AFL Telecommunications
A Fujikura Business

Test & Inspection

TURBOTEST 500B
Insertion Loss and Return Loss
Test Set
User's Guide

NOYES
Test & Inspection

A Division of **AFL** Telecommunications

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(For software version 4.1 or higher)

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 will 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

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Safety Information

Important Safety Information

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

CLASS 1 LASER PRODUCT   The TURBOTEST 500B is a **CLASS I LASER PRODUCT.**

⚠ **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.

⚠ **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.

⚠ **NOTICE!** The TURBOTEST 500B contains no user serviceable parts. The unit 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 TURBOTEST 500B. 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 TURBOTEST 500B Optical Loss Test Set. This instrument has been designed specifically for testing high fiber count cable commonly found in Telco or Broadband systems. 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** for updates to this manual, software updates, and additional application information. If you have any questions about the TURBOTEST 500B 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

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. If the TURBOTEST 500B is equipped with the talk option, then a headset will also be included.

The TURBOTEST 500B package includes:

- TURBOTEST 500B instrument
- PC Software and Manual
- AC Adapter/Charger
- RS-232 Serial Cable
- APC/UPC Optical Reference Cable

- Adapter Cap
- Mandrel
- Hex Screwdriver
- User's Guide
- Carry Case

Feature Overview

High-speed transmission systems employ laser sources with narrow bandwidths, which are sensitive to back-reflections caused by components, splices, and connectors. If too much light is reflected back to the laser transmitter, the modulation characteristics and spectrum of the laser may change. This change will degrade the systems performance. For efficient operation of the laser transmitter, it is necessary to test for optical return loss caused by back-reflections.

Note: Most manufacturers of fiber optic transmission systems specify the maximum allowable return loss for error free operation.

The TURBOTEST 500B offers the latest technology in a single fiber bi-directional loss and return loss testing that provides the exchange of loss data and references between units. The instrument performs three fiber optic measurements: Optical Power (OPM), Optical Return Loss (ORL), and Optical Loss (OLTS) measurements. In automatic TURBO mode, the instrument performs both Optical Return Loss (ORL) and Optical Loss (OLTS) measurements.

The TURBOTEST 500B can store up to 920 records in any combination of its four operating modes and if any configuration other than TRIPLE wavelength is selected. If the configuration is TRIPLE wavelength, the TURBOTEST 500B can store up to 460 records. Stored test results can be transferred to a PC for a complete report generation. For a complete description of the PC executable software, refer to the User's Guide supplied with the software.

An optional dedicated digital TALK option is available for full time/full duplex communication between test operators while testing other fibers in a bundle.

The TURBOTEST 500B is powered by the internal rechargeable Lithium-Ion battery pack or external AC power adapter.

Recommended Accessories

You will need fiber optic test jumpers to connect the TURBOTEST 500B 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 TURBOTEST 500B. 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.

Optical ports and connector end faces must be kept free from dirt or other contaminates to ensure accurate measurements and operation.

For cleaning connector end faces on the TURBOTEST 500B Voice and Test Ports, test jumpers, and in fiber frames or adapters, Noyes recommends using our exclusive FCC2 non-hazardous cleaning fluid and CCT molded cleaning tips.

The FCC2 fluid is a non-flammable, environmentally safe, residue free solvent engineered to clean fiber connector end-faces.

The CCT molded cleaning tips introduce a new fiber connector end face cleaning technology. Rather than

a fabric-covered or foam-covered stick, we are offering a molded cleaning tip that will trap contamination and wick cleaning solvents from bulkhead connectors. This new cleaning tip is a molded, sintered polymer that is both porous and pliable conforming to virtually any fiber end-face polish geometry while trapping and absorbing contaminants.

CCT cleaning tips and FCC2 cleaning fluid may be combined into FCP1 fiber optic cleaning kits. Noyes offers a complete selection of FCP1 cleaning kits for field cleaning. The FCP1 Series of kits delivers compact, safe, easy to use, reliable cleaning for all types of fiber optic connector end faces.

Visit our web at **www.AFLtele.com/go/Clean** for more information.

For cleaning the TURBOTEST 500B OPM optical port and adapter caps, a supply of optical cleaning wipes and IPA (Reagent Grade Isopropyl Alcohol 99% or better) and a can of filtered compressed air may be used.

Section 2: Functional Description

TURBOTEST 500B Ports

Adapter cap
The OPM port must be equipped with an adapter cap. Caps for different connector styles are available from Noyes.

Removable Cleaning port
Provides access to the internal ferrule for safe and easy cleaning.

**OPM optical input
(Adapter Cap mount)**
Accepts Noyes thread-on adapter caps.

Voice port
Allows connection to another TURBOTEST 500B or a compatible talk set.

Headphone Input
Used for connecting the head set to the TURBOTEST 500B for communication between test sets.

Serial Transfer Cable input
Allows connection to a PC for file transfer.

Power port
DC power input (18 V, 2.2 A maximum). This is the interface for the AC power adapter.

Optical Test port
Optical port for return loss testing, loss testing, and for generating a 270 Hz (1 kHz, 2 kHz) tone. Use the provided APC/UPC reference cable for connections.

AC/Charger indicator
When [ON], indicates that an AC adapter is connected to the TURBOTEST 500B. The red light indicates that the rechargeable battery is charging. The green light indicates that the battery is fully charged.

Voice   Test Port   OPM

Talk Active   Laser Active

10101   18V

Test   Back   Menu

TURBOTEST 500B
Optical Loss Test Set

√ NOYES
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Figure 2-1. TURBOTEST 500B Ports.

Front Panel Features

[Talk Active] indicator
When [ON], indicates that Talk laser is active.

[Laser Active] indicator
When [ON], indicates that the laser transmitter is turned [ON].

Soft keys
The label shown on the display above the key indicates the current function assigned to the key. Press the soft key to activate the command.

Display
Used to show various screens and setup menus, measured power or loss, and calibrated wavelength.

[Back] key
Press to return to the previous screen. Press and hold to return to the top-level test screen.

[Menu] key
Press to access the [MAIN MENU] screen for the current test mode.

[UP] and [DOWN] arrow keys
Used to navigate menus.

[Power] key
Press and hold to turn the instrument on or off.

[Backlight] key
Press to turn the display backlight [ON] or [OFF].

Figure 2-2. The TURBOTEST 500B Front Panel

Section 3: Common Functions

Main Menu Configuration

When the TURBOTEST 500B is powered on, the working screen - [TEST] screen of the currently selected test mode is always displayed. The [MAIN MENU] screen of the currently selected test mode may be accessed from the [TEST] screen by pressing the [MENU] key.

- To select a sub-menu, use the [Up] or [Down] arrow key to highlight a menu item, then press the [SELECT] soft key to display a sub-menu screen.

- Press the [BACK] key will display a previous screen or sub-menu screen.

The diagram below illustrates the [MAIN MENU] structure.
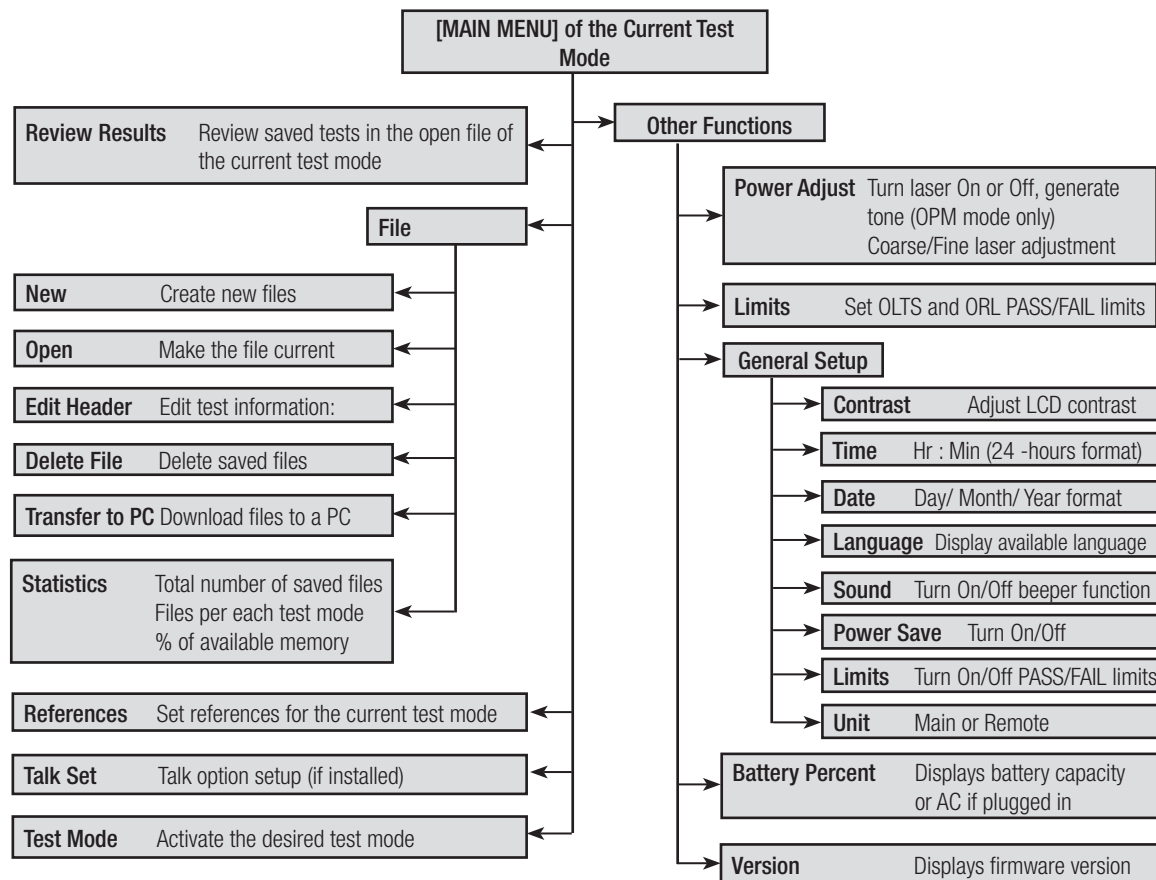
Figure 3-1. Main Menu Configuration.

Selecting Test Mode

The TURBOTEST 500B offers five operating modes to perform the following fiber optic measurements:

- [TURBO] mode - both optical return loss and optical loss measurements.
  Two TURBOTEST 500B units are required to operate in this mode. When the [TURBO] mode is enabled one TURBOTEST 500B unit auto-links to second TURBOTEST 500B unit.

- [OLTS] mode - optical loss measurements.
  Two TURBOTEST 500B units are required to operate in this mode. When the [OLTS] mode is enabled one TURBOTEST 500B unit auto-links to second TURBOTEST 500B unit.

- [REMOTE] mode - forces the TURBOTEST 500B unit into the [Smart Remote] mode.

- [OPM] mode - performs optical power measurements.

- [ORL] mode - performs optical return loss measurements.

To Select a Test Mode

1 From the [MAIN MENU] screen, use either [UP] or [DOWN] arrow key to highlight the [TEST MODE] option.

2 Press the [SELECT] soft key to display a list of available test modes.

3 Use either [UP] or [DOWN] arrow key to highlight the desired test mode.

4 Press the [SELECT] soft key to confirm your selection.

5 A [TEST] screen of the selected test mode will be displayed.

File Management

All the commands and sub-screens you need for creating new files, adding or editing the test identification parameters, opening saved files, deleting saved files, or downloading saved files to a PC can be accessed from the [FILE MENU] screen.

To access the [FILE MENU] screen, perform the following steps:

- From any screen, press the [Menu] key to display the [MAIN MENU] of the currently selected test mode.

- From the [MAIN MENU] screen, use either [Up] or [Down] arrow key to highlight the [FILE] option.

- Press the [SELECT] soft key to display the [FILE MENU] screen.

File Menu Configuration

The diagram below illustrates the [FILE MENU] structure.
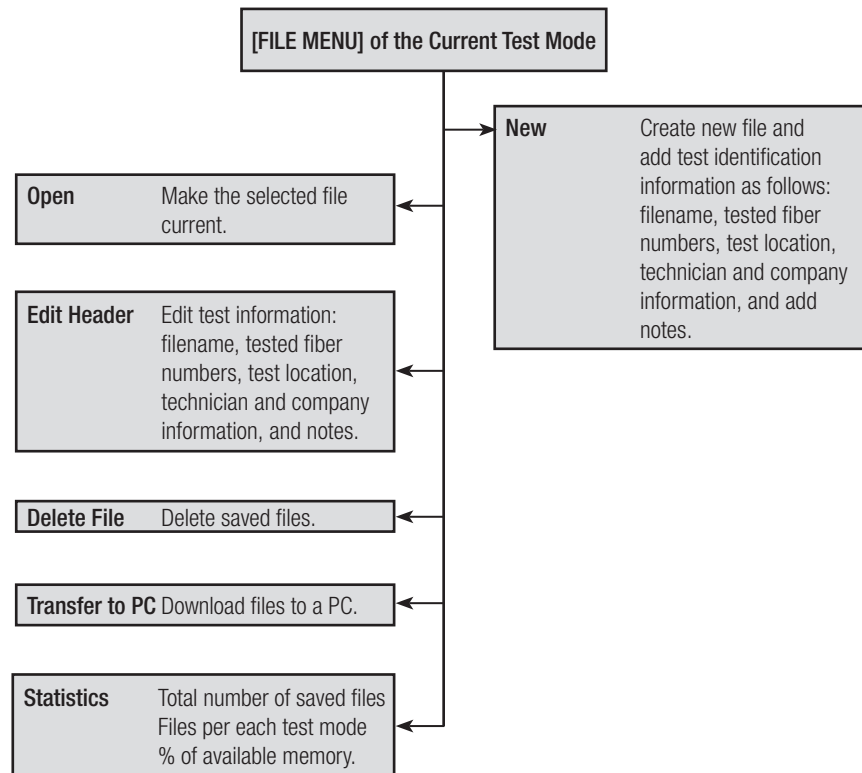
Figure 3-2. File Menu Configuration.

Creating a New File and Setting Test Identification Parameters

The [NEW] option from the [FILE MENU] screen allows you to create a new file to which a series of tests will be saved and set up test identification parameters, such as filename and number, test location, technician and job information, and add notes.

1 When the [FILE MENU] screen is displayed, the [NEW] option is highlighted by default.

2 Press the [SELECT] soft key to access the [EDIT FILE HEADER] screen.

The display appears as follows:

```
EDIT FILE HEADER

CBL: CABLE01
FROM: 1
LOC:
TECH #:
JOB #:
NOTE:

SAVE                    SELECT
```

The following sections explain how to set each test identification parameter.

Changing the Default Filename

By default, the TURBOTEST 500B creates the filename labeled [CABLE01]. This default filename may be changed if needed. A Filename may consist of up to 10 characters. To change the default filename, perform the following steps.

1 From the [EDIT FILE HEADER] screen, use either [Up] or [Down] arrow key to highlight the line labeled [CBL].

2 Press the [SELECT] soft key to display the [CABLE NUMBER] screen.

The display appears as follows:

```
CABLE NUMBER

CABLE 01XXX      ◄————————————————  Filename field - editable text field

Table of alphanumeric characters    ◄——  Table of alphanumeric characters

BACK = BACKSPACE

OK          CANCEL          SEL
```

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

4 Use either [Up] or [Down] arrow key to highlight the desired character from the displayed table of alphanumeric characters.

5   Press the [SEL] soft key to enter the highlighted character in the filename field.

6   Repeat steps 4 & 5 to enter up to 10 characters.

7   When you finish entering characters, press the [OK] soft key to return to the [EDIT FILE HEADER] screen.

8   You may continue setting other test identification parameters by selecting the desired parameter (refer to the corresponding section for details).

9   Or you may save the created file by pressing the [SAVE] soft key.

10 If you choose the [SAVE] option, you will be prompted to confirm creation of a new file.

   • Choose [YES] to save the created file and return to the [TEST] screen of the currently selected test mode.

   • Or choose [NO] to return to the [EDIT FILE HEADER] screen.

Note: If you attempt to create a new file with the filename that already exist, you will be prompted to confirm overwriting. Choose [YES] to confirm or [NO] to cancel overwriting.

Setting the [START FIBER] Parameter

By default, the TURBOTEST 500B sets the [start fiber] parameter as number 1. This parameter may be changed if needed. To set the [START FIBER] parameter, perform the following steps.

1   From the [EDIT FILE HEADER] screen, use either [Up] or [Down] arrow key to highlight the line labeled [FROM].

2   Press the [SELECT] soft key to display the [START FIBER] screen.

The display appears as follows:

```
START FIBER
XXXX   ◄─────────────────────────  [Start fiber number] field - editable numeric field

       0 1 2 3 4 5 6 7 8 9  ◄────   Table of numeric characters

BACK = BACKSPACE
OK          CANCEL        SEL
```

3   Press the [BACK] key multiple times to clear the editable numeric field if needed.

4   Use either [Up] or [Down] arrow key to highlight the desired character from the displayed table of numeric characters.

5   Press the [SEL] soft key to enter the highlighted character in the editable numeric field.

6   Repeat steps 4 & 5 to enter up to 4 characters.

7   When you finish entering characters, press the [OK] soft key to return to the [EDIT FILE HEADER] screen.

8   You may continue setting other test identification parameters by selecting the desired parameter (refer to the corresponding section for details).

9   Or you may save the created file by pressing the [SAVE] soft key.

10 If you choose the [SAVE] option, you will be prompted to confirm creation of a new file.

   ● Choose [YES] to save the created file and return to the [TEST] screen of the currently selected test mode.

   ● Or choose [NO] to return to the [EDIT FILE HEADER] screen.

Note: If you attempt to create a new file with the filename that already exist, you will be prompted to confirm overwriting. Choose [YES] to confirm or [NO] to cancel overwriting.

Setting the [LOCATION] Parameter

To set the [LOCATION] parameter, perform the following steps.

1   From the [EDIT FILE HEADER] screen, use either [Up] or [Down] arrow key to highlight the line labeled [LOC].

2   Press the [SELECT] soft key to display the [LOCATION] screen.

   The display appears as follows:

3   Press the [BACK] key multiple times to clear the editable text field if needed.

4   Use either [Up] or [Down] arrow key to highlight the desired character from the displayed table of alphanumeric characters.

5   Press the [SEL] soft key to enter the highlighted character in the filename field.

6   Repeat steps 4 & 5 to enter up to 12 characters.

7   When you finish entering characters, press the [OK] soft key to return to the [EDIT FILE HEADER] screen.

8   You may continue setting other test identification parameters by selecting the desired parameter (refer to the corresponding section for details).

9   Or you may save the created file by pressing the [SAVE] soft key.

10 If you choose the [SAVE] option, you will be prompted to confirm creation of a new file.

- Choose [YES] to save the created file and return to the [TEST] screen of the currently selected test mode.

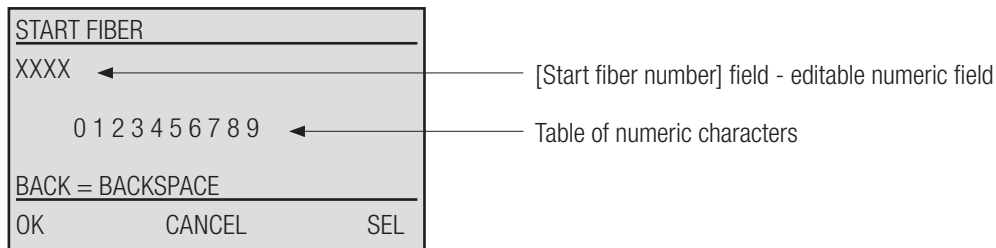- Or choose [NO] to return to the [EDIT FILE HEADER] screen.

