

# IDEAL INDUSTRIES LANTEK CABLE TESTERS



## USER'S GUIDE

01 FEBUARY 2002

MANUAL PART # 6510-00-5000 REV. A

# **LANTEK Cable Tester User's Guide**

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## Index of Safety Precautions

IDEAL INDUSTRIES recommends that the user review all of the information in Appendix A before using the LANTEK tester.

## Important Notice

### Charge Battery Packs Prior to Use

The battery packs in the Display and Remote Handsets are subject to discharge even when the units are turned off. With time on the shelf, the battery packs' charge levels may not support the instrument's operation. Refer to *Chapter 2, Your Cable Tester* for charging instructions and observe all Safety Precautions in Appendix A.



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## Operation 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.

---

# About This User's Guide

## Chapter 1 Quick Start

This chapter summarizes information and procedures regarding tester function, unpacking, setup, and operation.

## Chapter 2 Your Cable Tester

This chapter describes the LANTEK cable tester, performance specifications, tester controls, and indicators. It also contains useful information regarding unit power management.

## Chapter 3 Calibration, Configuration, and Special Operations

This chapter describes the test adapters and reference patchcords as well as the use of the Tone Generator and Digital Talkset. It explains the procedures for calibration, configuration, cable identification, selecting cable types, and custom cable settings. The last section depicts the useful effects of performing Time Domain Reflectometer tests.

## Chapter 4 Autotesting

This chapter describes the Autotest function, and provides instructions for setting up test preferences. This chapter also describes individual tests that run during an Autotest and provides instructions for viewing and interpreting Autotest results.

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## **Chapter 5 Analyze Testing**

This chapter describes the Analyze test function and provides instructions for setting up test preferences and running an Analyze test. This chapter also describes each Analyze test and provides instructions for viewing and interpreting test results.

## **Chapter 6 Using LANTEK REPORTER**

This chapter contains procedures for LANTEK REPORTER installation, configuration, operation, uploading test data into a PC database, and for viewing and printing test reports.

## **Chapter 7 Cable Testing Fundamentals**

This chapter describes test setup, physical and electrical characteristics of cables, test descriptions, test storage, and data management procedures. This chapter also describes how to set up different cabling tests, what to do when tests fail, and typical causes of test failure.

## **Appendix A Safety Precautions**

This appendix reviews safety information regarding setup and use of the tester.

## **Appendix B Customer Support**

This appendix contains information regarding Customer Service (Technical Assistance, Service in the USA, Service Outside the USA) and World Wide Web Services.



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## **Appendix C Measurement Methods and Limits**

This appendix contains information regarding cable test accuracy levels, worst allowable pair-to-pair measured performance levels, and basic and channel link test limits.

## **Appendix D Specifications**

This appendix contains information regarding standard and optional cables, adapters, accessories, and unit specifications.

## Contents

- What's in the Box?
- Quick Start Procedures
- Next Steps

## What's in the Box?

The LANTEK you received (Category 6 or Category 7 tester) comes in either the Basic package or Premier package based on your request. See *Figure 1-1*.

The Basic package consists of:

- |                         |  |
|-------------------------|--|
| • Display Handset       | • Serial Interface Cable                           |
| • Remote Handset        | • USB Cable  |
| • NiMH Batteries (2)    | • Cat 6 Channel Adapters (2)                       |
| • AC Wall Adapters (2)  | • Cat 7 Channel Adapters (2), LANTEK 7 only        |
| • LANTEK Reporter       | • Cat 6 RJ45 Patchcords (2)                        |
| • Quick Reference Guide | • Cat 7 RJ45 to Tera Patchcords (2), LANTEK 7 only |
| • Soft Carrying Case    | • Cat 7 Tera Patchcords (2), LANTEK 7 only         |
| • Hanging Strap (2)     |  |

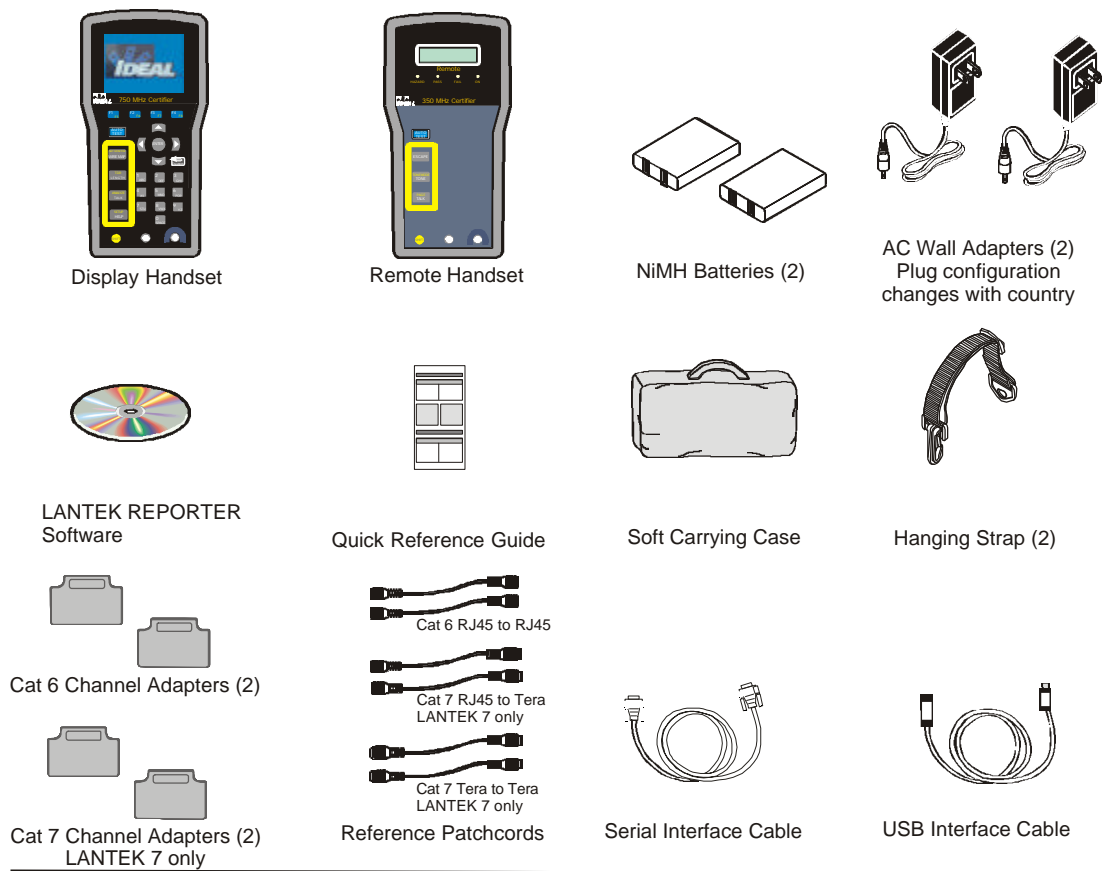
The Premier package consists of:

All items supplied in the Basic package with a substitution of a hard case for the soft case. In addition you get the (1) PCMCIA adapter, (1) Compact Flash Card (32 MB), (1) Flash card reader, and (1) 2-port battery charger.

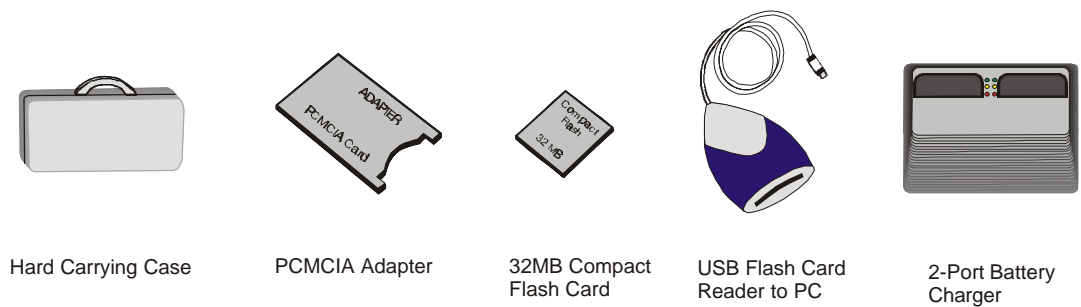
## Chapter 1 Quick Start

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### Basic Package



### Premier Package




**Figure 1-1: Contents of Package**

## Quick Start Procedures

The objective of this section is to supply a *highly experienced cable installer* with enough information to perform an Autotest on a twisted pair cable. For more detailed information refer to *Next Steps, page 1-7*.

### Power-up

Power-up the Display Handset by pressing the **On/Off**  key.

*Note: The Remote Handset will be powered up automatically by the Display Handset when the test begins.*

### Self-Test

When the LANTEK Tester is turned on, it displays a *Self-Test In Progress* message and performs a quick self-test. An alert message is displayed if the self-test determines that calibration or repair is necessary.




Figure 1-2: Self Test In Progress

## Tester Calibration

A calibration screen will always appear 7 days after the last field calibration. The purpose of calibration is to (1) synchronize the units, (2) qualify (test) the patchcords and (3) gather loss data regarding the patchcords and mated connections.

*Note: Calibration should also be done whenever there is a change of the reference patchcords.*

To calibrate the tester:

1. Connect the channel adapters to the Display Handset and Remote Handset.
2. Power the units on.
3. Connect one of the two appropriate patchcords to the adapters of the DH and RH units.
4. From the DH Ready screen, select **Field Calibration** .
5. From the Field Calibration screen, select **Start** on the DH.
6. At completion of the first patchcord process, disconnect the first patchcord from the adapters of the DH and RH and insert the second patchcord into both of the units' adapters.
7. Select **Start** on the DH.
8. At completion of the second patchcord process, disconnect the second patchcord from one of the units and re-insert the first patchcord to the unit's adapter not connected to a patchcord.

The field calibration is complete and you are ready to perform tests.

If the calibration was unsuccessful, proceed to *Chapter 3, Tester Field Calibration*. If you are unable to fix the problem, contact your local distributor or an IDEAL INDUSTRIES service facility for assistance.

## Twisted Pair Cable Connections

Most Autotests are performed with the DH and RH connected at opposite ends of the cable under test. The minimum level of connectivity required depends on the test and cable type selected.

- Some tests can be performed *without* the RH. Stored test results or test printouts will indicate the presence or absence of the RH during the test.
- If the test requires the RH, the DH will first attempt to communicate with the RH. If unable to communicate, the DH will display a message that it is looking for the RH.

Observe the following cautions while connecting the tester:

### Shielded Cabling Systems



Do not create testing ground loops with shielded cable systems. Shielded cable systems (i.e., 4 pair STP, or Coaxial) present a unique testing problem due to the cable shield's ground connection. The LANTEK unit can test these systems to specifications only if the handsets are operated on battery power and not connected to a PC or printer using a copper serial cable.

If connection to a printer or PC is essential to perform testing, IDEAL INDUSTRIES recommends using battery-operated devices and removing any wall power charging inputs. If this is not possible, an optically isolated serial cable should be used during testing to isolate the tester from all other ground connections.

### TELCO Lines



Do not connect the tester to a live or active TELCO lines. If you accidentally plug the unit into outlets with active TELCO lines present (indicated by a "Voltage Exceeds Limits" warning message) disconnect the tester immediately.

### **Permanent Link Test Setup**

1. Attach the channel adapters to both the Display and Remote Handsets.
2. Attach the appropriate patchcords to the adapters.
3. On the horizontal cable to be tested, disconnect the corresponding user patchcords from the network patch panel and the RJ-45 or Tera wall outlet.
4. Connect the DH with the adapter and the appropriate patchcord end to the network patch panel, and then connect the RH with the adapter and the appropriate patchcord end to the wall outlet.

*Note: Prior to testing, check that the Cable Type is set for Permanent Link.*

### **Channel Link Test Setup**

1. Attach the channel adapters to both the Display and Remote Handsets.
2. On the link to be tested, disconnect the corresponding user patch cords from the network equipment.
3. Connect the DH adapter to the patch panel using the user patchcord and the RH adapter to the wall outlet using the user patchcord.


*Note: Prior to testing, check that the Cable Type is set for Channel Link.*

## **Set Autotest Preferences**

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







- |                      |                  |                    |
|----------------------|------------------|--------------------|
| • Simple Cable ID    | • Pass Fail Icon | • Stop on Fail     |
| • Autosave           | • Save Graphs    | • Auto Increment   |
| • Marginal pass/fail | • ACR            | • Resistance       |
| • Capacitance        | • Impedance      | • Enable 24 ELFEXT |

### To set Preferences:

1. From the DH **Tools** screen, select **Preferences** .
2. Select **Autotest Preferences**.
3. From the open **Autotest Preferences** screen, set the preferences as required (refer to *Chapter 3, Set Autotest Preferences*).

## Perform Autotest on a Twisted Pair Cable

The selection of cable type determines the default tests and limits included in an Autotest suite.

1. Press **Shift**  and **Setup**  simultaneously or select  on the DH Ready screen to choose the **Cable Type** (refer to *Chapter 3, Selecting Cable Type*).
2. Press **Autotest**  to begin testing. The cable tester will perform a predefined test suite.
3. The test result is displayed below the Title Bar at the top right corner.  
A checkmark  indicates an overall pass. A  indicates an overall fail.
4. To interpret, save, or print an Autotest result, refer to *Chapter 4, Autotesting*.

## Next Steps

Refer to the following chapters for more information regarding the setup and operation of your LANTEK tester:

## Chapter 2 Your Cable Tester

This chapter describes the LANTEK tester controls, indicators, and screens. It also contains information regarding tester power management.



## **Chapter 3 Calibration, Configuration, and Special Operations**

This chapter describes the test adapters and reference patchcords as well as the use of the Tone Generator and Digital Talkset. It explains the procedures for calibration, configuration, cable identification, selecting cable types and custom cable settings. The last section depicts the useful effects of performing Time Domain Reflectometer tests.

## **Chapter 4 Autotesting**

This chapter describes the Autotest function and provides instructions for setting up test preferences. This chapter also describes individual tests that run during an Autotest and provides instructions for viewing and interpreting Autotest results.

## **Chapter 5 Analyze Testing**

This chapter describes the Analyze test function and provides instructions for setting up test preferences and running an Analyze test. This chapter also provides instructions for viewing and interpreting test results.

## **Chapter 6 Using LANTEK REPORTER**

This chapter describes how to upload test data from the LANTEK tester to a PC or laptop and how to organize and print the test data.

## **Chapter 7 Cable Testing Fundamentals**

This chapter describes physical and electrical characteristics of cables, test descriptions, test storage and data management procedures. This chapter also describes how to set up different cabling tests, what to do when tests fail and typical causes of test failure.

## Chapter 2

# Your Cable Tester

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### Contents

- The LANTEK Cable Tester
- The Display Handset
- The Remote Handset
- Operational Sequence
- Battery and Power Management

### The LANTEK Cable Tester

The LANTEK is a high-performance portable LAN cable tester designed to test and measure twisted pair and coaxial cable used for high-speed data communications networks.

The LANTEK 7 tester is capable of certifying Category 5, 5e, 6, and 7 cables to Level III accuracy with a frequency of 750 MHz (350 MHz for the LANTEK 6), and will perform a frequency sweep based platform with vector (amplitude and phase) capabilities. This instrument is designed to meet the current test requirements of the TIA/EIA 568 and ISO 11801 standards including “Permanent Link” characterization.

## **Features of the Tester**

¼ VGA (320 x 240) color LCD DH display with backlight.

Advanced TDR capabilities, including Fiber Optic capability (with TRACETEK adapter module).

PCMCIA double height slot for user removable and replaceable CF (Compact Flash) memory modules.

Digital talkset including FIBERTEK compatible capability (with FO adapter module).

USB and serial ports for downloading and communication with standard PC.

Both DH and RH have a “Kick stand” for optimum display visibility on the bench.

The RH has a two line alphanumeric B/W LCD display and a reduced keypad set.

Initiate Autotest from either the DH or RH.

IDEAL’s revolutionary Adapter modules with locking mechanisms (Patent Pending).

## Performance Specifications (Copper)

Delay	
Range	0-8000nsec
Resolution	1nsec
Accuracy	$\pm(3\% + 1\text{ns})$
Length	
Range	2000 ft.
Resolution	1ft.
Accuracy	3% + 3ft.
Propagation	0.5 – 0.99c
Cable Capacitance	
Range	0 – 100nF
Resolution	3dig
Accuracy	$\pm(2\% + 20\text{pF})$
DC Loop Resistance	
Range	0 – 200 $\Omega$
Resolution	0.1 $\Omega$
Accuracy	$+(1\% + 2\Omega)$
Attenuation	
Frequency Range	1 - 350 MHz (LANTEK 6) 1 - 750 MHz (LANTEK 7)
Measurement Range	0 – <90dB
Dynamic Range	55dB to 700 MHz
Frequency Step Size (kHz)	150,250,500,1000
Resolution	0.1dB
Accuracy	Exceeds Level III Accuracy

## Chapter 2

### Your Cable Tester

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NEXT	
Frequency Range	1 - 350 MHz (LANTEK 6) 1 - 750 MHz (LANTEK 7)
Measurement Range	20 – 100dB
Dynamic Range	70dB to 700 MHz
Frequency Step Size (kHz)	150,250,500,1000
Residual NEXT	72dB
Resolution	0.1dB
Accuracy	Exceeds Level III
Return Loss	
Frequency Range	1 - 350 MHz (LANTEK 6) 1 - 750 MHz (LANTEK 7)
Measurement Range	0 – 30dB
Frequency Step Size (kHz)	150,250,500,1000
Resolution	0.1dB
Accuracy	Exceeds Level III
Auto Test Time	
Cat 5-E	<25 seconds
Cat 6	<30 seconds
Certification to 750 MHz (LANTEK 7 only)	<35 seconds
Average Noise	
Range	0 – 2Vrms
Bandwidth	40 – 500 Hz
Resolution	10mVrms
Accuracy	±(3% +20mVrms)

Impulse Noise	
Count Range	0 – 9999 counts/sec
Threshold Range	0 – 2V
Threshold Resolution	10mV
Threshold Accuracy	$\pm(5\% + 20\text{mV})$
Min pulse width	10ns above threshold
ELFEXT	
Frequency Range	1 - 350 MHz (LANTEK 6) 1 - 750 MHz (LANTEK 7)
Measurement Range	20 – 100dB
Dynamic Range (FEXT)	70dB to 700 MHz
Frequency Step Size (kHz)	150,250,500,1000
Residual FEXT	72dB
Resolution	0.1dB
Accuracy	Exceeds Level III Accuracy

## The Display Handset

The LANTEK Display Handset performs as the command unit. This allows you to control procedural preference and test functions used during the performance of various cable test activities.

### Display, Controls, Indicators, and Interface

Figure 2-1 shows the controls and indicators of the Display Handset (DH). Table 2-1 provides a brief description of each DH feature.



Figure 2-1: Display Handset (DH)

**Table 2-1: Display Handset (DH) Keys, LCD, and Connectors**

<b>Item</b>	<b>DH Front Panel</b>	<b>Description</b>
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 test.
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 cable type setup screen
9	Escape Key	Abort and exit the current screen without making changes.
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	Connect an adapter.
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.
18	USB Port	PC upload port. Also used to load software upgrades.
19	DB-9 Serial Port	Printer and PC upload port. Also used to load software upgrades.



## VGA Front Panel

The Ready screen appears when the unit is powered up.

*Note: A warning screen will appear reminding you to perform a field calibration if one has not been performed within the last 7 days. You can still perform testing but the test results may not be qualified or reliable.*

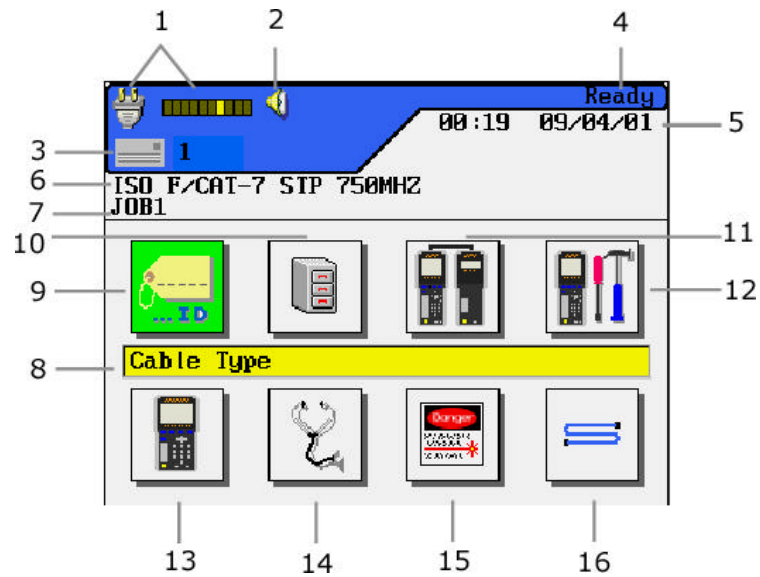


Figure 2-2: LCD Ready Screen

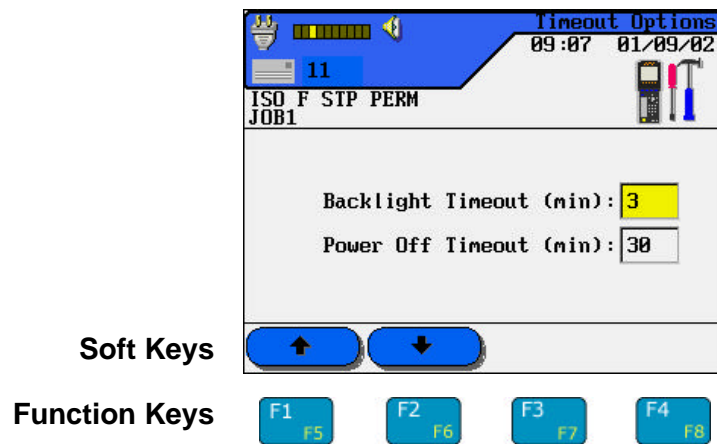
**Table 2-2: Ready Screen Indicators**

<b>Item</b>	<b>Function</b>	<b>Description</b>
1	Battery Meter or AC Cable	Display remaining battery power level (from Empty to Full) or Indicate 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.



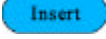





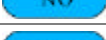











## Hard and Soft Keys

User options will often appear at the bottom of the tester display screen over the four function keys positioned directly below the display. To select an action, press its corresponding function key.












In the example below, press the Function keys directly below the screen to adjust the Timeout options. The soft key will indicate the function of the key below: F1 to increase or F2 to decrease.



**Table 2-3: Soft Key Descriptions**

<b>Soft Key</b>	<b>Description</b>
	Delete alphanumeric character(s) at the cursor
	Delete alphanumeric character(s) left of the cursor
	Insert alphanumeric character(s) at the cursor
	Insert an incremental value from the source or near-end
	Insert an incremental value to the far-end
	Show a list of options to select from
	Begin or Run the selected activity
	Accept the new changes upon exiting the activity
	Exit the activity without making changes
	Display graphs
	Save data to the current file or use the auto naming convention
	Save data to a renamed file or overwrite an existing file
	Print data
	Show a list of manufactured cables
	Create a Custom Cable
	Display Nominal Velocity of Propagation
	Page-up or increase value
	Page-down or decrease value
	Increase value 1 unit
	Increase value 10 units

**Table 2-4: Soft Key Descriptions (Continued)**

<b>Soft Key</b>	<b>Description</b>
	Decrease value 1 unit
	Decrease value 10 units
	Activate/Deactivate an item in a list box A box containing an X mark indicates the activity is on. An Open box indicates off.
	12 hour time format
	24 hour time format
	Measurement in feet
	Measurement in meters
	Manual setting
	Automatic setting
	Select an Item
	Automatically calculate a new NVP value

## Display Handset Interface Ports



Figure 2-3: Display Handset Interface Ports

Table 2-4: DH Connectors

Item	Connector	Description
1	Talkset Jack	Connect the Talkset to the tester.
2	DC Input Jack	Charge the battery in the handset.
3	DB-9 Serial Port	Supports the following functions: <ul style="list-style-type: none"> <li>• Print test results on a serial printer.</li> <li>• Upload stored test results to a PC.</li> <li>• Load firmware upgrades.</li> </ul>
4	USB Port	Supports the following functions: <ul style="list-style-type: none"> <li>• Upload stored test results to a PC.</li> <li>• Load firmware upgrades.</li> </ul>
5	Low-Crosstalk Connector	Attach adapters for all types of cables.

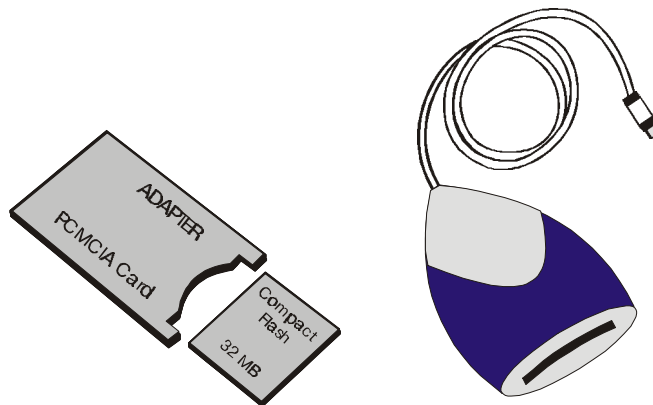
## **Removable Mass Storage**

The LANTEK tester provides two PCMCIA slots (Slot 0/Slot 1) for compact flash memory. These external memory modules can be used for storing test results. Storage will be organized in a standard Windows file structure with folders having names corresponding to job names and containing the test's data files.



**Figure 2-4: PCMCIA Slots**

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.



**Figure 2-5: PCMCIA Adapter, Compact Flash Card and Reader**

## The Remote Handset

The RH (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. The RH is automatically activated by the DH. 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 2-6 shows the controls and indicators of the Remote Handset (RH). Table 2-7 provides a brief description of each RH feature.

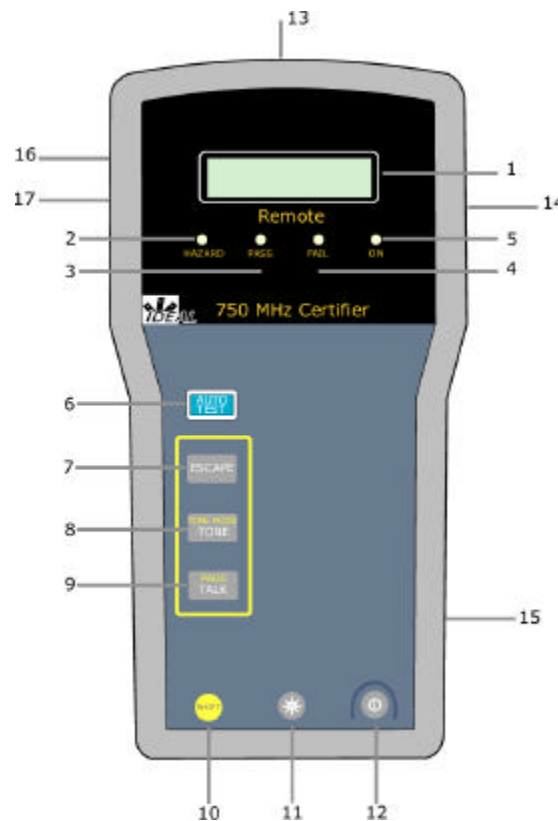


Figure 2-6: Remote Handset (RH)



**Table 2-5: Remote Handset (RH) Keys, LED, and Connectors**

<b>Item</b>	<b>RH Front Panel</b>	<b>Description</b>
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 change.
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	Toggle the screen backlight on/off
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

## Remote Handset Interface Ports



Figure 2-7: Remote Handset Interface Ports

Table 2-6: RH Connectors

Item	Connector	Description
1	Talkset Jack	Connect the Talkset to the tester
2	DC Input Jack	Charge the battery in the handset
3	DB-9 Serial Port	Load firmware upgrades
4	USB Port	Load firmware upgrades
5	Low-Crosstalk Connector	Attach adapters for all types of cables.

## Operational Sequence

- The DH searches for the RH.
- During *testing*, if the two handsets are unable to communicate, the DH will display a message that it is searching for the RH and continue trying to establish communications until you manually cancel the operation or the RH is found. If the handsets are unable to establish communication, check the links to verify proper connection.
- During *field calibration*, if the two handsets are unable to communicate, the DH will display a message instructing you to connect the DH and RH together using the adapters and reference patchcords. If you attempt to run the test without the adapter, the DH will display a warning message.

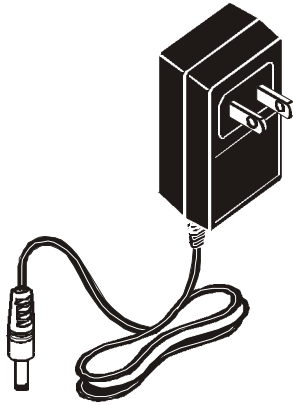
## Battery and Power Management

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

- The DH (Display Handset) 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 temperature.
- When the battery is almost empty, the tester displays a warning message. The tester will automatically shut down before testing results are affected.
- The RH (Remote Handset) can be run on battery power for approximately eight hours.
- After a brief period of inactivity, the DH and RH automatically power down to save battery power.

## Operating the DH and RH from an AC Power Source

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



**Figure 2-8: 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. These adapters are currently available for European, United Kingdom and North American AC power.

*Note: When the batteries become fully charged and the wall cube is still connected, the batteries will warm slightly. This does not affect the operation of either the DH or the RH.*

## **Battery Charging**

The handset batteries are recharged using the AC/DC Wall Cube. 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.

The batteries can be recharged in the handsets (using the AC/DC Wall Cube) in about 8 hours.

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

# Chapter 3

## Calibration, Configuration, and Special Operations

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### Contents

- Adapters and Reference Patchcords
- Warning Screens
- Tester Field Calibration
- Tester Configuration
- Cable ID/AutoName Option
- Changing a Cable Type
- Custom Cable Settings
- Tone Generator
- Digital Talkset
- TDR Test

## Adapters and Reference Patchcords

The Test Adapters for the LANTEK 6/7 Cable Tester look similar to the Channel Adapters and can perform calibration of the test units as well as Permanent Link and Channel Link testing.

The LANTEK 6 Cable Tester is supplied with two Category 6 Test Adapters and two Reference Patchcords with Category 6 plugs at both ends.

The LANTEK 7 Cable Tester is supplied with two Category 7 Tera Test Adapters and two sets of Reference Patchcords.

- The first set of Reference Patchcords have Tera plugs at both ends.
- The second set of Reference Patchcords have Tera Plugs at one-end and Category 6 RJ45 plugs at the other end.

