FX and FO SERIES
FIBER OPTIC SWITCHING SYSTEMS

CYTEC’s FX Series of Fiberoptic Switching Systems are nonblocking, full fan-out optoelectrical switch matrices available in configurations from 8x8 to 64x64. Different Transmitter/Receiver Module combinations provide for 820, 1310 or 1550 nanometer wavelengths, with data rates to 622 Mb (OC-12/STM-4).

The FO Series are passive, optical systems that use mechanical fiberoptic relays. Individual switches, 1xN Multiplexers or NxM Matrices can be supplied. Many connector types and both single and multimode fiber options can be specified. Control options include RS232, IEEE488 and Ethernet LAN. Manual Control is also available.

FX/16x16 and FX/64x64 CHASSIS

At the heart of the FX Chassis is a differential ECL Solid State Matrix routing data at rates up to 1.2 Gbs in both a nonblocking (any input to any output) and full fan-out (one input to many or all outputs) arrangement. The FX/16x16 is used for 8x8 and 16x16 matrices, while the larger FX/64x64 can supply up to 64 individual inputs and outputs. See Fig 1. The Chassis also holds, as needed, the Fiberoptic Receiver and Transmitter Modules. The user then specifies the Control Module and optionally a Manual Control. This modularized design allows systems to be configured according to the end user’s specific design requirements.

OPTOELECTRICAL SWITCHING’S ADVANTAGES:
- It is cost effective.
- One input can be distributed to many or all outputs.
- Modal dispersion is minimized.
- Amplitude restored on weak signals.
- No mechanical mirrors or switches to fail.

TYPICAL APPLICATIONS INCLUDE:
- Programmable Routing in Fiber Wiring Closets.
- Multiport Protocol Analysis for Networks and Test.
- Signal Distribution for Communications and Test.
- Automated Patch Panels.

CONTACT 1-800-346-3117 OR WWW.CYTEC-ATE.COM
FOR TECHNICAL ASSISTANCE
**TRANSCEIVER MODULE OPTIONS**

**FX/100-820-MM and FX/100-1310-MM**
Includes the FXR-100-820 Receiver and FXT-100-820 Transmitter Modules for 820 nm wavelengths as well as the FXT-100-1310 Transmitter and FXR/100-1310 Receiver Modules for 1310 nm. Eight individual input or output channels are supplied by each Receiver or Transmitter module. Multimode cables at data rates up to 155 Mb/sec (NRZ) are supported. Transmitters are ALGaAs LEDs, Receivers are PIN Photododes.

<table>
<thead>
<tr>
<th>Model</th>
<th>Connectors</th>
<th>Wavelength Range</th>
<th>Typical (nm)</th>
<th>Glass Fiber Types</th>
<th>Data Rates</th>
<th>FXR Input Power</th>
<th>FXT Output Power</th>
<th>Bit Error Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>FX/100-820</td>
<td>SMA or ST</td>
<td>795 - 860</td>
<td>820</td>
<td>50/125</td>
<td>Min. 5 KB/sec</td>
<td>-20 dBm</td>
<td>-15 dBm</td>
<td>1 x 10^{-9}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>62.5/125</td>
<td>Max. 155 MB/sec</td>
<td>-8 dBm</td>
<td>-17 dBm</td>
<td></td>
</tr>
<tr>
<td>FX/100-1310</td>
<td>ST or SC</td>
<td>1270 - 1370</td>
<td>1310</td>
<td>50/125</td>
<td>Min. 5 KB/sec</td>
<td>-28 dBm</td>
<td>-14 dBm</td>
<td>1 x 10^{-9}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>62.5/125</td>
<td>Max. 155 MB/sec</td>
<td>-11 dBm</td>
<td>-17 dBm</td>
<td></td>
</tr>
</tbody>
</table>

**FX/600-1310 and FX/600-1550 SERIES**
Includes the FXR-600-1310/1550 Receiver and either the FXT-600-1310 or FXT-600-1550 Transmitter Modules. Transmitter and Receiver Modules are each eight channels. Transmitters Modules transmit at the single wavelength of either 1310 nm or 1550 nm and data rates of 50 Mb to 700 Mb/sec (NRZ, nominal) with Laser Diodes (Class 1 Safety Compliant). Receiver Modules support 1100 nm thru 1600 nm.

<table>
<thead>
<tr>
<th>Model</th>
<th>Connectors</th>
<th>Wavelength Range</th>
<th>Typical (nm)</th>
<th>Glass Fiber Types</th>
<th>Data Rates</th>
<th>FXR Input Power</th>
<th>FXT Output Power</th>
<th>Bit Error Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>FXT/600-1310</td>
<td>ST, SC, FC</td>
<td>1261 - 1360</td>
<td>1310</td>
<td>Single Mode</td>
<td>Min. 50 Mb</td>
<td>-29 dBm</td>
<td>-11 dBm</td>
<td>1 x 10^{-10}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Max. 700 MB/sec</td>
<td>-6 dBm</td>
<td>(Higher Powers Available)</td>
<td></td>
</tr>
<tr>
<td>FXT/600-1550</td>
<td>ST, SC, FC</td>
<td>1480 - 1580</td>
<td>1550</td>
<td>[long reach]</td>
<td>Min. 50 Mb</td>
<td>-29 dBm</td>
<td>-11 dBm</td>
<td>1 x 10^{-10}</td>
</tr>
</tbody>
</table>

**ENVIRONMENTAL**

**AC Input**
Selectable 100-130 or 200-240 Volts AC, 50-60 Hz.

**Max. AC Power**
100 Watts for FX/16x16 Matrix
400 watts for FX/64x64

**PRICING AND AVAILABILITY**
Assemble systems by selecting the appropriate FX Chasis, the desired Control Module and input Receiver and output Transmitter Modules as needed. See Published Price List for current pricing on all FX Products.