Note: If you attempt to create a new file with the filename that already exist, you will be prompted to confirm overwriting. Choose [YES] to confirm or [NO] to cancel overwriting.

Setting the [TECHNICIAN] Parameter

To set the [TECHNICIAN] parameter, perform the following steps.

1   From the [EDIT FILE HEADER] screen, use either [Up] or [Down] arrow key to highlight the line labeled [TECH#].

2   Press the [SELECT] soft key to display the [TECHNICIAN] screen.

The display appears as follows:

```
TECHNICIAN
XXXXXXXXXXXX  ◄──────────────────   Editable text field

Table of alphanumeric characters          ◄─── Table of alphanumeric characters

BACK = BACKSPACE
OK              CANCEL          SEL
```

3   Press the [BACK] key multiple times to clear the editable text field if needed.

4   Use either [Up] or [Down] arrow key to highlight the desired character from the displayed table of alphanumeric characters.

5   Press the [SEL] soft key to enter the highlighted character in the filename field.

6   Repeat steps 4 & 5 to enter up to 12 characters.

7   When you finish entering characters, press the [OK] soft key to return to the [EDIT FILE HEADER] screen.

8   You may continue setting other test identification parameters by selecting the desired parameter (refer to the corresponding section for details).

9   Or you may save the created file by pressing the [SAVE] soft key.

10 If you choose the [SAVE] option, you will be prompted to confirm creation of a new file.

- Choose [YES] to save the created file and return to the [TEST] screen of the currently selected

test mode.

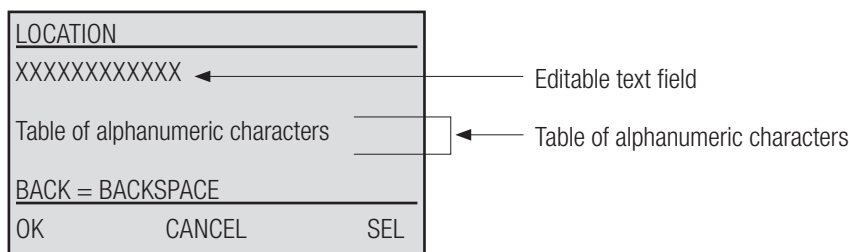- Or choose [NO] to return to the [EDIT FILE HEADER] screen.

Note: If you attempt to create a new file with the filename that already exist, you will be prompted to confirm overwriting. Choose [YES] to confirm or [NO] to cancel overwriting.

Setting the [JOB] Parameter

To set the [JOB] parameter, perform the following steps:

1 From the [EDIT FILE HEADER] screen, use either [Up] or [Down] arrow key to highlight the line labeled [JOB].

2 Press the [SELECT] soft key to display the [JOB] screen.

The display appears as follows:

```
JOB
XXXXXXXXXXXX  ◄————————————————  Editable text field

Table of alphanumeric characters  ◄————  Table of alphanumeric characters

BACK = BACKSPACE
OK            CANCEL           SEL
```

3 Press the [BACK] key multiple times to clear the editable text field if needed.

4 Use either [Up] or [Down] arrow key to highlight the desired character from the displayed table of alphanumeric characters.

5 Press the [SEL] soft key to enter the highlighted character in the filename field.

6 Repeat steps 4 & 5 to enter up to 12 characters.

7 When you finish entering characters, press the [OK] soft key to return to the [EDIT FILE HEADER] screen.

8 You may continue setting other test identification parameters by selecting the desired parameter (refer to the corresponding section for details).

9 Or you may save the created file by pressing the [SAVE] soft key.

10 If you choose the [SAVE] option, you will be prompted to confirm creation of a new file.

- Choose [YES] to save the created file and return to the [TEST] screen of the currently selected test mode.

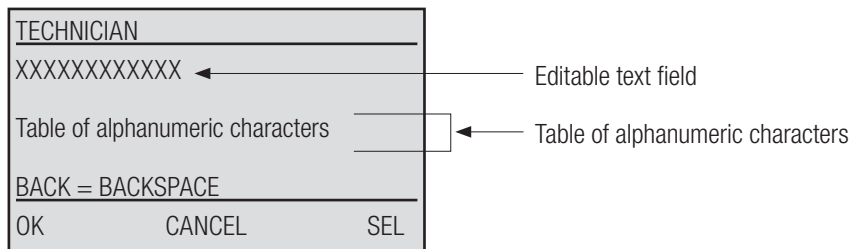- Or choose [NO] to return to the [EDIT FILE HEADER] screen.

Note: If you attempt to create a new file with the filename that already exist, you will be prompted to

confirm overwriting. Choose [YES] to confirm or [NO] to cancel overwriting.

Adding Notes

To add [NOTES], perform the following steps.

1   From the [EDIT FILE HEADER] screen, use either [Up] or [Down] arrow key to highlight the line labeled [NOTE].

2   Press the [SELECT] soft key to display the [NOTES] screen.

The display appears as follows:
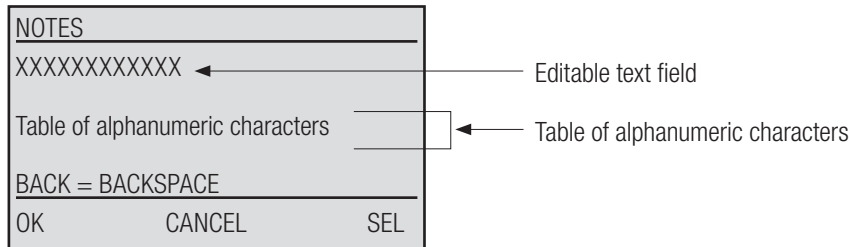
```
NOTES
XXXXXXXXXXXX  ◄──────────────────  Editable text field

Table of alphanumeric characters      ◄──  Table of alphanumeric characters

BACK = BACKSPACE
OK          CANCEL          SEL
```

3   Press the [BACK] key multiple times to clear the editable text field if needed.

4   Use either [Up] or [Down] arrow key to highlight the desired character from the displayed table of alphanumeric characters.

5   Press the [SEL] soft key to enter the highlighted character in the filename field.

6   Repeat steps 4 & 5 to enter up to 28 characters.

7   When you finish entering characters, press the [OK] soft key to return to the [EDIT FILE HEADER] screen.

8   You may continue setting other test identification parameters by selecting the desired parameter (refer to the corresponding section for details).

9   Or you may save the created file by pressing the [SAVE] soft key.

10 If you choose the [SAVE] option, you will be prompted to confirm creation of a new file.

• Choose [YES] to save the created file and return to the [TEST] screen of the currently selected test mode.

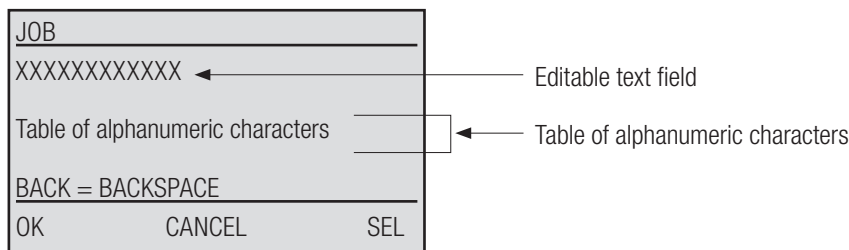• Or choose [NO] to return to the [EDIT FILE HEADER] screen.

Note: If you attempt to create a new file with the filename that already exist, you will be prompted to confirm overwriting. Choose [YES] to confirm or [NO] to cancel overwriting.

Opening Saved Files

1   From the [FILE MENU] screen, use either [UP] or [DOWN] arrow key to highlight the [OPEN] option.

2   Press the [SELECT] soft key to access the [OPEN FILE] screen. A list of saved files will be displayed.

Note: The [>] symbol next to the filename indicates the current file.

3   Use either [UP] or [DOWN] arrow key to highlight the desired file.

  • You may press [UP], [DOWN], or [MORE/TOP] (if displayed) soft keys to scroll through the list of saved files.

4   Once the desired file is highlighted, press the [SELECT] soft key to make it current.

Note: You will need to make the desired file current to perform the following functions:

  • Save test results to the desired file

  • Transfer files to a PC

  • Edit test identification parameters

Editing Test Identification Parameters

Once a new file is created and test identification parameters are set, they may be edited at any time. Editing is done in the [EDIT FILE HEADER] screen. For details, refer to sections titled as follows:

Deleting Files

TURBOTEST 500B allows you to delete the selected file or all saved files at once. Perform the following steps.

1   From the [FILE MENU] screen, use either [UP] or [DOWN] arrow key to highlight the [DELETE FILE] option.

2   Press the [SELECT] soft key to access the [DELETE FILES] screen. A list of saved files will be displayed.

3   Use either [UP] or [DOWN] arrow key to highlight the file to be deleted.

4   Press the [DEL] soft key to delete the selected file.

5   When prompted to confirm deletion, choose [YES] or [NO].

6   By pressing the [ALL] soft key, you may delete all saved files at once. When prompted to confirm deletion, choose [YES] or [NO].

7   To return to the [FILE MENU] screen, press the [BACK] key

Transferring Test Results to a PC

The TURBOTEST 500B can store internally up to 460 in any combination of its four operating modes. With the supplied Windows compatible software, stored test results can be transferred to a PC for a complete report generation.

To transfer files to a PC:

1   Install the PC Software supplied with your TURBOTEST 500B.

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

2   Using the supplied serial cable, connect the TURBOTEST 500B instrument to the available COM Port on your PC.

3   Open the installed PC Software.

- From the Software [Instrument] menu, select TURBOTEST 500B.

- From the Software [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 TURBOTEST 500B instrument.

- From the software [File] menu, select the [Receive Stored Report] command.

4   From the TURBOTEST 500B [MAIN MENU] screen, use either [UP] or [DOWN] arrow key to highlight the [FILE] option.

5   Press the [SELECT] soft key to access the [FILE MENU] screen.

6   From the [FILE MENU] screen, use either [UP] or [DOWN] arrow key to highlight the [TRANSFER TO PC] option.

7   Press the [SELECT] soft key to access the [REPORT] screen of the current test mode.

8   From the [REPORT] screen, choose one of the following:

- You may press the [SELECT] soft key to transfer the current file.

- You may press the [All] soft key to transfer all files of the current test mode.

9   When download is complete, press the [BACK] key several times (or press and hold) to return to the test screen.

Viewing Statistics

The [STATISTICS] screen allows you to review the following information:

- Total number of saved files.
- Number of saved files per every test mode.
- Number of used and free fibers.
- Percentage of the available memory.

To view statistics:

1 From the [MAIN MENU] screen, use either [UP] or [DOWN] arrow key to highlight the [FILE] option.

2 Press the [SELECT] soft key to access the [FILE MENU] screen.

3 From the [FILE MENU] screen, use either [UP] or [DOWN] arrow key to highlight the [STATISTICS] option.

4 Press the [SELECT] soft key to display the [STATISTICS] screen.

5 Press the [PAGE] soft key to toggle between the [STATISTICS] screen # 1 and screen # 2.

6 Press the [BACK] key to return to the [FILE MENU] screen.

Other Functions Menu

All the commands and sub-screens you need for general setup, adjusting power, generating a [Tone] signal, and setting OLTS and ORL Pass/Fail limits can be accessed from the [OTHER FUNCTIONS] screen.

To access the [OTHER FUNCTIONS] screen, perform the following steps:

- From any screen, press the [Menu] key to display the [MAIN MENU] of the currently selected test mode.

- From the [MAIN MENU] screen, use either [Up] or [Down] arrow key to highlight the [OTHER FUNCTIONS] option.

- Press the [SELECT] soft key to display the [OTHER FUNCTIONS] screen.

Other Functions Menu Configuration

The diagram below illustrates the [OTHER FUNCTIONS] menu structure.
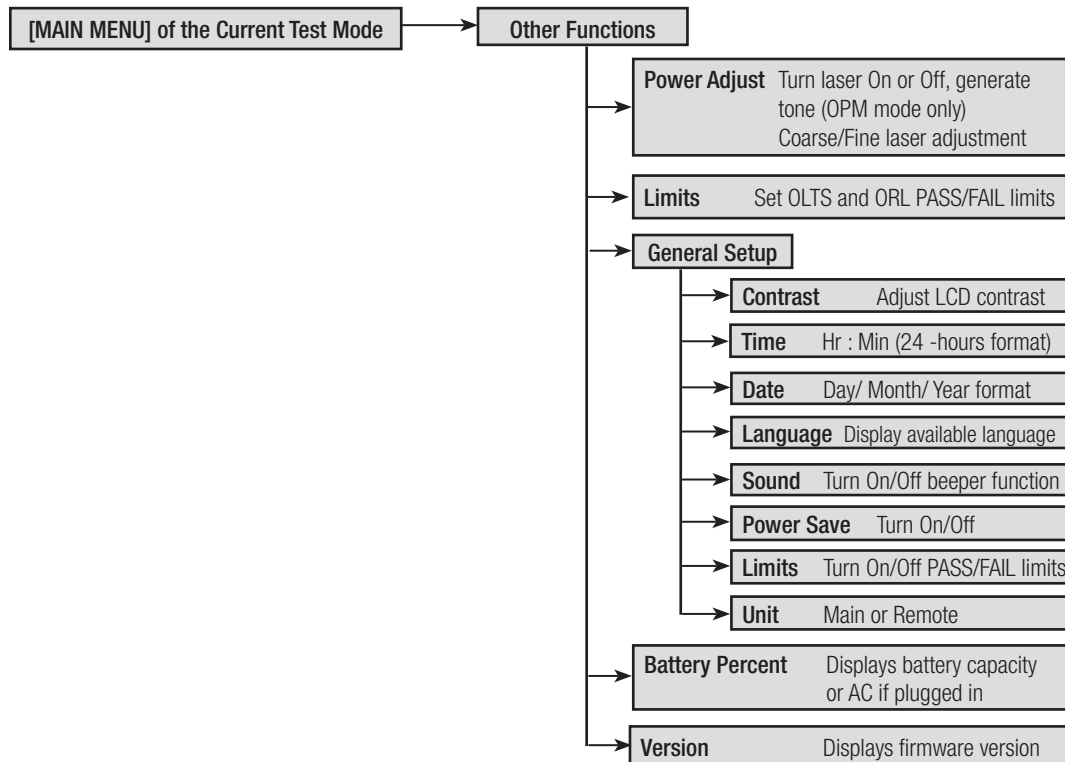
Figure 3-3. Other Functions Menu Configuration.

Power Adjustment

Use the following procedures to turn lasers [ON], [OFF], or to generate a [Tone] signal (270 Hz , 1 KHz, or 2 KHz) and adjust the [Continuous Wave - CW] signal. Refer to Figure 3-4 for a related illustration.

Note: Every operating test mode allows you to access the [POWER ADJUSTMENT] screen and perform the [Continuous Wave - CW] signal adjustment, but to turn lasers [ON], [OFF] or to generate a [Tone] signal (270 Hz, 1 KHz, 2 KHz), you need to enable the [OPM] test mode.

If lasers have been adjusted since last OLTS and/or ORL referencing , references need to be reset after adjustment.

Turning Lasers On/Off and Generating a Tone Signal

1 Enable the [OPM] test mode, then press the [MENU] key to display the [OPM MAIN MENU] screen.

2 Use either [UP] or [DOWN] arrow key to highlight the [OTHER FUNCTIONS] option.

3 Press the [SELECT] soft key to access the [OTHER FUNCTIONS] screen.

4 The [POWER ADJUST] option is highlighted by default.

5 Press the [SELECT] soft key to display the adjustment sub-screen.

6 Attach the APC connector on the reference cable to the Test Port.

7 Attach the UPC connector on the reference cable to the OPM Port.

8 Press the [λ] soft key to select the laser to be adjusted.

9 Press the [OFF /ON/ 270/ 1K/ 2K] soft key to turn the selected laser [ON], [OFF], or to generate a [Tone] signal (270 Hz, 1 KHz, 2 KHz).

10 When all adjustments are done, press the [BACK] key to return to the OTHER FUNCTIONS screen.
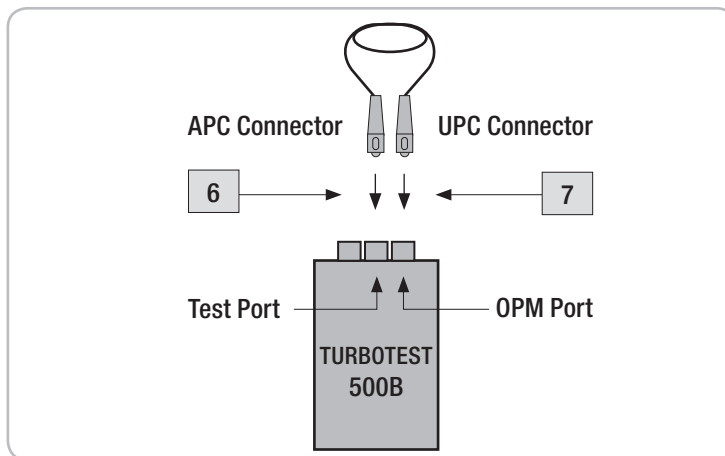
Figure 3-4. Laser Adjustment Setup.

Adjusting Continuous Wave - CW Signal

1 Enable the [OPM] test mode, then press the [MENU] key to display the [OPM MAIN MENU] screen.

2 Use either [UP] or [DOWN] arrow key to highlight the [OTHER FUNCTIONS] option.

3 Press the [SELECT] soft key to access the [OTHER FUNCTIONS] screen.

4 The [POWER ADJUST] option is highlighted by default.

5 Press the [SELECT] soft key to display the adjustment sub-screen.

6 Attach the APC connector on the reference cable to the Test Port.

7 Attach the UPC connector on the reference cable to the OPM Port.

8 Press the [λ] soft key to select the laser to be adjusted.

9 Press the [COARSE/ FINE] soft key to toggle between the [FINE] and [COARSE] adjustment mode.

10 Use the [Up] or [Down] arrow keys to increase or decrease the Continuous Wave - CW value displayed on the screen.

11 When all adjustments are done, press the [BACK] key to return to the OTHER FUNCTIONS screen.

Setting Limits

1 From the [MAIN MENU] screen, use either [UP] or [DOWN] arrow key to highlight the [OTHER FUNCTIONS] option.

2 Press the [SELECT] soft key to access the [OTHER FUNCTIONS] screen.

3 Use either [UP] or [DOWN] arrow key to highlight the [LIMITS] option.

4 Press the [SELECT] soft key to display the [LIMITS] screen.

5 Choose either [OLTS LIMITS] or [ORL LIMITS] option, then press the [SELECT] soft key to access the [OLTS LIMITS] or [ORL LIMITS] sub-screen.

6 Press the [λ] soft key to select the desired wavelength (refer to Section titled "Selecting Test Wavelength", page 23).

7 Press the [COARSE/ FINE] soft key to toggle between the [COARSE] and [FINE] adjustment mode.

8 Press either [UP] or [DOWN] arrow key to increase or decrease the limit value displayed on the screen. You may set limits within the allowable range as follows:

9 When done, press the [SET] soft key to save settings.

10 Press the [BACK] key to return to the previous screen.

Note: [PASS/FAIL] limits must be set to [ON] in the [GENERAL SETUP] screen before use.

