Fiber Optic Fallback Switch

Customer Support Information

To order or for technical support: Call 724-746-5500 or fax 724-746-0746
Technical support and fax orders 24 hours a day, 7 days a week
Phone orders 24 hours, 7 A.M. Monday to midnight Friday: Saturday 8 to 4 (Eastern)
Mail order: Black Box Corporation, 1000 Park Drive, Lawrence, PA 15055-1018

BLACK BOX SW700A-ST-MM

FIBER OPTIC FALLBACK SWITCH

User's Manual

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1. SAFETY INSTRUCTIONS

SOME SW700A-ST-MM UNITS MAY CONTAIN CLASS 1 LASERS.

These Class 1 lasers comply with one or more of the following.
- IEC 825-1, 1993
- IEC 825-2, 1993
- EN 60825-1, 1994
- EN 60825-2, 1994
- FDA 21 CFR 1040.10 AND 1040.11.

Please observe the following safety precautions.

General Restrictions

The units must be operated under recommended temperature and voltage limits.
These limits guarantee the laser safety.

Usage Restrictions

The optical ports of the modules shall be terminated with an optical connector or with a dust plug.

Caution

The use of optical instruments with this product will increase eye hazard!

2.   INTRODUCTION

2.1   General Description

Black Box Corporation's SW700A-ST-MM series is a Fiber Optic Fallback Switch that provides automated switching between primary (Remote 1) and secondary (Remote 2) fibers (in the case of faulty fibers) to support mission critical circuits or applications. See Figure 2-1. The SW700A-ST-MM is the ideal add-on for existing fiber optic data links or network system equipment that do not incorporate fault-tolerant designs. The SW700A-ST-MM provides plug-and-forget fiber optic path redundancy to data communication equipment without any modification. The SW700A-ST-MM can be used to add fault tolerance to fiber optic paths and/or data communication equipment, as shown in Figure 2-1. The supported data includes, but is not limited to: OC-3, FDDI, Fast Ethernet, etc. Both multimode and singlemode fiber versions are available. The SW700A-ST-MM provides visual alarms upon the loss of the main optical source and for faults in the primary or secondary fibers. Front panel indicators monitor normal activity for the user.

