: Power Sum NEXT Test Screen

During the Power Sum ELFEXT test, twelve measurements are made at the DH side of the cable and combined (pairs 1-2, 3-6, 4-5 vs. pair 7-8, etc.) for a total of four measurements.

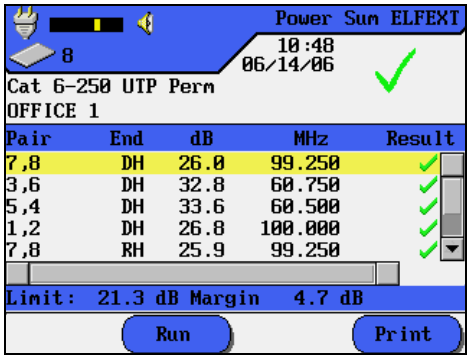


Figure 3-15: Power Sum ELFEXT Test Screen

Note: Power Sum NEXT measurements will generally read 2 - 3 dB lower in value (higher crosstalk) than conventional NEXT.

NEXT and ELFEXT Errors

Crosstalk is usually caused by poor connector termination on the ends of the cable. A low value of dB measurement reading indicates presence of high crosstalk.

Troubleshooting NEXT and ELFEXT Problems

Problem: Low dB test readings

Probable Causes	Installed cable or patch cable not correctly rated. Defective, poor quality cable or too many connectors. Poor quality installation at the connection points. Too much insulation has been stripped from the wires at termination. A pair of wires has been untwisted too much at termination. Split-pairs. Poor quality connectors or connectors not rated to desired category. Delay skew (ELFEXT). Excessive noise entering the cabling system from external sources.	
Other Tests Affected	**Test**	**Possible Result**
	Return Loss	May be over limit.
	NEXT	May show same symptoms.

Attenuation Test

This test measures the overall signal strength loss in the cable and verifies that it is within acceptable limits. Low attenuation is essential for error-free transmission. Attenuation is measured by injecting a signal of known amplitude at the Remote Handset and reading the amplitude at the Display Handset.

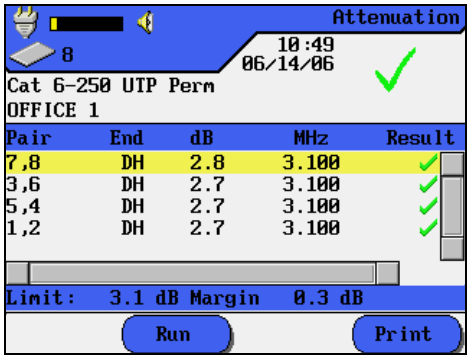


Figure 3-16: Attenuation Test Screen

Attenuation Errors

Attenuation causes a loss of signal strength over a cable. The loss increases with cable length, signal frequency, and temperature. Attenuation testing can be used to find problems in the cable, connectors, or connecting hardware. A high value of dB test reading indicates a high value of attenuation, leading to greater loss of signal.

Troubleshooting Attenuation Problems

Problem: High Attenuation Reading

Probable Causes	Poor connector termination points. Excessive cable length. Incorrect or poor quality adapter cable. Incorrect cable.	
Other Tests Affected	**Test**	**Possible Result**
	DC Loop Resistance	May be high.
	Capacitance	May be high.
	Length	May be over limit.
	NEXT	May be low on pair combinations.
	Average Impedance	May be low.
	Return Loss	May be over limit.

Return Loss Test

This test measures the ratio of reflected to transmitted signal strength. Good quality cable runs will have little reflected signal, indicating good impedance matches in the run's various components.

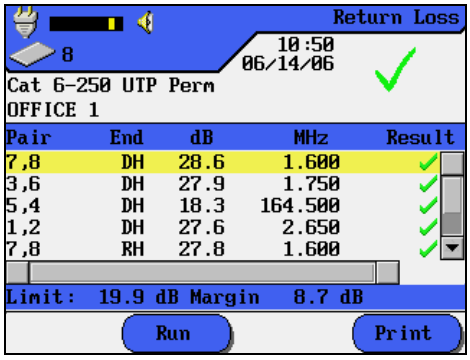


Figure 3-17: Return Loss Test Screen

Return Loss Errors

Like attenuation, excessive return loss reduces signal strength at the receive end. It also indicates a mismatched impedance at some point along the cable run. A value of 20 dB or greater indicates a good twisted pair cable. A value of 10 dB or less is severe, and causes a large reflection of signal back to the source.

Troubleshooting Return Loss Problems

Problem: Excessive Return Loss (Value of 10 dB or less)

Probable Causes	Open, shorted, or damaged cable. Installed cable, cable segments, or patch cord have improper characteristics. Damaged or worn cable or connectors. Poor punch-down. Factory splice in cable.	
Other Tests Affected	**Test**	**Possible Result**
	Attenuation	May be high.
	Capacitance and Average Impedance	Could be affected if the impedance mismatch is caused by cable damage.
	DC Loop Resistance	May be high if due to a poor punch-down.

Impedance Test

Average impedance is derived from electrical delay and capacitance measurements. The results of this test are expressed in ohms. Average impedance testing can help identify physical damage to the cable, connector defects, or cable segments with incorrect characteristic impedance.

This test uses capacitive measurements; therefore, it is necessary to specify the correct cable type in order to accurately perform the test.

Note: If a CAT 3 cable is selected (specified as the cable type where PVC is used in the cable insulation) but a CAT 5 cable (where Teflon® is used as the cable insulation) is actually used, the average impedance will be calculated incorrectly. To avoid this problem, be sure to specify the correct cable type.

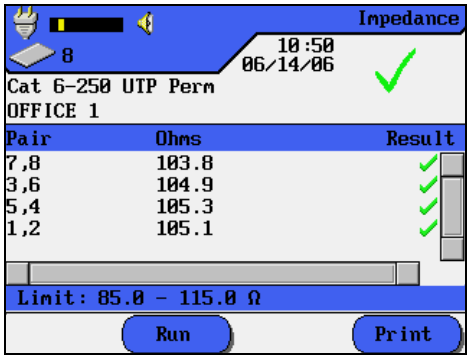


Figure 3-18: Impedance Test Screen

Impedance Errors

Impedance errors cause signal reflection and strength reduction. Average impedance of each pair should be equal to the LAN system impedance of 100, 120, or 150 Ω.

Troubleshooting Impedance Problems

Problem: High Impedance Readings

Probable Causes	Compression, stretching, or excessive bending damage to the cable. Defective connectors. Insulation damage at a connector. Ground loops created between cable shielding (if used) and equipment grounding (via RS-232 cable to computer, or auxiliary power). Improperly chosen cables or patch cords. Moisture in the cable.	
Other Tests Affected	**Test**	**Possible Result**
	Length	Affected pairs will appear longer.
	Average Impedance	Change in average impedance is inversely proportional to change in capacitance.

Delay and Skew Test

This test measures the period of time for a test signal applied to one end of a cable run to reach the other end. Skew indicates the difference between the measured time delay for that pair and the pair with the lowest value (displayed as 0.0 ns). Delay and Skew limits are set according to the currently selected cable type.

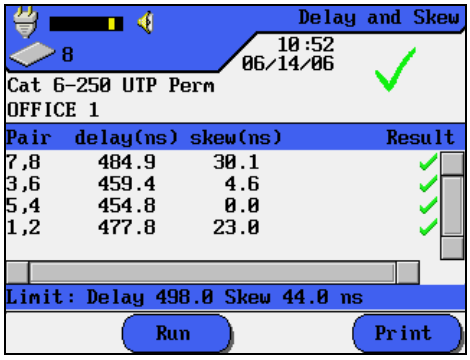


Figure 3-19: Delay and Skew Test Screen

Delay and Skew Errors

Delay and skew measurements will usually differ slightly between pairs in the same cable. A substantial difference indicates a cable installation problem or a pair defect.

Troubleshooting Delay and Skew Problems

Problem: Excessive Differences between Measurements

Probable Causes	Cables which use different materials for insulating the four pairs of wires. A break or short in the pair. Excessive cable length. Cable installation problems.
Other Tests Affected	Not Applicable

Capacitance Test

This test measures the mutual capacitance between the two conductors of each wire pair to verify that installation has not affected the capacitance for the particular cable type.

- Bulk capacitance measurements are displayed in nanofarad (nF) in the Analyze Capacitance test.
- Autotest measures the bulk capacitance in picofarads (pF) per foot or meter.

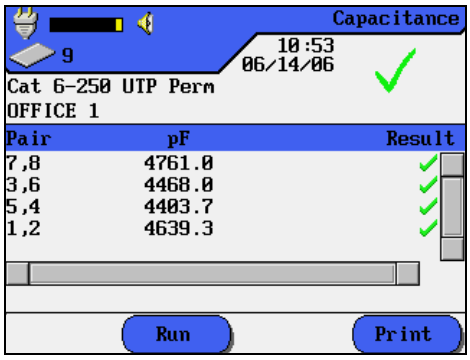


Figure 3-20: Capacitance Test Screen

Capacitance Errors

The larger the capacitance; the higher the error rate. Small changes in the capacitance measurements are normal due to the handling of the cable during shipping and installation. The addition of connectors and patch cables will also affect capacitance values.

Troubleshooting Capacitance Problems

Problem: Capacitance Exceeds the Maximum Limit

Probable Causes	Compression, stretching, or excessive bending damage to the cable. Defective connectors. Insulation damage at a connector. Ground loops created between cable shielding (if used) and equipment grounding (via RS-232 cable to computer, or auxiliary power). Improperly chosen cables or patch cords. Moisture in the cable. Poor connections at punch downs and wall plates	
Other Tests Affected	**Test**	**Possible Result**
	Length	Affected pairs will appear longer.
	Average Impedance	Change in average impedance is inversely proportional to change in capacitance.

ACR and Power Sum ACR Test

The ACR (Attenuation-to-Crosstalk Ratio) test performs a mathematical comparison (difference calculation) between the results of the Attenuation and NEXT tests. The difference reading between each pair gives an indication of how problem-free the cable pair will be for transmissions.

The ACR measurements are calculated pair-to-pair. The Power Sum ACR measurements are calculated by summing the NEXT between a selected pair and the other three pairs in the same cable sheath.

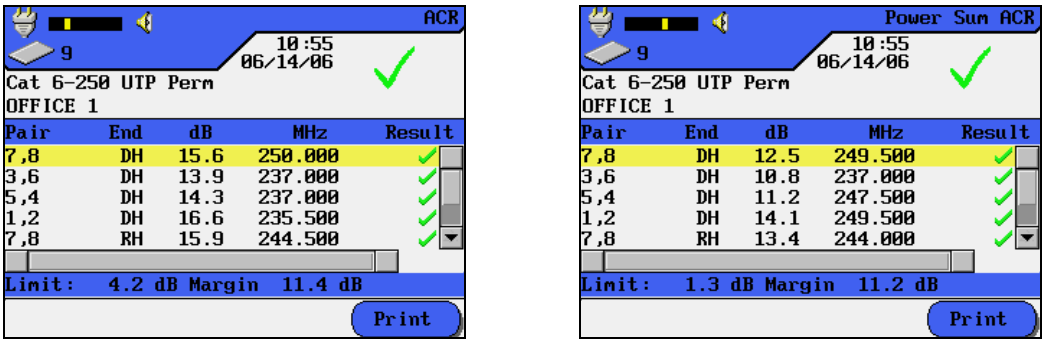


Figure 3-21: ACR and Power Sum Test Screens

ACR and Power Sum ACR Errors

A large difference reading is desirable, since it indicates a strong signal and little noise interference.

Troubleshooting ACR and Power Sum ACR Problems

Refer to the NEXT and Attenuation troubleshooting suggestions.

Headroom Test

The Headroom measurement is a mathematical analysis of the data already existing from previous tests. The calculated value is the sum of the Power Sum ACR test (Power Sum ACR of the worst pair after the attenuation for that pair has been normalized to 100 meters or 328 feet) and the additional margin between the worst case PS NEXT and the limit for PS NEXT.

Headroom provides a simplified means of reporting the margin available in a single cable run which will support an application with error-free performance. It also gives an indication of additional margin which may be achieved through the utilization of "enhanced" cable and connectors and careful installation practices.

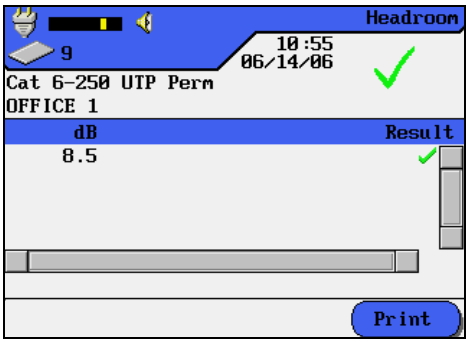


Figure 3-22: Headroom Test Screen

Headroom Errors

The Headroom number, reported in dB, characterizes the worst-case margin found in a single cable run. A large number is desirable, since it indicates a strong signal and little noise interference. The pass/fail limit for Headroom is the same as Power Sum ACR.

ANALYZE TEST SETUP

1. If the LANTEK tester has not been calibrated in the past 7 days, perform a field calibration.
2. Configure the tester as required.
3. Select the Cable Type.
4. Disconnect the cable to be tested from all network equipment.
5. Connect adapters and patchcords to both the Display and Remote Handsets using the connectors.
6. Connect the Display Handset patchcord to one end of the link and the Remote Handset patchcord to the opposite end.

   Note: Refer to Permanent and Channel Link testing for details regarding typical connections.

7. Press **ON / OFF** to power up the Display Handset.

ANALYZE TEST SEQUENCE

When an individual test is running, the following actions occur:

1. If the test requires the RH (Remote Handset), the DH will first attempt to communicate with the RH. If it is unable to establish communication, the DH will display a message that it is looking for the RH and continue trying until the Analyze test is manually canceled or the RH is found.
2. Once communication with the RH is established, its serial number is verified to the current field calibration data. If a field calibration has not been performed in the last 7 days with this RH, an appropriate "Calibration Recommended" message will display.
3. If the serial number is valid, the DH will proceed with the specified individual test.
4. If the test does not require the RH, the DH will run the test and display test data.

   Note: Pressing the ESCAPE key will cause the display to STOP scanning for the Remote and initiate the test in situations where the Remote is not required.

5. Once a test is completed, the test data can be reviewed or printed.

RUNNING A SINGLE TEST

Before beginning Analyze testing, connect the Display and Remote Handsets to the cable or link to be tested.

All Analyze tests are performed using the following procedure:

1. Select Analyze on the Ready screen to open the Analyze screen. The Analyze screen lists the tests that can be performed on the currently selected cable type.
2. Press the **ARROW** keys to highlight the desired test. Below is an example of the Length test.

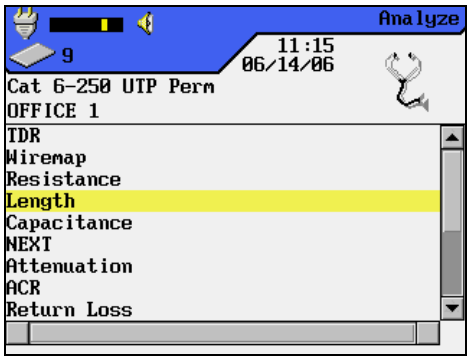


Figure 3-23: Analyze Screen

3. Press **ENTER** to start the test. During the execution of the test, the handset unit will display a progress screen.
4. Upon test completion, the tabular results screen is displayed.

INTERPRETING ANALYZE TEST RESULTS

Pass/Fail Reporting

The overall Analyze test result is displayed below the Title Bar at the top right of the display screen. Individual wire pair test results are displayed to the right of each test.

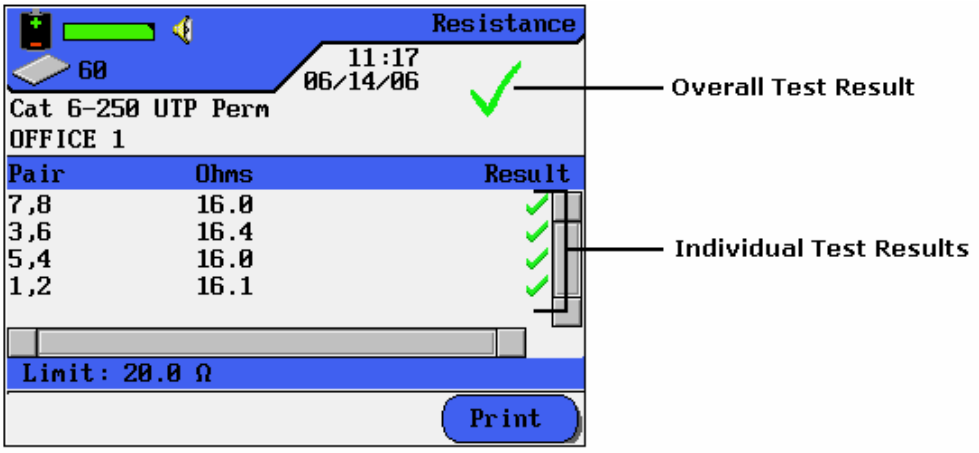


Figure 3-24: Test Results Screen

In the example above, the DC Resistance test results screen is displayed.

- An overall test result of pass or fail is displayed at the top right, below the date.
- Individual wire pair test results are displayed in the last column on the right (Result column).

Overall and Individual test result reporting is similar to the Autotest function.

Printing Analyze Test Results

A tabular test result screen can be sent directly to a serial printer. Before sending a result screen to the printer, the printer port needs to be configured.

Analyze Graphs

Certain Analyze test results can be viewed at the completion of the test sequence in either a tabular or a graphical format. Analyze graphs are similar to the Autotest graphs.

1. Run an Analyze test.
2. Position the highlighted cursor on the desired table data.
3. Press **ENTER** to display the wire pair table data as a graph.

TROUBLESHOOTING TOOLS: TDR

Time Domain Reflectometer is one of the most powerful diagnostic tools available for metallic cable troubleshooting. While conventional test methods cannot locate the fault, TDR is used to reveal conditions about a cable that simple Pass/Fail reports and raw measurements may not show.

The LANTEK tester uses the TDR test to scan the length of a cable for impedance problems, or to accurately verify the cable length. TDR is not limited to identifying just shorts or opens; it also points out any disturbances in the cable.

HOW TDR WORKS

The TDR function transmits energy into a cable pair, and the returning reflections are monitored in a manner similar to radar.

- The shape of the reflection identifies a cable deformity, open, short, or termination.
- The length of time it takes a transmitted pulse to return is used to calculate cable length.

HOW TO PERFORM A TDR TEST

Prior to running the TDR, connect the LANTEK DH to the cable or link to be tested. The TDR function is not a selected test available through custom cable setting.

TDR Test Setup

1. Select the Cable Type.
   Note: All TDR numerical information is NVP details of custom cables can be derived from the data in the cable database.
2. Calibrate and configure the tester as required.
3. Disconnect the cable to be tested from all network equipment.
4. Connect the required test lead to the Display Handset and to one end of the link (TDR does not require a Remote Handset). Refer to *Overview of Link Testing and Requirements*.
5. Press **ON/OFF** to power up the Display Handset.

Performing a TDR Analyze Function

1. Select the Analyze on the Ready screen. The Analyze screen appears.
2. Press the **ARROW** keys to highlight the TDR function.
3. Press **ENTER** to start the TDR test.
   Note: When TDR is running, relays will be heard clicking in the Display Handset.
4. At the completion of the TDR test, a graph is displayed.

THE TDR PLOT

The TDR graph is an image of the structure of the cable under test along its entire length, up to a limit of 2000 feet (609.6 meters). This graph shows anomalies by displaying blips, peaks, or valleys on an otherwise flat line.

TDR Plot Layout and Controls

The horizontal axis represents distance data and the vertical axis represents the percentage of reflection.

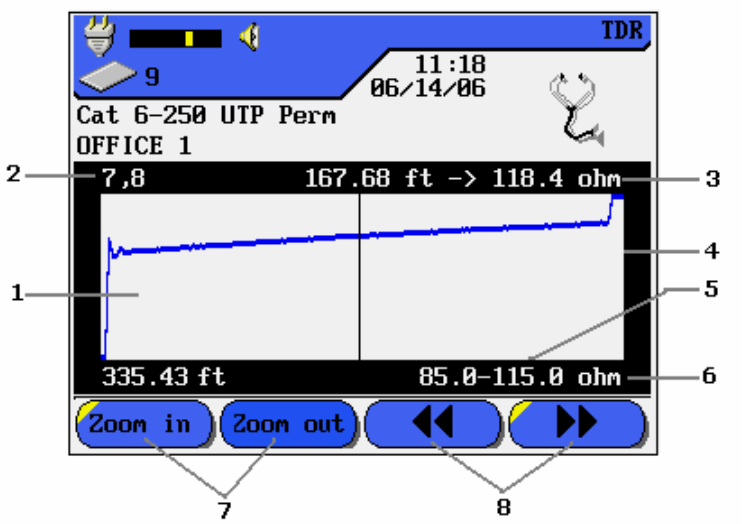


Figure 3-25: TDR Graphical Plot Layout and Controls

Table 3-6: TDR Graphical Plot Layout and Controls

Item	Function
1	Actual TDR data plot for a wire pair. When a wire graph is first displayed, the cursor is automatically positioned at the midpoint of the data.
2	Designated wire pair plotted from TDR data. (Pair A, B, C, or D)
3	Distance in meters or feet and impedance value at the cursor.
4	The vertical axis represents percentage of reflection data.
5	The horizontal axis represents distance data.
6	Left side of the display shows total length in meters or feet. Right side of the display shows the minimum/maximum level of Distance of cursor vs. total length measured in points and associated measured levels of impedance.
7	Zoom out/Zoom in keys to expand or compress the horizontal axis of the graph at the cursor.
8	Arrow keys are used to move the cursor horizontally. The screen data displayed will change to reflect the cursor position.

VIEWING TDR RESULTS

When the TDR diagnostic function is first started, the graphical plot is automatically scaled to the full length of the cable. A maximum of 2000 feet (609.6 meters) of cable results can be displayed on a TDR graph.