General Setup

The [GENERAL SETUP] sub-screen allows you to adjust Contrast, set Time/Date, and enable or disable the [SOUND], [POWER SAVE], or [LIMITS] functions.

1 From the [OTHER FUNCTIONS] screen, use either [UP] or [DOWN] arrow key to highlight the [GENERAL SETUP] option.

3 Press the [SELECT] soft key to access the [GENERAL SETUP] screen.

4 Press the [PAGE] soft key to toggle between the [GENERAL SETUP] screen # 1 and screen # 2.

Setting Contrast

1 From the [GENERAL SETUP] screen, use either [UP] or [DOWN] arrow key to highlight the [CONTRAST] option, then press the [SELECT] soft key to activate.

2 Press either **[-]** or **[+]** soft key to decrease or increase the contrast value.

3 Press the [BACK] key to deactivate the [CONTRAST] option and save settings.

Setting Time and Date

1 From the [GENERAL SETUP] screen, use either [UP] or [DOWN] arrow key to highlight the [TIME/DATE] option.

2 Press the [SELECT] soft key to access the [TIME/DATE] screen.

3 Press the **[<]** and **[>]** arrow soft keys to select the parameter to be changed.

4 Use either [UP] or [DOWN] arrow key to increase or decrease the value.

5 Press the [BACK] key to save settings and return to the [SETUP] screen.

Enabling Sound, Power Save, and Limits

1 From the [GENERAL SETUP] screen, use either [UP] or [DOWN] arrow key to highlight the desired function: [SOUND], [POWER SAVE], or [LIMITS].

2 Press the **[+]** soft key to turn the selected function [ON] or [OFF].

3 Press the [BACK] key to save settings and return to the previous screen.

Note: If the [POWER SAVE] option is set to [ON], the unit will power off automatically 10 minutes after the last key press.

Section 4: Turbo Mode - Measuring Insertion & Return Loss

Screens and Menus
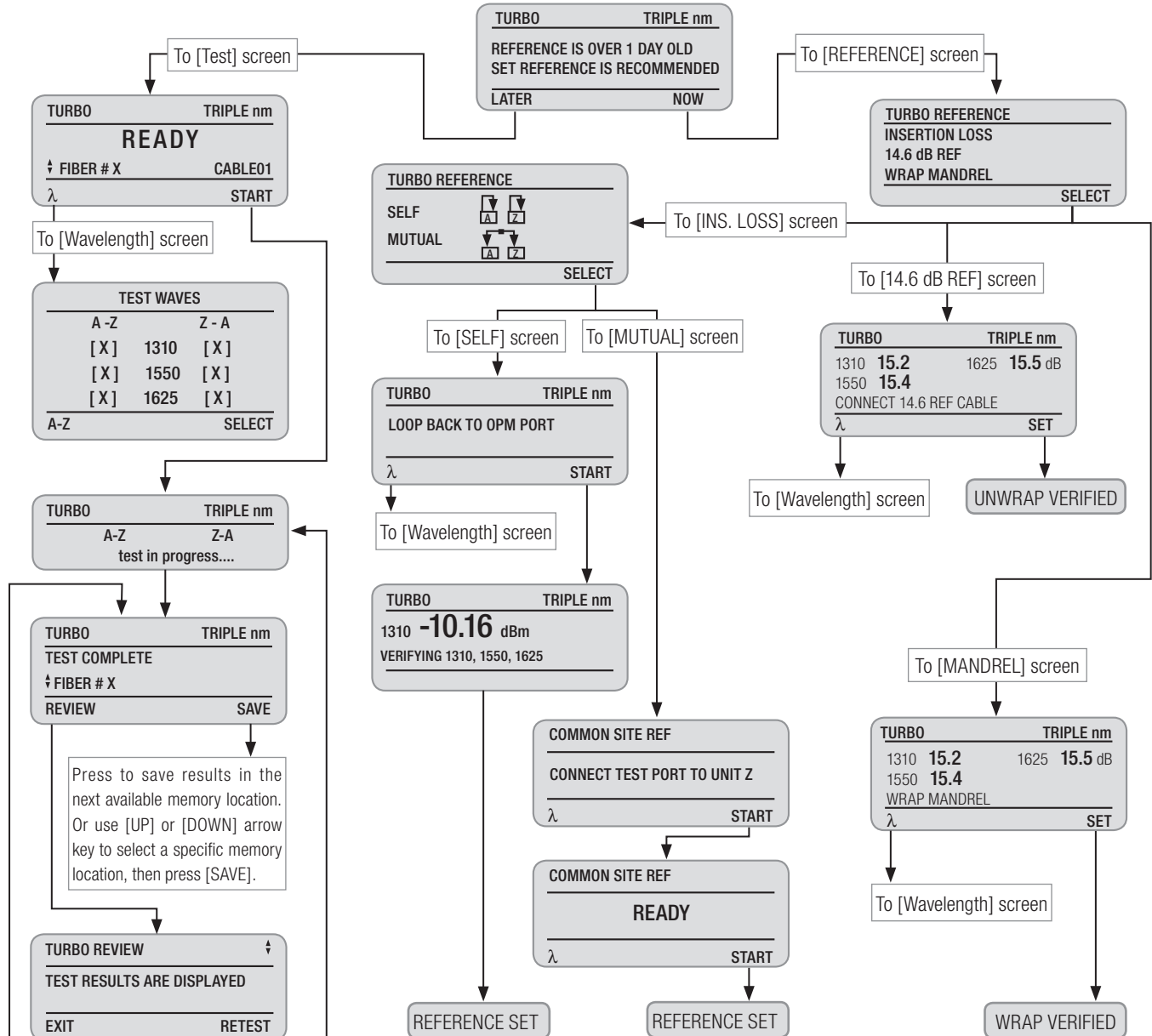
Figure 4-1. TURBO Mode Screens and Menus.

Two TURBOTEST 500B units are required to perform bi-directional insertion loss and return loss tests on a single fiber. One unit must be operating in the [TURBO] mode while another - in the [REMOTE] test mode. When the [TURBO] test mode is selected, the LCD display on the MAIN unit shows the [TURBO] indicator in the upper left part of the screen and the selected wavelength(s) in the upper right part of the screen. The LCD display on the REMOTE unit shows the [REMOTE] indicator in the upper left part of the screen.

```
┌─────────────────────────────┐   ┌─────────────────────────────┐
│ TURBO            TRIPLE nm   │   │ REMOTE                      │
│         READY               │   │         READY               │
│ ‡ FIBER # X                 │   │                             │
│ λ                  START    │   │                             │
└─────────────────────────────┘   └─────────────────────────────┘
```

Selecting a Test Wavelength

The following procedure is common for all [TURBO] and [OLTS] mode test screens or sub-screen where the wavelengths selection option is available. To select a wavelength, perform the following steps.

1 Press the [λ] to access the [TEST WAVES] screen. The display will read as follows:

```
                        TEST WAVES
A to Z direction of test  ──►A - Z        Z - A ◄──  Z to A direction of test
[   ] indicates that 1310nm, ──►[  ]  1310  [ X ]
direction A to Z is deselected   [ X ]  1550  [ X ] ◄── Available wavelengths
[ X ] indicates that 1625nm, ──►[ X ]  1625  [ X ] ◄── [ X ] Indicates the highlighted
direction A to Z is selected  A-Z         SELECT        wavelength
```
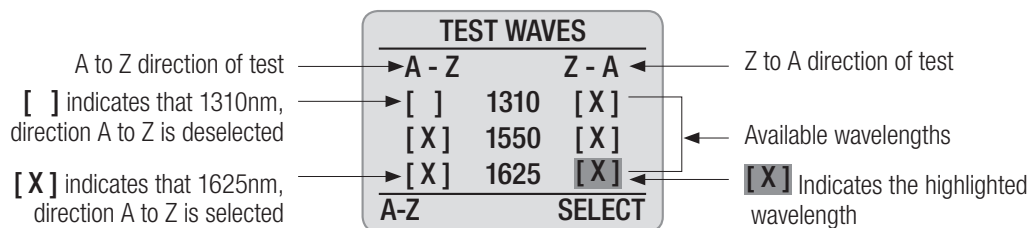
2 Press either [UP] or [DOWN] arrow key to highlight the desired wavelength.

3 Press the [A-Z] / [Z-A] soft key to select the direction of test.

4 Press the [SELECT] soft key to select or deselect the test wavelength.

5 When the desired wavelengths are selected, press the [Back] key to return to the previous screen.

Setting References

Setting references is recommended on a daily basis before testing and when changing test jumper(s). Lasers must be set to -5 dBm output (refer to the section titled "Power Adjustment", page 19). If lasers have been adjusted since last referencing, references need to be reset.

Clean all fiber optic connectors and optical ports before performing test procedures described below.

On entry to the [TURBO] test mode, the MAIN T500B unit will determine if the reference hasn't been set for over 24 hours and prompt you to re-reference.

The display will read:

```
TURBO                    TRIPLE nm

REFERENCE IS OVER 1 DAY OLD
SET REFERENCE IS RECOMMENDED

LATER                         NOW
```

- Pressing the [LATER] soft key allows you to omit setting references and use the old reference values.

- Pressing the [NOW] soft key allows you to access the [TURBO REFERENCES] screen and select the desired option as follows:

Turbo References

Insertion Loss	Self Referencing	[Loop Back to OPM port] screen
	Mutual Referencing	[Connect Test Port to Unit Z] screen
14.6 dB REF	[Connect 14.6 Ref Cable] screen	
WRAP MANDREL	[Wrap Mandrel] screen	
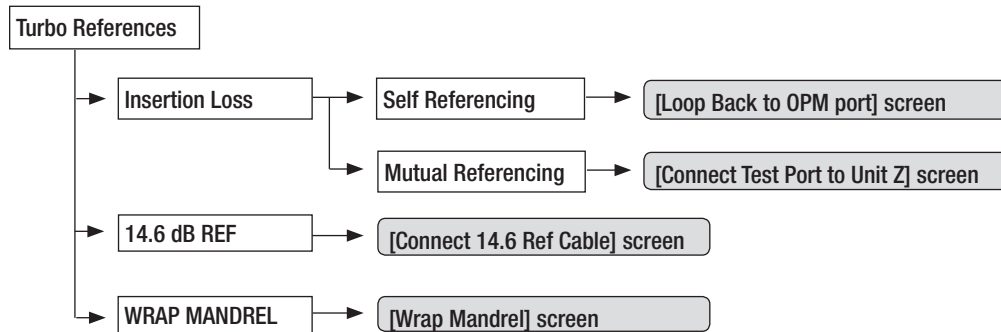
Note: You may also access the [TURBO REFERENCE] screen from the TURBO [MAIN MENU] screen as follows:

- Press the [MENU] key

- Use either [UP] or [DOWN] arrow key to highlight the [REFERENCES] option

- Press the [SELECT] soft key to display the [TURBO REFERENCE] screen

OLTS - Insertion Loss Reference

[INSERTION LOSS] referencing allows you to reference the laser output for accurate loss measurement of a fiber link. Two methods are available for setting an insertion loss reference: [SELF] or [MUTUAL].

Note: The [MUTUAL] referencing is available for eliminating variations due to connector tolerance

when self-referencing. Either referencing method may be selected for performing an insertion loss reference setup.

SELF Referencing

Clean all fiber optic connectors and optical ports before performing test procedures described below. Refer to Figure 4-2 for a related illustration.

1 On entry to the [TURBO REFERENCE] screen, the [INSERTION LOSS] screen is highlighted by default. Press the [SELECT] soft key to access the [INSERTION LOSS REFERENCE] sub-screen.

2 Using either [UP] or [DOWN] arrow key highlight the [SELF] option.

3 Press the [SELECT] soft key to access the [LOOP BACK TO OPM PORT] 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 the [λ] to select the desired wavelength to be referenced (refer to Section titled "Selecting Test Wavelength", page 23).

7 When the desired wavelengths are selected, press the [Back] key to return to the [LOOP BACK TO OPM PORT] screen.

8 From the [LOOP BACK TO OPM PORT] screen, press the [START] soft key to begin the verification. Once the display reads [REFS VERIFIED] followed by a beep (if the beeper function is enabled), then the reference is set.

Note: If the display reads [NOT VERIFIED], clean all fiber optic connectors again and check for excessive fiber bends, be sure laser output is properly set. Perform the required procedures over.
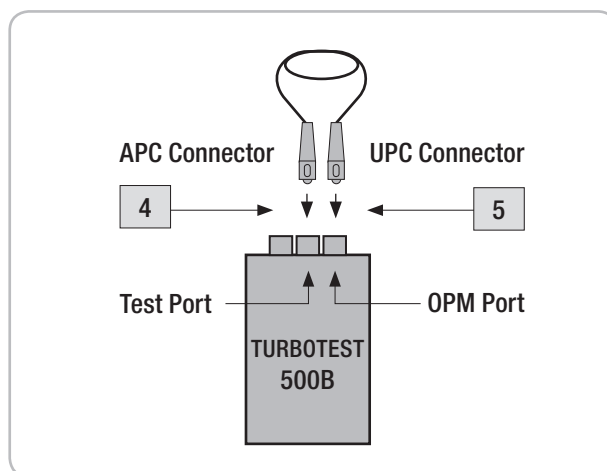
Figure 4-2. Self Referencing.

MUTUAL Referencing

Clean all fiber optic connectors and optical ports before performing test procedures described below. Refer to Figure 4-3 for a related illustration.

1   On entry to the [TURBO REFERENCE] screen, the [INSERTION LOSS] screen is highlighted by default. Press the [SELECT] soft key to access the [INSERTION LOSS REFERENCE] sub-screen.

2   Using either [UP] or [DOWN] arrow key highlight the [MUTUAL] option.

3   Press the [SELECT] soft key to access the [CONNECT TEST PORT TO UNIT Z] screen.

4   Attach the APC connector on one reference cable to the Test Port (unit A - MAIN).

5   Attach the APC connector on another reference cable to the Test Port (unit Z - REMOTE).

6   Mate free ends (UPC connectors) of test cables using the appropriate adapter.

7   Press the [λ] to select the desired wavelength to be referenced (refer to Section titled "Selecting Test Wavelength", page 23).

8   When the desired wavelengths are selected, press the [Back] key to return to the [CONNECT TEST PORT TO UNIT Z] screen.

9   From the [CONNECT TEST PORT TO UNIT Z] screen, press the [START] soft key on the MAIN unit to begin referencing. If prompted to confirm re-referencing, choose [YES].

10   When both units display [READY], press the [START] soft key on the MAIN unit.

11   When the MAIN unit displays [REFERENCE SET], press the [BACK] key several times to return to the [TURBO] test screen.

Figure 4-3. Mutual Referencing.

ORL - Return Loss Reference

ORL reference characterizes/calibrates the upper and lower back-reflection limits.
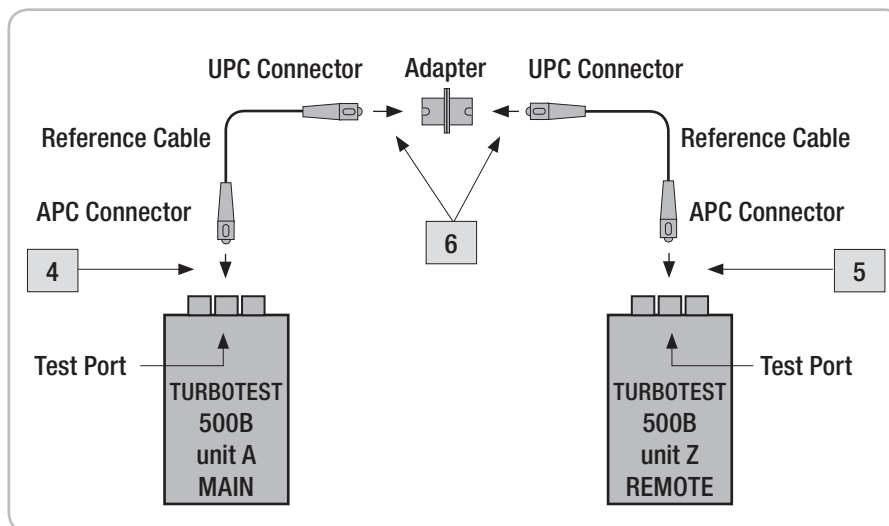
Clean all fiber optic connectors and optical ports before performing test procedures described below.

Step I: 14.6 dB Referencing - setting the upper ORL limit

1 From the [TURBO REFERENCE] screen, use either [UP] or [DOWN] arrow key highlight the [14.6 dB REF] option.

2 Press the [SELECT] soft key to access the [CONNECT 14.6 REF CABLE] screen.

3 Press the [λ] to select the desired wavelength to be referenced (refer to Section titled "Selecting Test Wavelength", page 23).

4 When the desired wavelengths are selected, press the [Back] key to return to the [CONNECT 14.6 REF CABLE] screen.

5 Clean the Test port and connectors on the reference cable.

6 Attach the APC connector on the reference cable to the Test Port. Use a dust cap for covering UPC connector to prevent ambient light.

7 From the [CONNECT 14.6 REF CABLE] screen, press the [SET] soft key to set the upper ORL limit.

8 If the display reads [NOT VERIFIED] followed by two beeps (if the beeper function is enabled), clean and inspect connectors and Test port, and then repeat step 7.

9 If the display reads [UNWRAP VERIFIED] followed by a beep, the value is accepted.

Step II: Mandrel Wrap Referencing - setting the lower ORL limit

Refer to Figure 4-4 for a related illustration.

1 From the [TURBO REFERENCE] screen, use either [UP] or [DOWN] arrow key to highlight the [WRAP MANDREL] option.

2 Press the [SELECT] soft key to access the [WRAP MANDREL] screen.

3 Press the [λ] to select the desired wavelength to be referenced (refer to Section titled "Selecting Test Wavelength", page 23).

4 When the desired wavelengths are selected, press the [Back] key to return to the [WRAP MANDREL] screen.

5 Clean the Test port and connectors on the reference cable.

6 Attach the APC connector on the reference cable to the Test Port.

7 Terminate the reference cable by slowly wrapping it around the supplied mandrel until the back-reflectance reading no longer changes. In most cases 10 wraps are sufficient.

   Note: The TURBOTEST 500B will accept an ORL reference between 40 and 70 dB. When measuring optical return loss, the higher the measurement value equals less reflection. For example, a fiber link measuring 35 dB has more reflection than a link measuring 45 dB.

8 While holding the wrap, press the [SET] soft key to save the reference values.

9 If the display reads [NOT VERIFIED] followed by two beeps, unwrap the reference cable, clean all fiber optic connectors again and check for fiber breaks, and then repeat steps 5 - 8.

