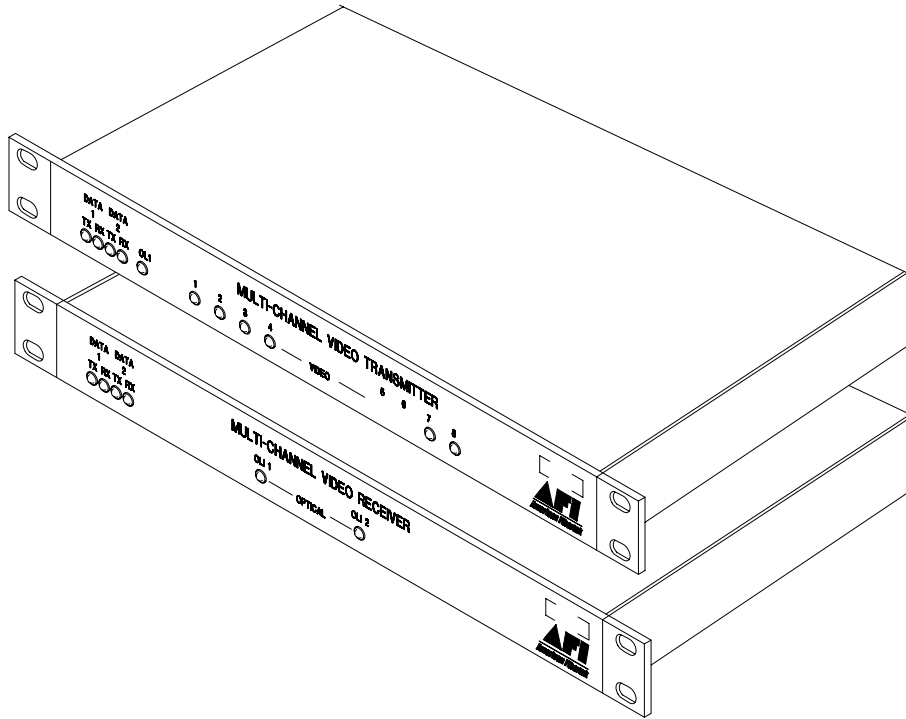




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Instruction Manual

MTX-8689C

MRX-8689C

Six Channel Video Multiplexer
with Bi-directional Data

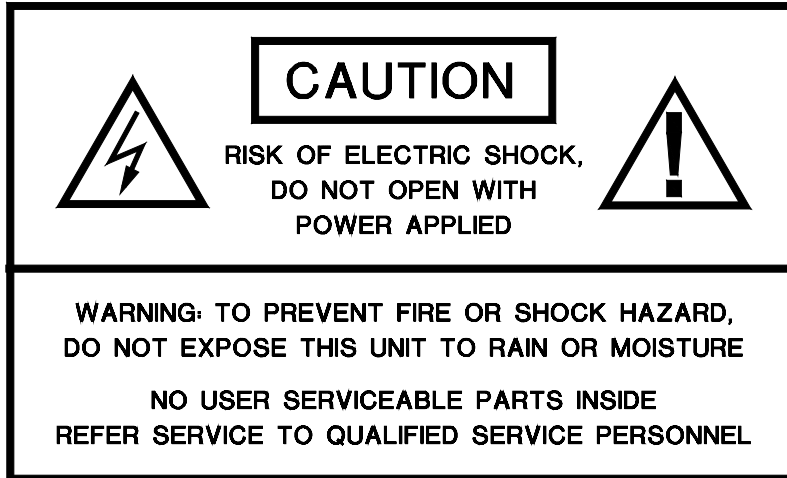


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INSTALLATION AND OPERATION INSTRUCTIONS

INTRODUCTION

Thank you for purchasing your American Fibertek 8689C Series multimode six channel video multiplexer with bi-directional data. Please take a few minutes to read these installation instructions in order to obtain the maximum performance from this product.

FUNCTIONAL DESCRIPTION

The 8689C Series units operate as a transmitter / receiver pair for the transmission of six simultaneous, real time baseband NTSC/PAL video signals with field configurable bi-directional data over one multimode fiber optic cable.

