Telecast Fiber Solutions

CopperHead 3404 User Guide

M4051-9900-103

6 April 2016

grass valley
A BELDEN BRAND

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

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1 About CopperHead 3404

This chapter provides an overview of the CopperHead 3404 Transceiver System and includes the safety and warranty information about it.

About CopperHead 3404

The CopperHead 3404 Transceiver System is a camera video, audio, and data multiplexing system that isinstalled between a portable video camera and its power source.It is connected via a single fiber optic cable to a Base Station in a truck, studio, or other video production setup. All video, audio, and data usually carried on Triax or multi-core cable is sent, bi-directionally, over a single lightweight fiber over distances as long as 5 km or more. The CopperHead 3404 is specifically designed to support the use of 4K, 3D, or Dual-Link camera setups.

The Camera Unit fits between the battery or optional power supply and the camera. The CopperHead Camera Unit is configured at time of purchase with special interface plates to accommodate the appropriate camera battery type.

The camera Battery or optional power source attaches to the Camera Unit, which in turn, attaches to the video camera. Batteries accommodated are Sony V-Mount, Anton-Bauer, and PAG.

The CopperHead 3404 Transceiver System consists of two main components:

- The CopperHead 3404 Camera Unit has two options:
  - the battery physical interface system
  - the fiber connector
- The CopperHead 3404 Base Station has three options
  - the power configuration
  - the fiber connector
  - the intercom module

Typically options are determined at the time of product order and the units are delivered pre-configured, although some options can be field-changed by qualified personnel.

Notes on Power Supply Usage

When using your CopperHead 3404 Transceiver System, please ensure that the power supply in use meets the power requirements of your camera. The amount of power available to be sent to the camera through a hybrid Fiber Optic cable depends on the Grass Valley power supply used.

- The available Grass Valley Power Wafer unit provides up to 95 Watts of continuous power.
- The available Grass Valley PowerPlus unit provides 100 Watts continuous power and 150 Watts peak power.

About this User Guide

This CopperHead 3404 Fiber Optic Transceiver System can be delivered in a number of configurations depending on the Power and Battery Mount options selected. This User Guide is designed to cover all of the various options, so not every page in this Guide will apply to your specific system.

Optical Fiber Safety

Never look directly into the end of the optic fiber while either end of the system is operating.

This CopperHead 3404 contains CDRH Class 1 laser devices. Always avoid looking directly at, or staring into, the laser light located on an optical connector or on the end of a fiber. Eye damage can result.

Infrared radiation is produced at the ST fiber connection and at the end of any un-terminated optical fibers that are attached to this connection. Avoid any direct exposure to the light that comes from these sources.

Do not power up the unit when no fiber is attached to the fiber port.

There are no user adjustments inside the CopperHead 3404. Do not attempt any type of service to this instrument other than any as instructed this manual. Refer all servicing to Grass Valley, a Belden Brand.

Always keep the Fiber Optical connectors protected. when not connected. Use protective caps if available. This protects the connector from damage and the unlikely event of exposure to an operating optical link. Keeping the connectors protected when the connectors are not in use will prevent dirt and dust from entering the connector and degrading the performance of the optical link.

Power Fuses

The CopperHead 3404 Base Station with internal power is equipped with Dual Cartridge fuses located next to the AC Power receptacle at the left rear of the unit. Refer to Multi-Pin Wiring Suggestions on page 100 for specific location information.

NEVER operate the CopperHead 3404 Base Station without properly installed and rated fuses. Severe electrical and heat damage could result as well as personal injury or death.

The fuses supplied are standard 4 Ampere fuses – 5 x 20mm. Both fuses are in operation at all times – both the AC Line Hot and the AC Line Neutral are fused.

Unpacking the CopperHead 3404 Transceiver System

The following table lists the various items shipped with a system depending on the particular configuration.

		CopperHead System Type		
Description	**Part Code**	**Tactical Fiber (local power at camera)**	**Hybrid Fiber - Standard Power (Power Wafer)**	**Hybrid Fiber - High Power (PowerPlus)**
CopperHead Camera Unit	CHG3-CAM	●	●	●
CopperHead Base Station	CHG3-BS	●	●	●
AC-to-DC Power Supply	ADAP-AC	●	No	No
Panel-Mountable Fiber Extension	CH3BFC	O	O	No
Camera Remote cable	CHCR	●	●	●
Camera Signal cable	CH3CS	O	O	O
Base Station Remote cable	CHBR	●	●	●
Power Wafer w/jumper cable	CHG3-PW	No	●	No
Eternal Power Wafer Supply	CH3-MPS	No	O	No
PowerPlus	PWRPLS	No	No	●
HDX Power Supply	HDX	No	No	●
Fiber jumper(s)	various	No	No	●
Reel or coil of Tactical Fiber	CA	●	No	No
Reel or coil of Hybrid Fiber	CA	No	●	●
Operations Manual	CA	●	●	●
			●	Standard
			O	Optional

Individual items shipped with a CopperHead 3404 system depend on the particular configuration.

Please consult your packing slip and purchase order to ensure that you have received all of the expected components. Inspect all components for scratches and other mechanical damage, and inspect the electrical connectors for bent or damaged pins and latches. Report any missing or damaged components to Grass Valley. See Product Returns on page 5.

You must use your own video and audio cables to make connections for Video, Tally, Black Burst/Genlock, Base Station monitor, intercom, and other ancillary signals and equipment. Suggestions for these cables are discussed later in this User Guide.

Leave the protective caps on the optical connectors whenever the fiber is disconnected.

Product Returns

In the unlikely event of damage to your CopperHead 3404 Transceiver System during shipping or delivery please note the damage with the delivery or shipping service and document the packaging and product where you see damage. If any component does not work correctly out of the box, please contact Grass Valley (see Contact Us on page 81).

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

2 System Overview

This chapter provides a system overview about the Fiber Cables and the Transceiver System.

Fiber Cable Concepts

Fiber Optics and Fiber Optic Cable are the core technologies at the heart of the CopperHead 3404 Transceiver System. The ability to multiplex and de-multiplex a variety of video, audio and data signals so that they can be carried over a thin strand of Fiber Optic cable for long distances enables the CopperHead System. The theory and operation of Fiber Optics is beyond the scope of this document: this document explains the different types of Fiber Optic Cable and Fiber Optic Cable Connectors.

Fiber Optic Cable

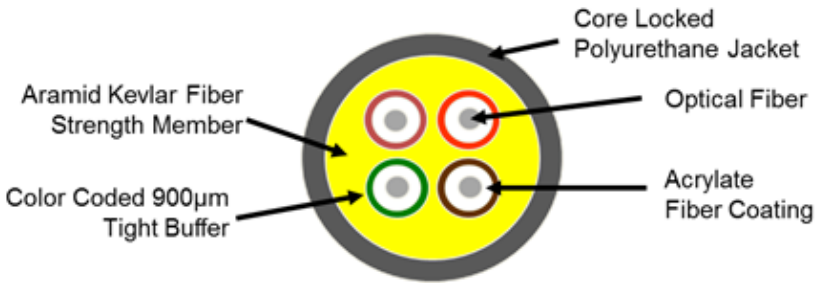


Fig. 2-1: Tactical Fiber Optic Cable Cross-section

Tactical Fiber cable is heavy duty, Kevlar protected, and capable of carrying CopperHead signals extended distances. The cable can generally withstand a variety of environmental hazards such as being crushed or run-over. Tactical Fiber can be used in the field mounted on Portable Fiber Reels in lengths up to 2000 feet.

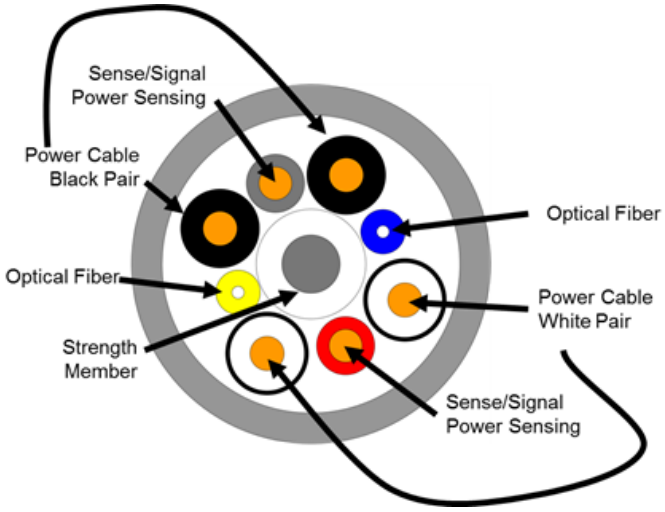


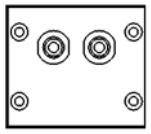
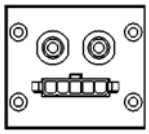
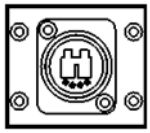
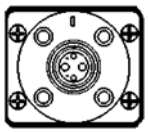
Fig. 2-2: Hybrid Fiber Optic Cable Cross-section

Hybrid Fiber Cable has the same Fiber Optic characteristics with the addition of copper cables. This allows the transmission of power through the cable. This increases weight and reduces operating distance. Hybrid Fiber Cable also includes a pair of Sense/Signal wires that allow systems to determine if there is an open or shorted cable. Hybrid Fiber Cable is also larger in diameter then Tactical Fiber Cable.

Fiber Optic Connector Types

Depending on the type of Fiber Optic Cable used, different Connector types can be configured. The following table summarizes the various types of connectors typically used in a CopperHead 3404 Transceiver System configuration and the allowed Fiber Optic Cable usage. Each connector type is illustrated below.

Connector Type	Tactical Fiber Use	Hybrid Fiber Use	Camera Unit Use	Base Station Use	Notes
ST Fiber Connectors	Yes	Not Typically	No	Yes	Less Expensive - not as durable as OpticalCON, SMPTE 304M or MX
ST Fiber Connectors with Molex Power Plug	No	Not Typically	No	Yes	Used with separate Fiber and Power cables
LC Connectors	No	No	No	No	Infrastructure and Internal Equipment Use
SMPTE 304M	No	Yes	Yes	Yes	
OpticalCON Cable Connector (Neutrik)	Yes	Yes (up to 95V)	Yes	Yes	
OpticalCON Panel Connector (Neutrik)	Yes	Yes	No	No	Infrastructure Use Only
MX Expanded Beam Connector	Yes	No	Yes	Yes	

				
ST Cable Connectors	ST Panel Connectors	ST Panel w/ Molex	OpticalCON Cable	OpticalCON Panel
				
LC Connectors	SMPTE 304M Cable	SMPTE 304M Panel	MX Expanded Beam Cable	MX Expanded Beam Panel

Signal paths in the CopperHead 3404 Transceiver System

The CopperHead 3404 Transceiver System utilizes an optical fiber link between the Base Station and the Camera Unit to carry all of the required signals necessary for operation of the camera and associated production equipment. The Camera Unit multiplexes electrical signals from the camera and other remote sources and converts them to an optical signal for transmission over the fiber. Simultaneously, an optical return signal is received at the Camera Unit from the Base Station; this signal is then converted to electrical analog information for use by the camera, camera operator, and auxiliary equipment at the camera location.

When the hybrid fiber cable option is used, the link also provides power to the Camera Unit and the camera itself. Only the single fiber link or hybrid fiber link is required between the Base Station and the Camera Unit.

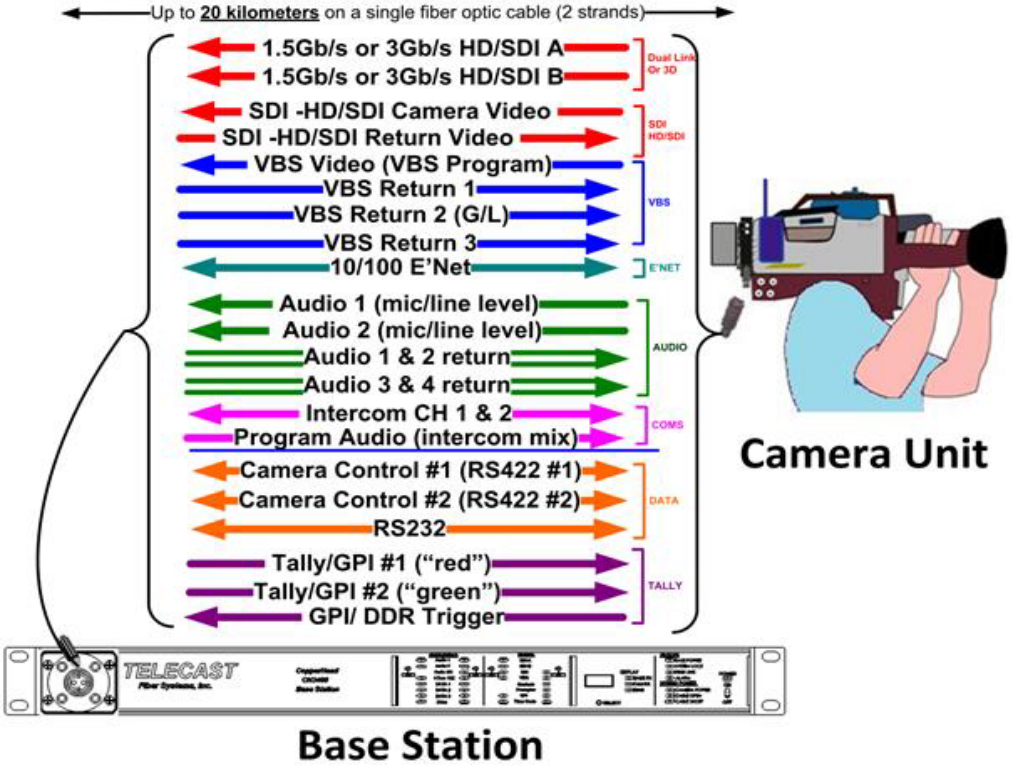


Fig. 2-3: Base Station to Camera Unit Connection

CopperHead 3404 Transceiver System Block Diagrams

Low Power Version

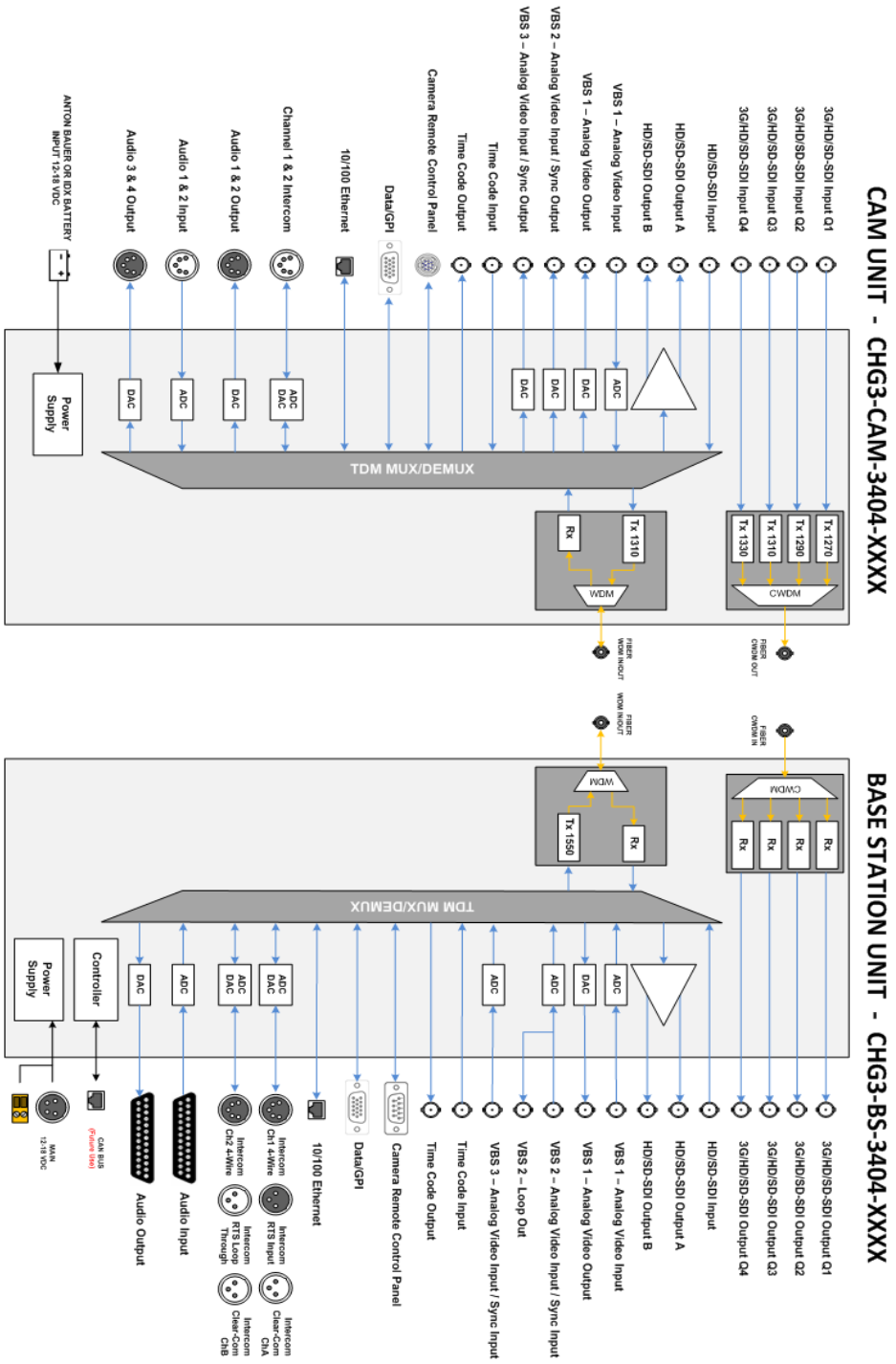


Fig. 2-4: CopperHead System Model 3404 Low Power Version Block Diagram

High Power Version

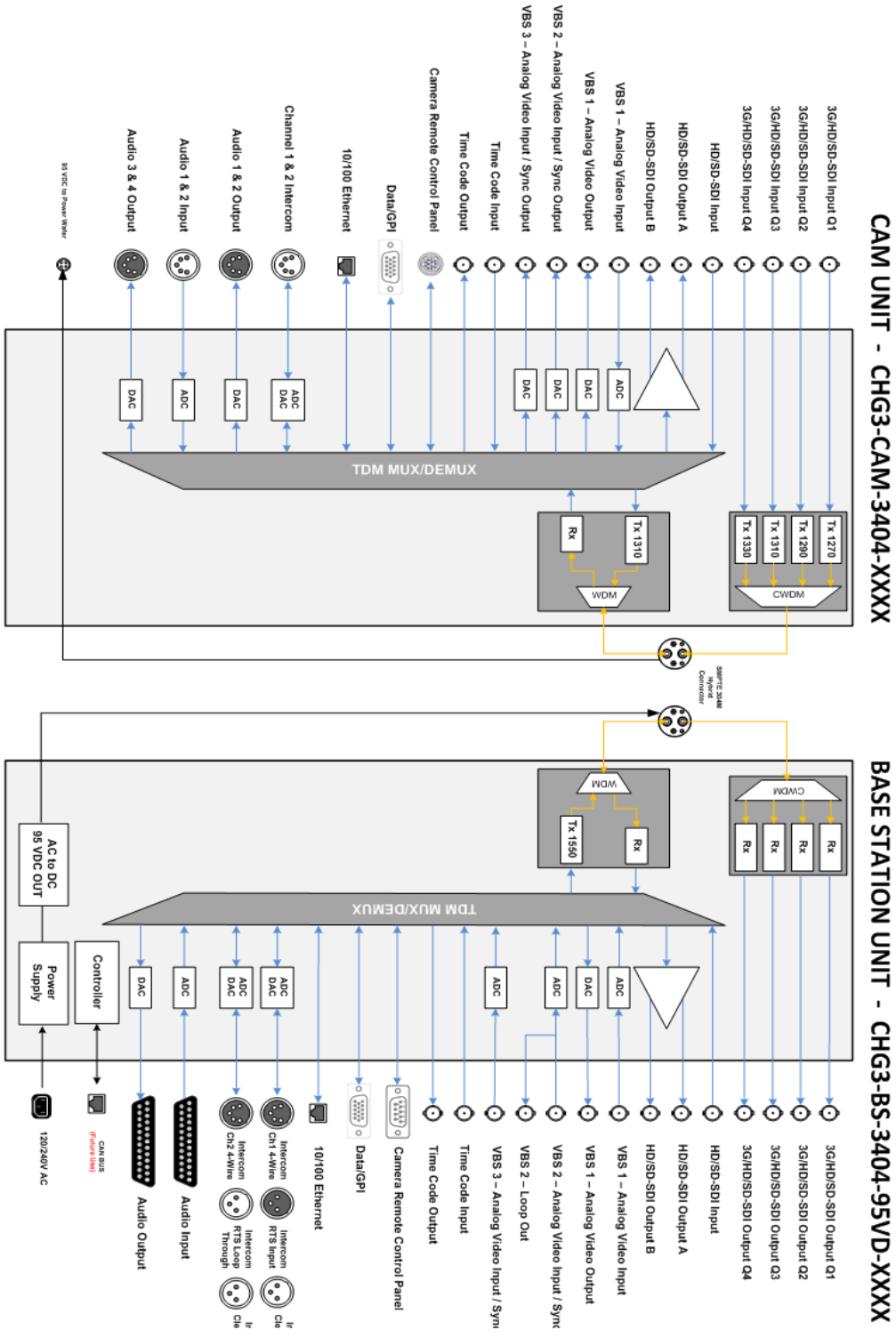
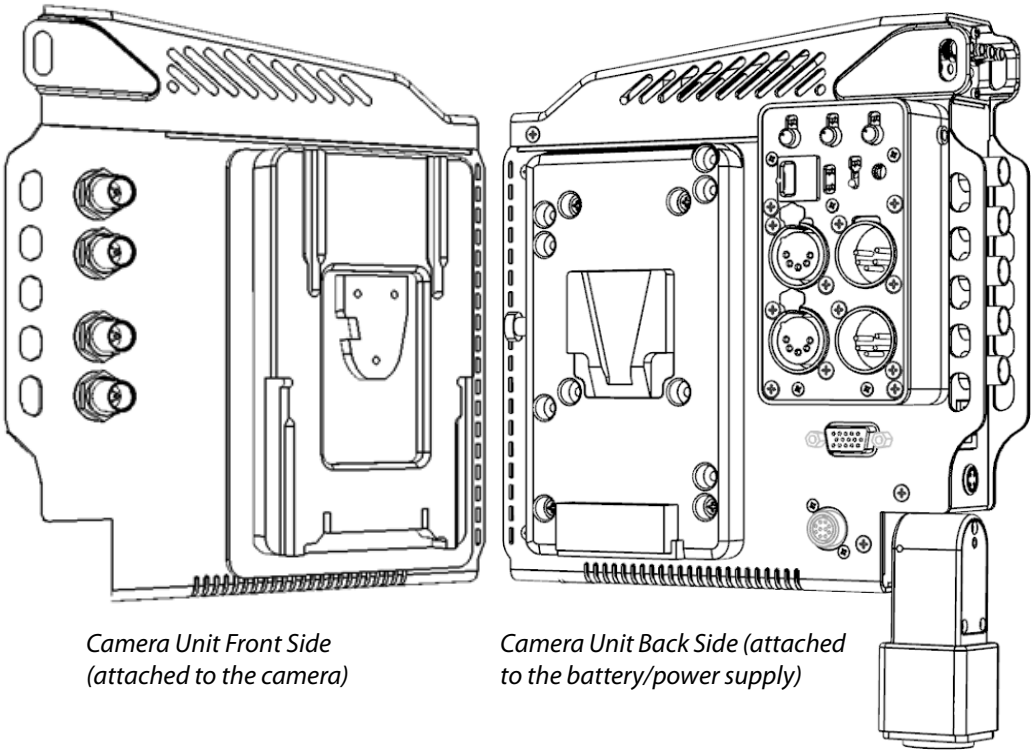


Fig. 2-5: CopperHead System Model 3404 High Power Version Block Diagram

3 CopperHead 3404 Transceiver System Components

The chapter describes the CopperHead 3404 components.

CopperHead 3404 Camera Unit Overview



Camera Unit Front Side (attached to the camera)

Camera Unit Back Side (attached to the battery/power supply)

Fig. 3-1: CopperHead 3404 Camera Unit, Front and Back Sides

The actual appearance of your CopperHead 3404 Camera Unit will vary depending on the battery mount and fiber cable connection options specified at the time of purchase.

CopperHead 3404 Base Station

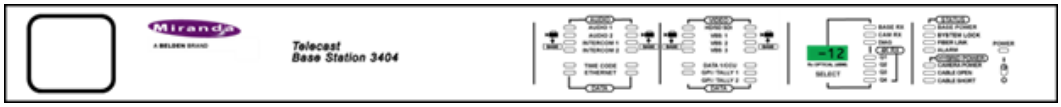


Fig. 3-2: CopperHead 3404 Base Station Front Panel

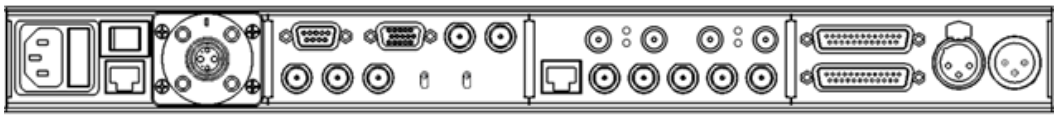


Fig. 3-3: CopperHead 3404 Base Station Connector or Back Panel

The actual appearance of your CopperHead 3404 Base Station will vary depending on the fiber cable connection and power options specified at the time of purchase.

