FIBERLINK®
XA-1400A, RA-1400
DC LEVEL TRANSMISSION

USER'S MANUAL

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P/N: 108216 Rev. D

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SECTION I
GENERAL INFORMATION

INTRODUCTION

The FIBERLINK® XA-1400A is an analog transmitter that will convert a DC electrical input to modulated light which may then be applied to a fiber optic cable. There are no operating controls on the unit. The XA-1400A employs a linear voltage to frequency converter which results in pulses of light being transmitted over the fiber optic cable. The use of this type of pulse modulation eliminates the effect of cable length or LED aging as well as deterioration of optical connections on the overall accuracy of the system.

The RA-1400A is an analog receiver that will convert pulses of light from a fiber optic cable into an electrical signal that is a replica of the original DC input to the transmitter. The RA-1400A employs a linear frequency to voltage converter and only has one operating control, a full scale, or "span" adjustment.

Both units feature integral signal indicator LEDs that can be used to continuously monitor the operation of the system.

SPECIFICATIONS

Complete System Response Time	0.5 seconds, typical
Transmitter Input Impedance	10 K ohms
Receiver Load Impedance	10 K ohms minimum
Input/Output Voltage Range	0 to 10 volts
DC Resolution	3 mv typical
Linearity	3 % typical
DC Offset Stability	100 ppm/degree C typical
Total Optical Attenuation	50u Fiber, 0-10 dB
	62.5u Fiber, 0-15 dB
	100u Fiber, 3-18 dB
Operating Wavelength	850 nm or 1300 nm
Optical Connectors	ST
Operating Temperature Range	0 to +50 degrees, C

SECTION II
OPERATING INSTRUCTIONS FOR XA-1400A

INSTALLATION AND ALIGNMENT

The XA-1400A is supplied pre-aligned for use with an input signal range of 0 to 10 volts DC. It may be put into service by simply making the appropriate signal and power connections according to the information in section IV.

Installation of the XA-1400A is as follows:

1. It will be necessary to have a source of +15 to +25 volts DC or 14 to 18 volts AC 50/60 Hz. Connections for either power source are given in section IV. Be certain to make all connections carefully and check that the correct pins are being used.

2. Apply the DC signal to be transmitted to the BNC input connector. Do not exceed the 10 volt maximum input as clipping, distortion, non-linearity and even damage to the unit could occur.

3. The XA-1400A is now ready for use.

4. If desired, an adapter may be connected to the input BNC connector to provide standard banana plug or copper wire input capabilities.

The integral signal indicator LED on the XA-1400A will light when the internal V/F circuitry of the unit is operating properly.

OPERATING POINTERS

Driving Signal: The input to the XA-1400A is across a 10K ohm resistor. This input can be any DC level from 0 to 10 volts. It should be realized that any step change in input will take about 0.5 seconds or so to stabilize.

Transmitted Signal: The XA-1400A utilizes a voltage to frequency converter that changes its rate as a function of applied input signal level. As a result, higher voltages will have more "pulses per volt" than lower voltage signals and resolution will tend to be better. If at all possible, try to scale inputs at the upper end of the input range.

Power Supplies: The power input to the XA-1400A 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. As long as this criteria is met, unregulated power 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 low voltage transformers or from an XP-1000A, 115 to 16 VAC plug-in adapter.

One side of the AC or DC input is connected to the case.

Optical Fiber: The XA-1400A will properly drive most optical fibers with core diameters of 50 microns or greater. The larger the diameter of the fiber, the greater the amount of light applied to the fiber. Single mode fibers cannot be used with this system.

A functional block diagram of the XA-1400A is given in Section III of this manual.

SECTION III
OPERATING INSTRUCTIONS FOR RA-1400A

INSTALLATION AND ALIGNMENT

The RA-1400A will operate over the normal optical attenuation range specified in Section 1 of this manual. It may be put in service simply by making the appropriate signal and power connections per the information in Section IV. In instances where the output signal span has to be "touched up" due to variations in input signal or output impedances, the following procedure should be employed:

1. It will be necessary to have a source of +15 to +25 volts DC or 14 to 18 volts AC 50/60 Hz to power the unit. Connections for either power source are given in section IV. As an alternative, an XP 1000A plug-in transformer may be used. Be certain to make all connections carefully and to check that the correct pins are being used.

2. Turn the full scale, or "span," potentiometer fully counter-clockwise (20 or 30 turns will achieve this).

3. Connect the fiber optic cable from the transmitter to the receiver and an accurate multimeter to the BNC connector of the receiver. Set the meter to the 10 volt DC range.

4. With a 9 volt input to the transmitter, adjust the full scale or "span," potentiometer until the output of the receiver is exactly 9 volts.

