Lightning is caused by static electricity building up in the atmosphere to the level at which flash-over occurs. Discharges between clouds are spectacular, but not a major cause of damage. Discharges to ground, however, can release vast amounts of energy and cause extensive damage. Since these discharges take the path of least resistance, they are more prevalent on elevated, moist ground, and are attracted to high points such as masts. Unfortunately, these are often the locations needed for telemetry systems, which often monitor reservoirs that are by necessity located on high ground. The aerials of radio outstations are particularly vulnerable. ***Zap Gap*** is designed to protect these systems from damage by lightning.

A direct lightning strike discharges so much energy that it will destroy anything in its path. One means of preventing this damage is to dissipate the charge before it achieves the flash-over potential. This requires a path of low electrical resistance between earth and the top of elevated constructions such as masts. Charged particles are attracted to the mast and flow safely to ground, inducing a substantial but controlled current in the conductor. Unfortunately the aerial is usually mounted at the top of the mast, so a significant current can flow through it to the radio equipment and thus to ground. ***Zap Gap*** prevents damage by diverting the current directly to ground, and thence by-passing the radio equipment.

## *Specifications*

| | |
|---|---|
| Connections: | TNC male – TNC female |
| Surge capacity: | 10,000A indefinitely repeated |
| Surge clamping: | <20V |
| Insertion loss: | <0.5dB @ 0…500MHz |

## *Installation*

***Zap Gap*** is very effective at protecting equipment, ***provided it is correctly installed***. The most important aspect is the provision of a good earth to which the transient can be diverted. There is no such thing as a perfect earth, since it is only relative to the surrounding area. Any current flow will cause earth in the local area to rise in potential. It is important that all equipment is earthed to the same point. Figure 1 graphically illustrates the potential problem caused by an incorrect installation. Figure 2 illustrates the correct method of installation.

This illustration correctly indicates that the integrity of the earth connection is irrelevant, provided there is no other path to earth. However, there are usually other paths via other equipment connected to the outstation or ultimately by arcing. The earth connection should therefore be as low impedance as possible. Mains earth is not adequate, since it is only designed to take fault currents of tens of amps.

Ideally the earth connection should be to a buried copper mat, or at least a substantial earth stake. The connecting cable should be at least $10mm^2$, and should be braid or copper strip to minimise its inductance.

***Zap Gap*** should be mounted close to the equipment being protected, but the aerial cable should be kept away from the equipment to prevent electromagnetic coupling.

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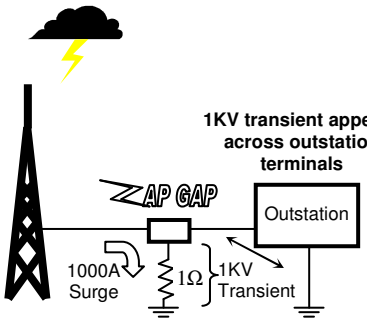


**Fig 1 Poor installation**

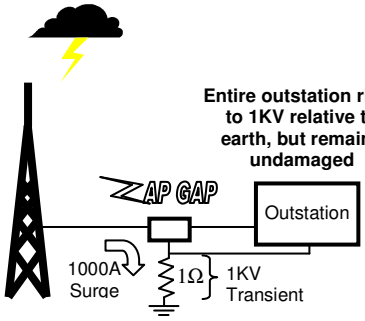


**Fig 2 Correct installation**

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CHURCHILL CONTROLS
www.churchill-controls.co.uk

ZAP GAP

# *Co-Axial Lightning Protection Unit*

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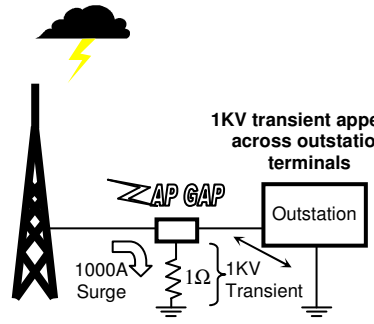
ZAP GAP

*Co-Axial Lightning Protection Unit*

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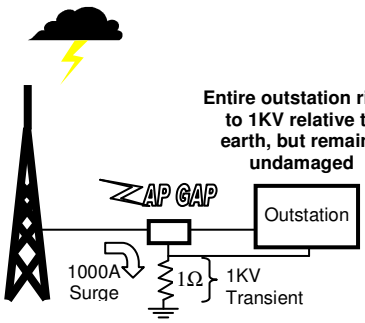


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