

different types. This enables the manufacturer to turn out a better three phase generator as to efficiency and heating, retaining the same core loss. Should he, however, select to keep the same density in the copper of the three phase as in the two phase machine, he will be in a position to reduce the magnetic flux by virtue of the larger number of turns that can be accommodated in the same slots, and thus considerably reduce the core loss. Inasmuch as the core loss in machines of large capacity is considerably greater than the copper loss, this will result in a material increase in the efficiency of the generator.

SWITCHBOARD: Taking up next the switchboard, we will find that the only advantage the two phase board has in comparison with the three phase, is the saving of one ammeter. It is standard practice to use an ammeter in each leg, therefore the three phase board will require three ammeters. It is also maintained that the figuring of the K. V. A. load from the instruments is a more difficult matter with a three phase than with a two phase installation, as no factor is used in the latter case in computing the apparent K. W. of the station's output. The above objections have very little weight when compared with the advantages of a three phase board.

All busbars, oil switch contacts and switch compartments, all cables from generators to switchboard and from the board to the transformers are reduced in the ratio of 4:3, and while 15.6% larger cross-section of copper is required in the instance of the three phase installation, maintaining the same current density, the 25% saving in the number of individual parts necessary for the installation will be in favour of the three phase board.

TRANSFORMERS: The use of two transformers for a given load allows a greater individual transformer capacity, and therefore a more efficient transformer. This would have been a decided advantage, favouring the two phase system, were it not for the fact that the transmission of power is to be by three phase. To accomplish this phase transformation by the well-known Scott connections, unless all transformers are provided with a heavier high tension winding, the transformer capacity would of necessity be reduced, due to a higher current in the three phase winding, namely that of 115.6% of the normal current. Should, however, the transformers be designed with provision made for this higher current, it would necessitate larger transformers, or in other words, a more expensive installation. Beside this increased transformer capacity, another disadvantage must be added, that of a possible resonance with T connected transformers for two-phase-three-phase transformers. Whenever one of the phases is open, due to a failure of making proper contact of various switches or any of the auxiliary connections, the high reactance of the high voltage transformer will