The SW700A-ST-MM series has two AC-powering configurations. SW700A-ST-MM is with 110 VAC power supply and SW700A-ST-MM-E is with universal 95-240 VAC power supply. In this manual, SW700A-ST-MM applies for both configurations, unless it is specified separately.
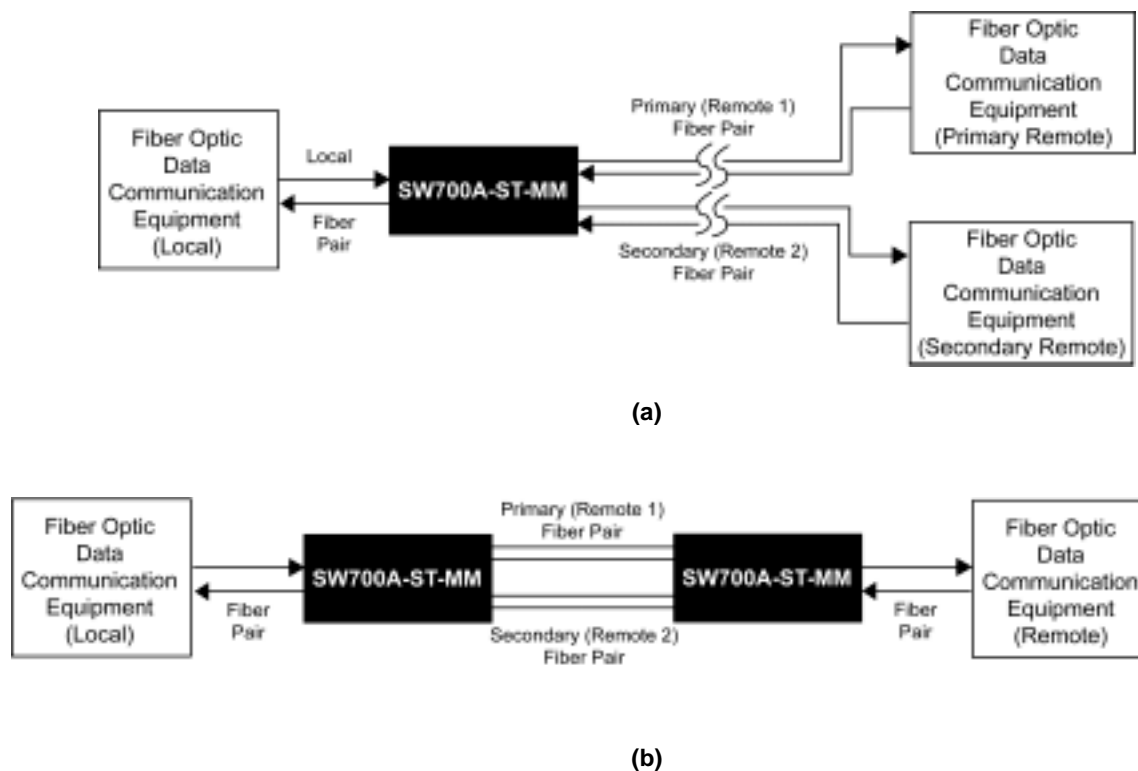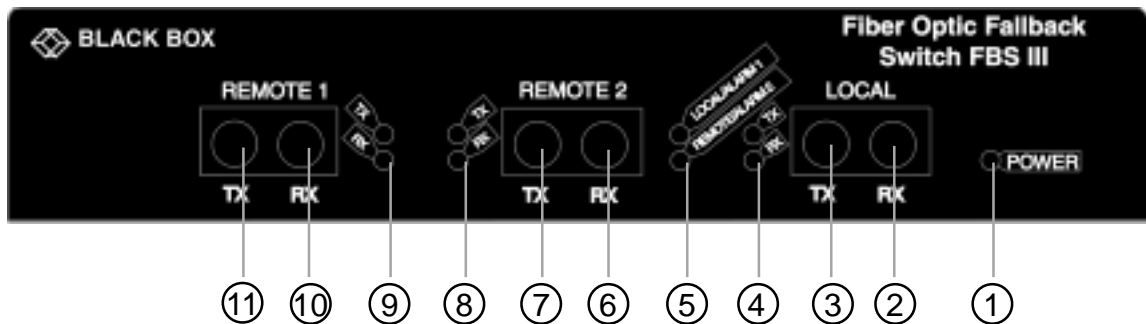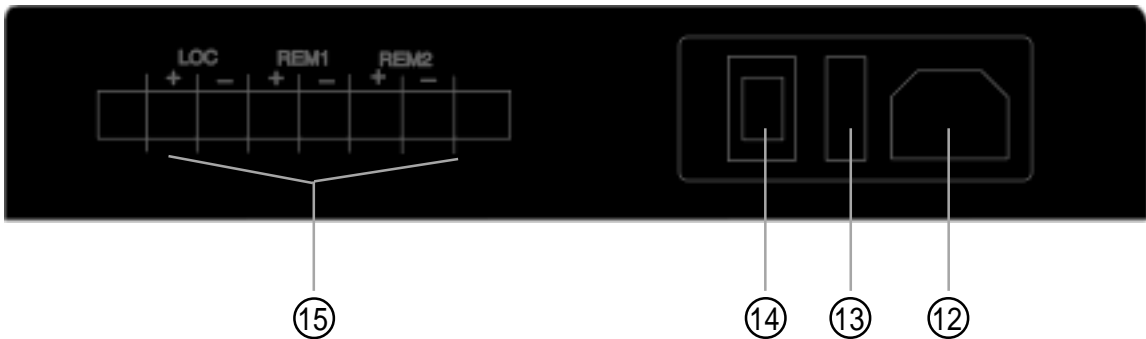
(a)

(b)

Figure 2-1
**SW700A-ST-MM System Applications: (a) Fault Tolerance on both Fiber Cables and Data
Communication Equipment, and (b) Fault Tolerance on Fiber Cables**

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Figure 2-2 shows the connectors, LED indicators, and other elements displayed in the front and rear panels of the SW700A-ST-MM.

