Correlation of

Modern Refrigeration and Air Conditioning, **Althouse, Turnquist, Bracciano**
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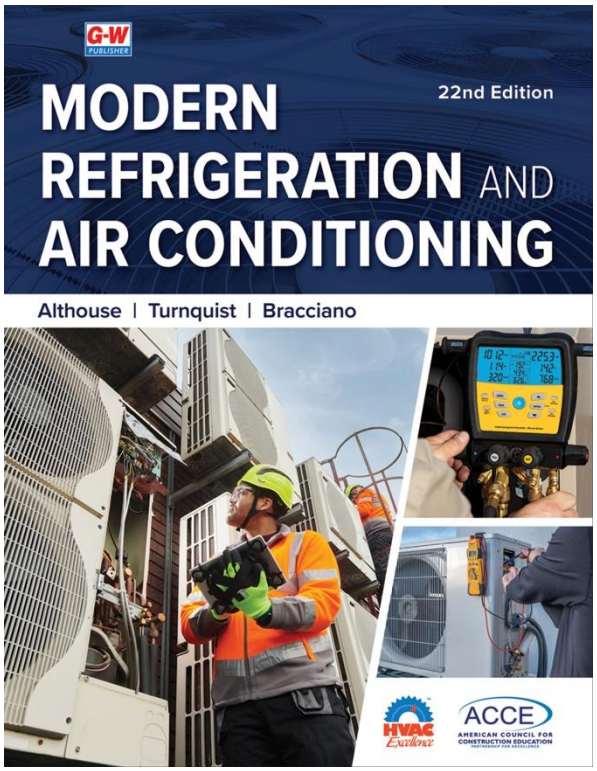
to
AHRI Curriculum Guide XVII. System Servicing and Troubleshooting

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



XVII.A. Mechanical System Problems	
Knowledge	**Textbook Chapter(s)**
1. Develop a systematic way to diagnose system problems and demonstrate method.	Chapters 3, 22, 23, 25, 28, 30, 33
2. Identify and describe possible causes of failure and how to eliminate causes.	Chapters 3, 22, 23, 25, 28, 30, 33
Tasks	**Textbook Chapter(s)**
1. Demonstrate use of tools and equipment following safety practices.	Chapters 4, 5, 11, 12, 18, 22, 23, 25, 30, 31
2. Record system data for the mechanical system operation.	Chapters 21, 22, 23, 25, 28, 48, 49

XVII.A. Mechanical System Problems (continued)	
Tasks	**Textbook Chapter(s)**
3. Verify mechanic system operation is acceptable.	Chapters 11, 12, 21, 22, 23, 25, 31, 48, 49
4. Determine cause of failure in system components.	Chapters 11, 12, 19, 21, 22, 23, 25, 31, 48, 49
5. Determine actual system airflow using the appropriate test equipment.	Chapters 4, 28, 30, 31
6. Determine system airflow requirements.	Chapters 4, 28, 30, 31
XVII.B. Electrical Troubleshooting	
Knowledge	**Textbook Chapter(s)**
1. Interpret electrical diagrams into sequence of operation.	Chapters 13, 14, 15, 16, 17, 18
2. Describe electrical mechanical sequence from electrical schematic.	Chapters 13, 14, 15, 16, 17, 18, 22, 23, 25
3. Develop a methodical routine for electrical troubleshooting.	Chapters 3, 13, 14, 15, 16, 17, 18, 22, 23, 25
Tasks	**Textbook Chapter(s)**
1. Analyze electrical performance of each component.	Chapters 13, 14, 15, 16, 17, 18, 22, 23, 25
2. Rewire an HVACR unit using an electrical diagram:	
a. air conditioner	Chapters 13, 14, 15, 16, 17, 18, 22, 23, 25
b. heat pump	Chapters 13, 14, 15, 16, 17, 18, 22, 36, 37
c. furnace	Chapters 13, 14, 15, 16, 17, 18, 33, 34, 35
3. Record electrical system data.	Chapters 13, 14, 15, 16, 17, 18, 22, 23, 25
4. Use electrical test instruments to diagnose electrical troubles and correct electrical system performance.	Chapters 16, 17, 18, 20, 22, 23, 25, 33, 34, 35, 43, 48, 49
5. Troubleshoot a faulty compressor overload protector.	Chapters 16, 17, 18, 20, 22, 23, 25, 36, 37, 43
6. Change a schematic diagram to a “ladder” diagram in a drawing.	Chapters 13, 14, 16, 17, 18, 20, 22, 23, 25, 33, 36, 37, 43, 45
XVII.C. Heating: Service and Problem Analysis	
Knowledge	**Textbook Chapter(s)**
1. Explain combustion theory for gas combustion and oil combustion.	Chapters 24, 33
2. Identify and describe possible causes of failure and how to correct problems.	Chapters 24, 33