**Table 3-1: LANTEK 6 Test Adapter and Reference Patchcord Usage**

Type of Test	Cat 6 Channel Adapter	Cat 6 to Cat 6 Reference Patchcords	Cat 6 to Cat 6 User Patchcords
Calibration	✓	✓	✓ *
Cat6/5e Class E/D Channel	✓		✓
Cat6/5e Class E/D Permanent Link	✓	✓	✓ *

*\* Note: Good quality user patchcords may be used for permanent link testing if the units have been calibrated with them.*

**Table 3-2: LANTEK 7 Test Adapter and Reference Patchcord Usage**

<b>Type of Test</b>	<b>Tera Cat 7 Channel Adapter</b>	<b>Tera to Tera Reference Patchcords</b>	<b>Tera to Cat 6 RJ45 Reference Patchcords</b>	<b>Tera to Tera User Patchcords</b>
Calibration	✓	✓		
Cat 7-Class F (Tera) Permanent Link	✓	✓		✓ <b>1</b>
Cat 7 Class F (Tera) Channel	✓			✓
Cat 6/5e Class E/D Permanent Link	✓		✓	
Cat 6/5e Class E/D Channel				<b>2</b>

*Note: **1** Good Quality User patchcords may be used for permanent link testing if the units have been calibrated with them.*

***2** Category 6 Test Adapters are required for Channel Testing. They also provide an additional option for Category 6 Permanent Link testing on the LANTEK 7.*

## **Benefits of Using the New Adapter Design**

### **Reduction of the Cost of Ownership**

The same adapter can be used for permanent and channel link testing, thereby reducing the number of adapters required to perform the same function. Performing tests on vendor's proprietary plugs may require a new set a patchcords not an additional set of adapters.



### **Reduction in Product Complexity**

Fewer adapters to manage, less adapters to order, less misplacement at the worksite or office.

### **Reduction in Adapter Connector Wear**

The 160-pin connector is secured to the tester, thereby locking with the tester creating no flexing of the pin connection during day to day operation. The adapter is a multi-use device facilitating fewer switching activity, reducing wear.

### **Reduction of Maintenance Costs**

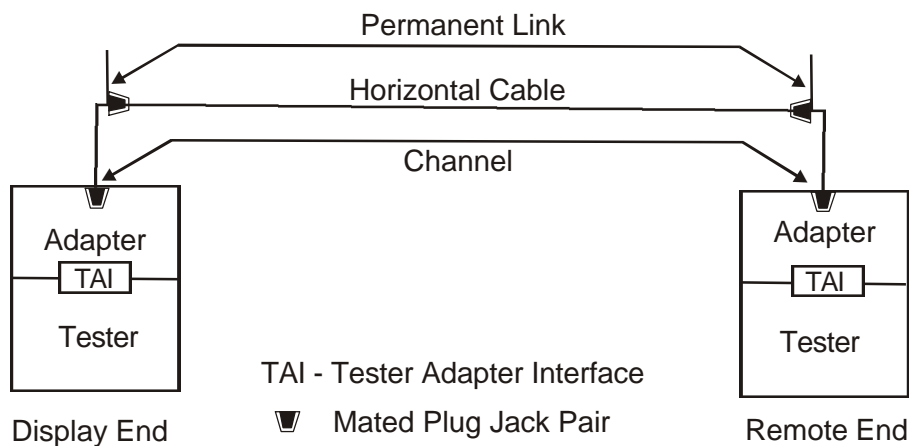
Repeated testing requires multiple plug insertions when moving from link to link. Repeated insertions cause the plug to wear, necessitating its replacement. The new design allows only the reference patchcord to be replaced, which is considerably less expensive than replacement of the adapter.

### **Reduction of Installer Test Time Caused by Adapter Switching**

Previously, performing different tests or a calibration required switching the adapter. The new design requires the use of one adapter for all functions, resulting in time savings when performing tests or calibration.

## Design Overview

The test lead to the adapter is a mated pair connection rather than a soldered connection. Allowing the use of the same adapter for both Permanent Link and Channel Link testing. The overall loss measurement is shown in Figure 3-1.



**Figure 3-1: Loss Components of a Total Link**

All of the loss effects of each of the above components must be known in order to properly report the Loss Effects of a Permanent Link or a Channel Link.

- Channel losses can be measured when the background loss effects of the test units, adapters, and the test unit/adapter interfaces are subtracted from the measured overall raw loss effects.
- Permanent link losses are measured when the loss effects of the test lead patchcords and the mated pair making up the adapter/patchcord interface are subtracted from the overall Channel losses.

## **Calibration**

Calibration is performed with the Channel adapters and patchcords. The Reference Patchcords supplied have plugs that match the jacks in the Channel adapters. We recommend that you calibrate with the patchcords that will be used for Permanent Link Testing. These cords should be identical, good quality, shielded patchcords.

Once the calibration is complete, the information is retained by the test unit to disclose the characteristics of the mated pair used to connect the patchcord cable to the test adapter.

## **Performing a Permanent Link Test**

1. Insert one end of a patchcord into the adapter's jack at both the Near-End and the Far-End.
2. Insert the other end into the Permanent Link's jack at both the Near-End and the Far-End.
3. Select the appropriate Permanent Link Test.
4. Start the Autotest Function.

## Performing a Channel Link Test

1. Insert one end of a patchcord into the adapter's jack at both the Near-End and the Far-End.
2. Insert the other end into the Channel Link's jack at both the Near-End and the Far-End.
3. Select the appropriate Channel Link Test.
4. Start the Autotest Function.

## Warning Screens

In response to a change in parameter(s), failure, harmful condition, or operational limitation, the tester will display a warning screen. This screen advises you of the activity or request you are or will be engaged in. The screen will prompt you to respond in a YES/NO manner.

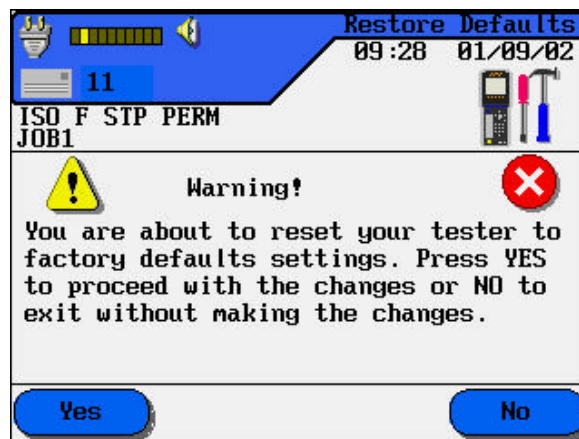


Figure 3-2: Sample Warning Screen

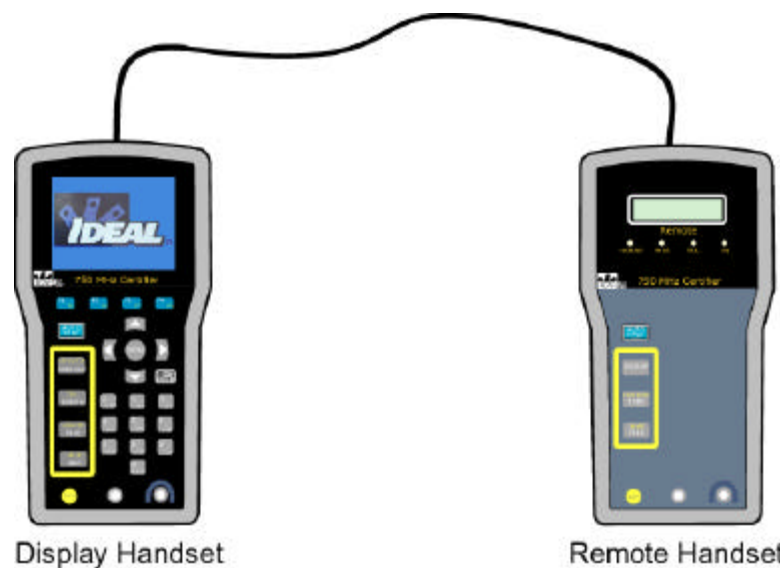
## Tester Field Calibration

It is recommended that the LANTEK tester be calibrated every 7 days. A calibration reminder message will appear on the Display Handset screen when calibration is requested.

The purpose of calibration is to (1) synchronize the units, (2) qualify (test) the patchcords and (3) gather loss data regarding the patchcords and mated connections.

**To calibrate the tester, perform the following steps:**

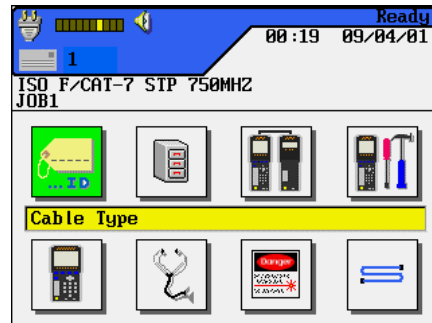
1. Connect the channel adapters to the Display Handset and Remote Handset.
2. Power both units on.
3. Connect one of the two appropriate patchcords to the adapters of the DH and RH units.



**Figure 3-3: Tester Field Calibration Setup**

4. From the DH Ready screen,

select **Field Calibration** .  
The Calibration screen appears.




5. From the Field Calibration screen, select **Start** to begin the calibration process on the first patchcord.  
Calibration takes approximately one minute to complete.



6. At completion of the first patchcord process, disconnect the first patchcord from the adapters of the DH and RH and insert the second matching patchcord into both of the units adapters.



7. From the Field Calibration screen, select **Start** to begin the calibration process on the second patchcord.
8. At completion of the second patchcord process, press  to return to the Ready screen.
9. Disconnect the second patchcord from one of the units and re-insert the first patchcord into the unit's adapter not connected to a patchcord. The field calibration is complete and you are ready to perform tests.

## Chapter 3

### Calibration, Configuration, and Special Operations

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If calibration is unsuccessful, the tester will briefly display either a Warning screen displaying “No Remote Handset” or a Calibration Failure screen.

The display handset will return to the Ready screen upon exiting from a calibration error screen.

*Note: If the field calibration is out of date, you can still perform an autotest but the results may not be qualified or reliable.*

**Table 3-3: Unsuccessful Field Calibration Checklist**

Action	Result
Check the battery power on both the Display and Remote Handsets.	Check the DH for a low battery message. If the Display Handset indicates a low battery, you must recharge the battery before the unit will pass calibration.  The RH will not respond if its battery is low.
Check the adapter and connections.	Make sure the adapter is correctly seated and there are no bent pins.

If you are unable to successfully calibrate the tester, contact your local distributor or an IDEAL INDUSTRIES service facility for assistance.

## Tester Configuration

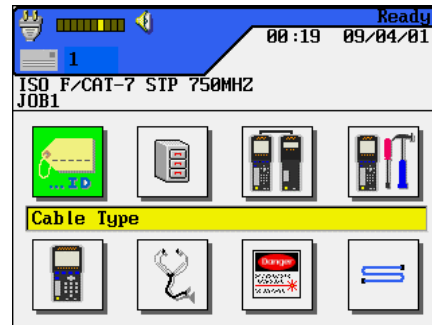
Most tester configuration parameters are set from the Preferences screen.

### To open the Preferences screen:

1. From the Ready screen, select

the **Preferences** .

The Preferences screen appears.



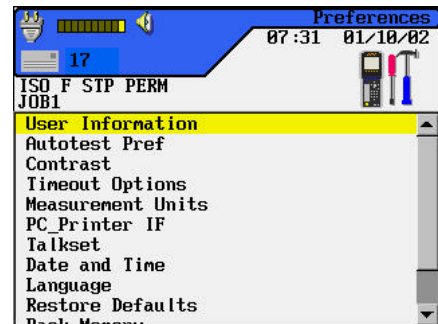
2. Use the **Up/Down Arrow** keys to select one of the following options:
  - Enter User Information
  - Set Date and Time
  - Set Autotest Preferences
  - Select Display Language
  - Adjust Display Contrast
  - Restore Factory Defaults
  - Set Time-Out Options
  - Pack Memory
  - Set Measurement Units
  - Clear Memory
  - Configure the PC & Printer I/F
  - Select Save Media
  - Configure the Talkset Option



## Entering User Information



User information identifies the unit operator for test reports.

1. From the Preferences screen, select **User Information**.



The User Information screen appears.



2. Use the **Alphanumeric** keys to enter your name. Press the **Left** or **Right Arrow** keys to move the cursor from one character to the next.
3. Use the **Up** or **Down Arrow** keys to move between the fields.
4. Press  to save or  to exit without saving changes.

## Setting Autotest Preferences

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

**Table 3-4: Autotest Preference Options**

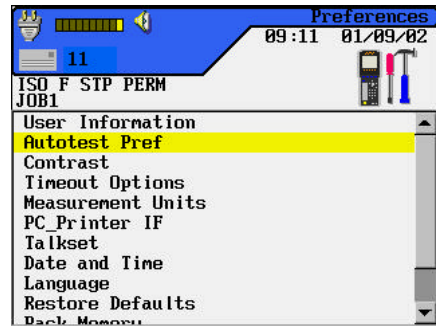
Option	Action
Simple Cable ID	Assigns a fixed alpha value for the Cable ID.
Pass/Fail Icon	Display Pass or Fail icon for overall test and individual test.
Stop on Fail	Autotest aborts at the first failed test. Otherwise, Autotest continues until all tests are completed, regardless of results. <i>Note: If a wire map cannot be reliably completed due to gross miswiring, the Autotest may abort regardless of the setting of this preference.</i>
AutoSave	Autotest automatically names and saves any passed Autotest results. Failed tests are <i>not</i> 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.
Auto Increment	Autotest automatically increments the Single and Double Cable ID test counters.
Marginal Pass/Fail	Display Pass or Fail with an * identifying marginally effected test(s).
ACR	Perform ACR Test.
Resistance	Perform Resistance Test.
Impedance	Perform Impedance Test.
Enable 24 ELFEXT	Enable measurements at the DH for all possible pair combinations.

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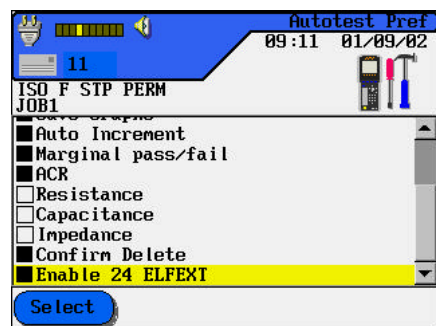
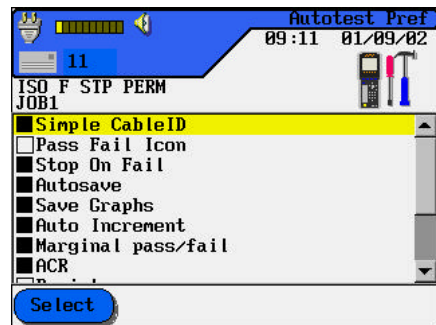
### Calibration, Configuration, and Special Operations

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1. From the Preferences screen, select **Autotest Preferences**. Press **Enter**. The Autotest Preference screen appears.



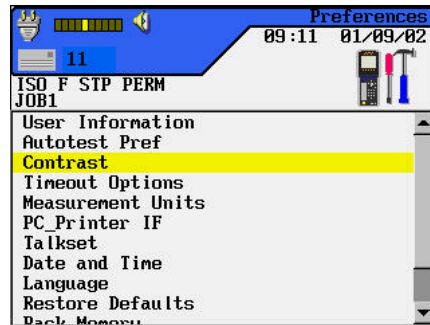
2. Press the **Up/Down Arrow** keys to highlight the desired option.
3. Choose Select to activate or deactivate the highlighted option.







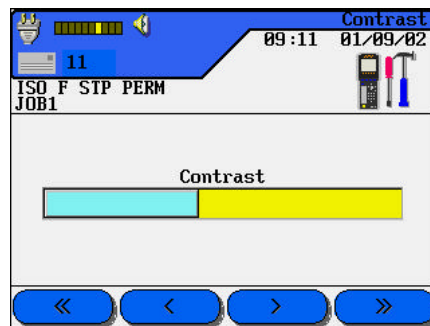
4. Press  to save or  to exit without saving changes.

### Adjusting the Display Contrast

1. From the Preferences screen, select **Contrast**. Press **Enter**. The Contrast screen appears.



2. Select  /  or  /  to adjust the screen contrast.



3. Press  to save or  to exit without saving changes.

### Setting Timeout Options

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

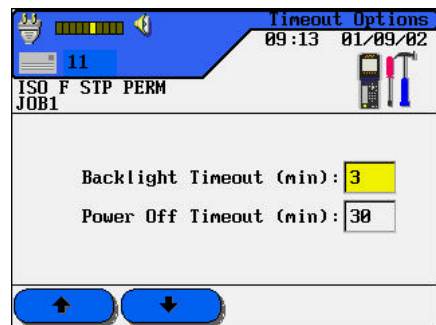
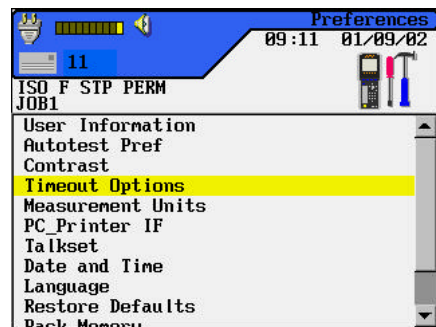
Default Timeout Settings:





Backlight	1 minute
Power	30 minutes

1. From the Preferences screen, select **Timeout Options**. 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. Select  or  to adjust the Backlight Timeout setting.

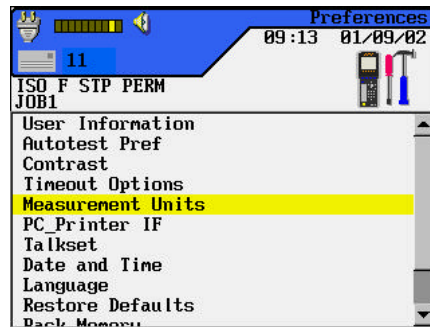


3. Press the **Down Arrow** key to select the Power Off Timeout option.
4. Select  or  to adjust the Power Off Timeout parameter.
5. Press  to save or  to exit without saving changes.

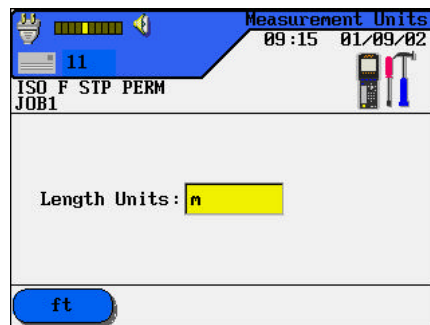
### Setting Length Measurement Units

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

1. From the Preferences screen, select **Measurement Units**. Press **Enter**. The Measurement Units screen appears.



2. Select either **ft** or **m** to set the unit of measure to feet or meters.

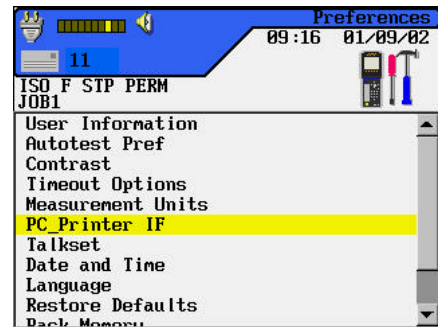




3. Press **ENTER** to save or **Escape** to exit without saving changes.

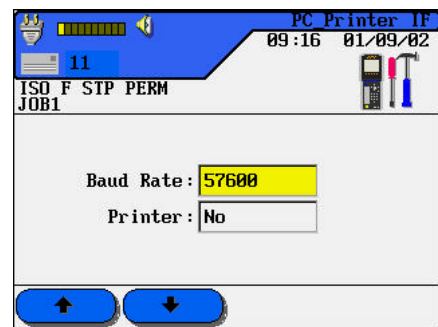
### Configuring the PC or Printer Interface

Use this option to configure the serial port and select the type of printer being used.

1. From the Preferences screen, select **PC & Printer I/F**. Press **Enter**. The PC & Printer I/F screen appears.



2. Press the **Arrow** keys to highlight the desired parameter.
3. Select  or  to input the desired setting.



4. Press  to save or  to exit without saving changes.

### **Configuring the Talkset**

LANTEK testers are “talkset ready.” Use this option to configure communications between the DH and the RH through an externally attached microphone/headset.

If the Talkset is enabled, the DH and RH may be switched between “Test” and “Talk.” If the Talk button on either unit is momentarily depressed, both units will return to “Test” mode.

If the Talk button on either unit is momentarily depressed when the units are in “Test” mode (and not currently testing), the units will switch to “Talk” mode. The units will remain in “Talk” mode until the Talk button on either unit is depressed, the AutoTest button is depressed, or after a period of time of no talk activity is detected by the DH.

During fiber testing, the lasers in each adapter are not powered when the DH and RH are in “Talk” mode. Prolonged active talk will not allow the Timeout to return the units to “Test” mode. This may permit the lasers’ temperature to drop below their threshold operating temperatures, requiring a new warm-up sequence for the fiber adapters. (See *IDEAL’s FIBERTEK User’s Manual*.)

1. From the Preferences screen, select **Talkset**. Press **Enter**. The Talkset screen appears.



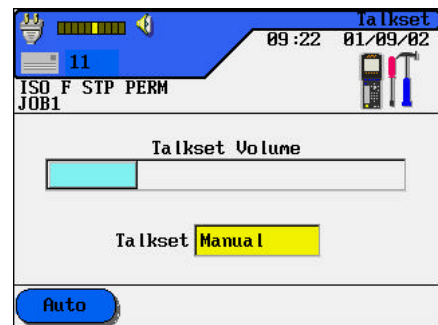
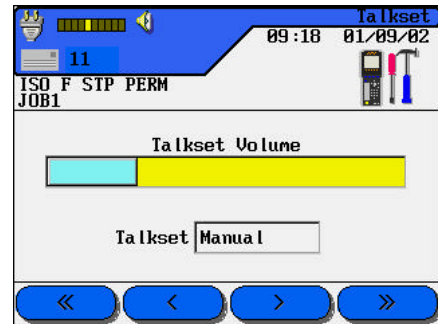


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### Calibration, Configuration, and Special Operations

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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.

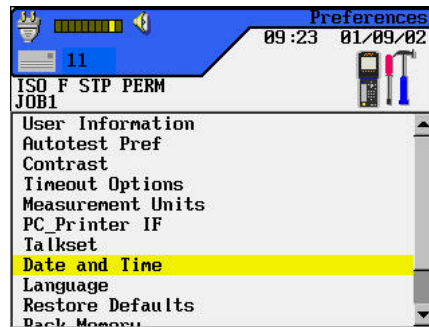


4. To talk with someone using the talkset both the Display Handset and the Remote Handset must be connected to a cable.
5. If the talkset is in Manual setting, select **<<** **<** or **>** **>>** to adjust the audible volume.
6. Press **ENTER** to save or **Escape** to exit without saving changes.

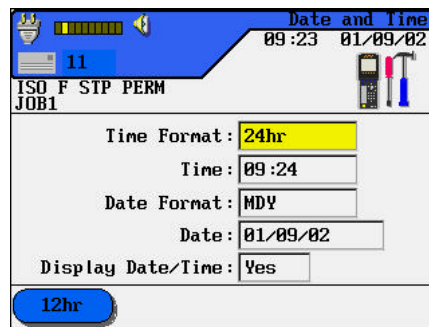
## Setting Date and Time

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

1. From the Preferences screen, select **Date and Time**. 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 Alphanumeric 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 without saving changes.

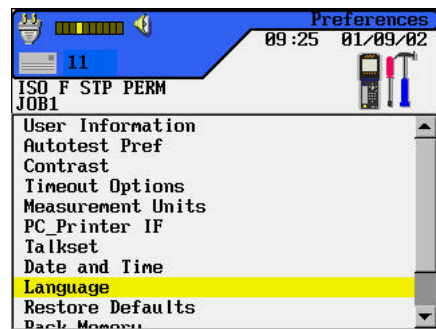
### Selecting a Display Language

You can select one of six languages for the tester display screen:

- English (Default)
- Italian
- French
- Portuguese
- German
- Spanish

1. From the Preferences screen, select **Language**.

Press **Enter**. The Language screen appears.



2. Select  or  to select the desired language.



3. Press  to save or  to exit without saving changes.

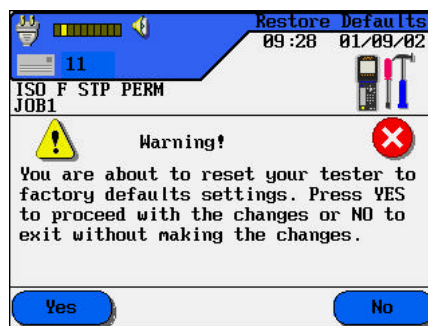
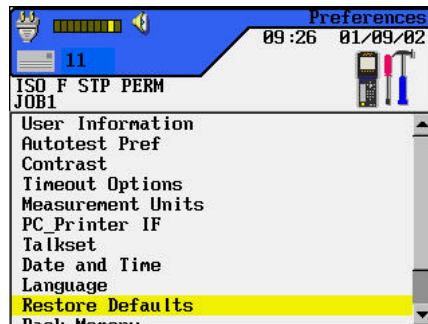
## Restoring Factory Defaults

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.



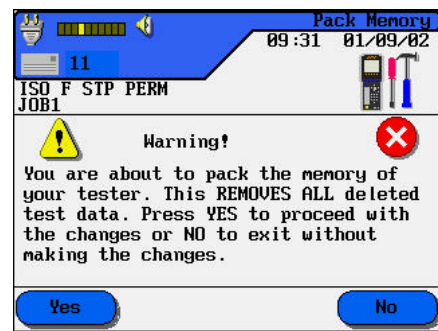
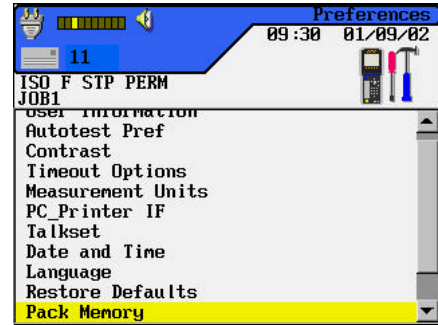
## Pack Memory

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

1. From the Preferences screen, press the **Arrow** key 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.



## Clear Memory

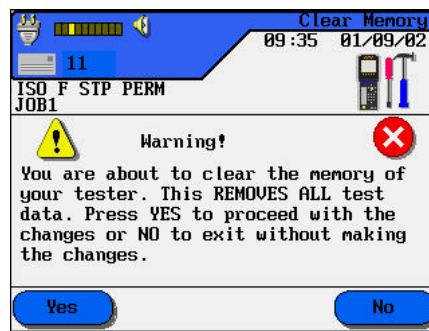
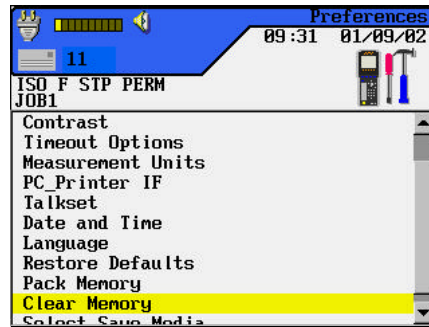
Use this option to clear the tester memory of all data.

1. From the Preferences screen, press the **Arrow** key 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.

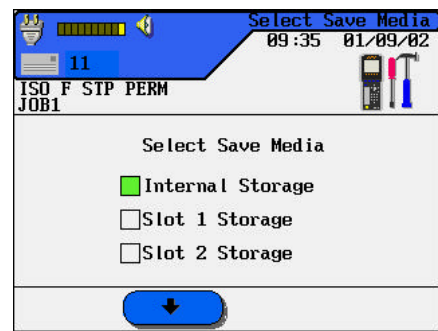
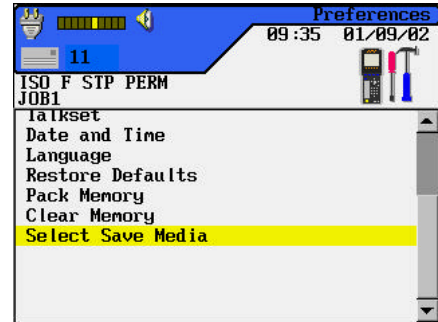
*Note: There is no undelete option when Clear Memory is used. All stored tests will be permanently deleted.*



## Select Save Media

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

1. From the Preferences screen, press the **Arrow** key to highlight **Select Save Media**.
2. Press **Enter**. The Select Save Media screen appears.
3. Use   to select the storage media.



4. Press  to save or  to exit without saving changes.

## Simple Cable ID/AutoName Option

### Cable IDs and Test Numbering

#### Single and Double Cable IDs

There are two levels of AutoName capability: Single and Double ID. The Double ID feature has several benefits:

- Both ends of the cable under test are clearly identified.
- While reviewing saved test records, potential problems can be identified and quickly located.

If the *Autosave* Autotest preference is selected, names will automatically be assigned to completed tests.

- You can assign a maximum of two unique 10-character cable names for the cable under test (Double ID).
- The tester defaults to a single naming mode (Single ID). The following three screens are examples of unique Single and Double Cable IDs.

#### 1. Single ID Example

A unique alphanumeric character name can be entered, along with a four-character incrementing counter field. The counter is set by default or by the user. This example is set to start at 0003.

The screenshot shows a handheld device screen titled "Cable ID". At the top, there is a status bar with a battery level indicator, the number "11", and the time "09:39" and date "01/09/02". Below the status bar, there is a section with the text "ISO F STP PERM" and "JOB1". The main area of the screen has two input fields: "Cable Name:" with the value "TEST" and "Current Value:" with the value "0003". At the bottom of the screen, there are three buttons: "Delete", "Backspace", and "Insert".



**2. Double ID “Cable To”  
Example**

A unique alphanumeric character name can be entered along with a four-character incrementing counter field. This example is set to start at *0000*.

The screenshot shows a handheld device screen titled 'Cable ID'. At the top, it displays '11', '09:41', and '01/09/02'. Below this, it says 'ISO F STP PERM' and 'JOB1'. The main area has two input fields: 'Cable Name:' with the text 'OFFIC~' and 'Current Value:' with the text '0000'. At the bottom, there are four buttons: 'Delete', 'Backspace', 'Insert', and 'From'.

*Note: Select **From** to switch to the Cable From screen.*

**3. Double ID “Cable From”  
Example**

A unique alphanumeric character name can be entered, along with a four-character incrementing counter field. This example is set to start at *0003*.


The screenshot shows a handheld device screen titled 'Cable ID'. At the top, it displays '11', '09:39', and '01/09/02'. Below this, it says 'ISO F STP PERM' and 'JOB1'. The main area has two input fields: 'Cable Name:' with the text 'TEST' and 'Current Value:' with the text '0003'. At the bottom, there are four buttons: 'Delete', 'Backspace', 'Insert', and 'To'.

