PRACTICE EXAM 10: ASE A7 SIMULATION (50 QUESTIONS)

1. A vehicle's A/C system has the following gauge readings at 92°F ambient: low side 48 psi, high side 310 psi. The vent temperature is 56°F. The condenser fan is operating at high speed and the condenser face is clean. The system was charged to specification by weight two weeks ago. What is the MOST likely cause of these both-sides-high readings?

A. A restricted orifice tube that is creating excessive back-pressure on the high side of the system

B. A failing compressor with worn reed valves that is allowing internal refrigerant bypass between sides

C. Non-condensable gases (air) in the system introduced during the recent charging procedure

D. A stuck-closed TXV that is preventing refrigerant from flowing into the evaporator and backing up pressure

2. Technician A says that when a compressor is replaced, the total system oil charge must be recalculated to account for oil distributed throughout all system components. Technician B says that a new compressor should be installed with its full factory oil charge without any adjustment. Who is correct?

A. Technician A only, because the factory charge must be reduced to account for oil already in other components

B. Both Technician A and Technician B, because the factory charge is pre-adjusted for a typical installation

C. Technician B only, because manufacturers calibrate the oil charge specifically for drop-in replacement

D. Neither Technician A nor Technician B, because all oil should be added through the service port only

3. A vehicle's electronic blower motor controller has failed with the power transistor shorted. The blower runs at maximum speed continuously. Before installing a replacement controller, what additional test should the technician perform?

A. Test the HVAC control module output for correct PWM signal frequency to prevent repeat controller failure

B. Measure the blower motor current draw to determine if excessive amperage caused the controller to fail

C. Check the blower motor relay contacts for welding that would bypass the controller and send full voltage

D. Verify the cabin air filter is clean since restricted airflow causes the controller to increase output voltage

4. A vehicle's A/C system was recently serviced. The customer returns reporting that the system cools well initially but produces a chemical or solvent smell from the vents for the first few minutes of operation. What is the MOST likely cause?

A. An incorrect refrigerant type was used that has a detectably different odor than the specified refrigerant

B. The new compressor oil is outgassing volatile compounds that will diminish after a few operating cycles

C. A refrigerant leak at the evaporator is releasing vapor into the cabin airstream through the vent ductwork

D. Residual flushing solvent in the system that was not fully purged with nitrogen before reassembly and charging

5. On a vehicle with electronic HVAC controls, the scan tool shows DTC B0263 — Mode Door Actuator Circuit Open. The mode doors are stuck in the defrost position. The technician checks the actuator connector and finds it firmly seated. What should the technician test next?

A. The mode door actuator motor by applying direct battery voltage to the motor terminals at the connector

B. The HVAC control module output by measuring the voltage at the module's mode door output terminal

C. The CAN bus communication between the HVAC module and the body control module for data integrity

D. The wiring between the HVAC module and the actuator connector for continuity and resistance values

6. A vehicle's engine temperature gauge reads normal at 200°F. Both heater hoses at the firewall are hot. The blend door moves to full hot position when commanded. The blower operates at all speeds. The cabin air filter is new. Yet the maximum floor vent temperature is only 108°F. Technician A says the heater core has internal restriction. Technician B says the heater core may have an air pocket trapped inside. Who is correct?

A. Technician A only, because an air pocket would cause the return hose to be cold rather than hot

B. Technician B only, because both hoses being hot eliminates the possibility of any flow restriction

C. Neither Technician A nor Technician B, because 108°F is within normal range for a floor vent reading

D. Both could be correct — a partial restriction reduces flow while an air pocket reduces effective heat transfer area

7. A technician removes a TXV from a vehicle and inspects the sensing bulb. The bulb is clamped to the suction line at the evaporator outlet, but the insulation wrap has completely fallen off. How would the missing insulation affect TXV operation?

A. The bulb reads a temperature influenced by surrounding air rather than just the suction line, causing erratic valve control

B. The missing insulation has no effect because the bulb only senses the metal temperature of the suction line

C. The valve remains permanently in the fully open position because the uninsulated bulb reads warmer than actual

D. The valve remains permanently in the fully closed position because the uninsulated bulb reads cooler than actual

8. A vehicle's A/C system has been operating with a slow leak for nine months. The customer finally brings the vehicle in when cooling stops. The technician recovers zero refrigerant. After leak repair, the technician evacuates to 490 microns and charges the system. The A/C cools but the compressor produces a noticeable grinding noise that was not present before. What has MOST likely occurred?

A. The new refrigerant charge is slightly different from the original specification and is creating cavitation

B. The leak repair introduced metallic debris into the system that is now circulating through the compressor

C. The compressor sustained internal bearing and surface damage from months of operation with depleted oil

D. The vacuum pump pulled debris from the leak site into the compressor during the evacuation process

9. A technician is testing the A/C compressor clutch relay. With the relay installed and the A/C requested, the technician measures 12.3V at relay terminal 30 (battery feed) and 0.8V at relay terminal 87 (output to clutch circuit). The clutch does not engage. What does the 0.8V reading at terminal 87 indicate?

A. The relay contacts are functioning normally and the fault is downstream in the pressure switch or clutch coil

B. The relay contacts are not fully closing, creating excessive resistance that drops most of the voltage internally

C. The HVAC module is intentionally limiting voltage to the clutch as part of a soft-start engagement strategy

D. The measurement is normal because the relay always drops approximately 12V across its internal contacts

10. On a vehicle with automatic temperature control, the driver sets the temperature to 72°F. The system initially cools the cabin efficiently from 95°F. As the cabin approaches 72°F, the ATC module begins adjusting the blend door from full cold toward a warmer position while reducing blower speed. What control principle does this behavior demonstrate?

A. Closed-loop proportional control, where the module adjusts output proportionally to the error between set and actual temperature

B. Open-loop control, where the module follows a pre-programmed time sequence regardless of cabin temperature

C. Binary on/off control, where the module cycles between full cooling and full heating to maintain temperature

D. Feedforward control, where the module anticipates temperature changes before they are detected by sensors

11. A vehicle's A/C performance degrades significantly whenever the vehicle is driven through a car wash. Cooling returns to normal after approximately 20 minutes of highway driving following the car wash. What is the MOST likely cause?

