



# FiberLink 1900 Series



## Optic IRIG Transmission System Installation and Operations Manual

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## Introduction

The FiberLink XA-1900 IRIG Fiber Optic Transmitter is designed to convert wide band IRIG analog signals into modulated light for transmission over fiber optic cables. The transmitter employs linear, intensity modulation and is suitable for use with most optical fibers. The XA-1900 employs a single ended, unbalanced input which is compatible with all IRIG input formats. There is only one operating control on the XA-1900 series. This is an input attenuator, designed to allow input signals larger than the normal 1 volt rms level to be accommodated. The XA-1903 is a 10 channel optical output version of the XA-1900 and is designed for IRIG signal distribution applications.

The RA-1900 IRIG Fiber Optic Receiver is the companion receiver for the XA-1900 and XA-1903. It converts the modulated light from a fiber optic cable back into an exact replica of the original transmitted signal. The RA-1900 is intended for driving single ended, unbalanced loads in accordance with IRIG standards. There is only one operating control on the RA-1900 series. This is an output level control and is used to compensate for the optical attenuation of the fiber being used.

### **NOTE:**

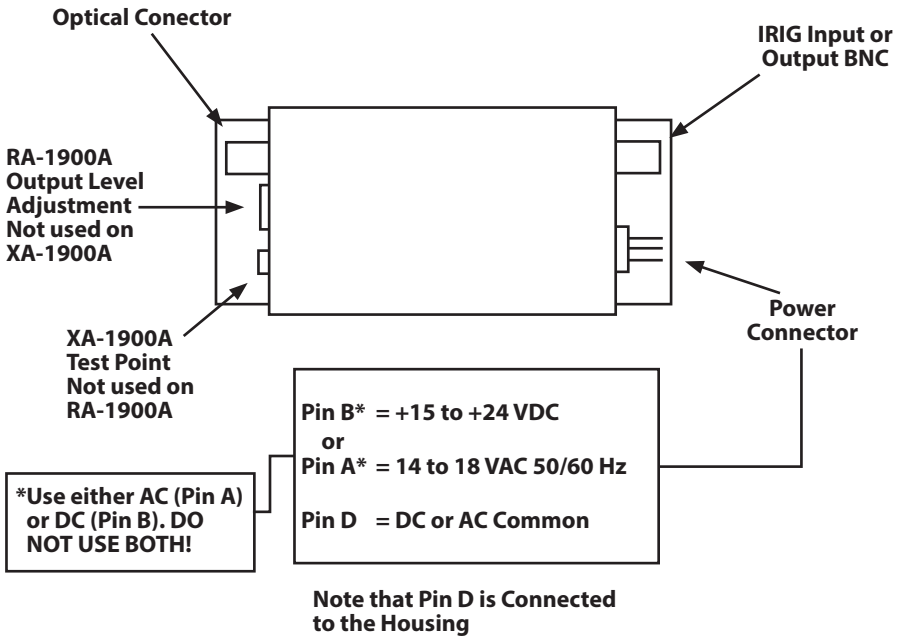
**This manual references the following discontinued items:**

**XR-1900 - No longer in production, no inventory is available.  
MCR-1000A - No longer in production, no inventory is available.**

## Quick Installation Guide

The following is a quick installation guide for the FiberLink XA-1900 and RA-1900. It is intended for users familiar with the installation of fiber optic transmission systems to get “up and running” in minimal time. For additional details, or for installation of the XA-1900 please consult the balance of this manual.

## Standalone Version



## Rackmountable Versions

The FiberLink XA/RA-1900 are available in card versions that fit the FiberLink 6000A rack-mountable card cage. See ordering information on page 6 of this manual.

The FiberLink XA/RA-1900 box version may also be used with an existing MCR-1000A rack-mountable card cage, which is no longer in production. AP-1000 Mounting brackets are available for systems with existing MCR-1000A card cages.

