Telecast Fiber Solutions

SHED and HDX User Guide

M4047-9900-103

16 January 2015

grass valley
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Warranty information is available in the Support section of the Grass Valley Web site (www.grassvalley.com).

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Part Number	M4047-9900-103
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1 About SHED and HDX

This chapter provides an overview of the SHED and HDX and includes the safety and warranty information about it.

About SHED and HDX

The SHED and HDX systems enable operation of Hybrid-Cable-equipped High Definition (HD) cameras using only two singlemode fibers. Since the limiting factor of hybrid cables are the distances at which they can propagate enough electricity to power the camera, the SHED and HDX's eliminate the copper and thus extend the total range of your camera chain.

The SHED and HDX are optically passive meaning that the optical signals to and from the camera are merely passed through the system. The electrical signals are interpreted to both allow the CCU to recognize that a camera is attached and to safely allow the local powering of the caSHED and HDXmera. ALL audio, video, and data signaling in the camera chain is maintained.

The SHED and HDX system consists of various parts depending on which versions of the components were ordered. Since these systems can operate passively using just SHEDs or actively using a combination of a SHED and an HDX, the components in your order will vary with your specific application.

Product Returns

In the unlikely event of damage to your SHED and HDX during shipping or delivery, take note the damage with the delivery or shipping service. If any component does not work correctly out of the box, contact Grass Valley (see Contact Us on page 21).

If the problem cannot be remedied through a service telephone call, an RMA number (Return of Merchandise Authorization) will be issued. Please note this RMA number inside and outside of all shipping boxes and on all documentation provided with the items to be returned.

About this User Guide

This User Guide is designed to cover all of the various options and so not every page in this guide will apply to your specific system.

Safety and Notices

Laser Radiation

WARNING! Class 1 Laser. Do not stare into any connector port or fiber.

This system transports the output of multiple CDRH Class 1 laser devices. Although this means it is Eye Safe, you must avoid looking directly at, or staring into, the laser beam located on an ST connector or on the end of any fiber.

Infrared radiation is produced at the fiber connection ports on each unit and potentially at the end of unterminated optical fibers that are attached to this port. Avoid any direct exposure to the light that comes from these sources.

Do not attempt any type of service to this instrument other than what is instructed in this manual. Refer servicing to Grass Valley, a Belden Brand (see Contact Us on page 21).

FCC Part A Manual Notice

This equipment has been tested and found to comply with the limits for a Class-A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the User Guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

Warning CE

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

2 Installation and Configuration

This chapter explains how to install and configure the SHED and HDX system.

Setting Up a System

There are two basic ways in which SHED and HDX units can be used to augment your HD camera systems, and both concern how the camera is ultimately powered.

Passive Set-up - SHED-BS and SHED-C

In a **Passive** set-up, a SHED-BS is connected to a SHED-C with two singlemode fibers (Figure 2-1). In this configuration, the camera head must be locally powered via a battery or a suitable local power supply.

