

IPMT-3



IP VIDEO MARGIN TESTER

INSTRUCTION BOOK

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DESCRIPTION

The IPMT-3 is a precision attenuator used to test IP video systems to insure that you have an adequate digital signal margin. Digital signal margin is the amount of signal level above the digital cliff that you have in your system to prevent a picture failure from occurring. IP cameras will give you a perfect picture until the network cable loss reaches beyond the minimum allowable signal level and then you suddenly get no picture at all. This effect is called the digital cliff, because like walking off of a cliff, everything is great till you take the last step off the edge and then all is lost.

When you install an IP camera particularly when the network cable run is long, you need to know how close your system is to the cliff. This test is easy to do, just temporarily insert the margin tester's 1dB and 2dB port in series using the short supplied jumper cable for a 3dB margin test, then connect it into the IP video line and see if you get a video image. If you have at least 3dB of margin you can rest assured that the system will operate even when the network cable loss varies with time and weather. If the video does not come on then the margin is below 3dB, next plug into the other ports one at a time to see how low the signal margin is. The IPMT-3 will test from 1 to 7dB of margin one dB at a time. If the margin is below 3dB you should consider amplification to get more margin for proper operation of the system. In this way you can be certain that the system you installed is not near the digital cliff waiting for a small change in cable loss to fail.

Besides changes in network cable loss, the camera and recorders can be damaged by lightning and power surges that degrade the output levels of the equipment bringing it nearer to the digital cliff and causing intermittent operation of the system. These intermittent camera problems are hard to diagnose without knowing that the equipment output levels have dropped. If you are called to test an intermittent camera and it is working when you get there, use this unit to introduce additional loss to bring the camera into fail mode. Use this to determine if the problem is level related or some other problem. Use this unit to test new and existing IP installations and to trouble shoot any intermittent camera operation. The unit comes complete with the IPMT-3 attenuator and two 6 inch straight IP network patch cables. This test tool will work with all forms of P.O.E. Power Over Ethernet.

HOW TO CABLE THE IPMT-3

Connect the network cable coming from the IP video camera to the 8P8C connector marked "4 dB". Next connect a network cable to the other 8P8C connector on the IPMT-3 unit also marked "4 dB". This will test for a 4 dB margin in your system. Then check the system monitor for a video image. If the video image is there and stable, then you have at least a 4 dB margin and the system can be assured of continuous operation with little chance of failure due to low level signals caused by changing cable loss.

HOW TO CABLE THE IPMT-3 (cont)

If you wish to know what the maximum margin is, you can insert different attenuation values into the path of the IP video and determine that. Use the two network cable patch cables supplied with the unit to introduce different amounts of loss into the IP video path and see at what point the video image disappears on the monitor. In this way you can determine the maximum signal margin up to 7 dB. If you want to measure the signal margin above the 7 dB point you may purchase more than one unit and put them in series to achieve a higher measurement value. For accuracy be sure not to kink or bend the network jumper cables in too tight a radius as this will increase the attenuation in the system and give you a reduced margin reading.

APPLICATIONS

This system can be used anywhere that a network cable exists. Use this unit to measure every IP network camera cable run to guarantee robust operation. Also this unit can be used to troubleshoot intermittent network cameras. Most intermittent cameras are caused by excessive loss in the transmission cable and if you get to the location and find the camera is on and won't fail while you are there, you need a way to induce the failure mode. Use this unit to determine if the failure is caused by low level signals or some other cause. Insert this unit into the signal path and if the camera fails you will know it is because of excessive cable loss and not the equipment at each end of the cable.

CARE AND MAINTENANCE

There is no routine maintenance or calibration required with this equipment. There are no controls that require adjustment inside the box. The box is not designed to be opened.

MORE INFORMATION

IP video is a relatively new technology and with it comes new installation techniques and tricks of the trade for the installer to learn. The advantages of using IP video cameras and recorders are obvious. Higher definition cameras are available, the cable slope loss will not degrade the video image, and when you connect the network cables you get a picture that is as sharp and clear as the camera can produce. That is of course, if you get a picture at all.

