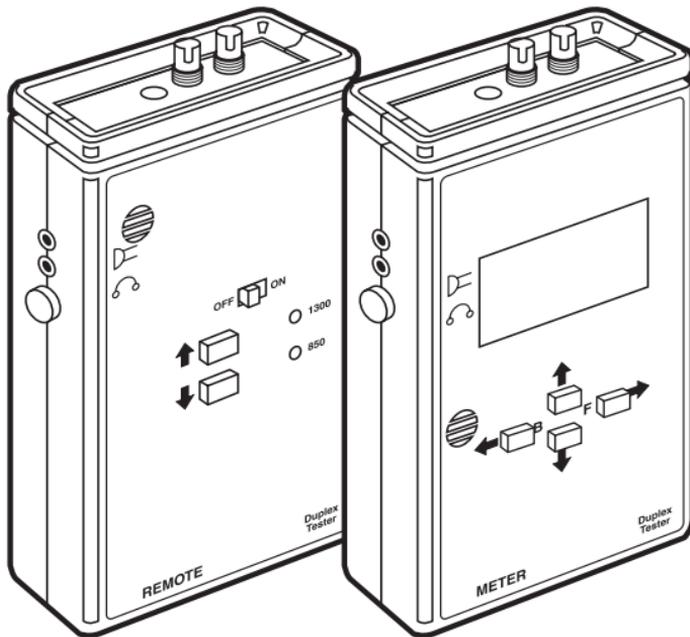




Fiber Optic Duplex Test Kit



CUSTOMER SUPPORT INFORMATION

Order toll-free in the U.S.: Call **877-877-BBOX** (outside U.S. call **724-746-5500**)

FREE technical support 24 hours a day, 7 days a week: Call **724-746-5500** or fax **724-746-0746**

Mailing address: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018

Web site: www.blackbox.com • E-mail: info@blackbox.com

**FEDERAL COMMUNICATIONS COMMISSION
AND
INDUSTRY CANADA
RADIO FREQUENCY INTERFERENCE STATEMENTS**

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication.

It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

NORMAS OFICIALES MEXICANAS (NOM) ELECTRICAL SAFETY STATEMENT

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.

10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energia.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos liquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

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Contents

Quick Start Guide	7
1. Specifications	21
2. Introduction	22
2.1 Description	22
2.2 What the Package Includes	23
3. Operating Instructions	25
3.1 Cleaning and Safety	25
3.2 Using the Test Kit	26
3.3 Controls and Indicators	29
3.3.1 Control Buttons on the Meter	29
3.3.2 Buttons and Switches on the Light Source	31
3.4 Getting Started	31
3.5 Main Menu Options	32
3.5.1 Calibrate	32
3.5.2 Testing Reference Cables	34
3.5.3 Test a Fiber	38
3.5.4 Scan Test Results	41
3.5.5 Transfer Data	42

4. Installing Software	44
4.1 Uploading Cable Database	44
4.2 Downloading Cable Test Data	45
5. Adapting to Different Connectors	46
5.1 Interpreting Measurement Results	46
5.2 Using FOfalk	47
5.3 Light Source Manual Mode	48
5.4 Using the Meter with Other Light Sources	49
6. Troubleshooting	50
6.1 Testing Hints	50
6.2 Problems/Solutions	50
6.3 Calling Black Box	53
6.4 Shipping and Packaging	53

Quick Start Guide

This chapter contains a quick overview of how to get started using your new Fiber Optic Duplex Test Kit. For detailed instructions, refer to the rest of this manual.

1. Unpack your kit and make sure you have everything. A list of what the package includes appears on page 23.

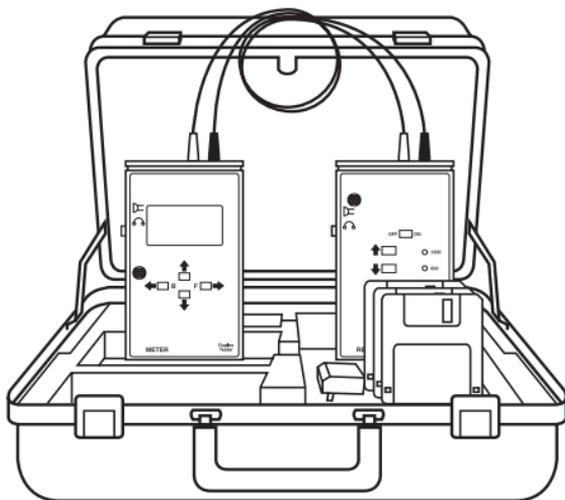


Figure Q-1. Package contents.

FIBER OPTIC DUPLEX TEST KIT

2. Get the meter and remote instruments, the two duplex launch cables, and ST mating adapters. Turn the units on. Clean the connectors with Alco pads and connect one of the duplex launch cables between the meter and the remote light source. Clean the connectors with Alco pads and connect one of the duplex launch cables between the meter and the remote light source.

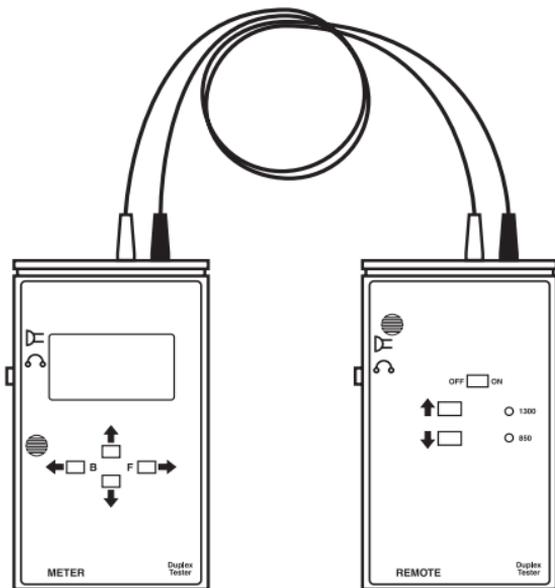


Figure Q-2. Meter and remote light source.

