



## **Installation/Operation Instructions**

### **Fiber Optic Video & Data Transmission System**

#### **Part Number:**

#### **DT/DR-1W(V)2A2G/2A2G-x Series**

***(1-Channel Video Tx/Rx & 2-Channel bi-directional Audio, 2-Channel  
Multi-Protocol Data Transceiver)***

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# 1.0 Product Description

Meridian's product series DT-1W(V)2A2G/2A2G and DR-1W(V)2A2G/2A2G are fiber optic modems that transmit one channel of uni-directional digitized video, two channel of bi-directional audio and two channel of user-selectable RS-232, RS-422 or RS-485 data signals over one or two optical fibers using digital transmission technologies. This product series uses Meridian's standard 2-slot wide chassis mount card assembly and plugs into the following Meridian chassis: SR-1000/S, SR-1001/S, SR-1002/S, SR-1200/S, SR-1500/S, and SR-2001 & SR-2000 series 19" equipment chassis.

The units consist of various plug-in personality function cards or SIMs. The top card is the optical card that contains the fiber optic interface. The bi-directional optical input/output connector is located on the right side of both the transmitter (DT) and receiver (DR) modules. The two fiber units have two optical ports. The port on the left side of the front panel is the transmit port while the optical port on the right side of the module's front panel is the optical receive port. It is important that, when connecting these modules together, it is necessary that the transmit port of one of the modules optically connects to the receive port of other module. The second SIM contains the video coaxial interface. The third SIM contains the bi-directional audio signals. The bottom two SIM cards contain the bi-directional multi-protocol data signals (one per SIM card).

## 2.0 Installation

Series DT-1W(V)2A2G/2A2G and DR-1W(V)2A2G/2A2G products are two-slot wide cards and, as such, occupy two slots in Meridian's standard chassis. To install in the 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 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 DT & DR-1W(V)2A2G/2A2G series products transmit and receive the following signals:

| Signal Type                   | Channels             | Transmit          | Receive           |
|-------------------------------|----------------------|-------------------|-------------------|
| NTSC/PAL video                | 1                    | DT-1W(V)2A2G/2A2G | DR-1W(V)2A2G/2A2G |
| Audio (600Ω, unbalanced)      | 2                    | Yes               | Yes               |
| RS-232 (Tx & Rx data)<br>(or) | 2<br>(jumper select) | Yes               | Yes               |
| RS-422 (Tx & Rx data)<br>(or) | 2<br>(jumper select) | Yes               | Yes               |
| RS-485 (2 & 4-wire)           | 2<br>(jumper select) | Yes               | Yes               |

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

| Video              |                              |                              |
|--------------------|------------------------------|------------------------------|
|                    | 8-bit                        | 10-bit                       |
| Format             | NTSC, PAL, SECAM             | NTSC, PAL, SECAM             |
| Voltage/Impedance  | 1Vp-p, 75 Ohm, 1.5Vp-p (max) | 1Vp-p, 75 Ohm, 1.5Vp-p (max) |
| Differential Gain  | <0.6%                        | <0.6%                        |
| Differential Phase | <0.3°                        | <0.3°                        |
| SNR                | >60dB (weighted)             | >67dB (weighted)             |
| Return Loss        | >30dB                        | >30dB                        |
| Field Tilt         | <0.5%                        | <0.5%                        |

| Audio                       |                                         |
|-----------------------------|-----------------------------------------|
| In/Out Impedance            | 600 Ohm (bal), unbalanced/unbalanced    |
| Frequency Response          | 10Hz to 20KHz                           |
| SNR                         | >90dB (weighted) @ 1KHz                 |
| In/Out Level                | -6 to +6dBm (4Vp-p, max)                |
| THD                         | <0.01% @ 1KHz                           |
| Digitized Resolution        | 24 bit                                  |
| Data                        |                                         |
| Formats                     | RS-232                                  |
| Data Rate (RS-232)          | DC to 1 25Kb/s                          |
| Data Rate (RS-422 & RS-485) | DC to 300Kb/s                           |
| Bit Error Rate (BER)        | Better than $10^{-9}$                   |
| Connectors                  |                                         |
| Video                       | 75 Ohm BNC w/gold center pin            |
| Audio                       | DB9 Female                              |
| Data                        | DB9 Female                              |
| Optical                     | Singlemode – ST or FC<br>Multimode – ST |

