# High-Speed RS-232/RS-485/RS-422 Single-Mode Fiber Optic Modem

# **User's Manual**

MODEL 277SM



# 1.0 Description:

The MODEL 277SM was designed to provide the most versatile connection possible between any asynchronous serial equipment using Fiber Optic cable. It allows any two pieces of asynchronous serial equipment to communicate full or half-duplex over two fibers at typical distances up to 20KM. The converter can also be set up in "Repeater" mode to create a multi-drop master/slave configuration, allowing one serial device to talk to multiple slave devices around a fiber ring.

RS-232 data signals at up to 115.2K bps and RS-422, or RS-485 data signals at up to 115.2K bps are supported. Different standards can be mixed and matched to allow RS-232 devices to connect to your RS-422 or RS-485 system. This means the MODEL 277SM can replace converters and isolators when connecting remote devices, while providing the EMI/RFI and transient immunity of optical fiber.

The MODEL 277SM supports both the Transmit and Receive data lines, and provides full hardware control of the RS-422 /485 driver with automatic Send Data Control circuit.

Timeouts are auto detect between 0.10 and 2.2 ms. All serial connections are provided on the DB-9 female connector or 6-bit terminal, while the single-mode fiber is connected via two SC connectors. The unit is powered by 9VDC at 140 mA

max.

## 2.0 RS-232 Connections:

Connection of the MODEL 277SM is simple and straight forward. The DB-9 female serial connector is used for connecting to RS-232.The RS-232 signals are pinned as a DTE device (input on Pin 2 and output on Pin 3)

RS-232	Connection	Diagrams
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DB-9 Male	RS-232
(PIN)	
2	RXD
3	TXD
5	GND

## 3.0 RS-422 & RS-485 Connections:

#### RS-422/RS-485 Connection Diagrams

6-Bit	RS-422	RS-485
Terminal		
PIN1	T+	485+
PIN2	T-	485-
PIN3	R+	NC
PIN4	R-	NC
PIN5	VIN	VIN
PIN6	GND	GND

#### 4.0 Fiber Optic Connections:

The MODEL277SM uses a separate LED emitter and photo-detector operating at 1310nm wavelength Connections .to the emitter and detector are on ST type connectors. Almost any multimode glass fiber size can be used including 50/125  $\mu$ m,62.5/125 $\mu$ m, 100/140  $\mu$ m, and 200  $\mu$ m. One fiber is required for each connection between a transmitter and receiver. In apoint-to-point configuration, two fibers are required between the two modems, one for data in each direction. A multi-drop ring configuration requires one fiber between TX and RX around the loop. See Figure 3 for typical point-to-point and multi-drop configurations.

The most important consideration in planning the fiber optic link is the "power budget" of the fiber modem. This value represents the amount of loss in dB that can be present in the link between the two modems before the units fail to perform properly. This value includes line attenuation as well as connector loss. For the MODEL277SM the typical connector-to-connector power budget is 13 dB. Because  $62.5/125 \mu m$  cable typically has a line attenuation of 0.6 dB per Km at 1310 nm, the 12 dB

power budget translates into 20 KM. This assumes no extra connectors or splices in the link. Each extra connection would typically add 0.5 dB of loss, reducing the possible distance by 166 m (547 ft.). The actual loss should be measured before assuming distances.



#### 6.0 Multi-Drop Operation:

A multi-drop configuration is created by forming a ring of MODEL277SM. Each transmitter is tied to the following converter's receiver, starting at a master node and continuing around to each slave and back to the master. By setting JP1(on PCB Mainbroad) to the "1-2" position on the slaves, "2-3" position on the Master, all data sent from the master or preceding slaves is echoed back out the fiber transmitter to therest of the slaves and eventually back to the master node.Because all data is echoed back, there are special considerations when constructing a multi-drop system. The master will see it's own transmitted data. This means that the master device must be full-duplex (RS-232, RS-422, or

four-wire RS-485) and that it must be capable of ignoring or otherwise accepting it's own echoed transmission. Slaves must also be able to accept data from previous slaves in the loop.

7.0 Specifications:

Transmission Line: Dual Single-mode optical cable Point to Point Transmission: Asynchronous, half or full-duplex Multi-Drop Transmission: Asynchronous, half duplex, master/slave, ring Interfaces: RS-232, RS-422, or RS-485 Data Rates: RS-232 0 to 115.2Kbps RS-422/485 0 to 115.2K Distance:RS-485/RS-422 0-1.2KM **Typical Range:** Up to 20 KM on Singlemode glass fiber Coupled Power Budget: 12.1 dB Optic Wavelength: 1310 nm Connectors: DB-25 female for serial connection, ST connectors for fiber Power Supply: Requires 9 – 14 VDC @ 250 mA max. Dimensions: 6.3"L x 4.3"W x 1.25"H