

# **ORL3B**

## **Optical Return Loss Test Set**

### **User's Guide**



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A Division of **AFL Telecommunications**

# Limited Warranty

## One Year Limited Warranty

All Noyes products are warranted against defective material and workmanship for a period of one year from the date of shipment to the original customer.

Any product found to be defective within the warranty period would be repaired or replaced by Noyes.

In no case will Noyes liabilities exceed the original purchase price of the product.

## Exclusions

The warranty on your equipment shall not apply to defects resulting from the following:

- Unauthorized repair or modification
- Misuse, negligence, or accident

## CE Information



These instruments have been designed and tested to comply with the relevant sections of any applicable specifications including full compliance with all essential requirements of all applicable EU Directives.

## Returning Equipment

To return equipment, please contact Noyes to obtain additional information and a Service Request (S.R.) number. To allow us to serve you more efficiently, please include a brief description specifying the reasons for the return of the equipment.

## AFL Telecommunications

Noyes Test & Inspection  
16 Eastgate Park Road  
Belmont, NH 03220  
Tel: 800-321-5298  
603-528-7780  
Fax: 603-528-2025

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# Table of Contents

## Safety Information

|                                    |    |
|------------------------------------|----|
| Important Safety Information ..... | iv |
|------------------------------------|----|

## Section 1: General Information

|   |   |
|---|---|
| Contacting Noyes Customer Service ..... | 1 |
| Unpacking and Inspection.....           | 1 |
| Feature Overview .....                  | 2 |
| Recommended Accessories.....            | 2 |

## Section 2: Functional Description

|                       |   |
|-----------------------|---|
| ORL3B Ports .....     | 3 |
| Functional Keys ..... | 4 |

## Section 3: Set up and Operation

|  |    |
|--|----|
| To Display the Main Menu Screen .....              | 5  |
| To Select a Sub-menu or Parameter from a Menu..... | 5  |
| Using the Back key .....                           | 5  |
| General Setup.....                                 | 6  |
| Contrast .....                                     | 6  |
| Time and Date .....                                | 6  |
| Sound, Power Save, and Limits.....                 | 6  |
| Selecting Test Mode.....                           | 6  |
| Power Adjustment.....                              | 7  |
| Setting Test Limits .....                          | 8  |
| Managing Files .....                               | 9  |
| To Create a New File .....                         | 9  |
| To Open an Existing File .....                     | 10 |
| To Delete Files .....                              | 10 |
| To Transfer Files to a PC.....                     | 10 |
| To View Statistics.....                            | 11 |

## Section 4: ORL Mode - Measuring Optical Return Loss

|  |    |
|--|----|
| Screens and Menus .....                            | 12 |
| Test Screen Features .....                         | 13 |
| Setting References.....                            | 13 |
| Step I: "14.1 dB/ 14.7 dB" (LED) Referencing ..... | 14 |
| Step II: "Terminate Fiber" Referencing.....        | 14 |
| Performing a Connector Test .....                  | 15 |
| Performing a Link Test .....                       | 16 |

|                                   |    |
|-----------------------------------|----|
| Reviewing Saved Test Results..... | 17 |
| Auto Retest.....                  | 17 |

### **Section 5: OPM Mode and Applications**

|                                   |    |
|-----------------------------------|----|
| Screens and Menus .....           | 18 |
| Test Screen Features .....        | 19 |
| Setting References.....           | 19 |
| Measuring Optical Power.....      | 19 |
| Reviewing Saved Test Results..... | 20 |
| Auto Retest.....                  | 20 |

### **Section 6: Maintenance**

|                                   |    |
|-----------------------------------|----|
| Battery Replacement .....         | 21 |
| Battery Recharging .....          | 21 |
| Battery Indicator Lights .....    | 21 |
| Cleaning Optical Ports.....       | 22 |
| Cleaning Test Port.....           | 22 |
| Cleaning OPM Port.....            | 22 |
| ORL3B Messages.....               | 23 |
| Print and Software Problems ..... | 23 |

### **Section 7: Specifications**

|                             |    |
|-----------------------------|----|
| ORL specifications.....     | 24 |
| OPM specifications.....     | 24 |
| General specifications..... | 24 |
| Serial Cable .....          | 25 |

## List of Figures

### **Safety Information**

#### **Section 1: General Information**

#### **Section 2: Functional Description**

|                                   |   |
|-----------------------------------|---|
| Figure 2-1. ORL3B Ports.....      | 3 |
| Figure 2-2. Front Panel Keys..... | 4 |

---

### **Section 3: Set up and Operation**

|   |   |
|---|---|
| Figure 3-1. Main Menu.....              | 5 |
| Figure 3-2. Power Adjustment Setup..... | 7 |

### **Section 4: ORL Mode - Measuring Optical Return Loss**

|   |    |
|---|----|
| Figure 4-1. ORL Mode Screens and Menus.....   | 12 |
| Figure 4-2. The ORL Mode Test Screen.....     | 13 |
| Figure 4-3. ORL Referencing.....              | 14 |
| Figure 4-4. Testing a Connector.....          | 15 |
| Figure 4-5. Link Test Setup.....              | 16 |
| Figure 4-6. Reviewing Saved Test Results..... | 17 |

### **Section 5: OPM Mode and Applications**

|   |    |
|---|----|
| Figure 5-1. OPM Mode Screens and Menus.....   | 18 |
| Figure 5-2. The OPM Mode Test Screen.....     | 19 |
| Figure 5-3. Reviewing Saved Test Results..... | 20 |

### **Section 6: Maintenance**

|   |    |
|---|----|
| Figure 6-1. Cleaning Optical Ports..... | 22 |
|---|----|

## Safety Information

### Important Safety Information



**WARNING!** Use of controls or adjustments other than those specified herein may result in hazardous radiation exposure.



**CAUTION!** To avoid serious eye injury, never look directly into the optical outputs of fiber optic network equipment, test equipment, patch cords, or test jumpers. Always assume that optical outputs are on.



**WARNING!** Use only the specified AC adapter. Use of another type of AC adapter can damage the instrument and create the danger of fire and electrical shock.



**WARNING!** To avoid the danger of fire and electrical shock:

- Never use a voltage that is different from that for which the AC adapter is rated.
- Do not plug the unit into a power outlet that is shared by other devices.
- Never modify the power cord or excessively bend, twist, or pull it.
- Do not allow the power cord to become damaged. Do not place heavy objects on the power cord or expose it to heat.
- Never touch the AC adapter while your hands are wet.
- Should the power cord become seriously damaged (internal wiring exposed or shorted), contact the manufacturer to request servicing.



**NOTICE!** The ORL3B contains no user serviceable parts. Except for changing battery and cleaning optical ports, this instrument must be returned to Noyes or authorized agents for repair and calibration.

**IMPORTANT!** Proper care in handling should be taken when using any precision optical test equipment such as the ORL3B. Scratched or contaminated optical connectors can impact the performance of the instrument. It is important to keep the dust caps in place when the unit is not being used.

**IMPORTANT!** Do not charge the Li-Ion battery pack at a temperature above +45°C.

## Section 1: General Information

Thank you for purchasing a Noyes ORL3B Return Loss Test Set. The purpose of this User's Guide is to explain how to use and maintain this instrument.

Please check our web site at [www.AFLtele.com/go/Noyes](http://www.AFLtele.com/go/Noyes) for updates to this manual, software updates, and additional application information. If you have any questions about the ORL3B and recommended accessories, or if you need technical or sales support, please contact Noyes Customer Service.

### Contacting Noyes Customer Service

You may call Noyes Customer Service between 8 a.m. and 5 p.m., United States Eastern Time, as follows:

**Tel:** 800-321-5298 (North America)  
603-528-7780  
**Fax:** 603-528-2025  
**E-mail:** [NoyesTechSupport@AFLtele.com](mailto:NoyesTechSupport@AFLtele.com)

### Unpacking and Inspection

This instrument has been carefully packed in accordance with standard shipping procedures. Examine the equipment for damage that may have occurred during shipment. If you find any damage, or if any of the following items are not included, please contact Noyes.

