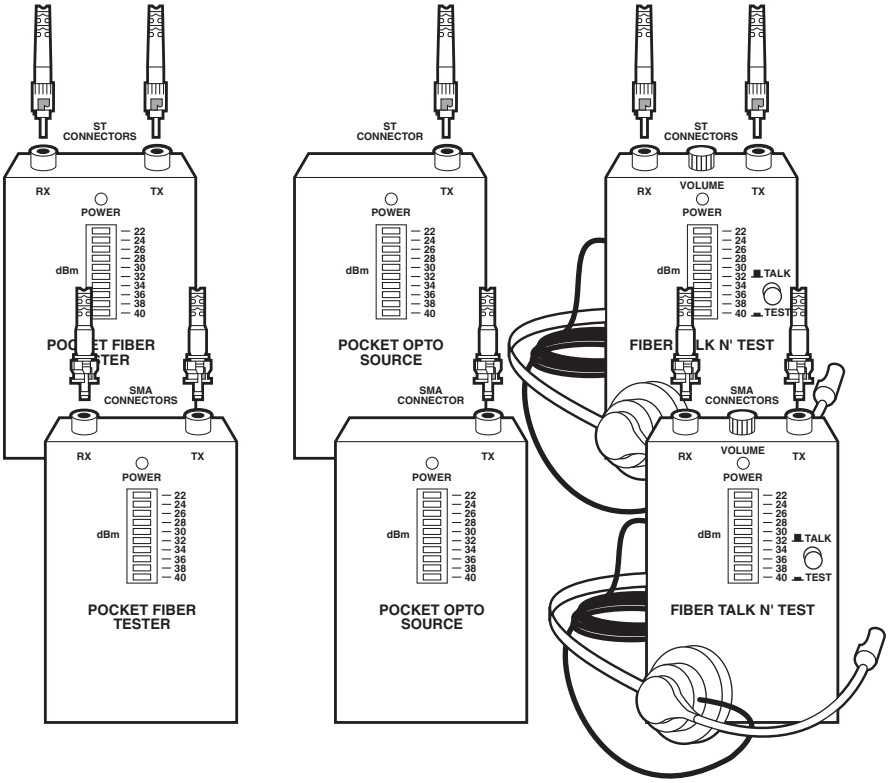
BLACK BOX®
NETWORK SERVICES

MARCH 1998
TS051A
TS052A
TS053A
TS054A
TS055A
TS056A

Pocket Fiber Tester
Pocket Opto Source
Fiber Talk N' Test



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Contents

1.0 Specifications

Indicators — All models: (1) Power LED; TS051A, TS053A, TS054A, TS055A: (1) Bar-graph-style LED indicator graduated in 2-dBm steps

Connectors — TS051A: (2) 905 SMA; TS052A: (1) 905 SMA; TS053A: (2) 905 SMA, (1) RJ-11; TS054A: (2) ST, (1) RJ-11; TS055A: (2) ST; TS056A: (1) ST

Controls — TS053A, TS054A: Volume, "press to test" button

Modulation — TS053A, TS054A: AM

Output Wavelength — 850 nm ±15 nm at ± 3 dB

Accessories — TS053A, TS054A: Folding headset with boom mike

Power Output — -20 dBm ±0.5 dBm into 100µ-core fiber; -23 dBm ±1 dBm into 62.5µ-core fiber; -26 dBm, 1.0 dBm into 50µ-core fiber

Readout Range — TS051A, TS053A, TS054A, TS055A: -22 dBm to -40 dBm

Readout Resolution — TS051A, TS053A, TS054A, TS055A: 2 dBm

Power — 9 volts, supplied by alkaline or nickel-cadmium transistor battery

Size — 4.5"H x 2.3"W x 1"D (11.4 x 5.8 x 2.5 cm)

Weight — 0.3 lb. (0.1 kg), including battery

2.0 Introduction

2.1 General

The Pocket Fiber Tester (Fig. 2-1) is a simple, convenient, general-purpose tool for checking the integrity of fiberoptic interconnections.

- It's small enough to fit into a shirt pocket.
- It's powered by a standard 9-volt alkaline battery.
- Its measurements are shown on an LED scale, which makes working in dim lighting easier.
- It comes in two models: one with SMA connectors (TS051A) and one with ST connectors (TS055A).

