VideoEase™
Passive CCTV Hub (500130,500131)

Installation Guide

MuxLab

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1. Overview

1.1. Description

The Passive CCTV Hub allows video, remote power and PTZ control to be transmitted via one 4-pair Cat 5 cable, thus eliminating the need to install multiple cables for more efficient cabling in the security video environment. There are two 16-port models: 500130; for coax video output and the 500131; for twisted pair video output.

The Passive CCTV Hub works in conjunction with MuxLab's 500000, 500009, 500015, 500022, 500023, 500024, 500029, 500120 and 500122. The product features a port switch to set the unit to Power-Thru or Pass-Thru mode.

1.2. Features

- Port switch to set unit to Pass-Thru Mode (500022) or Power-Thru Mode (500024/500029)

- Pin configuration chart on unit

- Space efficient, rack-mountable

2.
Technical Specifications

Specifications	
Environment	Composite video; NTSC, PAL, SECAM
Devices	CCTV cameras, DVRs, monitors, switchers, multiplexers and other CCTV equip.
Transmission	Transparent to the user.
Video	
Bandwidth	DC to 8 MHz.
Maximum Input	1.1Vp-p
Insertion Loss	Less than 2 dB per pair over the frequency range from DC to 8 MHz
Return Loss	Greater than 15 dB over the frequency range from DC to 8 MHz
Common Mode Rejection	Greater than 40 dB @ 8 MHz
Max. Distance - Color	Cat 3 –1,200 ft (365m); Cat 5 – 2,200 ft. (670m)* *Shorter distances will result with DVR equipment. Typically 1,000 to 1,500 ft*
Max. Distance - B&W	Cat 3 –1,500 ft (457m); Cat 5 – 2,500 ft (762m)
Remote Power	

Switch Mode	**Pass-Thru Mode (500022)**	**Power-Thru Mode (500024/500029)**
Number of twisted pairs	Two (2)	Three (3)
Max. Distance @ 24VAC* *Based on 10% voltage drop at camera. Longer distances may be achieved @ 28 VAC.*	5 VA: 350 ft (107m) 10 VA: 175 ft (53m) 20 VA: 90 ft (30m) 30 VA: 60 ft (20m)	5 VA: 518 ft (170m) 10 VA: 259 ft (85 m) 20 VA: 130 ft (43 m) 30 VA: 86 ft (28 m)
Maximum Input Voltage	50 Volts (AC RMS/DC). Recommended Class II PSU with fuse protection per port	
Maximum Current Rating	4.5A (AC RMS/DC)	
2-Wire PTZ Control (i.e. RS-422, Manchester/Bi-Phase, half duplex RS485) – Pass-Thru Mode (500022)		
Wiring	Remote 2-wire PTZ control supported via one (1) twisted pair.	
Maximum Distance	Up to 4,000 ft (1.2 km) depending on the PTZ camera vendor** **Please consult your CCTV equipment vendor for more detailed performance specifications.*	
Maximum Power Rating	50 Volts (AC RMS/DC); 3A (AC RMS/DC)	
Mechanical & Environmental		
Cable – UTP	24 AWG or lower solid copper twisted pair wire impedance: 100 ohms at 1 MHz Maximum capacitance: 20 pf/foot. Attenuation: 6.6 dB/1000 ft at 1 MHz	
Cable – Coax	Impedance: 75 Ω at 1 MHz. (RG59/U). Max. 25 ft. of coax allowed end to end.	
Connectors	Video (Model 500130): Sixteen (16) BNC-F Video (Model 500131): Sixteen (16) 2-pole screw terminals Power: Sixteen (16) 2-pole screw terminals Control: Sixteen (16) 2-pole screw terminals. Combined signals: Sixteen (16) RJ45 jacks	
Port Configuration Switch	Sets each port to Pass-Thru Mode (500022) or Power-Thru Mode (500024/500029)	

RJ45 Pin Configuration* *Reverse polarity sensitive*	**Signal**	**500022 Mode**	**500024/500029 Mode**
	Power A (+)	1, 3	1, 3, 5
	Power B (-)	2, 6	2, 4, 6
	Control (+)	4	Not used
	Control (-)	5	Not used
	Video BNC Center (Tip)	7 [T] opposite to 500000	7 [T] opposite to 500000
	Video BNC Ground (Ring)	8 [R] opposite to 500000	8 [R] opposite to 500000

Temperature	Operating: 0° to 55°C. Storage:-20° to 85°C. Humidity: up to 95%
Enclosure	Black, anodized aluminum
Dimensions	19" (48.26 cm) W x 1.75" (4.4 cm) H x 2.0" (5.1 cm) D
Weight	2.3 lbs. (1.1kgs)
Warranty	Lifetime
Order Information	500130 Passive CCTV Hub, UTP/Coax 500131 Passive CCTV Hub, UTP/UTP

3. Installation Procedure

3.1. Parts List

The Passive CCTV Hub comes with the following parts. Please verify that all pieces are present before proceeding.