The ORL3B package includes:

- (1) ORL3B instrument
- WinTEST software and manual
- Serial cable
- (1) Adapter cap
- User's guide
- Carry case

### **Feature Overview**

The ORL3B is a handheld fiber optic test and measurement instrument that offers two modes of testing. It performs optical return loss measurements (ORL mode) and operates as an optical power meter (OPM mode).

The ORL3B can store up to 1000 records (40 files) in any combination of its two operating modes. With the supplied PC software, saved test results can be transferred to a PC for storage, printing, and analysis. For a complete description of the PC software, refer to the User's Guide supplied with the software.

The ORL3B operates from an internal rechargeable Lithium-Ion battery pack or external AC power adapter.

### **Recommended Accessories**

You will need fiber optic test jumpers to connect the ORL3B to the fiber under test. Test jumpers must have the same core and cladding size as the fiber under test. The connector at one end of the test jumper must mate with the appropriate optical port on the ORL3B. The connector on the other end must mate with the fiber optic link under test. Test jumpers with a variety of lengths and connector styles are available from Noyes. Connector adapters are required to mate fiber optic test jumpers.

A supply of optical cleaning pads and isopropyl alcohol or a connector-cleaning cartridge is recommended to clean the optical connectors on the ORL3B and test jumpers. A supply of fiber optic cleaning swabs or a can of filtered compressed air is recommended for cleaning connector adapters.

## Section 2: Functional Description

### ORL3B Ports

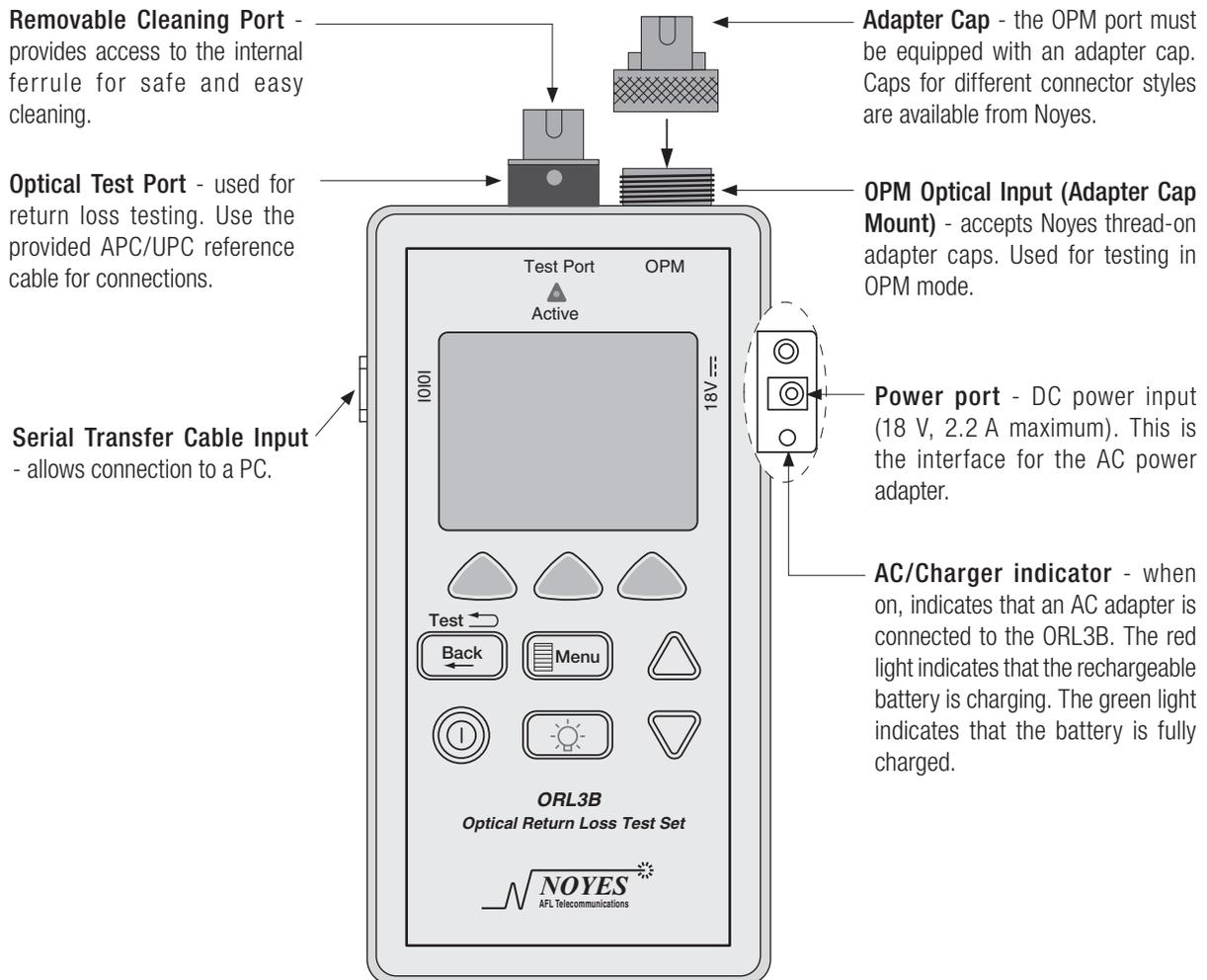


Figure 2-1. ORL3B Ports.

