Telecast Fiber Systems, Inc.

A **BELDEN** Brand

CopperHead™ 3400

Series 3000 Camera-Mountable ENG/EFP Fiber Optic Transceiver System

User Manual

PRELIMINARY

Telecast Fiber Systems, Inc.
102 Grove Street
Worcester, MA 01605
Tel: 508-754-4858
Fax: 508-752-1520
www.telecast-fiber.com

Telecast Fiber Systems, Inc.

A **Belden** Brand

Table of Contents

List of Main Figures

List of Tables

About this User Guide

This CopperHead 3400 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 and so not every page in this guide will apply to your specific system.

Throughout this guide a number of informational pointers are used to mark important or useful information.

	Caution – the information provided is important safety information and should be understood and followed in order to operate the CopperHead 3400 Fiber Optic Transceiver System safely and properly.
	Useful information regarding the User Guide and the CopperHead 3400 Fiber Optic Transceiver System. Reading and understanding this information will make using the manual and the product easier.

Chapter 1. Important Information

1.1. Warranty

LIMITED WARRANTY STATEMENT

Telecast Fiber Systems, Inc. ("Telecast") expressly warrants to Buyer that the Products supplied shall be free from defects in materials and workmanship for a period of 12 months following the date the Products are delivered to Buyer (the "Warranty Period"). Telecast's liability under this limited warranty shall be limited, at its option, to providing refund of purchase price for Products, or replacing or repairing Products shown to be defective either in materials or workmanship. Buyer's sole and exclusive remedy for breach of warranty shall be such refund, replacement or repair.

A claim of defect in materials or workmanship in any Product shall be allowed only when it is submitted in writing to Telecast Fiber Systems, Inc. within seven days after discovery of the defect, and in any event within the Warranty Period. No claim shall be allowed in respect of any Product which has been altered, neglected, damaged or stored in any manner which adversely affects it. In order to obtain service under the terms of this warranty, Distributor's customer or Distributor must notify Telecast of the defect prior to the expiration of the applicable warranty period and obtain a Return Authorization Number from Telecast. In no event may products be returned to Telecast or to Distributor for warranty service without having obtained from Telecast a Return Authorization Number.

This limited warranty applies only to new and unused Products delivered to Buyers located within the United States of America, or to international Buyers if sold through an authorized Distributor organization, and shall not extend to any equipment not manufactured by Telecast Fiber Systems, Inc., even though such equipment may be sold or operated with the Products. In addition, this limited warranty shall be void and of no further force or effect whatsoever if the Product is repaired or modified by any person other than an authorized representative of Telecast Fiber Systems, Inc. without the consent of Telecast Fiber Systems, Inc. This warranty shall not apply to any defect, failure or damage caused by improper use or inadequate maintenance and care. Nor shall this warranty apply to any damage caused in whole or in part by attempts by personnel other than Telecast's personnel, as approved in advance in accordance with the foregoing provisions, to open, install, repair, or service the Product; nor to damage resulting from improper connection with incompatible equipment; nor to damage to a unit which has been modified by personnel other than Telecast personnel.

Products returned to Telecast for warranty service shall be shipped, freight prepaid to Telecast. Telecast will return the repaired product or ship a replacement, freight prepaid, to either Distributor or Distributor's customer, as requested by Distributor's customer, at a location within the United States or, at Telecast's option, to Distributor's location in the case of international sales. This limited warranty shall also apply to Products that replace defective Products and Products that have been repaired by authorized representatives of Telecast Fiber Systems, Inc., but only for the original Warranty Period. The Warranty Period shall not be extended by reason of defect, or any period of time during which the Product is not available to Buyer because of defects or repairs, without the express written consent of Telecast Fiber Systems, Inc.

EXCEPT FOR THE EXPRESS LIMITED WARRANTY AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP CONTAINED HEREIN, TELECAST FIBER SYSTEMS, INC. MAKES NO WARRANTY OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, AND ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND OTHER WARRANTIES OF WHATEVER KIND ARE HEREBY DISCLAIMED BY TELECAST FIBER SYSTEMS, INC. THIS LIMITED WARRANTY SETS FORTH EXCLUSIVELY ALL OF TELECAST FIBER SYSTEMS, INC.'S LIABILITY IN CONTRACT OR OTHERWISE IN THE EVENT OF A DEFECTIVE PRODUCT. WITHOUT LIMITATION ON THE FOREGOING, TELECAST FIBER SYSTEMS, INC. EXPRESSLY DISCLAIMS ANY LIABILITY WHATSOEVER FOR ANY DAMAGES INCURRED DIRECTLY OR INDIRECTLY IN CONNECTION WITH THE SALE OR USE OF, OR OTHERWISE IN CONNECTION WITH, THE PRODUCT, INCLUDING WITHOUT LIMITATION, LOSS OF PROFITS AND SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, WHETHER CAUSED BY NEGLIGENCE OR OTHERWISE, REGARDLESS WHETHER TELECAST HAS BEEN GIVEN ADVANCE NOTICE OF THE POSSIBILITY THEREOF

THIS WARRANTY IS GIVEN BY TELECAST IN LIEU OF ANY OTHER WARRANTY EXPRESSED OR IMPLIED.

1.2. Safety and Fiber Optic Systems

Optical Fiber Safety

Never look directly into the end of the optic fiber while either end of the system is operating. Eye damage can result.

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

Power Fuses

The CopperHead 3400 Base Station with internal power is equipped with Dual Cartridge fuses located next to the AC Power receptacle at the left rear of the unit. Refer to Appendix 5 for specific location information.

NEVER operate the CopperHead 3400 Base Station without properly installed and rated fuses. Severe electrical and heat damage could result as well as personal injury or death.

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

One supplier is the Littlefuse Company. The series is Littlefuse 218.

1.3. Unpacking and the CopperHead 3400 Transceiver System

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

		CopperHead System Type		
Item Description	**Part Code**	**Tactical Fiber (local power at camera)**	**Hybrid Fiber - Standard Power (Power Wafer)**	**Hybrid Fiber - High Power (PowerPlus)**
CopperHead Camera Unit	CHG3-CAM	●	●	●
CopperHead Base Station	CHG3-BS	●	●	●
AC-to-DC Power Supply	ADAP-AC	●	No	No
Panel-Mountable Fiber Extension	CH3BFC	○	○	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 - What is shipped with a CopperHead 3400 System

Please consult your packing slip and purchase order to insure that you have received all of the expected Telecast Fiber Systems 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 Telecast Fiber Systems, Inc. See the following section regarding product returns.

You must use your own cables to make connections for 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.

1.4. Product Returns

In the unlikely event of damage to your CopperHead 3400 Fiber Optic Transceiver System during shipping or delivery please note the damage with the delivery or shipping service and document the packaging and product where you see damage. If any component does not work correctly out of the box please contact Telecast Fiber Systems service at (508) 754-4858.

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

Chapter 2.– System Overview

This chapter covers the following:

1) Fiber Optic Cable Concepts
2) CopperHead 3400 Transceiver System concepts
3) Signal paths in the CopperHead 3400 Transceiver System
4) CopperHead 3400 Transceiver System Components

2.1. Fiber Cable Concepts

Fiber Optics and Fiber Optic Cable are the core technologies at the heart of the Telecast Fiber Systems CopperHead 3400 Transceiver System. The ability to multiplex and de-multiplex a variety of video, audio and data signals so that they can be carried over a thin strand of Fiber Optic cable for long distances enables the CopperHead System. The theory and operation of Fiber Optics is beyond the scope of this document. What is important for the end user to be aware of are the different types of Fiber Optic Cable and Fiber Optic Cable Connectors.

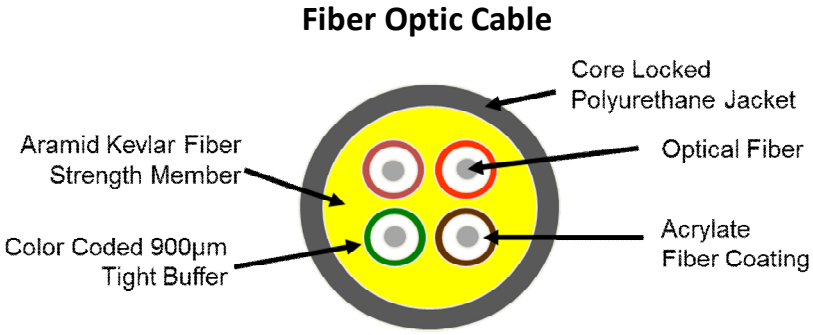


Figure 1 - Tactical Fiber Optic Cable Cross-section (Illustrative only)

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

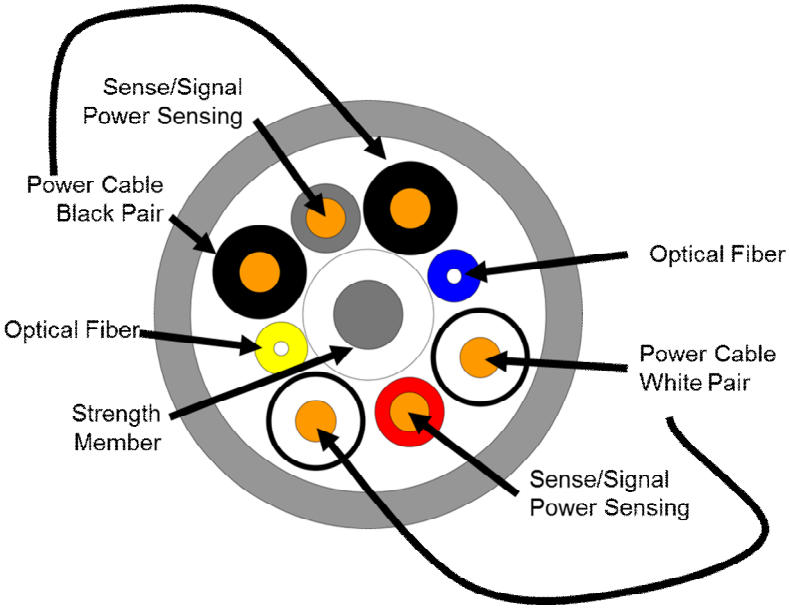


Figure 2 - Hybrid Fiber Optic Cable Cross-section (Illustrative only)

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

Fiber Optic Connector Types

Depending on the type of Fiber Optic Cable used, different Connector types can be configured. The following table summarizes the various types of connectors typically used in a CopperHead 3400 Transceiver System configuration and the allowed Fiber Optic Cable usage. Each connector type is illustrated below.

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

Table 2 - Fiber Optic Connector Types & Usage

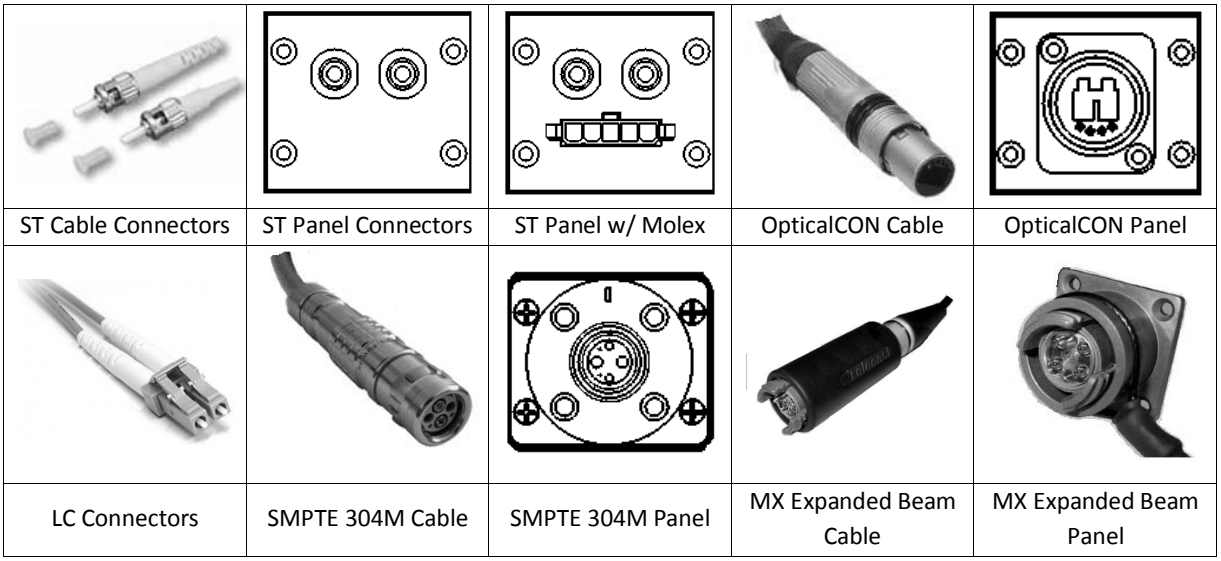


Figure 3 - Fiber Optic Connectors

2.2. CopperHead 3400 Transceiver System concepts

The Telecast CopperHead 3400 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 long as 5 km or more. The CopperHead 3400 is specifically designed to support the use of 3D or Dual-Link camera setups.

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

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

The CopperHead 3400 Transceiver System consists of two main components:

1. The CopperHead 3400 Camera Unit – this unit has two options: a) the battery physical interface system and b) the fiber connector.

2. The CopperHead 3400 Base Station – this unit has three options: a) the power configuration, b) the fiber connector and c) 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.

2.3. Signal paths in the CopperHead 3400 Transceiver System

The CopperHead 3400 Transceiver System utilizes an optical fiber link between the Base Station and the Camera Unit to carry all of the required signals necessary for operation of the camera and associated production equipment. The Camera Unit multiplexes electrical signals from the camera and other remote sources and converts them to an optical signal for transmission over the fiber. Simultaneously, an optical return signal is received at the Camera Unit from the Base Station; this signal is then converted to electrical analog information for use by the camera, camera operator, and auxiliary equipment at the camera location.

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

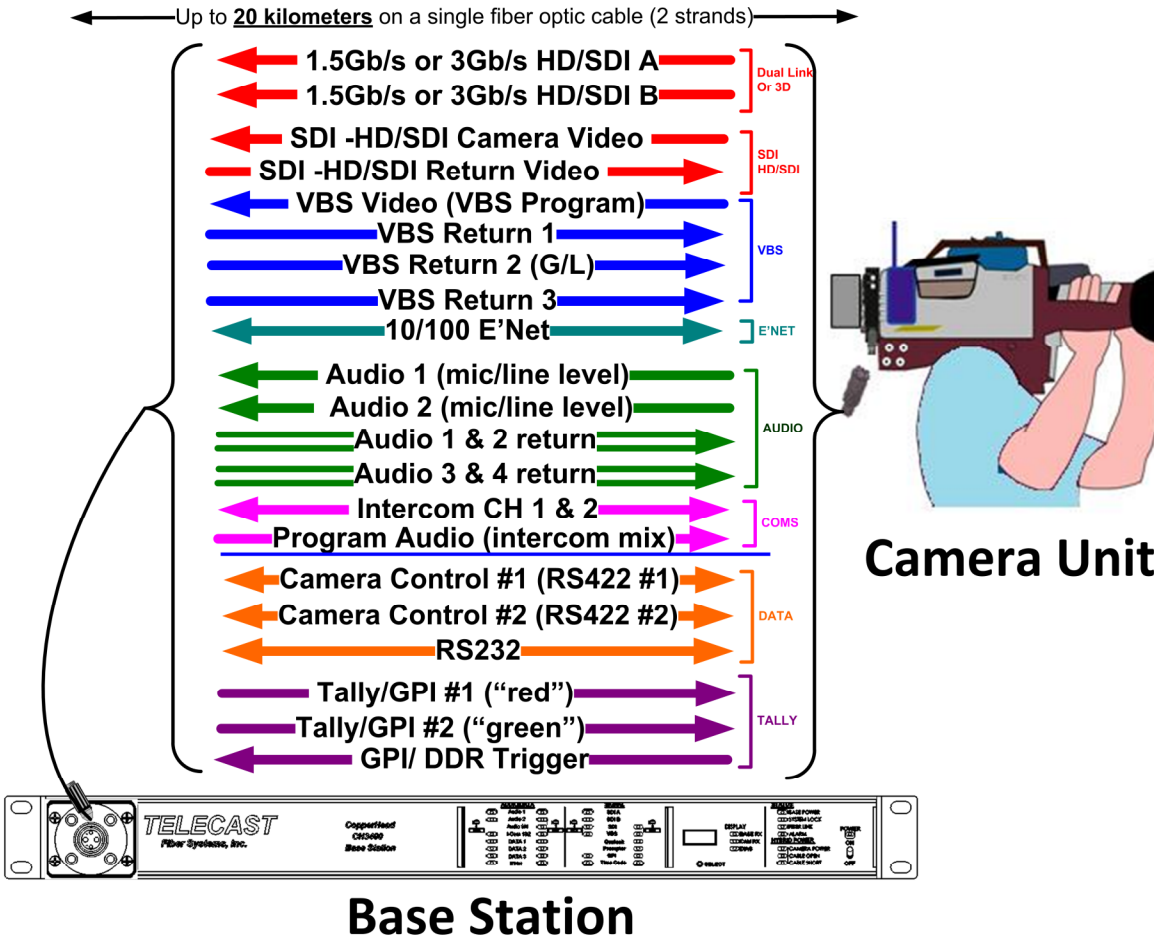


Figure 4- Base Station to Camera Unit Connection

2.4. CopperHead 3400 Transceiver System Components

CopperHead 3400 Camera Unit Overview

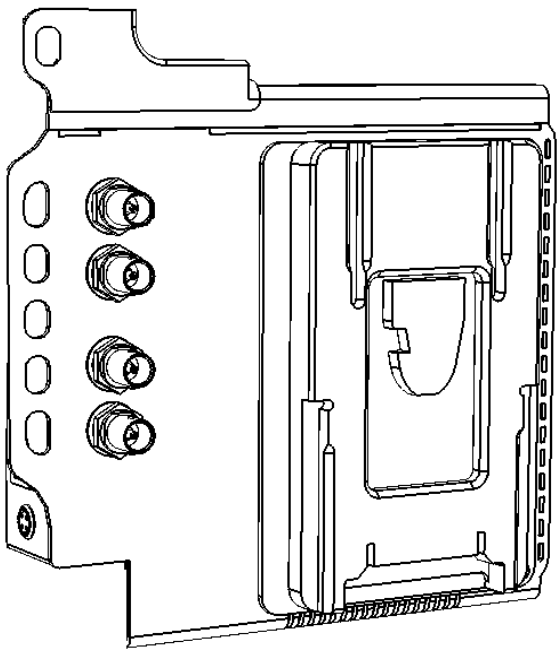


Figure 5 - Camera Unit Front Side (attached to the camera)

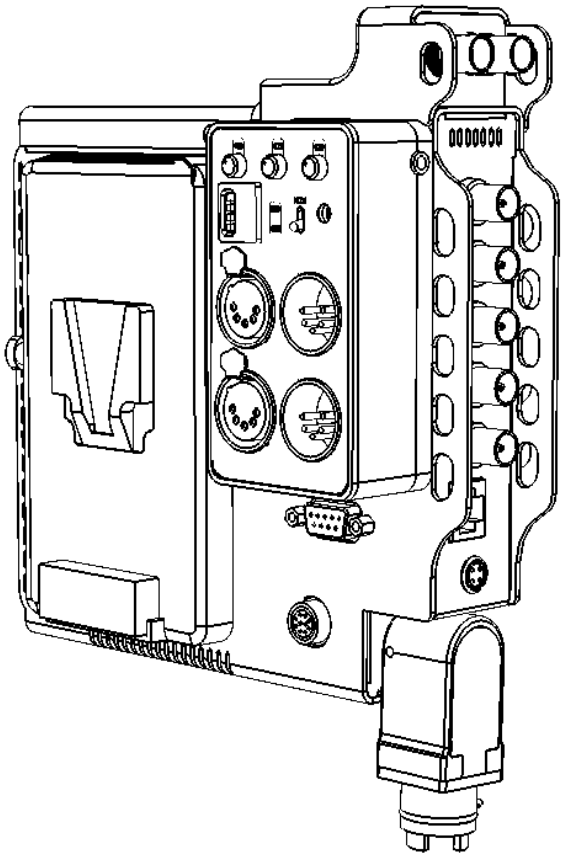


Figure 6 - Back Side (attached to the battery/power supply

The actual appearance of your CopperHead 3400 Camera Unit will vary depending on the battery mount and fiber cable connection options specified at the time of purchase.

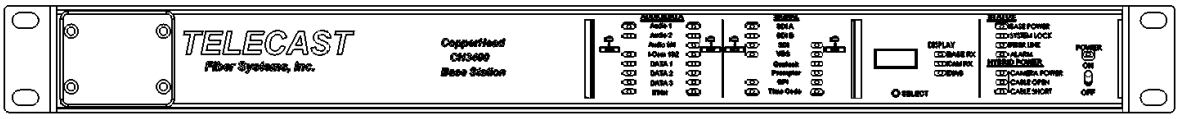


Figure 7 - CopperHead 3400 Base Station Front Panel

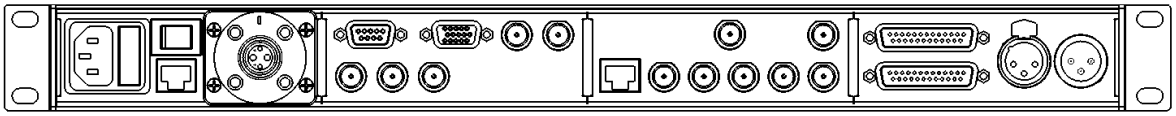


Figure 8 - CopperHead 3400 Base Station Connector or Back Panel

The actual appearance of your CopperHead 3400 Base Station will vary depending on the fiber cable connection and power options specified at the time of purchase.

