INSTRUCTION MANUAL

FiberSaver Series,
FS-6000, FS-12000, FS-18000

SERIAL DIGITAL
FIBER OPTIC TRANSPORT and DISTRIBUTION SYSTEM FOR SMPTE 259, 292, 424, DVB-ASI and other protocols

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FIBER FIRST

This product was designed and manufactured in the UNITED STATES of AMERICA.

Contents

Introduction

The FiberSaver Series of fiber optic transmitters and receivers makes possible the combining of up to 18 optical signals onto one fiber using CWDM techniques for transmission up to 20km standard or the distance required, and the reassignment of such signals (remapping) onto different wavelengths if needed to suit customer needs. The units can accept signals in either optical or copper formats, and can output them in both formats simultaneously. Although designed for SMPTE 424,292, or 259 SDI ad DVB-ASI, the FiberSaver Series can be used with other protocols up to 3GBPS. Each of the 6 channels has a re-clocker that is bypassable for non-SMPTE signals. Each channel of the FiberSaver Series FTX will automatically switch to its BNC input if its optical input is not illuminated.

It is also possible, upon special order, to have a mixture of transmit and receive channels at each end to support bidirectionality. For example, you could have 3 transmit and 3 receive channels at each end, or any other combination.

Applications include transmission links for high definition or digital television studio to transmitter, studio-to-studio, or any other similar long-range situations. It can also combine and optically remap the outputs of other Multidyne products.

The FiberSaver Series can be ordered as follows
1) FS-6000 - 6 channels in one fiber
2) FS-12000 - 12 channels in one fiber
3) FS-18000 - 18 channels in one fiber

Features and Operation

The following discussion assumes that we have a standard configuration consisting of 6 transmit channels at one end and 6 receive at the other end. A block diagram of the FS-6000 system is shown in Appendix A. Each end consists of 6 “remapping engines” and a CWDM cassette. For a mixed configuration, refer to the FTX description if the channel is an optical transmitter, or the FRX description if the channel is an optical receiver. The remapping engine routes and processes the copper and optical signals. It consists of a CWDM or 1310 SFP optical transceiver, a bidirectional BNC cable interface and a re-clocker with selectable inputs. The role of the channel, transmitter or receiver, is determined by how the SFP optical transceiver is connected to the CWDM cassette and to its channel’s rear panel ST connector, and if the SFP optical input is illuminated or not.

When wired as a transmitter (FTX), the SFP is always a CWDM and its optical input is always connected to one of the 6 rear ST channel connectors and its optical output to the CWDM cassette. Its receiver output is presented to the re-clocker. Electrical signals from the BNC interface are also presented to the re-clocker. If there is sufficient illumination of the SFP, the re-clocker chooses the SFP signal. If not, the BNC signal is chosen, with the cable interface set to be an input. The re-clocker then optionally re-clocks the chosen signal and sends it to the SFP transmitter input and from there to the CWDM cassette.

When wired as a receiver (FRX), the SFP can be a standard 1310 or it can be a CWDM if the application requires it. In the receiver case, the optical input of the SFP always comes from the CWDM cassette. The SFP optical output always goes to one of the 6 rear ST channel connectors. When the SFP is illuminated by a signal from the transmitter, the re-clocker chooses the SFP signal, optionally re-clocks it, and sends it to the SFP’s transmit section for optical output on a remapped CWDM wavelength if the application requires it, or on a standard 1310 wavelength. At the same time, it is also sent to the BNC cable driver which is now set to be an output.

TRANSMITTER FRONT AND REAR PANELS

The front and rear panels of the FTX are shown below in Fig. 1. The rear panel has one ST/UPC optical input and one BNC input for each channel, labeled **CH1** thru **CH6**, plus a **COMMON** ST/UPC output port for the resulting CWDM optical signal. Besides a **POWER** LED, which is green when power is applied to the unit, the front panel has 6 **STATUS** LEDS, one for each of the 6 channels. Assuming the channel is a transmit channel, the **STATUS** LEDs are:

Green whenever the rear panel ST optical input for the channel is illuminated with at least -15 dbm of signal **OR**, if the optical input has less than -18 dbm of signal, there is a carrier detected at the channel's BNC input.

