



FiberLink® 3360 Series



**3G/HD/SD-SDI Transmission and
AES/EBU Digital Audio Embedding
over one single mode or
multimode fiber**

**Installation and Operations
Manual**

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Welcome

Thank you for purchasing Artel Video Systems' FiberLink 3360 Series. The 3360 Series is used to transmit 3G/HD/SD-SDI over a single fiber optic core and embed up to 8 channels (4 Pairs) of AES/EBU digital audio. Alternatively, you can pass previously embedded audio and data as well, or replace previously embedded audio. The FiberLink 3360 series is compatible with single mode or multimode fiber. The 3360 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 3360 Series also provides immunity to video pathological signals over the entire link budget and operating temperature range.

Features

- Signal is equalized and re-clocked prior to fiber optic transmission
- Embed up to 8 Channels (4 Pairs) of AES/EBU Digital Audio
- Automatic Sample Rate Conversion (SRC) of audio inputs
- Selectively choose which audio pair to retireve on the receiver
- Receiver features one re-clocked SDI output and 4 AES/EBU audio outputs
- Designed for fiber optic interoperability with other SMPTE 297-2006 fiber optic compliant devices up to 2.97 Gbps
- 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 and 344M-2000
- Supports both Single Mode and Multimode (62.5u & 50u) fiber types
- Supports 3G/HD/SD-SDI inputs with or without embedded audio and data.
- 14db Optical Link Budget - 2.97 Gbps
- Wide operating temperature range: -10° C to +50° C
- Available in Box and Card versions
- Card version compatible with the FiberLink 6000A Rack Card Cage
- Designed and Manufactured in the USA by Artel Video systems

Package Contents

- One FiberLink 3360 or 3361
- This User's Manual

Technical Specifications

Model Part Number Specification

Unit Type	Part Number
Transmitter Box	3360-B7L (LC) 3360-B7S (ST)
Transmitter Rack Card	3360-C7L (LC) 3360-C7S (ST)
Receiver Box	3361-B7L (LC) 3361-B7S (ST)
Receiver Rack Card	3361-C7L (LC) 3361-C7S (ST)

General Specifications

Indicators	Power, 3G data rate lock, HD data rate lock, SD data rate lock, Pass Channel Pair, Embed Channel Pair, Alarm (Card version)
Box Version Dimensions	8.1x6.28x1.15 (in) 206x89x30 (mm)
Weight	18.1 ounces, 513 grams
Number of slots in 6000A card cage	2
Power	9-24 Volts AC or DC 3360 - 7.9 Watts; 3361 - 2.4 Watts 3360 - 26.96 BTU/Hr; 3361 - 8.19 BTU/Hr
Operating Temperature	-10°C to +50°C

3360 Transmitter Specifications:

Serial Video BNC Input

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

Technical Specifications

3360 Transmitter Specifications (cont.)

Audio Specifications:

Number of Inputs:	4 Unbalanced, 75 ohms, BNC per AES3id and SMPTE 276M
Channels	8 (4 pairs)
Embedding	Selectable per pair
Sample Rate Conversion (SRC)	32-96 kHz input range converted to 48 kHz
SDI pre-embedded audio	All channels supported for pass through. Pairs 1 to 4 may be stripped selectable for each pair

Optical Output

SMPTE 297-2006 Labeling	L-PC-ABCD-1310
Connector	LC or ST receptacle, PC polish
Wavelength	1310nm (nominal)
Emitter Type	FP Laser
Output Power	-3.5 dBm (nominal)
Re-clocking	At 270 Mbps, 1.485 Gbps & 2.97 Gbps

3361 Receiver Specifications

Optical Input

SMPTE 297-2006 Labeling	PC-ABCD-1310-1550
Connector	LC receptacle, PC polish or ST
Wavelength	1100 - 1620 nm
Minimum Input Sensitivity	-17 dBm at 2.97 Gbps; -22 dBm at 1.485 Gbps -24 dBm at 270 Mbps;
Maximum Input Power	0 dBm

Serial Video BNC Output

Number of Outputs	1
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Technical Specifications

3361 Receiver Specifications (cont.)

Signal Level	800mV \pm 10%
DC Offset	0V \pm 0.5V
Rise/Fall Time	< 135 ps at 2.97 Gbps per SMPTE 424M; < 270 ps at 1.485 Gbps per SMPTE 292; 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