CopperHead 3400 Transceiver System Additional Components

In addition to the CopperHead 3400 Camera Unit and Base Station the system consists of:

1. External Power Supply or Power Cord for the Base Station (depending the unit configuration)
2. 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
3. Hardware kits for rack mounting the Base Station
4. Portable fiber reel with fiber per your purchase order
5. Optional “Power Wafer” Camera Adaptor with optional external power supply
6. Optional “PowerPlus” Camera Adaptor and Power Adaptor
7. Optional Universal Camera Control Unit

For additional accessories see Appendix 3

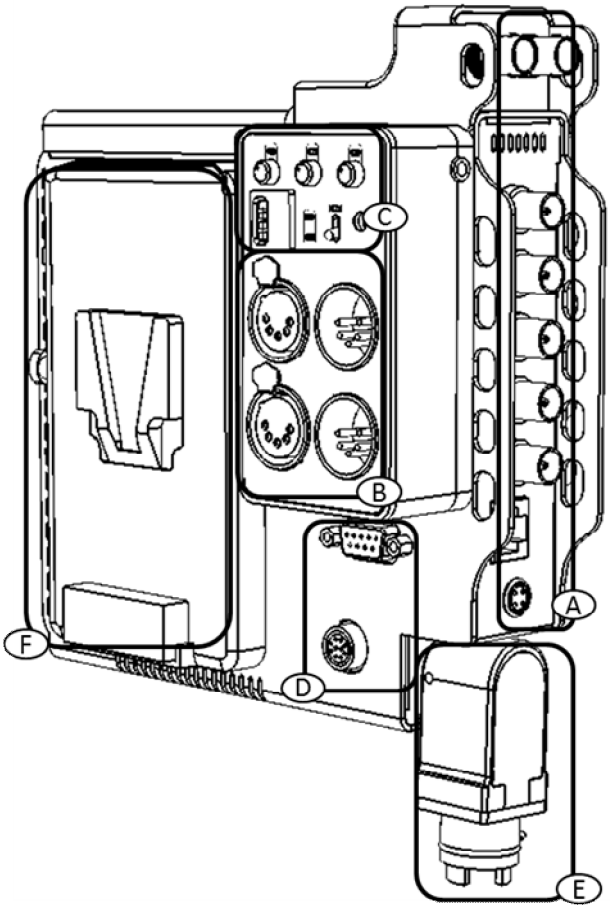
NOTE: You must use your own cables to make connections for Tally, Black Burst/Gen Lock, Base Station monitor, and other ancillary signals and equipment. See Appendix 4 for suggestions.

Chapter 3.– CopperHead 3400 Transceiver System Detailed Description

This chapter describes in detail each element on the Camera Unit and Base Station of the CopperHead 3400 Transceiver System. Physical installation of the system and system connections and practical operation are covered in following chapters. For an overall view of component location please see the CopperHead 3400 Transceiver System overall diagrams in Appendix 6. These diagrams can be folded out from the back of this User's Guide.

3.1. CopperHead 3400 Camera Unit

CopperHead 3400 Camera Unit Back Side



The back side of the Camera Unit has 6 areas of interest:

A) Connector Panel
See Page 20
B) Audio/Intercom Connector Panel
See Page 20
C) Audio/Intercom Controls
See Page 21
D) Misc. Connectors
See Page 21
E) Fiber Connector
See Page 22
F) Battery Mount
See Page 22

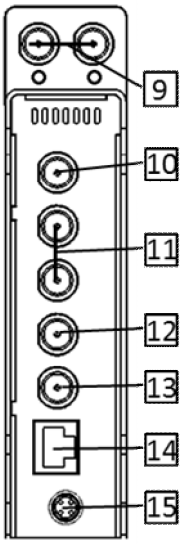
Figure 9 - CopperHead 3400 Camera Unit Back Side

CopperHead 3400 Camera Unit Front Side – Identifying Controls and Connectors

For additional information about the signals carried on these connectors please see Page 15.

Area A – Connector Panel

Throughout this document component Key Numbers are coordinated with the overall system diagrams found at the end of this User Guide in Appendix 6.



9) 3D – Dual Link SDI Connectors A & B – Activity indicators are below each SDI connector (to Base Station)

10) SD-HD/SDI In (to Base Station)

11) SD-HD/SDI Digital Video Outputs A & B (from Base Station)

12) VBS In (to Base Station)
VBS signal paths typically carry analog video

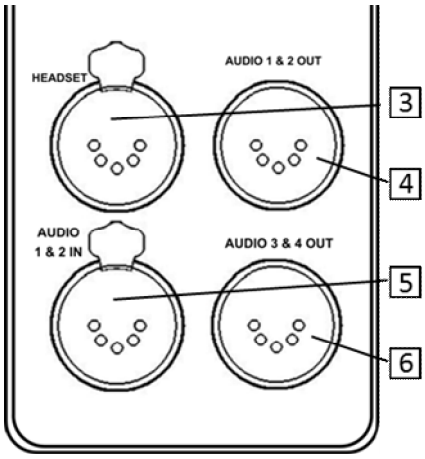
13) VBS Out (from Base Station)

14) Ethernet (100Mbs)

15) Power Wafer Connector

Area B - Audio/Intercom Connector Panel

For information on the Audio/Intercom Connector Panel operation please see Page 67



3) Intercom Head Set Connector

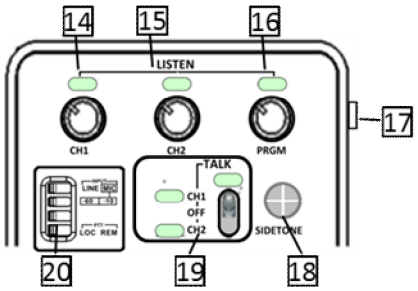
4) Audio 1 & 2 Output (from Base Station)
Typically return audio from the Base Station

5) Audio 1 & 2 Input (Line Level) - (to Base Station)
Typically audio program from camera line outputs

6) Audio 3 & 4 Output (from Base Station)
Typically return audio from the Base Station

Area C - Intercom Controls

For information on the Audio/Intercom Connector Panel operation please see Page 67



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

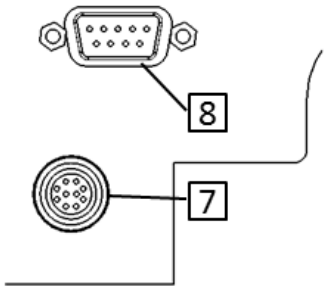
    Mini-phone jack with no microphone functionality

18) Side Tone Control
19) Intercom Talkback Control
20) Audio Input Level & Intercom Local/Remote Switches

    See Chapter 6 –Page 50 for a description of the use of these switches

Area D - Miscellaneous Connectors

For information regarding available cables and customer furnished cables please see Appendices 3 & 4



7) Camera Remote Connector (for optional Camera Remote Control unit). This connector also carries a Data Signal for Serial Communication (RS232/422/485)

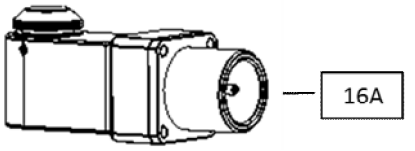
   l (see Appendix 1 for wiring information)

8) Production DB15HD Connector for Tally, Intercom Trigger, 2nd GPI and Serial Communication (RS232/422/485)

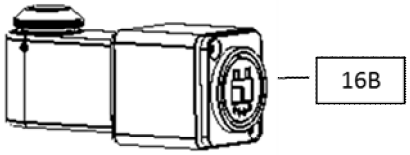
   l (see Appendix 1 for wiring information)

Area E – Fiber Connector

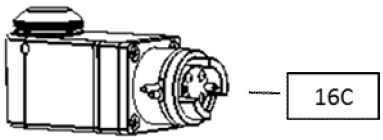
The CopperHead 3400 Camera Unit is shipped with one of the three Fiber Connectors shown below.



16 A) SMPTE 304M (powered)



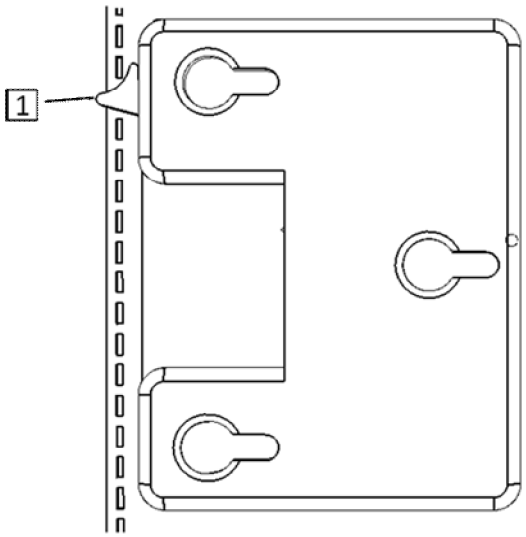
16 B) OpticalCON (powered or unpowered)



16 C) MX Expanded Beam (unpowered)

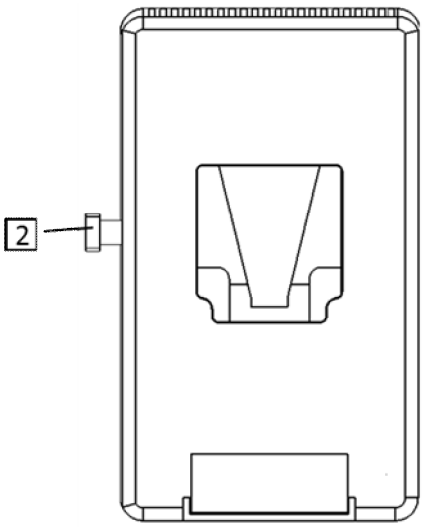
Area F – Battery Mount

The CopperHead 3400 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. Please contact Telecast Fiber Systems or your authorized dealer.



Anton-Bauer Type Battery Mount

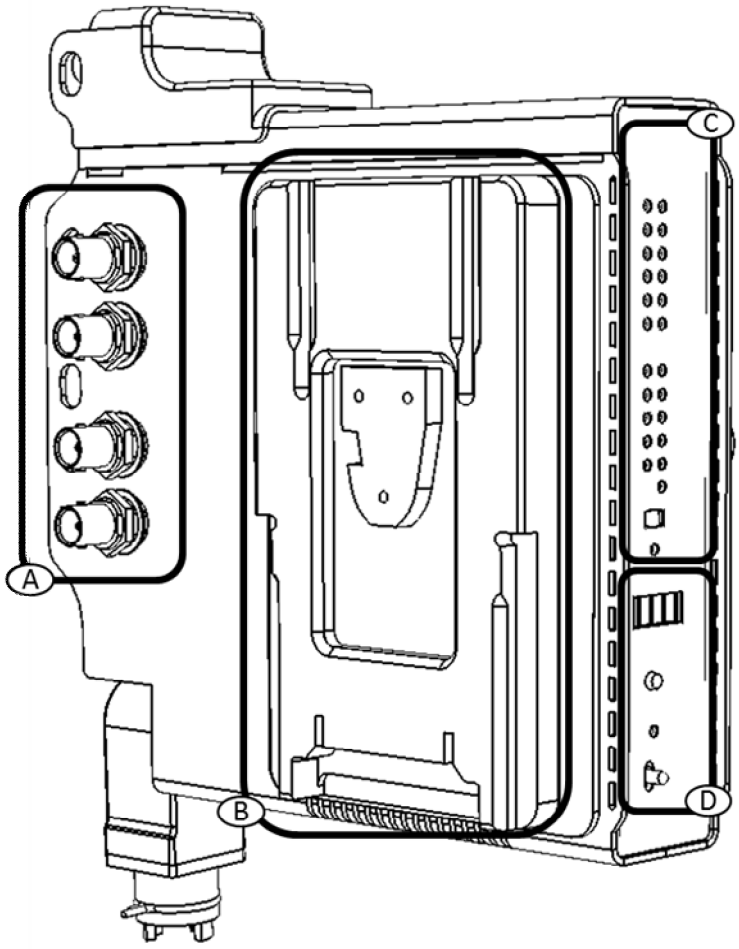
1) Battery release latch



V-type Battery Mount

2) Battery release latch

CopperHead 3400 Camera Unit Front Side



The front side of the Camera Unit has 4 areas of interest:

A) Connector Panel
See Page 24

B) Camera Mounting Plate
See Page 24

C) Signal/Data LED Activity Indicators
See Page 25

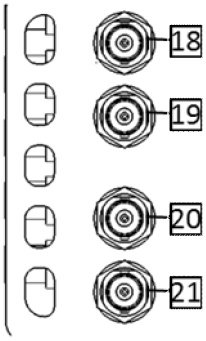
D) Digital Status Display & Power Switch
See Page 26

Figure 10 - CopperHead 3400 Camera Unit Front Side

CopperHead 3400 Camera Unit Back Side – Identifying Controls and Connectors

Area A – Connector Panel

For additional information about the signals carried on these connectors please see Page 15



18) Time Code In (to Base Station)

Used to provide feed of local camera time code or for the provision of a master synchronization time code for all other cameras (typically from Camera 1 and only if not master TC generator at base)

19) Time Code Out (from Base Station)

For time code synchronization of multi-camera productions

20) VBS Out 2 (from Base Station)

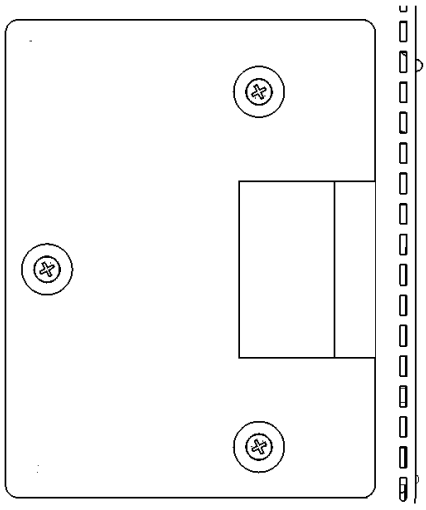
Typically used for Genlock/Black Burst from master synchronizing source

21) VBS Out 3 (from Base Station)

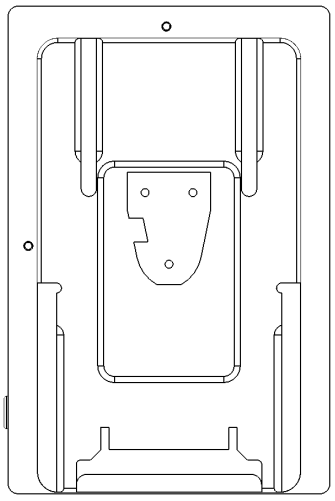
Typically used for Return Video to camera or for Prompter feed

Area B – Camera Mounting Plate

The CopperHead 3400 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. Please contact Telecast Fiber Systems or your authorized dealer.

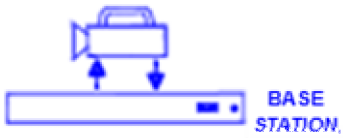


Anton Bauer Camera Mounting Plate



V-Type Camera Mounting Plate

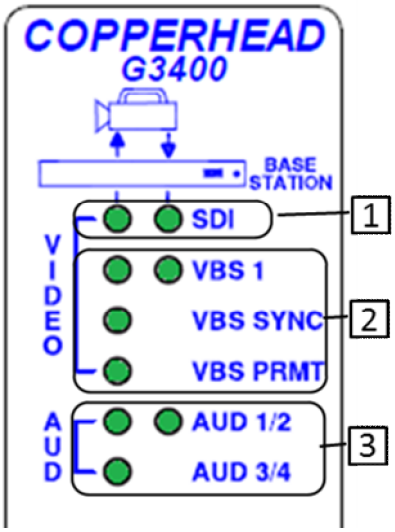
Area C – Signal/Data Indicators



The CopperHead 3400 Camera Unit Indicator Panel has a series of LED displays that monitor the various signal paths between the Camera Unit and the Base Station.

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

The LED indicators on the left side of the panel indicate signal paths from the Base Station to the Camera Unit. Right side LEDs indicate signal paths from the Camera Unit to the Base Station. Note: the 3D-Dual Link Indicators are located on the reverse side of the Camera Unit adjacent to the 3D-Dual Link SDI Connectors.



1) SDI Digital Video Signal

Monitors camera SDI Video to Base Station and SDI return video to the Camera Unit (this is not the 3D-DLink signal)

2) VBS 1-3 – Analog Video Signals 1-3

VBS 1 is used for Camera Monitor video from the Camera Unit to the Base Station and Return Video to the Base Station from the Camera Unit

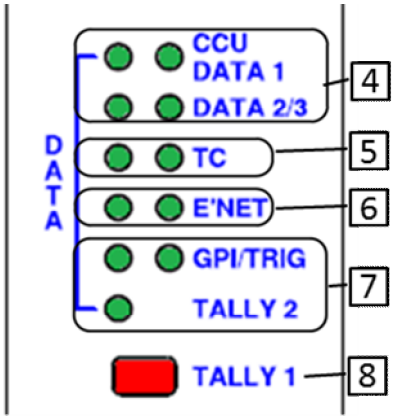
VBS SYNC is used for Genlock (one way from Base Station to Camera)

VBS PRMT (Prompter) is used for Prompter Feed (one way from Base Station to Camera)

3) Program Audio Channels 1/2 & 3/4

Monitors program audio from Camera Unit to Base Station and return audio from Base Station to Camera Unit

For information about configuring the use of Tally in your system please see Appendix 2.



4) Data Signal Path Monitors CCU and Data

CCU – Used for Camera Control Unit

Data 1 is used for a serial control device (RS232, 422, 485)

Data 2 is typically used for auxiliary devices such as Robotic Pan & Tilt Head

Data 3 is used for a serial control device (RS232, 422, 485)

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/Trigger Tally Signals 2

Monitors **GPI/TRIG** Signal to Base Station and return from Camera and **TALLY 2** Signal to Camera Unit

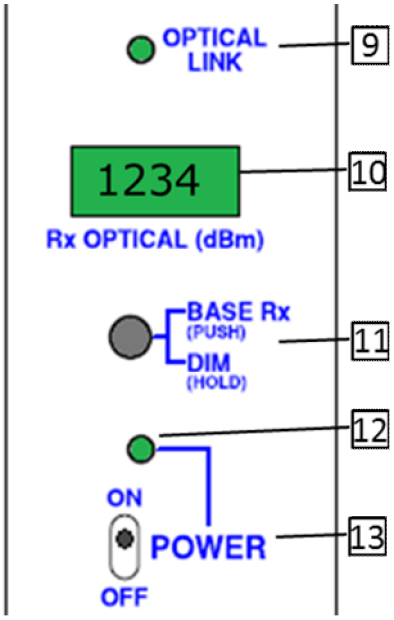
8) Tally 1 Indicator Light

Indicates the status of the GPI/Tally 1 signal

Off when the signal is not present

Bright Red when the signal is present

Area D - Optical Link Signal Strength Indicator & Power Switch



9) Optical Link Indicator

Indicates the status of the optical connection from base to camera and camera to base

Green when both the Base Station and camera control unit have optical power within normal range.

Red when either the Base Station or camera control unit optical power is not within normal range.

10) Rx Optical Display (Digital Status Display)

Four character display in one of five modes. See Page 74 for use of this Digital Status Display

11) Base Rx/Dim Push Button

Change four character display mode. Push and release changes display mode. Push and hold adjusts LED indicator brightness

12) Power Indicator LED

Green indicates power is applied to the camera control unit. **Blinking Green** indicates a camera control unit error. Refer to DIAG display mode for details – Page 74

13) Power On/Off Switch

Toggle switch to enable or disable camera power. When used with the high voltage Base Station this enables or disables camera power. When used with the low voltage Base Station this turns camera power on and off

3.2. CopperHead 3400 Base Station

The CopperHead 3400 Base Station is available with a number of options. The unit is ordered with a specified Power Module, Audio/Intercom Module and Fiber Connector. For an overall view of component location please see the overall diagrams in Appendix 6.

CopperHead 3400 Base Station Front Panel

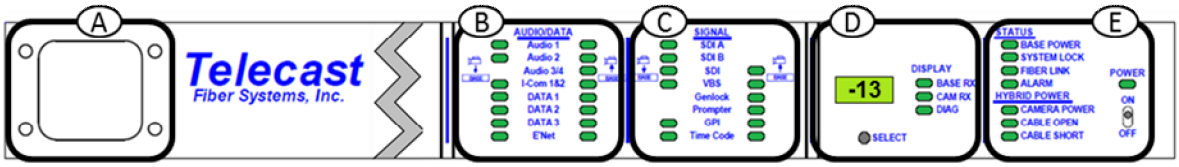


Figure 11 - CopperHead 3400 Base Station Front Panel

A) Optical Connector
See this Page (Front mounted Optional)

B) Audio/Data Indicators
See Page 28

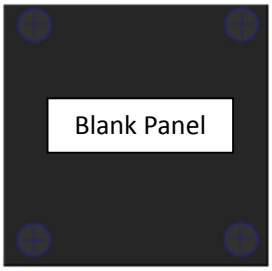
C) Video/Data Indicators
See Page 28

D) Signal Strength Indicators/Setup
See Page 29

E) Status/Power Indicators
See Page 29

CopperHead 3400 Base Station Front Panel – Identifying Controls & Connectors

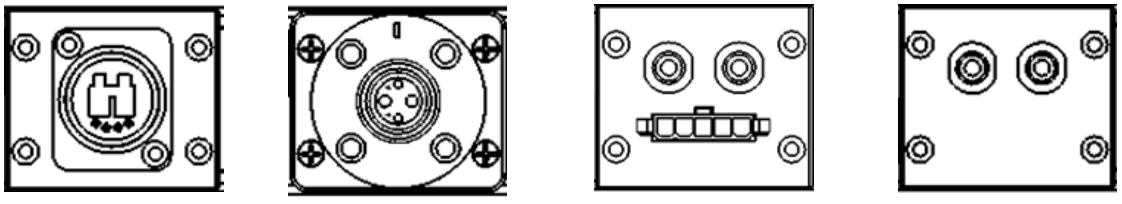
Area A – Front Panel Optical Connector (Optional)



Area A of the CopperHead 3400 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.

For information on how to convert the Base Station from Rear to Front Fiber Connector see Page 43.

Three types of Fiber Connectors are available for use with the CopperHead 3400 Base Station. Typically one of these Fiber Connectors is pre-configured at the time of delivery.

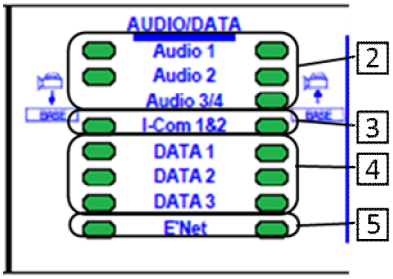


OpticalCON **SMPTE 304M** **Molex and STs** **ST Connectors**

Figure 12 - Fiber Connector Types

Area 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.



2) Program Audio Channels

Monitors Program audio from Camera Unit to Base Station and Return audio from Base Station to Camera Unit. Channels 3/4 are from Base Station to Camera Unit only.

