

Telecast Fiber Solutions

CopperHead 3200 Fiber Optic Transceiver System User Guide

M4011-9900-102

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1

Introduction

This chapter provides overview information about the CopperHead 3200 Fiber Optic Transceiver System, including safety information.

About the CopperHead 3200 Fiber Optic Transceiver System 2
Safety and Fiber Optic Systems 3

About the CopperHead 3200 Fiber Optic Transceiver System

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

Item Description	Part Code	CopperHead System Type		
		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	○	○	No
Camera Remote cable	CHCR	●	●	●
Camera Signal cable	CH3CS	○	○	○
Base Station Remote cable	CHBR	●	●	●
Power Wafer w/jumper cable	CHG3-PW	No	●	No
Eternal Power Wafer Supply	CH3-MPS	No	○	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	
		○	Optional	

Table 1-1: What is shipped with a CopperHead 3200 System

Consult your packing slip and purchase order to ensure that you have received all of the expected Grass Valley 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 3).

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

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

Product Returns

In the unlikely event of damage to your CopperHead 3200 Fiber Optic Transceiver System during shipping or delivery, take 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 support (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 the RMA number inside and outside of all shipping boxes and on all documentation provided with the items to be returned.

About this User Guide

This CopperHead 3200 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.

Safety and Fiber Optic Systems

Optical Fiber Safety

Do not look directly into the end of the optic fiber while either end of the system is operating to prevent damaging your eyes.

Always use cable connector caps when the cables are not connected. This protects the connector from damage and the unlikely event of exposure to an operating optical link. Keeping the caps in place when the connectors are not in use will prevent dirt and dust from entering the connector and degrading the performance of the optical link.

2 System Overview

This chapter lists the components for the CopperHead 3200 Fiber Optic Transceiver System and provides an overview about fiber cable.

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Fiber Cable Concepts

Fiber optics and fiber optic cable are the core technologies at the heart of the Miranda CopperHead 3200 Fiber Optic Transceiver System. It provides the ability to multiplex and de-multiplex a variety of video, audio, and data signals that can be carried over a thin strand of fiber optic cable for long distances.

The theory and operation of Fiber Optics is beyond the scope of this document, but you need to be aware of the different types of fiber optic cable and fiber optic cable connectors.

Fiber Optic Cable

Tactical Fiber Cables are extremely strong, lightweight, and rugged. They are designed for "harsh environment" (military and commercial) deployment and retrieval applications.

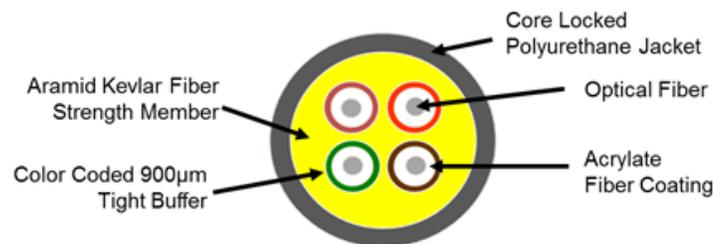


Fig. 2-1: Tactical Fiber Optic Cable Cross-section (Tac-4 cable shown)

The internal glass fiber optic cores are protected by a woven aramid (Kevlar) strength member, making them able to withstand a variety of environmental hazards. They are available in core counts of 1, 2, 4, 6, and 12. CopperHead systems require a minimum of two cores. Using a totally non-metallic design for electrical isolation; they are impervious to noise & grounding issues. Tactical Fiber can be used in the field when mounted on lightweight reels in lengths up to 2000 feet or longer.

Hybrid Fiber Cable has two fiber optic cores with six more copper wires, providing for the transmission of power through the cable in order to provide power to the camera.

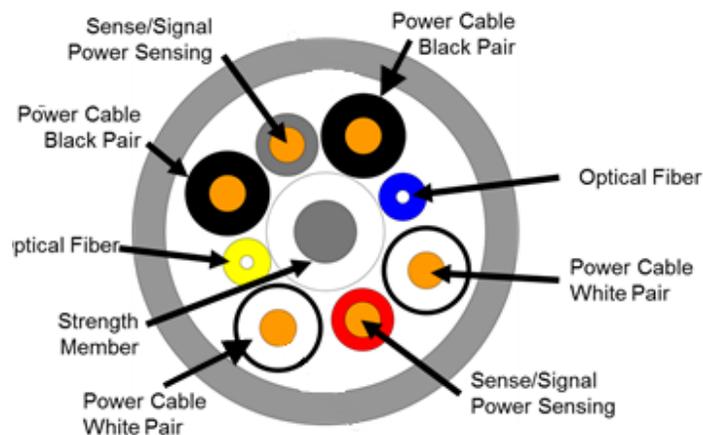


Fig. 2-2: Hybrid Fiber Optic Cable Cross-section

These copper wires increase the diameter and weight of the cable, making the cable more fragile than Tactical cable and making it susceptible to noise and grounding issues.

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 3200 Fiber Optic Transceiver System configuration and the allowed Fiber Optic Cable usage.

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 (up to 95V)	Yes	Yes	
OpticalCON Cable Connector (Neutrik)	Yes	Yes	Yes	Yes	
OpticalCON Panel Connector (Neutrik)	Yes	Yes	No	No	Infrastructure Use Only
MX Expanded Beam Connector	Yes	No	Yes	Yes	

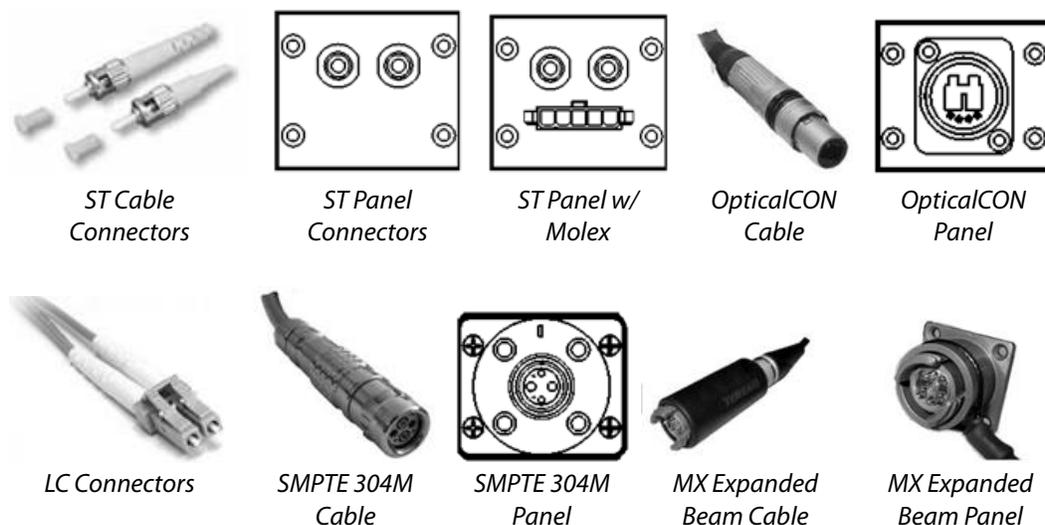


Fig. 2-3: Fiber Optic Connectors

CopperHead 3200 Transceiver System concepts

The CopperHead 3200 Fiber Optic Transceiver System is a camera video, audio, and data multiplexing system that installs between a portable video camera and its power source and connects 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 far as 5 km or more.

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, PAG, and Anton-Bauer.

The CopperHead 3200 Fiber Optic Transceiver System consists of two main components:

- **The CopperHead 3200 Camera Unit** – this unit has two options:
 - the battery physical interface system
 - the fiber connector
- **The CopperHead 3200 Base Station** – this unit 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. Options can be field-changed by qualified personnel. This manual describes each of the possible options.

Signal paths in the CopperHead 3200 System

The CopperHead 3200 Fiber Optic 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 converted to electrical analog information for use by the camera, camera operator, and auxiliary equipment at the camera location.

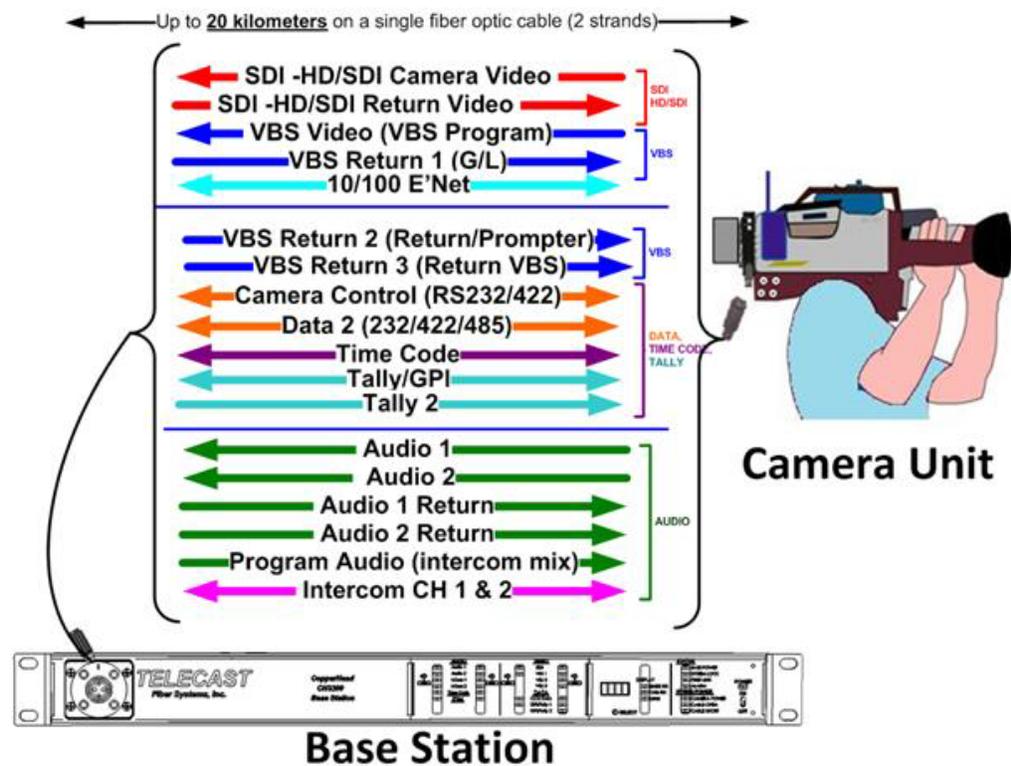


Fig. 2-4: Base Station to Camera Unit Connection

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.

CopperHead 3200 Components

Camera Unit Overview

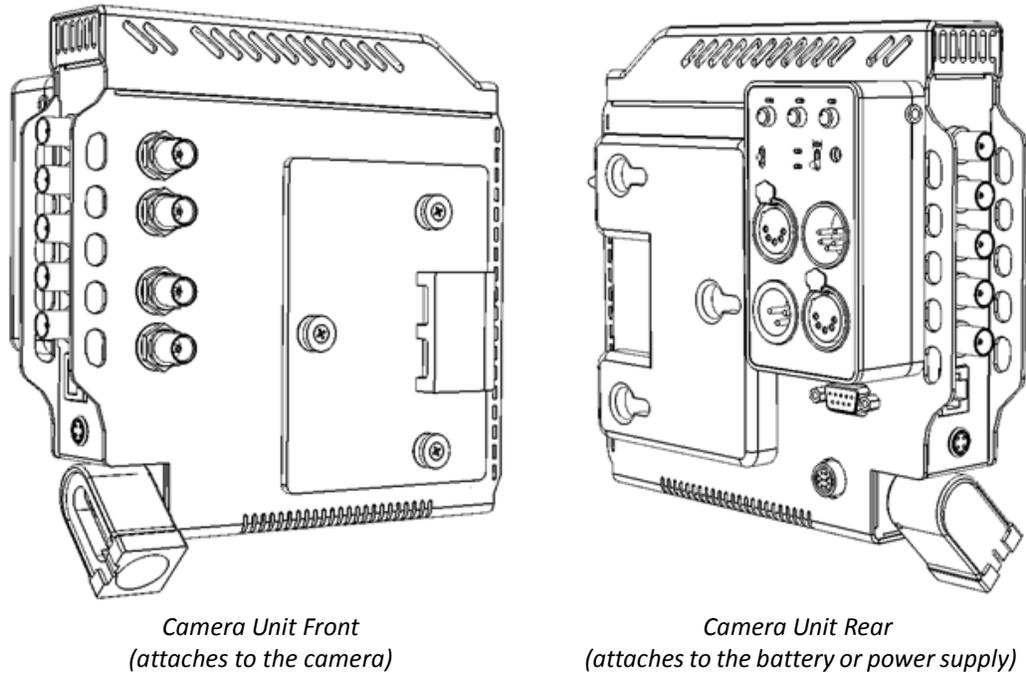


Fig. 2-5: Camera Unit, Front and Rear

The actual appearance of your CopperHead 3200 Camera Unit will vary depending on the battery mount and fiber cable connection options specified at the time of purchase.

Base Station Overview

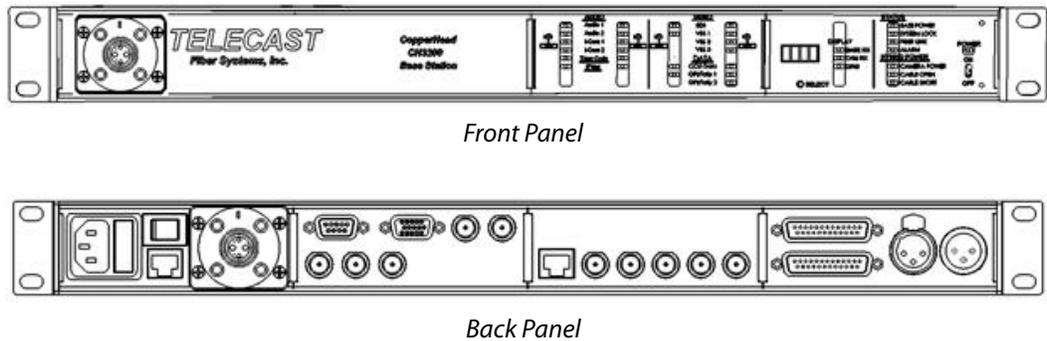


Fig. 2-6: CopperHead 3200 Base Station Connector, Front and Back Panel

The actual appearance of your CopperHead 3200 Base Station will vary depending on the fiber cable connectors and power option specified at the time of purchase.

Additional System Components

In addition to the CopperHead 3200 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 96,

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 Connectors: Suggested Wiring](#) on page 90 for suggestions.

3

Component Detailed Description

This chapter describes in detail each element on the Camera Unit and Base Station of the CopperHead 3200 Fiber Optic Transceiver System. Physical installation of the system and system connections and practical operation are covered in following chapters.

For an overall view of component locations, see the CopperHead 3200 Fiber Optic Transceiver System overall diagrams in [CopperHead 3200 Fiber Optic Transceiver System Base Station Back Panel](#) on page 105.

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Camera Unit

Camera Unit Front Components

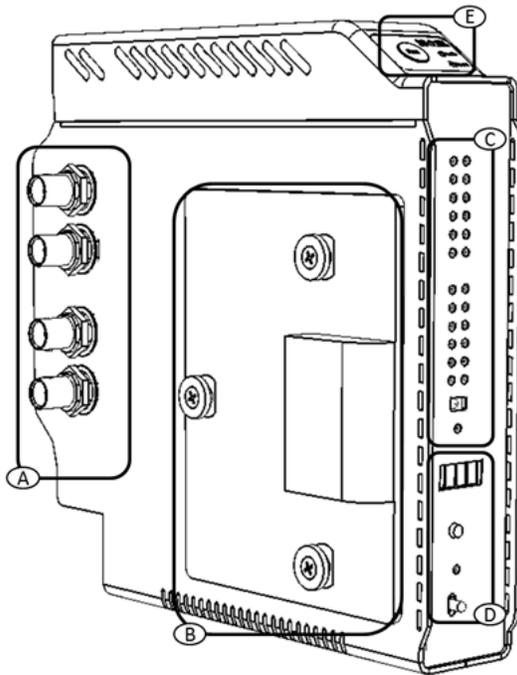


Fig. 3-1: CopperHead 3200 Camera Unit Front Side

The front side of the Camera Unit has five features:

- **A** - Connector Panel, see [Area A – Connector Panel](#) on page 20.
- **B** - Camera Mounting Plate, see [Area B – Camera Mounting Plate](#) on page 15.
- **C** - Signal/Data LED Activity Indicators, see [Area C – Signal/Data Indicators](#) on page 16
- **D** - Digital Status Display & Power Switch, see [Area D - Optical Link Signal Strength Indicator & Power Switch](#) on page 17
- **E** - Fan Control Switch and Indicators, see [Area E – Fan Control Switch and Indicators](#) on page 18

Area A – Connector Panel

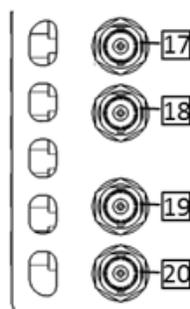
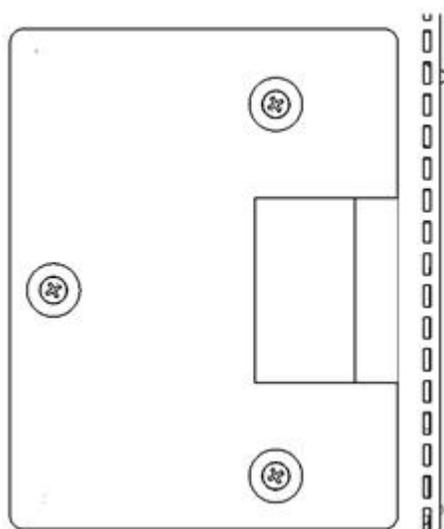


Fig. 3-2: Connector panel

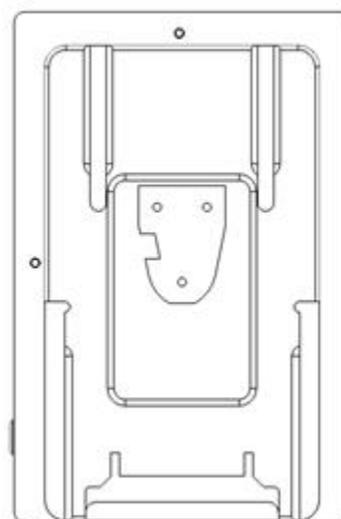
- **17 - Time Code In (to Base Station):** provides feed of local camera time code or for the provision of a master synchronization time code for all other cameras (typically from Camera 1 and only if not master TC generator at base)
- **18 - Time Code Out (from Base Station):** for time code synchronization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

For additional information about the signals carried on these connectors, see [Signal paths in the CopperHead 3200 System](#) on page 9.

Area B – Camera Mounting Plate



Anton Bauer Camera Mounting Plate



V-Type Camera Mounting Plate

Fig. 3-3: Camera Mounting Plates

The CopperHead 3200 Camera Unit is shipped with a variety of Battery Mount to camera types. The Anton Bauer mount and the Sony V-mount are the most common. PAG and other battery mount systems are available by special order (contact Grass Valley, a Belden Brand (see [Contact Us](#) on page 81) or your authorized dealer).

Area C – Signal/Data Indicators

The CopperHead 3200 Camera Unit Indicator Panel has a series of LED indicators 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 indicator remains illuminated as a steady green light. For signals that fluctuate (such as audio), the indicator will reflect the varying signal activity.

If the indicator is not illuminated, either the signal has been lost or it is not in use.

The indicators on the left side of the panel represent the status of signal paths from the Base Station to the Camera Unit. The indicators on the right side represent the status of signal paths from the Camera Unit to the Base Station.

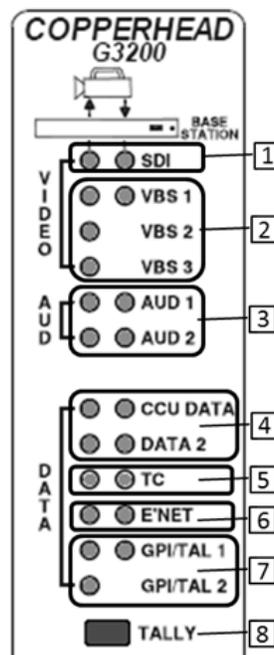


Fig. 3-4: Camera Unit Indicator Panel LEDs

- **1 - SDI Digital Video Signal:** monitors camera SDI Video to Base Station and SDI return video to the Camera Unit
- **2- VBS 1-3 – Analog Video Signals 1-3:**
 - **VBS 1:** 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:** used for Genlock (one way from Base Station to Camera)
 - **VBS 3:** 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 2:** typically used for auxiliary devices such as Robotic Pan & Tilt Head
- **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 1-2:** monitors GPI/Tally Signal 1 to Base Station and return from Camera and GPI/Tally Signal 2 to Camera Unit
- **8 - Tally Light:** lights up RED when GPI/Tally 1 signal is activated at the Base Stations
 - **Off** when the signal is not present
 - **On** when the signal is present

For information about configuring the use of Tally in your system, see [Multi-Pin Connectors: Suggested Wiring](#) on page 90.