- Base Unit (Factory configuration: Power-Thru Mode (500022)

- Installation Guide

3.2. Product Overview

The external connections of the Passive CCTV Hub are detailed in the following diagrams. Please familiarize yourself with them before installing the unit.
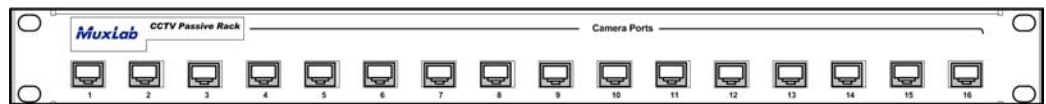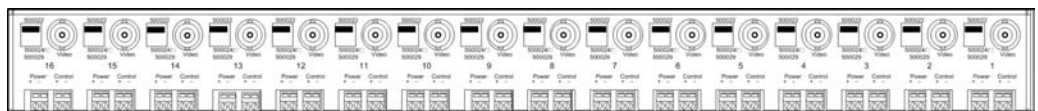
Figure 1: Front panel, all models
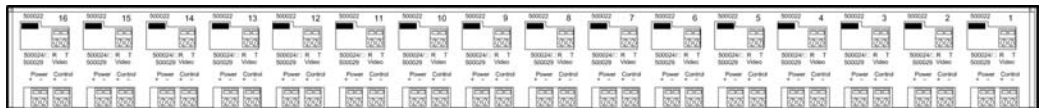
Figure 2: Rear panel, Model 500130 (UTP/Coax)

Figure 3: Rear panel: Model 500131 (UTP/UTP)

3.3. Pre-Installation Checklist

The Passive CCTV Hub provides a centralized sixteen (16) port CCTV copper twisted pair cabling solution.

1. The Passive CCTV Hub is used in a CCTV installation to manage the video, power and control connections between the CCTV cameras and the head-end.

2. There are two (2) models of the Passive CCTV Hub; 500130 and 500131. The difference between the 500130 and 500131 is that the video portion of the 500130 incorporates a video balun at each port and is connected to the DVR via coaxial cable. The video portion of the 500131 is fully twisted pair on the input and output and connected to the DVR via twisted pair cable. In order to convert from twisted pair back to coax, a CCTV video balun is connected at each DVR port.

3. The products feature a switch at each port to select between Pass-Thru Mode (500022 compatible) or Power-Thru Mode (500024/500029 compatible) depending on the cabling configuration.

4. The Passive CCTV Hub works in conjunction with MuxLab's other CCTV products including the 500000, 500009, 500015, 500022, 500023, 500024, 500029, 500120 and 500122). The passive CCTV Baluns are connected at the CCTV camera.

5. The Passive CCTV Hub works with CCTV cameras that have built-in twisted pair baluns. It may be necessary to reverse the polarity of the wires first. Distance performance may vary.

3.4.   Physical Installation

The Passive CCTV Hub is a 1U, 19" rackmount unit. The factory default switch settings of each port is Pass-Thru Mode (500022).

1.   Select the final destination for the product in the relay rack and install the unit using standard rackmount screws.
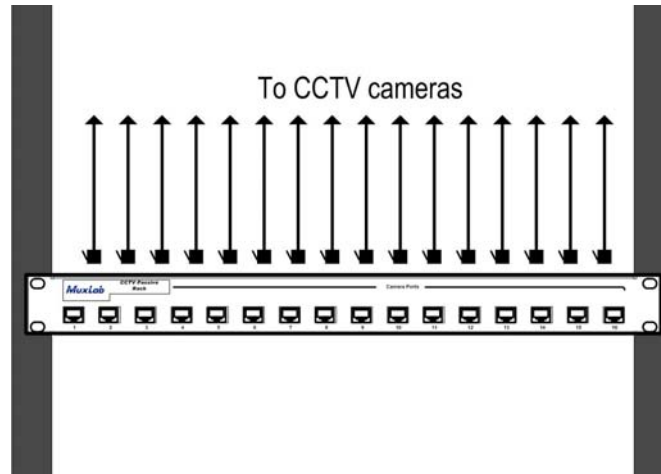

Figure 4: Rack-mount installation

3.5.   Installation Procedure – Model 500130

The Passive CCTV Hub, Model 500130 features BNC connectors on the video portion of the device, thereby allowing it to be connected directly to the DVR via coaxial cable. In order to install the product in this configuration, please follow the steps below:

1. Install the Passive CCTV Hub in its final location. Please verify that the distance between the rack and cameras are within MuxLab specifications.