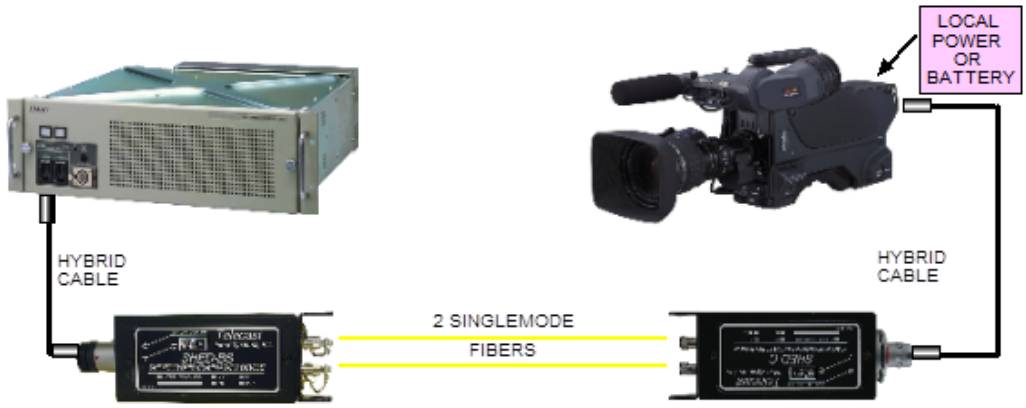


Fig. 2-1: Passive SHED-SHED System

Active Set-up - SHED-BS and HDX

In an **Active** configuration, a SHED-BS is connected to an HDX via two singlemode fibers and the HDX supplies power to the camera through up to 100m of SMPTE Hybrid Cable (Figure 2-2).

Fig. 2-2: Active SHED-HDX System

In each case, a SHED-BS returns an electrical signal to the base station that facilitates the operation of the camera even though there is no physical copper connection. The SHED-BS requires no external power supply.

SHED-BS Configuration for Camera Types

The SHED-BS supports multiple camera types, and each has different interface requirements at the CCU end. The SHED-BS must be manually configured for the type of camera in the system, using four DIP switches on the side of the case. A label is mounted on the case to show the switch positions for the supported cameras.

Camera	Sw 1	Sw 2	Sw 3	Sw 4
Sony	ON	ON	ON	OFF
Hitachi HD5000	OFF	ON	ON	OFF
Ikegami	ON	OFF	ON	OFF
Panasonic 3500	OFF	OFF	ON	OFF
Panasonic 931B	ON	ON	OFF	OFF
Panasonic 3800	OFF	ON	OFF	OFF

SHED-C and PANASONIC 3800 Camera

The Panasonic 3800 camera is a special case - the SHED-C is used to feed power to the camera. A jack on the SHED-C case accepts 12 VDC, and the 10 VDC required for the camera is fed down the hybrid fiber cable to the camera.

Setting Up HDX

The HDX can accept either 120 VAC or 240 VAC. Input voltage selection is **NOT** automatic; it must be manually configured by adjusting the Power Entry Module (Figure 2-3).

The unit accepts AC line voltage with a standard IEC/NEMA type power cord. A window on the Power Entry Module reflects the current VAC setting, either 115 or 230.

Verify that the voltages on the units are set properly before operating the system.

Changing the Input Voltage

To change the input voltage to the HDX:

1. Use a small, flat-blade screwdriver in the notch at the top of the Power Entry Module to gently pry open the module cover and expose the fuse block. The cover is hinged at the bottom and will open easily.
2. Gently pop out the fuse block.
3. Turn the block over and replace it back into the module.
4. Close the module cover.

The new input voltage value will be visible in the voltage value window.

The same procedure is followed for fuse replacement. Be careful to replace fuses with ones of equal voltage, current and duration (3 Amp, 250V, Slo-Blo)

Fig. 2-3: Power Entry Module for HDX

Selecting Normal or Low line voltage range

The HDX operates on AC mains power and can work with a variety of voltages. The internal power supply can be set for two operating ranges: 120/240 VAC (normal) and 100/200 VAC (low) +/- 10%, both at 50/60 Hz.

To change between Normal to Low line voltages, it is necessary to open the HDX unit and change the transformer connections to the Power Entry Module. Proceed as follows:

- Remove all external connections from the HDX.
- Remove the (4) #4-40 screws in the HDX faceplate and carefully withdraw the chassis from the cover. The connections to the transformer are color-coded and are connected to the Power Entry Module with 0.187" spade-type connectors ("Fastons"). These are labeled "A", "B", "C", and "D" on the rear of the power module.

IMPORTANT

Be sure to remove all external connections from the HDX including the power cord before attempting these changes.

To convert from Normal to Low voltage operation:

- Remove the Yellow and Black transformer leads from the Power Entry Module.
- Cover these leads with insulation (electrical tape) to prevent contact with the chassis or other components.
- Connect the unused Blue and Red leads, below. It is imperative that the leads go to the correct positions or damage to the HDX may result. Re-assemble the HDX in reverse order to complete the conversion.

