

Familiarization with the SCR-104

Objective:

To learn how to control DC motor speed with the H-SCR-104 SCR drive

To investigate the range of speed control available

Experimental Equipment Required:

Model H-SCR-104 4-quadrant DC motor speed controller

Model DCM-100 or DM-100A DC motor

Model MF=GB-100-DG Bedplate

Test Equipment:

DC voltmeter, 0-150V

DC Voltmeter, 0-15V

Tachometer

Procedure:

Step1: Clamp the DM-100 DC motor securely to the bedplate. Connect the DM-100 to the H-SCR-104 as shown in figure 1

Step2: Connect one voltmeter (0–150 volts) across the armature and the other (0–15 volts) between test points A4 (+) and A1 (–) as shown in Figure 1-1.

Step3: Plug in the H-SCR-104. Turn the MAX SPEED knob fully clockwise and the SPEED KNOB fully counterclockwise. Be sure all fault switches are off, the feedback switch is in the ARM position, and the speed control switch is in the LOCAL position. The motor's field rheostat should be fully counterclockwise to its minimum resistance position. Set the IR, DEADBAND (DB), ACCEL/DECEL, RESP and CL knobs to their respective mid-positions.

Step4: Turn on the H-SCR-104 by turning on the MAIN and then the two circuit breakers on the right side of the unit. Push START and turn the SPEED CONTROL knob fully clockwise and observe the gradual increase in armature voltage. This is the "soft-start", or controlled acceleration. You will notice a similar "ramp" when you decrease speed. Measure the time from zero to full armature voltage: _____ seconds.

Step 5: Measure the maximum motor speed: _____ rpm. Also measure the CONTROL voltage at test point A4 (test point A1 reference): _____ volts that provide maximum motor speed.

Step 6: For each of the CONTROL voltages listed in Table 1-1, measure and record armature voltage and motor speed.

Step 7: With the SPEED CONTROL knob fully clockwise, turn the MAX knob fully counterclockwise and measure the lowest possible maximum speed: _____ rpm.

Step 8: Turn off the H-SCR-104 Speed Controller.

Step 9: On a graph paper, *plot speed and armature voltage as ordinates against CONTROL voltage as the abscissa.*

Step 10: Disconnect the equipment and put everything away.

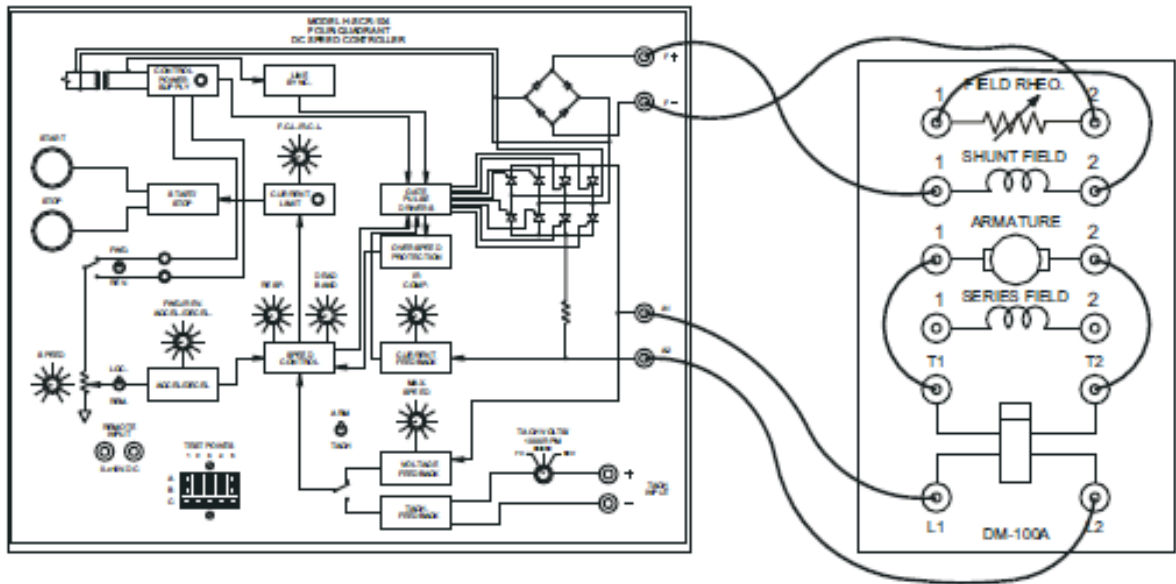


Figure 1-1

CONTROL VOLTS	ARMATURE VOLTS	MOTOR RPM
1		
2		
3		
4		
5		
6		
7		
8		
9		
9.8		

State the function of the following blocks:

a- LOCAL/REMOTE speed control switch:

b- FORWARD/REVERSE switch:

c- CURRENT LIMIT Block:

d- IR COMPENSATION potentiometer:

e- Speed control block:

f- Voltage feedback block:

Motor Mode with the SCR-104

Objective:

To learn when the H-SCR-104 will be in "motoring" operation.

