



Fiber Optic Data Transmission System Installation Instructions



HXA/HXB-3G/3G-x, HXA/HXB-2G/2G-xN
(1-fiber systems)

HX-3G/3G-x, HX-2G/2G-xN
(2-fiber systems)

Bi-directional High-Speed Multi-Protocol Data Transceiver

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1.0 Product Description

Meridian's HX & HXA/HXB-xG/xG-x products are fiber optic modems that transmit up to three high-speed channels of bi-directional, user-selectable RS-232, RS-422 and RS-485 (2 & 4 wire) data signals over one optical fiber (HXA/HXB) or two optical fibers (HX) using digital transmission technologies. This product series uses Meridian's standard 1-slot wide chassis mount card assembly and plugs into the following Meridian chassis: SR-500/S, SR-1002/S, SR-1600/S and SR-2001 & SR-2000 series equipment chassis.

Both ST and FC optical connectors are supported, depending on the part number. An ST optical interface is available for both multimode and single-mode fiber applications. The FC optical interface is available only for single-mode products. Optional conformal coating provides an additional level of protection from environments with high humidity.

2.0 Installation

Series HX & HXA/HXB-xG/xG-x products are one-slot wide cards and will occupy one slot in Meridian's standard chassis. To install in these chassis, orient the card with the Meridian logo at the top of the module and slide onto the top and bottom card guides in the chassis. Press securely on the top and bottom of the module to ensure that it is fully seated in the chassis so that the electrical connector mates with the chassis-mounted motherboard. Once installed, manually tighten the two thumbscrews located at the top and bottom of the card. Do not use tools to secure these and do not over tighten.

Note: A fully loaded 19" sub-rack should have forced-air cooling to avoid excessive heat generation inside the chassis. A fan assembly tray (P/N FA-2000) with three (3) fans is available and should be installed under the 19" SR-2000/1 whenever possible.

3.0 Product Signal Format & Specifications

The HX & HXA/HXB-xG/xG-x series products transmit and receive the following signals:

Signal Type	Part Number	Installed Data Connector	Channels	Transmit	Receive
RS-232 (Tx & Rx data)	HXA/HXB-3D/3D-x	Screw Terminals	3	Yes	Yes
RS-422 (Tx & Rx data)	HXA/HXB-3F/3F-x	Screw Terminals	3	Yes	Yes
RS-485 (2 & 4-wire)	HXA/HXB-3J/3J-x (2-wire) HXA/HXB-3K/3K-x (4-wire)	Screw Terminals	3	Yes	Yes
RS-232 (Tx & Rx data)	HXA/HXB-3D/3D-xN	DB9-F	2	Yes	Yes
RS-422 (Tx & Rx data)	HXA/HXB-3F/3F-xN	DB9-F	2	Yes	Yes
RS-485 (2 & 4-wire)	HXA/HXB-3J/3J-xN (2-wire) HXA/HXB-3K/3K-xN (4-wire)	DB9-F	2	Yes	Yes

The tables below identify the specifications for the various signals that these modems transmit/receive.

Data	
Formats	RS-232, RS-422, RS-485
Date Rate (RS-232)	DC to 250 Kb/s
Data Rate (RS-422 & RS-485)	DC to 500 Kb/s
Bit Error Rate (BER)	Better than 10^{-9}
PWD	10%

Connectors	
Data	screw terminals or DB9
Optical	Single-mode – ST or FC, Multimode - ST

3.1 Optical Specifications

The table below lists the optical specifications for both single-mode and multimode fiber applications.

Optical Specifications							
Fiber Type/Size (um)	Optical Output (dBm)	Rx Sensitivity (dBm)	Optical Budget (dB)	Wavelength (nm)	Optical connector	Optical Dynamic Range (Db)	Max. Distance
One Fiber Units							
Multimode (Laser) 62.5 / 125	-5	-25	20	850/1300	ST	25	7
Single-mode (FP Laser) 9 / 125	-5	-25	20	1310/1550	ST, FC	25	55
Two Fiber Units							
Multimode (Laser) 62.5 / 125	-5	-27	22	1300	ST	27	7
Single-mode (FP Laser) 9 / 125	-5	-27	22	1310	ST, FC	27	60
Single-mode (CWDM DFB Laser) 9 / 125	+1	-27	28	1270-1610	ST, FC	27	80

Refer to section 7.0 for CWDM wavelength selections.

