PRACTICE EXAM 16: ASE T6 SIMULATION

1. A technician measures 12.4 volts at a truck's headlight connector power terminal with the headlights on. The technician then measures between the headlight connector ground terminal and the battery negative post and reads 0.04 volts. The headlights appear slightly dim. Where should the technician focus the diagnosis?

A. On the ground side, since 0.04 volts indicates a marginal ground that is contributing to the dimming

B. On the power side, since 12.4 volts at the connector with a near-perfect ground means voltage is being lost between the battery and the connector on the power feed path

C. On the headlight bulbs, since the voltage readings are within normal limits and the bulbs may be nearing end of life

D. On the alternator, since 12.4 volts suggests the charging system is not maintaining adequate voltage

2. A heavy-duty truck's scan tool retrieves DTCs from the ECM, TCM, and ABS module simultaneously — all three report "System Voltage Low." Battery terminal voltage reads 14.1 volts with the engine running. What single fault could cause all three modules to report low voltage despite normal battery terminal readings?

A. A failing alternator that produces voltage spikes that the modules misinterpret as low voltage events

B. A global CAN bus fault that corrupts the voltage parameter broadcast from the ECM to other modules

C. A battery bank with one weak cell that produces momentary voltage dips under transient load conditions

D. Excessive resistance in the main power distribution wiring between the battery and the fuse panel where these modules receive their power, dropping voltage below each module's minimum threshold

3. A commercial vehicle's right front marker light operates normally during the day. At night, the driver notices the marker light dims noticeably when the headlights are turned on but returns to normal brightness when only the marker lights are active. The fuse for the marker circuit is good. What is the most likely cause?

A. The marker light and headlight circuits share a power feed or ground path with limited current capacity — when both circuits are active simultaneously, the combined current creates a voltage drop across the shared path that reduces the voltage available to the marker light

B. The alternator output drops when headlights are activated, reducing voltage to all circuits including the marker lights

C. The body controller module intentionally dims marker lights when headlights are active to reduce glare

D. The marker light bulb has developed increased filament resistance that makes it more sensitive to voltage changes

4. A truck's starter motor has been recently replaced. On the first start attempt, the engine cranks and starts, but a metallic grinding noise is heard for approximately one second during the starter's disengagement. The noise was not present with the old starter. What is the most likely cause?

A. The replacement starter's overrunning clutch is defective and does not freewheel when the engine fires

B. The flywheel ring gear has a damaged tooth that the new starter's pinion catches during disengagement

C. The replacement starter's pinion gear does not retract quickly enough after the key is released — either the solenoid return spring is weak or the shift fork is binding, keeping the pinion partially engaged with the spinning flywheel momentarily

D. The new starter motor has reversed armature rotation that causes the pinion to grind against the ring gear teeth as it retracts

5. Technician A says that a truck's battery specific gravity should be temperature-corrected by adding 0.004 for every 10°F above 80°F and subtracting 0.004 for every 10°F below 80°F. Technician B says that without temperature correction, specific gravity readings taken in very cold conditions will overestimate the battery's actual state of charge. Who is correct?

A. Technician A only

B. Both Technician A and Technician B

C. Technician B only

D. Neither Technician A nor Technician B

6. A heavy-duty truck's instrument cluster displays normal readings for all gauges except the oil pressure, which pegs at maximum regardless of actual engine conditions — even with the engine off and the ignition in the run position. What is the most likely cause?

A. A short-to-ground in the wire between the oil pressure sending unit and the instrument cluster, bypassing the sending unit's variable resistance and providing maximum current to the gauge circuit

B. A stuck oil pressure relief valve in the engine that maintains maximum system oil pressure at all times

C. A failed instrument cluster stepper motor that has seized in the maximum position

D. The oil pressure sending unit has failed with zero internal resistance, but this would drive the gauge to minimum, not maximum

7. A commercial vehicle's trailer ABS module communicates on the J1939 bus and reports no active fault codes. However, the trailer ABS warning light on the tractor dash remains illuminated. The tractor ABS system has no faults. What should the technician investigate?

A. The tractor ABS module firmware for a known compatibility issue with this trailer ABS module manufacturer

B. The CAN bus backbone termination resistors for an imbalance that affects warning light commands

C. The tractor's instrument cluster for a faulty ABS warning light driver that remains energized regardless of bus data

D. The trailer ABS warning light circuit on the tractor — the light may be controlled by a separate hardwired signal from the trailer rather than by the data bus, and the power line or signal wire for the warning light in the J560 connector or tractor wiring may have a fault

8. A technician is diagnosing a truck where the blower motor operates on high speed only. The technician replaces the blower motor resistor block. After replacement, the blower now operates on medium and high, but low speed is still inoperative. What does this indicate?

A. The replacement resistor block is defective and has an open on the low-speed element

B. The blower motor switch is also faulty — the low-speed contact has failed independently of the original resistor block failure

C. The blower motor switch has a failed low-speed contact, or the wire between the switch's low-speed output and the resistor block's low-speed input has an open — the original resistor failure masked this second fault on a different speed setting

D. The blower motor itself cannot operate at the low RPM required for the low-speed setting

9. A fleet of trucks has been experiencing intermittent starting problems that only occur on the coldest mornings of the year. The batteries pass load tests performed in the warm shop. The cables pass voltage drop tests. The starters crank normally when tested in moderate temperatures. What should the technician investigate?

A. Whether the battery CCA ratings are adequate for the engine's cold-cranking requirements at the lowest expected ambient temperatures — batteries that pass a load test at shop temperature may not deliver sufficient cranking amps at 0°F or below

B. Whether the fuel system's winter blend is appropriate for the cold temperatures causing hard starting

C. Whether the engine oil weight is too heavy for the coldest temperatures, increasing mechanical resistance

D. Whether the glow plug or intake air heater system is functioning properly to assist cold diesel combustion

10. A truck's right rear combination light assembly flickers only when the truck is driving over rough roads. The light is steady on smooth pavement. The technician wiggles the light assembly housing and reproduces the flicker. What has this test identified?

A. A failing light bulb with a loose filament that breaks contact under vibration

B. A loose or poorly secured light assembly that allows the housing to shift and momentarily interrupt the electrical connection between the socket contacts and the bulb base or between the housing ground and the vehicle body

C. A worn wiring connector at the rear of the truck that is being pulled by the shifting assembly

D. A corroded ground stud on the vehicle frame near the light assembly

11. A heavy-duty truck's alternator has been producing correct voltage and amperage during shop testing. However, the driver reports that after three to four hours of nighttime driving with all lights on, the batteries are noticeably weaker the next morning. The parasitic draw is within specification. What should the technician investigate?

