Individual Paced Instruction

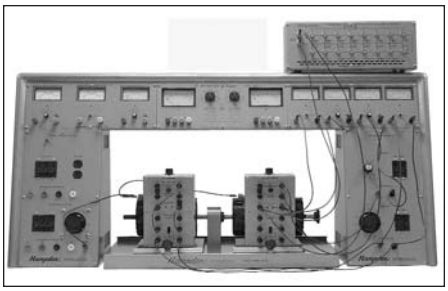
Educational Training Equipment for the 21st Century

Bulletin 259-6B

H-IPI-DCMC

Program for DC Motor Control

The Hampden Individually Paced Instruction Program for DC Motor Control, **Model H-IPI-DCMC**, proceeds through six modules. Motor theory and control theory are covered along with actual control components and systems. The **Model H-IPI-DCMC** is designed for use with Hampden Series 100 motors and controllers.



Shown is a reproduction of a typical frame from the Hampden **Model H-IPI-DCMC** program.

Requires Windows-95/98/ME/2000/XP™ with CD-ROM drive and multimedia capability.

Module A - Manual Starters

Objectives

After this unit, the student will be able to:

1. Explain the function of starting resistance.
2. Identify the main parts of a manual starter.
3. Use the correct procedure in operating a face-plate manual starter.
4. Make the correct connections from a three-point starter to a series motor.
5. Differentiate between no-voltage protection and no-load protection.
6. Start a compound motor using a three-point starter.
7. Describe the operation of a four-point starter.
8. Start a shunt motor using a four-point starter.
9. Understand the technique of reversing DC motors.
10. Make the correct connections for manually reversing the direction of a compound motor.

Module B - Automatic Systems

Objectives

After this unit, the student will be able to:

1. Identify common pilot devices.
2. Differentiate between the function of pilot devices and the function of relays.
3. Understand schematic control diagrams.
4. Describe the function of a sealing, or holding, contact.
5. Troubleshoot a control system, using a voltmeter.
6. Make the correct connections for an across-the-line starter to start a shunt motor.
7. Explain the schematic of a jogging control system.
8. Make the correct connections for a jogging control system to operate a shunt motor.
9. Describe the interlocks of a forward-reverse contactor.
10. Make the correct connections for a reversing starter control system to operate a compound motor.

Module C - Acceleration

Objectives

After this unit, the student will be able to:

1. Differentiate between CEMF acceleration, current acceleration, and definite time acceleration.
2. Identify the main parts of a CEMF acceleration starter.
3. Explain the theory of CEMF acceleration.
4. Make correct connections for a CEMF acceleration control system to operate a shunt motor.
5. Describe the operation of a current-sensitive relay.
6. Explain the theory of current acceleration.
7. Differentiate between a two-step and three-step starter.
8. Make correct connections for a current acceleration control system to operate a shunt motor.
9. Describe the operation of several types of time delay relays.
10. Make the correct connections for a definite time acceleration control system to operate a shunt motor.

Module D - Speed

Objectives

After this unit, the student will be able to:

1. Explain how motor speed is controlled by field-weakening.
2. Control the speed of a shunt motor by means of a field rheostat.
3. Explain how motor speed is controlled from armature current.
4. Control the speed of a shunt motor by means of an armature resistance controller.
5. Make the correct connections for a slow-fast speed control system to operate a shunt motor.
6. Explain how motor speed is controlled from applied voltage.
7. Identify the elements of a silicon controlled rectifier (SCR).
8. Describe the operation of a SCR.
9. List the function of an SCR speed controller and explain how each is accomplished.
10. Make the correct connections for an SCR speed controller to operate a shunt motor.

Module E - Braking

Objectives

After this unit, the student will be able to:

1. Differentiate between dynamic braking, regenerative braking, and “plugging” braking.
2. Describe the “generator action” of a motor that produces dynamic braking.
3. Explain the purpose of the dynamic braking resistor.
4. Make the correct connections for a dynamic braking system to operate a shunt motor.
5. Describe conditions under which regenerative braking can occur.
6. Define the control function known as "plugging".
7. Understand and explain the operation of a plugging control system.
8. Explain the need for the plugging resistors.
9. Describe how plugging braking is accomplished and the need for an anti-plugging relay.
10. Make the correct connections for a plugging braking system to operate a shunt motor.

Module F - Protection

Objectives

After this unit, the student will be able to:

1. Explain the purpose of protective devices.
2. Identify the parts and purpose of a thermal circuit breaker.
3. Explain the necessity for a fuse in the field circuit.
4. List the motor malfunctions that require protective devices.
5. Describe the operation of an overload relay.
6. Demonstrate how the overload relay symbol is used in a schematic diagram.
7. Connect an overload relay into a control system correctly and cause it to trip out.
8. Describe the operation and purpose of a field loss relay.
9. Connect a field loss relay into a control system correctly and cause it to trip out.
10. Describe the operation of a field accelerating relay and explain why it is needed.

All Hampden units are available for operation at any voltage or frequency

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