



Fiber Optic Video/Data Transmission System

Installation Instructions

Part Number:

FT/FR-4W1C1G/1C1G-x (ST/FC)

***(4-Channel Video Tx/Rx, 1-Channel BI-DI Contact Closure
& 1-Channel Multi-Protocol Data Transceiver)***

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FT/FR-4W1C1G/1C1G-x **Fiber Optic Video/Data Transmission System** **Installation Instructions**

1.0 Product Description

Meridian's FT/FR-4W1C1G/1C1G-x products are fiber optic modems that transmit four channel of 10-bit uni-directional digitized video, one channel of bi-directional contact closure and one bi-directional, user-selectable RS-232, RS-422 and RS-485 (2 & 4 wire) data signals over one optical fiber 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-1000/S, SR-1001/S, SR-1002/S, SR-1200/S, SR-1500/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 singlemode fiber applications. The FC optical interface is available only for singlemode products. Conformal coating provides an additional level of protection from environments with high humidity.

2.0 Installation

Series FT/FR-4W1C1G/1C1G-x products are one-slot wide cards and, as such, 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" subrack 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 FT/FR-4W1C1G/1C1G-x series products transmit and receive the following signals:

Signal Type	Channels	Transmit	Receive
NTSC/PAL/SECAM video	4	FT-4W1C1G/1C1G-x	FR-4W1C1G/1C1G-x
RS-232 (Tx & Rx data)	1	Yes	Yes
RS-422 (Tx & Rx data)	1	Yes	Yes
RS-485 (2 & 4-wire)	1	Yes	Yes

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

Video	
Format	NTSC, PAL, SECAM
Voltage/Impedance	1Vp-p, 75 Ohm, 1.5Vp-p (max)
Bandwidth	5 Hz to 7 MHz @ -3 dB
Differential Gain	<0.6%
Differential Phase	<0.3°
SNR	>67dB (weighted)
Return Loss	>30dB
Field Tilt	<0.5%

Data	
Formats	RS-232, RS-422, RS-485
Data Rate (RS-232)	DC to 125 Kb/s
Data Rate (RS-422 & RS-485)	DC to 250 Kb/s
Bit Error Rate (BER)	Better than 10 ⁻⁹

Contact Mapping	
Contact type	Relay, normally-open, normally-closed, jumper selectable, Isolated contacts
Contact rating	0.3amps, 30 VAC/VDC
Contact bounce	5 msec
Max switching rate	10Hz

Connectors	
Video	75 Ohm BNC w/gold center pin
Data	RJ45
Optical	Singlemode – ST or FC Multimode - ST

3.1 Optical Specifications

The table below lists the optical specifications for both singlemode 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)
Multimode (FP Laser) 62.5 / 125	-5	-25	20	1300/850	ST	25
Singlemode (FP Laser) 9 / 125	-5	-25	20	1310/1550	ST, FC	25

4.0 Data & Contact Mapping Connector Pin Assignment

The RJ45 connector on the front of the module is used for all data interfaces. This module supports the following data formats:

- RS-232 One full speed (Tx/Rx) with Handshake
- RS-422 One channel
- RS-485 One channel (either 2 or 4 wire) *4 wire-default

The RS-232 channel is used for transmitting/receiving one channel of 2-wire 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.

Data / C.C. 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/OUT (-)	Ch 1 IN (-)
2	Ch 1 IN (DTR)	Ch 1 IN (+)	Ch 1 IN/OUT (+)	Ch 1 IN (+)
3	Ch 1 OUT (TD)	Ch 1 OUT (-)		Ch 1 OUT (-)
4	Ch 1 OUT (DSR)	Ch 1 OUT (+)		Ch 1 OUT (+)
5	GROUND			
6	CC INPUT			
7	CC OUTPUT+			
8	CC OUTPUT-			

