MANUAL



# FiberLink®
# SDI Beamer™


## 3G/HD/SD-SDI Transmission over one single mode or multimode fiber

## Installation and Operations Manual

WWW.ARTEL.COM

## Contents

## Welcome

Thank you for purchasing Artel Video Systems' FiberLink SDI Beamer Series. The SDI Beamer Series is used to transmit 3G/HD/SD-SDI with or without embedded audio and data over a single fiber optic core. The FiberLink SDI Beamer Series is compatible with single mode or multimode fiber. The SDI Beamer is also compliant with SMPTE 297-2006 for seamless interoperability with other SMPTE 297-2006 devices. The system delivers noise-free transmission that retains all of the signals' initial parameters, regardless of fiber optic cable attenuation. The SDI Beamer Series also provides immunity to video pathological signals over the entire link budget and operating temperature range.

It's small footprint and internal battery power makes it ideal for in-the-field broadcasting.

## Features

- Wide power supply options: internal 9 volt battery or external DC power, AC adapter
- Locking ring power connector
- Glitch-free battery backup when using external power source and internal battery
- Signal is equalized prior to fiber optic transmission
- Receiver features a re-clocked SDI output
- Designed for fiber optic interoperability with all FiberLink SDI products, FiberLink Matrix and other SMPTE 297-2006 fiber optic compliant devices
- Immunity to pathological signals over entire link budget and operating temperature range
- Compliant with SMPTE 424M-2006, 259M-2006, 292-2006, 297-2006
- Supports transmission of SMPTE 305M-2005, 310M-2004, 344M-2000, DVB-ASI
- Supports both Single Mode and Multimode ( 62.5u & 50u) fiber types
- Supports 3G/HD/SD-SDI inputs with embedded audio and data and DVB-ASI.
- Wide operating temperature range: -10° C to +50° C
- Designed and Manufactured in the USA by Artel Video Systems

## Package Contents

- One FiberLink SDI Beamer Transmitter or SDI Beamer Receiver
- This User's Manual

## Technical Specifications

### Model Part Number Specification

| Unit Type | Part Number |
|---|---|
| SDI Beamer Transmitter | 3112 |
| SDI Beamer Receiver | 3113 |

### General Specifications

| | |
|---|---|
| Indicators | Power |
| Switch | Power On/Off |
| Power | External 9-24 volts DC or user supplied internal 9 volt battery. Internal battery can be used for glitch-free backup to external power source or battery only operation. |
| Power Dissipation | Transmitter: 1.20 Watts, 4.09 BTU/hr<br>Receiver: 1.20 Watts, 4.09 BTU/hr |
| Power Connector | Coaxial type with locking threads; 5.5mm O.D., 2.1mm I.D. |
| Operating Temperature | -10° C to +50° C |
| Dimensions | 2.4 x 4.47 x 1.06 (in)<br>60.96 x 113.53 x 26.92 (mm) |
| Weight | 4.23 oz. with batt., 2.60 oz without batt. |
| Approximate Internal Battery Life | 5 hours with Ultralife Lithium battery<br><br>3 hours, 30 minutes with Lithium battery<br><br>1 hour, 50 minutes with Advanced Alkaline battery<br><br>1 hour, 30 minutes with Alkaline battery |
| MTBF | 175,000 Hours |

## Technical Specifications

### SDI Beamer Transmitter (3112) Specifications

**Serial Video BNC Input**

| | |
|---|---|
| Number of Inputs | 1 BNC, 75 Ohms |
| Data Rate Range | 19.4 Mbps to 2.97 Gbps |
| Supported Standards | SMPTE 259M, 292, 297-2006, 424M-2006, 305M, 310M, 344M, DVB-ASI |
| Re-clocked Data Rates | 270 Mbps (SMPTE 259M, DVB-ASI-270), 1.485 Gbps (SMPTE 292), 2.97 Gbps (SMPTE 424M-2006) |
| Equalization | Automatic up to 100m of Belden 1694A at 3.0 Gbps, 200m at 1.485 Gbps and 350m at 270 Mbps |
| Return Loss | >10dB up to 2.97 Gbps |

**Optical Output**

| | |
|---|---|
| Connector | ST, with chain-attached dust cap |
| Wavelength | 1310nm (nominal) |
| Emmiter Type | FP Laser |
| Output Power | -8 dBm Min (Single Mode)<br>-3 dBm Min (Multimode 50u/62.5u) |

### SDI Beamer Receiver (3113) Specifications

**Optical Input**

| | |
|---|---|
| Connector | ST, with chain-attached dust cap |
| Wavelength | 1100 - 1620 nm |
| Minimum Input Sensitivity | -18 dBm at 2.97 Gbps;<br>-20 dBm at 1.485 Gbps<br>-20 dBm at 270 Mbps; |
| Maximum Input Power | 0 dBm |

