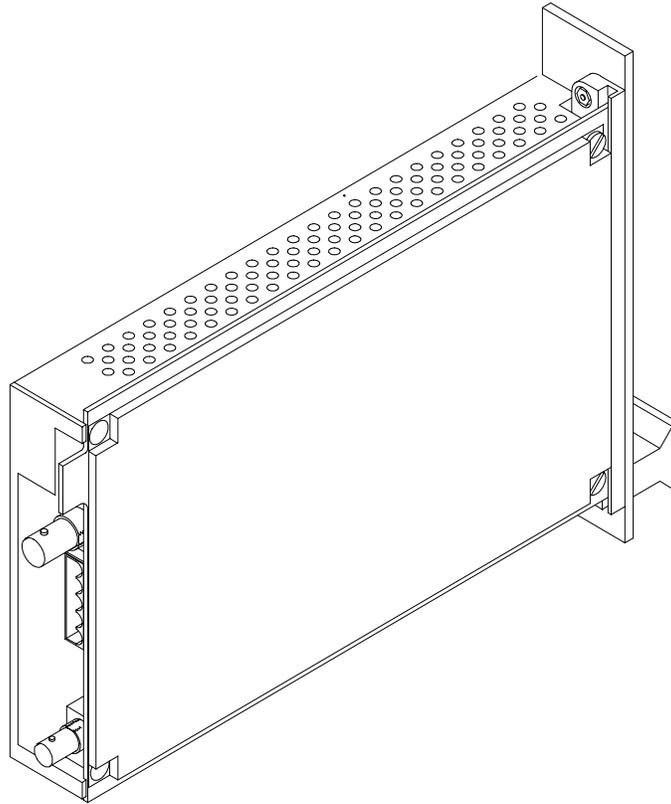




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***American Fibertek***

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## Instruction Manual

RRM-1485

Video Receiver

With Bi-directional RS485 Data

# INSTALLATION AND OPERATION INSTRUCTIONS

## INTRODUCTION

Thank you for purchasing your American Fibertek RRM-1485 multimode video receiver with RS485 transceiver. Please take a few minutes to read these installation instructions in order to obtain the maximum performance from this product.

## FUNCTIONAL DESCRIPTION

The RRM-1485 operates as half of a transmitter / receiver pair for the transmission of baseband NTSC, PAL, RS170, or RS343 video signals and bi-directional RS485 data. It is designed to operate with the MTM-1485 or RTM-1485 video transmitter with RS485 transceiver over a single multimode fiber optic cable.

The RRM-1485 converts a FM modulated optical fiber input into a single video output and a single RS485 output using a 1300 nm wavelength detector. The RRM-1485 also converts an electrical RS485 input signal into an optical RS485 output returning on the same fiber using an 850 nm wavelength source. This unit may be configured for two wire half duplex or four wire full duplex electrical interfaces. The M1485 Series product is designed to operate over an optical loss budget range of 0 to 12 dB. The RRM-1485 operates on 50 um or 62.5 um multimode fiber. Refer to the data sheets for detailed performance specifications.

This unit is designed for rack mounting in any of the three American Fibertek subracks available. The subrack model numbers are SR-20/1, SR-20R/1, and SR-20/2. Slide in rack mounting and LED indicators provide for easy installation and monitoring of video and power.

The RRM-1485 is designed for rack mounting only. For a modular stand alone version please see the MRM-1485.

## INSTALLATION

THE INSTALLATION OF THIS UNIT SHOULD BE MADE BY A QUALIFIED SERVICE PERSON(S) AND MUST CONFORM TO ALL LOCAL CODES.

The unit slides into any open slot in the SR-20 subrack. Use a small screwdriver to push and lock the two ¼ turn fasteners into place.

## POWER SOURCE

Power to the unit is supplied by the subrack. Please refer to the SR-20 and PSR instructions for further details.

## POWER CONNECTION

Power is supplied to the unit via a four finger backplane connector. The RRM-1485 can be inserted into the subrack or removed from the subrack with power applied to the backplane.

