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## Video Installation Tips

Issue #8

Published Monthly

### Power for CCTV Systems

Low voltage systems such as CCTV must be installed and powered correctly to ensure the optimal operation of the system components. CCTV cameras and peripheral hardware are very sensitive electronic devices that require regulated power and protection from surges and fluctuations. In this bulletin we cover two of the most important issues that installers should consider before wiring the system: voltage drop and distributed power supplies.

#### Voltage Drop

A major concern for CCTV system power is selecting the correct wire gauge for long runs to cameras or other equipment. Low voltage electronics require adequate and consistent power with minimal current fluctuation. Voltage drop at load end due to incorrect wire selection may result in poor video quality or total loss of video.

For CCTV equipment, the industry standard for maximum acceptable voltage drop is 10%. That translates into 1.2 volts for 12 VDC hardware or 2.4 volts for 24 VAC equipment.

#### How To Calculate Voltage Drop

The chart to the right provides the voltage drop factors per 100 feet of wire. The exact voltage drop for any length of wire can be calculated as follows:

Example: 300 feet using 18 gauge cable with a 1 Amp load current

Step 1.  $300/100 \text{ feet} = 3.0$

Step 2.  $3.0 \times 1.27$  (voltage drop factor from chart)

Answer: 3.81 volts

3.81 volts exceeds the acceptable voltage loss for both 12 VDC & 24 VAC equipment. Based on the example above we can use the chart to find

that the minimum wire gauge for 24 VAC over 300 feet at 1 Amp load is 16 AWG ( $3.0 \times 0.8 = 2.4$  volts dropped). Likewise the minimum gauge for 12 VDC is 13 AWG ( $3.0 \times 0.4 = 1.2$  volts dropped).

It's worth noting that most power adaptors supplied with CCTV cameras provide slightly higher voltage than specified. For example a 12 VDC adaptor usually supplies 13 to 13.5 volts to accommodate some voltage drop.

Note on Siamese Cable: If using siamese cable (coaxial cable with UTP) be aware that most have 18 AWG or smaller gauge twisted pair. This will be inadequate for longer runs so having heavier gauge LVT available will be necessary.

Voltage Drop Chart

Wire Gauge (AWG)	Voltage Drop Per 100 Feet				
	.5 amp Load Current	1 amp Load Current	2 amp Load Current	4 amp Load Current	10 amp Load Current
10	0.1	0.2	0.4	0.8	2
11	0.13	0.25	0.5	1.01	2.52
12	0.16	0.32	0.64	1.27	3.18
13	0.2	0.4	0.8	1.6	4
14	0.25	0.5	1.01	2.02	5.04
15	0.32	0.64	1.27	2.54	6.35
16	0.4	0.8	1.6	3.2	8
17	0.5	1.01	2.02	4.03	10.08
18	0.64	1.27	2.54	5.08	12.71
19	0.8	1.6	3.2	6.4	16.01
20	1.01	2.02	4.03	8.07	20.17
21	1.27	2.54	5.08	10.17	25.42
22	1.6	3.2	6.4	12.81	32.02



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### Distributed Power Supplies

Within a CCTV system, the cameras are usually the devices most susceptible to power issues such as surge, fluctuation and voltage drop. Distributed power supplies are designed to provide consistent, regulated power and feature fused outputs to protect cameras from sudden surges that can easily destroy electronic components. The cost and time to replace a blown fuse is insignificant compared to the cost of replacing cameras.

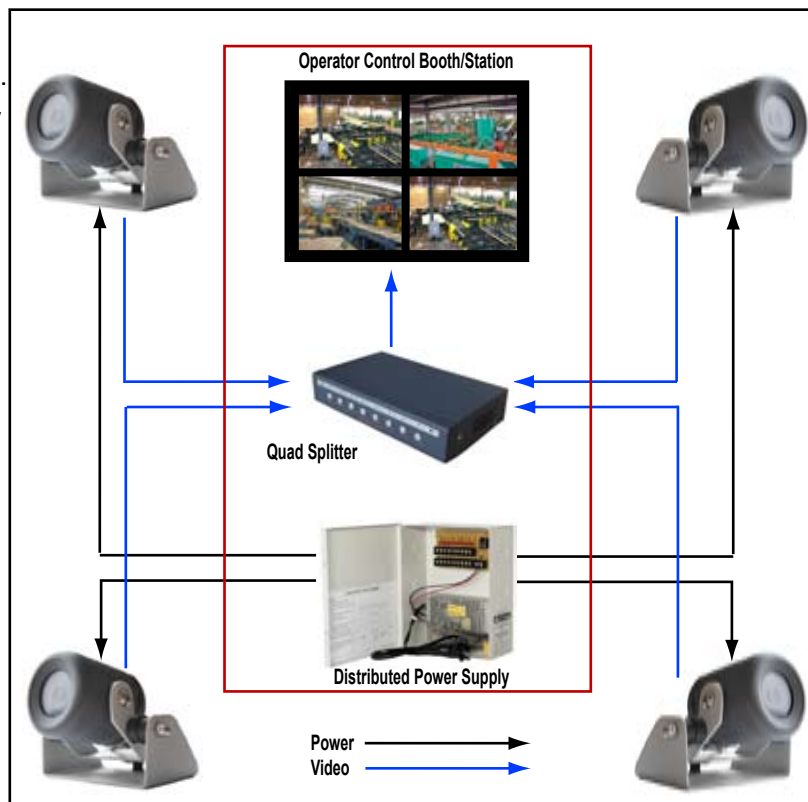
The tripping mechanisms used in distributed power supplies are either PTC's (Positive Temperature Coefficient resistors) or glass fuses. For CCTV purposes glass fuses are superior since they are more accurate and react faster to sudden increases in load current. A 1 AMP fuse will normally blow at roughly 1.25 AMPs whereas a PTC rated at 1 AMP typically won't trip below 2 AMPs. Fuses offer much better protection for cameras.



Distributed CCTV power supplies are typically available in 4, 8 & 16 channel configurations.

### Applications

The diagram to the right shows a typical process monitoring application. Installing the distributed power supply in the control booth eliminates the need for power bars or multiple outlets and will ensure maximum protection for the cameras. Having the power cables securely connected to the power supply also eliminates the possibility of plug-in type power adaptors working loose from outlets. Distributed power supplies provide a more organized installation and make trouble shooting system issues much easier. But most importantly they reduce maintenance costs by protecting and extending the life of the camera.



Example of Typical Application for Distributed Power Supply in a Sawmill

Look for the next issue of **Video Installation Tips: Trouble Shooting CCTV Systems**

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