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Video Installation Tips

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CCTV Trouble-Shooting Basics

The performance of any CCTV system can easily be evaluated by the video quality at the monitor and recording end. Although there are many potential problems that can affect the smooth operation of any CCTV system, the vast majority of common issues relate to either transmission media or power.

According to industry data collected by leading manufacturers:

1. 65% of service calls are due to problems with video transmission including cables, connectors and their installation;
2. 27% of service calls are related to power (such as inadequate or excessive voltage, grounding problems) and environmental issues (such as temperature or vibration).
3. 7% of system problems are due to installation errors including improper termination, incorrect equipment set-up and mistakes made by installation personnel.

Therefore only about 1% of CCTV system problems are caused by actual equipment failure due to defects in material or workmanship. In this bulletin we look at some of the more common problems associated with cable, power and camera signals.

CCTV Trouble-Shooting Quick Guide

| Problem | Possible Cause(s) | Troubleshooting / Solutions |
|---|--|---|
| Poor image quality on monitor/recording equipment | Low video signal strength due to inadequate power. | Ensure camera has adequate power using a regulated power supply. If using long runs of LVT, make sure the wire gauge is large enough to account for voltage drop. |
| | Low video signal strength due to video loss. | Make sure video cable length does not exceed maximum allowable distance (See chart below). Video loss increases at each connection point which reduces transmission distance. Install video amplifiers or replace cable with heavier gauge. |
| | Low video signal strength due to video loss. | Examine the cable installation. Older cable may have corrosion/moisture damage and may need replacing. Is the cable installed too close to other electrical wiring? RF or EM interference with the video signal can occur if the video cable is installed close to other wiring. See chart below for recommended minimum distances. |
| Fluctuating video quality | Power fluctuation to camera due irregular voltage current. | Install a distributed power supply with fused outputs to ensure consistent voltage. |
| Image out of focus | Varifocal lens screw locks have come loose - usually due to vibration or sudden shock at the camera. | Refocus lens. If a persistent problem consider replacing the camera with a fixed lens model. |
| Total image loss | No power. | Check if power adaptor has failed by testing camera with another supply. If using a distributed power supply check for blown fuses. |
| | Camera failure. | Test camera with a verified power source and replace if needed. |
| Rolling bars on monitor | Video ground loop due to more than one ground between camera and monitor/head-end. | See section on video ground loop next page. |



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Quick Reference Power & Video Tables

| Coaxial Cable Transmission Distance in Feet* | | | |
|--|---------|---------|---------------|
| Type | Typical | Maximum | Max. with DVR |
| RG59 | 750 | 1,000 | 500 |
| RG6 | 1,000 | 1,500 | 1,000 |
| RG11 | 2,000 | 2,500 | 1,500 |

*Based on point-to-point connection with no amplification

Digital video equipment such as DVR's require higher strength video signals than analog equivalents. Therefore transmission distances must be reduced.

| Voltage Drop Chart | | | | | |
|--------------------|---------------------|--------------------|--------------------|--------------------|---------------------|
| Wire Gauge (AWG) | .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 |

Video Ground Loop - Trouble-Shooting

Ground Loop is a common problem in CCTV installations, especially in large industrial applications. The problem is easily identified on monitors by the 60 cycle bars which slowly move up the video screen. If the problem is minor these rolling bars may be no more than a nuisance but in severe cases can cause the picture to break up entirely on the monitor.

The problem is caused by having more than one ground point in the CCTV system. A CCTV system is normally grounded at the monitor end which is connected directly to the 60 cycle main. A Ground Loop is created when the coaxial cable at the camera end becomes locally grounded for any reason. In 60 cycle power systems local grounds return any unbalanced current flow to ground. However each ground point usually has a different voltage potential depending on how uneven the current flow of the power load is in the building or facility. The voltage differential can be measured by disconnecting the video cables at the monitor end and using a voltmeter to measure between any two shields of the incoming video cables. If you have significant 60 cycle bar problems at the monitor you will find there is a large voltage differential between the video cables.

Resolving Ground Loop Problems

Ground Loop problems can be resolved by making sure that only one end of any video cable is connected to a local ground. Make sure the video cable shields do not come into direct contact with each other to prevent unintentional local grounding. This can easily occur with cable installed in conduit or cable trays. Tape all connectors in such situations to minimize this risk. Keep camera runs as short as possible with all video cables cut to fit. Excess cable left along any run can increase the risk of interference. Wherever cables share common connection points such as between buildings or in conduit junction boxes take extra care to tape the connectors and cable. At the monitor end make sure all the CCTV equipment is connected to same power point to provide a common local ground.

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

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