## FIBER CONNECTION

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

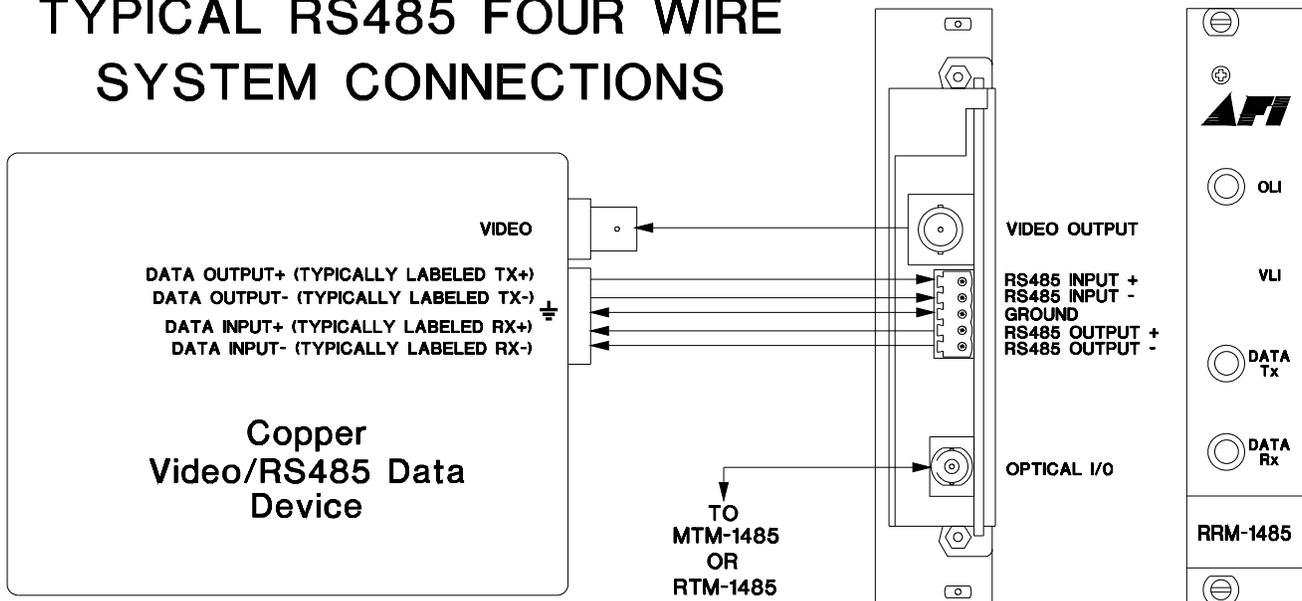
## VIDEO OUTPUT CONNECTION

The video output connection is made via a BNC connector on the back of the unit. The 75Ω video output can be looped through typical baseband video inputs of switchers, recorders and other equipment as required. For proper operation, the output must be terminated with 75Ω. For optimum performance the video cables should be the shortest length of coax practical.

## RS485 FOUR WIRE INPUT / OUTPUT DATA CONNECTIONS

Data input/output connections are made via a terminal block on the back of the unit. An example of the RS485 interconnection between the RRM-1485 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.

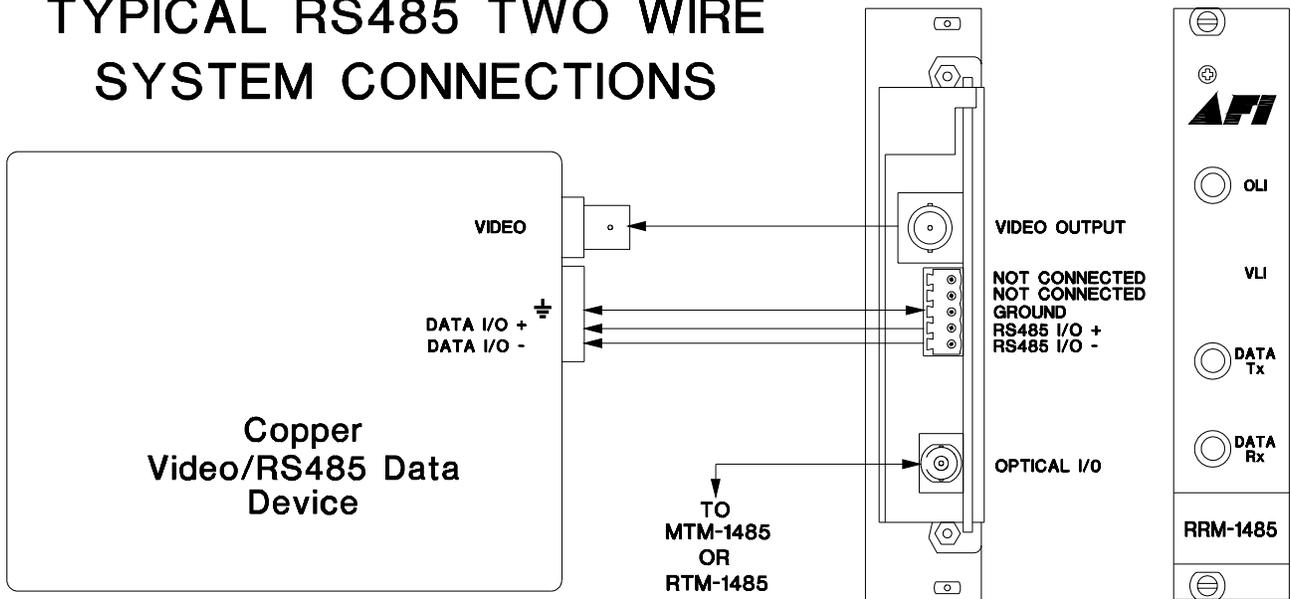
## TYPICAL RS485 FOUR WIRE SYSTEM CONNECTIONS



