Characteristics of (a) Compound Generator and (b) Series Generator

OBJECT:

The object of this experiment is to:
1.   Get the N.L and external characteristics of generator.
2.   Get the external characteristics of a series compound generator.

THEORY:

The compound generator is a combination of shunt and series winding as in (fig3). These winding being usually connected so that their ampere - turns assist one another.

There are two types of compound generator connections: along-shunt connection and short - shunt connection in long - shunt connection the shunt field circuit in Parallel with combined armature and series field circuits as well as with load circuit.

In short-shunt connection. The shunt field circuit in parallel with the armature circuit and the series field circuit is in series with the load.

An examination of these two types will reveal that regardless of the method of connection. The terminal voltage V_L, of the short-or long- shunt compound generates is the same as the equation:

$$V_L = Eg - (I_S Rs + Ia Ra)$$

The generated voltage, Eg, of compound generator is the results of combination of mmfs produced by the series $(I_s N_s)$ and shunt $(I_f N_f)$ ampere - turns, due to current which flows in their field windings.

When the series field mmf aids the shunt field mmf, the generator is said to be cumulatively compounded.

When the series field mmf opposes the shunt field mmf, the generator is said to be differentially compounded.

There are three types of load characteristics Possible for the cumulative compound generator, depending on the relative additional aiding mmf produced by the series field. These types are called.

(1) Over compound (2) flat - compound, and. (3) under compound.

PROCEDURES:

Take the name plate date of the machines under test.

RUN (1): (The N.L and external charac. Of series generator)

1.   Connect the D.C. supply to the series field winding with a load resistance (with electrical 0 - 6 T.C. 0.5A -lOA, 220V) in series Fig (1).
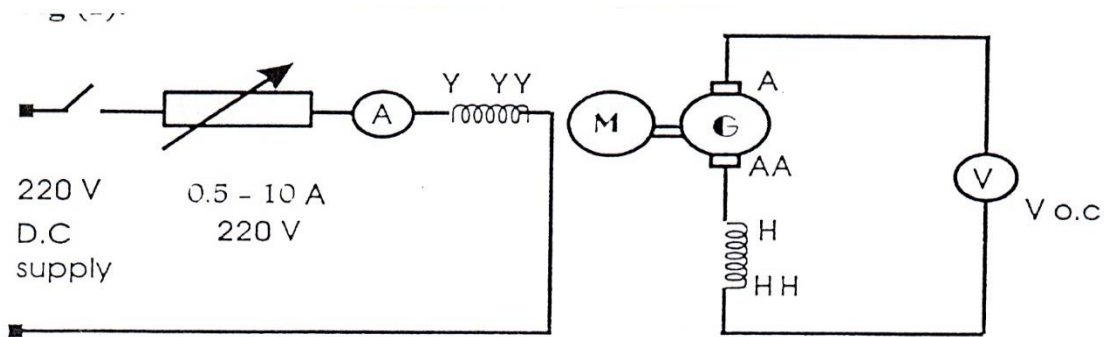

Fig. 1

Keeping the speed constant at rated, change IF in several steps should not be more than rated armature current and record it, reading with that of Vo.c open - circuit. voltage of the generator. This is the N.L chara: of series generator. Decrease If to zero and then disconnect the series field.

2.   Connect the generator for self - excitation series generator. (Fig2). Vary the load (the load is two rheostat resistance 12.5 -10 A connected is series) from zero load current to 125% full load current in 6 steps and record the values of V_L and I_L.
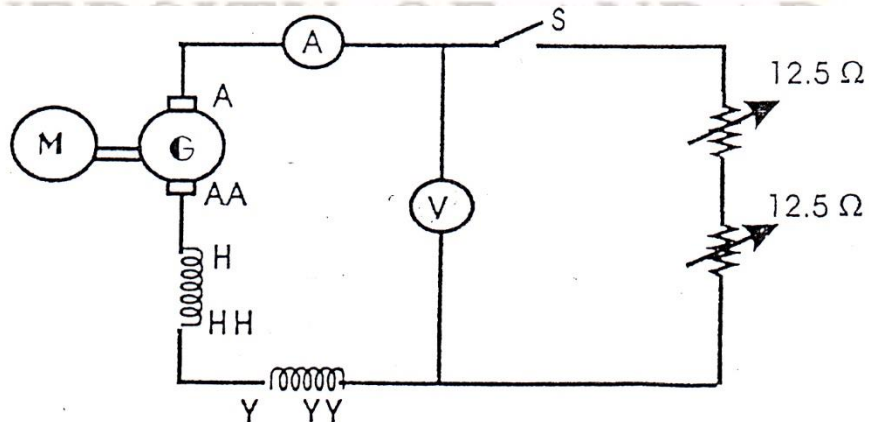

Fig. 2

RUN (2): (The External characteristics Of the Compound Generator)

1.   Connect the compound generator (fig3) as cumulative compounded provide. Instruments to read the generator terminal voltage field current and load current.

2.   Start the motor and bring the speed to rated value. Adjust the generator field current by means of the field regulator to give rated voltage, take reading of the generator terminal voltage and field current while varying the load current from full-load current to zero in about 6 steps. Keep the speed constant at rated value.

3.   Connect the generator as differential compound, by reversing the series coil y - yy. Run the motor at rated speed keep it constant through operation. Bring the field regulator of shunt winding to give rated voltage. With switch open, close the switch and change the load current from zero to a value, that gives about 35% of the open circuit voltage of the generator, take reading of V_L, I_F and I_L.
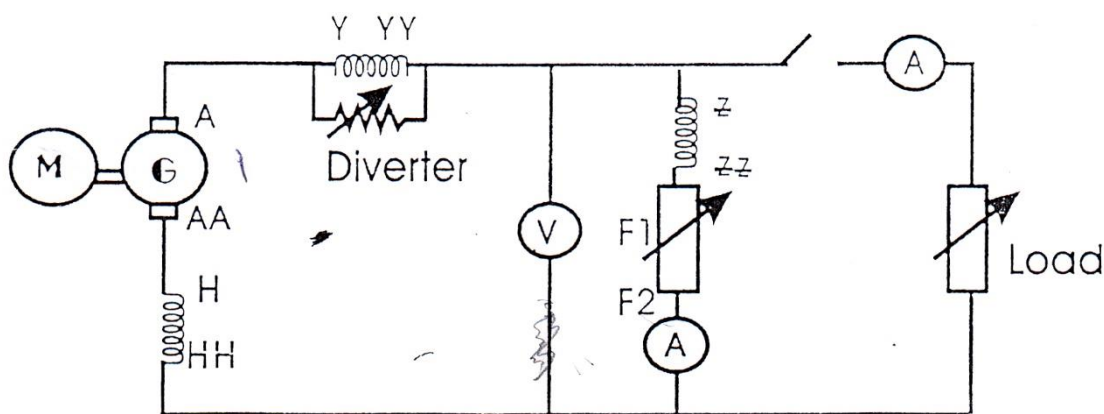

Fig. 3

DISCUSSION:

1.   Draw the N.L characteristics and external characteristics Of series generator, draw the different external characteristics. For two types of compound generator on one sheet.

2.   Does the external characteristics of series generator represent its load characteristics? Why?

3.   What is the difference between cumulative and differential compound generator?

4.   Is there a great difference between long and short - shunt compound generator, show that?

5.   What is the advantage of a diverter across the series field in compound generator?

6.   Comment on the possible industrial application of cumulative compound generator types, series, differential compound generator.