## Functional Keys

**Note:** The blue text on a front panel key indicates an additional function that is available by holding down the key.

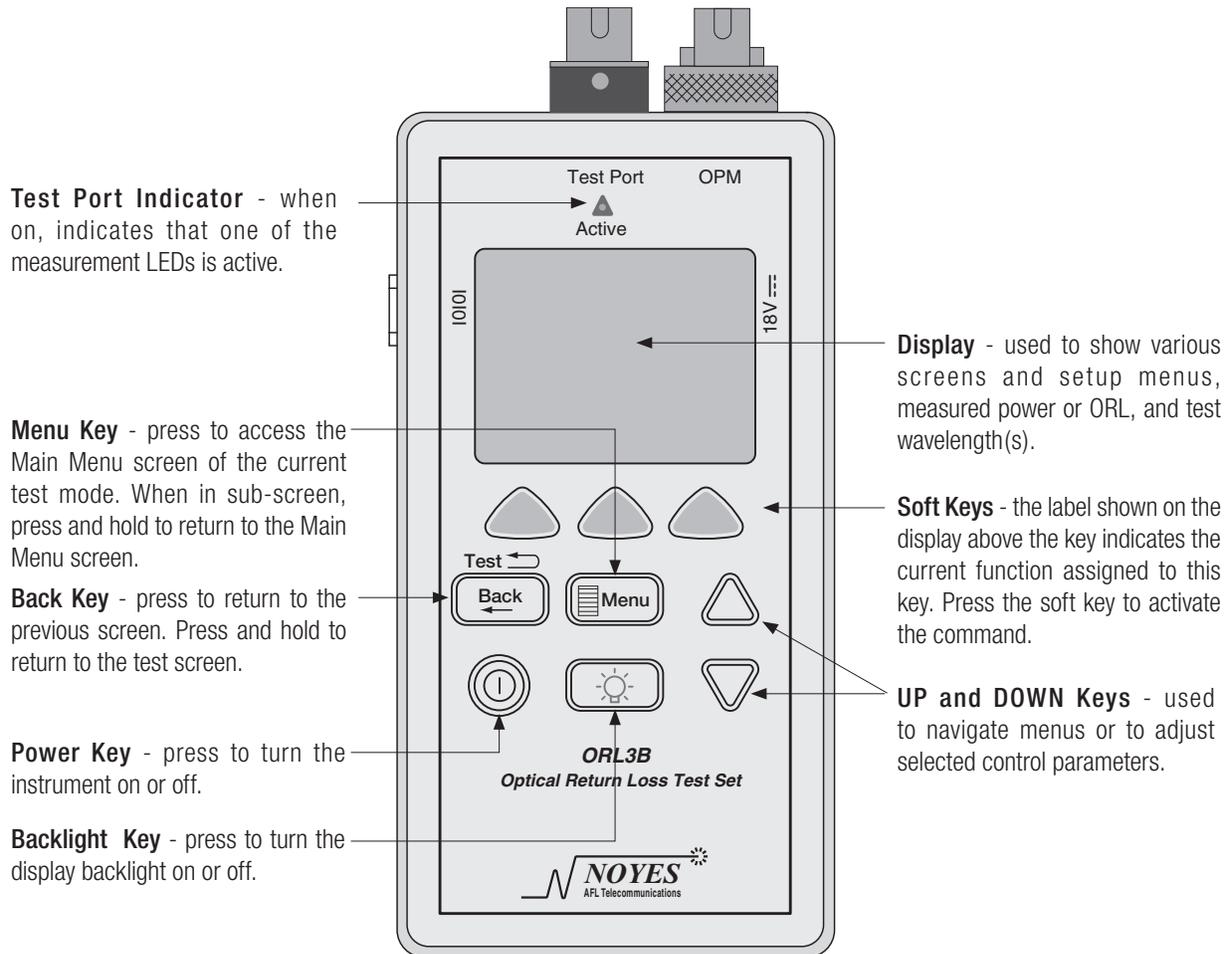


Figure 2-2. Front Panel Keys.

## Section 3: Set up and Operation

### To Display the Main Menu Screen

From any screen, press the MENU key (refer to Figure 3-1).

### To Select a Sub-menu or Parameter from a Menu

- 1 Use the arrow keys to highlight an item.
- 2 Press SELECT to display a sub-menu screen.

### Using the Back key

- Press to display a previous screen.
- Press and hold to return to the Test screen.

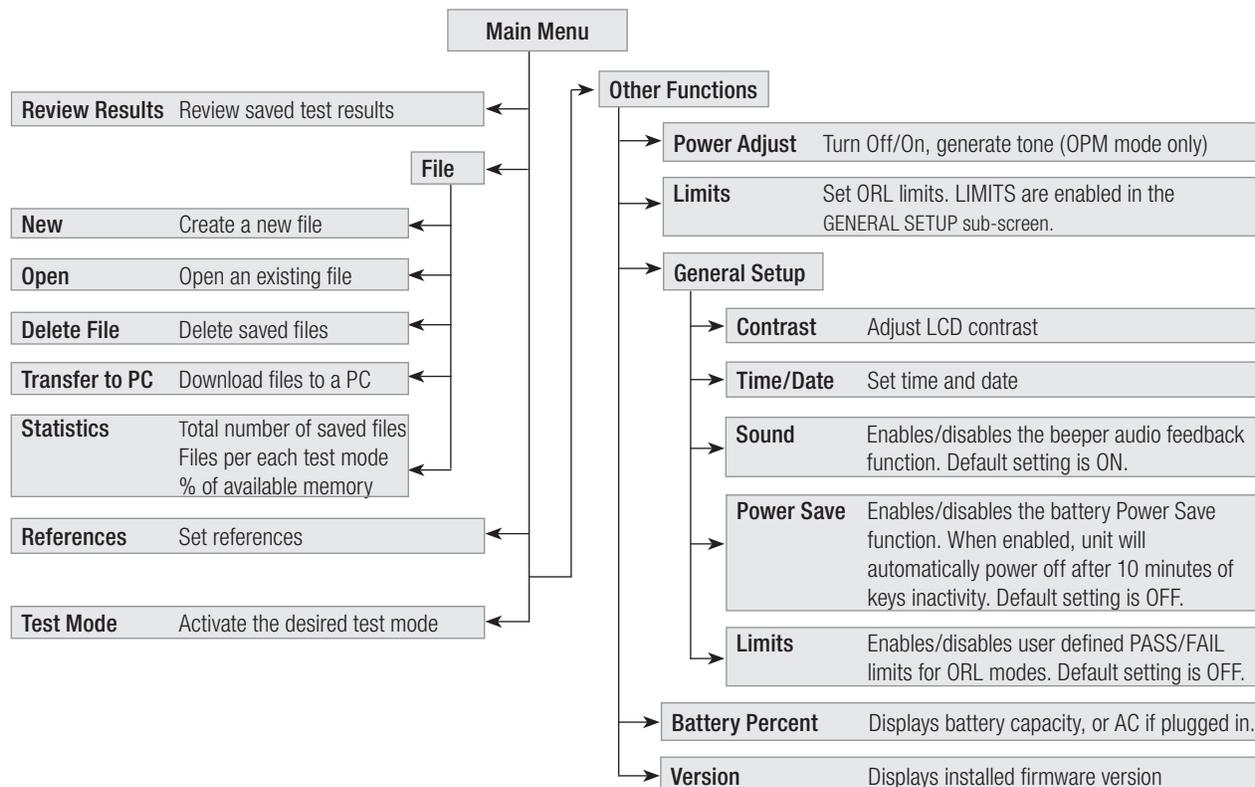


Figure 3-1. Main Menu.

### General Setup

The GENERAL SETUP sub-screen allows you to adjust Contrast, Time/Date, and turn On/Off Sound, Power Save, or Limits functions.

- 1 From the MAIN MENU screen, highlight and SELECT the OTHER FUNCTIONS option to access the OTHER FUNCTIONS screen.
- 2 Highlight and SELECT the GENERAL SETUP option to access the GENERAL SETUP screen.

### Contrast

- 1 Highlight the CONTRAST function, then press SELECT to activate.
- 2 Press **-/ +** to decrease / increase the contrast value.
- 3 Press the BACK key to exit the adjustment mode.

### Time and Date

- 1 Use the UP and DOWN arrow keys to highlight the TIME/DATE function.
- 2 Press SELECT to access the TIME/DATE screen.
- 3 Press the < and > arrow soft keys to select the parameter to be changed.
- 4 Use the UP and DOWN arrow keys to increase/decrease the value.
- 5 Press the BACK key to save settings and return to the SETUP screen.

### Sound, Power Save, and Limits

- 1 Use the UP and DOWN arrow keys to highlight the desired function (Sound, Power Save, or Limits).
- 2 Press **+** to turn the selected function ON/OFF.
- 3 Press the BACK key to save settings and return to the previous screen.

### Selecting Test Mode

The ORL3B offers two operating modes to performs the following fiber optic measurements:

- Optical Power measurements - OPM mode
- Optical Return Loss measurements - ORL mode

To select a Test Mode:

- 1 From the MAIN MENU screen, highlight the TEST MODE option.

- 2 Press SELECT to display a list of available test modes.
- 3 Highlight the desired test mode, then press SELECT.
- 4 A test screen of the selected mode will be displayed.

## Power Adjustment

**Note:** Both operating test modes allow you to access the POWER ADJUSTMENT screen and perform the power adjustment, but to turn LED OFF, ON, or to generate a 270 Hz (1 KHz, 2 KHz) tone, you need to enable the OPM test mode.

- 1 Press the MENU key to display the MAIN MENU screen.
- 2 Use arrow keys to highlight the OTHER FUNCTIONS option, then press SELECT to access the OTHER FUNCTIONS screen.
- 3 The POWER ADJUST option is highlighted; press SELECT to display the adjustment sub-screen.
- 4 Attach the APC connector on the reference cable to the Test Port.
- 5 Attach the UPC connector on the reference cable to the OPM Port.
- 6 Press WAVE to select the LED to be adjusted.
- 7 Press COARSE/ FINE to toggle between FINE and COARSE adjustment.
- 8 Use arrow keys to increase or decrease the power value displayed on the screen.