3) I-Comm (Intercom) Channels 1-2

Monitors Intercom audio from Camera Unit to Base Station and from Base Station to Camera Unit

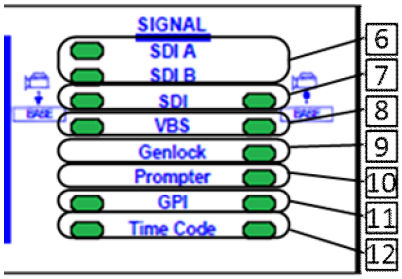
4) DATA 1-3 Signal

Monitors the serial Data signals to and from Base Station to and from the Camera Unit

5) E'Net (Ethernet) Signal

Indicates IP Data traffic to and from Camera Unit to and from Base Station

Area C – Video/Data Indicators



6) SDI A-B Signals

Monitors the 3D/D-Link signals from the Camera Unit

7) SDI Digital Video Signal

Monitors camera SDI video to Base Station and SDI return video to the Camera Unit

8) VBS– Analog Video Signal

Monitors analog Camera video from the Camera Unit to the Base Station and Return video to the Camera Unit from the Base Station

9) Genlock

Monitors Genlock signal (one way from Base Station to Camera)

10) Prompter

Monitors Prompter Feed (one way from Base Station to Camera)

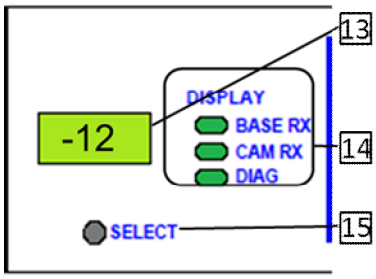
11) GPI

Monitors the GPI signals to and from Base Station and Camera Unit

12) Time Code

Monitors the time code signal generated by the Camera coming to the Base Station and the Base or House time code from the Base Station to the Camera Unit

Area D – Signal Strength Indicators/Setup



13) Signal Strength Readout in dBm

This display changes between display modes when selected

14) 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

15) Select Button

Chooses between three modes of operation

For details on how the setup/Diagnostic functions operate please see Page 70.

Area E – Status/Power Indicators

16) Power Switch & Power Indicator

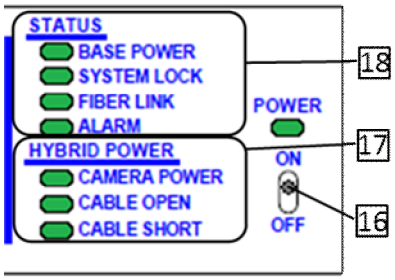
Toggle switch to enable or disable Base Station power.

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

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

17) 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 Pages 49 & 50).



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

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

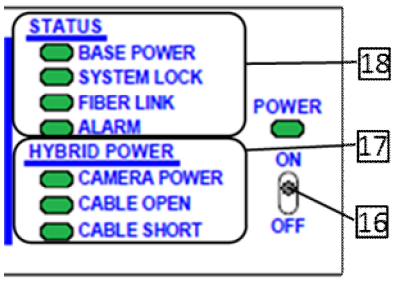
CABLE OPEN - indicates that the high voltage cable is open or there is no high voltage cable connected.

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 open.

High 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.



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

18) Status Indicators

BASE POWER - indicates the status of all power levels in the Base Station

Green when all power levels are normal.

Red when any power level is not normal.

SYSTEM LOCK - indicates that the Base Station is communicating with the Camera Unit.

Green when communicating with Camera Unit

Red when it is not communicating with the Camera Unit

FIBER LINK - indicates the optical power status of the Base Station and camera

Green when both the Base Station and camera optical power are within a normal range.

Red when both the Base Station and camera optical power are not within a normal range

Orange when either the Base Station or camera optical power are not within a normal range

ALARM - indicates that some error condition exists in either the Base Station or the camera.

Red if there is a Base Station error. Refer to the Base Station DIAG for details on the error.

Orange if there is a camera error. Refer to CAM DIAG for details for the error.

CopperHead 3400 Base Station Back Panel

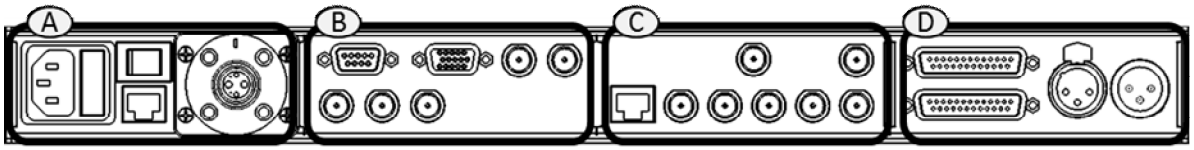


Figure 13 - CopperHead 3400 Base Station Back Panel

A) Power & Fiber Connectors
See this Page & Page 32

B) Sync/Data/Control Connectors
See Page 33

C) Video/Ethernet Connectors
See Page 33

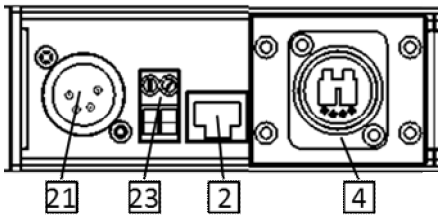
D) Audio/Intercom Connectors
See Page 33

CopperHead 3400 Base Station Front Panel – Identifying Controls & Connectors

Area A – Power & Fiber Connectors (Power Module)

The CopperHead 3400 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 Chapter 5. Multi-pin connector wiring suggestions are covered in Appendix 1.1.

External Power Options



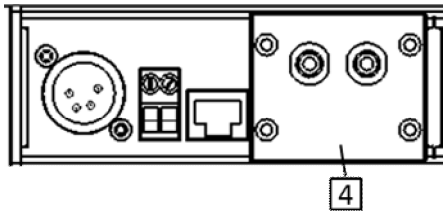
<u>External Power with OpticalCON Connector</u>

21) 12V DC External Power Supply input connector (XLR 4 Pin)

23) 12V DC Input – terminal block
See Appendix 1 – Page 83 for connection details

2) For Future Use

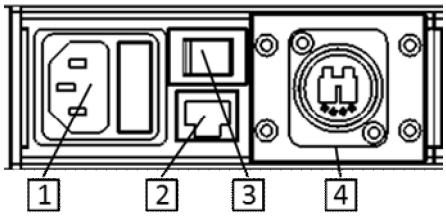
4) OpticalCON Connector



<u>External Power with STs Connector</u>

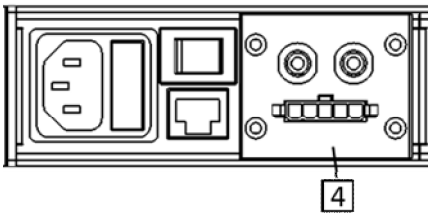
4) ST Fiber Connectors

Internal Power Options



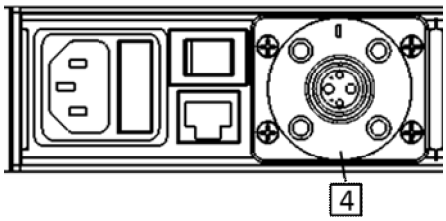
Internal Power with OpticalCON Connector

1) AC Power Receptacle and 4AMP Dual Fuse Assembly
   100-240V 50/60 Hz See Page 8 for the Fuse Specification
2) For Future Use
3) AC Mains Switch
4) OpticalCON Connector



Internal Power with STs and Molex Connectors

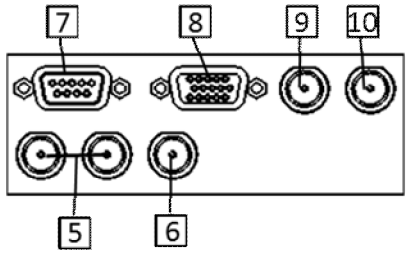
4) STs Connector with Molex for Camera power



Internal Power with SMPTE 304M Connector

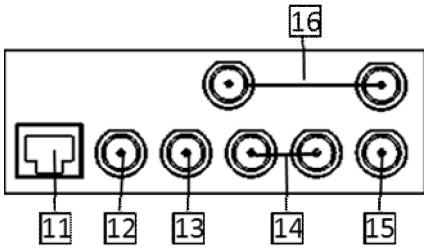
4) SMPTE 304M Connector

Area B – Sync/Data/Control Connectors



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

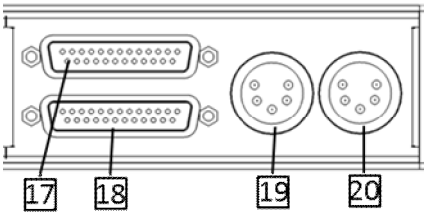
Area C – Video/Ethernet Connectors



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
16) SDI 3D or Dual-Link from camera outputs A-B

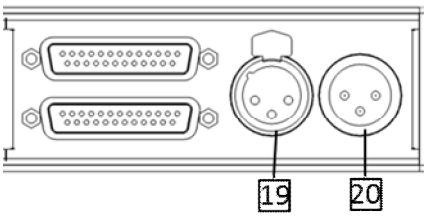
Area D – Audio/Intercom Connectors

The CopperHead 3400 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 Chapter 6 – Page 67. Multi-pin connector wiring is covered in Appendix 1



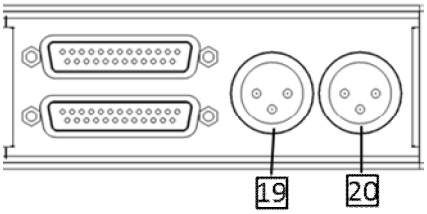
<u>Four Wire Intercom Module</u>

16) Audio In Multi-pin connector
17) Audio Out Multi-pin connector
18) Ch-1 Intercom connector
19) Ch-2 Intercom connector



<u>RTS TW Intercom Module</u>

19) Intercom Input
20) Intercom Loop Through



<u>Clear-Com Intercom Module</u>

19) Ch-A Intercom Connector
20) Ch-B intercom Connector

3.3. Additional Copperhead 3400 Transceiver System Items

Your Copperhead 3400 Transceiver System may consist of one or more of the following items.

1. Portable fiber reel with fiber per your purchase order
2. Optional Universal Camera Control Unit (please refer to the User's guide supplied with this product)
3. Optional "Power Wafer" Camera Adaptor
4. Optional MPS External Power Wafer Power Supply
5. Optional "PowerPlus" Camera Adaptor and Power Adaptor (please refer to the User's guide supplied with this product)
6. Optional HDX Power Unit (please refer to the User's guide supplied with this product)

"Power Wafer" Camera Adaptor

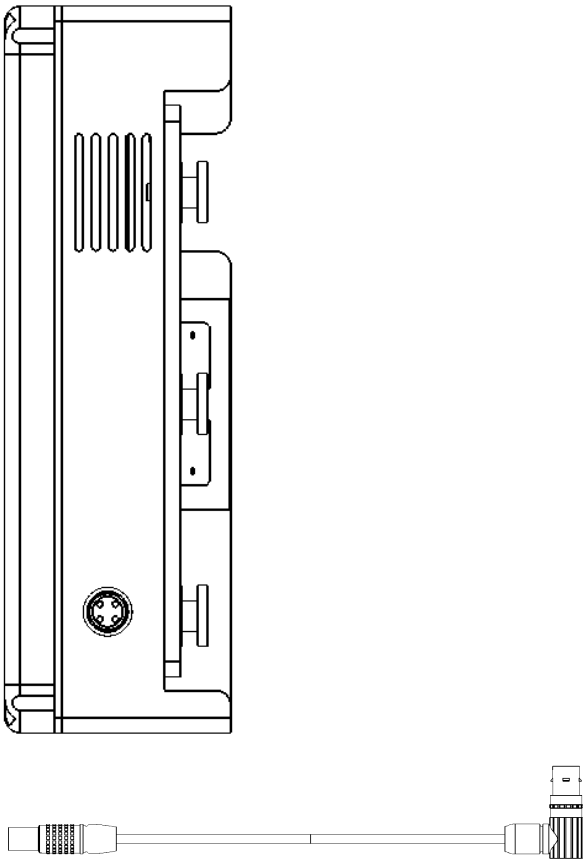
The CopperHead 3400 Camera Unit can be powered by the optional "Power Wafer" Camera Adaptor. The Power Wafer replaces the local camera battery and any local AC power supply adaptor. The Power Wafer gets its power from the use Hybrid fiber cable and the CopperHead 3400 Base Station equipped with the internal power supply or from the MPS external supply.

Up to 95 watts of power can be delivered to the camera, Camera Unit and camera powered accessories. Up to 780 feet (240 meters) of cable can be used when the Camera Unit is powered directly from the Base Station.

The use of an external power supply can extend Base Station to Camera range and increase camera power flexibility. The MPS "Throw Down" device or Wafer Power Adaptor provides this functionality. This unit is described on Page 36.

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

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



MPS External Power Wafer Power Supply

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

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

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

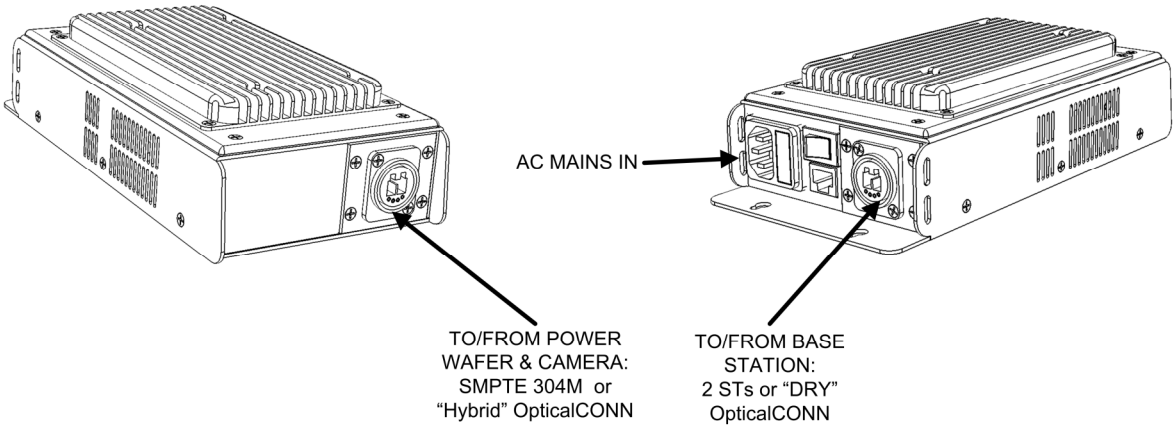


Figure 14 - MPS External Power Wafer Power Supply

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)

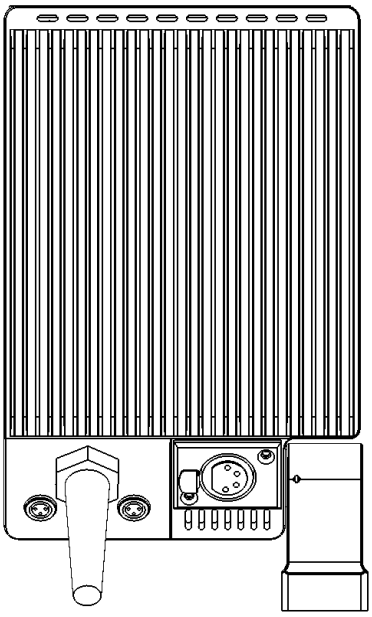
Table 3 - MPS Power Supply Adaptor Options

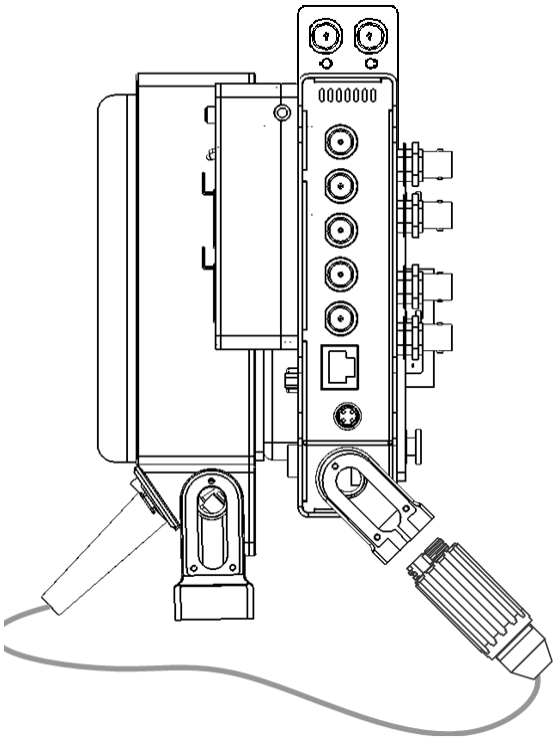
"PowerPlus" Camera Adaptor

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 2 ST connectors. See the configuration table below.

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





The PowerPlus unit is provided with a permanent connection to the fiber connector on the CopperHead 3400 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

Table 4 - PowerPlus Connection Options

HDX Power Unit

The HDX Power Supply Unit is required when using the PowerPlus Camera Adaptor. The HDX-2ST can be used as a free-standing unit or rack mounted. The HDX-FR-2 for two HDX units is shown below.
The unit allows PowerPlus to provide a continuous 100 Watts of 12VDC with peak output of 150 Watts of 12VDC.

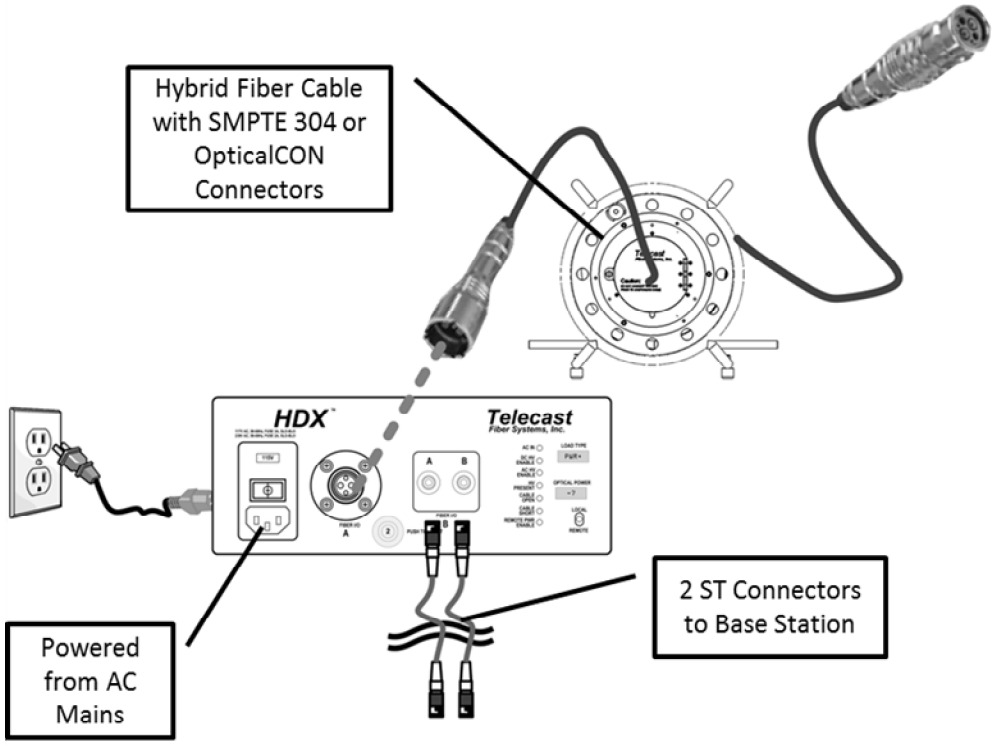


Figure 15 - HDX Power Supply Configuration

HDX-FR-2 – Two Unit HDX Rack Mount

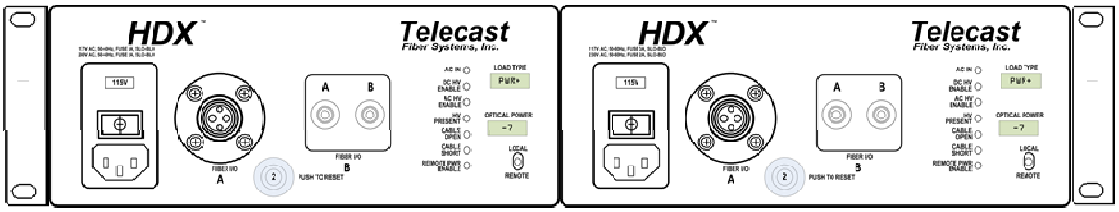


Figure 16 - Two Unit HDX Rack Mount

Chapter 4.– Physical Installation of the Copperhead 3400 Transceiver System

This chapter describes the physical installation of the Copperhead 3400 Transceiver System. The following areas are covered:

1) Mounting of the Copperhead 3400 Camera Unit to the camera
2) Mounting of the optional Power Wafer Unit to the Copperhead 3400 Camera Unit
3) Mounting of the optional PowerPlus Unit to the Copperhead 3400 Camera Unit
4) Relocation of the Copperhead 3400 Base Station Fiber connector from the back panel to the front panel

4.1. Mounting the Copperhead 3400 Camera Unit to the Camera

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

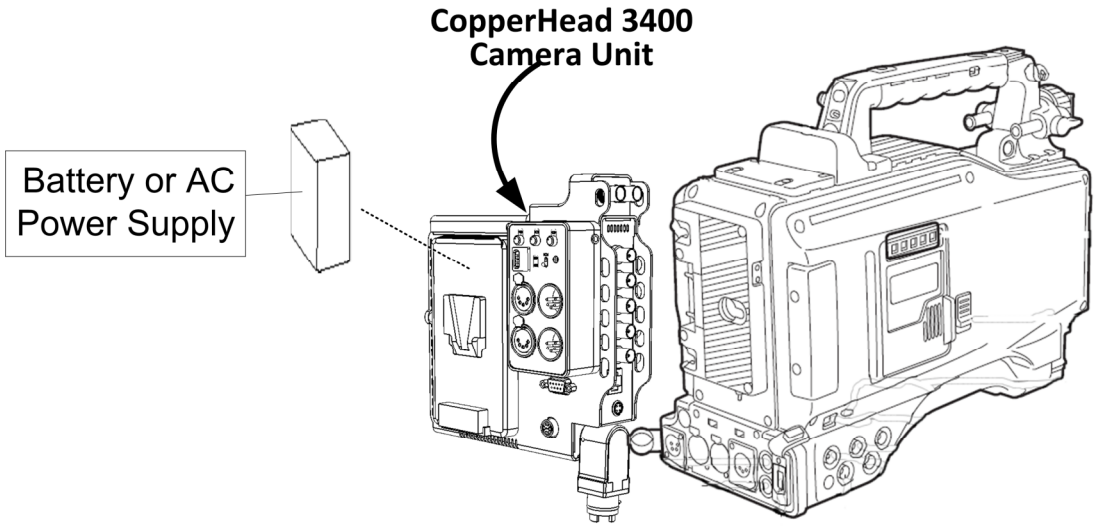


Figure 17 - Mounting the Copperhead 3400 Camera Unit to the Camera

1) Position your camera so that you can easily access the battery mounting plate at the rear of the camera. Insure that the camera is well supported and stable. If a battery is mounted remove it and put it to one side (camera model shown for illustrative purposes only – your camera may differ)

2) Attach the CopperHead 3400 Camera Unit 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 3400 Camera Unit can be found on Page 57.