FT-4W1C1G/1C1G-X

PINOUT DIAGRAM

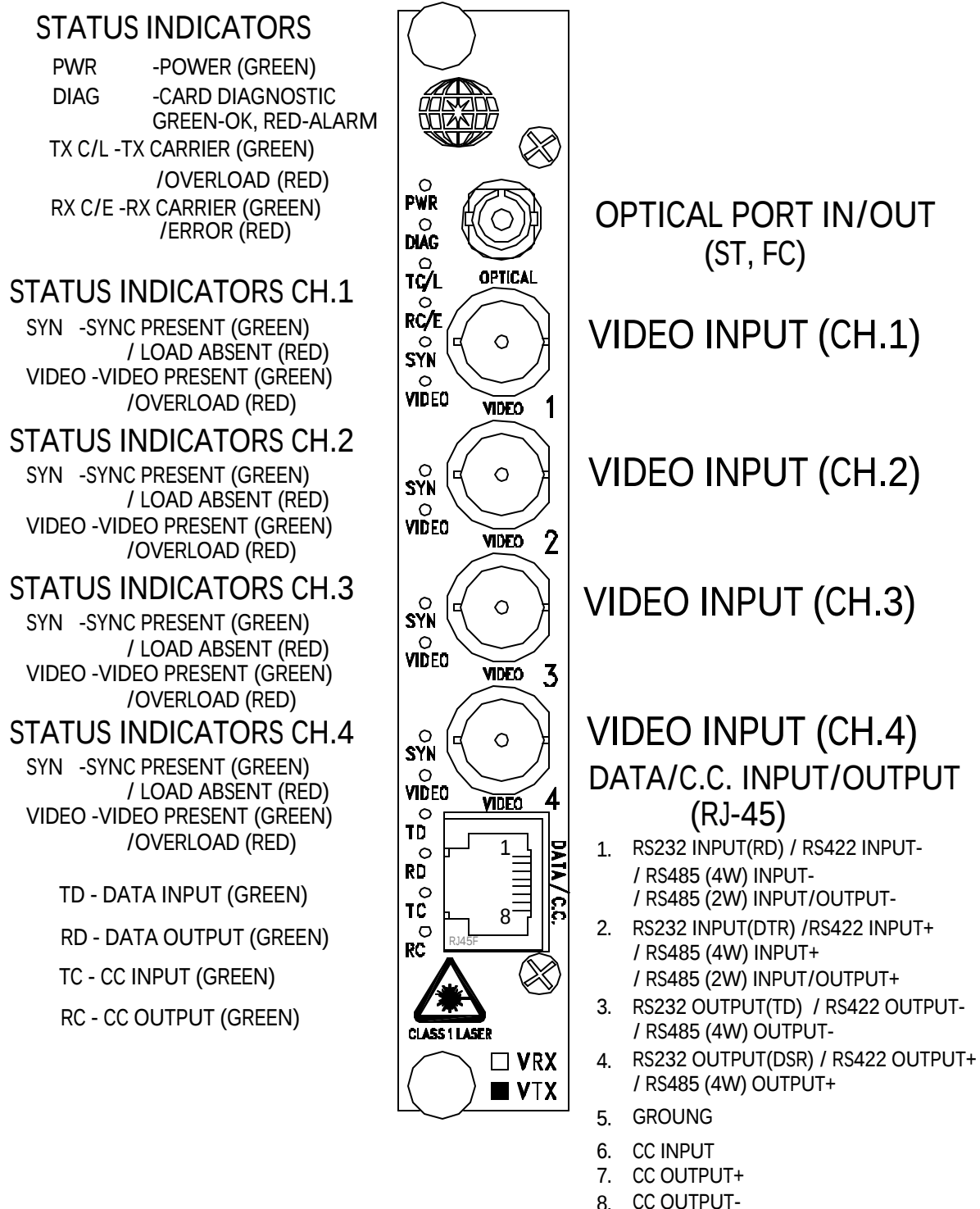


Figure 4.1

FT-4W1C1G/1C1G-x Front Panel Layout Diagram

FR-4W1C1G/1C1G-X

PINOUT DIAGRAM

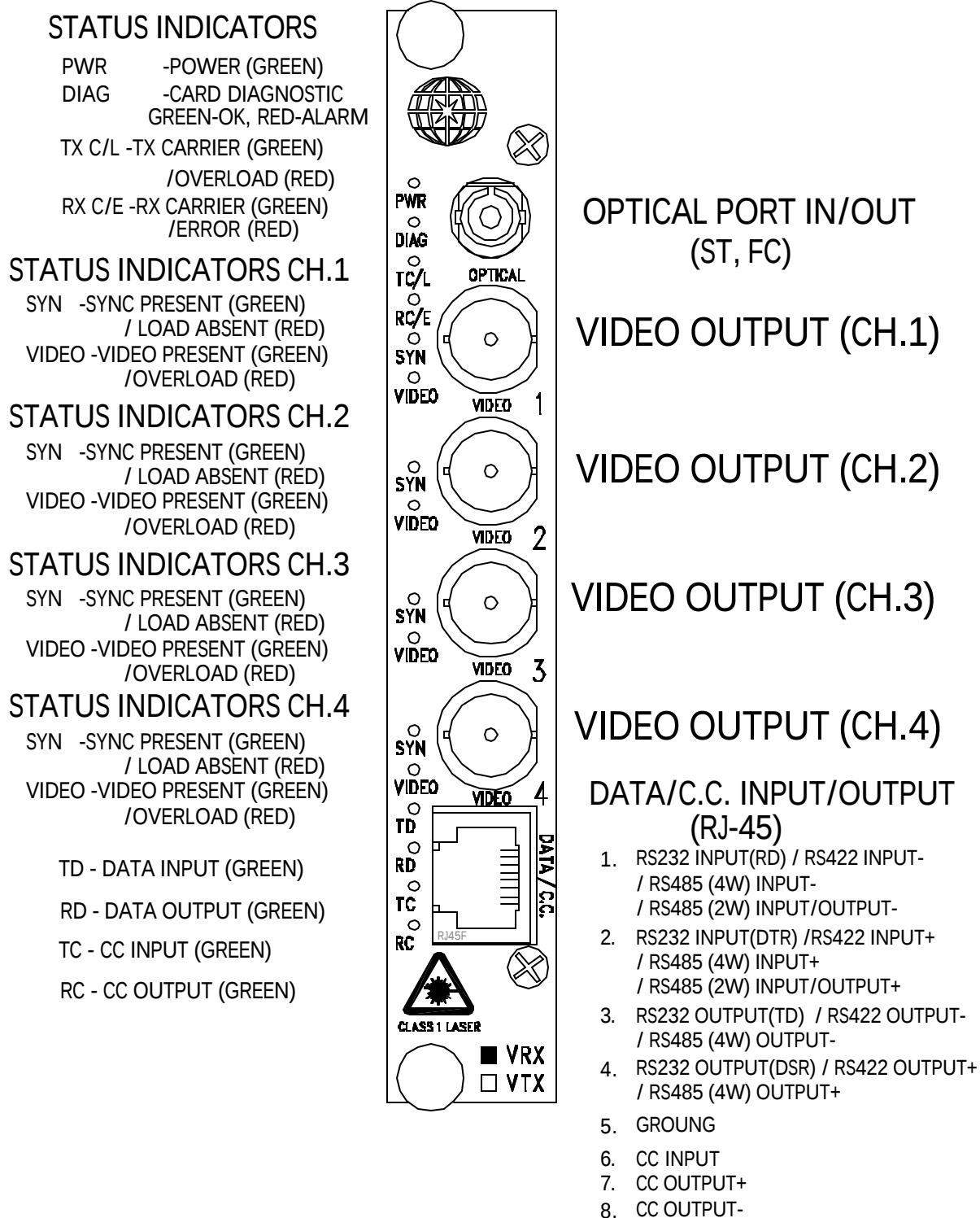


Figure 4.2
FR-4W1C1G/1C1G-x Front Panel Layout Diagram

5.0 Signal Conditioning Switch/Jumper Settings

The sections below illustrate how to change the various contact mapping conditions. For jumper and switch locations see Figure 5.2

5.1 Data and Contact Mapping Selection jumpers

There are four (4) 3-pin jumpers located directly behind the RJ45 front-panel mounted connector.

The top 3 jumpers are used for 2 & 4-wire RS-485 selection and removing the default 120Ohm load on the RS-422 input channels.

The bottom jumper (Jp.4) used to select the power-on state of the contacts (NO or NC). Contact Mapping - The output state of the contact can be changed from Normally-Open (NO) to Normally-Closed (NC) by properly selecting the jumper. A NO contact (output side) closes when the contact input on the input module's side is closed to ground. The default contact setting is NO (normally-open). To change settings to Normally-Closed (NC) move Jumper 4 from Pos.1 to Pos.2

The illustration below describes the function of each of these 4 jumpers. The jumpers are shown in their default condition in Table 1.

