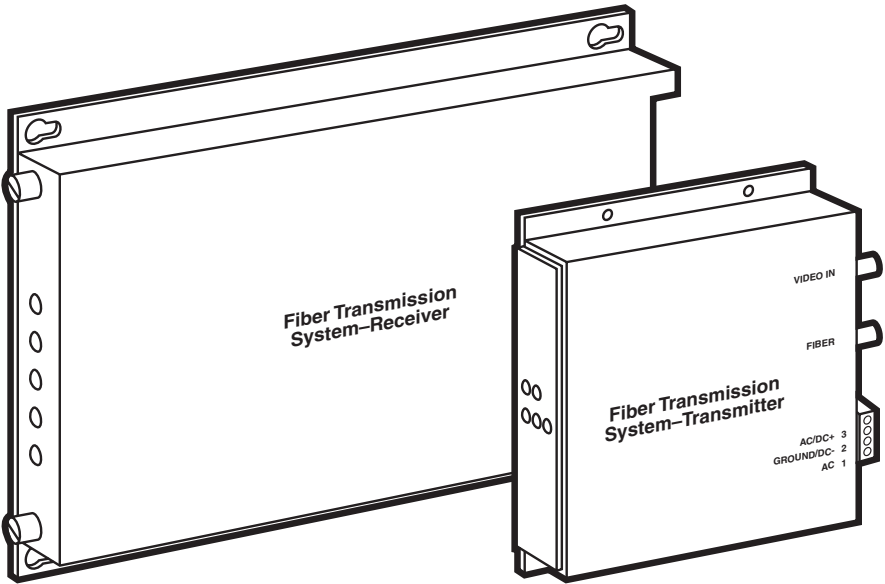




Fiber Transmission System Transmitter and Receiver



**CUSTOMER
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INFORMATION**

Order toll-free in the U.S. 24 hours, 7 A.M. Monday to midnight Friday: **877-877-BBOX**
FREE technical support, 24 hours a day, 7 days a week: Call **724-746-5500** or fax **724-746-0746**
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**FEDERAL COMMUNICATIONS COMMISSION
AND
INDUSTRY CANADA
RADIO FREQUENCY INTERFERENCE STATEMENTS**

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.



The Fiber Transmission System complies with CE EN55022 and EN50082-1 requirements.

NORMAS OFICIALES MEXICANAS (NOM) ELECTRICAL SAFETY STATEMENT

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

TRADEMARKS USED IN THIS MANUAL

Any trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.

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1. Specifications

Video Signal

Video Direction—TX→RX

Number of Video Channels—One

Standards Supported—Monochrome: EIA and CCIR; Color: NTSC, PAL, SECAM

Video Input Signal—1.0 V p-p nominal composite video

Input Impedance—75 Ω

Video Output Signal—1.0 V p-p nominal composite video, unity gain, $\pm 2\%$

Output Impedance—75 Ω

Signal-to-Noise Ratio— >54 dB at maximum optical attenuation

Video Bandwidth—10 Hz to 10 MHz

Video Resolution—800 TV lines

Differential Phase— $<3^\circ$

Differential Gain— $<3\%$

Tilt— 0°

Input Coupling—Capacitive

Output Coupling—Sync tip clamped

Video Interconnection

Recommended Maximum Distance—Video Equipment to AC455A-TX-R2: <100 ft. (30 m); AC456A-RX-R2 to Video Equipment: <100 ft. (30 m)

Recommended Cable Type—RG59 “U” cable (part number ETN59-BNC)

Video Termination—The last video component in the video line must be terminated with 75 Ω .

Control Data Signal

Data Directions—Control: RX→TX; Response: TX→RX

Data Formats—All major up-the-coax formats, including American Dynamics, Baxall, Burle, Elbex (sync and control), Panasonic® (PTZ and VD2), Pelco™, Robot, Sensormatic, VCS format, Vicon™, Videoalarm™, and others.

Detection Area—In even fields, the control signal is imposed on lines 8 through 19. In odd fields, the control signal is imposed on lines 9 through 20.