## General Specifications

Number of Fibers	<b>XA-1900 &amp; RA-1900:</b> <b>XA-1903:</b>	1 fiber 10 fibers
Operating Temperature	-20 to +60 Degrees C	
Operating Power (per unit)	+15 to +25 volts DC @ 250 mA or 14 to 18 volts AC, 50/60 Hz	
Dimensions	<b>XA-1900 &amp; RA-1900:</b> 5 W x 1.25 H x 2.5 L (inches) 127 W x 32 H x 64 L (mm) <b>XA-1903:</b> 19 W x 1.75 H x 6.5 L (inches) 483 W x 45 H x 165 L (mm)	
Weight	<b>XA-1900 &amp; RA-1900:</b> Approx. 1 lb; 0.45 kg <b>XA-1903:</b> Approx. 3 lbs; 1.36 kg	
Optical Connectors	ST: Multimode, ST or FCPC: Single Mode	
Indicator LEDs	Box: None Card Transmitter: Power, IRIG present, Alarm Card Receiver: Power, IRIG present, Alarm	
Optical Wavelength	MM: 850 nm & 1310 nm SM: 1310 nm	
Optical Fiber	50 or 62.5 micron (MM) multimode fiber, 8/10 micron (SM) single mode	
System Delay	< 5 uSec; Measured from a Transmitter input to a Receiver output with 1 meter of fiber. Does not include any additional length of fiber. Consult fiber cable manufacturer for specific propagation delay. An approximate fiber cable propagation delay is approximately 5 uSec/km.	
MTBF	<b>XA-1900:</b> 195,000 hours <b>RA-1900:</b> 181,000 hours <b>XA-1903:</b> 74,000 hours	
Plastic Material	UL-94 V0 or V1 Standard	

## Ordering Information

Part Number	Description	Number of Fibers
XA-1900-1	Transmitter, 850 nm, Multimode, Box, ST	1
XA-1900-C1S	Transmitter, 850 nm, Multimode, Card, ST	1
XA-1900-3	Transmitter, 1310 nm, Multimode, Box, ST	1
XA-1900-C3S	Transmitter, 1310 nm, Multimode, Card, ST	1
XA-1900-7	Transmitter, 1310 nm, Single Mode, Box, FCPC	1
XA-1900-7-ST	Transmitter, 1310 nm, Single Mode, Box, ST	1
XA-1900-C7S	Transmitter, 1310 nm, Single Mode, Card, ST	1
RA-1900-1	Receiver, 850 nm, Multimode, Box, ST	1
RA-1900-C1S	Receiver, 850 nm, Multimode, Card, ST	1
RA-1900-3	Receiver, 1310 nm, Multimode, Box, ST	1
RA-1900-C3S	Receiver, 1310 nm, Multimode, Card, ST	1
RA-1900-7	Receiver, 1310 nm, Single Mode, Box, FCPC	1
RA-1900-7-ST	Receiver, 1310 nm, Single Mode, Box, ST	1
RA-1900-C7S	Receiver, 1310 nm, Single Mode, Card, ST	1
XA-1903-1	Transmitter, 850 nm, Multimode, ST	10
XA-1903-3	Transmitter, 1310 nm, Multimode, ST	10
XP-1000A	115 volts AC, 50/60 Hz plug-in adaptor	
XP-1001	230 volts AC, 50/60 Hz plug-in adaptor	
AP-1000	Adapter Plate for use with the MCR-1000* card cage	

- Please note that the card versions of these products are compatible with the model 6000A card cage used with most FiberLink products and uses 1 slot.
- Box versions require the XP-1000A power supply, not included.
- The XA-1903 is a 1RU 19" rackmountable enclosure with internal power supply.

\* Box versions can be adapted for use with the discontinued MCR-1000 rack by ordering the AP1000 adapter plate.