**Note:** Once output adjustment made, ORL references need to be reset.

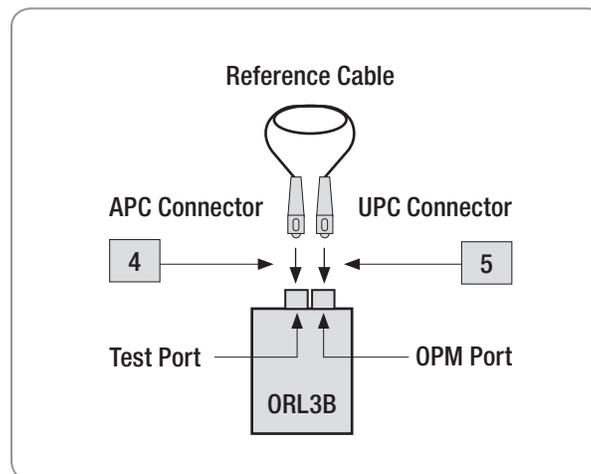


Figure 3-2. Power Adjustment Setup.

## Setting Test Limits

- 1 From the MAIN MENU screen, highlight and SELECT the OTHER FUNCTIONS option to access the OTHER FUNCTIONS screen.
- 2 Highlight and SELECT the LIMITS option to display the LIMITS screen.
- 3 Choose ORL LIMITS, then press SELECT to access the ORL LIMITS sub-screen.
- 4 Press WAVE to select the desired wavelength.
- 5 Press COARSE (FINE) to toggle between COARSE and FINE adjustment.
- 6 Press the UP or DOWN arrow keys to increase or decrease the limit value displayed on the screen. You may set limits within the allowable range as follows:

| Mode       | Range      | Coarse        | Fine          |
|------------|------------|---------------|---------------|
| ORL limits | 0 to 45 dB | $\pm 1.00$ dB | $\pm 0.01$ dB |

- 7 Choose SET to save settings.

**Note:** PASS/FAIL limits must be set to "ON" in GENERAL SETUP before use.

## Managing Files

All the commands and sub-screens for creating, opening, deleting, and transferring files to a PC can be accessed from the MAIN MENU > FILE > FILE MENU screen.

### To Create a New File

ORL3B filenames consist of up to six characters. If you create a filename prefix of up to four characters followed by a two-digit starting number, the ORL3B will increment automatically a two digit-number each time you press SAVE.

- 1 From the MAIN MENU screen, highlight and SELECT the FILE option to access the FILE MENU screen.
- 2 The NEW option is highlighted, press SELECT to access the NEW FILE screen. By default, ORL3B creates a filename "FILEXX", where XX is the next available number.

The display will read

|                     |          |                                  |
|---------------------|----------|----------------------------------|
| FILE                | FILEXX ← | Filename field                   |
| Table of Characters | □ ←      | Table of alphanumeric characters |
| BACK=BKSP           |          |                                  |
| OK                  | CANCEL   | SEL                              |

### To Change the Default Filename

- 3 Press the BACK key multiple times to clear the filename field.
 

**Note:** For AUTO INCREMENT - enter four characters followed by a two-digit starting number.
- 4 Use the UP and DOWN arrow keys to highlight the desired character.
- 5 Press SEL to enter the highlighted character in the filename field.
- 6 Repeat steps 4 & 5 to enter up to 6 characters.
- 7 When you finish entering characters, choose OK.
- 8 When prompted to confirm creating, press YES to save.
 

**Note:** If you attempt to create the filename that already exists, you will be prompted to confirm overwriting. Choose YES to confirm or NO to cancel overwriting.

### To Open an Existing File

- 1 From the MAIN MENU screen, highlight and SELECT the FILE option to access the FILE MENU screen.
- 2 Use arrow keys to highlight the OPEN option.
- 3 Press SELECT to access the OPEN FILE screen. A list of saved files is displayed.
- 4 Use the UP and DOWN arrow keys to highlight the desired file, then press SELECT.
  - You may press UP, DOWN, or MORE/TOP to scroll through the list of saved files.

**Note:** Selected file is now the current file. You need to make the desired file current to perform the following operations:

- Save test results to the desired file
- Transfer files to a PC

### To Delete Files

- 1 From the MAIN MENU screen, highlight and SELECT the FILE option to access the FILE MENU screen.
- 2 Use arrow keys to highlight the DELETE FILE option.
- 3 Press SELECT to access the DELETE FILES screen. A list of saved files is displayed.
- 4 Use the UP and DOWN arrow keys to highlight the file to be deleted.
- 5 Press DEL, when prompted to confirm deleting, choose YES or NO.
- 6 By pressing ALL, you may delete all saved files at once. When prompted to confirm deleting, choose YES or NO.

### To Transfer Files to a PC

- 1 Using the supplied serial cable, connect the ORL3B instrument to the available COM Port on a PC.
- 2 From the Windows Start Menu select Programs > Noyes > WinTest software.
  - From the WinTest Settings menu, select the appropriate COM Port.
  - In the header fields, enter the information that you want to appear on the files transferred from the ORL3B instrument.
  - From the WinTest Instrument menu, select ORL3B.
  - From the WinTest File menu, select Receive Stored Report.
- 3 From the ORL3B MAIN MENU > FILE MENU > OPEN, highlight the file to be transferred, then press SELECT.

- 4 From the FILE screen, use the UP and DOWN arrow keys to highlight the TRANSFER TO PC option.
- 5 Choose SELECT to start transferring.

**Note:** For a complete description of the PC executable software, refer to the User's Guide supplied with the software.

### **To View Statistics**

- 1 From the MAIN MENU screen, highlight and SELECT the FILE option to access the FILE MENU screen.
- 2 Highlight and SELECT the STATISTICS option to display the STATISTICS screen. This screen allows you to review the following information:
  - total number of saved files
  - number of saved files per each test mode
  - number of used and free fibers
  - percentage of available memory

