

Lab Information -- Direct Current Machine Experiments

EXPERIMENT NO. 2 SHUNT GENERATOR OUTPUT POLARITY AND BUILD-UP

PURPOSE:

To study the relationship between the direction of rotation. The output polarity and the direction of field flux in a shunt generator.

APPARATUS REQUIRED:

1. One DM-100/A D.C. Machine as generator
2. One MFM-100 Multi-function machine as cap-start motor
3. One Hampden D.C. voltmeter
4. One 0 to 150 volt D.C. power supply
5. One 120 volt A.C. power supply

PROCEDURE:

1. Couple the D.C. generator to the capacitor start motor and make the connections shown in Figure 2. The armature, shunt field, and rheostat are not connected together at this point.
2. Have the instructor check your connection. Turn on the power and start the motor. Measure and record the armature voltage. This voltage is due solely to residual flux. Note the direction of rotation looking from the right side of the motor.
3. Turn off the power. Connect the shunt field through the rheostat (in its full CW position) to the armature terminals. Turn on the power. Slowly decrease the rheostat resistance. If the generator voltage starts to rise, the correct connections have been made. If the voltage decreases, turn off the power and reverse the shunt field connections and proceed. After obtaining the right polarity, record the connections illustrating the armature and field polarities.
4. Stop the motor and reverse the direction of rotation by swapping the connections to the starting winding. With the shunt field disconnected, measure the DC voltage across the armature terminals for this direction of rotation. Record the magnitude and polarity of this voltage.
5. In order to cause the generator to build-up with this direction of rotation, it will be necessary to reverse the connections between the armature and field from those of Step 3, since the flux

produced by the shunt field and that of the residual flux must be the same. Make this connection, operate the generator as in Step 3 and record the polarities of the field and the armature.

6. It is sometimes necessary to obtain reversed polarity without changing the direction of rotation, as might be the case if the generator were driven by a non-reversible prime mover. This can be done if the residual flux is reversed by "flashing the field". With the power off, disconnect the shunt field and rheostat from the armature terminals. Connect the shunt field to the 150 volt DC power supply in the reverse polarity from that recorded for Step #5. For example if terminal 2 of the shunt field were positive with respect to terminal 1 of the armature, then connect the positive lead of the DC supply. Start the motor and maintain power for 15 Seconds. Record the armature voltage and polarity.

REPORT:

Show the data obtained and the polarity diagrams.

FIGURE 2

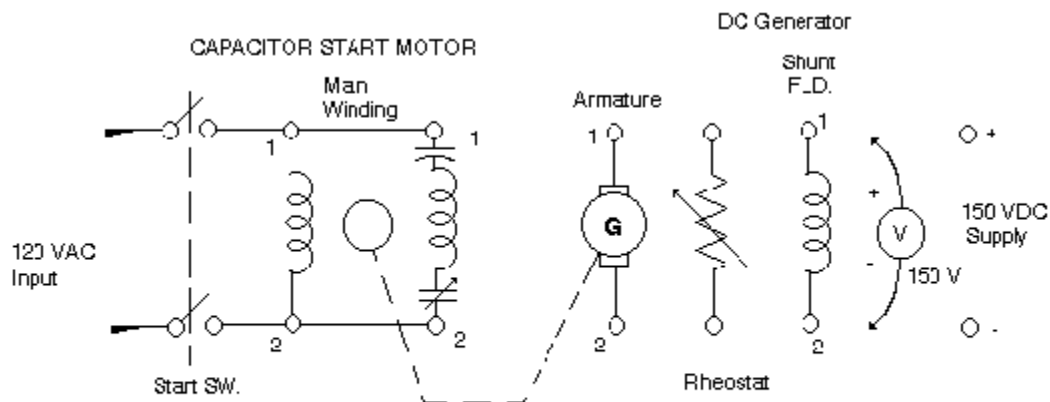

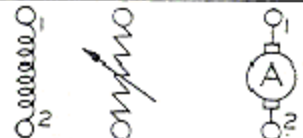

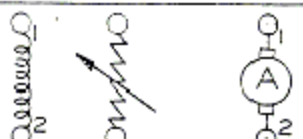
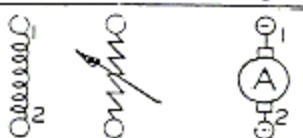


Figure 2

WORKSHEET 1:

STEP NO.	DIRECTION OF ROTATION	POLARITY AND CONNECTIONS	CONDITIONS OF TEST
2	CW		Generated voltage due to residual magnetism
3	CW		Proper connection of shunt field to cause build-up
4	CCW		Generated voltage due to residual magnetism and reversed direction of rotation
5	CCW		Proper connection of shunt field to cause build-up (Reverse rotation)
6	CCW		Generated voltage after flashing the field with reversed polarity