

Ground Isolation in Video Transmission

Application Note

AN/153

In coax video transmission systems the shield of the coax cable is usually connected to ground. It may very well turn out that a voltage difference at the power line frequency may exist between the ground at the transmitting location and the ground at the receiving end. The 60 Hz current through the shield is then likely to cause serious interference with the video transmission as the resulting voltage drop will add on directly to the video signal.

Power systems are grounded for a number of reasons: To provide a low impedance path for lightning strikes, to create a common reference point for different power sources, and as a safety measure in case of equipment failures. Machinery and instrumentation are usually grounded so as not present a hazard to anyone making physical contact with it.

Normally, no current should flow in a grounding connection. However, there is a variety of conditions that may cause current to flow in ground loops which have enough resistance to cause substantial voltage differences between ground points.

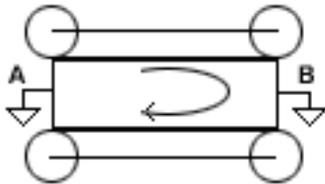


Figure 1. Ground Loop Current Due to Magnetic Field

A simple illustration is shown in Figure 1 where two coax cables run between points A and B. The grounded shields of the two cables constitute a loop which may be exposed to a 60 Hz magnetic field. The resulting loop current flow will set up a potential difference between A and B which will add on to video signals being transmitted.

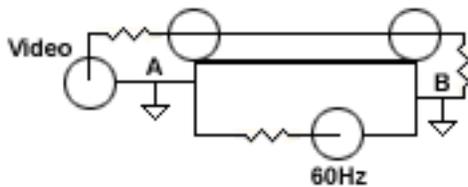


Figure 2. Equivalent Circuit

The equivalent circuit of a video coax transmission line and associated ground loop circuit is shown in Figure 2.

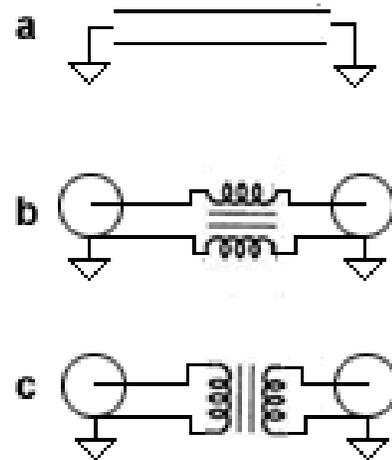


Figure 3. Anti-Loop Current Measures

GROUND ISOLATION TECHNIQUES

The effect of ground loop currents may be minimized by any one of three techniques, illustrated in Figure 3. In 3a, the coax cable is replaced by a balanced line. In 3b, the windings of a transformer are connected in series with the two line conductors. In 3c, they are placed in shunt, breaking the ground connection.



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E-Mail: service@BTT-C-Beta.com

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Call: HQ, N.Y., U.S.A (631) 224-7393

UK +44-(0)1635-811140

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India +91 80 46797 0368

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