2. Connect a MuxLab passive CCTV Balun (MuxLab p/n 500000, 500009, 500022, 500023, 500024 or 500029) to each CCTV camera video output. Please refer to the appropriate CCTV balun installation guide for details.

3. Connect one Cat5 cable from each camera to one of the modular RJ45 ports on the front of the Passive CCTV Hub (fig 5). Please ensure that EIA 568 wiring and straight-through polarity is respected between the CCTV balun and the rack. The use of other Cat5 connection hardware such as patch panels and 110 blocks may be used.
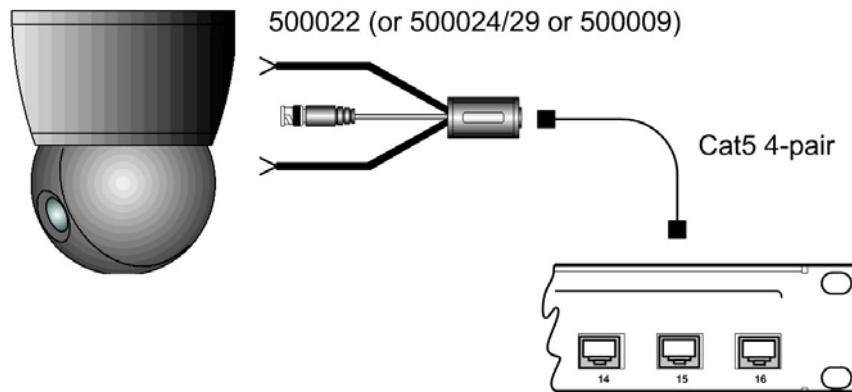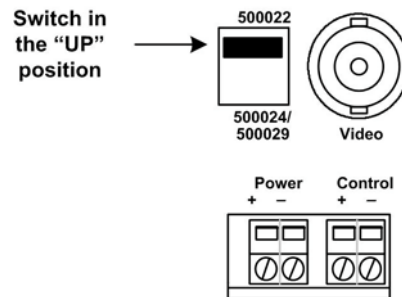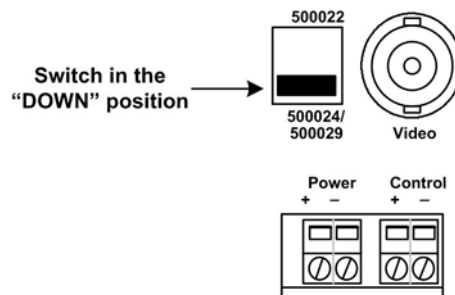

Figure 5: Camera connection

Port Switch Settings:

4. For each camera port, determine whether video, power and/or control is to be transmitted via the same Cat5 cable. If only video is to be transmitted, then the Power/Control terminals and port switch may be disregarded.

5. In order to transmit video on one (1) twisted pair, remote power on two (2) twisted pairs and control on one (1) twisted pair, set the port switch to Pass-Thru Mode (500022) using a small flathead screwdriver, as shown in fig 6. Ensure that there is a CCTV Pass-Thru Balun (500022) at the camera.
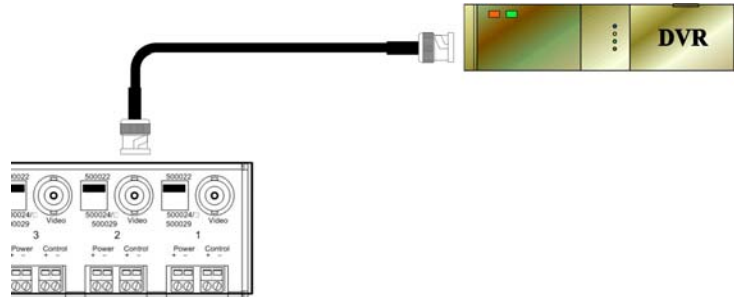
Figure 6: Port Setting – Pass-Thru Mode (500022)

