

## SPEED OF CORRECTION

In Servo Voltage Regulators, the speed of correction plays a significant role in the performance of voltage regulator vis-à-vis the application of the regulator. Of late, some manufacturers/customers have been specifying very high speed of correction varying from 75 - 120 V/Sec. It is a general impression that, by increasing the speed of Servo Motor or Gear ratio one could attain high speeds of correction, but technically it is not correct.

The Servo Voltage Regulators consists of an Auto Transformer, which is, coupled with a Buck Boost Transformer. The Auto Transformer is a single winding Transformer, where as, the buck boost transformer is a two winding (mutually coupled) Transformer. **The change of voltage on the secondary of the buck boost transformer is controlled by the time constant of the transformer.** The Time constant is normally defined in the following manner:

In a mutually coupled winding, the change of voltage on the primary is not instantaneously reflected in the secondary and is always delayed by the time constant purely depended upon L/R ratio (defined below).

Keeping the above definition in view, an increase in the speed of correction by the help of a high speed motor or gear ratio, the change of impressed voltage on the primary is simultaneously not reflected in the secondary. Since the sensing circuit is connected to the output of the stabilizer, the change in the output voltage is not immediately reflected, and that causes over shooting, which in turn, will cause

hunting in the voltage stabilizer. It is a wrong assumption that higher speeds of correction can be attained by fast sensing circuit or by high speed servo motors.

### **L/R RATIO**

L/R Ratio is a very important feature of the Transformer. The inductance (L) is purely governed by the number of turns and the area of the Core where as 'R' is controlled by the size and length of the wire used. Both these factors are in fact design factors and they cannot be changed keeping in view the speed of correction.

### **ACCEPTABLE LIMITS OF CORRECTION**

**The higher speed of correction not only results in hunting but also puts** heavy strain on the mechanical components and carbon brushes. It has been our experience that speeds of correction up to 20V/sec in single phase units up to a capacity of 5.0 KVA are fairly within limits of L/R ratio and in higher capacities, the correction rate of 10-12 V/sec is quite practical.

In 3 phase units, the speed of correction for line voltages up to a level of 35 V/sec are acceptable for capacities up to 15 KVA, where as, speed of correction up to 20 V/sec shall be suitable for capacities up to 60 KVA units. For higher capacities still lower speeds will be recommended. Even IS:9815 specifies a minimum speed of correction of 6 V/Sec.