This link can accommodate either a single RS485 interface (2 or 4 wire) or both an RS422 interface and a contact closure interface. When used in RS422 /Contact Closure mode, each interface functions independent of the other. **These units are factory shipped configured in the RS422 / Contact Closure configuration.**

The MTX-8689C transmitter accepts up to six video inputs and multiplexes these signals along with the data signals onto a single optical output port for connection to the fiber transmission system. Correspondingly, the MRX-8689C receiver converts the optical signal to six independent video output signals along with the data signals.

The 8689C Series units operate on 50 um or 62.5 um multimode fiber. Refer to the data sheets for detailed performance specifications.

The individual units may be configured for rack mounting or wall mounting depending upon the position of the included mounting hardware.

INSTALLATION

THIS INSTALLATION SHOULD BE MADE BY A QUALIFIED SERVICE PERSON AND SHOULD CONFORM TO THE NATIONAL ELECTRICAL CODE, ANSI/NFPA 70 AND LOCAL CODES.

To install the MTX-8689C or MRX-8689C it is first necessary to mount the rack flanges to the unit.

For rack mounting the ears are installed on the sides of the unit with the surfaces that have oval holes flush with the front of the unit as in Figure 1. Mount the ears with the #10 flathead screws provided. To mount in the rack cabinet, use mounting screws that are appropriate for the rack cabinet being used.

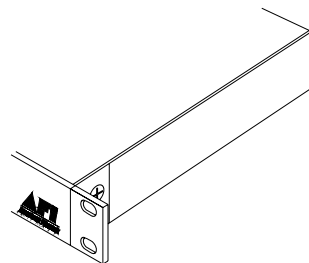


Figure 1. Rack Mount Configuration

For mounting the unit flush to a wall or other rigid surface, the ears may be installed on the sides with the oval holes flush with the bottom of the unit as in Figure 2. Mount the ears with the #10 flathead screws provided. Mount the unit to a rigid surface using #10 (5mm) screws.

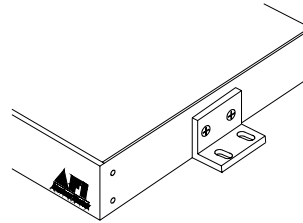


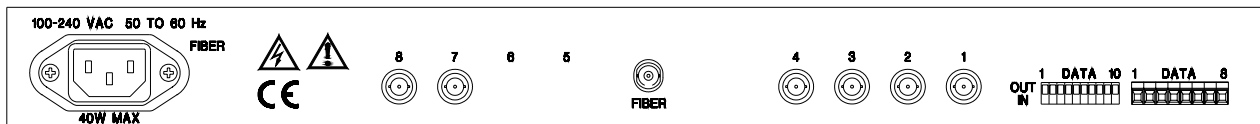
Figure 2. Wall Mount Configuration

POWER SOURCE

The internal power supply accepts universal line voltage. Any mains supply from 100 to 240 VAC, 50 to 60 Hz, may be used without modification or adjustment. A universal power connector is provided on the rear of the unit to facilitate connection to the power mains.

POWER CONNECTION

The unit is supplied (in the US and UK only) with a three conductor power cord. The “ground” conductor is directly connected to the chassis.

