Instruction Manual

MR-913C-SL
Video Receiver With
Bi-directional Multi-Protocol Data

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│  ⚡          ┌──────────────┐         ⚠   │
│  △          │   CAUTION    │        △    │
│             └──────────────┘              │
│           RISK OF ELECTRIC SHOCK,         │
│             DO NOT OPEN WITH              │
│               POWER APPLIED               │
├─────────────────────────────────────────┤
│     WARNING: TO PREVENT FIRE OR SHOCK HAZARD,   │
│   DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE   │
│                                           │
│         NO USER SERVICEABLE PARTS INSIDE  │
│   REFER SERVICE TO QUALIFIED SERVICE PERSONNEL  │
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Table of Contents

INSTALLATION AND OPERATION INSTRUCTIONS

INTRODUCTION
Thank you for purchasing your American Fibertek MR-913C-SL singlemode video receiver with bi-directional multi-protocol data. Please take a few minutes to read these installation instructions in order to obtain the maximum performance from this product.

FUNCTIONAL DESCRIPTION
The MR-913C-SL operates as half of a transmitter / receiver pair for the transmission of high performance 10 bit digital NTSC, PAL, RS170, or RS343 video signals. The MR-913C-SL also supports up to three bi-directional channels of RS485 (2 or 4 wire), RS422, RS232 or Manchester data. Switch selection allows for multiple data configurations in one of the following three formats:

      Channel 1: RS422, RS485-(2 or 4 wire), Manchester, or RS232 data
      Channel 2: RS422, RS485-(2 or 4 wire), Manchester, or RS232 data
      Channel 3: RS422, RS485-(2 or 4 wire), Manchester, or RS232 data

NOTE: This unit is shipped in the following default configuration. For other configurations, please refer to the DATA CONFIGURATION section for changes to the default switch settings.
      Channel 1: RS422 data
      Channel 2: RS485 (4 wire) or Manchester data
      Channel 3: RS232 data

The MR-913C-SL is designed to operate with the MT-913C-SL or RT-913C-SL video transmitter with bi-directional data over one singlemode fiber optic cable.

The MR-913C-SL multiplexes a single video output signal along with up to three data signals into a high speed serial data stream. This serial data stream modulates a laser at 1550 nm wavelength. The MR-913C-SL also detects and demultiplexes a return optical serial data stream signal containing up to three data channels at 1310 nm wavelength. The 913C-SL Series product is designed to operate over an optical loss budget range of 0 to 21 dB. Refer to the data sheets for detailed performance specifications.

The RS485 channel may be configured for 2-wire (half duplex) or 4-wire (full duplex) operation with or without biasing. Switch selectable internal 120 ohm terminations are available for RS422 or RS485 data.

This unit is contained in a rugged aluminum housing with internal dc voltage regulation. The detachable terminal blocks and LED indicators provide for easy installation and monitoring of video, data, and optical power.

The MR-913C-SL is designed for mounting as a modular stand alone unit. For a rack mounted version please see the RR-913C-SL.

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.

Mount the unit to a secure surface using #8 (3mm) hardware in four places. See the drawing at the bottom of this page for mounting dimensions. Be sure to allow sufficient room for the required minimum bend radius of the fiber cable used.

POWER SOURCE
THIS PRODUCT SHALL BE POWERED BY A LISTED CLASS 2 POWER SUPPLY ONLY.

This unit requires a +12VDC power source with a current rating of 1.25 amps for proper operation. The DC input is diode protected. In the USA and in Canada an American Fibertek PS-12D is supplied with this unit. The negative side of the power input is directly connected to ground. ANSI/NFPA 70 Class 2 wiring is recommended.

POWER CONNECTION
Power is supplied to the unit via a two pin terminal connector on the right side of the unit. Follow the label on unit for proper orientation of +12 volt dc and ground.

FIBER CONNECTION
The fiber optic connection is made via a FC/PC connector located on the right side of the unit.

