# Individual Paced Instruction

Educational Training Equipment for the 21st Century

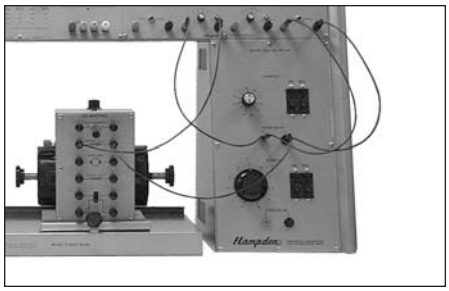
Bulletin 259-7B

# H-IPI-ACMC

## Program for AC Motor Control

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

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



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

## Module G - Single-phase Motor Control

### Objectives

After this unit, the student will be able to:

1. Describe the principle of speed control of universal motors.
2. Explain why universal motors are direct coupled to their loads.
3. Operate a universal motor and use the correct method for speed control.
4. Identify the main parts of a single phase induction motor.
5. Explain the function of the start winding.
6. Understand why induction motors operate at constant speed.
7. Identify and explain the function of a centrifugal switch.
8. Reverse the direction of a single-phase induction motor.
9. Explain the principle of DC injection braking.
10. Make the correct connections for a DC injection braking system and brake a split-phase motor.

## Module H - Three-phase Motor Control

### Objectives

After this unit, the student will be able to:

1. Explain the principle of operation of a three phase induction motor.
2. Compute the synchronous speed of the revolving field, given the frequency and number of poles.
3. Define full-voltage start.
4. Draw a schematic of an automatic control system to accomplish full-voltage start.
5. Connect a starter and successfully start a three phase induction motor.
6. Show how the direction of a three-phase induction motor may be reversed.
7. Connect a reversing starter to operate an induction motor.
8. Explain the principle of dual-speed motors.
9. Draw a schematic of a control system for a dual speed motor.
10. Connect a dual-speed motor control system to operate a motor.

## Module I - Reduced-Voltage Starting

### Objectives

After this unit, the student will be able to:

1. Differentiate between full-voltage and reduced-voltage starting of induction motors.
2. Explain the principle of autotransformer start.
3. Draw a schematic of an autotransformer start control system.
4. Connect an autotransformer start control system to operate an induction motor.
5. Explain the principle of resistor start.
6. Draw a schematic of a resistor start control system.
7. Connect a resistor start control system to operate an induction motor.
8. Explain the principle of wye-delta start.
9. Draw a schematic of a wye-delta start control system.
10. Connect a wye-delta start control system to operate an induction motor.

## Module J - Reversing And Braking

### Objectives

After this unit, the student will be able to:

1. Describe the procedure for reversing a three phase induction motor.
2. Explain the need for inserting starting resistance when reversing.
3. Explain why two steps of start resistance are often used.
4. Draw a schematic for a reduced-voltage start reversing control system.
5. Connect a reversing control system to operate a three-phase induction motor.
6. Define braking.
7. Explain the principle of dynamic braking by DC injection.
8. Connect a DC injection brake to an induction motor and successfully brake the motor.
9. Draw a schematic of a DC injection brake control system.
10. Connect a DC injection brake control system and successfully brake an induction motor.

## Module K - Wound Rotor Motor Control

### Objectives

After this unit, the student will be able to:

1. Identify the principle parts of a wound-rotor motor.
2. Describe the effect of adding resistance to the rotor circuit.
3. Draw a schematic of a wound-rotor motor starting control system.
4. Connect a wound-rotor motor starter control system to operate a motor.
5. Describe the procedure for reversing a wound-rotor motor.
6. Draw a schematic of a wound-rotor motor reversing control system.
7. Connect a wound-rotor motor reversing control system to operate a motor.
8. Explain the principle of wound-rotor motor speed control.
9. Draw a schematic of a wound-rotor motor speed control system.
10. Connect a wound-rotor motor speed control system to operate a motor.

## Module L - Synchronous Motor Control

### Objectives

After this unit, the student will be able to:

1. Identify the principle parts of a synchronous motor.
2. Describe the procedure of starting and synchronizing a synchronous motor.
3. Draw a schematic of a starting and synchronizing control system for a synchronous motor.
4. Connect a control system and successfully start and synchronize a synchronous motor.
5. Explain how synchronous motors can be made to run at a lagging, unity or leading power factor.
6. Draw a schematic of a system to vary the power factor of a synchronous motor.
7. Connect a control system and vary the power factor of a synchronous motor.
8. Explain the principle of dynamic braking of a synchronous motor.
9. Draw a schematic of a control system for dynamic braking.
10. Connect a dynamic braking system and successfully brake a synchronous motor.

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

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