CopperHead 3404 Transceiver System Additional Components

In addition to the CopperHead 3404 Camera Unit and Base Station the system consists of:

- External Power Supply or Power Cord for the Base Station (depending the unit configuration)
- Cable Sets as required by your camera and remote controller types to connect the CopperHead Camera Unit to the camera, and to connect the Base Station to the optional remote controller
- Hardware kits for rack mounting the Base Station
- Portable fiber reel with fiber per your purchase order
- Optional Power Wafer Camera Adaptor with optional external power supply
- Optional PowerPlus Camera Adaptor and Power Adaptor
- Optional Universal Camera Control Unit

For additional accessories see Available Accessories on page 90.

Note: You must use your own cables to make connections for Tally, Black Burst/Gen Lock, Base Station monitor, and other ancillary signals and equipment (see Multi-Pin Wiring Suggestions on page 100 for suggestions).

4 Feature Detailed Description

This chapter describes in detail each element on the Camera Unit and Base Station of the CopperHead 3404 Transceiver System. Physical installation of the system and system connections and practical operation are covered in following chapters.

For an overall view of component location, see the CopperHead 3404 Transceiver System overall diagrams in System Overview Diagrams on page 104.

CopperHead 3404 Camera Unit

CopperHead 3404 Camera Unit Front Side

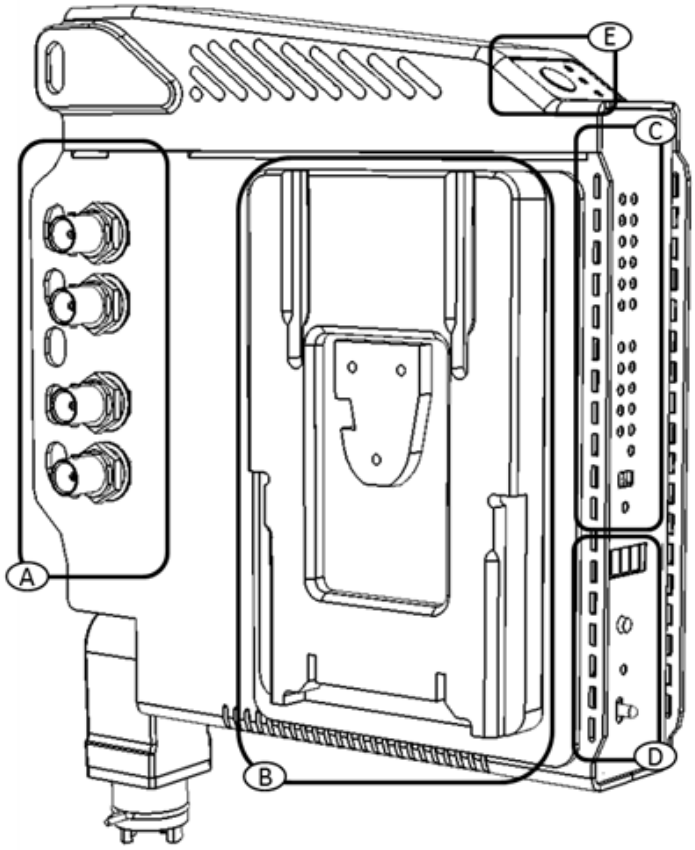


Fig. 4-1: CopperHead 3404 Camera Unit Front Side

The front side of the Camera Unit has five features:

- **A**: **Connector Panel** (see Area A - Connector Panel on page 19)
- **B**: **Camera Mounting Plate** (see Area B - Camera Mounting Plate on page 19)
- **C**: **Signal/Data LED Activity Indicators** (see Area C - Signal/Data Indicators on page 20)
- **D**: **Digital Status Display & Power Switch** (see Area D - Optical Link Signal Strength Indicator & Power Switch on page 21)
- **E**: **Fan Control Switch and Indicators** (see Area E - Fan Control Switch and Indicators on page 22)

Area A - Connector Panel

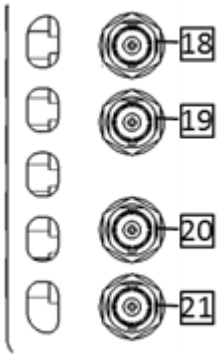
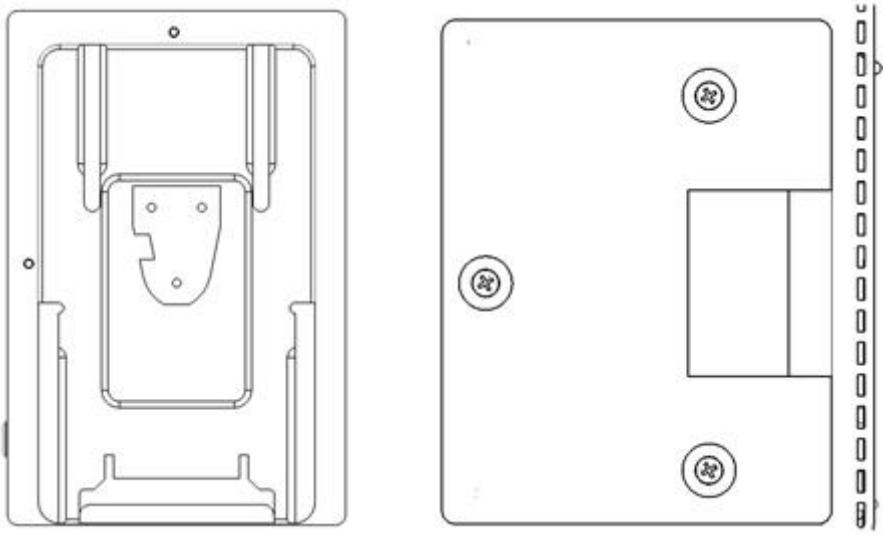


Fig. 4-2: Connector Panel

For additional information about the signals carried on these connectors, see Signal paths in the CopperHead 3404 Transceiver System on page 10.

- **18: Time Code In** (to Base Station) - provides feed of local camera time code or for the provision of a master synchronization time code for all other cameras (typically from Camera 1 and only if not master TC generator at base)
- **19: Time Code Out** (from Base Station) - for time code synchronization of multi-camera productions
- **20: VBS Out 2** (from Base Station) - typically used for Genlock/Black Burst from master synchronizing source
- **21: VBS Out 3** (from Base Station) - typically used for Return Video to camera or for Prompter feed

Area B - Camera Mounting Plate



V-Type Camera Mounting Plate *Anton Bauer Camera Mounting Plate*

Fig. 4-3: Two types of Camera Mounting Plates

The CopperHead 3404 Camera Unit is shipped with a variety of Battery Mount to camera types. The Sony V-mount and the Anton Bauer mount are the most common. PAG and other battery mount systems are available by special order. Please contact Grass Valley, a Belden Brand or your authorized dealer.

Area C - Signal/Data Indicators

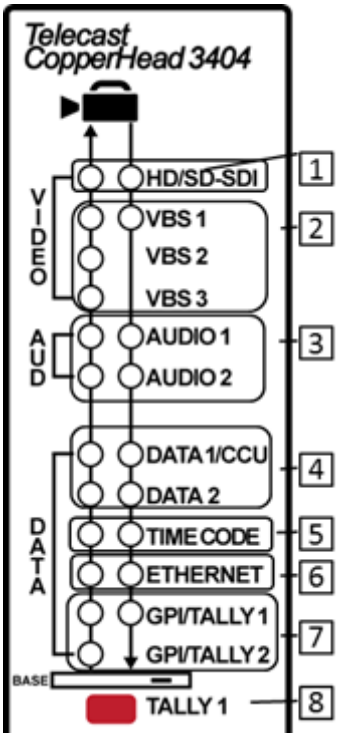


Fig. 4-4: Signal/Data Indicators

The CopperHead 3404 Camera Unit Indicator Panel has a series of LED displays that monitor the various signal paths between the Camera Unit and the Base Station.

For signals that remain constant, such as time code and video, the LED remains on as a steady Green. For signals that fluctuate, such as audio, the LED will reflect the varying signal activity. If the LED is off, either the signal has been lost or it is not in use.

The LED indicators on the left side of the panel indicate signal paths from the Base Station to the Camera Unit. Right side LEDs indicate signal paths from the Camera Unit to the Base Station.

> **Note:** The 4K-3G Signal Indicators are located on the reverse side of the Camera Unit adjacent to the 4K-3G SDI Connectors.

- **1: HD/SD SDI Digital Video Signals** - Monitors camera SDI Video to Base Station and SDI return video to the Camera Unit (these are not the 4K-3G signals).
- **2: VBS 1-3 - Analog Video Signals 1-3** - VBS 1 is used for Camera Monitor video from the Camera Unit to the Base Station and Return Video to the Base Station from the Camera Unit:
  - **VBS 2** is used for Genlock (one way from Base Station to Camera)

  - **VBS 3** (Prompter) is used for Prompter Feed (one way from Base Station to Camera)
- **3: Program Audio Channels 1 & 2** - Monitors program audio from Camera Unit to Base Station and return audio from Base Station to Camera Unit.
- **4: Data Signal Path Monitors CCU and Data - Data 1 /CCU** - Used for Camera Control Unit or for a serial control device (RS232, 422, 485):
  - **Data 2** is typically used for auxiliary devices such as a Robotic Pan & Tilt Head
  - **Data 3** is used for an RS232 serial control device
- **5: TC - Time Code Signal** - Monitors Time Code to Base Station and return from Camera.
- **6: Ethernet Signal** - Monitors Ethernet to Base Station and return from Camera.
- **7: GPI/ Tally Signals** - Monitors GPI/TRIG Signal to Base Station and return from Camera and/or TALLY 1 or 2 Signal to Camera Unit.
- **8: Tally1 Indicator Light** - Indicates the status of the GPI/Tally 1 signal:
  - Off when the signal is not present
  - Bright Red when the signal is present

Area D - Optical Link Signal Strength Indicator & Power Switch

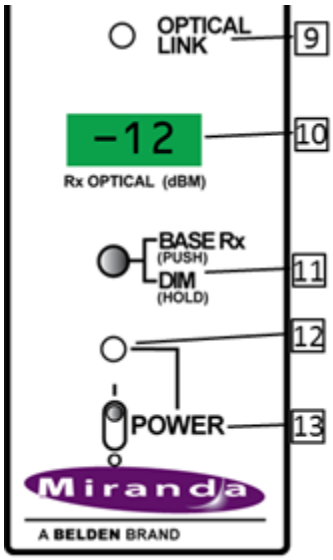


Fig. 4-5: Optical Link Signal Strength Indicator & Power Switch

- **9: Optical Link Indicator** - Indicates the status of the optical connection from base to camera and camera to base:
  - Green when both the Base Station and camera control unit have optical power within normal range.
  - Red when either the Base Station or camera control unit optical power is not within normal range.
- **10: Rx Optical Display (Digital Status Display)** - Four-character display in one of five modes. See The CopperHead 3404 Camera Unit Digital Display on page 71 for use of this Digital Status Display.
- **11: Base Rx/Dim Push Button** - Change four-character display mode.
  - Push and release changes display mode.

- Push and hold adjusts LED indicator brightness.

- **12: Power Indicator LED** - Green indicates power is applied to the camera control unit. Blinking Green indicates a camera control unit error. Refer to DIAG display mode for details - see The CopperHead 3404 Camera Unit Digital Display on page 71.
- **13: Power On/Off Switch** - Toggle switch to enable or disable camera power.
  - When used with the high voltage Base Station this enables or disables camera power.
  - When used with the low voltage Base Station this turns camera power on and off.

Area E - Fan Control Switch and Indicators

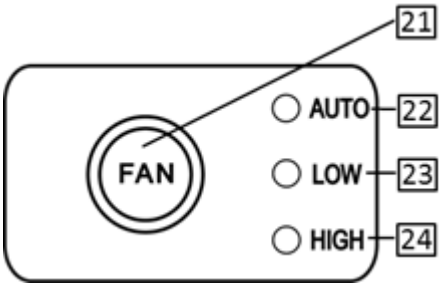


Fig. 4-6: Fan Control Switch and Indicators

- **21: Fan Control Switch** - Push switch selects between four settings:
  - **AUTO** - Fan Speed increases as unit temperature increases
  - **LOW** - Fan Speed set to low speed
  - **HIGH** - Fan Speed set to high speed
  - **OFF** - Fan is turned off (all LED indicators are off when the fan is turned off)
- **22: AUTO Indicator** - Fan is operating in Auto mode and speed increases from ¼ speed to full speed over a temperature range of 55 degrees centigrade to 70 degrees centigrade.
- **23: LOW Indicator** - Fan is at ¼ full speed
- **24: HIGH Indicator** - Fan is at full speed
  - **Fan Diagnostic Mode**: The fan switch allows entry into a LED test mode. Push and hold the FAN switch for about five seconds and the test will begin. At this point all of the LEDs will blink indicating that the fan system is functioning.
  - **High Temperature Warning**: If during regular operation (not the diagnostic mode described above) any of LEDs begin to blink then the CopperHead unit has reached a temperature of at least 70 degrees centigrade. If this occurs confirm that the fan is working correctly in the unit. If this high temperature is sustained for any period of time damage may occur to the system. The unit should be turned off and allowed to cool before restarting and the unit should be checked for malfunction as soon as possible.

CopperHead 3404 Camera Unit Back Side

For additional information about the signals carried on these connectors, see Signal paths in the CopperHead 3404 Transceiver System on page 10.

Throughout this document, component Key Numbers are coordinated with the overall system diagrams (see System Overview Diagrams on page 104).

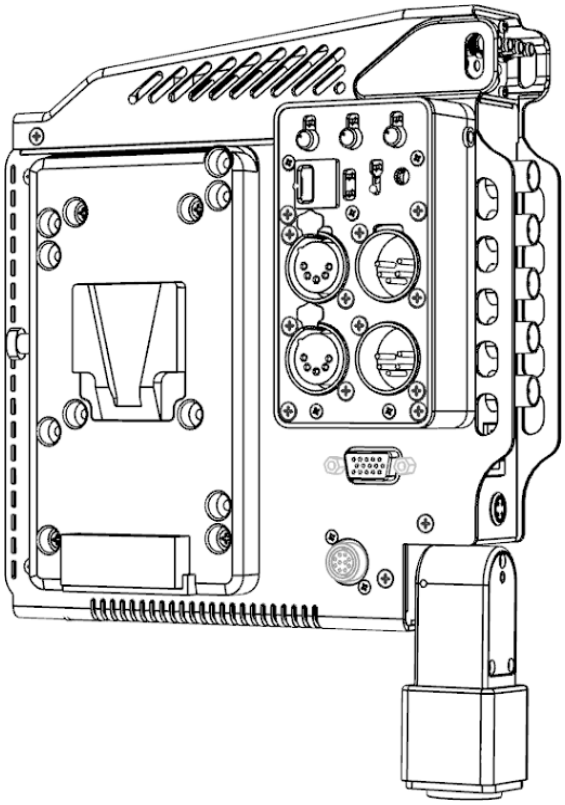


Fig. 4-7: CopperHead 3404 Camera Unit Back Side

The back side of the Camera Unit has six features:

- **A**: **Connector Panel** (see Area A - Connector Panel on page 24)
- **B**: **Audio/Intercom Connector Panel** (see Area B - Audio/Intercom Connector Panel on page 25)
- **C**: **Audio/Intercom Controls** (see Area C - Intercom Controls on page 25)
- **D: Misc. Connectors** (see Area D - Miscellaneous Connectors on page 26)
- **E**: **Fiber Connector** (see Area E - Fiber Connector on page 26)
- **F**: **Battery Mount** (see Area F - Battery Mount on page 27)

Area A - Connector Panel

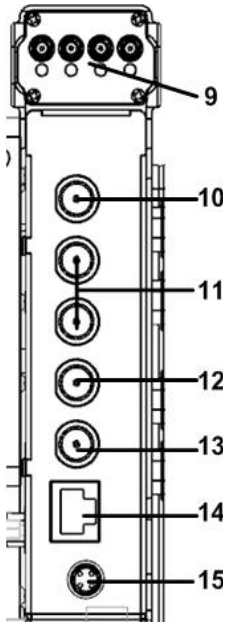


Fig. 4-8: Connector Panel

- **9: 4K - 3G/HD/SD SDI In** - Activity indicators are below each SDI connector (to Base Station)
- **10: HD/SD-SDI In (to Base Station)**
- **11: HD/SD-SDI Digital Video Outputs A & B (from Base Station)**
- **12: VBS In (to Base Station)** - VBS signal paths typically carry analog video
- **13: VBS Out (from Base Station)**
- **14: Ethernet (100Mbs)**
- **15: Power Wafer Connector**

Area B - Audio/Intercom Connector Panel

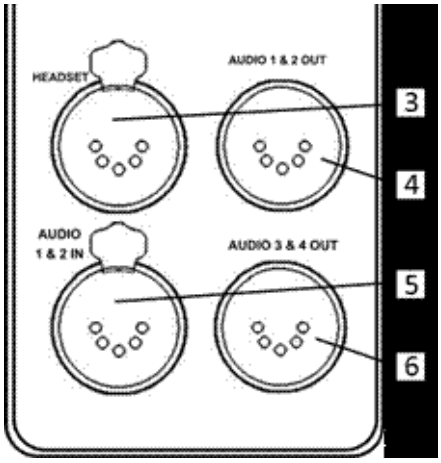


Fig. 4-9: Audio/Intercom Connector Panel

- **3**- **Intercom Head Set Connector**
- **4** - **Audio 1 & 2 Output** (from Base Station): typically for return audio from the Base Station
- **5** - **Audio 1 Input** (Line Level) - (to Base Station): typically for audio program from camera line outputs
- **6** - **Audio 2 Input** (Line Level) - (to Base Station): typically for audio program from camera line outputs

For information on the Audio/Intercom Connector Panel operation, see Understanding Intercom Usage with the CopperHead 3404 on page 62.

Area C - Intercom Controls

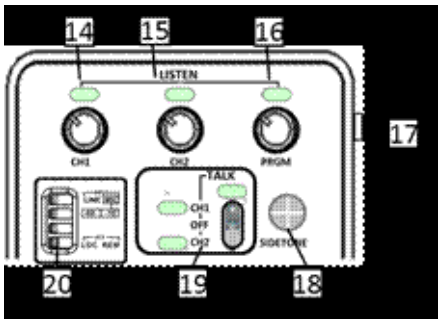


Fig. 4-10: Intercom Controls

- **14** - **Intercom 1 Monitor Level Control and Activity Indicator**
- **15** - **Intercom 2 Monitor Level Control and Activity Indicator**
- **16** - **Return Program Monitor Level Control and Activity Indicator**
- **17** - **Intercom & Return Program Output**: Mini-phone jack with no microphone functionality

- **18 - Sidetone Control**
- **19 - Intercom Talk Control**
- **20 - Intercom Local/Remote**
  - **LOCAL**- Switch 18 is enabled
  - **REMOTE**- Remote Push-to-Talk Switch enabled

For information on the Audio/Intercom Connector Panel operation, see Understanding Intercom Usage with the CopperHead 3404 on page 62..

Area D - Miscellaneous Connectors

For information regarding available cables and customer furnished cables, see Accessories on page 91. For wiring information, see Multi-Pin Wiring Suggestions on page 100.

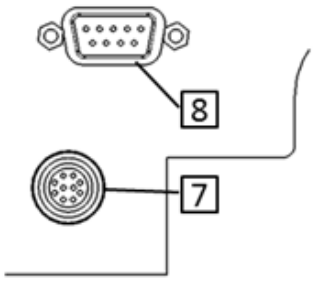


Fig. 4-11: Miscellaneous Connectors

- **7**: **Camera Remote Connector** (for optional Camera Remote Control unit). This connector also carries a Data Signal for Serial Communication (RS232/422/485)
- **8**: **Production DB15HD Connector for Tally, 2nd GPI, Intercom Trigger, and Serial Communication** (RS232/422/485)

Area E - Fiber Connector

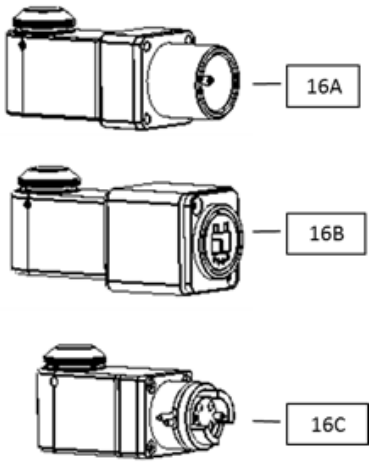
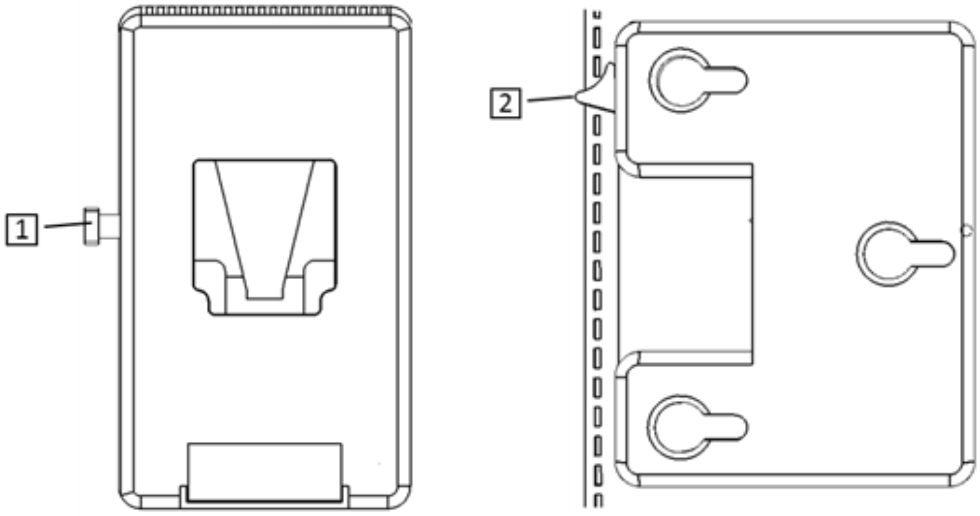


Fig. 4-12: Fiber Connectors

The CopperHead 3404 Camera Unit is shipped with one of the three Fiber Connectors shown in Figure 4-12:

- **A: SMPTE 304M** (powered)
- **B: OpticalCON** (powered or unpowered)
- **C: MX Expanded Beam** (unpowered)

Area F - Battery Mount



V-type Battery Mount *Anton-Bauer Type Battery Mount*

Fig. 4-13: Two types of Battery Mounts

- **1,2**: Battery release latch

The CopperHead 3404 Camera Unit is shipped with a variety of Battery Mount to camera types. The Sony V-mount mount and Anton Bauer are the most common. PAG and other battery mount systems are available by special order. Please contact Grass Valley, a Belden Brand or your authorized dealer.

CopperHead 3404 Base Station

The CopperHead 3404 Base Station is available with a number of options. The unit is ordered with a specified Power Module, Audio/Intercom Module and Fiber Connector. For an overall view of component location, see the overall diagrams in System Overview Diagrams on page 104.

CopperHead 3404 Base Station Front Panel

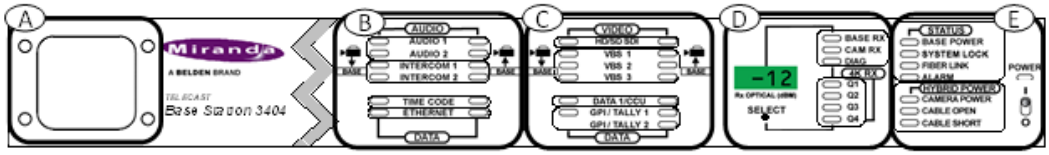


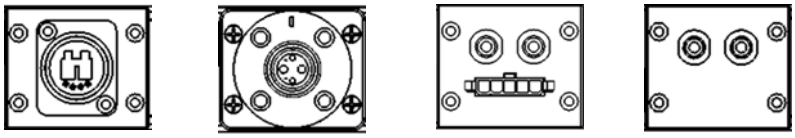
Fig. 4-14: CopperHead 3404 Base Station Front Panel

- **A**: **Optical Connector** (see Area A - Front Panel Optical Connector (Optional) on page 28)
- **B**: **Audio/Data Indicators** (see Area B - Audio Indicators on page 29)
- **C**: **Video/Data Indicators** (see Area C - Video/Data Indicators on page 29)
- **D**: **Signal Strength Indicators/Setup** (see Area D - Signal Strength Indicators/Setup on page 30)
- **E**: **Status/Power Indicators** (see Area E - Status/Power Indicators on page 30)

Area A - Front Panel Optical Connector (Optional)

Area A of the CopperHead 3404 Base Station provides for the optional mounting of the Fiber Optical Connector on the front of the Base Station instead of the rear of the Base Station. Please consult with Grass Valley support if you are interested in moving the Fiber Optical Connector.

Three types of Fiber Connectors are available for use with the CopperHead 3404 Base Station. Typically one of these Fiber Connectors is pre-configured at the time of delivery.



OpticalCON *SMPTE 304M* *ST and Molex Connectors* *ST Connectors*

Fig. 4-15: Fiber Connector Types

Area B - Audio Indicators

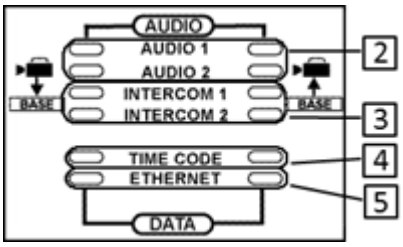


Fig. 4-16: Audio Indicators

LED Indicators to the left side of the label indicate signal paths from the Camera Unit to the Base Station.The right side LEDs indicate signal paths from the Base Station to the Camera Unit.

