

# Telecast Fiber Solutions

## T-POV Bidirectional Robotic Camera User Guide

M4017-9900-106

10 December 2018



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# About the T-POV Bidirectional Robotic Camera System

This chapter provides a high-level overview of the T-POV Bidirectional Robotic Camera system including how to order product and any related safety information.

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## T-POV Bidirectional Robotic Camera System concepts

The T-POV Bidirectional Robotic Camera is a camera video, audio, and data-multiplexing system. It connects to a video camera and through a single fiber optic cable link 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 cable over distances as long as 30 km (18.6 miles) or more. Hybrid cable systems can extend 240 meters (787 feet).

A typical installation controls unmanned robotically-controlled cameras used in stadiums, concert halls, high-end surveillance environments, traffic camera sites, and permanent weather/beauty shot locations.

The T-POV comes in two variations each providing a specific complement of signals carried on the fiber. Each variation can also be specified to provide power on the Fiber Optic Cable ("Wet") or without power carrying only the video, audio and data signals ("Dry").

The T-POV variations are the T-POV 301, T-POV 324 and T-POV 3244.

The selection of the T-POV model depends on the particular video, audio, data, camera control, tally/GPI, and power requirements of each application. Each of the T-POV variations or models can be delivered in either a Rack Unit configuration or Portable "Mini-Mussel" Shell configuration.

In summary, the differences between models depend on whether audio is carried on the Fiber Optic cable and how much and what types of data, control and Tally/GPI information is carried on the Fiber Optic cable. The two models are described in detail later in this user guide and the two physical configurations are explained in [T-POV Bidirectional Robotic Camera System Components](#) on page 12.

This illustration provides an example of a Base Station unit working with a single Camera unit. This is one of many possible configurations. Detailed connection information is provided in [Connections to the T-POV Base Station](#) on page 77 and [Connections to the T-POV Camera Unit](#) on page 79.

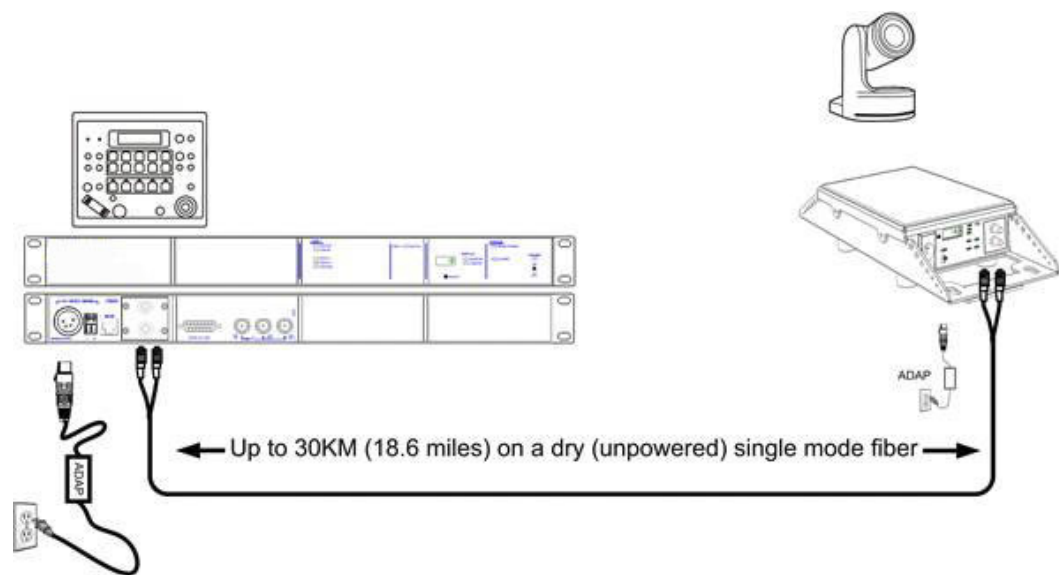


Fig. 1-1: Example Usage Scenario



In this usage example, a camera remote unit is attached to the T-POV base unit and controls a remote camera connected to a T-POV Camera Unit.

The remote camera with controllable pan and tilt unit is connected to the T-POV Camera Unit, which is connected to the Base Station over a Fiber Optic Cable. The Base Station is connected to the camera manufacturer's Camera & Pan & Tilt Control unit over a data cable.

Configuration options are determined at the time of product order and the units are delivered pre-configured.

## Unpacking the T-POV Robotic Camera Link System

Please consult your packing slip and purchase order to ensure that you have received all of the expected 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 Grass Valley (see [Product Returns](#) on page 3).

You must use your own video and audio cables to make connections for Video, Audio, GPI/Tally, Black Burst/Gen Lock, Base Station monitor, and other ancillary signals and data or control equipment. Suggestions for these cables are discussed in [Connector Wiring and Connection](#) on page 102).

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

## Product Returns

In the unlikely event of damage to your T-POV Robotic Camera Link System during shipping or delivery, take note of any damage with the delivery or shipping service. If any component does not work correctly out of the box, contact Grass Valley (see [Contact Us](#) on page 101).

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

## About this User Guide

This T-POV Bidirectional Robotic Camera Link System can be delivered in a number of configurations depending on the physical package selected. This User Guide is designed to cover each of the various packages, so not every page in this Guide will apply to your specific system.

## Product Ordering/Model Information

The T-POV part number consists of seven segments:

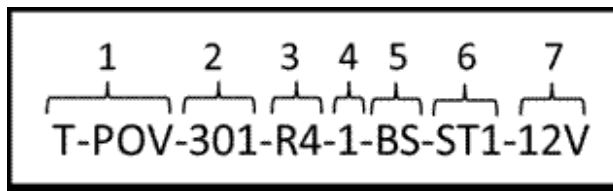


Fig. 1-2: T-POV part number format

Each segment represents a parameter describing the particular T-POV unit:

Segment	Description	Example
1	Product Designation	T-POV
2	Model #	301, 324 or 3244
3	Housing type	R4 for Rack Mount TDL or TDH for Throwdown MML or MMH for Mini-Mussel Shell
4	Unit Number (for Rack Unit models only)	1,2 or 3
5	Base Station or Camera Unit	BS or CA
6	Connector Type	ST1, ST2, ST4 for ST Fiber Connectors 304M for SMPTE 304M Hybrid Fiber Connector LC6 for LC Fiber Connectors
7	Power Type	12V for external power 95V for internally powered

### T-POV 301 Variations

Part No.	Short Description
<b>Base Stations</b>	
T-POV-301-R4-1-BS-ST1-12V	301 1 RU Single Base Station Rack Mount external power with 1 ST connector
T-POV-301-R4-1-BS-ST2-12V	301 1 RU Single Base Station Rack Mount external power with 2 ST connectors
T-POV-301-R4-2-BS-ST2-12V	301 1 RU Dual Base Station Rack Mount external power with 2 ST connectors
T-POV-301-R4-2-BS-ST4-12V	301 1 RU Dual Base Station Rack Mount external power with 4 ST connectors
T-POV-301-R4-1-BS-304M-95V	301 1 RU Single Base Station Rack Mount internal power with 304M connector

<b>Part No.</b>	<b>Short Description</b>
T-POV-301-R4-3-BS-LC6-12V	301 1 RU Triple Base Station Rack Mount external power with 6 LC connectors
T-POV-301-MML-BS-ST1-12V	301 Single Base Station Mini-Mussel Shell external power with 1 ST connector
T-POV-301-MML-BS-ST2-12V	301 Single Base Station Mini-Mussel Shell external power with 2 ST connectors
T-POV-301-TDL-BS-ST1-12V	301 Single Base Station Throwdown external power with 1 ST connector
T-POV-301-TDL-BS-ST2-12V	301 Single Base Station Throwdown external power with 2 ST connectors
<b>Camera Units</b>	
T-POV-301-R4-1-CA-ST1-12V	301 1 RU Single Camera Unit Rack Mount external power with 1 ST connector
T-POV-301-R4-1-CA-ST2-12V	301 1 RU Single Camera Unit Rack Mount external power with 2 ST connectors
T-POV-301-R4-2-CA-ST2-12V	301 1 RU Dual Camera Unit Rack Mount external power with 2 ST connectors
T-POV-301-R4-2-CA-ST4-12V	301 1 RU Dual Camera Unit Rack Mount external power with 4 ST connectors
T-POV-301-R4-3-CA-LC6-12V	301 1 RU Triple Camera Unit Rack Mount external power with 6 LC connectors
T-POV-301-MML-CA-ST1-12V	301 Single Camera Unit Mini-Mussel Shell external power with 1 ST connector
T-POV-301-MML-CA-ST2-12V	301 Single Camera Unit Mini-Mussel Shell external power with 2 ST connectors
T-POV-301-MMH-CA-304M-95V	301 Single Camera Unit Mini-Mussel Shell internal power with 304M connector
T-POV-301-TDL-CA-ST1-12V	301 Single Camera Unit Throwdown external power with 1 ST connector
T-POV-301-TDL-CA-ST2-12V	301 Single Camera Unit Throwdown external power with 2 ST connectors

## T-POV 324 Variations

<b>Part No.</b>	<b>Short Description</b>
<b>Base Stations</b>	
T-POV-324-R4-1-BS-ST1-12V	324 1 RU Single Base Station Rack Mount external power with 1 ST connector
T-POV-324-R4-1-BS-ST2-12V	324 1 RU Single Base Station Rack Mount external power with 2 ST connectors

About the T-POV Bidirectional Robotic Camera System  
T-POV 324 Variations

<b>Part No.</b>	<b>Short Description</b>
T-POV-324-R4-2-BS-ST2-12V	324 1 RU Dual Base Station Rack Mount external power with 2 ST connectors
T-POV-324-R4-2-BS-ST4-12V	324 1 RU Dual Base Station Rack Mount external power with 4 ST connectors
T-POV-324-R4-3-BS-LC6-12V	324 1 RU Triple Base Station Rack Mount external power with 6 LC connectors
T-POV-324-R4-1-BS-304M-95V	324 1 RU Single Base Station Rack Mount internal power with 304M connector
T-POV-324-MML-BS-ST1-12V	324 Single Base Station Mini-Mussel Shell external power with 1 ST connector
T-POV-324-MML-BS-ST2-12V	324 Single Base Station Mini-Mussel Shell external power with 2 ST connectors
T-POV-324-TDL-BS-ST1-12V	324 Single Base Station Throwdown external power with 1 ST connector
T-POV-324-TDL-BS-ST2-12V	324 Single Base Station Throwdown external power with 2 ST connectors
T-POV-324-TDL-BS-ST1-12V-HP	
<b>Camera Units</b>	
T-POV-324-R4-1-CA-ST1-12V	324 1 RU Single Camera Unit Rack Mount external power with 1 ST connector
T-POV-324-R4-1-CA-ST2-12V	324 1 RU Single Camera Unit Rack Mount external power with 2 ST connectors
T-POV-324-R4-2-CA-ST2-12V	324 1 RU Dual Camera Unit Rack Mount external power with 2 ST connectors
T-POV-324-R4-2-CA-ST4-12V	324 1 RU Dual Camera Unit Rack Mount external power with 4 ST connectors
T-POV-324-R4-3-CA-LC6-12V	324 1 RU Triple Camera Unit Rack Mount external power with 6 LC connectors
T-POV-324-R4-2-CA-ST4-12V	324 1 RU Dual Camera Unit Rack Mount external power with 4 ST connectors
T-POV-324-MML-CA-ST1-12V	324 Single Camera Unit Mini-Mussel Shell external power with 1 ST connector
T-POV-324-MML-CA-ST2-12V	324 Single Camera Unit Mini-Mussel Shell external power with 2 ST connectors
T-POV-324-MMH-CA-304M-95V	324 Single Camera Unit Mini-Mussel Shell internal power with 304M connector
T-POV-324-TDL-CA-ST1-12V	324 Single Camera Unit Throwdown external power with 1 ST connector
T-POV-324-TDL-CA-ST2-12V	324 Single Camera Unit Throwdown external power with 2 ST connectors
T-POV-324-TDL-CA-ST1-12V-HP	

## T-POV 3244 Variations

Part No.	Short Description
<b>Base Stations</b>	
T-POV-3244-R4-BS-12V	3244 Single Base Station Rack Mount external power with 4 3G-SDI connectors
T-POV-3244-R4-BS-95V	3244 Single Base Station Rack Mount internal power with 4 3G-SDI connectors
<b>Camera Units</b>	
T-POV-3244-TDL-CA-12V	3244 Single Camera Unit Throwdown external power with 4 3G-SDI connectors
T-POV-3244-TDL-CA-PW	3244 Single Camera Unit Throwdown remote power and Power Wafer with 4 3G-SDI connectors

## Safety and Fiber Optic Systems

### Optical Fiber Safety

To prevent damaging your eyes, never look directly into the end of the optic fiber while either end of the system is operating.

Always use cable connector caps when the Fiber Optic 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 T-POV Powered Base Stations are equipped with Dual Cartridge fuses located next to the AC Power receptacle at the left rear of the unit.

NEVER operate a T-POV Powered Base Station without properly installed and rated fuses. Severe electrical and heat damage to the equipment could result, as well as personal injury or death.



# 2 System Overview

This chapter lists the main components and options for the T-POV Bidirectional Robotic Camera system including an overview of Fiber Cable technology.

<i>Fiber Cable Concepts</i> .....	10
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## Fiber Cable Concepts

Fiber Optics and Fiber Optic Cable are the core technologies at the heart of the T-POV Robotic Camera Link System. The T-POV System features the ability to multiplex and demultiplex 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. The theory and operation of Fiber Optics is beyond the scope of this document, but you need to be aware of the different types of Fiber Optic Cable and Fiber Optic Cable Connectors.

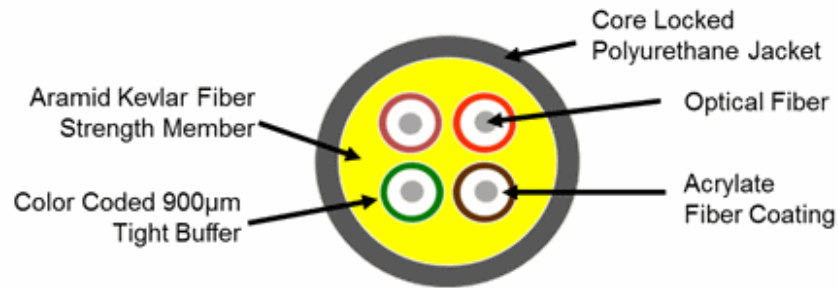


Fig. 2-1: Tactical Fiber Optic Cable Cross-section (Illustrative only)

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

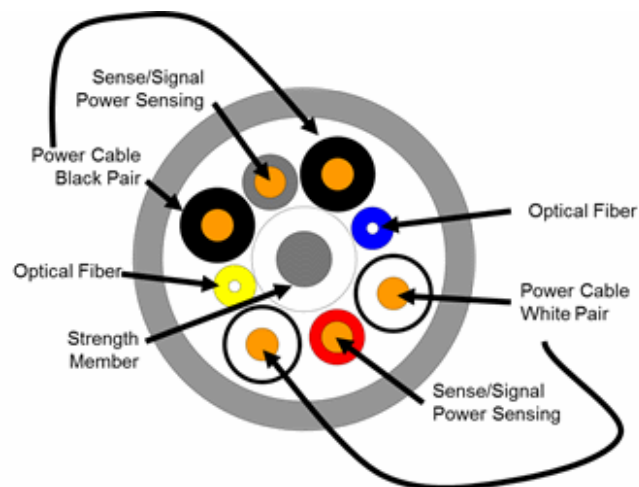


Fig. 2-2: Hybrid Fiber Optic Cable Cross-section (Illustrative only)

Hybrid Fiber Cable has the same Fiber Optic characteristics with the addition of copper cables, which 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 than Tactical Fiber Cable.



## Fiber Optic Connector Types

The T-POV Robotic Camera Link System is delivered with one of two types of Fiber Connectors.

- For 12 Volt systems using Tactical Fiber Cable, the system is delivered with ST Connectors.
- For AC Powered Base Unit systems, the T-POV is delivered with an SMPTE 304M type hybrid powered fiber connector.

Connector Type	Tactical Fiber Use	Hybrid Fiber Use	Camera Unit Use	Base Station Use
Fiber Connectors	Yes	Not Typically	Yes	Yes
SMPTE 304M	No	Yes	Yes	Yes

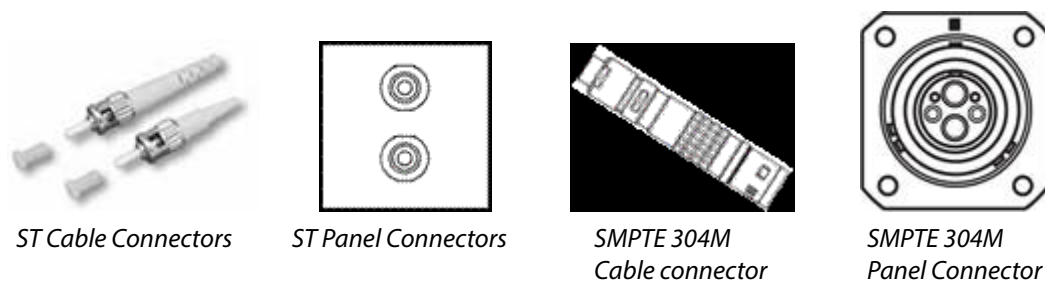


Fig. 2-3: Fiber Optic Connectors

The specific application of Fiber Optic connectors in T-POV systems is covered in [Understanding which Fiber Connector is applicable](#) on page 11

## Understanding which Fiber Connector is applicable

The selection of Fiber Connector type in the T-POV system depends on the following:

- Is the system an externally powered 12 Volt system or is the system internally powered at the Base Station by 120VAC? Note that all AC powered units can be configured for 120VAC or 240VAC operation.
- What is the number of Link units installed in the base station?

The choice of Fiber Connectors applies to both models of the T-POV Robotic Camera Link System. For a detailed list of Fiber Connector and Power Mode compatibility, see the following sections:

- For a general discussion of Fiber Connectors, see [Fiber Cable Concepts](#) on page 10.
- For a detailed list of Fiber Connector and Power Mode compatibility, see [Power Mode and Fiber Connector Compatibility](#) on page 20.

Powered T-POV Units are delivered with the SMPTE 304M Hybrid Connector. 12 Volt models use some variation of ST connectors depending on configuration and whether the system has one or two link units installed.

## T-POV Bidirectional Robotic Camera System Components

The T-POV system is comprised of a Base Station and one or two (only for T-POV 301 and 324 models) Camera Units. Any system must consist of Base Station and Camera Units that are of the same model type (ex.: a T-POV 301 Base Station will only work with a T-POV 301 Camera Unit). The same holds true for each of the T-POV 324 and T-POV 3244 models: you cannot mix and match a 301 with a 324 or 3244.

To understand the specific capabilities of the two models, please see the following sections on Signal Paths in the T-POV and the individual chapters on each model type:

- [T-POV 301 Components](#) on page 21
- [T-POV 324 Components](#) on page 37
- [T-POV 3244 Components](#) on page 55

### T-POV Base Station Variables

The T-POV Base station variations are summarized in the following table. For additional information, see [Product Ordering/Model Information](#) on page 4 or consult with Grass Valley (see [Contact Us](#) on page 101) or your Fiber Systems dealer.

Note that "12V" and "95V" refer to T-POV model types. Both externally powered and AC powered versions of the T-POV provide 12 Volts of power. The powered version additionally provides 95 Watts of 12 Volt power at the Camera Unit for use by the camera and accessories. The power is delivered through a Hybrid Fiber Optic Cable as described in [Fiber Cable Concepts](#) on page 10.

Housing	Number of Units	Fiber Connector	Power Option
Single - Mini-Mussel	1	ST1, ST2, SMPTE 304M (powered)	12V "dry" or 95V "wet" (power type dictates Fiber Connector choice)
Rack Mount	1 or 2	ST1, ST2, ST4,	12V "dry"
Rack Mount	1	SMPTE 304M (powered)	95V "wet"

## T-POV Base Station Housing Types

This section illustrates a selection of the more commonly specified T-POV Base Station housing types. For detailed illustrations of each device, see [T-POV 301 Components](#) on page 21, [T-POV 324 Components](#) on page 37 and [T-POV 3244 Components](#) on page 55.

See [Product Ordering/Model Information](#) on page 4 for a complete list of available T-POV models.

