

Earthing of Radio Installations

1 General

An adequate earthing system is necessary for:

- 1.1 Electrical Safety,
- 1.2 Static drain,
- 1.3 Functional efficiency, and
- 1.4 Noise reduction.

The first two items are absolutely essential, the third depends on the antenna system and the fourth may be necessary only occasionally.

2 Electrical Safety

Mains energised metal-cased transceiver power supplies are of a class which, for safety to the user, require connection to the protective earth of the power distribution system.

Protective earthing is necessary because the equipment relies upon *basic* insulation sufficient for functional purposes but which, should it fail, could allow dangerous voltages to be applied to accessible metal parts.

WARNING! It is mandatory for every mains energised installation to have an effective connection to the protective earth of the power distribution system either via the earthing conductor of the three-wire mains cord or by making a separate connection to the earthing terminal on the power supply chassis. For the two-wire mains distribution systems for which a protective earth wire is not already present, it is essential that a protective earth be established by bonding the power supply to an earth stake driven into the ground or to some other low-impedance connection to earth.

3 Static Drain

Under certain circumstances, wind-driven particles such as dry sand may charge the transceiver and ancillaries to very high voltages above earth. Generally, the low resistance protective earth connection prevents high voltages from ever building up but this may not be the case if the protective earth is disconnected (or does not exist as, for example, in a solar-powered installation).

If the voltage of the electrostatic charge becomes sufficiently high, a flashover will occur between charged metallic parts and earthed parts. The energy released at flashover depends upon the voltage at discharge and the capacity of the charged

parts to earth. This energy generates a steep wave front which may result in failure of the front-end of the transceiver or damage elsewhere. In particular, it could cause failure of the basic insulation of a mains-energised power supply and produce the attendant safety hazards.

4 Functional efficiency

It is well known that the proper operation of certain types of earthed (vertical) antennas and long-wire antenna tuners requires an effective RF earthing system. Although adequate as a static drain, such an earth should *never* be relied upon for *protective* earthing as the protection may be defeated on removal of one of the interconnecting plugs; a separate wire should always be connected to the protected item.

5 Noise reduction

Sometimes a reduction in noise pick-up may be achieved by direct earthing of the case of the transceiver. Any performance improvement suggests that the existing functional RF earth may be inadequate.

It may also happen that where the antenna and the transceiver have to be installed in close proximity, direct earthing of the transceiver may be required to eliminate RF feedback.

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