- **2: Audio Channel 1 & 2** - Monitors Program audio from Camera Unit to Base Station and Return audio from Base Station to Camera Unit.
- **3: Intercom Channels 1 & 2** - Monitors Intercom audio from Camera Unit to Base Station and from Base Station to Camera Unit
- **4: Time Code** - Monitors the time code signal generated by the Camera coming to the Base Station, and monitors the Base or House time code from the Base Station to the Camera Unit
- **5: Ethernet** - Indicates IP Data traffic to and from Camera Unit to and from Base Station

Area C - Video/Data Indicators

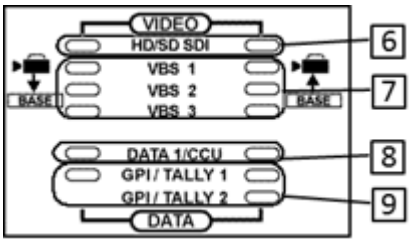


Fig. 4-17: Video/Data Indicators

- **6: HD/SD SDI Digital Video Signal** - Monitors camera SDI video to Base Station and SDI return video to the Camera Unit
- **7: VBS Signals 1-3** - The following are suggested uses of the three VBS signal paths.
  - VBS - 1 Analog Video Signal - Monitors analog Camera video from the Camera Unit to the Base Station and Return video to the Camera Unit from the Base Station
  - VBS - 2 Genlock - Monitors Genlock signal (from Base Station to Camera)
  - VBS 3 - Prompter - Monitors Prompter Feed (one way from Base Station to Camera
- **8: DATA 1/CCU Data** - Monitors Camera Control Unit data or other Data to and from Base Station and Camera Unit
- **9: GPI/Tally 1 & 2** - Monitors GPI and Tally signal activity to the camera. GPI/Tally 1 monitors any camera location originated GPI signals.

Area D - Signal Strength Indicators/Setup

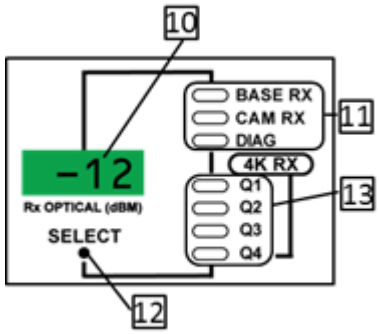


Fig. 4-18: Signal Strength Indicators/Setup

- **10: Signal Strength Readout in dBm** - This display changes between display modes when selected.
- **11: Readout Function Indicator**
  - BASE RX - Optical Link signal strength received at Base Station from Camera Unit
  - CAM RX - Optical Link signal strength received at Camera from Base Station
  - DIAG - Digital display is in Diagnostic mode
- **12: Select Button** - Chooses between three modes of operation (for details on how the setup/Diagnostic functions operate, please The CopperHead 3404 Base Station Digital Display on page 67).
- **13: 4X RX** - Monitors four 4K-3G Optical Link signal strength levels received at Base from Camera.

Area E - Status/Power Indicators

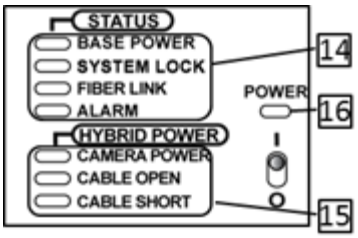


Fig. 4-19: Status/Power Indicators

Note: Hybrid Power Indicators are present only on a hybrid power unit.

- **14: Status Indicators**
  - **BASE POWER** - indicates the status of all power levels in the Base Station
    - Green when all power levels are normal.
    - Red when any power level is not normal.
  - **SYSTEM LOCK** - indicates that the Base Station is communicating with the Camera Unit.
    - Green when communicating with Camera Unit

- Red when it is not communicating with the Camera Unit

- **FIBER LINK** - indicates the optical power status of the Base Station and camera
  - Green when both the Base Station and camera optical power are within a normal range.
  - Red when both the Base Station and camera optical power are not within a normal range
  - Orange when either the Base Station or camera optical power are not within a normal range
- **ALARM** - indicates that some error condition exists in either the Base Station or the camera.
  - Red if there is a Base Station error. Refer to the Base Station DIAG for details on the error.
  - Orange if there is a camera error. Refer to CAM DIAG for details for the error.
  - Green when high voltage is being supplied to the camera.
  - Off when there is no high voltage applied to the camera

- **15: Hybrid Power Indicators**

  The Hybrid Power indicators are only applicable to units with the internal power supply (for configurations using the MPS or HDX power supplies - see MPS External Power Wafer Power Supply on page 37 and "PowerPlus" Camera Adaptor on page 38).

  - **CAMERA POWER** - indicates that high voltage is applied to power the camera
    - Green when the cable is properly connected from the Base Station to the camera.
    - Red when there no cable connected to the camera or the cable is connected but open.

    High voltage will not be applied to the camera until the open condition is corrected.
  - **CABLE OPEN** - indicates that the high voltage cable is open or there is no high voltage cable connected.
  - **CABLE SHORT** - indicates that the high voltage cable connected is shorted.
- **16: Power Switch & Power Indicator**

  Toggle switch to enable or disable Base Station power.

  LED turns Green when on/off switch is changed to the ON position. With a hybrid power system (power supplied by the Base Station) this switch will control power to the Camera and the Camera Unit

  For the hybrid system to be properly powered, the AC Mains switch on the rear of Base Station must be in the on position.

CopperHead 3404 Base Station Back Panel

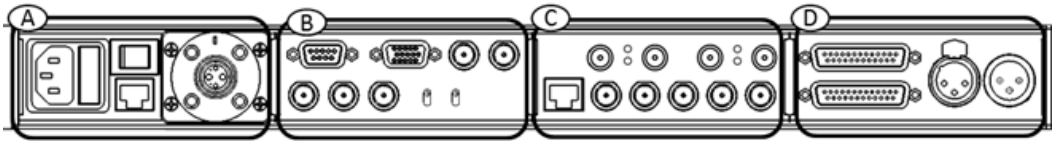


Fig. 4-20: CopperHead 3404 Base Station Back Panel

- **A**: **Power & Fiber Connectors** (see Area A - Power & Fiber Connectors (Power Module) on page 32)
- **B**: **Sync/Data/Control Connectors & Switches** (see Area B - Sync/Data/Control Connectors on page 33)
- **C**: **Video/Ethernet Connectors** (see Area C - Video/Ethernet Connectors & Indicators on page 34)
- **D**: **Audio/Intercom Connectors** (see Area D - Audio/Intercom Connectors on page 35)

Area A - Power & Fiber Connectors (Power Module)

The CopperHead 3404 Base Station can be configured with one of five different Power Module Options.

- The connection and practical use of each of these options is covered in Operation of CopperHead 3404 Transceiver System on page 59.
- Multi-pin connector wiring suggestions are covered in Multi-Pin Wiring Suggestions on page 100.

External Power Options

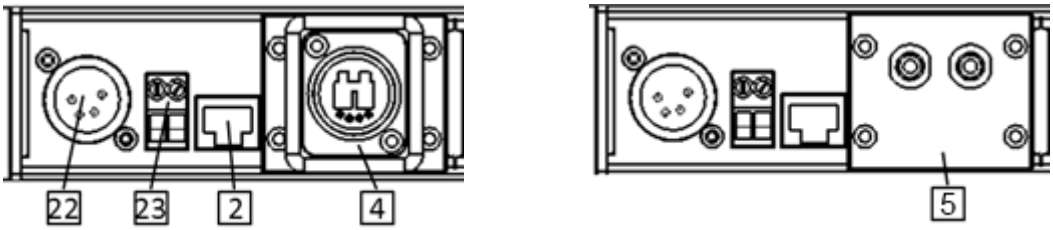


Fig. 4-21: External Power with OpticalCON Connector

- **22**: **12V DC External Power Supply input connector** (XLR 4 Pin)
- **23**: **12V DC Input - terminal block** (see Connector Pin Assignments on page 82 for connection details)
- **2**: **For Future Use**
- **4: OpticalCON Connector** - External Power with STs Connector
- **5**: **ST Fiber Connectors**

Internal Power Options

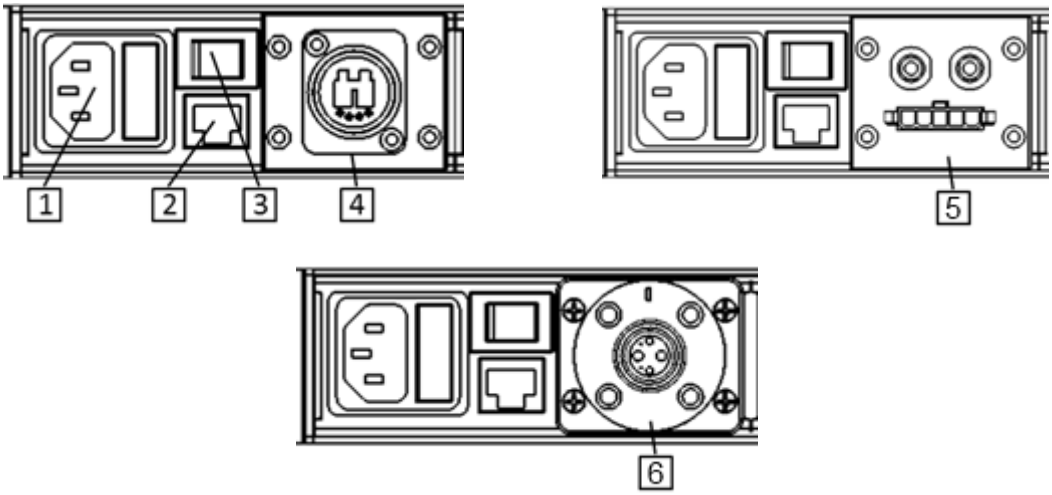


Fig. 4-22: Internal Power Options

Internal Power with OpticalCON Connector

- **1: AC Power Receptacle and 4AMP Dual Fuse Assembly** - 100-240V 50/60 Hz (see Power Fuses on page 3
- **2: For Future Use**
- **3: AC Mains Switch**
- **4: OpticalCON Connector** - Internal Power with STs and Molex Connectors
- **5: STs Connector with Molex for Camera power** - Internal Power with SMPTE 304M Connector
- **6: SMPTE 304M Connector**

Area B - Sync/Data/Control Connectors

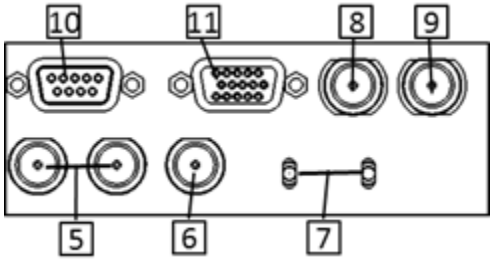


Fig. 4-23: Sync/Data/Control Connectors

- **5**: **Sync/Black Burst input connector & Loop through**
- **6**: **Video Prompter input to Camera**
- **7**: **VBS Switches** - For VBS 2 and VBS 3 select between Analog Video (VIDEO) and Tri-Level Sync (SYNC)
- **8**: **Time Code In to Camera**
- **9: Time Code Out from Camera**

- **10: Camera Remote Control Panel Connector**
- **11: Data/GPI Multi-Pin Connector**

Area C - Video/Ethernet Connectors & Indicators

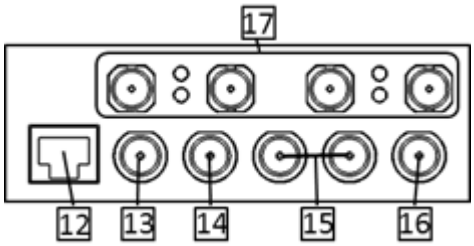


Fig. 4-24: Video/Ethernet Connectors & Indicators

- **12**: **Ethernet connector** - 10BaseT/100BaseT
- **13: VBS Output from Camera**
- **14: VBS Return Video source Input to Camera**
- **15: HD/SDI Program from Camera Unit outputs 1 & 2**
- **16: SDI Return Video source Input to Camera**
- **17**: **4K-3G/HD/SD** SDI Video from Camera Q1-Q4 with associated LED indicators

4K Signal Strength LEDs

Each 4K-3G/HD/SD SDI Video connection from the Camera (Q1-Q4) has a signal strength LED indicator. There are three possible indications.

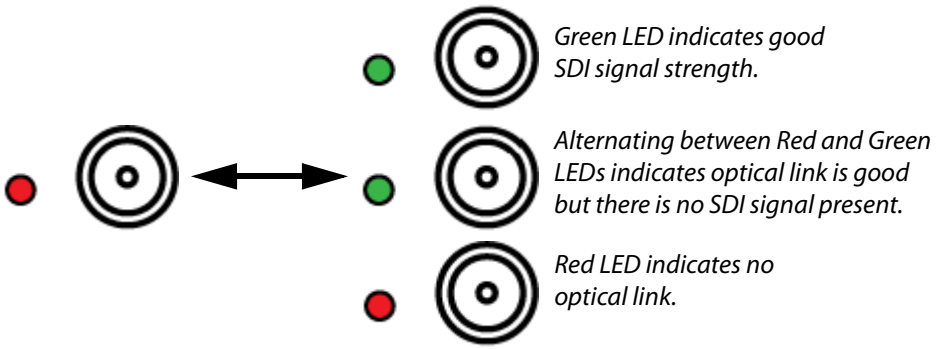
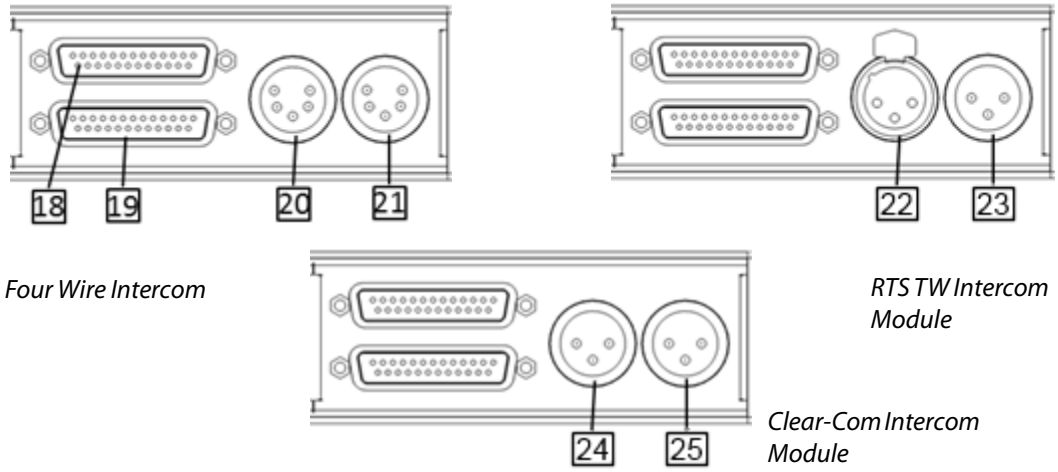


Fig. 4-25: 4K Signal Strength LEDs

Area D - Audio/Intercom Connectors



Four Wire Intercom

RTS TW Intercom Module

Clear-Com Intercom Module

Fig. 4-26: Audio/Intercom Connectors

The CopperHead 3404 Base Station can be configured with one of three different Intercom Options. The connection and practical use of each of these options is covered in Operation of CopperHead 3404 Transceiver System on page 59. Multi-pin connector wiring is covered in Connector Pin Assignments on page 82 and Multi-Pin Wiring Suggestions on page 100.

Four Wire Intercom Module

- **18: Audio In Multi-pin connector**
- **19: Audio Out Multi-pin connector** - Connectors 18 & 19 adhere to the TASCAM standard for DB25 Audio
- **20: Ch-1 Intercom connector**
- **21: Ch-2 Intercom connector**

RTS TW Intercom Module

- **22: Intercom Input**
- **23: Intercom Loop Through**

Clear-Com Intercom Module

- **24: Ch-A Intercom Connector**
- **25: Ch-B intercom Connector**

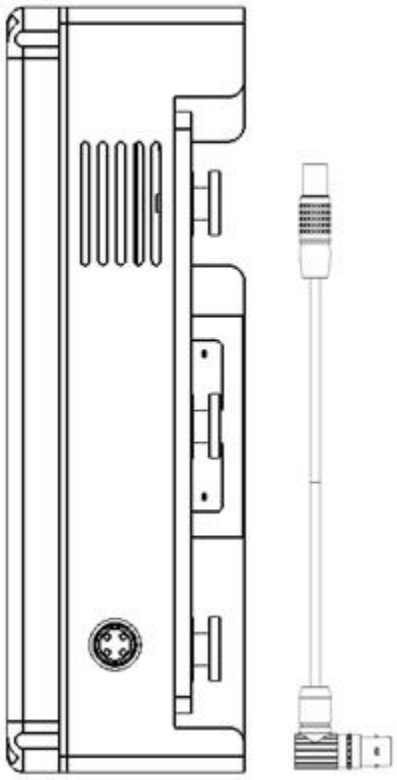
Additional CopperHead 3404 Transceiver System Items

Your CopperHead 3404 Transceiver System may include of one or more of the following items.

- Portable fiber reel with fiber per your purchase order
- Optional Universal Camera Control Unit (please refer to the User's guide supplied with this product)
- Optional "Power Wafer" Camera Adaptor (see "Power Wafer" Camera Adaptor on page 36)
- Optional MPS External Power Wafer Power Supply (see MPS External Power Wafer Power Supply on page 37)
- Optional "PowerPlus" Camera Adaptor and Power Adaptor (please refer to the User's guide supplied with this product) - see "PowerPlus" Camera Adaptor on page 38
- Optional HDX Power Unit (please refer to the User's guide supplied with this product) - see HDX Power Unit on page 39

"Power Wafer" Camera Adaptor

The CopperHead 3404 Camera Unit can be powered by the optional "Power Wafer" Camera Adaptor. The Power Wafer replaces the local camera battery and any local AC power supply adaptor. The Power Wafer gets its power from the Hybrid fiber cable and the CopperHead 3404 Base Station equipped with the internal power supply or from the MPS external supply.



The Power Wafer replaces the battery or local battery mount AC adaptor. Shown with the Anton-Bauer Battery Mount option.

A short jumper cable carries power from the Camera Unit to the Power Wafer. The power comes to the camera on the power section of the Hybrid Fiber

Fig. 4-27: Power Wafer battery mount

Up to 95 watts of power can be delivered to the camera, Camera Unit and camera powered accessories. Up to 780 feet (240 meters) of cable can be used when the Camera Unit is powered directly from the Base Station. Please ensure that the power provided is adequate for the camera in use with your system.

The use of an external power supply can extend Base Station to Camera range and increase camera power flexibility. The MPS "Throw Down" device or Wafer Power Adaptor provides this functionality.

MPS External Power Wafer Power Supply

The CopperHead MPS external power supply provides 95 watts of 12VDC power and fiber cable signal connectivity from the Base Station to the Camera. From the MPS unit to the camera can be configured using either a Hybrid OpticalCON connector or a SMPTE 304M connector. The length available is up to 780 feet or 240 meters.

From the MPS unit to the Base Station can be configured using a non-hybrid OpticalCON connector or two ST connectors. The length available is up to 5 kilometers (3 miles).

The MPS is powered locally with standard AC power. The unit is free standing.

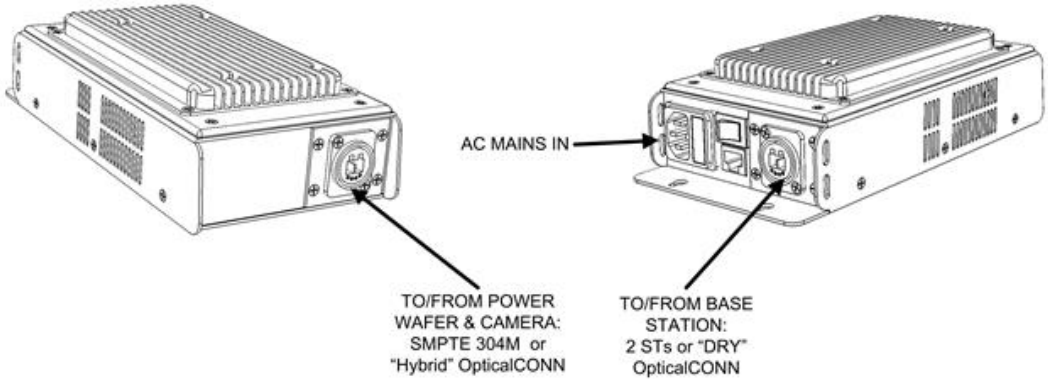


Fig. 4-28: MPS External Power Wafer Power Supply

All MPS Units require the Power Wafer to provide power to the Camera Unit. Four variations are available with a different set of fiber cable connectors. All MPS units provide 95 watts of 12VDC power.

Part Number	Fiber Connection to Camera	Fiber Connection to Base Station
CH2-MPS-95VD-2ST-NEU	OpticalCON	2 STs
CH2-MPS-95VD-2ST-304	SMPTE 304M	2 STs
CH2-MPS-95VD-NEU-NEU	OpticalCON (with power)	OpticalCON (no power)
CH2-MPS-95VD-NEU-304	SMPTE 304 (with power)	OpticalCON (no power)

"PowerPlus" Camera Adaptor

The CopperHead PowerPlus external power adaptor provides up to 150 watts of 12VDC power and fiber cable signal connectivity from the Base Station to the Camera. It also provides an external power feed of 12VDC and optionally 24VDC. The PowerPlus unit requires the use of the HDX Power Adaptor. Please ensure that the power provided is adequate for the camera in use with your system.

The PowerPlus unit connection to the camera can be configured using either a Hybrid OpticalCON connector, SMPTE 304M connector or an MX connector. The PowerPlus unit to the HDX power supply is configured using Hybrid Fiber Cable with SMPTE 304 connectors. From the Base Station to the HDX power adaptor requires 2 ST connectors. See the configuration table below.

The distance between the HDX power adaptor and the camera can be up to 2KM (1.2 miles) using Hybrid Fiber Cable and the distance between the HDX power adaptor and the Base Station can be up to 7KM (4.3 miles). The HDX unit is powered locally from regular AC power.

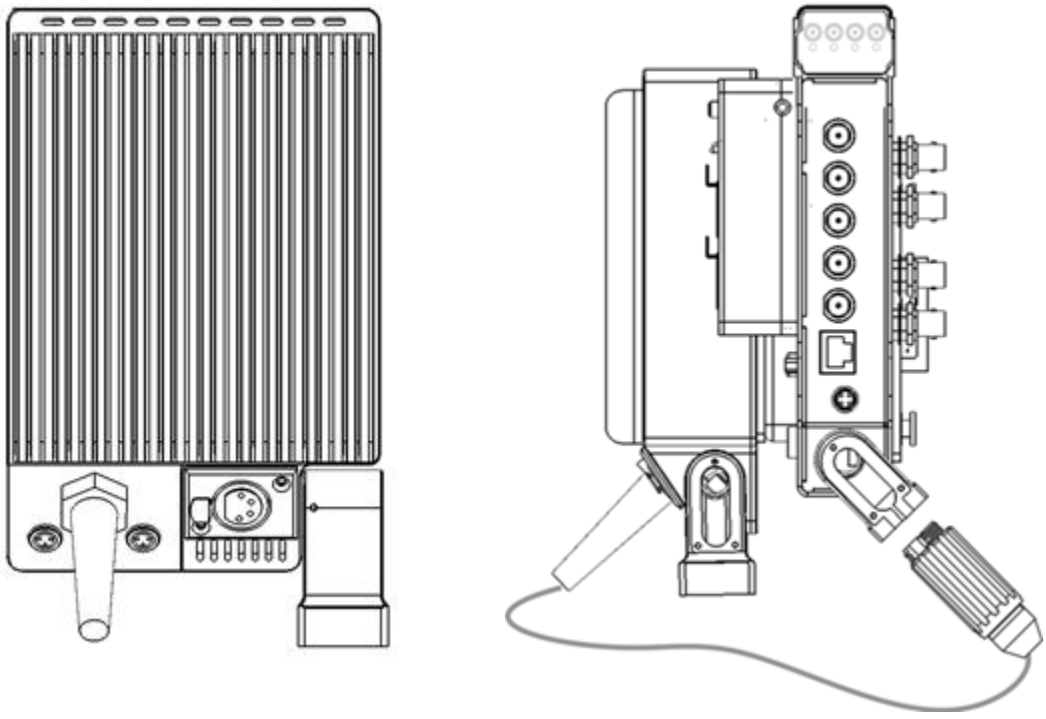


Fig. 4-29: PowerPlus Camera Adaptor

The PowerPlus unit is provided with a permanent connection to the fiber connector on the CopperHead 3404 Camera Unit.

PowerPlus to Camera Unit	PowerPlus to HDX Unit	HDX Unit to Base Station
MX Connector	SMPTE 304M	2 ST Connectors
OpticalCON (Neutrik)	SMPTE 304M	2 ST Connectors
SMPTE 304M	SMPTE 304M	2 ST Connectors

HDX Power Unit

The HDX Power Supply Unit is required when using the PowerPlus Camera Adaptor. The HDX-2ST can be used as a free-standing unit or rack mounted. The HDX-FR-2 for two HDX units is shown below.

The unit allows PowerPlus to provide a continuous 100 Watts of 12VDC with peak output of 150 Watts of 12VDC.

