

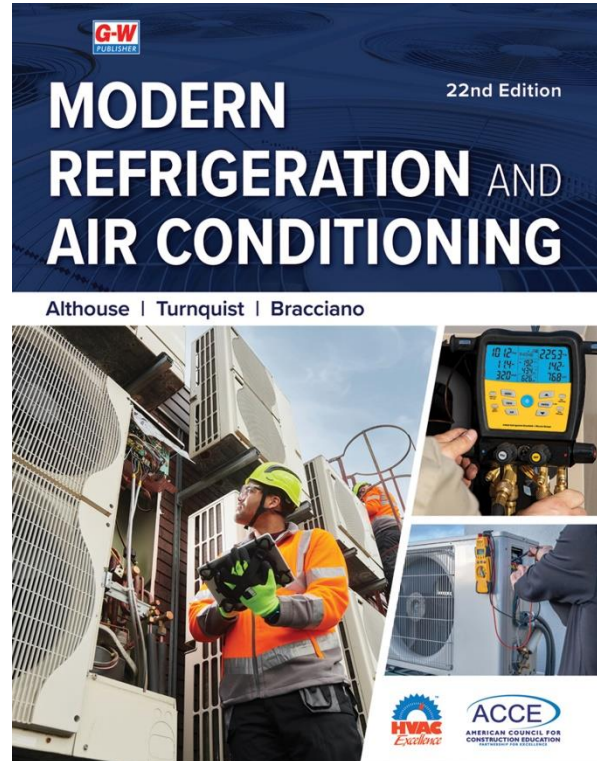


Correlation of
Modern Refrigeration and Air Conditioning, Althouse, Turnquist, Bracciano
(Goodheart-Willcox Publisher ©2025)
to
AHRI Curriculum Guide VII. Controls

Goodheart-Willcox is pleased to partner with the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) and the American Council for Construction Education (ACCE) by correlating *Modern Refrigeration and Air Conditioning* to the AHRI Curriculum Guide. The following chart correlates *Modern Refrigeration and Air Conditioning* to a section of the Curriculum Guide developed by AHRI used for ACCE (formerly PAHRA) accreditation.

The chart lists the Curriculum Guide’s knowledge and task competency objectives in the left column and the corresponding chapter numbers from *Modern Refrigeration and Air Conditioning* in the right column.

For more information on the American Council for Construction Education (ACCE) and related accreditation, please visit: www.acce-hq.org



VII.A. Gas Valves	
Knowledge	Textbook Chapter(s)
1. Identify types of gas valves:	
a. Low voltage	Chapter 33
b. Line voltage	Chapter 33
c. Redundant	Chapter 33
d. Two-stage	Chapter 33
e. Modulating	Chapter 33
2. Explain the operation of solenoid valves used to control gas flow.	Chapter 33

**Correlation of Modern Refrigeration and Air Conditioning to AHRI Curriculum Guide:
VII. Controls—page 2**

VII.A. Gas Valves (continued)	
Knowledge	Textbook Chapter(s)
3. Describe function and application of regulators.	Chapter 33
4. Describe the methods of pilot/burner ignition:	
a. Standing pilot thermocouple	Chapter 33
b. Glow coil pilot ignition	Chapter 33
c. Intermittent spark pilot ignition	Chapter 33
d. Direct spark burner ignition	Chapter 33
e. Hot surface burner ignition	Chapter 33
5. Describe methods of fan control for the three categories of gas furnaces:	
a. Low-efficiency - 60-70% efficient	Chapter 33
b. Mid-efficiency - 78-80% efficient	Chapter 33
c. High-efficiency - 90%+ efficient	Chapter 33
6. Describe the sequence of operation for 78-80% efficient gas furnaces.	Chapter 33
7. Identify the components used in all types of gas furnaces:	
a. Low-efficiency - 60-70% efficient	Chapter 33
b. Mid-efficiency - 78-80% efficient	Chapter 33
c. High-efficiency - 90%+ efficient	Chapter 33
8. Explain the operation of a redundant gas valve.	Chapter 33
Tasks	Textbook Chapter(s)
1. Check gas valve operation.	Chapter 33
2. Check flame sensing current of flame sensing device.	Chapter 33
3. Check and adjust inlet and outlet pressure of a gas valve.	Chapter 33
4. Perform conversion on gas valve from natural gas to liquefied petroleum (LP) or reverse.	Chapter 33
5. Check the operation of an induced draft blower by blocking flue outlet.	Chapter 33

