



**F280XD
Fiber-Optic
RS-232 Modem
Technical Manual**

Revision C

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Safeguarding Communications Since 1958

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1 DESCRIPTION OF EQUIPMENT

1.1 INTRODUCTION

This manual provides general and detailed information on the installation and operation of the VERSITRON FOM II F280XD RS-232 fiber optic modems. Note: All information presented in this document is equally applicable to the RS-423 interface and the MIL-STD-188-114A(unbalanced) interface. Section 1 provides a general description of the equipment. Section 2 provides installation instructions. Section 3 provides operating instructions. Section 4 provides the theory of operation. Section 5 provides maintenance and troubleshooting information. Illustrations 1 and 2 provide an overall view of the RS-232 modems.



Illustration 1: Front View, F280XD



Illustration 2: Rear View, F280XD

1.2 DESCRIPTION OF EQUIPMENT

1.2.1 Functional Characteristics

The model F280XD modem is an extender for RS-232 standard serial data communication protocols. These units are designed to be either DCE or DTE devices (depending on switchable settings). The main characteristics of the model F280XD are :

- Switch selectable protocol
- Switch selectable DCE or DTE emulation.
- Operation up to 128kbps.
- Compatible with VERSITRON M82XXD fiber optic MicroModems.
- Can be utilized in a VERSITRON Versimux II Chassis(VMX20), for multiplexed configurations.

Model F280XD modems use SFP optic modules to achieve transmit distances up to 20km over a single pair of fiber-optic cable. Alternatively, the modems can be used in a Versimux II chassis, which can multiplex up to 19 modems on a single pair of fiber-optic cables.

1.2.2 Physical Characteristics

The RS-232 modems measure 7.0" wide x 0.84" high x 11.6" deep (17.8 x 2.1 x 28.9 cm) and are designed to be mounted in a variety of VERSITRON enclosures and chassis (see Table 1 for dimensions of enclosures and chassis). "Desktop" option is a single-card enclosure. Rack-mount options include a 2-card and 20-card 19" standard rack-mountable chassis. For either desktop enclosure or 2-card rack-mount chassis, each F280XD unit requires a wall transformer,

VERSITRON Model PSAC08 (US) or PSAC09 (European), providing 12 VDC, 1.0A. The one-pin power connector for electrical input is on the back of the card. There is a DB25 female connector on the back of the card as well as an SFP module slot for the SFP fiber-optic interface. For HF20A chassis installations, power is provided by VERSITRON Model AC300WR Power Supply / System Monitor, through the twelve pin connector (P1). For Versimux II installations power is provided by VERSITRON Model AC300WR Power Supply / System Monitor, through the twelve pin connector, and the link connection is provided by the backplane connector (J5). In Versimux II installations the SFP module will be deactivated, and link communications will occur over the Backplane connector J5. Therefore, the SFP need not be populated in Versimux II installations. The F280XD has seven front panel indicators as shown in Illustration 1.

Table 1: Dimensions of Enclosures and Chassis

Model # (Part #)	Dimensions	Description	Power Supply Required* ¹
HF1 (19052)	1.3" H x 7.1" W x 11.6" D (3.3 x 18.0 x 29.5 cm)	Single Card Desktop Enclosure	PSAC08 PSAC09 (LTWPD1220PLX) (LTWPD1220EPL)
HF2SS (19629)	1.7" H x 19.0" W x 13.8" D (4.3 x 48.0 x 35.0 cm)	Dual Card Rack-Mount Chassis* ² (Side-by-Side)	PSAC08 PSAC09 (LTWPD1220PLX) (LTWPD1220EPL)
HF20A	7.0" H x 19.0" W x 11.6" D (17.8 x 48.0 x 29.5 cm)	20 Card Rack-Mount Chassis	AC300WR (19320-03)
Versimux II (VMX20)	7.0" H x 19.0" W x 11.6" D (17.8 x 48.0 x 29.5 cm)	20 Card Rack-Mount Chassis (Multiplexed Slots)	AC300WR (19320-03)

*¹ Note: US Model – PSAC08; European Model – PSAC09

*² Note: One Power Supply per Modem required.