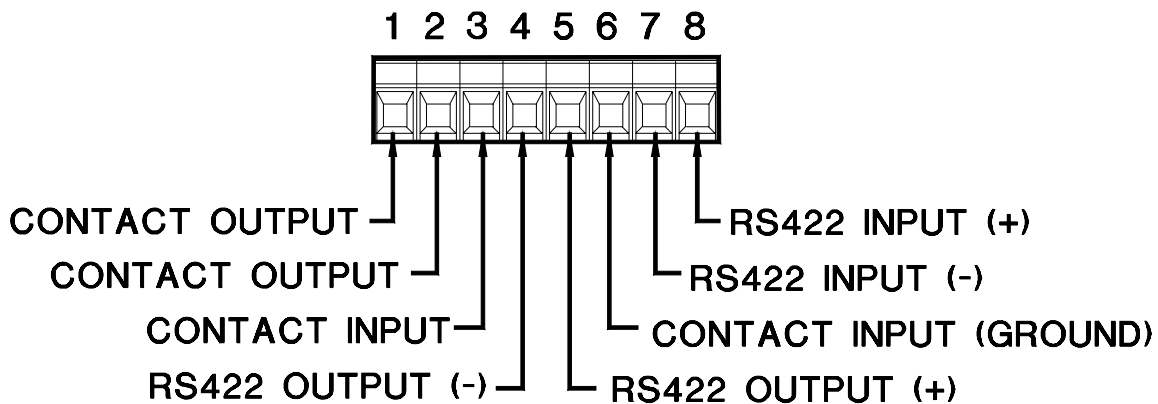


INPUT / OUTPUT CONNECTIONS

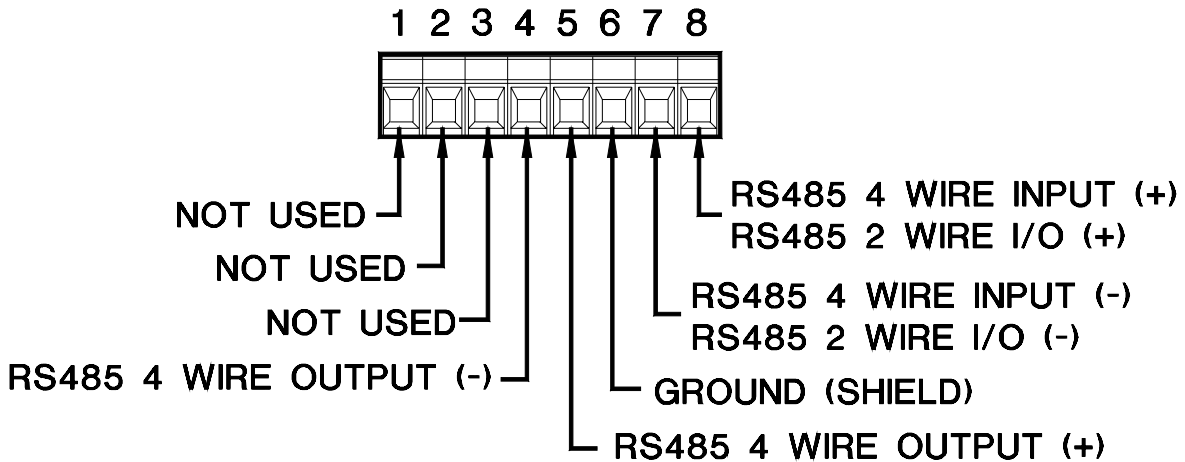
The fiber optic connection is made via a ST connector located at the back of the unit. Be sure to allow sufficient room for the required minimum bend radius of the fiber cable used.

Video input and output connections are located on the rear of the unit. A BNC connector is provided for each channel. Please note that video channels five and six are not used in this unit. The video inputs are connected to an appropriate 75Ω baseband source such as a camera or a video recorder output. The 75Ω video outputs can be looped through typical baseband video inputs of switchers, recorders and other equipment as required. For proper operation, the outputs must be terminated with 75Ω. For optimum performance the video cables should be the shortest length of coax practical.

Data input and output connections are located on the rear panel terminal block. A mating plug connector is provided. The figure below identifies the specific connections for RS422 / Contact Closure data. See next page for RS485 data connections.