Front Panel

Rear Panel

LED Indicators

1. Power ON Indicator
4. Local TX and RX Indicators
5. Alarm (Local and Remote) Indicators
8. Remote 2 TX and RX Indicators
9. Remote 1 TX and RX Indicators

Optical Ports

2. Local Fiber Optic RX Connector
3. Local Fiber Optic TX Connector
6. Remote 2 Fiber Optic RX Connector
7. Remote 2 Fiber Optic TX Connector
10. Remote 1 Fiber Optic RX Connector
11. Remote 1 Fiber Optic TX Connector

Rear Panel

12. Power Cord Connector
13. Fuse
14. Power Switch
15. Contact Closure for Local/Remote 1/Remote 2 Alarms

Figure 2-2
SW700A-ST-MM Front and Rear Panels

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For total bi-directional fault tolerance of a network system, SW700A-ST-MM units must be installed at both ends of the transmission link (see Figure 2-1b).

3.   INSTALLATION

3.1   Setup

Under normal circumstances, no setup is required.

3.2   Mounting

Make sure there is enough space to pull and connect both the electrical and optical cables without stressing them beyond the manufacturer's limitations (bend radius minimums). The units can be shelf mounted or rack mounted (using optional 19" enclosure or rack-mount kit).

Always place equipment as near as possible to the equipment to be supported. This will allow the use of short multimode fiber jumpers and, minimize jitter and bit-error due to modal dispersion.

3.3   Power Cabling

Make sure that the unit's rear panel switch is in the OFF (O) position. Power connections are made by plugging the included AC Line cord into the rear power entry of the unit then, connect the AC plug of the line cord into an AC power receptacle. A user serviceable 2 amp fuse is located in the power entry module.

3.4   Optical Cabling

> **!** **Optic ports are specified for singlemode or multimode fiber use.**
>
> Do not attempt to use multimode SW700A-ST-MM ports over singlemode fiber.

> **!** ***Use of short fiber jumpers may require the use of fixed optical attenuators to avoid significantly degrading transmission performance.*** Please contact Black Box technical supprt at 724-746-5500 if installer is unfamiliar with optical attenuators.

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For all optical connectors, follow connector manufacturers' instructions, or use the following procedure:

1.   Clean the optical ports in the SW700A-ST-MM unit: First remove and save the plastic dust caps from the optical ports on both units. Wipe the inside of the sleeve with a lint-free pipe cleaner moistened with reagent-grade isopropyl alcohol. Blow dry with compressed air.

2.   Clean the fiber optic connector: Use lint-free cloth dampened with alcohol and thoroughly wipe the side and end of the ferrule. Blow the ferrule dry with compressed air. Visually inspect the ferrule for lint. Chapter 5 describes a number of popular fiber optic connectors.

3.5   Channel Connection

The following connection procedure can be used for SW700A-ST-MM. Refer to Figure 3-1 for connecting one SW700A-ST-MM unit between one user-supplied local fiber optic transceiver and two user-supplied remote fiber optic transceivers via two fiber pairs (trunk). Figure 3-2 provides a graphic representation of the connections.
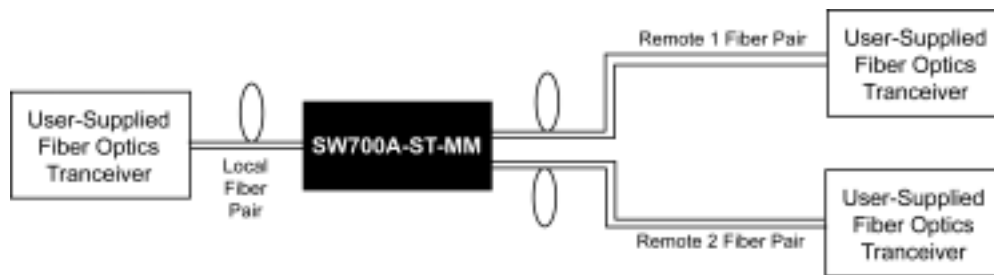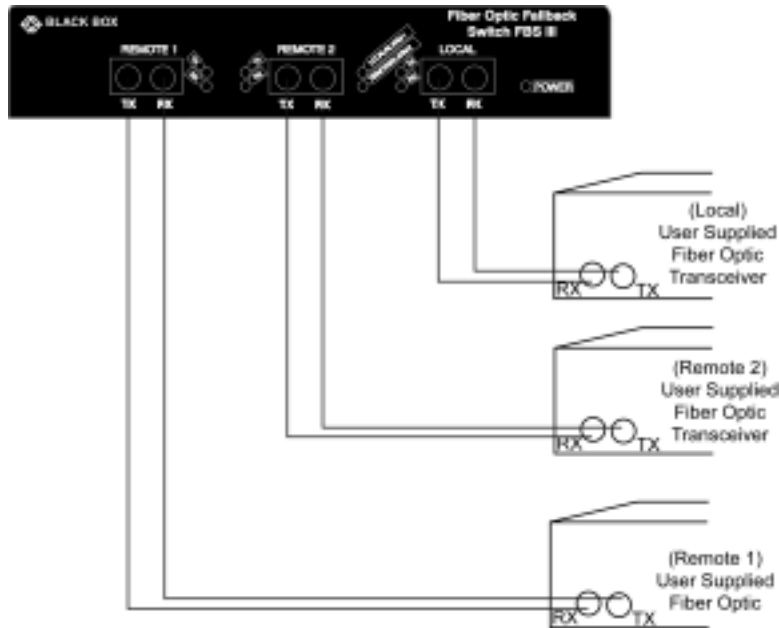