1.3 RS Modem Specification:

1.3.1 General Specifications:

Models	F280XD
Dimensions	(7" H x 7/8" W x 11" L) (17.8 x 2.1 x 27.9 cm)
Weight	0.28 kg (10.0 oz)
Operating Temperature	0° to 50°C (32° to 100°F)
Humidity	Up to 95% relative humidity (non-condensing)
Altitude	Up to 10,000 ft

1.3.2 Electrical Interface:

Models	F280XD
Power Requirements	12VDC, 1.0Amp
Data Connector	DB25, 25-pin female
Data Signal	RS 232/MIL-STD-188-114(unbalanced)
Terminal Timing Data Rate	DC to 128kbps
Source Timing Data Rate*	DC to 100kbps
DCE/DTE Options	Switch Selectable
Note:	* in Source Timing TXC and RXC must be the same rate and phase.

1.3.3 Fiber-Optic Interface:

See SFP module datasheet.

1.3.4 **Major Features:**

- Switch Selectable DCE or DTE operation.
- Will accept a variety of SFP modules for Fiber-optic interface.
- Versimux II compatibility.
- Compatible with VERSITRON M82XXD fiber optic MicroModems.

2 INSTALLATION

2.1 GENERAL

This section contains detailed information on the installation and initial checkout of the F280XD RS-232 Modem. Section 2.2 contains general information on site selection and mounting. Section 2.3 contains the description for selecting different options on the Modem. Sections 2.4 and 2.5 contain detailed instructions for connecting Model F280XD products to your system. Section 2.6 contains initial checkout procedures.

2.2 SITE SELECTION AND MOUNTING

The Model F280XD products are designed to be used as an interface extender for RS-232 standard protocols. When connecting the F280XD to a DCE or DTE device, the copper and fiber-optic cable should be securely installed so as to prevent accidental disconnection. Care should be taken to ensure that the copper and fiber-optic cables are not mechanically separated from the Modem during operation. When installed in either desktop chassis or in the dual-card rack-mount chassis, space for the power transformer must also be provided.

2.3 SWITCH AND JUMPER SETTINGS

There are ten switches provided for configuration of selectable options. Switch locations are shown in Illustration 3. Switch settings are as follows:

2.3.1 Modem Configuration Settings

Table 2: S1 Switch Settings

Position	On	Off
S1-1	DCE	DTE
S1-2		Factory setting*
S1-3	Factory setting*	
S1-4	Factory setting*	
S1-5	SourceTiming (DTE Only)**	Terminal Timing (DTE); DCE
S1-6	Inverted Data	Non-Inverted Data
S1-7		Factory setting*
S1-8		Factory setting*

* *Note:* Factory setting for the marked S1 positions as indicated by *. Do Not Change.
** *Note:* This setting(S1-5 ON) should only be made for DTE in Source Timing.

Table 3: S2 to S9 Switch Settings

Position	On	Off
S2	DCE	DTE
S3	DCE	DTE
S4	DCE	DTE
S5	DCE	DTE
S6	DCE	DTE
S7	DCE	DTE
S8	DCE	DTE
S9	DCE	DTE

Note: All switches must be set to the same configuration. All 'ON' or all 'OFF'

The switch SW10 is located on the front panel of the modem. This switch enables a local loop of all modem circuitry before the fiber-optic module when in the 'ON' position. The loop

indicator will be illuminated when this switch is in the 'ON' position.