A. The battery bank's amp-hour capacity to verify the batteries can sustain overnight storage with the measured parasitic draw

B. The alternator for a diode fault that allows reverse current flow overnight, draining the batteries after shutdown

C. The headlight circuit for a voltage drop that reduces charging current to the batteries during extended nighttime operation

D. Whether the total nighttime electrical load — headlights, marker lights, clearance lights, instrument cluster, telematics, and other accessories — exceeds the alternator's sustained output capacity, leaving insufficient reserve to fully recharge the batteries during the driving shift

12. A commercial vehicle's scan tool retrieves a DTC from the body controller module indicating "Right Front Clearance Light — Short to Battery." The right front clearance light is illuminated at full brightness at all times, even when the headlight switch is off. What does "short to battery" mean in this context?

A. The right front clearance light wire has contacted a constant battery voltage source somewhere in the harness, providing power to the bulb independently of the BCM output or the headlight switch — the light receives voltage directly from the always-hot wire regardless of switch or module commands

B. The BCM has an internal output driver that has failed in the permanently on state

C. The clearance light bulb has an internal fault creating a reverse current path to the battery

D. The fuse for the clearance light circuit has been bypassed with a direct battery connection

13. A truck's electronic cruise control system engages and holds speed, but the resume function does not work — pressing the resume button after canceling cruise has no effect. The set, coast, and cancel functions all operate normally. What is the most likely cause?

A. A failing vehicle speed sensor that loses the stored set-speed value when cruise is canceled

B. A data bus communication delay that prevents the resume command from reaching the ECM in time

C. A faulty resume switch contact on the steering wheel cruise control switch assembly, or an open in the wire between the resume switch and the cruise control input on the ECM or cruise module

D. An ECM software fault that clears the stored set-speed from memory when cruise is canceled, leaving no speed value for resume to target

14. A heavy-duty truck driver reports that the electric window on the driver door moves up very slowly but moves down at normal speed. The window motor draws 7 amps in both directions — within the 6 to 10 amp specification. What is the most likely cause?

A. A voltage drop in the up-direction power feed wire that limits current delivery for upward travel

B. A mechanical resistance issue — a binding window channel, deteriorated weatherstrip, or a worn regulator — that creates more friction against upward movement where the motor must lift the glass against both gravity and friction, while downward movement is assisted by gravity

C. A failing motor with a worn brush that only contacts the commutator reliably in one rotational direction

D. A body controller module that limits window motor speed in the up direction as an anti-pinch safety feature

15. A technician measures CAN bus resistance at the nine-pin diagnostic connector and reads 60 ohms with the ignition off. The technician turns the ignition on and the reading changes to 55 ohms. What does the 5-ohm decrease with ignition on indicate?

A. Normal behavior as modules power up and their internal bus transceivers add minor parallel resistance to the bus

B. A module with a failing bus transceiver that presents an abnormally low resistance when powered

C. The termination resistors are temperature-sensitive and their values decrease as they warm up from the current flowing through the bus

D. A powered module is loading down the bus with an abnormal resistance that should be investigated — while some minor change can occur, a drop from 60 to 55 ohms may indicate a module's transceiver is beginning to fail or a bus connection has a developing fault

16. A truck's scan tool shows the ECM receiving a MAP sensor signal of 1.2 volts at idle with the engine warm. The specification for idle MAP voltage on this naturally aspirated engine is 1.0 to 1.5 volts. The engine runs normally. Is the 1.2-volt reading a concern?

A. No — 1.2 volts falls within the specified 1.0 to 1.5 volt range for idle MAP on this engine, confirming the sensor is reading intake manifold vacuum correctly and no further action is needed

B. Yes — 1.2 volts is at the upper end of the range and suggests a developing vacuum leak

C. Yes — the MAP sensor should read closer to 4.0 volts at idle on a naturally aspirated engine

D. No — but only if the barometric pressure sensor also reads within specification

17. A commercial vehicle's left side clearance lights and left side marker lights are all dim while the right side operates at full brightness. Bulbs have been replaced on the left side with no improvement. Voltage at the left-side lighting connector measures 10.2 volts while the right side reads 12.1 volts. Both sides share the same fuse and headlight switch output. What does the 1.9-volt difference between sides indicate?

A. The left-side circuit has a developing short-to-ground that is pulling voltage down on that side only

B. The headlight switch has an internal fault that delivers less current to the left-side output terminal

C. The left-side lighting circuit has excessive resistance in its dedicated power feed wire, splice, or ground path — between the point where the left and right circuits separate and the left-side fixtures — dropping 1.9 volts before the current reaches the left-side bulbs

D. The alternator has an unbalanced output that delivers different voltages to the left and right sides of the vehicle

18. A heavy-duty truck's starter motor was recently replaced. The new starter cranks the engine at normal speed, but the technician notices the cranking current draw is 240 amps compared to the 200-amp specification. The engine starts normally. Should the technician be concerned?

A. No — a new starter may draw slightly higher current during its break-in period as the new brushes seat against the commutator

B. Yes — 240 amps exceeds the specification by 20%, and the starter should be investigated for an installation issue such as incorrect shimming that affects pinion-to-ring gear engagement depth, or a possible internal defect in the replacement unit

C. No — the specification is only a guideline and actual current draw varies widely between individual starter units

D. Yes — but only if the cranking speed is also below the minimum RPM specification

19. A truck's electronic instrument cluster shows the coolant temperature gauge rising rapidly from cold to the red zone within two minutes of engine start. The scan tool shows the ECM reporting coolant temperature at 75°F — consistent with a cold engine. What is the most likely cause?

A. A thermostat stuck closed that is preventing coolant circulation and causing actual rapid overheating

B. A CAN bus fault that is delivering incorrect temperature data from a different parameter to the cluster's temperature display

C. An ECM sensor fault that reads cold while the engine is actually overheating rapidly

D. The instrument cluster receives its temperature display data from a separate analog sending unit — not from the J1939 bus — and this dedicated sending unit has failed with low resistance, driving the gauge to the hot reading while the ECM's own sensor correctly reports the cold engine temperature

20. A commercial vehicle's power door locks cycle once — lock/unlock — when the driver turns the ignition key to the on position. This happens every time the ignition is turned on. The locks function normally from the door switches and key fob at all other times. What is the most likely explanation?

