**THE DC MOTOR**

**COMPOUND MOTOR**

**PURPOSE:**

This practical assignment will be used to examine the operation of a compound connected dc motor.

**TO ACHIEVE THE PURPOSE OF THIS SECTION:**

At the end of this practical assignment the student will be able to:

* Complete a connection diagram for the terminal block of a compound connected dc motor
* Connect a compound connected dc motor using a circuit diagram as a guide.
* Test a compound connected dc motor to determine the effect of supply voltage on torque.
* Carry out a load test on a compound connected dc motor.
* Determine the effect of differentially connected fields on the output of a compound connected dc motor
* Reverse a compound connected motor

EQUIPMENT:

* 1x single variable dc power supply (24 volt 20 amp type – 240 volt ac plug in type)
* 1 x Baldour dc machine
* 1 x eddy current load
* 1 x Betts mounting plate
* 1 x digital multimeter
* 1 x tachometer
* 4mm connecting leads

REMEMBER

WORK SAFELY AT ALL TIMES

Observe correct isolation procedures

**PROCEDURE**

Step 1

Complete the diagram of the motor connections to show a compound connected motor that has the machine supplied from a 0 – 24 volt 20 amp DC power supply. The field windings are to be connected to provide maximum field strength.

Shunt Winding

Shunt Winding

C:\Documents and Settings\Jeff\My Documents\My Pictures\transformer coil1.bmpC:\Documents and Settings\Jeff\My Documents\My Pictures\transformer coil1.bmp

F2

F4

F3

F1

Armature Winding

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Carbon

Brush

Carbon

Brush

A1

A2

Series

Winding

Series

Winding

Series

Winding

Series

Winding

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**Step 2**

Fit the motor and the eddy current brake to the mounting plate, ensuring that you fit the rubber coupling to the brake prior to mounting the equipment.

Have the teacher check your connections.

**Step 3**

Ensure that the coupling on the motor is arranged to provide a suitable signal for a photo operated tachometer.

**Step 4**

Set the power supply connected to the eddy current load to 2.5 volts, with current set to maximum.

Set the power supply connected to the motor to 24 volts (maximum).

**Step 5**

Switch supply on to all components, and run the machine.

Record your observations in the table below, adjusting the eddy current load to suit the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **motor** | | **Eddy current load** | | **Motor speed (rpm)** |
| **volts** | **current** | **volts** | **Torque indication** |
| **24** |  | **2.5v** |  |  |
| **24** |  | **5.0v** |  |  |
| **24** |  | **7.5v** |  |  |
| **24** |  | **10v** |  |  |

**Step 6**

Using the results obtained above, plot the speed to load characteristics of the machine when the field excitation is constant.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Max speed**  **Min speed** |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |
| **Minimum load maximum load** | | | | | | | | |

**Step 7**

Set the power supply connected to the eddy current load to 2.5 volts, with current set to maximum.

Set the power supply connected to the motor to 24 volts (maximum).

**Step 8**

Switch supply on to all components, and run the machine. Vary the supply voltage, while maintaining a relatively constant load. Adjust the eddy current load supply voltage in order to maintain the load as constant.

Record your observations in the table below, adjusting the eddy current load to suit the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **motor** | | **Eddy current load** | | **Motor speed (rpm)** |
| **volts** | **current** | **volts** | **Torque indication** |
| **24** |  | **2.5v** |  |  |
| **20** |  |  |  |  |
| **16** |  |  |  |  |
| **12** |  |  |  |  |

**Step 9**

Using the results obtained above, plot the speed to load characteristics of the machine when the supply voltage is varied.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Max speed**  **Min speed** |  |  |  |  |  |  |  |  |  |
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| **Minimum voltage maximum voltage** | | | | | | | | |

**Step 10**

Establish the motor at 24 volt supply, and the eddy current brake supply at 5 volts.

Run the motor, and test the speed, recording speed and running current in the table below.

Arrange the motor as differentially compounded connection by reversing either the shunt or the series field .

Run the motor and test the speed.

Record your observations in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| Motor connection | Speed (rpm) | Running current | torque |
| Conventionally compounded |  |  |  |
| Differentially compounded |  |  |  |

**Step 11**

Re-establish the motor as a conventionally compounded motor, and test the motor operation, observing the direction of rotation.

Reverse the direction of rotation by reversing the armature connections.

**Step 12**

Reverse the direction of rotation by reversing the fields.