Pulse Amplitude—50 mV to 2 V

Genlock Sync Signal

Sync Direction—RX→TX

Detection Area—Can be imposed on all lines outside the control area

Sync Amplitude—Up to 6 V

Optical

Wavelength—850 and/or 1300 nm

Optical Mode—Multimode

Optical Budget—13 dB minimum

Operating Distance at 850 nm—Operating distance is approximate, and will be affected by the type and number of splices in the fiber and by the exact type of fiber used. Maximum: 10,000 ft. (3048 m)

Emitter Type—LED

Fiber Size—62.5 μ

Modulation Type—Frequency modulation

Gain Control—Fully automatic (AGC)

Transmitter Launch Power—> -17 dBm (1300 nm)

Transmitter Sensitivity—< -27 dBm (850 nm)

Receiver Sensitivity—< -26 dBm (1300 nm)

Receiver Launch Power—> -14 dBm (850 nm)

Agency Compliance

Emissions—FCC Part 15; ICES-003 (Canada); AS/NZS 3548 (Australia/NZ); CE EN55022; CE EN50082-1, including EN61000-4-2 ESD, EN61000-4-3 Radiated Immunity, EN61000-4-4 Electrical Fast, Transient Burst (EFT) Immunity, EN61000-4-5 Power Surge Immunity, EN61000-4-6 Conducted Disturbances Immunity, EN61000-4-11 Voltage Dips, Short Interruptions and Voltage Variations

Immunity—ENV50204 Radiated, Pulsed Magnetic Field Immunity

Product Safety—No standards required, since the Fiber Transmission System is DC-powered by SELV (Safety Extra-Low Voltage)

Controls

Alarm Disable—Removable jumper on receiver cards

LEDs

Video In (bicolor)—Shows presence of good video signal

Level/Loss (bicolor)—Shows presence of good optical signal

COMMAND—Shows activity on PTZ control channel

RESPONSE—Shows activity on response channel

SYNC—Shows activity on genlock channel

Connectors

Signal Input—Optical: ST®; Video: BNC

Signal Output—Optical: ST; Video: BNC

Power Input—Standalone units: 3-pin detachable screw terminal connector;
Rack units: Direct rack connection

Electrical

Input Voltage—AC455A-TX-R2: 12 to 16 VAC, 12 to 14 VDC; AC456A-RX-R2: 13.5 to 16 VDC

Input Power Frequency—50 to 60 Hz

Current Requirement—AC455A-TX-R2: 300 mA; AC456A-RX-R2: 380 mA

Power Consumption—6 W

Heat Equivalent—0.3 BTU/min., 0.09 cal/min.

NOTE

The heat equivalent represents the conversion of all input power to heat. The actual heat generated will be less.

Environmental

Temperature—Operating: 32 to 122°F (0 to 50°C); Storage: -40 to +185°F (-40 to +85°C)

Mechanical

Enclosure—Transmitter: 4 x 4 (10 x 10 cm); Receiver: 501R

Construction—Aluminum enclosure with black semigloss paint finish

Mounting Method—(4) No. 6 (3-mm) screws

Size—AC455A-TX-R2: 1.2"H x 4.6"W x 4.7"D (3 x 11.7 x 11.9 cm), including connectors; AC456A-RX-R2: 1.2"H x 6.3"W x 9.8"D (3.2 x 16.2 x 24.9 cm), including connectors

Weight—AC455A-TX-R2: 0.7 lb. (0.3 kg); AC456A-RX-R2: 1.6 lb. (0.7 kg)

2. Introduction

2.1 Description

The Fiber Transmission System supports the transmission of video from a camera to a monitoring station and a data signal back to the camera over one multimode fiber. A single coaxial cable at each end of the link is used to connect the appropriate equipment to the system. In up-the-coax systems, video signals travel in one direction and control signals travel in the other direction for full-duplex operation. Video is transmitted from the camera back to the control center over coaxial cable. In conventional coax systems, signals travel in only one direction at a time. Control signals to operate the pan-tilt-zoom (PTZ) functions are transmitted from the control station out to the receiver/driver at the camera station. The Fiber Transmission System is a single-fiber link that uses two different wavelengths (850 and 1300 nm) for two-way transmission.