4.0 Data Connectors Pin Assignments

This module supports the following data formats:

RS-232	One channel w/Handshake (Tx/Rx)
RS-422	One channel
RS-485	One channel (either 2 or 4 wire)

The RS-232 channel is used for transmitting/receiving one channel of RS-232 w/Handshake (Tx/Rx). In addition to the RS-232, this module supports both RS-422 and 2 or 4-wire RS-485 signals. User-settable switches on the module's motherboard are used to select the appropriate data format as required.

Table below is pinout reference on Screw Terminal connectors (default). See pinouts below.

Port 1 Data Connector Pinout Assignment				
Pin #	RS-232	RS-422	RS-485 (2-wire)	RS-485 (4-wire)
1	Ch 1 IN (RD)	Ch 1 IN (-)		Ch 1 IN (-)
2	Ch 1 IN (DTR)	Ch 1 IN (+)		Ch 1 IN (+)
3	Ch 1 OUT (TD)	Ch 1 OUT (-)	Ch 1 IN/OUT (-)	Ch 1 OUT (-)
4	Ch 1 OUT (DSR)	Ch 1 OUT (+)	Ch 1 IN/OUT (+)	Ch 1 OUT (+)
5	GND	GND	GND	GND
Port 2 Data Connector Pinout Assignment				
Pin #	RS-232	RS-422	RS-485 (2-wire)	RS-485 (4-wire)
1	Ch 2 IN (RD)	Ch 2 IN (-)		Ch 2 IN (-)
2	Ch 2 IN (DTR)	Ch 2 IN (+)		Ch 2 IN (+)
3	Ch 2 OUT (TD)	Ch 2 OUT (-)	Ch 2 IN/OUT (-)	Ch 2 OUT (-)
4	Ch 2 OUT (DSR)	Ch 2 OUT (+)	Ch 2 IN/OUT (+)	Ch 2 OUT (+)
Port 3 Data Connector Pinout Assignment				
Pin #	RS-232	RS-422	RS-485 (2-wire)	RS-485 (4-wire)
1	Ch 3 IN (RD)	Ch 3 IN (-)		Ch 3 IN (-)
2	Ch 3 IN (DTR)	Ch 3 IN (+)		Ch 3 IN (+)
3	Ch 3 OUT (TD)	Ch 3 OUT (-)	Ch 3 IN/OUT (-)	Ch 3 OUT (-)
4	Ch 3 OUT (DSR)	Ch 3 OUT (+)	Ch 3 IN/OUT (+)	Ch 3 OUT (+)
5	GND	GND	GND	GND

Table below is pinout reference on DB9 connector. See pinouts below.

DB9 Data Connector Pinout Assignment				
Pin #	RS-232	RS-422	RS-485 (2-wire)	RS-485 (4-wire)
1	Ch 1 IN (RD)	Ch 1 IN (-)		Ch 1 IN (-)
2	Ch 1 IN (DTR)	Ch 1 IN (+)		Ch 1 IN (+)
3	Ch 1 OUT (TD)	Ch 1 OUT (-)	Ch 1 IN/OUT (-)	Ch 1 OUT (-)
4	Ch 1 OUT (DSR)	Ch 1 OUT (+)	Ch 1 IN/OUT (+)	Ch 1 OUT (+)
5	GND	GND	GND	GND
6	Ch 2 IN (RD)	Ch 2 IN (-)		Ch 2 IN (-)
7	Ch 2 IN (DTR)	Ch 2 IN (+)		Ch 2 IN (+)
8	Ch 2 OUT (TD)	Ch 2 OUT (-)	Ch 2 IN/OUT (-)	Ch 2 OUT (-)
9	Ch 2 OUT (DSR)	Ch 2 OUT (+)	Ch 2 IN/OUT (+)	Ch 2 OUT (+)

4.1 Front Panel Indicator Lights

There are 9 LED indicator lights mounted on the left side of the module's front panel. These indicators show the operation status of the module's power, optical carriers and data channels. These indicators can be used for troubleshooting the module, electrical and optical connections.