Most systems available 30 - 60 days ARO
FO SERIES
PASSIVE FIBER OPTIC SWITCHING SYSTEMS

CYTEC’s new FO Series Passive Fiberoptic Switching Systems are computer controlled chassis that are designed to switch standard fiberoptic wavelengths of 850 nm, 1310 nm and 1550 nm. Multimode 62.5/125 um switches are available for 850 nm and 1310 nm wavelengths, while Singlemode 9/125 um switches are available for 1310 nm and 1550 nm. Passive, bidirectional Moving Fiberoptic Switches are used that show insertion losses as low as 0.10 dB for Multimode and 0.25 dB for Singlemode switches. Three configurations are available: Individual Switches, Nx1 Multiplexers and NxM nonblocking (but not full fan-out) Matrices. Control options include RS232, IEEE488 and TCP/IP Ethernet LAN. Manual Control is optionally available.

FO CHASSIS
The FO Series are all 19” rack mounting chassis and are available either as Mainframes or Expansion Chassis. Standard chassis provide from eight to 32 individual switch points. All chassis have front panel LEDs for a visual indication of switch point status. Input and output signal connectors protrude from the chassis rear. FC, SC and ST fiberoptic connectors are standard.

STANDARD CHASSIS
Standard units are built with the required power supplies, a user specified Control Module and optionally a Manual Control. Control Module selections are shown on the last page of this bulletin. The system is completed by specifying the number and type of FO Series Fiberoptic Switches described below.

FO/8, FO/16 & FO/32 CHASSIS
These chassis furnish 8, 16 or 32 individual switch points. One front panel LED is assigned to each switch point and displays status.

CUSTOM CHASSIS
Custom configurations are available on request. As examples, switch modules can be wired out to nonstandard rear panel fiberoptic connectors; switch modules can also be wired together with fiberoptic interconnects to furnish small nonblocking matrices (2x2, 2x4, 4x4, etc.)

FO SERIES PASSIVE SWITCH MODULES
The FO Fiber Optic Switches utilizes a “moving fiber” design concept to achieve highly accurate direct fiber to fiber connections. Currently available in 1x2, dual 1x2 and dual 1x2 nonblocking configurations. Also available in both Single and Multimode versions as well as Normal and Low Loss types. Insertion Loss is as low as 0.25 for Singlemode and 0.10 dB for Multimode switches.

FO SERIES SWITCH SPECIFICATIONS
(Individual Modules without connectors):

- Connectors: ST, SC, FC Standard (others available on request)
- Wavelength Range: 850 nm, 1310 nm Singlemode
- Glass Fiber Types: 1310 nm, 1550 nm Multimode
- 9/125 um Singlemode
- 62.5/125 um Multimode
- Insertion Loss: 0.25 dB Singlemode
- Low Loss Type, typ.: 0.10 dB Multimode
- Insertion Loss: 0.8 dB Singlemode
- Normal Loss Type, typ.: 0.6 dB Multimode
- Back Reflection: -60 dB Typical
- Crosstalk: -70 dB Maximum
- Repeatability: 0.01 dB
- Switch Time: 10 milliseconds Typical
- Optical Power: +20 dBm max. Singlemode
- +23 dBm max. Multimode
FO SERIES MULTIPLEXERS
Bidirectional Nx1 Multiplexers are assembled from standard FO Chassis by interconnecting Fiberoptic Switch Modules as shown schematically in Fig. 5. The interconnects are fiberoptic cables and are usually wired externally, on the rear panel. Internally wired systems may be ordered as an option.

Fig. 5 8x1 Multiplexer using Seven FO/2x1 Switches

LED DISPLAYS
FO/8, FO/16 and FO/32 Chassis are built with individual, discrete front panel LEDs that show switchpoint status. These LEDs are an invaluable aid in program debugging and system troubleshooting.

CONTROL MODULES
IF-3C RS232 SERIAL
This module has all the RS232 features detailed in Applications Bulletin AP-5.
IF-4C IEEE488 BUS (TALK/LISTEN)
This control module has all the IEEE488 features detailed in Applications Bulletin AP-5.
IF-5C IEEE488/RS232 COMBINED CONTROL
This module has both the IEEE488 (Talk/Listen) and the RS232 features detailed in Applications Bulletin AP-5.
IF-6 LAN INTERFACE
This module uses TCP/IP protocols to allow control from an Ethernet LAN as described in Bulletin AP-5.

MANUAL CONTROL
VMCS SOFTWARE
This Virtual Manual Control Software gives the operator the ability to remotely Open and Close switches as well as observe system Status. Control is via a full Graphical User Interface (GUI).
MC/8 & MC/16 PUSHBUTTON
Individual Pushbuttons select and control mainframes holding either eight or 16 individual switchpoints.
MC/32-TW THUMBWHEEL
Mainframe chassis holding 32 switchpoints are built with optional Thumbwheel Manual Controls.

AVAILABILITY
Most systems are available 30 - 45 Days ARO.

WARRANTY
CYTEC Corp. warrants that all products are free from defects in Materials and Workmanship for a period of 5 years and that all switches are guaranteed for their rated Operational Lifetime.

SOFTWARE
Example and Driver Programs are available for most common Windows-based programming languages, including LabView, LabWindows and Visual Basic.