Area D - Optical Link Signal Strength Indicator & Power Switch

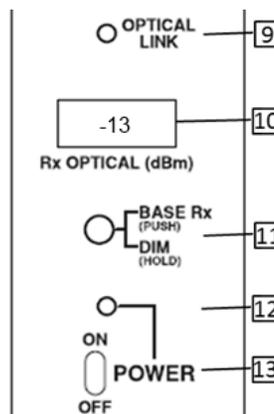


Fig. 3-5: Optical Link Signal Strength Indicator & Power Switch

- **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):** displays a four-character message in one of five modes (see [A Brief Guide to Measurement of Fiber Optic Signal Strength](#) on page 67)
- **11 - Base Rx/Dim Push Button:** changes 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 Unit error. Refer to DIAG display mode for details ([The CopperHead 3200 Camera Unit Digital Display](#) on page 72).
- **13 - Power On/Off Switch:** toggle switch to enable or disable camera power.

- High voltage Base Station: this enables or disables camera power.
- Low voltage Base Station: this turns camera power on and off.

Area E – Fan Control Switch and Indicators

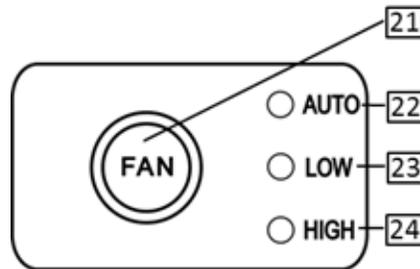


Fig. 3-6: Fan Control Switch

- **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.

Camera Unit Rear Components

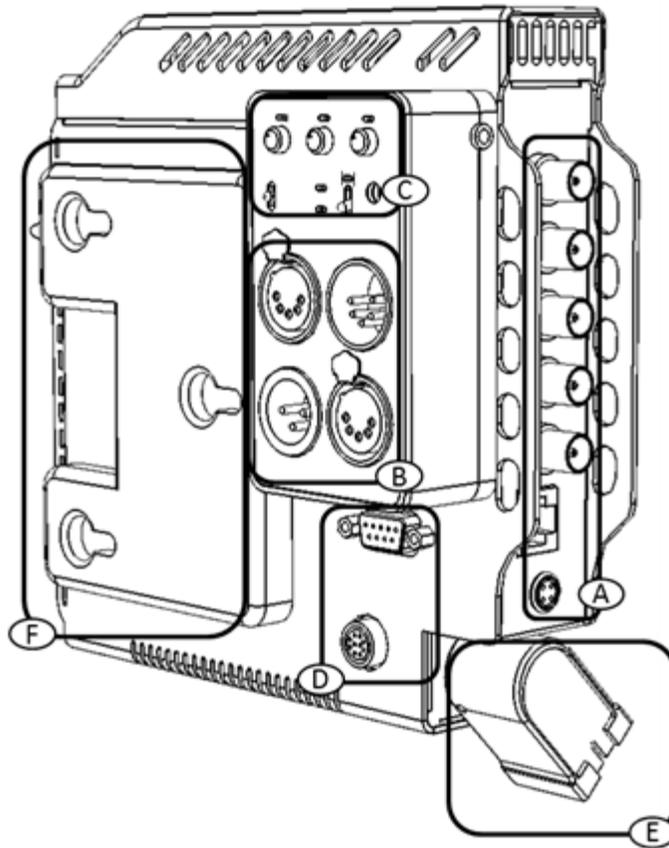


Fig. 3-7: CopperHead 3200 Camera Unit Back Side

The rear of the Camera Unit has six features:

- **A - Connector Panel:** see [Area A – Connector Panel](#) on page 20.
- **B - Audio/Intercom Connector Panel:** see [Area B - Audio/Intercom Connector Panel](#) on page 21.
- **C - Audio/Intercom Controls:** see [Area C - Intercom Controls](#) on page 21.
- **D - Misc. Connectors:** see [Area D - Miscellaneous Connectors](#) on page 22.
- **E - Fiber Connector:** see [Area E – Fiber Connector](#) on page 22.
- **F - Battery Mount:** see [Area F – Battery Mount](#) on page 23.

Area A – Connector Panel

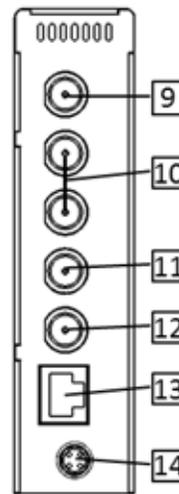


Fig. 3-8: Camera Rear Connector Panel

- **9 - SD/SDI or HD/SDI Input** - to Base Station
- **10 - SD-HD/SDI Digital Video Outputs A & B** - from Base Station: these two connectors output the same signal, using an internal Distribution Amplifier.
- **11 - VBS Input** (analog composite video) - to Base Station
- **12 - VBS Out** (analog composite video) - from Base Station
- **13 - Ethernet (10/100Mbps)** – to/from Base Station
- **14 - Power Wafer Connector**

For additional information about the signals carried on these connectors see [Signal paths in the CopperHead 3200 System](#) on page 9.

Throughout this document component Key Numbers are coordinated with the overall system diagrams found in [CopperHead 3200 Fiber Optic Transceiver System Base Station Back Panel](#) on page 105.

Area B - Audio/Intercom Connector Panel

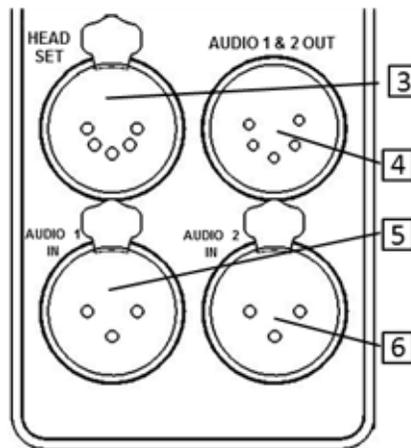


Fig. 3-9: Audio/Intercom Connector Panel

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

For information on the Audio/Intercom Connector Panel operation, see [Intercom](#) on page 64.

Area C - Intercom Controls

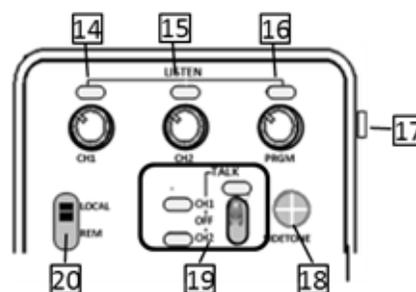


Fig. 3-10: Intercom Controls

- **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 [Intercom](#) on page 64.

Area D - Miscellaneous Connectors

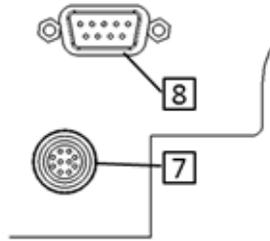


Fig. 3-11: Camera Remote and Production DB1 connectors

- **7 - Camera Remote Connector** (for optional Camera Remote Control unit)
- **8 - Production DB15HD Connector for Tally**
Intercom Trigger, 2nd GPI and Serial Communication (RS232/422/485)

For information regarding available cables and customer furnished cables, see [Available Accessories](#) on page 96.

Area E – Fiber Connector

The CopperHead 3200 Camera Unit is shipped with one of the three Fiber Connectors (see [Figure 3-12](#)).

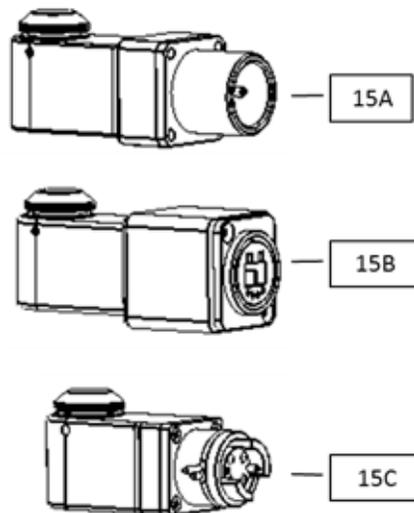


Fig. 3-12: Three types of Fiber Connectors

- 15A - SMPTE 304M, powered
- 15B - OpticalCON, powered or unpowered
- 15C - MX Expanded Beam, unpowered

Area F – Battery Mount

The CopperHead 3200 Camera Unit is shipped with a variety of Battery Mount to camera types. The Anton Bauer mount and the Sony V-mount are the most common. PAG and other battery mount systems are available by special order (contact Grass Valley, a Belden Brand (see [Contact Us](#) on page 81) or your authorized dealer).

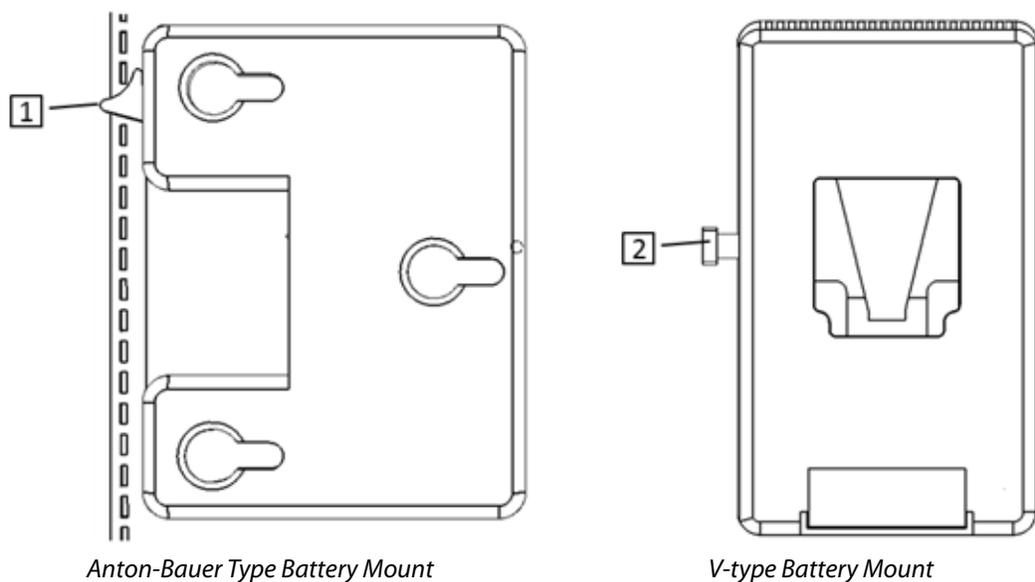


Fig. 3-13: Camera Unit Battery Mount

- 1, 2 - Battery release latch

Base Station

The CopperHead 3200 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 locations, see the overall diagrams in [Diagrams](#) on page 104.

Base Station Front Panel



Fig. 3-14: - CopperHead 3200 Base Station Front Panel

- **A - Optical Connector** (see [Front Panel Section A – Optical Connector \(Optional\)](#) on page 24)
- **B - Audio Indicators** (see [Front Panel Section B – Audio Indicators](#) on page 25)
- **C - Video/Data Indicators** (see [Front Panel Section C – Video/Data Indicators](#) on page 25)
- **D - Signal Strength Indicators/Setup** (see [Front Panel Section D – Signal Strength Indicators/Setup](#) on page 26)
- **E - Status/Power Indicators** (see [Front Panel Section E – Status/Power Indicators](#) on page 27)

Front Panel Section A – Optical Connector (Optional)

Area A of the CopperHead 3200 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.

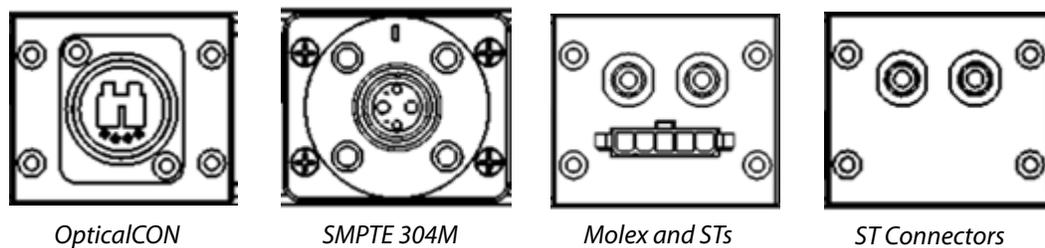


Fig. 3-15: Fiber Connector Types

For information on how to relocate the Base Station's optical connector from the front to the rear, contact Grass Valley, a Belden Brand (see [Contact Us](#) on page 81).

Three types of Fiber Connectors are available for use with the CopperHead 3200 Base Station. Typically one of these Fiber Connectors is pre-configured at the time of delivery.

Front Panel Section B – Audio Indicators

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

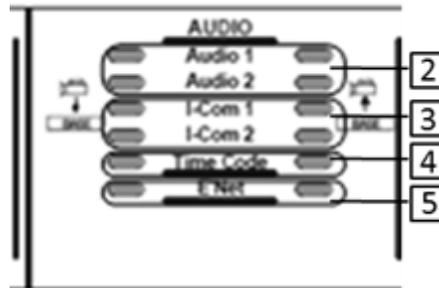


Fig. 3-16: Audio Indicators

- **2 - Program Audio Channels 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 Signal:** monitors the time code signal generated by the Camera coming to the Base Station, and monitors the Base or House timecode from the Base Station to the Camera Unit.
- **5 - Ethernet Signal:** indicates IP Data traffic to and from Camera Unit to and from Base Station.

Front Panel Section C – Video/Data Indicators

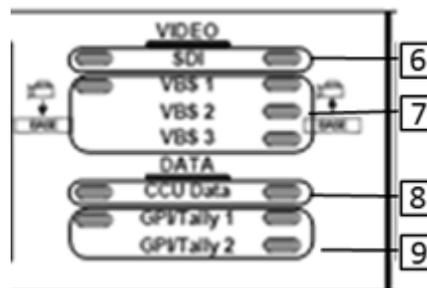


Fig. 3-17: Video/Data Indicators

- **6 - SDI Digital Video Signal:** monitors camera SDI video to Base Station and SDI return video to the Camera Unit.
- **7 - VBS 1-3 – Analog Video Signals 1-3**
 - **VBS 1:** used for Camera video from the Camera Unit to the Base Station, and returns video to the Camera Unit from the Base Station
 - **VBS 2:** used for Genlock (one way from Base Station to Camera)
 - **VBS 3:** used for Prompter Feed (one way from Base Station to Camera)

- **8 - CCU Data Signal:** indicates that two-way communication exists between the Camera Remote Panel and the Camera.
- **9 - GPI/Tally Indicators 1-2 :** monitors GPI/Tally Signal 1 to Base Station and Camera and monitors GPI/Tally Signals 1&2 to Camera Unit from Base Station.

Front Panel Section D – Signal Strength Indicators/Setup

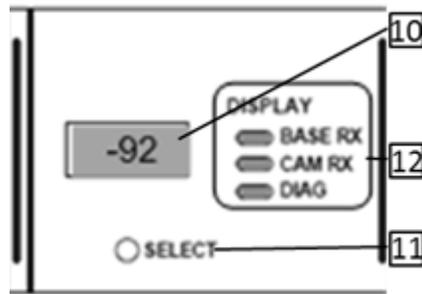


Fig. 3-18: Signal Strength Indicators/Setup

- **10 - Signal Strength Readout in dBm:** changes between display modes when selected.
- **11 - Select Button:** chooses between three modes of operation.
- **12 - 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

For details on how the setup/Diagnostic functions operate, see [A Brief Guide to Measurement of Fiber Optic Signal Strength](#) on page 67.

Front Panel Section E – Status/Power Indicators

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

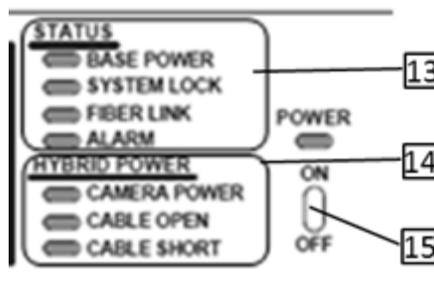


Fig. 3-19: Status/Power Indicators

- **13 - 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 (see [A Brief Guide to Measurement of Fiber Optic Signal Strength](#) on page 67):
 - **Green** when both the Base Station and Camera Unit optical power are within the specified operating power range. (-4 to -22 dBm)
 - **Orange** when the Base Station's received optical power is below the specified operating power range and video quality may be affected (-22dBm to -23dBm)
 - **Red** when both the Base Station and camera optical power are below specified optical power range (less than -23 dBm)
 - **ALARM:** indicates that some error condition exists in either the Base Station or the Camera Unit.
 - **Red** if there is a Base Station error(see [The CopperHead 3200 Base Station Digital Display](#) on page 68).
 - **Orange** if there is a Camera Unit error (see [The CopperHead 3200 Camera Unit Digital Display](#) on page 72).
- **14 - Hybrid Power Indicators:** the Hybrid Power indicators are only applicable to units with the internal power supply (for configurations using the HDX or MPS power supplies – see [Connecting the Transceiver System](#) on page 43).
 - **CAMERA POWER:** indicates that high voltage is applied to power the camera.
 - **Green** when high voltage is being supplied to the camera
 - **Off** when there is no high voltage applied to the camera

- **CABLE OPEN:** indicates that the high voltage cable is open or there is no high voltage cable connected:
 - **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 openHigh voltage will not be applied to the camera until the open condition is corrected.
- **CABLE SHORT:** indicates that the high voltage cable connected is shorted.
- **15 - 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.

Base Station Rear Panel

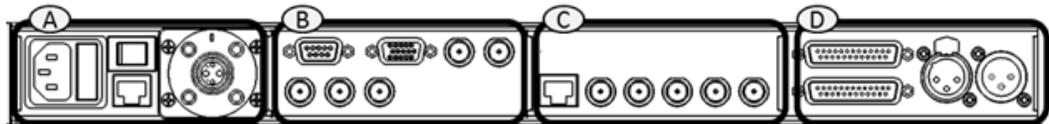


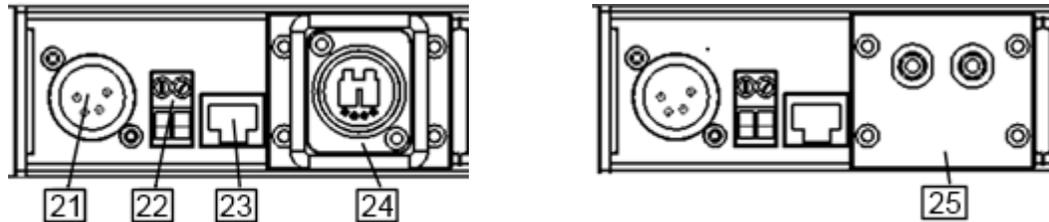
Fig. 3-20: CopperHead 3200 Base Station Back Panel

- **A - Power & Fiber Connectors** (see [Rear Panel Section A - Power & Fiber Connectors \(Power Module\)](#) on page 29)
- **B - Sync/Data/Control Connectors** (see [Rear Panel Section B – Sync/Data/Control Connectors](#) on page 31)
- **C - Video/Ethernet Connectors** (see [Rear Panel Section C – Video/Ethernet Connectors](#) on page 31)
- **D - Audio/Intercom Connectors** (see [Rear Panel Section D – Audio/Intercom Connectors](#) on page 32)

Rear Panel Section A - Power & Fiber Connectors (Power Module)

The CopperHead 3200 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 [Connecting the Transceiver System](#) on page 43. Multi-pin connector wiring suggestions are covered in [Multi-Pin Connectors: Suggested Wiring](#) on page 90.