Experimental Equipment Required:

Model H-SCR-104 4-quadrant DC motor speed controller

Model DCM-100 or DM-100A DC motor

Model MF=GB-100-DG Bedplate

Model PB-100 Prony Brake

Test Equipment:

DC voltmeter, 0-300V

DC Aoltmeter, 0-10A

Tachometer

Procedure:

Step1: Connect the DC motor to the H-SCR-104 and couple the Prony Brake PB-100 to the motor as shown in Figure 1-2. The motor's field rheostat should be fully counterclockwise to its minimum resistance position.

Step2: Plug in the H-SCR-104. Turn the MAX SPEED knob fully clockwise and the SPEED KNOB fully counterclockwise. Be sure all fault switches are off, the feedback switch is in the ARM position, and the speed CONTROL switch is in the LOCAL position. Set the IR, DEADBAND (DB), ACCEL/DECEL, RESP and CL knobs to their respective mid-positions.

Step3: Turn on the unit and adjust the SPEED knob to full clockwise position. Use the MAX SPEED potentiometer and adjust the armature voltage to about 90 volts. Do Not change this setting

Step 4: For each of the CONTROL voltages listed in table 2-1 (Test point A4 with test point A1 as reference), measure and record the motor speed, armature voltage and armature current.

Step 5: With the SPEED potentiometer turned fully clockwise and motor rotating, adjust the Prony Brake load so the armature current is _____ amps.

Step 6: Repeat Step 4 with the load applied and record in Table 2-2.

Step 7: Stop the motor and turn off the unit.

Step 8: Change the direction of rotation and repeat Steps 3, 4, 5 and 6 and record in Tables 2-3 and 2-4.

NOTE: When changing the direction of rotation, the Prony Brake scale and pre-weight should be swapped for proper operation.

Step 9: Compare the results. Note that the load applied to the motor in both directions is opposite to the direction of rotation.

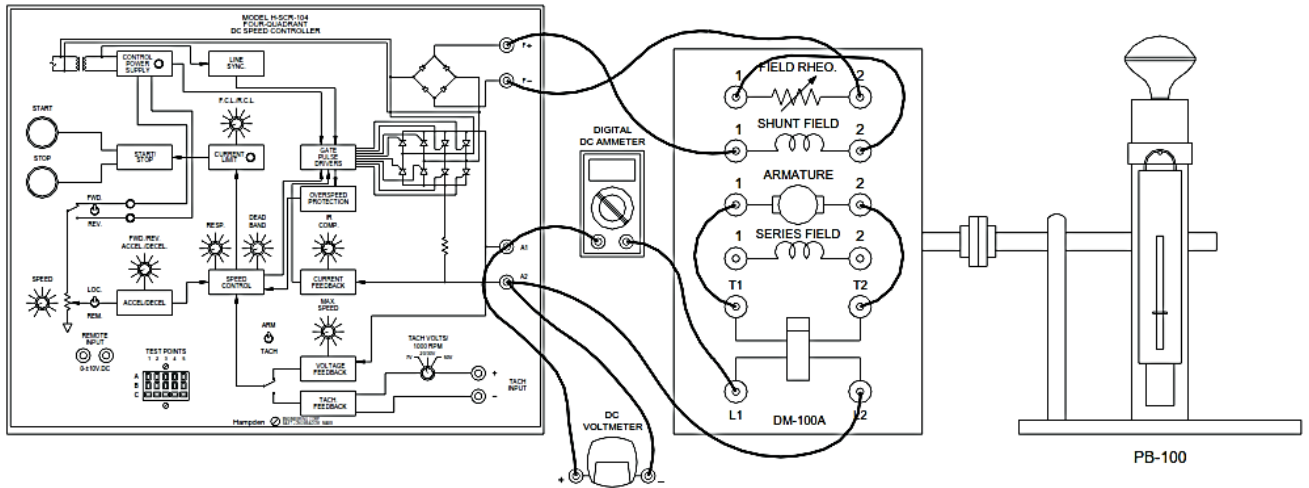


Figure 1-2

FORWARD - With Load Applied (Prony Brake Connected)			
CONTROL VOLTS	ARMATURE VOLTS	ARMATURE AMPS	MTR. SPEED (RPM)
1			
2			
3			
4			
5			
6			
7			
8			
9			
9.8			

Table 2-1

FORWARD - With Load Applied (Prony Brake Connected)			
CONTROL VOLTS	ARMATURE VOLTS	ARMATURE AMPS	MTR. SPEED (RPM)
1			
2			
3			
4			
5			
6			
7			
8			
9			
9.8			

Table 2-2

REVERSE - No Load Applied (Prony Brake Connected)			
CONTROL VOLTS	ARMATURE VOLTS	ARMATURE AMPS	MTR. SPEED (RPM)
-1			
-2			
-3			
-4			
-5			
-6			
-7			
-8			
-9			
-9.8			

Table 2-3

REVERSE - With Load Applied (Prony Brake Connected)			
CONTROL VOLTS	ARMATURE VOLTS	ARMATURE AMPS	MTR. SPEED (RPM)
-1			
-2			
-3			
-4			
-5			
-6			
-7			
-8			
-9			
-9.8			

Table 2-4