Experiment NO. 1:2

Building-up Voltage of Self-Excited Shunt Generator

OBJECTS:

The object of this experiment is to verity the factors which affect the process of voltage build – up in a self- excited shunt generator.

THEORY:

D.C. Machines may be magnetized by current obtained from a separate source, such as a battery or an auxiliary dynamo called an exciter, or may generate their own magnetizing current. These two methods of excitation are then called "separate excitation" and "self-excitation" respectively.

When the field is so connected to the armature that the flux produced by the field current assists the flux of residual magnetism then the generated voltage build-up and the process continuous until an equilibrium point is reached between the magnetization curve and the field resistance line.

When the field is separately excited the generator will build-up for either polarity of field and either direction of rotation, but when the field is self-excitation, the generator to build up its field;

1. There must be residual magnetism in the field system.
2. The connection of the field circuit to the armature must be such that the direction of the field current established is such as to tend to increase the field already existing.
3. The total resistance of the field 'winding circuit must not exceed the "critical value" if appreciable building up is to take place; this critical resistance increases in direct proportion to speed.
4. The speed must be higher than the critical speed for the field resistance used.

PROCEDURES:

Take the name plate data of the generator used In the experiment.

RUN (1):

1. Connect the circuit shown in fig.l with the field circuit open (i.e. the switch open).
2. Operate the generator at rated speed and no – load and read the voltmeter reading due to residual magnetism.

Note: Which armature terminal is positive relative to this initial polarity. Keep the speed constant.

RUN (2):

1. Connect the field circuit by closing the switch and change the field regulator (Fl - F2) as in the following table.

Note: The direction of rotation if clockwise or counter clockwise. Record all reading in the table:

Steps	Direction of rotation	Direction of switch	The field regulator	Armature polarity	Direction of field	Va	I_f	Build-up
1	CW	Right	In					
2	CW	Right	Out					
3	CW	Left	In					
4	CW	Left	Out					
5	CCW	Right	In					
6	CCW	Right	Out					
7	CCW	Left	In					
8	CCW	Left	Out					

RUN (3):

1. Reveres the residual magnetism voltage by separate excitation so,

connect the circuit shown in fig. 2.

Note: The direction of rotation remain the same (e,g CW) but the polarity of armature voltage will be reversed.

2. Repeat step 2,4,6,8 of run 2 with fig 1.

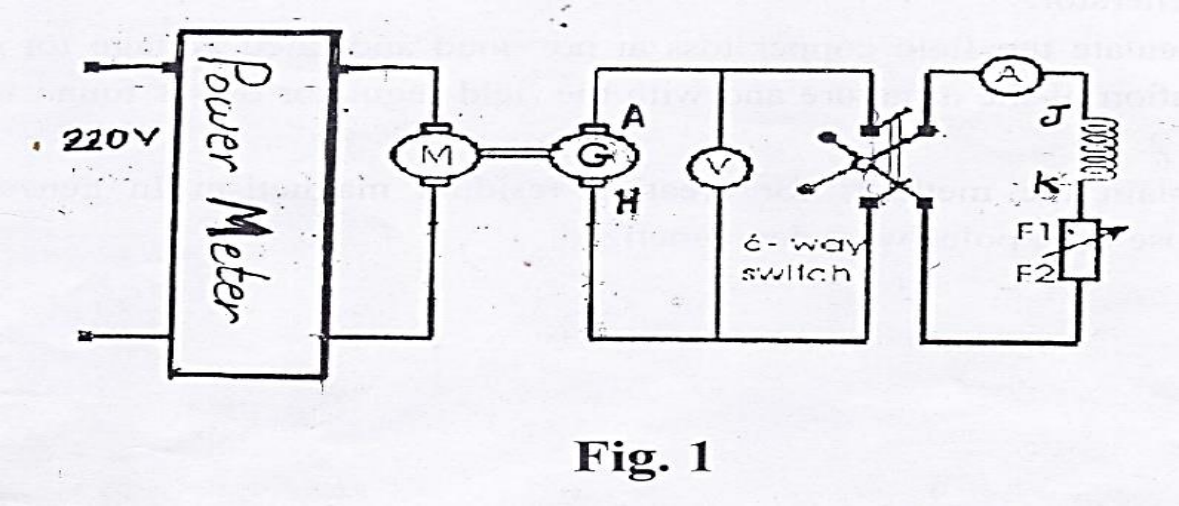

Fig. 1

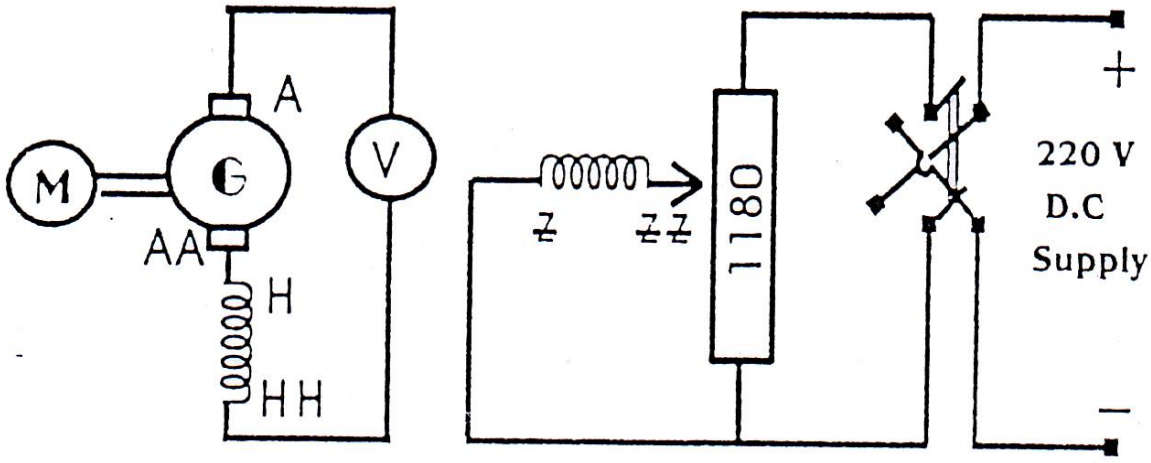

Fig. 2

Discussion:

1. Draw circuit diagram for the generator for step 3,5,7 of run- 2.
2. Explain how the polarity of the generator may be kept the same with reversed rotation.
3. Explain what is meant by the critical field resistance for rated speed of a generator.
4. Calculate the field copper loss at no –load and rated voltage for CW rotation of the armature and with the field regulator out as found from run 2.
5. Explain the methods for creating residual magnetism In generator whose field poles were demagnetized.