3) If you are powering the camera and 3400 Camera Unit by battery, mount the battery to the CopperHead 3400 Camera Unit battery mounting plate exactly as you would mount the battery to your camera.

   For configuration please see Chapter 5.

4.2. Mounting the Power Wafer Unit to the Copperhead 3400 Camera Unit

This example illustrates the use of a camera with a V-Mount battery system. Your system may differ. This case illustrates a configuration where the camera is powered through the Power Wafer option. The Power Wafer is powered through a Hybrid fiber cable which is powered from the CopperHead 3400 Base Station or MPS External Power Supply.

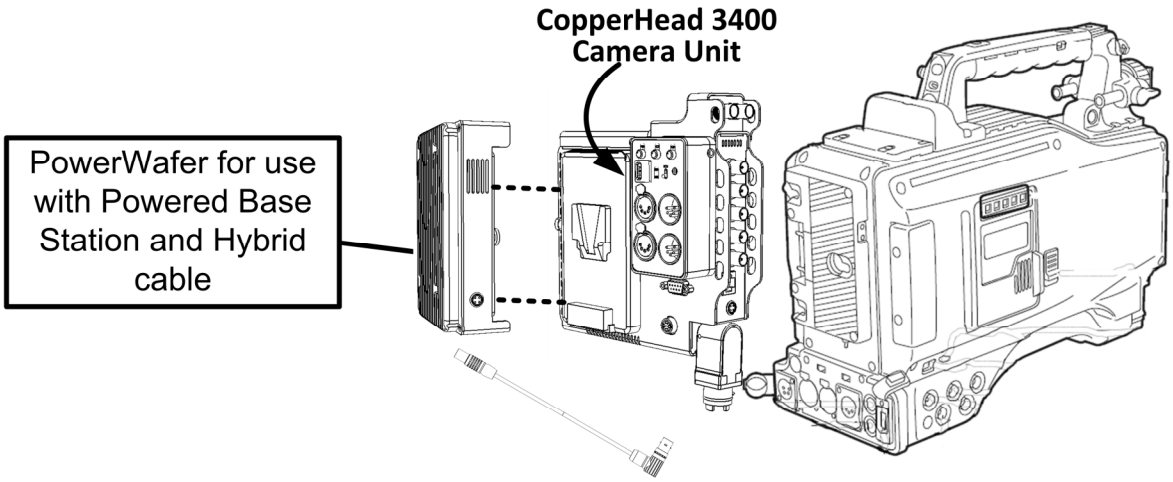
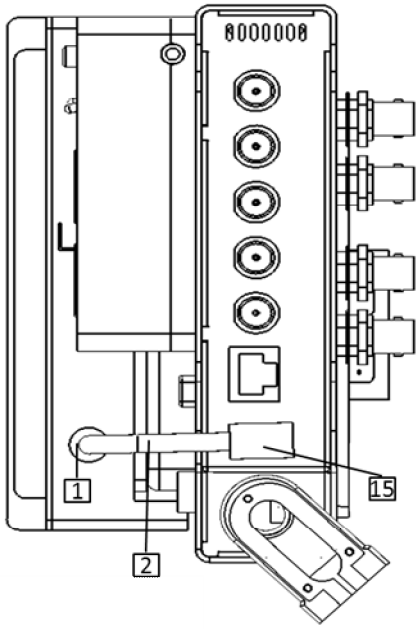


Figure 18 - Mounting the Power Wafer Unit to the Copperhead 3400 Camera Unit

1) The CopperHead 3400 Camera Unit is mounted to the camera as described above on the previous page.
2) The Power Wafer is attached to the CopperHead 3400 Camera Unit in place of the battery. It is attached in the same manner as the camera battery.



3) When the Power Wafer is securely mounted to the CopperHead 3400 Camera Unit you must connect the supplied Power Wafer connector cable (2) between the Power Wafer (1) and the Power Wafer connector on the Camera Unit (15)

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

For configuration please see Chapter 5.

4.3. Mounting the PowerPlus Unit to the Copperhead 3400 Camera Unit

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

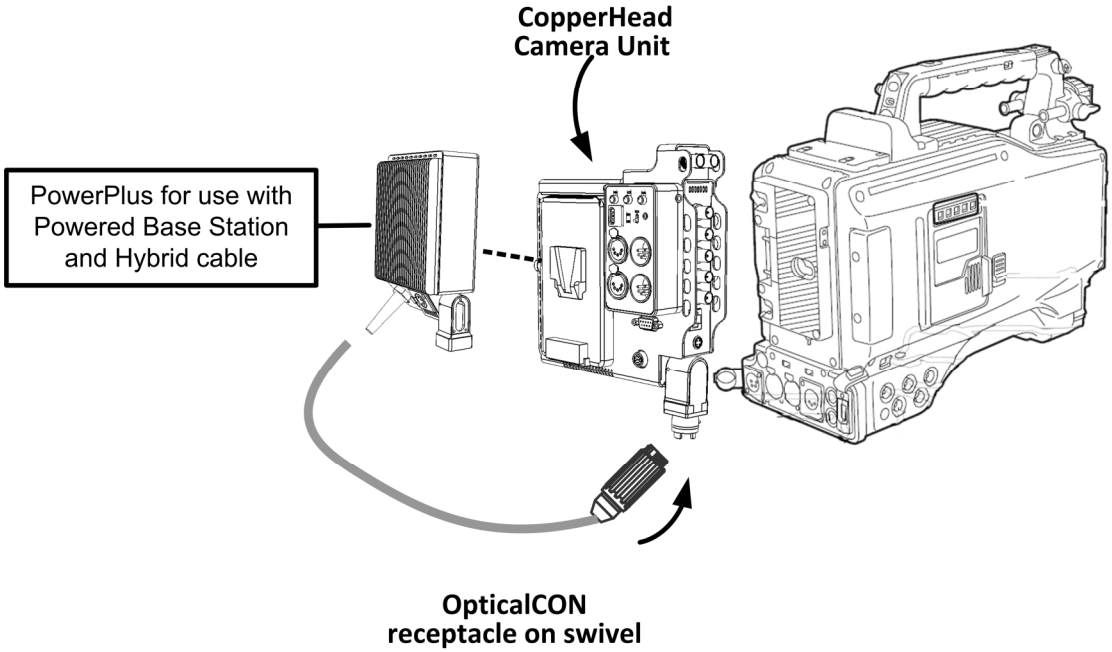
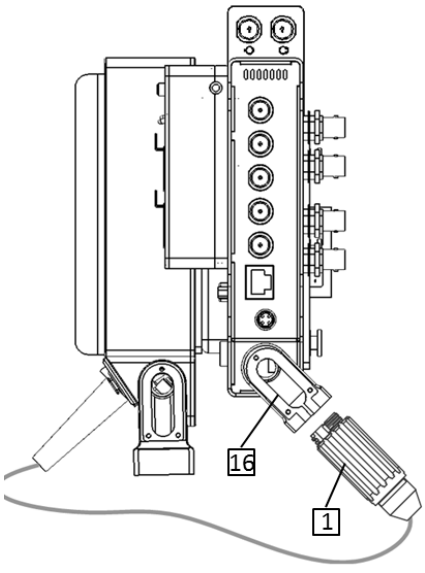


Figure 19 - Mounting the PowerPlus Unit to the Copperhead 3400 Camera Unit

1) The CopperHead 3400 Camera Unit is mounted to the camera as described above on Page 41.
2) The PowerPlus Unit is attached to the CopperHead 3400 Camera Unit in place of the battery. It is attached in the same manner as the camera battery.



3) When the PowerPlus Unit is securely mounted to the CopperHead 3400 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 please see Chapter 5.

4.4. Relocation of the Copperhead 3400 Base Station Fiber connector

The CopperHead 3400 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.

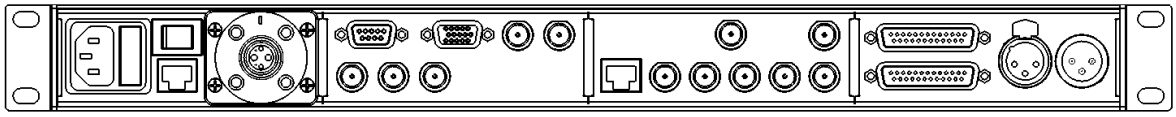


Figure 20 - CopperHead 3400 Base Station with Rear Mounted Fiber Connector

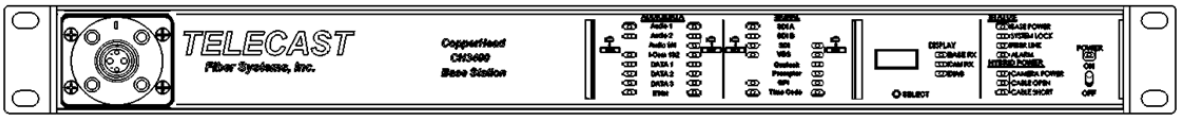


Figure 21 - CopperHead 3400 Base Station with Front Mounted Fiber Connector

The Fiber Connector relocation process can be accomplished by a qualified Telecast Fiber technician in about 15 minutes or less. You should give yourself an hour with the expectation that it will take less time.

For a complete illustrated step-by-step procedure please go to http://www.telecast-fiber.com/support and click on the CopperHead 3400 Technical Notes link or Telecast Fiber System support directly.

Page Intentionally Left Blank

Chapter 5. Connection of the Copperhead 3400 Transceiver System

Prior to connecting your Copperhead 3400 Transceiver System please insure 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. Please see the Appendix for information regarding cables, signals and custom multi-pin cable fabrication. Covered in this chapter are:

1) Connections between the Copperhead 3400 Base Station and the Camera Unit (Fiber Cable)

2) Connections between the Copperhead 3400 Base Station and the base video infrastructure & power components

3) Connections between the Copperhead 3400 Camera Unit and the video camera & power components

4) Connections between the Copperhead 3400 Camera Unit and the external field equipment used at the camera location

5.1. Section - Connections between the Copperhead 3400 Base Station and the Camera Unit

The following table summarizes the various Fiber Cable connection options between the Copperhead 3400 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)
MPTE 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

Table 5 - CopperHead 3400 Power Options

1. The external Wafer Power Supply must be equipped with the required Fiber Cable connectors depending on your system requirements. Please see Pages 46-50 for a description of the various options

2. The external HDX Power Supply provides two ST Fiber Connectors for connection between the HDX and the Base Station and a SMPTE 304M Connector for connection between the HDX and the Camera Unit.

The following fiber connection scenarios do not take into account any customized cable and connector installations you may have at your facility. For assistance regarding more complex connection situations please contact Telecast Fiber Systems or your local authorized dealer.

Tactical Fiber between the Base Station and Camera Unit

Camera Internally Powered

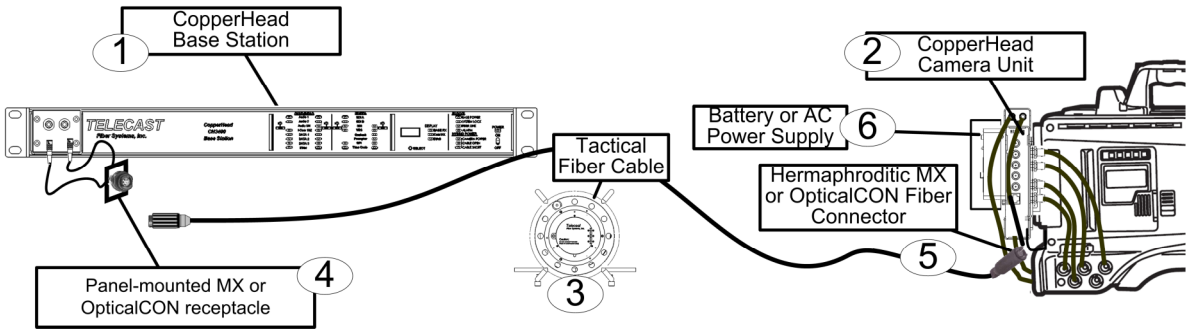


Figure 22 - Tactical Fiber between the Base Station and Camera Unit

Between the Base Station **(1)** the Camera Unit **(2)** connect a length of Tactical Fiber Cable **(3).**

At each end of the fiber cable will be either an OpticalCON or MX Fiber Connector **(4)** and **(5).**

The Base Station connector **(4)** may be mounted either on the front or back of the Base Station.

The camera must be powered by local power, either a Battery or a local AC Power Supply **(6).**

Note: your configuration may have the OpticalCON or MX Fiber Connector directly mounted on the Base Station Chassis.

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

Camera Powered through Hybrid Cable from Base Station

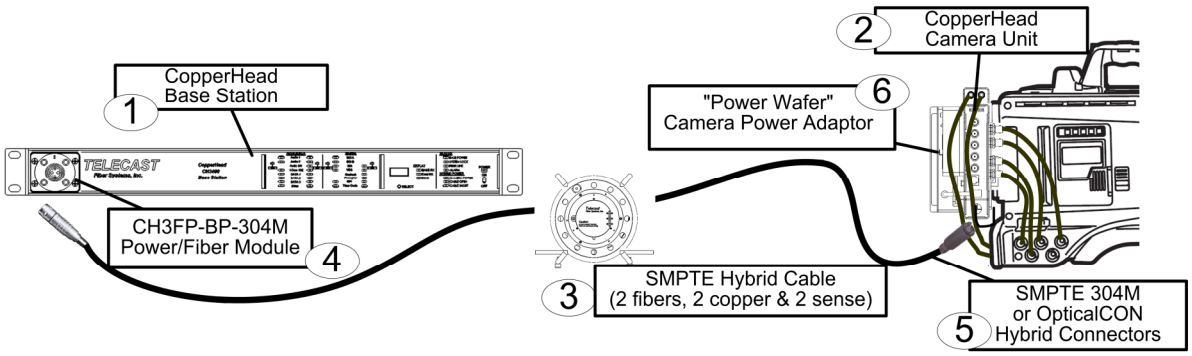


Figure 23 - SMPTE Hybrid Fiber between the Base Station (powered) and Camera Unit

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

At each end of the fiber cable will be either an OpticalCON or SMPTE 304M Connector **(4)** and **(5).**

The Base Station connector **(4)** may be mounted either on the front or back of the Base Station.

The camera will be powered by the CopperHead Power Wafer Camera Power Supply **(6).**

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

Infrastructure Wiring Built-In to a Facility using OpticalCON Connectors

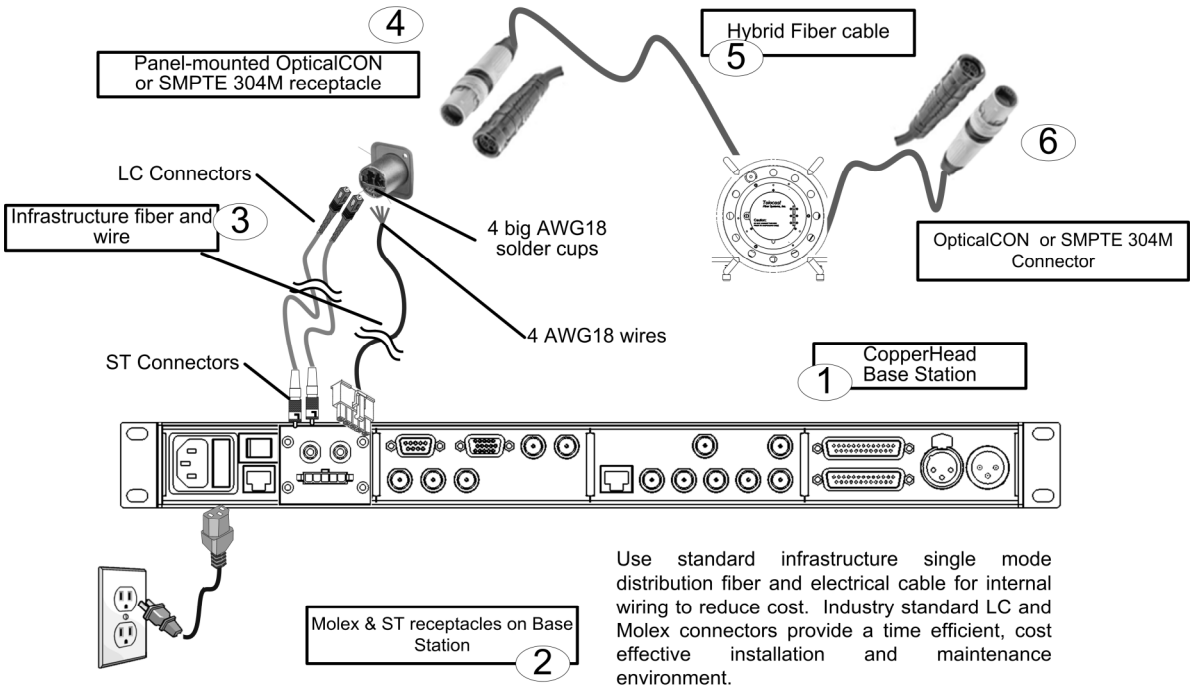


Figure 24 - SMPTE Hybrid Fiber between Base Station and Camera Unit (Infrastructure Wiring)

Panel mounted fiber connectors can be used for permanent installations such as communications closets, truck connector panels and sports facilities. A panel mounted OpticalCON or SMPTE 304M receptacle **(4)** is connected to the Base Station **(1)** through infrastructure grade wiring. Two LC Fiber Optic connectors and four soldered AWG18 copper power wires **(3)** connect to the Base Station through a Molex and ST receptacle **(2).**

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

SMPTE Hybrid Fiber between the MPS Power Unit and Camera Unit

ST Fiber Connectors between Base Station and External Power Unit

Camera powered by Power Wafer

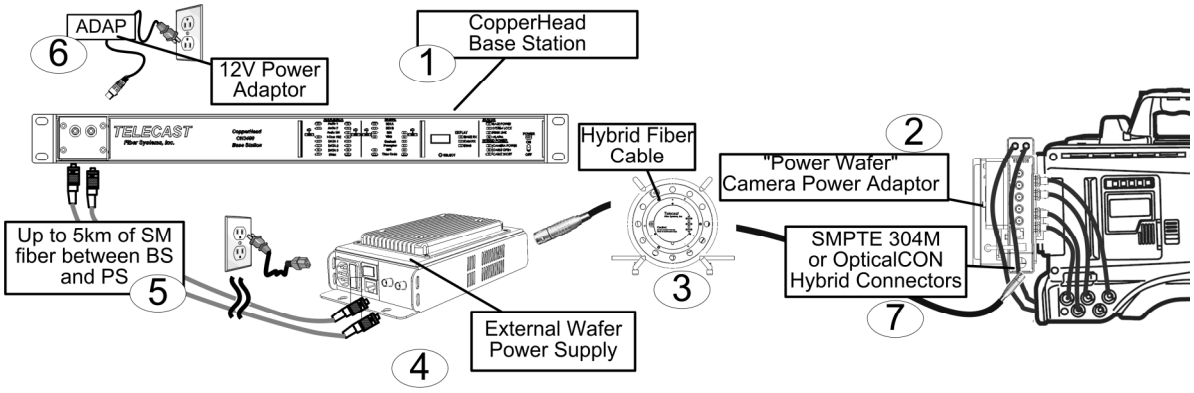


Figure 25 - SMPTE Hybrid Fiber between the MPS Power Unit and Camera Unit

Between the Base Station **(1)** and the External Wafer Power Supply **(4)** connect a pair of ST Fiber Cables **(5).**

Power the External Wafer Power Supply locally by connecting to AC Power. Between the External Wafer Power Supply **(4)** and the Camera Unit connect a length of SMPTE Hybrid Fiber Cable **(3).** At each end of the fiber cable will be either an OpticalCON or SMPTE 304M Connector (**7).**

The Base Station connector **(1)** may be mounted either on the front or back of the Base Station. The camera will be powered by the CopperHead Power Wafer Camera Power Supply **(2).**

The Base Station will be powered by connection to local AC power **(6).**

SMPTE Hybrid Fiber between the HDX Power Unit and Camera Unit -
ST Fiber Connectors between Base Station and HDX Power Unit
Camera powered by Copperhead PowerPlus

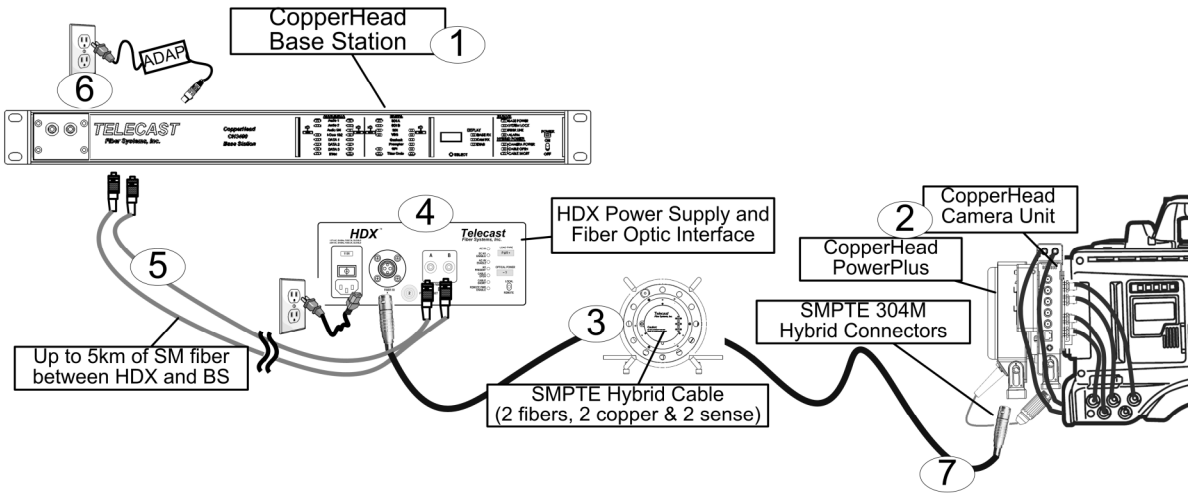


Figure 26 - SMPTE Hybrid Fiber between the HDX Power Unit and Camera Unit

Between the Base Station **(1)** and the HDX Power Supply **(4)** connect a pair of ST Fiber Cables **(5).**

Power the External Wafer Power Supply locally by connecting to AC Power. Between the External Wafer Power Supply **(4)** and the Camera Unit connect a length of SMPTE Hybrid Fiber Cable **(3).** At each end of the fiber cable must SMPTE 304M Connector **(7)**.