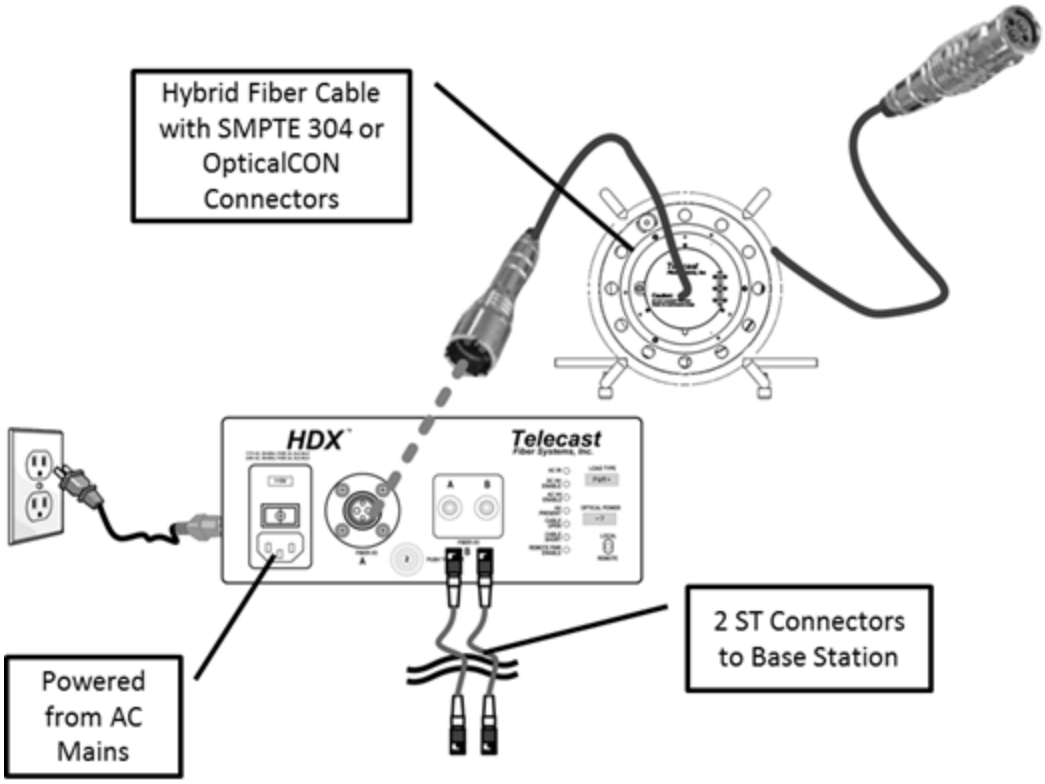


Fig. 4-30: HDX Power Supply Configuration

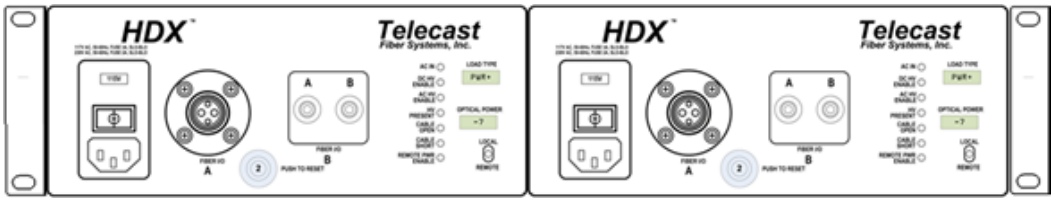


Fig. 4-31: Two Unit HDX Rack Mount

5 Installing and Connecting the System

This chapter explains how to install the CopperHead 3404 and how to connect the various components togethre.

Installing the CopperHead 3404 Transceiver System

Mounting the CopperHead 3404 Camera Unit to the Camera

This example illustrates the mounting of a V-Mount battery system. Your system may differ. This case illustrates a configuration where the camera is powered locally at the camera position by a battery. This assumes a tactical fiber connection with no hybrid power on the cable

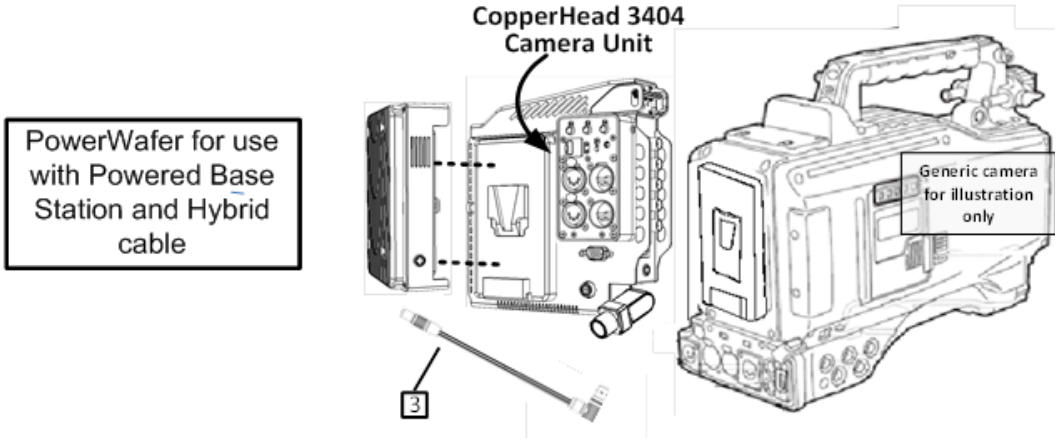


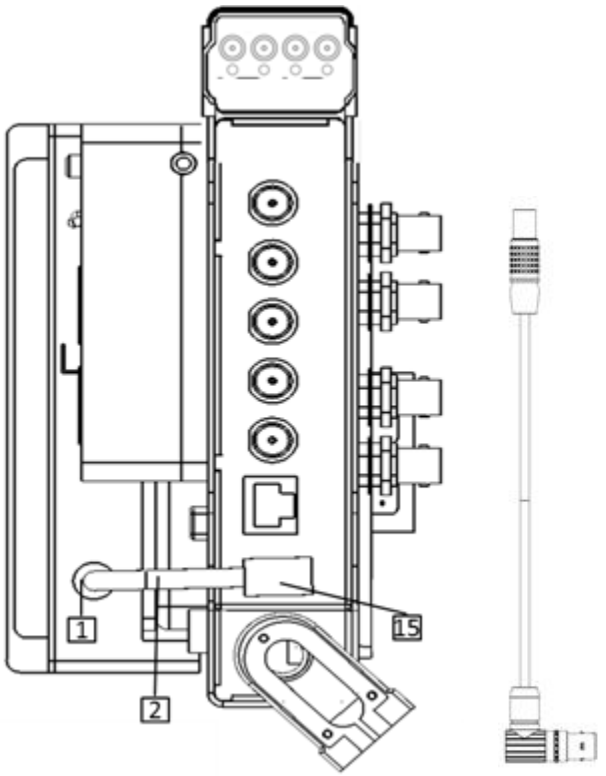
Fig. 5-1: Mounting the CopperHead 3404 Camera Unit to the Camera

Mounting the CopperHead 3404 Camera Unit to the Camera

1. Position your camera so that you can easily access the battery mounting plate at the rear of the camera. Ensure that the camera is well supported and stable. If a battery is mounted remove it and put it to one side (camera model shown for illustrative purposes only - your camera may differ).
2. Attach the CopperHead 3404 Camera Unit to the camera battery mounting plate. The mounting is mechanically identical to attaching a battery.
3. If you are powering the camera and 3404 Camera Unit by battery, mount the battery to the CopperHead 3404 Camera Unit battery mounting plate exactly as you would mount the battery to your camera.

Mounting the Power Wafer Unit to the CopperHead 3404 Camera Unit

This example illustrates the use of a camera with a V-Mount battery system. Your system may differ. This case illustrates a configuration where the camera is powered through the Power Wafer option. The Power Wafer is powered through a Hybrid fiber cable which is powered from the CopperHead 3404 Base Station or MPS External Power Supply.



The Power Wafer to Camera Unit cable is supplied with the CopperHead Power Wafer Unit.

Fig. 5-2: Mounting the Power Wafer Unit to the CopperHead 3404 Camera Unit

Mounting the Power Wafer Unit to the CopperHead 3404 Camera Unit

1 The CopperHead 3404 Camera Unit is mounted to the camera as described above on the previous page.

2 The Power Wafer is attached to the CopperHead 3404 Camera Unit in place of the battery. It is attached in the same manner as the camera battery.

3 When the Power Wafer is securely mounted to the CopperHead 3404 Camera Unit you must connect the supplied Power Wafer connector cable (2) between the Power Wafer (1) and the Power Wafer connector on the Camera Unit (15)

The Power Wafer to Camera Unit cable is supplied with the CopperHead Power Wafer Unit.

Mounting the PowerPlus Unit to the CopperHead 3404 Camera Unit

This example illustrates use of a camera with a V-Mount battery system. Your system may differ. This case illustrates a configuration where the camera is powered through the PowerPlus High Power option. The PowerPlus Unit is powered through a Hybrid fiber cable which is powered from the HDX Power Supply.

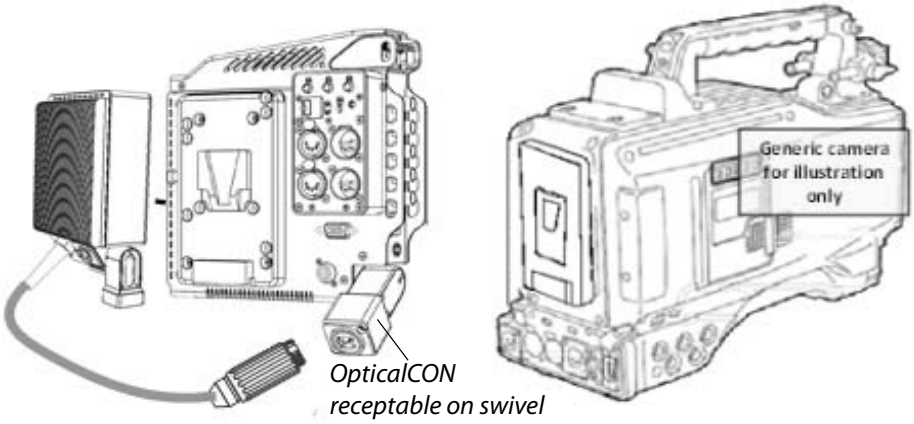


Fig. 5-3: Mounting the PowerPlus Unit to the CopperHead 3404 Camera Unit

Mounting the PowerPlus Unit to the CopperHead 3404 Camera Unit

1 The CopperHead 3404 Camera Unit is mounted to the camera ("Power Wafer" Camera Adaptor on page 36).

2 The PowerPlus Unit is attached to the CopperHead 3404 Camera Unit in place of the battery. It is attached in the same manner as the camera battery.

3 When the PowerPlus Unit is securely mounted to the CopperHead 3404 Camera Unit you must connect the supplied attached fiber cable connector between the PowerPlus (**1**) and the fiber connector on the Camera Unit (**16**).

Note: You must use the HDX-2-ST Power Supply in this configuration.

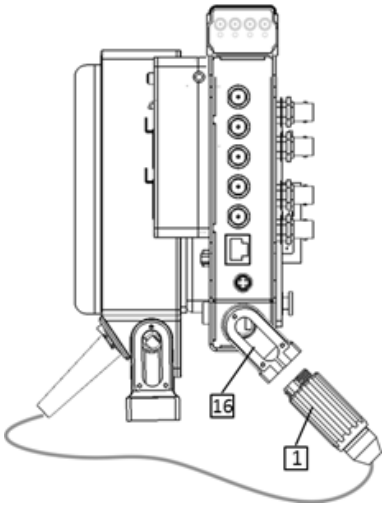


Fig. 5-4: Attaching the fiber cable

Connecting the CopperHead 3404 Transceiver System

Prior to connecting your CopperHead 3404 Transceiver System please ensure that each of the required cables is available for use. This includes standard video, audio and data cables as well as custom multi-pin cable sets required for your particular installation (see Available Accessories on page 90.

Covered in this chapter are the following topics:

- Connections between the CopperHead 3404 Base Station and the Camera Unit (Fiber Cable)
- Connections between the CopperHead 3404 Base Station and the base video infrastructure & power components
- Connections between the CopperHead 3404 Camera Unit and the video camera & power components
- Connections between the CopperHead 3404 Camera Unit and the external field equipment used at the camera location

Connections between Base Station and Camera Unit

The following table summarizes the various Fiber Cable connection options between the CopperHead 3404 Base Station and the Camera Unit.

Cable Type	Base Station Power	Camera Unit Power	Distance Range Between Camera and Base
Tactical Fiber	Internal	Local Battery or AC Power	Up to 10 KM (This range can be extended to greater than 20 KM through use of the optional High Power Laser - must be ordered at time of purchase)
SMPTE Hybrid Fiber	Internal	Power Wafer Camera Adaptor	240 meters
SMPTE Hybrid Fiber	External - Wafer Power Supply 95 Watts1	Power Wafer Camera Adaptor	5 KM between base and power supply 240 meters between power supply and camera
SMPTE Hybrid Fiber	External - HDX Power Supply - 150 Watts2	CopperHead PowerPlus Camera Adaptor	5 KM between base and power supply 3.2 KM between power supply and camera

- The external Wafer Power Supply must be equipped with the required Fiber Cable connectors depending on your system requirements.
- The external HDX Power Supply provides two ST Fiber Connectors for connection between the HDX and the Base Station and a SMPTE 304M Connector for connection between the HDX and the Camera Unit.

The following fiber connection scenarios do not take into account any customized cable and connector installations you may have at your facility. For assistance regarding more complex connection situations please contact Grass Valley, a Belden Brand or your local authorized dealer.

Tactical Fiber between the Base Station and Camera Unit

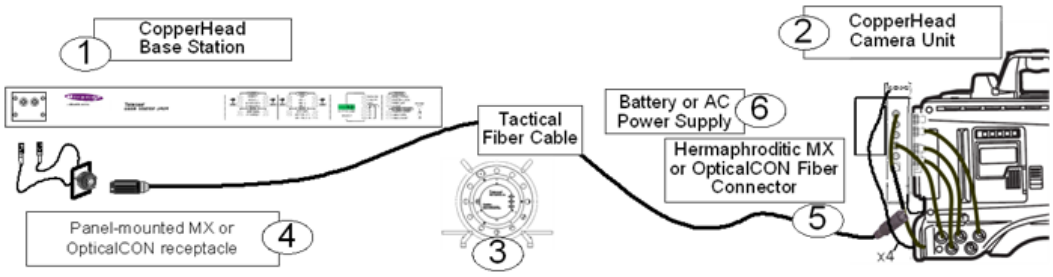


Fig. 5-5: Tactical Fiber between the Base Station and Camera Unit

Between the Base Station (**1**) the Camera Unit (**2**) connect a length of Tactical Fiber Cable (**3**). At each end of the fiber cable will be either an OpticalCON or MX Fiber Connector (**4**) and (**5**). The Base Station connector (**4**) may be mounted either on the front or back of the Base Station. The camera must be powered by local power, either a Battery or a local AC Power Supply (**6**).

> **Note:** Your configuration may have the OpticalCON or MX Fiber Connector (4) directly mounted on the Base Station Chassis or it may have a panel mounted connector leading to two ST connectors.

SMPTE Hybrid Fiber between the Base Station (powered) and Camera Unit

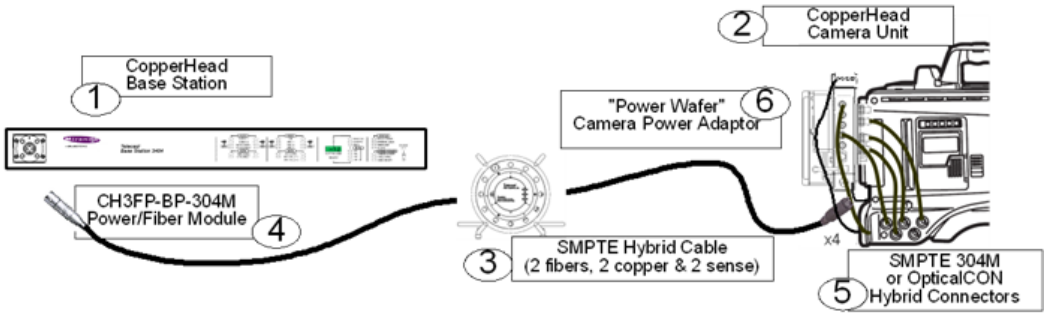


Fig. 5-6: SMPTE Hybrid Fiber between the Base Station (powered) and Camera Unit

Between the Base Station (**1**) and the Camera Unit (**2**) connect a length of SMPTE Hybrid Fiber Cable (**3**). At each end of the fiber cable will be either an OpticalCON or SMPTE 304M Connector (**4**) and (**5**). The Base Station connector (**4**) may be mounted either on the front or back of the Base Station. The camera will be powered by the CopperHead Power Wafer Camera Power Supply (**6**).

SMPTE Hybrid Fiber between Base Station and Camera Unit (Infrastructure)

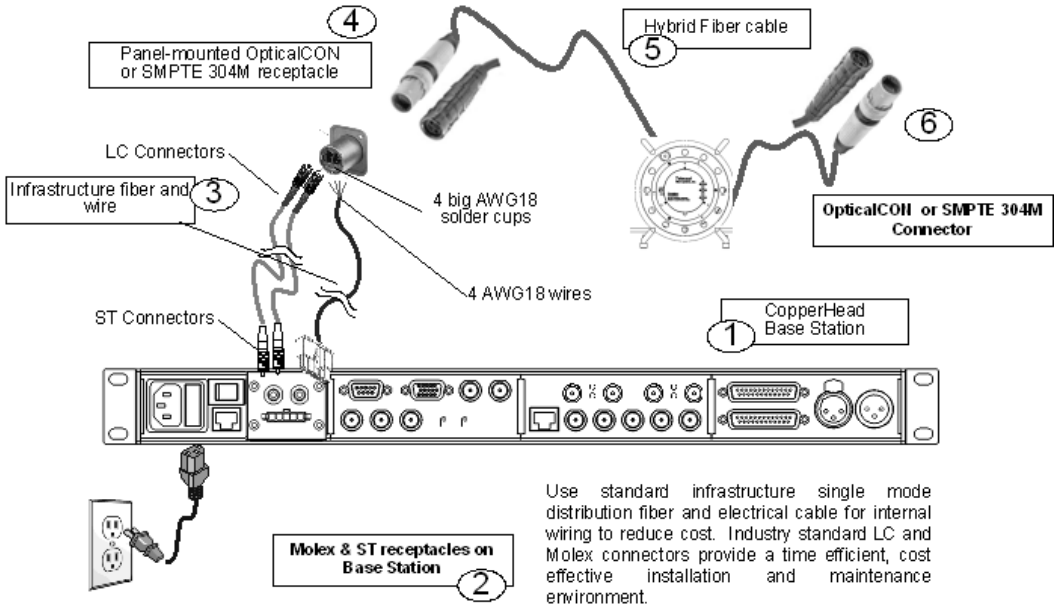


Fig. 5-7: SMPTE Hybrid Fiber between Base Station and Camera Unit (Infrastructure Wiring)

Panel mounted fiber connectors can be used for permanent installations such as communications closets, truck connector panels and sports facilities or performance venues.

A panel mounted OpticalCON or SMPTE 304M receptacle (**4**) is connected to the Base Station (**1**) through infrastructure grade wiring. Two LC Fiber Optic connectors and four soldered AWG18 copper power wires (**3**) connect to the Base Station through a Molex and ST receptacle (**2**).

Between the panel mounted receptacle and the Camera Unit is standard Hybrid Fiber Optic cable (**5**). This cable is matched to the panel mounted receptacle with either an OpticalCON or SMPTE 304M connector (**4**) to (**6**).

SMPTE Hybrid Fiber between the MPS Power Unit and Camera Unit

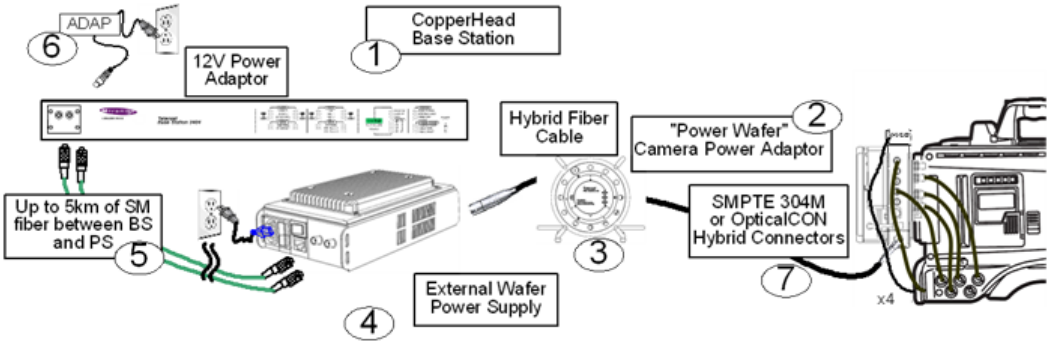


Fig. 5-8: SMPTE Hybrid Fiber between the MPS Power Unit and Camera Unit

Between the Base Station (**1**) and the External Wafer Power Supply (**4**) connect a pair of ST Fiber Cables (**5**). Power the External Wafer Power Supply locally by connecting to AC Power. Between the External Wafer Power Supply (**4**) and the Camera Unit connect a length of SMPTE Hybrid Fiber Cable (**3**). At each end of the fiber cable will be either an OpticalCON or SMPTE 304M Connector (**7**). The Base Station connector (**1**) may be mounted either on the front or back of the Base Station. The camera will be powered by the CopperHead Power Wafer Camera Power Supply (**2**).The Base Station will be powered by connection to local AC power (**6**).

SMPTE Hybrid Fiber between the HDX Power Unit and Camera Unit

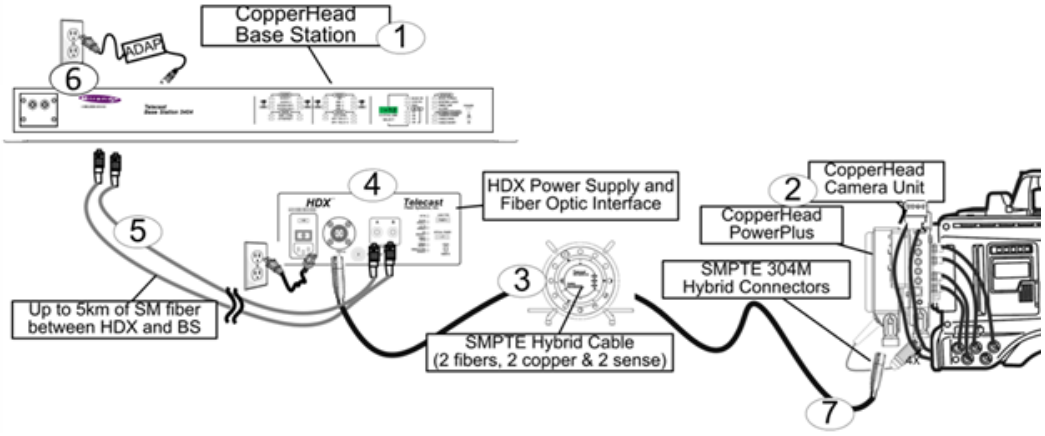


Fig. 5-9: SMPTE Hybrid Fiber between the HDX Power Unit and Camera Unit

Between the Base Station (**1**) and the HDX Power Supply (**4**) connect a pair of ST Fiber Cables (**5**). Power the External Wafer Power Supply locally by connecting to AC Power. Between the External Wafer Power Supply (**4**) and the Camera Unit connect a length of SMPTE Hybrid Fiber Cable (**3**). At each end of the fiber cable must be a SMPTE 304M Connector (**7**). The Base Station connector (**1**) may be mounted either on the front or back of the Base Station. The camera will be powered by the CopperHead PowerPlus Camera Power Supply (**2**). The Base Station will be powered by connection to local AC power (**6**).

Connections to the CopperHead 3404 Base Station

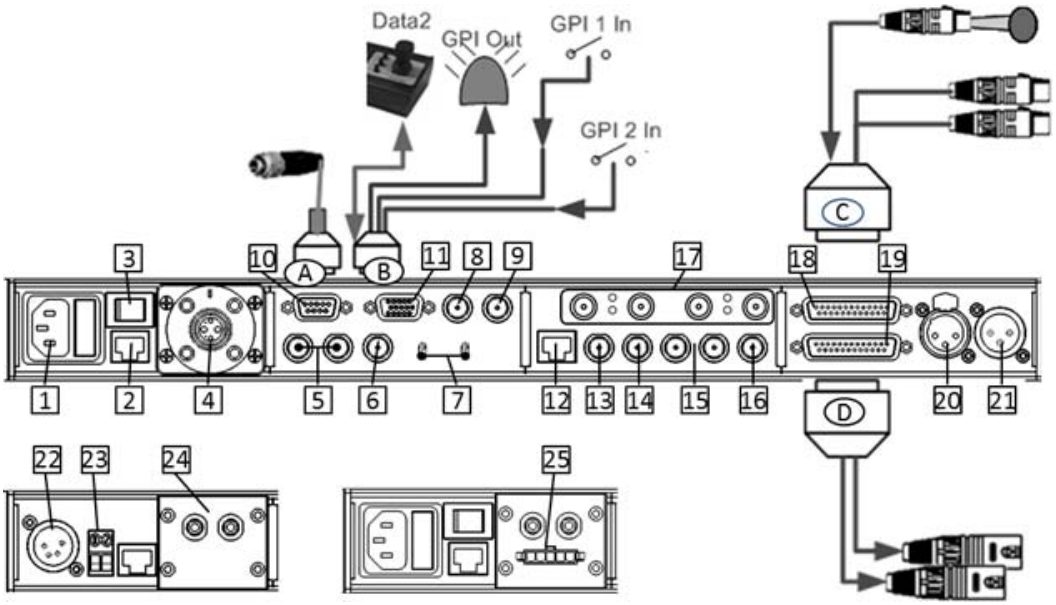


Fig. 5-10: CopperHead 3404 Base Unit Connections

Multi-Pin Cable Assemblies Used with the CopperHead 3404 Base Station

- **A: Camera Remote Control (Remote) Connector**

  Connect either your camera manufacturers Camera Remote Control or the Grass Valley Universal Controller - CHRCP-2050A or CHRCP-2050-LCD.

  See Available Accessories on page 90 for a list of Grass Valley supplied cables.

- **B: Data/GPI Connector**

  Connect a Remote Pan/Tilt/Zoom Control Unit and connect to one GPI Out and two GPI inputs. Usage of GPI/Os other than Tally and Intercom control is outside of the scope of this User Guide.

  Serial Control devices using RS232/422/485 can be controlled over this signal path.

  See Multi-Pin Signal Cables on page 96 for wiring details.

- **C: Audio In Connector**

  Connect Intercom Program Audio and four Production Audio Channel outputs

  See Multi-Pin Signal Cables on page 96 for wiring details.

