

However, the instantaneous drop in voltage which occurs during this period can be followed by a rapid decline in synchronizing power in the transmission system. Thus, a momentary fault on a line between a generating plant and a load area might cause the plant to pull out of synchronism with the load and cause a breakup of the system. To prevent this, the synchronous condensers are ready, at the instant of a fault, to deliver large blocks of leading reactive kva which compensates for the lagging kva that usually feeds into

ratio, a shaft-driven main exciter, a motor-driven pilot exciter with special field windings, and an electronic voltage regulator were used. The condenser field is supplied from the main exciter which has two shunt fields. One field is supplied with constant potential d-c; the other receives variable d-c voltages from the pilot exciter. The pilot exciter, in turn, has two shunt fields, one a "biasing" field, and the other designed to receive signal voltages from the electronic regulator. The photo, page 28, shows the electronic

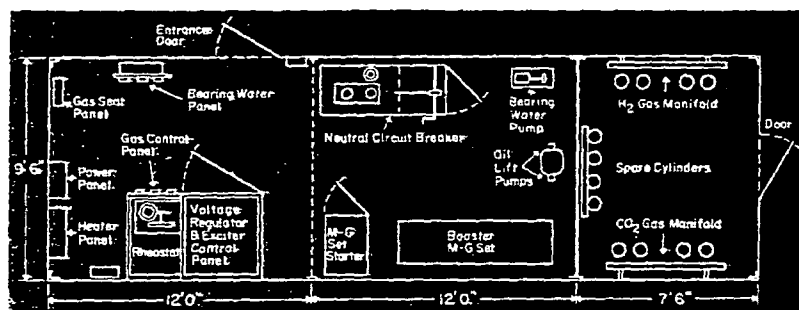
assemblies inserted beneath the feet of these parts. With the aid of a large rotor support beam and tripod assembly, the end domes and stator can be removed without moving the rotor. Thus the handling equipment provided with these condensers makes it possible to conduct normal maintenance and disassembly without disturbing the rotor.

Heat is removed from the condenser by two gas-to-water heat exchangers, each located laterally in the lower section of the end dome. Circulation of gas through the condenser is maintained by large shrouded-type fans at each end of the rotor. A uniform system of cooling is achieved with this arrangement.

The exciter, mounted in its own compartment within the condenser shell, is cooled by circulation of hydrogen gas within its enclosure, by means of its own shaft fan. A gas-to-gas heat exchanger, located directly above the exciter compartment transfers heat from this compartment directly into the main ventilating system of the condenser.

To facilitate visual inspection of such parts as collector rings, exciter commutator, and bearing pedestals, a series of viewing windows have been located in the end domes and exciter compartments. Adjacent to each viewing window is a suitably located lamp housing of explosion-proof construction. The lamp housings are arranged that lamps can be changed from outside the housing. By painting the interior of the end dome sections egg-shell white, visibility within the end dome has been greatly enhanced.

The Elliott Company is proud to have been selected to develop the high-response excitation system which has operated so successfully with these condensers under rather unique conditions established by the Bonneville Administration. Each of the units has performed designed, fully meeting the expectations of the user.



Simplified floor plan of the auxiliary control housing.

the fault. In fact, the Bonneville condensers, by virtue of their special design, can on short notice deliver 200 percent of their 15 psi leading kilovar rating—a momentary capacity of 120,000 kva.

High-speed excitation system

Each of the Bonneville condensers is equipped with an unusually high-speed excitation system. System requirements demanded that each unit be capable of delivering a short-time capacity of 200 percent for 10 seconds. This required an ASA response ratio of 5.0 rather than the conventional ratio of 1.0. Actually, tests made on the condensers after installation established a short-time capacity of 120,000 kva (140 percent) and an ASA response ratio of 6.0, considerably above the requirements.

To achieve this high ASA response

regulator, mounted in its steel cubicle.

Design features

In each of the condenser installations, the controls and auxiliaries which normally are placed in a pit beneath the condenser are located in an above-ground auxiliary housing. The condenser rests on a simple reinforced concrete base. This design results in considerable reduction in foundation expense.

Special attention was given to the fact that it would be necessary to disassemble these large condensers without the aid of a crane. Any attempt to lift the large rotors, weighing more than 65 tons, would obviously present a serious problem. Hence, each condenser foundation is provided with extended soleplates, along which the end domes and stator sections of the condenser can be moved with the aid of small roller