



Correlation of
Modern Refrigeration and Air Conditioning, by Althouse, Turnquist, Bracciano
(Goodheart-Willcox Publisher ©2021)
to
AHRI Curriculum Guide: XVII. System Servicing and Troubleshooting

The following chart correlates the *Modern Refrigeration and Air Conditioning* textbook (©2021) to a section of the Curriculum Guide developed by Air-Conditioning, Heating, and Refrigeration Institute (AHRI) and used for PAHRA accreditation.

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

For more information on the Partnership for Air-Conditioning, Heating, Refrigeration Accreditation (PAHRA) and related accreditation, please visit: www.pahrahvacr.org



XVII.A. Mechanical System Problems	
Knowledge	Textbook Chapter(s)
1. Develop a systematic way to diagnose system problems and demonstrate method.	Chapters 3, 27, 29, 31, 32, 33, 38
2. Identify and describe possible causes of failure and how to eliminate causes.	Chapters 3, 27, 29, 31, 32, 33, 38
Tasks	Textbook Chapter(s)
1. Demonstrate use of tools and equipment following safety practices.	Chapters 7, 8, 10, 11, 17, 29, 30, 31, 32, 33
2. Record system data for the mechanical system operation.	Chapters 25, 26, 27, 31, 32, 33, 53, 54
3. Verify mechanic system operation is acceptable.	Chapters 10, 11, 25, 26, 30, 31, 32, 33, 53, 54
4. Determine cause of failure in system components.	Chapters 10, 11, 18, 25, 26, 30, 31, 32, 33, 53, 54

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XVII.A. Mechanical System Problems (continued)	
Tasks	Textbook Chapter(s)
5. Determine actual system airflow using the appropriate test equipment.	Chapters 7, 27, 29, 30
6. Determine system airflow requirements.	Chapters 7, 27, 29, 30
XVII.B. Electrical Troubleshooting	
Knowledge	Textbook Chapter(s)
1. Interpret electrical diagrams into sequence of operation.	Chapters 12, 13, 14, 15, 16, 17
2. Describe electrical mechanical sequence from electrical schematic.	Chapters 12, 13, 14, 15, 16, 17, 31, 32, 33
3. Develop a methodical routine for electrical troubleshooting.	Chapters 3, 12, 13, 14, 15, 16, 17, 31, 32, 33
Tasks	Textbook Chapter(s)
1. Analyze electrical performance of each component.	Chapters 12, 13, 14, 15, 16, 17, 31, 32, 33
2. Rewire an HVACR unit using an electrical diagram:	
a. air conditioner	Chapters 12, 13, 14, 15, 16, 17, 31, 32, 33
b. heat pump	Chapters 12, 13, 14, 15, 16, 17, 31, 40
c. furnace	Chapters 12, 13, 14, 15, 16, 17, 38, 41, 42, 43
3. Record electrical system data.	Chapters 12, 13, 14, 15, 16, 17, 31, 32, 33
4. Use electrical test instruments to diagnose electrical troubles and correct electrical system performance.	Chapters 15, 16, 17, 19, 20, 23, 24, 31, 32, 33, 38, 41, 42, 43, 53, 54
5. Troubleshoot a faulty compressor overload protector.	Chapters 15, 16, 17, 19, 20, 24, 31, 32, 33, 40
6. Change a schematic diagram to a “ladder” diagram in a drawing.	Chapters 12, 13, 15, 16, 17, 19, 23, 24, 31, 32, 33, 38, 40
XVII.C. Heating: Service and Problem Analysis	
Knowledge	Textbook Chapter(s)
1. Explain combustion theory for gas combustion and oil combustion.	Chapters 35, 36
2. Identify and describe possible causes of failure and how to correct problems.	Chapters 35, 36, 38