Audio Specifications

Number of Outputs	4 Unbalanced, 75 ohms, BNC per AES3id and SMPTE 276M
Channels	8 (4 pairs)
Output mute	Each audio output pair may be muted on a selectable basis

Optical Loss Budget & Maximum Useable Distance

Operating Loss Budget

Single Mode Fiber	0-14 dB at 2.97 Gbps 0-17 dB at 1.485 Gbps 0-20 dB at 270 Mbps
Multimode Fiber (62.5u)	0-14 dB at 2.97 Gbps 0-17 dB at 1.485 Gbps 0-20 dB at 270 Mbps
Multimode Fiber (50u)	0-14 dB at 2.97 Gbps 0-17 dB at 1.485 Gbps 0-20 dB at 270 Mbps

Optical Loss Budget & Maximum Useable Distance (cont.)

Maximum Useable Distance*

Single Mode Fiber	30 km at 2.97 Gbps 48 km at 1.485 Gbps 50 km at 270 Mbps
Multimode Fiber (62.5u)	0.8 km at 2.97 Gbps 1 km at 1.485 Gbps 2.5 km at 270 Mbps
Multimode Fiber (50u)	1 km at 2.97 Gbps 1.3 km at 1.485 Gbps 3 km at 270 Mbps

*Distance specifications are approximate, based upon connecting a 3360 Transmitter to a 3360 Receiver, and are not guaranteed. Artel cannot estimate or guarantee operating loss budgets when the 3360 Series is used with other, non-FiberLink devices. Operating loss budget must not be exceeded.

Alarm Switch Settings & Options

The Rack Card version of this product has an additional red indicator LED that illuminates when an alarm condition exists.

The rack card unit also provides an output to drive a model 6020A Alarm Sensing Module which provides an audible tone and activates a set of contacts for external signaling purposes.

Alarm Switch Settings for the Transmitter Card

Switch Position	Alarm Indication	On	Off
1	Loss of Input Video	Enabled	Disabled
2	N/A	N/A	N/A

Alarm Switch Settings for the Receiver Card

Switch Position	Alarm Indication	On	Off
1	Loss of Optical Signal	Enabled	Disabled
2	N/A	N/A	N/A

Installation Instructions

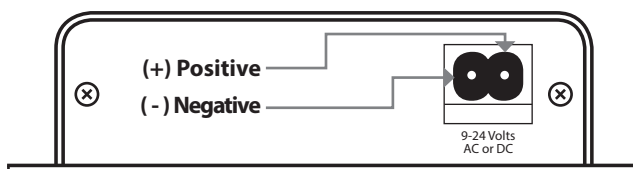
The FiberLink 3360 Series of fiber optic transmission systems are ready for immediate use and do not require any special tools or equipment. However, an Optical Power Meter, such as the FiberLink 6615, can be useful in determining optical loss budgets during your systems design and maintenance.

The following instructions describe the typical installation procedure:

- 1) Connect the video source to the video input BNC connector on the transmitter unit.
- 2) (Optional) Connect up to four AES/EBU Audio sources to the audio input BNCs on the transmitter unit.
- 3) Connect the video output cable to the video output BNC connectors on the receiver unit.
- 4) (Optional) Connect audio output cables to the four Audio BNCs on the receiver unit.
- 6) Connect the fiber optic cable to the transmitter and receiver units.
- 7) Connect the Universal Power Supply to the transmitter and receiver units.
For box versions using DC power, please refer to figure 1.
- 8) Configure your audio preferences as described in the Audio Configuration section of this manual.
- 9) When power is applied, the green POWER LED should illuminate, indicating the presence of operating power. The 3G/HD/SD RATE LED and the audio LEDs will give an indication as described in the Indicator LED's and Alarm Circuitry section of this manual.
- 10) The system should now be operational.

Note: The Rack Card version has an additional red LED for indicating the presence of an alarm condition (loss of signal). Refer to Indicator LED's and Alarm Circuitry sections of this manual.

**Figure 1:
Power Connector
DC Input Polarity**



DANGER!

The transmitting element in the FiberLink 3360 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!