5. This completes alignment of the RA-1400A.

The integral signal indicator LED on the RA-1400A will light when the internal F/V circuitry of the unit is receiving signals from the companion XA-1400A transmitter and operating properly.

OPERATING POINTERS

Output Signal:

The output signal of the RA-1400A is provided by a low impedance driving circuit that is short circuit proof to ground. Its impedance is adequate to drive loads of 10K ohms or more.

Power Supplies:

The power input to the RA-1400A 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. 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. These voltages can be obtained from low voltage transformers or from an XP-1000A, 115 to 16 VAC plug-in adapter.

One side of the DC input or AC input is connected to the case.

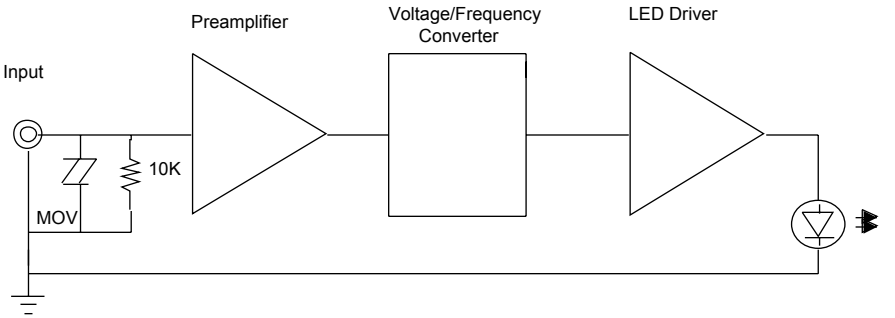
Optical Fiber:

The RA-1400A will operate with optical fiber having core diameters from 50u to 100u, in accordance with the published specifications. When used with 100u fiber, overloading will occur if the attenuation is less than 3 dB. The system will not operate properly with single-mode fibers.

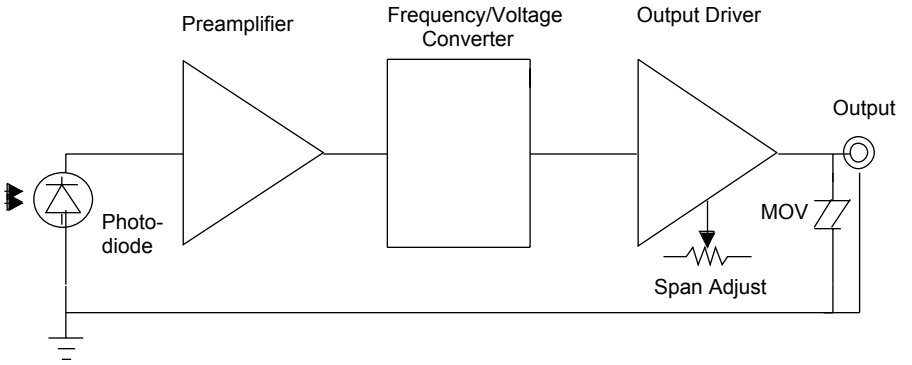
Resolution:

The RA-1400A utilizes an active filter in its output network to remove the pulse repetition rate signal from the reconstructed DC output. The primary noise component of the system are these residual pulses.

FUNCTIONAL BLOCK DIAGRAM OF XA-1400A



FUNCTIONAL BLOCK DIAGRAM OF RA-1400A



SECTION IV
POWER SUPPLY AND SIGNAL CONNECTIONS AND CONSIDERATIONS

The XA-1400A and RA-1400A are furnished with internal AC or DC power supplies. Either one may be employed at the user's option. Pin connections are as follows:

PIN	FOR DC OPERATION	FOR AC OPERATION
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 the AC and DC common are connected to the enclosure.

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

The mating signal connector for this system is a standard UG- 88/ BNC connector.

For operation from 115V AC 60Hz, a Fiberlink XP- 1000A plug-in adapter may be used. This adapter is supplied with the appropriate connector installed.

SECTION V
OPERATING INSTRUCTIONS FOR FIBER OPTIC CABLE

The XA/RA-1400A is supplied with ST type optical connectors, and will operate with most common fiber optic cables. Since the system operates at a wavelength of 850nm or 1300nm, the fiber optic cable should be optimized for use at the correct wavelength. Due to the small size of the actual optical fiber, correct alignment is imperative, especially when using the model 6030 SMA adapter. When using stepped **SMA connectors, be certain that the plastic alignment sleeve** is installed at the step. Otherwise, the system may not work properly!

When using any type of fiber optic cable, be careful not to cause excessive strains, especially at the cable-to-connector junctions. Also, do not subject the cable to sharp bends or pull around sharp corners. Whenever possible, service loops or extra slack should be provided in any installation.