Figure 3-1
Schematic of SW700A-ST-MM Channel Connection

Figure 3-2
Fiber Optical Cable Connections for the SW700-A-ST-MM Unit

Task A. Connecting User-Supplied Local Fiber Optic Equipment (or Transceiver)

The connection of one duplex optical cable is required at the near-end. Use the following steps to connect user-supplied fiber optic equipment to the SW700A-ST-MM:

1.   At the near-end, use one duplex fiber optic cable. On user-supplied fiber optic equipment, connect two fiber connectors to the TX and RX optical ports: (TX may also be labeled "OUTPUT" or "XMTR"; RX may also be labeled "INPUT" or "RCVR").

2.   At the near-end, connect the other end of the duplex fiber optic cable to the SW700A-ST-MM local fiber ports. Ensure that the fibers are crossed (i.e., that the TX port on the SW700A-ST-MM is connected to the RX port on the user-supplied equipment and that the RX port on the user-supplied equipment and that the RX port on the SW700A-ST-MM is connected to the TX port on the user-supplied equipment).

Task B. Connecting SW700A-ST-MM Units to Remote Fiber Optic Equipment (or Transceiver)

Connection of two duplex remote optical cables is required between the near-end SW700A-ST-MM unit and the far-end user-supplied fiber optic transceivers. Use the following steps to connect the SW700A-ST-MM unit:

1.   At the near-end, use one end of the duplex Remote 1 fiber optic trunk cable. On the SW700A-ST-MM, connect the two fiber connectors to the TX and RX Remote 1 optical ports.

2.   At the far-end, connect the other end of the same duplex Remote 1 fiber optic trunk cable to the optical ports of the user-supplied equipment. Ensure that the fibers are crossed (i.e., that the TX port on the near-end SW700A-ST-MM is connected to the RX port on the far-end user-suppled equipment and that the RX port on the near-end SW700A-ST-MM is connected to the TX port on the far-end user-supplied equipment).

3.   Repeat steps 1 and 2 for Remote 2 fiber optic trunk cable.

4.   OPERATION

4.1   Turn-On Procedure

To operate the SW700A-ST-MM unit, turn the rear panel switch from OFF (O) to ON (I). The red LED "POWER" indicator located on the front panel of the SW700A-ST-MM unit indicates that the unit is powered and is normally always illuminated. If the power indicator is not illuminated the system is not operating properly. Check the line source and the fuse located within the power entry port on the rear of the unit.

The front-panel green "Local RX" LED on the SW700A-ST-MM unit indicates that the unit detects an optical signal at the local optical input connector. This indicator is normally on if the user-supplied local transceiver equipment is sending an optical signal. If the Local RX indicator is off, first check that both units are on and that the correct fiber pair is crossed-over between the units.