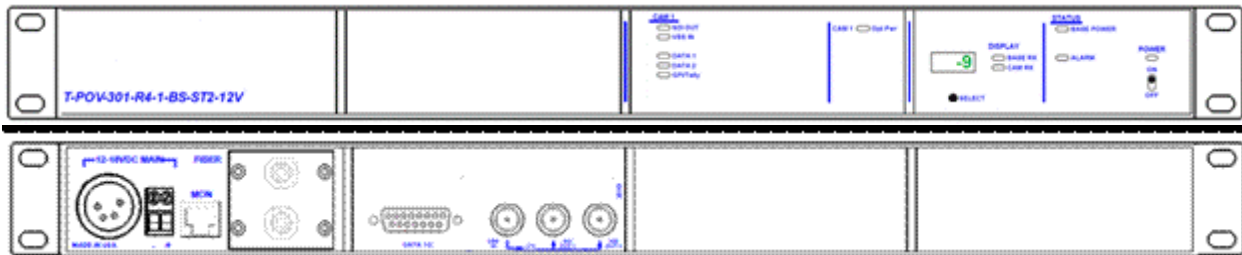


Fig. 2-4: Externally powered T-POV 301 single rack unit with 2 ST Fiber Connectors

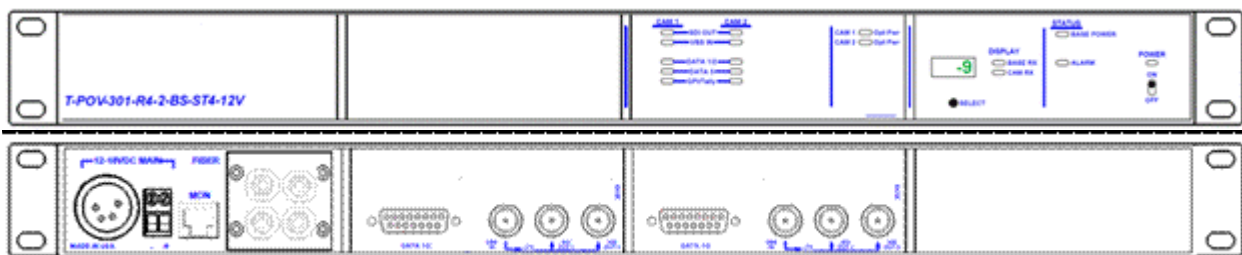


Fig. 2-5: Externally powered T-POV 301 dual rack unit with 4 ST Fiber Connectors

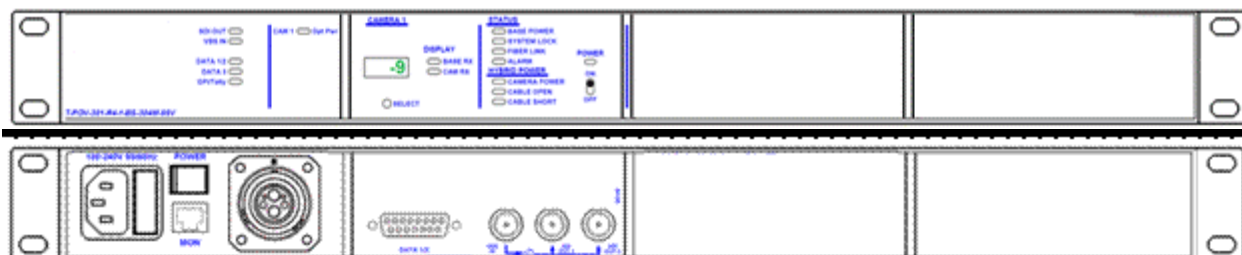


Fig. 2-6: Internally (AC) powered T-POV 301 rack unit with 1 SMPT 304M Fiber Connector

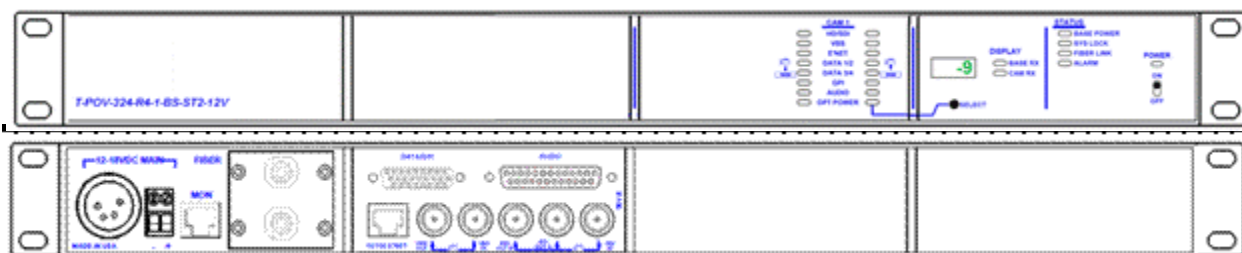


Fig. 2-7: Externally powered T-POV 324 rack unit with 2 ST Fiber Connectors

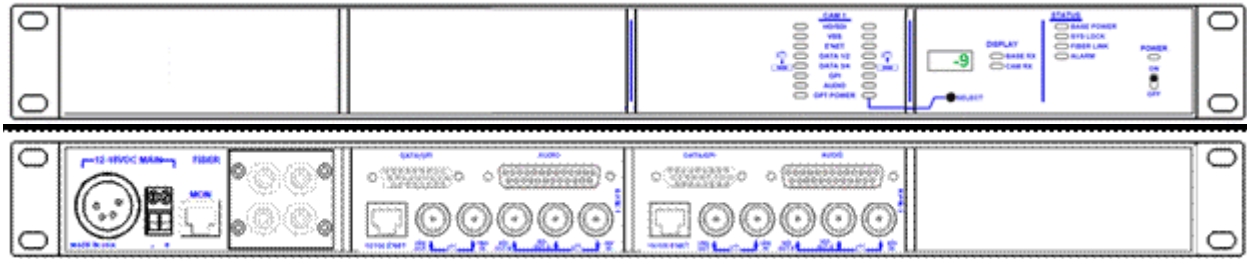


Fig. 2-8: Externally powered T-POV 324 dual rack unit with 4 ST Fiber Connectors

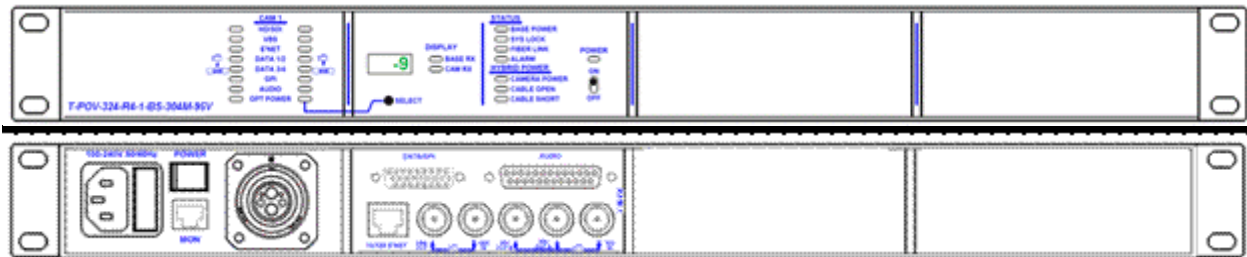


Fig. 2-9: Internally (AC) powered T-POV 324 rack unit with 1 SMPTE 304M Fiber Connector

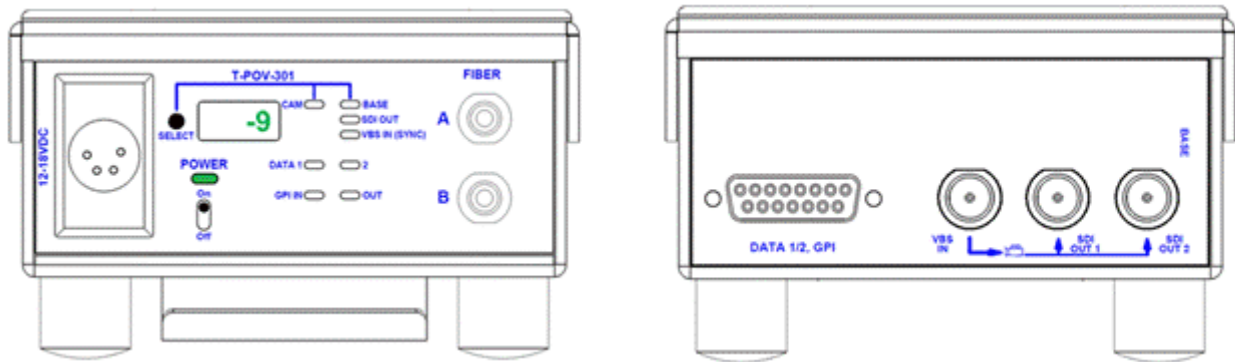


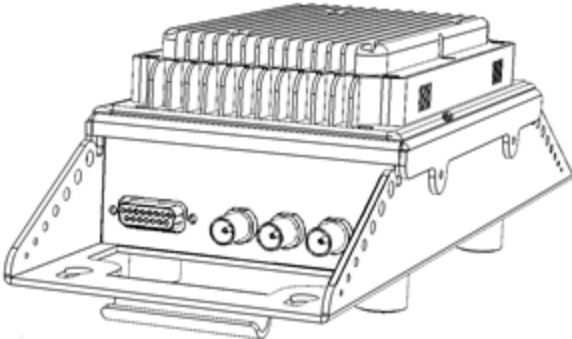
Fig. 2-10: Externally powered T-POV 301 Mini-Mussel unit with 2 ST Fiber Connectors

The T-POV 324 and 3244 models are similar with additional connectors and LED indicators.

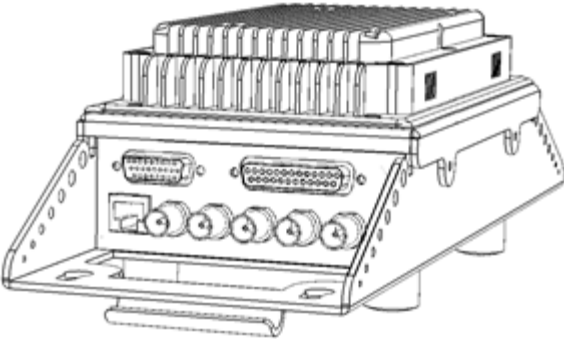
## T-POV Camera Unit housing types

This section illustrates the various Mini-Mussel Shell T-POV Camera Unit housing types. Rack Mount Camera Units are similar to the Rack Mount Base Station configurations. System labels are not shown in these illustrations for purposes of clarity.

See [Product Ordering/Model Information](#) on page 4 for a complete list of available T-POV models. Note the T-POV 324 is used for illustration of the front panel. The T-POV 301 front panel differs only in the number of LED indicators.

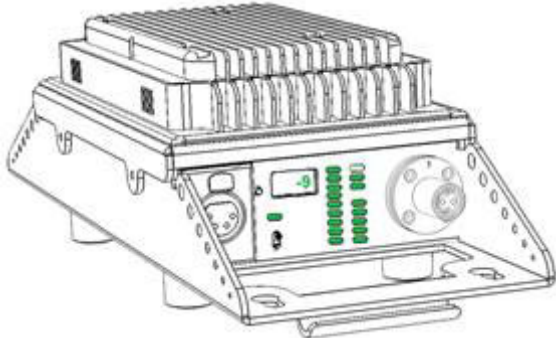


T-POV 301 Camera Unit -Rear Panel

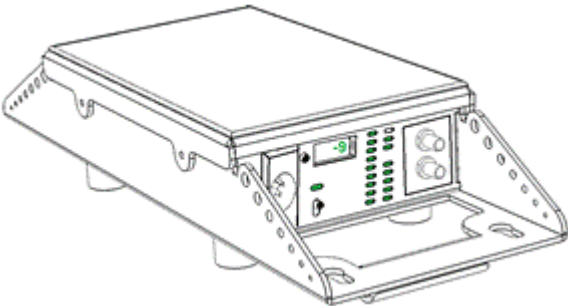


T-POV 324 Camera Unit -Rear Panel

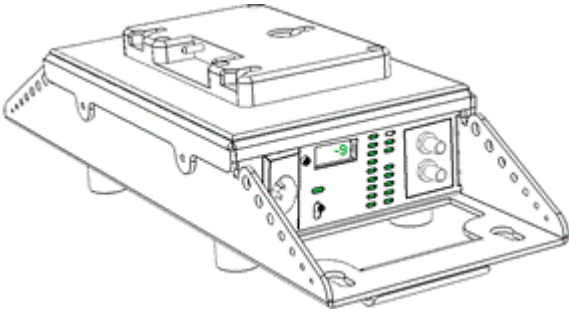
Fig. 2-11: Camera Unit Rear Panels



T-POV 324 Camera Unit Front Panel - Internal Power (From Hybrid Fiber Optic Cable)



T-POV 324 Camera Unit Front Panel - External Power



T-POV 324 Camera Unit Front Panel - External Power with Battery Mount Option (Anton-Bauer Battery Mount Shown)

Fig. 2-12: Camera Unit Front Panels

## Signal paths in the T-POV Bidirectional Robotic Camera System

All of the Rack Mount and Mini-Mussel Shell variations of a particular model carry the same signal set whether internally or externally powered.

	Model:	301	324	3244
	CAM ↔ BASE			
Q1 (4K) video	→			•
Q2 (4K) video	→			•
Q3 (4K) video	→			•
Q4 (4K) video	→			•
HD/SDI	→	•	•	•
Return HD/SDI	←		•	•
VBS	→		•	•
Return Video or VBS	←	•	•	•
10/100 Ethernet	↔		•	•
RS422/485	↔	•		
RS232	↔	•		
GPI /Tally	↔	•		
RS232/422/485 #1	↔		•	•
RS232/422/485 #2	↔		•	•
RS232/422/485 #3	↔		•	•
RS232	↔		•	•
Audio 1 (DB25)	↔		•	•
Audio 2 (DB25)	↔		•	•
Audio 3 (DB25)	↔		•	•
Audio 4 (DB25)	↔		•	•

Fig. 2-13: T-POV 301 Camera Link Signal Paths

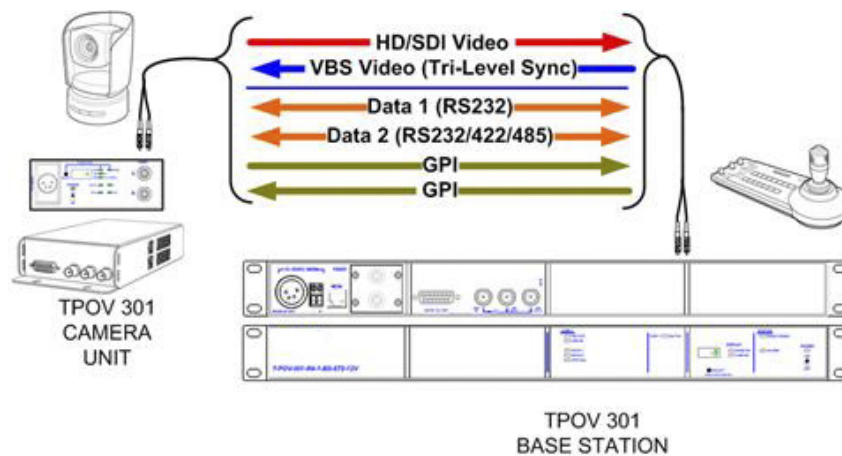


Fig. 2-14: T-POV 301 Camera Link Signal Paths



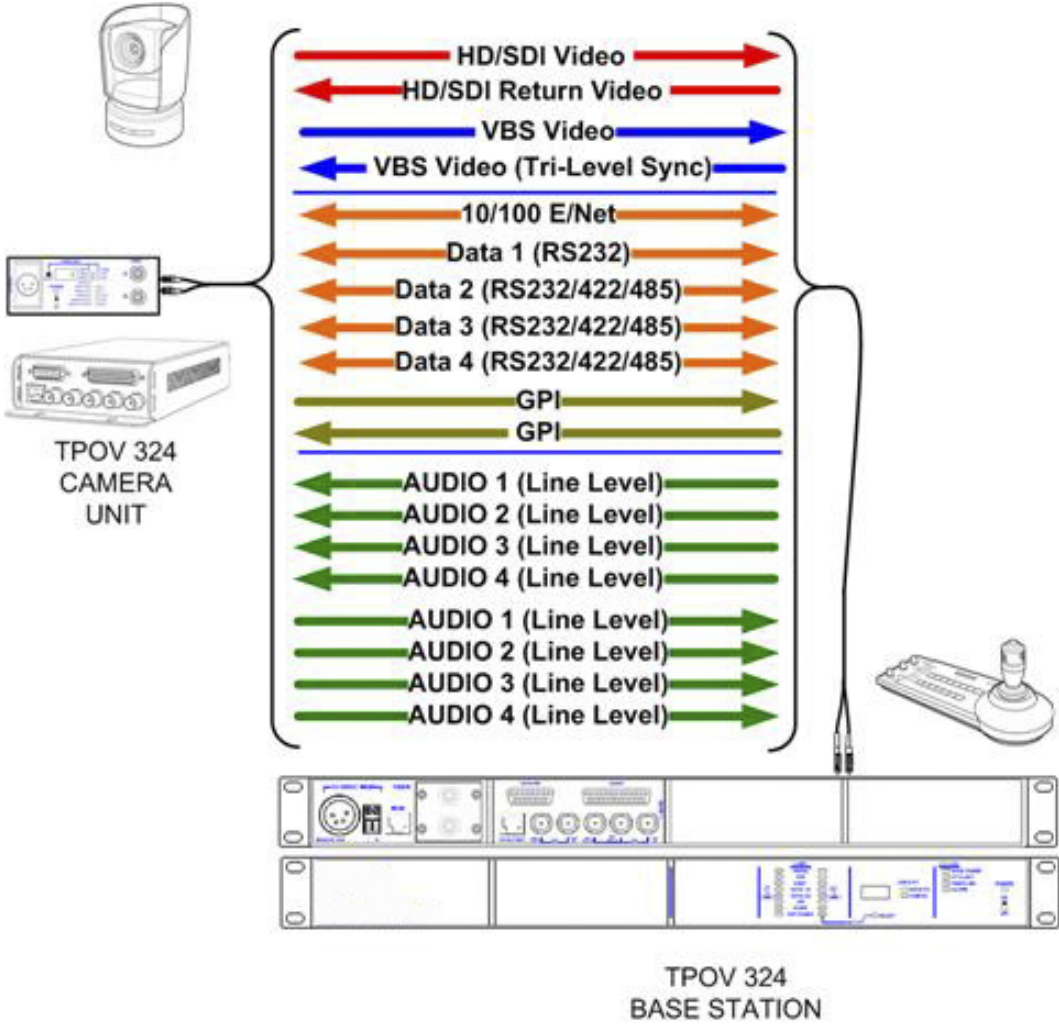


Fig. 2-15: T-POV 324 Camera Link Signal Paths

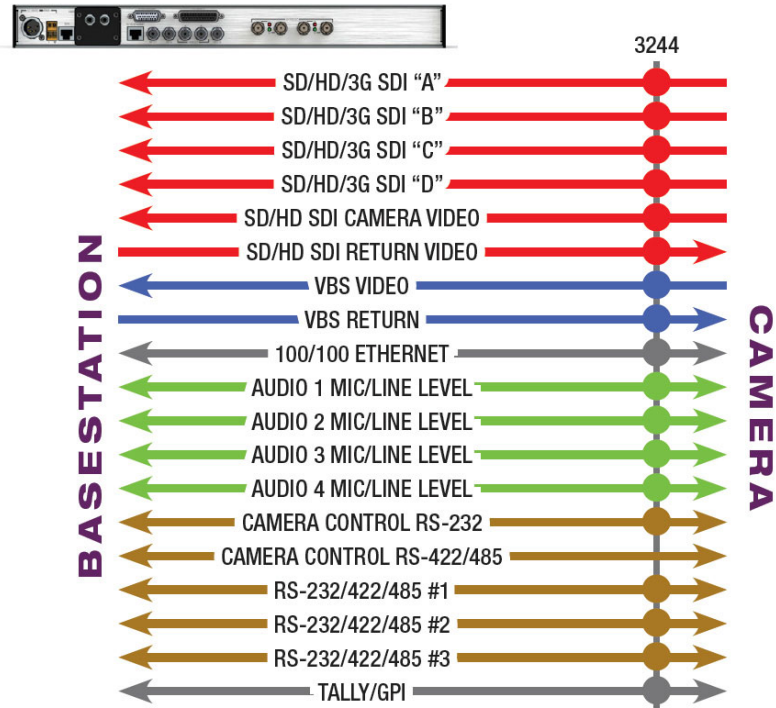


Fig. 2-16: T-POV 3244 Camera Link Signal Paths



## Power options with the T-POV

The T-POV Robotic Camera Link System has two methods of power for both the Base Station and the Camera Unit. The Base Station can be powered externally by a 12 Volt power supply (ADAP-AC-04 is recommended), which will work across a 100-240VAC range. The Base Station can also be powered with an internal AC power supply. This power supply provides power to a single Link unit in the Base Station and also provides power down the Hybrid Fiber Link cable to the Camera Unit.

The externally powered Base Station requires only one power supply regardless of the number of Camera Link units installed.

The externally powered Camera Unit can be powered by a 12 Volt Power supply, such as the ADAP-AC-04. The Camera Unit can also be equipped with a 12 Volt battery mount to provide operation independent of the AC mains or as an on-board power backup. Mounts for Anton Bauer or V-Mount type batteries are available.



Part Number  
ADAP-AC-04



Supplied with 4PIN  
XLR/A4F connector

Fig. 2-17: ADAP-AC-04 Power Supply

## Power Mode and Fiber Connector Compatibility

### Base Station Configurations

Chart applies to all models of T-POV

Power Mode	Number of Link Units	Fiber Connector	Notes
External 12 Volt	1	2 ST	
External 12 Volt	1	1 ST	Requires WDM (Wave Division Multiplexing) Unit in order to have bi-directional signals on signal fiber
External 12 Volt	2	4 ST	Not available for T-POV 3244
Internal AC	1	SMPTE 304M	

### Camera Unit Configurations

Chart applies to all models of T-POV.

Power Mode	Fiber Connector		Power Mode	Fiber Connector
External 12 Volt	1 ST (with WDM)		Internal AC	SMPTE 304M
External 12 Volt	2 ST			

The following chapters cover each T-POV model type individually. Please confirm your T-POV model type and proceed to the appropriate chapter.

- T-POV 301 - [T-POV 301 Components](#) on page 21
- T-POV 324 - [T-POV 324 Components](#) on page 37
- T-POV 324 - [T-POV 3244 Components](#) on page 55

# T-POV 301 Components

This chapter describes the components in the 301 model of the T-POV Bidirectional Robotic Camera system.

<i>About the T-POV 301 Components</i> .....	22
<i>T-POV 301 Base Unit</i> .....	22
<i>T-POV 301 Camera Unit</i> .....	31

## About the T-POV 301 Components

The T-POV 301 Robotic Camera Link Base Station and Camera Unit come in both portable and rack mount configurations. In this chapter, the system components are described using a single unit rack mounted base station with external 12 Volt power and a standard Mini-Mussel Shell version of the Camera Unit also with external 12 Volt power.

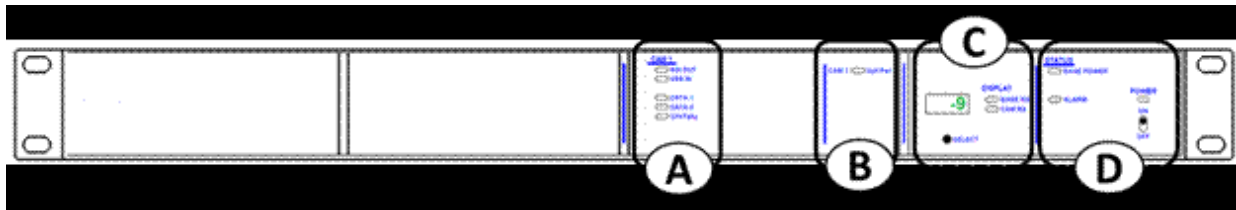
The variations for the internally powered Base Station and the powered version of the Camera Unit are described following the 12 Volt versions. Characteristics that are unique to the two link 12 Volt Base Stations are also described. The two link rack mounted Camera Units operate similarly to the two link unit Base Stations.

- [T-POV 301 Base Unit](#) on page 22
- [T-POV 301 Camera Unit](#) on page 31

## T-POV 301 Base Unit

- [Base Unit Front Panel Detail](#) on page 22
- [T-POV 301 Multiple Unit Detail](#) on page 26
- [T-POV 301 Powered Unit Detail](#) on page 27

## Base Unit Front Panel Detail



*Fig. 3-1: T-POV 301 Base Station Front Panel*

The T-POV Base Station Front Panel has four features:

- **A: Signal Indicator LEDs** (see [Area A - Signal Indicator LEDs](#) on page 23)
- **B: Optical Power Indicator LED** (see [Area B - Optical Power Indicator LED](#) on page 23)
- **C: Signal Strength & System Setup Display** (see [Area C - Signal Strength & System Setup Display](#) on page 24)
- **D: Power/Status Indicators and Power Switch** (see [Area D - Power/Status Indicators and Power Switch](#) on page 25)

### Area A - Signal Indicator LEDs

The five LED indicators in this area monitor the various signals being sent to and from the Camera Unit. LEDs will glow Green when a signal is present.

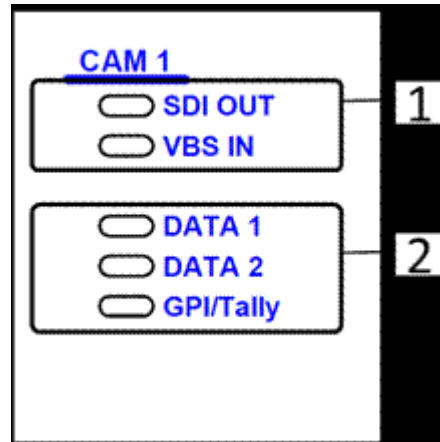


Fig. 3-2: Signal Indicator LEDs

- **1: SDI OUT** - monitors camera video signal returning from the Camera Unit to the Base Station
  - **VBS IN** - monitors the black burst/sync signal or return video signal being sent to the Camera Unit
- **2: DATA 1** - monitors data activity on Data Path 1
  - **DATA 2** - monitors data activity on Data Path 2
  - **GPI/Tally** - monitors GPI/Tally signal activity

### Area B - Optical Power Indicator LED



Fig. 3-3: Optical Power Indicator LED

**Opt Pwr** - When the LED is lit Green, this indicates that the Optical link between the base station and the camera unit is locked and functioning.