Rear Panel Section A - External Power Options



External Power with OpticalCON Connector

External Power with STs Connector

Fig. 3-21: Connector panels

- External Power with OpticalCON Connector
 - 21 - 12V DC External Power Supply input connector (XLR 4 Pin)
 - 22 - 12V DC Input – terminal block: see [Connector Pin Assignments](#) on page 82 for connection details.
 - 23 - For Future Use
 - 24 - OpticalCON Connector
- External Power with STs Connector
 - 25 - ST Fiber Connectors

Rear Panel Section A - Internal Power Options

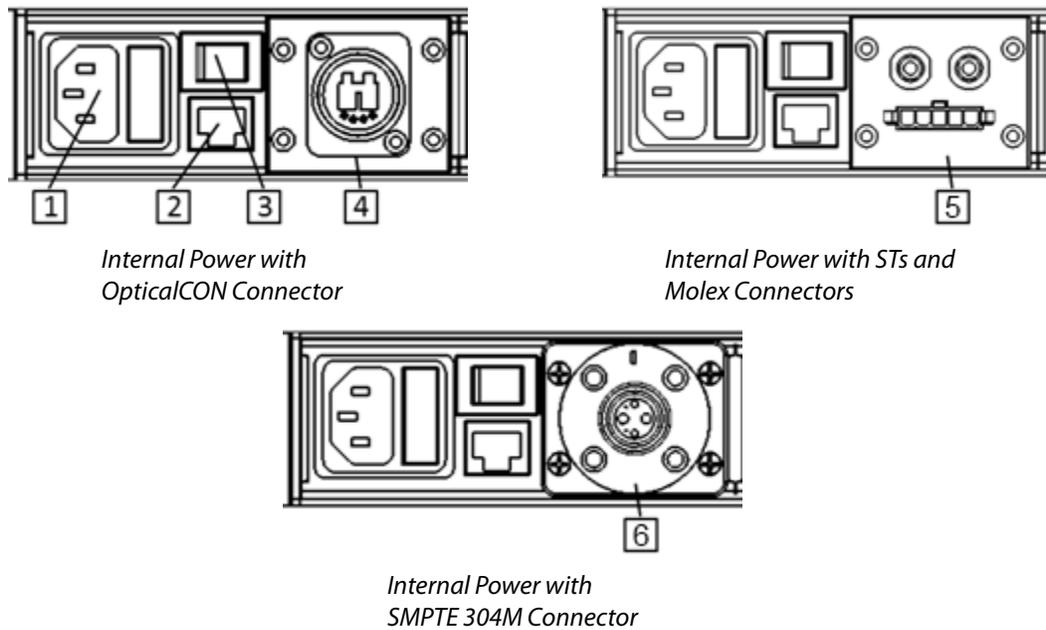


Fig. 3-22: Internal Power Options

- Internal Power with OpticalCON Connector
 - 1 - AC Power Receptacle and 4AMP Dual Fuse Assembly 100-240V 50/60 Hz
 - 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

Rear Panel Section B – Sync/Data/Control Connectors

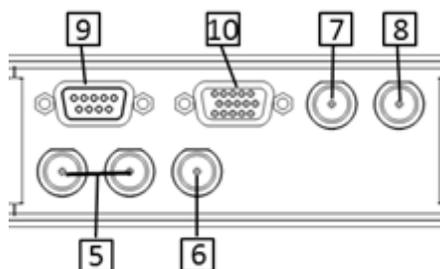


Fig. 3-23: Sync/Data/Control Connectors

- 5 - Sync/Black Burst input connector & Loop through
- 6 - Video Prompter input to Camera
- 7 - Time Code In to Camera
- 8 - Time Code Out from Camera
- 9 - Camera Remote Control Panel Connector
- 10 - Data/GPI Multi-Pin Connector

Rear Panel Section C – Video/Ethernet Connectors

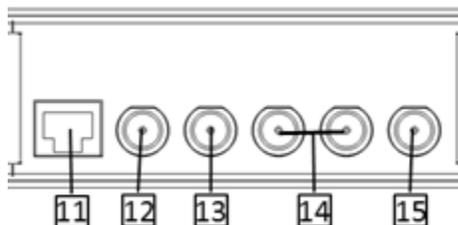


Fig. 3-24: Video/Ethernet Connectors

- 11- Ethernet connector – 10BaseT/100BaseT
- 12 - VBS Output from Camera
- 13 - VBS Return Video source Input to Camera
- 14 - HD/SDI Program from Camera Unit outputs 1-2
- 15 - SDI Return Video source Input to Camera

Rear Panel Section D – Audio/Intercom Connectors

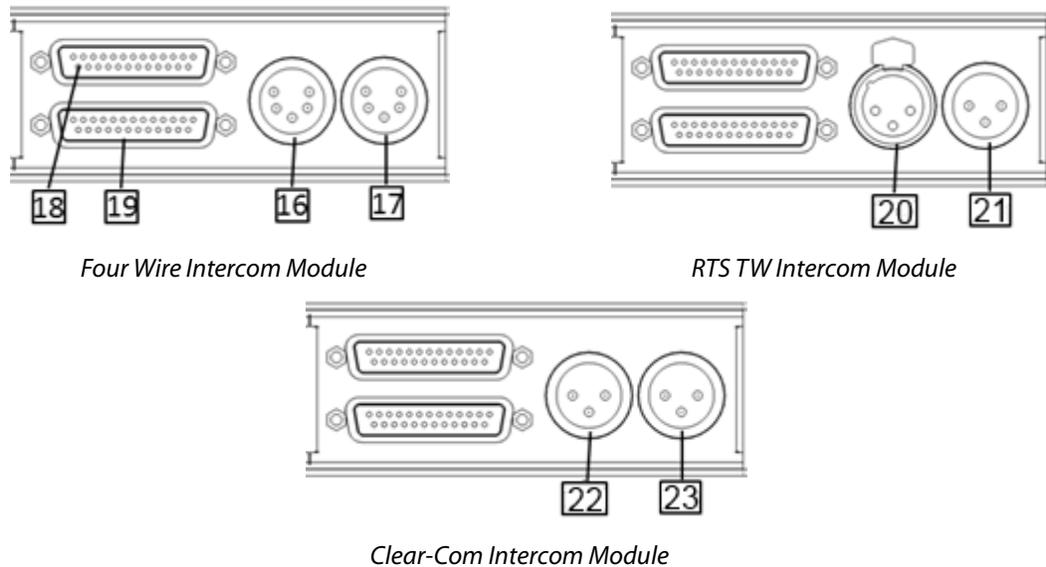


Fig. 3-25: Audio/Intercom Connectors

The CopperHead 3200 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 [Multi-Pin Connectors: Suggested Wiring](#) on page 90.

- Four-Wire Intercom Module
 - 16 - Ch-1 Intercom connector
 - 17 - Ch-2 Intercom connector
 - 18 - Audio In Multi-pin connector
 - 19 - Audio Out Multi-pin connector
- RTS TW Intercom Module
 - 20 - Intercom Input
 - 21 - Intercom Loop Through
- Clear-Com Intercom Module
 - 22 - Ch-A Intercom Connector
 - 23 - Ch-B intercom Connector

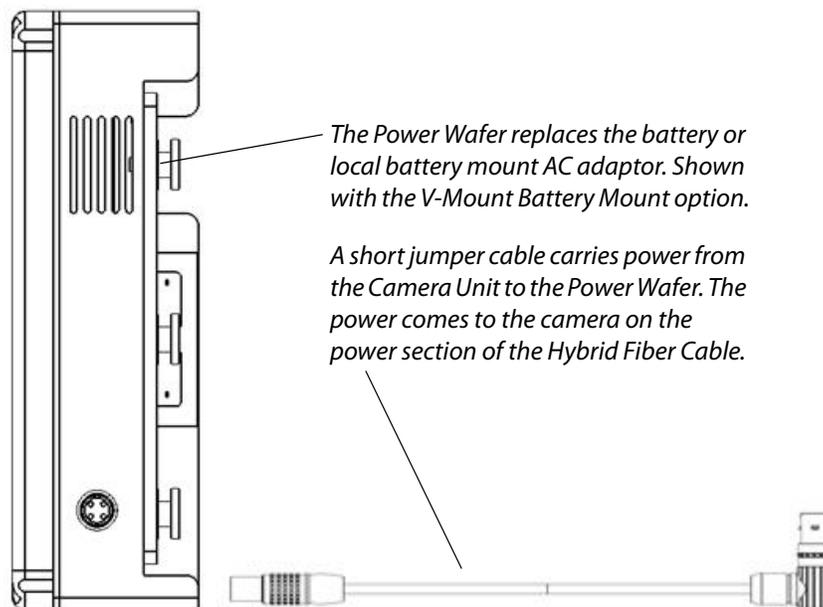
Additional CopperHead 3200 Items

Your CopperHead 3200 Fiber Optic Transceiver System may consist of one or more of the following items:

- Portable fiber reel with fiber per your purchase order
- Optional Universal Camera Control Unit (refer to the product's User guide)
- Optional "Power Wafer" Camera Adaptor
- Optional MPS External Power Wafer Power Supply
- Optional "PowerPlus" Camera Adaptor and Power Adaptor (refer to the product's UserGuide)
- Optional HDX Power Unit (refer to the product's UserGuide)

"Power Wafer" Camera Adaptor

The CopperHead 3200 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 use Hybrid fiber cable and the CopperHead 3200 Base Station, which is equipped with the internal power supply or from the MPS external supply.



Up to 95 watts of 12VDC-14VDC power can be delivered to the camera, the CopperHead 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.

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

MPS External Power Wafer Power Supply (requires PowerWafer)

The CopperHead MPS external power supply provides 95 watts of 12VDC power and fiber cable signal connectivity from the Base Station to the Camera Unit, using the CopperHead PowerWafer. Providing power 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 (240 meters).

Connectivity between the MPS unit and Base Station uses “dry” fiber and can be configured with a “dry” OpticalCON connector or two ST connectors. The MPS is powered locally with standard AC power. The unit is free standing. See [Hybrid Fiber Cable between MPS Power Unit and Camera Unit](#) on page 47 for a diagram showing a system configured with the MPS Power Supply and Power Wafer.

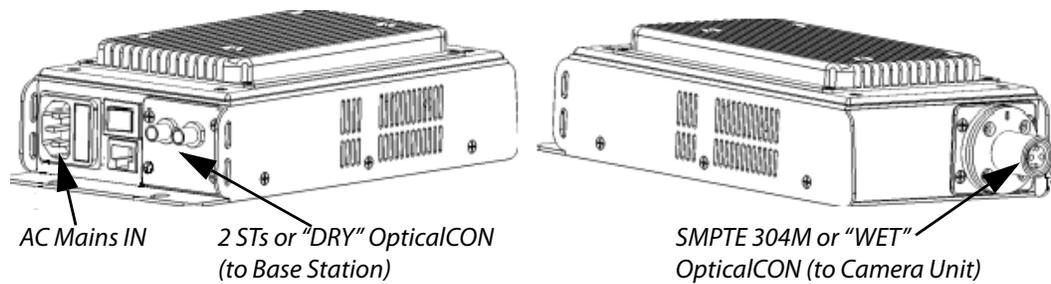


Fig. 3-26: - MPS External Power Wafer Power Supply

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.

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 two 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.

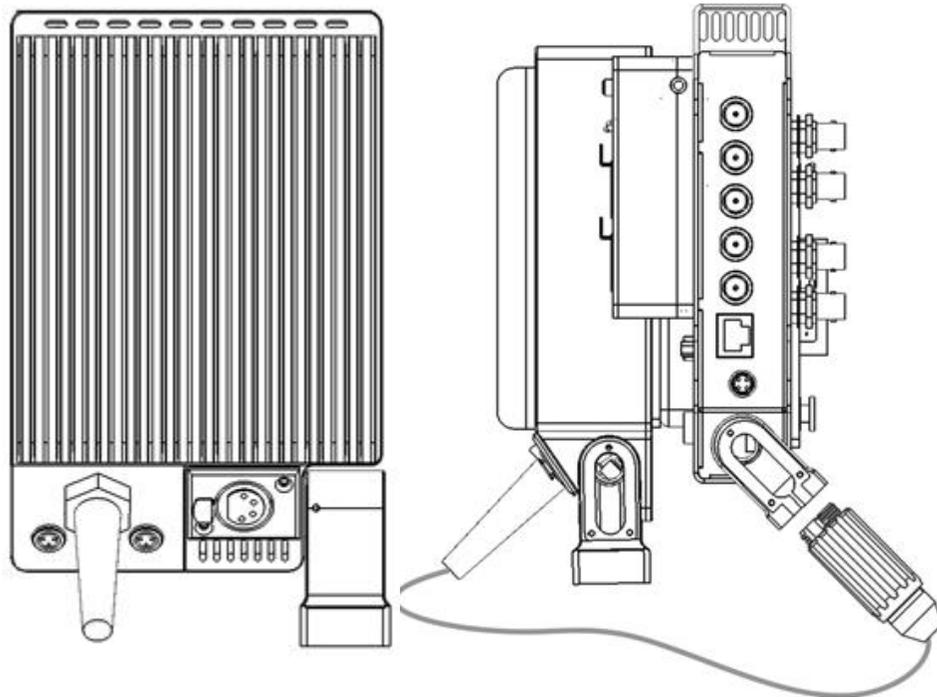


Fig. 3-27: PowerPlus Camera Unit

The PowerPlus unit is provided with a permanent connection to the fiber connector on the CopperHead 3200 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 in [Figure 3-28](#).

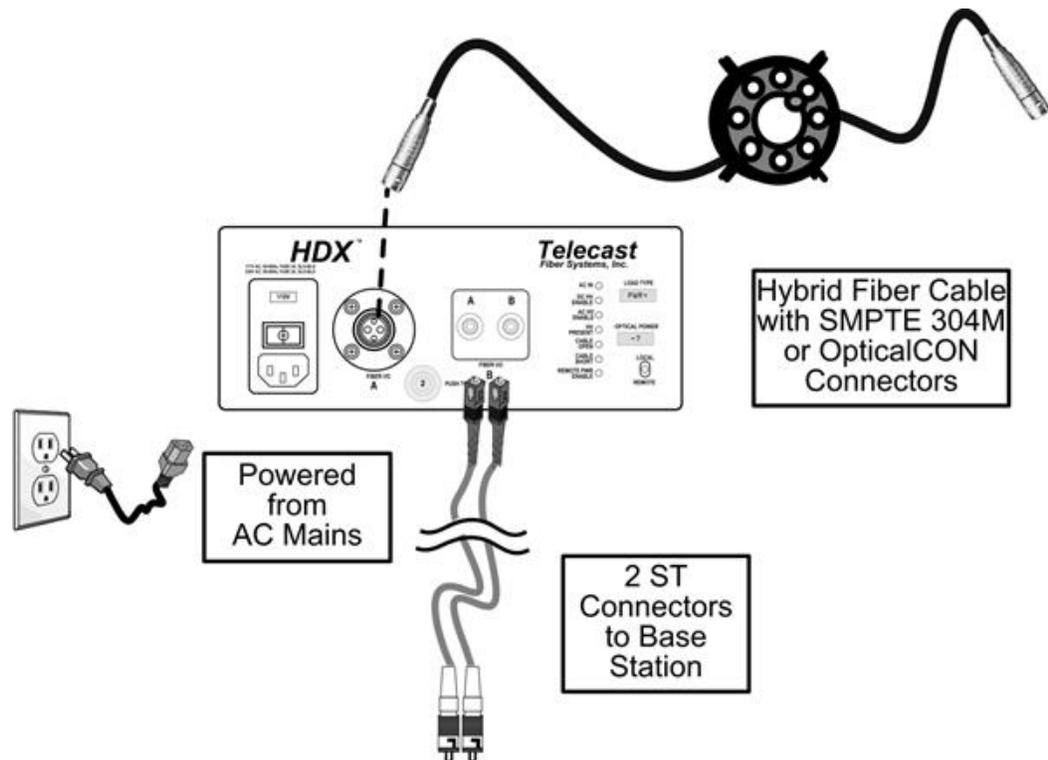


Fig. 3-28: HDX Power Supply Configuration

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

HDX-FR-2 – Two Unit HDX Rack Mount

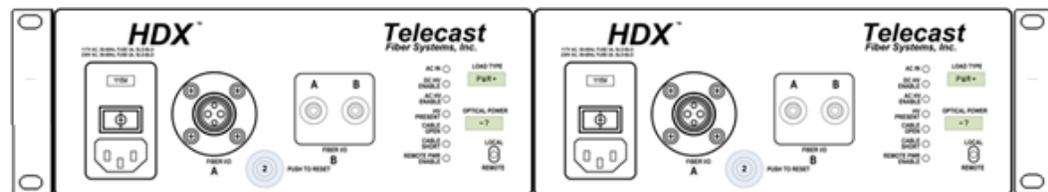


Fig. 3-29: Two Unit HDX Rack Mount

4

Installing the CopperHead 3200 System

This chapter describes the physical installation of the CopperHead 3200 Fiber Optic Transceiver System.

<i>Mounting the CopperHead 3200 Camera Unit to the Camera</i>	38
<i>Mounting the Power Wafer Unit to the Camera Unit</i>	39
<i>Mounting the PowerPlus Unit to the Camera Unit</i>	41
<i>Relocation of the CopperHead 3200 Base Station Fiber connector</i>	42

Mounting the CopperHead 3200 Camera Unit to the Camera

This example illustrates the mounting of an Anton-Bauer battery mount system, but your system may differ. This case illustrates a configuration where the camera is powered locally at the camera position either by battery or by a local power source. This assumes a tactical fiber connection with no hybrid power on the cable.

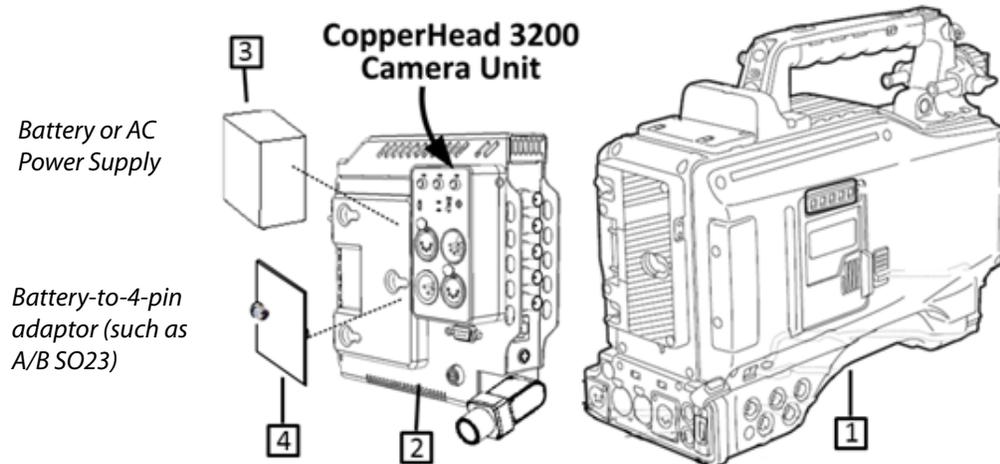


Fig. 4-1: Mounting the CopperHead 3200 Camera Unit to the Camera

- Position your camera (1) 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.
- Attach the CopperHead 3200 Camera Unit (2) to the camera battery mounting plate. The mounting is mechanically identical to attaching a battery. Instructions for attaching the required cables between the camera and the 3200 Camera Unit can be found in [Connections to the CopperHead 3200 Camera Unit](#) on page 53.
- If you are powering the camera and 3200 Camera Unit by battery, mount the battery (3) to the CopperHead 3200 Camera Unit battery mounting plate (2) exactly as you would mount the battery to your camera.
- If you are powering the camera and 3200 Camera Unit by local power supply, mount the power supply (4-Pin) adaptor plate (4) to the CopperHead 3200 Camera Unit battery mounting plate (2) exactly as you would mount a battery to your camera. You will supply the external local power supply.

For configuration, see [Connecting the Transceiver System](#) on page 43.

Mounting the Power Wafer Unit to the Camera Unit

This example illustrates the use of a camera with an Anton-Bauer battery mount 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 3200 Base Station or MPS External Power Supply.

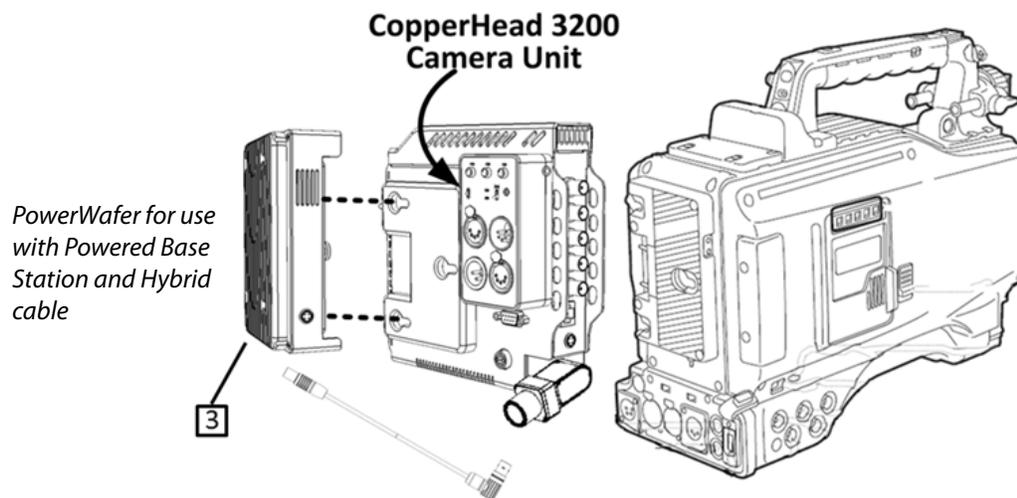


Fig. 4-2: Mounting the Power Wafer Unit to the CopperHead 3200 Camera Unit

- The CopperHead 3200 Camera Unit is mounted to the camera as described in [Mounting the CopperHead 3200 Camera Unit to the Camera](#) on page 38.
- The Power Wafer (3) is attached to the CopperHead 3200 Camera Unit in place of the battery. It is attached in the same manner as the camera battery.