JUMPER SETTINGS RS-232 Pos.1 / Pos.2 Jumper 1 SHUNT Jumper 2 SHUNT Jumper 3 SHUNT Jumper 4 Jp4 SHUNT 12 PIN CONN actory default settings data RS-232 Table 1	JUMPER SETTINGS RS-422 RS-485 (4W) Pos.1 / Pos.2 Jumper 1 SHUNT Jumper 2 SHUNT Jumper 3 SHUNT Jumper 4 Jp4 SHUNT 12 PIN CONN *To convert from RS-232 to RS-422 or RS-485 (4w) data move Jumper 2 to Pos.2 Table 2	JUMPER SETTINGS RS-485 (2W) Pos.1 / Pos.2 Jumper 1 SHUNT Jumper 2 SHUNT Jumper 3 SHUNT Jumper 4 Jp4 SHUNT 12 PIN CONN *To convert from RS-232 to RS-485 (2w) data move Jumpers 1,2,3 to Pos.2 Table 3
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5.2 Data Format Selection

A group of 10 switches is located on the bottom center of the module’s circuit card (see Figure 5.2). The left two (2) of these switches control the data format that is transmitted/received. These switches on both the transmitter and receiver must be set the same in order to have proper data communications format between them. FT and FR modules can be configuring different for data format conversion (see Figure 5.1)

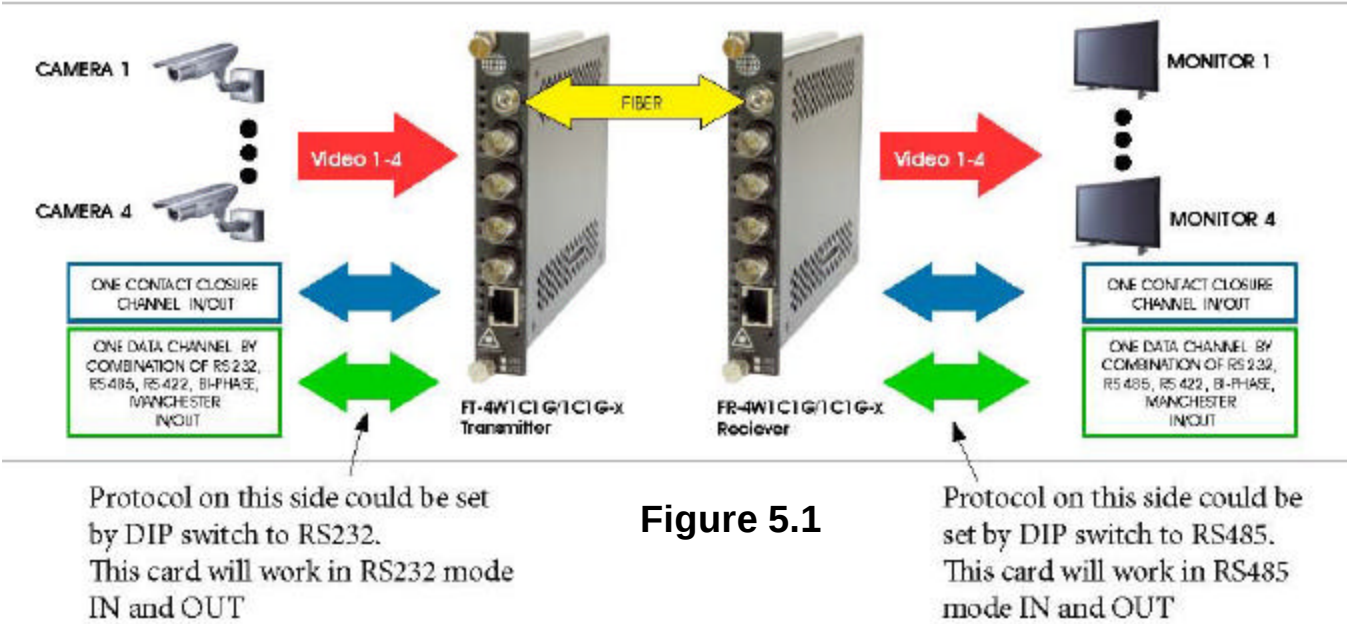


Figure 5.1

The figure and table below illustrates these switch 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 #1-2 OFF (up)).

Data Format Selection		
	Switch #1	Switch #2
RS-232	OFF (up)	OFF (up)
RS-422	ON (down)	ON (down)
RS-485 (2-wire)	ON (down)	OFF (up)
RS-485 (4-wire)	OFF (up)	ON (down)

Switches 3 and 4 should set by Meridian technician.
The illustration below describes the function of each of these switches.