10 If the display reads [WRAP VERIFIED] followed by a beep, the reference is set. You may unwrap the reference cable.

   Note: Do not unwrap the reference cable until after the [WRAP VERIFIED] message is displayed followed by the beep.
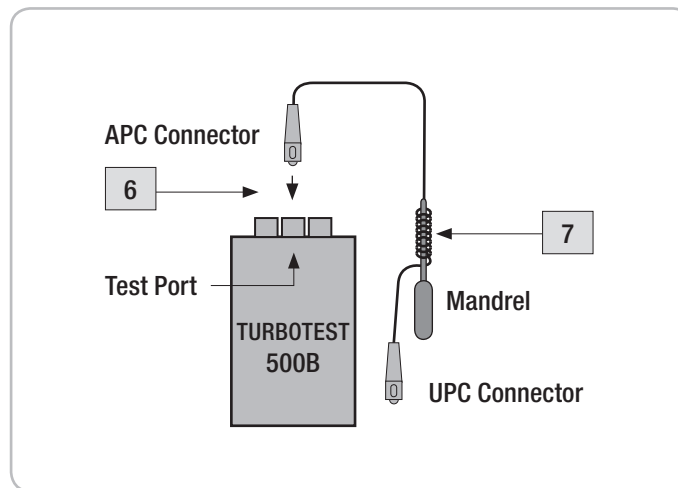
Figure 4-4. Mandrel Wrap Referencing.

Performing a TURBO Test

Use the following procedures on both TURBOTEST 500B units to simultaneously perform insertion and return loss tests on a single fiber optic link. For this setup procedure the two units will be differentiated by T500B unit A-MAIN and T500B unit Z-REMOTE.

Clean all fiber optic connectors and optical ports before performing test procedures described below. Refer to Figure 4-5 for a related illustration.

1 Attach the APC connector on the reference cable to the Test Port.

2 Attach the UPC connector on the reference cable to the link under test.

3 From the [TEST] screen, press the [λ] soft key on the MAIN unit to select the desired wavelength (refer to Section titled "Selecting Test Wavelength", page 23).

4 When the desired wavelengths are selected, press the [Back] key to return to the [TEST] screen.

5 When the [READY] label is displayed, press the [START] soft key on the MAIN unit to begin testing. The T500B unit A-MAIN attempts to establish a data link with the T500B unit Z-REMOTE. Once linked, the units exchange reference information, and then measure the following:

- insertion loss from T500B unit A to unit Z
- insertion loss from T500B unit Z to unit A
- return loss from T500B unit A to unit Z
- return loss from T500B unit Z to unit A

6 At the completion of the test, the T500B-MAIN unit will prompt you to [REVIEW] or [SAVE] the test results.
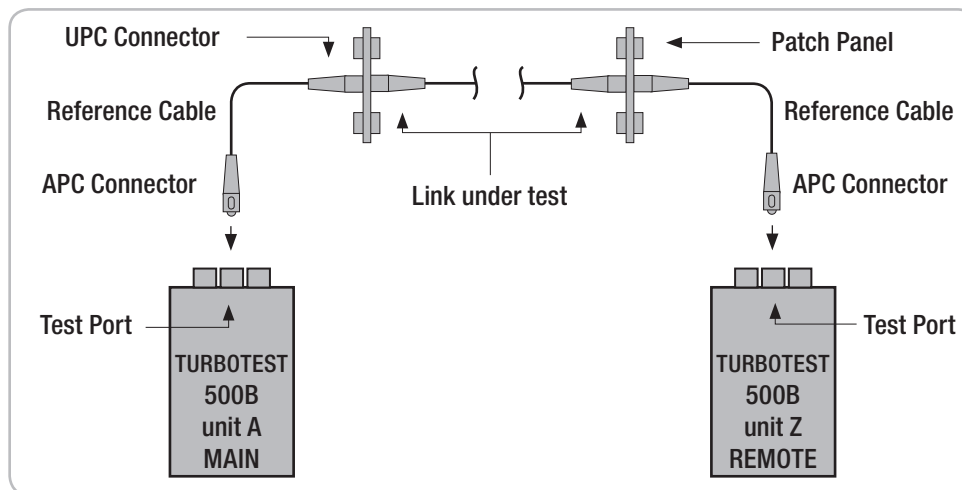
Figure 4-5. Performing a TURBO Test.

To Review Test Results (MAIN unit only):

7   From the [TEST COMPLETE] screen, press the [REVIEW] soft key to display the [TURBO REVIEW] screen (refer to Figure 4-6).

8   Press either [UP] or [DOWN] arrow key to toggle between [ORL] - optical return loss test results and [LOSS] insertion loss test results.

9   You may press the [RETEST] soft key to retest the link.

10 To return to the [TEST COMPLETE] screen, press either [EXIT] soft key or [BACK] key.

To Save Test Results (MAIN unit only):

11 From the [TEST COMPLETE] screen, press the [SAVE] soft key to store measurements in the next available memory location.

12 To save test results in a specific memory location, perform the following steps:

   • Press either [UP] or [DOWN] arrow key to select a specific memory location (increase or decrease fiber number).

   • Press the [SAVE] soft key to store test results in the selected location.

Once saved, test results can later be retrieved.

Figure 4-6. Reviewing Test Results.

Reviewing Saved TURBO Test Results

1   Prior to reviewing saved tests, select the [TURBO] test mode, and then [OPEN] the file to be viewed (refer to sections titled "Selecting Test Mode", page 7 and "Opening Files", page 15).

2   Press the [MENU]key to display the [TURBO MAIN MENU] screen.

3   The [REVIEW RESULTS] option is highlighted by default.

4   Press the [SELECT] soft key to access the [TURBO RESULTS] screen (refer to Figure 4-7).

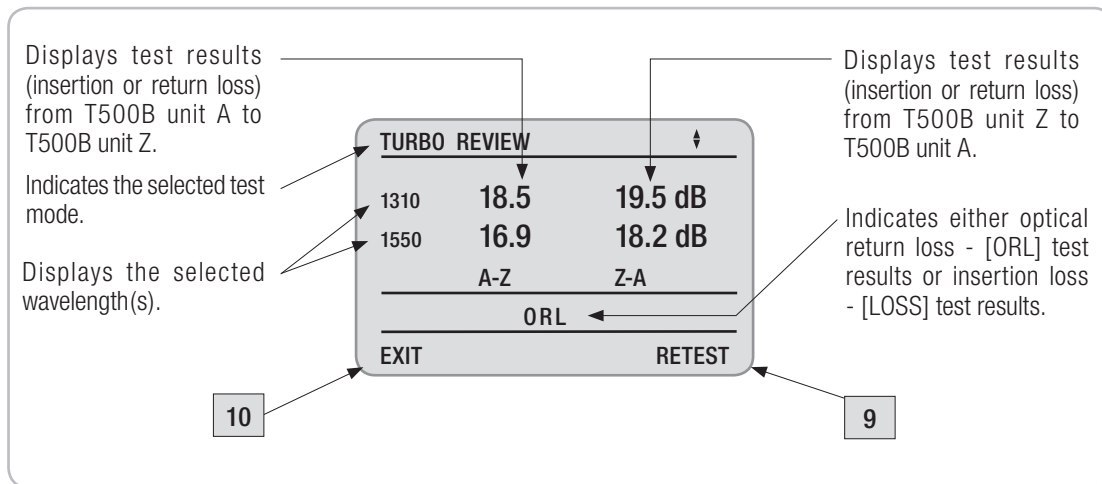5   Using either [UP] or [DOWN] arrow key highlight the desired test (fiber) number.

6   You may press the [MORE] soft key to scroll through saved test results.

7   Press the [SELECT] soft key to view the highlight test.

8   When test results are displayed, press either [UP] or [DOWN] arrow key to toggle between [LOSS] - insertion loss and [ORL] - return loss records.

9   To return to the [TURBO RESULTS] screen, press either [Exit] soft key or [Back] key.

Use either UP or DOWN arrow key to highlight the desired test.

Indicates date and time of the selected saved test.

Saved test (fiber) number

```
TURBO RESULTS          ▲▼
 18FEB02  12:56P
 70            TRPL
 69            1315
 68            1516
 67            1310
 66            1550
 MORE               SELECT
```

Highlight bar - Indicates the selected file.

Test wavelength:
   1310 - 1310 nm,
   1490 - 1490 nm
   1550 - 1550 nm,
   1625 - 1625 nm,
   1315 - 1310/1550 nm,
   1415 - 1490/1550 nm,
   1516 - 1550/1625 nm,
   TRPL - TRIPLE

Press to display more tests
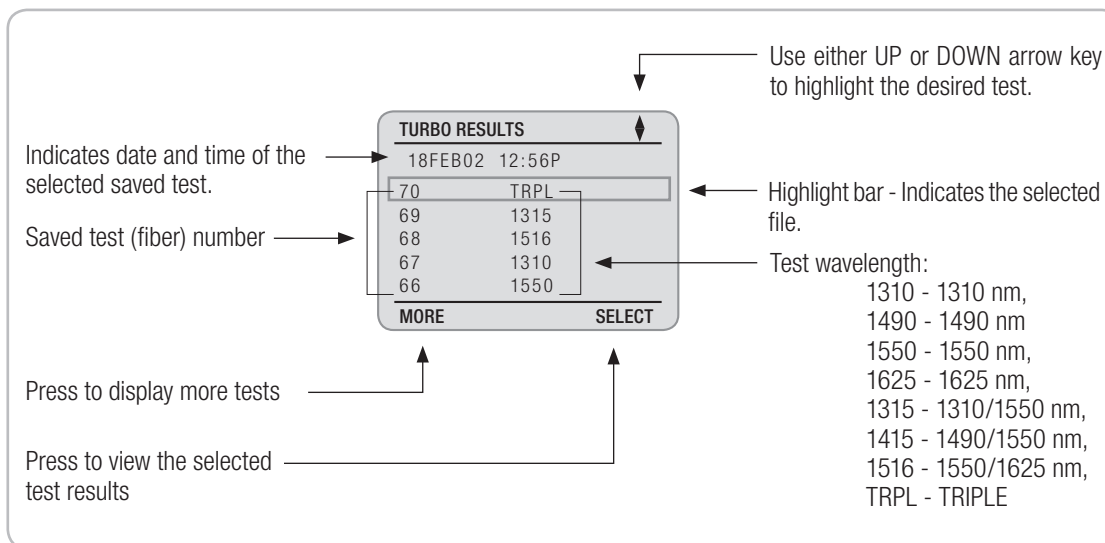
Press to view the selected test results

Figure 4-7. Reviewing Saved Test Results.

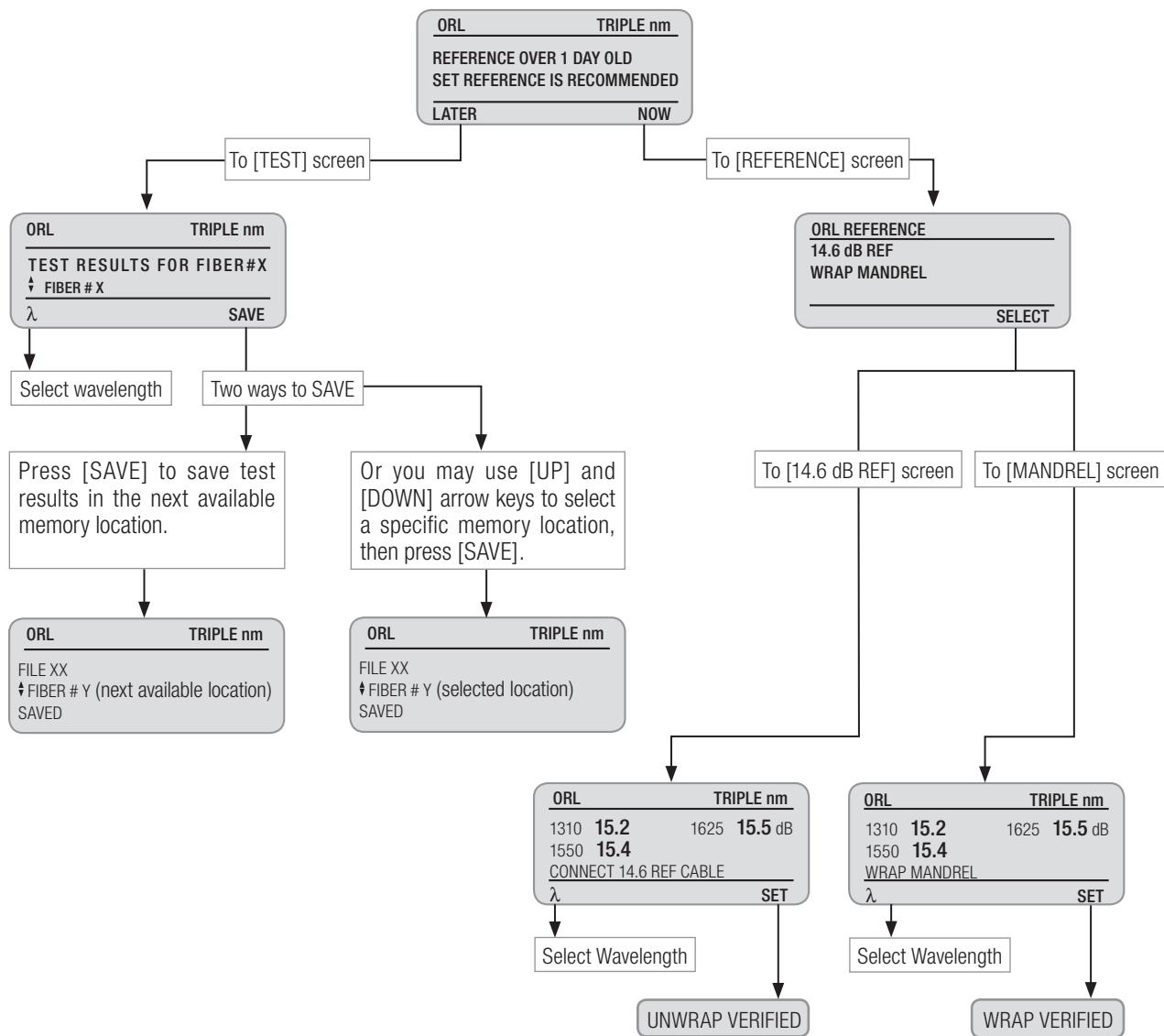# Section 5: ORL Mode - Measuring Optical Return Loss

Screens and Menus

Figure 5-1. ORL Mode Screens and Menus.

One TURBOTEST 500B unit is required to perform an optical return loss test. Fiber optic terminators are recommended to remove back-reflections when testing fiber link less than 60 kilometers (37.5 miles) in length. Call Noyes for ordering information. Refer to Appendix A for a chart and graph relating to return loss of a fiber link with open end vs. terminated end.
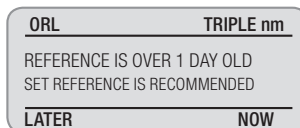
Setting References

Use the following procedures to perform an optical return loss reference setup. Setting references is recommended on a daily basis before testing and when changing test jumper(s). Lasers must be set to -5 dBm output (refer to section titled "Common Functions: Power Adjustment", page 19). If lasers have been adjusted since last referencing, references need to be reset.

Clean all fiber optic connectors and optical ports before performing test procedures described below.

On entry to the [ORL] test mode, the TURBOTEST 500B unit will determine if the reference hasn't been set for over 24 hours and prompt you to re-reference.

The display will read:

```
 ORL                    TRIPLE nm

 REFERENCE IS OVER 1 DAY OLD
 SET REFERENCE IS RECOMMENDED

 LATER                       NOW
```

- Pressing the [LATER] soft key allows you to omit setting references and use the old reference values.

- Pressing the [NOW] soft key allows you to access the [ORL REFERENCE] screen and select the desired option as follows:

```
ORL REFERENCE

        14.6 dB REF    ───►  ( [Connect 14.6 Ref Cable] screen )

        WRAP MANDREL   ───►  ( [Wrap Mandrel] screen )
```
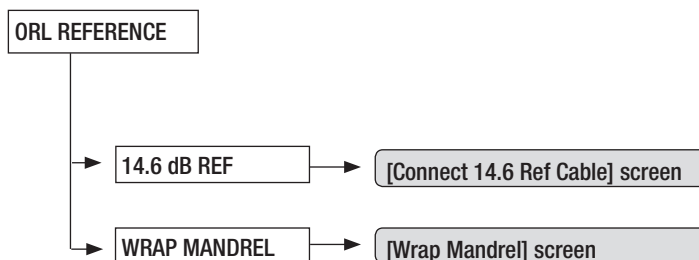
Note: You may also access the [REFERENCES] screen at any time from the [ORL MAIN MENU] screen. Press the [MENU] key, then choose [REFERENCES] option, and then press the [SELECT] soft key.

ORL - Return Loss Reference

ORL reference characterizes/calibrates the upper and lower back-reflection limits.

Clean all fiber optic connectors and optical ports before performing test procedures described below.

Step I: 14.6 dB Referencing - setting the upper ORL limit

1   From the [ORL REFERENCE] screen, use either [UP] or [DOWN] arrow key highlight the [14.6 dB REF] option.

2   Press the [SELECT] soft key to access the [CONNECT 14.6 REF CABLE] screen.

3   Press the [λ] to select the desired wavelength to be referenced.

4   Clean the Test port and connectors on the reference cable.

5   Attach the APC connector on the reference cable to the Test Port. Use a dust cap for covering UPC connector to prevent ambient light.

6   From the [CONNECT 14.6 REF CABLE] screen, press the [SET] soft key to set the upper ORL limit.

7   If the display reads [NOT VERIFIED] followed by two beeps (if the beeper function is enabled), clean and inspect connectors and Test port, and then repeat step 6.

8   If the display reads [UNWRAP VERIFIED] followed by a beep, the value is accepted.

Step II: Mandrel Wrap Referencing - setting the lower ORL limit

Refer to Figure 5-2 for a related illustration.

1   From the [ORL REFERENCE] screen, use either [UP] or [DOWN] arrow key to highlight the [WRAP MANDREL] option.

2   Press the [SELECT] soft key to access the [WRAP MANDREL] screen.

3   Press the [λ] to select the desired wavelength to be referenced.

4   Clean the Test port and connectors on the reference cable.

5   Attach the APC connector on the reference cable to the Test Port.

6   Terminate the reference cable by slowly wrapping it around the supplied mandrel until the back-reflectance reading no longer changes. In most cases 10 wraps are sufficient.

> **Note:** The TURBOTEST 500B will accept an [ORL] reference between 40 and 70 dB. When measuring optical return loss, the higher the measurement value equals less reflection. For example, a fiber link measuring 35 dB has more reflection than a link measuring 45 dB.

7   While holding the wrap, press the [SET] soft key to save the reference values.

8   If the display reads [NOT VERIFIED] followed by two beeps, unwrap the reference cable, clean all fiber optic connectors again and check for fiber breaks, and then repeat steps 5 - 7.

9   If the display reads [WRAP VERIFIED] followed by a beep, the reference is set. You may unwrap the reference cable.

> **Note:** Do not unwrap the reference cable until after the [WRAP VERIFIED] message is displayed followed by the beep.
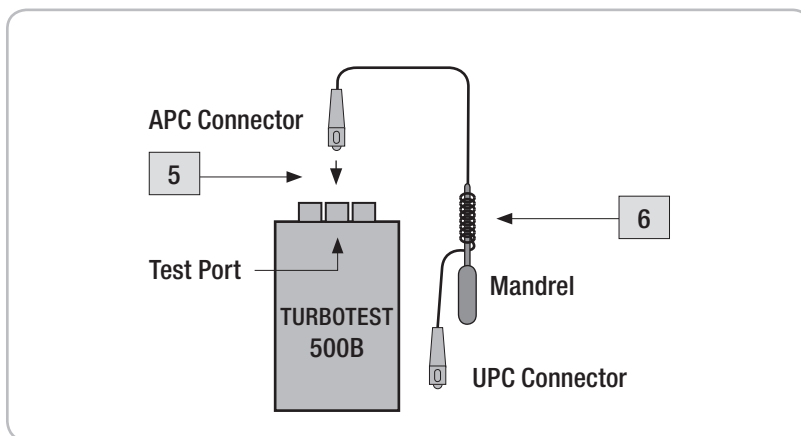

Figure 5-2. Mandrel Wrap Referencing.