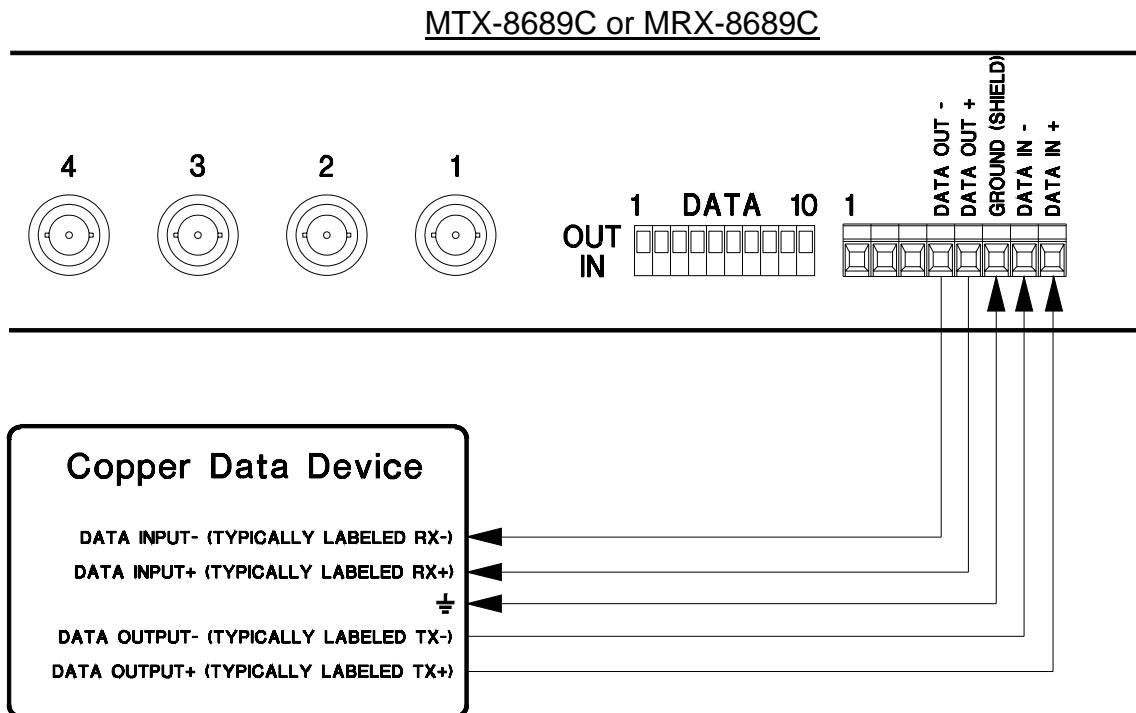


The figure below identifies the specific connections for the RS485 data connections.



TYPICAL SYSTEM DATA CONNECTIONS

An example of the RS422 or RS485 four-wire interconnection between the 8689C Series unit and the copper device to which it is attached is shown below. This illustration is based on industry standard EIA terminology for the transmission of electronic data signals. Using this terminology, the driver of an electronic signal is labeled TX or data out. Correspondingly, the receiver of an electronic signal is labeled RX or data in. Not all manufactures follow standard EIA terminology. Consult the installation instructions for your copper device if you are unsure which two wires are the drive (data out) wires and which two wires are the receive (data in) wires.



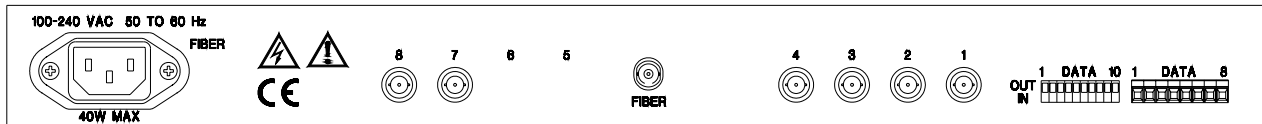
Please note that Data In on the MTX-8689C becomes Data Out on the MRX-8689C after going across the fiber. The reverse flow follows the same orientation. Also note that RS485 two-wire transmission uses only pins 6, 7, and 8 of the data terminal block.

DATA CONFIGURATION SWITCHES

This link accommodates transmission of:

- 1) 1 bi-directional RS422 data channel, or
- 2) 1 bi-directional Contact Closure channel, or
- 3) 1 bi-directional RS422 data channel and 1 bi-directional Contact Closure channel, or
- 4) 1 bi-directional RS485 (2 wire or 4 wire) data channel.

These units are factory shipped configured for RS422 / Contact Closure operation.