## Data Specifications

Number of Channels	1
Number of Outputs per Channel	XA-1900 & RA-1900: 1, XA-1903: 10
IRIG Compatibility	A through H
System Bandwidth (+0, -3 dB)	20 Hz to 100 kHz
Input/Output Load Impedance	600 Ohms nominal
Input/Output Signal Voltage	1 volt rms
Signal/Noise Ratio	67 dB typical
Noise Floor (full bandwidth)	1.3 mv rms maximum

## Operating Loss Budget & Maximum Usable Distance<sup>\*</sup>

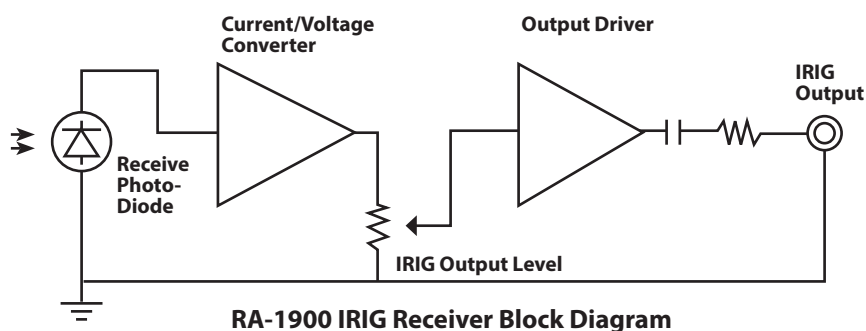
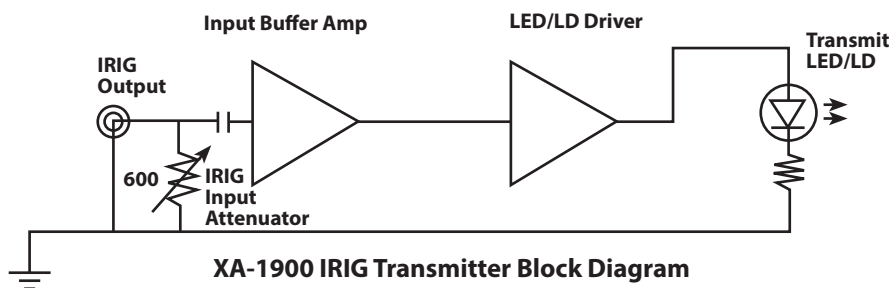
Wavelength	Loss (dB)	Distance (Km)
850nm MM	0-10dB	0-3.5 (62.5u)
850nm MM	0-10dB	0-4 (50u)
1310nm MM	0-13dB	0-10 (62.5u)
1310nm MM	0-13dB	0-12 (50u)
1310nm SM	0-13dB	0-20

\* For system to operate properly, operating loss budget must not be exceeded.

## Theory of Operation

The FiberLink XA-1900 converts an incoming time code signal into a varying current that intensity modulates the transmitting LED located in the optical connector on the unit. The modulated light is then applied to a fiber optic cable.

The RA-1900 detects the light coming from a fiber optic cable by a photodiode located in the optical connector on that unit. The small current produced by the photodiode is amplified and applied to a driver stage. This stage provides the proper output voltage to drive the required load. The output level adjustment is used to set the output audio to the proper level.





## Installation Procedure

The FiberLink XA-1900 is supplied pre-aligned for use with an input signal of 1 volt rms. It may be put into service by simply making the appropriate signal and power connections. When input voltages in excess of the normal 1 volt rms level are to be accommodated, the following procedure (in particular, steps 2, 3, and 4) should be followed:

1. It will be necessary to have a source of +15 to +25 volts DC or 14 to 18 volts AC 50/60 Hz. Be certain to make all connections carefully and check that the correct pins are being used.
2. Turn the input attenuator, located in the white plastic bushing between the electrical connectors on the XA-1900, fully clockwise (10 - 15 turns will be adequate). In the XA-1903, this attenuator is located on the internal P/C board, near the input BNC connector, and is labeled R1. When using the XA-1903, also set the rear panel input switch to the 600 ohm position.
3. Apply power and, with no signal applied, connect an oscilloscope between the test jack, located next to the optical output connector and the case of transmitter for the XA-1900, and on the P/C board for the XA-1903. Any of the points labeled TP1, TP2, TP3, TP4 or TP5 may be used. The oscilloscope will show the current flowing through the transmitting LED, which exactly corresponds to the signal being transmitted.
4. Apply the signal to be transmitted and slowly turn the attenuator until the signal appears on the scope. Now continue to turn the attenuator until a maximum peak-to-peak amplitude of 0.8 volts is obtained. This point constitutes full modulation. If the signal level is increased further, distortion and clipping will occur. The best level is just below the clipping point.
5. Once this adjustment has been made, the transmitter is ready for operation.