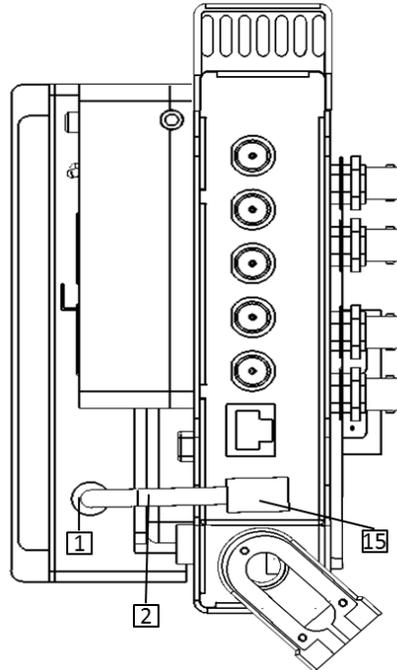


Fig. 4-3: CopperHead 3200 Camera Unit

- When the Power Wafer is securely mounted to the CopperHead 3200 Camera Unit, you must connect the supplied Power Wafer connector cable between the Power Wafer (1) and the Power Wafer connector on the Camera Unit (15).



Fig. 4-4: Power Wafer connector cable

The Power Wafer to Camera Unit cable is supplied with the CopperHead Power Wafer Unit. For configuration, see [Connecting the Transceiver System](#) on page 43.

Mounting the PowerPlus Unit to the Camera Unit

This example illustrates the use of a camera with an Anton-Bauer battery mount 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.

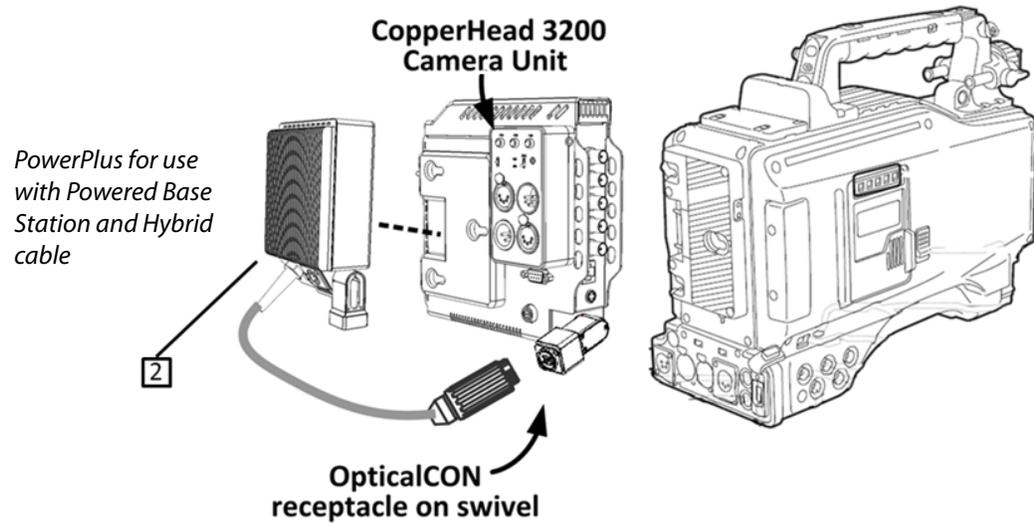


Fig. 4-5: Mounting the PowerPlus Unit to the CopperHead 3200 Camera Unit

- The CopperHead 3200 Camera Unit is mounted to the camera as described on [Mounting the CopperHead 3200 Camera Unit to the Camera](#) on page 38.
- The PowerPlus Unit (2) is attached to the CopperHead 3200 Camera Unit in place of the battery. It is attached in the same manner as the camera battery.

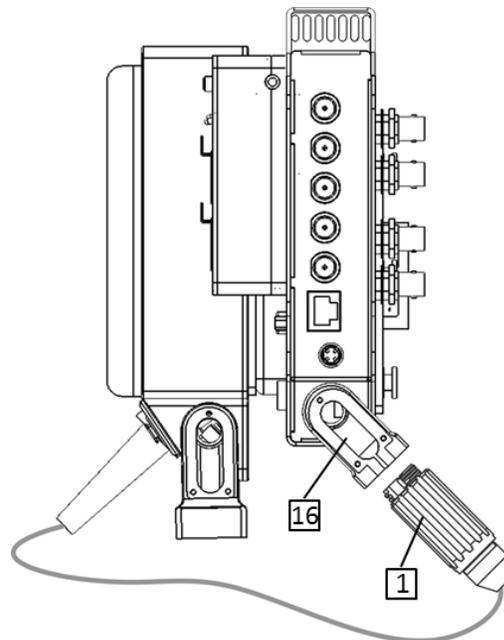


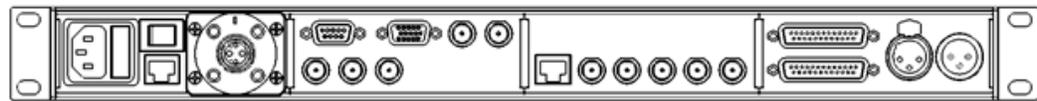
Fig. 4-6: Power Wafer connector

- When the PowerPlus Unit is securely mounted to the CopperHead 3200 Camera Unit, you must connect the supplied attached fiber cable connector between the Power Wafer (1) and the Power Wafer connector on the Camera Unit (16).

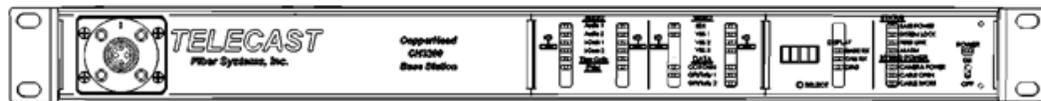
Note that the HDX-2-ST must be used in the PowerPlus configuration. For configuration, see [Connecting the Transceiver System](#) on page 43.

Relocation of the CopperHead 3200 Base Station Fiber connector

The CopperHead 3200 Base Station may be configured with the Fiber Connector mounted either on the back or the front of the Base Station. You may order your Base Station in either configuration and it is possible to relocate the Fiber Connector from one position to the other in the field.



Rear Mounted Fiber Connector



Front Mounted Fiber Connector

Fig. 4-7: CopperHead 3200 Base Station with Front and Rear Mounted Fiber Connector

The Fiber Connector relocation process can be accomplished by a qualified Miranda technician in about 15 minutes or less. If you attempt the relocation yourself, you should allocate an hour maximum to complete the process.

For a complete illustrated step-by-step procedure, contact Grass Valley, a Belden Brand (see [Contact Us](#) on page 81).

5

Connecting the Transceiver System

Prior to connecting your CopperHead 3200 Fiber Optic Transceiver System, 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.

Refer to [Multi-Pin Connectors: Suggested Wiring](#) on page 90 for information regarding cables, signals and custom multi-pin cable fabrication.

<i>Connections between the Base Station and the Camera Unit</i>	44
<i>Connections to the CopperHead 3200 Base Station</i>	49
<i>Connections to the CopperHead 3200 Camera Unit</i>	53
<i>Camera Unit Connection Example</i>	57

Connections between the Base Station and the Camera Unit

The following table summarizes the various Fiber Cable connection options between the CopperHead 3200 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 Watts ¹	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 Watts ²	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 the following:
 - two ST Fiber Connectors for connection between the HDX and the Base Station
 - an 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, contact Grass Valley, a Belden Brand (see [Contact Us](#) on page 81) or your local authorized dealer.

Tactical Fiber between the Base Station and Camera Unit

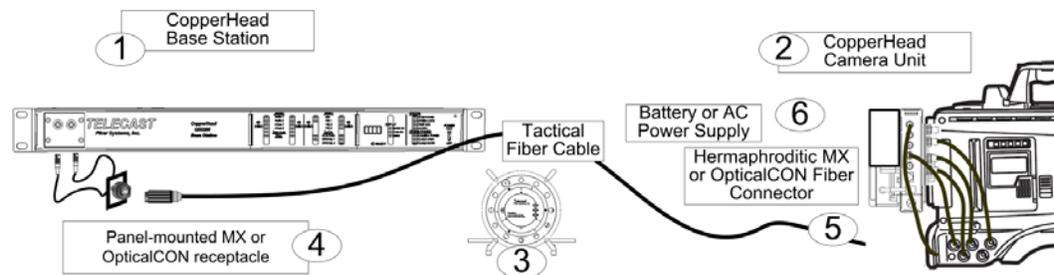


Fig. 5-1: Tactical Fiber between the Base Station and Camera Unit

Between the Base Station (1) the Camera Unit (2), connect a length of Tactical Fiber Cable (3). At each end of the fiber cable, there is either an OpticalCON (4) or MX Fiber Connector (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 directly mounted on the Base Station Chassis.

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

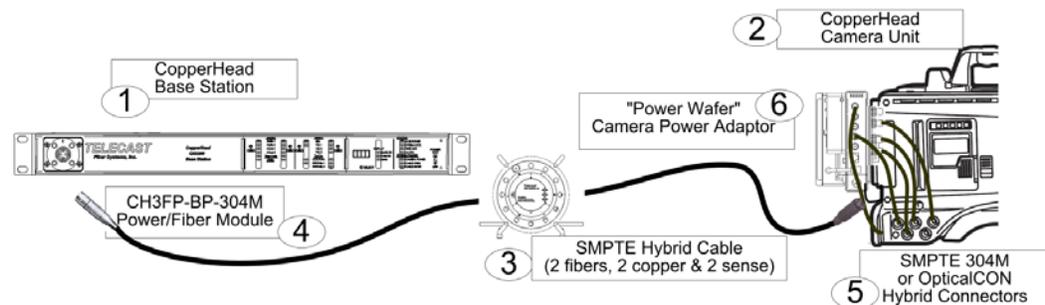


Fig. 5-2: SMPT E Hybrid Fiber between the Base Station (powered) and Camera Unit

Between the Base Station (1) and the Camera Unit (2) connect a length of SMPT E Hybrid Fiber Cable (3).

At each end of the fiber cable will be either an OpticalCON or SMPT E 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).

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

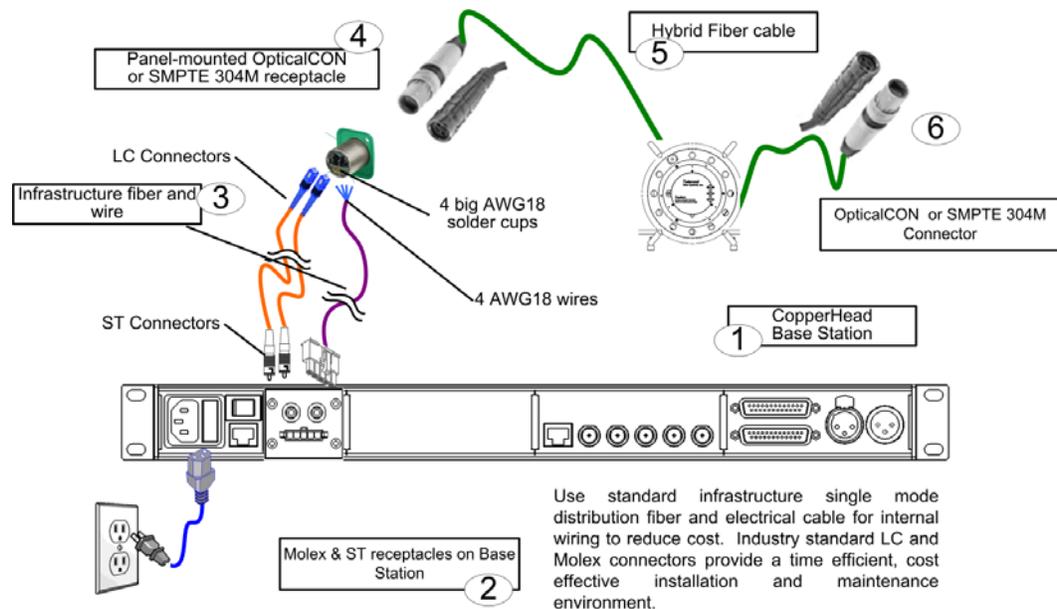


Fig. 5-3: Hybrid Fiber between Base Station and Camera Unit (Infrastructure Wiring)

Panel mounted fiber connectors can be used for permanent installations such as communications closets, truck connector panels, and sports facilities. 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). Use a Hybrid Fiber Optic cable (5) between the panel mounted receptacle and the Camera Unit. This cable is matched to the panel mounted receptacle with either an OpticalCON or SMPTE 304M connector (4) to (6).

Hybrid Fiber Cable between MPS Power Unit and Camera Unit

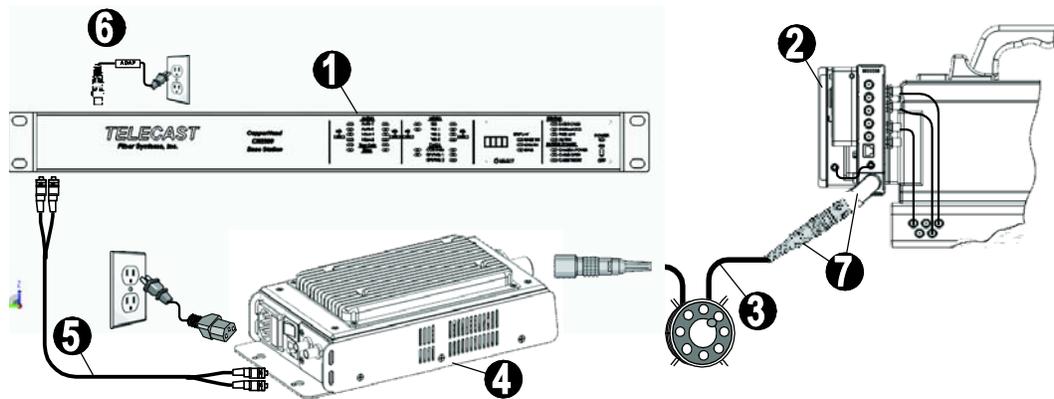


Fig. 5-4: Hybrid Fiber cable between the MPS Power Unit and Camera Unit

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 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 HDX Power Supply and Camera Unit

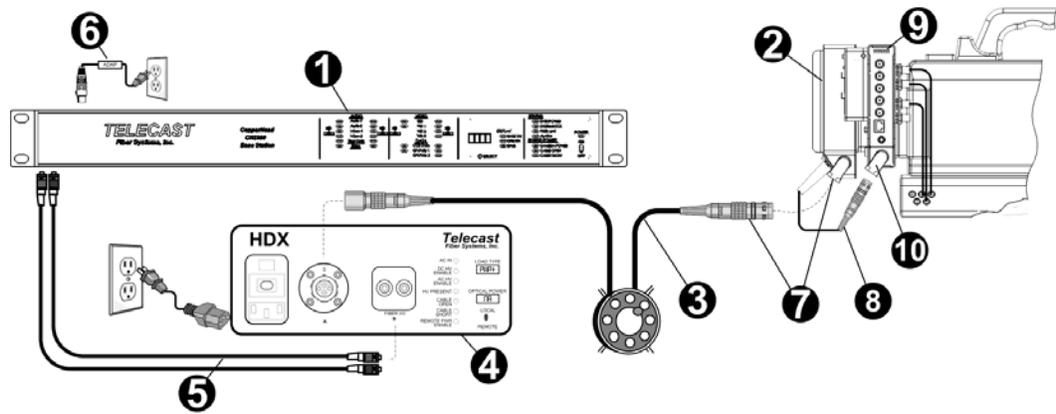


Fig. 5-5: SMPTE Hybrid Fiber between the HDX Power Supply and Camera Unit

After mounting the PowerPlus (2) to the CopperHead Camera Unit (9), plug the tactical fiber "dongle" (8) into the swivel-mounted fiber connector on the Camera Unit (10).

Connect a pair of ST Fiber Cables (5) between the Base Station (1) and the HDX Power Supply (4).

Power the HDX Power Supply (4) locally by connecting to AC Power. Connect a length of SMPTE Hybrid Fiber Cable (3) between the HDX Power Supply (4) and the SMPTE Hybrid connector on the PowerPlus (2). Connectors at each end of the fiber cable must be SMPTE 304M (7). OpticalCON connectors cannot be used in this configuration.

The Base Station fiber connectors (1) may be mounted either on the front or back of the Base Station. The camera is powered by the CopperHead PowerPlus Camera Power Supply (2).

The Base Station is powered by connection to local AC power (6).

Connections to the CopperHead 3200 Base Station

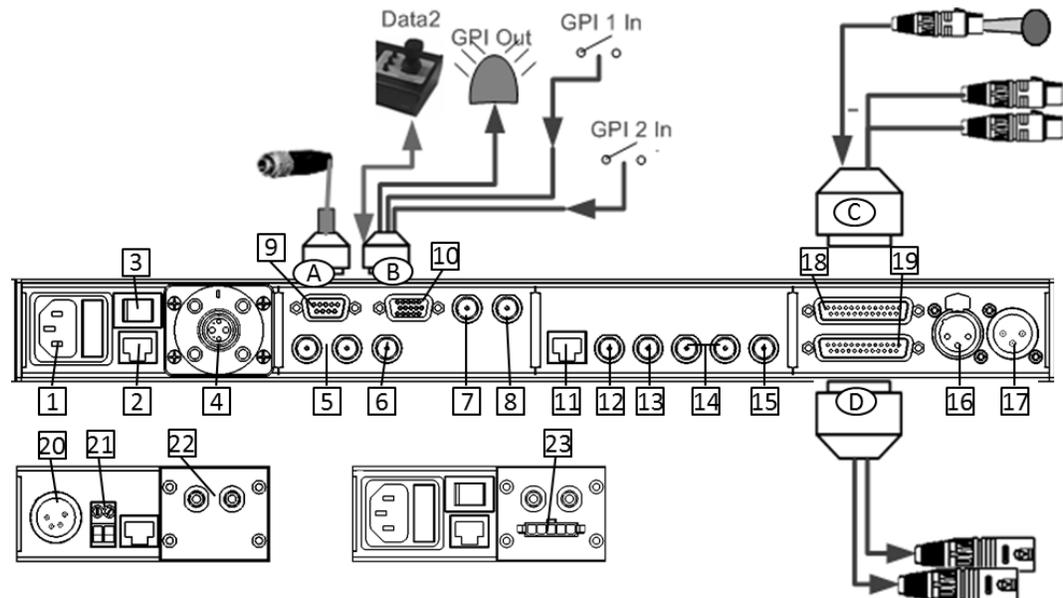


Fig. 5-6: CopperHead 3200 Base Unit Connections

Multi-Pin Cable Assemblies Used with the CopperHead 3200 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 96 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 Connectors: Suggested Wiring](#) on page 90 for wiring details.
- **C - Audio In Connector:** Connect Intercom Program Audio and two Production Audio Channel outputs.
See [Base Station 25-Pin Audio Input Cable](#) on page 93 for wiring details.
- **D - Audio Out Connector:** Carries audio back from the camera location – connect to an audio processing chain or monitors.
See [Base Station 25-Pin Audio Output Cable](#) on page 94 for wiring details.

Connectors into and out of the CopperHead 3200 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 [Figure 5-6](#) and to the Overview Diagram found in [CopperHead 3200 Fiber Optic Transceiver System Base Station Back Panel](#) on page 105.

Diagram #	Description
1 & 20	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.
4	Fiber Connector This connector can be mounted on the Base Station Front Panel (see Front Panel Section A – Optical Connector (Optional) on page 24). 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	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.
8	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.
9	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.