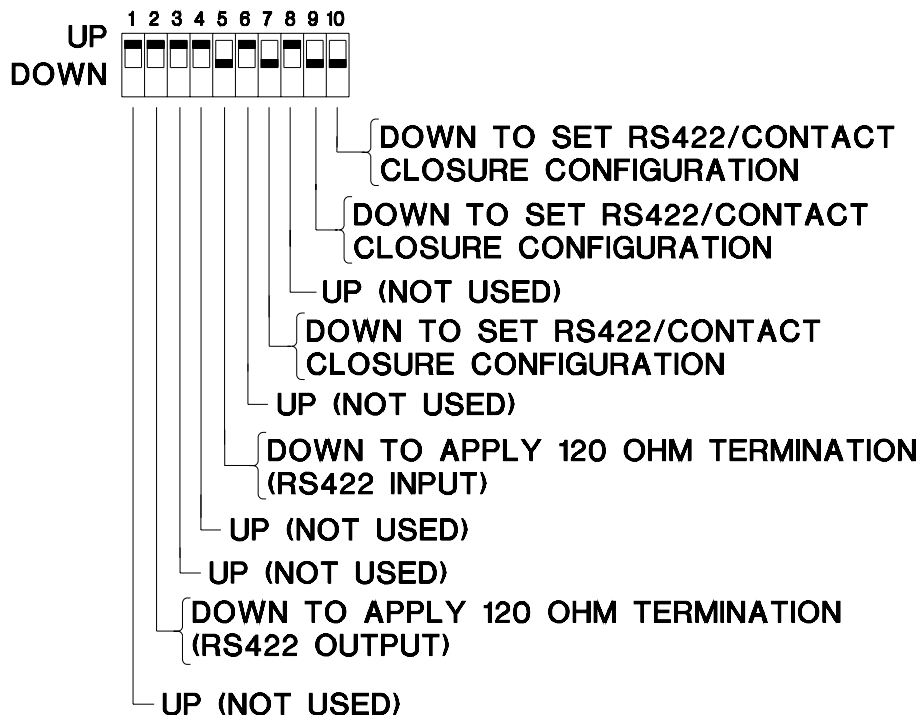
There is a rear panel data configuration switch bank which is available to select:

- 1) RS422/Contact Closure or RS485 data modes
- 2) Internal data input/output terminations
- 3) RS485 (2 or 4 wire) format
- 4) RS485 Offset Bias Option

RS422 / CONTACT CLOSURE SWITCH SETUP

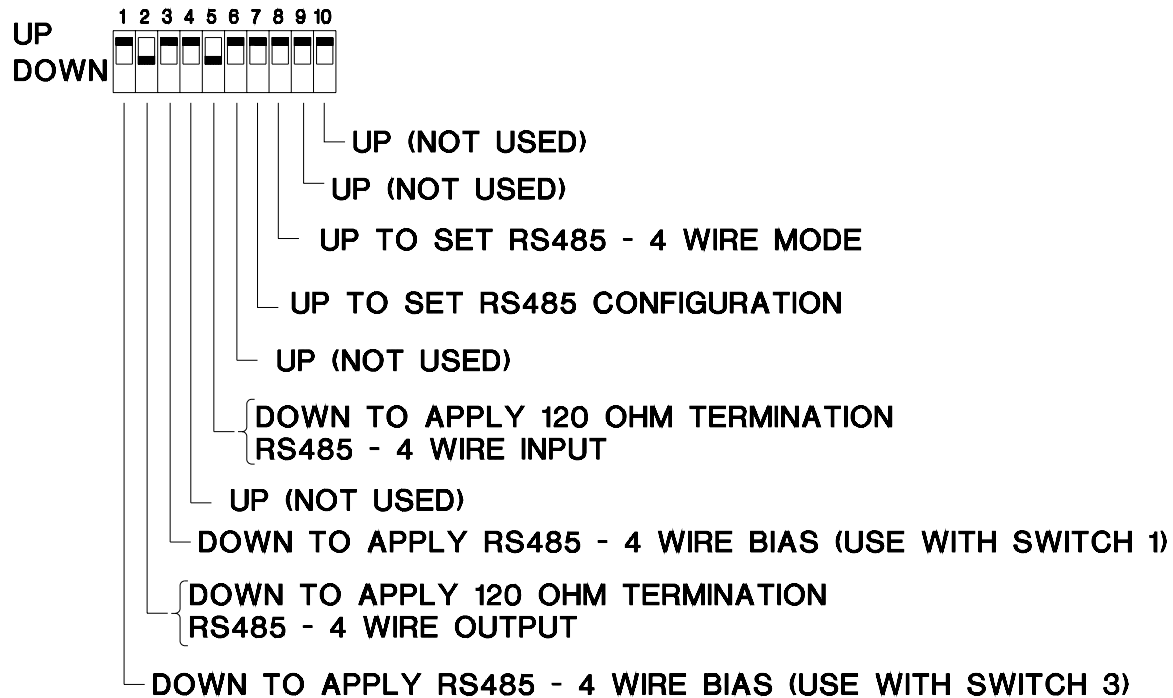
Below is an illustration of the data configuration switches that identifies the specific switch function and up/down direction for RS422 / Contact Closure transmission.