While excessive precautions are not necessary, fiber optic cable should be treated with moderate care as it does contain thin, fragile strands of glass.

To obtain best coupling to a fiber with SMA connectors when using the model 6030 SMA adapter, it is advisable to hook up a complete system and assure that everything is operating properly, following the directions in the model 6030 manual. Then the optical connector should be tightened so that accidental jarring or vibration will not loosen it. This procedure is not necessary for ST connectors.

SECTION VI
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. These difficulties are usually subtle and result from a less than thorough understanding of the unique nature of this electronic/optical technology.

It is in an attempt to simplify the task of the installer that the following checkout procedure is included. The procedure is in the form of an outline which should be followed until the difficulty is corrected.

A. Check transmitter

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. If the unit is a transmitter, does the transmitting LED glow dimly when a signal is applied? Note that this is only true for an operating wavelength of 850nm. Units at 1300 nm are totally invisible.*

5. If the unit is an analog or video transmitter (at 850 nm), is there a continuous dim glow from the transmitting LED?

6. Is the optical connector on the transmitter clear of any obstruction or minute dirt particles?

7. Does it matter that the power ground and signal ground of many systems are common?

8. 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. If stepped 906 type SMA optical connectors are being used with the model 6030 SMA adapter, are the short plastic alignment sleeves normally supplied with the connectors being used? If they are not present, the system will not work properly!

2. If SMA connectors are being used with the model 6030 adapter, are they the correct size for the fiber being used?

3. 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.

4. Is the fiber broken in the connector? A quick inspection with an inexpensive jeweler's loop can determine this.

5. Is the fiber protruding from the tip of the connector? If so, refinish ing 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 lengths shorter 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 light coming out of the fiber optic cable? This may be difficult to see in many cases, but often a very dim glow is present. Note that you can only see 850 nm light. Other wavelengths, such as 1300 nm, are totally invisible.

4. Is the optical connector on the receiver clear of any obstruction or minute dirt particles?

5. Does it matter that the power ground and signal ground of many systems are common?

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

OVERALL FIBER OPTIC CABLE CONSIDERATIONS

A. Fiber optic cable contains an optical fiber with a light carrying “core” that is only .002" in diameter for 50 micron fiber. This is smaller than a human hair! Any small particle of dirt or dust can easily block this fiber from accepting or radiating light. As a result, the key word is cleanliness. Always use the dust caps provided with all optical connectors whenever they are exposed to air. Also, it is a good idea to gently clean the tip of an optical connector with alcohol whenever dust is suspected.

B. Since the dimensions involved are so small, any alignment sleeves, or other devices supplied by the connector manufacturers, must always be used.

C. Mechanical butt splices/optical feedthru mating sleeves must be installed properly. The correct size for the fiber in use must be employed and any alignment devices (such as the long bushings on stepped 906 type SMA connectors) must be in place in order for the splice to operate properly. Butt splices can easily add more attenuation than specified, thereby preventing proper operation of a system.

D. The element that determines the fiber size for a system is usually the receiver. Be certain that 50 micron receivers are being used with 50 micron fiber. Otherwise, receiver overloading can occur. Most transmitters will drive any size fiber, but this is not always the case.

SECTION VII
MAINTENANCE

The Fiberlink XA-1400A and RA-1400A have 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 field repairable.

Should difficulty be encountered, Communications Specialties maintains a complete service facility to render accurate, timely and reliable service of our 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. All other questions or comments should be directed to our trained sales engineers or directly to our Customer Service Department.

WARRANTY

Communications Specialties, Inc. (CSI) warrants that for a period of three years after purchase by the Buyer, all Fiberlink® transmission systems will be free from defects in material and workmanship under normal use and service. A Return Material Authorization (RMA) number must be obtained from CSI before any equipment is returned by the Buyer. All material must be shipped to CSI at the expense and risk of the Buyer.

CSI's obligation under this warranty will be limited, at its option, to either the repair or replacement of defective units, including free materials and labor. In no event shall CSI be responsible for any incidental or consequential damages or loss of profits or goodwill.

CSI shall not be obligated to replace or repair equipment that has been damaged by fire, war, acts of God, or similar causes, or equipment that has been serviced by unauthorized personnel, altered, improperly installed or abused.

RMA numbers and repairs can be obtained from:

Communications Specialties, Inc.
55 Cabot Court
Hauppauge, N.Y. 11788 USA.

Tel: (631) 273-0404. **Internet: www.commspecial.com**
FAX: (631) 273-1638 **Email: info@commspecial.com**

Customers in the Asia Pacific Region should contact:

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Please have your serial number available when contacting us.