## RS485 TWO WIRE INPUT / OUTPUT DATA CONNECTIONS

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### TYPICAL RS485 TWO WIRE SYSTEM CONNECTIONS



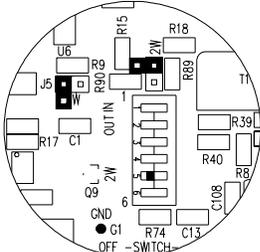
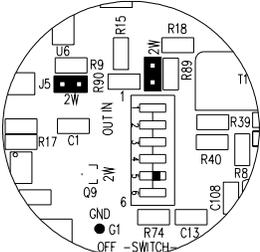
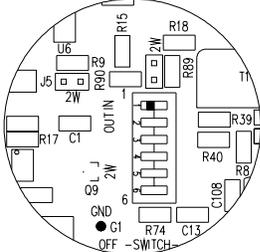
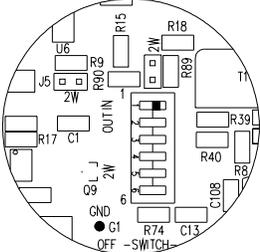
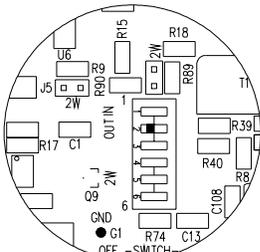
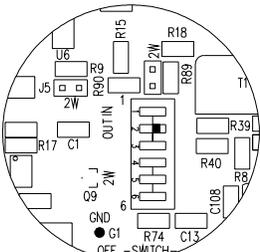
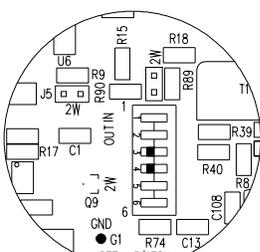
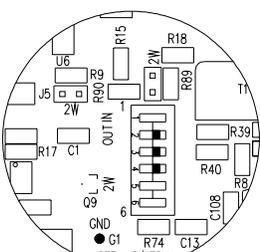
### DATA CONFIGURATION

The RRM-1485 is shipped from the factory in the RS485 4-wire configuration. In order to configure the unit for RS485 two wire operation, the unit needs to be opened up and several switch settings and jumper pins need to be modified using the internal switch/jumper settings shown on the next page.

The RRM-1485 is shipped from the factory with internal data input and output 120 ohm terminations switched on. In order to remove the internal terminations, the unit needs to be opened up and several switch settings need to be modified using the internal switch/jumper settings shown on the next page.

See page 7 for an explanation of termination and offset bias requirements for RS485 data. To open the RRM-1485, remove three screws on top cover to remove cover and access the switch and jumper locations.