A. Water from the car wash is temporarily insulating the condenser surface and reducing its heat rejection ability

B. Water spray enters the engine compartment and wets the serpentine belt, causing it to slip on the compressor pulley

C. The high-pressure water jets displace refrigerant inside the condenser tubes creating temporary flow disruption

D. Moisture enters the A/C system through the service port caps during the wash and causes temporary freeze-up

12. A vehicle has a TXV system with a receiver-drier. The technician replaces the condenser after a front-end collision. Which additional component MUST be replaced as part of this repair?

A. The compressor, because impact forces from the collision may have damaged the internal reed valve assembly

B. The evaporator, because collision forces can transmit vibration through the refrigerant lines and crack tubes

C. The TXV, because the new condenser may have different flow characteristics requiring a recalibrated valve

D. The receiver-drier, because the system will be opened to atmosphere during the condenser replacement

13. A vehicle's engine runs at 195°F operating temperature. The customer lives in northern Minnesota where winter temperatures regularly reach −20°F. The customer wants to install a 210°F thermostat to increase heater output. What should the technician advise?

A. A higher-rated thermostat may improve heater output but could cause engine overheating in warm weather and trigger DTCs

B. A 210°F thermostat will dramatically improve heater output with no negative consequences under any conditions

C. The thermostat rating has no effect on heater output because the blend door is the sole temperature controller

D. A 210°F thermostat is unsafe because it will cause the engine to overheat immediately regardless of conditions

14. A technician is diagnosing a vehicle where all HVAC actuators (blend door, mode door, air inlet door) respond correctly to scan tool bidirectional commands. However, none of them respond to the dashboard control panel buttons. The blower motor also does not respond to the fan speed buttons. What is the MOST likely cause?

A. Multiple simultaneous actuator failures that affect all doors and the blower motor at the same time

B. A failed HVAC control module that can execute scan tool commands but has lost its control panel input processing

C. A faulty HVAC control panel that is not transmitting any input signals to the HVAC module

D. A CAN bus communication failure between the control panel and the HVAC module preventing all commands

15. A vehicle's A/C compressor is a clutchless variable displacement design. The customer reports no cooling. The scan tool shows the displacement control solenoid is being commanded to 100% (maximum displacement) but the A/C pressure sensor readings show no pressure differential between the high and low sides. What is the MOST likely cause?

A. A failed displacement control valve that is stuck at minimum displacement regardless of the electrical command

B. A failed displacement control valve that is stuck at minimum displacement, ignoring the module's maximum command

C. The compressor drive belt has broken and the compressor shaft is not turning despite the electrical command

D. The A/C pressure sensor has failed and is sending identical readings for both sides when pressures are actually normal

16. A vehicle has an A/C system where the technician measures the following temperatures with an infrared thermometer: compressor discharge line 185°F, condenser inlet 183°F, condenser outlet 102°F, liquid line at the TXV inlet 100°F, evaporator outlet suction line 45°F. The ambient temperature is 88°F. What can the technician determine from these temperature readings?

A. All temperature readings are consistent with a normally operating A/C system under the stated conditions

B. The condenser outlet temperature of 102°F is too high, indicating the condenser is not fully condensing the refrigerant

C. The evaporator outlet temperature of 45°F is too warm, indicating the TXV is restricting refrigerant flow

D. The discharge line temperature of 185°F is dangerously high and indicates compressor overheating from oil starvation

17. Technician A says that an orifice tube system uses an accumulator to prevent liquid refrigerant from reaching the compressor. Technician B says that a TXV system uses a receiver-drier to store liquid refrigerant and ensure a steady supply of liquid reaches the expansion valve. Who is correct?

A. Technician A only, because TXV systems do not use any storage or separation component in the circuit

B. Technician B only, because orifice tube systems rely entirely on the TXV to prevent liquid slugging

C. Both Technician A and Technician B are correct about the function of each component in its respective system

D. Neither Technician A nor Technician B, because both system types use identical storage and separation methods

18. A vehicle's heater produces adequate heat at all engine speeds. However, the customer notices a gurgling or sloshing sound from behind the dashboard when accelerating from a stop. Engine temperature is stable and coolant level is correct. What is the MOST likely cause?

A. The heater core has developed an internal restriction that creates turbulence when flow rate increases

B. The water pump is cavitating during acceleration, creating air bubbles that travel to the heater core

C. A small air pocket trapped in the heater core produces audible gurgling when coolant flow changes with RPM

D. The evaporator condensation drain is partially blocked and standing water sloshes during acceleration

19. A vehicle's scan tool shows the A/C pressure sensor reading 45 psi with the engine off at 80°F ambient. The technician connects a manifold gauge to the same port and reads 92 psi. The P-T chart for R-134a shows approximately 92 psi at 80°F. Which component is MOST likely faulty?

A. The manifold gauge set, which may be reading high due to a stuck check valve in the service hose fitting

B. Both readings could be correct if the vehicle uses R-1234yf, which has a different P-T curve than R-134a

C. The electronic A/C pressure sensor, which is sending an inaccurate low reading to the HVAC control module

D. The Schrader valve core in the service port, which is partially blocking the manifold gauge's pressure access

20. On a vehicle with electronic HVAC controls, the technician retrieves DTC B0117 — In-Car Temperature Sensor Performance. No other DTCs are stored. The scan tool shows the in-car sensor reading 72°F and the ambient sensor reading 72°F. The technician's thermometer reads 72°F at the sensor location. What might cause a performance code with accurate current readings?

A. The sensor is reading correctly now but has a history of intermittent readings that triggered the code previously

B. The ambient and in-car sensors reading the same temperature is impossible and the module flags this as an error

C. The sensor's response time is too slow — it reads correctly at steady-state but cannot track rapid changes

D. The module detected that the sensor reading did not change as expected during a previous heating or cooling cycle

21. A customer complains that their vehicle's A/C produces a strong mildew odor that is worst when switching from recirculation to fresh air mode. The system cools normally. The cabin air filter was replaced recently. What is the MOST likely cause and recommended treatment?

A. Microbial growth on the evaporator surface that is disturbed when fresh air changes the airflow pattern across the core

B. Mold growth inside the fresh air intake ductwork that is introduced into the cabin when the recirculation door opens

C. A decaying organic material trapped in the cabin air filter housing that releases odor when airflow direction changes

D. Coolant seeping from the heater core that produces a musty smell when mixed with the humidity in fresh outside air

22. A vehicle's A/C compressor has been running with a significantly low charge for an extended period. The technician recovers the remaining refrigerant and the oil appears clear but measures only 2 ounces — the total system specification is 7 ounces. What has MOST likely happened to the missing oil?