When TDR is first activated, the left 10% of the graph displays prelaunch impedance signal rise distance data and the right 10% of the graph displays reflection data.

- Press the **LEFT/RIGHT ARROW** keys to move the cursor horizontally. As the cursor moves, screen data displays will change to reflect cursor position.
- Press the **UP/DOWN ARROW** keys to view TDR results from a different wire pair. The TDR test runs one time and displays the results.
- Press the **ZOOM** keys to scale the graph. At the maximum or minimum limits the key becomes inactive.
- TDR results can be uploaded and saved to a PC and printed.

INTERPRETING TDR RESULTS

Always note the cable pair currently being displayed. The shape of the reflections plotted for the pair can be used to identify and locate problems. If the cable pair has no problems along the entire length of the pair, the graph will appear as follows:

- The graph has an upswing point on the left most 10% of the display (start of the cable).
- The following 80% of the graph is relatively flat.
- The graph has an upswing or downswing point on the right most 10% of the graph (end of the cable).

At the end of the cable (right-side), a slope to the top means the pair is open, while a slope to the bottom of the screen indicates that the pair is shorted.

EVALUATING A TDR GRAPH

When evaluating the TDR graph, the first consideration should be the average impedance of the cable being tested:

- A graph with sharp dips or spikes can identify anomalies.
- For subtle problems, interpretations should be based on benchmark data obtained from the analysis of many cable segments.

When anomalies are detected in the cable pair, the cursor is automatically placed on the first anomaly. Press the **ARROW** keys to highlight the anomaly of interest. Impedance and distance values will be displayed on the screen.

The following troubleshooting tips identify typical cable conditions and their corresponding screen plots.

Condition	TDR Plot Indication
Open, Near End	Upswing develops early. In comparison to good cable pairs, this pair appears shorter in length.
Short, Near End	Downswing develops early. In comparison to good cable pairs, this pair appears shorter in length.
Open, Far End	Fully developed upswing at the Far End.
Short, Far End	Fully developed downswing at the Far End.
Split Pair	20% to 30% rise in relative impedance at the split with a corresponding drop in impedance where the pair is reconnected.
Cable segment with higher than nominal impedance	Peak in the level area of the plot.
Cable segment with lower than nominal impedance	Dip in the level area of the plot.
Level Plot, much higher than the known cable NVP	Wrong cable type selected, or wrong cable type installed.
No distinct upswing or downswing at the Far End	Matched terminator attached to the cable. The pair appears to have a very long length.

STORING, RETRIEVING, AND DELETING TDR RESULTS

Storing a Graph

The TDR results can be stored in the Current Job.

1. Press the **UP/DOWN ARROW** keys to select the desired cable pair graph.
2. Press **SHIFT** key to save/print.
3. Select Save As. The Save Test screen appears. Press **SHIFT** to bring up the “Save As” or “Rename” selection if the test has already been stored.
4. The test name is automatically assigned. If a different name is desired, press **DELETE** to change the highlighted character(s).
5. When you have entered the name, press **ENTER** to accept the changes and return to the ready screen.

Retrieving or Deleting a Graph

For detailed instructions regarding retrieving or deleting stored TDR results, refer to *Viewing or Deleting Stored Autotest Results*.

TROUBLESHOOTING 10/100/1000 BASE-T

10/100/1000 BASE-T Ethernet systems use twisted pair cabling for transmission of network data frames. Both the cable and connecting hardware must meet minimum standards as specified in the IEEE 802.3 standard. The default settings for 10BASE-T network links in the LANTEK tester reflect these standards.

10/100 BASE-T systems use the 1 and 2 pins for transmit and the 3 and 6 pins for receive, as shown in Figure 7-5. The instrument passes or fails the Wire Map based on this pin configuration. If your system does not use the IEEE 802.3 wiring standard, a custom adapter is required to align nonstandard transmit and receive pairs.

1000 BASE-T systems use all four pairs in a full-duplex (bi-directional) configuration.

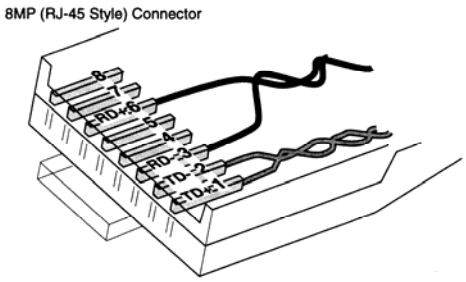


Figure 3-26: 10BASE-T Connector

CHAPTER 4
COAX CABLE FIELD CALIBRATION AND TESTING

UNDERSTANDING COAX CABLE

Coax has many desirable characteristics. It is highly resistant to EMI (Electrical Magnetic Interference) and can support high bandwidths. Many customers prefer using coax cable for CATV as well as Data applications.

A typical coax cable has the following components:

- **Center Conductor:** This conductor usually consists of a fairly heavy, solid yet flexible wire; stranded wires can also be used. Solid conductors are preferred for permanent wiring, but stranded conductors make the cable more flexible and easier to connect to equipment.
- **Insulation Layer:** Also called a dielectric layer, this layer provides electrical insulation and keeps the inner and outer conductors in precise coaxial relationship.
- **Outer Conductor or Shield:** This layer shields the inner conductor from outside electrical interference. The shield can consist of braided wires, metal foil, or a combination of both. Because of this shield, coax is highly resistant to electrical magnetic interference (EMI).
- **Jacket or sheath:** A durable plastic or Teflon jacket coats the cable to prevent damage.

Coax cable varies in impedance measurement (measured in unit of ohm), which is an indication of the cable's resistance to current flow. For example, a RG-59 and RG-6 coax cable will have an expected Impedance of 75-ohm, while a RG-58 coax cable will have a 50-ohm Impedance.

COAX STANDARDS

LANTEK can support the following Coax Standards:

CATV Standards	Ethernet Standards	Misc. Cable Types
RG59 100 or 300 ft (Tri or Quad-Shield) RG6 100 or 300 ft (Tri or Quad-Shield)	10Base 2 10Base 5	IBM Coax TWINAXIAL ARCNET

With LANTEK, AUTOTEST is the easiest and quickest way to measure and verify your cable installation. A variety of supported coaxial cable type can be found under "Cable Types". LANTEK can support coaxial cable testing to the standards identified below. Under each specific cable type, you will also find the specific test limits by executing the following steps:

1. From the DH Ready Screen, press **<SHIFT>F4** or select "Cable Type"
2. Using the **ARROW** Keys, select "Ethernet".
3. Within the Ethernet Cable Type screen, highlight cable type "10Base 2", then select the softkey **CREATE**.
4. The Create Custom Cable screen appears, use the **ARROW** KEYS and highlight "Test Limits" and press **ENTER** to view the specific test limits for this cable.

COAX AUTOTEST SUITE

CABLE TYPES	Resistance	Length	Attenuation	Return Loss	Impedance
RG59 100 or 300 ft	X	X	X	X	X
RG6 100 or 300 ft	X	X	X	X	X
IBM Coax	X	X	X		
TWINAXIAL, ARCNET	X	X	X		
10BASE2 (IEEE 802.3)	X	X	X		
10BASE5 (IEEE 802.3)	X	X	X		

COAX FIELD CALIBRATION AND TESTING PROCEDURE

Field Calibration using COAX adapters uses a modification of the LANTEK 4-step process. Since COAX testing is done for low frequencies, the additional data obtained during the calibration process is essentially ignored, and therefore the LANTEK will request one calibration process step to be performed.

To start testing COAX cable, refer to Setting Preferences and Autotest & Single Test for Structured Cable as indicated in previous Chapters for details.

Please follow the procedures below to perform cable selection of COAX cables:

Note: The LANTEK COAX adapters are configured with BNC connectors. User supplied adapters will be necessary to convert to-from BNC to F (CATV) or other connector types.

1. From the DH Ready Screen, press **<SHIFT>F4** or highlight the Cable Type icon, press **ENTER**.
2. Using the **ARROW KEYS** highlight "Misc. Types" and press **ENTER**.
3. Highlight the desired Cable Test Standard, press **ENTER**. The display will revert to the Ready Screen with the selected cable type updated.

Note: Other COAX Cable Types Available: RG59 & RG6

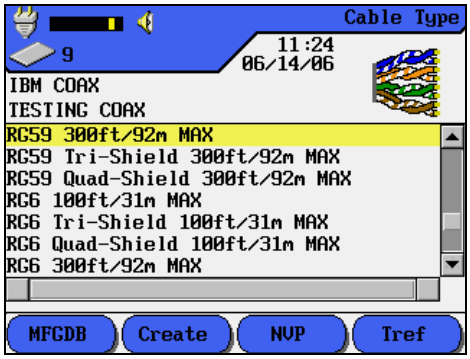


Figure 4-1: IBM COAX Cable Type Screen

For COAX Field Calibration, please follow the instruction below:

1. Connect the COAX adapters to the Display Handset (DH) and Remote Handset (RH).
2. Insert the short COAX calibration cable into both the DH and RH adapters.
3. From the DH Ready Screen, press **F3** or highlight Field Calibration icon and press **ENTER**.
4. Select **START** by pressing **F1** to begin the calibration process. Once the calibration process completion screen appears, select **ESCAPE** to return to the main screen.
5. When the calibration process is completed, the LANTEK is ready for testing.

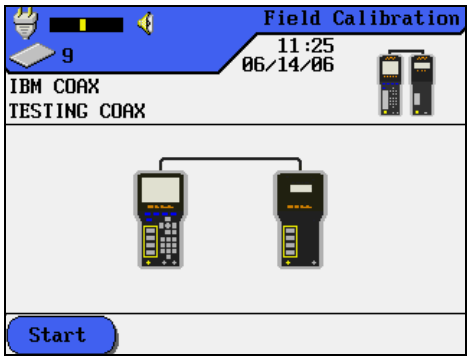


Figure 4-2: IBM COAX Field Calibration Screen

TROUBLESHOOTING COAX CABLING

Always use high quality connectors and tools to properly terminate COAX network. In case of a cable fail, look for the following cases:

- **FAULTY TERMINATION -** Make sure you have properly separated the center conductor from the shield.
- **CABLE SHORT -** This could occur from improper termination both at near-end and far-end. In case of a SHORT, look for the Resistance value on the tester. A zero (0) – Ohm resistance value will suggest the fault is at the near-end of the cable, while a ~ 20 – Ohm value will suggest the fault is at the far-end.
- **CABLE OPEN -** A common case. To diagnose this situation, look at the cable length measurement. A zero (0) cable length will suggest a fault at the near-end.
- **USE of TDR to Diagnose Problem -** The LANTEK build-in copper TDR is a good tool to identify the location of the fault and distance of the fault. Refer to the TDR operation in this manual for more details.

CHAPTER 5
FIBER OPTICS CABLE FIELD CALIBRATION AND TESTING (FIBERTEK™)

SETTING AUTOTEST PREFERENCES

Autotest is the most frequently used test mode. A number of preferences can be selected for the Autotest function:

- Autosave
- Pass Fail
- Disable Fiber Autotest Length

1. From the Display Handset Tools screen, select the Preferences.
2. Select Autotest Preferences.
3. From the open Autotest Preferences screen, set the preferences as required.

   Note: It is important that your fiber autotest settings match your certification requirements.

SPECIFYING A MODULE (FIBER TYPE)

The LANTEK must be configured by selecting the fiber test mode that corresponds to the FIBERTEK module installed in the handset.

1. Select the Fiber Optics on the Display Handset Ready screen. The Fiber Cable Type screen appears.
2. Highlight the option that corresponds to the installed FIBERTEK module.
3. If the loss budget has already been set, press **ENTER** to continue with the previously set values.

   OR:

4. Press the Budget key to enter the loss budget mode.

Loss Budget Description

The loss budget setting adjusts the pass/fail threshold for attenuation measurements made with FIBERTEK. Since the loss budget value does not affect the actual attenuation measurements, this function is for informative purposes only. When the measured attenuation is less than or equal to the loss budget, a ✓ is displayed. If the attenuation is greater than the loss budget, a ✗ is displayed. The loss budget can be set in one of two ways:

Manual Loss Budget configures a fixed loss limit value for each applicable wavelength. This mode is useful when the acceptable system loss has been specified or when testing to application specific limits such as those listed in *Appendix C, Fiber Optic Cabling Standards and Application Requirements*.

Calculated Loss Budget lets FIBERTEK calculate the limits for each wavelength based on parameters you specify. Fiber length, number of connectors and splices, and maximum attenuation for each of these are entered into the calculator to determine the proper loss budget.

Setting the Loss Budget

1. Select a wavelength by pressing the **F1–F4** keys.
2. Use the **ARROW** keys and **NUMERIC** keypad to enter a value into the Loss Budget field.
3. Select another wavelength with the **F1-F4** keys and enter the loss budget.
4. Press **ENTER** to complete the process.

Calculated Loss Budget

1. Choose a wavelength to adjust by pressing the **F1-F4** keys.
2. Press the **SHIFT** key and then select Calc to enter the Budget Loss Calculator.
3. Using the **UP/DOWN ARROW** keys to move between fields, and the **LEFT/RIGHT ARROW** keys to scroll through a field, enter values with the **NUMERIC** keypad for cable length, loss/km, splices, connectors, and repair margin.
4. Press Calc to update the budget then press **ENTER** to save. Repeat for each wavelength. Press Calc again to store values and return to the READY screen.

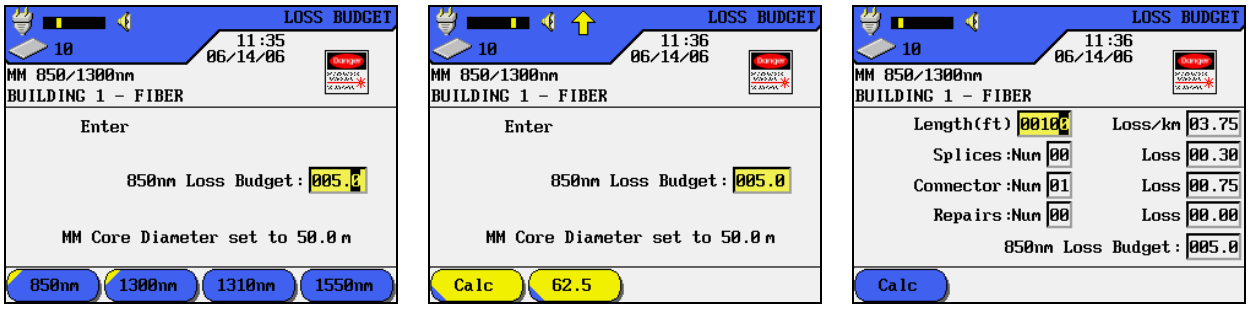


Figure 5-1: Calculated Loss Budget Screens

FIELD CALIBRATION (GENERAL)

Field calibration allows the FIBERTEK to obtain a reference level for loss measurement. The accuracy of the field calibration depends on the amount of warm-up time allowed prior to starting the calibration process.

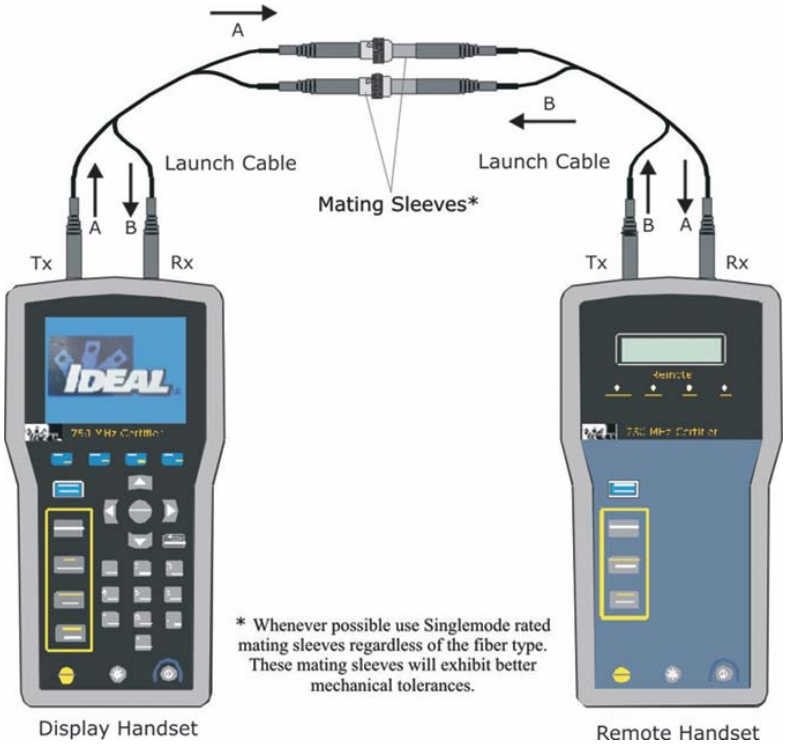


Figure 5-2: Preferred Setup for Field Calibration

Note: Allow the adapter a proper warm up time prior to field calibration. This will ensure specified accuracy. Be sure the launch cables are the same type of fiber as the cable being tested. (i.e. 50µm jumpers to test 50µm cabling)

If the FIBERTEK unit has been stored in a location substantially colder than the area where measurements are to be taken, allow the unit to warm up to the ambient temperature with the protective dust caps in place to prevent condensation on the transmitter or receiver diode lenses.

Thoroughly clean the laser and receiver lenses prior to attaching the launch cables using the Fiber Cleaning package supplied with your Basic or Premium Kit, which contains a high-quality cleaning solution and lint free wipes. Contact your local distributor for refills.

Replace dust caps immediately after launch cables are removed.

The setup depicted on this page is the normal calibration configuration for all tests that use both handsets. This includes Autotest as well as the Attenuation and Length tests, which are accessed through the Analyze menu. Calibration configuration for Loopback Attenuation is described later in this manual.

The calibration data is recorded and stored by the Display Handset. The loss effects of launch cables and couplers that were present during field calibration are subtracted from the attenuation results during testing.

When testing fiber optic cable, a field calibration is recommended every time one or more of the following events occur:

- Substantive physical movement or change to the launch cables
- Change in fiber cable type
- Change in the adapters
- Power turned OFF or ON for either of the units
- When the test setup is moved
- When a connector is disconnected from the "TX" port of a FIBERTEK module

PERFORMING A FIELD CALIBRATION

1. Connect the Display and Remote handsets as indicated in Figure 5-2. Make certain that the patch cords connected are compatible with the fiber type under test (i.e. 50μm vs. 62.5μm).
2. Turn on both handsets. For best accuracy, wait 5 minutes to allow the lasers to warm-up and settle. During the warm up time, clean all couplers and launch cables and check launch cables for dirt, scratches, and chips with a fiber optic inspection scope. Clean the connectors inside the FIBERTEK modules with optical cleaning swabs as well.
3. Select Field Calibration from the Ready screen and press **ENTER**.
4. To start the field calibration process press the **F1** key. Calibration takes about a minute after which you should see a ✓ icon indicating the calibration was successful. If the calibration fails check for the following conditions, as they are the most common causes of failure:
   - Verify the polarity of the patch cords. The transmit port (Tx) of one module must be connected to the receive port (Rx) of the other module.
   - Dirty connectors on the patchcords. Clean and inspect with a fiber inspection scope (IDEAL #45-332).

     ⚠ **Warning: Never look into a connector where the opposite end is connected to live equipment, including the FIBERTEK modules.**

   - Clean the connectors on the FIBERTEK modules with cleaning swabs. Any dirt on patch cords will be transferred to the module connectors.
   - Check for continuity of patchcords with a fiber continuity tester (IDEAL #VFF5).

AUTOTEST CONFIGURATION

Having the correct test configuration is critical to achieving accurate test results. Since FIBERTEK is a dual-fiber test system, the test configuration will vary slightly from the usual methods used with single fiber test systems.

There are two general methods used for calibration, and two methods used for testing with optical loss test sets such as FIBERTEK. These methods are described in the TIA/EIA 526-7 and 525-14 standards. These methods are commonly described as Method 'A' and Method 'A' Alternate.

METHOD 'A'

Calibration Setup

The Method 'A' calibration uses two launch cables and a set of couplers. This is the recommended calibration procedure for FIBERTEK, as it does not require disconnecting the launch cables from the modules.

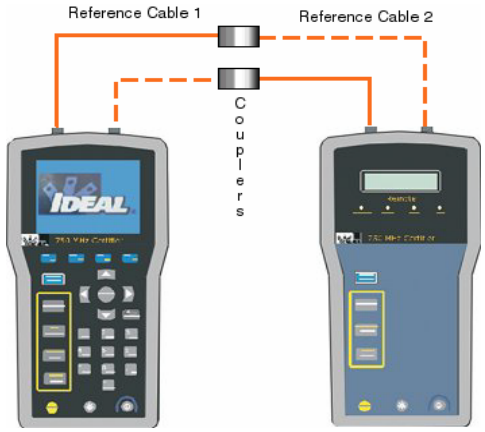


Figure 5-3: Method 'A' Calibration Setup

Test Setup

The Method 'A' test setup is best used for long fiber links where the majority of the attenuation is caused by the cable itself, not the connectors. With this configuration, the calibration reference plane is at the patch panel and work area outlet.

The measurement taken will include the loss of the fiber optic cable (including inline splices and couplers) and the individual connector at each end of the link (one pair). Since there is only one pair of connectors included in this measurement, the overall loss values may be lower than one would expect, particularly when this setup is used to test very short cables.

When used on long links of over 1km (multimode) or 4km (single mode) the loss of the connectors is small compared with the fiber, making this an acceptable setup for longer links. Use this configuration when knowing the loss of the optical fiber is more important than knowing the total link loss.