	100/200V	**120/240V**
D	White	White
C	Orange	Orange
B	Blue	Yellow
A	Red	Black

To convert back to Normal voltage, reverse the above procedure.

Setting up SHED and SHED-6

The SHED-BS and SHED-C do not require an external electrical power supply of any kind. The only exception is SHED-C for the Panasonic 3800 camera, which requires an external power supply. What little power they do consume is provided by the camera system. In a passive system, only the fiber link of two singlemode ST terminated fibers needs to be provided. As the camera head is locally powered, the SHED-BS and SHED-C merely serve to "fool" the camera and base station into believing there is a piece of SMPTE hybrid cable between them.

SMPTE Hybrid cable lengths should be as short as possible between the CCU and the SHED-BS and between the camera and the SHED-C to maintain optimum performance.

SHEDs can be positioned directly at an access panel (Figure 2-4) or rack mounted with Grass Valley's SHED-6, a 1-RU frame that houses six individual SHED-BS units in one simple enclosure (Figure 2-5).

Note that the SHED-6 requires 12VDC via a 4-pin XLR-M connector. Please also note that SHED-6 only supports listed Sony and Ikegami cameras.

- **Pin 1**: Ground
- **Pin 2**: Unused
- **Pin 3**: Unused
- **Pin 4**: + Power VDC

Fig. 2-4: SHED Mounted to Access Panel

Fig. 2-5: SHED-6 Front and Rear Panels

Fiber Connectors

Your system can be equipped with a variety of different fiber optic connectors, both for the Hybrid cable and for the two fibers that connect the system together.

Connector options are as shown below.

SHED-BS (Universal Base-Station end, stand-alone)

One End (choose 1)	Other End (choose 1)
UFP-304F	UFP-2ST
UFP-FIS	UFP-2SC
UFP-2STM	UFP-2SCA
	UFP-2LC
	UFP-NOC2
	UFP-MX2

SHED-C (Universal Camera end, stand-alone)

One End (choose 1)	Other End (choose 1)
UFP-304M	UFP-2ST
UFP-FISM	UFP-2SC
UFP-2STM	UFP-2SCA
	UFP-2LC
	UFP-NOC2
	UFP-MX2

3 SHED and HDX Features

This chapter presents the features of the SHED and HDX system, including a Troubleshooting section and a maintenance section.

System Operation

Since the HDX does the job of actually powering the camera head, the majority of its purpose is to produce the high voltages required by today's HD camera and large zoom lens systems. The remaining purpose is to sense the type of camera system that is attached, and then proceed through the proper start-up sequence that safely provides the appropriate voltages.

Since the optical portions of SHED and HDX systems are passive, the maximum distances that can be achieved are determined by the optics in your camera system. As most HD camera systems on the market today have optical budgets of around 12-14db, it is reasonable to assume that with ideal fiber and minimal connector losses, theoretical distances of 20km can be realized. Single mode fiber is mandatory.

Once powered up, an HDX with multiple-camera support will attempt to recognize what it is attached to. The HDX product line is designed to work with:

- Sony 750 and 950 HD Camera systems
- Ikegami HD Camera systems
- Power Plus (see CopperHead manual for details)
- Grass Valley LDK-6000 and -8000 series
- Panasonic 931B, 3500 and 3800
- Hitachi HD1000 andHD5000

See Compatible Camera Systems on page 11 for a complete list of supported camera systems.

Use of the HDX with any other equipment will result with an error condition indicated by ERR on the HDX 4-segment display. As long as an error condition is detected, no high voltage will be enabled.