6. In order to transmit video on one (1) twisted pair and remote power on three (3) twisted pairs, set the port switch to Power-Thru Mode (500024/500029) using a small flathead screwdriver (fig 7). Ensure that there is a CCTV Power-Thru Balun (500024 or 500029) at the camera.
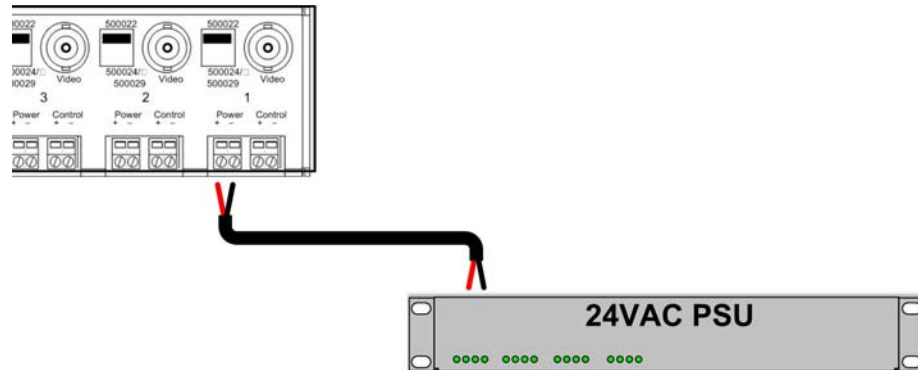
Figure 7: Port Setting – Power-Thru Mode (500024/500029)

Output Connections:

Video:

7. Connect one coax cable between each video output port on the rack and the DVR video input (fig 8).
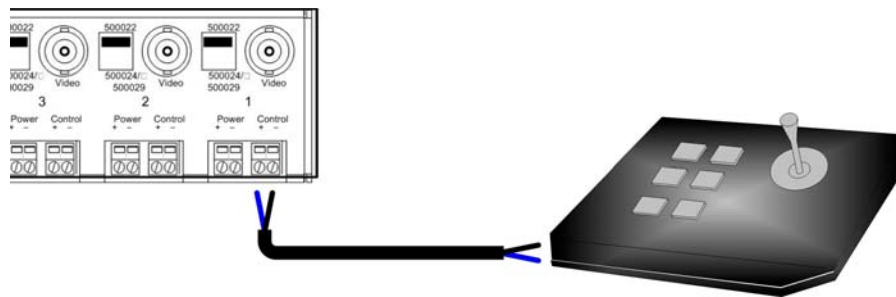

Figure 8: Video connection, Model 500130

Remote Power:

8. If remote power is being transmitted to the camera, verify that the distance between the camera and the hub is within MuxLab specifications. Please consult the distance charts at the back of the installation guide. When the port switch is set to Pass-Thru Mode (500022), two (2) twisted pairs are used for remote power. When the port switch is set to Power-Thru Mode (500024/500029), three (3) twisted pairs are used for remote power thus supporting greater distance.

9. Connect two (2) wires between the power terminals of the hub to the remote low voltage power supply (fig 9). **It is recommended to use a Class II power supply with fuse protection on each output port.**
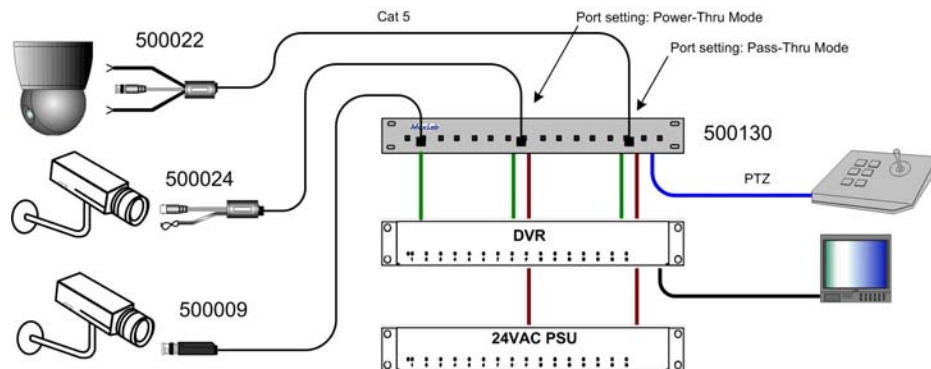

Figure 9: Remote power connection, Model 500130

PTZ Control:

10. If PTZ Control is to be transmitted to the camera, verify that the distance between the camera and the hub is within the distance specifications for sending PTZ control over twisted pair. Consult the PTZ equipment vendor for maximum distances. Please ensure that the port switch is set to Pass-Thru Mode (500022). When the port switch is set to Pass-Thru Mode (500022), one (1) twisted pair is used for PTZ control. For optimum results, it is recommended to use control protocols such as RS-422, RS-485 or Bi-phase. **Due to crosstalk issues, RS-232 is not recommended.**

11. Connect two (2) wires between the PTZ controller and the "Control" terminals on the hub (fig 10).

Figure 10: PTZ connection, Model 500130

12. Power on the CCTV equipment; cameras, remote power supply, PTZ controller.

13. The following diagram shows a typical configuration.

Figure 11: Typical Configuration, Model 500130

3.6.   Installation Procedure – Model 500131

The Passive CCTV Hub, Model 500131 features screw terminal connectors on the video portion of the device, thereby allowing it to be connected via twisted pair to the head end equipment (DVR). Video baluns, such as the 500009, must be used at the DVR to convert back to coaxial cable. In order to install the product in this configuration, please follow the steps below:

1. Install the Passive CCTV Hub in its final location. Please verify that the distance between the cameras and the head end are within MuxLab specifications.

2. Connect a MuxLab passive CCTV Balun (MuxLab p/n 500000, 500009, 500022, 500023, 500024 or 500029) to each CCTV camera video output. Please refer to the appropriate CCTV balun installation guide for details.

3. Connect one Cat5 cable from each camera to one of the modular RJ45 ports on the front of the Passive CCTV Hub (fig 12). Please ensure that EIA 568 wiring and straight-through polarity is respected between the CCTV balun and the rack. The use of other Cat5 connection hardware such as patch panels and 110 blocks may be used.
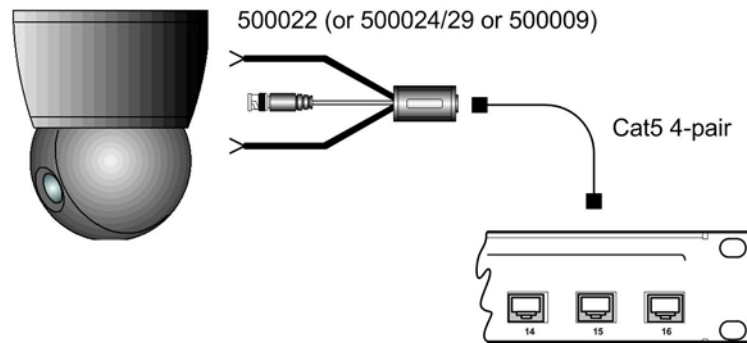

Figure 12: Camera connection

Port Switch Settings:

4. For each camera port, determine whether video, power and/or control is to be transmitted via the same Cat5 cable. If only video is to be transmitted, then the Power/Control terminals and port switch may be disregarded.

5. In order to transmit video on one (1) twisted pair, remote power on two (2) twisted pairs and control on one (1) twisted pair, set the port switch to Pass-Thru Mode (500022) as shown in figure 13. Ensure that there is a CCTV Pass-Thru Balun (500022) at the camera.
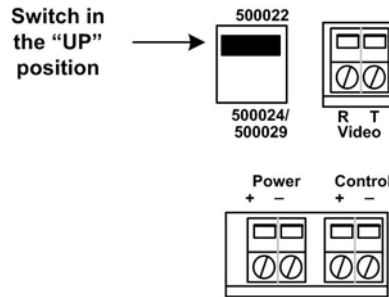
Figure 13: Port Setting – Pass-Thru Mode (500022)

6. In order to transmit video on one (1) twisted pair and remote power on three (3) twisted pairs, set the port switch to Power-Thru Mode (500024/500029) as shown in figure 14. Ensure that there is a CCTV Power-Thru Balun (500024 or 500029) at the camera.
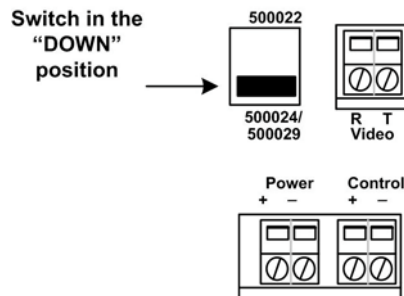
Figure 14: Port Setting – Power-Thru Mode (500024/500029)

Output Connections:

Video:

7. Install a CCTV balun on each port of the DVR. The products that may be connected include; 500000, 500009, 500015, 5000023 or 500122.