A. A faulty ignition switch that sends a momentary lock signal during the key-on transition

B. A body controller module with a failed output driver that fires both the lock and unlock commands simultaneously during power-up initialization

C. A programmed vehicle feature — many commercial vehicles include an automatic lock cycling or unlock feature triggered by the ignition key transition as a convenience or security function

D. A short between the ignition switch wire and the door lock relay wire inside the steering column harness

21. Technician A says that a truck's charging system should produce between 13.5 and 14.5 volts at the battery terminals with the engine running. Technician B says that charging voltage below 13.5 volts indicates the alternator is not producing enough output to fully charge the batteries. Who is correct?

A. Both Technician A and Technician B

B. Technician A only

C. Technician B only

D. Neither Technician A nor Technician B

22. A truck's trailer tail lights flash rapidly when the headlight switch is first turned on, then settle to a steady glow after approximately five seconds. No other trailer lights are affected. What is the most likely cause?

A. An aftermarket LED trailer tail light assembly that produces a brief flash during power-up as its internal driver circuit charges and stabilizes

B. A faulty headlight switch that sends pulsed power during the initial contact engagement before settling into steady output

C. A loose connection on the brown (tail light) wire at the J560 connector that arcs during initial current flow and then establishes a stable contact as the terminal heats and expands slightly

D. A body controller module output that ramps up the trailer tail light voltage gradually rather than applying full voltage instantly

23. A heavy-duty truck has a no-crank condition. Battery voltage is 12.6 volts. When the key is turned to start, the solenoid clicks but the starter does not crank. The headlights remain bright and do not dim during the click. A voltage drop test across the solenoid main terminals during a cranking attempt reads 12.4 volts. What do these combined findings indicate?

A. The batteries have adequate voltage but insufficient CCA capacity to deliver cranking current

B. The starter motor armature is mechanically locked and cannot rotate despite receiving power

C. The battery cables have excessive resistance that limits current delivery to the starter motor

D. The solenoid is engaging mechanically (click) but the internal contact disc is not bridging the main terminals — the 12.4-volt drop across the solenoid main terminals confirms that nearly all battery voltage is being dropped across the open solenoid contacts rather than reaching the motor

24. A commercial vehicle's scan tool retrieves a DTC from the ECM: "Accelerator Pedal Position Sensor 1 — Voltage Below Normal." The technician measures the sensor's reference voltage at 5.0 volts, the ground at 0.01 volts, and the signal voltage at 0.1 volts with the pedal fully released. Normal idle signal should be 0.5 to 0.8 volts. What does the 0.1-volt signal indicate?

A. Normal sensor output at the fully released pedal position on this vehicle model

B. The sensor element has a partial internal short that is pulling the signal voltage below its designed minimum, or the signal wire has a high-resistance ground fault that diverts signal current to ground before it reaches the ECM input pin

C. The reference voltage is too high at 5.0 volts, driving the signal proportionally lower than expected

D. The ECM's analog-to-digital converter has a calibration error that reads 0.4 volts below actual

25. A truck's right front headlight has been replaced with a new bulb of the correct part number. The headlight illuminates but the beam pattern is distorted — the hot spot is off-center and the beam appears to project higher on the right side than intended. The headlight housing is undamaged. What is the most likely cause?

A. The replacement bulb is not fully seated in the headlight housing or its alignment tabs are not properly engaged with the locating slots, causing the filament to sit off the reflector's designed focal point

B. The headlight aiming screws have been accidentally disturbed during the bulb replacement

C. The replacement bulb is from a different manufacturer with a slightly different filament position tolerance

D. The headlight housing's internal reflector has warped from heat exposure, shifting the focal point

26. A heavy-duty truck's batteries were recently replaced. The technician measured 12.65 volts across the bank after installation. After one week of normal operation, the batteries read 12.58 volts at the end of a full driving day before shutdown. The charging system produces 14.2 volts during operation. What should the technician investigate?

A. The alternator output cable for a developing high-resistance connection that limits charging current

B. The battery inter-connect cables for loose terminal connections that prevent equalized charging

C. The alternator's voltage regulator for an intermittent fault that reduces charging output during certain operating conditions

D. Whether the total daily electrical load exceeds the alternator's capacity to both power the vehicle and fully recharge the batteries during the available driving time

27. A commercial vehicle's scan tool retrieves a code from the transmission control module indicating "Internal Module Fault — Replace TCM." The technician powers down the vehicle, waits five minutes, and restarts. The code does not return and the transmission operates normally. Should the technician replace the TCM?

A. Yes — any internal module fault code requires immediate replacement regardless of whether it returns after a power cycle

B. No — a code that does not return after a power cycle may have been caused by a transient voltage event, a momentary communication error, or a one-time processor glitch, and should be monitored for recurrence rather than triggering immediate module replacement

C. Yes — but only after verifying the TCM firmware is the latest version available

D. No — the code indicates a CAN bus communication error that was misinterpreted by the TCM as an internal fault

28. A truck's dome light circuit is controlled by the body controller module. The BCM commands the dome light off, but the light remains on at approximately 25% brightness. The BCM output pin measures 0 volts when the off command is active. What does a 0-volt BCM output with the light still glowing indicate?

A. The BCM has a failed output driver that leaks voltage even when commanded off

B. The dome light bulb has developed an internal short that allows it to illuminate from residual magnetic fields in the wiring

C. The dome light is receiving power from a source other than the BCM output — a backfeed from another circuit, a short-to-power in the dome light wiring, or an alternate power path through a faulty door switch is providing voltage to the light independently of the BCM

D. Normal behavior — the BCM uses a ground-side driver and the 0-volt reading indicates the ground path is closed, which should illuminate the light

29. Technician A says that when a truck's battery negative cable is disconnected for service, the positive cable should be secured so it cannot accidentally contact any grounded surface. Technician B says that if the negative cable is disconnected, there is no risk from the positive terminal because the circuit cannot be completed without the ground path. Who is correct?

A. Technician A only — even with the negative cable disconnected from the battery, the positive cable remains connected to the entire vehicle's positive electrical system, and if a tool or wire bridges between any positive-side component and the vehicle frame, a short circuit occurs through the remaining batteries in the bank or through any other ground path that exists

B. Technician B only

C. Both Technician A and Technician B

D. Neither Technician A nor Technician B

30. A heavy-duty truck's alternator produces a rhythmic ticking noise that tracks with engine RPM. The noise is present at all engine speeds. Charging output tests normal — voltage, amperage, and AC ripple are all within specification. What is the most likely source of the noise?