VIDEO INPUT CONNECTION
The video input connection is made via a BNC connector on the right side of the unit. The video input should be connected to an appropriate 75Ω baseband video source such as a camera or a video recorder output. For optimum performance the video cables should be the shortest length of coax practical.
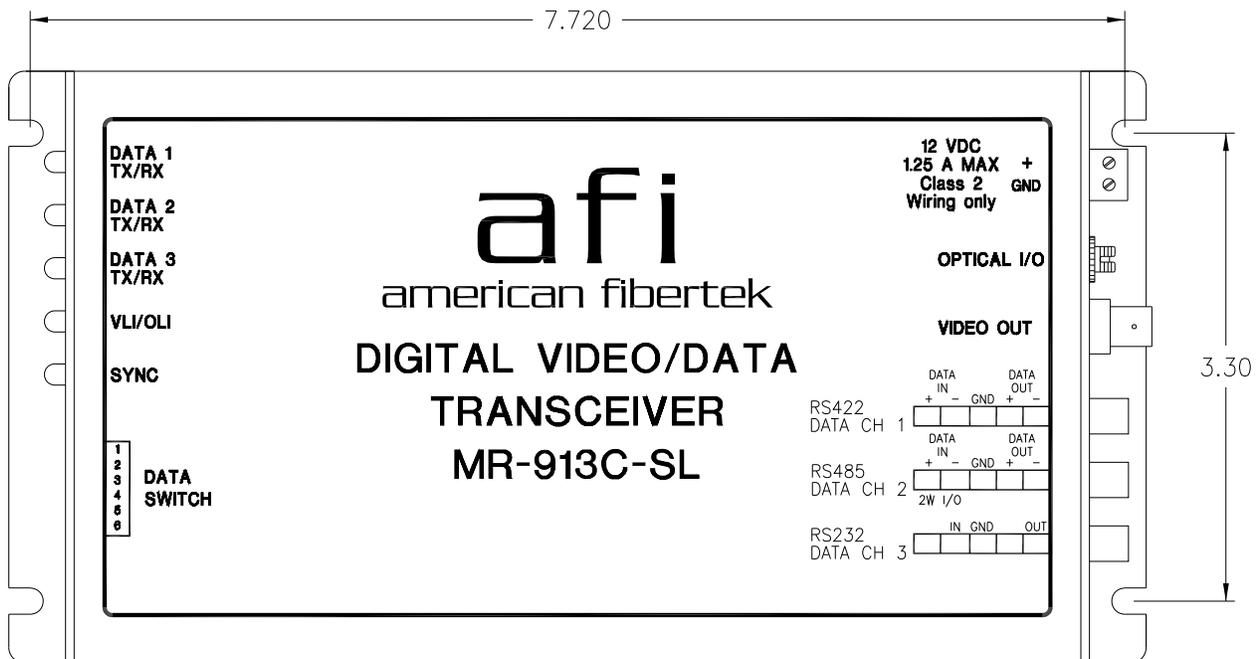
DATA INPUT / OUTPUT CONNECTIONS

Data input and output connections are made via terminal blocks on the right side of the unit. See the drawings below for proper orientation of input and output connections. Please note that the far right pin on each connection drawing corresponds with the terminal block pin located closest to the base of the unit.
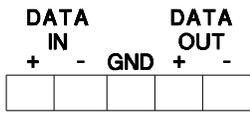
DATA IN	DATA OUT	DATA IN/OUT	DATA IN GND DATA OUT	DATA OUT
+ − GND + −		+ − GND		GND + −
RS485 4-WIRE OR RS422 DATA		**RS485 2-WIRE DATA**	**RS232 DATA**	**MANCHESTER DATA**
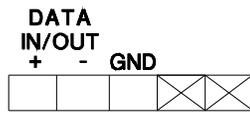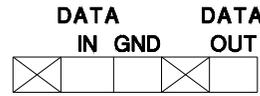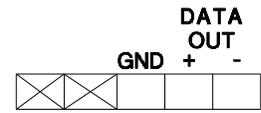
TYPICAL SYSTEM DATA CONNECTIONS

The RS422 or RS485 four wire interconnection between the MR-913C-SL and the copper device to which it is attached 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. Following this standard, the Data Out of the copper device is connected to the Data In of the MR-913C-SL. The plus terminal of the copper device is connected to the plus terminal of the MR-913C-SL and the minus is connected to the minus. The reverse flow of data from the MR-913C-SL to the copper device follows the same pattern. 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.

DATA CONFIGURATION

NOTE: This unit is shipped in the following default configuration.

   Channel 1: RS422 data
   Channel 2: RS485 (4 wire) or Manchester data
   Channel 3: RS232 data

For other configurations, please refer to the drawing below for changes to the default switch settings. These configuration switches are located on the left side of the unit and can be modified without opening the unit. Refer to FUNCTIONAL DESCRIPTION section for a list of allowable channel configurations.
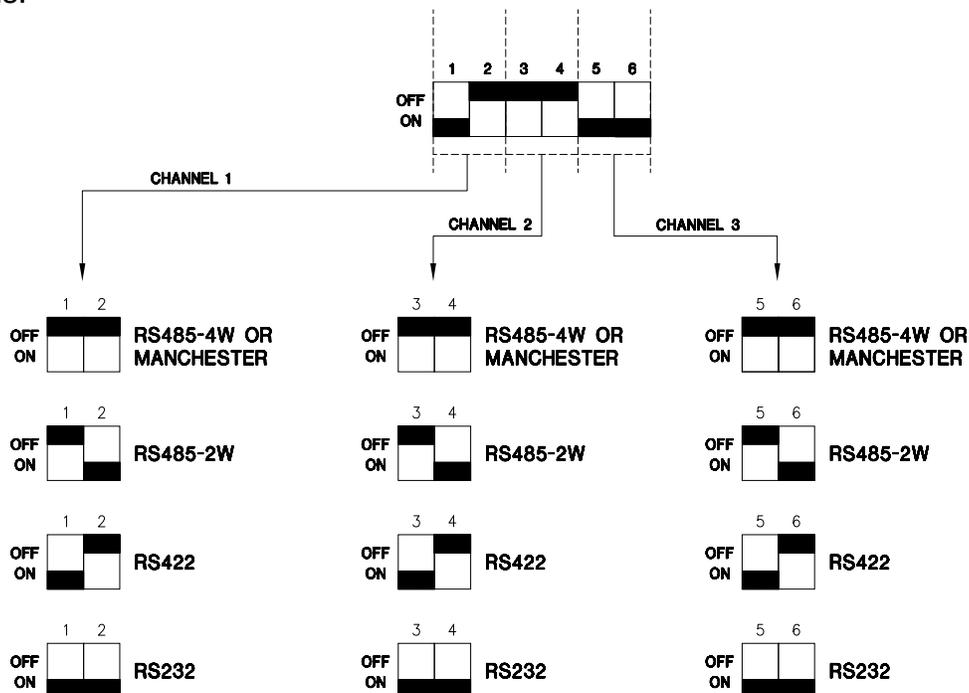
CHANNEL BIAS/TERMINATION SWITCHES