*Note: Select **To** to switch to the Cable To screen.*

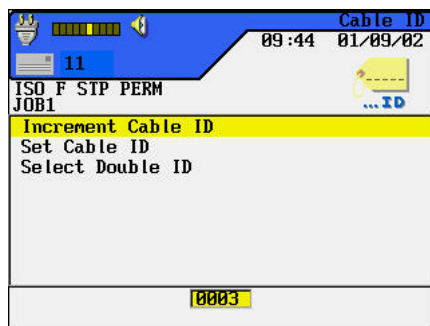
**Test Counter**

In addition to the cable name, you can assign up to four incrementing characters to identify individual tests. This input is placed in the Current Value parameter located just below the Cable Name parameter of the Cable ID screen. The default numbering scheme is set to start counting from 0000 and end at 9999. Custom numbering schemes may also be used.

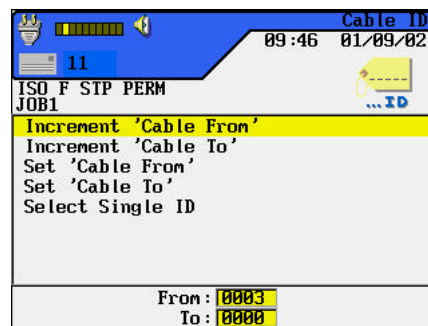
### Opening the Single/Double Cable ID Screen:



1. On the ready screen, select **Cable ID**  to open the main Cable ID screen.
2. The screen that appears will reflect the *most recently assigned* Cable ID (either single or double). To toggle between Single and Double ID screens, position the cursor over Select Single or Double ID and press **Enter**.

**Single ID Screen**



**Double ID Screen**

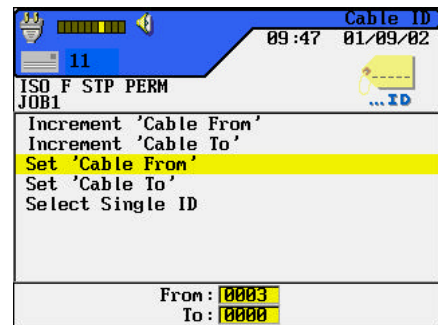


3. The following options may be selected from the main Cable ID screens:
  - Increment Cable ID (*Cable From* and *Cable To* in Double ID mode)
  - Set Cable ID (*Cable From* and *Cable To* in Double ID mode)
  - Select either Single or Double IDs for tests.
4. Press  to save changes.
5. Press  to return to the previous screen without saving changes.

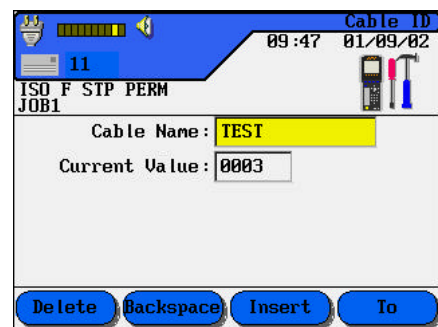
**To set a Cable ID:**

1. In the Cable ID screen, highlight **Set 'Cable From'**.
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 Name, ten characters maximum.
  - b. Current Value, four incrementing characters.
  - c. Select **To** to go to the *Cable To* screen. Repeat steps a and b.
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.






## Changing a Cable Type

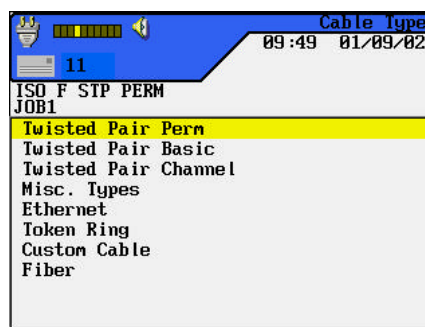
The tester comes with several cable types stored in non-volatile memory. When a cable type is selected, the recommended limits for that cable are automatically programmed into the tester.

Cable choices are made by cable type:

- Twisted Pair Permanent
- Twisted Pair Channel Link
- Miscellaneous Types
- Ethernet
- Custom Cable
- Fiber

### To select a cable type:

1. Press both  and  keys at the same time, or select  located on the DH Ready screen. The Cable Type screen appears.
2. Press the **Up/Down Arrow** keys highlight the desired cable type.
3. Press **Enter** to select a cable type and its associated default NVP for testing.



## Chapter 3

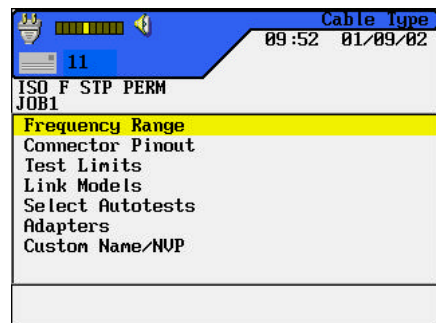
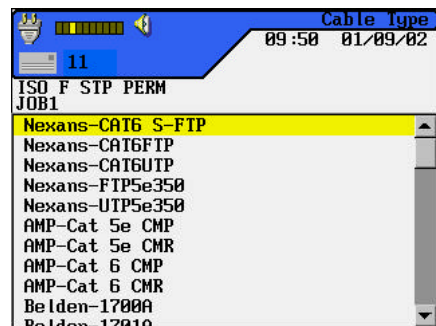
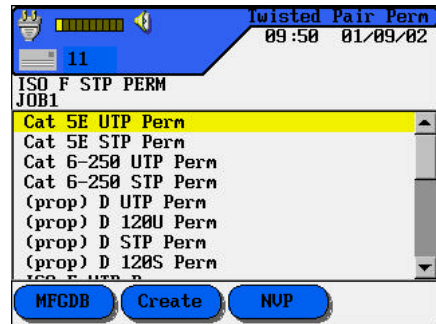
### Calibration, Configuration, and Special Operations

- Position the cursor on the desired cable type and press **Enter** to accept the new cable type and its associated default NVP for testing.

*Note: A number of unique cable manufacturer NVP values are stored in the tester memory. To display the list of manufacturer cables for the currently highlighted test standard, select*

**MFGDB**.

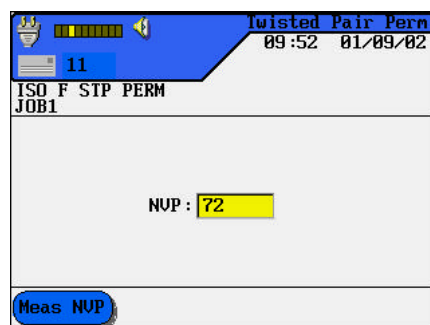
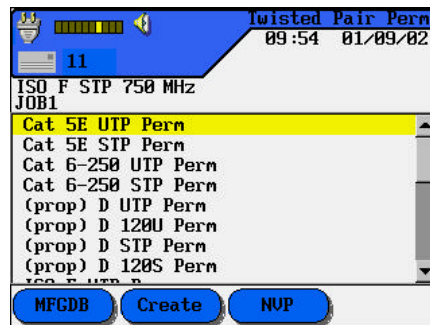
- Select **Create** if you want to use the selected cable as the basis for a Custom Cable. The tester will display the Custom Cable screen. You can then change the default cable features and save the cable as a Custom Cable.



**To change the default NVP value:**

1. From the Test Standard screen, select **NVP** to change the NVP.

The NVP screen will appear.



2. To manually enter a new NVP value, use the **Arrow** keys to highlight and enter new NVP values.
3. To automatically calculate a new NVP value, select **Measure NVP**. The Measure NVP screen appears.
4. Connect a test cable of known length.
5. Using the **Arrow** and **Number** 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: For ISO Standards add 4 meters to the known cable length.*




## Custom Cable Settings

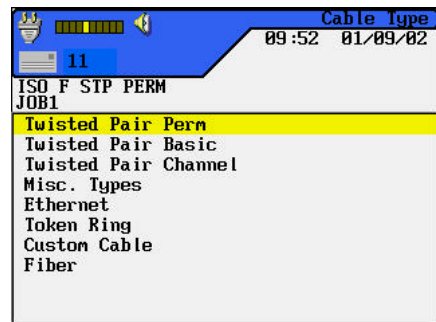
All of the cable types pre-programmed into the LANTEK tester are associated with a predefined test standard. You cannot change these pre-programmed settings. If you want to run a different set of tests for a given cable you must create a Custom Cable.

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.

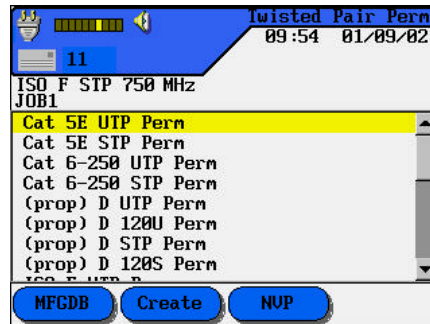
A maximum of ten custom cable settings can be created, stored, removed, and retrieved when needed.

### To create a new custom cable type:

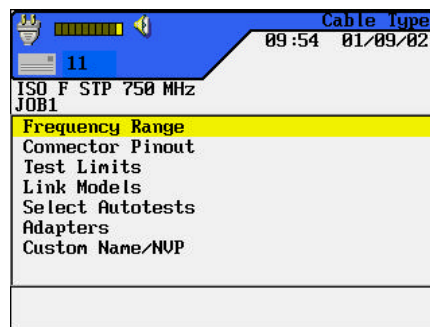
1. Press both  and  keys at the same time, or select  located on the DH Ready screen. The Cable Type screen appears.
2. Press the **Arrow** keys to highlight the desired cable type.
3. Press **Enter**. The Test Standard screen appears.



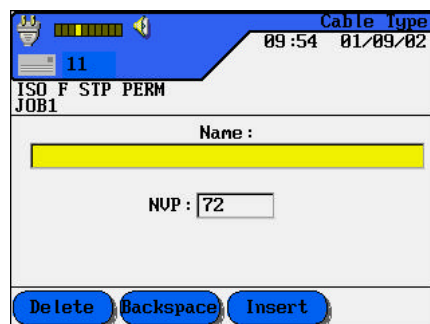
4. Position the cursor over the desired cable type and select **Create**. The Custom Cable screen appears.



5. Change the desired cable settings, then proceed to the next step, naming the cable.
6. Position the cursor over Custom Name/NVP and press **Enter**. The NVP Screen appears.







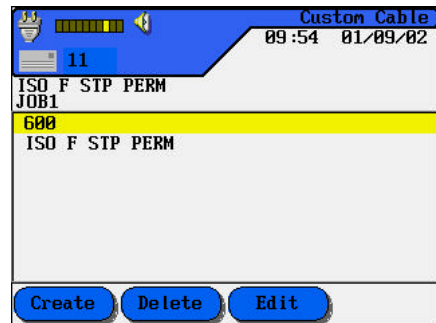
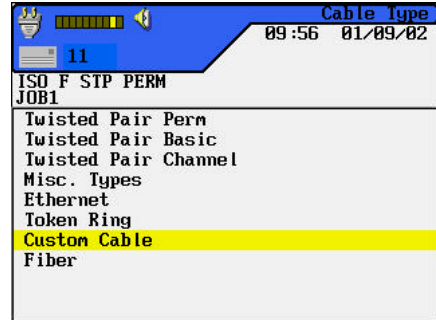
7. Change NVP parameters as required and then name your new custom cable.
8. Press **Enter** to accept the changes and return to the Custom Cable screen. The new custom cable is now selected as the cable under test.









**To select or delete a custom cable type:**

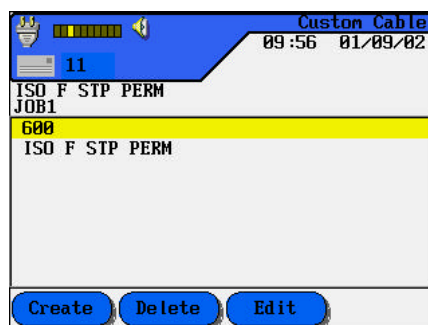
1. Press both  and  keys at the same time, or select  located on the DH Ready screen. The Cable Type screen appears.
2. Press the **Arrow** Key to highlight the Custom Cable type.
3. Press **Enter** to open the Custom Cable screen.
4. The tester displays all currently stored custom cable types.
5. Position the cursor over the desired custom cable type.
6. Press **Enter** to make the custom cable you highlighted the new cable type or select  to delete the selected custom cable type.



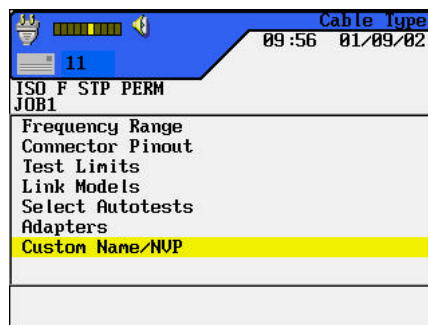
**To edit an existing custom cable type :**

1. Press both  and  keys at the same time, or select  located 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. Select the cable type to be customized.
5. Press the  soft key. The Custom Cable parameter screen appears.



6. Position the cursor on the desired custom cable parameter and press **Enter** to edit the settings.



7. After making the desired changes, select the Custom Name/NVP option. The NVP screen appears.

8. Press  to save the cable under its current name or under a new name.

*Note: Refer to the next page for a description of custom cable parameter options.*

## Custom Cable Parameters

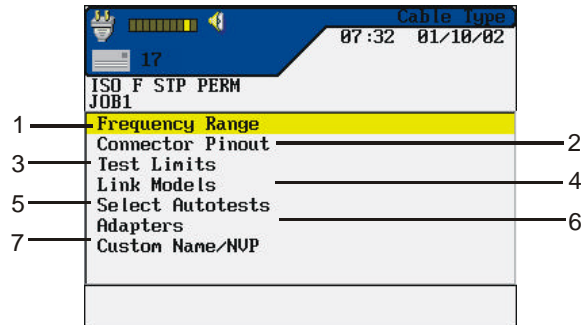


Figure 3-4: Custom Cable Parameter Screen

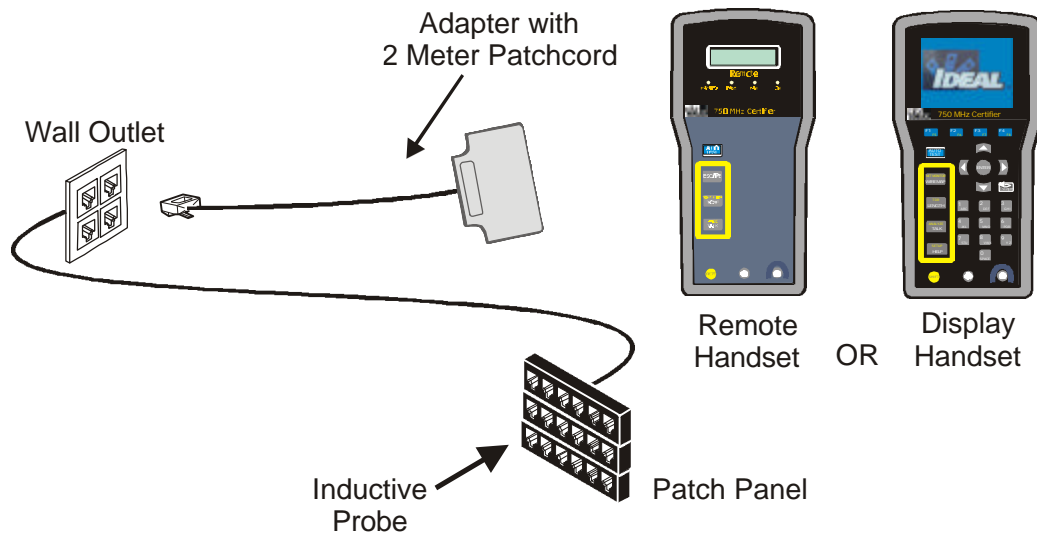
Table 3-5: Custom Cable Parameter Options

Item	Parameter	Description
1	Frequency Range	Use this menu to set minimum and maximum certification and cable grade frequencies.
2	Connector Pinout	This screen is used to define connector pinouts. <i>Note: If one wire pair is not selected, tests for NEXT, attenuation, capacitance, DC resistance, and impedance will not be performed on that pair.</i>
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 from less than 1 to 350 MHz for the LANTEK 6 and from 1 to 750 MHz for the LANTEK 7 based on the link type. For a detailed description of the methods and limits for calculating NEXT and Attenuation values, refer to <i>Appendix C, Measurement Methods and Limits</i> .
5	Select Autotests	Not all cables will require the full suite of Autotests. Use this menu to select the Autotests to be performed.
6	Adapters	Use this menu to indicate which near-end and far-end cable adapters are currently being used.
7	Custom Name/NVP	Use the alphanumeric 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 DH and RH 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 3-5: 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 displayed on the DH.*

### To activate the Tone Generator using the Display Handset:


1. Connect the DH to the Cable under test.
2. Press both **SHIFT** and **NET MONITOR / WIRE MAP** at the same time to enter Tone mode.

*Note: The Tone mode will remain active until **Escape** is pressed or no test activity has been performed after the past five minutes.*

3. Using the soft keys, select the pair (Pair A, Pair B, Pair C, or Pair D) on which to place the tone.


4. Select the tone, press  and select LOW, HIGH, or WARBLE using the soft keys.

**To activate the Tone Generator using the Remote Handset:**

1. Connect the RH to the cable under test.
2. Press  on the RH to enter Tone mode. The RH two-line display shows the first line *TONE*, the second line shows a *XY* form of characters.

<b>X Character (Tone Type)</b>	<b>Y Character (Placement of tone)</b>
L = Low	A = Pair A
H = High	B = Pair B
W = Warble	C = Pair C
	D = Pair D

Example: LA = Low tone, Pair A

*Note: The Tone mode will remain active until  is pressed or no test activity has been performed after the past five minutes.*

3. Select the pair on which to place the tone by cycling the **Tone** key.
4. Select the tone for the selected pair by cycling the **Tone** key.

## **Digital Talkset**

When the Display Handset and Remote handset establish communication and are connected by at least one correctly mapped wire pair, the units will support simultaneous two-way audio communication through an external attached microphone/headset. The actual communication from one handset to the other is via a digital data stream and is compatible with fiber optics (via the fiber optic adapter module).

Audio communication is initiated by assuring that the Talksets are properly connected and momentarily depressing the Talk button on either the DH or the RH.

If the wire map supports this, audio communications will be activated. Both the RH and DH provide visual indication when the Talkset is active. The Talkset will not function during any type of cable test operation.

## **TDR TEST**

### **TDR (Time Domain Reflectometer)**

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.



## **Applications of TDR**

### **Cable Inspection**

<b>Situation</b>	<b>Activity</b>
New Wiring Installation	The wiring contractor installs horizontal and backbone cables/wires in accordance with a Communication Cable Specification and supplied blueprints.
Cable Testing	All Autotest results are supplied in hard copy and on disk to the owner.
Final Inspection	Contractor and owner conduct final inspection.
Final Acceptance	Owner accepts installation.
Office equipment installed by owner	One of the telecommunications outlets appears to be faulty.
Owner informs a wiring contractor of bad cable	The wiring contractor sends a technician out to investigate.
Technician performs Autotest and TDR on the failed network drop	A wire pair fails the Crosstalk test. TDR indicates an anomaly at 100 feet from the patch panel. The current TDR graph (with anomaly) is saved.
Contractor checks the cable at 100 feet out from the telecommunications closet	The contractor finds a fire extinguisher mounting bracket on the cubicle wall. A bracket mounting screw has damaged the cable jacket.
Owner is informed that the problem is not related to a faulty cable or installation	Repairs can be authorized by the owner. The contractor will invoice time and materials.

## How to Perform a TDR Test

Prior to running the TDR, connect the LANTEK DH to the cable or link to be tested.


### Test Setup

1. Select the Cable Type (Refer to *Chapter 3, Changing a Cable Type*)

*Note: All TDR numerical information is derived from the data in the cable database.*

2. Calibrate and configure the tester as required (Refer to *Chapter 3, Calibration and Configuration* sections).

*Note: The tester retains the last configuration settings. Configuration settings must be adjusted if one or more settings have changed.*

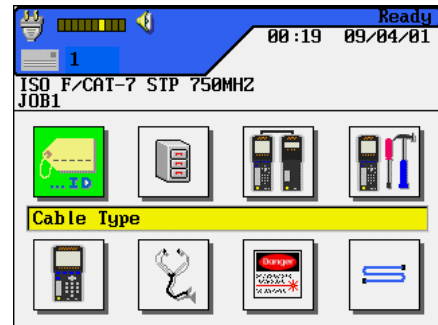
3. Disconnect the cable to be tested from all network equipment.
4. Connect the required test lead to the Display Handset and to one end of the link (TDR does not require a Remote Handset). Refer to Figures 7-3 and 7-4, for Permanent and Channel Link connections.
5. Press  to power up the Display Handset

### Performing a TDR Analyze Function

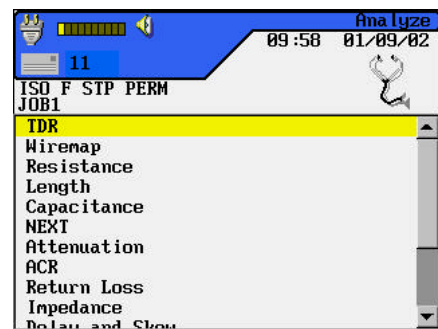
1. From the Ready screen, select



The Analyze screen appears.



2. Press the **Arrow** keys to highlight the TDR function.



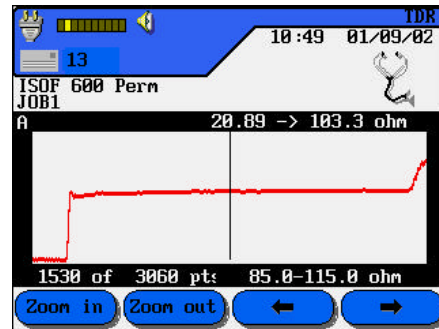
3. Press **Enter** to start the TDR test. Once started, the TDR automatically runs in the continuous mode.

*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.

*Note: The TDR function is not available through custom cable settings.*

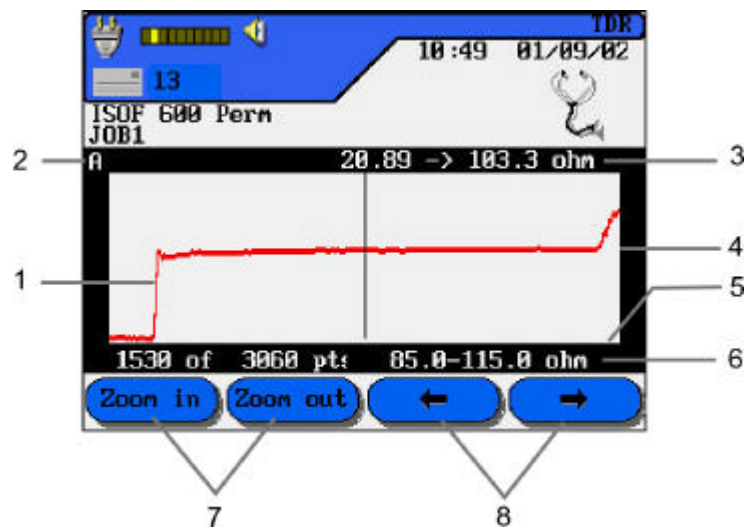


## The TDR Plot

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 3-6: TDR Graphical Plot Layout and Controls**

*Note: TDR graphs do not have a tabular view option*

**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 representing percentage of reflection data.
5	The horizontal axis representing distance data.
6	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 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, then 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).

### **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 position the cursor on 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.

<b>Condition</b>	<b>TDR Plot Indication</b>
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. Select . The Save Test screen appears.
3. The test name is automatically assigned. If a different name is desired, use the **Delete** key to change the highlighted character(s).

*Note: The default Save As... name is derived from the cable name entered into the Cable ID screen, or from the previous saved name.*

4. 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 *Chapter 4, Viewing or Deleting Stored Autotest Results*.



## Chapter 4

# Autotesting

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### Contents

- Autotest Overview
- Autotest Preferences
- Running Autotest
- Interpreting Autotest Results
- Autotest Graphs

### Autotest 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

The tests run during an Autotest depend on the cable type selected (refer to *Chapter 3, Changing a Cable Type*).

- 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* in this chapter.

## Chapter 4 Autotesting

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

**Table 4-1: Preset Autotest Suites Available for Specific Cable Types**

CABLE TYPES	Wire Map	Resistance	Attenuation Length	Capacitance NEXT	Capacitance	ELFEXT	Return Loss	Impedance	Delay & Skew	ACR	PS NEXT	PS ELFEXT	PS ACR	Headroom
<b>TWISTED PAIR PERMENANT</b>														
CAT 5e, UTP/STP Perm (TIA/EIA568B - Permanent/Channel)	•		•	•	•	•	•		•	•	•	•	•	•
CAT 6-250, UTP/STP Perm (TIA/EIA568B, Permanent/Channel)	•	•	•	•	•	•	•	•	•	•	•	•	•	•
(prop.) D, UTP/STP Perm (ISO/IEC 11801-2.Edition)	•	•	•	•	•	•	•	•	•	•	•	•	•	
(prop.) D, 120 ohm, UTP/STP Perm (ISO/IEC 11801-2.Edition)	•	•	•	•	•	•		•	•	•	•	•	•	
ISO Class E, UTP/STP Perm (ISO/IEC 11801-2.Edition)	•	•	•	•	•	•	•	•	•	•	•	•	•	
EN50173.A1 Class D, UTP/STP Perm (CENELEC)	•	•	•	•	•	•	•	•	•	•	•	•	•	
Nexans LANmark D, UTP/STP Perm	•		•	•	•	•	•	•	•	•	•	•	•	
Nexans LANmark E, UTP/STP Perm	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Nexans Epsilon E, UTP/STP Perm	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Nexans Class D, UTP/STP Perm	•		•	•	•	•	•	•	•	•	•	•	•	
<b>TWISTED PAIR Basic</b>														
CAT 3, UTP Link (TIA/EIA568B)	•		•	•	•									
CAT 5, UTP/STP Link (TIA/EIA568B)	•		•	•	•									
CAT 5 Gbit, UTP/STP Link (IEEE 802.3z)	•		•	•	•	•	•		•					
ISO Class C, UTP/STP Link (ISO/IEC 11801 – 1.Edition)	•	•	•	•	•	•	•	•	•	•				
ISO Class D, UTP/STP Link (ISO/IEC 11801 – 1.Edition)	•	•	•	•	•	•	•	•	•	•				
ISO Class D 120 ohm, UTP/STP Link (ISO/IEC 11801 – 1.Edition)	•	•	•	•	•	•		•	•	•				
TP-DDI, STP Link	•	•	•	•	•	•	•	•	•	•				
TPPMD, UTP Link	•	•	•	•	•	•	•	•	•	•				
AS/NZS C, UTP/STP Link	•	•	•	•	•	•	•	•	•	•				
AS/NZS D, UTP/STP Link	•	•	•	•	•	•	•	•	•	•				

(Table Continues)

**Table 4-1: Preset Autotest Suites Available for Specific Cable Types (Continued)**

CABLE TYPES	Wire Map	Resistance	Attenuation Length	NEXT	Capacitance	ELFEXT	Return Loss	Impedance	Delay & Skew	ACR	PS NEXT	PS ELFEXT	PS ACR	Headroom
<b>TWISTED PAIR Channel</b>														
CAT 3, UTP Channel (TIA/EIA568B)	•		•	•	•									
CAT 5, UTP/STP Channel (TIA/EIA568B)	•		•	•	•									
CAT 5 Gbit, UTP/STP Channel (IEEE 802.3z)	•		•	•	•	•	•		•					
CAT 5e, UTP/STP Channel (TIA/EIA568B.1)	•		•	•	•	•	•		•	•	•	•	•	•
CAT 6-250, UTP/STP Channel (TIA/EIA568B.2.1)	•	•	•	•	•	•	•	•	•	•	•	•	•	•
ISO Class C, UTP/STP Channel (ISO/IEC 11801 – 1.Edition)	•	•	•	•	•		•	•	•	•				
ISO Class D, UTP/STP Channel (ISO/IEC 11801 – 1.Edition)	•	•	•	•	•		•	•	•	•				
ISO Class D 120 ohm, UTP/STP Channel (ISO/IEC 11801 – 1.Edition)	•	•	•	•	•			•	•	•				
(prop.) ISO Class D, UTP/STP Channel (ISO/IEC 11801 – 2.Edition)	•	•	•	•	•	•	•	•	•	•	•	•	•	
(prop.) ISO Class D 120 ohm, UTP/STP Channel (ISO/IEC 11801 – 2.Edition)	•	•	•	•	•	•		•	•	•	•	•	•	
ISO Class E, UTP/STP Channel (ISO/IEC 11801 – 2.Edition)	•	•	•	•	•	•	•	•	•	•	•	•	•	•
TP-DDI, STP Channel	•	•	•	•	•		•	•	•	•				
TPPMD, UTP Channel	•	•	•	•	•		•	•	•	•				
AS/NZS C, UTP/STP Link	•	•	•	•	•		•	•	•	•				
AS/NZS D, UTP/STP Link	•	•	•	•	•		•	•	•	•				
EN50173.A1 Class D, UTP/STP Channel (CENELEC)	•	•	•	•	•	•	•	•	•	•	•	•	•	

(Table Continues)

## Chapter 4 Autotesting

**Table 4-1: Preset Autotest Suites Available for Specific Cable Types (Continued)**

CABLE TYPES	Wire Map	Resistance	Length	Attenuation	NEXT	Capacitance	ELFEXT	Return Loss	Impedance	Delay & Skew	ACR	PS NEXT	PS ELFEXT	PS ACR	Headroom
<b>MISC. TYPES</b>															
Local Talk	•	•	•	•	•	•									
ISDN	•	•	•	•	•	•					•				
Bavaria STP Link	•	•	•	•	•	•		•	•	•	•				
AUTOMATCH	•	•	•	•	•	•			•	•	•				
ECOMATCH	•	•	•	•	•	•			•	•	•				
FOILTEK	•	•	•	•	•	•		•	•	•	•				
PAIRTEK	•	•	•	•	•	•		•	•	•	•				
Single Pair	•	•	•			•									
USOC	•	•	•	•	•	•					•				
IBM Coax		•	•	•											
Twinaxial		•	•	•											
Arcnet		•	•	•											
CATV		•	•	•											
VW STP Link	•	•	•	•	•	•		•	•	•	•				
CAT 6-200, UTP/STP Channel	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CAT 6-200, UTP/STP Link	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<b>ETHERNET</b>															
10BASE T (IEEE 802.3)	•	•	•	•	•	•									
10BASE 2 (IEEE 802.3)		•	•	•											
10BASE 5 (IEEE 802.3)		•	•	•											
100BASE T Basic Link	•		•	•	•										
100BASE T Channel	•		•	•	•										

*Note: For a detailed test description, refer to Chapter 7, Cable Testing Fundamentals.*

## 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 (Refer to *Chapter 3, Calibrating the Tester*).
2. Configure the tester as required (Refer to *Chapter 3, Configuring the Tester*):
  - Enter User Information
  - Set Date & Time
  - Set Autotest Preferences
  - Select Display Language
  - Adjust Display Contrast
  - Restore Factory Defaults
  - Set Time-out Options
  - Pack Memory
  - Set Measurement Units
  - Clear Memory
  - Configure the PC and Printer I/F
  - Select Save Media
  - Configure the Talkset Option

*Note: The tester retains the last used configuration settings. You only need to set configuration options if one or more parameters have changed.*

3. Select the Cable Type (Refer to *Chapter 3, Changing a 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 (Refer to *Chapter 7, Permanent and Channel Link Test Setup*).
7. Power up the Display Handset by pressing the **On/Off** key.

