

# Video Power & Control

By Jeffrey Herman, Contributing Writer

**MuxLab**

The security video cabling industry is undergoing technological change. One of the changes taking place is the migration from traditional coaxial cable toward copper twisted pair. Traditionally analog security video equipment has been connected using coax cable, low-voltage remote power

to each camera (see Figure 2).

For example, each camera requires at least one twisted pair for video. If the camera is powered from a central console, then one or two extra pairs is required. If the camera supports PTZ control, then a fourth pair is needed. Since not all cameras require all three signals, it is necessary to combine and extract the desired signals depending on the type

jacks where accidental short circuits can occur more easily. In order to protect against this, power supplies with individually fused outputs are highly recommended. Furthermore, since security video remote power may now reside under cable jackets that carry other voice and data services, there is a greater need to protect the cabling. Companies such as Altronix (Brooklyn, N.Y.) carry Class II power supplies that meet this requirement. According to one installer, institutions such as schools and hospitals insist on fused or over current circuitry protected power supplies in a security video installation.

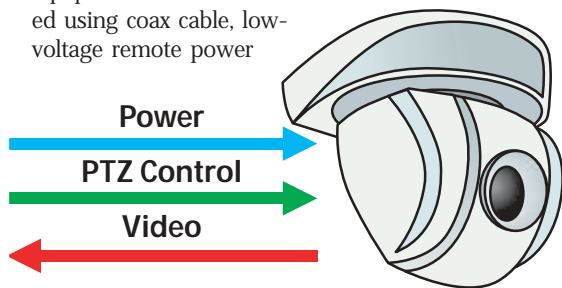


Fig. 1.

cable and RS422 cable for video, power and control respectively (see Figure 1).

Category 5 twisted pair cable (Cat5) now supports video, low voltage power and RS422 provided vendor-specific cabling guidelines are followed. This has opened up the possibility of powering and controlling analog security video cameras remotely via standard twisted pair cable. The support for copper twisted pair for the above signals has led to the problem of how to manage these multiple signal pairs within the context of a structured cabling system.

of camera connection.

### Maximum distance

In regard to the issues involved in security video signal concentration, one of the main issues is distance performance. The critical signal is remote power; video and control will normally surpass remote power in terms of distance. Remote PTZ

### Methods of combining

The integration of video, power and control over Cat5 requires products that combine and break-out the three signals into their respective services in order to route them to the appropriate equipment. In a hybrid system, it is necessary to specify products that will integrate easily into a structured cabling system.

One method is to use Siamese – round composite – cables (see Figure 3), which combine two Cat5 twisted

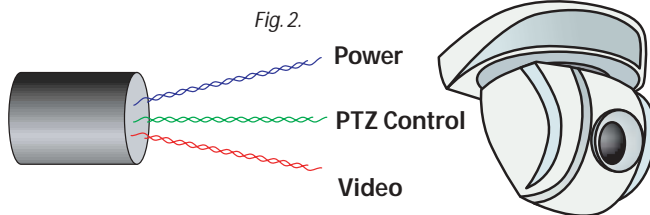


Fig. 2.

### The issue

The main issue in using DVR-based solutions for supporting power, video and control via Cat5 is how to efficiently combine and break-out the appropriate signal pairs to and from each camera without resorting to cable splicing techniques along the home-run cable itself. Similarly, at the central monitoring side, the same signals must be merged onto the Cat5 cabling system for distribution

control can usually be transmitted up to 4,000 feet, video up to 2,200 and 1,500 feet with analog monitors and DVR, respectively. Remote power distance depends on a number of factors, including cable grade, cable gauge, input voltage level, camera power consumption, and permissible voltage drop at the camera.

The second issue in regard to power is short circuit protection. Cat5 twisted pairs are often terminated under RJ45 plugs and

pairs for video and control together with two 16AWG wires for remote power within a single cable.

Another option is the use of security video pass-thru video baluns, which consolidate video, remote power and control under one Cat5 cable. The baluns allocate two or three twisted pairs for power depending on the model. Fixed cameras allow for three twisted pairs for power. PTZ cameras allow for two pairs for power.

Figure 4 illustrates an application that combines video, power and control over Cat5 cable using pass-thru baluns. The advantage of Siamese cable is that remote power may be transmitted further via 16 AWG power wire. The greatest advantage of using pass-thru baluns versus Siamese cable is cost savings. But from the structured cabling perspective, terminating the

Cat5 transmission of remote power. Based on this information, it is possible to determine what is the maximum distance that can be supported under actual conditions. The tables also specify the maximum distances that remote power may be transmitted via two or three twisted pairs.