8. Connect one (1) twisted pair for video between the hub and the balun on the DVR (fig 15).
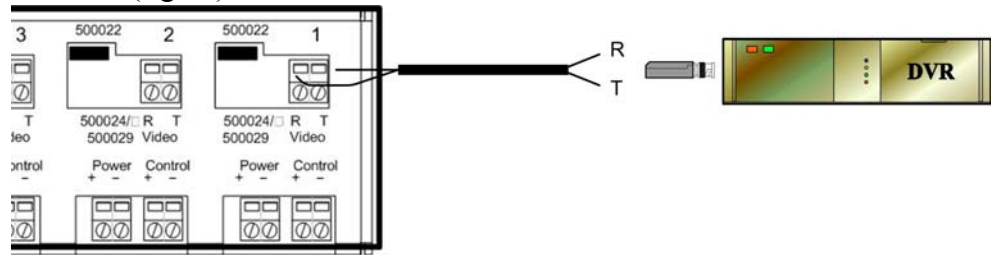

Figure 15: Video connection, Model 500131

Remote Power:

9. If remote power is being transmitted to the camera, verify that the distance between the camera and the hub is within MuxLab specifications. Please consult the distance charts at the back of the installation guide. When the port switch is set to Pass-Thru Mode (500022), two (2) twisted pairs are used for remote power. When the port switch is set to Power-Thru Mode (500024/500029), three (3) twisted pairs are used for remote power thus supporting greater distance.

10. Connect two (2) wires between the power terminals of the hub to the remote low voltage power supply (fig 16). **It is recommended to use a Class II power supply with fuse protection on each output port.**
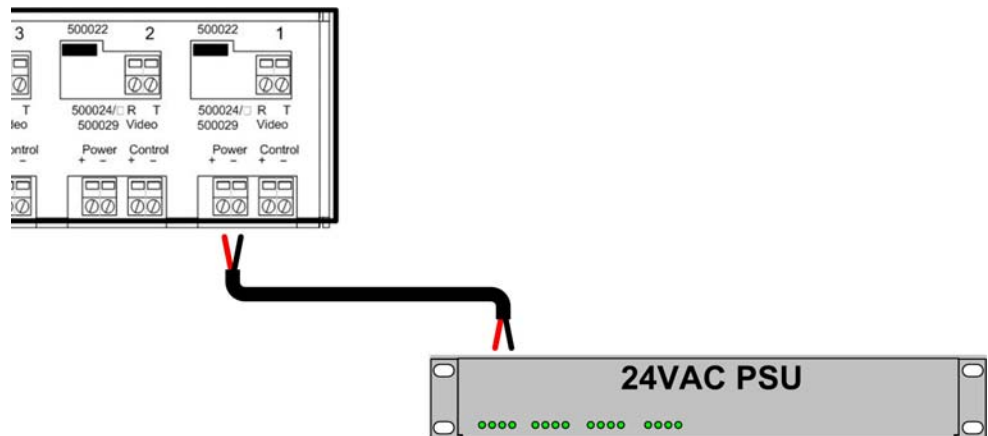

Figure 16: Remote power connection, Model 500131

PTZ Control:

11. If PTZ Control is to be transmitted to the camera, verify that the distance between the camera and the hub is within the distance specifications for sending PTZ control over twisted pair. Consult the PTZ equipment vendor for maximum distances. Please ensure that the port switch is set to Pass-Thru Mode (500022). When the port switch is set to Pass-Thru Mode (500022), one (1) twisted pair is used for PTZ control. For optimum results, it is recommended to use control protocols such as RS-422, RS-485 or Bi-phase. **Due to crosstalk issues, RS-232 is not recommended.**