The LED will turn Red if there is a problem with the Optical Link at the Base Station. The LED will turn Amber if there is a problem at the Camera Unit.

### Area C - Signal Strength & System Setup Display

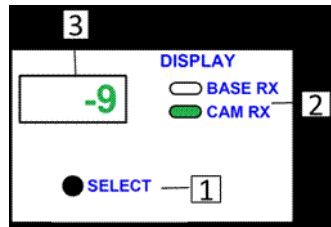


Fig. 3-4: Signal Strength & System Setup Display

- **1: SELECT** - selects between three modes of operation. When power is turned on, the unit defaults to BASE RX display mode.
  - **BASE RX** - indicates display mode is Optical Link signal strength received at Base Station from Camera Unit
  - **CAM RX** - indicates display mode is Optical Link signal strength received at Camera from Base Station
  - **DIAGNOSTIC** - displays various alphanumeric readouts

---

**Note:** Pushing and holding the SELECT button will enter diagnostics mode, while a quick push will return to the Base Station display. Only Base Station diagnostics appear on the Base Station; you must be at the camera unit for camera unit diagnostics. The ALARM STATUS LED (see [Area D - Power/Status Indicators and Power Switch](#) on page 25) will light Amber if there is a problem with the Camera Unit.

---

- **2: DISPLAY** - indicates which unit Optical Link level is being displayed. Neither LED is lit when the unit is in diagnostics mode.
- **3: Digital Display** - indicates Optical Link signal strength in dBm units. Also diagnostic information when Base Station is in diagnostics modes.

For additional information on both measuring optical link strength and T-POV diagnostics, see [A Brief Guide to Measurement of Fiber Optic Signal Strength](#) on page 86 and [The T-POV Base Station Digital Display](#) on page 87.

## Area D - Power/Status Indicators and Power Switch

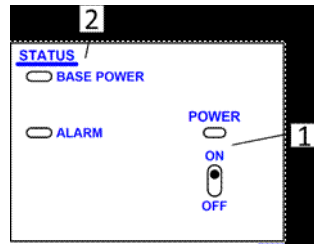


Fig. 3-5: Power/Status Indicators and Power Switch

- **1: POWER** - power indicator lights Green when the power switch is toggled on. Indicates that power supply levels are good.
- **2: STATUS:**
  - **BASE POWER** - monitors power levels on all circuit boards within the Base Station. If any internal power levels are incorrect the LED will light Red.
  - **ALARM** - lights Red if there is a temperature, power, hardware or firmware fault in the base unit system. The indicator will light Amber if there is a fault at the Camera Unit.

## T-POV 301 Multiple Unit Detail

The T-POV 301 Multiple Unit Base Station differs from the single unit model in that there are additional LED indicator columns for Camera 2 in Area A and additional Optical Power indicators in Area B. Component operation differences are noted below.

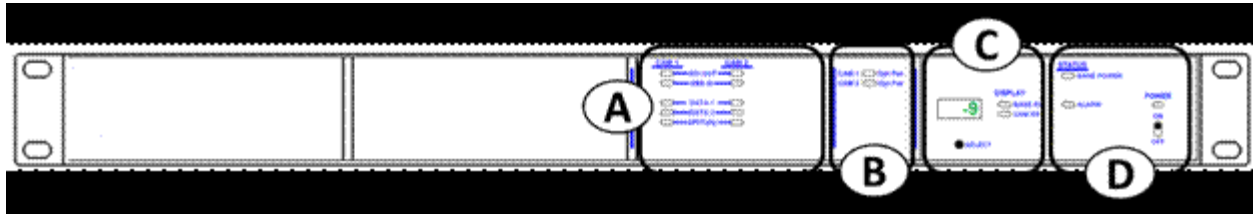


Fig. 3-6: T-POV 301 Multiple Unit Base Station

### AREA A

The indicator AREA A in the two unit Base Station operates identically to that of a single unit model (see [Area A - Signal Indicator LEDs](#) on page 23). The indicator LEDs monitor functions independently of each other.

### AREA B

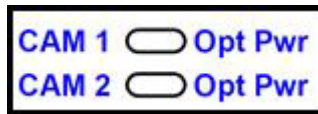


Fig. 3-7: T-POV 301 Multiple Unit Base Station -- Area B

The **Opt Pwr** indicators illuminate as the Select button is toggled through the two Camera Units. The indicators will light Red if there is no optical connection. A blinking Opt Pwr LED indicates that a camera link optical power level is being displayed on the Digital Display in Area C.

### AREA D

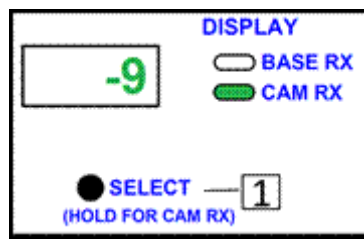


Fig. 3-8: T-POV 301 Multiple Unit Base Station -- Area D

**SELECT** button chooses between three modes of operation.

When the Base Station is powered on, Base Station optical power is displayed. The first push of the **SELECT** button will select CAM 1; the second push will select CAM 2.

Pushing and holding the **SELECT** button will enter the diagnostics mode for the device currently being displayed.



## T-POV 301 Powered Unit Detail

The T-POV 301 Powered Unit base station is delivered with one Optical Link unit. The physical configuration differs from the 12 Volt model in that the Optical Link unit with its power supply occupies one-half of the rack mount chassis and the Camera 1 unit is placed on the left side of the chassis. The term Hybrid Power refers to the integration of 95 Watts of 12 Volt power into the fiber optic cable.

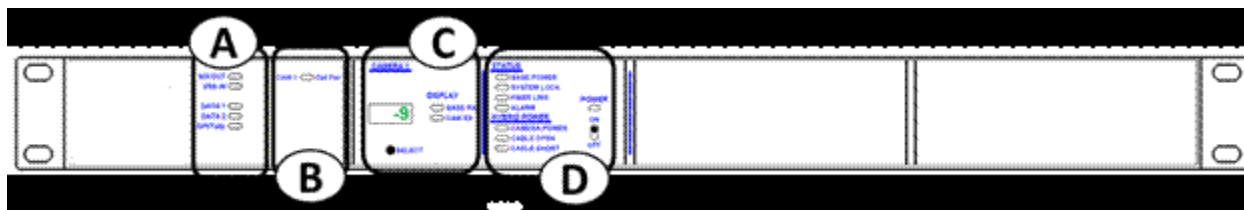


Fig. 3-9: T-POV 301 Powered Unit base station

The T-POV Powered Base Station Front Panel has five features:

- **A: Signal Indicator LEDs**
- **B: Optical Power Indicator LED**
- **C: Signal Strength & System Setup Display**
- **D: Power/Status Indicators and Power Switch**

### Area D

Areas A through C function identically to that of the 12 Volt version of the T-POV Base Station. The differences are in Area D - the Power/Status Indicators and Power Switch.

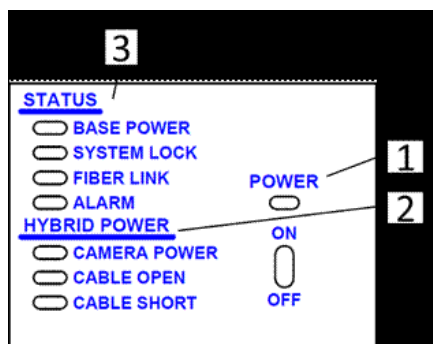


Fig. 3-10: T-POV 301 Powered Unit base station -- Area D

- **1: POWER** - lights Red when the AC power main switch on the rear of the unit is turned on and the front power switch is off. The indicator lights Green when the front panel power switch is toggled on.

With a powered system (power supplied by the Base Station) this switch will control power to the Camera Unit

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

- **2: HYBRID POWER INDICATORS**
  - **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.
- **3: 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
    - **Amber** when either the Base Station or camera optical power are not within a normal range
  - **ALARM** - Indicator will light Red if there is a temperature, power, hardware or firmware fault in the base unit system. The indicator will light Amber if there is a fault at the Camera Unit.
    - **Red** if there is a Base Station error. Refer to the Base Station DIAG for details on the error.
    - **Amber** if there is a camera error. Refer to CAM DIAG for details for the error.

## T-POV 301 Base Unit Rear Panel Detail

The Base Unit rear panel Area diagram is repeated for reference. In multi-unit Base Stations camera one is on the left next to the power and fiber connector section. Camera two is to the right of camera one and camera three is to the right of camera two (if so equipped).

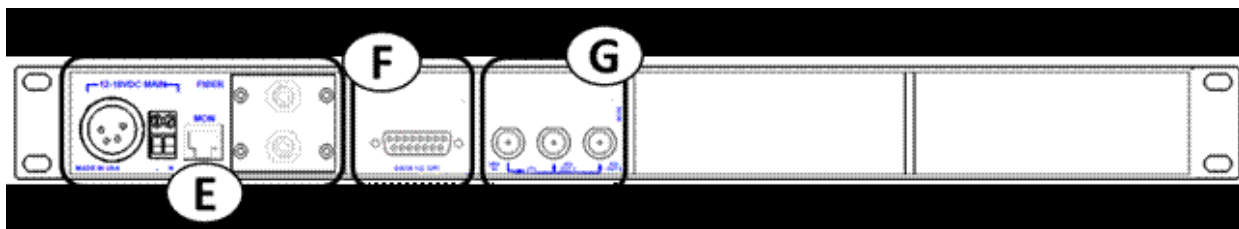


Fig. 3-11: T-POV 301 Base Station Rear/Connector Panel

The T-POV Base Station Connector Panel has four features:

- **E:** Power Section and Fiber Connector(s)
- **F:** Data/GPI-Tally Connector
- **G:** Video Connectors

### Area E - Power Section and Fiber Connector(s)

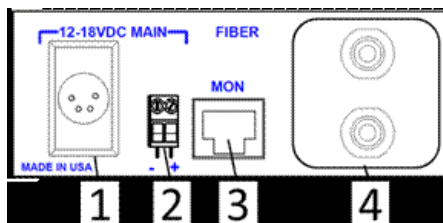


Fig. 3-12: T-POV 301 Base Station Rear/Connector Panel -- Area E

12 Volt models have a single power supply/fiber connection area regardless of the number of Optical Link units configured

#### 12 Volt Power Models

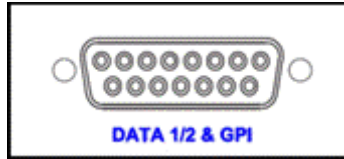
- **1:** 12V DC External Power Supply input connector (XLR 4 Pin) -  
For use with an external power supply such as the ADAP-AC-04  
See [Connector Wiring and Connection](#) on page 102 for connection details
- **2:** 12V DC Input - terminal block  
For use in rack mounted installations as an option to an external "brick" type power supply. See [Connector Wiring and Connection](#) on page 102 for connection details
- **3:** For Future Use
- **4:** ST Connectors

#### 95 Watt Powered Models

- **5:** AC Power Receptacle  
100-240V 50/60 Hz

- **6:** 4 AMP Dual Fuse Assembly  
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.
- **7:** AC Mains Power Switch - this must be turned on in order for the front panel power switch to work
- **8:** SMPTE 304M Fiber Connector (Powered)

### Area F - Data/GPI-Tally Connectors

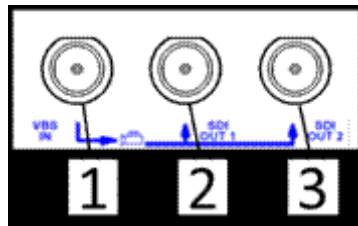


*Fig. 3-13: T-POV 301 Base Station Rear/Connector Panel -- Area F*

DATA 1/2 & GPI - Provides up to two bi-directional data feeds and a GPI feed. Available are RS232, RS422 and RS485 data formats.

For configuration and wiring information on all data & GPI connections please see [Connector Wiring and Connection](#) on page 102.

### Area G - Video Connectors



*Fig. 3-14: T-POV 301 Base Station Rear/Connector Panel -- Area G*

- **1:** VBS IN - Video black burst/sync or return video to Camera unit
- **2 & 3:** SDI OUT 1 & 2 - SDI Video signal coming from Camera Unit

## T-POV 301 Camera Unit

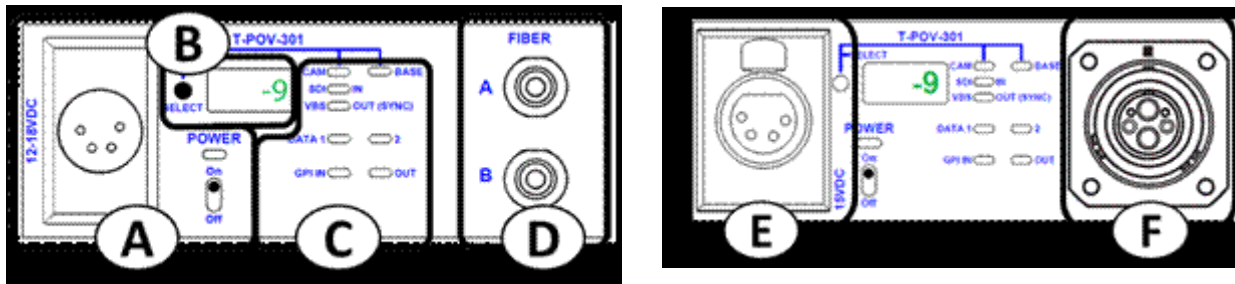


Fig. 3-15: T-POV 301 Camera Unit Front Panel

The T-POV 301 Camera Unit Front Panel has six features:

- **A: Power Section** (12 Volt Type)
- **B: Optical Power Strength and Diagnostic Display**
- **C: Signal Indicator LEDs**
- **D: ST Fiber Connectors**
- **E: 12-15 VDC Power Output** (AC Powered Version only)
- **F: SMPTE 304M Fiber Connector** ("Wet" with 95 Watts of 12 Volt power available)

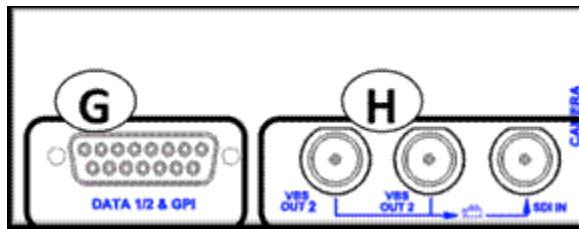


Fig. 3-16: T-POV 301 Camera Unit Front Panel

The T-POV 301 Camera Unit Rear Panel has two features:

- **G: Data/GPI-Tally Connector**
- **H: Video Connectors**

The T-POV Camera Unit rear panel is identical in the 12 Volt and Powered versions.

## T-POV 301 Camera Unit Front Panel Detail - 12 Volt Model

### Area A - Power Section (12 Volt Type)

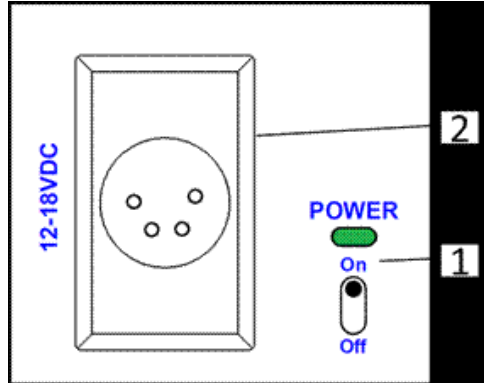


Fig. 3-17: T-POV 301 Camera Unit Front Panel -- Area A

- **1: POWER** - lights Green when the power switch is toggled on.
- **2: 12-18 VDC Power Connection** - 4-Pin XLR Female chassis connector for use with an external power supply such as the ADAP-AC-04 or equivalent

### Area B - Optical Power Strength and Diagnostic Display

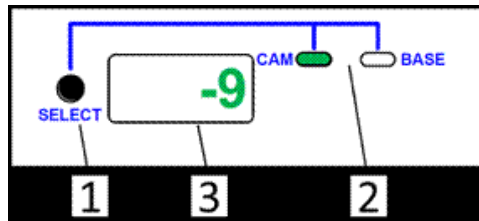


Fig. 3-18: T-POV 301 Camera Unit Front Panel -- Area B

- **1: DISPLAY SELECT** - push button chooses between three modes of operation  
When power is turned on, the Camera Unit optical power is first displayed. The first push of the select button will select the Base Station  
Pushing and holding the SELECT button will enter diagnostics, otherwise a quick push will return to the camera unit display.
- **2: CAM/BASE Indicators** - LEDs indicate which unit Optical Power is displayed.  
Neither LED is on when the display is in diagnostics mode.
- **3: DISPLAY** - optical power is displayed in dBm units and diagnostic information is alphanumeric. Only Camera Unit diagnostics can be viewed at the Camera Unit (Base Station diagnostics are not available at the Camera Unit)

For more information on measuring optical power and using system diagnostics please see [A Brief Guide to Measurement of Fiber Optic Signal Strength](#) on page 86 and [The T-POV Base Station Digital Display](#) on page 87.

### Area C - Signal Indicator LEDs

The eight LED indicators in this area monitor the various signals being sent to or from the Camera Unit. LEDs will light Green when a signal is present.

Note: LEDs labeled "IN" indicate signals coming into the camera unit. LEDs labeled "OUT" indicate signals coming out of the Base Station. If there is neither "IN" or "OUT" associated with an LED then activity in either the Camera Unit and Base Station is indicated

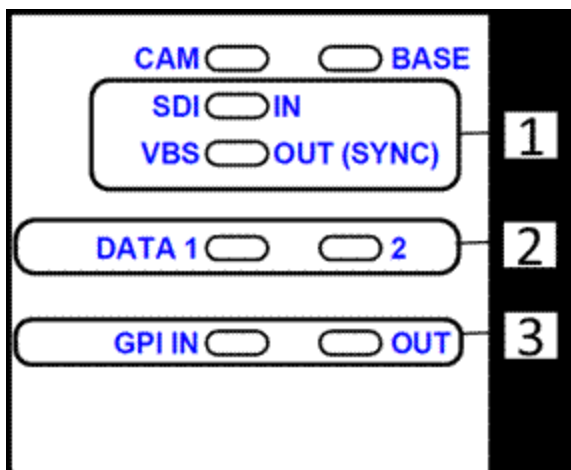


Fig. 3-19: T-POV 301 Camera Unit Front Panel -- Area C

- **1: SDI IN** - monitors camera video signal to the Base Station  
**VBS OUT (SYNC)** - monitors the black burst/sync signal or return video signal being sent to the camera
- **2: DATA** - monitors the two data channels available with the T-POV.
- **3: GPI** - monitors GPI/Tally pulse to and from Camera Unit

### Area D - Fiber Connectors - "Dry" Unpowered Connectors

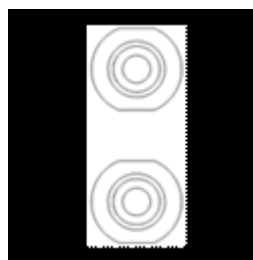


Fig. 3-20: T-POV 301 Camera Unit Front Panel -- Area D

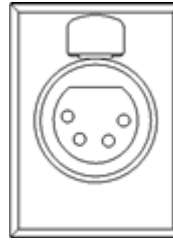
**FIBER CONNECTORS** - Shown are 2 ST connectors. Can be any available unpowered Fiber Connector depending on user requirements and number of camera units installed.

For additional information please see [Fiber Cable Concepts](#) on page 10 on Fiber Connectors and [Product Ordering/Model Information](#) on page 4 regarding ordering information.

## T-POV 301 Camera Unit Front Panel Detail - Powered Model

The T-POV 301 Powered Camera Unit receives power from the Base Station over the Hybrid Fiber Cable connection. The 12 Volt and Powered version of the T-POV 301 operate identically with two exceptions. The powered version provides a 12-15 Volt output for camera and accessory power and the Fiber Connection must of necessity be a Hybrid Fiber Cable connection.

### Area E - 12-15 VDC Power Output



*Fig. 3-21: T-POV 301 Camera Unit Front Panel -- Area E*

**12-15 VDC Power Output** - provides up to 95 Watts of 12 Volt power for the camera or accessories. Please ensure that the total power drain on this source is no more than 95 Watts.

For connector wiring information, see [Connector Wiring and Connection](#) on page 102

### Area F - Fiber Connector



*Fig. 3-22: T-POV 301 Camera Unit Front Panel -- Area F*

**Fiber Connector** - SMPTE 304M Hybrid power fiber connection carries signals to and from the Base Station and 95 Watts of 12 Volt power from the base station.



## T-POV 301 Camera Unit Rear Panel Detail

The Camera Unit rear panel Area diagram is repeated for reference.

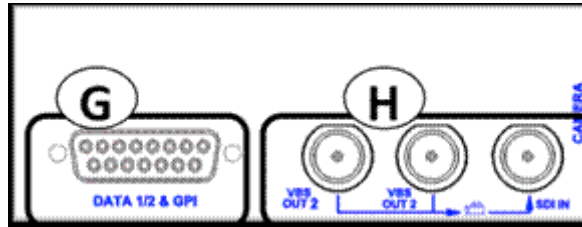


Fig. 3-23: T-POV 301 Camera Unit Rear Panel

The T-POV 301 Camera Unit Rear Panel has three features:

- **G: Data/GPI-Tally Connector**
- **H: Video Connectors**

The rear connector panels of all versions of the T-POV 301 Camera Unit are identical in physical configuration and in function.

### Area G - Data/GPI-Tally Connectors



Fig. 3-24: T-POV 301 Camera Unit Rear Panel -- Area G

**DATA 1/2 & GPI** - provides up to two bi-directional data feeds and a GPI/Tally connection. Available data formats are RS232, RS422, and RS485.

For configuration and wiring information on all data & GPI connections please see [Connector Wiring and Connection](#) on page 102.

### Area H - Video Connectors

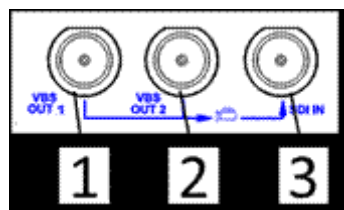


Fig. 3-25: T-POV 301 Camera Unit Rear Panel -- Area H

- **1 & 2 - VBS OUT 1 & 2:** video black burst/sync or return video to Camera Unit
- **3 - SDI IN:** SDI Video signal coming from Camera Unit



# 4

## T-POV 324 Components

This chapter describes the components in the 324 model of the T-POV Bidirectional Robotic Camera system.

<i>About the Camera Link System Components</i> .....	38
<i>T-POV 324 Base Unit</i> .....	38
<i>T-POV 324 Camera Unit</i> .....	48

## About the Camera Link System Components

The T-POV 324 Robotic Camera Link Base Station and Camera Unit come in both portable and rack mount configurations. In this chapter, the system components are described using a single unit rack mounted base station with external 12 Volt power and a standard Mini-Mussel Shell version of the Camera Unit also with external 12 Volt power.

The variations for the internally powered Base Station and the powered version of the Camera Unit are described following the 12 Volt versions. Characteristics that are unique to the two-link 12 Volt Base Stations are also described. The two link rack mounted Camera Units operate similarly to the two link unit Base Stations.