The control signals are transmitted during the vertical blanking period of the video signal. In addition to video and control, the Fiber Transmission System provides for the transmission of response signals from the camera station to the control station. It also provides for transmission of embedded genlock sync if genlocking is a feature of the particular control system used. It works with all major brands of up-the-coax systems.

The Fiber Transmission System features extensive LED diagnostics, with input/output indicators for video, command, response, genlock sync, and optical signal strength.

Table 2-1. Available Models

Model	Enclosure Type	Fiber Size	Number of Fibers	Maximum Attenuation	Wavelength
Transmitter	4 x 4 (10 x 10 cm)	62.5 μ	1	13 dB	850/1300 nm
Receiver	501R	62.5 μ	1	13 dB	850/1300 nm

2.2 Additional Features

- Operating distances of 10,000 feet (3048 m) make possible expanded, simpler systems.
- Built-in automatic gain control compensates for optical loss within a system.

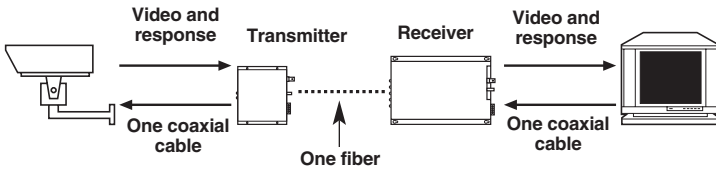


Figure 2-1. Typical Application.

3. Installation

To install the Fiber Transmission System, you will physically install the modules, connect the optical fiber, connect the input and output electrical signals, and connect power to the fiberoptic modules. Then you'll verify correct system operation.

3.1 Physical Installation

The Fiber Transmission System is a standalone module. Install the Fiber Transmission System components in dry locations protected from extremes of temperature and humidity.

1. Determine where you want to install the module, and make sure that there's adequate space at both ends for making various cable connections and reading the diagnostic LEDs.
2. The Fiber Transmission System has mounting holes for four No. 6 screws (3-mm screws).

Standalone Enclosures:

CAUTION

Make sure that the enclosure is not connected to any power source.

Look inside the enclosure to determine the location of the socket for the edge connector on the card. Orient the card so that it will seat in the socket, and slide it into the card guides in the enclosure until the edge connector at the back of the card seats in the socket. Seating may require gently pressing on the ends of the card's front panel.

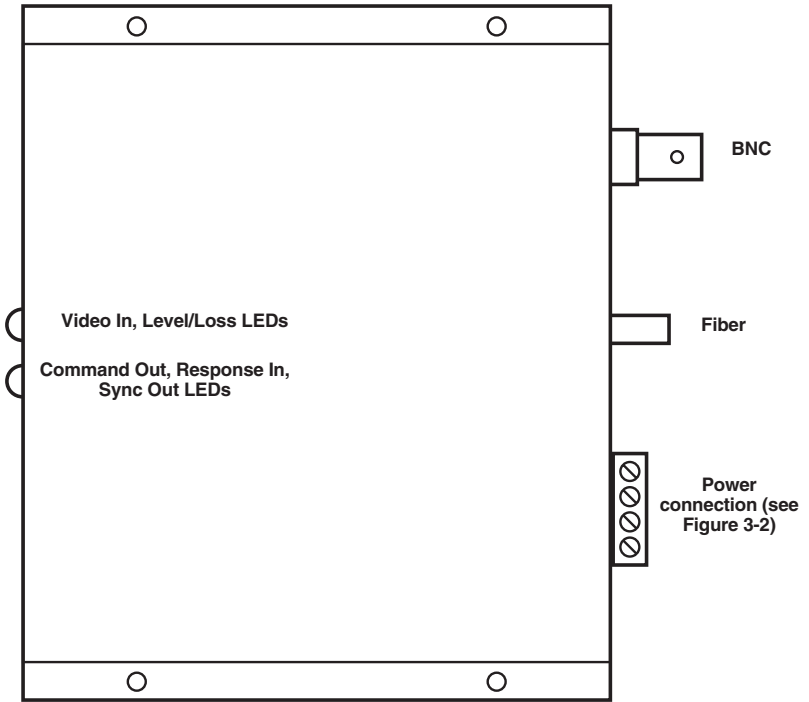


Figure 3-1. Standalone Transmitter.

