

get in series with the capacity of the transmission line and a resonance is likely to take place with the consequent disastrous results.

We have shown the advantages of using a three phase generator. This advantage is further augmented by the possibility of using transformer connections with which the danger of resonance is eliminated. Of the transformer connections in vogue, there are two which are free from the danger of resonance, namely Δ to Δ for step-up and Δ to Δ for step-down, or Δ to Y and Y to Δ . Neither of these two has the objectionable characteristic of resonance and while the Δ to Y and Y to Δ is selected for transmissions where highest voltages are made use of, it is the Δ to Δ and Δ to Δ which gives the most reliable service. With the latter style of connections, should one of the transformers fail, as soon as this transformer is cut out, the service may be restored. This latter connection, namely Δ to Δ and Δ to Δ which insures both continuity of service and freedom from resonance, is introduced now on one of the 60,000 volt transmission lines and is destined to become the standard, inasmuch as high tension transformers of 60,000 volts as well as the insulators, especially if the latter are carefully selected and tested, have the requisite factor of safety, making the resort to the Y connections, at a sacrifice of continuity of service, unnecessary.

DISTRIBUTING SYSTEM: The considerations which held true in the discussion of the transmission line, will also hold true in the distributing system. The three phase delta connections should be made use of, since on motor service a complete shut-down due to a failure of one transformer must be carefully guarded against. Again, the three wire three phase distribution will result in a saving of 25% of copper and insulators. It will reduce the maintenance expense by the same percentage.

The advantages thus enumerated show clearly the desirability of three phase distribution from the purely commercial standpoint and still more so from the point of view of reliability and permanency of supply. Some engineers object to the three phase distribution on the ground of the difficulty of balancing loads. This objection must not be given much importance. With the mixed load of lighting and power, the power load has an equalizing tendency on the balancing of the system and with some attention given to the proper division of the connected lighting load, no difficulty will be encountered.

The station records should be carefully watched, and occasional re-adjustment of the load, based on station records as well as tests of individual installations, will permit of as careful a balance as one may desire.