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

The Base Station will be powered by connection to local AC power **(6).**

5.2. Connections to the Copperhead 3400 Base Station

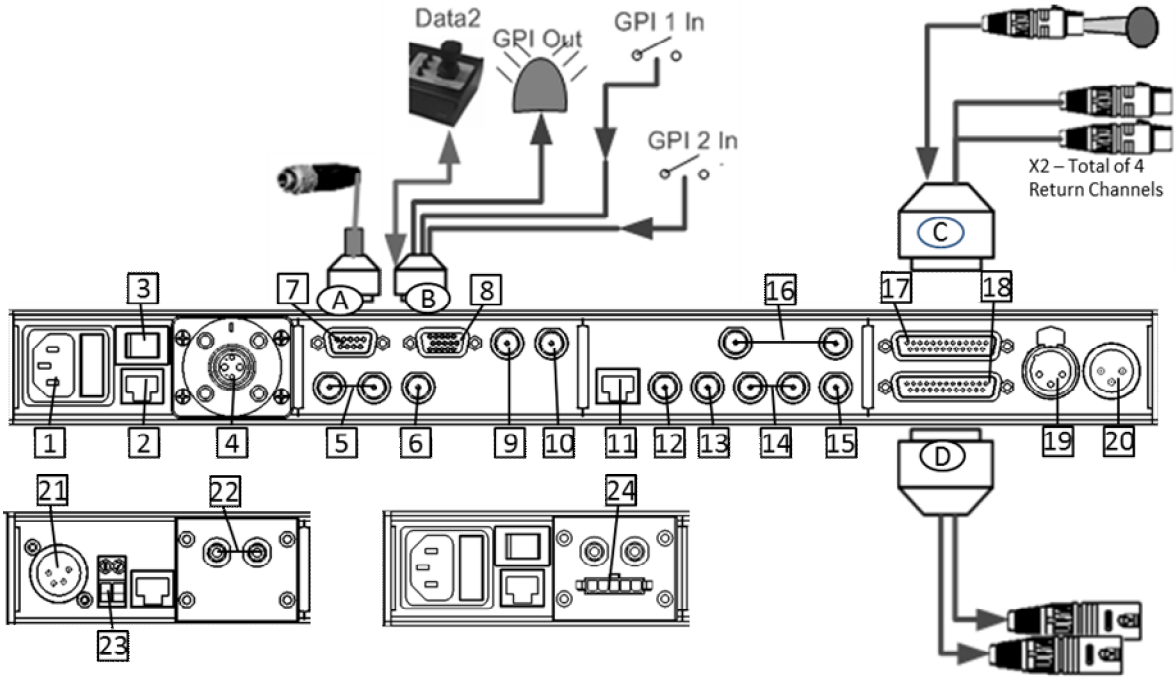


Figure 27 - CopperHead 3400 Base Unit Connections

Multi-Pin Cable Assemblies Used with the Copperhead 3400 Base Station

A) Camera Remote Control (Remote) Connector–

Connect either your camera manufacturers Camera Remote Control or the Telecast Fiber Universal Controller – CHRCP-2050A or CHRCP-2050-LCD.

See Appendix 3 for a list of Telecast Fiber 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 Page 92 for wiring details

C) Audio In Connector

Connect Intercom Program Audio and four Production Audio Channel outputs

See 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 Page 94 for wiring details

Connectors into and out of the Copperhead 3400 Base Station

This information duplicates some of that from above sections. It is presented here to provide a single list of all Base Station connections. Key numbers refer to the diagram above and to the Overview Diagram found in Appendix 6.

1 & 21 **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 Page 43)
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. See Page 27

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 **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.

8 **Multi-Pin Connector B**
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.

See Appendix 2 for an example configuration.

9 **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

10 **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.

11 **Ethernet Connector – 10Bt/100Bt capable**
Designed to carry IP traffic data between the Base Station and the Camera Unit. A laptop PC or other device such as a Wireless Access Point can be connected to the Production Environment IP network.

12 **VBS Out**
BNC Connector -Typically used for SD Monitoring Video return from the Camera

Connectors into and out of the Copperhead 3400 Base Station

13 **VBS In**
BNC Connector – Typically used to send SD return video to the camera – an example is monitor out from the Production Switcher

14 **SDI Out 1 & 2 (this carries the HD feed (not the 3D/Dual Link) from the camera)**
BNC Connectors – Two identical video feeds from the camera – typically one may be used for local HD monitoring and one is fed to the Production Switcher environment.

15 **SDI In**
BNC Connector – Typically used to send HD return video to the camera – an example is program out from the Production Switcher

16 **SDI Out A & B (this carries the dual 3D/Dual Link signals from the camera)**
BNC Connectors

17 **Audio In- Multi-Pin Connector**
DB25 – 25 pin Connector follows the Tascam TDIF standard. The CopperHead 3400 Transceiver System accommodates up to two Audio Channels at Line Level. This connector handles return audio to the Camera location as well as intercom Program Audio. Please see Page 93 for sample wiring.

18 **Audio Out- Multi-Pin Connector**
DB25 – 25 pin Connector follows the Tascam TDIF standard. The CopperHead 3400 Transceiver System accommodates up to two Audio Channels at Line Level. This connector handles Program audio from the Camera location. Please see Page 94 for sample wiring.

19 & 20 **Intercom Connectors #1 & #2**
XLR 3 pin or 5 pin Connector depending on configuration. One of three options will be installed (4-wire intercom, RTS or Clear-Com). Please see Chapter 6 – Section 6.4 for information on using each of the Intercom Options

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 **12V Terminal Block**
Terminal Block – bare wire connector. This can be used in place of the ADAP power connection in installations that have 12V power distributed as part of their infrastructure. Do not use this at the same time as the ADAP power connection.

24 **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.

5.3. Connections to the Copperhead 3400 Camera Unit

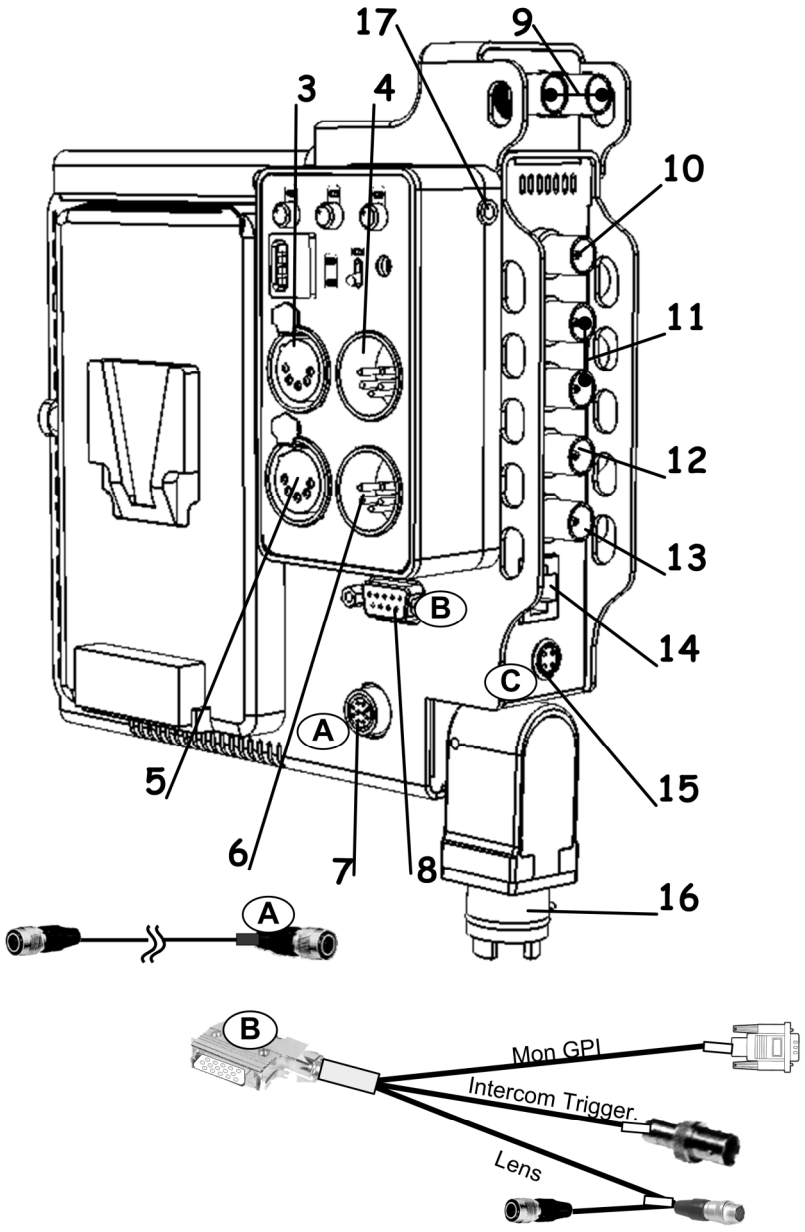


Figure 28 - CopperHead 3400 Camera Unit Back Side Connections

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 the diagram above and to the Overview Diagram found in Appendix 6.

Multi-Pin Cable Assemblies Used with the Copperhead 3400 Camera Unit

A) Camera Remote Control (Remote) Connector
Connect this to the CCU input on your camera. The Telecast Fiber System supplied cable has a red sleeve at the end to be connected to the CopperHead 3400 Camera Unit
See Appendix 3 for a list of Telecast Fiber supplied cables

B) Data/GPI /Tally Connector
This connector carries a number of control, GPI and Tally signals
See Page 92 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 3400 Camera Unit Back Side

Intercom Headset Out

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

Audio 1 & 2 Out

4 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.

Audio 1 & 2 In

5 XLR 5 Pin Female Connector – Line level audio input. Typically fed by short audio jumper cables from the Camera Audio 1 & 2 outputs (can also take local audio device feeds from camera position)

Audio 3 & 4 Out

6 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.

Camera Remote Connector

7 Multi-Pin Connector A– 10 Pin Hirose Connector. This is normally a Telecast Fiber Systems supplied cable. It connects the Camera Unit to the Camera CCU in to allow operation of the Camera Remote Control Panel. Please see Appendix 3 - Page 91 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.

Data Connector

8 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. Telecast Fiber supplies a number of pre-configured break out cables for use with this connector. Please see Appendix 3 - Page 90.

3D/Dual Link Inputs

9 BNC Connectors – Carries 3D/Dual Link camera video from the Camera(s) to the Camera Unit. This requires BNC jumper cables between the Camera Unit and the Camera (s).

HD-SD/SDI Input

10 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.

Connectors into and out of the Copperhead 3400 Camera Unit Back Side

11 **HD-SD/SDI Outputs #1 & #2**
BNC Connector – Carries return video from the Base Station to the Camera Unit. Typically this will feed a camera viewfinder or an HD viewing monitor at the camera location.

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

13 **VBS Out**
BNC Connector – Carries SD Analog video from the Base Station the Camera Unit. Typically this will feed an analog viewing monitor at the camera location.

14 **Ethernet Out**
RJ45 Connector – Carries IP Data. Typically connects to a Laptop computer or perhaps a wireless access point at the camera location. Any IP traffic controlled equipment can be handled through this signal path.

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

16 **Fiber Connector**
Swivel Mounted Fiber Optic Cable receptacle – specific connector depends on your configuration.

17 **Intercom Headset Connector**
Mini-phone Jack – Provides listen only Intercom audio.

Connectors into and out of the Copperhead 3400 Camera Unit Back Side

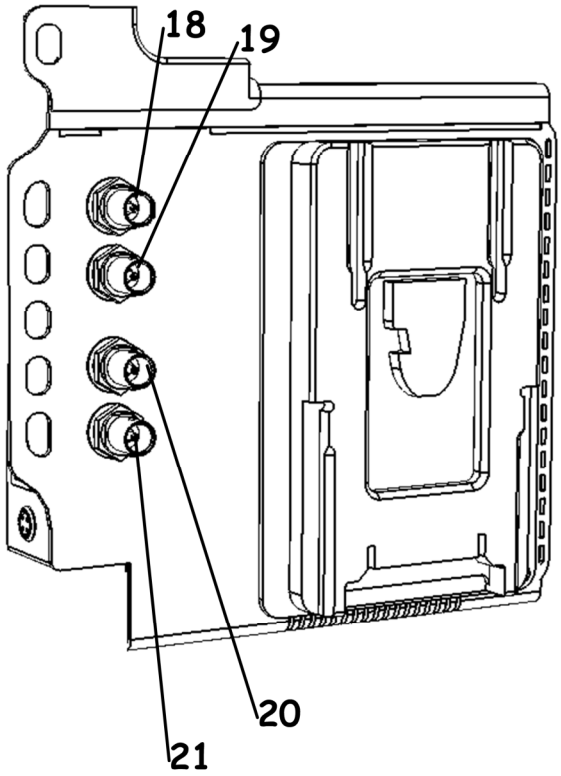


Figure 29- CopperHead 3400 Camera Unit Front Side Connections

Connectors into and out of the Copperhead 3400 Camera Unit Front Side

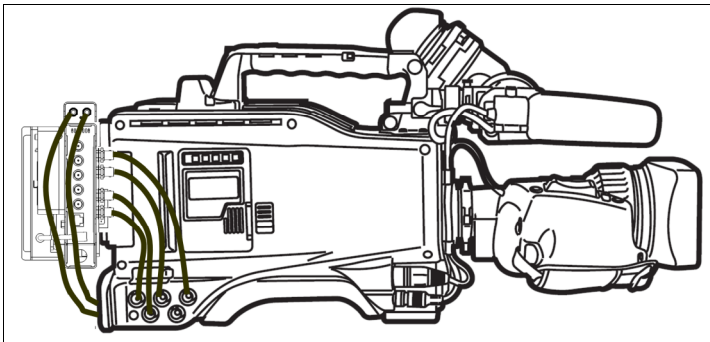
18 **Time Code In**
BNC Connector – Carries Time Code signal from the Camera *to* the Camera Unit. This is return time code to the Base Station. This requires a short BNC jumper cable between the Camera Unit and the Camera. Check to confirm the connector type for your camera time code output

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

20 **VBS Out 2 (Genlock)**
BNC Connector – Carries Genlock/Sync from the Camera Unit to the Camera. This requires a short BNC jumper cable between the Camera Unit and the Camera.

21 **VBS Out 3 (Prompter)**
BNC Connector – Carries a Prompter Feed or additional Base Station return Video from the Camera Unit to the Camera. This requires a BNC cable between the Camera Unit and any external equipment.

5.4. Camera Unit Connection Example



Camera shown for illustrative purposes only

Your CopperHead 3400 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 section for an overview of Camera Unit to Camera & Peripheral Equipment connections.

Camera Unit (Camera Facing Side) to Camera Connections

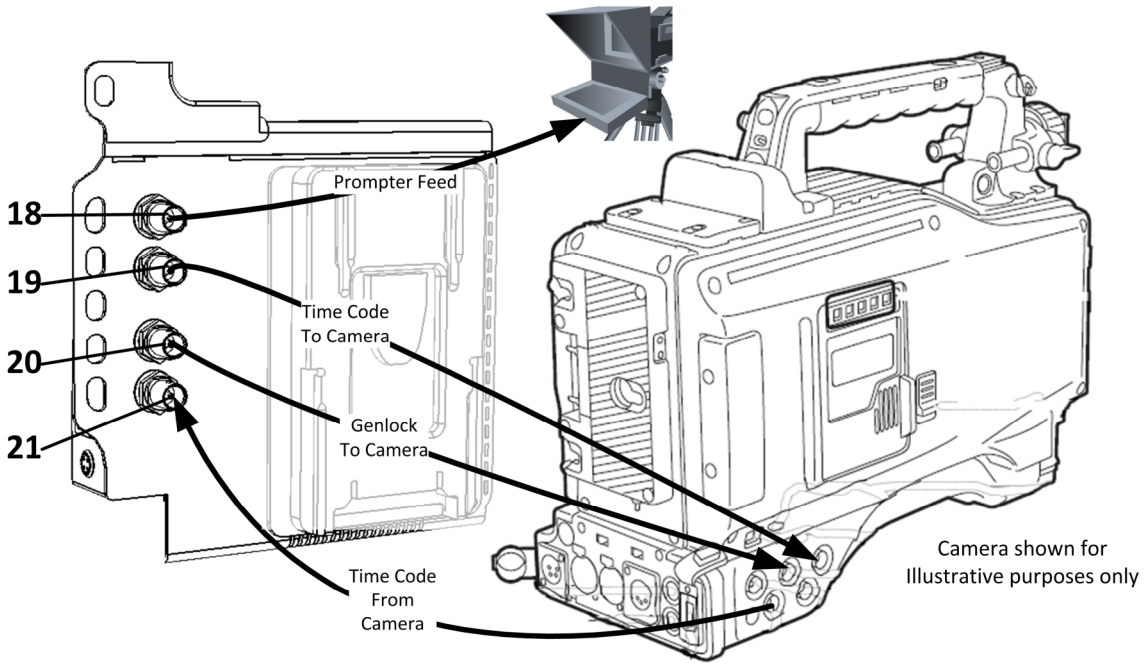


Figure 30 - Camera Unit (Camera Facing Side) to Camera Connections

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

Camera Unit Video Connections

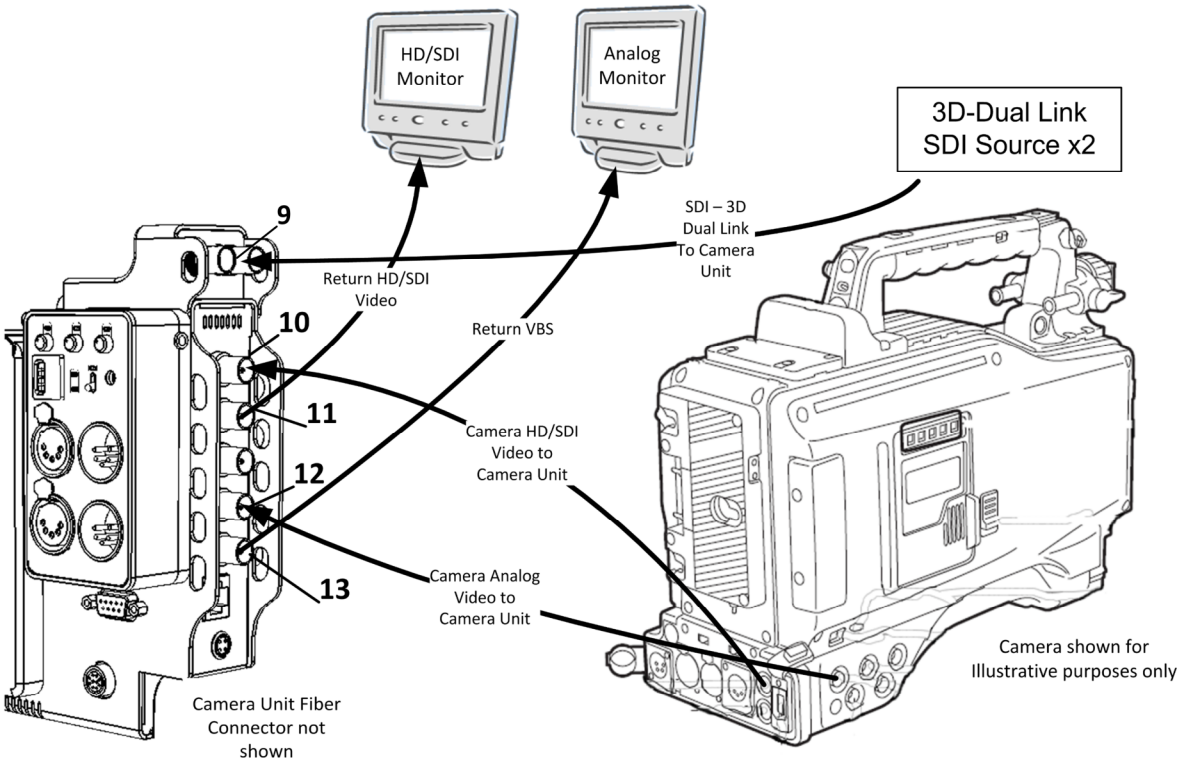


Figure 31 - Camera Unit Video Connections

Camera Unit Audio and Data/Control Connections

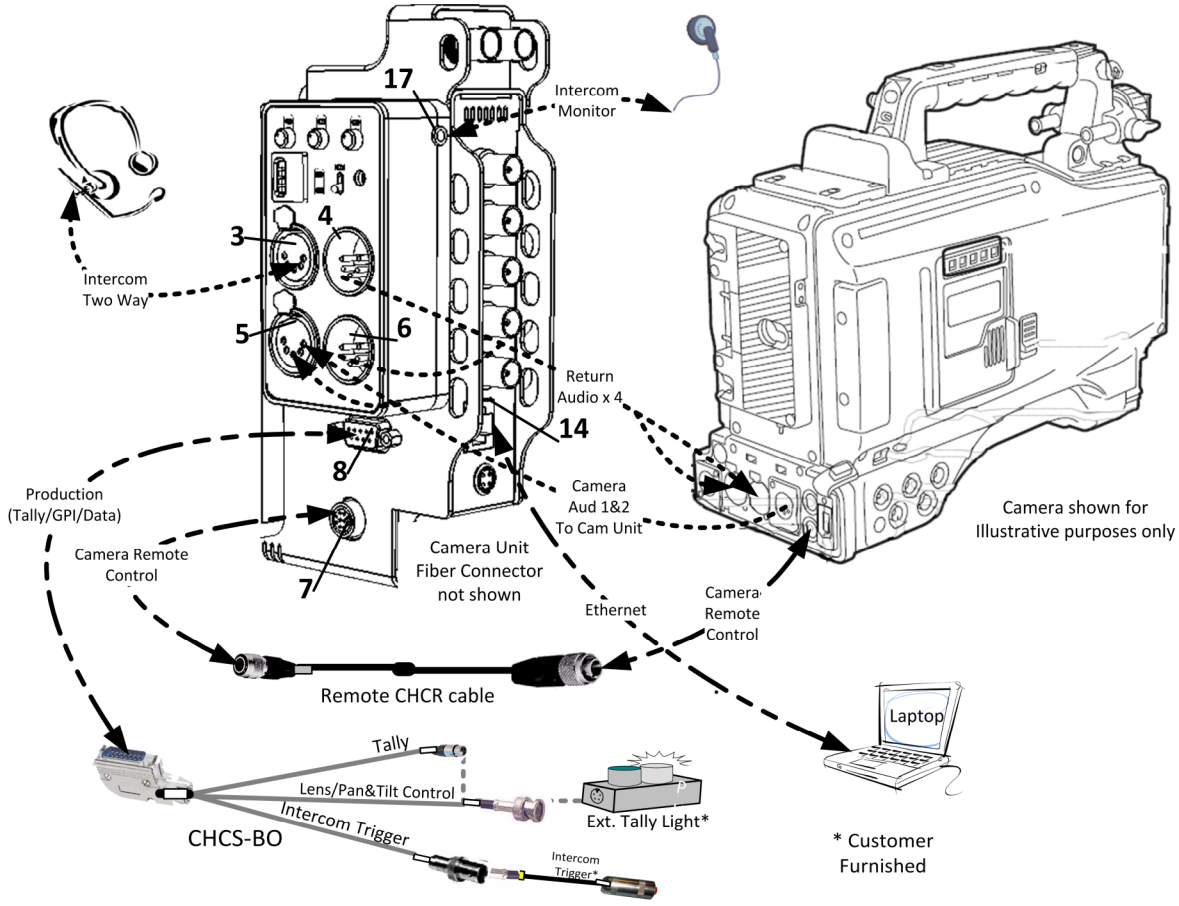


Figure 32 - Camera Unit Audio and Data/Control Connections

Chapter 6. Operation of the Copperhead 3400 Transceiver System

This chapter describes in detail the operation of Copperhead 3400 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.