# RRM-1485 INTERNAL SWITCH/JUMPER SETTINGS

<p><b>SWITCH #5</b> 2 Wire/ 4 Wire Set</p>	 <p><b>4 Wire (Full Duplex)</b> Remove 2 pin shunts across J4,J5. Shunts are plugged in without jumpering the 2 pin connection to be available if necessary to reconfigure the units. <b>Switch #5 OFF</b></p>	 <p><b>2 Wire (Half Duplex)</b> Jumper 2 pin headers J4,J5 with 2 pin shunts <b>Switch #5 ON</b></p>
<p><b>SWITCH #1</b> Input Data Termination</p> <p><b>NOTE:</b> This switch must be OFF for 2 Wire RS485</p>	 <p><b>No Input Termination</b> <b>Switch #1 OFF</b></p>	 <p><b>120 Ohm Input Termination</b> <b>Switch #1 ON</b></p>
<p><b>SWITCH #2</b> Output Data Termination</p>	 <p><b>No Output Term.</b> <b>Switch #2 OFF</b></p>	 <p><b>120 Ohm Output Term.</b> <b>Switch #2 ON</b></p>
<p><b>SWITCH #3,#4</b> Output Data Bias</p>	 <p><b>No Output Bias</b> <b>Switch #3, #4 OFF</b></p>	 <p><b>Output Bias</b> <b>Switch #2, #3, #4 ON</b> Bias Requires Termination</p>

## RRM-1485 STATUS INDICATORS

The RRM-1485 receiver provides the following LED status indicators to aid in installation and troubleshooting:

### OLI

A bi-color LED indicator monitors the optical input power of the video and data signal that is being received at the RRM-1485 from the MTM-1485 or the RTM-1485. DC power and optical input status associated with this LED are summarized below.

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

### DATA TX

A red LED indicator is provided to monitor the RS485 input data from the electrical interface, through the RRM-1485, and out onto the fiber. The intensity of this indicator will vary with input data patterns, however in typical applications it will cycle on and off as data is transmitted. RS485 status associated with this LED is summarized below.

DATA TX LED	RS485 Status
Red	Data Flow Present
Off	Data Flow Not Detected

### DATA RX

A red LED indicator is provided to monitor the RS485 data coming in from the fiber, through the RRM-1485, and out onto the electrical interface. The intensity of this indicator will vary with input data patterns, however in typical applications it will cycle on and off as data is received. RS485 status associated with this LED is summarized below.

DATA RX LED	RS485 Status
Red	Data Flow Present
Off	Data Flow Not Detected

## RS485 TERMINATIONS

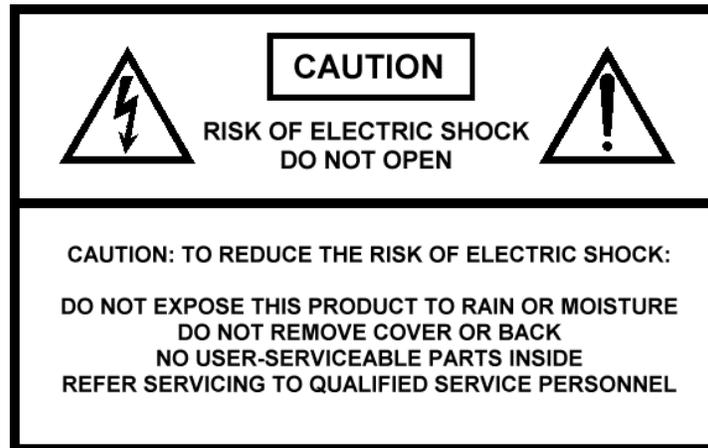
The RS485 protocol is an expanded version of the original RS422 protocol. The RS485 protocol is an expanded version of the original RS422 protocol. RS485 differs from RS422 in the ability of the transmitter devices to go into a high impedance (Hi-Z) state. This allows multiple transmitter devices to 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 or 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. A termination resistor for RS485 input data can be selected in the RRM-1485 using switch # 1. A termination resistor for RS485 output data can be selected in the RRM-1485 using switch # 2.

## 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 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 RS485 can be applied on the RRM-1485 by setting switch # 3 and switch # 4 on. Please note that these switches work as a set and must be either both on or both off. In a majority of cases, bias will not be required and these switches should remain in the off position. If using offset bias, it is important that termination resistor switch # 2 be on (applied) position. Using offset bias without a termination on the line will cause communications to fail.



#### 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:

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Phone: (732) 302-0660  
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