Not all of the LEDs apply to all versions of these modules. Please refer to the module's part number for the appropriate signals, description.

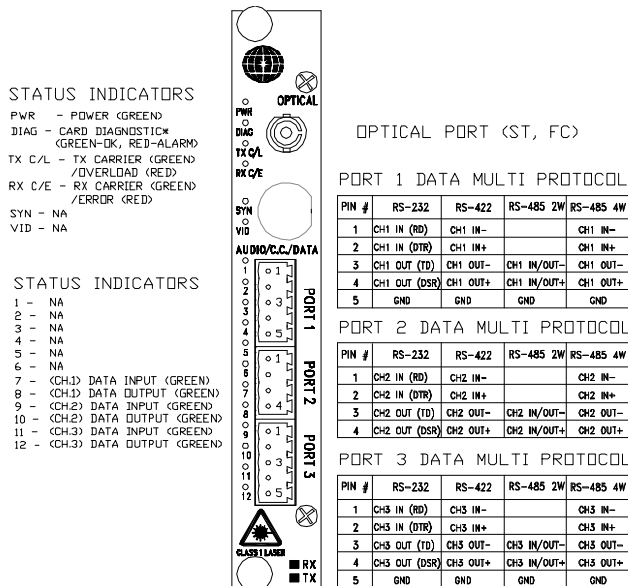
Table below is LED status on Screw Terminal connectors (default). See pinouts below.

Indicator	Function	Indicator	Function
Power	Green – ON		
Tx Carrier	Optical output (Green – OK, Red – Error)	TX Data 2	Data input ch.2 - Green
Rx Carrier	Optical Carrier input (Green – OK, Red – Error)	RX Data 2	Data output ch.2 - Green
TX Data 1	Data input ch.1 - Green	TX Data 3	Data input ch.3 - Green
RX Data 1	Data output ch.1 - Green	RX Data 3	Data output ch.3 - Green

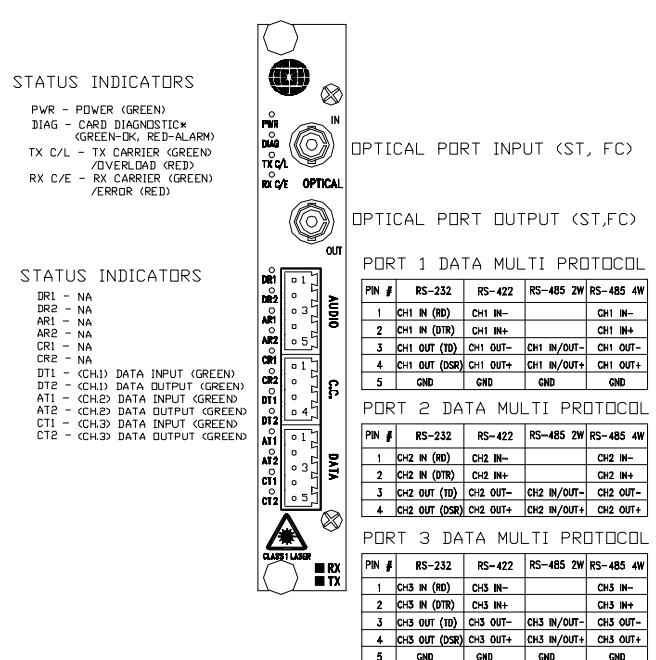
Table below is LED status on DB9 connector. See pinouts below.

Indicator	Function
Power	Green – ON
Tx Carrier	Optical output (Green – OK, Red – Error)
Rx Carrier	Optical Carrier input (Green – OK, Red – Error)
TD1 - TX Data 1	Data input ch.1 - Green
RD1 - RX Data 1	Data output ch.1 - Green
TD2 - TX Data 2	Data input ch.2 - Green
RD2 - RX Data 2	Data output ch.2 - Green