The following topics are covered:

1) Set Up of the Copperhead 3400 Transceiver System
2) Connecting and Managing the Fiber Cable
3) Connecting the Fiber Cable
4) Powering the System
5) Understanding Intercom usage with the CopperHead 3400
6) Using the Digital Displays
7) Standard Operation
8) Shutting Down the System
9) Troubleshooting

6.1. Set Up of the Copperhead 3400 Transceiver System for operation

This section provides an overview of setup of the Copperhead 3400 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 3400 Transceiver System as soon as your receive in order 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 3400 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 3400 Base Station or your setup is not permanent as it would likely be in a remote truck, stadium control room or similar, connect all required cables according to Chapter 5 (Starting at Page 51). The order in which you connect the cables makes no difference.

    a. 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.

    b. Keep Fiber Optic cable connectors capped until actually connecting the Fiber Cable.

3. When setting up the CopperHead 3400 Camera Unit and associated Camera you will need to do the following:

    a. Setup the external power supply as required. For the MPS power supply used with the CopperHead Power Wafer see Page 49. For the HDX power supply used with the Copperhead PowerPlus see Page 50. Make sure all cables running between the CopperHead 3400 Base Station and the Power Supply and local AC power cords are properly managed and secured.

    b. Mount the Camera and CopperHead 3400 Camera Unit as shown on Page 40.

    c. Connect all required cables according to Chapter 5 (Starting at Page 54). The order in which you connect the cables makes no difference.

    d. Make sure to connect the Camera Remote Control cable to the Camera Unit and Camera when the Camera power is turned off.

e. Set up the Intercom Talk Back switches and level controls as desired. Please see the following Section 6.4 on Page 67 for details on Intercom operation with the CopperHead 3400 Camera Unit.

4. Deploy the Fiber Cable (see the next section) – you are now ready to Power Up the system.

6.2. Connecting and Managing the Fiber Cable

Connecting and managing the Fiber Cable between the CopperHead 3400 Camera Unit and Base Station or an intermediate power supply requires you to perform four tasks:

1. Plan the route the Fiber Cable will take between the Camera Unit and the Base Station or power supply
2. Run the Fiber Cable along the planned route
3. Connect the Fiber Cable Connectors at each end
4. Power up the Camera Unit and the Base Station or power supply and check the Fiber Optic Cable Link and signal strength

Planning the Fiber Cable Route

Obviously the longer the planned cable run the more planning required. It also makes a difference whether you are running Tactical Fiber Cable or Hybrid Fiber Cable as these affect both the length and the type of exposure the cable can endure.

When planning your cable route take into the consideration the following:

1. Possible obstacles that might cause you to run short of cable – you may need to take a more indirect, but achievable route
2. Possible hazards to the cable – while tactical fiber is extremely durable it is not immune to damage. An obvious hazard is running the cable across a lawn scheduled to be cut during your live production. Make sure the empty roadway at 6AM will not be filled with heavy equipment when it comes time to retrieve your cable
3. Possible interference (physical) with the cable that might cause it to bend or kink to an extent that unacceptable signal loss occurs.
4. Safety hazards – make sure that the cable will not cause a tripping or tangling hazard with people, animals or vehicles.
5. Decide whether the Fiber Cable is to be unspooled from the Base Station location or the Camera location. Typically the reel is kept close to the base station. However if there is a chance the Camera location may need to move further away from the Base Station after initial placement it makes sense to place the reel at the camera end. Make sure there is enough free cable coming out of the stationary end of the cable reel to accommodate a well-managed connection to the camera.

Planning the cable route requires common sense and the ability to foresee the unforeseen.

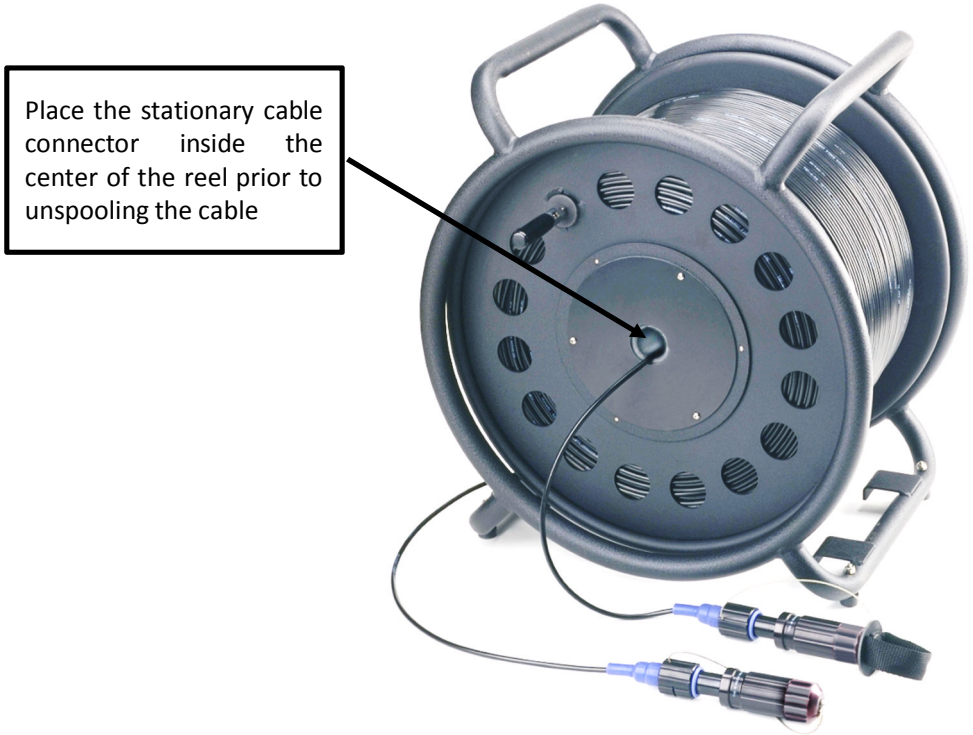
Running the Fiber Cable

Do the following when running your Fiber Cable:

1. Make sure that both ends of the Fiber Cable are securely capped. In this case the concern is dirt and damage. ANY dirt in the connector can adversely affect Fiber Optical performance and potentially cause you to lose the use of your camera while the problem is diagnosed and remedied.

2. If the cable run is long or if you will lose sight of the spooling out cable reel make sure you have appropriate assistance in running out the cable. When retrieving the cable, assistance to prevent the cable end from being caught or tangled up could be critical. Don't start reeling in the cable on your own and assume the Connector end will make it back to home base safely.

3. When unspooling the cable ALWAYS make sure the stationary end (the end that goes to the Base Station or Power Supply) us securely contained within the reel. A loose Connector can bang around and be damaged and NEVER connect the stationary end of the Fiber Cable to the Base Station or Power Supply and the start unspooling the Fiber Cable. Server damage to the cable could occur due to extreme spiraling of the connected portion of the cable.



4. Prior to connecting the Fiber Connectors to the Base Station and Camera Unit inspect both Connectors. If required, clean with dry compressed air or with technical wipes that have been moistened with isopropyl alcohol. Fingerprints or other dirt on the optical connector end surfaces will reduce the optical signal level on the fiber. If the connectors have been properly capped during storage and movement you will not likely have a problem. However if a connector has been dropped or dragged through dirt or exposed to dust cleaning is recommended.

5. Once the Fiber Cable has been connected it is time to secure the Fiber Cable run. Make sure there are no cable hazards in the run. Secure the cable with Cable Guards and/or Gaffers tape to insure safety.

6. Now the system can be powered on. Plugging in Fiber Cable connectors with the power on will not damage the system but is not recommended because of the chance of possible eye damage.

7. When re-spooling the Fiber Cable on to the spool guide it across the entire width of the spool so that it winds evenly and the possibility of cinching or kinks is greatly reduced.

6.3. Powering the System

The CopperHead 3400 Base Station and the CopperHead 3400 Camera Unit each have a power up routine which tests the equipment and performs a system diagnostic.

Powering the CopperHead 3400 Base Station

Base Station Main Power	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.
Base Station Power	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.
Four Character Display LED Indicator progression	3. The 4 character display indicates TEST and all front panel LEDs turn, red, then green, then orange, then off.
REV display	4. The LED color test is followed by REV and the revision of the display microcontroller firmware.
Scrolling	5. The REV indication is followed by “telecast-fiber.com” scrolling across the 4 character display. If there's no scrolling please contact Telecast Fiber Systems support for assistance.
PAUSE	6. The scroll is followed by about a 3 second interval used to synchronize all the microcontrollers in the Base Station
Diagnostics	7. The front panel will cycle through the diagnostics displays – See Section 6.5 – Page 71.
Current Status Displayed	8. After the 3 second pause, all the front panel displays update with current status. If the Camera Unit is not powered on the camera related status lights will show red.

Powering the CopperHead 3400 Camera Unit

Camera Unit power	1. Turn on the Camera Unit Power Switch
Camera Power	2. Turn on the Camera Power and also any peripheral equipment connected to the camera or the CopperHead 3400 Camera Unit such as monitors and microphones.
Four Character Display LED Indicator progression	3. On power on the four character display indicates the current Revision Version (REVA). Your unit will reflect the current Revision Version. After the revision display the current Fiber Link strength is displayed. A typical display is -8 to -13. This indicates Fiber link strength of from -8 to -13 dBm.

Both the Camera Unit and the Base Station have a digital display selector button which allows multiple functions for the digital display. These functions are described below on Page 70.

6.4. Understanding Intercom Usage with the Copperhead 3400

The CopperHead 3400 Transceiver System is delivered pre-configured with one of three intercom options:

1. Standard Four Wire Intercom
2. Clear-Com Intercom
3. RTS intercom

Wiring for each of these options is described in Appendix 1 on Page 83.

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

User settings for the Intercom system occur on the CopperHead 3400 Camera Unit at the top of the Audio Interface box on the back (not camera facing) side of the Camera Unit Please see the Overview Diagram on Page 98 – Reference Numbers 14-20. This Audio Interface box provides the following functionality:

1. Volume control through the Intercom headsets for two Intercom channels and for Program audio carried on the Intercom line.
2. Side Tone setting control. Side tone is the volume of your voice heard on your local intercom headset. It does not affect how others on the intercom line hear you.
3. Control of the Talk Back function for each Intercom Channel both locally and through a remote switch. Typically a remote switch can be configured either on a tripod or camera pedestal pan and tilt arm or at the lens control of a camera. This allows activation of Talk Back to the selected intercom channels without having to touch the back of the Camera Unit. Activating Talk Back only affects your ability to talk through to the intercom system and does not affect your ability to monitor intercom traffic.
4. LEDs provide activity monitoring of traffic on the two Intercom channels and Program audio. These are activity only monitors and do not represent audio levels.

Note that the CopperHead 3400 Camera Unit acts as the last component of any Intercom Belt-Pack chain. An Intercom Belt Pak cannot be plugged into the CopperHead 3400 Camera Unit. Only an Intercom Headset can be plugged into the Camera Unit

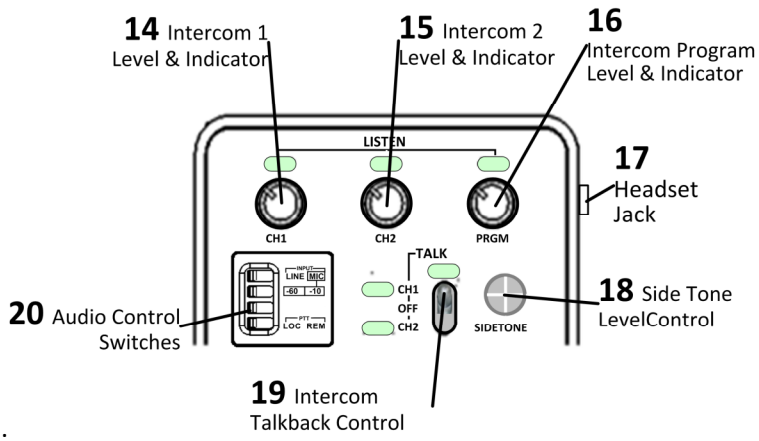
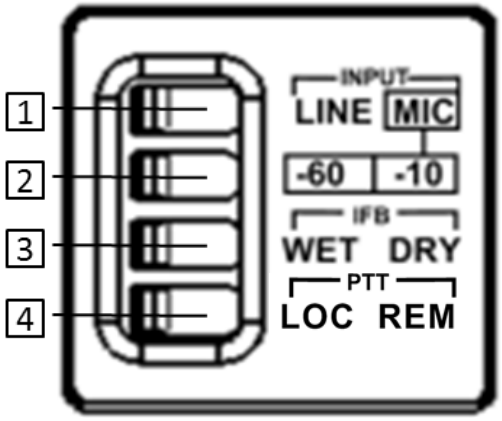


Figure 33- Audio Interface Box Detail (Camera Unit)

CopperHead 3400 Camera Unit Audio/Intercom/IFB 4-Switch Panel (#20 on the diagram above)



1) Audio Input LINE/MIC Switch

Left position sets audio inputs to line level (+4dB). Right position switches audio inputs to MIC level and enables Switch #2

2) MIC Input Level Switch

Left position sets MIC input level to -60dB. Right position sets MIC input level to -10dB.

3) IFB WET/DRY Switch

Left position sets IFB connector to Powered ("Wet"). Right position sets IFB connector to Unpowered ("Dry").

4) PTT (Push-to-Talk) –

Sets Intercom push-to-talk function to local or remote

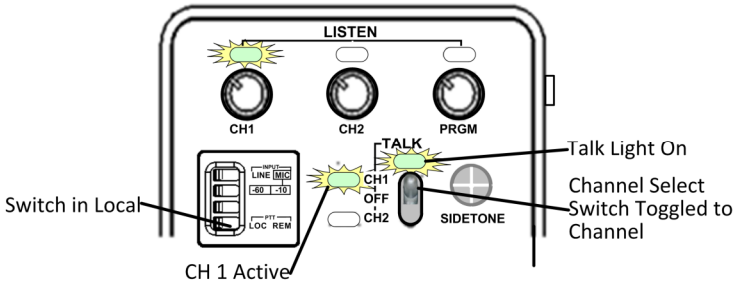


Figure 34 - Local Activation of Channel 1 Talk Back

The Copperhead 3400 Camera Unit allows you to select one or both Intercom Channels to be active.

1. To set listening level for an intercom channel, adjust the desired LISTEN control knobs at the top of the Audio Interface box.
2. To set listening level for the Program level (mixed in with the Intercom audio), adjust the PRGM control knob. When there is activity on either of the Intercom Channels or the Program audio, the indicator LEDs while come on. The drawing represents activity on CH1 Intercom.
3. The Intercom Talkback Control or Channel Select Switch controls which Intercom Channel is active for Talk Back from the Camera Position. This switch does not control which Intercom audio stream you will hear. The Channel Select Switch is a 5-way toggle switch.

   To turn on Talk Back for an intercom channel push the toggle switch up or down depending on which channel desired. Assuming the LED for CH1 Talk is not lit, the first push up on the switch will turn on the CH1 Talk Back and the LED will illuminate. The second push up on the switch will turn off the CH1 Talk Back and the LED will go out. A third push up on the switch will once again turn on the CH1 Talk Back.

   The Channel 2 Talk Back works identically with the switch being pushed downward to control the Talk Back function.

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

The following diagram illustrates how the Audio Interface Box should look with both Intercom Channels Active and Talk Back enabled locally for both Intercom Channels.

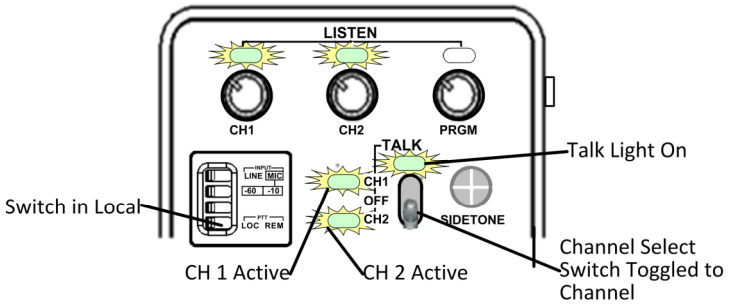


Figure 35- Local Activation of Both Intercom Channels

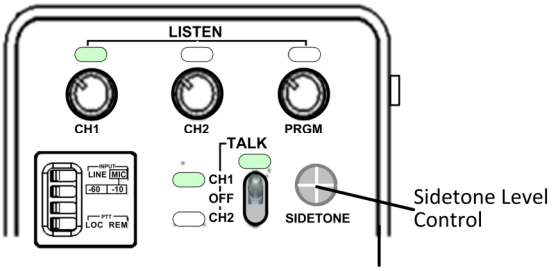


Figure 36 - Setting Intercom Side Tone

To set Intercom Side Tone Level, first establish Intercom communication and have the Intercom traffic continue while you adjust Side Tone. Activate Talk Back on an Intercom Channel and begin talking. With a "Tweaker" type screwdriver adjust the Side Tone Level until you are comfortable with the level of your own voice. This does not affect how others on the Intercom circuit here you, only the local level of your voice.

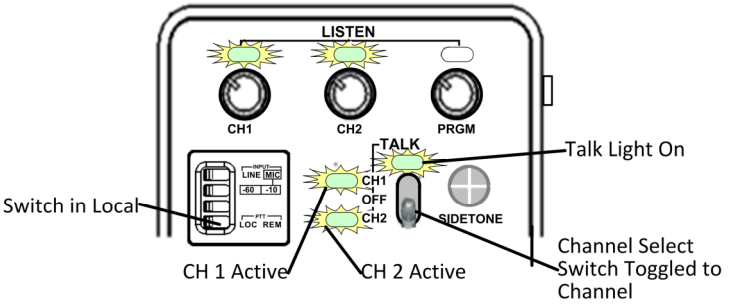


Figure 37 - Remote Activation of Intercom Talk Back

If your system requires Remote activation of Talk Back you will need to configure a remote intercom switch or wire a remote intercom signal path to your camera (if your camera provides remote intercom functionality). Please see Appendix 1 – Pages 81 and 84 for information regarding the wiring of GPI type triggers.

To use the Remote Talk Back function, switch the Intercom Local/Remote switch to REM. The Talk LED will not be dependent on remote activation. It will illuminate when the Remote Talk Switch is active and go out when the Talk Switch is inactive.

The selection of the active Talk Back Intercom Channel is identical to that when the Intercom Local/Remote Switch is in LOCAL.

6.5. Using the Digital Displays

A Brief Guide to Measurement of Fiber Optic Signal Strength

Certain portions of this description are attributed to Wikipedia – The Free Encyclopedia.

The CopperHead 3400 Transceiver System provides direct digital readout of the Fiber Optic Link signal strength for both the Base Station to Camera Unit Fiber Link and the Camera Unit to Base Station Fiber Link. This readout is presented in units of dBm. It is useful to understand both the dB or decibel and the dBm or decibel referenced to one milliwatt.

The decibel (dB) is a logarithmic unit of measurement that expresses the magnitude of a physical quantity (usually power or intensity) relative to a specified or implied reference level. Since it expresses a ratio of two quantities with the same unit, it is a dimensionless, relative unit. A decibel is one tenth of a bel, a seldom-used unit. Typically dB has been employed in Audio Measurement and Fiber Optics among many uses.

Proper measurement of signal strength requires an absolute measurement and the dBm provides this measurement. Since it is referenced to the milliwatt, it is an absolute unit, used when measuring absolute power. By comparison, the decibel (dB) is used for quantifying the ratio between two values, such as signal-to-noise ratio

The CopperHead 3400 Transceiver System operates within a defined range of Fiber Optic Link signal strength. The minimum recommended signal strength is -22 dBm or better. Typically the system should operate at levels between -8 dBm and -20 dBm. The standard CopperHead 3400 laser output strength is -6 dBm. Cable length affects signal strength as does the number of connections between the Camera Unit and the Base Station. For example, using a Power Supply such as the MPS or HDX produces a minimal signal loss through each connection.

The digital readouts on both the CopperHead 3400 Base Station and Camera Unit provide direct signal strength measurements in dBm. These readouts also provide a wide range of diagnostic information. The use of the digital readouts is described below

The CopperHead 3400 Base Station Digital Display

The Base Station digital display has three functions selected by the Display Mode Selector (#14 on the Overview Diagram). These functions are indicated by the Display Mode LEDs.

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

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

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

Display Mode	Typical Readout	Base Station Digital Display Activity Explanation
(assumes after initial power up – see Page 66 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
BASE RX	OPT	Indicates that the Display is showing Optical link signal strength
BASE RX	-9	Repeat of the Base Station signal strength
BASE RX	OPT	Repeat that the display is showing Optical link signal strength
		This display cycle repeats itself and depending on timing may start with either OPT of the strength measurement
		CAM RX (Camera Unit Receive Signal Strength)
CAM RX	ROPT	Sequence starts with ROPT to indicate remote optical signal strength
CAM RX	-9	Indicates that the signal strength from the Camera Unit is -13 dBm
CAM RX	OPT	Indicates that the Display is showing Optical link signal strength NOTE: the only way to distinguish between BASE RX and CAM RX is to check the Display Mode LED indicator.
CAM RX	-9	Repeat of the Camera Unit signal strength
CAM RX	OPT	Repeat that the display is showing Optical link signal strength
		This display cycle repeats itself and depending on timing may start with either OPT of the strength measurement – ROPT does not reappear in the repeating cycle

Display Mode	Typical Readout	Base Station Digital Display Activity Explanation
		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: that 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 *any* 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
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 Telecast-Fiber.