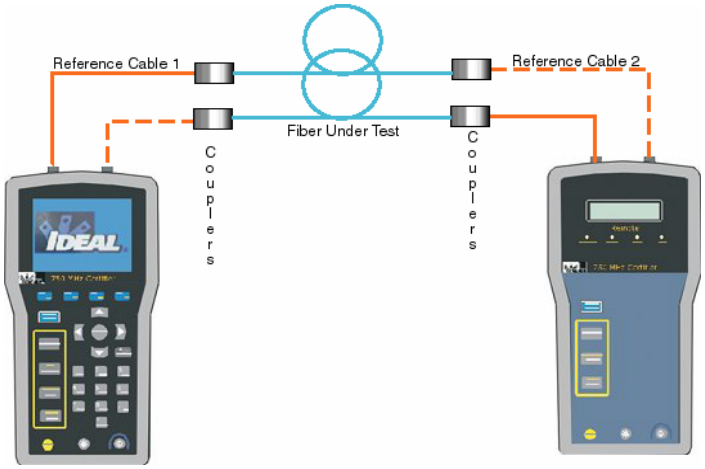


Figure 5-4: Method 'A' Test Setup

METHOD 'A' ALTERNATE

Test Setup

The Method 'A' Alternate test configuration makes it possible to use a dual fiber test system while measuring the actual loss of all the connections and fiber optic cable. By using the 'A' Method for calibration and adding a new test jumper for testing, the Method 'A' Alternate is useful for testing short links where the connectors make up a large portion of the link attenuation.

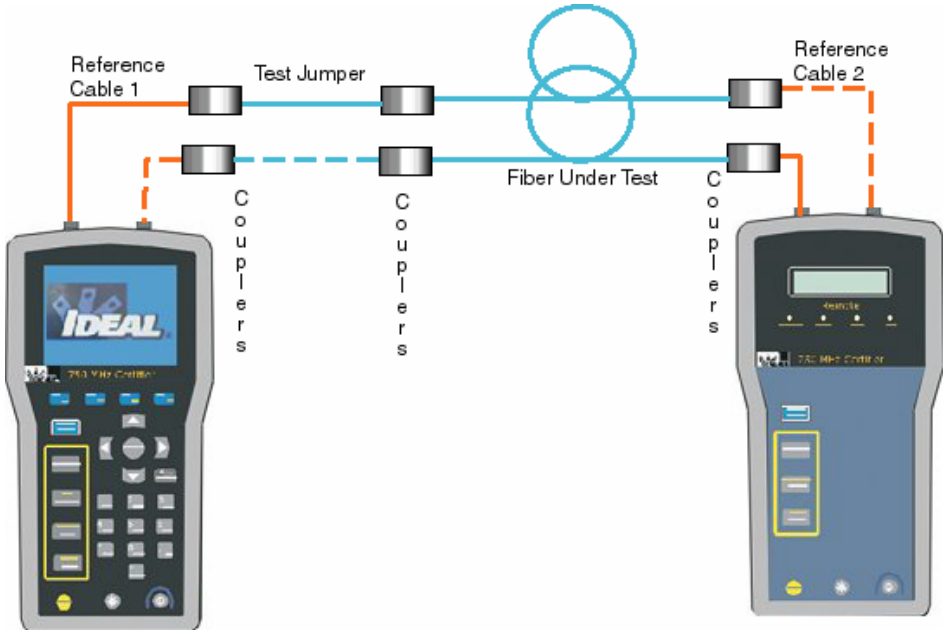


Figure 5-5: Method 'A' Alternate Test Setup

Recommended Setup

Calibration Method 'A' & Test Method 'A' Alternate

1. Following a successful field calibration as described in Method 'A', disconnect the Remote Handset launch cables from the couplers.
2. Connect another set of launch cables to the Display Handset launch cables. You should have two sets of launch cables connected to the Display Handset and one set connected to the Remote Handset.

PERFORMING A FIBER AUTOTEST

Autotest performs comprehensive tests using programmed testing limits. An overall pass or fail is displayed along with individual test results.

Fiber autotesting can be performed in either Multimode (in accordance with the TIA/EIA-526-14A Standards) or Singlemode (in accordance with the TIA/EIA-526-7 Standards).

Fiber Testing (Singlemode and Multimode)

There are four types of test that can be performed: Duplex Length, Loopback Length, Loopback Attenuation and Dual Fiber Attenuation.

Field calibration must be completed prior to performing tests. A field calibration is also recommended every time there is a change to the launch cables, fiber cable type, adapters, or when the power is turned OFF or ON for either of the units.

- The attached adapters of the handset units should be allowed to warm up for a minimum of 5 minutes to ensure accuracy.
- The launch cables of the same fiber type should be the same as the fiber to be tested. Position unattached launch cable leads on a flat surface. Allow the fiber to relax but not dangle in the air.

SETUP & CALIBRATION FOR LOOPBACK TESTING (SINGLE HANDSET)

Loopback testing allows testing fiber links using only the display handset. This type of test is convenient for testing short links or patch cords since the use of a single handset is less cumbersome than dual handsets. When loopback mode is used, only one wavelength is measured. Additionally the length result is the round trip distance. Remember that when testing a two-fiber link, the actual length will be half the reported length.

Field calibration for loopback testing requires only the LANTEK display handset, and sets the reference power level for attenuation measurements.

1. Attach the desired FIBERTEK module to the display handset. Choose Fiber from the Ready screen.
2. Select the single wavelength test that matches the module attached to the handset.
3. Select a loss budget as described earlier in the manual.
4. Select the Field Calibration option from the Ready Screen.
5. Connect one end of the reference cord to the display handset. Connect the opposite ends together with a coupler and begin calibration by pressing **F1**.

Figure 5-6: Loop Calibration Setup

LOOPBACK TESTING

Loopback testing can be performed by using either pressing the **AUTOTEST** button or selecting Analyze on the Ready Screen. Autotest performs the attenuation and round trip length, while the Analyze modes test either attenuation, length, or loopback length.

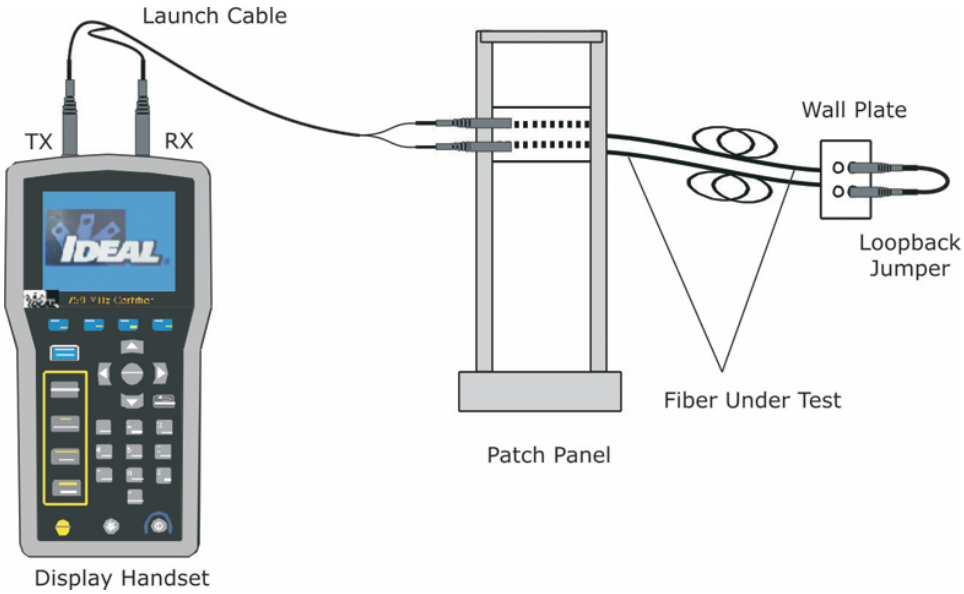


Figure 5-7: Configuration for Loopback Testing

A test result screen will appear at the completion of the test procedure.

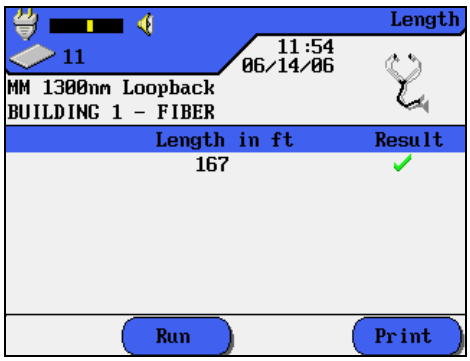


Figure 5-8: Loopback Test Results Screen

LENGTH TEST (DUAL HANDSET)

Configuration Setup for Length Testing

1. With the appropriate test adapter on the Display Handset and the appropriate test adapter on the Remote Handset, connect one end of the near end launch cable leads to the TX and RX connectors on the Display Handset adapter.
2. Connect the other end of the launch cable leads to the patch panel that connects to the fiber under test.
3. Connect one end of the far end launch cable leads to the TX and RX connectors on the Remote Handset adapter.
4. Connect the other end of the far end launch cable to the wall plate (fiber cable under test).
5. Check all connections to ensure proper contact. Upon completion, you are ready to perform a fiber test.

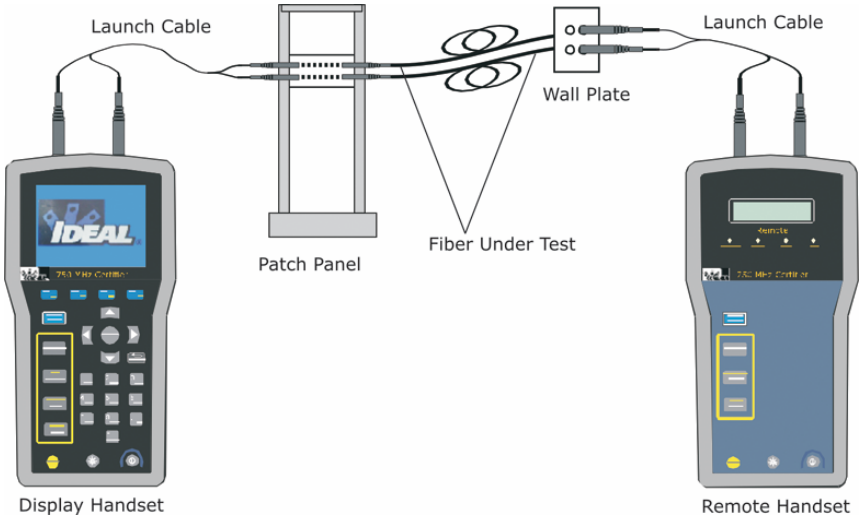


Figure 5-9: Configuration for Dual Handset Testing

6. Press the **LENGTH** key on the Display Handset or select Analyze on the Ready screen and press **ENTER**.
7. Then, select Length, and press **ENTER**.
8. At the completion of the test procedure, a test result screen will appear.

DUAL WAVELENGTH ATTENUATION TEST SETUP

1. With the appropriate test adapter on the Display Handset and the appropriate test adapter on the Remote Handset, connect one end of the near end launch cable leads to the TX and RX connectors on the Display Handset adapter.
2. Connect the other end of the launch cable leads to the patch panel that connects to the fiber under test.
3. Connect one end of the far end launch cable leads to the TX and RX connectors on the Remote Handset adapter.
4. Connect the other end of the far end launch cable to the wall plate (fiber cable under test).
5. Check all connections to ensure proper contact. Upon completion, you are ready to perform a fiber test.

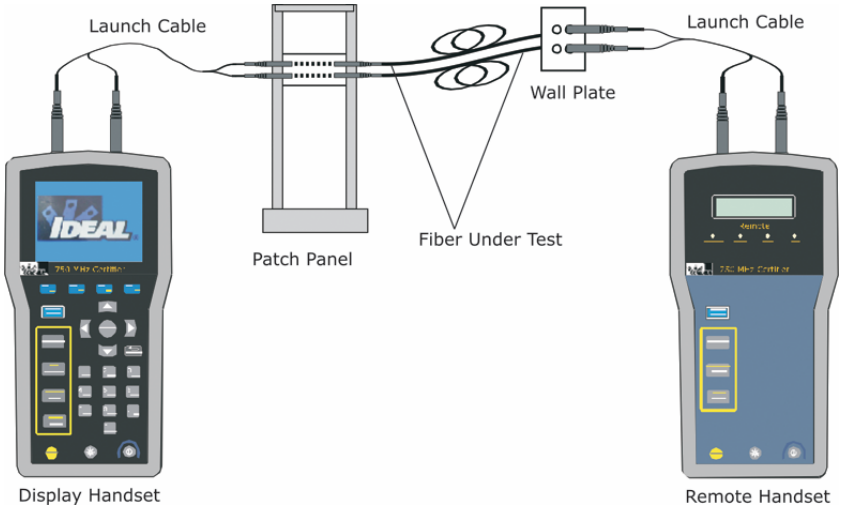
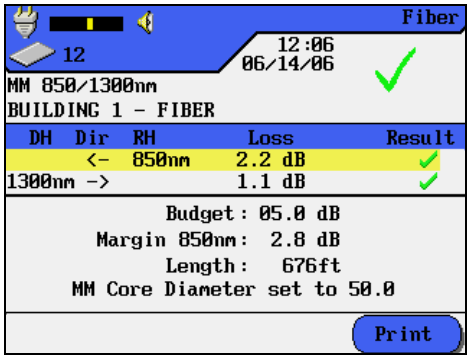


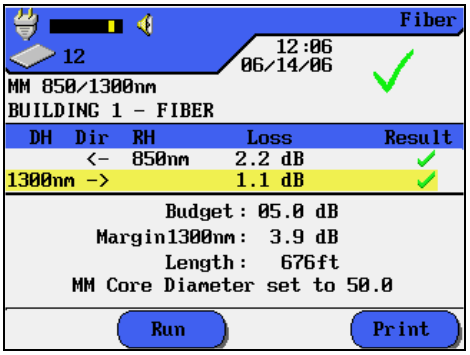
Figure 5-10: Dual Wavelength Attenuation Testing Configuration

DUAL WAVELENGTH ATTENUATION TESTING

1. Press **AUTOTEST** on the Display Handset or Remote Handset to begin the test, or select Analyze on the Display Handset Ready Screen and select Attenuation in the Analyze screen.
2. When the Autotest is completed, the results of the test are displayed.
3. Use the **UP/DOWN ARROW** Keys to view test results of different wavelengths.



Screen Results thru Autotest process



Screen Results thru Analyze process

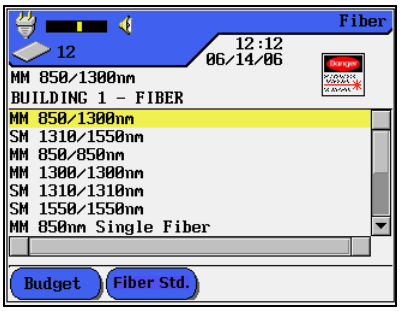
Figure 5-11: Dual Wavelength Attenuation Test Result Screens

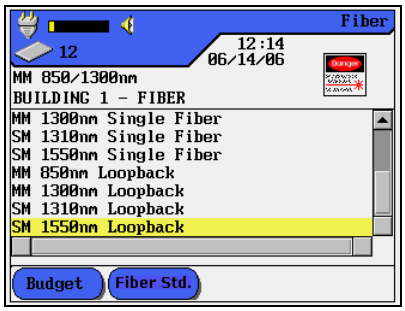
TESTING WITH FIBER STANDARDS

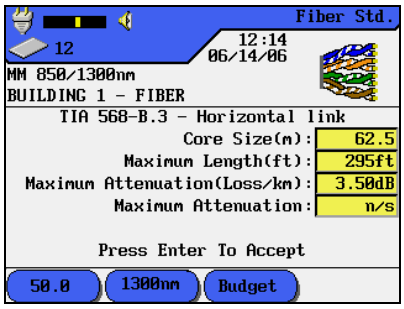
Certification of Fiber Optic Cabling is typically performed in accordance with the TIA-568 or ISO 11801 Cabling Standards where a Pass/Fail criterion is based on the length of the cable and the number of splices and connectors in a fiber link. In addition to these criteria, LANTEK can be configured to perform application specific fiber tests, which are useful when trying to determine whether a fiber link will support specific types of networking equipment such as 100BaseSX or 1000BaseLX.

To utilize these options, please follow the steps below:

1. From the DH Ready Screen, press **<SHIFT>F3** or select the Fiber icon, press **ENTER**
2. The Fiber Cable Type screen appears. Highlight the option corresponds to the installed adapters and select the softkey "Fiber Std." or **F2**.
3. Use the **UP/DOWN ARROW** Keys to highlight the desired standards for testing, and press **ENTER.**
4. The Fiber Standards screen appears. Select the applicable core size (**F1**), wavelength (**F2**), and/or setting the loss budget (**F3**) keys. Upon completion, press **ENTER**.







5. LANTEK units are now ready for testing with specified Fiber wavelength and standards.

Note: With different Standards, different softkeys of operations are provided for test setup. Refer to Appendix C – Fiber Optic Cabling Standards & Application Requirement for specific Fiber Standards.

INTERPRETING AUTOTEST RESULTS FOR FIBER OPTICS

PASS/FAIL REPORTING

The overall Autotest result is displayed at the top right of the Autotest display screen. Individual Autotest results are displayed to the right of each test.

Overall Test Result Symbols

Symbol	Overall Autotest Result
✓	Overall test result is a pass if each individual test is a pass.
✗	Overall test result is a fail if one or more individual tests is a fail.

Individual Autotest Reports

Symbol	Individual Autotest Result
✓	Pass - All values pass with sufficient margin.
✗	Fail - One or more values fail by a margin of failure greater than the instrument's specified accuracy.

SAVING CURRENT AUTOTEST RESULTS

Autotest results can be stored in the LANTEK internal tester memory or Compact Flash memory card and accessed later using the Stored Results feature. Autotest results can be saved immediately following the test.

- Only overall passed Autotests can be saved using the Autosave feature. Failed tests can be saved manually.
- Test results are automatically saved if the AutoSave preference is enabled. Refer to *Setting Preferences*.
- Test names are automatically assigned to completed tests when the Auto Increment feature is enabled. If a different name is desired, a test can be named manually using Save As.

MANUALLY SAVING AUTOTEST RESULTS (AUTOSAVE DISABLED)

1. To manually save an Autotest, select Save, located at the bottom of the screen.
2. The Test Saved screen will be displayed for a brief period, showing the name the test is saved under.
3. If the current name already exists, a warning screen appears asking you to overwrite the currently existing file or enter a new file name.
4. Press **ESCAPE** to exit and return to the previous screen without performing a save operation, or select Save to overwrite the existing file.

MANIPULATING JOB FOLDERS

When an Autotest is saved, the data is stored with a unique name. Test results can be viewed, printed, or deleted from the Stored Tests screen.

1. On the Ready screen, select Stored Tests to open the Job List screen.
2. Highlight the desired Job. Press Options to view the folder options list.
3. Highlight the desired function and Press **ENTER**.

VIEWING RESULT DETAILS

When an Autotest is saved, the data is stored with a unique name. Test results can be viewed, printed, or deleted from the Stored Tests screen.

1. On the Ready screen, select Stored Tests to open the Job List screen.
2. Highlight the desired Job. Press **ENTER** to open the job.
3. Press the **ARROW** keys to highlight the desired test record.
4. Press **ENTER** to open the record.
5. Press **ESCAPE** at any time to return to the previous screen.

MEASURING RETURN LOSS

Simply stated, return loss is the ratio of power reflected by a connector or other event compared to the power that arrived at the event. The scale of measure for return loss is dB (decibel). Because the scale of return loss is by definition a negative value, a larger (negative) number is better.

However, by convention, most people usually omit the negative sign and use it as a positive value. For example, a return loss measurement of 0 dB means that 100% of the power arriving at the connector was reflected back to the transmitter.

In reality a 0 dB measurement is impossible in fiber-optic systems; the worst reflection possible is about –14 dB which would be created by a perfect glass-to-air interface. In most cases a field polished connector will yield a return loss of approximately -30 to -40 dB, meaning .1% to .01% of the power was reflected upstream. Factory terminated Ultra Physical Contact (UPC) connectors usually perform to –50 dB or better (.001% reflection).

CHAPTER 6
FIBER OPTICS DIAGNOSTICS (TRACETEK™)

TRACETEK is a Reflective Anomaly Detection (RAD) system composed of two parts:

- LANTEK Cable Certifiers, and
- TRACETEK Optical Transceiver Module

The LANTEK Display Handset provides power, user interface, storage and signal processing capability to the TRACETEK module. The TRACETEK module converts the LANTEK electronic TDR signals to optical and optical signals back to electronic.

The primary use of this system is to locate optical reflections from cable discontinuities such as connectors, splices, fractures (i.e. cracked or broken strands) or other anomalies occurring within an optical fiber network.

Warning: The TRACETEK adapter generates light pulses exceeding 40 milliwatts of power. DO NOT look into the adapter or the fiber under test as serious eye damage may result.

TRACETEK is an alternative to using an OTDR (Optical Time Domain Reflectometer) and functions in a similar manner. Both methods will produce traces of optical back reflection for analysis by technicians. However, the Rayliegh scatter measurement used by the OTDR to infer fiber loss is not used in TRACETEK.

Note: True loss measurements can only be made with an Optical Loss Test Set such as TRACETEK's companion product, FIBERTEK.

TRACETEK VS. OTDR

OTDR OPERATING PRINCIPLES

The OTDR (Optical Time Domain Reflectometer) is a device that is able to "look" at a fiber optic cable and display a graphical representation of the events that occur on the cable. The basic concept is that a high-speed laser fires a precise pulse of light into the fiber, after which the device monitors the same fiber for reflections. The time between the launched pulse and reflected pulses represents the distance to the events that caused the pulses. This gives the OTDR the ability to not only measure the length of the fiber but to also measure the distance to each event on the fiber. This function allows the OTDR to be used as a trouble-shooting tool to find breaks in the fiber and to identify the location of individual connectors and splices.

The second feature of an OTDR is its ability to measure the tiny amounts of light that are reflected back by the fiber optic cable itself. This phenomena is known as Rayleigh scattering and is caused by light reflecting off molecules in the glass whose diameter is 1/10 the wavelength of the light. This is the same phenomenon that makes the sky appear blue. When the OTDR is able to detect these tiny reflections it can calculate the loss of the cable as well as the insertion loss of connectors and splices on the fiber cable.