- [T-POV 324 Base Unit](#) on page 38
- [T-POV 324 Camera Unit](#) on page 48

### T-POV 324 Base Unit

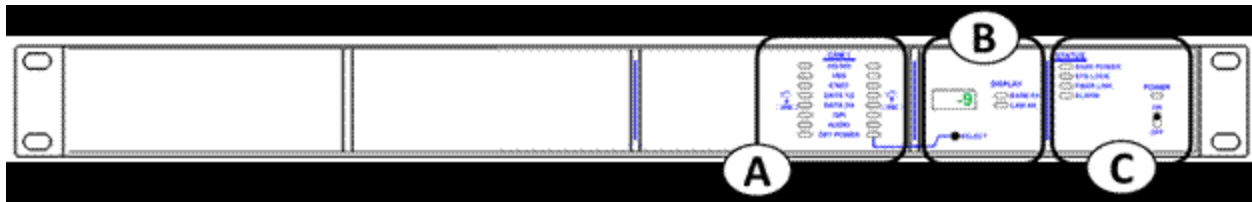


Fig. 4-1: T-POV 324 Base Unit

The T-POV Base Station Front Panel has three features:

- **A: Signal Indicator & Optical Power LEDs**
- **B: Signal Strength & System Setup Display**
- **C: Power/Status Indicators and Power Switch**

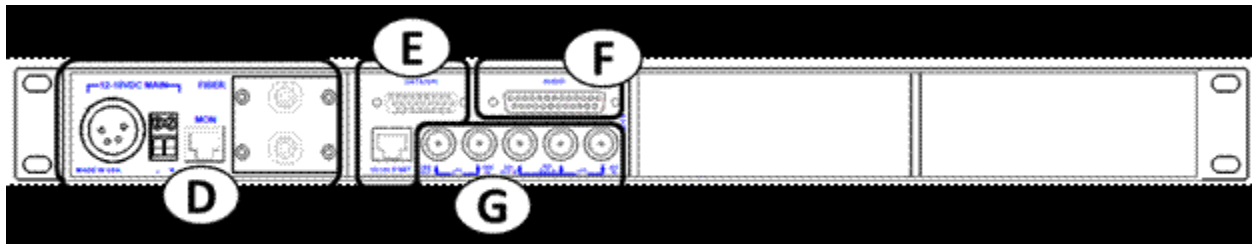


Fig. 4-2: T-POV 324 Base Unit

The T-POV Base Station Connector Panel has four features:

- **D: Power Section and Fiber Connector(s)**
- **E: Data/GPI-Tally/Ethernet Connectors**
- **F: Audio Multi-Pin Connector**
- **G: Video Connectors**

## T-POV 324 Base Unit Front Panel Detail

### Area A - Signal Indicator LEDs

The 16 LED indicators in this area monitor the various signals being sent from the Camera Unit. LEDs will glow Green when a signal is present.

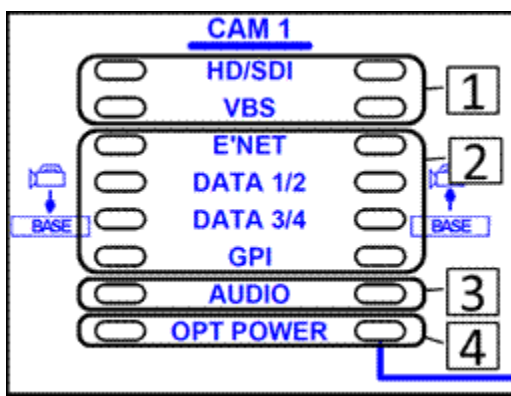
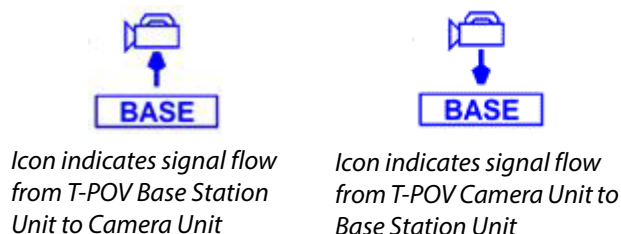


Fig. 4-3: Signal Indicator LEDs

- **1: SDI OUT:** monitors camera video signal returning from the camera unit
  - **VBS IN:** monitors the black burst/sync signal or return video signal being sent to the camera
- **2: E'NET:** monitors data activity on the Ethernet connection
  - **DATA 1/2:** Monitors data activity on Data Paths 1 and 2
  - **DATA 3/4:** Monitors data activity on Data Path 3
  - **GPI:** Monitors GPI/Tally signal activity
- **3: AUD-** monitors audio activity. All audio is at line level and signals on any of the four audio channels will activate the LED.
- **4: OPT POWER**
  - **Green:** indicates that the Optical link between the base station and the camera unit is locked and functioning.
  - **Red:** indicates there is a problem with the Optical Link at the Base Station.
  - **Amber:** indicates there is a problem at the Camera Unit.

## Area B - Signal Strength & System Setup Display

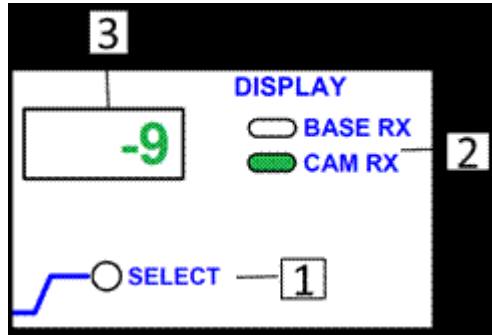


Fig. 4-4: Signal Strength & System Setup Display

- **1: SELECT:** selects between three modes of operation. When power is turned on, the unit defaults to BASE RX display mode
  - **BASE RX:** indicates display mode is Optical Link signal strength received at Base Station from Camera Unit
  - **CAM RX:** indicates display mode is Optical Link signal strength received at Camera from Base Station
  - **DIAGNOSTIC:** indicated by Digital Display showing various alphanumeric readouts (see [The T-POV Base Station Digital Display](#) on page 87)

Pushing and holding the SELECT button will enter diagnostics, while a quick push will return to the base station display. Only base station diagnostics appear on the base station; you must be at the camera unit for camera unit diagnostics.

The **ALARM** status (see [Area C - Power/Status Indicators and Power Switch](#) on page 41) will light Amber if there is a problem with the Camera Unit.

- **2: DISPLAY:** indicates which unit Optical Link level is being displayed. Neither LED is lit when the unit is in diagnostics mode.
- **3: Digital Display:** indicates Optical Link signal strength in dBm units. Also diagnostic information when Base Station is in diagnostics modes.

For additional information on both measuring optical link strength and T-POV diagnostics, see [A Brief Guide to Measurement of Fiber Optic Signal Strength](#) on page 86 and [The T-POV Base Station Digital Display](#) on page 87.

## Area C - Power/Status Indicators and Power Switch

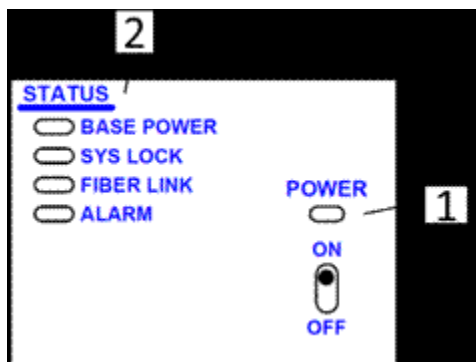


Fig. 4-5: Power/Status Indicators and Power Switch

- **1: POWER:** Power indicator lights Green when the power switch is toggled on.
- **2: STATUS**
  - **BASE POWER:** indicates the status of all power levels in the Base Station
    - **Green:** all power levels are normal.
    - **Red:** any power level is not normal.
  - **SYSTEM LOCK:** indicates that the Base Station is communicating with the Camera Unit.
    - **Green:** Base Station is communicating with Camera Unit
    - **Red:** Base Station is not communicating with the Camera Unit
  - **FIBER LINK:** indicates the optical power status of the Base Station and camera
    - **Green:** both the Base Station and camera optical power are within a normal range.
    - **Red:** both the Base Station and camera optical power are not within a normal range
    - **Amber:** either the Base Station or camera optical power are not within a normal range
  - **ALARM**
    - **Red:** there is a temperature, power, hardware or firmware fault in the base unit system.
    - **Amber:** there is a fault at the Camera Unit.

For more information on these error messages, see [The T-POV Base Station Digital Display](#) on page 87

## T-POV 324 Multiple Unit Detail

The T-POV 324 Multiple Unit Base Station differs from the single unit model in that there are additional LED indicator columns in Area A. Component operation differences are noted below.

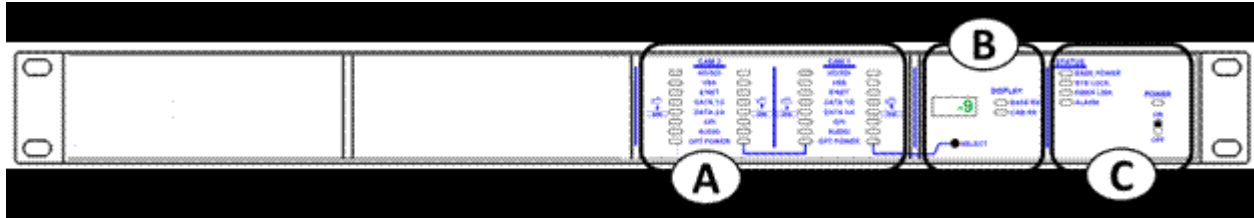


Fig. 4-6: T-POV 324 Multiple Unit

### AREA A

The indicator AREA A in the two unit Base Station operates identically to that of a single unit model (see [Area A - Signal Indicator LEDs](#) on page 39). The indicator LEDs monitor their functions independently of each other.

### AREA B

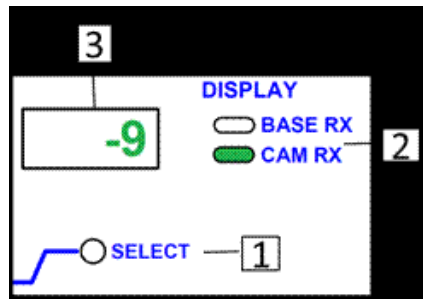


Fig. 4-7: T-POV 324 Multiple Unit Detail -- Area B

SELECT button (1) chooses between three modes of operation and between two or three camera units, depending on how many camera units are installed in the base station

When the Base Station is powered on, Base Station optical power is displayed.

- The first push of the select button will select CAM 1.
- The second push will select BASE 1.
- The third push will select CAM 2.
- The fourth push will select BASE 2.
- Pushing and holding the SELECT button will enter the diagnostics mode for the device currently being displayed.



## T-POV 324 Powered Unit Detail

The T-POV 324 Powered Unit base station is delivered with one Optical Link unit. The physical configuration differs from the 12 Volt model in that the Optical Link unit with its power supply occupies one-half of the rack mount chassis and the Camera 1 unit is placed on the left side of the chassis. The term Hybrid Power refers to the integration of 95 Watts of 12 Volt power into the fiber optic cable.

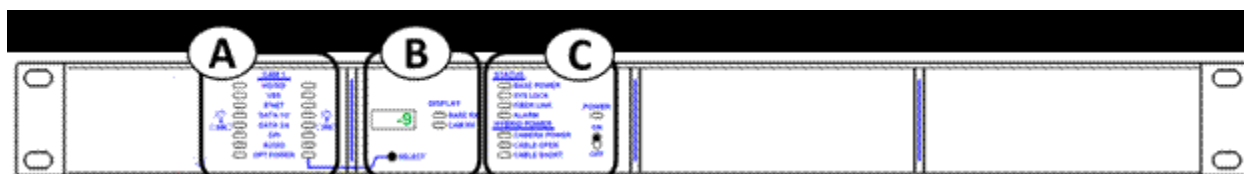


Fig. 4-8: T-POV 324 Powered Unit

The T-POV Powered Base Station Front Panel has three features:

- **A: Signal Indicator LEDs**
- **B: Signal Strength & System Setup Display**
- **C: Power/Status Indicators and Power Switch**

### Area A & B

Areas A and B function identically to that of the 12 Volt version of the T-POV Base Station (see [T-POV 324 Camera Unit Front Panel Detail - 12 Volt Model](#) on page 49). The differences are in Area C - the Power/Status Indicators and Power Switch.

### Area C

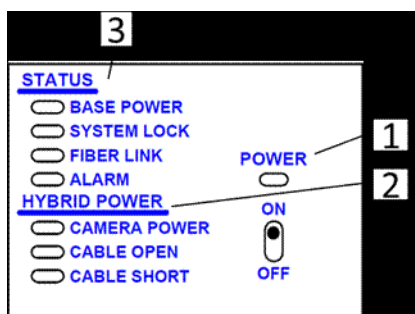


Fig. 4-9: T-POV 324 Powered Unit -- Area C

- **1: POWER:** lights Red when the AC power main switch on the rear of the unit is turned on and the front power switch is Off. The indicator lights Green when the front panel power switch is toggled On.
  - With a powered system (power supplied by the Base Station), this switch will control power to the Camera Unit
  - For the hybrid system to be powered on, the AC Mains switch on the rear of Base Station must be in the on position.
- **2: HYBRID POWER INDICATORS**
  - **CAMERA POWER:** indicates that high voltage is applied to power the camera.

- **Green:** 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:** the cable is properly connected from the Base Station to the camera.
  - **Red:** 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.
- **3: STATUS INDICATORS**
  - **BASE POWER:** indicates the status of all power levels in the Base Station
    - **Green:** all power levels are normal.
    - **Red:** any power level is not normal.
  - **SYSTEM LOCK:** indicates that the Base Station is communicating with the Camera Unit.
    - **Green:** Base Station is communicating with Camera Unit.
    - **Red:** Base Station is not communicating with the Camera Unit.
  - **FIBER LINK:** indicates the optical power status of the Base Station and camera
    - **Green:** both the Base Station and camera optical power are within a normal range.
    - **Red:** both the Base Station and camera optical power are not within a normal range
    - **Amber:** either the Base Station or camera optical power are not within a normal range.
  - **ALARM:** indicator will light Red if there is a temperature, power, hardware or firmware fault in the base unit system. The indicator will light Amber if there is a fault at the Camera Unit.
    - **Red:** there is a Base Station error. Refer to the Base Station DIAG for details on the error.
    - **Amber:** there is a camera error. Refer to CAM DIAG for details for the error.

## T-POV 324 Base Unit Rear Panel Detail

The Base Unit rear panel Area diagram is repeated for reference.

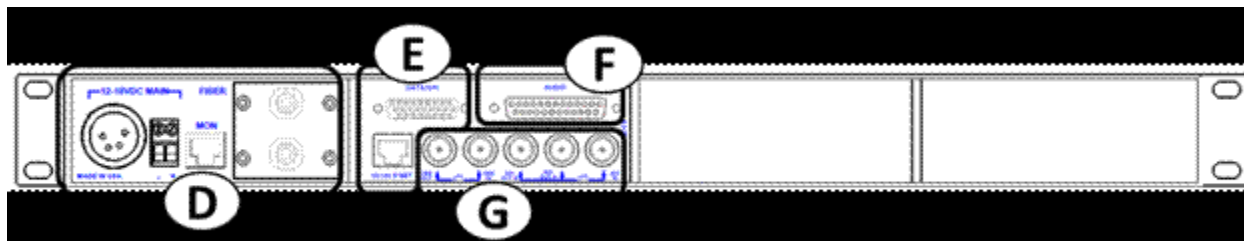


Fig. 4-10: T-POV 324 Base Unit Rear Panel

The T-POV Base Station Connector Panel has four features:

- **D: Power Section and Fiber Connector(s)**
- **E: Data/GPI-Tally Connectors & Ethernet**
- **F: Audio Multi-Pin Connector**
- **G: Video Connectors**

### Area D- Power Section and Fiber Connector(s)

12 Volt models have a single power supply/fiber connection area regardless of the number of Optical Link units configured.

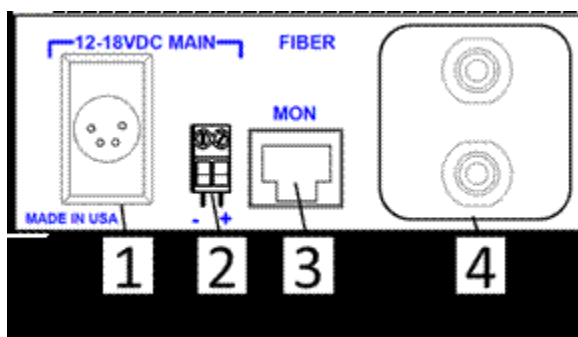


Fig. 4-11: T-POV 324 Base Unit Rear Panel -- Area D

### 12 Volt Power Models

- **1: 12V DC External Power Supply input connector (XLR 4 Pin)**  
For use with an external power supply such as the ADAP-AC-04. See [Connector Wiring and Connection](#) on page 102 for connection details.
- **2: 12V DC Input - terminal block**  
For use in rack mounted installations as an option to an external "brick" type power supply. See [Connector Wiring and Connection](#) on page 102 for connection details.
- **3: For future use**
- **4: ST Connectors**

### 95 Watt Powered Models

Powered models have either one or two AC power/fiber connection areas depending on the number of optical link units installed.

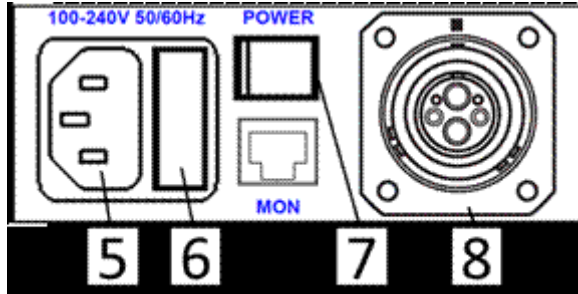


Fig. 4-12: T-POV 324 Base Unit Rear Panel -- 95 Watt Model

- **5: AC Power Receptacle:** 100-240V 50/60 Hz
- **6: 4 AMP Dual Fuse Assembly:** 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.
- **7: AC Mains Power Switch:** this must be turned on for the front panel power switch to work
- **8: SMPTE 304M Fiber Connector (Powered)**

### Area E - Data/GPI-Tally Connectors & Ethernet

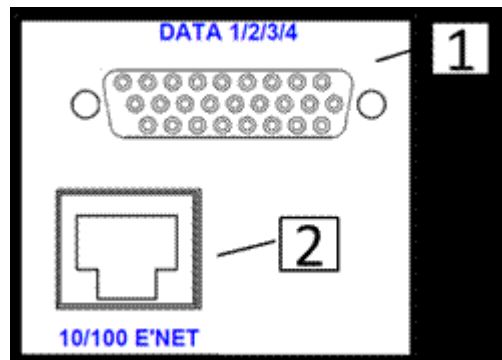


Fig. 4-13: T-POV 324 Base Unit Rear Panel -- Area E

- **1: DATA 1/2/3/4:** provides up to four bi-directional data feeds. Available are Rs232, RS422 and RS485 data formats.
- **2: 10/100 E'NET:** provides an Ethernet connection to the Camera Unit for data or any network protocol controlled device such as a camera remote control.

Ethernet port is limited to 100BaseT connections. For configuration and wiring information on all data & GPI connections, see [Connector Wiring and Connection](#) on page 102.

### Area F - Audio Multi-Pin Connector

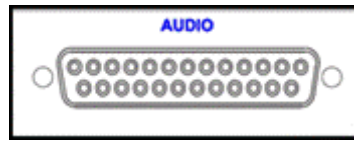


Fig. 4-14: T-POV 324 Base Unit Rear Panel -- Area F

**AUDIO:** multipin connector provides four line level audio signals in to camera unit, and for four line level audio signals returning from camera unit.

For audio configuration and wiring information connections, see [Connector Wiring and Connection](#) on page 102.

### Area G - Video Connectors

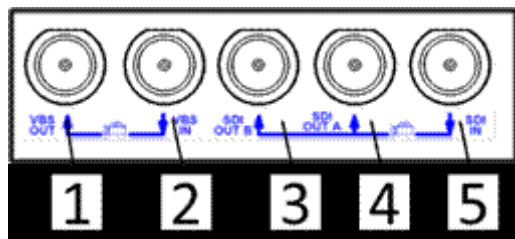


Fig. 4-15: T-POV 324 Base Unit Rear Panel -- Area G

- **1: VBS Out:** VBS video from Camera Unit
- **2: VBS In:** VBS Video feed from Base Station to Camera Unit
- **3 & 4: SDI Out A & B:** two SDI outs of Camera video from Camera Unit
- **5: SDI IN:** return video feed to Camera Unit from Base Station

## T-POV 324 Camera Unit

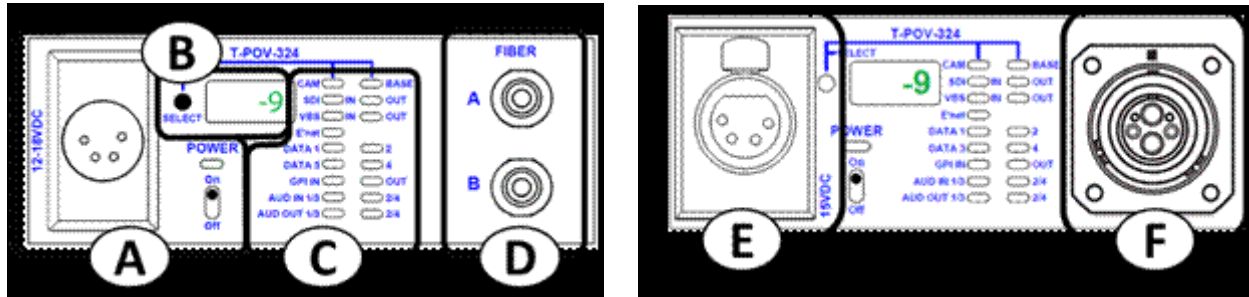


Fig. 4-16: T-POV 324 Camera Unit Front Panel

The T-POV 324 Camera Unit Front Panel has six features:

- **A: Power Section** (12 Volt Type)
- **B: Optical Power Strength and Diagnostic Display**
- **C: Signal Indicator LEDs**
- **D: ST Fiber Connectors**
- **E: 12-15 VDC Power Output** (AC Powered models only)
- **F: SMPTE 304M Fiber Connector** ("Wet" with 95 Watts of 12 Volt power available)

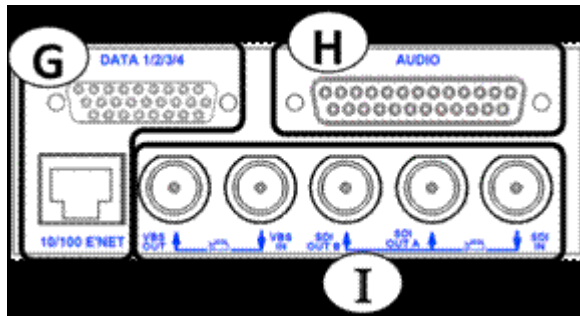


Fig. 4-17: T-POV 324 Camera Unit Front Panel

The T-POV 324 Camera Unit Rear Panel has three features:

- **G: Data & Ethernet Connectors**
- **H: Audio Multi-Pin Connector**
- **I: Video Connectors**

The T-POV Camera Unit rear panel is identical in the 12 Volt and Powered versions.