| 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        | -3                   | -24                  | 21                  | 1300/850        | ST                | 24                         |
| Singlemode (FP Laser) 9/125          | -3                   | -24                  | 21                  | 131 0/1 550     | ST, FC            | 24                         |
| Singlemode (DFB & CWDM Lasers) 9/125 | +3                   | -24                  | 27                  | 131 0/1 550     | ST, FC            | 24                         |

Refer to section 7.0 for CWDM wavelength selections.

## 4.0 Operating

Video – Each of the two BNC video connectors accepts a standard NTSC/PAL video input signal (DT module) and transmits these signals to the receive unit (DR module). The respective video output signal is located on the same channel (location) as the input video signal. Connect the input video signal to the appropriate BNC video input connector on the transmitter module (DT-1W(V)2A2G/2A2G) and the output video connector on the associated port on the receiver module (DR-1W(V)2A2G/2A2G).

Audio - Connect the audio source to one of the channels' input pins as shown in section 4.2. Connect an audio output device to the associated channel's output pins on the other module. To obtain optimal performance, the audio input level should be set to 0dB. The audio output level will track the input level. Once proper operation is verified, the other channels can be connected per the pinout diagram in this manual.

Data – Connect the data for each of the data channels to the appropriate data Tx/Rx pins on the connector as shown in section 4.3

### 4.1 Video, Audio and Data Status indicators

The figures 5.1 & 5.2 show the connector and LED indicator locations for the various video, audio & data status indicators on the transmitter and receiver modules. There are a number of diagnostic indicators on the front panel of each module. In addition, each of the video input/output channels has indicators associated with them to provide quick visual indications of the channel activity. These indicators for each of the video, audio & data SIM cards are listed below:

| Transmitter (DT-1W(V)2A2G/2A2G) Indicators |                                |                                               |
|--------------------------------------------|--------------------------------|-----------------------------------------------|
| Indicator                                  | Location                       | Function                                      |
| Tx carrier                                 | Under optical output connector | Optical output (Green – OK, Red – error)      |
| Power                                      | Left side of module            | Green – ON                                    |
| Video #1                                   | Under video input connectors   | Green – Sync received                         |
| Video #2                                   | Under video input connectors   | Video signal – Green OK, Red – video overload |

| <b>Receiver (DR-1W(V)2A2G/2A2G) Indicators</b> |                                |                                                 |
|------------------------------------------------|--------------------------------|-------------------------------------------------|
| <b>Indicator</b>                               | <b>Location</b>                | <b>Function</b>                                 |
| Rx Optical signal                              | Under optical output connector | Optical input (Green – OK, Red – error)         |
| Rx Carrier                                     | Under optical output connector | Optical Carrier input (Green – OK, Red – error) |
| Power                                          | Left side of module            | Green – ON                                      |
| Video #1 (each input)                          | Under video input connectors   | Green – Sync received                           |
| Video #2 (each input)                          | Under video input connectors   | Video signal – Green OK, Red – video overload   |

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Each audio input/output channel has four LED status indicators located under the associated audio I/O connector. Two adjacent LEDs are associated with each audio input channel and two are associated with the respective audio output channel. The table below shows the relationship between the connectors (I/O channels) and LEDs.

| <b>Audio Input/Output Status Indicators<br/>(Port 2)</b> |                               |
|----------------------------------------------------------|-------------------------------|
| <b>LED</b>                                               | <b>DT/DR-1W(V)2A2G/2A2G-x</b> |
| 1                                                        | Input 1 – Present             |
| 2                                                        | Input 1 – Overload            |
| 3                                                        | Input 2 – Present             |
| 4                                                        | Input 2 – Overload            |
| 5                                                        | Output 1 – Present            |
| 6                                                        | Output 1 – Overload           |
| 7                                                        | Output 2 – Present            |
| 8                                                        | Output 2 – Overload           |

Audio input PRESENT LEDs – Each of the LEDs associated with a specific audio input channel will light when the audio input source is connected and has a signal level greater than -8dB

Audio input OVERLOAD LEDs – when the audio input level of any channel exceeds +8dB, the associated audio channel input Overload LED will turn on indicating that the audio input level is too high and distortion on the output may result.