Display Mode	Readout	Base Station Digital Display Activity Explanation
		DIAGNOSTIC MODE Microcontroller Board Revision Version (REV)
DIAG/REV		A quick push of the Display Mode Selector advances to the 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
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 *No* fault
DIAG/CAM	ERR	Indicates that the Camera Unit is reporting *Some* fault
		This display cycle repeats until the Display Mode Selector is pushed

The CopperHead 3400 Camera Unit Digital Display

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

1. LOPT – 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.
2. ROPT – Optical Power (Remote OPTical) or Signal Strength generated by the Base Station as measured at the Camera Unit. Displayed in units of –dBm.
3. TEMP – displays operating temperature in degrees Centigrade of each circuit board that reports temperature
4. POWR – displays power level from monitored circuit boards
5. REV – displays microcontroller firmware version from each circuit board with a microcontroller
6. LED Brightness – Allows the adjustment of the Camera Unit LED brightness

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

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

Readout	Camera Unit Digital Display Activity Explanation
	(assumes after initial power up – see Page 66 for a description of the Power Up sequence)
	LOPT (Camera Unit Optical Signal Strength)
-9	Indicates that the Base Station signal strength is -9 dBm
OPT	Indicates that the Display is showing Optical link signal strength
-13	Repeat of the Base Station signal strength
OPT	Repeat that the display is showing Optical link signal strength
	This display cycle repeats itself and depending on timing may start with either OPT of the strength measurement
	ROPT (Base Station Signal Strength)
	A Quick push of the BASE Rx/DIM Selector advances to the ROPT mode
ROPT	Sequence starts with ROPT to indicate remote optical signal strength
rOPT	Indicates in the remote optical signal strength cycle
-9	Indicates that the signal strength from the Base Station is -9 dBm
	This display cycle repeats itself and depending on timing may start with either OPT of the strength measurement – ROPT does not reappear in the repeating cycle

Readout	Camera Unit Digital Display Activity Explanation
	DIAGNOSTIC MODE Temperature (TEMP)
	A Quick push of the BASE Rx/DIM Selector advances to the TEMP mode
TEMP	Sequence starts with TEMP to indicate the display mode is temperature
BASE	The main Camera Unit controller board temperature will be displayed – *does not refer to Base Station*
TEMP	Repeats that the display is in the TEMP mode
61C	Temperature display in Centigrade for Camera Unit main circuit board
	DIAGNOSTIC MODE Power (POWR)
	A Quick push of the BASE Rx/DIM Selector advances to the POWR mode
LBUS	Indicates that the LBUS controller board is being measured
POWR	Indicates the display is in the POWER sub-mode
OK	Indicates that the item is in an OK State
UBUS	Indicates that the UBUS controller board is being measured
POWR	Indicates the display is in the POWER sub-mode
OK	Indicates that the item is in an OK State
OBOX	Indicates that the Audio Interface Box controller board is being measured
POWR	Indicates the display is in the POWER sub-mode
OK	Indicates that the item is in an OK State
BASE	Indicates that main Camera Unit controller board is being measured
POWR	Indicates the display is in the POWER sub-mode
OK	Indicates that the item is in an OK State
	DIAGNOSTIC MODE Microcontroller Board Revision Version (REV)
	A Quick push of the BASE Rx/DIM Selector advances to the REV mode. This mode displays the microcontroller firmware revision of every board in the Camera Unit that has a microcontroller. (Note: the REV versions noted here were current as of August 1, 2010. Your system may have different REV versions)
REV	Indicates that mode is REV
OBOX	Indicates the OBOX microcontroller board is revision is being queried
REVA	Indicates that the REV for the Audio Interface Box board is REVA
REV	Indicates that mode is REV
BASE	Indicates the BASE microcontroller board is revision is being queried
REVA	Indicates that the REV for the BASE Camera Unit controller board is REVA
REV	Indicates that mode is REV
UBUS	Indicates the UBUS microcontroller board is revision is being queried
REVA	Indicates that the REV for the UBUS board is REVA

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

The four character Digital Display will indicate maximum brightness with this readout	**<O>**
The four character Digital Display will indicate minimum brightness with this readout	**<->**

6.6. Standard Operation

The section is devoted to a number of "Best Practices" for use of the CopperHead 3400 Transceiver System. Specific information on how to operate the system has been presented in the sections above.

1. Protect the Fiber Optic Cable and the Fiber Optic Connectors. **Always** keep these capped unless there are being connected.

2. Read the section on planning the Fiber Run – it may come in handy – Page 63.

3. Once the system is set up and running, do not ignore the Optical Power Signal Strength Readouts at either the Camera or the Base Station. While the Alarm functions of the system are very good, so is the tolerance for optical Signal Strength reduction. By monitoring –dBm levels you can take preventative action to stop a signal and possibly an On-Air or Recording loss. The system is, of course, digital and so the Signal Strength is either just good enough or usually much better than that. When it is no longer strong enough the signal stops.

4. If introducing new equipment (cameras, switchers, etc.) or new operators be sure to do a test run with everything as it will be during the actual production. Reading this User Guide is a good start but hands-on is the best way to understand how it will and more importantly what to do to insure proper operation.

5. 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.

6.7. Shutting Down the System

System shutdown is simple. The only cautions relate to the Fiber Cable and to the Camera Remote Control Panel Cable.

1. Camera Power and Camera Unit Power may be turned off at any time. If your system utilized Hybrid Power these are one and the same.

2. 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.

3. 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.

4. Protect all cables from dirt, water entry and being dragged across the ground or other surface.

5. 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.

6. If the Base Station is a permanent or semi-permanent installation then simply power off and disconnect and cap the Fiber Cable.

6.8. Troubleshooting

Troubleshooting any technical issues with the CopperHead 3400 Transceiver System is similar to any piece of television production gear with the obvious exception of the core Fiber Optic technology. Here is a list of things to look out for and check – some of them obvious but sometimes forgotten.

1. Check all your cables – any lost connections or bad connectors?

2. Confirm signal type is on the proper signal path – It is possible to physically connect analog signals to digital signal paths on the CopperHead 3200 Transceiver System signals will not pass through the system unless they are the correct type. An SDI signal will not pass through the Analog or VBS paths and an Analog signal will not pass through an SDI path. If the wrong type of signal is incorrectly connected the signal monitor indicator may light up because an electrical voltage is present on the line but no signal will pass through.

3. Check your power – are the Power Supplies working?

4. If there is a power problem, check the fuses.

5. Take advantage of the various diagnostic tools provided in the CopperHead 3400 Base Station and Camera Unit.

    a. 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 – though not guaranteed to do so – Use the Four Character Digital Displays to check signal strength. Remember to check at both ends, both local and remote power. It is useful to know that the Base Station is putting out good power but the Camera Unit is not receiving it.

    b. Observe all of the LED warning and alarm lights on the Base Station and follow up based on what you observe.

    c. If signal strength is degraded from the time of system checkout at a particular location, walk the Fiber Cable and see that it is in intact and has no damage of severe bends or kinks.

6. If the digital display indicates an error and displays a Hexadecimal error code you should contact Telecast Fiber support to assist in diagnosing the problem. Note the exact error code so you can report it to Telecast Fiber support. The hexadecimal errors indicate problems with the power supplies and the internal boards. In general, there is not much you can do as an end user if one of these rare error messages is displayed.

    The Digital Display will indicate ERR and then the actual error code will display. This is a typical error code: 00000010 – this indicates 10 to 16 volt status may be out of range

Page Intentionally Left Blank

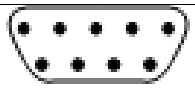
Appendices

Appendix 1. Multi-Pin Cable Wiring

1.1. CopperHead 3400 Base Station Multi-Pin Connectors

Reference Numbers Refer to the Overview Diagrams in Appendix 6 at the End of this User Guide

Base Remote –



Base Station #7

DB9 Female

DATA FORMAT CONFIGURATION (Pin 2)

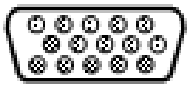
- Format pin floating for TL/422 operation
- Format pin grounded for RS-232 operation
- Format pin tied to +12VDC for RS-485 operation

Pin	Function
1	Data 1 -422 In, -485 I/O
2	Data 1 Format Select
3	GND (Ground)
4	+12 VDC Bias for Data 1 Format Select
5	Data 1 -422 Out
6	Data 1 232 In, +422 In, +485 I/O
7	- 12 VDC Camera Control Data Power Ground
8	+12 VDC Camera Control Data Power
9	Data 1 232 Out, +422 Out

Table 6 - Base Station Camera Remote Connector Wiring

Please See Appendix 4 for a list of Telecast Fiber Systems supplied cables.

Tally/GPI/Data – Base Station DB15 Connector Wiring



Base Station #8

Pin	Function
1	Data 2 -422 Out
2	Data 2 -422 In, -485 I/O
3	Intercom Mic Trigger
4	GPI 1 In (Tally Red)
5	GND
6	Data 2 232 OUT, +422 Out
7	GND
8	Data 2 232 In, +422 In, +485 I/O
9	GPI 2 In (Tally Green)
10	Data 2 Format
11	Data 3 RS232 In
12	Data 3 RS232 Out
13	GPI 1 OUT B
14	GPI 1 OUT A
15	+12VDC Bias for Format

Table 7 - Base Station Tally/GPI Connector Wiring

This cable is end-user supplied. Please see Appendix 4 – Page 92 for suggested wiring configuration

Base Station Audio Inputs & Outputs Connector Wiring

Base Station #17 & #18

For four-wire intercom use - wire Channels 1 & 2 to DB25 pins 7 & 8

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

Table 8 - Base Station Audio 25 Pin Connector Wiring

This cable is end-user supplied. Please see Appendix 4 – Pages 93 & 94 for suggested wiring configurations

Power Connector – Base Station 4 Pin XLR Connector Wiring

Base Station #21

Pin	Function
1	Ground
2	Unused
3	Unused
4	+ Power 12 VDC

Table 9 - Base Station Power Connector Wiring

This matching connector is from either an ADAP-AC-02 or a customer 12VDC camera power supply

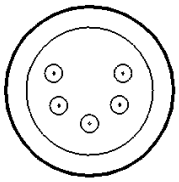
Molex Connector –5 Pin Connector Wiring

Base Station #24

Pin	Function	Wire Color
1	DC	White*
2	DC	Black*
5	Ground	Green

*Tied together at terminal lug end

Intercom (4 wire) – Base Station 5 Pin XLR Connector Wiring



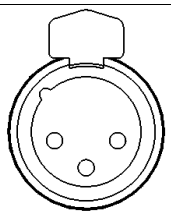
Base Station #19 & #20

Pin	Function	Impedance	Signals
1	Ground		
2	+ Input	600 Ohm Input	Line: +8 dBm
3	- Input		Mic: -32 dBm
4	- Output	>=600 Ohm Load	+8 dBm
5	+ Output		

Table 10 - Base Station Four Wire Intercom Output Wiring

This cable is end-user supplied

Clear-Com Intercom – Base Station 3 Pin XLR Connector Wiring



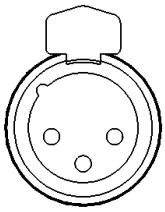
Base Station #19 & #20

Pin	Function
1	Ground
2	+ VDC Power
3	Power

Table 11 - Base Station Clear-Com Intercom Output Wiring

This cable is end-user supplied

RTS Intercom – Base Station 3 Pin XLR Connector Wiring



Base Station #19 & #20

Pin	Function
1	Ground
2	+ VDC Power & Channel 1 Audio
3	Channel 2 Audio

Table 12 - Base Station RTS Intercom Output Wiring

This cable is end-user supplied

Base Station 12VDC Terminal Block Wiring

Base Station #23

Pin	Function
1	Minus Voltage Terminal
2	Plus Voltage Terminal

Table 13 - Base Station 12VDC Terminal Block Wiring

This cable is end-user supplied

1.2. CopperHead 3400 Camera Unit Multi-Pin Connectors

Camera Remote – Camera Unit 10 Pin Hirose Connector Wiring

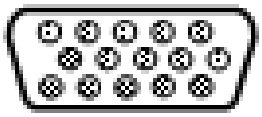
Camera Unit #7

Pin	Signal
1	+12VDC Input Power (also Format Select Bias)
2	12VDC Input Power – Ground
3	Data 1 232 In, +422 In, +485 I/O
4	Data 3 232 Data Input
5	Data 1 Format Select
6	Data -422 Output
7	Ground
8	Data 3 232 Data Output
9	Data 1 -422 In, -485 I/O
10	Data 1 232 Out, +422 Out, -485 I/O

Table 14 - Camera Unit Camera Remote Connector Wiring

Please see Appendix 3 for a list of Telecast Fiber System supplied Camera Remote Cables.

Production – Camera Unit DB15HD Connector Wiring



Camera Unit #8

Pin	Function
1	Data 2 -422 Out
2	Data 2 -422 In, -485 I/O
3	Intercom Microphone Trigger
4	GPI In
5	GND
6	Data 2 232 OUT, +422 Out, -485 I/O
7	GND
8	Data 2 232 In, +422 In, +485 I/O
9	Not Used
10	Data2 Format
11	GPI 2 OUT B (Green)
12	GPI 2 OUT A (Green)
13	GPI 1 OUT B (Red)
14	GPI 1 OUT A (Red)
15	+12VDC Bias for Format

Table 15 - Camera Unit Production DB15HD Connector Wiring

Please see Appendix 3 for a list of Telecast Fiber System supplied Camera Remote Cables.

Power Wafer – Camera Unit 4 Pin Lemo Connector Wiring

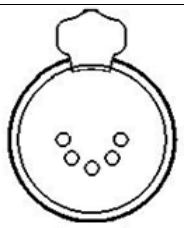
Camera Unit #15

Pin	Signal
1	95VDC +
2	95 VDC -
3	Not Used
4	Not Used

Table 16 - Camera Unit Power Wafer Connector Wiring

Supplied with Power Wafer

Camera Head Set – Camera Unit 5 Pin XLR Female Connector Wiring



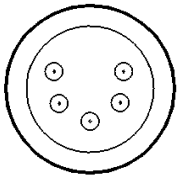
Camera Unit #3

Pin	Function
1	MIC Ground (shield)
2	+ MIC Input
3	- Earphone Output Ground
4	+ Earphone Output
5	+ Earphone Output

Table 17 - Camera Unit Head Set Connector Wiring

This cable is end-user supplied

Camera – Audio 1 & 2 Out – Camera Unit 5 Pin XLR Male Connector Wiring



Camera Unit #4-5-6

Pin	Function
1	Ground
2	Channel A/C (-) OUT
3	Channel A/C (+) OUT
4	Channel B/D (-) OUT
5	Channel B/D (+) OUT

Table 18 - Camera Unit Audio 1 & 2 Connector Wiring

This cable is end-user supplied

Appendix 2. Configuring Tally for the CopperHead 3400 Transceiver System

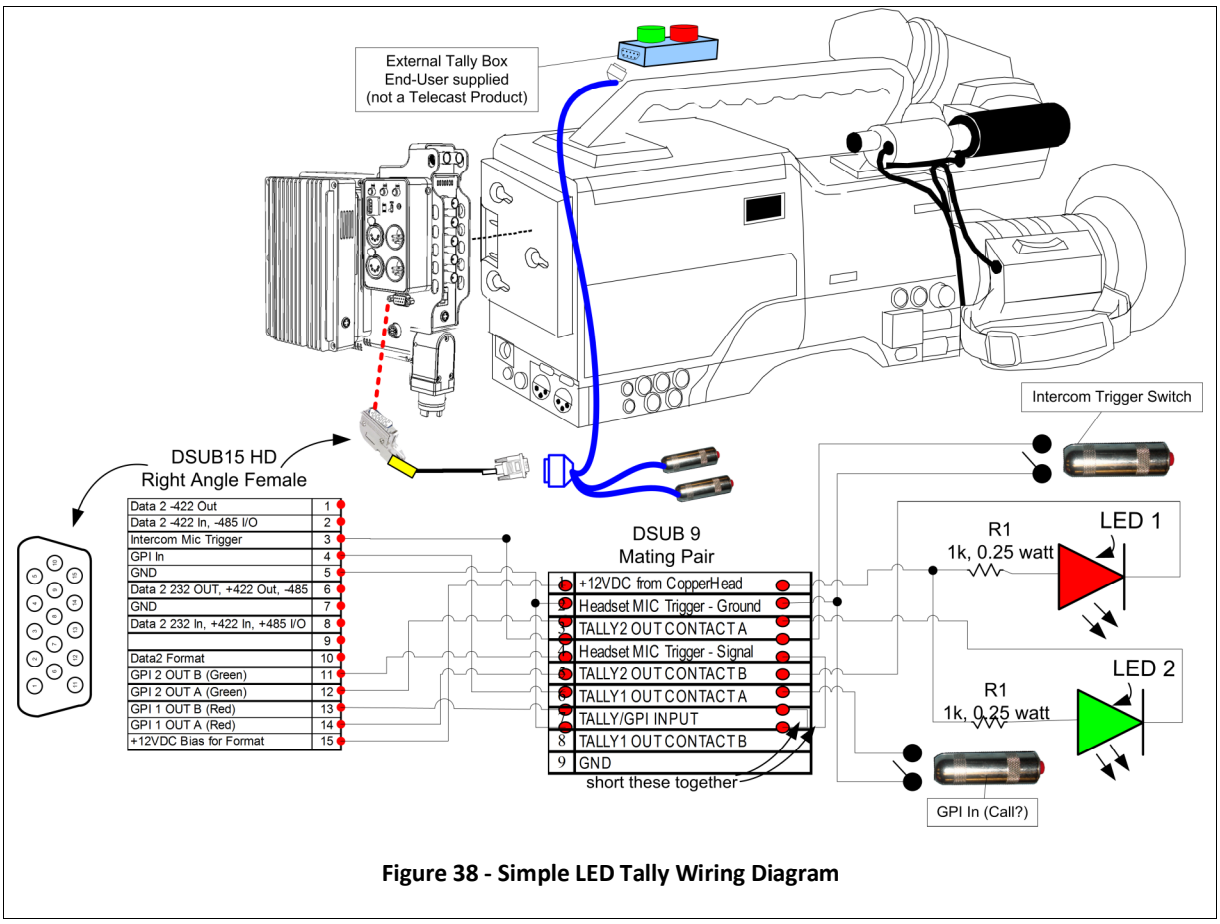
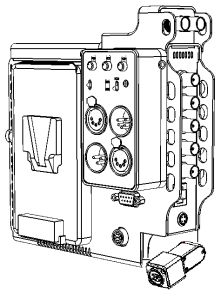
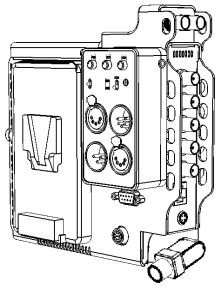
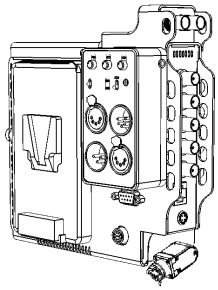
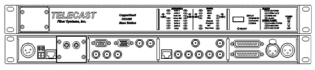
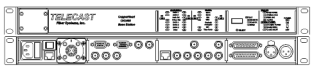
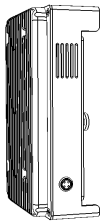
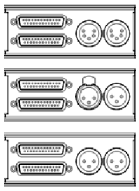
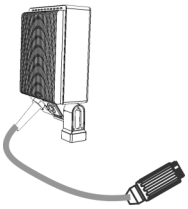
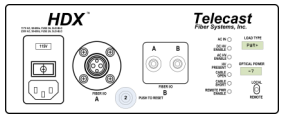
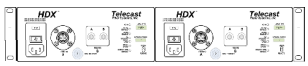
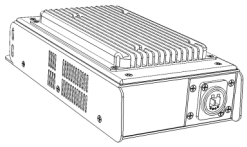
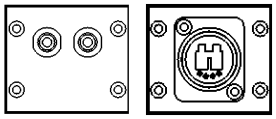
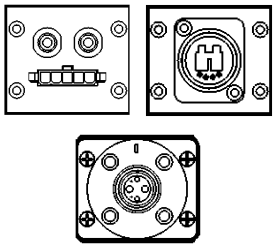


Figure 38 - Simple LED Tally Wiring Diagram

Appendix 3. Available Accessories

Item Number/ Description		Item Number/ Description	
CH3-CAM-3400-MX Camera Unit w/MX Connector: Tac Fiber only		**CAXX-MX** Tactical Fiber Assembly, MX Connectors	
CH3-CAM-3400-NEU Camera Unit w/ OpticalCON connector: Tac or SMPTE Hybrid Fiber		**CAXX-XT2S-NOC** Tactical Fiber Cable Assembly, OpticalCON Connectors	
CH3-CAM-3400-304M Camera Unit w/SMPTE 304M connector: Tac or SMPTE Hybrid Fiber		**CAXX-XSM311-NOC** SMPTE 311M Hybrid Fiber Cable Assembly, OpticalCON connectors	
CH3-BS-2ST or –NEU Standard Base Station 2 STs or OpticalCON connector		**CAXX-XSM311-SMPTE** SMPTE 311M Hybrid Fiber Cable Assembly, SMPTE 304M connectors	
CH3-BS-95VD-304 or -NEU or –STM Base Station w/internal Power Supply		**MXRE** MX Receptacle Flange Mount Assembly Breakout to STs	

Item Number/ Description		Item Number/ Description	
PWRWFR-95VD-FSR-AB Power Wafer Camera Adaptor (for use with CH Series 3400-BS-95VD)		**MXRV** MX Receptacle Jam Nut Assembly Breakout to STs	
ADAP-AC-02 Base Station AC Adaptor (for CH Series 3400-BS-2ST)		**CH3BFC-NOC-2ST/MOL-08-XX** OpticalCON receptacle to STs and Molex 39-01-4051	
CASM/MD/XL Tactical Fiber on Reel		**CH3BFC-NOC-NOC-08-XX** OpticalCON receptacle to OpticalCON Plug	
CHG3-AUD-RTS/CC/4W 2-Channel Intercom Modules: 4-wire, RTS, or Clear-Com		**CH3BFC-304M-2ST-08-XX** SMPTE Hybrid 304M plug to STs and Molex	
PWRPLUS-1MX/NO Long Distance "PowerPlus" Camera Adaptor for use with HDX (specify LP or HP)		**CH3BFC-304M-NOC-08-XX** SMPTE Hybrid 304M plug to OpticalCON Plug	
HDX-2-ST Power Supply for PowerPlus Power Adaptor		**CHCR-XXX** Camera Remote Cable (specify camera model)	
HDX-FR-2 Rack mount frame for 2 HDX units.		**CHBR-XXXX** Camera Remote Cable, 10 foot (specify remote model)	
CH2-MPS-95VD-2ST-XXX or CH2-MPS-95VD-NEU-XXX Power Supply for Power Wafer Power Adaptor			

Item Number/ Description		Item Number/ Description	
CH3BFP-ST/NOC Base Fiber Plates – unpowered ST or OpticalCON		**CH3CS-BO-XX** Camera Signal Breakout Cable	
CH3BFP-STMOL/NOC/304M Base Fiber Plates - powered: ST /Molex or OpticalCON or 304M		**CH3CS-26P** Camera Signal Cable 26-pin Multicore	
CHRCP-2050A Universal Camera Control Panel		**CHRCP-2050-LCD** Universal Camera Control Panel w/TFT-LCD Display	

Camera Signal Cables

Cable Description	Item Number	Cable is Wired with Connectors	Typical Equipment Used With Cable
Breakout Cable	CH3CS-3400-BO-BF1-D9F1	DB15HD to BNC-F, DB9F	Ext Intercom Trigger, Ext Tally I/O

Base station cables

Cable Description	Item Number	Cable is Wired with Connectors	Typical Equipment Used With Cable
Audio Input	CH3BAI-DB25-5XL3F	DB25 to 5 XLR3-F	Audio input sources
Audio Output	CH3BAO-DB25-2XL3M	DB25 to 2 XLR3-M	Audio output devices
Data/Tally	CH3BS-3400-BO-GPI-DATA	DB15HD to DB9 F and pigtails	Data2 and Tally I/Os

Base Station Remote Control Panel Cables

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

Camera Remote Control Cables

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

For information on these and other cable configurations please contact Telecast Fiber Systems, Inc. or your local CopperHead dealer.

