MAINTENANCE • ADJUSTMENT

INSTRUCTIONS

RECTIFIERS FOR CIRCUIT BREAKER OPERATION
SELENIUM TYPE

These rectifiers are designed to deliver direct-current at the current and voltage stamped on the nameplate at any commercial frequency. The normal value of a-c voltage at which the rated d-c output may be obtained appears on the nameplate. The complete unit consists of a metalic rectifier element, an optional adjustable series resistor in the a-c line, and a suitable mounting plate. See Figure 1 for a schematic diagram of the complete rectifier.

The rectifier is designed for intermittent operation and must not be used to supply load other than the circuit breaker solenoid. Unless otherwise indicated on the nameplate the load must not be applied to the rectifier for longer than one second nor for more than 20 times in 10 minutes or 30 times in one hour. The rectifier rating must not be exceeded, as for instance by the operation of two solenoids at once.

These rectifiers differ from copper-oxide rectifiers which they are superseding in several respects. The most important differences are mentioned in the next few paragraphs to provide a better understanding of these newer devices.

1. Resistance—temperature characteristics,—the increase in rectifier resistance with decreasing temperature is much lower in the case of selenium rectifiers than when treating with copper-oxide rectifiers. In general it has been found that this increase in the voltage drop across the selenium rectifier is completely compensated for by the decrease in the resistance of the closing coil and the adjustable series resistor. This fact makes it unnecessary in most cases to change the adjustable series resistor, for winter and summer service.

2. Shelf and Use aging of Selenium rectifiers is so low that for most practical purposes a change in the adjusting resistor setting to compensate for these effects should be unnecessary.

3. The selenium rectifier is a cooler operating device then it's predecessor. It has been found when testing on very frequent repetative operations that the breaker closing coil would fail, thermally, before the rectifier.

MAINTENANCE AND ADJUSTMENT

An adjustable resistor is included with some assemblies as a means of compensating for such variables as line voltage, lead and rectifier resistance, etc. When such an assembly is shipped from the factory the resistance is set to give the correct value of d-c voltage at the circuit breaker closing coil terminals when rated a-c line voltage is impressed across the rectifier and series resistor. Upon installation the setting should be checked as the line voltage at the site may be different from that used at the factory.

When making such settings at the factory, alternating current meters of the Dynamometer type are used to measure the input voltages across the assemblies and D'Arsonval type meters (having a moving coil in a permanent magnetic field) are used to measure the d-c output. Such a-c instruments are usually calibrated to read the root-mean-square of the quantity being evaluated while the D'Arsonval type instruments will indicate the average value of the output. The RMS value of the a-c voltage is equal to 1.15 times the sum of the Average D-C output voltage plus the average voltage drop through the

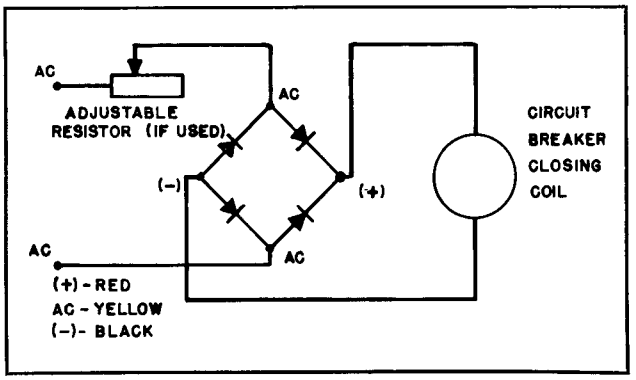

FIG. 1. Schematic Diagram of Selenium Type Rectifier

rectifier. If a rectifier is connected to a closing coil having an open circuit (No current through the coil) then under this condition the average d-c voltage at the coil terminals is approximately equal to .87 (1.00/1.15) times the R. M. S. value of the a-c voltage across the rectifier.

Caution. Never apply a load to the rectifier for more than 3 seconds while taking a reading. It is good practice to operate the rectifier a few times at least once a year.

TROUBLE INVESTIGATION

If the breaker fails to close electrically check the a-c voltage at the terminals of the rectifier when carrying load.

If the a-c voltage is correct check the d-c voltage at the rectifier terminals when carrying load. If the d-c voltage is approximately 87% of the a-c voltage the closing coil is open, see the "Maintenance and Adjustment." If the d-c voltage is as shown on the rectifier nameplate the rectifier is operating properly and the trouble is elsewhere. If the d-c voltage is of any other value the rectifier is probably faulty and should be replaced.

If the complete faulty unit has more then one rectifier stack, the stacks should be disconnected from the a-c and d-c circuits and tested in the following manner;—apply 120 a-c volts with a 25 to 100 watt lamp in series with one of the leads to each pair of adjacent terminals in succession. The lamp should light to half it's normal intensity in each case, full brilliance indicates a short, and no light indicates an open circuit. A stack should be replaced if any leg shows either of these conditions. Avoid loosening the nuts holding a stack together in an effort to replace a defective section or cell as it is very difficult to recompress a painted stack properly even with good assembly fixtures.

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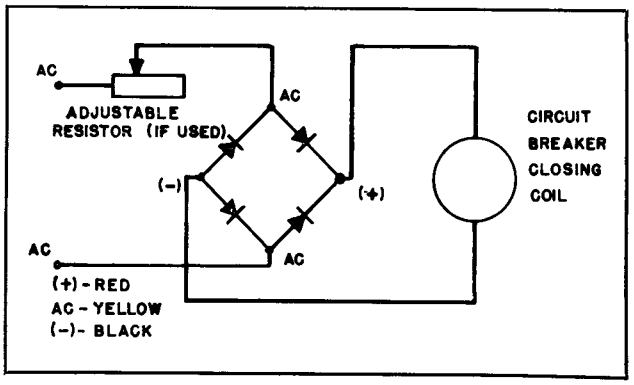

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