- **D: Audio Out Connector**

  Carries audio back from the camera location - connect to an audio processing chain or monitors. See Multi-Pin Signal Cables on page 96 for wiring details.

Connectors into and out of the CopperHead 3404 Base Station

This information duplicates some of that from above sections. It is presented here to provide a single list of all Base Station connections. Key numbers refer to the diagram above and to the Overview Diagram found in System Overview Diagrams on page 104.

- **1 & 22 - Power In**:

  Connect a standard 12V DC ADAP power source (4 Pin) or a standard 3 conductor AC Cable (IEC Plug) 100-240V 50/60 Hz.

- **3 - Power Switch (AC Powered Unit Only):**

  Turns on system power supply for AC powered base station. Front switch must also be turned on for unit to be operational.

- **4 - Fiber Connector:**

  Connect the fiber connector from either the Fiber Cable connected directly to the camera or from the external power unit designated for your system. The type of Fiber Connector will vary depending on your system configuration.

- **5 - Sync In/Loop:**

  BNC Connector - standard Genlock/Sync/Tri-Level sync signal. The loop through is self-terminating.

- **6 - Prompter In:**

  BNC Connector - SD Video feed from external prompter system originating at Base Station location and displaying at Camera location.

- **7 - VBS Switches:**

  Select between analog video (VIDEO) level (for black burst) or (SYNC) for Tri-level sync generator signals. Both VBS 2 and VBS 3 can be controlled.

- **8 - Time Code In:**

  BNC Connector - Standard time code signal sent to camera - typically originating from "house" time code generator feed available to Base Station. On remote productions the primary camera may be used to originate the system time code feed (signal would return to base station via connector 8 and then be distributed to other cameras through the associated Copperhead Base Stations.

- **9 - Time Code Out:**

  BNC Connector - Standard time code signal originating from the camera. This time code can be used to reference the local camera time code for proper operations and may also be used as a source for production wide time code distribution.

- **10 - Multi-Pin Connector A:**

  DB9 - 9 pin serial connector connected to an optional Camera Remote Control Panel. Power to the Base Unit (and the Camera Unit & Camera) must be turned off when connecting the Camera Remote Control Panel - connecting with the power on can seriously damage your equipment.

- **11 - Multi-Pin Connector B:**

  DB15 - 15 pin serial connector connected to a breakout of Tally and GPI signal connectors. Typically, this connector connects to the Camera Tally system originating at the Production Switcher or the Tally Management system in your production environment. Additional custom GPI - Contact Closures can be configured (see Data 1 (Camera Control) Pinout Configurations on page 89 for a sample configuration).

- **12 - Ethernet Connector - 10Bt/100Bt capable:**

  Designed to carry IP traffic data between the Base Station and the Camera Unit. A laptop PC or other device such as a Wireless Access Point can be connected to the Production Environment IP network.
- **13 - VBS Out:**

  BNC Connector -Typically used for SD Monitoring Video return from the Camera.
- **14 - VBS In:**

  BNC Connector - Typically used to send SD return video to the camera - an example is monitor out from the Production Switcher.
- **15 - SDI Out 1 & 2 (this carries the HD feed (not the 4K-3G feed) from the camera):**

  BNC Connectors - Two identical video feeds from the camera - typically one may be used for local HD monitoring and one is fed to the Production Switcher environment.
- **16 - SDI In:**

  BNC Connector - Typically used to send HD return video to the camera - an example is program out from the Production Switcher.
- **17 - 4K- 3G/HD/SD SDI Connectors (this carries the four 4K signals from the camera)**

  BNC Connectors
- **18 - Audio In- Multi-Pin Connector:**

  DB25 - 25 pin Connector follows the Tascam TDIF standard. The CopperHead 3404 Transceiver System accommodates up to two Audio Channels at Line Level. This connector handles return audio to the Camera location as well as intercom Program Audio. Please see Multi-Pin Wiring Suggestions on page 100 for sample wiring.
- **19 - Audio Out- Multi-Pin Connector:**

  DB25 - 25 pin Connector follows the Tascam TDIF standard. The CopperHead 3404 Transceiver System accommodates up to two Audio Channels at Line Level. This connector handles Program audio from the Camera location (see Multi-Pin Wiring Suggestions on page 100 for sample wiring).
- **20 & 21 - Intercom Connectors #1 & #2:**

  XLR 3 pin or 5 pin Connector depending on configuration. One of three options will be installed (4-wire intercom, RTS, or Clear-Com).
- **23 - 12V Terminal Block:**

  Terminal Block - bare wire connector. This can be used in place of the ADAP power connection in installations that have 12V power distributed as part of their infrastructure. Do not use this at the same time as the ADAP power connection.
- **24 - ST Fiber Connectors (used in place of connector 4):**

  Two ST Connector receptacles - Used as the Fiber Optic connection typically when infrastructure wire or with one of the two external power supply option (MPS or HDX Power Adaptors).
- **25 - Molex Power Connectors (used in place of 4 and only if so configured with ST Fiber Connectors):**

  5 Conductor Molex Connector - Used to provide power to the Hybrid Fiber Optic Cable. Typically installed with infrastructure wiring with cable leading from Molex connector to a panel mounted OpticalCON receptacle.

Connections to the CopperHead 3404 Camera Unit

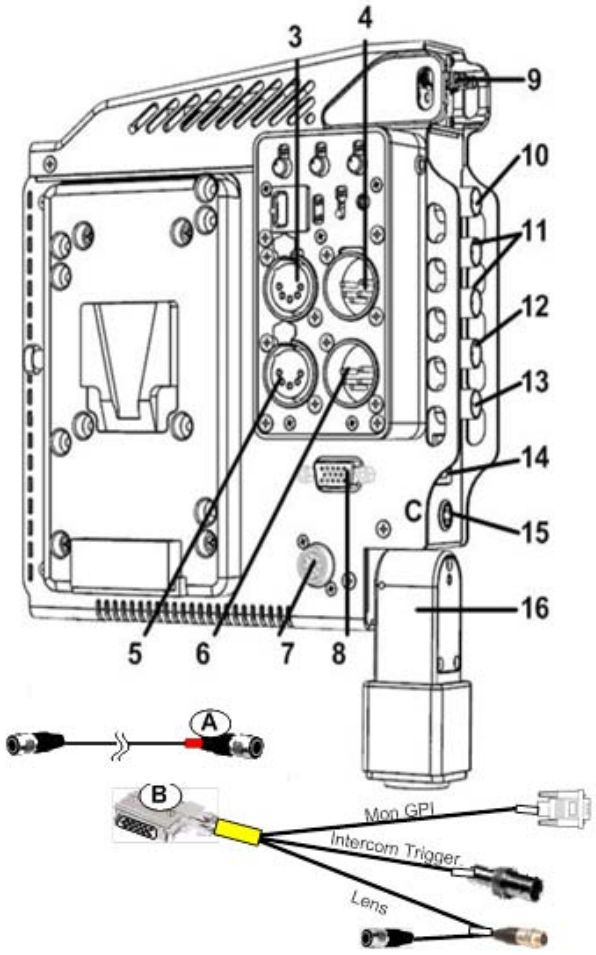


Fig. 5-11: CopperHead 3404 Camera Unit Back Side Connections

This information is presented here to provide a single list of all Camera Unit connections. Key numbers refer to the diagram above and to the Overview Diagram found in System Overview Diagrams on page 104.

Multi-Pin Cable Assemblies Used with the CopperHead 3404 Camera Unit

- **A: Camera Remote Control (Remote) Connector**

  Connect this to the CCU input on your camera. The Grass Valley supplied cable has a Red sleeve at the end to be connected to the CopperHead 3404 Camera Unit (see Available Accessories on page 90 for a list of Grass Valley supplied cables).
- **B: Data/GPI /Tally Connector**

  This connector carries a number of control, GPI and Tally signals(see Multi-Pin Signal Cables on page 96 for wiring details).
- **C: Power Wafer Connector**

  Connect the supplied Power Wafer cable between this connector and the Power Wafer.

Connectors into and out of the CopperHead 3404 Camera Unit Back Side

- **3: Intercom Headset Out**

  XLR 5 Pin Female Connector - Provides two channels of two-way intercom and the Intercom Program audio feed.

- **4: Audio 1 & 2 Out**

  XLR 5 Pin Male Connector - Provides Return Audio Out from camera for Channels 1 & 2. Typically connected to a local monitor at the camera position.

- **5: Audio 1 In**

  XLR 3 Pin Female Connector - Line level audio input. Typically fed by short audio jumper cables from the Camera Audio 1 output (can also take local audio device feeds from camera position).

- **6: Audio 2 In**

  XLR 3 Pin Female Connector - Line level audio input. Typically fed by short audio jumper cables from the Camera Audio 2 output (can also take local audio device feeds from camera position).

- **7: Camera Remote Connector**

  Multi-Pin Connector A - 10 Pin Hirose Connector. This is normally a Grass Valley, a Belden Brand supplied cable. It connects the Camera Unit to the Camera CCU in to allow operation of the Camera Remote Control Panel. Please see Available Accessories on page 90 for a list of available cables.

  Power to the Camera Unit & Camera must be turned off when connecting the Camera Remote Control Panel Cable- connecting with the power on can seriously damage your equipment.

- **8: Data Connector**

  Multi-Pin Connector B - DB15 15 Pin Serial Connector. This carries serial control signals for lens and remote pan & tilt units as well as GPI, Intercom Trigger (GPI) and Tally signals. Grass Valley, a Belden Brand supplies a number of pre-configured break out cables for use with this connector (see Multi-Pin Wiring Suggestions on page 100).

- **9: 4K- 3G/HD/SD SDI Inputs (4)**

  BNC Connectors - Carries 4K camera video from the Camera to the Camera Unit. This requires BNC jumper cables between the Camera Unit and the Camera.

- **10: HD/SD SDI Input**

  BNC Connector - Carries camera video from the Camera to the Camera Unit. This requires a short BNC jumper cable between the Camera Unit and the Camera.

- **11: HD/SD SDI Outputs #1 & #2**

  BNC Connector - Carries return video from the Base Station to the Camera Unit. Typically this will feed a camera viewfinder or an HD viewing monitor at the camera location.

- **12: VBS In**

  BNC Connector - Carries SD Analog video from the Camera to the Camera Unit. This requires a short BNC jumper cable between the Camera Unit and the Camera. Can be used to provide technical monitoring from camera as with superimposed camera menus and other information.

- **13: VBS Out**

  BNC Connector - Carries SD Analog video from the Base Station the Camera Unit. Typically this will feed an analog viewing monitor at the camera location.
- **14: Ethernet Out**

  RJ45 Connector - Carries IP Data. Typically connects to a Laptop computer or perhaps a wireless access point at the camera location. Any IP traffic controlled equipment can be handled through this signal path.
- **15: Power Wafer Connector**

  Multi-Pin Connector C - Supplies power to the Camera Unit from the Power Wafer (if so configured). This cable is supplied with the Power Wafer Power Adaptor.
- **16: Fiber Connector**

  Swivel Mounted Fiber Optic Cable receptacle - specific connector depends on your configuration.
- **17: Intercom Headset Connector**

  Mini-phone Jack - Provides listen only Intercom audio.

Connectors of the CopperHead 3404 Camera Unit Front Side

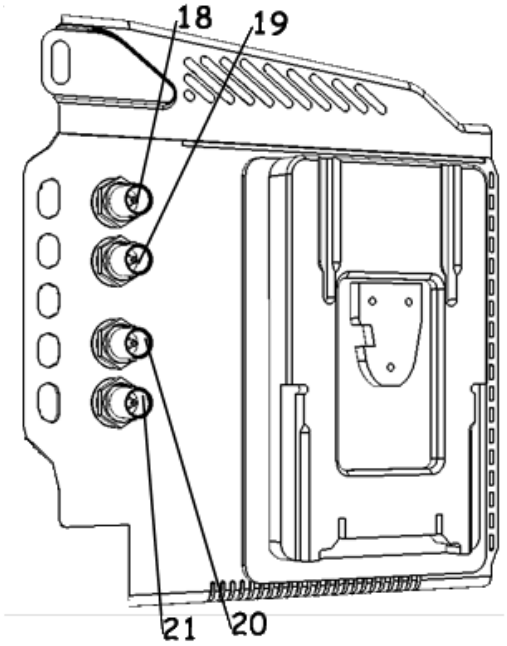


Fig. 5-12: CopperHead 3404 Camera Unit Front Side Connections

- **18: Time Code In**

  BNC Connector - Carries Time Code signal from the Camera to the Camera Unit. This is return time code to the Base Station. This requires a short BNC jumper cable between the Camera Unit and the Camera. Check to confirm the connector type for your camera time code output.
- **19: Time Code Out**

  BNC Connector - Carries Time Code signal from the Camera Unit to the Camera. This is master time code from the Base Station. This requires a short BNC jumper cable between the Camera Unit and the Camera. Check to confirm the connector type for your camera time code output.
- **20: VBS Out 2 (Genlock)**

  BNC Connector - Carries Genlock/Sync from the Camera Unit to the Camera. This requires a short BNC jumper cable between the Camera Unit and the Camera.
- **21: VBS Out 3 (Prompter)**

  BNC Connector - Carries a Prompter Feed or additional Base Station return Video from the Camera Unit to the Camera. This requires a BNC cable between the Camera Unit and any external equipment.

Camera Unit Connection Example

Your CopperHead 3404 Camera Unit and your camera will look something like this once you have connected the various signal paths. Each camera setup will be different depending on your model.

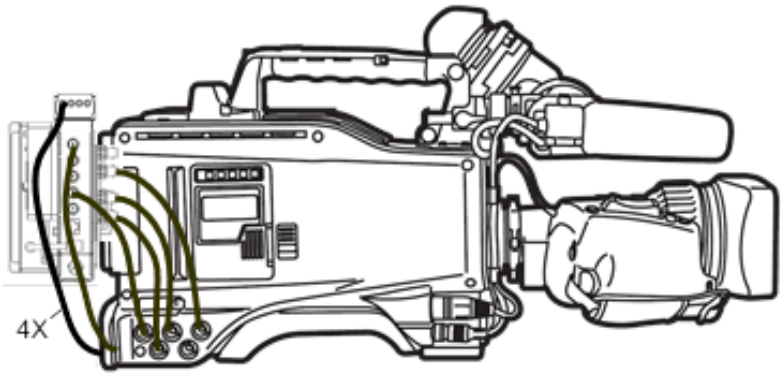


Fig. 5-13: CopperHead 3404 Camera Unit

See the following sections for an overview of Camera Unit to Camera & Peripheral Equipment connections.

Camera Unit (Camera Facing Side) to Camera Connections

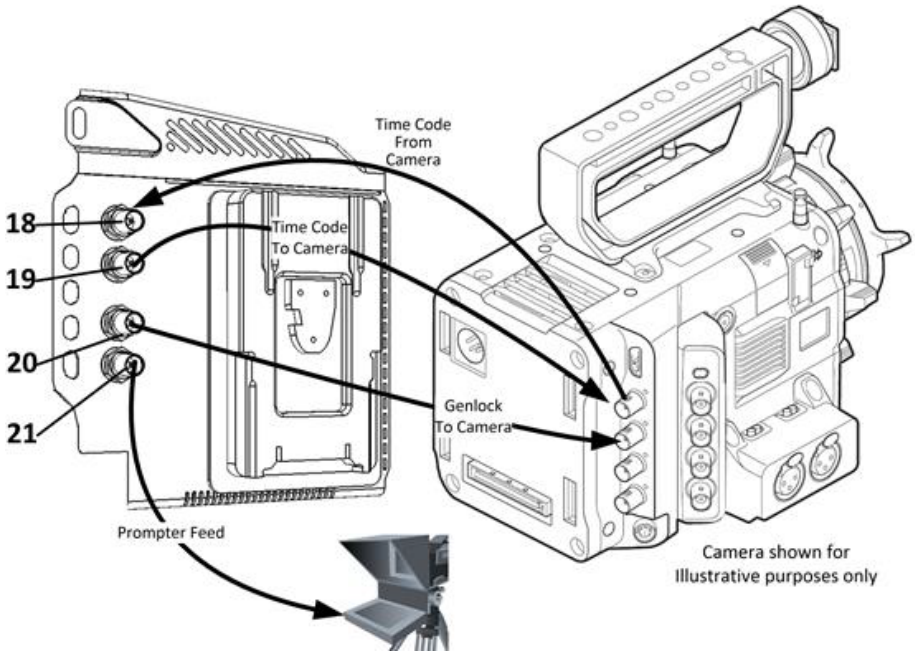


Fig. 5-14: Camera Unit (Camera Facing Side) to Camera Connections

Time Code signals vary depending on camera model. Some cameras have both TC input and output, while on others there is a single switchable TC connection. Other cameras have no time code I/O.

Camera Unit (Power Adaptor or Battery Facing Side) to Camera Connections

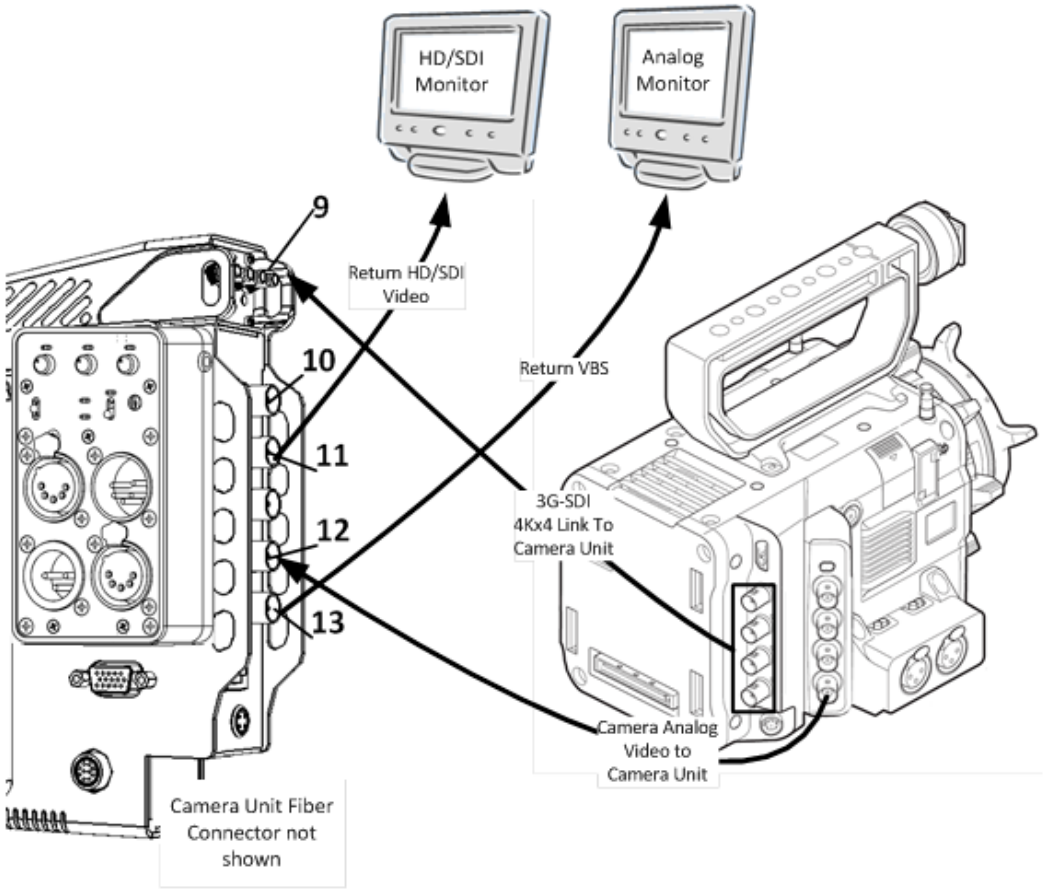


Fig. 5-15: Camera Unit Video Connections

Camera Unit Audio and Data/Control Connections

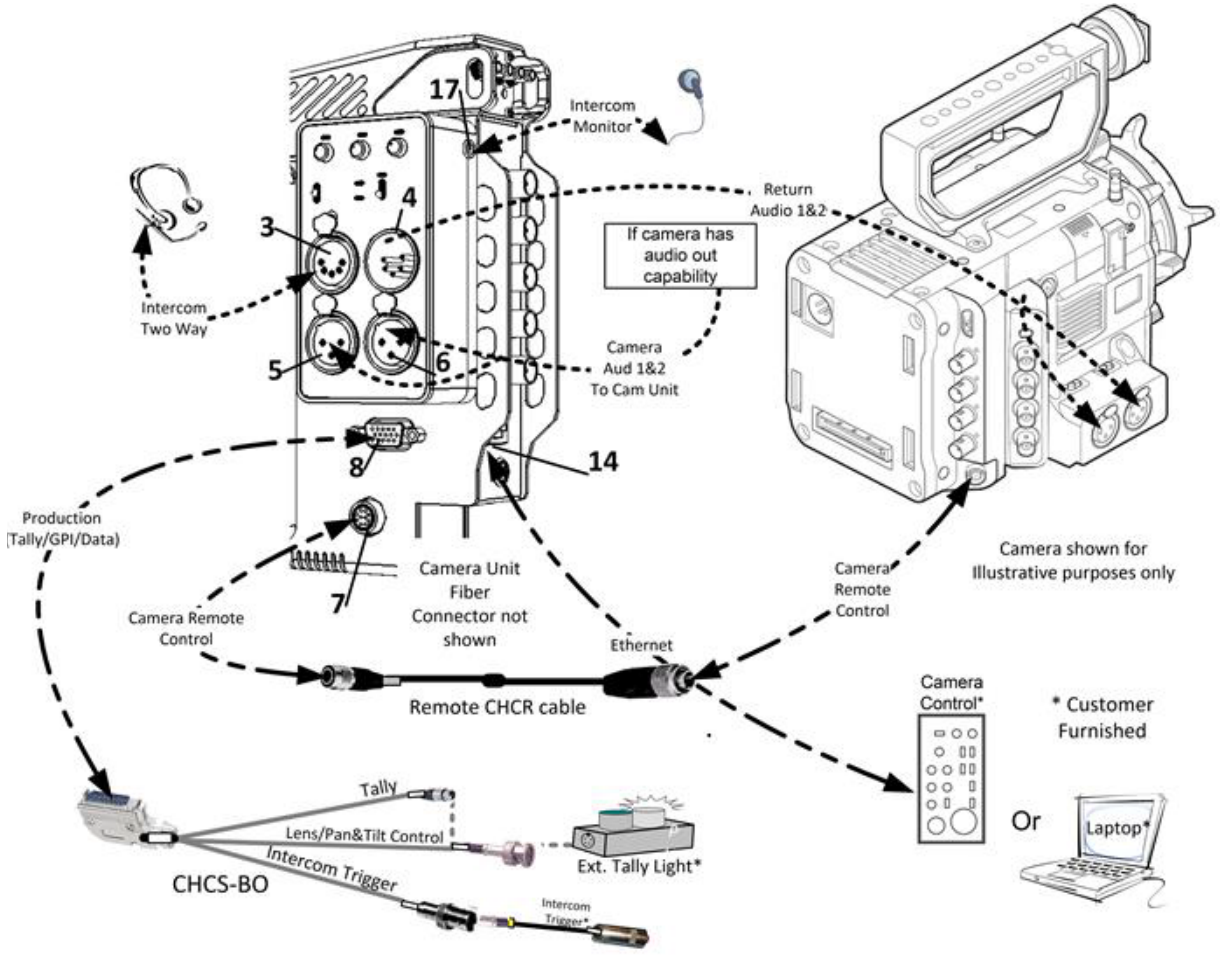


Fig. 5-16: Camera Unit Audio and Data/Control Connections

Note: Not all camera models have all available connections to the CopperHead Camera Unit.

6 Operation of CopperHead 3404 Transceiver System

This chapter describes howto operate the CopperHead 3404 Transceiver System.

Please keep in mind that a wide variety of options and variations are available in using this product, so not every possible operational environment can be described. Variations in camera type, battery and powering, fiber cable connections and intercom allow for an enormous number of slightly different operational modes.

Set Up of the CopperHead 3404 Transceiver System for operation

This section provides an overview of setup of the CopperHead 3404 Transceiver System for operation. The following sections provide additional detail on each aspect of setup and operation.

It is important that you do an initial setup and test of your CopperHead 3404 Transceiver System as soon as you receive it to confirm proper operation and to provide training to you and your team prior to an actual production.

Use the following list of items as an overall checklist for setup:

1. It is highly recommended that you do not attempt to power up the system until all connections are made and in particular the Fiber Optic Cable has been connected at both ends. If you need to power up either the CopperHead 3404 Base Station or Camera Unit make sure that the Fiber Connectors are securely capped. This will protect them from damage or dirt and protect you from eye damage.
2. If it is the first time setting up the CopperHead 3404 Base Station, or your setup is not permanent as it would likely be in a remote truck, stadium control room or similar, connect all of the required cables according to Installing and Connecting the System on page 41. The order in which you connect the cables makes no difference.
   - Make sure to connect the Camera Remote Control cable to the Base Station and Remote Control Panel when the Base Station power is turned off.
   - Keep Fiber Optic cable connectors capped until actually connecting the Fiber Cable.
3. When setting up the CopperHead 3404 Camera Unit and associated Camera you will need to do the following:
   - Setup the external power supply as required:
     - For the MPS power supply used with the CopperHead Power Wafer, see MPS External Power Wafer Power Supply on page 37.
     - For the HDX power supply used with the Copperhead PowerPlus, see "PowerPlus" Camera Adaptor on page 38.