*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.*

## Test Sequence

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

1. The DH will first 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 regardless of test failures.

*Note: All tests after Wire Map will only be performed on valid wire pairs.*

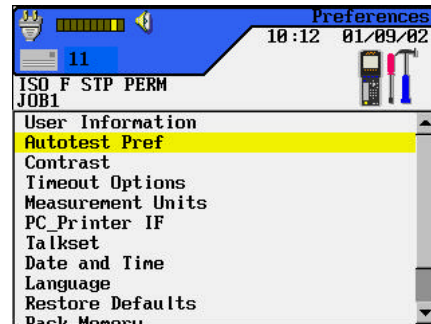
5. Once an Autotest has been completed, all of the test data can be reviewed, saved, and printed.
  - The test results for the last Autotest are held in non-volatile memory and available for review or storage, even after power is cycled off and back on.
  - The last Autotest results remain in non-volatile memory until they are replaced by new test results or the memory is cleared.

## Autotest Preferences

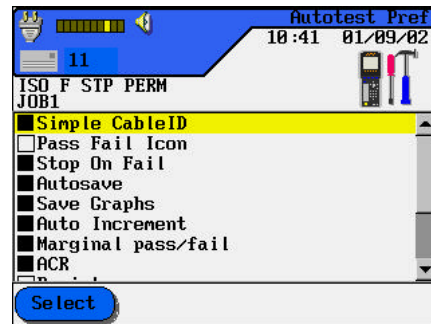
### Setting your Autotest Preference Options

1. On the Ready screen, select


**Preferences** . The Preferences screen appears.




2. Select **Autotest Preferences**. The Autotest Preference screen appears.



3. Press the **Arrow** keys to highlight the desired option.

4. Select  to activate or deactivate an option.

5. Press  to accept the selected Autotest Preferences.



6. Press  to exit this screen without making changes




## Running Autotest

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** .
2. If the RH unit is not found, a **Searching for Remote Handset** warning message is displayed on the DH.  
Press  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. While Autotest is in progress, an hour glass displays test progress and indicates pass or fail for each completed test.

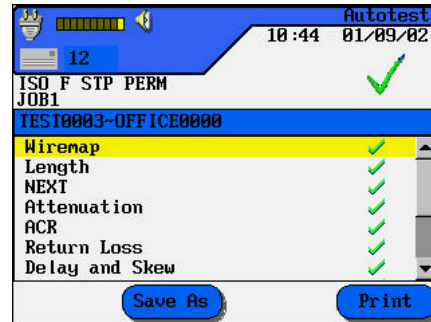
*Note: Press and hold the  key prior to Autotest completion to stop an Autotest after completion of the test in progress.*






5. 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.



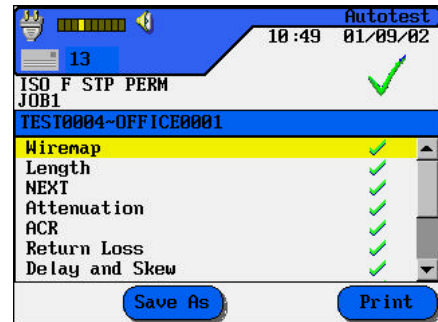
6. To begin the next Autotest, press **Autotest** .
7. If results from the current test have not been printed, or you did not have *AutoSave* enabled in the Autotest Preference screen, you will be prompted to discard or save the current test results before the next Autotest will run.

*Note: The tester also performs real time Analyze testing that enables you to troubleshoot problem areas. If Autotest results indicate a failure, refer to Chapter 5, Analyze Testing.*



## 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.



**Table 4-2: Overall Test Result Symbols**



Symbol	Overall Autotest Result
	Overall test result is a <i>pass</i> if each individual test is a <i>pass</i> or a <i>pass</i> *.
	Overall test result is a <i>fail</i> if one or more individual test is either a <i>fail</i> or a <i>fail</i> *.

**Table 4-3: Individual Autotest Reports**

Symbol	Individual Autotest Result
	<i>Pass</i> All values pass with sufficient margin.
	<i>Pass</i> * All values pass, but one or more test values passed by a margin smaller than the unit's specified accuracy for the measurement.  The <i>pass</i> * result does not fail the cable. However, it is a warning that the cable is close to the limit on that parameter and should be inspected as soon as possible.

(Table Continues)

**Table 4-3: Individual Autotest Reports (Continued)**

Symbol	Individual Autotest Result
	<p><i>Fail</i></p> <p>One or more values fail by a margin of failure greater than the unit's specified accuracy.</p>
	<p><i>Fail*</i></p> <p>One or more values fail, but the margin of failure is smaller than the unit's specified accuracy for the measurement.</p> <p>The <i>fail*</i> result fails the cable and must be cleared up, just like a standard fail. However, <i>fail*</i> means it has failed by a small margin and minor adjustments in the installation may correct the error.</p>

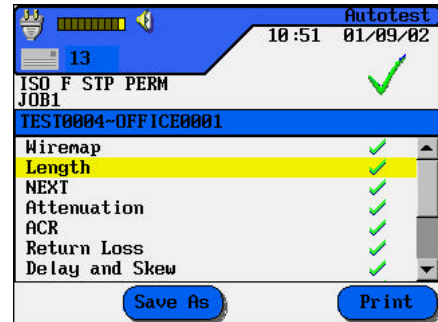
The effect of *pass\*/fail\** reporting of individual test results is to provide a built-in margin of safety above and below the advertised accuracy for a measurement. Measurements which fall outside this guard band are a clear *pass* or a clear *fail*, and the probability of the tester being in error is extremely small.

*Note: If you do not want to see marginal test results, deactivate the setting in the Preferences menu, AUTOTEST sub-menu details.*

## Viewing Current Autotest Results

Autotest results can be viewed at the 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.

Length  
10:51 01/09/02  
13  
ISO F STP PERM ✓  
JOB1  
Pair NUP n  
7,8 0.72 -2.6 ✓  
3,6 0.72 -2.7 ✓  
5,4 0.72 -2.8 ✓  
1,2 0.72 -2.7 ✓  
Limit: 0.0 n - 90.0 n  
Print

3. When finished, press  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 (see *Chapter 5*) 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 *Chapter 5, Analyze Testing* to run these tests.

## 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:

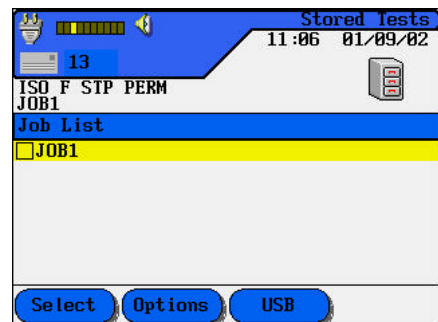
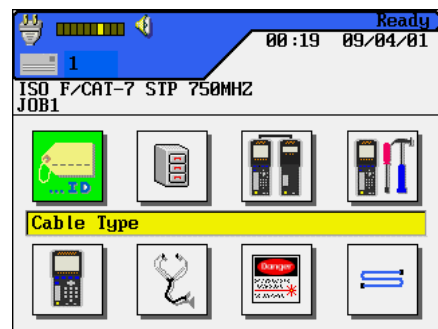
1. On the Ready screen, select

**Stored Results**

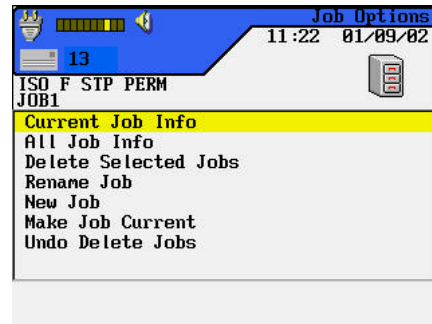


Press **Enter**. At this point, you will see a list of all the jobs which are currently available. If you have never created a Job, the list will be empty.

2. To create a new Job select **Options**. The **Job Options** screen appears.

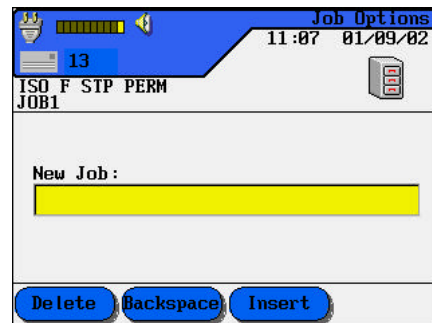


3. Press the Arrow keys to select **New Job**. Press **Enter**. The **New Job** screen appears.



4. Type a name into the text field on the **New Job** screen using the alphanumeric keyboard. Press a key second or third time to select the second or third character on the key.

Press the **Right Arrow** hard key to advance to the next character position.




*Note: Use the soft keys to correct a highlighted character.*

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.

*Note: When you save test results, they will be stored in the last Job you made current.*



## Saving Current Autotest Results

A maximum of 6,000 TIA Cat 5e individual Autotest results 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 Autotest Preferences* in this chapter.
- Test names are automatically assigned to completed tests. If a different name is desired, a test can be named manually using .

*Note: The user can either store the results in the internal memory or on the compact flash card.*

### To save Autotest results (AutoSave Disabled):

1. To manually save an Autotest, press the **Save** key.
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 rename the results to another file or new file name.
4. Press  to exit and return to the previous screen without performing a save operation, or select  to overwrite the existing file.



5. Select **Save As** to rename the current test. The **Save Test** screen will appear with a new name option.

*Note: The default Save As... name is derived from the cable name entered into the Cable ID screen, or from the previous saved name.*


6. Press **Enter** to accept the change and return to the Test Results screen.

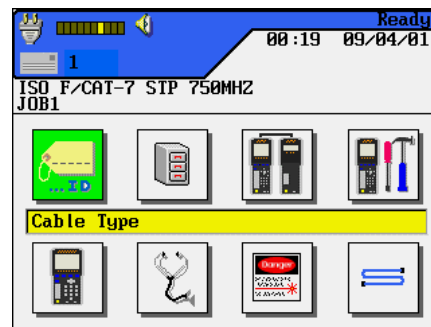
## Viewing or Deleting Stored Autotest Results

Test Results contain stored data from Autotest up to 6,000 Autotests can be stored in internal memory. You can view, print, delete or rename these files.

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

1. On the Ready screen, select

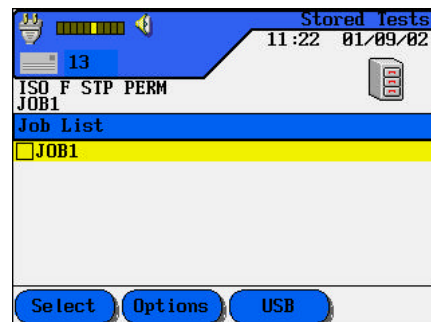
**Stored Results**  to open the **Job List** screen.



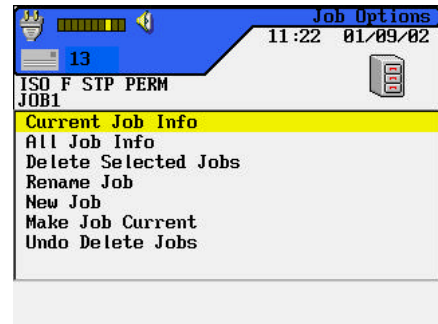
2. Highlight the desired Job.

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 Option Tables**

**Table 4-4: Job Options**

<b>Option</b>	<b>Description</b>
Current Job Info	Total number of tests passed/failed, cable length, and headroom for <i>current</i> job.
All Job Info	Total number of tests passed/failed, cable length, and headroom for <i>all</i> jobs.
Delete Selected Jobs	Deletes selected jobs from memory.
Rename Job	Change name of currently selected job.
New Job	Add new job to job list.
Make Job Current	Activate highlighted job. Saved tests (Autotests/Analyze) will be stored in this test.
Undo Delete Jobs	Undo last delete action.

**Table 4-5: Test Options**

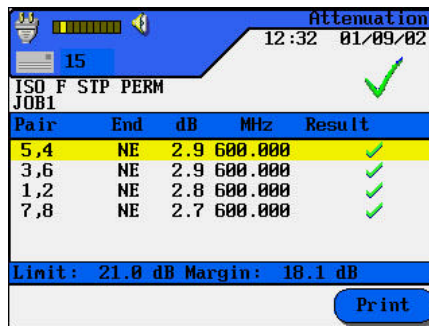
Option	Description
Select All	Select all stored test results.
Select All Passed	Select only passed tests for processing.
Select By Date	Select stored test results by date.
Select All Failed	Select only failed tests for processing.
De-select All	Unmark all stored test results.
Print Selected	Print selected test results.
Print All	Print a summary of stored test results.
Undo Deleted Tests	Undo the last delete action.
Delete Selected	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 headroom.
Selected Result Info	Display the results of selected tests.
Rename	Rename a selected test result.

*Note: The functions indicated above will only be performed on tests stored in memory.*

## Autotest Graphs

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

**Tabular Format**

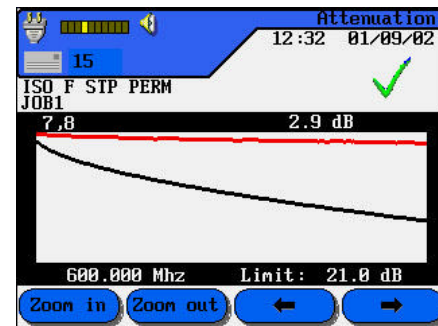


Pair	End	dB	MHz	Result
5,4	NE	2.9	600.000	✓
3,6	NE	2.9	600.000	✓
1,2	NE	2.8	600.000	✓
7,8	NE	2.7	600.000	✓

Limit: 21.0 dB Margin: 18.1 dB

Print

**Graphical Format**



## Graphing Facts

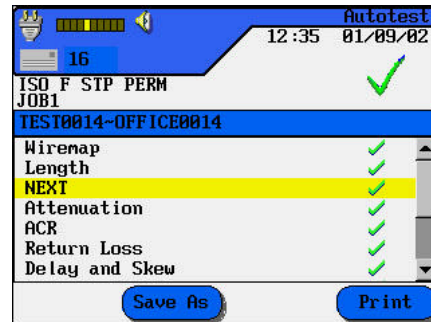
Graphs can be very useful for viewing test results. There are a few things you need to know before you start using them:

- In Autotest Preferences, you can set your tester to include and save graphs with test results. (Save Graphics is the factory default.)
- To save Autotest Results and graphs, use external storage media (Flash Card and/or PC)
- The limit and worst case margin parameters are always displayed at the bottom of the tabular test screen.
- When you go to graph view, the vertical cursor is always placed at the worst case margin location.

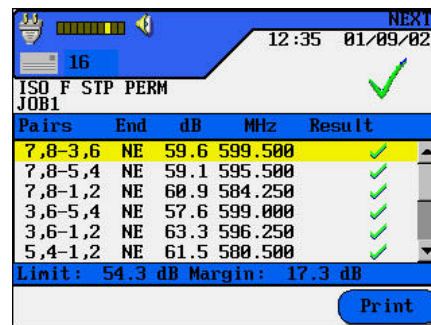
### To view an Autotest graph:

1. Configure the Autotest Preferences (Refer to *Page 4-9*).
2. In Autotest Preferences, make sure the **Save Graphs** checkbox is selected.

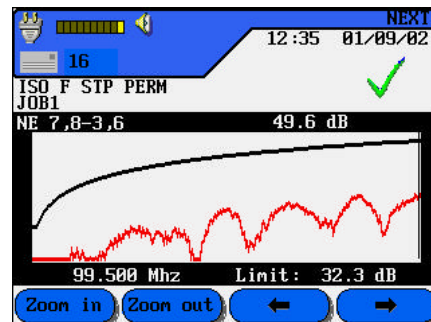
3. Press **Autotest**. Upon completion of the test suite for the cable type selected, the Overall Autotest results screen displays.



4. To display tabular data, position the cursor on the desired test result (the NEXT test) 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 99.50 MHz.

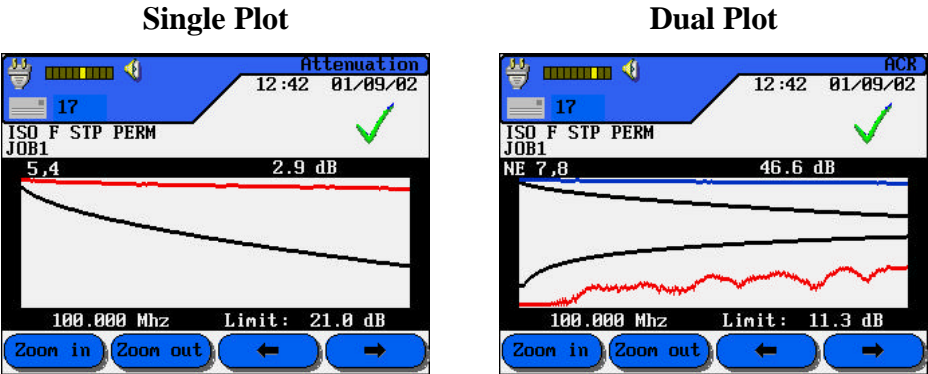


7. Press **Escape** to return to the previous screen.

# 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.



## Layout and Controls

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

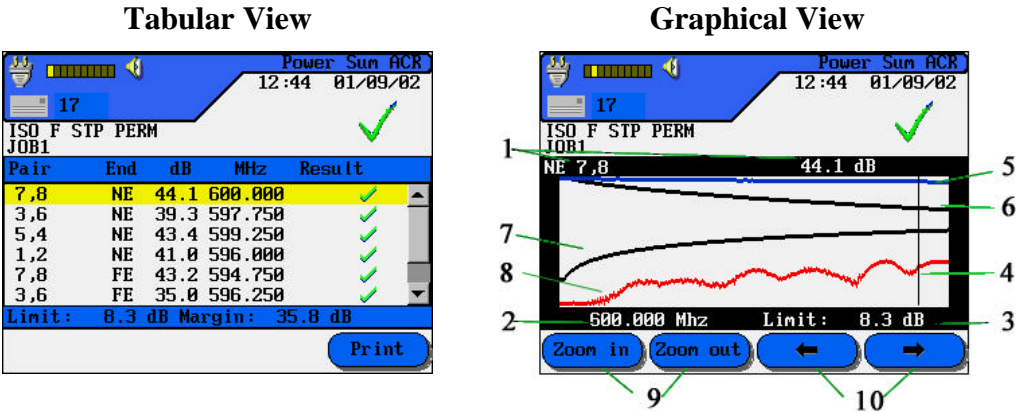


Figure 4-1: Tabular Data and Graphical Plot Layout

*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 4-6: 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, this key becomes inactive.
10	<p>Arrow keys are used to move the cursor horizontally. As the cursor moves, screen readouts will change to reflect cursor position.</p> <p>Moving the cursor:</p> <ul style="list-style-type: none"> <li>• Use the soft keys to move the cursor in larger steps.</li> <li>• Use the key pad keys to move the cursor in small steps.</li> </ul>





## Chapter 5

# Analyze Testing

---

### Contents

- Analyze Single Test Mode Overview
- Running a Single Test

### 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         |
| • ACR            | • Return Loss    | • Impedance           |
| • Delay and Skew | • Power Sum NEXT | • Power Sum ACR       |
| • Headroom       | • Power Sum ACR  | • Power Sum<br>ELFEXT |
| • TDR            |                  |                       |

## Analyze Test Descriptions and Availability

For an overview of individual tests, refer to *Chapter 7, Cable Testing Fundamentals*. The individual tests you can run depend upon the cable being tested. Test availability is pre-determined based on the adopted or proposed standards (See *Chapter 4, Test Suites, Table 4-1*).

## Test Setup

1. If the LANTEK tester has not been calibrated in the past 7 days, perform a field calibration (See *Chapter 3, Calibrating the Tester*).

2. Configure the tester as required (See *Chapter 3, Configuring the Tester*).

*Note: The tester retains the last used configuration settings. You will need to set configuration options if one or more parameters have changed.*

3. Select the Cable Type (See *Chapter 3, Changing a 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 Chapter 7, Figures 7-3 and 7-4, for connections to complete Permanent and Channel Link testing.*

7. Power up the Display Handset by pressing the **On/Off** key.

*Note: The Remote Handset will be powered up automatically by the Display Handset when the Analyze testing begins.*

## 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 checked to see if current field calibration data exists. 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.
5. Once a test is completed, the test data can be reviewed or printed.

## Analyze Test Screens

There are a total of 16 Analyze test screens. They are identical to the corresponding Autotest screens, with the addition of the **Start** key located in the soft key option row. When this key is pressed, the tester begins continuous execution of the selected test. The **Escape** key or **Cancel** key is used to end the test in progress.


## Analyze Test Limitations

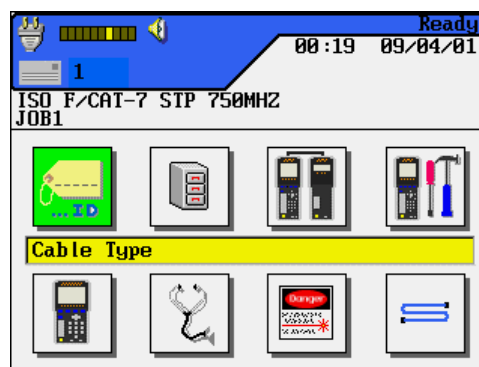
Analyze and Autotest test limitations are identical. For a description of test limits and ranges refer to *Appendix C, Measurement Methods and Limits*.

## Running a Single Test

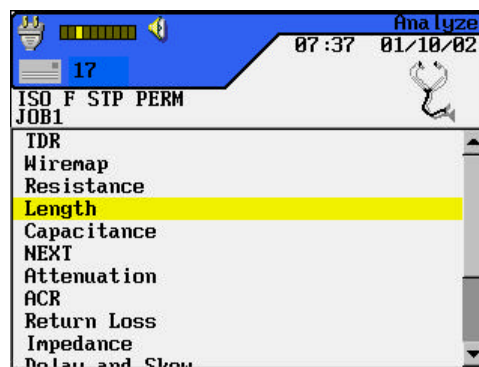
Before beginning Analyze testing, connect the Display and Remote Handsets to the cable or link to be tested.

All Analyze tests are performed using the following procedure:

1. In the **Ready** screen, select **Analyze**  to open the Analyze screen. The Analyze screen lists the tests that can be performed on the currently selected cable type (refer to *Chapter 3, Changing a Cable Type*).



2. Press the **Arrow** keys to highlight the desired test. In this example, the **Length** test is selected.



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



- Upon test completion, the tabular results screen is displayed.

The screenshot shows the same handheld device screen as before, but now displaying test results. The header bar is blue and contains the word 'Length'. Below the header, the time '14:00' and date '01/09/02' are displayed. A small calculator icon is visible on the right. The main display area shows a table of results. The table has four columns: 'Pair', 'NUP', 'n', and a checkmark column. The data rows are as follows:

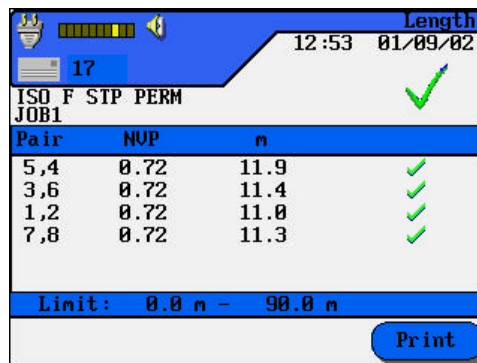
Pair	NUP	n	
5,4	0.72	11.8	✓
3,6	0.72	11.4	✓
1,2	0.72	11.0	✓
7,8	0.72	11.3	✓

Below the table, the text 'Limit: 0.0 n - 90.0 n' is displayed. At the bottom right, there is a blue button labeled 'Print'.

## 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.



Pair	NUP	n	Result
5,4	0.72	11.9	✓
3,6	0.72	11.4	✓
1,2	0.72	11.0	✓
7,8	0.72	11.3	✓

Limit: 0.0 m - 90.0 m

Print

In the example above, the Length 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 usually identical to Autotest mode. For a description of symbols and test results, refer to *Chapter 4, Pass/Fail Reporting*.

## 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. For detailed printer setup and screen printing instructions, refer to *Chapter 4, Printing Current Test Results*.

## Analyze Graphs

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

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.

Analyze graphs are similar to Autotest graphs. For a description of these graphs, refer to *Chapter 4, Graph Formats, Layout, and Controls*.





## Chapter 6

# Using LANTEK REPORTER

---

### Contents

- System Requirements
- LANTEK Reporter Installation and Startup
- Tester to PC Connectivity
- LANTEK Reporter User Interface
- LANTEK Reporter Help System Overview
- Uploading DH Tests to the PC
- Utilizing Graph Data
- Working with Databases
- Working at the Job Level
- Working at the Test Level
- Backing Up and Restoring Databases
- Producing and Printing a Report

## System Requirements

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 cable 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 cable of providing resolution of 1024 x 768 a laser printer and an available USB port.

*Note: Windows 95 and Windows NT SP4 do not support USB connections. Uploading test results is therefore limited to a serial port connection.*

## LANTEK Reporter Installation and Startup

### LANTEK Reporter Upgrades

The CD supplied with your tester may not contain the latest version of the LANTEK Reporter program. IDEAL INDUSTRIES provides a World Wide 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

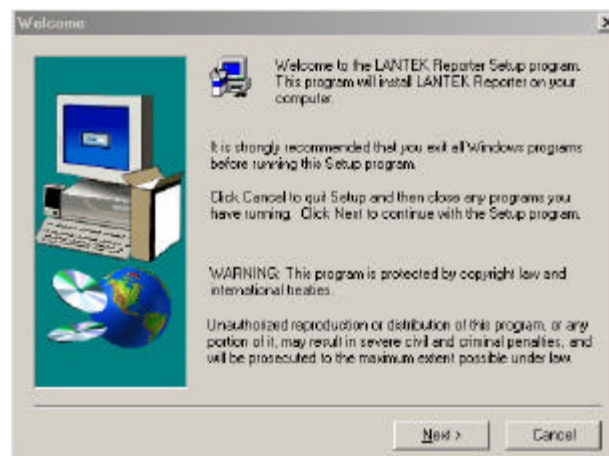
The LANTEK Reporter software is installed using the standard Windows 95, 98, ME, XP, 2000, NT up to SP6 program installer.

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 6-1: 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

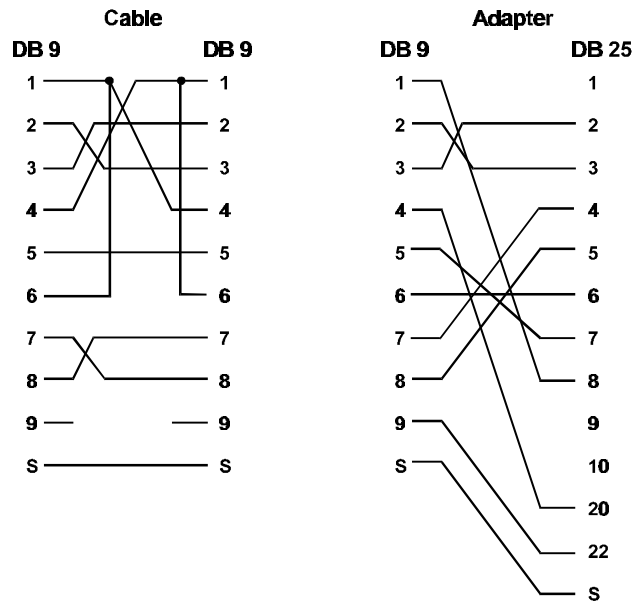
### PC Cables

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

#### Serial Port Interface Cable

The serial cable, commonly referred to as a Null modem cable, connects to the RS232 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 for printing.

If you supply your own serial port cable, it must be wired to the specifications shown in Figure 6-2.

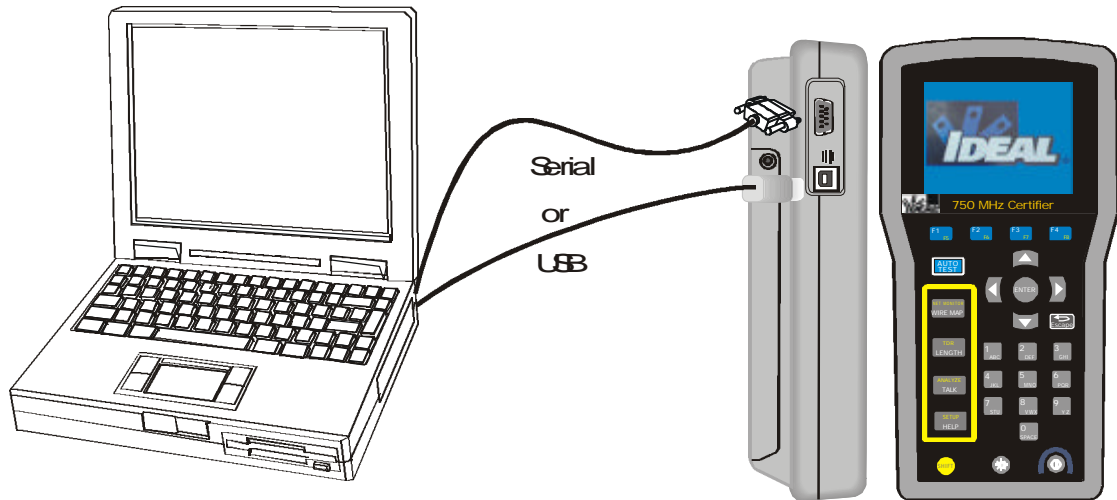


**Figure 6-2: PC Uploading Cable Pinout**


### USB Interface Cable

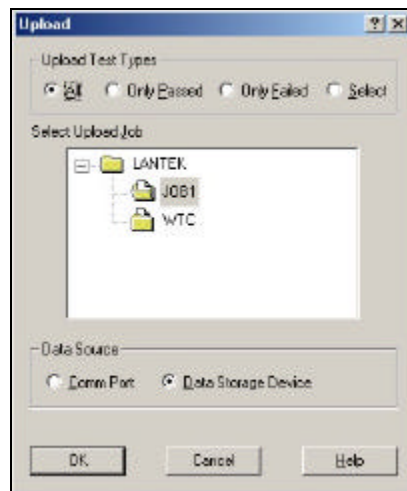
The USB (Universal Serial Bus) interface cable is supported by Windows 98, ME, XP, and NT (SP5 and SP6) operating systems and can upload data approximately 20 times faster than uploads via the serial port. The USB provides the same functionally provided by the serial port except printing.

