

GB464-UTP

GROUND-LOOP BLOCKER FOR UNSHIELDED TWISTED PAIR WIRE

INSTRUCTION BOOK

IB6403-01

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DESCRIPTION

This product blocks and removes the most common problems in Unshielded Twisted Pair wire CCTV video installations. The GB464-UTP also restores the picture quality before it goes to the monitor or recorder. The unit is placed at the end of the unshielded twisted pair wire run, near the monitor site or anywhere a twisted pair wire must become a BNC coaxial cable for use by a video device. Ground-Loop Bars in CCTV pictures caused by AC power ground-loops are cancelled completely.

The GB464-UTP will eliminate ground-loop problems induced by lightning protection equipment. It also corrects for video level loss, and loss of picture definition caused by long runs of twisted pair transmission systems up to 3000 feet. The unit prevents Ghosting in the picture by absorbing and eliminating the reflected video ghost signal. Unlike passive end of line video "Baluns" it will also restore the correct impedance to down-stream video signals to prevent secondary ghosting in the picture. A "Balun" is a passive transformer used to convert the characteristic impedance of a coaxial cable transmission line into a balanced twisted pair wire transmission system. Usually they convert from 75 Ohm coaxial cable impedance into 100 Ohm twisted pair wire impedance.

Longer wire runs can be accommodated by placing additional GB464-UTP units and passive "baluns" at intermediate locations to be used as line extenders. In this way, a mile or more of cable loss can be corrected and 60 cycle bars found particularly on long cable can be eliminated. This will also allow for video drops for use as intermediate monitor points in the CCTV system.

Each GB464-UTP corrects up to 4 CCTV channels with each channel having independent video level and definition controls as well as independent ground-loop blocking. A second fully isolated video BNC output is offered as an option for systems that require additional monitor connections, so the GB464-UTP will operate as an end of line Distribution Amplifier.

MOUNTING INSTRUCTIONS

The GB464-UTP card slides into one of the nine positions in the RMS-400 power supply and mainframe. Select a place to mount the RMS-400 away from harsh or wet environments, indoors is mandatory. The GB464-UTP should be located near the monitor equipment or the place you wish to bring the video signal to. Select a position that gives you the best access to cable the system and reduces the labor in installation.

MOUNTING INSTRUCTIONS (cont.)

Select one of the un-used nine positions in the RMS-400 to be occupied by the new GB464-UTP circuit board module. Remove the blank label in that position by peeling it off of the front panel. Peel the label slowly to remove all of the label and adhesive. Any remaining adhesive may be removed by rubbing the surface with your thumb. **WARNING DO NOT USE SOLVENTS TO REMOVE THE LABEL ADHESIVE.** The solvent could damage the equipment cards or cause a fire.

HOW TO CABLE THE GB464-UTP

Attach the Twisted Pair wires coming from the camera's "Balun" to the screw terminal Inputs A through D, one for each channel. Be sure to observe the correct polarity (plus and minus) marked on the sides of the screw terminal block. If the picture is scrambled reverse the polarity of the twisted pair wires on the terminal block. Then attach a cable from the BNC connector marked Output to the monitor equipment. BE SURE TO TERMINATE THE END OF THE VIDEO CABLE WITH A 75 OHM TERMINATION OR PROPERLY TERMINATE INTO OTHER EQUIPMENT. Repeat this step for each channel you wish to improve.

POWER SUPPLY INSTALLATION

The GB464-UTP is powered by the RMS-400 mainframe and power supply. It will power up when inserted into the RMS-400.

OPERATION

When twisted pair video is applied to the input screw terminals of the GB464-UTP an internal active Common-Mode-Rejection stage cancels the 60Hz ground-loop interfering signal. Next a video clamp removes residual 60Hz ground-loop signals that have become a part of the CCTV video picture. Next the video goes into an adjustable gain stage that lets the installer adjust for twisted pair wire loss on long wire runs. A second control allows the installer to adjust for high frequency losses that cause reduction in picture quality. This control will correct high frequency losses caused by the transmitting video "Balun" at the camera and the wire run. The down stream video impedance is then matched to the 75 Ohm cable to prevent Ghosting downstream.

CARE AND MAINTENANCE

There is no routine maintenance or calibration required with this equipment. All controls are accessible from the front panel.