FACTORY SHIPPED SETUP FOR RS422/CONTACT CLOSURE, DATA INPUT TERMINATION IN, NO BIAS



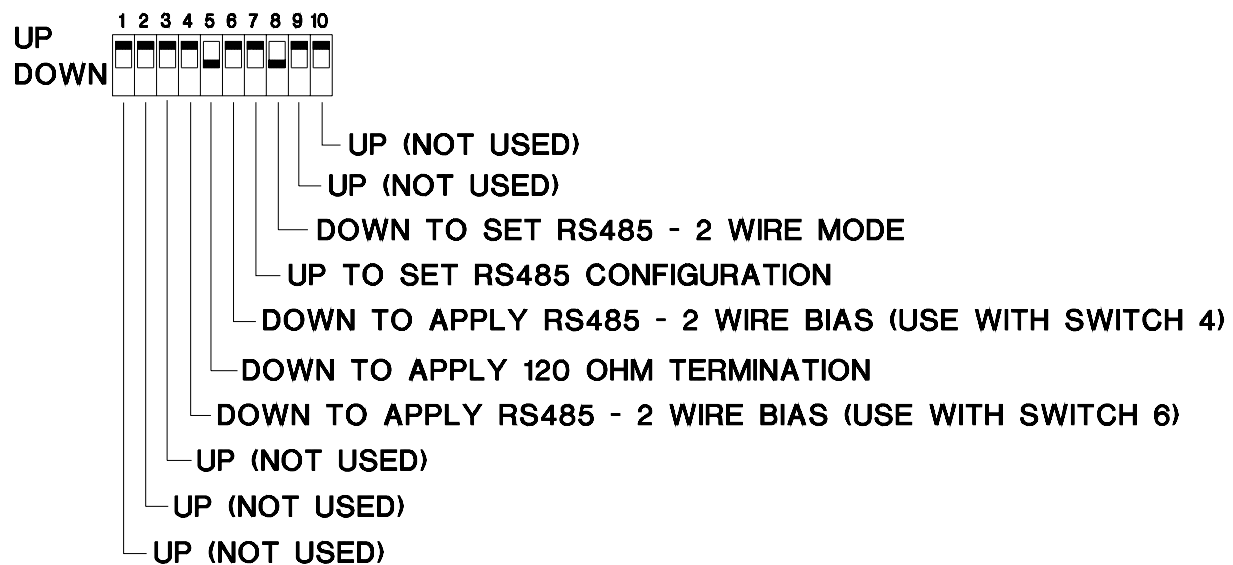
RS485 FOUR WIRE SWITCH SETUP

The following is an illustration of the data configuration switches that identifies the specific switch function and up/down direction for RS485 four-wire transmission.



RS485 TWO WIRE SWITCH SETUP

The following is an illustration of the data configuration switches that identifies the specific switch function and up/down direction for RS485 two-wire transmission.



MTX-8689C STATUS INDICATORS

The MTX-8689C transmitter provides the following front panel LED status indicators to aid in installation and troubleshooting:



DATA

These indicators turn green when any data activity is present. An active DATA TX LED indicates data is present at the input terminals to the MTX-8689C. An active DATA RX LED indicates data is present at the output terminals of the MTX-8689C. When configured for contact closure, the Tx and Rx LEDs will be off to indicate contact open and on to indicate contact closed. When configured for RS-485, an active Hi-Z LED indicates the MTX-8689C has seized the data line to allow data flow. The intensity of the indicators will vary with input data patterns, however, the Hi-Z LED will typically appear dimmer than the data Tx and Rx LEDs. The data channels associated with these front panel DATA LEDs are listed below.