A. The oil has chemically decomposed from overheating during operation with the low charge and reduced circulation

B. Oil was lost through the same leak that depleted the refrigerant charge, since oil circulates with refrigerant

C. The oil has been lost through the same refrigerant leak, as compressor oil travels with escaping refrigerant vapor

D. The accumulator or receiver-drier has absorbed all the excess oil into its desiccant material during normal operation

23. A vehicle's A/C manifold gauges show the following during operation at 85°F ambient: low side 4 psi (nearly in vacuum), high side 135 psi. The suction line at the evaporator outlet feels warm. The liquid line upstream of the metering device feels warm. The liquid line immediately downstream of the metering device feels extremely cold with frost forming. What does this pattern indicate?

A. A severely undercharged system with almost no refrigerant remaining in the circuit to sustain operation

B. A compressor with failed internal valves allowing high-side refrigerant to bypass back to the low side

C. An overcharged system where excess liquid refrigerant is flooding beyond the evaporator into the suction line

D. A severe restriction at or near the metering device that is creating an extreme pressure drop at that location

24. A technician is diagnosing a blower motor that works on speeds 1, 2, and 3 but not on speed 4 (HIGH). On this vehicle, the high-speed circuit bypasses the resistor block and uses a dedicated high-speed relay. What should the technician check FIRST?

A. The blower motor resistor block for an open circuit in the high-speed bypass wire routed through the block

B. The high-speed relay and its control circuit, including the relay fuse, coil voltage, and contact output

C. The blower motor for an internal winding fault that prevents operation only at the highest current draw level

D. The HVAC control module for a software fault that fails to send the high-speed command to the relay

25. A vehicle with ATC has the following scan tool data: set temperature 72°F, in-car sensor 72°F, ambient sensor 30°F, engine coolant temperature 205°F, blend door commanded 72%, blend door actual 72%. The heater output from the floor vents is adequate. The customer complains that the windshield fogs intermittently. What should the technician check?

A. The heater core for a slow leak that is releasing moisture-laden coolant vapor into the defrost airstream

B. The engine thermostat for erratic operation that intermittently drops coolant temperature below 195°F

C. The condenser fan for continuous operation that might be overcooling the engine in cold ambient conditions

D. Whether the A/C compressor is engaging when the defroster is selected to dehumidify the air before it hits the glass

26. A technician measures subcooling of 22°F at the condenser outlet on a system that was recently charged to specification by weight. Gauge pressures are within normal range and the vent temperature is 42°F at 82°F ambient. Is this subcooling value a concern?

A. The 22°F subcooling is at the upper end of normal but within acceptable range, and the system is performing well

B. The 22°F subcooling confirms an overcharge because any value above 20°F indicates excess refrigerant

C. The subcooling cannot be evaluated without simultaneously measuring superheat at the evaporator outlet

D. The 22°F subcooling indicates the condenser is oversized for the application and should be replaced

27. Technician A says that the high-pressure relief valve on an A/C system vents refrigerant if system pressure reaches approximately 500–550 psi. Technician B says that if the relief valve has vented, the system should be recharged immediately without further investigation. Who is correct?

A. Technician A only, because relief valve activation is normal and requires only a simple recharge afterward

B. Both Technician A and Technician B, because the relief valve is designed to vent periodically during operation

C. Technician A only, because relief valve activation indicates a severe underlying problem that must be diagnosed first

D. Neither Technician A nor Technician B, because modern A/C systems no longer include high-pressure relief valves

28. A vehicle is brought in for an A/C performance complaint. The technician connects manifold gauges and finds both-sides-low pressures: low side 10 psi, high side 95 psi at 84°F ambient. The vent temperature is 60°F. The technician adds refrigerant and the pressures normalize. The vent temperature drops to 42°F. One month later, the customer returns with the same complaint. What did the technician fail to do during the first visit?

A. Find and repair the leak before recharging — the refrigerant escaped again through the same unrepaired leak

B. Replace the accumulator or receiver-drier, which was saturated and caused the system to lose charge rapidly

C. Flush the system, which would have removed contamination that is degrading the refrigerant chemically

D. Replace the compressor, because the low pressures on the first visit indicated internal compressor failure

29. On a vehicle with vacuum-operated HVAC controls, the technician replaces the vacuum check valve between the intake manifold and the vacuum reservoir. After the repair, the mode doors function correctly during all driving conditions. However, the technician notices that the engine idle speed is now 200 RPM higher than specification. What is the MOST likely cause?

A. The new check valve has a slightly larger internal diameter that allows excess vacuum to reach the HVAC system

B. The technician created a small vacuum leak at one of the check valve hose connections during installation

C. The new check valve is oriented backward, blocking vacuum flow and causing the engine to compensate

D. The replacement check valve has a higher cracking pressure that restricts vacuum flow to the HVAC system

30. A vehicle's scan tool shows the ambient temperature sensor reading 145°F. The vehicle has been sitting in the sun on a 95°F day with the engine off for two hours. The actual air temperature measured near the sensor behind the bumper is 98°F. What is the MOST likely explanation?

A. The sensor is heat-soaked from solar radiation on the bumper and road surface, reading higher than actual air temperature

B. The sensor element has failed and is producing a fixed high reading regardless of the actual temperature

C. The scan tool is adding a software correction factor to the raw sensor reading to compensate for engine heat

D. The sensor wiring has developed high resistance that is artificially elevating the voltage signal to the module

31. A vehicle's A/C system produces intermittent cooling — works for 15 minutes, stops cooling for 5 minutes, then resumes. The compressor runs continuously without cycling. During the non-cooling periods, the vent temperature rises from 42°F to 65°F. Gauge pressures during the non-cooling period show the low side dropping to 5 psi while the high side rises to 350 psi. What is the MOST likely cause?

A. An intermittent electrical fault in the clutch circuit causing the compressor to disengage for 5-minute periods

B. A variable displacement compressor that cycles between maximum and minimum displacement automatically

C. A failing condenser fan that overheats and shuts down periodically before restarting after cooling down

D. An intermittent restriction at the metering device, likely from moisture freezing and thawing at the orifice tube

32. A technician is testing a blower motor ground circuit. With the blower running on HIGH, the voltage drop from the motor ground terminal to the battery negative terminal reads 1.5V. What should the technician conclude?

