

## **E1-24: Construction of a magnetic direction finder system for the location of lightning**

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A lightning discharge to ground, generates an electromagnetic radiation field which propagates in all directions from the side of the strike. A pair of loop antennas mounted at right angles to each other was used to pick-up the magnetic field component of the em radiation. Each loop antenna was constructed by fixing a 50  $\Omega$  coaxial screen cable around a 1 x 1 m, square shaped wooden frame. The height to the centre of the antenna set-up from ground level was 1.5 m. The screen of the wire was used to prevent induced effect of time varying electric fields from lightning discharges. The screen sheath was cut apart into two pieces to avoid eddy current effects. The induced voltage in the centre wire of the coaxial cable loop gave the derivative of the magnetic field. An electronic integrator circuit with rise and decay time constants 10 ns and 22 ms, respectively, together with a cable drive buffer amplifier was connected at the end of each loop antenna. The direction of a lightning discharge was determined by dividing the voltage signals induced in the two identical loop antennas fixed at right angles to each other. Recordings were made using a four channel LeCroy transient recorder with 50 ns sampling time.

The proportional constant between the two loop antennas was found to be  $0.95 \pm 0.03$ . This was evaluated using a third loop antenna, kept in parallel with each of the above antennas and comparing the simultaneously measured signal strengths from distant ( $d > 100$  km) lightning flashes. The above result was verified by applying an artificial magnetic field across each loop antenna by sending a known current through a wire wrapped around the antenna. Lightning localization required 3 such direction finders to determine the point of strike by triangulation method.