12. Connect two (2) wires between the PTZ controller and the "Control" terminals on the hub (fig 17).

Figure 17: PTZ connection, Model 500131

13. Power on the CCTV equipment; cameras, remote power supply, PTZ controller. The following diagram shows a typical configuration.
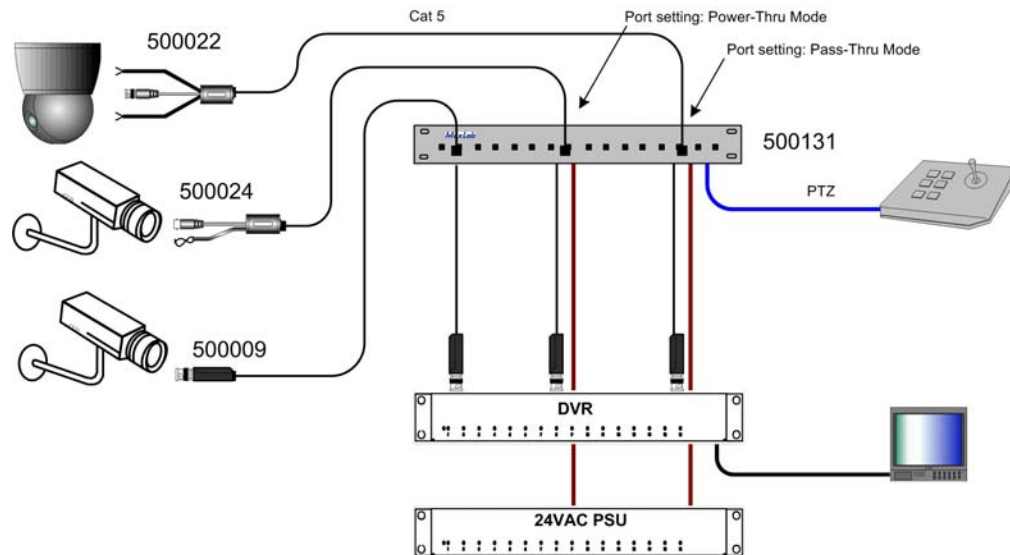

Figure 18: Typical Configuration, Model 500131

4.
Troubleshooting

The following chart describes some of the problem symptoms, the probable causes and possible solutions.   If the information below does not solve the problem, please contact MuxLab Technical Support at 877-689-5228 (North America) or at (+1) 514 905-0588 (International) or via e-mail at videoease@muxlab.com.

Picture	Probable Causes	Possible Solutions
No video image	• Power-off.	• Check power supplies of CCTV equipment. Check power supply fuse.
	• Wrong pin configuration	• Check pin configuration and verify straight-through wiring.
	• Defective CCTV Balun	• Change CCTV baluns for another pair.
Poor image quality, distortions, interference	• EMI interference • Wires reversed on signal pair on one side • Split pair	• Check that wiring is not too close to transformers and lighting ballasts • Make sure that the wires on the signal pair are not reversed on one side. • Check if the UTP pairs are correct (not split)
Picture loses color, faded or weak	• Exceeded distance specifications • Lower grade UTP cable is introducing high losses	• Check DC loop resistance and verify if distance spec is exceeded • Reduce cable length or eliminate high-loss components • Replace cable by higher grade
	• Wires reversed on signal pair on one side	• Make sure that the wires on the signal pair are not reversed on one side.
	• Split pair	• Check if the UTP pairs are split and correct. Each signal pair must be twisted.
	• Lower grade UTP cable is introducing high signal losses.	• Use signal repeater for extended distance or replace cable by higher grade.
No power or intermittent power at camera	• Wrong pin configuration.	• Check wiring
	• Distance exceeded	• Verify distance specifications for remote power. Move power closer to camera.
PTZ controls not responding	• Wrong pin config	• Check wiring.

When contacting your nearest MuxLab dealer or MuxLab Technical Support please have the following information ready:

- Unit model number.
- Cabling lay-out. Include model of camera and DVR used, power supply voltage, camera wattage, cable length and type.

- Description of problem.
- List of tests performed.

5.
Distance Tables

The following tables provide the maximum distances for remote power via Cat5 twisted pair when a port on the Passive CCTV Hub is set to Pass-Thru Mode (500022) or Power-Thru Mode (500024/500029).

Pass-Thru Mode (500022) – Two (2) Twisted Pairs

Voltage	Pcam (W)	Vcam[1] min (V)	Dist Spec[2] max (Feet)	Dist Spec[2] max (m)
12 VDC/AC	5	10.80	86	28
12VDC/AC camera	10	10.80	43	14
	20	10.80	22	7
	30	10.80	14	5
	40	10.80	11	4
	50	10.80	9	3
24 VAC	5	21.60	346	113
24VAC camera	10	21.60	173	57
	20	21.60	86	28
	30	21.60	58	19
	40	21.60	43	14
	50	21.60	35	11
28 VAC	5	21.60	922	302
24VAC camera	10	21.60	461	151
	20	21.60	230	76
	30	21.60	154	50
	40	21.60	115	38
	50	21.60	92	30

Power-Thru Mode (500024/500029)