- The meter has a data display that shows menus for all functions. It also has four buttons that allow scrolling through the menus. Take a minute to review the menu and familiarize yourself with the buttons.

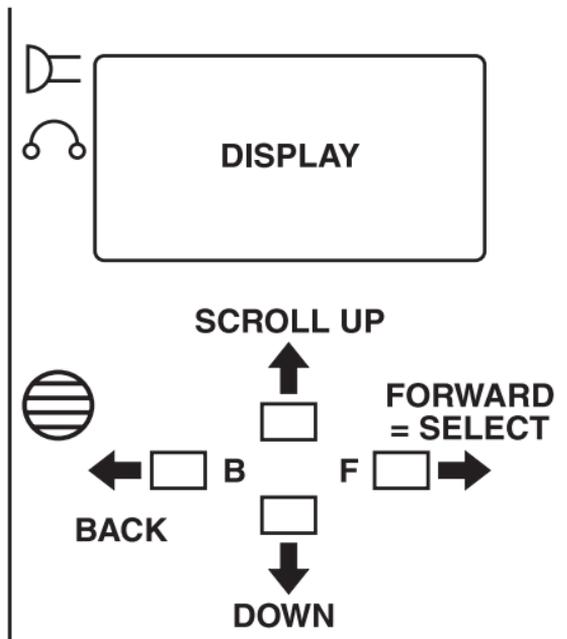


Figure Q-3. Data display on the meter.

4. Calibrate the launch cables for the “0 dB” loss reference for all tests. From the main menu on the meter, choose “Calibrate.”

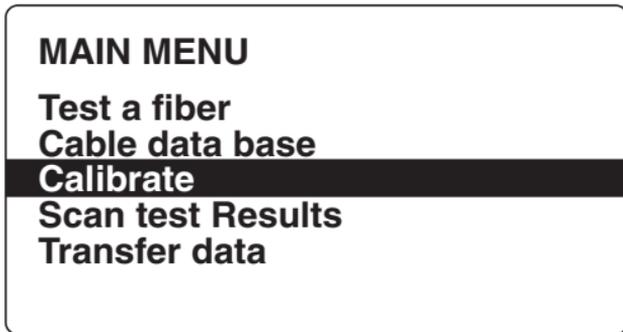


Figure Q-4. Calibrating the launch cables.

5. Adjust the meter to 0 dB for both wavelengths. Adjust the light source’s power output to set the meter to approximately “0 dB” (+0.02 is acceptable) for both wavelengths, then hold down the “F” button to accept this value as “0 dB.”

On this screen you can also choose the measurement resolution: the Up button chooses 0.1 dB; the Down button chooses 0.01 dB.

Calibrate**Zero out 850 nm
 -04.1 dB****Press F to continue
Hold down F to zero**

Figure Q-5. Choosing the dB settings for the meter.

NOTE

After setting the reference before testing the cable, do not remove the cables from the source—that will change the reference set. When working in the field, carry the light source with the reference cables attached. The carrying case will allow you to carry the light source in the case with the cable attached. You may turn the unit OFF and back ON without losing the reference.

FIBER OPTIC DUPLEX TEST KIT

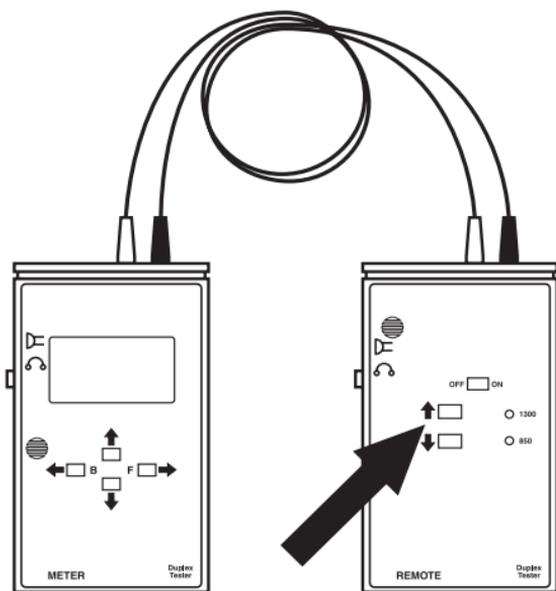


Figure Q-6. The meter and remote light source.

6. Test the second set of duplex cables to make sure they are good. Clean all the connectors. Disconnect the connectors at the meter and attach the second cable with a pair of mating adapters.