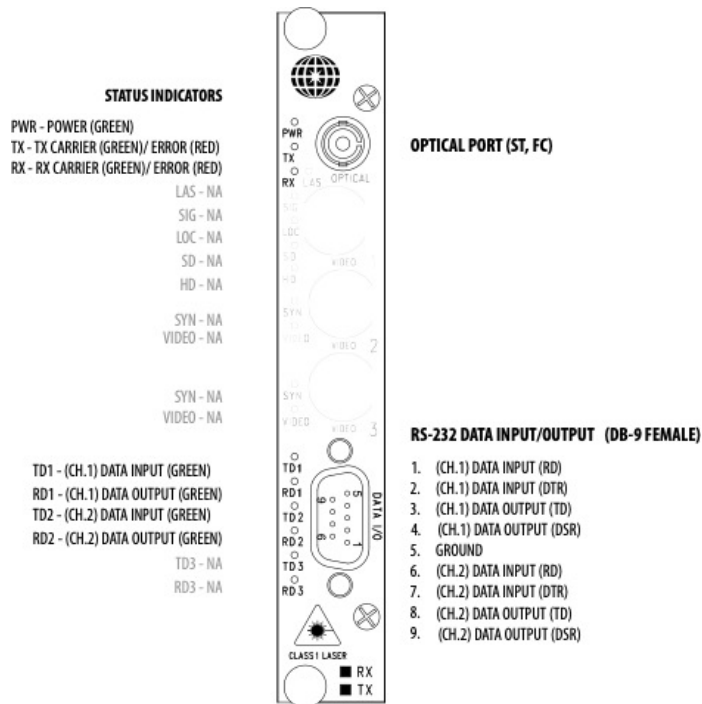
HXA/HXB-3G/3G-x PINOUT DIAGRAM



HX-3G/3G-x PINOUT DIAGRAM



HXA/HXB-2G/2G-x PINOUT DIAGRAM



5.0 Data Format Selection

A group of 10 switches is located on the bottom center of the module's circuit card (see figure 5.1 below). The first six of these switches control the data format for ch.1, ch.2 & ch.3 that is transmitted/received. These switches on both transceivers must be set the same in order to have proper data communications format between them. But optionally they also can be configured differently allowing each to have a different data protocol. For example: HXA side can be set as RS-232 and HXB side as RS-422 to allow data format conversion.

The figure and table below illustrate switches locations on the board and how they are configured for the proper data format options. The factory-supplied default setting is for RS-232 data (Switch #1-6 OFF (up)).

	Data Format Selection Switch Settings				
	RS-232	RS-422	RS-485 (2-wire)	RS-485 (4-wire)	DATA
Switch #1	OFF (up)	ON (down)	ON (down)	OFF (up)	CH.1
Switch #2	OFF (up)	ON (down)	OFF (up)	ON (down)	
Switch #3	OFF (up)	ON (down)	ON (down)	OFF (up)	CH.2
Switch #4	OFF (up)	ON (down)	OFF (up)	ON (down)	
Switch #5	OFF (up)	ON (down)	ON (down)	OFF (up)	CH.3
Switch #6	OFF (up)	ON (down)	OFF (up)	ON (down)	

Switches #7-9 factory-supplied default settings are OFF (up). These switches are used to configure RS-422/RS-485 data load for HX and HXA/HXB cards. The illustration below describes the function of each of these switches.

Data Load Format Selection Switch Settings			
	<i>Load Disable</i>	<i>Load Enable</i>	<i>DATA CHANNEL</i>
Switch #7	ON (down)	OFF (up)	CH.1
Switch #8	ON (down)	OFF (up)	CH.2
Switch #9	ON (down)	OFF (up)	CH.3