## Section 4: ORL Mode - Measuring Optical Return Loss

### Screens and Menus

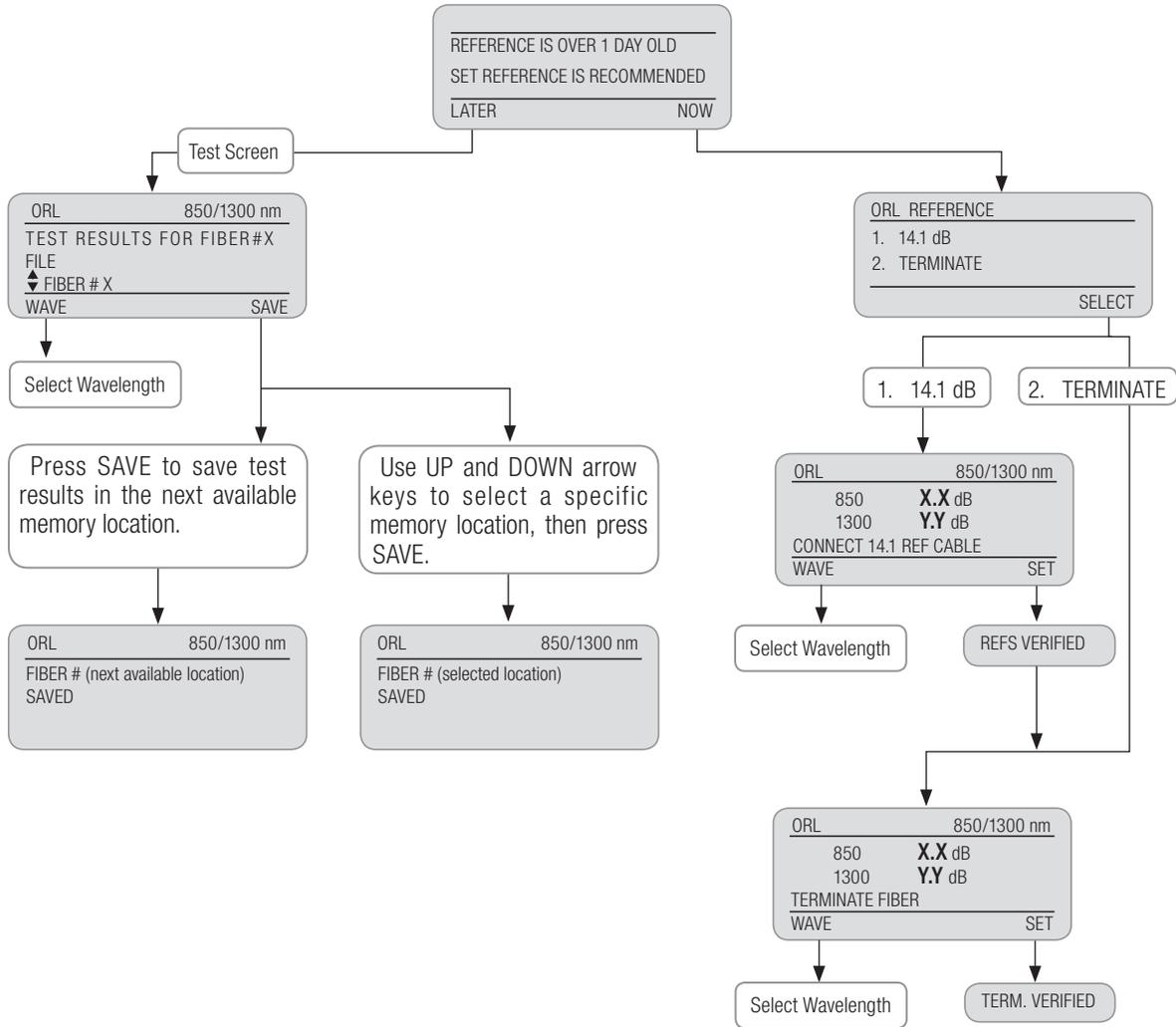


Figure 4-1. ORL Mode Screens and Menus.

## Test Screen Features

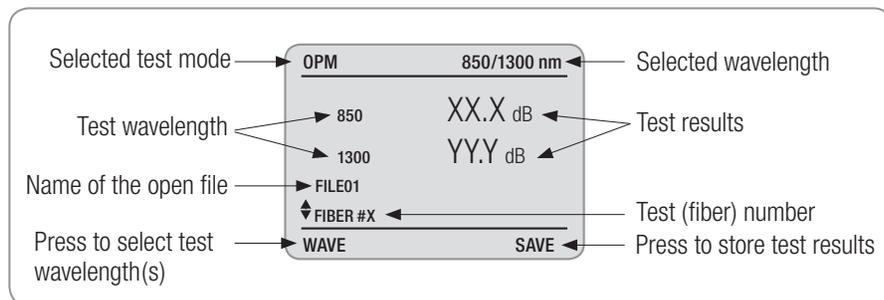


Figure 4-2. The ORL Mode Test Screen.

## Setting References

Use the following procedures to perform an optical return loss reference setup. This reference setup procedure is recommended on a daily basis before testing and when adding or changing reference cables. Clean all fiber optic connectors before performing test procedures described below.

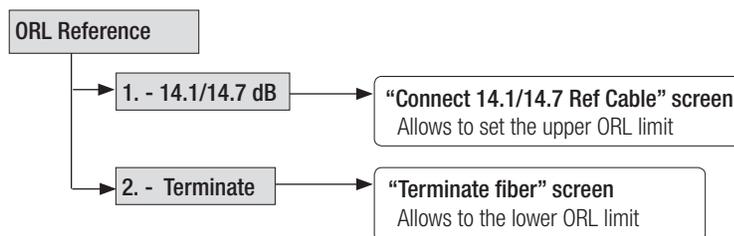
Enable the ORL test mode. If references haven't been set for over 24 hours, you will be prompted to set references.

The display will read

```
REFERENCE IS OVER 1 DAY OLD
SET REFERENCE IS RECOMMENDED

LATER                               NOW
```

- Pressing LATER allows you to omit setting references and start measurement of Return Loss at the selected wavelength(s).
- Pressing NOW allows you to access the ORL REFERENCES screen and select the desired option as follows:



**Note:** You may also access the REFERENCES screen from the ORL MAIN MENU screen. Press the MENU key, then choose REFERENCES > SELECT.

### Step I: “14.1 dB/ 14.7 dB” (LED) Referencing

- 1 From the ORL REFERENCE screen, select option “1 - 14.1 dB/[1 - 14.7 dB] ” to access the “CONNECT 14.1 REF CABLE / [CONNECT 14.7 REF CABLE]” screen.
- 2 Press WAVE to select the desired wavelength.
- 3 Clean the Test port and connectors on the reference cable.
- 4 Attach the APC connector on the reference cable to the Test Port (Figure 4-2). Use a dust cap for covering UPC connector to prevent ambient light.
- 5 Press SET to begin verification.
- 6 If the display reads NOT VERIFIED, clean and inspect connectors and Test port, and then repeat steps 4 - 5.
- 7 When the display reads REF VERIFIED, the values are accepted. The ORL3B will return to the ORL REFERENCE screen with “2. TERMINATE” option highlighted.

### Step II: “Terminate Fiber” Referencing

- 8 From the ORL REFERENCE screen, select option “2 - TERMINATE” to access the “TERMINATE FIBER” screen.
- 9 Attach the appropriate adapter followed by terminator to the UPC connector.
- 10 Press SET to begin verification.
- 11 If the display reads NOT VERIFIED, clean all fiber optic connectors again and check for fiber breaks, and then repeat step 9 - 10.
- 12 If the display reads TERM. VERIFIED, the reference is set.

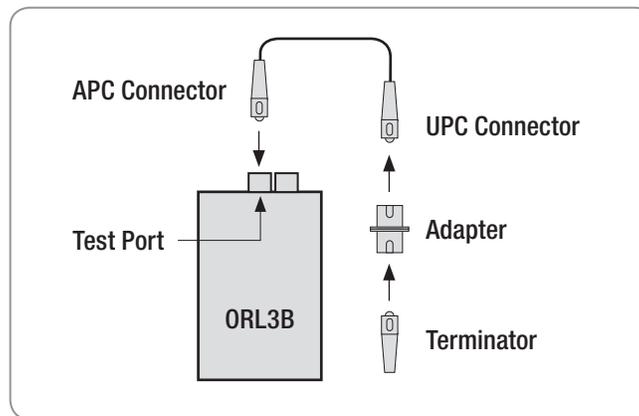


Figure 4-3. ORL Referencing.

## Performing a Connector Test

Use the following procedures to perform return loss tests on a jumper cable connector. When testing in the ORL mode, the display is live. The ORL3B is continuously measuring return loss, thus fiber movement will result in fluctuations in the displayed measurement values.

Refer to Figure 4-3 for a related drawing.

- 1 Attach the APC connector on the reference cable to the Test Port.
  - 2 Attach the appropriate adapter to the UPC connector on the reference cable.
  - 3 Attach the jumper cable to be tested to the adapter.
  - 4 Terminate the jumper cable after the adapter to eliminate back reflections.
- 5 The ORL3B will automatically measure and display return loss of the connection.
- 6 Press SAVE to store test results in the next available memory location.
- 7 If you need to save test results a specific memory location, use the UP or DOWN arrow keys to select a specific memory location (Increase or decrease fiber number), then press SAVE.
- 8 Repeat steps 3-7 to test the opposite end of the jumper cable.

Saved test results can later be retrieved (refer to section “Reviewing Saved Test Results”, page 17).

