Protector 256-PLL and 256-PLD

There are three requirements for safe synchronizing of two generators, or of a generator to the mains:

a.   the voltages of the running and incoming supplies should be matched in magnitude, within specified limits,

b.   the phase angle between the running and incoming supplies should be less than a specified maximum,

c.   the frequencies of the running and incoming supplies should be matched within specified limits.

The terms "running" and "incoming" have been used above. On the 256-PLL and PLD the terminals marked "GEN" should be connected to the incoming supply, and those marked "BUS" connected to the running supply.

The single control on the front of these units covers the setting of them for both requirement "a" and requirement "b" above, although it is marked in % volts only.

To understand this, recall that an AC voltage can be represented as a rotating vector, similar to the hand of a clock. (A vector is a quantity which has both length and direction).

On a 50Hz (60Hz) system a vector representing a voltage will rotate through a full 360 deg. 50 (60) times per second. Thus the running and incoming voltages can be represented as being like two rotating clock hands. When the "hands" are the same length as each other condition "a" is satisfied, when they are together (the angle between them is zero) condition "b" is satisfied.

The 256-PLL and PLD operate by connecting one internal VT, to the running voltage and another (of the same turns ratio) to the incoming voltage. The secondaries of the VT's are then connected in series, but with one of the windings reversed. The resultant voltage is rectified, filtered, potentially divided and compared with a voltage set by adjusting the front control. When this input voltage is less than the set voltage the output relay is energized, indicating that the incoming generator is synchronized to the running supply, within the desired limits.