A. A failing rectifier diode that arcs intermittently during each AC cycle but has not yet degraded enough to affect output

B. A loose stator lamination that vibrates with the magnetic field changes as each rotor pole passes

C. A cracked rotor pole finger that flexes under the alternating magnetic force during rotation

D. A worn alternator bearing that produces a rhythmic click as a damaged roller or ball contacts a defect in the bearing race with each revolution

31. A truck's scan tool shows the body controller module commanding the left headlight output on, but the technician measures 0 volts at the BCM's left headlight output pin. What does this indicate?

A. A CAN bus communication error between the scan tool and the BCM that displays incorrect command status

B. The BCM connector has a backed-out terminal on the left headlight output pin that is not making contact with the module's internal output driver

C. The BCM's internal output driver for the left headlight channel has failed and cannot deliver voltage to the output pin despite receiving the correct software command — the module processes the command but cannot physically execute it

D. The left headlight circuit has a short-to-ground that is pulling the BCM output to zero volts

32. A commercial vehicle's power lock actuator in the passenger door locks and unlocks correctly from the driver master switch but does not respond to the passenger door switch. The driver master switch controls all doors correctly. What is the most likely cause?

A. A failed passenger door lock actuator that only responds to the higher-current master switch signal

B. A body controller module that prioritizes the master switch and blocks simultaneous passenger switch commands

C. A blown fuse that only feeds the passenger door lock switch circuit independently of the master switch

D. A faulty passenger door lock switch, an open in the wiring between the passenger switch and the BCM or lock relay, or a failed connector at the passenger door that prevents the switch command from reaching the control circuit

33. A heavy-duty truck's batteries are being load-tested. The technician applies 450 amps to a 900 CCA battery. At 8 seconds into the test, the voltage reads 10.1 volts. At 15 seconds, the voltage reads 9.4 volts. What does the declining voltage during the load test indicate?

A. The load tester is malfunctioning and applying increasing load during the test

B. The battery's internal plate capacity is deteriorating during the sustained high-current discharge — the voltage decline from 10.1 to 9.4 over the final seven seconds shows the battery cannot sustain voltage

under load for the full 15-second test duration, and the final 9.4-volt reading below the 9.6-volt minimum confirms battery failure

C. Normal voltage decline that occurs during any load test as the battery's surface charge is consumed

D. The test cables have excessive resistance that increases as they heat up during the 15-second test

34. A truck's electronic throttle pedal has been replaced. After installation, the engine starts and idles normally, but when the driver presses the accelerator, the engine hesitates for approximately two seconds before responding. The scan tool shows the TPS signal responding immediately to pedal movement. What is the most likely cause?

A. The replacement pedal requires a throttle position sensor relearn or calibration procedure that teaches the ECM the new sensor's voltage range and idle-to-full-throttle sweep characteristics

B. A faulty replacement pedal with a sluggish internal potentiometer that introduces a mechanical delay in signal response

C. A CAN bus communication delay between the pedal module and the ECM that adds latency to the throttle command

D. The ECM's fuel map has been corrupted by the pedal replacement and requires a complete reflash

35. A commercial vehicle's right headlight beam has a sharp horizontal cutoff line at the correct height, but the left headlight beam has no defined cutoff and appears to scatter light in all directions. Both bulbs are the same type and were installed at the same time. What is the most likely cause?

A. A voltage imbalance between the left and right headlight circuits causing the left bulb to operate at a different color temperature

B. The left headlight housing is cracked or has a damaged seal allowing moisture inside, and the accumulated moisture or mineral deposits on the reflector have destroyed the precise reflective surface geometry needed to create the focused beam pattern

C. The left headlight has internal reflector deterioration or moisture damage that has destroyed the reflective surface geometry, scattering light instead of focusing it into a defined beam pattern with a proper cutoff line

D. The left headlight bulb has shifted position in its socket, moving the filament away from the reflector's focal point

36. Technician A says that an oscilloscope can reveal an alternator diode fault that a DMM's AC ripple test might miss. Technician B says that the oscilloscope shows individual phase waveforms that identify exactly which diode has failed, while the DMM only provides a pass/fail AC voltage reading. Who is correct?

A. Technician A only

B. Both Technician A and Technician B

C. Technician B only

D. Neither Technician A nor Technician B

37. A truck's HVAC blower motor resistor block has been replaced three times in the past year. Each time, the low-speed resistor element burns open within two to three months. The blower motor tests within specification for current draw. What underlying condition is most likely causing the repeated failure?

A. An incorrect resistor block part number being installed that has a lower power rating than the original specification

B. The motor drawing slightly more current than specification on the low-speed setting, which individually falls within tolerance but consistently exceeds the resistor element's heat dissipation capacity over time

C. An alternator overcharging condition that delivers higher-than-normal voltage to the blower circuit

D. Restricted airflow through the HVAC ductwork — a clogged cabin filter, a collapsed duct, or a blocked evaporator — that reduces the cooling air passing over the resistor block, allowing the low-speed element to overheat during normal operation

38. A commercial vehicle's scan tool shows the ECM commanding the intake air heater relay on. The technician measures 12.3 volts at the relay coil power terminal and 0.02 volts at the coil ground terminal. The relay clicks and the technician measures 12.1 volts at the relay output terminal. But the air heater does not warm up. What is the most likely cause?

A. The air heater element has failed open — the relay circuit is functioning correctly (coil energized, contacts closed, voltage at output), but the heater element cannot draw current because its internal resistance has become infinite

B. The relay contacts have excessive resistance that limits current delivery to the heater element below its operating threshold

C. The ECM is commanding the relay on for too short a duration to produce measurable heat in the element

D. The air intake temperature is already above the heater's activation threshold, so the heater element is functioning but no additional heat is detectable

39. A heavy-duty truck's left and right headlights dim alternately — the left dims while the right brightens, then the left brightens while the right dims, cycling approximately once per second. All other lighting circuits are unaffected. What is the most likely cause?

A. A voltage regulator with an oscillating output that affects the left and right headlight circuits alternately

B. A data bus communication error causing the BCM to alternate power between the left and right headlight outputs

C. A ground connection shared by both headlights that has high resistance — the alternating dimming occurs because each headlight's current return competes with the other through the shared path, and a resonance develops as each side's changing current load affects the other

D. A faulty headlight relay with contacts that oscillate between the left and right headlight feed circuits

40. A truck's scan tool retrieves a DTC from the ABS module indicating "Left Front Wheel Speed Sensor — Signal Frequency Error." The sensor has been replaced and the code returns. What should the technician check next?