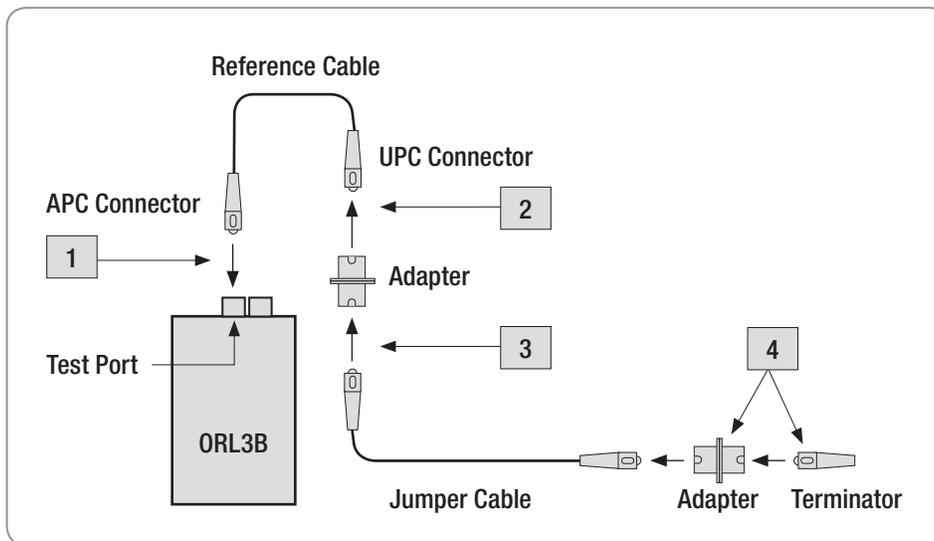


Figure 4-4. Testing a Connector.

## Performing a Link Test

- 1 Attach the APC connector on the reference cable to the Test Port.
- 2 Attach the UPC connector on the reference cable to the fiber link under test at the patch panel.
- 3 Once connected, the ORL3B will automatically measure and display the return loss measurements for the link under test.
- 4 Press SAVE to store test results in the next available memory location.
- 5 To save test results in a specific memory location, press the UP or DOWN arrow keys to select a specific memory location (increase/decrease fiber#), then press SAVE to store test results in the selected location.

Saved test results can later be retrieved (refer to section "Reviewing Saved Test Results", page 17).

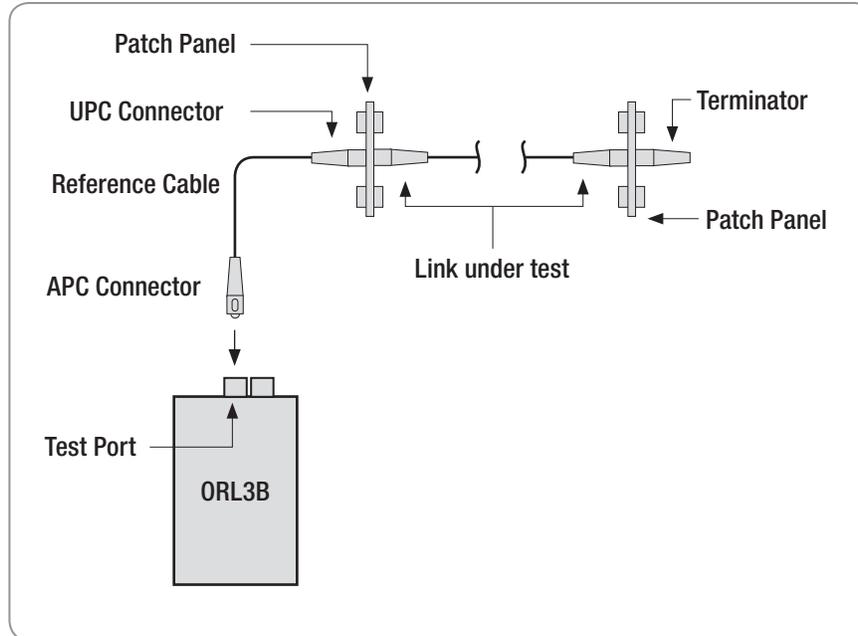


Figure 4-5. Link Test Setup.

## Reviewing Saved Test Results

Prior to reviewing saved tests, OPEN the file to be viewed (refer to section “To Open a File”, page 9).

- 1 From the MAIN MENU screen, highlight and SELECT the REVIEW RESULTS option to access the ORL RESULTS screen (Figure 4-6).
- 2 Use the UP and DOWN arrow keys to highlight the desired test (fiber) number.
- 3 You may press MORE to scroll through saved test results.
- 4 Press HEADER to change a header display as follows:

AUTO RETEST > TEST WAVELENGTH > DATE and TIME > FILE NAME

### Auto Retest

- 1 From the ORL RESULTS screen, use the UP and DOWN arrow keys to highlight the fiber to be retested.
- 2 Press HEADER to display the AUTO RETEST option (if not displayed).
- 3 Press TEST to start, the ORL3B display will switch from the ORL RESULTS screen to the ORL Test screen and show the retest results.
- 4 You may press SAVE to store results and return to the ORL RESULTS screen.

Or

- 5 You may press the Menu key to return to the ORL RESULTS screen without saving retest results.

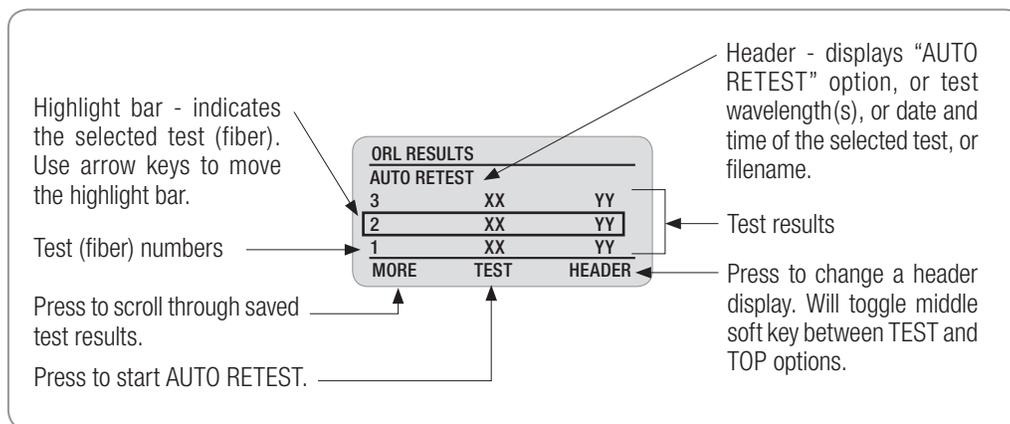


Figure 4-6. Reviewing Saved Test Results.