Audio output PRESENT LEDs – This light will turn on when the audio input on the transmit side is present, the DXA & DXB units are powered and the fiber is connected between the two modems.

Audio output OVERLOAD LEDs – These lights will light when the respective audio input on the transmit side is over +8dB. Since the audio output level will track the audio input level, this light should not illuminate when the audio input is below the overload condition (+8dB)

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Each data input/output channel has two LED status indicators located under the associated data I/O connector. One LED is associated with each data input channel on the DR unit while the second LED is associated with the respective data output channel on the DT unit. The table below shows the relationship between the connectors (I/O channels) and LEDs.

| <b>Data Input/Output Status Indicators Port 3 &amp; 4</b> |                                 |
|-----------------------------------------------------------|---------------------------------|
| <b>LED</b>                                                | <b>DT/DR-1W(V)2A2G/2A2G-x</b>   |
| 1                                                         | Input 1 – Green – data present  |
| 2                                                         | N/A                             |
| 3                                                         | Output 1 – Green - data present |
| 4                                                         | N/A                             |
| 5                                                         | Input 2 – Green – data present  |
| 6                                                         | N/A                             |
| 7                                                         | Output 2 – Green - data present |
| 8                                                         | N/A                             |

## 4.2 Audio Signal Connector Pinouts

The DT & DR-1W(V)2A2G/2A2G Audio channel connector pinouts are shown in the table below:

| <b>Audio connector (Port 2)</b> |                                  |
|---------------------------------|----------------------------------|
| <b>Pinout</b>                   | <b>DXA/DXB-1W(V)2A/2W(V)2A-x</b> |
| 1                               | Audio Ch 1 Output (-)            |
| 2                               | Audio Ch 1 Output (+)            |
| 3                               | Audio Ch 2 Output (-)            |
| 4                               | Audio Ch 2 Output (+)            |
| 5                               | GND                              |
| 6                               | Audio Ch 1 Input (-)             |
| 7                               | Audio Ch 1 Input (+)             |
| 8                               | Audio Ch 2 Input (-)             |
| 9                               | Audio Ch 2 Input (+)             |

The audio board (SIM) is inserted in the module at the Port 2.

The attached figures in section 5.0 show the module front panel and associated connector location & pinouts.

## 4.3 Multi-Protocol SIM Signal Assignment

Each of the multi-protocol SIM can be user-configured to transmit/receive one of the following data formats:

RS-232 One full speed, 2-wire channel (Tx/Rx)

RS-422 One channel

RS-485 One channel (either 2 or 4 wire)