## T-POV 324 Camera Unit Front Panel Detail - 12 Volt Model

### Area A - Power Section (12 Volt Type)

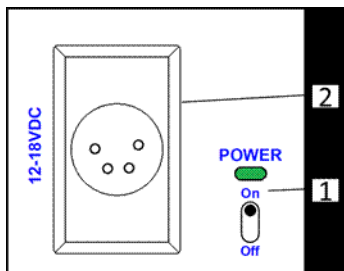


Fig. 4-18: T-POV 324 Camera Unit Front Panel -- 12 Volt Model

- **1: POWER:** lights Green when the power switch is toggled on.
- **2: 12-18 VDC Power Connection:** 4-Pin XLR Female chassis connector for use with an external power supply (such as the ADAP-AC-04 or equivalent).

### Area B - Optical Power Strength and Diagnostic Display

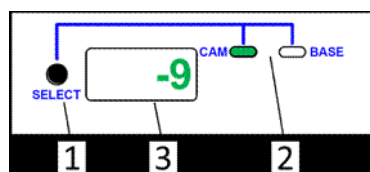


Fig. 4-19: T-POV 324 Camera Unit Front Panel -- Area B

- **1: DISPLAY SELECT:** chooses between three modes of operation.  
When power is turned on, the Camera Unit optical power appears first. The first push of the select button selects the Base Station.  
Pushing and holding the SELECT button will enter diagnostics mode, while a quick push will return to the camera unit display.
- **2: CAM/BASE Indicators:** LEDs indicate which unit Optical Power is displayed. Neither LED is on when the display is in diagnostics mode.
- **3: DISPLAY:** optical power is displayed in dBm units and diagnostic information is alphanumeric. Only Camera Unit diagnostics can be viewed at the Camera Unit (Base Station diagnostics are not available at the Camera Unit).  
For more information on measuring optical power and using system diagnostics, see [A Brief Guide to Measurement of Fiber Optic Signal Strength](#) on page 86 and [The T-POV Base Station Digital Display](#) on page 87.

### Area C - Signal Indicator LEDs

The 17 LED indicators in this area monitor the various signals being sent to or from the Camera Unit. LEDs will light Green when a signal is present.

**Note:** LEDs labeled "IN" indicate signals coming into the camera unit. LEDs labeled "OUT" indicate signals coming out of the Base Station. If there is neither "IN" or "OUT" associated with an LED then activity in either the Camera Unit and Base Station is indicated.

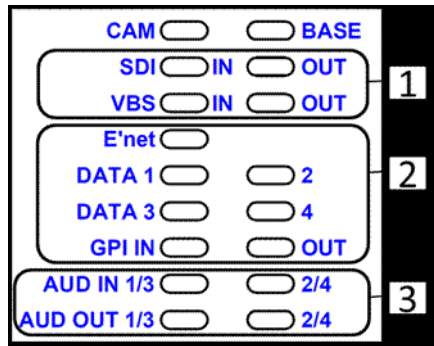


Fig. 4-20: T-POV 324 Camera Unit Front Panel -- Area C

- **1: SDI IN & OUT:** monitors SDI video signals to and from the Base Station
  - **VBS IN:** monitors the black burst/sync signal or return video signal being sent to the camera
  - **VBS OUT:** monitors the genlock signal or return video signal being sent to the base station
- **2: E'NET:** monitors data activity on the Ethernet connection
  - **DATA 1/2:** monitors data activity on Data Paths 1 and 2
  - **DATA 3/4:** monitors data activity on Data Path 3
  - **GPI:** Monitors GPI/Tally signal activity
- **3: AUDIO:**
  - the AUD IN 1/3 and 2/4 LEDs monitor line level audio coming to the Camera Unit
  - the AUD OUT 1/3 and 2/4 LEDs monitor line level audio going to the Base Station



## Area D - Fiber Connectors - "Dry" Unpowered Connectors



Fig. 4-21: T-POV 324 Camera Unit Front Panel -- Area D

**FIBER CONNECTORS** (shown are 2 ST connectors): can be any available unpowered Fiber Connector depending on user requirements and number of camera units installed. For additional information, see [Fiber Cable Concepts](#) on page 10 and [Product Ordering/Model Information](#) on page 4 regarding ordering information.

## T-POV 324 Camera Unit Front Panel Detail - Powered Model

The T-POV 324 Powered Camera Unit receives power from the Base Station over the Hybrid Fiber Cable connection. The 12 Volt and Powered version of the T-POV 324 operate identically with two exceptions. The powered version provides a 12-15 Volt output for camera and accessory power and the Fiber Connection must of necessity be a Hybrid Fiber Cable connection.

### Area E - 12-15 VDC Power Output

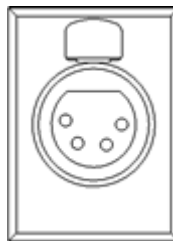


Fig. 4-22: T-POV 324 Camera Unit Front Panel -- Area E

**12-15 VDC Power Output:** provides up to 95 Watts of 12 Volt power for the camera or accessories. Please ensure that the total power drain on this source is no more than 95 Watts. For connector wiring information, see [Connector Wiring and Connection](#) on page 102.

### Area F - Fiber Connector



Fig. 4-23: T-POV 324 Camera Unit Front Panel -- Area f

**Fiber Connector:** SMPTE 304M Hybrid power fiber connection carries signals to and from the Base Station and 95 Watts of 12 Volt power from the base station.

### T-POV 324 Camera Unit Rear Panel Detail

The Camera Unit rear panel Area diagram is repeated for reference.

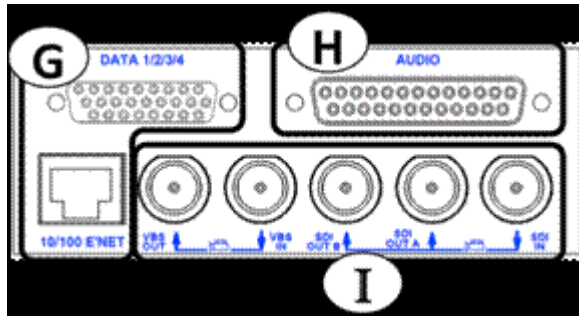


Fig. 4-24: T-POV 324 Camera Unit Rear Panel Detail

The T-POV 324 Camera Unit Rear Panel has three features:

- **G: Data & Ethernet Connectors**
- **H: Audio Multi-Pin Connector**
- **I: Video Connectors**

The rear connector panels of all versions of the T-POV 324 Camera Unit are identical in physical configuration and in function.

## Area G - Data/GPI-Tally Connectors

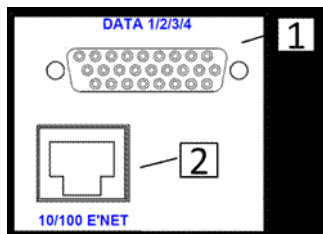


Fig. 4-25: T-POV 324 Camera Unit Rear Panel Detail -- Area G

- **1: DATA 1/2/3/4:** provides up to four bi-directional data feeds. Available are Rs232, RS422 and RS485 data formats.
- **2: 10/100 E'NET:** provides an Ethernet connection to the Base Unit for data or any network protocol controlled device such as a camera remote control. Ethernet port is limited to 100BaseT connections. For configuration and wiring information on all data & GPI connections, see [Connector Wiring and Connection](#) on page 102.

## Area H - Audio Multi-Pin Connector

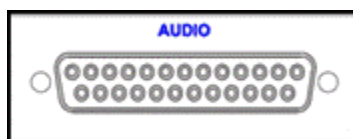


Fig. 4-26: T-POV 324 Camera Unit Rear Panel Detail -- Area H

**AUDIO:** multipin connector provides for four line level audio signals in to camera unit and for four line level audio signals returning from camera unit.

For configuration and wiring information on audio connections, see [Connector Wiring and Connection](#) on page 102.

## Area I - Video Connectors

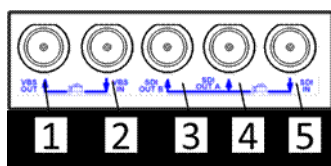


Fig. 4-27: T-POV 324 Camera Unit Rear Panel Detail -- Area I

- **1: VBS Out:** VBS video from Camera Unit
- **2: VBS In:** VBS Video feed from Base Station to Camera Unit
- **3 & 4: SDI Out A & B:** two SDI outs of Camera video from Camera Unit
- **5: SDI IN:** return video feed to Camera Unit from Base Station



# 5

## T-POV 3244 Components

This chapter describes the components in the 3244 model of the T-POV Bidirectional Robotic Camera system.

- About the Camera Link System Components* ..... 56
- T-POV 3244 Base Unit* ..... 56
- T-POV 3244 Camera Unit* ..... 65

## About the Camera Link System Components

The T-POV 3244 Robotic Camera Link Base Station and Camera Unit come in both portable and rack mount configurations. In this chapter, the system components are described using a single unit rack mounted base station with external 12 Volt power and a standard Mini-Mussel Shell version of the Camera Unit also with external 12 Volt power.

The variations for the internally powered Base Station and the powered version of the Camera Unit are described following the 12 Volt versions. Characteristics that are unique to the two-link 12 Volt Base Stations are also described. The two link rack mounted Camera Units operate similarly to the two link unit Base Stations.

- [T-POV 3244 Base Unit](#) on page 56
- [T-POV 3244 Camera Unit](#) on page 65

### T-POV 3244 Base Unit

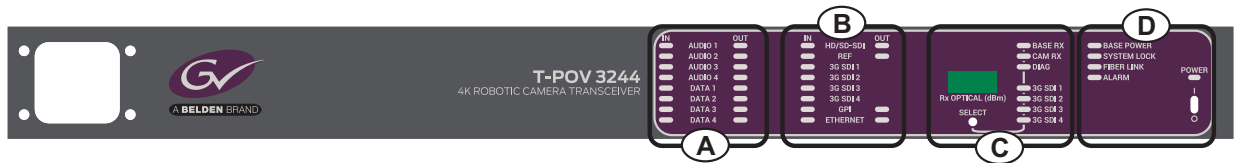


Fig. 5-1: T-POV 3244 Base Unit

The T-POV Base Station Front Panel has four features:

- **A: Signal Indicator & Optical Power LEDs**
- **B: Signal Strength & System Setup Display**
- **C: Signal Strength & System Setup Display**
- **D: Power/Status Indicators and Power Switch**

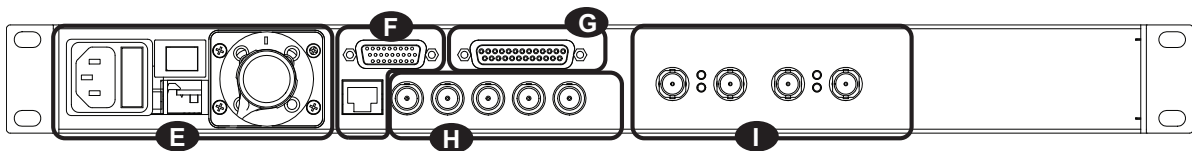


Fig. 5-2: T-POV 3244 Base Unit

The T-POV Base Station Connector Panel has five features:

- **E: Power Section and Fiber Connector(s)**
- **F: Data/GPI-Tally/Ethernet Connectors**
- **G: Audio Multi-Pin Connector**
- **H: Video Connectors**
- **I: Quad Link (4K) Video Connectors**

## T-POV 3244 Base Unit Front Panel Detail

### Area A - Signal Indicator LEDs

The 16 LED indicators in this area monitor the various signals being sent from the Camera Unit. LEDs will glow Green when a signal is present.

*"IN" indicates signal flow from T-POV Camera Unit to Base Station Unit*

*"OUT" indicates signal flow from T-POV Base Station Unit to Camera Unit*

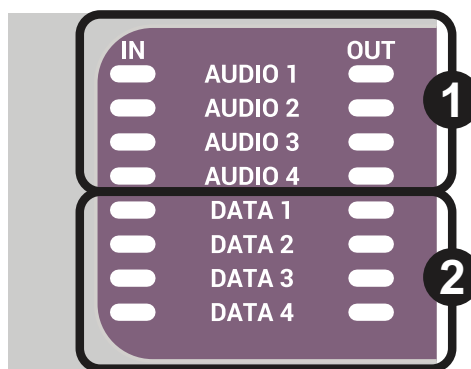


Fig. 5-3: Signal Indicator LEDs

- **1: AUDIO 1-4-** monitors audio activity for channel 1 to 4. All audio is at line level.
- **2: DATA 1-4:** monitors data activity on the Ethernet connection for Data Paths 1 to 4.

### Area B - Signal Indicator LEDs

The 10 LED indicators in this area monitor the various signals being sent from the Camera Unit. LEDs will glow Green when a signal is present.

*"IN" indicates signal flow from T-POV Camera Unit to Base Station Unit*

*"OUT" indicates signal flow from T-POV Base Station Unit to Camera Unit*

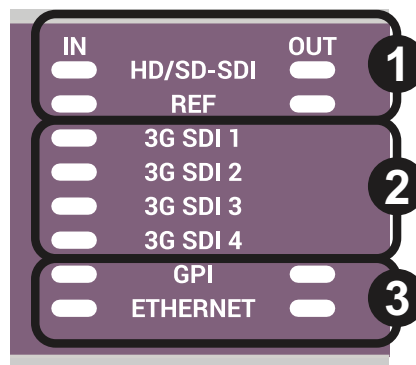


Fig. 5-4: Signal Indicator LEDs

- **1: HD/SDI OUT:** monitors camera video signal returning from the camera unit.

- **REF**: monitors the black burst/sync signal or return video signal being sent to the camera.
- **2: 3G SDI 1-4**: monitors incoming video signal on the quad link 4K inputs.
- **3: GPI**: monitors data activity on the GPI connection.
- **ETHERNET**: monitors data activity on the Ethernet connection.

### Area C - Signal Strength & System Setup Display

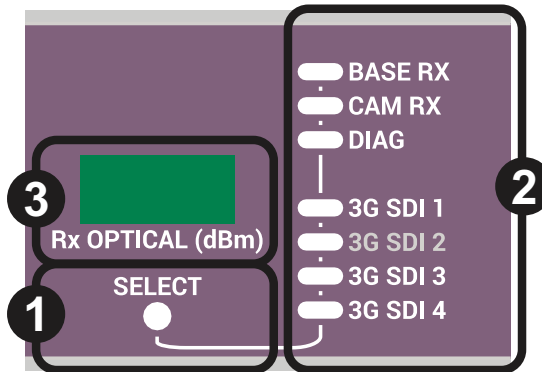


Fig. 5-5: Signal Strength & System Setup Display

- **1: SELECT**: selects between three modes of operation. When power is turned on, the unit defaults to BASE RX display mode

Pushing and holding the SELECT button will enter diagnostics, while a quick push will return to the base station display. Only base station diagnostics appear on the base station; you must be at the camera unit for camera unit diagnostics.

The **ALARM** status (see [Area D - Power/Status Indicators and Power Switch](#) on page 59) will light Amber if there is a problem with the Camera Unit.

- **2: SELECTED MENU ITEM**: indicates what information is displayed on the Digital Display:
  - **BASE RX**: indicates display mode is Optical Link signal strength received at Base Station from Camera Unit
  - **CAM RX**: indicates display mode is Optical Link signal strength received at the Camera unit from Base Station (remote reading)
  - **DIAG** indicated by the Digital Display showing various alphanumeric readouts (see [The T-POV Base Station Digital Display](#) on page 87)
  - **3G SDI 1-4**: indicates display mode is Optical Link signal strength received at the Camera unit from Base Station for each 4K Quad Link signals
- **3: Digital Display**: indicates received Optical Link signal strength in dBm units. Also diagnostic information when Base Station is in diagnostics modes.

For additional information on both measuring optical link strength and T-POV diagnostics, see [A Brief Guide to Measurement of Fiber Optic Signal Strength](#) on page 86 and [The T-POV Base Station Digital Display](#) on page 87.



## Area D - Power/Status Indicators and Power Switch

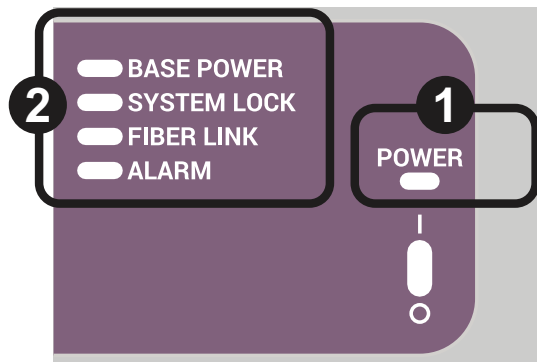


Fig. 5-6: Power/Status Indicators and Power Switch

- **1: POWER:** Power indicator lights Green when the power switch is toggled on.
- **2: STATUS**
  - **BASE POWER:** indicates the status of all power levels in the Base Station
    - **Green:** all power levels are normal.
    - **Red:** any power level is not normal.
  - **SYSTEM LOCK:** indicates that the Base Station is communicating with the Camera Unit.
    - **Green:** Base Station is communicating with Camera Unit
    - **Red:** Base Station is not communicating with the Camera Unit
  - **FIBER LINK:** indicates the optical power status of the Base Station and camera
    - **Green:** both the Base Station and camera optical power are within a normal range.
    - **Red:** both the Base Station and camera optical power are not within a normal range
    - **Amber:** either the Base Station or camera optical power are not within a normal range. This indicator also lights when one or more 4K Quad Link signals is not connected.
  - **ALARM**
    - **Red:** there is a temperature, power, hardware or firmware fault in the base unit system.
    - **Amber:** there is a fault at the Camera Unit.

For more information on these error messages, see [The T-POV Base Station Digital Display](#) on page 87

## T-POV 3244 Powered Unit Detail

The T-POV 3244 Powered Unit base station is delivered with one Optical Link unit. The physical configuration differs from the 12 Volt model in that the Optical Link unit with its power supply occupies one-half of the rack mount chassis and the Camera 1 unit is placed on the left side of the chassis. The term Hybrid Power refers to the integration of 95 Watts of 12 Volt power into the fiber optic cable.

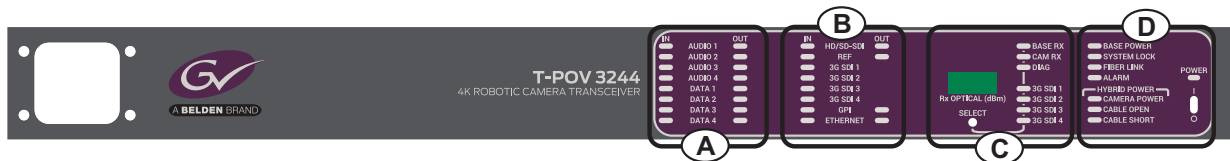


Fig. 5-7: T-POV 3244 Powered Unit

The T-POV Powered Base Station Front Panel has four features:

- **A: Signal Indicator & Optical Power LEDs**
- **B: Signal Strength & System Setup Display**
- **C: Signal Strength & System Setup Display**
- **D: Power/Status Indicators and Power Switch**

### Area A, B and C

Areas A and B function identically to that of the 12 Volt version of the T-POV Base Station (see [T-POV 3244 Base Unit Front Panel Detail](#) on page 57). The differences are in Area D - the Power/Status Indicators and Power Switch.

### Area D

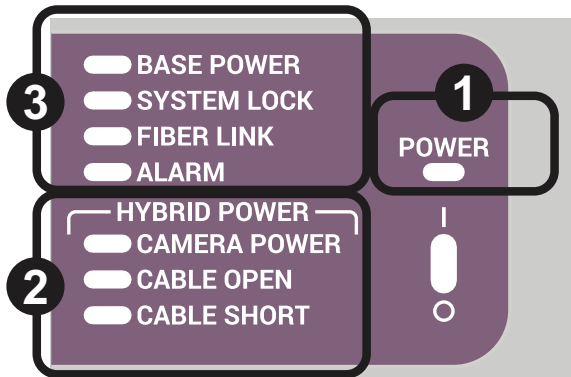


Fig. 5-8: T-POV 3244 Powered Unit -- Area D

- **1: POWER:** lights Red when the AC power main switch on the rear of the unit is turned on and the front power switch is Off. The indicator lights Green when the front panel power switch is toggled On.
  - With a powered system (power supplied by the Base Station), this switch will control power to the Camera Unit

- For the hybrid system to be powered on, the AC Mains switch on the rear of Base Station must be in the on position.
- **2: HYBRID POWER INDICATORS**
  - **CAMERA POWER:** indicates that high voltage is applied to power the camera.
    - **Green:** 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:** the cable is properly connected from the Base Station to the camera.
    - **Red:** 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.
- **3: STATUS INDICATORS**
  - **BASE POWER:** indicates the status of all power levels in the Base Station
    - **Green:** all power levels are normal.
    - **Red:** any power level is not normal.
  - **SYSTEM LOCK:** indicates that the Base Station is communicating with the Camera Unit.
    - **Green:** Base Station is communicating with Camera Unit.
    - **Red:** Base Station is not communicating with the Camera Unit.
  - **FIBER LINK:** indicates the optical power status of the Base Station and camera
    - **Green:** both the Base Station and camera optical power are within a normal range.
    - **Red:** both the Base Station and camera optical power are not within a normal range
    - **Amber:** either the Base Station or camera optical power are not within a normal range.
  - **ALARM:** indicator will light Red if there is a temperature, power, hardware or firmware fault in the base unit system. The indicator will light Amber if there is a fault at the Camera Unit.
    - **Red:** there is a Base Station error. Refer to the Base Station DIAG for details on the error.
    - **Amber:** there is a camera error. Refer to CAM DIAG for details for the error.

## T-POV 3244 Base Unit Rear Panel Detail

The Base Unit rear panel Area diagram is repeated for reference.

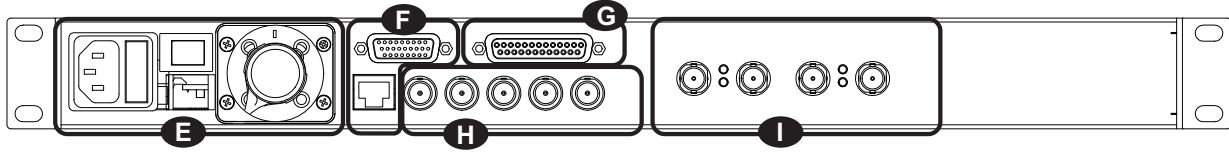


Fig. 5-9: T-POV 3244 Base Unit Rear Panel

The T-POV Base Station Connector Panel has five features:

- **E: Power Section and Fiber Connector(s)**
- **F: Data/GPI-Tally/Ethernet Connectors**
- **G: Audio Multi-Pin Connector**
- **H: Video Connectors**
- **I: Quad Link (4K) Video Connectors**

### Area E- Power Section and Fiber Connector(s)

12 Volt models have a single power supply/fiber connection area regardless of the number of Optical Link units configured.