Yellow if the optical input is receiving between -18 and -15 dbm of signal, regardless of BNC input.

Red if there is less than -18 dbm of optical signal **AND** no carrier is detected at the BNC input. This will cause the channel to be muted.

Blinking Red if the laser has failed for the channel, regardless of input status. This would affect the channel's CWDM signal exiting the **COMMON** ST/UPC connector.

Off if the channel is not populated.
Note that the status LEDS do NOT indicate quality or type of signal.

RECEIVER FRONT AND REAR PANELS

The front and rear panels of the FRX are shown below in Fig.1. Note that the rear panel is identical to that of the FTX except that the directionality of the ports is reversed. Besides a **POWER LED**, which is green when power is applied to the unit, the front panel has 6 **STATUS** LEDS, one for each of the 6 channels. Assuming the channel is a receive channel, the **STATUS** LEDs are:

Green whenever the CWDM wavelength representing the channel is illuminating the channel's optic with at least -15 dbm of signal. This is part of the signal that enters the unit via the **COMMON** ST/UPC connector. Note that we are referring to an individual wavelength, not the intensity of all 6 wavelengths together.

Yellow if this CWDM optical signal is between -18 and -15 dbm.

Red if this CWDM optical signal is less than -18 dbm. This will cause the channel to mute.

Blinking Red if the laser has failed for the channel, regardless of input status. Although the rear panel ST optical output for the channel would cease to function, the BNC output for the channel will still function if the failure has not spread to the SFP's receive section and it is sufficiently illuminated.
Off if the channel is not populated.
Note that the status LEDS do NOT indicate quality or type of signal.