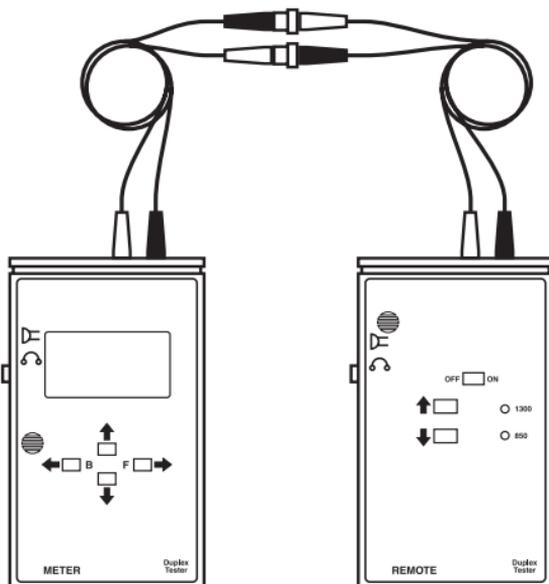


Figure Q-7. Testing the second set of duplex cables.

7. Before testing, you must enter a cable to test in the database. From the main menu, choose “Cable Database” (see below). In the submenu (see **Figure Q-9**, choose “Add New Cable.” Use the Up/Down/F buttons to enter a name for the cable.

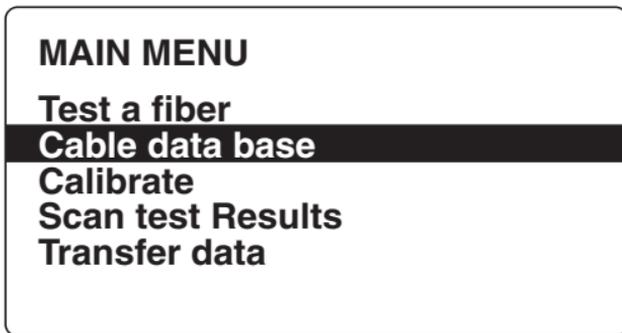


Figure Q-8. Main menu.

You may want to create a general cable to store readings when running quick tests. Use a cable name like ACABLE and leave it at the top of the list.

SUBMENU

Add new cable

Delete Cable

Delete Fiber

Clear memory

Figure Q-9. Submenu.

Add new cable ID

cabl3****

Press F to continue

Figure Q-10. Add new cable ID.

FIBER OPTIC DUPLEX TEST KIT

8. Choose Test Cable from the main menu, choose the cable you just added to the database, and press the F button to test. The display will show you a diagram of the complete cable test (see below). After you test one set, it will tell you to reverse the cables at the the meter to complete the test procedure (see Figure Q-12).

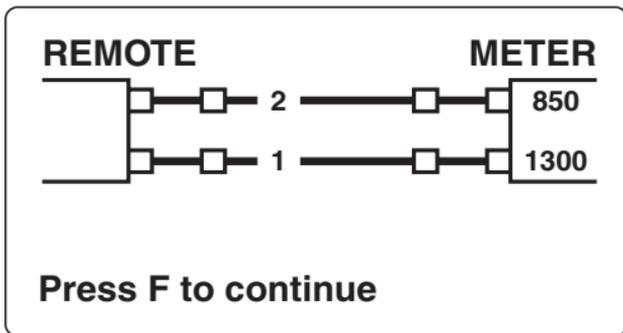


Figure Q-11. Testing a cable.

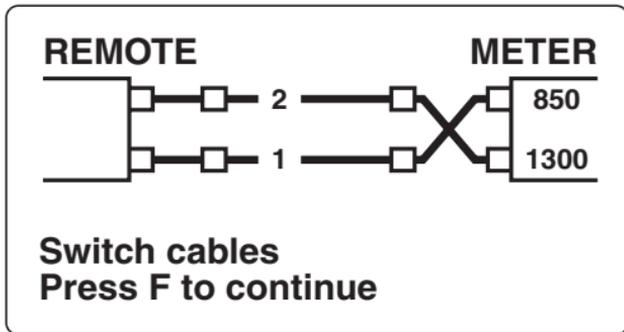


Figure Q-12. Switching cables.

9. Check the results for loss (see **Figure Q-13** on the next page). You should have less than 0.5 dB loss if your reference cables are good. If you get a higher loss, clean them and retest. Check your calibration.

NOTE

When testing short cables, ignore the length measurement and pass/fail—it is only valid for cables greater than 250 meters.

CBL cable 3 FIB 0001	
1300 nm	850 nm
-00.45dB	-00.05dB
Pass	
FIB 0002	
1300 nm	850 nm
-00.45dB	-00.02dB
length	- - -m Fail

Figure Q-13. Checking the results for loss.

- Test other cables. Disconnect the mating adapters and attach a cable to test between the launch and receive cables (see **Figure Q-14** on the next page). Add the cable name to the database. Choose Test a Cable from the main menu, choose the cable you just added to the database, and press the F button to test.

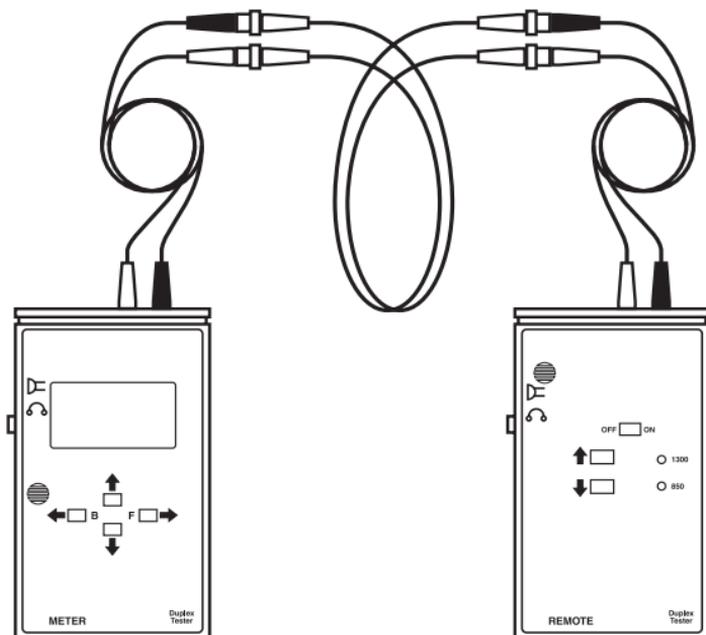


Figure Q-14. Testing other cables.