**Correlation of *Modern Refrigeration and Air Conditioning* to AHRI Curriculum Guide:
VII. Controls—page 3**

VII.B. Fuel Controls	
Knowledge	Textbook Chapter(s)
1. Explain the operation of ignition and pilot proving devices.	Chapters 33, 34
2. Explain operation of an oil delay valve.	Chapter 34
Tasks	Textbook Chapter(s)
1. Test and change a thermocouple flame sensor.	Chapters 33, 34, 38
2. Test spark ignition modules.	Chapters 33, 34, 38
3. Perform safety lockout procedures for burners.	Chapters 33, 34, 38
4. Measure resistance of cad cell.	Chapter 34
VII.C. Residential Control Systems	
Knowledge	Textbook Chapter(s)
1. Identify residential heating and cooling thermostats.	Chapters 23, 26, 33, 34, 35, 36, 38
2. Identify controls for heating and cooling.	Chapters 23, 26, 33, 34, 35, 36, 38
3. Explain heat and cooling anticipators.	Chapters 23, 26, 33, 34, 35, 36, 38
Tasks	Textbook Chapter(s)
1. Install and test a fan/limit control to identify set point of control.	Chapters 14, 17, 19, 22, 23, 26, 33, 34
2. Wire a complete heating system - line and low voltage.	Chapters 14, 16, 17, 19, 23, 33, 34, 35
3. Wire a humidistat into an electrical circuit.	Chapters 14, 16, 17, 19, 23, 33, 34, 35
4. Wire an electronic air cleaner into an electrical circuit.	Chapters 14, 16, 17, 19, 23, 29, 33
5. Program a programmable thermostat for heating, cooling, and heat pump operation including set-up and set back.	Chapters 13, 14, 15, 17, 19, 23, 26, 30, 33
6. Set heat anticipator on system thermostat.	Chapters 13, 14, 15, 17, 19, 23, 26, 30, 33
7. Install residential heating and cooling thermostats.	Chapters 13, 14, 15, 17, 19, 23, 26, 30, 33
VII.D. Commercial Control Systems	
Knowledge	Textbook Chapter(s)
1. Identify types of control systems:	
a. Electromechanical	Chapters 13, 14, 15, 16, 17, 19, 21, 22, 23, 33, 34, 43, 45
b. Pneumatic	Chapter 25
c. Electronic	Chapters 13, 14, 15, 16, 17, 19, 23, 26, 33, 40

Correlation of *Modern Refrigeration and Air Conditioning* to AHRI Curriculum Guide:

VII. Controls—page 4

VII.D. Commercial Control Systems (continued)	
Knowledge	Textbook Chapter(s)
d. Programmable	Chapters 13, 14, 15, 16, 17, 19, 23, 26, 33, 40
e. Building management	Chapters 13, 14, 15, 16, 17, 19, 23, 26, 33, 39, 40
2. Identify control system components.	Chapters 13, 14, 15, 16, 17, 19, 23, 26, 33, 39, 40
3. Describe electrical/mechanical sequences of operation of control systems.	Chapters 8, 13, 14, 15, 16, 17, 19, 22, 23, 26, 30, 33, 39, 40
Tasks	Textbook Chapter(s)
1. Draw a schematic diagram using all components necessary to safely operate an air conditioner, heat pump, furnace or chiller system.	Chapters 8, 13, 14, 15, 16, 17, 18, 19, 22, 23, 26, 30, 33, 34, 35, 36, 37, 39, 40
2. Wire the control circuit of an air-conditioning heating or chiller system.	Chapters 8, 13, 14, 15, 16, 17, 19, 22, 23, 26, 30, 33, 34, 35, 36, 37, 39, 40
VII.E. Heat Pump Controls	
Knowledge	Textbook Chapter(s)
1. Explain the operation and function of a reversing valve.	Chapters 36, 37
2. Identify the main types of defrost controls.	Chapters 36, 37, 44, 45
3. Identify and explain the operation of each type of defrost control.	Chapters 36, 37, 44, 45
4. Identify and explain the operation of flow and safety control for a geothermal system.	Chapter 37
5. Describe the purpose and function of outdoor thermostats.	Chapters 36, 37
6. Describe the sequence and purpose of emergency heat controls.	Chapters 36, 37
7. Identify and explain the operation of check valves in heat pumps.	Chapters 36, 37
8. Describe the sequence between first stage and second stage heating thermostat.	Chapters 36, 37
9. Describe the auxiliary heat controls.	Chapters 36, 37
Tasks	Textbook Chapter(s)
1. Select and install appropriate system thermostat.	Chapters 33, 36, 37
2. Wire the control circuit of a heat pump system.	Chapters 13, 14, 15, 16, 17, 19, 33, 36, 37
3. Install or replace a heat sequencing relay.	Chapters 13, 14, 15, 16, 17, 19, 33, 35, 36, 37
4. Perform tests on reversing valve to determine if mechanical or electrical failure.	Chapters 13, 14, 15, 16, 17, 19, 36, 37

**Correlation of Modern Refrigeration and Air Conditioning to AHRI Curriculum Guide:
VII. Controls—page 5**

VII.F. Direct Digital Controls (DDCs)	
Knowledge	Textbook Chapter(s)
1. Explain the history of DDC systems.	Chapters 17, 26
2. Discuss the definition of DDC systems.	Chapters 17, 26
3. Explain wiring methods.	Chapters 14, 17, 18, 26
4. Explain peripheral devices.	Chapters 17, 26
5. Explain input and output.	Chapters 17, 26
6. Explain central processors.	Chapters 17, 26
7. Explain the difference between DDC and Energy Management Systems (EMS).	Chapters 17, 26
8. Discuss remote communications, monitoring, and alarming.	Chapters 17, 26
9. Describe a programmable thermostat.	Chapters 17, 23, 26
10. Describe several applications for electronic controls.	Chapters 17, 19, 23, 25, 26, 33
11. Describe why electronic controls are more applicable to some situations than are electromechanical controls.	Chapters 14, 15, 17, 19, 23, 25, 26, 33, 47, 48, 49, 50
Tasks	Textbook Chapter(s)
1. Troubleshoot a basic electronic control circuit board.	Chapters 13, 14, 15, 17, 19
2. Program different types of thermostats.	Chapters 23, 26, 33, 35, 36
VII.G. Energy Management System (EMS) (Computer Controls)	
Knowledge	Textbook Chapter(s)
1. Explain the history of DDC systems.	Chapter 26
2. Discuss the definition of DDC systems.	Chapters 17, 26
3. Explain wiring methods.	Chapters 13, 14, 17, 19, 23, 33, 40
4. Explain peripheral devices.	Chapters 17, 26
5. Explain input and output.	Chapters 17, 26
6. Explain central processors.	Chapters 17, 26
7. Explain the difference between DDC and Energy Management Systems (EMS).	Chapters 17, 26
8. Discuss remote communications, monitoring, and alarming.	Chapters 17, 26
9. Describe a programmable thermostat.	Chapters 17, 23, 26

**Correlation of *Modern Refrigeration and Air Conditioning* to AHRI Curriculum Guide:
VII. Controls—page 6**

VII.G. Energy Management System (EMS) (Computer Controls) (continued)	
10. Describe several applications for electronic controls.	Chapters 13, 17, 19, 23, 25, 26, 31, 33
11. Describe why electronic controls are more applicable to some situations than are electromechanical controls.	Chapters 13, 17, 19, 23, 25, 26, 31, 33, 47, 48, 49, 50
Tasks	Textbook Chapter(s)
1. Draw basic diagrams of how input and output modules function.	Chapters 13, 14, 15, 17, 18, 23, 26
2. Enter a program into a programmable controller.	Chapters 17, 26