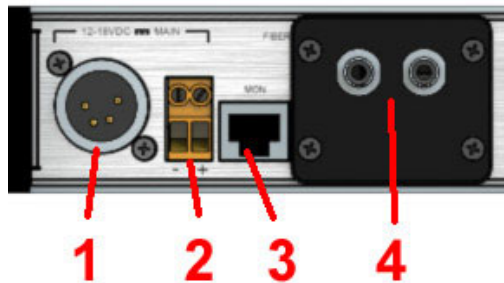


Fig. 5-10: T-POV 3244 Base Unit Rear Panel -- Area E

### 12 Volt Power Models

- **1: 12V DC External Power Supply input connector (XLR 4 Pin)**  
For use with an external power supply such as the ADAP-AC-04. See [Connector Wiring and Connection](#) on page 102 for connection details.
- **2: 12V DC Input - terminal block**  
For use in rack mounted installations as an option to an external "brick" type power supply. See [Connector Wiring and Connection](#) on page 102 for connection details.
- **3: For future use**
- **4: ST Connectors**

### 95 Watt Powered Models

Powered models have either one or two AC power/fiber connection areas depending on the number of optical link units installed.

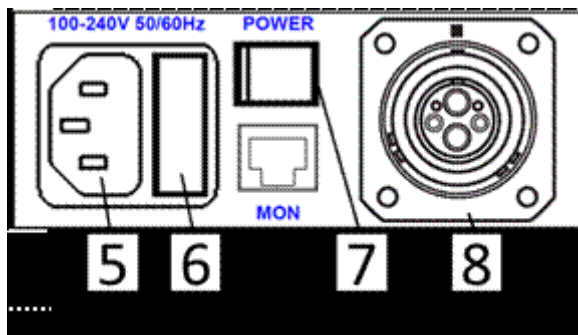


Fig. 5-11: T-POV 3244 Base Unit Rear Panel - 95 Watt Model

- **5: AC Power Receptacle:** 100-240V 50/60 Hz
- **6: 4 AMP Dual Fuse Assembly:** 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.
- **7: AC Mains Power Switch:** this must be turned on for the front panel power switch to work
- **8: SMPTE 304M Fiber Connector (Powered)**

### Area F - Data/GPI-Tally Connectors & Ethernet

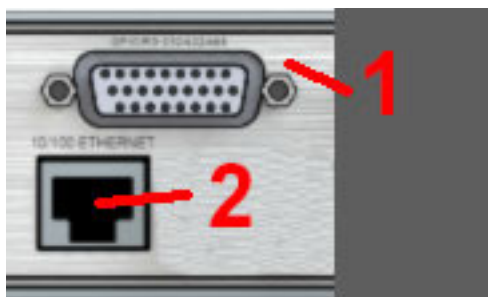


Fig. 5-12: T-POV 3244 Base Unit Rear Panel -- Area F

- **1: GPIO/RS-232/422/485:** provides up to four bi-directional data feeds. Available are RS-232, RS-422 and RS-485 data formats.
- **2: 10/100 ETHERNET:** provides an Ethernet connection to the Camera Unit for data or any network protocol controlled device such as a camera remote control. Ethernet port is limited to 100BaseT connections. For configuration and wiring information on all data & GPI connections, see [Connector Wiring and Connection](#) on page 102.

### Area G - Audio Multi-Pin Connector

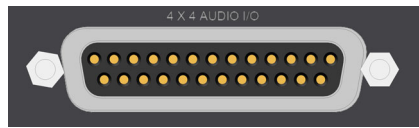


Fig. 5-13: T-POV 3244 Base Unit Rear Panel -- Area G

**4 x 4 AUDIO I/O:** multipin connector provides four line level audio signals in to camera unit, and for four line level audio signals returning from camera unit.

For audio configuration and wiring information connections, see [Connector Wiring and Connection](#) on page 102.

### Area H - Video Connectors



Fig. 5-14: T-POV 3244 Base Unit Rear Panel -- Area H

- **1: REF Out:** Reference video from Camera Unit
- **2: REF In:** ReferenceVideo feed from Base Station to Camera Unit
- **3 & 4: HD/SDI Out A & B:** two SDI outs of Camera video from Camera Unit
- **5: HD/SD IN:** return video feed to Camera Unit from Base Station

### Area I - Quad Link (4K) video connectors and LEDs

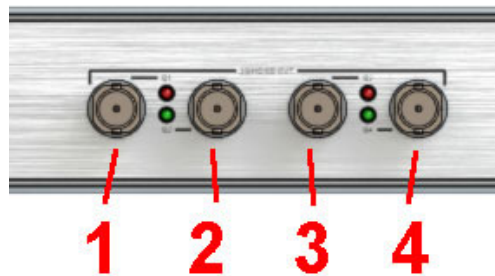


Fig. 5-15: T-POV 3244 Camera Unit Rear Panel Detail -- Area I

**1-4: 3G/HD/SD OUT Q1, Q2, Q3 & Q4:** four Quad Link (4K) video outputs from Camera Unit

These 4 Quad Link connectors have a Signal Status LEDs that light Green when a signal is present and Red when a signal is not present.

## T-POV 3244 Camera Unit

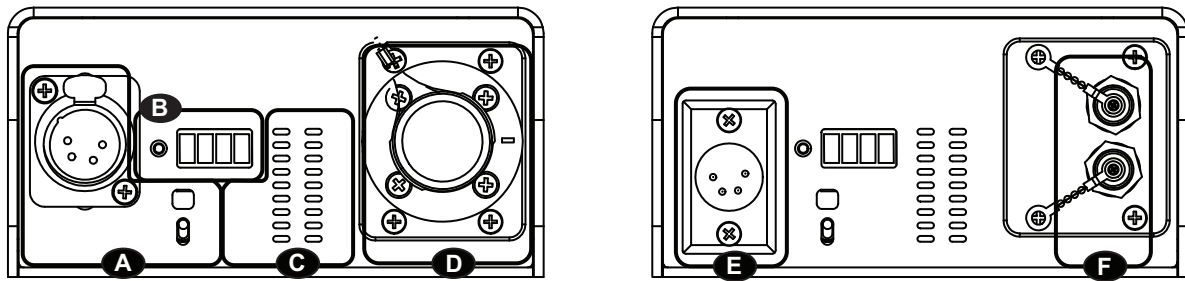


Fig. 5-16: T-POV 3244 Camera Unit Front Panel

The T-POV 3244 Camera Unit Front Panel has six features:

- **A: Power Section** (12 Volt Type)
- **B: Optical Power Strength and Diagnostic Display**
- **C: Signal Indicator LEDs**
- **D: ST Fiber Connectors**
- **E: 12-15 VDC Power Output** (AC Powered models only)
- **F: SMPTE 304M Fiber Connector** ("Wet" with 95 Watts of 12 Volt power available)

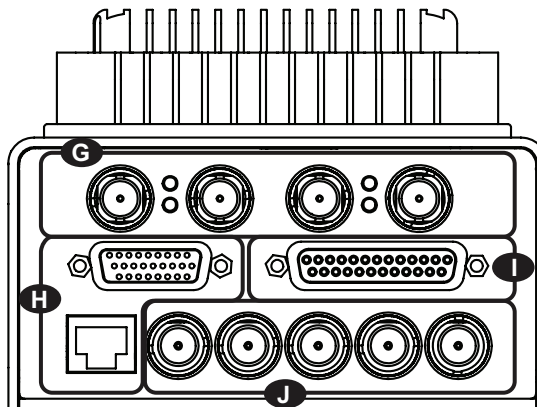


Fig. 5-17: T-POV 3244 Camera Unit Rear Panel

The T-POV 3244 Camera Unit Rear Panel has four features:

- **G: Quad Link (4K) video connectors and LEDs**
- **H: Data & Ethernet Connectors**
- **I: Audio Multi-Pin Connector**
- **J: Video Connectors**

The T-POV Camera Unit rear panel is identical in the 12 Volt and Powered versions.

## T-POV 3244 Camera Unit Front Panel Detail - 12 Volt Model

### Area A - Power Section (12 Volt Type)

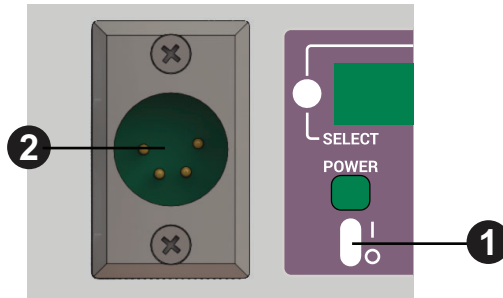


Fig. 5-18: T-POV 3244 Camera Unit Front Panel -- 12 Volt Model

- **1: POWER:** lights Green when the power switch is toggled on.
- **2: 12-18 VDC Power Connection:** 4-Pin XLR Female chassis connector for use with an external power supply (such as the ADAP-AC-04 or equivalent).

### Area B - Optical Power Strength and Diagnostic Display

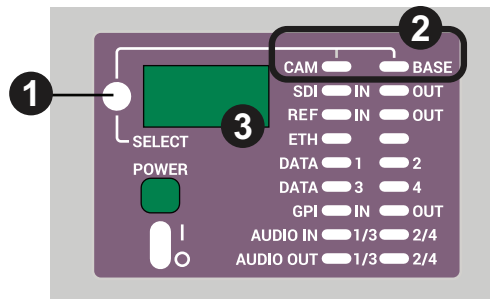


Fig. 5-19: T-POV 3244 Camera Unit Front Panel -- Area B

- **1: DISPLAY SELECT:** chooses between three modes of operation.  
When power is turned on, the Camera Unit optical power appears first. The first push of the select button selects the Base Station.  
Pushing and holding the SELECT button will enter diagnostics mode, while a quick push will return to the camera unit display.
- **2: CAM/BASE Indicators:** LEDs indicate which unit Optical Power is displayed. Neither LED is on when the display is in diagnostics mode.
- **3: DISPLAY:** optical power is displayed in dBm units and diagnostic information is alphanumeric. Only Camera Unit diagnostics can be viewed at the Camera Unit (Base Station diagnostics are not available at the Camera Unit).  
For more information on measuring optical power and using system diagnostics, see [A Brief Guide to Measurement of Fiber Optic Signal Strength](#) on page 86 and [The T-POV Base Station Digital Display](#) on page 87.



## Area C - Signal Indicator LEDs

The 17 LED indicators in this area monitor the various signals being sent to or from the Camera Unit. LEDs will light Green when a signal is present.

**Note:** LEDs labeled "IN" indicate signals coming into the camera unit. LEDs labeled "OUT" indicate signals coming out of the Base Station. If there is neither "IN" or "OUT" associated with an LED then activity in either the Camera Unit and Base Station is indicated.

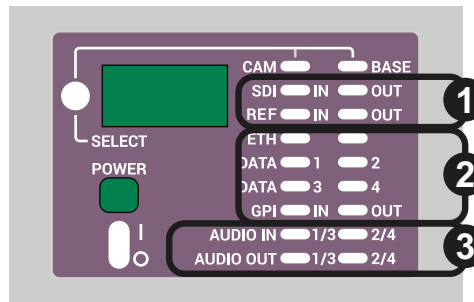


Fig. 5-20: T-POV 3244 Camera Unit Front Panel -- Area C

- **1: SDI IN & OUT:** monitors SDI video signals to and from the Base Station
  - **REF IN:** monitors the black burst/sync signal or return video signal being sent to the camera
  - **REF OUT:** monitors the genlock signal or return video signal being sent to the base station
- **2: ETH:** monitors data activity on the Ethernet connection
  - **DATA 1/2:** monitors data activity on Data Paths 1 and 2
  - **DATA 3/4:** monitors data activity on Data Path 3
  - **GPI:** Monitors GPI/Tally signal activity
- **3: AUDIO:**
  - the AUDIO IN 1/3 and 2/4 LEDs monitor line level audio coming to the Camera Unit
  - the AUDIO OUT 1/3 and 2/4 LEDs monitor line level audio going to the Base Station

### Area D - Fiber Connectors - "Dry" Unpowered Connectors



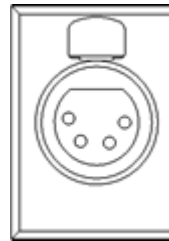
*Fig. 5-21: T-POV 3244 Camera Unit Front Panel -- Area D*

**FIBER CONNECTORS** (shown are 2 ST connectors): can be any available unpowered Fiber Connector depending on user requirements and number of camera units installed. For additional information, see [Fiber Cable Concepts](#) on page 10 and [Product Ordering/Model Information](#) on page 4 regarding ordering information.

### T-POV 3244 Camera Unit Front Panel Detail - Powered Model

The T-POV 3244 Powered Camera Unit receives power from the Base Station over the Hybrid Fiber Cable connection. The 12 Volt and Powered version of the T-POV 3244 operate identically with two exceptions. The powered version provides a 12-15 Volt output for camera and accessory power and the Fiber Connection must of necessity be a Hybrid Fiber Cable connection.

#### Area E - 12-15 VDC Power Output



*Fig. 5-22: T-POV 3244 Camera Unit Front Panel -- Area E*

**12-15 VDC Power Output:** provides up to 95 Watts of 12 Volt power for the camera or accessories. Please ensure that the total power drain on this source is no more than 95 Watts. For connector wiring information, see [Connector Wiring and Connection](#) on page 102.

## Area F - Fiber Connector



Fig. 5-23: T-POV 3244 Camera Unit Front Panel -- Area F

**Fiber Connector:** SMPTE 304M Hybrid power fiber connection carries signals to and from the Base Station and 95 Watts of 12 Volt power from the base station.

## T-POV 3244 Camera Unit Rear Panel Detail

The Camera Unit rear panel Area diagram is repeated for reference.

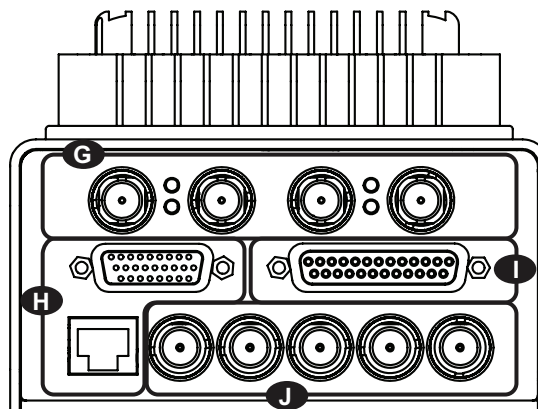


Fig. 5-24: T-POV 3244 Camera Unit Rear Panel Detail

The T-POV 3244 Camera Unit Rear Panel has three features:

- **G: Quad Link (4K) video connectors and LEDs**
- **H: Data & Ethernet Connectors**
- **I: Audio Multi-Pin Connector**
- **J: Video Connectors**

The rear connector panels of all versions of the T-POV 3244 Camera Unit are identical in physical configuration and in function.

## Area G - Quad Link (4K) video connectors and LEDs

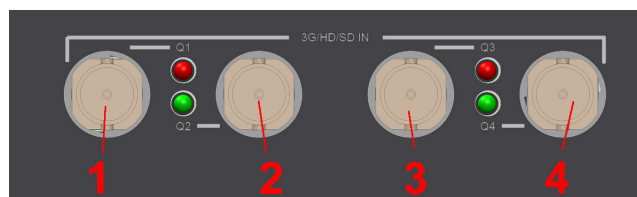


Fig. 5-25: T-POV 3244 Camera Unit Rear Panel Detail -- Area G

- **1-4: 3G/HD/SD IN Q1, Q2, Q3 & Q4:** four Quad Link (4K) video Inputs from Camera  
These 4 Quad Link connectors have a Signal Status LEDs that light Green when a signal is present and Red when a signal is not present.

### Area H - Data/GPI-Tally Connectors

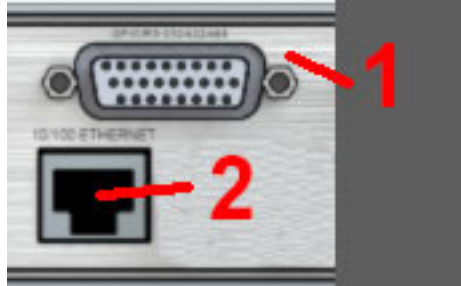


Fig. 5-26: T-POV 3244 Camera Unit Rear Panel Detail -- Area G

- **1: GPIO/RS-232/422/485:** provides up to four bi-directional data feeds. Available are RS-232, RS-422 and RS-485 data formats.
- **2: 10/100 ETHERNET:** provides an Ethernet connection to the Base Unit for data or any network protocol controlled device such as a camera remote control.  
Ethernet port is limited to 100BaseT connections. For configuration and wiring information on all data & GPI connections, see [Connector Wiring and Connection](#) on page 102.

### Area I - Audio Multi-Pin Connector

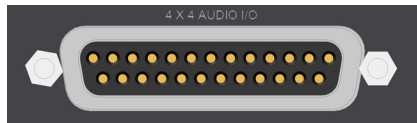


Fig. 5-27: T-POV 3244 Camera Unit Rear Panel Detail -- Area H

**AUDIO:** multipin connector provides for four line level audio signals in to camera unit and for four line level audio signals returning from camera unit.

For configuration and wiring information on audio connections, see [Connector Wiring and Connection](#) on page 102.

### Area J - Video Connectors



Fig. 5-28: T-POV 3244 Camera Unit Rear Panel Detail -- Area I

- **1: REF Out:** Reference video from Camera Unit

- **2: REF In:** Reference Video feed from Base Station to Camera Unit
- **3 & 4: HD SD Out A & B:** two SDI outs of Camera video from Camera Unit
- **5: HD/SD IN:** return video feed to Camera Unit from Base Station



# 6 Connecting the T-POV System

Prior to connecting your T-POV Robotic Camera Link System, please ensure that each of the required cables is available for use.

This includes standard video, audio and data cables as well as custom multi-pin cable sets required for your particular installation. Please see the [Connector Wiring and Connection](#) on page 102 for information regarding cables and connectors.

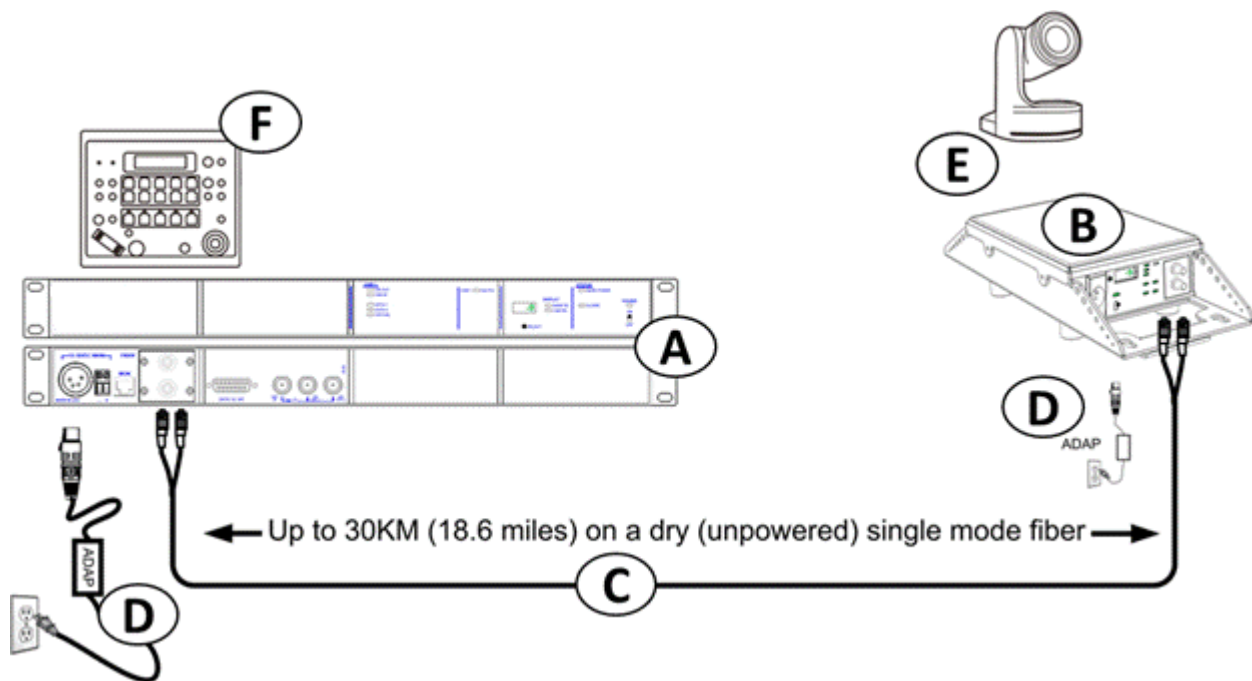
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<i>Connections to the T-POV Base Station</i> .....	77
<i>Connections to the T-POV Camera Unit</i> .....	79

## T-POV Usage Scenarios

The three scenarios shown represent a small cross-section of the various available configurations. Please consider these scenarios as samples of how a system might be used in a real-world application.

The following fiber connection scenarios do not take into account any customized cable and connector installations you may have at your facility. For assistance regarding more complex connection situations, contact Grass Valley (see [Contact Us](#) on page 101) or your local authorized dealer.

### Tactical Fiber between the Base Station and Camera Unit



*Fig. 6-1: Tactical Fiber between the Base Station and Camera Unit*

Between the Base Station (A) the Camera Unit (B) is a length of Tactical Fiber Cable (C). At each end of the fiber cable are a set of two ST Connectors.

The Camera Unit and the Base Station are powered by an external 12 Volt power supply (D). The recommended ADAP-AC-04 is illustrated. The Camera connected to the Camera Unit must have its own separate power source.

Connected to the Base Station is a Camera Control Unit (CCU) with camera controls and remote pan and tilt controls (F). Depending on the control unit requirements the connection to the base station will be either a serial data connection or an Ethernet connection.

Connected to the Camera Unit is a remote HD Camera (E) mounted on a remotely controlled pan and tilt unit. Typically the camera will be connected to the T-POV Camera Unit by an HD-SDI BNC cable and the pan and tilt unit will be connected through either a serial data connection or an Ethernet Connection.