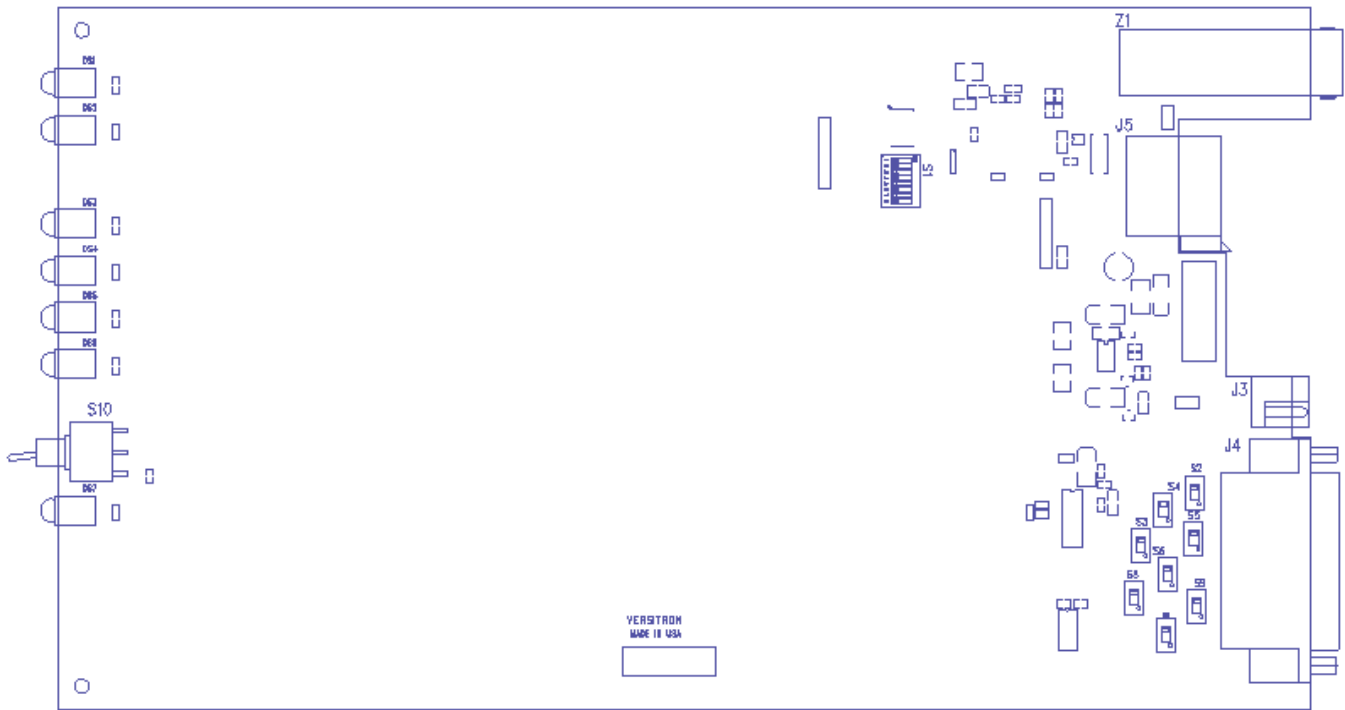


Illustration 3: Switch and Connector Locations

2.4 POWER REQUIREMENTS

The F280XD products are designed to operate from an AC power transformer or a DC power source in the range of +10 to +16 VDC.

2.4.1 Installation with AC Power

Before inserting the VERSITRON power transformer, PSAC08 (US) or PSAC09 (EUR), into an AC power source, the plug should be connected to the Modem. There are no special tools required.

2.4.2 Installation with DC Power

DC power may be used instead of a power transformer. This requires a 2.5 mm socket, J3 (location shown in Illustration 3) with the positive voltage on the center and the common on the concentric supplying 12VDC at 1.0A as shown below (Illustration 4):

Center = + 12VDC,
1.0A
Clip = Ground

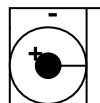


Illustration 4: DC Power Supply Connection

2.5 INTERFACE WIRING

Tables 4 and 5 list the interface wiring for F280XD modems. A female DB25 connector is used as shown in Table 4. The modular connector (J3) is wired in parallel with the 12-pin connector (P1) for power. When installing the modem in a standalone or dual-card rack-mount chassis, a power transformer is plugged into modular jack (J3). When installing the F280XD modem in a 20-card rack-mount chassis (HF20A or VMX20) with optional power supplies (AC300WR) the 12-pin connector (P1) is used. Wiring for the 12-pin connector is shown in Table 5. Hard Metric Type-C connector (J5) is used for backplane communications, when the F280XD is placed in a Versimux II chassis. Illustration 3 identifies the locations for the 12-pin power connector (P1), modular power jack (J3), and HM Type-C (J5) connector.

Table 4: DB25 Wiring

Pin Number	Signal Designation	Pin Number	Signal Designation
1	Frame Ground	14	Not Used
2	Transmit Data	15	Transmit Clock
3	Receive Data	16	Not Used
4	Request to Send	17	Receive Clock
5	Clear to Send	18	Local Loopback
6	Data Set Ready	19	Not Used
7	Signal Ground	20	Data Terminal Ready
8	Carrier Detect	21	Not Used
9	Not Used	22	Not Used
10	Not Used	23	Not Used
11	Not Used	24	Transmit Clock (TT)
12	Not Used	25	Not Used
13	Not Used		