SWITCH SETTINGS FT/FR-4W1C1G/1C1G CARD

Test Signals				
	RS-232	RS-422	RS485 (4W)	RS485 (2W)
Switch #1	1	0	1	0
Switch #2	1	0	0	1
	8-CH.	4-CH.	2-CH.	1-CH.
Switch #3	1	1	0	0
Switch #4	1	0	1	0
Switch #5	0-L Loop Enable			
Switch #6	0-R Loop Enable			
Switch #7	0-TX Test Enable			
Switch #8	0-RX Test Enable			
Switch #9	0-S.VIEW Enable			
Switch #10	1-Reserved			

*Default switch settings all off(1).

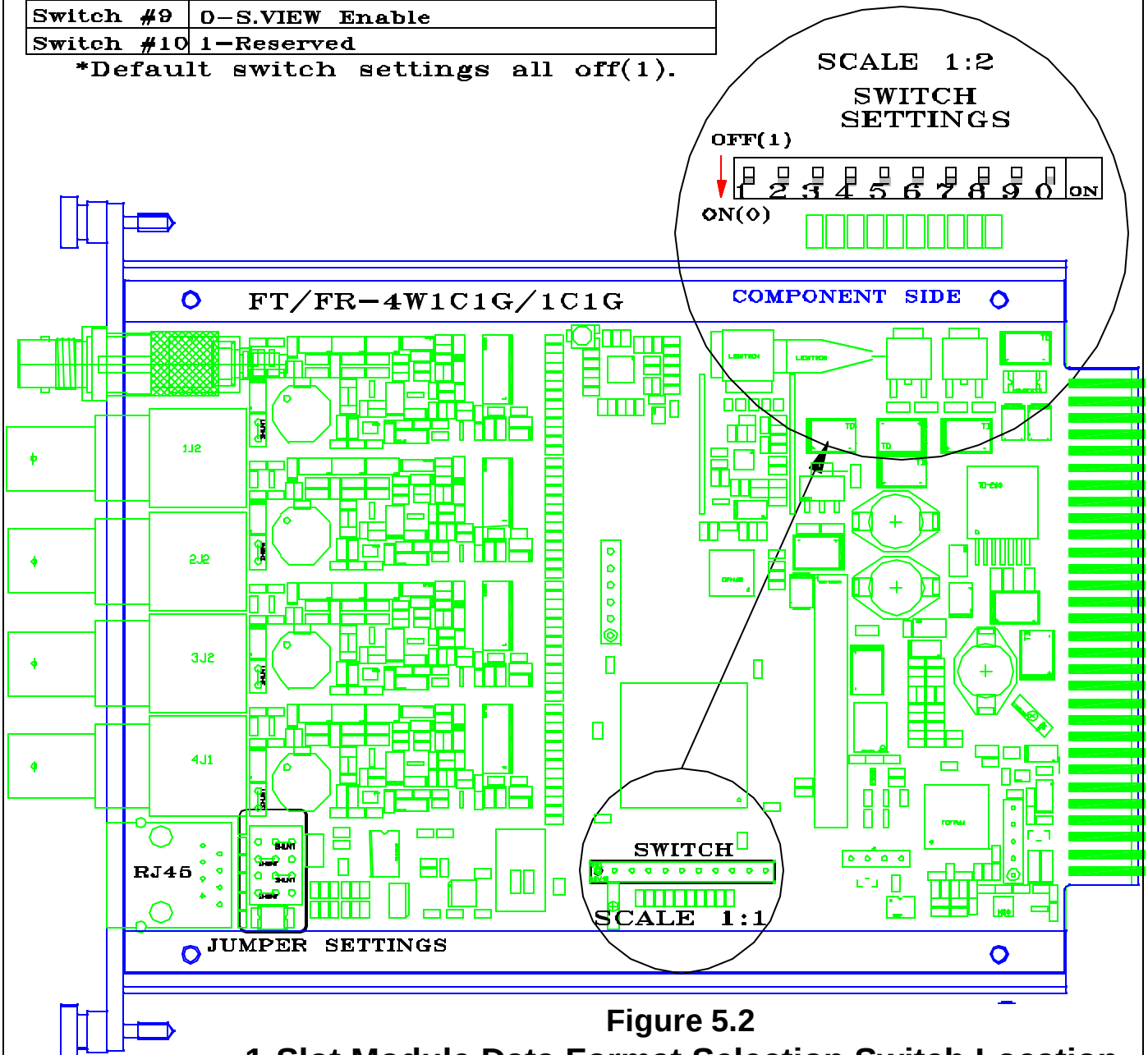


Figure 5.2
1-Slot Module Data Format Selection Switch Location

6.0 SpectraView™ Network Monitoring

The table below lists the function of each of these switches (numbered from left to right) and identifies how to set the various diagnostic test modes.