Appendix 4. Multi-Pin Wiring Suggestions

Base Station Breakout Data/GPI Cable for CopperHead 3400

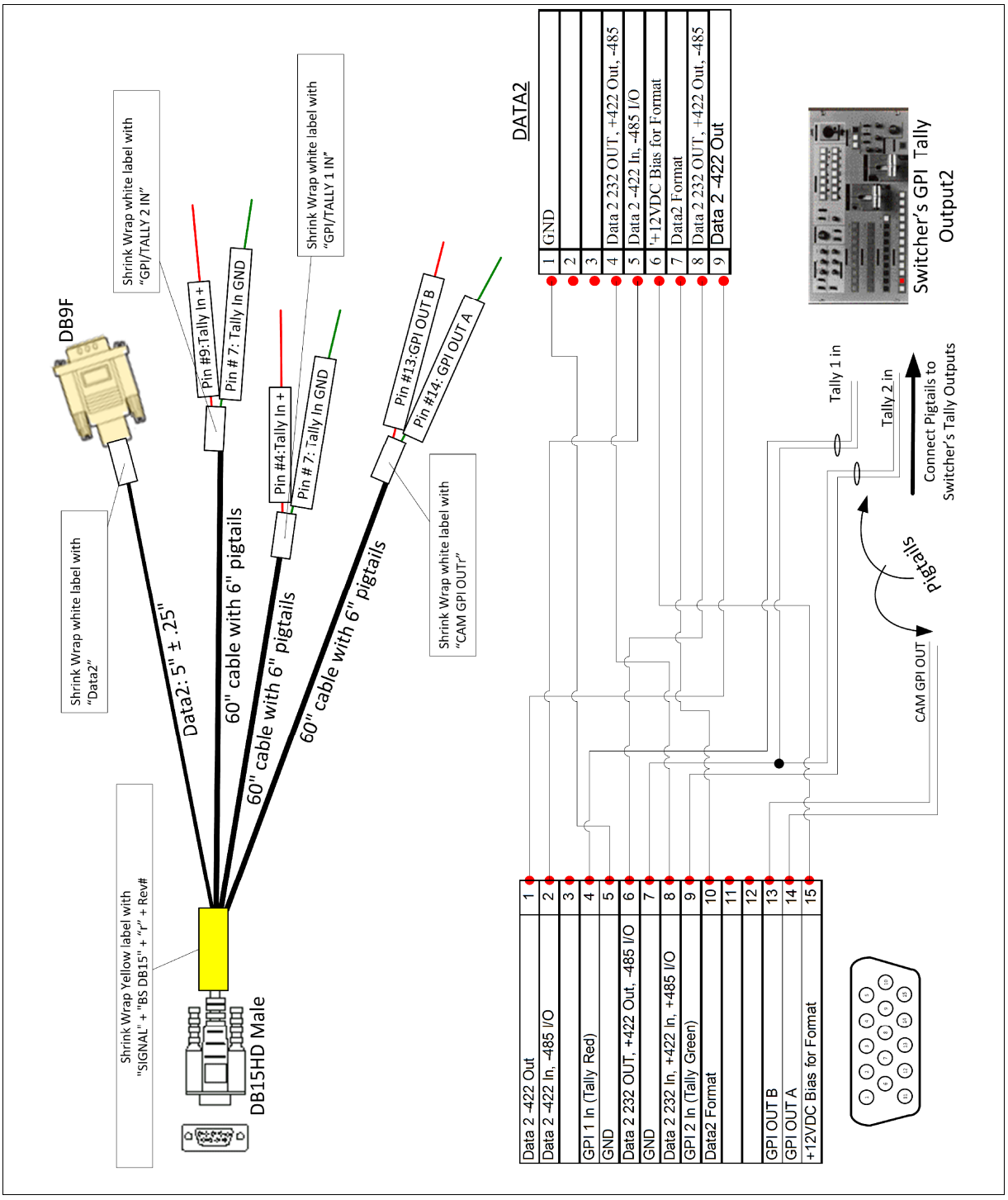


Figure 39 - Base Station Breakout Data/GPI Cable for CopperHead 3400

CopperHead 3400 Base Station 25-Pin Audio Input Cable

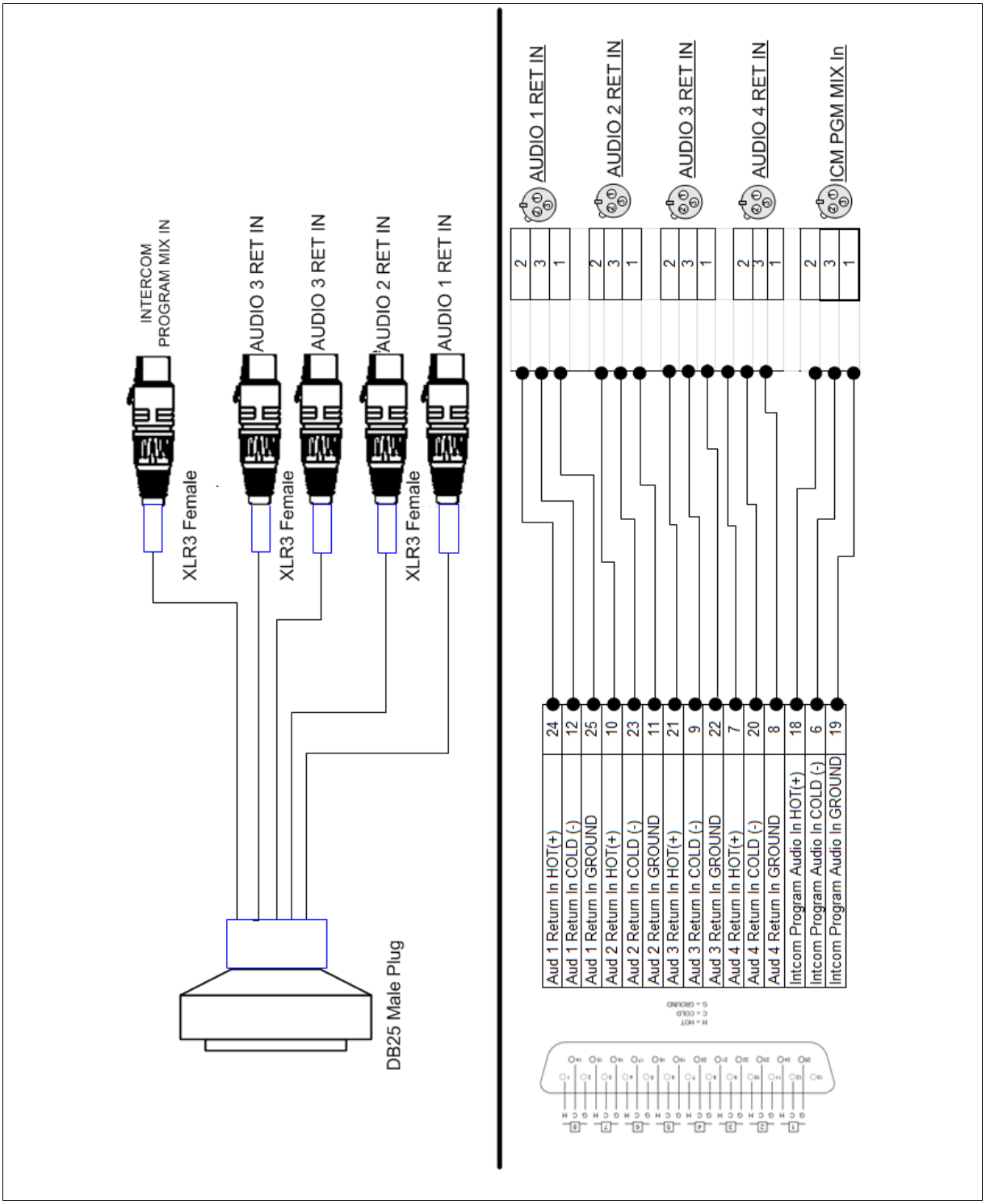


Figure 40 - CopperHead 3400 Base Station 25-Pin Audio Input Cable

CopperHead 3400 Base Station 25-Pin Audio Output Cable

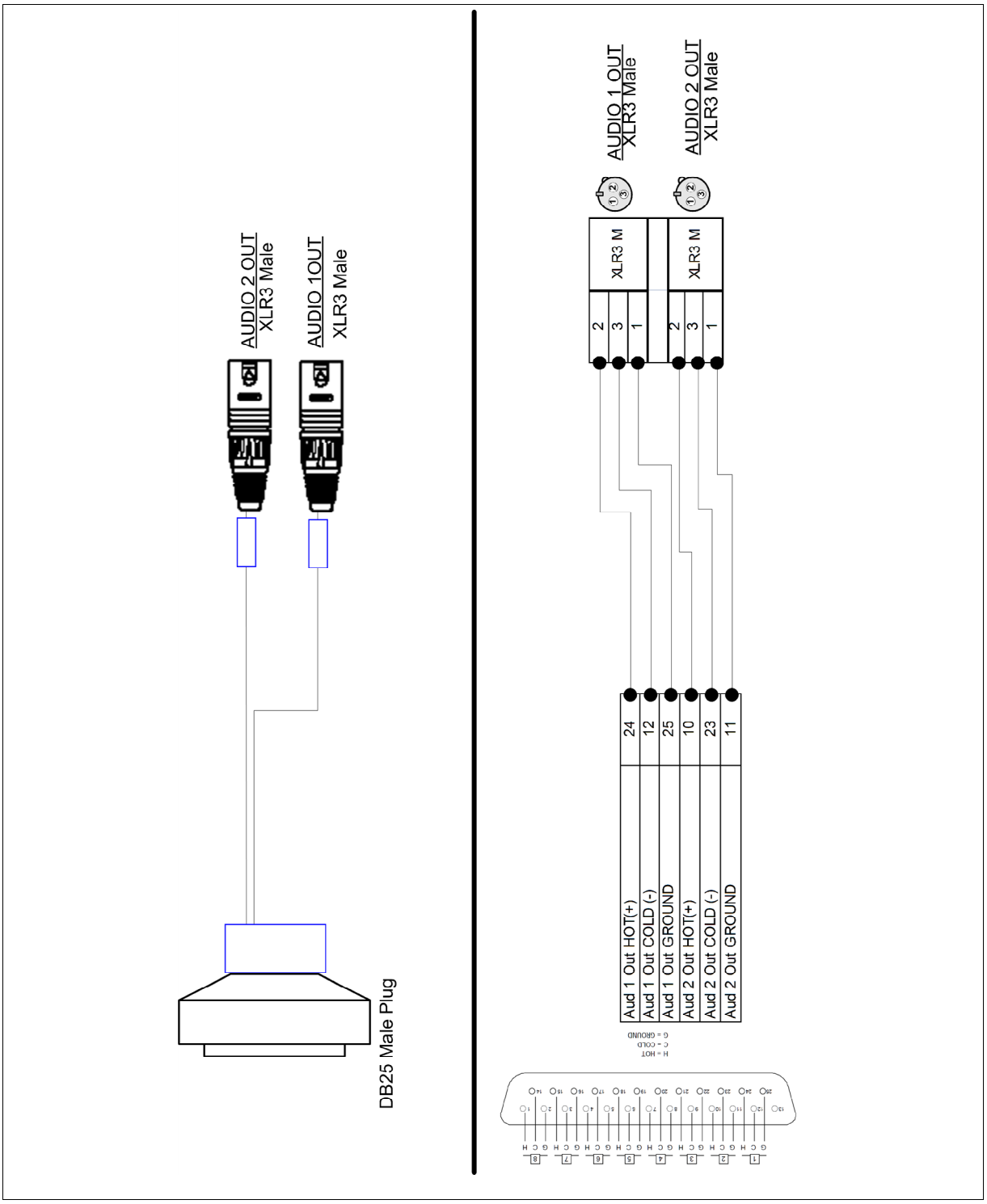


Figure 41 - CopperHead 3400 Base Station 25-Pin Audio Output Cable

Appendix 5. Specification

Video, Digital (bi-directional)

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

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

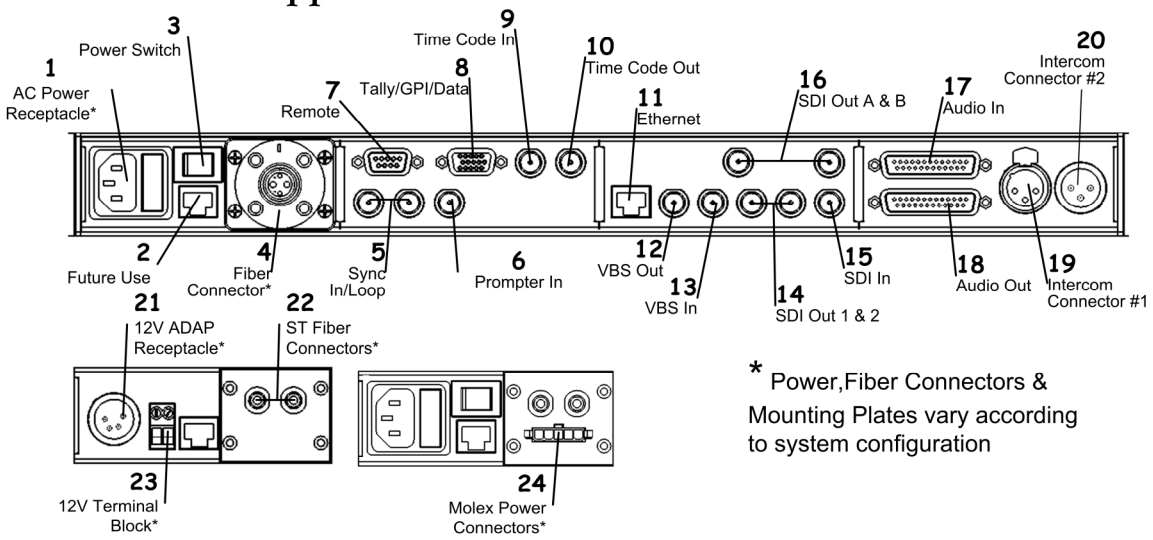
Temperature Range.....-25° to +55°C
Humidity Range..... 0 to 95% RH, Noncondensing

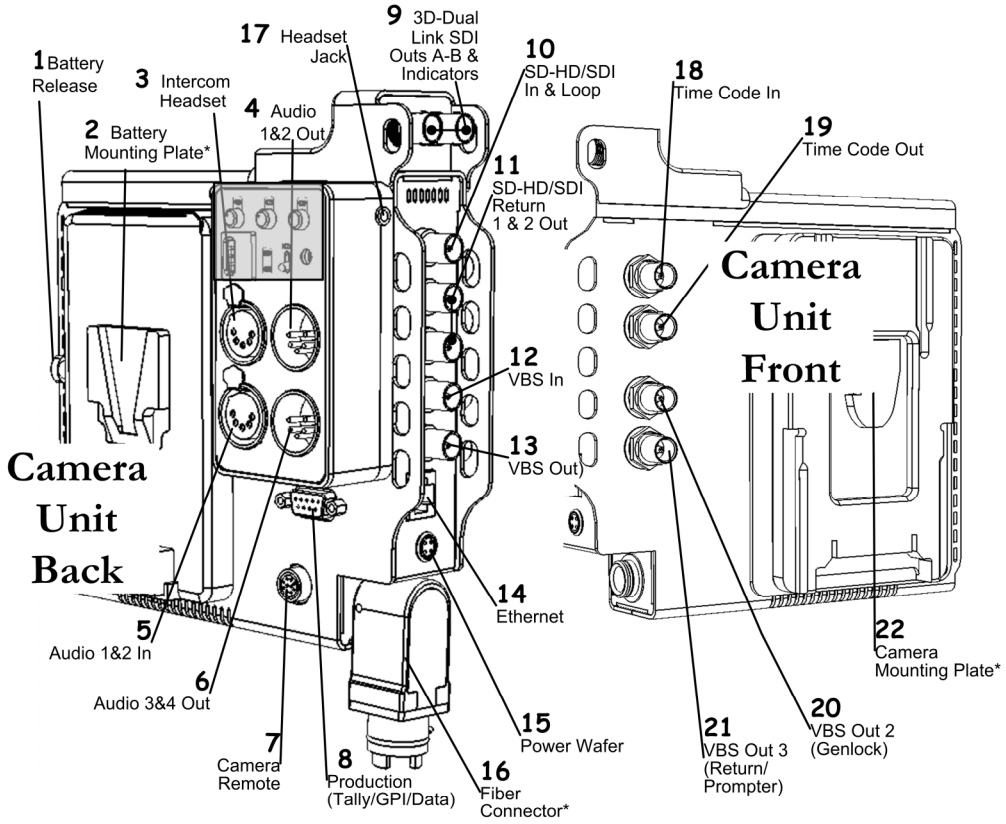
* The maximum cable length varies due to optical loss that can depend on cable quality, dirt/dust/contamination on connectors, and the number of cable connectors. When using hybrid cable for camera power, the size of the hybrid cable, as well as the power draw of the camera, lens, viewfinder, and other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

Page Intentionally Left Blank

Appendix 6. CopperHead 3400 Transceiver System Overview

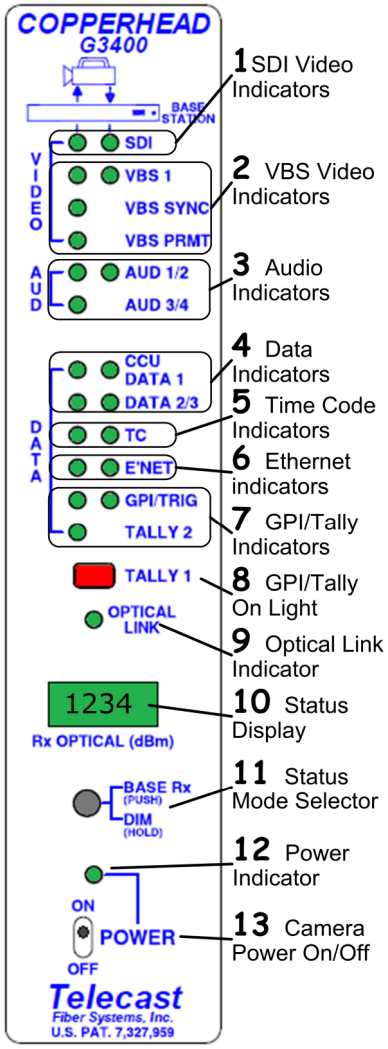
CopperHead 3400 Base Station Back Panel

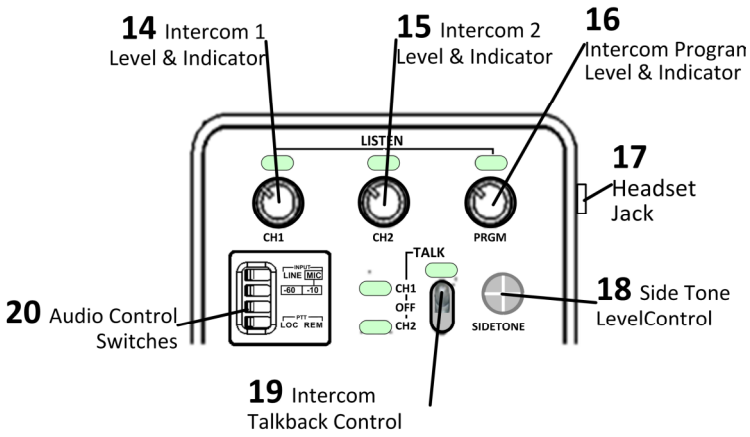




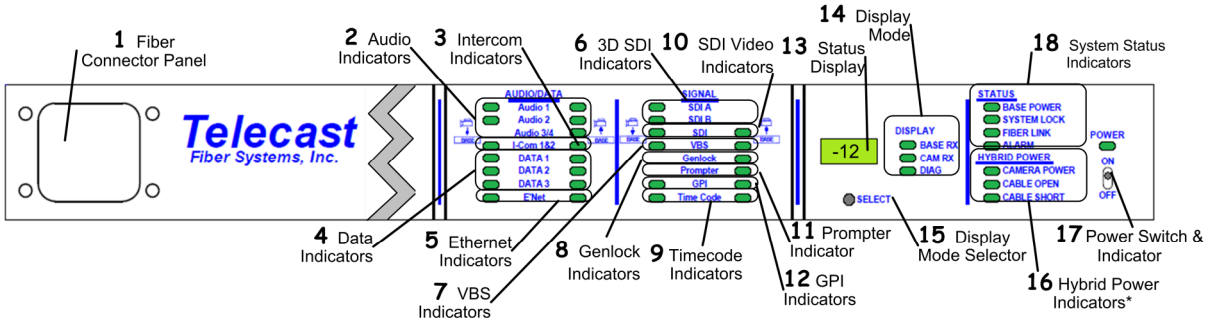
CopperHead 3400 Camera Unit

Page Intentionally Left Blank





Camera Unit Indicators and Controls



***Appears only on Hybrid Power Systems**

CopperHead Base Station Front Panel

End Page