HDX

HDX Faceplate Indicators

Fig. 3-1: HDX Front Panel Displays

HDX LED Indicators							
	AC IN	**DC HV Enable**	**AC HV Enable**	**HV Present**	**Cable Open**	**Cable Short**	**Remote Pwr Enable**
Nothing attached	**Green**	Unlit	Unlit	Unlit	**Red**	Unlit	Unlit
PowerPlus	**Green**	**Green**	Unlit	**Green**	Unlit	Unlit	Unlit
Ikegami	**Green**	Unlit	**Green**	**Green**	Unlit	Unlit	Unlit
Sony 750	**Green**	Unlit	**Green**	**Green**	Unlit	Unlit	Unlit
Sony 950	**Green**	Unlit	**Green**	**Green**	Unlit	Unlit	Unlit
Panasonic 3500	**Green**	Unlit	**Green**	**Green**	Unlit	Unlit	Unlit
Panasonic 931B	**Green**	Unlit	**Green**	**Green**	Unlit	Unlit	Unlit
Panasonic 3800	**Green**	**Green**	Unlit	**Green**	Unlit	Unlit	Unlit
Hitachi	**Green**	Unlit	**Green**	**Green**	Unlit	Unlit	Unlit
Grass Valley	**Green**	**Green**	Unlit	**Green**	Unlit	Unlit	Unlit

In both active and passive systems, the camera CCU needs to be powered on first and the camera head needs to be in the ON position. In passive systems, once local power is applied to the camera, the system should work normally. In active systems, the HDX will take a few seconds to:

- determine what kind of equipment is attached
- safely apply the correct voltage for that equipment

LED indicators (see Figure 3-1 and the **HDX LED Indicators** table above) will show diagnostic information. An Open or Shorted hybrid cable will always result in a fault condition. The remainder of the LEDs will be Green or Out depending on what type of camera (or Power Plus) is attached to the HDX (see the **HDX LED Indicators** table above).

Incoming optical power is indicated on the lower 4-segment display on the HDX. -20 dBm is the least amount of optical power that can reliably keep the system functioning. If the CCU is operating normally (typical optical output of approx. -7 dBm) and the HDX is showing high loss, check your installed cable for bend radius and connector problems.

The Optional LOCAL/REMOTE switch provides the convenience of having your camera powered down when optical power to the HDX is turned off. So when the switch is in the REMOTE position (Faceplate LED = Green), turning your camera CCU Off will also turn power to the camera head Off.

Compatible Camera Systems

Manufacturer	Supported Models
Sony	HDC700/750 HDC900/930/950 HDC1000/1450/1500/1550 HDC3300 HDCU3300 HDFX-100 BVP-950/CA950 w/CCU900 BVP-9500WS
Ikegami	HDK-79E & 790E HDK-725 & 725P HDK-75EX HDK-79EX-II & 790EX-II HDK-79EC & 79EX HDK-79EXNA
Grass Valley	LDK-6000 series - all LDK-8000 series - all
Panasonic	AK-HC3800
Hitachi	CH-HD1000 CH-HD5000 CU-HD500

Accessory List

- Power Supply for SHED-6 (ADAP-AC-02)
- Singlemode patch cords
- Remote Shut-off option for HDX

HDX Rack Mount Frame

The HDX Rack Mount Frame (2 RU) holds two HDXs in a standard rack.

Individual HDXs must be removed from their sheet-metal cases in order to be installed into an HDX Frame.

- Remove the four Philips-head screws on the top edge of the faceplate
- Slide the HDX chassis out of its case
- Slide the HDX chassis into one side the frame, and secure it using the four screws removed in the first step.

Note that all connections to the HDX are located on the front panel, so there are no connections on the rear of the frame.