Test Switch	Local Loop Back	Remote Loop Back	Transmit Test	Receive Test	Spectra View Enabled	Reserved
SW1 – SW2 – Data format selection switches						
SW5	ON	OFF	OFF	OFF	OFF	OFF
SW6	OFF	ON	OFF	OFF	OFF	OFF
SW7	OFF	OFF	ON	OFF	OFF	OFF
SW8	OFF	OFF	OFF	ON	OFF	OFF
SW9	OFF	OFF	OFF	OFF	ON	OFF
SW10	OFF	OFF	OFF	OFF	OFF	OFF

Note: To turn a switch “ON”, move the switch in the down position. Likewise, to turn a switch “OFF”, move it in the up position.

In order to enter the test modes on the module, it is necessary to actuate one of the above switches as described below:

Local Loopback test (SW5) -These tests will test all of the bi-directional data and contact closures installed on the module associated with the loopback test. Obviously, the channels that can be tested are determined by the type of channels associated with the particular module under test.

The following procedures can be used to properly perform the loopback testing on both the FT & FR series modules. Note that it is not necessary for both of the modules to be connected via fiber in order to perform the Local Loopback tests.

Note: Local loopback test is not available for RS-485 (2-wire) configuration.

Data Test:

1. Place SW5 in the ON (down) position
2. Use Switches 1-2 to select the appropriate data format to be tested
3. Apply an appropriate digital signal into the respective data input connector
4. Connect a data-monitoring device (oscilloscope, BERT test equipment, etc.) to the respective data output channel.
5. The output channel should be receiving the same data signal that was input to the respective data input channel.
6. The front panel Data Transmit & Receive LEDs (TD & RD) on the module’s data channel under test should light.
7. When complete, place SW5 in the OFF (up) position to return it to its normal operating mode.

Contact mapping test:

1. Place SW5 in the ON (down) position
2. Connect an input contact to one of the contact input channels. Contact actuation is caused when the contact input channel pin is connected to ground.
3. When each of the contact input channels is connected to ground, the appropriate channel's output contact will change state. Monitor with an ohmmeter to confirm proper operation.
4. The front panel Contact Transmit & Receive LEDs (TC & RC) on the module's contact mapping channel under test should flash in response to contact closure inputs.
5. When complete, place SW5 in the OFF (up) position to return it to its normal operating mode.

Remote Loopback Tests (SW6) -These tests will test all of the bi-directional data and contact closures installed on the module associated with the remote loopback test. Obviously, the channels that can be tested are determined by the type of channels associated with the particular module under test.

Note: Remote loopback test is not available for RS-485 (2-wire) configuration or transmit/receive modules with a video channel.

The following procedures can be used to properly perform the loopback testing on both the FT & FR series modules. In order to perform the remote loop back tests, it is necessary to configure both the FT & FR modules as follows:

- Both the FT & FR modules must be connected together via fiber and power applied in order to perform the Remote Loopback tests.
- When testing the data channels, it is necessary that the data formats for both the FT & FR units be set the same (RS-232, RS-422, RS-485)
- The Remote Loopback test switch (SW6) on the remote module must be in the ON (down) position
- Test switches (SW5-10) on the local unit must be in the OFF (up) position

Data Test:

1. Place SW6 on the remote unit in the ON (down) position
2. Use Switches 1-2 to select the appropriate data format to be tested.
3. Apply an appropriate digital signal into the respective data input connector on the local unit (either Channel 1 or 2).
4. Connect a data-monitoring device (oscilloscope, BERT test equipment, etc.) to the respective data output channel on the local unit.
5. The output channel should be receiving the same data signal that was input to the respective data input channel.
6. The front panel Data Transmit LED (TD) on the transmit module's data channel

under test should light as well as the Data Receive LED (RD) on the receiver module's front panel for each data channel under test.