     Make sure all cables running between the CopperHead 3404 Base Station and the Power Supply and local AC power cords are properly managed and secured.
   - Mount the Camera and CopperHead 3404 Camera Unit as shown on Mounting the CopperHead 3404 Camera Unit to the Camera on page 42.
   - Connect all required cables according to Installing and Connecting the System on page 41. The order in which you connect the cables makes no difference.
   - Make sure to connect the Camera Remote Control cable to the Camera Unit and Camera when the Camera power is turned off.
   - Set up the Intercom Talk Back switches and level controls as desired. Please see Understanding Intercom Usage with the CopperHead 3404 on page 62 for details on Intercom operation with the CopperHead 3404 Camera Unit.
4. Deploy the Fiber Cable- you are now ready to Power Up the system.

   Read the **Using Fiber Optics Guide** for information on how to manage and deploy your fiber optics cabling, safety precautions, tips & tricks, and recommendations for creating complex fiber optic networks. You can find a copy of this document on the Support portal (see Contact Us on page 81).

Powering the System

The CopperHead 3404 Base Station and the CopperHead 3404 Camera Unit each have a power up routine which tests the equipment and performs a system diagnostic.

Powering the CopperHead 3404 Base Station

1. **Base Station Main Power**: Turn on the Base Station Power Mains Switch located at the rear left (when facing the back of the Base Station) #3 on the overall diagram. This switch is only on Base Station units with internal power. The front panel power light will come on and displaysas Red until the next step.
2. **Base Station Power**: Turn on the Front Panel Power Switch located at the front right. #16 on the overall diagram. The power monitor indicator turns from Red to Green.
3. **Four-character Display LED Indicator progression**: The four-character display indicates TEST and all front panel LEDs turn, Red, then Green, then Orange, then OFF.
4. **REV display**: The LED color test is followed by REV and the revision of the display microcontroller firmware.
5. **Scrolling**: The REV indication is followed by "www.miranda..com" scrolling across the four-character display. If there's no scrolling please contact Grass Valley, a Belden Brand support for assistance (see Contact Us on page 81).
6. **PAUSE**: The scroll is followed by about a 3 second interval used to synchronize all the microcontrollers in the Base Station.
7. **Diagnostics**: The front panel will cycle through the diagnostics displays (see The CopperHead 3404 Base Station Digital Display on page 67).
8. **Current Status Displayed**: After the 3 second pause, all the front panel displays update with current status. If the Camera Unit is not powered on the camera related status lights will displayas Red.

Powering the CopperHead 3404 Camera Unit

1. **Camera Unit power**: Turn on the Camera Unit Power Switch.
2. **Camera Power**: Turn on the Camera Power and also any peripheral equipment connected to the camera or the CopperHead 3404 Camera Unit such as monitors and microphones.
3. **Four-character Display LED Indicator progression**: On power on the four-character display indicates the current Revision Version (REVA). Your unit will reflect the current Revision Version. After the revision display the current Fiber Link strength is displayed. A typical display is -8 to -13. This indicates Fiber link strength of from -8 to -13 dBm.

Both the Camera Unit and the Base Station have a digital display selector button which allows multiple functions for the digital display. These functions are described below on Understanding Intercom Usage with the CopperHead 3404 on page 62.

Understanding Intercom Usage with the CopperHead 3404

The CopperHead 3404 Transceiver System is delivered pre-configured with one of three intercom options:

- Standard Four Wire Intercom
- Clear-Com Intercom
- RTS intercom

Wiring for each of these options is described in Multi-Pin Connectors: Suggested Wiring on page 72.

The operation of your specific intercom system is beyond the scope of this User's Guide. Please see the documentation provided with your intercom or consult your intercom provider.

User settings for the Intercom system occur on the CopperHead 3404 Camera Unit at the top of the Audio Interface box on the back (not camera facing) side of the Camera Unit Please see the Diagrams on page 82 - Reference Numbers 9-15.

This Audio Interface box provides the following functionality:

- Volume control through the Intercom headsets for two Intercom channels and for Program audio carried on the Intercom line.
- Side Tone setting control. Side tone is the volume of your voice heard on your local intercom headset. It does not affect how others on the intercom line hear you.
- LEDs provide activity monitoring of traffic on the two Intercom channels and Program audio. These are activity only monitors and do not represent audio levels.

In addition to the Intercom controls, a 4-switch panel allows adjustment of various Audio Input and IFB settings.

Note: The CopperHead 3404 Camera Unit acts as the last component of any intercom beltpack chain. An Intercom beltpack cannot be plugged into the CopperHead 3404 Camera Unit. Only an intercom headset can be plugged into the Camera Unit.

CopperHead 3404 Camera Unit Intercom Operation

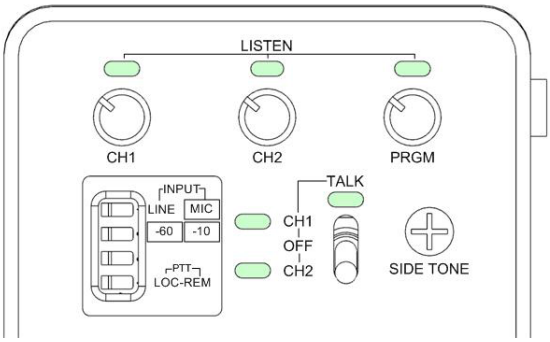


Fig. 6-1: Audio Interface Box Detail (Camera Unit)

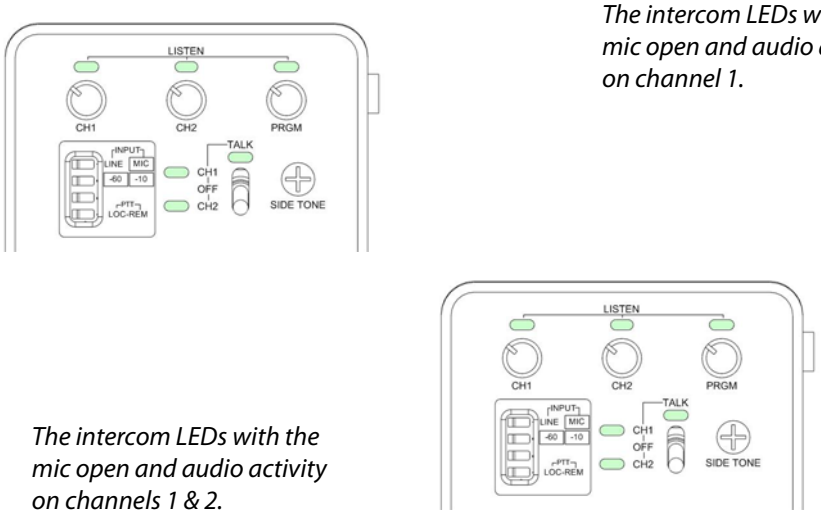
- **LISTEN:**

  To set listening level for an intercom channel or the PROGRAM Audio, adjust the desired LISTEN control knobs at the top of the Audio Interface box (Figure 6-1: #14, 15, 16). The LISTEN indicator LEDs indicate activity on the Intercom channel(s) and the Program audio feed. These LEDs illuminate even if your LISTEN control knobs are turned down.

- **TALK:**

  The Intercom TALK toggle switch (Figure 6-1, #18) opens the headset microphone onto Intercom Channel 1, Channel 2, or both channels. This switch does not control which Intercom audio channel is heard in the headset.

  - **Momentary Mode**: To activate the headset mic, press and hold the TALK toggle switch (#18) up (for Channel 1) or down (for Channel 2). The corresponding Green talk LED will remain lit while the TALK switch is held. The microphone is turned off when the TALK switch is released and the TALK indicator turns off.
  - **Latching Mode** (for Hands-free Conversation): Press the TALK toggle switch quickly , up (for Channel 1) or down (for Channel 2). The mic will turn on and remain on, as will the corresponding Green TALK LED. To turn the mic off, push the TALK toggle switch again quickly in the same direction (up or down). The talk indicator will also turn off.



The intercom LEDs with the mic open and audio activity on channel 1.

The intercom LEDs with the mic open and audio activity on channels 1 & 2.

Fig. 6-2: Local Activation of Channel 1 Talk Back and Both Intercom Channels

The middle position allows both channels to remain in the OFF position.

Adjusting Intercom Sidetone

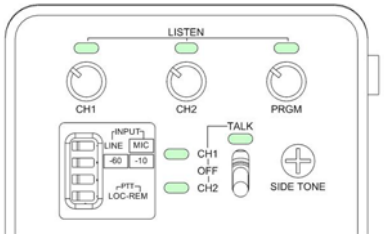


Fig. 6-3: Setting Intercom Side Tone

The intercom SIDE TONE adjustment controls the level of your own voice that you hear locally in your headset. It does not affect how others on the intercom circuit hear you. With the TALK control activated on CH1 and/or CH2, use a "Tweaker" type screwdriver to adjust the Side Tone Level until you are comfortable with the level of your own voice in your headset.

CopperHead 3404 Camera Unit Audio/Intercom/IFB 4-Switch Panel

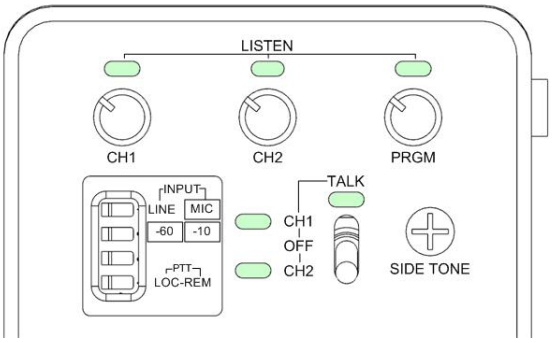


Fig. 6-4: Audio/Intercom/IFB switch panel

1 **Audio Input LINE/MIC Switch**
   - Left position sets audio inputs to line level (+4dB)
   - Right position switches audio inputs to MIC level and enables Switch #2

2 **MIC Input Level Switch**
   - Left position sets MIC input level to -60dB
   - Right position sets MIC input level to -10dB

3 **NOT USED**

4 **PTT (Push-to-Talk)**
   - Left position sets PTT to Local
   - Right position sets PTT to Remote

A Brief Guide to Measurement of Fiber Optic Signal Strength

The CopperHead 3404 Transceiver System operates within a defined fiber optic link margin, based on two factors:

- Output (or "launch") power of the optical transmitter at each end of the link: typically -7dBm*
- Sensitivity of the optical detector at each end of the link: typically -22 dBm.

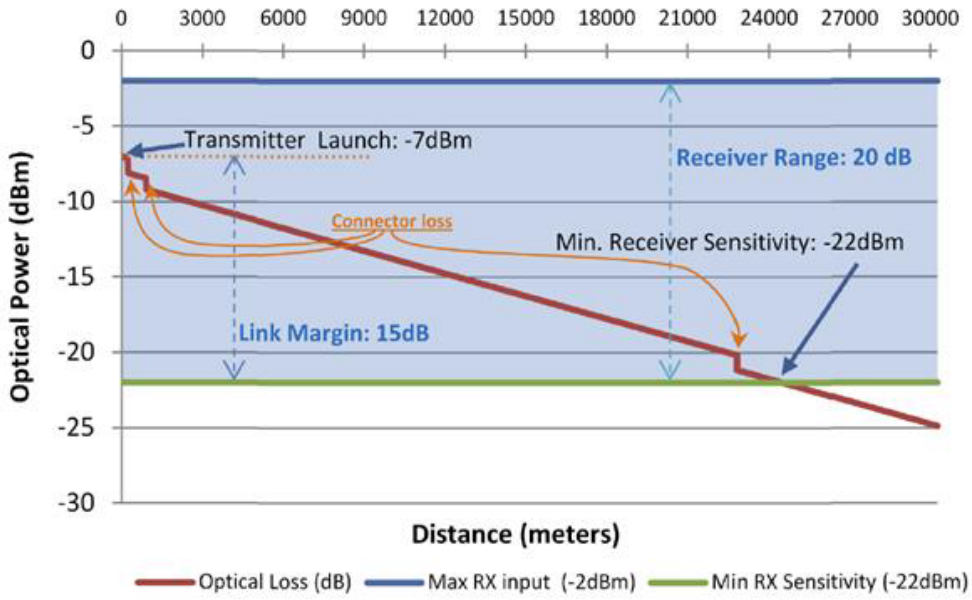


Fig. 6-5: CopperHead Fiber Optic Link Margin

The overall link margin (or dynamic range) of the CopperHead 3404 system (the difference between the transmitter's output power and the receiver's sensitivity) is typically 15dB.

That margin is consumed by two main factors:

- **Optical loss over the length of the fiber cable**: typically 0.5dB per kilometer
- **Optical loss at connection points**: typically 1 dB per connector

Therefore, a CopperHead 3404 system can optimally work over 24 kilometers of cable (spending 12 dB of the link budget), and three connectors (spending 3 dB of the budget).

However, adding additional devices, such as the HDX or MPS power supplies, or the camera-mounted PowerPlus will add connectors, and contribute additional connector loss.

The CopperHead 3404 Transceiver System provides direct digital readout of the Fiber Optic Link signal strength for both the Base-to-Camera link and the Camera-to-Base link.

The digital readouts on both the CopperHead 3404 Base Station and Camera Unit provide direct signal strength measurements in dBm. These readouts also provide a wide range of diagnostic information. The use of the digital readouts is described below.

*The unit "dBm" is an abbreviation for the optical power measured in decibels referenced to one milliwatt (mW).

The CopperHead 3404 Base Station Digital Display

The Base Station digital display has three functions selected by the Display Mode Selector (#12 on the Overview Diagram). These functions are indicated by the Display Mode LEDs.

- **BASE RX** - Base Station Optical Power or Signal Strength that is being generated at the Base Station and sent to the Camera Unit. Displayed in units of -dBm.
- **CAM RX** - Optical Power or Signal Strength generated by the Camera Unit as measured at the Base Station. Displayed in units of -dBm.
- **DIAG** - One of four diagnostics sub-modes available to the Base Station:
  - **TEMP** - displays operating temperature in degrees Centigrade of each circuit board that reports temperature
  - **POWR** - displays power level from monitored circuit boards
  - **REV** - displays microcontroller firmware version from each circuit board with a microcontroller
  - **CAM** - displays the error status reported by the Camera Unit

To select the different display modes push the Display Mode Selector. To enter the DIAGnostic mode, push and hold the Selector for five seconds. The transition from one mode to another may take a moment with the transition into the Diagnostic mode taking slightly longer. The Selector is cyclical rotating through each of the modes. Once in the Diagnostic mode, a quick push of the Selector cycles through the various diagnostic sub-modes described above.

The following table describes the expected readouts in each of the above Base Station display modes. By following the sequence, you can understand what the various readouts and four-character abbreviations mean for the system.

Display Mode	Typical Readout	Base Station Digital Display Activity Explanation
(assumes after initial power up - see Powering the System on page 61 for a description of the Power Up sequence).		
BASE RX (Base Station Receive Signal Strength)		
BASE RX LED LIT		
BASE RX	-9	Indicates that the Base Station signal strength is -9 dBm (typical power rating - value will reflect actual link strength at the time.
BASE RX	n/A	Indicates that there is no active fiber link between the base station and the camera unit
		Push the Display Select button once to advance to CAM RX
CAM RX (Camera Unit Receive Signal Strength) CAM RX LED LIT		
CAM RX	-9	Indicates that the Camera signal strength is -9 dBm (typical power rating - value will reflect actual link strength at the time
CAM RX	n/A	Indicates that there is no active fiber link between the base station and the camera unit

Display Mode	Typical Readout	Base Station Digital Display Activity Explanation
Push and hold the Display Select Button and the system advances to Diagnostics mode - DIAG LED is lit. You can view diagnostic display cycle in any sub-mode - the diagnostics cycle through Temperature, Power, Revision, and Camera Status.		
DIAGNOSTIC MODE Temperature (TEMP)		
DIAG		When first entering the Diagnostic mode the DIAG display mode indicator LED will blink - The first sub-mode is TEMP (Temperature). The Digital Display Characters will glow Green when the temperature is normal and Red when outside of normal range.
DIAG/TEMP	DIS	The Display Power Supply temperature will be displayed
DIAG/TEMP	TEMP	Indicates the display is in the TEMP sub-mode
DIAG/TEMP	39C	Temperature display in Centigrade for Power Supply circuit board (representative temperature - your unit may vary)
DIAG/TEMP	BASE	The Base Station main circuit board temperature will be displayed
DIAG/TEMP	TEMP	Repeats that the display is in the TEMP sub-mode
DIAG/TEMP	33C	Temperature display in Centigrade for Base Station circuit board
DIAG/TEMP	PS	The Power Supply (PS) temperature will be displayed
DIAG/TEMP	TEMP	Repeats that the display is in the TEMP sub-mode
DIAG/TEMP	30C	Temperature display in Centigrade for Power Supply circuit board
		This temperature display cycle repeats until the Display Mode Selector is pushed
DIAGNOSTIC MODE Power Supply Voltage Status (POWER)		
DIAG/POWER		A quick push of the Display Mode Selector advances to the Power (POWR) diagnostic sub-mode. Digital Display Characters are Green when all power levels are normal and Red when any power level is outside normal level
DIAG/POWER	AUD	Indicates that the Audio controller board is being measured
DIAG/POWER	POWR	Indicates the display is in the POWER sub-mode
DIAG/POWER	OK	Indicates that the item is in an OK State
DIAG/POWER	VBS	Indicates that the VBS (analog Video) controller board is being measured
DIAG/POWER	POWR	Indicates the display is in the POWER sub-mode
DIAG/POWER	OK	Indicates that the item is in an OK State
DIAG/POWER	DISP	Indicates that the LED Display controller board is being measured

Display Mode	Typical Readout	Base Station Digital Display Activity Explanation
DIAG/POWER	POWER	Indicates the display is in the POWER sub-mode
DIAG/POWER	OK	Indicates that the item is in an OK State
DIAG/POWER	BASE	Indicates that the Base Station main controller board is being measured
DIAG/POWER	POWER	Indicates the display is in the POWER sub-mode
DIAG/POWER	OK	Indicates that the item is in an OK State
DIAG/POWER	CHAR	Indicates that the Four-character controller board is being measured
DIAG/POWER	POWR	Indicates the display is in the POWER sub-mode
DIAG/POWER	OK	Indicates that the item is in an OK State
DIAG/POWER Exception		
DIAG/POWER	ERR	Instead of OK, the display will show ERR if a power level is outside of normal - ERR is followed by a Hexadecimal code. Please note the error code and contact support at Grass Valley, a Belden Brand.
Display Mode	Readout	Base Station Digital Display Activity Explanation
DIAGNOSTIC MODE Microcontroller Board Revision Version (REV)		
DIAG/REV		A quick push of the Display Mode Selector advances to the next diagnostic sub-mode. This sub-mode displays the microcontroller firmware revision of every board in the Base Station that has a microcontroller. **Note**: the REV versions noted here were current as of December 1, 2013. Your system may have different REV versions.
DIAG/REV	DISP	Indicates the Display microcontroller board is revision is being queried
DIAG/REV	REV	Indicates that sub-mode is REV
DIAG/REV	TSQ2	Indicates that the REV for the DISP board isTSQ2
DIAG/REV	AUD	Indicates the audio microcontroller board is revision is being queried
DIAG/REV	REV	Indicates that sub-mode is REV
DIAG/REV	REVE	Indicates that the REV for the AUD board is REVE
DIAG/REV	VBS	Indicates the VBS microcontroller board is revision is being queried
DIAG/REV	REV	Indicates that sub-mode is REV
DIAG/REV	REVH	Indicates that the REV for the VBS board is REVH
DIAG/REV	PS	Indicates the power supply microcontroller board is revision is being queried
DIAG/REV	REV	Indicates that sub-mode is REV

Display Mode	Typical Readout	Base Station Digital Display Activity Explanation
DIAG/REV	REVF	Indicates that the REV for the DISP board is REVF
DIAG/REV	BASE	Indicates the Base Station main microcontroller board is revision is being queried
DIAG/REV	REV	Indicates that sub-mode is REV
DIAG/REV	REVI	Indicates that the REV for the BASE board is REVI
This display cycle repeats until the Display Mode Selector is pushed		
DIAGNOSTIC MODE Camera Unit Error Status (CAM)		
A quick push of the Display Mode Selector advances to the Camera Unit (CAM) diagnostic sub-mode. This mode displays the error status of the Camera Unit. The Digital Display Characters are Green if Camera Unit shows no error and Red if the Camera Unit does have an error. This is a high-level view of the Camera Unit error status. For further information go to the Camera Unit diagnostic display (see The CopperHead 3404 Base Station Digital Display on page 67).		
DIAG/CAM	CAM	Indicates that the sub-mode is CAM
DIAG/CAM	OK	Indicates that the Camera Unit is reporting No fault
DIAG/CAM	ERR	Indicates that the Camera Unit is reporting Some fault
This display cycle repeats until the Display Mode Selector is pushed		

The CopperHead 3404 Camera Unit Digital Display

The Camera Unit Digital Display has seven functions selected by the BASE Rx/DIM Selector (#11 on the Overview Diagram in Camera Unit Indicators and Controls on page 106). These functions are indicated only by the activity in the Digital Display.

- **COPT** - Camera Unit Optical power being received at the camera coming from the base. Displayed in units of -dBm.
- **BOPT** - Optical Power (Remote OPTical) or Signal Strength generated by the Base Station as measured at the Camera Unit. Displayed in units of -dBm.
- **DIAGNOSTICS** - One of Five sub-modes
  - **TEMP** - displays operating temperature in degrees Centigrade of each circuit board that reports temperature
  - **FAN** - displays and allows testing of various fan operating modes
  - **POWR** - displays power level from monitored circuit boards
  - **REV** - displays microcontroller firmware version from each circuit board with a microcontroller
  - **LED Brightness** - Allows the adjustment of the Camera Unit LED brightness

To select the different display modes push the BASE Rx/DIM Selector. The transition from one mode to another may take a moment with the transition into the LED Brightness mode taking slightly longer. The Selector is cyclical rotating through each of the modes.

The following table describes the expected readouts in each of the above Camera Unit display modes. By following the sequence you can understand what the various readouts and four-character abbreviations mean for the system.

Readout	Camera Unit Digital Display Activity Explanation
(assumes after initial power up - see Powering the System on page 61 for a description of Power Up) After power up sequence system defaults to Camera Unit Optical Signal Strength - push the display select button and the system displays Base Station link strength. Push and hold button to enter diagnostics mode.	
COPT (Camera Unit Optical Signal Strength)	
-9	Indicates that the Camera signal strength is -9 dBm (typical power rating - value will reflect actual link strength at the time
n/A	Indicates that there is no active fiber link between the Base Station and the Camera Unit
BOPT (Base Station Signal Strength)	
A Quick push of the BASE Rx/DIM Selector advances to the BOPT mode	
-9	Indicates that the Base Station signal strength is -9 dBm (typical power rating - value will reflect actual link strength at the time
n/A	Indicates that there is no active fiber link between the base station and the camera unit
Readout	Camera Unit Digital Display Activity Explanation

Readout	Camera Unit Digital Display Activity Explanation
DIAGNOSTIC MODE Temperature (TEMP)	
A Quick push of the BASE Rx/DIM Selector advances to the TEMP mode	
TEMP	Sequence starts with TEMP to indicate the display mode is temperature
MAIN	The main Camera Unit controller board temperature will be displayed
TEMP	Repeats that the display is in the TEMP mode
36C	Temperature display in Centigrade for Camera Unit main circuit board
DIAGNOSTIC MODE Fan (FAN)	
FAN	When FAN appears and the Select button is held the cooling pan will cycle through the LO, HI, AUTO and OFF modes. This function duplicates the Fan Control on the Indicator side of the Camera Unit.
DIAGNOSTIC MODE Power (POWR)	
A Quick push of the BASE Rx/DIM Selector advances to the POWR mode	
LBUS	Indicates that the LBUS controller board is being measured
POWR	Indicates the display is in the POWER sub-mode
OK	Indicates that the item is in an OK State
UBUS	Indicates that the UBUS controller board is being measured
POWR	Indicates the display is in the POWER sub-mode
OK	Indicates that the item is in an OK State
OBOX	Indicates that the Audio Interface Box controller board is being measured
POWR	Indicates the display is in the POWER sub-mode
OK	Indicates that the item is in an OK State
MAIN	Indicates that main Camera Unit controller board is being measured
POWR	Indicates the display is in the POWER sub-mode
OK	Indicates that the item is in an OK State
DIAGNOSTIC MODE Microcontroller Board Revision Version (REV)	
A Quick push of the BASE Rx/DIM Selector advances to the REV mode. This mode displays the microcontroller firmware revision of every board in the Camera Unit that has a microcontroller. **Note**: the REV versions noted here were current as of December 1, 2013. Your system may have different REV versions.	
REV	Indicates that mode is REV
OBOX	Indicates the OBOX microcontroller board is revision is being queried
REVY	Indicates that the REV for the Audio Interface Box board is REVY
REV	Indicates that mode is REV
MAIN	Indicates the MAIN microcontroller board is revision is being queried
REVI	Indicates that the REV for the BASE Camera Unit controller board is REVI

Readout	Camera Unit Digital Display Activity Explanation
REV	Indicates that mode is REV
UBUS	Indicates the UBUS microcontroller board is revision is being queried
REVH	Indicates that the REV for the UBUS board is REVH

The BASE Rx/DIM accesses the Camera Unit dimming function. In order to change the brightness of the Camera Unit LEDs push and hold the BASE Rx/DIM selector. This may take a few moments. The dimming is cyclical - it will first change in direction and when it reaches the limit of that direction it will begin to go in the opposite direction (bright to dim, dim to bright).

Display	Description
<oo>	The four-character Digital Display will indicate maximum brightness with this readout, designating "eyes open".
<- ->	The four-character Digital Display will indicate minimum brightness with this readout, designating "eyes closed".