XVII.C. Heating: Service and Problem Analysis (continued)	
Tasks	**Textbook Chapter(s)**
1. Determine and measure combustion air, ventilation air, and unit/system air requirements.	Chapters 24, 33, 34
2. Develop systematic method(s) to diagnose system problems and demonstrate method.	Chapters 3, 24, 33, 34
3. Determine the cause of failure in a heating system.	Chapters 33, 34, 35, 36, 37, 38
4. Record data and verify system operation.	Chapters 33, 34, 35, 36, 37
XVII.D. Heat Pump: Service and Problem Analysis	
Tasks	**Textbook Chapter(s)**
1. Test and evaluate the operation of the refrigeration cycle in cooling and heating modes.	Chapters 7, 11, 12, 30, 31, 33, 36, 37
2. Test the operation of the supplementary heat component(s).	Chapters 11, 12, 19, 35, 36, 37
3. Test the operation of the emergency heat status for the heat pump system.	Chapters 7, 11, 12, 19, 35, 36, 37
4. Record appropriate data to evaluate complete system operation.	Chapters 7, 11, 12, 19, 35, 36, 37
5. Test proper operation of reversing valve.	Chapters 7, 11, 12, 19, 36, 37, 45
6. Check operation of defrost controls.	Chapters 7, 11, 12, 19, 21, 36, 37, 44, 45
7. Inspect wiring and tighten connections.	Chapters 7, 13, 14, 16, 17, 19, 33, 36, 37
XVII.E. Air-Conditioning: Service and Problem Analysis	
Knowledge	**Textbook Chapter(s)**
1. Explain proper temperatures and pressures at various system locations.	Chapters 8, 10, 22, 23
2. Explain proper fan/blower operation.	Chapters 28, 30, 33
3. Explain heat exchanger inspection.	Chapters 23, 25
4. Explain thermostat setting and operation.	Chapters 17, 23
5. Explain sounds that could indicate a problem.	Chapters 7, 18, 23, 25, 33
6. Explain how electrical measurements could indicate a problem.	Chapters 18, 23, 25, 33
7. Explain value of nameplate data and service records.	Chapters 16, 18, 43
8. Discuss the required performance checks.	Chapters 11, 12, 18, 23, 25
9. Discuss the method of measuring superheat, subcooling, evaporator, and condenser splits.	Chapters 4, 8, 11, 12, 23, 25

XVII.E. Air-Conditioning: Service and Problem Analysis (continued)	
Knowledge	**Textbook Chapter(s)**
10. Discuss the proper procedures for using a voltmeter and an ammeter.	Chapter 18
11. Explain normal operation of air-conditioning systems.	Chapters 8, 22, 23
12. Explain the effects of overcharge and undercharge of refrigerant.	Chapter 12
13. Explain the effects of improper airflow.	Chapters 28, 29, 30, 31
14. Develop a systematic approach to diagnose mechanical or electrical problems.	Chapters 3, 18, 31
Tasks	**Textbook Chapter(s)**
1. Check system for system leaks.	Chapters 11, 12
2. Check and clean heat exchangers.	Chapters 33, 44
3. Check for proper refrigerant charge.	Chapters 11, 12
4. Check for proper thermostat and electrical controls.	Chapters 13, 14, 17, 18, 19, 22, 23, 25, 33
5. Check oil sample for acidity.	Chapters 10, 21
6. Check and replace filter/driers.	Chapters 21, 22, 23, 25, 45
7. Check available voltage and install high and low side manifold gauges.	Chapters 11, 18, 19
8. Compare static pressure on a P/T chart to determine unit refrigerant.	Chapters 7, 10, 11, 12, 22, 23, 25
9. Start unit and allow to stabilize.	Chapters 4, 11, 12, 22, 23, 25
10. Measure superheat and subcooling.	Chapters 4, 12
11. Check evaporator and condenser splits.	Chapters 4, 11, 12, 18, 19, 22, 23, 25
12. Check amperage of each motor.	Chapters 16, 18, 19
13. Analyze performance using manufacturers' specifications.	Chapters 4, 11, 12, 18, 22, 23, 25
14. Check electrical component operation.	Chapters 14, 16, 17, 18, 22, 23, 25
15. Check airflow from furnace of air handler.	Chapters 22, 23, 25, 28, 30, 33
16. Inspect electrical connections.	Chapters 14, 18
17. Troubleshoot A/C systems from electrical schematics.	Chapters 13, 14, 15, 16, 17, 18, 22, 23, 25