7. When complete, place SW6 on the remote unit in the OFF (up) position to return it to its normal operating mode

Contact mapping test:

1. Place SW6 on the remote unit in the ON (down) position
2. Connect an input contact to one of the contact input channels on the local unit. Contact actuation is caused when the contact input channel pin is connected to ground.
3. When each of the contact input channels is connected to ground, the appropriate channel's output contact on the same local unit will change state. Monitor with an ohmmeter to confirm proper operation.
4. The front panel Contact Transmit LED (TC) on the transmit module's contact mapping channel under test should light as well as the Contact Receive LED (RC) on the receiver module's front panel for each contact mapping channel under test.
5. When complete, place SW6 on the remote unit in the OFF (up) position to return it to its normal operating mode

Data/Contact Transmit Test (SW7) – (applicable to both full-duplex transceiver modules and one-way data transmission modules) The type and quantity of channels that can be tested are determined by the type of channels associated with the particular module under test.

In order to perform the transmit test, it is necessary to configure both the modules as follows:

- ✍✍ The FT or FR modules must be connected together via fiber and power applied in order to perform the Transmit tests.
- ✍✍ When testing the data channels, it is necessary that the data formats for both the modules be set the same (RS-232, RS-422, RS-485)
- ✍✍ The Transmit Test switch (SW7) on the module initiating the test must be in the ON (down) position
- ✍✍ Test switches (SW5-10) on the local unit must be in the OFF (up) position
- ✍✍ This test overrides any external data that may be at the input terminals of the unit under test.

This test will inject the Data and Contact Closure test signals into the transmitter and will be sent over fiber to the associated receiver module. This test will perform diagnostic tests on all of the channels integrated in the module using the module's own internal test signals. In addition, the internal frequency/data rate of the various internal tests is as follows:

Data - 1Hz square wave

Contact closure - 1Hz square wave

Once the Transmit test switch on the remote FT or FR module is switched ON, the above signals will be transmitted over fiber to the receiving unit. The outputs can be monitored by standard Data and Contact mapping measurement/monitoring techniques.

LED indicator status – During the test, the Tx channel indicator lights for the data and contact mapping (TD & TC) on the module initiating the test will flash at a 1Hz rate. This applies to each type and number of channels in the module. Likewise, each of the channel's front panel Rx channel indicator lights for the data and contact mapping (RD & TC) on the receiver module's front panel will flash at a 1Hz rate to indicate proper reception of the test signals.

To disable the test, move SW7 on the FT or FR switch to the OFF position.

Data/Contact Receive Test (SW8) - (applicable to both full-duplex transceiver modules and one-way receiver modules) These tests will test all of the data and contact closure transmission channels installed on the module associated with the remote loopback test. Obviously, the channels that can be tested are determined by the type of channels associated with the particular module under test.

In order to perform the receive tests, it is necessary to configure both the modules as follows:

- ✍✍ The FR and FT modules do not need to be connected together via fiber.
- ✍✍ The type of data output will be as per the data format selection switches 1 through 2 (RS-232, RS-422, RS-485)
- ✍✍ The Receive Test switch (SW8) on the module initiating the test must be in the ON (down) position

The receive test will perform diagnostic tests on all of the channels integrated in the module using the module's own internal test signals. The internal frequency/data rate of the various internal tests is as follows:

Data - 1Hz square wave
Contact closure - 1Hz square wave

Once the Receive test switch on the FT or FR module is switched ON, the above signals sent to the appropriate electrical outputs on the same module. These signal outputs can be monitored by standard Data and Contact mapping measurement/monitoring techniques.

LED indicator status – During the test, each of the channel's front panel Rx channel indicator lights for the data and contact mapping (RD & TC) on the receiver module's front panel will flash at a 1Hz rate to indicate proper reception of the test signals. This applies to

each type and number of channels in the module.

To disable the test, move SW7 on the FR or FT switch to the OFF position. This will restore operation to its normal mode.

Video Test – (Applicable to one-way transmission modules (FT & FR units). This video test mode will allow the user to test the video transmission channel without the use of an external camera to generate a video signal.

There are two video tests available – Transmit video & Receive video. The following describes the test setup for each:

Transmit video test – This test injects a 4-bar video test pattern into the video transmitter and sends this signal over fiber to the associated receiver module.