Best Practices

When operating the system, keep the following in mind:

- Protect the Fiber Optic Cable and the Fiber Optic Connectors. Always keep these connectors capped except when connected.
- Once the system is set up and running, do not ignore the Optical Power Signal Strength Readouts at either the Camera or the Base Station. While the Alarm functions of the system are very good, so is the tolerance for optical Signal Strength reduction. By monitoring -dBm levels you can take preventative action to stop a signal and possibly an On-Air or Recording loss. The system is, of course, digital and so the Signal Strength is either just good enough or usually much better than that. When it is no longer strong enough the signal stops.
- If introducing new equipment (cameras, switchers, etc.) or new operators be sure to do a test run with everything as it will be during the actual production. Reading this User Guide is a good start but hands-on is the best way to understand how it will and more importantly what to do to ensure proper operation.
- If your production is a Multi-Camera shoot with Time Code synchronized between all cameras it is a good idea to periodically confirm that proper Time Code is being returned from the various cameras and that a switch has not been changed in error at a camera location.

Shutting Down the System

- When shutting down the system, take care when workingwith the Fiber Cable and the Camera Remote Control Panel Cable.
- Camera Power and Camera Unit Power may be turned off at any time. If your system utilized Hybrid Power these are one and the same.
- To avoid the possibility of looking directly into an active fiber optic port or cable, turn both the Camera Unit and the Base Station off before disconnecting the fiber from either point.
- To avoid the possibility of damaging the Camera or Camera Remote Control Panel, turn both the Camera Unit and the Base Station off before disconnecting the Control Cable from the Control Panel, the Base Station, the Camera Unit or the Camera itself.
- Protect all cables from dirt, water entry, and from being dragged across the ground or other surfaces.
- When re-spooling the cable, avoid cable snags, crimps, or damage to the connectors. Re-spool evenly across the reel.
- If the Base Station is a permanent or semi-permanent installation, power off and disconnect and cap the Fiber Cable.

Troubleshooting

Troubleshooting any technical issues with the CopperHead 3404 Transceiver System is similar to any piece of television production gear with the obvious exception of the core Fiber Optic technology.

1. Check all your cablesfor any lost connections or bad connectors.
2. Confirm signal type is on the proper signal path

   It is possible to physically connect analog signals to digital signal paths on the CopperHead 3404 Transceiver System signals will not pass through the system unless they are the correct type. An SDI signal will not pass through the Analog or VBS paths and an Analog signal will not pass through an SDI path. If the wrong type of signal is incorrectly connected, the signal monitor indicator may light up because an electrical voltage is present on the line but no signal will pass through.
3. Check that the Power Supplies are working correctly. and check the fuses.
4. Take advantage of the various diagnostic tools provided in the CopperHead 3404 Base Station and Camera Unit:
   - Is the Fiber Optic Signal Strength within an acceptable range? The product specification calls for strength of -22 dBm or greater, but the system will often work at lower strengths, though this is not guaranteed
   - Use the Four-character Digital Displays to check signal strength.
   - Remember to check at both ends, both local and remote power. It is useful to know that the Base Station is putting out good power but the Camera Unit is not receiving it.
   - Observe all of the LED warning and alarm lights on the Base Station and take the appropriate action.
   - If signal strength is degraded from the time of system checkout at a particular location, walk the Fiber Cable and see that it is in intact and has no damage of severe bends or kinks.
5. If the digital display indicates an error and displays a Hexadecimal error code you should contact Grass Valley, a Belden Brand support to assist in diagnosing the problem (see Contact Us on page 81).

   Take note the exact error code so you can report it to Grass Valley, a Belden Brand support. The hexadecimal errors indicate problems with the power supplies and the internal boards.

   The Digital Display will indicate ERR and then the actual error code will display. This is a typical error code: 0002 - this indicates 10 to 16 volt status may be out of range.

7 Specifications

Video, Digital (bi-directional)

- Interface ..... SMPTE 259M, 292M
- Data Rate ..... 270 Mb/s or 1.5 Gbits/s

Video, Digital (4K-3G Cam-to-Base)

- Interface ..... SMPTE 310M, 259M, 292M, 297M, 424M
- Data Rate ..... 19.4 Mb/s to 3.0 Gb/s

Video, Digital (all)

- Input Level. ..... 800 mV (peak to peak)
- Input/output Impedance. ..... 75 Ohms
- Output Impedance. ..... 75 Ohms
- Bit-Error Rate (@ -22 dBm) 10-12
- Jitter (pathological data) ..... < 0.2 UI
- Rise/Fall Times ..... < 270 ps

Video, Analog (bi-directional)

- Interface ..... RS170, NTSC, PAL
- Frequency Response
  - 30 Hz-4.2 MHz. ..... ±0.15 dB
  - 8MHz. ..... -3 dB
- Video Signal to Noise Ratio ..... ≥ 72 dB
- Differential Gain ..... < 2%
- Differential Phase ..... < 1°

Ethernet

- Data Support 10BaseT/100BaseT
- Connector ..... Twisted Pair RJ45
- Cable compatible ..... UTP 100-ohm Cat5
- Input/Output Impedance ..... 10 kΩ/30 Ω

Audio

- Number of Channels 1-to-4
- Type ..... Balanced, line level
- Impedance ..... >15KΩ
- Maximum Input Level ..... 24 dBu
- Quantization ..... 24 bits, 128x (oversampled)
- Sample Rate 48kS/sec
- Frequency Response ..... ±0.1 dB, 20 Hz to 20 KHz

Intercom

Number or channels 2
Interface types (Base) ..... RTS, Clear-Com or Four-Wire
Frequency Response ..... 200 - 18KHz ± 3dB
Max Distortion ..... <= 0.5%
Noise ..... < -60dBu
Max Gain (RTS or Clear-Com) ..... >= 24dB
Min Gain (RTS or Clear-Com) ..... <= -45dB

GPI/Tally

Number, Base-to-Camera Unit 2
Number, Camera Unit-to-Base 1
Inputs:
On: ..... TTL Low or Short to GND
Off: ..... TTL High or Open
Output: ..... 2 position Form A Relay, SPST, normally open
Max Switching Voltage 125VDC, 150VAC,
Max current ..... 1 Amp

Data

RS422 or RS485 ..... 0 to 1 Mb/s
RS232 ..... 0 to 100 kb/s
Jitter (sample asynchronous) ..... 80 nsec

Electro-Optical

Operating Wavelengths ..... 1271-1331, CH: 1310nm/1550nm
TX Laser output power (std./opt) ..... -6 dBm/0 dBm
RX Sensitivity, HD/SDI ..... -22 dBm
Fiber Compatibility ..... Single Mode
Optical Connector Options - Camera Unit: Local Power ..... MX or OpticalCON
Remote Power: Short Range Power ..... SMPTE 304M or
OpticalCON Long Range Power ..... SMPTE 304M
Optical Connector Options - Base Station:
Unpowered (Tac fiber) ..... ST or OpticalCON
Remote Power (Hybrid fiber): Standard Power ..... SMPTE 304M,
..... OpticalCON, or STs & Molex

Distance Limit

The maximum cable length varies due to optical loss that can depend on cable quality, dirt/dust/contamination on connectors, and the number of cable connectors. When using hybrid cable for camera power, the size of the hybrid cable, as well as the power draw of the camera, lens, viewfinder, and other accessories are also factors

Tactical Fiber (Local Power at Camera):

Standard laser ..... 15db optical loss (≈ 5 km*)
Optional DFB laser..... 19db optical loss (≈ 30 km*)
SMPTE 311M Hybrid Fiber: Standard Internal Power Supply w/PowerWafer ..... 240m (787 ft): 95W @ 12VDC*
Long Range: HDX w/PowerPlus ..... 2km (6562 ft.): 100W Cont./150W Peak*

Mechanical/Environmental

Dimensions (WxLxD)

Camera Unit..... 2.5" x 6.5" x 2.2"
Base Station..... 17.5" x 9" x 1.75"
Power Wafer..... 5" x 6.12" x 2.2"
PowerPlus LP (100W) ..... 5" x 6" x 2.5"
PowerPlus HP (150W) ..... 5" x 6" x 3.7"
HDX..... 13" x 3.5" x 8.5"

Weight

Camera Unit..... 1.5 lb.
Base Station. ..... 5.0 lb.
PowerWafer ..... 1.5 lb.
PowerPlus..... LP: 2.3 lb.....HP: 2.5 lb.
HDX..... 10.5 lb.

Power Consumption

Camera unit ..... 16.5watts@12-18VDC
Base Station (Tac Fiber):
Power Consumption ..... 21 watts@12-18VDC
Power Connector..... 4-Pin XLR
Base Station (Hybrid Fiber):
Power Req ..... 110-120/220-240 VAC, 50 to 60Hz
Power Consumption ..... 250 watts max @120VAC
Temperature Range ..... -25° to +55°C
Humidity Range ..... 0 to 95% RH, Noncondensing

Contact Us

Grass Valley Technical Support

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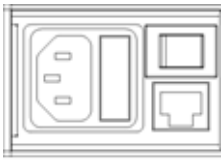
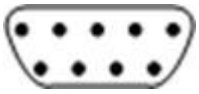
A Connector Pin Assignments

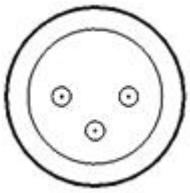
This appendix explains how the connectors work on the CopperHead 3404 Camera Unit and the Base Station.

Base Station Connectors

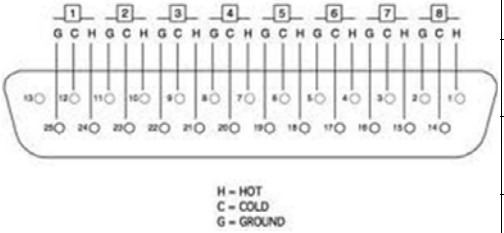
Reference Numbers: refer to the Overview System Overview Diagrams on page 104.

Item	Description
AC Power Input Connector- Models CHG3-BS-3404-95VD-xxx-xxx	
 Base Station #1 Standard IEC C14 receptacle	Panel Mounted AC Power Receptacle: 110/220 VAC Two 4 amp fuses (5 x 20mm). Fuses are in operation at all times – both the AC Line Hot and the AC Line Neutral are fused.
12VDC Input Power Connectors – Models CHG3-BS-3404-2ST/2MX/NEU	
 Base Station #22 XLR4 Male	• **Pin 1**: Ground • **Pin 2**: Unused • **Pin 3**: Unused • **Pin 4**: + Power 12 VDC This matching connector is from either an ADAP-AC-04 or a customer-supplied 12VDC power supply This connector is wired in parallel with terminal block #21 (below)
 Base Station #23 Terminal block	• **Pin 1**: Minus Voltage Terminal • **Pin 2**: Plus Voltage Terminal This connector is wired in parallel with XLR4 Male #20 (above).
Base Remote	
 Base Station #10 DB9 Female Format select (Pin 2) Floating for RS-422 or TTL Tie to GND (pin 3) for RS-232 Tie to +12VDC (pin 4) for RS-485	• **Pin 1**: Data 1 -422 In, -485 I/O • **Pin 2**: Data 1 Format Select • **Pin 3**: GND (Ground) • **Pin 4**: +12 VDC Bias for Data 1 Format Select • **Pin 5**: Data 1 -422 Out • **Pin 6**: Data 1 232 In, +422 In, +485 I/O • **Pin 7**: - 12 VDC Camera Control Data Power Ground • **Pin 8**: +12 VDC Camera Control Data Power • **Pin 9**: Data 1 232 Out, +422 Out
Tally/GPI/Data	

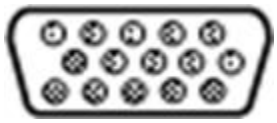
Item	Description
 Base Station #11 DB15HD Female Format select (Pin 10) Floating for RS-422 or TTL Tie to GND (pin 5/7) for RS-232 Tie to +12VDC (pin 15) for RS-485	• **Pin 1**: Data 2 -422 Out • **Pin 2**: Data 2 -422 In, -485 I/O • **Pin 3**: Not Used • **Pin 4**: GPI 1 In (Tally Red) • **Pin 5**: GND • **Pin 6**: Data 2 232 OUT, +422 Out • **Pin 7**: GND • **Pin 8**: Data 2 232 In, +422 In, +485 I/O • **Pin 9**: GPI2 In (Tally Green) • **Pin 10**: Data2 Format (see choices to the left) • **Pin 11**: Data 3 RS232 In • **Pin 12**: Data 3 RS232 Out • **Pin 13**: GPI OUT A • **Pin 14**: GPI OUT B • **Pin 15**: +12VDC Bias for Format
95VDC output: Model CHG3-BS-3404-95VD-STM-xxx	
 Base Station #25 Mating connector: Molex 39-01-4051	• **Pin 1**: 95VDC + OUT (White*) • **Pin 2**: 95VDC + OUT (Black*) • **Pin 5**: Ground (Green) *Tied together at terminal lug end
Clear-Com Intercom	
 Base Station #20 & 21 XLR3 Female (x2)	• **Pin 1**: Ground • **Pin 2**: +VDC Power • **Pin 3**: Power
RTS Intercom	
 Base Station #20 XLR3 Female	• **Pin 1**: Ground • **Pin 2**: +VDC Power & Channel 1 Audio • **Pin 3**: Channel 2 Audio

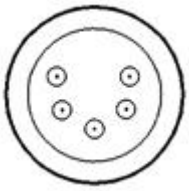
Item	Description
 Base Station #21 XLR3 Male	• **Pin 1**: Ground • **Pin 2**: +VDC Power & Channel 1 Audio • **Pin 3**: Channel 2 Audio

4-Wire Intercom				
	Pin	**Function**	**Imedance**	**Signal**
 Base Station #20 & #21 XLR5 Male	1	Ground		
	2	+ Input	600 Ohm Input	Line: +8 dBm
	3	- Input		Mic: -32 dBm
	4	+ Output	>=600 Ohm Load	+8 dBm
	5	- Output		

Audio Input & Output						
	Audio In #18	Audio Out #19	Channel	DB25 Pin Number		
				Hot	Cold	Ground
 Base Station #18 & #19 DB25 Female (x2)	Return Audio 1 In	Cam Audio 1 Out	1	24	12	25
	Return Audio 2 In	Cam Audio 2 Out	2	10	23	11
	Return Audio 3 In	Not Used	3	21	9	22
	Return Audio 4 In	Not Used	4	7	20	8
	Intercom Program In	Not Used	5	18	6	19
	Not Used	Not Used	6	4	17	5
	Intercom CH 1 In	Intercom CH 1 Out	7	15	3	16
	Intercom CH 2 In	Intercom CH 2 Out	8	1	14	2
	Not Connected			13		

Camera Unit Connectors

Item	Description
Camera Remote: Data 1 (Camera Control) and Data 3 (RS232)	
 Camera Unit #7 Hirose 10-Pin Female Pin 5 (Format select) Floating for RS-422 or TTL Tied to GND for RS-232 Tied to +12VDC for RS-485	• **Pin 1**: +12VDC Input Power (also Camera Control Data Format Select Bias) • **Pin 2**: 12VDC Input Power - Ground • **Pin 3**: Camera Control Data (+) Input or Di-directional Camera Control Data I/O • **Pin 4**: 232 Data Input (Data 3) • **Pin 5**: Camera Control Data Format Select (see choices to left) • **Pin 6**: Camera Control Data (-) Output • **Pin 7**: Ground (Camera Control Data Shields, 232 Data Common) • **Pin 8**: 232 Data Output (Data 3) • **Pin 9**: Camera Control Data (-) Input • **Pin 10**: Camera Control Data (+) Output Mating connector: Hirose HR10A-10P-10P. See Data 1 (Camera Control) Pinout Configurations on page 89 for pinout configuration.
Production/Signal	
 Camera Unit #8 DB15HD Female Pin 10 (Data 2 Format select) Floating for RS-422 or TTL Tied to GND for RS-232 Tied to +12VDC for RS-485	• **Pin 1**: Data 2 -422 Out • **Pin 2**: Data 2 -422 In, -485 I/O • **Pin 3**: Intercom Microphone Trigger • **Pin 4**: GPI In • **Pin 5**: GND • **Pin 6**: Data 2 232 OUT, +422 Out • **Pin 7**: GND • **Pin 8**: Data 2 232 In, +422 In, +485 I/O • **Pin 9**: Not Used • **Pin 10**: Data2 Format (see choices to left) • **Pin 11**: GPI 2 OUT B (Green) • **Pin 12**: GPI 2 OUT A (Green) • **Pin 13**: GPI 1 OUT B (Red) • **Pin 14**: GPI 1 OUT A (Red) • **Pin 15**: +12VDC (100mA max)- Bias for Format
Power Wafer	
 Camera Unit #15 Lemo 4-pin Female	• **Pin 1**: 95VDC+ • **Pin 2**: Not Used • **Pin 3**: 95VDC- • **Pin 4**: Not Used Mating connector: Lemo FGG.0B.304.CLAD42 (right angle)
Camera Headset	

Item	Description
 Camera Unit #3 XLR5 Female	• **Pin 1**: MIC Ground (shield) • **Pin 2**: + MIC Input • **Pin 3**: - Earphone Output Ground • **Pin 4**: + Earphone Output • **Pin 5**: + Earphone Output
Audio Output	
 Camera Unit #4 XLR5 Male	• **Pin 1**: Ground • **Pin 2**: Channel A/C (-) OUT • **Pin 3**: Channel A/C (+) OUT • **Pin 4**: Channel B/D (-) OUT • **Pin 5**: Channel B/D (+) OUT
Audio Input	
 Camera Unit #5 & #6 XLR3 Female	• **Pin 1**: Chassis ground (cable shield) • **Pin 2**: Positive polarity terminal (“hot”) • **Pin 3**: Return terminal (“cold”)

Data 1 (Camera Control) Pinout Configurations

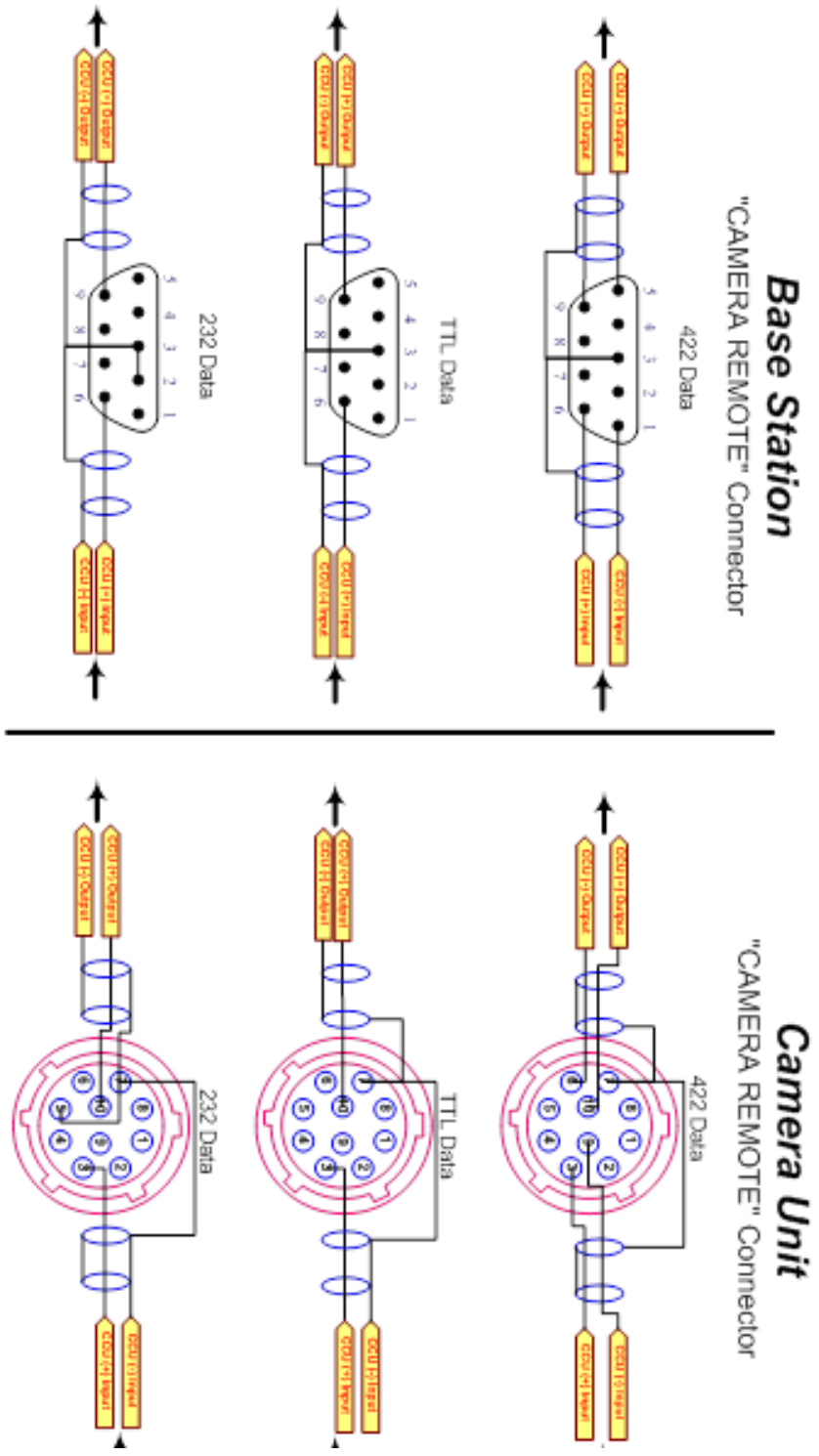
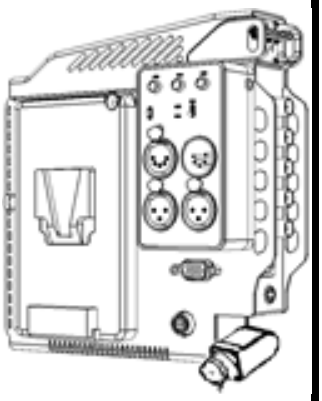
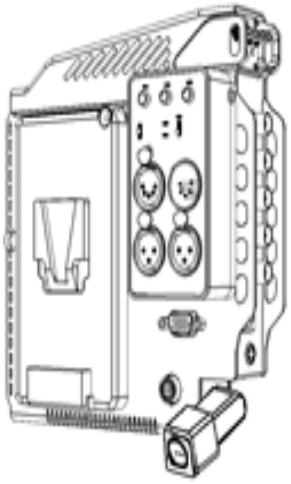
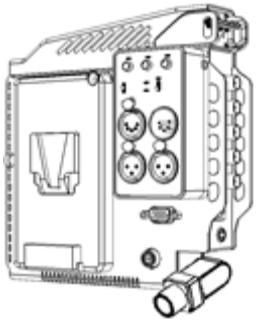


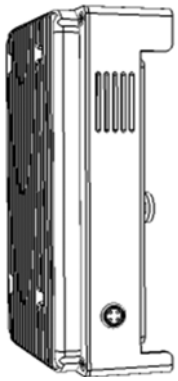
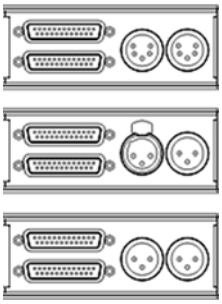
Fig. A-1: Data 1 (Camera Control) Pinout Configurations

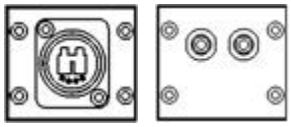
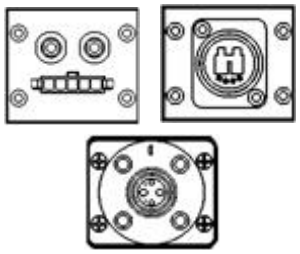
B Available Accessories

This appendix lists all the accessories available with the CopperHead 3404 system.

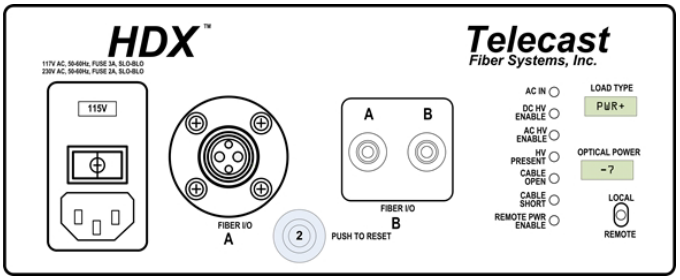
Accessories

Item	Picture	Item	Picture
CH3-CAM-3404-MX Camera Unit w/MX Connector: Tac Fiber only		**CAXX-MX** Tactical Fiber Assembly, MX Connectors	
CH3-CAM-3404-NEU Camera Unit w/ OpticalCON connector: Tac or SMPTE Hybrid Fiber		**CAXX-XT2S-NOC** Tactical Fiber Cable Assembly, OpticalCON Connectors	
CH3-CAM-3404-304M Camera Unit w/SMPTE 304M connector: Tac or SMPTE Hybrid Fiber		**CAXX-XSM311-NOC** SMPTE 311M Hybrid Fiber Cable Assembly, OpticalCON connectors	

Item	Picture	Item	Picture
MXRE MX Receptacle Flange Mount Assembly Breakout to STs		**CAXX-XSM311-SMPTE** SMPTE 311M Hybrid Fiber Cable Assembly, SMPTE 304M connectors	
PWRWFR-95VD-FSR-AB Power Wafer Camera Adaptor (for use with CH Series 3404-BS-95VD)		**MXRV** MX Receptacle Jam Nut Assembly Breakout to STs	
ADAP-AC-02 Base Station AC Adaptor (for CH Series 3404-BS-2ST)		**CH3BFC-NOC-2ST/MOL-08-XX** OpticalCON receptacle to STs and Molex 39-01-4051	
CASM/MD/XL Tactical Fiber on Reel		**CH3BFC-NOC-NOC-08-XX** OpticalCON receptacle to OpticalCON Plug	
CHG3-AUD-RTS/CC/4W 2-Channel Intercom Modules: 4-wire, RTS, or Clear-Com		**CH3BFC-304M-2ST-08-XX** SMPTE Hybrid 304M plug to STs and Molex	

Item	Picture	Item	Picture
PWRPLUS-1MX/NO Long Distance "PowerPlus" Camera Adaptor for use with HDX (specify LP or HP)		**CH3BFC-304M-NOC-08-XX** SMPTE Hybrid 304M plug to OpticalCON Plug	
CHCR-XXX Camera Remote Cable (specify camera model)		**CHBR-XXXX** Camera Remote Cable, 10 foot	
CH2-MPS-95VD-2ST-XXX or CH2-MPS-95VD-NEU-XXX Power Supply for Power Wafer Power Adaptor			
CH3BFP-ST/NOC Base Fiber Plates - unpowered ST or OpticalCON		**CH3CS-BO-XX** Camera Signal Breakout Cable	
CH3BFP-STMOL/NOC/304M Base Fiber Plates - powered: ST /Molex or OpticalCON or 304M		**CH3CS-26P** Camera Signal Cable 26-pin Multicore	
CHRCP-2050A Universal Camera Control Panel		**CHRCP-2050-LCD** Universal Camera Control Panel w/TFT-LCD Display	

Wider Illustrations

Item	Picture
HDX-2-ST Power Supply for PowerPlus Power Adaptor	
HDX-FR-2 Rack mount frame for 2 HDX units (specify remote model)	
CH3-BS-2ST or -NEU Standard Base Station 2 STs or OpticalCON connector	
CH3-BS-95VD-304 or -NEU or -STM Base Station w/internal Power Supply	

C Multi-Pin Signal Cables

This appendix describes how the CopperHead 3404 cables work together with the various components.