## Establishing a Connection



**Figure 6-3: PC to Tester Connections**

1. Attach the cable to the tester and an available serial port or USB port on the PC or Laptop.
2. Turn on the tester.
3. Start the LANTEK Reporter program on the PC or Laptop.
4. From the File Menu, select **Upload From Tester...** or select  on the toolbar. The upload process can be performed either by Serial or USB connection from the Display Handset directly into the PC or laptop. The upload process can also be performed through the USB flash card reader as a data storage device if a compact flash card is used for storage of test results.



5. Select the appropriate preferences and Click **OK**.

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**.



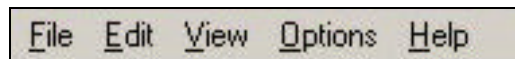
3. Click on the **Options** menu and select the **Serial Port** command. Select the correct **Port** and match the **Baud Rate** to that of your LANTEK tester.
4. After you have entered the values, click the **Test** button. If the Tester is identified, its serial and model numbers will be displayed.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

## 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, or press and hold the Alt key and then the underlined letter in the menu name.



## The File menu

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

<u>N</u> ew...	Ctrl+N
<u>O</u> pen Database...	Ctrl+O
Sa <u>v</u> e Database	Ctrl+S
<u>C</u> lose Database	
<u>U</u> pload From Tester...	
Pa <u>c</u> k Tester Memory	
<u>E</u> rase Tester Memory	
Up <u>g</u> rade Tester Firmware	
Co <u>n</u> figure <u>T</u> ester	
<u>E</u> xport...	
Page Setup...	
<u>H</u> eaders/Footers	
<u>P</u> rint...	Ctrl+P
<u>B</u> ackup Database...	
<u>R</u> estore Database...	
Re- <u>I</u> ndex Database	
<u>1</u> C:\Program Files\...\Practice	
<u>E</u> xit	

Command	Description
New	Create a new database.
Open Database	Open an existing database. More than one database can be open at the same time.
Save Database	Save the currently open database
Close Database	Close the currently open database.
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.

## Chapter 6

### Using LANTEK REPORTER

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Command	Description
Erase Tester Memory	Erase all tests in the tester memory.
Upgrade Tester Firmware	Copy new firmware code to the tester.
Configure Tester	Run the configuration wizard to customize tester's operating parameters. (Future enhancement)
Export	Export test results as Comma-Separated Values (CSV) or standard ASCII text files.
Page Setup	Modify the print settings.
Headers and Footers	Insert notes and company logos.
Print	Print a report.
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.
1., 2., 3., 4. List	List the last four accessed databases.
Exit	Exit the application.

## The Edit Menu

Click Edit to display the Edit pull-down menus.

### Job View

<u>A</u> dd Job...	Ins
<u>E</u> dit Job...	Enter
<u>D</u> elete	Del
<u>P</u> aste	Ctrl+V
<u>S</u> elect Job	
Selec <u>t</u> All	
<u>F</u> ind Job...	

Command	Description
Add Job	Add a Job.
Edit Job	Modify a Job.
Delete	Delete a job from the database.
Paste	Paste the clipboard contents to the currently selected item.
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.

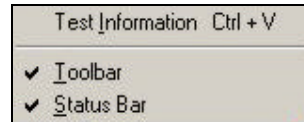
### Database (Test) View

Edit Test...	
Delete	Del
Cut	
Copy	
Paste	
Select Test	
Select All	
Set Operator...	
Find Test...	

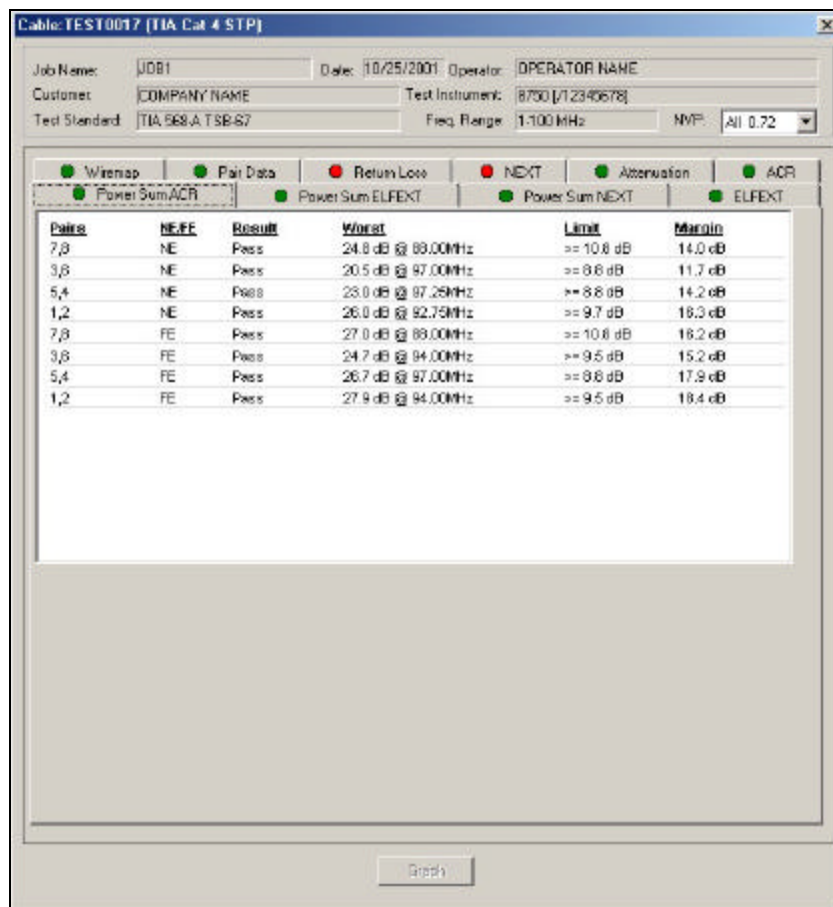
Command	Description
Edit Test	Modify a Test.
Delete	Delete a test from the database.
Cut	Cut the currently selected test(s).
Copy	Copy the currently selected tests to the clipboard.
Paste	Paste the clipboard contents to the currently selected item.
Select Test	Select a test in the database view for printing or reporting.
Select All	Select all tests in the job.
Set Operator	Provide details about the operator for the currently selected test.
Find Test	Locate a database test item.

## The View Menu

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



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



## Chapter 6

### Using LANTEK REPORTER

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

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 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 pull-down menu to configure the program to match the hardware and user preferences.



Command	Description
<u>S</u> ort	Sort tests in the database view.
<u>U</u> nits	Choose feet or meters as the measurement units for both the screen display and printouts.
Serial <u>P</u> ort	Configure the serial port for your LANTEK tester.
<u>G</u> raphing	Select graphing options.
Upload <u>T</u> arget	Designate the source of data.
<u>F</u> ont	Change the screen display font.
<u>L</u> anguage	Change the language for both the screen display and printouts.
<u>T</u> ester ID	Locate and identify a connected tester.

## 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.

### Tool Button Identification

	Create a new database		Upload Test
	Open a database		Find Tester ID
	Save		Set Operator
	Cut		Backup
	Copy		Select All
	Paste		Sort Test
	Delete		Find Jobs or Test
	Export		Help Assistant
	Print		Help

## 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 Topic Menu Option

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



### To open the Help System

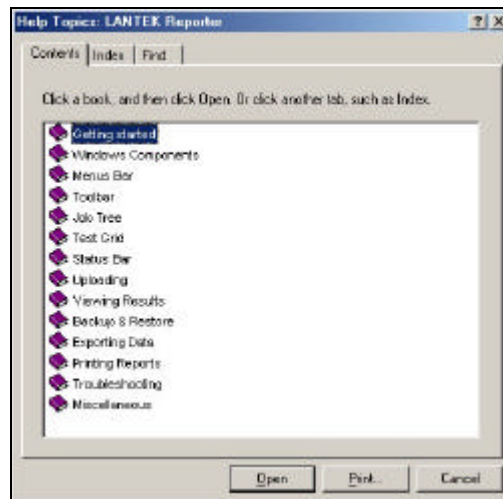
1. Pull down the **H**elp menu and click the **H**elp Topics command. The Help Topics screen displays.

### Help Topics Screen

The LANTEK Reporter **H**elp Topics screen contains three tabs and three buttons.

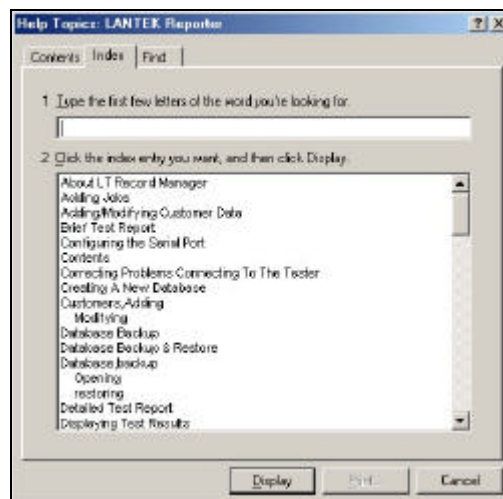
## Content Tab

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



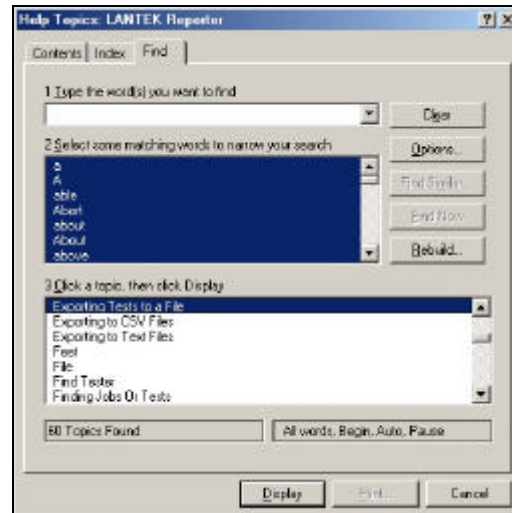
## Index Tab

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



## Find Tab

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



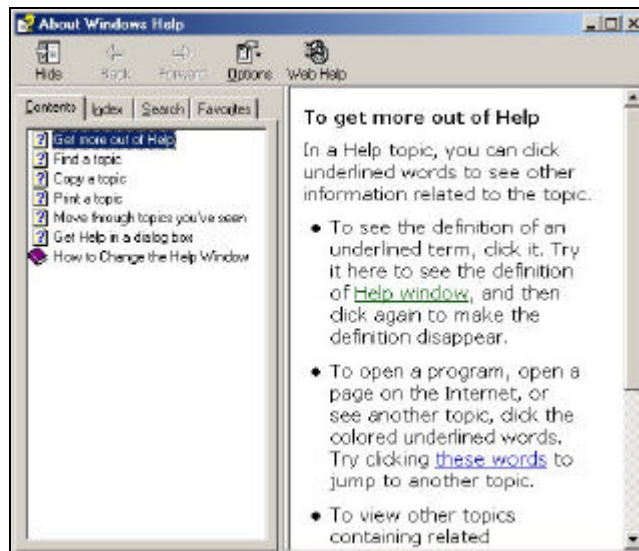
**Display button**      Opens the selected LANTEK Reporter Help item.

**Print button**      Prints the selected item.

**Cancel button**      Closes the LANTEK Reporter Help system.

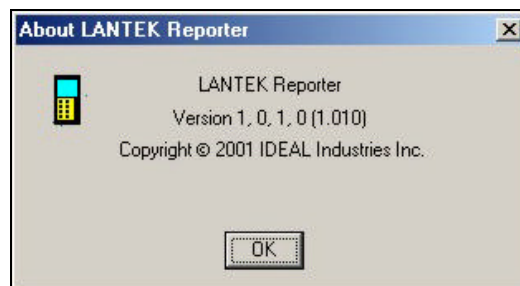
## Using Help Screen

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.



## Uploading DH Tests to the PC

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

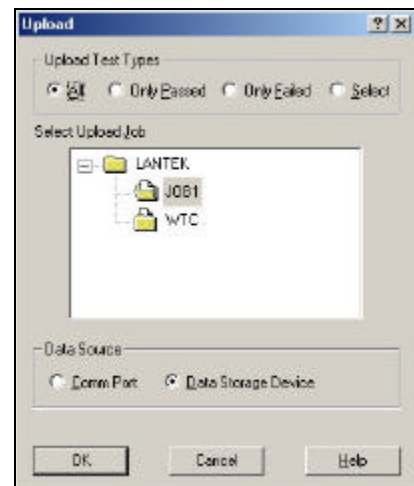
To create a new database, refer to *Creating a New Database*. To create a new job name, refer to *Adding a Job*.

### Upload procedure

1. Designate the upload location on the PC or Laptop.

Before uploading test data from the LANTEK DH, select a destination database in the Database View.

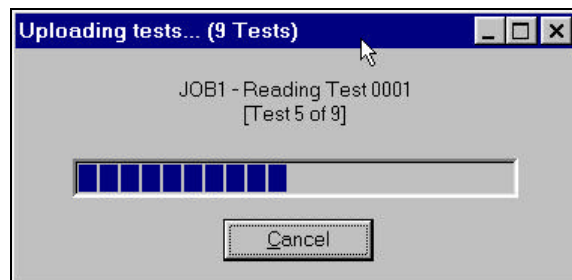
2. From the **File** pull-down menu, click on **Upload From Tester**.  
The Upload dialog box displays.



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

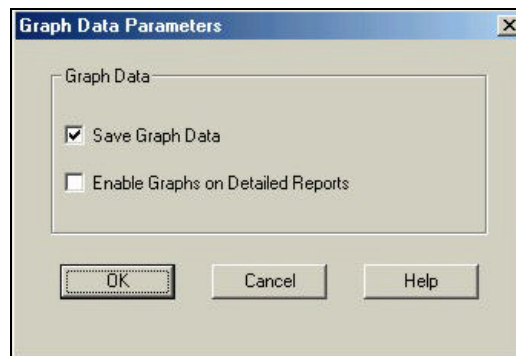
*Note: If you want to add AutoTests from a job in the cable tester to an existing LANTEK Reporter project with the same name, you have to select the mother project as <upload job>, that is located one level higher. (For example, JOB 1 in the cable tester; select <LANTEK> as upload job)*

5. Select the Data Source.
  - Choose **Comm Port** for direct connection (USB or Serial) with the tester.
  - Or **Data Storage Device** if you have stored the test results on the compact flash card and are using the USB flash card reader or if you have files stored on an alternate media device on your PC (CD ROM, Zip Disk, Hard Drive).
6. Click **OK** to begin the uploading process.
7. A status box will remain on screen during the uploading process and you will have the option to cancel at any time.



## Utilizing Graph Data

The saving of graph data is optional on the LANTEK 6/7. To help resolve a problem with a link under test, a collection of graph data can be made at the time the Autotest was performed. Once the “passed” test results have been uploaded to LANTEK Reporter, these graphs may no longer be needed. The LANTEK Reporter allows you to specify whether or not to include graphs with the test result data. This activity can be selected through the **Options** Menu under the **Graphing** command.



### Save Graph Data

Select this option to save graph data, if present, when tests are uploaded from the tester.

### Enable Graphs on Detailed Reports

Select this option to enable printing of summary graphs in the detailed report. The option, Save Graph Data, must be enabled when test data is uploaded in order for this option to have an effect. Printing graphs will substantially increase the total time required to print the detailed reports.




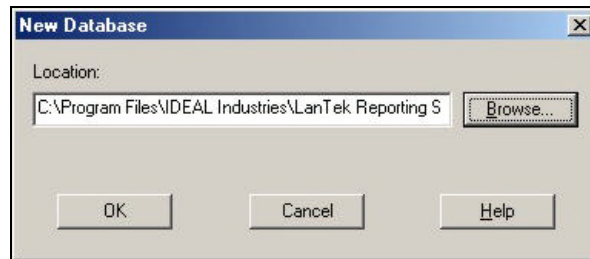
## Working with Databases

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:\...\IDEAL INDUSTRIES \ LANTEK Reporter \db) from the database directory.*

### Creating a New Database

1. Pull down the **File** menu and click the **New** command or click  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.

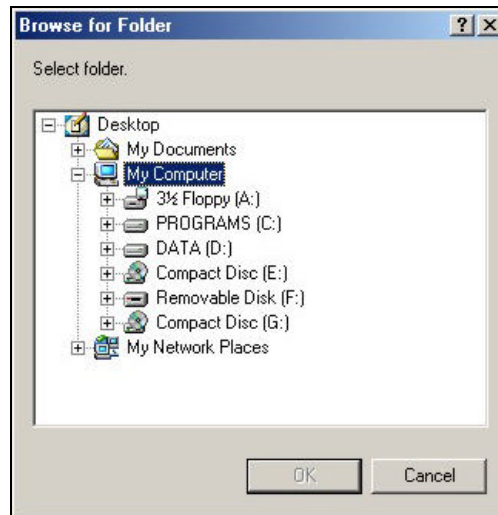
*Note: The name of the new database displays only in the title bar of the main window.*

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. Pull down the **File** menu and select the **Open** command or click  on the toolbar.



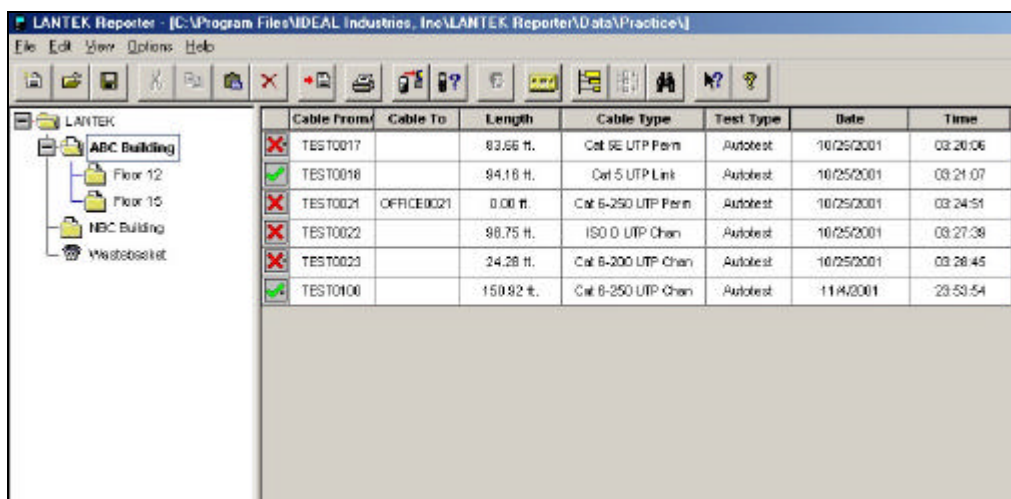
2. Use the **Browse** feature to locate the desired database folder and file.
3. Click **OK** to open the database.


## 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.

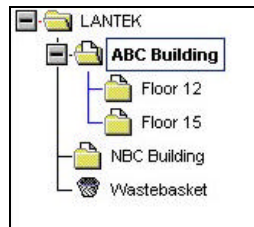


Jobs that have attached test records are indicated by an  icon. When you click on this icon, the test records become visible on the right side of the screen.

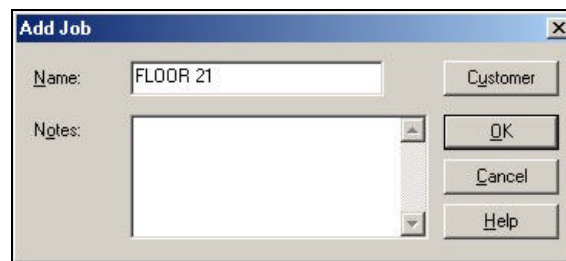
You may move Jobs from one folder to another by selecting and dragging them. Selection is indicated by a highlight bar.

## Adding a Job

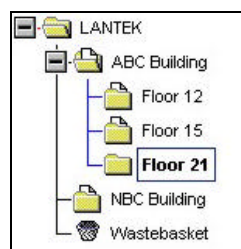
You must click on the left side of the main database view for the Add or Edit Job functions to be available. You can create a new collection of tests by adding a Job folder.



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.

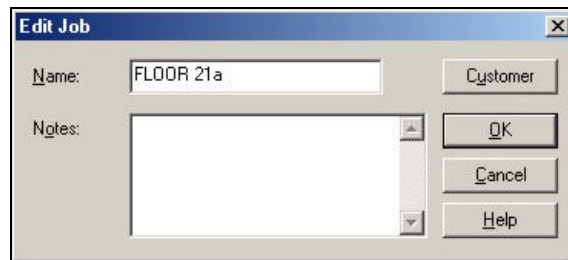


*Note: The preferred method of initiating the Add Job function is to right click the mouse on the job list where the new job can be defined as a sub job.*

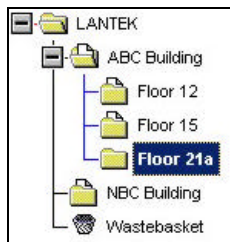
## Editing a Job

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

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



3. Click on the **N**ame or **N**ote 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 **E**dit menu, select **E**dit Job.
2. Click **C**ustomer. The Add Customer or Modify Customer dialog box displays.

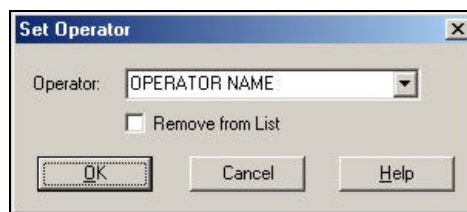
The image shows two side-by-side dialog boxes. The left dialog box is titled 'Add Customer' and the right is titled 'Modify Customer'. Both dialog boxes have a similar layout. The 'Add Customer' dialog has a 'Name' dropdown menu with 'Name' selected, and the 'Modify Customer' dialog has 'New Client' selected. Both have an 'Address' field with 'Address' or 'New Address' entered, followed by four empty text boxes. The 'Phone' field has 'Phone' or 'New Phone' entered, and the 'Fax' field has 'Fax' entered. The 'Contact' field has 'Name' entered, and the 'Email' field has 'Address' entered. Both dialog boxes have 'OK', 'Cancel', and 'Help' buttons on the right side.

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 add or change the operator name associated with a given test.


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 **E**dit menu. Click **C**ustomer or click . The Set Operator dialog box displays.

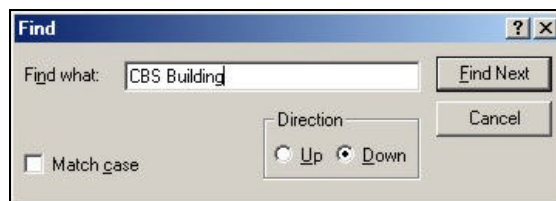


4. Click on the Drop-down Menu for a list of all operators.
5. Select an operator from the drop-down list or enter a new operator name.
6. Click **OK** when you are finished.

## 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.












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




## Working at the Test Level

### Displaying the Test Grid

1. Click on a Job folder that contains tests, as indicated by an  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
	0000		18.04 ft.	TIA Cat 3 UTP	Autotest	12/21/98	18:58:24
	0001		20.01 ft.	TIA Cat 6E UTP Link	Autotest	12/21/98	18:59:43
	0002		62.34 ft.	TIA Cat 5E UTP Link	Autotest	12/21/98	19:01:12
	0003		62.34 ft.	TIA Cat 5 UTP	Autotest	12/21/98	19:01:32
	0004		50.85 ft.	ISO D UTP	Autotest	12/21/98	19:03:00
	0005		50.85 ft.	ISO D UTP	Autotest	12/21/98	19:05:50
	TEST		20.01 ft.	TIA Cat 5 UTP	Autotest	12/21/98	18:55:24
	TEST0003		19.69 ft.	TIA Cat 5 UTP	Autotest	12/21/98	18:38:59

## 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.

Cable: TEST0006 (6900)

Job Name: ABC Building Date: 8/24/2001 Operator: OPERATOR NAME  
 Customer: COMPANY NAME Test Instrument: JLT750 [A0]  
 Test Standard: Custom Freq. Range: 1-800 MHz NVP: All 0.72

☒ Power Sum ACR
 ☒ Power Sum ELNEXT
 ☒ Power Sum NEXT
 ☒ ELNEXT  
☒ Wiremap
 ☒ Pair Data
 ☒ Return Loss
 ☒ NEXT
 ☒ Attenuation
 ☒ ACR

Pairs	NEFF	Result	Worst	Limit	Margin
7,8-3,6	NE	Fail	39.5 dB @ 102.50MHz	> 39.9 dB	-0.4 dB
7,8-1,2	NE	Fail	23.6 dB @ 733.00MHz	> 31.7 dB	-7.9 dB
7,8-5,4	NE	Pass	37.5 dB @ 760.00MHz	> 31.7 dB	5.8 dB
3,6-1,2	NE	Fail	3.8 dB @ 715.00MHz	> 31.7 dB	-27.9 dB
3,6-5,4	NE	Fail	20.3 dB @ 728.00MHz	> 31.7 dB	-11.4 dB
1,2-5,4	NE	Pass	32.2 dB @ 710.00MHz	> 31.7 dB	0.5 dB
7,8-3,6	FE	Fail	39.5 dB @ 91.50MHz	> 40.9 dB	-2.3 dB
7,8-1,2	FE	Fail	25.0 dB @ 734.00MHz	> 31.7 dB	-6.7 dB
7,8-5,4	FE	Pass	34.6 dB @ 743.00MHz	> 31.7 dB	2.9 dB
3,6-1,2	FE	Fail	7.0 dB @ 716.00MHz	> 31.7 dB	-24.7 dB
3,6-5,4	FE	Fail	19.0 dB @ 726.00MHz	> 31.7 dB	-12.7 dB
1,2-5,4	FE	Fail	29.2 dB @ 710.00MHz	> 31.7 dB	-2.5 dB

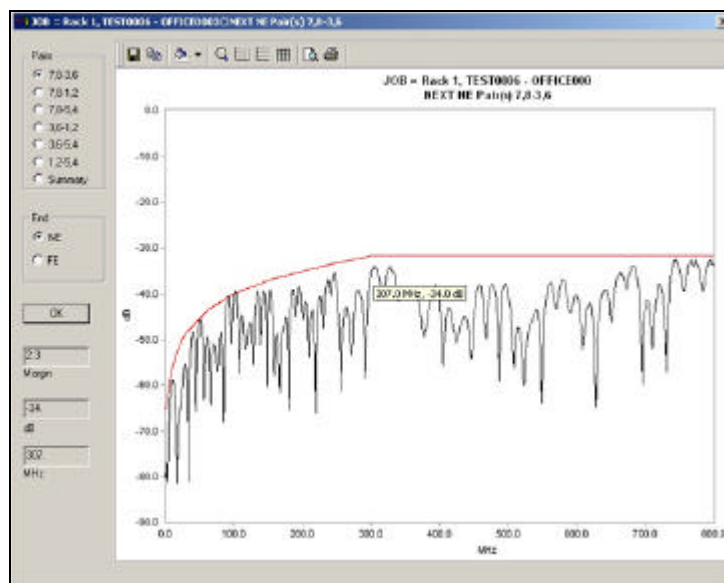
Graphs

## GRAPH Button

The GRAPH button may or may not be enabled, depending on whether graph data was saved during the uploading process of the test results. If it is enabled, you can select this button to view graphs of individual test results performed.

## The Graph Display

The graphical data display, depending upon the test tab that has been clicked, provides radio buttons on the left side to select the pair and/or the 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

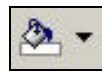
Save a graph in one of five different file formats (Chart FX files, Chart FX templates (no data), Text file (data only), Metafile picture, or Bitmap picture).



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 in a Word document.
- Text data can be pasted in 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 grid lines.



Horizontal



Data

Show or hide the data values in a grid.



Print Preview

Display the graph in a hard copy format prior to printing.



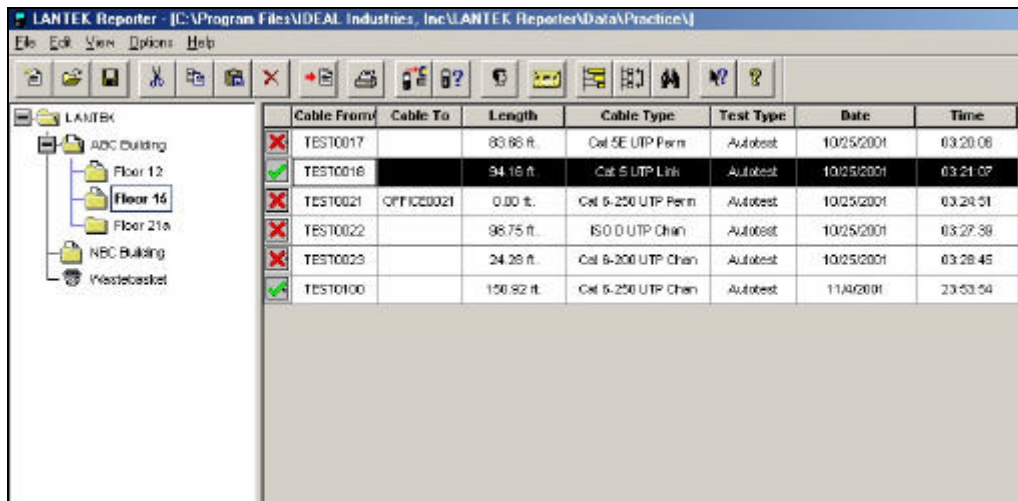
Print

Open the print dialog allowing printer selection and print options. Click **OK** to print the graph.

## Moving Tests Between Jobs

Tests may be selected and dragged into 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.

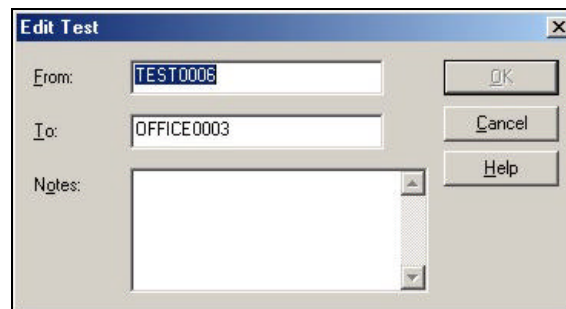


2. Move the cursor to the bottom of the highlighted area. The cursor will turn into a rectangle.
3. Click and hold the **left mouse** button while you drag the test(s) into a new Job folder on the left side of the screen.
4. Release the mouse.