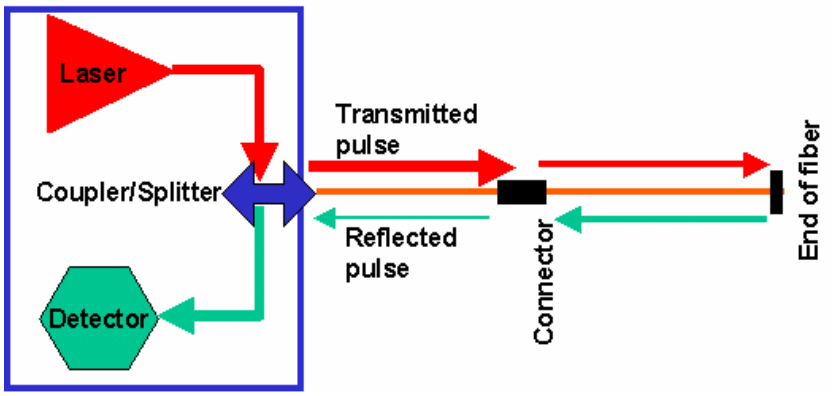


Figure 6-1: OTDR Block Diagram

OTDR History

OTDRs were first used in long distance outside plant fiber optic installations such as telecom or CATV to help document and troubleshoot fiber networks. The first generation OTDRs were massive, complex and very expensive. Most models required the use of a cart or dolly of some type to be moved, as they were heavy and bulky. These early machines did not offer any of the automatic setup features we are used to seeing today, meaning that the operator had to have a very thorough understanding of the operation of the equipment to properly configure it.

Today, OTDRs are smaller, less expensive and easier to use. But that still does not mean that the average installer can pick one up and begin using it. The technician still needs to understand the complex relationship between pulse width, dynamic range, acquisition time, Rayleigh scattering, and a myriad of other factors that determine what type of picture the technician will get from an OTDR.

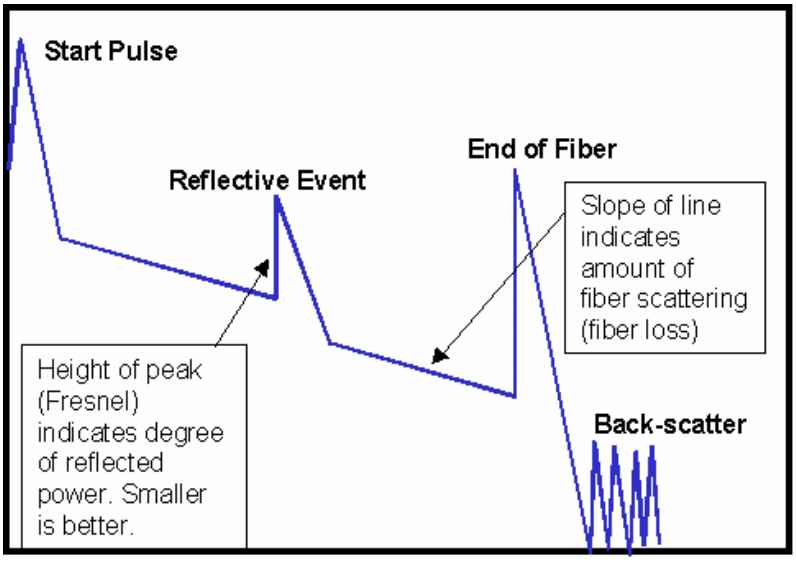


Figure 6-2: Typical OTDR Trace

TRACETEK OPERATING PRINCIPLES

TRACETEK is able to provide most of the troubleshooting functions of an OTDR at a fraction of the cost with a simple, easy-to-use interface that requires almost no training. Like an OTDR, TRACETEK fires a precise laser pulse into a fiber and monitors the fiber for return pulses. This means that like an OTDR, TRACETEK can measure the overall length of a fiber, as well as measure the distance to reflective events within the fiber.

Unlike an OTDR, TRACTEK is exceptionally easy to use. The only setup consists of choosing from one of three operating modes (High, Medium, or Low Resolution). The lightweight module is small enough that it can be carried in the installer's test equipment case, making it available in any situation that requires fiber troubleshooting. Since TRACETEK does not measure fiber scattering, it cannot measure the insertion loss of the link or individual connectors like an OTDR.

Unlike fiber test kits that also measure overall length, TRACETEK only needs to be connected to one side of the fiber to make its measurements. Traditional fiber test kits need to either have hardware connected at both ends of the fiber, or a loop-back cable installed at the far end to make its length measurement. This means that two technicians are required to test the length, or one technician can perform the test by walking back and forth to test each strand, taking twice as long to finish the job.

USING TRACETEK

The TRACETEK module uses a very high-power infrared laser for both multimode and single mode testing. The light emitted from TRACETEK is invisible, so take care when using TRACETEK or examining connectors not to look directly into the connector or examine it with an inspection scope unless you are certain the module is powered off or disconnected.

With the TRACETEK module attached to LANTEK, connect the module to the fiber under test with the included FC-ST (FC-FC for single mode) launch cable. Unlike an OTDR, TRACETEK does not require the use of long launch cables; its dead-zone is short enough that any jumper of 2 m (6 ft) or more can be used.

1. With the TRACETEK module attached to LANTEK, connect the module to the fiber under test with the included FC-ST (FC-FC for single mode) launch cable. Unlike an OTDR, TRACETEK does not require the use of long launch cables; its dead-zone is short enough that any jumper of 2 m (6 ft) or more can be used.
2. Turn on the power to the LANTEK. Choose the Analyze icon, press **ENTER**.
3. In the TRACETEK Analyze menu there are three options to choose from: High Resolution, Medium Resolution and Low Resolution. This setting will change the pulse with "laser power" that is fired into the cable. In this case resolution is the opposite of distance, meaning that the short cables are better tested with High Resolution and long cables are better tested with Low Resolution.

Table 6-1: Resolution Settings and Recommendations

Resolution Setting	Power	Distance Scale	Distance Recommendation
High	Low	Short	0-800 m (0-2625 ft)
Med	High	Short	250-850 m (820-2790 ft)
Low	High	Long	500-4000 m (1640-13120 ft)

Note: The recommendations for distance do not reflect the absolute minimum or maximum distance capabilities of TRACETEK. These are recommendations that will yield the best results in most cases. You should feel free to experiment and determine the setting that gives the best result for a particular test configuration.

HIGH RESOLUTION

High Resolution provides accurate back reflection measurement of fiber and will resolve individual events as close as 2 meters apart at rated accuracy. This setting is used to check for connector quality, optimized for short-distance cables with lengths of no more than 800 meters and mostly used on horizontal links and shorter backbone cables. This mode has a “low power” setting.

MEDIUM (MED) RESOLUTION

Medium Resolution provides accurate back reflection measurement of lengths and will resolve measure events 8 meters and up at distances of 850 meters. This setting is primarily used to locate high quality connections for documentation purposes. It is on cables between 250-850 m in length or when trying to locate low-reflection events such as mechanical splices or connectors where the polish is so good that they do not reflect enough light in the low power mode to be detected. This mode has a “long laser pulse” setting.

LOW RESOLUTION

Low Resolution provides accurate back reflection measurements for cables between 500 and 4000 meters in length, since most connectors and mechanical splices will be visible in this mode. This mode combines the “high power/long pulse” of the Medium Resolution mode with long-distance scaling.

TRACETEK OVERVIEW

High-bandwidth optical networks have become increasingly sensitive to signal transmission problems. In many cases the channel insertion loss is the only parameter that is measured to make a determination that a link’s performance is satisfactory. Channel insertion loss only measures the weakening of the signal from one end of a fiber optic link to the other, making sure that enough optical power is present at the receiver to ensure the optical transceivers can “see” each other.

FIBERTEK is an exceptional tool to certify proper link channel loss. However, in a situation when a certification test fails or there are unusual network performance problems, another tool can help isolate cabling problems.

TRACETEK is a unique tool that provides many of the useful features of an OTDR without the high cost or complex parameters to set up. An easy to use diagnostic tool, TRACETEK allows the user to measure the total length of a link, measure the distance to a reflective event such as a connector, and most importantly, identify faulty connections.

TRACETEK works by launching a high-power laser pulse down the fiber and monitoring reflections returned by the end of the cable, connectors, mechanical splices, and cable breaks. This important functionality will help locate sources of excessive reflection in the cabling system. Excessive reflection in an optical system leads to high bit error rates, preventing the network from operating at its full capability.

One of the most common sources of excessive return loss is dirty or poorly polished connectors. When there is too much reflection in a system, the reflected power can interact with the downstream signal, either increasing or decreasing the amplitude of the transmitted signal. Additionally, if the reflection is strong enough it can interfere with the feedback circuit on the laser transmitter causing fluctuations in output power. Unlike a power meter, which measures the loss across a link, TRACETEK displays the relative reflection of events in a link allowing the user to isolate and remedy problems.

TRACETEK DISPLAY

After deciding which setting is best for your situation, select the appropriate mode and press **ENTER**. TRACETEK will sample the fiber for about 30 seconds before displaying the acquired trace data.

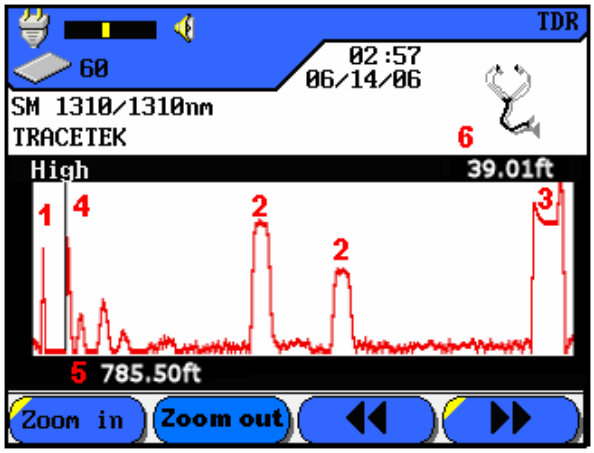


Figure 6-3: TRACETEK Display

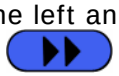
Table 6-2: Key Elements of the TRACETEK Display

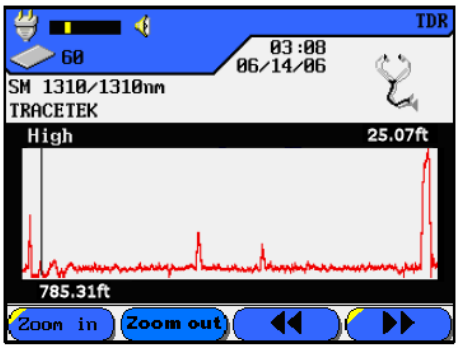
1	Start pulse (first connector)
2	Reflective events
3	End of fiber (last connector or break in cable)
4	Moveable Cursor
5	Total length of fiber
6	Cursor position

TRACETEK displays its measurement data in a graphical format similar to that of an ODTR, with the X-axis representing the distance from the handset and the Y-axis displaying the relative reflection (Return Loss) of each event. TRACETEK instantly displays the overall length to the end of the fiber and allows the operator to scroll a cursor to find the distance to any event on the screen. This functionality allows the operator to quickly measure overall fiber length, locate breaks in the fiber, locate individual reflective events, and check the relative reflection of events to identify defective connections.

The TRACETEK display provides a "roadmap" of the fiber at a glance. The number at the bottom of the screen, marker 5, indicates the measured distance to the end of the fiber. As with an OTDR, TRACETEK does not require a piece of equipment or a person at the opposite end of the fiber under test. For this reason, TRACETEK cannot differentiate between the expected end of the fiber or a break in the cable. If there is a break in the cable this reading will tell you how far down to look for the break.

- Marker 1 indicates the first connector attached to your launch jumper.
- Marker 2 indicates the two connectors in the middle of the fiber under test. The height of the reflected pulse (called a Fresnel) indicates the relative reflection of each event. In the High-Resolution mode, a good connector should not go much above the halfway point on the display. In this example, the two connectors should be cleaned, and the first appears to be a bit worse than the second.
- Marker 3 is at the end of fiber. This reflection is expected to be quite large since it is at the end of the cable and represents a glass-to-air interface.

Markers 1 and 6 indicate the user-moveable cursor and its position respectively. The cursor can be move by three methods: in very fine steps using the left and right arrow keys on the keypad, in medium size steps using the  and  soft-keys, or in large steps by holding the **SHIFT** button while pressing the **LEFT/RIGHT ARROW** keys on the keypad.

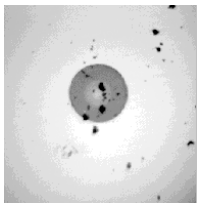


In the figure above, the display shows a trace of the same fiber as before, but the two connectors in the middle were cleaned using the IDEAL Starter Cleaning Kit included with your TRACETEK module. It is clearly evident that a dirty connector, even one that appears clean to the naked eye, can cause significant return loss problems in the link. After being cleaned, both connectors are well below half scale and should present no problems with network operation.

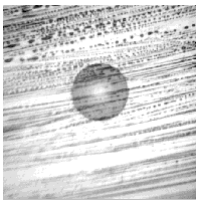
Cleaning connectors with any fiber-optic system is of utmost importance. Whenever there is any doubt about a test result, the first action is to clean the suspect connectors and retest the link.

There are many creative ways to clean connectors, and we've seen quite a few of these methods used in the field. It's also common that test technicians do not take the time to visually inspect or clean connectors before testing the link. Some technicians will check for cleanliness with their naked eyes, but the human eye cannot possibly see the type of contaminants that affect fiber-optic connectors. Cleaning is a mundane but very important task.

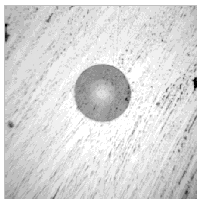
To illustrate this point, we have provided some magnified images of connectors cleaned with various methods.



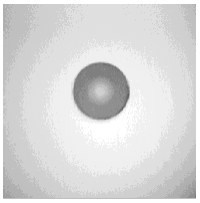
Dirty connector



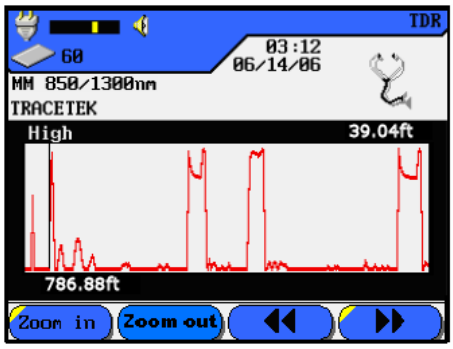
Wiped "clean" with finger



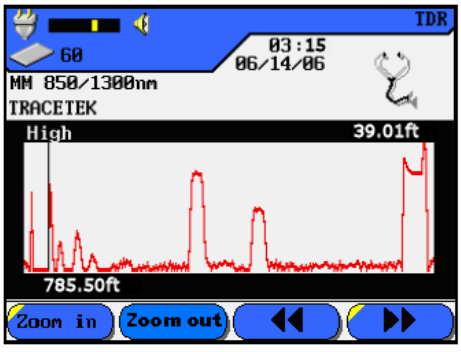
"Cleaned" on shirt



Cleaned w/IDEAL cleaning kit



Again, using the same fiber, but before the connectors were cleaned, the figure above displays the results when the optimal TRACETEK resolution mode is *not* selected. In this case the Medium Resolution mode was used. The resulting Fresnels are much higher than before and the "Batman ears" are caused by the saturation of the receiver. This is due to excessive reflection.



After cleaning the two center connectors, shown in the figure above, it is apparent there is some improvement in return loss. However, in this case we expect the Fresnel to be larger than before because of the higher launch power TRACETEK uses in the Medium Resolution mode. Also notice that the Fresnels are wider than before. This width is known as the dead zone, which is the distance that the receiver is blinded by the reflection of each event. High output power and dirty or poorly polished connectors will lead to an increased dead zone.

In its High Resolution mode with clean connectors, TRACETEK will have a dead zone of 2 m, while in the Medium and Low Resolution Modes the dead-zones will be about 8 m. When testing through patch panels or other cross-connect devices best results will be achieved with the High-Resolution mode. Refer to Table 1 when deciding which of the three resolution modes is best for your application.

TESTING WITH TRACETEK

The TRACETEK system is simple to use and requires no warm-up time.

1. Insert the TRACETEK adapter into the LANTEK Cable Certifier.
2. Clean the launch cable and attach it to the adapter.
3. Using a Good Quality mating adapter, attach the launch cable to the fiber to be tested. Clean all connections. Make sure the launch cable connector is aligned with the TRACETEK connector slot to assure proper mating of the connector.

Figure 6-4: LANTEK/TRACETEK Configuration on a Fiber

4. Select Fiber Optics on the Display Handset Ready screen. The Fiber Cable Type screen appears.
5. Highlight the desired fiber type and press **ENTER** to accept the new fiber type.
6. From the Ready screen of the LANTEK main unit, Press **AUTOTEST** or select Analyze to open the Analyze menu screen.
7. The Analyze menu provides three resolution options: High, Medium, and Low. The default resolution is High.

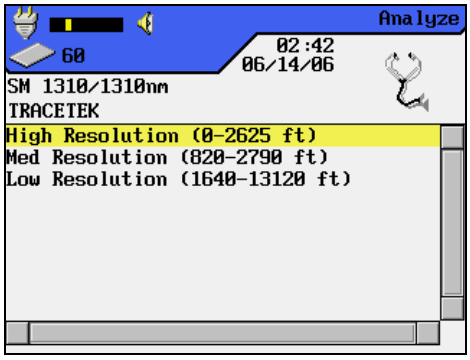


Figure 6-5: TRACETEK Analyze Menu Screen

8. Highlight the desired resolution and press **ENTER**. The LANTEK Cable Certifiers will conduct the measurement.
9. When the test is complete, the results are displayed on screen, left to right, with the last event usually taking place at the end of the fiber.

   Note: Sometimes the end of the fiber (EOF) is not where it is expected due to poor splices or cuts. EOF is the point where TRACETEK detects a large reflection (about -14dB) which can be the actual EOF, a bad connector, or a break in the fiber.

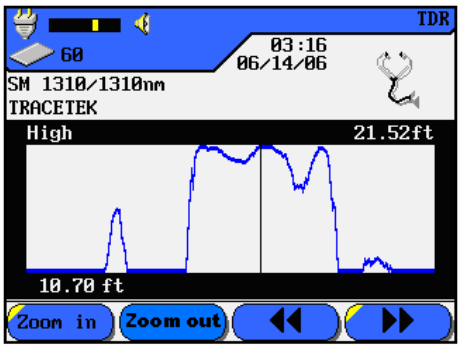


Figure 6-6: TRACETEK Test Results Screen

Using the high resolution setting is best for cables under 800 m (2625 ft) in length.

The distance to the end of the fiber is displayed on the screen in the lower left-hand corner of the display. The vertical cursor can be used to find the distance to an event by moving it along the trace where the event is indicated. The distance to this point appears on the screen in the upper right-hand corner of the display.

SAVING TRACETEK RESULTS

Like other tests, the resultant plot from TRACETEK can be stored in the LANTEK handset and recalled or uploaded to a PC using the LANTEK Reporter software.

1. From the TRACETEK display, press **SHIFT** and the Save As key.
2. Enter a test record name and press **ENTER** to save the record.

TROUBLESHOOTING WITH TRACETEK

TRACETEK can be an invaluable tool for troubleshooting a variety of network problems. One application is to locate a break in a cable. In a new installation, TRACETEK can be used with a power meter/light source test kit such as FIBERTEK to characterize a link and map the distance to known events.

In this example we're testing a backbone link consisting of 44 m of cross-connect cable to a 717 m backbone, followed by another 40 m of cross-connect. Figure A is the FIBERTEK (power meter/light source) result from the link indicating a passing result.

In Figure B, we see the connectors at 40 m and 760 m, as well as the end of the fiber at 801m. The connectors at 40 m and 760 m appear to be in good condition with a reflection that is just below half scale.

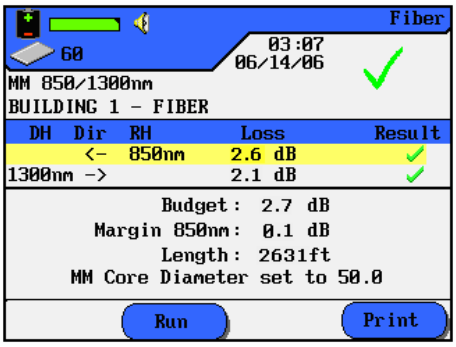


Figure A

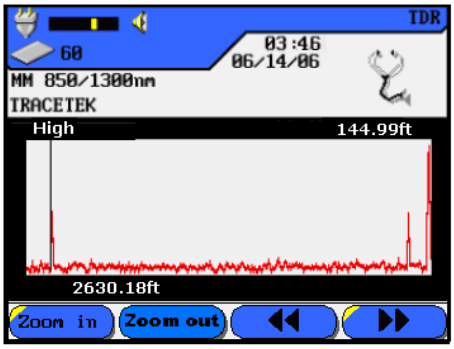


Figure B

Figures C and D show the same link failing. The FIBERTEK screen tells the degree of link failure but it does not help isolate the problem. TRACETEK screen (Figure D) shows the connector at 761 m is nearly full scale, an indication that it has become dirty or damaged.

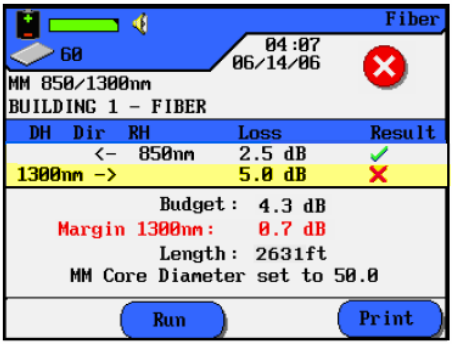


Figure C

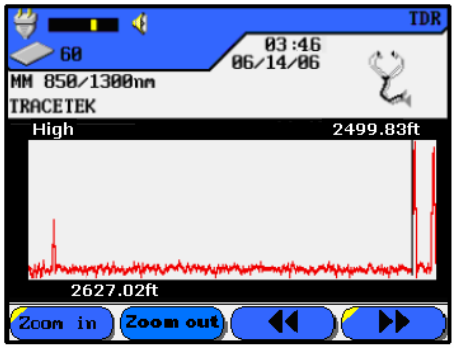


Figure D

In this situation, the best course of action is to clean the connection at 760 m and check it with a microscope (IDEAL P/N 45-332) before re-testing. Consult the instructions included with the IDEAL Starter Cleaning Kit for the best methods to clean connectors and couplers.