Audio Configuration:

The FiberLink 3360 & 3361 have a four position DIP switch that is accessible from the front panel. Each switch represents a channel pair: Channels 1/2, Channels 3/4, Channels 5/6 and Channels 7/8. Operation is as follows:

Audio Configuration Switch Settings for the Transmitter

Switch Position	Action
Embed	Will replace any existing audio on the respective channel pair and embed audio supplied from the Audio Input BNC for the respective channel pair
Pass	Will pass any previously embeded audio that is present in the video signal on the respective channel pair.

Audio Configuration Switch Settings for the Receiver

Switch Position	Action
Mute	Will mute any existing audio for the respective channel pair on the Audio Output BNC for the respective channel pair. Note that the audio will remain present in the video stream.
Output	Will output the audio for the respective channel pair on the Audio Output BNC for the respective channel pair.

Note: Audio embedding can only take place when a valid 3G/HD/SD-SDI video signal is present. The unit cannot be used as an audio only transmission system.

Please review the Indicator LEDs section of this manual for a comprehensive understanding of the video and audio status for each unit.

Indicator LEDs

The FiberLink 3360 Series has several indicator LEDs that are used to monitor the state of the unit. Card versions have an additional Alarm LED.

Transmitter LEDs

LED	Status	Definition
Power	On	Indicates that correct power has been applied.
3G Rate	Off On	Indicates no 3G-SDI data rate lock Indicates 3G-SDI data rate lock at 2.97 Gbps or 2.97/1.001 Gbps
HD Rate	Off On	Indicates no HD-SDI data rate lock Indicates HD-SDI data rate lock at 1.485 Gbps or 1.485/1.001 Gbps
SD Rate	Off On	Indicates no SD-SDI data rate lock Indicates SD-SDI data rate lock at 270 Mbps
Pass	Off On Dim	Indicates no audio present in the video stream Indicates audio present in the video stream and selected as the audio to pass Indicates audio present in the video stream but not selected as the audio to pass.
Embed	Off On Dim	Indicates no audio present on the BNC input Indicates audio present on the BNC input and selected as the audio to embed Indicates audio present on the BNC input but not selected as the audio to embed
Alarm	On	Loss of input video (card version only)

Note: The 3G, HD and SD LEDs indicators are off when a non-standard signal is applied.

Receiver LEDs

LED	Status	Definition
Power	On	Indicates that correct power has been applied.
3G Rate	Off On	Indicates no 3G-SDI data rate lock Indicates 3G-SDI data rate lock at 2.97 Gbps or 2.97/1.001 Gbps
HD Rate	Off On	Indicates no HD-SDI data rate lock Indicates HD-SDI data rate lock at 1.485 Gbps or 1.485/1.001 Gbps
SD Rate	Off On	Indicates no SD-SDI data rate lock Indicates SD-SDI data rate lock at 270 Mbps
CH Pair	Off On Dim	Indicates no audio present in the video stream Indicates audio present in the video stream and being de-embedded and output on the respective Audio Output BNC. Indicates audio present in the video stream but the respective Audio Output BNC is being muted.
Alarm	On	Loss of input video (card version only)

Note: The 3G, HD and SD LEDs indicators are off when a non-standard signal is applied.

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 3360 Transmitter, no optical power will be present on the 3360 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 LEDs should provide the first clue as to the origin of any operational failure. If these are off, it usually means that the fiber is broken or has too much attenuation. 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 Three Wavelength Light Source, such as the FiberLink 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 3360 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 Three Wavelength Light Source, such as the FiberLink 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





FiberLink 6656 Visible Fault Locator

The FiberLink 6656 is a light-weight, hand-held tool used to quickly troubleshoot faults in the continuity of both single-mode and multimode fibers. High-intensity visible laser allows for visible fault location of breaks and microbends in both single-mode and multimode fibers.



FiberLink 6650 Optical Power Meter

The FiberLink 6650 Optical Power Meter is a high accuracy, high resolution, microprocessor controlled optical power meter. 65 dB dynamic range; calibrated to measure 850, 1300, 1310 and 1550nm. Works with multimode and single mode fiber. Graphical LCD display with intuitive user interface with simple 2-key operation.



FiberLink 6654 Dual Wavelength Single Mode Light Source

The FiberLink Light Source offers a laser output at selectable wavelengths, allowing for convenient, on-site testing of fiber networks during construction and maintenance procedures.

Proven Products, Unrivaed 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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