A. The ground circuit is within specification since automotive motor circuits allow up to 2.0V of ground voltage drop

B. The ground circuit has excessive resistance that must be repaired to restore full motor voltage and performance

C. The reading indicates a normal ground circuit for a high-current motor drawing maximum amperage at full speed

D. The motor has an internal ground path fault that is creating the elevated voltage drop reading at the connector

33. A vehicle has a dual-zone ATC system. The driver side maintains 70°F correctly. The passenger side displays 70°F on the control panel but the actual cabin temperature on the passenger side measures 77°F. The scan tool shows the passenger blend door commanded at 25% and actual at 25%. No DTCs are stored. What is the MOST likely cause?

A. A faulty driver-side in-car sensor that is reading too cold and causing the driver-side zone to overcool

B. An HVAC module calibration error that commands an incorrect blend door position for the passenger zone

C. A passenger-side in-car temperature sensor reading colder than actual, causing the module to command less cooling

D. The evaporator is cooling unevenly, producing colder air on the driver side and warmer air on the passenger side

34. Technician A says that when evacuating an A/C system, opening both the high-side and low-side manifold valves allows the vacuum pump to pull through both sides simultaneously, reducing evacuation time. Technician B says that the micron gauge should be connected at the vehicle's service port, not at the vacuum pump, for the most accurate reading. Who is correct?

A. Both Technician A and Technician B are correct about proper evacuation technique and gauge placement

B. Technician A only, because the micron gauge location does not significantly affect the accuracy of the reading

C. Technician B only, because evacuating through both sides simultaneously can damage the metering device

D. Neither Technician A nor Technician B, because evacuation should only be done through the low-side port

35. A vehicle with electronic HVAC controls has the A/C compressor engaging when the defrost mode is selected but NOT engaging when the A/C button is pressed in panel mode. The scan tool shows the A/C button state as "OFF" even when the technician physically presses it. What does this confirm?

A. The A/C button or its signal circuit has failed — the module never receives the A/C request when the button is pressed

B. The HVAC module is ignoring the A/C button input due to a stored DTC that prevents normal A/C engagement

C. The A/C compressor clutch coil has intermittent resistance that only allows engagement at defrost-level current

D. The high-pressure cutout is tripping in panel mode but not in defrost because defrost uses a different threshold

36. A vehicle's cooling system pressure cap is rated at 16 psi. The technician pressure tests the cap and it releases at 11 psi. The customer complains of occasional overheating in heavy traffic with the A/C running. What is the connection between the failed cap and the overheating complaint?

A. A weak cap lowers the coolant's effective boiling point, reducing the cooling system's heat rejection capacity under load

B. A weak cap increases the coolant flow rate, which paradoxically reduces heat transfer efficiency at the radiator

C. A weak cap allows coolant vapor to enter the heater core, reducing the heater's ability to supplement cooling

D. A weak cap causes the water pump to cavitate at high RPM, reducing coolant circulation under heavy load

37. A vehicle's A/C system has been properly charged and all gauge readings are within normal range. The vent temperature reaches 40°F. However, the customer reports that the air does not feel as cold as their spouse's vehicle, which has the same make and model. The technician tests the spouse's vehicle and measures a vent temperature of 41°F. What should the technician explain?

A. One vehicle's evaporator may be slightly more efficient than the other due to manufacturing tolerances

B. Both vehicles are performing within normal specifications and the perceived difference is likely subjective

C. The customer's vehicle needs a refrigerant top-off of 1–2 ounces to match the spouse's performance exactly

D. The customer's vehicle has a marginally clogged cabin air filter that is reducing the perceived cooling effect

38. A vehicle has the following A/C gauge readings at 78°F ambient: low side 28 psi, high side 175 psi. The technician measures the temperature at four points along the liquid line from the condenser to the evaporator inlet. The temperatures read: 95°F at the condenser outlet, 94°F midway along the line, 60°F just upstream of the orifice tube fitting, and 32°F just downstream. What do these readings reveal?

A. A normally operating system where the temperature drop at the orifice tube location is the expected metering point

B. The condenser outlet temperature of 95°F is too high and indicates incomplete condensation in the condenser

C. The orifice tube is functioning correctly because the 60°F-to-32°F drop represents normal metering device operation

D. A restriction in the liquid line just upstream of the orifice tube, indicated by the sudden 34°F drop from 94°F to 60°F

39. A technician is replacing the evaporator on a vehicle with an orifice tube system. All of the following components should be replaced during this repair EXCEPT:

A. The orifice tube, since the technician has access to it during the evaporator replacement procedure

B. All O-rings at disturbed connections using new HNBR material lubricated with the correct refrigerant oil

C. The condenser, since it may contain residual debris from the evaporator leak that contaminated the system

D. The accumulator, since the system will be opened to atmosphere and the desiccant will be exposed to moisture

40. A technician is diagnosing a vehicle where the A/C clutch relay clicks audibly when the A/C is requested, but the compressor clutch does not engage. The technician measures 12.2V at relay terminal 30 (input) and 12.0V at relay terminal 87 (output) when the relay is energized. What does this indicate?

A. The relay is functioning but the 0.2V drop across the contacts is excessive and the relay should be replaced

B. The relay contacts are passing voltage adequately, and the fault is downstream between the relay and the clutch

C. The relay coil is energizing but the contacts are only partially closing, creating a high-resistance connection

D. The relay is defective because any measurable voltage drop across relay contacts indicates contact failure

41. A vehicle owner has been adding refrigerant from a retail can every few months to maintain cooling. The technician tests the system and finds R-134a at 87% purity with 8% R-22 and 5% air. What is the correct course of action?

A. Recharge the system with pure R-134a to dilute the contaminants below the 2% acceptance threshold

B. Recover the contaminated charge into a dedicated contaminated refrigerant container for proper reclamation

C. Flush the entire system with approved solvent to remove all traces of the R-22 before recharging with R-134a

D. Proceed with normal R-134a service since the small percentage of R-22 will not significantly affect performance

42. On a vehicle with ATC, the scan tool shows the HVAC module commanding the A/C compressor clutch relay ON. The scan tool also shows the A/C refrigerant pressure reading at 5 psi (system nearly empty). However, the compressor clutch IS engaging. What is the MOST likely explanation?