In order to initiate the internal transmit video test it is necessary to configure the modules as follows:

- ✍ ✍ SW7 on the FT video Tx module must be set to the ON (down) position.
- ✍ ✍ SW8 on the FR video Rx module must be set to the OFF (up) position.
- ✍ ✍ The optical fiber between the FT & FR modules must be connected together
- ✍ ✍ Connect a standard video monitor to the output of the FR (Video Receiver) module
- ✍ ✍ 4 grey-scale vertical bars will be displayed on the monitor
- ✍ ✍ Receiver module LEDs – If a video monitor is not available, the activity of the transmit video test can be monitored on the receiver's front panel LEDs. When this test is activated, the receiver modules Video Sync & Video Present green LEDs (SYN & VIDEO) will light.

Receive video test – This test injects an 8-bar video test pattern into the video receiver and sends it to the receiver output BNC for display on a video monitor.

In order to initiate the internal receive video test it is necessary to configure the modules as follows:

- ✍ ✍ SW7 on the FT video Tx module must be set to the OFF (up) position.
- ✍ ✍ SW8 on the FR video Rx module must be set to the ON (down) position.
- ✍ ✍ The optical fiber between the FT & FR modules must be connected together
- ✍ ✍ Connect a standard video monitor to the output of the SR (Video Receiver) module
- ✍ ✍ 8 grey-scale vertical bars will be displayed on the monitor

SpectraView Enabled (SW9) - (Applicable to one-way transmission modules with video (FT & FR units). This video mode will enable the vertical video bars to be displayed in the event that either the incoming video signal has been removed or if the optical signal from the transmitter has been interrupted.

To enable this video bars feature it is necessary to configure the modules as follow:

- ✍ SW 9 on the FR (video Receiver) module must be set to the ON (down) position
- ✍ SW 9 on the FT (video Transmitter) module must be set to the ON (down) position

Under normal operation, the video from the CCTV camera will be displayed on the respective monitor at the receive side. There are two ‘alarm’ modes - one for loss of video sync and one for loss of optical signal. When one or the other of these alarm modes is present, the monitor will display the following:

Loss of video sync - 4 vertical gray-scale bars across the monitor screen

Loss of optical signal - 8 vertical gray-scale bars across the monitor screen

Note: Modules equipment with Meridian’s SpectraSmart Network Diagnostic System option will have a slightly different video display. Instead of the vertical bars, the monitor will actually display a text message (as described below):

Loss of video sync error: will display the message “No Video Sync”

Loss of Optional signal error: will display – “No Optical Fiber”

This procedure concludes the testing of the video/data/contact channels within Meridian’s DigiCool (1-slot) fiber optic digitally-encoded transmission modules.

7.0 Product Part Numbers

The table below lists the various part numbers and description that are available for this series of product.

Product Part Number Guide			
Part Number	Matching Part #	Fiber Interface	Optical Connector
FT-4W1C1G/1C1G-2	FR-4W1C1G/1C1G-2	Multimode	ST
FT-4W1C1G/1C1G-5	FR-4W1C1G/1C1G-5	Singlemode	FC
FT-4W1C1G/1C1G-5ST	FR-4W1C1G/1C1G-5ST	Singlemode	ST

Note: *This FT & FR series cards are not compatible with the other 1-slot ST & SR cards.*

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/subrack 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 video at output of module*

Action: Check the SpectraView display on the monitor for an indication of what the problem may be. Also, check to ensure that the video channel-specific LEDs are on (Green). Also, check to ensure that the optical LEDs are ON. If no video is still present, check to ensure that the monitor is ON and the video cable is connected to the correct video port on the Rx module.

Problem: *Video image is dark*

Action: Check the iris control on the camera to ensure that it is open to the proper amount for the conditions.

Problem: *Video image is too bright and appears overexposed*

Action: Check the Video overload indicator on the Rx module. If it is Red, the video signal level is too high and the CCTV iris should be checked to ensure that it is open properly for the conditions.

Problem: *Contact closure not working*

Action: Input side – Ensure that the input contact is connected between the appropriate input connection and ground
Output side – Ensure that the terminal device is connected to the proper output contact pinouts and that the contact channel jumper are set to the appropriate normally-open or normally-closed position.

Problem: *No Data*

Action: Check that both transmit and receive modules is set to transmit/receive the same data format (see section 5.0 for switch settings). Confirm that the data connections are correct (see section 4.0 for data pinout connections). Check to ensure that the data source is operating properly.

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



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