A. The reluctor ring on the left front hub for missing teeth, cracks, contamination, or a ring that has shifted on the hub

B. The left front hub for a damaged reluctor ring that has slipped on the hub and is producing an incorrect frequency pattern

C. The ABS module's internal signal processing for the left front channel

D. The sensor air gap adjustment to verify the replacement sensor is at the correct distance from the reluctor ring

41. A commercial vehicle's electronic engine brake activates properly during deceleration but produces a loud exhaust bark when it disengages as the driver accelerates again. The exhaust system has been inspected and has no leaks. What is the most likely cause?

A. A faulty engine brake solenoid that releases too slowly, creating a momentary exhaust restriction as the engine transitions back to positive power

B. The engine brake solenoid releasing correctly but the exhaust brake butterfly valve sticking momentarily in the closed position — when the engine transitions to positive exhaust flow against the partially closed valve, the sudden rush of exhaust past the releasing valve produces the bark

C. The engine's turbocharger wastegate opening too quickly during the transition from braking to acceleration

D. A faulty exhaust pressure sensor that sends incorrect data to the ECM during the engine brake disengagement transition

42. A heavy-duty truck's alternator charges at 14.2 volts during normal operation. The technician notices the belt tensioner arm oscillates visibly — bouncing back and forth approximately two times per second at idle. What does the tensioner oscillation indicate?

A. Normal tensioner behavior caused by the engine's firing impulses creating torsional vibration in the belt drive system

B. The belt has stretched beyond its useful life and the tensioner cannot maintain consistent tension, causing it to bounce

C. The alternator bearing has a defect that creates a periodic resistance to rotation, causing the tensioner to pulse

D. The tensioner spring has weakened or the internal dampener mechanism has failed, allowing the arm to oscillate instead of holding steady tension — a healthy tensioner absorbs belt vibration without visible bounce

43. A truck's power window motor has been bench-tested and confirmed functional. When installed, the window moves up approximately two inches and then stops. The motor continues to run (audible buzzing) but the window does not move further. What is the most likely cause?

A. The window regulator mechanism has reached a mechanical bind or obstruction point approximately two inches from the top of travel — a damaged regulator arm, a bent track, or a foreign object is preventing further movement while the motor continues to stall against the obstruction

B. The window switch has a timer that limits continuous up-travel to two inches as an anti-pinch safety feature

C. The motor does not have enough torque to lift the window beyond two inches against gravity and friction

D. The body controller module limits window travel to prevent the glass from contacting the roof seal at the top of the door frame

44. A commercial vehicle's scan tool shows the ECM broadcasting a fuel rail pressure of 28,000 PSI during highway cruising. The specification for highway cruise conditions is 25,000 to 30,000 PSI. The engine runs normally with no driveability concerns. Is the 28,000 PSI reading a cause for concern?

A. Yes — 28,000 PSI is near the upper limit and indicates a developing pressure control fault

B. Yes — the fuel pressure should remain at exactly the middle of the specification range during steady-state cruise

C. No — 28,000 PSI falls within the specified 25,000 to 30,000 PSI range and indicates the high-pressure fuel system is operating correctly under the current load conditions

D. No — but only if the fuel temperature is also within specification, as elevated temperature can inflate pressure readings

45. A truck driver reports that the heated mirrors work correctly when first activated but shut off after approximately 20 minutes and will not reactivate until the ignition is cycled off and back on. What is the most likely cause?

A. A thermal protection circuit in the mirror heating element that activates after 20 minutes and latches in the off state until the power is interrupted and reapplied

B. A body controller module timer or thermal management function that limits heated mirror operation to a programmed duration to prevent overheating or excessive current draw — the module requires an ignition cycle to reset the timer

C. An intermittent open in the mirror heater wiring that develops as the wire heats and expands during the 20-minute operating period

D. A failing heated mirror relay that overheats after 20 minutes of sustaining the heater circuit current

46. A heavy-duty truck has a no-crank condition. The batteries read 12.6 volts. The starter relay clicks when the key is turned to start, but no click is heard from the solenoid. A test light connected to the solenoid S terminal illuminates when the key is turned. What does the test light illuminating at the S terminal while the solenoid does not click indicate?

A. The starter relay is providing voltage to the solenoid, but the test light draws far less current than the solenoid requires — the relay contacts may have sufficient integrity to illuminate a test light but not enough to deliver the higher current the solenoid pull-in winding demands

B. The test confirms the control circuit is delivering adequate current to the solenoid, so the solenoid coil has failed

C. The wiring between the relay and the solenoid has adequate voltage but excessive resistance that limits current below the solenoid's engagement threshold

D. The test light illuminating confirms adequate voltage and current at the S terminal — the solenoid pull-in winding has failed open and the solenoid must be replaced, or the solenoid has a failed ground path preventing coil current flow

47. A commercial vehicle's scan tool shows the transmission control module receiving a valid vehicle speed signal. However, the cruise control system will not engage — pressing the set button produces no response. The brake switch and clutch switch test correctly. The scan tool shows the cruise control enable input is "OFF." What should the technician check?

A. The cruise control on/off master switch — the enable input showing "OFF" on the scan tool indicates the main cruise control power switch has not been activated by the driver, or the switch has failed, or the wire between the switch and the cruise enable input has an open

B. The vehicle speed sensor for a signal quality issue that the cruise module rejects but the TCM accepts

C. The steering column clock spring for an open on the cruise control switch circuit

D. The ECM firmware for a cruise control calibration error that sets the enable threshold incorrectly

48. A truck's left rear marker light works normally, but when the trailer is connected, the left rear marker light on the tractor goes out while the trailer's left markers illuminate normally. Disconnecting the trailer restores the tractor's left rear marker. What is the most likely cause?

A. The trailer marker circuit draws all available current from the shared left marker feed, starving the tractor marker

B. A faulty J560 connector that creates a backfeed path pulling the tractor's marker voltage to ground through the trailer circuit

C. A high-resistance tractor-side ground connection for the left rear marker that cannot handle the combined current of both the tractor and trailer markers — the added trailer current creates enough ground-side voltage drop to extinguish the tractor marker while the trailer markers use a separate ground path through the J560 ground pin

D. A body controller module that reduces tractor marker output when trailer load is detected

49. A heavy-duty truck's scan tool retrieves a DTC from the ECM indicating "Boost Pressure Sensor — Signal Stuck." The sensor reads a constant 1.5 volts regardless of engine load. Normal boost pressure signal should vary between 1.0 and 4.0 volts depending on operating conditions. What does "signal stuck" mean?