A. The A/C pressure sensor is inaccurate and the system actually has a normal charge that supports engagement

B. The low-pressure cutout function on this vehicle uses a separate mechanical switch not shown on the scan tool

C. The HVAC module has a software glitch that allows engagement despite the critically low pressure reading

D. The vehicle uses an electronic pressure sensor for module data but a separate mechanical switch for clutch protection

43. A technician recovers refrigerant from a vehicle and measures the total recovered amount at 18 ounces. The underhood label specifies a 24-ounce charge. The system has been losing cooling gradually over the past six months. After performing a leak test, the technician finds a leak at the compressor shaft seal. Before recharging, what additional step related to oil management is required?

A. Add oil to replace the amount that was lost along with the 6 ounces of escaped refrigerant over the leak period

B. Drain all remaining oil from the system and replace with a completely fresh charge per the total system specification

C. No additional oil is needed because the remaining 18 ounces of refrigerant contains proportionally adequate oil

D. Add the maximum oil capacity to the compressor to ensure adequate lubrication after the extended low-charge period

44. Technician A says that a properly functioning NTC temperature sensor produces higher resistance at lower temperatures and lower resistance at higher temperatures. Technician B says that an open circuit in an NTC sensor circuit causes the module to read the maximum possible temperature. Who is correct?

A. Technician A only, because an open NTC circuit causes the module to read the minimum temperature not maximum

B. Both Technician A and Technician B, because NTC resistance increases with cold and an open reads as maximum

C. Technician A only, because an open NTC circuit reads as minimum temperature due to the maximum resistance interpretation

D. Technician B only, because NTC sensors actually produce lower resistance at colder temperatures not higher

45. A vehicle has an A/C performance complaint. The technician connects gauges and starts the engine with the A/C on maximum. The low-side pressure immediately drops to 18 psi and continues falling toward vacuum. The high-side pressure rises to only 130 psi. The suction line feels warm. What is the MOST likely cause?

A. A massively overcharged system that has flooded the evaporator and suction line with liquid refrigerant

B. A severely restricted or blocked metering device that is preventing refrigerant from entering the evaporator

C. A failed compressor with completely bypassing internal valves that cannot create any pressure differential

D. A plugged condenser that is trapping all refrigerant on the high side and starving the low side completely

46. A vehicle's A/C system was working normally before a transmission replacement. After the transmission was reinstalled, the A/C blows warm air. The compressor clutch engages and gauges show normal static pressure at rest. When the engine is started, the compressor runs but the low-side pressure does not drop and the high-side does not rise. What should the technician check?

A. Whether the compressor was accidentally drained of oil during the transmission removal process

B. The A/C pressure sensor for damage that may have occurred during the heavy mechanical work nearby

C. Whether a refrigerant line was kinked, crushed, or disconnected during the transmission removal and reinstallation

D. The compressor clutch air gap, which may have been widened by vibration from the transmission work

47. A technician is diagnosing an ATC system where the customer complains the system works perfectly except that when the ignition is first turned on, all vents blast cold air for approximately 8 seconds before the system adjusts to the previous settings. What is this behavior?

A. Normal HVAC initialization where the module runs all actuators through a calibration sweep before resuming stored settings

B. A failing blend door actuator that defaults to cold before the module's command signal reaches the motor

C. A faulty HVAC control module that temporarily loses its stored temperature settings during each power cycle

D. An incorrectly calibrated blend door actuator that overshoots to full cold before settling at the target position

48. A vehicle has a rear auxiliary A/C system. The total system charge is specified as 36 ounces. During service, the technician recovers 34 ounces. The customer had no cooling complaints. After performing the service (replacing the cabin air filter only — no refrigerant system work), the technician recharges with 36 ounces. What potential issue has the technician created?

A. The 2 ounces of oil removed with the refrigerant were not measured and replaced, leaving the system oil-short

B. The system was operating normally at 34 ounces and the additional 2 ounces may create a slight overcharge

C. The cabin air filter replacement should not have required refrigerant recovery and the service was unnecessary

D. No issue — charging to the manufacturer's specification of 36 ounces is always the correct approach regardless of recovered amount

49. Technician A says that when using an electronic leak detector, the probe should be moved at approximately one inch per second around fittings for maximum sensitivity. Technician B says that the probe should start at the top of each component and move downward because refrigerant vapor is heavier than air. Who is correct?

A. Technician A only, because probe movement direction does not affect detection accuracy for heavier-than-air gases

B. Both Technician A and Technician B are correct about proper electronic leak detection technique

C. Technician B only, because probe speed does not affect detection sensitivity as long as the probe is near the fitting

D. Neither Technician A nor Technician B, because electronic detectors work equally well regardless of technique

50. A vehicle's cooling system has been flushed and refilled with new coolant after a heater core replacement. The engine reaches operating temperature and the heater produces hot air. However, after 10 minutes of driving, the engine temperature gauge gradually rises from 200°F to 225°F, and then the cooling fan kicks on at high speed and brings it back to 205°F. This cycle repeats every 10–15 minutes. What is the MOST likely cause?

A. A defective new heater core that has a restriction causing periodic coolant flow interruption to the radiator

B. A weak cooling fan motor that cannot maintain high speed continuously and drops to low speed periodically

C. A large air pocket in the cooling system that intermittently blocks the thermostat and reduces radiator flow

D. A failing water pump bearing that seizes briefly under load and then frees, causing intermittent flow reduction

Practice Exam 10: Answer Key and Explanations

1. C — Both-sides-high pressures with a clean condenser and functional fan, on a system that was recently charged to specification by weight, point to non-condensable gases (air) in the system. Air cannot condense at system pressures and permanently elevates high-side pressure above what the refrigerant alone would produce. The most common entry point is inadequate evacuation before charging — if the system was not pulled to 500 microns or the hoses were not purged, air remains trapped and raises both pressures.

2. A — Technician A is correct that the oil charge in a new compressor must be adjusted because oil remains distributed throughout other system components (condenser, evaporator, hoses, accumulator/receiver-drier). Installing a new compressor with its full factory charge — which typically represents the total system capacity — would result in an overcharge when combined with the oil

already in other components. The service manual specifies how much to drain based on the specific replacement scenario.

3. B — The most common cause of electronic blower controller failure is a blower motor drawing excessive current. A motor with worn brushes, a dragging bearing, or a partially shorted winding draws more amperage than the controller's power transistor can handle, overheating the transistor until it fails. Measuring the motor's current draw before installing the new controller identifies whether the motor is the root cause — if it exceeds specification, the motor must also be replaced to prevent repeat controller failure.