## Editing Tests

This function becomes available on the Edit menu when a test record is selected. It can also be accessed by 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.”



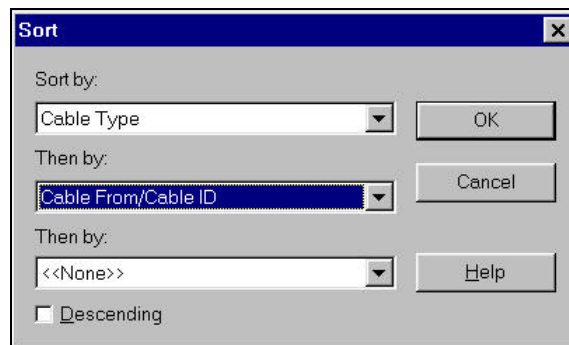
5. Enter data into the **From**, **To**, and **Notes** text boxes.
6. Click **OK**.

## Sorting the Tests

The Sort function allows you to reorganize tests in the Database view. You may Sort by Result, Cable ID, Cable Origin, Cable Destination, Cable Type, Test Type, Date, and Time. The easiest way to sort is to click on a column title. You sort by ascending, descending or natural order. The Sort function is available when more than one test is selected in the grid view.

1. On the **Options** menu, click **Sort**.
2. Click the **Down Arrow** next to each field and choose from the sorting options that are displayed.
3. 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.

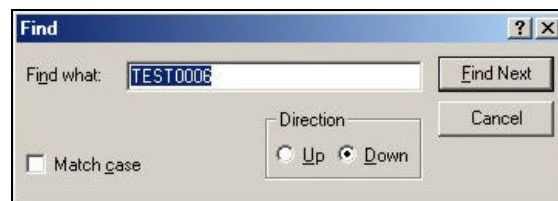


## Finding Data

The Find function searches for Job Names, Cable IDs and Tests. The Find function can be found on the Edit menu. It is context sensitive, and is available only when you have selected an item in the Test grid.

You can control both the type of match and the direction of the search. For example, if you are searching for a Test, you should have an item on the Test level of the hierarchy selected before bringing up the Find dialog box.

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 the **Find Test** command. The Find dialog box displays.



4. Enter the test name, then specify the find criteria using the **Match case** and **Direction** buttons.
5. Click **Find Next**.




## Backing Up and Restoring Databases

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

### Backing Up a Database

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

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

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

### Restoring a Database

This function becomes available on the File menu only after all databases have been closed.

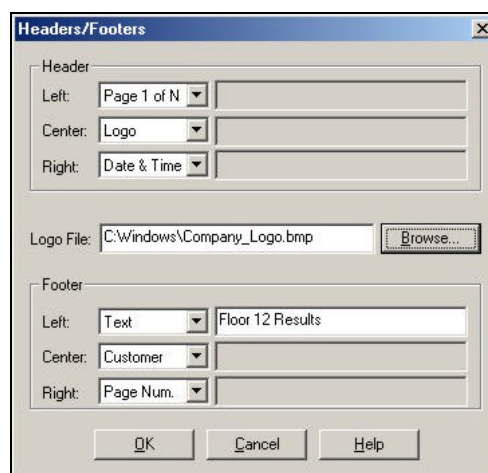
1. Click the **File** menu.
2. If you have a database open, click **C**lose Database and proceed to step 3. If you don't have a database open, proceed to step 4.
3. Click on the **File** menu again.
4. Select the **R**estore Database command. The backup file will be restored to the current folder.

## 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 **F**ile menu, click **H**eaders/Footers, the Headers/Footers dialog box displays.



2. Decide on the 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.*

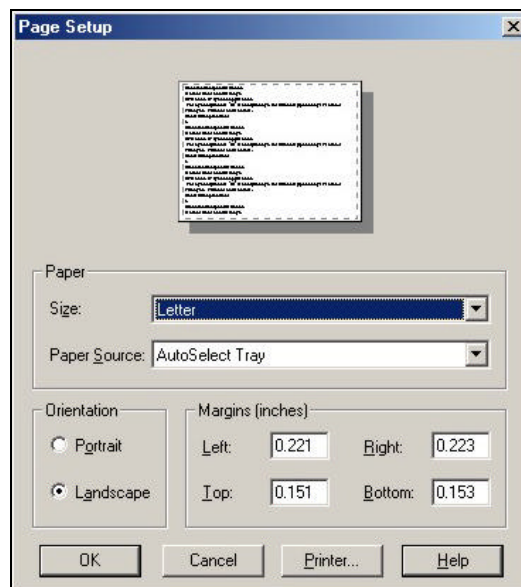
4. Click **OK**.

## Page Setup Command

Margins, paper instructions, and printer selection can be set in the Page Setup dialog box. Font style and size will be set by the program to maintain a single page per test.


1. From the **File** menu, click on **Page Setup**, the Page Setup dialog box displays.
2. Set **Paper Size, Source, Orientation**, and **Margins**.
3. Click **OK**.

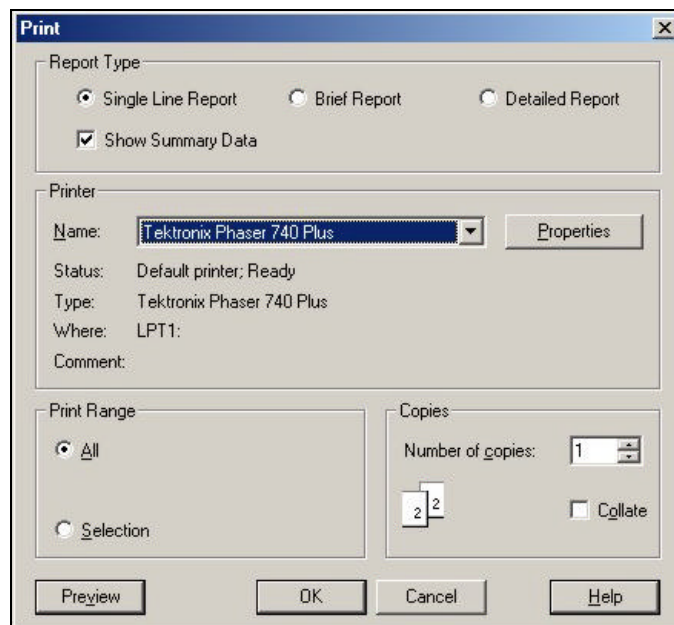
*Note: You may also need to adjust the space you allocate to the header, footer, and margins in order to fit the report on one page.*



## 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 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.

Report Type

☒ Single Line Report
 ☐ Brief Report
 ☐ Detailed Report

☒ Show Summary Data

IDEAL Industries Certified Single Line Report							
Job Name: FUDOR 15				Report Date: 10/17/2001			
Customer:				S/W Version: 1.004			
Summary:							
<u>All Cables</u>		<u>Twisted Pair</u>		<u>Cross/Twisted</u>		<u>Fiber</u>	
Total: 2		Total: 0		Total: 0		Total: 0	
Pass: 0		Pass: 0		Pass: 0		Pass: 0	
Fail: 2		Fail: 0		Fail: 0		Fail: 0	
		Tot. Length: 0.000.		Tot. Length: 0.000.		Tot. Length: 0.000.	
<u>Cable ID</u>	<u>Cable To</u>	<u>Length</u>	<u>Status</u>	<u>Date</u>	<u>Cable Type</u>	<u>Test Standard</u>	<u>Test Link</u>
TEST0006	OFFICE0000	62.0K ft.	Fail	9/24/2001	Toms Cable	Custom	N/A
TEST0007	OFFICE0000	62.0K ft.	Fail	9/24/2001	Toms Cable	Custom	N/A

## 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.

Report Type

☐ Single Line Report
 ☒ **Brief Report**
☐ Detailed Report

☒ Show Summary Data

**IDEAL Industries Certified Brief Report**

Job Name: R00R15

Customer:

Report Date: 10/10/2001

5/N/Tasks: 1.001

Summary:

<p><u>All Cables</u></p> <p>Total: 2</p> <p>Pass: 0</p> <p>Fail: 2</p>	<p><u>Twisted Pair</u></p> <p>Total: 0</p> <p>Pass: 0</p> <p>Fail: 0</p> <p>Tot. Length: 0.00ft.</p>	<p><u>Coax/Fiber/Plastic</u></p> <p>Total: 0</p> <p>Pass: 0</p> <p>Fail: 0</p> <p>Tot. Length: 0.00ft.</p>	<p><u>Fiber</u></p> <p>Total: 0</p> <p>Pass: 0</p> <p>Fail: 0</p>	<p><u>Custom</u></p> <p>Total: 2</p> <p>Pass: 0</p> <p>Fail: 2</p> <p>Tot. Length: 124.67ft.</p>
--	--	--	---	--

**FAIL**

Cable ID 1: TEST0006

Cable ID 2: OFFICE0003

Test Date: 8/24/2001

Test Time: 23:38:56

Cable Type: Toms Cable

WVP: 0.72c

UTP50 [10]

RW Version: 0.2a

Test Standard: Custom

Frequency Range: 1-800 MHz

Operator: OPERATOR NAME

Contractor: CONTRACTOR NAME

Company: COMPANY NAME

Notes:

	Result	Unit	Value	Unit	Value	Unit	Value
Wiremap	PASS		123456789	Unit	123456789	Unit	123456789
Attenuation	PASS		10.5 dB @ 707.0 MHz	dB	< 30.8 dB	dB	-20.3 dB
Length	PASS		63.32 ft.	ft.	< 328.08 ft.	ft.	-264.8 ft.
NEXT	FAIL		3.8 dB @ 715.0 MHz	dB	> 31.7 dB	dB	-27.9 dB
DC Resistance	PASS		3.5 Ohm	Ohm	< 25.0 Ohm	Ohm	-21.5 Ohm
Impedance	PASS		95.7 Ohm	Ohm	85.0 - 115.0 Ohm	Ohm	-11.7 Ohm
Prop. Delay	PASS		104.5 ns	ns	< 50.0 ns	ns	-48.5 ns
Delay Skew	PASS		1.2 ns	ns	< 50.0 ns	ns	-48.8 ns
Capacitance	FAIL		17.37 pF	pF	< 17.07 pF	pF	-0.3 pF
Return Loss	FAIL		2.0 dB @ 308.0 MHz	dB	> 7.2 dB	dB	-5.2 dB
ACR	PASS		-6.0 dB @ 715.0 MHz	dB	< -5.1 dB	dB	-2.1 dB
ELFEXT	FAIL		10.8 dB @ 729.0 MHz	dB	> 12.7 dB	dB	-2.9 dB
Headroom	PASS		0.0 dB	dB	N/A	dB	N/A
Power Sum ACR	PASS		-6.1 dB @ 715.0 MHz	dB	> -11.1 dB	dB	-5.0 dB
Power Sum ELFEXT	FAIL		10.0 dB @ 729.0 MHz	dB	> 10.7 dB	dB	-0.6 dB
Power Sum NEXT	FAIL		3.7 dB @ 715.0 MHz	dB	> 28.7 dB	dB	-25.0 dB

## The Detailed Layout

The Detailed Test Report prints out detailed subordinate test's 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 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.

**Report Type**

☐ Single Line Report
 ☐ Brief Report
 ☒ Detailed Report

☒ Show Summary Data

Job Name: FLOOR 15  
Customer:

Report Date: 10/17/2001  
SW Version: 1.00d

**Summary:**

Test Name	Test Type	Test Result	Test Date	Test Time
Test 1	Test 1	Pass	10/17/2001	10:00:00
Test 2	Test 2	Fail	10/17/2001	10:01:00
Test 3	Test 3	Pass	10/17/2001	10:02:00
Test 4	Test 4	Fail	10/17/2001	10:03:00
Test 5	Test 5	Pass	10/17/2001	10:04:00
Test 6	Test 6	Fail	10/17/2001	10:05:00
Test 7	Test 7	Pass	10/17/2001	10:06:00
Test 8	Test 8	Fail	10/17/2001	10:07:00
Test 9	Test 9	Pass	10/17/2001	10:08:00
Test 10	Test 10	Fail	10/17/2001	10:09:00

**FAIL**

Test 1: 10/17/2001  
Test 2: 10/17/2001  
Test 3: 10/17/2001  
Test 4: 10/17/2001  
Test 5: 10/17/2001  
Test 6: 10/17/2001  
Test 7: 10/17/2001  
Test 8: 10/17/2001  
Test 9: 10/17/2001  
Test 10: 10/17/2001

Notes:

Measurements

U/E

FE

Pass (N/P)

Test	7, 8, 9, 10, 11, 12	3, 4, 5, 6, 7	1, 2, 3, 4, 5	5, 6, 7, 8, 9, 10, 11, 12	U/E	Result
Length	0.000	0.000	0.000	0.000	0.000	Pass
Temp. Delay	0.000	0.000	0.000	0.000	0.000	Pass
Delay Slope	0.000	0.000	0.000	0.000	0.000	Pass
Impedance	0.000	0.000	0.000	0.000	0.000	Pass
DC Resistance	0.000	0.000	0.000	0.000	0.000	Pass
Capacitance	0.000	0.000	0.000	0.000	0.000	Pass
Humor	0.000	0.000	0.000	0.000	0.000	Pass

**NEXT: FAIL**

Test	U/E	Result	U/E	Result	U/E
0.000	0.000	Pass	0.000	0.000	0.000
0.000	0.000	Pass	0.000	0.000	0.000
0.000	0.000	Pass	0.000	0.000	0.000
0.000	0.000	Pass	0.000	0.000	0.000
0.000	0.000	Pass	0.000	0.000	0.000
0.000	0.000	Pass	0.000	0.000	0.000
0.000	0.000	Pass	0.000	0.000	0.000
0.000	0.000	Pass	0.000	0.000	0.000
0.000	0.000	Pass	0.000	0.000	0.000
0.000	0.000	Pass	0.000	0.000	0.000





# Chapter 7

## Cable Testing Fundamentals

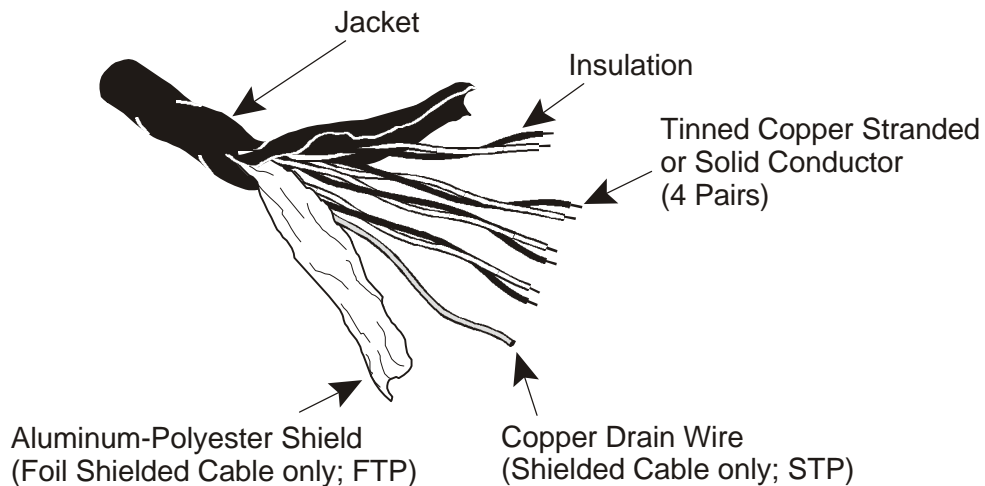
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### Contents

- Testing Twisted Pair Cables
- Wire Map Test
- Wire Length Test
- DC Resistance Test
- NEXT, ELFEXT, and Power Sum Test
- Attenuation Test
- Return Loss Test
- Impedance Test
- Delay and Skew Test
- Capacitance Test
- ACR and Power Sum ACR Test
- Headroom Test
- Testing and Troubleshooting 10Base-T Cabling
- Testing and Troubleshooting with Block Adapters

## Testing Twisted Pair Cables

Twisted pair wiring systems (Figure 7-1) typically employ four pairs of insulated conductors and connectors that allow you to operate different network types on the same cable (Table 7-1). Both unshielded (UTP) and foil shielded (STP, FTP) cables are available.



The following diagram shows modular jack pin numbering and wiring patterns for T568A, T568B, 10 Base-T, TP-PMD and USOC cabling types.

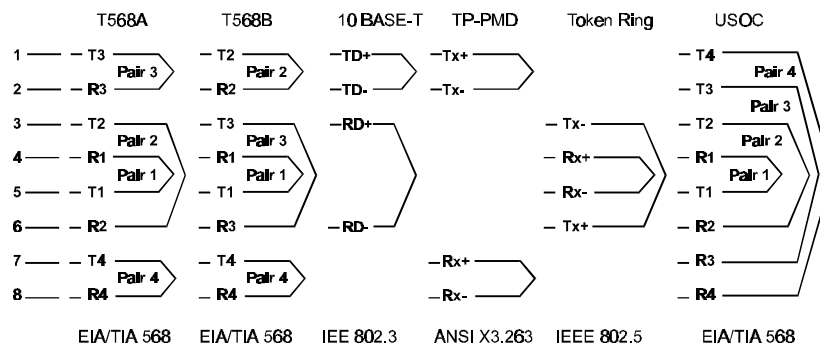


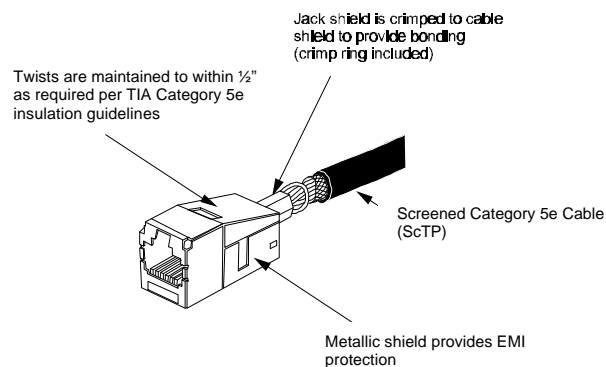
Figure 7-1: Twisted Pair Cables

**Table 7-1: Twisted Pair Cable Types and Associated Networks**

Cable Type	Network Examples
TIA Cat 3, 5e, 6 UTP or STP and 7 STP	Ethernet, Fast Ethernet, ATM, and Gigabit Ethernet
ISO Class C, D, E and F UTP or STP	Ethernet, Fast Ethernet, ATM
TP-PMD / TP-DDI	FDDI or ATM on Copper
10Base-T	Ethernet
Single Pair	Telephone, Apple Local Talk, ISDN
Shielded Two-Pair (1,2,7,8)	ATM, Fiber Channel on Copper

## Shielded Twisted Pair (STP)

Testing the continuity of the shield is important and requires shielded test leads at both the Display Handset and Remote Handset. When testing STP, be sure to select Shielded Cable Type (STP) in the Cable Type menu.



**Figure 7-2: Shield Continuity Test Connections Twisted Pair**

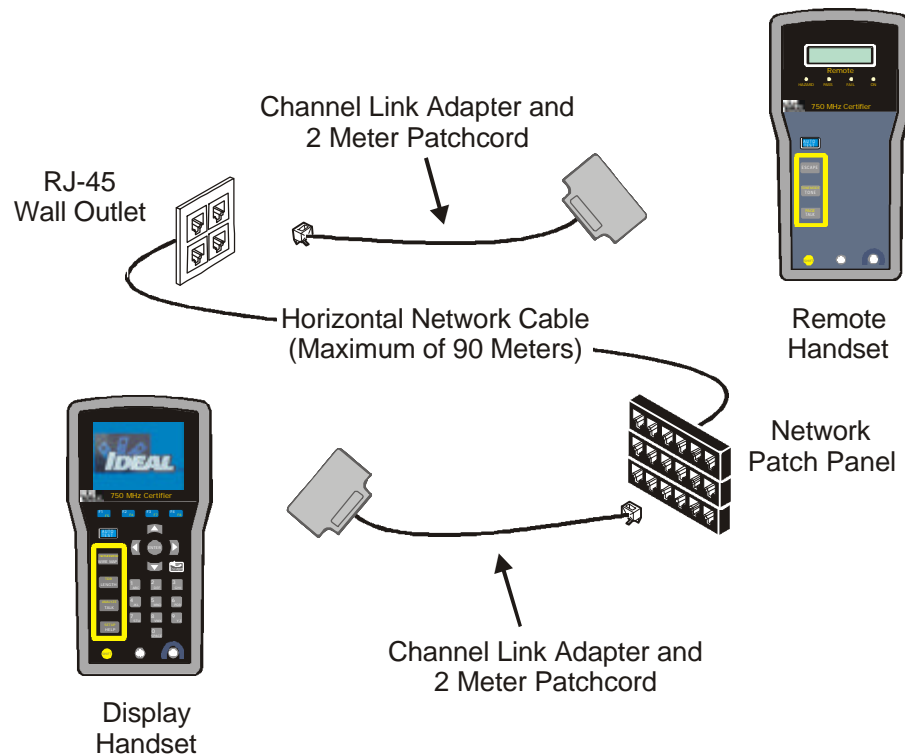
## USOC Wiring

If a USOC (Universal Service Ordering Code) or other wiring scheme is used, a special adapter may be required for connection. Refer to *Appendix D, Model Accessories* for a full list of available cable adapters.

*Note: If your testing requirements include connection to something other than an RJ-45 or Tera style jack, refer to Testing with Block Adapters later in this chapter.*

## 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. 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.



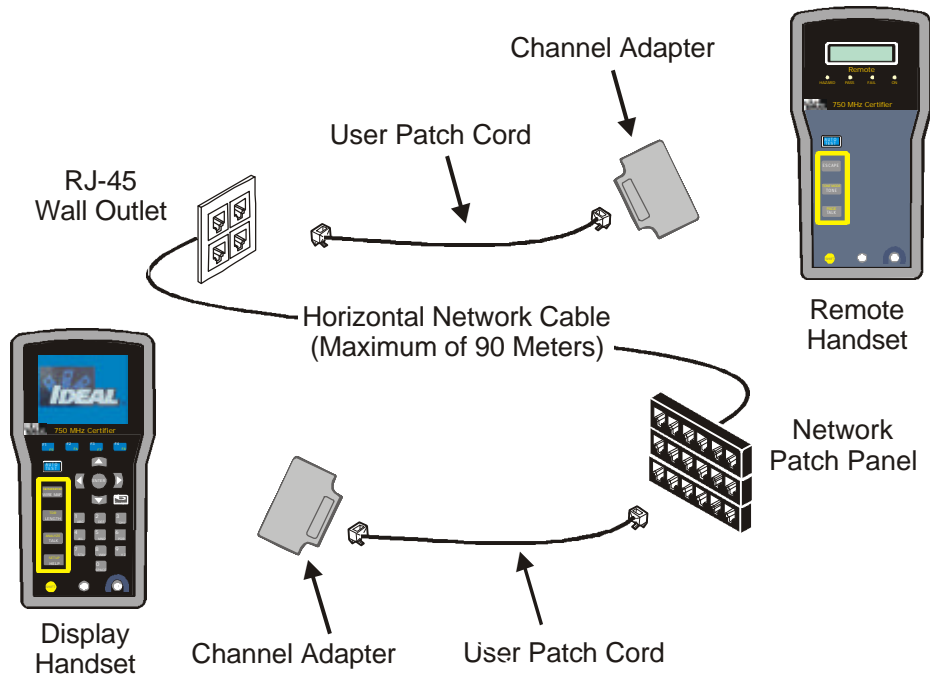
**Figure 7-3: Permanent Link Test Connections**

Connection	Cable Length Limits
Horizontal Network Cable	Maximum of 90 meters

*Note: Ensure that the Cable Type is set to Twisted Pair Permanent Link.  
If you exceed the tester length test limits, the tester will fail the link.*

## 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, 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 7-4: Channel Link Test Connections**

### Connection

Horizontal Network Cable  
User Patchcords

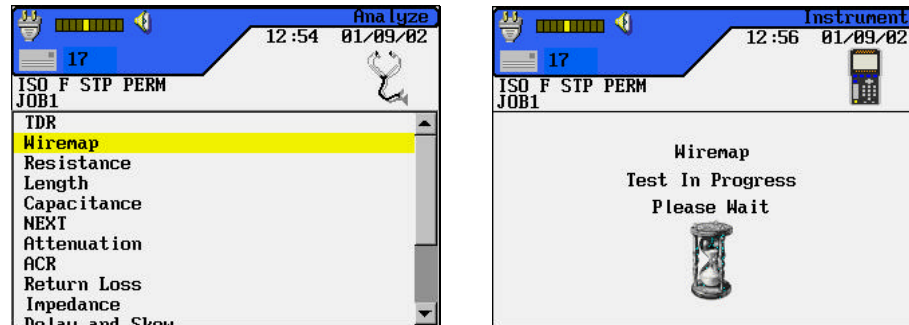
### Cable Length Limits

Maximum of 90 meters  
Combined Maximum length of 10 meters

*Note: Ensure that the Cable Type is set to Twisted Pair Channel Link when testing with channel adapters. If you exceed the tester length test limits, the tester will fail the link.*

## 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.



*Note: The RH is required to perform this test.*

## 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 (refer to *Chapter 3, Changing a 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 Wiremap 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	<u>Test</u> DC Resistance Attenuation NEXT Mutual Capacitance Length	<u>Possible Result</u> Fail. Fail. Some false measurements. 0 reading possible. May be low if the open is near the Display Handset.

### Problem: Shorted pins

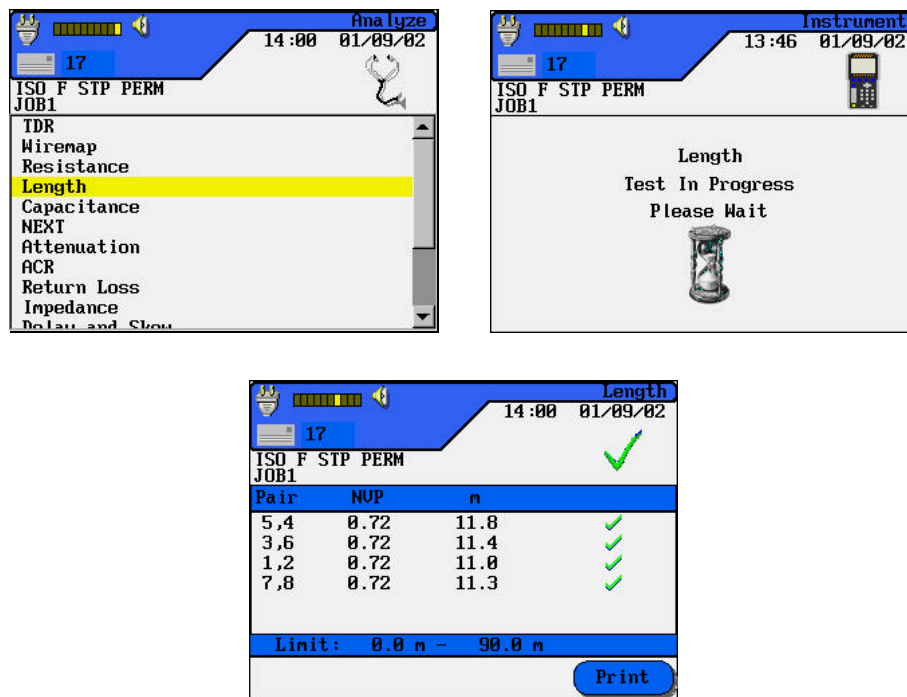
Probable Causes	Conductors making contact at a connector. Jack or plug has pin or circuit defect. Cable damaged.	
Other Tests Affected	<u>Test</u> DC Resistance Attenuation NEXT Capacitance Length	<u>Possible Result</u> Low or zero. Fail. Some false measurements. Over limit. Reduced or shorted pairs.

### Problem: Miswired pins

Probable Causes	Conductors reversed at a connector.	
Other Tests Affected	<u>Test</u> Usually none	<u>Possible Result</u> 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. Depending on the units selected in the Setup menu, length is reported in either feet or meters. See *Chapter 3, Setup information*.



Note: The RH is not required to perform this test.



### **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 (50 to 100 feet) and adjust the NVP until the tester displays the known cable length.

### **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.

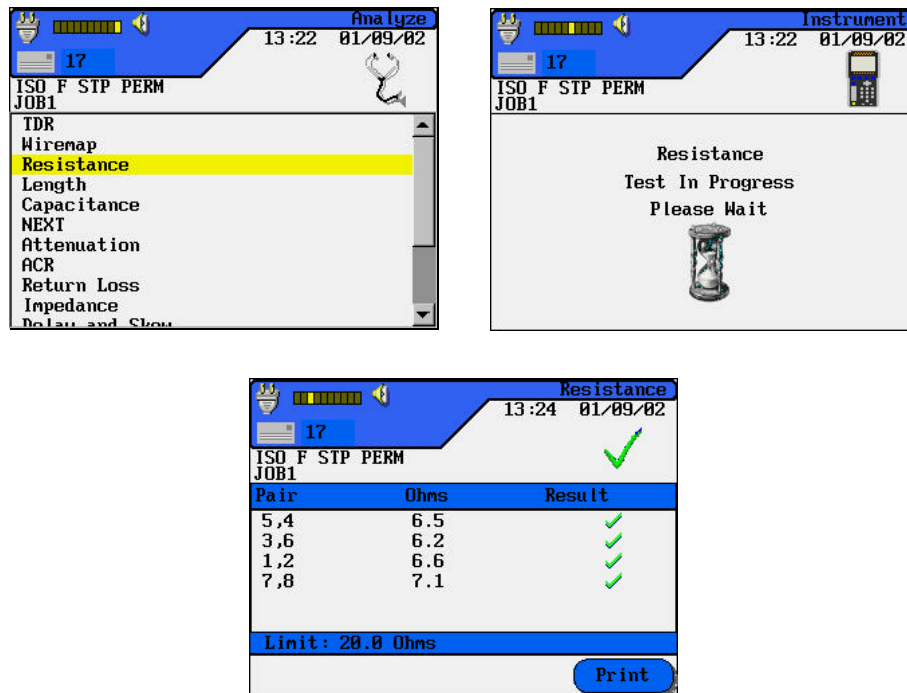
### **Troubleshooting Wire Length Problems**

**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	<u>Test</u> DC Loop Resistance Attenuation	<u>Possible Result</u> May be slightly high or fail. May be slightly high or fail.

## DC Resistance Test

This test measures the loop resistance of each pair of wires. The instrument tests to make sure 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.