## Installation of XA-1900 and RA-1900 in the 6000A Card Cage

The 6000A rack-mountable chassis is a 20 slot, 3RU chassis. The XA-1900 and RA-1900 are available in card versions that fit the 6000A rackmount chassis. The adjustment Potentiometers are located on the front of the XA-1900 and RA-1900 cards.

The XA-1900 and RA-1900 cards take advantage of the Alarm function of the 6000A chassis when using the 6020A ALARM Card. To activate the ALARM function, locate the ALARM switch on the printed circuit board and set Position 1 to ON. The transmitter ALARM function will detect loss of input signal. The receiver ALARM function will detect loss of signal or loss of optical input.

## Signal and Power Connections

The XA-1900 box may be powered from an external AC or DC power supply.

Pin connections are as follows:

<b>PIN</b>	<b>For DC Operation</b>	<b>For AC Operation</b>
A	No Connection	14 to 18 volts 50/60Hz
B	+15 to +25 volts	No Connection
D	DC Common	AC Common
E	No Connection	No Connection
H	No Connection	No Connection

*Please note that AC and DC common is connected to the enclosure.*

The mating power connector for this system is an Amphenol 126-223 or equivalent.

For operation from 115 VAC 60Hz, a Artel Video Systems XP-1000A plug-in adapter may be used. This adapter is supplied with the appropriate connector installed.

Signal connections are made via a standard BNC type signal connector.

Pin connections are as follows:

<b>PIN</b>	<b>Function</b>
Center Pin	Signal
Outer Shell	Signal return and ground



**DANGER!**

The transmitting element in the transmitter unit may contain a solid state Laser Diode located in the optical connector. This device emits invisible infrared electromagnetic radiation which can be harmful to human eyes. The radiation from this optical connector, if viewed at close range with no fiber optic cable connected to the optical connector, may be sufficient intensity to cause instantaneous damage to the retina of the eye. Direct viewing of this radiation should be avoided at all times!

## Operating Pointers

**Driving Signal:** The input to the XA-1900 is an AC coupled 600 ohm impedance. It can be driven by any source including lines with DC levels (below 4 volts) present. The signal return is connected to case ground and power ground.

The XA-1903 may be switched between the 600 ohm impedance level and a high impedance level. The high impedance level is used to connect additional XA-1903 units to form a distribution system. When this feature is desired, connect the original IRIG signal to the input BNC connector of the first XA-1903 and the output BNC connector of that unit to the input BNC connector of the second XA-1903 and so on until all XA-1903 units have been connected. Then set all impedance switches to the high impedance position except for the last XA-1903, which should be set for 600 ohms.

**Power Supplies:** The power input to the XA-1900 box is designed to accept AC or DC voltages. In order for proper operation, the AC level should not drop below 14 volts rms or the DC level, below 15 volts DC. As long as this criteria is met, unregulated sources may be used. To prevent damage, voltages higher than 18 volts AC or 25 volts DC should not be applied. Suitable voltages can be obtained from various low voltage transformers or from a FiberLink XP-1000A, 115 to 14 VAC plug-in adapter.

Note that one side of the DC input or AC input is connected to the case.

The XA-1900 and RA-1900 card versions derive their power from the 6000A chassis.

The XA-1903 operates from 115/239 VAC 50/60 Hz internal power supply.