The Pocket Fiber Tester is the perfect tool when all you want is a quick measure of a fiber cable's continuity.

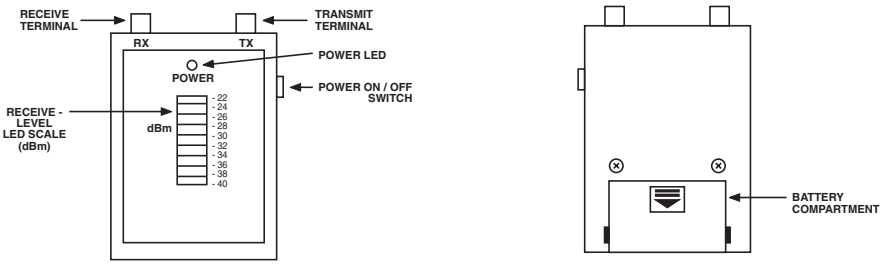

Fig. 2-1. The Pocket Fiber Tester

The Fiber Talk N' Test (Fig. 2-2) functions in the same way as the Pocket Fiber Tester, *plus* it lets you talk to a partner at the other end of the cable. You use a headset and a microphone to send your voice via amplitude modulation (AM). It comes in models with SMA connectors (TS053A) and ST connectors (TS054A).

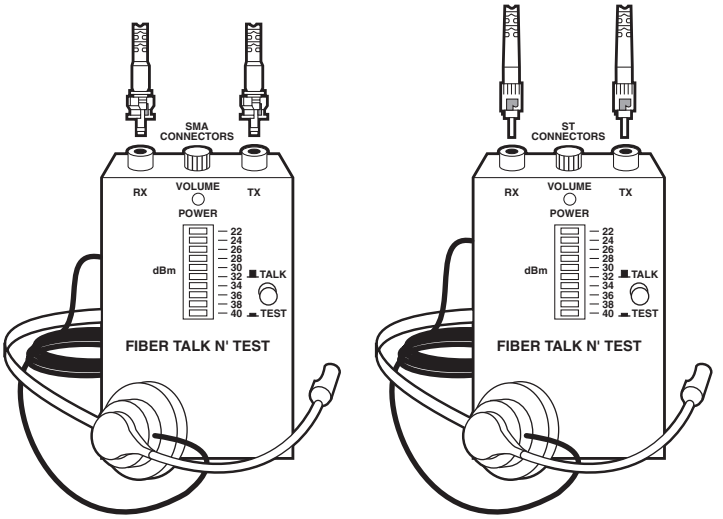

Fig. 2-2. The Fiber Talk N' Test.

The Pocket Opto Source (Fig. 2-3) works with the Pocket Fiber Tester or the Fiber Talk N' Test. It's also small enough to fit into your shirt pocket, and it also uses a standard 9-volt battery.

- It injects a continuous, nonpulsed signal at a known power level into a terminated fiber link.
- It comes in two models: one with an SMA connector (TS052A) and one with an ST connector (TS056A).

Used with the Pocket Fiber Tester, the Pocket Opto Source is ideal for measuring an installed cable's continuity or attenuation when the cable's ends are too far apart to be connected.

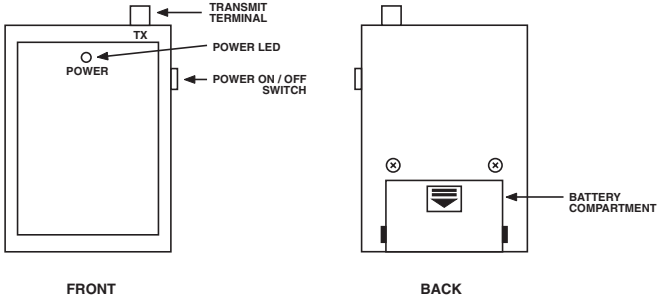

Figure 2-3. The Pocket Opto Source

2.2 Components

The Pocket Fiber Tester and Fiber Talk N' Test have four main components:

- an optical source
- an optical receiver
- receive-level circuitry
- receive-level scale

The Fiber Talk N' Test also has a head set with a boom microphone.