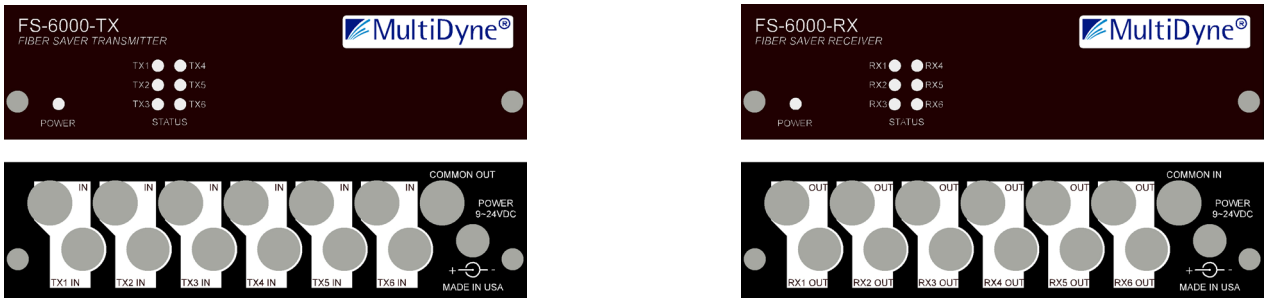


Fig. 1: FS-6000 FTX and FRX front panel and rear panel

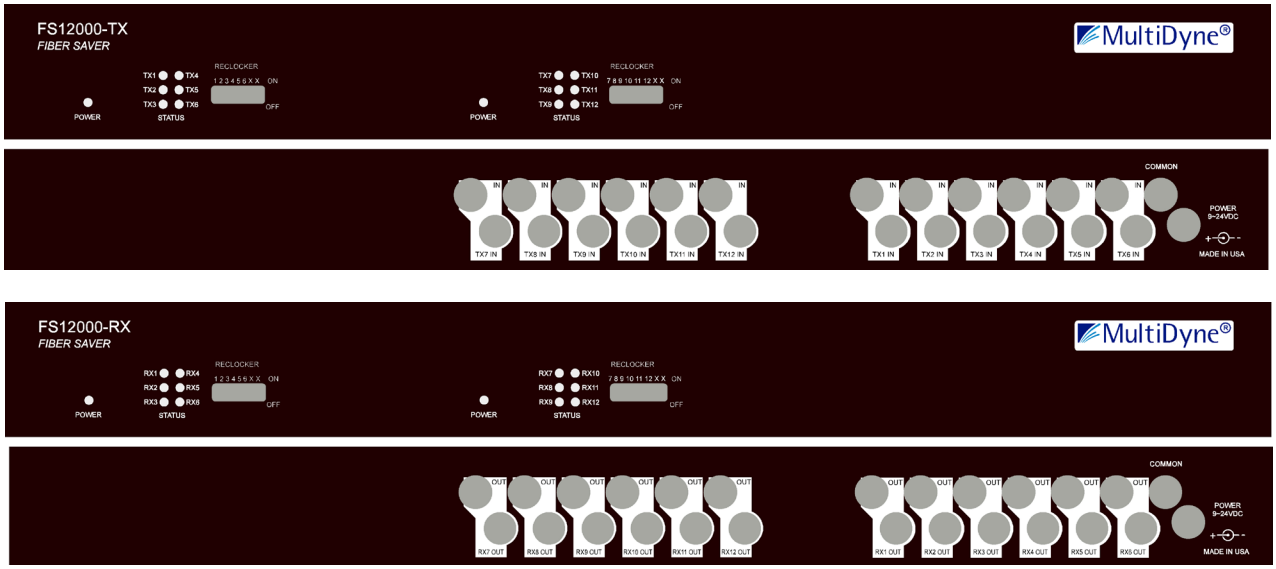


Fig. 1: FS-12000 FTX and FRX front panel and rear panel

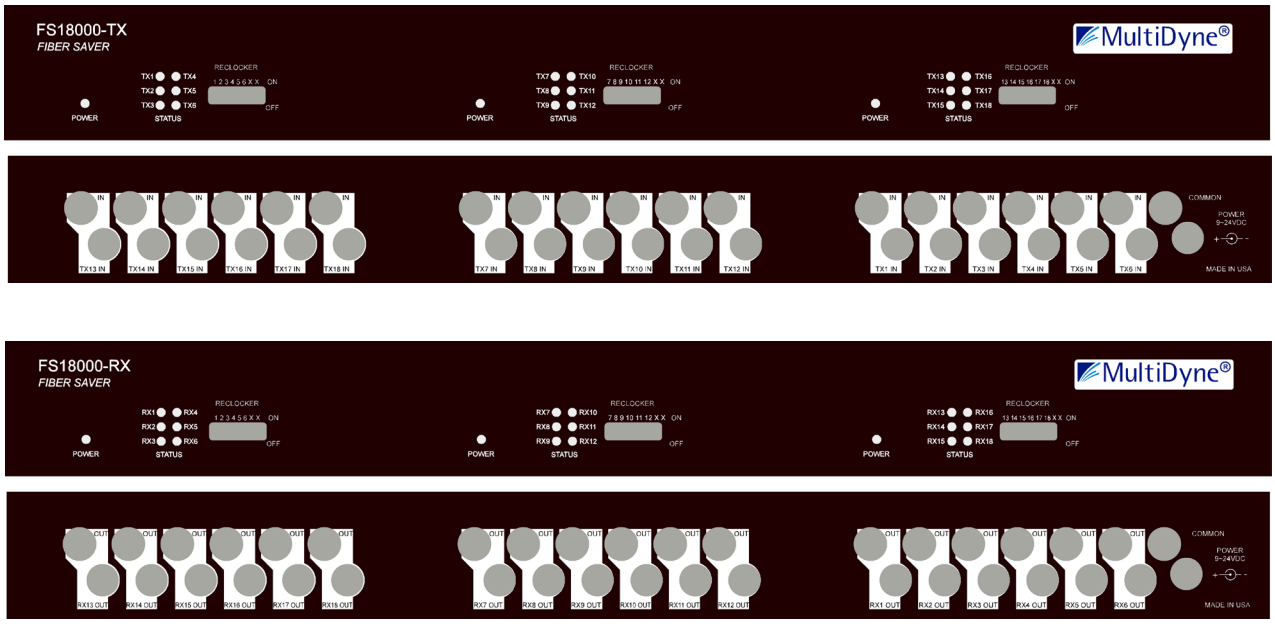


Fig. 1: FS-18000 FTX and FRX front panel and rear panel

POWER REQUIREMENTS

The FiberSaver Series operates from 110 or 220 VAC with the included desktop universal input 12V power supply or other source from 9 to 24 VDC and at least 12VA of power. It uses a coaxial type connector (sleeve ground) on the rear panel labeled **POWER**. If desired, the units can be powered from a battery pack or automotive battery instead of the wall unit.