APPLICATIONS (WHERE TO USE THE SYSTEM)

This system can be used anywhere that a video signal on twisted pair wire exists. It will improve Twisted pair video transmission system response. Video pictures on long wire runs will benefit from the installation of the GB464-UTP. In a long wire run the GB60-UTP can be placed at the mid point between the camera and the monitor by using a second "Balun" to improve the transmission level of the signal.

CCTV INSTALLATION TIPS

This section will discuss video ground loop problems in CCTV installations. The cause and how it effects picture quality with solutions to eliminate the problem. Remember that ground-loop problems are the same with twisted pair wire runs as they are with coaxial cable.

When Video Ground Loop problems or 60 cycle Bars occur, they are easy to see on a video monitor. They look like a horizontal band or bar across the video monitor, that slowly moves up the video screen. These bars can be barely noticeable, or can be so bad that the video monitor loses lock and breaks up the picture. If the video camera is Line-Locked to the 60 cycle main power, the bars may stand still in the picture, but they still obscure picture definition and create customer complaints.

The source of the 60 cycle bar originates from the power Industrie's use of local grounds to balance their power grid.

Everywhere 60 cycle power is used, a local ground is attached to the power grid to return all unbalanced current flow to ground. As an example, you will notice that every main power breaker box will have a ground wire or conduit going to a ground rod or similar device connected to an earth ground. Every correctly installed power outlet will have a connection to this ground.

Not all grounds are created equal. In fact the earth ground in one building is most likely to have a different voltage potential relative to any other building, even grounds inside the same building will have different voltages between them, based on the uneven current flow of the power load.

Here is how the 60 cycle bar gets into your video picture. If you connect a coaxial cable to a monitor or other equipment that plugs into the 60 cycle main power and the other end of the coaxial cable becomes grounded locally for any reason a Ground Loop is created. Any difference in the 60 cycle voltage between these two ground points will create a current flow in the shield of the coax that induces the 60 cycle AC voltage into your video signal.

CCTV INSTALLATION TIPS (cont).

It is easy to measure these differential voltages, simply disconnect the video cables at the monitor point and using your voltmeter on AC volts, measure between any two shields of the incoming video cables, you will be amazed at the difference.

The solution is to never connect both ends of a video cable to local grounds. Any cable can be grounded at one end without inducing the ground loop current. When you run coax cable from one building to another, it is acceptable to install through connection points, but do not allow the shields to come into contact with one another or the local ground.

A coaxial connector laying in a cable tray or conduit box can accidentally contact ground, don't let this happen. Use tape on the connector to prevent accidental grounding. Also try not to attach the camera to any structure that is likely to be grounded. Remember that the camera is already grounded at the opposite end of the coaxial cable by the monitor equipment.

At the monitor station you may have many pieces of equipment connected together, like a (Quad, Tape Recorder, Monitor) all of which plug into the main 60 cycle power. This will not present a problem if you plug all of the equipment into the same power line at the monitor point. Making sure that all the equipment share the same ground point at the monitor station. Also try to keep the video cables between equipment, (the service loops) as short as possible. If you already have an installation that has 60 cycle bars, there are some steps you can take to solve the problem. If coaxial cable shields are connected together anywhere in the system, separate them if possible. Similarly remove all but one ground connection on each coaxial cable if possible, the ground is usually at the monitor end of the coaxial cable because the monitor equipment plugs into the 60 cycle main power supply which is grounded.

Sometimes a ground loop problem can be reduced by reversing the AC plug on the power transformer used to power the camera, or reverse the 24 VAC power connection to the camera. This technique will not work on DC powered camera's.

If the problem still persists, a GB464-UTP can be installed at the end of the coaxial cable to eliminate the 60 cycle bars. This is much easier and cost effective when you consider the labor cost to find and solve the ground-loop problem.

With an understanding of Ground Loop problems and the use of the GB464-UTP, you should be able to keep the 60 cycle bars out of your CCTV installations.

TROUBLESHOOTING

PROBLEM: Video Scrambled, Wide White Jagged Area.
SOLUTION: Reverse wires on twisted pair connection.

PROBLEM: No Video at receiver.
SOLUTION: Check Camera Video and Coax Connections. Check the Twisted Pair for Shorts and Opens.

PROBLEM: Ghosts Image to the Right, Horizontal Smearing.
SOLUTION: Check for Bridge Taps or "T" Taps on the Twisted Pair and Remove Them.