## Section 5: OPM Mode and Applications

### Screens and Menus

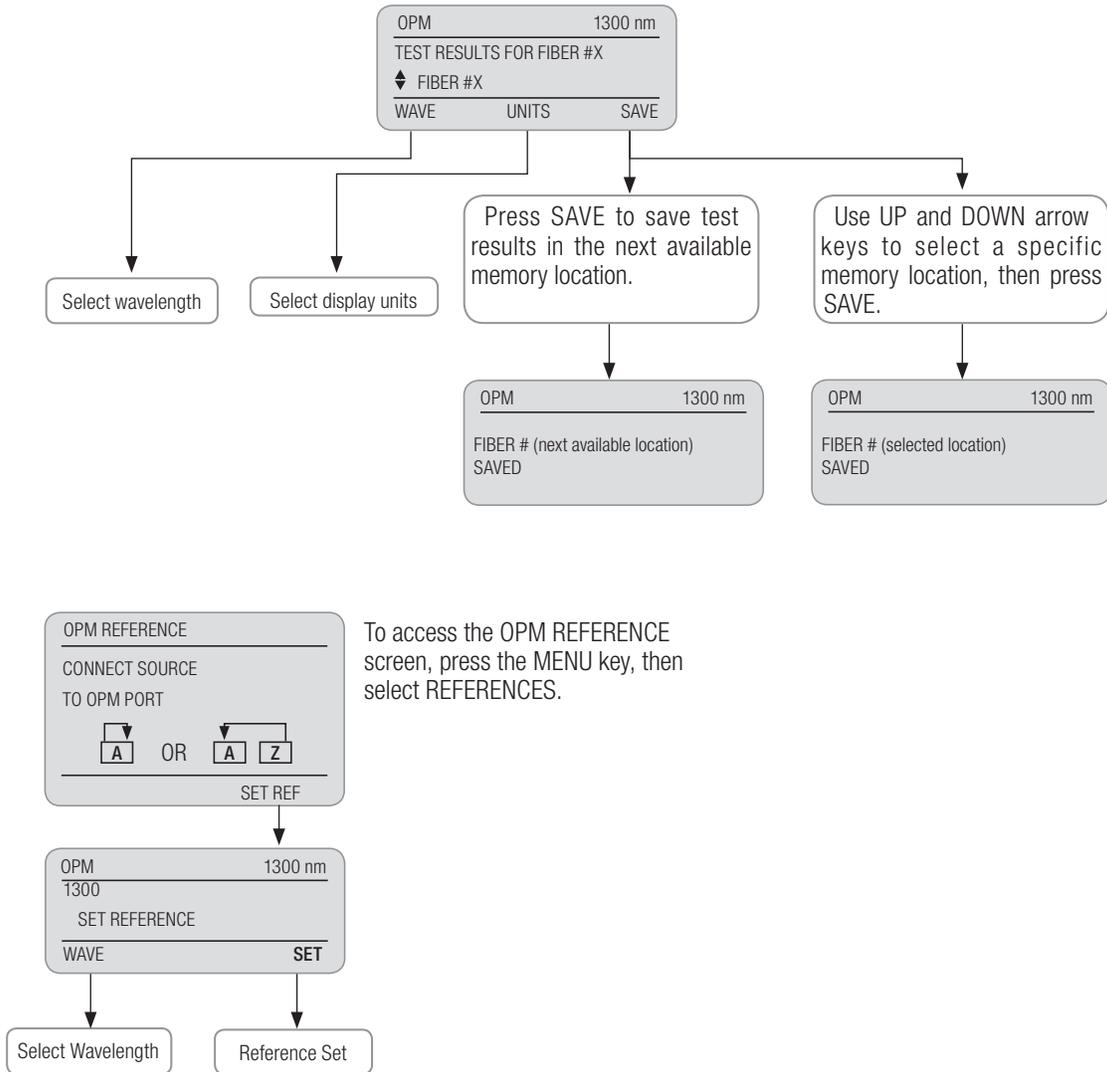
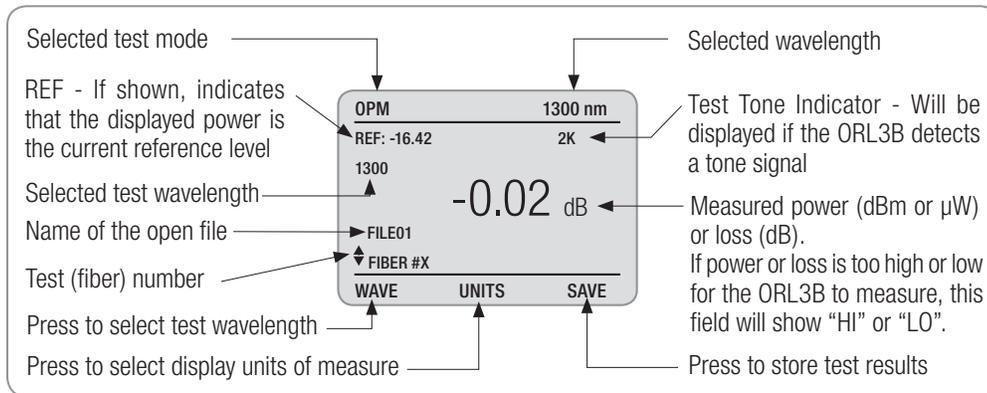


Figure 5-1. OPM Mode Screens and Menus.

## Test Screen Features



**Figure 5-2. The OPM Mode Test Screen.**

The ORL3B may be used as a stand alone Optical Power Meter to perform diagnostic and evaluation tests associated with fiber optic transmission systems. The ORL3B measures both absolute power (dBm or  $\mu$ W) and insertion loss (dB). The operational wavelength and the measurement mode (dBm, dB, or  $\mu$ W) must correspond with the specifications of the transmitter under test.

## Setting References

- 1 Press the MENU key to access the OPM MAIN MENU.
- 2 Use the arrow keys to highlight the REFERENCES option, then press SELECT > SET REF.
- 3 Press WAVE to select the desired wavelength.
- 4 Choose SET to save the displayed value (dBm) as a reference.
- 5 Press the BACK key to return to the OPM test screen.

## Measuring Optical Power

Use the following procedures to verify the optical power of a transmitter. The test results should be within manufacturer specifications. Clean all fiber optic connectors before performing test procedures described below.

- 1 Attach the jumper cable leading from the transmitter to the OPM Port.
- 2 Press WAVE to select the desired wavelength.
- 3 Press UNITS to select the display units, "dB", "dBm", or " $\mu$ W".
- 4 Press SAVE to save the test data in the next available memory location.

- To save test results in a specific memory location, press the UP or DOWN arrow keys to select a specific memory location (increase/decrease fiber #), then press SAVE to store test results in the selected location.

Saved test results can later be retrieved (refer to section “Reviewing Saved Test Results”).

## Reviewing Saved Test Results

Prior to reviewing saved tests, OPEN the file to be viewed (refer to section “To Open a File”, page 9).

- From the MAIN MENU screen, highlight and SELECT the REVIEW RESULTS option to access the OPM RESULTS screen (Figure 5-3).
- Use the UP and DOWN arrow keys to highlight the desired test (fiber) number.
- You may press MORE to scroll through saved test results.
- Press HEADER to change a header display as follows:

AUTO RETEST > FILE NAME > DATE and TIME > DBM / DB

### Auto Retest

- From the OPM RESULTS screen, use the UP and DOWN arrow keys to highlight the fiber to be retested.
- Press HEADER to display the AUTO RETEST option (if not displayed).
- Press TEST to start, the ORL3B display will switch from the OPM RESULTS screen to the OPM Test screen and show the retest results.
- You may press SAVE to store results and return to the OPM RESULTS screen.

Or

- You may press the Menu key to return to the OPM RESULTS screen without saving retest results.

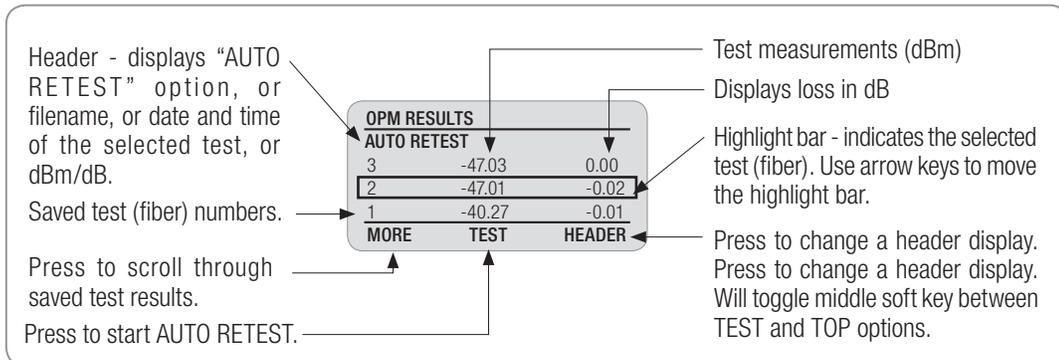


Figure 5-3. Reviewing Saved Test Results.

## Section 6: Maintenance

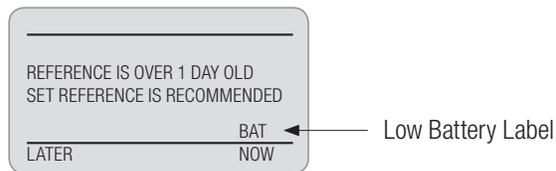
### Battery Replacement

To replace a battery:

- 1 Remove the protective rubber boot.
- 2 Remove the battery compartment cover located on the back of the instrument.
- 3 Replace the battery.
- 4 Replace the cover and rubber boot.