4. D — A chemical or solvent smell from the vents after recent A/C service is most commonly caused by residual flushing solvent that was not completely purged from the system with dry nitrogen before reassembly and charging. The solvent slowly evaporates from internal surfaces and is carried into the cabin by the blower. Proper flushing technique requires thorough nitrogen blow-dry of every flushed component to remove all traces of solvent before the system is sealed.

5. D — The DTC indicates an open circuit in the mode door actuator circuit. The connector is firmly seated (eliminating a disconnected plug), so the open circuit is in the wiring between the HVAC module and the actuator. Testing continuity and resistance in the wiring harness — checking each wire for breaks, high resistance, or damage — is the logical next step to pinpoint where the circuit is broken between the two endpoints.

6. D — Both technicians offer valid explanations for the reduced heat output despite hot hoses and correct upstream conditions. A partial heater core restriction limits coolant flow volume, reducing total heat transfer even though the coolant that does pass through is hot (both hoses feel hot because some flow is present). An air pocket trapped inside the core occupies space where coolant should be, reducing the effective heat exchange surface area without completely blocking flow. Either condition produces the described symptom.

7. A — The sensing bulb's insulation wrap prevents the surrounding air temperature from influencing the bulb's reading — the bulb should sense only the suction line metal temperature. Without insulation, the bulb reads a temperature that is a blend of the suction line temperature and the ambient air around it. On a hot day, this blended reading is warmer than the true suction line temperature, causing the TXV to open wider than necessary. On a cold day, the opposite occurs. The result is erratic, inaccurate valve control.

8. C — A system that operated with a progressively worsening leak for nine months ran with gradually decreasing refrigerant and oil. As the charge depleted, less oil circulated to the compressor, causing progressive wear to bearings, pistons or scrolls, and internal surfaces. By the time the system was empty, the compressor had sustained months of inadequate lubrication damage. Recharging restored refrigerant flow but the internal mechanical damage is permanent, producing the grinding noise.

9. B — Battery voltage of 12.3V enters the relay at terminal 30, but only 0.8V exits at terminal 87 — meaning the relay contacts are dropping 11.5V internally. Normal relay contact voltage drop should be under 0.5V. This massive voltage drop indicates the relay contacts are barely making connection — burned, pitted, or corroded surfaces create extreme resistance that consumes nearly all available voltage before it can reach the clutch circuit downstream. The relay must be replaced.

10. A — The ATC module continuously measures the difference between the set temperature and the actual cabin temperature (the error signal) and adjusts its outputs proportionally. When the error is large (cabin at 95°F, set at 72°F), the module commands maximum cooling. As the error shrinks (cabin approaches 72°F), the module proportionally reduces cooling output — moving the blend door warmer and reducing blower speed. This proportional response to the error signal is the definition of closed-loop proportional control.

11. B — Water from the car wash saturates the serpentine belt, dramatically reducing its friction coefficient against the pulley surfaces. The wet belt slips on the compressor clutch pulley, reducing or eliminating the compressor's mechanical drive. As the vehicle drives at highway speed, engine heat and airflow dry the belt over approximately 20 minutes, restoring normal friction and full compressor operation. This temporary belt slip produces the temporary A/C performance loss pattern described.

12. D — Whenever the A/C system is opened to atmosphere for any repair — including condenser replacement — the receiver-drier must be replaced because its desiccant absorbs atmospheric moisture immediately upon exposure. The fresh desiccant in the new receiver-drier protects the system from the moisture that entered during the condenser swap. The compressor, evaporator, and TXV do not require replacement unless they have independently failed or contamination is present.

13. A — A higher-rated thermostat will allow the engine to run at a higher temperature, which provides more heat to the heater core and improves cabin heat output in extreme cold. However, the higher operating temperature reduces the safety margin against overheating — in warm weather or under heavy load, the engine may exceed safe temperatures. Additionally, the engine management system is calibrated for the specified thermostat rating, and a deviation may trigger DTC P0128 or other temperature-related codes.

14. C — All actuators respond correctly to scan tool bidirectional commands, proving the HVAC module, the communication bus to the actuators, and the actuators themselves are all functional. The blower and all door actuators fail to respond to dashboard buttons — affecting every function simultaneously. Since the module can execute commands from the scan tool but not from the control panel, the input path from the panel to the module is broken. A faulty control panel that sends no signals is the most likely cause.

15. B — In a clutchless variable displacement compressor, the compressor shaft always turns with the engine — there is no clutch to fail. The module commands 100% displacement but the pressure sensor shows no differential, meaning the compressor is spinning but not pumping effectively. The electronic displacement control valve converts the module's electrical command into mechanical swashplate angle changes. A valve stuck at minimum displacement ignores the maximum command and keeps the swashplate at its shallowest angle, pumping virtually no refrigerant.

16. A — The discharge line at 185°F is within normal range for the compressor outlet. The condenser shows an 81°F temperature drop (183°F in, 102°F out), indicating effective heat rejection. The liquid line at 100°F (approximately 12°F above the 88°F ambient) is consistent with properly subcooled liquid. The evaporator outlet at 45°F confirms adequate cooling. All temperatures follow the expected pattern for a normally operating system at the stated ambient conditions.

17. C — Both technicians correctly describe the function of each component in its respective system type. Technician A is right that the accumulator in orifice tube systems separates liquid from vapor and allows only vapor to reach the compressor, preventing liquid slugging. Technician B is right that the receiver-drier in TXV systems stores liquid refrigerant and ensures a steady supply of fully condensed liquid reaches the expansion valve for proper metering.

18. C — A gurgling or sloshing sound from behind the dashboard that occurs with RPM changes — in a system with correct coolant level and stable engine temperature — is characteristic of a small air pocket trapped in the heater core. As engine RPM changes during acceleration, the water pump's flow rate changes, causing the air bubble to shift position inside the core passages and produce audible gurgling. Bleeding the cooling system to remove the trapped air resolves the noise.

19. C — The manifold gauge reads 92 psi, which matches the P-T chart's expected static pressure for R-134a at 80°F — confirming the gauge is accurate and the system has adequate charge. The electronic pressure sensor reads 45 psi at the same port — a 47 psi discrepancy that confirms the sensor is sending an incorrect signal to the module. This false low reading would cause the module to believe the system is nearly empty and potentially prevent compressor engagement.

20. D — A "performance" DTC (as opposed to a simple circuit fault code) indicates the module detected that the sensor's behavior did not match expected patterns — even though the current reading appears correct. The module likely observed that during a previous heating or cooling event, the in-car sensor reading did not change at the rate expected for the conditions. This could indicate a sluggish sensor response, a failing aspirator fan, or an intermittent sensor fault that has since resolved.