The Pocket Opto Source has one main component:

- a regulated optical source

2.2.1 The Optical Source

The Pocket Fiber Tester, Fiber Talk N' Test, or Pocket Opto Source shoots light (wavelength, 800 nanometers) into fiberoptic cable at the following intensities:

Cable core	Intensity
100 µ	-20 dBm
62.5 µ	-23 dBm
50 µ	-26 dBm

NOTE: **The light intensity transmitted by the Tester or Source is directly affected by the quality of connections (connector alignment, end-polish, and light-tightness, for example) along the fiberoptic cable.**

2.2.2 The Optical Receiver and Receive-Level Circuitry

The optical receiver and receive-level circuitry of the Pocket Fiber Tester and the Fiber Talk N' Test are made up of an optoelectronic transducer and active voltage-divider circuitry. These components convert the light that the Pocket Fiber Tester receives into a voltage. The receive-level circuitry then modifies this voltage and displays it on the receive-level LED scale on the surface of the tester, below the POWER LED. The scale has a resolution of 2 dBm. The reading shown on the LED scale is the intensity of light, in dBm, received by the tester.

2.2.3 How to Read a Measurement on the Receive-Level Scale

A voltage corresponding to the light that the Tester receives is displayed on the receive-level LED scale. This scale is calibrated in -2-dBm steps over a range from -22 dBm to -40 dBm. That means the highest bar illuminated on the LED gives an approximate measure of the power value of light that the tester receives. For example, if all bars on the scale are lit up to and including the "28" segment of the bar graph, the measured received power is at least -28 dBm, but less than -26 dBm, the next highest scale value (that is, the signal received is between -28 and -26 dBm).

NOTE: **Before you make any measurement with the Tester, calculate the loss you expect to have in your cable. That way, as soon as you get the measurement from the Tester, you'll have an idea of the quality of your fiberoptic cable.**

You must consider any measurement you make with the Pocket Fiber Tester or Talk N' Test an approximate value. If you need exact measurements of light intensity, or you require tests of more than just cable continuity, you need either an Optical Time-Domain Reflectometer (OTDR) or a power meter.

3.0 Applications

You can use the Pocket Fiber Tester or Talk N' Test in a variety of measurement modes. For example, you can use a single Tester:

- as both transmitter and receiver to test continuity in a spool of cable

or

- to detect light activity on a particular cable that you are trying to locate within a bundle of cable.

Two testers can work in tandem:

- to check both sides of duplex cables simultaneously.

You can use a Pocket Fiber Tester with a Pocket Opto Source:

- to examine single runs of cable by using the transmitter of the Pocket Opto Source to send the light signal, and the optical receiver of the Pocket Fiber Tester to measure the signal loss. (This is particularly helpful with long-distance cable runs.)

3.1 Using the Tester to Measure Signal Loss in a Loop of Fiberoptic Cable (Fig. 3-1)

1. Remove the red protective covers from the Tester's connectors. Briefly inspect the connectors on both the Tester and the cable you'll be checking for any debris that could interfere with your measurement.

2. Join the connectors by screwing the cable ends onto the receive and transmit sides of the tester. Don't overtighten—that could break the Tester.

3. Turn the Tester ON by sliding the side-mounted thumbswitch forward to the "ON" position. Both transmitter and receiver are now operational.

NOTE: **If the power indicator is very dim or does not illuminate, see Section 4.1, "Checking Your Battery."**

4. Observe the receive-power LED. Subtract the value on the readout from -20 dBm (the intensity of the light transmitted by the Tester). The difference tells you the drop in light-signal power over the fiberoptic cable.

EXAMPLE:

If the LED readout is -28 dBm, subtract -28 from -20:

-20 dBm - (-28 dBm) = 8 dBm

Your loss in this example is 8 dBm.