Fig. 3-2: HDX Rack Mount Frame

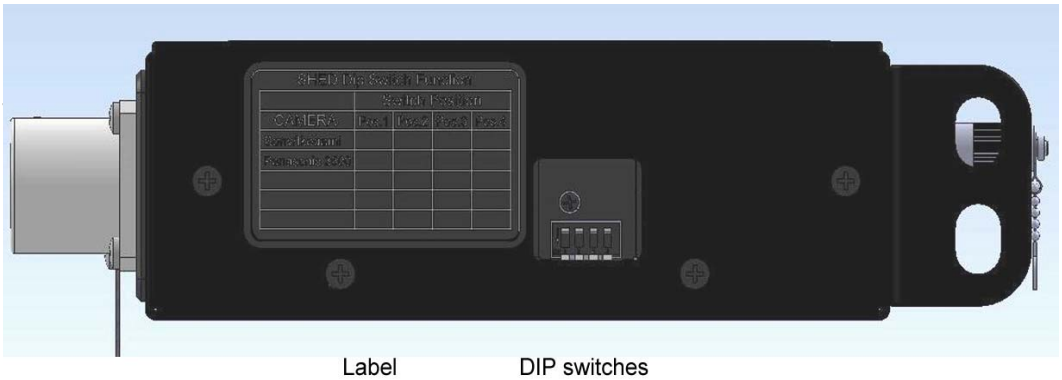
SHED-BS

Description

The new SHED-BS is a universal model that can be configured manually, using four switches, to support the following cameras:

- SONY
- HITACHI
- IKEGAGMI
- PANASONIC 931B
- PANASONIC 3500
- PANASONIC 3800

The four DIP switches, and a label showing the switch positions for the various supported cameras, are located on the side of the SHED-BS case, as shown in the figure.



The DIP switch positions for the cameras, as shown on the label, are as follows:

Camera	Sw 1	Sw 2	Sw 3	Sw 4
Sony	ON	ON	ON	OFF
Hitachi HD5000	OFF	ON	ON	OFF
Ikegami	ON	OFF	ON	OFF
Panasonic 3500	OFF	OFF	ON	OFF
Panasonic 931B	ON	ON	OFF	OFF
Panasonic 3800	OFF	ON	OFF	OFF

Connectors

The SHED-BS is equipped with ST connectors on the fiber-run side, and a LEMO connector on the CCU side, as shown in the figure. Note that other connectors are available as an option - see Fiber Connectors on page 8.

Fig. 3-3: Shed-BS fiber-run side - ST connectors

SHED-BS CCU side - LEMO connector

Deployment

A typical deployment of the SHED-BS and HDX to interface a remotely-powered camera to its CCU is shown in the diagram.

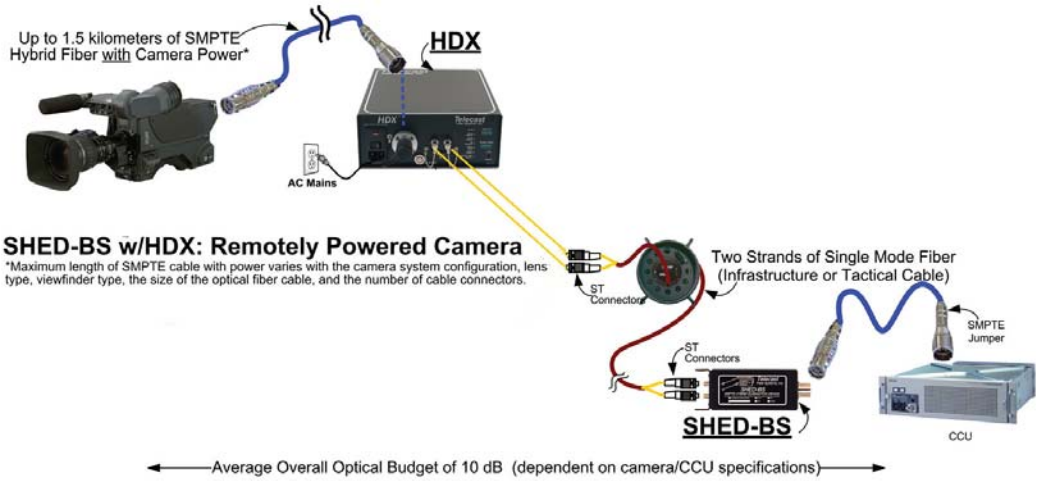


Fig. 3-4: SHED-BS and HDX Deployment Diagram

SHED-C

Application

The SHED-C is used in applications where power is applied to the camera locally. The SHED-C can operate in two modes:

- Active - *used only with the PANASONIC 3800 camera* - power is applied to the camera from the SHED-C, via a 12VDC external supply connected to the jack on the SHED-C case. The SHED-C generates the 10 VDC required by the camera, and sends it to the camera through an SMPTE Hybrid Fiber cable that can be up to 1.5 Km long.
- Passive - *used with all other cameras* - a local power supply is connected directly to the camera. The camera is connected to the SHED-C via an SMPTE Hybrid Fiber cable. A load is placed on the power feed wire used in the active mode.

