

NIMROD POWER SUPPLY

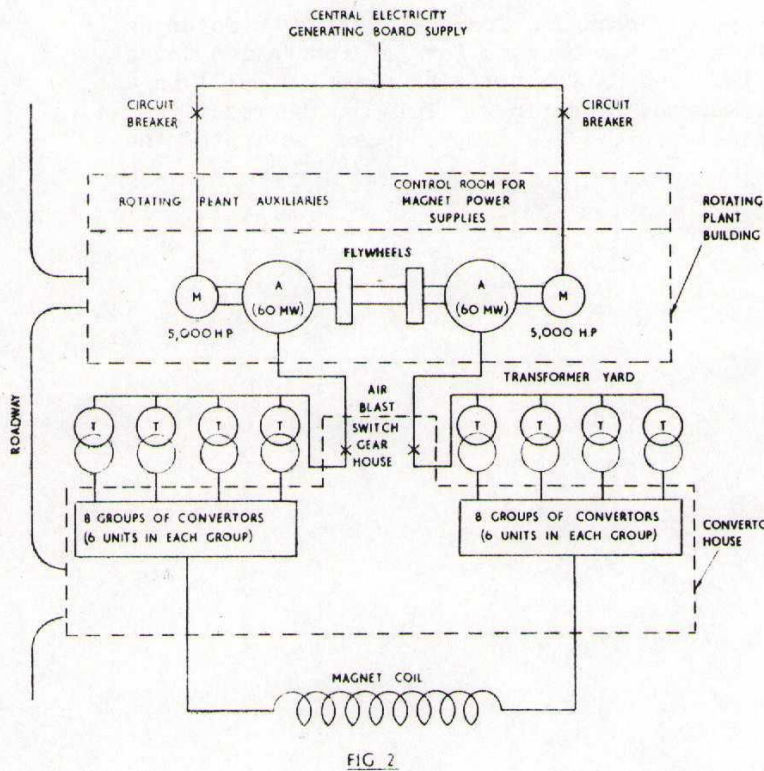


FIG. 2

As the proton energy increases with acceleration, the proton synchrotron magnet field strength has to be increased in order to confine the proton orbits to a constant radius, so the magnet current has to rise during the proton acceleration time (Period WX. Fig. 1).

Fig. 2 shows the proton synchrotron magnet power plant, two flywheels, two large alternators (A) and two motors (M), the shafts of which are all coupled together.

During the period WX (Fig. 1) the large machines (A) are acting as generators and during this period as the magnet current rises, the speed of the rotating plant falls from 970 r.p.m. to 930 r.p.m. Also during this period the convertor groups are all acting as rectifiers, so that the A.C. supply they receive from the generators (A) via the transformers (T) is changed to D.C. to feed the magnet coil.

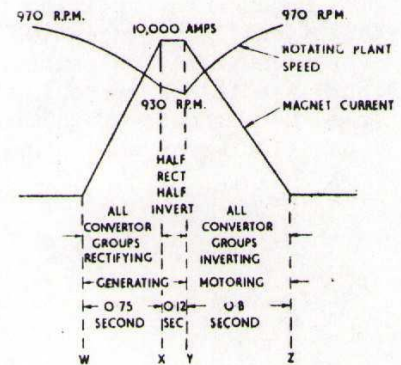


FIG. 1

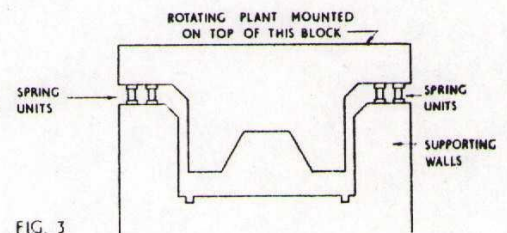


FIG. 3

After a short flat top period (Period XY, Fig. 1) the convertors are controlled so that they can accept back the energy stored in the magnet system and feed this back via the transformers (T) to the large machines (A) which now act as motors. The speed of the rotating plant during this period (shown as YZ in Fig. 1) returns to 970 r.p.m. The term used to describe the action of the convertors during this condition is 'inversion'.

The energy returned during this period YZ is stored in the flywheels ready for the next pulse. By this means only the circuit losses have to be provided from the Electricity Grid System, and this is done by feeding the two relatively small motors (M) on the ends of the rotating plant shaft system.

Because the rotating plant is rapidly changing from generating to motoring conditions it is essential to mount this plant on some form of foundation which overcomes vibration problems. For this reason the rotating plant is built on a foundation block which is, in turn, mounted on springs. This can be readily seen from the basement of the rotating plant room, and a simple cross section of the foundation arrangement is shown in Fig. 3.