## Technical Specifications

### SDI Beamer Receiver (3113) Specifications (cont.)

**Serial Video BNC Output**

| | |
|---|---|
| Number of Outputs | 1 |
| Signal Level | 800mV ± 10% |
| DC Offset | 0V ± 0.5V |
| Rise/Fall Time | < 135 ps at 2.97 Gbps per SMPTE 424M-2006;<br>< 270 ps at 1.485 Gbps per SMPTE 292;<br>0.4 ns to 1.5 ns at 270 Mbps per SMPTE 259M |
| Overshoot | < 10% of amplitude |
| Timing Jitter | < 0.2 UI at 270 Mbps; < 1.0 UI at 1.485 Gbps; < 2.0 UI at 2.97 Gbps with color bar signal |
| Alignment Jitter | < 0.2 UI at 270 Mbps; < 0.2 UI at 1.485 Gbps; < 0.3 UI at 2.97 Gbps with color bar signal |
| Re-clocking | At 270 Mbps, 1.485 Gbps & 2.97 Gbps |

### SDI Beamer System Loss Budget & Distance Specifications

**Operating Loss Budget**

| | | |
|---|---|---|
| Single Mode Fiber | 0-10 dB at 2.97 Gbps<br>0-12 dB at 270 Mbps | 0-12 dB at 1.485 Gbps |
| Multimode Fiber (62.5u) | 0-15 dB at 2.97 Gbps<br>0-17 dB at 270 Mbps | 0-17 dB at 1.485 Gbps |
| Multimode Fiber (50u) | 0-15 dB at 2.97 Gbps<br>0-17 dB at 270 Mbps | 0-17 dB at 1.485 Gbps |

**Maximum Useable Distance***

| | | |
|---|---|---|
| Single Mode Fiber | 10 km at 2.97 Gbps<br>15 km at 270 Mbps | 15 km at 1.485 Gbps |
| Multimode Fiber (62.5u) | 0.8 km at 2.97 Gbps<br>1.5 km at 270 Mbps | 1 km at 1.485 Gbps |
| Multimode Fiber (50u) | 1 km at 2.97 Gbps<br>2 km at 270 Mbps | 1.3 km at 1.485 Gbps |

*Distance specifications are approximate, based upon connecting a SDI Beamer Transmitter to a SDI Beamer Receiver, and are not guaranteed. Artel cannot estimate or guarantee operating loss budgets when the SDI Beamer Series is used with other, non-FiberLink devices. Operating loss budget must not be exceeded.

## Installation Instructions

The FiberLink SDI Beamer Series of fiber optic transmission systems are ready for immediate use and do not require any special tools or equipment. However, an Optical Power Meter, such as the FiberLink 6650, can be useful in determining optical loss budgets during your systems design and maintenance.

**The following instructions describe the typical installation procedure:**

1) Connect the video source to the video input BNC connector on the transmitter unit.

2) Connect the video output cable to the video output BNC connector on the receiver unit.

3) Connect the fiber optic cable to the transmitter and receiver units.

4) Optionally connect the Universal Power Supply (PDPS-4) to the transmitter and receiver units ensuring to fully tighten the power connector.

   SDI Beamer can also be powered independently via the internal 9V Battery.
   See page 8 for more information about powering SDI Beamer.

5) Switch the transmitter and receiver units on. The green BATTERY LED should illuminate steady or blink, indicating the presence of operating power.
   See page 9 for more information about the BATTERY LED.

6) The system should now be operational.


**The transmitting element in the FiberLink SDI Beamer transmitter unit contains 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!**

## Powering SDI Beamer

The FiberLink SDI Beamer Series will accept power from one of two sources: an internal 9V battery, or an external DC power source (PDPS-4).

### Power Configuration

| Source | Function |
|---|---|
| **Battery Only** | The unit can be power for up to 5 hours using the internal 9V battery. Use the On/Off switch to turn battery power on or off.<br><br>Battery life may vary depending upon battery type chosen, operating environment and other factors.<br><br>It is recommended that you always test the internal 9V battery before using SDI Beamer. |
| **External DC Power PDPS-4** | SDI Beamer is designed for robust, broadcast use and may be powered indefinitely when using an external DC power source such as the PDPS-4. SDI Beamer will be immediately available for use when power is applied to the DC input regardless of the Battery Power switch position. |
| **Battery & External DC Power (PDPS-4)**<br><br>  <br><br>**If the Battery Power switch is in the "Off" position and DC Power is interrupted, SDI Beamer will TURN OFF.**<br><br>**You must set the Battery Power switch to the "On" position to use the battery as a failsafe backup.** | SDI Beamer will prioritize power from the external DC power source.<br><br>Should the external power be interrupted, SDI Beamer will seamlessly switch to the internal 9V battery if the On/Off switch is in the "On" position. There will be no glitches or interruption of the optical signal during the switch over providing on-air confidence.<br><br>SDI Beamer will again prioritize power from the external DC power source when power returns.<br><br>SDI Beamer does **not** charge the internal battery. It is recommended that you always test the internal 9V battery before using SDI Beamer. |