Diagram #	Description
10	<p>Multi-Pin Connector B</p> <p>DB15 – 15 pin serial connector connected to a breakout of Tally and GPI signal connectors. Typically this connector will be connected to the Camera Tally system originating at the Production Switcher or the Tally Management system used on your production environment. Additional custom GPI – Contact Closures can be configured.</p> <p>See Multi-Pin Connectors: Suggested Wiring on page 90 for an example configuration.</p>
11	<p>Ethernet Connector – 10Bt/100Bt capable</p> <p>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.</p>
12	<p>VBS Out</p> <p>BNC Connector -Typically used for SD Monitoring Video return from the Camera.</p>
13	<p>VBS In</p> <p>BNC Connector – Typically used to send SD return video to the camera. For example,you can use it to monitor out from the Production Switcher.</p>
14	<p>SDI Out 1 & 2 (this carries the HD feed from the camera)</p> <p>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.</p>
15	<p>SDI In</p> <p>BNC Connector – Typically used to send HD return video to the camera. For example,you can use it to program out from the Production Switcher.</p>
16 & 17	<p>Intercom Connectors #1 & #2</p> <p>XLR 3 pin or 5 pin Connector depending on configuration. One of three options will be installed (4-wire intercom, RTS or Clear-Com).</p> <p>See Intercom on page 64 for information on using each of the Intercom Options.</p>
18	<p>Audio In- Multi-Pin Connector</p> <p>DB25 – 25 pin Connector follows the Tascam TDIF standard. The CopperHead 3200 Fiber Optic 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.</p> <p>See Multi-Pin Connectors: Suggested Wiring on page 90.</p>
19	<p>Audio Out- Multi-Pin Connector</p> <p>DB25 – 25 pin Connector follows the Tascam TDIF standard. The CopperHead 3200 Fiber Optic Transceiver System accommodates up to two Audio Channels at Line Level. This connector handles Program audio from the Camera location.</p> <p>See Multi-Pin Connectors: Suggested Wiring on page 90 for sample wiring.</p>

Connecting the Transceiver System

Connectors into and out of the CopperHead 3200 Base Station

Diagram #	Description
21	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.
22	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).
23	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 3200 Camera Unit

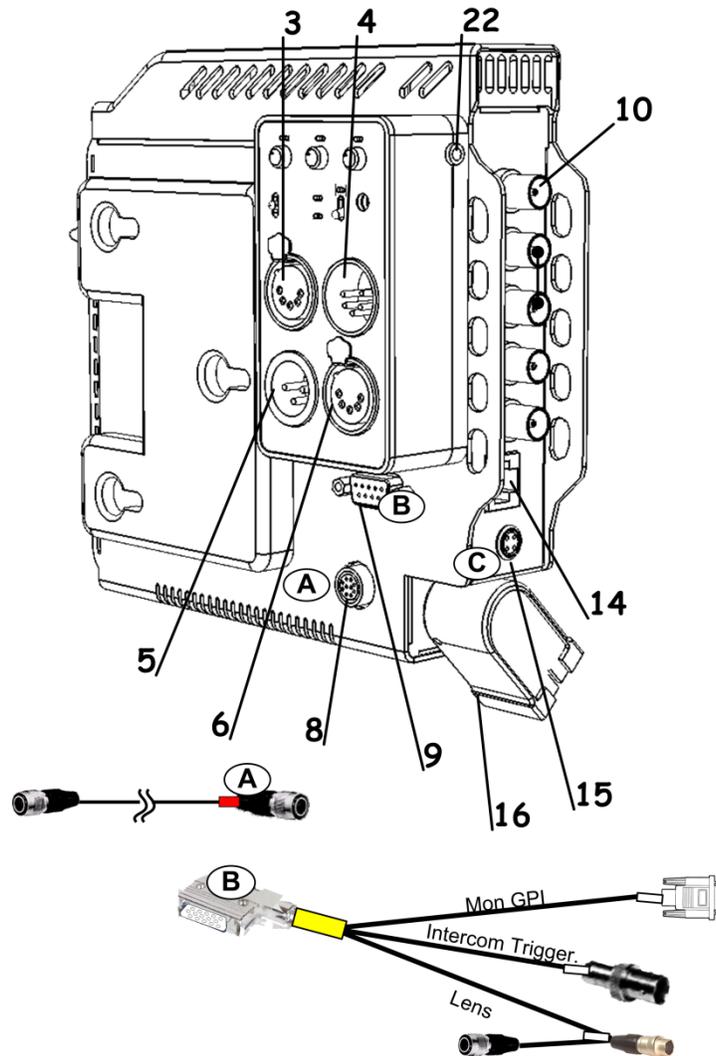


Fig. 5-7: CopperHead 3200 Camera Unit Back Side Connections

This information duplicates some of that from above sections. It is presented here to provide a single list of all Camera Unit connections. Key numbers refer to [Figure 5-7](#) and to the Overview Diagram found in [Diagrams](#) on page 104.

Multi-Pin Cable Assemblies Used with the CopperHead 3200 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 3200 Camera Unit.
See [Available Accessories](#) on page 96 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 [Signal Breakout cable: Tally, Remote Push-To-Talk, Call](#) on page 91 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 3200 Camera Unit Back Side

Diagram #	Description
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 Input XLR 3 Pin Female Connector – Line level audio input. Typically fed by a short audio jumper cable from the Camera Audio 1 output.
6	Audio 2 Input XLR 3 Pin Female Connector – Line level audio input. Typically fed by a short audio jumper cable from the Camera Audio 2 output.
8	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. See Available Accessories on page 96 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.
9	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 supplies a number of pre-configured break out cables for use with this connector. For more information, see Available Accessories – Cable Numbers on page 102.

Diagram #	Description
10	<p>HD-SD/SDI Input</p> <p>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.</p>
11	<p>HD-SD/SDI Outputs #1 & #2</p> <p>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.</p>
12	<p>VBS In</p> <p>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.</p> <p>Can be used to provide technical monitoring from camera as with superimposed camera menus and other information.</p>
13	<p>VBS Out</p> <p>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.</p>
14	<p>Ethernet Out</p> <p>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.</p>
15	<p>Power Wafer Connector</p> <p>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.</p>
16	<p>Fiber Connector</p> <p>Swivel Mounted Fiber Optic Cable receptacle – specific connector depends on your configuration.</p>
22	<p>Intercom Headset Connector</p> <p>Mini-phone Jack – Provides listen only Intercom audio.</p>

Connectors into and out of the CopperHead 3200 Camera Unit Front Side

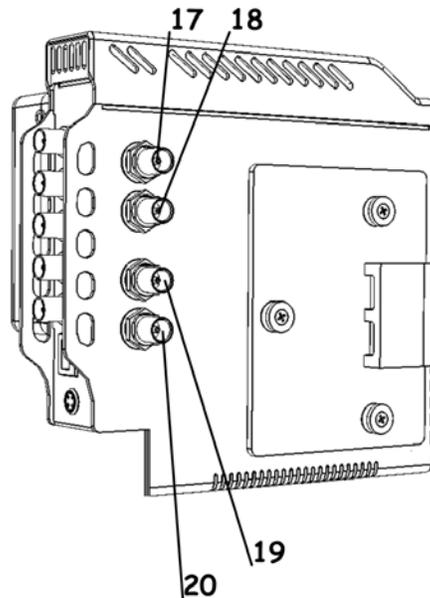


Fig. 5-8: CopperHead 3200 Camera Unit Front Side Connections

Diagram #	Description
17	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
18	Time Code Out BNC Connector – Carries Time Code signal from the Camera Unit to the Camera. This is master time code <i>from</i> 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	VBS Out 2 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.
20	VBS Out 3 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

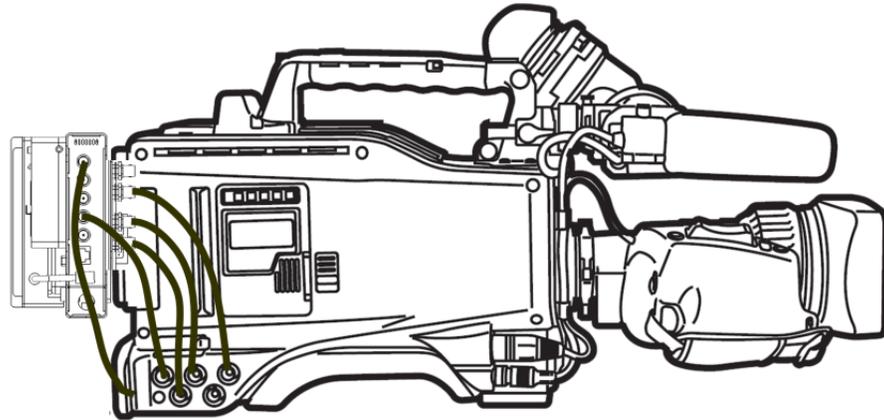


Fig. 5-9: CopperHead 3200 Camera Unit

Your CopperHead 3200 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.

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

Camera Unit to Camera Connections

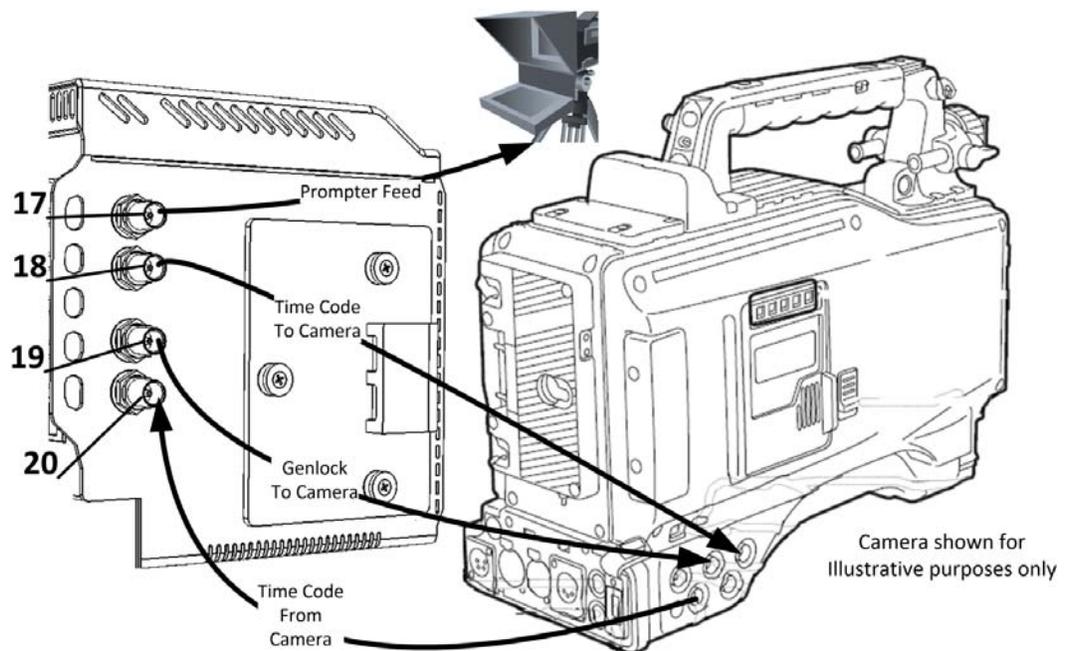


Fig. 5-10: Camera Unit (Camera Facing Side) to Camera Connections

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

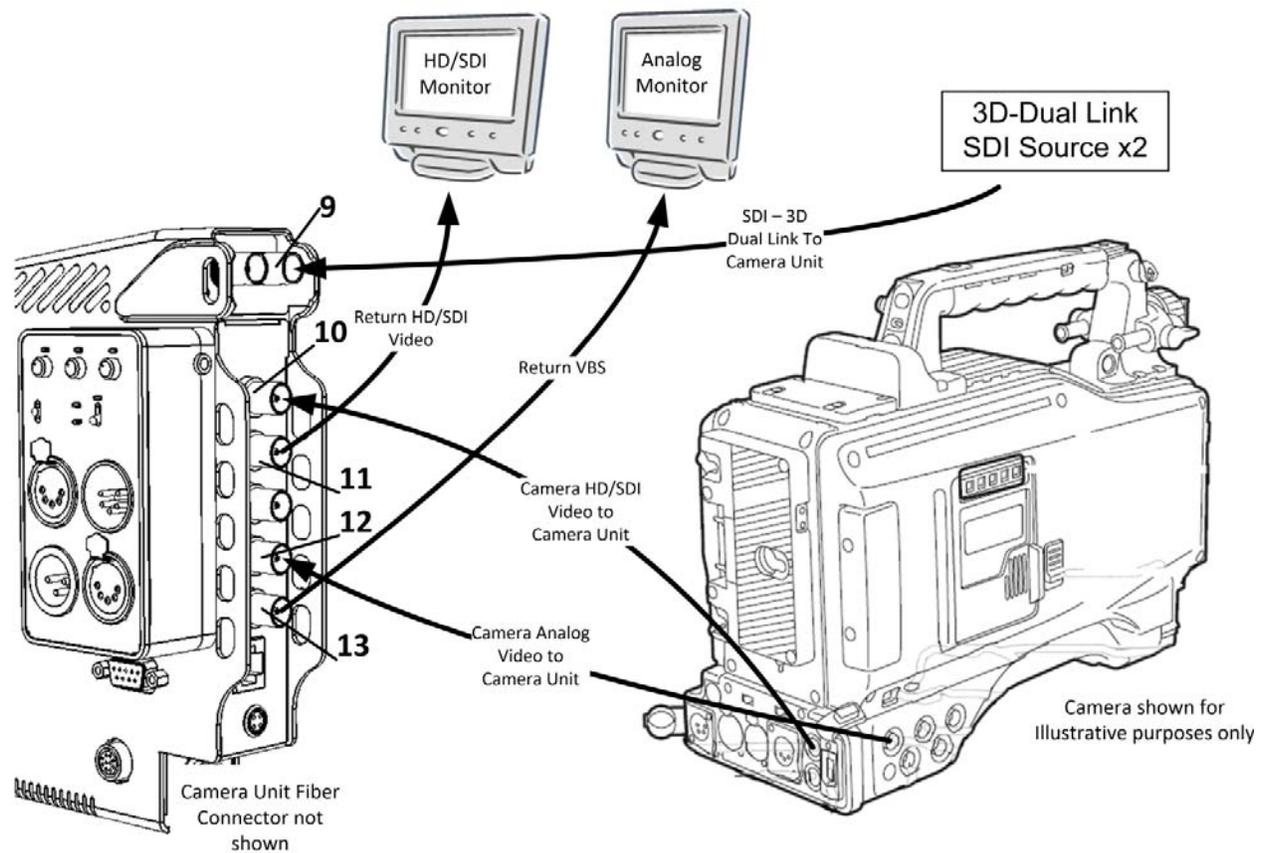


Fig. 5-11: Camera Unit Video Connections

Camera Unit Audio and Data/Control Connections

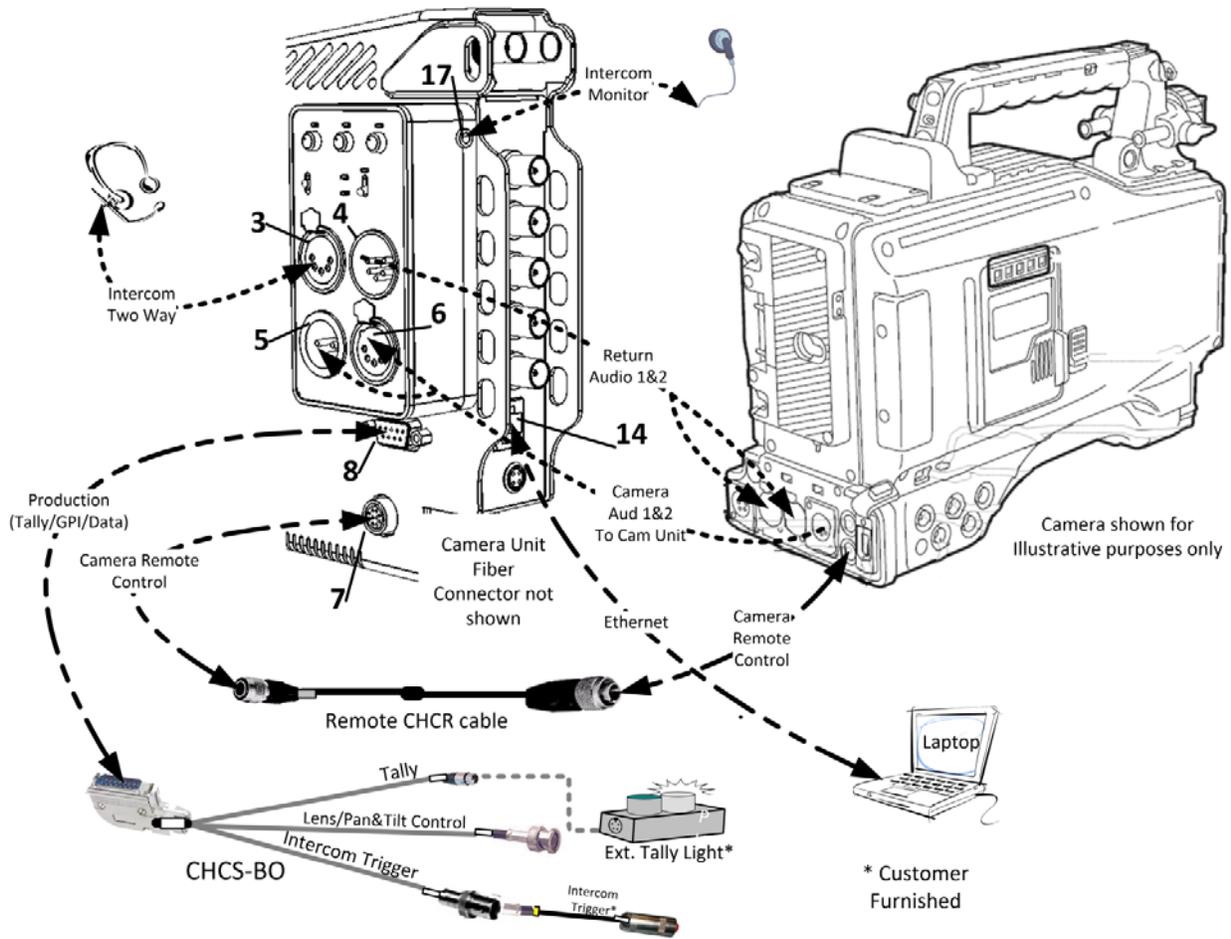


Fig. 5-12: Camera Unit Audio and Data/Control Connections



Operating the CopperHead 3200 System

This chapter describes in detail the operation of CopperHead 3200 Fiber Optic Transceiver System . Please keep in mind that a wide variety of options and variations are available in using this product and 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.

<i>Setting-up the CopperHead 3200 Transceiver System</i>	62
<i>Powering the System</i>	63
<i>Intercom</i>	64
<i>Using the Digital Displays</i>	67
<i>Best Practices</i>	75
<i>Troubleshooting</i>	76

Setting-up the CopperHead 3200 Transceiver System

This section provides an overview of setup of the CopperHead 3200 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 3200 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 3200 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 3200 Base Station, or your setup is not permanent (in a remote truck, stadium control room or similar), connect all required cables (see at [Tactical Fiber between the Base Station and Camera Unit](#) on page 45). 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 3200 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 [Hybrid Fiber Cable between MPS Power Unit and Camera Unit](#) on page 47.
 - For the HDX power supply used with the CopperHead PowerPlus, see [SMPTE Hybrid Fiber between HDX Power Supply and Camera Unit](#) on page 48.
 - Make sure all cables running between the CopperHead 3200 Base Station and the Power Supply and local AC power cords are properly managed and secured.
 - Mount the Camera and CopperHead 3200 Camera Unit as shown on [Mounting the CopperHead 3200 Camera Unit to the Camera](#) on page 38.
 - Connect all required cables (see [Hybrid Fiber Cable between MPS Power Unit and Camera Unit](#) on page 47). 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. See [Camera Unit Intercom Operation](#) on page 64 for details on Intercom operation with the CopperHead 3200 Camera Unit.
- 4 Deploy the Fiber Cable – you are now ready to Power Up the system.

You should 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 3200 Base Station and the CopperHead 3200 Camera Unit each have a power up routine which tests the equipment and performs a system diagnostic.

To power the CopperHead 3200 Base Station:

- 1 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 be red until the next step.
- 2 Turn on the Front Panel Power Switch located at the front right. #15 on the overall diagram. The power monitor indicator turns from Red to Green.
- 3 The four-character display indicates TEST and all front panel LEDs turn Red, then Green, then Orange, then OFF.
- 4 The LED color test is followed by REV and the revision of the display microcontroller firmware.
- 5 The REV indication is followed by “miranda.com” scrolling across the four-character display. If there's no scrolling, contact Grass Valley support for assistance (see [Contact Us](#) on page 81).
- 6 The scroll is followed by a three second pause which synchronizes all the microcontrollers in the Base Station.
- 7 The front panel will cycle through the diagnostics displays – see [Using the Digital Displays](#) on page 67.
- 8 After the three-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 show Red.

To power the CopperHead 3200 Camera Unit:

- 1 Turn on the Camera Unit Power Switch.
- 2 Turn on the Camera Power and any peripheral equipment connected to the camera or the CopperHead 3200 Camera Unit (such as monitors and microphones).
- 3 Once powered-up, the four-character display indicates the current Revision Version (REVA). Your unit will display the current Revision Version, followed by the Fiber Link strength (a typical display for Fiber Link strength is -8 to -13 which 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 in [A Brief Guide to Measurement of Fiber Optic Signal Strength](#) on page 67.

Intercom

The CopperHead 3200 Base Station is delivered pre-configured for compatibility with one of three standard intercom systems Clear-Com, RTS, or Four-Wire (matrix). Wiring for each of these options is described in [Multi-Pin Connectors: Suggested Wiring](#) on page 90. The operation of your specific intercom system is beyond the scope of this User's Guide (see the documentation provided with your intercom or consult your intercom provider).

Intercom controls and indicators are found on the rear of the CopperHead 3200 Camera Unit ([Figure D-3](#) on page 106), and provide the following functionality:

- Headset volume control for two Intercom channels and Program audio.
- Sidetone adjustment to control the volume of the operator's voice heard on the intercom headset. It does not affect the mic volume on the intercom channel.
- Control of the Push-To-TALK (PTT) function for each Intercom Channel, either locally or through a remote PTT switch.
- LEDs show audio activity on the two Intercom and Program audio channels.

Note that intercom beltpacks cannot be plugged into the CopperHead 3200 Camera Unit. Only an intercom headset can be plugged into the Camera Unit.