Switches are available internally that allow offset bias and termination features to be activated when using RS485 data. These switches also allow termination features to be activated when using RS422 data. In order to reconfigure the RS485/422 channel, the module needs to be opened up. To open the MR-913C-SL, remove the end panel on the terminal block side and remove the screw on the bottom of the module. Slide the PCB assembly out about half way. The configuration switch banks are located at the lower right corner of PCB next to the data terminals (See drawing below).

The MR-913C-SL is shipped with these switches in the off (down) position. When transmitting RS232 or Manchester data, the bias and termination switches must remain in the off (down) position. The top (S1) switches correspond to channel 1. The middle and bottom switch banks correspond to channel 2 and 3 respectively. The chart below describes the layout of the top (S1) switch bank. The remaining switch banks follow the same layout.

	ON/CLOSED	OFF/OPEN
S1-1	485/422 INPUT BIAS	NO BIAS
S1-2	485/422 INPUT TERM.	NO TERM.
S1-3	485/422 INPUT BIAS	NO BIAS
S1-4	485/422 OUTPUT BIAS	NO BIAS
S1-5	485/422 OUTPUT TERM.	NO TERM.
S1-6	485/422 OUTPUT BIAS	NO BIAS
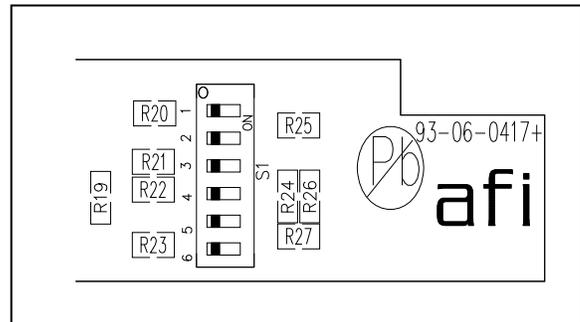
Please remember when using offset bias switches that they must be used in pairs. If switch # 1 is up then switch # 3 must also be up. The same situation applies for switch # 4 and switch # 6. Also, if using offset bias, it is important that the corresponding termination resistor switch be in the on (up) position. Using offset bias without a termination on the line will cause communications to fail. An explanation follows on general bias and termination guidelines.

RS485 DATA TERMINATION

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 only one device to transmit at any one time to prevent data crashes. 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. The driver chips that are 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.

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.

MR-913C-SL STATUS INDICATORS

The MR-913C-SL transmitter provides the following LED status indicators to aid in installation and troubleshooting:

DATA TX/RX INDICATORS

DATA TX and DATA RX indicators are provided to monitor each of the three available data channels. DATA 1 TX and DATA 1 RX correspond with DATA CH 1 input/output. Indicators for Channel 2 and Channel 3 are also provided. An explanation follows for these DATA TX and DATA RX indicators.

DATA TX

A green LED indicator is provided to monitor the data coming in from the electrical interface, through the MR-913C-SL, 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. Data transmitted status associated with this LED is summarized below.

DATA TX LED	Data Status
Green	Data Flow Present
Off	Data Flow Not Detected

DATA RX

A green LED indicator is provided to monitor the data coming in from the fiber, through the MR-913C-SL, 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. Data received status associated with this LED is summarized below.

DATA RX LED	Data Status
Green	Data Flow Present
Off	Data Flow Not Detected

VLI

A bi-color LED indicator is provided for the video input to the MR-913C-SL. DC power and video status associated with this LED is summarized below.

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

OLI

A bi-color LED indicator monitors the optical input power of the data signal that is being received at the MR-913C-SL from the MT-913C-SL or the RT-913C-SL. 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

SYNC
A bi-color LED indicator is provided to monitor the proper serialization of the electrical data stream through the MR-913C-SL and out onto the fiber. DC power and sync status associated with this LED is summarized below.

Sync LED	DC Power Status	Sync Status
Green	On	Proper Data Stream Serialization Present
Red	On	Data Stream Serialization Not Detected
Off	Off	Check Power Supply

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.   Phone: (877) 234-7200
120 Belmont Drive   Phone: (732) 302-0660
Somerset, NJ 08873   FAX (732) 302-0667
                          E-mail: techinfo@americanfibertek.com