FIBER OPTIC DUPLEX TEST KIT

After testing, the meter will add the data to the database. Scan the data from the panel display. Read the rest of this manual for information on software installation and to learn how to upload and download with a host PC.

1. Specifications

Fiber—Multimode

Wavelengths—850 and 1300 nm

Connectors—TS1200A: ST; adapters for MT-RJ (TS1210) and LC (TS1220) also available

Loss Measurement Range—20 dB

Display Resolution—0.1 or 0.01 dB

Measurement Uncertainty— ± 0.5 dB

Data Storage—250 cables, 500 fibers

Meter Controls—On/Off switch, 4 function buttons

Operating Temperature—32 to 122°F (0 to 50°C)

Datalink—RS-232, cable and software included

Power—9V battery (8–12 hours life) or AC adapter

Size—6.1"H x 3.7"W x 1.3"D (15.5 x 9.4 x 3.3 cm)

Weight—11 oz. (312 g)

2. Introduction

2.1 Description

The Fiber Optic Duplex Test Kit contains a unique meter for fiber optic links. Links always involve fibers in pairs, so the meter was designed to test pairs of cables simultaneously. Using a meter and a remote light source at opposite ends of a cable, you can test two multimode fibers at both 850 and 1300 nm very quickly, reducing the time and cost of comprehensive fiber optic link testing. Data on up to 500 fibers is stored in a relational database for readout on a PC. The built-in talkset allows crews to communicate over the fibers and speed up testing even more.

The meter tests one fiber at 850 nm and tests the other fiber at 1300 nm. Then the two fibers are switched at the meter and retested. The meter analyzes the data and estimates the length of the cable, then stores all the data. It can even identify the proper wavelength to prevent errors.

The meter is menu-driven, with four front-panel buttons to allow scrolling through menus on the large graphic display and choosing the proper functions.

To calibrate for testing, bring the two units together to set the reference for loss—with prompts by the meter showing you how to do it. Then, take the units to remote locations and begin testing. The remote unit will automatically change wavelengths in unison with the meter, which means one person can work alone while testing.

2.2 What the Package Includes

Your package should contain the following items.

- (1) duplex cable meter
- (1) remote light source unit
- (2) hands-free earphones for FOtalk
- (1) 9-V battery
- (2) AC adapters
- (2) ST duplex reference cables
- (1) serial cable
- (1) Fiber optic tracer

FIBER OPTIC DUPLEX TEST KIT

- (1) carrying case
- (3) software diskettes
- Texwipes Alco pads
- This users' manual.

If anything is missing or damaged, please call Black Box at 724-746-5500.

NOTE

We recommend that you try the procedures described in this manual first in your office before using it in the field. Make sure you know how to properly test cables and how the test kit works. If you have questions, call Black Box Technical Support at 724-746-5500.

3. Operating Instructions

3.1 Cleaning and Safety

Avoid touching the ends of a ferrule on the fiber optic cable. Oil on your skin will attract dirt. Always keep dust caps on connectors, bulkhead splices, patch panels, or anything else that is going to have a connection made with it. This avoids contamination and possible scratching of the polished fiber.

Use lint-free pads and isopropyl alcohol to clean the connectors. Some solvents may attack epoxy or leave a residue, so we recommend only isopropyl alcohol. And while cotton swabs and cloth will leave lint or threads behind, Texwipes Alco Pads won't. These pads are supplied with every Fiber Optic Kit.

The best way to clean bulkhead connectors is to remove both connectors and clean with Alco Pads. If this is not an option, blow dust out of the bulkhead connectors or optical ports with “canned air.” Canned air uses a liquid propellant and can leave a residue if you don't use it with caution. To avoid any problems, hold the can perfectly level and spray for 3 to 5 seconds to make sure that any propellant or debris is expelled from the

nozzle. The “Curtiss Blaster,” available at office supply and computer stores, is a better choice. Ferrules on connectors/cables get dirty from repeated insertions into the splice bushing. Material from the alignment sleeve is “shaved” off and can collect on the end of the connector or build up and form a ridge in the bushing causing excessive end gap (an unwanted attenuator). To avoid this, use splice bushings with metal or ceramic alignment sleeves only.

CAUTION

Dirt is harmful to fiber optic connectors. DO NOT drop the connectors on hard surfaces, touch the ends of the connectors with your fingers, or leave the connectors without dust caps.

DO clean the connectors with Alco Pads (supplied), before testing or reassembling a system.

WARNING

Never look into a fiber optic cable. Harmful optical radiation may be present. If you look directly into the cable, your eyes may be permanently damaged. Use the meter to determine if the signal is present.

3.2 Using the Test Kit

The meter works like any other fiber optic loss meter, with a calibrated source to send light of the proper wavelength down the fiber and the ability to measure

the change in power at the far end. Tests are performed to industry standards (EIA/TIA FOTP-171 and OFSTP14, EIA/TIA 568 Annex H).