Camera Unit Intercom Operation

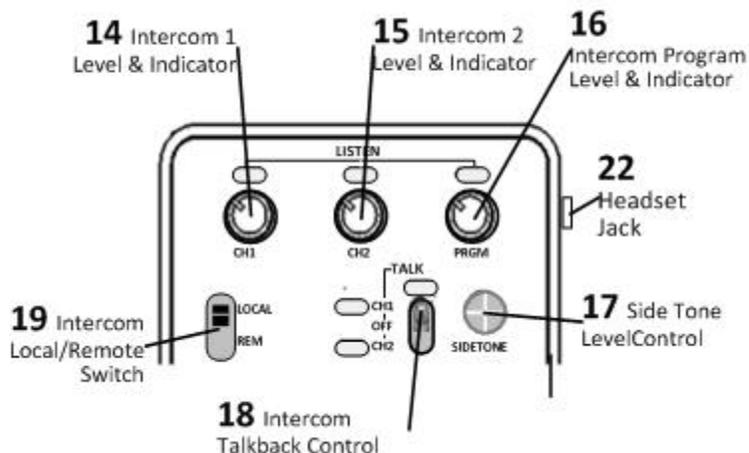


Fig. 6-1: Audio Interface Box Detail (Camera Unit)

- **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, and 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 (do not press and hold) 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.

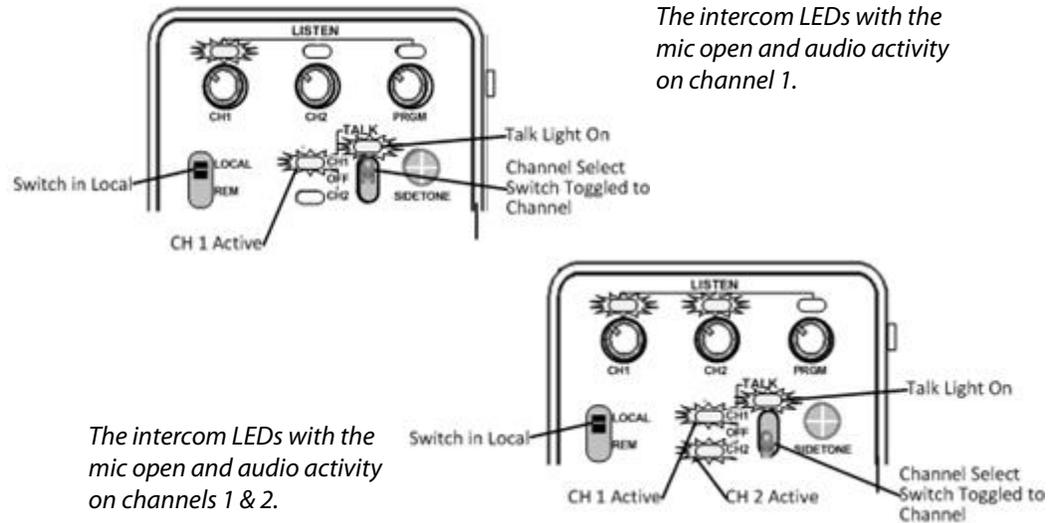


Fig. 6-2: Local Activation of Channel 1 Talk Back and Both Intercom Channels

Intercom Remote Push-To-Talk

When a Push-To-TALK (PTT) switch is required in a remote location (such as on a tripod panhandle or a camera boom), a remote PTT switch can be connected to the 15-pin "Signal/Data" connector ([Camera Unit Connectors](#) on page 86). See [Available Accessories](#) on page 96 for an example of a breakout cable with a remote PTT switch.

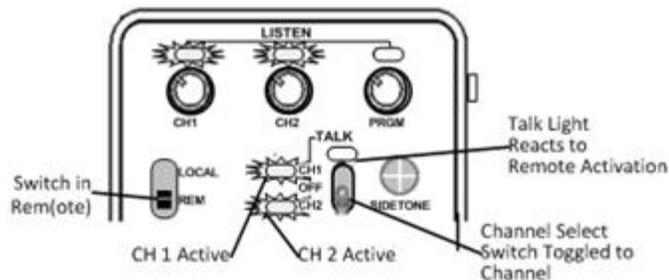


Fig. 6-3: Remote Activation of Intercom Talk Back

To activate a Remote PTT switch, switch the INTERCOM LOCAL/REMOTE switch to REM. Using the TALK toggle switch, select the intercom channel(s) you wish to use. The CH1 and/or CH2 LED(s) will illuminate to indicate selected channel(s).

When the remote PTT switch is toggled, the TALK indicator will illuminate, indicating the mic is open on the selected channel(s). The TALK indicator will go out when the remote PTT switch is toggled again.

The Remote PTT switch will operate in Momentary or Latching modes (see [Camera Unit Intercom Operation](#) on page 64).

Intercom Sidetone

The SIDETONE control ([Figure 6-4](#)) allows adjustment of the headset mic audio level in the headset's earcups. Use a "Tweaker" type screwdriver to adjust the sidetone level until the operator's voice is at a comfortable level.

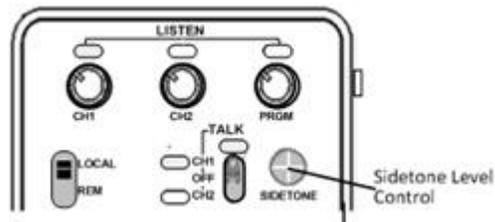


Fig. 6-4: Setting Intercom sidetone

Using the Digital Displays

A Brief Guide to Measurement of Fiber Optic Signal Strength

The CopperHead 3200 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.

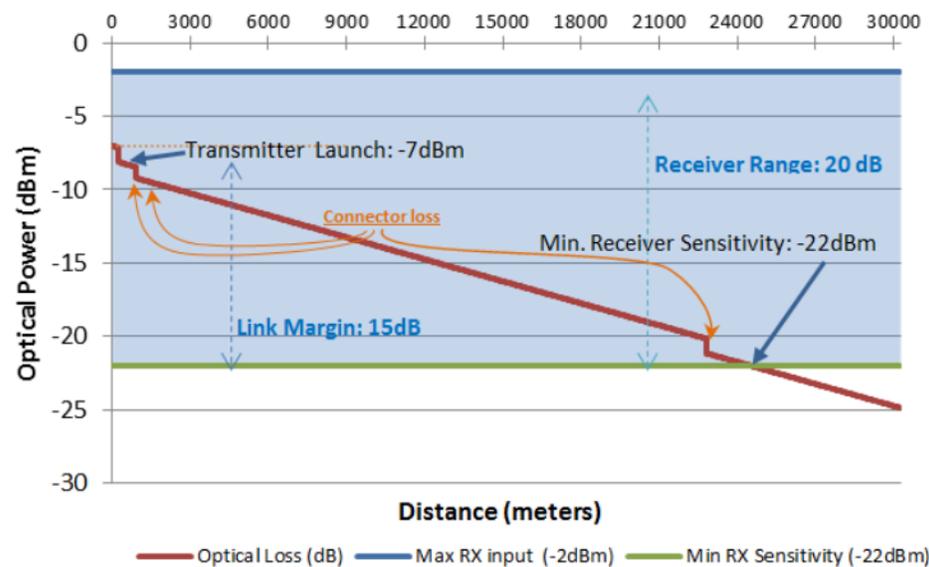


Fig. 6-5: CopperHead Fiber Optic Link Margin

The overall link margin (or dynamic range) of the CopperHead 3200 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 km
- Optical loss at connection points: typically 1 dB per connector

Therefore, a CopperHead 3200 system can optimally work over 24 km 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 3200 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 3200 Base Station and Camera Unit provide direct signal strength measurements in dBm. These readouts also provide a wide range of diagnostic information.

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

The CopperHead 3200 Base Station Digital Display

The Base Station digital display (10) has three functions selected by the Display Mode SELECT button (11). These functions are indicated by the Display Mode LEDs (12).

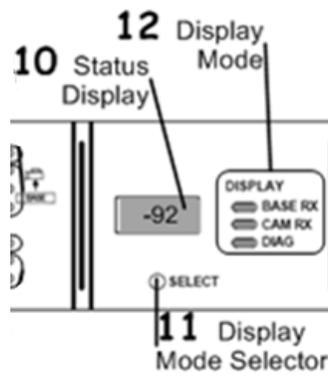


Fig. 6-6: Display Modes

- **BASE RX:** Base Station Optical Power or Signal Strength that is being received at the Base Station. Displayed in units of $-dBm$. The acceptable range for operation is $-7dBm$ down to $-22dBm$.
- **CAM RX:** Optical Power or Signal Strength being received at the Camera Unit. Displayed in units of $-dBm$. The acceptable range for operation is $-7dBm$ down to $-22dBm$.
- **DIAG:** One of four diagnostics modes:
 - **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

For more information about the CopperHead optical link loss system, see [A Brief Guide to Measurement of Fiber Optic Signal Strength](#) on page 67.

To select the different display modes, push the SELECT button. The transition from one mode to another may take a moment, with the transition into the DIAG mode taking slightly longer. The Selector is cyclical rotating through each of the modes. Once in the DIAG mode, a quick push of the SELECT button cycles through the various diagnostic sub-modes described above.

The following table describes the sequence, abbreviations, and expected readouts in each of the display modes.

Display Mode	Typical Readout	Base Station Digital Display Activity Explanation
(assumes after initial power up – see Powering the System on page 63 for a description of the Power Up sequence)		
BASE RX (Base Station Receive Signal Strength)		
BASE RX	-9	Indicates that the Base Station signal strength is -9 dBm. * In earlier firmware versions this display may cycle with “BOPT” (Base Optical) or “BOPT” (Base Optical) before/after the numerical optical Power Reading.
		CAM RX (Camera Unit Receive Signal Strength)
CAM RX	-9	Indicates that the signal strength from the Camera Unit is -9 dBm. In earlier firmware versions this display may cycle with “COPT” (Camera Optical) or “BOPT” (Base Optical) before/after the numerical optical Power Reading.
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	TEMP	Indicates the display is in the TEMP sub-mode.
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	37C	Temperature display in Centigrade for Power Supply circuit board.
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	47C	Temperature display in Centigrade for Base Station circuit board.
DIAG/TEMP	PS	The Power Supply (PS) temperature will be again displayed.
DIAG/TEMP	TEMP	Repeats that the display is in the TEMP sub-mode.
DIAG/TEMP	36C	Temperature display in Centigrade for Power Supply circuit board. Note: the PS temperature has dropped one degree.
		This 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 <i>any</i> power level is outside normal level.
DIAG/POWER	POWR	Indicates the display is in the POWER sub-mode.
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.

Display Mode	Typical Readout	Base Station Digital Display Activity Explanation
DIAG/POWER	DISP	Indicates that the LED Display 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	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 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.
DIAGNOSTIC MODE Microcontroller Board Revision Version (REV)		
DIAG/REV		A quick push of the Display Mode Selector advances to the Power (POWR) 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 August 1, 2010. Your system may have different REV versions.
DIAG/REV	REV	Initial display of REV after Display Mode Selector being advances.
DIAG/REV	DISP	Indicates the Display microcontroller board is revision is being queried.
DIAG/REV	REV	Indicates that sub-mode is REV.
DIAG/REV	REVC	Indicates that the REV for the DISP board is REVC.
DIAG/REV	VBS	Indicates the VBS microcontroller board is revision is being queried.
DIAG/REV	REV	Indicates that sub-mode is REV.
DIAG/REV	REVA	Indicates that the REV for the VBS board is REVA.
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	REVA	Indicates that the REV for the BASE board is REVA.
DIAG/REV	AUD	Indicates the audio microcontroller board is revision is being queried.
DIAG/REV	REV	Indicates that sub-mode is REV.
DIAG/REV	REVA	Indicates that the REV for the AUD board is REVA.

Display Mode	Typical Readout	Base Station Digital Display Activity Explanation
DIAG/REV	PS	Indicates the power supply microcontroller board is revision is being queried.
DIAG/REV	REV	Indicates that sub-mode is REV.
DIAG/REV	REVD	Indicates that the REV for the DISP board is REVD.
	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.
DIAG/CAM	CAM	Indicates that the sub-mode is CAM.
DIAG/CAM	OK	Indicates that the Camera Unit is reporting <i>No</i> fault.
DIAG/CAM	ERR	Indicates that the Camera Unit is reporting <i>Some</i> fault.
	This display cycle repeats until the Display Mode Selector is pushed.	

The CopperHead 3200 Camera Unit Digital Display

The Camera Unit Digital Display has six functions selected by the BASE Rx/DIM Selector (#11 in [CopperHead 3200 Fiber Optic Transceiver System Controls and Indicators](#) on page 106). These functions are indicated only by the activity in the Digital Display.

- **COPT:** Camera Unit Optical Power or Signal Strength (Local OPTical) that is being generated at the Camera Unit and sent to the Base Station. Displayed in units of –dBm.
- **BOPT:** Base Power (Base OPTical) or Signal Strength generated by the Base Station as measured at the Camera Unit. Displayed in units of –dBm.
- **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.
- **LED Brightness:** allows the adjustment of the brightness of the Camera Unit LED indicators.

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 sequence, abbreviations, and expected readouts in each of Camera Unit’s alpha-numeric display modes.

Readout	Camera Unit Digital Display Activity Explanation
	(assumes after initial power up – see Operating the CopperHead 3200 System on page 61 for a description of the Power Up sequence)
COPT - Camera Unit Optical Signal Strength	
COPT	Indicates that the Display is showing the optical signal strength at the Camera Unit (may display “LOPT” in earlier firmware)
-9	Indicates that the Camera Unit signal strength is -9 dBm
	This display cycle repeats until interrupted by the BASE Rx/DIM button. A quick push of the BASE Rx/DIM button advances to the BOPT mode A longer push (approx 5 seconds) advances to DIAG mode.
BOPT (Base Station Signal Strength)	
BOPT	Sequence starts with BOPT to indicate the optical signal strength at the Base Station (may display “ROPT” in earlier firmware).
-9	Indicates that the signal strength being received at the Base Station is -9 dBm
	This display cycle repeats until interrupted by the BASE Rx/DIM button. A quick push of the BASE Rx/DIM button returns to the COPT mode A longer push (approx 5 seconds) advances to DIAG mode.

Readout	Camera Unit Digital Display Activity Explanation
DIAGNOSTIC MODE Power (POWR)	
	Holding the BASE Rx/DIM SELECT button for approximately five seconds advances to the First diagnostic mode, which is POWR status. This mode cycles through the following sequence and may start at any point in the cycle.
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
	Unless interrupted by pushing BASE Rx/DIM SELECT button, the display will revert to COPT mode after cycling through this sequence two-to-three time.
DIAGNOSTIC MODE Microcontroller Board Revision Version (REV)	
	A quick push of the BASE Rx/DIM Selector button from PWR mode advances to the REV mode. This mode displays the microcontroller firmware revision of every board in the Camera Unit. This mode cycles through the following sequence and may start at any point in the cycle.
REV	Indicates that mode is REV
OBOX	Indicates the OBOX microcontroller board is revision is being queried
REVD	Indicates that the REV for the Audio Interface Box board is Revision "D"
REV	Indicates that mode is REV
MAIN	Indicates the BASE microcontroller board is revision is being queried
REVD	Indicates that the REV for the BASE Camera Unit controller board is Revision "D"
REV	Indicates that mode is REV
UBUS	Indicates the UBUS microcontroller board is revision is being queried
REVD	Indicates that the REV for the UBUS board is Revision "D"
	Unless interrupted by pushing BASE Rx/DIM SELECT button, the display will revert to COPT mode after cycling through this sequence two-to-three time.

Readout	Camera Unit Digital Display Activity Explanation
DIAGNOSTIC MODE Temperature (TEMP)	
	A quick push of the BASE Rx/DIM Selector button from REV mode advances to the TEMP mode. This mode displays the internal temperature (in degrees C) of the Camera Unit. This mode cycles through the following sequence and may start at any point in the cycle.
TEMP	Sequence starts with TEMP to indicate Temperature Display mode.
MAIN	The Camera Unit MAIN controller board temperature will be displayed.
61C	Temperature display in Centigrade for Camera Unit main circuit board.
	Unless interrupted by pushing BASE Rx/DIM SELECT button, the display will revert to COPT mode after cycling through this sequence two-to-three time. If Pushed, it will cycle to the Diagnostic POWR Mode.

Adjusting the Brightness of the Camera Unit Control Panel

To adjust the brightness of the Camera Unit control panel (LEDs and Alpha Display), push and hold the BASE Rx/DIM selector button for more than 10 seconds. The Alpha Display will change to one of the four-character sequences shown below, and the LEDs will begin to change brightness. The dimming is cyclical – it will change from bright to dim, and when it reaches the limit, it will change from dim to bright.

Four-Character Alpha Display	Representing	Action
<^^>	"eyes looking up"	Brightness increasing (brightening)
<oo>	"eyes wide open"	Display at maximum brightness
<vv>	"eyes looking down"	Brightness decreasing (dimming)
<-->	"eyes closed"	Display at minimum brightness

Best Practices

The section is devoted to a number of “Best Practices” for use of the CopperHead 3200 Transceiver System.

- Protect the Fiber Optic Cable and the Fiber Optic Connectors. **Always** keep these capped unless there are being connected.
- Read the Guide on planning the Fiber Run.
The Using Fiber Optics Guide explains 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).
- Once the system is set up and running, take regular readings of the Optical Power Signal Strength readings at both the Camera Unit and Base Station. While the ALARM functions will alert you to broad problems, monitoring the optical power level is the best way to know if there is a potential problem in the fiber path, permitting preventative action to ensure On-Air or Recording signal integrity.
- 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.
- 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 handling the Fiber Cable and to 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 power switches are 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 being dragged across the ground or other surface.
- When re-spooling the cable, take your time so as to 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 3200 Transceiver System is similar to any piece of television production gear with the exception of the core Fiber Optic technology.

Here is a list of things to look out for:

- Check all your cables for any lost connections or bad connectors.
- Confirm signal type is on the proper signal path – It is possible to physically connect analog signals to digital signal paths on the CopperHead 3200 Fiber Optic 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.
- Check that the Power Supplies are working and check the fuses. Take advantage of the various diagnostic tools provided in the CopperHead 3200 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 strengths lower than this. Use the Four-character Digital Displays to check signal strength.
Remember to check both local and remote power. It can be 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 indicators 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 ensure that it is intact and has no damage of severe bends or kinks.
- If the digital display indicates an error and displays a Hexadecimal error code, you should take note of the exact error code and contact Grass Valley support to assist in diagnosing the problem (see [Contact Us](#) on page 81). 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. The following typical error code of 00000010 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 Gb/s
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	>15K Ω
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

Datas

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

Electro-Optical

Operating Wavelengths 1300 nm/1550 nm
 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 *see note below

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.....	8 watts@10-18VDC
Base Station (Tac Fiber):	
Power Consumption.....	10 watts@10-18VDC
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

* 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.



Grass Valley Technical Support

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

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Office hours: 9:00 a.m. – 9:00 p.m. (EST)
Telephone: 1-800-224-7882
Fax: +1 514 335 1614
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Connector Pin Assignments

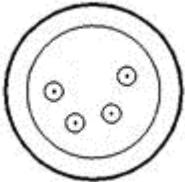
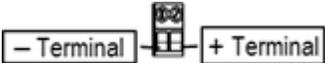
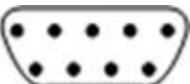


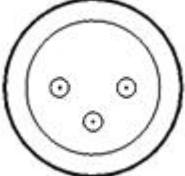
This appendix describes the pin assignments for the CopperHead 3200 Fiber Optic Transceiver System components.

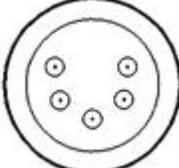
<i>Base Station Connectors</i>	83
<i>Camera Unit Connectors</i>	86
<i>Data 1 (Camera Control) Pinout Configurations</i>	88

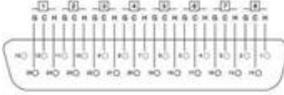
Base Station Connectors

Reference Numbers Refer to the Overview at the end of this User Guide.