| Configuration Protocol | DATA 1 TX | DATA 1 RX | DATA 2 TX | DATA 2 RX |
|------------------------|-----------|-----------|---------------|---------------|
| RS485 | RS485 Tx | RS485 Rx | Hi-Z | Hi-Z |
| RS422 | RS422 Tx | RS422 Rx | Not Used | Not Used |
| Contact Closure | Not Used | Not Used | Contact State | Contact State |
| RS422/Contact Closure | RS422 Tx | RS422 Rx | Contact State | Contact State |

OLI

A bi-color LED indicator monitors the optical input power of the data signal that is being received at the MTX-8689C from the MRX-8689C. AC power and optical input status associated with this LED are summarized below.

| Optical Level Indicator | AC Power Status | Optical Status |
|-------------------------|-----------------|------------------------------------|
| Green | On | Proper Optical Input Power Present |
| Red | On | Optical Input Not Detected |
| Off | Off | Check Power Supply Input |

VIDEO

A bi-color LED indicator is provided for each of the six video channel inputs. Please note that video channels five and six are not used in this unit. AC power and video status associated with each of these LEDs are summarized below.

| Video Presence LED | AC Power Status | Video Status |
|--------------------|-----------------|----------------------------|
| Green | On | Proper Input Video Present |
| Red | On | Input Video Not Detected |
| Off | Off | Check Power Supply Input |

MRX-8689C STATUS INDICATORS

The MRX-8689C receiver provides the following front panel LED status indicators to aid in installation and troubleshooting:



DATA

These indicators turn green when any data activity is present. An active DATA TX LED indicates data is present at the input terminals to the MRX-8689C. An active DATA RX LED indicates data is present at the output terminals of the MRX-8689C. When configured for contact closure, the Tx and Rx LEDs will be off to indicate contact open and on to indicate contact closed. When configured for RS-485, an active Hi-Z LED indicates the MRX-8689C has seized the data line to allow data flow. The intensity of the indicators will vary with input data patterns, however, the Hi-Z LED will typically appear dimmer than the data Tx and Rx LEDs. The data channels associated with these front panel DATA LEDs are listed below.

| Configuration Protocol | DATA 1 TX | DATA 1 RX | DATA 2 TX | DATA 2 RX |
|------------------------|-----------|-----------|---------------|---------------|
| RS485 | RS485 Tx | RS485 Rx | Hi-Z | Hi-Z |
| RS422 | RS422 Tx | RS422 Rx | Not Used | Not Used |
| Contact Closure | Not Used | Not Used | Contact State | Contact State |
| RS422/Contact Closure | RS422 Tx | RS422 Rx | Contact State | Contact State |

OLI 1

A bi-color LED indicator monitors the power of the optical input signal that is being received at the MRX-8689C from video channels one through four of the MTX-8689C. AC power and optical input status associated with this LED are summarized below. Please note that data is sent as a subcarrier on channel one's video signal.

| Optical Level Indicator | AC Power Status | Optical Status |
|-------------------------|-----------------|------------------------------------|
| Green | On | Proper Optical Input Power Present |
| Red | On | Optical Input Not Detected |
| Off | Off | Check Power Supply Input |

OLI 2

A bi-color LED indicator monitors the power of the optical input signal that is being received at the MRX-8689C from video channels seven and eight of the MTX-8689C. AC power and optical input status associated with this LED are summarized below.

| Optical Level Indicator | AC Power Status | Optical Status |
|-------------------------|-----------------|------------------------------------|
| Green | On | Proper Optical Input Power Present |
| Red | On | Optical Input Not Detected |
| Off | Off | Check Power Supply Input |

DATA TERMINATION REQUIREMENTS

RS422 Data Signals

The electrical interface described in RS422 is a data transmission standard for balanced digital signals. It allows for a single transmitter device communicating to as many as 32 receiving devices. This type of data signal is well suited to systems that require data to be distributed to several points without a return data path. Several companies offer camera telemetry controllers using this data interface. Because there is only one transmitting device on the network, this one may remain active at all times. There is no need for the driver to go into a high impedance state to allow others to "talk." A configuration using multiple drivers on the same wire pair is exclusive to RS485 described in the next section. In most cases termination resistors are not required to be applied to RS422 data outputs. In long copper runs (over 500 feet) termination resistors may be required to eliminate data reflections. Termination resistors for RS422 data can be selected in the MTX-8689C and MRX-8689C using switch #2 and switch #5.