A. The sensor has an intermittent connection that occasionally freezes at its last valid reading

B. The ECM has detected that the boost pressure signal remains at a fixed voltage and does not change in response to operating conditions that should cause it to vary — this indicates the sensor has failed with a fixed output, the signal wire is shorted to a voltage source that holds it at 1.5 volts, or the sensor's internal element has seized

C. The CAN bus is delivering a frozen data packet for the boost pressure parameter

D. The turbocharger is stuck at a fixed boost level that produces a constant 1.5-volt sensor reading

50. A fleet technician discovers that a group of trucks has a recurring pattern where the right rear tail light housing connector melts and fails approximately every 12 to 18 months. The same failure does not occur on the left side. What should the technician investigate as the root cause?

A. Whether the right-side tail light circuit carries more current than the left due to an additional accessory connected to the right-side feed

B. Whether the alternator produces unbalanced output that delivers more current to the right side of the vehicle

C. Whether the right-side tail light housing is a different part number than the left with a lower-rated connector

D. Whether the right-side connector has a design or installation characteristic that promotes progressive resistance buildup — such as a connector that is more exposed to road spray, positioned closer to an exhaust component, or has a pin design that creates a marginal contact under the steady current of tail light operation, generating heat that eventually melts the housing

PRACTICE EXAM 16: ANSWER KEY

1. B — The ground-side voltage drop of 0.04 volts is nearly perfect, confirming the ground path has negligible resistance. With a healthy ground, the 12.4 volts at the connector means voltage is being lost on the power side between the battery and the headlight connector. The technician should perform a voltage drop test along the power feed path — fuse, relay contacts, switch contacts, and wiring connections — to locate the source of the power-side resistance.

2. D — Battery terminal voltage of 14.1 volts confirms the alternator is producing adequate output at the battery. All three modules reporting low voltage simultaneously means the voltage reaching the fuse panel where they are powered has dropped below their minimum thresholds. Excessive resistance in the main power distribution path between the battery and the fuse panel — corroded connections, a high-resistance fusible link, or a deteriorated battery disconnect switch — produces this fleet-wide module low-voltage pattern.

3. A — The marker light operating at full brightness alone but dimming when the headlights are added indicates current interaction through a shared circuit element. When both circuits draw current through the same power feed wire or ground path, the total combined current creates a voltage drop across the shared resistance. The marker light receives less voltage during the combined operation, dimming proportionally until the headlights are turned off.

4. C — The grinding occurring during disengagement — not during cranking — indicates the pinion gear is not retracting quickly enough after the key is released and the engine fires. The spinning flywheel contacts the still-meshed pinion, producing the metallic grinding. A weak solenoid return spring or a binding shift fork on the replacement starter delays the pinion retraction, keeping it in the flywheel's path for approximately one second.

5. B — Both technicians are correct. Technician A accurately describes the temperature correction formula: add 0.004 per 10°F above 80°F and subtract 0.004 per 10°F below 80°F. Technician B correctly identifies the practical consequence — electrolyte becomes denser in cold temperatures, producing a higher hydrometer reading that does not reflect a proportionally higher state of charge. Without correction, cold-weather readings overestimate the battery's actual charge level.

6. A — A short-to-ground on the wire between the oil pressure sending unit and the cluster bypasses the sending unit's variable resistance entirely. The gauge sees a direct ground path — equivalent to the sending unit at minimum resistance — which on most gauge circuits drives the needle to maximum. The gauge reads pegged high with the engine off because the short provides a constant ground path regardless of actual oil pressure.

7. D — The trailer ABS module communicating on the bus with no faults eliminates the module itself and the data bus as causes. On many commercial vehicles, the trailer ABS warning light is controlled

by a separate hardwired circuit through the J560 connector — not by the data bus. A fault in this dedicated warning light signal wire, a loss of power on the blue wire, or a wiring fault in the tractor's warning light circuit keeps the light illuminated independently of the module's bus status.

8. C — The original resistor block failure caused some speed losses. The replacement restored medium and high speed but low speed remains inoperative, indicating a second fault exists on the low-speed circuit. The switch's low-speed contact may have failed independently, or the wire between the switch's low-speed terminal and the resistor block's low-speed input may have an open. The original resistor block failure masked this second fault because it also prevented low-speed operation.

9. A — Batteries that pass a load test at warm shop temperatures may not have adequate cold cranking amp capacity for the engine's requirements at the lowest ambient temperatures the fleet encounters. CCA capacity decreases as temperature drops — a battery rated at 900 CCA at 0°F delivers significantly less at -20°F. The fleet should verify battery CCA ratings match or exceed the engine manufacturer's cold-cranking requirements for the coldest expected operating conditions.

10. B — The wiggle test at the housing reproducing the flicker identifies the housing-to-vehicle interface as the fault location. A loose or poorly secured light assembly allows the housing to shift during road vibration, momentarily interrupting the electrical connection. This can occur at the socket-to-bulb contact, at the housing ground-to-body junction, or at the connector that joins the housing to the vehicle harness.

11. D — The alternator produces correct voltage and amperage during shop testing, and the parasitic draw is normal, eliminating those as causes. The batteries being weaker the next morning after extended nighttime driving suggests the alternator cannot fully recharge the batteries during the driving shift. The combined nighttime load — headlights, markers, clearance lights, cluster, and other accessories — may exceed the alternator's sustained output capacity, gradually depleting battery reserves.

12. A — "Short to battery" means the clearance light wire has contacted an always-hot power source somewhere in the harness — a battery-direct wire or an unfused constant feed. This provides voltage to the bulb independent of the BCM output or headlight switch. The light stays on at all times because it receives continuous battery voltage through the damaged insulation contact point, bypassing the entire normal control circuit.

13. C — The set, coast, and cancel functions all working proves the ECM or cruise module receives and processes steering wheel switch inputs, and the throttle control system responds to cruise commands. The resume function alone failing isolates the fault to the resume button's contact, its dedicated wire to the module input, or the module's resume input circuit. A failed switch contact or an open wire on that specific function prevents the resume command from reaching the module.

14. B — The motor drawing identical current in both directions eliminates electrical faults as the cause. The window moving slowly upward but normally downward indicates the mechanical resistance is directional. Upward travel requires the motor to lift the glass weight against gravity while

simultaneously overcoming friction from a binding channel, deteriorated weatherstrip, or worn regulator. Downward travel is gravity-assisted, reducing the net resistance the motor must overcome.