Voltage	Pcam (W)	Vcam[1] min (V)	Dist Spec[2] max (Feet)	Dist Spec[2] max (m)
12 VDC/AC	5	10.80	130	43
12VDC AC camera	10	10.80	65	21
	20	10.80	32	11
	30	10.80	22	7
	40	10.80	16	5
	50	10.80	13	4
24 VAC	5	21.60	518	170
24VAC camera	10	21.60	259	85
	20	21.60	130	43
	30	21.60	86	28
	40	21.60	65	21
	50	21.60	52	17
28 VAC	5	21.60	1382	454
24VAC camera	10	21.60	691	227
	20	21.60	346	113
	30	21.60	230	76
	40	21.60	173	57
	50	21.60	138	45

Notes:

1. Distances are specified for temperatures of $20\,^{\circ}$C to $30\,^{\circ}$C
2. Maximum distances based on 10% loss of voltage. For 28VAC, a 24VAC camera was used.
3. Distances specified are 90% of distances calculated.
4. If 22AWG gage wire is used, there would be an increase in distance of approximately 56%.

6.
Product Warranty Policy

Items under warranty - Company Policy
MuxLab guarantees its products to be free of defects in manufacturing and workmanship for the warranty period from the date of purchase. If this product fails to give satisfactory performance during this warranty period, MuxLab will either repair or replace this product at no additional charge, except as set forth below. Repair and replacement parts will be furnished on a exchange basis and will be either reconditioned or new. All replaced parts and products become the property of MuxLab. This limited warranty does not include repair services for damage to the product resulting from accident, disaster, misuse, abuse, or unauthorized modifications or normal decay of battery driven devices. Batteries if included with the product, are not covered under this warranty.

Limited warranty service can be obtained by delivering the product during the warranty period to the authorized MuxLab dealer from whom you purchased the product, or by sending it to MuxLab. MuxLab will not accept any such product for repair without a Return Material Authorization number (RMA#) issued by its Customer Service Department and a proof of purchase date. If this product is delivered to MuxLab by mail, you agree to assume risk of loss or damage in transit, to prepay shipping charges to the warranty service location, and to use the original shipping container or equivalent.

THE ABOVE LIMITED WARRANTY IS THE ONLY WARRANTY COVERING YOUR MUXLAB PRODUCT. THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SOME STATES DO NOT ALLOW LIMITATIONS ON IMPLIED WARRANTIES, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

IF THIS PRODUCT IS NOT IN GOOD WORKING ORDER, YOUR SOLE REMEDY SHALL BE REPAIR OR REPLACEMENT AS PROVIDED FOR ABOVE. IN NO EVENT SHALL MuxLab BE LIABLE TO YOU FOR ANY DAMAGES, INCLUDING ANY LOSS OF PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF OR INABILITY TO USE THIS PRODUCT, EVEN IF MUXLAB OR AN AUTHORISED MuxLab DEALER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES; NOR WILL MUXLAB BE LIABLE FOR ANY CLAIM BY ANY OTHER PARTY. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR CONSUMER PRODUCTS, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY FROM STATE TO STATE.

Warranty Periods
Any product found to be defective within three (3) months of invoice, including one (1) month shelf life, may be returned for replacement by a new unit or a satisfactory repair within one (1) month of receiving any returned product. The customer must provide MuxLab with the serial number and proof of purchase of the defective unit being returned. <u>All R.M.A.'s issued are subject to inspection by MuxLab,</u> and will be returned to customer if not properly package – units must be returned in original container or equivalent. MuxLab will not accept any such product for repair without an authorization for its Technical Support department and without a return authorization number issued by MuxLab Customer Service department.   For credit & replace R.M.A., customer will be liable to pay replacement invoice if defective products are not returned.
Product more than six months old, including shelf life.

The defective unit must be returned prepaid to MuxLab and then the unit will be repaired or if repair is not possible, replaced by an equivalent unit and returned to the customer within one (1) month of receiving any returned product.. There is no charge for repair (parts and labor) during the full warranty period.

Items Defective and not under Warranty
For products which are no longer under warranty the policy is repair and return. An amount of 25% of the products published list price at the time of purchase will be charged. Customer must issue a purchase order to cover the cost of repair.
Each unit will be returned to the customer within one (1) month from receipt of the unit by MuxLab. The defective unit must be returned prepaid to MuxLab. The repaired unit will be returned to the customer FOB MuxLab. The repaired unit has a 90 day warranty.

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