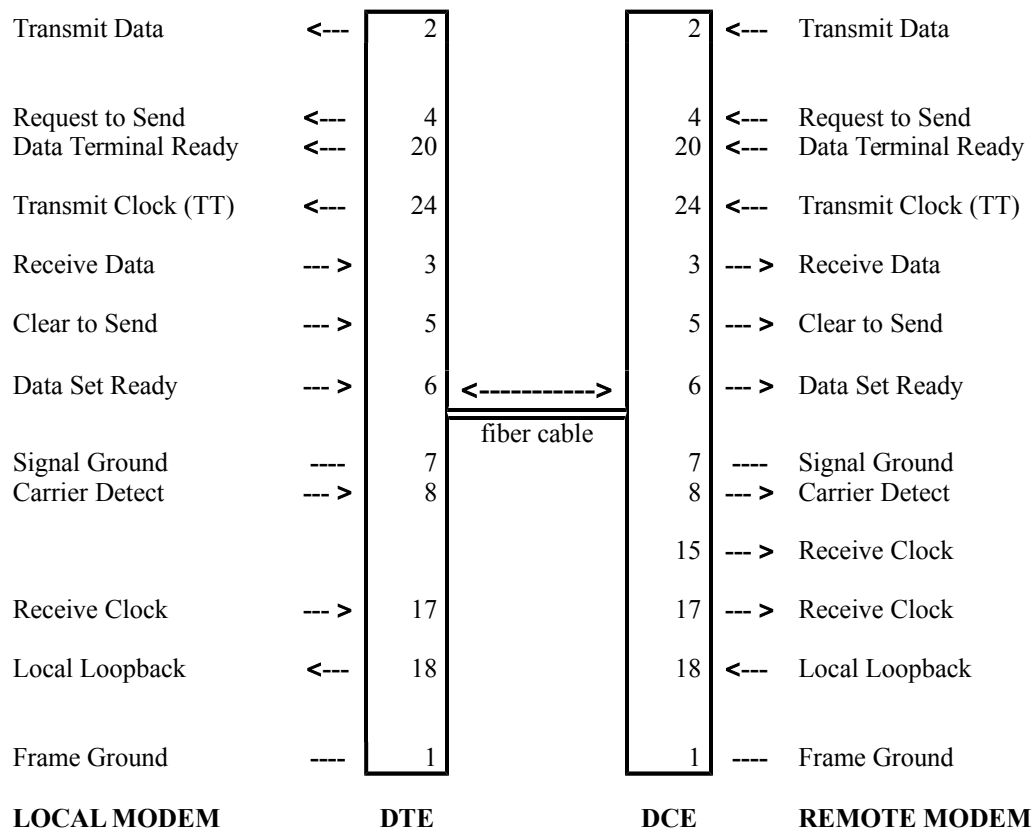


Illustration 5: Interface Extender Configuration(Terminal Timing)