21. A — Microbial growth (mold, mildew, bacteria) on the evaporator surface is the most common cause of musty A/C odor. The organisms thrive on the constantly moist evaporator and produce volatile compounds. The odor is worst when switching from recirculation to fresh air because the changed airflow pattern disturbs the microbial colonies and releases a concentrated burst of odor. Antimicrobial evaporator treatment and ensuring the condensation drain is clear are the recommended corrective actions.

22. C — Compressor oil circulates with the refrigerant throughout the system. When refrigerant escapes through a leak, it carries oil with it — the oil travels as a fine mist or dissolved component within the refrigerant vapor. Over nine months of slow leakage, 6 ounces of refrigerant escaped and took a proportional amount of oil with it. The 5-ounce oil deficit (2 ounces remaining of a 7-ounce specification) directly correlates with the refrigerant lost through the leak.

23. D — The extremely low low-side pressure (4 psi, nearly vacuum) with a warm suction line confirms almost no refrigerant is reaching the evaporator. The key diagnostic clue is the temperature pattern along the liquid line: warm upstream of the metering device, then extremely cold with frost immediately downstream. This localized extreme temperature drop at the metering device indicates a severe restriction — the tiny amount of refrigerant that squeezes through expands violently, producing the frost, while the upstream side remains warm because liquid backs up.

24. B — On vehicles where the high-speed blower circuit bypasses the resistor block and uses a dedicated relay, loss of only the high-speed setting points directly to the high-speed relay circuit. The relay, its fuse, its coil power supply, and the module's relay command signal are the logical first checks. The resistor block is not involved in high speed, and the motor is proven functional on all lower speeds — eliminating both as suspects.

25. D — The heating system is working correctly (adequate floor vent heat), all sensor readings verify accurate, and the blend door is properly positioned. Intermittent windshield fogging despite adequate heat most commonly results from the A/C compressor not engaging when the defroster is selected. The compressor must engage in defrost mode to dehumidify the air before it contacts the windshield. If the compressor fails to activate in defrost, the warm but humid air fogs the cold windshield glass.

26. A — Subcooling of 22°F is at the upper end of the acceptable range (normal is typically 10°F–20°F, with values up to approximately 25°F considered acceptable depending on conditions). Importantly, the system was charged to specification by weight, gauge pressures are normal, and the vent temperature of 42°F at 82°F ambient represents excellent cooling performance. A slightly elevated subcooling reading with otherwise perfect performance does not warrant corrective action.

27. C — Technician A correctly identifies that the high-pressure relief valve is a safety device that opens at approximately 500–550 psi to prevent catastrophic system rupture. Technician B is incorrect because the relief valve should never open during normal operation — its activation indicates a severe underlying problem such as a massive overcharge, complete condenser blockage, or extreme non-condensable gas contamination. The cause must be diagnosed and corrected before recharging, not simply ignored.

28. A — The technician added refrigerant to normalize the pressures and restore cooling but did not find and repair the leak that caused the original charge loss. Refrigerant does not wear out or evaporate — if the charge was low, a leak exists. One month later, the same amount of refrigerant has escaped through the same unrepaired leak, reproducing the identical complaint. Every low-charge diagnosis must include leak detection, repair, evacuation, and then recharging.

29. B — After the check valve replacement, the mode doors work correctly (confirming the HVAC vacuum system is restored), but the engine idle speed is 200 RPM high. A vacuum leak at one of the check valve hose connections introduces unmetered air into the intake manifold, leaning the air-fuel mixture. The engine management system compensates by increasing idle speed to maintain stable combustion. The hose connections at the new check valve should be inspected for a loose fit or cracked hose end.

30. A — A vehicle sitting in the sun on a 95°F day absorbs significant solar radiation on the bumper, grille area, and road surface beneath it. The ambient temperature sensor behind the bumper is heated by this radiated and reflected heat — not just the air temperature — causing it to read significantly higher than the actual air temperature. This heat soak effect is a known limitation of bumper-mounted ambient sensors. Many ATC modules include software filtering to manage this, but the raw reading can remain elevated until the vehicle moves and airflow cools the sensor.

31. D — The intermittent pattern — 15 minutes of cooling followed by 5 minutes without cooling, then recovery — with the compressor running continuously is the classic signature of moisture contamination freezing at the metering device. During the cooling period, the cold refrigerant at the orifice tube gradually freezes the trapped moisture into an ice plug that blocks flow (low side drops to 5 psi, high

side climbs to 350 psi). After 5 minutes without refrigerant flow, the ice melts, flow resumes, and cooling returns until the cycle repeats.

32. B — A ground circuit voltage drop of 1.5V far exceeds the maximum acceptable 0.3V for a ground path. This excessive resistance in the ground circuit consumes 1.5V of the available battery voltage, reducing the effective voltage at the motor and limiting current flow. The motor runs slower and delivers less airflow than designed. The ground connection — including the wire, terminal, chassis attachment point, and any intermediate splices — must be inspected, cleaned, and repaired to restore full motor performance.

33. C — Both blend door actuators command and achieve identical positions, and no DTCs are stored — the mechanical and electrical systems appear to be working correctly on both sides. Yet the passenger side runs 7°F warmer than the set point while the driver side is accurate. Since the module relies on the passenger-side in-car temperature sensor to determine whether adjustment is needed, a sensor reading colder than actual cabin temperature would cause the module to believe the zone is already at or below the target, commanding less cooling than actually needed.

34. A — Both technicians describe correct evacuation practices. Technician A is right that opening both manifold valves allows the vacuum pump to pull through the high side and low side simultaneously, dramatically reducing evacuation time because the pump does not have to pull vacuum through the metering device restriction. Technician B is right that the micron gauge must be connected at the vehicle's service port — not at the pump — because hose length and diameter create flow restriction that makes the pump-side reading appear deeper than the actual system vacuum.

35. A — The scan tool shows the A/C button state as "OFF" even when the technician physically presses the button. This confirms the module never receives the A/C request signal — the button press is not being communicated. The compressor works in defrost (through the automatic defrost override that engages the compressor independently of the A/C button), proving the compressor, relay, and clutch circuit are functional. The fault is isolated to the A/C request button or its signal wiring to the module.