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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 38, 41, 42
2. Develop systematic method(s) to diagnose system problems and demonstrate method.	Chapters 3, 38, 41, 42
3. Determine the cause of failure in a heating system.	Chapters 38, 39, 40, 41, 42, 43
4. Record data and verify system operation.	Chapters 38, 40, 41, 42, 43
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 5, 10, 11, 29, 30, 38, 40
2. Test the operation of the supplementary heat component(s).	Chapters 10, 11, 18, 40, 43
3. Test the operation of the emergency heat status for the heat pump system.	Chapters 5, 10, 11, 18, 40, 43
4. Record appropriate data to evaluate complete system operation.	Chapters 5, 10, 11, 18, 40, 43
5. Test proper operation of reversing valve.	Chapters 5, 10, 11, 18, 23, 40
6. Check operation of defrost controls.	Chapters 5, 10, 11, 18, 22, 23, 25, 40
7. Inspect wiring and tighten connections.	Chapters 5, 12, 13, 15, 16, 18, 38, 40
XVII.E. Air-Conditioning: Service and Problem Analysis	
Knowledge	Textbook Chapter(s)
1. Explain proper temperatures and pressures at various system locations.	Chapters 6, 9, 31, 32
2. Explain proper fan/blower operation.	Chapters 27, 29, 38
3. Explain heat exchanger inspection.	Chapters 32, 33
4. Explain thermostat setting and operation.	Chapter 36
5. Explain sounds that could indicate a problem.	Chapters 5, 17, 32, 33, 36, 38
6. Explain how electrical measurements could indicate a problem.	Chapters 17, 32, 33, 36, 38
7. Explain value of nameplate data and service records.	Chapters 15, 17, 19
8. Discuss the required performance checks.	Chapters 10, 11, 17, 32, 33
9. Discuss the method of measuring superheat, subcooling, evaporator, and condenser splits.	Chapters 6, 7, 10, 11, 32, 33
10. Discuss the proper procedures for using a voltmeter and an ammeter.	Chapter 17

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XVII.E. Air-Conditioning: Service and Problem Analysis (continued)	
Knowledge	Textbook Chapter(s)
11. Explain normal operation of air-conditioning systems.	Chapters 6, 31, 32
12. Explain the effects of overcharge and undercharge of refrigerant.	Chapter 11
13. Explain the effects of improper airflow.	Chapters 27, 28, 29, 30
14. Develop a systematic approach to diagnose mechanical or electrical problems.	Chapters 3, 17, 30
Tasks	Textbook Chapter(s)
1. Check system for system leaks.	Chapters 10, 11
2. Check and clean heat exchangers.	Chapters 22, 41
3. Check for proper refrigerant charge.	Chapters 10, 11
4. Check for proper thermostat and electrical controls.	Chapters 12, 13, 16, 17, 18, 31, 32, 33, 36
5. Check oil sample for acidity.	Chapters 9, 26
6. Check and replace filter/driers.	Chapters 23, 25, 31, 32, 33
7. Check available voltage and install high and low side manifold gauges.	Chapters 10, 17, 18
8. Compare static pressure on a P/T chart to determine unit refrigerant.	Chapters 5, 9, 10, 11, 31, 32, 33
9. Start unit and allow to stabilize.	Chapters 7, 10, 11, 31, 32, 33
10. Measure superheat and subcooling.	Chapters 7, 11
11. Check evaporator and condenser splits.	Chapters 7, 10, 11, 17, 18, 31, 32, 33
12. Check amperage of each motor.	Chapters 15, 17, 18
13. Analyze performance using manufacturers' specifications.	Chapters 7, 10, 11, 17, 31, 32, 33
14. Check electrical component operation.	Chapters 13, 15, 16, 17, 31, 32, 33
15. Check airflow from furnace of air handler.	Chapters 27, 29, 31, 32, 33, 38
16. Inspect electrical connections.	Chapters 13, 17
17. Troubleshoot A/C systems from electrical schematics.	Chapters 12, 13, 14, 15, 16, 17, 31, 32, 33