Q&A: IDENTIFYING TRACETEK CONFIGURATION PROBLEMS

Q1: Why is it so important that my launch cable connectors be kept clean?

A1: Unlike a traditional light source, the most high-powered of which have output levels significantly less than 1mW, TRACETEK's high-power laser source launches up to 40 mW of power. When dealing with return loss measurements, more power out means more power back. With the levels that TRACETEK operates at, a dirty launch cable will immediately reflect a large amount of power back at the detector, essentially causing temporary blindness of the detector. Keep your connectors clean!

Q2: What will happen if I set the Resolution incorrectly?

A2: Incorrectly setting the Resolution of TRACETEK will not cause any damage to the tester or cable. It will usually result in a garbled display that is a result of too much power being injected into a short cable, leading to very high reflections since the cable itself cannot attenuate the return pulse. Or, in the case of a very long cable, there will not be enough power for TRACETEK to see the end, meaning it will be unable to properly scale the screen. Here are a few images that result when the Resolution setting is not optimally set for the fiber being tested (Figures E-H).

- In this example a 1000 m cable was tested with the Resolution set to MED. The result is that the ramp time, which adjusts the scaling, is too short. The recommended maximum distance for MED mode is 850 m. Change to LOW Resolution and try again

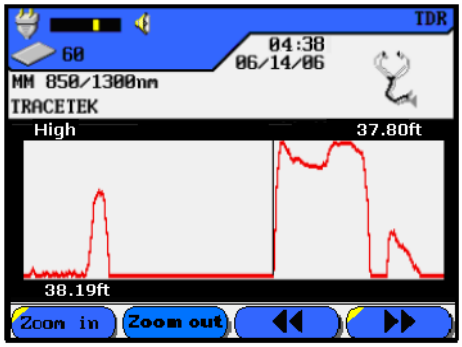


Figure E

- With the Resolution now set to LOW, the end of the 1000 m fiber is clearly visible.

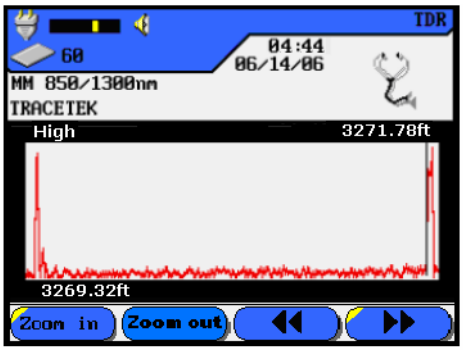


Figure F

- Here, a 45 m cable is tested with the MED Resolution mode. Although the length of the cable is correctly identified, there is so much power that the receiver is detecting echoes in the cable. Choosing the HIGH-Resolution mode should help.

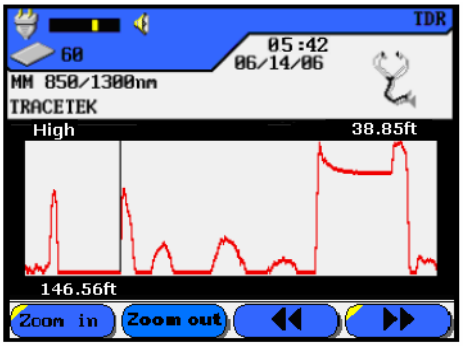


Figure G

- In the HIGH-Resolution mode the power output is decreased and the echoes are eliminated. Also that notice the dead-zones of the first and last events are noticeably narrower.

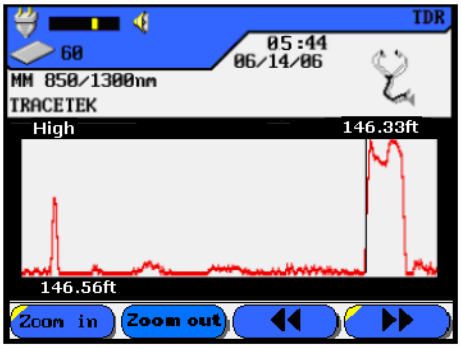


Figure H

Q3: Why is TRACETEK only available in 1300 nm modules?

A3: Since TRACETEK does not make attenuation measurements, the reason for choosing a 1300 nm laser is based purely on performance. Multimode fiber has less than half the attenuation at 1300nm than it does at 850 nm. By using the 1300 nm laser, TRACETEK can be used to test much longer cables than it could with an 850 nm laser whose power attenuates very rapidly.

Q4: Does TRACETEK support single mode testing?

A4: Yes. TRACETEK is also available in a single mode kit with a 1310 nm laser. For single mode fibers the attenuation difference between 1310 nm and 1550 nm is small enough that there is no major performance gain obtained by operating at 1550 nm. In this case the 1310 nm laser helps make TRACETEK the most affordable solution for reflectance testing of single mode fiber.

Q5: If I lose my TRACETEK launch cable, do I need to replace it with a special one?

A5: No, the included launch cable with TRACETEK is an ordinary FC-ST multimode or FC-FC single mode jumper. Any high-quality replacement jumper will work, and there is no calibration necessary. The length of the launch cable is only important in that its length is added to your distance measurements and keeping a conveniently short cable will minimize any offset in length measurements. TRACETEK utilizes a special technology that allows the use of very short launch cables, unlike an OTDR whose front-end dead zone may be 20-100 m long and require the use of very long launch cables.

CHAPTER 7
LANTEK REPORTER SOFTWARE

SYSTEM REQUIREMENT

Your PC should have the following capability:

Minimum	Pentium 90, Windows 95B, 32 MB RAM, 100 MB of available disk storage, one serial communications port, video card capable of providing resolution of 1024 x 768 and an inkjet printer.
Recommended	Pentium 300 MHz, one of the following (Windows 98, ME, XP, 2000, or NT SP5), 128 MB RAM, 100 MB available disk storage, video card capable of providing resolution of 1024 x 768, a laser printer and an available USB port.

Note: Windows 95 and Windows NT do not support USB connections. Uploading test results in these operating systems are therefore limited to a serial port connection.

LANTEK REPORTER INSTALLATION AND START-UP

LANTEK REPORTER UPGRADES

The CD supplied with your tester may not contain the latest version of the LANTEK Reporter program. Ideal Industries provides a web (www) site for LAN cable test products that allows you to use a PC and modem to obtain the latest LANTEK Reporter maintenance release. Refer to Appendix B, World Wide Web Services.

INSTALLATION PROCEDURE

The LANTEK Reporter software is installed using the standard Windows program installer.

1. Insert the LANTEK Reporter CD-ROM.
2. Click on the Start button, and then click Run.
3. Type, d:\ setup

   Note: If your CD-ROM drive is not the “d” drive, replace “d” with the correct drive letter.

4. Follow the instructions on your screen.

   Note: Install the LANTEK Reporting System in the default directory, c:\…\ LANTEK Reporter. An empty database will be created in c:\…\ LANTEK Reporter \db.

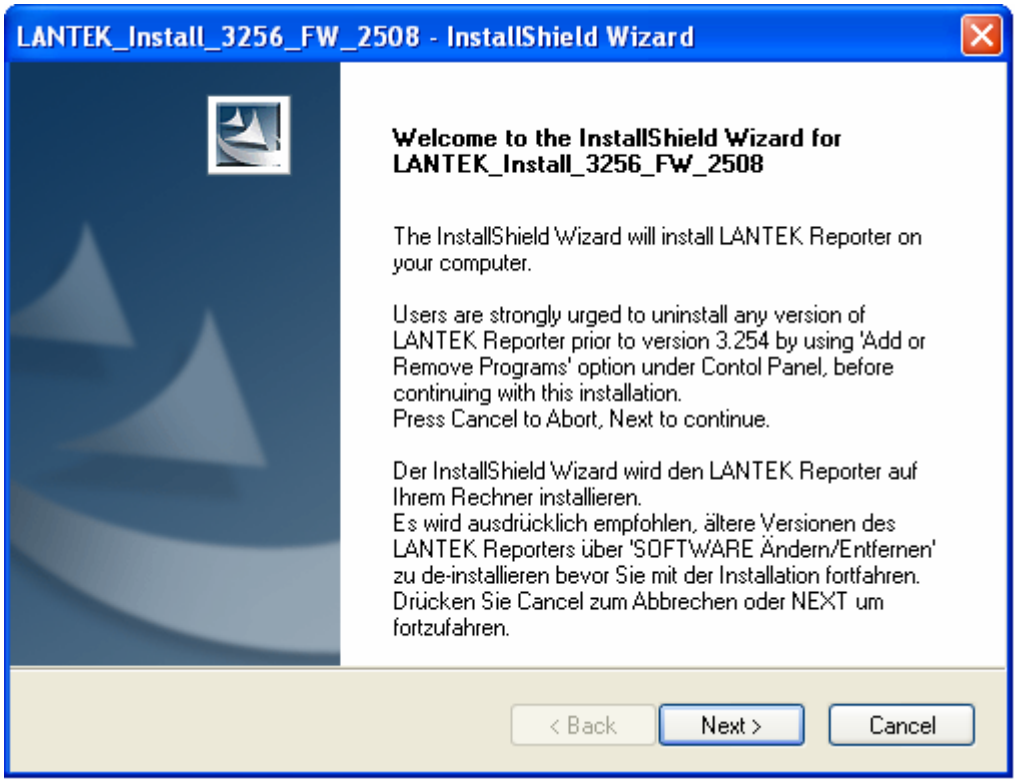


Figure 7-1: Typical Installation Window

STARTING THE LANTEK REPORTER PROGRAM

There are two ways to start the LANTEK Reporter program:

1. From the Windows desktop, select LANTEK Reporter.
2. From the Windows desktop select Start. Then, select Programs, LANTEK Reporter.

TESTER-TO-PC CONNECTIVITY

PC CABLES

Use the USB or the Serial Port interface cables supplied with your tester.

USB Interface Cable

The USB (Universal Serial Bus) interface cable is supported by the Windows 98 SE, ME, 2000, and XP (Pro and Home) operating systems and can upload data approximately 20 times faster than uploads via the serial port. The USB interface provides the same functionality as the serial port but does not support printing.

Serial Port Interface Cable

The serial cable, commonly referred to as a Null modem cable, connects to the RS-232 serial port and is capable of uploading data (test results) to the PC or laptop as well as establishing a connection to a serial port printer.

If you supply your own serial port cable, Figure 7-2 shows the wiring specifications.

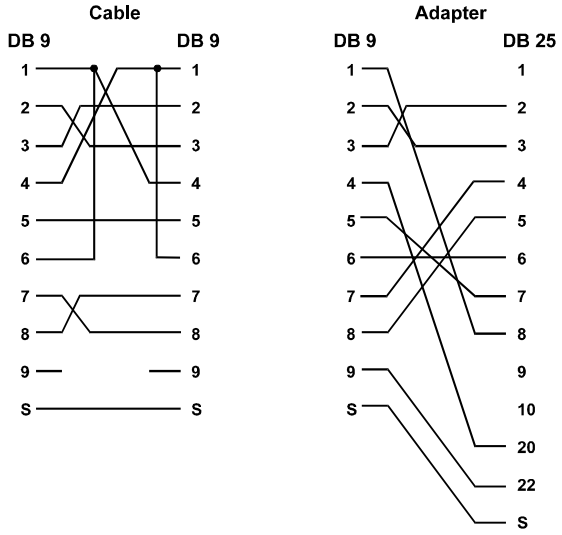


Figure 7-2: PC Uploading Cable Pinout

ESTABLISHING A CONNECTION

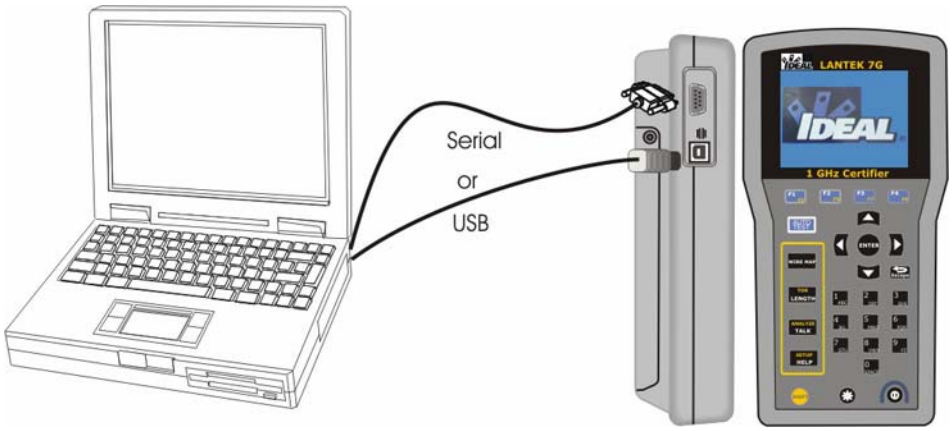


Figure 7-3: PC to Tester Connections

For USB Connection

1. Attach the USB cable to the tester and an available USB port on the PC.
2. Turn on the tester. The tester has an Operating System and must complete booting up before actions can be taken.
3. After Booting is complete, press **F2**. Then select USB by pressing **F3**.
4. Designate an upload location.
5. From the LANTEK Reporter's **File** Menu select **Upload From Tester** or select the Upload Test icon on the Toolbar to complete the Upload. A "Browse for folder" dialog appears. A new drive should appear as a "Removable Disk (E:) Double Click on the drive and a sub-folder should also appear. Click once on the "Stored Tests" folder to select it, then click the OK button.

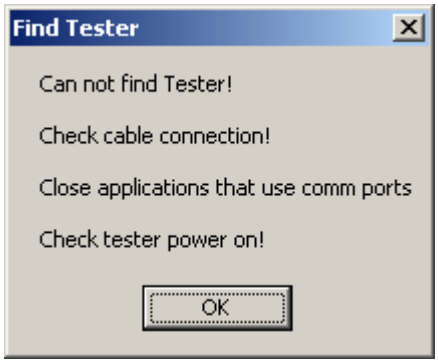
   Note: Drive letter may vary depending on the number of drives installed on the user's PC.

For RS-232 Serial Connection

1. Attach the RS-232 cable to the tester and an available RS-232 port on the PC.
2. Turn on the tester. The tester has an Operating System and must complete booting up before actions can be taken.
3. Start the LANTEK Reporter program on the PC, go to the **Options** menu and select **Upload Target**. Then, select **Comm Port**.
4. Designate an upload location.
5. From LANTEK Reporter's **File** Menu select **Upload From Tester** or select the Upload Test icon on the Toolbar to complete the Upload.

For a serial port connection that is not responsive:

1. Go to the LANTEK Reporter **Options** menu and select the **Tester ID** command. The program will automatically scan the available communications ports and baud rates to locate and identify the attached Tester. If the tester is not identified, proceed to the next step.
2. Some PCs may have difficulties with this function and the following dialog box displays. Click **OK**.



3. Shut down any other applications that use the serial communication ports.
4. Click on the **Options** menu and select the **Serial Port** command. Select the correct **Port** and match the **Baud Rate** to that of your LANTEK tester.
5. After you have entered the values, click the **Test** button. If the Tester is identified, its serial and model numbers will be displayed.
6. Click **OK**.

Note: If you have tried alternative baud rates and ports and LANTEK Reporter still cannot find the Tester, call IDEAL INDUSTRIES Customer Support.

For Compact Flash Transfer

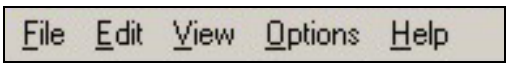
1. Insert the Flash card with the test results into the Flash Card Reader on the PC.
2. Start the LANTEK Reporter program on the PC, go to the **Options** menu and select **Upload Target.** Then select **USB Compact Flash.**
3. From LANTEK Reporter's **File** Menu select **Upload From Tester** or select the Upload Test icon on the Toolbar to complete the upload. A "Browse for folder" should appear. A new drive should appear as a "Removable Disk (E:)" Double Click on the drive and a sub-folder should appear. Click once on the "Stored Tests" folder to select it. Then click the OK button.

Note: Drive letter may vary depending on the number of drives installed on the user's PC.

LANTEK REPORTER USER INTERFACE

THE MENU BAR

The menu bar at the top of the screen displays the pull-down menu names.



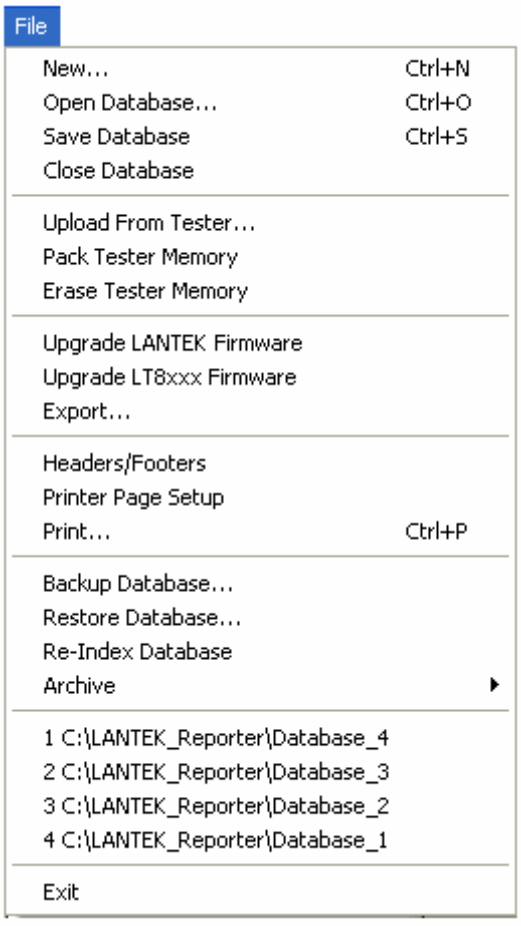
When you choose a menu, a list of commands drops down under the menu. You can choose only the commands that are solid black. Gray commands or options are disabled or may be context-sensitive. For example, to use test commands such as **Find Test** and **Select Test,** the cursor must be in the test grid portion of the screen or the commands are not available.

To open a menu

1. Move the mouse so that the tip of the mouse pointer is on the desired menu.
2. Click the left mouse button.

The File Menu

Many of the selections on this menu are standard Windows options.

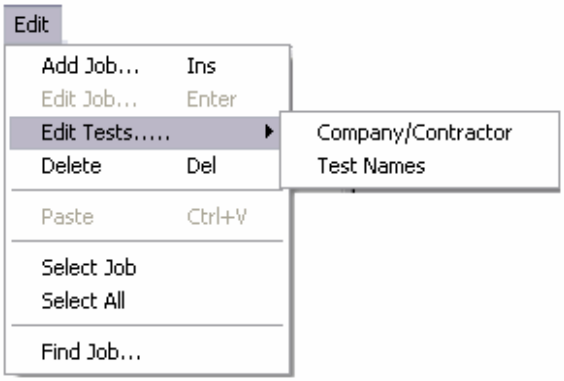


Command	Description
Upload From Tester	Pull result data from the LANTEK tester.
Pack Tester Memory	Erase all tests in the tester memory that are marked for deletion (Serial mode only).
Erase Tester Memory	Erase all tests in the tester memory.
Upgrade LANTEK Firmware	Copy new firmware code to the LANTEK tester.
Upgrade LTxxx Firmware	Copy new firmware code to the LTxxxx tester.
Export	Export test results as Comma-Separated Values (CSV) or standard ASCII text files.
Backup Database	Archive current data in the current folder.
Restore Database	Restore a closed database from a zipped archive file into the current folder.
Re-Index Database	Re-index the database.
Archive	Create a backup zip file of databases.

The Edit Menu

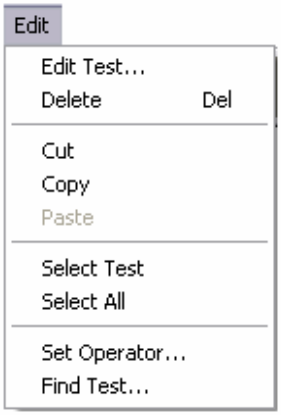
Click **Edit** to display the Edit menu. The Edit menu will vary based on which view (Job or Database) you are in.

Job View



Command	Description
Add Job	Add a Job.
Edit Job	Modify a Job.
Edit Tests	Edit test information such as Test Company/Contractor, and names.
Select Job	Select an item in the database view in preparation for printing or reporting.
Select All	Select all entries in the database view.
Find Job…	Locate a database item.

Database (Test) View

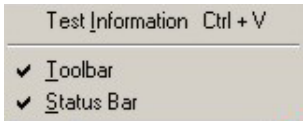


Command	Description
Edit Test	Modify a test name and details.
Select Test	Select a test in the database view for printing or reporting.
Set Operator	Provide details about the operator for the currently selected test.
Find Test	Locate a database test item.