IP video does have its limitations and when you reach those limits you will get a total failure of the system to deliver any kind of a picture. Unlike the old analog cameras that would give you a dull washed out picture when the signal level was too low, IP cameras will give you a perfect picture until the cable loss reaches beyond the minimum allowable signal and then you suddenly get no picture at all.

This effect is called the digital cliff, because like walking off of a cliff, everything is great till you take the last step off the edge and then all is lost.

IP VIDEO MARGIN is the amount of signal level above the digital cliff that you have in your system to prevent a failure from occurring. The question is how much margin is there in your IP video system, how close are you to falling off the cliff, and how can you measure it?

First let's look at what causes this loss of the network signal. Signal level loss and high frequency roll-off in the network cable also called "cable slope loss" are the main causes of most failure. Reactive loss is the predominant loss of signal level and is caused by the distributed inductance of the wires and the distributed capacitance between the wires with a small additional loss due to the loop resistance of the wire. So what effects cable loss the most is the insulating material, twists of the wire and the uniformity of manufacture of the cable, not so much the gage of the wire although increasing that does help some.

The rate of wire twist and uniformity of twist strongly affects inter-pair cross-talk between active pairs in the cable and ultimately this sets the maximum distance that a cable can be used. In the manufacture of cable the magnetic and electrostatic forces within the network cable must be precisely controlled to prevent Common Mode cable loss. When all the equipment is working correctly common mode loss is caused by slight mechanical defects in the manufacturing of the cable.

Small changes or irregularities in the twist of the wires or non-uniform insulation thickness on the wires can cause a long cable to have unusually high common mode loss. Network cable loss is also affected by the temperature and humidity, not to mention water infiltration into the cables outer jacket and wire insulation. This common mode loss will directly affect the maximum distance you can go with a network cable and it can change with time. Temperature effects are a daily change in the loss of the network cable. However humidity and water intrusion is a lasting slowly progressive loss that will take the system down over time.

In particular the consistency of the rate of twist and the diameter of the insulation must be very closely controlled over the entire length of the cable. Some manufactures control these parameters better than others, so if you find a good manufactured cable stick to using that brand for repeatable results. The manner in which the cable is handled and installed will also have a great effect on cable loss and over all system integrity. When installing network cable try not to stretch the cable when pulling it into conduit, this permanently changes the wire diameter and insulation thickness damaging the cable and creating greater loss in the cable. Also twisting, kinking, or bending the cable in a radius sharper than 5 times its diameter will create additional loss in the cable.

So now that you have installed your IP system, how do you test for the margin? What you need to know is how much additional loss can the system take before it fails and how close are you to having a failure? You will want to know if you are on the edge of the digital cliff before you finish the job so you can walk away with confidence that the system will continue to operate when cable losses change slightly.

The easiest way to test for this margin is to use the IPMT-3 IP VIDEO MARGIN TESTER to insert a know amount of loss in steps into the signal path and see how much additional loss the system can stand and still deliver a picture. This loss is measured on a dB scale, and you should have at least 3 dB margin for a safe operating system. A loss of 3dB is the equivalent of a 29% drop in the operating level of the system. By using the other loss steps on the unit you can determine if you have enough margin to reliably operate the system under all conditions. This unit will insert up to 7 dB of attenuation in 1 dB steps so you can precisely determine your system margin to guarantee reliable operation.

The IPMT-3 is a low cost inline attenuator for testing IP video margin equipped with 8P8C connectors to fit your network cables directly. Simply loop your IP video signal through the unit starting with the highest attenuation and when the system displays a picture you will know the amount of margin your system has and then you will know with confidence how much additional loss the system can withstand. Most importantly you will know your system is not sitting at the edge of the digital cliff waiting to fall off. Measuring this margin is a must for all installations to give you the security of knowing your system is capable of withstanding additional loss and still operate properly. You can also use the unit to perform periotic testing to insure that you maintain your margin of operating safety.



IPMT-3
IP VIDEO MARGIN TESTER