The remote light source controls the test procedure automatically. It has two identical outputs that switch between 850 and 1300 nm. Each input of the remote light source is wavelength specific, so one fiber is tested at 850 nm and the other at 1300 nm. Change the leads on the meter, and the fibers will be tested at the other wavelength. This process is automatic; however, you must physically change the fibers once during the test cycle.

After reversing the fibers and retesting, you will have tested both fibers at both wavelengths—in less than one minute.

The built-in FOtalk talkset lets you coordinate testing and changeover to more pairs of fiber for testing. Pushing the FOtalk button disables the test mode and allows test crews to communicate.

Data from every test is stored for future reference on the display or for transferring to a PC. The meter will store complete test data on 250 cables and 500 fiber tests.

FIBER OPTIC DUPLEX TEST KIT

The meter's unique measurement technique can be easily calibrated and only needs to be checked occasionally (for example, when changing reference cables). To calibrate the meter, simply check the two optical ports on the meter and adjust the remote light source if necessary.

Use the two duplex reference cables to test duplex links. The meter will test and calibrate all of the cables. Using color-coded duplex test cables will simplify testing and calibration. The test kit comes with a proper set of reference cables.

3.3 Controls and Indicators

The various controls and indicators of the meter and the remote light source are shown in Figure 3-1.

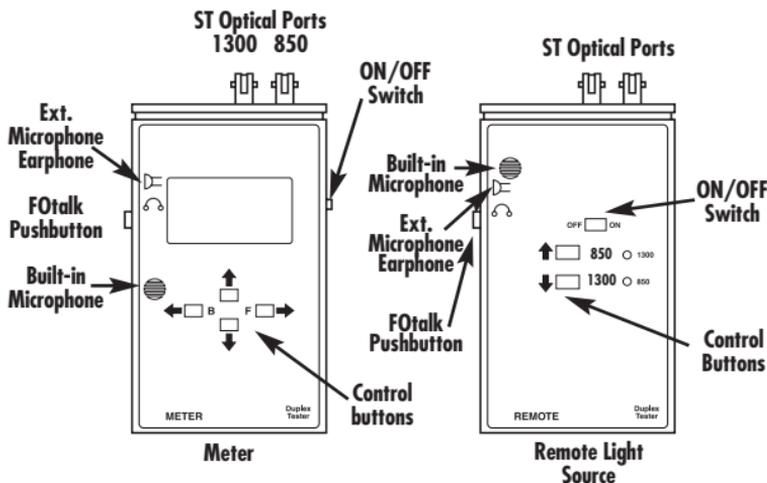


Figure 3-1. Controls and indicators on the meter and remote light source.

3.3.1 CONTROL BUTTONS ON THE METER

The meter has four buttons that control most functions. The display offers menus of choices that you can scroll through and chose with the control buttons.

Use the function button (marked “F”) to enter the highlighted headings on the menus. You can also use

the button to jump to the next field if you are within a sub-path.

Use the back button (marked “B”) to back out of certain fields to return to the main menu. If you are entering data into the database, the back button will let you clear data that was already entered. You can’t use the back button when running a test; the meter will give you an option to retest.

The remaining two buttons are simply up and down scroll buttons. Use these buttons to scroll through menus and the alphanumeric characters in the database.

Other buttons and switches on the meter include the ON/OFF switch and the pushbutton switch that activates the FOfalk talkset. The meter also has an input port for an earphone or a headset. This port is the one farthest from the black button on the left side of each unit for remote communication. Use the other port to bypass the internal microphone, so you can use an external microphone.

3.3.2 BUTTONS AND SWITCHES ON THE REMOTE LIGHT SOURCE

The remote light source, unlike the meter, has only two control buttons on the front panel. Use these buttons to light the LEDs. The remote light source also has a manual mode that you can enter by holding down both buttons down together. The manual mode lets you use the unit as just a source. You can jump back and forth from one LED to the other: simply hold down both buttons. To exit this mode, switch the unit off, then on.

The switches on the remote light source include the ON and OFF switch, as well as a button for the talkset. The two ports on the side of the unit are for the earphone and an external microphone, just like the meter.

3.4 Getting Started

1. Turn on the remote light source and connect the appropriate duplex launch reference cables to its output ports. The unit's front-panel wavelength indicators will flash, indicating that it is on but not being controlled by a remote meter.

2. Turn on the meter. It will display a software revision number for a few seconds, then the main menu will appear.
3. Use the UP or DOWN buttons on the meter's front panel and press the function button to enter the desired menu option. Each menu path features prompts to lead you easily through each state. The main menu options include Calibrate, Testing Reference Cables, and Test a Fiber.

3.5 Main Menu Options

3.5.1 CALIBRATE

Use the Calibrate menu path to calibrate the remote light source for zero loss reference (0 dB).

The menu will first prompt you to connect the jumper cables. (Refer to **Figure 3-2.**) Connect the cables attached to the remote light source to the meter's ports. Press the F button.

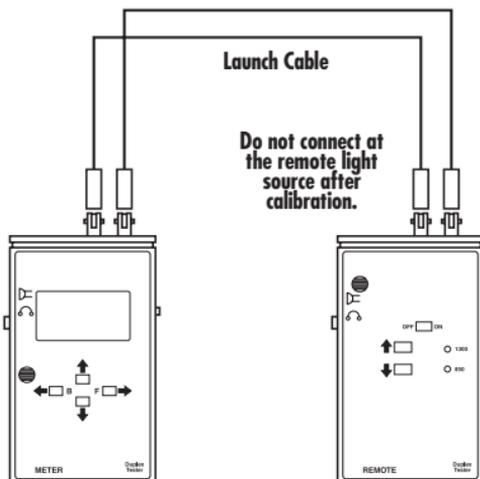


Figure 3-2. Calibrating the meter and remote light source.