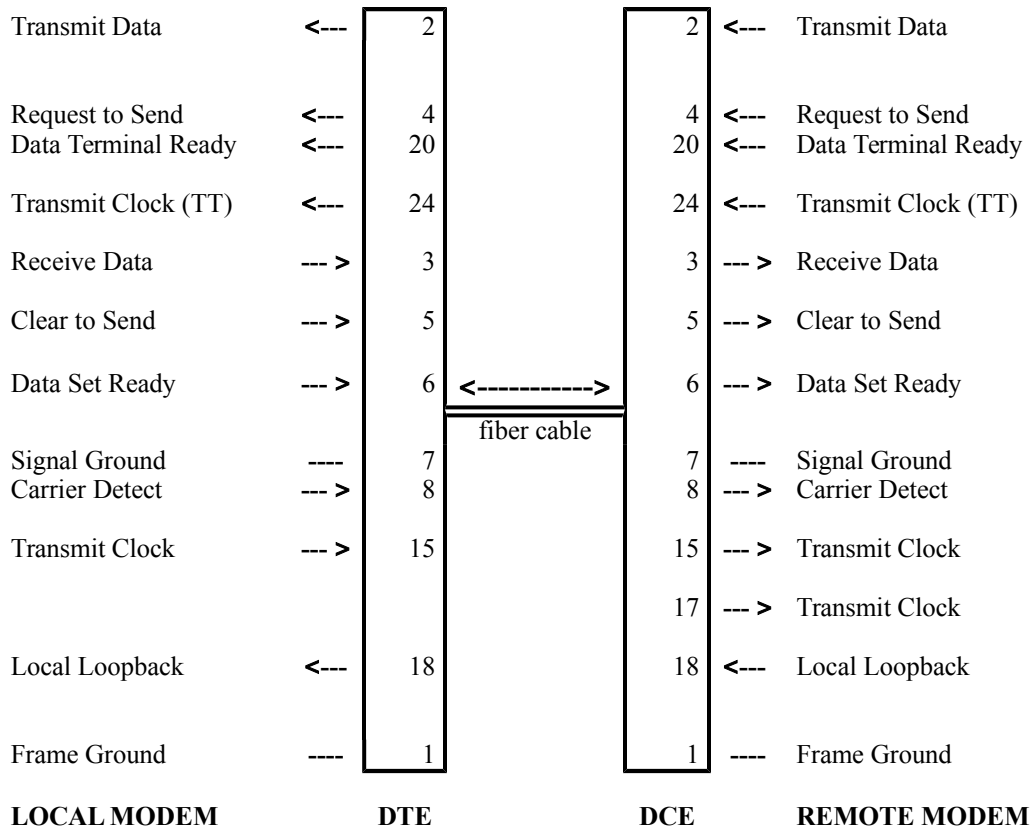


Illustration 6: Interface Extender Configuration(Source Timing; DTE ONLY S1-5 = ON)

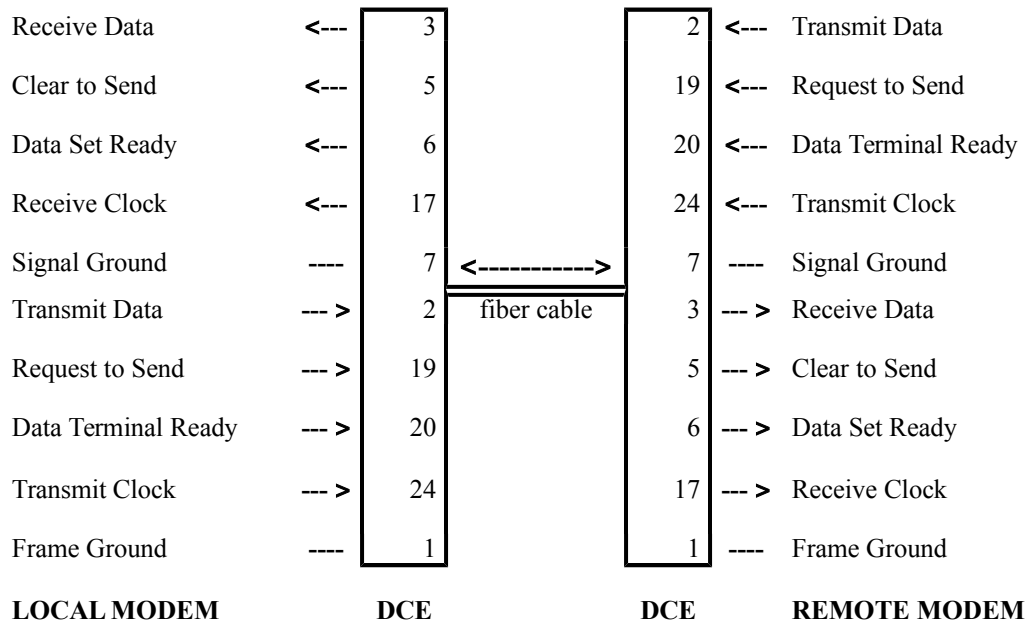


Illustration 7: Modem Link Configuration

Table 5: (P1) Chassis Power/Alarm Wiring

Pin Number	Signal Designation
1	+12 VDC
2	+12VDC
3	Signal Ground
4	Signal Ground
5	Signal Ground
6	Frame Ground (Chassis)
7	Not Used
8	Signal Ground
9	Signal Ground
10	+12 VDC
11	+12 VDC
12	+12 VDC

2.5.1 Fiber-Optic Cable Installation

After the electrical and digital interface cables have been wired according to sections 2.4 and 2.5, insert the SFP module into the SFP cage (Z1) and attach the fiber-optic cable to it (see Illustration 3 for location of Z1). The SFP module slides into the RFI Cage label side up. There will be a slight click when it locks into place. After the SFP module is installed the fiber-optic cable can be installed. The cable must be an LC type connection. The cable should be oriented with the thumb tab at the top. When completely inserted, the tabs will click into place.

2.6 INITIAL CHECKOUT PROCEDURE

F280XD modems contain no power on/off switch. Once power is connected, the modem will go through its power-up sequence. When the Power LED (see Illustration 1) is lit, the modem is ready for use. Before beginning system operation check the following to verify proper installation:

1. Verify that the power plug is seated fully into the modem or the modem is seated fully in the rack-mount enclosure (HF20A or VMX20).
2. Verify that the fiber cable is connected on each end.
3. Verify that the Alarm LED (see Illustration 1) is not lit when the fiber-optic cable is connected and the units, both local and remote, are powered.