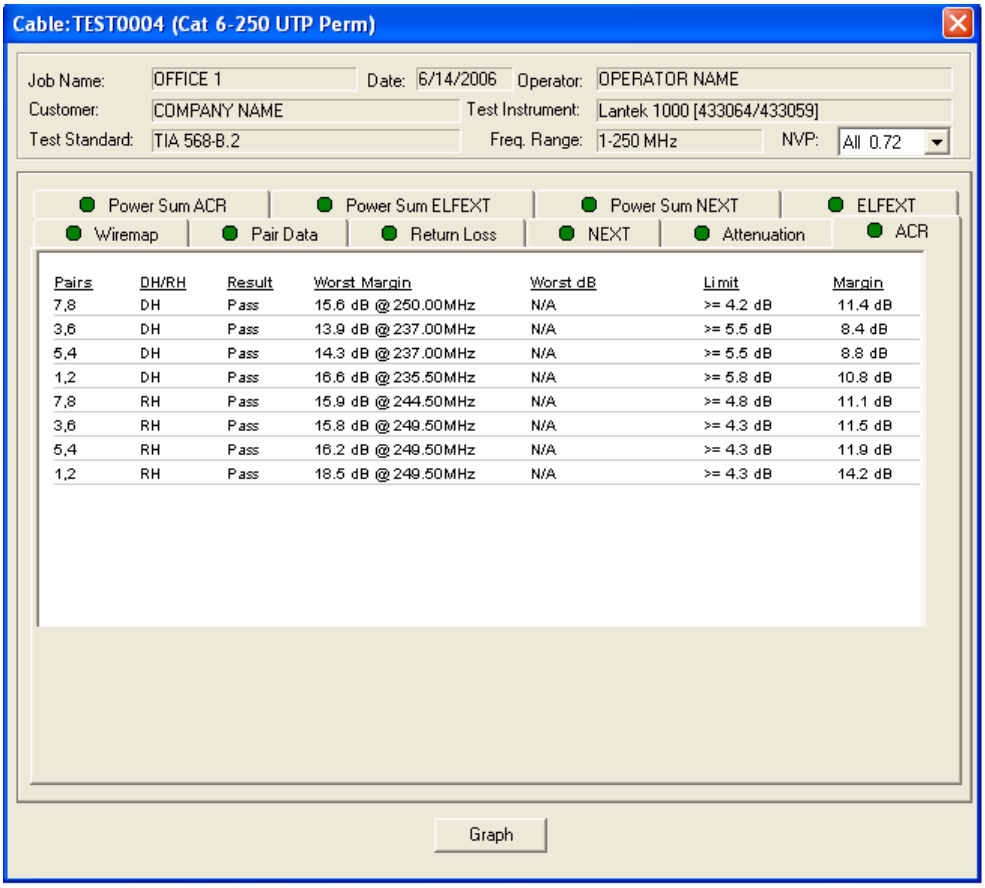
Note: In order to activate the Test View, at least one Autotest must be activated in the right main section of the screen. In the left section, the job tree (see Job View) is shown.

The View Menu

The View menu allows you to hide or display the toolbar or status bar and view.



While in database (test) view, select a test and click **Test Information** to open the Test Information window.



The Test Summary Information is located at the top of the screen.

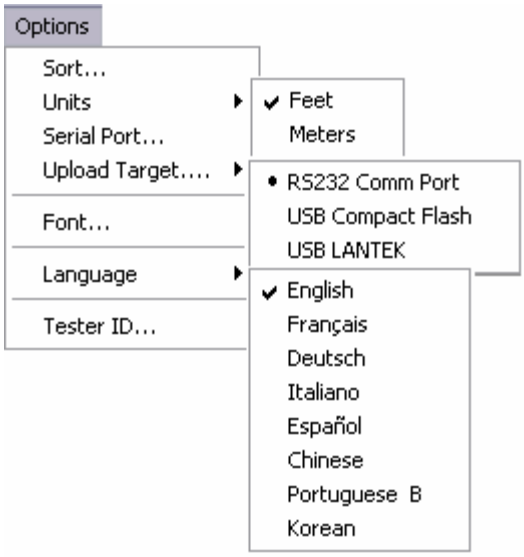
Command	Description
Job Name	The name of the job to which this test belongs.
Customer	The customer for whom the test and job have been performed.
Test Standard	The standard used by the handset to perform the test.
Date	The date the test was performed.
Operator	The name of the operator who performed the test.
Test Instrument	The type and serial number of the instrument used to perform the test.
Frequency Range	The test frequency range of the tested cable.
NVP	The Nominal Velocity of Propagation value defined for the cable on which the test was performed.

Individual tests can be viewed by double-clicking on a test tab to display stored test results.

- A red dot on a test tab indicates one or more tests within the tab failed.
- A green dot indicates that all tests within the tab passed.

The Options Menu

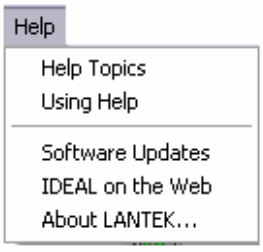
Use the Options menu to configure the program to match the hardware and user preferences.



Command	Description
Sort	Sort tests in the database view.
Units	Choose feet or meters as the measurement units for both the screen display and printouts.
Serial Port	Configure the serial port for your LANTEK tester.
Upload Target	Designate the source of the data.
Font	Change the screen display font.
Language	Change the language for both the screen display and printouts.
Tester ID	Locate and identify a connected tester. (Serial mode only)

The Help Menu

This menu provides the standard windows Help support and displays the About dialog.



THE STATUS BAR

The Status Bar at the bottom of the screen lists the functions that are currently operating and indicates the number of tests residing in the currently highlighted job.

THE TOOLBAR

The toolbar icons are shortcuts for many of the commands on the pulldown menus.

LANTEK Unique Tool Button Identification


Export


Backup


Upload Test


Select All


Find Tester ID


Sort Test


Set Operator

THE RIGHT MOUSE BUTTON

The right mouse button provides a shortcut to either display the Job or Test Edit menu depending on the area of the window where the click is performed.

LANTEK REPORTER HELP SYSTEM OVERVIEW

HELP TOPICS OPTION

The Help Topics menu option is the primary way to gain access to the LANTEK Reporter Help system.

To open the Help System

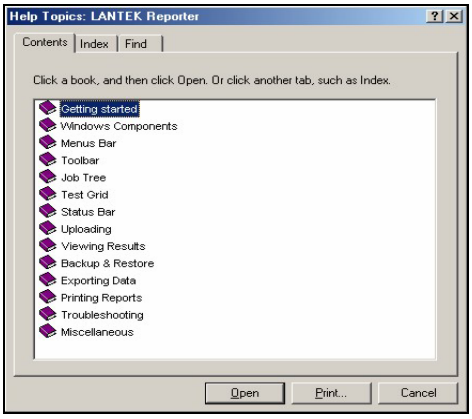
1. Pull down the Help menu and click the **Help Topics** command. The Help Topics screen displays.

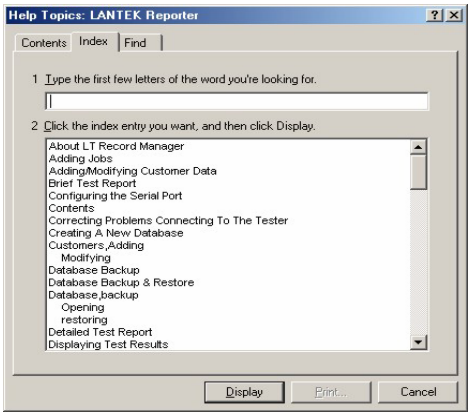
HELP TOPICS SCREEN

The LANTEK Reporter Help Topics screen contains three tabs and three buttons.

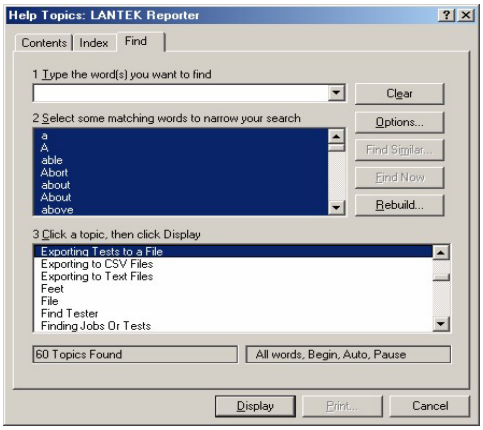
The **Content** tab displays a list of topics in the LANTEK Reporter Help system, organized by category.

The **Index** tab is similar to a traditional book index, listing keywords and phrases alphabetically.





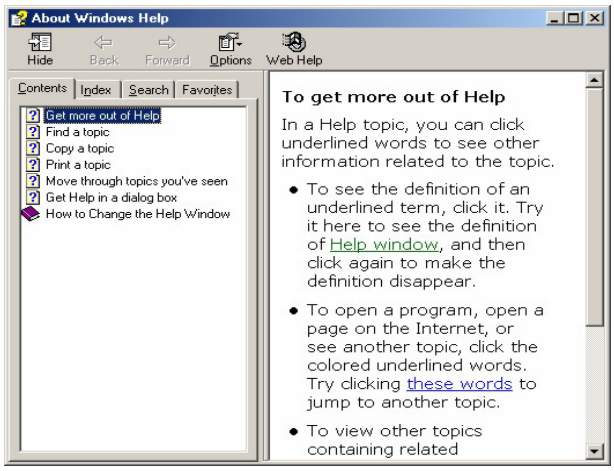
The **Find** tab allows a search for any word or phrase in the Help system.



Display button	Open the selected LANTEK Reporter Help item.
Print button	Print the selected item.
Cancel button	Close the LANTEK Reporter Help system.

USING HELP SCREEN

The Using Help screen consists of four tabs and a menu bar. The screen contains instructions for using and customizing the LANTEK Reporter Help system. The Web Help feature allows you to access Microsoft Product Support Online.



ABOUT LANTEK REPORTER SCREEN

The About LANTEK Reporter screen displays the LANTEK Reporter version number running on your computer.

Note: The appearance of this screen depends on the operating system.

UPLOADING DH TESTS TO THE PC

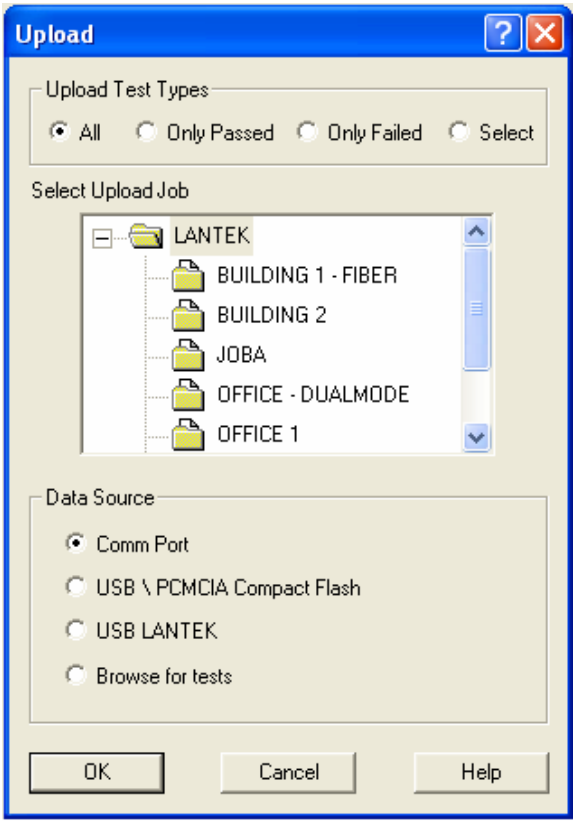
The LANTEK tester is capable of storing tests in individual job folders that can be uploaded to the PC. To upload a job folder to the PC, you must create a new job folder on the PC or use an existing job folder before uploading the tests.

To create a new database, refer to *Creating a New Database*. To create a new job name, refer to *Adding a Job*.

UPLOAD PROCEDURE

1. Designate the upload location (database) on the PC or Laptop. Before uploading test data from the LANTEK DH, select a destination database in the Database View.

2. From the **File** menu, select **Upload From Tester**. The Upload dialog box displays.

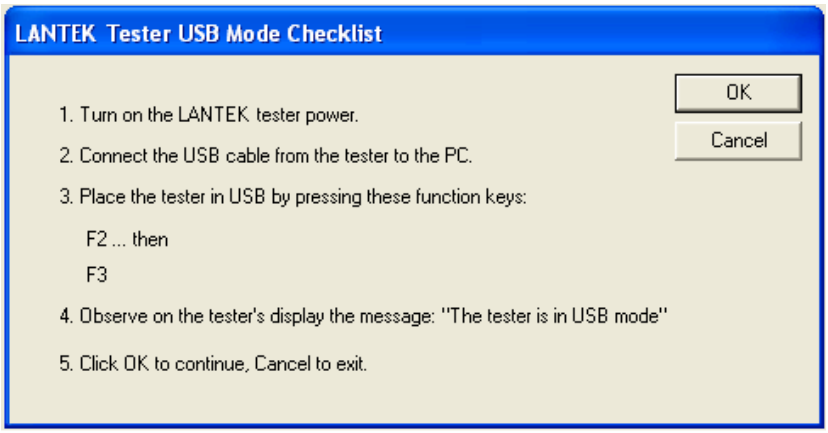


3. Click the desired **Upload Test Type** button.
4. Select a job in the **Select Upload Job** text box.

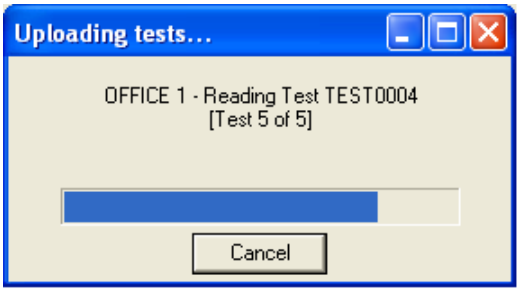
   Note: If you want to add AutoTests from a job in the cable tester to an existing LANTEK Reporter project with the same name, you have to select the mother project as <upload job>, that is located one level higher. (For example, for JOB 1 in the cable tester, select <LANTEK> as the upload job)

5. Select a Data Source. Click **OK** to begin the uploading process.
   - Select **Comm Port** for direct connection (Serial) with the tester.
   - Select **USB/PCMCIA Compact Flash** if you have stored the test results on the compact flash card and are using the USB flash card reader.
   - Select **USB LANTEK** if you have stored test results in the LANTEK Internal Memory.
   - Select **Browse for Tests** if you have Stored Tests kept on a local or network drive.

6. With USB/PCMCIA Compact Flash selected, the following dialog will appear. Click **OK** to continue; **CANCEL** to exit.



7. A status box will remain on screen during the uploading process and you will have the option to cancel at any time.



Note: If you want to use the USB port under Windows 98 SE, you will need special drivers. These can be found in the subdirectory \WIN98 USB Driver in the LANTEK REPORTER folder. The Windows 98 USB drivers must be installed before using the USB interface.

To install the drivers, proceed as follows:
Start Windows Explorer and go to the \WIN98 USB Driver subdirectory. Right click on the file USBLS120.INF and select INSTALL.

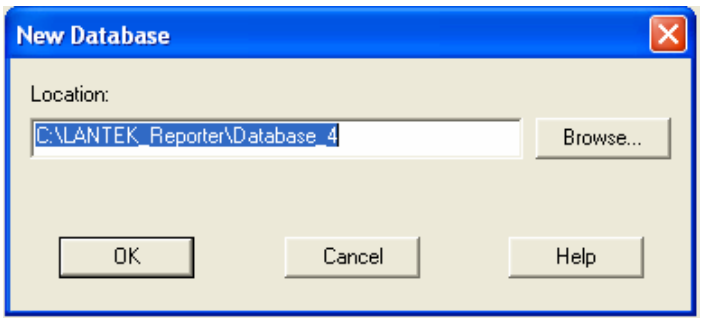
WORKING WITH THE DATABASE

On start-up, the database that was opened last will automatically reload.

Note: The first startup of LANTEK Reporter will load an 'empty' database (c:\LANTEK Reporter\...) from the database directory.

CREATING A NEW DATABASE

1. Select **New** command on the **File** menu or click the Create a new database icon on the toolbar.



2. You can either type the new path and database name or choose **Browse** and select an existing path and then type in the database name.

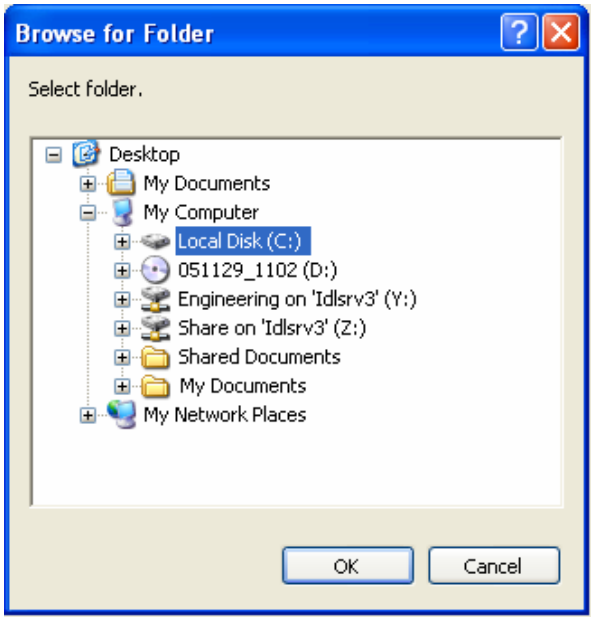
   Note: The name of the new database displays only in the title bar of the main window.

3. Click **OK** to enter your selection.

   Note: We recommend creating a new database for each new customer. When all of the reporting has been completed, make a final database backup and move the file off the computer to another media device (i.e. CD ROM or backup disk). This practice will ensure the optimum performance and test data integrity.

OPENING AN EXISTING DATABASE

1. Select **Open** on the File menu or click  on the toolbar.



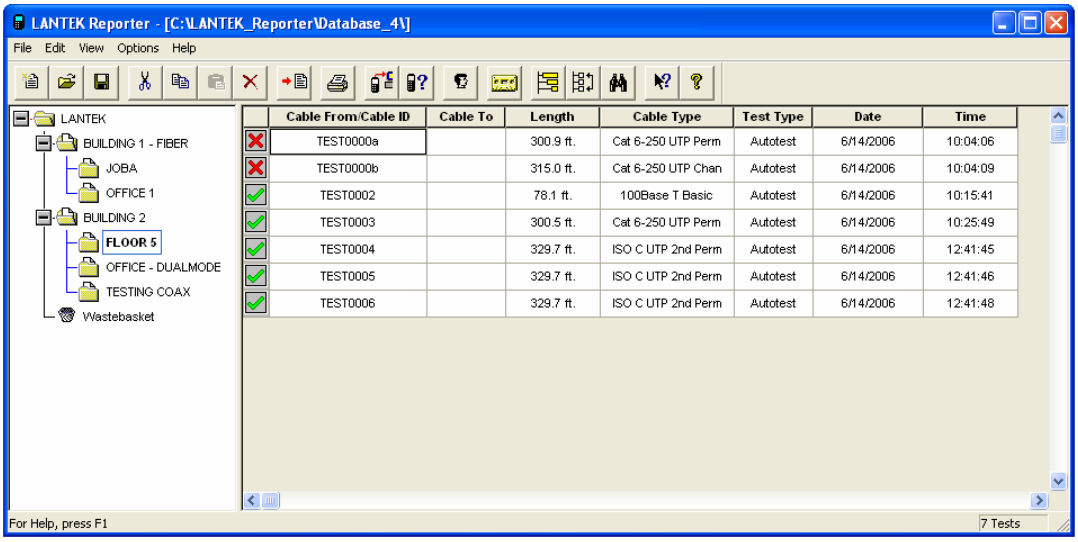
2. Use the **Browse** feature to locate the desired database folder and file.
3. Click **OK** to open the database.

WORKING AT THE JOB LEVEL

NAVIGATING THE JOB TREE

Tests are stored in folders called Jobs. For example, each floor of a building can be listed as a separate Job. Another Job can represent the entire building or just those tests conducted by a particular technician.

The left side of the Database View shows the hierarchy of Jobs. Clicking on a Job folder that is preceded by a plus (+) sign reveals the Jobs it contains. This hierarchy can be up to five levels deep.

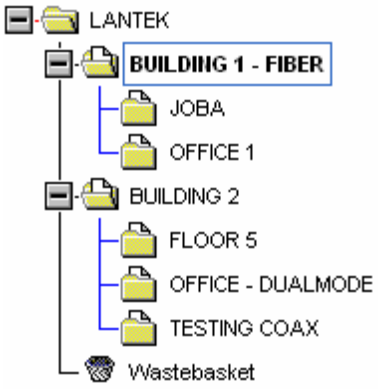


Jobs that have attached test records are indicated by a  icon. When you click on this icon, the test records become visible on the right side of the screen.

You may move Jobs from one folder to another by selecting and dragging them. The current selection is indicated by a highlight bar.

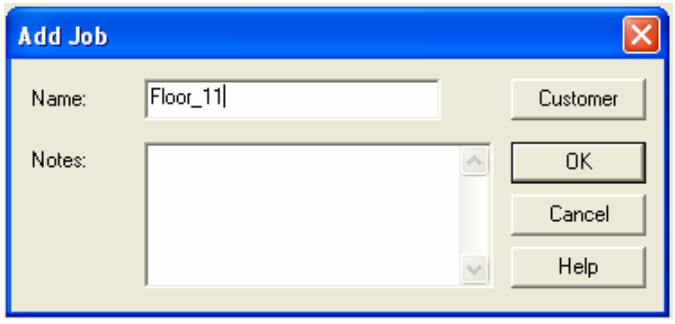
ADDING A JOB

You must click on the left side of the main database view for the Add or Edit Job functions to be available. You can create a new collection of tests by adding a Job folder.

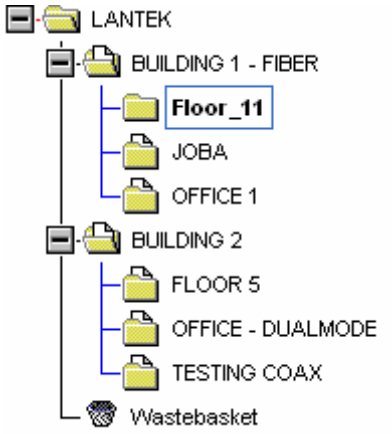


1. Select the folder that you want to add a Job to.

2. From the **Edit** menu, click **Add Job**. The Add Job dialog box displays.



3. Type in a name for the Job folder and any notes you want to add.
4. Click **OK** to create the new job folder.

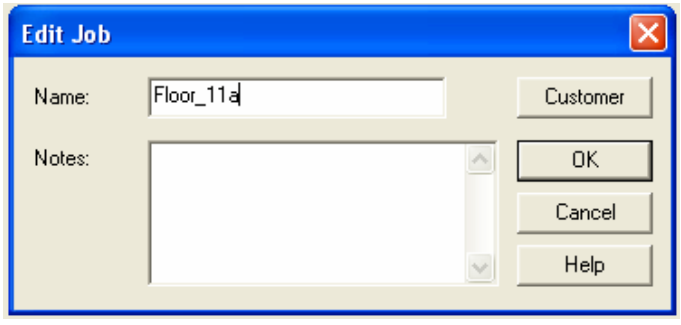


Note: An alternate method of initiating the Add Job function is to right click the mouse on the job list where the new job is to be defined as a sub job.