The meter will prompt you to zero out (calibrate) the 1300 nm input with the remote light source set at near its highest output power to maximize measurement range. If the meter is reading low, it isn't receiving input from the remote light source. To adjust the input, press the remote light source's UP button. The meter will respond by giving a dB reading. Adjust the remote light source until the meter reads near zero (± 0.5 dB is acceptable), then press and hold the F button to store this value as 0 dB.

In this field, you can choose a readout of 0.1 dB or 0.01 dB.

Holding down the UP button will make the readout 0.1 dB, and holding down the DOWN button will make the readout 0.01 dB. Again, press the F button to continue.

In the next field, you can choose to zero out the 850 nm input or the 1300 nm input. To zero out the 850 nm input, adjust the remote light source either UP or DOWN depending on the meter readout. Then press and hold the F button to save the 0 dB value.

Now that you've calibrated the units, press the F button to return to the main menu.

3.5.2 TESTING REFERENCE CABLES

NOTE

You cannot make reliable measurements unless both launch and receive cables are high quality and in good condition.

After calibration, use the meter and remote light source to test your reference cables as shown in Figure 3-3. Clean all connectors before testing and make certain all mating adapters are in good condition. Use a compressed gas source like the “Curtiss Blaster” to blow

dirt out of the optical ports of the meter and remote light source.

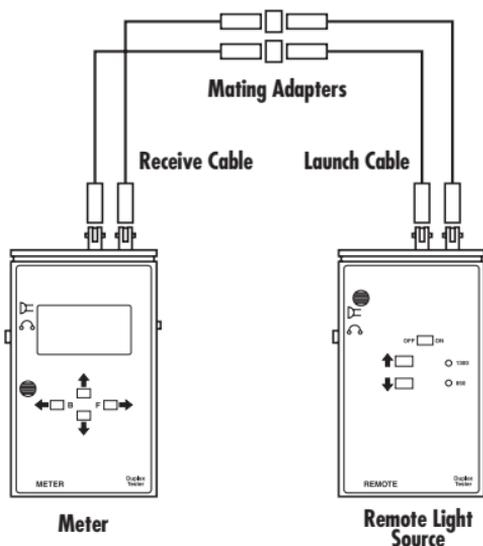


Figure 3-3. Testing reference cables.

Cable Database

This is the cable database file manager. When you enter this menu option, the meter will give four options: Add New Cable, Delete Cable, Delete Fiber, and Clear Memory.

1. Add New Cable

This menu path allows you to enter cable ID, user ID, and date from the front-panel buttons (or you can use the PC software). The cable ID consists of 6 alphanumeric characters. You can scroll through upper-case letters, lower-case letters, numbers, and a variety of selected symbols including a blank space.

When the menu displays the desired character, press the F button to select that character. The format is the same for each of the six characters that you can choose from. If you want to change a selected character, simply press the back button (B). This will prompt the cursor to jump back a character and initialize that character back to the letter “a.” After you’ve chosen all 6 characters, you may continue by pressing the F button, or press the B button to exit to the main menu.

The meter will also prompt you to enter a user ID of three alphanumeric characters and date. When you’ve entered both, the display will prompt you to press the F button. The meter will now display the entered data for you to look at and confirm, then prompt you to press F to return to the main menu.

The display will also ask you to enter the number of connectors used in the setup for each cable. It has a preset value of 0002, as shown on the screen. If the cable has a different number of connectors, use the up/down buttons to scroll to that number and press the F button.

2. Delete Cable

Use this option to delete an unwanted cable from the database. Enter the menu path by pressing the F button. This field will let you scroll down through the cables in the database and select one. When you have found the cable to delete, simply press the F button to delete the highlighted cable. Press F again to return to the main menu.

3. Delete Fiber

Use this option to delete a specific pair of fibers within a cable. Enter the menu path, which will give you a list of cables to choose from. Scroll to the cable that contains the fiber you want to delete and press the F button. The meter will now display the fibers within that cable and highlight the fibers in pairs in the order they are tested. Simply scroll to the desired pair of fibers and press the F button a number of times to delete that pair of fibers.

4. Clear Memory

This option will delete all data in the database. Simply highlight the desired option and press the F button. The meter will give you one more chance to quit from this option and if you wish to proceed, simply press the F button. The meter will tell you that it is clearing memory by displaying “initializing...” on the screen. When it has finished clearing the memory, the meter will jump back to the main menu.

3.5.3 TEST A FIBER

The next option on the main menu is to test a pair of fibers. The meter will prompt and lead you easily through a fiber test, which includes a graphic display of the exact setup for testing the pair of fibers.

To select “Test a Fiber” from the main menu, scroll to the option and press the F button. This selects the menu path for testing a pair of fibers.

To select a cable from the cable database, scroll to the cable and press the F button. If you have not set up a cable in the cable database, return to the main menu and set up a cable name to test.

The meter will now display a graphical setup. The screen will show the cables under test connected between the jumpers coming from the remote light source and the jumpers coming from the meter.

Your test setup should resemble the setup diagram below.