NOTE: **If the readout is much lower than you expected, or the Tester gives you inconsistent readings, loosen and retighten the terminal connections. If you cannot obtain a consistent readout, and a battery check shows that the batteries are charged, you might need to reterminate the cable end.**

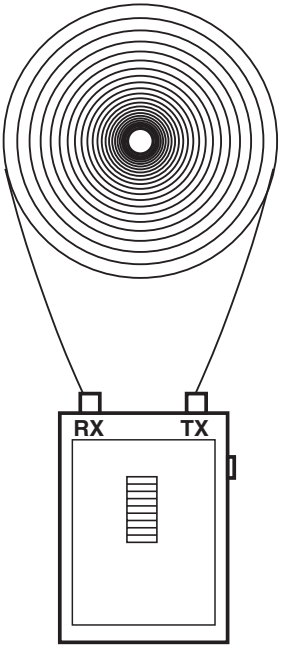

Fig. 3-1. Measuring the Loss in a Spool of Fiberoptic Cable.

3.2 Locating a Particular Cable Within a Bundle of Cables

Here's how to do it:

1. Make sure the cable you're looking for is the only cable transmitting a light signal. Turn on the Tester.

2. Pass the Tester's optical receiver back and forth in front of the cables until the LEDs light up. Then use the LED measurement to "close in on" the cable you're looking for. The measurement on the LED will be greatest when the optical receiver is directly in line with the cable you're looking for.

3.3 Using a Pair of Testers to Check a Duplex Cable (Fig. 3-2)

Here's how to do it:

1. Connect the terminals at the beginning of the duplex cable to one Tester. Then connect the terminals at the end of the duplex cable to the other Tester. (If the cable is already installed, you will need a partner to handle the second Tester.) Turn on the Testers.

NOTE: **Make sure that the optical transmitter from your Tester is connected to the same side of the duplex cable that the optical receiver of your partner's Tester is connected to, and vice-versa.**

2. The optical receiver on your partner's tester now receives the light signal sent from your Tester. At the same time, your optical receiver measures the signal your partner sent. Compare the measurements for each side of the duplex cable with the values you expect.

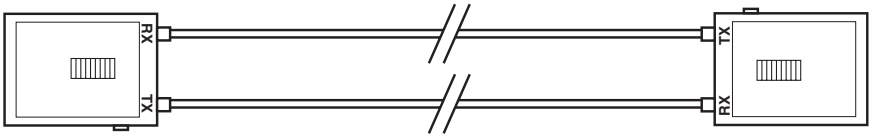

Fig. 3-2. Checking a Duplex Cable.

3.4 Using a Tester and a Pocket Opto Source to Check an Installed Cable (Fig. 3-3)

Here's how to do it:

1. Attach the optical receiver of your Tester to one end of the cable. Attach the optical transmitter of the Pocket Opto Source to the other end of the cable. Turn on both the Tester and the Opto Source.
2. Subtract the measurement shown on your LED from -20 dBm. The difference is the loss of light signal in the cable.

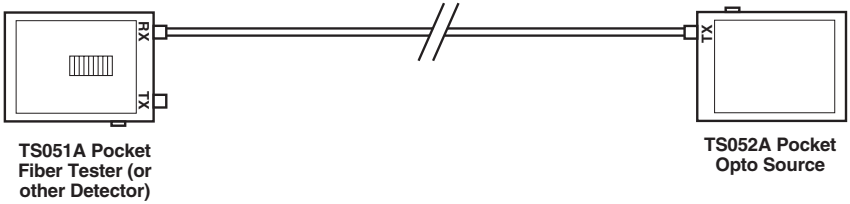

Fig. 3-3. Checking an Installed Cable.

4.0 Care and Maintenance

The Pocket Tester, Talk N' Test, and Opto Source are fairly rugged, but should be handled with some care, like any other hand-held electronic test equipment.

Give some care to the tester's and source's cable connectors. Always keep the red protective covers in place when you're not using the unit. Inspect the connectors before each use. The integrity of the Tester's connections will directly affect the accuracy of the measurements.

If necessary, clean the unit with a soft cloth dampened with a mild detergent/water solution.

CAUTION

The unit is not watertight. NEVER immerse it in water.

4.1 Checking Your Battery

With no cable attached to the Tester's terminals, point the optical receiver terminal at a nearby light source. If the LED does not light up to a maximum value as you approach the light source, your battery may be weak or dead.

Another way to test your battery is to take a relatively short piece of "known good" 100-micron cable and connect it between the optical-transmitter and optical-receiver connectors of the tester. When you switch the unit ON, all bars of the LED display should illuminate. If you don't get this "full scale" reading (even after you check the terminals for loose connections), replace the battery.

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