In order to construct these tables, the following assumptions were made:

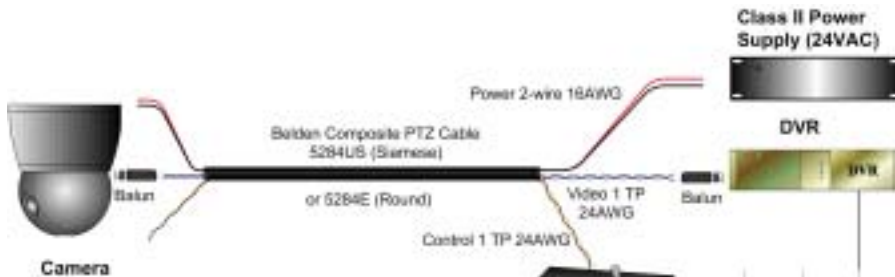


Fig. 3.

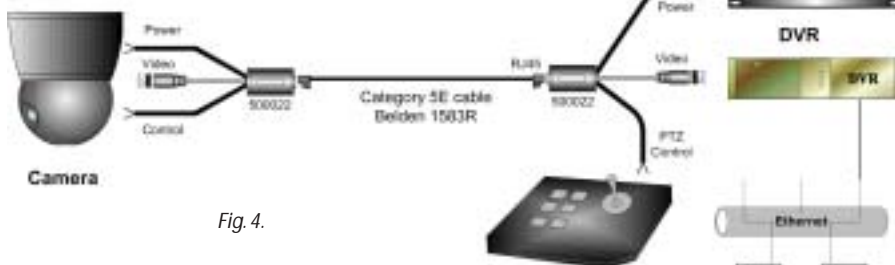


Fig. 4.

cable via a RJ45 plug is also neater and more user-friendly.

As the security video industry heats up, installers and contractors are looking for more cost-efficient cabling solutions without compromising on quality and reliability. Improved cable and video balun technology are bringing this goal closer to reality. For more information readers should consult a local security video specialist.

### Need more info?

There are two special tables related to this article and available on the Security magazine Web site at [www.security-magazine.com](http://www.security-magazine.com). Just click on the March 2005 archive and go to this article or search online using Security's LINX connection.

The tables online illustrate the distance performance based on two- or three-pair

- Distances are specified for temperatures from 20 to 30 degrees Celsius.
- Maximum distances allow for a 10 percent voltage drop at the camera.
- Distances for 28VAC-power are based on a camera that is rated for 24VAC.
- If 22AWG gage wire were used, there would be an increase in distance of approximately 55 percent

Elsewhere in this issue there is an article on Power Over Ethernet which discusses cost savings and factors of concern to a security executive's IT colleagues.

There is also more information on coax, hybrid and fiber optics cabling by using the Security magazine LINX service on the publication's Web site. LINX allows you to use keywords to search Security's online database of articles, case studies and products.

## Cabling Terms

### Active Device

A device that amplifies, restores or regenerates the signal and requires power.

### Balun

A device to convert from balanced to unbalanced signal transmission to support twisted pair cable.

### Cat5

Data grade twisted pair cable commonly used in voice and data networks. Higher grades such as Cat 5e, Cat 6, Cat 7 also exist.

### DVR

Digital Video Recorder.

### Passive

A device that allows the signal to pass without amplification or regeneration.

### Pass-Thru Balun

A balun that allows video, remote power and PTZ control to be inserted over the same Cat5 cable.

### Power-Thru Balun

A balun that allows video and remote power to be inserted over the same Cat5 cable.

### PTZ

Pan, Tilt, Zoom

### RS422

Typical serial communications protocol used to control PTZ cameras. Siamese Cable: A design consisting of two individual, yet separable cables; two 24AWG twisted pairs and two 16AWG wires for SECURITY VIDEO applications.

### UTP

Unshielded Twisted Pair

Security magazine also boasts a useful online Buyers Guide which lists sources of products, systems and services ranging from access control and communications to security video and burglar alarms. The Security magazine Buyers Guide includes officer, premises, investigative and office products as well. Also check out ISC West, Apr. 5-8, at [www.iscwest.com](http://www.iscwest.com). ❖

## About the Author

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