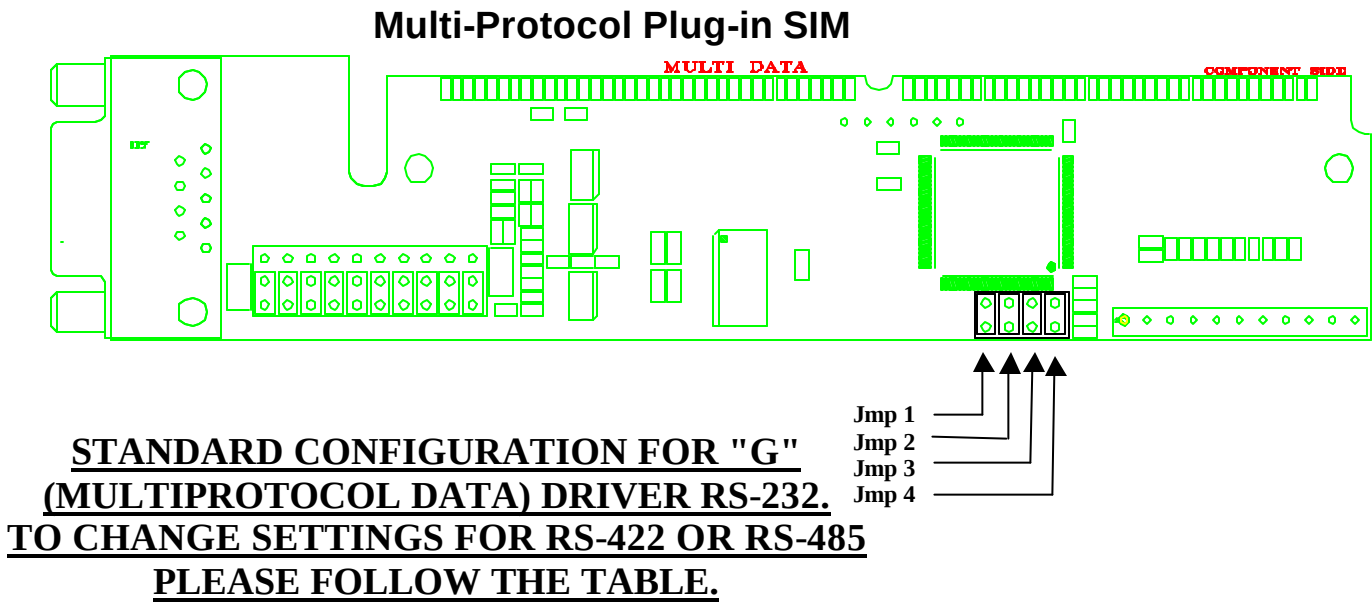
The RS-232 channels can be used either for transmitting/receiving two channels of 2-wire RS-232 (Tx/Rx) or one channel of RS-232 (Tx/Rx) with one bi-directional handshake (e.g., RTS & CTS)

In addition to the RS-232, each multi-protocol SIM can transmit/receive either RS-422 or 2 or 4-wire RS-485 signals. The signal pinouts on the female 9-pin DB9 connector are shown in the table below.

| <b>Data Connector Pinout Assignment (Port 3 &amp; 4)</b> |               |               |                        |                        |
|----------------------------------------------------------|---------------|---------------|------------------------|------------------------|
| <b>Pin #</b>                                             | <b>RS-232</b> | <b>RS-422</b> | <b>RS-485 (2-wire)</b> | <b>RS-485 (4-wire)</b> |
| 1                                                        |               | Ch1 IN (+)    | Ch1 IN/OUT (+)         | Ch1 IN (+)             |
| 2                                                        | Ch1 OUT       |               |                        |                        |
| 3                                                        | Ch1 IN        |               |                        |                        |
| 4                                                        |               | Ch1 IN (-)    | Ch1 IN/OUT (-)         | Ch1 IN (-)             |
| 5                                                        | Gnd           | Gnd           | Gnd                    | Gnd                    |
| 6                                                        |               | Ch1 OUT (+)   |                        | Ch1 OUT (+)            |
| 7                                                        | Ch2 IN        |               |                        |                        |
| 8                                                        | Ch2 OUT       |               |                        |                        |
| 9                                                        |               | Ch1 OUT (-)   |                        | Ch1 OUT (-)            |

There are four (4) jumpers located on each of the multi-protocol data SIMs that must be set properly in order to select the appropriate data format. The figure and table below illustrates these jumper locations on the SIM and how they are configured for the proper data format options. *The factory-supplied default setting is for RS-232 data (Jumper #1 ON).*

| Multi-Protocol SIM Signal Format Jumper Settings |          |          |          |          |
|--------------------------------------------------|----------|----------|----------|----------|
|                                                  | Jumper 1 | Jumper 2 | Jumper 3 | Jumper 4 |
| RS-232                                           | ON       | OFF      | OFF      | OFF      |
| RS-422                                           | OFF      | ON       | OFF      | OFF      |
| RS-485 (2-wire)                                  | OFF      | OFF      | ON       | OFF      |
| RS-485 (4-wire)                                  | OFF      | OFF      | OFF      | ON       |