INSTALLATION AND SETUP

Switch	Function	Setting (Default values in Bold)	
1	Channel 1 re-clock	**up=re-clock**	down=bypass
2	Channel 2 re-clock	**up=re-clock**	down=bypass
3	Channel 3 re-clock	**up=re-clock**	down=bypass
4	Channel 4 re-clock	**up=re-clock**	down=bypass
5	Channel 5 re-clock	**up=re-clock**	down=bypass
6	Channel 6 re-clock	**up=re-clock**	down=bypass
7	Reserved		Always leave in up position
8	Reserved		Always leave in up position

Table 1. Settings for Configuration Switch in the FiberSaver Series FTX or FRX

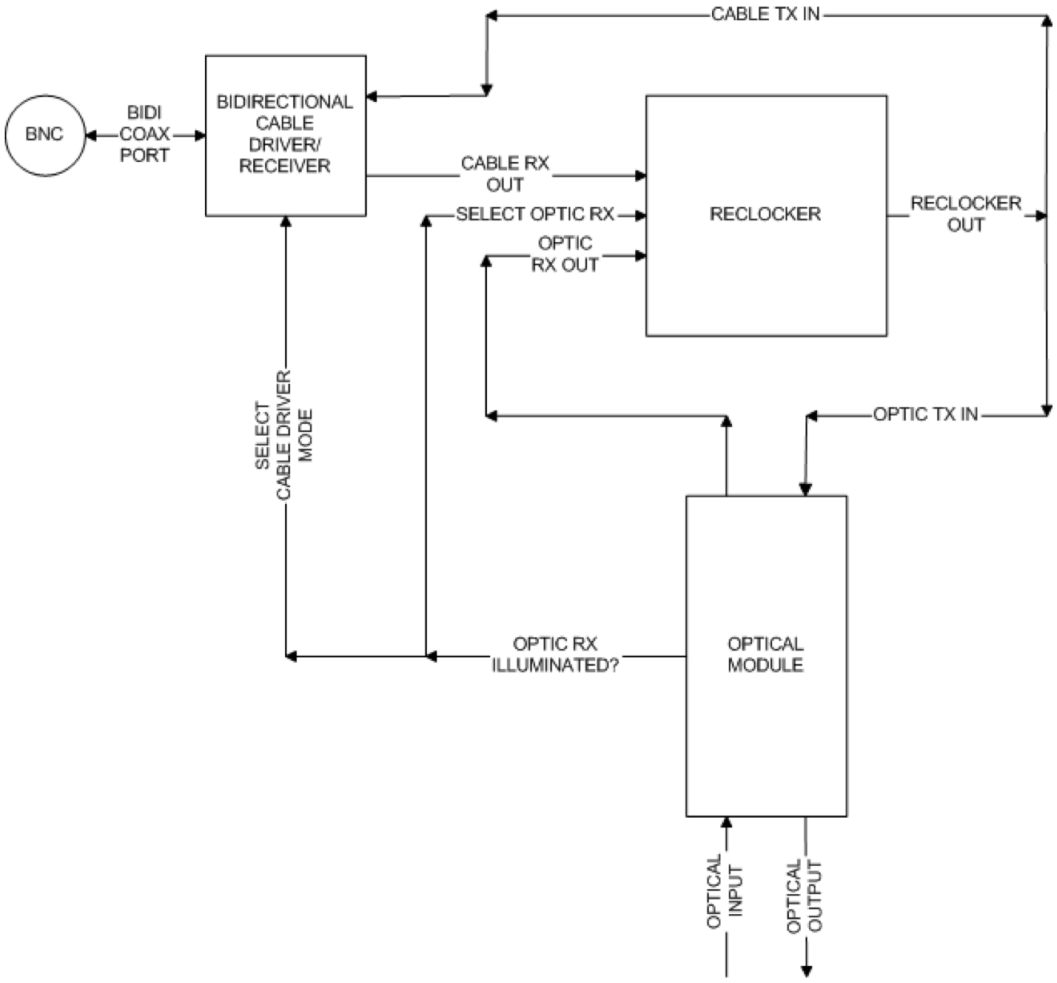
Reclocker	Signal	Muted?
bypassed	**Any**	no
on	**SMPTE**	no
on	**Non-SMPTE**	yes
x	**No carrier or no illum**	yes