*Note: The RH is required to perform this test.*

## DC 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 DC 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	<u>Test</u> Wire Map Attenuation NEXT Capacitance	<u>Possible Result</u> May fail. May fail. May have false readings. May fail.

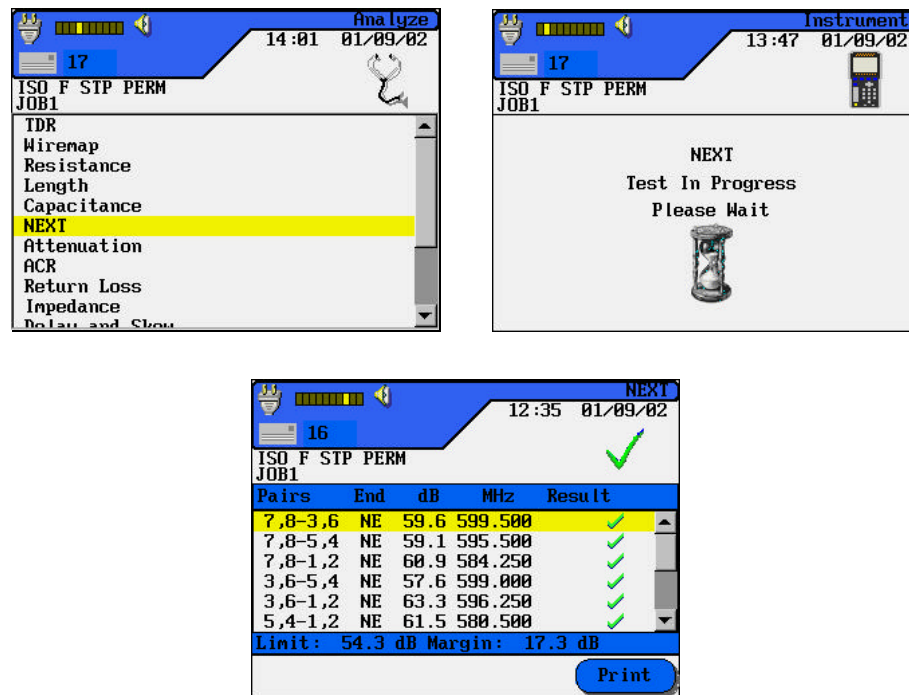
### Problem: One wire pair has a very high DC loop resistance, others are normal.

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

## NEXT, ELFEXT, and Power Sum Tests

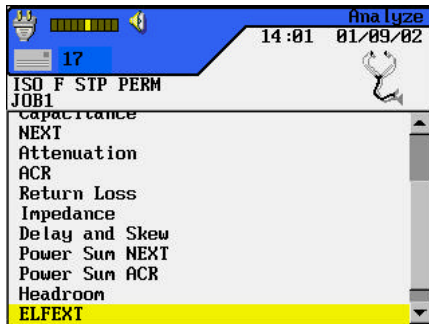
The NEXT (Near End Crosstalk) and ELFEXT (Equal Level Far-End Crosstalk) tests measure crosstalk at the near and far ends of the cable in one Autotest. High levels of crosstalk can cause excessive retransmissions, data corruption, and other problems that slow the network system.

### NEXT Test Screens



*Note: The RH is required to perform these tests.*

## ELFEXT Test Screens



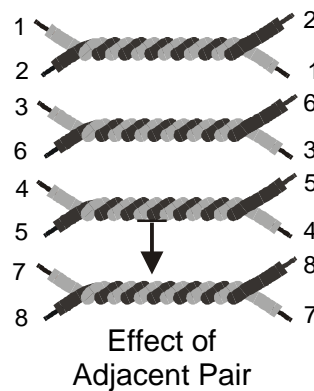
Pairs	End	dB	MHz	Result
5,4-3,6	NE	39.6	600.000	✓
5,4-1,2	NE	57.5	579.500	✓
5,4-7,8	NE	44.4	600.000	✓
3,6-5,4	NE	39.4	600.000	✓
3,6-1,2	NE	40.3	600.000	✓
3,6-7,8	NE	36.7	600.000	✓

Limit: 18.6 dB Margin: 21.0 dB

Print

## 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 both the DH and the RH.



## Chapter 7

### Cable Testing Fundamentals

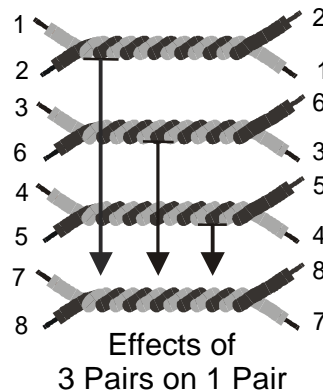
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The FEXT test is similar to the NEXT test except that the traffic is generated at the RH and crosstalk is measured at the DH.

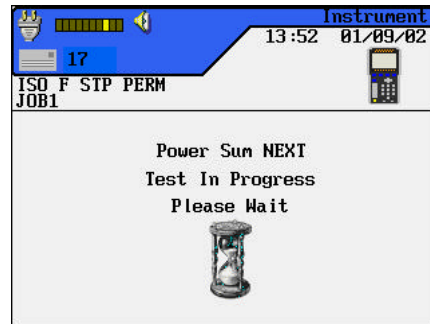
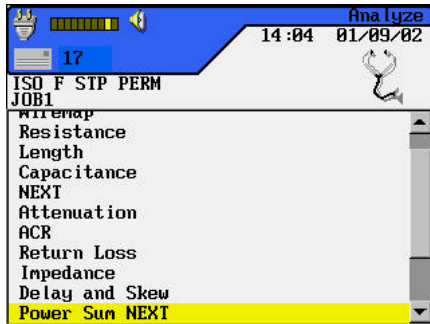
- NEXT measurements are made at *each end* of the cable for all pair combinations (pair 1-2 vs. 3-6, etc.), yielding a total of twelve measurements.
- ELFEXT measurements are made with the DH and RH for all possible pair combinations (1-2 vs. 3-6, 3-6 vs. 1-2, 1-2 etc.) at both ends yielding a total 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.



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.



The screenshot shows the 'Power Sum NEXT' results screen with a table of measurements. The top status bar shows '17', '14:06', and '01/09/02'. A green checkmark is visible in the top right corner.

Pair	End	dB	MHz	Result
5,4	NE	48.2	100.000	✓
3,6	NE	48.8	97.000	✓
1,2	NE	47.0	68.000	✓
7,8	NE	41.5	96.750	✓
5,4	FE	42.9	83.750	✓
3,6	FE	38.9	96.500	✓

Limit: 29.3 dB Margin: 18.9 dB

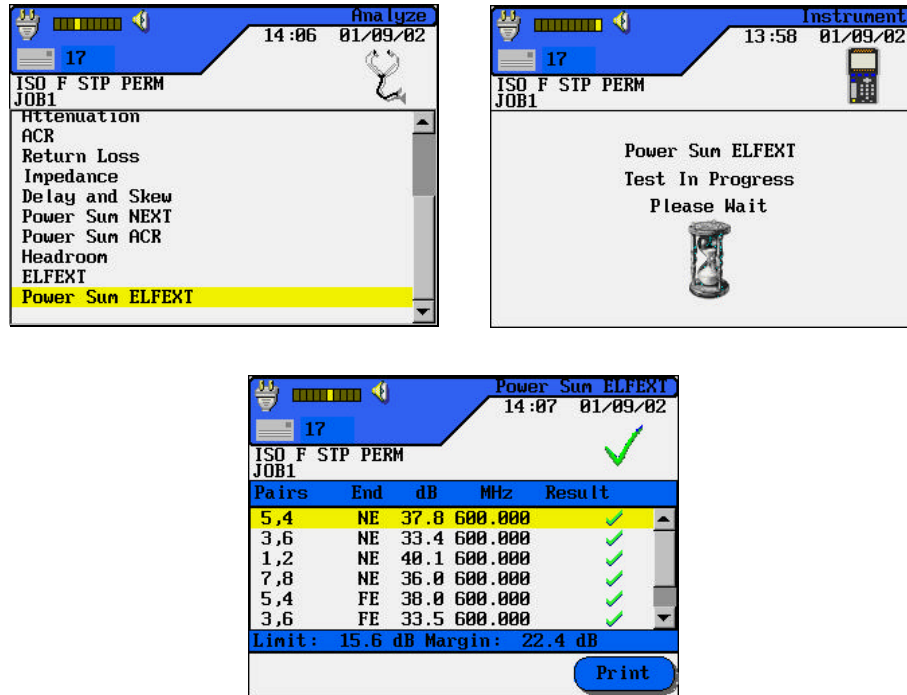
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## Chapter 7

### Cable Testing Fundamentals

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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.



*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.  
The smaller the number, the greater the crosstalk.

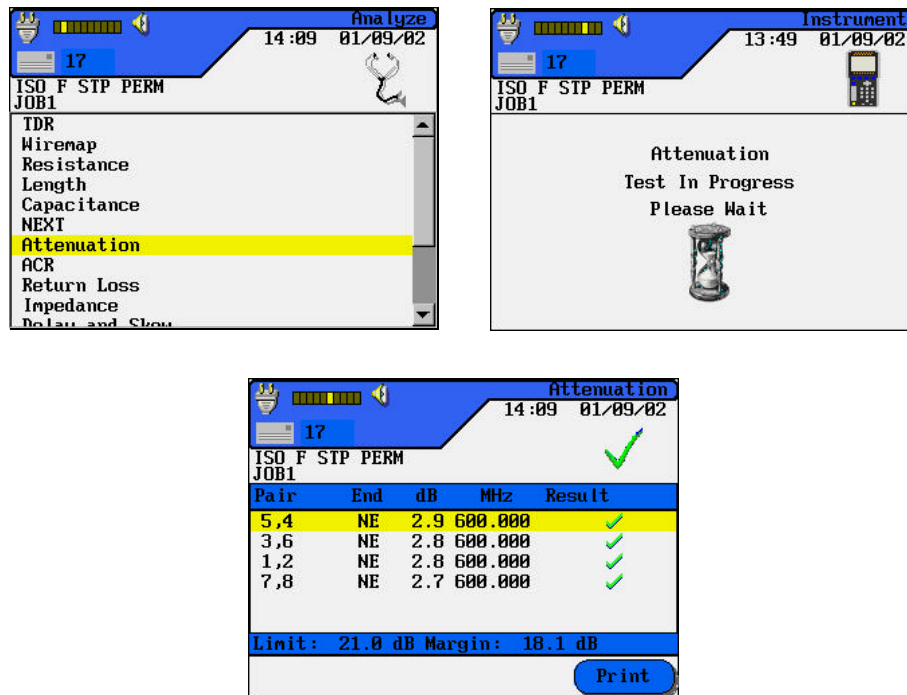
## Troubleshooting NEXT and ELFEXT Problems

### 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).	
Other Tests Affected	<u>Test</u> Return Loss NEXT	<u>Possible Result</u> May be over limit. 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.



*Note: The RH is required to perform this test.*

## 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. The larger the number, the greater the attenuation.

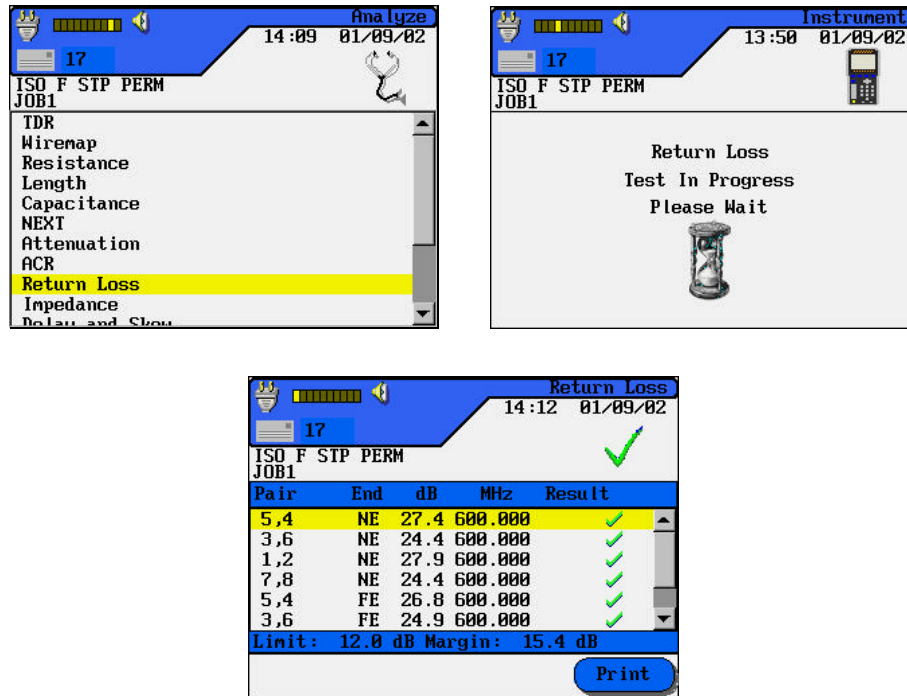
## Troubleshooting Attenuation Problems

### Problem: High Attenuation Reading

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



*Note: The RH is required to perform this test.*

## 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)

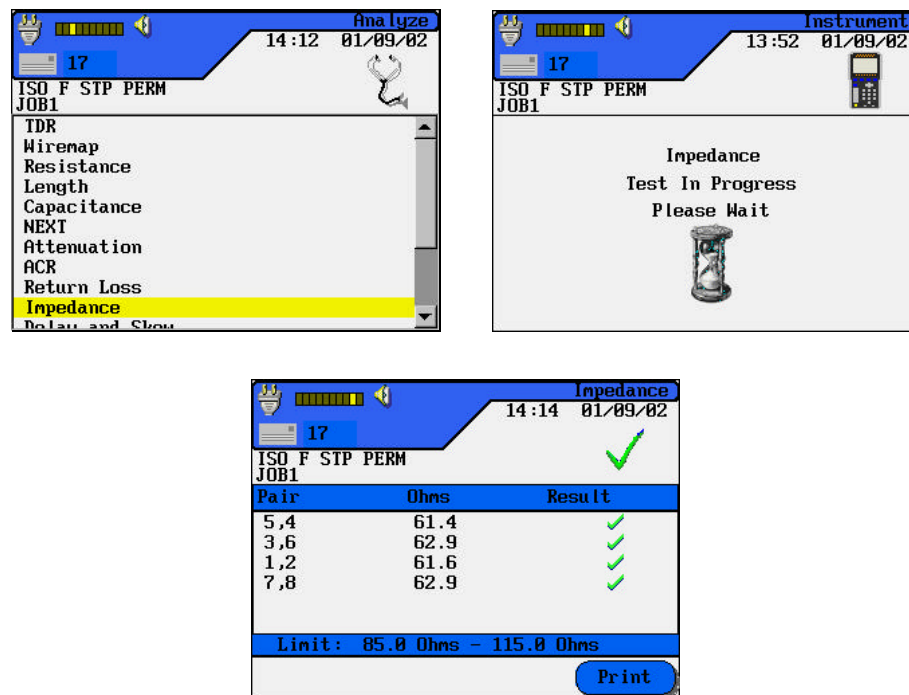
Probable Causes	Open, shorted, or damaged cable. Installed cable, cable segments, or patch cord have improper characteristics. Damaged or worn cable or connectors. Poor punch-down. Factory splice in cable.	
Other Tests Affected	<u>Test</u> Attenuation Capacitance and Average Impedance  DC Loop Resistance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



*Note: The RH is not required to perform this test.*

## 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  $\Omega$ , plus or minus 15  $\Omega$ .

## 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	<u>Test</u> Length Average Impedance	<u>Possible Result</u> Affected pairs will appear longer. 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.



The screenshot shows the 'Delay and Skew' results screen with a green checkmark icon. The table below displays the results for four cable pairs. The top status bar displays '17', '14:28', and '01/09/02'.

Pair	delay(ns)	skew(ns)	Result
5,4	73.7	4.0	
3,6	71.6	1.9	
1,2	69.7	0.0	
7,8	71.2	1.5	

Limit: Delay 510.0 Skew 43.0 ns

Print



## 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

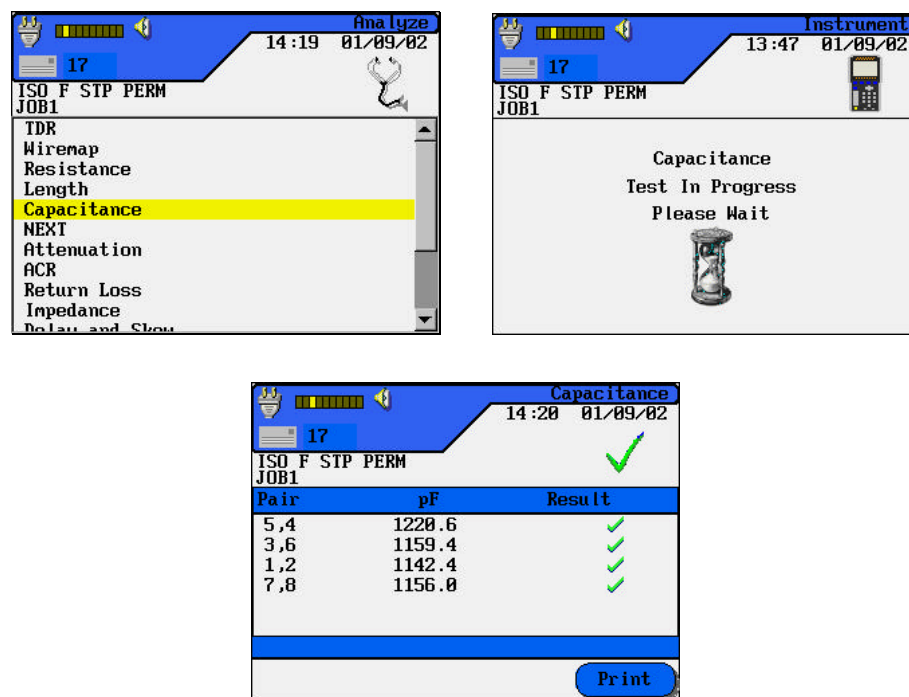
### Problem: Excessive Differences Between Measurements

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.
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## 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.



*Note: The RH is not required to perform this test.*

## 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

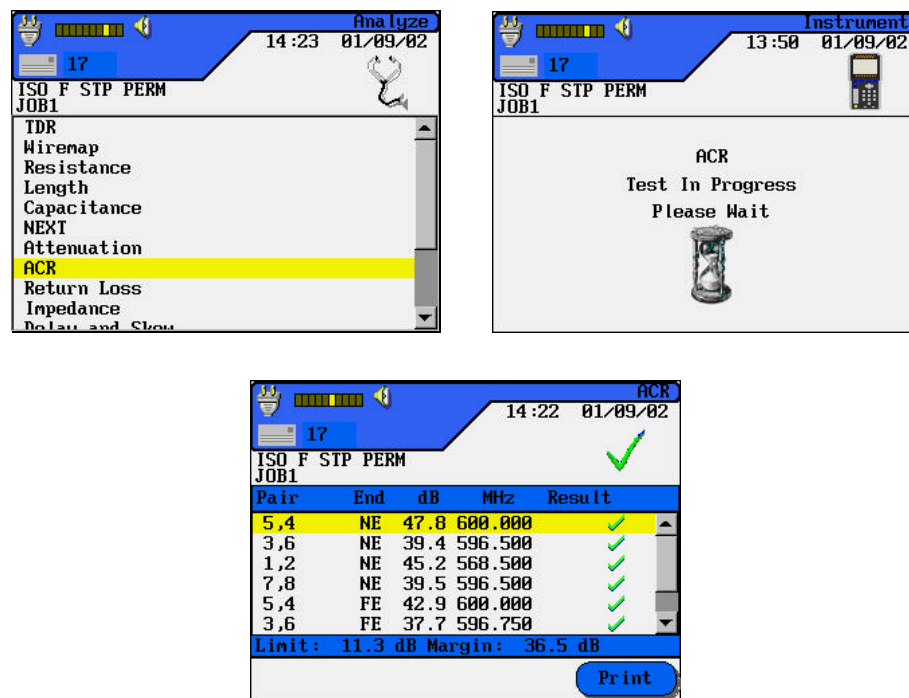
### Problem: Capacitance Exceeds the Maximum Limit

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	<u>Test</u> Length Average Impedance	<u>Possible Result</u> Affected pairs will appear longer. Change in average impedance is inversely proportional to change in capacitance.

## ACR and Power Sum ACR Test

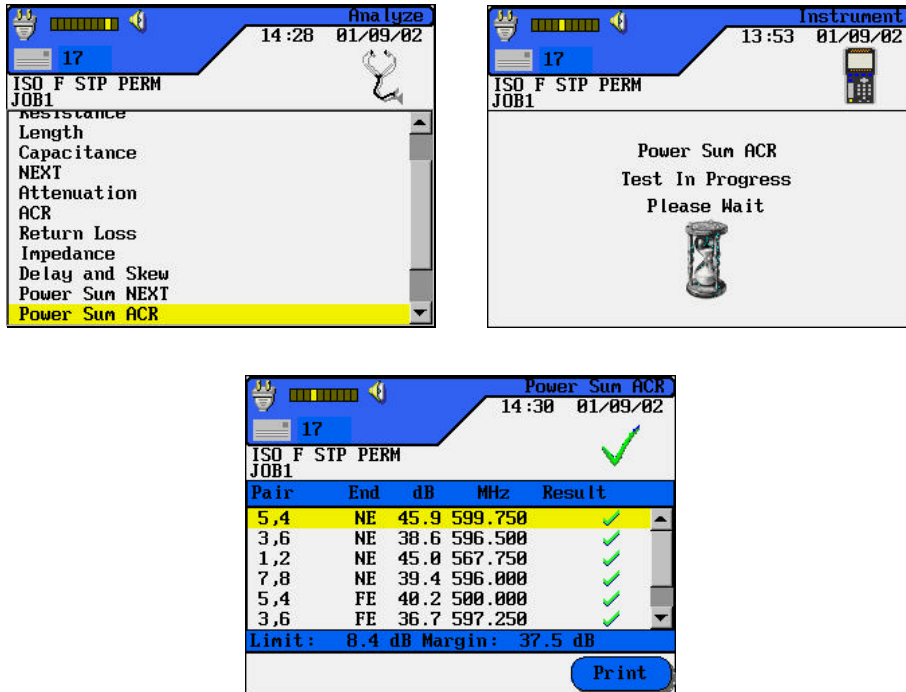
The ACR (Attenuation-to-Crosstalk Ratio) test performs a mathematical comparison (difference calculation) between the results of the Attenuation and NEXT tests. The difference reading between each pair gives an indication of how problem-free the cable pair will be for transmissions.

The ACR measurements are calculated pair-to-pair.



*Note: The RH is required to perform these tests.*

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.



## ACR and Power Sum ACR Errors

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

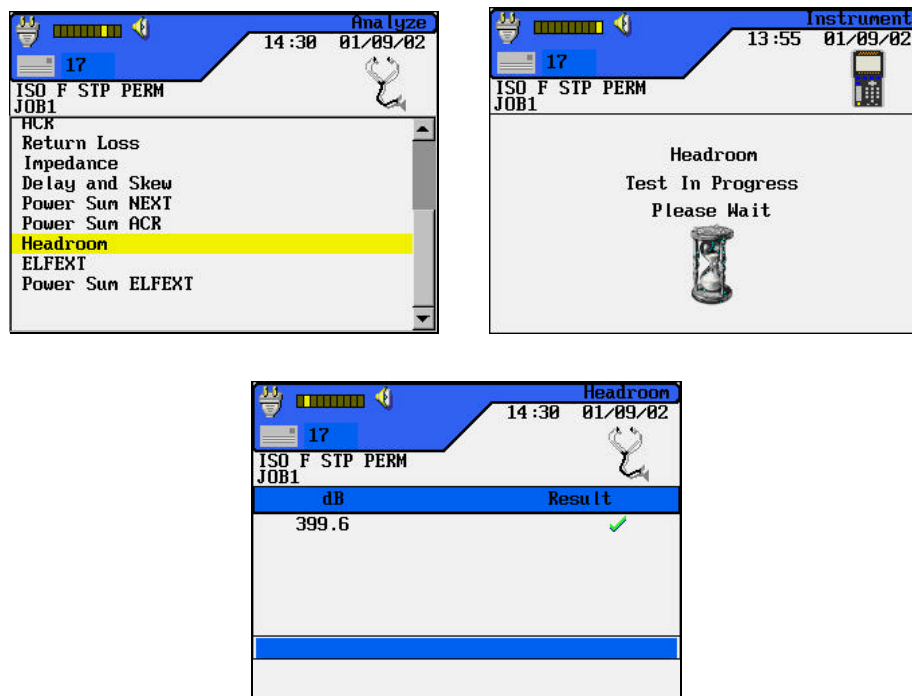
## Troubleshooting ACR and Power Sum ACR Problems

Refer to the NEXT and Attenuation troubleshooting suggestions in this chapter.

## 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.



*Note: The RH is required to perform this test.*

## Headroom Errors

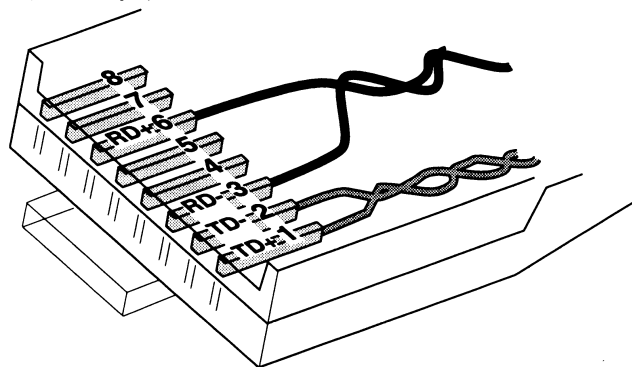
The Headroom number, reported in dB, characterizes the worst-case margin found in a single cable run. A large number is desirable, since it indicates a strong signal and little noise interference. The pass/fail limit for Headroom is the same as Power Sum ACR.

## Testing and Troubleshooting 10BASE-T Cabling

10BASE-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.

10BASE-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.

8MP (RJ-45 Style) Connector



**Figure 7-5: 10BASE-T Connector**

*Note: Other pairs may be wired, but 10BASE-T uses only the pairs shown.*

## **Testing and Troubleshooting with Block Adapters**

### **Testing with 110 and 210 Connecting Block Adapters**

At times, it is necessary to test directly from a 110 or 210 connecting block to either a patch panel or office outlet. IDEAL INDUSTRIES Category 6 adapters allow testing up to 250 MHz or to the manufacturer's specified limit.

Use a patchcord with a RJ45 plug on one end and the appropriate 110 or 210 plug on the other end. The RJ45 end of this patchcord is usually connected to the Display Handset. However, if required, it can be connected to the Remote Handset. Connect the other handset using one of the patchcords supplied with your tester.

*Note: Observe the Wire Map results on the first test carefully. If the Wire Map fails, it may indicate a reversal between T568A and T568B wiring standards. Try replacing the adapter patchcord with the opposite patchcord and the link should map correctly.*



# Appendix A

## Safety Precautions

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### Contents

- Handle Battery Packs With Care
- Statement of Liability
- Environmental Statement
- Important User Information

### 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 land fills.

**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.

## Appendix A

### Safety Precautions

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- 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.

## 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* of this manual, *Customer Service and Warranty*.

## 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's 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.

Refer to *Chapter 3* for information and instructions on how to select the correct cable type, change testing methods, and customize the cable's parameters for certification and testing. *Chapter 4, Table 4-1* provides a complete list of cable topologies supported.



# Appendix B

## Customer Support

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### Contents

- Customer Service
- World Wide Web Services

### 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 858-279-2200.

#### 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 858-279-2200.

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.

## **Appendix B**

### **Customer Support**

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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.
6. Ship prepaid to:

IDEAL INDUSTRIES Corporation  
9145 Balboa Avenue  
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.

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

### **Americas**

IDEAL INDUSTRIES Corporation  
9145 Balboa Avenue  
San Diego, CA 92123  
Tel: 800-854-2708  
Fax: 858-278-5141

**Europe (Germany, France, Italy, Spain, Portugal, Switzerland,  
Austria, And Eastern Europe, Africa and MEA)**

IDEAL INDUSTRIES GmbH  
Gutenbergstrasse 10  
Germany - 85737 Ismaning,  
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  
United Kingdom  
Tel: +44 1925 444444  
Fax: +44 1925 445501

**Australia**

IDEAL INDUSTRIES (AUST) PTY. LIMITED  
27 Keene Street  
Baulkham Hills, NWS 2153 Australia  
Tel: +61 2 9686 6923  
Fax: +61 2 9686 2364

## **World Wide Web Services**

IDEAL INDUSTRIES provides a World Wide 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 upgrades for your LANTEK tester using a PC computer. Upgrade files are available on the World Wide Web at:

**<http://www.idealindustries.com>**



# Appendix C

## Measurement Methods and Limits

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### Contents

- Electrical Performance Specifications
- Tester Performance Levels
- Permanent and Channel Link Test Limits

### Electrical Performance Specifications

A number of parameters, comparisons, and definitions for category 3, 5, 5e & 6 and ISO Class C, D, E and F cables are presented in this section.

Topics include tables and graphs that define and compare:

- Level I, II, and III accuracy levels
- Which tests are required
- Worst allowable pair-to-pair measured performance levels
- Permanent and channel link test limits

## Appendix C

### Measurement Methods and Limits

#### Attenuation

Measures the overall signal strength loss in the cable. Attenuation (worst pair-to-pair) @ 20 degrees Celsius.

