

## CURRENT LIMITING NEUTRAL DISPLACEMENT

### REACTORS

Current Limiting Neutral Displacement Reactors provide an economical solution to the problem of limiting earth fault currents to a safe value, in those cases where electrical isolation from the supply is not possible.

Such units find wide application in the Mining Industry where safety regulations require that for underground supplies, the earth fault current be limited to 10 Amps.

A typical schematic diagram, showing the main components with the current limiting neutral displacement reactor as a series connected device in Mine supply is shown on the enclosed drawing.

Physically the device consists of a single phase air gapped core, with three individual phase windings interwound on to the core. This is shown diagrammatically, in practice the windings are distributed over the two vertical limbs, and in common with all reactors, the steady state current under earth fault conditions is set by adjusting the variable air gap packing. See enclosed drawing.

Reactors can be fitted with the normal accessories, fittings and methods of winding termination normally associated with oil immersed transformers

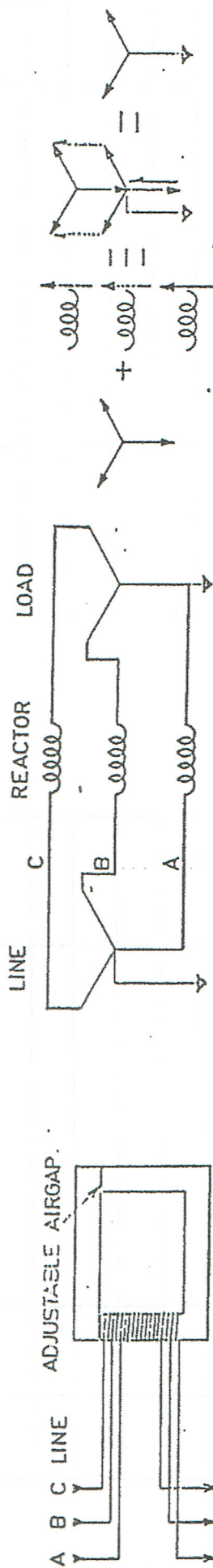
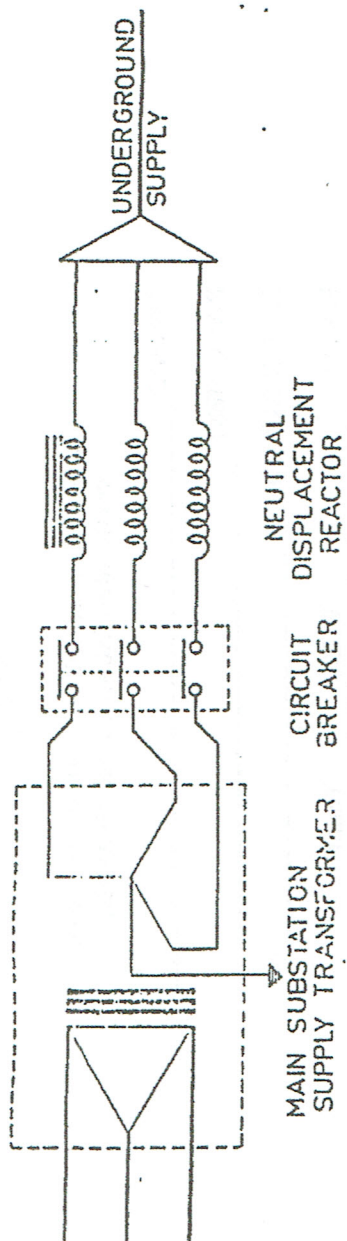
### PRINCIPLES OF OPERATION

This is shown in the simplified Vector diagram depicted. With a fault on the load side of Phase 'A', then Phase 'A' assumes ground potential, and Phase 'A' of the reactor has the supply voltage phase-neutral impressed upon it, in effect of equal magnitude but in phase opposition to the supply voltage. See enclosed drawing.

The air gap limits the current to the regulation 10 amperes and due to the interwinding of the other phases has induced in them voltages, equal to that in Phase 'A', and these voltages in the reactor then add to the supply voltage to give the load voltage satisfying the requirement that Phase 'A' is at earth potential.

Under fault conditions, the other two phases use up to Phase to Phase voltage, above ground, and cable or connected equipment should be capable of taking this over-voltage for the short period involved.

Tests have shown that the time taken to limit fault current to steady state value is in the order of 3 cycles. (See Fig. 3).



*EARTH FAULT CURRENT*

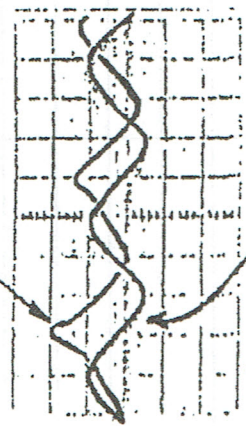


FIG 3.