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 TURBOTEST 500B is continuously measuring return loss, thus fiber movement will result in fluctuations in the displayed measurement values. Refer to Figure 5-3 for a related illustration.

1   Attach the APC connector on the reference cable to the Test Port.

2   Attach an 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 by slowly wrapping it around the supplied mandrel until the back-reflectance reading no longer changes. In most cases 10 wraps are sufficient.

5   The TURBOTEST 500B will automatically measure and display return loss of the connection.

   Note: If you do not want to wrap the jumper cable around the mandrel, attach a Terminator to the end of the cable to eliminate back reflections.

6   Press the [SAVE] soft key to store test results in the next available memory location.

7   If you need to save test results a specific memory location, perform the following steps:

   • Press either [UP] or[DOWN] arrow key to select a specific memory location (increase or decrease fiber number).
   • Press the [SAVE] soft key to store the test data in the selected location.

8   Unwrap the jumper cable from the mandrel, then disconnect the jumper cable from the adapter. Attach the opposite end of the jumper cable to the adapter and perform steps 1-7 again to complete the jumper cable test.

Saved test results can later be retrieved (refer to section titled "Reviewing Saved ORL Test Results", page 38).
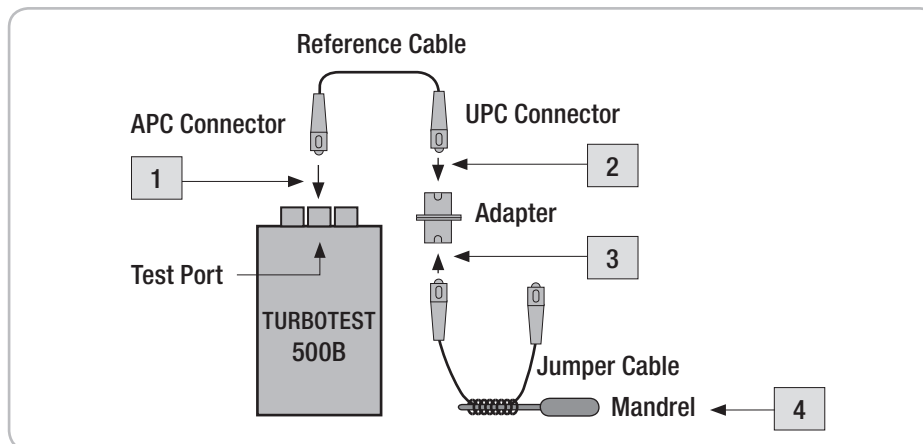

Figure 5-3. Testing a Connector.

Performing a Link Test

Refer to Figure 5-4 for a related illustration.

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 under test at the patch panel.

> **Note:** If the link under test is less than 60 km, then the use of a Terminator is recommended. If the link is greater than 60 km, then termination is not required.

3   Once connected, the TURBOTEST 500B will automatically measure and display the return loss measurements for the link under test.

4   Press the [SAVE] soft key to store test results in the next available memory location.

5   To save test results in a specific memory location, perform the following steps:

- Press either [UP] or [DOWN] arrow key to select a specific memory location (increase/decrease fiber #).

- Press the [SAVE] soft key to store test results in the selected location.

Once saved, test results can later be retrieved. (refer to section titled "Reviewing Saved ORL Test Results", page 38).
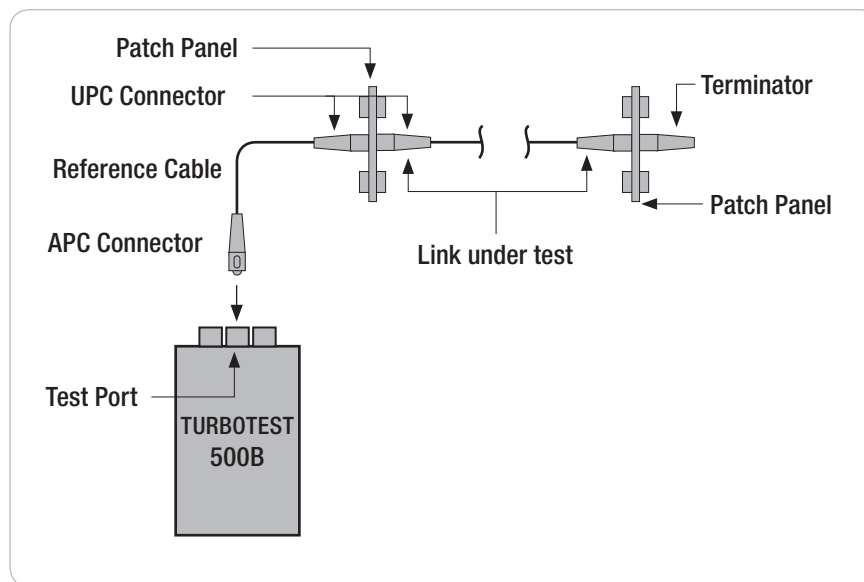

Figure 5-4. Link Test Setup.

Reviewing Saved ORL Test Results

Refer to Figure 5-5 for a related illustration.

1   Prior to reviewing saved tests, select the [ORL TEST MODE], and then [OPEN] the file to be viewed (refer to sections titled "Selecting Test Mode", page 7 and "Opening Files", page 15).

2   Press the [MENU] key to display the [ORL MAIN MENU] screen.

3   The [REVIEW RESULTS] option is highlighted by default.

4   Press the [SELECT] soft key to access the [ORL RESULTS] screen (refer to Figure 5-5).

5   Using either [UP] or [DOWN] arrow key highlight the desired test (fiber) number.

   • You may press the [MORE] soft key to scroll through saved test results.

6   Press the [HEADER] soft key to change a header display as follows:

   • [AUTO RETEST]

   • [TEST WAVELENGTH(S)]

   • [DATE and TIME]

   • [FILE NAME]

Highlight bar - indicates the selected test (fiber). Use arrow keys to move the highlight bar.

Header - displays labels as follows: [AUTO RETEST], [TEST WAVELENGTH], [DATE/TIME] of the selected test, or [FILENAME].

ORL RESULTS
AUTO RETEST
3   XX   YY
2   XX   YY
1   XX   YY
MORE   TEST HEADER

Test (fiber) numbers.

Test results.

Press to scroll through saved test results.

Press to start [AUTO RETEST]

Press to change a header display. Also, this soft key will toggle middle soft key between [TEST] and [TOP] options.
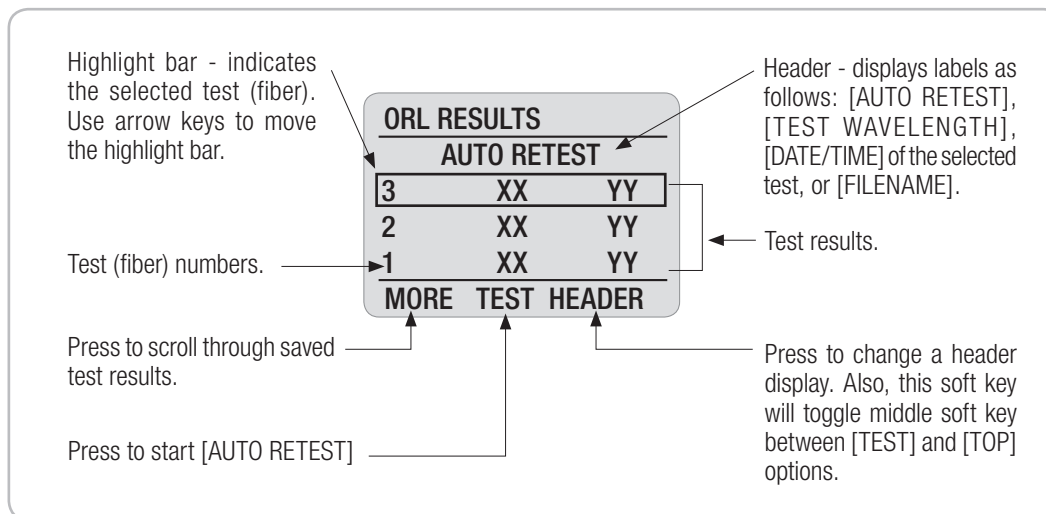
Figure 5-5. Reviewing Saved ORL Test Results.

Auto Retest

Refer to Figure 5-6 for a related illustration.

1 From the [ORL RESULTS] screen, using either [UP] or [DOWN] arrow key highlight the fiber to be retested.

  - You may press the [MORE] soft key to scroll through saved test results.

2 Press the [HEADER] soft key to display the [AUTO RETEST] label (if not displayed).

3 Press the [TEST] soft key to start testing.

4 The TURBOTEST 500B display will switch from the [ORL RESULTS] screen to the [ORL TEST] screen and show the retest results.

5 You may press the [SAVE] soft key to store results into the current memory location and return to the [ORL RESULTS] screen.
Or
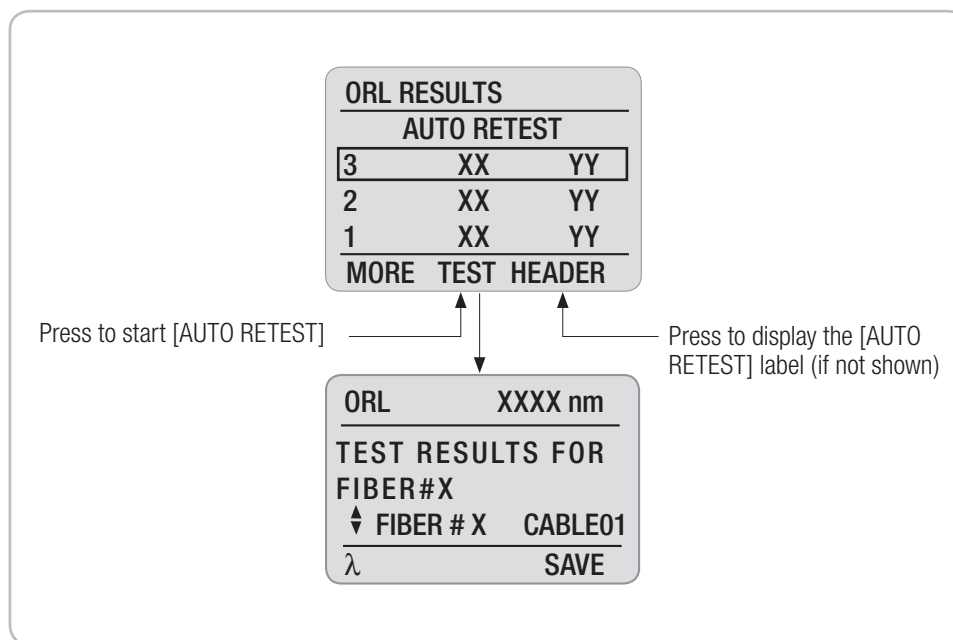6 You may press the [MENU] key to return to the [ORL RESULTS] screen without saving retest results.

Figure 5-6. ORL Auto Retest.

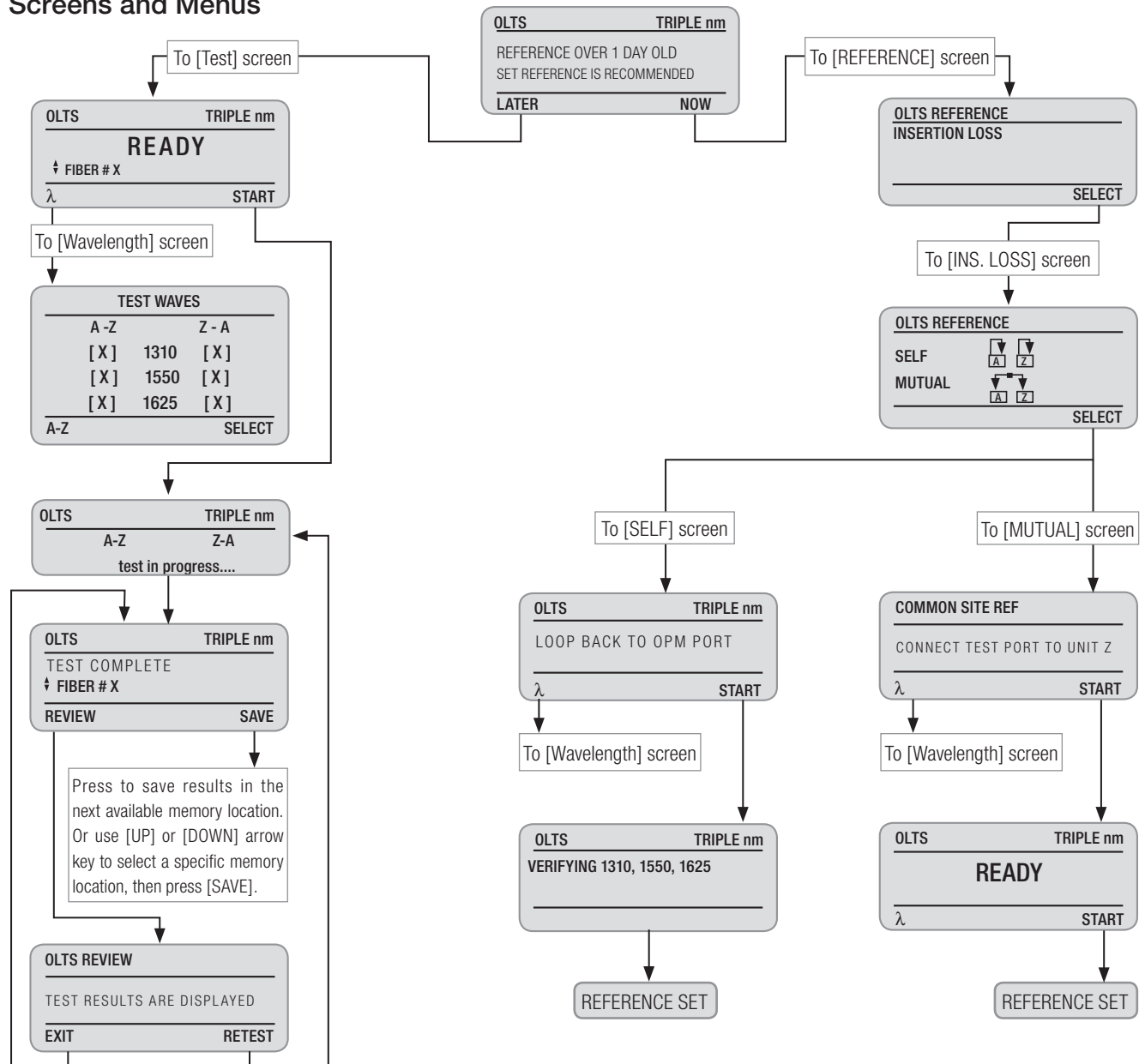# Section 6: OLTS Mode - Measuring Insertion Loss

Screens and Menus

Figure 6-1. OLTS Mode Screens and Menus.

Two TURBOTEST 500B units are required to perform bi-directional insertion loss tests on a single fiber. One unit must be operating in the [OLTS] test mode while another - in the [REMOTE] test mode. When the [OLTS] test mode is selected, the LCD display on the MAIN unit shows the [OLTS] indicator in the upper left part of the screen and the selected wavelength(s) in the upper right part of the screen. The LCD display on the REMOTE unit shows the [REMOTE] indicator in the upper left part of the screen.

```
OLTS                TRIPLE nm        REMOTE
        READY                               READY
  FIBER # X         CABLE01
λ                     START
```
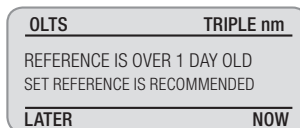
Setting References

Setting references is recommended on a daily basis before testing and when changing test jumper(s). If lasers have been adjusted since last referencing, references need to be reset.
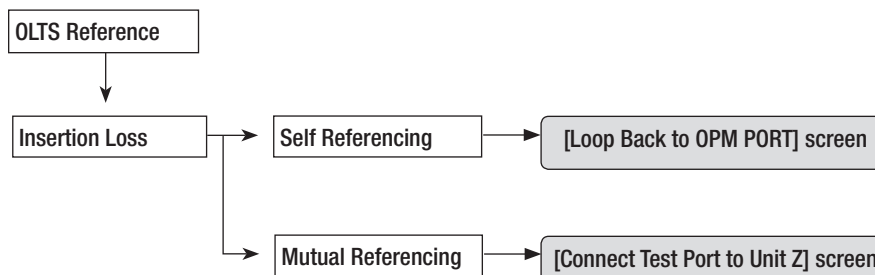
Clean all fiber optic connectors and optical ports before performing test procedures described below.

On entry to the [OLTS] test mode, the MAIN TURBOTEST 500B unit will determine if the reference hasn't been set for over 24 hours and prompt you to re-reference.

The display will read:
```
OLTS                TRIPLE nm
REFERENCE IS OVER 1 DAY OLD
SET REFERENCE IS RECOMMENDED
LATER                     NOW
```

- Pressing the [LATER] soft key allows you to omit setting references and use the old reference values.

- Pressing the [NOW] soft key allows you to access the [OLTS REFERENCES] screen and select the desired option as follows:

```
OLTS Reference
      |
      v
Insertion Loss  -->  Self Referencing  -->  [Loop Back to OPM PORT] screen
      |
      +-----------> Mutual Referencing -->  [Connect Test Port to Unit Z] screen
```

Note: You may also access the [REFERENCES] screen from the [OLTS MAIN MENU] screen. Press the [MENU] key, then choose [REFERENCES], and then press [SELECT].

OLTS - Insertion Loss Reference

[INSERTION LOSS] referencing allows you to reference the laser output for accurate loss measurement of a fiber link. Two methods are available for setting an insertion loss reference: [SELF] or [MUTUAL].

Note: [MUTUAL] referencing is available for eliminating variations due to connector tolerance when self-referencing. Either referencing method may be selected for performing an insertion loss reference setup.

SELF Referencing

Clean all fiber optic connectors and optical ports before performing test procedures described below. Refer to Figure 6-2 for a related Illustration.

1 On entry to the [OLTS REFERENCE] screen, the [INSERTION LOSS] screen is highlighted by default. Press the [SELECT] soft key to access the [INSERTION LOSS REFERENCE] sub-screen.

2 Using either [UP] or [DOWN] arrow key highlight the [SELF] option.

3 Press the [SELECT] soft key to access the [LOOP BACK TO OPM PORT] 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 the [λ] to select the desired wavelength to be referenced (refer to Section titled "Selecting Test Wavelength", page 23).

7 When the desired wavelengths are selected, press the [Back] key to return to the [LOOP BACK TO OPM PORT] screen.

8 From the [LOOP BACK TO OPM PORT] screen, press the [START] soft key to begin the verification. Once the display reads [REFS VERIFIED] followed by a beep (if the beeper function is enabled), then the reference is set.
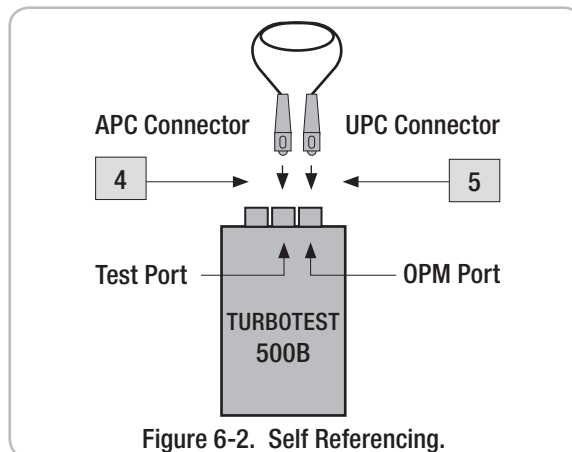

Figure 6-2. Self Referencing.