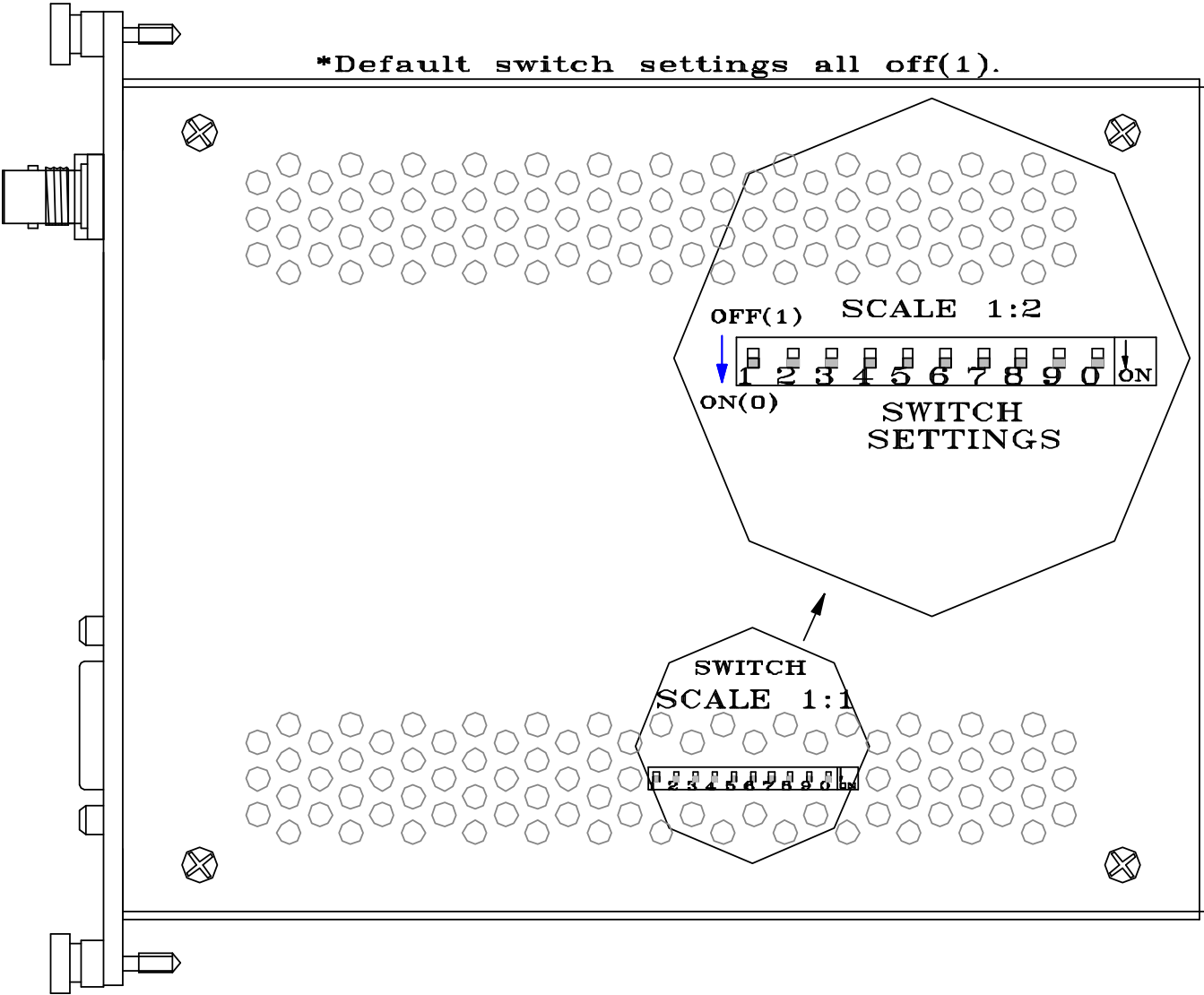


Figure 5.1
1-Slot Module Data Format Selection Switch Location

6.0 Product Part Number Variations

The table below lists the various part numbers available for one fiber series of product.

Product Part Number Guide							
<i>Tx Part Number</i>	<i>Rx Part Number</i>	<i>Data Connector</i>	<i>Fibers</i>	<i>Maximum Data Channels</i>	<i>Fiber Interface</i>	<i>Wavelength</i>	<i>Optical Connector</i>
HXA-3G/3G-2	HXB-3G/3G-2	Screw Terminal	1	3 Bi-Di Data	Multimode	850/1300nm	ST
HXA-3G/3G-5	HXB-3G/3G-5	Screw Terminal	1	3 Bi-Di Data	Single-mode	1310/1550nm	FC
HXA-3G/3G-5ST	HXB-3G/3G-5ST	Screw Terminal	1	3 Bi-Di Data	Single-mode	1310/1550nm	ST
HX-3G/3G-1	HXB-3G/3G-1	Screw Terminal	2	3 Bi-Di Data	Multimode	1300nm	ST
HX-3G/3G-3	HXB-3G/3G-3	Screw Terminal	2	3 Bi-Di Data	Single-mode	1310nm	FC
HX-3G/3G-7	HXB-3G/3G-7	Screw Terminal	2	3 Bi-Di Data	Single-mode	1550nm DFB	ST
HX-3G/3G-9	HXB-3G/3G-9	Screw Terminal	2	3 Bi-Di Data	Single-mode	1310nm DFB	ST
HXA-2G/2G-2N	HXB-2G/2G-2N	DB9	1	2 Bi-Di Data	Multimode	850/1300nm	ST
HXA-2G/2G-5N	HXB-2G/2G-5N	DB9	1	2 Bi-Di Data	Single-mode	1310/1550nm	FC
HXA-2G/2G-5N-ST	HXB-2G/2G-5N-ST	DB9	1	2 Bi-Di Data	Single-mode	1310/1550nm	ST