In both cases, the CCU-end of the fiber run uses a SHED-BS as the Fiber/CCU interface.

Connectors

The SHED-C is equipped with ST connectors on the fiber-run side, and a LEMO connector on the camera side, as shown in the figure. Note that other connectors are available as an option - see Fiber Connectors on page 8.

Fig. 3-5: SHED-C fiber-run side - ST connectors *SHED-C camera side - LEMO connector*

The power jack for the 12 VDC supply for active-mode operation with a PANASONIC 3800 camera is located on the side of the case, as shown in the figure.

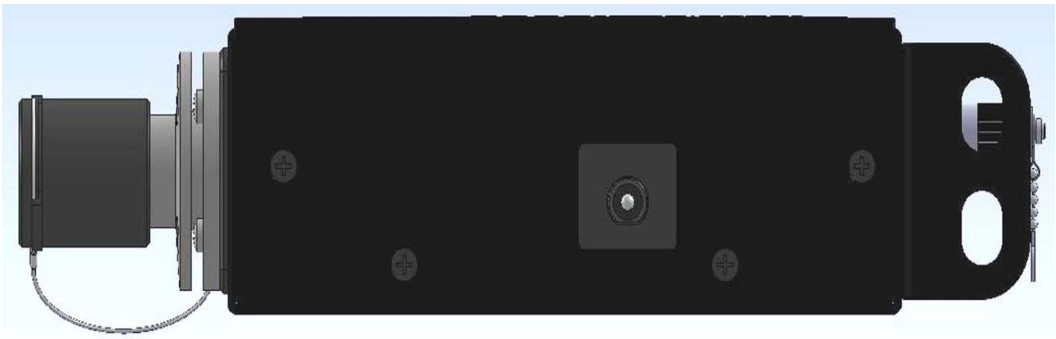


Fig. 3-6: SHED-C showing the 12 VDC input jack location

Deployment

The figure shows a typical deployment of a SHED-C and SHED-BS. In this case, the SHED-C is in passive mode, as a local power supply is connected directly to the camera.