**Optical Fiber:** Versions of the XA-1900 and XA-1903 are available to drive most multimode (MM) and single-mode (SM) optical fibers. The specific models are identified by a suffix at the end of the model number as follows:

Fiber Size	Connector	850nm	1310nm
50u, 62.5u MM	ST	-1	-3
8/10u SM	ST or FCPC	-	-7

## Installation Procedure

The RA-1900 is provided with a single control that will have to be adjusted prior to putting the unit in service. This control is used to compensate for existing optical cable attenuation. Since optical cable attenuation is a function of the fiber optic cable used, the receiver will have to be re-adjusted, with the actual fiber optic cable used in the system as follows:

1. Apply power and signal to both the RA-1900 to be used as well as the matching XA-1900 or channel being used on the XA-1903. For alignment purposes, the input signal to the transmitter should be a 1 KHz, 1 volt rms sine wave.
2. Connect the fiber optic cable from the transmitter to the receiver, and a 600 ohm load resistor to the output connector of the receiver.
3. Connect an oscilloscope across the 600 ohm load resistor.
4. Adjust the output level control until 1 volt rms is obtained.
5. This completes alignment of the receiver.

## Installation of XA-1900 and RA-1900 in the 6000A Card Cage

The 6000A rack-mountable chassis is a 20 slot, 3RU chassis. The XA-1900 and RA-1900 are available in card versions that fit the 6000A rackmount chassis. The adjustment Potentiometers are located on the front of the XA-1900 and RA-1900 cards.

The XA-1900 and RA-1900 cards take advantage of the Alarm function of the 6000A chassis when using the 6020A ALARM Card. To activate the ALARM function, locate the ALARM switch on the printed circuit board and set Position 1 to ON. The transmitter ALARM function will detect loss of input signal. The receiver ALARM function will detect loss of signal or loss of optical input.

## Signal and Power Connections

The RA-1900 may be powered from an external AC or DC power supply.

Pin connections are as follows:

<b>PIN</b>	<b>For DC Operation</b>	<b>For AC Operation</b>
A	No Connection	14 to 18 volts 50/60Hz
B	+15 to +25 volts	No Connection
D	DC Common	AC Common
E	No Connection	No Connection
H	No Connection	No Connection

*Please note that AC and DC common is connected to the enclosure.*

The mating power connector for this system is an Amphenol 126-223 or equivalent. For operation from 115 VAC 60Hz, a FiberLink XP-1000A plug-in adapter may be used. This adapter is supplied with the appropriate connector installed. Signal connections are made via a standard BNC type signal connector.

Pin connections are as follows:

<b>PIN</b>	<b>Function</b>
Center Pin	Signal
Outer Shell	Signal return and ground



**DANGER!**

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## Operating Pointers

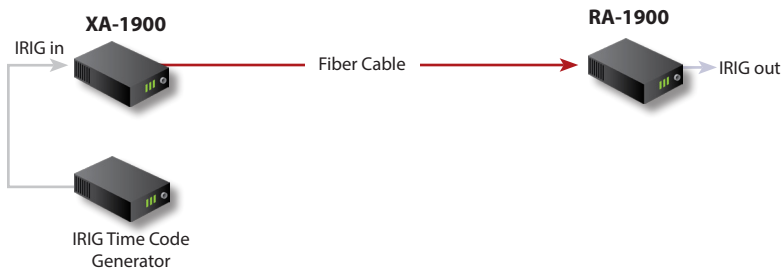
**Output Signal:** The output of the RA-1900 is designed to drive load impedances of 600 ohms or more. The RA-1900 employs an unbalanced output configuration with signal return connected to case ground and power ground. Attempting to drive lower impedance loads may result in distortion and low output levels.

**Power Supplies:** The power supply considerations for the RA-1900 are the same as for the XA-1900.

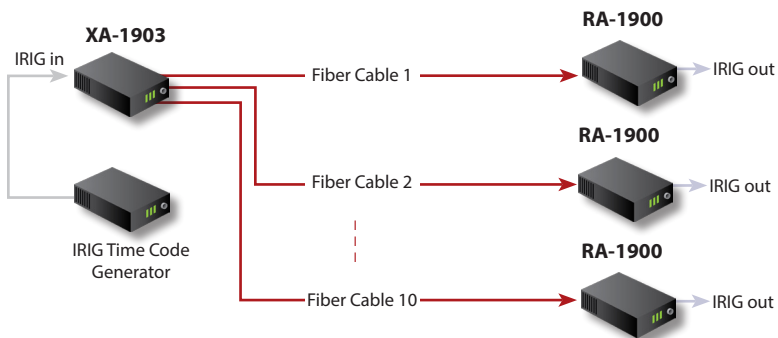
**Optical Fiber:** Versions of the RA-1900 are available to drive most multimode (MM) and single-mode (SM) optical fibers. The specific models are identified by a suffix at the end of the model number as follows:

Fiber Size	Connector	850nm	1310nm
50u, 62.5u MM	ST	-1	-3
8/10U SM	ST or FCPC	-	-7

## IRIG Point to Point Example



## IRIG Point to Multi-Point Example



## Interface Troubleshooting

Some troubleshooting pointers to consider when this system is not operating properly are:

### **XA-1900, XA-1903**

1. Is operating power present and connected to the proper pins on the power connector?
2. Is an IRIG signal present at the input connector of the unit?
3. Is the input attenuator set properly?
4. Is the impedance switch on the XA-1903 set properly?

### **RA-1900**

1. Is operating power present and connected to the proper pins on the power connector?
2. Is the correct fiber optic cable connected between the transmitter and receiver?
3. Is the correct size fiber being used for the particular transmitter/receiver combination?
4. Is the attenuation of the fiber optic cable within the range of the system's loss budget specifications?
5. Is an IRIG signal present at the output connector of the unit?
6. Is the output attenuator set properly?

If all of the above is correct and the system is still not operating, please contact the Customer Service Department for further assistance.

## Overall System Checkout and Troubleshooting Techniques

Occasionally, during the installation of a fiber optic system, difficulties arise that are the result of factors beyond the control of the installer. It is to simplify the task of the installer that the following general checkout procedure is included.

### **A. Check Transmitter or Transmit Section of a Transceiver**

1. Is operating power (DC, AC, Voltages) correct?
2. Are the correct pins on the connector or terminal block being used?
3. Is the correct signal level present at transmitter input?
4. Is the optical connector on the transmitting LED clear of any obstruction or minute dirt particles?
5. Does the fact that the power ground and signal ground of many systems are common, matter?



6. Does the fact that the power ground, signal ground, and case are common cause a short circuit anywhere in the system?

### **B. Check Optical Connectors**

1. Are the connectors being used the correct size for the fiber being used?
2. Are the ends of the connectors free of all dust or dirt? If not, gently clean the tip of the connector with a clean cloth or gauze moistened with alcohol.
3. Is the fiber broken in the connector? A quick inspection with an inexpensive jeweler's loop can determine this.
4. Is the fiber protruding from the tip of the connector? If so, refinishing will be necessary.

### **C. Check Fiber Optic Cable**

1. Is the fiber optic cable pulled too tightly around a sharp corner?
2. Is the correct fiber size being used with the correct transmitter/receiver combination?
3. Does the fiber pass light at all? A small penlight or flashlight can usually be used for this test.
4. Does the fiber have too much attenuation for the system? The attenuation measured on the reel will always be different after the cable is installed.
5. When using very short lengths, less than 10 meters (30 feet), overloading of the receiver may occur. The shorter the length of the fiber, the greater the possibility for this condition. Be sure there is adequate attenuation in any system. If this seems to be the case, or if operation with a meter or so of fiber is required, contact the factory.

### **D. Check Receiver**

1. Is the operating power (DC, AC, Voltages) correct?
2. Are the correct pins on the connector or terminal block being used?
3. Is the optical connector on the receiver optical port clear of any obstruction or minute dirt particles?
4. Does it matter that the power ground and signal ground of many systems are common?

## Maintenance

The FiberLink XA-1900, XA-1903, RA-1900 have all been manufactured using the latest semiconductor devices and techniques that electronic technology has to offer. They have been designed for long, reliable, and trouble free service and are not normally field repairable. Should difficulty be encountered, Artel Video Systems maintains a complete service facility to render accurate, timely and reliable service of all products.

The only maintenance that can be provided by the user is to ascertain that optical connectors are free of dust or dirt that could interfere with light transmission and that electrical connections are secure and accurate.

All other questions or comments should be directed to our Customer Service Department. It should be noted that many "problems" can easily be solved by a simple telephone call.

**DANGER!**

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