## Battery Power Switch

The FiberLink SDI Beamer Series has one "On/Off" switch that controls the application of battery power. The switch does not control external DC power.

| Battery Power Switch | |
|---|---|
| **Position** | **Result** |
| Off | The battery will **not** be used to power SDI Beamer.<br>If external DC power is applied, SDI Beamer will function but the battery will **not** be used as a fail-safe backup power source. |
| On | The battery **may** be used to power SDI Beamer:<br>If external DC power is applied, SDI Beamer will prioritize power from the external DC source and only use battery power should the external DC power be interrupted.<br>If no external DC power is applied, SDI Beamer will operate using the internal battery. |
| **Always turn the Battery Power Switch to the "Off" position when SDI Beamer is not in use to prevent inadvertent battery drain.** | |

## Indicator LED

The FiberLink SDI Beamer Series has one LED, Battery Status, to indicate the status of the units power.

| Indicator LED | | |
|---|---|---|
| **LED** | **Status** | **Definition** |
| Battery Status | Off | Indicates that the unit is powered off or there is no power available to the unit. Check connections and/or replace battery. |
| | On Steady | Indicates that the unit is operating correctly using external DC power. |
| | Blink | Indicates the unit is operating correctly using the internal 9V battery. |
| | Blink Fast | Indicates that the unit is operating correctly using the internal 9V battery, but the battery power is low. |

## Operating Pointers

Remember to check attenuation of the fiber optic cable. The system will only operate properly if these specifications fall within the range of the system's loss budget.

Note: If no signal is applied to the SDI Beamer Transmitter, no optical power will be present on the SDI Beamer Transmitter's output.

## Troubleshooting

Multimode fiber optic cable contains an optical fiber with a light carrying "core" that is only .0025 inches (62.5 microns) in diameter. Single mode fiber optic cable has an even smaller "core," only .00032 to .0004 inches (8-10 microns). This is smaller than a human hair! Therefore, any minute particles of dirt or dust can easily block the fiber from accepting or radiating light. To prevent this from happening, always use the provided dust caps when ever optical connectors are exposed to air. It is also a good idea to gently clean the tip of an optical connector with a lint-free cloth moistened with alcohol whenever dust is suspected.

The status of the power LED should provide the first clue as to the origin of any operational failure. If this LED is off, check the battery and/or external power connections. Next, be certain that the input and output signal connections are correct.

An optical power meter, such as the FiberLink 6650, a visible light source, such as the FiberLink 6656, and a dual wavelength light source, such as the FiberLink 6652 or 6654, can greatly assist and expedite troubleshooting of fiber optic transmission systems and are recommended tools all installers should have available.

Finally, although multimode and single mode devices may look the same, they will not operate properly together. Using the wrong device or fiber can easily add more attenuation than specified, resulting in poor overall performance. It should be noted that some of our fiber optic products support both single mode and multimode fiber in the same unit.

If, after reviewing the above possibilities, the system is still not operating, please contact the Customer Service Department for further assistance. If you suspect your problem is caused by the optics or the fiber optic cable, and you have an optical power meter, please take the appropriate measurements prior to contacting support.

## Maintenance and Repairs

The FiberLink SDI Beamer Series has 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. Please see the Troubleshooting section of this manual for additional information.

An optical power meter, such as the FiberLink 6650, a visible light source, such as the FiberLink 6656, and a dua wavelength light source, such as the FiberLink 6652 or 6654, can greatly assist and expedite troubleshooting of fiber optic transmission systems and are recommended tools all installers should have available.

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.

If you suspect your problem is caused by the optics or the fiber optic cable, and you have an optical power meter, please take the appropriate measurements prior to contacting support.

## Certifications

# Proven Products, Unrivaled Service, and Great Support


- High performance plug and play products
- Stand alone and card cage versions available
- Solutions for most video, audio, and data formats
- Multimode and single mode versions
- Designed and manufactured in the USA
- Training and installation support available
- 24x7x365 technical support available

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