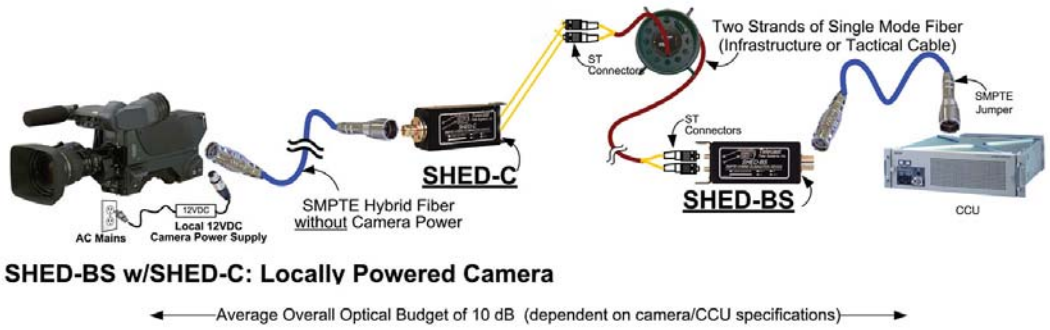


Fig. 3-7: SHED-C and SHED-BS Deployment Diagram

Troubleshooting

Symptom	Possible Cause	Corrective Action
No AC IN indication	Power source	Verify correct VAC selector setting Be sure power switch is On: 1 = On; 0 = Off Check fuses
Camera will not power. RED LEDs for Cable Short or Cable Open	Bad SMPTE Hybrid cable	Check for electrical problems with hybrid cable and/or replace the hybrid cable that connects the CCU to the SHED-BS or the CAMERA to the the HDX/SHED-C
No Optical Link. Optical Power Meter reads >20bDm	Bad fiber link	• Verify CCU/CAM is on and optics are working • Check all fiber to ensure that connectors are clean and that there are no bend-radius issues along the run. Minimize in-line connectors and patches, if possible.
HV not being applied (No HV LED = GREEN)	Camera system not powered. Improper camera system	Make sure that the camera system is supported Make sure that the camera system is powered
CAM stays powered ON when CCU is powered off	Switch in wrong position at HDX	If you wish the camera to power down when the CCU is turned (only if this option is installed)

A Note About Fiber Maintenance

As with any fiber optics system, connector cleanliness is one of the most important factors leading to a successful implementation. The ST connectors on the various components are very easy to clean with a "Kim-wipe" and 100% pure isopropyl alcohol. There are a number of other cleaning methods available.

In terms of cleaning the hybrid connector, there are only two acceptable methods. The first involves having the proper alcohol swab that can be inserted into the optical cavity without harming the ceramic alignment sleeve. These are one-time use. The other involves removal of the alignment sleeve via a special tool made by LEMO and others and then using conventional cleaning methods once the termini is exposed.

Having a routine maintenance/cleaning schedule for all of your fiber optic gear will provide you with many years of reliable service.