## Two Link Unit Installation with Tactical Fiber

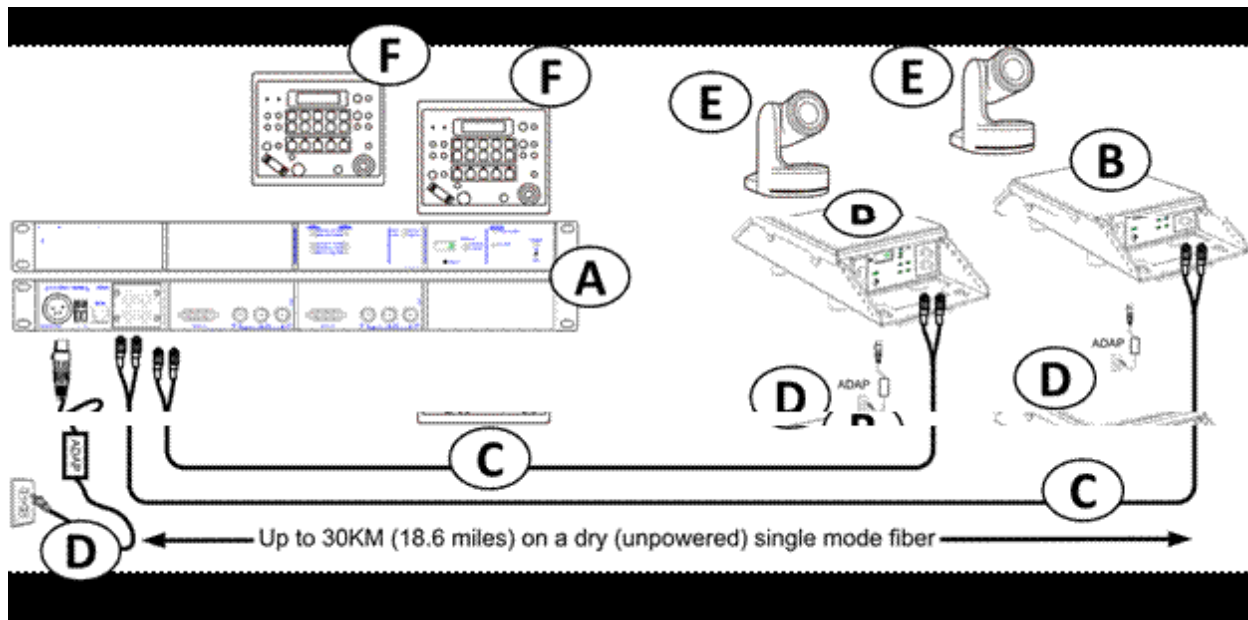


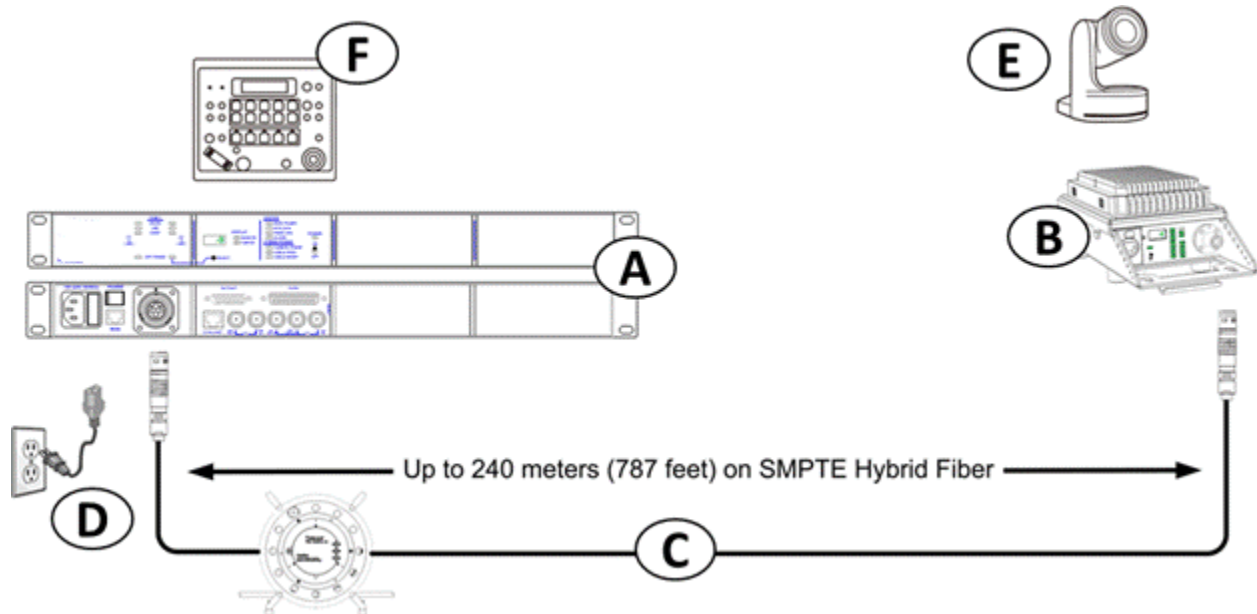
Fig. 6-2: Two Link Unit Installation with Tactical Fiber

This scenario is functionally identical to the first usage scenario with the addition of an added Camera Unit and CCU/Remote Pan & Tilt unit. One 2-Link Unit Base Station (A) is connected by Fiber Cable to two separate Camera Units (B). The Camera Unit connections begin with Unit 1 on the left next to the Power and Fiber Connector module. Unit 2 is to the right of Unit 1.

The Camera Units in this example use two ST connectors each. The Base Station and each Camera Unit are powered by an ADAP external 12 Volt power supply (D).

This example shows two identical Cameras (E) connected to the Camera Units. This is illustrative only and a real-world installation could have two different camera types if required. This example shows two individual Camera Control: Remote Pan & Tilt units (F). A common CCU could be used if it provides a separate data connection for each of the remote cameras.

## Hybrid Fiber between the Base Station and Camera Unit



*Fig. 6-3: Hybrid Fiber between the Base Station and Camera Unit*

Between the Base Station (A) the Camera Unit (B) is a length of Hybrid Fiber Cable (C). The maximum length of this hybrid cable is 240 meters. The cable is deployed from a fiber reel. At each end of the fiber cable is a "wet" SMPTE 304M Fiber Connector carrying 12 Volts of power.

The Base Station is powered by an internal AC power supply (D). The Camera Unit is powered through the Hybrid Fiber Cable. The Camera (E) connected to the Camera Unit can either be powered from the external power connection on the T-POV Camera Unit or from its own local power supply. If the camera is powered from the T-POV, the total power budget must not exceed a total of 95 Watts.

Connected to the Base Station is a Camera Control Unit (CCU) with camera controls and remote pan and tilt controls (F). Depending on the control unit requirements, the connection to the base station will be either a serial data connection or an Ethernet connection (T-POV 324 and 3244 only).

## Connections to the T-POV Base Station

This section provides details on both the connectors and signal types that can be applied to the T-POV Base Stations. In the list of connections, it is noted which connections are applicable to the various T-POV models.

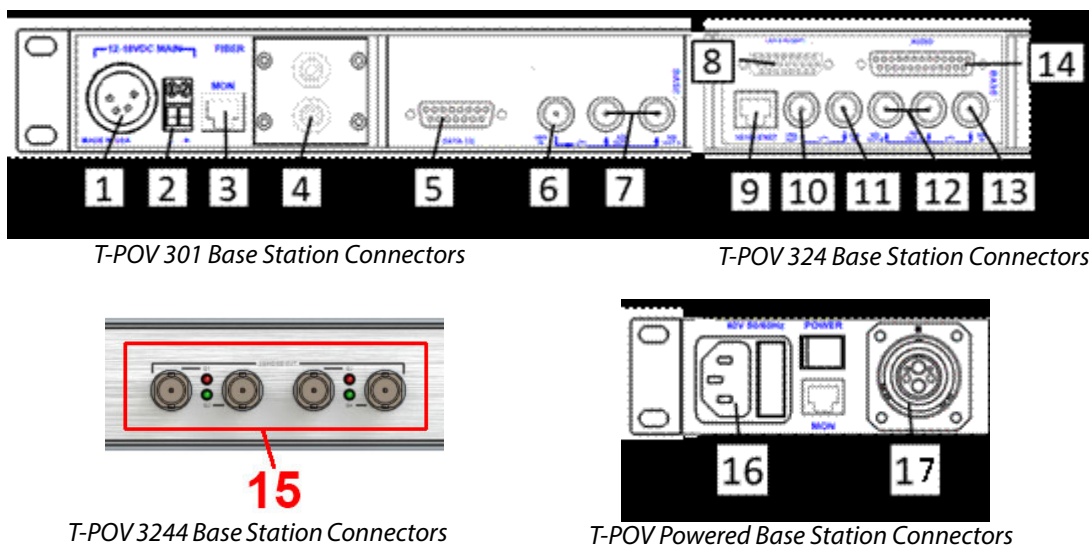


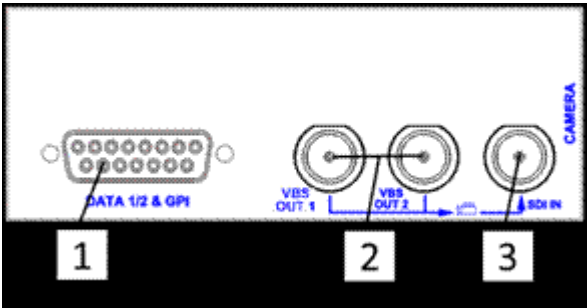
Fig. 6-4: T-POV Base Station

Item	Description
1 & 17	<p><b>Power In</b></p> <p>Connect a standard 12V DC ADAP power source (4 Pin) or a standard 3 conductor AC Cable (IEC Plug) 100-240V 50/60 Hz</p> <p>Applies to all models depending on power type.</p>
2	<p><b>12V Terminal Block</b></p> <p>The bare wire connector 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.</p> <p>Applies only to 12 Volt models - does not apply to AC powered types</p>
3	<p><b>MON - RJ45 Network Type Connection</b></p> <p>For Future Use</p> <p>Applies to all models</p>
4 & 18	<p><b>Fiber Connector</b></p> <p>Connect the fiber connector from the Fiber Cable connected to the Camera Unit. The type of fiber connector depends on whether the system is 12 Volt or internally powered.</p> <p>Applies to all models.</p> <p><b>Note:</b> Power to the Base Station (and the Camera Unit) must be turned off when connecting the Camera Remote Control Panel. Connecting with the power on can seriously damage your equipment.</p>

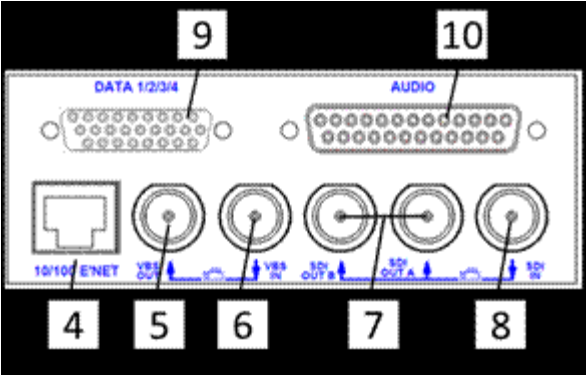
Item	Description
5	<p><b>Data 1/2 &amp; GPI</b></p> <p>DB15: 15 Pin data connector. Used for a variety of serial connections or GPI/Tally connections. The Camera Control Unit and Pan &amp; Tilt Control is one such data connection.</p> <p>Applies to T-POV 301</p>
6 & 11	<p><b>REF (or VBS) IN</b></p> <p>BNC Connector: typically used to send a Genlock/Black Burst signal or SD return video to the camera (ex.: monitor out from the Production Switcher).</p> <p>Applies to all models</p>
7 & 12	<p><b>SDI Out 1 &amp; 2 or A &amp; B (this carries the HD feed from the camera)</b></p> <p>BNC Connectors: two identical video feeds from the camera unit - typically one may be used for local HD monitoring and one is fed to the Production Switcher environment.</p> <p>Applies to all models</p>
8	<p><b>DATA/GPI</b></p> <p>DB26: 26 Pin data connector. Used for a variety of serial connections or GPI/Tally connections. The Camera Control Unit and Pan &amp; Tilt Control is one such data connection.</p> <p>Applies to T-POV 324 and T-POV 3244</p>
9	<p><b>Ethernet Connector - 10Bt/100Bt capable</b></p> <p>Designed to carry IP traffic data between the Base Station and the Camera Unit. Can be used to control Ethernet based Camera and Pan &amp; Tilt equipment. Also a laptop PC or other device such as a Wireless Access Point can be connected to the Production Environment IP network.</p> <p>Applies to T-POV 324 and T-POV 3244</p>
10	<p><b>REF (or VBS) Out</b></p> <p>BNC Connector: carries SD Analog video from the Camera Unit to the Base Station. Typically this will feed a Camera SD menu monitor feed.</p> <p><b>Note:</b> An HD signal can be sent through the VBS path but the system will only pass SD quality.</p> <p>Applies to T-POV 324 and T-POV 3244</p>
13	<p><b>SDI In</b></p> <p>BNC Connector: typically used to send HD return video to the camera (ex.: program out from the Production Switcher).</p> <p>Applies to T-POV 324 and T-POV 3244</p>
14	<p><b>Audio</b></p> <p>DB25: 25 Pin connector. Connector follows the Tascam TDIF standard. Up to four channels of line level audio in and out can be connected.</p> <p>Applies to T-POV 324 and T-POV 3244</p>
15	<p><b>3G/HD/SD OUT Q1, Q2, Q3 &amp; Q4</b></p> <p>BNC Connectors: four Quad Link (4K) video outputs from Camera Unit</p> <p>Applies to T-POV 3244</p>

## Connections to the T-POV Camera Unit

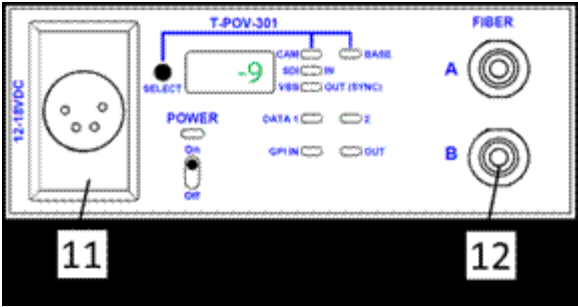
This section provides details on both the connectors and signal types that can be applied to the T-POV Camera Units. In the list of connections, it is noted which connections are applicable to the various T-POV models.



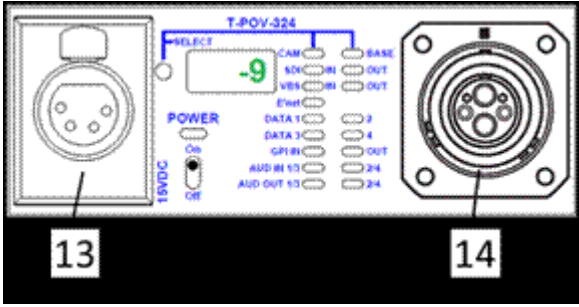
T-POV 301 Camera Unit (rear)



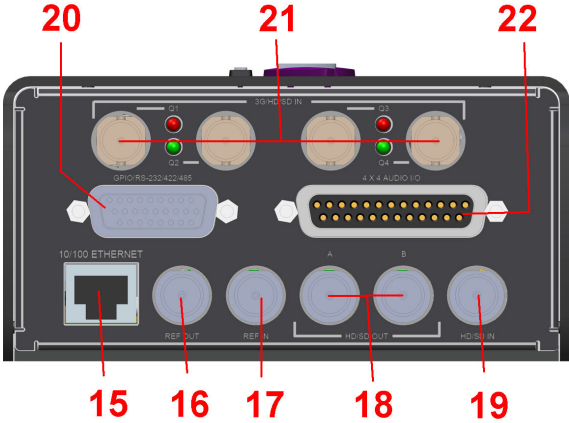
T-POV 324 Camera Unit (rear)



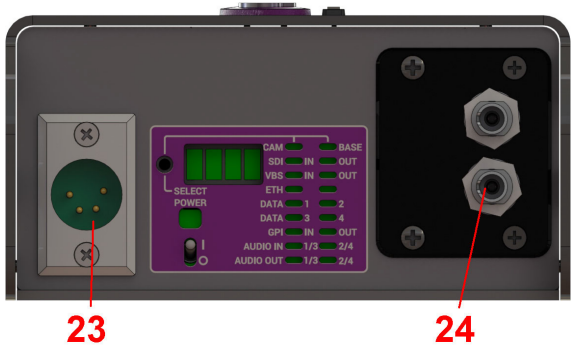
T-POV 301 Camera Unit (front)



T-POV 324 Camera Unit (front)



T-POV 3244 Camera Unit (rear)



T-POV 3244 Camera Unit (front)

Fig. 6-5: Camera Units

Item	Description
1	<p><b>Data 1/2 &amp; GPI</b>  DB15: 15 Pin data connector. Used for a variety of serial connections or GPI/Tally connections.  Applies to T-POV 301</p>
2,5 & 16	<p><b>REF/VBS Out</b>  BNC Connector: typically used to send a Genlock/Black Burst signal or SD return video to the camera (ex.: monitor out from the Production Switcher).  Applies to all models</p>
3, 8 & 19	<p><b>SDI In</b>  BNC Connectors: HD Video feed from the camera unit to the base station - typically this is fed to the Production Switcher or primary monitoring environment.  Applies to all models</p>
4	<p><b>Ethernet Connector - 10Bt/100Bt capable</b>  Designed to carry IP traffic data between the Base Station and the Camera Unit. Can be used to control Ethernet based Camera and Pan &amp; Tilt equipment. Also a laptop PC or other device such as a Wireless Access Point can be connected to the Production Environment IP network.  Applies to T-POV 324 and T-POV 3244</p>
6 & 17	<p><b>REF/VBS In</b>  BNC Connector: carries SD Analog video from the Camera Unit to the Base Station. Typically this will feed a Camera SD menu monitor feed.  Applies to T-POV 324 and T-POV 3244</p>
7 & 18	<p><b>SDI Out A &amp; B</b>  BNC Connector: typically used to send HD return video to the camera (ex.: program or aux bus out from the Production Switcher).  Applies to T-POV 324 and T-POV 3244</p>
9 & 20	<p><b>DATA 1/2/3/4</b>  DB26: 26 Pin data connector. Used for a variety of serial connections or GPI/Tally connections. The Camera Control Unit and Pan &amp; Tilt Control is one such data connection.  Applies to T-POV 324 and T-POV 3244</p>
10,22	<p><b>Audio</b>  DB25: 25 Pin connector. Connector follows the Tascam TDIF standard. Up to four channels of line level audio in and out can be connected.  Applies to T-POV 324 and T-POV 3244</p>
11, 23	<p><b>Power In</b>  Connect a standard 12V DC ADAP power source (4 Pin).  Applies to all models that have external power.</p>

<b>Item</b>	<b>Description</b>
12, 14 & 24	<p><b>Fiber Connector</b></p> <p>Connect the fiber connector from the Fiber Cable connected to the Camera Unit. The type of fiber connector depends on whether the system is 12 Volt or internally powered.</p> <p>Applies to all models</p>
13	<p><b>Power Out</b></p> <p>Provides a standard 12V DC power source (4 Pin). Total power available including that used by Camera Unit is 95 Watts.</p> <p>Applies to all models that have external power.</p>
21	<p><b>3G/HD/SD IN Q1, Q2, Q3 &amp; Q4</b></p> <p>BNC Connectors: 4K (Quad Link) video feed from the camera unit to the base station - typically this is fed to the Production Switcher or primary monitoring environment.</p> <p>Applies to T-POV 3244</p>







# Operation of the T-POV System

This chapter describes in detail the operation of T-POV Robotic Camera Link System. 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 allow for an enormous number of slightly different operational modes.

<i>Set Up Of The T-POV Robotic Camera Link System For Operation</i> .....	84
<i>Powering the System</i> .....	85
<i>A Brief Guide to Measurement of Fiber Optic Signal Strength</i> .....	86
<i>The T-POV Base Station Digital Display</i> .....	87
<i>Best Practices</i> .....	93
<i>Shutting Down the System</i> .....	94
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## Set Up Of The T-POV Robotic Camera Link System For Operation

This section provides a high-level overview of setup of the T-POV Robotic Camera Link 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 T-POV Robotic Camera Link System for operation as soon as you receive it to confirm proper operation and to provide training for you and your team prior to an actual production.

It is highly recommended that you do not attempt to power up the system until all connections are made, in particular that the Fiber Optic Cable has been connected at both ends. If you need to power up either the T-POV Robotic Camera Link Base Station or Camera Unit, make sure that the Fiber Connectors are securely capped. This will protect these connectors from damage or dirt and protect you from damaging your eyes.

The order in which you connect the cables makes no difference. Make sure to connect the Camera Remote Control cable to the Base Station and Remote Control Panel when the Base Station power is turned off.

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

Once you deploy the Fiber Cable, you are now ready to Power Up the system.

You should read the **Using Fiber Optics Guide** for information on how to manage and deploy your fiber optics cabling, safety precautions, tips & tricks, and recommendations for creating complex fiber optic networks. You can find a copy of this document on the Support portal (see [Contact Us](#) on page 101).

## Powering the System

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

### Powering the T-POV Base Station

#### To power up the T-POV Base Station

- 1 **Base Station Main Power:** for externally powered Base Stations plug in the power supply.  
For internally powered Base Station, connect the unit to the AC Mains and turn on the Base Station Power Mains Switch located at the rear left (when facing the back of the Base Station) of the unit. The front panel power light will light Red until the next step.
- 2 **Base Station Power:** Turn on the Front Panel Power Switch located at the front right.  
For internally (AC) powered units, the power monitor indicator changes from Red to Green.
- 3 **Four Character Display LED Indicator progression:** The 4-character display indicates TEST and all front panel LEDs change from Red to Green to Amber, and then off.
- 4 **REV display:** The LED color test is followed by REV and the revision of the display microcontroller firmware.
- 5 **Scrolling:** The REV indication is followed by "grassvalley.com" scrolling across the 4-character display. If there's no scrolling, contact Grass Valley support for assistance (see [Contact Us](#) on page 101).
- 6 **PAUSE:** The scroll is followed by about a three second interval used to synchronize all the microcontrollers in the Base Station
- 7 **Current Status Displayed:** After the three second pause, each of the entire front panel LEDs update with current status. If the Camera Unit is not powered on the camera, status lights will light Red.

### Powering the T-POV Camera Unit

#### To power up the T-POV Camera Unit

- 1 **Camera Unit power:** turn on the Camera Unit Power Switch
- 2 **Camera Power:** turn on the Camera Power and also any peripheral equipment connected to the camera or the T-POV Camera Unit such as monitors and microphones.
- 3 **Four Character Display LED Indicator progression:** once you turn on the power, the 4-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 appear. A typical display is -8 to -13, which indicates Fiber link strength of from -8 to -13 dBm.

## A Brief Guide to Measurement of Fiber Optic Signal Strength

The T-POV Optical Link System operates within a defined fiber optic link margin, based on two factors:

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

The following diagram illustrates the Fiber Link transmission range related to Optical Power

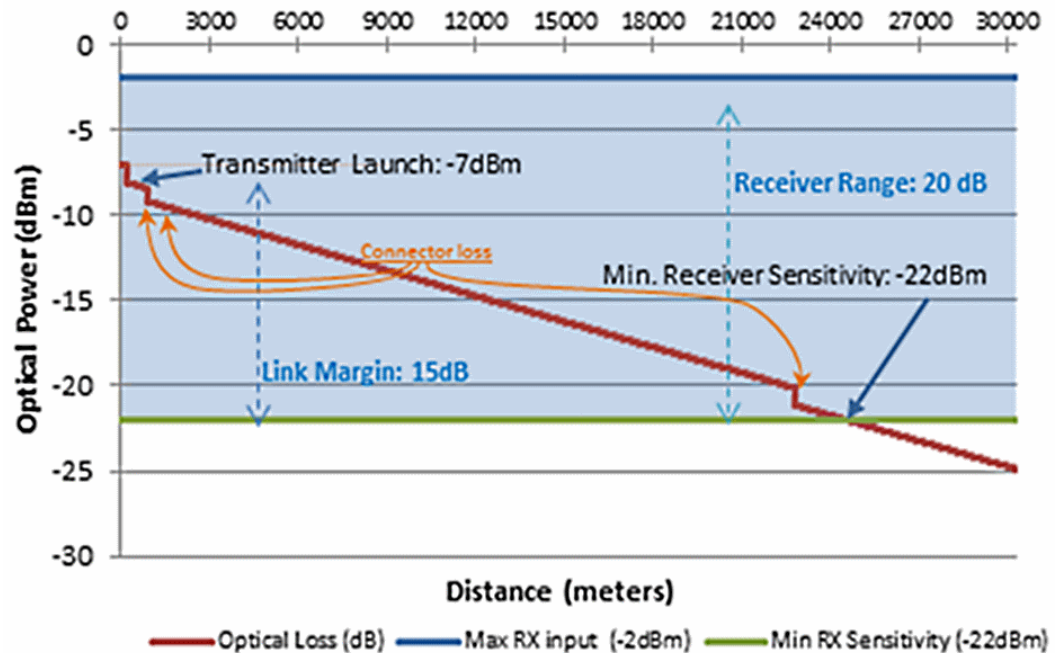


Fig. 7-1: T-POV Fiber Optic Link Margin

The overall link margin (or dynamic range) of the T-POV system (the difference between the transmitter's output power and the receiver's sensitivity) is typically 15dB.