The front-panel green "Local TX" LED on the SW700A-ST-MM unit indicates that the unit is transmitting an optical signal to the local optical output connector. This indicator is normally on if the SW700A-ST-MM is receiving Remote 1 (or Remote 2) optical signal from the far end. If the Local TX indicator is off, first check that both SW700A-ST-MM and remote user-supplied transceiver units are on and that the same fiber pair is cross-connected between the units.

The front-panel green "Remote 1 (or Remote 2) RX" LED on the SW700A-ST-MM unit indicates that the unit detects an optical signal at the optical input of the connector. This indicator is normally on if user-supplied transceiver equipment at the far end of the remote trunk is transmitting an optical signal. If the Remote 1 (or Remote 2) RX indicator is off, first check that both SW700A-ST-MM and remote user-supplied transceiver units are on and that the same fiber pair is cross-connected between the units.

The font-panel green "Remote 1 (or Remote 2) TX LED on the SW700A-ST-MM unit indicates that the unit is transmitting an optical signal to the optical output connector. This indicator is normally on if the local user-supplied transceiver equipment is sending an optical signal. If the Remote 1 (or Remote 2) TX indicator is off, first check that both the SW700A-ST-MM and the local user-supplied transceiver units are on and that the same fiber pair is cross-connected between the units.

In the rear-panel of the SW700A-ST-MM unit, there are three contact closures (Local, Remote 1, Remote 2). They can be used to trigger audible alarms if the Local, Remote 1, or Remote 2 link is failed, respectively.

If the units and/or indicators are not working properly, verify that the fiber and the fiber connectors are in good working condition and of the proper type (multimode or singlemode). Verify that fiber link loss does not exceed the specified optical detector sensitivity of the SW700A-ST-MM unit. If technical assistance is needed, please contact Black Box technical support at 724-746-5500 for immediate service.

4.2   Operation Sequence

When the SW700A-ST-MM unit is powered on, the default operating remote port is Remote 1. In other words, Remote 1 is the primary remote fiber optic port and Remote 2 is the secondary port. When the Remote 1 RX port does not detect an incoming optical signal from Remote 1 fiber pair for a consecutive 5 seconds the SW700A-ST-MM will automatically switch to the Remote 2 fiber optic port for backup operation. After switching to Remote 2 fiber optic port the SW700A-ST-MM will automatically switch back to the Remote 1 fiber optic port when the Remote 1 path is fixed and remains in service for a period greater than 3.5 to 4 minutes.

The SW700A-ST-MM is also equipped with two visible alarms. The Loss of Local Optical Source alarm, is lit when the SW700A-ST-MM does not detect an incoming optical signal from Local user-supplied equipment. Loss of Remote Optical Source alarm is lit when both Remote 1 and Remote 2 fibers suffer path loss and the SW700A-ST-MM does not detect an incoming optical signal from either Remote 1 or Remote 2 fibers.
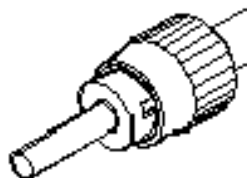
4.3   Adjustments
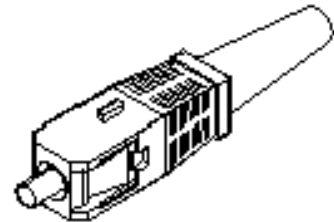
The SW700A-ST-MM has no user adjustments.

5.   FIBER OPTIC CONNECTORS
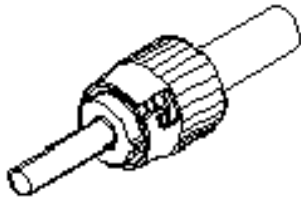
ST Connector   **FC Connector**   **SC Connector**

While there are many fiber optic connector types available, only a few types are widespread. They are as follows:

ST™ These connectors are very widespread in the U.S. and are used almost exclusively with multimode fiber. They offer good features, cost, and performance.

FC Also available as FC/PC, this is a good second-generation connector design with very good performance and features, but relatively high cost. With very good singlemode and multimode performance, this is one of the first connectors to address backreflection. FCs are often used for analog systems or high bit-rate systems where backreflection management is important.

SC A new third generation connector suitable for singlemode and multimode fibers, the push-pull feature is very popular. It simplifies use and increases packing density. The SC connector offers excellent features, performance, and cost.

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