15. D — A 60-ohm reading with ignition off confirms both termination resistors are properly connected. A 5-ohm drop to 55 ohms with ignition on indicates an additional parallel resistance path has appeared on the bus when modules power up. While a very small change can occur normally, a 5-ohm decrease warrants investigation — a module's bus transceiver presenting abnormally low impedance when powered adds enough parallel resistance to pull the total measurably below the expected 60 ohms.

16. A — The MAP sensor reading 1.2 volts at idle on a naturally aspirated engine falls squarely within the specified 1.0 to 1.5 volt range. This confirms the sensor is accurately reading intake manifold vacuum under normal idle conditions. The engine running normally with no driveability concerns further validates that the sensor, its wiring, and the ECM's response to the data are all functioning correctly.

17. C — Both sides share the same fuse and headlight switch output, so the power source and switch are delivering equal voltage to the point where the left and right circuits separate. The 1.9-volt difference between the left side (10.2V) and the right side (12.1V) means the left-side dedicated circuit has excessive resistance after the split point — in its power feed wire, a splice, a connector, or its ground return path — dropping 1.9 volts before reaching the left-side fixtures.

18. B — A current draw of 240 amps exceeding the 200-amp specification by 20% indicates the starter is working harder than designed. Even though the engine starts normally, the elevated draw may result from incorrect shimming that affects pinion-to-ring gear mesh depth, a manufacturing defect in the replacement unit, or a mounting issue creating excessive mechanical drag. The cause should be identified before the excess current leads to premature failure.

19. D — The scan tool confirms the ECM reports 75°F — consistent with a cold engine. The cluster displaying a rapidly rising temperature contradicts the bus data. On some commercial vehicles, the temperature gauge receives data from a separate analog sending unit wired directly to the cluster, not from the J1939 bus. This dedicated sending unit has failed with low resistance, driving the analog gauge to the hot reading independently of the ECM's correct bus data.

20. C — Many commercial vehicles include a programmed automatic lock or unlock function triggered by the ignition key transition. This is a factory convenience or security feature designed into the body controller module's software. The BCM detects the ignition-on event and executes the programmed lock cycle. This behavior is consistent and repeatable because it is designed into the module's operating logic.

21. A — Both technicians are correct. The standard charging voltage range for a properly functioning alternator is 13.5 to 14.5 volts at the battery terminals with the engine running. Voltage below 13.5 volts indicates the alternator cannot overcome the battery's resting voltage sufficiently to force charging current into the batteries, resulting in chronic undercharging and eventual battery depletion.

22. C — The trailer tail lights flashing during initial turn-on then settling to steady operation indicates a connection that is unstable during the initial current surge but stabilizes as the terminal heats and expands. A loose brown wire pin at the J560 connector arcs briefly as current begins flowing, producing the rapid flashing. As the contact heats from the arcing current, thermal expansion tightens the connection and steady current flow resumes.

23. D — The solenoid clicking confirms the plunger moves mechanically. The headlights not dimming proves no heavy cranking current flows. The 12.4-volt reading across the solenoid main terminals is the definitive test — nearly full battery voltage appearing across the main terminals means the internal contact disc is not bridging them. If the contacts were closed, the voltage across them would drop to near zero as current flowed through to the motor.

24. B — The reference voltage and ground are both within specification, eliminating the ECM's supply circuits. The signal voltage of 0.1 volts at the fully released position is below the normal 0.5 to 0.8 volt minimum. Either the sensor element has a partial internal short pulling the signal voltage lower than its designed minimum output, or the signal wire has a high-resistance ground fault diverting signal current to ground before it reaches the ECM input pin.

25. A — The headlight housing is undamaged and the bulb is the correct part number, but the beam pattern is distorted with an off-center hot spot. A replacement bulb that is not fully seated or whose alignment tabs are not properly engaged with the housing's locating slots positions the filament off the reflector's designed focal point. Even a millimeter of filament displacement produces a noticeable beam pattern distortion.

26. D — The charging system produces 14.2 volts — within specification. The batteries reading 12.58 volts at the end of a full driving day indicates they are not reaching full charge (12.65V+) during the available drive time. If the truck's total electrical load — including all daytime accessories — consumes most of the alternator's output capacity, insufficient reserve remains to fully recharge the batteries during each driving cycle.

27. B — A "replace TCM" code that does not return after a power cycle may have been triggered by a transient event — a momentary voltage spike, a brief communication interruption, or a one-time processor error. Immediately replacing an expensive module based on a non-recurring code is premature. The correct approach is clearing the code, documenting it, and monitoring for recurrence while investigating potential root causes such as power supply stability.

28. C — The BCM output pin measuring 0 volts when commanded off confirms the module is correctly turning off its output. The dome light still glowing at 25% brightness despite no BCM output means power is reaching the light through an alternate path. A backfeed from another circuit, a short-to-power in the dome light wiring, or a faulty door switch providing an alternate ground-side path allows current to flow to the bulb independently of the BCM.

29. A — Technician A is correct. Even with the negative cable disconnected from one battery, the positive cable remains connected to the vehicle's entire positive distribution system. In a multi-battery parallel

bank, the other batteries still have their negative cables connected to the frame. If a wrench bridges between any positive-side component and the frame, current flows from the remaining connected batteries through the short — creating a dangerous arc and potential fire.

30. D — All electrical output specifications — voltage, amperage, and AC ripple — testing within normal range eliminates electrical faults as the noise source. A rhythmic ticking that tracks with RPM from inside the alternator is characteristic of a mechanical bearing defect. A damaged ball or roller in the bearing contacts a pit or spall in the race once per revolution, producing a click at a frequency that increases proportionally with engine RPM.

31. C — The scan tool confirms the BCM's software is commanding the left headlight output on, but 0 volts at the output pin means no voltage is being delivered. The software command is correct but the hardware cannot execute it. The BCM's internal output driver transistor for the left headlight channel has failed open — it processes the command but cannot physically deliver voltage to the pin. The module needs replacement or repair.

32. D — The driver master switch controlling all doors including the passenger door proves the actuator, fuse, and main control circuit are functional. The passenger switch failing while the master switch works isolates the fault to the passenger switch itself, the wiring between the passenger switch and the BCM or lock relay, or a connector at the passenger door. The master switch uses a separate input path that bypasses the passenger switch entirely.