36. D — A pressure cap releasing at 11 psi instead of its rated 16 psi reduces the system's pressurized boiling point by approximately 10°F. Under heavy load conditions (stop-and-go traffic with A/C running), the coolant temperature can approach its now-lower boiling point. When coolant begins to boil locally — particularly at hot spots near the exhaust-side cylinder head — steam pockets form that displace liquid coolant and reduce heat transfer efficiency, causing localized overheating that the temperature gauge eventually detects.

37. B — Both vehicles produce virtually identical vent temperatures (40°F versus 41°F) — a 1°F difference that falls well within the normal measurement tolerance of any thermometer. Both systems are operating within their designed specifications. The customer's perception that one vehicle "feels colder" is subjective and may be influenced by factors like vent direction, blower speed preference, cabin volume, sun exposure, or simply expectation bias. The technician should document the objective measurements and explain that both systems are performing normally.

38. D — The liquid line temperature drops gradually from 95°F at the condenser outlet to 94°F midway — this minimal, gradual decline is normal. Then the temperature drops suddenly from 94°F to 60°F just upstream of the orifice tube fitting — a 34°F drop at a specific point in the liquid line before reaching the metering device. This abrupt localized temperature drop indicates a restriction at that point. A kink, dent, internal collapse, or foreign object in the liquid line is creating a pressure drop that cools the refrigerant at that location rather than at the intended metering point.

39. C — This is an EXCEPT question. The condenser does not need to be replaced for a routine evaporator leak repair where no compressor failure or system contamination has occurred. An evaporator leak is a localized failure that does not produce debris or contaminate other components. The orifice tube should be replaced (A — you have access during the repair), O-rings must be replaced at all disturbed connections (B — standard practice), and the accumulator must be replaced (D — system opened to atmosphere, fresh desiccant needed).

40. B — The relay clicks (confirming the coil energizes), 12.2V enters at terminal 30, and 12.0V exits at terminal 87 — a voltage drop of only 0.2V across the contacts. This is within the acceptable range (under 0.5V) for relay contacts, confirming the relay is passing adequate voltage to the downstream circuit. Since the relay is functioning correctly, the fault preventing clutch engagement must be downstream — in the wiring, pressure switches, clutch coil, or ground circuit between the relay output and the compressor.

41. B — The refrigerant identifier shows a severely contaminated charge: 87% R-134a, 8% R-22, and 5% air. R-22 is not approved for automotive A/C use and the total contamination level of 13% far exceeds the 2% acceptable threshold. This contaminated charge must be recovered into a dedicated contaminated-refrigerant container (gray body with yellow top) and sent to an EPA-certified reclaimer. It must never be put into the shop's clean R-134a storage tank. The system should then be evacuated and recharged with pure R-134a.

42. D — The scan tool shows the module commanding the clutch ON and the pressure sensor reading only 5 psi — yet the clutch engages. This apparent contradiction is explained by vehicles that use dual pressure monitoring: an electronic pressure transducer that sends data to the module for display and

decision-making on the scan tool, and a separate mechanical low-pressure cutout switch hardwired in the clutch circuit that physically controls engagement. The mechanical switch still closes at 5 psi, allowing engagement despite the module seeing a low reading.

43. A — When 6 ounces of refrigerant leaked out over six months, a proportional amount of compressor oil was carried out with it. The system now has less oil than its specification, and simply recharging with refrigerant does not replace the lost oil. The technician must estimate the oil loss (proportional to the refrigerant loss), add an equivalent amount of fresh, correct-type oil to the system, and then charge with the full refrigerant specification. Ignoring the oil deficit risks compressor damage from insufficient lubrication.

44. C — Technician A is correct that NTC (Negative Temperature Coefficient) thermistors increase resistance as temperature decreases and decrease resistance as temperature increases — this is the defining characteristic of NTC sensors. Technician B is incorrect because an open circuit in an NTC sensor circuit produces maximum resistance, which the module interprets as minimum temperature (the coldest possible reading, typically −40°F), not maximum temperature. High resistance = cold reading in an NTC circuit.

45. B — A low-side pressure dropping rapidly toward vacuum with a warm suction line indicates the compressor is pulling hard but no refrigerant is reaching the evaporator. The compressor evacuates the low side because the metering device is blocked — refrigerant cannot pass through to replenish what the compressor removes. The high-side remains moderately pressurized because refrigerant is trapped upstream of the restriction. A severely restricted or completely blocked orifice tube or stuck-closed TXV produces this exact pattern.

46. C — The system has adequate static pressure (normal charge confirmed at rest) and the compressor clutch engages, but when operating, no pressure differential develops — the compressor runs but pressures do not change. During transmission removal and reinstallation, the heavy mechanical work requires moving and repositioning components near the refrigerant lines. A kinked, crushed, or disconnected line would block refrigerant circulation while the compressor spins freely against the static charge. Inspect all lines in the transmission service area.

47. A — A brief blast of cold air lasting approximately 8 seconds at key-on before the system adjusts to previous settings is the characteristic behavior of HVAC system initialization. The ATC module commands all door actuators through their full travel range during this calibration sweep to establish position reference points. During the sweep, the blend door passes through the full-cold position, momentarily directing cold air through the vents. Once calibration completes (typically 5–10 seconds), the module commands the doors to their stored positions and normal operation resumes.

48. D — Charging to the manufacturer's specification of 36 ounces is always the correct approach. The 2-ounce difference between the 34 recovered and the 36 specified could represent refrigerant left in the recovery machine's hoses, normal measurement tolerance, or a small amount of charge that was naturally depleted through permeation over time. The manufacturer's specified charge is the engineered amount for optimal system performance, and charging to this number — not to whatever was recovered — ensures correct operation.

49. B — Both technicians describe correct electronic leak detection technique. Technician A is right that moving the probe at approximately one inch per second provides optimal sensitivity — too fast and the probe passes over a leak before the sensor can respond. Technician B is right that scanning from top to bottom is important because refrigerant vapor is heavier than air and sinks. A leak at the top of a fitting produces a vapor trail that flows downward — scanning top-down follows this trail to its source.

50. C — A cyclical pattern of temperature rise, fan activation, temperature drop, and repeat — occurring every 10–15 minutes after a cooling system service — is the classic symptom of a large air pocket trapped in the system. The air pocket intermittently blocks coolant flow through the thermostat or radiator passages. When flow is blocked, the engine heats up until the fan activates. Engine vibration, thermal expansion, or coolant pressure shifts the air pocket, flow resumes, and the temperature drops. Properly bleeding the cooling system to remove all trapped air resolves the cycle.