If a malfunction is detected during the initial checkout procedure, refer to Section 5 for information on isolating the malfunction in the unit.

3 OPERATION

3.1 INTRODUCTION

This chapter contains a description of the operating controls and indicators associated with the F280XD RS-232 Modems. Since the F280XD is designed for continuous and uninterrupted operation, there are no setting requirements after the unit is operational. Once the modem is powered up it should remain in service as long as required.

3.2 STATUS INDICATORS

There are 7 indicators on the F280XD: Power Status(Power), Alarm, Transmit Data(TXD), Receive Data(RXD), Transmit Clock(TXC), Receive Clock(RXC), and Loopback(LOOP) (see Table 6 for descriptions).

Table 6: Status Indicators

LEDs*	Color	Function
Power	Green	Indicates the modem is powered and ready for use.
Alarm	Red	Indicates no fiber-optic link with remote end when lit.
TXD	Yellow	Indicates transmit data
RXD	Yellow	Indicates receive data
TXC	Yellow	Indicates transmit clock
RXC	Yellow	Indicates receive clock.
Loop	Red	Indicates local loopback just before fiber-optic module
* See Illustration 1 for LED mapping		

4 THEORY OF OPERATION

4.1 INTRODUCTION

The F280XD is an RS-232 standard modem which can be configured as either Data Communications Equipment(DCE) or Data Terminal Equipment(DTE). These modems are designed to be used in pairs as a transparent interface extension over a fiber-optic link. These units are housed in VERSITRON FOM II chassis: HF1, HF2SS and HF20A or in a Versimux II chassis(VMX20). Chassis descriptions are found in section 1.2.2.

4.2 POWER SUPPLY AND ALARM CIRCUITRY

4.2.1 Power Supply Circuit

When 12VDC is applied to the circuit, the unit should draw approximately 100mA. The unit has a switching power supply circuit, which converts 12V to 3.3VDC, and 1.2VDC. .

4.2.2 Alarm Circuit

This unit does not have an alarm circuit. Therefore, the Alarm signal on the P1 connector will not be driven by this unit.

4.3 FUNCTIONAL DESCRIPTION

The unit consists of the following circuits:

- 4.3.1- Logic Conversion
- 4.3.2- FPGA (Mux/Demux)
- 4.3.3- Fiber-Optic Transceiver Circuit
- 4.3.4- Backplane Transceiver Circuit

4.3.1 Logic Conversion

There is a transceiver chipset that converts the RS-232 interface signals to logic level signals for processing and transmission over the fiber-optic link.

4.3.2 FPGA (Mux/Demux)

The FPGA is used to multiplex/demultiplex the RS-232 interface signals from the chipset for transmission over the fiber-optic link. The FPGA is a proprietary VERSITRON design that provides serial conversion and synchronization of the RS-232 interface signals on the fiber-optic link.

4.3.3 Fiber-Optic Transceiver Circuit

Fiber-optic communications are handled by the SFP module. The power for this module is isolated from the other power circuits through filters. This helps reduce the supply noise being coupled into the SFP module. The SFP interfaces directly with the FPGA.

4.3.4 Backplane Transceiver Circuit

Backplane communications are handled by the FPGA. Upon insertion of the unit into a Versimux II chassis(VMX20) the SFP module will be disabled, and serial communications will occur across the backplane connection (J5).

5 MAINTENANCE AND TROUBLESHOOTING

5.1 INTRODUCTION

This chapter contains general information designed to isolate a malfunction in the Model F280XD to a replaceable unit. These units are not equipped with redundancy. Therefore, a failure in one of these units will interrupt service.

5.2 FAULT ISOLATION

The steps in Table 7 should be taken to check a non-operating modem. Contact VERSITRON Customer Service for additional diagnostic assistance or to arrange for repair as necessary.

Table 7: Non-Operational Indicators

STATUS INDICATOR	PROBABLE CAUSE	CORRECTIVE ACTION
Power LED is OFF	No AC power	Check that both ends of the transformer are connected
	Other	Contact VERSITRON for assistance
Alarm LED is ON	Incorrect optical signal level received at receiver input	<ol style="list-style-type: none">1. Check that fiber-optic cables are properly connected2. Check that the remote unit power is on and the fiber-optic connectors are properly attached3. Check that the SFP module on each end is seated properly4. Contact VERSITRON for assistance
Modem is not working properly	Default switch settings are not set properly	<ol style="list-style-type: none">1. Check if S1 positions are set properly2. Check if S2-S9 are set properly3. Contact VERSITRON for assistance