EDITING A JOB

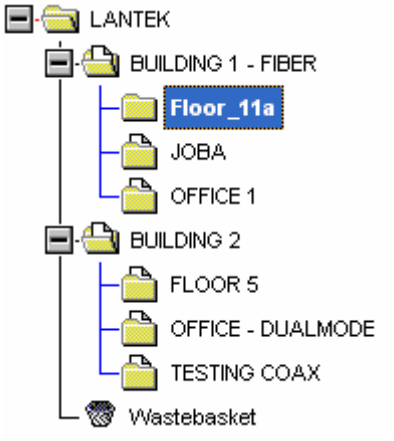
To change the name of a Job folder or attach text notes to it:

1. Select a Job
2. From the **Edit** menu, click **Edit Job**. The Edit job dialog box appears.



3. Click on the **Name** or **Notes** text boxes to perform the desired edits.

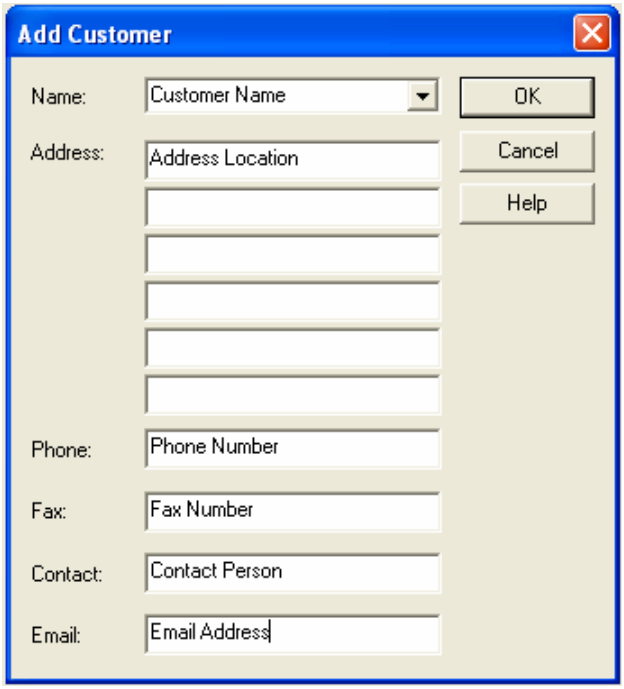
4. Click **OK** when you are finished.



ADDING OR EDITING CUSTOMER DETAILS

You may want to add or modify customer details for a specific Job entry.

1. From the **Edit** menu, select **Edit Job**.
2. Click **Customer**. The Add Customer or Modify Customer dialog box displays.



3. Add new customer information or edit existing information. If a customer name is supplied it will appear at the beginning of a report.

ADDING OR CHANGING THE TEST SET OPERATOR NAME

You may change the operator name for one or more tests. An operator name is assigned to each Autotest.

1. Open a job and position the cursor in the desired test field on the right side of the screen. Select one or several Autotest(s).
2. Select the **Edit** menu. Click **Set Operator** or click  . The Set Operator dialog box displays.

3. Click on the drop-down Menu for a list of all operators.
4. Select an operator from the drop-down list or enter a new operator name.
5. Click **OK** when you are finished.

FINDING A JOB OR TEST

The Find function searches for Job Names, Cable IDs, and Tests. You can control both the type of match and the direction of the search.

1. Before opening the Find dialog box:
   - Click on a folder at the Job level on the left side of the main database screen to find a job.
   - Click on a test in the test grid on the left side of the main database screen to find a test.
2. Select the **Edit** menu. Click **Find Job** or **Find Test** or click  on the toolbar. The Find dialog box displays.

3. Enter the job name and then specify the Find criteria using the **Match case** and **Direction** buttons.
4. Click **Find Next** to search for the next occurrence of the text.
5. Click **Cancel** when you are done searching.

NOTE: If the Test/Job is not found in the UP direction, use the DOWN direction and repeat Steps 5 and 6.

WORKING AT THE TEST LEVEL

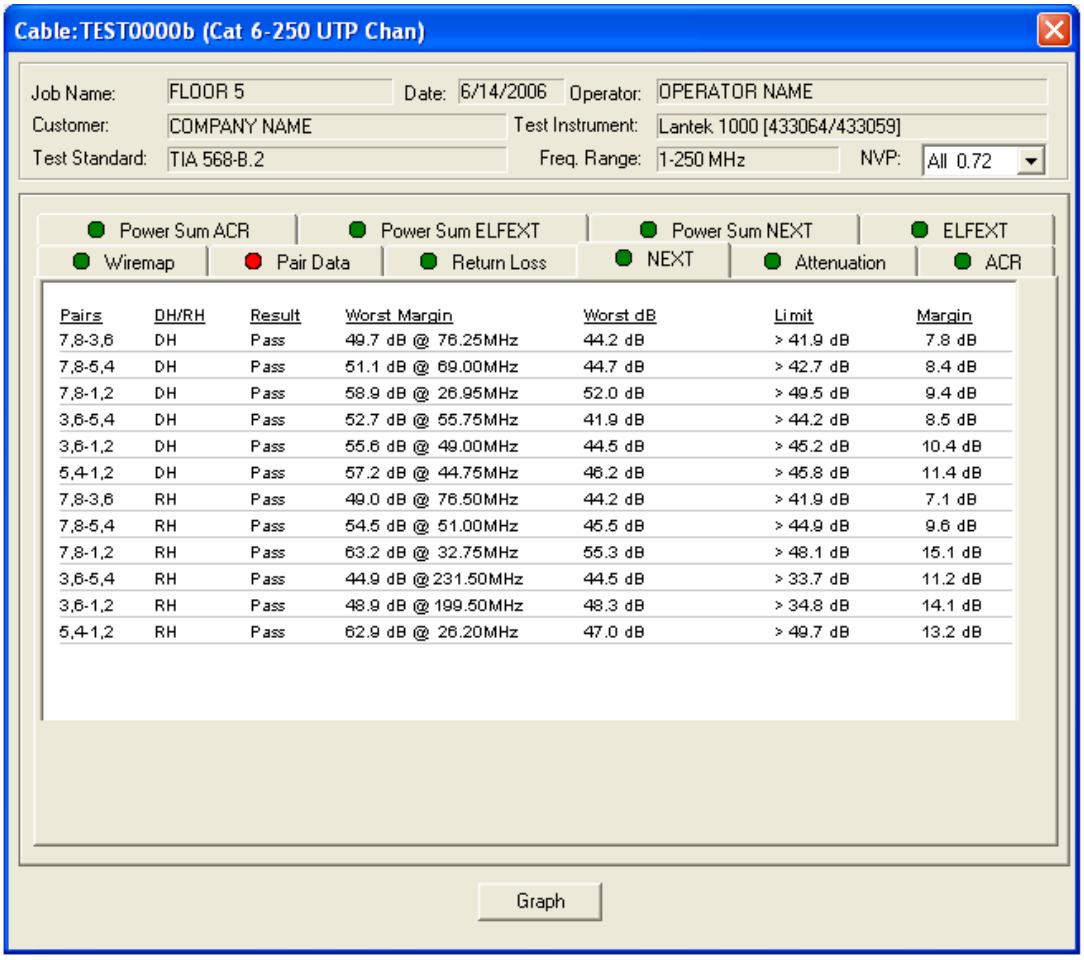
DISPLAYING THE TEST GRID

1. Click on a Job folder that contains tests, as indicated by a  icon.
2. A list of test records will appear on the right side of the Database View. This is referred to as the Test Grid.

	Cable From/Cable ID	Cable To	Length	Cable Type	Test Type	Date	Time
✗	TEST0000a		300.9 ft.	Cat 6-250 UTP Perm	Autotest	6/14/2006	10:04:06
✗	TEST0000b		315.0 ft.	Cat 6-250 UTP Chan	Autotest	6/14/2006	10:04:09
✓	TEST0002		78.1 ft.	100Base T Basic	Autotest	6/14/2006	10:15:41
✓	TEST0003		300.5 ft.	Cat 6-250 UTP Perm	Autotest	6/14/2006	10:25:49
✓	TEST0004		329.7 ft.	ISO C UTP 2nd Perm	Autotest	6/14/2006	12:41:45
✓	TEST0005		329.7 ft.	ISO C UTP 2nd Perm	Autotest	6/14/2006	12:41:46
✓	TEST0006		329.7 ft.	ISO C UTP 2nd Perm	Autotest	6/14/2006	12:41:48

VIEWING TEST DETAILS

1. Click on a Job folder that contains tests, as indicated by an  icon.
2. Double-click on any test entry in the test grid (left side of the main database screen) or hold down the **Control** key and type “V”. Depending on the type of cable, you will see individual tabs for each test.
3. Click on the desired Test Tab to view the test results.



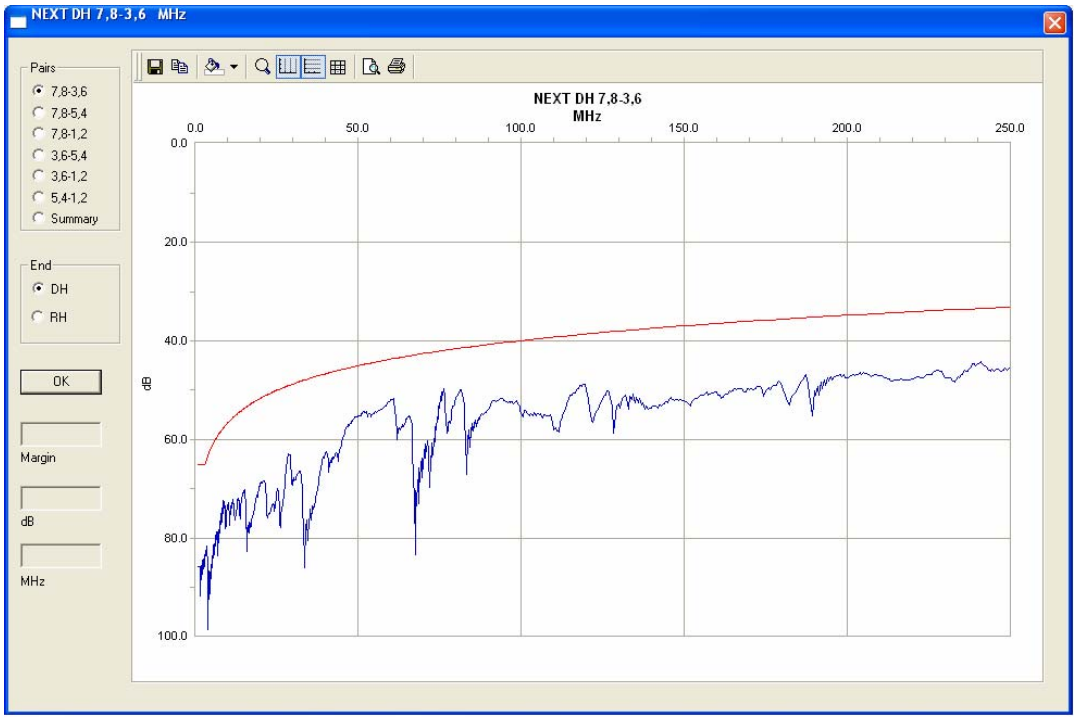
Pairs	DH/RH	Result	Worst Margin	Worst dB	Limit	Margin
7,8-3,6	DH	Pass	49.7 dB @ 76.25MHz	44.2 dB	> 41.9 dB	7.8 dB
7,8-5,4	DH	Pass	51.1 dB @ 69.00MHz	44.7 dB	> 42.7 dB	8.4 dB
7,8-1,2	DH	Pass	58.9 dB @ 26.95MHz	52.0 dB	> 49.5 dB	9.4 dB
3,6-5,4	DH	Pass	52.7 dB @ 55.75MHz	41.9 dB	> 44.2 dB	8.5 dB
3,6-1,2	DH	Pass	55.6 dB @ 49.00MHz	44.5 dB	> 45.2 dB	10.4 dB
5,4-1,2	DH	Pass	57.2 dB @ 44.75MHz	46.2 dB	> 45.8 dB	11.4 dB
7,8-3,6	RH	Pass	49.0 dB @ 76.50MHz	44.2 dB	> 41.9 dB	7.1 dB
7,8-5,4	RH	Pass	54.5 dB @ 51.00MHz	45.5 dB	> 44.9 dB	9.6 dB
7,8-1,2	RH	Pass	63.2 dB @ 32.75MHz	55.3 dB	> 48.1 dB	15.1 dB
3,6-5,4	RH	Pass	44.9 dB @ 231.50MHz	44.5 dB	> 33.7 dB	11.2 dB
3,6-1,2	RH	Pass	48.9 dB @ 199.50MHz	48.3 dB	> 34.8 dB	14.1 dB
5,4-1,2	RH	Pass	62.9 dB @ 26.20MHz	47.0 dB	> 49.7 dB	13.2 dB

Graph Button

The **Graph** button, located at the bottom of the result sheet, may or may not be enabled, depending on whether graph data was saved during the uploading of the test results. If it is enabled, you can select this button to view graphs of individual test results performed.

The Graph Display

Depending upon the test tab that has been selected, the graphical data display provides radio buttons on the left side to select the pair and/or test reference site of the graphed data.



The window displays the test result data over the plot area. The small popup window shows the frequency and dB value of the data point at the cursor.

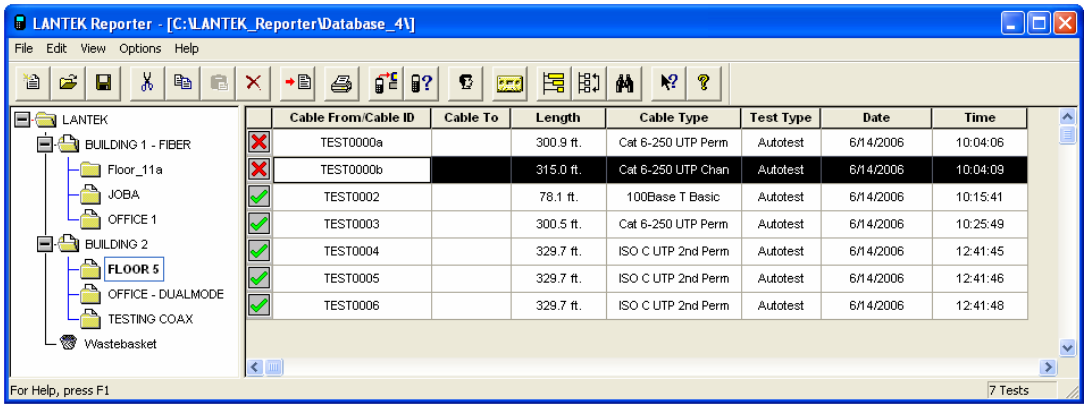
The Graph Display has its own tool bar.

Save	Save a graph in one of five different file formats (Chart FX files, Chart FX templates (no data), Text file (data only), Metafile picture, or Bitmap picture).
Copy	Copy a chart in one of four formats (Bitmap, Metafile, Text (data only) or OLE object) to the Windows clipboard. Data in the clipboard can be pasted into other applications. Bitmaps and Metafiles can be pasted into a Word document. Text data can be pasted into an Excel spreadsheet.
Color	Change the color of various items on the graph. Click and select a color from the drop-down dialog. Click, hold and drag the color to the desired item on the chart.
Zoom	Magnify an area of the graph. Click and move to the area of the plot that is to be magnified. Click, hold and drag on the area to be zoomed. This zoom operation can be repeated to intensify the magnification.
Vertical	Toggle between showing and hiding the vertical grid lines.
Horizontal	Toggle between showing and hiding the horizontal grid lines.
Data	Show or hide the data values in a grid.
Print Preview	Display the graph in a hard copy format prior to printing.
Print	Open the print dialog to select a printer and set the print options. Click **OK** to print the graph.

MOVING TESTS BETWEEN JOBS

Tests may be moved between different Job folders.

1. Click on a test (or a range of tests) to select it.
   - To select an individual test, click the first column of the preferred test.
   - To select a range of tests, click the first column then hold and drag to the last test preferred.
   - To select a set of non-contiguous tests, click the first column of each test while holding down the Control key.



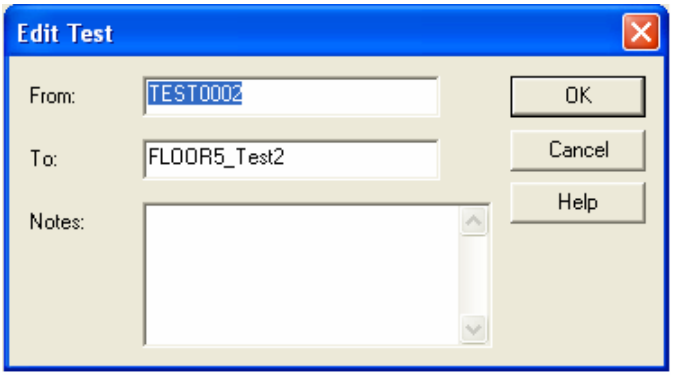
2. Move the cursor to the bottom of the highlighted area. The cursor will show a rectangle.
3. Hold the **left mouse** button while you drag the test(s) into a new Job folder on the left side of the screen.
4. Release the mouse.

Note: You can also use commands <Edit><Cut> and then <Edit> <Paste>. If you just want to copy a test, you can use the Command <Copy> instead of <Cut>.

EDITING TESTS

This function becomes available on the Edit menu when a test record is selected or when using the right mouse button.

1. Before opening the Edit menu:
   - Click on a folder at the Job level at the left side of the main database screen to find a job.
   - Click on a test in the test grid on the left side of the main database screen to find a test.
2. Select the **Edit** menu.
3. Click **Edit Test** to open the Edit Test dialog box.
4. Enter the cable ID in the text box labeled “From”. Enter the destination of the cable in the text box labeled “To.”



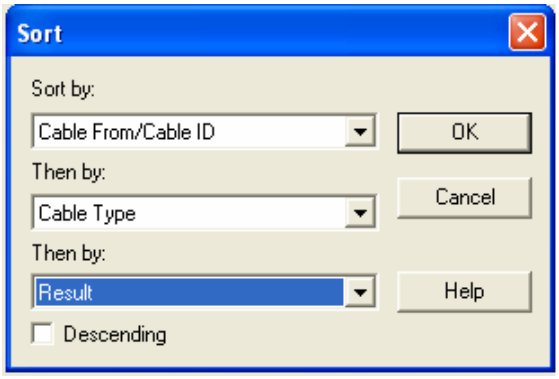
5. Enter data into the **From**, **To**, and **Notes** text boxes.
6. Click **OK**.

SORTING THE TESTS

The Sort function allows reorganization of tests in the Database view. The selections are by Result, Cable ID, Cable Origin, Cable Destination, Cable Type, Test Type, Date, or Time. The Sort function is available when more than one test is selected in the grid view by clicking on a column title. Sorting can be performed by ascending, descending or natural order

1. Click on a test in the test grid on the left side of the main database screen to sort the tests.
2. On the **Options** menu, click **Sort**.
3. Click the **Down Arrow** next to each field and choose from the sorting options that are displayed.
4. Click **OK** to begin the sort.

You can sort tests according to three different values, with highest sort criteria listed first, followed by the second, and then the least significant sort criteria.



BACKING UP AND RESTORING A DATABASE

Regular data backups to a removable storage device are recommended. You may also restore databases to the PC from these archives.

The database is automatically backed up prior to every test upload.

BACKING UP A DATABASE

Click the **File** menu and select the **Backup** command or Click  on the toolbar. The backup will be placed in the current folder.

Following a backup, the program will compact the database and remove any deleted records.

Note: Prior to performing an uploading of test results the currently open database is automatically backed up.

RESTORING A DATABASE

This function uses the back.zip file and will overwrite the current database files.

1. Click the **File** menu.
2. Select the **Restore Database** command. The backup file will be restored to the current folder.

   Note: If you have received a database backup file named back.zip on a data storage device, proceed as follows to display the data in LANTEK REPORTER:

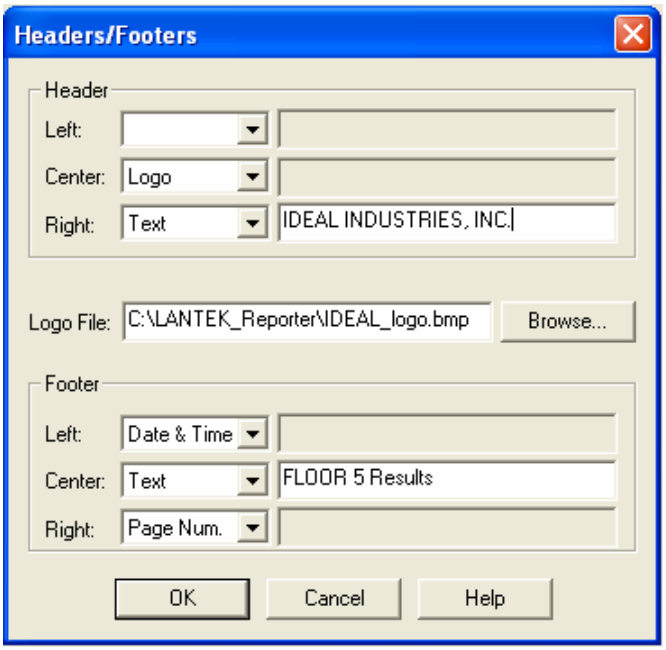
   Create a new database in LANTEK Reporter.
   Copy the backup.zip (e.g. using Explorer) into the database folder just created.
   Restore the database in LANTEK Reporter.