RS485 Data Signals

RS485 differs from RS422 in the ability of the transmitter devices to go into a high impedance (Hi-Z) state. This allows multiple transmitter devices to reside on the same wire pair. The software must dictate a protocol that allows one device to transmit at any one time to prevent data crashes. Data wiring can use two wires or four wires. Using two wires the system works in half duplex. This means that data is exchanged between two points sequentially. When a four-wire system is used, the system may be full duplex. In many cases the system head end controller will continuously poll data from all remote devices. The remote devices all respond back to the head end (one at a time!) as they are addressed. This property of the network rests solely in the hands of the software (firmware).

The driver chips used in RS485 communications are capable of changing into their high impedance state very rapidly. On even short lengths of wire there can exist a residual voltage after a driver circuit turns off. This can interfere with circuits that are used to detect the Hi-Z state. It is very important that the copper communications lines be terminated with resistors across the data wire pair. The best place to locate such resistors is at the furthest electrical devices at the ends of the wire pair. For instance, if several RS485 devices are connected in a daisy chain fashion, the wire connection would loop across all devices in a chain. The furthest two points in the chain would need to be terminated. Termination resistors for RS485 four-wire data can be selected in the MTX-8689C and MRX-8689C using switch #2 and switch #5. A termination resistor for RS485 two-wire data can be selected in the MTX-8689C and MRX-8689C using switch #5.

OFFSET BIAS – RS485

The RS485 specification requires receivers to detect input signals down to 200mVp-p of voltage level. In many cases this can cause systems to be sensitive to noise on the data wires. In an effort to eliminate the effects of low levels of noise, some manufacturers of equipment that communicate using RS485 have introduced a small voltage bias to the data lines. This is usually accomplished using a 470 Ohm resistance to +5V on the positive line and 470 Ohm resistance to ground on the negative line. When used in conjunction with the appropriate termination resistors referred to in the previous section, this introduces about a 300 mV offset, improving noise immunity.

Offset bias for four-wire RS485 can be applied on the MTX-8689C and MRX-8689C by setting switch # 1 and switch # 3 down. Please note that these switches work as a set and must be either both down or both up. In a majority of cases, bias will not be required and these switches should remain in the up position. If using offset bias, it is important that termination resistor switch # 2 and switch # 5 be in the down (applied) position. Using offset bias without a termination on the line will cause communications to fail.

Offset bias for two-wire RS485 can be applied on the MTX-8689C and MRX-8689C by setting switch # 4 and switch # 6 down. Please note that these switches work as a set and must be either both down or both up. In a majority of cases, bias will not be required and these switches should remain in the up position. If using offset bias, it is important that termination resistor switch # 5 be in the down (applied) position. Using offset bias without a termination on the line will cause communications to fail.

**This unit complies with 21 CFR
1040.10 and 1040.11**

LIFETIME WARRANTY INFORMATION

American Fibertek, Inc warrants that at the time of delivery the products delivered will be free of defects in materials and workmanship. Defective products will be repaired or replaced at the exclusive option of American Fibertek. A Return Material Authorization (RMA) number is required to send the products back in case of return. All returns must be shipped prepaid. This warranty is void if the products have been tampered with. This warranty shall be construed in accordance with New Jersey law and the courts of New Jersey shall have exclusive jurisdiction over this contract. **EXCEPT FOR THE FOREGOING WARRANTY, THERE IS NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE, EXPRESSED OR IMPLIED, WHICH EXTENDS BEYOND THE WARRANTY SET FORTH IN THIS AGREEMENT.** In any event, American Fibertek will not be responsible or liable for contingent, consequential, or incidental damages. No agreement or understanding, expressed or implied, except as set forth in this warranty, will be binding upon American Fibertek unless in writing, signed by a duly authorized officer of American Fibertek.

SERVICE INFORMATION

There are no user serviceable parts inside the unit.

In the event that service is required to this unit, please direct all inquiries to:

American Fibertek, Inc.
120 Belmont Drive
Somerset, NJ 08873

Phone: (877) 234-7200
Phone: (732) 302-0660
FAX (732) 302-0667

E-mail: techinfo@americanfibertek.com