Table 2. Automute Functionality.

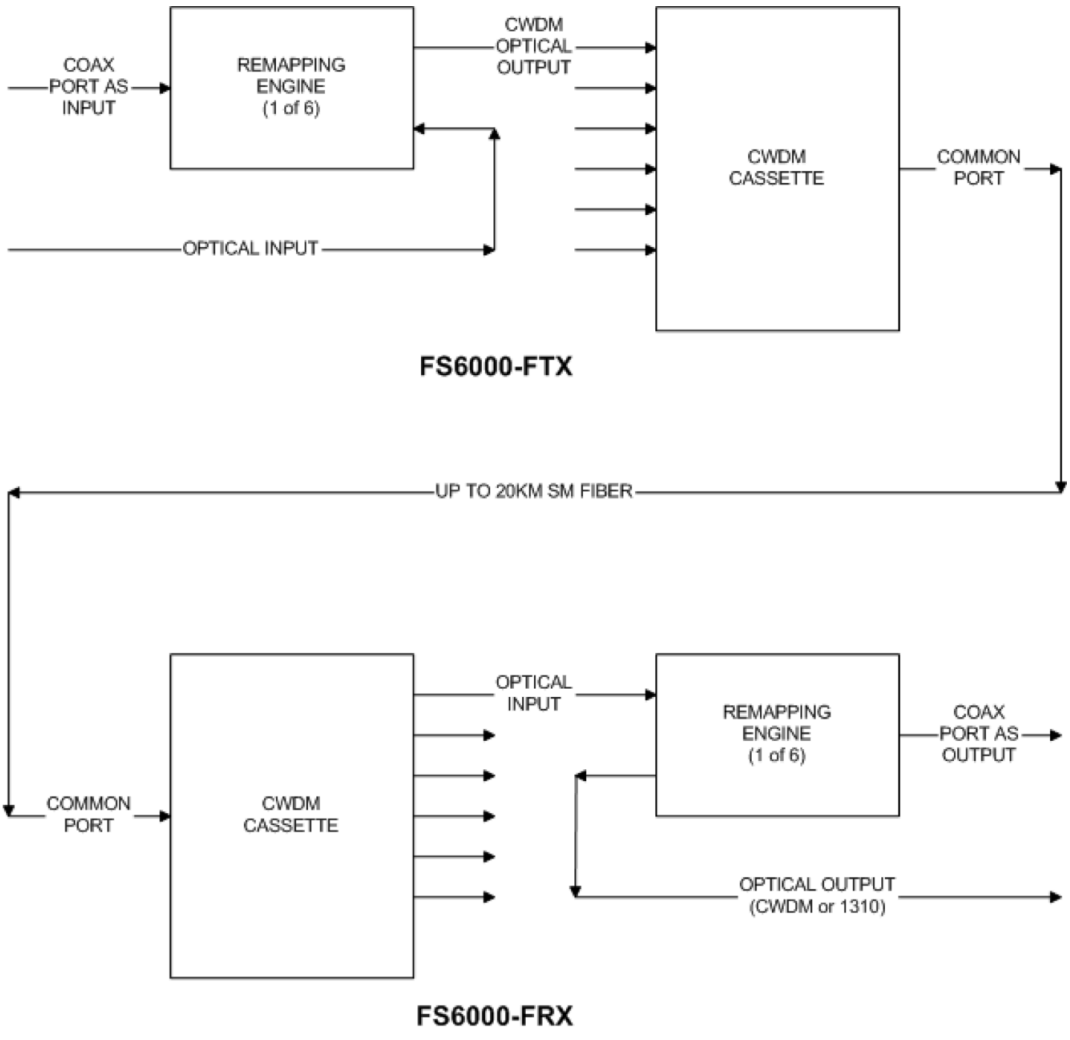
No special sequence must be followed to connect and start up the unit. RG59 or other 75 ohm coaxial cable must be used for the BNC SDI inputs and outputs, and single mode fiber with ST/UPC connectors must be used for the fiber links. Multimode fiber cannot be used with the FS-6000. At the FTX, or at a transmit channel if the configuration is mixed, you can use either the optical or the BNC input. The primary input to the channel will be the optical input at the ST/UPC connector for that channel. The FiberSaver Series FTX can accept wavelengths from 1100 to 1600 nm over SM fiber, with data rates between 19 and 2970 MBPS. The secondary input is the BNC connector for that channel. Note that the BNC input will only accept signals between 125 and 2970 MBPS, but the BNC output will function down to 19 MBPS. The channel will default to its optical input and ignore its BNC input as long as it is illuminated with at least -18 dbm. If the illumination is removed, the channel will look for a signal at its BNC input. The FTX and FRX should be connected by SM optical fiber at the COMMON ST/UPC connectors on their rear panels. This fiber will contain 6 CWDM signals representing the 6 channels. As such, it cannot go thru an O/E/O switch. At the FRX, or at a receiver channel if the configuration is mixed, there will be simultaneous optical output from the ST/UPC connector and electrical output from the BNC connector for that channel. The FRX optical output may be standard 1310nm or it can be ordered with a CWDM wavelength as required by the customer.