Camera Signal Cables

Cable Description	Item Number	Cable is Wired with Connectors	Typical Equipment Used With Cable
Breakout Cable	CH3CS-3404-BO-BF1-D9F1	DB15HD to BNC-F, DB9F	Ext Intercom Trigger, Ext Tally I/O

Base station cables

Cable Description	Item Number	Cable is Wired with Connectors	Typical Equipment Used With Cable
Audio Input	CH3BAI-DB25-5XL3F	DB25 to 5 XLR3-F	Audio input sources
Audio Output	CH3BAO-DB25-2XL3M	DB25 to 2 XLR3-M	Audio output devices
Data/Tally	CH3BS-3404-BO-GPI-DATA	DB15HD to DB9 F and pigtails	Data2 and Tally I/Os

Base Station Remote Control Panel Cables

Cable Description	Item Number	Cable is Wired with Connectors	Typical Equipment Used With Cable
Hitachi	CHBR-HIT-SK1-4	DB9M to HR10-7P-4S (4 pin)	RU-Z1, RC-Z1, RC-Z11, RU-Z2, RC-Z2A, RC-Z21A, RUZ1, RCZ3, MP-Z3000, CP7, RU777, SU-2100
Ikegami	CHBR-IKE-HK1-8	DB9M to PRC90-199P9-8F (8 pin)	OCP-377/388/45, MCP377/388, RCP-50
JVC	CHBR-JVC1-6	DB9M to mini DIN (6 pin)	RM-LP55U/57U/25
JVC	CHBR-JVC2-6	DB9 to HR10A-7P-6S (6 pin)	RM-LP35/37/38/80U
Panasonic	CHBR-PAN-AJ3-10	DB9 to HR10A-10P-10S (10 pin)	AJ-RC10G
Sony	CHBR-SON-BVP3-8-BNC	DB9 to MXR-8P-8P (8-pin) & BNC	RMB-150/750, RCP700 series, MSUs (w/video in)
Sony	CHBR-SON-DXC2-10-BNC	DB9 to HR10A-10P-10S (10 pin) & BNC	RCP-D50
CP2040 / 2050	CHBR-OCP2040-422	DB9 to DB15	TDS OCP2-40/2050

Camera Remote Control Cables

Cable Description	Item Number	Cable is Wired with Connectors	Typical Equipment Used With Cable
Hitachi	CHCR-HIT-SK1-4-0	HR10A-10P-10P to HR10-7P-4P (4 pin)	Z1000/2000/3000 series, SK888.
Ikegami	CHCR-IKE-HK2-10-0	HR10A-10P-10P to HR10B-10P-10PC (10 pin & coax)	HL-59, HL-V7X, HK-398P*, HK-387P*, HL-V59**
JVC	CHCR-JVC1-6-0	HR10A-10P-10P to Mini DIN (6 pin)	GY-DV550U
JVC	CHCR-JVC2-6-0	HR10A-10P-10P to HR10A-7P-6P (6 pin)	KY-D29
Panasonic	CHCR-PAN-AJ3-10-0	HR10A-10P-10P to HR10A-10P-10P (10 pin)	AJ-HDX900, HPX2000, HPX500, HPX3000G
Sony	CHCR-SON-BVP3-8-0	HR10A-10P-10P to MXR-8P-8P (8 pin)	HDW-700, HDC, BVP-750, 900, 950 MSW900, DNW (w/RMB-150/RCP700)
Sony	CHCR-SON-DXC2-10-0	HR10A-10P-10P to HR10A-10P-10P (10 pin)	DXC-537, DXC-D30/D35/ D50, DSR570 w/RCP-TX7 or RCP-D50 (no VTR)

For information on these and other cable configurations please contact Grass Valley, a Belden Brand (see Contact Us on page 81) or your local CopperHead dealer.

D Multi-Pin Wiring Suggestions

This appendix makes suggestions of how to connect the wires in the CopperHead 3404 system.

Base Station Breakout Data/GPI Cable

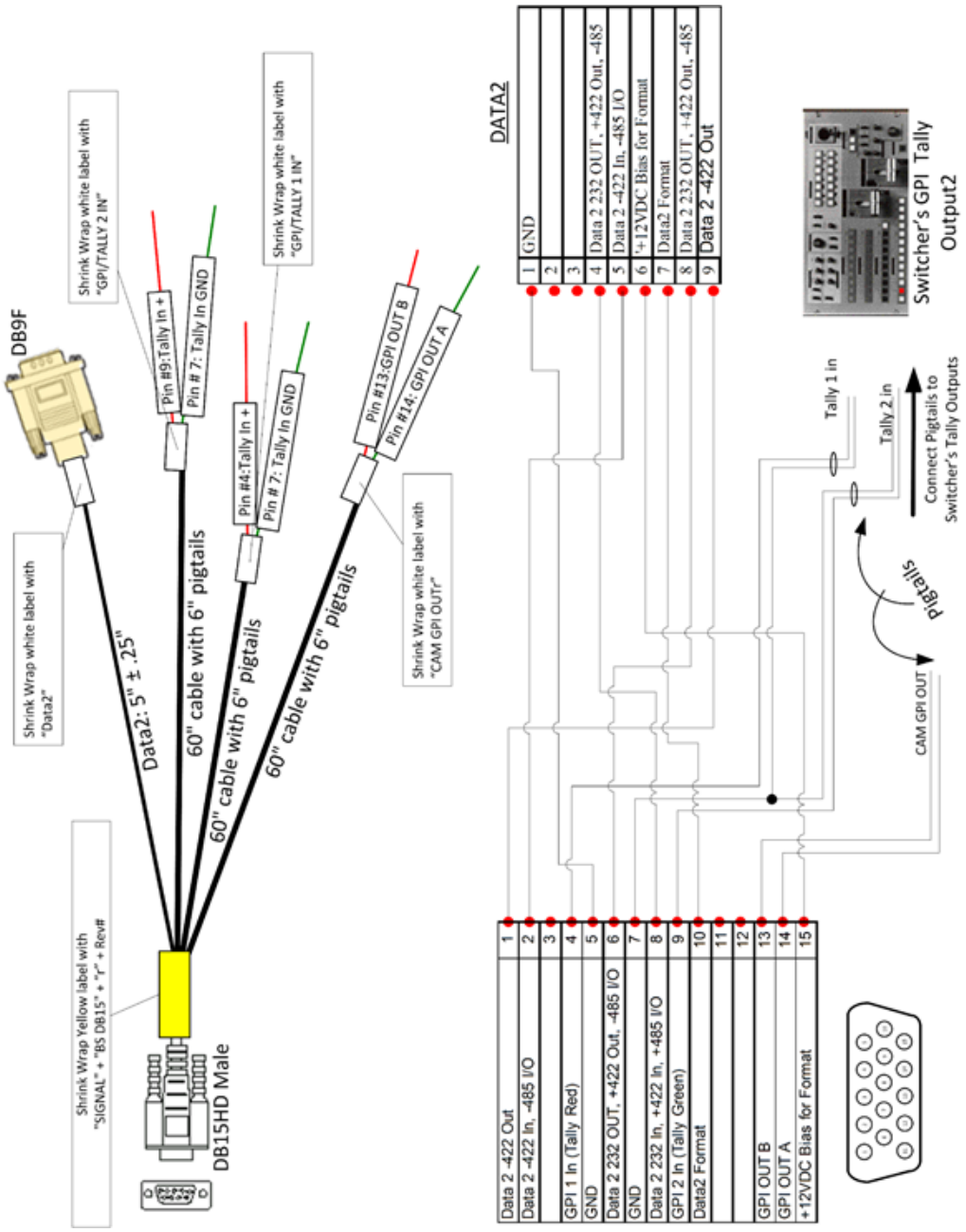


Fig. D-1: Base Station Breakout Data/GPI Cable for CopperHead 3404

Base Station 25-Pin Audio Input Cable

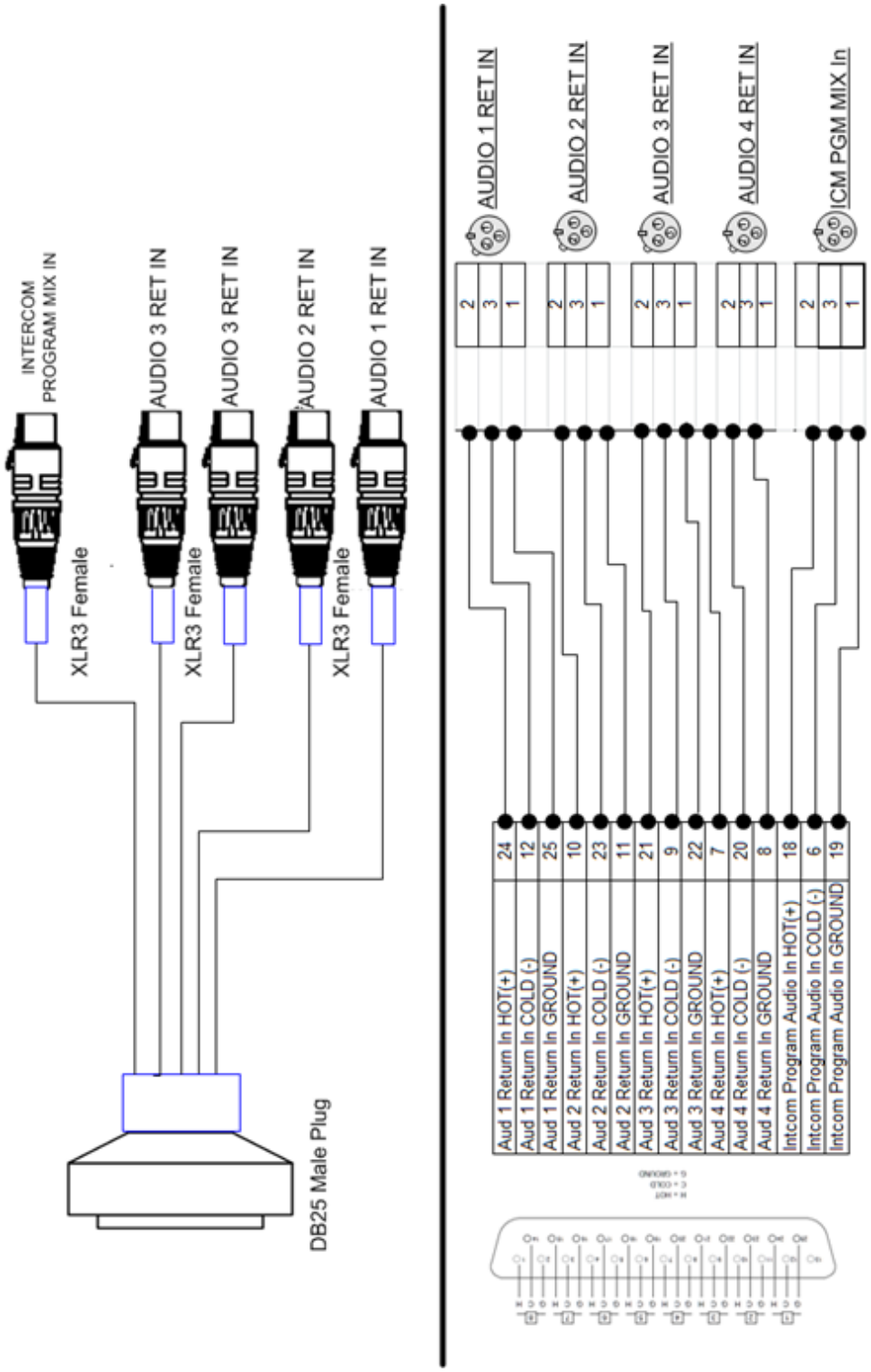


Fig. D-2: CopperHead 3404 Base Station 25-Pin Audio Input Cable

Base Station 25-Pin Audio Output Cable

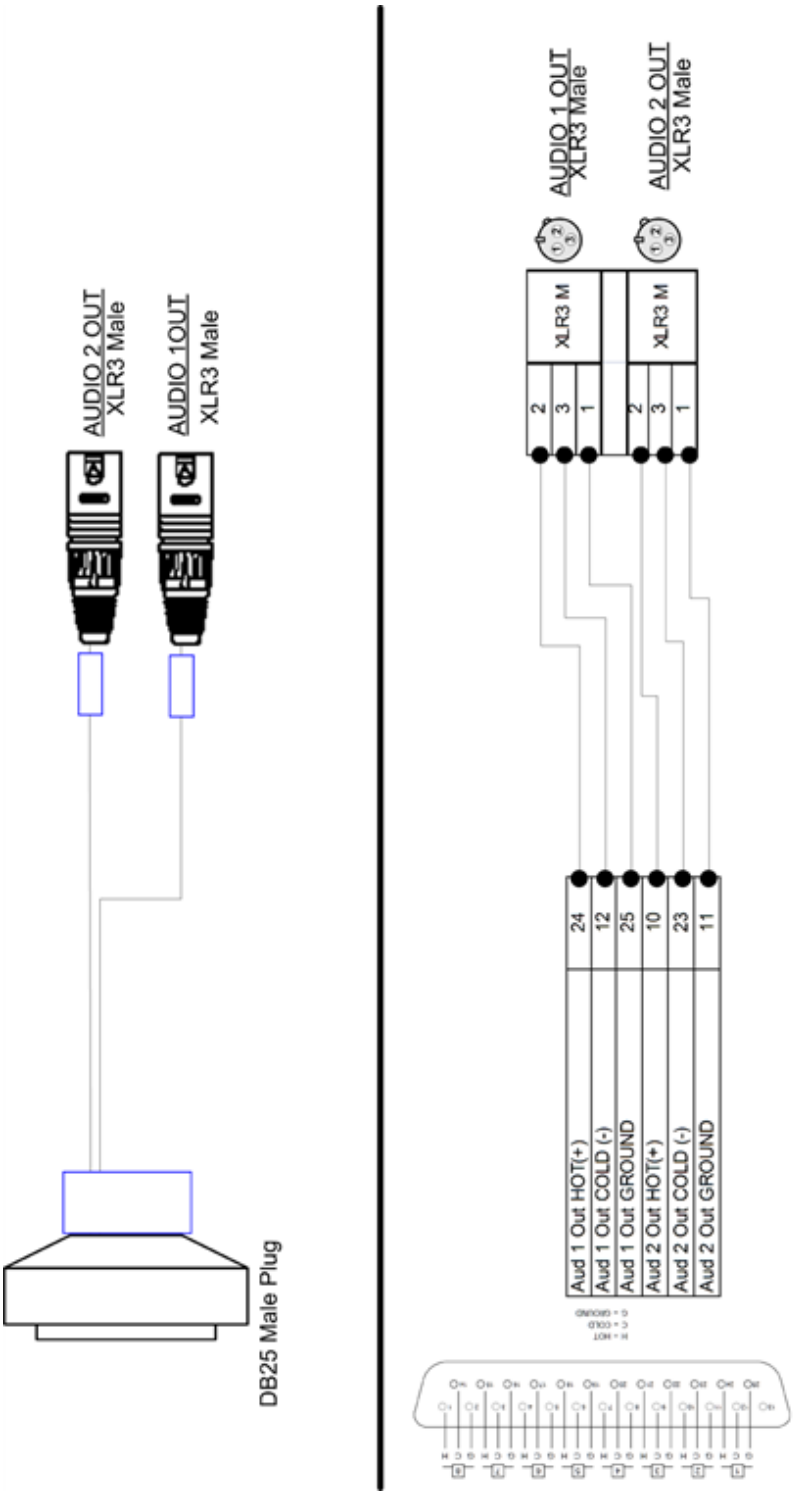


Fig. D-3: CopperHead 3404 Base Station 25-Pin Audio Output Cable

E System Overview Diagrams

This appendix provides a detailed overview of the various features of the CopperHead 3404 system.

CopperHead 3404 Transceiver System Base Station Back Panel

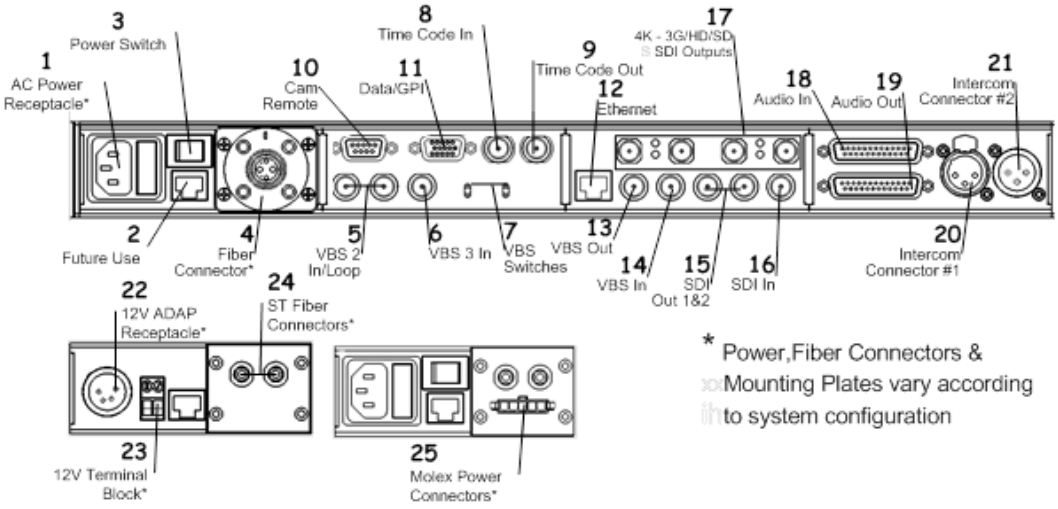


Fig. E-1: CopperHead 3404 Transceiver System Base Station Back Panel

CopperHead 3404 Transceiver System Camera Front and Back Panel

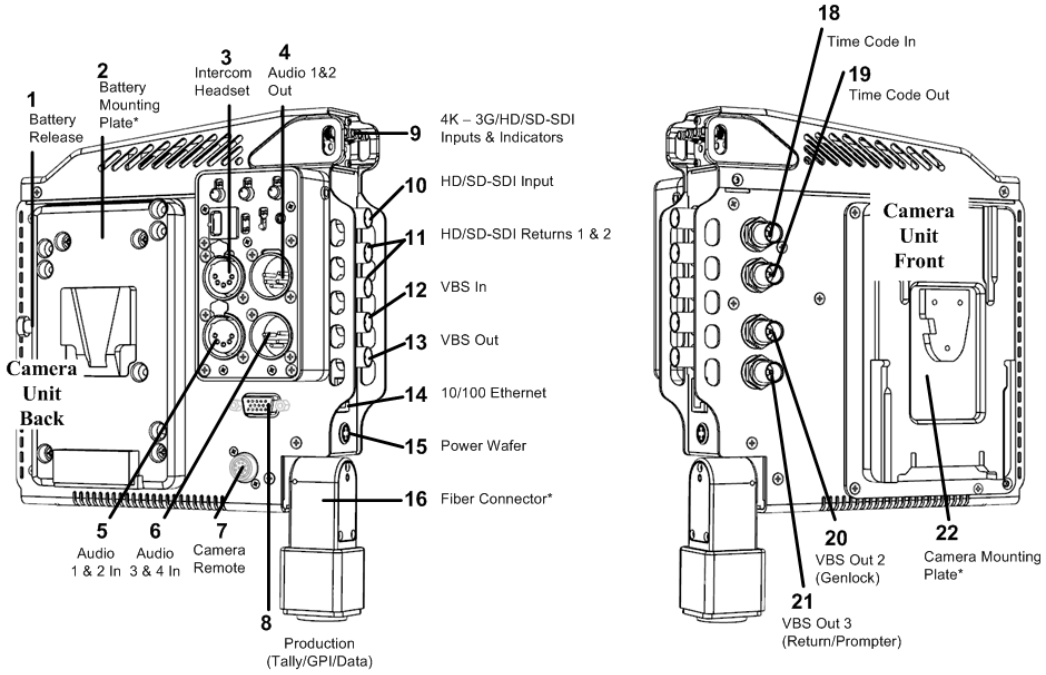


Fig. E-2: CopperHead 3404 Transceiver System Camera Front and Back Panel

Camera Unit Indicators and Controls

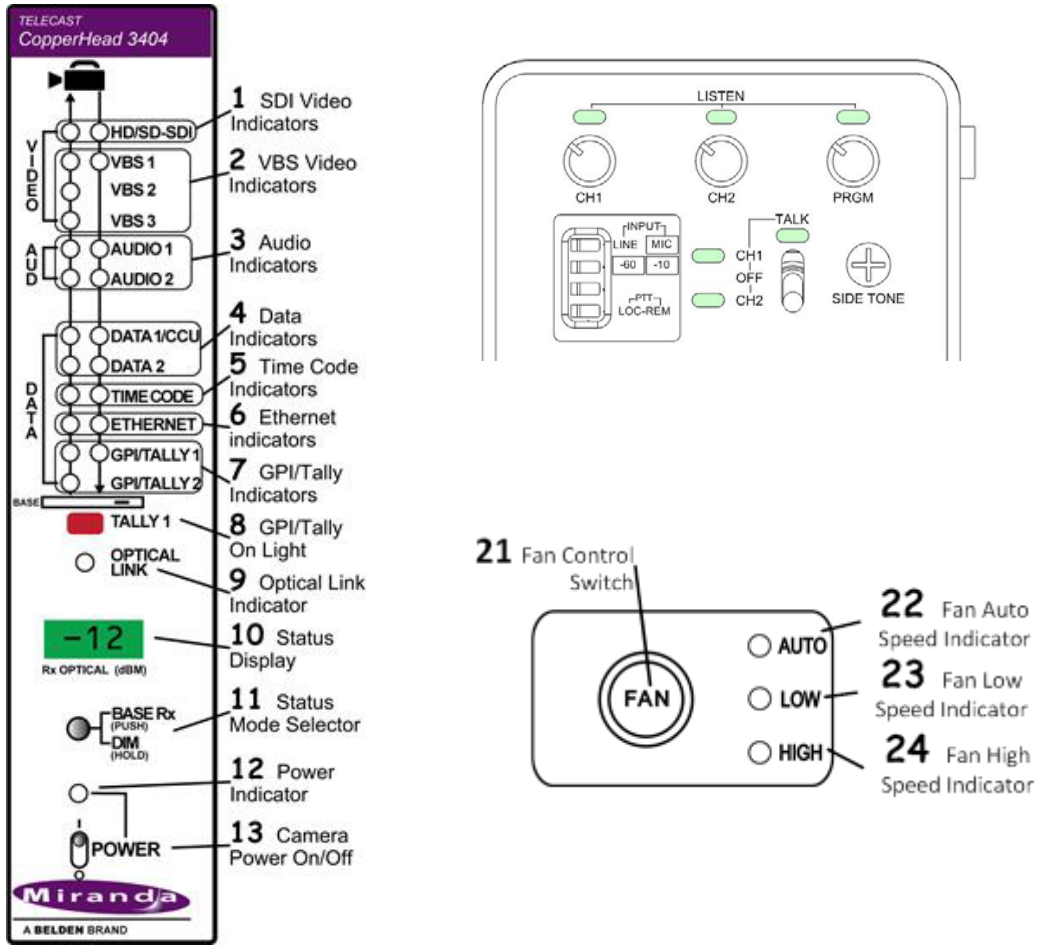


Fig. E-3: Camera Unit Indicators and Controls

CopperHead Base Station Front Panel

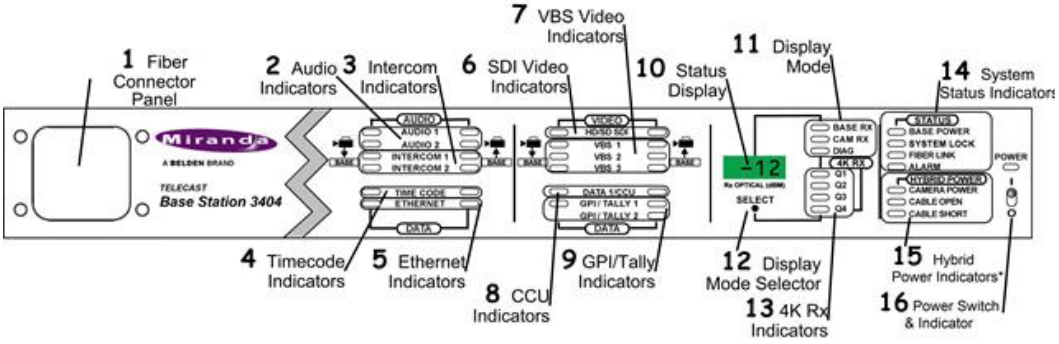


Fig. E-4: CopperHead Base Station Front Panel