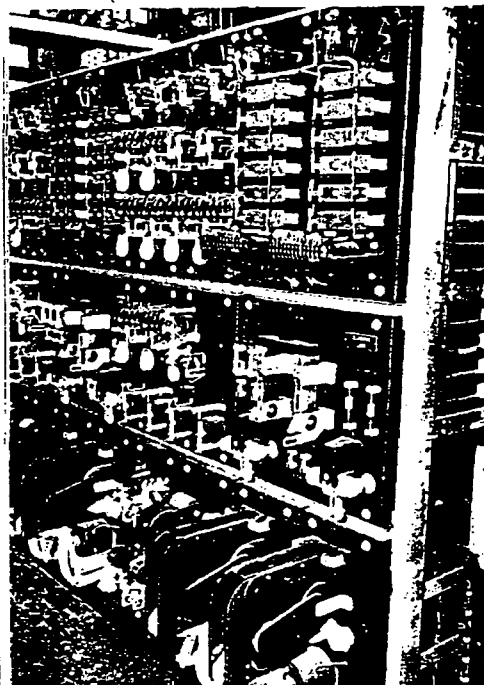


These photos show some of the adjustable voltage control equipment furnished by Elliott for each bridge.

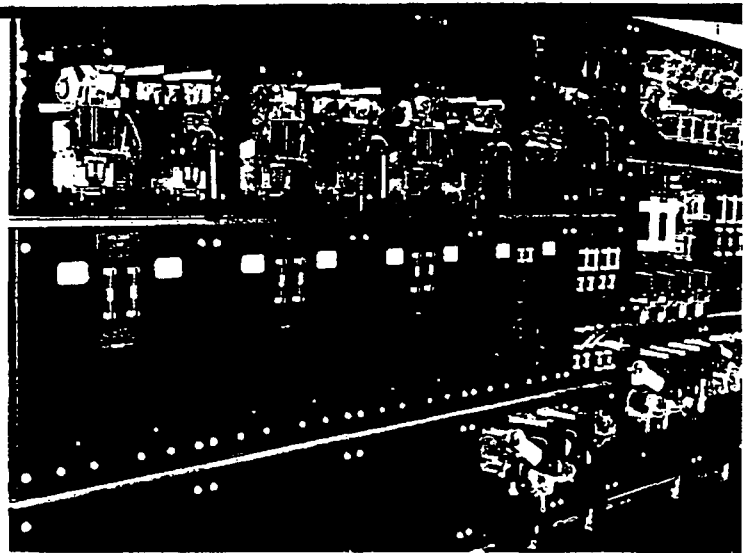
At right is the control for the generators, which is located in the totally-enclosed motor-generator set house. (Below) is a portion of the motor control all of which is located in the trolley cab, above the operator's cab. Panels shown serve one bucket motors.



with three master switches and three foot-operated pushbuttons. The switches control all motions of trolley, bucket, and bridge. One of the pushbuttons changes the output of the two hoisting generators to the pier and shear leg trucks, while simultaneously releasing the wheel clamps. The other two pushbuttons control the trolley rails sanding equipment and the trolley brake.

Adjustable voltage control

The new Ohio Works ore bridges reflect the trend toward d-c adjustable



voltage operation. This type of electrical system, under the proper circumstances, offers several significant advantages over the more traditional d-c constant potential method.

In essence, the constant potential system powers the bridge from 250-volt d-c generating equipment installed at the mill. This power supply is picked up by collectors mounted on the bridge and fed to 230-volt d-c motors which operate the various bridge motions. The largest standard mill motors presently available are rated at 200-hp continuous capacity at this voltage. Hence, the maximum ore-handling capacity of the bridge is limited, unless multiple motor drives are employed with consequent increase in bridge structural weight and cost.

On the other hand, the adjustable voltage system employs a 2300-volt, 25-cycle a-c power supply, picked up by trolleys on the bridge and carried to the ac-to-dc motor-generator set mounted on the bridge pier structure. The generators in turn supply adjustable voltage d-c to the appropriate drive motors. By operating the motors at double-rated voltage and double speed, their shaft horsepower can be effectively doubled. Thus, using standard 600-series mill motors, much greater bridge capacity can be obtained without increase in the size or number of the

bridge motors. In the case of each of the Ohio Works bridges, about 10 percent more capacity was achieved than would have been possible with a constant potential system.

In addition to the increased bridge capacity which is obtained through the adjustable voltage system, other advantages suggest its use. For example, the increased bridge capacity is possible with no increase in existing plant d-c capacity. Or, as in the case at the Ohio Works, conversion to adjustable voltage bridge operation reduces the load on present plant d-c equipment, appreciably increasing its service life.

Further, the adjustable voltage system requires less maintenance. It does not require frequent operation of many large contactors. And the inherently smooth acceleration of drive motors possible with adjustable voltage does not impose shock loads on the mechanical parts and structure.

Speed control is improved, and increased hoisting speeds are possible both tangible operating advantages. Finally, over-all power consumption is appreciably less than that of the constant potential system which depends upon dissipating unneeded energy in resistance. At the Ohio Works, all of these advantages were obtained at only about a 9 percent increase in first cost over the cost of new constant-potential driven bridge