The FiberSaver Series comes standard as stand-alone units. An optional rack-mounting kit is available to mount up to 3 units in a 1 Rack-unit or 1 ¾" by 19" rack space. The part number is –RMT. The FS-6000 requires room for adequate ventilation around the units. Do not block the fan vent holes on the top of the case.

APPENDIX A. Block Diagrams



REMAPPING ENGINE



SYSTEM BLOCK

APPENDIX B. Technical Specifications

General

Power: . . . . . .9-24V / 12VA

Impedance: . . . . . 75 ohms

Return Loss, < 1.5 GHz: . . . . . > 15 db

Return Loss, < 3.0 GHz: . . . . . > 10 db

Max Cable Length, < 3.0 GHz:. . . . . > 120 m

Added Jitter:. . . . . < 0.06UI

Laser Safety . . . . . Class 1

Optical Power . . . . . –8 dbm to 0 dbm

Optical Sensitivity . . . . . -18 dbm

Operating Temperature . . . . . 0 to 50 deg C

Data Rates, Optical I/O or BNC Out . . . . . 19 to 2970 MBPS

Data Rates, BNC Input: . . . . . 125 to 2970 MBPS

Transmitter (-FTX)

Input Wavelength (each channel) . . . . . 1100 to 1600 nm

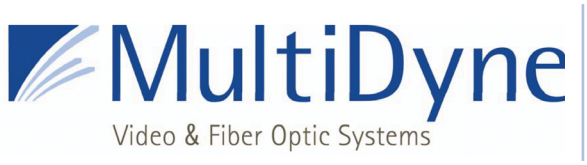
Output Wavelengths (common) . . . . . 6 CWDM

Receiver (-FRX)

Input Wavelengths (common) . . . . . 6 CWDM

Output Wavelength (each channel) . . . . . CWDM or 1310

***Specifications are subject to change without notice.**



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