## 4.4 Changing the multi-protocol SIM jumpers

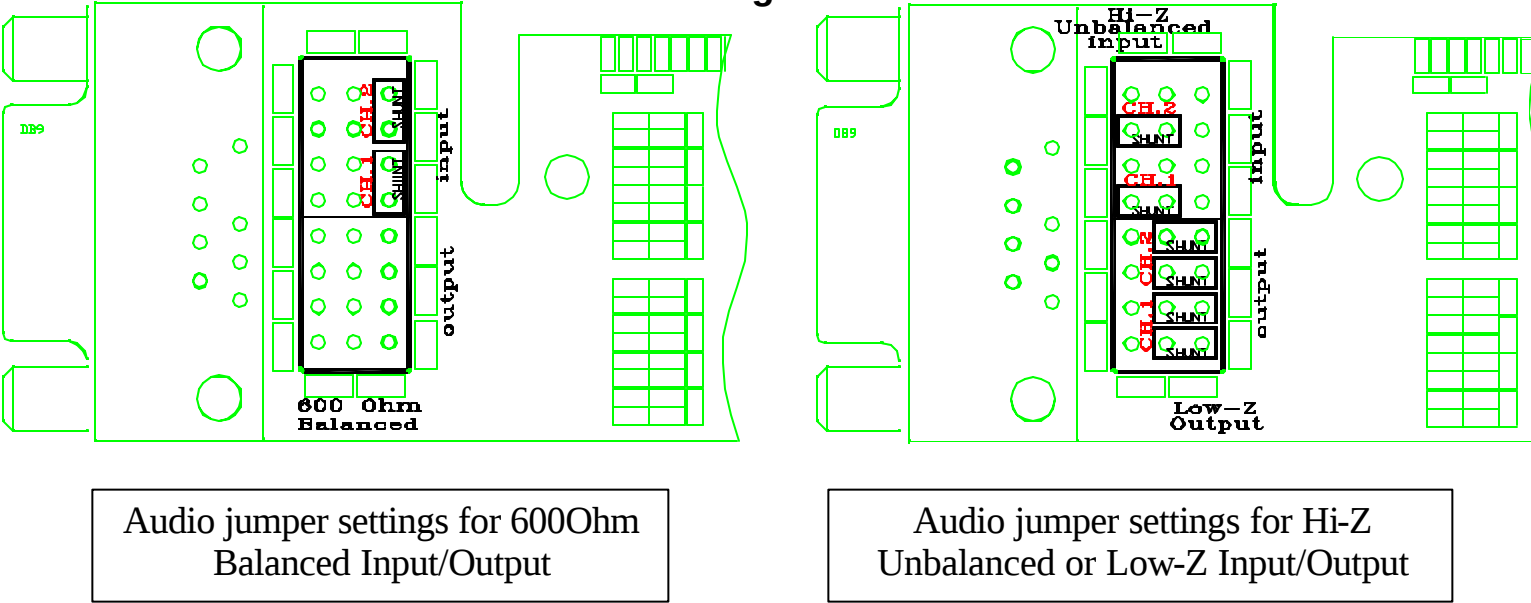
The jumpers to change the transmitted and received data format can be easily changed as follows:

1. Lay the module on its side with the front panel facing to the left.
2. If there is a side cover on the module, remove the screws in each of the 4 corners of the side cover and carefully remove the cover.
3. The Multi-Protocol (MPS) card is located on the bottom of the module.
4. Refer to the above drawing to locate the 4 jumpers that are located near the rear of the MPS card right at the top edge of the card.
5. Using a small tool, carefully remove the jumper and place it on the appropriate pins to properly select the data format (see table above)
6. Carefully replace the side cover and secure with the screws.
7. Repeat this process for the other module. The jumper selection needs to be the same for both the Tx and Rx units.