Note: If the display reads [NOT VERIFIED], clean all fiber optic connectors again and check for excessive fiber bends, be sure laser output is properly set. Perform the required procedures over.

MUTUAL Referencing

Refer to Figure 6-3 for a related illustration.

1   On entry to the [OLTS REFERENCE] screen, the [INSERTION LOSS] screen is highlighted by default. Press the [SELECT] soft key to access the [INSERTION LOSS REFERENCE] sub-screen.

2   Using either [UP] or [DOWN] arrow key highlight the [MUTUAL] option.

3   Press the [SELECT] soft key to access the [CONNECT TEST PORT TO UNIT Z] screen.

4   Attach the APC connector on one reference cable to the Test Port (unit A - MAIN).

5   Attach the APC connector on another reference cable to the Test Port (unit Z - REMOTE).

6   Mate free ends (UPC connectors) of test cables using the appropriate adapter.

7   Press the [λ] to select the desired wavelength to be referenced (refer to Section titled "Selecting Test Wavelength", page 23).

8   When the desired wavelengths are selected, press the [Back] key to return to the [CONNECT TEST PORT TO UNIT Z] screen.

9   From the [CONNECT TEST PORT TO UNIT Z] screen, press the [START] soft key on the MAIN unit to begin referencing. If prompted to confirm re-referencing, choose [YES].

10 When both units display [READY], press the [START] soft key on the MAIN unit.

11 When the MAIN unit displays [REFERENCE SET], press the [BACK] key several times to return to the [OLTS] test screen.
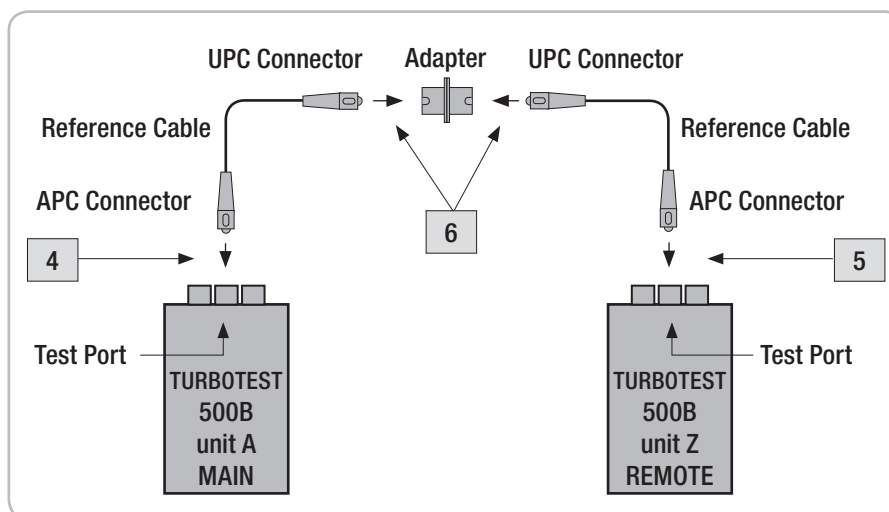

Figure 6-3. Mutual Referencing.

Performing a Link Test

One TURBOTEST 500B unit must be operating in the [OLTS] test mode while another - in the [REMOTE] test mode. For this setup procedure the two units will be differentiated by T500B unit A-MAIN and T500B unit Z-REMOTE.

Refer to Figure 6-4 for a related illustration.

1   Attach the APC connector on the reference cable to the Test Port.

2   Attach the UPC connector on the reference cable to the link under test.

3   From the [TEST] screen, press the [λ] soft key on the MAIN unit to select the desired wavelength (refer to Section titled "Selecting Test Wavelength", page 23).

4   When the desired wavelengths are selected, press the [Back] key to return to the [TEST] screen.

5   When the [READY] label is displayed, press the [START] soft key on the MAIN unit to begin testing.

    The T500B unit A-MAIN attempts to establish a data link with the T500B unit Z-REMOTE. Once linked, the units exchange reference information, and then measure the following:

    •   insertion loss from T500B unit A to unit Z

    •   insertion loss from T500B unit Z to unit A

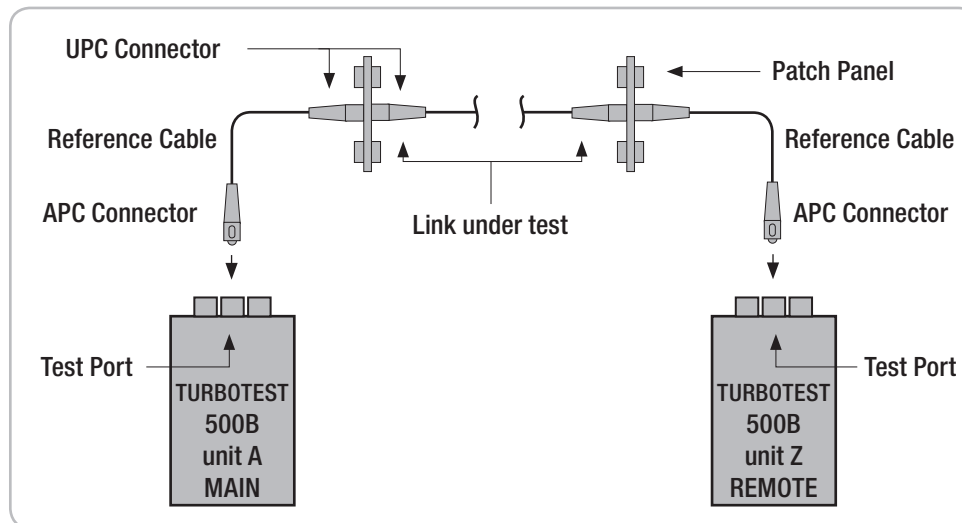6   At the completion of the test, the TURBOTEST 500B will prompt you to [REVIEW] or [SAVE] test results.

Figure 6-4. Link Test Setup.

To Review Test Results (MAIN unit only):

7   From the [TEST COMPLETE] screen, press the [REVIEW] soft key to display the [OLTS REVIEW] screen.

    After reviewing results you may do one of the following:

    • You may press the [EXIT] soft key or [BACK] key to return to the [TEST COMPLETE] screen.

    • Or you may press the [RETEST] soft key to retest the link.

To Save Test Results (MAIN unit only):

8   From the [TEST COMPLETE] screen, press the [SAVE] soft key to store measurements in the next available memory location.

9   To save test results in a specific memory location, perform the following steps:

    • Press either [UP] or [DOWN] arrow key to select a specific memory location (increase or decrease fiber number).

    • Press the [SAVE] soft key to store test results in the selected location.

Once saved, test results can later be retrieved. Refer to the section titled "Reviewing Saved OLTS Test Result", page 46.

Reviewing Saved OLTS Test Results

1 Prior to reviewing saved tests, select the [OLTS] test mode, and then [OPEN] the file to be viewed (refer to sections titled "Selecting Test Mode", page 7 and "Opening Files", page 15).

2 Press the [MENU]key to display the [OLTS MAIN MENU] screen.

3 The [REVIEW RESULTS] option is highlighted by default.

4 Press the [SELECT] soft key to access the [OLTS RESULTS] screen (refer to Figure 6-5).

6 Using either [UP] or [DOWN] arrow key highlight the desired test (fiber) number.

7 You may press the [MORE] soft key to scroll through saved test results.

8 Press the [SELECT] soft key to view the highlight test.

9 When test results are displayed, press either [UP] or [DOWN] arrow key to toggle between [LOSS] and [AVERAGE LOSS] records.

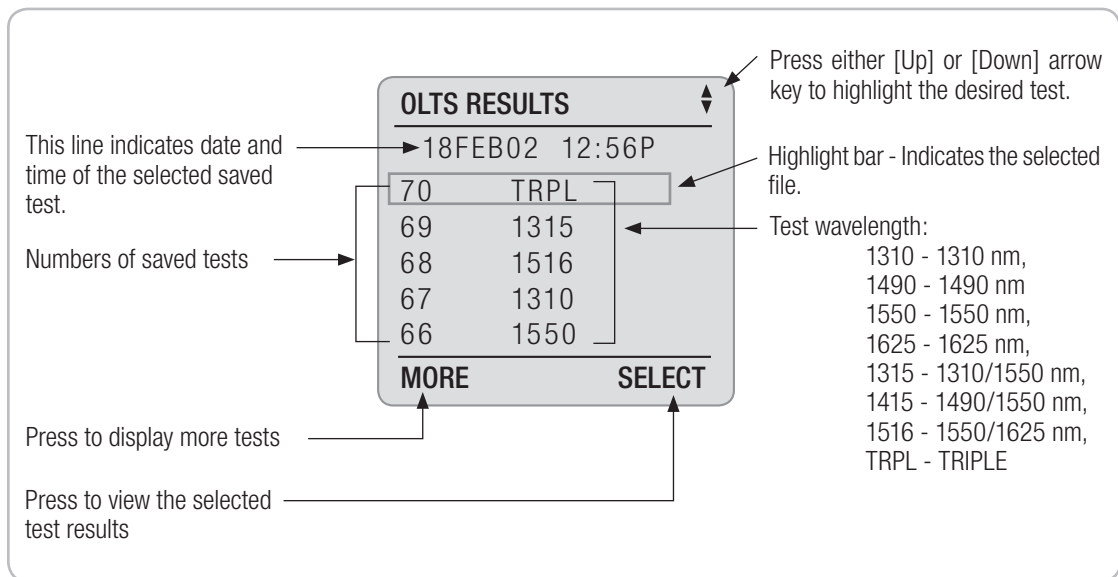10 To return to the [OLTS RESULTS] screen, press either [Exit] soft key or [Back] key.

Figure 6-5. Reviewing Saved OLTS Test Results.

Section 7: Testing with the TURBOTEST 500B, OPM, and OLS

If only one TURBOTEST 500B unit is available for testing, the Optical Power Meter (OPM) and Optical Light Source (OLS) may be used for performing optical loss tests on two fibers. The Optical Power Meter and Light Source in the following examples are manufactured by Noyes, other manufacturers' equipment can also be used.

Power Meter Reference Setup

Use the following procedures on the TURBOTEST 500B and the Optical Power Meter to perform optical reference setup at a common site. The Optical Power Meter in this example is the Noyes OPM 5.

Refer to Figure 7-1 for a related Illustration.

Clean all fiber optic connectors before performing test procedures described below.

Do the following to the TURBOTEST 500B:

1 Enable the [OPM] test mode, then press the [MENU] key to display the [OPM MAIN MENU] screen.

2 Use either [UP] or [DOWN] arrow key to highlight the [OTHER FUNCTIONS] option.

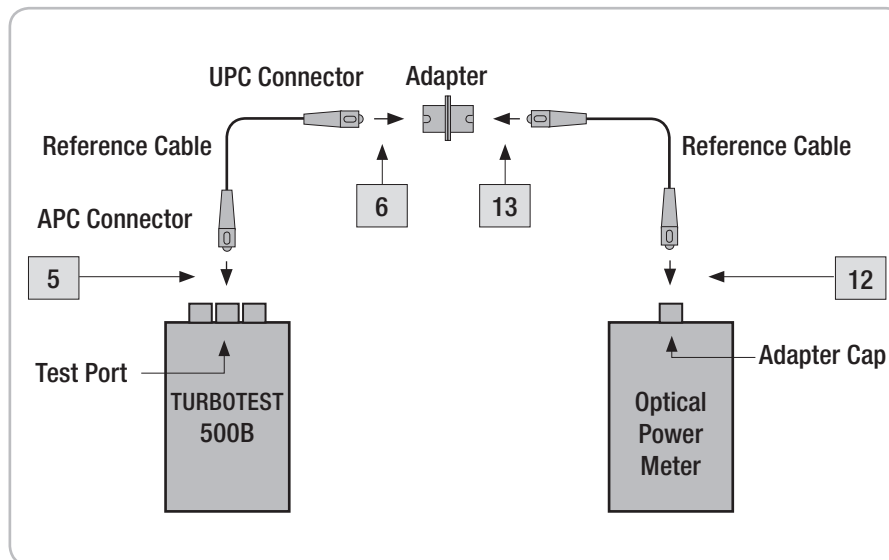3 Press the [SELECT] soft key to access the [OTHER FUNCTIONS] screen.

Figure 7-1. OPM Reference Setup.

4   The [POWER ADJUST] option is highlighted by default. Press the [SELECT] soft key to display the adjustment sub-screen.

5   Attach the APC connector on the reference cable to the Test Port.

6   Attach an adapter to the other end of the reference cable.

7   Press the [λ] soft key to select the laser to be adjusted.

8   Press the [OFF /ON/ 270/ 1K/ 2K] soft key to turn the selected laser [ON].

Do the following to the Optical Power Meter

9   Power on the Optical Power Meter.

10 Press the [λ] key to select a desired wavelength. The selected wavelength must correspond with the operational wavelength of the TURBOTEST 500B.

11 Press the [dB/dBm] key to select [dBm] units of measure.

12 Attach the reference cable to the adapter cap (see Figure 7-1).

13 Attach the other end of the reference cable to the adapter that is already on the TURBOTEST 500B reference cable.

14 Press and hold the [REF] key until the [HELD] label is displayed. The meter automatically "zeroes" the display and begins measuring direct loss from the TURBOTEST 500B to the Optical Power Meter.

TURBOTEST 500B Reference Setup

Use the following procedures on the TURBOTEST 500B and the Optical Light Source to perform the optical reference setup.

Refer to Figure 7-2 on page 50 for a related illustration.

Clean all fiber optic connectors before performing test procedures described below.

Do the following to the Optical Light Source

1   Power on the Optical Light Source and select the proper wavelength of operation. Allow the light source to stabilize 1-2 minutes.

2   Attach the reference cable to the optical port located on the top of the unit.

Do the following to the TURBOTEST 500B

3   Return to the [OPM] test mode.

4   Attach the APC connector on the reference cable to the OPM Port.

5   Attach an adapter to the connector at the other end of the reference cable.

6   Attach the reference cable on the Optical Light Source to the adapter on the TURBOTEST 500B reference cable.

7   Press the [λ] soft key to select the required wavelength.

8   Press the [MENU] key to access the [OPM MAIN MENU] screen.

9   Use either [UP] or [DOWN] arrow key to highlight the [REFERENCES] option.

10 Press the [SELECT] soft key to access the [OPM REFERENCE] screen.

11 Press the [SET REF] soft key to display the {OPM SET REFERENCE] sub-screen. The reference value will be displayed on the sub-screen.

12 Press the [SET] soft key to save the displayed reference value.

Once completed, the unit is now measuring optical loss from the Optical Light Source to the TURBOTEST 500B.
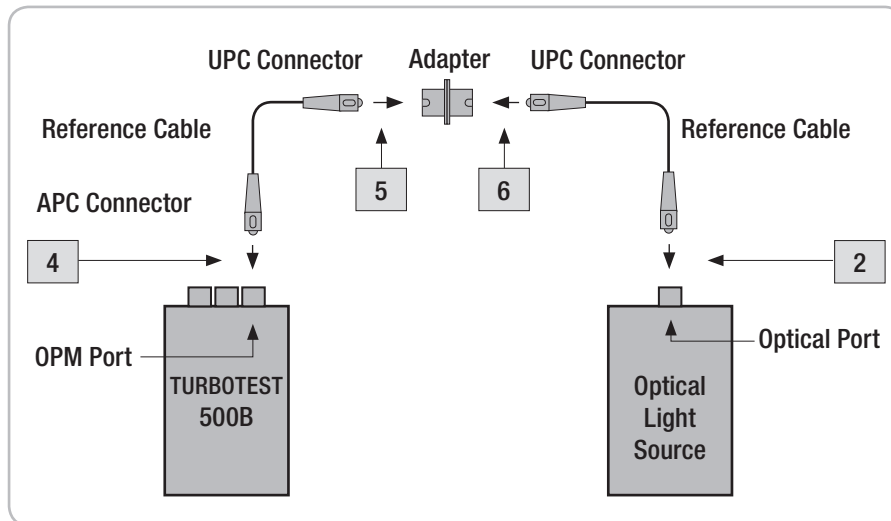

Figure 7-2. TURBOTEST 500B Reference Setup.

Performing a Link Test

Once the reference values have been set in the TURBOTEST 500B and the Optical Power Meter, do the following procedures to perform optical loss tests on two optical fiber links. Refer to Figure 7-3 for a related illustration

Do the following to the Optical Power Meter and Light Source:

1 Disconnect the cables at the adapters. Do not disturb the connections to the test equipment. This is very important to ensure accurate measurements.

2 Transport the Optical Light Source and the Optical Power Meter to the far end of the link. Place dust caps on the connectors to protect them during the moving process. All units may be powered down during this time to conserve battery life.

3 Once at the far end, power up the Optical Power Meter and Light Source, again allowing the laser to stabilize.

4 Attach the reference cable on the Optical Light Source to the fiber under test (Fiber #1).

5 Attach the reference cable on the Optical Power Meter to the second fiber under test (Fiber #2).

Do the following to the TURBOTEST 500B:

6 At the near end, power up the TURBOTEST 500B and verify that it is operating in [OPM] mode.

Note: The laser will need to be turned on again, repeat steps 1-8 on page 48 and 49.
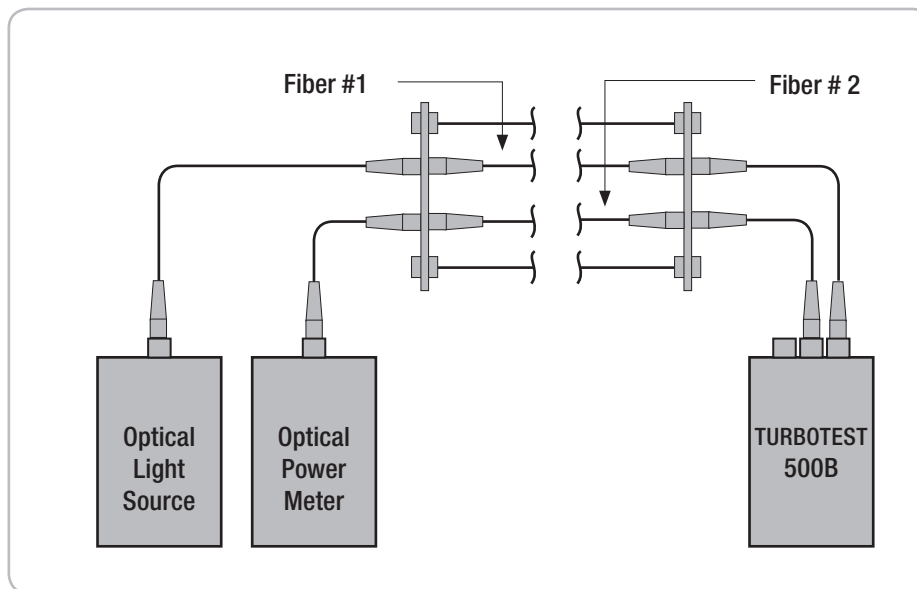

Figure 7-3. Link Test Setup.