3.2 Signal Connections

All fiberoptic links convert electrical signals into a light signal at the transmitter and convert the light back to electrical signals for output at the receiver. The electrical signal connections to the Fiber Transmission System consist of a single BNC connector on the transmitter and receiver.

CAUTION

Make sure all the peripheral equipment that is to be connected to the fiber unit is turned off.

NOTE

Use RG59/U coaxial cable (part number ETN59-BNC) between the video equipment and the fiber units. The video equipment and the fiber unit should be no more than 100 ft. (30.5 m) apart.

Terminate the coaxial cable with a female BNC and connect it to the fiber unit. Repeat for both ends of the link.

3.3 Optical Connections

The standard optical connector on the Fiber Transmission System is ST. Connect the preterminated fiber to the two fiber units.

3.4 Power Connections

All standalone modules are equipped with removable screw-terminal connectors for power input.

1. Identify the power connector and remove it from the module.
2. Make sure the power supply is not connected to any power source, and strip approximately $\frac{1}{4}$ inch (0.6 cm) of insulation from the ends of the cable.
3. While observing correct polarization of the cable (see **Table 3-1**), insert one lead into one of the screw sockets and tighten the screw. Repeat for the other conductor. Confirm the security of the connection with a light pull on the cable.

Table 3-1. Pin and Connector Functions

Pin No.	Function	Connector	Function
3	+12 to 16 VDC	BNC	Video, Data, and Genlock Sync
2	Alarm/+5 VDC		
1	Ground		

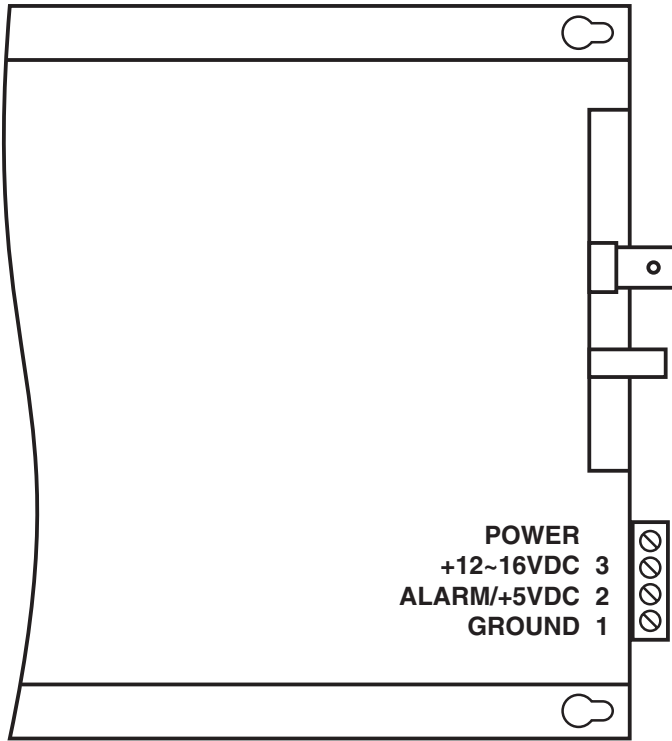


Figure 3-2. Electrical Connection.

4. Seat the connector in its position in the fiber unit.
5. Plug the power supply into a suitable outlet.

3.5 System Power

Power up the peripheral equipment. You'll need to verify system operation. You can do this by observing video on the monitor at the receiver end, or by operating all of the pan-tilt-zoom functions controlled by the up-the-coax data signal. If any feature of the system does not perform as expected, refer to **Table 4-1** for an explanation of how to diagnose system faults using the built-in LEDs.