33. B — A properly functioning battery maintains relatively stable voltage throughout a 15-second load test. The declining voltage from 10.1 volts at 8 seconds to 9.4 volts at 15 seconds indicates the battery's plates cannot sustain the electrochemical reaction under heavy current demand. The final reading of 9.4 volts falls below the 9.6-volt minimum threshold at 70°F, confirming the battery has failed the load test and must be replaced.

34. A — The scan tool showing the TPS signal responding immediately to pedal movement confirms the sensor and wiring are functioning correctly — the ECM receives the throttle command without delay. The two-second hesitation before engine response indicates the ECM is not immediately acting on the valid signal. A throttle position relearn or calibration procedure teaches the ECM the new pedal's idle point and full-travel voltage range, eliminating the hesitation.

35. C — Both bulbs are identical and were installed at the same time, eliminating bulb differences. The right headlight producing a proper beam pattern with a defined cutoff proves the headlight technology is capable of producing correct output. The left headlight scattering light without a defined cutoff indicates its reflector surface has been damaged — by internal moisture accumulation, oxidation, or chemical degradation — destroying the precise geometry needed to focus light into a controlled beam.

36. B — Both technicians are correct. An oscilloscope displays the alternator's output waveform in real time, showing individual rectifier diode contributions to the combined DC output. A failing diode produces a distinctive missing or reduced pulse in the waveform that the oscilloscope displays clearly.

A DMM AC ripple test only provides a single voltage reading that indicates whether total ripple exceeds the threshold — it cannot identify which specific diode has failed.

37. D — The blower motor testing within specification eliminates excessive motor current as the cause. The low-speed resistor element operates at the highest resistance and dissipates the most heat of any setting. Resistor blocks are specifically designed to be cooled by the HVAC airflow passing over them. A clogged cabin filter, collapsed duct, or blocked evaporator reduces this cooling airflow, allowing the low-speed element to overheat and burn open repeatedly.

38. A — The relay circuit is verified fully functional: coil energized (clicks), contacts closed (12.1 volts at output). Power is being delivered to the heater element's power terminal. The heater not warming despite receiving voltage means no current is flowing — the heater element has an internal open. An infinite-resistance break in the element prevents any current from passing through, so no heat is generated despite all upstream components functioning correctly.

39. C — Both headlights sharing a high-resistance ground creates a current interaction where each headlight's return current affects the other. As the left headlight draws current through the shared ground, the voltage drop increases, reducing voltage available to the left headlight while momentarily improving conditions for the right. The system oscillates because each side's changing current draw continuously alters the ground-side voltage for the other, creating the alternating dim/bright pattern.

40. B — The sensor has already been replaced and the code returns, eliminating the sensor itself. A "signal frequency error" means the ABS module receives a signal but the frequency does not match what it expects based on wheel rotation speed. The reluctor ring generates the frequency — if the ring has slipped on the hub, lost a tooth, cracked, or accumulated magnetic debris, it produces an incorrect frequency pattern that the module detects regardless of sensor condition.

41. B — The engine brake system uses an exhaust butterfly valve that closes to create backpressure during deceleration. When the driver accelerates and the engine brake disengages, the exhaust brake valve should open fully to allow unrestricted exhaust flow. If the valve sticks momentarily in the closed or partially closed position, the engine's positive exhaust pressure surges against the restriction and creates the loud bark as the exhaust rushes past the releasing valve.

42. D — Normal tensioner behavior involves minor vibration absorbed internally by the dampener mechanism — the arm should appear steady to the naked eye. Visible oscillation of the tensioner arm at idle indicates the internal dampener has failed or the spring has weakened. Without effective dampening, the arm bounces in response to the normal belt vibration caused by engine firing pulses rather than absorbing that energy smoothly.

43. A — The motor bench-testing successfully and running (buzzing) during installation confirms the motor is electrically functional. The window stopping at a specific point while the motor stalls against resistance indicates a mechanical obstruction in the regulator mechanism at that position in the travel. A damaged regulator arm, a bent track, a broken cable guide, or a foreign object creates a hard stop that the motor cannot overcome.

44. C — Fuel rail pressure of 28,000 PSI falls within the specified 25,000 to 30,000 PSI range for highway cruise conditions. The ECM commands fuel rail pressure based on current engine load, speed, and temperature conditions — pressure varies within the specification range as conditions change. The engine running normally with no driveability concerns confirms the fuel system is delivering the correct pressure for the current operating conditions.

45. B — The consistent 20-minute shutoff with ignition-cycle reset behavior is characteristic of a programmed BCM timer function. Many commercial vehicles limit heated mirror operation to a fixed duration — typically 15 to 30 minutes — to prevent overheating the mirror elements and to manage electrical load. The BCM requires an ignition power cycle to reset its internal timer before the heated mirror output can be commanded on again.

46. D — The relay clicking confirms the coil energizes. The test light illuminating at the S terminal proves voltage reaches the solenoid. However, a test light draws milliamps while a solenoid pull-in winding demands several amps. The test light illuminating confirms voltage is present but does not confirm adequate current delivery. The solenoid coil may be open, or the solenoid ground path may be broken — either condition prevents the heavy coil current needed for plunger engagement.

47. A — The cruise control enable input showing "OFF" on the scan tool is the diagnostic key. This input reflects the state of the cruise control master on/off switch. If the master switch has not been turned on, has failed, or its wire has an open, the ECM will not accept any cruise commands regardless of the set, resume, or coast buttons being pressed. Verifying the master switch and its circuit resolves the enable input status.

48. C — The tractor's left rear marker working alone but going out when the trailer is connected indicates the added trailer current through the shared ground exceeds the ground connection's capacity. A high-resistance tractor-side ground for the left rear marker cannot handle the combined current of both tractor and trailer markers. The increased ground-side voltage drop extinguishes the tractor's lower-current marker while the trailer markers use the J560 ground pin as a separate return path.

49. B — "Signal stuck" means the ECM has detected that the boost pressure sensor's output remains at a fixed 1.5 volts and does not change in response to varying engine load conditions that should produce pressure changes. A functioning sensor should vary its output between 1.0 and 4.0 volts as boost pressure changes during acceleration, deceleration, and varying load. The fixed reading indicates the sensor has failed, the signal wire is shorted to a fixed voltage source, or the sensor's internal element has seized.

50. D — The same failure occurring consistently on the right side across multiple trucks while the left side is unaffected points to a design, location, or installation characteristic unique to the right side. A connector more exposed to road spray, positioned closer to an exhaust component, or with a pin design that creates marginal contact under sustained tail light current would progressively build resistance. The $P = I^2R$ heat generation at the contact point eventually melts the connector housing.