Item	Description
AC Power Input Connector- Models CHG3-BS-3200-95VD-xxx-xxx	
 <p data-bbox="462 653 776 716">Base Station #1 Standard IEC C14 receptacle</p>	<p data-bbox="816 459 1412 590">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.</p>
12VDC Input Power Connectors – Models CHG3-BS-3200-2ST/2MX/NEU	
 <p data-bbox="526 995 711 1052">Base Station #20 XLR4 Male</p>	<ul data-bbox="816 783 1084 894" style="list-style-type: none"> • Pin 1: Ground • Pin 2: Unused • Pin 3: Unused • Pin 4: + Power 12 VDC <p data-bbox="816 905 1412 1031">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).</p>
 <p data-bbox="526 1178 711 1234">Base Station #21 Terminal block</p>	<ul data-bbox="816 1077 1166 1129" style="list-style-type: none"> • Pin 1: Minus Voltage Terminal • Pin 2: Plus Voltage Terminal <p data-bbox="816 1140 1404 1192">This connector is wired in parallel with XLR4 Male #20 (above).</p>
95VDC output: Model CHG3-BS-3200-95VD-STM-xxx	
 <p data-bbox="514 1398 724 1486">Base Station #23 Mating connector: Molex 39-01-4051</p>	<ul data-bbox="816 1304 1154 1381" style="list-style-type: none"> • Pin 1: 95VDC + OUT (White*) • Pin 2: 95VDC + OUT (Black*) • Pin 5: Ground (Green) <p data-bbox="816 1392 1198 1423">*Tied together at terminal lug end.</p>
Base Remote	
 <p data-bbox="440 1667 797 1856">Base Station #9 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</p>	<ul data-bbox="816 1556 1404 1812" style="list-style-type: none"> • 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 <p data-bbox="816 1822 1404 1877">See Available Accessories on page 96 for a list of Grass Valley, a Belden Brand supplied cables.</p>

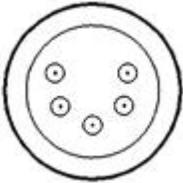
Item	Description
Tally/GPI/Data	
 <p>Base Station #10 DB15HD Female Format select (Pin 10) Floating for RS-422 or TTL Tie to GND (pin 5/7) for RS-232 Tie to +12VDC (pin 15) for RS-485</p>	<ul style="list-style-type: none"> • Pin 1: Data 2 -422 Out • Pin 2: Data 2 -422 In, -485 I/O • Pin 3: Not Used • 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 (optional) • Pin 12: Data 3 RS232 Out (optional) • Pin 13: GPI OUT A • Pin 14: GPI OUT B • Pin 15: +12VDC Bias for Format <p>See Multi-Pin Connectors: Suggested Wiring on page 90 for suggested wiring configuration.</p>
Clear-Com Intercom	
 <p>Base Station #16 & 17 XLR3 Female (x2)</p>	<ul style="list-style-type: none"> • Pin 1: Ground • Pin 2: +VDC Power • Pin 3: Power
RTS Intercom	
 <p>Base Station #16 XLR3 Female</p>	<ul style="list-style-type: none"> • Pin 1: Ground • Pin 2: +VDC Power & Channel 1 Audio • Pin 3: Channel 2 Audio
 <p>Base Station #17 XLR3 Male</p>	<ul style="list-style-type: none"> • Pin 1: Ground • Pin 2: +VDC Power & Channel 1 Audio • Pin 3: Channel 2 Audio

4-Wire Intercom				
	Pin	Function	Impedance	Signal
 <p>Base Station #16 & #17 XLR5 Male</p>	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
 <p>Base Station #18 & #19 DB25 Female (x2)</p>	Return Audio 1 In	Cam Audio 1 Out	1	24	12	25
	Return Audio 2 In	Cam Audio 2Out	2	10	23	11
	Not Used	Not Used	3	21	9	22
	Not Used	Not Used	4	7	20	8
	Intercom Program In	Not Used	5	18	6	19
	Not Used	Not Used	6	4	17	5
	4-Wire Dry* Intercom CH 1 In	4-Wire Dry* Intercom CH 1 Out	7	15	3	16
	4-Wire Dry* Intercom CH 2 In	4-Wire Dry* 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)	
 <p>Camera Unit #8 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 See <XREF> for pinout configuration</p>	<ul style="list-style-type: none"> • 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 - optional) • 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- optional) • Pin 9: Camera Control Data (-) Input • Pin 10: Camera Control Data (+) Output <p>Mating connector: Hirose HR10A-10P-10P. See Available Accessories on page 96 for a list of Camera Remote Cables.</p>
Production/Signal	
 <p>Camera Unit #9 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</p>	<ul style="list-style-type: none"> • 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 the 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 <p>See Available Accessories on page 96 for a list of Camera Remote Cables.</p>
Power Wafer	
 <p>Camera Unit #15 Lemo 4-pin Female</p>	<ul style="list-style-type: none"> • Pin 1: 95VDC+ • Pin 2: Not Used • Pin 3: 95VDC- • Pin 4: Not Used <p>Mating connector: Lemo FGG.0B.304.CLAD42 (right angle).</p>
Camera Headset	

Item	Description
 <p data-bbox="500 562 673 621">Camera Unit #3 XLR5 Female</p>	<ul style="list-style-type: none"> • Pin 1: MIC Ground (shield) • Pin 2: + MIC Input • Pin 3: - Earphone Output Ground • Pin 4: + Earphone Output • Pin 5: + Earphone Output <p data-bbox="751 457 1203 485">(RTS standard monaural headset pinout).</p>
<p data-bbox="435 638 597 665">Audio Output</p>	
 <p data-bbox="500 905 673 963">Camera Unit #4 XLR5 Male</p>	<ul style="list-style-type: none"> • 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
<p data-bbox="435 980 578 1008">Audio Input</p>	
 <p data-bbox="472 1302 699 1360">Camera Unit #5 & #6 XLR3 Female</p>	<ul style="list-style-type: none"> • Pin 1: Chassis ground (cable shield) • Pin 2: Positive polarity terminal ("hot") • Pin 3: Return terminal ("cold")

Data 1 (Camera Control) Pinout Configurations

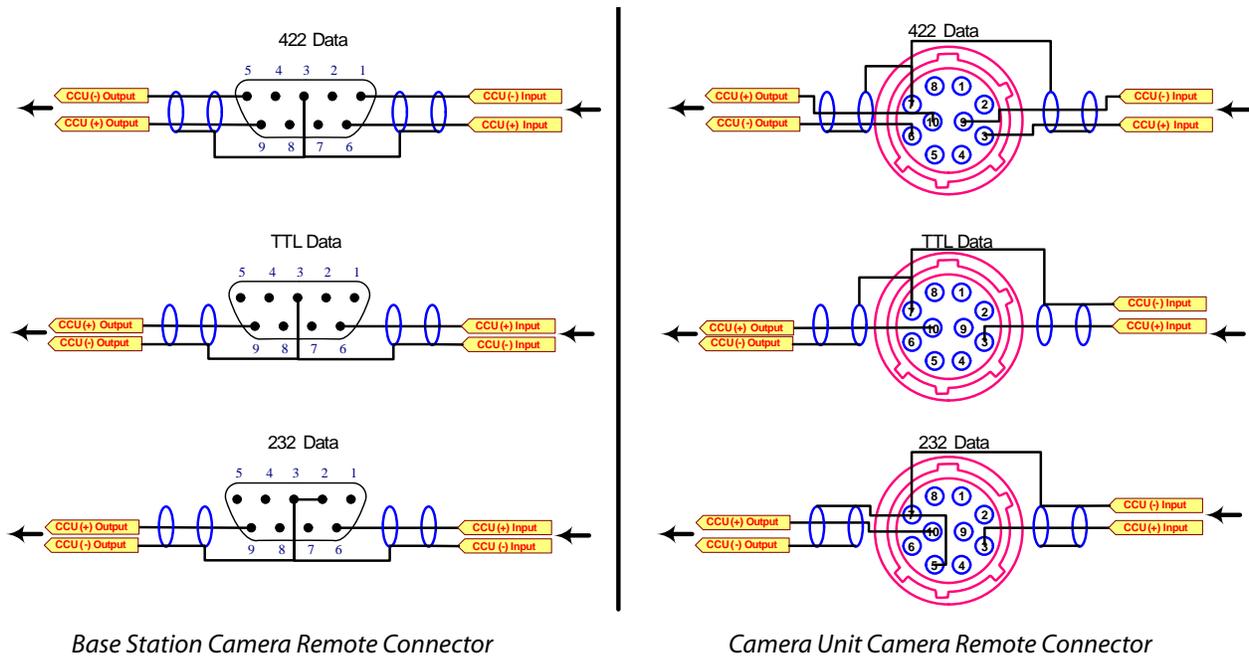


Fig. A-1: Camera Control Pinout configuration



Multi-Pin Connectors: Suggested Wiring

This appendix provides diagrams that illustrate what the wiring should be for the CopperHead 3200 cables.

<i>Signal Breakout cable: Tally, Remote Push-To-Talk, Call</i>	91
<i>Base Station Breakout Data/GPI Cable</i>	92
<i>Base Station 25-Pin Audio Input Cable</i>	93
<i>Base Station 25-Pin Audio Output Cable</i>	94

Signal Breakout cable: Tally, Remote Push-To-Talk, Call

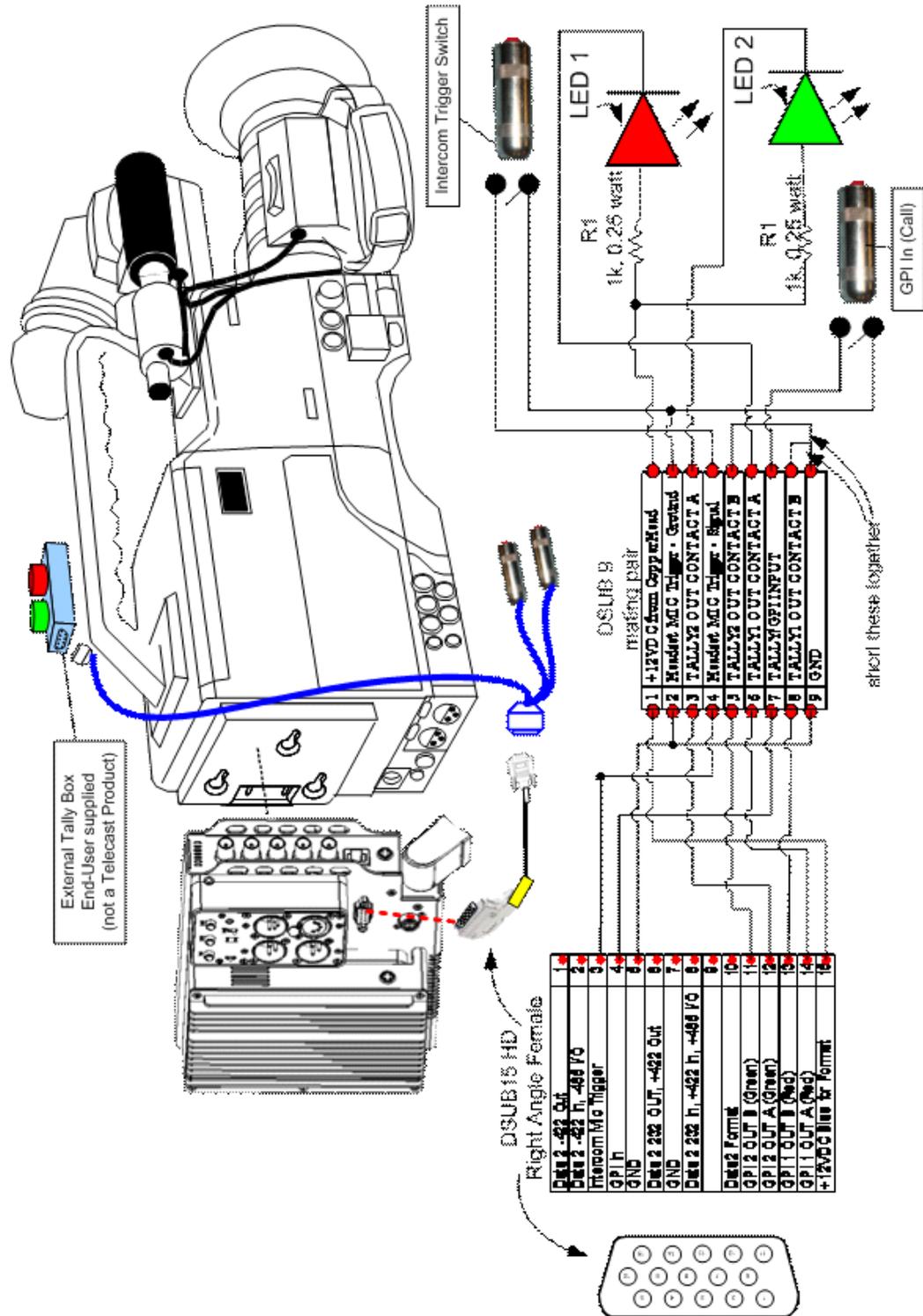


Fig. B-1: Example: Suggested Breakout Cable for Tally, Intercom Push-To-Talk, and Call/GPI

Base Station 25-Pin Audio Input Cable

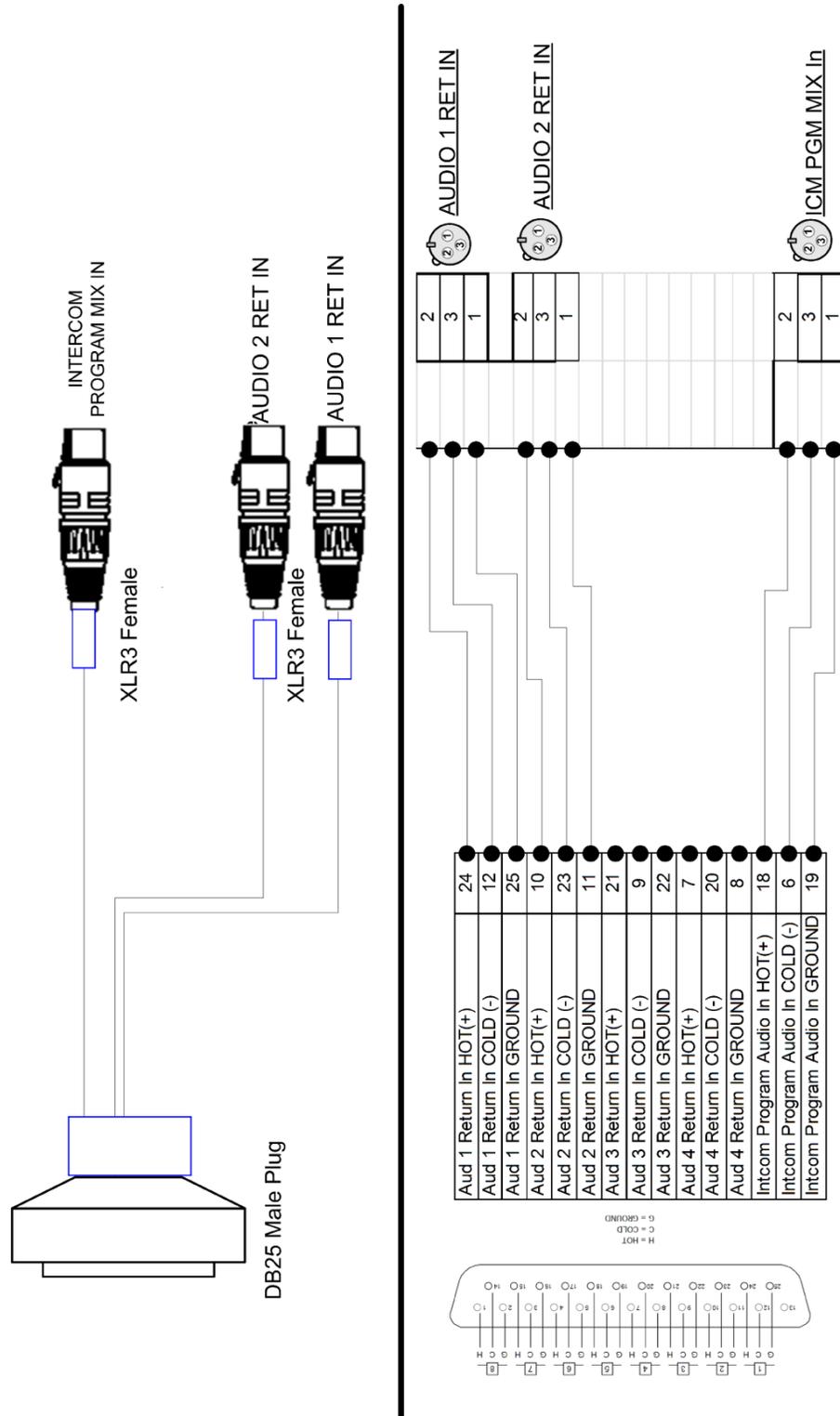


Fig. B-3: Base Station 25-Pin Audio Input Cable

Base Station 25-Pin Audio Output Cable

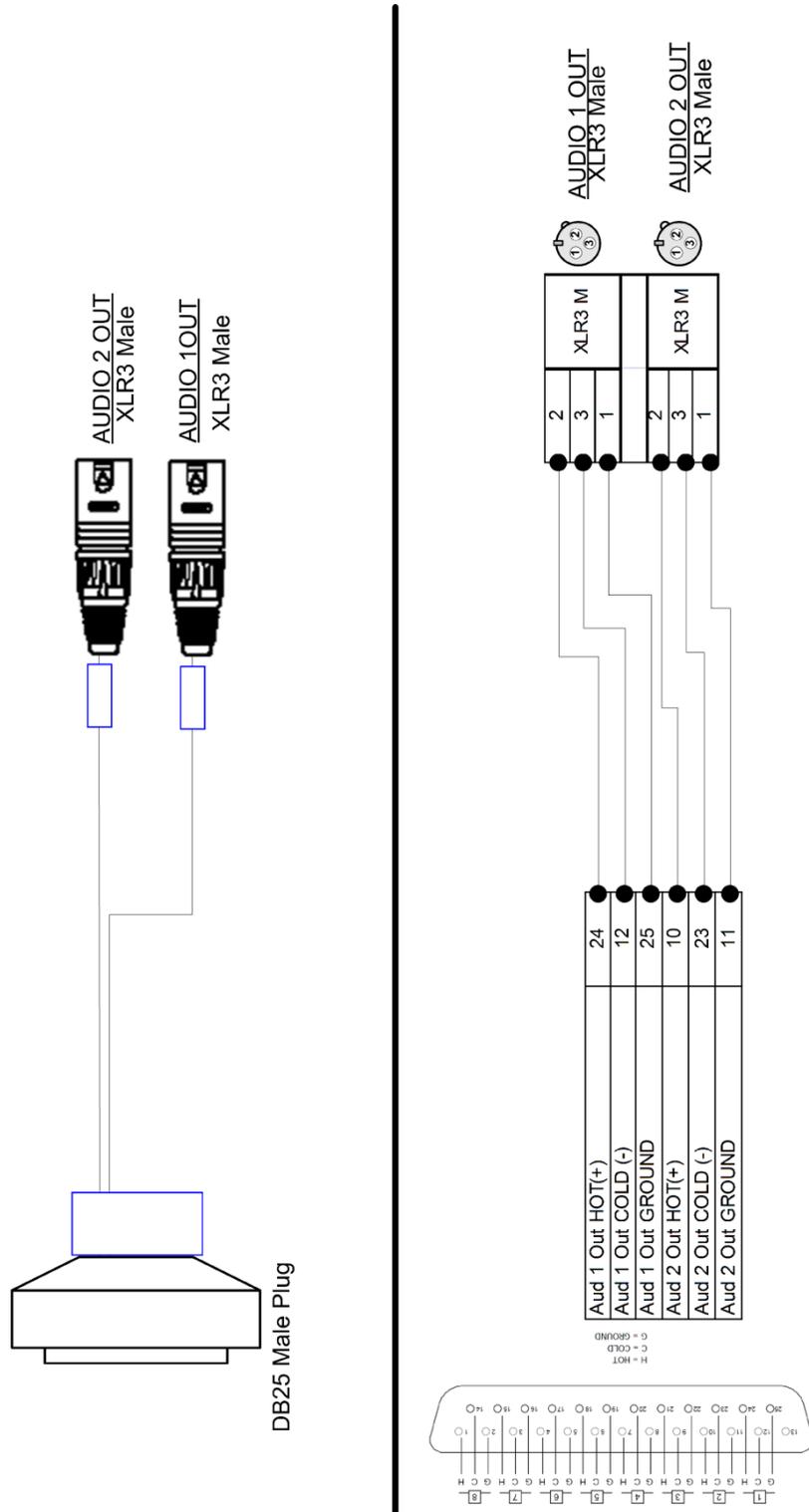


Fig. B-4: Base Station 25-Pin Audio Output Cable

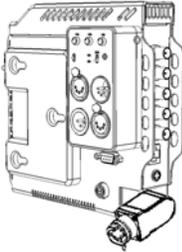
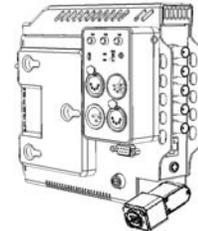
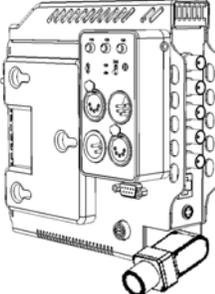


Available Accessories

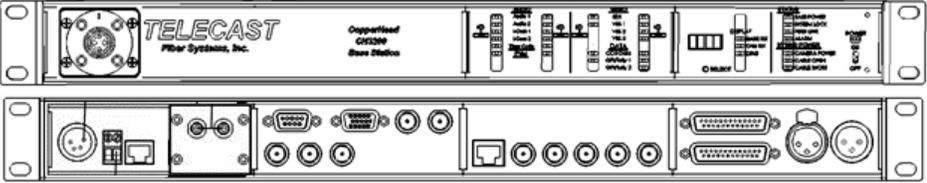
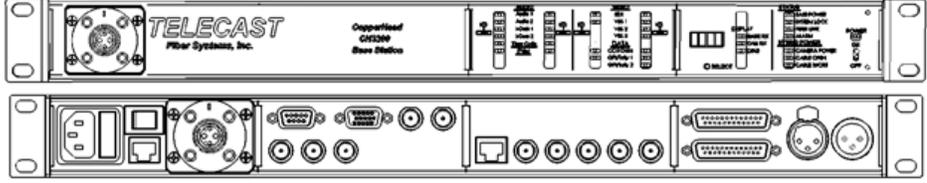
This appendix list the accessories that are available for the CopperHead 3200 Fiber Optic Transceiver System.