That margin is consumed by two main factors:

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

Therefore, a Tactical Fiber T-POV system can optimally work over 24 kilometers of cable (spending 12 dB of the link budget), and three connectors (spending 3 dB of the budget).

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

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

## The T-POV Base Station Digital Display

The digital readouts on both the T-POV 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 in this section.

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

- **BASE RX:** Base Station Optical Power or Signal Strength that is being received at the Base Station. Displayed in units of -dBm. The acceptable range for operation is -7dBm down to -22dBm. \*
- **CAM RX:** Optical Power or Signal Strength being received at the Camera Unit (displayed in units of -dBm). The acceptable range for operation is -7dBm down to -22dBm. \*
- **DIAG:** one of four diagnostics modes:
  - **TEMP:** displays operating temperature in degrees Centigrade of each circuit board that reports temperature
  - **POWR:** displays power level from monitored circuit boards
  - **REV:** displays microcontroller firmware version from each circuit board with a microcontroller
  - **CAM:** displays the error status reported by the Portable Unit

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

## Diagnostic Display Modes

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

Display Mode	Readout	Base Station Digital Display Activity Explanation
(assumes after initial power up: see <a href="#">Powering the System</a> on page 85 for a description of the Power Up sequence)		
<b>BASE RX (Base Station Receive Signal Strength)</b>		
BASE RX	-9	Indicates that the Base Station signal strength is -9 dBm
<b>CAM RX (Portable Unit Receive Signal Strength)</b>		
CAM RX	-9	Indicates that the signal strength from the Portable Unit is -9 dBm
		The display will cycle between "COPT" (Camera Optical) and "BOPT" (Base Optical) before/after the numerical optical Power Reading.
<b>DIAGNOSTIC MODE Temperature (TEMP)</b>		

Display Mode	Readout	Base Station Digital Display Activity Explanation
DIAG		When first entering the Diagnostic mode the DISPLAY indicator LED will blink - the first sub-mode displayed on the digital readout is TEMP (Temperature).
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
<b>DIAGNOSTIC MODE Power Supply Voltage Status (POWER)</b>		
DIAG/POWER		A quick push of the Display Mode Selector advances to the Power (POWER) diagnostic sub-mode.
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

Display Mode	Readout	Base Station Digital Display Activity Explanation
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
<b>DIAG/POWER Exception</b>		
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 (see <a href="#">Contact Us</a> on page 101).
<b>DIAGNOSTIC MODE Microcontroller Board Revision Version (REV)</b>		
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.
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 measured - applicable 324 model (Your Revision may differ)
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 (Your Revision may differ)
		This display cycle repeats until the Display Mode Selector is pushed

Display Mode	Readout	Base Station Digital Display Activity Explanation
<b>DIAGNOSTIC MODE Camera Unit Error Status (CAM)</b>		
		A quick push of the Display Mode Selector advances to the Portable Unit (CAM) diagnostic sub-mode. This mode displays the error status of the Portable Unit. The Digital Display Characters are Green if Portable Unit shows no error and Red if the Portable Unit does have an error. This is a high-level view of the Portable Unit error status. For further information go to the Portable Unit diagnostic display.
DIAG/CAM	CAM	Indicates that the sub-mode is CAM
DIAG/CAM	OK	Indicates that the Portable Unit is reporting No fault
DIAG/CAM	ERR	Indicates that the Portable Unit is reporting Some fault
		This display cycle repeats until the Display Mode Selector is pushed

## The T-POV Portable Unit Digital Display

The Portable Unit Digital Display has six functions selected by the Display Selector.

- **COPT**: displays the Camera Unit Optical Power or Signal Strength (Camera OPTical) that is being generated at the Portable Unit and sent to the Base Station. Displayed in units of -dBm.
- **BOPT**: displays the Optical Power (Base OPTical) or Signal Strength generated by the Base Station as measured at the Portable Unit. Displayed in units of -dBm.
- **TEMP**: displays operating temperature in degrees Centigrade of each circuit board that reports temperature
- **POWR**: displays power level from monitored circuit boards
- **REV**: displays microcontroller firmware version from each circuit board with a microcontroller

To select the different display modes push the Display Selector. The transition from one mode to another may take a moment. The Selector is cyclical rotating through each of the modes.

The following table describes the sequence, abbreviations, and expected readouts in each of Portable Unit's alpha-numeric display modes.

Readout	Portable Unit Digital Display Activity Explanation
(assumes after initial power up: see <a href="#">Powering the System</a> on page 85 for a description of the Power Up sequence)	
<b>COPT (Portable Unit Optical Signal Strength)</b>	
COPT	Indicates that the Display is showing the optical signal strength at the Portable Unit
-9	Indicates that the Portable Unit signal strength is -9 dBm
<b>BOPT (Base Station Signal Strength)</b>	



<b>Readout</b>	<b>Portable Unit Digital Display Activity Explanation</b>
BOPT	Sequence starts with BOPT to indicate the optical signal strength at the Base Station
-9	Indicates that the signal strength being received at the Base Station is -9 dBm  This display cycle repeats until interrupted by the BASE Rx/DIM button. . A quick push of the BASE Rx/DIM button returns to the COPT mode A longer push (approximately 5 seconds) advances to DIAG mode.

#### **DIAGNOSTIC MODE Power (POWR)**

Holding the SELECT button for approximately five seconds advances to the First diagnostic mode, which is POWR status. This mode cycles through the following sequence and may start at any point in the cycle.

LBUS	Indicates that the LBUS controller board is being measured
POWR	Indicates the display is in the POWER sub-mode
OK	Indicates that the item is in an OK State
UBUS	Indicates that the UBUS controller board is being measured
POWR	Indicates the display is in the POWER sub-mode
OK	Indicates that the item is in an OK State
OBOX	Indicates that the Audio Interface Box controller board is being measured - applicable to 324 model
POWR	Indicates the display is in the POWER sub-mode
OK	Indicates that the item is in an OK State
MAIN	Indicates that main Portable 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 SELECT button from PWR mode advances to the REV mode. This mode displays the microcontroller firmware revision of every board in the Portable Unit. This mode cycles through the following sequence and may start at any point in the cycle.

REV	Indicates that mode is REV
OBOX	Indicates the OBOX microcontroller board is revision is being queried - applicable to and 324 model
REVD	Indicates that the REV for the Audio Interface Box board is Revision "D" - Your revision may differ
REV	Indicates that mode is REV
MAIN	Indicates the BASE microcontroller board is revision is being queried
REVD	Indicates that the REV for the BASE Portable Unit controller board is Revision "D" - Your revision may differ
REV	Indicates that mode is REV
UBUS	Indicates the UBUS microcontroller board is revision is being queried

<b>Readout</b>	<b>Portable Unit Digital Display Activity Explanation</b>
REVD	Indicates that the REV for the UBUS board is Revision "D" - Your revision may differ
<b>DIAGNOSTIC MODE Temperature (TEMP)</b>	
A quick push of the SELECT button from REV mode advances to the TEMP mode. This mode displays the internal temperature (in degrees centigrade) of the Portable Unit. This mode cycles through the following sequence and may start at any point in the cycle.	
TEMP	Sequence starts with TEMP to indicate Temperature Display mode
MAIN	The Portable Unit MAIN controller board temperature will be displayed
61C	Temperature display in Centigrade for Portable Unit main circuit board

## Best Practices

When using the laser equipment, take special precautions to prevent damaging your eyes.

Protect the Fiber Optic Cable and the Fiber Optic Connectors. Always keep these items capped until they are being connected.

Once the system is set up and running, pay close attention to the Optical Power Signal Strength Readouts at either the Camera Unit 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 digital, so the Signal Strength either meets or exceeds requirements. When it is no longer strong enough, the signal stops.

If introducing new equipment (cameras, switchers, etc.) or new operators, perform a real-world test run as it would be during the actual production. A hands-on experience is the best way to understand how it works and what to do to ensure proper operation.

Be as careful during System tear down as with System setup.

Read the **Using Fiber Optics Guide** for information on how to manage and deploy your fiber optics cabling, safety precautions, tips & tricks, and recommendations for creating complex fiber optic networks. You can find a copy of this document on the Support portal (see [Contact Us](#) on page 101).

## Shutting Down the System

System shutdown is simple. Take special care when handling the Fiber Cable and to the Camera Remote Control Panel Cable.

Camera Power and Camera Unit Power may be turned off at any time. If your system uses Hybrid Power, these are same features.

- To prevent looking directly into an active fiber optic port or cable, turn both the Camera Unit and the Base Station off before disconnecting the fiber from either point.
- To prevent damaging the Camera or Camera Remote Control Panel, turn both the Camera Unit and the Base Station off before disconnecting the Control Cable from the Control Panel, the Base Station, the Camera Unit, or the Camera itself.
- Protect all cables from dirt, water entry, and from being dragged across the ground or other surfaces.
- When re-spooling the cable, avoid cable snags, crimps, or damage to the connectors. Re-spool evenly across the reel.
- If the Base Station is a permanent or semi-permanent installation, power off and disconnect and cap the Fiber Cable.

## Troubleshooting

Troubleshooting any technical issues with the T-POV Robotic Camera Link System is similar to any piece of television production gear with the obvious exception of the core Fiber Optic technology.

- Check all your cables for any broken connections or bad connectors.
- Ensure that the Power Supplies are working.
  - If the Base Station is internally-powered, ensure that the main switch on the rear panel turned on.
  - Check the fuses. If the system is internally powered, ensure that you are within the 95 Watt limit on power consumption.
- Use the various diagnostic tools provided in the T-POV Robotic Camera Link Base Station and Camera Unit.
  - Ensure that 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, although this is not guaranteed.  
Use the Four-Character Digital Displays to monitor signal strength. Remember to check both local and remote power in case that the Base Station is putting out good power, but the Camera Unit is not receiving it.
  - Observe all of the LED warning and alarm lights on the Base Station and follow up with the appropriate action.
  - If signal strength is degraded from the time of system checkout at a particular location, walk the Fiber Cable verify that it is intact and has no damage, no severe bends, or no kinks.
- If the digital display indicates an error and displays a Hexadecimal error code, you should contact Grass Valley support to assist in diagnosing the problem (see [Contact Us](#) on page 101).

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**Note:** The exact error code so you can report it to 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.

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# 8 Specifications

## Video, Digital (Quad Link)

Interface (x4)..... SMPTE 424M, 292M, 259M  
 Data rate (x4) .....3 Gb/s, 1.5 Gb/s or 270 Mb/s

## Video, Digital (Bidirectional)

Interface .....SMPTE 259M, 292M  
 Data Rate.....270 Mb/s or 1.5 Gb/s  
 Input Level..... 800mV (peak to peak)

## Video, Digital

Input Impedance .....75  $\Omega$   
 Output Impedance.....75  $\Omega$   
 Bit-Error Rate (@ -22 dBm) ..... 10-12  
 Jitter Measure w/Color Bars ..... <0.2 UI  
 Rise/Fall Times ..... 0.4ns-1.5ns SD  
 ..... <270ps HD

## Video Analog

Interface .....RS-170, NTSC, PAL, SECAM  
 Input/Output Level ..... 1V p-p @ 75  $\Omega$   
 Frequency Response.....30Hz-5 MHz $\pm$ 0.2 dB  
 ..... -3dB point min 8.6 MHz  
 Video Signal to Noise Ratio ..... $\geq$ 67 dB, weighted  
 Differential Gain ..... $\leq$  2.0%  
 Differential Phase ..... $\leq$  0.7 $^\circ$   
 Line Time Distortion.....  $\leq$  0.5 IRE  
 Chrom-Lum Intermod ..... $\leq$  1 IRE

## Ethernet

Data Support ..... 10Base-T/100Base-T  
 Connector ..... Twisted pair RJ-45  
 Cable Compatible ..... UTP 100  $\Omega$  Cat5e Cat6  
 Input Impedance ..... 100  $\Omega$  differential  
 Output Impedance..... 100  $\Omega$  differential

## Audio

Number of Channels..... 4 I/O  
 Type ..... Balanced, line level  
 Impedance I/O ..... >10K  $\Omega$ /30  $\Omega$   
 Maximum Input Level ..... +24 dBu  
 Quantization ..... 24 bits, 12.8x (oversampled)  
 Sample Rate ..... 48 kS/sec  
 Frequency Response..... $\pm$ 0.1 dB, 20 Hz to 20 KHz  
 Signal to Noise Ratio..... < -95dB (A-Weighted)

THD+N .....20Hz-20KHz.<=0.02%  
 Interface.....DB25 (AES standard pin out)

**Data Auxiliary**

RS-422/RS-485.....0 to 1 Mbaud  
 RS-232 .....0 to 150 Mbaud  
 Number of Channels..... 2-6 Channels  
 Sample .....80 ns  
 GPI Contacts ..... NO, Form 1 SPST

**Electro-Optical**

Operating Wavelengths.....1300 nm standard  
 ..... 1550 nm, CWDM wavelengths available  
 Tx Laser output power (std./opt).....6 dBm/0 dBm  
 Rx Sensitivity, HD-SDI ..... -22 dBm  
 Rx Sensitivity, 3G-SDI..... -20 dBm  
 Fiber Compatibility..... Single Mode  
 Distance Limit ..... \*see note below

**Tactical Fiber (Local Power at Camera):**

Standard laser ..... 15db optical loss (~ 30 km/18.6 mi.\*)  
 Optional DFB laser ..... 19db optical loss (~ 38 km/23.6 mi.\*)  
 SMPTE 311M Hybrid Fiber.....240 m (787 ft): 95W at 12VDC\*

**Optical Connector Options**

Local Power..... LC, ST, MX, OpticalCON  
 Remote Power ..... SMPTE 304M or OpticalCON

**Mechanical/Environmental**

**Dimensions (WxHxD):**

Rack Mounted Units (w/ears) .....482.6 x 44.45 x 203.2 mm (19 x 1.75 x 8")  
 Mini-Mussel Low Profile..... 133.35 x 69.85 x 323.85 mm (5.25x 2.75 x 12.75")  
 Mini-Mussel High Profile ..... 133.35 x 101.6 x 323.85 mm (5.25 x 4 x 9.1")  
 Throwdown Low Profile 4K ..... 129.5 x 64.5 x 231.1 mm (5.1 x 2.54 x 9.1")  
 Throwdown Low Profile..... 114.3 x 44.45 x 247.65 mm (4.5 x 1.75 x 9.75")  
 Throwdown High Profile ..... 114.3 x 76.2 x 247.65 mm (4.5 x3 x 9.75")

**Weight**

Rack Mounted Unit, 12VDC  
 Single .....2.27 kg (5 lb.)  
 Dual .....2.61 kg (5.75 lb.)  
 Triple.....2.84 kg (6.25 lb.)  
 Rack Mounted Unit - AC for SMPTE Power ..... 2.95 kg (6.5 lb.)  
 Mini-Mussel Low Profile.....0.91 kg (2 lb.)  
 Mini-Mussel High Profile ..... 1.59 kg (3.5 lb.)  
 Throwdown Low Profile 4K .....0.91kg (2 lb.)  
 Throwdown Low Profile..... 0.68 kg (1.5 lb.)  
 Throwdown High Profile ..... 1.36 kg (3 lb.)

Humidity.....0 to 95% RH, Noncondensing  
 Certifications..... FCC Part 15, RoHS, LEED, CE  
 Temperature Range.....Operating -25° C to +55°C (-13°F to +131°F)



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





## **Grass Valley Technical Support**

For technical assistance, contact our international support center, at 1-800-547-8949 (US and Canada) or +1 530 478 4148.

To obtain a local phone number for the support center nearest you, please consult the Contact Us section of Grass Valley's website ([www.grassvalley.com](http://www.grassvalley.com)).

An online form for e-mail contact is also available from the website.

## **Corporate Head Office**

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# Connector Wiring and Connection




This appendix provides information on the wiring layout and how the connectors are configured.

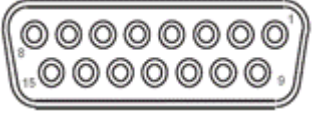
<i>Wiring Diagrams</i> .....	103
<i>Serial Data Configuration</i> .....	105

## Wiring Diagrams

### 12 Volt DC Power Connection

Component	Description
	<p><b>Pin 1:</b> Ground  <b>Pin 2:</b> Unused  <b>Pin 3:</b> Unused  <b>Pin 4:</b> + Power 12 VDC</p> <p>This matching connector is from either an ADAP-AC-04 or a customer 12VDC power supply.</p>

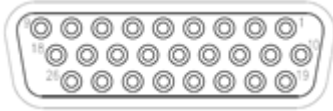
### 15 Pin Serial Data Connection

Component	Description	
	<b>Data 1</b>	<b>Data 2 Format select switch</b>
	(1) 232 In	00 = rs422
	(5) 232 Out	11 = rs485
	<b>Data 2</b>	<b>Tally</b>
	(3) +422 In	(4) GPI In
	(2) -422 In	(8) GPI Out A
	(7) +422 Out, +485 I/O	(15) GPI Out B
(6) +422 Out, -485 I/O	(9, 10, 11, 12)	

Applicable to T-POV 301


For information regarding the Data 2 Format Select Switch, see [26 Pin Serial Data Connection](#) on page 104.

## 26 Pin Serial Data Connection

Component	Description		
	Data 1	Data 3	Format Pin Orientation
	(9) 232 In	(6) 232 In, +422 In, +485 I/O	N/C for RS422
	(18) 232 Out	(15) -422 In, -485 I/O	Tie to ground for RS232
		(14) 232 Out, +422 Out	Tie to Format Bias for RS485
		(5) -422 Out	(20, 22, 24, 26) Ground
		(23) Data 3 Format	(2) Format Bias (12v)
	Data 2	Data 4	Tally
	(8) 232 In, +422 In, +485 I/O	(4) 232 In, +422 In, +485 I/O	(11) GPI In
	(17) -422 In, -485 I/O	(13) -422 In, -485 I/O	(1) GPI Out A
	(16) 232 Out, +422 Out	(12) 232 Out, +422 Out	(10) Out B
	(7) -422 Out	(3) -422 Out	
(25) Data 2 Format	(21) Data 4 Format		


Applicable to the T-POV 324

## 25 Pin Audio Connection

Component	Description			
	AUDIO 1 IN	AUDIO 2 IN	AUDIO 3 IN	AUDIO 4 IN
	(24) +Input	(10) +Input	(21) +Input	(7) +Input
	(12) -Input	(23) -Input	(9) -Input	(20) -Input
	(25) Ground	(11) Ground	(22) Ground	(8) Ground
	AUDIO 1 OUT	AUDIO 2 OUT	AUDIO 3 OUT	AUDIO 4 OUT
	(18) +Output	(4) +Output	(15) +Output	(1) +Output
	(6) -Output	(17) -Output	(3) -Output	(14) -Output
	(19) Ground	(5) Ground	(16) Ground	(2) Ground

Applicable to T-POV 324

## Base Station 12VDC Terminal Block Wiring

Component	Description
	<p><b>Pin 1:</b> Minus Voltage Terminal</p> <p><b>Pin 2:</b> Plus Voltage Terminal</p> <p>This cable is end-user supplied.</p>

## Serial Data Configuration

For the Serial Data connector on the T-POV 301, the Data 2 channel is configurable. To select between RS422 and RS485 serial communication, select the proper settings on a dual dip-switch contained on the main circuit board inside the unit. The switch is directly behind the right side of the serial connectors on both the base station and the camera unit.

### To configure the Serial Data connector

- 1 Remove the top of the unit by removing the four screws as shown. A Mini-Mussel Shell Camera Unit is shown as an example.

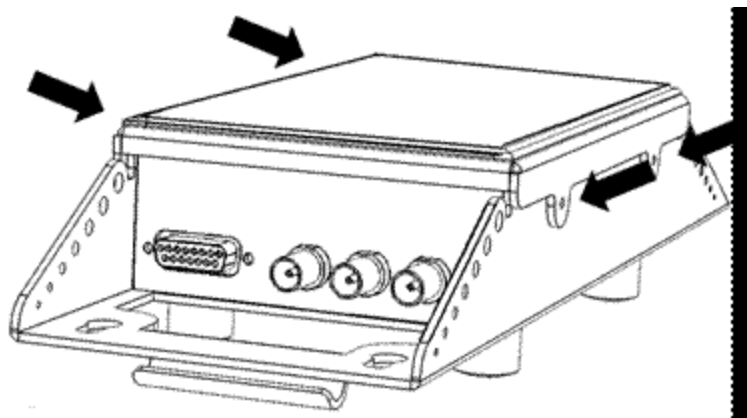


Fig. A-1: Removing the top of the Camera Unit

- 2 Flip the dual dip-switch contained on the main circuit board inside the RS422 or R485 unit. For a multi-unit Base Station, you must set each unit separately and units can be set differently from each other.
  - For RS422 serial communications, slide both switches to the back of the unit (towards the serial connector).

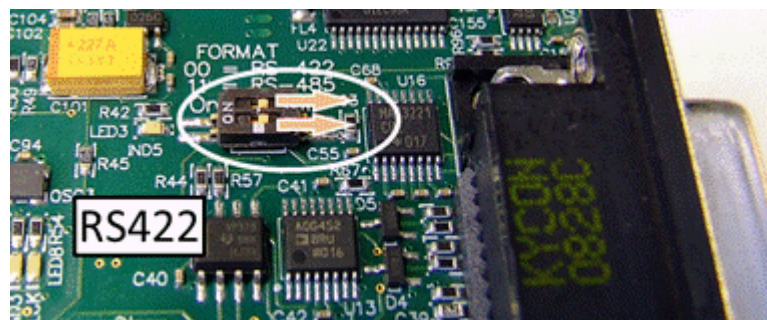
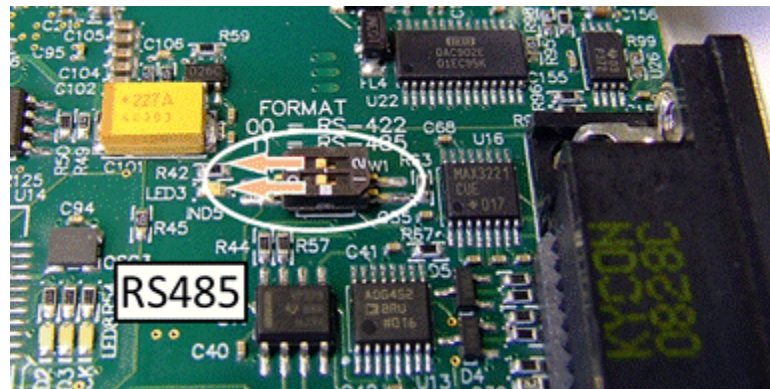


Fig. A-2: Flip switches on an RS422

- For RS485 serial communications, slide both switches to the front of the unit (away from the serial connector).



*Fig. A-3: Flip switches on an RS485*