#### ANSI/EIA/TIA

Frequency (MHz/dB)	Category 3 ANSI/TIA/EIA568/TSB67		Category 5 ANSI/TIA/EIA568/TSB67/95		Category 5e ANSI/TIA/EIA568/TSB67/95		Category 6 (Draft 9) ANSI/TIA/EIA568	
	Permanent	Channel	Permanent	Channel	Permanent	Channel	Permanent	Channel
1.00	3.20	4.20	2.10	2.50	2.10	2.20	1.88	2.15
4.00	6.10	7.30	4.00	4.50	4.00	4.50	3.53	4.02
8.00	8.80	10.20	5.70	6.30	5.70	6.30	-	-
10.00	10.00	11.50	6.30	7.00	6.30	7.10	-	-
16.00	13.20	14.90	8.20	9.20	8.20	9.10	7.06	8.04
20.00			9.20	10.30	9.20	10.20	7.93	9.03
25.00			10.30	11.40	10.30	11.40	8.89	10.12
31.25			11.50	12.80	11.50	12.90	9.94	11.33
62.50			16.70	18.50	16.70	18.60	14.34	16.38
100.00			21.60	24.00	21.60	24.00	18.56	21.26
200.00							27.21	31.47
250.00							30.86	35.87

#### EINBETTENEINBETTENEISO/AS/NZS

Frequency (MHz/dB)	ISO Class-C		ISO Class-D 11801 AS/NZS 3080		ISO Class-D		Proposed ISO Class-E	
	Permanent	Channel	Permanent	Channel	Permanent	Channel	Permanent	Channel
1.00	3.10	4.20	2.10	2.50	1.90	2.20	1.90	2.20
4.00	5.80	7.30	4.10	4.50	3.80	4.40	35.00	4.20
8.00	8.90	10.50	5.50	6.50	5.80	6.70	5.00	5.80
10.00	9.60	11.50	6.10	7.00	6.10	7.00	5.60	6.50
16.00	12.60	14.90	7.80	8.90	7.70	8.90	7.10	8.30
20.00			8.70	10.30	8.70	10.00	7.90	9.30
25.00			10.00	11.50	10.30	11.80	8.90	10.40
31.25			11.00	12.80	11.00	12.60	10.00	11.70
62.50			16.00	18.50	15.90	18.30	14.40	16.90
100.00			20.60	24.00	20.60	23.60	18.50	21.70
155.52							23.60	27.60
250.00							30.70	36.00

#### EINBETTENEINBETTENE

## NEXT

Measures crosstalk from a transmitting pair to an adjacent pair in the same cable sheath. NEXT (worst pair-to-pair).

### ANSI/EIA/TIA

Frequency (MHz/dB)	Category 3 ANSI/TIA/EIA568/TSB67		Category 5 ANSI/TIA/EIA568/TSB67/95		Category 5e ANSI/TIA/EIA568/TSB67/95		Category 6 (Draft 9) ANSI/TIA/EIA568	
	Permanent	Channel	Permanent	Channel	Permanent	Channel	Permanent	Channel
1.00	40.10	39.10	61.30	60.30	60.00	60.00	60.00	60.00
4.00	30.70	29.30	51.80	50.60	54.80	53.60	60.00	60.00
8.00	25.90	24.30	47.10	45.60	50.00	48.60	-	-
10.00	24.30	22.70	45.50	44.00	48.50	47.00	-	-
16.00	21.00	19.30	42.30	40.60	45.20	43.60	54.60	53.20
20.00			40.70	39.00	43.70	42.00	53.00	51.60
25.00			39.10	37.40	42.10	40.40	51.50	50.00
31.25			37.60	35.70	40.60	38.70	50.00	48.50
62.50			32.70	30.60	35.70	33.60	45.20	43.40
100.00			29.30	27.10	32.30	30.10	41.80	39.90
200.00							36.90	34.80
250.00							35.30	33.10

EINBETTEN

### EINBETTENISO/AS/NZS

Frequency (MHz/dB)	ISO Class-C		ISO Class-D 11801 AS/NZS 3080		ISO Class-D		Proposed ISO Class-E	
	Permanent	Channel	Permanent	Channel	Permanent	Channel	Permanent	Channel
1.00	40.10	39.10	54.00	54.00	61.20	60.30	72.70	72.70
4.00	30.70	29.30	45.00	45.00	51.80	50.60	63.00	63.10
8.00	25.90	24.30	41.00	41.00	47.10	45.60	58.20	58.20
10.00	24.30	22.70	39.00	39.00	45.50	44.00	56.60	56.60
16.00	21.00	19.30	36.00	36.00	42.30	40.60	53.20	53.20
20.00			35.00	35.00	40.70	39.00	51.60	51.60
25.00			33.60	33.60	39.10	37.40	50.00	50.00
31.25			32.00	32.00	37.60	35.70	48.40	48.40
62.50			27.00	27.00	32.70	30.60	43.40	43.40
100.00			24.00	24.00	29.30	27.10	39.90	39.90
155.52							36.70	36.70
250.00							33.10	33.10

## Appendix C

### Measurement Methods and Limits

---

#### Power Sum NEXT

Measures the crosstalk effects of three transmitting pairs on the fourth pair in the same sheath.

#### ANSI/TIA/EIA

Frequency (MHz/dB)	Category 3 ANSI/TIA/EIA568/TSB67	Category 5 ANSI/TIA/EIA568/TSB67/95	Category 5e ANSI/TIA/EIA568/TSB67/95		Category 6 (Draft 9) ANSI/TIA/EIA568	
	Permanent Channel	Permanent Channel	Permanent Channel	Channel	Permanent Channel	Channel
1.00			57.00	57.00	62.00	62.00
2.00			-	-	-	-
3.00			-	-	-	-
4.00			52.00	50.90	61.80	60.50
8.00			47.10	45.70	-	-
10.00			45.60	44.10	-	-
16.00			42.20	40.60	52.20	50.60
20.00			40.70	39.00	50.70	49.00
25.00			39.10	37.30	49.10	47.30
31.25			37.50	35.70	47.60	45.80
62.50			32.60	30.60	42.70	40.60
100.00			29.30	27.10	39.30	37.10
200.00					34.30	31.90
250.00					32.70	30.20

EINBETTEN

## Appendix C Measurement Methods and Limits

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### ISO

Frequency (MHz/dB)	ISO Class-C Permanent Channel	ISO Class-D 11801 AS/NZS 3080 Permanent Channel			Proposed	
			ISO Class-D		ISO Class-E	
			Permanent Channel	Channel	Permanent Channel	Channel
1.00			58.20	57.30	70.30	70.30
2.00					-	-
3.00					-	-
4.00			48.20	47.60	60.50	60.50
8.00			44.00	42.50	55.60	55.60
10.00			42.50	41.00	54.00	54.00
16.00			39.30	37.60	50.60	50.60
20.00			37.70	36.00	49.00	49.00
25.00			36.00	34.50	47.30	47.30
31.25			34.60	32.70	45.70	45.70
62.50			39.70	27.60	40.60	40.60
100.00			26.30	24.10	37.10	37.10
125.00					35.40	35.40
155.52					33.80	33.80
175.00					32.90	32.90
200.00					31.90	31.90
250.00					30.20	30.20

## Appendix C

### Measurement Methods and Limits

#### EINBETTENEINBETTENEINBETTENReturn Loss

Return Loss is the ratio of reflected to transmitted signal. Return Loss (worst pair-to-pair).

##### ANSI/TIA/EIA

Frequency (MHz/dB)	Category 3		Category 5		Category 5e		Category 6 (Draft 9)	
	ANSI/TIA/EIA568/TSB67		ANSI/TIA/EIA568/TSB67/95		ANSI/TIA/EIA568/TSB67/95		ANSI/TIA/EIA568	
	Permanent	Channel	Permanent	Channel	Permanent	Channel	Permanent	Channel
1.00	15.00	15.00	15.00	15.00	17.00	17.00	19.10	19.00
4.00	15.00	15.00	15.00	15.00	17.00	17.00	21.00	19.00
8.00	15.00	15.00	15.00	15.00	17.00	17.00	-	-
10.00	15.00	15.00	15.00	15.00	17.00	17.00	-	-
16.00	15.00	15.00	15.00	15.00	17.00	17.00	20.00	18.00
20.00			15.00	15.00	17.00	17.00	19.50	17.50
25.00			14.30	14.00	16.32	16.03	19.00	17.00
31.25			13.60	13.10	15.64	15.06	18.50	16.50
62.50			11.50	10.10	13.54	12.05	16.10	14.10
100.00			10.10	8.00	12.11	10.01	14.00	12.00
155.52							11.00	9.00
250.00							10.00	8.00

##### ISO/AS/NZS

Frequency (MHz/dB)	ISO Class-C		ISO Class-D 11801 AS/NZS 3080		ISO Class-D		Proposed ISO Class-E	
	Permanent	Channel	Permanent	Channel	Permanent	Channel	Permanent	Channel
	Permanent	Channel	Permanent	Channel	Permanent	Channel	Permanent	Channel
1.00	15.00	15.00	17.00	17.00	15.00	15.00	19.00	19.00
4.00	15.00	15.00	17.00	17.00	15.00	15.00	19.00	19.00
8.00	15.00	15.00	17.00	17.00	15.00	15.00	19.00	19.00
10.00	15.00	15.00	17.00	17.00	15.00	15.00	19.00	19.00
16.00	15.00	15.00	17.00	17.00	15.00	15.00	19.00	19.00
20.00			17.00	17.00	15.00	15.00	19.00	19.00
25.00			16.30	16.00	14.30	14.00	18.30	18.00
31.25			15.60	15.10	13.60	13.10	17.60	17.10
62.50			13.50	12.10	11.50	10.10	15.50	14.10
100.00			12.10	10.00	10.10	8.00	14.10	12.00
155.52							12.80	10.10
250.00							11.30	8.00

##### EINBETTEN

*Note: Return Loss applies only to TSB95.EINBETTEN*

## ACR

Attenuation-to-Crosstalk Ratio is the difference between results of Attenuation and NEXT. ACR (worst pair-to-pair).

### ANSI/TIA/EIA

Frequency (MHz/dB)	Category 3		Category 5		Category 5e		Category 6 (Draft 9)	
	ANSI/TIA/EIA568/TSB67		ANSI/TIA/EIA568/TSB67/95		ANSI/TIA/EIA568/TSB67/95		ANSI/TIA/EIA568	
	Permanent	Channel	Permanent	Channel	Permanent	Channel	Permanent	Channel
1.00	36.90	34.90	59.20	57.80	57.90	57.80	71.50	70.50
4.00	24.60	22.00	47.80	46.10	50.80	49.10	60.40	59.10
8.00	17.10	14.10	41.40	39.30	44.30	42.30	54.20	52.50
10.00	14.30	11.20	39.20	37.00	42.20	39.90	52.10	50.30
16.00	7.80	4.40	34.10	31.40	37.00	34.50	47.30	45.20
20.00			31.50	28.70	34.50	31.80	44.80	42.70
25.00			28.80	26.00	31.80	29.00	42.30	40.00
31.25			26.10	22.90	29.10	25.90	39.60	37.10
62.50			16.00	12.10	19.00	15.10	30.20	27.10
100.00			7.70	3.10	10.70	6.10	22.60	19.00
155.52							14.30	10.00
250.00							3.50	-

### ISO/AS/NZS

Frequency (MHz/dB)			ISO Class-D 11801				Proposed	
	ISO Class-C		AS/NZS 3080		ISO Class-D		ISO Class-E	
	Permanent	Channel	Permanent	Channel	Permanent	Channel	Permanent	Channel
1.00	37.00	34.90	51.50	51.30	59.30	58.10	70.80	70.40
4.00	24.90	22.00	40.20	39.80	48.00	46.20	59.50	58.90
8.00	17.00	13.80	34.10	33.90	41.30	38.90	53.20	52.30
10.00	14.70	11.20	31.50	30.90	39.40	37.00	51.00	50.00
16.00	8.40	4.40	26.60	25.90	34.60	31.70	46.10	44.90
20.00			24.50	23.70	32.00	29.00	43.70	42.30
25.00			21.90	21.10	28.80	25.60	41.10	39.60
31.25			18.90	17.90	26.60	23.10	38.40	36.70
62.50			8.60	7.20	16.80	12.30	29.00	26.50
100.00			4.00	4.00	8.70	3.50	21.40	18.20
155.52							13.10	9.00
250.00							2.40	-

**Appendix C**  
**Measurement Methods and Limits**

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**EINBETTENEINBETTENEINBETTENEINBETTENPower Sum**  
**ACR (ANSI/TIA/EIA)**

**ANSI/TIA/EIA**

<b>Frequency (MHz/dB)</b>	<b>Category 3</b>		<b>Category 5</b>		<b>Category 5e</b>		<b>Category 6 (Draft 9)</b>	
	<b>ANSI/TIA/EIA568/TSB67</b>		<b>ANSI/TIA/EIA568/TSB67/95</b>		<b>ANSI/TIA/EIA568/TSB67/95</b>		<b>ANSI/TIA/EIA568</b>	
	<b>Permanent</b>	<b>Channel</b>	<b>Permanent</b>	<b>Channel</b>	<b>Permanent</b>	<b>Channel</b>	<b>Permanent</b>	<b>Channel</b>
1.00					54.90	54.80	71.20	70.30
2.00							-	-
3.00							-	-
4.00					48.00	46.40	61.80	60.50
8.00					41.40	39.40	57.00	55.60
10.00					39.30	37.00	55.50	54.00
16.00					34.00	31.50	52.20	50.60
20.00					31.50	28.80	50.70	49.00
25.00					28.80	25.90	49.10	47.30
31.25					26.00	22.80	47.50	45.70
62.50					15.90	12.00	42.70	40.60
100.00					7.70	3.10	39.30	37.10
125.00							37.70	35.40
155.52							36.10	33.80
175.00							35.30	32.90
200.00							34.30	31.90
250.00							32.70	30.20

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## Appendix C

### Measurement Methods and Limits

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#### ISO

Frequency (MHz/dB)	ISO Class-C		ISO Class-D 11801 AS/NZS 3080		Proposed	
	Permanent Channel		Permanent Channel		Permanent Channel	
1.00			56.10	54.80	68.40	68.10
2.00					-	-
3.00					-	-
4.00			44.70	43.10	57.00	56.40
8.00			38.50	36.00	50.60	49.70
10.00			36.40	34.00	48.40	47.50
16.00			31.50	28.70	43.50	42.30
20.00			29.00	25.70	41.00	39.70
25.00			26.00	23.00	38.40	36.90
31.25			23.60	19.90	35.70	34.00
62.50			13.70	9.10	26.20	23.70
100.00			5.70	0.10	18.60	15.40
125.00					14.50	10.90
155.52					10.20	6.10
175.00					7.70	3.40
200.00					4.80	0.10
250.00					-	-

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## Appendix C

### Measurement Methods and Limits

---

#### EINBETTENELFEXT

The same measurement as NEXT except the crosstalk is measured from the RH and sent to DH. ELFEXT (worst pair-to-pair).

#### ANSI/TIA/EIA

Frequency (MHz/dB)	Category 3		Category 5		Category 5e		Category 6 (Draft 9)	
	ANSI/TIA/EIA568/TSB67		ANSI/TIA/EIA568/TSB67/95		ANSI/TIA/EIA568/TSB67/95		ANSI/TIA/EIA568	
	Permanent	Channel	Permanent	Channel	Permanent	Channel	Permanent	Channel
1.00			59.60	57.00	58.00	57.40	64.20	63.30
4.00			47.50	45.00	48.00	45.30	52.10	51.20
8.00			41.50	38.90	41.90	39.30	-	-
10.00			39.60	37.00	40.00	37.40	-	-
16.00			35.50	32.90	35.90	33.30	40.10	39.20
20.00			33.60	31.00	34.00	31.40	38.10	37.20
25.00			31.60	29.00	32.00	29.40	36.20	35.30
31.25			29.70	27.10	30.10	27.50	34.40	33.40
62.50			23.70	21.10	24.10	21.50	28.30	27.40
100.00			19.60	17.00	20.00	17.40	24.20	23.30
200.00							18.20	17.20
250.00							16.20	15.30

#### ISO/AS/NZS

Frequency (MHz/dB)	ISO Class-C		ISO Class-D 11801 AS/NZS 3080		Proposed	
					ISO Class-D	
	Permanent	Channel	Permanent	Channel	Permanent	Channel
1.00			59.60	57.00		64.20 63.20
4.00			47.60	45.00		52.10 51.20
8.00			42.00	39.00		46.10 45.20
10.00			39.60	37.00		44.20 43.20
16.00			35.50	32.90		40.10 39.10
20.00			33.60	31.00		38.10 37.20
25.00			31.00	29.00		36.20 35.30
31.25			29.70	27.10		34.30 33.30
62.50			23.70	21.10		28.20 27.30
100.00			19.60	17.00		24.20 23.20
155.52						20.30 19.40
250.00						16.20 15.30

EINBETTENNote: *ELFEXT* applies only to TSB95.

## EINBETTENPower Sum ELFEXT (ANSI/TIA/EIA)

### ANSI/TIA/EIA

Frequency (MHz/dB)	Category 3	Category 5	Category 5e		Category 6 (Draft 9)	
	ANSI/TIA/EIA568/TSB67 Permanent Channel	ANSI/TIA/EIA568/TSB67/95 Permanent Channel	ANSI/TIA/EIA568/TSB67/95 Permanent	ANSI/TIA/EIA568/TSB67/95 Channel	ANSI/TIA/EIA568 Permanent	ANSI/TIA/EIA568 Channel
1.00			54.90	54.80	61.20	60.30
2.00			-	-	-	-
3.00			-	-	-	-
4.00			48.00	46.40	49.10	48.20
8.00			41.40	39.40	-	-
10.00			39.30	37.00	-	-
16.00			34.00	31.50	37.10	36.20
20.00			31.50	28.80	35.10	34.20
25.00			28.80	25.90	33.20	32.30
31.25			26.00	22.80	31.40	30.40
62.50			15.90	12.00	25.30	24.40
100.00			7.70	3.10	21.20	20.30
200.00					15.20	14.20
250.00					13.20	12.30

### ISO

Frequency (MHz/dB)	ISO Class-C	ISO Class-D 11801 AS/NZS 3080	ISO Class-D		Proposed	
	Permanent Channel	Permanent Channel	Permanent	Channel	ISO Class-E Permanent	ISO Class-E Channel
1.00			57.00	54.40	61.20	60.20
2.00					-	-
3.00					-	-
4.00			45.00	42.40	49.10	48.20
8.00			39.00	36.00	43.10	42.20
10.00			37.00	34.40	41.20	40.20
16.00			32.90	30.30	37.10	36.10
20.00			31.00	28.40	35.10	34.20
25.00			29.00	26.50	33.20	32.30
31.25			27.10	24.50	31.30	30.30
62.50			21.10	18.50	25.20	24.30
100.00			17.00	14.40	21.20	20.20
125.00					19.20	18.30
155.52					17.30	16.40
175.00					16.30	15.40
200.00					15.10	14.50
250.00					13.20	12.30

## Appendix C

### Measurement Methods and Limits

---

#### ISO Class F (Category 7)

Measurement Limits in dB						
Freq ( MHz )	Attenuation		NEXT		ACR	Power Sum ACR
	Permanent	Channel	Permanent	Channel	Permanent	Permanent
1.0	4.0	4.0	65.0	65.0	61.0	58.0
4.0	4.0	4.1	65.0	65.0	61.0	58.0
10.0	5.4	6.4	65.0	65.0	59.6	56.6
16.0	6.8	8.1	65.0	65.0	58.2	55.2
100.0	17.5	20.8	65.0	62.9	47.5	44.5
250.0	28.4	33.8	60.4	56.9	32.0	29.0
300.0	31.4	37.4	59.2	55.7	27.8	24.8
350.0	34.1	40.6	58.2	54.7	24.1	21.1
400.0	36.7	43.7	57.3	53.8	20.6	17.6
450.0	39.2	46.6	56.6	53.1	17.4	14.4
500.0	41.5	49.4	55.9	52.4	14.4	11.4
550.0	43.8	52.1	55.3	51.8	11.5	8.5
600.0	46.0	54.7	54.7	51.2	8.7	5.7

Measurement Limits in dB								
Freq ( MHz )	Power Sum NEXT		ELFEXT		Power Sum ELFEXT		Return Loss	
	Permanent	Channel	Permanent	Channel	Permanent	Channel	Permanent	Channel
1.0	62.0	62.0	65.0	65.0	62.0	62.0	21.0	19.0
4.0	62.0	62.0	65.0	65.0	62.0	62.0	21.0	19.0
10.0	62.0	62.0	62.7	60.8	59.7	57.8	21.0	19.0
16.0	62.0	62.0	59.3	57.5	56.3	54.5	20.0	18.0
100.0	62.0	59.9	46.0	44.4	43.0	41.4	14.0	12.0
250.0	57.4	53.9	39.2	37.8	36.2	34.8	10.0	8.0
300.0	56.2	52.7	37.8	36.4	34.8	33.4	10.0	8.0
350.0	55.2	51.7	36.7	35.3	33.7	32.3	10.0	8.0
400.0	54.3	50.8	35.7	34.3	32.7	31.3	10.0	8.0
450.0	53.6	50.1	34.8	33.4	31.8	30.4	10.0	8.0
500.0	52.9	49.4	34.0	32.6	31.0	29.6	10.0	8.0
550.0	52.3	48.8	33.3	31.9	30.3	28.9	10.0	8.0
600.0	51.7	48.2	32.6	31.3	29.6	28.3	10.0	8.0

## Tester Performance Levels

There are two types of performance levels you need to consider when preparing to perform cable testing:

- The performance category of the cable system.
- The accuracy of the field tester.

## Twisted Pair Cable Categories

Categories	Description
CAT 1 and 2	UTP, not recommended for LAN use.
CAT 3	Four pairs with three twists per foot. Rated for signals up to 16 MHz.
CAT 4	Four pairs per foot. Rated for signals up to 20 MHz.
CAT 5	Four pairs with eight twists per foot. Rated for signals up to 100 MHz.
CAT 5E	Same characteristics as CAT 5. Higher quality cable (low crosstalk). Rated for signals up to 200 MHz.
CAT 6	Four pairs with each pair wrapped in foil insulation. Rated for signals greater than 250 MHz.

## **Field Tester Accuracy**

It is difficult to determine which type of tester may be required for certification. Generally, Level I testers are used by LAN managers for casual troubleshooting. Level II and Level III testers are used by cable installation contractors.

### **What does “accuracy” mean?**

Accuracy is the difference between the measured value reported by the LANTEK tester and the actual value. Accuracy is a function of the characteristics of the field tester and link transmission characteristics.

### **Requirements for Level I, II, and III Accuracy**

Accuracy requirements are specified in the TIA/EIA 568-B and ISO Class-E specifications. A CAT6 tester is required to meet Level III requirements from 1 to 250 MHz.

## Accuracy Levels

The following tables list the Level I, II, and III accuracy levels defined by the TIA/EIA 568-B and ISO Class-E specifications.

	Level I 1 - 100 MHz	Level II 1 - 100 MHz
Random Noise Floor	50 -15 log (f/200)dB	65 -15 log (f/200)dB
Residual NEXT	40 -15 log (f/200)dB	55 -15 log (f/200)dB
Output Signal Balance	27 -15 log (f/200)dB	37 -15 log (f/200)dB
Common Mode Rejection	27 -15 log (f/200)dB	37 -15 log (f/200)dB
Dynamic Accuracy	± 1.0 dB	± 0.75 dB
Length Accuracy	± 1 meter ± 4%	± 1 meter ± 4%
Return Loss	15 dB	15 dB
Directivity	--	--
Delay	--	--

	Level III - Draft 3 1 - 250 MHz	Level III - New Proposal 1 - 250 MHz
Random Noise Floor	70 -15 log (f/200)dB	75 -15 log (f/100)dB
Residual NEXT	60 -15 log (f/200)dB	65 -20 log (f/100)dB
Output Signal Balance	35 -15 log (f/200)dB	40 -20 log (f/100)dB
Common Mode Rejection	35 -15 log (f/200)dB	40 -20 log (f/100)dB
Dynamic Accuracy	± 0.5 dB	± 0.75 dB (±1.0 dB ELFEXT)
Length Accuracy	± 1 meter ± 4%	± 1 meter ± 4%
Return Loss	15 -15 log (f/200)dB	25 -15 log (f/100)dB
Directivity	25 -15 log (f/200)dB	27 -7 log (f/100)dB
Delay	5 ns + 4%	5 ns + 4%

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## Appendix D

### Specifications

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#### Contents

- LANTEK Cables, Adapters and Accessories
- Environmental and Physical Specifications

#### LANTEK Cables, Adapters, and Accessories

Part Number	Description
1219-00-1604	Battery Pack Cartridge for Handsets; Extra/Spare/Replacement
3070-70-0015	Headset, Set of 2; Includes earphone, microphone, vinyl case and user's guide
0012-00-0642	*c Dual Bay, Quick Charge Battery Recharger for LANTEK; switchable 120V, 240V Power
1019-00-1510	North American Wall Cube AC/DC Power Supply
1019-00-1511	European Wall Cube AC/DC Power Supply
1019-00-1512	United Kingdom Wall Cube AC/DC Power Supply
0012-00-0627	Category 6 Channel Adapter
0012-00-0626	Category 7 Channel Adapter
6011-50-0029	Category 6 Patchcords (RJ45 to RJ45) Set of 2
6011-50-0028	Category 7 Patchcords (RJ45 to Tera) Set of 2
6011-50-0027	Category 7 Patchcords (Tera to Tera) Set of 2
6011-59-0030	Serial Cable
6011-59-0031	USB Cable
2112-27-0603	PCMCIA Flash Card Adapter for LANTEK 6/7

## Appendix D

### Model Features, Options, Accessories, and Specifications

---

Model Number	Description
2112-27-0602	32 MB Compact Flash Card
2112-27-0604	USB Flash Card Reader for PC
3010-12-0092	Deluxe Hard-Shelled Carrying Case; holds tester set, rechargers, link adapters and accessories
3010-12-0096	Soft Carrying Case; holds tester set, rechargers, link adapters and accessories
0012-00-0624	Coax Adapters; Set of 2
0012-00-0338	Singlemode 1310 nm fiber optic adapter module
0012-00-0339	Singlemode 1550 nm fiber optic adapter module
0012-00-0336	Multimode 850 nm fiber optic adapter module
0012-00-0337	Multimode 1300 nm fiber optic adapter module
0012-00-0341	Singlemode TRACETEK Adapter
6011-00-1017	Singlemode TRACETEK Long Launch Cable *d
6011-20-5004	Singlemode 50-50 Splitter
0012-00-0340	Multimode TRACETEK Adapter
6011-00-1016	Multimode TRACETEK Long Launch Cable *d
6011-20-5003	Multimode 50-50 Splitter
6011-50-0035	Battery Charger Cord for USA/Canada
6011-50-0037	Battery Charger Cord for United Kingdom
6011-50-0036	Battery Charger Cord for Europe

\*c – Specify Country Code for AC Power Cord.

\*d – Long Launch Cables are sometimes known as Dead Zone Eliminators.

## Environmental and Physical Specifications

The following environmental specifications apply to all LANTEK Cable Testers.

### LANTEK 6 Specifications

	Range	Resolution	Accuracy
Length (50 Ohm or 100 $\Omega$ Cable)	0-2000 ft	1 ft	$\pm(3\% + 3 \text{ ft})$
Delay	0-8000 ns	1 ns	$\pm(3\% + 1 \text{ ns})$
Average Impedance	35-180 $\Omega$	0.1 $\Omega$	$\pm(3\% + 1 \text{ } \Omega)$
Capacitance (Bulk)	0-100 nF	1 pF or 3 dig	$\pm(2\% + 20 \text{ pF})$
Capacitance	0-100pF/ft	0.1 pF	$\pm(2\% + 1 \text{ pF})$
DC Loop Resistance	0-200 $\Omega$	0.1 $\Omega$	$\pm(1\% + 2 \text{ } \Omega)$
Attenuation	1-350 MHz	0.1 dB	Level III*
NEXT	1-350 MHz	0.1 dB	Level III*
Return Loss	1-350 MHz	0.1 dB	Level III*
ELFEXT	1-350 MHz	0.1 dB	Level III*
Noise Floor	>-90 dB		
Dynamic Range	< 90 dB		
<i>* Level III only specified to 250 MHz</i>			

Storage Capacity (Internal Memory)	
Cat 5e, 6 (No Graphics)	6,000 Test Results
Cat 5e with Graphics	100 Test Results
Cat 6 with Graphics	60 Test Results
Storage Capacity (External 32MB Flash)	
Cat 5e, 6 (No Graphics)	24,000 Test Results
Cat 5e with Graphics	400 Test Results
Cat 6 with Graphics	240 Test Results

**Appendix D**  
**Model Features, Options, Accessories, and Specifications**

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## LANTEK 7 Specifications

	Range	Resolution	Accuracy
Length (50 Or 100 $\Omega$ Cable)	0-2000 ft	1 ft	$\pm(3\% + 3 \text{ ft})$
Delay	0-8000 ns	1 ns	$\pm(3\% + 1 \text{ ns})$
Average Impedance	35-180 $\Omega$	0.1 $\Omega$	$\pm(3\% + 1 \Omega)$
Capacitance (Bulk)	0-100 nF	1 pF or 3 dig	$\pm(2\% + 20 \text{ pF})$
Capacitance	0-100pF/ft	0.1 pF	$\pm(2\% + 1 \text{ pF})$
DC Loop Resistance	0-200 $\Omega$	0.1 $\Omega$	$\pm(1\% + 2 \Omega)$
Attenuation	1-750 MHz	0.1 dB	Level III*
NEXT	1-750 MHz	0.1 dB	Level III*
Return Loss	1-750 MHz	0.1 dB	Level III*
ELFEXT	1-750 MHz	0.1 dB	Level III*
Noise Floor	>-90 dB		
Dynamic Range	< 90 dB		
* Level III only specified to 250 MHz			

Storage Capacity (Internal Memory)	
Cat 5e, 6 (No Graphics)	6,000 Test Results
Cat 5e with Graphics	100 Test Results
Cat 6 with Graphics	60 Test Results
Cat 7 with Graphics	25 Test Results
Storage Capacity (External 32MB Flash)	
Cat 5e, 6 (No Graphics)	24,000 Test Results
Cat 5e with Graphics	400 Test Results
Cat 6 with Graphics	240 Test Results
Cat 7 with Graphics	100 Test Results

## **Temperature Range**

Operating Temperature Range:	0 to + 50 degrees C
Storage Temperature Range:	-20 to +70 degrees C

## **Humidity**

5-90%, noncondensing

## **Shock / Bench Handling**

LANTEK testers are capable of surviving the normal bench handling procedures found in typical maintenance and repair facilities.

## **Connector Stress**

### **Strain**

All connectors and adapters will withstand a strain of > 25 lb. in any direction or orientation when attached to a Display Handset or Remote Handset.

### **Jerk**

All connectors and adapters will withstand a jerk force of up to 1 lb. dropped from a 3 foot cord in any orientation when attached to a Display Handset or Remote Handset.

## **Dimensions and Weight**

### **Display Handset**

Dimensions:	10.1"x5.0"x2.3"
Weight:	2 lbs. 3 oz.

### **Remote Handset**

Dimensions:	10.1"x5.0"x2.3"
Weight:	2 lbs.

## **Battery and Power Management**

### **Display Handset**

Battery Pack:	8.4 Vdc, 2.45 AH, NiMH
External Source:	12 Vdc, 800mA continuous

### **Remote Handset**

Battery Pack:	8.4 Vdc, 2.45 AH, NiMH
External Source:	12 Vdc, 800mA continuous

### **Test Connector Input Protection**

Input Impedance:	2 M $\Omega$
Voltage Protection:	20-200 VAC/DC

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