Notes: *DB9 Data connector (optional) can maximum support two Bi-di Data channels.*

HXA/HXB series cards are not compatible with FT/FR or ST/SR modules.

7.0 CWDM Option for 2-Fiber systems

These cards are also available with a CWDM laser/wavelength. In this configuration, 1 fiber on each unit is used for transmission of the uni-directional signals. One of the 2-fiber HX cards will incorporate one of the CWDM wavelengths while the complementary HX card will use a different CWDM wavelength.

Since the receiver portion of the card is wavelength agnostic, it is not necessary to specify the wavelength of the receive channel. This Rx channel will receive any wavelength from 1270nm to 1610nm.

The table below shows these various wavelength combinations for this particular unit. Please consult the part number label on the rear of the unit to properly identify the wavelengths for your specific cards.

Part #	Transmit Wavelength	Part #	Transmit Wavelength
HX-3G/3G-27	1270nm	HX-3G/3G-47	1470nm
HX-3G/3G-29	1290nm	HX-3G/3G-49	1490nm
HX-3G/3G-31	1310nm	HX-3G/3G-51	1510nm
HX-3G/3G-33	1330nm	HX-3G/3G-53	1530nm
HX-3G/3G-35	1350nm	HX-3G/3G-55	1550nm
HX-3G/3G-37	1370nm	HX-3G/3G-57	1570nm
HX-3G/3G-39	1390nm	HX-3G/3G-59	1590nm
HX-3G/3G-41	1410nm	HX-3G/3G-61	1610nm

When using in a system with a CWDM multiplexer/de-multiplexer, it is essential that the specific wavelengths to and from these units be connected to the corresponding input/output wavelengths on the CWDM mux/de-mux units. Otherwise, the individual wavelengths will not pass through the CWDM mux/de-mux device.

When using higher power CWDM lasers, an external attenuator of 5dB minimum is required when performing short distance testing to eliminate optical overload at the Rx card.

8.0 Troubleshooting

Below is a listing of several problems that may arise during the installation & operation of the modules. If you are having difficulty installing or operating the modules please refer to this list below.

Problem: *Module does not fit in chassis slots*

Action: Check module orientation. Meridian “Globe” must be oriented on the top left hand side of the module. Make sure the card guides in the chassis are aligned with the extrusion on the module.

Problem: *Card power LED does not light when power to the module/sub-rack is applied or power indicator turns on and off*

Action: Check power supply to ensure that it is plugged in and turned on. If flashing continues, move module to another chassis or location in the same chassis, if available.

Problem: *No Tx Carrier light*

Action: Optical module is defective, return to factory for repair.

Problem: *No Rx Carrier light*

Action: Received optical signal absent or low. Check fiber connection and optical power at receiver.

Problem: *No Data*

Action: Verify that the PWR, Tx and Rx lights on both modems are on GREEN. Confirm that the data pinouts/connections are correct (see section 4.0 for data pinout connections).

Verify that the TD1 light flashes when transmitting data and that the corresponding RD1 light on the other modem is flashing.

Confirm that the data connections are correct (Check to ensure that the data source is operating properly). The front panel lights located next to the DB9 connector should be flashing as data is being sent to the transmit side. Check to ensure that data is being transmitted to the unit.

If the problem still persists after reviewing the above items, please contact Meridian technical support (516-285-1000).



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