### Battery Recharging

When a low battery label - "BAT" is displayed on the test screen, a battery requires charging. The instrument will operate for approximately 1 hour (minimum) after a "BAT" label is displayed.



A battery can be recharged to full capacity in about three hours.

To fully recharge the battery:

- 1 Connect the AC power adapter/charger to the Power Port.
- 2 The battery will charge whether an instrument is on or off.

### Battery Indicator Lights

The two-color LED on the side of the ORL3B shows the power condition of the internal battery when the unit is plugged into the AC adapter/charger. The **green light** indicates that the battery is fully charged. The **red light** indicates that the battery is charging via the AC adapter/charger (Figure 2-1, page 3).

## Cleaning Optical Ports

Optical ports must be kept free from dirt or other contaminants to ensure accurate measurements and operation. A supply of optical cleaning pads and isopropyl alcohol or a connector-cleaning cartridge is recommended to clean the optical ports. Before conducting the cleaning procedures that follow, turn the instrument off.

### Cleaning Test Port

- 1 Using the supplied hex key screw driver, remove the two hex head screws on the Removable Cleaning Port.
- 2 Pull the Removable Cleaning Port directly out away from the mount.
- 3 The ferrule can now be cleaned using optical wipes and optical grade alcohol. Dirt and contaminants can be blown out from the Removable Cleaning Port using a can of compressed air.
- 4 After cleaning, carefully align the key way and replace the Removable Cleaning Port insuring that it snaps into place.
- 5 Once completed, the hex head screws can be replaced and tightened.

### Cleaning OPM Port

- 6 Unscrew the adapter cap from the adapter cap mount.
- 7 Clean the optical port using optical wipes and optical grade alcohol.
- 8 Replace the adapter cap once the cleaning is complete.

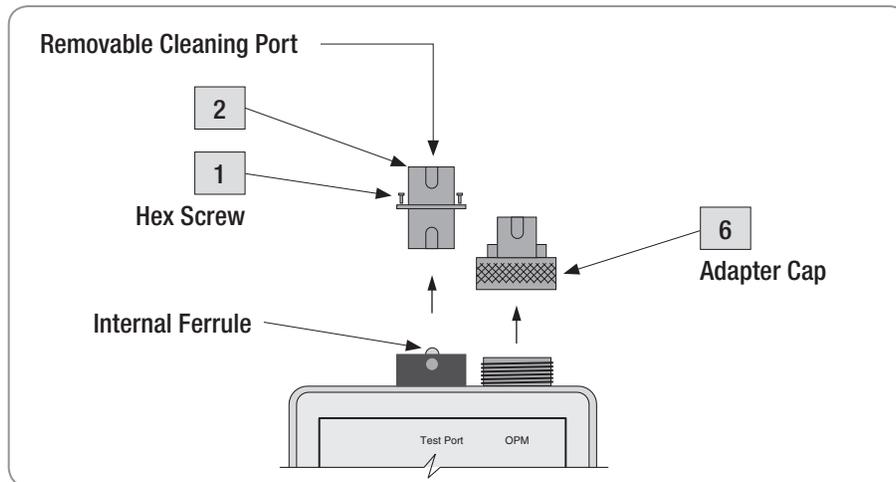


Figure 6-1. Cleaning Optical Ports.

## ORL3B Messages

| Message          | Cause/Meaning   | Solution   |
|------------------|---|--|
| LO               | The amount of light detected is below the range of the ORL3B. | Clean all fiber optic connectors again and check for excessive fiber bends. Perform the required test procedures over. |
| REF NOT VERIFIED | The ORL3B is unable to verify the reference cable value.      | Clean all fiber optic connectors. Perform the reference setup procedures again.  |

## Print and Software Problems

| Problem   | Cause  | Solution   |
|---|--|--|
| Can't transfer data to a PC.  | Incomplete or improper setup.                    | <p>Confirm that the data to be transferred from the ORL3B is retrieved from the proper test mode.</p> <p>Verify that the WinTEST software is ready to receive that data transfer.</p> <p>Confirm that the transfer cable is connected properly.</p> <p>Verify that the selected COM Port option is the same as that of the transfer cable connection on the computer port.</p> |
| Unable to power up while operating from the rechargeable batteries. | The internal battery is extremely low on charge. | <p>Power the ORL3B from the AC power.</p> <p>Or</p> <p>Recharge the internal battery.</p>  |
| Unable to print from WinTEST software.                              | The computer may be connected to a network.      | Log-off the network.   |

## Section 7: Specifications

### ORL specifications

| Model                       | ORL3-MM   |
|-----------------------------|---|
| Calibrated wavelengths (nm) | 850, 1300   |
| Output power (dBm)          | -20   |
| Emitter type                | LED   |
| Safety class                | Laser, Class I FDA 21 CFR 1040.10 and 1040.11, IEC 60825-1: 2007-03 |
| ORL dynamic range (dB)      | 40  |
| Measurement units           | dB, dBm, $\mu$ W  |
| Available connector types   | ASC   |

### OPM specifications

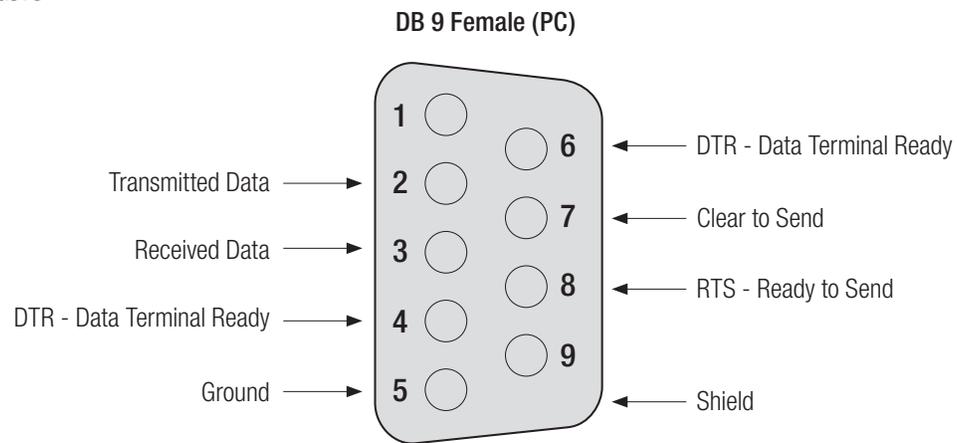
|                             |                  |
|-----------------------------|------------------|
| Calibrated wavelengths (nm) | 850, 1300        |
| Detector type               | InGaAs           |
| Measurement range (dBm)     | +6 to -70        |
| Resolution                  | 0.01 dB          |
| Accuracy @ -10 dBm @ 25°C   | $\pm$ 0.25 dB    |
| Measurement units           | dB, dBm, $\mu$ W |

### General specifications

|                                      |   |
|--------------------------------------|---|
| Display type                         | 128 X 64 dot matrix liquid crystal display, w/LED backlight |
| Dimensions, without boot (H x W x D) | 19.5 X 10.1 X 5.7 cm (7.67 X 3.97 X 2.25 in)                |
| Weight, without boot                 | 0.907 kg (2 lb)   |
| Operating temperature                | 0 to +50°C, 90% RH (non-condensing)                         |
| Storage temperature                  | -20 to +60°C, 95% RH  |
| Power                                | Lithium-Ion or AC Adapter                                   |
| Battery life (typ.)                  | 32 hours  |
| Li-Ion battery pack charging temp.   | -10 to +45°C  |

**Note:** Li-Ion battery pack charging time will increase by 25% at a temperature below -5°C.

**Important:** Do not charge the Li-Ion battery pack at a temperature above +45°C.

**Serial Cable**



**Thank you for choosing Noyes Test & Inspection**

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