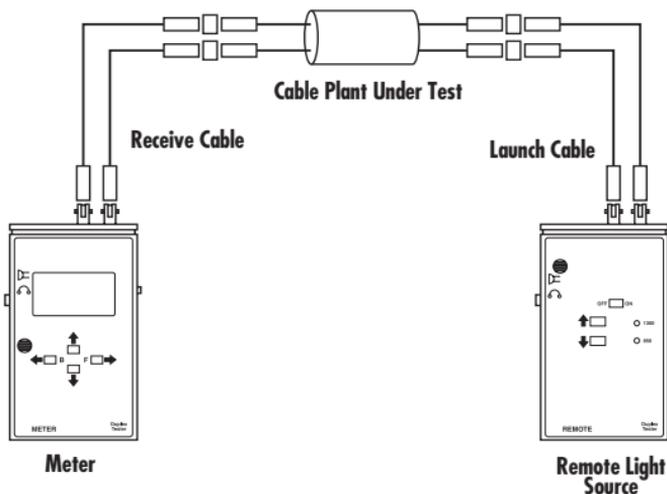


Figure 3-4. Test setup.

After switching the cables (refer to Figure 3-5), simply press the F button to continue testing. The meter will now test fiber #1 at 850 nm and fiber #2 at 1300 nm.

FIBER OPTIC DUPLEX TEST KIT

After it takes these readings, the meter will calculate an estimation of the length of both cables based on the loss readings.

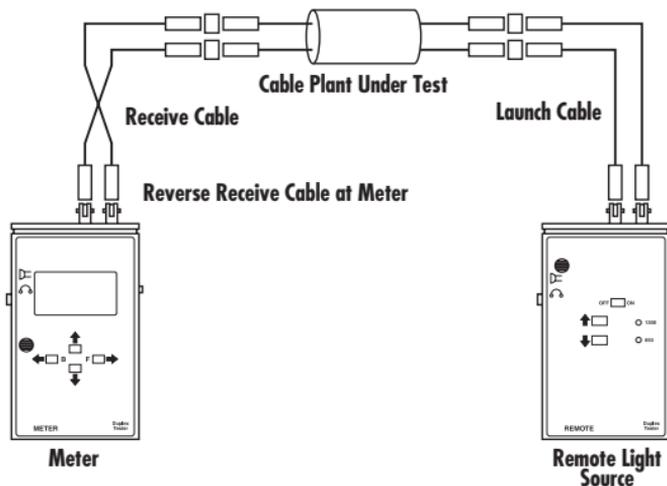


Figure 3-5. Reversing the test setup.

If the meter gets a low for any of the readings, it will respond by giving “—m” on the length display. It will also give “—m” as a reading if the loss @ 850 nm is less than or equal to the loss @ 1300 nm. Otherwise, it will display the length: less than 250 m by displaying <250 m and in increments of 50 m after that (for example, if the meter calculates a length of 516 m, it will display 500 m).

The meter will also display whether the cable has passed or failed certification, based on the EIA/TIA 568 component specifications.

After the meter has finished the complete test of both fibers, press the F button to continue. You will now be given the option to save the test results to memory (press F) or to retest (press B). On a retest, the result will not be saved, but it will reuse the fiber IDs that were previously used.

The meter will now return to the main menu with “test a fiber” highlighted, ready to test another pair of fibers or to scroll to another option.

3.5.4 SCAN TEST RESULTS

This feature allows you to scan through the entire database of stored test results. When it enters the menu path, the meter will ask you to select a cable from the cable database. Scroll to the desired cable and press the F button to select a cable. The meter will display the fibers in the cable selected, and will highlight the fibers in pairs. Scroll to the pair of fibers to review and press the F button to view the test data.

To view any other sets of fibers in that particular cable, press the B button to go back to the list of fibers, scroll to that pair of fibers and press the F button to view the test data.

When you are finished reviewing the database, exit to the main menu by pressing the F button. To view a different cable in the database, simply enter Scan Test Results in the main menu and follow the same procedure stated above.

3.5.5 TRANSFER DATA

This option lets you transfer data to or from the accompanying meter software program running on the PC.

Inside this option, the submenu will give you a choice of two headings: Write to host and read from host.

1. Write to Host: Press the F button to enter this menu path. Write to host will download all of the information that is currently held in the meter's database. The next screen will prompt you to set the PC program to Read and continue by pressing the F button. The meter will now download all the information to the software program that is stored

in the meter's database. The software will display "writing to host..." while it is transferring data from the meter to the host PC. After it completes the transfer of all the data from the meter, it will return to the main menu.

2. **Read from Host:** Scroll to this option and press the F button to enter the menu path. This menu path allows you to enter data from a host computer. The software program that comes with the meter has three boxes for data entry: Cable ID, User ID, and Date. The meter will wait for a response from the host computer. If it receives data, it will respond by entering the data into the database and returning to the main menu. If it does not receive data from the host, it will continue waiting for data until you press the B button to return to the main menu.

4. Installing Software

Software for your meter allows you to download data to a PC to create certification reports or files for customers. The software runs on a PC using Windows® 95 or 98.

To install the software, insert the supplied diskette into the floppy drive and run the setup program.

To use the software, connect the meter to the PC with the supplied cable and open the program. Start the program with the run button. Select the COM port to which the meter is attached.

4.1 Uploading Cable Database

Enter the cable name, operator initials, and date in the windows provided on the meter's software program on the PC.

On the meter, select "Transfer Data" from the main menu and "Read From Host" from the Transfer Data menu.

On the PC, click on the Read/Write button to upload data. Repeat as necessary to upload all the cable data desired.

4.2 Downloading Cable Test Data

On the meter, select “Transfer Data” from the main menu and “Write to Host” from the Transfer Data menu.