# 4.5 Audio SIM Jumper Settings

The Audio SIM has 2 jumpers on it (located directly behind the DB9 connector), one for each channel. These jumpers are used to set the input/output impedance of the audio channels. Each audio input channel can be set to either 600ohm (balanced) or 47kohm (unbalanced) input impedance (Hi-Z). Each audio output channel's impedance can be set to either 600 ohm, balanced or low impedance (Low-Z). The default setting is 600 ohm, balanced. The figures below illustrate these jumpers and how they are configured:

Audio Plug-in SIM



# 5.0 Front Panel Pinout Assignment Diagram

Figures 5.1 and 5.2 below show the front panel layout, connector location and pinout assignment for both the DT & DR modules.

# DT-1V(W)2A2G/2A2G-X

## PINOUT DIAGRAM

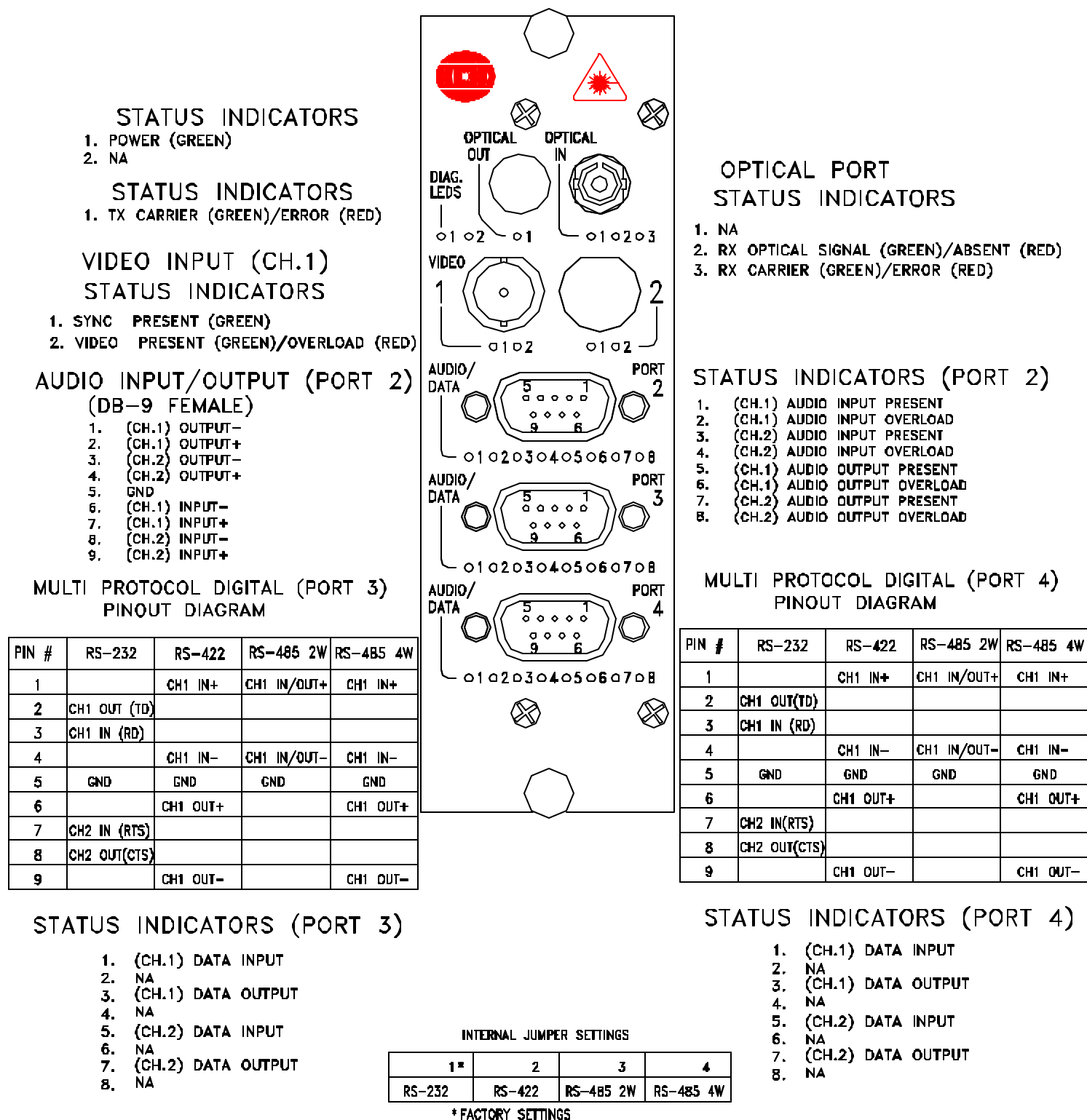


Figure 5.1

## DT-1W(V)2A2G/2A2G-x Front Panel Layout Diagrams

# DR-1V(W)2A2G/2A2G-X

## PINOUT DIAGRAM

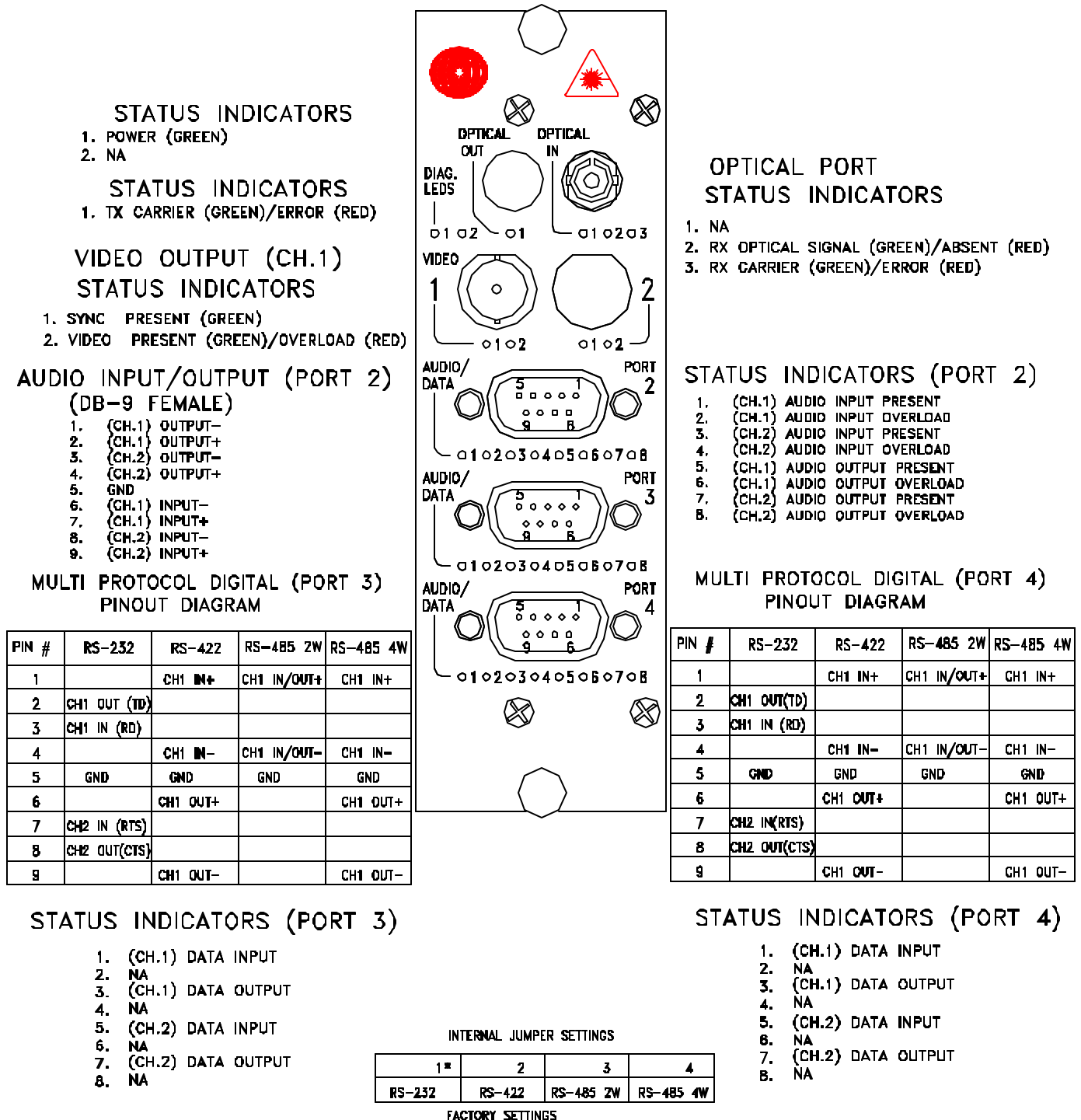


Figure 5.2

DR-1W(V)2A2G/2A2G -x Front Panel Layout Diagrams

## 6.0 Product Part Number Variations

The table below lists the various part numbers associated with different module types:

Basic module description:

Video: 1-channels, one way (8 or 10-bit digital encoding)

Audio: 2-channels, bi-directional

Data: 2-channels, bi-directional, multi-protocol

| Transmitter      | Receiver         | Video Resolution | # Fibers & Type | Wavelength  |
|------------------|------------------|------------------|-----------------|-------------|
| DT-1W2A2G/2A2G-2 | DR-1W2A2G/2A2G-2 | 10-bit           | 1 (MM)          | 1310/850nm  |
| DT-1W2A2G/2A2G-5 | DR-1W2A2G/2A2G-5 | 10-bit           | 1 (SM)          | 1310/1550nm |
| DT-1V2A2G/2A2G-2 | DR-1V2A2G/2A2G-2 | 8-bit            | 1 (MM)          | 1310/850nm  |
| DT-1V2A2G/2A2G-5 | DR-1V2A2G/2A2G-5 | 8-bit            | 1 (SM)          | 1310/1550nm |

For proper operation, it is necessary to match the transmitter (DT) with the associated receiver module (DR).

## 7.0 2-Fiber, CWDM Option

These cards are also available with a 2-fiber, CWDM option. In this configuration, 2 fibers on each unit are used for transmission of the bi-directional signals. The DT unit will transmit on one unique CWDM wavelength and receive on a 2<sup>nd</sup> wavelength while the DR unit transmits and receives on the complementary wavelengths. 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 | Receive Wavelength |
|-------------------------|---------------------|--------------------|
| DT-1W(V)2A2G/2A2G-47/49 | 1470nm              | 1490nm             |
| DR-1W(V)2A2G/2A2G-49/47 | 1490nm              | 1470nm             |
| DT-1W(V)2A2G/2A2G-51/53 | 1510nm              | 1530nm             |
| DR-1W(V)2A2G/2A2G-53/51 | 1530nm              | 1510nm             |
| DT-1W(V)2A2G/2A2G-55/57 | 1550nm              | 1570nm             |
| DR-1W(V)2A2G/2A2G-57/55 | 1570nm              | 1550nm             |
| DT-1W(V)2A2G/2A2G-59/61 | 1590nm              | 1610nm             |
| DR-1W(V)2A2G/2A2G-61/59 | 1610nm              | 1590nm             |

When using in a system with a CWDM multiplexer/demultiplexer, it is essential that the specific wavelengths to and from these units are connected to the corresponding input/output wavelengths on the CWDM mux/demux units. Otherwise, the individual wavelengths will not pass through the CWMD mux/demux 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/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 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:** *No Audio*

**Action:** Check the audio input status indicator lights on the transmit module to ensure that they are on (indicating an audio input signal). Also check the audio output status indicator lights on the corresponding receiver module to ensure that the signal is being transmitted and received. If not, please check the audio input/output and fiber connections.

**Problem:** *Low/High Audio output*

**Action:** Check to ensure that the input/output impedance properly matches the impedance of the audio input source and output device.

**Problem:** *Audio distortion on output*

**Action:** Check the status of the associated channel input/output Overload LEDs. If they are on, reduce the audio input level at the source to bring it below the overload condition. This should resolve problem.

**Problem:** *No Data*

**Action:** Check the data input status indicator light #1 on the transmit module to ensure it is on (indicating a data input signal). Also check the data output status indicator light #2 on the corresponding receiver module to ensure that the signal is being transmitted and received. If not, please check the data input/output and fiber connections. Ensure that the jumpers on the data Multi-protocol SIM are programmed properly to match the data format

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

## Notes:

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