4. Transmitter and Receiver Optical Indicators

All transmitters and receivers have five active LEDs. See **Figure 4-1**.

Level/Loss indicators are used in determining received optical power. The LED will glow in varying intensities of green depending upon the amount of optical power received. Any amount of green illumination, from barely visible to bright, indicates that sufficient light is at the receiver or transmitter. Red indicates insufficient optical power is being received, suggesting that the fiber is open or that the transmitting link is inoperative.

The VIDEO indicators are used to monitor the presence of valid video signals. When a valid signal is being transmitted or received, the VIDEO LED will glow green; if no signal is present, the LED will glow red.

A Red VIDEO LED suggests that the camera is either off or inoperative. It could also mean that the coaxial cable from the camera to the module is defective, or that the fiber link from the transmitter to the receiver is not functional.

The COMMAND indicator monitors outgoing PTZ Control Data Pulses, while the RESPONSE LED shows return signals from the camera, when applicable.

The SYNC LED indicates Genlock Synchronization Pulses, when applicable.

Table 4-1. Diagnostic LED Indicators

Indicator	Display	What It Means
LEVEL/LOSS	Green (varying)	Sufficient light is at the receiver.
	Red	Optical power not being received. Fiber open, or transmitter or receiver inoperative. Check fiber loss, connectors, and splices (if any).

Table 4-1 (continued). Diagnostic LED Indicators

Indicator	Display	What It Means
VIDEO (TX)	Green	Video coax input to link is good. Note that even a totally black screen is a valid video signal.
	Red	Video coax input to link is not good. Check the camera and the coax into the link.
VIDEO (RX)	Green	Valid video signal received. Note that even a totally black screen is a valid video signal.
	Red	No video signal received. Check the camera and coax. Check the LEVEL/LOSS indicator. If the LEVEL/LOSS indicator is green, check the video indicator on the TX unit.
COMMAND	Green	Indicates PTZ command transmission (>250 mV).
	Dark	No activity, or command being transmitted is <250 mV.
RESPONSE	Green	Indicates response from camera >250 mV.
	Dark	No response from camera or signal is <250 mV, may indicate a problem with the camera. This function is not commonly available in all systems.
SYNC	Green	Indicates transmission of Genlock Synchronization signals (>2V), where applicable.
	Dark	No Genlock signal being sent, or signal is <2V.

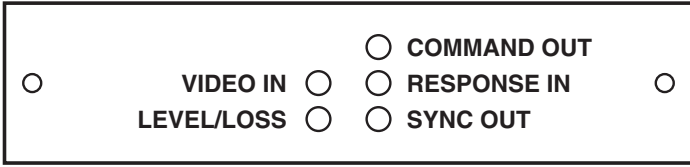


Figure 4-1. End View of Standalone Module.

5. Troubleshooting

5.1 Try This First

If you encounter problems using the Fiber Transmission System:

1. Check to make sure the power is properly connected to the modules.
2. Then verify that the fiber is good.
3. Check the video status indicators. If they're lit, power and video are present.

NOTE

Even a totally black picture is a valid input.

4. If you still cannot find the source of the problem, call Black Box Technical Support at 724-746-5500. Before calling, have the following information available:
 - Product code (AC455A-TX-R2, AC456A-RX-R2) of the Fiber Transmission System.
 - A listing of the diagnostic indicators and their respective color/condition.

5.2 Calling Black Box

If you determine that your Fiber Transmission System is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box at 724-746-5500.

Before you do, make a record of the history of the problem. Black Box Technical Support will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

5.3 Shipping and Packaging

If you need to transport or ship your Fiber Transmission System:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the Fiber Transmission System for repair, make sure you include its power supply. If you are returning the Fiber Transmission System, make sure you include this manual as well. Before you ship, contact Black Box at 724-746-5500 to get a Return Materials Authorization (RMA) number.



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