Block Diagram

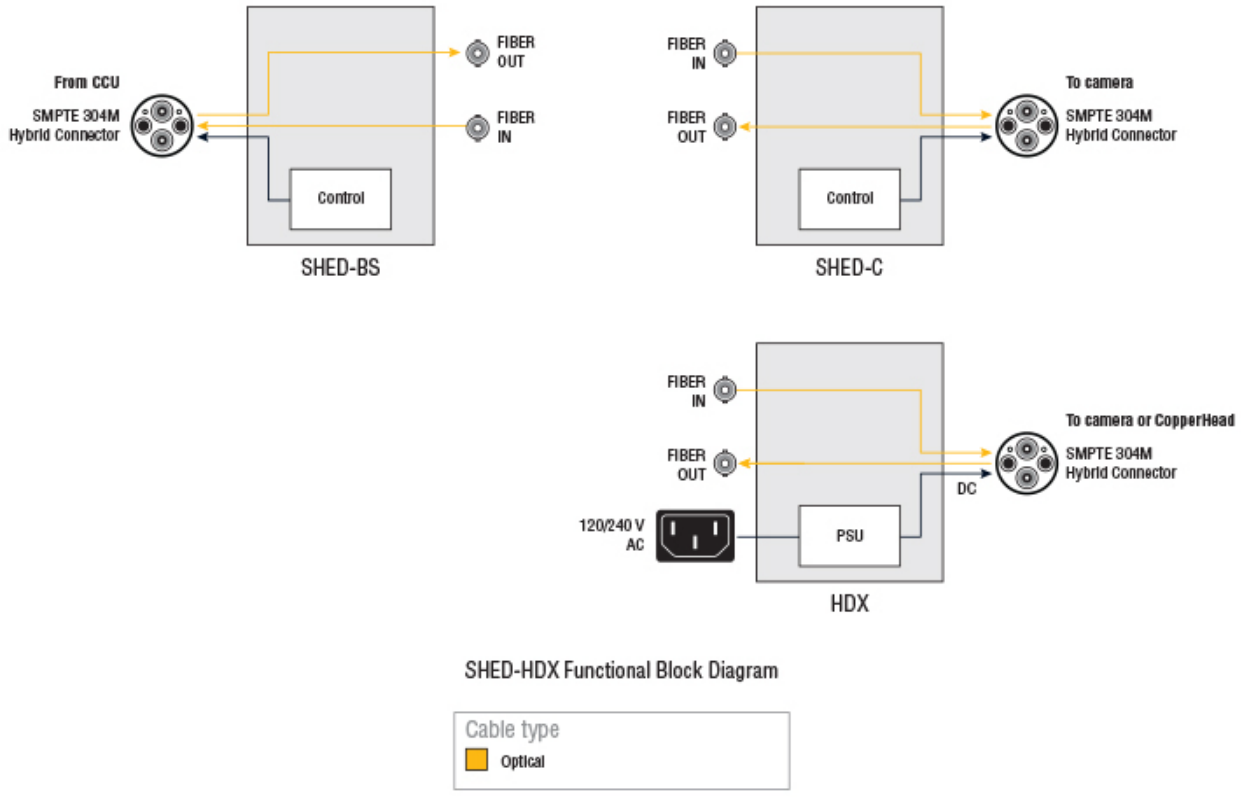


Fig. 3-8: SHED and HDX Functional Block Diagram

4 Specifications

Specifications - SHED-BS & SHED-C

Environment

Dimensions (L x W x H) ..... 7.5" x 1.9" x 2.5"
Weight ..... 1 lb.
Temperature Range ..... -20 C to +55 C
Humidity Range ..... 0 to 95% non-condensing

Connectors

HYBRID (SMPTE) ..... LEMO (SMPTE 304M) standard,
Optional: Fisher, or 2 STs with 5-pin Molex
Optical ..... Two STs, SCs, SCAs, LCs, OpticalCon or MX

Power Consumption

Base Station unit (SHED-BS) ..... Less than 20 Watts
Camera unit (SHED-C) ..... Less than 20 Watts

Transmission

Transmission Method ..... As determined by camera system
Fiber Types ..... Single-Mode
Wavelength (from/to cam) ..... 1300/1550 nm

Representative Fiber Specifications

Fiber Type ..... Single Mode (SM) 9/125µ
Attenuation Factor ..... 0.5 dB/km @ 1300 nm

Specifications - SHED-6 Frame

Environment

Dimensions (L x W x H) ..... 17.5" x 1.9" x 7"
Weight ..... 2 lb.
Temperature Range ..... -20 C to +55 C
Humidity Range ..... 0 to 95% non-condensing

Power Consumption

SHED-6 ..... Less than 20 Watts

All other Specifications remain the same as for SHED-BS and SHED-C.

Specifications - HDX

Environment

Dimensions (D x W x H) ..... 13" x 8.4" x 3.4"

Weight ..... 8.5 lbs.
Temperature Range ..... -20 C to +55 C
Humidity Range ..... 0 to 95% non-condensing

Connectors

HYBRID (SMPTE) ..... LEMO (SMPTE 304M) or Fisher
Optical ..... Two STs, SCs or SCAs

Input Voltage

Mains ..... 100/120/240 VAC, Nominal, 47 - 63 Hz, 250 VA

Power Consumption

HDX & camera ..... 150 VA (120 VA available for camera ops, viewfinder, lens, etc.)

Indicators

LEDs: ..... AC IN, DC HV Enable, AC HV Enable, HV Present, Cable Open, Short Cable, Remote Pwr Enable
4-Segment Display: ..... "Load Type" and "Optical Power"

Transmission

Transmission Method ..... As determined by Camera System
Fiber Types ..... Single-Mode
Link Margin/Distance ..... 12 dB/20 km
Wavelength (from/to cam) ..... 1300/1550 nm

Representative Fiber Specifications

Fiber Type ..... Single Mode (SM) 9/125µ
Attenuation Factor ..... 0.5 dB/km @ 1300 nm

Specifications - HDX - Double Frame

Environment

Dimensions (D x W x H) ..... 12″ x 16.7" x 3.5"
Weight ..... 4.5 lbs.
Temperature Range ..... -20 C to +55 C
Humidity Range ..... 0 to 95% non-condensing
All other Specifications remain the same as for individual HDXs.

Contact Us

Grass Valley Technical Support

For technical assistance, please contact the Grass Valley Technical Support center nearest you:

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