PRODUCING AND PRINTING A REPORT

HEADERS AND FOOTERS COMMAND

Headers and footers can be added to your printed report. In a printed report, lines will separate the header and footer from the body of the report if the header or footer contains any information.

1. From the File menu, click **Headers/Footers**. The Headers/Footers dialog box appears.



2. Select a position for your header or footer and click the accompanying **Down Arrow**.
3. From the drop-down text box, select one of the displayed options.
   - If you select **Text**, the Text Box will open. Enter your information.
   - If you select **Logo**, you must supply the location of the Bitmap file (.bmp file) to be used as the logo. Type the name of the file directly into the box titled "Logo File:" or use the Browse function to locate the file.

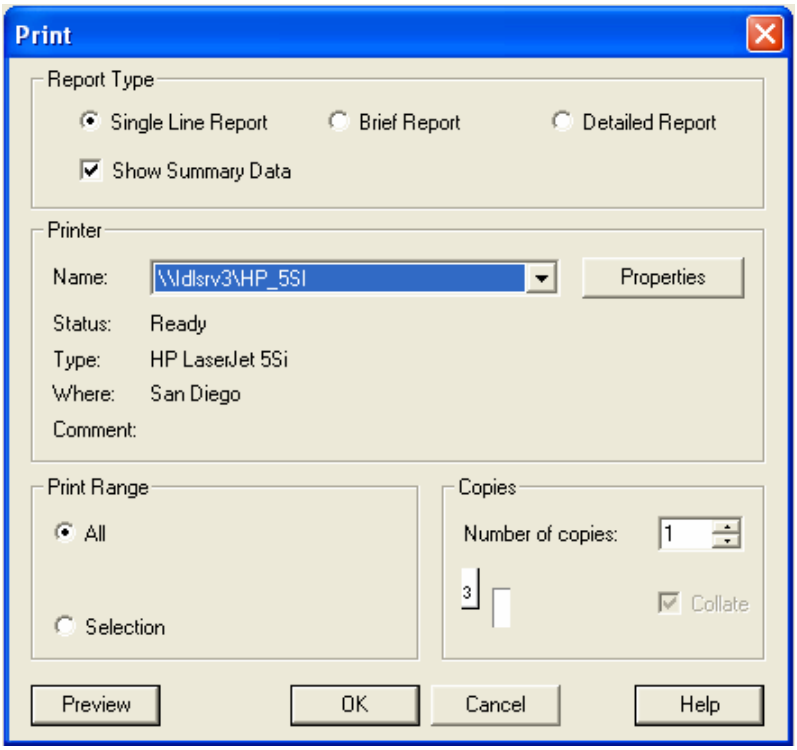
   Note: Customer is a value that is set in the Edit Job function.

4. Click **OK**.

PRINT COMMAND

Printing involves two steps: selecting the printer; and specifying what you want to print.

1. From the File menu, click **Print** or click  on the toolbar. The Print dialog box displays.
2. Select **Report Type**, **Printer**, **Print Range**, and the number of **Copies**.
3. Click **Preview** to display your report as it will appear in print.
4. Click **OK**.



The Single Line Report Layout

The Single Line Report prints one line for each test. The tests included in the report are determined by what item(s) are selected in the views.

- If a job is selected in the Tree view, all tests in that job are included.
- If tests have been selected in the Grid view, the selected tests are reported.

To view summary test information for the selected job, check the "Show Summary Data" box.

The Brief Report Layout

The Brief Test Report prints out summary information about all subordinate tests for each test. The tests included in the report are determined by what item(s) are selected in the views.

- If a job is selected in the Tree view, all tests in that job are included.
- If tests have been selected in the Grid view, the selected tests are reported.

To view summary test information for the selected job, check the ‘‘Show Summary Data” box.

Note: In order to print the graphics presented in this report, select Save Graphs in the Auto Preference prior to performing tests.

The Detailed Layout

The Detailed Test Report prints out detailed subordinate test information for all selected tests. The tests included in the report are determined by what item(s) are selected in the views.

- If a job is selected in the Tree view, all tests in that job are included.
- If tests have been selected in the Grid view, the selected tests are reported.

To view summary test information for the selected job, check the ‘‘Show Summary Data” box.

APPENDIX A
SAFETY PRECAUTIONS

HANDLE BATTERY PACKS WITH CARE

DO NOT dispose of NiMH battery packs in a fire or with regular trash. NiMH batteries may explode if exposed to open flame, create hazardous waste, and contaminate ground water sources if disposed of in landfills.

CAUTION - All Nickel-Metal Hydride (NiMH) battery packs, regardless of their indicated charge state, are capable of producing electrical currents sufficient to cause personal injury and/or property damage.

IDEAL INDUSTRIES has tried to provide the maximum protection possible by installing an automatic reset fuse in every battery pack to help stop high current discharges as quickly as possible. However, this fuse may not completely protect against a momentary arc, which can result if the battery pack's electrical contacts are shorted. The following battery pack handling precautions must be closely followed to avoid risk of injury.

- When a battery pack is not installed in the handset or the charger, it should be kept in a clean, dry, non-conductive package.
- Keep conductive materials away from the battery contacts at all times.
- Keep the contact sides of the battery packs away from each other at all times.
- Batteries are normally charged while in the handsets or when using the optional Dual Bay Battery Charger. Charging with other chargers or in any other manner may cause the battery packs to explode.
- Always install, remove, store, and charge the battery packs in a non-explosive atmosphere.
- Use and store battery packs in locations that do not exceed 122 degrees Fahrenheit (50 degrees Celsius).
- Do not allow children or persons unfamiliar with the precautionary instructions in this manual to handle or recharge the battery packs.
- Leave the sealed battery pack case intact. There are no user-serviceable parts inside the case and the batteries in the case are not replaceable.

Note: Charge battery packs prior to use.

STATEMENT OF LIABILITY

IDEAL INDUSTRIES does NOT assume any liability for death, injury or damage to equipment or property resulting from the use of this charger in a manner inconsistent with the use for which it was intended. IDEAL INDUSTRIES will not be liable for consequences that may result from tampering with the battery packs or charger or consequences resulting from their use thereafter.

ENVIRONMENTAL STATEMENT

If you have any questions concerning these precautions, the operating instructions, or any other concerns about the safe use and disposal of the LANTEK battery packs, please contact an IDEAL INDUSTRIES representative at one of the offices listed in *Appendix B*, *Customer Service*.

IMPORTANT USER INFORMATION

Please read this information before proceeding with any cable testing/certification using the LANTEK testers.

All cable parameter default settings preprogrammed in the LANTEK testers are based on generic standards, proposed industry recommendations for cables and network links, the latest technical information available from International LAN cabling standards committees, the LAN industry, and IDEAL INDUSTRIES' own experience and testing. However, the default settings in the tester may not yield the desired certification / test results in every given instance because each network is a custom installation designed to suit the requirements of the users. It is therefore imperative that specific network parameter limits be obtained from the network designer(s) and employed during certification and testing.

APPENDIX B
CUSTOMER SUPPORT

CUSTOMER SERVICE

TECHNICAL ASSISTANCE

For technical assistance or service questions in the U.S.A. and Canada, call IDEAL INDUSTRIES at 1-800-854-2708 or 858-627-0100.

SERVICE IN THE USA

Your LANTEK tester may require annual calibration to meet accuracy specifications. Before returning a unit for calibration or service, call IDEAL INDUSTRIES Technical Support at 1-800-854-2708 or 858-627-0100.

Note: If cleaning is required, use a soft cloth and mild cleaner suitable for plastic. Do not immerse the tester in water.

When returning a unit for service or calibration:

1. Customer name, company, address, telephone number, proof of purchase (for warranty repairs), and a description of the service are required.
2. Pack in a soft carrying case, hard-sided carrying case, or wrap the instrument in heavy paper or plastic.
3. Use a strong shipping container. A double-walled carton of 250-pound test material is recommended.
4. Use a layer of shock-absorbing material 70 to 100 mm (3 to 4 inches) thick around all sides of the instrument to provide firm cushioning and to prevent the unit from moving inside the container.
5. Seal the shipping container securely.

Ship prepaid to:
IDEAL INDUSTRIES Corporation
9650 Chesapeake Drive
San Diego, CA 92123
ATTN: Instrument Repair/Service

Return shipping to the customer within the domestic U.S.A. will be paid by IDEAL INDUSTRIES Corporation.

SERVICE OUTSIDE THE USA

For technical assistance or service questions outside the U.S.A. and Canada, call your local distributor.

IDEAL INDUSTRIES recommends annual calibration of the LANTEK testers to ensure that it continually meets its accuracy specifications. Before returning a unit for calibration or service outside the U.S.A., contact your local distributor or one of the IDEAL INDUSTRIES Corporation offices listed below. If your local distributor does not have a service facility, they will provide assistance in returning the tester to an authorized IDEAL INDUSTRIES service facility.

Americas

IDEAL INDUSTRIES Corporation
9650 Chesapeake Drive
San Diego, CA 92123
Tel: 800-854-2708
Fax: 858-715-7003

Europe (Germany, France, Italy, Spain, Portugal, Switzerland, Austria, Eastern Europe, MEA)

IDEAL INDUSTRIES GmbH
Gutenbergstrasse 10
85737 Ismaning, Germany
Tel: +49-89-99686-0
Fax: +49-89-99686-111

United Kingdom (Netherlands, Belgium, Luxembourg, Sweden, Norway, Finland, Denmark, Iceland)

IDEAL INDUSTRIES (UK) Ltd.
225 Europa Boulevard, Gemini Business Park
Warrington, Cheshire WA5 7TN, England
TEL: +44-1925-444446
FAX: +44-1925-445501

IDEAL Industries China, L.L.C.

Unit 911, Tower W1, Oriental Plaza
No. 1 East Chang An Avenue, Dongcheng District
Beijing, 100738, China
Tel: +86-10-8518-3141
Fax: +86-10-8518-3143

IDEAL Industries Brazil Comercio LTDA

Av. Major Sylvio de M. Padilha, 5200, Bloco F, Cj 201
CEP – 05677-000
Sao Paulo – SP – Brazil
05677-000 – Brazil
Tel: +55-11-3759-8777
Fax: +55-11-3759-8775

IDEAL Industries Mexico

Parque Intermex
Periferico Sur 7999 A
Col. Sta. Ma. Tequepexpan
Tlaquepaque, Jalisco 45601
Mexico
Tel: +52-33-37702320
Fax: +52-33-37702300

IDEAL Industries (Australia) PTY.Limited

Level 6
75-85 Elizabeth Street
Sydney NSW 2000 Australia
Tel: 61300-765-800 (Australia)
Tel: 61405-123-100 (New Zealand)
Fax: 61300-765-801

WEB SERVICES

IDEAL INDUSTRIES provides a Web (www) site for LAN cable test products that allows you to use a PC and modem to obtain the latest information on cable test application notes or firmware version upgrades. A question and answer forum allows you to share information with other users and submit questions to IDEAL INDUSTRIES product managers.

You can download the latest firmware updates for your LANTEK tester and the corresponding version of the LANTEK Reporter analysis software using a PC with an Internet service connection. Upgrade files are available on the World Wide Web at:

http://www.idealindustries.com

APPENDIX C
FIBER OPTIC CABLING STANDARDS & APPLICATION REQUIREMENTS

Summary of Fiber Optic Cabling Standards & Application Requirements

Standards Organization	Classification or Application	Fiber Type	Core size (um) / wavelength (nm)	Max Link Channel Loss (dB)	Max Connector Insertion Loss (dB)	Max Splice Insertion Loss (dB)	Min Connector Return Loss (dB)	Maximum Distance (m)	Min Operating Distance (m) (50um/62.5um)	Max Fiber Attenuation (dB/km)	Min Fiber Bandwidth (MHz-km)
TIA 568-B.3 Generic Cabling	Horizontal link	Multimode	62.5/850	n/s	0.75	0.3	>20	90	n/s	3.5	160
	Horizontal link	Multimode	50/850	n/s	0.75	0.3	>20	90	n/s	3.5	500
	Horizontal link	Multimode	62.5/1300	n/s	0.75	0.3	>20	90	n/s	1.5	500
	Horizontal link	Multimode	50/1300	n/s	0.75	0.3	>20	90	n/s	1.5	500
	Backbone	Multimode	62.5/850	n/s	0.75	0.3	>20	2km	n/s	3.5	160
	Backbone	Multimode	50/850	n/s	0.75	0.3	>20	2km	n/s	3.5	500
	Backbone	Multimode	62.5/1300	n/s	0.75	0.3	>20	2km	n/s	1.5	500
	Backbone	Multimode	50/1300	n/s	0.75	0.3	>20	2km	n/s	1.5	500
	Horizontal link	Single mode	9/1310	n/s	0.75	0.3	>26	90	n/s	1.0	n/a
	Horizontal link	Single mode	9/1550	n/s	0.75	0.3	>26	90	n/s	1.0	n/a
	Backbone (ISP)	Single mode	9/1310	n/s	0.75	0.3	>26	3km	n/s	1.0	n/a
	Backbone (ISP)	Single mode	9/1550	n/s	0.75	0.3	>26	3km	n/s	1.0	n/a
	Backbone - (OSP)	Single mode	9/1310	n/s	0.75	0.3	>26	3km	n/s	0.5	n/a
	Backbone - (OSP)	Single mode	9/1550	n/s	0.75	0.3	>26	3km	n/s	0.5	n/a
ISO 11801 Generic Cabling	OF-300	OM1	50 or 62.5/1300	1.95	0.75 ea/ 1.5 total	0.3	>20	n/s	300	1.5	500
	OF-300	OM2	50 or 62.5/850	2.55	0.75 ea/ 1.5 total	0.3	>20	n/s	300	3.5	500
	OF-300	OM2	50 or 62.5/1300	1.95	0.75 ea/ 1.5 total	0.3	>20	n/s	300	1.5	500

Standards Organization	Classification or Application	Fiber Type	Core size (um) / wavelength (nm)	Max Link Channel Loss (dB)	Max Connector Insertion Loss (dB)	Max Splice Insertion Loss (dB)	Min Connector Return Loss (dB)	Maximum Distance (m)	Min Operating Distance (m) (50um/62.5um)	Max Fiber Attenuation (dB/km)	Min Fiber Bandwidth (MHz-km)
ISO 11801 Generic Cabling	OF-300	OM3	50/850	2.55	0.75 ea/ 1.5 total	0.3	>20	n/s	300	3.5	1500
	OF-300	OM3	50/1300	1.95	0.75 ea/ 1.5 total	0.3	>20	n/s	300	1.5	500
	OF-300	OS1	9/1310 or 1550	1.80	0.75 ea/ 1.5 total	0.3	>35	n/s	300	1.0	n/s
	OF-500	OM1	50 or 62.5/850	3.25	0.75 ea/ 1.5 total	0.3	>20	n/s	500	3.5	200
	OF-500	OM1	50 or 62.5/1300	2.25	0.75 ea/ 1.5 total	0.3	>20	n/s	500	1.5	500
	OF-500	OM2	50 or 62.5/850	3.25	0.75 ea/ 1.5 total	0.3	>20	n/s	500	3.5	500
	OF-500	OM2	50 or 62.5/1300	2.25	0.75 ea/ 1.5 total	0.3	>20	n/s	500	3.5	500
	OF-500	OM3	50/850	3.25	0.75 ea/ 1.5 total	0.3	>20	n/s	500	3.5	1500
	OF-500	OM3	50/1300	2.25	0.75 ea/ 1.5 total	0.3	>20	n/s	500	1.5	500
	OF-500	OS1	9/1310 or 1550	2.00	0.75 ea/ 1.5 total	0.3	>35	n/s	500	1.0	n/a
	OF-2000	OM1	50 or 62.5/850	8.50	0.75 ea/ 1.5 total	0.3	>20	n/s	2km	3.5	200
	OF-2000	OM1	50 or 62.5/1300	4.50	0.75 ea/ 1.5 total	0.3	>20	n/s	2km	1.5	500
	OF-2000	OM2	50 or 62.5/850	8.50	0.75 ea/ 1.5 total	0.3	>20	n/s	2km	3.5	500
	OF-2000	OM2	50 or 62.5/1300	4.50	0.75 ea/ 1.5 total	0.3	>20	n/s	2km	1.5	500
	OF-2000	OM3	50/850	8.50	0.75 ea/ 1.5 total	0.3	>20	n/s	2km	3.5	1500
ISO 11801 Generic Cabling	OF-2000	OM3	50/1300	4.50	0.75 ea/ 1.5 total	0.3	>20	n/s	2km	1.5	500
	OF-2000	OS1	9/1310 or 1550	3.50	0.75 ea/ 1.5 total	0.3	>35	n/s	2km	1.0	n/a
IEEE 802.3	10Base-FL	Multimode/ OM1-OM2	62.5/850	12.50	0.75 ea/ 1.5 total	n/s	>20	2km	0	3.75	160
	10Base-FL	Multimode/ OM1-OM3	50/850	12.50	0.75 ea/ 1.5 total	n/s	>20	1.5km	0	3.75	160
	100Base-FX	Multimode/ OM1-OM3	62.5 or 50/1300	11.00	0.75 ea/ 1.5 total	n/s	n/s	2km	0	3.75	500
	1000Base-SX	Multimode/ OM1-OM2	62.5/850	2.33	0.75 ea/ 1.5 total	n/s	>20	n/s	220	3.75	160
	1000Base-SX	Multimode/ OM2-OM3	62.5/850	2.53	0.75 ea/ 1.5 total	n/s	>20	n/s	275	3.75	200
	1000Base-SX	Multimode/ OM1-OM3	50/850	3.25	0.75 ea/ 1.5 total	n/s	>20	n/s	500	3.5	400
	1000Base-SX	Multimode/ OM2-OM3	50/850	3.43	0.75 ea/ 1.5 total	n/s	>20	n/s	550	3.5	500
	1000Base-LX	Multimode/ OM1-OM2	62.5/1300	2.32	0.75 ea/ 1.5 total	n/s	>20	n/s	550	1.5	500
	1000Base-LX	Multimode/ OM1-OM2	50/1300	2.32	0.75 ea/ 1.5 total	n/s	>20	n/s	550	1.5	400/500
	1000Base-LX	Singlemode/ OS1	9/1310	4.50	0.75 ea/ 1.5 total	n/s	>26	n/s	5km	0.5	n/a
	10GBase-SR	Multimode-OM1	62.5/850	2.60	0.75 ea/ 1.5 total	n/s	>20	n/s	26	3.5	160
	10GBase-SR	Multimode-OM1	62.5/805	2.50	0.75 ea/ 1.5 total	n/s	>20	n/s	33	3.5	200
	10GBase-SR	Multimode/ OM2-OM3	50/850	2.20	0.75 ea/ 1.5 total	n/s	>20	n/s	66	3.5	400

Standards Organization	Classification or Application	Fiber Type	Core size (um) / wavelength (nm)	Max Link Channel Loss (dB)	Max Connector Insertion Loss (dB)	Max Splice Insertion Loss (dB)	Min Connector Return Loss (dB)	Maximum Distance (m)	Min Operating Distance (m) (50um/62.5um)	Max Fiber Attenuation (dB/km)	Min Fiber Bandwidth (MHz-km)
IEEE 802.3	10GBase-SR	Multimode/ OM2-OM3	50/850	2.30	0.75 ea/ 1.5 total	n/s	>20	n/s	82	3.5	500
	10GBase-SR	Multimode/OM3	50/850	2.60	0.75 ea/ 1.5 total	n/s	>20	n/s	300	3.5	2000
	10GBase-LR	Singlemode/ OS1	9/1310	6.00	0.75 ea/ 1.5 total	n/s	>26	n/s	10km	0.5	n/a
	10GBase-EW	Singlemode/ OS1	9/1550	5>11	0.75 ea/ 1.5 total	n/s	>26	n/s	30-40km	n/s	n/a
ISO/IEC 14165	133MbB/s Fibre Channel	Multimode/ OM1-OM3	62.5/1300	6.00	0.75 ea/ 1.5 total	n/s	n/s	n/s	1500	n/s	500
	266Mb/s Fibre Channel	Multimode/ OM1-OM3	50 or 62.5/850	12.00	0.75 ea/ 1.5 total	n/s	n/s	n/s	2000/700	n/s	500
	266Mb/s Fibre Channel	Multimode/ OM1-OM3	62.5/1300	6.00	0.75 ea/ 1.5 total	n/s	n/s	n/s	330	n/s	500
	266Mb/s Fibre Channel	Multimode/ OM1-OM3	50/1300	5.50	0.75 ea/ 1.5 total	n/s	n/s	n/s	500	n/s	500
	266Mb/s Fibre Channel	Singlemode/ OS1	9/1310	6.00	0.75 ea/ 1.5 total	n/s	n/s	n/s	2000	n/s	n/a
	531Mb/s Fibre Channel	Multimode/ OM1-OM3	50 or 62.5/850	8.00	0.75 ea/ 1.5 total	n/s	n/s	n/s	1000/350	n/s	500/160
	531Mb/s Fibre Channel	Singlemode/ OS1	9/1310	14.00	0.75 ea/ 1.5 total	n/s	n/s	n/s	2000	n/s	n/a
	1062Mb/s Fibre Channel	Multimode/ OM1-OM3	50 or 62.5/850	4.00	0.75 ea/ 1.5 total	n/s	n/s	n/s	1000/350	1.5/3.5	500/200
	1062Mb/s Fibre Channel	Singlemode/ OS1	9/1310	6.00	0.75 ea/ 1.5 total	n/s	n/s	n/s	2000	0.5	n/a

Definitions

Link channel loss - The maximum allowable loss measured with a power meter/light source kit
Minimum operating distance - Most standards do not limit the length, instead require operation to a minimum lentgh
Max fiber attenuation - Indicates max allowable loss per km. Verify from mfg that your cable is less than spec'd limit
Connector return loss - Indicate reflected power from connectors. Failures indicate polishing or cleaning problems.