7   Attach the reference cable that is connected to the OPM Port to the fiber under test (Fiber #1).

8   Attach the reference cable that is connected to the Test Port to the second fiber under test (Fiber #2).

9   The display will now show a loss measurement of the fiber link (Fiber #1).

10 Press the [SAVE] soft key to save the measurement(s) in the next available memory location.

11 To save test results in a specific memory location, perform the following steps:

  • Press either [UP] or [DOWN] arrow key to select a specific memory location (increase/decrease fiber #).

  • Press the [SAVE] soft key to store test results in the selected location.

Once saved, test results can later be retrieved (refer to the section titled "Reviewing Saved TURBO Test Results", page 31).

Do the following to the Optical Power Meter

12 At the far end, the loss of the fiber link (Fiber #2) is displayed on the OPM. Press the [STORE] key to save the loss data in the next available memory location.

Note: Swap fibers and repeat for bi-directional test results.

Repeat the procedures described in this section to continue testing insertion loss of additional fiber links.

Section 8: OPM Mode

Screens and Menus

OPM   1310 nm
TEST RESULTS FOR FIBER #X
FILE##
  FIBER #X
λ   UNITS   SAVE

Select wavelength

Select units of measure

Press the [SAVE] soft key to save test results in the next available memory location.

Use [UP] or [DOWN] arrow key to select a specific memory location, then press the [SAVE] soft key.

To access the [OPM REFERENCE] screen, press the [MENU] key, then select [REFERENCES], and then press [SELECT]

OPM   1310 nm
FIBER #X (next available location)
SAVED
λ   UNITS   SAVE

OPM   1310 nm
FIBER #Y (selected location)
SAVED
λ   UNITS   SAVE

OPM REFERENCE

CONNECT SOURCE
TO OPM PORT
     A   OR   A   Z
                      SET REF

OPM   1310 nm

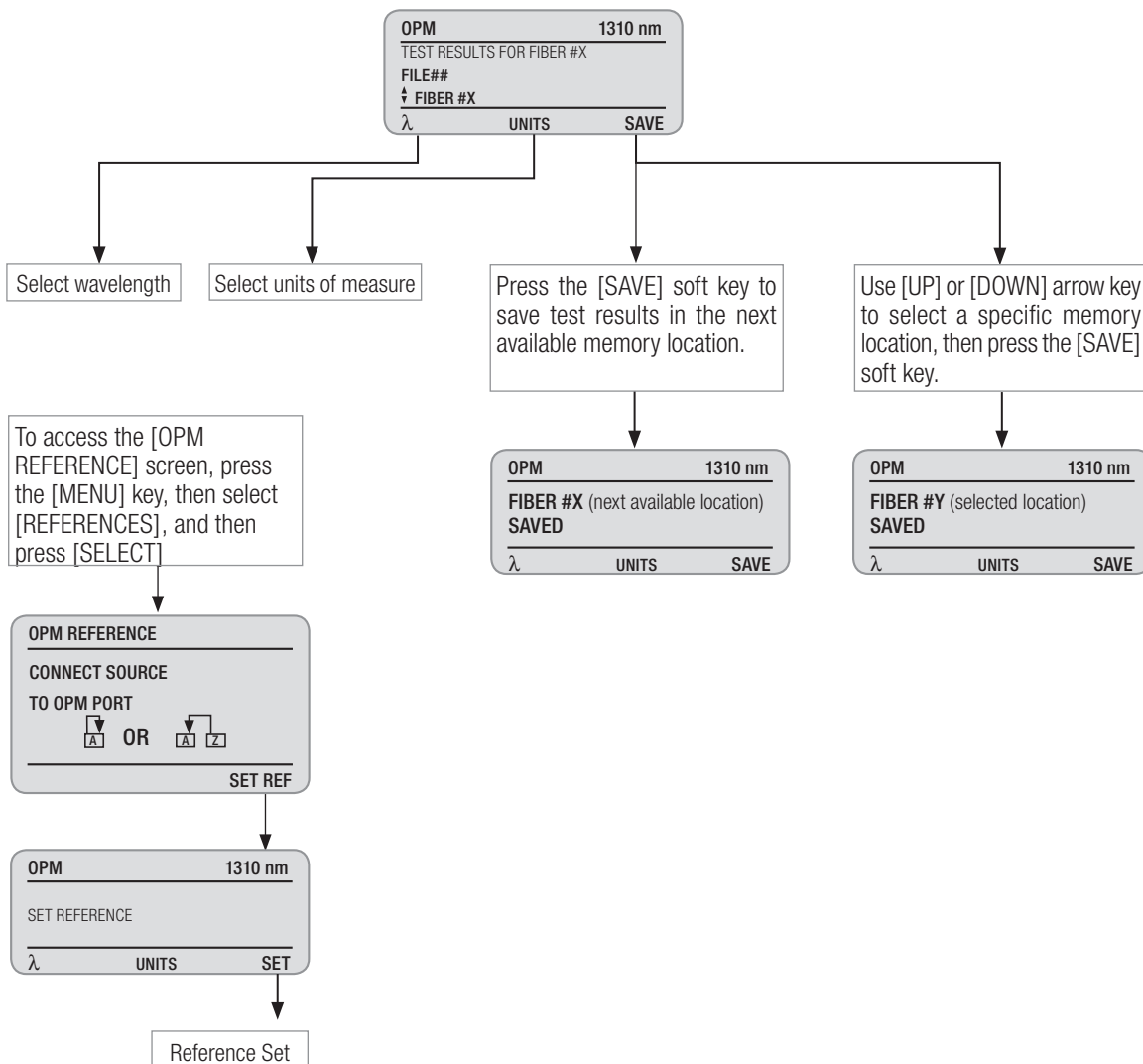SET REFERENCE
λ   UNITS   SET

Reference Set

Figure 8-1. OPM Mode Screens and Menus.

The TURBOTEST 500B may be used as a stand alone Optical Power Meter to perform diagnostic and evaluation tests associated with fiber optic transmission systems. The TURBOTEST 500B measures both absolute power (dBm or µW) and loss (dB). The operational wavelength and the measurement mode (dBm, dB, or µW) must correspond with the specifications of the transmitter under test.

Setting References

1   From the OPM [TEST] screen, press the [MENU] key to access the [OPM MAIN MENU].

2   Using either [UP] or [DOWN] arrow key highlight the [REFERENCES] option.

3   Press the [SELECT] soft key to access the [OPM REFERENCE] screen.

4   Press the [SET REF] soft key to access the [OPM SET REFERENCE] sub-screen.

5   Press the [λ] soft key to select the desired wavelength to be referenced.

6   Press the [SET] soft key to save the displayed value as the new reference.
    The display will 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.

1   Attach the jumper cable leading from the transmitter to the OPM Port.

2   Press the [λ] soft key to select the desired wavelength.

3   Press the [UNITS] soft key to choose the display units: [dB], [dBm], or [µW].

4   Press the [SAVE] soft key to save the test data in the next available memory location.

Indicates the selected test mode.

Indicates the reference level value.

Displays the selected wavelength.

Indicates fiber number.

Displays the selected wavelength.

Test Tone Indicator.
Will be displayed if the unit detects a [TONE] signal (270 Hz 1 KHz, or 2 KHz).

Displays the filename of the selected file.

Displays the test measurement.

```
OPM                    1310 nm
REF: -16.42                 2K
1310
       -0.02 dB
  ⬍ FIBER #1          FILE01
  λ          UNITS       SAVE
```
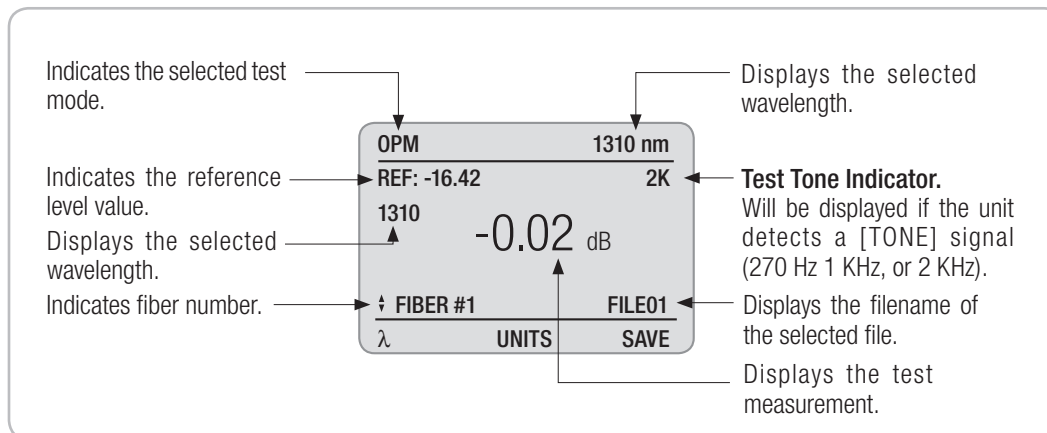
Figure 8-2. The OPM Test Mode Screen.

5 To save test results in a specific memory location, perform the following steps:

- Press either [UP] or [DOWN] arrow key to select a specific memory location to increase or decrease fiber number.

- Press the [SAVE] soft key to store test results in the selected location.

Once saved, test results can later be retrieved. Refer to the following section.

Reviewing Saved OPM Test Results

1 Prior to reviewing saved tests, select the [OPM] test mode, and then [OPEN] the file to be viewed (refer to sections titled "Selecting Test Mode", page 7 and "Opening Files", page 15).

2 Press the [MENU]key to display the [OPM MAIN MENU] screen.

3 The [REVIEW RESULTS] option is highlighted by default.

4 Press the [SELECT] soft key to access the [OPM RESULTS] screen (refer to Figure 8-3).

5 Using either [UP] or [DOWN] arrow key highlight the desired test (fiber) number.

- You may press the [MORE] soft key to scroll through saved test results.

6 Press the [HEADER] soft key to change a header display as follows:

- [AUTO RETEST]
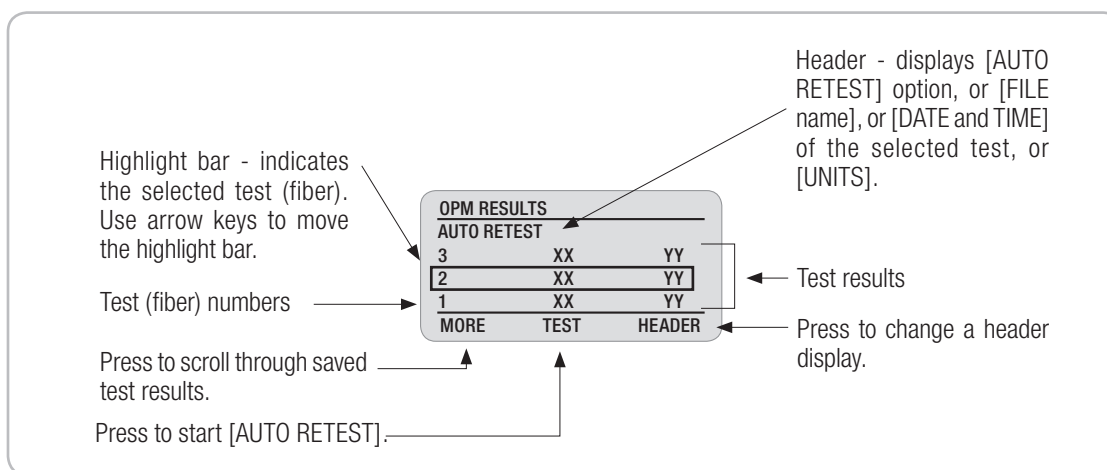
- [FILE NAME]

- [DATE and TIME]

- [UNITS]

Figure 8-3. Reviewing Saved Test Results.

Auto Retest

Refer to Figure 8-4 for a related illustration.

1   From the [OPM RESULTS] screen, using either [UP] or [DOWN] arrow key highlight the fiber to be retested.

   • You may press the [MORE] soft key to scroll through saved test results.

2   Press the [HEADER] soft key to display the [AUTO RETEST] label (if not displayed).

3   Press the [TEST] soft key to start testing.

4   The TURBOTEST 500B display will switch from the [OPM RESULTS] screen to the [OPM TEST] screen and show the retest results.

5   You may press the [SAVE] soft key to store results into the current memory location and return to the [OPM RESULTS] screen.

   Or

6   You may press the [BACK] key to return to the [OPM RESULTS] screen without saving retest results.
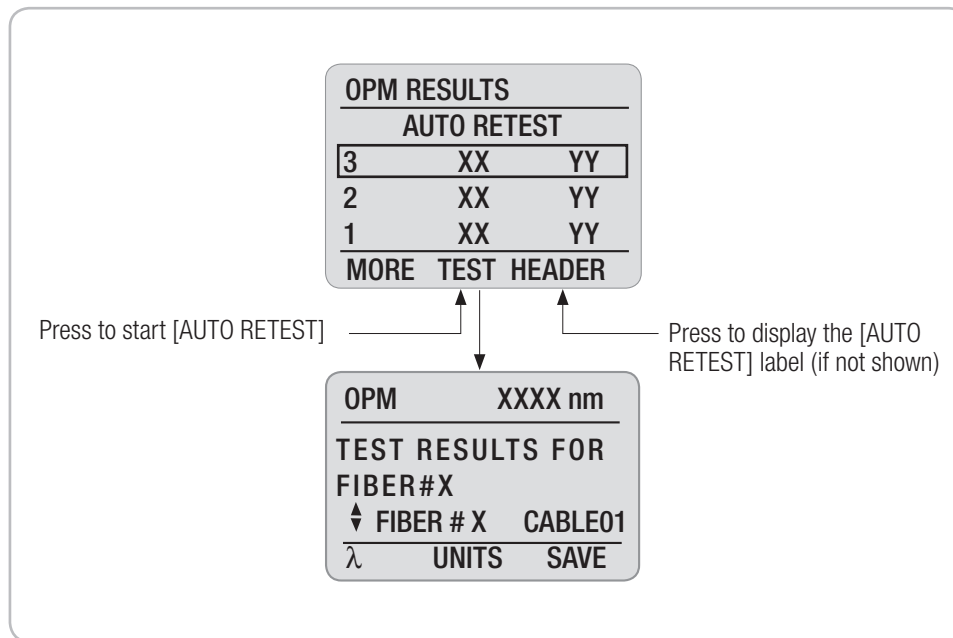
Figure 8-4. OPM Auto Retest.

Using the TURBOTEST 500B with Optical Fiber Identifiers

The TURBOTEST 500B is designed to generate the 2 kHz [TONE] signal for use with Optical Fiber Identifiers to isolate specific fibers from a bundle. In the following procedures the Noyes OFI 200 Optical Fiber Identifier is used to detect the modulated tone from the TURBOTEST 500B. This application is commonly referred to as "toning out the fiber".

Tone Setup

1   Attach the APC connector on the reference cable to the Test Port.

2   Attach the other end of the reference cable to the fiber to be traced.

3   From the OPM test screen, press the [MENU] key to access the [OPM MAIN MENU] screen.

4   Use either [UP] or [DOWN] arrow key to highlight the [OTHER FUNCTIONS] option, then press the [SELECT] soft key to access the [OTHER FUNCTIONS] screen.

5   Choose the [POWER ADJUST] option, and then press the [SELECT] soft key to display the [POWER ADJUSTMENT] screen.

6   Press the [λ] soft key to select the desired laser to modulate the 2 kHz [TONE] signal.

7   Press the [OFF/ ON/ 270/ 1 K/ 2 K] soft key to display the [2 K] tone option.

8   The operator at the far end or cut-over point is now able to begin searching for the fiber with a 2 kHz tone using an Optical Fiber Identifier.
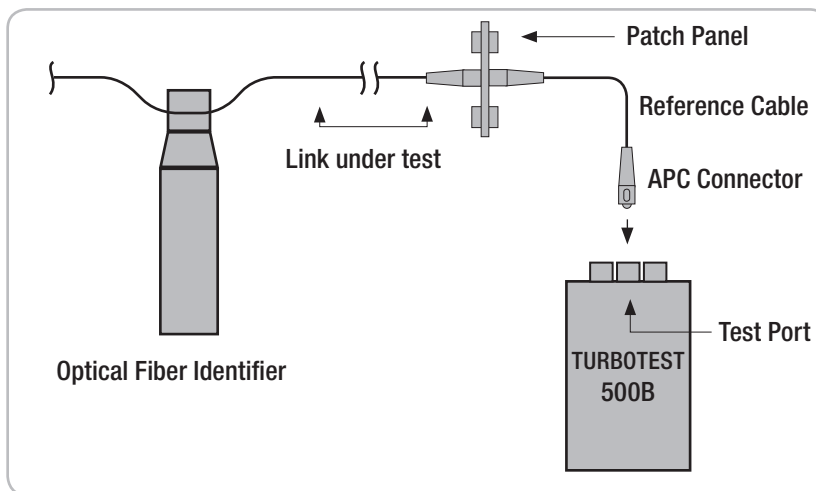

Figure 8-5. Fiber Identification Setup.
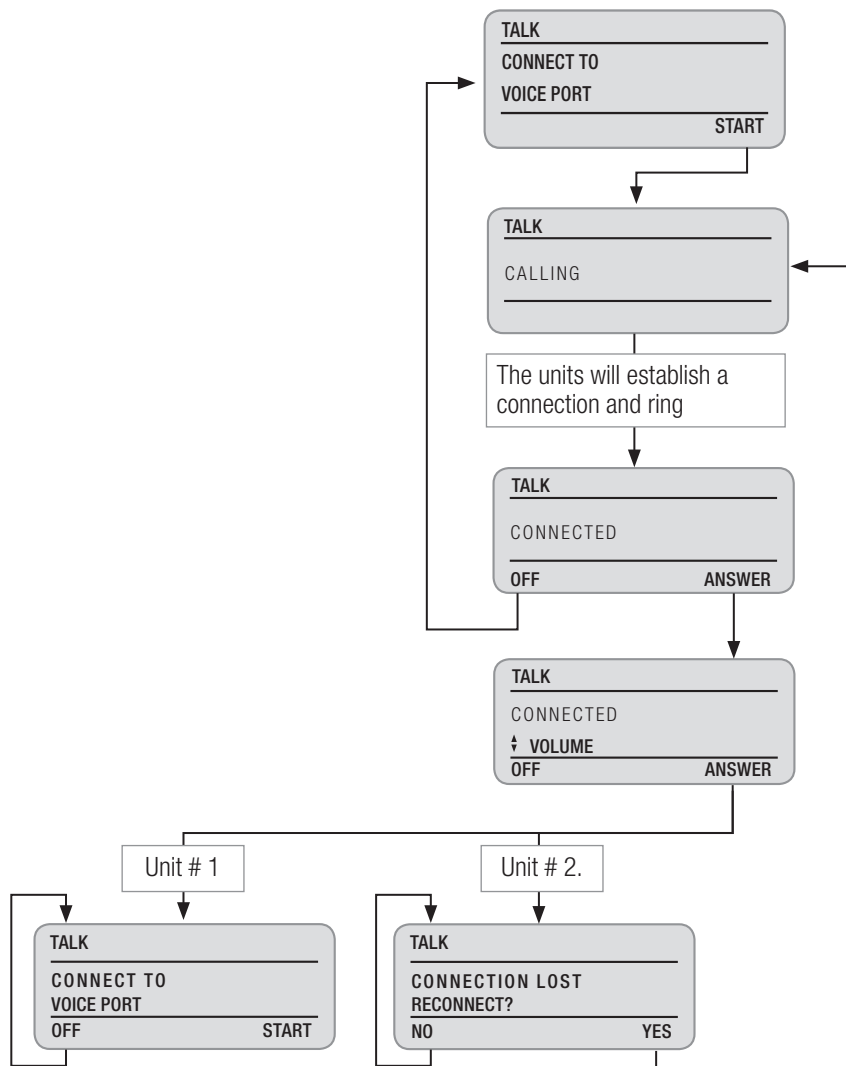
Section 9: Talk Option

Screens and Menus

```
TALK
────────────────────────
CONNECT TO
VOICE PORT
────────────────────────
                   START
```

```
TALK
────────────────────────
CALLING
────────────────────────
```

The units will establish a
connection and ring

```
TALK
────────────────────────
CONNECTED
────────────────────────
OFF                ANSWER
```

```
TALK
────────────────────────
CONNECTED
↕ VOLUME
────────────────────────
OFF                ANSWER
```

Unit # 1

Unit # 2.

```
TALK
────────────────────────
CONNECT TO
VOICE PORT
────────────────────────
OFF                START
```

```
TALK
────────────────────────
CONNECTION LOST
RECONNECT?
────────────────────────
NO                   YES
```

Figure 9-1. Talk Mode Screens and Menus.