On the PC, press the Read/Write button.

On the meter, press F to transfer the data.

The data will appear in the window to the right of the meter’s screen. You can scroll throughout the data to review it.

You will be prompted to provide a file name and location to store the data. We suggest that you create a directory under the meter software to store cable data.

Stored data can be read directly into a table or spreadsheet for analysis or printing reports.

5. Adapting to Different Connectors

The meter uses ST connectors. Other connectors such as SC, FDDI, and ESCON use the same connector ferrule and can be tested using proper hybrid adapters (TS1210, TS1220).

Other connectors like the new small form factor MT-RJ, Voliton, OptiJack, or even the ones that can mate to an SC can be accommodated using hybrid reference cables with ST connections at the instruments and the proper connectors on the testing end.

Some connectors like the MT-RJ or Volition use polarized or male/female connections. These need special “bucket fiber” adapter cables. Call Black Box Technical Support at 724-746-5500 for details.

5.1 Interpreting Measurement Results

Total loss in a link is comprised of connector loss, fiber loss, and splice loss (if any are included in the link). To estimate loss, you can use typical figures for loss or the more conservative values given in EIA/TIA 568. The values are listed in Table 5-1.

Table 5-1. EIA/TIA-568 values

Component	Typical Specification	EIA/TIA 568
Fiber multimode 850	3 dB/km	3.75 dB/km
Fiber multimode 1300	0.7 dB/km	1.5 dB/km
Connector	0.3 dB	0.75 dB
Splice	0.2 dB	0.3 dB

Estimated loss is calculated by the following formula:

Loss=fiber loss (length - km x attenuation - dB/km +
connector loss (# of connectors x loss) + splice loss (# of
splices x loss)

5.2 Using FOfalk

The meter and remote light source units include a FOfalk headset. There is a built-in microphone on the front panel of each unit and a jack for the earphone supplied with the units on the side near the FOfalk pushbutton. The communication is two-way with both talk and listen in both directions. The display of the meter will indicate that you are in the FOfalk mode. You cannot test and talk at the same time.

Attach the earphone to the units before using. Press and hold the round black FOfalk button on the side of either the meter or the remote light source unit and

speak into the microphone on the front panel. Listen on the provided earphone.

You can also use a headset with microphone. Plug the microphone connector into the units where indicated to override the internal microphone. Use the FOfalk button to activate the talkset function.

5.3 Remote Light Source Manual Mode

The remote light source also has a manual mode that turns off the toggle mode used with the meter. You can access this mode from the toggle mode by holding down both the up and down buttons together. This mode is totally separate from the toggle mode and is used independently. In the manual mode, the unit will work as if it were a regular remote light source with both outputs at the chosen wavelength.

Use the up and down buttons to adjust the remote light source to the desired output. The red LED on the front label will indicate at what wavelength the source is transmitting. To switch wavelengths, simply push the up and down buttons at the same time. You can switch between wavelengths as many times as you want to.

When you want to return to the toggle mode, simply reset the unit by turning it off, then on.

5.4 Using the Meter with Other Remote Light Sources

You can use the meter with other remote light sources, such as a 1300-nm single-mode laser or 850-nm VCSEL for special testing applications. Attach the source to the proper input of the meter and follow the calibration procedure for the wavelength of the source.

6. Troubleshooting

6.1 Testing Hints

- Follow the procedures carefully. The meter's reference method for zero calibration may be different from procedures you have used before.
- Make sure that your launch and receive cables are good. Before going out to a job site, test all your cables in the office to be absolutely certain that they are good cables.
- Clean the meter's connectors regularly and inspect them with a microscope for scratches and cracks.

6.2 Problems/Solutions

Symptom: The meter or remote light source has no display or (doesn't turn on).

Possible Cause: The battery is discharged.

Check and Fix: Power off, replace the battery or connect an AC adapter.

Symptom: Readings high under test conditions > 20 dB.

Possible Cause: The meter may not be sending enough light for the remote light source to respond.

Check and Fix: Attenuation may be greater than 20 dB or the cables may be bad. Check with FOtracer.

Symptom: The power reads low while setting the launch reference for loss testing.

Possible Cause #1: The launch cable is bad.

Check and Fix #1: Use FOtracer or a visual remote light source to test the launch cable and replace it if it's bad.

Possible Cause #2: The remote light source LED power is low.

Check and Fix #2: Check the battery condition, power set control, or try another modular adapter.

Symptom: All cables tested have high loss.

Possible Cause #1: The launch and/or receive cable is bad.

Check and Fix #1: Test the launch and receive cables with a known good cable to see if the connectors are good. Replace the connectors if necessary.

Symptom: All of the cables tested have high loss.

Possible Cause: The splice bushing connecting the launch or receive cables to the cable under test is worn out.

Check and Fix: Replace the splice bushing, preferably with a ceramic or metal alignment sleeve.

Symptom: The reading jumps on one end.

Possible Cause: FOtalk is in use.

Check and Fix: Don't talk and test at the same time.

Symptom: The meter reads low.

Possible Cause: The fiber is not inserted or is broken.

Check and Fix: Check the connections with FOtracer.

6.3 Calling Black Box

If you determine that your Fiber Optic Duplex Test Kit is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box at 724-746-5500.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

6.4 Shipping and Packaging

If you need to transport or ship your Fiber Optic Duplex Test Kit:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the Fiber Optic Duplex Test Kit for repair, make sure you include everything that came in the original package. Before you ship, contact Black Box to get a Return Material Authorization (RMA) number.



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