<i>Units and Connectors</i>	97
<i>Adaptors and Plugs</i>	99
<i>Plates, Panels, and Cables</i>	101
<i>Available Accessories – Cable Numbers</i>	102

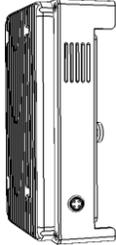
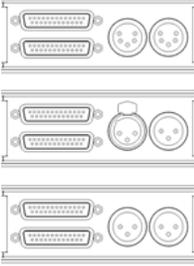
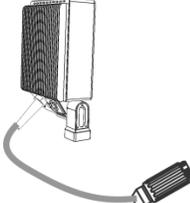
Units and Connectors

Item Number/ Description	Picture	Item Number/ Description	Picture
CH3-CAM-3200-MX		CAXX-MX	
Camera Unit w/MX Connector: Tac Fiber only		Tactical Fiber Assembly, MX Connectors	
CH3-CAM-3200-NEU		CAXX-XT2S-NOC	
Camera Unit w/ OpticalCON connector: Tac or SMPTE Hybrid Fiber		Tactical Fiber Cable Assembly, OpticalCON Connectors	
CH3-CAM-3200- 304M		CAXX-XSM311-NOC	
Camera Unit w/SMPTE 304M connector: Tac or SMPTE Hybrid Fiber		SMPTE 311M Hybrid Fiber Cable Assembly, OpticalCON connectors	
CAXX-XSM311- SMPTE		MXRE	
SMPTE 311M Hybrid Fiber Cable Assembly, SMPTE 304M connectors		MX Recepta cle Flange Mount Assembly Breakout to STs	

Wider Illustrations

Item Number/ Description	Picture
<p>CH3-BS-2ST or -NEU</p> <p>Standard Base Station 2 STs or OpticalCON connector</p>	
<p>CH3-BS-95VD-304 or NEU or -STM</p> <p>Base Station w/internal Power Supply</p>	

Adaptors and Plugs

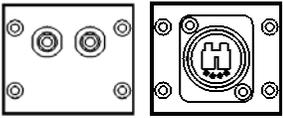
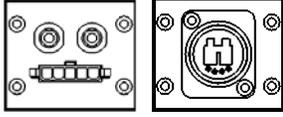
Item Number/ Description	Picture	Item Number/ Description	Picture
PWRWFR-95VD-FSR-AB		MXRV	
Power Wafer Camera Adaptor (for use with CH Series 3200-BS-95VD)		MX Receptacle Jam Nut Assembly Breakout to STs	
ADAP-AC-02		CH3BFC-NOC-2ST/MOL-08-XX	
Base Station AC Adaptor (for CH Series 3200-BS-2ST)		OpticalCON receptacle to STs and Molex 39-01-4051	
CASM/MD/XL		CH3BFC-NOC-NOC-08-XX	
Tactical Fiber on Reel: Small (SM), Medium (MD), or Large (XL)		OpticalCON receptacle to OpticalCON Plug	
CHG3-AUD-RTS/CC/4W		CH3BFC-304M-2ST-08-XX	
2-Channel Intercom Modules: 4-wire, RTS, or Clear-Com		SMPTE Hybrid 304M plug to STs and Molex 39-01-4051	
PWRPLUS-1MX/NO		CH3BFC-304M-NOC-08-XX	
Long Distance "PowerPlus" Camera Adaptor for use with HDX (specify LP or HP)		SMPTE Hybrid 304M plug to OpticalCON Plug	

Item Number/ Description	Picture	Item Number/ Description	Picture
CHBR-XXXX		CHCR-XXX	
Camera Remote Cable, 10 foot (specify remote model)		Camera Remote Cable (specify camera model)	

Wider Illustrations

Item Number/ Description	Picture
CH2-MPS-95VD-2ST-XXX or CH2-MPS-95VD-NEU-XXX Power Supply for Power Wafer Power Adaptor	
HDX-2-ST Power Supply for PowerPlus Power Adaptor	
HDX-FR-2 Rack mount frame for 2 HDX units	

Plates, Panels, and Cables

Item Number/ Description	Picture	Item Number/ Description	Picture
CH3BFP-ST/NO		CH3CS-BO-xx	
Base Fiber Plates – unpowered ST or OpticalCON		Camera Signal Breakout Cable (various)	
CH3BFP- STMOL/NO/304 M		CH3CS-26P-xx	
Base Fiber Plates - powered: ST /Molex or OpticalCON or 304M		Camera Signal Cable 26-pin Multicore (various)	
CHRCP-2050A		CHRCP-2050-LCD	
Universal Camera Control Panel		Universal Camera Control Panel w/TFT- LCD Display	

Available Accessories – Cable Numbers

Camera Unit Signal Cable

Cable Description	Item Number	Cable is Wired with Connectors	Typical Equipment Used With Cable
Breakout Cable	CH3CS-3200-BO-BF1-D9F1	DB15HD to BNC-F, DB9F	Ext Intercom Trigger, Ext Tally I/O

Base Station Audio 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

Base Station Data/Tally

Cable Description	Item Number	Cable is Wired with Connectors	Typical Equipment Used With Cable
Data/Tally	CH3BS-3200-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	DB9 to MXR-8P-8P (8-pin)	RMB-150/750, RCP700 series, MSUs (

Cable Description	Item Number	Cable is Wired with Connectors	Typical Equipment Used With Cable
Sony	CHBR-SON-BVP3-8-BNC	DB9 to MXR-8P-8P (8-pin) & BNC	RMB-750, MSUs (w/video in)
Sony	CHBR-SON-DXC2-10-BNC	DB9 to HR10A-10P-10S (10 pin) & BNC	RCP-D50
RCP2050	CHBR-OCP2040-422	DB9 to DB15	CHRC2040/2050

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, contact Grass Valley, a Belden Brand (see [Contact Us](#) on page 81) or your local CopperHead dealer.

D Diagrams

This appendix provides diagrams that list the features on the front and back panels of the CopperHead 3200 Fiber Optic Transceiver System Base Station.

<i>CopperHead 3200 Fiber Optic Transceiver System Base Station Front Panel</i>	105
<i>CopperHead 3200 Fiber Optic Transceiver System Base Station Back Panel</i>	105
<i>CopperHead 3200 Fiber Optic Transceiver System Controls and Indicators</i>	106
<i>Block Diagrams</i>	107

CopperHead 3200 Fiber Optic Transceiver System Base Station Front Panel

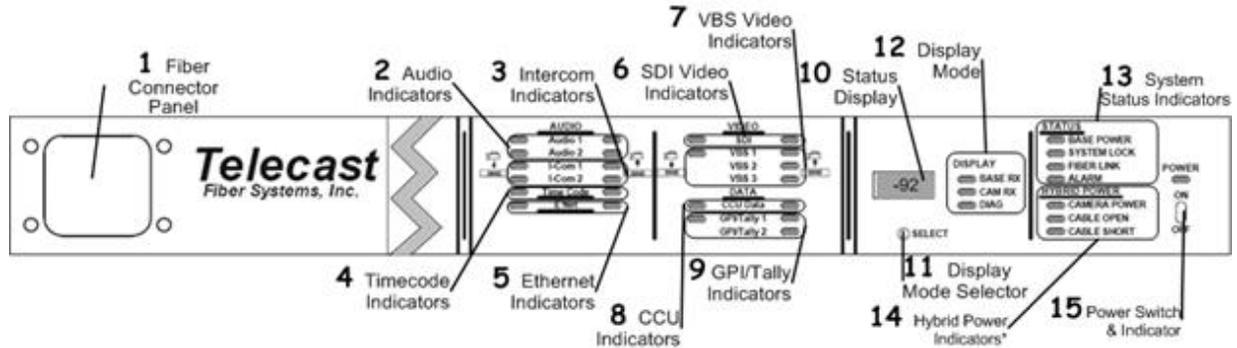


Fig. D-1: CopperHead 3200 Base Station Front Panel Indicators

*Appears only on Hybrid Power Systems

CopperHead 3200 Fiber Optic Transceiver System Base Station Back Panel

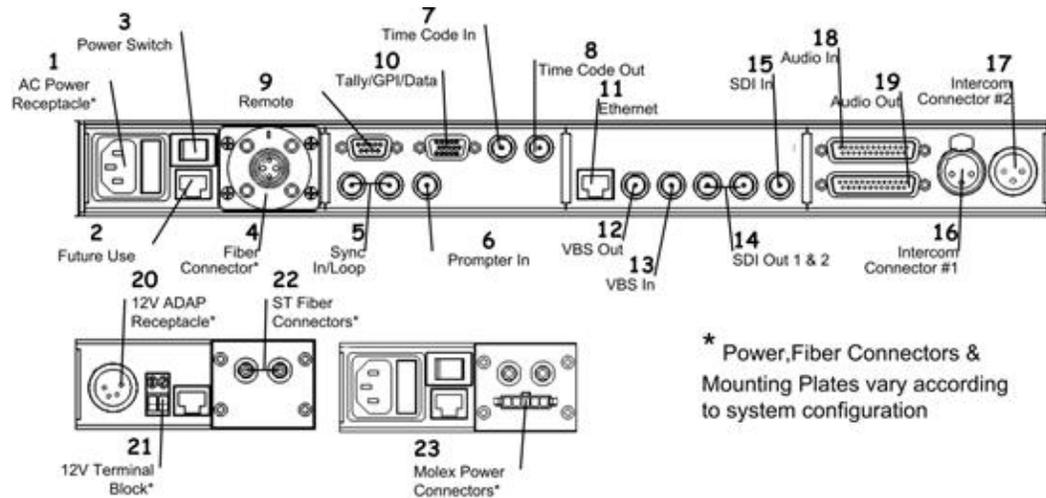


Fig. D-2: CopperHead 3200 Base Station Back Panel

CopperHead 3200 Fiber Optic Transceiver System Controls and Indicators

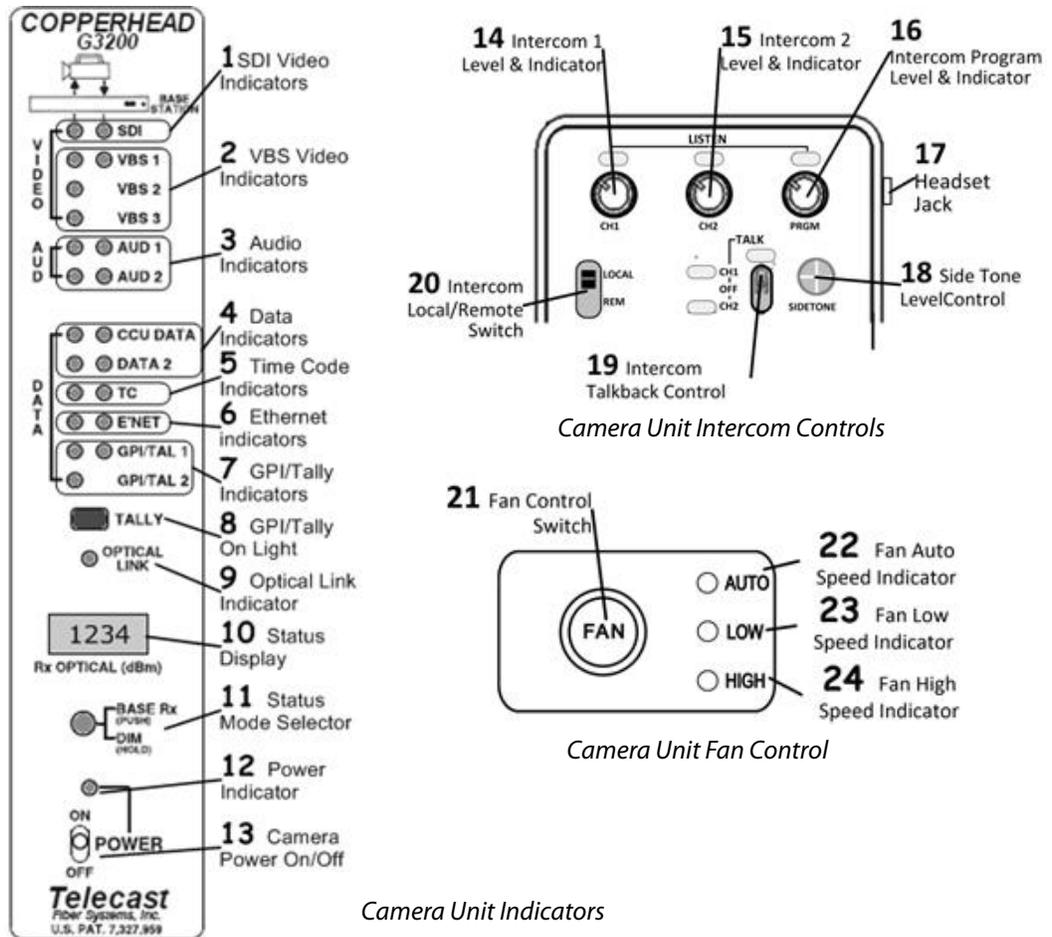


Fig. D-3: CopperHead 3200 Base Station Controls and Indicators

High Powered Version

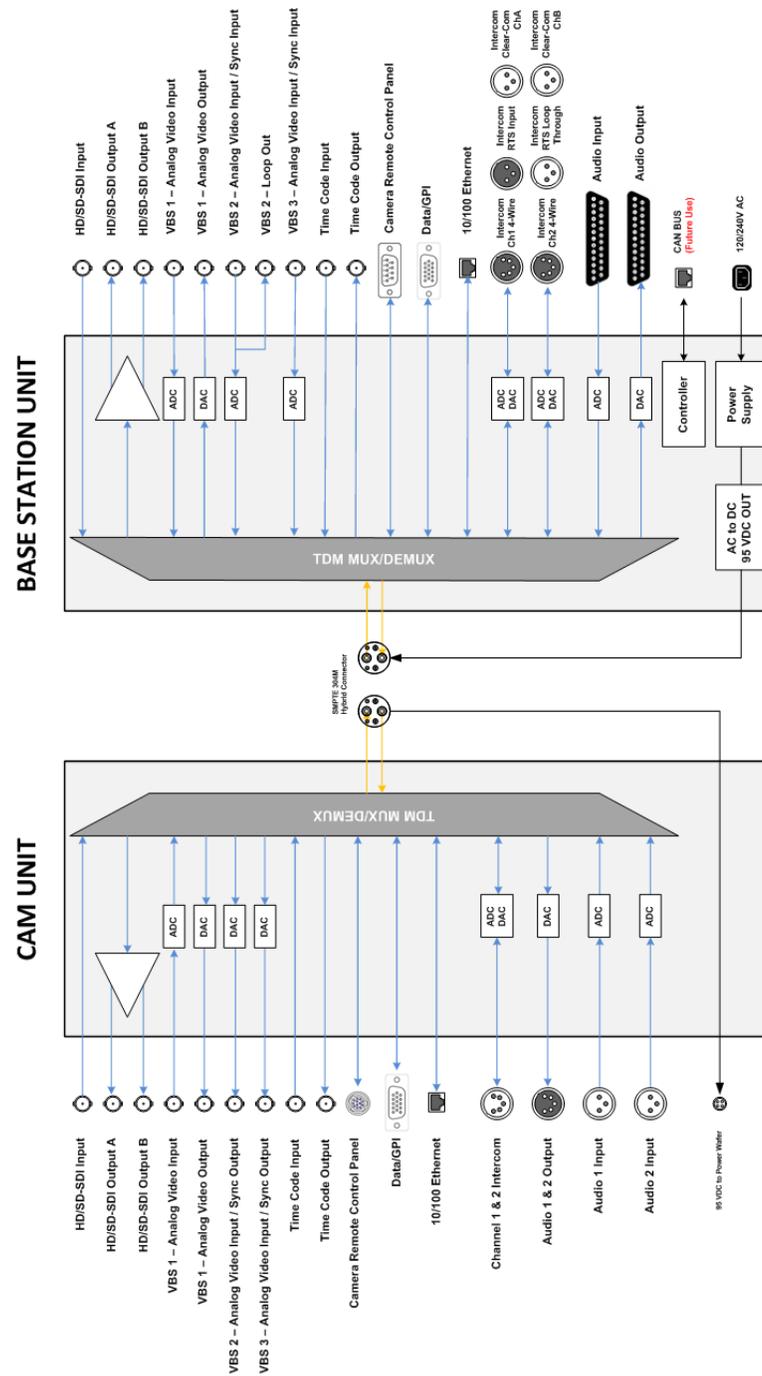


Fig. D-5: CopperHead 3200 High Powered Version

Low Powered Version

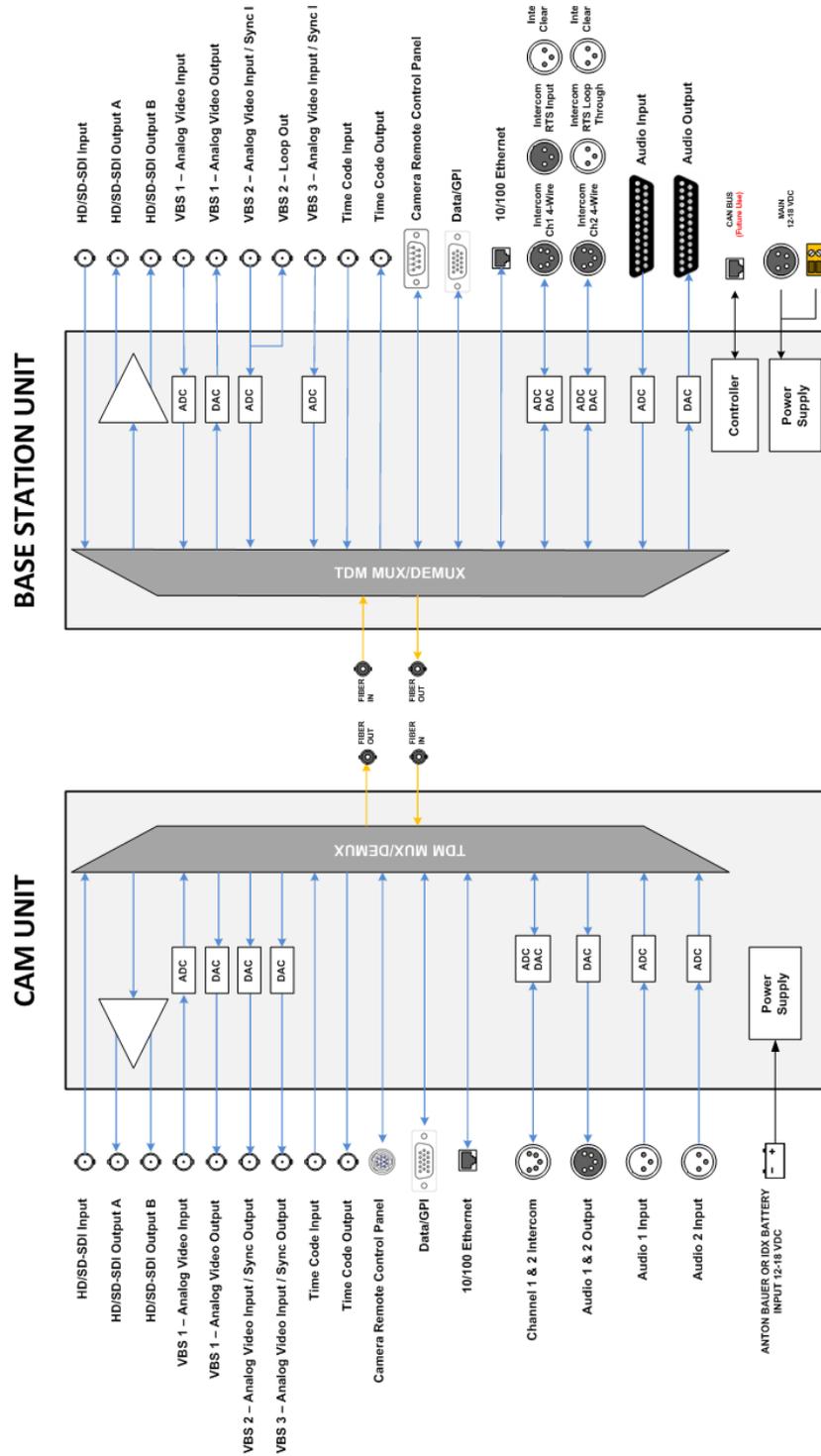


Fig. D-6: CopperHead 3200 Low Powered Version