The TURBOTEST 500B is optionally equipped to allow voice communication between operators while testing other fibers in a bundle. Designed for use on spare single-mode fibers, the instrument allows quick connection to terminated connectors. The voice communication feature is useful where other types of communication are not available.

Talk Setup

Use the following procedures on both TURBOTEST 500B units to setup a communication link on a common spare fiber.

1   From the [MAIN MENU] screen, use either [UP] and [DOWN] arrow key to highlight the [TALK SET] option.

2   Press the [SELECT] soft key to enable the [TALK] mode.

3   Attach one end of a jumper cable to the Voice Port and the other to the spare fiber.

4   Attach the headset plug to the Headset Port, then put the headset on and adjust to fit.

5   Press the [START] soft key to begin.

6   The units will attempt to establish a link. Once completed, the units will ring.
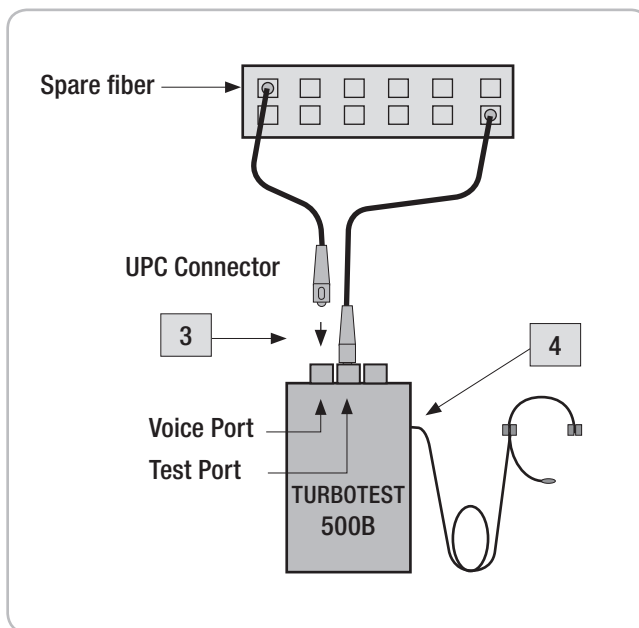
Figure 9-2. Talk Setup.

The display will read

```
CONNECTED

OFF                    ANSWER
```

7   Press the [ANSWER] soft key.

The display will read

```
CONNECTED
↕ VOLUME
OFF                    RETURN
```

- You may press the UP or DOWN arrow key to adjust the volume.

Note: The volume control is automatically readjusted to default settings when the [TALK] mode is turned [OFF] or the unit is powered down.

8   To allow testing during the conversation, press the [RETURN] soft key or [BACK] key, and then select the desired test mode.

The [TALK] option will still be activated and designated by the [Talk Active] Indicator.

9   To make volume adjustments or to return to the [TALK] mode, press the [MENU] key, then choose [TALK SET] option, and then press the [SELECT] soft key again.

10 To disconnect the communication link, press the [OFF] soft key.

Note: Disabling the [TALK] feature when it is not needed will prolong the battery life.

Section 10: Troubleshooting and Maintenance

This section suggests how to diagnose and solve problems that you may encounter, describes the displayed messages, explains how to clean optical ports and charge the battery. Please use the following sequence of steps if there is a problem.

1   Review the "Troubleshooting" section (page 64 and 65) for problem solving information.

2   If you can't solve the problem on your own, contact Noyes for further assistance.

Be sure to have the following information available before you contact Technical Support.

- Product name and serial number (printed on the back of the unit).

- Purchase data.

- Description of the problem including any error messages that were displayed.

3   Call the Technical Support Department

Phone: 800-321-5298 (North America)

603-528-7780

A Technical Support representative will work with you to quickly determine and solve problems you may have. It is helpful if the units are available when you call.

Battery Maintenance

Battery Replacement

To replace a battery:

1   Remove the protective rubber boot from a unit.

2   Remove the battery compartment cover located on the back of the unit.

3   Replace the battery observing proper polarity.

4   Replace the cover and rubber boot.

Battery Recharging

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

REFERENCE IS OVER 1 DAY OLD
SET REFERENCE IS RECOMMENDED

BAT ◄———————— Low Battery Label

LATER   NOW
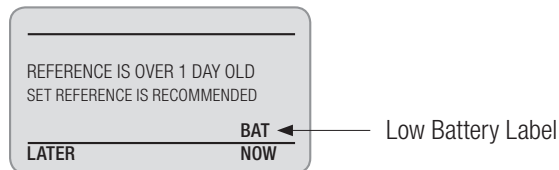
A battery can be recharged to full capacity in about three hours. To fully recharge the battery:

1   Connect the AC power adapter/charger to the Power Port.

2   The battery will charge whether the TURBOTEST 500B is powered [ON] or [OFF].

Battery Indicator Lights

The two color LED on the side of the TURBOTEST 500B 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 (refer to Figure 2-1, page 4).

Note: To reduce noise, the AC adapter/charger will shut down during TURBO or OLTS tests. The [AC/charger] indicator will turn red. Once the test is complete, the indicator will turn back green.

Cleaning Optical Ports

The Voice, Test, and OPM Ports must be kept free from dirt or other contaminates 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 Voice and Test Ports

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. Perform one of the following:

If using Noyes Cleaning Supplies

- Leaning the FCC2 can back (30°), press the button on the FCC2 to fill the well.

- Dip the CCTP tip into the well of the FCC2 to dampen the tip with optical cleaning fluid.

- Place the damp tip over the ferrule to be cleaned.

- Rotate the tip clockwise 10 revolutions while applying varying pressure to create a gentle pumping action where the tip contacts the ferrule.

- Discard the CCTP stick after using both tips.
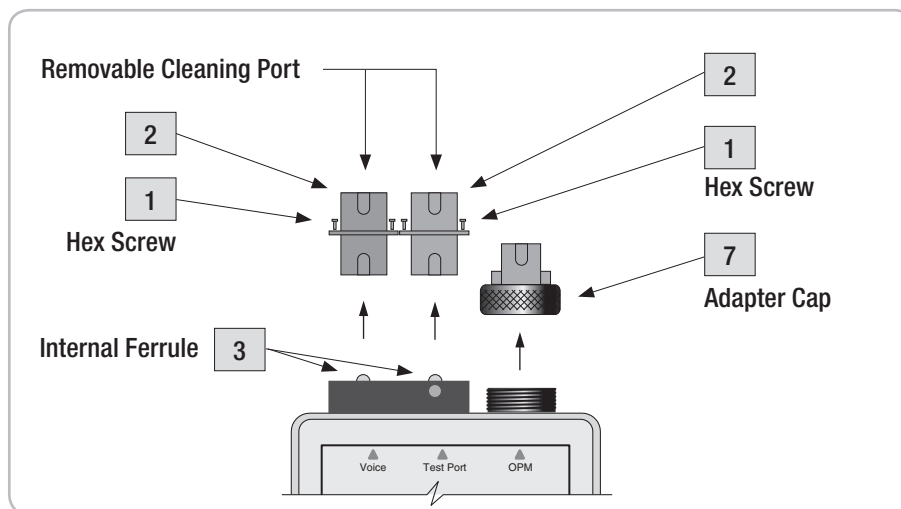
Figure 10-1. Cleaning Optical Ports

If using lint-free optical cleaning pads and isopropyl alcohol

- Be sure to use 99% IPA that has not been contaminated.

- Dampen the wipe with the alcohol and gently wipe the exposed ferrule. Then dry the ferrule using a new optical wipe

4 Using a can of filtered compressed air (held vertically), blow out any contaminants from the adapter.

5 After cleaning, carefully align the key way and replace the Removable Cleaning Port insuring that it snaps into place.

6 Once completed, the hex head screws can be replaced and tightened.

Cleaning OPM Port

7 Unscrew the adapter cap from the adapter cap mount.

8 Clean the optical port using optical wipes and IPA.

9 Using a can of filtered compressed air (held vertically), blow out any contaminants from the adapter cap.

10 Replace the adapter cap once the cleaning is complete.

TURBOTEST 500B Messages

The following display messages are listed alphabetically for easy reference.

Message	Cause/Meaning	Solution
HI	The amount of light detected is above the range of the TURBOTEST 500B.	Be sure laser output is properly set in Laser Adjustment screen under OPM menu. Perform the required test procedures over.
LO	The amount of light detected is below the range of the TURBOTEST 500B.	Clean all fiber optic connectors again and check for excessive fiber bends. Perform the required test procedures over. Be sure laser output is properly set in Laser Adjustment screen under OPM menu. Perform the required test procedures over.
REFERENCE NOT VERIFIED	The TURBOTEST 500B is unable to verify the reference cable value.	Clean all fiber optic connectors again. If operating in TURBO mode, perform the reference setup procedures again. Refer to Section 4 If operating in OLTS mode, perform the reference setup procedures again. Refer to Section 6

Solving Test, Print and Software Problems

This section describes how to solve problems you may encounter while using the TURBOTEST 500B instrument or PC software.

Problem	Cause	Solution
The unit beeps twice when attempting to reach a return loss reference value of greater than 40 dB with the reference cable wrapped around the mandrel.	The reference cable could be dirty or damaged.	Clean the reference cable connectors and optical ports on the TURBOTEST 500B. Check the adapter for cracks or damage. Perform the reference setup procedures again using the newly cleaned jumper cable for accurate results. If you are still unable to reach a return loss measurement greater than 50 dB, then the reference cable might need to be replaced.
The unit beeps twice when attempting to set the 14.6 dB (ORL) reference with an unwrapped reference cable.	The reference cable could be dirty or damaged.	Clean the reference cable connectors and optical ports on the TURBOTEST 500B. Check the adapter for cracks or damage. Be sure laser output is properly set in Laser Adjustment screen under OPM menu. Perform the reference setup procedures again using the newly cleaned jumper cable for accurate results.

REFERENCE NOT VERIFIED	The TURBOTEST 500B is unable to verify the reference cable value.	Clean all fiber optic connectors again.
		If operating in TURBO mode, perform the reference setup procedures again. Refer to Section 4
		If operating in OLTS mode, perform the reference setup procedures again. Refer to Section 6
With properly cleaned or newly supplied APC/UPC reference cables, the unit does not show close to 14.6 dB of return loss.	Unit needs to be referenced to the test cable.	Perform the reference procedure again for terminating the fiber around the mandrel. Select a single wavelength mode and remove any mandrel wraps on the test cable.
		Press the MENU key to access the "[MAIN MENU]" screen.
		Select REFERENCES > ORL - 14.6 dB, then press SET.
		The unit will display the return loss value within 0.2 dB of 14.6 dB at the selected wavelengths. The unit is now referenced to the test cable at the selected wavelength.
Can't transfer data to a PC.	Incomplete or improper setup.	Confirm that the data to be transferred from the TURBOTEST 500B is retrieved from the proper test mode.
		Verify that the PC software is ready to receive that data transfer.
		Confirm that the transfer cable is connected properly.
		Verify that the selected COM Port option is the same as that of the transfer cable connection on the computer port.
Unable to power up while operating from the rechargeable batteries.	The internal battery is extremely low on charge	Power the TURBOTEST 500B from the AC power.
		Or
		Recharge the internal battery. Refer to the section titled "Battery Maintenance" on page 62 for additional information.
Unable to print from PC software.	The computer may be connected to a network.	Log-off the network.

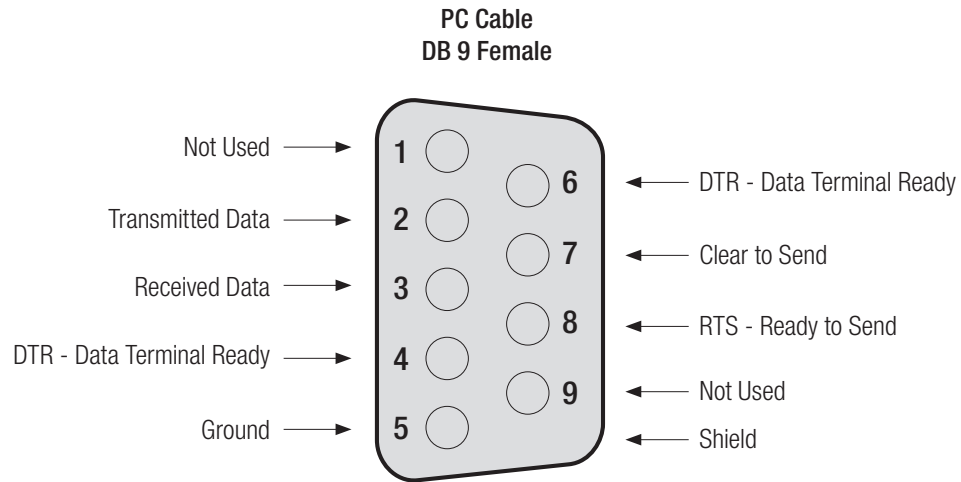# Section 11: Specifications

TURBOTEST 500B specifications

Model	T503B	T504B	T506B	T506B-FTTH
Calibrated wavelengths (nm)	1310, 1550	1310, 1550	1310, 1550, 1625	1310, 1490, 1550
Output power (dBm)	-5	-5	-5	-5
Emitter type	Laser	Laser	Laser	Laser
Safety class	Class I FDA 21 CFR 1040.10 and 1040.11, IEC 60825-1: 2007-03			
Detector type	InGaAs	InGaAs	InGaAs	InGaAs
Insertion loss measurement range	45	45	45	45
Measurement range (dBm)	+6 to -70	+26 to -50	+26 to -50	+26 to -50
Measurement units	dB, dBm, µW			
ORL dynamic range (dB)	65			

General Specifications	All Models
Display type	128 x 64 dot matrix liquid crystal display with LED backlight
Fiber type	Single mode 9/125µm nominal
Standard connector type	SC/APC, FC/APC
Dimensions, without boot (H x W x D)	195 x 101 x 57 mm (7.67 x 3.97 x 2.25 inch)
Weight	1.2 kg (2.6 lb)
Operating temperature	0 to +50°C, 90% RH (non-condensing)
Storage temperature	-20 to +60°C, 95% RH
Power	4 cell Lithium-Ion rechargeable pack or 110/220V AC chargers

Battery life:
    w/o talk active and backlight ON
    w/o talk active and backlight OFF
    talk active and backlight ON
    talk active and backlight OFF
	
	22 hours (typ) with Lithium-Ion rechargeable pack
	32 hours (typ) with Lithium-Ion rechargeable pack
	10 hours (typ) with Lithium-Ion rechargeable pack
	12 hours (typ) with Lithium-Ion rechargeable pack

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.

RS-232 Pin Designations

PC Cable
DB 9 Female

Not Used → **1** ○

○ **6** ← DTR - Data Terminal Ready

Transmitted Data → **2** ○

○ **7** ← Clear to Send

Received Data → **3** ○

○ **8** ← RTS - Ready to Send

DTR - Data Terminal Ready → **4** ○

○ **9** ← Not Used

Ground → **5** ○

← Shield

Appendix A: Return Loss of Fiber Link with Open End vs. Terminated End

Length km)	Length miles	1310 nm Terminated	1310 nm Open	1550 nm Terminated	1 550 nm Open
1.61	1	38.1	15.9	40.9	15.6
3.22	2	35.7	17.1	38.3	16.5
4.83	3	34.5	18.4	37.0	17.5
6.44	4	33.8	19.6	36.2	18.4
8.05	5	33.3	20.8	35.6	19.3
9.65	6	33.0	22.0	35.2	20.3
11.26	7	32.8	23.1	34.9	21.2
12.87	8	32.6	24.2	34.7	22.1
14.48	9	32.5	25.3	34.5	23.0
16.09	10	32.4	26.3	34.4	23.9
24.14	15	32.3	30.0	34.0	27.9
32.18	20	32.2	31.6	33.9	30.9
40.23	25	32.2	32.1	33.9	32.7
48.27	30	32.2	32.2	33.9	33.4
56.32	35	32.2	32.2	33.9	33.7
64.36	40	32.2	32.2	33.9	33.8
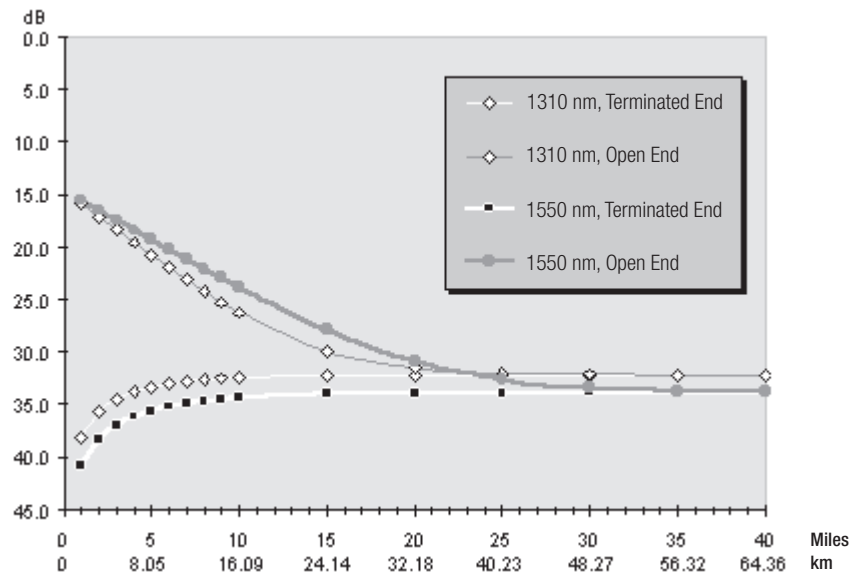
Return loss of fiber span with open end vs. terminated end

AFL Telecommunications
A Fujikura Business

Thank you for choosing Noyes Test & Inspection

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NOYES
ISO
9001
CERTIFIED

$C\epsilon$

NOYES
Test & Inspection

A Division of **AFL** Telecommunications